

Detailed Tabulation of Atomic Form Factors, Photoelectric Absorption and Scattering Cross Section, and Mass Attenuation Coefficients in the Vicinity of Absorption Edges in the Soft X-Ray ($Z=30-36$, $Z=60-89$, $E=0.1$ keV–10 keV), Addressing Convergence Issues of Earlier Work

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C. T. Chantler^{a)}

School of Physics, University of Melbourne, Victoria 3010, Australia

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Reliable knowledge of the complex x-ray form factor [$\text{Re}(f)$ and f''] and the photoelectric attenuation coefficient (σ_{PE}) is required for crystallography, medical diagnosis, radiation safety, and XAFS studies. Discrepancies between currently used theoretical approaches of 200% exist for numerous elements from 1 to 3 keV x-ray energies. The key discrepancies are due to the smoothing of edge structure, the use of nonrelativistic wave functions, and the lack of appropriate convergence of wave functions. This paper addresses these key discrepancies and derives new theoretical results of substantially higher accuracy in near-edge soft x-ray regions. The high-energy limitations of the current approach are also illustrated. The energy range covered is 0.1 to 10 keV. The associated figures and tabulation demonstrate the current comparison with alternate theory and with available experimental data. In general, experimental data are not sufficiently accurate to establish the errors and inadequacies of theory at this level. However, the best experimental data and the observed experimental structure as a function of energy are strong indicators of the validity of the current approach. New developments in experimental measurement hold great promise in making critical comparisons with theory in the near future. © 2001 American Institute of Physics. [S0047-2689(00)00604-8]

Key words: anomalous dispersion; atomic photoeffect; attenuation coefficients; cross sections; form factors; photons; scattering factors; x-ray.

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^{a)}Electronic mail: chantler@physics.unimelb.edu.au
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1. Introduction and Importance of Form Factors

The complex form factor f is the fundamental parameter for all optical devices. It specifies refractive indices, permittivities, scattering and attenuation coefficients, and hence the critical properties for mirrors, lenses, filters and coatings. At higher (x-ray) photon energies, the form factor becomes accessible to theoretical prediction on the basis of atomic physics and the atomic form factor.¹

In the x-ray energy range covered herein, the primary interactions of photons with atoms are photoabsorption and coherent (elastic) scattering. Inelastic (Compton) scattering becomes dominant for all elements as the higher γ -ray energies are approached. For light elements, this transfer of dominance occurs at much lower energies (for hydrogen the inelastic component dominates above 3–5 keV). Additional nuclear scattering and absorption occurs above MeV energies, including pair production and Delbrück scattering from the nuclear field; and nuclear resonant processes (such as nuclear Thomson scattering).² For XUV photons below the energy range of this paper, lattice phonon absorption, delocalized plasmon excitation, excitons, and dipole resonances may appear.³ Although these remain qualitatively identifiable as photon interactions with bound electrons, it is misleading

to attempt to identify them with atomic orbitals or isolated atoms.

In the intermediate energy range, typically from 0.01–0.1 keV through to 80–800 keV, the interaction of the incident photon with the electrons—i.e., with the bound atomic orbitals—without production of secondary x-rays of reduced energy, is the dominant process. The photon is then either scattered without altering the internal energy of the atom, or it is fully absorbed. This absorption is usually into a single atomic orbital, with a consequent ejection of a photoelectron and production of a singly ionized species.

Photoabsorption and (Rayleigh) scattering are both described by the structure factor F of the material in condensed or gas phase. Diffracted intensity or coherent scattering is a complicated function of F , but for weak reflections is linear or quadratic in F . Equally, transmission through a bulk material is a complex function of F but local attenuation is a relatively simple function of the imaginary component of F .^{4,5}

This is well-known in the crystallographic community and is used extensively in the multilayer community at lower energies.^{6–8} The structure factor for a given reflection (denoted hkl from the Miller indices) is a sum over the atoms in the appropriate lattice (for a crystal) of the atomic form factors or the x-ray scattering factors f_j of the j^{th} atom:

$$F(hkl) = \sum_j f_j e^{-M_j} e^{2\pi i(hx_j + ky_j + lz_j)}, (\text{TDS} = 0), \quad (1)$$

where thermal diffuse scattering [TDS, Eq. (17), discussed below] is neglected, M_j is the thermal parameter for the given temperature, reflection and atom, and the location of the atom in the unit cell is given by (x_j, y_j, z_j) . For an isolated atom or a single elemental lattice, a scaled atomic form factor may therefore be substituted for the structure factor.

At grazing angles of incidence with solids, photons interact with the surface, and the photoabsorption and reflection processes may be given by Fresnel equations (while still dominated by electron orbital interaction and governed by the structure factor and form factors).⁹

If the atoms in a condensed system may be considered to scatter as dipoles (i.e., for low energies or small scattering angles), then the interaction of x-rays with matter may be described using optical constants such as the complex index of refraction n_r or the complex dielectric constant $\varepsilon(E)$. These are related to the form factors by

$$n_r = n + ik = \sqrt{\varepsilon} = 1 - \delta - i\beta = 1 - \frac{r_e}{2\pi} \lambda^2 \sum_j n_j f_j, \quad (2)$$

where n_j is the atom number density and r_e is the classical electron radius.

2. Form Factors and Standard Definitions

The (x-ray) atomic form factor f is the resonant scattering amplitude of x-rays by charge (primarily electron) density.

Using standard conventions in the x-ray regime, we also consider the imaginary and real components of the form factor separately, and separate three contributions to the real component. The real component $\text{Re}(f)$ is composed of: the “normal” coherent scattering factor f_0 , depending upon the photon angle of scattering θ via the momentum transfer

$$q = |\mathbf{K} - \mathbf{K}'| = 4\pi \sin(\theta/2)/\lambda \quad (3)$$

with λ in, e.g., Ångströms; the “anomalous” scattering factor f' (depending on x-ray energy E and the atomic number Z); and the small nuclear Thomson term f_{NT} .^{10,11} f' can also be expressed in terms of a small relativistic correction term f_{rel} , Z and the function f_1 often used to characterize these form factors:

$$\text{Re}(f) = f_0 + f' + f_{\text{NT}}, f' = f_1 + f_{\text{rel}} - Z, \quad (4)$$

$$f_0(q, Z) = 4\pi \int_0^\infty \frac{\rho(r) \sin(qr) r^2 dr}{qr}. \quad (5)$$

The angular factor f_0 is identical to the values $f(q)$ or $F(x, Z)$ given in Hubbell *et al.*,¹² Hubbell and Øverbø,¹³ and Schaupp *et al.*¹⁴ and use q instead of x , with $x = q/4\pi$.^{12–14}

$$f'(E, Z) = f'(\infty) - \frac{2}{\pi} P \int_0^\infty \frac{\varepsilon' f''(\varepsilon')}{E^2 - (\varepsilon')^2} d\varepsilon'. \quad (6)$$

The imaginary component $\text{Im}(f) = f''$ is directly related to the atomic photoabsorption cross-section given as τ_{PE} or σ_{PE} in different references:

$$\text{Im}(f) = f''(E) = f_2(E) = \frac{E \sigma_{\text{PE}}(E)}{2hc r_e}. \quad (7)$$

The fundamental constants and conversion factors are given by Cohen and Taylor.¹⁵ Conventionally, the total interaction cross-section σ_{tot} is represented as a sum over the individual photon interaction cross-sections:

$$\sigma_{\text{tot}} = \sigma_{\text{coh}} + \sigma_{\text{incoh}} + \tau_{\text{PE}} + \kappa_n + \kappa_e + \sigma_{\text{p.n.}} \quad (8)$$

These cross-sections are conventionally given in barns/atom. The total cross-section is directly related to the linear attenuation coefficient (μ) in cm^{-1} and the mass attenuation coefficient in cm^2/g . The mass attenuation coefficient is conventionally given by the symbol $[\mu/\rho] = \sigma/uA$, where σ is the cross-section in barns/atom, u is the atomic mass unit, and A is the relative atomic mass of the target element. Coefficients for converting between these units are given by many authors (see the table header in Sec. 12).¹⁵

This paper develops the approach covered in Chantler¹⁵ and makes extensive reference to this earlier work, which will therefore be denoted in what follows as C95. Table 1 summarizes the type of use to which this tabulation (and that of C95) may be put. It summarizes the typical equation to use (with reference to column headings in the current tabulation) and gives the author's current personal recommendation of a useful or appropriate reference for additional information or coefficients as might be needed.

3. Concerns With Standard Conventions

3.1. Coherence of Cross-Sections

In Eq. (8), σ_{coh} is the cross-section for “coherent” or Rayleigh scattering. This is not always coherent—the complex Rayleigh amplitude for adjacent atoms may add in phase or may add with random relative phase. This component represents the elastic scattering contribution to the interaction coefficient. It relates directly to the structure factor F . The structure factor depends on the material under observation and the crystallographic arrangement of atoms, and hence on both the real and imaginary components of the atomic form factor. For an isolated atom or elemental metal, the total elastic scattering of a material is dominated by the real component of the atomic form factor $\text{Re}(f)$.

The “incoherent” or “Compton” cross-section σ_{incoh} is likewise not always incoherent, but represents the inelastic scattering contribution to the total interaction coefficient. This also depends upon the atomic form factor. The atomic photoabsorption cross-section τ_{PE} or σ_{PE} is directly related to the imaginary component of the form factor.

3.2. Simple Addition of Cross-Sections

Simple addition of cross-sections from scattering and photoabsorption depends on the relative phases of scattered waves being incoherent, and may in some cases be quite inappropriate. In general, the amplitudes should be summed including any relative phases. However, the simple summation of the cross-sections represents a common and often very good approximation.

3.3. Contributions of High-Energy Terms in the Medium-Energy X-Ray Regime

The remaining terms in Eq. (8) represent large contributions only for MeV energies and above, and as such are not the concern of the current discussion. They represent the pair production cross-section in the nuclear field (κ_n), the pair production cross-section in the atomic electron field (or triplet cross-section, κ_e), and the photonuclear cross-section $\sigma_{\text{p.n.}}$. An excellent review of these cross-sections is given elsewhere.² Below MeV energies all interaction coefficients depend directly and implicitly upon the real and imaginary components of the atomic form factor. The graphs below depict the mass attenuation coefficients and the values of the form factors themselves, since it is critical to present not only quantities in use but also the fundamental parameters underlying the used quantities.

3.4. Dependence of f' and f'' on Angle

There have been concerns regarding a possible angular dependence (or scattering vector dependence) of the anomalous dispersion (i.e., energy-dependent) components f' and f'' of the form factor [Eqs. (4) and (7)]. The current status of this query is well represented by Creagh and McAuley, who summarize that there is no dependence of either quantity

TABLE 1. Summary of particular uses of these tables (this work and Chantler¹⁵)

| | | |
|--|-------|---|
| Form factors for forward scattering | §8.1 | Direct use or interpolation, with Eq. (4) |
| Form factors for significant momentum transfers | §8.2 | Eqs. (4) and (5) or Refs. 13, 14, 28, or 59 |
| Calculation of structure factors | §8.3 | As §8.2, but also Eq. (1) |
| Refractive indices | §8.3 | As §8.2, but also Eq. (2) |
| Crystallography (diffraction) | §8.4 | As §8.3, but also see text for references |
| Multilayer reflectivity, transmission | §8.4 | As §8.2 and 3, but also see text for references |
| Electron density studies | §8.5 | As §8.3, but also Eq. (11) |
| Sum rules | §8.6 | As §8.2, but also see text for references |
| Computation of scattering processes | §8.7 | As §8.2, but also Eqs. (12), (14), (1), (16), (17), and (18), and (limited) Eqs. (13) and (15) (see text) |
| Photoelectric cross-sections, linear absorption coefficient, or mass absorption coefficients | §8.8 | Direct use or interpolation, with conversion as given in table headers as needed |
| X-ray attenuation [medical imaging, transmission studies] | §8.8 | Direct use of total mass attenuation coefficient for Raleigh scattering |
| X-ray attenuation studies with alternate scattering estimates | §8.8 | Direct use of mass absorption coefficient, with Eq. (19) and possibly Refs. 2, 13, and 27 |
| X-ray attenuation of crystalline samples | §8.8 | Direct use of mass absorption coefficient, with Eq. (19) and §8.7 |
| Angle-dependent scattering processes | §8.8 | Not applicable in general—see text |
| High-energy attenuation, above 100 keV | §8.9 | Direct use of mass absorption coefficient, with Eqs. (19) and (8) and possibly Refs. 2, 12, 13, and 27 |
| High-energy (γ -ray) attenuation, above 1 MeV | §8.9 | See Refs. 12 and 13 |
| VUV studies | §8.10 | Directly, but with caveats and see also Ref. 32 |
| K-shell studies and fluorescence yields | §8.11 | Directly, but see text |
| Electron scattering | §8.14 | Eq. (21), and see text |

upon scattering vector.¹⁶ Hence all angular dependence of the form factor for an isolated atom is contained in f_0 .

The justification for the separability of the angular and energy-dependent components as given in Eq. (4), is a related issue. If the two dependencies upon angle (in f_0) and energy (in f') are truly independent, then the components are clearly separable. However, it has been argued that this separation may not be valid for large energies and large momentum scattering vectors.¹⁷

Because of this, some authors define a modified form factor MFF (g) and anomalous scattering factors (g' and g'').¹⁴ This formalism appears useful for MeV energies, but not relevant for the current discussion (the differences for even up to 500 keV energies are unobservable).¹⁸

3.5. S-Matrix and General Formalisms

Recent S -matrix computations have predicted new structure in angular dependence of Rayleigh scattering.^{17–19} A recent report and review for incoherent scattering factors has summarized much important information in this area.²⁰ There is no doubt that higher order corrections, particularly relating to the relativistic correction factor, are important and observable in principle. However, it is often not realized that the relativistic formulations of Cromer and Liberman^{21–24} (and most derivations since) are based on the following S -matrix (*scattering matrix*) equations for the superposition of the final states f (including ionized atoms, excited states, and elastic and inelastic scattered states) in a transition from the initial state i :

$$|\psi\rangle = \sum_f |f\rangle \langle f| S |i\rangle, \quad (9)$$

$$S_{fi} = \delta_{fi} + 2\pi i \delta(E_f - E_i) T_{fi}. \quad (10)$$

The scattering amplitudes T_{fi} in general are complex.^{25,26} Most investigations have been restricted to coherent, forward scattering, and where changes in photon polarization do not occur.

All general theories make the isolated atom approximation and the independent particle approximation (IPA). Any variation between computations based on these theories are due to other limitations, not to the use of isolated atom or IPA. Experimental work relating to solids with very different near-edge structure from isolated atoms may be unable to be compared directly to these theoretical results. This can be used to investigate the redistribution of electron density in the formation of bonding in the solids, and can lead to improved XAFS calibration (see Sec. 8.15). In some cases, this gives significant variation between one experiment and another. The comparison of different theoretical and computational schemes within these assumptions is unaffected by these solid state effects; and the conclusions below are largely independent of these concerns.

These approximations are usually combined with the electric dipole approximation to yield final computable results. In this sense all computations have made the same broad approximations. As seen below, most limitations in Chantler,¹⁶ Scofield,²⁷ and Saloman and Hubbell,²⁸ can be attributed to convergence problems rather than to higher-order corrections.

4. Reliability of Experimental and Theoretical Results

This paper addresses a key theoretical issue behind this dilemma, focusing on the soft x-ray near-edge region. We derive new results based on the formalism of C95. We primarily compare our new theoretical results to those of C95 and Refs. 27 and 29, because of the detailed and extensive discussion of these references over the last few years. A moderately detailed discussion of databases of Henke *et al.*, Cromer and Liberman,²⁴ and Brennan and Cowan²⁸ has been made earlier in comparison to C95.^{1,30}

The primary experimental references for comparison in this paper will be Henke *et al.*^{31,32} and those contained in Saloman, Hubbell, and Scofield.³³ Compilations of experimental data for photoabsorption and total cross-sections are widespread,³³ particularly for common elements over the central x-ray energies. These are useful in evaluating the reliability of a particular measurement, or the difficulty of an experiment in a given energy regime. The range of the imaginary coefficient in such compilations often varies by 10%–30%. This implies, in general, that claimed experimental accuracies of 1%–2% are not reliable. The effect of a

10% error is equivalent to a 10% error in the thickness of the sample, or a 10% error in the exponent of the probability of photoabsorption through a sample.

The second primary source for an experimental best-fit line is given by the Center for X-Ray Optics, Lawrence Berkeley Laboratory.^{31,32} A recent successor in this series is presented by Cullen, Hubbell, and Kissel,³⁴ but we do not discuss it further in the current context. These references present experimental–theoretical syntheses for the complex form factor in the softer x-ray regime. As a weighted evaluation of experimental data, they are extremely useful. However, no variance or error bar is associated with this single fit, and in soft x-ray regimes, near-edge regimes, and other areas the result may be in sharp discrepancy with theory and expected results, or with the best available data. Observed deviations lie at the same 10%–30% level as the deviations of less critical compilations.

For medical and diagnostic applications, reliance on either theory or idealized “narrow beam” experiment is dangerous: an “ideal” procedure is to measure relative fluxes of energy distributions *in situ*, with and without filters, in “broad beam” geometry, as they would be used in practice. This then ignores the relative significance of scattering, absorption, harmonic contamination, and divergence effects, and yields a purely empirical calibration subject to the detector calibration itself. The danger of this approach is that lack of subsequent control of flux distribution with angle and energy, and of the orientation and uniformity of filters and optical elements, will lead to arbitrary and potentially severe changes (over time, or between exposures) in administered doses or derived structural distributions.

Given this situation, it is sensible to turn to theoretical computations. One of the most recent and comprehensive theoretical approaches was developed to explicitly eliminate these difficulties (C95). Useful recent general reviews of other theoretical and experimental compilations are given by Hubbell³⁵ and Creagh and McAuley.¹⁶ These also discuss scattering contributions which are not the primary concern of this paper.

Comparing the new theoretical approach with other commonly used theoretical references^{27,29,33} reveals surprising variation and uncertainty in the theory. Many references have been made to Scofield theory in unrenormalized and normalized forms, and we discuss some of the variations between these two results. Scofield presents only atomic photoabsorption cross-sections, τ_{PE} , so this discussion will be limited to the imaginary component of the atomic form factor. The real component will be discussed for comparison to Henke *et al.*³²

It is difficult to accurately assign uncertainty to theoretical results, and the uncertainty varies dramatically across energy ranges for well-defined reasons. A number of authors give useful estimates based on convergence criteria,²⁹ on self-consistency or consistency with experiment,^{4,33} or on a combination of these criteria (C95). A figure of 0.1%–1% is often quoted away from edges and in the medium energy

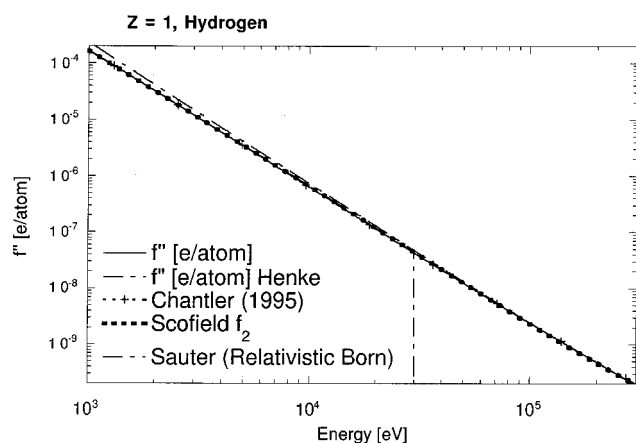


FIG. 1. Imaginary component of the atomic form factor for hydrogen, following a variety of models. Henke *et al.*^{32,33} covers a more restricted energy range, and the Sauter formula (e.g. Ref. 38) only becomes a useful approximation at energies above 40 keV. With these two exceptions, all approaches appear very similar across several decades of energy and form factor. The Chantler result is accurate to within approximately 2% up to 300 keV for an isolated hydrogen atom.

range. This paper highlights and addresses the largest apparent single source of discrepancy currently observed.

5. General Discussion of Recent Issues and a Summary of Earlier Issues

5.1. Hydrogen

C95 uses a simplified approach to give the form factor for hydrogen itself. This is extrapolated to high energies, and it may be noted that at very high energies there is an approximation error for the result even for a single isolated hydrogen atom. The primary purpose of that tabulation (and the current work) is to address the need in crystallographic and synchrotron communities for accurate form factors for structural and other investigations. Hence the primary target lies over the range of x-ray energies. I am grateful to Peter Mohr for raising this issue. Of course, for many investigations the form factor of bonded hydrogen is nonspherical and completely different from that for atomic hydrogen. In these cases a form factor for atomic hydrogen may be used to directly investigate the bonding patterns, and so the tabulated values remain useful. Results may alternatively be obtained for the assumptions of bonded floating sphere hydrogen,³⁶ and/or hydrogen in the H₂ molecule.^{12,37} However, it is worthwhile investigating the actual limitation of C95 across the range of tabulated energies. This is presented in Fig. 1, where a variety of models are given for the hydrogen atomic form factor. The Sauter relativistic Born approximation is actually very poor for x-ray energies, but indicates the asymptotic limit at high energies.³⁸ This functional dependence is not observed in the earlier tabulation, and reference should be made to other sources listed here for energies above 433 keV.

Henke *et al.* (1988) covers a very restricted energy range, and the Sauter formula (e.g., Ref. 38) only becomes a useful

approximation at energies above 80 keV. With these two exceptions, all approaches appear very similar across several decades of energy and form factor. C95 is accurate to within approximately 2% up to 330 keV for an isolated hydrogen atom. The original tabulation presented results by extrapolation to 433 keV, where the relativistic high-energy correction to the simple result has a magnitude of 13%–15%. Although this correction is beginning to be significant at this level, the magnitude of coherent and incoherent scattering dominates by seven orders of magnitude. Other comments regarding the utility of the earlier presentation were given in C95.

5.2. Singularities, Integration Precision, Interpolation

C95 detailed the correct approach to these issues, and discussed particular tabulations where problems of these types have been noted earlier. The main problems are related to the use of a relatively sparse set of values of f_2 as a function of energy, and the use of inappropriate formulas for the determination of the imaginary and real components of f from the atomic orbital wave functions. Both C95 and the current work are free from such problems.

Several approaches have major problems with extrapolation, interpolation, and integration approaches to the determination of $\text{Re}(f)$ and of $\text{Im}(f)$. The work of Creagh and Hubbell⁴ suffers from some generally minor limitations in this regard, and theory reported in Saloman *et al.*³³ is relatively free from these effects. This paper does not relate directly to regions of failure of extrapolation, integration, or interpolation. However, the specific near-edge problems discussed below reveal new limitations that in some cases may be related to problems of extrapolation, depending on the computational approach used.

5.3. Comparison of Recent Tabulations for Helium, Z=2

Helium is a near-perfect system for study. The gas is monatomic so the isolated atom approximation is valid. There are only two electrons, but correlations of the two electron wave functions are large. The independent particle approximation (IPA) can be very good, except for direct correlations of the two motions of the electrons during transitions. Figure 2 indicates that Scofield (unrenormalized)³³ deviates from experiment by generally 3–4 σ in the soft-to-medium x-ray regime, as opposed to C95, who lies within a fraction of deviation from experiment. C95 provided a simple computation of scattering coefficients to complement the more detailed computation of form factors contained therein. The differences between the simple coherent cross-section of C95 and that given in Saloman are significant at the 1.5 σ level in this region.

If coherent scattering follows Bragg-Laue processes (such as for crystals and diffraction peaks) or thermal diffuse scattering approximations (usually for crystals, but with explicit alignment away from Bragg peaks) then the estimates of Chantler or Saloman *et al.* may be inappropriate and the ac-

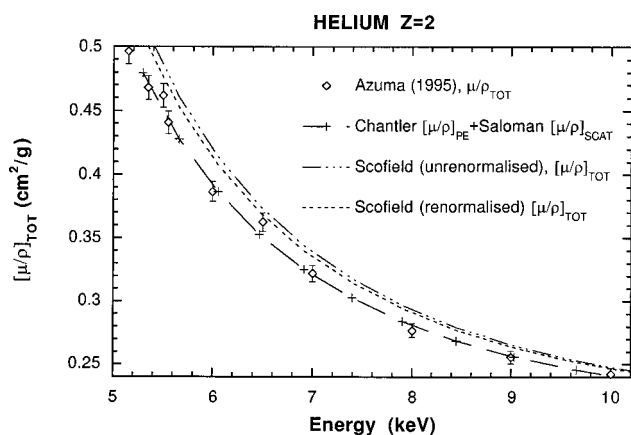


FIG. 2. Attenuation in He. Experimental data from Azuma *et al.* (1995). Chantler (1995) (dash-with-cross) agrees with experiment, as compared to Scofield unrenormalized (dash-dot-dot-dot) or renormalized (short dash, Saloman, Hubbell and Scofield, 1988). Uncertainty in scattering dominates above 11 keV. Scattering component in the dash-with-cross curve is derived from Saloman, Hubbell and Scofield, 1988, in turn from Brown in Hubbell *et al.*, 1975.

tual scattering cross-section may be larger or smaller than that predicted, by an order of magnitude or more. However, for isolated atoms such as helium, or for systems where the Rayleigh scattering approximation is good, the estimates of Hubbell and Øverbø¹³ (and herein) are expected to be good approximations to the experiments.

More detailed evaluation of scattering coefficients is given by Hubbell and Øverbø¹³ (σ_{coh}), and Hubbell *et al.*¹² (σ_{incoh}), tabulated by Saloman *et al.*³⁴ Use of these (generally more accurate) scattering coefficients with the attenuation coefficients of C95 yields very good agreement with the precision experiment of Azuma *et al.*³⁹

The discrepancy shown in Fig. 2 is primarily due to the use by Scofield of Hartree–Slater orbitals, hence omitting certain relativistic corrections. At some level, this limitation would be expected to yield lower accuracy than the self-consistent Dirac–Hartree–Fock approach (Ref. 15 and this work). The general approach for new theoretical work is certainly to use a multi-configurational Dirac–Hartree–Fock approach whenever possible, and this argues for the approach of this work rather than that of Ref. 33. The DHF approach more accurately incorporates relativistic effects that become more significant for higher Z elements.

For $Z=2$ to 54, Scofield provided estimated renormalization factors to convert to values which might be expected from a relativistic Hartree–Fock model. The difference between renormalized and unrenormalized results vary from about 5%–15% or more for lower energies or outer orbitals, so is very significant in the current discussion. There are other differences between Scofield and Chantler beyond simply the Dirac–Hartree–Fock versus Hartree–Slater approach. The exchange potential of the Chantler approach follows that of Cromer and Liberman (1981) and Brennan and Cowan (1992) and is quite distinct from the approximation used by Scofield. On this issue the preferred approach is not clear *a priori*. In the context of helium, application of renor-

malization would improve agreement with experiment, but by only a fraction of a standard deviation, and hence would not resolve the discrepancy. This large and significant discrepancy is several σ , but only about 8%–10% in magnitude. Other discrepancies for higher Z elements show discrepancies many times this value.

Much recent theoretical and experimental work has investigated helium, particularly in the VUV region. These extensive calculations offer improvements in precision, particularly in the energy ranges below 300 eV and above 300 keV, while having similar quoted precision in the central x-ray range. A review has shown consistency of recent detailed calculations by Hino⁴⁰ and Anderson and Burgdörfer⁴¹ with C95 in the region plotted in Fig. 2.⁴² This review also showed the consistency of experimental results of Samson *et al.*⁴³ with Azuma *et al.* and the inconsistency of these results with Henke *et al.*³² and Viegeler *et al.*⁴⁴ Detailed investigations of sum rules by Berkowitz⁴⁵ has supported the approach of C95. Undoubtedly further theoretical and experimental work is needed, particularly for the high energy regions.

5.4. Causes of Uncertainty Near Absorption Edges

The above examples concentrated on regions where alternate theories claim convergence to 0.1% and hence can claim accuracies of 1%. However, the greatest discrepancies between these theories occur near edges, with deviations by factors of 5 or more between alternate results.

The cause of near-edge error in theoretical computations is often due to inadequate interpolation, extrapolation or integration methods, which introduce apparent oscillations or discontinuities into the data.³⁰ The cause of near-edge error in experimental compilations is often due to neglect of the edge region or smoothing through edge structure.³² The cause of near-edge error in specific experiments is often due to the dramatic variation of form factor with energy, requiring both accurate absolute intensity measurement and also precision energy calibration.⁴⁶

Assuming that these issues have been correctly addressed, theory will disagree with experiment near edges by large factors due to XAFS and related structure. This can reach a 200% discrepancy between IPA theory and a solid-state experiment.¹⁶ Even if the experiment is performed on a monoatomic gas, there may be pressure-dependent structure and other strong oscillatory behavior near edges. Some of this structure (shape resonances and Cooper minima) may be qualitatively predicted by some theoretical approaches, but often the detailed experimental result will show significant quantitative discrepancy.⁴⁷

The largest discrepancies between C95 and the Scofield theory are not due to any of these causes. C95 claims uncertainties of up to a factor of two (50%) in soft x-ray near-edge regions. Saloman *et al.*³⁴ refers to 10%–20% discrepancies from experimental data in the medium- Z regime, which may be taken as an uncertainty estimate.

In most elements and regions, the near-edge variation falls

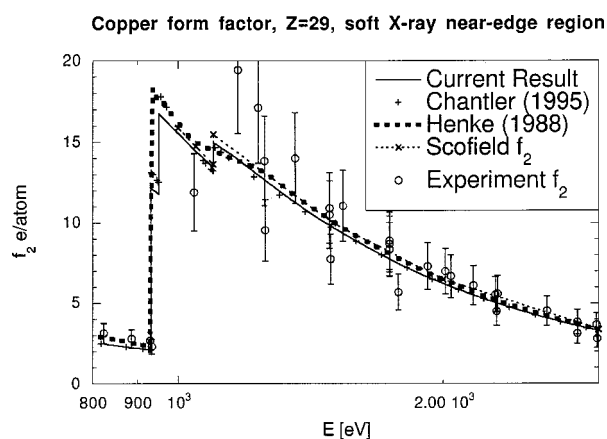


FIG. 3. Attenuation in Cu ($Z=29$), represented by $\text{Im}(f)=f_2$. [μ/ρ] (in cm^2/g) = f_2 (e/atom) $\times 6.62202 \times 10^5$. Experimental data from Saloman, Hubbell and Scofield (1988), Chantler (1995), Scofield theory and even the smoothed structure of Henke (1988) agree within uncertainties of available experiment. In this case, the qualitative near-edge structure is the same for all tabulations, except for the apparent omission of the L_{III} edge in the Henke curve.

within these error bars. This is illustrated for copper in Fig. 3. Such experimental data is not sufficiently precise to distinguish between these two theories, or even to observe edge structure which would diverge from Henke *et al.*^{31,32} Figure 3 indicates the 1 keV lower limit of the range of Saloman *et al.*³³ The current result is slightly modified in the near edge region, but the accuracy here is not improved, the difference between the earlier result of Chantler and the current are within one standard deviation, and we do not present this in the following tabulation. A detailed experimental work claiming 4% accuracy has recently demonstrated good agreement of C95 with experiment and with Creagh and McAuley¹⁶ for copper.⁴⁸

Experimental data have large scatter and large uncertainties compared to the theoretical discrepancies discussed here, and hence cannot distinguish between the alternatives. This is generally true for this near-edge soft x-ray region, and has made comparisons of theory difficult. Figure 3 also plots experimental data plotted for f_2 rather than μ/ρ . This involves a straightforward scaling of attenuation data and subtraction of scattering contributions to attenuation cross-sections. The coherent and incoherent scattering functions contribute a maximum of 1.5% in the region tabulated, and a maximum of 0.2% in the regions near edges. The uncertainty in this subtraction should generally be less than 0.2% and hence will not add to the experimental uncertainty. The experimental references in the figures are taken from the comprehensive database of Chantler.³¹ Reference 49 indicate the range of references used in compiling Fig. 3, as a typical example.

5.5. Isolated Atoms, Independent Particles, and the Formalism

In this work we use the same formalism as described in C95. This also follows the DHF SCF approach of Cromer

and Liberman^{21–24} and uses the Kohn–Sham potential⁵⁰ and experimental energy levels to compute partial photoelectric absorption coefficients using the Brysk–Zerby program⁵⁰ (modified). The modifications introduced are to improve computational precision rather than a change of the formalism. We then use f_2 to compute f_1 using the standard Kramers–Kronig dispersion formula [Eq. (6)].

Hence, we treat each atom as an isolated system, not influenced by any other atoms or particles (this is the isolated atom approximation). Additionally, we determine each wave function including correlation according to the DHF procedure, and allow for the electron–electron interactions via the use of the central field and Kohn–Sham potential. In other words, we use Dirac relativistic wave functions with full antisymmetrization of product wave functions within the DHF method.

We make the assumption of the independent particle approximation so that each electron is considered to move in an effective potential of the nucleus with the average repulsive force of the electrons. This effective screening neglects some correlation and also neglects the fact that the potential for one electron is really not identical to that of a different electron. This assumption is quite general—the only choice is the selection of the form of the central potential.

This may be contrasted with other procedures including, e.g., the use of Hylleraas, MCDF, or configuration interaction wave functions. The most important question is to ask what the consequences of a refined treatment of the wave function might yield, and this is a worthy and valuable issue for the future. Our understanding is that, within the context of the current discussion, such issues affect edge energies dramatically, but do not have a great effect on the issues and results presented in this paper. The computational cost of such approaches generally allows them for investigation of specific energies, or perhaps a specific edge, but otherwise gives a major limitation in developing general solutions for all Z and all energies.

5.6. Convergence

The estimation of the “accuracy” or “precision” of a theoretical work is always difficult. We have investigated several types of consistency which lead us to give the specifications (i.e., estimates) listed in Sec. 9. We have investigated plots similar to Fig. 3 in C95 which lead us to estimate convergence of that kind for f_1 at the 0.2 electron / atom level (away from edges) for uranium, or in general at the 0.2% level. Near edges this increases, and for difficult regions of f_2 , this may lead to an additional offset error in f_1 over a wide energy range (as discussed in detail below).

We have investigated convergence in computational detail of the sort represented by Fig. 4 in C95. This leads us to estimate convergence of that kind for f_2 approaching the 0.4 electron/atom level (away from edges) for uranium, or in general approaching the 1% level for “good” regions “away from edges.” This imprecision has a secondary effect upon the determination of offset errors for f_1 , but, in general, at a

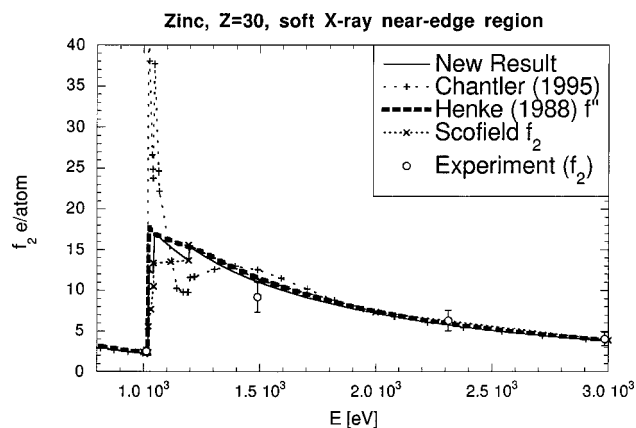


FIG. 4. Attenuation in Zn ($Z=30$), represented by $\text{Im}(f)=f_2$. $[\mu/\rho] \text{ (cm}^2/\text{g)} = f_2 \text{ (e/atom)} \times 6.43627 \times 10^5$. Experimental data from Saloman, Hubbell and Scofield (1988). Chantler (1995), Scofield and Henke (1988) agree with available experiment, but all have large error, as indicated by the 'New Result.'

lower level. We have estimated convergence of the intrinsic wave function itself (related to this), which suggests the values we have indicated. We have noted that convergence of theoretical edge energies is not required nor appropriate using this approach, and we do not do this. We have compared, where possible, our experimental results to a selected set of the best experimental data, and this has so far supported our uncertainty estimates. We have noted further details in C95, including specific caveats for particular regions, which we do not reproduce here. For example, we note in C95 that the result for Rb ($Z=37$) below 0.112 keV is invalid, and that significant imprecision remains (even within the formalism) below 0.2 keV. We also note that solid state effects and correlated electron excitations (phonons, double-electron resonances, etc.) do occur at low energies and are not accounted for in this formalism.

Tseng *et al.*⁵¹ point out that f is rather insensitive to electron correlation effects, at least for the elements $Z=2$ to $Z=6$ for which such effects have been studied by Kim and Inokuti⁵² and by Brown.⁵³ Although the incoherent scattering function may have electron correlation effects of 20%–30% due to inadequacies of the independent particle model or the implementation used for wave functions, such effects on the atomic form factor f were found to be 1% or less. Weiss also confirms this.⁵⁴

6. Uncertainties Near Soft X-Ray L_{II} , L_{III} , M_{IV} , M_V Edges, and the Reason for the New Tabulation

In the region 1–2 keV for particular edges in medium or high- Z elements, enormous discrepancies are observed between the theoretical treatments of C95 and Saloman *et al.*³³ The first occurrence of this effect in C95 is illustrated in Fig. 4 for Zn, $Z=30$. On a log scale the variation is suppressed and may be overlooked; but on this linear scale the enormous peaks and oscillatory behavior of C95 is unmistakable. This

is *not* due to XAFS or any such near edge oscillation. Despite the large magnitude of this discrepancy, experimental results are still generally unable to discriminate between the two theories and Henke.^{31,32}

Relative to appropriate high-energy theory, which would yield well-defined edges and smooth behavior for each orbital on a log–log plot, the results of C95 and Refs. 31, 32, and 33 are all in error. The structure from C95 could be interpreted as a sharp shape resonance, but it is a fictitious one.

This error arises from an accumulation of minor errors in inner shells and the electronic wave function distributions. Particularly for near-edge energies, these errors accumulate, which is a strong reason for the low accuracy claimed by theory in this region. The K shell ($1s$ orbital) and L_I shell ($2s$ orbital) are usually accurately computed, and the form factors for these sub-shells are accurate; but the errors for L_{II} and L_{III} ($2p$) are amplified, and also fall in increasingly difficult soft x-ray energies. Hence the wave function solution for the orbital radial electron density, which leads to the computation of the near-edge form factor, becomes unreliable and increasingly inaccurate. Similarly, the M_I – M_{III} ($3s$, $3p$) edges are well defined, but the M_{IV} and M_V ($3d$) structure is poor near the absorption edge.

For C95, this yields a sharp slope for the $L_{II,III}$ edges for $Z=30$ –36, and for the $M_{IV,V}$ edges for $Z=60$ –88. For Chantler,³⁰ this effect appears periodically in a less well-defined manner.

Within the convergence criteria for the DHF wave functions, this may be more or less difficult to address, depending upon the exchange potential and method used. In the case of C95, we have been able to retain the original formalism but simply to require a better and more uniform convergence in these regions.

When the wave functions of C95 are improved and this issue is addressed, we obtain the 'New' or 'Current Result' [Fig. 3. et seq.]. These new results are tabulated for the regions of atomic number and energy where any significant imprecision was observed. The results of this work also appear to reliably obtain the theoretically expected IPA edge structure. The precision of these results is clearly dramatically improved; but the accuracy is still limited for the reasons discussed above. Hence, we would claim no better than 20%–30% accuracy in this region, even though in some cases experiment may agree to better than 10%.

This paper emphasizes the results of this investigation for the imaginary component of the form factor. The same structures are seen on an expanded log plot of $[\mu/\rho]$ as illustrated by Fig. 5. Due to space constraints, we present plots of the real and imaginary components of the form factor for all energies and all atomic numbers affected, but we present $[\mu/\rho]$ only in the tables. As indicated in Eq. (7), there is a simple relation between the two.

The same qualitative errors in structure for f_2 or $[\mu/\rho]$ are transformed following Eqs. (4) and (6) into qualitative errors in the structure of $\text{Re}(f)$ as a function of energy, as indicated in Fig. 6. The result reported here is in better agreement with

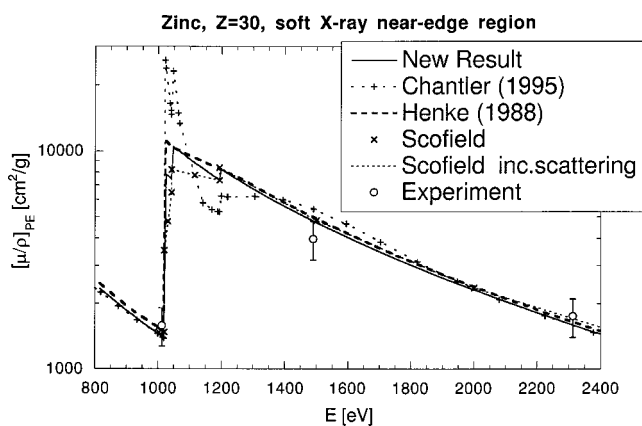


FIG. 5. Attenuation in Zn ($Z=30$), represented by $[\mu/\rho]$ (cm^2/g). Experimental data from Saloman, Hubbell and Scofield (1988). Chantler (1995), Scofield and Henke (1988) agree with available experiment, but all have large error, as indicated by the 'New Result.'

Henke *et al.*^{31,32} than C95, and includes features for all edges. The most common spurious structural effects in $\text{Re}(f)$ are seen just above the edge, where a spurious peak may appear, and in subsequent waves of dips and peaks extending up in energy for some keV or so. This same structure also leads to an accentuated minimum in $\text{Re}(f)$ at the edge location, and also to an apparent decrease in $\text{Re}(f)$ or f_1 below the edge, by perhaps 1 e/atom. These secondary effects are quite variable, depending on the nature of the approach to convergence of the wave functions. However, this seems to represent the most common signature in problem cases in C95.

The transform of the erroneous structure shows significant deviations from the new result, in some cases down to 100 eV. Hence the plots and tabulations cover regions down to 100 eV even though the error in convergence of f_2 only exists in the 1–4 keV region. By providing this full region, we allow the new tables to be continuous with the older tabulation of C95, so that a simple replacement of the new material for the old yields a smooth and continuous result. We have taken the opportunity suggested by colleagues to implement a finer grid spacing in this near-edge regime, simplifying any interpolation that may be applied to the data.

C95 stated low energy, high energy, and near-edge limitations of this tabulation, which also apply to this current work. The main difference is the new precision in the computation of soft x-ray near-edge regions. However, we tabulate these estimates of precision in Table 2, and give an indication of the effects that limit the accuracy in these regions. Two types of inaccuracy may be identified. The first listed is the estimate of convergence precision (intrinsic to the computation), while the second is an estimate of additional structure (such as XAFS or solid state effects) in particular, applications. Correlation between electrons contributes to both of these error estimates.

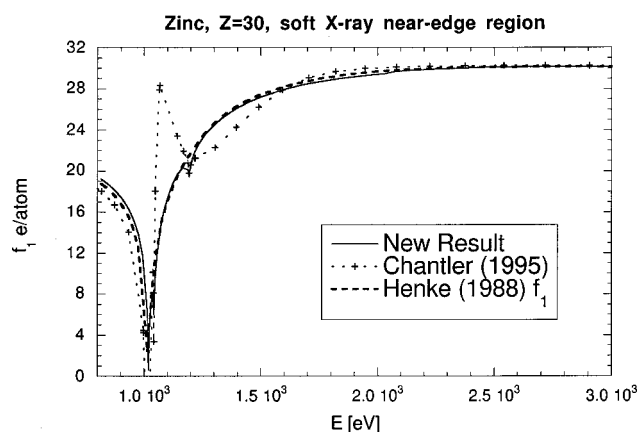


FIG. 6. The real component of the form factor in Zn ($Z=30$), represented by f_1 (e/atom). This is responsible for scattering, so that accurate computations of coherent and incoherent scattering, including Bragg-Laue or TDS extremes, should make use of this coefficient. This plot illustrates the effect of the wavefunction imprecision on the structure of $\text{Re}(f)$. The 'New Result' improves upon the qualitative structure given by Chantler (1995) and by Henke (1988).

7. Comparison of Agreement of Earlier Tabulations With the New Result

The worst cases of this convergence error in C95 are represented by Zn ($Z=30$) and Pm ($Z=61$) (Fig. 7). The imprecision of theory increases towards lower energies below the edge. A rough estimate of the imprecision for experiment, Henke,³² C95, and this work is given by the difference between Henke and C95. Hence this uncertainty reaches 50% below 300 eV, and lies around 10% at about 600 eV. The uncertainty in theory within 10% of the edge is estimated to be about 10%, so between 600 and 900 eV we might expect agreement of theoretical approaches at the 3% level. The discrepancy with Henke lies at the 10% level which in this region we attribute to solid state structure or to the synthesis used by Henke.

In the high-energy region convergence of theory would expect a 1% accuracy, but discrepancies of 6% are observed. These areas must be the subject of future experiments in this field.

The convergence errors of C95 near the edge represent 1.5σ errors, where σ is estimated as 50%, as stated earlier. In these and similar cases the Scofield result yields 80% and 220% errors near the edge (or 4–5 errors); conversely, C95 yielded maximum 68% and 87% errors, respectively, at the same locations. We assume that the cause of the Scofield discrepancies lie in the same problem regarding the electron distribution. This will be affected by the formalism used to derive the wave functions. The C95 convergence errors tended to be extended over slightly larger energy ranges (i.e., 40%–50% versus 20%–30% above the edge). For $Z=61$, (Fig. 7) Henke³² displays 30% discrepancies in the near edge region. Henke includes a weighting for a theoretical prediction, but may be affected more by the scatter of available experimental results, or by the Z -interpolation scheme used.

TABLE 2. Summary of estimated uncertainties of current work over energies tabulated, and of Chantler¹⁵ over extended regions of Z and energy for f_1 , f_2 , $[\mu/\rho]_{\text{PE}}$ and μ_{PE}

| Regions of energy within tabulated range | Estimated typical uncertainty | | |
|--|---|--|------------------------------|
| | f_2 , $[\mu/\rho]_{\text{PE}}$ and μ_{PE} Monatomic gases | f_2 , $[\mu/\rho]_{\text{PE}}$ and μ_{PE} Solids, liquid | f' f_1 - Z (see §9) |
| 0.001 eV–1 MeV | | | |
| Below 200 eV (correlations, phonons) | 50%–100% ³² | 100%–200% ³² | 50%–100% ³² |
| 200–500 eV | 20%–30% ³² | 50%–100% ³² | 20%–50% |
| 500 eV–1 keV | 3%–10% ³² | 5%–20% ³² | 5%–15% |
| Near edges (within 0.1%) | 20%–30% | 50% | 50%–100% |
| Near K edges (within 10%) | 10% | 10%–20% | 30% |
| Near K edges ($1.1 < E/E_K < 1.2$) | 3% | 3% | 10% |
| Well above K edges ($E/E_K > 1.2$) | 1% | 1% | 1%–2% |
| Near L_I, M_I – M_{III} edges (within 15%) | 15% | 15%–30% | 30% |
| Near L_I, M_I – M_{III} edges ($1.15 < E/E_{\text{edge}} < 1.4$) | 4% | 4% | 10% |
| Well above L_I, M_I – M_{III} edges ($E/E_{\text{edge}} > 1.4$) | 1% | 1% | 1%–2% |
| Near $L_{II/III}, M_{IV,V}$ edges (within 15%) | 20% | 20%–40% | 30% |
| Near $L_{II/III}, M_{IV}$ – M_V edges ($1.15 < E/E_{\text{edge}} < 1.4$) | 4% | 4% | 10% |
| Well above $L_{II/III}, M_{IV}$ – M_V edges ($E/E_{\text{edge}} < 1.4$) | 1% | 1% | 1%–2% |
| Above 200 keV (see also §5 and §8.0) | 2%–3% | 2%–3% | 1%–2% |

Figures 8 and 9 illustrate these percentage deviations explicitly compared to this work (which also has an uncertainty, but yields a correct IPA structure).

As stated, usually the experimental data are inadequate to make a critical comparison of C95 or of the current work

with respect to other databases. A nice comparison is however given by the noble gas Kr, $Z = 36$ (Fig. 10).⁵⁵ Here the structure suggested by C95 is clearly incorrect, although the theoretical uncertainty was almost equal to the difference between C95 and experiment. The structures of Henke³² and Scofield²⁸ are also seen to be in error, particularly for the L_{III} edge region, although for krypton this maximum error is

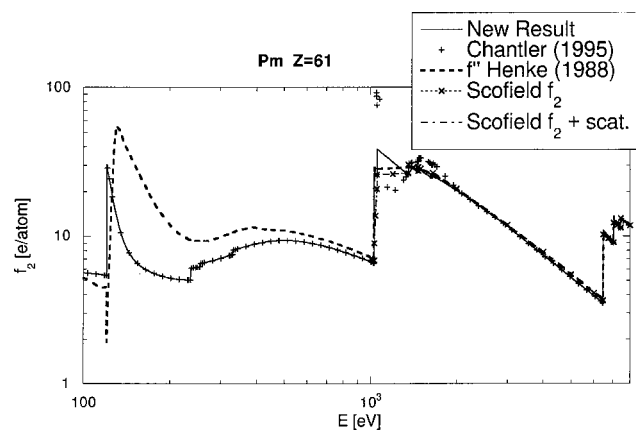


FIG. 7. Attenuation in Pm ($Z=61$), represented by $\text{Im}(f)=f_2$. $[\mu/\rho] \text{ (cm}^2/\text{g)} = f_2 \text{ (e/atom)} \times 2.90209 \times 10^5$. Experimental data from Saloman, Hubbell and Scofield (1988). The extended range plotted shows the insignificance of Rayleigh scattering for all but the highest energies plotted (where the contribution reaches 1%). The lower energy behavior illustrates the increasing uncertainty at lower energies. The near-edge structure of the 'New Result' follows qualitative expectations unlike all others shown.

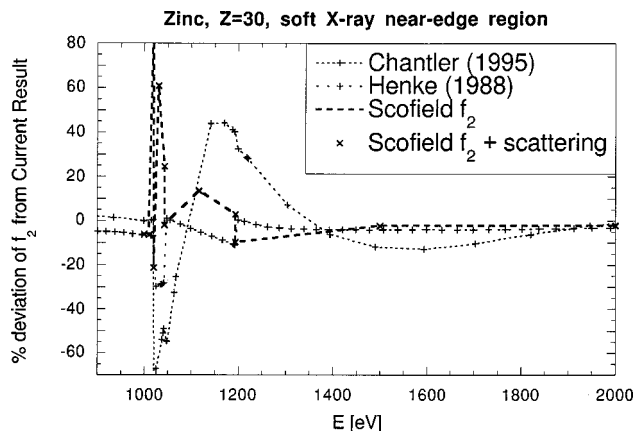


FIG. 8. The result of Figure 4 presented as a percentage deviation of tabulated results for f_2 compared to this work, for Zinc. All results show large excursions from the reference line, and all have corresponding imprecision in this near-edge region. The result of Henke (1988) is relatively smooth.

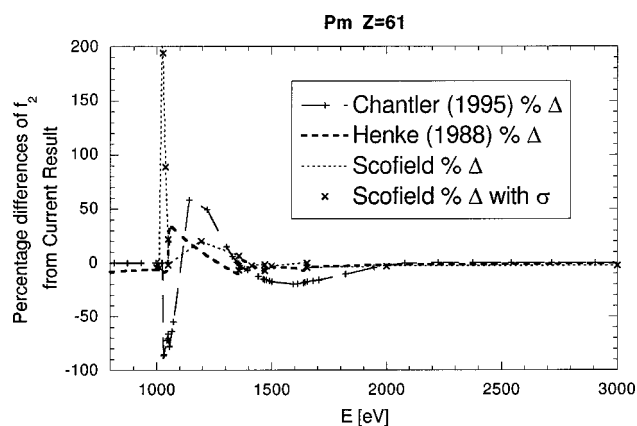


FIG. 9. The result of Figure 7 presented as a percentage deviation of tabulated results for f_2 compared to this work, for $Z=61$. All results show large excursions from the reference line, and all have corresponding imprecision in this near-edge region.

50% rather than the larger error of C95. The experimental data set plotted here is quite dated, and we estimate experimental uncertainties to be $\pm 4\%$. The precision appears to be better than this, and possibly approaching the 1% level. This is therefore a good data set, and there is also the advantage of this referring to a monatomic gas, so that the independent particle approximation should be valid.

Other experimental data are plotted in the tabulation. Results for Yb ($Z=70$), Lu ($Z=71$), and Ta ($Z=73$) suggest a smoothed M_V edge structure, although this may be partly due to detector and monochromator resolution.

Current experimental data for rhenium ($Z=75$), gold ($Z=79$), lead ($Z=82$) and bismuth ($Z=83$) also give strong evidence against the oscillation of C95. In particular, data for gold ($Z=79$) and lead ($Z=82$) appear to favor the current work rather than Henke³² and Scofield,²⁷ certainly in the near-edge region for the M_{IV}/M_V edges. The predicted structure matches up very well with the current result, as opposed to alternatives. There is some indication of M_V smoothing,

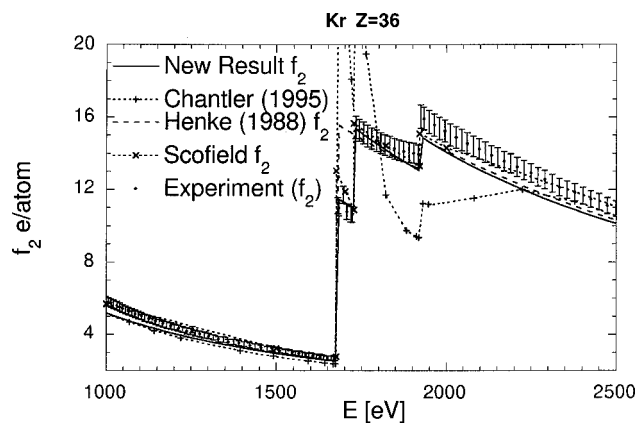


FIG. 10. The best experimental data in the range of $Z=30$ –36, for Kr $Z=36$ (Wuilleumier, 1972), supports this work in structure and detail. In $(f)=f_2$. The experimental values include contributions from scattering. $[\mu/\rho] \text{ (cm}^2/\text{g)} = f_2 \text{ (e/atom)} \times 5.02152 \times 10^5$.

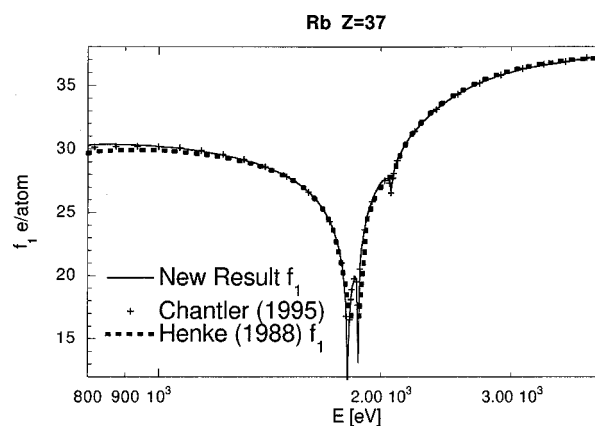


FIG. 11. A confirmation that this discrepancy is insignificant for f_1 in Rb ($Z=37$) and hence that we have no new result to present in this region. With the exception of the fine structure at the edge, Henke (1988) is in good agreement with Chantler (1995).

which may also be due to detector and monochromator resolution. Scattering contributes to the experimental data at the 0.1% to 0.25% level. These plots also show some absolute offsets at the 1 – 2σ level, where σ is given by experiment. There is strong motivation for high accuracy experiments to address these sorts of discrepancies and to reduce the experimental uncertainties by a factor of three or so.

A confirmation that the region of interest has been fully addressed is given by the result for $Z=37$ (Rb) in Figs. 11 and 12, and by the result for $Z=59$ (Pr) in Figs. 13 and 14. Here the revised approach is indistinguishable from the earlier result, and the signature of the previous lack of convergence is absent. Figures 13 and 14 show all L and M edge regions for completeness. Hence the earlier tabulation is not reproduced for the elements lying between these in the periodic table.

Neodymium ($Z=60$) and actinium ($Z=89$) are included in this tabulation. Although the results for $Z=89$ were not

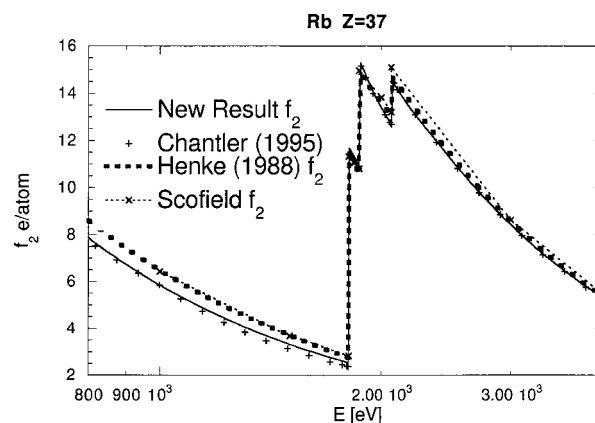


FIG. 12. A confirmation that this discrepancy is insignificant for f_2 in Rb ($Z=37$) and hence that we have no new result to present in this region. Hence the lower range of the tabulation is only given for $Z=30$ to $Z=36$. Theoretical and experimental uncertainties increase towards lower energies.

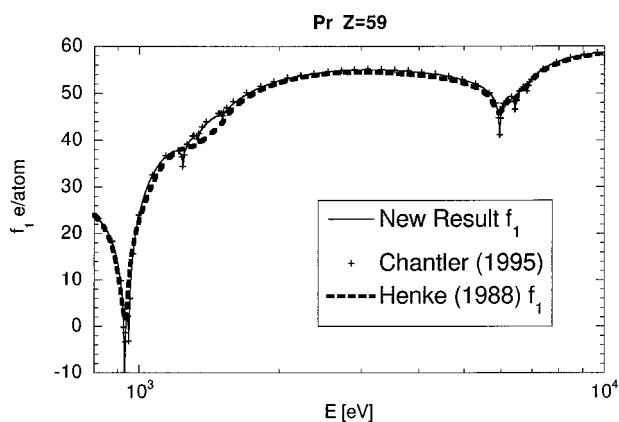


FIG. 13. A confirmation that this discrepancy is insignificant for f_1 in Pr ($Z=59$) and hence that we have no new result to present in this region. Chantler (1995) appears to give a sound prediction of the independent particle approximation, especially compared to Henke (1988).

obviously affected by the earlier lack of convergence, the new results show a very minor variation which is therefore also presented.

A recent experimental program by Chantler *et al.*⁴⁶ is proceeding to address the experimental variation in the literature, by measuring attenuation coefficients to much better than 1% over central energy ranges for important elements. Other work is also in progress by several experimental groups. A number of detailed XAFS studies have been made, which often show high resolution relative structure but without an absolute calibration to compare directly to theory. Of course, the near-edge region of direct relevance here is also strongly affected by XAFS, which are intrinsically solid state interactions not represented in the current series of tabulations. The main exception to this rule is the noble gases He, Ar, and Kr as discussed above.

All these experimental programs hold the prospect of reducing the experimental uncertainty to much less than the theoretical variation, which will allow much more critical investigation of atomic and solid form factors. A number of

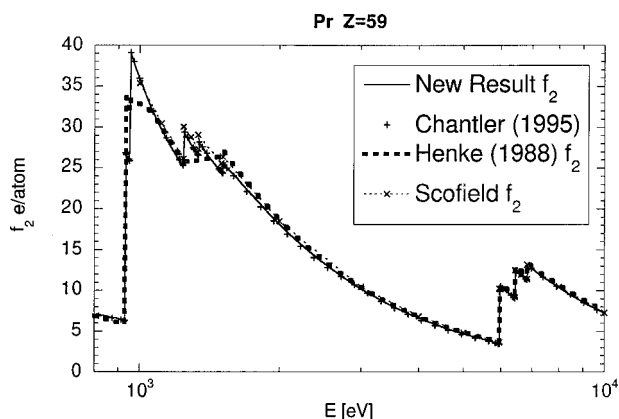


FIG. 14. A confirmation that this discrepancy is insignificant for f_2 in Pr ($Z=59$) and hence that we have no new result to present in this region. Hence the upper range of the tabulation is only given for $Z=60$ to $Z=89$.

detailed theoretical issues including the near-edge “offset” from IPA theory will then become accessible to investigation.

Even where experimental accuracy is inadequate to discriminate between theoretical alternatives, the anticipated atomic edge structure is reasonably well represented by the new results tabulated below, and differs from that of all of the earlier tabulations represented in the plots. The tables and plots show that the experimental structure represented by the experimental data for krypton ($Z=36$) and other elements support the edge structure of this work rather than that of earlier references.

8. How to Use These Tables

These tables should be combined with the tables of C95 unless the full range of interest is covered in the tables here. Then the tables provide f_1 and f_2 form factors and $[\mu/\rho]_{\text{PE}}$ for all elements up to $Z=92$ from 0.001–0.01 to 1000 keV.

In isolation, these tables provide form factors, attenuation and scattering cross-sections for $Z=30$ –36 from $E=0.9$ keV to $E=6.58$ keV; for $Z=60$ –74, from $E=0.1$ keV to $E=3.98$ keV; and for $Z=75$ –89, from $E=0.5$ keV to $E=8.54$ keV. These regions relate directly to the regions of interest in the text, and are the regions where significant improvement has been made. Additionally, we provide in Table 6 a coarse grid for $Z=30$ –36, $Z=60$ –89 from 0.1 to 10 keV following the “Grodstein grid” energies used in earlier tabulations and by other researchers.

Values for f_1 , f_2 or $[\mu/\rho]_{\text{PE}}$ should be extracted from the tables for the given element(s) and energies required. Linear interpolation of f_1 should be adequate, while linear log–log interpolation of f_2 or $[\mu/\rho]_{\text{PE}}$ should be adequate on this scale, if required.

The energy range covered exceeds that for normal x-ray diffraction and crystallography studies but allows limitations and specialized experiments to be investigated with reference to updated and corrected theory. Discussion of solid target effects, correlation, nuclear resonances, and uncertainties should be noted carefully in applications below 1 keV or above 100 keV.

The tabulation provides a sufficiently fine grid with accurate atomic edge structure to allow such experiments as DAFS (diffraction anomalous fine structure) to investigate fine structure and spatial distribution of atoms and electrons within materials.⁵⁶ Multilayer diffraction experiments may be pursued at lower energies in an analogous manner.

Table 6 presents results for the Grodstein grid energies in this region from 0.1 to 10 keV, particularly for comparison to other or earlier tables without interpolation. Although the interpolation process is very straightforward, it has been found that this brief summary is often useful for nonsynchrotron applications.

8.1. Computation of Form Factors for Forward Scattering

Equation (4) should be used to obtain f' using the negative value of f_{rel} as included at the top of each table for each element. For comparison to old data or computations, the value corresponding to Henke *et al.*⁶ denoted H82, may be used (following Cromer and Liberman but omitting the Jensen energy-dependent correction).^{21–24,57} More recent work has suggested not only that the Jensen term should be omitted but also that the appropriate relativistic correction is 3/5ths of the Cromer–Liberman value.^{4,58} This latter value is denoted 3/5CL at the top of each table for each element. Likewise, the nuclear Thompson term (also negative with respect to the atomic phase) is provided at the top of each table for each element.

For comparisons to other results in the forward scattering limit where the momentum transfer $q=0$, the value of $f_0 = Z$ may be used and the real and imaginary components of f are then fully defined. As an example, the forward scattering limit for copper at 10.32 keV, in electrons per atom, is $f = \text{Re}(f) + i\text{Im}(f) = 28.07(28) - 0.0876 - 0.000\,726 + i3.05(3)$. Clearly the uncertainty in the computation of f_1 dominates over the relativistic and nuclear Thomson corrections in most cases.

8.2. Computation of Form Factors for High Energies and Large Momentum Transfers

For large scattering angles it is necessary to use a more appropriate value of f_0 than $f_0 = Z$, as may be gained from Refs. 12, 13, 14, 28, or 59. This is generally true for Bragg diffraction calculations. For example, metallic copper with a lattice spacing of $2d = 3.6150 \text{ \AA}$ will yield a momentum transfer $q = 4\pi/2d = 3.476 \text{ \AA}^{-1}$ or $x = 0.2766 \text{ \AA}^{-1}$. (The maximum momentum transfer for a back-reflected beam at this energy would be $q = 4\pi/\lambda = 10.4598 \text{ \AA}^{-1}$ or $x = 0.8324 \text{ \AA}^{-1}$.) We note that for $q=0$ the tabulated values are exact, but uncertainties quoted in tabulations of f_0 refer to 1%–5% of the total, which would predict 0.29 e/atom uncertainty for $q=0$. Nonetheless, we use 1% here and add the uncertainties in quadrature. Then use of Maslen *et al.*⁵⁹ (for neutral copper atoms) gives $f_0 = 20.713 \text{ e/atom}$ for the Bragg reflection, or $f = \text{Re}(f) + i\text{Im}(f) = 28.07(28) - 0.0876 - 0.000\,726 + [20.713(207) - 29] + i3.05(3) = (19.69 \pm 0.35) + i(3.05 \pm 0.03) \text{ e/atom}$.

8.3. Computation of Structure Factors

Then the composition and arrangement of the material may be used as indicated in the introduction to provide structure factors [Eq. (1)], refractive indices [Eq. (2)], and Fresnel coefficients [Eq. (54) of Ref. 32, for example], together with scattered, diffracted, or transmitted intensities. More complex formula may be found in the relevant literature, allowing for thermal diffuse scattering, orientation effects, and the zeroth order reflection in particular.

8.4. Crystallography (Diffraction)

For a general diffraction profile calculation, there is usually a need to consider at least two waves: the incident wave and the corresponding attenuation of this wave (represented by the zeroth order diffraction, the Fresnel equations for the interface, or equivalently the $q=0$ forward scattering component) and the nearest Bragg-diffracted wave. There is often the need to consider multiple-beam diffraction, and in general the solution to a particular problem may require a dynamical theory of diffraction applied simultaneously to each of these waves. As a brief summary of some possible relevant formulas and applications, we refer to Refs. 5, 60, 61, and 62 (curved crystal diffraction), Refs. 6, 7, 8, and 63 (single layer or multilayer reflectivities and Fresnel equations), Refs. 64 and 65 (flat perfect crystals), and Ref. 66 (general discussion of many related issues). This is not intended as a complete list, but as a useful guide.

8.5. Electron Density Studies

As a simple extension of Eq. (1), we note the field of difference density mapping uses the following equation for the exploration of bonding patterns:

$$\Delta\rho(x,y,z) = \frac{1}{V} \sum_h \sum_k \sum_l \Delta F(hkl) e^{-2\pi i(hx + ky + lz)}. \quad (11)$$

8.6. Computation of Sum Rules

Sum rules have been discussed and investigated, particularly at relatively low energies. Good recent examples are given by Berkowitz,^{45,67} Barkyoumb and Smith,^{68,69} and others.^{42,70} Such studies serve to highlight relativistic corrections to form factors and to confirm self-consistent tabulations. The relevant formulas are given by the high-energy limit of the Kramers–Kronig relation, and by other energy moments involving the form factors.⁷¹

8.7. Computation of Scattering Cross-Sections

The structure factors may be used to compute differential or integrated coherent and incoherent scattering cross-sections directly, rather than using the integrated sum given in the tables, which assumes Rayleigh scattering for the coherent component. Standard formulas for the Thomson scattering of unpolarized incident radiation, the intensity of Rayleigh (elastic, coherent) scattering, and the incoherent (inelastic) scattering are

$$I_{\text{coh}} = I_e \left(\sum_{j=1}^Z f_j \right)^2 = I_e f^2, \quad (12)$$

$$\text{and} \quad I_e = I_0 r_e^2 \left[\frac{1 + \cos^2 \theta}{2} \right],$$

$$I_{\text{incoh}} = I_e \left(\sum_{j=1}^Z \left(1 - f_j^2 - \sum_{k \neq j} \int \psi_j^* \psi_k e^{i\mathbf{q} \cdot \mathbf{r}} d\mathbf{r} \right) \right) = I_e S(q, Z). \quad (13)$$

In these equations, f_j is the form factor for an individual orbital, leading to the sum f for the atomic form factor. Corresponding integrated cross-sections, as presented in sum in C95, this work, and (for example) Refs. 2 and 13 are given by

$$\sigma_{\text{coh, Rayleigh}} = \pi r_e^2 \int_{-1}^1 (1 + \cos^2 \theta) f^2(q, Z) d(\cos \theta) \quad (14)$$

$$\sigma_{\text{incoh, Compton}} = \pi r_e^2 \int_{-1}^1 \left(\frac{1 + \cos^2 \theta + \frac{k^2(1 - \cos \theta)^2}{1 + k(1 - \cos \theta)}}{(1 + k(1 - \cos \theta))^2} \right) \times S(q, Z) d(\cos \theta), k = \frac{\hbar \omega}{mc^2}, \quad (15)$$

where the large bracketed factor represents the recoil process for a free electron as given by the Klein-Nishina formula⁷² and the binding effects are included by the incoherent scattering function $I(q, Z)$ or $S(q, Z)$.

However, for N atoms in a unit cell of volume V_c , the coherent scattering in a Bragg reflection should be summed in phase to give $I_{\text{coh}, H=hkl} = I_e F_{H=hkl}^2$ for the structure factor F from Eq. (1). Use of the structure factor F then leads to (coherent) Bragg-Laue diffraction, with m_H the multiplicity of the hkl reflection and d_H the spacing of the hkl planes in the crystal yielding

$$\sigma_{\text{coh, BL}} = \left(\frac{r_e^2 \lambda^2}{2NV_c} \right) \sum_H \left[\left(\frac{1 + \cos^2 \theta}{2} \right) m_H |F|^2 \right] \quad (16)$$

This is a much larger value than the Rayleigh computation, and assumes alignment of the Bragg planes near a Bragg condition. The corresponding thermal diffuse scattering approximation assumes the scattering crystal is explicitly misaligned from any Bragg conditions, and leads to a much lower cross-section

$$\sigma_{\text{coh, TDS}} = \left(\frac{r_e^2 \lambda^2}{2NV_c} \right) \sum_H \left[\left(\frac{1 + \cos^2 \theta}{2} \right) m_H |F|^2 \times \{1 - e^{-2M}\} \right] \quad (17)$$

or

$$\sigma_{\text{coh, TDS}} = \pi r_e^2 \int_{-1}^1 (1 + \cos^2 \theta) f^2(q, Z) \times \{1 - e^{-2M(q)}\} d(\cos \theta). \quad (18)$$

Corresponding formulas may be found in Refs. 2, 13, 18, and 66 for differential cross-sections. Because these various formulas have significant energy and angular dependence, and vary dramatically from monatomic gas to aligned or misaligned solid, it is often advisable to compute the scattering cross-sections directly rather than to use a simple approximation. However, the full version of the incoherent cross-section cannot be computed from the data in C95 or this

work, because we do not present the orbital wave functions needed to compute the interference term of $S(q, Z)$. It is, however, possible to compute the coherent cross-sections in any approximation, and to compute the estimates of $S(q, Z)$ omitting that last term. For most low or medium-energy purposes this is quite adequate, but we also present the sum of coherent and incoherent cross-sections under the assumption of Rayleigh scattering, in the tabulation.

8.8. X-Ray Attenuation [Medical Imaging, Transmission Studies]

For filters or filter materials, the photoelectric attenuation coefficient is provided in order to compare to appropriate experiments or to allow for objects in a beam line. The conversion to this from f_2 in appropriate units is provided at the top of the table. Use of barns/atom is also common, and the conversion factor for this is also provided. Often this column is not measured, and only the total observed mass attenuation coefficient

$$[\mu/\rho]_{\text{TOT}} = [\mu/\rho]_{\text{PE}} + [\mu/\rho]_{\text{coh}} + [\mu/\rho]_{\text{incoh}} \quad (19)$$

is observed. These latter two coefficients are angle-dependent and may in part be determined from appropriate structure factors for a given crystal orientation as described above. However a column is provided for the sum of these two latter coefficients in an average over-angles for an atomic scatterer.^{44,73} These references should be consulted for details concerning the approximation involved, although the column in the current tabulation is a new computation of the sum (following C95). The main assumption is that Bragg-Laue peaks and troughs are avoided, or that the material is randomly oriented and preferably mosaic. If this is not true, it may be necessary to compute the dynamically diffracted intensities from the structure factor rather than rely on the approximation. However, simply summing these two columns allows the comparison of theory to experimental attenuation data. For most regions of interest for medical imaging, this is an adequate approximation. The accuracy of the scattering coefficients (within the Rayleigh approximation) is of order 5%.

8.9. [High-Energy] Radiation Shielding

For high energies (the transition depends upon Z), the coherent and incoherent cross-sections dominate over the photoelectric cross-section. In this region the scattering coefficients of Refs. 2 and 13 are recommended as a possibly higher precision computation. At this point the experimental evidence on this point is inconclusive, but we do not claim any higher accuracy than 5% for these scattering estimates. At high energies there may also be interference between the photoeffect and coherent cross-sections, in which case the current tabulation is important in identifying such effects but not in computing them.

At 1 MeV energies and above, (or at γ -ray resonances), nuclear physics dominates and we recommend inclusion of corrections by Hubbell *et al.*^{12,13} for radiative and double-

Compton contributions to incoherent cross-sections, reaching 1% at 100 MeV energies, and those of nuclear-field pair production κ_n beginning at $2m_e c^2 = 1.022$ MeV and becoming dominant around 10 MeV and above. Electron-field pair production ("triplet production") begins at 2.044 MeV and contributes above this energy at the 1% level for high Z elements but up to 10% for fluorine and 50% for hydrogen [or $1/(1+Z)$]. Nuclear photoabsorption consists of one (or a few) peaks (giant resonances) between 10–24 MeV of width 3–9 MeV, contributing up to 10% of the total cross-section in this region. Elastic processes include high energy Delbrück and dipole resonance scattering in addition to Rayleigh and nuclear Thompson contributions mentioned above.

8.10. VUV Reflectivities and Multilayer Computations

In addition to the discussions in Refs. 6–8, relating to multilayer theory, experimental investigations in the VUV region suffer from the limited precision of theory (and of this current work). Our best recommendation regarding the estimation of either the magnitude of the form factor for an element in this region, or for a structural feature in this region, is to compare the results of the current approach to that of Ref. 32, and to treat the difference as an estimate of the theoretical uncertainty in the region. The major problems arise from valence shell correlations, and hence poor convergence of orbitals, and from correlated excitations, phonons, and other solid state interactions. At the current time, we only present the results of C95 and this work as a guide in the region below 100 eV.

8.11. Individual Orbital Cross-Section Studies, and Fluorescence Yields

The column providing the photoabsorption coefficient for the K -shell only is included for two purposes. The first is that at high energies this is the dominant contribution to the total photoabsorption, and provides a guide for the local energy dependence of the cross-section. Secondly, it serves as an illustration of the isolation of individual orbital cross-sections, particularly for higher energies.

The isolated K -shell cross-section is also important for experimental diagnostics and corrections. In particular, fluorescence yields from atoms are negligible for almost all orbitals except the K -shell, when compared to Auger and Coster-Kronig transitions. However, the fluorescence yield fraction for the K -shell is large, so the dependence of the cross-section upon energy is equally important. The qualitative result in an experimental ion chamber is significant—the fluorescence x-ray may escape from the ion chamber without conversion to (detectable) ion pairs. A more detailed discussion of this is provided elsewhere.⁴²

8.12. Comparisons to the Literature

The plots provide comparison to the theoretical results of Scofield,^{27,29,33} the experimental compilation of Saloman

et al.,³³ and the experimental synthesis of Henke *et al.*^{31,32} This is considered by the author to be the most useful and convenient comparison of current work in the literature. Scofield is often cited and the original stimulation for the preparation of this work was a comparison with that theory. The plots indicate limitations regarding restricted ranges and tabulation steps, show good agreement over much of the energy range for many elements, and indicate regions of divergence, difficulty, or concern. Some of these concerns have been addressed directly in this paper, while others remain. A naïve statement of uncertainty in Henke or this work arises from the divergence between the two. This may relate to local structure, absolute values, or global structure. An alternate error estimate is provided in Table 2.

8.13. Chemical Shifts

The edge energies used follow Bearden⁷⁹ are provided at the top of each table so that criticism (or experimental investigation) may indicate a shift of the local energy scale which may be appropriate in a specific material or experiment. This is not encouraged or recommended; nonetheless, it is provided as a statement of the assumptions and basis of the computation.

8.14. Electron Form Factors and Scattering

Within the isolated atom approximation for spherically symmetric atoms, the electron atomic form factor is given by an analogue of Eq. (5), with the electron density replaced by the periodic potential (r):

$$f^B(q, Z) = \frac{2me}{\hbar^2} \int_0^\infty \frac{\varphi(r) \sin(qr) r^2 dr}{qr}. \quad (20)$$

Poisson's equation relates the potential and charge distributions, and leads to the Mott–Bethe formula for $f^B(q, Z)$ in terms of the x-ray atomic form factor $f(q, Z)$:

$$f^B(q, Z) = \frac{me^2}{2\pi\hbar^2\epsilon_0} \left\{ \frac{Z - f(q, Z)}{q^2} \right\}. \quad (21)$$

On the basis of these formulas, numerous studies can be and have been conducted, and we refer simply to two summaries for elastic and inelastic scattering.^{75,76}

8.15. X-Ray Anomalous Fine Structure (XAFS) and Diffraction Anomalous Fine Structure (DAFS)

X-ray anomalous fine structure (XAFS) studies typically use a scaled reference line for atomic structure, relative to which the bonding, nearest neighbor, and structural information are extracted. This reference line should be derived from atomic theory for an isolated atom. If this reference theory were accurate to better than 1%, XAFS and DAFS would be consistent and provide unambiguous determination of local structure. Not all theories provide a self-consistent reference for atomic theory near edges, which is a pre-condition for the correct interpretation of fine structure measurements.

9. Summary of Uncertainties

9.1. f_2 and $[\mu/\rho]_{\text{PE}}$

Estimates of uncertainties are provided in Table 2. Relative uncertainties in f_2 and $[\mu/\rho]_{\text{PE}}$ are identical. Form factors are given in units of electrons per atom (e/atom). The accuracy of f_2 in this work and C95 in a central x-ray region well away from edges is estimated as 1%. This claim leads to significant discrepancies with other theory and experiment, which must be the subject of future investigation.

At low energies (especially below 200 eV) the uncertainty of C95 is very large and reaches 100%–200%. This is due to the dominance of non-IPA interactions in this region. The best estimate of the accuracy of reported structure in this region (in C95) is given by comparison to an independent experimental or theoretical source, such as Henke *et al.*³²

Accuracies below 1 keV reach a few percent or better in the absence of edge structure, and accuracies somewhat above edges are intermediate in estimated accuracy.

In the near-edge regions of direct concern to this work, the results of C95 should be replaced by the current tables in overlapping regions. Then the estimated uncertainty of f_2 in the combined tabulation (for energies and edges above 1 keV) is 20%–30% compared to a monatomic gas form factor (i.e., ignoring the effects of solid state structure and XAFS, for example). The presence of molecular or solid state interactions can lead to dramatic excursions from theory for a monatomic gas in these regions, which can exceed 50% in extreme cases.

9.2. Energies

In this near-edge region the location of the edge is critical to a general comparison, and this work uses the same experimental edge energies as C95. They are usually in good agreement with experiment (say to a few eV) and with those listed for Ref. 27. However, there are exceptions to this as indicated in the plot for gallium, $Z=31$, where discrepancies might reach 100 eV. Some of these variations are due to experimental calibration errors or to chemical shifts of up to 10 eV. Others are not clear at this point, and we have preferred to be consistent with C95 than to alter any of these.

9.3. $f_1 - Z_{\text{eff}}$

The precision of f_1 is dominated by that of f' , so any percentage uncertainty should be expressed in terms of this or of $f_1 - Z$. However, below an edge the orbitals do not contribute to f_2 and do not need to be computed for f_2 except for near-edge discrete transitions. Hence, the effective Z is reduced. However, as seen for Nd, $Z=60$, and other elements, an error of f_2 at an edge can significantly affect the value of f' some order of magnitude below the edge. The typical ideal is represented by the results for krypton, $Z=36$, where an error (or uncertainty) in f_2 has led to errors of some 50% for f' in the near-edge region, but has had no effect some factor of two in energy below the edge. Further,

we find that at that point a factor of two in energy below the edge, the value of f_1 correctly represents the number of effective oscillators at this energy—i.e., 30 rather than 36 (for forward scattering). An error of f_2 at a lower energy would therefore be expected to have an effect on the region of the edge (within a factor of two) at the 50% level, applied to $f' - 30$.

C95 has discussed several types of error corresponding to 100%–200% errors in this value near edges. While this work is free of those errors, any computation of f' is extremely sensitive near edges to the sharpness of the discontinuity in f_2 . As such there will remain significant uncertainties in the near edge region, of perhaps 50%. In any application of $\text{Re}(f)$ away from forward scattering, the uncertainty in f_0 computations (or in $f_0 - Z$) may be 1%–5% and may dominate over the uncertainty in the anomalous dispersion f' .

9.4. f_{rel}

Because of the nature of the computation, the error in f_1 at very high energies can be very small and much less than 0.1 e/atom within the current formalism. This may compare with previously discussed limitations at the 1–3 e/atom level of some sources.¹⁵ This is because $f_1 - Z$ becomes very small and indeed dominated by the relativistic correction f_{rel} and that associated uncertainty. We do not tabulate this uncertainty because the experimental evidence is usually limited by other uncertainties. An upper estimate for old sources of data is represented by the differences between the two values provided in the header of the tables for each element. This ‘‘H92–3/5CL’’ value is 1.09 e/atom for uranium or 0.002 e/atom for $Z=6$ (i.e., 40% of the dipole correction). However, we suggest as a lower estimate of uncertainty the difference between the results of Creagh^{16,74} and Kissel.⁷⁷ This reaches 19% of the total relativistic correction for $Z=90$, or 0.3 e/atom, or 1% of the relativistic correction for $Z=6$.

9.5. $[\sigma/\rho]_{\text{coh+inc}}$

The column for Rayleigh scattering and incoherent scattering is of no value for angle-dependent studies (this should be recomputed as discussed above). It is also of little value in experimental comparisons of aligned or misaligned Bragg-Laue scattering, except to estimate the magnitudes of these processes (again, see the discussion of uses of this tabulation). However, it allows us to compute a total attenuation coefficient $[\mu/\rho]$ in the tables, and to point out the relative significance of isolated atomic scattering for each element at various energies. This is the prime use to which this column should be put.

The accuracy of this computation for scattering varies, and also improves for higher energies, but we estimate it to lie at the 5% level. This value is generally consistent with discrepancies from Hubbell and Øverbø¹³ and Schaupp *et al.*¹⁴ Ericson and Hufner¹¹ claim to approach 1%–2% in several regimes, but notes some particular deviations of 10% for heavy elements at 100 keV, for example.

10. Conclusion

Several generic difficulties of experimental and theoretical determinations of atomic form factors have been identified and resolved. We recommend intelligent application of a variety of the available experimental and theoretical sources, depending upon the user's purpose, and as summarized in Tables 1 and 2, and Sec. 8. Regions of solid state structure and XAFS limit the overall accuracy of such theoretical work unless explicitly modified to include such nearest neighbor effects, or comparison is made directly to non-atomic gases. However, strong reasons favor use of theoretical sources at the present time for energies above 1 keV, for most applications. In this context, results based on Chantler,¹⁵ but with the current results presented here appear most reliable.

There are selected experimental data sets, which appear reliable, and suggest the accuracy of Chantler¹⁵ compared to, e.g., Saloman *et al.*³³ Both theoretical approaches had large uncertainties in the soft x-ray near-edge region for a range of elements, for well-defined reasons. The convergence error of Chantler¹⁵ was at all times within 1.5σ . However, this still represented a large area of concern, particularly for present and future experimental investigations, even though it was often more accurate than Saloman *et al.*³⁴ We have improved upon the theoretical uncertainty for f_2 in these regions (to an estimated $\sigma = 20\% - 30\%$ in the difficult near-edge regions) and this appears to reduce the error of this approach to less than one standard deviation.

In regions above edges, the uncertainty in f_2 of this work and that of Chantler¹⁵ reduces to an estimated 1%. This is also the typical uncertainty quoted by other theoretical work, yet discrepancies between these often exist at the 6% level. Uncertainties in f_1 are dominated by small errors or sharp discontinuities in f_2 . Therefore, the precision of local structure in f_1 remains uncertain, as listed in Table 2. In all cases, uncertainties are quoted as percentages of $f' = f_1 - Z_{\text{eff}}$, as this is the computed quantity. Near high-energy asymptotes, the accuracy of f_1 may therefore be very good, as explained in the previous section.

Future experimental and theoretical work holds the prospect of addressing many of the issues raised in this work. The tabulation presented here resolves many of the difficulties encountered with previous tabulations, while some aspects remain to be treated in greater depth in the future, perhaps including aspects of collective behavior and near-edge smoothing. There also appears to be a high priority for a comprehensive recalculation of scattering factors based on the approach of this work.

For general application, the tabulation presented here should be combined with Chantler¹⁵ and may make use of scattering coefficients contained in Hubbell and Øverbø¹³ (σ_{coh}), and Hubbell *et al.*¹² (σ_{incoh}), for example.

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13. Explanation of Tables and Tabulated Figures (Note the symbols used here are slightly different from Chantler,¹⁵ in order to clearly differentiate the mass attenuation coefficients from the atomic cross-sections and the linear absorption coefficients, but the meanings are identical.)

All tables follow a consistent grid. The figures are adapted to highlight the region of energy affected for each element, and hence vary with the atomic number.

| Z | Atomic number | f_{NT} | Nuclear Thomson correction to $Re(f)$ following Eq. (4) and Refs. 10 and 11 |
|-----------|---|------------------------------------|---|
| E | Energy in keV | f_2 , K -shell | Component of f_2 relating to the isolated K -shell orbital |
| λ | Equivalent wavelength using $E\lambda = 1.239\,842\,44$ keV nm, from Ref. 78. | $[\mu/\rho]_{PE} = \sigma_{PE}/uA$ | Mass attenuation coefficient in cm^2/g [see Eq. (8)] |

| Atomic weight | g/mol, used in determination of conversion factors | $[\mu/\rho]_{\text{PE, K}}$ | Component of μ relating to the isolated K -shell orbital (cm^2/g) |
|---|--|-----------------------------|---|
| ρ | Nominal density in typical elemental material for determination of linear absorption coefficients $\mu = [\mu/\rho]\rho$ | σ/ρ (coh+inc) | Estimate of coherent and incoherent $= \sigma_{\text{coh}} + \sigma_{\text{incoh}}$ scattering cross-section sum (in cm^2/g) |
| $\tau_{\text{PE}} = \sigma_{\text{PE}}$ | Atomic photoabsorption cross-section in barns/atom | Full lines on plots | Current theoretical tabulation for f_1 , f_2 |
| Edge energies | Values taken from Ref. 79 | + | Earlier theoretical implementation ¹⁵ showing limited convergence near selected edges |
| Edge labels | Spectroscopic notation ($K=1s$, $L_1=2s$, $L_{II}=2p_{1/2}$, et seq.) | Thick dashes | Henke <i>et al.</i> experimental synthesis (Refs. 31 and 32) |
| f_1, f_2 | Atomic form factors in eu (electrons/atom) for forward scattering following Eqs. (4) and (7) | Dotted curves with crosses | Theoretical results for comparison reinterpolated from Refs. 27, 29, and 33, for f_2 and $[\mu/\rho]$ |
| f_{rel} | Relativistic correction to $\text{Re}(f)$, following Ref. 6 (denoted H82), and Refs. 21–24, scaled as in Refs. 15, 16, and 58 (denoted 3/5CL) | Circles with error bars | Experimental results, summarized in Ref. 33 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV

| Zn (Z=30) | | | | | | | |
|--|-----------------------|-----------------------|--|--|--|---|------------|
| Atomic weight: $A_r = 65.38000$ g mol ⁻¹ Nominal density: ρ (g cm ⁻³) = 7.1120 | | | | | | | |
| σ_a (barns/atom) = $[\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 108.566$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) = f_2(e \text{ atom}^{-1}) \times 6.43627 \times 10^5$ | | | | | | | |
| 9 edges. Edge energies (keV) | | | | | | | |
| K | 9.65860 | L I | 1.19360 | L II | 1.04280 | L III | 1.01970 |
| M I | 0.135900 | M II | 0.0866000 | M III | 0.0866000 | M IV | 0.00810000 |
| M V | 0.00810000 | | | | | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL}) = (-0.15183, -0.095400) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}} = -0.0075516 e \text{ atom}^{-1}$ | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric cm ² g ⁻¹ | Coh+inc cm ² g ⁻¹ | Total cm ² g ⁻¹ | K -shell cm ² g ⁻¹ | nm |
| 0.90000000 | 17.3931 | 2.5564 | 1828.2 | 4.5382 | 1832.7 | 0.00 | 1.378 |
| 0.90450000 | 17.2630 | 2.5415 | 1808.5 | 4.5464 | 1813.1 | 0.00 | 1.371 |
| 0.90902250 | 17.1262 | 2.5268 | 1789.1 | 4.5545 | 1793.6 | 0.00 | 1.364 |
| 0.91356761 | 16.9821 | 2.5121 | 1769.8 | 4.5626 | 1774.4 | 0.00 | 1.357 |
| 0.91813545 | 16.8299 | 2.4976 | 1750.8 | 4.5705 | 1755.4 | 0.00 | 1.350 |
| 0.92272613 | 16.6690 | 2.4831 | 1732.0 | 4.5784 | 1736.6 | 0.00 | 1.344 |
| 0.92733976 | 16.4984 | 2.4687 | 1713.4 | 4.5863 | 1718.0 | 0.00 | 1.337 |
| 0.93197646 | 16.3171 | 2.4544 | 1695.0 | 4.5940 | 1699.6 | 0.00 | 1.330 |
| 0.93663634 | 16.1239 | 2.4401 | 1676.8 | 4.6017 | 1681.4 | 0.00 | 1.324 |
| 0.94131952 | 15.9173 | 2.4260 | 1658.8 | 4.6093 | 1663.4 | 0.00 | 1.317 |
| 0.94602612 | 15.6957 | 2.4119 | 1640.9 | 4.6169 | 1645.5 | 0.00 | 1.311 |
| 0.95075625 | 15.4569 | 2.3979 | 1623.3 | 4.6243 | 1627.9 | 0.00 | 1.304 |
| 0.95551003 | 15.1986 | 2.3840 | 1605.9 | 4.6317 | 1610.5 | 0.00 | 1.298 |
| 0.96028758 | 14.9176 | 2.3702 | 1588.6 | 4.6390 | 1593.2 | 0.00 | 1.291 |
| 0.96508902 | 14.6101 | 2.3565 | 1571.5 | 4.6463 | 1576.2 | 0.00 | 1.285 |
| 0.96991446 | 14.2713 | 2.3428 | 1554.7 | 4.6534 | 1559.3 | 0.00 | 1.278 |
| 0.97476404 | 13.8946 | 2.3292 | 1538.0 | 4.6605 | 1542.6 | 0.00 | 1.272 |
| 0.97963786 | 13.4716 | 2.3157 | 1521.4 | 4.6676 | 1526.1 | 0.00 | 1.266 |
| 0.98453605 | 12.9904 | 2.3023 | 1505.1 | 4.6745 | 1509.8 | 0.00 | 1.259 |
| 0.98945873 | 12.4339 | 2.2890 | 1488.9 | 4.6813 | 1493.6 | 0.00 | 1.253 |
| 0.99440602 | 11.7757 | 2.2757 | 1472.9 | 4.6881 | 1477.6 | 0.00 | 1.247 |
| 0.99937805 | 10.9729 | 2.2625 | 1457.1 | 4.6948 | 1461.8 | 0.00 | 1.241 |
| 1.0043749 | 9.94316 | 2.2458 | 1439.2 | 4.7015 | 1443.9 | 0.00 | 1.234 |
| 1.0093968 | 8.51478 | 2.2287 | 1421.1 | 4.7080 | 1425.8 | 0.00 | 1.228 |
| 1.0144438 | 6.15159 | 2.2118 | 1403.3 | 4.7145 | 1408.0 | 0.00 | 1.222 |
| 1.0195160 | -5.07956 | 2.1950 | 1385.7 | 4.7209 | 1390.4 | 0.00 | 1.216 |
| 1.0196290 | -8.22555 | 2.1946 | 1385.3 | 4.7210 | 1390.1 | 0.00 | 1.216 |
| 1.0197711 | -8.40332 | 12.572 | 7934.7 | 4.7212 | 7939.4 | 0.00 | 1.216 |
| 1.0246136 | 5.36770 | 12.469 | 7832.8 | 4.7272 | 7837.6 | 0.00 | 1.210 |
| 1.0297367 | 7.32086 | 12.362 | 7727.0 | 4.7334 | 7731.7 | 0.00 | 1.204 |
| 1.0348853 | 7.99378 | 12.256 | 7622.6 | 4.7396 | 7627.3 | 0.00 | 1.198 |
| 1.0400598 | 7.35582 | 12.151 | 7519.6 | 4.7457 | 7524.4 | 0.00 | 1.192 |
| 1.0427279 | 1.91437 | 12.098 | 7467.3 | 4.7488 | 7472.0 | 0.00 | 1.189 |
| 1.0428720 | 1.85341 | 17.202 | 10616 | 4.7489 | 10621 | 0.00 | 1.189 |
| 1.0452601 | 7.97659 | 17.134 | 10550 | 4.7517 | 10555 | 0.00 | 1.186 |
| 1.0504864 | 10.5445 | 16.987 | 10408 | 4.7576 | 10413 | 0.00 | 1.180 |
| 1.0557388 | 11.9953 | 16.842 | 10267 | 4.7634 | 10272 | 0.00 | 1.174 |
| 1.0610175 | 13.0750 | 16.697 | 10129 | 4.7692 | 10134 | 0.00 | 1.169 |
| 1.0663226 | 13.9517 | 16.554 | 9992.1 | 4.7749 | 9996.8 | 0.00 | 1.163 |
| 1.0716542 | 14.6953 | 16.412 | 9857.2 | 4.7805 | 9861.9 | 0.00 | 1.157 |
| 1.0770125 | 15.3428 | 16.272 | 9724.1 | 4.7860 | 9728.9 | 0.00 | 1.151 |
| 1.0823975 | 15.9165 | 16.132 | 9592.9 | 4.7914 | 9597.6 | 0.00 | 1.145 |
| 1.0878095 | 16.4313 | 15.994 | 9463.4 | 4.7968 | 9468.2 | 0.00 | 1.140 |
| 1.0932486 | 16.8974 | 15.857 | 9335.7 | 4.8021 | 9340.5 | 0.00 | 1.134 |
| 1.0987148 | 17.3222 | 15.722 | 9209.7 | 4.8072 | 9214.5 | 0.00 | 1.128 |
| 1.1042084 | 17.7116 | 15.587 | 9085.5 | 4.8124 | 9090.3 | 0.00 | 1.123 |
| 1.1097294 | 18.0696 | 15.454 | 8962.9 | 4.8174 | 8967.7 | 0.00 | 1.117 |
| 1.1152781 | 18.3997 | 15.321 | 8842.0 | 4.8223 | 8846.8 | 0.00 | 1.112 |
| 1.1208545 | 18.7044 | 15.190 | 8722.7 | 4.8272 | 8727.5 | 0.00 | 1.106 |
| 1.1264587 | 18.9856 | 15.060 | 8605.1 | 4.8320 | 8609.9 | 0.00 | 1.101 |
| 1.1320910 | 19.2447 | 14.932 | 8489.0 | 4.8367 | 8493.9 | 0.00 | 1.095 |
| 1.1377515 | 19.4825 | 14.804 | 8374.6 | 4.8413 | 8379.4 | 0.00 | 1.090 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Zn ($Z=30$) | | | | | | | |
| 1.1434402 | 19.6995 | 14.677 | 8261.6 | 4.8458 | 8266.5 | 0.00 | 1.084 |
| 1.1491574 | 19.8953 | 14.552 | 8150.3 | 4.8502 | 8155.1 | 0.00 | 1.079 |
| 1.1549032 | 20.0688 | 14.427 | 8040.4 | 4.8546 | 8045.2 | 0.00 | 1.074 |
| 1.1606777 | 20.2177 | 14.304 | 7932.0 | 4.8589 | 7936.9 | 0.00 | 1.068 |
| 1.1664811 | 20.3376 | 14.182 | 7825.1 | 4.8631 | 7830.0 | 0.00 | 1.063 |
| 1.1723135 | 20.4199 | 14.061 | 7719.6 | 4.8672 | 7724.5 | 0.00 | 1.058 |
| 1.1781751 | 20.4469 | 13.941 | 7615.6 | 4.8712 | 7620.5 | 0.00 | 1.052 |
| 1.1840660 | 20.3734 | 13.822 | 7513.0 | 4.8751 | 7517.9 | 0.00 | 1.047 |
| 1.1899863 | 20.0079 | 13.703 | 7411.8 | 4.8790 | 7416.7 | 0.00 | 1.042 |
| 1.1924542 | 19.4199 | 13.655 | 7370.2 | 4.8806 | 7375.0 | 0.00 | 1.040 |
| 1.1947459 | 19.4670 | 15.440 | 8317.7 | 4.8820 | 8322.6 | 0.00 | 1.038 |
| 1.1959362 | 19.9205 | 15.416 | 8296.4 | 4.8828 | 8301.3 | 0.00 | 1.037 |
| 1.2019159 | 20.8465 | 15.294 | 8190.2 | 4.8865 | 8195.1 | 0.00 | 1.032 |
| 1.2079255 | 21.3413 | 15.174 | 8085.4 | 4.8901 | 8090.3 | 0.00 | 1.026 |
| 1.2139651 | 21.7172 | 15.055 | 7982.0 | 4.8936 | 7986.9 | 0.00 | 1.021 |
| 1.2200350 | 22.0337 | 14.937 | 7880.0 | 4.8970 | 7884.9 | 0.00 | 1.016 |
| 1.2261351 | 22.3130 | 14.820 | 7779.3 | 4.9003 | 7784.2 | 0.00 | 1.011 |
| 1.2322658 | 22.5663 | 14.704 | 7679.9 | 4.9036 | 7684.8 | 0.00 | 1.006 |
| 1.2384271 | 22.7996 | 14.589 | 7581.9 | 4.9068 | 7586.8 | 0.00 | 1.001 |
| 1.2446193 | 23.0170 | 14.474 | 7485.1 | 4.9099 | 7490.0 | 0.00 | 0.9962 |
| 1.2508424 | 23.2211 | 14.361 | 7389.6 | 4.9129 | 7394.5 | 0.00 | 0.9912 |
| 1.2570966 | 23.4138 | 14.249 | 7295.6 | 4.9158 | 7300.5 | 0.00 | 0.9863 |
| 1.2633821 | 23.5968 | 14.139 | 7203.0 | 4.9186 | 7207.9 | 0.00 | 0.9814 |
| 1.2696990 | 23.7712 | 14.029 | 7111.6 | 4.9214 | 7116.5 | 0.00 | 0.9765 |
| 1.2760475 | 23.9379 | 13.921 | 7021.4 | 4.9240 | 7026.4 | 0.00 | 0.9716 |
| 1.2824277 | 24.0975 | 13.813 | 6932.5 | 4.9266 | 6937.4 | 0.00 | 0.9668 |
| 1.2888399 | 24.2507 | 13.706 | 6844.7 | 4.9291 | 6849.6 | 0.00 | 0.9620 |
| 1.2952840 | 24.3978 | 13.601 | 6758.1 | 4.9315 | 6763.0 | 0.00 | 0.9572 |
| 1.3017605 | 24.5392 | 13.496 | 6672.6 | 4.9338 | 6677.6 | 0.00 | 0.9524 |
| 1.3082693 | 24.6754 | 13.392 | 6588.3 | 4.9360 | 6593.3 | 0.00 | 0.9477 |
| 1.3148106 | 24.8065 | 13.289 | 6505.1 | 4.9381 | 6510.1 | 0.00 | 0.9430 |
| 1.3213847 | 24.9329 | 13.187 | 6423.0 | 4.9402 | 6428.0 | 0.00 | 0.9383 |
| 1.3279916 | 25.0546 | 13.086 | 6342.5 | 4.9422 | 6347.4 | 0.00 | 0.9336 |
| 1.3346316 | 25.1727 | 12.989 | 6263.8 | 4.9440 | 6268.7 | 0.00 | 0.9290 |
| 1.3413047 | 25.2874 | 12.892 | 6186.2 | 4.9458 | 6191.1 | 0.00 | 0.9244 |
| 1.3480112 | 25.3986 | 12.796 | 6109.6 | 4.9475 | 6114.5 | 0.00 | 0.9198 |
| 1.3547513 | 25.5066 | 12.701 | 6034.0 | 4.9492 | 6038.9 | 0.00 | 0.9152 |
| 1.3615250 | 25.6115 | 12.607 | 5959.8 | 4.9507 | 5964.8 | 0.00 | 0.9106 |
| 1.3683327 | 25.7138 | 12.515 | 5886.7 | 4.9521 | 5891.7 | 0.00 | 0.9061 |
| 1.3751743 | 25.8134 | 12.423 | 5814.6 | 4.9535 | 5819.5 | 0.00 | 0.9016 |
| 1.3820502 | 25.9104 | 12.333 | 5743.4 | 4.9548 | 5748.4 | 0.00 | 0.8971 |
| 1.3889605 | 26.0050 | 12.243 | 5673.1 | 4.9560 | 5678.1 | 0.00 | 0.8926 |
| 1.3959053 | 26.0973 | 12.154 | 5603.8 | 4.9571 | 5608.8 | 0.00 | 0.8882 |
| 1.4028848 | 26.1872 | 12.065 | 5535.4 | 4.9581 | 5540.3 | 0.00 | 0.8838 |
| 1.4098992 | 26.2750 | 11.978 | 5467.8 | 4.9590 | 5472.8 | 0.00 | 0.8794 |
| 1.4169487 | 26.3606 | 11.891 | 5401.2 | 4.9598 | 5406.1 | 0.00 | 0.8750 |
| 1.4240335 | 26.4442 | 11.805 | 5335.3 | 4.9606 | 5340.3 | 0.00 | 0.8707 |
| 1.4311536 | 26.5257 | 11.719 | 5270.4 | 4.9613 | 5275.4 | 0.00 | 0.8663 |
| 1.4383094 | 26.6054 | 11.634 | 5206.3 | 4.9618 | 5211.2 | 0.00 | 0.8620 |
| 1.4455009 | 26.6833 | 11.550 | 5143.0 | 4.9623 | 5147.9 | 0.00 | 0.8577 |
| 1.4527284 | 26.7594 | 11.467 | 5080.5 | 4.9628 | 5085.5 | 0.00 | 0.8535 |
| 1.4599921 | 26.8337 | 11.385 | 5018.8 | 4.9631 | 5023.8 | 0.00 | 0.8492 |
| 1.4672920 | 26.9065 | 11.303 | 4957.9 | 4.9633 | 4962.9 | 0.00 | 0.8450 |
| 1.4746285 | 26.9776 | 11.222 | 4897.8 | 4.9635 | 4902.8 | 0.00 | 0.8408 |
| 1.4820016 | 27.0472 | 11.141 | 4838.5 | 4.9635 | 4843.4 | 0.00 | 0.8366 |
| 1.4894117 | 27.1153 | 11.061 | 4779.9 | 4.9635 | 4784.9 | 0.00 | 0.8324 |
| 1.4968587 | 27.1820 | 10.982 | 4722.0 | 4.9634 | 4727.0 | 0.00 | 0.8283 |
| 1.5043430 | 27.2473 | 10.903 | 4664.9 | 4.9632 | 4669.9 | 0.00 | 0.8242 |
| 1.5118647 | 27.3113 | 10.825 | 4608.5 | 4.9629 | 4613.5 | 0.00 | 0.8201 |
| 1.5194240 | 27.3741 | 10.748 | 4552.9 | 4.9626 | 4557.8 | 0.00 | 0.8160 |
| 1.5270212 | 27.4356 | 10.671 | 4497.9 | 4.9621 | 4502.8 | 0.00 | 0.8119 |
| 1.5346563 | 27.4960 | 10.595 | 4443.6 | 4.9616 | 4448.5 | 0.00 | 0.8079 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Zn ($Z=30$) | | | | | | | |
| 1.5423295 | 27.5554 | 10.520 | 4390.0 | 4.9609 | 4394.9 | 0.00 | 0.8039 |
| 1.5500412 | 27.6139 | 10.445 | 4337.0 | 4.9602 | 4342.0 | 0.00 | 0.7999 |
| 1.5577914 | 27.6711 | 10.369 | 4284.2 | 4.9594 | 4289.1 | 0.00 | 0.7959 |
| 1.5655804 | 27.7270 | 10.294 | 4231.8 | 4.9586 | 4236.8 | 0.00 | 0.7919 |
| 1.5734083 | 27.7815 | 10.219 | 4180.1 | 4.9576 | 4185.1 | 0.00 | 0.7880 |
| 1.5812753 | 27.8347 | 10.144 | 4129.0 | 4.9565 | 4134.0 | 0.00 | 0.7841 |
| 1.5891817 | 27.8868 | 10.070 | 4078.6 | 4.9554 | 4083.5 | 0.00 | 0.7802 |
| 1.5971276 | 27.9377 | 9.9972 | 4028.8 | 4.9542 | 4033.7 | 0.00 | 0.7763 |
| 1.6051132 | 27.9874 | 9.9245 | 3979.6 | 4.9529 | 3984.5 | 0.00 | 0.7724 |
| 1.6131388 | 28.0361 | 9.8523 | 3931.0 | 4.9515 | 3935.9 | 0.00 | 0.7686 |
| 1.6212045 | 28.0838 | 9.7807 | 3883.0 | 4.9500 | 3887.9 | 0.00 | 0.7648 |
| 1.6293105 | 28.1304 | 9.7092 | 3835.4 | 4.9485 | 3840.4 | 0.00 | 0.7610 |
| 1.6374571 | 28.1761 | 9.6375 | 3788.1 | 4.9468 | 3793.1 | 0.00 | 0.7572 |
| 1.6456443 | 28.2207 | 9.5663 | 3741.5 | 4.9451 | 3746.4 | 0.00 | 0.7534 |
| 1.6538726 | 28.2644 | 9.4957 | 3695.4 | 4.9433 | 3700.3 | 0.00 | 0.7497 |
| 1.6621419 | 28.3071 | 9.4256 | 3649.9 | 4.9414 | 3654.8 | 0.00 | 0.7459 |
| 1.6704526 | 28.3489 | 9.3561 | 3604.9 | 4.9395 | 3609.8 | 0.00 | 0.7422 |
| 1.6788049 | 28.3898 | 9.2870 | 3560.5 | 4.9374 | 3565.4 | 0.00 | 0.7385 |
| 1.6871989 | 28.4298 | 9.2185 | 3516.6 | 4.9353 | 3521.6 | 0.00 | 0.7349 |
| 1.6956349 | 28.4690 | 9.1505 | 3473.3 | 4.9330 | 3478.3 | 0.00 | 0.7312 |
| 1.7041131 | 28.5073 | 9.0830 | 3430.6 | 4.9307 | 3435.5 | 0.00 | 0.7276 |
| 1.7126337 | 28.5449 | 9.0160 | 3388.3 | 4.9284 | 3393.2 | 0.00 | 0.7239 |
| 1.7211968 | 28.5816 | 8.9495 | 3346.6 | 4.9259 | 3351.5 | 0.00 | 0.7203 |
| 1.7298028 | 28.6175 | 8.8835 | 3305.4 | 4.9233 | 3310.3 | 0.00 | 0.7168 |
| 1.7384518 | 28.6527 | 8.8180 | 3264.7 | 4.9207 | 3269.6 | 0.00 | 0.7132 |
| 1.7471441 | 28.6872 | 8.7530 | 3224.5 | 4.9180 | 3229.4 | 0.00 | 0.7096 |
| 1.7558798 | 28.7209 | 8.6884 | 3184.8 | 4.9152 | 3189.7 | 0.00 | 0.7061 |
| 1.7646592 | 28.7539 | 8.6244 | 3145.6 | 4.9123 | 3150.5 | 0.00 | 0.7026 |
| 1.7734825 | 28.7862 | 8.5608 | 3106.9 | 4.9094 | 3111.8 | 0.00 | 0.6991 |
| 1.7823499 | 28.8179 | 8.4977 | 3068.6 | 4.9063 | 3073.5 | 0.00 | 0.6956 |
| 1.7912617 | 28.8489 | 8.4350 | 3030.8 | 4.9032 | 3035.7 | 0.00 | 0.6922 |
| 1.8002180 | 28.8793 | 8.3728 | 2993.5 | 4.9000 | 2998.4 | 0.00 | 0.6887 |
| 1.8092191 | 28.9090 | 8.3111 | 2956.7 | 4.8967 | 2961.6 | 0.00 | 0.6853 |
| 1.8182652 | 28.9381 | 8.2499 | 2920.3 | 4.8934 | 2925.2 | 0.00 | 0.6819 |
| 1.8273565 | 28.9666 | 8.1891 | 2884.3 | 4.8899 | 2889.2 | 0.00 | 0.6785 |
| 1.8364933 | 28.9946 | 8.1287 | 2848.8 | 4.8864 | 2853.7 | 0.00 | 0.6751 |
| 1.8456757 | 29.0220 | 8.0688 | 2813.8 | 4.8828 | 2818.6 | 0.00 | 0.6718 |
| 1.8549041 | 29.0488 | 8.0093 | 2779.1 | 4.8792 | 2784.0 | 0.00 | 0.6684 |
| 1.8641786 | 29.0750 | 7.9503 | 2744.9 | 4.8754 | 2749.8 | 0.00 | 0.6651 |
| 1.8734995 | 29.1008 | 7.8917 | 2711.1 | 4.8716 | 2716.0 | 0.00 | 0.6618 |
| 1.8828670 | 29.1260 | 7.8335 | 2677.8 | 4.8677 | 2682.6 | 0.00 | 0.6585 |
| 1.8922814 | 29.1507 | 7.7758 | 2644.8 | 4.8637 | 2649.7 | 0.00 | 0.6552 |
| 1.9017428 | 29.1750 | 7.7185 | 2612.3 | 4.8596 | 2617.1 | 0.00 | 0.6520 |
| 1.9112515 | 29.1987 | 7.6616 | 2580.1 | 4.8555 | 2585.0 | 0.00 | 0.6487 |
| 1.9208077 | 29.2220 | 7.6052 | 2548.4 | 4.8513 | 2553.2 | 0.00 | 0.6455 |
| 1.9304118 | 29.2448 | 7.5491 | 2517.0 | 4.8470 | 2521.8 | 0.00 | 0.6423 |
| 1.9400638 | 29.2672 | 7.4935 | 2486.0 | 4.8426 | 2490.9 | 0.00 | 0.6391 |
| 1.9497642 | 29.2892 | 7.4383 | 2455.4 | 4.8382 | 2460.3 | 0.00 | 0.6359 |
| 1.9595130 | 29.3107 | 7.3835 | 2425.2 | 4.8336 | 2430.0 | 0.00 | 0.6327 |
| 1.9693105 | 29.3318 | 7.3291 | 2395.4 | 4.8290 | 2400.2 | 0.00 | 0.6296 |
| 1.9791571 | 29.3526 | 7.2751 | 2365.9 | 4.8244 | 2370.7 | 0.00 | 0.6264 |
| 1.9890529 | 29.3730 | 7.2216 | 2336.8 | 4.8196 | 2341.6 | 0.00 | 0.6233 |
| 1.9989981 | 29.3930 | 7.1684 | 2308.0 | 4.8148 | 2312.8 | 0.00 | 0.6202 |
| 2.0089931 | 29.4126 | 7.1156 | 2279.6 | 4.8099 | 2284.5 | 0.00 | 0.6171 |
| 2.0190381 | 29.4320 | 7.0632 | 2251.6 | 4.8049 | 2256.4 | 0.00 | 0.6141 |
| 2.0291333 | 29.4510 | 7.0112 | 2223.9 | 4.7999 | 2228.7 | 0.00 | 0.6110 |
| 2.0392790 | 29.4697 | 6.9596 | 2196.5 | 4.7948 | 2201.3 | 0.00 | 0.6080 |
| 2.0494754 | 29.6021 | 6.9060 | 2168.8 | 4.7896 | 2173.6 | 0.00 | 0.6050 |
| 2.0597227 | 29.6199 | 6.8528 | 2141.4 | 4.7843 | 2146.2 | 0.00 | 0.6019 |
| 2.0700213 | 29.6373 | 6.8000 | 2114.3 | 4.7790 | 2119.1 | 0.00 | 0.5990 |
| 2.0803714 | 29.6541 | 6.7476 | 2087.6 | 4.7736 | 2092.3 | 0.00 | 0.5960 |
| 2.0907733 | 29.7278 | 6.6950 | 2061.0 | 4.7681 | 2065.8 | 0.00 | 0.5930 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Zn ($Z=30$) | | | | | | | |
| 2.1012272 | 29.7436 | 6.6423 | 2034.6 | 4.7625 | 2039.4 | 0.00 | 0.5901 |
| 2.1117333 | 29.7589 | 6.5900 | 2008.5 | 4.7569 | 2013.3 | 0.00 | 0.5871 |
| 2.1222920 | 29.7737 | 6.5380 | 1982.8 | 4.7512 | 1987.5 | 0.00 | 0.5842 |
| 2.1329034 | 29.7879 | 6.4865 | 1957.4 | 4.7455 | 1962.1 | 0.00 | 0.5813 |
| 2.1435680 | 29.8017 | 6.4354 | 1932.3 | 4.7396 | 1937.0 | 0.00 | 0.5784 |
| 2.1542858 | 29.8149 | 6.3847 | 1907.5 | 4.7337 | 1912.3 | 0.00 | 0.5755 |
| 2.1650572 | 29.8278 | 6.3345 | 1883.1 | 4.7278 | 1887.8 | 0.00 | 0.5727 |
| 2.1758825 | 29.8401 | 6.2846 | 1859.0 | 4.7217 | 1863.7 | 0.00 | 0.5698 |
| 2.1867619 | 29.8521 | 6.2351 | 1835.2 | 4.7156 | 1839.9 | 0.00 | 0.5670 |
| 2.1976957 | 29.8637 | 6.1860 | 1811.7 | 4.7094 | 1816.4 | 0.00 | 0.5642 |
| 2.2086842 | 29.8748 | 6.1373 | 1788.5 | 4.7032 | 1793.2 | 0.00 | 0.5613 |
| 2.2197276 | 29.8856 | 6.0890 | 1765.5 | 4.6969 | 1770.2 | 0.00 | 0.5586 |
| 2.2308263 | 29.8960 | 6.0411 | 1742.9 | 4.6905 | 1747.6 | 0.00 | 0.5558 |
| 2.2419804 | 29.9061 | 5.9935 | 1720.6 | 4.6840 | 1725.3 | 0.00 | 0.5530 |
| 2.2531903 | 29.9158 | 5.9464 | 1698.6 | 4.6775 | 1703.3 | 0.00 | 0.5503 |
| 2.2644562 | 29.9252 | 5.8996 | 1676.9 | 4.6710 | 1681.5 | 0.00 | 0.5475 |
| 2.2757785 | 29.9343 | 5.8532 | 1655.4 | 4.6643 | 1660.1 | 0.00 | 0.5448 |
| 2.2871574 | 29.9430 | 5.8072 | 1634.2 | 4.6576 | 1638.9 | 0.00 | 0.5421 |
| 2.2985932 | 29.9515 | 5.7616 | 1613.3 | 4.6508 | 1617.9 | 0.00 | 0.5394 |
| 2.3100862 | 29.9596 | 5.7163 | 1592.7 | 4.6440 | 1597.3 | 0.00 | 0.5367 |
| 2.3216366 | 29.9675 | 5.6714 | 1572.3 | 4.6371 | 1576.9 | 0.00 | 0.5340 |
| 2.3332448 | 29.9751 | 5.6269 | 1552.2 | 4.6301 | 1556.8 | 0.00 | 0.5314 |
| 2.3449110 | 29.9824 | 5.5827 | 1532.3 | 4.6231 | 1537.0 | 0.00 | 0.5287 |
| 2.3566356 | 29.9895 | 5.5389 | 1512.8 | 4.6160 | 1517.4 | 0.00 | 0.5261 |
| 2.3684187 | 29.9964 | 5.4955 | 1493.4 | 4.6088 | 1498.0 | 0.00 | 0.5235 |
| 2.3802608 | 30.0030 | 5.4524 | 1474.3 | 4.6016 | 1478.9 | 0.00 | 0.5209 |
| 2.3921621 | 30.0496 | 5.4093 | 1455.4 | 4.5943 | 1460.0 | 0.00 | 0.5183 |
| 2.4041230 | 30.0559 | 5.3661 | 1436.6 | 4.5870 | 1441.2 | 0.00 | 0.5157 |
| 2.4161436 | 30.0619 | 5.3232 | 1418.0 | 4.5796 | 1422.6 | 0.00 | 0.5131 |
| 2.4282243 | 30.0676 | 5.2806 | 1399.7 | 4.5721 | 1404.3 | 0.00 | 0.5106 |
| 2.4403654 | 30.0730 | 5.2385 | 1381.6 | 4.5646 | 1386.2 | 0.00 | 0.5081 |
| 2.4525672 | 30.0782 | 5.1966 | 1363.7 | 4.5570 | 1368.3 | 0.00 | 0.5055 |
| 2.4648301 | 30.0831 | 5.1551 | 1346.1 | 4.5494 | 1350.7 | 0.00 | 0.5030 |
| 2.4771542 | 30.0877 | 5.1140 | 1328.7 | 4.5417 | 1333.3 | 0.00 | 0.5005 |
| 2.4895400 | 30.0921 | 5.0732 | 1311.6 | 4.5339 | 1316.1 | 0.00 | 0.4980 |
| 2.5019877 | 30.0962 | 5.0327 | 1294.6 | 4.5261 | 1299.2 | 0.00 | 0.4955 |
| 2.5144976 | 30.1001 | 4.9925 | 1277.9 | 4.5182 | 1282.4 | 0.00 | 0.4931 |
| 2.5270701 | 30.1038 | 4.9527 | 1261.4 | 4.5103 | 1265.9 | 0.00 | 0.4906 |
| 2.5397055 | 30.1073 | 4.9133 | 1245.1 | 4.5023 | 1249.7 | 0.00 | 0.4882 |
| 2.5524040 | 30.1105 | 4.8741 | 1229.1 | 4.4942 | 1233.6 | 0.00 | 0.4858 |
| 2.5651660 | 30.1136 | 4.8351 | 1213.2 | 4.4861 | 1217.7 | 0.00 | 0.4833 |
| 2.5779919 | 30.1165 | 4.7965 | 1197.5 | 4.4780 | 1202.0 | 0.00 | 0.4809 |
| 2.5908818 | 30.1191 | 4.7582 | 1182.0 | 4.4698 | 1186.5 | 0.00 | 0.4785 |
| 2.6038362 | 30.1216 | 4.7202 | 1166.7 | 4.4615 | 1171.2 | 0.00 | 0.4762 |
| 2.6168554 | 30.1239 | 4.6825 | 1151.7 | 4.4532 | 1156.1 | 0.00 | 0.4738 |
| 2.6299397 | 30.1260 | 4.6451 | 1136.8 | 4.4448 | 1141.2 | 0.00 | 0.4714 |
| 2.6430894 | 30.1280 | 4.6080 | 1122.1 | 4.4364 | 1126.6 | 0.00 | 0.4691 |
| 2.6563048 | 30.1297 | 4.5713 | 1107.6 | 4.4279 | 1112.1 | 0.00 | 0.4668 |
| 2.6695863 | 30.1313 | 4.5348 | 1093.3 | 4.4193 | 1097.7 | 0.00 | 0.4644 |
| 2.6829343 | 30.1328 | 4.4987 | 1079.2 | 4.4107 | 1083.6 | 0.00 | 0.4621 |
| 2.6963489 | 30.1341 | 4.4629 | 1065.3 | 4.4021 | 1069.7 | 0.00 | 0.4598 |
| 2.7098307 | 30.1353 | 4.4273 | 1051.6 | 4.3934 | 1055.9 | 0.00 | 0.4575 |
| 2.7233798 | 30.1363 | 4.3921 | 1038.0 | 4.3847 | 1042.4 | 0.00 | 0.4553 |
| 2.7369967 | 30.1372 | 4.3571 | 1024.6 | 4.3759 | 1029.0 | 0.00 | 0.4530 |
| 2.7506817 | 30.1379 | 4.3225 | 1011.4 | 4.3670 | 1015.8 | 0.00 | 0.4507 |
| 2.7644351 | 30.1386 | 4.2881 | 998.38 | 4.3581 | 1002.7 | 0.00 | 0.4485 |
| 2.7782573 | 30.1391 | 4.2541 | 985.52 | 4.3492 | 989.87 | 0.00 | 0.4463 |
| 2.7921486 | 30.1395 | 4.2203 | 972.83 | 4.3402 | 977.17 | 0.00 | 0.4440 |
| 2.8061093 | 30.1397 | 4.1868 | 960.30 | 4.3312 | 964.64 | 0.00 | 0.4418 |
| 2.8201399 | 30.1399 | 4.1536 | 947.95 | 4.3221 | 952.27 | 0.00 | 0.4396 |
| 2.8342406 | 30.1400 | 4.1206 | 935.75 | 4.3129 | 940.06 | 0.00 | 0.4375 |
| 2.8484118 | 30.1400 | 4.0880 | 923.72 | 4.3038 | 928.02 | 0.00 | 0.4353 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Zn ($Z=30$) | | | | | | | |
| 2.8626539 | 30.1399 | 4.0556 | 911.84 | 4.2945 | 916.13 | 0.00 | 0.4331 |
| 2.8769671 | 30.1397 | 4.0235 | 900.12 | 4.2853 | 904.40 | 0.00 | 0.4310 |
| 2.8913520 | 30.1394 | 3.9916 | 888.55 | 4.2759 | 892.83 | 0.00 | 0.4288 |
| 2.9058087 | 30.1391 | 3.9601 | 877.14 | 4.2666 | 881.41 | 0.00 | 0.4267 |
| 2.9203378 | 30.1387 | 3.9288 | 865.88 | 4.2572 | 870.13 | 0.00 | 0.4246 |
| 2.9349394 | 30.1382 | 3.8977 | 854.76 | 4.2477 | 859.01 | 0.00 | 0.4224 |
| 2.9496141 | 30.1377 | 3.8669 | 843.79 | 4.2382 | 848.03 | 0.00 | 0.4203 |
| 2.9643622 | 30.1372 | 3.8364 | 832.97 | 4.2287 | 837.20 | 0.00 | 0.4182 |
| 2.9791840 | 30.1366 | 3.8062 | 822.29 | 4.2191 | 826.51 | 0.00 | 0.4162 |
| 2.9940799 | 30.1360 | 3.7762 | 811.75 | 4.2094 | 815.96 | 0.00 | 0.4141 |
| 3.0090503 | 30.1369 | 3.7445 | 800.94 | 4.1998 | 805.14 | 0.00 | 0.4120 |
| 3.0240956 | 30.1381 | 3.7119 | 790.01 | 4.1901 | 794.20 | 0.00 | 0.4100 |
| 3.0392161 | 30.1387 | 3.6796 | 779.24 | 4.1803 | 783.42 | 0.00 | 0.4079 |
| 3.0544122 | 30.1388 | 3.6475 | 768.61 | 4.1705 | 772.78 | 0.00 | 0.4059 |
| 3.0696842 | 30.1383 | 3.6158 | 758.14 | 4.1607 | 762.30 | 0.00 | 0.4039 |
| 3.0850326 | 30.1375 | 3.5844 | 747.81 | 4.1508 | 751.96 | 0.00 | 0.4019 |
| 3.1004578 | 30.1364 | 3.5532 | 737.62 | 4.1409 | 741.76 | 0.00 | 0.3999 |
| 3.1159601 | 30.1349 | 3.5224 | 727.58 | 4.1310 | 731.71 | 0.00 | 0.3979 |
| 3.1315399 | 30.1331 | 3.4918 | 717.68 | 4.1210 | 721.80 | 0.00 | 0.3959 |
| 3.1471976 | 30.1312 | 3.4615 | 707.91 | 4.1109 | 712.02 | 0.00 | 0.3940 |
| 3.1629336 | 30.1289 | 3.4315 | 698.28 | 4.1009 | 702.38 | 0.00 | 0.3920 |
| 3.1787482 | 30.1265 | 3.4018 | 688.79 | 4.0908 | 692.88 | 0.00 | 0.3900 |
| 3.1946420 | 30.1239 | 3.3723 | 679.43 | 4.0806 | 683.51 | 0.00 | 0.3881 |
| 3.2106152 | 30.1211 | 3.3432 | 670.20 | 4.0705 | 674.27 | 0.00 | 0.3862 |
| 3.2266683 | 30.1181 | 3.3142 | 661.10 | 4.0603 | 665.16 | 0.00 | 0.3842 |
| 3.2428016 | 30.1149 | 3.2856 | 652.12 | 4.0500 | 656.17 | 0.00 | 0.3823 |
| 3.2590156 | 30.1116 | 3.2572 | 643.27 | 4.0397 | 647.31 | 0.00 | 0.3804 |
| 3.2753107 | 30.1082 | 3.2291 | 634.54 | 4.0294 | 638.57 | 0.00 | 0.3785 |
| 3.2916873 | 30.1046 | 3.2012 | 625.94 | 4.0191 | 629.96 | 0.00 | 0.3767 |
| 3.3081457 | 30.1009 | 3.1736 | 617.45 | 4.0087 | 621.46 | 0.00 | 0.3748 |
| 3.3246864 | 30.0970 | 3.1462 | 609.08 | 3.9983 | 613.08 | 0.00 | 0.3729 |
| 3.3413099 | 30.0930 | 3.1191 | 600.83 | 3.9878 | 604.82 | 0.00 | 0.3711 |
| 3.3580164 | 30.0890 | 3.0923 | 592.69 | 3.9774 | 596.67 | 0.00 | 0.3692 |
| 3.3748065 | 30.0848 | 3.0657 | 584.67 | 3.9668 | 588.64 | 0.00 | 0.3674 |
| 3.3916805 | 30.0805 | 3.0393 | 576.76 | 3.9563 | 580.72 | 0.00 | 0.3656 |
| 3.4086389 | 30.0761 | 3.0132 | 568.96 | 3.9457 | 572.90 | 0.00 | 0.3637 |
| 3.4256821 | 30.0716 | 2.9873 | 561.26 | 3.9351 | 565.20 | 0.00 | 0.3619 |
| 3.4428105 | 30.0670 | 2.9617 | 553.68 | 3.9245 | 557.60 | 0.00 | 0.3601 |
| 3.4600246 | 30.0624 | 2.9362 | 546.19 | 3.9138 | 550.11 | 0.00 | 0.3583 |
| 3.4773247 | 30.0576 | 2.9111 | 538.82 | 3.9032 | 542.72 | 0.00 | 0.3566 |
| 3.4947113 | 30.0528 | 2.8861 | 531.54 | 3.8924 | 535.43 | 0.00 | 0.3548 |
| 3.5121849 | 30.0479 | 2.8614 | 524.37 | 3.8817 | 528.25 | 0.00 | 0.3530 |
| 3.5297458 | 30.0429 | 2.8369 | 517.29 | 3.8709 | 521.16 | 0.00 | 0.3513 |
| 3.5473945 | 30.0379 | 2.8126 | 510.31 | 3.8601 | 514.17 | 0.00 | 0.3495 |
| 3.5651315 | 30.0327 | 2.7886 | 503.43 | 3.8493 | 507.28 | 0.00 | 0.3478 |
| 3.5829572 | 30.0276 | 2.7647 | 496.65 | 3.8384 | 500.49 | 0.00 | 0.3460 |
| 3.6008719 | 30.0223 | 2.7411 | 489.96 | 3.8276 | 493.78 | 0.00 | 0.3443 |
| 3.6188763 | 30.0170 | 2.7177 | 483.36 | 3.8167 | 487.17 | 0.00 | 0.3426 |
| 3.6369707 | 30.0116 | 2.6946 | 476.85 | 3.8057 | 480.66 | 0.00 | 0.3409 |
| 3.6551555 | 30.0062 | 2.6716 | 470.43 | 3.7948 | 474.23 | 0.00 | 0.3392 |
| 3.6734313 | 30.0007 | 2.6488 | 464.10 | 3.7838 | 467.89 | 0.00 | 0.3375 |
| 3.6917985 | 29.9952 | 2.6263 | 457.86 | 3.7728 | 461.63 | 0.00 | 0.3358 |
| 3.7102575 | 29.9896 | 2.6039 | 451.70 | 3.7618 | 455.46 | 0.00 | 0.3342 |
| 3.7288088 | 29.9840 | 2.5817 | 445.63 | 3.7507 | 449.38 | 0.00 | 0.3325 |
| 3.7474528 | 29.9783 | 2.5598 | 439.64 | 3.7397 | 443.38 | 0.00 | 0.3308 |
| 3.7661901 | 29.9726 | 2.5380 | 433.73 | 3.7286 | 437.46 | 0.00 | 0.3292 |
| 3.7850210 | 29.9668 | 2.5164 | 427.91 | 3.7175 | 431.63 | 0.00 | 0.3276 |
| 3.8039461 | 29.9610 | 2.4951 | 422.16 | 3.7063 | 425.87 | 0.00 | 0.3259 |
| 3.8229659 | 29.9551 | 2.4739 | 416.50 | 3.6952 | 420.19 | 0.00 | 0.3243 |
| 3.8420807 | 29.9492 | 2.4529 | 410.91 | 3.6840 | 414.60 | 0.00 | 0.3227 |
| 3.8612911 | 29.9433 | 2.4321 | 405.40 | 3.6728 | 409.07 | 0.00 | 0.3211 |
| 3.8805975 | 29.9374 | 2.4115 | 399.97 | 3.6616 | 403.63 | 0.00 | 0.3195 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Zn ($Z=30$) | | | | | | | |
| 3.9000005 | 29.9314 | 2.3911 | 394.61 | 3.6504 | 398.26 | 0.00 | 0.3179 |
| 3.9195005 | 29.9253 | 2.3709 | 389.32 | 3.6391 | 392.96 | 0.00 | 0.3163 |
| 3.9390980 | 29.9193 | 2.3508 | 384.11 | 3.6279 | 387.74 | 0.00 | 0.3148 |
| 3.9587935 | 29.9132 | 2.3310 | 378.97 | 3.6166 | 382.59 | 0.00 | 0.3132 |
| 3.9785875 | 29.9071 | 2.3113 | 373.90 | 3.6053 | 377.51 | 0.00 | 0.3116 |
| 3.9984804 | 29.9009 | 2.2918 | 368.90 | 3.5940 | 372.49 | 0.00 | 0.3101 |
| 4.0184728 | 29.8948 | 2.2724 | 363.97 | 3.5827 | 367.55 | 0.00 | 0.3085 |
| 4.0385652 | 29.8886 | 2.2533 | 359.11 | 3.5713 | 362.68 | 0.00 | 0.3070 |
| 4.0587580 | 29.8824 | 2.2343 | 354.31 | 3.5599 | 357.87 | 0.00 | 0.3055 |
| 4.0790518 | 29.8762 | 2.2155 | 349.58 | 3.5486 | 353.13 | 0.00 | 0.3040 |
| 4.0994471 | 29.8699 | 2.1969 | 344.91 | 3.5372 | 348.45 | 0.00 | 0.3024 |
| 4.1199443 | 29.8636 | 2.1784 | 340.31 | 3.5258 | 343.84 | 0.00 | 0.3009 |
| 4.1405440 | 29.8574 | 2.1601 | 335.77 | 3.5144 | 339.29 | 0.00 | 0.2994 |
| 4.1612467 | 29.8511 | 2.1419 | 331.30 | 3.5029 | 334.80 | 0.00 | 0.2979 |
| 4.1820530 | 29.8447 | 2.1240 | 326.88 | 3.4915 | 330.37 | 0.00 | 0.2965 |
| 4.2029632 | 29.8384 | 2.1062 | 322.53 | 3.4800 | 326.01 | 0.00 | 0.2950 |
| 4.2239781 | 29.8321 | 2.0885 | 318.23 | 3.4686 | 321.70 | 0.00 | 0.2935 |
| 4.2450980 | 29.8257 | 2.0710 | 314.00 | 3.4571 | 317.46 | 0.00 | 0.2921 |
| 4.2663234 | 29.8194 | 2.0537 | 309.82 | 3.4456 | 313.27 | 0.00 | 0.2906 |
| 4.2876551 | 29.8130 | 2.0365 | 305.70 | 3.4341 | 309.13 | 0.00 | 0.2892 |
| 4.3090933 | 29.8066 | 2.0195 | 301.64 | 3.4226 | 305.06 | 0.00 | 0.2877 |
| 4.3306388 | 29.8003 | 2.0026 | 297.63 | 3.4111 | 301.04 | 0.00 | 0.2863 |
| 4.3522920 | 29.7939 | 1.9859 | 293.67 | 3.3995 | 297.07 | 0.00 | 0.2849 |
| 4.3740535 | 29.7875 | 1.9693 | 289.78 | 3.3880 | 293.16 | 0.00 | 0.2835 |
| 4.3959237 | 29.7811 | 1.9529 | 285.93 | 3.3765 | 289.31 | 0.00 | 0.2820 |
| 4.4179033 | 29.7748 | 1.9366 | 282.14 | 3.3649 | 285.50 | 0.00 | 0.2806 |
| 4.4399929 | 29.7684 | 1.9198 | 278.30 | 3.3533 | 281.65 | 0.00 | 0.2792 |
| 4.4621928 | 29.7620 | 1.9032 | 274.51 | 3.3418 | 277.85 | 0.00 | 0.2779 |
| 4.4845038 | 29.7555 | 1.8867 | 270.78 | 3.3302 | 274.11 | 0.00 | 0.2765 |
| 4.5069263 | 29.7490 | 1.8703 | 267.10 | 3.3186 | 270.42 | 0.00 | 0.2751 |
| 4.5294609 | 29.7424 | 1.8540 | 263.45 | 3.3070 | 266.76 | 0.00 | 0.2737 |
| 4.5521082 | 29.7358 | 1.8376 | 259.82 | 3.2954 | 263.12 | 0.00 | 0.2724 |
| 4.5748688 | 29.7291 | 1.8214 | 256.25 | 3.2838 | 259.53 | 0.00 | 0.2710 |
| 4.5977431 | 29.7224 | 1.8054 | 252.73 | 3.2722 | 256.00 | 0.00 | 0.2697 |
| 4.6207318 | 29.7156 | 1.7895 | 249.26 | 3.2606 | 252.52 | 0.00 | 0.2683 |
| 4.6438355 | 29.7087 | 1.7737 | 245.84 | 3.2490 | 249.08 | 0.00 | 0.2670 |
| 4.6670547 | 29.7018 | 1.7581 | 242.46 | 3.2374 | 245.70 | 0.00 | 0.2657 |
| 4.6903900 | 29.6949 | 1.7427 | 239.14 | 3.2258 | 242.36 | 0.00 | 0.2643 |
| 4.7138419 | 29.6879 | 1.7274 | 235.86 | 3.2142 | 239.07 | 0.00 | 0.2630 |
| 4.7374111 | 29.6809 | 1.7123 | 232.63 | 3.2025 | 235.83 | 0.00 | 0.2617 |
| 4.7610982 | 29.6738 | 1.6973 | 229.44 | 3.1909 | 232.63 | 0.00 | 0.2604 |
| 4.7849037 | 29.6667 | 1.6824 | 226.30 | 3.1793 | 229.48 | 0.00 | 0.2591 |
| 4.8088282 | 29.6595 | 1.6677 | 223.21 | 3.1676 | 226.38 | 0.00 | 0.2578 |
| 4.8328723 | 29.6523 | 1.6531 | 220.16 | 3.1560 | 223.31 | 0.00 | 0.2565 |
| 4.8570367 | 29.6451 | 1.6387 | 217.15 | 3.1444 | 220.29 | 0.00 | 0.2553 |
| 4.8813219 | 29.6379 | 1.6244 | 214.19 | 3.1328 | 217.32 | 0.00 | 0.2540 |
| 4.9057285 | 29.6306 | 1.6102 | 211.26 | 3.1211 | 214.38 | 0.00 | 0.2527 |
| 4.9302571 | 29.6233 | 1.5962 | 208.38 | 3.1095 | 211.49 | 0.00 | 0.2515 |
| 4.9549084 | 29.6160 | 1.5823 | 205.54 | 3.0979 | 208.64 | 0.00 | 0.2502 |
| 4.9796829 | 29.6086 | 1.5686 | 202.74 | 3.0862 | 205.83 | 0.00 | 0.2490 |
| 5.0045814 | 29.6012 | 1.5550 | 199.98 | 3.0746 | 203.06 | 0.00 | 0.2477 |
| 5.0296043 | 29.5938 | 1.5415 | 197.26 | 3.0630 | 200.32 | 0.00 | 0.2465 |
| 5.0547523 | 29.5864 | 1.5281 | 194.58 | 3.0513 | 197.63 | 0.00 | 0.2453 |
| 5.0800260 | 29.5789 | 1.5149 | 191.93 | 3.0397 | 194.97 | 0.00 | 0.2441 |
| 5.1054262 | 29.5714 | 1.5018 | 189.32 | 3.0281 | 192.35 | 0.00 | 0.2428 |
| 5.1309533 | 29.5639 | 1.4888 | 186.75 | 3.0165 | 189.77 | 0.00 | 0.2416 |
| 5.1566081 | 29.5564 | 1.4759 | 184.22 | 3.0049 | 187.22 | 0.00 | 0.2404 |
| 5.1823911 | 29.5489 | 1.4630 | 181.69 | 2.9933 | 184.69 | 0.00 | 0.2392 |
| 5.2083031 | 29.5414 | 1.4498 | 179.16 | 2.9817 | 182.14 | 0.00 | 0.2381 |
| 5.2343446 | 29.5337 | 1.4367 | 176.66 | 2.9701 | 179.63 | 0.00 | 0.2369 |
| 5.2605163 | 29.5260 | 1.4238 | 174.20 | 2.9585 | 177.16 | 0.00 | 0.2357 |
| 5.2868189 | 29.5183 | 1.4109 | 171.77 | 2.9469 | 174.72 | 0.00 | 0.2345 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Zn ($Z=30$) | | | | | | | |
| 5.3132530 | 29.5105 | 1.3982 | 169.38 | 2.9353 | 172.31 | 0.00 | 0.2333 |
| 5.3398192 | 29.5026 | 1.3857 | 167.02 | 2.9237 | 169.94 | 0.00 | 0.2322 |
| 5.3665183 | 29.4947 | 1.3732 | 164.70 | 2.9122 | 167.61 | 0.00 | 0.2310 |
| 5.3933509 | 29.4867 | 1.3609 | 162.40 | 2.9006 | 165.30 | 0.00 | 0.2299 |
| 5.4203177 | 29.4787 | 1.3487 | 160.15 | 2.8890 | 163.03 | 0.00 | 0.2287 |
| 5.4474193 | 29.4706 | 1.3366 | 157.92 | 2.8775 | 160.80 | 0.00 | 0.2276 |
| 5.4746564 | 29.4625 | 1.3246 | 155.72 | 2.8659 | 158.59 | 0.00 | 0.2265 |
| 5.5020297 | 29.4543 | 1.3127 | 153.56 | 2.8544 | 156.42 | 0.00 | 0.2253 |
| 5.5295398 | 29.4461 | 1.3010 | 151.43 | 2.8429 | 154.27 | 0.00 | 0.2242 |
| 5.5571875 | 29.4378 | 1.2893 | 149.33 | 2.8314 | 152.16 | 0.00 | 0.2231 |
| 5.5849734 | 29.4294 | 1.2778 | 147.26 | 2.8199 | 150.07 | 0.00 | 0.2220 |
| 5.6128983 | 29.4210 | 1.2664 | 145.21 | 2.8084 | 148.02 | 0.00 | 0.2209 |
| 5.6409628 | 29.4126 | 1.2550 | 143.20 | 2.7969 | 146.00 | 0.00 | 0.2198 |
| 5.6691676 | 29.4041 | 1.2438 | 141.21 | 2.7854 | 144.00 | 0.00 | 0.2187 |
| 5.6975135 | 29.3955 | 1.2327 | 139.26 | 2.7739 | 142.03 | 0.00 | 0.2176 |
| 5.7260010 | 29.3870 | 1.2217 | 137.33 | 2.7625 | 140.09 | 0.00 | 0.2165 |
| 5.7546310 | 29.3783 | 1.2109 | 135.43 | 2.7510 | 138.18 | 0.00 | 0.2155 |
| 5.7834042 | 29.3696 | 1.2001 | 133.55 | 2.7396 | 136.29 | 0.00 | 0.2144 |
| 5.8123212 | 29.3608 | 1.1894 | 131.71 | 2.7282 | 134.44 | 0.00 | 0.2133 |
| 5.8413828 | 29.3520 | 1.1788 | 129.89 | 2.7167 | 132.60 | 0.00 | 0.2123 |
| 5.8705897 | 29.3432 | 1.1683 | 128.09 | 2.7053 | 130.80 | 0.00 | 0.2112 |
| 5.8999427 | 29.3342 | 1.1579 | 126.32 | 2.6940 | 129.02 | 0.00 | 0.2101 |
| 5.9294424 | 29.3253 | 1.1477 | 124.58 | 2.6826 | 127.26 | 0.00 | 0.2091 |
| 5.9590896 | 29.3162 | 1.1375 | 122.86 | 2.6712 | 125.53 | 0.00 | 0.2081 |
| 5.9888850 | 29.3071 | 1.1274 | 121.16 | 2.6599 | 123.82 | 0.00 | 0.2070 |
| 6.0188295 | 29.2980 | 1.1174 | 119.49 | 2.6485 | 122.14 | 0.00 | 0.2060 |
| 6.0489236 | 29.2887 | 1.1075 | 117.84 | 2.6372 | 120.48 | 0.00 | 0.2050 |
| 6.0791682 | 29.2795 | 1.0977 | 116.22 | 2.6259 | 118.84 | 0.00 | 0.2039 |
| 6.1095641 | 29.2701 | 1.0880 | 114.62 | 2.6146 | 117.23 | 0.00 | 0.2029 |
| 6.1401119 | 29.2607 | 1.0784 | 113.04 | 2.6033 | 115.64 | 0.00 | 0.2019 |
| 6.1708125 | 29.2512 | 1.0688 | 111.48 | 2.5920 | 114.07 | 0.00 | 0.2009 |
| 6.2016665 | 29.2416 | 1.0594 | 109.95 | 2.5808 | 112.53 | 0.00 | 0.1999 |
| 6.2326749 | 29.2320 | 1.0500 | 108.43 | 2.5696 | 111.00 | 0.00 | 0.1989 |
| 6.2638382 | 29.2223 | 1.0408 | 106.94 | 2.5583 | 109.50 | 0.00 | 0.1979 |
| 6.2951574 | 29.2125 | 1.0316 | 105.47 | 2.5471 | 108.02 | 0.00 | 0.1970 |
| 6.3266332 | 29.2027 | 1.0225 | 104.02 | 2.5359 | 106.56 | 0.00 | 0.1960 |
| 6.3582664 | 29.1928 | 1.0135 | 102.59 | 2.5248 | 105.12 | 0.00 | 0.1950 |
| 6.3900577 | 29.1827 | 1.0046 | 101.19 | 2.5136 | 103.70 | 0.00 | 0.1940 |
| 6.4220080 | 29.1726 | 0.99576 | 99.797 | 2.5025 | 102.30 | 0.00 | 0.1931 |
| 6.4541180 | 29.1624 | 0.98700 | 98.427 | 2.4914 | 100.92 | 0.00 | 0.1921 |
| 6.4863886 | 29.1522 | 0.97833 | 97.077 | 2.4802 | 99.558 | 0.00 | 0.1911 |
| 6.5188206 | 29.1418 | 0.96975 | 95.746 | 2.4692 | 98.216 | 0.00 | 0.1902 |
| 6.5514147 | 29.1313 | 0.96124 | 94.434 | 2.4581 | 96.892 | 0.00 | 0.1892 |
| 6.5841717 | 29.1207 | 0.95281 | 93.141 | 2.4470 | 95.588 | 0.00 | 0.1883 |
| Ga ($Z=31$) | | | | | | | |
| Atomic weight: $A_r=69.72000 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=5.8770$ | | | | | | | |
| $\sigma_a (\text{barns/atom})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 115.773$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2(e \text{ atom}^{-1})\times 6.03562\times 10^5$ | | | | | | | |
| 9 edges. Edge energies (keV) | | | | | | | |
| K | 10.3671 | L I | 1.29770 | L II | 1.14230 | L III | 1.11540 |
| M I | 0.158100 | M II | 0.106800 | M III | 0.102900 | M IV | 0.0174000 |
| M V | 0.0174000 | | | | | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-0.16423, -0.10320) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.0075615 e \text{ atom}^{-1}$ | | | | | | | |
| 0.90000000 | 20.4665 | 2.9826 | 2000.2 | 4.4663 | 2004.6 | 0.00 | 1.378 |
| 0.90450000 | 20.4043 | 2.9644 | 1978.1 | 4.4745 | 1982.6 | 0.00 | 1.371 |
| 0.90902250 | 20.3401 | 2.9464 | 1956.3 | 4.4826 | 1960.8 | 0.00 | 1.364 |
| 0.91356761 | 20.2736 | 2.9284 | 1934.7 | 4.4907 | 1939.2 | 0.00 | 1.357 |
| 0.91813545 | 20.2050 | 2.9106 | 1913.4 | 4.4987 | 1917.9 | 0.00 | 1.350 |
| 0.92272613 | 20.1339 | 2.8929 | 1892.3 | 4.5066 | 1896.8 | 0.00 | 1.344 |
| 0.92733976 | 20.0604 | 2.8753 | 1871.4 | 4.5144 | 1875.9 | 0.00 | 1.337 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ga ($Z=31$) | | | | | | | |
| 0.93197646 | 19.9842 | 2.8578 | 1850.8 | 4.5222 | 1855.3 | 0.00 | 1.330 |
| 0.93663634 | 19.9053 | 2.8404 | 1830.4 | 4.5300 | 1834.9 | 0.00 | 1.324 |
| 0.94131952 | 19.8233 | 2.8232 | 1810.2 | 4.5376 | 1814.7 | 0.00 | 1.317 |
| 0.94602612 | 19.7383 | 2.8060 | 1790.2 | 4.5452 | 1794.8 | 0.00 | 1.311 |
| 0.95075625 | 19.6499 | 2.7890 | 1770.5 | 4.5527 | 1775.0 | 0.00 | 1.304 |
| 0.95551003 | 19.5580 | 2.7720 | 1751.0 | 4.5601 | 1755.5 | 0.00 | 1.298 |
| 0.96028758 | 19.4622 | 2.7552 | 1731.7 | 4.5675 | 1736.2 | 0.00 | 1.291 |
| 0.96508902 | 19.3625 | 2.7384 | 1712.6 | 4.5747 | 1717.2 | 0.00 | 1.285 |
| 0.96991446 | 19.2584 | 2.7218 | 1693.7 | 4.5820 | 1698.3 | 0.00 | 1.278 |
| 0.97476404 | 19.1497 | 2.7053 | 1675.1 | 4.5891 | 1679.7 | 0.00 | 1.272 |
| 0.97963786 | 19.0360 | 2.6889 | 1656.6 | 4.5962 | 1661.2 | 0.00 | 1.266 |
| 0.98453605 | 18.9169 | 2.6725 | 1638.4 | 4.6031 | 1643.0 | 0.00 | 1.259 |
| 0.98945873 | 18.7920 | 2.6563 | 1620.3 | 4.6101 | 1625.0 | 0.00 | 1.253 |
| 0.99440602 | 18.6608 | 2.6402 | 1602.5 | 4.6169 | 1607.1 | 0.00 | 1.247 |
| 0.99937805 | 18.5227 | 2.6242 | 1584.9 | 4.6237 | 1589.5 | 0.00 | 1.241 |
| 1.0043749 | 18.3744 | 2.6042 | 1564.9 | 4.6304 | 1569.6 | 0.00 | 1.234 |
| 1.0093968 | 18.2171 | 2.5837 | 1544.9 | 4.6370 | 1549.6 | 0.00 | 1.228 |
| 1.0144438 | 18.0503 | 2.5634 | 1525.2 | 4.6435 | 1529.8 | 0.00 | 1.222 |
| 1.0195160 | 17.8730 | 2.5434 | 1505.7 | 4.6500 | 1510.3 | 0.00 | 1.216 |
| 1.0246136 | 17.6841 | 2.5234 | 1486.5 | 4.6564 | 1491.1 | 0.00 | 1.210 |
| 1.0297367 | 17.4821 | 2.5037 | 1467.5 | 4.6627 | 1472.2 | 0.00 | 1.204 |
| 1.0348853 | 17.2655 | 2.4842 | 1448.8 | 4.6689 | 1453.5 | 0.00 | 1.198 |
| 1.0400598 | 17.0322 | 2.4648 | 1430.4 | 4.6751 | 1435.0 | 0.00 | 1.192 |
| 1.0452601 | 16.7800 | 2.4456 | 1412.1 | 4.6811 | 1416.8 | 0.00 | 1.186 |
| 1.0504864 | 16.5058 | 2.4266 | 1394.2 | 4.6872 | 1398.9 | 0.00 | 1.180 |
| 1.0557388 | 16.2061 | 2.4077 | 1376.5 | 4.6931 | 1381.2 | 0.00 | 1.174 |
| 1.0610175 | 15.8760 | 2.3890 | 1359.0 | 4.6989 | 1363.7 | 0.00 | 1.169 |
| 1.0663226 | 15.5096 | 2.3705 | 1341.7 | 4.7047 | 1346.5 | 0.00 | 1.163 |
| 1.0716542 | 15.0984 | 2.3521 | 1324.7 | 4.7104 | 1329.4 | 0.00 | 1.157 |
| 1.0770125 | 14.6313 | 2.3339 | 1308.0 | 4.7160 | 1312.7 | 0.00 | 1.151 |
| 1.0823975 | 14.0917 | 2.3159 | 1291.4 | 4.7215 | 1296.1 | 0.00 | 1.145 |
| 1.0878095 | 13.4544 | 2.2981 | 1275.1 | 4.7270 | 1279.8 | 0.00 | 1.140 |
| 1.0932486 | 12.6780 | 2.2803 | 1258.9 | 4.7323 | 1263.7 | 0.00 | 1.134 |
| 1.0987148 | 11.6858 | 2.2628 | 1243.0 | 4.7376 | 1247.8 | 0.00 | 1.128 |
| 1.1042084 | 10.3097 | 2.2454 | 1227.3 | 4.7429 | 1232.1 | 0.00 | 1.123 |
| 1.1097294 | 8.02547 | 2.2282 | 1211.9 | 4.7480 | 1216.6 | 0.00 | 1.117 |
| 1.1152781 | 4.27780 | 2.2111 | 1196.6 | 4.7530 | 1201.3 | 0.00 | 1.112 |
| 1.1153150 | -5.41991 | 2.2110 | 1196.5 | 4.7531 | 1201.2 | 0.00 | 1.112 |
| 1.1154850 | -5.58976 | 12.157 | 6577.7 | 4.7532 | 6582.4 | 0.00 | 1.111 |
| 1.1208545 | 7.38309 | 12.061 | 6494.4 | 4.7580 | 6499.2 | 0.00 | 1.106 |
| 1.1264587 | 9.26436 | 11.962 | 6409.1 | 4.7629 | 6413.9 | 0.00 | 1.101 |
| 1.1320910 | 9.98691 | 11.864 | 6324.9 | 4.7677 | 6329.7 | 0.00 | 1.095 |
| 1.1377515 | 9.75120 | 11.766 | 6241.8 | 4.7724 | 6246.6 | 0.00 | 1.090 |
| 1.1422130 | 4.23877 | 11.690 | 6177.4 | 4.7761 | 6182.2 | 0.00 | 1.085 |
| 1.1423871 | 4.18116 | 16.591 | 8765.7 | 4.7762 | 8770.4 | 0.00 | 1.085 |
| 1.1434402 | 8.34121 | 16.566 | 8744.3 | 4.7771 | 8749.1 | 0.00 | 1.084 |
| 1.1491574 | 11.8240 | 16.430 | 8629.6 | 4.7817 | 8634.4 | 0.00 | 1.079 |
| 1.1549032 | 13.3476 | 16.296 | 8516.5 | 4.7861 | 8521.3 | 0.00 | 1.074 |
| 1.1606777 | 14.4324 | 16.163 | 8404.8 | 4.7905 | 8409.6 | 0.00 | 1.068 |
| 1.1664811 | 15.2974 | 16.031 | 8294.6 | 4.7949 | 8299.4 | 0.00 | 1.063 |
| 1.1723135 | 16.0239 | 15.900 | 8185.9 | 4.7991 | 8190.7 | 0.00 | 1.058 |
| 1.1781751 | 16.6524 | 15.770 | 8078.6 | 4.8033 | 8083.4 | 0.00 | 1.052 |
| 1.1840660 | 17.2067 | 15.641 | 7972.7 | 4.8073 | 7977.5 | 0.00 | 1.047 |
| 1.1899863 | 17.7023 | 15.513 | 7868.2 | 4.8113 | 7873.0 | 0.00 | 1.042 |
| 1.1959362 | 18.1496 | 15.386 | 7765.1 | 4.8152 | 7769.9 | 0.00 | 1.037 |
| 1.2019159 | 18.5562 | 15.261 | 7663.3 | 4.8191 | 7668.1 | 0.00 | 1.032 |
| 1.2079255 | 18.9278 | 15.136 | 7562.9 | 4.8228 | 7567.7 | 0.00 | 1.026 |
| 1.2139651 | 19.2684 | 15.012 | 7463.8 | 4.8265 | 7468.6 | 0.00 | 1.021 |
| 1.2200350 | 19.5812 | 14.890 | 7366.0 | 4.8300 | 7370.9 | 0.00 | 1.016 |
| 1.2261351 | 19.8687 | 14.768 | 7269.6 | 4.8335 | 7274.4 | 0.00 | 1.011 |
| 1.2322658 | 20.1326 | 14.648 | 7174.3 | 4.8369 | 7179.2 | 0.00 | 1.006 |
| 1.2384271 | 20.3739 | 14.528 | 7080.4 | 4.8403 | 7085.2 | 0.00 | 1.001 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ga ($Z=31$) | | | | | | | |
| 1.2446193 | 20.5931 | 14.409 | 6987.7 | 4.8435 | 6992.5 | 0.00 | 0.9962 |
| 1.2508424 | 20.7900 | 14.292 | 6896.2 | 4.8467 | 6901.0 | 0.00 | 0.9912 |
| 1.2570966 | 20.9633 | 14.175 | 6805.9 | 4.8497 | 6810.7 | 0.00 | 0.9863 |
| 1.2633821 | 21.1106 | 14.060 | 6716.8 | 4.8527 | 6721.6 | 0.00 | 0.9814 |
| 1.2696990 | 21.2267 | 13.945 | 6628.8 | 4.8556 | 6633.7 | 0.00 | 0.9765 |
| 1.2760475 | 21.3018 | 13.831 | 6542.1 | 4.8585 | 6546.9 | 0.00 | 0.9716 |
| 1.2824277 | 21.3144 | 13.718 | 6456.4 | 4.8612 | 6461.3 | 0.00 | 0.9668 |
| 1.2888399 | 21.2054 | 13.607 | 6372.0 | 4.8639 | 6376.8 | 0.00 | 0.9620 |
| 1.2952840 | 20.6512 | 13.496 | 6288.6 | 4.8664 | 6293.4 | 0.00 | 0.9572 |
| 1.2964841 | 20.2896 | 13.475 | 6273.2 | 4.8669 | 6278.1 | 0.00 | 0.9563 |
| 1.2989160 | 20.3323 | 15.253 | 7087.7 | 4.8678 | 7092.6 | 0.00 | 0.9545 |
| 1.3017605 | 21.1138 | 15.205 | 7049.8 | 4.8689 | 7054.7 | 0.00 | 0.9524 |
| 1.3082693 | 21.8519 | 15.095 | 6964.0 | 4.8713 | 6968.9 | 0.00 | 0.9477 |
| 1.3148106 | 22.3083 | 14.986 | 6879.4 | 4.8736 | 6884.2 | 0.00 | 0.9430 |
| 1.3213847 | 22.6677 | 14.878 | 6795.8 | 4.8759 | 6800.6 | 0.00 | 0.9383 |
| 1.3279916 | 22.9755 | 14.771 | 6713.3 | 4.8780 | 6718.1 | 0.00 | 0.9336 |
| 1.3346316 | 23.2501 | 14.665 | 6631.8 | 4.8801 | 6636.7 | 0.00 | 0.9290 |
| 1.3413047 | 23.5011 | 14.559 | 6551.4 | 4.8820 | 6556.2 | 0.00 | 0.9244 |
| 1.3480112 | 23.7338 | 14.455 | 6471.9 | 4.8839 | 6476.8 | 0.00 | 0.9198 |
| 1.3547513 | 23.9522 | 14.351 | 6393.6 | 4.8857 | 6398.4 | 0.00 | 0.9152 |
| 1.3615250 | 24.1587 | 14.248 | 6316.2 | 4.8875 | 6321.0 | 0.00 | 0.9106 |
| 1.3683327 | 24.3549 | 14.144 | 6238.9 | 4.8891 | 6243.7 | 0.00 | 0.9061 |
| 1.3751743 | 24.5413 | 14.041 | 6162.5 | 4.8907 | 6167.4 | 0.00 | 0.9016 |
| 1.3820502 | 24.7192 | 13.938 | 6087.0 | 4.8921 | 6091.9 | 0.00 | 0.8971 |
| 1.3889605 | 24.8895 | 13.836 | 6012.4 | 4.8935 | 6017.3 | 0.00 | 0.8926 |
| 1.3959053 | 25.0529 | 13.735 | 5938.8 | 4.8948 | 5943.6 | 0.00 | 0.8882 |
| 1.4028848 | 25.2099 | 13.635 | 5866.0 | 4.8960 | 5870.9 | 0.00 | 0.8838 |
| 1.4098992 | 25.3612 | 13.535 | 5794.1 | 4.8972 | 5799.0 | 0.00 | 0.8794 |
| 1.4169487 | 25.5071 | 13.436 | 5723.0 | 4.8982 | 5727.9 | 0.00 | 0.8750 |
| 1.4240335 | 25.6479 | 13.337 | 5652.9 | 4.8992 | 5657.8 | 0.00 | 0.8707 |
| 1.4311536 | 25.7841 | 13.240 | 5583.5 | 4.9000 | 5588.4 | 0.00 | 0.8663 |
| 1.4383094 | 25.9158 | 13.143 | 5515.0 | 4.9008 | 5519.9 | 0.00 | 0.8620 |
| 1.4455009 | 26.0433 | 13.046 | 5447.4 | 4.9015 | 5452.3 | 0.00 | 0.8577 |
| 1.4527284 | 26.1669 | 12.951 | 5380.6 | 4.9022 | 5385.5 | 0.00 | 0.8535 |
| 1.4599921 | 26.2868 | 12.856 | 5314.7 | 4.9027 | 5319.6 | 0.00 | 0.8492 |
| 1.4672920 | 26.4031 | 12.762 | 5249.6 | 4.9031 | 5254.5 | 0.00 | 0.8450 |
| 1.4746285 | 26.5161 | 12.669 | 5185.2 | 4.9035 | 5190.1 | 0.00 | 0.8408 |
| 1.4820016 | 26.6260 | 12.576 | 5121.7 | 4.9038 | 5126.6 | 0.00 | 0.8366 |
| 1.4894117 | 26.7327 | 12.484 | 5058.9 | 4.9040 | 5063.8 | 0.00 | 0.8324 |
| 1.4968587 | 26.8366 | 12.393 | 4996.9 | 4.9041 | 5001.8 | 0.00 | 0.8283 |
| 1.5043430 | 26.9376 | 12.302 | 4935.7 | 4.9041 | 4940.6 | 0.00 | 0.8242 |
| 1.5118647 | 27.0359 | 12.212 | 4875.2 | 4.9041 | 4880.1 | 0.00 | 0.8201 |
| 1.5194240 | 27.1317 | 12.123 | 4815.4 | 4.9040 | 4820.3 | 0.00 | 0.8160 |
| 1.5270212 | 27.2249 | 12.034 | 4756.4 | 4.9037 | 4761.3 | 0.00 | 0.8119 |
| 1.5346563 | 27.3158 | 11.946 | 4698.1 | 4.9034 | 4703.0 | 0.00 | 0.8079 |
| 1.5423295 | 27.4043 | 11.858 | 4640.5 | 4.9030 | 4645.4 | 0.00 | 0.8039 |
| 1.5500412 | 27.4906 | 11.772 | 4583.6 | 4.9026 | 4588.5 | 0.00 | 0.7999 |
| 1.5577914 | 25.5748 | 11.685 | 4527.5 | 4.9020 | 4532.4 | 0.00 | 0.7959 |
| 1.5655804 | 26.6569 | 11.600 | 4472.0 | 4.9014 | 4476.9 | 0.00 | 0.7919 |
| 1.5734083 | 27.7370 | 11.515 | 4417.2 | 4.9006 | 4422.1 | 0.00 | 0.7880 |
| 1.5812753 | 28.8151 | 11.431 | 4363.0 | 4.8998 | 4367.9 | 0.00 | 0.7841 |
| 1.5891817 | 28.8914 | 11.347 | 4309.6 | 4.8989 | 4314.5 | 0.00 | 0.7802 |
| 1.5971276 | 29.9659 | 11.264 | 4256.7 | 4.8980 | 4261.6 | 0.00 | 0.7763 |
| 1.6051132 | 28.0387 | 11.182 | 4204.6 | 4.8969 | 4209.5 | 0.00 | 0.7724 |
| 1.6131388 | 28.1097 | 11.100 | 4153.1 | 4.8958 | 4158.0 | 0.00 | 0.7686 |
| 1.6212045 | 28.1791 | 11.019 | 4102.2 | 4.8945 | 4107.1 | 0.00 | 0.7648 |
| 1.6293105 | 28.2470 | 10.938 | 4052.0 | 4.8932 | 4056.9 | 0.00 | 0.7610 |
| 1.6374571 | 28.3133 | 10.858 | 4002.3 | 4.8918 | 4007.2 | 0.00 | 0.7572 |
| 1.6456443 | 28.3781 | 10.779 | 3953.3 | 4.8904 | 3958.2 | 0.00 | 0.7534 |
| 1.6538726 | 28.4415 | 10.700 | 3904.9 | 4.8888 | 3909.8 | 0.00 | 0.7497 |
| 1.6621419 | 28.5036 | 10.622 | 3857.1 | 4.8872 | 3862.0 | 0.00 | 0.7459 |
| 1.6704526 | 28.5643 | 10.545 | 3809.9 | 4.8855 | 3814.8 | 0.00 | 0.7422 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ga ($Z=31$) | | | | | | | |
| 1.6788049 | 28.6238 | 10.468 | 3763.3 | 4.8837 | 3768.2 | 0.00 | 0.7385 |
| 1.6871989 | 28.6822 | 10.391 | 3717.3 | 4.8818 | 3722.1 | 0.00 | 0.7349 |
| 1.6956349 | 28.7392 | 10.315 | 3671.5 | 4.8798 | 3676.3 | 0.00 | 0.7312 |
| 1.7041131 | 28.7948 | 10.238 | 3626.2 | 4.8778 | 3631.1 | 0.00 | 0.7276 |
| 1.7126337 | 28.8491 | 10.163 | 3581.5 | 4.8756 | 3586.4 | 0.00 | 0.7239 |
| 1.7211968 | 28.9022 | 10.088 | 3537.4 | 4.8734 | 3542.3 | 0.00 | 0.7203 |
| 1.7298028 | 28.9540 | 10.013 | 3493.8 | 4.8712 | 3498.7 | 0.00 | 0.7168 |
| 1.7384518 | 29.0047 | 9.9394 | 3450.8 | 4.8688 | 3455.7 | 0.00 | 0.7132 |
| 1.7471441 | 29.0542 | 9.8661 | 3408.3 | 4.8663 | 3413.2 | 0.00 | 0.7096 |
| 1.7558798 | 29.1026 | 9.7933 | 3366.3 | 4.8638 | 3371.2 | 0.00 | 0.7061 |
| 1.7646592 | 29.1499 | 9.7210 | 3324.9 | 4.8612 | 3329.7 | 0.00 | 0.7026 |
| 1.7734825 | 29.1962 | 9.6493 | 3283.9 | 4.8585 | 3288.8 | 0.00 | 0.6991 |
| 1.7823499 | 29.2415 | 9.5782 | 3243.5 | 4.8558 | 3248.3 | 0.00 | 0.6956 |
| 1.7912617 | 29.2858 | 9.5075 | 3203.5 | 4.8529 | 3208.4 | 0.00 | 0.6922 |
| 1.8002180 | 29.3291 | 9.4374 | 3164.1 | 4.8500 | 3169.0 | 0.00 | 0.6887 |
| 1.8092191 | 29.3715 | 9.3679 | 3125.2 | 4.8470 | 3130.0 | 0.00 | 0.6853 |
| 1.8182652 | 29.4130 | 9.2988 | 3086.7 | 4.8439 | 3091.5 | 0.00 | 0.6819 |
| 1.8273565 | 29.4536 | 9.2303 | 3048.7 | 4.8407 | 3053.5 | 0.00 | 0.6785 |
| 1.8364933 | 29.4933 | 9.1622 | 3011.2 | 4.8375 | 3016.0 | 0.00 | 0.6751 |
| 1.8456757 | 29.5322 | 9.0947 | 2974.1 | 4.8342 | 2978.9 | 0.00 | 0.6718 |
| 1.8549041 | 29.5702 | 9.0277 | 2937.5 | 4.8308 | 2942.3 | 0.00 | 0.6684 |
| 1.8641786 | 29.6075 | 8.9612 | 2901.3 | 4.8273 | 2906.2 | 0.00 | 0.6651 |
| 1.8734995 | 29.6439 | 8.8952 | 2865.6 | 4.8238 | 2870.5 | 0.00 | 0.6618 |
| 1.8828670 | 29.6796 | 8.8297 | 2830.4 | 4.8201 | 2835.2 | 0.00 | 0.6585 |
| 1.8922814 | 29.7146 | 8.7646 | 2795.6 | 4.8164 | 2800.4 | 0.00 | 0.6552 |
| 1.9017428 | 29.7488 | 8.7001 | 2761.2 | 4.8126 | 2766.0 | 0.00 | 0.6520 |
| 1.9112515 | 29.7823 | 8.6360 | 2727.2 | 4.8088 | 2732.0 | 0.00 | 0.6487 |
| 1.9208077 | 29.8151 | 8.5724 | 2693.7 | 4.8048 | 2698.5 | 0.00 | 0.6455 |
| 1.9304118 | 29.8473 | 8.5093 | 2660.5 | 4.8008 | 2665.3 | 0.00 | 0.6423 |
| 1.9400638 | 29.8787 | 8.4462 | 2627.6 | 4.7968 | 2632.4 | 0.00 | 0.6391 |
| 1.9497642 | 29.9096 | 8.3834 | 2595.1 | 4.7926 | 2599.9 | 0.00 | 0.6359 |
| 1.9595130 | 29.9397 | 8.3210 | 2563.0 | 4.7884 | 2567.8 | 0.00 | 0.6327 |
| 1.9693105 | 29.9692 | 8.2591 | 2531.3 | 4.7840 | 2536.1 | 0.00 | 0.6296 |
| 1.9791571 | 29.9981 | 8.1977 | 2500.0 | 4.7797 | 2504.8 | 0.00 | 0.6264 |
| 1.9890529 | 30.0264 | 8.1368 | 2469.0 | 4.7752 | 2473.8 | 0.00 | 0.6233 |
| 1.9989981 | 30.0541 | 8.0763 | 2438.5 | 4.7707 | 2443.3 | 0.00 | 0.6202 |
| 2.0089931 | 30.0812 | 8.0162 | 2408.3 | 4.7661 | 2413.1 | 0.00 | 0.6171 |
| 2.0190381 | 30.1077 | 7.9563 | 2378.4 | 4.7614 | 2383.2 | 0.00 | 0.6141 |
| 2.0291333 | 30.1337 | 7.8969 | 2348.9 | 4.7566 | 2353.7 | 0.00 | 0.6110 |
| 2.0392790 | 30.1591 | 7.8379 | 2319.8 | 4.7518 | 2324.5 | 0.00 | 0.6080 |
| 2.0494754 | 30.1839 | 7.7793 | 2291.0 | 4.7469 | 2295.7 | 0.00 | 0.6050 |
| 2.0597227 | 30.2083 | 7.7212 | 2262.6 | 4.7419 | 2267.3 | 0.00 | 0.6019 |
| 2.0700213 | 30.2321 | 7.6636 | 2234.5 | 4.7369 | 2239.2 | 0.00 | 0.5990 |
| 2.0803714 | 30.2554 | 7.6064 | 2206.8 | 4.7318 | 2211.5 | 0.00 | 0.5960 |
| 2.0907733 | 30.2782 | 7.5496 | 2179.4 | 4.7266 | 2184.1 | 0.00 | 0.5930 |
| 2.1012272 | 30.3006 | 7.4932 | 2152.4 | 4.7214 | 2157.1 | 0.00 | 0.5901 |
| 2.1117333 | 30.3225 | 7.4373 | 2125.7 | 4.7160 | 2130.4 | 0.00 | 0.5871 |
| 2.1222920 | 30.3439 | 7.3818 | 2099.3 | 4.7106 | 2104.0 | 0.00 | 0.5842 |
| 2.1329034 | 30.3649 | 7.3268 | 2073.3 | 4.7052 | 2078.0 | 0.00 | 0.5813 |
| 2.1435680 | 30.3855 | 7.2721 | 2047.6 | 4.6996 | 2052.3 | 0.00 | 0.5784 |
| 2.1542858 | 30.4057 | 7.2179 | 2022.2 | 4.6940 | 2026.9 | 0.00 | 0.5755 |
| 2.1650572 | 30.4255 | 7.1641 | 1997.2 | 4.6884 | 2001.8 | 0.00 | 0.5727 |
| 2.1758825 | 30.4448 | 7.1107 | 1972.4 | 4.6826 | 1977.1 | 0.00 | 0.5698 |
| 2.1867619 | 30.4639 | 7.0577 | 1948.0 | 4.6768 | 1952.6 | 0.00 | 0.5670 |
| 2.1976957 | 30.4825 | 7.0051 | 1923.8 | 4.6709 | 1928.5 | 0.00 | 0.5642 |
| 2.2086842 | 30.5008 | 6.9529 | 1900.0 | 4.6650 | 1904.7 | 0.00 | 0.5613 |
| 2.2197276 | 30.5188 | 6.9011 | 1876.5 | 4.6590 | 1881.1 | 0.00 | 0.5586 |
| 2.2308263 | 30.6455 | 6.8497 | 1853.2 | 4.6529 | 1857.9 | 0.00 | 0.5558 |
| 2.2419804 | 30.6628 | 6.7967 | 1829.7 | 4.6467 | 1834.4 | 0.00 | 0.5530 |
| 2.2531903 | 30.6796 | 6.7441 | 1806.6 | 4.6405 | 1811.2 | 0.00 | 0.5503 |
| 2.2644562 | 30.6959 | 6.6920 | 1783.7 | 4.6343 | 1788.3 | 0.00 | 0.5475 |
| 2.2757785 | 30.7117 | 6.6403 | 1761.1 | 4.6279 | 1765.7 | 0.00 | 0.5448 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|--|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K -shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Ga ($Z=31$) | | | | | | | |
| 2.2871574 | 30.7822 | 6.5887 | 1738.7 | 4.6215 | 1743.3 | 0.00 | 0.5421 |
| 2.2985932 | 30.7971 | 6.5368 | 1716.4 | 4.6150 | 1721.0 | 0.00 | 0.5394 |
| 2.3100862 | 30.8114 | 6.4853 | 1694.4 | 4.6085 | 1699.0 | 0.00 | 0.5367 |
| 2.3216366 | 30.8253 | 6.4343 | 1672.7 | 4.6019 | 1677.3 | 0.00 | 0.5340 |
| 2.3332448 | 30.8387 | 6.3836 | 1651.3 | 4.5952 | 1655.9 | 0.00 | 0.5314 |
| 2.3449110 | 30.8516 | 6.3333 | 1630.2 | 4.5885 | 1634.7 | 0.00 | 0.5287 |
| 2.3566356 | 30.8641 | 6.2835 | 1609.3 | 4.5817 | 1613.9 | 0.00 | 0.5261 |
| 2.3684187 | 30.8762 | 6.2340 | 1588.7 | 4.5749 | 1593.2 | 0.00 | 0.5235 |
| 2.3802608 | 30.8879 | 6.1849 | 1568.3 | 4.5679 | 1572.9 | 0.00 | 0.5209 |
| 2.3921621 | 30.8991 | 6.1363 | 1548.2 | 4.5610 | 1552.8 | 0.00 | 0.5183 |
| 2.4041230 | 30.9100 | 6.0880 | 1528.4 | 4.5539 | 1533.0 | 0.00 | 0.5157 |
| 2.4161436 | 30.9206 | 6.0401 | 1508.8 | 4.5468 | 1513.4 | 0.00 | 0.5131 |
| 2.4282243 | 30.9307 | 5.9926 | 1489.5 | 4.5397 | 1494.1 | 0.00 | 0.5106 |
| 2.4403654 | 30.9406 | 5.9455 | 1470.5 | 4.5324 | 1475.0 | 0.00 | 0.5081 |
| 2.4525672 | 30.9501 | 5.8987 | 1451.6 | 4.5252 | 1456.2 | 0.00 | 0.5055 |
| 2.4648301 | 30.9593 | 5.8523 | 1433.1 | 4.5178 | 1437.6 | 0.00 | 0.5030 |
| 2.4771542 | 30.9682 | 5.8064 | 1414.7 | 4.5104 | 1419.2 | 0.00 | 0.5005 |
| 2.4895400 | 30.9768 | 5.7607 | 1396.6 | 4.5030 | 1401.1 | 0.00 | 0.4980 |
| 2.5019877 | 30.9850 | 5.7155 | 1378.8 | 4.4955 | 1383.3 | 0.00 | 0.4955 |
| 2.5144976 | 30.9931 | 5.6706 | 1361.1 | 4.4879 | 1365.6 | 0.00 | 0.4931 |
| 2.5270701 | 31.0008 | 5.6261 | 1343.7 | 4.4803 | 1348.2 | 0.00 | 0.4906 |
| 2.5397055 | 31.0083 | 5.5820 | 1326.6 | 4.4726 | 1331.0 | 0.00 | 0.4882 |
| 2.5524040 | 31.0155 | 5.5382 | 1309.6 | 4.4648 | 1314.1 | 0.00 | 0.4858 |
| 2.5651660 | 31.0225 | 5.4947 | 1292.9 | 4.4570 | 1297.3 | 0.00 | 0.4833 |
| 2.5779919 | 31.0293 | 5.4517 | 1276.3 | 4.4492 | 1280.8 | 0.00 | 0.4809 |
| 2.5908818 | 31.0358 | 5.4090 | 1260.0 | 4.4413 | 1264.5 | 0.00 | 0.4785 |
| 2.6038362 | 31.0839 | 5.3661 | 1243.8 | 4.4333 | 1248.3 | 0.00 | 0.4762 |
| 2.6168554 | 31.0901 | 5.3233 | 1227.8 | 4.4253 | 1232.2 | 0.00 | 0.4738 |
| 2.6299397 | 31.0961 | 5.2809 | 1211.9 | 4.4172 | 1216.4 | 0.00 | 0.4714 |
| 2.6430894 | 31.1018 | 5.2388 | 1196.3 | 4.4091 | 1200.7 | 0.00 | 0.4691 |
| 2.6563048 | 31.1072 | 5.1970 | 1180.9 | 4.4009 | 1185.3 | 0.00 | 0.4668 |
| 2.6695863 | 31.1124 | 5.1556 | 1165.6 | 4.3926 | 1170.0 | 0.00 | 0.4644 |
| 2.6829343 | 31.1173 | 5.1146 | 1150.6 | 4.3844 | 1155.0 | 0.00 | 0.4621 |
| 2.6963489 | 31.1220 | 5.0739 | 1135.8 | 4.3760 | 1140.1 | 0.00 | 0.4598 |
| 2.7098307 | 31.1265 | 5.0335 | 1121.1 | 4.3676 | 1125.5 | 0.00 | 0.4575 |
| 2.7233798 | 31.1308 | 4.9935 | 1106.7 | 4.3592 | 1111.0 | 0.00 | 0.4553 |
| 2.7369967 | 31.1350 | 4.9538 | 1092.4 | 4.3507 | 1096.8 | 0.00 | 0.4530 |
| 2.7506817 | 31.1389 | 4.9145 | 1078.3 | 4.3421 | 1082.7 | 0.00 | 0.4507 |
| 2.7644351 | 31.1426 | 4.8754 | 1064.5 | 4.3335 | 1068.8 | 0.00 | 0.4485 |
| 2.7782573 | 31.1462 | 4.8367 | 1050.7 | 4.3249 | 1055.1 | 0.00 | 0.4463 |
| 2.7921486 | 31.1496 | 4.7983 | 1037.2 | 4.3162 | 1041.5 | 0.00 | 0.4440 |
| 2.8061093 | 31.1529 | 4.7603 | 1023.9 | 4.3075 | 1028.2 | 0.00 | 0.4418 |
| 2.8201399 | 31.1561 | 4.7225 | 1010.7 | 4.2987 | 1015.0 | 0.00 | 0.4396 |
| 2.8342406 | 31.1591 | 4.6851 | 997.71 | 4.2898 | 1002.0 | 0.00 | 0.4375 |
| 2.8484118 | 31.1621 | 4.6480 | 984.88 | 4.2810 | 989.16 | 0.00 | 0.4353 |
| 2.8626539 | 31.1649 | 4.6112 | 972.22 | 4.2720 | 976.50 | 0.00 | 0.4331 |
| 2.8769671 | 31.1677 | 4.5747 | 959.73 | 4.2630 | 964.00 | 0.00 | 0.4310 |
| 2.8913520 | 31.1705 | 4.5385 | 947.40 | 4.2540 | 951.66 | 0.00 | 0.4288 |
| 2.9058087 | 31.1732 | 4.5026 | 935.24 | 4.2450 | 939.48 | 0.00 | 0.4267 |
| 2.9203378 | 31.1759 | 4.4671 | 923.23 | 4.2358 | 927.47 | 0.00 | 0.4246 |
| 2.9349394 | 31.1787 | 4.4318 | 911.39 | 4.2267 | 915.61 | 0.00 | 0.4224 |
| 2.9496141 | 31.1817 | 4.3968 | 899.70 | 4.2175 | 903.91 | 0.00 | 0.4203 |
| 2.9643622 | 31.1848 | 4.3621 | 888.16 | 4.2082 | 892.37 | 0.00 | 0.4182 |
| 2.9791840 | 31.1882 | 4.3277 | 876.75 | 4.1989 | 880.95 | 0.00 | 0.4162 |
| 2.9940799 | 31.1921 | 4.2934 | 865.49 | 4.1896 | 869.68 | 0.00 | 0.4141 |
| 3.0090503 | 31.1967 | 4.2573 | 853.93 | 4.1802 | 858.11 | 0.00 | 0.4120 |
| 3.0240956 | 31.2005 | 4.2200 | 842.25 | 4.1708 | 846.42 | 0.00 | 0.4100 |
| 3.0392161 | 31.2033 | 4.1831 | 830.73 | 4.1613 | 834.90 | 0.00 | 0.4079 |
| 3.0544122 | 31.2054 | 4.1466 | 819.38 | 4.1518 | 823.53 | 0.00 | 0.4059 |
| 3.0696842 | 31.2068 | 4.1104 | 808.18 | 4.1423 | 812.32 | 0.00 | 0.4039 |
| 3.0850326 | 31.2078 | 4.0745 | 797.14 | 4.1327 | 801.27 | 0.00 | 0.4019 |
| 3.1004578 | 31.2083 | 4.0389 | 786.26 | 4.1231 | 790.38 | 0.00 | 0.3999 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ga ($Z=31$) | | | | | | | |
| 3.1159601 | 31.2084 | 4.0037 | 775.52 | 4.1134 | 779.64 | 0.00 | 0.3979 |
| 3.1315399 | 31.2082 | 3.9688 | 764.94 | 4.1037 | 769.04 | 0.00 | 0.3959 |
| 3.1471976 | 31.2077 | 3.9343 | 754.51 | 4.0940 | 758.60 | 0.00 | 0.3940 |
| 3.1629336 | 31.2068 | 3.9000 | 744.22 | 4.0842 | 748.30 | 0.00 | 0.3920 |
| 3.1787482 | 31.2057 | 3.8661 | 734.07 | 4.0744 | 738.15 | 0.00 | 0.3900 |
| 3.1946420 | 31.2044 | 3.8325 | 724.07 | 4.0645 | 728.13 | 0.00 | 0.3881 |
| 3.2106152 | 31.2028 | 3.7992 | 714.21 | 4.0546 | 718.26 | 0.00 | 0.3862 |
| 3.2266683 | 31.2010 | 3.7662 | 704.48 | 4.0447 | 708.52 | 0.00 | 0.3842 |
| 3.2428016 | 31.1990 | 3.7335 | 694.89 | 4.0347 | 698.93 | 0.00 | 0.3823 |
| 3.2590156 | 31.1968 | 3.7011 | 685.43 | 4.0247 | 689.46 | 0.00 | 0.3804 |
| 3.2753107 | 31.1944 | 3.6690 | 676.11 | 4.0147 | 680.13 | 0.00 | 0.3785 |
| 3.2916873 | 31.1919 | 3.6372 | 666.92 | 4.0046 | 670.92 | 0.00 | 0.3767 |
| 3.3081457 | 31.1891 | 3.6057 | 657.85 | 3.9945 | 661.85 | 0.00 | 0.3748 |
| 3.3246864 | 31.1862 | 3.5745 | 648.91 | 3.9844 | 652.90 | 0.00 | 0.3729 |
| 3.3413099 | 31.1832 | 3.5436 | 640.10 | 3.9742 | 644.07 | 0.00 | 0.3711 |
| 3.3580164 | 31.1800 | 3.5129 | 631.41 | 3.9640 | 635.37 | 0.00 | 0.3692 |
| 3.3748065 | 31.1767 | 3.4826 | 622.84 | 3.9538 | 626.79 | 0.00 | 0.3674 |
| 3.3916805 | 31.1733 | 3.4525 | 614.39 | 3.9435 | 618.33 | 0.00 | 0.3656 |
| 3.4086389 | 31.1697 | 3.4227 | 606.05 | 3.9332 | 609.99 | 0.00 | 0.3637 |
| 3.4256821 | 31.1660 | 3.3932 | 597.84 | 3.9229 | 601.76 | 0.00 | 0.3619 |
| 3.4428105 | 31.1622 | 3.3639 | 589.73 | 3.9125 | 593.65 | 0.00 | 0.3601 |
| 3.4600246 | 31.1582 | 3.3349 | 581.74 | 3.9022 | 585.65 | 0.00 | 0.3583 |
| 3.4773247 | 31.1542 | 3.3062 | 573.86 | 3.8917 | 577.76 | 0.00 | 0.3566 |
| 3.4947113 | 31.1500 | 3.2778 | 566.10 | 3.8813 | 569.98 | 0.00 | 0.3548 |
| 3.5121849 | 31.1458 | 3.2496 | 558.43 | 3.8708 | 562.30 | 0.00 | 0.3530 |
| 3.5297458 | 31.1414 | 3.2216 | 550.88 | 3.8603 | 554.74 | 0.00 | 0.3513 |
| 3.5473945 | 31.1370 | 3.1940 | 543.43 | 3.8498 | 547.28 | 0.00 | 0.3495 |
| 3.5651315 | 31.1325 | 3.1665 | 536.08 | 3.8392 | 539.92 | 0.00 | 0.3478 |
| 3.5829572 | 31.1279 | 3.1394 | 528.84 | 3.8286 | 532.67 | 0.00 | 0.3460 |
| 3.6008719 | 31.1232 | 3.1124 | 521.69 | 3.8180 | 525.51 | 0.00 | 0.3443 |
| 3.6188763 | 31.1184 | 3.0858 | 514.65 | 3.8074 | 518.46 | 0.00 | 0.3426 |
| 3.6369707 | 31.1135 | 3.0593 | 507.70 | 3.7967 | 511.50 | 0.00 | 0.3409 |
| 3.6551555 | 31.1086 | 3.0331 | 500.85 | 3.7860 | 504.64 | 0.00 | 0.3392 |
| 3.6734313 | 31.1036 | 3.0072 | 494.09 | 3.7753 | 497.87 | 0.00 | 0.3375 |
| 3.6917985 | 31.0985 | 2.9815 | 487.43 | 3.7645 | 491.20 | 0.00 | 0.3358 |
| 3.7102575 | 31.0933 | 2.9560 | 480.86 | 3.7538 | 484.62 | 0.00 | 0.3342 |
| 3.7288088 | 31.0881 | 2.9307 | 474.38 | 3.7430 | 478.13 | 0.00 | 0.3325 |
| 3.7474528 | 31.0828 | 2.9057 | 467.99 | 3.7322 | 471.73 | 0.00 | 0.3308 |
| 3.7661901 | 31.0775 | 2.8809 | 461.69 | 3.7213 | 465.41 | 0.00 | 0.3292 |
| 3.7850210 | 31.0721 | 2.8564 | 455.48 | 3.7105 | 459.19 | 0.00 | 0.3276 |
| 3.8039461 | 31.0666 | 2.8320 | 449.35 | 3.6996 | 453.05 | 0.00 | 0.3259 |
| 3.8229659 | 31.0611 | 2.8079 | 443.31 | 3.6887 | 447.00 | 0.00 | 0.3243 |
| 3.8420807 | 31.0556 | 2.7840 | 437.35 | 3.6778 | 441.03 | 0.00 | 0.3227 |
| 3.8612911 | 31.0499 | 2.7603 | 431.47 | 3.6668 | 435.14 | 0.00 | 0.3211 |
| 3.8805975 | 31.0443 | 2.7369 | 425.68 | 3.6559 | 429.33 | 0.00 | 0.3195 |
| 3.9000005 | 31.0386 | 2.7136 | 419.96 | 3.6449 | 423.60 | 0.00 | 0.3179 |
| 3.9195005 | 31.0328 | 2.6906 | 414.32 | 3.6339 | 417.96 | 0.00 | 0.3163 |
| 3.9390980 | 31.0270 | 2.6678 | 408.76 | 3.6229 | 412.39 | 0.00 | 0.3148 |
| 3.9587935 | 31.0211 | 2.6451 | 403.28 | 3.6118 | 406.89 | 0.00 | 0.3132 |
| 3.9785875 | 31.0153 | 2.6227 | 397.87 | 3.6008 | 401.47 | 0.00 | 0.3116 |
| 3.9984804 | 31.0093 | 2.6005 | 392.54 | 3.5897 | 396.13 | 0.00 | 0.3101 |
| 4.0184728 | 31.0034 | 2.5785 | 387.28 | 3.5786 | 390.86 | 0.00 | 0.3085 |
| 4.0385652 | 30.9974 | 2.5567 | 382.09 | 3.5675 | 385.66 | 0.00 | 0.3070 |
| 4.0587580 | 30.9913 | 2.5351 | 376.98 | 3.5564 | 380.54 | 0.00 | 0.3055 |
| 4.0790518 | 30.9853 | 2.5136 | 371.93 | 3.5452 | 375.48 | 0.00 | 0.3040 |
| 4.0994471 | 30.9791 | 2.4924 | 366.96 | 3.5341 | 370.49 | 0.00 | 0.3024 |
| 4.1199443 | 30.9730 | 2.4714 | 362.05 | 3.5229 | 365.57 | 0.00 | 0.3009 |
| 4.1405440 | 30.9668 | 2.4505 | 357.21 | 3.5117 | 360.72 | 0.00 | 0.2994 |
| 4.1612467 | 30.9606 | 2.4299 | 352.44 | 3.5005 | 355.94 | 0.00 | 0.2979 |
| 4.1820530 | 30.9544 | 2.4094 | 347.73 | 3.4893 | 351.22 | 0.00 | 0.2965 |
| 4.2029632 | 30.9482 | 2.3891 | 343.09 | 3.4781 | 346.57 | 0.00 | 0.2950 |
| 4.2239781 | 30.9419 | 2.3690 | 338.51 | 3.4668 | 341.98 | 0.00 | 0.2935 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ga ($Z=31$) | | | | | | | |
| 4.2450980 | 30.9356 | 2.3491 | 333.99 | 3.4556 | 337.45 | 0.00 | 0.2921 |
| 4.2663234 | 30.9293 | 2.3294 | 329.54 | 3.4443 | 332.98 | 0.00 | 0.2906 |
| 4.2876551 | 30.9229 | 2.3098 | 325.15 | 3.4331 | 328.58 | 0.00 | 0.2892 |
| 4.3090933 | 30.9166 | 2.2904 | 320.82 | 3.4218 | 324.24 | 0.00 | 0.2877 |
| 4.3306388 | 30.9102 | 2.2712 | 316.54 | 3.4105 | 319.95 | 0.00 | 0.2863 |
| 4.3522920 | 30.9038 | 2.2522 | 312.33 | 3.3992 | 315.73 | 0.00 | 0.2849 |
| 4.3740535 | 30.8974 | 2.2333 | 308.17 | 3.3878 | 311.56 | 0.00 | 0.2835 |
| 4.3959237 | 30.8909 | 2.2146 | 304.07 | 3.3765 | 307.45 | 0.00 | 0.2820 |
| 4.4179033 | 30.8845 | 2.1961 | 300.03 | 3.3652 | 303.39 | 0.00 | 0.2806 |
| 4.4399929 | 30.8780 | 2.1777 | 296.04 | 3.3538 | 299.39 | 0.00 | 0.2792 |
| 4.4621928 | 30.8715 | 2.1596 | 292.10 | 3.3425 | 295.45 | 0.00 | 0.2779 |
| 4.4845038 | 30.8650 | 2.1415 | 288.22 | 3.3311 | 291.55 | 0.00 | 0.2765 |
| 4.5069263 | 30.8585 | 2.1236 | 284.40 | 3.3197 | 287.72 | 0.00 | 0.2751 |
| 4.5294609 | 30.8520 | 2.1059 | 280.62 | 3.3084 | 283.93 | 0.00 | 0.2737 |
| 4.5521082 | 30.8455 | 2.0884 | 276.90 | 3.2970 | 280.20 | 0.00 | 0.2724 |
| 4.5748688 | 30.8390 | 2.0710 | 273.23 | 3.2856 | 276.51 | 0.00 | 0.2710 |
| 4.5977431 | 30.8324 | 2.0538 | 269.60 | 3.2742 | 272.88 | 0.00 | 0.2697 |
| 4.6207318 | 30.8259 | 2.0367 | 266.03 | 3.2628 | 269.29 | 0.00 | 0.2683 |
| 4.6438355 | 30.8193 | 2.0197 | 262.51 | 3.2514 | 265.76 | 0.00 | 0.2670 |
| 4.6670547 | 30.8128 | 2.0030 | 259.03 | 3.2400 | 262.27 | 0.00 | 0.2657 |
| 4.6903900 | 30.8062 | 1.9863 | 255.60 | 3.2285 | 258.83 | 0.00 | 0.2643 |
| 4.7138419 | 30.7997 | 1.9699 | 252.22 | 3.2171 | 255.44 | 0.00 | 0.2630 |
| 4.7374111 | 30.7931 | 1.9535 | 248.89 | 3.2057 | 252.09 | 0.00 | 0.2617 |
| 4.7610982 | 30.7866 | 1.9373 | 245.59 | 3.1943 | 248.79 | 0.00 | 0.2604 |
| 4.7849037 | 30.7800 | 1.9213 | 242.35 | 3.1828 | 245.53 | 0.00 | 0.2591 |
| 4.8088282 | 30.7735 | 1.9054 | 239.15 | 3.1714 | 242.32 | 0.00 | 0.2578 |
| 4.8328723 | 30.7669 | 1.8896 | 235.99 | 3.1599 | 239.15 | 0.00 | 0.2565 |
| 4.8570367 | 30.7604 | 1.8734 | 232.80 | 3.1485 | 235.94 | 0.00 | 0.2553 |
| 4.8813219 | 30.7538 | 1.8572 | 229.64 | 3.1371 | 232.78 | 0.00 | 0.2540 |
| 4.9057285 | 30.7472 | 1.8413 | 226.54 | 3.1256 | 229.66 | 0.00 | 0.2527 |
| 4.9302571 | 30.7405 | 1.8255 | 223.47 | 3.1142 | 226.59 | 0.00 | 0.2515 |
| 4.9549084 | 30.7338 | 1.8097 | 220.44 | 3.1027 | 223.55 | 0.00 | 0.2502 |
| 4.9796829 | 30.7271 | 1.7939 | 217.42 | 3.0913 | 220.52 | 0.00 | 0.2490 |
| 5.0045814 | 30.7203 | 1.7782 | 214.45 | 3.0798 | 217.53 | 0.00 | 0.2477 |
| 5.0296043 | 30.7134 | 1.7626 | 211.52 | 3.0684 | 214.58 | 0.00 | 0.2465 |
| 5.0547523 | 30.7065 | 1.7472 | 208.63 | 3.0570 | 211.68 | 0.00 | 0.2453 |
| 5.0800260 | 30.6995 | 1.7320 | 205.77 | 3.0455 | 208.82 | 0.00 | 0.2441 |
| 5.1054262 | 30.6925 | 1.7168 | 202.97 | 3.0341 | 206.00 | 0.00 | 0.2428 |
| 5.1309533 | 30.6855 | 1.7019 | 200.20 | 3.0226 | 203.22 | 0.00 | 0.2416 |
| 5.1566081 | 30.6784 | 1.6871 | 197.46 | 3.0112 | 200.48 | 0.00 | 0.2404 |
| 5.1823911 | 30.6713 | 1.6724 | 194.77 | 2.9998 | 197.77 | 0.00 | 0.2392 |
| 5.2083031 | 30.6641 | 1.6579 | 192.12 | 2.9883 | 195.11 | 0.00 | 0.2381 |
| 5.2343446 | 30.6569 | 1.6435 | 189.50 | 2.9769 | 192.48 | 0.00 | 0.2369 |
| 5.2605163 | 30.6496 | 1.6292 | 186.92 | 2.9655 | 189.89 | 0.00 | 0.2357 |
| 5.2868189 | 30.6423 | 1.6151 | 184.38 | 2.9541 | 187.34 | 0.00 | 0.2345 |
| 5.3132530 | 30.6350 | 1.6011 | 181.88 | 2.9426 | 184.82 | 0.00 | 0.2333 |
| 5.3398192 | 30.6277 | 1.5872 | 179.40 | 2.9312 | 182.34 | 0.00 | 0.2322 |
| 5.3665183 | 30.6203 | 1.5735 | 176.97 | 2.9198 | 179.89 | 0.00 | 0.2310 |
| 5.3933509 | 30.6130 | 1.5599 | 174.57 | 2.9084 | 177.47 | 0.00 | 0.2299 |
| 5.4203177 | 30.6055 | 1.5464 | 172.20 | 2.8970 | 175.10 | 0.00 | 0.2287 |
| 5.4474193 | 30.5981 | 1.5331 | 169.86 | 2.8856 | 172.75 | 0.00 | 0.2276 |
| 5.4746564 | 30.5906 | 1.5199 | 167.56 | 2.8742 | 170.44 | 0.00 | 0.2265 |
| 5.5020297 | 30.5832 | 1.5068 | 165.29 | 2.8629 | 168.16 | 0.00 | 0.2253 |
| 5.5295398 | 30.5756 | 1.4938 | 163.06 | 2.8515 | 165.91 | 0.00 | 0.2242 |
| 5.5571875 | 30.5681 | 1.4810 | 160.85 | 2.8401 | 163.69 | 0.00 | 0.2231 |
| 5.5849734 | 30.5606 | 1.4683 | 158.68 | 2.8288 | 161.51 | 0.00 | 0.2220 |
| 5.6128983 | 30.5530 | 1.4557 | 156.53 | 2.8174 | 159.35 | 0.00 | 0.2209 |
| 5.6409628 | 30.5454 | 1.4429 | 154.38 | 2.8061 | 157.19 | 0.00 | 0.2198 |
| 5.6691676 | 30.5378 | 1.4299 | 152.24 | 2.7948 | 155.03 | 0.00 | 0.2187 |
| 5.6975135 | 30.5301 | 1.4171 | 150.12 | 2.7834 | 152.91 | 0.00 | 0.2176 |
| 5.7260010 | 30.5224 | 1.4044 | 148.04 | 2.7721 | 150.81 | 0.00 | 0.2165 |
| 5.7546310 | 30.5146 | 1.3919 | 145.98 | 2.7608 | 148.74 | 0.00 | 0.2155 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ga ($Z=31$) | | | | | | | |
| 5.7834042 | 30.5067 | 1.3794 | 143.96 | 2.7495 | 146.71 | 0.00 | 0.2144 |
| 5.8123212 | 30.4988 | 1.3671 | 141.96 | 2.7383 | 144.70 | 0.00 | 0.2133 |
| 5.8413828 | 30.4908 | 1.3549 | 139.99 | 2.7270 | 142.72 | 0.00 | 0.2123 |
| 5.8705897 | 30.4828 | 1.3428 | 138.05 | 2.7157 | 140.77 | 0.00 | 0.2112 |
| 5.8999427 | 30.4747 | 1.3308 | 136.14 | 2.7045 | 138.85 | 0.00 | 0.2101 |
| 5.9294424 | 30.4665 | 1.3189 | 134.26 | 2.6932 | 136.95 | 0.00 | 0.2091 |
| 5.9590896 | 30.4583 | 1.3072 | 132.40 | 2.6820 | 135.08 | 0.00 | 0.2081 |
| 5.9888850 | 30.4501 | 1.2956 | 130.57 | 2.6708 | 133.24 | 0.00 | 0.2070 |
| 6.0188295 | 30.4418 | 1.2840 | 128.76 | 2.6596 | 131.42 | 0.00 | 0.2060 |
| 6.0489236 | 30.4334 | 1.2726 | 126.98 | 2.6484 | 129.63 | 0.00 | 0.2050 |
| 6.0791682 | 30.4250 | 1.2613 | 125.23 | 2.6372 | 127.86 | 0.00 | 0.2039 |
| 6.1095641 | 30.4165 | 1.2501 | 123.50 | 2.6260 | 126.12 | 0.00 | 0.2029 |
| 6.1401119 | 30.4080 | 1.2390 | 121.79 | 2.6149 | 124.41 | 0.00 | 0.2019 |
| 6.1708125 | 30.3995 | 1.2280 | 120.11 | 2.6037 | 122.71 | 0.00 | 0.2009 |
| 6.2016665 | 30.3908 | 1.2171 | 118.45 | 2.5926 | 121.04 | 0.00 | 0.1999 |
| 6.2326749 | 30.3822 | 1.2063 | 116.82 | 2.5815 | 119.40 | 0.00 | 0.1989 |
| 6.2638382 | 30.3734 | 1.1956 | 115.21 | 2.5704 | 117.78 | 0.00 | 0.1979 |
| 6.2951574 | 30.3647 | 1.1851 | 113.62 | 2.5593 | 116.18 | 0.00 | 0.1970 |
| 6.3266332 | 30.3558 | 1.1746 | 112.05 | 2.5482 | 114.60 | 0.00 | 0.1960 |
| 6.3582664 | 30.3469 | 1.1642 | 110.51 | 2.5372 | 113.05 | 0.00 | 0.1950 |
| 6.3900577 | 30.3380 | 1.1539 | 108.99 | 2.5262 | 111.52 | 0.00 | 0.1940 |
| 6.4220080 | 30.3289 | 1.1437 | 107.49 | 2.5151 | 110.01 | 0.00 | 0.1931 |
| 6.4541180 | 30.3199 | 1.1336 | 106.01 | 2.5041 | 108.52 | 0.00 | 0.1921 |
| 6.4863886 | 30.3107 | 1.1236 | 104.55 | 2.4931 | 107.05 | 0.00 | 0.1911 |
| 6.5188206 | 30.3015 | 1.1137 | 103.12 | 2.4822 | 105.60 | 0.00 | 0.1902 |
| 6.5514147 | 30.2923 | 1.1039 | 101.70 | 2.4712 | 104.17 | 0.00 | 0.1892 |
| 6.5841717 | 30.2829 | 1.0942 | 100.30 | 2.4603 | 102.76 | 0.00 | 0.1883 |
| Ge ($Z=32$) | | | | | | | |
| Atomic weight: $A_r=72.59000 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=5.3070$ | | | | | | | |
| $\sigma_a (\text{barns/atom})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 120.539$ | | | | | | | |
| $E(\text{eV})[\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2(e \text{ atom}^{-1})\times 5.79699\times 10^5$ | | | | | | | |
| 9 edges. Edge energies (keV) | | | | | | | |
| K | 11.1031 | L I | 1.41430 | L II | 1.24780 | L III | 1.21670 |
| M I | 0.180000 | M II | 0.127900 | M III | 0.120800 | M IV | 0.0287000 |
| M V | 0.0287000 | | | | | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-0.17723, -0.11160) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.0077386 e \text{ atom}^{-1}$ | | | | | | | |
| 0.90000000 | 22.6092 | 3.4614 | 2229.5 | 4.5369 | 2234.1 | 0.00 | 1.378 |
| 0.90450000 | 22.5715 | 3.4396 | 2204.5 | 4.5452 | 2209.0 | 0.00 | 1.371 |
| 0.90902250 | 22.5327 | 3.4180 | 2179.7 | 4.5534 | 2184.3 | 0.00 | 1.364 |
| 0.91356761 | 22.4929 | 3.3965 | 2155.2 | 4.5616 | 2159.8 | 0.00 | 1.357 |
| 0.91813545 | 22.4520 | 3.3751 | 2131.0 | 4.5697 | 2135.6 | 0.00 | 1.350 |
| 0.92272613 | 22.4100 | 3.3539 | 2107.1 | 4.5778 | 2111.7 | 0.00 | 1.344 |
| 0.92733976 | 22.3668 | 3.3328 | 2083.4 | 4.5857 | 2088.0 | 0.00 | 1.337 |
| 0.93197646 | 22.3224 | 3.3119 | 2060.0 | 4.5936 | 2064.6 | 0.00 | 1.330 |
| 0.93663634 | 22.2768 | 3.2910 | 2036.9 | 4.6015 | 2041.5 | 0.00 | 1.324 |
| 0.94131952 | 22.2298 | 3.2704 | 2014.0 | 4.6092 | 2018.6 | 0.00 | 1.317 |
| 0.94602612 | 22.1816 | 3.2498 | 1991.4 | 4.6169 | 1996.0 | 0.00 | 1.311 |
| 0.95075625 | 22.1319 | 3.2294 | 1969.1 | 4.6245 | 1973.7 | 0.00 | 1.304 |
| 0.95551003 | 22.0807 | 3.2092 | 1947.0 | 4.6321 | 1951.6 | 0.00 | 1.298 |
| 0.96028758 | 22.0281 | 3.1890 | 1925.1 | 4.6395 | 1929.8 | 0.00 | 1.291 |
| 0.96508902 | 21.9739 | 3.1690 | 1903.5 | 4.6469 | 1908.2 | 0.00 | 1.285 |
| 0.96991446 | 21.9180 | 3.1491 | 1882.2 | 4.6543 | 1886.8 | 0.00 | 1.278 |
| 0.97476404 | 21.8603 | 3.1294 | 1861.1 | 4.6615 | 1865.7 | 0.00 | 1.272 |
| 0.97963786 | 21.8009 | 3.1098 | 1840.2 | 4.6687 | 1844.9 | 0.00 | 1.266 |
| 0.98453605 | 21.7396 | 3.0903 | 1819.6 | 4.6758 | 1824.3 | 0.00 | 1.259 |
| 0.98945873 | 21.6763 | 3.0710 | 1799.2 | 4.6828 | 1803.9 | 0.00 | 1.253 |
| 0.99440602 | 21.6109 | 3.0517 | 1779.0 | 4.6898 | 1783.7 | 0.00 | 1.247 |
| 0.99937805 | 21.5433 | 3.0326 | 1759.1 | 4.6966 | 1763.8 | 0.00 | 1.241 |
| 1.0043749 | 21.4902 | 3.0089 | 1736.7 | 4.7034 | 1741.4 | 0.00 | 1.234 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ge ($Z=32$) | | | | | | | |
| 1.0093968 | 21.4294 | 2.9847 | 1714.1 | 4.7102 | 1718.8 | 0.00 | 1.228 |
| 1.0144438 | 21.3624 | 2.9607 | 1691.9 | 4.7168 | 1696.6 | 0.00 | 1.222 |
| 1.0195160 | 21.2906 | 2.9369 | 1669.9 | 4.7234 | 1674.7 | 0.00 | 1.216 |
| 1.0246136 | 21.2148 | 2.9133 | 1648.3 | 4.7299 | 1653.0 | 0.00 | 1.210 |
| 1.0297367 | 21.1349 | 2.8900 | 1627.0 | 4.7363 | 1631.7 | 0.00 | 1.204 |
| 1.0348853 | 21.0510 | 2.8669 | 1605.9 | 4.7427 | 1610.7 | 0.00 | 1.198 |
| 1.0400598 | 20.9631 | 2.8440 | 1585.2 | 4.7489 | 1589.9 | 0.00 | 1.192 |
| 1.0452601 | 20.8711 | 2.8213 | 1564.7 | 4.7551 | 1569.4 | 0.00 | 1.186 |
| 1.0504864 | 20.7747 | 2.7988 | 1544.5 | 4.7612 | 1549.2 | 0.00 | 1.180 |
| 1.0557388 | 20.6737 | 2.7765 | 1524.6 | 4.7672 | 1529.3 | 0.00 | 1.174 |
| 1.0610175 | 20.5680 | 2.7544 | 1504.9 | 4.7732 | 1509.7 | 0.00 | 1.169 |
| 1.0663226 | 20.4571 | 2.7326 | 1485.5 | 4.7791 | 1490.3 | 0.00 | 1.163 |
| 1.0716542 | 20.3407 | 2.7109 | 1466.4 | 4.7849 | 1471.2 | 0.00 | 1.157 |
| 1.0770125 | 20.2185 | 2.6894 | 1447.6 | 4.7906 | 1452.4 | 0.00 | 1.151 |
| 1.0823975 | 20.0899 | 2.6681 | 1429.0 | 4.7962 | 1433.8 | 0.00 | 1.145 |
| 1.0878095 | 19.9546 | 2.6470 | 1410.6 | 4.8018 | 1415.4 | 0.00 | 1.140 |
| 1.0932486 | 19.8118 | 2.6261 | 1392.5 | 4.8073 | 1397.3 | 0.00 | 1.134 |
| 1.0987148 | 19.6610 | 2.6054 | 1374.7 | 4.8127 | 1379.5 | 0.00 | 1.128 |
| 1.1042084 | 19.5012 | 2.5849 | 1357.0 | 4.8180 | 1361.9 | 0.00 | 1.123 |
| 1.1097294 | 19.3318 | 2.5646 | 1339.7 | 4.8232 | 1344.5 | 0.00 | 1.117 |
| 1.1152781 | 19.1515 | 2.5444 | 1322.5 | 4.8284 | 1327.4 | 0.00 | 1.112 |
| 1.1208545 | 18.9592 | 2.5245 | 1305.6 | 4.8334 | 1310.5 | 0.00 | 1.106 |
| 1.1264587 | 18.7534 | 2.5047 | 1289.0 | 4.8384 | 1293.8 | 0.00 | 1.101 |
| 1.1320910 | 18.5323 | 2.4851 | 1272.5 | 4.8433 | 1277.3 | 0.00 | 1.095 |
| 1.1377515 | 18.2939 | 2.4656 | 1256.3 | 4.8482 | 1261.1 | 0.00 | 1.090 |
| 1.1434402 | 18.0355 | 2.4464 | 1240.3 | 4.8529 | 1245.1 | 0.00 | 1.084 |
| 1.1491574 | 17.7540 | 2.4273 | 1224.5 | 4.8576 | 1229.3 | 0.00 | 1.079 |
| 1.1549032 | 17.4452 | 2.4084 | 1208.9 | 4.8622 | 1213.7 | 0.00 | 1.074 |
| 1.1606777 | 17.1038 | 2.3896 | 1193.5 | 4.8667 | 1198.4 | 0.00 | 1.068 |
| 1.1664811 | 16.7230 | 2.3711 | 1178.3 | 4.8711 | 1183.2 | 0.00 | 1.063 |
| 1.1723135 | 16.2931 | 2.3526 | 1163.4 | 4.8754 | 1168.2 | 0.00 | 1.058 |
| 1.1781751 | 15.8006 | 2.3344 | 1148.6 | 4.8797 | 1153.5 | 0.00 | 1.052 |
| 1.1840660 | 15.2254 | 2.3163 | 1134.0 | 4.8839 | 1138.9 | 0.00 | 1.047 |
| 1.1899863 | 14.5354 | 2.2984 | 1119.7 | 4.8880 | 1124.5 | 0.00 | 1.042 |
| 1.1959362 | 13.6744 | 2.2806 | 1105.5 | 4.8920 | 1110.4 | 0.00 | 1.037 |
| 1.2019159 | 12.5293 | 2.2630 | 1091.5 | 4.8959 | 1096.4 | 0.00 | 1.032 |
| 1.2079255 | 10.8065 | 2.2456 | 1077.7 | 4.8997 | 1082.6 | 0.00 | 1.026 |
| 1.2139651 | 7.08105 | 2.2283 | 1064.1 | 4.9035 | 1069.0 | 0.00 | 1.021 |
| 1.2165985 | -3.13227 | 2.2208 | 1058.2 | 4.9051 | 1063.1 | 0.00 | 1.019 |
| 1.2168014 | -3.29888 | 11.907 | 5672.7 | 4.9052 | 5677.6 | 0.00 | 1.019 |
| 1.2200350 | 7.38606 | 11.856 | 5633.3 | 4.9072 | 5638.3 | 0.00 | 1.016 |
| 1.2261351 | 10.3333 | 11.760 | 5560.1 | 4.9107 | 5565.0 | 0.00 | 1.011 |
| 1.2322658 | 11.4726 | 11.665 | 5487.8 | 4.9143 | 5492.7 | 0.00 | 1.006 |
| 1.2384271 | 11.8269 | 11.571 | 5416.4 | 4.9177 | 5421.3 | 0.00 | 1.001 |
| 1.2446193 | 11.0504 | 11.478 | 5346.0 | 4.9210 | 5350.9 | 0.00 | 0.9962 |
| 1.2476951 | 6.23429 | 11.432 | 5311.5 | 4.9226 | 5316.4 | 0.00 | 0.9937 |
| 1.2479049 | 6.17858 | 16.209 | 7529.5 | 4.9227 | 7534.4 | 0.00 | 0.9935 |
| 1.2508424 | 11.6286 | 16.147 | 7483.3 | 4.9243 | 7488.2 | 0.00 | 0.9912 |
| 1.2570966 | 13.9279 | 16.017 | 7386.2 | 4.9274 | 7391.2 | 0.00 | 0.9863 |
| 1.2633821 | 15.2259 | 15.889 | 7290.4 | 4.9305 | 7295.3 | 0.00 | 0.9814 |
| 1.2696990 | 16.1910 | 15.761 | 7195.9 | 4.9335 | 7200.8 | 0.00 | 0.9765 |
| 1.2760475 | 16.9747 | 15.634 | 7102.5 | 4.9364 | 7107.5 | 0.00 | 0.9716 |
| 1.2824277 | 17.6396 | 15.509 | 7010.4 | 4.9393 | 7015.4 | 0.00 | 0.9668 |
| 1.2888399 | 18.2185 | 15.384 | 6919.5 | 4.9420 | 6924.5 | 0.00 | 0.9620 |
| 1.2952840 | 18.7314 | 15.261 | 6829.8 | 4.9447 | 6834.7 | 0.00 | 0.9572 |
| 1.3017605 | 19.1913 | 15.138 | 6741.2 | 4.9472 | 6746.2 | 0.00 | 0.9524 |
| 1.3082693 | 19.6071 | 15.016 | 6653.9 | 4.9497 | 6658.8 | 0.00 | 0.9477 |
| 1.3148106 | 19.9856 | 14.896 | 6567.6 | 4.9521 | 6572.6 | 0.00 | 0.9430 |
| 1.3213847 | 20.3315 | 14.776 | 6482.5 | 4.9545 | 6487.4 | 0.00 | 0.9383 |
| 1.3279916 | 20.6485 | 14.658 | 6398.5 | 4.9567 | 6403.4 | 0.00 | 0.9336 |
| 1.3346316 | 20.9392 | 14.540 | 6315.5 | 4.9589 | 6320.5 | 0.00 | 0.9290 |
| 1.3413047 | 21.2057 | 14.424 | 6233.7 | 4.9609 | 6238.7 | 0.00 | 0.9244 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ge ($Z=32$) | | | | | | | |
| 1.3480112 | 21.4492 | 14.308 | 6152.9 | 4.9629 | 6157.9 | 0.00 | 0.9198 |
| 1.3547513 | 21.6704 | 14.193 | 6073.2 | 4.9648 | 6078.2 | 0.00 | 0.9152 |
| 1.3615250 | 21.8693 | 14.079 | 5994.6 | 4.9666 | 5999.5 | 0.00 | 0.9106 |
| 1.3683327 | 22.0449 | 13.966 | 5916.9 | 4.9683 | 5921.9 | 0.00 | 0.9061 |
| 1.3751743 | 22.1951 | 13.854 | 5840.3 | 4.9700 | 5845.2 | 0.00 | 0.9016 |
| 1.3820502 | 22.3155 | 13.743 | 5764.6 | 4.9715 | 5769.6 | 0.00 | 0.8971 |
| 1.3889605 | 22.3976 | 13.633 | 5690.0 | 4.9730 | 5695.0 | 0.00 | 0.8926 |
| 1.3959053 | 22.4237 | 13.524 | 5616.3 | 4.9744 | 5621.3 | 0.00 | 0.8882 |
| 1.4028848 | 22.3485 | 13.416 | 5543.6 | 4.9757 | 5548.6 | 0.00 | 0.8838 |
| 1.4098992 | 21.9837 | 13.308 | 5471.8 | 4.9769 | 5476.8 | 0.00 | 0.8794 |
| 1.4130073 | 21.3436 | 13.261 | 5440.4 | 4.9774 | 5445.4 | 0.00 | 0.8774 |
| 1.4155926 | 21.3844 | 15.085 | 6177.4 | 4.9778 | 6182.4 | 0.00 | 0.8758 |
| 1.4169487 | 21.8469 | 15.064 | 6162.8 | 4.9780 | 6167.8 | 0.00 | 0.8750 |
| 1.4240335 | 22.8052 | 14.954 | 6087.5 | 4.9791 | 6092.4 | 0.00 | 0.8707 |
| 1.4311536 | 23.3095 | 14.845 | 6013.0 | 4.9800 | 6018.0 | 0.00 | 0.8663 |
| 1.4383094 | 23.6912 | 14.737 | 5939.5 | 4.9809 | 5944.5 | 0.00 | 0.8620 |
| 1.4455009 | 24.0122 | 14.629 | 5867.0 | 4.9817 | 5871.9 | 0.00 | 0.8577 |
| 1.4527284 | 24.2954 | 14.523 | 5795.3 | 4.9824 | 5800.3 | 0.00 | 0.8535 |
| 1.4599921 | 24.5523 | 14.417 | 5724.6 | 4.9830 | 5729.5 | 0.00 | 0.8492 |
| 1.4672920 | 24.7893 | 14.313 | 5654.7 | 4.9835 | 5659.7 | 0.00 | 0.8450 |
| 1.4746285 | 25.0104 | 14.209 | 5585.7 | 4.9840 | 5590.7 | 0.00 | 0.8408 |
| 1.4820016 | 25.2184 | 14.106 | 5517.6 | 4.9843 | 5522.6 | 0.00 | 0.8366 |
| 1.4894117 | 25.4154 | 14.003 | 5450.2 | 4.9846 | 5455.2 | 0.00 | 0.8324 |
| 1.4968587 | 25.6025 | 13.901 | 5383.6 | 4.9848 | 5388.6 | 0.00 | 0.8283 |
| 1.5043430 | 25.7810 | 13.800 | 5317.9 | 4.9849 | 5322.9 | 0.00 | 0.8242 |
| 1.5118647 | 25.9517 | 13.700 | 5253.0 | 4.9849 | 5258.0 | 0.00 | 0.8201 |
| 1.5194240 | 26.1154 | 13.600 | 5188.8 | 4.9848 | 5193.8 | 0.00 | 0.8160 |
| 1.5270212 | 26.2728 | 13.501 | 5125.5 | 4.9847 | 5130.5 | 0.00 | 0.8119 |
| 1.5346563 | 26.4243 | 13.403 | 5063.0 | 4.9845 | 5068.0 | 0.00 | 0.8079 |
| 1.5423295 | 26.5705 | 13.306 | 5001.2 | 4.9841 | 5006.2 | 0.00 | 0.8039 |
| 1.5500412 | 26.7116 | 13.210 | 4940.2 | 4.9837 | 4945.2 | 0.00 | 0.7999 |
| 1.5577914 | 26.8480 | 13.114 | 4880.0 | 4.9833 | 4885.0 | 0.00 | 0.7959 |
| 1.5655804 | 26.9801 | 13.019 | 4820.5 | 4.9827 | 4825.5 | 0.00 | 0.7919 |
| 1.5734083 | 27.1082 | 12.924 | 4761.8 | 4.9820 | 4766.8 | 0.00 | 0.7880 |
| 1.5812753 | 27.2324 | 12.831 | 4703.8 | 4.9813 | 4708.7 | 0.00 | 0.7841 |
| 1.5891817 | 27.3529 | 12.737 | 4646.2 | 4.9805 | 4651.2 | 0.00 | 0.7802 |
| 1.5971276 | 27.4698 | 12.644 | 4589.3 | 4.9796 | 4594.3 | 0.00 | 0.7763 |
| 1.6051132 | 27.5833 | 12.552 | 4533.1 | 4.9786 | 4538.1 | 0.00 | 0.7724 |
| 1.6131388 | 27.6935 | 12.460 | 4477.7 | 4.9775 | 4482.6 | 0.00 | 0.7686 |
| 1.6212045 | 27.8007 | 12.369 | 4422.9 | 4.9763 | 4427.9 | 0.00 | 0.7648 |
| 1.6293105 | 27.9049 | 12.278 | 4368.6 | 4.9751 | 4373.6 | 0.00 | 0.7610 |
| 1.6374571 | 28.0062 | 12.188 | 4315.0 | 4.9738 | 4320.0 | 0.00 | 0.7572 |
| 1.6456443 | 28.1047 | 12.099 | 4262.0 | 4.9724 | 4267.0 | 0.00 | 0.7534 |
| 1.6538726 | 28.2005 | 12.010 | 4209.7 | 4.9709 | 4214.7 | 0.00 | 0.7497 |
| 1.6621419 | 28.2938 | 11.922 | 4158.0 | 4.9693 | 4163.0 | 0.00 | 0.7459 |
| 1.6704526 | 28.3847 | 11.835 | 4107.0 | 4.9677 | 4112.0 | 0.00 | 0.7422 |
| 1.6788049 | 28.4732 | 11.748 | 4056.6 | 4.9659 | 4061.6 | 0.00 | 0.7385 |
| 1.6871989 | 28.5594 | 11.662 | 4006.8 | 4.9641 | 4011.8 | 0.00 | 0.7349 |
| 1.6956349 | 28.6435 | 11.576 | 3957.7 | 4.9622 | 3962.6 | 0.00 | 0.7312 |
| 1.7041131 | 28.7255 | 11.491 | 3909.1 | 4.9602 | 3914.1 | 0.00 | 0.7276 |
| 1.7126337 | 28.8055 | 11.407 | 3861.2 | 4.9581 | 3866.1 | 0.00 | 0.7239 |
| 1.7211968 | 28.8835 | 11.324 | 3813.8 | 4.9560 | 3818.7 | 0.00 | 0.7203 |
| 1.7298028 | 28.9596 | 11.241 | 3767.0 | 4.9538 | 3772.0 | 0.00 | 0.7168 |
| 1.7384518 | 29.0340 | 11.158 | 3720.8 | 4.9515 | 3725.8 | 0.00 | 0.7132 |
| 1.7471441 | 29.1066 | 11.077 | 3675.2 | 4.9491 | 3680.1 | 0.00 | 0.7096 |
| 1.7558798 | 29.1775 | 10.995 | 3630.1 | 4.9466 | 3635.1 | 0.00 | 0.7061 |
| 1.7646592 | 29.2467 | 10.915 | 3585.6 | 4.9440 | 3590.5 | 0.00 | 0.7026 |
| 1.7734825 | 29.3144 | 10.835 | 3541.6 | 4.9414 | 3546.6 | 0.00 | 0.6991 |
| 1.7823499 | 29.3806 | 10.756 | 3498.2 | 4.9387 | 3503.1 | 0.00 | 0.6956 |
| 1.7912617 | 29.4453 | 10.677 | 3455.3 | 4.9359 | 3460.3 | 0.00 | 0.6922 |
| 1.8002180 | 29.5085 | 10.599 | 3413.0 | 4.9330 | 3417.9 | 0.00 | 0.6887 |
| 1.8092191 | 29.5705 | 10.521 | 3371.1 | 4.9301 | 3376.1 | 0.00 | 0.6853 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ge ($Z=32$) | | | | | | | |
| 1.8182652 | 29.6311 | 10.444 | 3329.8 | 4.9270 | 3334.7 | 0.00 | 0.6819 |
| 1.8273565 | 29.6905 | 10.368 | 3289.0 | 4.9239 | 3293.9 | 0.00 | 0.6785 |
| 1.8364933 | 29.7488 | 10.292 | 3248.7 | 4.9207 | 3253.6 | 0.00 | 0.6751 |
| 1.8456757 | 29.8058 | 10.216 | 3208.6 | 4.9175 | 3213.6 | 0.00 | 0.6718 |
| 1.8549041 | 29.8613 | 10.140 | 3169.0 | 4.9141 | 3173.9 | 0.00 | 0.6684 |
| 1.8641786 | 29.9155 | 10.065 | 3129.8 | 4.9107 | 3134.7 | 0.00 | 0.6651 |
| 1.8734995 | 29.9685 | 9.9900 | 3091.1 | 4.9072 | 3096.0 | 0.00 | 0.6618 |
| 1.8828670 | 30.0202 | 9.9158 | 3052.9 | 4.9036 | 3057.8 | 0.00 | 0.6585 |
| 1.8922814 | 30.0707 | 9.8422 | 3015.1 | 4.8999 | 3020.0 | 0.00 | 0.6552 |
| 1.9017428 | 30.1200 | 9.7691 | 2977.9 | 4.8962 | 2982.8 | 0.00 | 0.6520 |
| 1.9112515 | 30.1682 | 9.6966 | 2941.0 | 4.8924 | 2945.9 | 0.00 | 0.6487 |
| 1.9208077 | 30.2153 | 9.6245 | 2904.7 | 4.8885 | 2909.6 | 0.00 | 0.6455 |
| 1.9304118 | 30.2614 | 9.5530 | 2868.8 | 4.8845 | 2873.6 | 0.00 | 0.6423 |
| 1.9400638 | 30.3064 | 9.4821 | 2833.3 | 4.8805 | 2838.2 | 0.00 | 0.6391 |
| 1.9497642 | 30.3504 | 9.4117 | 2798.2 | 4.8764 | 2803.1 | 0.00 | 0.6359 |
| 1.9595130 | 30.3935 | 9.3417 | 2763.6 | 4.8722 | 2768.5 | 0.00 | 0.6327 |
| 1.9693105 | 30.4356 | 9.2723 | 2729.5 | 4.8679 | 2734.3 | 0.00 | 0.6296 |
| 1.9791571 | 30.4768 | 9.2034 | 2695.7 | 4.8636 | 2700.6 | 0.00 | 0.6264 |
| 1.9890529 | 30.5171 | 9.1351 | 2662.4 | 4.8591 | 2667.2 | 0.00 | 0.6233 |
| 1.9989981 | 30.5564 | 9.0672 | 2629.4 | 4.8546 | 2634.3 | 0.00 | 0.6202 |
| 2.0089931 | 30.5950 | 8.9998 | 2596.9 | 4.8501 | 2601.8 | 0.00 | 0.6171 |
| 2.0190381 | 30.6327 | 8.9329 | 2564.8 | 4.8454 | 2569.6 | 0.00 | 0.6141 |
| 2.0291333 | 30.6695 | 8.8666 | 2533.1 | 4.8407 | 2537.9 | 0.00 | 0.6110 |
| 2.0392790 | 30.7056 | 8.8007 | 2501.7 | 4.8359 | 2506.6 | 0.00 | 0.6080 |
| 2.0494754 | 30.7409 | 8.7353 | 2470.8 | 4.8310 | 2475.6 | 0.00 | 0.6050 |
| 2.0597227 | 30.7755 | 8.6704 | 2440.2 | 4.8261 | 2445.1 | 0.00 | 0.6019 |
| 2.0700213 | 30.8093 | 8.6059 | 2410.0 | 4.8211 | 2414.9 | 0.00 | 0.5990 |
| 2.0803714 | 30.8423 | 8.5420 | 2380.2 | 4.8160 | 2385.0 | 0.00 | 0.5960 |
| 2.0907733 | 30.8747 | 8.4785 | 2350.8 | 4.8109 | 2355.6 | 0.00 | 0.5930 |
| 2.1012272 | 30.9064 | 8.4155 | 2321.7 | 4.8056 | 2326.5 | 0.00 | 0.5901 |
| 2.1117333 | 30.9374 | 8.3529 | 2293.0 | 4.8003 | 2297.8 | 0.00 | 0.5871 |
| 2.1222920 | 30.9677 | 8.2909 | 2264.6 | 4.7950 | 2269.4 | 0.00 | 0.5842 |
| 2.1329034 | 30.9974 | 8.2293 | 2236.6 | 4.7895 | 2241.4 | 0.00 | 0.5813 |
| 2.1435680 | 30.0265 | 8.1681 | 2209.0 | 4.7840 | 2213.7 | 0.00 | 0.5784 |
| 2.1542858 | 31.0549 | 8.1074 | 2181.6 | 4.7784 | 2186.4 | 0.00 | 0.5755 |
| 2.1650572 | 31.0828 | 8.0472 | 2154.7 | 4.7728 | 2159.4 | 0.00 | 0.5727 |
| 2.1758825 | 31.1100 | 7.9874 | 2128.0 | 4.7671 | 2132.8 | 0.00 | 0.5698 |
| 2.1867619 | 31.1367 | 7.9281 | 2101.7 | 4.7613 | 2106.4 | 0.00 | 0.5670 |
| 2.1976957 | 31.1629 | 7.8692 | 2075.7 | 4.7554 | 2080.4 | 0.00 | 0.5642 |
| 2.2086842 | 31.1885 | 7.8107 | 2050.0 | 4.7495 | 2054.8 | 0.00 | 0.5613 |
| 2.2197276 | 31.2135 | 7.7527 | 2024.7 | 4.7435 | 2029.4 | 0.00 | 0.5586 |
| 2.2308263 | 31.2381 | 7.6951 | 1999.6 | 4.7374 | 2004.4 | 0.00 | 0.5558 |
| 2.2419804 | 31.2621 | 7.6380 | 1974.9 | 4.7313 | 1979.6 | 0.00 | 0.5530 |
| 2.2531903 | 31.2857 | 7.5813 | 1950.5 | 4.7251 | 1955.2 | 0.00 | 0.5503 |
| 2.2644562 | 31.3088 | 7.5250 | 1926.4 | 4.7188 | 1931.1 | 0.00 | 0.5475 |
| 2.2757785 | 31.3314 | 7.4687 | 1902.5 | 4.7125 | 1907.2 | 0.00 | 0.5448 |
| 2.2871574 | 31.3535 | 7.4127 | 1878.8 | 4.7061 | 1883.5 | 0.00 | 0.5421 |
| 2.2985932 | 31.3752 | 7.3571 | 1855.4 | 4.6997 | 1860.1 | 0.00 | 0.5394 |
| 2.3100862 | 31.3964 | 7.3019 | 1832.4 | 4.6931 | 1837.0 | 0.00 | 0.5367 |
| 2.3216366 | 31.4172 | 7.2471 | 1809.6 | 4.6865 | 1814.3 | 0.00 | 0.5340 |
| 2.3332448 | 31.4375 | 7.1928 | 1787.1 | 4.6799 | 1791.7 | 0.00 | 0.5314 |
| 2.3449110 | 31.4574 | 7.1389 | 1764.8 | 4.6732 | 1769.5 | 0.00 | 0.5287 |
| 2.3566356 | 31.4770 | 7.0854 | 1742.9 | 4.6664 | 1747.6 | 0.00 | 0.5261 |
| 2.3684187 | 31.4961 | 7.0323 | 1721.2 | 4.6595 | 1725.9 | 0.00 | 0.5235 |
| 2.3802608 | 31.5149 | 6.9796 | 1699.8 | 4.6526 | 1704.5 | 0.00 | 0.5209 |
| 2.3921621 | 31.5332 | 6.9273 | 1678.7 | 4.6456 | 1683.4 | 0.00 | 0.5183 |
| 2.4041230 | 31.5513 | 6.8754 | 1657.8 | 4.6386 | 1662.5 | 0.00 | 0.5157 |
| 2.4161436 | 31.5690 | 6.8236 | 1637.2 | 4.6315 | 1641.8 | 0.00 | 0.5131 |
| 2.4282243 | 31.5864 | 6.7722 | 1616.8 | 4.6244 | 1621.4 | 0.00 | 0.5106 |
| 2.4403654 | 31.7109 | 6.7203 | 1596.4 | 4.6171 | 1601.0 | 0.00 | 0.5081 |
| 2.4525672 | 31.7274 | 6.6681 | 1576.1 | 4.6099 | 1580.7 | 0.00 | 0.5055 |
| 2.4648301 | 31.7435 | 6.6163 | 1556.1 | 4.6025 | 1560.7 | 0.00 | 0.5030 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ge ($Z=32$) | | | | | | | |
| 2.4771542 | 31.7591 | 6.5650 | 1536.3 | 4.5951 | 1540.9 | 0.00 | 0.5005 |
| 2.4895400 | 31.7742 | 6.5140 | 1516.8 | 4.5877 | 1521.4 | 0.00 | 0.4980 |
| 2.5019877 | 31.8434 | 6.4630 | 1497.5 | 4.5801 | 1502.0 | 0.00 | 0.4955 |
| 2.5144976 | 31.8576 | 6.4121 | 1478.3 | 4.5726 | 1482.8 | 0.00 | 0.4931 |
| 2.5270701 | 31.8714 | 6.3615 | 1459.3 | 4.5649 | 1463.9 | 0.00 | 0.4906 |
| 2.5397055 | 31.8847 | 6.3114 | 1440.6 | 4.5572 | 1445.2 | 0.00 | 0.4882 |
| 2.5524040 | 31.8976 | 6.2616 | 1422.1 | 4.5495 | 1426.7 | 0.00 | 0.4858 |
| 2.5651660 | 31.9100 | 6.2123 | 1403.9 | 4.5417 | 1408.5 | 0.00 | 0.4833 |
| 2.5779919 | 31.9221 | 6.1634 | 1385.9 | 4.5338 | 1390.5 | 0.00 | 0.4809 |
| 2.5908818 | 31.9338 | 6.1148 | 1368.2 | 4.5259 | 1372.7 | 0.00 | 0.4785 |
| 2.6038362 | 31.9451 | 6.0666 | 1350.6 | 4.5179 | 1355.1 | 0.00 | 0.4762 |
| 2.6168554 | 31.9561 | 6.0189 | 1333.3 | 4.5099 | 1337.8 | 0.00 | 0.4738 |
| 2.6299397 | 31.9667 | 5.9715 | 1316.3 | 4.5018 | 1320.8 | 0.00 | 0.4714 |
| 2.6430894 | 31.9770 | 5.9245 | 1299.4 | 4.4936 | 1303.9 | 0.00 | 0.4691 |
| 2.6563048 | 31.9870 | 5.8779 | 1282.8 | 4.4854 | 1287.2 | 0.00 | 0.4668 |
| 2.6695863 | 31.9966 | 5.8317 | 1266.3 | 4.4772 | 1270.8 | 0.00 | 0.4644 |
| 2.6829343 | 32.0060 | 5.7858 | 1250.1 | 4.4689 | 1254.6 | 0.00 | 0.4621 |
| 2.6963489 | 32.0152 | 5.7403 | 1234.1 | 4.4605 | 1238.6 | 0.00 | 0.4598 |
| 2.7098307 | 32.0240 | 5.6952 | 1218.3 | 4.4521 | 1222.8 | 0.00 | 0.4575 |
| 2.7233798 | 32.0326 | 5.6505 | 1202.8 | 4.4436 | 1207.2 | 0.00 | 0.4553 |
| 2.7369967 | 32.0410 | 5.6061 | 1187.4 | 4.4351 | 1191.8 | 0.00 | 0.4530 |
| 2.7506817 | 32.0491 | 5.5621 | 1172.2 | 4.4266 | 1176.6 | 0.00 | 0.4507 |
| 2.7644351 | 32.0570 | 5.5185 | 1157.2 | 4.4179 | 1161.6 | 0.00 | 0.4485 |
| 2.7782573 | 32.0647 | 5.4752 | 1142.4 | 4.4093 | 1146.8 | 0.00 | 0.4463 |
| 2.7921486 | 32.0722 | 5.4323 | 1127.8 | 4.4006 | 1132.2 | 0.00 | 0.4440 |
| 2.8061093 | 32.0795 | 5.3897 | 1113.4 | 4.3918 | 1117.8 | 0.00 | 0.4418 |
| 2.8201399 | 32.0866 | 5.3475 | 1099.2 | 4.3830 | 1103.6 | 0.00 | 0.4396 |
| 2.8342406 | 32.1349 | 5.3054 | 1085.1 | 4.3741 | 1089.5 | 0.00 | 0.4375 |
| 2.8484118 | 32.1419 | 5.2633 | 1071.2 | 4.3652 | 1075.5 | 0.00 | 0.4353 |
| 2.8626539 | 32.1487 | 5.2215 | 1057.4 | 4.3562 | 1061.7 | 0.00 | 0.4331 |
| 2.8769671 | 32.1554 | 5.1801 | 1043.8 | 4.3472 | 1048.1 | 0.00 | 0.4310 |
| 2.8913520 | 32.1620 | 5.1390 | 1030.3 | 4.3382 | 1034.7 | 0.00 | 0.4288 |
| 2.9058087 | 32.1684 | 5.0983 | 1017.1 | 4.3291 | 1021.4 | 0.00 | 0.4267 |
| 2.9203378 | 32.1748 | 5.0579 | 1004.0 | 4.3199 | 1008.3 | 0.00 | 0.4246 |
| 2.9349394 | 32.1811 | 5.0179 | 991.11 | 4.3107 | 995.42 | 0.00 | 0.4224 |
| 2.9496141 | 32.1874 | 4.9781 | 978.37 | 4.3015 | 982.67 | 0.00 | 0.4203 |
| 2.9643622 | 32.1937 | 4.9388 | 965.80 | 4.2922 | 970.10 | 0.00 | 0.4182 |
| 2.9791840 | 32.2002 | 4.8997 | 953.40 | 4.2829 | 957.68 | 0.00 | 0.4162 |
| 2.9940799 | 32.2068 | 4.8610 | 941.16 | 4.2735 | 945.44 | 0.00 | 0.4141 |
| 3.0090503 | 32.2124 | 4.8201 | 928.60 | 4.2641 | 932.86 | 0.00 | 0.4120 |
| 3.0240956 | 32.2167 | 4.7779 | 915.90 | 4.2546 | 920.15 | 0.00 | 0.4100 |
| 3.0392161 | 32.2206 | 4.7361 | 903.37 | 4.2451 | 907.61 | 0.00 | 0.4079 |
| 3.0544122 | 32.2241 | 4.6947 | 891.02 | 4.2355 | 895.25 | 0.00 | 0.4059 |
| 3.0696842 | 32.2271 | 4.6537 | 878.84 | 4.2260 | 883.07 | 0.00 | 0.4039 |
| 3.0850326 | 32.2298 | 4.6131 | 866.83 | 4.2163 | 871.05 | 0.00 | 0.4019 |
| 3.1004578 | 32.2321 | 4.5729 | 854.99 | 4.2067 | 859.20 | 0.00 | 0.3999 |
| 3.1159601 | 32.2341 | 4.5330 | 843.32 | 4.1969 | 847.52 | 0.00 | 0.3979 |
| 3.1315399 | 32.2358 | 4.4935 | 831.81 | 4.1872 | 836.00 | 0.00 | 0.3959 |
| 3.1471976 | 32.2372 | 4.4543 | 820.46 | 4.1774 | 824.64 | 0.00 | 0.3940 |
| 3.1629336 | 32.2382 | 4.4155 | 809.28 | 4.1676 | 813.44 | 0.00 | 0.3920 |
| 3.1787482 | 32.2390 | 4.3771 | 798.24 | 4.1577 | 802.40 | 0.00 | 0.3900 |
| 3.1946420 | 32.2396 | 4.3391 | 787.36 | 4.1478 | 791.51 | 0.00 | 0.3881 |
| 3.2106152 | 3.22398 | 4.3013 | 776.64 | 4.1379 | 780.78 | 0.00 | 0.3862 |
| 3.2266683 | 32.2399 | 4.2640 | 766.06 | 4.1279 | 770.19 | 0.00 | 0.3842 |
| 3.2428016 | 32.2397 | 4.2270 | 755.63 | 4.1179 | 759.75 | 0.00 | 0.3823 |
| 3.2590156 | 32.2393 | 4.1903 | 745.35 | 4.1078 | 749.46 | 0.00 | 0.3804 |
| 3.2753107 | 32.2386 | 4.1540 | 735.21 | 4.0977 | 739.31 | 0.00 | 0.3785 |
| 3.2916873 | 32.2378 | 4.1180 | 725.21 | 4.0876 | 729.30 | 0.00 | 0.3767 |
| 3.3081457 | 32.2368 | 4.0823 | 715.36 | 4.0774 | 719.43 | 0.00 | 0.3748 |
| 3.3246864 | 32.2355 | 4.0470 | 705.64 | 4.0672 | 709.70 | 0.00 | 0.3729 |
| 3.3413099 | 32.2341 | 4.0119 | 696.05 | 4.0570 | 700.11 | 0.00 | 0.3711 |
| 3.3580164 | 32.2325 | 3.9773 | 686.60 | 4.0467 | 690.65 | 0.00 | 0.3692 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ge ($Z=32$) | | | | | | | |
| 3.3748065 | 32.2308 | 3.9429 | 677.28 | 4.0364 | 681.32 | 0.00 | 0.3674 |
| 3.3916805 | 32.2288 | 3.9088 | 668.08 | 4.0261 | 672.10 | 0.00 | 0.3656 |
| 3.4086389 | 32.2268 | 3.8749 | 658.99 | 4.0157 | 663.01 | 0.00 | 0.3637 |
| 3.4256821 | 32.2245 | 3.8413 | 650.04 | 4.0053 | 654.04 | 0.00 | 0.3619 |
| 3.4428105 | 32.2221 | 3.8081 | 641.21 | 3.9949 | 645.20 | 0.00 | 0.3601 |
| 3.4600246 | 32.2196 | 3.7752 | 632.50 | 3.9845 | 636.48 | 0.00 | 0.3583 |
| 3.4773247 | 32.2169 | 3.7425 | 623.91 | 3.9740 | 627.89 | 0.00 | 0.3566 |
| 3.4947113 | 32.2140 | 3.7102 | 615.45 | 3.9634 | 619.41 | 0.00 | 0.3548 |
| 3.5121849 | 32.2111 | 3.6782 | 607.10 | 3.9529 | 611.05 | 0.00 | 0.3530 |
| 3.5297458 | 32.2079 | 3.6464 | 598.86 | 3.9423 | 602.81 | 0.00 | 0.3513 |
| 3.5473945 | 32.2047 | 3.6150 | 590.75 | 3.9317 | 594.68 | 0.00 | 0.3495 |
| 3.5651315 | 32.2014 | 3.5838 | 582.74 | 3.9211 | 586.66 | 0.00 | 0.3478 |
| 3.5829572 | 32.1979 | 3.5530 | 574.85 | 3.9104 | 578.76 | 0.00 | 0.3460 |
| 3.6008719 | 32.1943 | 3.5224 | 567.06 | 3.8997 | 570.96 | 0.00 | 0.3443 |
| 3.6188763 | 32.1906 | 3.4921 | 559.39 | 3.8890 | 563.28 | 0.00 | 0.3426 |
| 3.6369707 | 32.1868 | 3.4620 | 551.82 | 3.8783 | 555.70 | 0.00 | 0.3409 |
| 3.6551555 | 32.1829 | 3.4323 | 544.35 | 3.8675 | 548.22 | 0.00 | 0.3392 |
| 3.6734313 | 32.1789 | 3.4028 | 536.99 | 3.8567 | 540.85 | 0.00 | 0.3375 |
| 3.6917985 | 32.1748 | 3.3736 | 529.73 | 3.8459 | 533.58 | 0.00 | 0.3358 |
| 3.7102575 | 32.1705 | 3.3447 | 522.58 | 3.8350 | 526.41 | 0.00 | 0.3342 |
| 3.7288088 | 32.1662 | 3.3160 | 515.52 | 3.8241 | 519.34 | 0.00 | 0.3325 |
| 3.7474528 | 32.1619 | 3.2876 | 508.56 | 3.8132 | 512.37 | 0.00 | 0.3308 |
| 3.7661901 | 32.1574 | 3.2594 | 501.69 | 3.8023 | 505.50 | 0.00 | 0.3292 |
| 3.7850210 | 32.1528 | 3.2315 | 494.93 | 3.7914 | 498.72 | 0.00 | 0.3276 |
| 3.8039461 | 32.1482 | 3.2039 | 488.25 | 3.7804 | 492.03 | 0.00 | 0.3259 |
| 3.8229659 | 32.1435 | 3.1765 | 481.67 | 3.7694 | 485.44 | 0.00 | 0.3243 |
| 3.8420807 | 32.1387 | 3.1493 | 475.18 | 3.7584 | 478.94 | 0.00 | 0.3227 |
| 3.8612911 | 32.1338 | 3.1224 | 468.78 | 3.7474 | 472.52 | 0.00 | 0.3211 |
| 3.8805975 | 32.1288 | 3.0958 | 462.46 | 3.7363 | 466.20 | 0.00 | 0.3195 |
| 3.9000005 | 32.1238 | 3.0694 | 456.24 | 3.7253 | 459.96 | 0.00 | 0.3179 |
| 3.9195005 | 32.1187 | 3.0432 | 450.10 | 3.7142 | 453.81 | 0.00 | 0.3163 |
| 3.9390980 | 32.1136 | 3.0173 | 444.04 | 3.7031 | 447.75 | 0.00 | 0.3148 |
| 3.9587935 | 32.1084 | 2.9916 | 438.07 | 3.6919 | 441.76 | 0.00 | 0.3132 |
| 3.9785875 | 32.1031 | 2.9662 | 432.18 | 3.6808 | 435.86 | 0.00 | 0.3116 |
| 3.9984804 | 32.0978 | 2.9409 | 426.38 | 3.6696 | 430.05 | 0.00 | 0.3101 |
| 4.0184728 | 32.0924 | 2.9159 | 420.65 | 3.6584 | 424.31 | 0.00 | 0.3085 |
| 4.0385652 | 32.0870 | 2.8912 | 415.00 | 3.6472 | 418.65 | 0.00 | 0.3070 |
| 4.0587580 | 32.0815 | 2.8666 | 409.43 | 3.6360 | 413.07 | 0.00 | 0.3055 |
| 4.0790518 | 32.0759 | 2.8423 | 403.94 | 3.6247 | 407.56 | 0.00 | 0.3040 |
| 4.0994471 | 32.0703 | 2.8182 | 398.52 | 3.6135 | 402.13 | 0.00 | 0.3024 |
| 4.1199443 | 32.0647 | 2.7943 | 393.18 | 3.6022 | 396.78 | 0.00 | 0.3009 |
| 4.1405440 | 32.0590 | 2.7707 | 387.91 | 3.5909 | 391.50 | 0.00 | 0.2994 |
| 4.1612467 | 32.0532 | 2.7472 | 382.71 | 3.5796 | 386.29 | 0.00 | 0.2979 |
| 4.1820530 | 32.0475 | 2.7240 | 377.59 | 3.5683 | 381.16 | 0.00 | 0.2965 |
| 4.2029632 | 32.0416 | 2.7010 | 372.53 | 3.5570 | 376.09 | 0.00 | 0.2950 |
| 4.2239781 | 32.0358 | 2.6781 | 367.55 | 3.5456 | 371.09 | 0.00 | 0.2935 |
| 4.2450980 | 32.0299 | 2.6555 | 362.63 | 3.5343 | 366.17 | 0.00 | 0.2921 |
| 4.2663234 | 32.0239 | 2.6331 | 357.78 | 3.5229 | 361.31 | 0.00 | 0.2906 |
| 4.2876551 | 32.0180 | 2.6109 | 353.00 | 3.5115 | 356.51 | 0.00 | 0.2892 |
| 4.3090933 | 32.0119 | 2.5889 | 348.28 | 3.5001 | 351.78 | 0.00 | 0.2877 |
| 4.3306388 | 32.0059 | 2.5671 | 343.63 | 3.4887 | 347.12 | 0.00 | 0.2863 |
| 4.3522920 | 31.9998 | 2.5455 | 339.05 | 3.4773 | 342.52 | 0.00 | 0.2849 |
| 4.3740535 | 31.9937 | 2.5241 | 334.52 | 3.4658 | 337.99 | 0.00 | 0.2835 |
| 4.3959237 | 31.9875 | 2.5029 | 330.06 | 3.4544 | 333.51 | 0.00 | 0.2820 |
| 4.4179033 | 31.9814 | 2.4818 | 325.66 | 3.4430 | 329.10 | 0.00 | 0.2806 |
| 4.4399929 | 31.9752 | 2.4610 | 321.32 | 3.4315 | 324.75 | 0.00 | 0.2792 |
| 4.4621928 | 31.9689 | 2.4404 | 317.03 | 3.4200 | 320.45 | 0.00 | 0.2779 |
| 4.4845038 | 31.9627 | 2.4199 | 312.81 | 3.4085 | 316.22 | 0.00 | 0.2765 |
| 4.5069263 | 31.9564 | 2.3996 | 308.65 | 3.3971 | 312.04 | 0.00 | 0.2751 |
| 4.5294609 | 31.9501 | 2.3795 | 304.54 | 3.3856 | 307.92 | 0.00 | 0.2737 |
| 4.5521082 | 31.9438 | 2.3596 | 300.49 | 3.3741 | 303.86 | 0.00 | 0.2724 |
| 4.5748688 | 31.9374 | 2.3399 | 296.49 | 3.3625 | 299.85 | 0.00 | 0.2710 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ge ($Z=32$) | | | | | | | |
| 4.5977431 | 31.9311 | 2.3203 | 292.55 | 3.3510 | 295.90 | 0.00 | 0.2697 |
| 4.6207318 | 31.9247 | 2.3009 | 288.66 | 3.3395 | 292.00 | 0.00 | 0.2683 |
| 4.6438355 | 31.9183 | 2.2817 | 284.83 | 3.3280 | 288.16 | 0.00 | 0.2670 |
| 4.6670547 | 31.9118 | 2.2627 | 281.05 | 3.3164 | 284.36 | 0.00 | 0.2657 |
| 4.6903900 | 31.9054 | 2.2438 | 277.32 | 3.3049 | 280.62 | 0.00 | 0.2643 |
| 4.7138419 | 31.8989 | 2.2251 | 273.64 | 3.2933 | 276.93 | 0.00 | 0.2630 |
| 4.7374111 | 31.8925 | 2.2066 | 270.01 | 3.2818 | 273.29 | 0.00 | 0.2617 |
| 4.7610982 | 31.8860 | 2.1882 | 266.43 | 3.2702 | 269.70 | 0.00 | 0.2604 |
| 4.7849037 | 31.8795 | 2.1700 | 262.90 | 3.2587 | 266.16 | 0.00 | 0.2591 |
| 4.8088282 | 31.8730 | 2.1520 | 259.42 | 3.2471 | 262.66 | 0.00 | 0.2578 |
| 4.8328723 | 31.8664 | 2.1341 | 255.98 | 3.2355 | 259.22 | 0.00 | 0.2565 |
| 4.8570367 | 31.8599 | 2.1164 | 252.59 | 3.2240 | 255.82 | 0.00 | 0.2553 |
| 4.8813219 | 31.8533 | 2.0988 | 249.25 | 3.2124 | 252.46 | 0.00 | 0.2540 |
| 4.9057285 | 31.8468 | 2.0814 | 245.95 | 3.2008 | 249.15 | 0.00 | 0.2527 |
| 4.9302571 | 31.8402 | 2.0641 | 242.70 | 3.1892 | 245.89 | 0.00 | 0.2515 |
| 4.9549084 | 31.8337 | 2.0471 | 239.49 | 3.1777 | 242.67 | 0.00 | 0.2502 |
| 4.9796829 | 31.8271 | 2.0301 | 236.33 | 3.1661 | 239.50 | 0.00 | 0.2490 |
| 5.0045814 | 31.8205 | 2.0133 | 233.21 | 3.1545 | 236.37 | 0.00 | 0.2477 |
| 5.0296043 | 31.8139 | 1.9967 | 230.13 | 3.1429 | 233.28 | 0.00 | 0.2465 |
| 5.0547523 | 31.8073 | 1.9802 | 227.10 | 3.1313 | 230.23 | 0.00 | 0.2453 |
| 5.0800260 | 31.8007 | 1.9638 | 224.10 | 3.1198 | 227.22 | 0.00 | 0.2441 |
| 5.1054262 | 31.7941 | 1.9476 | 221.15 | 3.1082 | 224.25 | 0.00 | 0.2428 |
| 5.1309533 | 31.7875 | 1.9316 | 218.23 | 3.0966 | 221.33 | 0.00 | 0.2416 |
| 5.1566081 | 31.7809 | 1.9157 | 215.36 | 3.0850 | 218.44 | 0.00 | 0.2404 |
| 5.1823911 | 31.7743 | 1.8999 | 212.52 | 3.0734 | 215.60 | 0.00 | 0.2392 |
| 5.2083031 | 31.7677 | 1.8843 | 209.72 | 3.0619 | 212.79 | 0.00 | 0.2381 |
| 5.2343446 | 31.7612 | 1.8688 | 206.97 | 3.0503 | 210.02 | 0.00 | 0.2369 |
| 5.2605163 | 31.7546 | 1.8534 | 204.24 | 3.0387 | 207.28 | 0.00 | 0.2357 |
| 5.2868189 | 31.7480 | 1.8379 | 201.52 | 3.0272 | 204.55 | 0.00 | 0.2345 |
| 5.3132530 | 31.7414 | 1.8221 | 198.80 | 3.0156 | 201.82 | 0.00 | 0.2333 |
| 5.3398192 | 31.7348 | 1.8066 | 196.12 | 3.0041 | 199.13 | 0.00 | 0.2322 |
| 5.3665183 | 31.7281 | 1.7911 | 193.48 | 2.9925 | 196.47 | 0.00 | 0.2310 |
| 5.3933509 | 31.7214 | 1.7759 | 190.88 | 2.9810 | 193.86 | 0.00 | 0.2299 |
| 5.4203177 | 31.7146 | 1.7606 | 188.29 | 2.9694 | 191.26 | 0.00 | 0.2287 |
| 5.4474193 | 31.7078 | 1.7453 | 185.73 | 2.9579 | 188.68 | 0.00 | 0.2276 |
| 5.4746564 | 31.7010 | 1.7301 | 183.20 | 2.9464 | 186.14 | 0.00 | 0.2265 |
| 5.5020297 | 31.6941 | 1.7151 | 180.70 | 2.9348 | 183.64 | 0.00 | 0.2253 |
| 5.5295398 | 31.6871 | 1.7002 | 178.24 | 2.9233 | 181.17 | 0.00 | 0.2242 |
| 5.5571875 | 31.6801 | 1.6855 | 175.82 | 2.9118 | 178.73 | 0.00 | 0.2231 |
| 5.5849734 | 31.6731 | 1.6709 | 173.43 | 2.9003 | 176.33 | 0.00 | 0.2220 |
| 5.6128983 | 31.6660 | 1.6564 | 171.07 | 2.8888 | 173.96 | 0.00 | 0.2209 |
| 5.6409628 | 31.6588 | 1.6421 | 168.75 | 2.8773 | 171.63 | 0.00 | 0.2198 |
| 5.6691676 | 31.6517 | 1.6279 | 166.46 | 2.8658 | 169.33 | 0.00 | 0.2187 |
| 5.6975135 | 31.6445 | 1.6139 | 164.20 | 2.8543 | 167.06 | 0.00 | 0.2176 |
| 5.7260010 | 31.6372 | 1.6000 | 161.98 | 2.8429 | 164.82 | 0.00 | 0.2165 |
| 5.7546310 | 31.6300 | 1.5862 | 159.78 | 2.8314 | 162.62 | 0.00 | 0.2155 |
| 5.7834042 | 31.6227 | 1.5725 | 157.62 | 2.8200 | 160.44 | 0.00 | 0.2144 |
| 5.8123212 | 31.6153 | 1.5590 | 155.49 | 2.8085 | 158.30 | 0.00 | 0.2133 |
| 5.8413828 | 31.6080 | 1.5456 | 153.39 | 2.7971 | 156.18 | 0.00 | 0.2123 |
| 5.8705897 | 31.6006 | 1.5323 | 151.31 | 2.7857 | 154.10 | 0.00 | 0.2112 |
| 5.8999427 | 31.5932 | 1.5192 | 149.27 | 2.7743 | 152.04 | 0.00 | 0.2101 |
| 5.9294424 | 31.5857 | 1.5062 | 147.25 | 2.7629 | 150.02 | 0.00 | 0.2091 |
| 5.9590896 | 31.5783 | 1.4933 | 145.27 | 2.7515 | 148.02 | 0.00 | 0.2081 |
| 5.9888850 | 31.5708 | 1.4805 | 143.31 | 2.7401 | 146.05 | 0.00 | 0.2070 |
| 6.0188295 | 31.5633 | 1.4679 | 141.38 | 2.7287 | 144.11 | 0.00 | 0.2060 |
| 6.0489236 | 31.5557 | 1.4553 | 139.47 | 2.7174 | 142.19 | 0.00 | 0.2050 |
| 6.0791682 | 31.5482 | 1.4429 | 137.59 | 2.7061 | 140.30 | 0.00 | 0.2039 |
| 6.1095641 | 31.5406 | 1.4306 | 135.74 | 2.6947 | 138.44 | 0.00 | 0.2029 |
| 6.1401119 | 31.5330 | 1.4182 | 133.90 | 2.6834 | 136.58 | 0.00 | 0.2019 |
| 6.1708125 | 31.5254 | 1.4056 | 132.04 | 2.6721 | 134.72 | 0.00 | 0.2009 |
| 6.2016665 | 31.5177 | 1.3931 | 130.22 | 2.6608 | 132.88 | 0.00 | 0.1999 |
| 6.2326749 | 31.5100 | 1.3807 | 128.42 | 2.6495 | 131.07 | 0.00 | 0.1989 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ge ($Z=32$) | | | | | | | |
| 6.2638382 | 31.5022 | 1.3684 | 126.64 | 2.6383 | 129.28 | 0.00 | 0.1979 |
| 6.2951574 | 31.4943 | 1.3562 | 124.89 | 2.6270 | 127.52 | 0.00 | 0.1970 |
| 6.3266332 | 31.4863 | 1.3442 | 123.16 | 2.6158 | 125.78 | 0.00 | 0.1960 |
| 6.3582664 | 31.4784 | 1.3322 | 121.46 | 2.6046 | 124.07 | 0.00 | 0.1950 |
| 6.3900577 | 31.4703 | 1.3204 | 119.79 | 2.5934 | 122.38 | 0.00 | 0.1940 |
| 6.4220080 | 31.4622 | 1.3087 | 118.13 | 2.5822 | 120.72 | 0.00 | 0.1931 |
| 6.4541180 | 31.4540 | 1.2971 | 116.50 | 2.5710 | 119.07 | 0.00 | 0.1921 |
| 6.4863886 | 31.4458 | 1.2856 | 114.90 | 2.5598 | 117.46 | 0.00 | 0.1911 |
| 6.5188206 | 31.4375 | 1.2742 | 113.31 | 2.5487 | 115.86 | 0.00 | 0.1902 |
| 6.5514147 | 31.4292 | 1.2630 | 111.75 | 2.5376 | 114.29 | 0.00 | 0.1892 |
| 6.5841717 | 31.4208 | 1.2518 | 110.21 | 2.5265 | 112.74 | 0.00 | 0.1883 |
| As ($Z=33$) | | | | | | | |
| Atomic weight: $A_r=74.92160 \text{ g/mol}^{-1}$, Nominal density: $\rho (\text{g/cm}^{-3})=5.7200$ | | | | | | | |
| $\sigma_a(\text{barns/atom})=[\mu/\rho](\text{cm}^2/\text{g}^{-1}) \times 124.410$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2/\text{g}^{-1})=f_2(e/\text{atom}) \times 5.61658 \times 10^5$ | | | | | | | |
| 9 edges. Edge energies (keV): | | | | | | | |
| K | 11.8667 | LI | 1.52650 | LII | 1.35860 | LIII | 1.32310 |
| MI | 0.203500 | MII | 0.146400 | MIII | 0.140500 | MIV | 0.0412000 |
| M V | 0.0412000 | | | | | | |
| Relativistic correction estimate $f_{\text{rel}}(\text{H82,3/5CL})=(-0.19087, -0.12000) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction $f_{\text{NT}}=-0.0079737 e \text{ atom}^{-1}$ | | | | | | | |
| 0.90000000 | 24.4656 | 3.9929 | 2491.8 | 4.6620 | 2496.5 | 0.00 | 1.378 |
| 0.90450000 | 24.4435 | 3.9672 | 2463.4 | 4.6705 | 2468.1 | 0.00 | 1.371 |
| 0.90902250 | 24.4209 | 3.9416 | 2435.4 | 4.6789 | 2440.1 | 0.00 | 1.364 |
| 0.91356761 | 24.3978 | 3.9163 | 2407.7 | 4.6872 | 2412.4 | 0.00 | 1.357 |
| 0.91813545 | 24.3741 | 3.8910 | 2380.3 | 4.6954 | 2385.0 | 0.00 | 1.350 |
| 0.92272613 | 24.3499 | 3.8660 | 2353.2 | 4.7036 | 2357.9 | 0.00 | 1.344 |
| 0.92733976 | 24.3250 | 3.8411 | 2326.4 | 4.7117 | 2331.2 | 0.00 | 1.337 |
| 0.93197646 | 24.2997 | 3.8164 | 2300.0 | 4.7198 | 2304.7 | 0.00 | 1.330 |
| 0.93663634 | 24.2737 | 3.7919 | 2273.8 | 4.7278 | 2278.5 | 0.00 | 1.324 |
| 0.94131952 | 24.2472 | 3.7675 | 2247.9 | 4.7357 | 2252.7 | 0.00 | 1.317 |
| 0.94602612 | 24.2202 | 3.7432 | 2222.4 | 4.7435 | 2227.1 | 0.00 | 1.311 |
| 0.95075625 | 24.1925 | 3.7192 | 2197.1 | 4.7512 | 2201.9 | 0.00 | 1.304 |
| 0.95551003 | 24.1643 | 3.6953 | 2172.1 | 4.7589 | 2176.9 | 0.00 | 1.298 |
| 0.96028758 | 24.1355 | 3.6715 | 2147.4 | 4.7665 | 2152.2 | 0.00 | 1.291 |
| 0.96508902 | 24.1062 | 3.6480 | 2123.0 | 4.7740 | 2127.8 | 0.00 | 1.285 |
| 0.96991446 | 24.0763 | 3.6245 | 2098.9 | 4.7815 | 2103.7 | 0.00 | 1.278 |
| 0.97476404 | 24.0458 | 3.6013 | 2075.1 | 4.7889 | 2079.8 | 0.00 | 1.272 |
| 0.97963786 | 24.0149 | 3.5782 | 2051.5 | 4.7962 | 2056.3 | 0.00 | 1.266 |
| 0.98453605 | 23.9834 | 3.5552 | 2028.2 | 4.8034 | 2033.0 | 0.00 | 1.259 |
| 0.98945873 | 23.9515 | 3.5325 | 2005.2 | 4.8106 | 2010.0 | 0.00 | 1.253 |
| 0.99440602 | 23.9192 | 3.5098 | 1982.4 | 4.8176 | 1987.2 | 0.00 | 1.247 |
| 0.99937805 | 23.8865 | 3.4874 | 1959.9 | 4.8246 | 1964.8 | 0.00 | 1.241 |
| 1.0043749 | 23.8509 | 3.4595 | 1934.6 | 4.8316 | 1939.4 | 0.00 | 1.234 |
| 1.0093968 | 23.8095 | 3.4312 | 1909.2 | 4.8384 | 1914.0 | 0.00 | 1.228 |
| 1.0144438 | 23.7656 | 3.4030 | 1884.1 | 4.8452 | 1889.0 | 0.00 | 1.222 |
| 1.0195160 | 23.7197 | 3.3752 | 1859.4 | 4.8519 | 1864.3 | 0.00 | 1.216 |
| 1.0246136 | 23.6722 | 3.3476 | 1835.1 | 4.8585 | 1839.9 | 0.00 | 1.210 |
| 1.0297367 | 23.6231 | 3.3203 | 1811.0 | 4.8650 | 1815.9 | 0.00 | 1.204 |
| 1.0348853 | 23.5725 | 3.2932 | 1787.3 | 4.8715 | 1792.2 | 0.00 | 1.198 |
| 1.0400598 | 23.5201 | 3.2664 | 1763.9 | 4.8778 | 1768.8 | 0.00 | 1.192 |
| 1.0452601 | 23.4662 | 3.2399 | 1740.9 | 4.8841 | 1745.8 | 0.00 | 1.186 |
| 1.0504864 | 23.4105 | 3.2135 | 1718.2 | 4.8904 | 1723.1 | 0.00 | 1.180 |
| 1.0557388 | 23.3531 | 3.1875 | 1695.7 | 4.8965 | 1700.6 | 0.00 | 1.174 |
| 1.0610175 | 23.2939 | 3.1616 | 1673.6 | 4.9026 | 1678.5 | 0.00 | 1.169 |
| 1.0663226 | 23.2327 | 3.1360 | 1651.8 | 4.9085 | 1656.7 | 0.00 | 1.163 |
| 1.0716542 | 23.1696 | 3.1107 | 1630.3 | 4.9144 | 1635.2 | 0.00 | 1.157 |
| 1.0770125 | 23.1045 | 3.0856 | 1609.1 | 4.9203 | 1614.0 | 0.00 | 1.151 |
| 1.0823975 | 23.0371 | 3.0607 | 1588.2 | 4.9260 | 1593.1 | 0.00 | 1.145 |
| 1.0878095 | 22.9676 | 3.0360 | 1567.6 | 4.9317 | 1572.5 | 0.00 | 1.140 |
| 1.0932486 | 22.8956 | 3.0116 | 1547.2 | 4.9372 | 1552.2 | 0.00 | 1.134 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| As($Z=33$) | | | | | | | |
| 1.0987148 | 22.8212 | 2.9874 | 1527.1 | 4.9427 | 1532.1 | 0.00 | 1.128 |
| 1.1042084 | 22.7442 | 2.9634 | 1507.4 | 4.9482 | 1512.3 | 0.00 | 1.123 |
| 1.1097294 | 22.6644 | 2.9397 | 1487.8 | 4.9535 | 1492.8 | 0.00 | 1.117 |
| 1.1152781 | 22.5817 | 2.9161 | 1468.6 | 4.9587 | 1473.5 | 0.00 | 1.112 |
| 1.1208545 | 22.4959 | 2.8928 | 1449.6 | 4.9639 | 1454.5 | 0.00 | 1.106 |
| 1.1264587 | 22.4069 | 2.8697 | 1430.8 | 4.9690 | 1435.8 | 0.00 | 1.101 |
| 1.1320910 | 22.3144 | 2.8468 | 1412.4 | 4.9740 | 1417.3 | 0.00 | 1.095 |
| 1.1377515 | 22.2182 | 2.8241 | 1394.1 | 4.9789 | 1399.1 | 0.00 | 1.090 |
| 1.1434402 | 22.1180 | 2.8016 | 1376.2 | 4.9837 | 1381.1 | 0.00 | 1.084 |
| 1.1491574 | 22.0137 | 2.7794 | 1358.4 | 4.9885 | 1363.4 | 0.00 | 1.079 |
| 1.1549032 | 21.9049 | 2.7573 | 1340.9 | 4.9932 | 1345.9 | 0.00 | 1.074 |
| 1.1606777 | 21.7912 | 2.7354 | 1323.7 | 4.9978 | 1328.7 | 0.00 | 1.068 |
| 1.1664811 | 21.6724 | 2.7137 | 1306.7 | 5.0023 | 1311.7 | 0.00 | 1.063 |
| 1.1723135 | 21.5479 | 2.6923 | 1289.9 | 5.0067 | 1294.9 | 0.00 | 1.058 |
| 1.1781751 | 21.4173 | 2.6710 | 1273.3 | 5.0110 | 1278.3 | 0.00 | 1.052 |
| 1.1840660 | 21.2802 | 2.6499 | 1257.0 | 5.0153 | 1262.0 | 0.00 | 1.047 |
| 1.1899863 | 21.1358 | 2.6290 | 1240.9 | 5.0194 | 1245.9 | 0.00 | 1.042 |
| 1.1959362 | 20.9834 | 2.6083 | 1225.0 | 5.0235 | 1230.0 | 0.00 | 1.037 |
| 1.2019159 | 20.8225 | 2.5878 | 1209.3 | 5.0275 | 1214.3 | 0.00 | 1.032 |
| 1.2079255 | 20.6519 | 2.5674 | 1193.8 | 5.0314 | 1198.8 | 0.00 | 1.026 |
| 1.2139651 | 20.4706 | 2.5473 | 1178.5 | 5.0352 | 1183.6 | 0.00 | 1.021 |
| 1.2200350 | 20.2775 | 2.5273 | 1163.5 | 5.0390 | 1168.5 | 0.00 | 1.016 |
| 1.2261351 | 20.0709 | 2.5075 | 1148.6 | 5.0426 | 1153.7 | 0.00 | 1.011 |
| 1.2322658 | 19.8492 | 2.4879 | 1134.0 | 5.0462 | 1139.0 | 0.00 | 1.006 |
| 1.2384271 | 19.6102 | 2.4685 | 1119.5 | 5.0497 | 1124.6 | 0.00 | 1.001 |
| 1.2446193 | 19.3513 | 2.4492 | 1105.3 | 5.0531 | 1110.3 | 0.00 | 0.9962 |
| 1.2508424 | 19.0692 | 2.4301 | 1091.2 | 5.0564 | 1096.2 | 0.00 | 0.9912 |
| 1.2570966 | 18.7596 | 2.4112 | 1077.3 | 5.0597 | 1082.4 | 0.00 | 0.9863 |
| 1.2633821 | 18.4174 | 2.3925 | 1063.6 | 5.0628 | 1068.7 | 0.00 | 0.9814 |
| 1.2696990 | 18.0351 | 2.3739 | 1050.1 | 5.0659 | 1055.2 | 0.00 | 0.9765 |
| 1.2760475 | 17.6029 | 2.3555 | 1036.8 | 5.0688 | 1041.8 | 0.00 | 0.9716 |
| 1.2824277 | 17.1067 | 2.3372 | 1023.6 | 5.0717 | 1028.7 | 0.00 | 0.9668 |
| 1.2888399 | 16.5252 | 2.3191 | 1010.6 | 5.0745 | 1015.7 | 0.00 | 0.9620 |
| 1.2952840 | 15.8238 | 2.3012 | 997.84 | 5.0772 | 1002.9 | 0.00 | 0.9572 |
| 1.3017605 | 14.9407 | 2.2834 | 985.20 | 5.0799 | 990.28 | 0.00 | 0.9524 |
| 1.3082693 | 13.7469 | 2.2658 | 972.74 | 5.0824 | 977.82 | 0.00 | 0.9477 |
| 1.3148106 | 11.8809 | 2.2483 | 960.45 | 5.0849 | 965.53 | 0.00 | 0.9430 |
| 1.3213847 | 7.00551 | 2.2310 | 948.31 | 5.0872 | 953.40 | 0.00 | 0.9383 |
| 1.3229793 | -1.02828 | 2.2269 | 945.40 | 5.0878 | 950.49 | 0.00 | 0.9372 |
| 1.3232206 | -1.19194 | 11.702 | 4967.0 | 5.0879 | 4972.1 | 0.00 | 0.9370 |
| 1.3279916 | 9.86152 | 11.634 | 4920.6 | 5.0895 | 4925.7 | 0.00 | 0.9336 |
| 1.3346316 | 12.1906 | 11.541 | 4856.9 | 5.0917 | 4862.0 | 0.00 | 0.9290 |
| 1.3413047 | 13.1749 | 11.449 | 4794.1 | 5.0938 | 4799.2 | 0.00 | 0.9244 |
| 1.3480112 | 13.4770 | 11.357 | 4732.1 | 5.0958 | 4737.2 | 0.00 | 0.9198 |
| 1.3547513 | 12.7785 | 11.267 | 4671.0 | 5.0978 | 4676.1 | 0.00 | 0.9152 |
| 1.3584739 | 80.7519 | 11.217 | 4637.6 | 5.0988 | 4642.7 | 0.00 | 0.9127 |
| 1.3587261 | 80.2227 | 15.893 | 6569.7 | 5.0989 | 6574.8 | 0.00 | 0.9125 |
| 1.3615250 | 12.9746 | 15.841 | 6534.6 | 5.0996 | 6539.7 | 0.00 | 0.9106 |
| 1.3683327 | 15.3326 | 15.714 | 6450.3 | 5.1014 | 6455.4 | 0.00 | 0.9061 |
| 1.3751743 | 16.6108 | 15.589 | 6367.1 | 5.1030 | 6372.2 | 0.00 | 0.9016 |
| 1.3820502 | 17.5520 | 15.465 | 6285.0 | 5.1046 | 6290.1 | 0.00 | 0.8971 |
| 1.3889605 | 18.3128 | 15.342 | 6204.0 | 5.1061 | 6209.1 | 0.00 | 0.8926 |
| 1.3959053 | 18.9565 | 15.220 | 6124.0 | 5.1076 | 6129.1 | 0.00 | 0.8882 |
| 1.4028848 | 19.5156 | 15.099 | 6045.1 | 5.1089 | 6050.2 | 0.00 | 0.8838 |
| 1.4098992 | 20.0100 | 14.979 | 5967.2 | 5.1101 | 5972.3 | 0.00 | 0.8794 |
| 1.4169487 | 20.4522 | 14.860 | 5890.3 | 5.1113 | 5895.4 | 0.00 | 0.8750 |
| 1.4240335 | 20.8510 | 14.742 | 5814.4 | 5.1123 | 5819.5 | 0.00 | 0.8707 |
| 1.4311536 | 21.2128 | 14.625 | 5739.4 | 5.1133 | 5744.5 | 0.00 | 0.8663 |
| 1.4383094 | 21.5421 | 14.508 | 5665.5 | 5.1142 | 5670.6 | 0.00 | 0.8620 |
| 1.4455009 | 21.8422 | 14.393 | 5592.5 | 5.1150 | 5597.6 | 0.00 | 0.8577 |
| 1.4527284 | 22.1155 | 14.279 | 5520.4 | 5.1158 | 5525.6 | 0.00 | 0.8535 |
| 1.4599921 | 22.3634 | 14.165 | 5449.3 | 5.1164 | 5454.5 | 0.00 | 0.8492 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| As($Z=33$) | | | | | | | |
| 1.4672920 | 22.5867 | 14.053 | 5379.1 | 5.1169 | 5384.3 | 0.00 | 0.8450 |
| 1.4746285 | 22.7850 | 13.941 | 5309.9 | 5.1174 | 5315.0 | 0.00 | 0.8408 |
| 1.4820016 | 22.9569 | 13.830 | 5241.5 | 5.1178 | 5246.6 | 0.00 | 0.8366 |
| 1.4894117 | 23.0990 | 13.720 | 5174.0 | 5.1181 | 5179.1 | 0.00 | 0.8324 |
| 1.4968587 | 23.2045 | 13.612 | 5107.4 | 5.1183 | 5112.5 | 0.00 | 0.8283 |
| 1.5043430 | 23.2595 | 13.503 | 5041.6 | 5.1184 | 5046.8 | 0.00 | 0.8242 |
| 1.5118647 | 23.2307 | 13.396 | 4976.7 | 5.1184 | 4981.9 | 0.00 | 0.8201 |
| 1.5194240 | 23.0055 | 13.290 | 4912.7 | 5.1184 | 4917.8 | 0.00 | 0.8160 |
| 1.5251383 | 22.1676 | 13.211 | 4865.0 | 5.1183 | 4870.1 | 0.00 | 0.8129 |
| 1.5270212 | 21.6078 | 15.080 | 5546.6 | 5.1182 | 5551.8 | 0.00 | 0.8119 |
| 1.5278616 | 22.2101 | 15.068 | 5539.0 | 5.1182 | 5544.2 | 0.00 | 0.8115 |
| 1.5346563 | 23.4670 | 14.969 | 547.83 | 5.1180 | 5483.4 | 0.00 | 0.8079 |
| 1.5423295 | 24.0566 | 14.858 | 5410.7 | 5.1177 | 5415.8 | 0.00 | 0.8039 |
| 1.5500412 | 24.4774 | 14.748 | 5344.1 | 5.1173 | 5349.2 | 0.00 | 0.7999 |
| 1.5577914 | 24.8232 | 14.639 | 5278.2 | 5.1168 | 5283.3 | 0.00 | 0.7959 |
| 1.5655804 | 25.1247 | 14.531 | 5213.2 | 5.1162 | 5218.3 | 0.00 | 0.7919 |
| 1.5734083 | 25.3961 | 14.424 | 5149.0 | 5.1156 | 5154.1 | 0.00 | 0.7880 |
| 1.5812753 | 25.6449 | 14.318 | 5085.6 | 5.1148 | 5090.7 | 0.00 | 0.7841 |
| 1.5891817 | 25.8760 | 14.212 | 5023.0 | 5.1140 | 5028.2 | 0.00 | 0.7802 |
| 1.5971276 | 26.0924 | 14.108 | 4961.2 | 5.1131 | 4966.4 | 0.00 | 0.7763 |
| 1.6051132 | 26.2963 | 14.004 | 4900.3 | 5.1121 | 4905.5 | 0.00 | 0.7724 |
| 1.6131388 | 26.4898 | 13.902 | 4840.4 | 5.1110 | 4845.5 | 0.00 | 0.7686 |
| 1.6212045 | 26.6742 | 13.801 | 4781.3 | 5.1098 | 4786.4 | 0.00 | 0.7648 |
| 1.6293105 | 26.8504 | 13.701 | 4722.9 | 5.1086 | 4728.0 | 0.00 | 0.7610 |
| 1.6374571 | 27.0193 | 13.601 | 4665.2 | 5.1072 | 4670.3 | 0.00 | 0.7572 |
| 1.6456443 | 27.1815 | 13.502 | 4608.3 | 5.1058 | 4613.4 | 0.00 | 0.7534 |
| 1.6538726 | 27.3375 | 13.404 | 4552.1 | 5.1043 | 4557.2 | 0.00 | 0.7497 |
| 1.6621419 | 27.4878 | 13.307 | 4496.6 | 5.1027 | 4501.7 | 0.00 | 0.7459 |
| 1.6704526 | 27.6329 | 13.211 | 4441.9 | 5.1010 | 4447.0 | 0.00 | 0.7422 |
| 1.6788049 | 27.7732 | 13.115 | 4387.8 | 5.0993 | 4392.9 | 0.00 | 0.7385 |
| 1.6871989 | 27.9088 | 13.021 | 4334.5 | 5.0974 | 4339.5 | 0.00 | 0.7349 |
| 1.6956349 | 28.0403 | 12.927 | 4281.8 | 5.0955 | 4286.9 | 0.00 | 0.7312 |
| 1.7041131 | 28.1678 | 12.833 | 4229.7 | 5.0935 | 4234.8 | 0.00 | 0.7276 |
| 1.7126337 | 28.2917 | 12.741 | 4178.4 | 5.0914 | 4183.5 | 0.00 | 0.7239 |
| 1.7211968 | 28.4121 | 12.649 | 4127.6 | 5.0893 | 4132.7 | 0.00 | 0.7203 |
| 1.7298028 | 28.5289 | 12.557 | 4077.0 | 5.0870 | 4082.1 | 0.00 | 0.7168 |
| 1.7384518 | 28.6423 | 12.465 | 4027.1 | 5.0847 | 4032.2 | 0.00 | 0.7132 |
| 1.7471441 | 28.7524 | 12.374 | 3977.8 | 5.0822 | 3982.9 | 0.00 | 0.7096 |
| 1.7558798 | 28.8595 | 12.284 | 3929.2 | 5.0797 | 3934.3 | 0.00 | 0.7061 |
| 1.7646592 | 28.9637 | 12.194 | 3881.1 | 5.0771 | 3886.2 | 0.00 | 0.7026 |
| 1.7734825 | 29.0650 | 12.104 | 3833.4 | 5.0745 | 3838.5 | 0.00 | 0.6991 |
| 1.7823499 | 29.1635 | 12.015 | 3786.3 | 5.0717 | 3791.4 | 0.00 | 0.6956 |
| 1.7912617 | 29.2593 | 11.927 | 3739.8 | 5.0689 | 3744.9 | 0.00 | 0.6922 |
| 1.8002180 | 29.3525 | 11.839 | 3693.8 | 5.0660 | 3698.9 | 0.00 | 0.6887 |
| 1.8092191 | 29.4432 | 11.752 | 3648.4 | 5.0630 | 3653.5 | 0.00 | 0.6853 |
| 1.8182652 | 29.5316 | 11.666 | 3603.6 | 5.0599 | 3608.7 | 0.00 | 0.6819 |
| 1.8273565 | 29.6177 | 11.580 | 3559.4 | 5.0567 | 3564.4 | 0.00 | 0.6785 |
| 1.8364933 | 29.7016 | 11.495 | 3515.6 | 5.0535 | 3520.7 | 0.00 | 0.6751 |
| 1.8456757 | 29.7834 | 11.411 | 3472.5 | 5.0502 | 3477.5 | 0.00 | 0.6718 |
| 1.8549041 | 29.8632 | 11.327 | 3429.8 | 5.0468 | 3434.9 | 0.00 | 0.6684 |
| 1.8641786 | 29.9411 | 11.244 | 3387.7 | 5.0433 | 3392.8 | 0.00 | 0.6651 |
| 1.8734995 | 30.0171 | 11.162 | 3346.1 | 5.0398 | 3351.2 | 0.00 | 0.6618 |
| 1.8828670 | 30.0913 | 11.080 | 3305.0 | 5.0361 | 3310.1 | 0.00 | 0.6585 |
| 1.8922814 | 30.1637 | 10.998 | 3264.5 | 5.0324 | 3269.5 | 0.00 | 0.6552 |
| 1.9017428 | 30.2345 | 10.918 | 3224.4 | 5.0286 | 3229.4 | 0.00 | 0.6520 |
| 1.9112515 | 30.3037 | 10.838 | 3184.8 | 5.0248 | 3189.9 | 0.00 | 0.6487 |
| 1.9208077 | 30.3712 | 10.758 | 3145.8 | 5.0208 | 3150.8 | 0.00 | 0.6455 |
| 1.9304118 | 30.4373 | 10.679 | 3107.2 | 5.0168 | 3112.2 | 0.00 | 0.6423 |
| 1.9400638 | 30.5020 | 10.601 | 3069.0 | 5.0127 | 3074.0 | 0.00 | 0.6391 |
| 1.9497642 | 30.5652 | 10.523 | 3031.4 | 5.0085 | 3036.4 | 0.00 | 0.6359 |
| 1.9595130 | 30.6271 | 10.446 | 2994.2 | 5.0042 | 2999.2 | 0.00 | 0.6327 |
| 1.9693105 | 30.6878 | 10.370 | 2957.5 | 4.9999 | 2962.5 | 0.00 | 0.6296 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|--|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K -shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| As($Z=33$) | | | | | | | |
| 1.9791571 | 30.7473 | 10.294 | 2921.2 | 4.9955 | 2926.2 | 0.00 | 0.6264 |
| 1.9890529 | 30.8056 | 10.218 | 2885.2 | 4.9910 | 2890.2 | 0.00 | 0.6233 |
| 1.9989981 | 30.8624 | 10.141 | 2849.4 | 4.9864 | 2854.4 | 0.00 | 0.6202 |
| 2.0089931 | 30.9178 | 10.066 | 2814.1 | 4.9818 | 2819.1 | 0.00 | 0.6171 |
| 2.0190381 | 30.9719 | 9.9906 | 2779.2 | 4.9771 | 2784.2 | 0.00 | 0.6141 |
| 2.0291333 | 31.0246 | 9.9161 | 2744.7 | 4.9723 | 2749.7 | 0.00 | 0.6110 |
| 2.0392790 | 31.0762 | 9.8421 | 2710.7 | 4.9674 | 2715.7 | 0.00 | 0.6080 |
| 2.0494754 | 31.1265 | 9.7686 | 2677.1 | 4.9625 | 2682.1 | 0.00 | 0.6050 |
| 2.0597227 | 31.1757 | 9.6957 | 2643.9 | 4.9575 | 2648.8 | 0.00 | 0.6019 |
| 2.0700213 | 31.2237 | 9.6233 | 2611.1 | 4.9524 | 2616.0 | 0.00 | 0.5990 |
| 2.0803714 | 31.2706 | 9.5514 | 2578.7 | 4.9472 | 2583.6 | 0.00 | 0.5960 |
| 2.0907733 | 31.3165 | 9.4801 | 2546.7 | 4.9420 | 2551.6 | 0.00 | 0.5930 |
| 2.1012272 | 31.3613 | 9.4093 | 2515.1 | 4.9367 | 2520.0 | 0.00 | 0.5901 |
| 2.1117333 | 31.4051 | 9.3390 | 2483.9 | 4.9313 | 2488.8 | 0.00 | 0.5871 |
| 2.1222920 | 31.4479 | 9.2692 | 2453.1 | 4.9258 | 2458.0 | 0.00 | 0.5842 |
| 2.1329034 | 31.4898 | 9.1999 | 2422.6 | 4.9203 | 2427.5 | 0.00 | 0.5813 |
| 2.1435680 | 31.5308 | 9.1311 | 2392.5 | 4.9147 | 2397.4 | 0.00 | 0.5784 |
| 2.1542858 | 31.5708 | 9.0628 | 2362.8 | 4.9090 | 2367.7 | 0.00 | 0.5755 |
| 2.1650572 | 31.6099 | 8.9951 | 2333.5 | 4.9033 | 2338.4 | 0.00 | 0.5727 |
| 2.1758825 | 31.6482 | 8.9278 | 2304.5 | 4.8975 | 2309.4 | 0.00 | 0.5698 |
| 2.1867619 | 31.6856 | 8.8610 | 2275.9 | 4.8916 | 2280.8 | 0.00 | 0.5670 |
| 2.1976957 | 31.7222 | 8.7947 | 2247.6 | 4.8856 | 2252.5 | 0.00 | 0.5642 |
| 2.2086842 | 31.7580 | 8.7289 | 2219.7 | 4.8796 | 2224.6 | 0.00 | 0.5613 |
| 2.2197276 | 31.7930 | 8.6636 | 2192.2 | 4.8735 | 2197.0 | 0.00 | 0.5586 |
| 2.2308263 | 31.8272 | 8.5988 | 2164.9 | 4.8674 | 2169.8 | 0.00 | 0.5558 |
| 2.2419804 | 31.8607 | 8.5344 | 2138.0 | 4.8611 | 2142.9 | 0.00 | 0.5530 |
| 2.2531903 | 31.8935 | 8.4705 | 2111.5 | 4.8548 | 2116.3 | 0.00 | 0.5503 |
| 2.2644562 | 31.9255 | 8.4071 | 2085.2 | 4.8485 | 2090.1 | 0.00 | 0.5475 |
| 2.2757785 | 31.9569 | 8.3442 | 2059.3 | 4.8420 | 2064.2 | 0.00 | 0.5448 |
| 2.2871574 | 31.9875 | 8.2817 | 2033.7 | 4.8355 | 2038.6 | 0.00 | 0.5421 |
| 2.2985932 | 32.0175 | 8.2197 | 2008.5 | 4.8290 | 2013.3 | 0.00 | 0.5394 |
| 2.3100862 | 32.0468 | 8.1582 | 1983.5 | 4.8223 | 1988.3 | 0.00 | 0.5367 |
| 2.3216366 | 32.0755 | 8.0971 | 1958.9 | 4.8156 | 1963.7 | 0.00 | 0.5340 |
| 2.3332448 | 32.1036 | 8.0365 | 1934.5 | 4.8089 | 1939.4 | 0.00 | 0.5314 |
| 2.3449110 | 32.1311 | 7.9763 | 1910.5 | 4.8020 | 1915.3 | 0.00 | 0.5287 |
| 2.3566356 | 32.1580 | 7.9166 | 1886.8 | 4.7951 | 1891.6 | 0.00 | 0.5261 |
| 2.3684187 | 32.1843 | 7.8574 | 1863.3 | 4.7882 | 1868.1 | 0.00 | 0.5235 |
| 2.3802608 | 32.2100 | 7.7985 | 1840.2 | 4.7812 | 1845.0 | 0.00 | 0.5209 |
| 2.3921621 | 32.2352 | 7.7402 | 1817.3 | 4.7741 | 1822.1 | 0.00 | 0.5183 |
| 2.4041230 | 32.2598 | 7.6822 | 1794.7 | 4.7669 | 1799.5 | 0.00 | 0.5157 |
| 2.4161436 | 32.2840 | 7.6247 | 1772.4 | 4.7597 | 1777.2 | 0.00 | 0.5131 |
| 2.4282243 | 32.3076 | 7.5677 | 1750.4 | 4.7524 | 1755.2 | 0.00 | 0.5106 |
| 2.4403654 | 32.3307 | 7.5110 | 1728.7 | 4.7451 | 1733.4 | 0.00 | 0.5081 |
| 2.4525672 | 32.3533 | 7.4548 | 1707.2 | 4.7377 | 1712.0 | 0.00 | 0.5055 |
| 2.4648301 | 32.3754 | 7.3991 | 1686.0 | 4.7302 | 1690.7 | 0.00 | 0.5030 |
| 2.4771542 | 32.3971 | 7.3437 | 1665.1 | 4.7227 | 1669.8 | 0.00 | 0.5005 |
| 2.4895400 | 32.4184 | 7.2888 | 1644.4 | 4.7151 | 1649.1 | 0.00 | 0.4980 |
| 2.5019877 | 32.4392 | 7.2343 | 1624.0 | 4.7075 | 1628.7 | 0.00 | 0.4955 |
| 2.5144976 | 32.4595 | 7.1802 | 1603.8 | 4.6997 | 1608.5 | 0.00 | 0.4931 |
| 2.5270701 | 32.4795 | 7.1265 | 1583.9 | 4.6920 | 1588.6 | 0.00 | 0.4906 |
| 2.5397055 | 32.4990 | 7.0732 | 1564.3 | 4.6841 | 1568.9 | 0.00 | 0.4882 |
| 2.5524040 | 32.5182 | 7.0204 | 1544.8 | 4.6763 | 1549.5 | 0.00 | 0.4858 |
| 2.5651660 | 32.5370 | 6.9679 | 1525.7 | 4.6683 | 1530.3 | 0.00 | 0.4833 |
| 2.5779919 | 32.5554 | 6.9159 | 1506.7 | 4.6603 | 1511.4 | 0.00 | 0.4809 |
| 2.5908818 | 32.5735 | 6.8642 | 1488.0 | 4.6523 | 1492.7 | 0.00 | 0.4785 |
| 2.6038362 | 32.5912 | 6.8130 | 1469.6 | 4.6441 | 1474.2 | 0.00 | 0.4762 |
| 2.6168554 | 32.6086 | 6.7621 | 1451.4 | 4.6360 | 1456.0 | 0.00 | 0.4738 |
| 2.6299397 | 32.6257 | 6.7117 | 1433.4 | 4.6277 | 1438.0 | 0.00 | 0.4714 |
| 2.6430894 | 32.6425 | 6.6614 | 1415.5 | 4.6195 | 1420.2 | 0.00 | 0.4691 |
| 2.6563048 | 32.6595 | 6.6101 | 1397.7 | 4.6111 | 1402.3 | 0.00 | 0.4668 |
| 2.6695863 | 32.6764 | 6.5590 | 1380.0 | 4.6027 | 1384.6 | 0.00 | 0.4644 |
| 2.6829343 | 32.6934 | 6.5082 | 1362.5 | 4.5943 | 1367.1 | 0.00 | 0.4621 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| As($Z=33$) | | | | | | | |
| 2.6963489 | 32.8099 | 6.4579 | 1345.2 | 4.5858 | 1349.8 | .000 | 0.4598 |
| 2.7098307 | 32.8246 | 6.4080 | 1328.2 | 4.5772 | 1332.7 | 0.00 | 0.4575 |
| 2.7233798 | 32.8894 | 6.3581 | 1311.3 | 4.5686 | 1315.8 | 0.00 | 0.4553 |
| 2.7369967 | 32.9031 | 6.3083 | 1294.5 | 4.5599 | 1299.1 | 0.00 | 0.4530 |
| 2.7506817 | 32.9164 | 6.2589 | 1278.0 | 4.5512 | 1282.5 | 0.00 | 0.4507 |
| 2.7644351 | 32.9293 | 6.2096 | 1261.6 | 4.5424 | 1266.2 | 0.00 | 0.4485 |
| 2.7782573 | 32.9418 | 6.1607 | 1245.5 | 4.5336 | 1250.0 | 0.00 | 0.4463 |
| 2.7921486 | 32.9538 | 6.1122 | 1229.5 | 4.5247 | 1234.0 | 0.00 | 0.4440 |
| 2.8061093 | 32.9656 | 6.0642 | 1213.8 | 4.5158 | 1218.3 | 0.00 | 0.4418 |
| 2.8201399 | 32.9769 | 6.0165 | 1198.2 | 4.5068 | 1202.7 | 0.00 | 0.4396 |
| 2.8342406 | 32.9880 | 5.9692 | 1182.9 | 4.4978 | 1187.4 | 0.00 | 0.4375 |
| 2.8484118 | 32.9987 | 5.9223 | 1167.8 | 4.4887 | 1172.3 | 0.00 | 0.4353 |
| 2.8626539 | 33.0091 | 5.8757 | 1152.8 | 4.4796 | 1157.3 | 0.00 | 0.4331 |
| 2.8769671 | 33.0192 | 5.8296 | 1138.1 | 4.4704 | 1142.6 | 0.00 | 0.4310 |
| 2.8913520 | 33.0290 | 5.7838 | 1123.5 | 4.4612 | 1128.0 | 0.00 | 0.4288 |
| 2.9058087 | 33.0386 | 5.7385 | 1109.2 | 4.4520 | 1113.6 | 0.00 | 0.4267 |
| 2.9203378 | 33.0479 | 5.6935 | 1095.0 | 4.4426 | 1099.4 | 0.00 | 0.4246 |
| 2.9349394 | 33.0570 | 5.6489 | 1081.0 | 4.4333 | 1085.5 | 0.00 | 0.4224 |
| 2.9496141 | 33.0659 | 5.6046 | 1067.2 | 4.4239 | 1071.6 | 0.00 | 0.4203 |
| 2.9643622 | 33.0747 | 5.5607 | 1053.6 | 4.4144 | 1058.0 | 0.00 | 0.4182 |
| 2.9791840 | 33.0835 | 5.5172 | 1040.2 | 4.4049 | 1044.6 | 0.00 | 0.4162 |
| 2.9940799 | 33.0940 | 5.4741 | 1026.9 | 4.3954 | 1031.3 | 0.00 | 0.4141 |
| 3.0090503 | 33.1145 | 5.4288 | 1013.3 | 4.3858 | 1017.7 | 0.00 | 0.4120 |
| 3.0240956 | 33.1264 | 5.3822 | 999.62 | 4.3762 | 1004.0 | 0.00 | 0.4100 |
| 3.0392161 | 33.1367 | 5.3360 | 986.12 | 4.3665 | 990.49 | 0.00 | 0.4079 |
| 3.0544122 | 33.1882 | 5.2902 | 972.79 | 4.3568 | 977.15 | 0.00 | 0.4059 |
| 3.0696842 | 33.1966 | 5.2439 | 959.47 | 4.3470 | 963.81 | 0.00 | 0.4039 |
| 3.0850326 | 33.2041 | 5.1979 | 946.33 | 4.3372 | 950.67 | 0.00 | 0.4019 |
| 3.1004578 | 33.2109 | 5.1524 | 933.38 | 4.3273 | 937.71 | 0.00 | 0.3999 |
| 3.1159601 | 33.2171 | 5.1074 | 920.61 | 4.3174 | 924.93 | 0.00 | 0.3979 |
| 3.1315399 | 33.2227 | 5.0627 | 908.02 | 4.3075 | 912.33 | 0.00 | 0.3959 |
| 3.1471976 | 33.2278 | 5.0184 | 895.61 | 4.2975 | 899.90 | 0.00 | 0.3940 |
| 3.1629336 | 33.2325 | 4.9746 | 883.37 | 4.2875 | 887.65 | 0.00 | 0.3920 |
| 3.1787482 | 33.2366 | 4.9312 | 871.30 | 4.2775 | 875.58 | 0.00 | 0.3900 |
| 3.1946420 | 33.2404 | 4.8882 | 859.40 | 4.2674 | 863.67 | 0.00 | 0.3881 |
| 3.2106152 | 33.2438 | 4.8455 | 847.67 | 4.2573 | 851.92 | 0.00 | 0.3862 |
| 3.2266683 | 33.2468 | 4.8033 | 836.10 | 4.2471 | 840.35 | 0.00 | 0.3842 |
| 3.2428016 | 33.2495 | 4.7615 | 824.69 | 4.2369 | 828.93 | 0.00 | 0.3823 |
| 3.2590156 | 33.2518 | 4.7200 | 813.45 | 4.2266 | 817.67 | 0.00 | 0.3804 |
| 3.2753107 | 33.2539 | 4.6789 | 802.36 | 4.2164 | 806.57 | 0.00 | 0.3785 |
| 3.2916873 | 33.2556 | 4.6383 | 791.42 | 4.2060 | 795.63 | 0.00 | 0.3767 |
| 3.3081457 | 33.2570 | 4.5980 | 780.64 | 4.1957 | 784.84 | 0.00 | 0.3748 |
| 3.3246864 | 33.2582 | 4.5580 | 770.01 | 4.1853 | 774.20 | 0.00 | 0.3729 |
| 3.3413099 | 33.2591 | 4.5184 | 759.53 | 4.1749 | 763.70 | 0.00 | 0.3711 |
| 3.3580164 | 33.2598 | 4.4792 | 749.19 | 4.1644 | 753.36 | 0.00 | 0.3692 |
| 3.3748065 | 33.2602 | 4.4404 | 739.00 | 4.1539 | 743.15 | 0.00 | 0.3674 |
| 3.3916805 | 33.2604 | 4.4019 | 728.95 | 4.1434 | 733.10 | 0.00 | 0.3656 |
| 3.4086389 | 33.2603 | 4.3638 | 719.04 | 4.1328 | 723.18 | 0.00 | 0.3637 |
| 3.4256821 | 33.2600 | 4.3260 | 709.27 | 4.1222 | 713.39 | 0.00 | 0.3619 |
| 3.4428105 | 33.2596 | 4.2886 | 699.64 | 4.1116 | 703.75 | 0.00 | 0.3601 |
| 3.4600246 | 33.2589 | 4.2515 | 690.14 | 4.1009 | 694.24 | 0.00 | 0.3583 |
| 3.4773247 | 33.2580 | 4.2148 | 680.77 | 4.0903 | 684.86 | 0.00 | 0.3566 |
| 3.4947113 | 33.2570 | 4.1784 | 671.53 | 4.0795 | 675.61 | 0.00 | 0.3548 |
| 3.5121849 | 33.2557 | 4.1423 | 662.42 | 4.0688 | 666.49 | 0.00 | 0.3530 |
| 3.5297458 | 33.2543 | 4.1066 | 653.44 | 4.0580 | 657.50 | 0.00 | 0.3513 |
| 3.5473945 | 33.2527 | 4.0712 | 644.58 | 4.0472 | 648.63 | 0.00 | 0.3495 |
| 3.5651315 | 33.2510 | 4.0361 | 635.85 | 4.0363 | 639.89 | 0.00 | 0.3478 |
| 3.5829572 | 33.2490 | 4.0013 | 627.24 | 4.0255 | 631.26 | 0.00 | 0.3460 |
| 3.6008719 | 33.2470 | 3.9669 | 618.75 | 4.0146 | 622.76 | 0.00 | 0.3443 |
| 3.6188763 | 33.2447 | 3.9328 | 610.37 | 4.0036 | 614.38 | 0.00 | 0.3426 |
| 3.6369707 | 33.2424 | 3.8989 | 602.12 | 3.9927 | 606.11 | 0.00 | 0.3409 |
| 3.6551555 | 33.2399 | 3.8654 | 593.97 | 3.9817 | 597.95 | 0.00 | 0.3392 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| As($Z=33$) | | | | | | | |
| 3.6734313 | 33.2372 | 3.8323 | 585.94 | 3.9707 | 589.91 | 0.00 | 0.3375 |
| 3.6917985 | 33.2344 | 3.7994 | 578.02 | 3.9597 | 581.98 | 0.00 | 0.3358 |
| 3.7102575 | 33.2315 | 3.7668 | 570.22 | 3.9486 | 574.16 | 0.00 | 0.3342 |
| 3.7288088 | 33.2285 | 3.7345 | 562.51 | 3.9375 | 566.45 | 0.00 | 0.3325 |
| 3.7474528 | 33.2254 | 3.7025 | 554.92 | 3.9264 | 558.85 | 0.00 | 0.3308 |
| 3.7661901 | 33.2221 | 3.6708 | 547.43 | 3.9153 | 551.35 | 0.00 | 0.3292 |
| 3.7850210 | 33.2187 | 3.6394 | 540.05 | 3.9041 | 543.95 | 0.00 | 0.3276 |
| 3.8039461 | 33.2152 | 3.6083 | 532.77 | 3.8929 | 536.66 | 0.00 | 0.3259 |
| 3.8229659 | 33.2116 | 3.5774 | 525.58 | 3.8817 | 529.47 | 0.00 | 0.3243 |
| 3.8420807 | 33.2079 | 3.5468 | 518.49 | 3.8705 | 522.36 | 0.00 | 0.3227 |
| 3.8612911 | 33.2041 | 3.5164 | 511.49 | 3.8592 | 515.34 | 0.00 | 0.3211 |
| 3.8805975 | 33.2002 | 3.4862 | 504.58 | 3.8479 | 508.43 | 0.00 | 0.3195 |
| 3.9000005 | 33.1962 | 3.4564 | 497.77 | 3.8366 | 501.61 | 0.00 | 0.3179 |
| 3.9195005 | 33.1921 | 3.4268 | 491.06 | 3.8253 | 494.89 | 0.00 | 0.3163 |
| 3.9390980 | 33.1879 | 3.3975 | 484.44 | 3.8140 | 488.25 | 0.00 | 0.3148 |
| 3.9587935 | 33.1836 | 3.3685 | 477.91 | 3.8026 | 481.71 | 0.00 | 0.3132 |
| 3.9785875 | 33.1792 | 3.3397 | 471.47 | 3.7913 | 475.26 | 0.00 | 0.3116 |
| 3.9984804 | 33.1748 | 3.3112 | 465.12 | 3.7799 | 468.90 | 0.00 | 0.3101 |
| 4.0184728 | 33.1702 | 3.2830 | 458.86 | 3.7684 | 462.6/3 | 0.00 | 0.3085 |
| 4.0385652 | 33.1656 | 3.2550 | 452.69 | 3.7570 | 456.44 | 0.00 | 0.3070 |
| 4.0587580 | 33.1609 | 3.2273 | 446.60 | 3.7456 | 450.34 | 0.00 | 0.3055 |
| 4.0790518 | 33.1561 | 3.1998 | 440.59 | 3.7341 | 444.32 | 0.00 | 0.3040 |
| 4.0994471 | 33.1513 | 3.1726 | 434.67 | 3.7226 | 438.39 | 0.00 | 0.3024 |
| 4.1199443 | 33.1464 | 3.1456 | 428.83 | 3.7111 | 432.54 | 0.00 | 0.3009 |
| 4.1405440 | 33.1414 | 3.1188 | 423.07 | 3.6996 | 426.77 | 0.00 | 0.2994 |
| 4.1612467 | 33.1363 | 3.0923 | 417.38 | 3.6880 | 421.07 | 0.00 | 0.2979 |
| 4.1820530 | 33.1312 | 3.0661 | 411.78 | 3.6765 | 415.46 | 0.00 | 0.2965 |
| 4.2029632 | 33.1260 | 3.0401 | 406.26 | 3.6649 | 409.92 | 0.00 | 0.2950 |
| 4.2239781 | 33.1208 | 3.0143 | 400.81 | 3.6533 | 404.46 | 0.00 | 0.2935 |
| 4.2450980 | 33.1155 | 2.9888 | 395.43 | 3.6417 | 399.08 | 0.00 | 0.2921 |
| 4.2663234 | 33.1101 | 2.9634 | 390.13 | 3.6301 | 393.76 | 0.00 | 0.2906 |
| 4.2876551 | 33.1047 | 2.9384 | 384.91 | 3.6185 | 388.53 | 0.00 | 0.2892 |
| 4.3090933 | 33.0992 | 2.9135 | 379.75 | 3.6069 | 383.36 | 0.00 | 0.2877 |
| 4.3306388 | 33.0937 | 2.8889 | 374.67 | 3.5952 | 378.26 | 0.00 | 0.2863 |
| 4.3522920 | 33.0881 | 2.8645 | 369.65 | 3.5836 | 373.24 | 0.00 | 0.2849 |
| 4.3740535 | 33.0825 | 2.8403 | 364.71 | 3.5719 | 368.28 | 0.00 | 0.2835 |
| 4.3959237 | 33.0768 | 2.8163 | 359.83 | 3.5602 | 363.39 | 0.00 | 0.2820 |
| 4.4179033 | 33.0711 | 2.7925 | 355.02 | 3.5485 | 358.57 | 0.00 | 0.2806 |
| 4.4399929 | 33.0654 | 2.7690 | 350.28 | 3.5368 | 353.81 | 0.00 | 0.2792 |
| 4.4621928 | 33.0596 | 2.7457 | 345.60 | 3.5251 | 349.12 | 0.00 | 0.2779 |
| 4.4845038 | 33.0538 | 2.7226 | 340.98 | 3.5134 | 344.50 | 0.00 | 0.2765 |
| 4.5069263 | 33.0479 | 2.6996 | 336.43 | 3.5016 | 339.93 | 0.00 | 0.2751 |
| 4.5294609 | 33.0420 | 2.6769 | 331.94 | 3.4899 | 335.43 | 0.00 | 0.2737 |
| 4.5521082 | 33.0360 | 2.6544 | 327.52 | 3.4782 | 330.99 | 0.00 | 0.2724 |
| 4.5748688 | 33.0300 | 2.6322 | 323.15 | 3.4664 | 326.62 | 0.00 | 0.2710 |
| 4.5977431 | 33.0240 | 2.6101 | 318.84 | 3.4546 | 322.30 | 0.00 | 0.2697 |
| 4.6207318 | 33.0179 | 2.5882 | 314.60 | 3.4429 | 318.04 | 0.00 | 0.2683 |
| 4.6438355 | 33.0119 | 2.5665 | 310.41 | 3.4311 | 313.84 | 0.00 | 0.2670 |
| 4.6670547 | 33.0057 | 2.5450 | 306.27 | 3.4193 | 309.69 | 0.00 | 0.2657 |
| 4.6903900 | 32.9996 | 2.5237 | 302.20 | 3.4075 | 305.61 | 0.00 | 0.2643 |
| 4.7138419 | 32.9934 | 2.5025 | 298.18 | 3.3957 | 301.57 | 0.00 | 0.2630 |
| 4.7374111 | 32.9872 | 2.4816 | 294.21 | 3.3839 | 297.60 | 0.00 | 0.2617 |
| 4.7610982 | 32.9810 | 2.4609 | 290.30 | 3.3721 | 293.68 | 0.00 | 0.2604 |
| 4.7849037 | 32.9747 | 2.4403 | 286.45 | 3.3603 | 289.81 | 0.00 | 0.2591 |
| 4.8088282 | 32.9685 | 2.4199 | 282.64 | 3.3485 | 285.99 | 0.00 | 0.2578 |
| 4.8328723 | 32.9622 | 2.3998 | 278.89 | 3.3366 | 282.23 | 0.00 | 0.2565 |
| 4.8570367 | 32.9558 | 2.3797 | 275.19 | 3.3248 | 278.51 | 0.00 | 0.2553 |
| 4.8813219 | 32.9495 | 2.3599 | 271.54 | 3.3130 | 274.85 | 0.00 | 0.2540 |
| 4.9057285 | 32.9431 | 2.3403 | 267.94 | 3.3012 | 271.24 | 0.00 | 0.2527 |
| 4.9302571 | 32.9367 | 2.3208 | 264.39 | 3.2893 | 267.68 | 0.00 | 0.2515 |
| 4.9549084 | 32.9303 | 2.3015 | 260.88 | 3.2775 | 264.16 | 0.00 | 0.2502 |
| 4.9796829 | 32.9239 | 2.2824 | 257.43 | 3.2657 | 260.69 | 0.00 | 0.2490 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| As($Z=33$) | | | | | | | |
| 5.0045814 | 32.9174 | 2.2634 | 254.02 | 3.2538 | 257.27 | 0.00 | 0.2477 |
| 5.0296043 | 32.9110 | 2.2446 | 250.66 | 3.2420 | 253.90 | 0.00 | 0.2465 |
| 5.0547523 | 32.9045 | 2.2260 | 247.34 | 3.2302 | 250.57 | 0.00 | 0.2453 |
| 5.0800260 | 32.8980 | 2.2075 | 244.07 | 3.2183 | 247.29 | 0.00 | 0.2441 |
| 5.1054262 | 32.8915 | 2.1893 | 240.84 | 3.2065 | 244.05 | 0.00 | 0.2428 |
| 5.1309533 | 32.8850 | 2.1711 | 237.66 | 3.1946 | 240.86 | 0.00 | 0.2416 |
| 5.1566081 | 32.8785 | 2.1532 | 234.52 | 3.1828 | 237.71 | 0.00 | 0.2404 |
| 5.1823911 | 32.8719 | 2.1354 | 231.43 | 3.1710 | 234.60 | 0.00 | 0.2392 |
| 5.2083031 | 32.8654 | 2.1177 | 228.37 | 3.1591 | 231.53 | 0.00 | 0.2381 |
| 5.2343446 | 32.8588 | 2.1002 | 225.36 | 3.1473 | 228.51 | 0.00 | 0.2369 |
| 5.2605163 | 32.8522 | 2.0829 | 222.39 | 3.1355 | 225.52 | 0.00 | 0.2357 |
| 5.2868189 | 32.8457 | 2.0657 | 219.46 | 3.1237 | 222.58 | 0.00 | 0.2345 |
| 5.3132530 | 32.8391 | 2.0487 | 216.56 | 3.1118 | 219.68 | 0.00 | 0.2333 |
| 5.3398192 | 32.8325 | 2.0318 | 213.71 | 3.1000 | 216.81 | 0.00 | 0.2322 |
| 5.3665183 | 32.8259 | 2.0151 | 210.90 | 3.0882 | 213.99 | 0.00 | 0.2310 |
| 5.3933509 | 32.8193 | 1.9985 | 208.12 | 3.0764 | 211.20 | 0.00 | 0.2299 |
| 5.4203177 | 32.8127 | 1.9821 | 205.38 | 3.0646 | 208.45 | 0.00 | 0.2287 |
| 5.4474193 | 32.8060 | 1.9658 | 202.68 | 3.0528 | 205.74 | 0.00 | 0.2276 |
| 5.4746564 | 32.7994 | 1.9496 | 200.02 | 3.0410 | 203.06 | 0.00 | 0.2265 |
| 5.5020297 | 32.7928 | 1.9336 | 197.39 | 3.0292 | 200.42 | 0.00 | 0.2253 |
| 5.5295398 | 32.7862 | 1.9178 | 194.80 | 3.0174 | 197.82 | 0.00 | 0.2242 |
| 5.5571875 | 32.7796 | 1.9021 | 192.24 | 3.0057 | 195.25 | 0.00 | 0.2231 |
| 5.5849734 | 32.7729 | 1.8865 | 189.72 | 2.9939 | 192.71 | 0.00 | 0.2220 |
| 5.6128983 | 32.7663 | 1.8711 | 187.23 | 2.9821 | 190.21 | 0.00 | 0.2209 |
| 5.6409628 | 32.7597 | 1.8558 | 184.77 | 2.9704 | 187.74 | 0.00 | 0.2198 |
| 5.6691676 | 32.7531 | 1.8406 | 182.35 | 2.9586 | 185.31 | 0.00 | 0.2187 |
| 5.6975135 | 32.7465 | 1.8255 | 179.96 | 2.9469 | 182.91 | 0.00 | 0.2176 |
| 5.7260010 | 32.7399 | 1.8106 | 177.60 | 2.9351 | 180.54 | 0.00 | 0.2165 |
| 5.7546310 | 32.7333 | 1.7954 | 175.23 | 2.9234 | 178.16 | 0.00 | 0.2155 |
| 5.7834042 | 32.7267 | 1.7802 | 172.88 | 2.9117 | 175.79 | 0.00 | 0.2144 |
| 5.8123212 | 32.7200 | 1.7651 | 170.56 | 2.9000 | 173.46 | 0.00 | 0.2133 |
| 5.8413828 | 32.7133 | 1.7501 | 168.27 | 2.8883 | 171.16 | 0.00 | 0.2123 |
| 5.8705897 | 32.7066 | 1.7353 | 166.02 | 2.8766 | 168.89 | 0.00 | 0.2112 |
| 5.8999427 | 32.6998 | 1.7204 | 163.78 | 2.8649 | 166.65 | 0.00 | 0.2101 |
| 5.9294424 | 32.6930 | 1.7056 | 161.56 | 2.8533 | 164.41 | 0.00 | 0.2091 |
| 5.9590896 | 32.6861 | 1.6908 | 159.37 | 2.8416 | 162.21 | 0.00 | 0.2081 |
| 5.9888850 | 32.6792 | 1.6763 | 157.21 | 2.8300 | 160.04 | 0.00 | 0.2070 |
| 6.0188295 | 32.6722 | 1.6618 | 155.08 | 2.8183 | 157.89 | 0.00 | 0.2060 |
| 6.0489236 | 32.6652 | 1.6475 | 152.98 | 2.8067 | 155.78 | 0.00 | 0.2050 |
| 6.0791682 | 32.6582 | 1.6333 | 150.90 | 2.7951 | 153.70 | 0.00 | 0.2039 |
| 6.1095641 | 32.6511 | 1.6193 | 148.86 | 2.7835 | 151.65 | 0.00 | 0.2029 |
| 6.1401119 | 32.6439 | 1.6054 | 146.85 | 2.7719 | 149.62 | 0.00 | 0.2019 |
| 6.1708125 | 32.6368 | 1.5916 | 144.87 | 2.7603 | 147.63 | 0.00 | 0.2009 |
| 6.2016665 | 32.6296 | 1.5780 | 142.91 | 2.7488 | 145.66 | 0.00 | 0.1999 |
| 6.2326749 | 32.6223 | 1.5645 | 140.98 | 2.7372 | 143.72 | 0.00 | 0.1989 |
| 6.2638382 | 32.6151 | 1.5511 | 139.08 | 2.7257 | 141.81 | 0.00 | 0.1979 |
| 6.2951574 | 32.6078 | 1.5378 | 137.20 | 2.7142 | 139.92 | 0.00 | 0.1970 |
| 6.3266332 | 32.6004 | 1.5247 | 135.36 | 2.7027 | 138.06 | 0.00 | 0.1960 |
| 6.3582664 | 32.5931 | 1.5117 | 133.53 | 2.6912 | 136.22 | 0.00 | 0.1950 |
| 6.3900577 | 32.5857 | 1.4988 | 131.74 | 2.6797 | 134.42 | 0.00 | 0.1940 |
| 6.4220080 | 32.5783 | 1.4860 | 129.96 | 2.6682 | 132.63 | 0.00 | 0.1931 |
| 6.4541180 | 32.5708 | 1.4734 | 128.22 | 2.6568 | 130.87 | 0.00 | 0.1921 |
| 6.4863886 | 32.5634 | 1.4608 | 126.49 | 2.6454 | 129.14 | 0.00 | 0.1911 |
| 6.5188206 | 32.5559 | 1.4484 | 124.80 | 2.6339 | 127.43 | 0.00 | 0.1902 |
| 6.5514147 | 32.5484 | 1.4361 | 123.12 | 2.6225 | 125.74 | 0.00 | 0.1892 |
| 6.5841717 | 32.5408 | 1.4239 | 121.47 | 2.6112 | 124.08 | 0.00 | 0.1883 |

Se ($Z=34$)Atomic weight: $A_r=78.96000 \text{ g/mol}^{-1}$, Nominal density: $\rho \text{ (g/cm}^3\text{)}=4.7800$ $\sigma_a(\text{barns/atom})=[\mu/\rho](\text{cm}^2/\text{g}^{-1}) \times 131.116$ $E(\text{eV}) [\mu/\rho](\text{cm}^2/\text{g}^{-1})=f_2(e/\text{atom}^{-1}) \times 5.32932 \times 10^5$

9 edges. Edge energies (keV):

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| K | 12.6578 | LI | 1.65390 | LII | 1.47620 | LIII | 1.43580 |
| MI | 0.231500 | MII | 0.168200 | MIII | 0.161900 | MIV | 0.0567000 |
| M V | 0.0412000 | | | | | | |
| Relativistic correction estimate $f_{\text{rel}}(\text{H82,3/5CL})=(-0.20514, -0.12900) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction $f_{\text{NT}}=-0.0080314 e \text{ atom}^{-1}$ | | | | | | | |
| 0.90000000 | 26.0490 | 4.5539 | 2696.6 | 4.6931 | 2701.3 | 0.00 | 1.378 |
| 0.90450000 | 26.0344 | 4.5259 | 2666.7 | 4.7016 | 2671.4 | 0.00 | 1.371 |
| 0.90902250 | 26.0195 | 4.4981 | 2637.1 | 4.7100 | 2641.8 | 0.00 | 1.364 |
| 0.91356761 | 26.0042 | 4.4705 | 2607.9 | 4.7183 | 2612.6 | 0.00 | 1.357 |
| 0.91813545 | 25.9885 | 4.4430 | 2578.9 | 4.7266 | 2583.7 | 0.00 | 1.350 |
| 0.92272613 | 25.9723 | 4.4157 | 2550.3 | 4.7347 | 2555.1 | 0.00 | 1.344 |
| 0.92733976 | 25.9558 | 4.3885 | 2522.0 | 4.7428 | 2526.8 | 0.00 | 1.337 |
| 0.93197646 | 25.9388 | 4.3615 | 2494.1 | 4.7509 | 2498.8 | 0.00 | 1.330 |
| 0.93663634 | 25.9214 | 4.3347 | 2466.4 | 4.7588 | 2471.1 | 0.00 | 1.324 |
| 0.94131952 | 25.9036 | 4.3080 | 2439.0 | 4.7667 | 2443.8 | 0.00 | 1.317 |
| 0.94602612 | 25.8853 | 4.2815 | 2411.9 | 4.7745 | 2416.7 | 0.00 | 1.311 |
| 0.95075625 | 25.8666 | 4.2551 | 2385.2 | 4.7823 | 2389.9 | 0.00 | 1.304 |
| 0.95551003 | 25.8475 | 4.2289 | 2358.7 | 4.7900 | 2363.5 | 0.00 | 1.298 |
| 0.96028758 | 25.8279 | 4.2029 | 2332.5 | 4.7976 | 2337.3 | 0.00 | 1.291 |
| 0.96508902 | 25.8078 | 4.1770 | 2306.6 | 4.8051 | 2311.4 | 0.00 | 1.285 |
| 0.96991446 | 25.7872 | 4.1513 | 2281.0 | 4.8125 | 2285.8 | 0.00 | 1.278 |
| 0.97476404 | 25.7662 | 4.1257 | 2255.6 | 4.8199 | 2260.5 | 0.00 | 1.272 |
| 0.97963786 | 25.7447 | 4.1003 | 2230.6 | 4.8272 | 2235.4 | 0.00 | 1.266 |
| 0.98453605 | 25.7227 | 4.0750 | 2205.8 | 4.8344 | 2210.7 | 0.00 | 1.259 |
| 0.98945873 | 25.7002 | 4.0499 | 2181.3 | 4.8416 | 2186.2 | 0.00 | 1.253 |
| 0.99440602 | 25.6772 | 4.0250 | 2157.1 | 4.8486 | 2162.0 | 0.00 | 1.247 |
| 0.99937805 | 25.6537 | 4.0002 | 2133.2 | 4.8556 | 2138.0 | 0.00 | 1.241 |
| 1.0043749 | 25.6296 | 3.9699 | 2106.5 | 4.8625 | 2111.4 | 0.00 | 1.234 |
| 1.0093968 | 25.6045 | 3.9392 | 2079.8 | 4.8694 | 2084.6 | 0.00 | 1.228 |
| 1.0144438 | 25.5785 | 3.9086 | 2053.4 | 4.8761 | 2058.3 | 0.00 | 1.222 |
| 1.0195160 | 25.5515 | 3.8784 | 2027.3 | 4.8828 | 2032.2 | 0.00 | 1.216 |
| 1.0246136 | 25.5236 | 3.8484 | 2001.6 | 4.8894 | 2006.5 | 0.00 | 1.210 |
| 1.0297367 | 25.4946 | 3.8186 | 1976.3 | 4.8960 | 1981.2 | 0.00 | 1.204 |
| 1.0348853 | 25.4647 | 3.7891 | 1951.3 | 4.9024 | 1956.2 | 0.00 | 1.198 |
| 1.0400598 | 25.4338 | 3.7599 | 1926.6 | 4.9088 | 1931.5 | 0.00 | 1.192 |
| 1.0452601 | 25.4018 | 3.7309 | 1902.2 | 4.9151 | 1907.1 | 0.00 | 1.186 |
| 1.0504864 | 25.3689 | 3.7021 | 1878.1 | 4.9213 | 1883.1 | 0.00 | 1.180 |
| 1.0557388 | 25.3349 | 3.6736 | 1854.4 | 4.9274 | 1859.3 | 0.00 | 1.174 |
| 1.0610175 | 25.2998 | 3.6453 | 1831.0 | 4.9335 | 1835.9 | 0.00 | 1.169 |
| 1.0663226 | 25.2637 | 3.6166 | 1807.5 | 4.9395 | 1812.5 | 0.00 | 1.163 |
| 1.0716542 | 25.2264 | 3.5868 | 1783.7 | 4.9453 | 1788.6 | 0.00 | 1.157 |
| 1.0770125 | 25.1879 | 3.5572 | 1760.2 | 4.9512 | 1765.1 | 0.00 | 1.151 |
| 1.0823975 | 25.1482 | 3.5278 | 1737.0 | 4.9569 | 1741.9 | 0.00 | 1.145 |
| 1.0878095 | 25.1072 | 3.4988 | 1714.1 | 4.9625 | 1719.1 | 0.00 | 1.140 |
| 1.0932486 | 25.0649 | 3.4700 | 1691.6 | 4.9681 | 1696.5 | 0.00 | 1.134 |
| 1.0987148 | 25.0213 | 3.4415 | 1669.3 | 4.9736 | 1674.3 | 0.00 | 1.128 |
| 1.1042084 | 24.9764 | 3.4133 | 1647.4 | 4.9790 | 1652.4 | 0.00 | 1.123 |
| 1.1097294 | 24.9300 | 3.3853 | 1625.8 | 4.9843 | 1630.7 | 0.00 | 1.117 |
| 1.1152781 | 24.8821 | 3.3576 | 1604.4 | 4.9896 | 1609.4 | 0.00 | 1.112 |
| 1.1208545 | 24.8328 | 3.3302 | 1583.4 | 4.9948 | 1588.4 | 0.00 | 1.106 |
| 1.1264587 | 24.7820 | 3.3030 | 1562.7 | 4.9998 | 1567.7 | 0.00 | 1.101 |
| 1.1320910 | 24.7295 | 3.2760 | 1542.2 | 5.0048 | 1547.2 | 0.00 | 1.095 |
| 1.1377515 | 24.6754 | 3.2494 | 1522.0 | 5.0097 | 1527.0 | 0.00 | 1.090 |
| 1.1434402 | 24.6197 | 3.2229 | 1502.1 | 5.0146 | 1507.1 | 0.00 | 1.084 |
| 1.1491574 | 24.5621 | 3.1967 | 1482.5 | 5.0193 | 1487.5 | 0.00 | 1.079 |
| 1.1549032 | 24.5027 | 3.1708 | 1463.2 | 5.0240 | 1468.2 | 0.00 | 1.074 |
| 1.1606777 | 24.4414 | 3.1451 | 1444.1 | 5.0286 | 1449.1 | 0.00 | 1.068 |
| 1.1664811 | 24.3781 | 3.1196 | 1425.3 | 5.0331 | 1430.3 | 0.00 | 1.063 |
| 1.1723135 | 24.3127 | 3.0944 | 1406.7 | 5.0375 | 1411.7 | 0.00 | 1.058 |
| 1.1781751 | 24.2451 | 3.0694 | 1388.4 | 5.0418 | 1393.4 | 0.00 | 1.052 |
| 1.1840660 | 24.1752 | 3.0447 | 1370.4 | 5.0461 | 1375.4 | 0.00 | 1.047 |
| 1.1899863 | 24.1029 | 3.0201 | 1352.6 | 5.0502 | 1357.6 | 0.00 | 1.042 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Se ($Z=34$) | | | | | | | |
| 1.1959362 | 24.0281 | 2.9958 | 1335.0 | 5.0543 | 1340.0 | 0.00 | 1.037 |
| 1.2019159 | 23.9506 | 2.9717 | 1317.7 | 5.0583 | 1322.7 | 0.00 | 1.032 |
| 1.2079255 | 23.8704 | 2.9479 | 1300.6 | 5.0622 | 1305.7 | 0.00 | 1.026 |
| 1.2139651 | 23.7872 | 2.9242 | 1283.7 | 5.0660 | 1288.8 | 0.00 | 1.021 |
| 1.2200350 | 23.7008 | 2.9008 | 1267.1 | 5.0698 | 1272.2 | 0.00 | 1.016 |
| 1.2261351 | 23.6111 | 2.8776 | 1250.7 | 5.0734 | 1255.8 | 0.00 | 1.011 |
| 1.2322658 | 23.5179 | 2.8546 | 1234.6 | 5.0770 | 1239.6 | 0.00 | 1.006 |
| 1.2384271 | 23.4209 | 2.8318 | 1218.6 | 5.0805 | 1223.7 | 0.00 | 1.001 |
| 1.2446193 | 23.3199 | 2.8093 | 1202.9 | 5.0839 | 1208.0 | 0.00 | 0.9962 |
| 1.2508424 | 23.2146 | 2.7869 | 1187.4 | 5.0872 | 1192.5 | 0.00 | 0.9912 |
| 1.2570966 | 23.1047 | 2.7647 | 1172.1 | 5.0904 | 1177.2 | 0.00 | 0.9863 |
| 1.2633821 | 22.9898 | 2.7428 | 1157.0 | 5.0936 | 1162.1 | 0.00 | 0.9814 |
| 1.2696990 | 22.8696 | 2.7210 | 1142.1 | 5.0966 | 1147.2 | 0.00 | 0.9765 |
| 1.2760475 | 22.7437 | 2.6995 | 1127.4 | 5.0996 | 1132.5 | 0.00 | 0.9716 |
| 1.2824277 | 22.6114 | 2.6781 | 1112.9 | 5.1025 | 1118.0 | 0.00 | 0.9668 |
| 1.2888399 | 22.4723 | 2.6569 | 1098.6 | 5.1053 | 1103.7 | 0.00 | 0.9620 |
| 1.2952840 | 22.3258 | 2.6359 | 1084.5 | 5.1080 | 1089.6 | 0.00 | 0.9572 |
| 1.3017605 | 22.1711 | 2.6152 | 1070.6 | 5.1106 | 1075.7 | 0.00 | 0.9524 |
| 1.3082693 | 22.0073 | 2.5946 | 1056.9 | 5.1132 | 1062.0 | 0.00 | 0.9477 |
| 1.3148106 | 21.8335 | 2.5741 | 1043.4 | 5.1156 | 1048.5 | 0.00 | 0.9430 |
| 1.3213847 | 21.6486 | 2.5539 | 1030.0 | 5.1180 | 1035.1 | 0.00 | 0.9383 |
| 1.3279916 | 21.4512 | 2.5339 | 1016.9 | 5.1203 | 1022.0 | 0.00 | 0.9336 |
| 1.3346316 | 21.2397 | 2.5140 | 1003.9 | 5.1225 | 1009.0 | 0.00 | 0.9290 |
| 1.3413047 | 21.0122 | 2.4943 | 991.05 | 5.1246 | 996.18 | 0.00 | 0.9244 |
| 1.3480112 | 20.7662 | 2.4748 | 978.41 | 5.1266 | 983.54 | 0.00 | 0.9198 |
| 1.3547513 | 20.4989 | 2.4555 | 965.94 | 5.1285 | 971.07 | 0.00 | 0.9152 |
| 1.3615250 | 20.2066 | 2.4363 | 953.63 | 5.1304 | 958.76 | 0.00 | 0.9106 |
| 1.3683327 | 19.8845 | 2.4173 | 941.49 | 5.1321 | 946.63 | 0.00 | 0.9061 |
| 1.3751743 | 19.5263 | 2.3985 | 929.52 | 5.1338 | 934.65 | 0.00 | 0.9016 |
| 1.3820502 | 19.1236 | 2.3799 | 917.70 | 5.1354 | 922.84 | 0.00 | 0.8971 |
| 1.3889605 | 18.6644 | 2.3614 | 906.05 | 5.1369 | 911.18 | 0.00 | 0.8926 |
| 1.3959053 | 18.1311 | 2.3431 | 894.55 | 5.1383 | 899.68 | 0.00 | 0.8882 |
| 1.4028848 | 17.4959 | 2.3249 | 883.20 | 5.1397 | 888.34 | 0.00 | 0.8838 |
| 1.4098992 | 16.7115 | 2.3069 | 872.00 | 5.1409 | 877.15 | 0.00 | 0.8794 |
| 1.4169487 | 15.6854 | 2.2891 | 860.96 | 5.1421 | 866.10 | 0.00 | 0.8750 |
| 1.4240335 | 14.1918 | 2.2714 | 850.06 | 5.1431 | 855.21 | 0.00 | 0.8707 |
| 1.4311536 | 11.3302 | 2.2539 | 839.31 | 5.1441 | 844.46 | 0.00 | 0.8663 |
| 1.4356568 | 0.959582 | 2.2430 | 832.61 | 5.1447 | 837.76 | 0.00 | 0.8636 |
| 1.4359431 | 0.798914 | 11.542 | 4283.7 | 5.1447 | 4288.8 | 0.00 | 0.8634 |
| 1.4383094 | 9.23944 | 11.512 | 4265.3 | 5.1450 | 4270.5 | 0.00 | 0.8620 |
| 1.4455009 | 13.0471 | 11.420 | 4210.3 | 5.1458 | 4215.4 | 0.00 | 0.8577 |
| 1.4527284 | 14.3962 | 11.329 | 4155.9 | 5.1466 | 4161.0 | 0.00 | 0.8535 |
| 1.4599921 | 14.9963 | 11.238 | 4102.2 | 5.1472 | 4107.4 | 0.00 | 0.8492 |
| 1.4672920 | 14.9826 | 11.149 | 4049.3 | 5.1477 | 4054.4 | 0.00 | 0.8450 |
| 1.4746285 | 13.1496 | 11.060 | 3997.0 | 5.1482 | 4002.2 | 0.00 | 0.8408 |
| 1.4760494 | 9.84436 | 11.043 | 3987.0 | 5.1483 | 3992.2 | 0.00 | 0.8400 |
| 1.4763506 | 9.79284 | 15.634 | 5643.7 | 5.1483 | 5648.8 | 0.00 | 0.8398 |
| 1.4820016 | 15.5867 | 15.539 | 5587.9 | 5.1486 | 5593.1 | 0.00 | 0.8366 |
| 1.4894117 | 17.2959 | 15.416 | 5516.0 | 5.1489 | 5521.1 | 0.00 | 0.8324 |
| 1.4968587 | 18.3878 | 15.293 | 5445.0 | 5.1491 | 5450.1 | 0.00 | 0.8283 |
| 1.5043430 | 19.2260 | 15.172 | 5374.9 | 5.1492 | 5380.1 | 0.00 | 0.8242 |
| 1.5118647 | 19.9166 | 15.052 | 5305.7 | 5.1492 | 5310.9 | 0.00 | 0.8201 |
| 1.5194240 | 20.5070 | 14.932 | 5237.5 | 5.1492 | 5242.6 | 0.00 | 0.8160 |
| 1.5270212 | 21.0233 | 14.814 | 5170.1 | 5.1490 | 5175.2 | 0.00 | 0.8119 |
| 1.5346563 | 21.4817 | 14.696 | 5103.6 | 5.1488 | 5108.7 | 0.00 | 0.8079 |
| 1.5423295 | 21.8929 | 14.580 | 5037.9 | 5.1485 | 5043.1 | 0.00 | 0.8039 |
| 1.5500412 | 22.2641 | 14.464 | 4973.1 | 5.1481 | 4978.3 | 0.00 | 0.7999 |
| 1.5577914 | 22.6008 | 14.350 | 4909.1 | 5.1476 | 4914.3 | 0.00 | 0.7959 |
| 1.5655804 | 22.9069 | 14.236 | 4846.0 | 5.1471 | 4851.2 | 0.00 | 0.7919 |
| 1.5734083 | 23.1850 | 14.123 | 4783.7 | 5.1464 | 4788.8 | 0.00 | 0.7880 |
| 1.5812753 | 23.4368 | 14.011 | 4722.2 | 5.1457 | 4727.3 | 0.00 | 0.7841 |
| 1.5891817 | 23.6634 | 13.900 | 4661.5 | 5.1449 | 4666.6 | 0.00 | 0.7802 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Se ($Z=34$) | | | | | | | |
| 1.5971276 | 23.8645 | 13.790 | 4601.5 | 5.1440 | 4606.7 | 0.00 | 0.7763 |
| 1.6051132 | 24.0389 | 13.681 | 4542.4 | 5.1430 | 4547.5 | 0.00 | 0.7724 |
| 1.6131388 | 24.1834 | 13.573 | 4484.0 | 5.1419 | 4489.1 | 0.00 | 0.7686 |
| 1.6212045 | 24.2915 | 13.465 | 4426.4 | 5.1407 | 4431.5 | 0.00 | 0.7648 |
| 1.6293105 | 24.3501 | 13.359 | 4369.5 | 5.1395 | 4374.6 | 0.00 | 0.7610 |
| 1.6374571 | 24.3277 | 13.253 | 4313.3 | 5.1381 | 4318.5 | 0.00 | 0.7572 |
| 1.6456443 | 24.1226 | 13.148 | 4257.9 | 5.1367 | 4263.1 | 0.00 | 0.7534 |
| 1.6524595 | 23.2318 | 13.062 | 4212.6 | 5.1355 | 4217.7 | 0.00 | 0.7503 |
| 1.6538726 | 20.8530 | 13.044 | 4203.2 | 5.1352 | 4208.4 | 0.00 | 0.7497 |
| 1.6553406 | 23.2748 | 14.940 | 4809.9 | 5.1350 | 4815.0 | 0.00 | 0.7490 |
| 1.6621419 | 24.5031 | 14.848 | 4760.8 | 5.1336 | 4765.9 | 0.00 | 0.7459 |
| 1.6704526 | 25.1190 | 14.737 | 4701.7 | 5.1320 | 4706.9 | 0.00 | 0.7422 |
| 1.6788049 | 25.5503 | 14.627 | 4643.4 | 5.1302 | 4648.5 | 0.00 | 0.7385 |
| 1.6871989 | 25.9020 | 14.518 | 4585.8 | 5.1284 | 4591.0 | 0.00 | 0.7349 |
| 1.6956349 | 26.2073 | 14.410 | 4529.0 | 5.1265 | 4534.1 | 0.00 | 0.7312 |
| 1.7041131 | 26.4811 | 14.302 | 4472.8 | 5.1245 | 4478.0 | 0.00 | 0.7276 |
| 1.7126337 | 26.7317 | 14.196 | 4417.4 | 5.1224 | 4422.5 | 0.00 | 0.7239 |
| 1.7211968 | 26.9639 | 14.090 | 4362.7 | 5.1202 | 4367.8 | 0.00 | 0.7203 |
| 1.7298028 | 27.1809 | 13.985 | 4308.6 | 5.1180 | 4313.7 | 0.00 | 0.7168 |
| 1.7384518 | 27.3848 | 13.882 | 4255.5 | 5.1156 | 4260.6 | 0.00 | 0.7132 |
| 1.7471441 | 27.5781 | 13.780 | 4203.3 | 5.1132 | 4208.4 | 0.00 | 0.7096 |
| 1.7558798 | 27.7624 | 13.679 | 4151.8 | 5.1107 | 4156.9 | 0.00 | 0.7061 |
| 1.7646592 | 27.9384 | 13.579 | 4101.0 | 5.1081 | 4106.1 | 0.00 | 0.7026 |
| 1.7734825 | 28.1070 | 13.481 | 4050.9 | 5.1055 | 4056.0 | 0.00 | 0.6991 |
| 1.7823499 | 28.2688 | 13.383 | 4001.4 | 5.1027 | 4006.5 | 0.00 | 0.6956 |
| 1.7912617 | 28.4245 | 13.285 | 3952.6 | 5.0999 | 3957.7 | 0.00 | 0.6922 |
| 1.8002180 | 28.5744 | 13.189 | 3904.4 | 5.0970 | 3909.5 | 0.00 | 0.6887 |
| 1.8092191 | 28.7191 | 13.093 | 3856.9 | 5.0940 | 3862.0 | 0.00 | 0.6853 |
| 1.8182652 | 28.8590 | 12.999 | 3809.9 | 5.0910 | 3815.0 | 0.00 | 0.6819 |
| 1.8273565 | 28.9943 | 12.905 | 3763.6 | 5.0878 | 3768.7 | 0.00 | 0.6785 |
| 1.8364933 | 29.1253 | 12.812 | 3717.8 | 5.0846 | 3722.9 | 0.00 | 0.6751 |
| 1.8456757 | 29.2525 | 12.719 | 3672.7 | 5.0813 | 3677.8 | 0.00 | 0.6718 |
| 1.8549041 | 29.3760 | 12.628 | 3628.1 | 5.0779 | 3633.2 | 0.00 | 0.6684 |
| 1.8641786 | 29.4961 | 12.537 | 3584.1 | 5.0744 | 3589.2 | 0.00 | 0.6651 |
| 1.8734995 | 29.6128 | 12.446 | 3540.3 | 5.0709 | 3545.4 | 0.00 | 0.6618 |
| 1.8828670 | 29.7260 | 12.355 | 3496.9 | 5.0672 | 3502.0 | 0.00 | 0.6585 |
| 1.8922814 | 29.8359 | 12.264 | 3454.0 | 5.0635 | 3459.1 | 0.00 | 0.6552 |
| 1.9017428 | 29.9427 | 12.175 | 3411.7 | 5.0598 | 3416.8 | 0.00 | 0.6520 |
| 1.9112515 | 30.0466 | 12.086 | 3369.9 | 5.0559 | 3375.0 | 0.00 | 0.6487 |
| 1.9208077 | 30.1477 | 11.997 | 3328.6 | 5.0519 | 3333.7 | 0.00 | 0.6455 |
| 1.9304118 | 30.2460 | 11.909 | 3287.6 | 5.0479 | 3292.7 | 0.00 | 0.6423 |
| 1.9400638 | 30.3416 | 11.821 | 3247.1 | 5.0438 | 3252.2 | 0.00 | 0.6391 |
| 1.9497642 | 30.4345 | 11.733 | 3207.1 | 5.0397 | 3212.2 | 0.00 | 0.6359 |
| 1.9595130 | 30.5249 | 11.647 | 3167.6 | 5.0354 | 3172.7 | 0.00 | 0.6327 |
| 1.9693105 | 30.6130 | 11.561 | 3128.6 | 5.0311 | 3133.7 | 0.00 | 0.6296 |
| 1.9791571 | 30.6988 | 11.476 | 3090.1 | 5.0267 | 3095.2 | 0.00 | 0.6264 |
| 1.9890529 | 30.7824 | 11.391 | 3052.1 | 5.0222 | 3057.1 | 0.00 | 0.6233 |
| 1.9989981 | 30.8638 | 11.307 | 3014.5 | 5.0176 | 3019.6 | 0.00 | 0.6202 |
| 2.0089931 | 30.9433 | 11.224 | 2977.4 | 5.0130 | 2982.5 | 0.00 | 0.6171 |
| 2.0190381 | 31.0208 | 11.141 | 2940.8 | 5.0083 | 2945.8 | 0.00 | 0.6141 |
| 2.0291333 | 31.0964 | 11.059 | 2904.6 | 5.0035 | 2909.6 | 0.00 | 0.6110 |
| 2.0392790 | 31.1702 | 10.978 | 2868.9 | 4.9987 | 2873.9 | 0.00 | 0.6080 |
| 2.0494754 | 31.2423 | 10.897 | 2833.6 | 4.9937 | 2838.6 | 0.00 | 0.6050 |
| 2.0597227 | 31.3127 | 10.817 | 2798.8 | 4.9887 | 2803.7 | 0.00 | 0.6019 |
| 2.0700213 | 31.3815 | 10.737 | 2764.3 | 4.9836 | 2769.3 | 0.00 | 0.5990 |
| 2.0803714 | 31.4487 | 10.658 | 2730.3 | 4.9785 | 2735.3 | 0.00 | 0.5960 |
| 2.0907733 | 31.5144 | 10.580 | 2696.8 | 4.9733 | 2701.7 | 0.00 | 0.5930 |
| 2.1012272 | 31.5787 | 10.502 | 2663.6 | 4.9680 | 2668.6 | 0.00 | 0.5901 |
| 2.1117333 | 31.6416 | 10.425 | 2630.8 | 4.9626 | 2635.8 | 0.00 | 0.5871 |
| 2.1222920 | 31.7031 | 10.348 | 2598.5 | 4.9571 | 2603.4 | 0.00 | 0.5842 |
| 2.1329034 | 31.7634 | 10.272 | 2566.5 | 4.9516 | 2571.5 | 0.00 | 0.5813 |
| 2.1435680 | 31.8225 | 10.196 | 2535.0 | 4.9460 | 2539.9 | 0.00 | 0.5784 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Se ($Z=34$) | | | | | | | |
| 2.1542858 | 31.8805 | 10.121 | 2503.7 | 4.9404 | 2508.6 | 0.00 | 0.5755 |
| 2.1650572 | 31.9370 | 10.045 | 2472.6 | 4.9346 | 2477.5 | 0.00 | 0.5727 |
| 2.1758825 | 31.9920 | 9.9697 | 2441.8 | 4.9288 | 2446.8 | 0.00 | 0.5698 |
| 2.1867619 | 32.0458 | 9.8950 | 2411.5 | 4.9230 | 2416.4 | 0.00 | 0.5670 |
| 2.1976957 | 32.0982 | 9.8209 | 2381.5 | 4.9170 | 2386.4 | 0.00 | 0.5642 |
| 2.2086842 | 32.1494 | 9.7473 | 2351.9 | 4.9110 | 2356.8 | 0.00 | 0.5613 |
| 2.2197276 | 32.1994 | 9.6742 | 2322.7 | 4.9049 | 2327.6 | 0.00 | 0.5586 |
| 2.2308263 | 32.2482 | 9.6016 | 2293.8 | 4.8988 | 2298.7 | 0.00 | 0.5558 |
| 2.2419804 | 32.2959 | 9.5296 | 2265.2 | 4.8926 | 2270.1 | 0.00 | 0.5530 |
| 2.2531903 | 32.3425 | 9.4581 | 2237.1 | 4.8863 | 2241.9 | 0.00 | 0.5503 |
| 2.2644562 | 32.3880 | 9.3871 | 2209.2 | 4.8799 | 2214.1 | 0.00 | 0.5475 |
| 2.2757785 | 32.4325 | 9.3166 | 2181.7 | 4.8735 | 2186.6 | 0.00 | 0.5448 |
| 2.2871574 | 32.4760 | 9.2467 | 2154.6 | 4.8670 | 2159.4 | 0.00 | 0.5421 |
| 2.2985932 | 32.5185 | 9.1772 | 2127.8 | 4.8604 | 2132.6 | 0.00 | 0.5394 |
| 2.3100862 | 32.5601 | 9.1083 | 2101.3 | 4.8538 | 2106.1 | 0.00 | 0.5367 |
| 2.3216366 | 32.6007 | 9.0399 | 2075.1 | 4.8471 | 2079.9 | 0.00 | 0.5340 |
| 2.3332448 | 32.6404 | 8.9719 | 2049.3 | 4.8404 | 2054.1 | 0.00 | 0.5314 |
| 2.3449110 | 32.6792 | 8.9045 | 2023.7 | 4.8335 | 2028.6 | 0.00 | 0.5287 |
| 2.3566356 | 32.7172 | 8.8376 | 1998.5 | 4.8267 | 2003.4 | 0.00 | 0.5261 |
| 2.3684187 | 32.7543 | 8.7711 | 1973.6 | 4.8197 | 1978.5 | 0.00 | 0.5235 |
| 2.3802608 | 32.7906 | 8.7052 | 1949.1 | 4.8127 | 1953.9 | 0.00 | 0.5209 |
| 2.3921621 | 32.8261 | 8.6397 | 1924.8 | 4.8056 | 1929.6 | 0.00 | 0.5183 |
| 2.4041230 | 32.8608 | 8.5747 | 1900.8 | 4.7985 | 1905.6 | 0.00 | 0.5157 |
| 2.4161436 | 32.8947 | 8.5102 | 1877.1 | 4.7913 | 1881.9 | 0.00 | 0.5131 |
| 2.4282243 | 32.9279 | 8.4462 | 1853.7 | 4.7840 | 1858.5 | 0.00 | 0.5106 |
| 2.4403654 | 32.9604 | 8.3826 | 1830.6 | 4.7767 | 1835.4 | 0.00 | 0.5081 |
| 2.4525672 | 32.9922 | 8.3195 | 1807.8 | 4.7693 | 1812.6 | 0.00 | 0.5055 |
| 2.4648301 | 33.0232 | 8.2569 | 1785.3 | 4.7618 | 1790.0 | 0.00 | 0.5030 |
| 2.4771542 | 33.0536 | 8.1948 | 1763.0 | 4.7543 | 1767.8 | 0.00 | 0.5005 |
| 2.4895400 | 33.0834 | 8.1331 | 1741.0 | 4.7467 | 1745.8 | 0.00 | 0.4980 |
| 2.5019877 | 33.1125 | 8.0719 | 1719.3 | 4.7391 | 1724.1 | 0.00 | 0.4955 |
| 2.5144976 | 33.1409 | 8.0112 | 1697.9 | 4.7314 | 1702.7 | 0.00 | 0.4931 |
| 2.5270701 | 33.1688 | 7.9509 | 1676.8 | 4.7236 | 1681.5 | 0.00 | 0.4906 |
| 2.5397055 | 33.1960 | 7.8911 | 1655.9 | 4.7158 | 1660.6 | 0.00 | 0.4882 |
| 2.5524040 | 33.2227 | 7.8317 | 1635.2 | 4.7079 | 1639.9 | 0.00 | 0.4858 |
| 2.5651660 | 33.2488 | 7.7728 | 1614.8 | 4.7000 | 1619.5 | 0.00 | 0.4833 |
| 2.5779919 | 33.2743 | 7.7143 | 1594.7 | 4.6920 | 1599.4 | 0.00 | 0.4809 |
| 2.5908818 | 33.2993 | 7.6562 | 1574.9 | 4.6839 | 1579.5 | 0.00 | 0.4785 |
| 2.6038362 | 33.3238 | 7.5986 | 1555.2 | 4.6758 | 1559.9 | 0.00 | 0.4762 |
| 2.6168554 | 33.3478 | 7.5415 | 1535.9 | 4.6676 | 1540.5 | 0.00 | 0.4738 |
| 2.6299397 | 33.3712 | 7.4848 | 1516.7 | 4.6594 | 1521.4 | 0.00 | 0.4714 |
| 2.6430894 | 33.3942 | 7.4285 | 1497.8 | 4.6511 | 1502.5 | 0.00 | 0.4691 |
| 2.6563048 | 33.4167 | 7.3726 | 1479.2 | 4.6428 | 1483.8 | 0.00 | 0.4668 |
| 2.6695863 | 33.4388 | 7.3172 | 1460.7 | 4.6344 | 1465.4 | 0.00 | 0.4644 |
| 2.6829343 | 33.4604 | 7.2622 | 1442.5 | 4.6260 | 1447.2 | 0.00 | 0.4621 |
| 2.6963489 | 33.4816 | 7.2076 | 1424.6 | 4.6175 | 1429.2 | 0.00 | 0.4598 |
| 2.7098307 | 33.5024 | 7.1535 | 1406.8 | 4.6089 | 1411.5 | 0.00 | 0.4575 |
| 2.7233798 | 33.5228 | 7.0998 | 1389.3 | 4.6003 | 1393.9 | 0.00 | 0.4553 |
| 2.7369967 | 33.5427 | 7.0464 | 1372.0 | 4.5916 | 1376.6 | 0.00 | 0.4530 |
| 2.7506817 | 33.5624 | 6.9935 | 1355.0 | 4.5829 | 1359.5 | 0.00 | 0.4507 |
| 2.7644351 | 33.5816 | 6.9411 | 1338.1 | 4.5742 | 1342.7 | 0.00 | 0.4485 |
| 2.7782573 | 33.6006 | 6.8890 | 1321.5 | 4.5654 | 1326.0 | 0.00 | 0.4463 |
| 2.7921486 | 33.6192 | 6.8373 | 1305.0 | 4.5565 | 1309.6 | 0.00 | 0.4440 |
| 2.8061093 | 33.6375 | 6.7860 | 1288.8 | 4.5476 | 1293.3 | 0.00 | 0.4418 |
| 2.8201399 | 33.6555 | 6.7352 | 1272.8 | 4.5386 | 1277.3 | 0.00 | 0.4396 |
| 2.8342406 | 33.6732 | 6.6847 | 1256.9 | 4.5296 | 1261.5 | 0.00 | 0.4375 |
| 2.8484118 | 33.6907 | 6.6346 | 1241.3 | 4.5205 | 1245.8 | 0.00 | 0.4353 |
| 2.8626539 | 33.7080 | 6.5849 | 1225.9 | 4.5114 | 1230.4 | 0.00 | 0.4331 |
| 2.8769671 | 33.8286 | 6.5352 | 1210.6 | 4.5022 | 1215.1 | 0.00 | 0.4310 |
| 2.8913520 | 33.8455 | 6.4853 | 1195.4 | 4.4930 | 1199.9 | 0.00 | 0.4288 |
| 2.9058087 | 33.8621 | 6.4357 | 1180.3 | 4.4837 | 1184.8 | 0.00 | 0.4267 |
| 2.9203378 | 33.8785 | 6.3865 | 1165.5 | 4.4744 | 1169.9 | 0.00 | 0.4246 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Se ($Z=34$) | | | | | | | |
| 2.9349394 | 33.8948 | 6.3377 | 1150.8 | 4.4651 | 1155.3 | 0.00 | 0.4224 |
| 2.9496141 | 33.9110 | 6.2893 | 1136.3 | 4.4557 | 1140.8 | 0.00 | 0.4203 |
| 2.9643622 | 33.9811 | 6.2408 | 1122.0 | 4.4462 | 1126.4 | 0.00 | 0.4182 |
| 2.9791840 | 33.9974 | 6.1927 | 1107.8 | 4.4367 | 1112.2 | 0.00 | 0.4162 |
| 2.9940799 | 34.0140 | 6.1449 | 1093.8 | 4.4272 | 1098.2 | 0.00 | 0.4141 |
| 3.0090503 | 34.0286 | 6.0945 | 1079.4 | 4.4176 | 1083.8 | 0.00 | 0.4120 |
| 3.0240956 | 34.0413 | 6.0426 | 1064.9 | 4.4079 | 1069.3 | 0.00 | 0.4100 |
| 3.0392161 | 34.0534 | 5.9911 | 1050.6 | 4.3983 | 1055.0 | 0.00 | 0.4079 |
| 3.0544122 | 34.0649 | 5.9398 | 1036.4 | 4.3886 | 1040.8 | 0.00 | 0.4059 |
| 3.0696842 | 34.0758 | 5.8889 | 1022.4 | 4.3788 | 1026.8 | 0.00 | 0.4039 |
| 3.0850326 | 34.0862 | 5.8385 | 1008.6 | 4.3690 | 1012.9 | 0.00 | 0.4019 |
| 3.1004578 | 34.0961 | 5.7885 | 994.98 | 4.3591 | 999.34 | 0.00 | 0.3999 |
| 3.1159601 | 34.1055 | 5.7390 | 981.56 | 4.3492 | 985.91 | 0.00 | 0.3979 |
| 3.1315399 | 34.1144 | 5.6900 | 968.34 | 4.3393 | 972.68 | 0.00 | 0.3959 |
| 3.1471976 | 34.1229 | 5.6414 | 955.29 | 4.3293 | 959.62 | 0.00 | 0.3940 |
| 3.1629336 | 34.1310 | 5.5932 | 942.42 | 4.3193 | 946.74 | 0.00 | 0.3920 |
| 3.1787482 | 34.1387 | 5.5454 | 929.71 | 4.3093 | 934.02 | 0.00 | 0.3900 |
| 3.1946420 | 34.1460 | 5.4980 | 917.18 | 4.2992 | 921.47 | 0.00 | 0.3881 |
| 3.2106152 | 34.1529 | 5.4510 | 904.81 | 4.2890 | 909.10 | 0.00 | 0.3862 |
| 3.2266683 | 34.1594 | 5.4045 | 892.63 | 4.2789 | 896.91 | 0.00 | 0.3842 |
| 3.2428016 | 34.1657 | 5.3584 | 880.61 | 4.2687 | 884.88 | 0.00 | 0.3823 |
| 3.2590156 | 34.1715 | 5.3127 | 868.76 | 4.2584 | 873.02 | 0.00 | 0.3804 |
| 3.2753107 | 34.1771 | 5.2674 | 857.07 | 4.2481 | 861.32 | 0.00 | 0.3785 |
| 3.2916873 | 34.1824 | 5.2226 | 845.55 | 4.2378 | 849.79 | 0.00 | 0.3767 |
| 3.3081457 | 34.2289 | 5.1781 | 834.18 | 4.2275 | 838.41 | 0.00 | 0.3748 |
| 3.3246864 | 34.2338 | 5.1330 | 822.79 | 4.2171 | 827.01 | 0.00 | 0.3729 |
| 3.3413099 | 34.2383 | 5.0882 | 811.56 | 4.2066 | 815.76 | 0.00 | 0.3711 |
| 3.3580164 | 34.2424 | 5.0438 | 800.48 | 4.1962 | 804.68 | 0.00 | 0.3692 |
| 3.3748065 | 34.2462 | 4.9999 | 789.56 | 4.1857 | 793.75 | 0.00 | 0.3674 |
| 3.3916805 | 34.2496 | 4.9564 | 778.79 | 4.1751 | 782.97 | 0.00 | 0.3656 |
| 3.4086389 | 34.2527 | 4.9133 | 768.17 | 4.1646 | 772.34 | 0.00 | 0.3637 |
| 3.4256821 | 34.2555 | 4.8705 | 757.71 | 4.1540 | 761.86 | 0.00 | 0.3619 |
| 3.4428105 | 34.2580 | 4.8282 | 747.38 | 4.1434 | 751.53 | 0.00 | 0.3601 |
| 3.4600246 | 34.2602 | 4.7862 | 737.20 | 4.1327 | 741.34 | 0.00 | 0.3583 |
| 3.4773247 | 34.2621 | 4.7447 | 727.17 | 4.1220 | 731.29 | 0.00 | 0.3566 |
| 3.4947113 | 34.2637 | 4.7035 | 717.27 | 4.1113 | 721.38 | 0.00 | 0.3548 |
| 3.5121849 | 34.2651 | 4.6627 | 707.51 | 4.1005 | 711.61 | 0.00 | 0.3530 |
| 3.5297458 | 34.2662 | 4.6223 | 697.89 | 4.0897 | 701.98 | 0.00 | 0.3513 |
| 3.5473945 | 34.2671 | 4.5823 | 688.40 | 4.0789 | 692.48 | 0.00 | 0.3495 |
| 3.5651315 | 34.2678 | 4.5426 | 679.05 | 4.0680 | 683.11 | 0.00 | 0.3478 |
| 3.5829572 | 34.2682 | 4.5033 | 669.82 | 4.0572 | 673.88 | 0.00 | 0.3460 |
| 3.6008719 | 34.2684 | 4.4643 | 660.72 | 4.0463 | 664.77 | 0.00 | 0.3443 |
| 3.6188763 | 34.2684 | 4.4257 | 651.75 | 4.0353 | 655.79 | 0.00 | 0.3426 |
| 3.6369707 | 34.2682 | 4.3875 | 642.91 | 4.0244 | 646.93 | 0.00 | 0.3409 |
| 3.6551555 | 34.2678 | 4.3496 | 634.19 | 4.0134 | 638.20 | 0.00 | 0.3392 |
| 3.6734313 | 34.2671 | 4.3121 | 625.58 | 4.0023 | 629.59 | 0.00 | 0.3375 |
| 3.6917985 | 34.2663 | 4.2749 | 617.10 | 3.9913 | 621.09 | 0.00 | 0.3358 |
| 3.7102575 | 34.2654 | 4.2380 | 608.74 | 3.9802 | 612.72 | 0.00 | 0.3342 |
| 3.7288088 | 34.2642 | 4.2015 | 600.49 | 3.9691 | 604.46 | 0.00 | 0.3325 |
| 3.7474528 | 34.2629 | 4.1653 | 592.36 | 3.9580 | 596.32 | 0.00 | 0.3308 |
| 3.7661901 | 34.2614 | 4.1295 | 584.34 | 3.9469 | 588.29 | 0.00 | 0.3292 |
| 3.7850210 | 34.2597 | 4.0940 | 576.43 | 3.9357 | 580.37 | 0.00 | 0.3276 |
| 3.8039461 | 34.2579 | 4.0588 | 568.63 | 3.9245 | 572.56 | 0.00 | 0.3259 |
| 3.8229659 | 34.2559 | 4.0239 | 560.94 | 3.9133 | 564.86 | 0.00 | 0.3243 |
| 3.8420807 | 34.2538 | 3.9894 | 553.36 | 3.9020 | 557.26 | 0.00 | 0.3227 |
| 3.8612911 | 34.2516 | 3.9551 | 545.88 | 3.8908 | 549.77 | 0.00 | 0.3211 |
| 3.8805975 | 34.2492 | 3.9212 | 538.51 | 3.8795 | 542.39 | 0.00 | 0.3195 |
| 3.9000005 | 34.2466 | 3.8876 | 531.24 | 3.8682 | 535.10 | 0.00 | 0.3179 |
| 3.9195005 | 34.2440 | 3.8543 | 524.06 | 3.8568 | 527.92 | 0.00 | 0.3163 |
| 3.9390980 | 34.2412 | 3.8213 | 516.99 | 3.8455 | 520.84 | 0.00 | 0.3148 |
| 3.9587935 | 34.2382 | 3.7886 | 510.02 | 3.8341 | 513.85 | 0.00 | 0.3132 |
| 3.9785875 | 34.2352 | 3.7562 | 503.14 | 3.8227 | 506.96 | 0.00 | 0.3116 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Se ($Z=34$) | | | | | | | |
| 3.9984804 | 34.2320 | 3.7241 | 496.36 | 3.8113 | 500.17 | 0.00 | 0.3101 |
| 4.0184728 | 34.2288 | 3.6923 | 489.67 | 3.7999 | 493.47 | 0.00 | 0.3085 |
| 4.0385652 | 34.2254 | 3.6607 | 483.07 | 3.7884 | 486.86 | 0.00 | 0.3070 |
| 4.0587580 | 34.2219 | 3.6295 | 476.57 | 3.7770 | 480.35 | 0.00 | 0.3055 |
| 4.0790518 | 34.2183 | 3.5986 | 470.16 | 3.7655 | 473.92 | 0.00 | 0.3040 |
| 4.0994471 | 34.2146 | 3.5679 | 463.83 | 3.7540 | 467.58 | 0.00 | 0.3024 |
| 4.1199443 | 34.2108 | 3.5375 | 457.59 | 3.7425 | 461.33 | 0.00 | 0.3009 |
| 4.1405440 | 34.2069 | 3.5074 | 451.44 | 3.7309 | 455.17 | 0.00 | 0.2994 |
| 4.1612467 | 34.2029 | 3.4775 | 445.37 | 3.7194 | 449.09 | 0.00 | 0.2979 |
| 4.1820530 | 34.1989 | 3.4480 | 439.39 | 3.7078 | 443.09 | 0.00 | 0.2965 |
| 4.2029632 | 34.1947 | 3.4187 | 433.49 | 3.6962 | 437.18 | 0.00 | 0.2950 |
| 4.2239781 | 34.1905 | 3.3896 | 427.67 | 3.6846 | 431.35 | 0.00 | 0.2935 |
| 4.2450980 | 34.1861 | 3.3609 | 421.93 | 3.6730 | 425.60 | 0.00 | 0.2921 |
| 4.2663234 | 34.1817 | 3.3324 | 416.27 | 3.6614 | 419.93 | 0.00 | 0.2906 |
| 4.2876551 | 34.1772 | 3.3041 | 410.68 | 3.6497 | 414.33 | 0.00 | 0.2892 |
| 4.3090933 | 34.1727 | 3.2761 | 405.18 | 3.6381 | 408.82 | 0.00 | 0.2877 |
| 4.3306388 | 34.1680 | 3.2484 | 399.75 | 3.6264 | 403.37 | 0.00 | 0.2863 |
| 4.3522920 | 34.1633 | 3.2209 | 394.39 | 3.6147 | 398.00 | 0.00 | 0.2849 |
| 4.3740535 | 34.1586 | 3.1935 | 389.09 | 3.6031 | 392.70 | 0.00 | 0.2835 |
| 4.3959237 | 34.1537 | 3.1664 | 383.87 | 3.5914 | 387.46 | 0.00 | 0.2820 |
| 4.4179033 | 34.1488 | 3.1395 | 378.72 | 3.5796 | 382.30 | 0.00 | 0.2806 |
| 4.4399929 | 34.1438 | 3.1129 | 373.64 | 3.5679 | 377.21 | 0.00 | 0.2792 |
| 4.4621928 | 34.1388 | 3.0865 | 368.63 | 3.5562 | 372.19 | 0.00 | 0.2779 |
| 4.4845038 | 34.1337 | 3.0604 | 363.69 | 3.5444 | 367.24 | 0.00 | 0.2765 |
| 4.5069263 | 34.1285 | 3.0345 | 358.82 | 3.5327 | 362.35 | 0.00 | 0.2751 |
| 4.5294609 | 34.1233 | 3.0088 | 354.02 | 3.5209 | 357.54 | 0.00 | 0.2737 |
| 4.5521082 | 34.1180 | 2.9834 | 349.28 | 3.5091 | 352.79 | 0.00 | 0.2724 |
| 4.5748688 | 34.1127 | 2.9582 | 344.60 | 3.4974 | 348.10 | 0.00 | 0.2710 |
| 4.5977431 | 34.1073 | 2.9332 | 339.99 | 3.4856 | 343.48 | 0.00 | 0.2697 |
| 4.6207318 | 34.1018 | 2.9085 | 335.45 | 3.4738 | 338.92 | 0.00 | 0.2683 |
| 4.6438355 | 34.0963 | 2.8839 | 330.96 | 3.4620 | 334.43 | 0.00 | 0.2670 |
| 4.6670547 | 34.0908 | 2.8596 | 326.54 | 3.4502 | 329.99 | 0.00 | 0.2657 |
| 4.6903900 | 34.0852 | 2.8355 | 322.18 | 3.4383 | 325.62 | 0.00 | 0.2643 |
| 4.7138419 | 34.0795 | 2.8117 | 317.88 | 3.4265 | 321.30 | 0.00 | 0.2630 |
| 4.7374111 | 34.0738 | 2.7880 | 313.63 | 3.4147 | 317.05 | 0.00 | 0.2617 |
| 4.7610982 | 34.0681 | 2.7645 | 309.45 | 3.4029 | 312.85 | 0.00 | 0.2604 |
| 4.7849037 | 34.0623 | 2.7413 | 305.32 | 3.3910 | 308.71 | 0.00 | 0.2591 |
| 4.8088282 | 34.0565 | 2.7183 | 301.25 | 3.3792 | 304.63 | 0.00 | 0.2578 |
| 4.8328723 | 34.0507 | 2.6955 | 297.24 | 3.3673 | 300.60 | 0.00 | 0.2565 |
| 4.8570367 | 34.0448 | 2.6729 | 293.28 | 3.3555 | 296.63 | 0.00 | 0.2553 |
| 4.8813219 | 34.0389 | 2.6504 | 289.37 | 3.3436 | 292.71 | 0.00 | 0.2540 |
| 4.9057285 | 34.0329 | 2.6282 | 285.52 | 3.3318 | 288.85 | 0.00 | 0.2527 |
| 4.9302571 | 34.0269 | 2.6062 | 281.72 | 3.3199 | 285.04 | 0.00 | 0.2515 |
| 4.9549084 | 34.0209 | 2.5844 | 277.97 | 3.3080 | 281.28 | 0.00 | 0.2502 |
| 4.9796829 | 34.0148 | 2.5628 | 274.27 | 3.2962 | 277.57 | 0.00 | 0.2490 |
| 5.0045814 | 34.0087 | 2.5414 | 270.63 | 3.2843 | 273.91 | 0.00 | 0.2477 |
| 5.0296043 | 34.0026 | 2.5201 | 267.03 | 3.2724 | 270.30 | 0.00 | 0.2465 |
| 5.0547523 | 33.9964 | 2.4991 | 263.48 | 3.2606 | 266.74 | 0.00 | 0.2453 |
| 5.0800260 | 33.9903 | 2.4782 | 259.98 | 3.2487 | 263.23 | 0.00 | 0.2441 |
| 5.1054262 | 33.9841 | 2.4576 | 256.53 | 3.2368 | 259.77 | 0.00 | 0.2428 |
| 5.1309533 | 33.9778 | 2.4371 | 253.13 | 3.2250 | 256.35 | 0.00 | 0.2416 |
| 5.1566081 | 33.9716 | 2.4168 | 249.77 | 3.2131 | 252.98 | 0.00 | 0.2404 |
| 5.1823911 | 33.9653 | 2.3967 | 246.46 | 3.2012 | 249.66 | 0.00 | 0.2392 |
| 5.2083031 | 33.9590 | 2.3767 | 243.19 | 3.1894 | 246.38 | 0.00 | 0.2381 |
| 5.2343446 | 33.9527 | 2.3569 | 239.97 | 3.1775 | 243.15 | 0.00 | 0.2369 |
| 5.2605163 | 33.9463 | 2.3374 | 236.79 | 3.1656 | 239.96 | 0.00 | 0.2357 |
| 5.2868189 | 33.9400 | 2.3179 | 233.66 | 3.1538 | 236.81 | 0.00 | 0.2345 |
| 5.3132530 | 33.9336 | 2.2987 | 230.57 | 3.1419 | 233.71 | 0.00 | 0.2333 |
| 5.3398192 | 33.9272 | 2.2796 | 227.52 | 3.1301 | 230.65 | 0.00 | 0.2322 |
| 5.3665183 | 33.9207 | 2.2607 | 224.51 | 3.1182 | 227.63 | 0.00 | 0.2310 |
| 5.3933509 | 33.9143 | 2.2420 | 221.54 | 3.1064 | 224.65 | 0.00 | 0.2299 |
| 5.4203177 | 33.9078 | 2.2234 | 218.61 | 3.0946 | 221.71 | 0.00 | 0.2287 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Se ($Z=34$) | | | | | | | |
| 5.4474193 | 33.9014 | 2.2050 | 215.72 | 3.0827 | 218.81 | 0.00 | 0.2276 |
| 5.4746564 | 33.8949 | 2.1868 | 212.88 | 3.0709 | 215.95 | 0.00 | 0.2265 |
| 5.5020297 | 33.8884 | 2.1687 | 210.07 | 3.0591 | 213.13 | 0.00 | 0.2253 |
| 5.5295398 | 33.8819 | 2.1508 | 207.29 | 3.0472 | 210.34 | 0.00 | 0.2242 |
| 5.5571875 | 33.8753 | 2.1331 | 204.56 | 3.0354 | 207.60 | 0.00 | 0.2231 |
| 5.5849734 | 33.8688 | 2.1155 | 201.86 | 3.0236 | 204.89 | 0.00 | 0.2220 |
| 5.6128983 | 33.8623 | 2.0980 | 199.20 | 3.0118 | 202.22 | 0.00 | 0.2209 |
| 5.6409628 | 33.8557 | 2.0807 | 196.58 | 3.0000 | 199.58 | 0.00 | 0.2198 |
| 5.6691676 | 33.8491 | 2.0636 | 193.99 | 2.9882 | 196.98 | 0.00 | 0.2187 |
| 5.6975135 | 33.8425 | 2.0466 | 191.44 | 2.9765 | 194.41 | 0.00 | 0.2176 |
| 5.7260010 | 33.8359 | 2.0298 | 188.92 | 2.9647 | 191.88 | 0.00 | 0.2165 |
| 5.7546310 | 33.8293 | 2.0131 | 186.43 | 2.9529 | 189.39 | 0.00 | 0.2155 |
| 5.7834042 | 33.8227 | 1.9966 | 183.98 | 2.9412 | 186.92 | 0.00 | 0.2144 |
| 5.8123212 | 33.8161 | 1.9802 | 181.56 | 2.9294 | 184.49 | 0.00 | 0.2133 |
| 5.8413828 | 33.8095 | 1.9639 | 179.18 | 2.9177 | 182.10 | 0.00 | 0.2123 |
| 5.8705897 | 33.8029 | 1.9478 | 176.83 | 2.9059 | 179.73 | 0.00 | 0.2112 |
| 5.8999427 | 33.7963 | 1.9319 | 174.50 | 2.8942 | 177.40 | 0.00 | 0.2101 |
| 5.9294424 | 33.7896 | 1.9161 | 172.21 | 2.8825 | 175.10 | 0.00 | 0.2091 |
| 5.9590896 | 33.7830 | 1.9004 | 169.96 | 2.8708 | 172.83 | 0.00 | 0.2081 |
| 5.9888850 | 33.7764 | 1.8848 | 167.73 | 2.8591 | 170.59 | 0.00 | 0.2070 |
| 6.0188295 | 33.7697 | 1.8694 | 165.53 | 2.8475 | 168.38 | 0.00 | 0.2060 |
| 6.0489236 | 33.7631 | 1.8542 | 163.36 | 2.8358 | 166.20 | 0.00 | 0.2050 |
| 6.0791682 | 33.7565 | 1.8390 | 161.22 | 2.8241 | 164.04 | 0.00 | 0.2039 |
| 6.1095641 | 33.7498 | 1.8240 | 159.11 | 2.8125 | 161.92 | 0.00 | 0.2029 |
| 6.1401119 | 33.7432 | 1.8092 | 157.03 | 2.8009 | 159.83 | 0.00 | 0.2019 |
| 6.1708125 | 33.7366 | 1.7944 | 154.97 | 2.7892 | 157.76 | 0.00 | 0.2009 |
| 6.2016665 | 33.7299 | 1.7798 | 152.95 | 2.7776 | 155.72 | 0.00 | 0.1999 |
| 6.2326749 | 33.7233 | 1.7651 | 150.93 | 2.7660 | 153.69 | 0.00 | 0.1989 |
| 6.2638382 | 33.7167 | 1.7502 | 148.91 | 2.7545 | 151.66 | 0.00 | 0.1979 |
| 6.2951574 | 33.7100 | 1.7354 | 146.91 | 2.7429 | 149.65 | 0.00 | 0.1970 |
| 6.3266332 | 33.7033 | 1.7207 | 144.94 | 2.7313 | 147.68 | 0.00 | 0.1960 |
| 6.3582664 | 33.6966 | 1.7061 | 143.00 | 2.7198 | 145.72 | 0.00 | 0.1950 |
| 6.3900577 | 33.6898 | 1.6917 | 141.09 | 2.7083 | 143.80 | 0.00 | 0.1940 |
| 6.4220080 | 33.6830 | 1.6772 | 139.18 | 2.6968 | 141.88 | 0.00 | 0.1931 |
| 6.4541180 | 33.6761 | 1.6628 | 137.30 | 2.6853 | 139.99 | 0.00 | 0.1921 |
| 6.4863886 | 33.6692 | 1.6485 | 135.44 | 2.6738 | 138.12 | 0.00 | 0.1911 |
| 6.5188206 | 33.6622 | 1.6343 | 133.61 | 2.6623 | 136.27 | 0.00 | 0.1902 |
| 6.5514147 | 33.6552 | 1.6203 | 131.80 | 2.6509 | 134.45 | 0.00 | 0.1892 |
| 6.5841717 | 33.6482 | 1.6064 | 130.02 | 2.6395 | 132.66 | 0.00 | 0.1883 |
| Br ($Z=35$) | | | | | | | |
| Atomic weight: $A_r=79.90400 \text{ g/mol}^{-1}$, Nominal density $\rho (\text{g/cm}^{-3})=3.1100$ | | | | | | | |
| $\sigma_a (\text{barns/atom})=[\mu/\rho](\text{cm}^2/\text{g}^{-1}) \times 132.684$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2/\text{g}^{-1})=f_2(e/\text{atom}^{-1}) \times 5.26636 \times 10^5$ | | | | | | | |
| 9 edges. Edge energies (keV): | | | | | | | |
| K | 13.4737 | LI | 1.78200 | LII | 1.59600 | LIII | 1.54990 |
| MI | 0.256500 | MII | 0.189300 | MIII | 0.181500 | MIV | 0.0701000 |
| M V | 0.069000 | | | | | | |
| Relativistic correction estimate $f_{\text{rel}}(\text{H82,3/5CL})=(-0.22007, -0.13860) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction $f_{\text{NT}}=-0.0084102 e \text{ atom}^{-1}$ | | | | | | | |
| 0.90000000 | 27.4506 | 5.1786 | 3030.3 | 4.9149 | 3035.2 | 0.00 | 1.378 |
| 0.90450000 | 27.4412 | 5.1467 | 2996.6 | 4.9238 | 3001.5 | 0.00 | 1.371 |
| 0.90902250 | 27.4315 | 5.1149 | 2963.3 | 4.9325 | 2968.2 | 0.00 | 1.364 |
| 0.91356761 | 27.4215 | 5.0832 | 2930.3 | 4.9412 | 2935.2 | 0.00 | 1.357 |
| 0.91813545 | 27.4111 | 5.0518 | 2897.7 | 4.9499 | 2902.6 | 0.00 | 1.350 |
| 0.92272613 | 27.4004 | 5.0206 | 2865.4 | 4.9584 | 2870.4 | 0.00 | 1.344 |
| 0.92733976 | 27.3893 | 4.9895 | 2833.5 | 4.9669 | 2838.5 | 0.00 | 1.337 |
| 0.93197646 | 27.3778 | 4.9586 | 2802.0 | 4.9753 | 2807.0 | 0.00 | 1.330 |
| 0.93663634 | 27.3661 | 4.9279 | 2770.8 | 4.9836 | 2775.8 | 0.00 | 1.324 |
| 0.94131952 | 27.3539 | 4.8974 | 2739.9 | 4.9919 | 2744.9 | 0.00 | 1.317 |
| 0.94602612 | 27.3414 | 4.8670 | 2709.4 | 5.0000 | 2714.4 | 0.00 | 1.311 |
| 0.95075625 | 27.3285 | 4.8368 | 2679.2 | 5.0081 | 2684.2 | 0.00 | 1.304 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Br ($Z=35$) | | | | | | | |
| 0.95551003 | 27.3153 | 4.8068 | 2649.3 | 5.0161 | 2654.3 | 0.00 | 1.298 |
| 0.96028758 | 27.3017 | 4.7770 | 2619.8 | 5.0241 | 2624.8 | 0.00 | 1.291 |
| 0.96508902 | 27.2877 | 4.7474 | 2590.6 | 5.0319 | 2595.6 | 0.00 | 1.285 |
| 0.96991446 | 27.2733 | 4.7180 | 2561.7 | 5.0397 | 2566.8 | 0.00 | 1.278 |
| 0.97476404 | 27.2586 | 4.6887 | 2533.2 | 5.0474 | 2538.2 | 0.00 | 1.272 |
| 0.97963786 | 27.2434 | 4.6596 | 2504.9 | 5.0551 | 2510.0 | 0.00 | 1.266 |
| 0.98453605 | 27.2279 | 4.6307 | 2477.0 | 5.0626 | 2482.0 | 0.00 | 1.259 |
| 0.98945873 | 27.2119 | 4.6019 | 2449.4 | 5.0701 | 2454.4 | 0.00 | 1.253 |
| 0.99440602 | 27.1956 | 4.5734 | 2422.1 | 5.0775 | 2427.1 | 0.00 | 1.247 |
| 0.99937805 | 27.1788 | 4.5450 | 2395.1 | 5.0848 | 2400.1 | 0.00 | 1.241 |
| 1.0043749 | 27.1723 | 4.5108 | 2365.2 | 5.0920 | 2370.3 | 0.00 | 1.234 |
| 1.0093968 | 27.1649 | 4.4761 | 2335.3 | 5.0992 | 2340.4 | 0.00 | 1.228 |
| 1.0144438 | 27.1553 | 4.4416 | 2305.8 | 5.1062 | 2310.9 | 0.00 | 1.222 |
| 1.0195160 | 27.1437 | 4.4075 | 2276.7 | 5.1132 | 2281.8 | 0.00 | 1.216 |
| 1.0246136 | 27.1305 | 4.3736 | 2248.0 | 5.1201 | 2253.1 | 0.00 | 1.210 |
| 1.0297367 | 27.1157 | 4.3396 | 2219.4 | 5.1270 | 2224.5 | 0.00 | 1.204 |
| 1.0348853 | 27.0996 | 4.3058 | 2191.1 | 5.1337 | 2196.3 | 0.00 | 1.198 |
| 1.0400598 | 27.0821 | 4.2722 | 2163.2 | 5.1404 | 2168.4 | 0.00 | 1.192 |
| 1.0452601 | 27.0634 | 4.2390 | 2135.7 | 5.1470 | 2140.9 | 0.00 | 1.186 |
| 1.0504864 | 27.0435 | 4.2060 | 2108.6 | 5.1535 | 2113.7 | 0.00 | 1.180 |
| 1.0557388 | 27.0225 | 4.1733 | 2081.8 | 5.1599 | 2086.9 | 0.00 | 1.174 |
| 1.0610175 | 27.0005 | 4.1409 | 2055.3 | 5.1662 | 2060.5 | 0.00 | 1.169 |
| 1.0663226 | 26.9775 | 4.1088 | 2029.3 | 5.1725 | 2034.4 | 0.00 | 1.163 |
| 1.0716542 | 26.9534 | 4.0769 | 2003.5 | 5.1786 | 2008.7 | 0.00 | 1.157 |
| 1.0770125 | 26.9284 | 4.0454 | 1978.1 | 5.1847 | 1983.3 | 0.00 | 1.151 |
| 1.0823975 | 26.9024 | 4.0141 | 1953.0 | 5.1907 | 1958.2 | 0.00 | 1.145 |
| 1.0878095 | 26.8754 | 3.9830 | 1928.3 | 5.1966 | 1933.5 | 0.00 | 1.140 |
| 1.0932486 | 26.8475 | 3.9523 | 1903.9 | 5.2025 | 1909.1 | 0.00 | 1.134 |
| 1.0987148 | 26.8187 | 3.9217 | 1879.8 | 5.2082 | 1885.0 | 0.00 | 1.128 |
| 1.1042084 | 26.7889 | 3.8915 | 1856.0 | 5.2139 | 1861.2 | 0.00 | 1.123 |
| 1.1097294 | 26.7582 | 3.8615 | 1832.5 | 5.2195 | 1837.7 | 0.00 | 1.117 |
| 1.1152781 | 26.7266 | 3.8318 | 1809.4 | 5.2249 | 1814.6 | 0.00 | 1.112 |
| 1.1208545 | 26.6940 | 3.8023 | 1786.5 | 5.2303 | 1791.7 | 0.00 | 1.106 |
| 1.1264587 | 26.6604 | 3.7731 | 1764.0 | 5.2357 | 1769.2 | 0.00 | 1.101 |
| 1.1320910 | 26.6258 | 3.7441 | 1741.7 | 5.2409 | 1746.9 | 0.00 | 1.095 |
| 1.1377515 | 26.5903 | 3.7153 | 1719.7 | 5.2460 | 1725.0 | 0.00 | 1.090 |
| 1.1434402 | 26.5538 | 3.6869 | 1698.1 | 5.2511 | 1703.3 | 0.00 | 1.084 |
| 1.1491574 | 26.5162 | 3.6586 | 1676.7 | 5.2561 | 1681.9 | 0.00 | 1.079 |
| 1.1549032 | 26.4775 | 3.6306 | 1655.6 | 5.2610 | 1660.8 | 0.00 | 1.074 |
| 1.1606777 | 26.4378 | 3.6028 | 1634.7 | 5.2658 | 1640.0 | 0.00 | 1.068 |
| 1.1664811 | 26.3970 | 3.5753 | 1614.2 | 5.2705 | 1619.4 | 0.00 | 1.063 |
| 1.1723135 | 26.3551 | 3.5480 | 1593.9 | 5.2751 | 1599.1 | 0.00 | 1.058 |
| 1.1781751 | 26.3120 | 3.5209 | 1573.8 | 5.2797 | 1579.1 | 0.00 | 1.052 |
| 1.1840660 | 26.2677 | 3.4941 | 1554.1 | 5.2841 | 1559.3 | 0.00 | 1.047 |
| 1.1899863 | 26.2222 | 3.4675 | 1534.6 | 5.2885 | 1539.8 | 0.00 | 1.042 |
| 1.1959362 | 26.1754 | 3.4411 | 1515.3 | 5.2927 | 1520.6 | 0.00 | 1.037 |
| 1.2019159 | 26.1273 | 3.4149 | 1496.3 | 5.2969 | 1501.6 | 0.00 | 1.032 |
| 1.2079255 | 26.0778 | 3.3890 | 1477.5 | 5.3010 | 1482.8 | 0.00 | 1.026 |
| 1.2139651 | 26.0269 | 3.3633 | 1459.0 | 5.3050 | 1464.3 | 0.00 | 1.021 |
| 1.2200350 | 25.9746 | 3.3377 | 1440.8 | 5.3090 | 1446.1 | 0.00 | 1.016 |
| 1.2261351 | 25.9207 | 3.3124 | 1422.7 | 5.3128 | 1428.0 | 0.00 | 1.011 |
| 1.2322658 | 25.8653 | 3.2874 | 1404.9 | 5.3165 | 1410.2 | 0.00 | 1.006 |
| 1.2384271 | 25.8082 | 3.2625 | 1387.4 | 5.3202 | 1392.7 | 0.00 | 1.001 |
| 1.2446193 | 25.7494 | 3.2378 | 1370.0 | 5.3238 | 1375.3 | 0.00 | 0.9962 |
| 1.2508424 | 25.6889 | 3.2134 | 1352.9 | 5.3273 | 1358.2 | 0.00 | 0.9912 |
| 1.2570966 | 25.6264 | 3.1891 | 1336.0 | 5.3306 | 1341.4 | 0.00 | 0.9863 |
| 1.2633821 | 25.5620 | 3.1651 | 1319.3 | 5.3339 | 1324.7 | 0.00 | 0.9814 |
| 1.2696990 | 25.4956 | 3.1412 | 1302.9 | 5.3372 | 1308.2 | 0.00 | 0.9765 |
| 1.2760475 | 25.4270 | 3.1176 | 1286.7 | 5.3403 | 1292.0 | 0.00 | 0.9716 |
| 1.2824277 | 25.3562 | 3.0941 | 1270.6 | 5.3433 | 1276.0 | 0.00 | 0.9668 |
| 1.2888399 | 25.2830 | 3.0709 | 1254.8 | 5.3462 | 1260.1 | 0.00 | 0.9620 |
| 1.2952840 | 25.2072 | 3.0478 | 1239.2 | 5.3491 | 1244.5 | 0.00 | 0.9572 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Br ($Z=35$) | | | | | | | |
| 1.3017605 | 25.1289 | 3.0240 | 1223.4 | 5.3519 | 1228.7 | 0.00 | 0.9524 |
| 1.3082693 | 25.0477 | 3.0004 | 1207.8 | 5.3545 | 1213.1 | 0.00 | 0.9477 |
| 1.3148106 | 24.9634 | 2.9769 | 1192.4 | 5.3571 | 1197.7 | 0.00 | 0.9430 |
| 1.3213847 | 24.8761 | 2.9532 | 1177.0 | 5.3596 | 1182.3 | 0.00 | 0.9383 |
| 1.3279916 | 24.7853 | 2.9295 | 1161.7 | 5.3620 | 1167.1 | 0.00 | 0.9336 |
| 1.3346316 | 24.6908 | 2.9061 | 1146.7 | 5.3643 | 1152.1 | 0.00 | 0.9290 |
| 1.3413047 | 24.5925 | 2.8828 | 1131.9 | 5.3666 | 1137.2 | 0.00 | 0.9244 |
| 1.3480112 | 24.4901 | 2.8598 | 1117.3 | 5.3687 | 1122.6 | 0.00 | 0.9198 |
| 1.3547513 | 24.3832 | 2.8370 | 1102.8 | 5.3707 | 1108.2 | 0.00 | 0.9152 |
| 1.3615250 | 24.2716 | 2.8144 | 1088.6 | 5.3727 | 1094.0 | 0.00 | 0.9106 |
| 1.3683327 | 24.1549 | 2.7920 | 1074.6 | 5.3745 | 1080.0 | 0.00 | 0.9061 |
| 1.3751743 | 24.0326 | 2.7699 | 1060.7 | 5.3763 | 1066.1 | 0.00 | 0.9016 |
| 1.3820502 | 23.9044 | 2.7479 | 1047.1 | 5.3780 | 1052.5 | 0.00 | 0.8971 |
| 1.3889605 | 23.7696 | 2.7261 | 1033.6 | 5.3796 | 1039.0 | 0.00 | 0.8926 |
| 1.3959053 | 23.6277 | 2.7046 | 1020.4 | 5.3811 | 1025.7 | 0.00 | 0.8882 |
| 1.4028848 | 23.4781 | 2.6832 | 1007.3 | 5.3825 | 1012.6 | 0.00 | 0.8838 |
| 1.4098992 | 23.3198 | 2.6620 | 994.34 | 5.3838 | 999.72 | 0.00 | 0.8794 |
| 1.4169487 | 23.1521 | 2.6411 | 981.60 | 5.3851 | 986.98 | 0.00 | 0.8750 |
| 1.4240335 | 22.9739 | 2.6203 | 969.03 | 5.3862 | 974.41 | 0.00 | 0.8707 |
| 1.4311536 | 22.7839 | 2.5997 | 956.63 | 5.3873 | 962.02 | 0.00 | 0.8663 |
| 1.4383094 | 22.5806 | 2.5793 | 944.40 | 5.3882 | 949.79 | 0.00 | 0.8620 |
| 1.4455009 | 22.3623 | 2.5591 | 932.33 | 5.3891 | 937.72 | 0.00 | 0.8577 |
| 1.4527284 | 22.1268 | 2.5390 | 920.43 | 5.3899 | 925.82 | 0.00 | 0.8535 |
| 1.4599921 | 21.8715 | 2.5192 | 908.69 | 5.3906 | 914.08 | 0.00 | 0.8492 |
| 1.4672920 | 21.5929 | 2.4995 | 897.11 | 5.3912 | 902.50 | 0.00 | 0.8450 |
| 1.4746285 | 21.2869 | 2.4800 | 885.69 | 5.3917 | 891.08 | 0.00 | 0.8408 |
| 1.4820016 | 20.9478 | 2.4607 | 874.42 | 5.3921 | 879.81 | 0.00 | 0.8366 |
| 1.4894117 | 20.5681 | 2.4415 | 863.30 | 5.3924 | 868.69 | 0.00 | 0.8324 |
| 1.4968587 | 20.1376 | 2.4226 | 852.33 | 5.3927 | 857.72 | 0.00 | 0.8283 |
| 1.5043430 | 19.6410 | 2.4038 | 841.51 | 5.3928 | 846.90 | 0.00 | 0.8242 |
| 1.5118647 | 19.0553 | 2.3852 | 830.84 | 5.3929 | 836.23 | 0.00 | 0.8201 |
| 1.5194240 | 18.3419 | 2.3667 | 820.31 | 5.3928 | 825.70 | 0.00 | 0.8160 |
| 1.5270212 | 17.4295 | 2.3484 | 809.92 | 5.3927 | 815.31 | 0.00 | 0.8119 |
| 1.5346563 | 16.1588 | 2.3303 | 799.67 | 5.3925 | 805.06 | 0.00 | 0.8079 |
| 1.5423295 | 14.0202 | 2.3123 | 789.56 | 5.3922 | 794.95 | 0.00 | 0.8039 |
| 1.5497311 | 2.83862 | 2.2952 | 779.98 | 5.3918 | 785.37 | 0.00 | 0.8000 |
| 1.5500412 | 2.15632 | 11.454 | 3891.6 | 5.3918 | 3897.0 | 0.00 | 0.7999 |
| 1.5500690 | 2.68037 | 11.454 | 3891.4 | 5.3918 | 3896.8 | 0.00 | 0.7999 |
| 1.5577914 | 13.7486 | 11.363 | 3841.3 | 5.3913 | 3846.7 | 0.00 | 0.7959 |
| 1.5655804 | 15.5172 | 11.272 | 3791.7 | 5.3908 | 3797.1 | 0.00 | 0.7919 |
| 1.5734083 | 16.3532 | 11.182 | 3742.7 | 5.3901 | 3748.1 | 0.00 | 0.7880 |
| 1.5812753 | 16.6565 | 11.093 | 3694.4 | 5.3894 | 3699.8 | 0.00 | 0.7841 |
| 1.5891817 | 16.2799 | 11.004 | 3646.7 | 5.3885 | 3652.1 | 0.00 | 0.7802 |
| 1.5958196 | 11.5761 | 10.931 | 3607.3 | 5.3878 | 3612.7 | 0.00 | 0.7769 |
| 1.5961803 | 11.5274 | 15.450 | 5097.4 | 5.3877 | 5102.8 | 0.00 | 0.7768 |
| 1.5971276 | 14.2378 | 15.435 | 5089.6 | 5.3876 | 5095.0 | 0.00 | 0.7763 |
| 1.6051132 | 17.7760 | 15.313 | 5024.0 | 5.3866 | 5029.4 | 0.00 | 0.7724 |
| 1.6131388 | 19.1375 | 15.191 | 4959.4 | 5.3855 | 4964.8 | 0.00 | 0.7686 |
| 1.6212045 | 20.0886 | 15.071 | 4895.5 | 5.3843 | 4900.9 | 0.00 | 0.7648 |
| 1.6293105 | 20.8413 | 14.951 | 4832.5 | 5.3831 | 4837.9 | 0.00 | 0.7610 |
| 1.6374571 | 21.4709 | 14.832 | 4770.3 | 5.3817 | 4775.7 | 0.00 | 0.7572 |
| 1.6456443 | 22.0139 | 14.715 | 4709.0 | 5.3802 | 4714.3 | 0.00 | 0.7534 |
| 1.6538726 | 22.4914 | 14.598 | 4648.4 | 5.3787 | 4653.8 | 0.00 | 0.7497 |
| 1.6621419 | 22.9166 | 14.482 | 4588.6 | 5.3771 | 4594.0 | 0.00 | 0.7459 |
| 1.6704526 | 23.2986 | 14.367 | 4529.6 | 5.3754 | 4534.9 | 0.00 | 0.7422 |
| 1.6788049 | 23.6436 | 14.254 | 4471.3 | 5.3736 | 4476.7 | 0.00 | 0.7385 |
| 1.6871989 | 23.9561 | 14.141 | 4413.8 | 5.3717 | 4419.2 | 0.00 | 0.7349 |
| 1.6956349 | 24.2392 | 14.029 | 4357.0 | 5.3697 | 4362.4 | 0.00 | 0.7312 |
| 1.7041131 | 24.4950 | 13.917 | 4301.0 | 5.3676 | 4306.4 | 0.00 | 0.7276 |
| 1.7126337 | 24.7245 | 13.807 | 4245.7 | 5.3655 | 4251.1 | 0.00 | 0.7239 |
| 1.7211968 | 24.9278 | 13.698 | 4191.2 | 5.3632 | 4196.5 | 0.00 | 0.7203 |
| 1.7298028 | 25.1036 | 13.589 | 4137.3 | 5.3609 | 4142.6 | 0.00 | 0.7168 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Br ($Z=35$) | | | | | | | |
| 1.7384518 | 25.2488 | 13.482 | 4084.1 | 5.3585 | 4089.5 | 0.00 | 0.7132 |
| 1.7471441 | 25.3568 | 13.375 | 4031.6 | 5.3560 | 4037.0 | 0.00 | 0.7096 |
| 1.7558798 | 25.4137 | 13.269 | 3979.8 | 5.3534 | 3985.2 | 0.00 | 0.7061 |
| 1.7646592 | 25.3870 | 13.164 | 3928.7 | 5.3508 | 3934.0 | 0.00 | 0.7026 |
| 1.7734825 | 25.1675 | 13.060 | 3878.2 | 5.3480 | 3883.6 | 0.00 | 0.6991 |
| 1.7804852 | 24.2756 | 12.979 | 3838.8 | 5.3458 | 3844.2 | 0.00 | 0.6964 |
| 1.7823499 | 23.3907 | 14.883 | 4397.6 | 5.3452 | 4402.9 | 0.00 | 0.6956 |
| 1.7835146 | 24.3169 | 14.869 | 4390.4 | 5.3448 | 4395.7 | 0.00 | 0.6952 |
| 1.7912617 | 25.6026 | 14.771 | 4342.8 | 5.3423 | 4348.1 | 0.00 | 0.6922 |
| 1.8002180 | 26.2089 | 14.660 | 4288.7 | 5.3393 | 4294.0 | 0.00 | 0.6887 |
| 1.8092191 | 26.6377 | 14.550 | 4235.3 | 5.3362 | 4240.6 | 0.00 | 0.6853 |
| 1.8182652 | 26.9884 | 14.441 | 4182.5 | 5.3330 | 4187.9 | 0.00 | 0.6819 |
| 1.8273565 | 27.2932 | 14.332 | 4130.5 | 5.3297 | 4135.8 | 0.00 | 0.6785 |
| 1.8364933 | 27.5667 | 14.225 | 4079.0 | 5.3264 | 4084.4 | 0.00 | 0.6751 |
| 1.8456757 | 27.8169 | 14.118 | 4028.3 | 5.3230 | 4033.6 | 0.00 | 0.6718 |
| 1.8549041 | 28.0486 | 14.012 | 3978.1 | 5.3195 | 3983.5 | 0.00 | 0.6684 |
| 1.8641786 | 28.2649 | 13.907 | 3928.7 | 5.3159 | 3934.0 | 0.00 | 0.6651 |
| 1.8734995 | 28.4681 | 13.803 | 3880.0 | 5.3122 | 3885.3 | 0.00 | 0.6618 |
| 1.8828670 | 28.6607 | 13.702 | 3832.4 | 5.3084 | 3837.7 | 0.00 | 0.6585 |
| 1.8922814 | 28.8442 | 13.601 | 3785.4 | 5.3046 | 3790.7 | 0.00 | 0.6552 |
| 1.9017428 | 29.0195 | 13.502 | 3739.0 | 5.3007 | 3744.3 | 0.00 | 0.6520 |
| 1.9112515 | 29.1874 | 13.404 | 3693.3 | 5.2967 | 3698.6 | 0.00 | 0.6487 |
| 1.9208077 | 29.3485 | 13.306 | 3648.1 | 5.2926 | 3653.4 | 0.00 | 0.6455 |
| 1.9304118 | 29.5034 | 13.209 | 3603.6 | 5.2884 | 3608.9 | 0.00 | 0.6423 |
| 1.9400638 | 29.6527 | 13.113 | 3559.6 | 5.2842 | 3564.9 | 0.00 | 0.6391 |
| 1.9497642 | 29.7967 | 13.018 | 3516.2 | 5.2798 | 3521.5 | 0.00 | 0.6359 |
| 1.9595130 | 29.9357 | 12.924 | 3473.4 | 5.2754 | 3478.7 | 0.00 | 0.6327 |
| 1.9693105 | 30.0703 | 12.830 | 3431.1 | 5.2710 | 3436.4 | 0.00 | 0.6296 |
| 1.9791571 | 30.2006 | 12.738 | 3389.4 | 5.2664 | 3394.7 | 0.00 | 0.6264 |
| 1.9890529 | 30.3270 | 12.646 | 3348.2 | 5.2617 | 3353.5 | 0.00 | 0.6233 |
| 1.9989981 | 30.4497 | 12.555 | 3307.6 | 5.2570 | 3312.9 | 0.00 | 0.6202 |
| 2.0089931 | 30.5691 | 12.465 | 3267.5 | 5.2522 | 3272.8 | 0.00 | 0.6171 |
| 2.0190381 | 30.6852 | 12.374 | 3227.7 | 5.2473 | 3232.9 | 0.00 | 0.6141 |
| 2.0291333 | 30.7978 | 12.284 | 3188.1 | 5.2423 | 3193.4 | 0.00 | 0.6110 |
| 2.0392790 | 30.9070 | 12.194 | 3149.0 | 5.2373 | 3154.3 | 0.00 | 0.6080 |
| 2.0494754 | 31.0132 | 12.105 | 3110.5 | 5.2322 | 3115.7 | 0.00 | 0.6050 |
| 2.0597227 | 31.1164 | 12.016 | 3072.4 | 5.2270 | 3077.6 | 0.00 | 0.6019 |
| 2.0700213 | 31.2169 | 11.929 | 3034.8 | 5.2217 | 3040.0 | 0.00 | 0.5990 |
| 2.0803714 | 31.3147 | 11.841 | 2997.5 | 5.2164 | 3002.7 | 0.00 | 0.5960 |
| 2.0907733 | 31.4098 | 11.754 | 2960.6 | 5.2109 | 2965.8 | 0.00 | 0.5930 |
| 2.1012272 | 31.5023 | 11.667 | 2924.1 | 5.2054 | 2929.3 | 0.00 | 0.5901 |
| 2.1117333 | 31.5922 | 11.581 | 2888.1 | 5.1998 | 2893.3 | 0.00 | 0.5871 |
| 2.1222920 | 31.6798 | 11.496 | 2852.6 | 5.1942 | 2857.7 | 0.00 | 0.5842 |
| 2.1329034 | 31.7650 | 11.411 | 2817.4 | 5.1884 | 2822.6 | 0.00 | 0.5813 |
| 2.1435680 | 31.8481 | 11.327 | 2782.8 | 5.1826 | 2788.0 | 0.00 | 0.5784 |
| 2.1542858 | 31.9291 | 11.243 | 2748.5 | 5.1768 | 2753.7 | 0.00 | 0.5755 |
| 2.1650572 | 32.0081 | 11.160 | 2714.7 | 5.1708 | 2719.9 | 0.00 | 0.5727 |
| 2.1758825 | 32.0851 | 11.078 | 2681.3 | 5.1648 | 2686.5 | 0.00 | 0.5698 |
| 2.1867619 | 32.1603 | 10.997 | 2648.3 | 5.1587 | 2653.5 | 0.00 | 0.5670 |
| 2.1976957 | 32.2336 | 10.916 | 2615.7 | 5.1525 | 2620.9 | 0.00 | 0.5642 |
| 2.2086842 | 32.3052 | 10.835 | 2583.6 | 5.1462 | 2588.7 | 0.00 | 0.5613 |
| 2.2197276 | 32.3752 | 10.756 | 2551.8 | 5.1399 | 2556.9 | 0.00 | 0.5586 |
| 2.2308263 | 32.4435 | 10.676 | 2520.4 | 5.1335 | 2525.5 | 0.00 | 0.5558 |
| 2.2419804 | 32.5103 | 10.598 | 2489.4 | 5.1271 | 2494.5 | 0.00 | 0.5530 |
| 2.2531903 | 32.5755 | 10.520 | 2458.8 | 5.1205 | 2463.9 | 0.00 | 0.5503 |
| 2.2644562 | 32.6394 | 10.442 | 2428.6 | 5.1139 | 2433.7 | 0.00 | 0.5475 |
| 2.2757785 | 32.7018 | 10.366 | 2398.7 | 5.1072 | 2403.8 | 0.00 | 0.5448 |
| 2.2871574 | 32.7629 | 10.289 | 2369.2 | 5.1005 | 2374.3 | 0.00 | 0.5421 |
| 2.2985932 | 32.8227 | 10.214 | 2340.0 | 5.0937 | 2345.1 | 0.00 | 0.5394 |
| 2.3100862 | 32.8814 | 10.138 | 2311.3 | 5.0868 | 2316.3 | 0.00 | 0.5367 |
| 2.3216366 | 32.9389 | 10.063 | 2282.7 | 5.0798 | 2287.8 | 0.00 | 0.5340 |
| 2.3332448 | 32.9949 | 9.9879 | 2254.4 | 5.0728 | 2259.4 | 0.00 | 0.5314 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Br ($Z=35$) | | | | | | | |
| 2.3449110 | 33.0495 | 9.9131 | 2226.4 | 5.0657 | 2231.4 | 0.00 | 0.5287 |
| 2.3566356 | 33.1028 | 9.8389 | 2198.7 | 5.0585 | 2203.8 | 0.00 | 0.5261 |
| 2.3684187 | 33.1548 | 9.7652 | 2171.4 | 5.0513 | 2176.4 | 0.00 | 0.5235 |
| 2.3802608 | 33.2056 | 9.6921 | 2144.4 | 5.0440 | 2149.4 | 0.00 | 0.5209 |
| 2.3921621 | 33.2552 | 9.6195 | 2117.7 | 5.0366 | 2122.8 | 0.00 | 0.5183 |
| 2.4041230 | 33.3037 | 9.5474 | 2091.4 | 5.0292 | 2096.4 | 0.00 | 0.5157 |
| 2.4161436 | 33.3510 | 9.4758 | 2065.4 | 5.0217 | 2070.4 | 0.00 | 0.5131 |
| 2.4282243 | 33.3972 | 9.4048 | 2039.7 | 5.0141 | 2044.7 | 0.00 | 0.5106 |
| 2.4403654 | 33.4424 | 9.3342 | 2014.3 | 5.0065 | 2019.4 | 0.00 | 0.5081 |
| 2.4525672 | 33.4866 | 9.2642 | 1989.3 | 4.9988 | 1994.3 | 0.00 | 0.5055 |
| 2.4648301 | 33.5297 | 9.1947 | 1964.5 | 4.9910 | 1969.5 | 0.00 | 0.5030 |
| 2.4771542 | 33.5719 | 9.1257 | 1940.1 | 4.9832 | 1945.1 | 0.00 | 0.5005 |
| 2.4895400 | 33.6131 | 9.0572 | 1916.0 | 4.9753 | 1920.9 | 0.00 | 0.4980 |
| 2.5019877 | 33.6534 | 8.9892 | 1892.1 | 4.9674 | 1897.1 | 0.00 | 0.4955 |
| 2.5144976 | 33.6928 | 8.9217 | 1868.6 | 4.9594 | 1873.5 | 0.00 | 0.4931 |
| 2.5270701 | 33.7314 | 8.8547 | 1845.3 | 4.9513 | 1850.3 | 0.00 | 0.4906 |
| 2.5397055 | 33.7690 | 8.7882 | 1822.3 | 4.9431 | 1827.3 | 0.00 | 0.4882 |
| 2.5524040 | 33.8059 | 8.7222 | 1799.6 | 4.9349 | 1804.6 | 0.00 | 0.4858 |
| 2.5651660 | 33.8419 | 8.6567 | 1777.2 | 4.9267 | 1782.2 | 0.00 | 0.4833 |
| 2.5779919 | 33.8771 | 8.5917 | 1755.1 | 4.9184 | 1760.0 | 0.00 | 0.4809 |
| 2.5908818 | 33.9116 | 8.5271 | 1733.3 | 4.9100 | 1738.2 | 0.00 | 0.4785 |
| 2.6038362 | 33.9453 | 8.4631 | 1711.7 | 4.9015 | 1716.6 | 0.00 | 0.4762 |
| 2.6168554 | 33.9783 | 8.3995 | 1690.4 | 4.8930 | 1695.3 | 0.00 | 0.4738 |
| 2.6299397 | 34.0105 | 8.3364 | 1669.3 | 4.8845 | 1674.2 | 0.00 | 0.4714 |
| 2.6430894 | 34.0421 | 8.2737 | 1648.5 | 4.8758 | 1653.4 | 0.00 | 0.4691 |
| 2.6563048 | 34.0730 | 8.2116 | 1628.0 | 4.8672 | 1632.9 | 0.00 | 0.4668 |
| 2.6695863 | 34.1032 | 8.1499 | 1607.7 | 4.8584 | 1612.6 | 0.00 | 0.4644 |
| 2.6829343 | 34.1328 | 8.0887 | 1587.7 | 4.8496 | 1592.6 | 0.00 | 0.4621 |
| 2.6963489 | 34.1617 | 8.0279 | 1568.0 | 4.8408 | 1572.8 | 0.00 | 0.4598 |
| 2.7098307 | 34.1900 | 7.9676 | 1548.5 | 4.8319 | 1553.3 | 0.00 | 0.4575 |
| 2.7233798 | 34.2177 | 7.9078 | 1529.2 | 4.8229 | 1534.0 | 0.00 | 0.4553 |
| 2.7369967 | 34.2449 | 7.8484 | 1510.1 | 4.8139 | 1515.0 | 0.00 | 0.4530 |
| 2.7506817 | 34.2715 | 7.7895 | 1491.4 | 4.8048 | 1496.2 | 0.00 | 0.4507 |
| 2.7644351 | 34.2975 | 7.7310 | 1472.8 | 4.7957 | 1477.6 | 0.00 | 0.4485 |
| 2.7782573 | 34.3230 | 7.6730 | 1454.5 | 4.7865 | 1459.3 | 0.00 | 0.4463 |
| 2.7921486 | 34.3480 | 7.6155 | 1436.4 | 4.7773 | 1441.2 | 0.00 | 0.4440 |
| 2.8061093 | 34.3725 | 7.5583 | 1418.5 | 4.7680 | 1423.3 | 0.00 | 0.4418 |
| 2.8201399 | 34.3964 | 7.5017 | 1400.9 | 4.7586 | 1405.6 | 0.00 | 0.4396 |
| 2.8342406 | 34.4200 | 7.4454 | 1383.4 | 4.7492 | 1388.2 | 0.00 | 0.4375 |
| 2.8484118 | 34.4431 | 7.3896 | 1366.2 | 4.7398 | 1371.0 | 0.00 | 0.4353 |
| 2.8626539 | 34.4657 | 7.3342 | 1349.3 | 4.7303 | 1354.0 | 0.00 | 0.4331 |
| 2.8769671 | 34.4879 | 7.2793 | 1332.5 | 4.7207 | 1337.2 | 0.00 | 0.4310 |
| 2.8913520 | 34.5098 | 7.2248 | 1315.9 | 4.7111 | 1320.6 | 0.00 | 0.4288 |
| 2.9058087 | 34.5312 | 7.1707 | 1299.6 | 4.7015 | 1304.3 | 0.00 | 0.4267 |
| 2.9203378 | 34.5523 | 7.1171 | 1283.4 | 4.6918 | 1288.1 | 0.00 | 0.4246 |
| 2.9349394 | 34.5731 | 7.0638 | 1267.5 | 4.6820 | 1272.2 | 0.00 | 0.4224 |
| 2.9496141 | 34.5937 | 7.0110 | 1251.8 | 4.6722 | 1256.4 | 0.00 | 0.4203 |
| 2.9643622 | 34.6139 | 6.9586 | 1236.2 | 4.6624 | 1240.9 | 0.00 | 0.4182 |
| 2.9791840 | 34.6341 | 6.9066 | 1220.9 | 4.6525 | 1225.6 | 0.00 | 0.4162 |
| 2.9940799 | 34.6541 | 6.8551 | 1205.8 | 4.6425 | 1210.4 | 0.00 | 0.4141 |
| 3.0090503 | 34.6779 | 6.8016 | 1190.4 | 4.6325 | 1195.0 | 0.00 | 0.4120 |
| 3.0240956 | 34.7003 | 6.7472 | 1175.0 | 4.6225 | 1179.6 | 0.00 | 0.4100 |
| 3.0392161 | 34.7205 | 6.6931 | 1159.8 | 4.6124 | 1164.4 | 0.00 | 0.4079 |
| 3.0544122 | 34.7395 | 6.6395 | 1144.8 | 4.6023 | 1149.4 | 0.00 | 0.4059 |
| 3.0696842 | 34.7576 | 6.5864 | 1130.0 | 4.5921 | 1134.6 | 0.00 | 0.4039 |
| 3.0850326 | 34.7751 | 6.5337 | 1115.3 | 4.5819 | 1119.9 | 0.00 | 0.4019 |
| 3.1004578 | 34.8925 | 6.4813 | 1100.9 | 4.5716 | 1105.5 | 0.00 | 0.3999 |
| 3.1159601 | 34.9089 | 6.4271 | 1086.3 | 4.5613 | 1090.8 | 0.00 | 0.3979 |
| 3.1315399 | 34.9247 | 6.3735 | 1071.8 | 4.5510 | 1076.4 | 0.00 | 0.3959 |
| 3.1471976 | 34.9397 | 6.3203 | 1057.6 | 4.5406 | 1062.1 | 0.00 | 0.3940 |
| 3.1629336 | 34.9542 | 6.2676 | 1043.6 | 4.5301 | 1048.1 | 0.00 | 0.3920 |
| 3.1787482 | 34.9681 | 6.2154 | 1029.7 | 4.5196 | 1034.2 | 0.00 | 0.3900 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Br ($Z=35$) | | | | | | | |
| 3.1946420 | 35.0325 | 6.1634 | 1016.0 | 4.5091 | 1020.5 | 0.00 | 0.3881 |
| 3.2106152 | 35.0453 | 6.1109 | 1002.4 | 4.4986 | 1006.9 | 0.00 | 0.3862 |
| 3.2266683 | 35.0576 | 6.0589 | 988.90 | 4.4880 | 993.39 | 0.00 | 0.3842 |
| 3.2428016 | 35.0692 | 6.0074 | 975.61 | 4.4773 | 980.09 | 0.00 | 0.3823 |
| 3.2590156 | 35.0803 | 5.9564 | 962.51 | 4.4666 | 966.98 | 0.00 | 0.3804 |
| 3.2753107 | 35.0908 | 5.9058 | 949.59 | 4.4559 | 954.04 | 0.00 | 0.3785 |
| 3.2916873 | 35.1008 | 5.8557 | 936.85 | 4.4452 | 941.29 | 0.00 | 0.3767 |
| 3.3081457 | 35.1104 | 5.8060 | 924.28 | 4.4344 | 928.72 | 0.00 | 0.3748 |
| 3.3246864 | 35.1195 | 5.7568 | 911.89 | 4.4235 | 916.31 | 0.00 | 0.3729 |
| 3.3413099 | 35.1282 | 5.7081 | 899.67 | 4.4126 | 904.09 | 0.00 | 0.3711 |
| 3.3580164 | 35.1365 | 5.6598 | 887.62 | 4.4017 | 892.02 | 0.00 | 0.3692 |
| 3.3748065 | 35.1443 | 5.6120 | 875.74 | 4.3908 | 880.13 | 0.00 | 0.3674 |
| 3.3916805 | 35.1518 | 5.5645 | 864.02 | 4.3798 | 868.40 | 0.00 | 0.3656 |
| 3.4086389 | 35.1590 | 5.5176 | 852.47 | 4.3688 | 856.83 | 0.00 | 0.3637 |
| 3.4256821 | 35.1658 | 5.4707 | 841.02 | 4.3577 | 845.37 | 0.00 | 0.3619 |
| 3.4428105 | 35.1722 | 5.4242 | 829.73 | 4.3466 | 834.07 | 0.00 | 0.3601 |
| 3.4600246 | 35.1783 | 5.3782 | 818.59 | 4.3355 | 822.93 | 0.00 | 0.3583 |
| 3.4773247 | 35.1841 | 5.3326 | 807.61 | 4.3244 | 811.94 | 0.00 | 0.3566 |
| 3.4947113 | 35.1896 | 5.2874 | 796.79 | 4.3132 | 801.10 | 0.00 | 0.3548 |
| 3.5121849 | 35.1948 | 5.2426 | 786.11 | 4.3019 | 790.41 | 0.00 | 0.3530 |
| 3.5297458 | 35.1998 | 5.1983 | 775.58 | 4.2907 | 779.87 | 0.00 | 0.3513 |
| 3.5473945 | 35.2045 | 5.1543 | 765.20 | 4.2794 | 769.48 | 0.00 | 0.3495 |
| 3.5651315 | 35.2095 | 5.1106 | 754.93 | 4.2681 | 759.20 | 0.00 | 0.3478 |
| 3.5829572 | 35.2539 | 5.0661 | 744.63 | 4.2567 | 748.88 | 0.00 | 0.3460 |
| 3.6008719 | 35.2579 | 5.0219 | 734.46 | 4.2454 | 738.71 | 0.00 | 0.3443 |
| 3.6188763 | 35.2616 | 4.9782 | 724.44 | 4.2339 | 728.68 | 0.00 | 0.3426 |
| 3.6369707 | 35.2649 | 4.9348 | 714.56 | 4.2225 | 718.79 | 0.00 | 0.3409 |
| 3.6551555 | 35.2678 | 4.8919 | 704.82 | 4.2110 | 709.03 | 0.00 | 0.3392 |
| 3.6734313 | 35.2705 | 4.8493 | 695.22 | 4.1995 | 699.41 | 0.00 | 0.3375 |
| 3.6917985 | 35.2728 | 4.8072 | 685.74 | 4.1880 | 689.93 | 0.00 | 0.3358 |
| 3.7102575 | 35.2749 | 4.7654 | 676.40 | 4.1765 | 680.58 | 0.00 | 0.3342 |
| 3.7288088 | 35.2767 | 4.7240 | 667.19 | 4.1649 | 671.36 | 0.00 | 0.3325 |
| 3.7474528 | 35.2782 | 4.6830 | 658.11 | 4.1533 | 662.27 | 0.00 | 0.3308 |
| 3.7661901 | 35.2794 | 4.6424 | 649.16 | 4.1417 | 653.30 | 0.00 | 0.3292 |
| 3.7850210 | 35.2804 | 4.6022 | 640.33 | 4.1300 | 644.46 | 0.00 | 0.3276 |
| 3.8039461 | 35.2812 | 4.5623 | 631.62 | 4.1183 | 635.74 | 0.00 | 0.3259 |
| 3.8229659 | 35.2817 | 4.5228 | 623.04 | 4.1066 | 627.14 | 0.00 | 0.3243 |
| 3.8420807 | 35.2820 | 4.4836 | 614.57 | 4.0949 | 618.67 | 0.00 | 0.3227 |
| 3.8612911 | 35.2821 | 4.4448 | 606.23 | 4.0831 | 610.31 | 0.00 | 0.3211 |
| 3.8805975 | 35.2819 | 4.4064 | 597.99 | 4.0713 | 602.07 | 0.00 | 0.3195 |
| 3.9000005 | 35.2816 | 4.3683 | 589.88 | 4.0595 | 593.94 | 0.00 | 0.3179 |
| 3.9195005 | 35.2810 | 4.3306 | 581.87 | 4.0477 | 585.92 | 0.00 | 0.3163 |
| 3.9390980 | 35.2803 | 4.2932 | 573.98 | 4.0359 | 578.02 | 0.00 | 0.3148 |
| 3.9587935 | 35.2794 | 4.2562 | 566.20 | 4.0240 | 570.22 | 0.00 | 0.3132 |
| 3.9785875 | 35.2783 | 4.2195 | 558.52 | 4.0121 | 562.54 | 0.00 | 0.3116 |
| 3.9984804 | 35.2770 | 4.1831 | 550.96 | 4.0002 | 554.96 | 0.00 | 0.3101 |
| 4.0184728 | 35.2755 | 4.1471 | 543.49 | 3.9883 | 547.48 | 0.00 | 0.3085 |
| 4.0385652 | 35.2739 | 4.1114 | 536.14 | 3.9763 | 540.11 | 0.00 | 0.3070 |
| 4.0587580 | 35.2722 | 4.0760 | 528.88 | 3.9643 | 532.84 | 0.00 | 0.3055 |
| 4.0790518 | 35.2702 | 4.0410 | 521.72 | 3.9523 | 525.68 | 0.00 | 0.3040 |
| 4.0994471 | 35.2681 | 4.0063 | 514.67 | 3.9403 | 518.61 | 0.00 | 0.3024 |
| 4.1199443 | 35.2659 | 3.9719 | 507.71 | 3.9283 | 511.64 | 0.00 | 0.3009 |
| 4.1405440 | 35.2635 | 3.9378 | 500.85 | 3.9163 | 504.76 | 0.00 | 0.2994 |
| 4.1612467 | 35.2610 | 3.9040 | 494.08 | 3.9042 | 497.98 | 0.00 | 0.2979 |
| 4.1820530 | 35.2584 | 3.8705 | 487.41 | 3.8921 | 491.30 | 0.00 | 0.2965 |
| 4.2029632 | 35.2556 | 3.8374 | 480.82 | 3.8800 | 484.70 | 0.00 | 0.2950 |
| 4.2239781 | 35.2527 | 3.8045 | 474.34 | 3.8679 | 478.20 | 0.00 | 0.2935 |
| 4.2450980 | 35.2497 | 3.7719 | 467.94 | 3.8558 | 471.79 | 0.00 | 0.2921 |
| 4.2663234 | 35.2466 | 3.7397 | 461.62 | 3.8437 | 465.47 | 0.00 | 0.2906 |
| 4.2876551 | 35.2433 | 3.7077 | 455.40 | 3.8315 | 459.23 | 0.00 | 0.2892 |
| 4.3090933 | 35.2399 | 3.6760 | 449.26 | 3.8193 | 453.08 | 0.00 | 0.2877 |
| 4.3306388 | 35.2364 | 3.6446 | 443.21 | 3.8071 | 447.02 | 0.00 | 0.2863 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Br ($Z=35$) | | | | | | | |
| 4.3522920 | 35.2329 | 3.6135 | 437.24 | 3.7949 | 441.04 | 0.00 | 0.2849 |
| 4.3740535 | 35.2292 | 3.5827 | 431.36 | 3.7827 | 435.14 | 0.00 | 0.2835 |
| 4.3959237 | 35.2254 | 3.5521 | 425.55 | 3.7705 | 429.32 | 0.00 | 0.2820 |
| 4.4179033 | 35.2215 | 3.5219 | 419.83 | 3.7583 | 423.58 | 0.00 | 0.2806 |
| 4.4399929 | 35.2175 | 3.4919 | 414.18 | 3.7460 | 417.93 | 0.00 | 0.2792 |
| 4.4621928 | 35.2134 | 3.4622 | 408.61 | 3.7338 | 412.35 | 0.00 | 0.2779 |
| 4.4845038 | 35.2093 | 3.4327 | 403.12 | 3.7215 | 406.84 | 0.00 | 0.2765 |
| 4.5069263 | 35.2050 | 3.4035 | 397.71 | 3.7092 | 401.41 | 0.00 | 0.2751 |
| 4.5294609 | 35.2007 | 3.3746 | 392.36 | 3.6969 | 396.06 | 0.00 | 0.2737 |
| 4.5521082 | 35.1963 | 3.3460 | 387.10 | 3.6846 | 390.78 | 0.00 | 0.2724 |
| 4.5748688 | 35.1918 | 3.3176 | 381.90 | 3.6723 | 385.58 | 0.00 | 0.2710 |
| 4.5977431 | 35.1872 | 3.2894 | 376.78 | 3.6600 | 380.44 | 0.00 | 0.2697 |
| 4.6207318 | 35.1826 | 3.2616 | 371.73 | 3.6477 | 375.38 | 0.00 | 0.2683 |
| 4.6438355 | 35.1779 | 3.2339 | 366.75 | 3.6354 | 370.38 | 0.00 | 0.2670 |
| 4.6670547 | 35.1731 | 3.2066 | 361.83 | 3.6230 | 365.45 | 0.00 | 0.2657 |
| 4.6903900 | 35.1682 | 3.1794 | 356.99 | 3.6107 | 360.60 | 0.00 | 0.2643 |
| 4.7138419 | 35.1633 | 3.1525 | 352.21 | 3.5983 | 355.80 | 0.00 | 0.2630 |
| 4.7374111 | 35.1583 | 3.1259 | 347.49 | 3.5860 | 351.08 | 0.00 | 0.2617 |
| 4.7610982 | 35.1533 | 3.0995 | 342.84 | 3.5736 | 346.42 | 0.00 | 0.2604 |
| 4.7849037 | 35.1482 | 3.0733 | 338.26 | 3.5612 | 341.82 | 0.00 | 0.2591 |
| 4.8088282 | 35.1430 | 3.0474 | 333.74 | 3.5489 | 337.28 | 0.00 | 0.2578 |
| 4.8328723 | 35.1378 | 3.0216 | 329.27 | 3.5365 | 332.80 | 0.00 | 0.2565 |
| 4.8570367 | 35.1325 | 2.9961 | 324.86 | 3.5241 | 328.38 | 0.00 | 0.2553 |
| 4.8813219 | 35.1272 | 2.9707 | 320.51 | 3.5117 | 324.02 | 0.00 | 0.2540 |
| 4.9057285 | 35.1218 | 2.9456 | 316.22 | 3.4993 | 319.72 | 0.00 | 0.2527 |
| 4.9302571 | 35.1164 | 2.9207 | 311.98 | 3.4869 | 315.47 | 0.00 | 0.2515 |
| 4.9549084 | 35.1109 | 2.8961 | 307.81 | 3.4745 | 311.29 | 0.00 | 0.2502 |
| 4.9796829 | 35.1053 | 2.8716 | 303.70 | 3.4621 | 307.16 | 0.00 | 0.2490 |
| 5.0045814 | 35.0997 | 2.8474 | 299.64 | 3.4497 | 303.09 | 0.00 | 0.2477 |
| 5.0296043 | 35.0941 | 2.8234 | 295.63 | 3.4373 | 299.07 | 0.00 | 0.2465 |
| 5.0547523 | 35.0884 | 2.7996 | 291.68 | 3.4249 | 295.11 | 0.00 | 0.2453 |
| 5.0800260 | 35.0826 | 2.7761 | 287.79 | 3.4125 | 291.20 | 0.00 | 0.2441 |
| 5.1054262 | 35.0769 | 2.7527 | 283.95 | 3.4001 | 287.35 | 0.00 | 0.2428 |
| 5.1309533 | 35.0711 | 2.7296 | 280.16 | 3.3877 | 283.55 | 0.00 | 0.2416 |
| 5.1566081 | 35.0652 | 2.7066 | 276.42 | 3.3753 | 279.80 | 0.00 | 0.2404 |
| 5.1823911 | 35.0593 | 2.6839 | 272.74 | 3.3629 | 276.10 | 0.00 | 0.2392 |
| 5.2083031 | 35.0534 | 2.6614 | 269.10 | 3.3505 | 272.45 | 0.00 | 0.2381 |
| 5.2343446 | 35.0474 | 2.6390 | 265.52 | 3.3381 | 268.86 | 0.00 | 0.2369 |
| 5.2605163 | 35.0414 | 2.6169 | 261.98 | 3.3257 | 265.31 | 0.00 | 0.2357 |
| 5.2868189 | 35.0353 | 2.5950 | 258.49 | 3.3133 | 261.81 | 0.00 | 0.2345 |
| 5.3132530 | 35.0293 | 2.5732 | 255.05 | 3.3009 | 258.35 | 0.00 | 0.2333 |
| 5.3398192 | 35.0232 | 2.5517 | 251.66 | 3.2885 | 254.95 | 0.00 | 0.2322 |
| 5.3665183 | 35.0170 | 2.5304 | 248.31 | 3.2761 | 251.59 | 0.00 | 0.2310 |
| 5.3933509 | 35.0109 | 2.5092 | 245.01 | 3.2638 | 248.28 | 0.00 | 0.2299 |
| 5.4203177 | 35.0047 | 2.4882 | 241.76 | 3.2514 | 245.01 | 0.00 | 0.2287 |
| 5.4474193 | 34.9984 | 2.4675 | 238.55 | 3.2390 | 241.78 | 0.00 | 0.2276 |
| 5.4746564 | 34.9922 | 2.4469 | 235.38 | 3.2266 | 238.60 | 0.00 | 0.2265 |
| 5.5020297 | 34.9859 | 2.4265 | 232.25 | 3.2143 | 235.47 | 0.00 | 0.2253 |
| 5.5295398 | 34.9796 | 2.4062 | 229.17 | 3.2019 | 232.37 | 0.00 | 0.2242 |
| 5.5571875 | 34.9733 | 2.3862 | 226.13 | 3.1896 | 229.32 | 0.00 | 0.2231 |
| 5.5849734 | 34.9669 | 2.3663 | 223.13 | 3.1772 | 226.31 | 0.00 | 0.2220 |
| 5.6128983 | 34.9606 | 2.3466 | 220.18 | 3.1649 | 223.34 | 0.00 | 0.2209 |
| 5.6409628 | 34.9542 | 2.3271 | 217.26 | 3.1525 | 220.41 | 0.00 | 0.2198 |
| 5.6691676 | 34.9478 | 2.3078 | 214.38 | 3.1402 | 217.52 | 0.00 | 0.2187 |
| 5.6975135 | 34.9413 | 2.2886 | 211.54 | 3.1279 | 214.67 | 0.00 | 0.2176 |
| 5.7260010 | 34.9349 | 2.2696 | 208.74 | 3.1156 | 211.86 | 0.00 | 0.2165 |
| 5.7546310 | 34.9284 | 2.2508 | 205.98 | 3.1033 | 209.08 | 0.00 | 0.2155 |
| 5.7834042 | 34.9219 | 2.2321 | 203.26 | 3.0910 | 206.35 | 0.00 | 0.2144 |
| 5.8123212 | 34.9154 | 2.2136 | 200.57 | 3.0787 | 203.65 | 0.00 | 0.2133 |
| 5.8413828 | 34.9089 | 2.1953 | 197.92 | 3.0664 | 200.99 | 0.00 | 0.2123 |
| 5.8705897 | 34.9024 | 2.1771 | 195.31 | 3.0542 | 198.36 | 0.00 | 0.2112 |
| 5.8999427 | 34.8958 | 2.1591 | 192.73 | 3.0419 | 195.77 | 0.00 | 0.2101 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Br ($Z=35$) | | | | | | | |
| 5.9294424 | 34.8892 | 2.1413 | 190.18 | 3.0296 | 193.21 | 0.00 | 0.2091 |
| 5.9590896 | 34.8827 | 2.1236 | 187.67 | 3.0174 | 190.69 | 0.00 | 0.2081 |
| 5.9888850 | 34.8761 | 2.1061 | 185.20 | 3.0052 | 188.20 | 0.00 | 0.2070 |
| 6.0188295 | 34.8695 | 2.0887 | 182.76 | 2.9930 | 185.75 | 0.00 | 0.2060 |
| 6.0489236 | 34.8629 | 2.0715 | 180.35 | 2.9808 | 183.33 | 0.00 | 0.2050 |
| 6.0791682 | 34.8562 | 2.0544 | 177.97 | 2.9686 | 180.94 | 0.00 | 0.2039 |
| 6.1095641 | 34.8496 | 2.0375 | 175.63 | 2.9564 | 178.58 | 0.00 | 0.2029 |
| 6.1401119 | 34.8430 | 2.0207 | 173.31 | 2.9442 | 176.26 | 0.00 | 0.2019 |
| 6.1708125 | 34.8363 | 2.0041 | 171.03 | 2.9321 | 173.97 | 0.00 | 0.2009 |
| 6.2016665 | 34.8297 | 1.9876 | 168.78 | 2.9199 | 171.70 | 0.00 | 0.1999 |
| 6.2326749 | 34.8230 | 1.9713 | 166.56 | 2.9078 | 169.47 | 0.00 | 0.1989 |
| 6.2638382 | 34.8163 | 1.9551 | 164.38 | 2.8957 | 167.27 | 0.00 | 0.1979 |
| 6.2951574 | 34.8096 | 1.9390 | 162.22 | 2.8836 | 165.10 | 0.00 | 0.1970 |
| 6.3266332 | 34.8029 | 1.9231 | 160.08 | 2.8715 | 162.96 | 0.00 | 0.1960 |
| 6.3582664 | 34.7963 | 1.9074 | 157.98 | 2.8594 | 160.84 | 0.00 | 0.1950 |
| 6.3900577 | 34.7896 | 1.8918 | 155.91 | 2.8474 | 158.76 | 0.00 | 0.1940 |
| 6.4220080 | 34.7829 | 1.8763 | 153.86 | 2.8353 | 156.70 | 0.00 | 0.1931 |
| 6.4541180 | 34.7762 | 1.8609 | 151.85 | 2.8233 | 154.67 | 0.00 | 0.1921 |
| 6.4863886 | 34.7695 | 1.8457 | 149.86 | 2.8113 | 152.67 | 0.00 | 0.1911 |
| 6.5188206 | 34.7628 | 1.8306 | 147.89 | 2.7993 | 150.69 | 0.00 | 0.1902 |
| 6.5514147 | 34.7561 | 1.8157 | 145.95 | 2.7873 | 148.74 | 0.00 | 0.1892 |
| 6.5841717 | 34.7494 | 1.8009 | 144.04 | 2.7753 | 146.82 | 0.00 | 0.1883 |
| Kr ($Z=36$) | | | | | | | |
| Atomic weight: $A_r = 83.80000 \text{ g/mol}^{-1}$, Nominal density $\rho \text{ (g/cm}^{-3}\text{)} = 0.003484$ | | | | | | | |
| $\sigma_a \text{ (barns/atom)} = [\mu/\rho] \text{ (cm}^2/\text{g}^{-1}\text{)} \times 139.153$ | | | | | | | |
| $E \text{ (eV)} [\mu/\rho] \text{ (cm}^2/\text{g}^{-1}\text{)} = f_2 \text{ (e/atom}^{-1}\text{)} \times 5.02152 \times 10^5$ | | | | | | | |
| 9 edges. Edge energies (keV): | | | | | | | |
| K | 14.3256 | LI | 1.92100 | LII | 1.72720 | LIII | 1.67490 |
| MI | 0.288330 | MII | 0.222700 | MIII | 0.213800 | MIV | 0.0889000 |
| M V | 0.0889000 | | | | | | |
| Relativistic correction estimate $f_{\text{rel}} \text{ (H82,3/5CL)} = (-0.23566, -0.14820) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction $f_{\text{NT}} = -0.0084840 e \text{ atom}^{-1}$ | | | | | | | |
| 0.90000000 | 28.8820 | 5.9226 | 3304.5 | 4.9601 | 3309.5 | 0.00 | 1.378 |
| 0.90450000 | 28.8793 | 5.8857 | 3267.6 | 4.9691 | 3272.6 | 0.00 | 1.371 |
| 0.90902250 | 28.8765 | 5.8490 | 3231.1 | 4.9780 | 3236.0 | 0.00 | 1.364 |
| 0.91356761 | 28.8735 | 5.8125 | 3194.9 | 4.9868 | 3199.9 | 0.00 | 1.357 |
| 0.91813545 | 28.8703 | 5.7762 | 3159.1 | 4.9955 | 3164.1 | 0.00 | 1.350 |
| 0.92272613 | 28.8669 | 5.7401 | 3123.8 | 5.0042 | 3128.8 | 0.00 | 1.344 |
| 0.92733976 | 28.8633 | 5.7041 | 3088.8 | 5.0128 | 3093.8 | 0.00 | 1.337 |
| 0.93197646 | 28.8596 | 5.6684 | 3054.1 | 5.0213 | 3059.2 | 0.00 | 1.330 |
| 0.93663634 | 28.8558 | 5.6328 | 3019.9 | 5.0297 | 3024.9 | 0.00 | 1.324 |
| 0.94131952 | 28.8519 | 5.5975 | 2986.0 | 5.0380 | 2991.1 | 0.00 | 1.317 |
| 0.94602612 | 28.8479 | 5.5624 | 2952.5 | 5.0463 | 2957.6 | 0.00 | 1.311 |
| 0.95075625 | 28.8438 | 5.5274 | 2919.4 | 5.0545 | 2924.4 | 0.00 | 1.304 |
| 0.95551003 | 28.8397 | 5.4927 | 2886.6 | 5.0627 | 2891.7 | 0.00 | 1.298 |
| 0.96028758 | 28.8357 | 5.4582 | 2854.2 | 5.0707 | 2859.2 | 0.00 | 1.291 |
| 0.96508902 | 28.8318 | 5.4238 | 2822.1 | 5.0787 | 2827.2 | 0.00 | 1.285 |
| 0.96991446 | 28.8280 | 5.3897 | 2790.4 | 5.0866 | 2795.5 | 0.00 | 1.278 |
| 0.97476404 | 28.8245 | 5.3558 | 2759.0 | 5.0944 | 2764.1 | 0.00 | 1.272 |
| 0.97963786 | 28.8214 | 5.3220 | 2728.0 | 5.1021 | 2733.1 | 0.00 | 1.266 |
| 0.98453605 | 28.8188 | 5.2885 | 2697.4 | 5.1098 | 2702.5 | 0.00 | 1.259 |
| 0.98945873 | 28.8169 | 5.2552 | 2667.0 | 5.1173 | 2672.2 | 0.00 | 1.253 |
| 0.99440602 | 28.8161 | 5.2221 | 2637.1 | 5.1248 | 2642.2 | 0.00 | 1.247 |
| 0.99937805 | 28.8167 | 5.1892 | 2607.4 | 5.1323 | 2612.5 | 0.00 | 1.241 |
| 1.0043749 | 28.8063 | 5.1494 | 2574.5 | 5.1396 | 2579.7 | 0.00 | 1.234 |
| 1.0093968 | 28.7937 | 5.1090 | 2541.6 | 5.1468 | 2546.8 | 0.00 | 1.228 |
| 1.0144438 | 28.7805 | 5.0689 | 2509.1 | 5.1540 | 2514.3 | 0.00 | 1.222 |
| 1.0195160 | 28.7668 | 5.0291 | 2477.0 | 5.1611 | 2482.2 | 0.00 | 1.216 |
| 1.0246136 | 28.7525 | 4.9897 | 2445.4 | 5.1681 | 2450.6 | 0.00 | 1.210 |
| 1.0297367 | 28.7376 | 4.9507 | 2414.2 | 5.1751 | 2419.4 | 0.00 | 1.204 |
| 1.0348853 | 28.7222 | 4.9119 | 2383.4 | 5.1819 | 2388.6 | 0.00 | 1.198 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Kr ($Z=36$) | | | | | | | |
| 1.0400598 | 28.7063 | 4.8736 | 2353.0 | 5.1887 | 2358.2 | 0.00 | 1.192 |
| 1.0452601 | 28.6898 | 4.8355 | 2323.0 | 5.1953 | 2328.2 | 0.00 | 1.186 |
| 1.0504864 | 28.6727 | 4.7978 | 2293.4 | 5.2019 | 2298.6 | 0.00 | 1.180 |
| 1.0557388 | 28.6551 | 4.7604 | 2264.2 | 5.2085 | 2269.4 | 0.00 | 1.174 |
| 1.0610175 | 28.6370 | 4.7233 | 2235.4 | 5.2149 | 2240.6 | 0.00 | 1.169 |
| 1.0663226 | 28.6183 | 4.6866 | 2207.0 | 5.2212 | 2212.2 | 0.00 | 1.163 |
| 1.0716542 | 28.5991 | 4.6502 | 2179.0 | 5.2275 | 2184.2 | 0.00 | 1.157 |
| 1.0770125 | 28.5793 | 4.6141 | 2151.3 | 5.2337 | 2156.5 | 0.00 | 1.151 |
| 1.0823975 | 28.5589 | 4.5783 | 2124.0 | 5.2398 | 2129.2 | 0.00 | 1.145 |
| 1.0878095 | 28.5381 | 4.5428 | 2097.0 | 5.2458 | 2102.3 | 0.00 | 1.140 |
| 1.0932486 | 28.5166 | 4.5076 | 2070.5 | 5.2517 | 2075.7 | 0.00 | 1.134 |
| 1.0987148 | 28.4946 | 4.4728 | 2044.2 | 5.2576 | 2049.5 | 0.00 | 1.128 |
| 1.1042084 | 28.4720 | 4.4382 | 2018.3 | 5.2633 | 2023.6 | 0.00 | 1.123 |
| 1.1097294 | 28.4488 | 4.4040 | 1992.8 | 5.2690 | 1998.1 | 0.00 | 1.117 |
| 1.1152781 | 28.4251 | 4.3700 | 1967.6 | 5.2746 | 1972.9 | 0.00 | 1.112 |
| 1.1208545 | 28.4007 | 4.3363 | 1942.7 | 5.2801 | 1948.0 | 0.00 | 1.106 |
| 1.1264587 | 28.3758 | 4.3029 | 1918.2 | 5.2855 | 1923.4 | 0.00 | 1.101 |
| 1.1320910 | 28.3503 | 4.2699 | 1893.9 | 5.2908 | 1899.2 | 0.00 | 1.095 |
| 1.1377515 | 28.3242 | 4.2371 | 1870.0 | 5.2960 | 1875.3 | 0.00 | 1.090 |
| 1.1434402 | 28.2974 | 4.2045 | 1846.5 | 5.3012 | 1851.8 | 0.00 | 1.084 |
| 1.1491574 | 28.2701 | 4.1723 | 1823.2 | 5.3063 | 1828.5 | 0.00 | 1.079 |
| 1.1549032 | 28.2420 | 4.1402 | 1800.2 | 5.3112 | 1805.5 | 0.00 | 1.074 |
| 1.1606777 | 28.2134 | 4.1081 | 1777.3 | 5.3161 | 1782.6 | 0.00 | 1.068 |
| 1.1664811 | 28.1840 | 4.0762 | 1754.7 | 5.3209 | 1760.0 | 0.00 | 1.063 |
| 1.1723135 | 28.1539 | 4.0446 | 1732.5 | 5.3256 | 1737.8 | 0.00 | 1.058 |
| 1.1781751 | 28.1231 | 4.0132 | 1710.5 | 5.3303 | 1715.8 | 0.00 | 1.052 |
| 1.1840660 | 28.0915 | 3.9822 | 1688.8 | 5.3348 | 1694.1 | 0.00 | 1.047 |
| 1.1899863 | 28.0592 | 3.9514 | 1667.4 | 5.3392 | 1672.7 | 0.00 | 1.042 |
| 1.1959362 | 28.0261 | 3.9208 | 1646.3 | 5.3436 | 1651.6 | 0.00 | 1.037 |
| 1.2019159 | 27.9923 | 3.8906 | 1625.5 | 5.3479 | 1630.8 | 0.00 | 1.032 |
| 1.2079255 | 27.9576 | 3.8606 | 1604.9 | 5.3521 | 1610.3 | 0.00 | 1.026 |
| 1.2139651 | 27.9222 | 3.8308 | 1584.6 | 5.3562 | 1590.0 | 0.00 | 1.021 |
| 1.2200350 | 27.8858 | 3.8014 | 1564.6 | 5.3602 | 1570.0 | 0.00 | 1.016 |
| 1.2261351 | 27.8487 | 3.7721 | 1544.8 | 5.3641 | 1550.2 | 0.00 | 1.011 |
| 1.2322658 | 27.8106 | 3.7431 | 1525.3 | 5.3679 | 1530.7 | 0.00 | 1.006 |
| 1.2384271 | 27.7716 | 3.7144 | 1506.1 | 5.3716 | 1511.5 | 0.00 | 1.001 |
| 1.2446193 | 27.7317 | 3.6859 | 1487.1 | 5.3753 | 1492.5 | 0.00 | 0.9962 |
| 1.2508424 | 27.6908 | 3.6577 | 1468.4 | 5.3788 | 1473.8 | 0.00 | 0.9912 |
| 1.2570966 | 27.6489 | 3.6297 | 1449.9 | 5.3823 | 1455.3 | 0.00 | 0.9863 |
| 1.2633821 | 27.6060 | 3.6020 | 1431.7 | 5.3857 | 1437.0 | 0.00 | 0.9814 |
| 1.2696990 | 27.5620 | 3.5744 | 1413.6 | 5.3890 | 1419.0 | 0.00 | 0.9765 |
| 1.2760475 | 27.5170 | 3.5472 | 1395.9 | 5.3922 | 1401.3 | 0.00 | 0.9716 |
| 1.2824277 | 27.4707 | 3.5201 | 1378.3 | 5.3953 | 1383.7 | 0.00 | 0.9668 |
| 1.2888399 | 27.4234 | 3.4933 | 1361.0 | 5.3983 | 1366.4 | 0.00 | 0.9620 |
| 1.2952840 | 27.3748 | 3.4667 | 1344.0 | 5.4012 | 1349.4 | 0.00 | 0.9572 |
| 1.3017605 | 27.3249 | 3.4403 | 1327.1 | 5.4041 | 1332.5 | 0.00 | 0.9524 |
| 1.3082693 | 27.2737 | 3.4142 | 1310.5 | 5.4068 | 1315.9 | 0.00 | 0.9477 |
| 1.3148106 | 27.2211 | 3.3883 | 1294.1 | 5.4095 | 1299.5 | 0.00 | 0.9430 |
| 1.3213847 | 27.1672 | 3.3626 | 1277.9 | 5.4120 | 1283.3 | 0.00 | 0.9383 |
| 1.3279916 | 27.1117 | 3.3371 | 1261.9 | 5.4145 | 1267.3 | 0.00 | 0.9336 |
| 1.3346316 | 27.0547 | 3.3119 | 1246.1 | 5.4169 | 1251.5 | 0.00 | 0.9290 |
| 1.3413047 | 26.9961 | 3.2868 | 1230.5 | 5.4192 | 1235.9 | 0.00 | 0.9244 |
| 1.3480112 | 26.9358 | 3.2620 | 1215.1 | 5.4214 | 1220.6 | 0.00 | 0.9198 |
| 1.3547513 | 26.8737 | 3.2374 | 1200.0 | 5.4235 | 1205.4 | 0.00 | 0.9152 |
| 1.3615250 | 26.8098 | 3.2130 | 1185.0 | 5.4255 | 1190.4 | 0.00 | 0.9106 |
| 1.3683327 | 26.7439 | 3.1888 | 1170.2 | 5.4275 | 1175.7 | 0.00 | 0.9061 |
| 1.3751743 | 26.6760 | 3.1648 | 1155.6 | 5.4293 | 1161.1 | 0.00 | 0.9016 |
| 1.3820502 | 26.6060 | 3.1410 | 1141.2 | 5.4310 | 1146.7 | 0.00 | 0.8971 |
| 1.3889605 | 26.5337 | 3.1174 | 1127.0 | 5.4327 | 1132.5 | 0.00 | 0.8926 |
| 1.3959053 | 26.4591 | 3.0940 | 1113.0 | 5.4343 | 1118.4 | 0.00 | 0.8882 |
| 1.4028848 | 26.3819 | 3.0708 | 1099.2 | 5.4357 | 1104.6 | 0.00 | 0.8838 |
| 1.4098992 | 26.3021 | 3.0478 | 1085.5 | 5.4371 | 1091.0 | 0.00 | 0.8794 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Kr ($Z=36$) | | | | | | | |
| 1.4169487 | 26.2195 | 3.0250 | 1072.0 | 5.4384 | 1077.5 | 0.00 | 0.8750 |
| 1.4240335 | 26.1339 | 3.0024 | 1058.7 | 5.4396 | 1064.2 | 0.00 | 0.8707 |
| 1.4311536 | 26.0451 | 2.9800 | 1045.6 | 5.4407 | 1051.0 | 0.00 | 0.8663 |
| 1.4383094 | 25.9530 | 2.9577 | 1032.6 | 5.4418 | 1038.1 | 0.00 | 0.8620 |
| 1.4455009 | 25.8573 | 2.9357 | 1019.8 | 5.4427 | 1025.3 | 0.00 | 0.8577 |
| 1.4527284 | 25.7577 | 2.9138 | 1007.2 | 5.4435 | 1012.6 | 0.00 | 0.8535 |
| 1.4599921 | 25.6540 | 2.8921 | 994.72 | 5.4443 | 1000.2 | 0.00 | 0.8492 |
| 1.4672920 | 25.5459 | 2.8706 | 982.42 | 5.4449 | 987.86 | 0.00 | 0.8450 |
| 1.4746285 | 25.4330 | 2.8493 | 970.27 | 5.4455 | 975.71 | 0.00 | 0.8408 |
| 1.4820016 | 25.3150 | 2.8282 | 958.28 | 5.4460 | 963.72 | 0.00 | 0.8366 |
| 1.4894117 | 25.1914 | 2.8072 | 946.44 | 5.4464 | 951.89 | 0.00 | 0.8324 |
| 1.4968587 | 25.0618 | 2.7864 | 934.76 | 5.4467 | 940.20 | 0.00 | 0.8283 |
| 1.5043430 | 24.9256 | 2.7658 | 923.23 | 5.4469 | 928.67 | 0.00 | 0.8242 |
| 1.5118647 | 24.7821 | 2.7453 | 911.84 | 5.4470 | 917.29 | 0.00 | 0.8201 |
| 1.5194240 | 24.6308 | 2.7251 | 900.60 | 5.4470 | 906.05 | 0.00 | 0.8160 |
| 1.5270212 | 24.4707 | 2.7050 | 889.51 | 5.4469 | 894.96 | 0.00 | 0.8119 |
| 1.5346563 | 24.3009 | 2.6850 | 878.56 | 5.4468 | 884.01 | 0.00 | 0.8079 |
| 1.5423295 | 24.1203 | 2.6652 | 867.75 | 5.4465 | 873.20 | 0.00 | 0.8039 |
| 1.5500412 | 23.9276 | 2.6456 | 857.08 | 5.4462 | 862.53 | 0.00 | 0.7999 |
| 1.5577914 | 23.7211 | 2.6262 | 846.55 | 5.4458 | 851.99 | 0.00 | 0.7959 |
| 1.5655804 | 23.4991 | 2.6069 | 836.15 | 5.4452 | 841.59 | 0.00 | 0.7919 |
| 1.5734083 | 23.2591 | 2.5878 | 825.88 | 5.4446 | 831.33 | 0.00 | 0.7880 |
| 1.5812753 | 22.9983 | 2.5688 | 815.75 | 5.4439 | 821.20 | 0.00 | 0.7841 |
| 1.5891817 | 22.7131 | 2.5500 | 805.75 | 5.4431 | 811.19 | 0.00 | 0.7802 |
| 1.5971276 | 22.3986 | 2.5313 | 795.87 | 5.4423 | 801.32 | 0.00 | 0.7763 |
| 1.6051132 | 22.0489 | 2.5128 | 786.12 | 5.4413 | 791.57 | 0.00 | 0.7724 |
| 1.6131388 | 21.6552 | 2.4945 | 776.50 | 5.4402 | 781.94 | 0.00 | 0.7686 |
| 1.6212045 | 21.2058 | 2.4763 | 767.00 | 5.4391 | 772.44 | 0.00 | 0.7648 |
| 1.6293105 | 20.6827 | 2.4582 | 757.62 | 5.4379 | 763.06 | 0.00 | 0.7610 |
| 1.6374571 | 20.0577 | 2.4403 | 748.36 | 5.4365 | 753.80 | 0.00 | 0.7572 |
| 1.6456443 | 19.2819 | 2.4226 | 739.22 | 5.4351 | 744.65 | 0.00 | 0.7534 |
| 1.6538726 | 18.2574 | 2.4049 | 730.19 | 5.4336 | 735.63 | 0.00 | 0.7497 |
| 1.6621419 | 16.7363 | 2.3875 | 721.28 | 5.4320 | 726.72 | 0.00 | 0.7459 |
| 1.6704526 | 13.6146 | 2.3700 | 712.44 | 5.4304 | 717.88 | 0.00 | 0.7422 |
| 1.6747007 | 4.64497 | 2.3607 | 707.83 | 5.4295 | 713.26 | 0.00 | 0.7403 |
| 1.6750994 | 4.49118 | 11.391 | 3414.7 | 5.4294 | 3420.1 | 0.00 | 0.7402 |
| 1.6788049 | 13.0021 | 11.350 | 3395.0 | 5.4286 | 3400.4 | 0.00 | 0.7385 |
| 1.6871989 | 16.1340 | 11.259 | 3351.0 | 5.4268 | 3356.4 | 0.00 | 0.7349 |
| 1.6956349 | 17.3862 | 11.169 | 3307.5 | 5.4248 | 3313.0 | 0.00 | 0.7312 |
| 1.7041131 | 18.0060 | 11.079 | 3264.7 | 5.4228 | 3270.1 | 0.00 | 0.7276 |
| 1.7126337 | 18.1618 | 10.990 | 3222.4 | 5.4207 | 3227.8 | 0.00 | 0.7239 |
| 1.7211968 | 17.5651 | 10.902 | 3180.6 | 5.4185 | 3186.0 | 0.00 | 0.7203 |
| 1.7269841 | 13.2390 | 10.843 | 3152.8 | 5.4169 | 3158.2 | 0.00 | 0.7179 |
| 1.7274159 | 13.1930 | 15.298 | 4447./1 | 5.4168 | 4452.5 | 0.00 | 0.7177 |
| 1.7298028 | 16.8801 | 15.264 | 4431.2 | 5.4162 | 4436.6 | 0.00 | 0.7168 |
| 1.7384518 | 19.4458 | 15.143 | 4373.9 | 5.4138 | 4379.3 | 0.00 | 0.7132 |
| 1.7471441 | 20.6785 | 15.022 | 4317.4 | 5.4113 | 4322.8 | 0.00 | 0.7096 |
| 1.7558798 | 21.5639 | 14.902 | 4261.7 | 5.4088 | 4267.1 | 0.00 | 0.7061 |
| 1.7646592 | 22.2720 | 14.783 | 4206.7 | 5.4061 | 4212.1 | 0.00 | 0.7026 |
| 1.7734825 | 22.8675 | 14.665 | 4152.4 | 5.4034 | 4157.8 | 0.00 | 0.6991 |
| 1.7823499 | 23.3827 | 14.548 | 4098.8 | 5.4006 | 4104.2 | 0.00 | 0.6956 |
| 1.7912617 | 23.8363 | 14.432 | 4045.9 | 5.3977 | 4051.3 | 0.00 | 0.6922 |
| 1.8002180 | 24.2405 | 14.317 | 3993.7 | 5.3947 | 3999.0 | 0.00 | 0.6887 |
| 1.8092191 | 24.6033 | 14.203 | 3942.1 | 5.3917 | 3947.5 | 0.00 | 0.6853 |
| 1.8182652 | 24.9304 | 14.090 | 3891.3 | 5.3885 | 3896.7 | 0.00 | 0.6819 |
| 1.8273565 | 25.2257 | 13.978 | 3841.1 | 5.3853 | 3846.5 | 0.00 | 0.6785 |
| 1.8364933 | 25.4918 | 13.867 | 3791.5 | 5.3820 | 3796.9 | 0.00 | 0.6751 |
| 1.8456757 | 25.7302 | 13.756 | 3742.6 | 5.3786 | 3748.0 | 0.00 | 0.6718 |
| 1.8549041 | 25.9413 | 13.647 | 3694.4 | 5.3751 | 3699.7 | 0.00 | 0.6684 |
| 1.8641786 | 26.1241 | 13.538 | 3646.7 | 5.3715 | 3652.1 | 0.00 | 0.6651 |
| 1.8734995 | 26.2757 | 13.430 | 3599.7 | 5.3679 | 3605.1 | 0.00 | 0.6618 |
| 1.8828670 | 26.3900 | 13.324 | 3553.3 | 5.3641 | 3558.7 | 0.00 | 0.6585 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Kr ($Z=36$) | | | | | | | |
| 1.8922814 | 26.4538 | 13.218 | 3507.5 | 5.3603 | 3512.9 | 0.00 | 0.6552 |
| 1.9017428 | 26.4363 | 13.112 | 3462.3 | 5.3564 | 3467.7 | 0.00 | 0.6520 |
| 1.9112515 | 26.2375 | 13.008 | 3417.7 | 5.3524 | 3423.1 | 0.00 | 0.6487 |
| 1.9194747 | 25.2812 | 12.919 | 3379.8 | 5.3489 | 3385.1 | 0.00 | 0.6459 |
| 1.9208077 | 24.0373 | 12.905 | 3373.7 | 5.3483 | 3379.0 | 0.00 | 0.6455 |
| 1.9225253 | 25.3179 | 14.817 | 3870.2 | 5.3476 | 3875.5 | 0.00 | 0.6449 |
| 1.9304118 | 26.6053 | 14.725 | 3830.3 | 5.3442 | 3835.7 | 0.00 | 0.6423 |
| 1.9400638 | 27.2335 | 14.613 | 3782.4 | 5.3399 | 3787.7 | 0.00 | 0.6391 |
| 1.9497642 | 27.6713 | 14.502 | 3735.0 | 5.3356 | 3740.3 | 0.00 | 0.6359 |
| 1.9595130 | 28.0275 | 14.392 | 3688.2 | 5.3312 | 3693.6 | 0.00 | 0.6327 |
| 1.9693105 | 28.3362 | 14.283 | 3642.1 | 5.3268 | 3647.4 | 0.00 | 0.6296 |
| 1.9791571 | 28.6126 | 14.175 | 3596.5 | 5.3222 | 3601.8 | 0.00 | 0.6264 |
| 1.9890529 | 28.8651 | 14.068 | 3551.5 | 5.3176 | 3556.8 | 0.00 | 0.6233 |
| 1.9989981 | 29.0986 | 13.961 | 3507.0 | 5.3128 | 3512.3 | 0.00 | 0.6202 |
| 2.0089931 | 29.3165 | 13.855 | 3463.2 | 5.3080 | 3468.5 | 0.00 | 0.6171 |
| 2.0190381 | 29.5207 | 13.751 | 3420.1 | 5.3032 | 3425.4 | 0.00 | 0.6141 |
| 2.0291333 | 29.7142 | 13.650 | 3377.9 | 5.2982 | 3383.2 | 0.00 | 0.6110 |
| 2.0392790 | 29.8985 | 13.549 | 3336.3 | 5.2932 | 3341.6 | 0.00 | 0.6080 |
| 2.0494754 | 30.0744 | 13.449 | 3295.3 | 5.2880 | 3300.6 | 0.00 | 0.6050 |
| 2.0597227 | 30.2428 | 13.351 | 3254.8 | 5.2829 | 3260.1 | 0.00 | 0.6019 |
| 2.0700213 | 30.4043 | 13.253 | 3214.9 | 5.2776 | 3220.2 | 0.00 | 0.5990 |
| 2.0803714 | 30.5596 | 13.156 | 3175.5 | 5.2722 | 3180.8 | 0.00 | 0.5960 |
| 2.0907733 | 30.7091 | 13.060 | 3136.7 | 5.2668 | 3141.9 | 0.00 | 0.5930 |
| 2.1012272 | 30.8532 | 12.965 | 3098.3 | 5.2613 | 3103.6 | 0.00 | 0.5901 |
| 2.1117333 | 30.9923 | 12.870 | 3060.5 | 5.2557 | 3065.7 | 0.00 | 0.5871 |
| 2.1222920 | 31.1269 | 12.777 | 3023.1 | 5.2501 | 3028.4 | 0.00 | 0.5842 |
| 2.1329034 | 31.2571 | 12.684 | 2986.3 | 5.2443 | 2991.5 | 0.00 | 0.5813 |
| 2.1435680 | 31.3834 | 12.592 | 2949.9 | 5.2385 | 2955.1 | 0.00 | 0.5784 |
| 2.1542858 | 31.5059 | 12.501 | 2914.0 | 5.2326 | 2919.2 | 0.00 | 0.5755 |
| 2.1650572 | 31.6249 | 12.411 | 2878.6 | 5.2267 | 2883.8 | 0.00 | 0.5727 |
| 2.1758825 | 31.7407 | 12.322 | 2843.6 | 5.2206 | 2848.8 | 0.00 | 0.5698 |
| 2.1867619 | 31.8532 | 12.231 | 2808.7 | 5.2145 | 2813.9 | 0.00 | 0.5670 |
| 2.1976957 | 31.9623 | 12.142 | 2774.2 | 5.2083 | 2779.4 | 0.00 | 0.5642 |
| 2.2086842 | 32.0683 | 12.053 | 2740.2 | 5.2021 | 2745.4 | 0.00 | 0.5613 |
| 2.2197276 | 32.1713 | 11.964 | 2706.6 | 5.1957 | 2711.8 | 0.00 | 0.5586 |
| 2.2308263 | 32.2715 | 11.877 | 2673.4 | 5.1893 | 2678.6 | 0.00 | 0.5558 |
| 2.2419804 | 32.3690 | 11.790 | 2640.7 | 5.1829 | 2645.8 | 0.00 | 0.5530 |
| 2.2531903 | 32.4640 | 11.703 | 2608.2 | 5.1763 | 2613.3 | 0.00 | 0.5503 |
| 2.2644562 | 32.5564 | 11.617 | 2576.0 | 5.1697 | 2581.2 | 0.00 | 0.5475 |
| 2.2757785 | 32.6462 | 11.531 | 2544.3 | 5.1630 | 2549.5 | 0.00 | 0.5448 |
| 2.2871574 | 32.7336 | 11.446 | 2512.9 | 5.1562 | 2518.1 | 0.00 | 0.5421 |
| 2.2985932 | 32.8188 | 11.361 | 2482.0 | 5.1494 | 2487.1 | 0.00 | 0.5394 |
| 2.3100862 | 32.9017 | 11.277 | 2451.4 | 5.1425 | 2456.6 | 0.00 | 0.5367 |
| 2.3216366 | 32.9825 | 11.194 | 2421.2 | 5.1355 | 2426.4 | 0.00 | 0.5340 |
| 2.3332448 | 33.0613 | 11.112 | 2391.4 | 5.1285 | 2396.6 | 0.00 | 0.5314 |
| 2.3449110 | 33.1382 | 11.030 | 2362.0 | 5.1214 | 2367.1 | 0.00 | 0.5287 |
| 2.3566356 | 33.2132 | 10.948 | 2332.9 | 5.1142 | 2338.0 | 0.00 | 0.5261 |
| 2.3684187 | 33.2864 | 10.868 | 2304.2 | 5.1069 | 2309.3 | 0.00 | 0.5235 |
| 2.3802608 | 33.3578 | 10.788 | 2275.8 | 5.0996 | 2280.9 | 0.00 | 0.5209 |
| 2.3921621 | 33.4275 | 10.708 | 2247.8 | 5.0922 | 2252.9 | 0.00 | 0.5183 |
| 2.4041230 | 33.4957 | 10.629 | 2220.1 | 5.0848 | 2225.2 | 0.00 | 0.5157 |
| 2.4161436 | 33.5622 | 10.551 | 2192.8 | 5.0773 | 2197.9 | 0.00 | 0.5131 |
| 2.4282243 | 33.6273 | 10.473 | 2165.8 | 5.0697 | 2170.9 | 0.00 | 0.5106 |
| 2.4403654 | 33.6909 | 10.396 | 2139.1 | 5.0620 | 2144.2 | 0.00 | 0.5081 |
| 2.4525672 | 33.7531 | 10.319 | 2112.8 | 5.0543 | 2117.9 | 0.00 | 0.5055 |
| 2.4648301 | 33.8140 | 10.243 | 2086.8 | 5.0465 | 2091.8 | 0.00 | 0.5030 |
| 2.4771542 | 33.8736 | 10.168 | 2061.1 | 5.0387 | 2066.1 | 0.00 | 0.5005 |
| 2.4895400 | 33.9320 | 10.093 | 2035.7 | 5.0307 | 2040.7 | 0.00 | 0.4980 |
| 2.5019877 | 33.9892 | 10.018 | 2010.6 | 5.0228 | 2015.6 | 0.00 | 0.4955 |
| 2.5144976 | 34.0449 | 9.9428 | 1985.6 | 5.0147 | 1990.6 | 0.00 | 0.4931 |
| 2.5270701 | 34.0993 | 9.8684 | 1960.9 | 5.0066 | 1965.9 | 0.00 | 0.4906 |
| 2.5397055 | 34.1524 | 9.7945 | 1936.6 | 4.9984 | 1941.6 | 0.00 | 0.4882 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Kr ($Z=36$) | | | | | | | |
| 2.5524040 | 34.2042 | 9.7211 | 1912.5 | 4.9902 | 1917.5 | 0.00 | 0.4858 |
| 2.5651660 | 34.2548 | 9.6483 | 1888.7 | 4.9819 | 1893.7 | 0.00 | 0.4833 |
| 2.5779919 | 34.3042 | 9.5760 | 1865.3 | 4.9736 | 1870.2 | 0.00 | 0.4809 |
| 2.5908818 | 34.3525 | 9.5043 | 1842.1 | 4.9651 | 1847.0 | 0.00 | 0.4785 |
| 2.6038362 | 34.3997 | 9.4331 | 1819.2 | 4.9567 | 1824.1 | 0.00 | 0.4762 |
| 2.6168554 | 34.4457 | 9.3624 | 1796.6 | 4.9481 | 1801.5 | 0.00 | 0.4738 |
| 2.6299397 | 34.4908 | 9.2922 | 1774.2 | 4.9395 | 1779.2 | 0.00 | 0.4714 |
| 2.6430894 | 34.5348 | 9.2225 | 1752.2 | 4.9309 | 1757.1 | 0.00 | 0.4691 |
| 2.6563048 | 34.5779 | 9.1534 | 1730.4 | 4.9222 | 1735.3 | 0.00 | 0.4668 |
| 2.6695863 | 34.6200 | 9.0847 | 1708.8 | 4.9134 | 1713.8 | 0.00 | 0.4644 |
| 2.6829343 | 34.6611 | 9.0166 | 1687.6 | 4.9046 | 1692.5 | 0.00 | 0.4621 |
| 2.6963489 | 34.7014 | 8.9490 | 1666.6 | 4.8957 | 1671.5 | 0.00 | 0.4598 |
| 2.7098307 | 34.7408 | 8.8819 | 1645.9 | 4.8867 | 1650.8 | 0.00 | 0.4575 |
| 2.7233798 | 34.7793 | 8.8152 | 1625.4 | 4.8777 | 1630.3 | 0.00 | 0.4553 |
| 2.7369967 | 34.8170 | 8.7491 | 1605.2 | 4.8687 | 1610.1 | 0.00 | 0.4530 |
| 2.7506817 | 34.8539 | 8.6835 | 1585.2 | 4.8595 | 1590.1 | 0.00 | 0.4507 |
| 2.7644351 | 34.8900 | 8.6184 | 1565.5 | 4.8504 | 1570.4 | 0.00 | 0.4485 |
| 2.7782573 | 34.9253 | 8.5538 | 1546.0 | 4.8411 | 1550.9 | 0.00 | 0.4463 |
| 2.7921486 | 34.9600 | 8.4897 | 1526.8 | 4.8319 | 1531.6 | 0.00 | 0.4440 |
| 2.8061093 | 34.9939 | 8.4260 | 1507.8 | 4.8225 | 1512.7 | 0.00 | 0.4418 |
| 2.8201399 | 35.0271 | 8.3629 | 1489.1 | 4.8131 | 1493.9 | 0.00 | 0.4396 |
| 2.8342406 | 35.0597 | 8.3002 | 1470.6 | 4.8037 | 1475.4 | 0.00 | 0.4375 |
| 2.8484118 | 35.0917 | 8.2380 | 1452.3 | 4.7942 | 1457.1 | 0.00 | 0.4353 |
| 2.8626539 | 35.1230 | 8.1763 | 1434.2 | 4.7846 | 1439.0 | 0.00 | 0.4331 |
| 2.8769671 | 35.1538 | 8.1151 | 1416.4 | 4.7750 | 1421.2 | 0.00 | 0.4310 |
| 2.8913520 | 35.1841 | 8.0544 | 1398.8 | 4.7654 | 1403.6 | 0.00 | 0.4288 |
| 2.9058087 | 35.2139 | 7.9941 | 1381.5 | 4.7557 | 1386.2 | 0.00 | 0.4267 |
| 2.9203378 | 35.2433 | 7.9343 | 1364.3 | 4.7459 | 1369.0 | 0.00 | 0.4246 |
| 2.9349394 | 35.2723 | 7.8749 | 1347.4 | 4.7361 | 1352.1 | 0.00 | 0.4224 |
| 2.9496141 | 35.3012 | 7.8161 | 1330.6 | 4.7263 | 1335.4 | 0.00 | 0.4203 |
| 2.9643622 | 35.3301 | 7.7577 | 1314.1 | 4.7164 | 1318.8 | 0.00 | 0.4182 |
| 2.9791840 | 35.3594 | 7.6997 | 1297.8 | 4.7064 | 1302.5 | 0.00 | 0.4162 |
| 2.9940799 | 35.3902 | 7.6422 | 1281.7 | 4.6964 | 1286.4 | 0.00 | 0.4141 |
| 3.0090503 | 35.4225 | 7.5826 | 1265.4 | 4.6864 | 1270.1 | 0.00 | 0.4120 |
| 3.0240956 | 35.4522 | 7.5217 | 1249.0 | 4.6763 | 1253.7 | 0.00 | 0.4100 |
| 3.0392161 | 35.4800 | 7.4613 | 1232.8 | 4.6661 | 1237.5 | 0.00 | 0.4079 |
| 3.0544122 | 35.5064 | 7.4014 | 1216.8 | 4.6559 | 1221.5 | 0.00 | 0.4059 |
| 3.0696842 | 35.5316 | 7.3420 | 1201.0 | 4.6457 | 1205.7 | 0.00 | 0.4039 |
| 3.0850326 | 35.5558 | 7.2831 | 1185.5 | 4.6354 | 1190.1 | 0.00 | 0.4019 |
| 3.1004578 | 35.5790 | 7.2247 | 1170.1 | 4.6251 | 1174.7 | 0.00 | 0.3999 |
| 3.1159601 | 35.6013 | 7.1667 | 1154.9 | 4.6147 | 1159.6 | 0.00 | 0.3979 |
| 3.1315399 | 35.6229 | 7.1092 | 1140.0 | 4.6043 | 1144.6 | 0.00 | 0.3959 |
| 3.1471976 | 35.6438 | 7.0522 | 1125.2 | 4.5939 | 1129.8 | 0.00 | 0.3940 |
| 3.1629336 | 35.6640 | 6.9957 | 1110.6 | 4.5834 | 1115.2 | 0.00 | 0.3920 |
| 3.1787482 | 35.6836 | 6.9396 | 1096.3 | 4.5728 | 1100.8 | 0.00 | 0.3900 |
| 3.1946420 | 35.7026 | 6.8840 | 1082.1 | 4.5622 | 1086.6 | 0.00 | 0.3881 |
| 3.2106152 | 35.7211 | 6.8289 | 1068.1 | 4.5516 | 1072.6 | 0.00 | 0.3862 |
| 3.2266683 | 35.7390 | 6.7742 | 1054.2 | 4.5409 | 1058.8 | 0.00 | 0.3842 |
| 3.2428016 | 35.7565 | 6.7200 | 1040.6 | 4.5302 | 1045.1 | 0.00 | 0.3823 |
| 3.2590156 | 35.7734 | 6.6662 | 1027.1 | 4.5195 | 1031.7 | 0.00 | 0.3804 |
| 3.2753107 | 35.7899 | 6.6129 | 1013.9 | 4.5087 | 1018.4 | 0.00 | 0.3785 |
| 3.2916873 | 35.8060 | 6.5600 | 1000.7 | 4.4979 | 1005.2 | 0.00 | 0.3767 |
| 3.3081457 | 35.8217 | 6.5076 | 987.81 | 4.4870 | 992.29 | 0.00 | 0.3748 |
| 3.3246864 | 35.8370 | 6.4556 | 975.04 | 4.4761 | 979.52 | 0.00 | 0.3729 |
| 3.3413099 | 35.8519 | 6.4041 | 962.44 | 4.4651 | 966.91 | 0.00 | 0.3711 |
| 3.3580164 | 35.9671 | 6.3518 | 949.84 | 4.4542 | 954.29 | 0.00 | 0.3692 |
| 3.3748065 | 35.9811 | 6.2987 | 937.21 | 4.4431 | 941.66 | 0.00 | 0.3674 |
| 3.3916805 | 35.9946 | 6.2461 | 924.76 | 4.4321 | 929.20 | 0.00 | 0.3656 |
| 3.4086389 | 36.0076 | 6.1940 | 912.49 | 4.4210 | 916.91 | 0.00 | 0.3637 |
| 3.4256821 | 36.0200 | 6.1424 | 900.38 | 4.4099 | 904.79 | 0.00 | 0.3619 |
| 3.4428105 | 36.0319 | 6.0912 | 888.43 | 4.3987 | 892.83 | 0.00 | 0.3601 |
| 3.4600246 | 36.0940 | 6.0401 | 876.59 | 4.3875 | 880.98 | 0.00 | 0.3583 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Kr ($Z=36$) | | | | | | | |
| 3.4773247 | 36.1050 | 5.9885 | 864.79 | 4.3763 | 869.17 | 0.00 | 0.3566 |
| 3.4947113 | 36.1154 | 5.9375 | 853.15 | 4.3650 | 857.52 | 0.00 | 0.3548 |
| 3.5121849 | 36.1254 | 5.8869 | 841.68 | 4.3537 | 846.03 | 0.00 | 0.3530 |
| 3.5297458 | 36.1348 | 5.8368 | 830.37 | 4.3424 | 834.71 | 0.00 | 0.3513 |
| 3.5473945 | 36.1437 | 5.7872 | 819.21 | 4.3310 | 823.54 | 0.00 | 0.3495 |
| 3.5651315 | 36.1523 | 5.7380 | 808.21 | 4.3196 | 812.53 | 0.00 | 0.3478 |
| 3.5829572 | 36.1603 | 5.6893 | 797.36 | 4.3082 | 801.67 | 0.00 | 0.3460 |
| 3.6008719 | 36.1680 | 5.6411 | 786.66 | 4.2967 | 790.96 | 0.00 | 0.3443 |
| 3.6188763 | 36.1753 | 5.5932 | 776.11 | 4.2852 | 780.40 | 0.00 | 0.3426 |
| 3.6369707 | 36.1822 | 5.5459 | 765.71 | 4.2737 | 769.98 | 0.00 | 0.3409 |
| 3.6551555 | 36.1888 | 5.4989 | 755.45 | 4.2622 | 759.72 | 0.00 | 0.3392 |
| 3.6734313 | 36.1950 | 5.4524 | 745.34 | 4.2506 | 749.59 | 0.00 | 0.3375 |
| 3.6917985 | 36.2010 | 5.4063 | 735.36 | 4.2390 | 739.60 | 0.00 | 0.3358 |
| 3.7102575 | 36.2066 | 5.3607 | 725.52 | 4.2273 | 729.75 | 0.00 | 0.3342 |
| 3.7288088 | 36.2119 | 5.3155 | 715.82 | 4.2157 | 720.04 | 0.00 | 0.3325 |
| 3.7474528 | 36.2169 | 5.2706 | 706.26 | 4.2040 | 710.46 | 0.00 | 0.3308 |
| 3.7661901 | 36.2216 | 5.2262 | 696.82 | 4.1923 | 701.02 | 0.00 | 0.3292 |
| 3.7850210 | 36.2261 | 5.1823 | 687.52 | 4.1805 | 691.70 | 0.00 | 0.3276 |
| 3.8039461 | 36.2304 | 5.1387 | 678.35 | 4.1688 | 682.51 | 0.00 | 0.3259 |
| 3.8229659 | 36.2344 | 5.0955 | 669.30 | 4.1570 | 673.45 | 0.00 | 0.3243 |
| 3.8420807 | 36.2807 | 5.0527 | 660.37 | 4.1451 | 664.52 | 0.00 | 0.3227 |
| 3.8612911 | 36.2845 | 5.0089 | 651.40 | 4.1333 | 655.53 | 0.00 | 0.3211 |
| 3.8805975 | 36.2880 | 4.9656 | 642.55 | 4.1214 | 646.67 | 0.00 | 0.3195 |
| 3.9000005 | 36.2911 | 4.9226 | 633.82 | 4.1095 | 637.93 | 0.00 | 0.3179 |
| 3.9195005 | 36.2939 | 4.8800 | 625.21 | 4.0976 | 629.31 | 0.00 | 0.3163 |
| 3.9390980 | 36.2964 | 4.8379 | 616.73 | 4.0857 | 620.81 | 0.00 | 0.3148 |
| 3.9587935 | 36.2986 | 4.7961 | 608.36 | 4.0737 | 612.43 | 0.00 | 0.3132 |
| 3.9785875 | 36.3005 | 4.7547 | 600.11 | 4.0617 | 604.17 | 0.00 | 0.3116 |
| 3.9984804 | 36.3022 | 4.7137 | 591.97 | 4.0497 | 596.02 | 0.00 | 0.3101 |
| 4.0184728 | 36.3036 | 4.6730 | 583.94 | 4.0377 | 587.98 | 0.00 | 0.3085 |
| 4.0385652 | 36.3047 | 4.6324 | 575.99 | 4.0257 | 580.01 | 0.00 | 0.3070 |
| 4.0587580 | 36.3056 | 4.5922 | 568.15 | 4.0136 | 572.16 | 0.00 | 0.3055 |
| 4.0790518 | 36.3063 | 4.5524 | 560.42 | 4.0015 | 564.42 | 0.00 | 0.3040 |
| 4.0994471 | 36.3067 | 4.5129 | 552.80 | 3.9894 | 556.79 | 0.00 | 0.3024 |
| 4.1199443 | 36.3069 | 4.4738 | 545.28 | 3.9773 | 549.26 | 0.00 | 0.3009 |
| 4.1405440 | 36.3068 | 4.4351 | 537.87 | 3.9652 | 541.83 | 0.00 | 0.2994 |
| 4.1612467 | 36.3066 | 4.3967 | 530.56 | 3.9530 | 534.51 | 0.00 | 0.2979 |
| 4.1820530 | 36.3062 | 4.3586 | 523.36 | 3.9408 | 527.30 | 0.00 | 0.2965 |
| 4.2029632 | 36.3055 | 4.3208 | 516.23 | 3.9286 | 520.16 | 0.00 | 0.2950 |
| 4.2239781 | 36.3047 | 4.2833 | 509.21 | 3.9164 | 513.12 | 0.00 | 0.2935 |
| 4.2450980 | 36.3037 | 4.2462 | 502.28 | 3.9042 | 506.19 | 0.00 | 0.2921 |
| 4.2663234 | 36.3024 | 4.2094 | 495.45 | 3.8920 | 499.34 | 0.00 | 0.2906 |
| 4.2876551 | 36.3010 | 4.1730 | 488.72 | 3.8797 | 492.60 | 0.00 | 0.2892 |
| 4.3090933 | 36.2995 | 4.1368 | 482.08 | 3.8674 | 485.95 | 0.00 | 0.2877 |
| 4.3306388 | 36.2977 | 4.1011 | 475.53 | 3.8552 | 479.39 | 0.00 | 0.2863 |
| 4.3522920 | 36.2958 | 4.0656 | 469.07 | 3.8429 | 472.92 | 0.00 | 0.2849 |
| 4.3740535 | 36.2938 | 4.0305 | 462.71 | 3.8306 | 466.54 | 0.00 | 0.2835 |
| 4.3959237 | 36.2916 | 3.9957 | 456.43 | 3.8182 | 460.25 | 0.00 | 0.2820 |
| 4.4179033 | 36.2892 | 3.9612 | 450.24 | 3.8059 | 454.04 | 0.00 | 0.2806 |
| 4.4399929 | 36.2867 | 3.9270 | 444.13 | 3.7935 | 447.93 | 0.00 | 0.2792 |
| 4.4621928 | 36.2841 | 3.8931 | 438.11 | 3.7812 | 441.90 | 0.00 | 0.2779 |
| 4.4845038 | 36.2813 | 3.8596 | 432.18 | 3.7688 | 435.95 | 0.00 | 0.2765 |
| 4.5069263 | 36.2784 | 3.8264 | 426.32 | 3.7564 | 430.08 | 0.00 | 0.2751 |
| 4.5294609 | 36.2753 | 3.7934 | 420.55 | 3.7440 | 424.30 | 0.00 | 0.2737 |
| 4.5521082 | 36.2722 | 3.7608 | 414.86 | 3.7316 | 418.59 | 0.00 | 0.2724 |
| 4.5748688 | 36.2689 | 3.7285 | 409.25 | 3.7192 | 412.97 | 0.00 | 0.2710 |
| 4.5977431 | 36.2655 | 3.6964 | 403.71 | 3.7068 | 407.42 | 0.00 | 0.2697 |
| 4.6207318 | 36.2619 | 3.6647 | 398.25 | 3.6944 | 401.95 | 0.00 | 0.2683 |
| 4.6438355 | 36.2583 | 3.6332 | 392.87 | 3.6819 | 396.55 | 0.00 | 0.2670 |
| 4.6670547 | 36.2546 | 3.6021 | 387.56 | 3.6695 | 391.23 | 0.00 | 0.2657 |
| 4.6903900 | 36.2507 | 3.5712 | 382.33 | 3.6571 | 385.99 | 0.00 | 0.2643 |
| 4.7138419 | 36.2468 | 3.5406 | 377.17 | 3.6446 | 380.81 | 0.00 | 0.2630 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Kr ($Z=36$) | | | | | | | |
| 4.7374111 | 36.2428 | 3.5103 | 372.08 | 3.6321 | 375.71 | 0.00 | 0.2617 |
| 4.7610982 | 36.2386 | 3.4802 | 367.06 | 3.6197 | 370.68 | 0.00 | 0.2604 |
| 4.7849037 | 36.2344 | 3.4505 | 362.11 | 3.6072 | 365.72 | 0.00 | 0.2591 |
| 4.8088282 | 36.2301 | 3.4210 | 357.23 | 3.5947 | 360.82 | 0.00 | 0.2578 |
| 4.8328723 | 36.2257 | 3.3917 | 352.41 | 3.5822 | 356.00 | 0.00 | 0.2565 |
| 4.8570367 | 36.2212 | 3.3628 | 347.67 | 3.5697 | 351.24 | 0.00 | 0.2553 |
| 4.8813219 | 36.2166 | 3.3341 | 342.98 | 3.5572 | 346.54 | 0.00 | 0.2540 |
| 4.9057285 | 36.2120 | 3.3057 | 338.37 | 3.5447 | 341.91 | 0.00 | 0.2527 |
| 4.9302571 | 36.2072 | 3.2775 | 333.81 | 3.5322 | 337.35 | 0.00 | 0.2515 |
| 4.9549084 | 36.2024 | 3.2496 | 329.32 | 3.5197 | 332.84 | 0.00 | 0.2502 |
| 4.9796829 | 36.1976 | 3.2219 | 324.90 | 3.5072 | 328.40 | 0.00 | 0.2490 |
| 5.0045814 | 36.1926 | 3.1945 | 320.53 | 3.4947 | 324.02 | 0.00 | 0.2477 |
| 5.0296043 | 36.1876 | 3.1673 | 316.22 | 3.4822 | 319.71 | 0.00 | 0.2465 |
| 5.0547523 | 36.1825 | 3.1404 | 311.98 | 3.4697 | 315.45 | 0.00 | 0.2453 |
| 5.0800260 | 36.1774 | 3.1137 | 307.79 | 3.4571 | 311.24 | 0.00 | 0.2441 |
| 5.1054262 | 36.1722 | 3.0873 | 303.66 | 3.4446 | 307.10 | 0.00 | 0.2428 |
| 5.1309533 | 36.1669 | 3.0611 | 299.58 | 3.4321 | 303.01 | 0.00 | 0.2416 |
| 5.1566081 | 36.1616 | 3.0352 | 295.56 | 3.4196 | 298.98 | 0.00 | 0.2404 |
| 5.1823911 | 36.1562 | 3.0094 | 291.60 | 3.4071 | 295.01 | 0.00 | 0.2392 |
| 5.2083031 | 36.1508 | 2.9840 | 287.69 | 3.3946 | 291.09 | 0.00 | 0.2381 |
| 5.2343446 | 36.1453 | 2.9587 | 283.84 | 3.3820 | 287.22 | 0.00 | 0.2369 |
| 5.2605163 | 36.1398 | 2.9337 | 280.04 | 3.3695 | 283.41 | 0.00 | 0.2357 |
| 5.2868189 | 36.1342 | 2.9089 | 276.29 | 3.3570 | 279.65 | 0.00 | 0.2345 |
| 5.3132530 | 36.1285 | 2.8843 | 272.59 | 3.3445 | 275.94 | 0.00 | 0.2333 |
| 5.3398192 | 36.1228 | 2.8600 | 268.95 | 3.3320 | 272.28 | 0.00 | 0.2322 |
| 5.3665183 | 36.1171 | 2.8358 | 265.35 | 3.3195 | 268.67 | 0.00 | 0.2310 |
| 5.3933509 | 36.1113 | 2.8119 | 261.80 | 3.3070 | 265.11 | 0.00 | 0.2299 |
| 5.4203177 | 36.1055 | 2.7882 | 258.30 | 3.2945 | 261.60 | 0.00 | 0.2287 |
| 5.4474193 | 36.0997 | 2.7646 | 254.84 | 3.2820 | 258.13 | 0.00 | 0.2276 |
| 5.4746564 | 36.0938 | 2.7412 | 251.43 | 3.2695 | 254.70 | 0.00 | 0.2265 |
| 5.5020297 | 36.0878 | 2.7181 | 248.07 | 3.2570 | 251.32 | 0.00 | 0.2253 |
| 5.5295398 | 36.0819 | 2.6951 | 244.75 | 3.2446 | 247.99 | 0.00 | 0.2242 |
| 5.5571875 | 36.0758 | 2.6723 | 241.48 | 3.2321 | 244.71 | 0.00 | 0.2231 |
| 5.5849734 | 36.0698 | 2.6498 | 238.25 | 3.2196 | 241.47 | 0.00 | 0.2220 |
| 5.6128983 | 36.0637 | 2.6275 | 235.06 | 3.2072 | 238.27 | 0.00 | 0.2209 |
| 5.6409628 | 36.0575 | 2.6053 | 231.92 | 3.1947 | 235.12 | 0.00 | 0.2198 |
| 5.6691676 | 36.0514 | 2.5834 | 228.83 | 3.1823 | 232.01 | 0.00 | 0.2187 |
| 5.6975135 | 36.0452 | 2.5616 | 225.77 | 3.1698 | 228.94 | 0.00 | 0.2176 |
| 5.7260010 | 36.0389 | 2.5401 | 222.76 | 3.1574 | 225.92 | 0.00 | 0.2165 |
| 5.7546310 | 36.0327 | 2.5187 | 219.79 | 3.1450 | 222.93 | 0.00 | 0.2155 |
| 5.7834042 | 36.0264 | 2.4976 | 216.86 | 3.1326 | 219.99 | 0.00 | 0.2144 |
| 5.8123212 | 36.0201 | 2.4766 | 213.96 | 3.1202 | 217.09 | 0.00 | 0.2133 |
| 5.8413828 | 36.0137 | 2.4558 | 211.11 | 3.1078 | 214.22 | 0.00 | 0.2123 |
| 5.8705897 | 36.0073 | 2.4352 | 208.30 | 3.0954 | 211.40 | 0.00 | 0.2112 |
| 5.8999427 | 36.0009 | 2.4148 | 205.53 | 3.0830 | 208.61 | 0.00 | 0.2101 |
| 5.9294424 | 35.9945 | 2.3946 | 202.79 | 3.0706 | 205.86 | 0.00 | 0.2091 |
| 5.9590896 | 35.9880 | 2.3745 | 200.09 | 3.0583 | 203.15 | 0.00 | 0.2081 |
| 5.9888850 | 35.9816 | 2.3547 | 197.43 | 3.0459 | 200.48 | 0.00 | 0.2070 |
| 6.0188295 | 35.9751 | 2.3350 | 194.81 | 3.0336 | 197.84 | 0.00 | 0.2060 |
| 6.0489236 | 35.9685 | 2.3155 | 192.22 | 3.0213 | 195.24 | 0.00 | 0.2050 |
| 6.0791682 | 35.9620 | 2.2961 | 189.67 | 3.0089 | 192.67 | 0.00 | 0.2039 |
| 6.1095641 | 35.9554 | 2.2770 | 187.15 | 2.9966 | 190.14 | 0.00 | 0.2029 |
| 6.1401119 | 35.9488 | 2.2580 | 184.66 | 2.9843 | 187.65 | 0.00 | 0.2019 |
| 6.1708125 | 35.9422 | 2.2391 | 182.21 | 2.9721 | 185.18 | 0.00 | 0.2009 |
| 6.2016665 | 35.9356 | 2.2205 | 179.79 | 2.9598 | 182.75 | 0.00 | 0.1999 |
| 6.2326749 | 35.9290 | 2.2020 | 177.41 | 2.9476 | 180.36 | 0.00 | 0.1989 |
| 6.2638382 | 35.9223 | 2.1837 | 175.06 | 2.9353 | 177.99 | 0.00 | 0.1979 |
| 6.2951574 | 35.9157 | 2.1655 | 172.74 | 2.9231 | 175.66 | 0.00 | 0.1970 |
| 6.3266332 | 35.9090 | 2.1475 | 170.45 | 2.9109 | 173.36 | 0.00 | 0.1960 |
| 6.3582664 | 35.9023 | 2.1297 | 168.19 | 2.8987 | 171.09 | 0.00 | 0.1950 |
| 6.3900577 | 35.8956 | 2.1120 | 165.97 | 2.8865 | 168.85 | 0.00 | 0.1940 |
| 6.4220080 | 35.8889 | 2.0945 | 163.77 | 2.8743 | 166.65 | 0.00 | 0.1931 |

TABLE 3. Form factors, attenuation, and scattering cross-sections, $Z=30-36$, from $E=0.9$ keV to $E=6.58$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ K -shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Kr ($Z=36$) | | | | | | | |
| 6.4541180 | 35.8821 | 2.0771 | 161.61 | 2.8622 | 164.47 | 0.00 | 0.1921 |
| 6.4863886 | 35.8754 | 2.0599 | 159.47 | 2.8500 | 162.32 | 0.00 | 0.1911 |
| 6.5188206 | 35.8686 | 2.0428 | 157.36 | 2.8379 | 160.20 | 0.00 | 0.1902 |
| 6.5514147 | 35.8618 | 2.0259 | 155.28 | 2.8258 | 158.11 | 0.00 | 0.1892 |
| 6.5841717 | 35.8551 | 2.0092 | 153.23 | 2.8137 | 156.05 | 0.00 | 0.1883 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV

| | | | | | | | |
|--|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| Nd ($Z=60$) | | | | | | | |
| Atomic weight: $A_r=144.2400$ g mol ⁻¹ Nominal density: ρ (g cm ⁻³)=6.9940 | | | | | | | |
| σ_a (barns/atom) = $[\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 239.516$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) = f_2(e \text{ atom}^{-1}) \times 2.91738 \times 10^5$ | | | | | | | |
| 18 edges. Edge energies (keV) | | | | | | | |
| K | 43.5689 | L I | 7.12600 | L II | 6.72150 | L III | 6.20790 |
| M I | 1.57530 | M II | 1.40280 | M III | 1.29740 | M IV | 0.999500 |
| M V | 0.977700 | N I | 0.315200 | N II | 0.243300 | N III | 0.224600 |
| N IV | 0.117500 | N V | 0.117500 | N VI | 0.00300000 | O I | 0.0375000 |
| O II | 0.0211000 | O III | 0.0211000 | | | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-0.84384,-0.51240) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.013692 e \text{ atom}^{-1}$ | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.1000000 | 20.9142 | 4.1569 | 12127 | 0.40755 | 12128. | 0.00 | 12.40 |
| 0.1005000 | 20.8515 | 4.1519 | 12052 | 0.41220 | 12053 | 0.00 | 12.34 |
| 0.10100250 | 20.7848 | 4.1468 | 11978 | 0.41690 | 11978 | 0.00 | 12.28 |
| 0.10150751 | 20.7137 | 4.1416 | 11903 | 0.42165 | 11904 | 0.00 | 12.21 |
| 0.10201505 | 20.6377 | 4.1364 | 11829 | 0.42644 | 11830 | 0.00 | 12.15 |
| 0.10252513 | 20.5565 | 4.1311 | 11755 | 0.43127 | 11756 | 0.00 | 12.09 |
| 0.10303775 | 20.4695 | 4.1258 | 11682 | 0.43615 | 11682 | 0.00 | 12.03 |
| 0.10355294 | 20.3763 | 4.1203 | 11608 | 0.44107 | 11609 | 0.00 | 11.97 |
| 0.10407070 | 20.2762 | 4.1148 | 11535 | 0.44603 | 11535 | 0.00 | 11.91 |
| 0.10459106 | 20.1685 | 4.1092 | 11462 | 0.45105 | 11462 | 0.00 | 11.85 |
| 0.10511401 | 20.0523 | 4.1035 | 11389 | 0.45610 | 11390 | 0.00 | 11.80 |
| 0.10563958 | 19.9269 | 4.0978 | 11317 | 0.46121 | 11317 | 0.00 | 11.74 |
| 0.10616778 | 19.7909 | 4.0919 | 11244 | 0.46636 | 11245 | 0.00 | 11.68 |
| 0.10669862 | 19.6433 | 4.0860 | 11172 | 0.47155 | 11173 | 0.00 | 11.62 |
| 0.10723211 | 19.4824 | 4.0801 | 11100 | 0.47680 | 11101 | 0.00 | 11.56 |
| 0.10776827 | 19.3065 | 4.0740 | 11029 | 0.48209 | 11029 | 0.00 | 11.50 |
| 0.10830712 | 19.1135 | 4.0679 | 10957 | 0.48742 | 10958 | 0.00 | 11.45 |
| 0.10884865 | 18.9007 | 4.0617 | 10886 | 0.49281 | 10887 | 0.00 | 11.39 |
| 0.10939289 | 18.6649 | 4.0554 | 10815 | 0.49824 | 10816 | 0.00 | 11.33 |
| 0.10993986 | 18.4023 | 4.0491 | 10745 | 0.50372 | 10745 | 0.00 | 11.28 |
| 0.11048956 | 18.1078 | 4.0427 | 10674 | 0.50925 | 10675 | 0.00 | 11.22 |
| 0.11104201 | 17.7752 | 4.0362 | 10604 | 0.51483 | 10605 | 0.00 | 11.17 |
| 0.11159722 | 17.3961 | 4.0296 | 10534 | 0.52046 | 10535 | 0.00 | 11.11 |
| 0.11215520 | 16.9596 | 4.0230 | 10465 | 0.52613 | 10465 | 0.00 | 11.05 |
| 0.11271598 | 16.4510 | 4.0163 | 10395 | 0.53186 | 10396 | 0.00 | 11.00 |
| 0.11327956 | 15.8479 | 4.0096 | 10326 | 0.53763 | 10327 | 0.00 | 10.94 |
| 0.11384596 | 15.1193 | 4.0027 | 10257 | 0.54346 | 10258 | 0.00 | 10.89 |
| 0.11441519 | 14.2163 | 3.9958 | 10189 | 0.54933 | 10189 | 0.00 | 10.84 |
| 0.11498726 | 13.0569 | 3.9888 | 10120 | 0.55526 | 10121 | 0.00 | 10.78 |
| 0.11556220 | 11.4906 | 3.9818 | 10052 | 0.56123 | 10053 | 0.00 | 10.73 |
| 0.11614001 | 9.19412 | 3.9747 | 9984.2 | 0.56726 | 9984.7 | 0.00 | 10.68 |
| 0.11672071 | 5.25443 | 3.9675 | 9916.6 | 0.57334 | 9917.1 | 0.00 | 10.62 |
| 0.11730431 | -5.79019 | 3.9602 | 9849.2 | 0.57947 | 9849.8 | 0.00 | 10.57 |
| 0.11748954 | -31.9507 | 3.9579 | 9827.9 | 0.58142 | 9828.5 | 0.00 | 10.55 |
| 0.11751046 | -31.8147 | 32.823 | 81489 | 0.58164 | 81490 | 0.00 | 10.55 |
| 0.11751048 | -31.7939 | 32.823 | 81489 | 0.58164 | 81489 | 0.00 | 10.55 |
| 0.11789083 | 2.87043 | 31.525 | 78014 | 0.58565 | 78014 | 0.00 | 10.52 |
| 0.11848029 | 12.4334 | 29.635 | 72970 | 0.59189 | 72971 | 0.00 | 10.46 |
| 0.11907269 | 17.4057 | 27.872 | 68290 | 0.59818 | 68290 | 0.00 | 10.41 |
| 0.11966805 | 20.6974 | 26.230 | 63946 | 0.60452 | 63947 | 0.00 | 10.36 |
| 0.12026639 | 23.0793 | 24.699 | 59915 | 0.61091 | 59916 | 0.00 | 10.31 |
| 0.12086772 | 24.8815 | 23.273 | 56173 | 0.61736 | 56174 | 0.00 | 10.26 |
| 0.12147206 | 26.2796 | 21.943 | 52700 | 0.62386 | 52700 | 0.00 | 10.21 |
| 0.12207942 | 27.3799 | 20.703 | 49475 | 0.63041 | 49476 | 0.00 | 10.16 |
| 0.12268982 | 28.2520 | 19.548 | 46481 | 0.63702 | 46482 | 0.00 | 10.11 |
| 0.12330327 | 28.9449 | 18.470 | 43701 | 0.64368 | 43702 | 0.00 | 10.06 |
| 0.12391979 | 29.4940 | 17.466 | 41120 | 0.65040 | 41120 | 0.00 | 10.01 |
| 0.12453939 | 29.9260 | 16.530 | 38722 | 0.65717 | 38723 | 0.00 | 9.955 |
| 0.12516208 | 30.2618 | 15.657 | 36495 | 0.66400 | 36495 | 0.00 | 9.906 |
| 0.12578789 | 30.5176 | 14.843 | 34425 | 0.67088 | 34426 | 0.00 | 9.857 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 0.12641683 | 30.7063 | 14.084 | 32503 | 0.67782 | 32503 | 0.00 | 9.808 |
| 0.12704892 | 30.8384 | 13.376 | 30716 | 0.68482 | 30717 | 0.00 | 9.759 |
| 0.12768416 | 30.9224 | 12.716 | 29055 | 0.69187 | 29056 | 0.00 | 9.710 |
| 0.12832258 | 30.9650 | 12.101 | 27511 | 0.69897 | 27512 | 0.00 | 9.662 |
| 0.12896419 | 30.9715 | 11.527 | 26076 | 0.70614 | 26076 | 0.00 | 9.614 |
| 0.12960902 | 30.9458 | 10.992 | 24742 | 0.71336 | 24743 | 0.00 | 9.566 |
| 0.13025706 | 30.8930 | 10.503 | 23524 | 0.72064 | 23524 | 0.00 | 9.518 |
| 0.13090835 | 30.8211 | 10.056 | 22412 | 0.72797 | 22412 | 0.00 | 9.471 |
| 0.13156289 | 30.7355 | 9.6484 | 21395 | 0.73537 | 21396 | 0.00 | 9.424 |
| 0.13222070 | 30.6403 | 9.2749 | 20465 | 0.74282 | 20465 | 0.00 | 9.377 |
| 0.13288181 | 30.5385 | 8.9324 | 19611 | 0.75033 | 19612 | 0.00 | 9.330 |
| 0.13354621 | 30.4323 | 8.6180 | 18826 | 0.75790 | 18827 | 0.00 | 9.284 |
| 0.13421395 | 30.3234 | 8.3287 | 18104 | 0.76553 | 18105 | 0.00 | 9.238 |
| 0.13488502 | 30.2132 | 8.0624 | 17438 | 0.77321 | 17439 | 0.00 | 9.192 |
| 0.13555944 | 30.1027 | 7.8166 | 16822 | 0.78096 | 16823 | 0.00 | 9.146 |
| 0.13623724 | 29.9926 | 7.5896 | 16252 | 0.78876 | 16253 | 0.00 | 9.101 |
| 0.13691842 | 29.8837 | 7.3796 | 15724 | 0.79663 | 15725 | 0.00 | 9.055 |
| 0.13760302 | 29.7763 | 7.1851 | 15233 | 0.80456 | 15234 | 0.00 | 9.010 |
| 0.13829103 | 29.6708 | 7.0046 | 14777 | 0.81254 | 14778 | 0.00 | 8.965 |
| 0.13898249 | 29.5675 | 6.8369 | 14351 | 0.82059 | 14352 | 0.00 | 8.921 |
| 0.13967740 | 29.4665 | 6.6809 | 13954 | 0.82869 | 13955 | 0.00 | 8.876 |
| 0.14037579 | 29.3681 | 6.5356 | 13583 | 0.83686 | 13584 | 0.00 | 8.832 |
| 0.14107766 | 29.2722 | 6.4000 | 13235 | 0.84509 | 13236 | 0.00 | 8.788 |
| 0.14178305 | 29.1790 | 6.2735 | 12909 | 0.85338 | 12909 | 0.00 | 8.745 |
| 0.14249197 | 29.0884 | 6.1551 | 12602 | 0.86173 | 12603 | 0.00 | 8.701 |
| 0.14320443 | 29.0004 | 6.0443 | 12313 | 0.87015 | 12314 | 0.00 | 8.658 |
| 0.14392045 | 28.9151 | 5.9404 | 12042 | 0.87863 | 12043 | 0.00 | 8.615 |
| 0.14464005 | 28.8323 | 5.8429 | 11785 | 0.88716 | 11786 | 0.00 | 8.572 |
| 0.14536325 | 28.7520 | 5.7512 | 11543 | 0.89577 | 11543 | 0.00 | 8.529 |
| 0.14609007 | 28.6742 | 5.6650 | 11313 | 0.90443 | 11314 | 0.00 | 8.487 |
| 0.14682052 | 28.5987 | 5.5839 | 11095 | 0.91316 | 11096 | 0.00 | 8.445 |
| 0.14755462 | 28.5256 | 5.5073 | 10889 | 0.92195 | 10890 | 0.00 | 8.403 |
| 0.14829239 | 28.4547 | 5.4351 | 10693 | 0.93080 | 10693 | 0.00 | 8.361 |
| 0.14903386 | 28.3860 | 5.3668 | 10506 | 0.93972 | 10507 | 0.00 | 8.319 |
| 0.14977903 | 28.3194 | 5.3022 | 10328 | 0.94871 | 10329 | 0.00 | 8.278 |
| 0.15052792 | 28.2548 | 5.2411 | 10158 | 0.95775 | 10159 | 0.00 | 8.237 |
| 0.15128056 | 28.1921 | 5.1831 | 9995.4 | 0.96686 | 9996.4 | 0.00 | 8.196 |
| 0.15203696 | 28.1313 | 5.1282 | 9840.2 | 0.97604 | 9841.2 | 0.00 | 8.155 |
| 0.15279715 | 28.0722 | 5.0759 | 9691.6 | 0.98528 | 9692.6 | 0.00 | 8.114 |
| 0.15356113 | 28.0149 | 5.0263 | 9549.1 | 0.99458 | 9550.1 | 0.00 | 8.074 |
| 0.15432894 | 27.9592 | 4.9791 | 9412.4 | 1.0040 | 9413.4 | 0.00 | 8.034 |
| 0.15510058 | 27.9050 | 4.9342 | 9281.0 | 1.0134 | 9282.0 | 0.00 | 7.994 |
| 0.15587609 | 27.8523 | 4.8914 | 9154.7 | 1.0229 | 9155.7 | 0.00 | 7.954 |
| 0.15665547 | 27.8011 | 4.8505 | 9033.1 | 1.0325 | 9034.1 | 0.00 | 7.914 |
| 0.15743875 | 27.7512 | 4.8115 | 8915.9 | 1.0421 | 8917.0 | 0.00 | 7.875 |
| 0.15822594 | 27.7026 | 4.7743 | 8802.9 | 1.0518 | 8804.0 | 0.00 | 7.836 |
| 0.15901707 | 27.6552 | 4.7387 | 8693.8 | 1.0616 | 8694.9 | 0.00 | 7.797 |
| 0.15981215 | 27.6090 | 4.7047 | 8588.5 | 1.0714 | 8589.5 | 0.00 | 7.758 |
| 0.16061121 | 27.5639 | 4.6721 | 8486.6 | 1.0813 | 8487.6 | 0.00 | 7.720 |
| 0.16141427 | 27.5199 | 4.6409 | 8388.0 | 1.0913 | 8389.1 | 0.00 | 7.681 |
| 0.16222134 | 27.4769 | 4.6110 | 8292.5 | 1.1013 | 8293.6 | 0.00 | 7.643 |
| 0.16303245 | 27.4349 | 4.5824 | 8200.0 | 1.1114 | 8201.1 | 0.00 | 7.605 |
| 0.16384761 | 27.3938 | 4.5549 | 8110.2 | 1.1216 | 8111.3 | 0.00 | 7.567 |
| 0.16466685 | 27.3535 | 4.5285 | 8023.1 | 1.1318 | 8024.3 | 0.00 | 7.529 |
| 0.16549018 | 27.3141 | 4.5032 | 7938.6 | 1.1421 | 7939.7 | 0.00 | 7.492 |
| 0.16631763 | 27.2754 | 4.4789 | 7856.4 | 1.1525 | 7857.5 | 0.00 | 7.455 |
| 0.16714922 | 27.2375 | 4.4555 | 7776.5 | 1.1629 | 7777.7 | 0.00 | 7.418 |
| 0.16798497 | 27.2003 | 4.4330 | 7698.8 | 1.1734 | 7700.0 | 0.00 | 7.381 |
| 0.16882489 | 27.1637 | 4.4114 | 7623.2 | 1.1840 | 7624.3 | 0.00 | 7.344 |
| 0.16966902 | 27.1277 | 4.3906 | 7549.5 | 1.1947 | 7550.7 | 0.00 | 7.307 |
| 0.17051736 | 27.0924 | 4.3706 | 7477.7 | 1.2054 | 7478.9 | 0.00 | 7.271 |
| 0.17136995 | 27.0575 | 4.3514 | 7407.8 | 1.2162 | 7409.0 | 0.00 | 7.235 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 0.17222680 | 27.0232 | 4.3329 | 7339.6 | 1.2270 | 7340.8 | 0.00 | 7.199 |
| 0.17308793 | 26.9893 | 4.3151 | 7273.1 | 1.2379 | 7274.3 | 0.00 | 7.163 |
| 0.17395337 | 26.9559 | 4.2980 | 7208.1 | 1.2489 | 7209.4 | 0.00 | 7.127 |
| 0.17482314 | 26.9229 | 4.2815 | 7144.7 | 1.2600 | 7146.0 | 0.00 | 7.092 |
| 0.17569726 | 26.8903 | 4.2656 | 7082.8 | 1.2711 | 7084.1 | 0.00 | 7.057 |
| 0.17657574 | 26.8580 | 4.2503 | 7022.4 | 1.2823 | 7023.7 | 0.00 | 7.022 |
| 0.17745862 | 26.8260 | 4.2356 | 6963.3 | 1.2936 | 6964.6 | 0.00 | 6.987 |
| 0.17834591 | 26.7944 | 4.2215 | 6905.5 | 1.3049 | 6906.8 | 0.00 | 6.952 |
| 0.17923764 | 26.7629 | 4.2079 | 6849.0 | 1.3163 | 6850.4 | 0.00 | 6.917 |
| 0.18013383 | 26.7318 | 4.1948 | 6793.8 | 1.3278 | 6795.1 | 0.00 | 6.883 |
| 0.18103450 | 26.7008 | 4.1823 | 6739.8 | 1.3394 | 6741.1 | 0.00 | 6.849 |
| 0.18193967 | 26.6700 | 4.1702 | 6686.9 | 1.3510 | 6688.3 | 0.00 | 6.815 |
| 0.18284937 | 26.6394 | 4.1587 | 6635.2 | 1.3627 | 6636.6 | 0.00 | 6.781 |
| 0.18376362 | 26.6088 | 4.1476 | 6584.6 | 1.3745 | 6585.9 | 0.00 | 6.747 |
| 0.18468244 | 26.5784 | 4.1369 | 6535.0 | 1.3863 | 6536.4 | 0.00 | 6.713 |
| 0.18560585 | 26.5481 | 4.1268 | 6486.5 | 1.3982 | 6487.9 | 0.00 | 6.680 |
| 0.18653388 | 26.5178 | 4.1170 | 6439.0 | 1.4102 | 6440.4 | 0.00 | 6.647 |
| 0.18746655 | 26.4875 | 4.1077 | 6392.5 | 1.4222 | 6393.9 | 0.00 | 6.614 |
| 0.18840388 | 26.4572 | 4.0988 | 6346.9 | 1.4344 | 6348.3 | 0.00 | 6.581 |
| 0.18934590 | 26.4268 | 4.0903 | 6302.3 | 1.4466 | 6303.7 | 0.00 | 6.548 |
| 0.19029263 | 26.3964 | 4.0823 | 6258.5 | 1.4588 | 6260.0 | 0.00 | 6.515 |
| 0.19124409 | 26.3659 | 4.0746 | 6215.7 | 1.4712 | 6217.2 | 0.00 | 6.483 |
| 0.19220031 | 26.3352 | 4.0673 | 6173.8 | 1.4836 | 6175.2 | 0.00 | 6.451 |
| 0.19316131 | 26.3044 | 4.0605 | 6132.7 | 1.4960 | 6134.2 | 0.00 | 6.419 |
| 0.19412712 | 26.2733 | 4.0540 | 6092.4 | 1.5086 | 6093.9 | 0.00 | 6.387 |
| 0.19509776 | 26.2421 | 4.0479 | 6052.9 | 1.5212 | 6054.5 | 0.00 | 6.355 |
| 0.19607325 | 26.2105 | 4.0421 | 6014.3 | 1.5339 | 6015.8 | 0.00 | 6.323 |
| 0.19705361 | 26.1786 | 4.0368 | 5976.4 | 1.5467 | 5978.0 | 0.00 | 6.292 |
| 0.19803888 | 26.1463 | 4.0318 | 5939.3 | 1.5595 | 5940.9 | 0.00 | 6.261 |
| 0.19902907 | 26.1137 | 4.0271 | 5903.0 | 1.5724 | 5904.6 | 0.00 | 6.229 |
| 0.20002422 | 26.0805 | 4.0229 | 5867.4 | 1.5854 | 5869.0 | 0.00 | 6.198 |
| 0.20102434 | 26.0468 | 4.0189 | 5832.5 | 1.5985 | 5834.1 | 0.00 | 6.168 |
| 0.20202946 | 26.0125 | 4.0154 | 5798.4 | 1.6116 | 5800.0 | 0.00 | 6.137 |
| 0.20303961 | 25.9776 | 4.0122 | 5764.9 | 1.6248 | 5766.5 | 0.00 | 6.106 |
| 0.20405481 | 25.9418 | 4.0093 | 5732.2 | 1.6381 | 5733.8 | 0.00 | 6.076 |
| 0.20507508 | 25.9052 | 4.0068 | 5700.1 | 1.6514 | 5701.7 | 0.00 | 6.046 |
| 0.20610046 | 25.8677 | 4.0047 | 5668.7 | 1.6648 | 5670.3 | 0.00 | 6.016 |
| 0.20713096 | 25.8290 | 4.0029 | 5637.9 | 1.6783 | 5639.6 | 0.00 | 5.986 |
| 0.20816661 | 25.7891 | 4.0014 | 5607.8 | 1.6919 | 5609.5 | 0.00 | 5.956 |
| 0.20920745 | 25.7478 | 4.0003 | 5578.4 | 1.7055 | 5580.1 | 0.00 | 5.926 |
| 0.21025348 | 25.7048 | 3.9995 | 5549.6 | 1.7192 | 5551.3 | 0.00 | 5.897 |
| 0.21130475 | 25.6598 | 3.9991 | 5521.3 | 1.7330 | 5523.1 | 0.00 | 5.868 |
| 0.21236128 | 25.6127 | 3.9990 | 5493.8 | 1.7469 | 5495.5 | 0.00 | 5.838 |
| 0.21342308 | 25.5629 | 3.9992 | 5466.8 | 1.7608 | 5468.5 | 0.00 | 5.809 |
| 0.21449020 | 25.5098 | 3.9998 | 5440.4 | 1.7748 | 5442.1 | 0.00 | 5.780 |
| 0.21556265 | 25.4528 | 4.0008 | 5414.6 | 1.7889 | 5416.3 | 0.00 | 5.752 |
| 0.21664046 | 25.3908 | 4.0020 | 5389.3 | 1.8030 | 5391.1 | 0.00 | 5.723 |
| 0.21772366 | 25.3224 | 4.0036 | 5364.7 | 1.8172 | 5366.5 | 0.00 | 5.695 |
| 0.21881228 | 25.2454 | 4.0056 | 5340.6 | 1.8315 | 5342.4 | 0.00 | 5.666 |
| 0.21990634 | 25.1562 | 4.0079 | 5317.0 | 1.8459 | 5318.9 | 0.00 | 5.638 |
| 0.22100588 | 25.0481 | 4.0105 | 5294.0 | 1.8603 | 5295.9 | 0.00 | 5.610 |
| 0.22211090 | 24.9074 | 4.0134 | 5271.6 | 1.8748 | 5273.4 | 0.00 | 5.582 |
| 0.22322146 | 24.6945 | 4.0167 | 5249.6 | 1.8894 | 5251.5 | 0.00 | 5.554 |
| 0.22433757 | 24.1391 | 4.0204 | 5228.3 | 1.9040 | 5230.2 | 0.00 | 5.527 |
| 0.22447692 | 23.8940 | 4.0208 | 5225.6 | 1.9059 | 5227.5 | 0.00 | 5.523 |
| 0.22472308 | 23.8879 | 5.0250 | 6523.5 | 1.9091 | 6525.4 | 0.00 | 5.517 |
| 0.22545925 | 24.4907 | 5.0302 | 6508.9 | 1.9188 | 6510.8 | 0.00 | 5.499 |
| 0.22658655 | 24.7326 | 5.0384 | 6487.2 | 1.9336 | 6489.1 | 0.00 | 5.472 |
| 0.22771948 | 24.8514 | 5.0470 | 6465.9 | 1.9484 | 6467.9 | 0.00 | 5.445 |
| 0.22885808 | 24.9255 | 5.0560 | 6445.2 | 1.9634 | 6447.1 | 0.00 | 5.418 |
| 0.23000237 | 24.9759 | 5.0653 | 6424.9 | 1.9784 | 6426.9 | 0.00 | 5.391 |
| 0.23115238 | 25.0114 | 5.0749 | 6405.1 | 1.9934 | 6407.1 | 0.00 | 5.364 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 0.23230814 | 25.0365 | 5.0850 | 6385.8 | 2.0086 | 6387.8 | 0.00 | 5.337 |
| 0.23346969 | 25.0536 | 5.0953 | 6367.0 | 2.0238 | 6369.0 | 0.00 | 5.311 |
| 0.23463703 | 25.0640 | 5.1060 | 6348.6 | 2.0391 | 6350.6 | 0.00 | 5.284 |
| 0.23581022 | 25.0685 | 5.1171 | 6330.7 | 2.0545 | 6332.8 | 0.00 | 5.258 |
| 0.23698927 | 25.0671 | 5.1285 | 6313.2 | 2.0699 | 6315.3 | 0.00 | 5.232 |
| 0.23817422 | 25.0592 | 5.1402 | 6296.2 | 2.0854 | 6298.3 | 0.00 | 5.206 |
| 0.23936509 | 25.0433 | 5.1523 | 6279.6 | 2.1010 | 6281.7 | 0.00 | 5.180 |
| 0.24056191 | 25.0153 | 5.1648 | 6263.5 | 2.1167 | 6265.6 | 0.00 | 5.154 |
| 0.24176472 | 24.9630 | 5.1776 | 6247.8 | 2.1324 | 6249.9 | 0.00 | 5.128 |
| 0.24297355 | 24.8079 | 5.1907 | 6232.5 | 2.1482 | 6234.6 | 0.00 | 5.103 |
| 0.24315743 | 24.7223 | 5.1927 | 6230.2 | 2.1506 | 6232.3 | 0.00 | 5.099 |
| 0.24344258 | 24.7234 | 5.5238 | 6619.6 | 2.1543 | 6621.8 | 0.00 | 5.093 |
| 0.24418841 | 24.9173 | 5.5330 | 6610.5 | 2.1641 | 6612.6 | 0.00 | 5.077 |
| 0.24540936 | 25.0122 | 5.5484 | 6595.8 | 2.1800 | 6598.0 | 0.00 | 5.052 |
| 0.24663640 | 25.0643 | 5.5641 | 6581.5 | 2.1960 | 6583.7 | 0.00 | 5.027 |
| 0.24786959 | 25.1008 | 5.5801 | 6567.7 | 2.2121 | 6569.9 | 0.00 | 5.002 |
| 0.24910893 | 25.1292 | 5.5964 | 6554.2 | 2.2282 | 6556.4 | 0.00 | 4.977 |
| 0.25035448 | 25.1523 | 5.6131 | 6541.0 | 2.2445 | 6543.2 | 0.00 | 4.952 |
| 0.25160625 | 25.1719 | 5.6301 | 6528.1 | 2.2607 | 6530.4 | 0.00 | 4.928 |
| 0.25286428 | 25.1888 | 5.6474 | 6515.6 | 2.2771 | 6517.9 | 0.00 | 4.903 |
| 0.25412860 | 25.2036 | 5.6650 | 6503.4 | 2.2935 | 6505.7 | 0.00 | 4.879 |
| 0.25539925 | 25.2168 | 5.6829 | 6491.5 | 2.3100 | 6493.8 | 0.00 | 4.855 |
| 0.25667624 | 25.2287 | 5.7011 | 6479.9 | 2.3266 | 6482.2 | 0.00 | 4.830 |
| 0.25795962 | 25.2394 | 5.7196 | 6468.6 | 2.3432 | 6470.9 | 0.00 | 4.806 |
| 0.25924942 | 25.2493 | 5.7384 | 6457.5 | 2.3599 | 6459.9 | 0.00 | 4.782 |
| 0.26054567 | 25.2583 | 5.7575 | 6446.8 | 2.3767 | 6449.2 | 0.00 | 4.759 |
| 0.26184840 | 25.2666 | 5.7769 | 6436.3 | 2.3936 | 6438.7 | 0.00 | 4.735 |
| 0.26315764 | 25.2744 | 5.7966 | 6426.1 | 2.4105 | 6428.5 | 0.00 | 4.711 |
| 0.26447343 | 25.2816 | 5.8165 | 6416.2 | 2.4274 | 6418.6 | 0.00 | 4.688 |
| 0.26579579 | 25.2883 | 5.8368 | 6406.5 | 2.4445 | 6408.9 | 0.00 | 4.665 |
| 0.26712477 | 25.2947 | 5.8573 | 6397.0 | 2.4616 | 6399.5 | 0.00 | 4.641 |
| 0.26846040 | 25.3006 | 5.8781 | 6387.8 | 2.4788 | 6390.3 | 0.00 | 4.618 |
| 0.26980270 | 25.3063 | 5.8992 | 6378.8 | 2.4960 | 6381.3 | 0.00 | 4.595 |
| 0.27115171 | 25.3116 | 5.9205 | 6370.0 | 2.5133 | 6372.5 | 0.00 | 4.573 |
| 0.27250747 | 25.3167 | 5.9421 | 6361.4 | 2.5307 | 6364.0 | 0.00 | 4.550 |
| 0.27387001 | 25.3215 | 5.9639 | 6353.0 | 2.5482 | 6355.6 | 0.00 | 4.527 |
| 0.27523936 | 25.3260 | 5.9860 | 6344.9 | 2.5657 | 6347.4 | 0.00 | 4.505 |
| 0.27661556 | 25.3304 | 6.0084 | 6336.9 | 2.5833 | 6339.4 | 0.00 | 4.482 |
| 0.27799863 | 25.3345 | 6.0310 | 6329.0 | 2.6009 | 6331.6 | 0.00 | 4.460 |
| 0.27938863 | 25.3384 | 6.0538 | 6321.4 | 2.6186 | 6324.0 | 0.00 | 4.438 |
| 0.28078557 | 25.3420 | 6.0768 | 6313.9 | 2.6364 | 6316.5 | 0.00 | 4.416 |
| 0.28218950 | 25.3454 | 6.1001 | 6306.5 | 2.6543 | 6309.2 | 0.00 | 4.394 |
| 0.28360044 | 25.3486 | 6.1236 | 6299.3 | 2.6722 | 6302.0 | 0.00 | 4.372 |
| 0.28501845 | 25.3516 | 6.1473 | 6292.2 | 2.6901 | 6294.9 | 0.00 | 4.350 |
| 0.28644354 | 25.3542 | 6.1712 | 6285.3 | 2.7082 | 6288.0 | 0.00 | 4.328 |
| 0.28787576 | 25.3565 | 6.1953 | 6278.5 | 2.7263 | 6281.2 | 0.00 | 4.307 |
| 0.28931514 | 25.3585 | 6.2196 | 6271.7 | 2.7444 | 6274.5 | 0.00 | 4.285 |
| 0.29076171 | 25.3601 | 6.2441 | 6265.1 | 2.7627 | 6267.9 | 0.00 | 4.264 |
| 0.29221552 | 25.3612 | 6.2688 | 6258.6 | 2.7810 | 6261.4 | 0.00 | 4.243 |
| 0.29367660 | 25.3618 | 6.2937 | 6252.1 | 2.7993 | 6254.9 | 0.00 | 4.222 |
| 0.29514498 | 25.3618 | 6.3187 | 6245.8 | 2.8177 | 6248.6 | 0.00 | 4.201 |
| 0.29662071 | 25.3610 | 6.3439 | 6239.5 | 2.8362 | 6242.3 | 0.00 | 4.180 |
| 0.29810381 | 25.3593 | 6.3692 | 6233.2 | 2.8547 | 6236.1 | 0.00 | 4.159 |
| 0.29959433 | 25.3565 | 6.3947 | 6227.1 | 2.8733 | 6229.9 | 0.00 | 4.138 |
| 0.30109230 | 25.3522 | 6.4204 | 6220.9 | 2.8920 | 6223.8 | 0.00 | 4.118 |
| 0.30259776 | 25.3463 | 6.4461 | 6214.8 | 2.9107 | 6217.7 | 0.00 | 4.097 |
| 0.30411075 | 25.3381 | 6.4720 | 6208.7 | 2.9295 | 6211.7 | 0.00 | 4.077 |
| 0.30563130 | 25.3268 | 6.4980 | 6202.7 | 2.9483 | 6205.6 | 0.00 | 4.057 |
| 0.30715946 | 25.3114 | 6.5242 | 6196.6 | 2.9672 | 6199.6 | 0.00 | 4.036 |
| 0.30869526 | 25.2900 | 6.5504 | 6190.6 | 2.9862 | 6193.6 | 0.00 | 4.016 |
| 0.31023873 | 25.2590 | 6.5767 | 6184.5 | 3.0052 | 6187.5 | 0.00 | 3.996 |
| 0.31178993 | 25.2109 | 6.6031 | 6178.5 | 3.0243 | 6181.5 | 0.00 | 3.977 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 0.31334888 | 25.1239 | 6.6296 | 6172.4 | 3.0434 | 6175.4 | 0.00 | 3.957 |
| 0.31491562 | 24.8279 | 6.6562 | 6166.3 | 3.0626 | 6169.3 | 0.00 | 3.937 |
| 0.31551520 | 24.8503 | 7.1864 | 6644.9 | 3.0700 | 6647.9 | 0.00 | 3.930 |
| 0.31649020 | 25.0924 | 7.2036 | 6640.2 | 3.0819 | 6643.3 | 0.00 | 3.917 |
| 0.31807265 | 25.2399 | 7.2314 | 6632.7 | 3.1012 | 6635.8 | 0.00 | 3.898 |
| 0.31966301 | 25.3283 | 7.2592 | 6625.1 | 3.1206 | 6628.2 | 0.00 | 3.879 |
| 0.32126133 | 25.3949 | 7.2871 | 6617.4 | 3.1400 | 6620.6 | 0.00 | 3.859 |
| 0.32286763 | 25.4502 | 7.3150 | 6609.7 | 3.1594 | 6612.9 | 0.00 | 3.840 |
| 0.32448197 | 25.4986 | 7.3429 | 6601.9 | 3.1790 | 6605.1 | 0.00 | 3.821 |
| 0.32610438 | 25.5425 | 7.3709 | 6594.1 | 3.1986 | 6597.3 | 0.00 | 3.802 |
| 0.32773491 | 25.5832 | 7.3988 | 6586.2 | 3.2182 | 6589.4 | 0.00 | 3.783 |
| 0.32937358 | 25.6215 | 7.4268 | 6578.2 | 3.2379 | 6581.4 | 0.00 | 3.764 |
| 0.33102045 | 25.6580 | 7.4547 | 6570.1 | 3.2576 | 6573.3 | 0.00 | 3.746 |
| 0.33267555 | 25.6932 | 7.4826 | 6561.8 | 3.2774 | 6565.1 | 0.00 | 3.727 |
| 0.33433893 | 25.7274 | 7.5105 | 6553.5 | 3.2973 | 6556.8 | 0.00 | 3.708 |
| 0.33601062 | 25.7607 | 7.5384 | 6545.1 | 3.3172 | 6548.4 | 0.00 | 3.690 |
| 0.33769068 | 25.7934 | 7.5662 | 6536.6 | 3.3372 | 6539.9 | 0.00 | 3.672 |
| 0.33937913 | 25.8256 | 7.5939 | 6527.9 | 3.3572 | 6531.2 | 0.00 | 3.653 |
| 0.34107602 | 25.8574 | 7.6216 | 6519.1 | 3.3772 | 6522.5 | 0.00 | 3.635 |
| 0.34278140 | 25.8890 | 7.6492 | 6510.1 | 3.3973 | 6513.5 | 0.00 | 3.617 |
| 0.34449531 | 25.9203 | 7.6767 | 6501.1 | 3.4175 | 6504.5 | 0.00 | 3.599 |
| 0.34621779 | 25.9515 | 7.7041 | 6491.8 | 3.4377 | 6495.3 | 0.00 | 3.581 |
| 0.34794888 | 25.9826 | 7.7314 | 6482.4 | 3.4580 | 6485.9 | 0.00 | 3.563 |
| 0.34968862 | 26.0136 | 7.7586 | 6472.9 | 3.4783 | 6476.3 | 0.00 | 3.546 |
| 0.35143706 | 26.0446 | 7.7857 | 6463.1 | 3.4986 | 6466.6 | 0.00 | 3.528 |
| 0.35319425 | 26.0752 | 7.8126 | 6453.2 | 3.5190 | 6456.7 | 0.00 | 3.510 |
| 0.35496022 | 26.1063 | 7.8393 | 6443.1 | 3.5395 | 6446.6 | 0.00 | 3.493 |
| 0.35673502 | 26.1375 | 7.8659 | 6432.7 | 3.5600 | 6436.3 | 0.00 | 3.476 |
| 0.35851870 | 26.1687 | 7.8923 | 6422.2 | 3.5805 | 6425.8 | 0.00 | 3.458 |
| 0.36031129 | 26.2000 | 7.9185 | 6411.5 | 3.6011 | 6415.1 | 0.00 | 3.441 |
| 0.36211285 | 26.2314 | 7.9445 | 6400.6 | 3.6217 | 6404.2 | 0.00 | 3.424 |
| 0.36392341 | 26.2629 | 7.9704 | 6389.4 | 3.6424 | 6393.1 | 0.00 | 3.407 |
| 0.36574303 | 26.2945 | 7.9960 | 6378.1 | 3.6631 | 6381.7 | 0.00 | 3.390 |
| 0.36757174 | 26.3263 | 8.0214 | 6366.5 | 3.6839 | 6370.2 | 0.00 | 3.373 |
| 0.36940960 | 26.3582 | 8.0465 | 6354.7 | 3.7047 | 6358.4 | 0.00 | 3.356 |
| 0.37125665 | 26.3902 | 8.0715 | 6342.7 | 3.7255 | 6346.4 | 0.00 | 3.340 |
| 0.37311293 | 26.4224 | 8.0962 | 6330.4 | 3.7464 | 6334.2 | 0.00 | 3.323 |
| 0.37497850 | 26.4547 | 8.1206 | 6317.9 | 3.7673 | 6321.7 | 0.00 | 3.306 |
| 0.37685339 | 26.4872 | 8.1448 | 6305.2 | 3.7883 | 6309.0 | 0.00 | 3.290 |
| 0.37873766 | 26.5198 | 8.1687 | 6292.3 | 3.8093 | 6296.1 | 0.00 | 3.274 |
| 0.38063135 | 26.5526 | 8.1924 | 6279.1 | 3.8303 | 6282.9 | 0.00 | 3.257 |
| 0.38253450 | 26.5855 | 8.2157 | 6265.7 | 3.8514 | 6269.5 | 0.00 | 3.241 |
| 0.38444718 | 26.6186 | 8.2388 | 6252.0 | 3.8725 | 6255.9 | 0.00 | 3.225 |
| 0.38636941 | 26.6518 | 8.2616 | 6238.1 | 3.8937 | 6242.0 | 0.00 | 3.209 |
| 0.38830126 | 26.6852 | 8.2841 | 6224.0 | 3.9149 | 6227.9 | 0.00 | 3.193 |
| 0.39024276 | 26.7187 | 8.3062 | 6209.6 | 3.9361 | 6213.5 | 0.00 | 3.177 |
| 0.39219398 | 26.7523 | 8.3281 | 6195.0 | 3.9574 | 6198.9 | 0.00 | 3.161 |
| 0.39415495 | 26.7861 | 8.3496 | 6180.1 | 3.9787 | 6184.1 | 0.00 | 3.146 |
| 0.39612572 | 26.8200 | 8.3708 | 6165.0 | 4.0000 | 6169.0 | 0.00 | 3.130 |
| 0.39810635 | 26.8540 | 8.3916 | 6149.5 | 4.0214 | 6153.5 | 0.00 | 3.114 |
| 0.40009688 | 26.8882 | 8.4120 | 6133.8 | 4.0428 | 6137.8 | 0.00 | 3.099 |
| 0.40209737 | 26.9224 | 8.4321 | 6117.8 | 4.0642 | 6121.9 | 0.00 | 3.083 |
| 0.40410785 | 26.9568 | 8.4518 | 6101.6 | 4.0857 | 6105.7 | 0.00 | 3.068 |
| 0.40612839 | 26.9912 | 8.4712 | 6085.2 | 4.1072 | 6089.3 | 0.00 | 3.053 |
| 0.40815904 | 27.0258 | 8.4902 | 6068.5 | 4.1287 | 6072.6 | 0.00 | 3.038 |
| 0.41019983 | 27.0604 | 8.5088 | 6051.6 | 4.1503 | 6055.7 | 0.00 | 3.023 |
| 0.41225083 | 27.0951 | 8.5271 | 6034.4 | 4.1719 | 6038.5 | 0.00 | 3.007 |
| 0.41431208 | 27.1299 | 8.5449 | 6016.9 | 4.1935 | 6021.1 | 0.00 | 2.993 |
| 0.41638364 | 27.1647 | 8.5624 | 5999.2 | 4.2151 | 6003.5 | 0.00 | 2.978 |
| 0.41846556 | 27.1997 | 8.5795 | 5981.3 | 4.2368 | 5985.5 | 0.00 | 2.963 |
| 0.42055789 | 27.2346 | 8.5962 | 5963.1 | 4.2585 | 5967.4 | 0.00 | 2.948 |
| 0.42266068 | 27.2696 | 8.6125 | 5944.7 | 4.2802 | 5949.0 | 0.00 | 2.933 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 0.42477398 | 27.3046 | 8.6284 | 5926.1 | 4.3020 | 5930.4 | 0.00 | 2.919 |
| 0.42689785 | 27.3397 | 8.6439 | 5907.2 | 4.3237 | 5911.5 | 0.00 | 2.904 |
| 0.42903234 | 27.3747 | 8.6590 | 5888.0 | 4.3455 | 5892.4 | 0.00 | 2.890 |
| 0.43117750 | 27.4098 | 8.6736 | 5868.7 | 4.3673 | 5873.0 | 0.00 | 2.875 |
| 0.43333339 | 27.4449 | 8.6879 | 5849.0 | 4.3892 | 5853.4 | 0.00 | 2.861 |
| 0.43550006 | 27.4800 | 8.7017 | 5829.2 | 4.4110 | 5833.6 | 0.00 | 2.847 |
| 0.43767756 | 27.5150 | 8.7151 | 5809.1 | 4.4329 | 5813.6 | 0.00 | 2.833 |
| 0.43986595 | 27.5500 | 8.7281 | 5788.8 | 4.4548 | 5793.3 | 0.00 | 2.819 |
| 0.44206528 | 27.5850 | 8.7406 | 5768.3 | 4.4768 | 5772.8 | 0.00 | 2.805 |
| 0.44427560 | 27.6199 | 8.7527 | 5747.6 | 4.4987 | 5752.1 | 0.00 | 2.791 |
| 0.44649698 | 27.6548 | 8.7644 | 5726.6 | 4.5207 | 5731.1 | 0.00 | 2.777 |
| 0.44872947 | 27.6896 | 8.7756 | 5705.4 | 4.5426 | 5709.9 | 0.00 | 2.763 |
| 0.45097311 | 27.7244 | 8.7864 | 5684.0 | 4.5646 | 5688.6 | 0.00 | 2.749 |
| 0.45322798 | 27.7590 | 8.7967 | 5662.4 | 4.5866 | 5667.0 | 0.00 | 2.736 |
| 0.45549412 | 27.7936 | 8.8066 | 5640.5 | 4.6087 | 5645.1 | 0.00 | 2.722 |
| 0.45777159 | 27.8281 | 8.8161 | 5618.5 | 4.6307 | 5623.1 | 0.00 | 2.708 |
| 0.46006045 | 27.8624 | 8.8251 | 5596.3 | 4.6527 | 5600.9 | 0.00 | 2.695 |
| 0.46236075 | 27.8967 | 8.8337 | 5573.8 | 4.6748 | 5578.5 | 0.00 | 2.682 |
| 0.46467255 | 27.9308 | 8.8418 | 5551.2 | 4.6969 | 5555.9 | 0.00 | 2.668 |
| 0.46699592 | 27.9647 | 8.8494 | 5528.3 | 4.7190 | 5533.1 | 0.00 | 2.655 |
| 0.46933090 | 27.9985 | 8.8566 | 5505.3 | 4.7411 | 5510.1 | 0.00 | 2.642 |
| 0.47167755 | 28.0322 | 8.8634 | 5482.1 | 4.7632 | 5486.9 | 0.00 | 2.629 |
| 0.47403594 | 28.0657 | 8.8696 | 5458.6 | 4.7853 | 5463.4 | 0.00 | 2.616 |
| 0.47640612 | 28.0990 | 8.8752 | 5434.9 | 4.8074 | 5439.7 | 0.00 | 2.602 |
| 0.47878815 | 28.1320 | 8.8803 | 5411.0 | 4.8296 | 5415.8 | 0.00 | 2.590 |
| 0.48118209 | 28.1649 | 8.8849 | 5386.9 | 4.8517 | 5391.7 | 0.00 | 2.577 |
| 0.48358800 | 28.1975 | 8.8889 | 5362.5 | 4.8738 | 5367.4 | 0.00 | 2.564 |
| 0.48600594 | 28.2298 | 8.8925 | 5337.9 | 4.8960 | 5342.8 | 0.00 | 2.551 |
| 0.48843597 | 28.2619 | 8.8954 | 5313.2 | 4.9181 | 5318.1 | 0.00 | 2.538 |
| 0.49087815 | 28.2936 | 8.8979 | 5288.2 | 4.9403 | 5293.1 | 0.00 | 2.526 |
| 0.49333254 | 28.3250 | 8.8998 | 5263.0 | 4.9625 | 5268.0 | 0.00 | 2.513 |
| 0.49579920 | 28.3561 | 8.9012 | 5237.7 | 4.9846 | 5242.7 | 0.00 | 2.501 |
| 0.49827820 | 28.3869 | 8.9021 | 5212.1 | 5.0068 | 5217.1 | 0.00 | 2.488 |
| 0.50076959 | 28.4172 | 8.9025 | 5186.4 | 5.0290 | 5191.5 | 0.00 | 2.476 |
| 0.50327344 | 28.4472 | 8.9024 | 5160.6 | 5.0511 | 5165.6 | 0.00 | 2.464 |
| 0.50578980 | 28.4768 | 8.9018 | 5134.5 | 5.0733 | 5139.6 | 0.00 | 2.451 |
| 0.50831875 | 28.5060 | 8.9007 | 5108.3 | 5.0955 | 5113.4 | 0.00 | 2.439 |
| 0.51086035 | 28.5348 | 8.8990 | 5082.0 | 5.1176 | 5087.1 | 0.00 | 2.427 |
| 0.51341465 | 28.5630 | 8.8969 | 5055.5 | 5.1398 | 5060.7 | 0.00 | 2.415 |
| 0.51598172 | 28.5909 | 8.8943 | 5028.9 | 5.1619 | 5034.1 | 0.00 | 2.403 |
| 0.51856163 | 28.6182 | 8.8913 | 5002.1 | 5.1841 | 5007.3 | 0.00 | 2.391 |
| 0.52115444 | 28.6451 | 8.8877 | 4975.3 | 5.2062 | 4980.5 | 0.00 | 2.379 |
| 0.52376021 | 28.6715 | 8.8837 | 4948.3 | 5.2283 | 4953.5 | 0.00 | 2.367 |
| 0.52637901 | 28.6973 | 8.8792 | 4921.2 | 5.2505 | 4926.4 | 0.00 | 2.355 |
| 0.52901091 | 28.7226 | 8.8742 | 4893.9 | 5.2726 | 4899.2 | 0.00 | 2.344 |
| 0.53165596 | 28.7473 | 8.8688 | 4866.6 | 5.2947 | 4871.9 | 0.00 | 2.332 |
| 0.53431424 | 28.7715 | 8.8630 | 4839.2 | 5.3168 | 4844.5 | 0.00 | 2.320 |
| 0.53698581 | 28.7950 | 8.8566 | 4811.7 | 5.3389 | 4817.1 | 0.00 | 2.309 |
| 0.53967074 | 28.8180 | 8.8499 | 4784.1 | 5.3610 | 4789.5 | 0.00 | 2.297 |
| 0.54236910 | 28.8404 | 8.8427 | 4756.5 | 5.3830 | 4761.8 | 0.00 | 2.286 |
| 0.54508094 | 28.8621 | 8.8351 | 4728.7 | 5.4051 | 4734.1 | 0.00 | 2.275 |
| 0.54780635 | 28.8832 | 8.8271 | 4700.9 | 5.4271 | 4706.3 | 0.00 | 2.263 |
| 0.55054538 | 28.9036 | 8.8186 | 4673.0 | 5.4491 | 4678.5 | 0.00 | 2.252 |
| 0.55329810 | 28.9233 | 8.8097 | 4645.1 | 5.4711 | 4650.6 | 0.00 | 2.241 |
| 0.55606460 | 28.9424 | 8.8005 | 4617.2 | 5.4931 | 4622.6 | 0.00 | 2.230 |
| 0.55884492 | 28.9607 | 8.7908 | 4589.1 | 5.5151 | 4594.7 | 0.00 | 2.219 |
| 0.56163914 | 28.9783 | 8.7807 | 4561.1 | 5.5370 | 4566.6 | 0.00 | 2.208 |
| 0.56444734 | 28.9952 | 8.7703 | 4533.0 | 5.5590 | 4538.5 | 0.00 | 2.197 |
| 0.56726958 | 29.0113 | 8.7595 | 4504.9 | 5.5809 | 4510.4 | 0.00 | 2.186 |
| 0.57010592 | 29.0267 | 8.7483 | 4476.7 | 5.6028 | 4482.3 | 0.00 | 2.175 |
| 0.57295645 | 29.0412 | 8.7367 | 4448.5 | 5.6246 | 4454.2 | 0.00 | 2.164 |
| 0.57582123 | 29.0549 | 8.7247 | 4420.4 | 5.6465 | 4426.0 | 0.00 | 2.153 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 0.57870034 | 29.0679 | 8.7124 | 4392.2 | 5.6683 | 4397.8 | 0.00 | 2.142 |
| 0.58159384 | 29.0800 | 8.6998 | 4364.0 | 5.6901 | 4369.7 | 0.00 | 2.132 |
| 0.58450181 | 29.0912 | 8.6868 | 4335.8 | 5.7119 | 4341.5 | 0.00 | 2.121 |
| 0.58742432 | 29.1015 | 8.6735 | 4307.6 | 5.7336 | 4313.3 | 0.00 | 2.111 |
| 0.59036144 | 29.1110 | 8.6598 | 4279.4 | 5.7553 | 4285.2 | 0.00 | 2.100 |
| 0.59331325 | 29.1195 | 8.6458 | 4251.2 | 5.7770 | 4257.0 | 0.00 | 2.090 |
| 0.59627982 | 29.1272 | 8.6315 | 4223.1 | 5.7987 | 4228.9 | 0.00 | 2.079 |
| 0.59926122 | 29.1338 | 8.6169 | 4195.0 | 5.8203 | 4200.8 | 0.00 | 2.069 |
| 0.60225752 | 29.1395 | 8.6020 | 4166.9 | 5.8419 | 4172.7 | 0.00 | 2.059 |
| 0.60526881 | 29.1443 | 8.5867 | 4138.8 | 5.8635 | 4144.6 | 0.00 | 2.048 |
| 0.60829515 | 29.1480 | 8.5712 | 4110.7 | 5.8850 | 4116.6 | 0.00 | 2.038 |
| 0.61133663 | 29.1507 | 8.5554 | 4082.7 | 5.9065 | 4088.7 | 0.00 | 2.028 |
| 0.61439331 | 29.1523 | 8.5393 | 4054.8 | 5.9280 | 4060.7 | 0.00 | 2.018 |
| 0.61746528 | 29.1529 | 8.5229 | 4026.9 | 5.9494 | 4032.8 | 0.00 | 2.008 |
| 0.62055260 | 29.1524 | 8.5063 | 3999.0 | 5.9708 | 4005.0 | 0.00 | 1.998 |
| 0.62365537 | 29.1508 | 8.4894 | 3971.2 | 5.9922 | 3977.2 | 0.00 | 1.988 |
| 0.62677364 | 29.1481 | 8.4722 | 3943.5 | 6.0135 | 3949.5 | 0.00 | 1.978 |
| 0.62990751 | 29.1442 | 8.4548 | 3915.8 | 6.0348 | 3921.8 | 0.00 | 1.968 |
| 0.63305705 | 29.1391 | 8.4371 | 3888.1 | 6.0561 | 3894.2 | 0.00 | 1.959 |
| 0.63622234 | 29.1328 | 8.4192 | 3860.6 | 6.0773 | 3866.7 | 0.00 | 1.949 |
| 0.63940345 | 29.1253 | 8.4010 | 3833.1 | 6.0984 | 3839.2 | 0.00 | 1.939 |
| 0.64260046 | 29.1166 | 8.3826 | 3805.7 | 6.1196 | 3811.8 | 0.00 | 1.929 |
| 0.64581347 | 29.1066 | 8.3640 | 3778.3 | 6.1407 | 3784.5 | 0.00 | 1.920 |
| 0.64904253 | 29.0952 | 8.3452 | 3751.1 | 6.1617 | 3757.2 | 0.00 | 1.910 |
| 0.65228775 | 29.0825 | 8.3262 | 3723.9 | 6.1827 | 3730.1 | 0.00 | 1.901 |
| 0.65554919 | 29.0685 | 8.3069 | 3696.8 | 6.2036 | 3703.0 | 0.00 | 1.891 |
| 0.65882693 | 29.0531 | 8.2875 | 3669.8 | 6.2246 | 3676.0 | 0.00 | 1.882 |
| 0.66212107 | 29.0362 | 8.2678 | 3642.9 | 6.2454 | 3649.1 | 0.00 | 1.873 |
| 0.66543167 | 29.0179 | 8.2480 | 3616.1 | 6.2662 | 3622.3 | 0.00 | 1.863 |
| 0.66875883 | 28.9980 | 8.2280 | 3589.4 | 6.2870 | 3595.6 | 0.00 | 1.854 |
| 0.67210262 | 28.9767 | 8.2078 | 3562.7 | 6.3077 | 3569.0 | 0.00 | 1.845 |
| 0.67546314 | 28.9537 | 8.1874 | 3536.2 | 6.3284 | 3542.5 | 0.00 | 1.836 |
| 0.67884045 | 28.9292 | 8.1668 | 3509.8 | 6.3490 | 3516.1 | 0.00 | 1.826 |
| 0.68223466 | 28.9030 | 8.1461 | 3483.5 | 6.3695 | 3489.8 | 0.00 | 1.817 |
| 0.68564583 | 28.8752 | 8.1253 | 3457.2 | 6.3900 | 3463.6 | 0.00 | 1.808 |
| 0.68907406 | 28.8456 | 8.1042 | 3431.1 | 6.4105 | 3437.6 | 0.00 | 1.799 |
| 0.69251943 | 28.8143 | 8.0830 | 3405.2 | 6.4309 | 3411.6 | 0.00 | 1.790 |
| 0.69598202 | 28.7811 | 8.0617 | 3379.3 | 6.4512 | 3385.7 | 0.00 | 1.781 |
| 0.69946194 | 28.7461 | 8.0403 | 3353.5 | 6.4715 | 3360.0 | 0.00 | 1.773 |
| 0.70295924 | 28.7091 | 8.0187 | 3327.9 | 6.4917 | 3334.4 | 0.00 | 1.764 |
| 0.70647404 | 28.6702 | 7.9969 | 3302.3 | 6.5119 | 3308.8 | 0.00 | 1.755 |
| 0.71000641 | 28.6293 | 7.9750 | 3276.9 | 6.5320 | 3283.4 | 0.00 | 1.746 |
| 0.71355644 | 28.5863 | 7.9530 | 3251.6 | 6.5521 | 3258.1 | 0.00 | 1.738 |
| 0.71712423 | 28.5411 | 7.9308 | 3226.4 | 6.5721 | 3233.0 | 0.00 | 1.729 |
| 0.72070985 | 28.4937 | 7.9086 | 3201.3 | 6.5920 | 3207.9 | 0.00 | 1.720 |
| 0.72431340 | 28.4440 | 7.8862 | 3176.4 | 6.6119 | 3183.0 | 0.00 | 1.712 |
| 0.72793496 | 28.3920 | 7.8638 | 3151.6 | 6.6317 | 3158.2 | 0.00 | 1.703 |
| 0.73157464 | 28.3396 | 7.8412 | 3126.9 | 6.6514 | 3133.6 | 0.00 | 1.695 |
| 0.73523251 | 28.2827 | 7.8185 | 3102.4 | 6.6711 | 3109.0 | 0.00 | 1.686 |
| 0.73890867 | 28.2232 | 7.7958 | 3077.9 | 6.6907 | 3084.6 | 0.00 | 1.678 |
| 0.74260322 | 28.1610 | 7.7729 | 3053.7 | 6.7102 | 3060.4 | 0.00 | 1.670 |
| 0.74631623 | 28.0961 | 7.7500 | 3029.5 | 6.7297 | 3036.2 | 0.00 | 1.661 |
| 0.75004781 | 28.0283 | 7.7270 | 3005.5 | 6.7491 | 3012.2 | 0.00 | 1.653 |
| 0.75379805 | 27.9575 | 7.7039 | 2981.6 | 6.7685 | 2988.4 | 0.00 | 1.645 |
| 0.75756704 | 27.8837 | 7.6807 | 2957.8 | 6.7877 | 2964.6 | 0.00 | 1.637 |
| 0.76135488 | 27.8066 | 7.6575 | 2934.2 | 6.8069 | 2941.0 | 0.00 | 1.628 |
| 0.76516165 | 27.7263 | 7.6342 | 2910.7 | 6.8261 | 2917.6 | 0.00 | 1.620 |
| 0.76898746 | 27.6425 | 7.6109 | 2887.4 | 6.8451 | 2894.3 | 0.00 | 1.612 |
| 0.77283240 | 27.5551 | 7.5874 | 2864.2 | 6.8641 | 2871.1 | 0.00 | 1.604 |
| 0.77669656 | 27.4640 | 7.5640 | 2841.1 | 6.8830 | 2848.0 | 0.00 | 1.596 |
| 0.78058004 | 27.3691 | 7.5405 | 2818.2 | 6.9018 | 2825.1 | 0.00 | 1.588 |
| 0.78448294 | 27.2700 | 7.5169 | 2795.4 | 6.9206 | 2802.3 | 0.00 | 1.580 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 0.78840536 | 27.1668 | 7.4933 | 2772.8 | 6.9393 | 2779.7 | 0.00 | 1.573 |
| 0.79234738 | 27.0591 | 7.4696 | 2750.3 | 6.9579 | 2757.2 | 0.00 | 1.565 |
| 0.79630912 | 26.9467 | 7.4459 | 2727.9 | 6.9764 | 2734.9 | 0.00 | 1.557 |
| 0.80029067 | 26.8295 | 7.4222 | 2705.7 | 6.9949 | 2712.7 | 0.00 | 1.549 |
| 0.80429212 | 26.7072 | 7.3984 | 2683.6 | 7.0132 | 2690.6 | 0.00 | 1.542 |
| 0.80831358 | 26.5796 | 7.3746 | 2661.7 | 7.0315 | 2668.7 | 0.00 | 1.534 |
| 0.81235515 | 26.4463 | 7.3508 | 2639.9 | 7.0497 | 2646.9 | 0.00 | 1.526 |
| 0.81641693 | 26.3071 | 7.3269 | 2618.2 | 7.0679 | 2625.3 | 0.00 | 1.519 |
| 0.82049901 | 26.1616 | 7.3031 | 2596.7 | 7.0859 | 2603.8 | 0.00 | 1.511 |
| 0.82460150 | 26.0095 | 7.2792 | 2575.3 | 7.1039 | 2582.4 | 0.00 | 1.504 |
| 0.82872451 | 25.8504 | 7.2553 | 2554.1 | 7.1217 | 2561.2 | 0.00 | 1.496 |
| 0.83286813 | 25.6839 | 7.2314 | 2533.0 | 7.1395 | 2540.1 | 0.00 | 1.489 |
| 0.83703248 | 25.5094 | 7.2074 | 2512.1 | 7.1572 | 2519.2 | 0.00 | 1.481 |
| 0.84121764 | 25.3266 | 7.1835 | 2491.3 | 7.1749 | 2498.4 | 0.00 | 1.474 |
| 0.84542373 | 25.1348 | 7.1595 | 2470.6 | 7.1924 | 2477.8 | 0.00 | 1.467 |
| 0.84965084 | 24.9334 | 7.1356 | 2450.1 | 7.2098 | 2457.3 | 0.00 | 1.459 |
| 0.85389910 | 24.7218 | 7.1116 | 2429.7 | 7.2272 | 2436.9 | 0.00 | 1.452 |
| 0.85816859 | 24.4991 | 7.0877 | 2409.5 | 7.2444 | 2416.7 | 0.00 | 1.445 |
| 0.86245944 | 24.2646 | 7.0637 | 2389.4 | 7.2616 | 2396.7 | 0.00 | 1.438 |
| 0.86677173 | 24.0172 | 7.0398 | 2369.4 | 7.2787 | 2376.7 | 0.00 | 1.430 |
| 0.87110559 | 23.7560 | 7.0158 | 2349.6 | 7.2957 | 2356.9 | 0.00 | 1.423 |
| 0.87546112 | 23.4797 | 6.9919 | 2330.0 | 7.3126 | 2337.3 | 0.00 | 1.416 |
| 0.87983843 | 23.1869 | 6.9680 | 2310.5 | 7.3294 | 2317.8 | 0.00 | 1.409 |
| 0.88423762 | 22.8761 | 6.9441 | 2291.1 | 7.3461 | 2298.4 | 0.00 | 1.402 |
| 0.88865881 | 22.5455 | 6.9202 | 2271.8 | 7.3627 | 2279.2 | 0.00 | 1.395 |
| 0.89310210 | 22.1930 | 6.8963 | 2252.7 | 7.3793 | 2260.1 | 0.00 | 1.388 |
| 0.89756761 | 21.8163 | 6.8724 | 2233.8 | 7.3957 | 2241.2 | 0.00 | 1.381 |
| 0.90205545 | 21.4123 | 6.8486 | 2214.9 | 7.4120 | 2222.3 | 0.00 | 1.374 |
| 0.90656573 | 20.9779 | 6.8248 | 2196.2 | 7.4282 | 2203.7 | 0.00 | 1.368 |
| 0.91109856 | 20.5089 | 6.8010 | 2177.7 | 7.4444 | 2185.1 | 0.00 | 1.361 |
| 0.91565405 | 20.0005 | 6.7772 | 2159.3 | 7.4604 | 2166.7 | 0.00 | 1.354 |
| 0.92023232 | 19.4466 | 6.7534 | 2141.0 | 7.4764 | 2148.5 | 0.00 | 1.347 |
| 0.92483348 | 18.8399 | 6.7297 | 2122.9 | 7.4922 | 2130.4 | 0.00 | 1.341 |
| 0.92945765 | 18.1709 | 6.7060 | 2104.9 | 7.5079 | 2112.4 | 0.00 | 1.334 |
| 0.93410494 | 17.4272 | 6.6823 | 2087.0 | 7.5236 | 2094.5 | 0.00 | 1.327 |
| 0.93877546 | 16.5924 | 6.6586 | 2069.3 | 7.5391 | 2076.8 | 0.00 | 1.321 |
| 0.94346934 | 15.6442 | 6.6350 | 2051.7 | 7.5545 | 2059.2 | 0.00 | 1.314 |
| 0.94818668 | 14.5504 | 6.6115 | 2034.2 | 7.5698 | 2041.8 | 0.00 | 1.308 |
| 0.95292762 | 13.2624 | 6.5879 | 2016.9 | 7.5851 | 2024.5 | 0.00 | 1.301 |
| 0.95769226 | 11.7018 | 6.5644 | 1999.7 | 7.6002 | 2007.3 | 0.00 | 1.295 |
| 0.96248072 | 9.72743 | 6.5410 | 1982.6 | 7.6152 | 1990.3 | 0.00 | 1.288 |
| 0.96729312 | 7.03962 | 6.5176 | 1965.7 | 7.6301 | 1973.3 | 0.00 | 1.282 |
| 0.97212959 | 2.76831 | 6.4942 | 1948.9 | 7.6449 | 1956.6 | 0.00 | 1.275 |
| 0.97699023 | -10.4456 | 6.4709 | 1932.3 | 7.6596 | 1939.9 | 0.00 | 1.269 |
| 0.97760223 | -22.7447 | 6.4680 | 1930.2 | 7.6614 | 1937.9 | 0.00 | 1.268 |
| 0.97779777 | -22.7620 | 25.854 | 7714.0 | 7.6620 | 7721.6 | 0.00 | 1.268 |
| 0.98187519 | -0.169924 | 25.716 | 7640.3 | 7.6741 | 7648.0 | 0.00 | 1.263 |
| 0.98678456 | 3.55695 | 25.547 | 7552.9 | 7.6886 | 7560.6 | 0.00 | 1.256 |
| 0.99171848 | 4.46341 | 25.381 | 7466.5 | 7.7030 | 7474.2 | 0.00 | 1.250 |
| 0.99667708 | 2.40080 | 25.217 | 7381.2 | 7.7172 | 7388.9 | 0.00 | 1.244 |
| 0.99936105 | -8.95807 | 25.128 | 7335.6 | 7.7249 | 7343.3 | 0.00 | 1.241 |
| 0.99963891 | -8.87175 | 37.894 | 11059 | 7.7257 | 11067 | 0.00 | 1.240 |
| 1.0016605 | 3.16228 | 38.008 | 11070 | 7.7314 | 11078 | 0.00 | 1.238 |
| 1.0066688 | 9.52744 | 37.726 | 10933 | 7.7454 | 10941 | 0.00 | 1.232 |
| 1.0117021 | 12.9304 | 37.445 | 10798 | 7.7593 | 10806 | 0.00 | 1.226 |
| 1.0167606 | 15.4145 | 37.166 | 10664 | 7.7731 | 10672 | 0.00 | 1.219 |
| 1.0218444 | 17.4130 | 36.890 | 10532 | 7.7868 | 10540 | 0.00 | 1.213 |
| 1.0269536 | 19.1007 | 36.616 | 10402 | 7.8004 | 10410 | 0.00 | 1.207 |
| 1.0320884 | 20.5681 | 36.343 | 10273 | 7.8139 | 10281 | 0.00 | 1.201 |
| 1.0372489 | 21.8694 | 36.073 | 10146 | 7.8272 | 10154 | 0.00 | 1.195 |
| 1.0424351 | 23.0399 | 35.805 | 10020 | 7.8404 | 10028 | 0.00 | 1.189 |
| 1.0476473 | 24.1040 | 35.539 | 9896.5 | 7.8536 | 9904.4 | 0.00 | 1.183 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 1.0528855 | 25.0795 | 35.275 | 9774.1 | 7.8666 | 9782.0 | 0.00 | 1.178 |
| 1.0581499 | 25.9799 | 35.013 | 9653.3 | 7.8794 | 9661.2 | 0.00 | 1.172 |
| 1.0634407 | 26.8155 | 34.753 | 9533.9 | 7.8922 | 9541.8 | 0.00 | 1.166 |
| 1.0687579 | 27.5945 | 34.495 | 9416.0 | 7.9049 | 9423.9 | 0.00 | 1.160 |
| 1.0741017 | 28.3237 | 34.239 | 9299.6 | 7.9174 | 9307.5 | 0.00 | 1.154 |
| 1.0794722 | 29.0083 | 33.985 | 9184.7 | 7.9298 | 9192.6 | 0.00 | 1.149 |
| 1.0848695 | 29.6529 | 33.732 | 9071.1 | 7.9421 | 9079.1 | 0.00 | 1.143 |
| 1.0902939 | 30.2614 | 33.482 | 8959.0 | 7.9543 | 8967.0 | 0.00 | 1.137 |
| 1.0957454 | 30.8368 | 33.234 | 8848.3 | 7.9663 | 8856.3 | 0.00 | 1.132 |
| 1.1012241 | 31.3819 | 32.987 | 8739.0 | 7.9782 | 8747.0 | 0.00 | 1.126 |
| 1.1067302 | 31.8992 | 32.742 | 8631.0 | 7.9901 | 8639.0 | 0.00 | 1.120 |
| 1.1122639 | 32.3905 | 32.500 | 8524.4 | 8.0017 | 8532.4 | 0.00 | 1.115 |
| 1.1178252 | 32.8578 | 32.259 | 8419.1 | 8.0133 | 8427.1 | 0.00 | 1.109 |
| 1.1234143 | 33.3025 | 32.020 | 8315.1 | 8.0247 | 8323.1 | 0.00 | 1.104 |
| 1.1290314 | 33.7260 | 31.782 | 8212.4 | 8.0361 | 8220.5 | 0.00 | 1.098 |
| 1.1346765 | 34.1294 | 31.547 | 8111.0 | 8.0473 | 8119.1 | 0.00 | 1.093 |
| 1.1403499 | 34.5139 | 31.313 | 8010.9 | 8.0583 | 8018.9 | 0.00 | 1.087 |
| 1.1460517 | 34.8802 | 31.081 | 7912.0 | 8.0693 | 7920.1 | 0.00 | 1.082 |
| 1.1517819 | 35.2293 | 30.851 | 7814.3 | 8.0801 | 7822.4 | 0.00 | 1.076 |
| 1.1575408 | 35.5617 | 30.622 | 7717.9 | 8.0908 | 7726.0 | 0.00 | 1.071 |
| 1.1633285 | 35.8780 | 30.396 | 7622.6 | 8.1013 | 7630.7 | 0.00 | 1.066 |
| 1.1691452 | 36.1787 | 30.171 | 7528.6 | 8.1118 | 7536.7 | 0.00 | 1.060 |
| 1.1749909 | 36.4642 | 29.948 | 7435.7 | 8.1221 | 7443.8 | 0.00 | 1.055 |
| 1.1808659 | 36.7347 | 29.726 | 7343.9 | 8.1323 | 7352.1 | 0.00 | 1.050 |
| 1.1867702 | 36.9904 | 29.506 | 7253.3 | 8.1423 | 7261.5 | 0.00 | 1.045 |
| 1.1927040 | 37.2315 | 29.288 | 7163.9 | 8.1523 | 7172.0 | 0.00 | 1.040 |
| 1.1986676 | 37.4577 | 29.071 | 7075.5 | 8.1621 | 7083.7 | 0.00 | 1.034 |
| 1.2046609 | 37.6690 | 28.856 | 6988.3 | 8.1717 | 6996.4 | 0.00 | 1.029 |
| 1.2106842 | 37.8650 | 28.643 | 6902.1 | 8.1813 | 6910.3 | 0.00 | 1.024 |
| 1.2167376 | 38.0451 | 28.431 | 6817.0 | 8.1907 | 6825.2 | 0.00 | 1.019 |
| 1.2228213 | 38.2085 | 28.221 | 6733.0 | 8.2000 | 6741.2 | 0.00 | 1.014 |
| 1.2289354 | 38.3540 | 28.013 | 6650.0 | 8.2091 | 6658.2 | 0.00 | 1.009 |
| 1.2350801 | 38.4802 | 27.806 | 6568.0 | 8.2181 | 6576.2 | 0.00 | 1.004 |
| 1.2412555 | 38.5848 | 27.601 | 6487.1 | 8.2270 | 6495.3 | 0.00 | 0.9989 |
| 1.2474618 | 38.6646 | 27.397 | 6407.2 | 8.2358 | 6415.4 | 0.00 | 0.9939 |
| 1.2536991 | 38.7151 | 27.195 | 6328.2 | 8.2444 | 6336.5 | 0.00 | 0.9889 |
| 1.2599676 | 38.7296 | 26.994 | 6250.3 | 8.2529 | 6258.5 | 0.00 | 0.9840 |
| 1.2662674 | 38.6970 | 26.794 | 6173.2 | 8.2612 | 6181.5 | 0.00 | 0.9791 |
| 1.2725988 | 38.5988 | 26.596 | 6097.1 | 8.2695 | 6105.4 | 0.00 | 0.9743 |
| 1.2789618 | 38.3993 | 26.400 | 6022.0 | 8.2776 | 6030.3 | 0.00 | 0.9694 |
| 1.2853566 | 38.0146 | 26.205 | 5947.8 | 8.2855 | 5956.1 | 0.00 | 0.9646 |
| 1.2917833 | 37.1555 | 26.012 | 5874.5 | 8.2933 | 5882.8 | 0.00 | 0.9598 |
| 1.2965165 | 34.7103 | 25.871 | 5821.3 | 8.2990 | 5829.6 | 0.00 | 0.9563 |
| 1.2982423 | 34.6325 | 30.254 | 6798.5 | 8.3010 | 6806.8 | 0.00 | 0.9550 |
| 1.2982835 | 34.7017 | 30.252 | 6797.9 | 8.3011 | 6806.2 | 0.00 | 0.9550 |
| 1.3047335 | 37.9088 | 30.007 | 6709.6 | 8.3086 | 6717.9 | 0.00 | 0.9503 |
| 1.3112571 | 38.9968 | 29.763 | 6622.0 | 8.3160 | 6630.3 | 0.00 | 0.9455 |
| 1.3178134 | 39.7146 | 29.521 | 6535.5 | 8.3233 | 6543.8 | 0.00 | 0.9408 |
| 1.3244025 | 40.2643 | 29.282 | 6450.1 | 8.3304 | 6458.4 | 0.00 | 0.9362 |
| 1.3310245 | 40.7135 | 29.044 | 6365.9 | 8.3375 | 6374.3 | 0.00 | 0.9315 |
| 1.3376796 | 41.0926 | 28.808 | 6282.8 | 8.3443 | 6291.2 | 0.00 | 0.9269 |
| 1.3443680 | 41.4174 | 28.575 | 6200.9 | 8.3511 | 6209.2 | 0.00 | 0.9222 |
| 1.3510899 | 41.6960 | 28.343 | 6120.0 | 8.3577 | 6128.4 | 0.00 | 0.9177 |
| 1.3578453 | 41.9314 | 28.113 | 6040.2 | 8.3642 | 6048.6 | 0.00 | 0.9131 |
| 1.3646345 | 42.1234 | 27.897 | 5964.0 | 8.3705 | 5972.4 | 0.00 | 0.9086 |
| 1.3714577 | 42.2814 | 27.695 | 5891.4 | 8.3767 | 5899.7 | 0.00 | 0.9040 |
| 1.3783150 | 42.3984 | 27.496 | 5819.9 | 8.3827 | 5828.3 | 0.00 | 0.8995 |
| 1.3852066 | 42.4558 | 27.300 | 5749.7 | 8.3887 | 5758.1 | 0.00 | 0.8951 |
| 1.3921326 | 42.4046 | 27.107 | 5680.6 | 8.3945 | 5688.9 | 0.00 | 0.8906 |
| 1.3990933 | 42.0209 | 26.916 | 5612.5 | 8.4001 | 5620.9 | 0.00 | 0.8862 |
| 1.4018615 | 41.3093 | 26.841 | 5585.9 | 8.4023 | 5594.3 | 0.00 | 0.8844 |
| 1.4037384 | 41.3414 | 28.630 | 5950.1 | 8.4038 | 5958.5 | 0.00 | 0.8832 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 1.4060887 | 42.1539 | 28.560 | 5925.7 | 8.4056 | 5934.1 | 0.00 | 0.8818 |
| 1.4131192 | 43.0410 | 28.354 | 5853.8 | 8.4110 | 5862.2 | 0.00 | 0.8774 |
| 1.4201848 | 43.5497 | 28.151 | 5782.9 | 8.4162 | 5791.3 | 0.00 | 0.8730 |
| 1.4272857 | 43.9423 | 27.951 | 5713.2 | 8.4213 | 5721.6 | 0.00 | 0.8687 |
| 1.4344221 | 44.2742 | 27.753 | 5644.5 | 8.4263 | 5652.9 | 0.00 | 0.8643 |
| 1.4415942 | 44.5668 | 27.557 | 5576.9 | 8.4311 | 5585.3 | 0.00 | 0.8600 |
| 1.4488022 | 44.8307 | 27.364 | 5510.2 | 8.4358 | 5518.7 | 0.00 | 0.8558 |
| 1.4560462 | 45.0718 | 27.174 | 5444.6 | 8.4403 | 5453.1 | 0.00 | 0.8515 |
| 1.4633265 | 45.2936 | 26.985 | 5380.0 | 8.4447 | 5388.4 | 0.00 | 0.8473 |
| 1.4706431 | 45.4979 | 26.799 | 5316.3 | 8.4490 | 5324.7 | 0.00 | 0.8431 |
| 1.4779963 | 45.6869 | 26.623 | 5255.1 | 8.4531 | 5263.5 | 0.00 | 0.8389 |
| 1.4853863 | 45.8662 | 26.451 | 5195.2 | 8.4571 | 5203.6 | 0.00 | 0.8347 |
| 1.4928132 | 46.0356 | 26.282 | 5136.2 | 8.4609 | 5144.6 | 0.00 | 0.8305 |
| 1.5002773 | 46.1952 | 26.115 | 5078.1 | 8.4646 | 5086.6 | 0.00 | 0.8264 |
| 1.5077787 | 46.3447 | 25.950 | 5021.0 | 8.4682 | 5029.5 | 0.00 | 0.8223 |
| 1.5153176 | 46.4839 | 25.787 | 4964.7 | 8.4716 | 4973.2 | 0.00 | 0.8182 |
| 1.5228942 | 46.6118 | 25.627 | 4909.3 | 8.4749 | 4917.8 | 0.00 | 0.8141 |
| 1.5305086 | 46.7269 | 25.469 | 4854.7 | 8.4781 | 4863.2 | 0.00 | 0.8101 |
| 1.5381612 | 46.8266 | 25.312 | 4800.9 | 8.4811 | 4809.4 | 0.00 | 0.8061 |
| 1.5458520 | 46.9058 | 25.158 | 4747.9 | 8.4839 | 4756.4 | 0.00 | 0.8020 |
| 1.5535812 | 46.9546 | 25.006 | 4695.7 | 8.4867 | 4704.2 | 0.00 | 0.7981 |
| 1.5613491 | 46.9488 | 24.855 | 4644.2 | 8.4892 | 4652.7 | 0.00 | 0.7941 |
| 1.5691559 | 46.7997 | 24.707 | 4593.5 | 8.4917 | 4602.0 | 0.00 | 0.7901 |
| 1.5732678 | 46.4683 | 24.630 | 4567.2 | 8.4929 | 4575.7 | 0.00 | 0.7881 |
| 1.5770017 | 46.4656 | 25.733 | 4760.4 | 8.4940 | 4768.9 | 0.00 | 0.7862 |
| 1.5773321 | 46.5384 | 25.726 | 4758.3 | 8.4941 | 4766.8 | 0.00 | 0.7860 |
| 1.5848867 | 47.2640 | 25.583 | 4709.2 | 8.4962 | 4717.7 | 0.00 | 0.7823 |
| 1.5928111 | 47.6379 | 25.435 | 4658.7 | 8.4982 | 4667.2 | 0.00 | 0.7784 |
| 1.6007752 | 47.9239 | 25.289 | 4608.9 | 8.5001 | 4617.4 | 0.00 | 0.7745 |
| 1.6087790 | 48.1694 | 25.144 | 4559.7 | 8.5018 | 4568.2 | 0.00 | 0.7707 |
| 1.6168229 | 48.3912 | 25.001 | 4511.2 | 8.5034 | 4519.7 | 0.00 | 0.7668 |
| 1.6249070 | 48.5972 | 24.859 | 4463.3 | 8.5049 | 4471.8 | 0.00 | 0.7630 |
| 1.6330316 | 48.7917 | 24.719 | 4416.0 | 8.5062 | 4424.5 | 0.00 | 0.7592 |
| 1.6411967 | 48.9777 | 24.580 | 4369.3 | 8.5074 | 4377.8 | 0.00 | 0.7555 |
| 1.6494027 | 49.1569 | 24.442 | 4323.2 | 8.5085 | 4331.7 | 0.00 | 0.7517 |
| 1.6576497 | 49.3300 | 24.301 | 4276.8 | 8.5094 | 4285.3 | 0.00 | 0.7480 |
| 1.6659380 | 49.4977 | 24.158 | 4230.5 | 8.5102 | 4239.0 | 0.00 | 0.7442 |
| 1.6742677 | 49.6612 | 24.016 | 4184.8 | 8.5108 | 4193.3 | 0.00 | 0.7405 |
| 1.6826390 | 49.8214 | 23.876 | 4139.7 | 8.5113 | 4148.2 | 0.00 | 0.7368 |
| 1.6910522 | 49.9783 | 23.731 | 4094.1 | 8.5116 | 4102.6 | 0.00 | 0.7332 |
| 1.6995075 | 50.1293 | 23.579 | 4047.6 | 8.5118 | 4056.1 | 0.00 | 0.7295 |
| 1.7080050 | 50.2750 | 23.428 | 4001.7 | 8.5119 | 4010.2 | 0.00 | 0.7259 |
| 1.7165450 | 50.4161 | 23.278 | 3956.3 | 8.5119 | 3964.8 | 0.00 | 0.7223 |
| 1.7251278 | 50.5529 | 23.129 | 3911.4 | 8.5117 | 3920.0 | 0.00 | 0.7187 |
| 1.7337534 | 50.6858 | 22.982 | 3867.1 | 8.5113 | 3875.6 | 0.00 | 0.7151 |
| 1.7424222 | 50.8151 | 22.835 | 3823.3 | 8.5108 | 3831.8 | 0.00 | 0.7116 |
| 1.7511343 | 50.9411 | 22.689 | 3780.0 | 8.5102 | 3788.5 | 0.00 | 0.7080 |
| 1.7598899 | 51.0640 | 22.544 | 3737.2 | 8.5094 | 3745.7 | 0.00 | 0.7045 |
| 1.7686894 | 51.1841 | 22.400 | 3694.8 | 8.5085 | 3703.4 | 0.00 | 0.7010 |
| 1.7775328 | 51.3014 | 22.257 | 3653.0 | 8.5075 | 3661.5 | 0.00 | 0.6975 |
| 1.7864205 | 51.4163 | 22.115 | 3611.6 | 8.5063 | 3620.2 | 0.00 | 0.6940 |
| 1.7953526 | 51.5288 | 21.974 | 3570.8 | 8.5050 | 3579.3 | 0.00 | 0.6906 |
| 1.8043294 | 51.6391 | 21.834 | 3530.3 | 8.5036 | 3538.8 | 0.00 | 0.6871 |
| 1.8133510 | 51.7475 | 21.695 | 3490.4 | 8.5020 | 3498.9 | 0.00 | 0.6837 |
| 1.8224178 | 51.8542 | 21.557 | 3450.8 | 8.5003 | 3459.3 | 0.00 | 0.6803 |
| 1.8315299 | 51.9587 | 21.416 | 3411.2 | 8.4984 | 3419.7 | 0.00 | 0.6769 |
| 1.8406875 | 52.0603 | 21.275 | 3371.9 | 8.4964 | 3380.4 | 0.00 | 0.6736 |
| 1.8498909 | 52.1594 | 21.135 | 3333.1 | 8.4943 | 3341.6 | 0.00 | 0.6702 |
| 1.8591404 | 52.2561 | 20.996 | 3294.7 | 8.4920 | 3303.2 | 0.00 | 0.6669 |
| 1.8684361 | 52.3506 | 20.857 | 3256.7 | 8.4896 | 3265.2 | 0.00 | 0.6636 |
| 1.8777783 | 52.4428 | 20.720 | 3219.1 | 8.4871 | 3227.6 | 0.00 | 0.6603 |
| 1.8871672 | 52.5329 | 20.583 | 3182.0 | 8.4844 | 3190.5 | 0.00 | 0.6570 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 1.8966030 | 52.6211 | 20.447 | 3145.3 | 8.4816 | 3153.7 | 0.00 | 0.6537 |
| 1.9060860 | 52.7073 | 20.312 | 3108.9 | 8.4786 | 3117.4 | 0.00 | 0.6505 |
| 1.9156165 | 52.7916 | 20.178 | 3073.0 | 8.4755 | 3081.5 | 0.00 | 0.6472 |
| 1.9251945 | 52.8740 | 20.045 | 3037.5 | 8.4723 | 3046.0 | 0.00 | 0.6440 |
| 1.9348205 | 52.9548 | 19.912 | 3002.4 | 8.4690 | 3010.8 | 0.00 | 0.6408 |
| 1.9444946 | 53.0338 | 19.780 | 2967.6 | 8.4655 | 2976.1 | 0.00 | 0.6376 |
| 1.9542171 | 53.1111 | 19.649 | 2933.3 | 8.4619 | 2941.8 | 0.00 | 0.6344 |
| 1.9639882 | 53.1868 | 19.519 | 2899.4 | 8.4581 | 2907.8 | 0.00 | 0.6313 |
| 1.9738081 | 53.2609 | 19.389 | 2865.8 | 8.4542 | 2874.2 | 0.00 | 0.6281 |
| 1.9836772 | 53.3335 | 19.260 | 2832.6 | 8.4502 | 2841.0 | 0.00 | 0.6250 |
| 1.9935955 | 53.4046 | 19.132 | 2799.8 | 8.4460 | 2808.2 | 0.00 | 0.6219 |
| 2.0035635 | 53.4743 | 19.005 | 2767.3 | 8.4418 | 2775.8 | 0.00 | 0.6188 |
| 2.0135813 | 53.5425 | 18.879 | 2735.2 | 8.4373 | 2743.7 | 0.00 | 0.6157 |
| 2.0236492 | 53.6094 | 18.753 | 2703.5 | 8.4328 | 2711.9 | 0.00 | 0.6127 |
| 2.0337675 | 53.6750 | 18.628 | 2672.1 | 8.4281 | 2680.6 | 0.00 | 0.6096 |
| 2.0439363 | 53.7394 | 18.504 | 2641.1 | 8.4233 | 2649.6 | 0.00 | 0.6066 |
| 2.0541560 | 53.8025 | 18.380 | 2610.4 | 8.4183 | 2618.8 | 0.00 | 0.6036 |
| 2.0644268 | 53.8641 | 18.257 | 2580.0 | 8.4133 | 2588.4 | 0.00 | 0.6006 |
| 2.0747489 | 53.9243 | 18.134 | 2549.9 | 8.4081 | 2558.3 | 0.00 | 0.5976 |
| 2.0851227 | 53.9832 | 18.012 | 2520.1 | 8.4027 | 2528.5 | 0.00 | 0.5946 |
| 2.0955483 | 54.0407 | 17.891 | 2490.7 | 8.3973 | 2499.1 | 0.00 | 0.5917 |
| 2.1060260 | 54.0969 | 17.770 | 2461.6 | 8.3917 | 2470.0 | 0.00 | 0.5887 |
| 2.1165562 | 54.1520 | 17.651 | 2432.9 | 8.3859 | 2441.3 | 0.00 | 0.5858 |
| 2.1271389 | 54.2057 | 17.532 | 2404.5 | 8.3801 | 2412.9 | 0.00 | 0.5829 |
| 2.1377746 | 54.2583 | 17.414 | 2376.4 | 8.3741 | 2384.8 | 0.00 | 0.5800 |
| 2.1484635 | 54.3098 | 17.296 | 2348.7 | 8.3680 | 2357.0 | 0.00 | 0.5771 |
| 2.1592058 | 54.3601 | 17.180 | 2321.2 | 8.3618 | 2329.6 | 0.00 | 0.5742 |
| 2.1700018 | 54.4093 | 17.064 | 2294.1 | 8.3554 | 2302.5 | 0.00 | 0.5714 |
| 2.1808519 | 54.4575 | 16.949 | 2267.3 | 8.3489 | 2275.7 | 0.00 | 0.5685 |
| 2.1917561 | 54.5045 | 16.835 | 2240.8 | 8.3423 | 2249.2 | 0.00 | 0.5657 |
| 2.2027149 | 54.5506 | 16.721 | 2214.7 | 8.3356 | 2223.0 | 0.00 | 0.5629 |
| 2.2137285 | 54.5957 | 16.607 | 2188.6 | 8.3287 | 2196.9 | 0.00 | 0.5601 |
| 2.2247971 | 54.6397 | 16.492 | 2162.7 | 8.3217 | 2171.0 | 0.00 | 0.5573 |
| 2.2359211 | 54.6827 | 16.379 | 2137.1 | 8.3146 | 2145.4 | 0.00 | 0.5545 |
| 2.2471007 | 54.7246 | 16.266 | 2111.8 | 8.3074 | 2120.1 | 0.00 | 0.5518 |
| 2.2583362 | 54.7654 | 16.154 | 2086.8 | 8.3000 | 2095.1 | 0.00 | 0.5490 |
| 2.2696279 | 54.8053 | 16.042 | 2062.1 | 8.2925 | 2070.4 | 0.00 | 0.5463 |
| 2.2809760 | 54.8442 | 15.932 | 2037.7 | 8.2849 | 2046.0 | 0.00 | 0.5436 |
| 2.2923809 | 54.8821 | 15.822 | 2013.6 | 8.2772 | 2021.9 | 0.00 | 0.5409 |
| 2.3038428 | 54.9191 | 15.713 | 1989.8 | 8.2694 | 1998.1 | 0.00 | 0.5382 |
| 2.3153620 | 54.9552 | 15.605 | 1966.3 | 8.2614 | 1974.5 | 0.00 | 0.5355 |
| 2.3269388 | 54.9904 | 15.498 | 1943.0 | 8.2533 | 1951.3 | 0.00 | 0.5328 |
| 2.3385735 | 55.0247 | 15.391 | 1920.1 | 8.2451 | 1928.3 | 0.00 | 0.5302 |
| 2.3502664 | 55.0582 | 15.286 | 1897.4 | 8.2368 | 1905.7 | 0.00 | 0.5275 |
| 2.3620177 | 55.0909 | 15.181 | 1875.0 | 8.2283 | 1883.2 | 0.00 | 0.5249 |
| 2.3738278 | 55.1227 | 15.077 | 1852.9 | 8.2197 | 1861.1 | 0.00 | 0.5223 |
| 2.3856970 | 55.1538 | 14.973 | 1831.0 | 8.2110 | 1839.3 | 0.00 | 0.5197 |
| 2.3976254 | 55.1841 | 14.871 | 1809.5 | 8.2022 | 1817.7 | 0.00 | 0.5171 |
| 2.4096136 | 55.2137 | 14.769 | 1788.1 | 8.1933 | 1796.3 | 0.00 | 0.5145 |
| 2.4216616 | 55.2426 | 14.668 | 1767.1 | 8.1843 | 1775.3 | 0.00 | 0.5120 |
| 2.4337699 | 55.2707 | 14.568 | 1746.3 | 8.1751 | 1754.5 | 0.00 | 0.5094 |
| 2.4459388 | 55.2982 | 14.469 | 1725.7 | 8.1659 | 1733.9 | 0.00 | 0.5069 |
| 2.4581685 | 55.3251 | 14.370 | 1705.5 | 8.1565 | 1713.6 | 0.00 | 0.5044 |
| 2.4704593 | 55.3513 | 14.272 | 1685.4 | 8.1470 | 1693.6 | 0.00 | 0.5019 |
| 2.4828116 | 55.3768 | 14.175 | 1665.6 | 8.1374 | 1673.8 | 0.00 | 0.4994 |
| 2.4952257 | 55.4018 | 14.079 | 1646.1 | 8.1276 | 1654.2 | 0.00 | 0.4969 |
| 2.5077018 | 55.4262 | 13.983 | 1626.8 | 8.1178 | 1634.9 | 0.00 | 0.4944 |
| 2.5202403 | 55.4501 | 13.888 | 1607.7 | 8.1078 | 1615.8 | 0.00 | 0.4920 |
| 2.5328415 | 55.4734 | 13.794 | 1588.9 | 8.0978 | 1597.0 | 0.00 | 0.4895 |
| 2.5455057 | 55.4962 | 13.701 | 1570.3 | 8.0876 | 1578.3 | 0.00 | 0.4871 |
| 2.5582333 | 55.5185 | 13.608 | 1551.9 | 8.0773 | 1560.0 | 0.00 | 0.4846 |
| 2.5710244 | 55.5404 | 13.517 | 1533.8 | 8.0669 | 1541.8 | 0.00 | 0.4822 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 2.5838796 | 55.5618 | 13.425 | 1515.8 | 8.0564 | 1523.9 | 0.00 | 0.4798 |
| 2.5967990 | 55.6852 | 13.335 | 1498.1 | 8.0458 | 1506.1 | 0.00 | 0.4775 |
| 2.6097829 | 55.7063 | 13.243 | 1480.4 | 8.0351 | 1488.4 | 0.00 | 0.4751 |
| 2.6228319 | 55.7268 | 13.152 | 1462.9 | 8.0242 | 1470.9 | 0.00 | 0.4727 |
| 2.6359460 | 55.7467 | 13.061 | 1445.6 | 8.0133 | 1453.6 | 0.00 | 0.4704 |
| 2.6491257 | 55.7661 | 12.972 | 1428.5 | 8.0022 | 1436.5 | 0.00 | 0.4680 |
| 2.6623714 | 55.7849 | 12.883 | 1411.7 | 7.9911 | 1419.7 | 0.00 | 0.4657 |
| 2.6756832 | 55.8032 | 12.794 | 1395.0 | 7.9798 | 1403.0 | 0.00 | 0.4634 |
| 2.6890617 | 55.8211 | 12.707 | 1378.6 | 7.9685 | 1386.5 | 0.00 | 0.4611 |
| 2.7025070 | 55.8385 | 12.620 | 1362.3 | 7.9570 | 1370.3 | 0.00 | 0.4588 |
| 2.7160195 | 55.8555 | 12.534 | 1346.3 | 7.9454 | 1354.2 | 0.00 | 0.4565 |
| 2.7295996 | 55.8721 | 12.448 | 1330.4 | 7.9337 | 1338.4 | 0.00 | 0.4542 |
| 2.7432476 | 55.8884 | 12.363 | 1314.8 | 7.9220 | 1322.7 | 0.00 | 0.4520 |
| 2.7569638 | 55.9043 | 12.279 | 1299.4 | 7.9101 | 1307.3 | 0.00 | 0.4497 |
| 2.7707486 | 55.9200 | 12.196 | 1284.1 | 7.8981 | 1292.0 | 0.00 | 0.4475 |
| 2.7846024 | 55.9354 | 12.113 | 1269.0 | 7.8860 | 1276.9 | 0.00 | 0.4452 |
| 2.7985254 | 55.9506 | 12.030 | 1254.1 | 7.8738 | 1262.0 | 0.00 | 0.4430 |
| 2.8125180 | 56.0125 | 11.948 | 1239.4 | 7.8615 | 1247.2 | 0.00 | 0.4408 |
| 2.8265806 | 56.0276 | 11.866 | 1224.8 | 7.8492 | 1232.6 | 0.00 | 0.4386 |
| 2.8407135 | 56.0425 | 11.785 | 1210.3 | 7.8367 | 1218.1 | 0.00 | 0.4365 |
| 2.8549171 | 56.0573 | 11.704 | 1196.0 | 7.8241 | 1203.9 | 0.00 | 0.4343 |
| 2.8691917 | 56.0720 | 11.624 | 1181.9 | 7.8114 | 1189.8 | 0.00 | 0.4321 |
| 2.8835376 | 56.0868 | 11.545 | 1168.0 | 7.7987 | 1175.8 | 0.00 | 0.4300 |
| 2.8979553 | 56.1016 | 11.466 | 1154.3 | 7.7858 | 1162.1 | 0.00 | 0.4278 |
| 2.9124451 | 56.1167 | 11.388 | 1140.7 | 7.7728 | 1148.5 | 0.00 | 0.4257 |
| 2.9270073 | 56.1323 | 11.310 | 1127.3 | 7.7598 | 1135.1 | 0.00 | 0.4236 |
| 2.9416424 | 56.1642 | 11.233 | 1114.0 | 7.7466 | 1121.8 | 0.00 | 0.4215 |
| 2.9563506 | 56.1826 | 11.157 | 1101.0 | 7.7334 | 1108.7 | 0.00 | 0.4194 |
| 2.9711323 | 56.2027 | 11.081 | 1088.0 | 7.7200 | 1095.8 | 0.00 | 0.4173 |
| 2.9859880 | 56.2254 | 11.006 | 1075.3 | 7.7066 | 1083.0 | 0.00 | 0.4152 |
| 3.0009179 | 56.2662 | 10.930 | 1062.6 | 7.6931 | 1070.3 | 0.00 | 0.4132 |
| 3.0159225 | 56.2762 | 10.844 | 1049.0 | 7.6795 | 1056.7 | 0.00 | 0.4111 |
| 3.0310021 | 56.2847 | 10.758 | 1035.5 | 7.6658 | 1043.2 | 0.00 | 0.4091 |
| 3.0461571 | 56.2920 | 10.674 | 1022.2 | 7.6520 | 1029.9 | 0.00 | 0.4070 |
| 3.0613879 | 56.2981 | 10.589 | 1009.1 | 7.6381 | 1016.8 | 0.00 | 0.4050 |
| 3.0766949 | 56.3033 | 10.506 | 996.20 | 7.6241 | 1003.8 | 0.00 | 0.4030 |
| 3.0920783 | 56.3075 | 10.423 | 983.43 | 7.6101 | 991.04 | 0.00 | 0.4010 |
| 3.1075387 | 56.3109 | 10.341 | 970.84 | 7.5960 | 978.44 | 0.00 | 0.3990 |
| 3.1230764 | 56.3136 | 10.260 | 958.41 | 7.5817 | 965.99 | 0.00 | 0.3970 |
| 3.1386918 | 56.3154 | 10.179 | 946.15 | 7.5674 | 953.72 | 0.00 | 0.3950 |
| 3.1543853 | 56.3367 | 10.099 | 934.03 | 7.5530 | 941.59 | 0.00 | 0.3931 |
| 3.1701572 | 56.3375 | 10.019 | 922.03 | 7.5385 | 929.57 | 0.00 | 0.3911 |
| 3.1860080 | 56.3375 | 9.9400 | 910.19 | 7.5240 | 917.72 | 0.00 | 0.3892 |
| 3.2019380 | 56.3368 | 9.8615 | 898.51 | 7.5093 | 906.02 | 0.00 | 0.3872 |
| 3.2179477 | 56.3355 | 9.7836 | 886.98 | 7.4946 | 894.48 | 0.00 | 0.3853 |
| 3.2340374 | 56.3336 | 9.7064 | 875.60 | 7.4798 | 883.08 | 0.00 | 0.3834 |
| 3.2502076 | 56.3310 | 9.6299 | 864.38 | 7.4649 | 871.84 | 0.00 | 0.3815 |
| 3.2664587 | 56.3279 | 9.5540 | 853.30 | 7.4499 | 860.75 | 0.00 | 0.3796 |
| 3.2827910 | 56.3242 | 9.4788 | 842.37 | 7.4349 | 849.80 | 0.00 | 0.3777 |
| 3.2992049 | 56.3200 | 9.4042 | 831.58 | 7.4198 | 839.00 | 0.00 | 0.3758 |
| 3.3157009 | 56.3152 | 9.3302 | 820.94 | 7.4046 | 828.34 | 0.00 | 0.3739 |
| 3.3322794 | 56.3100 | 9.2569 | 810.43 | 7.3893 | 817.82 | 0.00 | 0.3721 |
| 3.3489408 | 56.3042 | 9.1842 | 800.07 | 7.3739 | 807.44 | 0.00 | 0.3702 |
| 3.3656856 | 56.2979 | 9.1121 | 789.84 | 7.3585 | 797.20 | 0.00 | 0.3684 |
| 3.3825140 | 56.2912 | 9.0407 | 779.75 | 7.3430 | 787.09 | 0.00 | 0.3665 |
| 3.3994265 | 56.2840 | 8.9699 | 769.79 | 7.3274 | 777.12 | 0.00 | 0.3647 |
| 3.4164237 | 56.2763 | 8.8996 | 759.96 | 7.3118 | 767.28 | 0.00 | 0.3629 |
| 3.4335058 | 56.2682 | 8.8300 | 750.27 | 7.2960 | 757.56 | 0.00 | 0.3611 |
| 3.4506733 | 56.2597 | 8.7610 | 740.70 | 7.2802 | 747.98 | 0.00 | 0.3593 |
| 3.4679267 | 56.2507 | 8.6925 | 731.26 | 7.2644 | 738.52 | 0.00 | 0.3575 |
| 3.4852663 | 56.2413 | 8.6247 | 721.94 | 7.2484 | 729.19 | 0.00 | 0.3557 |
| 3.5026927 | 56.2315 | 8.5574 | 712.75 | 7.2324 | 719.98 | 0.00 | 0.3540 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Nd ($Z=60$) | | | | | | | |
| 3.5202061 | 56.2213 | 8.4907 | 703.67 | 7.2163 | 710.89 | 0.00 | 0.3522 |
| 3.5378072 | 56.2107 | 8.4246 | 694.72 | 7.2002 | 701.92 | 0.00 | 0.3505 |
| 3.5554962 | 56.1997 | 8.3591 | 685.89 | 7.1840 | 693.07 | 0.00 | 0.3487 |
| 3.5732737 | 56.1883 | 8.2941 | 677.17 | 7.1677 | 684.34 | 0.00 | 0.3470 |
| 3.5911400 | 56.1766 | 8.2297 | 668.57 | 7.1513 | 675.72 | 0.00 | 0.3453 |
| 3.6090957 | 56.1645 | 8.1658 | 660.08 | 7.1349 | 667.21 | 0.00 | 0.3435 |
| 3.6271412 | 56.1520 | 8.1025 | 651.70 | 7.1184 | 658.82 | 0.00 | 0.3418 |
| 3.6452769 | 56.1391 | 8.0397 | 643.43 | 7.1019 | 650.54 | 0.00 | 0.3401 |
| 3.6635033 | 56.1259 | 7.9775 | 635.28 | 7.0853 | 642.36 | 0.00 | 0.3384 |
| 3.6818208 | 56.1124 | 7.9158 | 627.23 | 7.0686 | 634.30 | 0.00 | 0.3367 |
| 3.7002299 | 56.0985 | 7.8546 | 619.28 | 7.0519 | 626.34 | 0.00 | 0.3351 |
| 3.7187311 | 56.0842 | 7.7940 | 611.45 | 7.0351 | 618.48 | 0.00 | 0.3334 |
| 3.7373247 | 56.0696 | 7.7339 | 603.71 | 7.0182 | 610.73 | 0.00 | 0.3317 |
| 3.7560114 | 56.0547 | 7.6743 | 596.08 | 7.0013 | 603.08 | 0.00 | 0.3301 |
| 3.7747914 | 56.0394 | 7.6152 | 588.55 | 6.9844 | 595.53 | 0.00 | 0.3285 |
| 3.7936654 | 56.0239 | 7.5566 | 581.11 | 6.9673 | 588.08 | 0.00 | 0.3268 |
| 3.8126337 | 56.0080 | 7.4985 | 573.78 | 6.9502 | 580.73 | 0.00 | 0.3252 |
| 3.8316969 | 55.9917 | 7.4409 | 566.54 | 6.9331 | 573.47 | 0.00 | 0.3236 |
| 3.8508554 | 55.9752 | 7.3839 | 559.40 | 6.9159 | 566.31 | 0.00 | 0.3220 |
| 3.8701096 | 55.9584 | 7.3273 | 552.35 | 6.8986 | 559.25 | 0.00 | 0.3204 |
| 3.8894602 | 55.9412 | 7.2712 | 545.39 | 6.8813 | 552.27 | 0.00 | 0.3188 |
| 3.9089075 | 55.9237 | 7.2155 | 538.53 | 6.8640 | 545.39 | 0.00 | 0.3172 |
| 3.9284520 | 55.9059 | 7.1584 | 531.61 | 6.8465 | 538.45 | 0.00 | 0.3156 |
| 3.9480943 | 55.8876 | 7.1016 | 524.76 | 6.8291 | 531.59 | 0.00 | 0.3140 |
| 3.9678347 | 55.8688 | 7.0453 | 518.01 | 6.8115 | 524.82 | 0.00 | 0.3125 |
| 3.9876739 | 55.8496 | 6.9895 | 511.35 | 6.7940 | 518.15 | 0.00 | 0.3109 |
| Pm ($Z=61$) | | | | | | | |
| Atomic weight: $A_r = 145.0000 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3}) = 7.2000$ | | | | | | | |
| σ_a (barns/atom) $= [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 240.778$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) = f_2(e \text{ atom}^{-1}) \times 2.90209 \times 10^5$ | | | | | | | |
| 18 edges. Edge energies (keV) | | | | | | | |
| K | 45.1840 | L I | 7.42790 | L II | 7.01280 | L III | 6.45930 |
| M I | 1.64650 | M II | 1.47140 | M III | 1.35690 | M IV | 1.05150 |
| M V | 1.026990 | N I | 0.330400 | N II | 0.254400 | N III | 0.236000 |
| M IV | 0.120400 | N V | 0.120400 | N VI | 0.00400000 | O I | 0.0375000 |
| O II | 0.0211000 | O III | 0.0211000 | | | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL}) = (-0.88035, -0.53340) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}} = -0.014078 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 21.0426 | 5.6661 | 16444 | 0.42706 | 16444 | 0.00 | 12.40 |
| 0.10050000 | 21.0130 | 5.6624 | 16351 | 0.43192 | 16351 | 0.00 | 12.34 |
| 0.10100250 | 20.9808 | 5.6585 | 16258 | 0.43682 | 16259 | 0.00 | 12.28 |
| 0.10150751 | 20.9459 | 5.6545 | 16166 | 0.44177 | 16167 | 0.00 | 12.21 |
| 0.10201505 | 20.9081 | 5.6503 | 16074 | 0.44676 | 16074 | 0.00 | 12.15 |
| 0.10252513 | 20.8671 | 5.6461 | 15982 | 0.45180 | 15982 | 0.00 | 12.09 |
| 0.10303775 | 20.8226 | 5.6417 | 15890 | 0.45689 | 15890 | 0.00 | 12.03 |
| 0.10355294 | 20.7745 | 5.6371 | 15798 | 0.46202 | 15799 | 0.00 | 11.97 |
| 0.10407070 | 20.7223 | 5.6324 | 15707 | 0.46720 | 15707 | 0.00 | 11.91 |
| 0.10459106 | 20.6659 | 5.6276 | 15615 | 0.47242 | 15615 | 0.00 | 11.85 |
| 0.10511401 | 20.6047 | 5.6227 | 15524 | 0.47769 | 15524 | 0.00 | 11.80 |
| 0.10563958 | 20.5384 | 5.6176 | 15433 | 0.48301 | 15433 | 0.00 | 11.74 |
| 0.10616778 | 20.4664 | 5.6124 | 15342 | 0.48838 | 15342 | 0.00 | 11.68 |
| 0.10669862 | 20.3882 | 5.6071 | 15251 | 0.49380 | 15251 | 0.00 | 11.62 |
| 0.10723211 | 20.3033 | 5.6016 | 15160 | 0.49926 | 15161 | 0.00 | 11.56 |
| 0.10776827 | 20.2107 | 5.5960 | 15070 | 0.50477 | 15070 | 0.00 | 11.50 |
| 0.10830712 | 20.1098 | 5.5903 | 14979 | 0.51034 | 14980 | 0.00 | 11.45 |
| 0.10884865 | 19.9996 | 5.5844 | 14889 | 0.51595 | 14890 | 0.00 | 11.39 |
| 0.10939289 | 19.8788 | 5.5784 | 14799 | 0.52161 | 14800 | 0.00 | 11.33 |
| 0.10993986 | 19.7461 | 5.5723 | 14709 | 0.52732 | 14710 | 0.00 | 11.28 |
| 0.11048956 | 19.6000 | 5.5661 | 14620 | 0.53308 | 14620 | 0.00 | 11.22 |
| 0.11104201 | 19.4386 | 5.5597 | 14530 | 0.53889 | 14531 | 0.00 | 11.17 |
| 0.11159722 | 19.2594 | 5.5532 | 14441 | 0.54475 | 14442 | 0.00 | 11.11 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Pm ($Z=61$) | | | | | | | |
| 0.11215520 | 19.0597 | 5.5465 | 14352 | 0.55067 | 14353 | 0.00 | 11.05 |
| 0.11271598 | 18.8364 | 5.5398 | 14263 | 0.55663 | 14264 | 0.00 | 11.00 |
| 0.11327956 | 18.5840 | 5.5329 | 14175 | 0.56265 | 14175 | 0.00 | 10.94 |
| 0.11384596 | 18.2973 | 5.5259 | 14086 | 0.56871 | 14087 | 0.00 | 10.89 |
| 0.11441519 | 17.9689 | 5.5187 | 13998 | 0.57483 | 13999 | 0.00 | 10.84 |
| 0.11498726 | 17.5888 | 5.5114 | 13910 | 0.58100 | 13911 | 0.00 | 10.78 |
| 0.11556220 | 17.1433 | 5.5041 | 13822 | 0.58723 | 13823 | 0.00 | 10.73 |
| 0.11614001 | 16.6130 | 5.4965 | 13735 | 0.59351 | 13735 | 0.00 | 10.68 |
| 0.11672071 | 15.9690 | 5.4889 | 13647 | 0.59984 | 13648 | 0.00 | 10.62 |
| 0.11730431 | 15.1662 | 5.4811 | 13560 | 0.60622 | 13561 | 0.00 | 10.57 |
| 0.11789083 | 14.1287 | 5.4732 | 13473 | 0.61266 | 13474 | 0.00 | 10.52 |
| 0.11848029 | 12.7149 | 5.4652 | 13387 | 0.61915 | 13387 | 0.00 | 10.46 |
| 0.11907269 | 10.6144 | 5.4571 | 13300 | 0.62570 | 13301 | 0.00 | 10.41 |
| 0.11966805 | 6.90986 | 5.4488 | 13214 | 0.63230 | 13215 | 0.00 | 10.36 |
| 0.12026639 | -5.15134 | 5.4405 | 13128 | 0.63895 | 13129 | 0.00 | 10.31 |
| 0.12038579 | -22.5841 | 5.4388 | 13111 | 0.64028 | 13112 | 0.00 | 10.30 |
| 0.12041420 | -22.4362 | 30.450 | 73387 | 0.64060 | 73387 | 0.00 | 10.30 |
| 0.12086772 | 6.71061 | 29.192 | 70092 | 0.64566 | 70093 | 0.00 | 10.26 |
| 0.12147206 | 14.2183 | 27.620 | 65987 | 0.65243 | 65988 | 0.00 | 10.21 |
| 0.12207942 | 18.3192 | 26.151 | 62165 | 0.65925 | 62166 | 0.00 | 10.16 |
| 0.12268982 | 21.0848 | 24.777 | 58607 | 0.66613 | 58608 | 0.00 | 10.11 |
| 0.12330327 | 23.1102 | 23.493 | 55294 | 0.67307 | 55295 | 0.00 | 10.06 |
| 0.12391979 | 24.6580 | 22.293 | 52209 | 0.68006 | 52210 | 0.00 | 10.01 |
| 0.12453939 | 25.8700 | 21.172 | 49335 | 0.68710 | 49336 | 0.00 | 9.955 |
| 0.12516208 | 26.8329 | 20.123 | 46658 | 0.69421 | 46659 | 0.00 | 9.906 |
| 0.12578789 | 27.6041 | 19.143 | 44164 | 0.70137 | 44165 | 0.00 | 9.857 |
| 0.12641683 | 28.2237 | 18.226 | 41841 | 0.70859 | 41841 | 0.00 | 9.808 |
| 0.12704892 | 28.7212 | 17.369 | 39675 | 0.71587 | 39676 | 0.00 | 9.759 |
| 0.12768416 | 29.1188 | 16.568 | 37656 | 0.72321 | 37657 | 0.00 | 9.710 |
| 0.12832258 | 29.4339 | 15.818 | 35774 | 0.73060 | 35775 | 0.00 | 9.662 |
| 0.12896419 | 29.6800 | 15.118 | 34019 | 0.73805 | 34020 | 0.00 | 9.614 |
| 0.12960902 | 29.8680 | 14.462 | 32382 | 0.74557 | 32383 | 0.00 | 9.566 |
| 0.13025706 | 30.0066 | 13.849 | 30855 | 0.75314 | 30856 | 0.00 | 9.518 |
| 0.13090835 | 30.1029 | 13.276 | 29430 | 0.76077 | 29431 | 0.00 | 9.471 |
| 0.13156289 | 30.1627 | 12.739 | 28100 | 0.76846 | 28101 | 0.00 | 9.424 |
| 0.13222070 | 30.1903 | 12.237 | 26859 | 0.77621 | 26860 | 0.00 | 9.377 |
| 0.13288181 | 30.1888 | 11.769 | 25702 | 0.78402 | 25703 | 0.00 | 9.330 |
| 0.13354621 | 30.1633 | 11.339 | 24641 | 0.79189 | 24642 | 0.00 | 9.284 |
| 0.13421395 | 30.1206 | 10.946 | 23669 | 0.79983 | 23669 | 0.00 | 9.238 |
| 0.13488502 | 30.0653 | 10.586 | 22775 | 0.80782 | 22776 | 0.00 | 9.192 |
| 0.13555944 | 30.0009 | 10.255 | 21953 | 0.81587 | 21954 | 0.00 | 9.146 |
| 0.13623724 | 29.9301 | 9.9501 | 21196 | 0.82399 | 21196 | 0.00 | 9.101 |
| 0.13691842 | 29.8548 | 9.6696 | 20495 | 0.83217 | 20496 | 0.00 | 9.055 |
| 0.13760302 | 29.7764 | 9.4107 | 19847 | 0.84041 | 19848 | 0.00 | 9.010 |
| 0.13829103 | 29.6963 | 9.1715 | 19247 | 0.84871 | 19248 | 0.00 | 8.965 |
| 0.13898249 | 29.6153 | 8.9500 | 18689 | 0.85708 | 18689 | 0.00 | 8.921 |
| 0.13967740 | 29.5341 | 8.7448 | 18169 | 0.86551 | 18170 | 0.00 | 8.876 |
| 0.14037579 | 29.4533 | 8.5542 | 17685 | 0.87400 | 17686 | 0.00 | 8.832 |
| 0.14107766 | 29.3734 | 8.3770 | 17232 | 0.88255 | 17233 | 0.00 | 8.788 |
| 0.14178305 | 29.2947 | 8.2121 | 16809 | 0.89117 | 16810 | 0.00 | 8.745 |
| 0.14249197 | 29.2175 | 8.0583 | 16412 | 0.89985 | 16413 | 0.00 | 8.701 |
| 0.14320443 | 29.1419 | 7.9147 | 16039 | 0.90860 | 16040 | 0.00 | 8.658 |
| 0.14392045 | 29.0681 | 7.7804 | 15689 | 0.91741 | 15690 | 0.00 | 8.615 |
| 0.14464005 | 28.9962 | 7.6547 | 15358 | 0.92628 | 15359 | 0.00 | 8.572 |
| 0.14536325 | 28.9262 | 7.5368 | 15047 | 0.93522 | 15048 | 0.00 | 8.529 |
| 0.14609007 | 28.8582 | 7.4261 | 14752 | 0.94423 | 14753 | 0.00 | 8.487 |
| 0.14682052 | 28.7923 | 7.3221 | 14473 | 0.95329 | 14474 | 0.00 | 8.445 |
| 0.14755462 | 28.7283 | 7.2242 | 14208 | 0.96243 | 14209 | 0.00 | 8.403 |
| 0.14829239 | 28.6663 | 7.1319 | 13957 | 0.97163 | 13958 | 0.00 | 8.361 |
| 0.14903386 | 28.6063 | 7.0448 | 13718 | 0.98090 | 13719 | 0.00 | 8.319 |
| 0.14977903 | 28.5482 | 6.9625 | 13490 | 0.99023 | 13491 | 0.00 | 8.278 |
| 0.15052792 | 28.4920 | 6.8846 | 13273 | 0.99963 | 13274 | 0.00 | 8.237 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Pm ($Z=61$) | | | | | | | |
| 0.15128056 | 28.4376 | 6.8109 | 13066 | 1.0091 | 13067 | 0.00 | 8.196 |
| 0.15203696 | 28.3849 | 6.7409 | 12867 | 1.0186 | 12868 | 0.00 | 8.155 |
| 0.15279715 | 28.3340 | 6.6745 | 12677 | 1.0282 | 12678 | 0.00 | 8.114 |
| 0.15356113 | 28.2847 | 6.6114 | 12495 | 1.0379 | 12496 | 0.00 | 8.074 |
| 0.15432894 | 28.2370 | 6.5514 | 12320 | 1.0476 | 12321 | 0.00 | 8.034 |
| 0.15510058 | 28.1909 | 6.4942 | 12151 | 1.0574 | 12152 | 0.00 | 7.994 |
| 0.15587609 | 28.1462 | 6.4397 | 11989 | 1.0673 | 11990 | 0.00 | 7.954 |
| 0.15665547 | 28.1029 | 6.3876 | 11833 | 1.0772 | 11834 | 0.00 | 7.914 |
| 0.15743875 | 28.0610 | 6.3379 | 11683 | 1.0872 | 11684 | 0.00 | 7.875 |
| 0.15822594 | 28.0204 | 6.2903 | 11537 | 1.0973 | 11538 | 0.00 | 7.836 |
| 0.15901707 | 27.9810 | 6.2447 | 11397 | 1.1075 | 11398 | 0.00 | 7.797 |
| 0.15981215 | 27.9428 | 6.2011 | 11261 | 1.1177 | 11262 | 0.00 | 7.758 |
| 0.16061121 | 27.9057 | 6.1592 | 11129 | 1.1279 | 11130 | 0.00 | 7.720 |
| 0.16141427 | 27.8697 | 6.1190 | 11001 | 1.1383 | 11003 | 0.00 | 7.681 |
| 0.16222134 | 27.8348 | 6.0804 | 10878 | 1.1487 | 10879 | 0.00 | 7.643 |
| 0.16303245 | 27.8008 | 6.0432 | 10757 | 1.1592 | 10759 | 0.00 | 7.605 |
| 0.16384761 | 27.7677 | 6.0075 | 10641 | 1.1698 | 10642 | 0.00 | 7.567 |
| 0.16466685 | 27.7356 | 5.9731 | 10527 | 1.1804 | 10528 | 0.00 | 7.529 |
| 0.16549018 | 27.7042 | 5.9399 | 10416 | 1.1911 | 10418 | 0.00 | 7.492 |
| 0.16631763 | 27.6737 | 5.9079 | 10309 | 1.2018 | 10310 | 0.00 | 7.455 |
| 0.16714922 | 27.6439 | 5.8770 | 10204 | 1.2127 | 10205 | 0.00 | 7.418 |
| 0.16798497 | 27.6148 | 5.8472 | 10101 | 1.2236 | 10103 | 0.00 | 7.381 |
| 0.16882489 | 27.5864 | 5.8183 | 10002 | 1.2346 | 10003 | 0.00 | 7.344 |
| 0.16966902 | 27.5587 | 5.7905 | 9904.3 | 1.2456 | 9905.5 | 0.00 | 7.307 |
| 0.17051736 | 27.5315 | 5.7635 | 9809.1 | 1.2567 | 9810.4 | 0.00 | 7.271 |
| 0.17136995 | 27.5049 | 5.7374 | 9716.1 | 1.2679 | 9717.4 | 0.00 | 7.235 |
| 0.17222680 | 27.4788 | 5.7121 | 9625.2 | 1.2792 | 9626.5 | 0.00 | 7.199 |
| 0.17308793 | 27.4533 | 5.6877 | 9536.3 | 1.2905 | 9537.5 | 0.00 | 7.163 |
| 0.17395337 | 27.4281 | 5.6639 | 9449.2 | 1.3019 | 9450.5 | 0.00 | 7.127 |
| 0.17482314 | 27.4035 | 5.6409 | 9364.0 | 1.3134 | 9365.3 | 0.00 | 7.092 |
| 0.17569726 | 27.3792 | 5.6186 | 9280.6 | 1.3250 | 9281.9 | 0.00 | 7.057 |
| 0.17657574 | 27.3553 | 5.5969 | 9198.8 | 1.3366 | 9200.1 | 0.00 | 7.022 |
| 0.17745862 | 27.3317 | 5.5759 | 9118.7 | 1.3483 | 9120.0 | 0.00 | 6.987 |
| 0.17834591 | 27.3085 | 5.5555 | 9040.1 | 1.3601 | 9041.5 | 0.00 | 6.952 |
| 0.17923764 | 27.2856 | 5.5357 | 8963.0 | 1.3719 | 8964.4 | 0.00 | 6.917 |
| 0.18013383 | 27.2629 | 5.5165 | 8887.5 | 1.3838 | 8888.8 | 0.00 | 6.883 |
| 0.18103450 | 27.2405 | 5.4978 | 8813.3 | 1.3958 | 8814.7 | 0.00 | 6.849 |
| 0.18193967 | 27.2183 | 5.4796 | 8740.5 | 1.4079 | 8741.9 | 0.00 | 6.815 |
| 0.18284937 | 27.1963 | 5.4620 | 8669.0 | 1.4200 | 8670.4 | 0.00 | 6.781 |
| 0.18376362 | 27.1744 | 5.4449 | 8598.8 | 1.4322 | 8600.3 | 0.00 | 6.747 |
| 0.18468244 | 27.1527 | 5.4282 | 8529.9 | 1.4445 | 8531.3 | 0.00 | 6.713 |
| 0.18560585 | 27.1311 | 5.4121 | 8462.2 | 1.4568 | 8463.6 | 0.00 | 6.680 |
| 0.18653388 | 27.1097 | 5.3963 | 8395.6 | 1.4692 | 8397.1 | 0.00 | 6.647 |
| 0.18746655 | 27.0883 | 5.3811 | 8330.2 | 1.4817 | 8331.7 | 0.00 | 6.614 |
| 0.18840388 | 27.0669 | 5.3663 | 8266.0 | 1.4943 | 8267.5 | 0.00 | 6.581 |
| 0.18934590 | 27.0457 | 5.3519 | 8202.8 | 1.5070 | 8204.3 | 0.00 | 6.548 |
| 0.19029263 | 27.0244 | 5.3379 | 8140.7 | 1.5197 | 8142.2 | 0.00 | 6.515 |
| 0.19124409 | 27.0031 | 5.3244 | 8079.6 | 1.5325 | 8081.2 | 0.00 | 6.483 |
| 0.19220031 | 26.9818 | 5.3112 | 8019.6 | 1.5453 | 8021.1 | 0.00 | 6.451 |
| 0.19316131 | 26.9604 | 5.2985 | 7960.5 | 1.5583 | 7962.1 | 0.00 | 6.419 |
| 0.19412712 | 26.9390 | 5.2861 | 7902.4 | 1.5713 | 7904.0 | 0.00 | 6.387 |
| 0.19509776 | 26.9174 | 5.2741 | 7845.3 | 1.5844 | 7846.9 | 0.00 | 6.355 |
| 0.19607325 | 26.8958 | 5.2626 | 7789.1 | 1.5975 | 7790.7 | 0.00 | 6.323 |
| 0.19705361 | 26.8740 | 5.2513 | 7733.9 | 1.6108 | 7735.5 | 0.00 | 6.292 |
| 0.19803888 | 26.8520 | 5.2405 | 7679.5 | 1.6241 | 7681.1 | 0.00 | 6.261 |
| 0.19902907 | 26.8299 | 5.2300 | 7626.0 | 1.6375 | 7627.7 | 0.00 | 6.229 |
| 0.20002422 | 26.8075 | 5.2199 | 7573.4 | 1.6509 | 7575.1 | 0.00 | 6.198 |
| 0.20102434 | 26.7849 | 5.2101 | 7521.6 | 1.6645 | 7523.3 | 0.00 | 6.168 |
| 0.20202946 | 26.7620 | 5.2007 | 7470.7 | 1.6781 | 7472.4 | 0.00 | 6.137 |
| 0.20303961 | 26.7388 | 5.1917 | 7420.6 | 1.6918 | 7422.3 | 0.00 | 6.106 |
| 0.20405481 | 26.7153 | 5.1830 | 7371.3 | 1.7055 | 7373.0 | 0.00 | 6.076 |
| 0.20507508 | 26.6914 | 5.1746 | 7322.8 | 1.7193 | 7324.5 | 0.00 | 6.046 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Pm ($Z=61$) | | | | | | | |
| 0.20610046 | 26.6671 | 5.1666 | 7275.1 | 1.7332 | 7276.9 | 0.00 | 6.016 |
| 0.20713096 | 26.6423 | 5.1590 | 7228.2 | 1.7472 | 7229.9 | 0.00 | 5.986 |
| 0.20816661 | 26.6171 | 5.1517 | 7182.0 | 1.7613 | 7183.8 | 0.00 | 5.956 |
| 0.20920745 | 26.5913 | 5.1447 | 7136.6 | 1.7754 | 7138.4 | 0.00 | 5.926 |
| 0.21025348 | 26.5649 | 5.1380 | 7092.0 | 1.7896 | 7093.7 | 0.00 | 5.897 |
| 0.21130475 | 26.5378 | 5.1318 | 7048.0 | 1.8039 | 7049.8 | 0.00 | 5.868 |
| 0.21236128 | 26.5101 | 5.1258 | 7004.8 | 1.8183 | 7006.6 | 0.00 | 5.838 |
| 0.21342308 | 26.4815 | 5.1202 | 6962.3 | 1.8327 | 6964.1 | 0.00 | 5.809 |
| 0.21449020 | 26.4521 | 5.1149 | 6920.5 | 1.8472 | 6922.4 | 0.00 | 5.780 |
| 0.21556265 | 26.4217 | 5.1099 | 6879.4 | 1.8618 | 6881.3 | 0.00 | 5.752 |
| 0.21664046 | 26.3901 | 5.1053 | 6839.0 | 1.8764 | 6840.9 | 0.00 | 5.723 |
| 0.21772366 | 26.3574 | 5.1010 | 6799.3 | 1.8911 | 6801.2 | 0.00 | 5.695 |
| 0.21881228 | 26.3233 | 5.0971 | 6760.2 | 1.9059 | 6762.1 | 0.00 | 5.666 |
| 0.21990634 | 26.2876 | 5.0935 | 6721.8 | 1.9208 | 6723.7 | 0.00 | 5.638 |
| 0.22100588 | 26.2501 | 5.0902 | 6684.1 | 1.9358 | 6686.0 | 0.00 | 5.610 |
| 0.22211090 | 26.2106 | 5.0873 | 6647.0 | 1.9508 | 6648.9 | 0.00 | 5.582 |
| 0.22322146 | 26.1686 | 5.0847 | 6610.5 | 1.9659 | 6612.5 | 0.00 | 5.554 |
| 0.22433757 | 26.1238 | 5.0824 | 6574.7 | 1.9811 | 6576.7 | 0.00 | 5.527 |
| 0.22545925 | 26.0756 | 5.0804 | 6539.5 | 1.9963 | 6541.5 | 0.00 | 5.499 |
| 0.22658655 | 26.0231 | 5.0788 | 6504.9 | 2.0116 | 6506.9 | 0.00 | 5.472 |
| 0.22771948 | 25.9655 | 5.0776 | 6470.9 | 2.0270 | 6473.0 | 0.00 | 5.445 |
| 0.22885808 | 25.9010 | 5.0766 | 6437.6 | 2.0425 | 6439.6 | 0.00 | 5.418 |
| 0.23000237 | 25.8274 | 5.0760 | 6404.8 | 2.0581 | 6406.8 | 0.00 | 5.391 |
| 0.23115238 | 25.7407 | 5.0758 | 6372.6 | 2.0737 | 6374.7 | 0.00 | 5.364 |
| 0.23230814 | 25.6341 | 5.0759 | 6341.0 | 2.0894 | 6343.1 | 0.00 | 5.337 |
| 0.23346969 | 25.4922 | 5.0763 | 6309.9 | 2.1051 | 6312.0 | 0.00 | 5.311 |
| 0.23463703 | 25.2703 | 5.0770 | 6279.5 | 2.1210 | 6281.6 | 0.00 | 5.284 |
| 0.23581022 | 24.6034 | 5.0781 | 6249.6 | 2.1369 | 6251.7 | 0.00 | 5.258 |
| 0.23585864 | 24.5060 | 5.0781 | 6248.3 | 2.1375 | 6250.5 | 0.00 | 5.257 |
| 0.23614137 | 24.5005 | 6.1083 | 7506.9 | 2.1414 | 7509.1 | 0.00 | 5.250 |
| 0.23698927 | 25.1225 | 6.1123 | 7484.9 | 2.1529 | 7487.0 | 0.00 | 5.232 |
| 0.23817422 | 25.3599 | 6.1181 | 7454.7 | 2.1689 | 7456.9 | 0.00 | 5.206 |
| 0.23936509 | 25.4826 | 6.1242 | 7425.1 | 2.1851 | 7427.2 | 0.00 | 5.180 |
| 0.24056191 | 25.5617 | 6.1307 | 7396.0 | 2.2013 | 7398.2 | 0.00 | 5.154 |
| 0.24176472 | 25.6173 | 6.1375 | 7367.4 | 2.2176 | 7369.6 | 0.00 | 5.128 |
| 0.24297355 | 25.6579 | 6.1447 | 7339.3 | 2.2339 | 7341.6 | 0.00 | 5.103 |
| 0.24418841 | 25.6877 | 6.1523 | 7311.8 | 2.2503 | 7314.0 | 0.00 | 5.077 |
| 0.24540936 | 25.7091 | 6.1602 | 7284.7 | 2.2668 | 7287.0 | 0.00 | 5.052 |
| 0.24663640 | 25.7233 | 6.1684 | 7258.2 | 2.2834 | 7260.5 | 0.00 | 5.027 |
| 0.24786959 | 25.7307 | 6.1770 | 7232.1 | 2.3000 | 7234.4 | 0.00 | 5.002 |
| 0.24910893 | 25.7309 | 6.1860 | 7206.6 | 2.3168 | 7208.9 | 0.00 | 4.977 |
| 0.25035448 | 25.7223 | 6.1952 | 7181.5 | 2.3335 | 7183.8 | 0.00 | 4.952 |
| 0.25160625 | 25.7007 | 6.2049 | 7156.9 | 2.3504 | 7159.2 | 0.00 | 4.928 |
| 0.25286428 | 25.6532 | 6.2149 | 7132.7 | 2.3673 | 7135.1 | 0.00 | 4.903 |
| 0.25412860 | 25.4844 | 6.2252 | 7109.0 | 2.3843 | 7111.4 | 0.00 | 4.879 |
| 0.25423287 | 25.4345 | 6.2260 | 7107.1 | 2.3857 | 7109.5 | 0.00 | 4.877 |
| 0.25456716 | 25.4375 | 6.5590 | 7477.3 | 2.3902 | 7479.7 | 0.00 | 4.870 |
| 0.25539925 | 25.6329 | 6.5670 | 7462.1 | 2.4014 | 7464.5 | 0.00 | 4.855 |
| 0.25667624 | 25.7306 | 6.5796 | 7439.1 | 2.4186 | 7441.6 | 0.00 | 4.830 |
| 0.25795962 | 25.7882 | 6.5925 | 7416.6 | 2.4358 | 7419.1 | 0.00 | 4.806 |
| 0.25924942 | 25.8307 | 6.6057 | 7394.6 | 2.4531 | 7397.0 | 0.00 | 4.782 |
| 0.26054567 | 25.8649 | 6.6193 | 7372.9 | 2.4704 | 7375.4 | 0.00 | 4.759 |
| 0.26184840 | 25.8940 | 6.6332 | 7351.6 | 2.4878 | 7354.1 | 0.00 | 4.735 |
| 0.26315764 | 25.9195 | 6.6474 | 7330.7 | 2.5053 | 7333.2 | 0.00 | 4.711 |
| 0.26447343 | 25.9422 | 6.6619 | 7310.2 | 2.5229 | 7312.7 | 0.00 | 4.688 |
| 0.26579579 | 25.9628 | 6.6767 | 7290.0 | 2.5406 | 7292.5 | 0.00 | 4.665 |
| 0.26712477 | 25.9817 | 6.6919 | 7270.1 | 2.5583 | 7272.7 | 0.00 | 4.641 |
| 0.26846040 | 25.9992 | 6.7073 | 7250.6 | 2.5760 | 7253.2 | 0.00 | 4.618 |
| 0.26980270 | 26.0156 | 6.7230 | 7231.4 | 2.5939 | 7234.0 | 0.00 | 4.595 |
| 0.27115171 | 26.0310 | 6.7390 | 7212.6 | 2.6118 | 7215.2 | 0.00 | 4.573 |
| 0.27250747 | 26.0455 | 6.7552 | 7194.0 | 2.6298 | 7196.7 | 0.00 | 4.550 |
| 0.27387001 | 26.0593 | 6.7718 | 7175.8 | 2.6478 | 7178.4 | 0.00 | 4.527 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Pm ($Z=61$) | | | | | | | |
| 0.27523936 | 26.0725 | 6.7886 | 7157.8 | 2.6659 | 7160.5 | 0.00 | 4.505 |
| 0.27661556 | 26.0851 | 6.8057 | 7140.2 | 2.6841 | 7142.9 | 0.00 | 4.482 |
| 0.27799863 | 26.0972 | 6.8231 | 7122.8 | 2.7024 | 7125.5 | 0.00 | 4.460 |
| 0.27938863 | 26.1089 | 6.8408 | 7105.7 | 2.7207 | 7108.4 | 0.00 | 4.438 |
| 0.28078557 | 26.1202 | 6.8587 | 7088.9 | 2.7391 | 7091.6 | 0.00 | 4.416 |
| 0.28218950 | 26.1311 | 6.8769 | 7072.3 | 2.7576 | 7075.0 | 0.00 | 4.394 |
| 0.28360044 | 26.1417 | 6.8953 | 7056.0 | 2.7761 | 7058.7 | 0.00 | 4.372 |
| 0.28501845 | 26.1520 | 6.9139 | 7039.9 | 2.7947 | 7042.6 | 0.00 | 4.350 |
| 0.28644354 | 26.1620 | 6.9328 | 7024.0 | 2.8133 | 7026.8 | 0.00 | 4.328 |
| 0.28787576 | 26.1718 | 6.9520 | 7008.3 | 2.8320 | 7011.2 | 0.00 | 4.307 |
| 0.28931514 | 26.1813 | 6.9714 | 6992.9 | 2.8508 | 6995.7 | 0.00 | 4.285 |
| 0.29076171 | 26.1906 | 6.9909 | 6977.7 | 2.8697 | 6980.5 | 0.00 | 4.264 |
| 0.29221552 | 26.1996 | 7.0108 | 6962.6 | 2.8886 | 6965.5 | 0.00 | 4.243 |
| 0.29367660 | 26.2084 | 7.0308 | 6947.8 | 2.9076 | 6950.7 | 0.00 | 4.222 |
| 0.29514498 | 26.2169 | 7.0510 | 6933.1 | 2.9266 | 6936.0 | 0.00 | 4.201 |
| 0.29662071 | 26.2252 | 7.0715 | 6918.6 | 2.9457 | 6921.5 | 0.00 | 4.180 |
| 0.29810381 | 26.2333 | 7.0921 | 6904.3 | 2.9649 | 6907.2 | 0.00 | 4.159 |
| 0.29959433 | 26.2410 | 7.1129 | 6890.1 | 2.9841 | 6893.1 | 0.00 | 4.138 |
| 0.30109230 | 26.2484 | 7.1339 | 6876.0 | 3.0034 | 6879.0 | 0.00 | 4.118 |
| 0.30259776 | 26.2555 | 7.1551 | 6862.1 | 3.0228 | 6865.1 | 0.00 | 4.097 |
| 0.30411075 | 26.2622 | 7.1764 | 6848.3 | 3.0422 | 6851.4 | 0.00 | 4.077 |
| 0.30563130 | 26.2685 | 7.1979 | 6834.7 | 3.0617 | 6837.7 | 0.00 | 4.057 |
| 0.30715946 | 26.2742 | 7.2195 | 6821.1 | 3.0812 | 6824.2 | 0.00 | 4.036 |
| 0.30869526 | 26.2793 | 7.2413 | 6807.7 | 3.1008 | 6810.8 | 0.00 | 4.016 |
| 0.31023873 | 26.2837 | 7.2633 | 6794.3 | 3.1205 | 6797.5 | 0.00 | 3.996 |
| 0.31178993 | 26.2873 | 7.2853 | 6781.1 | 3.1402 | 6784.2 | 0.00 | 3.977 |
| 0.31334888 | 26.2898 | 7.3075 | 6767.9 | 3.1600 | 6771.1 | 0.00 | 3.957 |
| 0.31491562 | 26.2910 | 7.3298 | 6754.8 | 3.1798 | 6758.0 | 0.00 | 3.937 |
| 0.31649020 | 26.2907 | 7.3523 | 6741.7 | 3.1997 | 6744.9 | 0.00 | 3.917 |
| 0.31807265 | 26.2883 | 7.3748 | 6728.7 | 3.2197 | 6732.0 | 0.00 | 3.898 |
| 0.31966301 | 26.2832 | 7.3974 | 6715.8 | 3.2397 | 6719.0 | 0.00 | 3.879 |
| 0.32126133 | 26.2745 | 7.4201 | 6702.9 | 3.2598 | 6706.1 | 0.00 | 3.859 |
| 0.32286764 | 26.2606 | 7.4429 | 6690.0 | 3.2799 | 6693.3 | 0.00 | 3.840 |
| 0.32448197 | 26.2390 | 7.4657 | 6677.2 | 3.3001 | 6680.5 | 0.00 | 3.821 |
| 0.32610438 | 26.2044 | 7.4886 | 6664.3 | 3.3203 | 6667.6 | 0.00 | 3.802 |
| 0.32773491 | 26.1438 | 7.5116 | 6651.5 | 3.3406 | 6654.8 | 0.00 | 3.783 |
| 0.32937358 | 26.0040 | 7.5346 | 6638.7 | 3.3610 | 6642.0 | 0.00 | 3.764 |
| 0.33005637 | 25.8298 | 7.5441 | 6633.3 | 3.3694 | 6636.7 | 0.00 | 3.756 |
| 0.33074361 | 25.8376 | 8.0762 | 7086.4 | 3.3779 | 7089.8 | 0.00 | 3.749 |
| 0.33102045 | 25.9390 | 8.0802 | 7084.0 | 3.3814 | 7087.4 | 0.00 | 3.746 |
| 0.33267555 | 26.1743 | 8.1044 | 7069.9 | 3.4018 | 7073.3 | 0.00 | 3.727 |
| 0.33433893 | 26.2855 | 8.1286 | 7055.7 | 3.4223 | 7059.1 | 0.00 | 3.708 |
| 0.33601062 | 26.3646 | 8.1528 | 7041.5 | 3.4429 | 7045.0 | 0.00 | 3.690 |
| 0.33769068 | 26.4290 | 8.1770 | 7027.3 | 3.4635 | 7030.8 | 0.00 | 3.672 |
| 0.33937913 | 26.4848 | 8.2013 | 7013.0 | 3.4842 | 7016.5 | 0.00 | 3.653 |
| 0.34107602 | 26.5351 | 8.2254 | 6998.7 | 3.5049 | 7002.2 | 0.00 | 3.635 |
| 0.34278140 | 26.5817 | 8.2496 | 6984.4 | 3.5257 | 6987.9 | 0.00 | 3.617 |
| 0.34449531 | 26.6255 | 8.2738 | 6970.0 | 3.5465 | 6973.5 | 0.00 | 3.599 |
| 0.34621779 | 26.6673 | 8.2979 | 6955.5 | 3.5674 | 6959.1 | 0.00 | 3.581 |
| 0.34794888 | 26.7075 | 8.3219 | 6940.9 | 3.5884 | 6944.5 | 0.00 | 3.563 |
| 0.34968862 | 26.7466 | 8.3459 | 6926.3 | 3.6093 | 6929.9 | 0.00 | 3.546 |
| 0.35143706 | 26.7847 | 8.3698 | 6911.6 | 3.6304 | 6915.2 | 0.00 | 3.528 |
| 0.35319425 | 26.8220 | 8.3937 | 6896.8 | 3.6514 | 6900.5 | 0.00 | 3.510 |
| 0.35496022 | 26.8588 | 8.4174 | 6881.9 | 3.6726 | 6885.6 | 0.00 | 3.493 |
| 0.35673502 | 26.8951 | 8.4411 | 6867.0 | 3.6937 | 6870.7 | 0.00 | 3.476 |
| 0.35851870 | 26.9311 | 8.4647 | 6851.9 | 3.7149 | 6855.6 | 0.00 | 3.458 |
| 0.36031129 | 26.9667 | 8.4881 | 6836.7 | 3.7362 | 6840.4 | 0.00 | 3.441 |
| 0.36211285 | 27.0045 | 8.5115 | 6821.4 | 3.7575 | 6825.1 | 0.00 | 3.424 |
| 0.36392341 | 27.0398 | 8.5347 | 6806.0 | 3.7789 | 6809.7 | 0.00 | 3.407 |
| 0.36574303 | 27.0750 | 8.5578 | 6790.4 | 3.8003 | 6794.2 | 0.00 | 3.390 |
| 0.36757174 | 27.1102 | 8.5807 | 6774.7 | 3.8217 | 6778.5 | 0.00 | 3.373 |
| 0.36940960 | 27.1453 | 8.6034 | 6758.8 | 3.8432 | 6762.7 | 0.00 | 3.356 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Pm ($Z=61$) | | | | | | | |
| 0.37125665 | 27.1804 | 8.6259 | 6742.8 | 3.8647 | 6746.7 | 0.00 | 3.340 |
| 0.37311293 | 27.2155 | 8.6483 | 6726.7 | 3.8863 | 6730.6 | 0.00 | 3.323 |
| 0.37497850 | 27.2506 | 8.6704 | 6710.3 | 3.9079 | 6714.2 | 0.00 | 3.306 |
| 0.37685339 | 27.2858 | 8.6924 | 6693.8 | 3.9296 | 6697.8 | 0.00 | 3.290 |
| 0.37873766 | 27.3210 | 8.7141 | 6677.2 | 3.9513 | 6681.1 | 0.00 | 3.274 |
| 0.38063135 | 27.3563 | 8.7356 | 6660.4 | 3.9730 | 6664.3 | 0.00 | 3.257 |
| 0.38253450 | 27.3916 | 8.7568 | 6643.4 | 3.9948 | 6647.3 | 0.00 | 3.241 |
| 0.38444718 | 27.4271 | 8.7779 | 6626.2 | 4.0166 | 6630.2 | 0.00 | 3.225 |
| 0.38636941 | 27.4626 | 8.7986 | 6608.8 | 4.0384 | 6612.9 | 0.00 | 3.209 |
| 0.38830126 | 27.4982 | 8.8192 | 6591.3 | 4.0603 | 6595.3 | 0.00 | 3.193 |
| 0.39024276 | 27.5340 | 8.8394 | 6573.5 | 4.0823 | 6577.6 | 0.00 | 3.177 |
| 0.39219398 | 27.5698 | 8.8594 | 6555.6 | 4.1042 | 6559.7 | 0.00 | 3.161 |
| 0.39415495 | 27.6057 | 8.8791 | 6537.5 | 4.1262 | 6541.7 | 0.00 | 3.146 |
| 0.39612572 | 27.6417 | 8.8986 | 6519.2 | 4.1482 | 6523.4 | 0.00 | 3.130 |
| 0.39810635 | 27.6778 | 8.9176 | 6500.7 | 4.1703 | 6504.9 | 0.00 | 3.114 |
| 0.40009688 | 27.7141 | 8.9363 | 6482.0 | 4.1924 | 6486.1 | 0.00 | 3.099 |
| 0.40209737 | 27.7504 | 8.9548 | 6463.0 | 4.2145 | 6467.2 | 0.00 | 3.083 |
| 0.40410785 | 27.7868 | 8.9729 | 6443.9 | 4.2367 | 6448.1 | 0.00 | 3.068 |
| 0.40612839 | 27.8233 | 8.9907 | 6424.6 | 4.2589 | 6428.8 | 0.00 | 3.053 |
| 0.40815904 | 27.8599 | 9.0082 | 6405.0 | 4.2811 | 6409.3 | 0.00 | 3.038 |
| 0.41019983 | 27.8966 | 9.0254 | 6385.3 | 4.3034 | 6389.6 | 0.00 | 3.023 |
| 0.41225083 | 27.9334 | 9.0422 | 6365.4 | 4.3257 | 6369.7 | 0.00 | 3.007 |
| 0.41431208 | 27.9702 | 9.0587 | 6345.3 | 4.3480 | 6349.6 | 0.00 | 2.993 |
| 0.41638364 | 28.0071 | 9.0748 | 6324.9 | 4.3703 | 6329.3 | 0.00 | 2.978 |
| 0.41846556 | 28.0441 | 9.0906 | 6304.4 | 4.3927 | 6308.8 | 0.00 | 2.963 |
| 0.42055789 | 28.0811 | 9.1061 | 6283.7 | 4.4151 | 6288.1 | 0.00 | 2.948 |
| 0.42266068 | 28.1182 | 9.1211 | 6262.8 | 4.4375 | 6267.2 | 0.00 | 2.933 |
| 0.42477398 | 28.1554 | 9.1358 | 6241.7 | 4.4600 | 6246.1 | 0.00 | 2.919 |
| 0.42689785 | 28.1926 | 9.1501 | 6220.4 | 4.4824 | 6224.8 | 0.00 | 2.904 |
| 0.42903234 | 28.2298 | 9.1641 | 6198.8 | 4.5049 | 6203.4 | 0.00 | 2.890 |
| 0.43117750 | 28.2671 | 9.1777 | 6177.1 | 4.5275 | 6181.7 | 0.00 | 2.875 |
| 0.43333339 | 28.3044 | 9.1909 | 6155.2 | 4.5500 | 6159.8 | 0.00 | 2.861 |
| 0.43550006 | 28.3417 | 9.2037 | 6133.1 | 4.5726 | 6137.7 | 0.00 | 2.847 |
| 0.43767756 | 28.3790 | 9.2161 | 6110.9 | 4.5951 | 6115.5 | 0.00 | 2.833 |
| 0.43986595 | 28.4163 | 9.2281 | 6088.4 | 4.6178 | 6093.0 | 0.00 | 2.819 |
| 0.44206528 | 28.4536 | 9.2397 | 6065.7 | 4.6404 | 6070.4 | 0.00 | 2.805 |
| 0.44427560 | 28.4909 | 9.2509 | 6042.9 | 4.6630 | 6047.5 | 0.00 | 2.791 |
| 0.44649698 | 28.5282 | 9.2617 | 6019.8 | 4.6857 | 6024.5 | 0.00 | 2.777 |
| 0.44872947 | 28.5654 | 9.2721 | 5996.6 | 4.7084 | 6001.3 | 0.00 | 2.763 |
| 0.45097311 | 28.6027 | 9.2821 | 5973.2 | 4.7311 | 5977.9 | 0.00 | 2.749 |
| 0.45322798 | 28.6398 | 9.2916 | 5949.6 | 4.7538 | 5954.3 | 0.00 | 2.736 |
| 0.45549412 | 28.6769 | 9.3008 | 5925.8 | 4.7765 | 5930.6 | 0.00 | 2.722 |
| 0.45777159 | 28.7140 | 9.3095 | 5901.8 | 4.7993 | 5906.6 | 0.00 | 2.708 |
| 0.46006045 | 28.7509 | 9.3178 | 5877.7 | 4.8220 | 5882.5 | 0.00 | 2.695 |
| 0.46236075 | 28.7878 | 9.3257 | 5853.4 | 4.8448 | 5858.3 | 0.00 | 2.682 |
| 0.46467255 | 28.8246 | 9.3331 | 5829.0 | 4.8676 | 5833.8 | 0.00 | 2.668 |
| 0.46699592 | 28.8613 | 9.3401 | 5804.3 | 4.8904 | 5809.2 | 0.00 | 2.655 |
| 0.46933090 | 28.8979 | 9.3467 | 5779.5 | 4.9132 | 5784.4 | 0.00 | 2.642 |
| 0.47167755 | 28.9344 | 9.3529 | 5754.6 | 4.9360 | 5759.5 | 0.00 | 2.629 |
| 0.47403594 | 28.9708 | 9.3586 | 5729.4 | 4.9588 | 5734.4 | 0.00 | 2.616 |
| 0.47640612 | 29.0070 | 9.3639 | 5704.2 | 4.9816 | 5709.1 | 0.00 | 2.602 |
| 0.47878815 | 29.0431 | 9.3688 | 5678.7 | 5.0045 | 5683.7 | 0.00 | 2.590 |
| 0.48118209 | 29.0790 | 9.3732 | 5653.1 | 5.0273 | 5658.2 | 0.00 | 2.577 |
| 0.48358800 | 29.1148 | 9.3772 | 5627.4 | 5.0502 | 5632.4 | 0.00 | 2.564 |
| 0.48600594 | 29.1504 | 9.3806 | 5601.5 | 5.0730 | 5606.5 | 0.00 | 2.551 |
| 0.48843597 | 29.1858 | 9.3835 | 5575.3 | 5.0959 | 5580.4 | 0.00 | 2.538 |
| 0.49087815 | 29.2211 | 9.3859 | 5549.0 | 5.1187 | 5554.1 | 0.00 | 2.526 |
| 0.49333254 | 29.2560 | 9.3878 | 5522.5 | 5.1416 | 5527.6 | 0.00 | 2.513 |
| 0.49579920 | 29.2908 | 9.3892 | 5495.8 | 5.1645 | 5501.0 | 0.00 | 2.501 |
| 0.49827820 | 29.3253 | 9.3900 | 5469.0 | 5.1873 | 5474.1 | 0.00 | 2.488 |
| 0.50076959 | 29.3595 | 9.3903 | 5441.9 | 5.2102 | 5447.2 | 0.00 | 2.476 |
| 0.50327344 | 29.3934 | 9.3901 | 5414.8 | 5.2331 | 5420.0 | 0.00 | 2.464 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Pm ($Z=61$) | | | | | | | |
| 0.50578980 | 29.4270 | 9.3895 | 5387.4 | 5.2559 | 5392.7 | 0.00 | 2.451 |
| 0.50831875 | 29.4602 | 9.3883 | 5360.0 | 5.2788 | 5365.2 | 0.00 | 2.439 |
| 0.51086035 | 29.4931 | 9.3866 | 5332.3 | 5.3016 | 5337.6 | 0.00 | 2.427 |
| 0.51341465 | 29.5257 | 9.3844 | 5304.6 | 5.3245 | 5309.9 | 0.00 | 2.415 |
| 0.51598172 | 29.5579 | 9.3818 | 5276.7 | 5.3474 | 5282.0 | 0.00 | 2.403 |
| 0.51856163 | 29.5897 | 9.3786 | 5248.7 | 5.3702 | 5254.0 | 0.00 | 2.391 |
| 0.52115444 | 29.6211 | 9.3750 | 5220.5 | 5.3930 | 5225.9 | 0.00 | 2.379 |
| 0.52376021 | 29.6521 | 9.3709 | 5192.3 | 5.4159 | 5197.7 | 0.00 | 2.367 |
| 0.52637901 | 29.6827 | 9.3663 | 5163.9 | 5.4387 | 5169.4 | 0.00 | 2.355 |
| 0.52901091 | 29.7128 | 9.3612 | 5135.5 | 5.4615 | 5140.9 | 0.00 | 2.344 |
| 0.53165596 | 29.7424 | 9.3557 | 5106.9 | 5.4843 | 5112.4 | 0.00 | 2.332 |
| 0.53431424 | 29.7716 | 9.3498 | 5078.3 | 5.5071 | 5083.8 | 0.00 | 2.320 |
| 0.53698581 | 29.8003 | 9.3433 | 5049.5 | 5.5299 | 5055.0 | 0.00 | 2.309 |
| 0.53967074 | 29.8285 | 9.3365 | 5020.7 | 5.5527 | 5026.2 | 0.00 | 2.297 |
| 0.54236910 | 29.8561 | 9.3291 | 4991.8 | 5.5754 | 4997.4 | 0.00 | 2.286 |
| 0.54508094 | 29.8833 | 9.3214 | 4962.8 | 5.5981 | 4968.4 | 0.00 | 2.275 |
| 0.54780635 | 29.9099 | 9.3132 | 4933.8 | 5.6209 | 4939.4 | 0.00 | 2.263 |
| 0.55054538 | 29.9359 | 9.3046 | 4904.7 | 5.6436 | 4910.4 | 0.00 | 2.252 |
| 0.55329810 | 29.9613 | 9.2955 | 4875.6 | 5.6663 | 4881.3 | 0.00 | 2.241 |
| 0.55606460 | 29.9862 | 9.2861 | 4846.4 | 5.6890 | 4852.1 | 0.00 | 2.230 |
| 0.55884492 | 30.0105 | 9.2762 | 4817.2 | 5.7116 | 4822.9 | 0.00 | 2.219 |
| 0.56163914 | 30.0341 | 9.2660 | 4787.9 | 5.7342 | 4793.6 | 0.00 | 2.208 |
| 0.56444734 | 30.0571 | 9.2553 | 4758.6 | 5.7569 | 4764.3 | 0.00 | 2.197 |
| 0.56726958 | 30.0795 | 9.2442 | 4729.3 | 5.7795 | 4735.0 | 0.00 | 2.186 |
| 0.57010592 | 30.1012 | 9.2328 | 4699.9 | 5.8020 | 4705.7 | 0.00 | 2.175 |
| 0.57295645 | 30.1222 | 9.2210 | 4670.5 | 5.8246 | 4676.4 | 0.00 | 2.164 |
| 0.57582123 | 30.1426 | 9.2088 | 4641.1 | 5.8471 | 4647.0 | 0.00 | 2.153 |
| 0.57870034 | 30.1622 | 9.1962 | 4611.8 | 5.8696 | 4617.6 | 0.00 | 2.142 |
| 0.58159384 | 30.1812 | 9.1833 | 4582.4 | 5.8921 | 4588.2 | 0.00 | 2.132 |
| 0.58450181 | 30.1994 | 9.1700 | 4553.0 | 5.9145 | 4558.9 | 0.00 | 2.121 |
| 0.58742432 | 30.2168 | 9.1563 | 4523.6 | 5.9370 | 4529.5 | 0.00 | 2.111 |
| 0.59036144 | 30.2335 | 9.1423 | 4494.2 | 5.9594 | 4500.1 | 0.00 | 2.100 |
| 0.59331325 | 30.2495 | 9.1280 | 4464.8 | 5.9817 | 4470.8 | 0.00 | 2.090 |
| 0.59627982 | 30.2646 | 9.1134 | 4435.5 | 6.0041 | 4441.5 | 0.00 | 2.079 |
| 0.59926122 | 30.2789 | 9.0984 | 4406.1 | 6.0264 | 4412.2 | 0.00 | 2.069 |
| 0.60225752 | 30.2924 | 9.0831 | 4376.8 | 6.0486 | 4382.9 | 0.00 | 2.059 |
| 0.60526881 | 30.3051 | 9.0674 | 4347.6 | 6.0709 | 4353.6 | 0.00 | 2.048 |
| 0.60829515 | 30.3170 | 9.0515 | 4318.3 | 6.0931 | 4324.4 | 0.00 | 2.038 |
| 0.61133663 | 30.3279 | 9.0353 | 4289.2 | 6.1153 | 4295.3 | 0.00 | 2.028 |
| 0.61439331 | 30.3380 | 9.0187 | 4260.0 | 6.1374 | 4266.1 | 0.00 | 2.018 |
| 0.61746528 | 30.3472 | 9.0019 | 4230.9 | 6.1595 | 4237.1 | 0.00 | 2.008 |
| 0.62055260 | 30.3555 | 8.9848 | 4201.9 | 6.1816 | 4208.0 | 0.00 | 1.998 |
| 0.62365537 | 30.3628 | 8.9674 | 4172.9 | 6.2036 | 4179.1 | 0.00 | 1.988 |
| 0.62677364 | 30.3692 | 8.9498 | 4143.9 | 6.2256 | 4150.2 | 0.00 | 1.978 |
| 0.62990751 | 30.3746 | 8.9318 | 4115.1 | 6.2475 | 4121.3 | 0.00 | 1.968 |
| 0.63305705 | 30.3790 | 8.9137 | 4086.2 | 6.2694 | 4092.5 | 0.00 | 1.959 |
| 0.63622234 | 30.3825 | 8.8952 | 4057.5 | 6.2913 | 4063.8 | 0.00 | 1.949 |
| 0.63940345 | 30.3849 | 8.8765 | 4028.8 | 6.3131 | 4035.1 | 0.00 | 1.939 |
| 0.64260046 | 30.3862 | 8.8576 | 4000.2 | 6.3349 | 4006.6 | 0.00 | 1.929 |
| 0.64581347 | 30.3865 | 8.8384 | 3971.7 | 6.3566 | 3978.1 | 0.00 | 1.920 |
| 0.64904253 | 30.3857 | 8.8190 | 3943.3 | 6.3783 | 3949.7 | 0.00 | 1.910 |
| 0.65228775 | 30.3839 | 8.7994 | 3914.9 | 6.4000 | 3921.3 | 0.00 | 1.901 |
| 0.65554919 | 30.3808 | 8.7796 | 3886.7 | 6.4216 | 3893.1 | 0.00 | 1.891 |
| 0.65882693 | 30.3767 | 8.7595 | 3858.5 | 6.4431 | 3864.9 | 0.00 | 1.882 |
| 0.66212107 | 30.3714 | 8.7392 | 3830.4 | 6.4646 | 3836.9 | 0.00 | 1.873 |
| 0.66543167 | 30.3648 | 8.7188 | 3802.4 | 6.4861 | 3808.9 | 0.00 | 1.863 |
| 0.66875883 | 30.3571 | 8.6981 | 3774.5 | 6.5075 | 3781.1 | 0.00 | 1.854 |
| 0.67210262 | 30.3481 | 8.6772 | 3746.8 | 6.5288 | 3753.3 | 0.00 | 1.845 |
| 0.67546314 | 30.3379 | 8.6562 | 3719.1 | 6.5501 | 3725.6 | 0.00 | 1.836 |
| 0.67884045 | 30.3264 | 8.6349 | 3691.5 | 6.5714 | 3698.1 | 0.00 | 1.826 |
| 0.68223466 | 30.3135 | 8.6135 | 3664.0 | 6.5926 | 3670.6 | 0.00 | 1.817 |
| 0.68564583 | 30.2993 | 8.5919 | 3636.7 | 6.6137 | 3643.3 | 0.00 | 1.808 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Pm ($Z=61$) | | | | | | | |
| 0.68907406 | 30.2838 | 8.5702 | 3609.4 | 6.6348 | 3616.0 | 0.00 | 1.799 |
| 0.69251943 | 30.2668 | 8.5483 | 3582.3 | 6.6558 | 3588.9 | 0.00 | 1.790 |
| 0.69598202 | 30.2484 | 8.5262 | 3555.2 | 6.6768 | 3561.9 | 0.00 | 1.781 |
| 0.69946194 | 30.2285 | 8.5040 | 3528.3 | 6.6977 | 3535.0 | 0.00 | 1.773 |
| 0.70295924 | 30.2071 | 8.4816 | 3501.6 | 6.7185 | 3508.3 | 0.00 | 1.764 |
| 0.70647404 | 30.1841 | 8.4591 | 3474.9 | 6.7393 | 3481.6 | 0.00 | 1.755 |
| 0.71000641 | 30.1621 | 8.4364 | 3448.3 | 6.7601 | 3455.1 | 0.00 | 1.746 |
| 0.71355644 | 30.1360 | 8.4136 | 3421.9 | 6.7807 | 3428.7 | 0.00 | 1.738 |
| 0.71712423 | 30.1082 | 8.3907 | 3395.6 | 6.8013 | 3402.4 | 0.00 | 1.729 |
| 0.72070985 | 30.0788 | 8.3676 | 3369.4 | 6.8219 | 3376.2 | 0.00 | 1.720 |
| 0.72431340 | 30.0476 | 8.3444 | 3343.3 | 6.8423 | 3350.2 | 0.00 | 1.712 |
| 0.72793496 | 30.0146 | 8.3211 | 3317.4 | 6.8628 | 3324.3 | 0.00 | 1.703 |
| 0.73157464 | 29.9798 | 8.2977 | 3291.6 | 6.8831 | 3298.5 | 0.00 | 1.695 |
| 0.73523251 | 29.9431 | 8.2742 | 3266.0 | 6.9034 | 3272.9 | 0.00 | 1.686 |
| 0.73890867 | 29.9045 | 8.2506 | 3240.4 | 6.9236 | 3247.4 | 0.00 | 1.678 |
| 0.74260322 | 29.8639 | 8.2268 | 3215.0 | 6.9437 | 3222.0 | 0.00 | 1.670 |
| 0.74631623 | 29.8213 | 8.2030 | 3189.8 | 6.9638 | 3196.8 | 0.00 | 1.661 |
| 0.75004781 | 29.7766 | 8.1791 | 3164.7 | 6.9838 | 3171.7 | 0.00 | 1.653 |
| 0.75379805 | 29.7297 | 8.1552 | 3139.7 | 7.0037 | 3146.7 | 0.00 | 1.645 |
| 0.75756704 | 29.6806 | 8.1311 | 3114.9 | 7.0236 | 3121.9 | 0.00 | 1.637 |
| 0.76135488 | 29.6292 | 8.1070 | 3090.2 | 7.0434 | 3097.2 | 0.00 | 1.628 |
| 0.76516165 | 29.5776 | 8.0827 | 3065.6 | 7.0631 | 3072.7 | 0.00 | 1.620 |
| 0.76898746 | 29.5214 | 8.0585 | 3041.2 | 7.0827 | 3048.3 | 0.00 | 1.612 |
| 0.77283240 | 29.4627 | 8.0341 | 3016.9 | 7.1023 | 3024.0 | 0.00 | 1.604 |
| 0.77669656 | 29.4014 | 8.0097 | 2992.8 | 7.1218 | 2999.9 | 0.00 | 1.596 |
| 0.78058004 | 29.3375 | 7.9853 | 2968.8 | 7.1412 | 2976.0 | 0.00 | 1.588 |
| 0.78448294 | 29.2707 | 7.9607 | 2945.0 | 7.1605 | 2952.1 | 0.00 | 1.580 |
| 0.78840536 | 29.2010 | 7.9362 | 2921.3 | 7.1798 | 2928.5 | 0.00 | 1.573 |
| 0.79234738 | 29.1284 | 7.9115 | 2897.7 | 7.1989 | 2904.9 | 0.00 | 1.565 |
| 0.79630912 | 29.0527 | 7.8869 | 2874.3 | 7.2180 | 2881.5 | 0.00 | 1.557 |
| 0.80029067 | 28.9737 | 7.8622 | 2851.1 | 7.2370 | 2858.3 | 0.00 | 1.549 |
| 0.80429212 | 28.8915 | 7.8374 | 2827.9 | 7.2560 | 2835.2 | 0.00 | 1.542 |
| 0.80831358 | 28.8057 | 7.8126 | 2805.0 | 7.2748 | 2812.3 | 0.00 | 1.534 |
| 0.81235515 | 28.7164 | 7.7878 | 2782.2 | 7.2936 | 2789.5 | 0.00 | 1.526 |
| 0.81641693 | 28.6233 | 7.7630 | 2759.5 | 7.3123 | 2766.8 | 0.00 | 1.519 |
| 0.82049901 | 28.5262 | 7.7381 | 2737.0 | 7.3309 | 2744.3 | 0.00 | 1.511 |
| 0.82460150 | 28.4251 | 7.7132 | 2714.6 | 7.3494 | 2721.9 | 0.00 | 1.504 |
| 0.82872451 | 28.3197 | 7.6883 | 2692.4 | 7.3678 | 2699.7 | 0.00 | 1.496 |
| 0.83286813 | 28.2099 | 7.6634 | 2670.3 | 7.3861 | 2677.7 | 0.00 | 1.489 |
| 0.83703248 | 28.0953 | 7.6384 | 2648.3 | 7.4044 | 2655.7 | 0.00 | 1.481 |
| 0.84121764 | 27.9759 | 7.6135 | 2626.6 | 7.4225 | 2634.0 | 0.00 | 1.474 |
| 0.84542373 | 27.8513 | 7.5885 | 2604.9 | 7.4406 | 2612.4 | 0.00 | 1.467 |
| 0.84965084 | 27.7212 | 7.5635 | 2583.4 | 7.4585 | 2590.9 | 0.00 | 1.459 |
| 0.85389910 | 27.5855 | 7.5386 | 2562.1 | 7.4764 | 2569.6 | 0.00 | 1.452 |
| 0.85816859 | 27.4438 | 7.5136 | 2540.9 | 7.4942 | 2548.4 | 0.00 | 1.445 |
| 0.86245944 | 27.2957 | 7.4886 | 2519.8 | 7.5119 | 2527.4 | 0.00 | 1.438 |
| 0.86677173 | 27.1410 | 7.4636 | 2498.9 | 7.5295 | 2506.5 | 0.00 | 1.430 |
| 0.87110559 | 26.9791 | 7.4386 | 2478.2 | 7.5470 | 2485.7 | 0.00 | 1.423 |
| 0.87546112 | 26.8097 | 7.4137 | 2457.6 | 7.5644 | 2465.1 | 0.00 | 1.416 |
| 0.87983843 | 26.6323 | 7.3887 | 2437.1 | 7.5818 | 2444.7 | 0.00 | 1.409 |
| 0.88423762 | 26.4464 | 7.3637 | 2416.8 | 7.5990 | 2424.4 | 0.00 | 1.402 |
| 0.88865881 | 26.2514 | 7.3388 | 2396.6 | 7.6161 | 2404.2 | 0.00 | 1.395 |
| 0.89310210 | 26.0467 | 7.3139 | 2376.6 | 7.6331 | 2384.2 | 0.00 | 1.388 |
| 0.89756761 | 25.8315 | 7.2890 | 2356.7 | 7.6500 | 2364.4 | 0.00 | 1.381 |
| 0.90205545 | 25.6051 | 7.2641 | 2337.0 | 7.6669 | 2344.7 | 0.00 | 1.374 |
| 0.90656573 | 25.3667 | 7.2392 | 2317.4 | 7.6836 | 2325.1 | 0.00 | 1.368 |
| 0.91109856 | 25.1153 | 7.2144 | 2298.0 | 7.7002 | 2305.7 | 0.00 | 1.361 |
| 0.91565405 | 24.8497 | 7.1895 | 2278.7 | 7.7167 | 2286.4 | 0.00 | 1.354 |
| 0.92023232 | 24.5687 | 7.1647 | 2259.5 | 7.7332 | 2267.2 | 0.00 | 1.347 |
| 0.92483348 | 24.2709 | 7.1400 | 2240.5 | 7.7495 | 2248.2 | 0.00 | 1.341 |
| 0.92945765 | 23.9548 | 7.1152 | 2221.6 | 7.7657 | 2229.4 | 0.00 | 1.334 |
| 0.93410494 | 23.6184 | 7.0905 | 2202.9 | 7.7818 | 2210.7 | 0.00 | 1.327 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Pm ($Z=61$) | | | | | | | |
| 0.93877546 | 23.2597 | 7.0658 | 2184.3 | 7.7978 | 2192.1 | 0.00 | 1.321 |
| 0.94346934 | 22.8761 | 7.0412 | 2165.8 | 7.8137 | 2173.7 | 0.00 | 1.314 |
| 0.94818668 | 22.4647 | 7.0165 | 2147.5 | 7.8295 | 2155.4 | 0.00 | 1.308 |
| 0.95292762 | 22.0220 | 6.9920 | 2129.4 | 7.8452 | 2137.2 | 0.00 | 1.301 |
| 0.95769226 | 21.5438 | 6.9674 | 2111.3 | 7.8607 | 2119.2 | 0.00 | 1.295 |
| 0.96248072 | 21.0251 | 6.9429 | 2093.4 | 7.8762 | 2101.3 | 0.00 | 1.288 |
| 0.96729312 | 20.4596 | 6.9184 | 2075.7 | 7.8915 | 2083.6 | 0.00 | 1.282 |
| 0.97212959 | 19.8395 | 6.8940 | 2058.1 | 7.9068 | 2066.0 | 0.00 | 1.275 |
| 0.97699023 | 19.1548 | 6.8696 | 2040.6 | 7.9219 | 2048.5 | 0.00 | 1.269 |
| 0.98187519 | 18.3927 | 6.8453 | 2023.2 | 7.9369 | 2031.2 | 0.00 | 1.263 |
| 0.98678456 | 17.5357 | 6.8210 | 2006.0 | 7.9518 | 2014.0 | 0.00 | 1.256 |
| 0.99171848 | 16.5599 | 6.7968 | 1989.0 | 7.9666 | 1996.9 | 0.00 | 1.250 |
| 0.99667708 | 15.4309 | 6.7726 | 1972.0 | 7.9813 | 1980.0 | 0.00 | 1.244 |
| 1.0016605 | 14.1039 | 6.7441 | 1954.0 | 7.9959 | 1962.0 | 0.00 | 1.238 |
| 1.0066688 | 12.4974 | 6.7071 | 1933.6 | 8.0103 | 1941.6 | 0.00 | 1.232 |
| 1.0117021 | 10.4350 | 6.6703 | 1913.4 | 8.0247 | 1921.4 | 0.00 | 1.226 |
| 1.0167606 | 7.56515 | 6.6338 | 1893.4 | 8.0389 | 1901.5 | 0.00 | 1.219 |
| 1.0218444 | 2.77945 | 6.5967 | 1873.5 | 8.0530 | 1881.5 | 0.00 | 1.213 |
| 1.0267933 | -22.1483 | 6.5608 | 1854.3 | 8.0666 | 1862.4 | 0.00 | 1.207 |
| 1.0269536 | -26.8792 | 26.530 | 7497.3 | 8.0670 | 7505.4 | 0.00 | 1.207 |
| 1.0270069 | -22.4988 | 26.528 | 7496.3 | 8.0671 | 7504.4 | 0.00 | 1.207 |
| 1.0320884 | 1.58433 | 26.326 | 7402.5 | 8.0809 | 7410.6 | 0.00 | 1.201 |
| 1.0372489 | 4.98823 | 26.123 | 7309.0 | 8.0946 | 7317.1 | 0.00 | 1.195 |
| 1.0424351 | 5.96659 | 25.922 | 7216.7 | 8.1083 | 7224.8 | 0.00 | 1.189 |
| 1.0476473 | 4.51624 | 25.723 | 7125.5 | 8.1218 | 7133.7 | 0.00 | 1.183 |
| 1.0513391 | -7.48748 | 25.583 | 7061.9 | 8.1312 | 7070.1 | 0.00 | 1.179 |
| 1.0516608 | -7.60111 | 38.691 | 10677 | 8.1321 | 10685 | 0.00 | 1.179 |
| 1.0528855 | 1.77888 | 38.620 | 10645 | 8.1352 | 10653 | 0.00 | 1.178 |
| 1.0581499 | 9.77361 | 38.318 | 10509 | 8.1484 | 10517 | 0.00 | 1.172 |
| 1.0634407 | 13.4392 | 38.017 | 10375 | 8.1616 | 10383 | 0.00 | 1.166 |
| 1.0687579 | 16.0406 | 37.719 | 10242 | 8.1746 | 10250 | 0.00 | 1.160 |
| 1.0741017 | 18.1099 | 37.424 | 10111 | 8.1875 | 10120 | 0.00 | 1.154 |
| 1.0794722 | 19.8470 | 37.131 | 9982.3 | 8.2003 | 9990.5 | 0.00 | 1.149 |
| 1.0848695 | 21.3520 | 36.840 | 9854.9 | 8.2130 | 9863.1 | 0.00 | 1.143 |
| 1.0902939 | 22.6832 | 36.551 | 9729.1 | 8.2255 | 9737.3 | 0.00 | 1.137 |
| 1.0957454 | 23.8785 | 36.265 | 9604.9 | 8.2379 | 9613.1 | 0.00 | 1.132 |
| 1.1012241 | 24.9635 | 35.982 | 9482.3 | 8.2502 | 9490.6 | 0.00 | 1.126 |
| 1.1067302 | 25.9570 | 35.700 | 9361.3 | 8.2624 | 9369.6 | 0.00 | 1.120 |
| 1.1122639 | 26.8730 | 35.421 | 9241.9 | 8.2744 | 9250.2 | 0.00 | 1.115 |
| 1.1178252 | 27.7223 | 35.144 | 9124.0 | 8.2864 | 9132.3 | 0.00 | 1.109 |
| 1.1234143 | 28.5133 | 34.869 | 9007.6 | 8.2981 | 9015.9 | 0.00 | 1.104 |
| 1.1290314 | 29.2530 | 34.596 | 8892.8 | 8.3098 | 8901.1 | 0.00 | 1.098 |
| 1.1346765 | 29.9468 | 34.326 | 8779.4 | 8.3213 | 8787.7 | 0.00 | 1.093 |
| 1.1403499 | 30.5995 | 34.058 | 8667.4 | 8.3327 | 8675.8 | 0.00 | 1.087 |
| 1.1460517 | 31.2150 | 33.792 | 8556.9 | 8.3440 | 8565.3 | 0.00 | 1.082 |
| 1.1517819 | 31.7965 | 33.528 | 8447.9 | 8.3551 | 8456.2 | 0.00 | 1.076 |
| 1.1575408 | 32.3468 | 33.266 | 8340.2 | 8.3662 | 8348.6 | 0.00 | 1.071 |
| 1.1633285 | 32.8684 | 33.007 | 8234.0 | 8.3770 | 8242.3 | 0.00 | 1.066 |
| 1.1691452 | 33.3633 | 32.749 | 8129.0 | 8.3878 | 8137.4 | 0.00 | 1.060 |
| 1.1749909 | 33.8334 | 32.493 | 8025.5 | 8.3984 | 8033.9 | 0.00 | 1.055 |
| 1.1808659 | 34.2802 | 32.240 | 7923.3 | 8.4089 | 7931.7 | 0.00 | 1.050 |
| 1.1867702 | 34.7051 | 31.989 | 7822.4 | 8.4193 | 7830.8 | 0.00 | 1.045 |
| 1.1927040 | 35.1092 | 31.739 | 7722.8 | 8.4295 | 7731.2 | 0.00 | 1.040 |
| 1.1986676 | 35.4938 | 31.492 | 7624.5 | 8.4396 | 7632.9 | 0.00 | 1.034 |
| 1.2046609 | 35.8596 | 31.246 | 7527.4 | 8.4496 | 7535.8 | 0.00 | 1.029 |
| 1.2106842 | 36.2074 | 31.003 | 7431.6 | 8.4594 | 7440.1 | 0.00 | 1.024 |
| 1.2167376 | 36.5379 | 30.761 | 7337.0 | 8.4691 | 7345.5 | 0.00 | 1.019 |
| 1.2228213 | 36.8517 | 30.522 | 7243.7 | 8.4786 | 7252.1 | 0.00 | 1.014 |
| 1.2289354 | 37.1491 | 30.284 | 7151.5 | 8.4881 | 7160.0 | 0.00 | 1.009 |
| 1.2350801 | 37.4307 | 30.048 | 7060.5 | 8.4974 | 7069.0 | 0.00 | 1.004 |
| 1.2412555 | 37.6965 | 29.815 | 6970.7 | 8.5065 | 6979.3 | 0.00 | 0.9989 |
| 1.2474618 | 37.9467 | 29.583 | 6882.1 | 8.5155 | 6890.6 | 0.00 | 0.9939 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Pm ($Z=61$) | | | | | | | |
| 1.2536991 | 38.1812 | 29.353 | 6794.6 | 8.5244 | 6803.1 | 0.00 | 0.9889 |
| 1.2599676 | 38.4001 | 29.124 | 6708.2 | 8.5332 | 6716.8 | 0.00 | 0.9840 |
| 1.2662674 | 38.6028 | 28.898 | 6623.0 | 8.5418 | 6631.5 | 0.00 | 0.9791 |
| 1.2725988 | 38.7889 | 28.673 | 6538.8 | 8.5503 | 6547.3 | 0.00 | 0.9743 |
| 1.2789618 | 38.9576 | 28.451 | 6455.7 | 8.5586 | 6464.3 | 0.00 | 0.9694 |
| 1.2853566 | 39.1078 | 28.230 | 6373.7 | 8.5668 | 6382.3 | 0.00 | 0.9646 |
| 1.2917833 | 39.2379 | 28.010 | 6292.7 | 8.5749 | 6301.3 | 0.00 | 0.9598 |
| 1.2982423 | 39.3457 | 27.793 | 6212.8 | 8.5828 | 6221.4 | 0.00 | 0.9550 |
| 1.3047335 | 39.4280 | 27.577 | 6133.9 | 8.5906 | 6142.5 | 0.00 | 0.9503 |
| 1.3112571 | 39.4803 | 27.363 | 6056.0 | 8.5982 | 6064.6 | 0.00 | 0.9455 |
| 1.3178134 | 39.4957 | 27.151 | 5979.2 | 8.6057 | 5987.8 | 0.00 | 0.9408 |
| 1.3244025 | 39.4633 | 26.940 | 5903.2 | 8.6131 | 5911.8 | 0.00 | 0.9362 |
| 1.3310245 | 39.3642 | 26.731 | 5828.2 | 8.6203 | 5836.9 | 0.00 | 0.9315 |
| 1.3376796 | 39.1625 | 26.524 | 5754.4 | 8.6274 | 5763.1 | 0.00 | 0.9269 |
| 1.3443680 | 38.7743 | 26.321 | 5681.9 | 8.6344 | 5690.6 | 0.00 | 0.9222 |
| 1.3510899 | 37.9059 | 26.119 | 5610.3 | 8.6412 | 5619.0 | 0.00 | 0.9177 |
| 1.3559325 | 35.5390 | 25.976 | 5559.5 | 8.6460 | 5568.2 | 0.00 | 0.9144 |
| 1.3578453 | 35.4989 | 30.344 | 6485.4 | 8.6478 | 6494.0 | 0.00 | 0.9131 |
| 1.3578674 | 35.5324 | 30.343 | 6485.1 | 8.6479 | 6493.8 | 0.00 | 0.9131 |
| 1.3646345 | 38.6761 | 30.096 | 6400.4 | 8.6544 | 6409.0 | 0.00 | 0.9086 |
| 1.3714577 | 39.7544 | 29.851 | 6316.6 | 8.6607 | 6325.3 | 0.00 | 0.9040 |
| 1.3783150 | 40.4681 | 29.608 | 6234.1 | 8.6670 | 6242.7 | 0.00 | 0.8995 |
| 1.3852066 | 41.0163 | 29.367 | 6152.6 | 8.6731 | 6161.3 | 0.00 | 0.8951 |
| 1.3921326 | 41.4657 | 29.129 | 6072.3 | 8.6791 | 6081.0 | 0.00 | 0.8906 |
| 1.3990933 | 41.8464 | 28.892 | 5993.0 | 8.6849 | 6001.7 | 0.00 | 0.8862 |
| 1.4060887 | 42.1743 | 28.658 | 5914.8 | 8.6906 | 5923.5 | 0.00 | 0.8818 |
| 1.4131192 | 42.4576 | 28.425 | 5837.7 | 8.6961 | 5846.4 | 0.00 | 0.8774 |
| 1.4201848 | 42.7000 | 28.195 | 5761.5 | 8.7015 | 5770.2 | 0.00 | 0.8730 |
| 1.4272857 | 42.9021 | 27.977 | 5688.5 | 8.7067 | 5697.2 | 0.00 | 0.8687 |
| 1.4344221 | 43.0731 | 27.771 | 5618.6 | 8.7119 | 5627.3 | 0.00 | 0.8643 |
| 1.4415942 | 43.2089 | 27.568 | 5549.8 | 8.7168 | 5558.6 | 0.00 | 0.8600 |
| 1.4488022 | 43.2972 | 27.369 | 5482.2 | 8.7216 | 5490.9 | 0.00 | 0.8558 |
| 1.4560462 | 43.3111 | 27.171 | 5415.6 | 8.7263 | 5424.3 | 0.00 | 0.8515 |
| 1.4633265 | 43.1658 | 26.977 | 5350.0 | 8.7309 | 5358.8 | 0.00 | 0.8473 |
| 1.4703391 | 42.1883 | 26.792 | 5288.2 | 8.7351 | 5296.9 | 0.00 | 0.8432 |
| 1.4706431 | 41.9985 | 26.784 | 5285.5 | 8.7353 | 5294.2 | 0.00 | 0.8431 |
| 1.4724609 | 42.2231 | 28.592 | 5635.2 | 8.7363 | 5643.9 | 0.00 | 0.8420 |
| 1.4779963 | 43.4706 | 28.433 | 5582.9 | 8.7395 | 5591.7 | 0.00 | 0.8389 |
| 1.4853863 | 44.1218 | 28.225 | 5514.4 | 8.7436 | 5523.2 | 0.00 | 0.8347 |
| 1.4928132 | 44.5680 | 28.019 | 5446.9 | 8.7476 | 5455.7 | 0.00 | 0.8305 |
| 1.5002773 | 44.9287 | 27.815 | 5380.5 | 8.7514 | 5389.3 | 0.00 | 0.8264 |
| 1.5077787 | 45.2394 | 27.614 | 5315.0 | 8.7551 | 5323.8 | 0.00 | 0.8223 |
| 1.5153176 | 45.5159 | 27.416 | 5250.6 | 8.7586 | 5259.3 | 0.00 | 0.8182 |
| 1.5228942 | 45.7663 | 27.219 | 5187.0 | 8.7620 | 5195.8 | 0.00 | 0.8141 |
| 1.5305086 | 45.9953 | 27.025 | 5124.4 | 8.7652 | 5133.2 | 0.00 | 0.8101 |
| 1.5381612 | 46.2055 | 26.834 | 5062.8 | 8.7683 | 5071.5 | 0.00 | 0.8061 |
| 1.5458520 | 46.3980 | 26.646 | 5002.4 | 8.7713 | 5011.2 | 0.00 | 0.8020 |
| 1.5535812 | 46.5781 | 26.469 | 4944.4 | 8.7741 | 4953.1 | 0.00 | 0.7981 |
| 1.5613491 | 46.7480 | 26.294 | 4887.2 | 8.7768 | 4896.0 | 0.00 | 0.7941 |
| 1.5691559 | 46.9076 | 26.121 | 4831.0 | 8.7793 | 4839.8 | 0.00 | 0.7901 |
| 1.5770017 | 47.0567 | 25.951 | 4775.6 | 8.7817 | 4784.4 | 0.00 | 0.7862 |
| 1.5848867 | 47.1947 | 25.783 | 4721.1 | 8.7839 | 4729.8 | 0.00 | 0.7823 |
| 1.5928111 | 47.3209 | 25.617 | 4667.3 | 8.7860 | 4676.1 | 0.00 | 0.7784 |
| 1.6007752 | 47.4334 | 25.453 | 4614.4 | 8.7880 | 4623.2 | 0.00 | 0.7745 |
| 1.6087790 | 47.5295 | 25.291 | 4562.3 | 8.7898 | 4571.1 | 0.00 | 0.7707 |
| 1.6168229 | 47.6037 | 25.131 | 4510.9 | 8.7914 | 4519.7 | 0.00 | 0.7668 |
| 1.6249070 | 47.6449 | 24.974 | 4460.3 | 8.7930 | 4469.1 | 0.00 | 0.7630 |
| 1.6330316 | 47.6250 | 24.818 | 4410.4 | 8.7943 | 4419.2 | 0.00 | 0.7592 |
| 1.6411967 | 47.4301 | 24.663 | 4361.2 | 8.7956 | 4370.0 | 0.00 | 0.7555 |
| 1.6442772 | 47.1621 | 24.606 | 4342.9 | 8.7960 | 4351.7 | 0.00 | 0.7540 |
| 1.6487228 | 47.2348 | 25.699 | 4523.5 | 8.7966 | 4532.3 | 0.00 | 0.7520 |
| 1.6494027 | 47.3473 | 25.686 | 4519.4 | 8.7966 | 4528.2 | 0.00 | 0.7517 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Pm ($Z=61$) | | | | | | | |
| 1.6576497 | 47.9992 | 25.531 | 4469.8 | 8.7976 | 4478.6 | 0.00 | 0.7480 |
| 1.6659380 | 48.3513 | 25.378 | 4420.8 | 8.7984 | 4429.6 | 0.00 | 0.7442 |
| 1.6742677 | 48.6254 | 25.226 | 4372.5 | 8.7990 | 4381.3 | 0.00 | 0.7405 |
| 1.6826390 | 48.8617 | 25.076 | 4324.9 | 8.7996 | 4333.7 | 0.00 | 0.7368 |
| 1.6910522 | 49.0749 | 24.927 | 4277.9 | 8.7999 | 4286.7 | 0.00 | 0.7332 |
| 1.6995075 | 49.2722 | 24.780 | 4231.4 | 8.8001 | 4240.2 | 0.00 | 0.7295 |
| 1.7080050 | 49.4578 | 24.634 | 4185.6 | 8.8002 | 4194.4 | 0.00 | 0.7259 |
| 1.7165450 | 49.6341 | 24.490 | 4140.4 | 8.8002 | 4149.2 | 0.00 | 0.7223 |
| 1.7251278 | 49.8028 | 24.347 | 4095.7 | 8.8000 | 4104.5 | 0.00 | 0.7187 |
| 1.7337534 | 49.9652 | 24.205 | 4051.7 | 8.7996 | 4060.5 | 0.00 | 0.7151 |
| 1.7424222 | 50.1230 | 24.066 | 4008.3 | 8.7991 | 4017.1 | 0.00 | 0.7116 |
| 1.7511343 | 50.2769 | 23.928 | 3965.5 | 8.7985 | 3974.3 | 0.00 | 0.7080 |
| 1.7598899 | 50.4276 | 23.791 | 3923.2 | 8.7977 | 3932.0 | 0.00 | 0.7045 |
| 1.7686894 | 50.5752 | 23.651 | 3880.7 | 8.7968 | 3889.5 | 0.00 | 0.7010 |
| 1.7775328 | 50.7180 | 23.508 | 3838.1 | 8.7957 | 3846.9 | 0.00 | 0.6975 |
| 1.7864205 | 50.8566 | 23.367 | 3796.0 | 8.7945 | 3804.8 | 0.00 | 0.6940 |
| 1.7953526 | 50.9915 | 23.227 | 3754.4 | 8.7932 | 3763.2 | 0.00 | 0.6906 |
| 1.8043294 | 51.1230 | 23.087 | 3713.3 | 8.7917 | 3722.1 | 0.00 | 0.6871 |
| 1.8133510 | 51.2513 | 22.949 | 3672.7 | 8.7901 | 3681.5 | 0.00 | 0.6837 |
| 1.8224178 | 51.3767 | 22.811 | 3632.6 | 8.7883 | 3641.3 | 0.00 | 0.6803 |
| 1.8315299 | 51.4995 | 22.675 | 3592.8 | 8.7864 | 3601.6 | 0.00 | 0.6769 |
| 1.8406875 | 51.6197 | 22.539 | 3553.6 | 8.7843 | 3562.4 | 0.00 | 0.6736 |
| 1.8498909 | 51.7377 | 22.404 | 3514.8 | 8.7821 | 3523.5 | 0.00 | 0.6702 |
| 1.8591404 | 51.8534 | 22.270 | 3476.4 | 8.7798 | 3485.2 | 0.00 | 0.6669 |
| 1.8684361 | 51.9672 | 22.137 | 3438.4 | 8.7773 | 3447.2 | 0.00 | 0.6636 |
| 1.8777783 | 52.0791 | 22.005 | 3400.9 | 8.7747 | 3409.7 | 0.00 | 0.6603 |
| 1.8871672 | 52.1892 | 21.874 | 3363.8 | 8.7720 | 3372.6 | 0.00 | 0.6570 |
| 1.8966030 | 52.2979 | 21.744 | 3327.1 | 8.7691 | 3335.9 | 0.00 | 0.6537 |
| 1.9060860 | 52.4052 | 21.614 | 3290.8 | 8.7660 | 3299.6 | 0.00 | 0.6505 |
| 1.9156165 | 52.5112 | 21.484 | 3254.7 | 8.7629 | 3263.5 | 0.00 | 0.6472 |
| 1.9251945 | 52.6150 | 21.352 | 3218.6 | 8.7596 | 3227.4 | 0.00 | 0.6440 |
| 1.9348205 | 52.7166 | 21.220 | 3182.9 | 8.7561 | 3191.6 | 0.00 | 0.6408 |
| 1.9444946 | 52.8161 | 21.090 | 3147.5 | 8.7525 | 3156.3 | 0.00 | 0.6376 |
| 1.9542171 | 52.9137 | 20.960 | 3112.6 | 8.7488 | 3121.3 | 0.00 | 0.6344 |
| 1.9639882 | 53.0095 | 20.830 | 3078.0 | 8.7449 | 3086.7 | 0.00 | 0.6313 |
| 1.9738081 | 53.1035 | 20.702 | 3043.8 | 8.7409 | 3052.5 | 0.00 | 0.6281 |
| 1.9836772 | 53.1960 | 20.574 | 3009.9 | 8.7368 | 3018.7 | 0.00 | 0.6250 |
| 1.9935955 | 53.2868 | 20.447 | 2976.5 | 8.7325 | 2985.2 | 0.00 | 0.6219 |
| 2.0035635 | 53.3762 | 20.321 | 2943.4 | 8.7281 | 2952.1 | 0.00 | 0.6188 |
| 2.0135813 | 53.4641 | 20.195 | 2910.6 | 8.7236 | 2919.3 | 0.00 | 0.6157 |
| 2.0236492 | 53.5507 | 20.070 | 2878.2 | 8.7189 | 2886.9 | 0.00 | 0.6127 |
| 2.0337675 | 53.6360 | 19.946 | 2846.2 | 8.7141 | 2854.9 | 0.00 | 0.6096 |
| 2.0439363 | 53.7201 | 19.822 | 2814.5 | 8.7091 | 2823.2 | 0.00 | 0.6066 |
| 2.0541560 | 54.0324 | 19.699 | 2783.1 | 8.7040 | 2791.8 | 0.00 | 0.6036 |
| 2.0644268 | 54.1145 | 19.571 | 2751.2 | 8.6988 | 2759.9 | 0.00 | 0.6006 |
| 2.0747489 | 54.1948 | 19.443 | 2719.6 | 8.6935 | 2728.3 | 0.00 | 0.5976 |
| 2.0851227 | 54.2733 | 19.316 | 2688.3 | 8.6880 | 2697.0 | 0.00 | 0.5946 |
| 2.0955483 | 54.3502 | 19.189 | 2657.5 | 8.6824 | 2666.2 | 0.00 | 0.5917 |
| 2.1060260 | 54.5801 | 19.062 | 2626.8 | 8.6766 | 2635.5 | 0.00 | 0.5887 |
| 2.1165562 | 54.6540 | 18.933 | 2596.0 | 8.6707 | 2604.7 | 0.00 | 0.5858 |
| 2.1271389 | 54.7261 | 18.805 | 2565.6 | 8.6647 | 2574.3 | 0.00 | 0.5829 |
| 2.1377746 | 54.7965 | 18.678 | 2535.6 | 8.6585 | 2544.2 | 0.00 | 0.5800 |
| 2.1484635 | 54.8651 | 18.551 | 2505.8 | 8.6523 | 2514.4 | 0.00 | 0.5771 |
| 2.1592058 | 54.9318 | 18.424 | 2476.3 | 8.6458 | 2484.9 | 0.00 | 0.5742 |
| 2.1700018 | 54.9968 | 18.298 | 2447.1 | 8.6393 | 2455.8 | 0.00 | 0.5714 |
| 2.1808519 | 55.0600 | 18.173 | 2418.3 | 8.6326 | 2427.0 | 0.00 | 0.5685 |
| 2.1917561 | 55.1217 | 18.049 | 2389.9 | 8.6258 | 2398.5 | 0.00 | 0.5657 |
| 2.2027149 | 55.1819 | 17.926 | 2361.7 | 8.6189 | 2370.4 | 0.00 | 0.5629 |
| 2.2137285 | 55.2405 | 17.803 | 2333.9 | 8.6118 | 2342.5 | 0.00 | 0.5601 |
| 2.2247971 | 55.2978 | 17.682 | 2306.5 | 8.6046 | 2315.1 | 0.00 | 0.5573 |
| 2.2359211 | 55.3536 | 17.561 | 2279.3 | 8.5973 | 2287.9 | 0.00 | 0.5545 |
| 2.2471007 | 55.4081 | 17.441 | 2252.5 | 8.5899 | 2261.0 | 0.00 | 0.5518 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Pm ($Z=61$) | | | | | | | |
| 2.2583362 | 55.4613 | 17.322 | 2225.9 | 8.5823 | 2234.5 | 0.00 | 0.5490 |
| 2.2696279 | 55.5133 | 17.201 | 2199.4 | 8.5746 | 2208.0 | 0.00 | 0.5463 |
| 2.2809760 | 55.5640 | 17.081 | 2173.2 | 8.5667 | 2181.8 | 0.00 | 0.5436 |
| 2.2923809 | 55.6134 | 16.961 | 2147.3 | 8.5588 | 2155.8 | 0.00 | 0.5409 |
| 2.3038428 | 55.6614 | 16.843 | 2121.6 | 8.5507 | 2130.2 | 0.00 | 0.5382 |
| 2.3153620 | 55.7083 | 16.725 | 2096.3 | 8.5425 | 2104.9 | 0.00 | 0.5355 |
| 2.3269388 | 55.7540 | 16.608 | 2071.3 | 8.5342 | 2079.8 | 0.00 | 0.5328 |
| 2.3385735 | 55.7984 | 16.492 | 2046.6 | 8.5257 | 2055.1 | 0.00 | 0.5302 |
| 2.3502664 | 55.8418 | 16.377 | 2022.2 | 8.5172 | 2030.7 | 0.00 | 0.5275 |
| 2.3620177 | 55.8840 | 16.262 | 1998.1 | 8.5085 | 2006.6 | 0.00 | 0.5249 |
| 2.3738278 | 55.9252 | 16.149 | 1974.3 | 8.4996 | 1982.8 | 0.00 | 0.5223 |
| 2.3856970 | 55.9653 | 16.036 | 1950.8 | 8.4907 | 1959.2 | 0.00 | 0.5197 |
| 2.3976254 | 56.0044 | 15.925 | 1927.5 | 8.4816 | 1936.0 | 0.00 | 0.5171 |
| 2.4096136 | 56.0425 | 15.814 | 1904.6 | 8.4724 | 1913.0 | 0.00 | 0.5145 |
| 2.4216616 | 56.0797 | 15.704 | 1881.9 | 8.4631 | 1890.4 | 0.00 | 0.5120 |
| 2.4337699 | 56.1159 | 15.594 | 1859.5 | 8.4537 | 1868.0 | 0.00 | 0.5094 |
| 2.4459388 | 56.1512 | 15.486 | 1837.4 | 8.4442 | 1845.9 | 0.00 | 0.5069 |
| 2.4581685 | 56.1857 | 15.378 | 1815.6 | 8.4345 | 1824.0 | 0.00 | 0.5044 |
| 2.4704593 | 56.2192 | 15.272 | 1794.0 | 8.4247 | 1802.4 | 0.00 | 0.5019 |
| 2.4828116 | 56.2520 | 15.166 | 1772.7 | 8.4148 | 1781.1 | 0.00 | 0.4994 |
| 2.4952257 | 56.2839 | 15.061 | 1751.7 | 8.4048 | 1760.1 | 0.00 | 0.4969 |
| 2.5077018 | 56.3151 | 14.957 | 1730.9 | 8.3947 | 1739.3 | 0.00 | 0.4944 |
| 2.5202403 | 56.3455 | 14.853 | 1710.4 | 8.3844 | 1718.8 | 0.00 | 0.4920 |
| 2.5328415 | 56.3751 | 14.751 | 1690.1 | 8.3741 | 1698.5 | 0.00 | 0.4895 |
| 2.5455057 | 56.4041 | 14.649 | 1670.1 | 8.3636 | 1678.5 | 0.00 | 0.4871 |
| 2.5582333 | 56.4324 | 14.548 | 1650.3 | 8.3530 | 1658.7 | 0.00 | 0.4846 |
| 2.5710244 | 56.4600 | 14.448 | 1630.8 | 8.3423 | 1639.2 | 0.00 | 0.4822 |
| 2.5838796 | 56.4870 | 14.348 | 1611.5 | 8.3315 | 1619.9 | 0.00 | 0.4798 |
| 2.5967990 | 56.5133 | 14.250 | 1592.5 | 8.3205 | 1600.8 | 0.00 | 0.4775 |
| 2.6097829 | 56.5391 | 14.152 | 1573.7 | 8.3095 | 1582.0 | 0.00 | 0.4751 |
| 2.6228319 | 56.5643 | 14.055 | 1555.2 | 8.2983 | 1563.5 | 0.00 | 0.4727 |
| 2.6359460 | 56.5890 | 13.959 | 1536.8 | 8.2871 | 1545.1 | 0.00 | 0.4704 |
| 2.6491257 | 56.6132 | 13.864 | 1518.7 | 8.2757 | 1527.0 | 0.00 | 0.4680 |
| 2.6623714 | 56.6369 | 13.769 | 1500.9 | 8.2642 | 1509.1 | 0.00 | 0.4657 |
| 2.6756832 | 56.6601 | 13.675 | 1483.2 | 8.2526 | 1491.5 | 0.00 | 0.4634 |
| 2.6890617 | 56.6830 | 13.582 | 1465.8 | 8.2409 | 1474.0 | 0.00 | 0.4611 |
| 2.7025070 | 56.7054 | 13.490 | 1448.6 | 8.2291 | 1456.8 | 0.00 | 0.4588 |
| 2.7160195 | 56.8219 | 13.398 | 1431.6 | 8.2172 | 1439.8 | 0.00 | 0.4565 |
| 2.7295996 | 56.8437 | 13.305 | 1414.6 | 8.2052 | 1422.8 | 0.00 | 0.4542 |
| 2.7432476 | 56.8650 | 13.213 | 1397.8 | 8.1930 | 1406.0 | 0.00 | 0.4520 |
| 2.7569638 | 56.8858 | 13.121 | 1381.2 | 8.1808 | 1389.4 | 0.00 | 0.4497 |
| 2.7707486 | 56.9061 | 13.031 | 1364.9 | 8.1685 | 1373.0 | 0.00 | 0.4475 |
| 2.7846024 | 56.9259 | 12.941 | 1348.7 | 8.1560 | 1356.8 | 0.00 | 0.4452 |
| 2.7985254 | 56.9453 | 12.852 | 1332.7 | 8.1435 | 1340.9 | 0.00 | 0.4430 |
| 2.8125180 | 56.9644 | 12.763 | 1317.0 | 8.1308 | 1325.1 | 0.00 | 0.4408 |
| 2.8265806 | 56.9831 | 12.676 | 1301.4 | 8.1181 | 1309.5 | 0.00 | 0.4386 |
| 2.8407135 | 57.0015 | 12.589 | 1286.1 | 8.1052 | 1294.2 | 0.00 | 0.4365 |
| 2.8549171 | 57.0196 | 12.502 | 1270.9 | 8.0923 | 1279.0 | 0.00 | 0.4343 |
| 2.8691917 | 57.0375 | 12.417 | 1255.9 | 8.0792 | 1264.0 | 0.00 | 0.4321 |
| 2.8835376 | 57.0553 | 12.332 | 1241.1 | 8.0660 | 1249.2 | 0.00 | 0.4300 |
| 2.8979553 | 57.0730 | 12.247 | 1226.5 | 8.0528 | 1234.5 | 0.00 | 0.4278 |
| 2.9124451 | 57.0906 | 12.164 | 1212.1 | 8.0394 | 1220.1 | 0.00 | 0.4257 |
| 2.9270073 | 57.1082 | 12.081 | 1197.8 | 8.0260 | 1205.8 | 0.00 | 0.4236 |
| 2.9416424 | 57.1260 | 11.999 | 1183.8 | 8.0124 | 1191.8 | 0.00 | 0.4215 |
| 2.9563506 | 57.1955 | 11.916 | 1169.8 | 7.9988 | 1177.8 | 0.00 | 0.4194 |
| 2.9711323 | 57.2142 | 11.835 | 1156.0 | 7.9851 | 1163.9 | 0.00 | 0.4173 |
| 2.9859880 | 57.2332 | 11.753 | 1142.3 | 7.9712 | 1150.3 | 0.00 | 0.4152 |
| 3.0009179 | 57.2688 | 11.672 | 1128.8 | 7.9573 | 1136.7 | 0.00 | 0.4132 |
| 3.0159225 | 57.3099 | 11.578 | 1114.1 | 7.9433 | 1122.1 | 0.00 | 0.4111 |
| 3.0310021 | 57.3283 | 11.485 | 1099.7 | 7.9292 | 1107.6 | 0.00 | 0.4091 |
| 3.0461571 | 57.3431 | 11.393 | 1085.4 | 7.9150 | 1093.3 | 0.00 | 0.4070 |
| 3.0613879 | 57.3556 | 11.302 | 1071.4 | 7.9007 | 1079.3 | 0.00 | 0.4050 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Pm ($Z=61$) | | | | | | | |
| 3.0766949 | 57.3663 | 11.211 | 1057.5 | 7.8863 | 1065.4 | 0.00 | 0.4030 |
| 3.0920783 | 57.3755 | 11.121 | 1043.8 | 7.8718 | 1051.7 | 0.00 | 0.4010 |
| 3.1075387 | 57.3833 | 11.033 | 1030.3 | 7.8572 | 1038.2 | 0.00 | 0.3990 |
| 3.1230764 | 57.3900 | 10.945 | 1017.0 | 7.8426 | 1024.9 | 0.00 | 0.3970 |
| 3.1386918 | 57.3956 | 10.857 | 1003.9 | 7.8278 | 1011.7 | 0.00 | 0.3950 |
| 3.1543853 | 57.4003 | 10.771 | 990.93 | 7.8130 | 998.74 | 0.00 | 0.3931 |
| 3.1701572 | 57.4040 | 10.685 | 978.15 | 7.7981 | 985.95 | 0.00 | 0.3911 |
| 3.1860080 | 57.4069 | 10.600 | 965.55 | 7.7831 | 973.33 | 0.00 | 0.3892 |
| 3.2019380 | 57.4090 | 10.516 | 953.12 | 7.7680 | 960.89 | 0.00 | 0.3872 |
| 3.2179477 | 57.4104 | 10.433 | 940.86 | 7.7528 | 948.61 | 0.00 | 0.3853 |
| 3.2340374 | 57.4111 | 10.350 | 928.76 | 7.7376 | 936.49 | 0.00 | 0.3834 |
| 3.2502076 | 57.4112 | 10.268 | 916.82 | 7.7222 | 924.54 | 0.00 | 0.3815 |
| 3.2664587 | 57.4106 | 10.187 | 905.05 | 7.7068 | 912.76 | 0.00 | 0.3796 |
| 3.2827910 | 57.4093 | 10.106 | 893.43 | 7.6913 | 901.12 | 0.00 | 0.3777 |
| 3.2992049 | 57.4285 | 10.026 | 881.95 | 7.6757 | 889.63 | 0.00 | 0.3758 |
| 3.3157009 | 57.4263 | 9.9467 | 870.59 | 7.6601 | 878.25 | 0.00 | 0.3739 |
| 3.3322794 | 57.4234 | 9.8677 | 859.38 | 7.6443 | 867.03 | 0.00 | 0.3721 |
| 3.3489408 | 57.4200 | 9.7894 | 848.32 | 7.6285 | 855.95 | 0.00 | 0.3702 |
| 3.3656856 | 57.4160 | 9.7119 | 837.41 | 7.6126 | 84503 | 0.00 | 0.3684 |
| 3.3825140 | 57.4114 | 9.6350 | 826.65 | 7.5966 | 834.25 | 0.00 | 0.3665 |
| 3.3994265 | 57.4063 | 9.5588 | 816.04 | 7.5806 | 823.62 | 0.00 | 0.3647 |
| 3.4164237 | 57.4007 | 9.4833 | 805.56 | 7.5644 | 813.13 | 0.00 | 0.3629 |
| 3.4335058 | 57.3946 | 9.4084 | 795.23 | 7.5482 | 802.78 | 0.00 | 0.3611 |
| 3.4506733 | 57.3880 | 9.3343 | 785.03 | 7.5320 | 792.56 | 0.00 | 0.3593 |
| 3.4679267 | 57.3809 | 9.2607 | 774.97 | 7.5156 | 782.49 | 0.00 | 0.3575 |
| 3.4852663 | 57.3734 | 9.1879 | 765.05 | 7.4992 | 772.55 | 0.00 | 0.3557 |
| 3.5026927 | 57.3654 | 9.1157 | 755.26 | 7.4827 | 762.74 | 0.00 | 0.3540 |
| 3.5202061 | 57.3569 | 9.0441 | 745.60 | 7.4661 | 753.07 | 0.00 | 0.3522 |
| 3.5378072 | 57.3481 | 8.9731 | 736.07 | 7.4495 | 743.52 | 0.00 | 0.3505 |
| 3.5554962 | 57.3388 | 8.9028 | 726.67 | 7.4328 | 734.10 | 0.00 | 0.3487 |
| 3.5732737 | 57.3291 | 8.8331 | 717.39 | 7.4160 | 724.81 | 0.00 | 0.3470 |
| 3.5911400 | 57.3189 | 8.7640 | 708.24 | 7.3991 | 715.64 | 0.00 | 0.3453 |
| 3.6090957 | 57.3084 | 8.6955 | 699.21 | 7.3822 | 706.60 | 0.00 | 0.3435 |
| 3.6271412 | 57.2975 | 8.6277 | 690.30 | 7.3652 | 697.67 | 0.00 | 0.3418 |
| 3.6452769 | 57.2862 | 8.5604 | 681.51 | 7.3482 | 688.86 | 0.00 | 0.3401 |
| 3.6635033 | 57.2745 | 8.4937 | 672.84 | 7.3311 | 680.17 | 0.00 | 0.3384 |
| 3.6818208 | 57.2625 | 8.4276 | 664.28 | 7.3139 | 671.60 | 0.00 | 0.3367 |
| 3.7002299 | 57.2500 | 8.3621 | 655.84 | 7.2967 | 663.14 | 0.00 | 0.3351 |
| 3.7187311 | 57.2373 | 8.2972 | 647.51 | 7.2794 | 654.79 | 0.00 | 0.3334 |
| 3.7373247 | 57.2241 | 8.2328 | 639.29 | 7.2620 | 646.55 | 0.00 | 0.3317 |
| 3.7560114 | 57.2106 | 8.1690 | 631.18 | 7.2445 | 638.42 | 0.00 | 0.3301 |
| 3.7747914 | 57.1967 | 8.1057 | 623.18 | 7.2271 | 630.40 | 0.00 | 0.3285 |
| 3.7936654 | 57.1825 | 8.0431 | 615.28 | 7.2095 | 622.49 | 0.00 | 0.3268 |
| 3.8126337 | 57.1679 | 7.9809 | 607.49 | 7.1919 | 614.68 | 0.00 | 0.3252 |
| 3.8316969 | 57.1530 | 7.9193 | 599.80 | 7.1742 | 606.98 | 0.00 | 0.3236 |
| 3.8508554 | 57.1378 | 7.8582 | 592.21 | 7.1565 | 599.37 | 0.00 | 0.3220 |
| 3.8701096 | 57.1222 | 7.7977 | 584.73 | 7.1387 | 591.87 | 0.00 | 0.3204 |
| 3.8894602 | 57.1063 | 7.7377 | 577.34 | 7.1209 | 584.46 | 0.00 | 0.3188 |
| 3.9089075 | 57.0901 | 7.6782 | 570.05 | 7.1030 | 577.16 | 0.00 | 0.3172 |
| 3.9284520 | 57.0735 | 7.6193 | 562.86 | 7.0850 | 569.95 | 0.00 | 0.3156 |
| 3.9480943 | 57.0566 | 7.5608 | 555.77 | 7.0670 | 562.83 | 0.00 | 0.3140 |
| 3.9678347 | 57.0393 | 7.5029 | 548.76 | 7.0489 | 555.81 | 0.00 | 0.3125 |
| 3.9876739 | 57.0217 | 7.4454 | 541.85 | 7.0308 | 548.88 | 0.00 | 0.3109 |
| Sm ($Z=62$) | | | | | | | |
| Atomic weight: $A_r=150.3600 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=7.5100$ | | | | | | | |
| $\sigma_a (\text{barns/atom})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 249.679$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2(e \text{ atom}^{-1})\times 2.79864\times 10^5$ | | | | | | | |
| 18 edges. Edge energies (keV) | | | | | | | |
| K | 46.8342 | L I | 7.73680 | L II | 7.31180 | L III | 6.71629 |
| M I | 1.72280 | M II | 1.54070 | M III | 1.41980 | M IV | 1.10600 |
| M V | 1.08020 | N I | 0.345700 | N II | 0.265600 | N III | 0.247400 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| N IV | 0.129000 | N V | 0.129000 | N VI | 0.00550000 | O I | 0.0374000 |
| O II | 0.0213000 | O III | 0.0213000 | | | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-0.91787, -0.55500) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.014025 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 20.5652 | 7.2460 | 20279 | 0.43263 | 20279 | 0.00 | 12.40 |
| 0.10050000 | 20.5766 | 7.2725 | 20252 | 0.43753 | 20252 | 0.00 | 12.34 |
| 0.10100250 | 20.5878 | 7.2991 | 20225 | 0.44248 | 20225 | 0.00 | 12.28 |
| 0.10150751 | 20.5987 | 7.3257 | 20198 | 0.44747 | 20198 | 0.00 | 12.21 |
| 0.10201505 | 20.6092 | 7.3525 | 20170 | 0.45250 | 20171 | 0.00 | 12.15 |
| 0.10252513 | 20.6194 | 7.3792 | 20143 | 0.45759 | 20144 | 0.00 | 12.09 |
| 0.10303775 | 20.6291 | 7.4061 | 20116 | 0.46272 | 20116 | 0.00 | 12.03 |
| 0.10355294 | 20.6388 | 7.4181 | 20048 | 0.46789 | 20049 | 0.00 | 11.97 |
| 0.10407070 | 20.6473 | 7.4167 | 19945 | 0.47311 | 19945 | 0.00 | 11.91 |
| 0.10459106 | 20.6540 | 7.4150 | 19841 | 0.47838 | 19842 | 0.00 | 11.85 |
| 0.10511401 | 20.6588 | 7.4132 | 19737 | 0.48370 | 19738 | 0.00 | 11.80 |
| 0.10563958 | 20.6616 | 7.4111 | 19634 | 0.48906 | 19634 | 0.00 | 11.74 |
| 0.10616778 | 20.6622 | 7.4088 | 19530 | 0.49447 | 19531 | 0.00 | 11.68 |
| 0.10669862 | 20.6607 | 7.4063 | 19426 | 0.49993 | 19427 | 0.00 | 11.62 |
| 0.10723211 | 20.6569 | 7.4036 | 19323 | 0.50544 | 19323 | 0.00 | 11.56 |
| 0.10776827 | 20.6506 | 7.4007 | 19219 | 0.51100 | 19219 | 0.00 | 11.50 |
| 0.10830712 | 20.6417 | 7.3976 | 19115 | 0.51661 | 19116 | 0.00 | 11.45 |
| 0.10884865 | 20.6301 | 7.3943 | 19012 | 0.52226 | 19012 | 0.00 | 11.39 |
| 0.10939289 | 20.6155 | 7.3907 | 18908 | 0.52797 | 18909 | 0.00 | 11.33 |
| 0.10993986 | 20.5979 | 7.3870 | 18804 | 0.53373 | 18805 | 0.00 | 11.28 |
| 0.11048956 | 20.5769 | 7.3830 | 18701 | 0.53953 | 18701 | 0.00 | 11.22 |
| 0.11104201 | 20.5524 | 7.3789 | 18597 | 0.54539 | 18598 | 0.00 | 11.17 |
| 0.11159722 | 20.5240 | 7.3745 | 18494 | 0.55130 | 18494 | 0.00 | 11.11 |
| 0.11215520 | 20.4915 | 7.3699 | 18390 | 0.55725 | 18391 | 0.00 | 11.05 |
| 0.11271598 | 20.4550 | 7.3651 | 18287 | 0.56326 | 18288 | 0.00 | 11.00 |
| 0.11327956 | 20.4131 | 7.3602 | 18184 | 0.56933 | 18184 | 0.00 | 10.94 |
| 0.11384596 | 20.3659 | 7.3550 | 18080 | 0.57544 | 18081 | 0.00 | 10.89 |
| 0.11441519 | 20.3129 | 7.3496 | 17977 | 0.58161 | 17978 | 0.00 | 10.84 |
| 0.11498726 | 20.2535 | 7.3440 | 17874 | 0.58782 | 17875 | 0.00 | 10.78 |
| 0.11556220 | 20.1871 | 7.3381 | 17771 | 0.59410 | 17772 | 0.00 | 10.73 |
| 0.11614001 | 20.1128 | 7.3321 | 17668 | 0.60042 | 17669 | 0.00 | 10.68 |
| 0.11672071 | 20.0299 | 7.3259 | 17566 | 0.60680 | 17566 | 0.00 | 10.62 |
| 0.11730431 | 19.9372 | 7.3195 | 17463 | 0.61323 | 17463 | 0.00 | 10.57 |
| 0.11789083 | 19.8336 | 7.3129 | 17360 | 0.61971 | 17361 | 0.00 | 10.52 |
| 0.11848029 | 19.7175 | 7.3061 | 17258 | 0.62625 | 17258 | 0.00 | 10.46 |
| 0.11907269 | 19.5872 | 7.2990 | 17155 | 0.63285 | 17156 | 0.00 | 10.41 |
| 0.11966805 | 19.4406 | 7.2918 | 17053 | 0.63949 | 17054 | 0.00 | 10.36 |
| 0.12026639 | 19.2750 | 7.2844 | 16951 | 0.64620 | 16952 | 0.00 | 10.31 |
| 0.12086772 | 19.0872 | 7.2768 | 16849 | 0.65296 | 16850 | 0.00 | 10.26 |
| 0.12147206 | 18.8731 | 7.2689 | 16747 | 0.65977 | 16748 | 0.00 | 10.21 |
| 0.12207942 | 18.6273 | 7.2609 | 16645 | 0.66664 | 16646 | 0.00 | 10.16 |
| 0.12268982 | 18.3429 | 7.2527 | 16544 | 0.67357 | 16545 | 0.00 | 10.11 |
| 0.12330327 | 18.0107 | 7.2443 | 16443 | 0.68055 | 16443 | 0.00 | 10.06 |
| 0.12391979 | 17.6178 | 7.2357 | 16341 | 0.68759 | 16342 | 0.00 | 10.01 |
| 0.12453939 | 17.1458 | 7.2269 | 16240 | 0.69469 | 16241 | 0.00 | 9.955 |
| 0.12516208 | 16.5674 | 7.2179 | 16139 | 0.70184 | 16140 | 0.00 | 9.906 |
| 0.12578789 | 15.8392 | 7.2087 | 16039 | 0.70905 | 16039 | 0.00 | 9.857 |
| 0.12641683 | 14.8876 | 7.1994 | 15938 | 0.71632 | 15939 | 0.00 | 9.808 |
| 0.12704892 | 13.5719 | 7.1898 | 15838 | 0.72365 | 15838 | 0.00 | 9.759 |
| 0.12768416 | 11.5723 | 7.1801 | 15738 | 0.73103 | 15738 | 0.00 | 9.710 |
| 0.12832258 | 7.86869 | 7.1701 | 15638 | 0.73847 | 15638 | 0.00 | 9.662 |
| 0.12896419 | -11.3090 | 7.1600 | 15538 | 0.74598 | 15539 | 0.00 | 9.614 |
| 0.12897987 | -15.2959 | 7.1598 | 15535 | 0.74616 | 15536 | 0.00 | 9.613 |
| 0.12902012 | -15.1333 | 29.133 | 63193 | 0.74663 | 63194 | 0.00 | 9.610 |
| 0.12960902 | 10.0196 | 27.850 | 60137 | 0.75354 | 60137 | 0.00 | 9.566 |
| 0.13025706 | 15.8212 | 26.530 | 57000 | 0.76116 | 57001 | 0.00 | 9.518 |
| 0.13090835 | 19.1850 | 25.292 | 54071 | 0.76884 | 54071 | 0.00 | 9.471 |
| 0.13156289 | 21.5087 | 24.132 | 51333 | 0.77658 | 51334 | 0.00 | 9.424 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Sm ($Z=62$) | | | | | | | |
| 0.13222070 | 23.2368 | 23.044 | 48776 | 0.78438 | 48776 | 0.00 | 9.377 |
| 0.13288181 | 24.5738 | 22.024 | 46385 | 0.79224 | 46386 | 0.00 | 9.330 |
| 0.13354621 | 25.6325 | 21.068 | 44151 | 0.80016 | 44152 | 0.00 | 9.284 |
| 0.13421395 | 26.4830 | 20.171 | 42062 | 0.80814 | 42062 | 0.00 | 9.238 |
| 0.13488502 | 27.1720 | 19.331 | 40108 | 0.81619 | 40109 | 0.00 | 9.192 |
| 0.13555944 | 27.7327 | 18.542 | 38281 | 0.82429 | 38282 | 0.00 | 9.146 |
| 0.13623724 | 28.1894 | 17.803 | 36571 | 0.83246 | 36572 | 0.00 | 9.101 |
| 0.13691842 | 28.5606 | 17.109 | 34972 | 0.84069 | 34973 | 0.00 | 9.055 |
| 0.13760302 | 28.8605 | 16.459 | 33475 | 0.84898 | 33475 | 0.00 | 9.010 |
| 0.13829103 | 29.1007 | 15.848 | 32073 | 0.85733 | 32074 | 0.00 | 8.965 |
| 0.13898249 | 29.2902 | 15.276 | 30760 | 0.86574 | 30761 | 0.00 | 8.921 |
| 0.13967740 | 29.4363 | 14.738 | 29530 | 0.87422 | 29531 | 0.00 | 8.876 |
| 0.14037579 | 29.5450 | 14.234 | 28377 | 0.88276 | 28378 | 0.00 | 8.832 |
| 0.14107766 | 29.6211 | 13.760 | 27297 | 0.89137 | 27297 | 0.00 | 8.788 |
| 0.14178305 | 29.6681 | 13.315 | 26283 | 0.90004 | 26284 | 0.00 | 8.745 |
| 0.14249197 | 29.6888 | 12.900 | 25337 | 0.90877 | 25338 | 0.00 | 8.701 |
| 0.14320443 | 29.6881 | 12.519 | 24466 | 0.91756 | 24467 | 0.00 | 8.658 |
| 0.14392045 | 29.6719 | 12.169 | 23663 | 0.92643 | 23664 | 0.00 | 8.615 |
| 0.14464005 | 29.6442 | 11.846 | 22922 | 0.93535 | 22923 | 0.00 | 8.572 |
| 0.14536325 | 29.6080 | 11.549 | 22236 | 0.94434 | 22237 | 0.00 | 8.529 |
| 0.14609007 | 29.5655 | 11.275 | 21600 | 0.95339 | 21601 | 0.00 | 8.487 |
| 0.14682052 | 29.5185 | 11.022 | 21009 | 0.96251 | 21010 | 0.00 | 8.445 |
| 0.14755462 | 29.4682 | 10.787 | 20459 | 0.97170 | 20460 | 0.00 | 8.403 |
| 0.14829239 | 29.4158 | 10.569 | 19946 | 0.98095 | 19947 | 0.00 | 8.361 |
| 0.14903386 | 29.3622 | 10.367 | 19467 | 0.99027 | 19468 | 0.00 | 8.319 |
| 0.14977903 | 29.3078 | 10.178 | 19018 | 0.99965 | 19019 | 0.00 | 8.278 |
| 0.15052792 | 29.2534 | 10.003 | 18597 | 1.0091 | 18598 | 0.00 | 8.237 |
| 0.15128056 | 29.1992 | 9.8390 | 18202 | 1.0186 | 18203 | 0.00 | 8.196 |
| 0.15203696 | 29.1457 | 9.6858 | 17829 | 1.0282 | 17830 | 0.00 | 8.155 |
| 0.15279715 | 29.0930 | 9.5424 | 17478 | 1.0378 | 17479 | 0.00 | 8.114 |
| 0.15356113 | 29.0414 | 9.4079 | 17146 | 1.0476 | 17147 | 0.00 | 8.074 |
| 0.15432894 | 28.9910 | 9.2816 | 16832 | 1.0573 | 16833 | 0.00 | 8.034 |
| 0.15510058 | 28.9419 | 9.1628 | 16533 | 1.0672 | 16535 | 0.00 | 7.994 |
| 0.15587609 | 28.8941 | 9.0510 | 16250 | 1.0771 | 16251 | 0.00 | 7.954 |
| 0.15665547 | 28.8478 | 8.9455 | 15981 | 1.0871 | 15982 | 0.00 | 7.914 |
| 0.15743875 | 28.8030 | 8.8458 | 15724 | 1.0972 | 15725 | 0.00 | 7.875 |
| 0.15822594 | 28.7596 | 8.7516 | 15479 | 1.1073 | 15481 | 0.00 | 7.836 |
| 0.15901707 | 28.7177 | 8.6623 | 15245 | 1.1175 | 15246 | 0.00 | 7.797 |
| 0.15981215 | 28.6773 | 8.5777 | 15021 | 1.1277 | 15022 | 0.00 | 7.758 |
| 0.16061121 | 28.6382 | 8.4973 | 14806 | 1.1381 | 14808 | 0.00 | 7.720 |
| 0.16141427 | 28.6006 | 8.4208 | 14600 | 1.1485 | 14601 | 0.00 | 7.681 |
| 0.16222134 | 28.5644 | 8.3480 | 14402 | 1.1589 | 14403 | 0.00 | 7.643 |
| 0.16303245 | 28.5295 | 8.2786 | 14211 | 1.1695 | 14212 | 0.00 | 7.605 |
| 0.16384761 | 28.4959 | 8.2124 | 14027 | 1.1801 | 14029 | 0.00 | 7.567 |
| 0.16466685 | 28.4635 | 8.1491 | 13850 | 1.1908 | 13851 | 0.00 | 7.529 |
| 0.16549018 | 28.4324 | 8.0885 | 13679 | 1.2015 | 13680 | 0.00 | 7.492 |
| 0.16631763 | 28.4024 | 8.0305 | 13513 | 1.2123 | 13514 | 0.00 | 7.455 |
| 0.16714922 | 28.3735 | 7.9749 | 13353 | 1.2232 | 13354 | 0.00 | 7.418 |
| 0.16798497 | 28.3457 | 7.9215 | 13197 | 1.2342 | 13198 | 0.00 | 7.381 |
| 0.16882489 | 28.3189 | 7.8702 | 13046 | 1.2452 | 13048 | 0.00 | 7.344 |
| 0.16966902 | 28.2930 | 7.8208 | 12900 | 1.2563 | 12901 | 0.00 | 7.307 |
| 0.17051736 | 28.2681 | 7.7732 | 12758 | 1.2675 | 12759 | 0.00 | 7.271 |
| 0.17136995 | 28.2441 | 7.7274 | 12620 | 1.2787 | 12621 | 0.00 | 7.235 |
| 0.17222680 | 28.2209 | 7.6831 | 12485 | 1.2900 | 12486 | 0.00 | 7.199 |
| 0.17308793 | 28.1985 | 7.6404 | 12354 | 1.3014 | 12355 | 0.00 | 7.163 |
| 0.17395337 | 28.1769 | 7.5991 | 12226 | 1.3129 | 12227 | 0.00 | 7.127 |
| 0.17482314 | 28.1559 | 7.5591 | 12101 | 1.3244 | 12102 | 0.00 | 7.092 |
| 0.17569726 | 28.1357 | 7.5204 | 11979 | 1.3360 | 11980 | 0.00 | 7.057 |
| 0.17657574 | 28.1160 | 7.4829 | 11860 | 1.3477 | 11861 | 0.00 | 7.022 |
| 0.17745862 | 28.0970 | 7.4465 | 11744 | 1.3594 | 11745 | 0.00 | 6.987 |
| 0.17834591 | 28.0785 | 7.4112 | 11630 | 1.3712 | 11631 | 0.00 | 6.952 |
| 0.17923764 | 28.0606 | 7.3769 | 11518 | 1.3831 | 11520 | 0.00 | 6.917 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Sm ($Z=62$) | | | | | | | |
| 0.18013383 | 28.0431 | 7.3436 | 11409 | 1.3951 | 11411 | 0.00 | 6.883 |
| 0.18103450 | 28.0261 | 7.3112 | 11302 | 1.4071 | 11304 | 0.00 | 6.849 |
| 0.18193967 | 28.0095 | 7.2796 | 11198 | 1.4192 | 11199 | 0.00 | 6.815 |
| 0.18284937 | 27.9933 | 7.2489 | 11095 | 1.4314 | 11096 | 0.00 | 6.781 |
| 0.18376362 | 27.9774 | 7.2190 | 10994 | 1.4437 | 10996 | 0.00 | 6.747 |
| 0.18468244 | 27.9619 | 7.1898 | 10895 | 1.4560 | 10897 | 0.00 | 6.713 |
| 0.18560585 | 27.9467 | 7.1614 | 10798 | 1.4684 | 10800 | 0.00 | 6.680 |
| 0.18653388 | 27.9318 | 7.1336 | 10703 | 1.4809 | 10704 | 0.00 | 6.647 |
| 0.18746655 | 27.9171 | 7.1065 | 10609 | 1.4934 | 10611 | 0.00 | 6.614 |
| 0.18840388 | 27.9026 | 7.0801 | 10517 | 1.5060 | 10519 | 0.00 | 6.581 |
| 0.18934590 | 27.8883 | 7.0543 | 10427 | 1.5187 | 10428 | 0.00 | 6.548 |
| 0.19029263 | 27.8742 | 7.0290 | 10338 | 1.5315 | 10339 | 0.00 | 6.515 |
| 0.19124409 | 27.8603 | 7.0043 | 10250 | 1.5443 | 10252 | 0.00 | 6.483 |
| 0.19220031 | 27.8464 | 6.9802 | 10164 | 1.5572 | 10165 | 0.00 | 6.451 |
| 0.19316131 | 27.8327 | 6.9566 | 10079 | 1.5702 | 10081 | 0.00 | 6.419 |
| 0.19412712 | 27.8190 | 6.9335 | 9995.8 | 1.5833 | 9997.3 | 0.00 | 6.387 |
| 0.19509776 | 27.8054 | 6.9110 | 9913.6 | 1.5964 | 9915.2 | 0.00 | 6.355 |
| 0.19607325 | 27.7918 | 6.8889 | 9832.8 | 1.6096 | 9834.4 | 0.00 | 6.323 |
| 0.19705361 | 27.7782 | 6.8673 | 9753.2 | 1.6229 | 9754.8 | 0.00 | 6.292 |
| 0.19803888 | 27.7645 | 6.8461 | 9674.8 | 1.6363 | 9676.4 | 0.00 | 6.261 |
| 0.19902907 | 27.7509 | 6.8254 | 9597.5 | 1.6497 | 9599.2 | 0.00 | 6.229 |
| 0.20002422 | 27.7372 | 6.8051 | 9521.4 | 1.6632 | 9523.1 | 0.00 | 6.198 |
| 0.20102434 | 27.7234 | 6.7853 | 9446.4 | 1.6768 | 9448.1 | 0.00 | 6.168 |
| 0.20202946 | 27.7095 | 6.7659 | 9372.5 | 1.6904 | 9374.2 | 0.00 | 6.137 |
| 0.20303961 | 27.6954 | 6.7469 | 9299.7 | 1.7042 | 9301.4 | 0.00 | 6.106 |
| 0.20405481 | 27.6812 | 6.7283 | 9227.9 | 1.7180 | 9229.6 | 0.00 | 6.076 |
| 0.20507508 | 27.6669 | 6.7100 | 9157.1 | 1.7318 | 9158.9 | 0.00 | 6.046 |
| 0.20610046 | 27.6523 | 6.6922 | 9087.4 | 1.7458 | 9089.1 | 0.00 | 6.016 |
| 0.20713096 | 27.6375 | 6.6748 | 9018.6 | 1.7598 | 9020.4 | 0.00 | 5.986 |
| 0.20816661 | 27.6225 | 6.6577 | 8950.8 | 1.7739 | 8952.6 | 0.00 | 5.956 |
| 0.20920745 | 27.6071 | 6.6411 | 8884.0 | 1.7881 | 8885.8 | 0.00 | 5.926 |
| 0.21025348 | 27.5915 | 6.6248 | 8818.1 | 1.8024 | 8819.9 | 0.00 | 5.897 |
| 0.21130475 | 27.5756 | 6.6088 | 8753.1 | 1.8167 | 8754.9 | 0.00 | 5.868 |
| 0.21236128 | 27.5593 | 6.5932 | 8689.0 | 1.8311 | 8690.8 | 0.00 | 5.838 |
| 0.21342308 | 27.5425 | 6.5780 | 8625.8 | 1.8455 | 8627.7 | 0.00 | 5.809 |
| 0.21449020 | 27.5254 | 6.5632 | 8563.5 | 1.8601 | 8565.4 | 0.00 | 5.780 |
| 0.21556265 | 27.5078 | 6.5487 | 8502.1 | 1.8747 | 8504.0 | 0.00 | 5.752 |
| 0.21664046 | 27.4897 | 6.5345 | 8441.5 | 1.8894 | 8443.4 | 0.00 | 5.723 |
| 0.21772366 | 27.4710 | 6.5207 | 8381.8 | 1.9042 | 8383.7 | 0.00 | 5.695 |
| 0.21881228 | 27.4518 | 6.5072 | 8322.8 | 1.9190 | 8324.8 | 0.00 | 5.666 |
| 0.21990634 | 27.4319 | 6.4941 | 8264.8 | 1.9339 | 8266.7 | 0.00 | 5.638 |
| 0.22100588 | 27.4112 | 6.4814 | 8207.5 | 1.9489 | 8209.4 | 0.00 | 5.610 |
| 0.22211090 | 27.3899 | 6.4689 | 8151.0 | 1.9640 | 8153.0 | 0.00 | 5.582 |
| 0.22322146 | 27.3676 | 6.4569 | 8095.3 | 1.9792 | 8097.3 | 0.00 | 5.554 |
| 0.22433757 | 27.3445 | 6.4451 | 8040.4 | 1.9944 | 8042.4 | 0.00 | 5.527 |
| 0.22545925 | 27.3203 | 6.4337 | 7986.2 | 2.0097 | 7988.3 | 0.00 | 5.499 |
| 0.22658655 | 27.2950 | 6.4227 | 7932.9 | 2.0250 | 7934.9 | 0.00 | 5.472 |
| 0.22771948 | 27.2684 | 6.4120 | 7880.2 | 2.0405 | 7882.3 | 0.00 | 5.445 |
| 0.22885808 | 27.2404 | 6.4016 | 7828.4 | 2.0560 | 7830.4 | 0.00 | 5.418 |
| 0.23000237 | 27.2109 | 6.3916 | 7777.2 | 2.0716 | 7779.3 | 0.00 | 5.391 |
| 0.23115238 | 27.1796 | 6.3819 | 7726.8 | 2.0872 | 7728.9 | 0.00 | 5.364 |
| 0.23230814 | 27.1462 | 6.3726 | 7677.1 | 2.1030 | 7679.2 | 0.00 | 5.337 |
| 0.23346969 | 27.1104 | 6.3636 | 7628.1 | 2.1188 | 7630.2 | 0.00 | 5.311 |
| 0.23463703 | 27.0719 | 6.3549 | 7579.8 | 2.1346 | 7582.0 | 0.00 | 5.284 |
| 0.23581022 | 27.0301 | 6.3466 | 7532.2 | 2.1506 | 7534.4 | 0.00 | 5.258 |
| 0.23698927 | 26.9843 | 6.3386 | 7485.3 | 2.1666 | 7487.5 | 0.00 | 5.232 |
| 0.23817422 | 26.9336 | 6.3310 | 7439.1 | 2.1827 | 7441.3 | 0.00 | 5.206 |
| 0.23936509 | 26.8767 | 6.3237 | 7393.6 | 2.1989 | 7395.8 | 0.00 | 5.180 |
| 0.24056191 | 26.8116 | 6.3167 | 7348.7 | 2.2151 | 7350.9 | 0.00 | 5.154 |
| 0.24176472 | 26.7352 | 6.3101 | 7304.5 | 2.2315 | 7306.7 | 0.00 | 5.128 |
| 0.24297355 | 26.6420 | 6.3039 | 7261.0 | 2.2478 | 7263.2 | 0.00 | 5.103 |
| 0.24418841 | 26.5215 | 6.2979 | 7218.1 | 2.2643 | 7220.3 | 0.00 | 5.077 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Sm ($Z=62$) | | | | | | | |
| 0.24540936 | 26.3473 | 6.2924 | 7175.8 | 2.2808 | 7178.1 | 0.00 | 5.052 |
| 0.24663640 | 26.0106 | 6.2871 | 7134.1 | 2.2975 | 7136.4 | 0.00 | 5.027 |
| 0.24723820 | 25.4816 | 6.2847 | 7114.0 | 2.3056 | 7116.3 | 0.00 | 5.015 |
| 0.24756180 | 25.4768 | 7.3380 | 8295.5 | 2.3100 | 8297.8 | 0.00 | 5.008 |
| 0.24786959 | 25.8299 | 7.3379 | 8285.0 | 2.3141 | 8287.3 | 0.00 | 5.002 |
| 0.24910893 | 26.2469 | 7.3374 | 8243.3 | 2.3309 | 8245.6 | 0.00 | 4.977 |
| 0.25035448 | 26.4145 | 7.3374 | 8202.2 | 2.3477 | 8204.6 | 0.00 | 4.952 |
| 0.25160625 | 26.5167 | 7.3377 | 8161.7 | 2.3646 | 8164.1 | 0.00 | 4.928 |
| 0.25286428 | 26.5877 | 7.3383 | 8121.9 | 2.3816 | 8124.2 | 0.00 | 4.903 |
| 0.25412860 | 26.6399 | 7.3393 | 8082.6 | 2.3986 | 8085.0 | 0.00 | 4.879 |
| 0.25539925 | 26.6792 | 7.3407 | 8043.9 | 2.4157 | 8046.3 | 0.00 | 4.855 |
| 0.25667624 | 26.7086 | 7.3424 | 8005.7 | 2.4329 | 8008.2 | 0.00 | 4.830 |
| 0.25795962 | 26.7296 | 7.3445 | 7968.2 | 2.4501 | 7970.6 | 0.00 | 4.806 |
| 0.25924942 | 26.7429 | 7.3470 | 7931.2 | 2.4675 | 7933.7 | 0.00 | 4.782 |
| 0.26054567 | 26.7477 | 7.3498 | 7894.8 | 2.4849 | 7897.2 | 0.00 | 4.759 |
| 0.26184840 | 26.7422 | 7.3530 | 7858.9 | 2.5023 | 7861.4 | 0.00 | 4.735 |
| 0.26315764 | 26.7202 | 7.3565 | 7823.5 | 2.5199 | 7826.1 | 0.00 | 4.711 |
| 0.26447343 | 26.6594 | 7.3604 | 7788.7 | 2.5375 | 7791.3 | 0.00 | 4.688 |
| 0.26540451 | 26.4878 | 7.3634 | 7764.5 | 2.5499 | 7767.1 | 0.00 | 4.672 |
| 0.26579579 | 26.4932 | 7.6966 | 8103.9 | 2.5551 | 8106.5 | 0.00 | 4.665 |
| 0.26712477 | 26.7272 | 7.7027 | 8070.1 | 2.5729 | 8072.7 | 0.00 | 4.641 |
| 0.26846040 | 26.8103 | 7.7093 | 8036.8 | 2.5907 | 8039.3 | 0.00 | 4.618 |
| 0.26980270 | 26.8667 | 7.7162 | 8003.9 | 2.6086 | 8006.5 | 0.00 | 4.595 |
| 0.27115171 | 26.9111 | 7.7235 | 7971.6 | 2.6265 | 7974.2 | 0.00 | 4.573 |
| 0.27250747 | 26.9484 | 7.7311 | 7939.8 | 2.6445 | 7942.4 | 0.00 | 4.550 |
| 0.27387001 | 26.9811 | 7.7390 | 7908.4 | 2.6626 | 7911.1 | 0.00 | 4.527 |
| 0.27523936 | 27.0104 | 7.7473 | 7877.5 | 2.6807 | 7880.2 | 0.00 | 4.505 |
| 0.27661556 | 27.0371 | 7.7559 | 7847.0 | 2.6990 | 7849.7 | 0.00 | 4.482 |
| 0.27799863 | 27.0617 | 7.7649 | 7817.0 | 2.7172 | 7819.7 | 0.00 | 4.460 |
| 0.27938863 | 27.0847 | 7.7741 | 7787.3 | 2.7356 | 7790.1 | 0.00 | 4.438 |
| 0.28078557 | 27.1063 | 7.7837 | 7758.1 | 2.7540 | 7760.9 | 0.00 | 4.416 |
| 0.28218950 | 27.1266 | 7.7935 | 7729.3 | 2.7725 | 7732.1 | 0.00 | 4.394 |
| 0.28360044 | 27.1460 | 7.8037 | 7700.9 | 2.7911 | 7703.6 | 0.00 | 4.372 |
| 0.28501845 | 27.1645 | 7.8141 | 7672.8 | 2.8097 | 7675.6 | 0.00 | 4.350 |
| 0.28644354 | 27.1822 | 7.8249 | 7645.2 | 2.8284 | 7648.0 | 0.00 | 4.328 |
| 0.28787576 | 27.1992 | 7.8360 | 7617.9 | 2.8471 | 7620.7 | 0.00 | 4.307 |
| 0.28931514 | 27.2157 | 7.8473 | 7591.0 | 2.8659 | 7593.9 | 0.00 | 4.285 |
| 0.29076171 | 27.2316 | 7.8590 | 7564.4 | 2.8848 | 7567.3 | 0.00 | 4.264 |
| 0.29221552 | 27.2470 | 7.8709 | 7538.2 | 2.9037 | 7541.1 | 0.00 | 4.243 |
| 0.29367660 | 27.2619 | 7.8831 | 7512.4 | 2.9227 | 7515.3 | 0.00 | 4.222 |
| 0.29514498 | 27.2764 | 7.8956 | 7486.8 | 2.9418 | 7489.8 | 0.00 | 4.201 |
| 0.29662071 | 27.2906 | 7.9084 | 7461.6 | 2.9609 | 7464.6 | 0.00 | 4.180 |
| 0.29810381 | 27.3044 | 7.9214 | 7436.7 | 2.9801 | 7439.7 | 0.00 | 4.159 |
| 0.29959433 | 27.3179 | 7.9347 | 7412.1 | 2.9994 | 7415.1 | 0.00 | 4.138 |
| 0.30109230 | 27.3311 | 7.9482 | 7387.9 | 3.0187 | 7390.9 | 0.00 | 4.118 |
| 0.30259776 | 27.3440 | 7.9620 | 7363.9 | 3.0381 | 7366.9 | 0.00 | 4.097 |
| 0.30411075 | 27.3566 | 7.9761 | 7340.1 | 3.0575 | 7343.2 | 0.00 | 4.077 |
| 0.30563130 | 27.3690 | 7.9903 | 7316.7 | 3.0770 | 7319.8 | 0.00 | 4.057 |
| 0.30715946 | 27.3810 | 8.0049 | 7293.5 | 3.0966 | 7296.6 | 0.00 | 4.036 |
| 0.30869526 | 27.3928 | 8.0196 | 7270.6 | 3.1162 | 7273.7 | 0.00 | 4.016 |
| 0.31023873 | 27.4042 | 8.0345 | 7247.9 | 3.1359 | 7251.0 | 0.00 | 3.996 |
| 0.31178993 | 27.4154 | 8.0497 | 7225.5 | 3.1556 | 7228.6 | 0.00 | 3.977 |
| 0.31334888 | 27.4262 | 8.0651 | 7203.2 | 3.1755 | 7206.4 | 0.00 | 3.957 |
| 0.31491562 | 27.4367 | 8.0807 | 7181.3 | 3.1953 | 7184.5 | 0.00 | 3.937 |
| 0.31649020 | 27.4468 | 8.0965 | 7159.5 | 3.2152 | 7162.7 | 0.00 | 3.917 |
| 0.31807265 | 27.4565 | 8.1124 | 7137.9 | 3.2352 | 7141.2 | 0.00 | 3.898 |
| 0.31966301 | 27.4657 | 8.1286 | 7116.6 | 3.2552 | 7119.8 | 0.00 | 3.879 |
| 0.32126133 | 27.4743 | 8.1449 | 7095.4 | 3.2753 | 7098.6 | 0.00 | 3.859 |
| 0.32286764 | 27.4823 | 8.1614 | 7074.4 | 3.2955 | 7077.7 | 0.00 | 3.840 |
| 0.32448197 | 27.4896 | 8.1781 | 7053.5 | 3.3157 | 7056.9 | 0.00 | 3.821 |
| 0.32610438 | 27.4959 | 8.1949 | 7032.9 | 3.3360 | 7036.2 | 0.00 | 3.802 |
| 0.32773491 | 27.5013 | 8.2118 | 7012.4 | 3.3563 | 7015.7 | 0.00 | 3.783 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Sm ($Z=62$) | | | | | | | |
| 0.32937358 | 27.5053 | 8.2289 | 6992.0 | 3.3766 | 6995.4 | 0.00 | 3.764 |
| 0.33102045 | 27.5077 | 8.2462 | 6971.8 | 3.3971 | 6975.2 | 0.00 | 3.746 |
| 0.33267555 | 27.5080 | 8.2635 | 6951.7 | 3.4175 | 6955.1 | 0.00 | 3.727 |
| 0.33433893 | 27.5057 | 8.2810 | 6931.7 | 3.4381 | 6935.2 | 0.00 | 3.708 |
| 0.33601062 | 27.4998 | 8.2986 | 6911.9 | 3.4587 | 6915.4 | 0.00 | 3.690 |
| 0.33769068 | 27.4889 | 8.3163 | 6892.2 | 3.4793 | 6895.6 | 0.00 | 3.672 |
| 0.33937913 | 27.4705 | 8.3340 | 6872.5 | 3.5000 | 6876.0 | 0.00 | 3.653 |
| 0.34107602 | 27.4395 | 8.3519 | 6853.0 | 3.5207 | 6856.5 | 0.00 | 3.635 |
| 0.34278140 | 27.3841 | 8.3698 | 6833.5 | 3.5415 | 6837.1 | 0.00 | 3.617 |
| 0.34449531 | 27.2578 | 8.3878 | 6814.1 | 3.5624 | 6817.7 | 0.00 | 3.599 |
| 0.34532318 | 27.0743 | 8.3965 | 6804.8 | 3.5724 | 6808.4 | 0.00 | 3.590 |
| 0.34607681 | 27.0834 | 8.9281 | 7219.9 | 3.5816 | 7223.5 | 0.00 | 3.583 |
| 0.34621779 | 27.1381 | 8.9296 | 7218.2 | 3.5833 | 7221.8 | 0.00 | 3.581 |
| 0.34794888 | 27.4045 | 8.9488 | 7197.8 | 3.6042 | 7201.4 | 0.00 | 3.563 |
| 0.34968862 | 27.5221 | 8.9681 | 7177.4 | 3.6252 | 7181.0 | 0.00 | 3.546 |
| 0.35143706 | 27.6054 | 8.9874 | 7157.0 | 3.6463 | 7160.7 | 0.00 | 3.528 |
| 0.35319425 | 27.6729 | 9.0067 | 7136.7 | 3.6673 | 7140.4 | 0.00 | 3.510 |
| 0.35496022 | 27.7316 | 9.0261 | 7116.5 | 3.6885 | 7120.2 | 0.00 | 3.493 |
| 0.35673502 | 27.7845 | 9.0454 | 7096.3 | 3.7097 | 7100.0 | 0.00 | 3.476 |
| 0.35851870 | 27.8336 | 9.0648 | 7076.1 | 3.7309 | 7079.8 | 0.00 | 3.458 |
| 0.36031129 | 27.8798 | 9.0841 | 7055.9 | 3.7522 | 7059.6 | 0.00 | 3.441 |
| 0.36211285 | 27.9239 | 9.1035 | 7035.7 | 3.7735 | 7039.5 | 0.00 | 3.424 |
| 0.36392341 | 27.9664 | 9.1228 | 7015.6 | 3.7949 | 7019.4 | 0.00 | 3.407 |
| 0.36574303 | 28.0077 | 9.1420 | 6995.4 | 3.8163 | 6999.2 | 0.00 | 3.390 |
| 0.36757174 | 28.0479 | 9.1612 | 6975.2 | 3.8377 | 6979.1 | 0.00 | 3.373 |
| 0.36940960 | 28.0874 | 9.1804 | 6955.0 | 3.8592 | 6958.9 | 0.00 | 3.356 |
| 0.37125665 | 28.1263 | 9.1995 | 6934.8 | 3.8808 | 6938.7 | 0.00 | 3.340 |
| 0.37311293 | 28.1646 | 9.2185 | 6914.6 | 3.9023 | 6918.5 | 0.00 | 3.323 |
| 0.37497850 | 28.2026 | 9.2375 | 6894.4 | 3.9240 | 6898.3 | 0.00 | 3.306 |
| 0.37685339 | 28.2403 | 9.2563 | 6874.1 | 3.9456 | 6878.0 | 0.00 | 3.290 |
| 0.37873766 | 28.2777 | 9.2751 | 6853.7 | 3.9673 | 6857.7 | 0.00 | 3.274 |
| 0.38063135 | 28.3149 | 9.2938 | 6833.4 | 3.9891 | 6837.3 | 0.00 | 3.257 |
| 0.38253450 | 28.3520 | 9.3123 | 6812.9 | 4.0108 | 6816.9 | 0.00 | 3.241 |
| 0.38444718 | 28.3890 | 9.3307 | 6792.4 | 4.0327 | 6796.4 | 0.00 | 3.225 |
| 0.38636941 | 28.4260 | 9.3489 | 6771.8 | 4.0545 | 6775.9 | 0.00 | 3.209 |
| 0.38830126 | 28.4366 | 9.3670 | 6751.2 | 4.0764 | 6755.2 | 0.00 | 3.193 |
| 0.39024276 | 28.4735 | 9.3849 | 6730.4 | 4.0983 | 6734.5 | 0.00 | 3.177 |
| 0.39219398 | 28.5103 | 9.4026 | 6709.6 | 4.1203 | 6713.7 | 0.00 | 3.161 |
| 0.39415495 | 28.5472 | 9.4201 | 6688.6 | 4.1423 | 6692.8 | 0.00 | 3.146 |
| 0.39612572 | 28.5841 | 9.4375 | 6667.6 | 4.1643 | 6671.8 | 0.00 | 3.130 |
| 0.39810635 | 28.6211 | 9.4546 | 6646.5 | 4.1864 | 6650.7 | 0.00 | 3.114 |
| 0.40009688 | 28.6581 | 9.4715 | 6625.2 | 4.2085 | 6629.4 | 0.00 | 3.099 |
| 0.40209737 | 28.6952 | 9.4881 | 6603.8 | 4.2307 | 6608.1 | 0.00 | 3.083 |
| 0.40410785 | 28.7324 | 9.5045 | 6582.3 | 4.2528 | 6586.6 | 0.00 | 3.068 |
| 0.40612839 | 28.7696 | 9.5207 | 6560.7 | 4.2750 | 6565.0 | 0.00 | 3.053 |
| 0.40815904 | 28.8069 | 9.5366 | 6539.0 | 4.2973 | 6543.3 | 0.00 | 3.038 |
| 0.41019983 | 28.8443 | 9.5522 | 6517.1 | 4.3195 | 6521.5 | 0.00 | 3.023 |
| 0.41225083 | 28.8817 | 9.5676 | 6495.2 | 4.3418 | 6499.5 | 0.00 | 3.007 |
| 0.41431208 | 28.9193 | 9.5828 | 6473.1 | 4.3641 | 6477.4 | 0.00 | 2.993 |
| 0.41638364 | 28.9569 | 9.5976 | 6450.9 | 4.3865 | 6455.2 | 0.00 | 2.978 |
| 0.41846556 | 28.9946 | 9.6122 | 6428.5 | 4.4088 | 6432.9 | 0.00 | 2.963 |
| 0.42055789 | 29.0324 | 9.6265 | 6406.0 | 4.4312 | 6410.5 | 0.00 | 2.948 |
| 0.42266068 | 29.0702 | 9.6405 | 6383.4 | 4.4537 | 6387.9 | 0.00 | 2.933 |
| 0.42477398 | 29.1082 | 9.6542 | 6360.7 | 4.4761 | 6365.2 | 0.00 | 2.919 |
| 0.42689785 | 29.1462 | 9.6676 | 6337.9 | 4.4986 | 6342.4 | 0.00 | 2.904 |
| 0.42903234 | 29.1842 | 9.6807 | 6314.9 | 4.5211 | 6319.4 | 0.00 | 2.890 |
| 0.43117750 | 29.2224 | 9.6935 | 6291.7 | 4.5436 | 6296.3 | 0.00 | 2.875 |
| 0.43333339 | 29.2606 | 9.7060 | 6268.5 | 4.5661 | 6273.1 | 0.00 | 2.861 |
| 0.43550006 | 29.2988 | 9.7181 | 6245.1 | 4.5887 | 6249.7 | 0.00 | 2.847 |
| 0.43767756 | 29.3372 | 9.7299 | 6221.6 | 4.6113 | 6226.2 | 0.00 | 2.833 |
| 0.43986595 | 29.3755 | 9.7413 | 6197.9 | 4.6339 | 6202.5 | 0.00 | 2.819 |
| 0.44206528 | 29.4139 | 9.7524 | 6174.1 | 4.6565 | 6178.7 | 0.00 | 2.805 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Sm ($Z=62$) | | | | | | | |
| 0.44427560 | 29.4524 | 9.7632 | 6150.1 | 4.6792 | 6154.8 | 0.00 | 2.791 |
| 0.44649698 | 29.4908 | 9.7736 | 6126.1 | 4.7018 | 6130.8 | 0.00 | 2.777 |
| 0.44872947 | 29.5293 | 9.7836 | 6101.9 | 4.7245 | 6106.6 | 0.00 | 2.763 |
| 0.45097311 | 29.5678 | 9.7933 | 6077.5 | 4.7472 | 6082.3 | 0.00 | 2.749 |
| 0.45322798 | 29.6063 | 9.8026 | 6053.0 | 4.7699 | 6057.8 | 0.00 | 2.736 |
| 0.45549412 | 29.6449 | 9.8116 | 6028.4 | 4.7926 | 6033.2 | 0.00 | 2.722 |
| 0.45777159 | 29.6834 | 9.8201 | 6003.6 | 4.8154 | 6008.5 | 0.00 | 2.708 |
| 0.46006045 | 29.7219 | 9.8283 | 5978.7 | 4.8381 | 5983.6 | 0.00 | 2.695 |
| 0.46236075 | 29.7604 | 9.8361 | 5953.7 | 4.8609 | 5958.6 | 0.00 | 2.682 |
| 0.46467255 | 29.7988 | 9.8435 | 5928.6 | 4.8836 | 5933.5 | 0.00 | 2.668 |
| 0.46699592 | 29.8372 | 9.8505 | 5903.3 | 4.9064 | 5908.2 | 0.00 | 2.655 |
| 0.46933090 | 29.8756 | 9.8572 | 5877.9 | 4.9292 | 5882.8 | 0.00 | 2.642 |
| 0.47167755 | 29.9139 | 9.8634 | 5852.3 | 4.9520 | 5857.3 | 0.00 | 2.629 |
| 0.47403594 | 29.9522 | 9.8692 | 5826.6 | 4.9749 | 5831.6 | 0.00 | 2.616 |
| 0.47640612 | 29.9904 | 9.8747 | 5800.8 | 4.9977 | 5805.8 | 0.00 | 2.602 |
| 0.47878815 | 30.0285 | 9.8797 | 5774.9 | 5.0205 | 5779.9 | 0.00 | 2.590 |
| 0.48118209 | 30.0665 | 9.8843 | 5748.9 | 5.0433 | 5753.9 | 0.00 | 2.577 |
| 0.48358800 | 30.1044 | 9.8885 | 5722.7 | 5.0662 | 5727.8 | 0.00 | 2.564 |
| 0.48600594 | 30.1423 | 9.8923 | 5696.4 | 5.0890 | 5701.5 | 0.00 | 2.551 |
| 0.48843597 | 30.1800 | 9.8957 | 5670.0 | 5.1119 | 5675.2 | 0.00 | 2.538 |
| 0.49087815 | 30.2176 | 9.8987 | 5643.5 | 5.1347 | 5648.7 | 0.00 | 2.526 |
| 0.49333254 | 30.2550 | 9.9012 | 5616.9 | 5.1576 | 5622.1 | 0.00 | 2.513 |
| 0.49579920 | 30.2923 | 9.9034 | 5590.2 | 5.1805 | 5595.3 | 0.00 | 2.501 |
| 0.49827820 | 30.3295 | 9.9051 | 5563.3 | 5.2033 | 5568.5 | 0.00 | 2.488 |
| 0.50076959 | 30.3665 | 9.9064 | 5536.4 | 5.2262 | 5541.6 | 0.00 | 2.476 |
| 0.50327344 | 30.4033 | 9.9073 | 5509.3 | 5.2490 | 5514.6 | 0.00 | 2.464 |
| 0.50578980 | 30.4400 | 9.9078 | 5482.2 | 5.2719 | 5487.5 | 0.00 | 2.451 |
| 0.50831875 | 30.4765 | 9.9078 | 5454.9 | 5.2947 | 5460.2 | 0.00 | 2.439 |
| 0.51086035 | 30.5128 | 9.9075 | 5427.6 | 5.3176 | 5432.9 | 0.00 | 2.427 |
| 0.51341465 | 30.5488 | 9.9067 | 5400.2 | 5.3404 | 5405.5 | 0.00 | 2.415 |
| 0.51598172 | 30.5847 | 9.9055 | 5372.6 | 5.3633 | 5378.0 | 0.00 | 2.403 |
| 0.51856163 | 30.6204 | 9.9038 | 5345.0 | 5.3861 | 5350.4 | 0.00 | 2.391 |
| 0.52115444 | 30.6558 | 9.9016 | 5317.2 | 5.4089 | 5322.7 | 0.00 | 2.379 |
| 0.52376021 | 30.6909 | 9.8989 | 5289.4 | 5.4317 | 5294.8 | 0.00 | 2.367 |
| 0.52637901 | 30.7258 | 9.8957 | 5261.3 | 5.4546 | 5266.8 | 0.00 | 2.355 |
| 0.52901091 | 30.7604 | 9.8920 | 5233.2 | 5.4774 | 5238.7 | 0.00 | 2.344 |
| 0.53165596 | 30.7946 | 9.8878 | 5205.0 | 5.5001 | 5210.5 | 0.00 | 2.332 |
| 0.53431424 | 30.8286 | 9.8831 | 5176.6 | 5.5229 | 5182.1 | 0.00 | 2.320 |
| 0.53698581 | 30.8622 | 9.8780 | 5148.2 | 5.5457 | 5153.7 | 0.00 | 2.309 |
| 0.53967074 | 30.8954 | 9.8723 | 5119.6 | 5.5684 | 5125.2 | 0.00 | 2.297 |
| 0.54236910 | 30.9283 | 9.8662 | 5091.0 | 5.5912 | 5096.6 | 0.00 | 2.286 |
| 0.54508094 | 30.9607 | 9.8595 | 5062.2 | 5.6139 | 5067.8 | 0.00 | 2.275 |
| 0.54780635 | 30.9928 | 9.8524 | 5033.4 | 5.6366 | 5039.1 | 0.00 | 2.263 |
| 0.55054538 | 31.0244 | 9.8449 | 5004.5 | 5.6593 | 5010.2 | 0.00 | 2.252 |
| 0.55329810 | 31.0556 | 9.8368 | 4975.6 | 5.6820 | 4981.3 | 0.00 | 2.241 |
| 0.55606460 | 31.0863 | 9.8284 | 4946.6 | 5.7047 | 4952.3 | 0.00 | 2.230 |
| 0.55884492 | 31.1166 | 9.8194 | 4917.5 | 5.7273 | 4923.2 | 0.00 | 2.219 |
| 0.56163914 | 31.1464 | 9.8100 | 4888.3 | 5.7499 | 4894.1 | 0.00 | 2.208 |
| 0.56444734 | 31.1757 | 9.8002 | 4859.1 | 5.7725 | 4864.9 | 0.00 | 2.197 |
| 0.56726958 | 31.2044 | 9.7900 | 4829.9 | 5.7951 | 4835.7 | 0.00 | 2.186 |
| 0.57010592 | 31.2327 | 9.7793 | 4800.6 | 5.8177 | 4806.4 | 0.00 | 2.175 |
| 0.57295645 | 31.2604 | 9.7681 | 4771.3 | 5.8402 | 4777.1 | 0.00 | 2.164 |
| 0.57582123 | 31.2875 | 9.7566 | 4742.0 | 5.8627 | 4747.8 | 0.00 | 2.153 |
| 0.57870034 | 31.3141 | 9.7447 | 4712.6 | 5.8852 | 4718.5 | 0.00 | 2.142 |
| 0.58159384 | 31.3401 | 9.7323 | 4683.2 | 5.9077 | 4689.1 | 0.00 | 2.132 |
| 0.58450181 | 31.3655 | 9.7195 | 4653.8 | 5.9301 | 4659.7 | 0.00 | 2.121 |
| 0.58742432 | 31.3903 | 9.7064 | 4624.4 | 5.9525 | 4630.3 | 0.00 | 2.111 |
| 0.59036144 | 31.4144 | 9.6928 | 4594.9 | 5.9749 | 4600.9 | 0.00 | 2.100 |
| 0.59331325 | 31.4379 | 9.6789 | 4565.5 | 5.9972 | 4571.5 | 0.00 | 2.090 |
| 0.59627982 | 31.4608 | 9.6646 | 4536.1 | 6.0195 | 4542.1 | 0.00 | 2.079 |
| 0.59926122 | 31.4830 | 9.6499 | 4506.7 | 6.0418 | 4512.7 | 0.00 | 2.069 |
| 0.60225752 | 31.5045 | 9.6349 | 4477.2 | 6.0641 | 4483.3 | 0.00 | 2.059 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Sm ($Z=62$) | | | | | | | |
| 0.60526881 | 31.5253 | 9.6195 | 4447.8 | 6.0863 | 4453.9 | 0.00 | 2.048 |
| 0.60829515 | 31.5454 | 9.6037 | 4418.5 | 6.1085 | 4424.6 | 0.00 | 2.038 |
| 0.61133663 | 31.5647 | 9.5876 | 4389.1 | 6.1307 | 4395.2 | 0.00 | 2.028 |
| 0.61439331 | 31.5834 | 9.5712 | 4359.8 | 6.1528 | 4365.9 | 0.00 | 2.018 |
| 0.61746528 | 31.6013 | 9.5544 | 4330.5 | 6.1749 | 4336.7 | 0.00 | 2.008 |
| 0.62055260 | 31.6184 | 9.5373 | 4301.2 | 6.1969 | 4307.4 | 0.00 | 1.998 |
| 0.62365537 | 31.6347 | 9.5199 | 4272.0 | 6.2189 | 4278.2 | 0.00 | 1.988 |
| 0.62677364 | 31.6502 | 9.5021 | 4242.8 | 6.2409 | 4249.1 | 0.00 | 1.978 |
| 0.62990751 | 31.6650 | 9.4841 | 4213.7 | 6.2628 | 4220.0 | 0.00 | 1.968 |
| 0.63305705 | 31.6789 | 9.4657 | 4184.6 | 6.2847 | 4190.9 | 0.00 | 1.959 |
| 0.63622234 | 31.6919 | 9.4471 | 4155.6 | 6.3065 | 4161.9 | 0.00 | 1.949 |
| 0.63940345 | 31.7041 | 9.4281 | 4126.6 | 6.3283 | 4133.0 | 0.00 | 1.939 |
| 0.64260046 | 31.7155 | 9.4089 | 4097.7 | 6.3501 | 4104.1 | 0.00 | 1.929 |
| 0.64581347 | 31.7259 | 9.3894 | 4068.9 | 6.3718 | 4075.3 | 0.00 | 1.920 |
| 0.64904253 | 31.7354 | 9.3696 | 4040.1 | 6.3935 | 4046.5 | 0.00 | 1.910 |
| 0.65228775 | 31.7440 | 9.3496 | 4011.4 | 6.4151 | 4017.9 | 0.00 | 1.901 |
| 0.65554919 | 31.7517 | 9.3293 | 3982.8 | 6.4367 | 3989.3 | 0.00 | 1.891 |
| 0.65882693 | 31.7585 | 9.3088 | 3954.3 | 6.4582 | 3960.7 | 0.00 | 1.882 |
| 0.66212107 | 31.7642 | 9.2880 | 3925.8 | 6.4797 | 3932.3 | 0.00 | 1.873 |
| 0.66543167 | 31.7690 | 9.2669 | 3897.4 | 6.5011 | 3903.9 | 0.00 | 1.863 |
| 0.66875883 | 31.7727 | 9.2457 | 3869.2 | 6.5225 | 3875.7 | 0.00 | 1.854 |
| 0.67210262 | 31.7755 | 9.2242 | 3841.0 | 6.5439 | 3847.5 | 0.00 | 1.845 |
| 0.67546314 | 31.7772 | 9.2025 | 3812.9 | 6.5651 | 3819.4 | 0.00 | 1.836 |
| 0.67884045 | 31.7778 | 9.1805 | 3784.8 | 6.5864 | 3791.4 | 0.00 | 1.826 |
| 0.68223466 | 31.7774 | 9.1584 | 3756.9 | 6.6075 | 3763.5 | 0.00 | 1.817 |
| 0.68564583 | 31.7758 | 9.1361 | 3729.1 | 6.6287 | 3735.7 | 0.00 | 1.808 |
| 0.68907406 | 31.7731 | 9.1135 | 3701.4 | 6.6497 | 3708.1 | 0.00 | 1.799 |
| 0.69251943 | 31.7693 | 9.0908 | 3673.8 | 6.6707 | 3680.5 | 0.00 | 1.790 |
| 0.69598202 | 31.7643 | 9.0679 | 3646.3 | 6.6917 | 3653.0 | 0.00 | 1.781 |
| 0.69946194 | 31.7582 | 9.0448 | 3618.9 | 6.7126 | 3625.6 | 0.00 | 1.773 |
| 0.70295924 | 31.7508 | 9.0215 | 3591.7 | 6.7334 | 3598.4 | 0.00 | 1.764 |
| 0.70647404 | 31.7422 | 8.9980 | 3564.5 | 6.7542 | 3571.2 | 0.00 | 1.755 |
| 0.71000641 | 31.7323 | 8.9743 | 3537.4 | 6.7749 | 3544.2 | 0.00 | 1.746 |
| 0.71355644 | 31.7211 | 8.9505 | 3510.5 | 6.7955 | 3517.3 | 0.00 | 1.738 |
| 0.71712423 | 31.7086 | 8.9265 | 3483.6 | 6.8161 | 3490.5 | 0.00 | 1.729 |
| 0.72070985 | 31.6948 | 8.9024 | 3456.9 | 6.8366 | 3463.8 | 0.00 | 1.720 |
| 0.72431340 | 31.6796 | 8.8781 | 3430.4 | 6.8571 | 3437.2 | 0.00 | 1.712 |
| 0.72793496 | 31.6630 | 8.8537 | 3403.9 | 6.8775 | 3410.8 | 0.00 | 1.703 |
| 0.73157464 | 31.6450 | 8.8292 | 3377.6 | 6.8978 | 3384.5 | 0.00 | 1.695 |
| 0.73523251 | 31.6255 | 8.8045 | 3351.4 | 6.9180 | 3358.3 | 0.00 | 1.686 |
| 0.73890867 | 31.6046 | 8.7797 | 3325.3 | 6.9382 | 3332.3 | 0.00 | 1.678 |
| 0.74260322 | 31.5867 | 8.7548 | 3299.4 | 6.9584 | 3306.4 | 0.00 | 1.670 |
| 0.74631623 | 31.5627 | 8.7298 | 3273.6 | 6.9784 | 3280.6 | 0.00 | 1.661 |
| 0.75004781 | 31.5371 | 8.7046 | 3247.9 | 6.9984 | 3254.9 | 0.00 | 1.653 |
| 0.75379805 | 31.5098 | 8.6794 | 3222.4 | 7.0183 | 3229.4 | 0.00 | 1.645 |
| 0.75756704 | 31.4809 | 8.6540 | 3197.0 | 7.0381 | 3204.1 | 0.00 | 1.637 |
| 0.76135488 | 31.4502 | 8.6286 | 3171.8 | 7.0579 | 3178.8 | 0.00 | 1.628 |
| 0.76516165 | 31.4178 | 8.6031 | 3146.6 | 7.0776 | 3153.7 | 0.00 | 1.620 |
| 0.76898746 | 31.3836 | 8.5775 | 3121.7 | 7.0972 | 3128.8 | 0.00 | 1.612 |
| 0.77283240 | 31.3475 | 8.5518 | 3096.8 | 7.1168 | 3103.9 | 0.00 | 1.604 |
| 0.77669656 | 31.3095 | 8.5260 | 3072.1 | 7.1362 | 3079.3 | 0.00 | 1.596 |
| 0.78058004 | 31.2695 | 8.5001 | 3047.6 | 7.1556 | 3054.7 | 0.00 | 1.588 |
| 0.78448294 | 31.2276 | 8.4742 | 3023.2 | 7.1749 | 3030.3 | 0.00 | 1.580 |
| 0.78840536 | 31.1836 | 8.4482 | 2998.9 | 7.1942 | 3006.1 | 0.00 | 1.573 |
| 0.79234738 | 31.1374 | 8.4222 | 2974.8 | 7.2133 | 2982.0 | 0.00 | 1.565 |
| 0.79630912 | 31.0891 | 8.3961 | 2950.8 | 7.2324 | 2958.0 | 0.00 | 1.557 |
| 0.80029067 | 31.0402 | 8.3699 | 2927.0 | 7.2514 | 2934.2 | 0.00 | 1.549 |
| 0.80429212 | 30.9873 | 8.3437 | 2903.3 | 7.2703 | 2910.6 | 0.00 | 1.542 |
| 0.80831358 | 30.9320 | 8.3174 | 2879.8 | 7.2891 | 2887.0 | 0.00 | 1.534 |
| 0.81235515 | 30.8742 | 8.2911 | 2856.4 | 7.3079 | 2863.7 | 0.00 | 1.526 |
| 0.81641693 | 30.8138 | 8.2648 | 2833.1 | 7.3265 | 2840.4 | 0.00 | 1.519 |
| 0.82049901 | 30.7508 | 8.2384 | 2810.0 | 7.3451 | 2817.4 | 0.00 | 1.511 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Sm ($Z=62$) | | | | | | | |
| 0.82460150 | 30.6851 | 8.2120 | 2787.1 | 7.3636 | 2794.4 | 0.00 | 1.504 |
| 0.82872451 | 30.6166 | 8.1855 | 2764.3 | 7.3820 | 2771.7 | 0.00 | 1.496 |
| 0.83286813 | 30.5451 | 8.1591 | 2741.6 | 7.4003 | 2749.0 | 0.00 | 1.489 |
| 0.83703248 | 30.4705 | 8.1326 | 2719.1 | 7.4185 | 2726.6 | 0.00 | 1.481 |
| 0.84121764 | 30.3928 | 8.1060 | 2696.8 | 7.4367 | 2704.2 | 0.00 | 1.474 |
| 0.84542373 | 30.3119 | 8.0795 | 2674.6 | 7.4547 | 2682.0 | 0.00 | 1.467 |
| 0.84965084 | 30.2275 | 8.0530 | 2652.5 | 7.4727 | 2660.0 | 0.00 | 1.459 |
| 0.85389910 | 30.1396 | 8.0264 | 2630.6 | 7.4905 | 2638.1 | 0.00 | 1.452 |
| 0.85816859 | 30.0480 | 7.9998 | 2608.9 | 7.5083 | 2616.4 | 0.00 | 1.445 |
| 0.86245944 | 29.9525 | 7.9733 | 2587.3 | 7.5260 | 2594.8 | 0.00 | 1.438 |
| 0.86677173 | 29.8531 | 7.9467 | 2565.8 | 7.5436 | 2573.4 | 0.00 | 1.430 |
| 0.87110559 | 29.7494 | 7.9201 | 2544.5 | 7.5610 | 2552.1 | 0.00 | 1.423 |
| 0.87546112 | 29.6414 | 7.8936 | 2523.4 | 7.5784 | 2531.0 | 0.00 | 1.416 |
| 0.87983843 | 29.5288 | 7.8670 | 2502.4 | 7.5957 | 2510.0 | 0.00 | 1.409 |
| 0.88423762 | 29.4113 | 7.8404 | 2481.5 | 7.6129 | 2489.1 | 0.00 | 1.402 |
| 0.88865881 | 29.2888 | 7.8139 | 2460.8 | 7.6300 | 2468.4 | 0.00 | 1.395 |
| 0.89310210 | 29.1611 | 7.7873 | 2440.3 | 7.6471 | 2447.9 | 0.00 | 1.388 |
| 0.89756761 | 29.0277 | 7.7608 | 2419.8 | 7.6640 | 2427.5 | 0.00 | 1.381 |
| 0.90205545 | 28.8884 | 7.7343 | 2399.6 | 7.6808 | 2407.3 | 0.00 | 1.374 |
| 0.90656573 | 28.7430 | 7.7078 | 2379.5 | 7.6975 | 2387.2 | 0.00 | 1.368 |
| 0.91109856 | 28.5909 | 7.6814 | 2359.5 | 7.7141 | 2367.2 | 0.00 | 1.361 |
| 0.91565405 | 28.4320 | 7.6549 | 2339.7 | 7.7306 | 2347.4 | 0.00 | 1.354 |
| 0.92023232 | 28.2656 | 7.6285 | 2320.0 | 7.7470 | 2327.7 | 0.00 | 1.347 |
| 0.92483348 | 28.0915 | 7.6021 | 2300.5 | 7.7633 | 2308.2 | 0.00 | 1.341 |
| 0.92945765 | 27.9090 | 7.5757 | 2281.1 | 7.7795 | 2288.9 | 0.00 | 1.334 |
| 0.93410494 | 27.7176 | 7.5494 | 2261.9 | 7.7956 | 2269.6 | 0.00 | 1.327 |
| 0.93877546 | 27.5167 | 7.5231 | 2242.8 | 7.8116 | 2250.6 | 0.00 | 1.321 |
| 0.94346934 | 27.3056 | 7.4969 | 2223.8 | 7.8274 | 2231.6 | 0.00 | 1.314 |
| 0.94818668 | 27.0836 | 7.4706 | 2205.0 | 7.8432 | 2212.9 | 0.00 | 1.308 |
| 0.95292762 | 26.8498 | 7.4445 | 2186.3 | 7.8589 | 2194.2 | 0.00 | 1.301 |
| 0.95769226 | 26.6032 | 7.4183 | 2167.8 | 7.8744 | 2175.7 | 0.00 | 1.295 |
| 0.96248072 | 26.3429 | 7.3922 | 2149.5 | 7.8899 | 2157.3 | 0.00 | 1.288 |
| 0.96729312 | 26.0676 | 7.3661 | 2131.2 | 7.9052 | 2139.1 | 0.00 | 1.282 |
| 0.97212959 | 25.7759 | 7.3401 | 2113.1 | 7.9205 | 2121.0 | 0.00 | 1.275 |
| 0.97699023 | 25.4663 | 7.3142 | 2095.2 | 7.9356 | 2103.1 | 0.00 | 1.269 |
| 0.98187519 | 25.1370 | 7.2882 | 2077.4 | 7.9506 | 2085.3 | 0.00 | 1.263 |
| 0.98678456 | 24.7860 | 7.2624 | 2059.7 | 7.9655 | 2067.7 | 0.00 | 1.256 |
| 0.99171848 | 24.4108 | 7.2365 | 2042.2 | 7.9803 | 2050.1 | 0.00 | 1.250 |
| 0.99667708 | 24.0086 | 7.2108 | 2024.8 | 7.9949 | 2032.8 | 0.00 | 1.244 |
| 1.0016605 | 23.8623 | 7.1801 | 2006.1 | 8.0095 | 2014.1 | 0.00 | 1.238 |
| 1.0066688 | 23.4100 | 7.1397 | 1984.9 | 8.0239 | 1992.9 | 0.00 | 1.232 |
| 1.0117021 | 22.8983 | 7.0995 | 1963.9 | 8.0383 | 1971.9 | 0.00 | 1.226 |
| 1.0167606 | 22.3385 | 7.0596 | 1943.2 | 8.0525 | 1951.2 | 0.00 | 1.219 |
| 1.0218444 | 21.7245 | 7.0199 | 1922.6 | 8.0666 | 1930.7 | 0.00 | 1.213 |
| 1.0269536 | 21.0471 | 6.9806 | 1902.3 | 8.0806 | 1910.4 | 0.00 | 1.207 |
| 1.0320884 | 20.2942 | 6.9414 | 1882.3 | 8.0944 | 1890.3 | 0.00 | 1.201 |
| 1.0372489 | 19.4493 | 6.9025 | 1862.4 | 8.1082 | 1870.5 | 0.00 | 1.195 |
| 1.0424351 | 18.4895 | 6.8639 | 1842.8 | 8.1218 | 1850.9 | 0.00 | 1.189 |
| 1.0476473 | 17.3824 | 6.8256 | 1823.3 | 8.1353 | 1831.5 | 0.00 | 1.183 |
| 1.0528855 | 16.0787 | 6.7874 | 1804.1 | 8.1487 | 1812.3 | 0.00 | 1.178 |
| 1.0581499 | 14.4986 | 6.7496 | 1785.2 | 8.1619 | 1793.3 | 0.00 | 1.172 |
| 1.0634407 | 12.4979 | 6.7118 | 1766.3 | 8.1751 | 1774.5 | 0.00 | 1.166 |
| 1.0687579 | 9.76901 | 6.6735 | 1747.5 | 8.1881 | 1755.7 | 0.00 | 1.160 |
| 1.0741017 | 5.41125 | 6.6354 | 1728.9 | 8.2010 | 1737.1 | 0.00 | 1.154 |
| 1.0794722 | −8.48450 | 6.5977 | 1710.5 | 8.2138 | 1718.7 | 0.00 | 1.149 |
| 1.0800822 | −20.0658 | 6.5934 | 1708.4 | 8.2152 | 1716.7 | 0.00 | 1.148 |
| 1.0803177 | −20.4132 | 6.6480 | 6859.7 | 8.2158 | 6867.9 | 0.00 | 1.148 |
| 1.0848695 | 2.37973 | 26.307 | 6786.4 | 8.2264 | 6794.7 | 0.00 | 1.143 |
| 1.0902939 | 6.31812 | 26.104 | 6700.6 | 8.2390 | 6708.8 | 0.00 | 1.137 |
| 1.0957454 | 7.54898 | 25.903 | 6615.8 | 8.2514 | 6624.1 | 0.00 | 1.132 |
| 1.1012241 | 6.54865 | 25.703 | 6532.1 | 8.2637 | 6540.4 | 0.00 | 1.126 |
| 1.1058130 | −5.44034 | 25.538 | 6463.2 | 8.2738 | 6471.5 | 0.00 | 1.121 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Sm ($Z=62$) | | | | | | | |
| 1.1061869 | -5.54165 | 38.594 | 9764.2 | 8.2746 | 9772.5 | 0.00 | 1.121 |
| 1.1067302 | 0.293779 | 38.564 | 9751.9 | 8.2758 | 9760.1 | 0.00 | 1.120 |
| 1.1122639 | 10.7026 | 38.261 | 9627.2 | 8.2879 | 9635.4 | 0.00 | 1.115 |
| 1.1178252 | 14.5771 | 37.961 | 9504.1 | 8.2998 | 9512.4 | 0.00 | 1.109 |
| 1.1234143 | 17.2549 | 37.663 | 9382.6 | 8.3115 | 9390.9 | 0.00 | 1.104 |
| 1.1290314 | 19.3618 | 37.368 | 9262.7 | 8.3232 | 9271.0 | 0.00 | 1.098 |
| 1.1346765 | 21.1195 | 37.075 | 9144.3 | 8.3347 | 9152.6 | 0.00 | 1.093 |
| 1.1403499 | 22.6362 | 36.784 | 9027.5 | 8.3461 | 9035.8 | 0.00 | 1.087 |
| 1.1460517 | 23.9740 | 36.495 | 8912.1 | 8.3574 | 8920.5 | 0.00 | 1.082 |
| 1.1517819 | 25.1724 | 36.209 | 8798.3 | 8.3685 | 8806.7 | 0.00 | 1.076 |
| 1.1575408 | 26.2585 | 35.926 | 8685.9 | 8.3795 | 8694.3 | 0.00 | 1.071 |
| 1.1633285 | 27.2515 | 35.644 | 8575.0 | 8.3904 | 8583.4 | 0.00 | 1.066 |
| 1.1691452 | 28.1659 | 35.365 | 8465.5 | 8.4012 | 8473.9 | 0.00 | 1.060 |
| 1.1749909 | 29.0127 | 35.088 | 8357.4 | 8.4118 | 8365.9 | 0.00 | 1.055 |
| 1.1808659 | 29.8008 | 34.814 | 8250.8 | 8.4223 | 8259.2 | 0.00 | 1.050 |
| 1.1867702 | 30.5370 | 34.541 | 8145.5 | 8.4326 | 8153.9 | 0.00 | 1.045 |
| 1.1927040 | 31.2271 | 34.271 | 8041.5 | 8.4429 | 8050.0 | 0.00 | 1.040 |
| 1.1986676 | 31.8758 | 34.003 | 7938.9 | 8.4530 | 7947.4 | 0.00 | 1.034 |
| 1.2046609 | 32.4870 | 33.737 | 7837.7 | 8.4629 | 7846.1 | 0.00 | 1.029 |
| 1.2106842 | 33.0640 | 33.473 | 7737.7 | 8.4727 | 7746.2 | 0.00 | 1.024 |
| 1.2167376 | 33.6098 | 33.211 | 7639.0 | 8.4824 | 7647.5 | 0.00 | 1.019 |
| 1.2228213 | 34.1267 | 32.952 | 7541.6 | 8.4920 | 7550.1 | 0.00 | 1.014 |
| 1.2289354 | 34.6168 | 32.695 | 7445.5 | 8.5014 | 7454.0 | 0.00 | 1.009 |
| 1.2350801 | 35.0820 | 32.439 | 7350.6 | 8.5107 | 7359.1 | 0.00 | 1.004 |
| 1.2412555 | 35.5238 | 32.186 | 7256.9 | 8.5199 | 7265.4 | 0.00 | 0.9989 |
| 1.2474618 | 35.9436 | 31.935 | 7164.4 | 8.5289 | 7172.9 | 0.00 | 0.9939 |
| 1.2536991 | 36.3426 | 31.685 | 7073.1 | 8.5378 | 7081.7 | 0.00 | 0.9889 |
| 1.2599676 | 36.7218 | 31.438 | 6983.0 | 8.5465 | 6991.6 | 0.00 | 0.9840 |
| 1.2662674 | 37.0821 | 31.193 | 6894.1 | 8.5551 | 6902.6 | 0.00 | 0.9791 |
| 1.2725988 | 37.4242 | 30.950 | 6806.3 | 8.5636 | 6814.9 | 0.00 | 0.9743 |
| 1.2789618 | 37.7489 | 30.708 | 6719.6 | 8.5720 | 6728.2 | 0.00 | 0.9694 |
| 1.2853566 | 38.0566 | 30.469 | 6634.1 | 8.5802 | 6642.7 | 0.00 | 0.9646 |
| 1.2917833 | 38.3478 | 30.232 | 6549.6 | 8.5882 | 6558.2 | 0.00 | 0.9598 |
| 1.2982423 | 38.6227 | 29.996 | 6466.3 | 8.5961 | 6474.9 | 0.00 | 0.9550 |
| 1.3047335 | 38.8814 | 29.762 | 6384.0 | 8.6039 | 6392.6 | 0.00 | 0.9503 |
| 1.3112571 | 39.1242 | 29.531 | 6302.8 | 8.6116 | 6311.4 | 0.00 | 0.9455 |
| 1.3178134 | 39.3508 | 29.301 | 6222.6 | 8.6191 | 6231.2 | 0.00 | 0.9408 |
| 1.3244025 | 39.5609 | 29.073 | 6143.5 | 8.6265 | 6152.1 | 0.00 | 0.9362 |
| 1.3310245 | 39.7542 | 28.847 | 6065.3 | 8.6337 | 6074.0 | 0.00 | 0.9315 |
| 1.3376796 | 39.9298 | 28.622 | 5988.2 | 8.6408 | 5996.9 | 0.00 | 0.9269 |
| 1.3443680 | 40.0866 | 28.400 | 5912.1 | 8.6478 | 5920.7 | 0.00 | 0.9222 |
| 1.3510899 | 40.2233 | 28.179 | 5837.0 | 8.6546 | 5845.6 | 0.00 | 0.9177 |
| 1.3578453 | 40.3376 | 27.960 | 5762.8 | 8.6612 | 5771.4 | 0.00 | 0.9131 |
| 1.3646345 | 40.4264 | 27.743 | 5689.6 | 8.6678 | 5698.2 | 0.00 | 0.9086 |
| 1.3714577 | 40.4855 | 27.527 | 5617.3 | 8.6742 | 5625.9 | 0.00 | 0.9040 |
| 1.3783150 | 40.5082 | 27.313 | 5545.9 | 8.6804 | 5554.6 | 0.00 | 0.8995 |
| 1.3852066 | 40.4839 | 27.101 | 5475.5 | 8.6865 | 5484.2 | 0.00 | 0.8951 |
| 1.3921326 | 40.3947 | 26.891 | 5405.9 | 8.6925 | 5414.6 | 0.00 | 0.8906 |
| 1.3990933 | 40.2067 | 26.682 | 5337.2 | 8.6983 | 5345.9 | 0.00 | 0.8862 |
| 1.4060887 | 39.8419 | 26.475 | 5269.5 | 8.7040 | 5278.2 | 0.00 | 0.8818 |
| 1.4131192 | 39.0431 | 26.271 | 5202.9 | 8.7096 | 5211.6 | 0.00 | 0.8774 |
| 1.4187409 | 36.6193 | 26.110 | 5150.5 | 8.7139 | 5159.2 | 0.00 | 0.8739 |
| 1.4201848 | 35.1582 | 30.507 | 6011.8 | 8.7150 | 6020.6 | 0.00 | 0.8730 |
| 1.4208592 | 36.6130 | 30.484 | 6004.3 | 8.7155 | 6013.1 | 0.00 | 0.8726 |
| 1.4272857 | 39.5710 | 30.261 | 5933.6 | 8.7202 | 5942.3 | 0.00 | 0.8687 |
| 1.4344221 | 40.7074 | 30.016 | 5856.3 | 8.7253 | 5865.0 | 0.00 | 0.8643 |
| 1.4415942 | 41.4447 | 29.774 | 5780.2 | 8.7303 | 5788.9 | 0.00 | 0.8600 |
| 1.4488022 | 42.0074 | 29.534 | 5705.1 | 8.7352 | 5713.8 | 0.00 | 0.8558 |
| 1.4560462 | 42.4677 | 29.296 | 5631.0 | 8.7399 | 5639.7 | 0.00 | 0.8515 |
| 1.4633265 | 42.8577 | 29.061 | 5557.9 | 8.7444 | 5566.6 | 0.00 | 0.8473 |
| 1.4706431 | 43.1941 | 28.827 | 5485.8 | 8.7488 | 5494.5 | 0.00 | 0.8431 |
| 1.4779963 | 43.4859 | 28.595 | 5414.6 | 8.7531 | 5423.3 | 0.00 | 0.8389 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Sm ($Z=62$) | | | | | | | |
| 1.4853863 | 43.7373 | 28.365 | 5344.3 | 8.7572 | 5353.1 | 0.00 | 0.8347 |
| 1.4928132 | 43.9488 | 28.145 | 5276.5 | 8.7612 | 5285.2 | 0.00 | 0.8305 |
| 1.5002773 | 44.1290 | 27.938 | 5211.6 | 8.7650 | 5220.4 | 0.00 | 0.8264 |
| 1.5077787 | 44.2753 | 27.734 | 5147.7 | 8.7687 | 5156.5 | 0.00 | 0.8223 |
| 1.5153176 | 44.3773 | 27.532 | 5084.9 | 8.7722 | 5093.7 | 0.00 | 0.8182 |
| 1.5228942 | 44.4127 | 27.333 | 5023.0 | 8.7756 | 5031.8 | 0.00 | 0.8141 |
| 1.5305086 | 44.3185 | 27.137 | 4962.1 | 8.7789 | 4970.9 | 0.00 | 0.8101 |
| 1.5381612 | 43.7226 | 26.943 | 4902.1 | 8.7820 | 4910.9 | 0.00 | 0.8061 |
| 1.5395028 | 43.3145 | 26.909 | 4891.8 | 8.7825 | 4900.5 | 0.00 | 0.8054 |
| 1.5418971 | 43.3563 | 28.725 | 5213.7 | 8.7835 | 5222.5 | 0.00 | 0.8041 |
| 1.5458520 | 44.3465 | 28.615 | 5180.5 | 8.7850 | 5189.3 | 0.00 | 0.8020 |
| 1.5535812 | 45.1079 | 28.403 | 5116.5 | 8.7878 | 5125.3 | 0.00 | 0.7981 |
| 1.5613491 | 45.5900 | 28.193 | 5053.4 | 8.7905 | 5062.2 | 0.00 | 0.7941 |
| 1.5691559 | 45.9703 | 27.986 | 4991.4 | 8.7930 | 5000.1 | 0.00 | 0.7901 |
| 1.5770017 | 46.2944 | 27.781 | 4930.2 | 8.7954 | 4939.0 | 0.00 | 0.7862 |
| 1.5848867 | 46.5810 | 27.579 | 4869.9 | 8.7977 | 4878.7 | 0.00 | 0.7823 |
| 1.5928111 | 46.8395 | 27.379 | 4810.5 | 8.7998 | 4819.3 | 0.00 | 0.7784 |
| 1.6007752 | 47.0753 | 27.181 | 4752.0 | 8.8018 | 4760.8 | 0.00 | 0.7745 |
| 1.6087790 | 47.2916 | 26.985 | 4694.3 | 8.8036 | 4703.1 | 0.00 | 0.7707 |
| 1.6168229 | 47.4894 | 26.792 | 4637.6 | 8.8053 | 4646.4 | 0.00 | 0.7668 |
| 1.6249070 | 47.6728 | 26.611 | 4583.3 | 8.8068 | 4592.2 | 0.00 | 0.7630 |
| 1.6330316 | 47.8461 | 26.433 | 4530.0 | 8.8082 | 4538.8 | 0.00 | 0.7592 |
| 1.6411967 | 48.0090 | 26.257 | 4477.5 | 8.8095 | 4486.3 | 0.00 | 0.7555 |
| 1.6494027 | 48.1611 | 26.084 | 4425.8 | 8.8106 | 4434.6 | 0.00 | 0.7517 |
| 1.6576497 | 48.3022 | 25.913 | 4374.9 | 8.8115 | 4383.7 | 0.00 | 0.7480 |
| 1.6659380 | 48.4312 | 25.744 | 4324.7 | 8.8123 | 4333.5 | 0.00 | 0.7442 |
| 1.6742677 | 48.5467 | 25.577 | 4275.3 | 8.8130 | 4284.1 | 0.00 | 0.7405 |
| 1.6826390 | 48.6459 | 25.412 | 4226.6 | 8.8135 | 4235.5 | 0.00 | 0.7368 |
| 1.6910522 | 48.7236 | 25.249 | 4178.7 | 8.8139 | 4187.5 | 0.00 | 0.7332 |
| 1.6995075 | 48.7694 | 25.089 | 4131.4 | 8.8142 | 4140.2 | 0.00 | 0.7295 |
| 1.7080050 | 48.7575 | 24.930 | 4084.9 | 8.8143 | 4093.7 | 0.00 | 0.7259 |
| 1.7165450 | 48.5899 | 24.773 | 4038.9 | 8.8142 | 4047.7 | 0.00 | 0.7223 |
| 1.7203536 | 48.3059 | 24.704 | 4018.7 | 8.8142 | 4027.5 | 0.00 | 0.7207 |
| 1.7251278 | 48.3630 | 25.796 | 4184.9 | 8.8141 | 4193.7 | 0.00 | 0.7187 |
| 1.7252464 | 48.3838 | 25.794 | 4184.3 | 8.8141 | 4193.1 | 0.00 | 0.7186 |
| 1.7337534 | 49.0945 | 25.638 | 4138.6 | 8.8137 | 4147.4 | 0.00 | 0.7151 |
| 1.7424222 | 49.4588 | 25.482 | 4092.9 | 8.8133 | 4101.7 | 0.00 | 0.7116 |
| 1.7511343 | 49.7386 | 25.327 | 4047.8 | 8.8126 | 4056.6 | 0.00 | 0.7080 |
| 1.7598899 | 49.9783 | 25.174 | 4003.3 | 8.8119 | 4012.1 | 0.00 | 0.7045 |
| 1.7686894 | 50.1939 | 25.022 | 3959.4 | 8.8110 | 3968.2 | 0.00 | 0.7010 |
| 1.7775328 | 50.3931 | 24.872 | 3916.0 | 8.8100 | 3924.8 | 0.00 | 0.6975 |
| 1.7864205 | 50.5800 | 24.724 | 3873.2 | 8.8088 | 3882.0 | 0.00 | 0.6940 |
| 1.7953526 | 50.7574 | 24.576 | 3831.0 | 8.8075 | 3839.8 | 0.00 | 0.6906 |
| 1.8043294 | 50.9269 | 24.430 | 3789.3 | 8.8060 | 3798.1 | 0.00 | 0.6871 |
| 1.8133510 | 51.0899 | 24.286 | 3748.2 | 8.8044 | 3757.0 | 0.00 | 0.6837 |
| 1.8224178 | 51.2480 | 24.144 | 3707.8 | 8.8027 | 3716.6 | 0.00 | 0.6803 |
| 1.8315299 | 51.4021 | 24.004 | 3667.8 | 8.8008 | 3676.6 | 0.00 | 0.6769 |
| 1.8406875 | 51.5528 | 23.864 | 3628.4 | 8.7987 | 3637.2 | 0.00 | 0.6736 |
| 1.8498909 | 51.7004 | 23.723 | 3588.9 | 8.7966 | 3597.7 | 0.00 | 0.6702 |
| 1.8591404 | 51.8434 | 23.578 | 3549.3 | 8.7943 | 3558.1 | 0.00 | 0.6669 |
| 1.8684361 | 51.9820 | 23.435 | 3510.1 | 8.7918 | 3518.9 | 0.00 | 0.6636 |
| 1.8777783 | 52.1169 | 23.292 | 3471.5 | 8.7892 | 3480.2 | 0.00 | 0.6603 |
| 1.8871672 | 52.2482 | 23.151 | 3433.2 | 8.7865 | 3442.0 | 0.00 | 0.6570 |
| 1.8966030 | 52.3764 | 23.010 | 3395.4 | 8.7836 | 3404.2 | 0.00 | 0.6537 |
| 1.9060860 | 52.5017 | 22.871 | 3358.1 | 8.7806 | 3366.9 | 0.00 | 0.6505 |
| 1.9156165 | 52.6242 | 22.733 | 3321.2 | 8.7775 | 3330.0 | 0.00 | 0.6472 |
| 1.9251945 | 52.7442 | 22.596 | 3284.7 | 8.7742 | 3293.5 | 0.00 | 0.6440 |
| 1.9348205 | 52.8619 | 22.459 | 3248.6 | 8.7708 | 3257.4 | 0.00 | 0.6408 |
| 1.9444946 | 52.9773 | 22.324 | 3213.0 | 8.7672 | 3221.8 | 0.00 | 0.6376 |
| 1.9542171 | 53.0907 | 22.189 | 3177.7 | 8.7635 | 3186.5 | 0.00 | 0.6344 |
| 1.9639882 | 53.2022 | 22.056 | 3142.9 | 8.7597 | 3151.6 | 0.00 | 0.6313 |
| 1.9738081 | 53.3119 | 21.923 | 3108.4 | 8.7557 | 3117.2 | 0.00 | 0.6281 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Sm ($Z=62$) | | | | | | | |
| 1.9836772 | 53.4200 | 21.791 | 3074.3 | 8.7516 | 3083.1 | 0.00 | 0.6250 |
| 1.9935955 | 53.5268 | 21.660 | 3040.7 | 8.7474 | 3049.4 | 0.00 | 0.6219 |
| 2.0035635 | 53.6323 | 21.529 | 3007.3 | 8.7430 | 3016.0 | 0.00 | 0.6188 |
| 2.0135813 | 53.7358 | 21.396 | 2973.8 | 8.7385 | 2982.5 | 0.00 | 0.6157 |
| 2.0236492 | 53.8370 | 21.263 | 2940.6 | 8.7338 | 2949.3 | 0.00 | 0.6127 |
| 2.0337675 | 53.9360 | 21.131 | 2907.8 | 8.7291 | 2916.5 | 0.00 | 0.6096 |
| 2.0439363 | 54.0331 | 20.999 | 2875.3 | 8.7241 | 2884.1 | 0.00 | 0.6066 |
| 2.0541560 | 54.1284 | 20.869 | 2843.2 | 8.7191 | 2852.0 | 0.00 | 0.6036 |
| 2.0644268 | 54.2218 | 20.739 | 2811.5 | 8.7139 | 2820.2 | 0.00 | 0.6006 |
| 2.0747489 | 54.3136 | 20.610 | 2780.1 | 8.7086 | 2788.8 | 0.00 | 0.5976 |
| 2.0851227 | 54.4038 | 20.482 | 2749.0 | 8.7031 | 2757.7 | 0.00 | 0.5946 |
| 2.0955483 | 54.4924 | 20.354 | 2718.3 | 8.6975 | 2727.0 | 0.00 | 0.5917 |
| 2.1060260 | 54.5796 | 20.227 | 2687.9 | 8.6918 | 2696.6 | 0.00 | 0.5887 |
| 2.1165562 | 54.6653 | 20.101 | 2657.9 | 8.6859 | 2666.6 | 0.00 | 0.5858 |
| 2.1271389 | 54.7497 | 19.976 | 2628.2 | 8.6799 | 2636.9 | 0.00 | 0.5829 |
| 2.1377746 | 54.8329 | 19.851 | 2598.8 | 8.6738 | 2607.4 | 0.00 | 0.5800 |
| 2.1484635 | 54.9148 | 19.727 | 2569.7 | 8.6676 | 2578.4 | 0.00 | 0.5771 |
| 2.1592058 | 54.9955 | 19.604 | 2540.9 | 8.6612 | 2549.6 | 0.00 | 0.5742 |
| 2.1700018 | 55.2956 | 19.476 | 2511.8 | 8.6547 | 2520.5 | 0.00 | 0.5714 |
| 2.1808519 | 55.3737 | 19.348 | 2482.9 | 8.6480 | 2491.6 | 0.00 | 0.5685 |
| 2.1917561 | 55.4502 | 19.221 | 2454.4 | 8.6413 | 2463.0 | 0.00 | 0.5657 |
| 2.2027149 | 55.5250 | 19.095 | 2426.1 | 8.6344 | 2434.8 | 0.00 | 0.5629 |
| 2.2137285 | 55.7481 | 18.969 | 2398.1 | 8.6273 | 2406.8 | 0.00 | 0.5601 |
| 2.2247971 | 55.8202 | 18.841 | 2370.1 | 8.6202 | 2378.7 | 0.00 | 0.5573 |
| 2.2359211 | 55.8904 | 18.713 | 2342.3 | 8.6129 | 2350.9 | 0.00 | 0.5545 |
| 2.2471007 | 55.9589 | 18.586 | 2314.8 | 8.6055 | 2323.4 | 0.00 | 0.5518 |
| 2.2583362 | 56.0256 | 18.459 | 2287.5 | 8.5979 | 2296.1 | 0.00 | 0.5490 |
| 2.2696279 | 56.0905 | 18.333 | 2260.6 | 8.5903 | 2269.2 | 0.00 | 0.5463 |
| 2.2809760 | 56.1536 | 18.208 | 2234.0 | 8.5825 | 2242.6 | 0.00 | 0.5436 |
| 2.2923809 | 56.2152 | 18.084 | 2207.7 | 8.5746 | 2216.3 | 0.00 | 0.5409 |
| 2.3038428 | 56.2753 | 17.960 | 2181.8 | 8.5665 | 2190.3 | 0.00 | 0.5382 |
| 2.3153620 | 56.3339 | 17.838 | 2156.1 | 8.5583 | 2164.6 | 0.00 | 0.5355 |
| 2.3269388 | 56.3910 | 17.716 | 2130.7 | 8.5501 | 2139.2 | 0.00 | 0.5328 |
| 2.3385735 | 56.4468 | 17.595 | 2105.6 | 8.5416 | 2114.2 | 0.00 | 0.5302 |
| 2.3502664 | 56.5012 | 17.475 | 2080.8 | 8.5331 | 2089.4 | 0.00 | 0.5275 |
| 2.3620177 | 56.5543 | 17.355 | 2056.3 | 8.5244 | 2064.9 | 0.00 | 0.5249 |
| 2.3738278 | 56.6062 | 17.237 | 2032.1 | 8.5156 | 2040.7 | 0.00 | 0.5223 |
| 2.3856970 | 56.6569 | 17.119 | 2008.2 | 8.5067 | 2016.7 | 0.00 | 0.5197 |
| 2.3976254 | 56.7064 | 17.002 | 1984.6 | 8.4977 | 1993.1 | 0.00 | 0.5171 |
| 2.4096136 | 56.7547 | 16.886 | 1961.3 | 8.4886 | 1969.8 | 0.00 | 0.5145 |
| 2.4216616 | 56.8020 | 16.771 | 1938.2 | 8.4793 | 1946.7 | 0.00 | 0.5120 |
| 2.4337699 | 56.8482 | 16.654 | 1915.1 | 8.4699 | 1923.6 | 0.00 | 0.5094 |
| 2.4459388 | 56.8933 | 16.538 | 1892.3 | 8.4604 | 1900.7 | 0.00 | 0.5069 |
| 2.4581685 | 56.9372 | 16.423 | 1869.7 | 8.4508 | 1878.2 | 0.00 | 0.5044 |
| 2.4704593 | 56.9801 | 16.308 | 1847.4 | 8.4410 | 1855.9 | 0.00 | 0.5019 |
| 2.4828116 | 57.0218 | 16.194 | 1825.4 | 8.4312 | 1833.9 | 0.00 | 0.4994 |
| 2.4952257 | 57.0626 | 16.082 | 1803.7 | 8.4212 | 1812.1 | 0.00 | 0.4969 |
| 2.5077018 | 57.1023 | 15.970 | 1782.2 | 8.4111 | 1790.6 | 0.00 | 0.4944 |
| 2.5202403 | 57.1411 | 15.858 | 1761.0 | 8.4009 | 1769.4 | 0.00 | 0.4920 |
| 2.5328415 | 57.1789 | 15.748 | 1740.1 | 8.3906 | 1748.5 | 0.00 | 0.4895 |
| 2.5455057 | 57.2158 | 15.639 | 1719.4 | 8.3801 | 1727.8 | 0.00 | 0.4871 |
| 2.5582333 | 57.2518 | 15.530 | 1699.0 | 8.3696 | 1707.3 | 0.00 | 0.4846 |
| 2.5710244 | 57.2869 | 15.422 | 1678.8 | 8.3589 | 1687.1 | 0.00 | 0.4822 |
| 2.5838796 | 57.3213 | 15.315 | 1658.8 | 8.3481 | 1667.2 | 0.00 | 0.4798 |
| 2.5967990 | 57.3548 | 15.209 | 1639.2 | 8.3372 | 1647.5 | 0.00 | 0.4775 |
| 2.6097829 | 57.3875 | 15.104 | 1619.7 | 8.3262 | 1628.0 | 0.00 | 0.4751 |
| 2.6228319 | 57.4195 | 15.000 | 1600.5 | 8.3151 | 1608.8 | 0.00 | 0.4727 |
| 2.6359460 | 57.4507 | 14.896 | 1581.6 | 8.3039 | 1589.9 | 0.00 | 0.4704 |
| 2.6491257 | 57.4813 | 14.794 | 1562.8 | 8.2925 | 1571.1 | 0.00 | 0.4680 |
| 2.6623714 | 57.5112 | 14.692 | 1544.4 | 8.2811 | 1552.6 | 0.00 | 0.4657 |
| 2.6756832 | 57.5404 | 14.591 | 1526.1 | 8.2695 | 1534.4 | 0.00 | 0.4634 |
| 2.6890617 | 57.5691 | 14.490 | 1508.1 | 8.2579 | 1516.3 | 0.00 | 0.4611 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Sm ($Z=62$) | | | | | | | |
| 2.7025070 | 57.5971 | 14.391 | 1490.3 | 8.2461 | 1498.5 | 0.00 | 0.4588 |
| 2.7160195 | 57.6247 | 14.292 | 1472.7 | 8.2342 | 1480.9 | 0.00 | 0.4565 |
| 2.7295996 | 57.6516 | 14.194 | 1455.3 | 8.2222 | 1463.5 | 0.00 | 0.4542 |
| 2.7432476 | 57.6781 | 14.097 | 1438.2 | 8.2101 | 1446.4 | 0.00 | 0.4520 |
| 2.7569638 | 57.7042 | 14.001 | 1421.3 | 8.1979 | 1429.5 | 0.00 | 0.4497 |
| 2.7707486 | 57.7298 | 13.905 | 1404.5 | 8.1856 | 1412.7 | 0.00 | 0.4475 |
| 2.7846024 | 57.7551 | 13.811 | 1388.0 | 8.1732 | 1396.2 | 0.00 | 0.4452 |
| 2.7985254 | 57.7800 | 13.717 | 1371.7 | 8.1607 | 1379.9 | 0.00 | 0.4430 |
| 2.8125180 | 57.8046 | 13.624 | 1355.7 | 8.1481 | 1363.8 | 0.00 | 0.4408 |
| 2.8265806 | 57.8289 | 13.531 | 1339.8 | 8.1354 | 1347.9 | 0.00 | 0.4386 |
| 2.8407135 | 57.9556 | 13.440 | 1324.1 | 8.1226 | 1332.2 | 0.00 | 0.4365 |
| 2.8549171 | 57.9802 | 13.347 | 1308.4 | 8.1096 | 1316.5 | 0.00 | 0.4343 |
| 2.8691917 | 58.0046 | 13.255 | 1292.9 | 8.0966 | 1301.0 | 0.00 | 0.4321 |
| 2.8835376 | 58.0289 | 13.164 | 1277.6 | 8.0835 | 1285.7 | 0.00 | 0.4300 |
| 2.8979553 | 58.0531 | 13.073 | 1262.5 | 8.0703 | 1270.6 | 0.00 | 0.4278 |
| 2.9124451 | 58.0774 | 12.983 | 1247.6 | 8.0570 | 1255.7 | 0.00 | 0.4257 |
| 2.9270073 | 58.1021 | 12.894 | 1232.9 | 8.0436 | 1240.9 | 0.00 | 0.4236 |
| 2.9416424 | 58.1275 | 12.806 | 1218.3 | 8.0301 | 1226.4 | 0.00 | 0.4215 |
| 2.9563506 | 58.1540 | 12.718 | 1204.0 | 8.0165 | 1212.0 | 0.00 | 0.4194 |
| 2.9711323 | 58.1830 | 12.632 | 1189.8 | 8.0028 | 1197.8 | 0.00 | 0.4173 |
| 2.9859880 | 58.2179 | 12.545 | 1175.8 | 7.9890 | 1183.8 | 0.00 | 0.4152 |
| 3.0009179 | 58.2834 | 12.459 | 1161.9 | 7.9751 | 1169.9 | 0.00 | 0.4132 |
| 3.0159225 | 58.3010 | 12.360 | 1147.0 | 7.9611 | 1154.9 | 0.00 | 0.4111 |
| 3.0310021 | 58.3166 | 12.262 | 1132.2 | 7.9470 | 1140.1 | 0.00 | 0.4091 |
| 3.0461571 | 58.3307 | 12.165 | 1117.6 | 7.9328 | 1125.6 | 0.00 | 0.4070 |
| 3.0613879 | 58.3436 | 12.069 | 1103.3 | 7.9186 | 1111.2 | 0.00 | 0.4050 |
| 3.0766949 | 58.3556 | 11.973 | 1089.1 | 7.9042 | 1097.0 | 0.00 | 0.4030 |
| 3.0920783 | 58.4146 | 11.877 | 1075.0 | 7.8898 | 1082.9 | 0.00 | 0.4010 |
| 3.1075387 | 58.4249 | 11.782 | 1061.1 | 7.8753 | 1069.0 | 0.00 | 0.3990 |
| 3.1230764 | 58.4343 | 11.687 | 1047.3 | 7.8607 | 1055.2 | 0.00 | 0.3970 |
| 3.1386918 | 58.4427 | 11.594 | 1033.8 | 7.8459 | 1041.6 | 0.00 | 0.3950 |
| 3.1543853 | 58.4503 | 11.501 | 1020.4 | 7.8312 | 1028.2 | 0.00 | 0.3931 |
| 3.1701572 | 58.4570 | 11.409 | 1007.2 | 7.8163 | 1015.0 | 0.00 | 0.3911 |
| 3.1860080 | 58.4629 | 11.318 | 994.16 | 7.8013 | 1002.0 | 0.00 | 0.3892 |
| 3.2019380 | 58.4681 | 11.227 | 981.32 | 7.7863 | 989.10 | 0.00 | 0.3872 |
| 3.2179477 | 58.4725 | 11.138 | 968.65 | 7.7711 | 976.42 | 0.00 | 0.3853 |
| 3.2340374 | 58.4763 | 11.049 | 956.15 | 7.7559 | 963.91 | 0.00 | 0.3834 |
| 3.2502076 | 58.4793 | 10.961 | 943.82 | 7.7406 | 951.56 | 0.00 | 0.3815 |
| 3.2664587 | 58.4817 | 10.874 | 931.66 | 7.7252 | 939.39 | 0.00 | 0.3796 |
| 3.2827910 | 58.4834 | 10.788 | 919.67 | 7.7097 | 927.38 | 0.00 | 0.3777 |
| 3.2992049 | 58.4846 | 10.702 | 907.83 | 7.6942 | 915.53 | 0.00 | 0.3758 |
| 3.3157009 | 58.4851 | 10.617 | 896.16 | 7.6786 | 903.84 | 0.00 | 0.3739 |
| 3.3322794 | 58.4850 | 10.533 | 884.64 | 7.6629 | 892.30 | 0.00 | 0.3721 |
| 3.3489408 | 58.4844 | 10.450 | 873.28 | 7.6471 | 880.93 | 0.00 | 0.3702 |
| 3.3656856 | 58.4832 | 10.367 | 862.07 | 7.6312 | 869.70 | 0.00 | 0.3684 |
| 3.3825140 | 58.4816 | 10.286 | 851.01 | 7.6153 | 858.63 | 0.00 | 0.3665 |
| 3.3994265 | 58.4793 | 10.205 | 840.11 | 7.5992 | 847.71 | 0.00 | 0.3647 |
| 3.4164237 | 58.4766 | 10.124 | 829.35 | 7.5832 | 836.93 | 0.00 | 0.3629 |
| 3.4335058 | 58.4735 | 10.045 | 818.73 | 7.5670 | 826.30 | 0.00 | 0.3611 |
| 3.4506733 | 58.4903 | 9.9655 | 808.24 | 7.5507 | 815.79 | 0.00 | 0.3593 |
| 3.4679267 | 58.4863 | 9.8865 | 797.85 | 7.5344 | 805.38 | 0.00 | 0.3575 |
| 3.4852663 | 58.4818 | 9.8083 | 787.60 | 7.5180 | 795.12 | 0.00 | 0.3557 |
| 3.5026927 | 58.4768 | 9.7308 | 777.49 | 7.5016 | 784.99 | 0.00 | 0.3540 |
| 3.5202061 | 58.4713 | 9.6540 | 767.51 | 7.4850 | 775.00 | 0.00 | 0.3522 |
| 3.5378072 | 58.4653 | 9.5778 | 757.67 | 7.4684 | 765.14 | 0.00 | 0.3505 |
| 3.5554962 | 58.4588 | 9.5024 | 747.96 | 7.4517 | 755.41 | 0.00 | 0.3487 |
| 3.5732737 | 58.4519 | 9.4276 | 738.38 | 7.4350 | 745.81 | 0.00 | 0.3470 |
| 3.5911400 | 58.4445 | 9.3534 | 728.93 | 7.4182 | 736.35 | 0.00 | 0.3453 |
| 3.6090957 | 58.4367 | 9.2799 | 719.60 | 7.4013 | 727.01 | 0.00 | 0.3435 |
| 3.6271412 | 58.4285 | 9.2071 | 710.40 | 7.3844 | 717.79 | 0.00 | 0.3418 |
| 3.6452769 | 58.4198 | 9.1349 | 701.33 | 7.3673 | 708.70 | 0.00 | 0.3401 |
| 3.6635033 | 58.4107 | 9.0634 | 692.37 | 7.3503 | 699.72 | 0.00 | 0.3384 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Sm ($Z=62$) | | | | | | | |
| 3.6818208 | 58.4012 | 8.9925 | 683.54 | 7.3331 | 690.87 | 0.00 | 0.3367 |
| 3.7002299 | 58.3914 | 8.9222 | 674.82 | 7.3159 | 682.14 | 0.00 | 0.3351 |
| 3.7187311 | 58.3811 | 8.8525 | 666.22 | 7.2986 | 673.52 | 0.00 | 0.3334 |
| 3.7373247 | 58.3704 | 8.7834 | 657.73 | 7.2813 | 665.02 | 0.00 | 0.3317 |
| 3.7560114 | 58.3594 | 8.7150 | 649.36 | 7.2639 | 656.63 | 0.00 | 0.3301 |
| 3.7747914 | 58.3480 | 8.6472 | 641.10 | 7.2464 | 648.35 | 0.00 | 0.3285 |
| 3.7936654 | 58.3362 | 8.5799 | 632.95 | 7.2289 | 640.18 | 0.00 | 0.3268 |
| 3.8126337 | 58.3241 | 8.5132 | 624.91 | 7.2113 | 632.12 | 0.00 | 0.3252 |
| 3.8316969 | 58.3116 | 8.4472 | 616.97 | 7.1937 | 624.17 | 0.00 | 0.3236 |
| 3.8508554 | 58.2987 | 8.3817 | 609.14 | 7.1760 | 616.32 | 0.00 | 0.3220 |
| 3.8701096 | 58.2855 | 8.3167 | 601.42 | 7.1582 | 608.58 | 0.00 | 0.3204 |
| 3.8894602 | 58.2720 | 8.2524 | 593.80 | 7.1404 | 600.94 | 0.00 | 0.3188 |
| 3.9089075 | 58.2581 | 8.1886 | 586.27 | 7.1225 | 593.40 | 0.00 | 0.3172 |
| 3.9284520 | 58.2439 | 8.1254 | 578.85 | 7.1046 | 585.96 | 0.00 | 0.3156 |
| 3.9480943 | 58.2293 | 8.0627 | 571.53 | 7.0866 | 578.62 | 0.00 | 0.3140 |
| 3.9678347 | 58.2144 | 8.0005 | 564.30 | 7.0686 | 571.37 | 0.00 | 0.3125 |
| 3.9876739 | 58.1992 | 7.9390 | 557.17 | 7.0505 | 564.22 | 0.00 | 0.3109 |
| Eu ($Z=63$) | | | | | | | |
| Atomic weight: $A_r = 151.9600 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3}) = 5.2280$ | | | | | | | |
| $\sigma_a (\text{barns/atom}) = [\mu/\rho] (\text{cm}^2 \text{ g}^{-1}) \times 252.336$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho] (\text{cm}^2 \text{ g}^{-1}) = f_2 (e \text{ atom}^{-1}) \times 2.76917 \times 10^5$ | | | | | | | |
| 18 edges. Edge energies (keV) | | | | | | | |
| K | 48.5190 | L I | 8.05200 | L II | 7.61710 | L III | 6.97690 |
| M I | 1.80000 | M II | 1.61390 | M III | 1.48060 | M IV | 1.16060 |
| M V | 1.13090 | N I | 0.360200 | N II | 0.283900 | N III | 0.256600 |
| N IV | 0.133200 | N V | 0.133200 | N VI | 0.00291151 | O I | 0.0318000 |
| O II | 0.0220000 | O III | 0.0220000 | | | | |
| Relativistic correction estimate: $f_{\text{rel}} (\text{H82,3/5CL}) = (-0.95641, -0.57720) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}} = -0.014328 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 23.5129 | 5.5787 | 15448 | 0.44771 | 15449 | 0.00 | 12.40 |
| 0.10050000 | 23.5122 | 5.5790 | 15372 | 0.45277 | 15373 | 0.00 | 12.34 |
| 0.10100250 | 23.5108 | 5.5791 | 15296 | 0.45787 | 15297 | 0.00 | 12.28 |
| 0.10150751 | 23.5088 | 5.5791 | 15220 | 0.46302 | 15220 | 0.00 | 12.21 |
| 0.10201505 | 23.5060 | 5.5790 | 15144 | 0.46821 | 15145 | 0.00 | 12.15 |
| 0.10252513 | 23.5024 | 5.5788 | 15068 | 0.47345 | 15069 | 0.00 | 12.09 |
| 0.10303775 | 23.4981 | 5.5785 | 14992 | 0.47874 | 14993 | 0.00 | 12.03 |
| 0.10355294 | 23.4929 | 5.5780 | 14917 | 0.48408 | 14917 | 0.00 | 11.97 |
| 0.10407070 | 23.4868 | 5.5775 | 14841 | 0.48946 | 14841 | 0.00 | 11.91 |
| 0.10459106 | 23.4797 | 5.5769 | 14765 | 0.49490 | 14766 | 0.00 | 11.85 |
| 0.10511401 | 23.4717 | 5.5761 | 14690 | 0.50038 | 14690 | 0.00 | 11.80 |
| 0.10563958 | 23.4626 | 5.5752 | 14615 | 0.50591 | 14615 | 0.00 | 11.74 |
| 0.10616778 | 23.4524 | 5.5742 | 14539 | 0.51149 | 14540 | 0.00 | 11.68 |
| 0.10669862 | 23.4410 | 5.5731 | 14464 | 0.51712 | 14465 | 0.00 | 11.62 |
| 0.10723211 | 23.4284 | 5.5719 | 14389 | 0.52280 | 14389 | 0.00 | 11.56 |
| 0.10776827 | 23.4145 | 5.5706 | 14314 | 0.52853 | 14314 | 0.00 | 11.50 |
| 0.10830712 | 23.3992 | 5.5691 | 14239 | 0.53431 | 14240 | 0.00 | 11.45 |
| 0.10884865 | 23.3824 | 5.5676 | 14164 | 0.54014 | 14165 | 0.00 | 11.39 |
| 0.10939289 | 23.3640 | 5.5659 | 14090 | 0.54602 | 14090 | 0.00 | 11.33 |
| 0.10993986 | 23.3439 | 5.5641 | 14015 | 0.55196 | 14015 | 0.00 | 11.28 |
| 0.11048956 | 23.3221 | 5.5622 | 13940 | 0.55794 | 13941 | 0.00 | 11.22 |
| 0.11104201 | 23.2983 | 5.5602 | 13866 | 0.56398 | 13867 | 0.00 | 11.17 |
| 0.11159722 | 23.2726 | 5.5581 | 13792 | 0.57007 | 13792 | 0.00 | 11.11 |
| 0.11215520 | 23.2446 | 5.5558 | 13718 | 0.57621 | 13718 | 0.00 | 11.05 |
| 0.11271598 | 23.2143 | 5.5535 | 13644 | 0.58240 | 13644 | 0.00 | 11.00 |
| 0.11327956 | 23.1814 | 5.5510 | 13570 | 0.58865 | 13570 | 0.00 | 10.94 |
| 0.11384596 | 23.1458 | 5.5484 | 13496 | 0.59495 | 13496 | 0.00 | 10.89 |
| 0.11441519 | 23.1073 | 5.5457 | 13422 | 0.60131 | 13423 | 0.00 | 10.84 |
| 0.11498726 | 23.0656 | 5.5429 | 13349 | 0.60772 | 13349 | 0.00 | 10.78 |
| 0.11556220 | 23.0205 | 5.5400 | 13275 | 0.61418 | 13276 | 0.00 | 10.73 |
| 0.11614001 | 22.9716 | 5.5369 | 13202 | 0.62070 | 13202 | 0.00 | 10.68 |
| 0.11672071 | 22.9187 | 5.5337 | 13129 | 0.62727 | 13129 | 0.00 | 10.62 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Eu ($Z=63$) | | | | | | | |
| 0.11730431 | 22.8613 | 5.5305 | 13056 | 0.63389 | 13056 | 0.00 | 10.57 |
| 0.11789083 | 22.7989 | 5.5271 | 12983 | 0.64058 | 12983 | 0.00 | 10.52 |
| 0.11848029 | 22.7312 | 5.5236 | 12910 | 0.64731 | 12911 | 0.00 | 10.46 |
| 0.11907269 | 22.6575 | 5.5199 | 12837 | 0.65411 | 12838 | 0.00 | 10.41 |
| 0.11966805 | 22.5772 | 5.5162 | 12765 | 0.66096 | 12765 | 0.00 | 10.36 |
| 0.12026639 | 22.4895 | 5.5123 | 12692 | 0.66786 | 12693 | 0.00 | 10.31 |
| 0.12086772 | 22.3935 | 5.5084 | 12620 | 0.67483 | 12621 | 0.00 | 10.26 |
| 0.12147206 | 22.2882 | 5.5043 | 12548 | 0.68185 | 12549 | 0.00 | 10.21 |
| 0.12207942 | 22.1724 | 5.5001 | 12476 | 0.68892 | 12477 | 0.00 | 10.16 |
| 0.12268982 | 22.0445 | 5.4958 | 12404 | 0.69606 | 12405 | 0.00 | 10.11 |
| 0.12330327 | 21.9029 | 5.4914 | 12333 | 0.70325 | 12333 | 0.00 | 10.06 |
| 0.12391979 | 21.7452 | 5.4868 | 12261 | 0.71050 | 12262 | 0.00 | 10.01 |
| 0.12453939 | 21.5689 | 5.4822 | 12190 | 0.71781 | 12190 | 0.00 | 9.955 |
| 0.12516208 | 21.3706 | 5.4774 | 12119 | 0.72518 | 12119 | 0.00 | 9.906 |
| 0.12578789 | 21.1459 | 5.4725 | 12048 | 0.73261 | 12048 | 0.00 | 9.857 |
| 0.12641683 | 20.8893 | 5.4675 | 11977 | 0.74010 | 11977 | 0.00 | 9.808 |
| 0.12704892 | 20.5935 | 5.4624 | 11906 | 0.74764 | 11907 | 0.00 | 9.759 |
| 0.12768416 | 20.2483 | 5.4572 | 11835 | 0.75525 | 11836 | 0.00 | 9.710 |
| 0.12832258 | 19.8395 | 5.4519 | 11765 | 0.76291 | 11766 | 0.00 | 9.662 |
| 0.12896419 | 19.3466 | 5.4465 | 11695 | 0.77064 | 11696 | 0.00 | 9.614 |
| 0.12960902 | 18.7376 | 5.4409 | 11625 | 0.77843 | 11626 | 0.00 | 9.566 |
| 0.13025706 | 17.9602 | 5.4353 | 11555 | 0.78627 | 11556 | 0.00 | 9.518 |
| 0.13090835 | 16.9196 | 5.4295 | 11485 | 0.79418 | 11486 | 0.00 | 9.471 |
| 0.13156289 | 15.4187 | 5.4236 | 11416 | 0.80215 | 11417 | 0.00 | 9.424 |
| 0.13222070 | 12.9303 | 5.4176 | 11346 | 0.81018 | 11347 | 0.00 | 9.377 |
| 0.13288181 | 6.86825 | 5.4115 | 11277 | 0.81828 | 11278 | 0.00 | 9.330 |
| 0.13317243 | -7.84966 | 5.4088 | 11247 | 0.82184 | 11248 | 0.00 | 9.310 |
| 0.13322758 | -7.66782 | 25.088 | 52145 | 0.82252 | 52146 | 0.00 | 9.306 |
| 0.13354621 | 8.89574 | 24.497 | 50796 | 0.82643 | 50797 | 0.00 | 9.284 |
| 0.13421395 | 16.4402 | 23.320 | 48115 | 0.83465 | 48115 | 0.00 | 9.238 |
| 0.13488502 | 20.1017 | 22.214 | 45606 | 0.84293 | 45606 | 0.00 | 9.192 |
| 0.13555944 | 22.5011 | 21.176 | 43258 | 0.85128 | 43259 | 0.00 | 9.146 |
| 0.13623724 | 24.2431 | 20.201 | 41061 | 0.85968 | 41062 | 0.00 | 9.101 |
| 0.13691842 | 25.5737 | 19.285 | 39004 | 0.86815 | 39005 | 0.00 | 9.055 |
| 0.13760302 | 26.6201 | 18.425 | 37080 | 0.87669 | 37080 | 0.00 | 9.010 |
| 0.13829103 | 27.4577 | 17.617 | 35277 | 0.88529 | 35278 | 0.00 | 8.965 |
| 0.13898249 | 28.1354 | 16.858 | 33590 | 0.89395 | 33591 | 0.00 | 8.921 |
| 0.13967740 | 28.6869 | 16.146 | 32009 | 0.90268 | 32010 | 0.00 | 8.876 |
| 0.14037579 | 29.1369 | 15.476 | 30529 | 0.91147 | 30530 | 0.00 | 8.832 |
| 0.14107766 | 29.5036 | 14.847 | 29142 | 0.92033 | 29143 | 0.00 | 8.788 |
| 0.14178305 | 29.8012 | 14.256 | 27843 | 0.92925 | 27844 | 0.00 | 8.745 |
| 0.14249197 | 30.0407 | 13.700 | 26625 | 0.93823 | 26626 | 0.00 | 8.701 |
| 0.14320443 | 30.2312 | 13.178 | 25483 | 0.94729 | 25484 | 0.00 | 8.658 |
| 0.14392045 | 30.3796 | 12.688 | 24412 | 0.95641 | 24413 | 0.00 | 8.615 |
| 0.14464005 | 30.4919 | 12.227 | 23408 | 0.96559 | 23409 | 0.00 | 8.572 |
| 0.14536325 | 30.5726 | 11.793 | 22466 | 0.97484 | 22467 | 0.00 | 8.529 |
| 0.14609007 | 30.6253 | 11.386 | 21582 | 0.98416 | 21583 | 0.00 | 8.487 |
| 0.14682052 | 30.6528 | 11.003 | 20753 | 0.99355 | 20754 | 0.00 | 8.445 |
| 0.14755462 | 30.6580 | 10.650 | 19987 | 1.0030 | 19988 | 0.00 | 8.403 |
| 0.14829239 | 30.6466 | 10.325 | 19281 | 1.0125 | 19282 | 0.00 | 8.361 |
| 0.14903386 | 30.6229 | 10.027 | 18630 | 1.0221 | 18631 | 0.00 | 8.319 |
| 0.14977903 | 30.5901 | 9.7515 | 18029 | 1.0318 | 18030 | 0.00 | 8.278 |
| 0.15052792 | 30.5503 | 9.4978 | 17473 | 1.0415 | 17474 | 0.00 | 8.237 |
| 0.15128056 | 30.5054 | 9.2634 | 16956 | 1.0513 | 16958 | 0.00 | 8.196 |
| 0.15203696 | 30.4567 | 9.0465 | 16477 | 1.0611 | 16478 | 0.00 | 8.155 |
| 0.15279715 | 30.4054 | 8.8455 | 16031 | 1.0711 | 16032 | 0.00 | 8.114 |
| 0.15356113 | 30.3522 | 8.6590 | 15615 | 1.0811 | 15616 | 0.00 | 8.074 |
| 0.15432894 | 30.2980 | 8.4858 | 15226 | 1.0911 | 15227 | 0.00 | 8.034 |
| 0.15510058 | 30.2431 | 8.3245 | 14863 | 1.1013 | 14864 | 0.00 | 7.994 |
| 0.15587609 | 30.1882 | 8.1743 | 14522 | 1.1115 | 14523 | 0.00 | 7.954 |
| 0.15665547 | 30.1335 | 8.0342 | 14202 | 1.1217 | 14203 | 0.00 | 7.914 |
| 0.15743875 | 30.0792 | 7.9033 | 13901 | 1.1321 | 13902 | 0.00 | 7.875 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Eu ($Z=63$) | | | | | | | |
| 0.15822594 | 30.0257 | 7.7808 | 13617 | 1.1425 | 13619 | 0.00 | 7.836 |
| 0.15901707 | 29.9731 | 7.6661 | 13350 | 1.1530 | 13351 | 0.00 | 7.797 |
| 0.15981215 | 29.9215 | 7.5585 | 13097 | 1.1635 | 13098 | 0.00 | 7.758 |
| 0.16061121 | 29.8709 | 7.4575 | 12858 | 1.1742 | 12859 | 0.00 | 7.720 |
| 0.16141427 | 29.8216 | 7.3626 | 12631 | 1.1849 | 12632 | 0.00 | 7.681 |
| 0.16222134 | 29.7734 | 7.2732 | 12416 | 1.1956 | 12417 | 0.00 | 7.643 |
| 0.16303245 | 29.7265 | 7.1890 | 12211 | 1.2065 | 12212 | 0.00 | 7.605 |
| 0.16384761 | 29.6809 | 7.1095 | 12016 | 1.2174 | 12017 | 0.00 | 7.567 |
| 0.16466685 | 29.6365 | 7.0345 | 11830 | 1.2284 | 11831 | 0.00 | 7.529 |
| 0.16549018 | 29.5934 | 6.9636 | 11652 | 1.2394 | 11653 | 0.00 | 7.492 |
| 0.16631763 | 29.5516 | 6.8964 | 11482 | 1.2505 | 11484 | 0.00 | 7.455 |
| 0.16714922 | 29.5109 | 6.8328 | 11320 | 1.2617 | 11321 | 0.00 | 7.418 |
| 0.16798497 | 29.4715 | 6.7724 | 11164 | 1.2730 | 11165 | 0.00 | 7.381 |
| 0.16882489 | 29.4332 | 6.7151 | 11014 | 1.2843 | 11016 | 0.00 | 7.344 |
| 0.16966902 | 29.3960 | 6.6606 | 10871 | 1.2958 | 10872 | 0.00 | 7.307 |
| 0.17051736 | 29.3600 | 6.6087 | 10732 | 1.3072 | 10734 | 0.00 | 7.271 |
| 0.17136995 | 29.3250 | 6.5594 | 10599 | 1.3188 | 10601 | 0.00 | 7.235 |
| 0.17222680 | 29.2911 | 6.5123 | 10471 | 1.3304 | 10472 | 0.00 | 7.199 |
| 0.17308793 | 29.2582 | 6.4674 | 10347 | 1.3421 | 10348 | 0.00 | 7.163 |
| 0.17395337 | 29.2262 | 6.4245 | 10227 | 1.3539 | 10229 | 0.00 | 7.127 |
| 0.17482314 | 29.1951 | 6.3835 | 10111 | 1.3658 | 10113 | 0.00 | 7.092 |
| 0.17569726 | 29.1649 | 6.3443 | 9999.3 | 1.3777 | 10001 | 0.00 | 7.057 |
| 0.17657574 | 29.1355 | 6.3068 | 9890.7 | 1.3897 | 9892.1 | 0.00 | 7.022 |
| 0.17745862 | 29.1069 | 6.2709 | 9785.4 | 1.4018 | 9786.8 | 0.00 | 6.987 |
| 0.17834591 | 29.0792 | 6.2364 | 9683.2 | 1.4139 | 9684.7 | 0.00 | 6.952 |
| 0.17923764 | 29.0521 | 6.2033 | 9584.0 | 1.4261 | 9585.4 | 0.00 | 6.917 |
| 0.18013383 | 29.0257 | 6.1716 | 9487.5 | 1.4384 | 9488.9 | 0.00 | 6.883 |
| 0.18103450 | 29.0000 | 6.1411 | 9393.6 | 1.4508 | 9395.1 | 0.00 | 6.849 |
| 0.18193967 | 28.9749 | 6.1118 | 9302.3 | 1.4633 | 9303.7 | 0.00 | 6.815 |
| 0.18284937 | 28.9504 | 6.0836 | 9213.3 | 1.4758 | 9214.8 | 0.00 | 6.781 |
| 0.18376362 | 28.9265 | 6.0564 | 9126.5 | 1.4884 | 9128.0 | 0.00 | 6.747 |
| 0.18468244 | 28.9031 | 6.0303 | 9042.0 | 1.5010 | 9043.5 | 0.00 | 6.713 |
| 0.18560585 | 28.8802 | 6.0051 | 8959.4 | 1.5138 | 8960.9 | 0.00 | 6.680 |
| 0.18653388 | 28.8578 | 5.9808 | 8878.8 | 1.5266 | 8880.3 | 0.00 | 6.647 |
| 0.18746655 | 28.8358 | 5.9574 | 8800.1 | 1.5395 | 8801.6 | 0.00 | 6.614 |
| 0.18840388 | 28.8142 | 5.9349 | 8723.1 | 1.5525 | 8724.7 | 0.00 | 6.581 |
| 0.18934590 | 28.7930 | 5.9131 | 8647.9 | 1.5655 | 8649.4 | 0.00 | 6.548 |
| 0.19029263 | 28.7722 | 5.8921 | 8574.2 | 1.5786 | 8575.8 | 0.00 | 6.515 |
| 0.19124409 | 28.7517 | 5.8718 | 8502.2 | 1.5918 | 8503.8 | 0.00 | 6.483 |
| 0.19220031 | 28.7315 | 5.8522 | 8431.6 | 1.6051 | 8433.2 | 0.00 | 6.451 |
| 0.19316131 | 28.7116 | 5.8332 | 8362.5 | 1.6184 | 8364.1 | 0.00 | 6.419 |
| 0.19412712 | 28.6919 | 5.8149 | 8294.8 | 1.6319 | 8296.4 | 0.00 | 6.387 |
| 0.19509776 | 28.6725 | 5.7972 | 8228.4 | 1.6454 | 8230.1 | 0.00 | 6.355 |
| 0.19607325 | 28.6533 | 5.7801 | 8163.4 | 1.6589 | 8165.0 | 0.00 | 6.323 |
| 0.19705361 | 28.6343 | 5.7636 | 8099.6 | 1.6726 | 8101.2 | 0.00 | 6.292 |
| 0.19803888 | 28.6155 | 5.7477 | 8036.9 | 1.6863 | 8038.6 | 0.00 | 6.261 |
| 0.19902907 | 28.5968 | 5.7322 | 7975.5 | 1.7001 | 7977.2 | 0.00 | 6.229 |
| 0.20002422 | 28.5782 | 5.7173 | 7915.2 | 1.7140 | 7916.9 | 0.00 | 6.198 |
| 0.20102434 | 28.5598 | 5.7029 | 7856.0 | 1.7280 | 7857.7 | 0.00 | 6.168 |
| 0.20202946 | 28.5414 | 5.6890 | 7797.8 | 1.7420 | 7799.6 | 0.00 | 6.137 |
| 0.20303961 | 28.5231 | 5.6756 | 7740.7 | 1.7561 | 7742.5 | 0.00 | 6.106 |
| 0.20405481 | 28.5048 | 5.6626 | 7684.6 | 1.7703 | 7686.4 | 0.00 | 6.076 |
| 0.20507508 | 28.4866 | 5.6501 | 7629.5 | 1.7845 | 7631.2 | 0.00 | 6.046 |
| 0.20610046 | 28.4684 | 5.6380 | 7575.3 | 1.7989 | 7577.1 | 0.00 | 6.016 |
| 0.20713096 | 28.4501 | 5.6264 | 7522.0 | 1.8133 | 7523.8 | 0.00 | 5.986 |
| 0.20816661 | 28.4318 | 5.6152 | 7469.7 | 1.8278 | 7471.5 | 0.00 | 5.956 |
| 0.20920745 | 28.4135 | 5.6044 | 7418.2 | 1.8423 | 7420.0 | 0.00 | 5.926 |
| 0.21025348 | 28.3951 | 5.5940 | 7367.6 | 1.8570 | 7369.5 | 0.00 | 5.897 |
| 0.21130475 | 28.3766 | 5.5840 | 7317.8 | 1.8717 | 7319.7 | 0.00 | 5.868 |
| 0.21236128 | 28.3580 | 5.5744 | 7268.9 | 1.8865 | 7270.8 | 0.00 | 5.838 |
| 0.21342308 | 28.3392 | 5.5651 | 7220.8 | 1.9013 | 7222.7 | 0.00 | 5.809 |
| 0.21449020 | 28.3203 | 5.5563 | 7173.4 | 1.9163 | 7175.4 | 0.00 | 5.780 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Eu ($Z=63$) | | | | | | | |
| 0.21556265 | 28.3011 | 5.5478 | 7126.9 | 1.9313 | 7128.8 | 0.00 | 5.752 |
| 0.21664046 | 28.2818 | 5.5397 | 7081.1 | 1.9464 | 7083.0 | 0.00 | 5.723 |
| 0.21772366 | 28.2622 | 5.5320 | 7036.0 | 1.9616 | 7038.0 | 0.00 | 5.695 |
| 0.21881228 | 28.2424 | 5.5246 | 6991.7 | 1.9768 | 6993.7 | 0.00 | 5.666 |
| 0.21990634 | 28.2222 | 5.5176 | 6948.1 | 1.9921 | 6950.1 | 0.00 | 5.638 |
| 0.22100588 | 28.2018 | 5.5110 | 6905.2 | 2.0075 | 6907.2 | 0.00 | 5.610 |
| 0.22211090 | 28.1810 | 5.5047 | 6863.0 | 2.0230 | 6865.0 | 0.00 | 5.582 |
| 0.22322146 | 28.1597 | 5.4987 | 6821.4 | 2.0386 | 6823.5 | 0.00 | 5.554 |
| 0.22433757 | 28.1381 | 5.4931 | 6780.6 | 2.0542 | 6782.6 | 0.00 | 5.527 |
| 0.22545925 | 28.1160 | 5.4879 | 6740.4 | 2.0699 | 6742.5 | 0.00 | 5.499 |
| 0.22658655 | 28.0934 | 5.4830 | 6700.9 | 2.0857 | 6702.9 | 0.00 | 5.472 |
| 0.22771948 | 28.0702 | 5.4784 | 6662.0 | 2.1015 | 6664.1 | 0.00 | 5.445 |
| 0.22885808 | 28.0464 | 5.4741 | 6623.7 | 2.1175 | 6625.8 | 0.00 | 5.418 |
| 0.23000237 | 28.0219 | 5.4703 | 6586.0 | 2.1335 | 6588.2 | 0.00 | 5.391 |
| 0.23115238 | 27.9966 | 5.4667 | 6549.0 | 2.1495 | 6551.2 | 0.00 | 5.364 |
| 0.23230814 | 27.9706 | 5.4635 | 6512.6 | 2.1657 | 6514.8 | 0.00 | 5.337 |
| 0.23346969 | 27.9436 | 5.4606 | 6476.8 | 2.1819 | 6478.9 | 0.00 | 5.311 |
| 0.23463703 | 27.9155 | 5.4580 | 6441.5 | 2.1982 | 6443.7 | 0.00 | 5.284 |
| 0.23581022 | 27.8864 | 5.4558 | 6406.9 | 2.2146 | 6409.1 | 0.00 | 5.258 |
| 0.23698927 | 27.8560 | 5.4539 | 6372.8 | 2.2311 | 6375.0 | 0.00 | 5.232 |
| 0.23817422 | 27.8241 | 5.4523 | 6339.3 | 2.2476 | 6341.5 | 0.00 | 5.206 |
| 0.23936509 | 27.7905 | 5.4511 | 6306.3 | 2.2642 | 6308.6 | 0.00 | 5.180 |
| 0.24056191 | 27.7551 | 5.4502 | 6273.9 | 2.2809 | 6276.2 | 0.00 | 5.154 |
| 0.24176472 | 27.7175 | 5.4497 | 6242.0 | 2.2976 | 6244.3 | 0.00 | 5.128 |
| 0.24297355 | 27.6774 | 5.4494 | 6210.7 | 2.3145 | 6213.0 | 0.00 | 5.103 |
| 0.24418841 | 27.6342 | 5.4495 | 6179.9 | 2.3314 | 6182.2 | 0.00 | 5.077 |
| 0.24540936 | 27.5873 | 5.4499 | 6149.6 | 2.3484 | 6152.0 | 0.00 | 5.052 |
| 0.24663640 | 27.5359 | 5.4507 | 6119.9 | 2.3654 | 6122.3 | 0.00 | 5.027 |
| 0.24786959 | 27.4788 | 5.4518 | 6090.7 | 2.3825 | 6093.0 | 0.00 | 5.002 |
| 0.24910893 | 27.4142 | 5.4532 | 6061.9 | 2.3997 | 6064.3 | 0.00 | 4.977 |
| 0.25035448 | 27.3394 | 5.4549 | 6033.7 | 2.4170 | 6036.1 | 0.00 | 4.952 |
| 0.25160625 | 27.2499 | 5.4570 | 6006.0 | 2.4343 | 6008.4 | 0.00 | 4.928 |
| 0.25286428 | 27.1370 | 5.4594 | 5978.7 | 2.4518 | 5981.2 | 0.00 | 4.903 |
| 0.25412860 | 26.9814 | 5.4621 | 5951.9 | 2.4693 | 5954.4 | 0.00 | 4.879 |
| 0.25539925 | 26.7189 | 5.4652 | 5925.6 | 2.4868 | 5928.1 | 0.00 | 4.855 |
| 0.25641678 | 26.0606 | 5.4679 | 5905.0 | 2.5009 | 5907.5 | 0.00 | 4.835 |
| 0.25667624 | 25.7561 | 6.5471 | 7063.3 | 2.5045 | 7065.8 | 0.00 | 4.830 |
| 0.25678320 | 26.0554 | 6.5477 | 7061.1 | 2.5059 | 7063.6 | 0.00 | 4.828 |
| 0.25795962 | 26.7284 | 6.5549 | 7036.6 | 2.5222 | 7039.1 | 0.00 | 4.806 |
| 0.25924942 | 26.9422 | 6.5631 | 7010.3 | 2.5399 | 7012.9 | 0.00 | 4.782 |
| 0.26054567 | 27.0641 | 6.5716 | 6984.5 | 2.5578 | 6987.1 | 0.00 | 4.759 |
| 0.26184840 | 27.1475 | 6.5805 | 6959.1 | 2.5757 | 6961.7 | 0.00 | 4.735 |
| 0.26315764 | 27.2093 | 6.5897 | 6934.2 | 2.5937 | 6936.8 | 0.00 | 4.711 |
| 0.26447343 | 27.2573 | 6.5992 | 6909.7 | 2.6118 | 6912.3 | 0.00 | 4.688 |
| 0.26579579 | 27.2956 | 6.6091 | 6885.6 | 2.6299 | 6888.3 | 0.00 | 4.665 |
| 0.26712477 | 27.3266 | 6.6193 | 6862.0 | 2.6481 | 6864.6 | 0.00 | 4.641 |
| 0.26846040 | 27.3518 | 6.6299 | 6838.7 | 2.6664 | 6841.4 | 0.00 | 4.618 |
| 0.26980270 | 27.3722 | 6.6408 | 6815.9 | 2.6848 | 6818.6 | 0.00 | 4.595 |
| 0.27115171 | 27.3884 | 6.6520 | 6793.4 | 2.7032 | 6796.1 | 0.00 | 4.573 |
| 0.27250747 | 27.4006 | 6.6636 | 6771.4 | 2.7217 | 6774.1 | 0.00 | 4.550 |
| 0.27387001 | 27.4091 | 6.6755 | 6749.8 | 2.7402 | 6752.5 | 0.00 | 4.527 |
| 0.27523936 | 27.4137 | 6.6877 | 6728.5 | 2.7589 | 6731.2 | 0.00 | 4.505 |
| 0.27661556 | 27.4139 | 6.7003 | 6707.6 | 2.7775 | 6710.4 | 0.00 | 4.482 |
| 0.27799863 | 27.4088 | 6.7132 | 6687.1 | 2.7963 | 6689.8 | 0.00 | 4.460 |
| 0.27938863 | 27.3963 | 6.7264 | 6666.9 | 2.8151 | 6669.7 | 0.00 | 4.438 |
| 0.28078557 | 27.3718 | 6.7399 | 6647.1 | 2.8340 | 6649.9 | 0.00 | 4.416 |
| 0.28218950 | 27.3221 | 6.7538 | 6627.6 | 2.8530 | 6630.5 | 0.00 | 4.394 |
| 0.28360044 | 27.1502 | 6.7680 | 6608.5 | 2.8721 | 6611.4 | 0.00 | 4.372 |
| 0.28366578 | 27.1247 | 6.7686 | 6607.6 | 2.8729 | 6610.5 | 0.00 | 4.371 |
| 0.28413421 | 27.1284 | 7.1061 | 6925.6 | 2.8793 | 6928.5 | 0.00 | 4.364 |
| 0.28501845 | 27.3011 | 7.1162 | 6913.9 | 2.8912 | 6916.8 | 0.00 | 4.350 |
| 0.28644354 | 27.3998 | 7.1326 | 6895.4 | 2.9103 | 6898.3 | 0.00 | 4.328 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Eu ($Z=63$) | | | | | | | |
| 0.28787576 | 27.4586 | 7.1492 | 6877.1 | 2.9296 | 6880.0 | 0.00 | 4.307 |
| 0.28931514 | 27.5026 | 7.1662 | 6859.1 | 2.9489 | 6862.0 | 0.00 | 4.285 |
| 0.29076171 | 27.5387 | 7.1834 | 6841.4 | 2.9682 | 6844.4 | 0.00 | 4.264 |
| 0.29221552 | 27.5699 | 7.2009 | 6823.9 | 2.9877 | 6826.9 | 0.00 | 4.243 |
| 0.29367660 | 27.5977 | 7.2187 | 6806.8 | 3.0072 | 6809.8 | 0.00 | 4.222 |
| 0.29514498 | 27.6229 | 7.2368 | 6789.8 | 3.0267 | 6792.9 | 0.00 | 4.201 |
| 0.29662071 | 27.6463 | 7.2551 | 6773.1 | 3.0464 | 6776.2 | 0.00 | 4.180 |
| 0.29810381 | 27.6681 | 7.2737 | 6756.7 | 3.0661 | 6759.8 | 0.00 | 4.159 |
| 0.29959433 | 27.6886 | 7.2925 | 6740.5 | 3.0858 | 6743.6 | 0.00 | 4.138 |
| 0.30109230 | 27.7082 | 7.3116 | 6724.5 | 3.1057 | 6727.6 | 0.00 | 4.118 |
| 0.30259776 | 27.7269 | 7.3309 | 6708.7 | 3.1255 | 6711.9 | 0.00 | 4.097 |
| 0.30411075 | 27.7448 | 7.3505 | 6693.2 | 3.1455 | 6696.3 | 0.00 | 4.077 |
| 0.30563130 | 27.7622 | 7.3703 | 6677.8 | 3.1655 | 6681.0 | 0.00 | 4.057 |
| 0.30715946 | 27.7789 | 7.3903 | 6662.7 | 3.1856 | 6665.9 | 0.00 | 4.036 |
| 0.30869526 | 27.7952 | 7.4106 | 6647.7 | 3.2057 | 6650.9 | 0.00 | 4.016 |
| 0.31023873 | 27.8111 | 7.4311 | 6633.0 | 3.2259 | 6636.2 | 0.00 | 3.996 |
| 0.31178993 | 27.8265 | 7.4518 | 6618.4 | 3.2462 | 6621.6 | 0.00 | 3.977 |
| 0.31334888 | 27.8416 | 7.4728 | 6603.9 | 3.2665 | 6607.2 | 0.00 | 3.957 |
| 0.31491562 | 27.8564 | 7.4939 | 6589.7 | 3.2868 | 6592.9 | 0.00 | 3.937 |
| 0.31649020 | 27.8709 | 7.5152 | 6575.5 | 3.3073 | 6578.8 | 0.00 | 3.917 |
| 0.31807265 | 27.8851 | 7.5367 | 6561.6 | 3.3278 | 6564.9 | 0.00 | 3.898 |
| 0.31966301 | 27.8990 | 7.5584 | 6547.7 | 3.3483 | 6551.1 | 0.00 | 3.879 |
| 0.32126133 | 27.9127 | 7.5803 | 6534.0 | 3.3689 | 6537.4 | 0.00 | 3.859 |
| 0.32286764 | 27.9260 | 7.6024 | 6520.4 | 3.3896 | 6523.8 | 0.00 | 3.840 |
| 0.32448197 | 27.9391 | 7.6246 | 6506.9 | 3.4103 | 6510.3 | 0.00 | 3.821 |
| 0.32610438 | 27.9519 | 7.6470 | 6493.5 | 3.4311 | 6497.0 | 0.00 | 3.802 |
| 0.32773491 | 27.9643 | 7.6695 | 6480.3 | 3.4520 | 6483.7 | 0.00 | 3.783 |
| 0.32937358 | 27.9764 | 7.6922 | 6467.1 | 3.4729 | 6470.6 | 0.00 | 3.764 |
| 0.33102045 | 27.9881 | 7.7150 | 6454.0 | 3.4938 | 6457.5 | 0.00 | 3.746 |
| 0.33267555 | 27.9994 | 7.7379 | 6441.0 | 3.5148 | 6444.5 | 0.00 | 3.727 |
| 0.33433893 | 28.0101 | 7.7609 | 6428.0 | 3.5359 | 6431.6 | 0.00 | 3.708 |
| 0.33601062 | 28.0203 | 7.7841 | 6415.1 | 3.5570 | 6418.7 | 0.00 | 3.690 |
| 0.33769068 | 28.0298 | 7.8074 | 6402.3 | 3.5782 | 6405.9 | 0.00 | 3.672 |
| 0.33937913 | 28.0384 | 7.8307 | 6389.5 | 3.5994 | 6393.1 | 0.00 | 3.653 |
| 0.34107602 | 28.0461 | 7.8542 | 6376.8 | 3.6207 | 6380.4 | 0.00 | 3.635 |
| 0.34278140 | 28.0526 | 7.8777 | 6364.1 | 3.6420 | 6367.7 | 0.00 | 3.617 |
| 0.34449531 | 28.0576 | 7.9014 | 6351.4 | 3.6634 | 6355.0 | 0.00 | 3.599 |
| 0.34621779 | 28.0607 | 7.9250 | 6338.7 | 3.6848 | 6342.4 | 0.00 | 3.581 |
| 0.34794888 | 28.0613 | 7.9488 | 6326.1 | 3.7063 | 6329.8 | 0.00 | 3.563 |
| 0.34968862 | 28.0586 | 7.9726 | 6313.4 | 3.7278 | 6317.2 | 0.00 | 3.546 |
| 0.35143706 | 28.0513 | 7.9964 | 6300.8 | 3.7494 | 6304.6 | 0.00 | 3.528 |
| 0.35319425 | 28.0373 | 8.0202 | 6288.2 | 3.7710 | 6291.9 | 0.00 | 3.510 |
| 0.35496022 | 28.0123 | 8.0441 | 6275.5 | 3.7927 | 6279.3 | 0.00 | 3.493 |
| 0.35673502 | 27.9669 | 8.0680 | 6262.8 | 3.8144 | 6266.7 | 0.00 | 3.476 |
| 0.35851870 | 27.8699 | 8.0919 | 6250.1 | 3.8362 | 6254.0 | 0.00 | 3.458 |
| 0.35978936 | 27.6514 | 8.1089 | 6241.1 | 3.8517 | 6245.0 | 0.00 | 3.446 |
| 0.36031129 | 27.4403 | 8.6402 | 6640.4 | 3.8580 | 6644.3 | 0.00 | 3.441 |
| 0.36061062 | 27.6621 | 8.6444 | 6638.1 | 3.8617 | 6642.0 | 0.00 | 3.438 |
| 0.36211285 | 27.9389 | 8.6652 | 6626.5 | 3.8799 | 6630.4 | 0.00 | 3.424 |
| 0.36392341 | 28.0747 | 8.6902 | 6612.5 | 3.9018 | 6616.5 | 0.00 | 3.407 |
| 0.36574303 | 28.1662 | 8.7151 | 6598.5 | 3.9238 | 6602.5 | 0.00 | 3.390 |
| 0.36757174 | 28.2393 | 8.7401 | 6584.5 | 3.9458 | 6588.4 | 0.00 | 3.373 |
| 0.36940960 | 28.3024 | 8.7650 | 6570.4 | 3.9678 | 6574.4 | 0.00 | 3.356 |
| 0.37125665 | 28.3592 | 8.7898 | 6556.2 | 3.9899 | 6560.2 | 0.00 | 3.340 |
| 0.37311293 | 28.4118 | 8.8146 | 6542.0 | 4.0120 | 6546.0 | 0.00 | 3.323 |
| 0.37497850 | 28.4614 | 8.8393 | 6527.7 | 4.0342 | 6531.7 | 0.00 | 3.306 |
| 0.37685339 | 28.5087 | 8.8639 | 6513.3 | 4.0564 | 6517.3 | 0.00 | 3.290 |
| 0.37873766 | 28.5544 | 8.8884 | 6498.8 | 4.0787 | 6502.9 | 0.00 | 3.274 |
| 0.38063135 | 28.5987 | 8.9128 | 6484.3 | 4.1010 | 6488.4 | 0.00 | 3.257 |
| 0.38253450 | 28.6420 | 8.9371 | 6469.6 | 4.1233 | 6473.7 | 0.00 | 3.241 |
| 0.38444718 | 28.6845 | 8.9614 | 6454.9 | 4.1457 | 6459.0 | 0.00 | 3.225 |
| 0.38636941 | 28.7263 | 8.9854 | 6440.0 | 4.1681 | 6444.2 | 0.00 | 3.209 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Eu ($Z=63$) | | | | | | | |
| 0.38830126 | 28.7677 | 9.0094 | 6425.1 | 4.1906 | 6429.2 | 0.00 | 3.193 |
| 0.39024276 | 28.8086 | 9.0332 | 6410.0 | 4.2130 | 6414.2 | 0.00 | 3.177 |
| 0.39219398 | 28.8493 | 9.0569 | 6394.8 | 4.2356 | 6399.0 | 0.00 | 3.161 |
| 0.39415495 | 28.8897 | 9.0804 | 6379.5 | 4.2581 | 6383.8 | 0.00 | 3.146 |
| 0.39612572 | 28.9299 | 9.1037 | 6364.1 | 4.2807 | 6368.3 | 0.00 | 3.130 |
| 0.39810635 | 28.9700 | 9.1269 | 6348.5 | 4.3034 | 6352.8 | 0.00 | 3.114 |
| 0.40009688 | 28.9879 | 9.1498 | 6332.8 | 4.3260 | 6337.1 | 0.00 | 3.099 |
| 0.40209737 | 29.0279 | 9.1725 | 6317.0 | 4.3487 | 6321.3 | 0.00 | 3.083 |
| 0.40410785 | 29.0678 | 9.1950 | 6301.0 | 4.3715 | 6305.3 | 0.00 | 3.068 |
| 0.40612839 | 29.1076 | 9.2173 | 6284.8 | 4.3942 | 6289.2 | 0.00 | 3.053 |
| 0.40815904 | 29.1475 | 9.2394 | 6268.5 | 4.4170 | 6272.9 | 0.00 | 3.038 |
| 0.41019983 | 29.1874 | 9.2612 | 6252.0 | 4.4398 | 6256.4 | 0.00 | 3.023 |
| 0.41225083 | 29.2274 | 9.2827 | 6235.4 | 4.4627 | 6239.8 | 0.00 | 3.007 |
| 0.41431208 | 29.2674 | 9.3039 | 6218.5 | 4.4856 | 6223.0 | 0.00 | 2.993 |
| 0.41638364 | 29.3075 | 9.3248 | 6201.5 | 4.5085 | 6206.0 | 0.00 | 2.978 |
| 0.41846556 | 29.3476 | 9.3455 | 6184.3 | 4.5314 | 6188.9 | 0.00 | 2.963 |
| 0.42055789 | 29.3878 | 9.3659 | 6167.0 | 4.5544 | 6171.5 | 0.00 | 2.948 |
| 0.42266068 | 29.4281 | 9.3859 | 6149.4 | 4.5774 | 6154.0 | 0.00 | 2.933 |
| 0.42477398 | 29.4684 | 9.4057 | 6131.7 | 4.6004 | 6136.3 | 0.00 | 2.919 |
| 0.42689785 | 29.5088 | 9.4251 | 6113.8 | 4.6234 | 6118.5 | 0.00 | 2.904 |
| 0.42903234 | 29.5493 | 9.4443 | 6095.8 | 4.6465 | 6100.4 | 0.00 | 2.890 |
| 0.43117750 | 29.5899 | 9.4631 | 6077.5 | 4.6696 | 6082.2 | 0.00 | 2.875 |
| 0.43333339 | 29.6306 | 9.4816 | 6059.1 | 4.6927 | 6063.8 | 0.00 | 2.861 |
| 0.43550006 | 29.6714 | 9.4998 | 6040.5 | 4.7158 | 6045.3 | 0.00 | 2.847 |
| 0.43767756 | 29.7122 | 9.5176 | 6021.8 | 4.7390 | 6026.5 | 0.00 | 2.833 |
| 0.43986595 | 29.7531 | 9.5351 | 6002.8 | 4.7622 | 6007.6 | 0.00 | 2.819 |
| 0.44206528 | 29.7941 | 9.5522 | 5983.7 | 4.7854 | 5988.5 | 0.00 | 2.805 |
| 0.44427560 | 29.8352 | 9.5690 | 5964.4 | 4.8086 | 5969.2 | 0.00 | 2.791 |
| 0.44649698 | 29.8763 | 9.5854 | 5944.9 | 4.8318 | 5949.7 | 0.00 | 2.777 |
| 0.44872947 | 29.9175 | 9.6015 | 5925.2 | 4.8551 | 5930.1 | 0.00 | 2.763 |
| 0.45097311 | 29.9588 | 9.6172 | 5905.4 | 4.8783 | 5910.2 | 0.00 | 2.749 |
| 0.45322798 | 30.0001 | 9.6325 | 5885.3 | 4.9016 | 5890.2 | 0.00 | 2.736 |
| 0.45549412 | 30.0414 | 9.6474 | 5865.1 | 4.9249 | 5870.0 | 0.00 | 2.722 |
| 0.45777159 | 30.0828 | 9.6619 | 5844.7 | 4.9482 | 5849.7 | 0.00 | 2.708 |
| 0.46006045 | 30.1243 | 9.6760 | 5824.1 | 4.9715 | 5829.1 | 0.00 | 2.695 |
| 0.46236075 | 30.1658 | 9.6898 | 5803.4 | 4.9949 | 5808.4 | 0.00 | 2.682 |
| 0.46467255 | 30.2073 | 9.7031 | 5782.5 | 5.0182 | 5787.5 | 0.00 | 2.668 |
| 0.46699592 | 30.2488 | 9.7160 | 5761.4 | 5.0416 | 5766.4 | 0.00 | 2.655 |
| 0.46933090 | 30.2903 | 9.7285 | 5740.1 | 5.0650 | 5745.1 | 0.00 | 2.642 |
| 0.47167755 | 30.3318 | 9.7406 | 5718.6 | 5.0883 | 5723.7 | 0.00 | 2.629 |
| 0.47403594 | 30.3733 | 9.7523 | 5697.0 | 5.1117 | 5702.1 | 0.00 | 2.616 |
| 0.47640612 | 30.4149 | 9.7636 | 5675.2 | 5.1351 | 5680.4 | 0.00 | 2.602 |
| 0.47878815 | 30.4564 | 9.7744 | 5653.3 | 5.1585 | 5658.4 | 0.00 | 2.590 |
| 0.48118209 | 30.4978 | 9.7849 | 5631.1 | 5.1819 | 5636.3 | 0.00 | 2.577 |
| 0.48358800 | 30.5393 | 9.7949 | 5608.8 | 5.2054 | 5614.0 | 0.00 | 2.564 |
| 0.48600594 | 30.5806 | 9.8044 | 5586.4 | 5.2288 | 5591.6 | 0.00 | 2.551 |
| 0.48843597 | 30.6220 | 9.8135 | 5563.8 | 5.2522 | 5569.0 | 0.00 | 2.538 |
| 0.49087815 | 30.6633 | 9.8222 | 5541.0 | 5.2756 | 5546.3 | 0.00 | 2.526 |
| 0.49333254 | 30.7045 | 9.8305 | 5518.0 | 5.2991 | 5523.3 | 0.00 | 2.513 |
| 0.49579920 | 30.7456 | 9.8383 | 5495.0 | 5.3225 | 5500.3 | 0.00 | 2.501 |
| 0.49827820 | 30.7866 | 9.8457 | 5471.7 | 5.3459 | 5477.1 | 0.00 | 2.488 |
| 0.50076959 | 30.8276 | 9.8526 | 5448.3 | 5.3693 | 5453.7 | 0.00 | 2.476 |
| 0.50327344 | 30.8684 | 9.8591 | 5424.8 | 5.3928 | 5430.2 | 0.00 | 2.464 |
| 0.50578980 | 30.9092 | 9.8651 | 5401.1 | 5.4162 | 5406.5 | 0.00 | 2.451 |
| 0.50831875 | 30.9498 | 9.8707 | 5377.3 | 5.4396 | 5382.7 | 0.00 | 2.439 |
| 0.51086035 | 30.9902 | 9.8758 | 5353.3 | 5.4631 | 5358.8 | 0.00 | 2.427 |
| 0.51341465 | 31.0306 | 9.8805 | 5329.2 | 5.4865 | 5334.7 | 0.00 | 2.415 |
| 0.51598172 | 31.0708 | 9.8847 | 5304.9 | 5.5099 | 5310.5 | 0.00 | 2.403 |
| 0.51856163 | 31.1108 | 9.8885 | 5280.6 | 5.5333 | 5286.1 | 0.00 | 2.391 |
| 0.52115444 | 31.1507 | 9.8919 | 5256.1 | 5.5567 | 5261.6 | 0.00 | 2.379 |
| 0.52376021 | 31.1904 | 9.8948 | 5231.5 | 5.5801 | 5237.0 | 0.00 | 2.367 |
| 0.52637901 | 31.2299 | 9.8972 | 5206.7 | 5.6035 | 5212.3 | 0.00 | 2.355 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Eu ($Z=63$) | | | | | | | |
| 0.52901091 | 31.2692 | 9.8992 | 5181.8 | 5.6268 | 5187.5 | 0.00 | 2.344 |
| 0.53165596 | 31.3083 | 9.9007 | 5156.9 | 5.6502 | 5162.5 | 0.00 | 2.332 |
| 0.53431424 | 31.3472 | 9.9018 | 5131.8 | 5.6736 | 5137.4 | 0.00 | 2.320 |
| 0.53698581 | 31.3859 | 9.9023 | 5106.5 | 5.6969 | 5112.2 | 0.00 | 2.309 |
| 0.53967074 | 31.4243 | 9.9023 | 5081.1 | 5.7202 | 5086.8 | 0.00 | 2.297 |
| 0.54236910 | 31.4625 | 9.9018 | 5055.6 | 5.7435 | 5061.3 | 0.00 | 2.286 |
| 0.54508094 | 31.5004 | 9.9007 | 5029.9 | 5.7668 | 5035.6 | 0.00 | 2.275 |
| 0.54780635 | 31.5380 | 9.8991 | 5004.0 | 5.7901 | 5009.8 | 0.00 | 2.263 |
| 0.55054538 | 31.5753 | 9.8970 | 4978.1 | 5.8134 | 4983.9 | 0.00 | 2.252 |
| 0.55329810 | 31.6122 | 9.8944 | 4952.0 | 5.8366 | 4957.8 | 0.00 | 2.241 |
| 0.55606460 | 31.6489 | 9.8912 | 4925.8 | 5.8598 | 4931.6 | 0.00 | 2.230 |
| 0.55884492 | 31.6851 | 9.8876 | 4899.5 | 5.8831 | 4905.3 | 0.00 | 2.219 |
| 0.56163914 | 31.7210 | 9.8834 | 4873.0 | 5.9062 | 4878.9 | 0.00 | 2.208 |
| 0.56444734 | 31.7565 | 9.8787 | 4846.5 | 5.9294 | 4852.4 | 0.00 | 2.197 |
| 0.56726958 | 31.7915 | 9.8736 | 4819.9 | 5.9526 | 4825.8 | 0.00 | 2.186 |
| 0.57010592 | 31.8262 | 9.8679 | 4793.1 | 5.9757 | 4799.1 | 0.00 | 2.175 |
| 0.57295645 | 31.8604 | 9.8618 | 4766.3 | 5.9988 | 4772.3 | 0.00 | 2.164 |
| 0.57582123 | 31.8941 | 9.8552 | 4739.4 | 6.0219 | 4745.5 | 0.00 | 2.153 |
| 0.57870034 | 31.9274 | 9.8481 | 4712.5 | 6.0449 | 4718.5 | 0.00 | 2.142 |
| 0.58159384 | 31.9602 | 9.8405 | 4685.4 | 6.0679 | 4691.5 | 0.00 | 2.132 |
| 0.58450181 | 31.9926 | 9.8325 | 4658.3 | 6.0909 | 4664.4 | 0.00 | 2.121 |
| 0.58742432 | 32.0244 | 9.8241 | 4631.2 | 6.1139 | 4637.3 | 0.00 | 2.111 |
| 0.59036144 | 32.0557 | 9.8151 | 4603.9 | 6.1368 | 4610.1 | 0.00 | 2.100 |
| 0.59331325 | 32.0864 | 9.8058 | 4576.7 | 6.1597 | 4582.8 | 0.00 | 2.090 |
| 0.59627982 | 32.1166 | 9.7960 | 4549.3 | 6.1826 | 4555.5 | 0.00 | 2.079 |
| 0.59926122 | 32.1462 | 9.7857 | 4522.0 | 6.2055 | 4528.2 | 0.00 | 2.069 |
| 0.60225752 | 32.1753 | 9.7750 | 4494.5 | 6.2283 | 4500.8 | 0.00 | 2.059 |
| 0.60526881 | 32.2038 | 9.7639 | 4467.1 | 6.2511 | 4473.3 | 0.00 | 2.048 |
| 0.60829515 | 32.2316 | 9.7523 | 4439.6 | 6.2738 | 4445.9 | 0.00 | 2.038 |
| 0.61133663 | 32.2588 | 9.7404 | 4412.1 | 6.2965 | 4418.4 | 0.00 | 2.028 |
| 0.61439331 | 32.2855 | 9.7280 | 4384.6 | 6.3192 | 4390.9 | 0.00 | 2.018 |
| 0.61746528 | 32.3114 | 9.7153 | 4357.0 | 6.3418 | 4363.4 | 0.00 | 2.008 |
| 0.62055260 | 32.3367 | 9.7021 | 4329.5 | 6.3644 | 4335.9 | 0.00 | 1.998 |
| 0.62365537 | 32.3613 | 9.6886 | 4302.0 | 6.3870 | 4308.4 | 0.00 | 1.988 |
| 0.62677364 | 32.3853 | 9.6747 | 4274.4 | 6.4095 | 4280.8 | 0.00 | 1.978 |
| 0.62990751 | 32.4085 | 9.6605 | 4246.9 | 6.4320 | 4253.3 | 0.00 | 1.968 |
| 0.63305705 | 32.4311 | 9.6459 | 4219.4 | 6.4544 | 4225.8 | 0.00 | 1.959 |
| 0.63622234 | 32.4529 | 9.6309 | 4191.9 | 6.4768 | 4198.3 | 0.00 | 1.949 |
| 0.63940345 | 32.4740 | 9.6156 | 4164.4 | 6.4992 | 4170.9 | 0.00 | 1.939 |
| 0.64260046 | 32.4943 | 9.5999 | 4136.9 | 6.5215 | 4143.4 | 0.00 | 1.929 |
| 0.64581347 | 32.5138 | 9.5839 | 4109.5 | 6.5437 | 4116.0 | 0.00 | 1.920 |
| 0.64904253 | 32.5326 | 9.5676 | 4082.1 | 6.5660 | 4088.6 | 0.00 | 1.910 |
| 0.65228775 | 32.5506 | 9.5510 | 4054.7 | 6.5881 | 4061.3 | 0.00 | 1.901 |
| 0.65554919 | 32.5678 | 9.5340 | 4027.4 | 6.6102 | 4034.0 | 0.00 | 1.891 |
| 0.65882693 | 32.5841 | 9.5168 | 4000.1 | 6.6323 | 4006.7 | 0.00 | 1.882 |
| 0.66212107 | 32.5997 | 9.4992 | 3972.8 | 6.6543 | 3979.5 | 0.00 | 1.873 |
| 0.66543167 | 32.6143 | 9.4813 | 3945.6 | 6.6763 | 3952.3 | 0.00 | 1.863 |
| 0.66875883 | 32.6281 | 9.4632 | 3918.5 | 6.6982 | 3925.2 | 0.00 | 1.854 |
| 0.67210262 | 32.6411 | 9.4448 | 3891.4 | 6.7201 | 3898.1 | 0.00 | 1.845 |
| 0.67546314 | 32.6531 | 9.4261 | 3864.4 | 6.7419 | 3871.1 | 0.00 | 1.836 |
| 0.67884045 | 32.6643 | 9.4071 | 3837.4 | 6.7637 | 3844.2 | 0.00 | 1.826 |
| 0.68223466 | 32.6745 | 9.3879 | 3810.5 | 6.7854 | 3817.3 | 0.00 | 1.817 |
| 0.68564583 | 32.6837 | 9.3684 | 3783.7 | 6.8070 | 3790.5 | 0.00 | 1.808 |
| 0.68907406 | 32.6920 | 9.3486 | 3756.9 | 6.8286 | 3763.7 | 0.00 | 1.799 |
| 0.69251943 | 32.6994 | 9.3286 | 3730.2 | 6.8501 | 3737.1 | 0.00 | 1.790 |
| 0.69598202 | 32.7057 | 9.3084 | 3703.6 | 6.8716 | 3710.5 | 0.00 | 1.781 |
| 0.69946194 | 32.7111 | 9.2879 | 3677.1 | 6.8930 | 3684.0 | 0.00 | 1.773 |
| 0.70295924 | 32.7154 | 9.2673 | 3650.7 | 6.9144 | 3657.6 | 0.00 | 1.764 |
| 0.70647404 | 32.7187 | 9.2464 | 3624.3 | 6.9357 | 3631.2 | 0.00 | 1.755 |
| 0.71000641 | 32.7209 | 9.2252 | 3598.0 | 6.9569 | 3605.0 | 0.00 | 1.746 |
| 0.71355644 | 32.7221 | 9.2039 | 3571.9 | 6.9781 | 3578.8 | 0.00 | 1.738 |
| 0.71712423 | 32.7221 | 9.1824 | 3545.8 | 6.9992 | 3552.8 | 0.00 | 1.729 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Eu ($Z=63$) | | | | | | | |
| 0.72070985 | 32.7211 | 9.1607 | 3519.8 | 7.0202 | 3526.8 | 0.00 | 1.720 |
| 0.72431340 | 32.7189 | 9.1388 | 3493.9 | 7.0412 | 3500.9 | 0.00 | 1.712 |
| 0.72793496 | 32.7155 | 9.1167 | 3468.1 | 7.0621 | 3475.2 | 0.00 | 1.703 |
| 0.73157464 | 32.7110 | 9.0944 | 3442.4 | 7.0829 | 3449.5 | 0.00 | 1.695 |
| 0.73523251 | 32.7052 | 9.0719 | 3416.8 | 7.1037 | 3423.9 | 0.00 | 1.686 |
| 0.73890867 | 32.6983 | 9.0493 | 3391.4 | 7.1244 | 3398.5 | 0.00 | 1.678 |
| 0.74260322 | 32.6901 | 9.0265 | 3366.0 | 7.1450 | 3373.1 | 0.00 | 1.670 |
| 0.74631623 | 32.6806 | 9.0036 | 3340.7 | 7.1656 | 3347.9 | 0.00 | 1.661 |
| 0.75004781 | 32.6698 | 8.9805 | 3315.6 | 7.1861 | 3322.8 | 0.00 | 1.653 |
| 0.75379805 | 32.6577 | 8.9572 | 3290.5 | 7.2065 | 3297.8 | 0.00 | 1.645 |
| 0.75756704 | 32.6442 | 8.9338 | 3265.6 | 7.2268 | 3272.9 | 0.00 | 1.637 |
| 0.76135488 | 32.6294 | 8.9103 | 3240.8 | 7.2471 | 3248.1 | 0.00 | 1.628 |
| 0.76516165 | 32.6132 | 8.8867 | 3216.1 | 7.2673 | 3223.4 | 0.00 | 1.620 |
| 0.76898746 | 32.5955 | 8.8629 | 3191.6 | 7.2874 | 3198.9 | 0.00 | 1.612 |
| 0.77283240 | 32.5805 | 8.8390 | 3167.1 | 7.3074 | 3174.4 | 0.00 | 1.604 |
| 0.77669656 | 32.5599 | 8.8150 | 3142.8 | 7.3274 | 3150.1 | 0.00 | 1.596 |
| 0.78058004 | 32.5378 | 8.7908 | 3118.6 | 7.3473 | 3126.0 | 0.00 | 1.588 |
| 0.78448294 | 32.5141 | 8.7666 | 3094.5 | 7.3671 | 3101.9 | 0.00 | 1.580 |
| 0.78840536 | 32.4887 | 8.7422 | 3070.6 | 7.3868 | 3078.0 | 0.00 | 1.573 |
| 0.79234738 | 32.4618 | 8.7178 | 3046.8 | 7.4064 | 3054.2 | 0.00 | 1.565 |
| 0.79630912 | 32.4331 | 8.6932 | 3023.1 | 7.4260 | 3030.5 | 0.00 | 1.557 |
| 0.80029067 | 32.4028 | 8.6686 | 2999.5 | 7.4455 | 3007.0 | 0.00 | 1.549 |
| 0.80429212 | 32.3706 | 8.6439 | 2976.1 | 7.4648 | 2983.5 | 0.00 | 1.542 |
| 0.80831358 | 32.3367 | 8.6191 | 2952.8 | 7.4842 | 2960.3 | 0.00 | 1.534 |
| 0.81235515 | 32.3009 | 8.5942 | 2929.6 | 7.5034 | 2937.1 | 0.00 | 1.526 |
| 0.81641693 | 32.2632 | 8.5692 | 2906.6 | 7.5225 | 2914.1 | 0.00 | 1.519 |
| 0.82049901 | 32.2235 | 8.5442 | 2883.7 | 7.5415 | 2891.2 | 0.00 | 1.511 |
| 0.82460150 | 32.1818 | 8.5191 | 2860.9 | 7.5605 | 2868.4 | 0.00 | 1.504 |
| 0.82872451 | 32.1380 | 8.4940 | 2838.2 | 7.5794 | 2845.8 | 0.00 | 1.496 |
| 0.83286813 | 32.0922 | 8.4687 | 2815.7 | 7.5982 | 2823.3 | 0.00 | 1.489 |
| 0.83703248 | 32.0441 | 8.4435 | 2793.4 | 7.6168 | 2801.0 | 0.00 | 1.481 |
| 0.84121764 | 31.9938 | 8.4182 | 2771.1 | 7.6354 | 2778.8 | 0.00 | 1.474 |
| 0.84542373 | 31.9411 | 8.3928 | 2749.0 | 7.6540 | 2756.7 | 0.00 | 1.467 |
| 0.84965084 | 31.8861 | 8.3674 | 2727.1 | 7.6724 | 2734.8 | 0.00 | 1.459 |
| 0.85389910 | 31.8295 | 8.3419 | 2705.3 | 7.6907 | 2713.0 | 0.00 | 1.452 |
| 0.85816859 | 31.7695 | 8.3164 | 2683.6 | 7.7089 | 2691.3 | 0.00 | 1.445 |
| 0.86245944 | 31.7068 | 8.2909 | 2662.0 | 7.7270 | 2669.8 | 0.00 | 1.438 |
| 0.86677173 | 31.6414 | 8.2653 | 2640.6 | 7.7451 | 2648.4 | 0.00 | 1.430 |
| 0.87110559 | 31.5732 | 8.2398 | 2619.3 | 7.7630 | 2627.1 | 0.00 | 1.423 |
| 0.87546112 | 31.5021 | 8.2141 | 2598.2 | 7.7809 | 2606.0 | 0.00 | 1.416 |
| 0.87983843 | 31.4280 | 8.1885 | 2577.2 | 7.7986 | 2585.0 | 0.00 | 1.409 |
| 0.88423762 | 31.3507 | 8.1629 | 2556.4 | 7.8162 | 2564.2 | 0.00 | 1.402 |
| 0.88865881 | 31.2703 | 8.1372 | 2535.6 | 7.8338 | 2543.5 | 0.00 | 1.395 |
| 0.89310210 | 31.1864 | 8.1115 | 2515.1 | 7.8512 | 2522.9 | 0.00 | 1.388 |
| 0.89756761 | 31.0991 | 8.0858 | 2494.6 | 7.8686 | 2502.5 | 0.00 | 1.381 |
| 0.90205545 | 31.0082 | 8.0601 | 2474.3 | 7.8858 | 2482.2 | 0.00 | 1.374 |
| 0.90656573 | 30.9135 | 8.0344 | 2454.2 | 7.9030 | 2462.1 | 0.00 | 1.368 |
| 0.91109856 | 30.8150 | 8.0087 | 2434.1 | 7.9200 | 2442.1 | 0.00 | 1.361 |
| 0.91565405 | 30.7123 | 7.9830 | 2414.3 | 7.9369 | 2422.2 | 0.00 | 1.354 |
| 0.92023232 | 30.6054 | 7.9573 | 2394.5 | 7.9537 | 2402.5 | 0.00 | 1.347 |
| 0.92483348 | 30.4941 | 7.9316 | 2374.9 | 7.9705 | 2382.9 | 0.00 | 1.341 |
| 0.92945765 | 30.3783 | 7.9059 | 2355.4 | 7.9871 | 2363.4 | 0.00 | 1.334 |
| 0.93410494 | 30.2576 | 7.8802 | 2336.1 | 8.0036 | 2344.1 | 0.00 | 1.327 |
| 0.93877546 | 30.1320 | 7.8545 | 2316.9 | 8.0200 | 2324.9 | 0.00 | 1.321 |
| 0.94346934 | 30.0011 | 7.8289 | 2297.8 | 8.0363 | 2305.9 | 0.00 | 1.314 |
| 0.94818668 | 29.8649 | 7.8032 | 2278.9 | 8.0525 | 2287.0 | 0.00 | 1.308 |
| 0.95292762 | 29.7231 | 7.7776 | 2260.1 | 8.0685 | 2268.2 | 0.00 | 1.301 |
| 0.95769226 | 29.5754 | 7.7520 | 2241.5 | 8.0845 | 2249.6 | 0.00 | 1.295 |
| 0.96248072 | 29.4218 | 7.7264 | 2223.0 | 8.1003 | 2231.1 | 0.00 | 1.288 |
| 0.96729312 | 29.2620 | 7.7009 | 2204.6 | 8.1161 | 2212.7 | 0.00 | 1.282 |
| 0.97212959 | 29.0959 | 7.6753 | 2186.4 | 8.1317 | 2194.5 | 0.00 | 1.275 |
| 0.97699023 | 28.9235 | 7.6498 | 2168.3 | 8.1472 | 2176.4 | 0.00 | 1.269 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Eu ($Z=63$) | | | | | | | |
| 0.98187519 | 28.7450 | 7.6243 | 2150.3 | 8.1626 | 2158.4 | 0.00 | 1.263 |
| 0.98678456 | 28.5607 | 7.5989 | 2132.4 | 8.1779 | 2140.6 | 0.00 | 1.256 |
| 0.99171848 | 28.3715 | 7.5735 | 2114.7 | 8.1931 | 2122.9 | 0.00 | 1.250 |
| 0.99667708 | 28.1790 | 7.5481 | 2097.2 | 8.2081 | 2105.4 | 0.00 | 1.244 |
| 1.0016605 | 27.9686 | 7.5180 | 2078.4 | 8.2231 | 2086.6 | 0.00 | 1.238 |
| 1.0066688 | 27.7137 | 7.4786 | 2057.2 | 8.2379 | 2065.5 | 0.00 | 1.232 |
| 1.0117021 | 27.4438 | 7.4394 | 2036.3 | 8.2526 | 2044.5 | 0.00 | 1.226 |
| 1.0167606 | 27.1576 | 7.4004 | 2015.5 | 8.2672 | 2023.8 | 0.00 | 1.219 |
| 1.0218444 | 26.8535 | 7.3617 | 1995.0 | 8.2816 | 2003.3 | 0.00 | 1.213 |
| 1.0269536 | 26.5299 | 7.3230 | 1974.6 | 8.2960 | 1982.9 | 0.00 | 1.207 |
| 1.0320884 | 26.1848 | 7.2827 | 1954.0 | 8.3102 | 1962.3 | 0.00 | 1.201 |
| 1.0372489 | 25.8156 | 7.2427 | 1933.6 | 8.3243 | 1941.9 | 0.00 | 1.195 |
| 1.0424351 | 25.4197 | 7.2029 | 1913.4 | 8.3383 | 1921.7 | 0.00 | 1.189 |
| 1.0476473 | 24.9940 | 7.1633 | 1893.4 | 8.3522 | 1901.8 | 0.00 | 1.183 |
| 1.0528855 | 24.5345 | 7.1241 | 1873.7 | 8.3659 | 1882.1 | 0.00 | 1.178 |
| 1.0581499 | 24.0367 | 7.0850 | 1854.1 | 8.3795 | 1862.5 | 0.00 | 1.172 |
| 1.0634407 | 23.4948 | 7.0462 | 1834.8 | 8.3930 | 1843.2 | 0.00 | 1.166 |
| 1.0687579 | 22.9019 | 7.0077 | 1815.7 | 8.4064 | 1824.1 | 0.00 | 1.160 |
| 1.0741017 | 22.2490 | 6.9694 | 1796.8 | 8.4196 | 1805.2 | 0.00 | 1.154 |
| 1.0794722 | 21.5245 | 6.9313 | 1778.1 | 8.4327 | 1786.5 | 0.00 | 1.149 |
| 1.0848695 | 20.7134 | 6.8935 | 1759.6 | 8.4457 | 1768.0 | 0.00 | 1.143 |
| 1.0902939 | 19.7944 | 6.8559 | 1741.3 | 8.4586 | 1749.7 | 0.00 | 1.137 |
| 1.0957454 | 18.7378 | 6.8185 | 1723.2 | 8.4713 | 1731.6 | 0.00 | 1.132 |
| 1.1012241 | 17.4994 | 6.7814 | 1705.3 | 8.4840 | 1713.7 | 0.00 | 1.126 |
| 1.1067302 | 16.0081 | 6.7445 | 1687.5 | 8.4964 | 1696.0 | 0.00 | 1.120 |
| 1.1122639 | 14.1386 | 6.7078 | 1670.0 | 8.5088 | 1678.5 | 0.00 | 1.115 |
| 1.1178252 | 11.6332 | 6.6714 | 1652.7 | 8.5210 | 1661.2 | 0.00 | 1.109 |
| 1.1234143 | 7.79666 | 6.6352 | 1635.5 | 8.5331 | 1644.1 | 0.00 | 1.104 |
| 1.1290314 | -1.32844 | 6.5992 | 1618.6 | 8.5451 | 1627.1 | 0.00 | 1.098 |
| 1.1307711 | -18.3139 | 6.5881 | 1613.4 | 8.5488 | 1621.9 | 0.00 | 1.096 |
| 1.1310289 | -18.6591 | 26.407 | 6465.4 | 8.5493 | 6474.0 | 0.00 | 1.096 |
| 1.1346765 | 2.34454 | 26.277 | 6412.8 | 8.5569 | 6421.3 | 0.00 | 1.093 |
| 1.1403499 | 7.40466 | 26.075 | 6331.9 | 8.5686 | 6340.5 | 0.00 | 1.087 |
| 1.1460517 | 9.28125 | 25.875 | 6252.1 | 8.5802 | 6260.7 | 0.00 | 1.082 |
| 1.1517819 | 9.48813 | 25.677 | 6173.3 | 8.5917 | 6181.9 | 0.00 | 1.076 |
| 1.1575408 | 6.90042 | 25.480 | 6095.5 | 8.6030 | 6104.1 | 0.00 | 1.071 |
| 1.1603841 | -3.30656 | 25.383 | 6057.6 | 8.6085 | 6066.2 | 0.00 | 1.068 |
| 1.1608158 | -3.40633 | 38.394 | 9159.0 | 8.6093 | 9167.6 | 0.00 | 1.068 |
| 1.1633285 | 7.75267 | 38.263 | 9108.1 | 8.6141 | 9116.7 | 0.00 | 1.066 |
| 1.1691452 | 13.7680 | 37.964 | 8991.9 | 8.6252 | 9000.5 | 0.00 | 1.060 |
| 1.1749909 | 17.0308 | 37.667 | 8877.2 | 8.6361 | 8885.8 | 0.00 | 1.055 |
| 1.1808659 | 19.4196 | 37.373 | 8764.0 | 8.6469 | 8772.6 | 0.00 | 1.050 |
| 1.1867702 | 21.3458 | 37.080 | 8652.2 | 8.6575 | 8660.9 | 0.00 | 1.045 |
| 1.1927040 | 22.9755 | 36.791 | 8541.9 | 8.6680 | 8550.6 | 0.00 | 1.040 |
| 1.1986676 | 24.3950 | 36.503 | 8433.0 | 8.6784 | 8441.7 | 0.00 | 1.034 |
| 1.2046609 | 25.6554 | 36.218 | 8325.5 | 8.6886 | 8334.2 | 0.00 | 1.029 |
| 1.2106842 | 26.7903 | 35.935 | 8219.4 | 8.6987 | 8228.1 | 0.00 | 1.024 |
| 1.2167376 | 27.8230 | 35.655 | 8114.7 | 8.7087 | 8123.4 | 0.00 | 1.019 |
| 1.2228213 | 28.7702 | 35.376 | 8011.3 | 8.7185 | 8020.0 | 0.00 | 1.014 |
| 1.2289354 | 29.6448 | 35.100 | 7909.2 | 8.7282 | 7917.9 | 0.00 | 1.009 |
| 1.2350801 | 30.4566 | 34.827 | 7808.5 | 8.7378 | 7817.2 | 0.00 | 1.004 |
| 1.2412555 | 31.2134 | 34.555 | 7709.0 | 8.7472 | 7717.8 | 0.00 | 0.9989 |
| 1.2474618 | 31.9215 | 34.286 | 7610.9 | 8.7565 | 7619.6 | 0.00 | 0.9939 |
| 1.2536991 | 32.5862 | 34.018 | 7514.0 | 8.7656 | 7522.7 | 0.00 | 0.9889 |
| 1.2599676 | 33.2116 | 33.753 | 7418.3 | 8.7746 | 7427.1 | 0.00 | 0.9840 |
| 1.2662674 | 33.8014 | 33.490 | 7323.9 | 8.7835 | 7332.7 | 0.00 | 0.9791 |
| 1.2725988 | 34.3586 | 33.229 | 7230.7 | 8.7922 | 7239.5 | 0.00 | 0.9743 |
| 1.2789618 | 34.8859 | 32.970 | 7138.7 | 8.8008 | 7147.5 | 0.00 | 0.9694 |
| 1.2853566 | 35.3854 | 32.714 | 7047.8 | 8.8092 | 7056.7 | 0.00 | 0.9646 |
| 1.2917833 | 35.8591 | 32.459 | 6958.2 | 8.8175 | 6967.0 | 0.00 | 0.9598 |
| 1.2982423 | 36.3087 | 32.207 | 6869.7 | 8.8257 | 6878.5 | 0.00 | 0.9550 |
| 1.3047335 | 36.7356 | 31.956 | 6782.3 | 8.8337 | 6791.2 | 0.00 | 0.9503 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Eu ($Z=63$) | | | | | | | |
| 1.3112571 | 37.1411 | 31.707 | 6696.1 | 8.8415 | 6704.9 | 0.00 | 0.9455 |
| 1.3178134 | 37.5262 | 31.461 | 6611.0 | 8.8493 | 6619.8 | 0.00 | 0.9408 |
| 1.3244025 | 37.8918 | 31.216 | 6526.9 | 8.8569 | 6535.8 | 0.00 | 0.9362 |
| 1.3310245 | 38.2389 | 30.973 | 6443.8 | 8.8643 | 6452.7 | 0.00 | 0.9315 |
| 1.3376796 | 38.5679 | 30.732 | 6361.9 | 8.8716 | 6370.7 | 0.00 | 0.9269 |
| 1.3443680 | 38.8795 | 30.492 | 6280.9 | 8.8788 | 6289.8 | 0.00 | 0.9222 |
| 1.3510899 | 39.1740 | 30.255 | 6201.0 | 8.8858 | 6209.9 | 0.00 | 0.9177 |
| 1.3578453 | 39.4517 | 30.020 | 6122.1 | 8.8927 | 6131.0 | 0.00 | 0.9131 |
| 1.3646345 | 39.7127 | 29.786 | 6044.3 | 8.8994 | 6053.2 | 0.00 | 0.9086 |
| 1.3714577 | 39.9571 | 29.554 | 5967.4 | 8.9060 | 5976.3 | 0.00 | 0.9040 |
| 1.3783150 | 40.1847 | 29.324 | 5891.6 | 8.9124 | 5900.5 | 0.00 | 0.8995 |
| 1.3852066 | 40.3952 | 29.097 | 5816.7 | 8.9187 | 5825.6 | 0.00 | 0.8951 |
| 1.3921326 | 40.5878 | 28.870 | 5742.8 | 8.9249 | 5751.7 | 0.00 | 0.8906 |
| 1.3990933 | 40.7619 | 28.646 | 5669.8 | 8.9309 | 5678.7 | 0.00 | 0.8862 |
| 1.4060887 | 40.9159 | 28.424 | 5597.8 | 8.9368 | 5606.7 | 0.00 | 0.8818 |
| 1.4131192 | 41.0482 | 28.203 | 5526.7 | 8.9425 | 5535.6 | 0.00 | 0.8774 |
| 1.4201848 | 41.1560 | 27.984 | 5456.5 | 8.9481 | 5465.5 | 0.00 | 0.8730 |
| 1.4272857 | 41.2357 | 27.767 | 5387.2 | 8.9535 | 5396.2 | 0.00 | 0.8687 |
| 1.4344221 | 41.2815 | 27.551 | 5318.8 | 8.9588 | 5327.8 | 0.00 | 0.8643 |
| 1.4415942 | 41.2848 | 27.338 | 5251.3 | 8.9639 | 5260.3 | 0.00 | 0.8600 |
| 1.4488022 | 41.2313 | 27.125 | 5184.6 | 8.9689 | 5193.6 | 0.00 | 0.8558 |
| 1.4560462 | 41.0948 | 26.915 | 5118.8 | 8.9738 | 5127.8 | 0.00 | 0.8515 |
| 1.4633265 | 40.8209 | 26.706 | 5053.8 | 8.9785 | 5062.8 | 0.00 | 0.8473 |
| 1.4706431 | 40.2600 | 26.499 | 4989.7 | 8.9830 | 4998.6 | 0.00 | 0.8431 |
| 1.4779963 | 38.5729 | 26.295 | 4926.6 | 8.9874 | 4935.6 | 0.00 | 0.8389 |
| 1.4794437 | 37.4597 | 26.255 | 4914.3 | 8.9883 | 4923.3 | 0.00 | 0.8380 |
| 1.4817563 | 37.4574 | 30.678 | 5733.2 | 8.9896 | 5742.2 | 0.00 | 0.8367 |
| 1.4853863 | 39.6033 | 30.555 | 5696.3 | 8.9917 | 5705.3 | 0.00 | 0.8347 |
| 1.4928132 | 41.1518 | 30.306 | 5621.7 | 8.9958 | 5630.7 | 0.00 | 0.8305 |
| 1.5002773 | 42.0233 | 30.059 | 5548.2 | 8.9998 | 5557.1 | 0.00 | 0.8264 |
| 1.5077787 | 42.6591 | 29.814 | 5475.6 | 9.0036 | 5484.6 | 0.00 | 0.8223 |
| 1.5153176 | 43.1692 | 29.571 | 5404.0 | 9.0073 | 5413.0 | 0.00 | 0.8182 |
| 1.5228942 | 43.5979 | 29.331 | 5333.4 | 9.0108 | 5342.4 | 0.00 | 0.8141 |
| 1.5305086 | 43.9672 | 29.093 | 5263.8 | 9.0142 | 5272.8 | 0.00 | 0.8101 |
| 1.5381612 | 44.2891 | 28.856 | 5195.0 | 9.0174 | 5204.1 | 0.00 | 0.8061 |
| 1.5458520 | 44.5699 | 28.622 | 5127.2 | 9.0205 | 5136.2 | 0.00 | 0.8020 |
| 1.5535812 | 44.8120 | 28.390 | 5060.3 | 9.0234 | 5069.4 | 0.00 | 0.7981 |
| 1.5613491 | 45.0210 | 28.179 | 4997.8 | 9.0262 | 5006.8 | 0.00 | 0.7941 |
| 1.5691559 | 45.2033 | 27.971 | 4936.2 | 9.0289 | 4945.3 | 0.00 | 0.7901 |
| 1.5770017 | 45.3541 | 27.766 | 4875.6 | 9.0314 | 4884.7 | 0.00 | 0.7862 |
| 1.5848867 | 45.4652 | 27.564 | 4816.0 | 9.0337 | 4825.0 | 0.00 | 0.7823 |
| 1.5928111 | 45.5195 | 27.364 | 4757.3 | 9.0359 | 4766.3 | 0.00 | 0.7784 |
| 1.6007752 | 45.4731 | 27.167 | 4699.5 | 9.0380 | 4708.6 | 0.00 | 0.7745 |
| 1.6087790 | 45.1426 | 26.972 | 4642.6 | 9.0399 | 4651.6 | 0.00 | 0.7707 |
| 1.6125491 | 44.4561 | 26.881 | 4616.2 | 9.0407 | 4625.2 | 0.00 | 0.7689 |
| 1.6152508 | 44.5036 | 28.687 | 4918.2 | 9.0413 | 4927.2 | 0.00 | 0.7676 |
| 1.6168229 | 45.0086 | 28.646 | 4906.2 | 9.0417 | 4915.3 | 0.00 | 0.7668 |
| 1.6249070 | 46.0143 | 28.434 | 4845.8 | 9.0433 | 4854.8 | 0.00 | 0.7630 |
| 1.6330316 | 46.5443 | 28.225 | 4786.2 | 9.0447 | 4795.2 | 0.00 | 0.7592 |
| 1.6411967 | 46.9454 | 28.018 | 4727.5 | 9.0461 | 4736.5 | 0.00 | 0.7555 |
| 1.6494027 | 47.2812 | 27.814 | 4669.6 | 9.0472 | 4678.7 | 0.00 | 0.7517 |
| 1.6576497 | 47.5756 | 27.612 | 4612.7 | 9.0483 | 4621.7 | 0.00 | 0.7480 |
| 1.6659380 | 47.8398 | 27.412 | 4556.5 | 9.0492 | 4565.6 | 0.00 | 0.7442 |
| 1.6742677 | 48.0804 | 27.215 | 4501.2 | 9.0499 | 4510.2 | 0.00 | 0.7405 |
| 1.6826390 | 48.3007 | 27.019 | 4446.7 | 9.0505 | 4455.7 | 0.00 | 0.7368 |
| 1.6910522 | 48.5027 | 26.826 | 4392.9 | 9.0509 | 4402.0 | 0.00 | 0.7332 |
| 1.6995075 | 48.6883 | 26.642 | 4341.1 | 9.0512 | 4350.2 | 0.00 | 0.7295 |
| 1.7080050 | 48.8632 | 26.464 | 4290.5 | 9.0514 | 4299.6 | 0.00 | 0.7259 |
| 1.7165450 | 49.0275 | 26.288 | 4240.8 | 9.0514 | 4249.8 | 0.00 | 0.7223 |
| 1.7251278 | 49.1808 | 26.114 | 4191.8 | 9.0512 | 4200.8 | 0.00 | 0.7187 |
| 1.7337534 | 49.3227 | 25.942 | 4143.5 | 9.0509 | 4152.5 | 0.00 | 0.7151 |
| 1.7424222 | 49.4521 | 25.773 | 4096.0 | 9.0505 | 4105.0 | 0.00 | 0.7116 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Eu ($Z=63$) | | | | | | | |
| 1.7511343 | 49.5674 | 25.605 | 4049.1 | 9.0499 | 4058.2 | 0.00 | 0.7080 |
| 1.7598899 | 49.6653 | 25.440 | 4003.0 | 9.0492 | 4012.0 | 0.00 | 0.7045 |
| 1.7686894 | 49.7400 | 25.277 | 3957.5 | 9.0483 | 3966.6 | 0.00 | 0.7010 |
| 1.7775328 | 49.7791 | 25.116 | 3912.7 | 9.0473 | 3921.7 | 0.00 | 0.6975 |
| 1.7864205 | 49.7502 | 24.956 | 3868.5 | 9.0461 | 3877.6 | 0.00 | 0.6940 |
| 1.7953526 | 49.5046 | 24.799 | 3825.0 | 9.0448 | 3834.0 | 0.00 | 0.6906 |
| 1.7973000 | 49.3344 | 24.765 | 3815.6 | 9.0445 | 3824.6 | 0.00 | 0.6898 |
| 1.8027000 | 49.4181 | 25.851 | 3971.1 | 9.0437 | 3980.1 | 0.00 | 0.6878 |
| 1.8043294 | 49.6237 | 25.822 | 3963.1 | 9.0434 | 3972.1 | 0.00 | 0.6871 |
| 1.8133510 | 50.1984 | 25.664 | 3919.1 | 9.0418 | 3928.1 | 0.00 | 0.6837 |
| 1.8224178 | 50.5401 | 25.507 | 3875.7 | 9.0400 | 3884.8 | 0.00 | 0.6803 |
| 1.8315299 | 50.8117 | 25.351 | 3832.9 | 9.0382 | 3842.0 | 0.00 | 0.6769 |
| 1.8406875 | 51.0477 | 25.197 | 3790.7 | 9.0361 | 3799.7 | 0.00 | 0.6736 |
| 1.8498909 | 51.2615 | 25.045 | 3749.0 | 9.0340 | 3758.0 | 0.00 | 0.6702 |
| 1.8591404 | 51.4599 | 24.894 | 3707.9 | 9.0316 | 3716.9 | 0.00 | 0.6669 |
| 1.8684361 | 51.6467 | 24.744 | 3667.3 | 9.0292 | 3676.3 | 0.00 | 0.6636 |
| 1.8777783 | 51.8243 | 24.596 | 3627.2 | 9.0266 | 3636.2 | 0.00 | 0.6603 |
| 1.8871672 | 51.9943 | 24.449 | 3587.6 | 9.0238 | 3596.6 | 0.00 | 0.6570 |
| 1.8966030 | 52.1580 | 24.305 | 3548.6 | 9.0209 | 3557.7 | 0.00 | 0.6537 |
| 1.9060860 | 52.3172 | 24.162 | 3510.2 | 9.0179 | 3519.2 | 0.00 | 0.6505 |
| 1.9156165 | 52.4725 | 24.020 | 3472.3 | 9.0147 | 3481.3 | 0.00 | 0.6472 |
| 1.9251945 | 52.6247 | 23.880 | 3434.8 | 9.0114 | 3443.8 | 0.00 | 0.6440 |
| 1.9348205 | 52.7725 | 23.733 | 3396.7 | 9.0080 | 3405.7 | 0.00 | 0.6408 |
| 1.9444946 | 52.9156 | 23.587 | 3359.0 | 9.0044 | 3368.0 | 0.00 | 0.6376 |
| 1.9542171 | 53.0545 | 23.442 | 3321.8 | 9.0006 | 3330.8 | 0.00 | 0.6344 |
| 1.9639882 | 53.1896 | 23.299 | 3285.1 | 8.9967 | 3294.1 | 0.00 | 0.6313 |
| 1.9738081 | 53.3213 | 23.156 | 3248.7 | 8.9927 | 3257.7 | 0.00 | 0.6281 |
| 1.9836772 | 53.4498 | 23.015 | 3212.8 | 8.9886 | 3221.8 | 0.00 | 0.6250 |
| 1.9935955 | 53.5754 | 22.875 | 3177.3 | 8.9843 | 3186.3 | 0.00 | 0.6219 |
| 2.0035635 | 53.6983 | 22.735 | 3142.3 | 8.9798 | 3151.2 | 0.00 | 0.6188 |
| 2.0135813 | 53.8186 | 22.597 | 3107.6 | 8.9752 | 3116.6 | 0.00 | 0.6157 |
| 2.0236492 | 53.9365 | 22.459 | 3073.3 | 8.9705 | 3082.3 | 0.00 | 0.6127 |
| 2.0337675 | 54.0521 | 22.323 | 3039.4 | 8.9657 | 3048.4 | 0.00 | 0.6096 |
| 2.0439363 | 54.1657 | 22.187 | 3005.9 | 8.9607 | 3014.9 | 0.00 | 0.6066 |
| 2.0541560 | 54.2773 | 22.052 | 2972.8 | 8.9555 | 2981.8 | 0.00 | 0.6036 |
| 2.0644268 | 54.3870 | 21.918 | 2940.0 | 8.9503 | 2949.0 | 0.00 | 0.6006 |
| 2.0747489 | 54.4951 | 21.785 | 2907.7 | 8.9449 | 2916.6 | 0.00 | 0.5976 |
| 2.0851227 | 54.6017 | 21.653 | 2875.6 | 8.9393 | 2884.6 | 0.00 | 0.5946 |
| 2.0955483 | 54.7070 | 21.521 | 2844.0 | 8.9336 | 2852.9 | 0.00 | 0.5917 |
| 2.1060260 | 54.8106 | 21.388 | 2812.3 | 8.9278 | 2821.2 | 0.00 | 0.5887 |
| 2.1165562 | 54.9118 | 21.254 | 2780.8 | 8.9219 | 2789.7 | 0.00 | 0.5858 |
| 2.1271389 | 55.0110 | 21.122 | 2749.7 | 8.9158 | 2758.6 | 0.00 | 0.5829 |
| 2.1377746 | 55.1081 | 20.990 | 2718.9 | 8.9095 | 2727.8 | 0.00 | 0.5800 |
| 2.1484635 | 55.2033 | 20.858 | 2688.4 | 8.9032 | 2697.3 | 0.00 | 0.5771 |
| 2.1592058 | 55.2968 | 20.728 | 2658.3 | 8.8967 | 2667.2 | 0.00 | 0.5742 |
| 2.1700018 | 55.3885 | 20.598 | 2628.5 | 8.8901 | 2637.4 | 0.00 | 0.5714 |
| 2.1808519 | 55.4787 | 20.469 | 2599.1 | 8.8833 | 2608.0 | 0.00 | 0.5685 |
| 2.1917561 | 55.5672 | 20.341 | 2569.9 | 8.8764 | 2578.8 | 0.00 | 0.5657 |
| 2.2027149 | 55.6543 | 20.213 | 2541.1 | 8.8694 | 2550.0 | 0.00 | 0.5629 |
| 2.2137285 | 55.7400 | 20.086 | 2512.6 | 8.8622 | 2521.5 | 0.00 | 0.5601 |
| 2.2247971 | 55.8243 | 19.960 | 2484.4 | 8.8549 | 2493.3 | 0.00 | 0.5573 |
| 2.2359211 | 55.9072 | 19.835 | 2456.6 | 8.8475 | 2465.4 | 0.00 | 0.5545 |
| 2.2471007 | 55.9890 | 19.711 | 2429.0 | 8.8400 | 2437.8 | 0.00 | 0.5518 |
| 2.2583362 | 56.0695 | 19.587 | 2401.7 | 8.8323 | 2410.6 | 0.00 | 0.5490 |
| 2.2696279 | 56.3690 | 19.460 | 2374.3 | 8.8245 | 2383.1 | 0.00 | 0.5463 |
| 2.2809760 | 56.4470 | 19.332 | 2347.0 | 8.8166 | 2355.8 | 0.00 | 0.5436 |
| 2.2923809 | 56.5233 | 19.205 | 2319.9 | 8.8085 | 2328.8 | 0.00 | 0.5409 |
| 2.3038428 | 56.5981 | 19.079 | 2293.2 | 8.8003 | 2302.0 | 0.00 | 0.5382 |
| 2.3153620 | 56.6713 | 18.953 | 2266.8 | 8.7920 | 2275.6 | 0.00 | 0.5355 |
| 2.3269388 | 56.8928 | 18.827 | 2240.5 | 8.7835 | 2249.3 | 0.00 | 0.5328 |
| 2.3385735 | 56.9633 | 18.700 | 2214.3 | 8.7749 | 2223.1 | 0.00 | 0.5302 |
| 2.3502664 | 57.0319 | 18.573 | 2188.3 | 8.7662 | 2197.0 | 0.00 | 0.5275 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Eu ($Z=63$) | | | | | | | |
| 2.3620177 | 57.0988 | 18.446 | 2162.6 | 8.7574 | 2171.3 | 0.00 | 0.5249 |
| 2.3738278 | 57.1639 | 18.320 | 2137.1 | 8.7484 | 2145.9 | 0.00 | 0.5223 |
| 2.3856970 | 57.2274 | 18.196 | 2112.0 | 8.7394 | 2120.8 | 0.00 | 0.5197 |
| 2.3976254 | 57.2893 | 18.072 | 2087.2 | 8.7302 | 2095.9 | 0.00 | 0.5171 |
| 2.4096136 | 57.3497 | 17.948 | 2062.7 | 8.7208 | 2071.4 | 0.00 | 0.5145 |
| 2.4216616 | 57.4087 | 17.826 | 2038.4 | 8.7114 | 2047.1 | 0.00 | 0.5120 |
| 2.4337699 | 57.4662 | 17.705 | 2014.5 | 8.7018 | 2023.2 | 0.00 | 0.5094 |
| 2.4459388 | 57.5225 | 17.584 | 1990.8 | 8.6921 | 1999.5 | 0.00 | 0.5069 |
| 2.4581685 | 57.5774 | 17.464 | 1967.4 | 8.6823 | 1976.1 | 0.00 | 0.5044 |
| 2.4704593 | 57.6311 | 17.345 | 1944.3 | 8.6724 | 1952.9 | 0.00 | 0.5019 |
| 2.4828116 | 57.6835 | 17.227 | 1921.4 | 8.6623 | 1930.1 | 0.00 | 0.4994 |
| 2.4952257 | 57.7348 | 17.110 | 1898.9 | 8.6521 | 1907.5 | 0.00 | 0.4969 |
| 2.5077018 | 57.7851 | 16.992 | 1876.4 | 8.6418 | 1885.0 | 0.00 | 0.4944 |
| 2.5202403 | 57.8341 | 16.874 | 1854.0 | 8.6314 | 1862.7 | 0.00 | 0.4920 |
| 2.5328415 | 57.8820 | 16.756 | 1832.0 | 8.6209 | 1840.6 | 0.00 | 0.4895 |
| 2.5455057 | 57.9287 | 16.639 | 1810.2 | 8.6102 | 1818.8 | 0.00 | 0.4871 |
| 2.5582333 | 57.9743 | 16.524 | 1788.6 | 8.5994 | 1797.2 | 0.00 | 0.4846 |
| 2.5710244 | 58.0188 | 16.409 | 1767.3 | 8.5886 | 1775.9 | 0.00 | 0.4822 |
| 2.5838796 | 58.0623 | 16.295 | 1746.3 | 8.5775 | 1754.9 | 0.00 | 0.4798 |
| 2.5967990 | 58.1048 | 16.182 | 1725.6 | 8.5664 | 1734.1 | 0.00 | 0.4775 |
| 2.6097829 | 58.1463 | 16.069 | 1705.1 | 8.5552 | 1713.6 | 0.00 | 0.4751 |
| 2.6228319 | 58.1869 | 15.958 | 1684.8 | 8.5438 | 1693.4 | 0.00 | 0.4727 |
| 2.6359460 | 58.2266 | 15.847 | 1664.8 | 8.5324 | 1673.3 | 0.00 | 0.4704 |
| 2.6491257 | 58.2654 | 15.737 | 1645.1 | 8.5208 | 1653.6 | 0.00 | 0.4680 |
| 2.6623714 | 58.3033 | 15.629 | 1625.6 | 8.5091 | 1634.1 | 0.00 | 0.4657 |
| 2.6756832 | 58.3405 | 15.521 | 1606.3 | 8.4973 | 1614.8 | 0.00 | 0.4634 |
| 2.6890617 | 58.3768 | 15.413 | 1587.3 | 8.4854 | 1595.8 | 0.00 | 0.4611 |
| 2.7025070 | 58.4125 | 15.307 | 1568.5 | 8.4734 | 1577.0 | 0.00 | 0.4588 |
| 2.7160195 | 58.4474 | 15.202 | 1549.9 | 8.4613 | 1558.4 | 0.00 | 0.4565 |
| 2.7295996 | 58.4816 | 15.097 | 1531.6 | 8.4490 | 1540.0 | 0.00 | 0.4542 |
| 2.7432476 | 58.5153 | 14.993 | 1513.5 | 8.4367 | 1521.9 | 0.00 | 0.4520 |
| 2.7569638 | 58.5483 | 14.890 | 1495.6 | 8.4242 | 1504.1 | 0.00 | 0.4497 |
| 2.7707486 | 58.5807 | 14.788 | 1478.0 | 8.4117 | 1486.4 | 0.00 | 0.4475 |
| 2.7846024 | 58.6127 | 14.687 | 1460.6 | 8.3990 | 1469.0 | 0.00 | 0.4452 |
| 2.7985254 | 58.6441 | 14.587 | 1443.4 | 8.3862 | 1451.7 | 0.00 | 0.4430 |
| 2.8125180 | 58.6752 | 14.487 | 1426.4 | 8.3733 | 1434.7 | 0.00 | 0.4408 |
| 2.8265806 | 58.7058 | 14.388 | 1409.6 | 8.3603 | 1418.0 | 0.00 | 0.4386 |
| 2.8407135 | 58.7361 | 14.290 | 1393.0 | 8.3472 | 1401.4 | 0.00 | 0.4365 |
| 2.8549171 | 58.7662 | 14.193 | 1376.7 | 8.3341 | 1385.0 | 0.00 | 0.4343 |
| 2.8691917 | 58.7960 | 14.097 | 1360.5 | 8.3208 | 1368.8 | 0.00 | 0.4321 |
| 2.8835376 | 58.8257 | 14.001 | 1344.6 | 8.3074 | 1352.9 | 0.00 | 0.4300 |
| 2.8979553 | 58.8553 | 13.906 | 1328.8 | 8.2939 | 1337.1 | 0.00 | 0.4278 |
| 2.9124451 | 58.8850 | 13.812 | 1313.3 | 8.2803 | 1321.5 | 0.00 | 0.4257 |
| 2.9270073 | 58.9148 | 13.719 | 1297.9 | 8.2665 | 1306.2 | 0.00 | 0.4236 |
| 2.9416424 | 58.9450 | 13.626 | 1282.7 | 8.2527 | 1291.0 | 0.00 | 0.4215 |
| 2.9563506 | 58.9756 | 13.535 | 1267.8 | 8.2388 | 1276.0 | 0.00 | 0.4194 |
| 2.9711323 | 59.1179 | 13.443 | 1252.9 | 8.2248 | 1261.1 | 0.00 | 0.4173 |
| 2.9859880 | 59.1515 | 13.351 | 1238.1 | 8.2108 | 1246.3 | 0.00 | 0.4152 |
| 3.0009179 | 59.1880 | 13.258 | 1223.5 | 8.1966 | 1231.7 | 0.00 | 0.4132 |
| 3.0159225 | 59.2104 | 13.153 | 1207.7 | 8.1823 | 1215.8 | 0.00 | 0.4111 |
| 3.0310021 | 59.2313 | 13.048 | 1192.1 | 8.1679 | 1200.3 | 0.00 | 0.4091 |
| 3.0461571 | 59.2511 | 12.944 | 1176.7 | 8.1534 | 1184.9 | 0.00 | 0.4070 |
| 3.0613879 | 59.2696 | 12.841 | 1161.6 | 8.1388 | 1169.7 | 0.00 | 0.4050 |
| 3.0766949 | 59.2870 | 12.739 | 1146.6 | 8.1242 | 1154.7 | 0.00 | 0.4030 |
| 3.0920783 | 59.3033 | 12.638 | 1131.9 | 8.1094 | 1140.0 | 0.00 | 0.4010 |
| 3.1075387 | 59.3186 | 12.538 | 1117.3 | 8.0946 | 1125.4 | 0.00 | 0.3990 |
| 3.1230764 | 59.3329 | 12.439 | 1103.0 | 8.0796 | 1111.0 | 0.00 | 0.3970 |
| 3.1386918 | 59.3464 | 12.341 | 1088.8 | 8.0646 | 1096.9 | 0.00 | 0.3950 |
| 3.1543853 | 59.3589 | 12.243 | 1074.8 | 8.0495 | 1082.9 | 0.00 | 0.3931 |
| 3.1701572 | 59.3707 | 12.147 | 1061.1 | 8.0343 | 1069.1 | 0.00 | 0.3911 |
| 3.1860080 | 59.3816 | 12.051 | 1047.5 | 8.0190 | 1055.5 | 0.00 | 0.3892 |
| 3.2019380 | 59.3918 | 11.957 | 1034.1 | 8.0036 | 1042.1 | 0.00 | 0.3872 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Eu ($Z=63$) | | | | | | | |
| 3.2179477 | 59.4012 | 11.863 | 1020.8 | 7.9881 | 1028.8 | 0.00 | 0.3853 |
| 3.2340374 | 59.4577 | 11.769 | 1007.7 | 7.9725 | 1015.7 | 0.00 | 0.3834 |
| 3.2502076 | 59.4661 | 11.675 | 994.70 | 7.9569 | 1002.7 | 0.00 | 0.3815 |
| 3.2664587 | 59.4737 | 11.582 | 981.85 | 7.9412 | 989.79 | 0.00 | 0.3796 |
| 3.2827910 | 59.4804 | 11.489 | 969.18 | 7.9253 | 977.10 | 0.00 | 0.3777 |
| 3.2992049 | 59.4863 | 11.398 | 956.67 | 7.9094 | 964.58 | 0.00 | 0.3758 |
| 3.3157009 | 59.4915 | 11.307 | 944.34 | 7.8935 | 952.23 | 0.00 | 0.3739 |
| 3.3322794 | 59.4959 | 11.217 | 932.17 | 7.8774 | 940.05 | 0.00 | 0.3721 |
| 3.3489408 | 59.4997 | 11.128 | 920.17 | 7.8613 | 928.03 | 0.00 | 0.3702 |
| 3.3656856 | 59.5027 | 11.040 | 908.33 | 7.8450 | 916.17 | 0.00 | 0.3684 |
| 3.3825140 | 59.5051 | 10.952 | 896.65 | 7.8287 | 904.48 | 0.00 | 0.3665 |
| 3.3994265 | 59.5069 | 10.866 | 885.12 | 7.8123 | 892.94 | 0.00 | 0.3647 |
| 3.4164237 | 59.5081 | 10.780 | 873.76 | 7.7959 | 881.55 | 0.00 | 0.3629 |
| 3.4335058 | 59.5087 | 10.695 | 862.54 | 7.7793 | 870.32 | 0.00 | 0.3611 |
| 3.4506733 | 59.5087 | 10.610 | 851.48 | 7.7627 | 859.24 | 0.00 | 0.3593 |
| 3.4679267 | 59.5082 | 10.527 | 840.57 | 7.7460 | 848.31 | 0.00 | 0.3575 |
| 3.4852663 | 59.5071 | 10.444 | 829.80 | 7.7293 | 837.53 | 0.00 | 0.3557 |
| 3.5026927 | 59.5055 | 10.362 | 819.18 | 7.7124 | 826.89 | 0.00 | 0.3540 |
| 3.5202061 | 59.5034 | 10.280 | 808.70 | 7.6955 | 816.39 | 0.00 | 0.3522 |
| 3.5378072 | 59.5008 | 10.200 | 798.36 | 7.6785 | 806.04 | 0.00 | 0.3505 |
| 3.5554962 | 59.4978 | 10.120 | 788.16 | 7.6615 | 795.82 | 0.00 | 0.3487 |
| 3.5732737 | 59.4942 | 10.040 | 778.10 | 7.6443 | 785.74 | 0.00 | 0.3470 |
| 3.5911400 | 59.4903 | 9.9618 | 768.17 | 7.6271 | 775.80 | 0.00 | 0.3453 |
| 3.6090957 | 59.5065 | 9.8836 | 758.35 | 7.6099 | 765.96 | 0.00 | 0.3435 |
| 3.6271412 | 59.5018 | 9.8057 | 748.63 | 7.5925 | 756.22 | 0.00 | 0.3418 |
| 3.6452769 | 59.4966 | 9.7285 | 739.04 | 7.5751 | 746.61 | 0.00 | 0.3401 |
| 3.6635033 | 59.4909 | 9.6520 | 729.57 | 7.5576 | 737.13 | 0.00 | 0.3384 |
| 3.6818208 | 59.4847 | 9.5761 | 720.24 | 7.5401 | 727.78 | 0.00 | 0.3367 |
| 3.7002299 | 59.4781 | 9.5010 | 711.03 | 7.5225 | 718.55 | 0.00 | 0.3351 |
| 3.7187311 | 59.4710 | 9.4264 | 701.94 | 7.5048 | 709.45 | 0.00 | 0.3334 |
| 3.7373247 | 59.4634 | 9.3526 | 692.98 | 7.4871 | 700.47 | 0.00 | 0.3317 |
| 3.7560114 | 59.4555 | 9.2794 | 684.13 | 7.4693 | 691.60 | 0.00 | 0.3301 |
| 3.7747914 | 59.4471 | 9.2068 | 675.41 | 7.4514 | 682.86 | 0.00 | 0.3285 |
| 3.7936654 | 59.4383 | 9.1349 | 666.80 | 7.4335 | 674.23 | 0.00 | 0.3268 |
| 3.8126337 | 59.4291 | 9.0636 | 658.30 | 7.4155 | 665.72 | 0.00 | 0.3252 |
| 3.8316969 | 59.4195 | 8.9929 | 649.92 | 7.3974 | 657.32 | 0.00 | 0.3236 |
| 3.8508554 | 59.4095 | 8.9229 | 641.65 | 7.3793 | 649.03 | 0.00 | 0.3220 |
| 3.8701096 | 59.3991 | 8.8535 | 633.49 | 7.3611 | 640.85 | 0.00 | 0.3204 |
| 3.8894602 | 59.3884 | 8.7847 | 625.44 | 7.3429 | 632.78 | 0.00 | 0.3188 |
| 3.9089075 | 59.3773 | 8.7165 | 617.50 | 7.3246 | 624.82 | 0.00 | 0.3172 |
| 3.9284520 | 59.3658 | 8.6488 | 609.66 | 7.3063 | 616.96 | 0.00 | 0.3156 |
| 3.9480943 | 59.3539 | 8.5818 | 601.92 | 7.2879 | 609.21 | 0.00 | 0.3140 |
| 3.9678347 | 59.3417 | 8.5154 | 594.29 | 7.2694 | 601.56 | 0.00 | 0.3125 |
| 3.9876739 | 59.3292 | 8.4495 | 586.76 | 7.2509 | 594.01 | 0.00 | 0.3109 |
| Gd ($Z=64$) | | | | | | | |
| Atomic weight: $A_r=157.2500 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=7.87700$ | | | | | | | |
| σ_a (barns/atom) $=[\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 261.120$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1})=f_2(e \text{ atom}^{-1}) \times 2.67601 \times 10^5$ | | | | | | | |
| 19 edges. Edge energies (keV) | | | | | | | |
| K | 50.2391 | L I | 8.37560 | L II | 7.93030 | L III | 7.24280 |
| M I | 1.88080 | M II | 1.68830 | M III | 1.54400 | M IV | 1.21720 |
| M V | 1.18520 | N I | 0.375800 | N II | 0.288500 | N III | 0.270900 |
| N IV | 0.140500 | N V | 0.140500 | N VI | 0.00927940 | N VII | 0.00852419 |
| O I | 0.0361000 | O II | 0.0203000 | O III | 0.0203000 | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-0.99598, -0.60000) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.014289 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 20.0918 | 7.6231 | 20400 | 0.46011 | 20400 | 0.00 | 12.40 |
| 0.10050000 | 20.1097 | 7.6464 | 20360 | 0.46525 | 20361 | 0.00 | 12.34 |
| 0.10100250 | 20.1276 | 7.6697 | 20320 | 0.47044 | 20321 | 0.00 | 12.28 |
| 0.10150751 | 20.1454 | 7.6929 | 20281 | 0.47568 | 20281 | 0.00 | 12.21 |
| 0.10201505 | 20.1631 | 7.7161 | 20240 | 0.48096 | 20241 | 0.00 | 12.15 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Gd ($Z=64$) | | | | | | | |
| 0.10252513 | 20.1807 | 7.7392 | 20200 | 0.48629 | 20201 | 0.00 | 12.09 |
| 0.10303775 | 20.1981 | 7.7623 | 20160 | 0.49167 | 20160 | 0.00 | 12.03 |
| 0.10355294 | 20.2154 | 7.7853 | 20119 | 0.49709 | 20119 | 0.00 | 11.97 |
| 0.10407070 | 20.2325 | 7.8083 | 20078 | 0.50256 | 20078 | 0.00 | 11.91 |
| 0.10459106 | 20.2494 | 7.8312 | 20037 | 0.50809 | 20037 | 0.00 | 11.85 |
| 0.10511401 | 20.2662 | 7.8541 | 19995 | 0.51366 | 19996 | 0.00 | 11.80 |
| 0.10563958 | 20.2827 | 7.8770 | 19954 | 0.51928 | 19954 | 0.00 | 11.74 |
| 0.10616778 | 20.2991 | 7.8998 | 19912 | 0.52495 | 19912 | 0.00 | 11.68 |
| 0.10669862 | 20.3151 | 7.9225 | 19870 | 0.53067 | 19870 | 0.00 | 11.62 |
| 0.10723211 | 20.3310 | 7.9452 | 19828 | 0.53644 | 19828 | 0.00 | 11.56 |
| 0.10776827 | 20.3465 | 7.9679 | 19785 | 0.54226 | 19786 | 0.00 | 11.50 |
| 0.10830712 | 20.3624 | 7.9905 | 19743 | 0.54813 | 19743 | 0.00 | 11.45 |
| 0.10884865 | 20.3773 | 8.0131 | 19700 | 0.55405 | 19701 | 0.00 | 11.39 |
| 0.10939289 | 20.3919 | 8.0356 | 19657 | 0.56002 | 19658 | 0.00 | 11.33 |
| 0.10993986 | 20.4062 | 8.0581 | 19614 | 0.56605 | 19615 | 0.00 | 11.28 |
| 0.11048956 | 20.4200 | 8.0805 | 19571 | 0.57212 | 19571 | 0.00 | 11.22 |
| 0.11104201 | 20.4334 | 8.1029 | 19527 | 0.57825 | 19528 | 0.00 | 11.17 |
| 0.11159722 | 20.4464 | 8.1253 | 19484 | 0.58443 | 19484 | 0.00 | 11.11 |
| 0.11215520 | 20.4589 | 8.1476 | 19440 | 0.59066 | 19441 | 0.00 | 11.05 |
| 0.11271598 | 20.4708 | 8.1699 | 19396 | 0.59695 | 19397 | 0.00 | 11.00 |
| 0.11327956 | 20.4822 | 8.1921 | 19352 | 0.60329 | 19353 | 0.00 | 10.94 |
| 0.11384596 | 20.4930 | 8.2143 | 19308 | 0.60968 | 19309 | 0.00 | 10.89 |
| 0.11441519 | 20.5032 | 8.2364 | 19264 | 0.61613 | 19264 | 0.00 | 10.84 |
| 0.11498726 | 20.5126 | 8.2585 | 19219 | 0.62263 | 19220 | 0.00 | 10.78 |
| 0.11556220 | 20.5214 | 8.2806 | 19175 | 0.62918 | 19176 | 0.00 | 10.73 |
| 0.11614001 | 20.5293 | 8.3026 | 19130 | 0.63579 | 19131 | 0.00 | 10.68 |
| 0.11672071 | 20.5363 | 8.3246 | 19085 | 0.64245 | 19086 | 0.00 | 10.62 |
| 0.11730431 | 20.5425 | 8.3465 | 19040 | 0.64917 | 19041 | 0.00 | 10.57 |
| 0.11789083 | 20.5476 | 8.3684 | 18995 | 0.65595 | 18996 | 0.00 | 10.52 |
| 0.11848029 | 20.5516 | 8.3902 | 18950 | 0.66278 | 18951 | 0.00 | 10.46 |
| 0.11907269 | 20.5545 | 8.4120 | 18905 | 0.66966 | 18906 | 0.00 | 10.41 |
| 0.11966805 | 20.5561 | 8.4338 | 18860 | 0.67660 | 18860 | 0.00 | 10.36 |
| 0.12026639 | 20.5563 | 8.4556 | 18814 | 0.68360 | 18815 | 0.00 | 10.31 |
| 0.12086772 | 20.5551 | 8.4773 | 18769 | 0.69066 | 18769 | 0.00 | 10.26 |
| 0.12147206 | 20.5521 | 8.4989 | 18723 | 0.69777 | 18724 | 0.00 | 10.21 |
| 0.12207942 | 20.5474 | 8.5205 | 18677 | 0.70494 | 18678 | 0.00 | 10.16 |
| 0.12268982 | 20.5408 | 8.5421 | 18631 | 0.71217 | 18632 | 0.00 | 10.11 |
| 0.12330327 | 20.5320 | 8.5637 | 18586 | 0.71945 | 18586 | 0.00 | 10.06 |
| 0.12391979 | 20.5209 | 8.5852 | 18540 | 0.72680 | 18540 | 0.00 | 10.01 |
| 0.12453939 | 20.5071 | 8.6067 | 18493 | 0.73420 | 18494 | 0.00 | 9.955 |
| 0.12516208 | 20.4905 | 8.6282 | 18447 | 0.74166 | 18448 | 0.00 | 9.906 |
| 0.12578789 | 20.4707 | 8.6496 | 18401 | 0.74918 | 18402 | 0.00 | 9.857 |
| 0.12641683 | 20.4473 | 8.6710 | 18355 | 0.75676 | 18356 | 0.00 | 9.808 |
| 0.12704892 | 20.4200 | 8.6923 | 18309 | 0.76439 | 18309 | 0.00 | 9.759 |
| 0.12768416 | 20.3882 | 8.7137 | 18262 | 0.77209 | 18263 | 0.00 | 9.710 |
| 0.12832258 | 20.3513 | 8.7349 | 18216 | 0.77985 | 18216 | 0.00 | 9.662 |
| 0.12896419 | 20.3087 | 8.7562 | 18169 | 0.78767 | 18170 | 0.00 | 9.614 |
| 0.12960902 | 20.2596 | 8.7775 | 18123 | 0.79555 | 18123 | 0.00 | 9.566 |
| 0.13025706 | 20.2028 | 8.7987 | 18076 | 0.80349 | 18077 | 0.00 | 9.518 |
| 0.13090835 | 20.1373 | 8.8199 | 18029 | 0.81149 | 18030 | 0.00 | 9.471 |
| 0.13156289 | 20.0615 | 8.8410 | 17983 | 0.81955 | 17984 | 0.00 | 9.424 |
| 0.13222070 | 19.9734 | 8.8621 | 17936 | 0.82767 | 17937 | 0.00 | 9.377 |
| 0.13288181 | 19.8708 | 8.8832 | 17889 | 0.83586 | 17890 | 0.00 | 9.330 |
| 0.13354621 | 19.7505 | 8.9043 | 17843 | 0.84410 | 17843 | 0.00 | 9.284 |
| 0.13421395 | 19.6081 | 8.9254 | 17796 | 0.85241 | 17797 | 0.00 | 9.238 |
| 0.13488502 | 19.4381 | 8.9464 | 17749 | 0.86079 | 17750 | 0.00 | 9.192 |
| 0.13555944 | 19.2323 | 8.9674 | 17702 | 0.86922 | 17703 | 0.00 | 9.146 |
| 0.13623724 | 18.9787 | 8.9884 | 17655 | 0.87772 | 17656 | 0.00 | 9.101 |
| 0.13691842 | 18.6585 | 9.0094 | 17609 | 0.88628 | 17609 | 0.00 | 9.055 |
| 0.13760302 | 18.2403 | 9.0304 | 17562 | 0.89491 | 17563 | 0.00 | 9.010 |
| 0.13829103 | 17.6653 | 9.0513 | 17515 | 0.90359 | 17516 | 0.00 | 8.965 |
| 0.13898249 | 16.8045 | 9.0722 | 17468 | 0.91235 | 17469 | 0.00 | 8.921 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Gd ($Z=64$) | | | | | | | |
| 0.13967740 | 15.2719 | 9.0931 | 17421 | 0.92116 | 17422 | 0.00 | 8.876 |
| 0.14037579 | 9.93257 | 9.1140 | 17374 | 0.93005 | 17375 | 0.00 | 8.832 |
| 0.14046403 | 6.19564 | 9.1166 | 17368 | 0.93117 | 17369 | 0.00 | 8.827 |
| 0.14053596 | 6.28437 | 18.785 | 35770 | 0.93209 | 35771 | 0.00 | 8.822 |
| 0.14107766 | 15.2536 | 18.453 | 35003 | 0.93899 | 35004 | 0.00 | 8.788 |
| 0.14178305 | 18.0396 | 18.041 | 34051 | 0.94800 | 34052 | 0.00 | 8.745 |
| 0.14249197 | 19.6242 | 17.649 | 33146 | 0.95708 | 33147 | 0.00 | 8.701 |
| 0.14320443 | 20.7340 | 17.277 | 32284 | 0.96622 | 32285 | 0.00 | 8.658 |
| 0.14392045 | 21.5809 | 16.922 | 31464 | 0.97543 | 31465 | 0.00 | 8.615 |
| 0.14464005 | 22.2580 | 16.585 | 30684 | 0.98470 | 30685 | 0.00 | 8.572 |
| 0.14536325 | 22.8151 | 16.265 | 29942 | 0.99404 | 29943 | 0.00 | 8.529 |
| 0.14609007 | 23.2827 | 15.960 | 29235 | 1.0035 | 29236 | 0.00 | 8.487 |
| 0.14682052 | 23.6805 | 15.670 | 28562 | 1.0129 | 28563 | 0.00 | 8.445 |
| 0.14755462 | 24.0225 | 15.395 | 27921 | 1.0225 | 27922 | 0.00 | 8.403 |
| 0.14829239 | 24.3187 | 15.134 | 27310 | 1.0321 | 27311 | 0.00 | 8.361 |
| 0.14903386 | 24.5768 | 14.886 | 26729 | 1.0417 | 26730 | 0.00 | 8.319 |
| 0.14977903 | 24.8027 | 14.650 | 26174 | 1.0515 | 26175 | 0.00 | 8.278 |
| 0.15052792 | 25.0010 | 14.426 | 25646 | 1.0613 | 25647 | 0.00 | 8.237 |
| 0.15128056 | 25.1754 | 14.214 | 25143 | 1.0712 | 25144 | 0.00 | 8.196 |
| 0.15203696 | 25.3290 | 14.012 | 24663 | 1.0811 | 24664 | 0.00 | 8.155 |
| 0.15279715 | 25.4641 | 13.821 | 24205 | 1.0911 | 24206 | 0.00 | 8.114 |
| 0.15356113 | 25.5827 | 13.639 | 23769 | 1.1012 | 23770 | 0.00 | 8.074 |
| 0.15432894 | 25.6862 | 13.467 | 23352 | 1.1114 | 23353 | 0.00 | 8.034 |
| 0.15510058 | 25.7757 | 13.305 | 22956 | 1.1216 | 22957 | 0.00 | 7.994 |
| 0.15587609 | 25.8529 | 13.155 | 22585 | 1.1319 | 22586 | 0.00 | 7.954 |
| 0.15665547 | 25.9207 | 13.018 | 22238 | 1.1422 | 22239 | 0.00 | 7.914 |
| 0.15743875 | 25.9812 | 12.892 | 21912 | 1.1527 | 21913 | 0.00 | 7.875 |
| 0.15822594 | 26.0358 | 12.776 | 21607 | 1.1632 | 21608 | 0.00 | 7.836 |
| 0.15901707 | 26.0858 | 12.669 | 21320 | 1.1737 | 21321 | 0.00 | 7.797 |
| 0.15981215 | 26.1321 | 12.571 | 21050 | 1.1844 | 21052 | 0.00 | 7.758 |
| 0.16061121 | 26.1755 | 12.477 | 20789 | 1.1951 | 20790 | 0.00 | 7.720 |
| 0.16141427 | 26.2165 | 12.388 | 20538 | 1.2058 | 20539 | 0.00 | 7.681 |
| 0.16222134 | 26.2555 | 12.306 | 20300 | 1.2167 | 20302 | 0.00 | 7.643 |
| 0.16303245 | 26.2929 | 12.230 | 20075 | 1.2276 | 20076 | 0.00 | 7.605 |
| 0.16384761 | 26.3291 | 12.160 | 19861 | 1.2386 | 19862 | 0.00 | 7.567 |
| 0.16466685 | 26.3644 | 12.096 | 19657 | 1.2497 | 19658 | 0.00 | 7.529 |
| 0.16549018 | 26.3991 | 12.036 | 19463 | 1.2608 | 19464 | 0.00 | 7.492 |
| 0.16631763 | 26.4335 | 11.981 | 19278 | 1.2720 | 19279 | 0.00 | 7.455 |
| 0.16714922 | 26.4677 | 11.931 | 19101 | 1.2833 | 19102 | 0.00 | 7.418 |
| 0.16798497 | 26.5020 | 11.884 | 18931 | 1.2946 | 18932 | 0.00 | 7.381 |
| 0.16882489 | 26.5364 | 11.841 | 18769 | 1.3060 | 18770 | 0.00 | 7.344 |
| 0.16966902 | 26.5712 | 11.802 | 18613 | 1.3175 | 18615 | 0.00 | 7.307 |
| 0.17051736 | 26.6064 | 11.765 | 18464 | 1.3291 | 18465 | 0.00 | 7.271 |
| 0.17136995 | 26.6421 | 11.732 | 18320 | 1.3407 | 18322 | 0.00 | 7.235 |
| 0.17222680 | 26.6785 | 11.702 | 18182 | 1.3524 | 18184 | 0.00 | 7.199 |
| 0.17308793 | 26.7156 | 11.674 | 18049 | 1.3642 | 18050 | 0.00 | 7.163 |
| 0.17395337 | 26.7535 | 11.649 | 17921 | 1.3761 | 17922 | 0.00 | 7.127 |
| 0.17482314 | 26.7928 | 11.601 | 17758 | 1.3880 | 17759 | 0.00 | 7.092 |
| 0.17569726 | 26.8320 | 11.542 | 17579 | 1.4000 | 17580 | 0.00 | 7.057 |
| 0.17657574 | 26.8704 | 11.484 | 17404 | 1.4121 | 17405 | 0.00 | 7.022 |
| 0.17745862 | 26.9080 | 11.428 | 17233 | 1.4242 | 17235 | 0.00 | 6.987 |
| 0.17834591 | 26.9451 | 11.374 | 17066 | 1.4364 | 17067 | 0.00 | 6.952 |
| 0.17923764 | 26.9814 | 11.321 | 16902 | 1.4487 | 16904 | 0.00 | 6.917 |
| 0.18013383 | 27.0172 | 11.270 | 16742 | 1.4611 | 16744 | 0.00 | 6.883 |
| 0.18103450 | 27.0524 | 11.220 | 16585 | 1.4735 | 16586 | 0.00 | 6.849 |
| 0.18193967 | 27.0870 | 11.171 | 16431 | 1.4860 | 16432 | 0.00 | 6.815 |
| 0.18284937 | 27.1211 | 11.124 | 16280 | 1.4986 | 16281 | 0.00 | 6.781 |
| 0.18376362 | 27.1546 | 11.077 | 16131 | 1.5113 | 16133 | 0.00 | 6.747 |
| 0.18468244 | 27.1877 | 11.032 | 15985 | 1.5240 | 15987 | 0.00 | 6.713 |
| 0.18560585 | 27.2202 | 10.988 | 15842 | 1.5368 | 15843 | 0.00 | 6.680 |
| 0.18653388 | 27.2522 | 10.944 | 15701 | 1.5497 | 15702 | 0.00 | 6.647 |
| 0.18746655 | 27.2838 | 10.902 | 15562 | 1.5627 | 15564 | 0.00 | 6.614 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Gd ($Z=64$) | | | | | | | |
| 0.18840388 | 27.3149 | 10.860 | 15426 | 1.5757 | 15427 | 0.00 | 6.581 |
| 0.18934590 | 27.3455 | 10.820 | 15291 | 1.5888 | 15293 | 0.00 | 6.548 |
| 0.19029263 | 27.3757 | 10.780 | 15159 | 1.6020 | 15160 | 0.00 | 6.515 |
| 0.19124409 | 27.4054 | 10.740 | 15028 | 1.6153 | 15030 | 0.00 | 6.483 |
| 0.19220031 | 27.4346 | 10.702 | 14900 | 1.6286 | 14902 | 0.00 | 6.451 |
| 0.19316131 | 27.4634 | 10.664 | 14773 | 1.6420 | 14775 | 0.00 | 6.419 |
| 0.19412712 | 27.4917 | 10.626 | 14648 | 1.6555 | 14650 | 0.00 | 6.387 |
| 0.19509776 | 27.5195 | 10.590 | 14525 | 1.6690 | 14527 | 0.00 | 6.355 |
| 0.19607325 | 27.5469 | 10.554 | 14404 | 1.6827 | 14405 | 0.00 | 6.323 |
| 0.19705361 | 27.5739 | 10.518 | 14284 | 1.6964 | 14285 | 0.00 | 6.292 |
| 0.19803888 | 27.6004 | 10.483 | 14165 | 1.7102 | 14167 | 0.00 | 6.261 |
| 0.19902907 | 27.6264 | 10.449 | 14048 | 1.7240 | 14050 | 0.00 | 6.229 |
| 0.20002422 | 27.6520 | 10.414 | 13933 | 1.7380 | 13935 | 0.00 | 6.198 |
| 0.20102434 | 27.6771 | 10.381 | 13819 | 1.7520 | 13821 | 0.00 | 6.168 |
| 0.20202946 | 27.7018 | 10.348 | 13706 | 1.7660 | 13708 | 0.00 | 6.137 |
| 0.20303961 | 27.7259 | 10.315 | 13595 | 1.7802 | 13597 | 0.00 | 6.106 |
| 0.20405481 | 27.7497 | 10.283 | 13485 | 1.7944 | 13487 | 0.00 | 6.076 |
| 0.20507508 | 27.7729 | 10.251 | 13377 | 1.8087 | 13379 | 0.00 | 6.046 |
| 0.20610046 | 27.7956 | 10.220 | 13270 | 1.8231 | 13271 | 0.00 | 6.016 |
| 0.20713096 | 27.8179 | 10.189 | 13164 | 1.8376 | 13165 | 0.00 | 5.986 |
| 0.20816661 | 27.8397 | 10.158 | 13059 | 1.8521 | 13061 | 0.00 | 5.956 |
| 0.20920745 | 27.8610 | 10.128 | 12955 | 1.8667 | 12957 | 0.00 | 5.926 |
| 0.21025348 | 27.8817 | 10.098 | 12853 | 1.8814 | 12855 | 0.00 | 5.897 |
| 0.21130475 | 27.9020 | 10.069 | 12751 | 1.8962 | 12753 | 0.00 | 5.868 |
| 0.21236128 | 27.9218 | 10.040 | 12651 | 1.9110 | 12653 | 0.00 | 5.838 |
| 0.21342308 | 27.9410 | 10.011 | 12552 | 1.9259 | 12554 | 0.00 | 5.809 |
| 0.21449020 | 27.9597 | 9.9825 | 12454 | 1.9409 | 12456 | 0.00 | 5.780 |
| 0.21556265 | 27.9779 | 9.9544 | 12357 | 1.9560 | 12359 | 0.00 | 5.752 |
| 0.21664046 | 27.9956 | 9.9266 | 12262 | 1.9711 | 12264 | 0.00 | 5.723 |
| 0.21772366 | 28.0127 | 9.8992 | 12167 | 1.9863 | 12169 | 0.00 | 5.695 |
| 0.21881228 | 28.0293 | 9.8721 | 12073 | 2.0016 | 12075 | 0.00 | 5.666 |
| 0.21990634 | 28.0452 | 9.8453 | 11981 | 2.0170 | 11983 | 0.00 | 5.638 |
| 0.22100588 | 28.0606 | 9.8188 | 11889 | 2.0324 | 11891 | 0.00 | 5.610 |
| 0.22211090 | 28.0755 | 9.7927 | 11798 | 2.0479 | 11800 | 0.00 | 5.582 |
| 0.22322146 | 28.0897 | 9.7668 | 11709 | 2.0635 | 11711 | 0.00 | 5.554 |
| 0.22433757 | 28.1033 | 9.7413 | 11620 | 2.0792 | 11622 | 0.00 | 5.527 |
| 0.22545925 | 28.1163 | 9.7161 | 11532 | 2.0949 | 11534 | 0.00 | 5.499 |
| 0.22658655 | 28.1286 | 9.6911 | 11445 | 2.1107 | 11447 | 0.00 | 5.472 |
| 0.22771948 | 28.1403 | 9.6665 | 11360 | 2.1266 | 11362 | 0.00 | 5.445 |
| 0.22885808 | 28.1513 | 9.6422 | 11275 | 2.1426 | 11277 | 0.00 | 5.418 |
| 0.23000237 | 28.1617 | 9.6183 | 11191 | 2.1586 | 11193 | 0.00 | 5.391 |
| 0.23115238 | 28.1713 | 9.5946 | 11107 | 2.1747 | 11110 | 0.00 | 5.364 |
| 0.23230814 | 28.1802 | 9.5712 | 11025 | 2.1909 | 11027 | 0.00 | 5.337 |
| 0.23346969 | 28.1883 | 9.5481 | 10944 | 2.2071 | 10946 | 0.00 | 5.311 |
| 0.23463703 | 28.1956 | 9.5253 | 10864 | 2.2235 | 10866 | 0.00 | 5.284 |
| 0.23581022 | 28.2021 | 9.5029 | 10784 | 2.2399 | 10786 | 0.00 | 5.258 |
| 0.23698927 | 28.2078 | 9.4807 | 10705 | 2.2563 | 10708 | 0.00 | 5.232 |
| 0.23817422 | 28.2126 | 9.4589 | 10628 | 2.2729 | 10630 | 0.00 | 5.206 |
| 0.23936509 | 28.2164 | 9.4373 | 10551 | 2.2895 | 10553 | 0.00 | 5.180 |
| 0.24056191 | 28.2193 | 9.4161 | 10474 | 2.3062 | 10477 | 0.00 | 5.154 |
| 0.24176472 | 28.2211 | 9.3951 | 10399 | 2.3230 | 10401 | 0.00 | 5.128 |
| 0.24297355 | 28.2218 | 9.3745 | 10325 | 2.3398 | 10327 | 0.00 | 5.103 |
| 0.24418841 | 28.2214 | 9.3542 | 10251 | 2.3568 | 10253 | 0.00 | 5.077 |
| 0.24540936 | 28.2197 | 9.3342 | 10178 | 2.3738 | 10181 | 0.00 | 5.052 |
| 0.24663640 | 28.2166 | 9.3145 | 10106 | 2.3908 | 10109 | 0.00 | 5.027 |
| 0.24786959 | 28.2122 | 9.2951 | 10035 | 2.4080 | 10037 | 0.00 | 5.002 |
| 0.24910893 | 28.2061 | 9.2760 | 9964.6 | 2.4252 | 9967.0 | 0.00 | 4.977 |
| 0.25035448 | 28.1983 | 9.2573 | 9895.0 | 2.4424 | 9897.4 | 0.00 | 4.952 |
| 0.25160625 | 28.1886 | 9.2388 | 9826.1 | 2.4598 | 9828.6 | 0.00 | 4.928 |
| 0.25286428 | 28.1768 | 9.2207 | 9758.1 | 2.4772 | 9760.6 | 0.00 | 4.903 |
| 0.25412860 | 28.1626 | 9.2029 | 9690.8 | 2.4947 | 9693.3 | 0.00 | 4.879 |
| 0.25539925 | 28.1457 | 9.1854 | 9624.2 | 2.5123 | 9626.7 | 0.00 | 4.855 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Gd ($Z=64$) | | | | | | | |
| 0.25667624 | 28.1256 | 9.1682 | 9558.4 | 2.5299 | 9561.0 | 0.00 | 4.830 |
| 0.25795962 | 28.1019 | 9.1513 | 9493.4 | 2.5476 | 9495.9 | 0.00 | 4.806 |
| 0.25924942 | 28.0738 | 9.1348 | 9429.1 | 2.5654 | 9431.6 | 0.00 | 4.782 |
| 0.26054567 | 28.0404 | 9.1186 | 9365.5 | 2.5833 | 9368.1 | 0.00 | 4.759 |
| 0.26184840 | 28.0004 | 9.1027 | 9302.7 | 2.6012 | 9305.3 | 0.00 | 4.735 |
| 0.26315764 | 27.9517 | 9.0871 | 9240.5 | 2.6192 | 9243.2 | 0.00 | 4.711 |
| 0.26447343 | 27.8913 | 9.0718 | 9179.1 | 2.6372 | 9181.8 | 0.00 | 4.688 |
| 0.26579579 | 27.8140 | 9.0569 | 9118.4 | 2.6554 | 9121.1 | 0.00 | 4.665 |
| 0.26712477 | 27.7097 | 9.0423 | 9058.4 | 2.6736 | 9061.1 | 0.00 | 4.641 |
| 0.26846040 | 27.5550 | 9.0280 | 8999.1 | 2.6919 | 9001.8 | 0.00 | 4.618 |
| 0.26980270 | 27.2664 | 9.0140 | 8940.5 | 2.7102 | 8943.2 | 0.00 | 4.595 |
| 0.27068519 | 26.6714 | 9.0051 | 8902.5 | 2.7222 | 8905.2 | 0.00 | 4.580 |
| 0.27111483 | 26.6713 | 10.149 | 10018 | 2.7281 | 10020 | 0.00 | 4.573 |
| 0.27115171 | 26.7292 | 10.149 | 10016 | 2.7286 | 10019 | 0.00 | 4.573 |
| 0.27250747 | 27.4074 | 10.139 | 9956.8 | 2.7471 | 9959.6 | 0.00 | 4.550 |
| 0.27387001 | 27.6326 | 10.130 | 9898.4 | 2.7656 | 9901.1 | 0.00 | 4.527 |
| 0.27523936 | 27.7715 | 10.121 | 9840.6 | 2.7842 | 9843.4 | 0.00 | 4.505 |
| 0.27661556 | 27.8715 | 10.113 | 9783.5 | 2.8029 | 9786.3 | 0.00 | 4.482 |
| 0.27799863 | 27.9486 | 10.105 | 9727.0 | 2.8217 | 9729.8 | 0.00 | 4.460 |
| 0.27938863 | 28.0099 | 10.097 | 9671.1 | 2.8405 | 9674.0 | 0.00 | 4.438 |
| 0.28078557 | 28.0589 | 10.090 | 9615.9 | 2.8594 | 9618.8 | 0.00 | 4.416 |
| 0.28218950 | 28.0969 | 10.083 | 9561.3 | 2.8783 | 9564.2 | 0.00 | 4.394 |
| 0.28360044 | 28.1236 | 10.076 | 9507.4 | 2.8973 | 9510.3 | 0.00 | 4.372 |
| 0.28501845 | 28.1360 | 10.069 | 9454.0 | 2.9164 | 9456.9 | 0.00 | 4.350 |
| 0.28644354 | 28.1244 | 10.063 | 9401.3 | 2.9356 | 9404.2 | 0.00 | 4.328 |
| 0.28787576 | 28.0362 | 10.057 | 9349.1 | 2.9548 | 9352.1 | 0.00 | 4.307 |
| 0.28823661 | 27.9515 | 10.056 | 9336.1 | 2.9596 | 9339.1 | 0.00 | 4.301 |
| 0.28876341 | 27.9661 | 10.400 | 9638.1 | 2.9667 | 9641.0 | 0.00 | 4.294 |
| 0.28931514 | 28.1056 | 10.399 | 9618.3 | 2.9740 | 9621.3 | 0.00 | 4.285 |
| 0.29076171 | 28.2566 | 10.395 | 9567.2 | 2.9934 | 9570.2 | 0.00 | 4.264 |
| 0.29221552 | 28.3485 | 10.392 | 9516.7 | 3.0128 | 9519.7 | 0.00 | 4.243 |
| 0.29367660 | 28.4209 | 10.389 | 9466.7 | 3.0323 | 9469.7 | 0.00 | 4.222 |
| 0.29514498 | 28.4830 | 10.387 | 9417.3 | 3.0518 | 9420.3 | 0.00 | 4.201 |
| 0.29662071 | 28.5386 | 10.384 | 9368.4 | 3.0714 | 9371.5 | 0.00 | 4.180 |
| 0.29810381 | 28.5897 | 10.382 | 9320.1 | 3.0910 | 9323.2 | 0.00 | 4.159 |
| 0.29959433 | 28.6373 | 10.381 | 9272.3 | 3.1108 | 9275.4 | 0.00 | 4.138 |
| 0.30109230 | 28.6822 | 10.380 | 9225.0 | 3.1306 | 9228.1 | 0.00 | 4.118 |
| 0.30259776 | 28.7248 | 10.379 | 9178.2 | 3.1504 | 9181.4 | 0.00 | 4.097 |
| 0.30411075 | 28.7656 | 10.378 | 9131.9 | 3.1703 | 9135.1 | 0.00 | 4.077 |
| 0.30563130 | 28.8048 | 10.377 | 9086.1 | 3.1903 | 9089.3 | 0.00 | 4.057 |
| 0.30715946 | 28.8426 | 10.377 | 9040.7 | 3.2103 | 9043.9 | 0.00 | 4.036 |
| 0.30869526 | 28.8792 | 10.377 | 8995.8 | 3.2304 | 8999.0 | 0.00 | 4.016 |
| 0.31023873 | 28.9148 | 10.378 | 8951.4 | 3.2505 | 8954.6 | 0.00 | 3.996 |
| 0.31178993 | 28.9493 | 10.378 | 8907.4 | 3.2707 | 8910.7 | 0.00 | 3.977 |
| 0.31334888 | 28.9831 | 10.379 | 8863.8 | 3.2910 | 8867.1 | 0.00 | 3.957 |
| 0.31491562 | 29.0160 | 10.380 | 8820.7 | 3.3113 | 8824.0 | 0.00 | 3.937 |
| 0.31649020 | 29.0483 | 10.382 | 8778.0 | 3.3317 | 8781.4 | 0.00 | 3.917 |
| 0.31807265 | 29.0799 | 10.383 | 8735.8 | 3.3522 | 8739.1 | 0.00 | 3.898 |
| 0.31966301 | 29.1109 | 10.385 | 8693.9 | 3.3727 | 8697.3 | 0.00 | 3.879 |
| 0.32126133 | 29.1413 | 10.387 | 8652.4 | 3.3932 | 8655.8 | 0.00 | 3.859 |
| 0.32286764 | 29.1712 | 10.390 | 8611.3 | 3.4138 | 8614.8 | 0.00 | 3.840 |
| 0.32448197 | 29.2006 | 10.392 | 8570.6 | 3.4345 | 8574.1 | 0.00 | 3.821 |
| 0.32610438 | 29.2296 | 10.395 | 8530.3 | 3.4552 | 8533.8 | 0.00 | 3.802 |
| 0.32773491 | 29.2580 | 10.398 | 8490.3 | 3.4760 | 8493.8 | 0.00 | 3.783 |
| 0.32937358 | 29.2861 | 10.401 | 8450.7 | 3.4968 | 8454.2 | 0.00 | 3.764 |
| 0.33102045 | 29.3137 | 10.405 | 8411.5 | 3.5177 | 8415.0 | 0.00 | 3.746 |
| 0.33267555 | 29.3409 | 10.409 | 8372.5 | 3.5387 | 8376.1 | 0.00 | 3.727 |
| 0.33433893 | 29.3676 | 10.412 | 8334.0 | 3.5597 | 8337.5 | 0.00 | 3.708 |
| 0.33601062 | 29.3940 | 10.416 | 8295.7 | 3.5807 | 8299.3 | 0.00 | 3.690 |
| 0.33769068 | 29.4199 | 10.421 | 8257.7 | 3.6018 | 8261.3 | 0.00 | 3.672 |
| 0.33937913 | 29.4453 | 10.425 | 8220.1 | 3.6230 | 8223.7 | 0.00 | 3.653 |
| 0.34107602 | 29.4703 | 10.429 | 8182.7 | 3.6442 | 8186.4 | 0.00 | 3.635 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Gd ($Z=64$) | | | | | | | |
| 0.34278140 | 29.4948 | 10.434 | 8145.7 | 3.6654 | 8149.4 | 0.00 | 3.617 |
| 0.34449531 | 29.5187 | 10.439 | 8108.9 | 3.6867 | 8112.6 | 0.00 | 3.599 |
| 0.34621779 | 29.5421 | 10.444 | 8072.4 | 3.7081 | 8076.1 | 0.00 | 3.581 |
| 0.34794888 | 29.5648 | 10.449 | 8036.2 | 3.7295 | 8039.9 | 0.00 | 3.563 |
| 0.34968862 | 29.5869 | 10.454 | 8000.2 | 3.7509 | 8004.0 | 0.00 | 3.546 |
| 0.35143706 | 29.6081 | 10.460 | 7964.5 | 3.7724 | 7968.3 | 0.00 | 3.528 |
| 0.35319425 | 29.6284 | 10.465 | 7929.1 | 3.7940 | 7932.8 | 0.00 | 3.510 |
| 0.35496022 | 29.6477 | 10.471 | 7893.8 | 3.8156 | 7897.6 | 0.00 | 3.493 |
| 0.35673502 | 29.6656 | 10.476 | 7858.8 | 3.8372 | 7862.7 | 0.00 | 3.476 |
| 0.35851870 | 29.6821 | 10.482 | 7824.0 | 3.8589 | 7827.9 | 0.00 | 3.458 |
| 0.36031129 | 29.6967 | 10.488 | 7789.5 | 3.8806 | 7793.3 | 0.00 | 3.441 |
| 0.36211285 | 29.7089 | 10.494 | 7755.1 | 3.9024 | 7759.0 | 0.00 | 3.424 |
| 0.36392341 | 29.7182 | 10.500 | 7721.0 | 3.9242 | 7724.9 | 0.00 | 3.407 |
| 0.36574303 | 29.7233 | 10.506 | 7687.0 | 3.9461 | 7690.9 | 0.00 | 3.390 |
| 0.36757174 | 29.7226 | 10.512 | 7653.2 | 3.9680 | 7657.2 | 0.00 | 3.373 |
| 0.36940960 | 29.7132 | 10.518 | 7619.6 | 3.9899 | 7623.6 | 0.00 | 3.356 |
| 0.37125665 | 29.6888 | 10.525 | 7586.2 | 4.0119 | 7590.2 | 0.00 | 3.340 |
| 0.37311293 | 29.6331 | 10.531 | 7552.9 | 4.0339 | 7557.0 | 0.00 | 3.323 |
| 0.37497850 | 29.4654 | 10.537 | 7519.8 | 4.0560 | 7523.9 | 0.00 | 3.306 |
| 0.37534905 | 29.3702 | 10.538 | 7513.3 | 4.0604 | 7517.4 | 0.00 | 3.303 |
| 0.37625097 | 29.3860 | 11.074 | 7876.5 | 4.0710 | 7880.6 | 0.00 | 3.295 |
| 0.37685339 | 29.5405 | 11.077 | 7865.6 | 4.0781 | 7869.7 | 0.00 | 3.290 |
| 0.37873766 | 29.7481 | 11.084 | 7831.7 | 4.1003 | 7835.8 | 0.00 | 3.274 |
| 0.38063135 | 29.8664 | 11.092 | 7797.9 | 4.1225 | 7802.0 | 0.00 | 3.257 |
| 0.38253450 | 29.9570 | 11.099 | 7764.2 | 4.1447 | 7768.3 | 0.00 | 3.241 |
| 0.38444718 | 30.0339 | 11.106 | 7730.6 | 4.1670 | 7734.8 | 0.00 | 3.225 |
| 0.38636941 | 30.1027 | 11.113 | 7697.2 | 4.1893 | 7701.4 | 0.00 | 3.209 |
| 0.38830126 | 30.1662 | 11.121 | 7663.9 | 4.2116 | 7668.1 | 0.00 | 3.193 |
| 0.39024276 | 30.2258 | 11.128 | 7630.7 | 4.2340 | 7634.9 | 0.00 | 3.177 |
| 0.39219398 | 30.2827 | 11.135 | 7597.6 | 4.2564 | 7601.9 | 0.00 | 3.161 |
| 0.39415495 | 30.3374 | 11.142 | 7564.6 | 4.2788 | 7568.9 | 0.00 | 3.146 |
| 0.39612572 | 30.3904 | 11.149 | 7531.8 | 4.3013 | 7536.1 | 0.00 | 3.130 |
| 0.39810635 | 30.4421 | 11.156 | 7499.0 | 4.3238 | 7503.3 | 0.00 | 3.114 |
| 0.40009688 | 30.4928 | 11.163 | 7466.3 | 4.3464 | 7470.6 | 0.00 | 3.099 |
| 0.40209737 | 30.5425 | 11.170 | 7433.6 | 4.3690 | 7438.0 | 0.00 | 3.083 |
| 0.40410785 | 30.5915 | 11.176 | 7401.1 | 4.3916 | 7405.5 | 0.00 | 3.068 |
| 0.40612839 | 30.6399 | 11.183 | 7368.6 | 4.4142 | 7373.1 | 0.00 | 3.053 |
| 0.40815904 | 30.6877 | 11.190 | 7336.2 | 4.4369 | 7340.7 | 0.00 | 3.038 |
| 0.41019983 | 30.7352 | 11.196 | 7303.9 | 4.4596 | 7308.4 | 0.00 | 3.023 |
| 0.41225083 | 30.7822 | 11.202 | 7271.6 | 4.4823 | 7276.1 | 0.00 | 3.007 |
| 0.41431208 | 30.8289 | 11.208 | 7239.4 | 4.5050 | 7243.9 | 0.00 | 2.993 |
| 0.41638364 | 30.8754 | 11.214 | 7207.2 | 4.5278 | 7211.8 | 0.00 | 2.978 |
| 0.41846556 | 30.9217 | 11.220 | 7175.1 | 4.5506 | 7179.7 | 0.00 | 2.963 |
| 0.42055789 | 30.9677 | 11.226 | 7143.0 | 4.5735 | 7147.6 | 0.00 | 2.948 |
| 0.42266068 | 31.0021 | 11.231 | 7110.9 | 4.5963 | 7115.5 | 0.00 | 2.933 |
| 0.42477398 | 31.0478 | 11.237 | 7078.9 | 4.6192 | 7083.5 | 0.00 | 2.919 |
| 0.42689785 | 31.0934 | 11.242 | 7046.8 | 4.6421 | 7051.5 | 0.00 | 2.904 |
| 0.42903234 | 31.1389 | 11.247 | 7014.8 | 4.6650 | 7019.5 | 0.00 | 2.890 |
| 0.43117750 | 31.1842 | 11.251 | 6982.8 | 4.6880 | 6987.5 | 0.00 | 2.875 |
| 0.43333339 | 31.2295 | 11.256 | 6950.9 | 4.7109 | 6955.6 | 0.00 | 2.861 |
| 0.43550006 | 31.2747 | 11.260 | 6918.9 | 4.7339 | 6923.6 | 0.00 | 2.847 |
| 0.43767756 | 31.3198 | 11.264 | 6886.9 | 4.7570 | 6891.7 | 0.00 | 2.833 |
| 0.43986595 | 31.3649 | 11.268 | 6855.0 | 4.7800 | 6859.7 | 0.00 | 2.819 |
| 0.44206528 | 31.4099 | 11.271 | 6823.0 | 4.8030 | 6827.8 | 0.00 | 2.805 |
| 0.44427560 | 31.4548 | 11.275 | 6791.1 | 4.8261 | 6795.9 | 0.00 | 2.791 |
| 0.44649698 | 31.4997 | 11.278 | 6759.1 | 4.8492 | 6764.0 | 0.00 | 2.777 |
| 0.44872947 | 31.5445 | 11.280 | 6727.2 | 4.8723 | 6732.0 | 0.00 | 2.763 |
| 0.45097311 | 31.5892 | 11.283 | 6695.2 | 4.8954 | 6700.1 | 0.00 | 2.749 |
| 0.45322798 | 31.6339 | 11.285 | 6663.2 | 4.9185 | 6668.2 | 0.00 | 2.736 |
| 0.45549412 | 31.6786 | 11.287 | 6631.3 | 4.9417 | 6636.2 | 0.00 | 2.722 |
| 0.45777159 | 31.7232 | 11.289 | 6599.3 | 4.9648 | 6604.3 | 0.00 | 2.708 |
| 0.46006045 | 31.7678 | 11.291 | 6567.3 | 4.9880 | 6572.3 | 0.00 | 2.695 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Gd ($Z=64$) | | | | | | | |
| 0.46236075 | 31.8123 | 11.292 | 6535.3 | 5.0112 | 6540.3 | 0.00 | 2.682 |
| 0.46467255 | 31.8567 | 11.293 | 6503.3 | 5.0344 | 6508.4 | 0.00 | 2.668 |
| 0.46699592 | 31.9011 | 11.293 | 6471.3 | 5.0576 | 6476.4 | 0.00 | 2.655 |
| 0.46933090 | 31.9454 | 11.294 | 6439.3 | 5.0808 | 6444.4 | 0.00 | 2.642 |
| 0.47167755 | 31.9897 | 11.294 | 6407.3 | 5.1040 | 6412.4 | 0.00 | 2.629 |
| 0.47403594 | 32.0339 | 11.293 | 6375.2 | 5.1272 | 6380.4 | 0.00 | 2.616 |
| 0.47640612 | 32.0780 | 11.293 | 6343.2 | 5.1504 | 6348.3 | 0.00 | 2.602 |
| 0.47878815 | 32.1220 | 11.292 | 6311.1 | 5.1737 | 6316.3 | 0.00 | 2.590 |
| 0.48118209 | 32.1660 | 11.290 | 6279.0 | 5.1969 | 6284.2 | 0.00 | 2.577 |
| 0.48358800 | 32.2098 | 11.289 | 6246.9 | 5.2202 | 6252.1 | 0.00 | 2.564 |
| 0.48600594 | 32.2536 | 11.287 | 6214.8 | 5.2434 | 6220.0 | 0.00 | 2.551 |
| 0.48843597 | 32.2973 | 11.285 | 6182.7 | 5.2667 | 6187.9 | 0.00 | 2.538 |
| 0.49087815 | 32.3408 | 11.282 | 6150.5 | 5.2899 | 6155.8 | 0.00 | 2.526 |
| 0.49333254 | 32.3843 | 11.279 | 6118.4 | 5.3132 | 6123.7 | 0.00 | 2.513 |
| 0.49579920 | 32.4276 | 11.276 | 6086.2 | 5.3365 | 6091.5 | 0.00 | 2.501 |
| 0.49827820 | 32.4708 | 11.273 | 6054.0 | 5.3597 | 6059.4 | 0.00 | 2.488 |
| 0.50076959 | 32.5139 | 11.269 | 6021.9 | 5.3830 | 6027.2 | 0.00 | 2.476 |
| 0.50327344 | 32.5568 | 11.265 | 5989.7 | 5.4062 | 5995.1 | 0.00 | 2.464 |
| 0.50578980 | 32.5996 | 11.260 | 5957.5 | 5.4295 | 5962.9 | 0.00 | 2.451 |
| 0.50831875 | 32.6423 | 11.255 | 5925.2 | 5.4527 | 5930.7 | 0.00 | 2.439 |
| 0.51086035 | 32.6848 | 11.250 | 5893.0 | 5.4760 | 5898.5 | 0.00 | 2.427 |
| 0.51341465 | 32.7271 | 11.244 | 5860.8 | 5.4992 | 5866.3 | 0.00 | 2.415 |
| 0.51598172 | 32.7693 | 11.238 | 5828.6 | 5.5224 | 5834.1 | 0.00 | 2.403 |
| 0.51856163 | 32.8112 | 11.232 | 5796.3 | 5.5456 | 5801.9 | 0.00 | 2.391 |
| 0.52115444 | 32.8530 | 11.226 | 5764.1 | 5.5689 | 5769.6 | 0.00 | 2.379 |
| 0.52376021 | 32.8946 | 11.219 | 5731.8 | 5.5921 | 5737.4 | 0.00 | 2.367 |
| 0.52637901 | 32.9360 | 11.211 | 5699.6 | 5.6153 | 5705.2 | 0.00 | 2.355 |
| 0.52901091 | 32.9772 | 11.204 | 5667.3 | 5.6384 | 5673.0 | 0.00 | 2.344 |
| 0.53165596 | 33.0182 | 11.196 | 5635.1 | 5.6616 | 5640.8 | 0.00 | 2.332 |
| 0.53431424 | 33.0590 | 11.187 | 5602.9 | 5.6848 | 5608.6 | 0.00 | 2.320 |
| 0.53698581 | 33.0995 | 11.178 | 5570.6 | 5.7079 | 5576.3 | 0.00 | 2.309 |
| 0.53967074 | 33.1398 | 11.169 | 5538.4 | 5.7311 | 5544.1 | 0.00 | 2.297 |
| 0.54236910 | 33.1798 | 11.160 | 5506.2 | 5.7542 | 5512.0 | 0.00 | 2.286 |
| 0.54508094 | 33.2196 | 11.150 | 5474.0 | 5.7773 | 5479.8 | 0.00 | 2.275 |
| 0.54780635 | 33.2592 | 11.140 | 5441.8 | 5.8004 | 5447.6 | 0.00 | 2.263 |
| 0.55054538 | 33.2984 | 11.129 | 5409.6 | 5.8234 | 5415.5 | 0.00 | 2.252 |
| 0.55329810 | 33.3374 | 11.119 | 5377.5 | 5.8465 | 5383.3 | 0.00 | 2.241 |
| 0.55606460 | 33.3761 | 11.107 | 5345.3 | 5.8695 | 5351.2 | 0.00 | 2.230 |
| 0.55884492 | 33.4146 | 11.096 | 5313.2 | 5.8925 | 5319.1 | 0.00 | 2.219 |
| 0.56163914 | 33.4527 | 11.084 | 5281.1 | 5.9155 | 5287.0 | 0.00 | 2.208 |
| 0.56444734 | 33.4905 | 11.072 | 5249.0 | 5.9385 | 5254.9 | 0.00 | 2.197 |
| 0.56726958 | 33.5280 | 11.059 | 5216.9 | 5.9614 | 5222.8 | 0.00 | 2.186 |
| 0.57010592 | 33.5652 | 11.046 | 5184.8 | 5.9844 | 5190.7 | 0.00 | 2.175 |
| 0.57295645 | 33.6020 | 11.032 | 5152.6 | 6.0073 | 5158.6 | 0.00 | 2.164 |
| 0.57582123 | 33.6385 | 11.018 | 5120.5 | 6.0301 | 5126.5 | 0.00 | 2.153 |
| 0.57870034 | 33.6746 | 11.004 | 5088.4 | 6.0530 | 5094.4 | 0.00 | 2.142 |
| 0.58159384 | 33.7102 | 10.989 | 5056.2 | 6.0758 | 5062.3 | 0.00 | 2.132 |
| 0.58450181 | 33.7455 | 10.974 | 5024.1 | 6.0986 | 5030.2 | 0.00 | 2.121 |
| 0.58742432 | 33.7803 | 10.958 | 4992.0 | 6.1214 | 4998.1 | 0.00 | 2.111 |
| 0.59036144 | 33.8147 | 10.942 | 4959.9 | 6.1441 | 4966.0 | 0.00 | 2.100 |
| 0.59331325 | 33.8487 | 10.926 | 4927.8 | 6.1668 | 4934.0 | 0.00 | 2.090 |
| 0.59627982 | 33.8822 | 10.909 | 4895.7 | 6.1895 | 4901.9 | 0.00 | 2.079 |
| 0.59926122 | 33.9152 | 10.892 | 4863.7 | 6.2121 | 4869.9 | 0.00 | 2.069 |
| 0.60225752 | 33.9477 | 10.874 | 4831.7 | 6.2347 | 4838.0 | 0.00 | 2.059 |
| 0.60526881 | 33.9797 | 10.856 | 4799.8 | 6.2573 | 4806.0 | 0.00 | 2.048 |
| 0.60829515 | 34.0112 | 10.838 | 4767.8 | 6.2798 | 4774.1 | 0.00 | 2.038 |
| 0.61133663 | 34.0421 | 10.819 | 4735.9 | 6.3023 | 4742.2 | 0.00 | 2.028 |
| 0.61439331 | 34.0726 | 10.800 | 4704.1 | 6.3248 | 4710.4 | 0.00 | 2.018 |
| 0.61746528 | 34.1024 | 10.781 | 4672.3 | 6.3472 | 4678.7 | 0.00 | 2.008 |
| 0.62055260 | 34.1317 | 10.761 | 4640.6 | 6.3696 | 4646.9 | 0.00 | 1.998 |
| 0.62365537 | 34.1604 | 10.741 | 4608.9 | 6.3919 | 4615.3 | 0.00 | 1.988 |
| 0.62677364 | 34.1886 | 10.721 | 4577.3 | 6.4142 | 4583.7 | 0.00 | 1.978 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Gd ($Z=64$) | | | | | | | |
| 0.62990751 | 34.2161 | 10.700 | 4545.7 | 6.4365 | 4552.1 | 0.00 | 1.968 |
| 0.63305705 | 34.2430 | 10.679 | 4514.2 | 6.4587 | 4520.7 | 0.00 | 1.959 |
| 0.63622234 | 34.2693 | 10.658 | 4482.8 | 6.4809 | 4489.3 | 0.00 | 1.949 |
| 0.63940345 | 34.2950 | 10.636 | 4451.4 | 6.5030 | 4457.9 | 0.00 | 1.939 |
| 0.64260046 | 34.3200 | 10.614 | 4420.2 | 6.5251 | 4426.7 | 0.00 | 1.929 |
| 0.64581347 | 34.3443 | 10.592 | 4389.0 | 6.5472 | 4395.5 | 0.00 | 1.920 |
| 0.64904253 | 34.3680 | 10.570 | 4357.9 | 6.5692 | 4364.4 | 0.00 | 1.910 |
| 0.65228775 | 34.3910 | 10.547 | 4326.8 | 6.5911 | 4333.4 | 0.00 | 1.901 |
| 0.65554919 | 34.4133 | 10.524 | 4295.9 | 6.6130 | 4302.5 | 0.00 | 1.891 |
| 0.65882693 | 34.4349 | 10.500 | 4265.1 | 6.6349 | 4271.7 | 0.00 | 1.882 |
| 0.66212107 | 34.4558 | 10.477 | 4234.3 | 6.6567 | 4241.0 | 0.00 | 1.873 |
| 0.66543167 | 34.4760 | 10.453 | 4203.6 | 6.6784 | 4210.3 | 0.00 | 1.863 |
| 0.66875883 | 34.4954 | 10.429 | 4173.1 | 6.7001 | 4179.8 | 0.00 | 1.854 |
| 0.67210262 | 34.5141 | 10.405 | 4142.6 | 6.7218 | 4149.4 | 0.00 | 1.845 |
| 0.67546314 | 34.5320 | 10.380 | 4112.3 | 6.7434 | 4119.0 | 0.00 | 1.836 |
| 0.67884045 | 34.5491 | 10.355 | 4082.0 | 6.7649 | 4088.8 | 0.00 | 1.826 |
| 0.68223466 | 34.5655 | 10.330 | 4051.9 | 6.7864 | 4058.7 | 0.00 | 1.817 |
| 0.68564583 | 34.5810 | 10.305 | 4021.8 | 6.8078 | 4028.6 | 0.00 | 1.808 |
| 0.68907406 | 34.5957 | 10.279 | 3991.9 | 6.8292 | 3998.7 | 0.00 | 1.799 |
| 0.69251943 | 34.6097 | 10.253 | 3962.1 | 6.8505 | 3969.0 | 0.00 | 1.790 |
| 0.69598202 | 34.6227 | 10.227 | 3932.4 | 6.8717 | 3939.3 | 0.00 | 1.781 |
| 0.69946194 | 34.6349 | 10.201 | 3902.8 | 6.8929 | 3909.7 | 0.00 | 1.773 |
| 0.70295924 | 34.6463 | 10.175 | 3873.4 | 6.9141 | 3880.3 | 0.00 | 1.764 |
| 0.70647404 | 34.6568 | 10.148 | 3844.1 | 6.9351 | 3851.0 | 0.00 | 1.755 |
| 0.71000641 | 34.6664 | 10.122 | 3814.9 | 6.9561 | 3821.8 | 0.00 | 1.746 |
| 0.71355644 | 34.6751 | 10.095 | 3785.8 | 6.9771 | 3792.8 | 0.00 | 1.738 |
| 0.71712423 | 34.6828 | 10.068 | 3756.9 | 6.9979 | 3763.9 | 0.00 | 1.729 |
| 0.72070985 | 34.6897 | 10.041 | 3728.1 | 7.0188 | 3735.1 | 0.00 | 1.720 |
| 0.72431340 | 34.6956 | 10.013 | 3699.4 | 7.0395 | 3706.5 | 0.00 | 1.712 |
| 0.72793496 | 34.7005 | 9.9857 | 3670.9 | 7.0602 | 3678.0 | 0.00 | 1.703 |
| 0.73157464 | 34.7045 | 9.9580 | 3642.5 | 7.0808 | 3649.6 | 0.00 | 1.695 |
| 0.73523251 | 34.7074 | 9.9302 | 3614.3 | 7.1013 | 3621.4 | 0.00 | 1.686 |
| 0.73890867 | 34.7094 | 9.9022 | 3586.2 | 7.1218 | 3593.3 | 0.00 | 1.678 |
| 0.74260322 | 34.7103 | 9.8741 | 3558.2 | 7.1422 | 3565.3 | 0.00 | 1.670 |
| 0.74631623 | 34.7102 | 9.8459 | 3530.4 | 7.1626 | 3537.5 | 0.00 | 1.661 |
| 0.75004781 | 34.7091 | 9.8176 | 3502.7 | 7.1828 | 3509.9 | 0.00 | 1.653 |
| 0.75379805 | 34.7069 | 9.7891 | 3475.2 | 7.2030 | 3482.4 | 0.00 | 1.645 |
| 0.75756704 | 34.7035 | 9.7605 | 3447.8 | 7.2231 | 3455.0 | 0.00 | 1.637 |
| 0.76135488 | 34.6991 | 9.7319 | 3420.6 | 7.2432 | 3427.8 | 0.00 | 1.628 |
| 0.76516165 | 34.6935 | 9.7031 | 3393.5 | 7.2631 | 3400.7 | 0.00 | 1.620 |
| 0.76898746 | 34.6868 | 9.6742 | 3366.5 | 7.2830 | 3373.8 | 0.00 | 1.612 |
| 0.77283240 | 34.6789 | 9.6452 | 3339.8 | 7.3028 | 3347.1 | 0.00 | 1.604 |
| 0.77669656 | 34.6699 | 9.6162 | 3313.1 | 7.3226 | 3320.5 | 0.00 | 1.596 |
| 0.78058004 | 34.6596 | 9.5870 | 3286.7 | 7.3422 | 3294.0 | 0.00 | 1.588 |
| 0.78448294 | 34.6480 | 9.5578 | 3260.3 | 7.3618 | 3267.7 | 0.00 | 1.580 |
| 0.78840536 | 34.6353 | 9.5285 | 3234.2 | 7.3813 | 3241.6 | 0.00 | 1.573 |
| 0.79234738 | 34.6212 | 9.4991 | 3208.2 | 7.4007 | 3215.6 | 0.00 | 1.565 |
| 0.79630912 | 34.6058 | 9.4697 | 3182.3 | 7.4200 | 3189.7 | 0.00 | 1.557 |
| 0.80029067 | 34.5891 | 9.4402 | 3156.6 | 7.4393 | 3164.1 | 0.00 | 1.549 |
| 0.80429212 | 34.5710 | 9.4107 | 3131.1 | 7.4585 | 3138.5 | 0.00 | 1.542 |
| 0.80831358 | 34.5516 | 9.3811 | 3105.7 | 7.4775 | 3113.2 | 0.00 | 1.534 |
| 0.81235515 | 34.5307 | 9.3514 | 3080.5 | 7.4965 | 3088.0 | 0.00 | 1.526 |
| 0.81641693 | 34.5113 | 9.3217 | 3055.4 | 7.5154 | 3062.9 | 0.00 | 1.519 |
| 0.82049901 | 34.4875 | 9.2920 | 3030.5 | 7.5343 | 3038.1 | 0.00 | 1.511 |
| 0.82460150 | 34.4622 | 9.2622 | 3005.8 | 7.5530 | 3013.3 | 0.00 | 1.504 |
| 0.82872451 | 34.4354 | 9.2324 | 2981.2 | 7.5716 | 2988.8 | 0.00 | 1.496 |
| 0.83286813 | 34.4070 | 9.2025 | 2956.8 | 7.5902 | 2964.4 | 0.00 | 1.489 |
| 0.83703248 | 34.3770 | 9.1727 | 2932.5 | 7.6087 | 2940.1 | 0.00 | 1.481 |
| 0.84121764 | 34.3453 | 9.1428 | 2908.4 | 7.6271 | 2916.0 | 0.00 | 1.474 |
| 0.84542373 | 34.3120 | 9.1129 | 2884.5 | 7.6453 | 2892.1 | 0.00 | 1.467 |
| 0.84965084 | 34.2769 | 9.0829 | 2860.7 | 7.6635 | 2868.4 | 0.00 | 1.459 |
| 0.85389910 | 34.2400 | 9.0530 | 2837.1 | 7.6816 | 2844.8 | 0.00 | 1.452 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Gd ($Z=64$) | | | | | | | |
| 0.85816859 | 34.2013 | 9.0230 | 2813.6 | 7.6996 | 2821.3 | 0.00 | 1.445 |
| 0.86245944 | 34.1607 | 8.9931 | 2790.3 | 7.7175 | 2798.1 | 0.00 | 1.438 |
| 0.86677173 | 34.1190 | 8.9631 | 2767.2 | 7.7354 | 2774.9 | 0.00 | 1.430 |
| 0.87110559 | 34.0745 | 8.9332 | 2744.2 | 7.7531 | 2752.0 | 0.00 | 1.423 |
| 0.87546112 | 34.0281 | 8.9032 | 2721.4 | 7.7707 | 2729.2 | 0.00 | 1.416 |
| 0.87983843 | 33.9795 | 8.8732 | 2698.8 | 7.7882 | 2706.6 | 0.00 | 1.409 |
| 0.88423762 | 33.9288 | 8.8433 | 2676.3 | 7.8057 | 2684.1 | 0.00 | 1.402 |
| 0.88865881 | 33.8760 | 8.8134 | 2654.0 | 7.8230 | 2661.8 | 0.00 | 1.395 |
| 0.89310210 | 33.8208 | 8.7835 | 2631.8 | 7.8402 | 2639.6 | 0.00 | 1.388 |
| 0.89756761 | 33.7633 | 8.7536 | 2609.8 | 7.8573 | 2617.7 | 0.00 | 1.381 |
| 0.90205545 | 33.7035 | 8.7237 | 2587.9 | 7.8744 | 2595.8 | 0.00 | 1.374 |
| 0.90656573 | 33.6411 | 8.6938 | 2566.3 | 7.8913 | 2574.1 | 0.00 | 1.368 |
| 0.91109856 | 33.5762 | 8.6640 | 2544.7 | 7.9081 | 2552.6 | 0.00 | 1.361 |
| 0.91565405 | 33.5087 | 8.6342 | 2523.4 | 7.9248 | 2531.3 | 0.00 | 1.354 |
| 0.92023232 | 33.4385 | 8.6044 | 2502.1 | 7.9414 | 2510.1 | 0.00 | 1.347 |
| 0.92483348 | 33.3655 | 8.5747 | 2481.1 | 7.9579 | 2489.1 | 0.00 | 1.341 |
| 0.92945765 | 33.2895 | 8.5450 | 2460.2 | 7.9743 | 2468.2 | 0.00 | 1.334 |
| 0.93410494 | 33.2106 | 8.5153 | 2439.5 | 7.9906 | 2447.5 | 0.00 | 1.327 |
| 0.93877546 | 33.1286 | 8.4857 | 2418.9 | 8.0068 | 2426.9 | 0.00 | 1.321 |
| 0.94346934 | 33.0435 | 8.4561 | 2398.5 | 8.0229 | 2406.5 | 0.00 | 1.314 |
| 0.94818668 | 32.9550 | 8.4266 | 2378.2 | 8.0389 | 2386.2 | 0.00 | 1.308 |
| 0.95292762 | 32.8631 | 8.3971 | 2358.1 | 8.0547 | 2366.1 | 0.00 | 1.301 |
| 0.95769226 | 32.7677 | 8.3676 | 2338.1 | 8.0705 | 2346.2 | 0.00 | 1.295 |
| 0.96248072 | 32.6686 | 8.3382 | 2318.3 | 8.0861 | 2326.4 | 0.00 | 1.288 |
| 0.96729312 | 32.5658 | 8.3089 | 2298.6 | 8.1017 | 2306.7 | 0.00 | 1.282 |
| 0.97212959 | 32.4592 | 8.2796 | 2279.1 | 8.1171 | 2287.3 | 0.00 | 1.275 |
| 0.97699023 | 32.3485 | 8.2503 | 2259.8 | 8.1324 | 2267.9 | 0.00 | 1.269 |
| 0.98187519 | 32.2338 | 8.2211 | 2240.6 | 8.1476 | 2248.7 | 0.00 | 1.263 |
| 0.98678456 | 32.1148 | 8.1920 | 2221.6 | 8.1627 | 2229.7 | 0.00 | 1.256 |
| 0.99171848 | 31.9916 | 8.1630 | 2202.7 | 8.1776 | 2210.8 | 0.00 | 1.250 |
| 0.99667708 | 31.8640 | 8.1339 | 2183.9 | 8.1925 | 2192.1 | 0.00 | 1.244 |
| 1.0016605 | 31.7259 | 8.0996 | 2163.9 | 8.2072 | 2172.1 | 0.00 | 1.238 |
| 1.0066688 | 31.5686 | 8.0546 | 2141.2 | 8.2219 | 2149.4 | 0.00 | 1.232 |
| 1.0117021 | 31.4033 | 8.0100 | 2118.7 | 8.2364 | 2126.9 | 0.00 | 1.226 |
| 1.0167606 | 31.2296 | 7.9656 | 2096.5 | 8.2507 | 2104.7 | 0.00 | 1.219 |
| 1.0218444 | 31.0473 | 7.9215 | 2074.5 | 8.2650 | 2082.7 | 0.00 | 1.213 |
| 1.0269536 | 30.8556 | 7.8777 | 2052.7 | 8.2792 | 2061.0 | 0.00 | 1.207 |
| 1.0320884 | 30.6542 | 7.8341 | 2031.2 | 8.2932 | 2039.5 | 0.00 | 1.201 |
| 1.0372489 | 30.4423 | 7.7909 | 2010.0 | 8.3071 | 2018.3 | 0.00 | 1.195 |
| 1.0424351 | 30.2191 | 7.7479 | 1989.0 | 8.3209 | 1997.3 | 0.00 | 1.189 |
| 1.0476473 | 29.9839 | 7.7053 | 1968.2 | 8.3346 | 1976.5 | 0.00 | 1.183 |
| 1.0528855 | 29.7357 | 7.6629 | 1947.6 | 8.3481 | 1955.9 | 0.00 | 1.178 |
| 1.0581499 | 29.4734 | 7.6208 | 1927.3 | 8.3615 | 1935.6 | 0.00 | 1.172 |
| 1.0634407 | 29.1958 | 7.5789 | 1907.1 | 8.3748 | 1915.5 | 0.00 | 1.166 |
| 1.0687579 | 28.9016 | 7.5374 | 1887.3 | 8.3880 | 1895.6 | 0.00 | 1.160 |
| 1.0741017 | 28.5893 | 7.4961 | 1867.6 | 8.4011 | 1876.0 | 0.00 | 1.154 |
| 1.0794722 | 28.2568 | 7.4551 | 1848.1 | 8.4140 | 1856.5 | 0.00 | 1.149 |
| 1.0848695 | 27.9023 | 7.4140 | 1828.8 | 8.4268 | 1837.2 | 0.00 | 1.143 |
| 1.0902939 | 27.5231 | 7.3716 | 1809.3 | 8.4395 | 1817.7 | 0.00 | 1.137 |
| 1.0957454 | 27.1163 | 7.3296 | 1790.0 | 8.4521 | 1798.5 | 0.00 | 1.132 |
| 1.1012241 | 26.6784 | 7.2878 | 1771.0 | 8.4645 | 1779.4 | 0.00 | 1.126 |
| 1.1067302 | 26.2054 | 7.2464 | 1752.1 | 8.4768 | 1760.6 | 0.00 | 1.120 |
| 1.1122639 | 25.6921 | 7.2052 | 1733.5 | 8.4890 | 1742.0 | 0.00 | 1.115 |
| 1.1178252 | 25.1323 | 7.1643 | 1715.1 | 8.5010 | 1723.6 | 0.00 | 1.109 |
| 1.1234143 | 24.5182 | 7.1237 | 1696.9 | 8.5129 | 1705.4 | 0.00 | 1.104 |
| 1.1290314 | 23.8396 | 7.0834 | 1678.9 | 8.5247 | 1687.4 | 0.00 | 1.098 |
| 1.1346765 | 23.0837 | 7.0433 | 1661.1 | 8.5364 | 1669.6 | 0.00 | 1.093 |
| 1.1403499 | 22.2325 | 7.0035 | 1643.5 | 8.5479 | 1652.0 | 0.00 | 1.087 |
| 1.1460517 | 21.2613 | 6.9640 | 1626.1 | 8.5593 | 1634.6 | 0.00 | 1.082 |
| 1.1517819 | 20.1339 | 6.9248 | 1608.9 | 8.5706 | 1617.5 | 0.00 | 1.076 |
| 1.1575408 | 18.7939 | 6.8853 | 1591.7 | 8.5817 | 1600.3 | 0.00 | 1.071 |
| 1.1633285 | 17.1463 | 6.8457 | 1574.7 | 8.5927 | 1583.3 | 0.00 | 1.066 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Gd ($Z=64$) | | | | | | | |
| 1.1691452 | 15.0091 | 6.8064 | 1557.9 | 8.6036 | 1566.5 | 0.00 | 1.060 |
| 1.1749909 | 11.9519 | 6.7674 | 1541.2 | 8.6144 | 1549.9 | 0.00 | 1.055 |
| 1.1808659 | 6.37618 | 6.7286 | 1524.8 | 8.6250 | 1533.4 | 0.00 | 1.050 |
| 1.1850578 | -14.7683 | 6.7012 | 1513.2 | 8.6324 | 1521.8 | 0.00 | 1.046 |
| 1.1853422 | -15.1056 | 25.900 | 5847.2 | 8.6329 | 5855.9 | 0.00 | 1.046 |
| 1.1867702 | -0.517733 | 25.854 | 5829.7 | 8.6354 | 5838.3 | 0.00 | 1.045 |
| 1.1927040 | 8.46718 | 25.662 | 5757.7 | 8.6458 | 5766.3 | 0.00 | 1.040 |
| 1.1986676 | 11.1758 | 25.472 | 5686.6 | 8.6560 | 5695.2 | 0.00 | 1.034 |
| 1.2046609 | 12.0958 | 25.283 | 5616.4 | 8.6661 | 5625.1 | 0.00 | 1.029 |
| 1.2106842 | 11.3510 | 25.096 | 5547.1 | 8.6760 | 5555.7 | 0.00 | 1.024 |
| 1.2167376 | 2.28360 | 24.910 | 5478.6 | 8.6858 | 5487.3 | 0.00 | 1.019 |
| 1.2169590 | -0.280404 | 24.904 | 5476.1 | 8.6862 | 5484.8 | 0.00 | 1.019 |
| 1.2174410 | -0.374992 | 37.507 | 8244.3 | 8.6869 | 8253.0 | 0.00 | 1.018 |
| 1.2228213 | 13.4452 | 37.258 | 8153.4 | 8.6955 | 8162.1 | 0.00 | 1.014 |
| 1.2289354 | 17.5253 | 36.978 | 8051.9 | 8.7050 | 8060.6 | 0.00 | 1.009 |
| 1.2350801 | 20.1965 | 36.700 | 7951.6 | 8.7144 | 7960.4 | 0.00 | 1.004 |
| 1.2412555 | 22.2583 | 36.424 | 7852.6 | 8.7237 | 7861.4 | 0.00 | 0.9989 |
| 1.2474618 | 23.9629 | 36.151 | 7754.9 | 8.7328 | 7763.6 | 0.00 | 0.9939 |
| 1.2536991 | 25.4265 | 35.879 | 7658.4 | 8.7418 | 7667.1 | 0.00 | 0.9889 |
| 1.2599676 | 26.7135 | 35.610 | 7563.1 | 8.7506 | 7571.8 | 0.00 | 0.9840 |
| 1.2662674 | 27.8643 | 35.343 | 7469.0 | 8.7593 | 7477.7 | 0.00 | 0.9791 |
| 1.2725988 | 28.9059 | 35.077 | 7376.0 | 8.7679 | 7384.8 | 0.00 | 0.9743 |
| 1.2789618 | 29.8574 | 34.814 | 7284.3 | 8.7764 | 7293.1 | 0.00 | 0.9694 |
| 1.2853566 | 30.7332 | 34.553 | 7193.7 | 8.7846 | 7202.5 | 0.00 | 0.9646 |
| 1.2917833 | 31.5438 | 34.294 | 7104.2 | 8.7928 | 7113.0 | 0.00 | 0.9598 |
| 1.2982423 | 32.2980 | 34.037 | 7015.9 | 8.8008 | 7024.7 | 0.00 | 0.9550 |
| 1.3047335 | 33.0023 | 33.782 | 6928.7 | 8.8087 | 6937.5 | 0.00 | 0.9503 |
| 1.3112571 | 33.6624 | 33.529 | 6842.6 | 8.8164 | 6851.4 | 0.00 | 0.9455 |
| 1.3178134 | 34.2827 | 33.278 | 6757.5 | 8.8240 | 6766.4 | 0.00 | 0.9408 |
| 1.3244025 | 34.8671 | 33.029 | 6673.6 | 8.8315 | 6682.4 | 0.00 | 0.9362 |
| 1.3310245 | 35.4186 | 32.781 | 6590.7 | 8.8388 | 6599.5 | 0.00 | 0.9315 |
| 1.3376796 | 35.9401 | 32.536 | 6508.8 | 8.8460 | 6517.6 | 0.00 | 0.9269 |
| 1.3443680 | 36.4337 | 32.293 | 6428.0 | 8.8530 | 6436.8 | 0.00 | 0.9222 |
| 1.3510899 | 36.9016 | 32.051 | 6348.1 | 8.8599 | 6357.0 | 0.00 | 0.9177 |
| 1.3578453 | 37.3453 | 31.811 | 6269.3 | 8.8666 | 6278.2 | 0.00 | 0.9131 |
| 1.3646345 | 37.7665 | 31.574 | 6191.5 | 8.8732 | 6200.4 | 0.00 | 0.9086 |
| 1.3714577 | 38.1662 | 31.338 | 6114.6 | 8.8797 | 6123.5 | 0.00 | 0.9040 |
| 1.3783150 | 38.5457 | 31.103 | 6038.8 | 8.8860 | 6047.6 | 0.00 | 0.8995 |
| 1.3852066 | 38.9058 | 30.871 | 5963.8 | 8.8922 | 5972.7 | 0.00 | 0.8951 |
| 1.3921326 | 39.2473 | 30.640 | 5889.8 | 8.8982 | 5898.7 | 0.00 | 0.8906 |
| 1.3990933 | 39.5709 | 30.412 | 5816.8 | 8.9041 | 5825.7 | 0.00 | 0.8862 |
| 1.4060887 | 39.8771 | 30.185 | 5744.6 | 8.9099 | 5753.5 | 0.00 | 0.8818 |
| 1.4131192 | 40.1663 | 29.959 | 5673.4 | 8.9155 | 5682.3 | 0.00 | 0.8774 |
| 1.4201848 | 40.4386 | 29.736 | 5603.0 | 8.9209 | 5612.0 | 0.00 | 0.8730 |
| 1.4272857 | 40.6942 | 29.514 | 5533.6 | 8.9262 | 5542.5 | 0.00 | 0.8687 |
| 1.4344221 | 40.9331 | 29.294 | 5465.0 | 8.9314 | 5473.9 | 0.00 | 0.8643 |
| 1.4415942 | 41.1549 | 29.076 | 5397.3 | 8.9364 | 5406.2 | 0.00 | 0.8600 |
| 1.4488022 | 41.3593 | 28.859 | 5330.4 | 8.9413 | 5339.3 | 0.00 | 0.8558 |
| 1.4560462 | 41.5454 | 28.644 | 5264.4 | 8.9461 | 5273.3 | 0.00 | 0.8515 |
| 1.4633265 | 41.7121 | 28.431 | 5199.1 | 8.9507 | 5208.1 | 0.00 | 0.8473 |
| 1.4706431 | 41.8580 | 28.219 | 5134.8 | 8.9551 | 5143.7 | 0.00 | 0.8431 |
| 1.4779963 | 41.9806 | 28.009 | 5071.2 | 8.9594 | 5080.1 | 0.00 | 0.8389 |
| 1.4853863 | 42.0769 | 27.800 | 5008.4 | 8.9636 | 5017.3 | 0.00 | 0.8347 |
| 1.4928132 | 42.1419 | 27.593 | 4946.4 | 8.9676 | 4955.3 | 0.00 | 0.8305 |
| 1.5002773 | 42.1684 | 27.388 | 4885.2 | 8.9715 | 4894.1 | 0.00 | 0.8264 |
| 1.5077787 | 42.1448 | 27.184 | 4824.7 | 8.9752 | 4833.6 | 0.00 | 0.8223 |
| 1.5153176 | 42.0507 | 26.982 | 4764.9 | 8.9788 | 4773.9 | 0.00 | 0.8182 |
| 1.5228942 | 41.8463 | 26.781 | 4705.9 | 8.9822 | 4714.9 | 0.00 | 0.8141 |
| 1.5305086 | 41.4359 | 26.582 | 4647.7 | 8.9855 | 4656.7 | 0.00 | 0.8101 |
| 1.5381612 | 40.4625 | 26.384 | 4590.1 | 8.9886 | 4599.1 | 0.00 | 0.8061 |
| 1.5427108 | 38.4229 | 26.267 | 4556.3 | 8.9904 | 4565.3 | 0.00 | 0.8037 |
| 1.5452893 | 38.4315 | 30.743 | 5323.8 | 8.9914 | 5332.8 | 0.00 | 0.8023 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Gd ($Z=64$) | | | | | | | |
| 1.5458520 | 38.9750 | 30.725 | 5318.7 | 8.9916 | 5327.7 | 0.00 | 0.8020 |
| 1.5535812 | 41.5876 | 30.476 | 5249.4 | 8.9945 | 5258.4 | 0.00 | 0.7981 |
| 1.5613491 | 42.6547 | 30.229 | 5180.9 | 8.9972 | 5189.9 | 0.00 | 0.7941 |
| 1.5691559 | 43.3830 | 29.984 | 5113.4 | 8.9998 | 5122.4 | 0.00 | 0.7901 |
| 1.5770017 | 43.9517 | 29.741 | 5046.7 | 9.0022 | 5055.7 | 0.00 | 0.7862 |
| 1.5848867 | 44.4237 | 29.499 | 4980.8 | 9.0044 | 4989.8 | 0.00 | 0.7823 |
| 1.5928111 | 44.8279 | 29.258 | 4915.5 | 9.0066 | 4924.5 | 0.00 | 0.7784 |
| 1.6007752 | 45.1798 | 29.019 | 4851.1 | 9.0085 | 4860.1 | 0.00 | 0.7745 |
| 1.6087790 | 45.4880 | 28.782 | 4787.5 | 9.0104 | 4796.5 | 0.00 | 0.7707 |
| 1.6168229 | 45.7569 | 28.547 | 4724.8 | 9.0121 | 4733.8 | 0.00 | 0.7668 |
| 1.6249070 | 45.9888 | 28.326 | 4665.0 | 9.0136 | 4674.0 | 0.00 | 0.7630 |
| 1.6330316 | 46.1953 | 28.116 | 4607.4 | 9.0150 | 4616.4 | 0.00 | 0.7592 |
| 1.6411967 | 46.3751 | 27.910 | 4550.7 | 9.0163 | 4559.7 | 0.00 | 0.7555 |
| 1.6494027 | 46.5238 | 27.705 | 4495.0 | 9.0174 | 4504.0 | 0.00 | 0.7517 |
| 1.6576497 | 46.6335 | 27.504 | 4440.1 | 9.0183 | 4449.1 | 0.00 | 0.7480 |
| 1.6659380 | 46.6876 | 27.305 | 4386.0 | 9.0192 | 4395.0 | 0.00 | 0.7442 |
| 1.6742677 | 46.6433 | 27.108 | 4332.8 | 9.0198 | 4341.8 | 0.00 | 0.7405 |
| 1.6826390 | 46.3288 | 26.914 | 4280.4 | 9.0204 | 4289.4 | 0.00 | 0.7368 |
| 1.6868076 | 45.6433 | 26.819 | 4254.7 | 9.0206 | 4263.7 | 0.00 | 0.7350 |
| 1.6897925 | 45.6961 | 28.633 | 4534.3 | 9.0207 | 4543.4 | 0.00 | 0.7337 |
| 1.6910522 | 46.0974 | 28.601 | 4525.9 | 9.0207 | 4534.9 | 0.00 | 0.7332 |
| 1.6995075 | 47.1547 | 28.389 | 4470.0 | 9.0210 | 4479.1 | 0.00 | 0.7295 |
| 1.7080050 | 47.6933 | 28.179 | 4415.0 | 9.0211 | 4424.0 | 0.00 | 0.7259 |
| 1.7165450 | 48.0981 | 27.972 | 4360.8 | 9.0210 | 4369.8 | 0.00 | 0.7223 |
| 1.7251278 | 48.4359 | 27.768 | 4307.3 | 9.0208 | 4316.4 | 0.00 | 0.7187 |
| 1.7337534 | 48.7315 | 27.566 | 4254.7 | 9.0205 | 4263.7 | 0.00 | 0.7151 |
| 1.7424222 | 48.9965 | 27.366 | 4202.8 | 9.0200 | 4211.8 | 0.00 | 0.7116 |
| 1.7511343 | 49.2374 | 27.168 | 4151.7 | 9.0194 | 4160.7 | 0.00 | 0.7080 |
| 1.7598899 | 49.4580 | 26.972 | 4101.3 | 9.0186 | 4110.3 | 0.00 | 0.7045 |
| 1.7686894 | 49.6599 | 26.779 | 4051.6 | 9.0177 | 4060.6 | 0.00 | 0.7010 |
| 1.7775328 | 49.8450 | 26.594 | 4003.7 | 9.0166 | 4012.7 | 0.00 | 0.6975 |
| 1.7864205 | 50.0193 | 26.416 | 3957.0 | 9.0154 | 3966.0 | 0.00 | 0.6940 |
| 1.7953526 | 50.1830 | 26.240 | 3911.1 | 9.0141 | 3920.1 | 0.00 | 0.6906 |
| 1.8043294 | 50.3355 | 26.066 | 3865.8 | 9.0126 | 3874.8 | 0.00 | 0.6871 |
| 1.8133510 | 50.4763 | 25.894 | 3821.2 | 9.0109 | 3830.3 | 0.00 | 0.6837 |
| 1.8224178 | 50.6043 | 25.725 | 3777.4 | 9.0092 | 3786.4 | 0.00 | 0.6803 |
| 1.8315299 | 50.7176 | 25.557 | 3734.1 | 9.0073 | 3743.1 | 0.00 | 0.6769 |
| 1.8406875 | 50.8127 | 25.392 | 3691.5 | 9.0052 | 3700.5 | 0.00 | 0.6736 |
| 1.8498909 | 50.8829 | 25.229 | 3649.5 | 9.0030 | 3658.5 | 0.00 | 0.6702 |
| 1.8591404 | 50.9135 | 25.067 | 3608.1 | 9.0006 | 3617.1 | 0.00 | 0.6669 |
| 1.8684361 | 50.8640 | 24.908 | 3567.3 | 8.9982 | 3576.3 | 0.00 | 0.6636 |
| 1.8777783 | 50.4941 | 24.750 | 3527.1 | 8.9955 | 3536.1 | 0.00 | 0.6603 |
| 1.8778472 | 50.4867 | 24.749 | 3526.8 | 8.9955 | 3535.8 | 0.00 | 0.6602 |
| 1.8837529 | 50.5743 | 25.825 | 3668.7 | 8.9938 | 3677.7 | 0.00 | 0.6582 |
| 1.8871672 | 50.9179 | 25.767 | 3653.8 | 8.9928 | 3662.8 | 0.00 | 0.6570 |
| 1.8966030 | 51.4087 | 25.609 | 3613.3 | 8.9898 | 3622.3 | 0.00 | 0.6537 |
| 1.9060860 | 51.7311 | 25.452 | 3573.3 | 8.9868 | 3582.3 | 0.00 | 0.6505 |
| 1.9156165 | 51.9939 | 25.297 | 3533.8 | 8.9836 | 3542.8 | 0.00 | 0.6472 |
| 1.9251945 | 52.2248 | 25.143 | 3494.9 | 8.9803 | 3503.8 | 0.00 | 0.6440 |
| 1.9348205 | 52.4354 | 24.991 | 3456.4 | 8.9768 | 3465.4 | 0.00 | 0.6408 |
| 1.9444946 | 52.6314 | 24.840 | 3418.4 | 8.9732 | 3427.4 | 0.00 | 0.6376 |
| 1.9542171 | 52.8165 | 24.690 | 3381.0 | 8.9694 | 3389.9 | 0.00 | 0.6344 |
| 1.9639882 | 52.9929 | 24.542 | 3344.0 | 8.9655 | 3352.9 | 0.00 | 0.6313 |
| 1.9738081 | 53.1619 | 24.395 | 3307.4 | 8.9615 | 3316.4 | 0.00 | 0.6281 |
| 1.9836772 | 53.3252 | 24.251 | 3271.5 | 8.9573 | 3280.4 | 0.00 | 0.6250 |
| 1.9935955 | 53.4841 | 24.108 | 3236.0 | 8.9530 | 3245.0 | 0.00 | 0.6219 |
| 2.0035635 | 53.6394 | 23.966 | 3201.0 | 8.9486 | 3209.9 | 0.00 | 0.6188 |
| 2.0135813 | 53.7909 | 23.821 | 3165.7 | 8.9440 | 3174.6 | 0.00 | 0.6157 |
| 2.0236492 | 53.9373 | 23.673 | 3130.5 | 8.9393 | 3139.4 | 0.00 | 0.6127 |
| 2.0337675 | 54.0792 | 23.527 | 3095.7 | 8.9344 | 3104.6 | 0.00 | 0.6096 |
| 2.0439363 | 54.2170 | 23.382 | 3061.3 | 8.9294 | 3070.2 | 0.00 | 0.6066 |
| 2.0541560 | 54.3512 | 23.238 | 3027.3 | 8.9243 | 3036.2 | 0.00 | 0.6036 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Gd ($Z=64$) | | | | | | | |
| 2.0644268 | 54.4819 | 23.095 | 2993.7 | 8.9190 | 3002.6 | 0.00 | 0.6006 |
| 2.0747489 | 54.6095 | 22.953 | 2960.5 | 8.9136 | 2969.4 | 0.00 | 0.5976 |
| 2.0851227 | 54.7342 | 22.812 | 2927.7 | 8.9081 | 2936.6 | 0.00 | 0.5946 |
| 2.0955483 | 54.8562 | 22.672 | 2895.3 | 8.9024 | 2904.2 | 0.00 | 0.5917 |
| 2.1060260 | 54.9756 | 22.533 | 2863.2 | 8.8966 | 2872.1 | 0.00 | 0.5887 |
| 2.1165562 | 55.0926 | 22.395 | 2831.5 | 8.8907 | 2840.4 | 0.00 | 0.5858 |
| 2.1271389 | 55.2073 | 22.258 | 2800.2 | 8.8846 | 2809.0 | 0.00 | 0.5829 |
| 2.1377746 | 55.3199 | 22.122 | 2769.2 | 8.8784 | 2778.0 | 0.00 | 0.5800 |
| 2.1484635 | 55.4305 | 21.987 | 2738.5 | 8.8721 | 2747.4 | 0.00 | 0.5771 |
| 2.1592058 | 55.5393 | 21.852 | 2708.2 | 8.8656 | 2717.1 | 0.00 | 0.5742 |
| 2.1700018 | 55.6464 | 21.718 | 2678.3 | 8.8590 | 2687.1 | 0.00 | 0.5714 |
| 2.1808519 | 55.7519 | 21.586 | 2648.7 | 8.8522 | 2657.5 | 0.00 | 0.5685 |
| 2.1917561 | 55.8560 | 21.454 | 2619.4 | 8.8454 | 2628.2 | 0.00 | 0.5657 |
| 2.2027149 | 55.9585 | 21.320 | 2590.1 | 8.8384 | 2598.9 | 0.00 | 0.5629 |
| 2.2137285 | 56.0586 | 21.186 | 2561.0 | 8.8312 | 2569.8 | 0.00 | 0.5601 |
| 2.2247971 | 56.1566 | 21.052 | 2532.2 | 8.8240 | 2541.0 | 0.00 | 0.5573 |
| 2.2359211 | 56.2525 | 20.920 | 2503.8 | 8.8166 | 2512.6 | 0.00 | 0.5545 |
| 2.2471007 | 56.3466 | 20.788 | 2475.6 | 8.8091 | 2484.4 | 0.00 | 0.5518 |
| 2.2583362 | 56.4389 | 20.657 | 2447.8 | 8.8014 | 2456.6 | 0.00 | 0.5490 |
| 2.2696279 | 56.5294 | 20.527 | 2420.3 | 8.7937 | 2429.1 | 0.00 | 0.5463 |
| 2.2809760 | 56.6183 | 20.398 | 2393.0 | 8.7858 | 2401.8 | 0.00 | 0.5436 |
| 2.2923809 | 56.7056 | 20.269 | 2366.1 | 8.7777 | 2374.9 | 0.00 | 0.5409 |
| 2.3038428 | 56.7914 | 20.141 | 2339.5 | 8.7696 | 2348.3 | 0.00 | 0.5382 |
| 2.3153620 | 56.8757 | 20.014 | 2313.2 | 8.7613 | 2321.9 | 0.00 | 0.5355 |
| 2.3269388 | 56.9586 | 19.888 | 2287.1 | 8.7529 | 2295.9 | 0.00 | 0.5328 |
| 2.3385735 | 57.0402 | 19.762 | 2261.4 | 8.7443 | 2270.1 | 0.00 | 0.5302 |
| 2.3502664 | 57.1205 | 19.637 | 2235.9 | 8.7357 | 2244.6 | 0.00 | 0.5275 |
| 2.3620177 | 57.1996 | 19.513 | 2210.7 | 8.7269 | 2219.5 | 0.00 | 0.5249 |
| 2.3738278 | 57.4955 | 19.389 | 2185.7 | 8.7180 | 2194.4 | 0.00 | 0.5223 |
| 2.3856970 | 57.5721 | 19.261 | 2160.5 | 8.7089 | 2169.2 | 0.00 | 0.5197 |
| 2.3976254 | 57.6471 | 19.134 | 2135.6 | 8.6998 | 2144.3 | 0.00 | 0.5171 |
| 2.4096136 | 57.7206 | 19.009 | 2111.0 | 8.6905 | 2119.7 | 0.00 | 0.5145 |
| 2.4216616 | 57.7926 | 18.884 | 2086.7 | 8.6811 | 2095.4 | 0.00 | 0.5120 |
| 2.4337699 | 57.8632 | 18.759 | 2062.7 | 8.6716 | 2071.3 | 0.00 | 0.5094 |
| 2.4459388 | 58.0807 | 18.633 | 2038.6 | 8.6620 | 2047.2 | 0.00 | 0.5069 |
| 2.4581685 | 58.1483 | 18.507 | 2014.7 | 8.6522 | 2023.3 | 0.00 | 0.5044 |
| 2.4704593 | 58.2142 | 18.381 | 1991.0 | 8.6423 | 1999.7 | 0.00 | 0.5019 |
| 2.4828116 | 58.2783 | 18.256 | 1967.7 | 8.6323 | 1976.3 | 0.00 | 0.4994 |
| 2.4952257 | 58.3409 | 18.132 | 1944.6 | 8.6222 | 1953.2 | 0.00 | 0.4969 |
| 2.5077018 | 58.4020 | 18.009 | 1921.8 | 8.6120 | 1930.4 | 0.00 | 0.4944 |
| 2.5202403 | 58.4617 | 17.887 | 1899.3 | 8.6016 | 1907.9 | 0.00 | 0.4920 |
| 2.5328415 | 58.5199 | 17.766 | 1877.0 | 8.5911 | 1885.6 | 0.00 | 0.4895 |
| 2.5455057 | 58.5768 | 17.645 | 1855.0 | 8.5805 | 1863.6 | 0.00 | 0.4871 |
| 2.5582333 | 58.6324 | 17.525 | 1833.2 | 8.5698 | 1841.8 | 0.00 | 0.4846 |
| 2.5710244 | 58.6868 | 17.407 | 1811.7 | 8.5590 | 1820.3 | 0.00 | 0.4822 |
| 2.5838796 | 58.7400 | 17.289 | 1790.5 | 8.5481 | 1799.1 | 0.00 | 0.4798 |
| 2.5967990 | 58.7920 | 17.172 | 1769.5 | 8.5370 | 1778.1 | 0.00 | 0.4775 |
| 2.6097829 | 58.8429 | 17.055 | 1748.8 | 8.5259 | 1757.3 | 0.00 | 0.4751 |
| 2.6228319 | 58.8927 | 16.940 | 1728.3 | 8.5146 | 1736.9 | 0.00 | 0.4727 |
| 2.6359460 | 58.9415 | 16.825 | 1708.1 | 8.5032 | 1716.6 | 0.00 | 0.4704 |
| 2.6491257 | 58.9893 | 16.709 | 1687.9 | 8.4917 | 1696.4 | 0.00 | 0.4680 |
| 2.6623714 | 59.0360 | 16.594 | 1667.9 | 8.4801 | 1676.3 | 0.00 | 0.4657 |
| 2.6756832 | 59.0817 | 16.479 | 1648.1 | 8.4684 | 1656.5 | 0.00 | 0.4634 |
| 2.6890617 | 59.1263 | 16.365 | 1628.5 | 8.4565 | 1637.0 | 0.00 | 0.4611 |
| 2.7025070 | 59.1700 | 16.252 | 1609.2 | 8.4446 | 1617.7 | 0.00 | 0.4588 |
| 2.7160195 | 59.2127 | 16.140 | 1590.2 | 8.4325 | 1598.6 | 0.00 | 0.4565 |
| 2.7295996 | 59.2546 | 16.028 | 1571.4 | 8.4204 | 1579.8 | 0.00 | 0.4542 |
| 2.7432476 | 59.2955 | 15.918 | 1552.8 | 8.4081 | 1561.2 | 0.00 | 0.4520 |
| 2.7569638 | 59.3356 | 15.808 | 1534.4 | 8.3958 | 1542.8 | 0.00 | 0.4497 |
| 2.7707486 | 59.3750 | 15.700 | 1516.3 | 8.3833 | 1524.7 | 0.00 | 0.4475 |
| 2.7846024 | 59.4135 | 15.592 | 1498.4 | 8.3707 | 1506.7 | 0.00 | 0.4452 |
| 2.7985254 | 59.4514 | 15.485 | 1480.7 | 8.3580 | 1489.0 | 0.00 | 0.4430 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Gd ($Z=64$) | | | | | | | |
| 2.8125180 | 59.4885 | 15.379 | 1463.2 | 8.3452 | 1471.6 | 0.00 | 0.4408 |
| 2.8265806 | 59.5250 | 15.273 | 1446.0 | 8.3323 | 1454.3 | 0.00 | 0.4386 |
| 2.8407135 | 59.5610 | 15.169 | 1429.0 | 8.3193 | 1437.3 | 0.00 | 0.4365 |
| 2.8549171 | 59.5963 | 15.065 | 1412.1 | 8.3062 | 1420.4 | 0.00 | 0.4343 |
| 2.8691917 | 59.6312 | 14.963 | 1395.5 | 8.2930 | 1403.8 | 0.00 | 0.4321 |
| 2.8835376 | 59.6655 | 14.861 | 1379.1 | 8.2797 | 1387.4 | 0.00 | 0.4300 |
| 2.8979553 | 59.6995 | 14.760 | 1362.9 | 8.2663 | 1371.2 | 0.00 | 0.4278 |
| 2.9124451 | 59.7331 | 14.660 | 1347.0 | 8.2528 | 1355.2 | 0.00 | 0.4257 |
| 2.9270073 | 59.7664 | 14.560 | 1331.2 | 8.2392 | 1339.4 | 0.00 | 0.4236 |
| 2.9416424 | 59.7994 | 14.462 | 1315.6 | 8.2255 | 1323.8 | 0.00 | 0.4215 |
| 2.9563506 | 59.8323 | 14.364 | 1300.2 | 8.2117 | 1308.4 | 0.00 | 0.4194 |
| 2.9711323 | 59.8651 | 14.267 | 1285.0 | 8.1978 | 1293.2 | 0.00 | 0.4173 |
| 2.9859880 | 59.8980 | 14.171 | 1270.0 | 8.1838 | 1278.2 | 0.00 | 0.4152 |
| 3.0009179 | 59.9312 | 14.075 | 1255.1 | 8.1697 | 1263.3 | 0.00 | 0.4132 |
| 3.0159225 | 59.9661 | 13.966 | 1239.2 | 8.1555 | 1247.3 | 0.00 | 0.4111 |
| 3.0310021 | 59.9971 | 13.857 | 1223.4 | 8.1412 | 1231.6 | 0.00 | 0.4091 |
| 3.0461571 | 60.0255 | 13.750 | 1207.9 | 8.1269 | 1216.1 | 0.00 | 0.4070 |
| 3.0613879 | 60.0522 | 13.644 | 1192.6 | 8.1124 | 1200.8 | 0.00 | 0.4050 |
| 3.0766949 | 60.0773 | 13.539 | 1177.5 | 8.0978 | 1185.6 | 0.00 | 0.4030 |
| 3.0920783 | 60.2037 | 13.433 | 1162.6 | 8.0832 | 1170.7 | 0.00 | 0.4010 |
| 3.1075387 | 60.2269 | 13.327 | 1147.6 | 8.0684 | 1155.7 | 0.00 | 0.3990 |
| 3.1230764 | 60.2486 | 13.221 | 1132.8 | 8.0536 | 1140.9 | 0.00 | 0.3970 |
| 3.1386918 | 60.2690 | 13.116 | 1118.3 | 8.0387 | 1126.3 | 0.00 | 0.3950 |
| 3.1543853 | 60.2883 | 13.012 | 1103.9 | 8.0237 | 1111.9 | 0.00 | 0.3931 |
| 3.1701572 | 60.3063 | 12.909 | 1089.7 | 8.0086 | 1097.7 | 0.00 | 0.3911 |
| 3.1860080 | 60.3233 | 12.807 | 1075.7 | 7.9934 | 1083.7 | 0.00 | 0.3892 |
| 3.2019380 | 60.3392 | 12.706 | 1061.9 | 7.9781 | 1069.9 | 0.00 | 0.3872 |
| 3.2179477 | 60.3542 | 12.606 | 1048.3 | 7.9628 | 1056.3 | 0.00 | 0.3853 |
| 3.2340374 | 60.3682 | 12.507 | 1034.9 | 7.9473 | 1042.8 | 0.00 | 0.3834 |
| 3.2502076 | 60.3813 | 12.409 | 1021.6 | 7.9318 | 1029.6 | 0.00 | 0.3815 |
| 3.2664587 | 60.3936 | 12.311 | 1008.6 | 7.9162 | 1016.5 | 0.00 | 0.3796 |
| 3.2827910 | 60.4051 | 12.215 | 995.68 | 7.9005 | 1003.6 | 0.00 | 0.3777 |
| 3.2992049 | 60.4158 | 12.119 | 982.97 | 7.8847 | 990.85 | 0.00 | 0.3758 |
| 3.3157009 | 60.4257 | 12.024 | 970.42 | 7.8688 | 978.29 | 0.00 | 0.3739 |
| 3.3322794 | 60.4350 | 11.930 | 958.05 | 7.8529 | 965.90 | 0.00 | 0.3721 |
| 3.3489408 | 60.4435 | 11.837 | 945.84 | 7.8369 | 953.68 | 0.00 | 0.3702 |
| 3.3656856 | 60.4514 | 11.745 | 933.80 | 7.8208 | 941.62 | 0.00 | 0.3684 |
| 3.3825140 | 60.5064 | 11.652 | 921.86 | 7.8046 | 929.67 | 0.00 | 0.3665 |
| 3.3994265 | 60.5134 | 11.560 | 909.99 | 7.7883 | 917.78 | 0.00 | 0.3647 |
| 3.4164237 | 60.5195 | 11.468 | 898.28 | 7.7720 | 906.05 | 0.00 | 0.3629 |
| 3.4335058 | 60.5249 | 11.377 | 886.72 | 7.7556 | 894.48 | 0.00 | 0.3611 |
| 3.4506733 | 60.5295 | 11.287 | 875.32 | 7.7391 | 883.06 | 0.00 | 0.3593 |
| 3.4679267 | 60.5334 | 11.198 | 864.07 | 7.7225 | 871.80 | 0.00 | 0.3575 |
| 3.4852663 | 60.5367 | 11.109 | 852.98 | 7.7059 | 860.69 | 0.00 | 0.3557 |
| 3.5026927 | 60.5393 | 11.022 | 842.03 | 7.6892 | 849.72 | 0.00 | 0.3540 |
| 3.5202061 | 60.5412 | 10.935 | 831.24 | 7.6724 | 838.91 | 0.00 | 0.3522 |
| 3.5378072 | 60.5426 | 10.849 | 820.59 | 7.6555 | 828.24 | 0.00 | 0.3505 |
| 3.5554962 | 60.5434 | 10.763 | 810.08 | 7.6386 | 817.72 | 0.00 | 0.3487 |
| 3.5732737 | 60.5436 | 10.678 | 799.71 | 7.6216 | 807.33 | 0.00 | 0.3470 |
| 3.5911400 | 60.5432 | 10.595 | 789.48 | 7.6045 | 797.09 | 0.00 | 0.3453 |
| 3.6090957 | 60.5423 | 10.512 | 779.39 | 7.5874 | 786.98 | 0.00 | 0.3435 |
| 3.6271412 | 60.5409 | 10.429 | 769.44 | 7.5702 | 777.01 | 0.00 | 0.3418 |
| 3.6452769 | 60.5389 | 10.347 | 759.61 | 7.5529 | 767.17 | 0.00 | 0.3401 |
| 3.6635033 | 60.5365 | 10.267 | 749.92 | 7.5355 | 757.46 | 0.00 | 0.3384 |
| 3.6818208 | 60.5336 | 10.186 | 740.36 | 7.5181 | 747.88 | 0.00 | 0.3367 |
| 3.7002299 | 60.5303 | 10.107 | 730.93 | 7.5007 | 738.43 | 0.00 | 0.3351 |
| 3.7187311 | 60.5265 | 10.028 | 721.63 | 7.4831 | 729.11 | 0.00 | 0.3334 |
| 3.7373247 | 60.5222 | 9.9500 | 712.45 | 7.4655 | 719.91 | 0.00 | 0.3317 |
| 3.7560114 | 60.5175 | 9.8726 | 703.39 | 7.4478 | 710.83 | 0.00 | 0.3301 |
| 3.7747914 | 60.5343 | 9.7954 | 694.41 | 7.4301 | 701.84 | 0.00 | 0.3285 |
| 3.7936654 | 60.5290 | 9.7185 | 685.53 | 7.4123 | 692.95 | 0.00 | 0.3268 |
| 3.8126337 | 60.5231 | 9.6424 | 676.78 | 7.3945 | 684.17 | 0.00 | 0.3252 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Gd ($Z=64$) | | | | | | | |
| 3.8316969 | 60.5168 | 9.5669 | 668.14 | 7.3765 | 675.52 | 0.00 | 0.3236 |
| 3.8508554 | 60.5100 | 9.4921 | 659.62 | 7.3586 | 666.98 | 0.00 | 0.3220 |
| 3.8701096 | 60.5027 | 9.4179 | 651.21 | 7.3405 | 658.55 | 0.00 | 0.3204 |
| 3.8894602 | 60.4950 | 9.3444 | 642.91 | 7.3224 | 650.23 | 0.00 | 0.3188 |
| 3.9089075 | 60.4869 | 9.2715 | 634.72 | 7.3043 | 642.03 | 0.00 | 0.3172 |
| 3.9284520 | 60.4784 | 9.1993 | 626.65 | 7.2861 | 633.93 | 0.00 | 0.3156 |
| 3.9480943 | 60.4695 | 9.1277 | 618.68 | 7.2678 | 625.94 | 0.00 | 0.3140 |
| 3.9678347 | 60.4602 | 9.0567 | 610.81 | 7.2495 | 618.06 | 0.00 | 0.3125 |
| 3.9876739 | 60.4504 | 8.9864 | 603.05 | 7.2311 | 610.28 | 0.00 | 0.3109 |
| Tb ($Z=65$) | | | | | | | |
| Atomic weight: $A_r=158.254 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=8.2140$ | | | | | | | |
| $\sigma_a (\text{barns/atom})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 263.902$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2(e \text{ atom}^{-1})\times 2.64780\times 10^5$ | | | | | | | |
| 19 edges. Edge energies (keV) | | | | | | | |
| K | 51.9957 | L I | 8.70800 | L II | 8.25160 | L III | 7.51400 |
| M I | 1.96750 | M II | 1.76770 | M III | 1.61130 | M IV | 1.27500 |
| M V | 1.24120 | N I | 0.397900 | N II | 0.310200 | N III | 0.2585000 |
| N IV | 0.147000 | N V | 0.147000 | N VI | 0.00940000 | N VII | 0.00860000 |
| O I | 0.0390000 | O II | 0.0254000 | O III | 0.0254000 | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H}82,3/5\text{CL})=(-1.0366, -0.62340) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.014584 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 19.0901 | 8.3031 | 21985 | 0.46374 | 21986 | 0.00 | 1.240 |
| 0.10050000 | 19.1079 | 8.3317 | 21951 | 0.46895 | 21951 | 0.00 | 1.234 |
| 0.10100250 | 19.1257 | 8.3603 | 21917 | 0.47421 | 21917 | 0.00 | 1.228 |
| 0.10150751 | 19.1434 | 8.3888 | 21882 | 0.47951 | 21883 | 0.00 | 1.221 |
| 0.10201505 | 19.1611 | 8.4173 | 21847 | 0.48487 | 21848 | 0.00 | 1.215 |
| 0.10252513 | 19.1787 | 8.4458 | 21812 | 0.49027 | 21813 | 0.00 | 1.209 |
| 0.10303775 | 19.1962 | 8.4743 | 21777 | 0.49572 | 21777 | 0.00 | 1.203 |
| 0.10355294 | 19.2136 | 8.5028 | 21741 | 0.50122 | 21742 | 0.00 | 1.197 |
| 0.10407070 | 19.2309 | 8.5312 | 21705 | 0.50677 | 21706 | 0.00 | 1.191 |
| 0.10459106 | 19.2481 | 8.5596 | 21669 | 0.51237 | 21670 | 0.00 | 1.185 |
| 0.10511401 | 19.2651 | 8.5880 | 21633 | 0.51802 | 21634 | 0.00 | 1.180 |
| 0.10563958 | 19.2821 | 8.6164 | 21597 | 0.52372 | 21597 | 0.00 | 1.174 |
| 0.10616778 | 19.2988 | 8.6447 | 21560 | 0.52947 | 21560 | 0.00 | 1.168 |
| 0.10669862 | 19.3154 | 8.6731 | 21523 | 0.53528 | 21523 | 0.00 | 1.162 |
| 0.10723211 | 19.3318 | 8.7014 | 21486 | 0.54113 | 21486 | 0.00 | 1.156 |
| 0.10776827 | 19.3480 | 8.7296 | 21448 | 0.54703 | 21449 | 0.00 | 1.150 |
| 0.10830712 | 19.3639 | 8.7579 | 21411 | 0.55299 | 21411 | 0.00 | 1.145 |
| 0.10884865 | 19.3797 | 8.7861 | 21373 | 0.55900 | 21373 | 0.00 | 1.139 |
| 0.10939289 | 19.3951 | 8.8143 | 21335 | 0.56506 | 21335 | 0.00 | 1.133 |
| 0.10993986 | 19.4103 | 8.8425 | 21296 | 0.57117 | 21297 | 0.00 | 1.128 |
| 0.11048956 | 19.4252 | 8.8707 | 21258 | 0.57734 | 21258 | 0.00 | 1.122 |
| 0.11104201 | 19.4397 | 8.8988 | 21219 | 0.58355 | 21220 | 0.00 | 1.117 |
| 0.11159722 | 19.4539 | 8.9269 | 21180 | 0.58983 | 21181 | 0.00 | 1.111 |
| 0.11215520 | 19.4677 | 8.9550 | 21141 | 0.59615 | 21142 | 0.00 | 1.105 |
| 0.11271598 | 19.4811 | 8.9830 | 21102 | 0.60253 | 21103 | 0.00 | 1.100 |
| 0.11327956 | 19.4940 | 9.0110 | 21062 | 0.60897 | 21063 | 0.00 | 1.094 |
| 0.11384596 | 19.5065 | 9.0390 | 21023 | 0.61546 | 21023 | 0.00 | 1.089 |
| 0.11441519 | 19.5185 | 9.0670 | 20983 | 0.62200 | 20984 | 0.00 | 1.084 |
| 0.11498726 | 19.5299 | 9.0950 | 20943 | 0.62860 | 20944 | 0.00 | 1.078 |
| 0.11556220 | 19.5408 | 9.1229 | 20903 | 0.63526 | 20903 | 0.00 | 1.073 |
| 0.11614001 | 19.5510 | 9.1508 | 20862 | 0.64197 | 20863 | 0.00 | 1.068 |
| 0.11672071 | 19.5605 | 9.1787 | 20822 | 0.64873 | 20822 | 0.00 | 1.062 |
| 0.11730431 | 19.5699 | 9.2065 | 20781 | 0.65556 | 20782 | 0.00 | 1.057 |
| 0.11789083 | 19.5780 | 9.2343 | 20740 | 0.66244 | 20741 | 0.00 | 1.052 |
| 0.11848029 | 19.5852 | 9.2621 | 20699 | 0.66937 | 20700 | 0.00 | 1.046 |
| 0.11907269 | 19.5916 | 9.2899 | 20658 | 0.67637 | 20659 | 0.00 | 1.041 |
| 0.11966805 | 19.5970 | 9.3177 | 20616 | 0.68342 | 20617 | 0.00 | 1.036 |
| 0.12026639 | 19.6013 | 9.3454 | 20575 | 0.69053 | 20576 | 0.00 | 1.031 |
| 0.12086772 | 19.6046 | 9.3731 | 20533 | 0.69770 | 20534 | 0.00 | 1.026 |
| 0.12147206 | 19.6066 | 9.4008 | 20491 | 0.70492 | 20492 | 0.00 | 1.021 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 0.12207942 | 19.6074 | 9.4284 | 20449 | 0.71221 | 20450 | 0.00 | 1.016 |
| 0.12268982 | 19.6068 | 9.4560 | 20407 | 0.71955 | 20408 | 0.00 | 1.011 |
| 0.12330327 | 19.6047 | 9.4836 | 20365 | 0.72696 | 20366 | 0.00 | 1.006 |
| 0.12391979 | 19.6010 | 9.5112 | 20323 | 0.73442 | 20323 | 0.00 | 1.001 |
| 0.12453939 | 19.5955 | 9.5388 | 20280 | 0.74194 | 20281 | 0.00 | 9.955 |
| 0.12516208 | 19.5881 | 9.5663 | 20238 | 0.74952 | 20238 | 0.00 | 9.906 |
| 0.12578789 | 19.5786 | 9.5939 | 20195 | 0.75717 | 20196 | 0.00 | 9.857 |
| 0.12641683 | 19.5668 | 9.6214 | 20152 | 0.76487 | 20153 | 0.00 | 9.808 |
| 0.12704892 | 19.5526 | 9.6488 | 20109 | 0.77264 | 20110 | 0.00 | 9.759 |
| 0.12768416 | 19.5357 | 9.6763 | 20066 | 0.78046 | 20067 | 0.00 | 9.710 |
| 0.12832258 | 19.5159 | 9.7037 | 20023 | 0.78835 | 20023 | 0.00 | 9.662 |
| 0.12896419 | 19.4927 | 9.7312 | 19979 | 0.79630 | 19980 | 0.00 | 9.614 |
| 0.12960902 | 19.4660 | 9.7586 | 19936 | 0.80431 | 19937 | 0.00 | 9.566 |
| 0.13025706 | 19.4354 | 9.7859 | 19892 | 0.81238 | 19893 | 0.00 | 9.518 |
| 0.13090835 | 19.4003 | 9.8133 | 19849 | 0.82052 | 19850 | 0.00 | 9.471 |
| 0.13156289 | 19.3604 | 9.8407 | 19805 | 0.82872 | 19806 | 0.00 | 9.424 |
| 0.13222070 | 19.3150 | 9.8680 | 19761 | 0.83698 | 19762 | 0.00 | 9.377 |
| 0.13288181 | 19.2636 | 9.8953 | 19717 | 0.84531 | 19718 | 0.00 | 9.330 |
| 0.13354621 | 19.2052 | 9.9226 | 19673 | 0.85369 | 19674 | 0.00 | 9.284 |
| 0.13421395 | 19.1390 | 9.9499 | 19629 | 0.86215 | 19630 | 0.00 | 9.238 |
| 0.13488502 | 19.0640 | 9.9772 | 19585 | 0.87067 | 19586 | 0.00 | 9.192 |
| 0.13555944 | 18.9787 | 10.004 | 19541 | 0.87925 | 19542 | 0.00 | 9.146 |
| 0.13623724 | 18.8818 | 10.032 | 19497 | 0.88789 | 19498 | 0.00 | 9.101 |
| 0.13691842 | 18.7711 | 10.059 | 19453 | 0.89660 | 19453 | 0.00 | 9.055 |
| 0.13760302 | 18.6444 | 10.086 | 19408 | 0.90538 | 19409 | 0.00 | 9.010 |
| 0.13829103 | 18.4986 | 10.113 | 19364 | 0.91422 | 19365 | 0.00 | 8.965 |
| 0.13898249 | 18.3300 | 10.141 | 19319 | 0.92313 | 19320 | 0.00 | 8.921 |
| 0.13967740 | 18.1334 | 10.168 | 19275 | 0.93210 | 19276 | 0.00 | 8.876 |
| 0.14037579 | 17.9023 | 10.195 | 19230 | 0.94114 | 19231 | 0.00 | 8.832 |
| 0.14107766 | 17.6275 | 10.222 | 19185 | 0.95025 | 19186 | 0.00 | 8.788 |
| 0.14178305 | 17.2961 | 10.249 | 19141 | 0.95942 | 19142 | 0.00 | 8.745 |
| 0.14249197 | 16.8889 | 10.277 | 19096 | 0.96866 | 19097 | 0.00 | 8.701 |
| 0.14320443 | 16.3762 | 10.304 | 19051 | 0.97797 | 19052 | 0.00 | 8.658 |
| 0.14392045 | 15.7080 | 10.331 | 19006 | 0.98735 | 19007 | 0.00 | 8.615 |
| 0.14464005 | 14.7917 | 10.358 | 18962 | 0.99679 | 18963 | 0.00 | 8.572 |
| 0.14536325 | 13.4255 | 10.385 | 18917 | 1.0063 | 18918 | 0.00 | 8.529 |
| 0.14609007 | 11.0209 | 10.412 | 18872 | 1.0159 | 18873 | 0.00 | 8.487 |
| 0.14682052 | 3.47099 | 10.440 | 18827 | 1.0255 | 18828 | 0.00 | 8.445 |
| 0.14695355 | -3.34446 | 10.444 | 18819 | 1.0273 | 18820 | 0.00 | 8.437 |
| 0.14704645 | -3.13135 | 26.773 | 48209 | 1.0285 | 48210 | 0.00 | 8.432 |
| 0.14755462 | 10.5112 | 26.136 | 46899 | 1.0352 | 46900 | 0.00 | 8.403 |
| 0.14829239 | 15.5232 | 25.261 | 45104 | 1.0450 | 45105 | 0.00 | 8.361 |
| 0.14903386 | 18.2741 | 24.438 | 43418 | 1.0549 | 43419 | 0.00 | 8.319 |
| 0.14977903 | 20.1565 | 23.664 | 41833 | 1.0648 | 41834 | 0.00 | 8.278 |
| 0.15052792 | 21.5618 | 22.936 | 40345 | 1.0748 | 40346 | 0.00 | 8.237 |
| 0.15128056 | 22.6604 | 22.252 | 38946 | 1.0849 | 38948 | 0.00 | 8.196 |
| 0.15203696 | 23.5434 | 21.608 | 37632 | 1.0950 | 37633 | 0.00 | 8.155 |
| 0.15279715 | 24.2662 | 21.004 | 36397 | 1.1052 | 36398 | 0.00 | 8.114 |
| 0.15356113 | 24.8653 | 20.435 | 35236 | 1.1155 | 35237 | 0.00 | 8.074 |
| 0.15432894 | 25.3661 | 19.901 | 34144 | 1.1258 | 34145 | 0.00 | 8.034 |
| 0.15510058 | 25.7872 | 19.399 | 33118 | 1.1362 | 33119 | 0.00 | 7.994 |
| 0.15587609 | 26.1426 | 18.928 | 32152 | 1.1467 | 32153 | 0.00 | 7.954 |
| 0.15665547 | 26.4432 | 18.485 | 31244 | 1.1573 | 31245 | 0.00 | 7.914 |
| 0.15743875 | 26.6977 | 18.070 | 30390 | 1.1679 | 30391 | 0.00 | 7.875 |
| 0.15822594 | 26.9127 | 17.680 | 29586 | 1.1786 | 29587 | 0.00 | 7.836 |
| 0.15901707 | 27.0940 | 17.314 | 28829 | 1.1894 | 28831 | 0.00 | 7.797 |
| 0.15981215 | 27.2460 | 16.970 | 28117 | 1.2002 | 28118 | 0.00 | 7.758 |
| 0.16061121 | 27.3723 | 16.648 | 27446 | 1.2111 | 27448 | 0.00 | 7.720 |
| 0.16141427 | 27.4756 | 16.347 | 26815 | 1.2221 | 26816 | 0.00 | 7.681 |
| 0.16222134 | 27.5581 | 16.054 | 26203 | 1.2332 | 26204 | 0.00 | 7.643 |
| 0.16303245 | 27.6224 | 15.784 | 25634 | 1.2443 | 25635 | 0.00 | 7.605 |
| 0.16384761 | 27.6730 | 15.536 | 25107 | 1.2555 | 25108 | 0.00 | 7.567 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 0.16466685 | 27.7135 | 15.310 | 24618 | 1.2668 | 24620 | 0.00 | 7.529 |
| 0.16549018 | 27.7462 | 15.103 | 24164 | 1.2781 | 24166 | 0.00 | 7.492 |
| 0.16631763 | 27.7731 | 14.913 | 23741 | 1.2896 | 23743 | 0.00 | 7.455 |
| 0.16714922 | 27.7956 | 14.738 | 23347 | 1.3011 | 23348 | 0.00 | 7.418 |
| 0.16798497 | 27.8150 | 14.578 | 22978 | 1.3126 | 22979 | 0.00 | 7.381 |
| 0.16882489 | 27.8322 | 14.430 | 22632 | 1.3243 | 22634 | 0.00 | 7.344 |
| 0.16966902 | 27.8480 | 14.295 | 22308 | 1.3360 | 22309 | 0.00 | 7.307 |
| 0.17051736 | 27.8629 | 14.170 | 22003 | 1.3478 | 22005 | 0.00 | 7.271 |
| 0.17136995 | 27.8775 | 14.055 | 21717 | 1.3597 | 21718 | 0.00 | 7.235 |
| 0.17222680 | 27.8921 | 13.950 | 21446 | 1.3716 | 21447 | 0.00 | 7.199 |
| 0.17308793 | 27.9072 | 13.852 | 21190 | 1.3836 | 21192 | 0.00 | 7.163 |
| 0.17395337 | 27.9231 | 13.763 | 20948 | 1.3957 | 20950 | 0.00 | 7.127 |
| 0.17482314 | 27.9398 | 13.680 | 20719 | 1.4079 | 20720 | 0.00 | 7.092 |
| 0.17569726 | 27.9578 | 13.604 | 20501 | 1.4202 | 20503 | 0.00 | 7.057 |
| 0.17657574 | 27.9771 | 13.531 | 20290 | 1.4325 | 20292 | 0.00 | 7.022 |
| 0.17745862 | 27.9983 | 13.428 | 20036 | 1.4449 | 20037 | 0.00 | 6.987 |
| 0.17834591 | 28.0193 | 13.330 | 19791 | 1.4574 | 19792 | 0.00 | 6.952 |
| 0.17923764 | 28.0402 | 13.237 | 19555 | 1.4699 | 19556 | 0.00 | 6.917 |
| 0.18013383 | 28.0611 | 13.148 | 19326 | 1.4825 | 19328 | 0.00 | 6.883 |
| 0.18103450 | 28.0821 | 13.062 | 19105 | 1.4952 | 19106 | 0.00 | 6.849 |
| 0.18193967 | 28.1031 | 12.981 | 18891 | 1.5080 | 18892 | 0.00 | 6.815 |
| 0.18284937 | 28.1242 | 12.902 | 18683 | 1.5209 | 18685 | 0.00 | 6.781 |
| 0.18376362 | 28.1455 | 12.826 | 18481 | 1.5338 | 18483 | 0.00 | 6.747 |
| 0.18468244 | 28.1669 | 12.754 | 18285 | 1.5468 | 18287 | 0.00 | 6.713 |
| 0.18560585 | 28.1885 | 12.684 | 18094 | 1.5599 | 18096 | 0.00 | 6.680 |
| 0.18653388 | 28.2102 | 12.616 | 17908 | 1.5730 | 17910 | 0.00 | 6.647 |
| 0.18746655 | 28.2321 | 12.551 | 17727 | 1.5863 | 17728 | 0.00 | 6.614 |
| 0.18840388 | 28.2542 | 12.487 | 17550 | 1.5996 | 17551 | 0.00 | 6.581 |
| 0.18934590 | 28.2763 | 12.426 | 17377 | 1.6130 | 17378 | 0.00 | 6.548 |
| 0.19029263 | 28.2986 | 12.367 | 17208 | 1.6264 | 17209 | 0.00 | 6.515 |
| 0.19124409 | 28.3210 | 12.309 | 17042 | 1.6400 | 17044 | 0.00 | 6.483 |
| 0.19220031 | 28.3435 | 12.253 | 16880 | 1.6536 | 16882 | 0.00 | 6.451 |
| 0.19316131 | 28.3661 | 12.198 | 16721 | 1.6673 | 16723 | 0.00 | 6.419 |
| 0.19412712 | 28.3888 | 12.145 | 16566 | 1.6811 | 16567 | 0.00 | 6.387 |
| 0.19509776 | 28.4115 | 12.093 | 16413 | 1.6949 | 16414 | 0.00 | 6.355 |
| 0.19607325 | 28.4343 | 12.043 | 16263 | 1.7088 | 16264 | 0.00 | 6.323 |
| 0.19705361 | 28.4571 | 11.993 | 16115 | 1.7228 | 16117 | 0.00 | 6.292 |
| 0.19803888 | 28.4799 | 11.945 | 15971 | 1.7369 | 15972 | 0.00 | 6.261 |
| 0.19902907 | 28.5027 | 11.898 | 15828 | 1.7511 | 15830 | 0.00 | 6.229 |
| 0.20002422 | 28.5254 | 11.851 | 15688 | 1.7653 | 15690 | 0.00 | 6.198 |
| 0.20102434 | 28.5481 | 11.806 | 15550 | 1.7797 | 15552 | 0.00 | 6.168 |
| 0.20202946 | 28.5708 | 11.761 | 15414 | 1.7940 | 15416 | 0.00 | 6.137 |
| 0.20303961 | 28.5934 | 11.718 | 15281 | 1.8085 | 15282 | 0.00 | 6.106 |
| 0.20405481 | 28.6158 | 11.675 | 15149 | 1.8231 | 15151 | 0.00 | 6.076 |
| 0.20507508 | 28.6382 | 11.632 | 15019 | 1.8377 | 15021 | 0.00 | 6.046 |
| 0.20610046 | 28.6604 | 11.591 | 14891 | 1.8524 | 14893 | 0.00 | 6.016 |
| 0.20713096 | 28.6825 | 11.550 | 14765 | 1.8672 | 14766 | 0.00 | 5.986 |
| 0.20816661 | 28.7045 | 11.510 | 14640 | 1.8820 | 14642 | 0.00 | 5.956 |
| 0.20920745 | 28.7262 | 11.470 | 14517 | 1.8970 | 14519 | 0.00 | 5.926 |
| 0.21025348 | 28.7478 | 11.431 | 14396 | 1.9120 | 14397 | 0.00 | 5.897 |
| 0.21130475 | 28.7691 | 11.393 | 14276 | 1.9271 | 14278 | 0.00 | 5.868 |
| 0.21236128 | 28.7903 | 11.355 | 14157 | 1.9423 | 14159 | 0.00 | 5.838 |
| 0.21342308 | 28.8112 | 11.317 | 14040 | 1.9575 | 14042 | 0.00 | 5.809 |
| 0.21449020 | 28.8318 | 11.280 | 13925 | 1.9729 | 13927 | 0.00 | 5.780 |
| 0.21556265 | 28.8522 | 11.244 | 13811 | 1.9883 | 13813 | 0.00 | 5.752 |
| 0.21664046 | 28.8723 | 11.208 | 13698 | 2.0037 | 13700 | 0.00 | 5.723 |
| 0.21772366 | 28.8921 | 11.172 | 13587 | 2.0193 | 13589 | 0.00 | 5.695 |
| 0.21881228 | 28.9116 | 11.137 | 13477 | 2.0349 | 13479 | 0.00 | 5.666 |
| 0.21990634 | 28.9308 | 11.102 | 13368 | 2.0507 | 13370 | 0.00 | 5.638 |
| 0.22100588 | 28.9497 | 11.068 | 13260 | 2.0665 | 13262 | 0.00 | 5.610 |
| 0.22211090 | 28.9682 | 11.034 | 13154 | 2.0823 | 13156 | 0.00 | 5.582 |
| 0.22322146 | 28.9864 | 11.000 | 13048 | 2.0983 | 13051 | 0.00 | 5.554 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 0.22433757 | 29.0041 | 10.967 | 12944 | 2.1143 | 12947 | 0.00 | 5.527 |
| 0.22545925 | 29.0215 | 10.934 | 12841 | 2.1304 | 12844 | 0.00 | 5.499 |
| 0.22658655 | 29.0385 | 10.902 | 12740 | 2.1466 | 12742 | 0.00 | 5.472 |
| 0.22771948 | 29.0551 | 10.870 | 12639 | 2.1628 | 12641 | 0.00 | 5.445 |
| 0.22885808 | 29.0713 | 10.838 | 12539 | 2.1792 | 12541 | 0.00 | 5.418 |
| 0.23000237 | 29.0870 | 10.807 | 12441 | 2.1956 | 12443 | 0.00 | 5.391 |
| 0.23115238 | 29.1023 | 10.776 | 12343 | 2.2121 | 12345 | 0.00 | 5.364 |
| 0.23230814 | 29.1171 | 10.745 | 12247 | 2.2287 | 12249 | 0.00 | 5.337 |
| 0.23346969 | 29.1314 | 10.714 | 12151 | 2.2453 | 12154 | 0.00 | 5.311 |
| 0.23463703 | 29.1452 | 10.684 | 12057 | 2.2620 | 12059 | 0.00 | 5.284 |
| 0.23581022 | 29.1585 | 10.654 | 11963 | 2.2788 | 11966 | 0.00 | 5.258 |
| 0.23698927 | 29.1712 | 10.625 | 11871 | 2.2957 | 11873 | 0.00 | 5.232 |
| 0.23817422 | 29.1834 | 10.596 | 11780 | 2.3126 | 11782 | 0.00 | 5.206 |
| 0.23936509 | 29.1951 | 10.567 | 11689 | 2.3297 | 11691 | 0.00 | 5.180 |
| 0.24056191 | 29.2061 | 10.538 | 11599 | 2.3468 | 11602 | 0.00 | 5.154 |
| 0.24176472 | 29.2165 | 10.510 | 11511 | 2.3640 | 11513 | 0.00 | 5.128 |
| 0.24297355 | 29.2263 | 10.482 | 11423 | 2.3812 | 11426 | 0.00 | 5.103 |
| 0.24418841 | 29.2354 | 10.455 | 11336 | 2.3985 | 11339 | 0.00 | 5.077 |
| 0.24540936 | 29.2439 | 10.427 | 11251 | 2.4159 | 11253 | 0.00 | 5.052 |
| 0.24663640 | 29.2516 | 10.400 | 11166 | 2.4334 | 11168 | 0.00 | 5.027 |
| 0.24786959 | 29.2585 | 10.374 | 11082 | 2.4510 | 11084 | 0.00 | 5.002 |
| 0.24910893 | 29.2647 | 10.347 | 10998 | 2.4686 | 11001 | 0.00 | 4.977 |
| 0.25035448 | 29.2701 | 10.321 | 10916 | 2.4863 | 10919 | 0.00 | 4.952 |
| 0.25160625 | 29.2746 | 10.296 | 10835 | 2.5041 | 10837 | 0.00 | 4.928 |
| 0.25286428 | 29.2781 | 10.270 | 10754 | 2.5220 | 10757 | 0.00 | 4.903 |
| 0.25412860 | 29.2807 | 10.245 | 10675 | 2.5399 | 10677 | 0.00 | 4.879 |
| 0.25539925 | 29.2823 | 10.220 | 10596 | 2.5579 | 10598 | 0.00 | 4.855 |
| 0.25667624 | 29.2828 | 10.196 | 10518 | 2.5760 | 10520 | 0.00 | 4.830 |
| 0.25795962 | 29.2821 | 10.172 | 10441 | 2.5941 | 10443 | 0.00 | 4.806 |
| 0.25924942 | 29.2802 | 10.148 | 10364 | 2.6123 | 10367 | 0.00 | 4.782 |
| 0.26054567 | 29.2768 | 10.124 | 10289 | 2.6306 | 10291 | 0.00 | 4.759 |
| 0.26184840 | 29.2720 | 10.101 | 10214 | 2.6490 | 10217 | 0.00 | 4.735 |
| 0.26315764 | 29.2656 | 10.078 | 10140 | 2.6675 | 10143 | 0.00 | 4.711 |
| 0.26447343 | 29.2574 | 10.056 | 10067 | 2.6860 | 10070 | 0.00 | 4.688 |
| 0.26579579 | 29.2471 | 10.033 | 9995.0 | 2.7046 | 9997.7 | 0.00 | 4.665 |
| 0.26712477 | 29.2346 | 10.011 | 9923.6 | 2.7232 | 9926.3 | 0.00 | 4.641 |
| 0.26846040 | 29.2196 | 9.9898 | 9852.9 | 2.7420 | 9855.6 | 0.00 | 4.618 |
| 0.26980270 | 29.2016 | 9.9686 | 9783.0 | 2.7608 | 9785.8 | 0.00 | 4.595 |
| 0.27115171 | 29.1802 | 9.9476 | 9713.9 | 2.7797 | 9716.7 | 0.00 | 4.573 |
| 0.27250747 | 29.1547 | 9.9270 | 9645.5 | 2.7986 | 9648.3 | 0.00 | 4.550 |
| 0.27387001 | 29.1243 | 9.9068 | 9578.0 | 2.8176 | 9580.8 | 0.00 | 4.527 |
| 0.27523936 | 29.0876 | 9.8868 | 9511.1 | 2.8367 | 9514.0 | 0.00 | 4.505 |
| 0.27661556 | 29.0430 | 9.8672 | 9445.0 | 2.8559 | 9447.9 | 0.00 | 4.482 |
| 0.27799863 | 28.9877 | 9.8480 | 9379.7 | 2.8751 | 9382.6 | 0.00 | 4.460 |
| 0.27938863 | 28.9170 | 9.8290 | 9315.1 | 2.8944 | 9318.0 | 0.00 | 4.438 |
| 0.28078557 | 28.8223 | 9.8104 | 9251.2 | 2.9138 | 9254.1 | 0.00 | 4.416 |
| 0.28218950 | 28.6841 | 9.7922 | 9188.1 | 2.9332 | 9191.0 | 0.00 | 4.394 |
| 0.28360044 | 28.4403 | 9.7743 | 9125.6 | 2.9527 | 9128.6 | 0.00 | 4.372 |
| 0.28474920 | 27.8284 | 9.7600 | 9075.6 | 2.9686 | 9078.5 | 0.00 | 4.354 |
| 0.28501845 | 26.8959 | 10.880 | 10107 | 2.9723 | 10110 | 0.00 | 4.350 |
| 0.28525080 | 27.8290 | 10.878 | 10097 | 2.9755 | 10100 | 0.00 | 4.346 |
| 0.28644354 | 28.4574 | 10.867 | 10045 | 2.9920 | 10048 | 0.00 | 4.328 |
| 0.28787576 | 28.7078 | 10.854 | 9983.6 | 3.0117 | 9986.6 | 0.00 | 4.307 |
| 0.28931514 | 28.8569 | 10.842 | 9922.7 | 3.0315 | 9925.7 | 0.00 | 4.285 |
| 0.29076171 | 28.9640 | 10.830 | 9862.5 | 3.0513 | 9865.5 | 0.00 | 4.264 |
| 0.29221552 | 29.0477 | 10.819 | 9802.9 | 3.0712 | 9806.0 | 0.00 | 4.243 |
| 0.29367660 | 29.1163 | 10.807 | 9744.1 | 3.0912 | 9747.1 | 0.00 | 4.222 |
| 0.29514498 | 29.1740 | 10.797 | 9685.9 | 3.1113 | 9689.0 | 0.00 | 4.201 |
| 0.29662071 | 29.2234 | 10.786 | 9628.3 | 3.1314 | 9631.4 | 0.00 | 4.180 |
| 0.29810381 | 29.2659 | 10.776 | 9571.4 | 3.1515 | 9574.6 | 0.00 | 4.159 |
| 0.29959433 | 29.3022 | 10.766 | 9515.2 | 3.1718 | 9518.4 | 0.00 | 4.138 |
| 0.30109230 | 29.3327 | 10.757 | 9459.6 | 3.1921 | 9462.8 | 0.00 | 4.118 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 0.30259776 | 29.3572 | 10.748 | 9404.6 | 3.2125 | 9407.8 | 0.00 | 4.097 |
| 0.30411075 | 29.3748 | 10.739 | 9350.3 | 3.2329 | 9353.5 | 0.00 | 4.077 |
| 0.30563130 | 29.3832 | 10.731 | 9296.5 | 3.2534 | 9299.8 | 0.00 | 4.057 |
| 0.30715946 | 29.3770 | 10.723 | 9243.4 | 3.2740 | 9246.7 | 0.00 | 4.036 |
| 0.30869526 | 29.3374 | 10.715 | 9190.9 | 3.2946 | 9194.2 | 0.00 | 4.016 |
| 0.30988670 | 29.1967 | 10.710 | 9150.7 | 3.3106 | 9154.0 | 0.00 | 4.001 |
| 0.31023873 | 28.9823 | 11.041 | 9423.4 | 3.3153 | 9426.7 | 0.00 | 3.996 |
| 0.31051331 | 29.2097 | 11.040 | 9414.2 | 3.3190 | 9417.6 | 0.00 | 3.993 |
| 0.31178993 | 29.4082 | 11.036 | 9372.0 | 3.3361 | 9375.4 | 0.00 | 3.977 |
| 0.31334888 | 29.5122 | 11.031 | 9321.3 | 3.3569 | 9324.6 | 0.00 | 3.957 |
| 0.31491562 | 29.5859 | 11.027 | 9271.1 | 3.3778 | 9274.4 | 0.00 | 3.937 |
| 0.31649020 | 29.6467 | 11.022 | 9221.4 | 3.3987 | 9224.8 | 0.00 | 3.917 |
| 0.31807265 | 29.7001 | 11.018 | 9172.2 | 3.4197 | 9175.7 | 0.00 | 3.898 |
| 0.31966301 | 29.7486 | 11.015 | 9123.6 | 3.4408 | 9127.1 | 0.00 | 3.879 |
| 0.32126133 | 29.7936 | 11.011 | 9075.5 | 3.4619 | 9079.0 | 0.00 | 3.859 |
| 0.32286764 | 29.8359 | 11.008 | 9027.9 | 3.4831 | 9031.4 | 0.00 | 3.840 |
| 0.32448197 | 29.8761 | 11.006 | 8980.8 | 3.5043 | 8984.3 | 0.00 | 3.821 |
| 0.32610438 | 29.9146 | 11.003 | 8934.2 | 3.5256 | 8937.7 | 0.00 | 3.802 |
| 0.32773491 | 29.9516 | 11.001 | 8888.0 | 3.5469 | 8891.6 | 0.00 | 3.783 |
| 0.32937358 | 29.9874 | 10.999 | 8842.4 | 3.5684 | 8845.9 | 0.00 | 3.764 |
| 0.33102045 | 30.0221 | 10.998 | 8797.1 | 3.5898 | 8800.7 | 0.00 | 3.746 |
| 0.33267555 | 30.0558 | 10.997 | 8752.4 | 3.6113 | 8756.0 | 0.00 | 3.727 |
| 0.33433893 | 30.0887 | 10.996 | 8708.1 | 3.6329 | 8711.7 | 0.00 | 3.708 |
| 0.33601062 | 30.1208 | 10.995 | 8664.2 | 3.6546 | 8667.9 | 0.00 | 3.690 |
| 0.33769068 | 30.1523 | 10.995 | 8620.8 | 3.6762 | 8624.5 | 0.00 | 3.672 |
| 0.33937913 | 30.1831 | 10.994 | 8577.8 | 3.6980 | 8581.5 | 0.00 | 3.653 |
| 0.34107602 | 30.2133 | 10.995 | 8535.2 | 3.7198 | 8538.9 | 0.00 | 3.635 |
| 0.34278140 | 30.2431 | 10.995 | 8493.0 | 3.7416 | 8496.8 | 0.00 | 3.617 |
| 0.34449531 | 30.2723 | 10.996 | 8451.2 | 3.7635 | 8455.0 | 0.00 | 3.599 |
| 0.34621779 | 30.3010 | 10.996 | 8409.8 | 3.7855 | 8413.6 | 0.00 | 3.581 |
| 0.34794888 | 30.3293 | 10.998 | 8368.8 | 3.8075 | 8372.6 | 0.00 | 3.563 |
| 0.34968862 | 30.3572 | 10.999 | 8328.2 | 3.8296 | 8332.0 | 0.00 | 3.546 |
| 0.35143706 | 30.3846 | 11.000 | 8287.9 | 3.8517 | 8291.8 | 0.00 | 3.528 |
| 0.35319425 | 30.4117 | 11.002 | 8248.0 | 3.8738 | 8251.9 | 0.00 | 3.510 |
| 0.35496022 | 30.4383 | 11.004 | 8208.4 | 3.8960 | 8212.3 | 0.00 | 3.493 |
| 0.35673502 | 30.4645 | 11.006 | 8169.2 | 3.9183 | 8173.1 | 0.00 | 3.476 |
| 0.35851870 | 30.4903 | 11.009 | 8130.3 | 3.9406 | 8134.2 | 0.00 | 3.458 |
| 0.36031129 | 30.5156 | 11.011 | 8091.7 | 3.9629 | 8095.7 | 0.00 | 3.441 |
| 0.36211285 | 30.5405 | 11.014 | 8053.4 | 3.9854 | 8057.4 | 0.00 | 3.424 |
| 0.36392341 | 30.5649 | 11.017 | 8015.5 | 4.0078 | 8019.5 | 0.00 | 3.407 |
| 0.36574303 | 30.5887 | 11.020 | 7977.8 | 4.0303 | 7981.8 | 0.00 | 3.390 |
| 0.36757174 | 30.6120 | 11.023 | 7940.4 | 4.0528 | 7944.5 | 0.00 | 3.373 |
| 0.36940960 | 30.6346 | 11.026 | 7903.3 | 4.0754 | 7907.4 | 0.00 | 3.356 |
| 0.37125665 | 30.6565 | 11.030 | 7866.5 | 4.0980 | 7870.6 | 0.00 | 3.340 |
| 0.37311293 | 30.6775 | 11.034 | 7830.0 | 4.1207 | 7834.1 | 0.00 | 3.323 |
| 0.37497850 | 30.6976 | 11.037 | 7793.7 | 4.1434 | 7797.8 | 0.00 | 3.306 |
| 0.37685339 | 30.7166 | 11.041 | 7757.7 | 4.1662 | 7761.8 | 0.00 | 3.290 |
| 0.37873766 | 30.7342 | 11.045 | 7721.9 | 4.1890 | 7726.1 | 0.00 | 3.274 |
| 0.38063135 | 30.7502 | 11.049 | 7686.3 | 4.2118 | 7690.5 | 0.00 | 3.257 |
| 0.38253450 | 30.7641 | 11.054 | 7651.0 | 4.2347 | 7655.2 | 0.00 | 3.241 |
| 0.38444718 | 30.7754 | 11.058 | 7615.9 | 4.2576 | 7620.1 | 0.00 | 3.225 |
| 0.38636941 | 30.7832 | 11.062 | 7581.0 | 4.2806 | 7585.3 | 0.00 | 3.209 |
| 0.38830126 | 30.7863 | 11.067 | 7546.3 | 4.3036 | 7550.6 | 0.00 | 3.193 |
| 0.39024276 | 30.7822 | 11.071 | 7511.8 | 4.3266 | 7516.2 | 0.00 | 3.177 |
| 0.39219398 | 30.7669 | 11.076 | 7477.5 | 4.3497 | 7481.9 | 0.00 | 3.161 |
| 0.39415495 | 30.7304 | 11.080 | 7443.4 | 4.3728 | 7447.8 | 0.00 | 3.146 |
| 0.39612572 | 30.6395 | 11.085 | 7409.5 | 4.3960 | 7413.9 | 0.00 | 3.130 |
| 0.39739863 | 30.4502 | 11.088 | 7387.8 | 4.4109 | 7392.2 | 0.00 | 3.120 |
| 0.39810635 | 30.3141 | 11.614 | 7724.2 | 4.4191 | 7728.6 | 0.00 | 3.114 |
| 0.39840134 | 30.4670 | 11.614 | 7719.1 | 4.4226 | 7723.5 | 0.00 | 3.112 |
| 0.40009688 | 30.7421 | 11.619 | 7689.6 | 4.4424 | 7694.1 | 0.00 | 3.099 |
| 0.40209737 | 30.8843 | 11.625 | 7655.2 | 4.4656 | 7659.7 | 0.00 | 3.083 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 0.40410785 | 30.9841 | 11.631 | 7621.0 | 4.4889 | 7625.4 | 0.00 | 3.068 |
| 0.40612839 | 31.0659 | 11.637 | 7586.8 | 4.5122 | 7591.4 | 0.00 | 3.053 |
| 0.40815904 | 31.1378 | 11.643 | 7552.9 | 4.5356 | 7557.4 | 0.00 | 3.038 |
| 0.41019983 | 31.2034 | 11.649 | 7519.0 | 4.5589 | 7523.6 | 0.00 | 3.023 |
| 0.41225083 | 31.2647 | 11.654 | 7485.3 | 4.5824 | 7489.9 | 0.00 | 3.007 |
| 0.41431208 | 31.3229 | 11.660 | 7451.8 | 4.6058 | 7456.4 | 0.00 | 2.993 |
| 0.41638364 | 31.3788 | 11.666 | 7418.3 | 4.6293 | 7422.9 | 0.00 | 2.978 |
| 0.41846556 | 31.4328 | 11.671 | 7384.9 | 4.6528 | 7389.6 | 0.00 | 2.963 |
| 0.42055789 | 31.4855 | 11.677 | 7351.7 | 4.6763 | 7356.4 | 0.00 | 2.948 |
| 0.42266068 | 31.5370 | 11.682 | 7318.6 | 4.6998 | 7323.3 | 0.00 | 2.933 |
| 0.42477398 | 31.5875 | 11.688 | 7285.5 | 4.7234 | 7290.3 | 0.00 | 2.919 |
| 0.42689785 | 31.6373 | 11.693 | 7252.6 | 4.7470 | 7257.3 | 0.00 | 2.904 |
| 0.42903234 | 31.6865 | 11.698 | 7219.7 | 4.7707 | 7224.5 | 0.00 | 2.890 |
| 0.43117750 | 31.7351 | 11.703 | 7186.9 | 4.7943 | 7191.7 | 0.00 | 2.875 |
| 0.43333339 | 31.7833 | 11.708 | 7154.2 | 4.8180 | 7159.1 | 0.00 | 2.861 |
| 0.43550006 | 31.8312 | 11.713 | 7121.6 | 4.8417 | 7126.5 | 0.00 | 2.847 |
| 0.43767756 | 31.8787 | 11.718 | 7089.1 | 4.8654 | 7093.9 | 0.00 | 2.833 |
| 0.43986595 | 31.9260 | 11.723 | 7056.6 | 4.8892 | 7061.4 | 0.00 | 2.819 |
| 0.44206528 | 31.9700 | 11.727 | 7024.1 | 4.9129 | 7029.0 | 0.00 | 2.805 |
| 0.44427560 | 32.0169 | 11.731 | 6991.7 | 4.9367 | 6996.6 | 0.00 | 2.791 |
| 0.44649698 | 32.0636 | 11.735 | 6959.3 | 4.9605 | 6964.3 | 0.00 | 2.777 |
| 0.44872947 | 32.1102 | 11.739 | 6927.0 | 4.9843 | 6932.0 | 0.00 | 2.763 |
| 0.45097311 | 32.1567 | 11.743 | 6894.7 | 5.0082 | 6899.7 | 0.00 | 2.749 |
| 0.45322798 | 32.2031 | 11.746 | 6862.4 | 5.0320 | 6867.4 | 0.00 | 2.736 |
| 0.45549412 | 32.2494 | 11.750 | 6830.2 | 5.0559 | 6835.2 | 0.00 | 2.722 |
| 0.45777159 | 32.2956 | 11.753 | 6797.9 | 5.0798 | 6803.0 | 0.00 | 2.708 |
| 0.46006045 | 32.3417 | 11.756 | 6765.7 | 5.1037 | 6770.8 | 0.00 | 2.695 |
| 0.46236075 | 32.3878 | 11.758 | 6733.6 | 5.1276 | 6738.7 | 0.00 | 2.682 |
| 0.46467255 | 32.4338 | 11.761 | 6701.4 | 5.1515 | 6706.5 | 0.00 | 2.668 |
| 0.46699592 | 32.4798 | 11.763 | 6669.2 | 5.1754 | 6674.4 | 0.00 | 2.655 |
| 0.46933090 | 32.5257 | 11.764 | 6637.1 | 5.1994 | 6642.3 | 0.00 | 2.642 |
| 0.47167755 | 32.5716 | 11.766 | 6605.0 | 5.2233 | 6610.2 | 0.00 | 2.629 |
| 0.47403594 | 32.6175 | 11.767 | 6572.8 | 5.2473 | 6578.1 | 0.00 | 2.616 |
| 0.47640612 | 32.6633 | 11.768 | 6540.7 | 5.2713 | 6546.0 | 0.00 | 2.602 |
| 0.47878815 | 32.7091 | 11.769 | 6508.6 | 5.2952 | 6513.9 | 0.00 | 2.590 |
| 0.48118209 | 32.7549 | 11.769 | 6476.4 | 5.3192 | 6481.7 | 0.00 | 2.577 |
| 0.48358800 | 32.8006 | 11.770 | 6444.2 | 5.3432 | 6449.6 | 0.00 | 2.564 |
| 0.48600594 | 32.8462 | 11.769 | 6412.0 | 5.3672 | 6417.4 | 0.00 | 2.551 |
| 0.48843597 | 32.8918 | 11.769 | 6379.9 | 5.3912 | 6385.2 | 0.00 | 2.538 |
| 0.49087815 | 32.9374 | 11.768 | 6347.7 | 5.4152 | 6353.1 | 0.00 | 2.526 |
| 0.49333254 | 32.9829 | 11.767 | 6315.5 | 5.4392 | 6320.9 | 0.00 | 2.513 |
| 0.49579920 | 33.0283 | 11.765 | 6283.3 | 5.4632 | 6288.8 | 0.00 | 2.501 |
| 0.49827820 | 33.0737 | 11.764 | 6251.1 | 5.4872 | 6256.6 | 0.00 | 2.488 |
| 0.50076959 | 33.1190 | 11.762 | 6218.9 | 5.5113 | 6224.4 | 0.00 | 2.476 |
| 0.50327344 | 33.1642 | 11.759 | 6186.7 | 5.5353 | 6192.2 | 0.00 | 2.464 |
| 0.50578980 | 33.2094 | 11.756 | 6154.5 | 5.5593 | 6160.1 | 0.00 | 2.451 |
| 0.50831875 | 33.2545 | 11.753 | 6122.3 | 5.5833 | 6127.9 | 0.00 | 2.439 |
| 0.51086035 | 33.2995 | 11.750 | 6090.1 | 5.6073 | 6095.7 | 0.00 | 2.427 |
| 0.51341465 | 33.3444 | 11.746 | 6057.8 | 5.6313 | 6063.5 | 0.00 | 2.415 |
| 0.51598172 | 33.3892 | 11.742 | 6025.6 | 5.6553 | 6031.3 | 0.00 | 2.403 |
| 0.51856163 | 33.4339 | 11.738 | 5993.4 | 5.6793 | 5999.0 | 0.00 | 2.391 |
| 0.52115444 | 33.4784 | 11.733 | 5961.1 | 5.7032 | 5966.8 | 0.00 | 2.379 |
| 0.52376021 | 33.5229 | 11.728 | 5928.9 | 5.7272 | 5934.6 | 0.00 | 2.367 |
| 0.52637901 | 33.5672 | 11.722 | 5896.6 | 5.7512 | 5902.4 | 0.00 | 2.355 |
| 0.52901091 | 33.6114 | 11.717 | 5864.3 | 5.7751 | 5870.1 | 0.00 | 2.344 |
| 0.53165596 | 33.6555 | 11.710 | 5832.1 | 5.7991 | 5837.9 | 0.00 | 2.332 |
| 0.53431424 | 33.6994 | 11.704 | 5799.8 | 5.8230 | 5805.6 | 0.00 | 2.320 |
| 0.53698581 | 33.7431 | 11.697 | 5767.5 | 5.8469 | 5773.4 | 0.00 | 2.309 |
| 0.53967074 | 33.7867 | 11.690 | 5735.3 | 5.8708 | 5741.1 | 0.00 | 2.297 |
| 0.54236910 | 33.8302 | 11.682 | 5703.0 | 5.8947 | 5708.9 | 0.00 | 2.286 |
| 0.54508094 | 33.8734 | 11.674 | 5670.7 | 5.9186 | 5676.7 | 0.00 | 2.275 |
| 0.54780635 | 33.9164 | 11.665 | 5638.5 | 5.9425 | 5644.4 | 0.00 | 2.263 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 0.55054538 | 33.9593 | 11.657 | 5606.2 | 5.9663 | 5612.2 | 0.00 | 2.252 |
| 0.55329810 | 34.0019 | 11.648 | 5574.0 | 5.9901 | 5579.9 | 0.00 | 2.241 |
| 0.55606460 | 34.0444 | 11.638 | 5541.7 | 6.0139 | 5547.7 | 0.00 | 2.230 |
| 0.55884492 | 34.0866 | 11.628 | 5509.5 | 6.0377 | 5515.5 | 0.00 | 2.219 |
| 0.56163914 | 34.1286 | 11.618 | 5477.2 | 6.0615 | 5483.3 | 0.00 | 2.208 |
| 0.56444734 | 34.1703 | 11.607 | 5445.0 | 6.0852 | 5451.1 | 0.00 | 2.197 |
| 0.56726958 | 34.2119 | 11.596 | 5412.8 | 6.1090 | 5418.9 | 0.00 | 2.186 |
| 0.57010592 | 34.2531 | 11.585 | 5380.6 | 6.1327 | 5386.7 | 0.00 | 2.175 |
| 0.57295645 | 34.2941 | 11.573 | 5348.4 | 6.1563 | 5354.6 | 0.00 | 2.164 |
| 0.57582123 | 34.3349 | 11.561 | 5316.3 | 6.1800 | 5322.4 | 0.00 | 2.153 |
| 0.57870034 | 34.3753 | 11.549 | 5284.1 | 6.2036 | 5290.3 | 0.00 | 2.142 |
| 0.58159384 | 34.4155 | 11.536 | 5252.0 | 6.2272 | 5258.2 | 0.00 | 2.132 |
| 0.58450181 | 34.4554 | 11.523 | 5219.9 | 6.2508 | 5226.1 | 0.00 | 2.121 |
| 0.58742432 | 34.4950 | 11.509 | 5187.8 | 6.2743 | 5194.1 | 0.00 | 2.111 |
| 0.59036144 | 34.5343 | 11.495 | 5155.7 | 6.2979 | 5162.0 | 0.00 | 2.100 |
| 0.59331325 | 34.5732 | 11.481 | 5123.7 | 6.3214 | 5130.0 | 0.00 | 2.090 |
| 0.59627982 | 34.6119 | 11.466 | 5091.6 | 6.3448 | 5097.9 | 0.00 | 2.079 |
| 0.59926122 | 34.6501 | 11.451 | 5059.5 | 6.3682 | 5065.9 | 0.00 | 2.069 |
| 0.60225752 | 34.6880 | 11.435 | 5027.4 | 6.3916 | 5033.8 | 0.00 | 2.059 |
| 0.60526881 | 34.7255 | 11.419 | 4995.3 | 6.4150 | 5001.7 | 0.00 | 2.048 |
| 0.60829515 | 34.7626 | 11.402 | 4963.2 | 6.4383 | 4969.6 | 0.00 | 2.038 |
| 0.61133663 | 34.7993 | 11.385 | 4931.1 | 6.4616 | 4937.6 | 0.00 | 2.028 |
| 0.61439331 | 34.8356 | 11.368 | 4899.1 | 6.4848 | 4905.6 | 0.00 | 2.018 |
| 0.61746528 | 34.8713 | 11.350 | 4867.0 | 6.5080 | 4873.5 | 0.00 | 2.008 |
| 0.62055260 | 34.9067 | 11.332 | 4835.0 | 6.5312 | 4841.5 | 0.00 | 1.998 |
| 0.62365537 | 34.9415 | 11.313 | 4803.0 | 6.5544 | 4809.6 | 0.00 | 1.988 |
| 0.62677364 | 34.9759 | 11.294 | 4771.1 | 6.5774 | 4777.6 | 0.00 | 1.978 |
| 0.62990751 | 35.0097 | 11.274 | 4739.1 | 6.6005 | 4745.7 | 0.00 | 1.968 |
| 0.63305705 | 35.0430 | 11.254 | 4707.2 | 6.6235 | 4713.9 | 0.00 | 1.959 |
| 0.63622234 | 35.0758 | 11.234 | 4675.4 | 6.6465 | 4682.0 | 0.00 | 1.949 |
| 0.63940345 | 35.1081 | 11.214 | 4643.6 | 6.6694 | 4650.3 | 0.00 | 1.939 |
| 0.64260046 | 35.1398 | 11.193 | 4611.8 | 6.6923 | 4618.5 | 0.00 | 1.929 |
| 0.64581347 | 35.1709 | 11.171 | 4580.1 | 6.7151 | 4586.9 | 0.00 | 1.920 |
| 0.64904253 | 35.2014 | 11.150 | 4548.5 | 6.7379 | 4555.2 | 0.00 | 1.910 |
| 0.65228775 | 35.2313 | 11.127 | 4516.9 | 6.7606 | 4523.7 | 0.00 | 1.901 |
| 0.65554919 | 35.2607 | 11.105 | 4485.4 | 6.7833 | 4492.2 | 0.00 | 1.891 |
| 0.65882693 | 35.2894 | 11.082 | 4454.0 | 6.8060 | 4460.8 | 0.00 | 1.882 |
| 0.66212107 | 35.3175 | 11.059 | 4422.6 | 6.8285 | 4429.4 | 0.00 | 1.873 |
| 0.66543167 | 35.3449 | 11.036 | 4391.3 | 6.8511 | 4398.1 | 0.00 | 1.863 |
| 0.66875883 | 35.3717 | 11.012 | 4360.1 | 6.8736 | 4366.9 | 0.00 | 1.854 |
| 0.67210262 | 35.3978 | 10.988 | 4328.9 | 6.8960 | 4335.8 | 0.00 | 1.845 |
| 0.67546314 | 35.4232 | 10.964 | 4297.9 | 6.9184 | 4304.8 | 0.00 | 1.836 |
| 0.67884045 | 35.4480 | 10.939 | 4266.9 | 6.9407 | 4273.8 | 0.00 | 1.826 |
| 0.68223466 | 35.4720 | 10.915 | 4236.0 | 6.9630 | 4243.0 | 0.00 | 1.817 |
| 0.68564583 | 35.4953 | 10.889 | 4205.2 | 6.9852 | 4212.2 | 0.00 | 1.808 |
| 0.68907406 | 35.5180 | 10.864 | 4174.5 | 7.0073 | 4181.5 | 0.00 | 1.799 |
| 0.69251943 | 35.5398 | 10.838 | 4143.9 | 7.0294 | 4151.0 | 0.00 | 1.790 |
| 0.69598202 | 35.5610 | 10.812 | 4113.5 | 7.0515 | 4120.5 | 0.00 | 1.781 |
| 0.69946194 | 35.5813 | 10.786 | 4083.1 | 7.0734 | 4090.2 | 0.00 | 1.773 |
| 0.70295924 | 35.6009 | 10.760 | 4052.8 | 7.0953 | 4059.9 | 0.00 | 1.764 |
| 0.70647404 | 35.6197 | 10.733 | 4022.6 | 7.1172 | 4029.8 | 0.00 | 1.755 |
| 0.71000641 | 35.6378 | 10.706 | 3992.6 | 7.1390 | 3999.7 | 0.00 | 1.746 |
| 0.71355644 | 35.6550 | 10.679 | 3962.7 | 7.1607 | 3969.8 | 0.00 | 1.738 |
| 0.71712423 | 35.6714 | 10.652 | 3932.9 | 7.1824 | 3940.0 | 0.00 | 1.729 |
| 0.72070985 | 35.6870 | 10.624 | 3903.2 | 7.2040 | 3910.4 | 0.00 | 1.720 |
| 0.72431340 | 35.7017 | 10.596 | 3873.6 | 7.2255 | 3880.8 | 0.00 | 1.712 |
| 0.72793496 | 35.7156 | 10.568 | 3844.1 | 7.2469 | 3851.4 | 0.00 | 1.703 |
| 0.73157464 | 35.7286 | 10.540 | 3814.8 | 7.2683 | 3822.1 | 0.00 | 1.695 |
| 0.73523251 | 35.7408 | 10.512 | 3785.6 | 7.2896 | 3792.9 | 0.00 | 1.686 |
| 0.73890867 | 35.7520 | 10.483 | 3756.5 | 7.3109 | 3763.9 | 0.00 | 1.678 |
| 0.74260322 | 35.7624 | 10.454 | 3727.6 | 7.3321 | 3734.9 | 0.00 | 1.670 |
| 0.74631623 | 35.7718 | 10.426 | 3698.8 | 7.3532 | 3706.1 | 0.00 | 1.661 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 0.75004781 | 35.7803 | 10.396 | 3670.1 | 7.3742 | 3677.5 | 0.00 | 1.653 |
| 0.75379805 | 35.7879 | 10.367 | 3641.6 | 7.3952 | 3649.0 | 0.00 | 1.645 |
| 0.75756704 | 35.7945 | 10.338 | 3613.2 | 7.4160 | 3620.6 | 0.00 | 1.637 |
| 0.76135488 | 35.8001 | 10.308 | 3585.0 | 7.4369 | 3592.4 | 0.00 | 1.628 |
| 0.76516165 | 35.8048 | 10.279 | 3556.9 | 7.4576 | 3564.3 | 0.00 | 1.620 |
| 0.76898746 | 35.8084 | 10.249 | 3528.9 | 7.4782 | 3536.4 | 0.00 | 1.612 |
| 0.77283240 | 35.8110 | 10.219 | 3501.1 | 7.4988 | 3508.6 | 0.00 | 1.604 |
| 0.77669656 | 35.8126 | 10.189 | 3473.4 | 7.5193 | 3480.9 | 0.00 | 1.596 |
| 0.78058004 | 35.8132 | 10.159 | 3445.9 | 7.5397 | 3453.4 | 0.00 | 1.588 |
| 0.78448294 | 35.8126 | 10.128 | 3418.5 | 7.5601 | 3426.1 | 0.00 | 1.580 |
| 0.78840536 | 35.8110 | 10.098 | 3391.3 | 7.5803 | 3398.9 | 0.00 | 1.573 |
| 0.79234738 | 35.8083 | 10.067 | 3364.3 | 7.6005 | 3371.9 | 0.00 | 1.565 |
| 0.79630912 | 35.8045 | 10.037 | 3337.4 | 7.6206 | 3345.0 | 0.00 | 1.557 |
| 0.80029067 | 35.7996 | 10.006 | 3310.6 | 7.6406 | 3318.3 | 0.00 | 1.549 |
| 0.80429212 | 35.7935 | 9.9755 | 3284.0 | 7.6605 | 3291.7 | 0.00 | 1.542 |
| 0.80831358 | 35.7862 | 9.9447 | 3257.6 | 7.6803 | 3265.3 | 0.00 | 1.534 |
| 0.81235515 | 35.7777 | 9.9138 | 3231.3 | 7.7001 | 3239.0 | 0.00 | 1.526 |
| 0.81641693 | 35.7680 | 9.8828 | 3205.2 | 7.7197 | 3212.9 | 0.00 | 1.519 |
| 0.82049901 | 35.7571 | 9.8518 | 3179.2 | 7.7393 | 3187.0 | 0.00 | 1.511 |
| 0.82460150 | 35.7449 | 9.8207 | 3153.4 | 7.7588 | 3161.2 | 0.00 | 1.504 |
| 0.82872451 | 35.7315 | 9.7895 | 3127.8 | 7.7782 | 3135.6 | 0.00 | 1.496 |
| 0.83286813 | 35.7167 | 9.7583 | 3102.3 | 7.7975 | 3110.1 | 0.00 | 1.489 |
| 0.83703248 | 35.7007 | 9.7271 | 3077.0 | 7.8167 | 3084.8 | 0.00 | 1.481 |
| 0.84121764 | 35.6832 | 9.6958 | 3051.8 | 7.8358 | 3059.7 | 0.00 | 1.474 |
| 0.84542373 | 35.6644 | 9.6645 | 3026.9 | 7.8548 | 3034.7 | 0.00 | 1.467 |
| 0.84965084 | 35.6442 | 9.6332 | 3002.0 | 7.8737 | 3009.9 | 0.00 | 1.459 |
| 0.85389910 | 35.6226 | 9.6018 | 2977.4 | 7.8926 | 2985.3 | 0.00 | 1.452 |
| 0.85816859 | 35.6013 | 9.5704 | 2952.9 | 7.9113 | 2960.8 | 0.00 | 1.445 |
| 0.86245944 | 35.5767 | 9.5390 | 2928.5 | 7.9299 | 2936.5 | 0.00 | 1.438 |
| 0.86677173 | 35.5506 | 9.5075 | 2904.3 | 7.9485 | 2912.3 | 0.00 | 1.430 |
| 0.87110559 | 35.5230 | 9.4761 | 2880.3 | 7.9669 | 2888.3 | 0.00 | 1.423 |
| 0.87546112 | 35.4938 | 9.4446 | 2856.5 | 7.9853 | 2864.5 | 0.00 | 1.416 |
| 0.87983843 | 35.4629 | 9.4132 | 2832.8 | 8.0035 | 2840.8 | 0.00 | 1.409 |
| 0.88423762 | 35.4304 | 9.3817 | 2809.3 | 8.0217 | 2817.3 | 0.00 | 1.402 |
| 0.88865881 | 35.3962 | 9.3502 | 2786.0 | 8.0397 | 2794.0 | 0.00 | 1.395 |
| 0.89310210 | 35.3602 | 9.3188 | 2762.8 | 8.0576 | 2770.8 | 0.00 | 1.388 |
| 0.89756761 | 35.3225 | 9.2874 | 2739.7 | 8.0755 | 2747.8 | 0.00 | 1.381 |
| 0.90205545 | 35.2829 | 9.2559 | 2716.9 | 8.0932 | 2725.0 | 0.00 | 1.374 |
| 0.90656573 | 35.2415 | 9.2245 | 2694.2 | 8.1108 | 2702.3 | 0.00 | 1.368 |
| 0.91109856 | 35.1981 | 9.1931 | 2671.7 | 8.1284 | 2679.8 | 0.00 | 1.361 |
| 0.91565405 | 35.1528 | 9.1617 | 2649.3 | 8.1458 | 2657.5 | 0.00 | 1.354 |
| 0.92023232 | 35.1055 | 9.1304 | 2627.1 | 8.1631 | 2635.3 | 0.00 | 1.347 |
| 0.92483348 | 35.0561 | 9.0991 | 2605.1 | 8.1803 | 2613.3 | 0.00 | 1.341 |
| 0.92945765 | 35.0046 | 9.0678 | 2583.2 | 8.1974 | 2591.4 | 0.00 | 1.334 |
| 0.93410494 | 34.9509 | 9.0365 | 2561.5 | 8.2144 | 2569.7 | 0.00 | 1.327 |
| 0.93877546 | 34.8950 | 9.0053 | 2539.9 | 8.2313 | 2548.2 | 0.00 | 1.321 |
| 0.94346934 | 34.8368 | 8.9741 | 2518.6 | 8.2480 | 2526.8 | 0.00 | 1.314 |
| 0.94818668 | 34.7763 | 8.9430 | 2497.3 | 8.2647 | 2505.6 | 0.00 | 1.308 |
| 0.95292762 | 34.7133 | 8.9119 | 2476.3 | 8.2812 | 2484.5 | 0.00 | 1.301 |
| 0.95769226 | 34.6478 | 8.8809 | 2455.4 | 8.2977 | 2463.7 | 0.00 | 1.295 |
| 0.96248072 | 34.5798 | 8.8499 | 2434.6 | 8.3140 | 2442.9 | 0.00 | 1.288 |
| 0.96729312 | 34.5092 | 8.8190 | 2414.0 | 8.3302 | 2422.4 | 0.00 | 1.282 |
| 0.97212959 | 34.4358 | 8.7881 | 2393.6 | 8.3463 | 2402.0 | 0.00 | 1.275 |
| 0.97699023 | 34.3597 | 8.7572 | 2373.4 | 8.3623 | 2381.7 | 0.00 | 1.269 |
| 0.98187519 | 34.2807 | 8.7265 | 2353.2 | 8.3781 | 2361.6 | 0.00 | 1.263 |
| 0.98678456 | 34.1987 | 8.6958 | 2333.3 | 8.3939 | 2341.7 | 0.00 | 1.256 |
| 0.99171848 | 34.1138 | 8.6651 | 2313.5 | 8.4095 | 2321.9 | 0.00 | 1.250 |
| 0.99667708 | 34.0258 | 8.6345 | 2293.9 | 8.4250 | 2302.3 | 0.00 | 1.244 |
| 1.0016605 | 33.9309 | 8.5979 | 2272.8 | 8.4404 | 2281.2 | 0.00 | 1.238 |
| 1.0066688 | 33.8244 | 8.5491 | 2248.6 | 8.4557 | 2257.1 | 0.00 | 1.232 |
| 1.0117021 | 33.7127 | 8.5006 | 2224.8 | 8.4708 | 2233.2 | 0.00 | 1.226 |
| 1.0167606 | 33.5959 | 8.4525 | 2201.2 | 8.4858 | 2209.6 | 0.00 | 1.219 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 1.0218444 | 33.4736 | 8.4047 | 2177.8 | 8.5007 | 2186.3 | 0.00 | 1.213 |
| 1.0269536 | 33.3455 | 8.3572 | 2154.7 | 8.5155 | 2163.3 | 0.00 | 1.207 |
| 1.0320884 | 33.2115 | 8.3100 | 2131.9 | 8.5302 | 2140.4 | 0.00 | 1.201 |
| 1.0372489 | 33.0713 | 8.2632 | 2109.3 | 8.5447 | 2117.9 | 0.00 | 1.195 |
| 1.0424351 | 32.9245 | 8.2166 | 2087.0 | 8.5592 | 2095.6 | 0.00 | 1.189 |
| 1.0476473 | 32.7707 | 8.1704 | 2065.0 | 8.5735 | 2073.5 | 0.00 | 1.183 |
| 1.0528855 | 32.6097 | 8.1245 | 2043.2 | 8.5876 | 2051.7 | 0.00 | 1.178 |
| 1.0581499 | 32.4410 | 8.0789 | 2021.6 | 8.6017 | 2030.2 | 0.00 | 1.172 |
| 1.0634407 | 32.2642 | 8.0337 | 2000.3 | 8.6156 | 2008.9 | 0.00 | 1.166 |
| 1.0687579 | 32.0788 | 7.9887 | 1979.2 | 8.6294 | 1987.8 | 0.00 | 1.160 |
| 1.0741017 | 31.8842 | 7.9440 | 1958.3 | 8.6431 | 1967.0 | 0.00 | 1.154 |
| 1.0794722 | 31.6798 | 7.8997 | 1937.7 | 8.6566 | 1946.3 | 0.00 | 1.149 |
| 1.0848695 | 31.4650 | 7.8556 | 1917.3 | 8.6700 | 1926.0 | 0.00 | 1.143 |
| 1.0902939 | 31.2390 | 7.8119 | 1897.1 | 8.6833 | 1905.8 | 0.00 | 1.137 |
| 1.0957454 | 31.0010 | 7.7684 | 1877.2 | 8.6964 | 1885.9 | 0.00 | 1.132 |
| 1.1012241 | 30.7501 | 7.7253 | 1857.5 | 8.7095 | 1866.2 | 0.00 | 1.126 |
| 1.1067302 | 30.4851 | 7.6824 | 1838.0 | 8.7224 | 1846.7 | 0.00 | 1.120 |
| 1.1122639 | 30.2050 | 7.6398 | 1818.7 | 8.7351 | 1827.4 | 0.00 | 1.115 |
| 1.1178252 | 29.9083 | 7.5976 | 1799.6 | 8.7478 | 1808.4 | 0.00 | 1.109 |
| 1.1234143 | 29.5935 | 7.5556 | 1780.8 | 8.7603 | 1789.6 | 0.00 | 1.104 |
| 1.1290314 | 29.2589 | 7.5139 | 1762.2 | 8.7726 | 1770.9 | 0.00 | 1.098 |
| 1.1346765 | 28.9023 | 7.4725 | 1743.7 | 8.7849 | 1752.5 | 0.00 | 1.093 |
| 1.1403499 | 28.5214 | 7.4312 | 1725.5 | 8.7970 | 1734.3 | 0.00 | 1.087 |
| 1.1460517 | 28.1132 | 7.3885 | 1707.0 | 8.8089 | 1715.8 | 0.00 | 1.082 |
| 1.1517819 | 27.6743 | 7.3461 | 1688.8 | 8.8208 | 1697.6 | 0.00 | 1.076 |
| 1.1575408 | 27.2007 | 7.3040 | 1670.7 | 8.8325 | 1679.6 | 0.00 | 1.071 |
| 1.1633285 | 26.6875 | 7.2621 | 1652.9 | 8.8440 | 1661.7 | 0.00 | 1.066 |
| 1.1691452 | 26.1287 | 7.2206 | 1635.3 | 8.8554 | 1644.1 | 0.00 | 1.060 |
| 1.1749909 | 25.5167 | 7.1793 | 1617.8 | 8.8667 | 1626.7 | 0.00 | 1.055 |
| 1.1808659 | 24.8419 | 7.1384 | 1600.6 | 8.8779 | 1609.5 | 0.00 | 1.050 |
| 1.1867702 | 24.0918 | 7.0977 | 1583.6 | 8.8889 | 1592.5 | 0.00 | 1.045 |
| 1.1927040 | 23.2496 | 7.0573 | 1566.7 | 8.8998 | 1575.6 | 0.00 | 1.040 |
| 1.1986676 | 22.2917 | 7.0172 | 1550.1 | 8.9105 | 1559.0 | 0.00 | 1.034 |
| 1.2046609 | 21.1857 | 6.9774 | 1533.6 | 8.9211 | 1542.5 | 0.00 | 1.029 |
| 1.2106842 | 19.8799 | 6.9379 | 1517.3 | 8.9316 | 1526.3 | 0.00 | 1.024 |
| 1.2167376 | 18.2900 | 6.8986 | 1501.2 | 8.9419 | 1510.2 | 0.00 | 1.019 |
| 1.2228213 | 16.2608 | 6.8596 | 1485.3 | 8.9521 | 1494.3 | 0.00 | 1.014 |
| 1.2289354 | 13.4483 | 6.8209 | 1469.6 | 8.9621 | 1478.6 | 0.00 | 1.009 |
| 1.2350801 | 8.76614 | 6.7824 | 1454.0 | 8.9720 | 1463.0 | 0.00 | 1.004 |
| 1.2410448 | −14.6252 | 6.7452 | 1439.2 | 8.9815 | 1448.2 | 0.00 | 9.990 |
| 1.2412555 | −21.4128 | 26.448 | 5641.9 | 8.9818 | 5650.9 | 0.00 | 9.989 |
| 1.2413551 | −14.9723 | 26.445 | 5640.7 | 8.9820 | 5649.7 | 0.00 | 9.988 |
| 1.2474618 | 7.73230 | 26.244 | 5570.5 | 8.9914 | 5579.5 | 0.00 | 9.939 |
| 1.2536991 | 11.2864 | 26.042 | 5500.0 | 9.0009 | 5509.0 | 0.00 | 9.889 |
| 1.2599676 | 12.6566 | 25.841 | 5430.4 | 9.0103 | 5439.4 | 0.00 | 9.840 |
| 1.2662674 | 12.4859 | 25.641 | 5361.7 | 9.0195 | 5370.7 | 0.00 | 9.791 |
| 1.2725988 | 8.84739 | 25.444 | 5293.8 | 9.0285 | 5302.9 | 0.00 | 9.743 |
| 1.2747297 | 0.375774 | 25.378 | 5271.3 | 9.0315 | 5280.3 | 0.00 | 9.726 |
| 1.2752703 | 0.286762 | 38.277 | 7947.4 | 9.0323 | 7956.4 | 0.00 | 9.722 |
| 1.2789618 | 12.1356 | 38.103 | 7888.4 | 9.0374 | 7897.4 | 0.00 | 9.694 |
| 1.2853566 | 17.2921 | 37.804 | 7787.6 | 9.0462 | 7796.6 | 0.00 | 9.646 |
| 1.2917833 | 20.3204 | 37.508 | 7688.1 | 9.0548 | 7697.2 | 0.00 | 9.598 |
| 1.2982423 | 22.5811 | 37.214 | 7590.0 | 9.0633 | 7599.0 | 0.00 | 9.550 |
| 1.3047335 | 24.4201 | 36.923 | 7493.0 | 9.0716 | 7502.1 | 0.00 | 9.503 |
| 1.3112571 | 25.9839 | 36.634 | 7397.4 | 9.0798 | 7406.5 | 0.00 | 9.455 |
| 1.3178134 | 27.3503 | 36.347 | 7303.0 | 9.0879 | 7312.1 | 0.00 | 9.408 |
| 1.3244025 | 28.5662 | 36.063 | 7209.8 | 9.0958 | 7218.9 | 0.00 | 9.362 |
| 1.3310245 | 29.6627 | 35.780 | 7117.8 | 9.1035 | 7126.9 | 0.00 | 9.315 |
| 1.3376796 | 30.6615 | 35.501 | 7027.0 | 9.1112 | 7036.1 | 0.00 | 9.269 |
| 1.3443680 | 31.5784 | 35.223 | 6937.4 | 9.1186 | 6946.5 | 0.00 | 9.222 |
| 1.3510899 | 32.4253 | 34.948 | 6848.9 | 9.1259 | 6858.0 | 0.00 | 9.177 |
| 1.3578453 | 33.2117 | 34.675 | 6761.6 | 9.1331 | 6770.7 | 0.00 | 9.131 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 1.3646345 | 33.9449 | 34.404 | 6675.4 | 9.1401 | 6684.5 | 0.00 | 9.086 |
| 1.3714577 | 34.6310 | 34.135 | 6590.3 | 9.1470 | 6599.4 | 0.00 | 9.040 |
| 1.3783150 | 35.2747 | 33.869 | 6506.3 | 9.1538 | 6515.5 | 0.00 | 8.995 |
| 1.3852066 | 35.8803 | 33.604 | 6423.4 | 9.1603 | 6432.6 | 0.00 | 8.951 |
| 1.3921326 | 36.4511 | 33.342 | 6341.6 | 9.1668 | 6350.7 | 0.00 | 8.906 |
| 1.3990933 | 36.9901 | 33.082 | 6260.8 | 9.1731 | 6270.0 | 0.00 | 8.862 |
| 1.4060887 | 37.4997 | 32.824 | 6181.1 | 9.1792 | 6190.3 | 0.00 | 8.818 |
| 1.4131192 | 37.9820 | 32.568 | 6102.4 | 9.1852 | 6111.6 | 0.00 | 8.774 |
| 1.4201848 | 38.4389 | 32.314 | 6024.7 | 9.1911 | 6033.9 | 0.00 | 8.730 |
| 1.4272857 | 38.8719 | 32.062 | 5948.0 | 9.1968 | 5957.2 | 0.00 | 8.687 |
| 1.4344221 | 39.2824 | 31.813 | 5872.3 | 9.2023 | 5881.5 | 0.00 | 8.643 |
| 1.4415942 | 39.6715 | 31.565 | 5797.6 | 9.2077 | 5806.8 | 0.00 | 8.600 |
| 1.4488022 | 40.0403 | 31.319 | 5723.8 | 9.2130 | 5733.1 | 0.00 | 8.558 |
| 1.4560462 | 40.3894 | 31.075 | 5651.0 | 9.2181 | 5660.3 | 0.00 | 8.515 |
| 1.4633265 | 40.7198 | 30.834 | 5579.2 | 9.2230 | 5588.4 | 0.00 | 8.473 |
| 1.4706431 | 41.0317 | 30.594 | 5508.2 | 9.2278 | 5517.5 | 0.00 | 8.431 |
| 1.4779963 | 41.3257 | 30.356 | 5438.2 | 9.2325 | 5447.5 | 0.00 | 8.389 |
| 1.4853863 | 41.6020 | 30.120 | 5369.1 | 9.2370 | 5378.3 | 0.00 | 8.347 |
| 1.4928132 | 41.8607 | 29.886 | 5300.9 | 9.2413 | 5310.1 | 0.00 | 8.305 |
| 1.5002773 | 42.1016 | 29.654 | 5233.5 | 9.2456 | 5242.8 | 0.00 | 8.264 |
| 1.5077787 | 42.3245 | 29.423 | 5167.0 | 9.2496 | 5176.3 | 0.00 | 8.223 |
| 1.5153176 | 42.5289 | 29.195 | 5101.4 | 9.2535 | 5110.7 | 0.00 | 8.182 |
| 1.5228942 | 42.7137 | 28.968 | 5036.6 | 9.2573 | 5045.9 | 0.00 | 8.141 |
| 1.5305086 | 42.8779 | 28.744 | 4972.7 | 9.2609 | 4982.0 | 0.00 | 8.101 |
| 1.5381612 | 43.0195 | 28.521 | 4909.6 | 9.2643 | 4918.8 | 0.00 | 8.061 |
| 1.5458520 | 43.1358 | 28.300 | 4847.3 | 9.2676 | 4856.5 | 0.00 | 8.020 |
| 1.5535812 | 43.2231 | 28.080 | 4785.8 | 9.2708 | 4795.0 | 0.00 | 7.981 |
| 1.5613491 | 43.2756 | 27.862 | 4725.0 | 9.2738 | 4734.3 | 0.00 | 7.941 |
| 1.5691559 | 43.2843 | 27.647 | 4665.1 | 9.2767 | 4674.4 | 0.00 | 7.901 |
| 1.5770017 | 43.2344 | 27.432 | 4605.9 | 9.2794 | 4615.2 | 0.00 | 7.862 |
| 1.5848867 | 43.0989 | 27.220 | 4547.5 | 9.2819 | 4556.8 | 0.00 | 7.823 |
| 1.5928111 | 42.8205 | 27.009 | 4489.9 | 9.2843 | 4499.2 | 0.00 | 7.784 |
| 1.6007752 | 42.2397 | 26.800 | 4432.9 | 9.2866 | 4442.2 | 0.00 | 7.745 |
| 1.6087790 | 40.4058 | 26.592 | 4376.7 | 9.2887 | 4386.0 | 0.00 | 7.707 |
| 1.6098611 | 39.6252 | 26.565 | 4369.2 | 9.2890 | 4378.5 | 0.00 | 7.702 |
| 1.6127389 | 39.6414 | 31.048 | 5097.5 | 9.2897 | 5106.7 | 0.00 | 7.688 |
| 1.6168229 | 41.7185 | 30.919 | 5063.5 | 9.2906 | 5072.8 | 0.00 | 7.668 |
| 1.6249070 | 43.2470 | 30.667 | 4997.2 | 9.2925 | 5006.4 | 0.00 | 7.630 |
| 1.6330316 | 44.1265 | 30.416 | 4931.7 | 9.2941 | 4941.0 | 0.00 | 7.592 |
| 1.6411967 | 44.7741 | 30.168 | 4867.1 | 9.2956 | 4876.4 | 0.00 | 7.555 |
| 1.6494027 | 45.2968 | 29.922 | 4803.4 | 9.2970 | 4812.7 | 0.00 | 7.517 |
| 1.6576497 | 45.7386 | 29.678 | 4740.6 | 9.2982 | 4749.9 | 0.00 | 7.480 |
| 1.6659380 | 46.1214 | 29.436 | 4678.5 | 9.2992 | 4687.8 | 0.00 | 7.442 |
| 1.6742677 | 46.4572 | 29.196 | 4617.2 | 9.3001 | 4626.5 | 0.00 | 7.405 |
| 1.6826390 | 46.7528 | 28.957 | 4556.7 | 9.3009 | 4566.0 | 0.00 | 7.368 |
| 1.6910522 | 47.0108 | 28.722 | 4497.2 | 9.3015 | 4506.5 | 0.00 | 7.332 |
| 1.6995075 | 47.2386 | 28.507 | 4441.4 | 9.3019 | 4450.7 | 0.00 | 7.295 |
| 1.7080050 | 47.4430 | 28.295 | 4386.4 | 9.3022 | 4395.7 | 0.00 | 7.259 |
| 1.7165450 | 47.6215 | 28.086 | 4332.3 | 9.3024 | 4341.7 | 0.00 | 7.223 |
| 1.7251278 | 47.7705 | 27.880 | 4279.1 | 9.3024 | 4288.4 | 0.00 | 7.187 |
| 1.7337534 | 47.8831 | 27.676 | 4226.7 | 9.3023 | 4236.0 | 0.00 | 7.151 |
| 1.7424222 | 47.9450 | 27.475 | 4175.1 | 9.3020 | 4184.4 | 0.00 | 7.116 |
| 1.7511343 | 47.9218 | 27.276 | 4124.3 | 9.3015 | 4133.6 | 0.00 | 7.080 |
| 1.7598899 | 47.6933 | 27.080 | 4074.3 | 9.3009 | 4083.6 | 0.00 | 7.045 |
| 1.7660507 | 46.9089 | 26.944 | 4039.6 | 9.3004 | 4048.9 | 0.00 | 7.020 |
| 1.7686894 | 46.6372 | 28.792 | 4310.3 | 9.3002 | 4319.6 | 0.00 | 7.010 |
| 1.7693492 | 46.9650 | 28.776 | 4306.2 | 9.3001 | 4315.5 | 0.00 | 7.007 |
| 1.7775328 | 48.2501 | 28.575 | 4256.6 | 9.2993 | 4265.9 | 0.00 | 6.975 |
| 1.7864205 | 48.8419 | 28.361 | 4203.7 | 9.2983 | 4213.0 | 0.00 | 6.940 |
| 1.7953526 | 49.2675 | 28.150 | 4151.6 | 9.2971 | 4160.9 | 0.00 | 6.906 |
| 1.8043294 | 49.6165 | 27.941 | 4100.3 | 9.2957 | 4109.5 | 0.00 | 6.871 |
| 1.8133510 | 49.9189 | 27.734 | 4049.7 | 9.2943 | 4059.0 | 0.00 | 6.837 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 1.8224178 | 50.1884 | 27.530 | 3999.8 | 9.2926 | 4009.1 | 0.00 | 6.803 |
| 1.8315299 | 50.4324 | 27.328 | 3950.7 | 9.2908 | 3960.0 | 0.00 | 6.769 |
| 1.8406875 | 50.6550 | 27.128 | 3902.3 | 9.2889 | 3911.6 | 0.00 | 6.736 |
| 1.8498909 | 50.8584 | 26.930 | 3854.6 | 9.2869 | 3863.9 | 0.00 | 6.702 |
| 1.8591404 | 51.0436 | 26.740 | 3808.3 | 9.2846 | 3817.6 | 0.00 | 6.669 |
| 1.8684361 | 51.2174 | 26.558 | 3763.6 | 9.2823 | 3772.9 | 0.00 | 6.636 |
| 1.8777783 | 51.3805 | 26.379 | 3719.6 | 9.2798 | 3728.9 | 0.00 | 6.603 |
| 1.8871672 | 51.5326 | 26.202 | 3676.3 | 9.2771 | 3685.6 | 0.00 | 6.570 |
| 1.8966030 | 51.6730 | 26.028 | 3633.7 | 9.2743 | 3642.9 | 0.00 | 6.537 |
| 1.9060860 | 51.8006 | 25.855 | 3591.6 | 9.2713 | 3600.9 | 0.00 | 6.505 |
| 1.9156165 | 51.9135 | 25.685 | 3550.3 | 9.2682 | 3559.5 | 0.00 | 6.472 |
| 1.9251945 | 52.0083 | 25.517 | 3509.5 | 9.2650 | 3518.8 | 0.00 | 6.440 |
| 1.9348205 | 52.0783 | 25.351 | 3469.3 | 9.2616 | 3478.6 | 0.00 | 6.408 |
| 1.9444946 | 52.1094 | 25.187 | 3429.8 | 9.2581 | 3439.0 | 0.00 | 6.376 |
| 1.9542171 | 52.0624 | 25.025 | 3390.7 | 9.2544 | 3400.0 | 0.00 | 6.344 |
| 1.9639882 | 51.7185 | 24.865 | 3352.3 | 9.2506 | 3361.5 | 0.00 | 6.313 |
| 1.9642536 | 51.6931 | 24.861 | 3351.2 | 9.2505 | 3360.5 | 0.00 | 6.312 |
| 1.9707463 | 51.7851 | 25.938 | 3485.0 | 9.2479 | 3494.2 | 0.00 | 6.291 |
| 1.9738081 | 52.0833 | 25.888 | 3472.8 | 9.2466 | 3482.0 | 0.00 | 6.281 |
| 1.9836772 | 52.5884 | 25.726 | 3433.9 | 9.2425 | 3443.2 | 0.00 | 6.250 |
| 1.9935955 | 52.9146 | 25.566 | 3395.6 | 9.2383 | 3404.8 | 0.00 | 6.219 |
| 2.0035635 | 53.1790 | 25.408 | 3357.8 | 9.2339 | 3367.0 | 0.00 | 6.188 |
| 2.0135813 | 53.4106 | 25.251 | 3320.4 | 9.2293 | 3329.7 | 0.00 | 6.157 |
| 2.0236492 | 53.6213 | 25.096 | 3283.6 | 9.2247 | 3292.8 | 0.00 | 6.127 |
| 2.0337675 | 53.8172 | 24.942 | 3247.3 | 9.2198 | 3256.5 | 0.00 | 6.096 |
| 2.0439363 | 54.0019 | 24.790 | 3211.4 | 9.2149 | 3220.6 | 0.00 | 6.066 |
| 2.0541560 | 54.1777 | 24.639 | 3175.9 | 9.2098 | 3185.1 | 0.00 | 6.036 |
| 2.0644268 | 54.3459 | 24.489 | 3140.9 | 9.2045 | 3150.1 | 0.00 | 6.006 |
| 2.0747489 | 54.5082 | 24.342 | 3106.6 | 9.1991 | 3115.8 | 0.00 | 5.976 |
| 2.0851227 | 54.6662 | 24.197 | 3072.6 | 9.1936 | 3081.8 | 0.00 | 5.946 |
| 2.0955483 | 54.8205 | 24.052 | 3039.1 | 9.1879 | 3048.2 | 0.00 | 5.917 |
| 2.1060260 | 54.9700 | 23.902 | 3005.1 | 9.1821 | 3014.3 | 0.00 | 5.887 |
| 2.1165562 | 55.1146 | 23.753 | 2971.5 | 9.1762 | 2980.7 | 0.00 | 5.858 |
| 2.1271389 | 55.2548 | 23.606 | 2938.4 | 9.1701 | 2947.5 | 0.00 | 5.829 |
| 2.1377746 | 55.3910 | 23.459 | 2905.6 | 9.1639 | 2914.8 | 0.00 | 5.800 |
| 2.1484635 | 55.5237 | 23.314 | 2873.2 | 9.1575 | 2882.4 | 0.00 | 5.771 |
| 2.1592058 | 55.6530 | 23.169 | 2841.2 | 9.1510 | 2850.4 | 0.00 | 5.742 |
| 2.1700018 | 55.7793 | 23.026 | 2809.6 | 9.1444 | 2818.8 | 0.00 | 5.714 |
| 2.1808519 | 55.9026 | 22.884 | 2778.4 | 9.1376 | 2787.5 | 0.00 | 5.685 |
| 2.1917561 | 56.0233 | 22.743 | 2747.5 | 9.1307 | 2756.6 | 0.00 | 5.657 |
| 2.2027149 | 56.1415 | 22.602 | 2717.0 | 9.1237 | 2726.1 | 0.00 | 5.629 |
| 2.2137285 | 56.2573 | 22.463 | 2686.8 | 9.1165 | 2695.9 | 0.00 | 5.601 |
| 2.2247971 | 56.3709 | 22.325 | 2657.0 | 9.1092 | 2666.1 | 0.00 | 5.573 |
| 2.2359211 | 56.4824 | 22.187 | 2627.5 | 9.1017 | 2636.6 | 0.00 | 5.545 |
| 2.2471007 | 56.5919 | 22.051 | 2598.3 | 9.0942 | 2607.4 | 0.00 | 5.518 |
| 2.2583362 | 56.6995 | 21.915 | 2569.5 | 9.0865 | 2578.6 | 0.00 | 5.490 |
| 2.2696279 | 56.8055 | 21.781 | 2541.0 | 9.0786 | 2550.0 | 0.00 | 5.463 |
| 2.2809760 | 56.9099 | 21.647 | 2512.8 | 9.0706 | 2521.9 | 0.00 | 5.436 |
| 2.2923809 | 57.0129 | 21.514 | 2484.9 | 9.0625 | 2494.0 | 0.00 | 5.409 |
| 2.3038428 | 57.1145 | 21.379 | 2457.1 | 9.0543 | 2466.2 | 0.00 | 5.382 |
| 2.3153620 | 57.2137 | 21.244 | 2429.5 | 9.0459 | 2438.5 | 0.00 | 5.355 |
| 2.3269388 | 57.3108 | 21.110 | 2402.1 | 9.0374 | 2411.1 | 0.00 | 5.328 |
| 2.3385735 | 57.4059 | 20.977 | 2375.0 | 9.0287 | 2384.1 | 0.00 | 5.302 |
| 2.3502664 | 57.4991 | 20.844 | 2348.3 | 9.0200 | 2357.3 | 0.00 | 5.275 |
| 2.3620177 | 57.5905 | 20.712 | 2321.8 | 9.0111 | 2330.8 | 0.00 | 5.249 |
| 2.3738278 | 57.6802 | 20.581 | 2295.6 | 9.0021 | 2304.6 | 0.00 | 5.223 |
| 2.3856970 | 57.7683 | 20.451 | 2269.7 | 8.9929 | 2278.7 | 0.00 | 5.197 |
| 2.3976254 | 57.8547 | 20.321 | 2244.1 | 8.9836 | 2253.1 | 0.00 | 5.171 |
| 2.4096136 | 57.9397 | 20.192 | 2218.8 | 8.9742 | 2227.8 | 0.00 | 5.145 |
| 2.4216616 | 58.0231 | 20.064 | 2193.8 | 8.9647 | 2202.8 | 0.00 | 5.120 |
| 2.4337699 | 58.1052 | 19.937 | 2169.0 | 8.9550 | 2178.0 | 0.00 | 5.094 |
| 2.4459388 | 58.1860 | 19.811 | 2144.6 | 8.9452 | 2153.5 | 0.00 | 5.069 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 2.4581685 | 58.2654 | 19.685 | 2120.4 | 8.9353 | 2129.3 | 0.00 | 5.044 |
| 2.4704593 | 58.3436 | 19.560 | 2096.4 | 8.9253 | 2105.3 | 0.00 | 5.019 |
| 2.4828116 | 58.6401 | 19.436 | 2072.7 | 8.9151 | 2081.6 | 0.00 | 4.994 |
| 2.4952257 | 58.7160 | 19.308 | 2048.8 | 8.9049 | 2057.7 | 0.00 | 4.969 |
| 2.5077018 | 58.7903 | 19.181 | 2025.2 | 8.8944 | 2034.1 | 0.00 | 4.944 |
| 2.5202403 | 58.8630 | 19.054 | 2001.9 | 8.8839 | 2010.8 | 0.00 | 4.920 |
| 2.5328415 | 58.9343 | 18.929 | 1978.8 | 8.8733 | 1987.7 | 0.00 | 4.895 |
| 2.5455057 | 59.0042 | 18.804 | 1956.0 | 8.8625 | 1964.8 | 0.00 | 4.871 |
| 2.5582333 | 59.2221 | 18.678 | 1933.2 | 8.8516 | 1942.1 | 0.00 | 4.846 |
| 2.5710244 | 59.2892 | 18.552 | 1910.6 | 8.8406 | 1919.4 | 0.00 | 4.822 |
| 2.5838796 | 59.3545 | 18.426 | 1888.2 | 8.8295 | 1897.0 | 0.00 | 4.798 |
| 2.5967990 | 59.4182 | 18.301 | 1866.0 | 8.8182 | 1874.9 | 0.00 | 4.775 |
| 2.6097829 | 59.4804 | 18.177 | 1844.2 | 8.8069 | 1853.0 | 0.00 | 4.751 |
| 2.6228319 | 59.5411 | 18.054 | 1822.6 | 8.7954 | 1831.4 | 0.00 | 4.727 |
| 2.6359460 | 59.6004 | 17.931 | 1801.2 | 8.7838 | 1810.0 | 0.00 | 4.704 |
| 2.6491257 | 59.6584 | 17.810 | 1780.1 | 8.7721 | 1788.9 | 0.00 | 4.680 |
| 2.6623714 | 59.7150 | 17.689 | 1759.3 | 8.7602 | 1768.0 | 0.00 | 4.657 |
| 2.6756832 | 59.7704 | 17.570 | 1738.6 | 8.7483 | 1747.4 | 0.00 | 4.634 |
| 2.6890617 | 59.8246 | 17.451 | 1718.3 | 8.7362 | 1727.0 | 0.00 | 4.611 |
| 2.7025070 | 59.8777 | 17.333 | 1698.2 | 8.7240 | 1706.9 | 0.00 | 4.588 |
| 2.7160195 | 59.9296 | 17.216 | 1678.3 | 8.7117 | 1687.0 | 0.00 | 4.565 |
| 2.7295996 | 59.9805 | 17.099 | 1658.7 | 8.6993 | 1667.4 | 0.00 | 4.542 |
| 2.7432476 | 60.0304 | 16.984 | 1639.3 | 8.6868 | 1648.0 | 0.00 | 4.520 |
| 2.7569638 | 60.0793 | 16.869 | 1620.1 | 8.6742 | 1628.8 | 0.00 | 4.497 |
| 2.7707486 | 60.1273 | 16.753 | 1601.0 | 8.6615 | 1609.7 | 0.00 | 4.475 |
| 2.7846024 | 60.1743 | 16.638 | 1582.0 | 8.6486 | 1590.7 | 0.00 | 4.452 |
| 2.7985254 | 60.2204 | 16.523 | 1563.3 | 8.6357 | 1571.9 | 0.00 | 4.430 |
| 2.8125180 | 60.2655 | 16.409 | 1544.8 | 8.6226 | 1553.4 | 0.00 | 4.408 |
| 2.8265806 | 60.3097 | 16.296 | 1526.5 | 8.6094 | 1535.1 | 0.00 | 4.386 |
| 2.8407135 | 60.3531 | 16.184 | 1508.5 | 8.5962 | 1517.1 | 0.00 | 4.365 |
| 2.8549171 | 60.3958 | 16.073 | 1490.7 | 8.5828 | 1499.3 | 0.00 | 4.343 |
| 2.8691917 | 60.4377 | 15.962 | 1473.1 | 8.5693 | 1481.6 | 0.00 | 4.321 |
| 2.8835376 | 60.4789 | 15.853 | 1455.7 | 8.5557 | 1464.3 | 0.00 | 4.300 |
| 2.8979553 | 60.5195 | 15.745 | 1438.5 | 8.5420 | 1447.1 | 0.00 | 4.278 |
| 2.9124451 | 60.5595 | 15.637 | 1421.6 | 8.5282 | 1430.1 | 0.00 | 4.257 |
| 2.9270073 | 60.5992 | 15.530 | 1404.9 | 8.5143 | 1413.4 | 0.00 | 4.236 |
| 2.9416424 | 60.6384 | 15.424 | 1388.4 | 8.5003 | 1396.9 | 0.00 | 4.215 |
| 2.9563506 | 60.6775 | 15.319 | 1372.0 | 8.4861 | 1380.5 | 0.00 | 4.194 |
| 2.9711323 | 60.7165 | 15.215 | 1355.9 | 8.4719 | 1364.4 | 0.00 | 4.173 |
| 2.9859880 | 60.7557 | 15.112 | 1340.0 | 8.4576 | 1348.5 | 0.00 | 4.152 |
| 3.0009179 | 60.7956 | 15.009 | 1324.3 | 8.4432 | 1332.7 | 0.00 | 4.132 |
| 3.0159225 | 60.8359 | 14.891 | 1307.4 | 8.4287 | 1315.8 | 0.00 | 4.111 |
| 3.0310021 | 60.8734 | 14.775 | 1290.7 | 8.4141 | 1299.1 | 0.00 | 4.091 |
| 3.0461571 | 60.9086 | 14.660 | 1274.3 | 8.3994 | 1282.7 | 0.00 | 4.070 |
| 3.0613879 | 60.9417 | 14.546 | 1258.1 | 8.3846 | 1266.4 | 0.00 | 4.050 |
| 3.0766949 | 60.9732 | 14.433 | 1242.1 | 8.3697 | 1250.4 | 0.00 | 4.030 |
| 3.0920783 | 61.0030 | 14.321 | 1226.3 | 8.3547 | 1234.6 | 0.00 | 4.010 |
| 3.1075387 | 61.0315 | 14.210 | 1210.7 | 8.3396 | 1219.1 | 0.00 | 3.990 |
| 3.1230764 | 61.0586 | 14.100 | 1195.4 | 8.3244 | 1203.7 | 0.00 | 3.970 |
| 3.1386918 | 61.0844 | 13.990 | 1180.2 | 8.3091 | 1188.5 | 0.00 | 3.950 |
| 3.1543853 | 61.1091 | 13.882 | 1165.3 | 8.2937 | 1173.6 | 0.00 | 3.931 |
| 3.1701572 | 61.1328 | 13.775 | 1150.6 | 8.2783 | 1158.8 | 0.00 | 3.911 |
| 3.1860080 | 61.1554 | 13.669 | 1136.0 | 8.2627 | 1144.3 | 0.00 | 3.892 |
| 3.2019380 | 61.1770 | 13.564 | 1121.7 | 8.2470 | 1129.9 | 0.00 | 3.872 |
| 3.2179477 | 61.1978 | 13.460 | 1107.5 | 8.2313 | 1115.8 | 0.00 | 3.853 |
| 3.2340374 | 61.3211 | 13.354 | 1093.4 | 8.2155 | 1101.6 | 0.00 | 3.834 |
| 3.2502076 | 61.3406 | 13.249 | 1079.3 | 8.1996 | 1087.5 | 0.00 | 3.815 |
| 3.2664587 | 61.3590 | 13.144 | 1065.4 | 8.1836 | 1073.6 | 0.00 | 3.796 |
| 3.2827910 | 61.3763 | 13.040 | 1051.8 | 8.1675 | 1059.9 | 0.00 | 3.777 |
| 3.2992049 | 61.3925 | 12.937 | 1038.3 | 8.1513 | 1046.4 | 0.00 | 3.758 |
| 3.3157009 | 61.4078 | 12.835 | 1024.9 | 8.1350 | 1033.1 | 0.00 | 3.739 |
| 3.3322794 | 61.4220 | 12.734 | 1011.8 | 8.1187 | 1019.9 | 0.00 | 3.721 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tb ($Z=65$) | | | | | | | |
| 3.3489408 | 61.4354 | 12.634 | 998.86 | 8.1023 | 1007.0 | 0.00 | 3.702 |
| 3.3656856 | 61.4479 | 12.534 | 986.08 | 8.0857 | 994.17 | 0.00 | 3.684 |
| 3.3825140 | 61.4596 | 12.436 | 973.48 | 8.0691 | 981.55 | 0.00 | 3.665 |
| 3.3994265 | 61.4705 | 12.338 | 961.04 | 8.0525 | 969.09 | 0.00 | 3.647 |
| 3.4164237 | 61.4807 | 12.242 | 948.77 | 8.0357 | 956.81 | 0.00 | 3.629 |
| 3.4335058 | 61.4901 | 12.146 | 936.67 | 8.0189 | 944.69 | 0.00 | 3.611 |
| 3.4506733 | 61.4988 | 12.051 | 924.73 | 8.0020 | 932.73 | 0.00 | 3.593 |
| 3.4679267 | 61.5069 | 11.957 | 912.95 | 7.9850 | 920.94 | 0.00 | 3.575 |
| 3.4852663 | 61.5143 | 11.864 | 901.33 | 7.9679 | 909.30 | 0.00 | 3.557 |
| 3.5026927 | 61.5211 | 11.772 | 889.87 | 7.9507 | 897.82 | 0.00 | 3.540 |
| 3.5202061 | 61.5273 | 11.680 | 878.56 | 7.9335 | 886.49 | 0.00 | 3.522 |
| 3.5378072 | 61.5803 | 11.589 | 867.38 | 7.9162 | 875.30 | 0.00 | 3.505 |
| 3.5554962 | 61.5858 | 11.497 | 856.22 | 7.8988 | 864.12 | 0.00 | 3.487 |
| 3.5732737 | 61.5905 | 11.406 | 845.21 | 7.8814 | 853.09 | 0.00 | 3.470 |
| 3.5911400 | 61.5945 | 11.316 | 834.35 | 7.8638 | 842.21 | 0.00 | 3.453 |
| 3.6090957 | 61.5978 | 11.227 | 823.63 | 7.8462 | 831.48 | 0.00 | 3.435 |
| 3.6271412 | 61.6004 | 11.138 | 813.06 | 7.8286 | 820.89 | 0.00 | 3.418 |
| 3.6452769 | 61.6023 | 11.050 | 802.63 | 7.8108 | 810.44 | 0.00 | 3.401 |
| 3.6635033 | 61.6036 | 10.963 | 792.34 | 7.7930 | 800.13 | 0.00 | 3.384 |
| 3.6818208 | 61.6044 | 10.877 | 782.19 | 7.7751 | 789.97 | 0.00 | 3.367 |
| 3.7002299 | 61.6045 | 10.791 | 772.18 | 7.7572 | 779.93 | 0.00 | 3.351 |
| 3.7187311 | 61.6041 | 10.706 | 762.30 | 7.7392 | 770.04 | 0.00 | 3.334 |
| 3.7373247 | 61.6031 | 10.622 | 752.55 | 7.7211 | 760.27 | 0.00 | 3.317 |
| 3.7560114 | 61.6016 | 10.539 | 742.94 | 7.7029 | 750.64 | 0.00 | 3.301 |
| 3.7747914 | 61.5996 | 10.456 | 733.45 | 7.6847 | 741.13 | 0.00 | 3.285 |
| 3.7936654 | 61.5971 | 10.374 | 724.09 | 7.6664 | 731.76 | 0.00 | 3.268 |
| 3.8126337 | 61.5941 | 10.293 | 714.85 | 7.6481 | 722.50 | 0.00 | 3.252 |
| 3.8316969 | 61.5907 | 10.213 | 705.74 | 7.6297 | 713.37 | 0.00 | 3.236 |
| 3.8508554 | 61.5868 | 10.133 | 696.76 | 7.6112 | 704.37 | 0.00 | 3.220 |
| 3.8701096 | 61.5824 | 10.054 | 687.89 | 7.5926 | 695.48 | 0.00 | 3.204 |
| 3.8894602 | 61.5776 | 9.9761 | 679.14 | 7.5740 | 686.71 | 0.00 | 3.188 |
| 3.9089075 | 61.5724 | 9.8986 | 670.51 | 7.5554 | 678.06 | 0.00 | 3.172 |
| 3.9284520 | 61.5668 | 9.8217 | 661.99 | 7.5367 | 669.52 | 0.00 | 3.156 |
| 3.9480943 | 61.5835 | 9.7449 | 653.55 | 7.5179 | 661.06 | 0.00 | 3.140 |
| 3.9678347 | 61.5773 | 9.6685 | 645.20 | 7.4991 | 652.70 | 0.00 | 3.125 |
| 3.9876739 | 61.5705 | 9.5928 | 636.96 | 7.4802 | 644.44 | 0.00 | 3.109 |
| Dy ($Z=66$) | | | | | | | |
| Atomic weight: $A_r=162.5000 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=8.5250$ | | | | | | | |
| $\sigma_a (\text{barns/atom})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 269.838$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2(e \text{ atom}^{-1})\times 2.58956\times 10^5$ | | | | | | | |
| 19 edges. Edge energies (keV) | | | | | | | |
| K | 53.7885 | L I | 9.04580 | L II | 8.58060 | L III | 7.79010 |
| M I | 2.04680 | M II | 1.84180 | M III | 1.67560 | M IV | 1.33250 |
| M V | 1.29490 | N I | 0.416300 | N II | 0.331800 | N III | 0.292900 |
| N IV | 0.154200 | N V | 0.154200 | N VI | 0.00420000 | N VII | 0.00420000 |
| O I | 0.0629000 | O II | 0.0263000 | O III | 0.0263000 | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-1.0783, -0.64740) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.014705 e \text{ atom}^{-1}$ | | | | | | | |
| 0.1000000 | 21.4950 | 9.2747 | 24017 | 0.46914 | 24018 | 0.00 | 12.40 |
| 0.1005000 | 21.5276 | 9.2870 | 23930 | 0.47441 | 23930 | 0.00 | 12.34 |
| 0.10100250 | 21.5600 | 9.2991 | 23842 | 0.47972 | 23842 | 0.00 | 12.28 |
| 0.10150751 | 21.5924 | 9.3110 | 23753 | 0.48509 | 23754 | 0.00 | 12.21 |
| 0.10201505 | 21.6246 | 9.3228 | 23665 | 0.49050 | 23665 | 0.00 | 12.15 |
| 0.10252513 | 21.6568 | 9.3343 | 23576 | 0.49596 | 23577 | 0.00 | 12.09 |
| 0.10303775 | 21.6888 | 9.3456 | 23488 | 0.50147 | 23488 | 0.00 | 12.03 |
| 0.10355294 | 21.7206 | 9.3568 | 23399 | 0.50703 | 23399 | 0.00 | 11.97 |
| 0.10407070 | 21.7524 | 9.3677 | 23309 | 0.51264 | 23310 | 0.00 | 11.91 |
| 0.10459106 | 21.7839 | 9.3785 | 23220 | 0.51830 | 23221 | 0.00 | 11.85 |
| 0.10511401 | 21.8153 | 9.3890 | 23131 | 0.52401 | 23131 | 0.00 | 11.80 |
| 0.10563958 | 21.8466 | 9.3994 | 23041 | 0.52977 | 23041 | 0.00 | 11.74 |
| 0.10616778 | 21.8776 | 9.4095 | 22951 | 0.53558 | 22952 | 0.00 | 11.68 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Dy ($Z=66$) | | | | | | | |
| 0.10669862 | 21.9084 | 9.4195 | 22861 | 0.54145 | 22861 | 0.00 | 11.62 |
| 0.10723211 | 21.9391 | 9.4292 | 22771 | 0.54736 | 22771 | 0.00 | 11.56 |
| 0.10776827 | 21.9695 | 9.4388 | 22680 | 0.55333 | 22681 | 0.00 | 11.50 |
| 0.10830712 | 21.9997 | 9.4481 | 22590 | 0.55935 | 22590 | 0.00 | 11.45 |
| 0.10884865 | 22.0296 | 9.4572 | 22499 | 0.56542 | 22500 | 0.00 | 11.39 |
| 0.10939289 | 22.0593 | 9.4661 | 22408 | 0.57154 | 22409 | 0.00 | 11.33 |
| 0.10993986 | 22.0887 | 9.4748 | 22317 | 0.57772 | 22318 | 0.00 | 11.28 |
| 0.11048956 | 22.1178 | 9.4833 | 22226 | 0.58395 | 22227 | 0.00 | 11.22 |
| 0.11104201 | 22.1466 | 9.4916 | 22135 | 0.59024 | 22135 | 0.00 | 11.17 |
| 0.11159722 | 22.1751 | 9.4997 | 22043 | 0.59658 | 22044 | 0.00 | 11.11 |
| 0.11215520 | 22.2033 | 9.5075 | 21952 | 0.60297 | 21953 | 0.00 | 11.05 |
| 0.11271598 | 22.2311 | 9.5151 | 21860 | 0.60942 | 21861 | 0.00 | 11.00 |
| 0.11327956 | 22.2585 | 9.5225 | 21768 | 0.61592 | 21769 | 0.00 | 10.94 |
| 0.11384596 | 22.2856 | 9.5297 | 21676 | 0.62248 | 21677 | 0.00 | 10.89 |
| 0.11441519 | 22.3122 | 9.5367 | 21584 | 0.62909 | 21585 | 0.00 | 10.84 |
| 0.11498726 | 22.3384 | 9.5434 | 21492 | 0.63576 | 21493 | 0.00 | 10.78 |
| 0.11556220 | 22.3642 | 9.5499 | 21400 | 0.64249 | 21400 | 0.00 | 10.73 |
| 0.11614001 | 22.3894 | 9.5562 | 21307 | 0.64927 | 21308 | 0.00 | 10.68 |
| 0.11672071 | 22.4141 | 9.5623 | 21215 | 0.65611 | 21215 | 0.00 | 10.62 |
| 0.11730431 | 22.4384 | 9.5681 | 21122 | 0.66300 | 21123 | 0.00 | 10.57 |
| 0.11789083 | 22.4620 | 9.5737 | 21029 | 0.66995 | 21030 | 0.00 | 10.52 |
| 0.11848029 | 22.4850 | 9.5791 | 20936 | 0.67696 | 20937 | 0.00 | 10.46 |
| 0.11907269 | 22.5075 | 9.5842 | 20843 | 0.68403 | 20844 | 0.00 | 10.41 |
| 0.11966805 | 22.5292 | 9.5891 | 20750 | 0.69116 | 20751 | 0.00 | 10.36 |
| 0.12026639 | 22.5502 | 9.5938 | 20657 | 0.69834 | 20658 | 0.00 | 10.31 |
| 0.12086772 | 22.5706 | 9.5983 | 20564 | 0.70558 | 20565 | 0.00 | 10.26 |
| 0.12147206 | 22.5901 | 9.6025 | 20471 | 0.71289 | 20471 | 0.00 | 10.21 |
| 0.12207942 | 22.6088 | 9.6065 | 20377 | 0.72025 | 20378 | 0.00 | 10.16 |
| 0.12268982 | 22.6266 | 9.6102 | 20284 | 0.72767 | 20285 | 0.00 | 10.11 |
| 0.12330327 | 22.6435 | 9.6137 | 20190 | 0.73515 | 20191 | 0.00 | 10.06 |
| 0.12391979 | 22.6594 | 9.6170 | 20097 | 0.74269 | 20097 | 0.00 | 10.01 |
| 0.12453939 | 22.6743 | 9.6200 | 20003 | 0.75029 | 20004 | 0.00 | 9.955 |
| 0.12516208 | 22.6880 | 9.6228 | 19909 | 0.75795 | 19910 | 0.00 | 9.906 |
| 0.12578789 | 22.7006 | 9.6254 | 19816 | 0.76568 | 19816 | 0.00 | 9.857 |
| 0.12641683 | 22.7119 | 9.6277 | 19722 | 0.77346 | 19722 | 0.00 | 9.808 |
| 0.12704892 | 22.7219 | 9.6298 | 19628 | 0.78131 | 19629 | 0.00 | 9.759 |
| 0.12768416 | 22.7305 | 9.6317 | 19534 | 0.78921 | 19535 | 0.00 | 9.710 |
| 0.12832258 | 22.7376 | 9.6333 | 19440 | 0.79718 | 19441 | 0.00 | 9.662 |
| 0.12896419 | 22.7430 | 9.6346 | 19346 | 0.80522 | 19347 | 0.00 | 9.614 |
| 0.12960902 | 22.7467 | 9.6358 | 19252 | 0.81331 | 19253 | 0.00 | 9.566 |
| 0.13025706 | 22.7486 | 9.6366 | 19158 | 0.82147 | 19159 | 0.00 | 9.518 |
| 0.13090835 | 22.7484 | 9.6373 | 19064 | 0.82969 | 19065 | 0.00 | 9.471 |
| 0.13156289 | 22.7461 | 9.6377 | 18970 | 0.83797 | 18971 | 0.00 | 9.424 |
| 0.13222070 | 22.7414 | 9.6379 | 18876 | 0.84632 | 18877 | 0.00 | 9.377 |
| 0.13288181 | 22.7343 | 9.6378 | 18782 | 0.85473 | 18783 | 0.00 | 9.330 |
| 0.13354621 | 22.7244 | 9.6375 | 18688 | 0.86321 | 18689 | 0.00 | 9.284 |
| 0.13421395 | 22.7116 | 9.6369 | 18594 | 0.87175 | 18595 | 0.00 | 9.238 |
| 0.13488502 | 22.6955 | 9.6361 | 18500 | 0.88036 | 18501 | 0.00 | 9.192 |
| 0.13555944 | 22.6760 | 9.6351 | 18406 | 0.88903 | 18407 | 0.00 | 9.146 |
| 0.13623724 | 22.6526 | 9.6338 | 18312 | 0.89776 | 18313 | 0.00 | 9.101 |
| 0.13691842 | 22.6249 | 9.6323 | 18218 | 0.90657 | 18219 | 0.00 | 9.055 |
| 0.13760302 | 22.5927 | 9.6305 | 18124 | 0.91543 | 18125 | 0.00 | 9.010 |
| 0.13829103 | 22.5552 | 9.6285 | 18030 | 0.92437 | 18031 | 0.00 | 8.965 |
| 0.13898249 | 22.5121 | 9.6262 | 17936 | 0.93337 | 17937 | 0.00 | 8.921 |
| 0.13967740 | 22.4625 | 9.6237 | 17842 | 0.94243 | 17843 | 0.00 | 8.876 |
| 0.14037579 | 22.4057 | 9.6210 | 17748 | 0.95157 | 17749 | 0.00 | 8.832 |
| 0.14107766 | 22.3409 | 9.6180 | 17654 | 0.96077 | 17655 | 0.00 | 8.788 |
| 0.14178305 | 22.2668 | 9.6148 | 17561 | 0.97004 | 17562 | 0.00 | 8.745 |
| 0.14249197 | 22.1822 | 9.6114 | 17467 | 0.97937 | 17468 | 0.00 | 8.701 |
| 0.14320443 | 22.0854 | 9.6077 | 17374 | 0.98878 | 17375 | 0.00 | 8.658 |
| 0.14392045 | 21.9746 | 9.6038 | 17280 | 0.99825 | 17281 | 0.00 | 8.615 |
| 0.14464005 | 21.8471 | 9.5996 | 17187 | 1.0078 | 17188 | 0.00 | 8.572 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Dy ($Z=66$) | | | | | | | |
| 0.14536325 | 21.7000 | 9.5952 | 17093 | 1.0174 | 17094 | 0.00 | 8.529 |
| 0.14609007 | 21.5292 | 9.5905 | 17000 | 1.0271 | 17001 | 0.00 | 8.487 |
| 0.14682052 | 21.3295 | 9.5856 | 16907 | 1.0368 | 16908 | 0.00 | 8.445 |
| 0.14755462 | 21.0937 | 9.5805 | 16814 | 1.0466 | 16815 | 0.00 | 8.403 |
| 0.14829239 | 20.8121 | 9.5751 | 16721 | 1.0565 | 16722 | 0.00 | 8.361 |
| 0.14903386 | 20.4705 | 9.5695 | 16628 | 1.0665 | 16629 | 0.00 | 8.319 |
| 0.14977903 | 20.0477 | 9.5637 | 16535 | 1.0765 | 16536 | 0.00 | 8.278 |
| 0.15052792 | 19.5095 | 9.5576 | 16442 | 1.0866 | 16443 | 0.00 | 8.237 |
| 0.15128056 | 18.7967 | 9.5513 | 16350 | 1.0968 | 16351 | 0.00 | 8.196 |
| 0.15203696 | 17.7930 | 9.5448 | 16257 | 1.1070 | 16258 | 0.00 | 8.155 |
| 0.15279715 | 16.2198 | 9.5380 | 16165 | 1.1173 | 16166 | 0.00 | 8.114 |
| 0.15356113 | 13.0688 | 9.5310 | 16072 | 1.1277 | 16074 | 0.00 | 8.074 |
| 0.15414295 | 2.08158 | 9.5255 | 16003 | 1.1356 | 16004 | 0.00 | 8.043 |
| 0.15425706 | 2.30352 | 24.699 | 41462 | 1.1372 | 41463 | 0.00 | 8.038 |
| 0.15432894 | 6.37497 | 24.616 | 41305 | 1.1381 | 41306 | 0.00 | 8.034 |
| 0.15510058 | 16.5698 | 23.763 | 39675 | 1.1487 | 39676 | 0.00 | 7.994 |
| 0.15587609 | 20.0324 | 22.957 | 38138 | 1.1593 | 38139 | 0.00 | 7.954 |
| 0.15665547 | 22.1796 | 22.195 | 36690 | 1.1699 | 36691 | 0.00 | 7.914 |
| 0.15743875 | 23.7146 | 21.476 | 35323 | 1.1807 | 35325 | 0.00 | 7.875 |
| 0.15822594 | 24.8860 | 20.796 | 34035 | 1.1915 | 34036 | 0.00 | 7.836 |
| 0.15901707 | 25.8134 | 20.153 | 32819 | 1.2023 | 32820 | 0.00 | 7.797 |
| 0.15981215 | 26.5647 | 19.546 | 31672 | 1.2133 | 31673 | 0.00 | 7.758 |
| 0.16061121 | 27.1824 | 18.972 | 30589 | 1.2243 | 30590 | 0.00 | 7.720 |
| 0.16141427 | 27.6954 | 18.430 | 29566 | 1.2354 | 29568 | 0.00 | 7.681 |
| 0.16222134 | 28.1242 | 17.917 | 28601 | 1.2466 | 28602 | 0.00 | 7.643 |
| 0.16303245 | 28.4839 | 17.432 | 27688 | 1.2579 | 27689 | 0.00 | 7.605 |
| 0.16384761 | 28.7863 | 16.973 | 26826 | 1.2692 | 26827 | 0.00 | 7.567 |
| 0.16466685 | 29.0402 | 16.540 | 26011 | 1.2806 | 26012 | 0.00 | 7.529 |
| 0.16549018 | 29.2530 | 16.130 | 25240 | 1.2920 | 25241 | 0.00 | 7.492 |
| 0.16631763 | 29.4304 | 15.742 | 24510 | 1.3036 | 24511 | 0.00 | 7.455 |
| 0.16714922 | 29.5770 | 15.375 | 23820 | 1.3152 | 23821 | 0.00 | 7.418 |
| 0.16798497 | 29.6966 | 15.028 | 23166 | 1.3269 | 23167 | 0.00 | 7.381 |
| 0.16882489 | 29.7922 | 14.699 | 22547 | 1.3387 | 22548 | 0.00 | 7.344 |
| 0.16966902 | 29.8659 | 14.388 | 21960 | 1.3505 | 21961 | 0.00 | 7.307 |
| 0.17051736 | 29.9196 | 14.097 | 21408 | 1.3624 | 21409 | 0.00 | 7.271 |
| 0.17136995 | 29.9573 | 13.827 | 20895 | 1.3744 | 20896 | 0.00 | 7.235 |
| 0.17222680 | 29.9828 | 13.578 | 20416 | 1.3865 | 20418 | 0.00 | 7.199 |
| 0.17308793 | 29.9991 | 13.348 | 19970 | 1.3986 | 19971 | 0.00 | 7.163 |
| 0.17395337 | 30.0081 | 13.134 | 19552 | 1.4109 | 19553 | 0.00 | 7.127 |
| 0.17482314 | 30.0115 | 12.935 | 19160 | 1.4231 | 19161 | 0.00 | 7.092 |
| 0.17569726 | 30.0105 | 12.750 | 18792 | 1.4355 | 18793 | 0.00 | 7.057 |
| 0.17657574 | 30.0061 | 12.577 | 18445 | 1.4480 | 18447 | 0.00 | 7.022 |
| 0.17745862 | 29.9991 | 12.416 | 18118 | 1.4605 | 18120 | 0.00 | 6.987 |
| 0.17834591 | 29.9902 | 12.266 | 17809 | 1.4731 | 17811 | 0.00 | 6.952 |
| 0.17923764 | 29.9798 | 12.125 | 17517 | 1.4858 | 17519 | 0.00 | 6.917 |
| 0.18013383 | 29.9684 | 11.992 | 17240 | 1.4985 | 17241 | 0.00 | 6.883 |
| 0.18103450 | 29.9563 | 11.868 | 16976 | 1.5114 | 16978 | 0.00 | 6.849 |
| 0.18193967 | 29.9439 | 11.751 | 16726 | 1.5243 | 16727 | 0.00 | 6.815 |
| 0.18284937 | 29.9313 | 11.641 | 16487 | 1.5372 | 16488 | 0.00 | 6.781 |
| 0.18376362 | 29.9187 | 11.537 | 16258 | 1.5503 | 16260 | 0.00 | 6.747 |
| 0.18468244 | 29.9063 | 11.439 | 16040 | 1.5634 | 16042 | 0.00 | 6.713 |
| 0.18560585 | 29.8943 | 11.347 | 15831 | 1.5767 | 15832 | 0.00 | 6.680 |
| 0.18653388 | 29.8825 | 11.259 | 15630 | 1.5900 | 15632 | 0.00 | 6.647 |
| 0.18746655 | 29.8713 | 11.176 | 15437 | 1.6033 | 15439 | 0.00 | 6.614 |
| 0.18840388 | 29.8606 | 11.097 | 15252 | 1.6168 | 15254 | 0.00 | 6.581 |
| 0.18934590 | 29.8520 | 11.021 | 15073 | 1.6303 | 15075 | 0.00 | 6.548 |
| 0.19029263 | 29.8424 | 10.950 | 14901 | 1.6439 | 14902 | 0.00 | 6.515 |
| 0.19124409 | 29.8334 | 10.882 | 14734 | 1.6576 | 14736 | 0.00 | 6.483 |
| 0.19220031 | 29.8250 | 10.816 | 14573 | 1.6713 | 14575 | 0.00 | 6.451 |
| 0.19316131 | 29.8172 | 10.754 | 14417 | 1.6852 | 14419 | 0.00 | 6.419 |
| 0.19412712 | 29.8101 | 10.694 | 14266 | 1.6991 | 14268 | 0.00 | 6.387 |
| 0.19509776 | 29.8035 | 10.637 | 14119 | 1.7131 | 14121 | 0.00 | 6.355 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Dy ($Z=66$) | | | | | | | |
| 0.19607325 | 29.7975 | 10.583 | 13976 | 1.7272 | 13978 | 0.00 | 6.323 |
| 0.19705361 | 29.7921 | 10.530 | 13838 | 1.7413 | 13840 | 0.00 | 6.292 |
| 0.19803888 | 29.7873 | 10.479 | 13703 | 1.7555 | 13705 | 0.00 | 6.261 |
| 0.19902907 | 29.7830 | 10.431 | 13571 | 1.7699 | 13573 | 0.00 | 6.229 |
| 0.20002422 | 29.7793 | 10.384 | 13443 | 1.7842 | 13445 | 0.00 | 6.198 |
| 0.20102434 | 29.7760 | 10.339 | 13318 | 1.7987 | 13320 | 0.00 | 6.168 |
| 0.20202946 | 29.7732 | 10.295 | 13196 | 1.8132 | 13198 | 0.00 | 6.137 |
| 0.20303961 | 29.7709 | 10.253 | 13076 | 1.8279 | 13078 | 0.00 | 6.106 |
| 0.20405481 | 29.7690 | 10.212 | 12960 | 1.8426 | 12961 | 0.00 | 6.076 |
| 0.20507508 | 29.7675 | 10.172 | 12845 | 1.8573 | 12847 | 0.00 | 6.046 |
| 0.20610046 | 29.7664 | 10.134 | 12733 | 1.8722 | 12735 | 0.00 | 6.016 |
| 0.20713096 | 29.7657 | 10.097 | 12623 | 1.8871 | 12625 | 0.00 | 5.986 |
| 0.20816661 | 29.7653 | 10.061 | 12516 | 1.9022 | 12518 | 0.00 | 5.956 |
| 0.20920745 | 29.7652 | 10.026 | 12410 | 1.9172 | 12412 | 0.00 | 5.926 |
| 0.21025348 | 29.7655 | 9.9921 | 12307 | 1.9324 | 12309 | 0.00 | 5.897 |
| 0.21130475 | 29.7660 | 9.9590 | 12205 | 1.9477 | 12207 | 0.00 | 5.868 |
| 0.21236128 | 29.7667 | 9.9268 | 12105 | 1.9630 | 12107 | 0.00 | 5.838 |
| 0.21342308 | 29.7677 | 9.8954 | 12007 | 1.9784 | 12009 | 0.00 | 5.809 |
| 0.21449020 | 29.7689 | 9.8648 | 11910 | 1.9939 | 11912 | 0.00 | 5.780 |
| 0.21556265 | 29.7702 | 9.8350 | 11815 | 2.0095 | 11817 | 0.00 | 5.752 |
| 0.21664046 | 29.7717 | 9.8059 | 11721 | 2.0251 | 11723 | 0.00 | 5.723 |
| 0.21772366 | 29.7734 | 9.7775 | 11629 | 2.0408 | 11631 | 0.00 | 5.695 |
| 0.21881228 | 29.7752 | 9.7497 | 11538 | 2.0566 | 11540 | 0.00 | 5.666 |
| 0.21990634 | 29.7771 | 9.7226 | 11449 | 2.0725 | 11451 | 0.00 | 5.638 |
| 0.22100588 | 29.7791 | 9.6960 | 11361 | 2.0885 | 11363 | 0.00 | 5.610 |
| 0.22211090 | 29.7811 | 9.6701 | 11274 | 2.1045 | 11276 | 0.00 | 5.582 |
| 0.22322146 | 29.7832 | 9.6447 | 11189 | 2.1206 | 11191 | 0.00 | 5.554 |
| 0.22433757 | 29.7853 | 9.6198 | 11104 | 2.1368 | 11106 | 0.00 | 5.527 |
| 0.22545925 | 29.7874 | 9.5955 | 11021 | 2.1531 | 11023 | 0.00 | 5.499 |
| 0.22658655 | 29.7895 | 9.5716 | 10939 | 2.1694 | 10941 | 0.00 | 5.472 |
| 0.22771948 | 29.7915 | 9.5482 | 10858 | 2.1859 | 10860 | 0.00 | 5.445 |
| 0.22885808 | 29.7935 | 9.5253 | 10778 | 2.2024 | 10780 | 0.00 | 5.418 |
| 0.23000237 | 29.7955 | 9.5029 | 10699 | 2.2189 | 10701 | 0.00 | 5.391 |
| 0.23115238 | 29.7974 | 9.4809 | 10621 | 2.2356 | 10623 | 0.00 | 5.364 |
| 0.23230814 | 29.7991 | 9.4593 | 10544 | 2.2523 | 10547 | 0.00 | 5.337 |
| 0.23346969 | 29.8008 | 9.4381 | 10468 | 2.2692 | 10471 | 0.00 | 5.311 |
| 0.23463703 | 29.8023 | 9.4173 | 10393 | 2.2861 | 10396 | 0.00 | 5.284 |
| 0.23581022 | 29.8036 | 9.3969 | 10319 | 2.3030 | 10322 | 0.00 | 5.258 |
| 0.23698927 | 29.8048 | 9.3769 | 10246 | 2.3201 | 10248 | 0.00 | 5.232 |
| 0.23817422 | 29.8058 | 9.3573 | 10174 | 2.3372 | 10176 | 0.00 | 5.206 |
| 0.23936509 | 29.8065 | 9.3381 | 10102 | 2.3544 | 10105 | 0.00 | 5.180 |
| 0.24056191 | 29.8071 | 9.3192 | 10032 | 2.3717 | 10034 | 0.00 | 5.154 |
| 0.24176472 | 29.8074 | 9.3007 | 9962.0 | 2.3890 | 9964.4 | 0.00 | 5.128 |
| 0.24297355 | 29.8074 | 9.2825 | 9893.1 | 2.4065 | 9895.5 | 0.00 | 5.103 |
| 0.24418841 | 29.8071 | 9.2647 | 9825.0 | 2.4240 | 9827.4 | 0.00 | 5.077 |
| 0.24540936 | 29.8065 | 9.2472 | 9757.6 | 2.4416 | 9760.1 | 0.00 | 5.052 |
| 0.24663640 | 29.8056 | 9.2300 | 9691.1 | 2.4592 | 9693.5 | 0.00 | 5.027 |
| 0.24786959 | 29.8043 | 9.2132 | 9625.3 | 2.4770 | 9627.8 | 0.00 | 5.002 |
| 0.24910893 | 29.8027 | 9.1967 | 9560.3 | 2.4948 | 9562.8 | 0.00 | 4.977 |
| 0.25035448 | 29.8006 | 9.1806 | 9496.0 | 2.5127 | 9498.5 | 0.00 | 4.952 |
| 0.25160625 | 29.7981 | 9.1648 | 9432.5 | 2.5306 | 9435.0 | 0.00 | 4.928 |
| 0.25286428 | 29.7951 | 9.1492 | 9369.6 | 2.5487 | 9372.2 | 0.00 | 4.903 |
| 0.25412860 | 29.7916 | 9.1341 | 9307.6 | 2.5668 | 9310.1 | 0.00 | 4.879 |
| 0.25539925 | 29.7875 | 9.1192 | 9246.2 | 2.5850 | 9248.8 | 0.00 | 4.855 |
| 0.25667624 | 29.7829 | 9.1046 | 9185.5 | 2.6033 | 9188.1 | 0.00 | 4.830 |
| 0.25795962 | 29.7777 | 9.0904 | 9125.5 | 2.6216 | 9128.1 | 0.00 | 4.806 |
| 0.25924942 | 29.7718 | 9.0765 | 9066.2 | 2.6400 | 9068.8 | 0.00 | 4.782 |
| 0.26054567 | 29.7651 | 9.0628 | 9007.5 | 2.6585 | 9010.2 | 0.00 | 4.759 |
| 0.26184840 | 29.7577 | 9.0495 | 8949.6 | 2.6771 | 8952.2 | 0.00 | 4.735 |
| 0.26315764 | 29.7494 | 9.0365 | 8892.2 | 2.6957 | 8894.9 | 0.00 | 4.711 |
| 0.26447343 | 29.7402 | 9.0238 | 8835.6 | 2.7144 | 8838.3 | 0.00 | 4.688 |
| 0.26579579 | 29.7300 | 9.0115 | 8779.6 | 2.7332 | 8782.3 | 0.00 | 4.665 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Dy ($Z=66$) | | | | | | | |
| 0.26712477 | 29.7187 | 8.9994 | 8724.2 | 2.7521 | 8726.9 | 0.00 | 4.641 |
| 0.26846040 | 29.7062 | 8.9877 | 8669.5 | 2.7710 | 8672.2 | 0.00 | 4.618 |
| 0.26980270 | 29.6923 | 8.9762 | 8615.3 | 2.7900 | 8618.1 | 0.00 | 4.595 |
| 0.27115171 | 29.6769 | 8.9651 | 8561.8 | 2.8091 | 8564.6 | 0.00 | 4.573 |
| 0.27250747 | 29.6598 | 8.9542 | 8508.9 | 2.8282 | 8511.8 | 0.00 | 4.550 |
| 0.27387001 | 29.6408 | 8.9437 | 8456.7 | 2.8474 | 8459.5 | 0.00 | 4.527 |
| 0.27523936 | 29.6196 | 8.9335 | 8405.0 | 2.8667 | 8407.9 | 0.00 | 4.505 |
| 0.27661556 | 29.5958 | 8.9236 | 8353.9 | 2.8861 | 8356.8 | 0.00 | 4.482 |
| 0.27799863 | 29.5690 | 8.9140 | 8303.4 | 2.9055 | 8306.3 | 0.00 | 4.460 |
| 0.27938863 | 29.5386 | 8.9047 | 8253.5 | 2.9250 | 8256.4 | 0.00 | 4.438 |
| 0.28078557 | 29.5039 | 8.8958 | 8204.2 | 2.9446 | 8207.1 | 0.00 | 4.416 |
| 0.28218950 | 29.4638 | 8.8871 | 8155.4 | 2.9643 | 8158.4 | 0.00 | 4.394 |
| 0.28360044 | 29.4169 | 8.8788 | 8107.2 | 2.9840 | 8110.2 | 0.00 | 4.372 |
| 0.28501845 | 29.3608 | 8.8707 | 8059.6 | 3.0038 | 8062.6 | 0.00 | 4.350 |
| 0.28644354 | 29.2919 | 8.8630 | 8012.5 | 3.0236 | 8015.5 | 0.00 | 4.328 |
| 0.28787576 | 29.2039 | 8.8556 | 7966.0 | 3.0435 | 7969.0 | 0.00 | 4.307 |
| 0.28931514 | 29.0837 | 8.8485 | 7920.0 | 3.0635 | 7923.0 | 0.00 | 4.285 |
| 0.29076171 | 28.8976 | 8.8417 | 7874.5 | 3.0836 | 7877.6 | 0.00 | 4.264 |
| 0.29221552 | 28.4835 | 8.8352 | 7829.6 | 3.1037 | 7832.7 | 0.00 | 4.243 |
| 0.29262731 | 28.1482 | 8.8334 | 7817.0 | 3.1094 | 7820.1 | 0.00 | 4.237 |
| 0.29317269 | 28.1476 | 9.9758 | 8811.5 | 3.1169 | 8814.6 | 0.00 | 4.229 |
| 0.29367660 | 28.5284 | 9.9751 | 8795.8 | 3.1239 | 8798.9 | 0.00 | 4.222 |
| 0.29514498 | 28.9155 | 9.9735 | 8750.6 | 3.1442 | 8753.7 | 0.00 | 4.201 |
| 0.29662071 | 29.1008 | 9.9722 | 8705.9 | 3.1645 | 8709.1 | 0.00 | 4.180 |
| 0.29810381 | 29.2247 | 9.9711 | 8661.7 | 3.1849 | 8664.9 | 0.00 | 4.159 |
| 0.29959433 | 29.3182 | 9.9705 | 8618.0 | 3.2053 | 8621.2 | 0.00 | 4.138 |
| 0.30109230 | 29.3936 | 9.9701 | 8574.8 | 3.2259 | 8578.1 | 0.00 | 4.118 |
| 0.30259776 | 29.4569 | 9.9701 | 8532.2 | 3.2465 | 8535.4 | 0.00 | 4.097 |
| 0.30411075 | 29.5114 | 9.9704 | 8490.0 | 3.2671 | 8493.2 | 0.00 | 4.077 |
| 0.30563130 | 29.5594 | 9.9710 | 8448.2 | 3.2878 | 8451.5 | 0.00 | 4.057 |
| 0.30715946 | 29.6020 | 9.9719 | 8407.0 | 3.3086 | 8410.3 | 0.00 | 4.036 |
| 0.30869526 | 29.6404 | 9.9732 | 8366.2 | 3.3295 | 8369.6 | 0.00 | 4.016 |
| 0.31023873 | 29.6750 | 9.9748 | 8325.9 | 3.3504 | 8329.3 | 0.00 | 3.996 |
| 0.31178993 | 29.7065 | 9.9767 | 8286.1 | 3.3714 | 8289.5 | 0.00 | 3.977 |
| 0.31334888 | 29.7352 | 9.9789 | 8246.7 | 3.3924 | 8250.1 | 0.00 | 3.957 |
| 0.31491562 | 29.7611 | 9.9814 | 8207.8 | 3.4135 | 8211.2 | 0.00 | 3.937 |
| 0.31649020 | 29.7845 | 9.9843 | 8169.3 | 3.4347 | 8172.7 | 0.00 | 3.917 |
| 0.31807265 | 29.8052 | 9.9874 | 8131.2 | 3.4559 | 8134.6 | 0.00 | 3.898 |
| 0.31966301 | 29.8233 | 9.9909 | 8093.5 | 3.4772 | 8097.0 | 0.00 | 3.879 |
| 0.32126133 | 29.8384 | 9.9947 | 8056.3 | 3.4985 | 8059.8 | 0.00 | 3.859 |
| 0.32286764 | 29.8499 | 9.9988 | 8019.5 | 3.5199 | 8023.0 | 0.00 | 3.840 |
| 0.32448197 | 29.8570 | 10.003 | 7983.1 | 3.5414 | 7986.6 | 0.00 | 3.821 |
| 0.32610438 | 29.8579 | 10.008 | 7947.0 | 3.5629 | 7950.6 | 0.00 | 3.802 |
| 0.32773491 | 29.8488 | 10.013 | 7911.4 | 3.5845 | 7915.0 | 0.00 | 3.783 |
| 0.32937358 | 29.8200 | 10.018 | 7876.1 | 3.6061 | 7879.7 | 0.00 | 3.764 |
| 0.33102045 | 29.7246 | 10.023 | 7841.1 | 3.6278 | 7844.7 | 0.00 | 3.746 |
| 0.33144831 | 29.6465 | 10.025 | 7832.1 | 3.6335 | 7835.8 | 0.00 | 3.741 |
| 0.33215172 | 29.6565 | 10.360 | 8077.1 | 3.6427 | 8080.7 | 0.00 | 3.733 |
| 0.33267555 | 29.7606 | 10.362 | 8066.2 | 3.6496 | 8069.8 | 0.00 | 3.727 |
| 0.33433893 | 29.8975 | 10.370 | 8032.0 | 3.6714 | 8035.6 | 0.00 | 3.708 |
| 0.33601062 | 29.9753 | 10.378 | 7998.1 | 3.6933 | 8001.8 | 0.00 | 3.690 |
| 0.33769068 | 30.0349 | 10.386 | 7964.5 | 3.7152 | 7968.2 | 0.00 | 3.672 |
| 0.33937913 | 30.0855 | 10.394 | 7931.3 | 3.7372 | 7935.0 | 0.00 | 3.653 |
| 0.34107602 | 30.1306 | 10.403 | 7898.3 | 3.7592 | 7902.1 | 0.00 | 3.635 |
| 0.34278140 | 30.1722 | 10.412 | 7865.7 | 3.7813 | 7869.5 | 0.00 | 3.617 |
| 0.34449531 | 30.2110 | 10.421 | 7833.4 | 3.8034 | 7837.2 | 0.00 | 3.599 |
| 0.34621779 | 30.2479 | 10.430 | 7801.4 | 3.8256 | 7805.2 | 0.00 | 3.581 |
| 0.34794888 | 30.2831 | 10.440 | 7769.7 | 3.8479 | 7773.5 | 0.00 | 3.563 |
| 0.34968862 | 30.3171 | 10.450 | 7738.2 | 3.8702 | 7742.1 | 0.00 | 3.546 |
| 0.35143706 | 30.3501 | 10.460 | 7707.1 | 3.8925 | 7711.0 | 0.00 | 3.528 |
| 0.35319425 | 30.3821 | 10.470 | 7676.2 | 3.9149 | 7680.1 | 0.00 | 3.510 |
| 0.35496022 | 30.4134 | 10.480 | 7645.5 | 3.9374 | 7649.5 | 0.00 | 3.493 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Dy ($Z=66$) | | | | | | | |
| 0.35673502 | 30.4440 | 10.491 | 7615.2 | 3.9599 | 7619.1 | 0.00 | 3.476 |
| 0.35851870 | 30.4740 | 10.501 | 7585.0 | 3.9824 | 7589.0 | 0.00 | 3.458 |
| 0.36031129 | 30.5035 | 10.512 | 7555.2 | 4.0050 | 7559.2 | 0.00 | 3.441 |
| 0.36211285 | 30.5326 | 10.523 | 7525.5 | 4.0276 | 7529.5 | 0.00 | 3.424 |
| 0.36392341 | 30.5612 | 10.535 | 7496.1 | 4.0503 | 7500.1 | 0.00 | 3.407 |
| 0.36574303 | 30.5894 | 10.546 | 7466.9 | 4.0731 | 7471.0 | 0.00 | 3.390 |
| 0.36757174 | 30.6172 | 10.558 | 7437.9 | 4.0959 | 7442.0 | 0.00 | 3.373 |
| 0.36940960 | 30.6447 | 10.569 | 7409.1 | 4.1187 | 7413.2 | 0.00 | 3.356 |
| 0.37125665 | 30.6718 | 10.581 | 7380.5 | 4.1416 | 7384.7 | 0.00 | 3.340 |
| 0.37311293 | 30.6986 | 10.593 | 7352.1 | 4.1645 | 7356.3 | 0.00 | 3.323 |
| 0.37497850 | 30.7250 | 10.605 | 7323.9 | 4.1875 | 7328.1 | 0.00 | 3.306 |
| 0.37685339 | 30.7510 | 10.618 | 7295.9 | 4.2105 | 7300.1 | 0.00 | 3.290 |
| 0.37873766 | 30.7767 | 10.630 | 7268.0 | 4.2335 | 7272.3 | 0.00 | 3.274 |
| 0.38063135 | 30.8019 | 10.642 | 7240.3 | 4.2566 | 7244.6 | 0.00 | 3.257 |
| 0.38253450 | 30.8267 | 10.655 | 7212.8 | 4.2797 | 7217.1 | 0.00 | 3.241 |
| 0.38444718 | 30.8509 | 10.668 | 7185.4 | 4.3029 | 7189.7 | 0.00 | 3.225 |
| 0.38636941 | 30.8747 | 10.680 | 7158.2 | 4.3261 | 7162.5 | 0.00 | 3.209 |
| 0.38830126 | 30.8977 | 10.693 | 7131.1 | 4.3494 | 7135.4 | 0.00 | 3.193 |
| 0.39024276 | 30.9201 | 10.706 | 7104.1 | 4.3727 | 7108.5 | 0.00 | 3.177 |
| 0.39219398 | 30.9415 | 10.719 | 7077.3 | 4.3960 | 7081.7 | 0.00 | 3.161 |
| 0.39415495 | 30.9619 | 10.732 | 7050.5 | 4.4194 | 7055.0 | 0.00 | 3.146 |
| 0.39612572 | 30.9811 | 10.745 | 7023.9 | 4.4428 | 7028.4 | 0.00 | 3.130 |
| 0.39810635 | 30.9987 | 10.757 | 6997.4 | 4.4662 | 7001.9 | 0.00 | 3.114 |
| 0.40009688 | 31.0144 | 10.770 | 6971.0 | 4.4897 | 6975.5 | 0.00 | 3.099 |
| 0.40209737 | 31.0275 | 10.783 | 6944.7 | 4.5132 | 6949.2 | 0.00 | 3.083 |
| 0.40410785 | 31.0374 | 10.796 | 6918.5 | 4.5368 | 6923.0 | 0.00 | 3.068 |
| 0.40612839 | 31.0426 | 10.809 | 6892.3 | 4.5603 | 6896.9 | 0.00 | 3.053 |
| 0.40815904 | 31.0411 | 10.822 | 6866.3 | 4.5839 | 6870.9 | 0.00 | 3.038 |
| 0.41019983 | 31.0287 | 10.835 | 6840.3 | 4.6076 | 6844.9 | 0.00 | 3.023 |
| 0.41225083 | 30.9962 | 10.848 | 6814.4 | 4.6313 | 6819.0 | 0.00 | 3.007 |
| 0.41431208 | 30.9136 | 10.861 | 6788.5 | 4.6550 | 6793.2 | 0.00 | 2.993 |
| 0.41572967 | 30.7302 | 10.870 | 6770.8 | 4.6712 | 6775.5 | 0.00 | 2.982 |
| 0.41638364 | 30.4221 | 11.397 | 7087.7 | 4.6787 | 7092.4 | 0.00 | 2.978 |
| 0.41687033 | 30.7496 | 11.400 | 7081.4 | 4.6843 | 7086.1 | 0.00 | 2.974 |
| 0.41846556 | 30.9990 | 11.410 | 7061.0 | 4.7025 | 7065.7 | 0.00 | 2.963 |
| 0.42055789 | 31.1479 | 11.424 | 7034.4 | 4.7262 | 7039.1 | 0.00 | 2.948 |
| 0.42266068 | 31.2515 | 11.438 | 7007.8 | 4.7501 | 7012.6 | 0.00 | 2.933 |
| 0.42477398 | 31.3364 | 11.452 | 6981.3 | 4.7739 | 6986.1 | 0.00 | 2.919 |
| 0.42689785 | 31.4111 | 11.465 | 6954.8 | 4.7978 | 6959.6 | 0.00 | 2.904 |
| 0.42903234 | 31.4795 | 11.479 | 6928.3 | 4.8217 | 6933.1 | 0.00 | 2.890 |
| 0.43117750 | 31.5435 | 11.492 | 6901.9 | 4.8456 | 6906.7 | 0.00 | 2.875 |
| 0.43333339 | 31.6044 | 11.505 | 6875.4 | 4.8695 | 6880.3 | 0.00 | 2.861 |
| 0.43550006 | 31.6630 | 11.518 | 6849.0 | 4.8935 | 6853.9 | 0.00 | 2.847 |
| 0.43767756 | 31.7198 | 11.531 | 6822.6 | 4.9175 | 6827.5 | 0.00 | 2.833 |
| 0.43986595 | 31.7752 | 11.544 | 6796.2 | 4.9415 | 6801.1 | 0.00 | 2.819 |
| 0.44206528 | 31.8296 | 11.557 | 6769.8 | 4.9656 | 6774.8 | 0.00 | 2.805 |
| 0.44427560 | 31.8830 | 11.569 | 6743.4 | 4.9896 | 6748.4 | 0.00 | 2.791 |
| 0.44649698 | 31.9357 | 11.582 | 6717.0 | 5.0137 | 6722.0 | 0.00 | 2.777 |
| 0.44872947 | 31.9878 | 11.594 | 6690.6 | 5.0378 | 6695.6 | 0.00 | 2.763 |
| 0.45097311 | 32.0395 | 11.606 | 6664.2 | 5.0619 | 6669.2 | 0.00 | 2.749 |
| 0.45322798 | 32.0907 | 11.617 | 6637.7 | 5.0860 | 6642.8 | 0.00 | 2.736 |
| 0.45549412 | 32.1417 | 11.629 | 6611.3 | 5.1101 | 6616.4 | 0.00 | 2.722 |
| 0.45777159 | 32.1923 | 11.640 | 6584.8 | 5.1343 | 6589.9 | 0.00 | 2.708 |
| 0.46006045 | 32.2428 | 11.651 | 6558.3 | 5.1585 | 6563.5 | 0.00 | 2.695 |
| 0.46236075 | 32.2930 | 11.662 | 6531.8 | 5.1827 | 6536.9 | 0.00 | 2.682 |
| 0.46467255 | 32.3492 | 11.673 | 6505.2 | 5.2069 | 6510.4 | 0.00 | 2.668 |
| 0.46699592 | 32.3992 | 11.683 | 6478.5 | 5.2311 | 6483.8 | 0.00 | 2.655 |
| 0.46933090 | 32.4491 | 11.693 | 6451.8 | 5.2553 | 6457.1 | 0.00 | 2.642 |
| 0.47167755 | 32.4990 | 11.703 | 6425.1 | 5.2795 | 6430.4 | 0.00 | 2.629 |
| 0.47403594 | 32.5488 | 11.713 | 6398.3 | 5.3038 | 6403.6 | 0.00 | 2.616 |
| 0.47640612 | 32.5985 | 11.722 | 6371.5 | 5.3280 | 6376.8 | 0.00 | 2.602 |
| 0.47878815 | 32.6481 | 11.731 | 6344.6 | 5.3523 | 6349.9 | 0.00 | 2.590 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Dy ($Z=66$) | | | | | | | |
| 0.48118209 | 32.6978 | 11.739 | 6317.6 | 5.3765 | 6323.0 | 0.00 | 2.577 |
| 0.48358800 | 32.7474 | 11.747 | 6290.6 | 5.4008 | 6296.0 | 0.00 | 2.564 |
| 0.48600594 | 32.7969 | 11.755 | 6263.5 | 5.4251 | 6268.9 | 0.00 | 2.551 |
| 0.48843597 | 32.8465 | 11.763 | 6236.4 | 5.4494 | 6241.8 | 0.00 | 2.538 |
| 0.49087815 | 32.8960 | 11.770 | 6209.2 | 5.4737 | 6214.7 | 0.00 | 2.526 |
| 0.49333254 | 32.9455 | 11.777 | 6181.9 | 5.4979 | 6187.4 | 0.00 | 2.513 |
| 0.49579920 | 32.9949 | 11.784 | 6154.6 | 5.5222 | 6160.1 | 0.00 | 2.501 |
| 0.49827820 | 33.0444 | 11.790 | 6127.1 | 5.5465 | 6132.7 | 0.00 | 2.488 |
| 0.50076959 | 33.0938 | 11.795 | 6099.6 | 5.5708 | 6105.2 | 0.00 | 2.476 |
| 0.50327344 | 33.1432 | 11.801 | 6072.1 | 5.5951 | 6077.7 | 0.00 | 2.464 |
| 0.50578980 | 33.1926 | 11.806 | 6044.4 | 5.6194 | 6050.1 | 0.00 | 2.451 |
| 0.50831875 | 33.2419 | 11.811 | 6016.7 | 5.6437 | 6022.4 | 0.00 | 2.439 |
| 0.51086035 | 33.2912 | 11.815 | 5989.0 | 5.6680 | 5994.7 | 0.00 | 2.427 |
| 0.51341465 | 33.3404 | 11.819 | 5961.2 | 5.6923 | 5966.9 | 0.00 | 2.415 |
| 0.51598172 | 33.3896 | 11.822 | 5933.3 | 5.7165 | 5939.0 | 0.00 | 2.403 |
| 0.51856163 | 33.4388 | 11.826 | 5905.4 | 5.7408 | 5911.1 | 0.00 | 2.391 |
| 0.52115444 | 33.4878 | 11.828 | 5877.4 | 5.7651 | 5883.1 | 0.00 | 2.379 |
| 0.52376021 | 33.5369 | 11.831 | 5849.3 | 5.7893 | 5855.1 | 0.00 | 2.367 |
| 0.52637901 | 33.5858 | 11.833 | 5821.2 | 5.8136 | 5827.0 | 0.00 | 2.355 |
| 0.52901091 | 33.6347 | 11.834 | 5793.0 | 5.8378 | 5798.8 | 0.00 | 2.344 |
| 0.53165596 | 33.6835 | 11.835 | 5764.7 | 5.8620 | 5770.6 | 0.00 | 2.332 |
| 0.53431424 | 33.7323 | 11.836 | 5736.4 | 5.8863 | 5742.3 | 0.00 | 2.320 |
| 0.53698581 | 33.7809 | 11.837 | 5708.1 | 5.9105 | 5714.0 | 0.00 | 2.309 |
| 0.53967074 | 33.8294 | 11.837 | 5679.6 | 5.9347 | 5685.6 | 0.00 | 2.297 |
| 0.54236910 | 33.8779 | 11.836 | 5651.2 | 5.9588 | 5657.1 | 0.00 | 2.286 |
| 0.54508094 | 33.9262 | 11.835 | 5622.6 | 5.9830 | 5628.6 | 0.00 | 2.275 |
| 0.54780635 | 33.9744 | 11.834 | 5594.1 | 6.0072 | 5600.1 | 0.00 | 2.263 |
| 0.55054538 | 34.0224 | 11.832 | 5565.4 | 6.0313 | 5571.5 | 0.00 | 2.252 |
| 0.55329810 | 34.0703 | 11.830 | 5536.8 | 6.0554 | 5542.8 | 0.00 | 2.241 |
| 0.55606460 | 34.1181 | 11.828 | 5508.0 | 6.0795 | 5514.1 | 0.00 | 2.230 |
| 0.55884492 | 34.1657 | 11.825 | 5479.3 | 6.1036 | 5485.4 | 0.00 | 2.219 |
| 0.56163914 | 34.2132 | 11.821 | 5450.4 | 6.1276 | 5456.6 | 0.00 | 2.208 |
| 0.56444734 | 34.2605 | 11.817 | 5421.6 | 6.1517 | 5427.7 | 0.00 | 2.197 |
| 0.56726958 | 34.3076 | 11.813 | 5392.7 | 6.1757 | 5398.9 | 0.00 | 2.186 |
| 0.57010592 | 34.3545 | 11.809 | 5363.8 | 6.1997 | 5370.0 | 0.00 | 2.175 |
| 0.57295645 | 34.4013 | 11.804 | 5334.8 | 6.2237 | 5341.0 | 0.00 | 2.164 |
| 0.57582123 | 34.4478 | 11.798 | 5305.8 | 6.2476 | 5312.0 | 0.00 | 2.153 |
| 0.57870034 | 34.4941 | 11.792 | 5276.7 | 6.2715 | 5283.0 | 0.00 | 2.142 |
| 0.58159384 | 34.5402 | 11.786 | 5247.7 | 6.2954 | 5254.0 | 0.00 | 2.132 |
| 0.58450181 | 34.5861 | 11.779 | 5218.6 | 6.3193 | 5224.9 | 0.00 | 2.121 |
| 0.58742432 | 34.6317 | 11.772 | 5189.4 | 6.3431 | 5195.8 | 0.00 | 2.111 |
| 0.59036144 | 34.6771 | 11.764 | 5160.3 | 6.3669 | 5166.7 | 0.00 | 2.100 |
| 0.59331325 | 34.7222 | 11.756 | 5131.1 | 6.3907 | 5137.5 | 0.00 | 2.090 |
| 0.59627982 | 34.7671 | 11.748 | 5101.9 | 6.4144 | 5108.3 | 0.00 | 2.079 |
| 0.59926122 | 34.8117 | 11.739 | 5072.7 | 6.4382 | 5079.2 | 0.00 | 2.069 |
| 0.60225752 | 34.8560 | 11.730 | 5043.5 | 6.4618 | 5050.0 | 0.00 | 2.059 |
| 0.60526881 | 34.9000 | 11.720 | 5014.3 | 6.4855 | 5020.8 | 0.00 | 2.048 |
| 0.60829515 | 34.9438 | 11.710 | 4985.0 | 6.5091 | 4991.5 | 0.00 | 2.038 |
| 0.61133663 | 34.9872 | 11.699 | 4955.8 | 6.5327 | 4962.3 | 0.00 | 2.028 |
| 0.61439331 | 35.0303 | 11.689 | 4926.5 | 6.5562 | 4933.1 | 0.00 | 2.018 |
| 0.61746528 | 35.0732 | 11.677 | 4897.3 | 6.5797 | 4903.9 | 0.00 | 2.008 |
| 0.62055260 | 35.1156 | 11.665 | 4868.0 | 6.6032 | 4874.6 | 0.00 | 1.998 |
| 0.62365537 | 35.1578 | 11.653 | 4838.7 | 6.6266 | 4845.3 | 0.00 | 1.988 |
| 0.62677364 | 35.1995 | 11.640 | 4809.3 | 6.6500 | 4816.0 | 0.00 | 1.978 |
| 0.62990751 | 35.2409 | 11.627 | 4779.9 | 6.6734 | 4786.6 | 0.00 | 1.968 |
| 0.63305705 | 35.2819 | 11.613 | 4750.5 | 6.6967 | 4757.2 | 0.00 | 1.959 |
| 0.63622234 | 35.3225 | 11.599 | 4721.1 | 6.7199 | 4727.8 | 0.00 | 1.949 |
| 0.63940345 | 35.3626 | 11.585 | 4691.7 | 6.7431 | 4698.4 | 0.00 | 1.939 |
| 0.64260046 | 35.4023 | 11.569 | 4662.2 | 6.7663 | 4669.0 | 0.00 | 1.929 |
| 0.64581347 | 35.4416 | 11.554 | 4632.8 | 6.7894 | 4639.6 | 0.00 | 1.920 |
| 0.64904253 | 35.4803 | 11.538 | 4603.3 | 6.8125 | 4610.2 | 0.00 | 1.910 |
| 0.65228775 | 35.5186 | 11.521 | 4573.9 | 6.8355 | 4580.7 | 0.00 | 1.901 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Dy ($Z=66$) | | | | | | | |
| 0.65554919 | 35.5564 | 11.504 | 4544.5 | 6.8585 | 4551.3 | 0.00 | 1.891 |
| 0.65882693 | 35.5936 | 11.487 | 4515.1 | 6.8815 | 4521.9 | 0.00 | 1.882 |
| 0.66212107 | 35.6304 | 11.469 | 4485.7 | 6.9043 | 4492.6 | 0.00 | 1.873 |
| 0.66543167 | 35.6666 | 11.451 | 4456.3 | 6.9272 | 4463.2 | 0.00 | 1.863 |
| 0.66875883 | 35.7022 | 11.433 | 4426.9 | 6.9499 | 4433.9 | 0.00 | 1.854 |
| 0.67210262 | 35.7373 | 11.414 | 4397.6 | 6.9727 | 4404.6 | 0.00 | 1.845 |
| 0.67546314 | 35.7718 | 11.394 | 4368.3 | 6.9953 | 4375.3 | 0.00 | 1.836 |
| 0.67884045 | 35.8058 | 11.375 | 4339.1 | 7.0180 | 4346.1 | 0.00 | 1.826 |
| 0.68223466 | 35.8391 | 11.355 | 4309.9 | 7.0405 | 4316.9 | 0.00 | 1.817 |
| 0.68564583 | 35.8718 | 11.334 | 4280.7 | 7.0630 | 4287.8 | 0.00 | 1.808 |
| 0.68907406 | 35.9040 | 11.313 | 4251.6 | 7.0855 | 4258.7 | 0.00 | 1.799 |
| 0.69251943 | 35.9355 | 11.292 | 4222.5 | 7.1078 | 4229.6 | 0.00 | 1.790 |
| 0.69598202 | 35.9664 | 11.271 | 4193.5 | 7.1302 | 4200.6 | 0.00 | 1.781 |
| 0.69946194 | 35.9966 | 11.249 | 4164.6 | 7.1524 | 4171.7 | 0.00 | 1.773 |
| 0.70295924 | 36.0262 | 11.227 | 4135.7 | 7.1746 | 4142.9 | 0.00 | 1.764 |
| 0.70647404 | 36.0551 | 11.204 | 4106.8 | 7.1968 | 4114.0 | 0.00 | 1.755 |
| 0.71000641 | 36.0833 | 11.181 | 4077.9 | 7.2189 | 4085.1 | 0.00 | 1.746 |
| 0.71355644 | 36.1107 | 11.157 | 4049.0 | 7.2409 | 4056.3 | 0.00 | 1.738 |
| 0.71712423 | 36.1374 | 11.133 | 4020.3 | 7.2628 | 4027.6 | 0.00 | 1.729 |
| 0.72070985 | 36.1633 | 11.109 | 3991.6 | 7.2847 | 3998.9 | 0.00 | 1.720 |
| 0.72431340 | 36.1884 | 11.085 | 3963.0 | 7.3065 | 3970.3 | 0.00 | 1.712 |
| 0.72793496 | 36.2128 | 11.060 | 3934.5 | 7.3283 | 3941.9 | 0.00 | 1.703 |
| 0.73157464 | 36.2364 | 11.035 | 3906.1 | 7.3499 | 3913.5 | 0.00 | 1.695 |
| 0.73523251 | 36.2592 | 11.010 | 3877.8 | 7.3716 | 3885.2 | 0.00 | 1.686 |
| 0.73890867 | 36.2811 | 10.984 | 3849.6 | 7.3931 | 3857.0 | 0.00 | 1.678 |
| 0.74260322 | 36.3023 | 10.959 | 3821.5 | 7.4146 | 3828.9 | 0.00 | 1.670 |
| 0.74631623 | 36.3226 | 10.933 | 3793.4 | 7.4360 | 3800.9 | 0.00 | 1.661 |
| 0.75004781 | 36.3421 | 10.907 | 3765.5 | 7.4573 | 3773.0 | 0.00 | 1.653 |
| 0.75379805 | 36.3608 | 10.880 | 3737.7 | 7.4785 | 3745.2 | 0.00 | 1.645 |
| 0.75756704 | 36.3785 | 10.853 | 3710.0 | 7.4997 | 3717.5 | 0.00 | 1.637 |
| 0.76135488 | 36.3954 | 10.826 | 3682.4 | 7.5208 | 3689.9 | 0.00 | 1.628 |
| 0.76516165 | 36.4115 | 10.799 | 3654.9 | 7.5418 | 3662.4 | 0.00 | 1.620 |
| 0.76898746 | 36.4266 | 10.772 | 3627.5 | 7.5627 | 3635.1 | 0.00 | 1.612 |
| 0.77283240 | 36.4408 | 10.745 | 3600.2 | 7.5836 | 3607.8 | 0.00 | 1.604 |
| 0.77669656 | 36.4541 | 10.717 | 3573.1 | 7.6044 | 3580.7 | 0.00 | 1.596 |
| 0.78058004 | 36.4665 | 10.689 | 3546.1 | 7.6251 | 3553.7 | 0.00 | 1.588 |
| 0.78448294 | 36.4779 | 10.661 | 3519.2 | 7.6457 | 3526.8 | 0.00 | 1.580 |
| 0.78840536 | 36.4883 | 10.633 | 3492.4 | 7.6662 | 3500.0 | 0.00 | 1.573 |
| 0.79234738 | 36.4978 | 10.604 | 3465.7 | 7.6867 | 3473.4 | 0.00 | 1.565 |
| 0.79630912 | 36.5063 | 10.576 | 3439.2 | 7.7071 | 3446.9 | 0.00 | 1.557 |
| 0.80029067 | 36.5138 | 10.547 | 3412.8 | 7.7274 | 3420.5 | 0.00 | 1.549 |
| 0.80429212 | 36.5203 | 10.518 | 3386.6 | 7.7476 | 3394.3 | 0.00 | 1.542 |
| 0.80831358 | 36.5258 | 10.489 | 3360.4 | 7.7677 | 3368.2 | 0.00 | 1.534 |
| 0.81235515 | 36.5302 | 10.460 | 3334.4 | 7.7877 | 3342.2 | 0.00 | 1.526 |
| 0.81641693 | 36.5336 | 10.431 | 3308.6 | 7.8076 | 3316.4 | 0.00 | 1.519 |
| 0.82049901 | 36.5359 | 10.402 | 3282.8 | 7.8275 | 3290.7 | 0.00 | 1.511 |
| 0.82460150 | 36.5371 | 10.372 | 3257.3 | 7.8473 | 3265.1 | 0.00 | 1.504 |
| 0.82872451 | 36.5372 | 10.343 | 3231.8 | 7.8669 | 3239.7 | 0.00 | 1.496 |
| 0.83286813 | 36.5362 | 10.313 | 3206.5 | 7.8865 | 3214.4 | 0.00 | 1.489 |
| 0.83703248 | 36.5341 | 10.283 | 3181.4 | 7.9060 | 3189.3 | 0.00 | 1.481 |
| 0.84121764 | 36.5307 | 10.253 | 3156.3 | 7.9254 | 3164.3 | 0.00 | 1.474 |
| 0.84542373 | 36.5263 | 10.223 | 3131.5 | 7.9447 | 3139.4 | 0.00 | 1.467 |
| 0.84965084 | 36.5206 | 10.193 | 3106.7 | 7.9639 | 3114.7 | 0.00 | 1.459 |
| 0.85389910 | 36.5137 | 10.163 | 3082.1 | 7.9830 | 3090.1 | 0.00 | 1.452 |
| 0.85816859 | 36.5056 | 10.133 | 3057.7 | 8.0020 | 3065.7 | 0.00 | 1.445 |
| 0.86245944 | 36.4962 | 10.103 | 3033.4 | 8.0209 | 3041.4 | 0.00 | 1.438 |
| 0.86677173 | 36.4855 | 10.073 | 3009.3 | 8.0397 | 3017.3 | 0.00 | 1.430 |
| 0.87110559 | 36.4736 | 10.042 | 2985.3 | 8.0585 | 2993.3 | 0.00 | 1.423 |
| 0.87546112 | 36.4603 | 10.012 | 2961.4 | 8.0771 | 2969.5 | 0.00 | 1.416 |
| 0.87983843 | 36.4469 | 9.9813 | 2937.7 | 8.0956 | 2945.8 | 0.00 | 1.409 |
| 0.88423762 | 36.4310 | 9.9508 | 2914.2 | 8.1140 | 2922.3 | 0.00 | 1.402 |
| 0.88865881 | 36.4136 | 9.9203 | 2890.8 | 8.1323 | 2898.9 | 0.00 | 1.395 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Dy ($Z=66$) | | | | | | | |
| 0.89310210 | 36.3948 | 9.8897 | 2867.5 | 8.1506 | 2875.7 | 0.00 | 1.388 |
| 0.89756761 | 36.3746 | 9.8591 | 2844.4 | 8.1687 | 2852.6 | 0.00 | 1.381 |
| 0.90205545 | 36.3529 | 9.8285 | 2821.5 | 8.1867 | 2829.7 | 0.00 | 1.374 |
| 0.90656573 | 36.3297 | 9.7979 | 2798.7 | 8.2046 | 2806.9 | 0.00 | 1.368 |
| 0.91109856 | 36.3050 | 9.7672 | 2776.1 | 8.2224 | 2784.3 | 0.00 | 1.361 |
| 0.91565405 | 36.2786 | 9.7366 | 2753.6 | 8.2400 | 2761.8 | 0.00 | 1.354 |
| 0.92023232 | 36.2507 | 9.7059 | 2731.3 | 8.2576 | 2739.5 | 0.00 | 1.347 |
| 0.92483348 | 36.2212 | 9.6752 | 2709.1 | 8.2751 | 2717.4 | 0.00 | 1.341 |
| 0.92945765 | 36.1900 | 9.6445 | 2687.1 | 8.2925 | 2695.3 | 0.00 | 1.334 |
| 0.93410494 | 36.1570 | 9.6138 | 2665.2 | 8.3097 | 2673.5 | 0.00 | 1.327 |
| 0.93877546 | 36.1223 | 9.5832 | 2643.5 | 8.3269 | 2651.8 | 0.00 | 1.321 |
| 0.94346934 | 36.0859 | 9.5525 | 2621.9 | 8.3439 | 2630.2 | 0.00 | 1.314 |
| 0.94818668 | 36.0476 | 9.5219 | 2600.5 | 8.3608 | 2608.8 | 0.00 | 1.308 |
| 0.95292762 | 36.0074 | 9.4912 | 2579.2 | 8.3776 | 2587.6 | 0.00 | 1.301 |
| 0.95769226 | 35.9653 | 9.4606 | 2558.1 | 8.3943 | 2566.5 | 0.00 | 1.295 |
| 0.96248072 | 35.9213 | 9.4300 | 2537.2 | 8.4109 | 2545.6 | 0.00 | 1.288 |
| 0.96729312 | 35.8752 | 9.3995 | 2516.4 | 8.4274 | 2524.8 | 0.00 | 1.282 |
| 0.97212959 | 35.8271 | 9.3689 | 2495.7 | 8.4437 | 2504.1 | 0.00 | 1.275 |
| 0.97699023 | 35.7769 | 9.3384 | 2475.2 | 8.4600 | 2483.7 | 0.00 | 1.269 |
| 0.98187519 | 35.7245 | 9.3080 | 2454.8 | 8.4761 | 2463.3 | 0.00 | 1.263 |
| 0.98678456 | 35.6700 | 9.2776 | 2434.7 | 8.4921 | 2443.1 | 0.00 | 1.256 |
| 0.99171848 | 35.6131 | 9.2472 | 2414.6 | 8.5080 | 2423.1 | 0.00 | 1.250 |
| 0.99667708 | 35.5541 | 9.2168 | 2394.7 | 8.5237 | 2403.2 | 0.00 | 1.244 |
| 1.0016605 | 35.5075 | 9.1789 | 2373.0 | 8.5394 | 2381.5 | 0.00 | 1.238 |
| 1.0066688 | 35.4827 | 9.1261 | 2347.6 | 8.5549 | 2356.1 | 0.00 | 1.232 |
| 1.0117021 | 35.4478 | 9.0736 | 2322.5 | 8.5703 | 2331.0 | 0.00 | 1.226 |
| 1.0167606 | 35.4039 | 9.0214 | 2297.6 | 8.5856 | 2306.2 | 0.00 | 1.219 |
| 1.0218444 | 35.3516 | 8.9696 | 2273.1 | 8.6007 | 2281.7 | 0.00 | 1.213 |
| 1.0269536 | 35.2915 | 8.9182 | 2248.8 | 8.6158 | 2257.4 | 0.00 | 1.207 |
| 1.0320884 | 35.2241 | 8.8671 | 2224.8 | 8.6307 | 2233.4 | 0.00 | 1.201 |
| 1.0372489 | 35.1497 | 8.8164 | 2201.1 | 8.6455 | 2209.7 | 0.00 | 1.195 |
| 1.0424351 | 35.0684 | 8.7660 | 2177.6 | 8.6602 | 2186.3 | 0.00 | 1.189 |
| 1.0476473 | 34.9805 | 8.7160 | 2154.4 | 8.6747 | 2163.1 | 0.00 | 1.183 |
| 1.0528855 | 34.8859 | 8.6663 | 2131.5 | 8.6891 | 2140.1 | 0.00 | 1.178 |
| 1.0581499 | 34.7847 | 8.6169 | 2108.8 | 8.7034 | 2117.5 | 0.00 | 1.172 |
| 1.0634407 | 34.6769 | 8.5679 | 2086.4 | 8.7176 | 2095.1 | 0.00 | 1.166 |
| 1.0687579 | 34.5624 | 8.5193 | 2064.2 | 8.7316 | 2072.9 | 0.00 | 1.160 |
| 1.0741017 | 34.4411 | 8.4709 | 2042.3 | 8.7455 | 2051.0 | 0.00 | 1.154 |
| 1.0794722 | 34.3129 | 8.4229 | 2020.6 | 8.7593 | 2029.3 | 0.00 | 1.149 |
| 1.0848695 | 34.1775 | 8.3753 | 1999.2 | 8.7730 | 2007.9 | 0.00 | 1.143 |
| 1.0902939 | 34.0347 | 8.3279 | 1978.0 | 8.7865 | 1986.7 | 0.00 | 1.137 |
| 1.0957454 | 33.8842 | 8.2809 | 1957.0 | 8.7999 | 1965.8 | 0.00 | 1.132 |
| 1.1012241 | 33.7257 | 8.2342 | 1936.3 | 8.8131 | 1945.1 | 0.00 | 1.126 |
| 1.1067302 | 33.5589 | 8.1878 | 1915.8 | 8.8263 | 1924.6 | 0.00 | 1.120 |
| 1.1122639 | 33.3833 | 8.1418 | 1895.6 | 8.8393 | 1904.4 | 0.00 | 1.115 |
| 1.1178252 | 33.1985 | 8.0961 | 1875.5 | 8.8521 | 1884.4 | 0.00 | 1.109 |
| 1.1234143 | 33.0039 | 8.0507 | 1855.7 | 8.8649 | 1864.6 | 0.00 | 1.104 |
| 1.1290314 | 32.7990 | 8.0056 | 1836.2 | 8.8775 | 1845.0 | 0.00 | 1.098 |
| 1.1346765 | 32.5831 | 7.9608 | 1816.8 | 8.8899 | 1825.7 | 0.00 | 1.093 |
| 1.1403499 | 32.3554 | 7.9163 | 1797.7 | 8.9022 | 1806.6 | 0.00 | 1.087 |
| 1.1460517 | 32.1151 | 7.8721 | 1778.7 | 8.9144 | 1787.7 | 0.00 | 1.082 |
| 1.1517819 | 31.8612 | 7.8283 | 1760.0 | 8.9265 | 1769.0 | 0.00 | 1.076 |
| 1.1575408 | 31.5927 | 7.7847 | 1741.5 | 8.9384 | 1750.5 | 0.00 | 1.071 |
| 1.1633285 | 31.3083 | 7.7415 | 1723.2 | 8.9502 | 1732.2 | 0.00 | 1.066 |
| 1.1691452 | 31.0067 | 7.6985 | 1705.2 | 8.9619 | 1714.1 | 0.00 | 1.060 |
| 1.1749909 | 30.6860 | 7.6548 | 1687.0 | 8.9734 | 1696.0 | 0.00 | 1.055 |
| 1.1808659 | 30.3445 | 7.6105 | 1668.9 | 8.9848 | 1677.9 | 0.00 | 1.050 |
| 1.1867702 | 29.9798 | 7.5666 | 1651.0 | 8.9960 | 1660.0 | 0.00 | 1.045 |
| 1.1927040 | 29.5894 | 7.5229 | 1633.3 | 9.0071 | 1642.4 | 0.00 | 1.040 |
| 1.1986676 | 29.1703 | 7.4795 | 1615.9 | 9.0180 | 1624.9 | 0.00 | 1.034 |
| 1.2046609 | 28.7188 | 7.4365 | 1598.6 | 9.0289 | 1607.6 | 0.00 | 1.029 |
| 1.2106842 | 28.2306 | 7.3938 | 1581.5 | 9.0395 | 1590.5 | 0.00 | 1.024 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Dy ($Z=66$) | | | | | | | |
| 1.2167376 | 27.7003 | 7.3513 | 1564.6 | 9.0501 | 1573.6 | 0.00 | 1.019 |
| 1.2228213 | 27.1213 | 7.3092 | 1547.9 | 9.0605 | 1556.9 | 0.00 | 1.014 |
| 1.2289354 | 26.4852 | 7.2673 | 1531.3 | 9.0707 | 1540.4 | 0.00 | 1.009 |
| 1.2350801 | 25.7812 | 7.2258 | 1515.0 | 9.0809 | 1524.1 | 0.00 | 1.004 |
| 1.2412555 | 24.9950 | 7.1845 | 1498.9 | 9.0908 | 1508.0 | 0.00 | 0.9989 |
| 1.2474618 | 24.1072 | 7.1435 | 1482.9 | 9.1007 | 1492.0 | 0.00 | 0.9939 |
| 1.2536991 | 23.0911 | 7.1029 | 1467.1 | 9.1104 | 1476.2 | 0.00 | 0.9889 |
| 1.2599676 | 21.9047 | 7.0625 | 1451.5 | 9.1199 | 1460.6 | 0.00 | 0.9840 |
| 1.2662674 | 20.4841 | 7.0223 | 1436.1 | 9.1293 | 1445.2 | 0.00 | 0.9791 |
| 1.2725988 | 18.7174 | 6.9825 | 1420.8 | 9.1386 | 1430.0 | 0.00 | 0.9743 |
| 1.2789618 | 16.3805 | 6.9430 | 1405.8 | 9.1477 | 1414.9 | 0.00 | 0.9694 |
| 1.2853566 | 12.8991 | 6.9037 | 1390.9 | 9.1566 | 1400.0 | 0.00 | 0.9646 |
| 1.2917833 | 5.58834 | 6.8647 | 1376.1 | 9.1655 | 1385.3 | 0.00 | 0.9598 |
| 1.2947290 | -12.7100 | 6.8469 | 1369.4 | 9.1694 | 1378.6 | 0.00 | 0.9576 |
| 1.2950709 | -13.0561 | 26.489 | 5296.5 | 9.1699 | 5305.7 | 0.00 | 0.9574 |
| 1.2982423 | 5.35530 | 26.389 | 5263.6 | 9.1741 | 5272.8 | 0.00 | 0.9550 |
| 1.3047335 | 11.5342 | 26.186 | 5197.3 | 9.1827 | 5206.4 | 0.00 | 0.9503 |
| 1.3112571 | 13.8769 | 25.985 | 5131.7 | 9.1911 | 5140.9 | 0.00 | 0.9455 |
| 1.3178134 | 14.7162 | 25.786 | 5067.0 | 9.1993 | 5076.2 | 0.00 | 0.9408 |
| 1.3244025 | 14.0991 | 25.588 | 5003.2 | 9.2074 | 5012.4 | 0.00 | 0.9362 |
| 1.3310245 | 8.65102 | 25.392 | 4940.1 | 9.2154 | 4949.3 | 0.00 | 0.9315 |
| 1.3321988 | 2.39694 | 25.357 | 4929.0 | 9.2167 | 4938.2 | 0.00 | 0.9307 |
| 1.3328011 | 2.31057 | 38.199 | 7421.9 | 9.2175 | 7431.1 | 0.00 | 0.9303 |
| 1.3376796 | 14.9106 | 37.980 | 7352.4 | 9.2232 | 7361.6 | 0.00 | 0.9269 |
| 1.3443680 | 19.4254 | 37.683 | 7258.7 | 9.2308 | 7267.9 | 0.00 | 0.9222 |
| 1.3510899 | 22.2413 | 37.389 | 7166.1 | 9.2383 | 7175.4 | 0.00 | 0.9177 |
| 1.3578453 | 24.3810 | 37.097 | 7074.8 | 9.2457 | 7084.0 | 0.00 | 0.9131 |
| 1.3646345 | 26.1366 | 36.807 | 6984.6 | 9.2529 | 6993.9 | 0.00 | 0.9086 |
| 1.3714577 | 27.6375 | 36.520 | 6895.6 | 9.2600 | 6904.9 | 0.00 | 0.9040 |
| 1.3783150 | 28.9537 | 36.235 | 6807.8 | 9.2669 | 6817.0 | 0.00 | 0.8995 |
| 1.3852066 | 30.1281 | 35.952 | 6721.1 | 9.2736 | 6730.3 | 0.00 | 0.8951 |
| 1.3921326 | 31.1894 | 35.672 | 6635.5 | 9.2802 | 6644.7 | 0.00 | 0.8906 |
| 1.3990933 | 32.1577 | 35.394 | 6551.0 | 9.2867 | 6560.3 | 0.00 | 0.8862 |
| 1.4060887 | 33.0477 | 35.118 | 6467.6 | 9.2930 | 6476.9 | 0.00 | 0.8818 |
| 1.4131192 | 33.8708 | 34.844 | 6385.2 | 9.2992 | 6394.5 | 0.00 | 0.8774 |
| 1.4201848 | 34.6356 | 34.573 | 6304.0 | 9.3052 | 6313.3 | 0.00 | 0.8730 |
| 1.4272857 | 35.3491 | 34.303 | 6223.8 | 9.3111 | 6233.1 | 0.00 | 0.8687 |
| 1.4344221 | 36.0170 | 34.036 | 6144.6 | 9.3168 | 6153.9 | 0.00 | 0.8643 |
| 1.4415942 | 36.6440 | 33.771 | 6066.4 | 9.3224 | 6075.7 | 0.00 | 0.8600 |
| 1.4488022 | 37.2340 | 33.509 | 5989.3 | 9.3278 | 5998.6 | 0.00 | 0.8558 |
| 1.4560462 | 37.7901 | 33.248 | 5913.1 | 9.3331 | 5922.4 | 0.00 | 0.8515 |
| 1.4633265 | 38.3152 | 32.989 | 5837.9 | 9.3382 | 5847.3 | 0.00 | 0.8473 |
| 1.4706431 | 38.8115 | 32.733 | 5763.7 | 9.3432 | 5773.1 | 0.00 | 0.8431 |
| 1.4779963 | 39.2812 | 32.479 | 5690.5 | 9.3480 | 5699.8 | 0.00 | 0.8389 |
| 1.4853863 | 39.7259 | 32.226 | 5618.2 | 9.3526 | 5627.5 | 0.00 | 0.8347 |
| 1.4928132 | 40.1470 | 31.976 | 5546.8 | 9.3572 | 5556.2 | 0.00 | 0.8305 |
| 1.5002773 | 40.5459 | 31.728 | 5476.4 | 9.3615 | 5485.7 | 0.00 | 0.8264 |
| 1.5077787 | 40.9237 | 31.481 | 5406.8 | 9.3657 | 5416.2 | 0.00 | 0.8223 |
| 1.5153176 | 41.2811 | 31.237 | 5338.2 | 9.3698 | 5347.5 | 0.00 | 0.8182 |
| 1.5228942 | 41.6190 | 30.995 | 5270.4 | 9.3737 | 5279.8 | 0.00 | 0.8141 |
| 1.5305086 | 41.9380 | 30.754 | 5203.5 | 9.3775 | 5212.9 | 0.00 | 0.8101 |
| 1.5381612 | 42.2384 | 30.516 | 5137.5 | 9.3811 | 5146.9 | 0.00 | 0.8061 |
| 1.5458520 | 42.5206 | 30.279 | 5072.3 | 9.3845 | 5081.7 | 0.00 | 0.8020 |
| 1.5535812 | 42.7846 | 30.045 | 5007.9 | 9.3878 | 5017.3 | 0.00 | 0.7981 |
| 1.5613491 | 43.0304 | 29.812 | 4944.4 | 9.3910 | 4953.8 | 0.00 | 0.7941 |
| 1.5691559 | 43.2576 | 29.581 | 4881.7 | 9.3940 | 4891.1 | 0.00 | 0.7901 |
| 1.5770017 | 43.4658 | 29.352 | 4819.8 | 9.3968 | 4829.2 | 0.00 | 0.7862 |
| 1.5848867 | 43.6539 | 29.125 | 4758.7 | 9.3995 | 4768.1 | 0.00 | 0.7823 |
| 1.5928111 | 43.8206 | 28.900 | 4698.4 | 9.4021 | 4707.8 | 0.00 | 0.7784 |
| 1.6007752 | 43.9641 | 28.676 | 4638.9 | 9.4044 | 4648.3 | 0.00 | 0.7745 |
| 1.6087790 | 44.0814 | 28.454 | 4580.1 | 9.4067 | 4589.5 | 0.00 | 0.7707 |
| 1.6168229 | 44.1685 | 28.234 | 4522.1 | 9.4088 | 4531.5 | 0.00 | 0.7668 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Dy ($Z=66$) | | | | | | | |
| 1.6249070 | 44.2193 | 28.016 | 4464.9 | 9.4107 | 4474.3 | 0.00 | 0.7630 |
| 1.6330316 | 44.2240 | 27.800 | 4408.3 | 9.4125 | 4417.7 | 0.00 | 0.7592 |
| 1.6411967 | 44.1663 | 27.585 | 4352.5 | 9.4141 | 4361.9 | 0.00 | 0.7555 |
| 1.6494027 | 44.0159 | 27.372 | 4297.4 | 9.4156 | 4306.8 | 0.00 | 0.7517 |
| 1.6576497 | 43.7067 | 27.161 | 4243.1 | 9.4169 | 4252.5 | 0.00 | 0.7480 |
| 1.6659380 | 43.0420 | 26.951 | 4189.4 | 9.4181 | 4198.8 | 0.00 | 0.7442 |
| 1.6740015 | 40.6438 | 26.750 | 4138.0 | 9.4191 | 4147.4 | 0.00 | 0.7406 |
| 1.6742677 | 40.3848 | 26.743 | 4136.3 | 9.4191 | 4145.7 | 0.00 | 0.7405 |
| 1.6771986 | 40.6710 | 31.276 | 4828.9 | 9.4194 | 4838.3 | 0.00 | 0.7392 |
| 1.6826390 | 43.0080 | 31.109 | 4787.6 | 9.4200 | 4797.0 | 0.00 | 0.7368 |
| 1.6910522 | 44.3844 | 30.853 | 4724.6 | 9.4207 | 4734.0 | 0.00 | 0.7332 |
| 1.6995075 | 45.2282 | 30.599 | 4662.4 | 9.4213 | 4671.9 | 0.00 | 0.7295 |
| 1.7080050 | 45.8623 | 30.348 | 4601.1 | 9.4217 | 4610.5 | 0.00 | 0.7259 |
| 1.7165450 | 46.3795 | 30.098 | 4540.6 | 9.4220 | 4550.0 | 0.00 | 0.7223 |
| 1.7251278 | 46.8192 | 29.851 | 4480.9 | 9.4221 | 4490.3 | 0.00 | 0.7187 |
| 1.7337534 | 47.2017 | 29.606 | 4422.0 | 9.4220 | 4431.4 | 0.00 | 0.7151 |
| 1.7424222 | 47.5382 | 29.362 | 4363.8 | 9.4219 | 4373.2 | 0.00 | 0.7116 |
| 1.7511343 | 47.8347 | 29.120 | 4306.3 | 9.4215 | 4315.7 | 0.00 | 0.7080 |
| 1.7598899 | 48.0934 | 28.885 | 4250.2 | 9.4210 | 4259.6 | 0.00 | 0.7045 |
| 1.7686894 | 48.3245 | 28.668 | 4197.3 | 9.4204 | 4206.7 | 0.00 | 0.7010 |
| 1.7775328 | 48.5326 | 28.454 | 4145.2 | 9.4196 | 4154.7 | 0.00 | 0.6975 |
| 1.7864205 | 48.7158 | 28.243 | 4094.0 | 9.4187 | 4103.4 | 0.00 | 0.6940 |
| 1.7953526 | 48.8707 | 28.034 | 4043.6 | 9.4176 | 4053.0 | 0.00 | 0.6906 |
| 1.8043294 | 48.9917 | 27.829 | 3994.0 | 9.4163 | 4003.4 | 0.00 | 0.6871 |
| 1.8133510 | 49.0667 | 27.626 | 3945.1 | 9.4150 | 3954.5 | 0.00 | 0.6837 |
| 1.8224178 | 49.0685 | 27.425 | 3897.0 | 9.4134 | 3906.4 | 0.00 | 0.6803 |
| 1.8315299 | 48.9126 | 27.227 | 3849.6 | 9.4117 | 3859.0 | 0.00 | 0.6769 |
| 1.8399858 | 48.0751 | 27.047 | 3806.5 | 9.4100 | 3815.9 | 0.00 | 0.6738 |
| 1.8406875 | 47.7976 | 27.032 | 3802.9 | 9.4099 | 3812.3 | 0.00 | 0.6736 |
| 1.8436141 | 48.1344 | 28.861 | 4053.8 | 9.4093 | 4063.3 | 0.00 | 0.6725 |
| 1.8498909 | 49.1843 | 28.714 | 4019.5 | 9.4079 | 4028.9 | 0.00 | 0.6702 |
| 1.8591404 | 49.8465 | 28.500 | 3969.7 | 9.4058 | 3979.1 | 0.00 | 0.6669 |
| 1.8684361 | 50.2957 | 28.289 | 3920.7 | 9.4035 | 3930.1 | 0.00 | 0.6636 |
| 1.8777783 | 50.6570 | 28.080 | 3872.4 | 9.4011 | 3881.8 | 0.00 | 0.6603 |
| 1.8871672 | 50.9672 | 27.873 | 3824.7 | 9.3985 | 3834.1 | 0.00 | 0.6570 |
| 1.8966030 | 51.2425 | 27.669 | 3777.8 | 9.3958 | 3787.2 | 0.00 | 0.6537 |
| 1.9060860 | 51.4913 | 27.467 | 3731.6 | 9.3929 | 3741.0 | 0.00 | 0.6505 |
| 1.9156165 | 51.7182 | 27.267 | 3686.0 | 9.3899 | 3695.3 | 0.00 | 0.6472 |
| 1.9251945 | 51.9258 | 27.068 | 3640.9 | 9.3867 | 3650.3 | 0.00 | 0.6440 |
| 1.9348205 | 52.1149 | 26.875 | 3596.9 | 9.3834 | 3606.3 | 0.00 | 0.6408 |
| 1.9444946 | 52.2909 | 26.692 | 3554.6 | 9.3799 | 3564.0 | 0.00 | 0.6376 |
| 1.9542171 | 52.4563 | 26.511 | 3513.0 | 9.3763 | 3522.4 | 0.00 | 0.6344 |
| 1.9639882 | 52.6103 | 26.332 | 3472.0 | 9.3725 | 3481.3 | 0.00 | 0.6313 |
| 1.9738081 | 52.7525 | 26.156 | 3431.6 | 9.3686 | 3441.0 | 0.00 | 0.6281 |
| 1.9836772 | 52.8816 | 25.982 | 3391.8 | 9.3646 | 3401.2 | 0.00 | 0.6250 |
| 1.9935955 | 52.9957 | 25.811 | 3352.7 | 9.3604 | 3362.0 | 0.00 | 0.6219 |
| 2.0035635 | 53.0912 | 25.641 | 3314.1 | 9.3561 | 3323.4 | 0.00 | 0.6188 |
| 2.0135813 | 53.1611 | 25.474 | 3276.0 | 9.3516 | 3285.4 | 0.00 | 0.6157 |
| 2.0236492 | 53.1904 | 25.308 | 3238.5 | 9.3470 | 3247.9 | 0.00 | 0.6127 |
| 2.0337675 | 53.1357 | 25.144 | 3201.6 | 9.3422 | 3210.9 | 0.00 | 0.6096 |
| 2.0432385 | 52.7952 | 24.994 | 3167.6 | 9.3376 | 3177.0 | 0.00 | 0.6068 |
| 2.0439363 | 52.7239 | 24.983 | 3165.2 | 9.3373 | 3174.5 | 0.00 | 0.6066 |
| 2.0503613 | 52.8942 | 26.064 | 3291.8 | 9.3341 | 3301.2 | 0.00 | 0.6047 |
| 2.0541560 | 53.2252 | 26.003 | 3278.1 | 9.3322 | 3287.4 | 0.00 | 0.6036 |
| 2.0644268 | 53.7063 | 25.840 | 3241.2 | 9.3270 | 3250.6 | 0.00 | 0.6006 |
| 2.0747489 | 54.0275 | 25.678 | 3204.9 | 9.3217 | 3214.2 | 0.00 | 0.5976 |
| 2.0851227 | 54.2903 | 25.518 | 3169.1 | 9.3162 | 3178.4 | 0.00 | 0.5946 |
| 2.0955483 | 54.5215 | 25.359 | 3133.7 | 9.3106 | 3143.0 | 0.00 | 0.5917 |
| 2.1060260 | 54.7324 | 25.202 | 3098.8 | 9.3048 | 3108.1 | 0.00 | 0.5887 |
| 2.1165562 | 54.9288 | 25.046 | 3064.3 | 9.2989 | 3073.6 | 0.00 | 0.5858 |
| 2.1271389 | 55.1141 | 24.892 | 3030.3 | 9.2929 | 3039.6 | 0.00 | 0.5829 |
| 2.1377746 | 55.2905 | 24.739 | 2996.7 | 9.2867 | 3006.0 | 0.00 | 0.5800 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Dy ($Z=66$) | | | | | | | |
| 2.1484635 | 55.4593 | 24.587 | 2963.5 | 9.2804 | 2972.8 | 0.00 | 0.5771 |
| 2.1592058 | 55.6224 | 24.438 | 2930.9 | 9.2739 | 2940.2 | 0.00 | 0.5742 |
| 2.1700018 | 55.7810 | 24.291 | 2898.7 | 9.2673 | 2908.0 | 0.00 | 0.5714 |
| 2.1808519 | 55.9360 | 24.143 | 2866.8 | 9.2606 | 2876.0 | 0.00 | 0.5685 |
| 2.1917561 | 56.0858 | 23.991 | 2834.6 | 9.2537 | 2843.8 | 0.00 | 0.5657 |
| 2.2027149 | 56.2307 | 23.841 | 2802.8 | 9.2467 | 2812.0 | 0.00 | 0.5629 |
| 2.2137285 | 56.3713 | 23.691 | 2771.4 | 9.2395 | 2780.6 | 0.00 | 0.5601 |
| 2.2247971 | 56.5079 | 23.543 | 2740.3 | 9.2322 | 2749.5 | 0.00 | 0.5573 |
| 2.2359211 | 56.6409 | 23.396 | 2709.6 | 9.2248 | 2718.9 | 0.00 | 0.5545 |
| 2.2471007 | 56.7706 | 23.250 | 2679.3 | 9.2172 | 2688.5 | 0.00 | 0.5518 |
| 2.2583362 | 56.8971 | 23.105 | 2649.4 | 9.2095 | 2658.6 | 0.00 | 0.5490 |
| 2.2696279 | 57.0207 | 22.961 | 2619.7 | 9.2017 | 2628.9 | 0.00 | 0.5463 |
| 2.2809760 | 57.1417 | 22.818 | 2590.5 | 9.1937 | 2599.7 | 0.00 | 0.5436 |
| 2.2923809 | 57.2600 | 22.676 | 2561.5 | 9.1856 | 2570.7 | 0.00 | 0.5409 |
| 2.3038428 | 57.3759 | 22.535 | 2532.9 | 9.1774 | 2542.1 | 0.00 | 0.5382 |
| 2.3153620 | 57.4896 | 22.395 | 2504.7 | 9.1690 | 2513.8 | 0.00 | 0.5355 |
| 2.3269388 | 57.6011 | 22.255 | 2476.7 | 9.1605 | 2485.9 | 0.00 | 0.5328 |
| 2.3385735 | 57.7105 | 22.117 | 2449.1 | 9.1519 | 2458.2 | 0.00 | 0.5302 |
| 2.3502664 | 57.8181 | 21.980 | 2421.7 | 9.1431 | 2430.9 | 0.00 | 0.5275 |
| 2.3620177 | 57.9238 | 21.843 | 2394.7 | 9.1342 | 2403.9 | 0.00 | 0.5249 |
| 2.3738278 | 58.0279 | 21.707 | 2368.0 | 9.1252 | 2377.1 | 0.00 | 0.5223 |
| 2.3856970 | 58.1305 | 21.573 | 2341.6 | 9.1160 | 2350.7 | 0.00 | 0.5197 |
| 2.3976254 | 58.2317 | 21.438 | 2315.4 | 9.1067 | 2324.5 | 0.00 | 0.5171 |
| 2.4096136 | 58.3307 | 21.301 | 2289.2 | 9.0973 | 2298.3 | 0.00 | 0.5145 |
| 2.4216616 | 58.4276 | 21.166 | 2263.3 | 9.0878 | 2272.4 | 0.00 | 0.5120 |
| 2.4337699 | 58.5224 | 21.031 | 2237.7 | 9.0781 | 2246.8 | 0.00 | 0.5094 |
| 2.4459388 | 58.6153 | 20.897 | 2212.4 | 9.0683 | 2221.5 | 0.00 | 0.5069 |
| 2.4581685 | 58.7064 | 20.764 | 2187.4 | 9.0584 | 2196.5 | 0.00 | 0.5044 |
| 2.4704593 | 58.7958 | 20.632 | 2162.7 | 9.0483 | 2171.7 | 0.00 | 0.5019 |
| 2.4828116 | 58.8835 | 20.500 | 2138.2 | 9.0381 | 2147.2 | 0.00 | 0.4994 |
| 2.4952257 | 58.9696 | 20.370 | 2114.0 | 9.0278 | 2123.0 | 0.00 | 0.4969 |
| 2.5077018 | 59.0542 | 20.240 | 2090.1 | 9.0174 | 2099.1 | 0.00 | 0.4944 |
| 2.5202403 | 59.1374 | 20.111 | 2066.4 | 9.0069 | 2075.4 | 0.00 | 0.4920 |
| 2.5328415 | 59.2191 | 19.983 | 2043.0 | 8.9962 | 2052.0 | 0.00 | 0.4895 |
| 2.5455057 | 59.2994 | 19.855 | 2019.9 | 8.9854 | 2028.9 | 0.00 | 0.4871 |
| 2.5582333 | 59.3784 | 19.728 | 1997.0 | 8.9745 | 2006.0 | 0.00 | 0.4846 |
| 2.5710244 | 59.4562 | 19.602 | 1974.4 | 8.9634 | 1983.3 | 0.00 | 0.4822 |
| 2.5838796 | 59.5328 | 19.477 | 1952.0 | 8.9523 | 1961.0 | 0.00 | 0.4798 |
| 2.5967990 | 59.6080 | 19.351 | 1929.7 | 8.9410 | 1938.6 | 0.00 | 0.4775 |
| 2.6097829 | 59.6821 | 19.223 | 1907.4 | 8.9296 | 1916.3 | 0.00 | 0.4751 |
| 2.6228319 | 59.7546 | 19.096 | 1885.4 | 8.9181 | 1894.3 | 0.00 | 0.4727 |
| 2.6359460 | 60.0456 | 18.970 | 1863.6 | 8.9064 | 1872.5 | 0.00 | 0.4704 |
| 2.6491257 | 60.1154 | 18.845 | 1842.1 | 8.8947 | 1851.0 | 0.00 | 0.4680 |
| 2.6623714 | 60.1838 | 18.721 | 1820.9 | 8.8828 | 1829.8 | 0.00 | 0.4657 |
| 2.6756832 | 60.3943 | 18.594 | 1799.6 | 8.8708 | 1808.5 | 0.00 | 0.4634 |
| 2.6890617 | 60.4596 | 18.469 | 1778.5 | 8.8587 | 1787.4 | 0.00 | 0.4611 |
| 2.7025070 | 60.5233 | 18.344 | 1757.7 | 8.8465 | 1766.5 | 0.00 | 0.4588 |
| 2.7160195 | 60.5855 | 18.220 | 1737.1 | 8.8341 | 1746.0 | 0.00 | 0.4565 |
| 2.7295996 | 60.6463 | 18.096 | 1716.8 | 8.8217 | 1725.6 | 0.00 | 0.4542 |
| 2.7432476 | 60.7057 | 17.974 | 1696.7 | 8.8091 | 1705.5 | 0.00 | 0.4520 |
| 2.7569638 | 60.7638 | 17.853 | 1676.8 | 8.7964 | 1685.6 | 0.00 | 0.4497 |
| 2.7707486 | 60.8207 | 17.732 | 1657.2 | 8.7836 | 1666.0 | 0.00 | 0.4475 |
| 2.7846024 | 60.8763 | 17.612 | 1637.9 | 8.7707 | 1646.6 | 0.00 | 0.4452 |
| 2.7985254 | 60.9309 | 17.493 | 1618.7 | 8.7577 | 1627.5 | 0.00 | 0.4430 |
| 2.8125180 | 60.9843 | 17.376 | 1599.8 | 8.7446 | 1608.6 | 0.00 | 0.4408 |
| 2.8265806 | 61.0368 | 17.259 | 1581.1 | 8.7313 | 1589.9 | 0.00 | 0.4386 |
| 2.8407135 | 61.0882 | 17.142 | 1562.7 | 8.7180 | 1571.4 | 0.00 | 0.4365 |
| 2.8549171 | 61.1387 | 17.027 | 1544.5 | 8.7045 | 1553.2 | 0.00 | 0.4343 |
| 2.8691917 | 61.1884 | 16.913 | 1526.5 | 8.6910 | 1535.1 | 0.00 | 0.4321 |
| 2.8835376 | 61.2372 | 16.799 | 1508.7 | 8.6773 | 1517.4 | 0.00 | 0.4300 |
| 2.8979553 | 61.2854 | 16.686 | 1491.1 | 8.6635 | 1499.7 | 0.00 | 0.4278 |
| 2.9124451 | 61.3328 | 16.572 | 1473.5 | 8.6496 | 1482.1 | 0.00 | 0.4257 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Dy ($Z=66$) | | | | | | | |
| 2.9270073 | 61.3795 | 16.458 | 1456.1 | 8.6357 | 1464.7 | 0.00 | 0.4236 |
| 2.9416424 | 61.4255 | 16.345 | 1438.9 | 8.6216 | 1447.5 | 0.00 | 0.4215 |
| 2.9563506 | 61.4711 | 16.234 | 1422.0 | 8.6074 | 1430.6 | 0.00 | 0.4194 |
| 2.9711323 | 61.5162 | 16.123 | 1405.2 | 8.5931 | 1413.8 | 0.00 | 0.4173 |
| 2.9859880 | 61.5613 | 16.013 | 1388.7 | 8.5787 | 1397.3 | 0.00 | 0.4152 |
| 3.0009179 | 61.6075 | 15.903 | 1372.3 | 8.5642 | 1380.8 | 0.00 | 0.4132 |
| 3.0159225 | 61.6638 | 15.778 | 1354.7 | 8.5496 | 1363.3 | 0.00 | 0.4111 |
| 3.0310021 | 61.7137 | 15.654 | 1337.4 | 8.5349 | 1345.9 | 0.00 | 0.4091 |
| 3.0461571 | 61.7593 | 15.531 | 1320.3 | 8.5201 | 1328.8 | 0.00 | 0.4070 |
| 3.0613879 | 61.8015 | 15.410 | 1303.5 | 8.5052 | 1312.0 | 0.00 | 0.4050 |
| 3.0766949 | 61.8410 | 15.289 | 1286.8 | 8.4902 | 1295.3 | 0.00 | 0.4030 |
| 3.0920783 | 61.8782 | 15.170 | 1270.4 | 8.4751 | 1278.9 | 0.00 | 0.4010 |
| 3.1075387 | 61.9134 | 15.051 | 1254.3 | 8.4599 | 1262.7 | 0.00 | 0.3990 |
| 3.1230764 | 61.9468 | 14.934 | 1238.3 | 8.4446 | 1246.7 | 0.00 | 0.3970 |
| 3.1386918 | 61.9786 | 14.818 | 1222.6 | 8.4292 | 1231.0 | 0.00 | 0.3950 |
| 3.1543853 | 62.0089 | 14.703 | 1207.0 | 8.4138 | 1215.4 | 0.00 | 0.3931 |
| 3.1701572 | 62.0378 | 14.589 | 1191.7 | 8.3982 | 1200.1 | 0.00 | 0.3911 |
| 3.1860080 | 62.0654 | 14.476 | 1176.6 | 8.3825 | 1185.0 | 0.00 | 0.3892 |
| 3.2019380 | 62.0918 | 14.364 | 1161.7 | 8.3668 | 1170.1 | 0.00 | 0.3872 |
| 3.2179477 | 62.1171 | 14.253 | 1147.0 | 8.3509 | 1155.3 | 0.00 | 0.3853 |
| 3.2340374 | 62.1413 | 14.143 | 1132.5 | 8.3350 | 1140.8 | 0.00 | 0.3834 |
| 3.2502076 | 62.1646 | 14.035 | 1118.2 | 8.3190 | 1126.5 | 0.00 | 0.3815 |
| 3.2664587 | 62.1868 | 13.927 | 1104.1 | 8.3028 | 1112.4 | 0.00 | 0.3796 |
| 3.2827910 | 62.2082 | 13.820 | 1090.1 | 8.2866 | 1098.4 | 0.00 | 0.3777 |
| 3.2992049 | 62.2287 | 13.714 | 1076.4 | 8.2704 | 1084.7 | 0.00 | 0.3758 |
| 3.3157009 | 62.2484 | 13.609 | 1062.8 | 8.2540 | 1071.1 | 0.00 | 0.3739 |
| 3.3322794 | 62.2674 | 13.505 | 1049.5 | 8.2375 | 1057.7 | 0.00 | 0.3721 |
| 3.3489408 | 62.2856 | 13.402 | 1036.3 | 8.2210 | 1044.5 | 0.00 | 0.3702 |
| 3.3656856 | 62.4074 | 13.296 | 1023.0 | 8.2043 | 1031.2 | 0.00 | 0.3684 |
| 3.3825140 | 62.4245 | 13.191 | 1009.9 | 8.1876 | 1018.1 | 0.00 | 0.3665 |
| 3.3994265 | 62.4405 | 13.087 | 996.95 | 8.1708 | 1005.1 | 0.00 | 0.3647 |
| 3.4164237 | 62.4556 | 12.984 | 984.18 | 8.1539 | 992.33 | 0.00 | 0.3629 |
| 3.4335058 | 62.4697 | 12.882 | 971.58 | 8.1369 | 979.72 | 0.00 | 0.3611 |
| 3.4506733 | 62.4829 | 12.781 | 959.15 | 8.1199 | 967.27 | 0.00 | 0.3593 |
| 3.4679267 | 62.4953 | 12.681 | 946.89 | 8.1028 | 955.00 | 0.00 | 0.3575 |
| 3.4852663 | 62.5068 | 12.581 | 934.80 | 8.0856 | 942.88 | 0.00 | 0.3557 |
| 3.5026927 | 62.5176 | 12.483 | 922.87 | 8.0683 | 930.94 | 0.00 | 0.3540 |
| 3.5202061 | 62.5276 | 12.385 | 911.10 | 8.0509 | 919.15 | 0.00 | 0.3522 |
| 3.5378072 | 62.5369 | 12.289 | 899.49 | 8.0335 | 907.52 | 0.00 | 0.3505 |
| 3.5554962 | 62.5456 | 12.193 | 888.04 | 8.0159 | 896.05 | 0.00 | 0.3487 |
| 3.5732737 | 62.5535 | 12.098 | 876.74 | 7.9984 | 884.73 | 0.00 | 0.3470 |
| 3.5911400 | 62.5608 | 12.004 | 865.59 | 7.9807 | 873.57 | 0.00 | 0.3453 |
| 3.6090957 | 62.5675 | 11.911 | 854.59 | 7.9629 | 862.55 | 0.00 | 0.3435 |
| 3.6271412 | 62.5737 | 11.818 | 843.74 | 7.9451 | 851.69 | 0.00 | 0.3418 |
| 3.6452769 | 62.5792 | 11.727 | 833.04 | 7.9272 | 840.97 | 0.00 | 0.3401 |
| 3.6635033 | 62.5843 | 11.636 | 822.48 | 7.9093 | 830.39 | 0.00 | 0.3384 |
| 3.6818208 | 62.5888 | 11.546 | 812.06 | 7.8912 | 819.95 | 0.00 | 0.3367 |
| 3.7002299 | 62.6415 | 11.455 | 801.64 | 7.8731 | 809.52 | 0.00 | 0.3351 |
| 3.7187311 | 62.6452 | 11.364 | 791.35 | 7.8550 | 799.21 | 0.00 | 0.3334 |
| 3.7373247 | 62.6482 | 11.274 | 781.20 | 7.8367 | 789.04 | 0.00 | 0.3317 |
| 3.7560114 | 62.6506 | 11.186 | 771.18 | 7.8184 | 779.00 | 0.00 | 0.3301 |
| 3.7747914 | 62.6523 | 11.097 | 761.30 | 7.8000 | 769.10 | 0.00 | 0.3285 |
| 3.7936654 | 62.6534 | 11.010 | 751.55 | 7.7816 | 759.33 | 0.00 | 0.3268 |
| 3.8126337 | 62.6538 | 10.924 | 741.94 | 7.7631 | 749.70 | 0.00 | 0.3252 |
| 3.8316969 | 62.6537 | 10.838 | 732.45 | 7.7445 | 740.19 | 0.00 | 0.3236 |
| 3.8508554 | 62.6531 | 10.753 | 723.09 | 7.7259 | 730.81 | 0.00 | 0.3220 |
| 3.8701096 | 62.6519 | 10.669 | 713.85 | 7.7072 | 721.56 | 0.00 | 0.3204 |
| 3.8894602 | 62.6502 | 10.585 | 704.74 | 7.6884 | 712.43 | 0.00 | 0.3188 |
| 3.9089075 | 62.6480 | 10.502 | 695.75 | 7.6696 | 703.42 | 0.00 | 0.3172 |
| 3.9284520 | 62.6452 | 10.420 | 686.88 | 7.6507 | 694.53 | 0.00 | 0.3156 |
| 3.9480943 | 62.6421 | 10.339 | 678.13 | 7.6318 | 685.76 | 0.00 | 0.3140 |
| 3.9678347 | 62.6384 | 10.258 | 669.50 | 7.6128 | 677.11 | 0.00 | 0.3125 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Dy ($Z=66$) | | | | | | | |
| 3.9876739 | 62.6343 | 10.178 | 660.98 | 7.5937 | 668.58 | 0.00 | 0.3109 |
| Ho ($Z=67$) | | | | | | | |
| Atomic weight: $A_r = 164.9304 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3}) = 8.7690$ | | | | | | | |
| σ_a (barns/atom) $= [\mu/\rho] (\text{cm}^2 \text{ g}^{-1}) \times 2.5514 \times 10^5$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho] (\text{cm}^2 \text{ g}^{-1}) = f_2 (e \text{ atom}^{-1}) \times 2.73874 \times 10^5$ | | | | | | | |
| 19 edges. Edge energies (keV) | | | | | | | |
| K | 55.6177 | L I | 9.39420 | L II | 8.91780 | L III | 8.07110 |
| M I | 2.12830 | M II | 1.9228 | M III | 1.74120 | M IV | 1.39150 |
| M V | 1.35140 | N I | 0.435700 | N II | 0.343500 | N III | 0.306600 |
| N IV | 0.161000 | N V | 0.161000 | N VI | 0.00370000 | N VII | 0.00370000 |
| O I | 0.0512000 | O II | 0.0203000 | O III | 0.0203000 | | |
| Relativistic correction estimate: $f_{\text{rel}} (\text{H82,3/5CL}) = (-1.1210, -0.67140) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}} = -0.014931 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 21.6923 | 9.2556 | 23615 | 0.47577 | 23615 | 0.00 | 12.40 |
| 0.10050000 | 21.7247 | 9.2711 | 23536 | 0.48112 | 23537 | 0.00 | 12.34 |
| 0.10100250 | 21.7570 | 9.2864 | 23458 | 0.48651 | 23459 | 0.00 | 12.28 |
| 0.10150751 | 21.7893 | 9.3015 | 23379 | 0.49195 | 23380 | 0.00 | 12.21 |
| 0.10201505 | 21.8216 | 9.3165 | 23301 | 0.49744 | 23301 | 0.00 | 12.15 |
| 0.10252513 | 21.8539 | 9.3313 | 23221 | 0.50298 | 23222 | 0.00 | 12.09 |
| 0.10303775 | 21.8862 | 9.3459 | 23142 | 0.50857 | 23143 | 0.00 | 12.03 |
| 0.10355294 | 21.9184 | 9.3603 | 23062 | 0.51421 | 23063 | 0.00 | 11.97 |
| 0.10407070 | 21.9506 | 9.3745 | 22983 | 0.51990 | 22983 | 0.00 | 11.91 |
| 0.10459106 | 21.9827 | 9.3886 | 22903 | 0.52564 | 22903 | 0.00 | 11.85 |
| 0.10511401 | 22.0148 | 9.4024 | 22822 | 0.53143 | 22823 | 0.00 | 11.80 |
| 0.10563958 | 22.0468 | 9.4161 | 22742 | 0.53728 | 22742 | 0.00 | 11.74 |
| 0.10616778 | 22.0787 | 9.4296 | 22661 | 0.54317 | 22662 | 0.00 | 11.68 |
| 0.10669862 | 22.1106 | 9.4429 | 22580 | 0.54912 | 22581 | 0.00 | 11.62 |
| 0.10723211 | 22.1423 | 9.4560 | 22499 | 0.55512 | 22500 | 0.00 | 11.56 |
| 0.10776827 | 22.1740 | 9.4689 | 22418 | 0.56118 | 22418 | 0.00 | 11.50 |
| 0.10830712 | 22.2056 | 9.4817 | 22336 | 0.56728 | 22337 | 0.00 | 11.45 |
| 0.10884865 | 22.2370 | 9.4942 | 22254 | 0.57344 | 22255 | 0.00 | 11.39 |
| 0.10939289 | 22.2684 | 9.5065 | 22172 | 0.57966 | 22173 | 0.00 | 11.33 |
| 0.10993986 | 22.2995 | 9.5186 | 22090 | 0.58592 | 22091 | 0.00 | 11.28 |
| 0.11048956 | 22.3306 | 9.5306 | 22008 | 0.59224 | 22008 | 0.00 | 11.22 |
| 0.11104201 | 22.3615 | 9.5423 | 21925 | 0.59862 | 21926 | 0.00 | 11.17 |
| 0.11159722 | 22.3922 | 9.5538 | 21842 | 0.60505 | 21843 | 0.00 | 11.11 |
| 0.11215520 | 22.4228 | 9.5651 | 21759 | 0.61154 | 21760 | 0.00 | 11.05 |
| 0.11271598 | 22.4531 | 9.5762 | 21676 | 0.61808 | 21677 | 0.00 | 11.00 |
| 0.11327956 | 22.4833 | 9.5871 | 21593 | 0.62468 | 21594 | 0.00 | 10.94 |
| 0.11384596 | 22.5132 | 9.5978 | 21510 | 0.63133 | 21510 | 0.00 | 10.89 |
| 0.11441519 | 22.5430 | 9.6082 | 21426 | 0.63804 | 21427 | 0.00 | 10.84 |
| 0.11498726 | 22.5724 | 9.6185 | 21342 | 0.64481 | 21343 | 0.00 | 10.78 |
| 0.11556220 | 22.6017 | 9.6286 | 21258 | 0.65163 | 21259 | 0.00 | 10.73 |
| 0.11614001 | 22.6306 | 9.6384 | 21174 | 0.65851 | 21175 | 0.00 | 10.68 |
| 0.11672071 | 22.6592 | 9.6480 | 21090 | 0.66545 | 21090 | 0.00 | 10.62 |
| 0.11730431 | 22.6876 | 9.6574 | 21005 | 0.67244 | 21006 | 0.00 | 10.57 |
| 0.11789083 | 22.7156 | 9.6666 | 20920 | 0.67950 | 20921 | 0.00 | 10.52 |
| 0.11848029 | 22.7433 | 9.6755 | 20836 | 0.68661 | 20836 | 0.00 | 10.46 |
| 0.11907269 | 22.7706 | 9.6843 | 20751 | 0.69378 | 20751 | 0.00 | 10.41 |
| 0.11966805 | 22.7975 | 9.6928 | 20666 | 0.70101 | 20666 | 0.00 | 10.36 |
| 0.12026639 | 22.8240 | 9.7011 | 20580 | 0.70830 | 20581 | 0.00 | 10.31 |
| 0.12086772 | 22.8501 | 9.7092 | 20495 | 0.71565 | 20496 | 0.00 | 10.26 |
| 0.12147206 | 22.8758 | 9.7170 | 20410 | 0.72306 | 20410 | 0.00 | 10.21 |
| 0.12207942 | 22.9009 | 9.7246 | 20324 | 0.73053 | 20325 | 0.00 | 10.16 |
| 0.12268982 | 22.9256 | 9.7320 | 20238 | 0.73806 | 20239 | 0.00 | 10.11 |
| 0.12330327 | 22.9497 | 9.7392 | 20152 | 0.74565 | 20153 | 0.00 | 10.06 |
| 0.12391979 | 22.9733 | 9.7462 | 20066 | 0.75330 | 20067 | 0.00 | 10.01 |
| 0.12453939 | 22.9962 | 9.7529 | 19980 | 0.76101 | 19981 | 0.00 | 9.955 |
| 0.12516208 | 23.0186 | 9.7594 | 19894 | 0.76879 | 19895 | 0.00 | 9.906 |
| 0.12578789 | 23.0402 | 9.7656 | 19808 | 0.77662 | 19809 | 0.00 | 9.857 |
| 0.12641683 | 23.0612 | 9.7717 | 19722 | 0.78452 | 19722 | 0.00 | 9.808 |
| 0.12704892 | 23.0814 | 9.7774 | 19635 | 0.79249 | 19636 | 0.00 | 9.759 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ho ($Z=67$) | | | | | | | |
| 0.12768416 | 23.1008 | 9.7830 | 19549 | 0.80051 | 19549 | 0.00 | 9.710 |
| 0.12832258 | 23.1194 | 9.7883 | 19462 | 0.80860 | 19463 | 0.00 | 9.662 |
| 0.12896419 | 23.1371 | 9.7934 | 19375 | 0.81675 | 19376 | 0.00 | 9.614 |
| 0.12960902 | 23.1538 | 9.7983 | 19288 | 0.82496 | 19289 | 0.00 | 9.566 |
| 0.13025706 | 23.1696 | 9.8029 | 19201 | 0.83324 | 19202 | 0.00 | 9.518 |
| 0.13090835 | 23.1843 | 9.8073 | 19114 | 0.84158 | 19115 | 0.00 | 9.471 |
| 0.13156289 | 23.1978 | 9.8115 | 19027 | 0.84999 | 19028 | 0.00 | 9.424 |
| 0.13222070 | 23.2102 | 9.8154 | 18940 | 0.85846 | 18941 | 0.00 | 9.377 |
| 0.13288181 | 23.2213 | 9.8191 | 18853 | 0.86700 | 18854 | 0.00 | 9.330 |
| 0.13354621 | 23.2309 | 9.8226 | 18766 | 0.87560 | 18767 | 0.00 | 9.284 |
| 0.13421395 | 23.2392 | 9.8258 | 18679 | 0.88427 | 18680 | 0.00 | 9.238 |
| 0.13488502 | 23.2458 | 9.8287 | 18591 | 0.89300 | 18592 | 0.00 | 9.192 |
| 0.13555944 | 23.2508 | 9.8315 | 18504 | 0.90180 | 18505 | 0.00 | 9.146 |
| 0.13623724 | 23.2539 | 9.8340 | 18417 | 0.91067 | 18418 | 0.00 | 9.101 |
| 0.13691842 | 23.2552 | 9.8363 | 18329 | 0.91960 | 18330 | 0.00 | 9.055 |
| 0.13760302 | 23.2543 | 9.8383 | 18242 | 0.92860 | 18243 | 0.00 | 9.010 |
| 0.13829103 | 23.2512 | 9.8401 | 18154 | 0.93766 | 18155 | 0.00 | 8.965 |
| 0.13898249 | 23.2456 | 9.8416 | 18067 | 0.94680 | 18068 | 0.00 | 8.921 |
| 0.13967740 | 23.2373 | 9.8429 | 17979 | 0.95600 | 17980 | 0.00 | 8.876 |
| 0.14037579 | 23.2262 | 9.8440 | 17892 | 0.96527 | 17893 | 0.00 | 8.832 |
| 0.14107766 | 23.2120 | 9.8448 | 17804 | 0.97461 | 17805 | 0.00 | 8.788 |
| 0.14178305 | 23.1943 | 9.8454 | 17717 | 0.98401 | 17718 | 0.00 | 8.745 |
| 0.14249197 | 23.1728 | 9.8457 | 17629 | 0.99349 | 17630 | 0.00 | 8.701 |
| 0.14320443 | 23.1472 | 9.8459 | 17542 | 1.0030 | 17543 | 0.00 | 8.658 |
| 0.14392045 | 23.1170 | 9.8457 | 17454 | 1.0126 | 17455 | 0.00 | 8.615 |
| 0.14464005 | 23.0817 | 9.8454 | 17367 | 1.0223 | 17368 | 0.00 | 8.572 |
| 0.14536325 | 23.0408 | 9.8447 | 17279 | 1.0321 | 17280 | 0.00 | 8.529 |
| 0.14609007 | 22.9936 | 9.8439 | 17192 | 1.0419 | 17193 | 0.00 | 8.487 |
| 0.14682052 | 22.9393 | 9.8428 | 17105 | 1.0518 | 17106 | 0.00 | 8.445 |
| 0.14755462 | 22.8769 | 9.8415 | 17017 | 1.0618 | 17018 | 0.00 | 8.403 |
| 0.14829239 | 22.8054 | 9.8399 | 16930 | 1.0718 | 16931 | 0.00 | 8.361 |
| 0.14903386 | 22.7234 | 9.8381 | 16842 | 1.0819 | 16844 | 0.00 | 8.319 |
| 0.14977903 | 22.6293 | 9.8361 | 16755 | 1.0921 | 16756 | 0.00 | 8.278 |
| 0.15052792 | 22.5211 | 9.8338 | 16668 | 1.1023 | 16669 | 0.00 | 8.237 |
| 0.15128056 | 22.3962 | 9.8313 | 16581 | 1.1126 | 16582 | 0.00 | 8.196 |
| 0.15203696 | 22.2514 | 9.8285 | 16494 | 1.1230 | 16495 | 0.00 | 8.155 |
| 0.15279715 | 22.0827 | 9.8255 | 16407 | 1.1335 | 16408 | 0.00 | 8.114 |
| 0.15356113 | 21.8844 | 9.8223 | 16320 | 1.1440 | 16321 | 0.00 | 8.074 |
| 0.15432894 | 21.6505 | 9.8188 | 16233 | 1.1546 | 16234 | 0.00 | 8.034 |
| 0.15510058 | 21.3677 | 9.8151 | 16146 | 1.1653 | 16147 | 0.00 | 7.994 |
| 0.15587609 | 21.0222 | 9.8111 | 16059 | 1.1761 | 16060 | 0.00 | 7.954 |
| 0.15665547 | 20.5904 | 9.8069 | 15972 | 1.1869 | 15973 | 0.00 | 7.914 |
| 0.15743875 | 20.0337 | 9.8025 | 15886 | 1.1978 | 15887 | 0.00 | 7.875 |
| 0.15822594 | 19.2825 | 9.7979 | 15799 | 1.2088 | 15800 | 0.00 | 7.836 |
| 0.15901707 | 18.1924 | 9.7930 | 15713 | 1.2198 | 15714 | 0.00 | 7.797 |
| 0.15981215 | 16.3791 | 9.7878 | 15626 | 1.2309 | 15628 | 0.00 | 7.758 |
| 0.16061121 | 11.9740 | 9.7825 | 15540 | 1.2421 | 15541 | 0.00 | 7.720 |
| 0.16093012 | 4.52486 | 9.7803 | 15506 | 1.2466 | 15507 | 0.00 | 7.704 |
| 0.16106987 | 4.76173 | 24.061 | 38113 | 1.2486 | 38114 | 0.00 | 7.698 |
| 0.16141427 | 13.2915 | 23.717 | 37489 | 1.2534 | 37490 | 0.00 | 7.681 |
| 0.16222134 | 18.8069 | 22.947 | 36090 | 1.2647 | 36092 | 0.00 | 7.643 |
| 0.16303245 | 21.4996 | 22.218 | 34770 | 1.2762 | 34772 | 0.00 | 7.605 |
| 0.16384761 | 23.2847 | 21.529 | 33524 | 1.2877 | 33525 | 0.00 | 7.567 |
| 0.16466685 | 24.5995 | 20.877 | 32347 | 1.2992 | 32348 | 0.00 | 7.529 |
| 0.16549018 | 25.6206 | 20.260 | 31235 | 1.3109 | 31236 | 0.00 | 7.492 |
| 0.16631763 | 26.4387 | 19.676 | 30184 | 1.3226 | 30185 | 0.00 | 7.455 |
| 0.16714922 | 27.1074 | 19.124 | 29191 | 1.3344 | 29192 | 0.00 | 7.418 |
| 0.16798497 | 27.6612 | 18.601 | 28252 | 1.3463 | 28253 | 0.00 | 7.381 |
| 0.16882489 | 28.1241 | 18.107 | 27364 | 1.3582 | 27365 | 0.00 | 7.344 |
| 0.16966902 | 28.5131 | 17.639 | 26524 | 1.3702 | 26525 | 0.00 | 7.307 |
| 0.17051736 | 28.8413 | 17.195 | 25729 | 1.3823 | 25730 | 0.00 | 7.271 |
| 0.17136995 | 29.1186 | 16.776 | 24976 | 1.3945 | 24978 | 0.00 | 7.235 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ho ($Z=67$) | | | | | | | |
| 0.17222680 | 29.3527 | 16.379 | 24264 | 1.4068 | 24265 | 0.00 | 7.199 |
| 0.17308793 | 29.5498 | 16.003 | 23589 | 1.4191 | 23590 | 0.00 | 7.163 |
| 0.17395337 | 29.7151 | 15.647 | 22949 | 1.4315 | 22951 | 0.00 | 7.127 |
| 0.17482314 | 29.8524 | 15.309 | 22343 | 1.4440 | 22344 | 0.00 | 7.092 |
| 0.17569726 | 29.9651 | 14.990 | 21768 | 1.4565 | 21769 | 0.00 | 7.057 |
| 0.17657574 | 30.0557 | 14.687 | 21222 | 1.4692 | 21223 | 0.00 | 7.022 |
| 0.17745862 | 30.1258 | 14.400 | 20704 | 1.4819 | 20706 | 0.00 | 6.987 |
| 0.17834591 | 30.1778 | 14.134 | 20220 | 1.4947 | 20221 | 0.00 | 6.952 |
| 0.17923764 | 30.2159 | 13.887 | 19768 | 1.5076 | 19770 | 0.00 | 6.917 |
| 0.18013383 | 30.2432 | 13.659 | 19346 | 1.5205 | 19348 | 0.00 | 6.883 |
| 0.18103450 | 30.2623 | 13.447 | 18952 | 1.5335 | 18953 | 0.00 | 6.849 |
| 0.18193967 | 30.2749 | 13.251 | 18582 | 1.5466 | 18583 | 0.00 | 6.815 |
| 0.18284937 | 30.2824 | 13.068 | 18234 | 1.5598 | 18236 | 0.00 | 6.781 |
| 0.18376362 | 30.2858 | 12.897 | 17907 | 1.5731 | 17908 | 0.00 | 6.747 |
| 0.18468244 | 30.2862 | 12.738 | 17598 | 1.5864 | 17600 | 0.00 | 6.713 |
| 0.18560585 | 30.2842 | 12.590 | 17307 | 1.5999 | 17308 | 0.00 | 6.680 |
| 0.18653388 | 30.2803 | 12.451 | 17030 | 1.6134 | 17032 | 0.00 | 6.647 |
| 0.18746655 | 30.2751 | 12.321 | 16768 | 1.6269 | 16770 | 0.00 | 6.614 |
| 0.18840388 | 30.2689 | 12.199 | 16520 | 1.6406 | 16521 | 0.00 | 6.581 |
| 0.18934590 | 30.2620 | 12.084 | 16283 | 1.6543 | 16284 | 0.00 | 6.548 |
| 0.19029263 | 30.2548 | 11.976 | 16057 | 1.6681 | 16059 | 0.00 | 6.515 |
| 0.19124409 | 30.2473 | 11.874 | 15841 | 1.6820 | 15843 | 0.00 | 6.483 |
| 0.19220031 | 30.2399 | 11.778 | 15635 | 1.6960 | 15637 | 0.00 | 6.451 |
| 0.19316131 | 30.2325 | 11.687 | 15437 | 1.7101 | 15439 | 0.00 | 6.419 |
| 0.19412712 | 30.2254 | 11.601 | 15247 | 1.7242 | 15249 | 0.00 | 6.387 |
| 0.19509776 | 30.2185 | 11.520 | 15065 | 1.7384 | 15067 | 0.00 | 6.355 |
| 0.19607325 | 30.2121 | 11.443 | 14890 | 1.7527 | 14892 | 0.00 | 6.323 |
| 0.19705361 | 30.2060 | 11.369 | 14721 | 1.7671 | 14723 | 0.00 | 6.292 |
| 0.19803888 | 30.2005 | 11.300 | 14558 | 1.7815 | 14559 | 0.00 | 6.261 |
| 0.19902907 | 30.1954 | 11.233 | 14400 | 1.7961 | 14402 | 0.00 | 6.229 |
| 0.20002422 | 30.1908 | 11.170 | 14248 | 1.8107 | 14249 | 0.00 | 6.198 |
| 0.20102434 | 30.1868 | 11.109 | 14100 | 1.8254 | 14102 | 0.00 | 6.168 |
| 0.20202946 | 30.1832 | 11.052 | 13957 | 1.8401 | 13959 | 0.00 | 6.137 |
| 0.20303961 | 30.1802 | 10.996 | 13818 | 1.8550 | 13820 | 0.00 | 6.106 |
| 0.20405481 | 30.1778 | 10.943 | 13683 | 1.8699 | 13685 | 0.00 | 6.076 |
| 0.20507508 | 30.1758 | 10.892 | 13552 | 1.8849 | 13553 | 0.00 | 6.046 |
| 0.20610046 | 30.1743 | 10.844 | 13424 | 1.9000 | 13426 | 0.00 | 6.016 |
| 0.20713096 | 30.1734 | 10.797 | 13299 | 1.9152 | 13301 | 0.00 | 5.986 |
| 0.20816661 | 30.1728 | 10.752 | 13178 | 1.9304 | 13180 | 0.00 | 5.956 |
| 0.20920745 | 30.1728 | 10.708 | 13059 | 1.9458 | 13061 | 0.00 | 5.926 |
| 0.21025348 | 30.1732 | 10.666 | 12943 | 1.9612 | 12945 | 0.00 | 5.897 |
| 0.21130475 | 30.1740 | 10.626 | 12830 | 1.9767 | 12832 | 0.00 | 5.868 |
| 0.21236128 | 30.1752 | 10.587 | 12719 | 1.9922 | 12721 | 0.00 | 5.838 |
| 0.21342308 | 30.1767 | 10.549 | 12611 | 2.0079 | 12613 | 0.00 | 5.809 |
| 0.21449020 | 30.1786 | 10.512 | 12505 | 2.0236 | 12507 | 0.00 | 5.780 |
| 0.21556265 | 30.1809 | 10.477 | 12400 | 2.0394 | 12402 | 0.00 | 5.752 |
| 0.21664046 | 30.1834 | 10.443 | 12298 | 2.0553 | 12300 | 0.00 | 5.723 |
| 0.21772366 | 30.1863 | 10.409 | 12198 | 2.0713 | 12200 | 0.00 | 5.695 |
| 0.21881228 | 30.1894 | 10.377 | 12100 | 2.0873 | 12102 | 0.00 | 5.666 |
| 0.21990634 | 30.1928 | 10.345 | 12003 | 2.1035 | 12005 | 0.00 | 5.638 |
| 0.22100588 | 30.1964 | 10.315 | 11908 | 2.1197 | 11910 | 0.00 | 5.610 |
| 0.22211090 | 30.2002 | 10.285 | 11815 | 2.1360 | 11817 | 0.00 | 5.582 |
| 0.22322146 | 30.2042 | 10.256 | 11723 | 2.1523 | 11725 | 0.00 | 5.554 |
| 0.22433757 | 30.2084 | 10.228 | 11632 | 2.1688 | 11635 | 0.00 | 5.527 |
| 0.22545925 | 30.2127 | 10.201 | 11543 | 2.1853 | 11546 | 0.00 | 5.499 |
| 0.22658655 | 30.2171 | 10.174 | 11456 | 2.2019 | 11458 | 0.00 | 5.472 |
| 0.22771948 | 30.2217 | 10.148 | 11369 | 2.2186 | 11372 | 0.00 | 5.445 |
| 0.22885808 | 30.2263 | 10.122 | 11284 | 2.2354 | 11287 | 0.00 | 5.418 |
| 0.23000237 | 30.2310 | 10.097 | 11201 | 2.2522 | 11203 | 0.00 | 5.391 |
| 0.23115238 | 30.2358 | 10.073 | 11118 | 2.2692 | 11120 | 0.00 | 5.364 |
| 0.23230814 | 30.2406 | 10.049 | 11036 | 2.2862 | 11039 | 0.00 | 5.337 |
| 0.23346969 | 30.2454 | 10.026 | 10956 | 2.3033 | 10958 | 0.00 | 5.311 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Ho ($Z=67$) | | | | | | | |
| 0.23463703 | 30.2502 | 10.003 | 10877 | 2.3204 | 10879 | 0.00 | 5.284 |
| 0.23581022 | 30.2550 | 9.9804 | 10799 | 2.3377 | 10801 | 0.00 | 5.258 |
| 0.23698927 | 30.2598 | 9.9586 | 10721 | 2.3550 | 10724 | 0.00 | 5.232 |
| 0.23817422 | 30.2645 | 9.9372 | 10645 | 2.3724 | 10647 | 0.00 | 5.206 |
| 0.23936509 | 30.2692 | 9.9163 | 10570 | 2.3899 | 10572 | 0.00 | 5.180 |
| 0.24056191 | 30.2737 | 9.8958 | 10495 | 2.4074 | 10498 | 0.00 | 5.154 |
| 0.24176472 | 30.2782 | 9.8757 | 10422 | 2.4251 | 10425 | 0.00 | 5.128 |
| 0.24297355 | 30.2825 | 9.8561 | 10350 | 2.4428 | 10352 | 0.00 | 5.103 |
| 0.24418841 | 30.2868 | 9.8368 | 10278 | 2.4606 | 10280 | 0.00 | 5.077 |
| 0.24540936 | 30.2908 | 9.8179 | 10207 | 2.4785 | 10210 | 0.00 | 5.052 |
| 0.24663640 | 30.2947 | 9.7994 | 10137 | 2.4964 | 10140 | 0.00 | 5.027 |
| 0.24786959 | 30.2984 | 9.7812 | 10068 | 2.5144 | 10071 | 0.00 | 5.002 |
| 0.24910893 | 30.3019 | 9.7634 | 9999.8 | 2.5325 | 10002 | 0.00 | 4.977 |
| 0.25035448 | 30.3052 | 9.7460 | 9932.3 | 2.5507 | 9934.9 | 0.00 | 4.952 |
| 0.25160625 | 30.3082 | 9.7289 | 9865.6 | 2.5690 | 9868.1 | 0.00 | 4.928 |
| 0.25286428 | 30.3110 | 9.7122 | 9799.6 | 2.5873 | 9802.2 | 0.00 | 4.903 |
| 0.25412860 | 30.3135 | 9.6958 | 9734.4 | 2.6057 | 9737.0 | 0.00 | 4.879 |
| 0.25539925 | 30.3157 | 9.6798 | 9669.9 | 2.6242 | 9672.5 | 0.00 | 4.855 |
| 0.25667624 | 30.3176 | 9.6640 | 9606.2 | 2.6428 | 9608.8 | 0.00 | 4.830 |
| 0.25795962 | 30.3191 | 9.6486 | 9543.1 | 2.6614 | 9545.8 | 0.00 | 4.806 |
| 0.25924942 | 30.3203 | 9.6335 | 9480.8 | 2.6801 | 9483.5 | 0.00 | 4.782 |
| 0.26054567 | 30.3210 | 9.6188 | 9419.2 | 2.6989 | 9421.9 | 0.00 | 4.759 |
| 0.26184840 | 30.3214 | 9.6043 | 9358.3 | 2.7178 | 9361.0 | 0.00 | 4.735 |
| 0.26315764 | 30.3213 | 9.5902 | 9298.0 | 2.7367 | 9300.7 | 0.00 | 4.711 |
| 0.26447343 | 30.3207 | 9.5764 | 9238.4 | 2.7557 | 9241.2 | 0.00 | 4.688 |
| 0.26579579 | 30.3196 | 9.5629 | 9179.5 | 2.7748 | 9182.2 | 0.00 | 4.665 |
| 0.26712477 | 30.3180 | 9.5496 | 9121.2 | 2.7940 | 9124.0 | 0.00 | 4.641 |
| 0.26846040 | 30.3158 | 9.5367 | 9063.6 | 2.8133 | 9066.4 | 0.00 | 4.618 |
| 0.26980270 | 30.3130 | 9.5242 | 9006.5 | 2.8326 | 9009.4 | 0.00 | 4.595 |
| 0.27115171 | 30.3095 | 9.5119 | 8950.2 | 2.8520 | 8953.0 | 0.00 | 4.573 |
| 0.27250747 | 30.3052 | 9.4999 | 8894.4 | 2.8714 | 8897.3 | 0.00 | 4.550 |
| 0.27387001 | 30.3002 | 9.4882 | 8839.3 | 2.8910 | 8842.2 | 0.00 | 4.527 |
| 0.27523936 | 30.2943 | 9.4768 | 8784.8 | 2.9106 | 8787.7 | 0.00 | 4.505 |
| 0.27661556 | 30.2875 | 9.4657 | 8730.8 | 2.9303 | 8733.8 | 0.00 | 4.482 |
| 0.27799863 | 30.2797 | 9.4550 | 8677.5 | 2.9500 | 8680.5 | 0.00 | 4.460 |
| 0.27938863 | 30.2708 | 9.4445 | 8624.8 | 2.9698 | 8627.7 | 0.00 | 4.438 |
| 0.28078557 | 30.2607 | 9.4343 | 8572.6 | 2.9897 | 8575.6 | 0.00 | 4.416 |
| 0.28218950 | 30.2492 | 9.4244 | 8521.0 | 3.0097 | 8524.0 | 0.00 | 4.394 |
| 0.28360044 | 30.2362 | 9.4148 | 8470.0 | 3.0297 | 8473.0 | 0.00 | 4.372 |
| 0.28501845 | 30.2215 | 9.4056 | 8419.6 | 3.0499 | 8422.6 | 0.00 | 4.350 |
| 0.28644354 | 30.2049 | 9.3966 | 8369.7 | 3.0700 | 8372.8 | 0.00 | 4.328 |
| 0.28787576 | 30.1861 | 9.3879 | 8320.4 | 3.0903 | 8323.4 | 0.00 | 4.307 |
| 0.28931514 | 30.1648 | 9.3795 | 8271.6 | 3.1106 | 8274.7 | 0.00 | 4.285 |
| 0.29076171 | 30.1405 | 9.3714 | 8223.3 | 3.1310 | 8226.5 | 0.00 | 4.264 |
| 0.29221552 | 30.1126 | 9.3637 | 8175.6 | 3.1515 | 8178.8 | 0.00 | 4.243 |
| 0.29367660 | 30.0806 | 9.3562 | 8128.5 | 3.1720 | 8131.6 | 0.00 | 4.222 |
| 0.29514498 | 30.0432 | 9.3490 | 8081.8 | 3.1926 | 8085.0 | 0.00 | 4.201 |
| 0.29662071 | 29.9991 | 9.3421 | 8035.7 | 3.2133 | 8038.9 | 0.00 | 4.180 |
| 0.29810381 | 29.9462 | 9.3356 | 7990.1 | 3.2340 | 7993.3 | 0.00 | 4.159 |
| 0.29959433 | 29.8810 | 9.3293 | 7945.0 | 3.2548 | 7948.2 | 0.00 | 4.138 |
| 0.30109230 | 29.7978 | 9.3233 | 7900.4 | 3.2757 | 7903.7 | 0.00 | 4.118 |
| 0.30259776 | 29.6848 | 9.3176 | 7856.3 | 3.2966 | 7859.6 | 0.00 | 4.097 |
| 0.30411075 | 29.5135 | 9.3123 | 7812.7 | 3.3176 | 7816.0 | 0.00 | 4.077 |
| 0.30563130 | 29.1672 | 9.3072 | 7769.6 | 3.3387 | 7773.0 | 0.00 | 4.057 |
| 0.30629770 | 28.7365 | 9.3051 | 7750.9 | 3.3479 | 7754.3 | 0.00 | 4.048 |
| 0.30690231 | 28.7368 | 10.468 | 8702.5 | 3.3563 | 8705.8 | 0.00 | 4.040 |
| 0.30715946 | 28.9651 | 10.468 | 8695.1 | 3.3598 | 8698.5 | 0.00 | 4.036 |
| 0.30869526 | 29.4571 | 10.468 | 8651.6 | 3.3810 | 8655.0 | 0.00 | 4.016 |
| 0.31023873 | 29.6653 | 10.468 | 8608.6 | 3.4023 | 8612.0 | 0.00 | 3.996 |
| 0.31178993 | 29.8008 | 10.468 | 8566.1 | 3.4236 | 8569.5 | 0.00 | 3.977 |
| 0.31334888 | 29.9022 | 10.469 | 8524.0 | 3.4450 | 8527.5 | 0.00 | 3.957 |
| 0.31491562 | 29.9837 | 10.470 | 8482.4 | 3.4665 | 8485.9 | 0.00 | 3.937 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ho ($Z=67$) | | | | | | | |
| 0.31649020 | 30.0520 | 10.471 | 8441.3 | 3.4880 | 8444.7 | 0.00 | 3.917 |
| 0.31807265 | 30.1109 | 10.473 | 8400.5 | 3.5096 | 8404.1 | 0.00 | 3.898 |
| 0.31966301 | 30.1626 | 10.475 | 8360.3 | 3.5312 | 8363.8 | 0.00 | 3.879 |
| 0.32126133 | 30.2087 | 10.477 | 8320.4 | 3.5530 | 8324.0 | 0.00 | 3.859 |
| 0.32286764 | 30.2501 | 10.479 | 8281.0 | 3.5747 | 8284.6 | 0.00 | 3.840 |
| 0.32448197 | 30.2875 | 10.482 | 8242.1 | 3.5966 | 8245.7 | 0.00 | 3.821 |
| 0.32610438 | 30.3214 | 10.485 | 8203.5 | 3.6184 | 8207.1 | 0.00 | 3.802 |
| 0.32773491 | 30.3520 | 10.489 | 8165.4 | 3.6404 | 8169.0 | 0.00 | 3.783 |
| 0.32937358 | 30.3795 | 10.492 | 8127.6 | 3.6624 | 8131.3 | 0.00 | 3.764 |
| 0.33102045 | 30.4038 | 10.496 | 8090.3 | 3.6845 | 8094.0 | 0.00 | 3.746 |
| 0.33267555 | 30.4247 | 10.501 | 8053.4 | 3.7066 | 8057.1 | 0.00 | 3.727 |
| 0.33433893 | 30.4417 | 10.505 | 8016.8 | 3.7288 | 8020.6 | 0.00 | 3.708 |
| 0.33601062 | 30.4539 | 10.510 | 7980.7 | 3.7510 | 7984.4 | 0.00 | 3.690 |
| 0.33769068 | 30.4596 | 10.515 | 7944.9 | 3.7733 | 7948.7 | 0.00 | 3.672 |
| 0.33937913 | 30.4548 | 10.521 | 7909.5 | 3.7957 | 7913.3 | 0.00 | 3.653 |
| 0.34107602 | 30.4294 | 10.527 | 7874.4 | 3.8181 | 7878.2 | 0.00 | 3.635 |
| 0.34278140 | 30.3304 | 10.533 | 7839.6 | 3.8406 | 7843.5 | 0.00 | 3.617 |
| 0.34311527 | 30.2700 | 10.534 | 7832.9 | 3.8450 | 7836.7 | 0.00 | 3.613 |
| 0.34388471 | 30.2826 | 10.869 | 8064.0 | 3.8551 | 8067.8 | 0.00 | 3.605 |
| 0.34449531 | 30.3931 | 10.872 | 8051.8 | 3.8631 | 8055.6 | 0.00 | 3.599 |
| 0.34621779 | 30.5278 | 10.880 | 8017.7 | 3.8857 | 8021.6 | 0.00 | 3.581 |
| 0.34794888 | 30.6084 | 10.888 | 7983.9 | 3.9083 | 7987.8 | 0.00 | 3.563 |
| 0.34968862 | 30.6716 | 10.897 | 7950.5 | 3.9310 | 7954.4 | 0.00 | 3.546 |
| 0.35143706 | 30.7261 | 10.906 | 7917.3 | 3.9537 | 7921.3 | 0.00 | 3.528 |
| 0.35319425 | 30.7751 | 10.915 | 7884.5 | 3.9765 | 7888.5 | 0.00 | 3.510 |
| 0.35496022 | 30.8205 | 10.924 | 7851.9 | 3.9993 | 7855.9 | 0.00 | 3.493 |
| 0.35673502 | 30.8633 | 10.933 | 7819.7 | 4.0222 | 7823.7 | 0.00 | 3.476 |
| 0.35851870 | 30.9041 | 10.943 | 7787.7 | 4.0452 | 7791.7 | 0.00 | 3.458 |
| 0.36031129 | 30.9432 | 10.953 | 7756.0 | 4.0682 | 7760.0 | 0.00 | 3.441 |
| 0.36211285 | 30.9811 | 10.963 | 7724.5 | 4.0912 | 7728.6 | 0.00 | 3.424 |
| 0.36392341 | 31.0179 | 10.974 | 7693.3 | 4.1143 | 7697.4 | 0.00 | 3.407 |
| 0.36574303 | 31.0538 | 10.984 | 7662.4 | 4.1374 | 7666.5 | 0.00 | 3.390 |
| 0.36757174 | 31.0889 | 10.995 | 7631.7 | 4.1606 | 7635.9 | 0.00 | 3.373 |
| 0.36940960 | 31.1234 | 11.006 | 7601.3 | 4.1838 | 7605.4 | 0.00 | 3.356 |
| 0.37125665 | 31.1573 | 11.017 | 7571.0 | 4.2071 | 7575.2 | 0.00 | 3.340 |
| 0.37311293 | 31.1907 | 11.028 | 7541.0 | 4.2304 | 7545.3 | 0.00 | 3.323 |
| 0.37497850 | 31.2236 | 11.039 | 7511.3 | 4.2538 | 7515.5 | 0.00 | 3.306 |
| 0.37685339 | 31.2561 | 11.051 | 7481.7 | 4.2772 | 7486.0 | 0.00 | 3.290 |
| 0.37873766 | 31.2882 | 11.063 | 7452.4 | 4.3007 | 7456.7 | 0.00 | 3.274 |
| 0.38063135 | 31.3199 | 11.074 | 7423.2 | 4.3242 | 7427.5 | 0.00 | 3.257 |
| 0.38253450 | 31.3513 | 11.086 | 7394.3 | 4.3477 | 7398.6 | 0.00 | 3.241 |
| 0.38444718 | 31.3824 | 11.098 | 7365.5 | 4.3713 | 7369.9 | 0.00 | 3.225 |
| 0.38636941 | 31.4132 | 11.111 | 7336.9 | 4.3949 | 7341.3 | 0.00 | 3.209 |
| 0.38830126 | 31.4437 | 11.123 | 7308.5 | 4.4186 | 7313.0 | 0.00 | 3.193 |
| 0.39024276 | 31.4738 | 11.135 | 7280.3 | 4.4423 | 7284.7 | 0.00 | 3.177 |
| 0.39219398 | 31.5037 | 11.148 | 7252.2 | 4.4661 | 7256.7 | 0.00 | 3.161 |
| 0.39415495 | 31.5332 | 11.161 | 7224.3 | 4.4898 | 7228.8 | 0.00 | 3.146 |
| 0.39612572 | 31.5623 | 11.173 | 7196.5 | 4.5137 | 7201.0 | 0.00 | 3.130 |
| 0.39810635 | 31.5911 | 11.186 | 7168.9 | 4.5375 | 7173.4 | 0.00 | 3.114 |
| 0.40009688 | 31.6194 | 11.199 | 7141.4 | 4.5614 | 7146.0 | 0.00 | 3.099 |
| 0.40209737 | 31.6473 | 11.212 | 7114.0 | 4.5853 | 7118.6 | 0.00 | 3.083 |
| 0.40410785 | 31.6747 | 11.225 | 7086.8 | 4.6093 | 7091.4 | 0.00 | 3.068 |
| 0.40612839 | 31.7014 | 11.237 | 7059.7 | 4.6333 | 7064.3 | 0.00 | 3.053 |
| 0.40815904 | 31.7274 | 11.250 | 7032.6 | 4.6573 | 7037.3 | 0.00 | 3.038 |
| 0.41019983 | 31.7526 | 11.263 | 7005.7 | 4.6814 | 7010.4 | 0.00 | 3.023 |
| 0.41225083 | 31.7768 | 11.276 | 6978.9 | 4.7055 | 6983.6 | 0.00 | 3.007 |
| 0.41431208 | 31.7998 | 11.289 | 6952.2 | 4.7296 | 6956.9 | 0.00 | 2.993 |
| 0.41638364 | 31.8212 | 11.302 | 6925.6 | 4.7538 | 6930.3 | 0.00 | 2.978 |
| 0.41846556 | 31.8409 | 11.315 | 6899.0 | 4.7780 | 6903.8 | 0.00 | 2.963 |
| 0.42055789 | 31.8581 | 11.328 | 6872.5 | 4.8022 | 6877.3 | 0.00 | 2.948 |
| 0.42266068 | 31.8721 | 11.341 | 6846.1 | 4.8265 | 6851.0 | 0.00 | 2.933 |
| 0.42477398 | 31.8818 | 11.354 | 6819.8 | 4.8507 | 6824.7 | 0.00 | 2.919 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Ho ($Z=67$) | | | | | | | |
| 0.42689785 | 31.8851 | 11.367 | 6793.5 | 4.8750 | 6798.4 | 0.00 | 2.904 |
| 0.42903234 | 31.8783 | 11.380 | 6767.3 | 4.8994 | 6772.2 | 0.00 | 2.890 |
| 0.43117750 | 31.8532 | 11.392 | 6741.2 | 4.9237 | 6746.1 | 0.00 | 2.875 |
| 0.43333339 | 31.7852 | 11.405 | 6715.0 | 4.9481 | 6720.0 | 0.00 | 2.861 |
| 0.43505516 | 31.6007 | 11.415 | 6694.3 | 4.9675 | 6699.3 | 0.00 | 2.850 |
| 0.43550006 | 31.4146 | 11.417 | 6689.0 | 4.9725 | 6693.9 | 0.00 | 2.847 |
| 0.43634484 | 31.6239 | 11.943 | 6983.6 | 4.9820 | 6988.6 | 0.00 | 2.841 |
| 0.43767756 | 31.8338 | 11.952 | 6967.1 | 4.9969 | 6972.1 | 0.00 | 2.833 |
| 0.43986595 | 31.9973 | 11.965 | 6940.3 | 5.0214 | 6945.3 | 0.00 | 2.819 |
| 0.44206528 | 32.1080 | 11.979 | 6913.5 | 5.0459 | 6918.5 | 0.00 | 2.805 |
| 0.44427560 | 32.1982 | 11.992 | 6886.7 | 5.0704 | 6891.7 | 0.00 | 2.791 |
| 0.44649698 | 32.2775 | 12.005 | 6859.9 | 5.0949 | 6865.0 | 0.00 | 2.777 |
| 0.44872947 | 32.3500 | 12.018 | 6833.1 | 5.1194 | 6838.3 | 0.00 | 2.763 |
| 0.45097311 | 32.4180 | 12.031 | 6806.4 | 5.1440 | 6811.5 | 0.00 | 2.749 |
| 0.45322798 | 32.4828 | 12.043 | 6779.7 | 5.1685 | 6784.8 | 0.00 | 2.736 |
| 0.45549412 | 32.5452 | 12.056 | 6752.9 | 5.1931 | 6758.1 | 0.00 | 2.722 |
| 0.45777159 | 32.6058 | 12.068 | 6726.2 | 5.2177 | 6731.4 | 0.00 | 2.708 |
| 0.46006045 | 32.6649 | 12.080 | 6699.5 | 5.2423 | 6704.7 | 0.00 | 2.695 |
| 0.46236075 | 32.7229 | 12.092 | 6672.7 | 5.2670 | 6678.0 | 0.00 | 2.682 |
| 0.46467255 | 32.7799 | 12.104 | 6646.0 | 5.2916 | 6651.3 | 0.00 | 2.668 |
| 0.46699592 | 32.8362 | 12.116 | 6619.2 | 5.3163 | 6624.6 | 0.00 | 2.655 |
| 0.46933090 | 32.8919 | 12.127 | 6592.5 | 5.3410 | 6597.8 | 0.00 | 2.642 |
| 0.47167755 | 32.9471 | 12.138 | 6565.7 | 5.3656 | 6571.1 | 0.00 | 2.629 |
| 0.47403594 | 33.0018 | 12.149 | 6538.9 | 5.3903 | 6544.3 | 0.00 | 2.616 |
| 0.47640612 | 33.0563 | 12.160 | 6512.1 | 5.4150 | 6517.5 | 0.00 | 2.602 |
| 0.47878815 | 33.1104 | 12.170 | 6485.2 | 5.4397 | 6490.7 | 0.00 | 2.590 |
| 0.48118209 | 33.1643 | 12.180 | 6458.3 | 5.4645 | 6463.8 | 0.00 | 2.577 |
| 0.48358800 | 33.2323 | 12.190 | 6431.4 | 5.4892 | 6436.9 | 0.00 | 2.564 |
| 0.48600594 | 33.2859 | 12.200 | 6404.4 | 5.5139 | 6409.9 | 0.00 | 2.551 |
| 0.48843597 | 33.3393 | 12.209 | 6377.4 | 5.5387 | 6383.0 | 0.00 | 2.538 |
| 0.49087815 | 33.3926 | 12.218 | 6350.3 | 5.5634 | 6355.9 | 0.00 | 2.526 |
| 0.49333254 | 33.4459 | 12.226 | 6323.2 | 5.5881 | 6328.8 | 0.00 | 2.513 |
| 0.49579920 | 33.4990 | 12.235 | 6296.0 | 5.6129 | 6301.7 | 0.00 | 2.501 |
| 0.49827820 | 33.5520 | 12.243 | 6268.8 | 5.6376 | 6274.4 | 0.00 | 2.488 |
| 0.50076959 | 33.6050 | 12.250 | 6241.5 | 5.6624 | 6247.2 | 0.00 | 2.476 |
| 0.50327344 | 33.6579 | 12.258 | 6214.2 | 5.6872 | 6219.9 | 0.00 | 2.464 |
| 0.50578980 | 33.7108 | 12.265 | 6186.8 | 5.7119 | 6192.5 | 0.00 | 2.451 |
| 0.50831875 | 33.7636 | 12.271 | 6159.3 | 5.7367 | 6165.1 | 0.00 | 2.439 |
| 0.51086035 | 33.8163 | 12.278 | 6131.8 | 5.7614 | 6137.6 | 0.00 | 2.427 |
| 0.51341465 | 33.8690 | 12.283 | 6104.2 | 5.7861 | 6110.0 | 0.00 | 2.415 |
| 0.51598172 | 33.9217 | 12.289 | 6076.6 | 5.8109 | 6082.4 | 0.00 | 2.403 |
| 0.51856163 | 33.9743 | 12.294 | 6048.9 | 5.8356 | 6054.8 | 0.00 | 2.391 |
| 0.52115444 | 34.0269 | 12.299 | 6021.2 | 5.8603 | 6027.0 | 0.00 | 2.379 |
| 0.52376021 | 34.0794 | 12.303 | 5993.4 | 5.8851 | 5999.2 | 0.00 | 2.367 |
| 0.52637901 | 34.1319 | 12.307 | 5965.5 | 5.9098 | 5971.4 | 0.00 | 2.355 |
| 0.52901091 | 34.1843 | 12.311 | 5937.6 | 5.9345 | 5943.5 | 0.00 | 2.344 |
| 0.53165596 | 34.2366 | 12.314 | 5909.6 | 5.9592 | 5915.5 | 0.00 | 2.332 |
| 0.53431424 | 34.2889 | 12.317 | 5881.5 | 5.9839 | 5887.5 | 0.00 | 2.320 |
| 0.53698581 | 34.3411 | 12.320 | 5853.4 | 6.0085 | 5859.5 | 0.00 | 2.309 |
| 0.53967074 | 34.3933 | 12.322 | 5825.3 | 6.0332 | 5831.3 | 0.00 | 2.297 |
| 0.54236910 | 34.4454 | 12.323 | 5797.1 | 6.0578 | 5803.1 | 0.00 | 2.286 |
| 0.54508094 | 34.4974 | 12.324 | 5768.8 | 6.0825 | 5774.9 | 0.00 | 2.275 |
| 0.54780635 | 34.5493 | 12.325 | 5740.5 | 6.1071 | 5746.6 | 0.00 | 2.263 |
| 0.55054538 | 34.6011 | 12.326 | 5712.1 | 6.1317 | 5718.2 | 0.00 | 2.252 |
| 0.55329810 | 34.6529 | 12.326 | 5683.7 | 6.1563 | 5689.8 | 0.00 | 2.241 |
| 0.55606460 | 34.7045 | 12.325 | 5655.2 | 6.1809 | 5661.4 | 0.00 | 2.230 |
| 0.55884492 | 34.7560 | 12.324 | 5626.7 | 6.2054 | 5632.9 | 0.00 | 2.219 |
| 0.56163914 | 34.8074 | 12.323 | 5598.1 | 6.2299 | 5604.3 | 0.00 | 2.208 |
| 0.56444734 | 34.8587 | 12.321 | 5569.5 | 6.2544 | 5575.7 | 0.00 | 2.197 |
| 0.56726958 | 34.9098 | 12.319 | 5540.8 | 6.2789 | 5547.1 | 0.00 | 2.186 |
| 0.57010592 | 34.9608 | 12.317 | 5512.1 | 6.3034 | 5518.4 | 0.00 | 2.175 |
| 0.57295645 | 35.0116 | 12.314 | 5483.3 | 6.3278 | 5489.7 | 0.00 | 2.164 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ho ($Z=67$) | | | | | | | |
| 0.57582123 | 35.0623 | 12.310 | 5454.5 | 6.3523 | 5460.9 | 0.00 | 2.153 |
| 0.57870034 | 35.1129 | 12.306 | 5425.7 | 6.3766 | 5432.1 | 0.00 | 2.142 |
| 0.58159384 | 35.1632 | 12.302 | 5396.8 | 6.4010 | 5403.2 | 0.00 | 2.132 |
| 0.58450181 | 35.2134 | 12.297 | 5367.9 | 6.4253 | 5374.3 | 0.00 | 2.121 |
| 0.58742432 | 35.2634 | 12.292 | 5339.0 | 6.4497 | 5345.4 | 0.00 | 2.111 |
| 0.59036144 | 35.3132 | 12.287 | 5310.0 | 6.4739 | 5316.5 | 0.00 | 2.100 |
| 0.59331325 | 35.3627 | 12.281 | 5281.0 | 6.4982 | 5287.5 | 0.00 | 2.090 |
| 0.59627982 | 35.4121 | 12.274 | 5251.9 | 6.5224 | 5258.5 | 0.00 | 2.079 |
| 0.59926122 | 35.4613 | 12.267 | 5222.9 | 6.5466 | 5229.4 | 0.00 | 2.069 |
| 0.60225752 | 35.5102 | 12.260 | 5193.8 | 6.5708 | 5200.4 | 0.00 | 2.059 |
| 0.60526881 | 35.5588 | 12.252 | 5164.7 | 6.5949 | 5171.3 | 0.00 | 2.048 |
| 0.60829515 | 35.6073 | 12.244 | 5135.6 | 6.6190 | 5142.2 | 0.00 | 2.038 |
| 0.61133663 | 35.6554 | 12.235 | 5106.4 | 6.6430 | 5113.1 | 0.00 | 2.028 |
| 0.61439331 | 35.7034 | 12.226 | 5077.3 | 6.6670 | 5083.9 | 0.00 | 2.018 |
| 0.61746528 | 35.7510 | 12.217 | 5048.1 | 6.6910 | 5054.8 | 0.00 | 2.008 |
| 0.62055260 | 35.7983 | 12.207 | 5018.9 | 6.7150 | 5025.6 | 0.00 | 1.998 |
| 0.62365537 | 35.8454 | 12.197 | 4989.7 | 6.7389 | 4996.5 | 0.00 | 1.988 |
| 0.62677364 | 35.8922 | 12.186 | 4960.5 | 6.7627 | 4967.3 | 0.00 | 1.978 |
| 0.62990751 | 35.9386 | 12.175 | 4931.3 | 6.7865 | 4938.1 | 0.00 | 1.968 |
| 0.63305705 | 35.9848 | 12.163 | 4902.1 | 6.8103 | 4908.9 | 0.00 | 1.959 |
| 0.63622234 | 36.0306 | 12.151 | 4872.9 | 6.8340 | 4879.8 | 0.00 | 1.949 |
| 0.63940345 | 36.0761 | 12.139 | 4843.7 | 6.8577 | 4850.6 | 0.00 | 1.939 |
| 0.64260046 | 36.1213 | 12.126 | 4814.5 | 6.8814 | 4821.4 | 0.00 | 1.929 |
| 0.64581347 | 36.1661 | 12.113 | 4785.4 | 6.9050 | 4792.3 | 0.00 | 1.920 |
| 0.64904253 | 36.2106 | 12.099 | 4756.2 | 6.9285 | 4763.1 | 0.00 | 1.910 |
| 0.65228775 | 36.2546 | 12.085 | 4726.9 | 6.9520 | 4733.9 | 0.00 | 1.901 |
| 0.65554919 | 36.2983 | 12.070 | 4697.7 | 6.9755 | 4704.7 | 0.00 | 1.891 |
| 0.65882693 | 36.3416 | 12.055 | 4668.4 | 6.9989 | 4675.4 | 0.00 | 1.882 |
| 0.66212107 | 36.3845 | 12.039 | 4639.1 | 7.0222 | 4646.2 | 0.00 | 1.873 |
| 0.66543167 | 36.4269 | 12.023 | 4609.9 | 7.0455 | 4616.9 | 0.00 | 1.863 |
| 0.66875883 | 36.4688 | 12.006 | 4580.6 | 7.0688 | 4587.7 | 0.00 | 1.854 |
| 0.67210262 | 36.5103 | 11.989 | 4551.3 | 7.0920 | 4558.4 | 0.00 | 1.845 |
| 0.67546314 | 36.5513 | 11.972 | 4522.1 | 7.1151 | 4529.2 | 0.00 | 1.836 |
| 0.67884045 | 36.5917 | 11.954 | 4492.8 | 7.1382 | 4500.0 | 0.00 | 1.826 |
| 0.68223466 | 36.6317 | 11.935 | 4463.6 | 7.1612 | 4470.8 | 0.00 | 1.817 |
| 0.68564583 | 36.6711 | 11.917 | 4434.4 | 7.1842 | 4441.6 | 0.00 | 1.808 |
| 0.68907406 | 36.7100 | 11.897 | 4405.2 | 7.2071 | 4412.4 | 0.00 | 1.799 |
| 0.69251943 | 36.7484 | 11.878 | 4376.1 | 7.2300 | 4383.3 | 0.00 | 1.790 |
| 0.69598202 | 36.7862 | 11.858 | 4346.9 | 7.2528 | 4354.2 | 0.00 | 1.781 |
| 0.69946194 | 36.8234 | 11.837 | 4317.9 | 7.2755 | 4325.1 | 0.00 | 1.773 |
| 0.70295924 | 36.8600 | 11.817 | 4288.8 | 7.2982 | 4296.1 | 0.00 | 1.764 |
| 0.70647404 | 36.8960 | 11.795 | 4259.8 | 7.3208 | 4267.2 | 0.00 | 1.755 |
| 0.71000641 | 36.9315 | 11.774 | 4230.9 | 7.3433 | 4238.3 | 0.00 | 1.746 |
| 0.71355644 | 36.9663 | 11.752 | 4202.0 | 7.3658 | 4209.4 | 0.00 | 1.738 |
| 0.71712423 | 37.0005 | 11.730 | 4173.2 | 7.3882 | 4180.6 | 0.00 | 1.729 |
| 0.72070985 | 37.0340 | 11.707 | 4144.4 | 7.4106 | 4151.8 | 0.00 | 1.720 |
| 0.72431340 | 37.0669 | 11.684 | 4115.7 | 7.4329 | 4123.2 | 0.00 | 1.712 |
| 0.72793496 | 37.0992 | 11.661 | 4087.1 | 7.4551 | 4094.6 | 0.00 | 1.703 |
| 0.73157464 | 37.1308 | 11.637 | 4058.5 | 7.4772 | 4066.0 | 0.00 | 1.695 |
| 0.73523251 | 37.1617 | 11.613 | 4030.1 | 7.4993 | 4037.6 | 0.00 | 1.686 |
| 0.73890867 | 37.1920 | 11.589 | 4001.6 | 7.5213 | 4009.1 | 0.00 | 1.678 |
| 0.74260322 | 37.2215 | 11.564 | 3973.1 | 7.5432 | 3980.6 | 0.00 | 1.670 |
| 0.74631623 | 37.2502 | 11.539 | 3944.7 | 7.5651 | 3952.3 | 0.00 | 1.661 |
| 0.75004781 | 37.2782 | 11.513 | 3916.4 | 7.5869 | 3924.0 | 0.00 | 1.653 |
| 0.75379805 | 37.3053 | 11.488 | 3888.2 | 7.6086 | 3895.8 | 0.00 | 1.645 |
| 0.75756704 | 37.3318 | 11.461 | 3860.1 | 7.6302 | 3867.7 | 0.00 | 1.637 |
| 0.76135488 | 37.3574 | 11.435 | 3832.1 | 7.6518 | 3839.7 | 0.00 | 1.628 |
| 0.76516165 | 37.3822 | 11.409 | 3804.1 | 7.6732 | 3811.8 | 0.00 | 1.620 |
| 0.76898746 | 37.4062 | 11.382 | 3776.3 | 7.6946 | 3784.0 | 0.00 | 1.612 |
| 0.77283240 | 37.4294 | 11.355 | 3748.6 | 7.7160 | 3756.3 | 0.00 | 1.604 |
| 0.77669656 | 37.4518 | 11.327 | 3721.0 | 7.7372 | 3728.7 | 0.00 | 1.596 |
| 0.78058004 | 37.4733 | 11.300 | 3693.5 | 7.7584 | 3701.2 | 0.00 | 1.588 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ho ($Z=67$) | | | | | | | |
| 0.78448294 | 37.4940 | 11.272 | 3666.1 | 7.7794 | 3673.9 | 0.00 | 1.580 |
| 0.78840536 | 37.5138 | 11.244 | 3638.8 | 7.8004 | 3646.6 | 0.00 | 1.573 |
| 0.79234738 | 37.5327 | 11.216 | 3611.6 | 7.8213 | 3619.4 | 0.00 | 1.565 |
| 0.79630912 | 37.5508 | 11.188 | 3584.6 | 7.8422 | 3592.4 | 0.00 | 1.557 |
| 0.80029067 | 37.5680 | 11.159 | 3557.6 | 7.8629 | 3565.5 | 0.00 | 1.549 |
| 0.80429212 | 37.5843 | 11.130 | 3530.8 | 7.8836 | 3538.7 | 0.00 | 1.542 |
| 0.80831358 | 37.5997 | 11.101 | 3504.1 | 7.9041 | 3512.0 | 0.00 | 1.534 |
| 0.81235515 | 37.6141 | 11.072 | 3477.6 | 7.9246 | 3485.5 | 0.00 | 1.526 |
| 0.81641693 | 37.6276 | 11.043 | 3451.1 | 7.9450 | 3459.1 | 0.00 | 1.519 |
| 0.82049901 | 37.6402 | 11.014 | 3424.8 | 7.9653 | 3432.8 | 0.00 | 1.511 |
| 0.82460150 | 37.6518 | 10.984 | 3398.6 | 7.9855 | 3406.6 | 0.00 | 1.504 |
| 0.82872451 | 37.6625 | 10.955 | 3372.6 | 8.0056 | 3380.6 | 0.00 | 1.496 |
| 0.83286813 | 37.6721 | 10.925 | 3346.7 | 8.0256 | 3354.7 | 0.00 | 1.489 |
| 0.83703248 | 37.6808 | 10.895 | 3320.9 | 8.0456 | 3328.9 | 0.00 | 1.481 |
| 0.84121764 | 37.6885 | 10.865 | 3295.2 | 8.0654 | 3303.3 | 0.00 | 1.474 |
| 0.84542373 | 37.6951 | 10.834 | 3269.7 | 8.0851 | 3277.8 | 0.00 | 1.467 |
| 0.84965084 | 37.7007 | 10.804 | 3244.4 | 8.1048 | 3252.5 | 0.00 | 1.459 |
| 0.85389910 | 37.7053 | 10.774 | 3219.1 | 8.1243 | 3227.3 | 0.00 | 1.452 |
| 0.85816859 | 37.7088 | 10.743 | 3194.0 | 8.1438 | 3202.2 | 0.00 | 1.445 |
| 0.86245944 | 37.7112 | 10.713 | 3169.1 | 8.1631 | 3177.3 | 0.00 | 1.438 |
| 0.86677173 | 37.7125 | 10.682 | 3144.3 | 8.1824 | 3152.5 | 0.00 | 1.430 |
| 0.87110559 | 37.7127 | 10.651 | 3119.6 | 8.2016 | 3127.8 | 0.00 | 1.423 |
| 0.87546112 | 37.7118 | 10.620 | 3095.1 | 8.2206 | 3103.3 | 0.00 | 1.416 |
| 0.87983843 | 37.7098 | 10.589 | 3070.8 | 8.2396 | 3079.0 | 0.00 | 1.409 |
| 0.88423762 | 37.7066 | 10.558 | 3046.5 | 8.2584 | 3054.8 | 0.00 | 1.402 |
| 0.88865881 | 37.7022 | 10.527 | 3022.5 | 8.2772 | 3030.7 | 0.00 | 1.395 |
| 0.89310210 | 37.6966 | 10.496 | 2998.5 | 8.2958 | 3006.8 | 0.00 | 1.388 |
| 0.89756761 | 37.6898 | 10.465 | 2974.8 | 8.3143 | 2983.1 | 0.00 | 1.381 |
| 0.90205545 | 37.6818 | 10.434 | 2951.1 | 8.3328 | 2959.5 | 0.00 | 1.374 |
| 0.90656573 | 37.6725 | 10.403 | 2927.6 | 8.3511 | 2936.0 | 0.00 | 1.368 |
| 0.91109856 | 37.6620 | 10.371 | 2904.3 | 8.3693 | 2912.7 | 0.00 | 1.361 |
| 0.91565405 | 37.6501 | 10.340 | 2881.1 | 8.3874 | 2889.5 | 0.00 | 1.354 |
| 0.92023232 | 37.6373 | 10.309 | 2858.1 | 8.4054 | 2866.5 | 0.00 | 1.347 |
| 0.92483348 | 37.6228 | 10.277 | 2835.2 | 8.4233 | 2843.7 | 0.00 | 1.341 |
| 0.92945765 | 37.6070 | 10.246 | 2812.5 | 8.4411 | 2820.9 | 0.00 | 1.334 |
| 0.93410494 | 37.5897 | 10.214 | 2789.9 | 8.4588 | 2798.4 | 0.00 | 1.327 |
| 0.93877546 | 37.5711 | 10.183 | 2767.5 | 8.4763 | 2776.0 | 0.00 | 1.321 |
| 0.94346934 | 37.5510 | 10.152 | 2745.2 | 8.4938 | 2753.7 | 0.00 | 1.314 |
| 0.94818668 | 37.5295 | 10.120 | 2723.1 | 8.5111 | 2731.6 | 0.00 | 1.308 |
| 0.95292762 | 37.5065 | 10.089 | 2701.2 | 8.5283 | 2709.7 | 0.00 | 1.301 |
| 0.95769226 | 37.4819 | 10.057 | 2679.4 | 8.5454 | 2687.9 | 0.00 | 1.295 |
| 0.96248072 | 37.4559 | 10.026 | 2657.7 | 8.5624 | 2666.3 | 0.00 | 1.288 |
| 0.96729312 | 37.4282 | 9.9944 | 2636.2 | 8.5793 | 2644.8 | 0.00 | 1.282 |
| 0.97212959 | 37.3989 | 9.9630 | 2614.8 | 8.5961 | 2623.4 | 0.00 | 1.275 |
| 0.97699023 | 37.3680 | 9.9316 | 2593.6 | 8.6127 | 2602.2 | 0.00 | 1.269 |
| 0.98187519 | 37.3354 | 9.9002 | 2572.6 | 8.6292 | 2581.2 | 0.00 | 1.263 |
| 0.98678456 | 37.3010 | 9.8689 | 2551.7 | 8.6456 | 2560.3 | 0.00 | 1.256 |
| 0.99171848 | 37.2650 | 9.8375 | 2530.9 | 8.6619 | 2539.6 | 0.00 | 1.250 |
| 0.99667708 | 37.2271 | 9.8063 | 2510.3 | 8.6781 | 2519.0 | 0.00 | 1.244 |
| 1.0016605 | 37.1944 | 9.7664 | 2487.7 | 8.6941 | 2496.3 | 0.00 | 1.238 |
| 1.0066688 | 37.1717 | 9.7094 | 2460.8 | 8.7100 | 2469.5 | 0.00 | 1.232 |
| 1.0117021 | 37.1444 | 9.6527 | 2434.3 | 8.7258 | 2443.0 | 0.00 | 1.226 |
| 1.0167606 | 37.1126 | 9.5965 | 2408.1 | 8.7415 | 2416.8 | 0.00 | 1.219 |
| 1.0218444 | 37.0764 | 9.5407 | 2382.2 | 8.7571 | 2390.9 | 0.00 | 1.213 |
| 1.0269536 | 37.0358 | 9.4853 | 2356.6 | 8.7725 | 2365.3 | 0.00 | 1.207 |
| 1.0320884 | 36.9915 | 9.4303 | 2331.2 | 8.7878 | 2340.0 | 0.00 | 1.201 |
| 1.0372489 | 36.9422 | 9.3756 | 2306.2 | 8.8030 | 2315.0 | 0.00 | 1.195 |
| 1.0424351 | 36.8886 | 9.3213 | 2281.4 | 8.8180 | 2290.3 | 0.00 | 1.189 |
| 1.0476473 | 36.8306 | 9.2674 | 2257.0 | 8.8329 | 2265.8 | 0.00 | 1.183 |
| 1.0528855 | 36.7682 | 9.2139 | 2232.8 | 8.8477 | 2241.6 | 0.00 | 1.178 |
| 1.0581499 | 36.7014 | 9.1608 | 2208.8 | 8.8624 | 2217.7 | 0.00 | 1.172 |
| 1.0634407 | 36.6301 | 9.1080 | 2185.2 | 8.8769 | 2194.1 | 0.00 | 1.166 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ho ($Z=67$) | | | | | | | |
| 1.0687579 | 36.5542 | 9.0556 | 2161.8 | 8.8914 | 2170.7 | 0.00 | 1.160 |
| 1.0741017 | 36.4737 | 9.0036 | 2138.7 | 8.9056 | 2147.6 | 0.00 | 1.154 |
| 1.0794722 | 36.3884 | 8.9519 | 2115.8 | 8.9198 | 2124.7 | 0.00 | 1.149 |
| 1.0848695 | 36.2982 | 8.9005 | 2093.2 | 8.9338 | 2102.2 | 0.00 | 1.143 |
| 1.0902939 | 36.2031 | 8.8496 | 2070.9 | 8.9477 | 2079.8 | 0.00 | 1.137 |
| 1.0957454 | 36.1028 | 8.7990 | 2048.8 | 8.9615 | 2057.8 | 0.00 | 1.132 |
| 1.1012241 | 35.9972 | 8.7487 | 2027.0 | 8.9751 | 2035.9 | 0.00 | 1.126 |
| 1.1067302 | 35.8862 | 8.6988 | 2005.4 | 8.9886 | 2014.4 | 0.00 | 1.120 |
| 1.1122639 | 35.7695 | 8.6492 | 1984.0 | 9.0019 | 1993.0 | 0.00 | 1.115 |
| 1.1178252 | 35.6469 | 8.6000 | 1962.9 | 9.0151 | 1971.9 | 0.00 | 1.109 |
| 1.1234143 | 35.5182 | 8.5511 | 1942.1 | 9.0282 | 1951.1 | 0.00 | 1.104 |
| 1.1290314 | 35.3831 | 8.5026 | 1921.4 | 9.0412 | 1930.5 | 0.00 | 1.098 |
| 1.1346765 | 35.2413 | 8.4544 | 1901.0 | 9.0540 | 1910.1 | 0.00 | 1.093 |
| 1.1403499 | 35.0925 | 8.4065 | 1880.9 | 9.0667 | 1889.9 | 0.00 | 1.087 |
| 1.1460517 | 34.9364 | 8.3590 | 1860.9 | 9.0792 | 1870.0 | 0.00 | 1.082 |
| 1.1517819 | 34.7725 | 8.3118 | 1841.2 | 9.0916 | 1850.3 | 0.00 | 1.076 |
| 1.1575408 | 34.6005 | 8.2649 | 1821.7 | 9.1039 | 1830.8 | 0.00 | 1.071 |
| 1.1633285 | 34.4198 | 8.2183 | 1802.4 | 9.1160 | 1811.6 | 0.00 | 1.066 |
| 1.1691452 | 34.2300 | 8.1721 | 1783.4 | 9.1280 | 1792.5 | 0.00 | 1.060 |
| 1.1749909 | 34.0305 | 8.1262 | 1764.5 | 9.1399 | 1773.7 | 0.00 | 1.055 |
| 1.1808659 | 33.8205 | 8.0806 | 1745.9 | 9.1516 | 1755.1 | 0.00 | 1.050 |
| 1.1867702 | 33.5995 | 8.0353 | 1727.5 | 9.1631 | 1736.7 | 0.00 | 1.045 |
| 1.1927040 | 33.3666 | 7.9904 | 1709.3 | 9.1746 | 1718.5 | 0.00 | 1.040 |
| 1.1986676 | 33.1208 | 7.9457 | 1691.3 | 9.1859 | 1700.5 | 0.00 | 1.034 |
| 1.2046609 | 32.8613 | 7.9014 | 1673.5 | 9.1970 | 1682.7 | 0.00 | 1.029 |
| 1.2106842 | 32.5867 | 7.8574 | 1655.9 | 9.2080 | 1665.1 | 0.00 | 1.024 |
| 1.2167376 | 32.2959 | 7.8137 | 1638.5 | 9.2189 | 1647.7 | 0.00 | 1.019 |
| 1.2228213 | 31.9872 | 7.7702 | 1621.2 | 9.2296 | 1630.5 | 0.00 | 1.014 |
| 1.2289354 | 31.6591 | 7.7264 | 1604.1 | 9.2402 | 1613.3 | 0.00 | 1.009 |
| 1.2350801 | 31.3092 | 7.6817 | 1586.9 | 9.2506 | 1596.1 | 0.00 | 1.004 |
| 1.2412555 | 30.9354 | 7.6374 | 1569.9 | 9.2609 | 1579.1 | 0.00 | 0.9989 |
| 1.2474618 | 30.5348 | 7.5934 | 1553.1 | 9.2710 | 1562.3 | 0.00 | 0.9939 |
| 1.2536991 | 30.1041 | 7.5497 | 1536.4 | 9.2810 | 1545.7 | 0.00 | 0.9889 |
| 1.2599676 | 29.6396 | 7.5063 | 1520.0 | 9.2909 | 1529.3 | 0.00 | 0.9840 |
| 1.2662674 | 29.1364 | 7.4632 | 1503.8 | 9.3006 | 1513.1 | 0.00 | 0.9791 |
| 1.2725988 | 28.5886 | 7.4204 | 1487.7 | 9.3101 | 1497.0 | 0.00 | 0.9743 |
| 1.2789618 | 27.9891 | 7.3779 | 1471.8 | 9.3195 | 1481.1 | 0.00 | 0.9694 |
| 1.2853566 | 27.3285 | 7.3357 | 1456.1 | 9.3288 | 1465.5 | 0.00 | 0.9646 |
| 1.2917833 | 26.5947 | 7.2939 | 1440.6 | 9.3379 | 1449.9 | 0.00 | 0.9598 |
| 1.2982423 | 25.7716 | 7.2523 | 1425.3 | 9.3469 | 1434.6 | 0.00 | 0.9550 |
| 1.3047335 | 24.8368 | 7.2110 | 1410.1 | 9.3557 | 1419.5 | 0.00 | 0.9503 |
| 1.3112571 | 23.7589 | 7.1700 | 1395.1 | 9.3644 | 1404.5 | 0.00 | 0.9455 |
| 1.3178134 | 22.4875 | 7.1292 | 1380.3 | 9.3729 | 1389.7 | 0.00 | 0.9408 |
| 1.3244025 | 20.9428 | 7.0888 | 1365.6 | 9.3813 | 1375.0 | 0.00 | 0.9362 |
| 1.3310245 | 18.9771 | 7.0486 | 1351.1 | 9.3895 | 1360.5 | 0.00 | 0.9315 |
| 1.3376796 | 16.2672 | 7.0088 | 1336.8 | 9.3976 | 1346.2 | 0.00 | 0.9269 |
| 1.3443680 | 11.8184 | 6.9692 | 1322.6 | 9.4055 | 1332.0 | 0.00 | 0.9222 |
| 1.3510899 | -7.94075 | 6.9299 | 1308.6 | 9.4133 | 1318.0 | 0.00 | 0.9177 |
| 1.3512135 | -11.1161 | 6.9291 | 1308.4 | 9.4135 | 1317.8 | 0.00 | 0.9176 |
| 1.3515865 | -11.4577 | 26.506 | 5003.5 | 9.4139 | 5012.9 | 0.00 | 0.9173 |
| 1.3578453 | 10.2390 | 26.318 | 4945.1 | 9.4209 | 4954.5 | 0.00 | 0.9131 |
| 1.3646345 | 14.0730 | 26.116 | 4882.8 | 9.4284 | 4892.3 | 0.00 | 0.9086 |
| 1.3714577 | 15.7145 | 25.916 | 4821.4 | 9.4358 | 4830.8 | 0.00 | 0.9040 |
| 1.3783150 | 16.0735 | 25.718 | 4760.6 | 9.4429 | 4770.0 | 0.00 | 0.8995 |
| 1.3852066 | 14.7112 | 25.520 | 4700.6 | 9.4500 | 4710.0 | 0.00 | 0.8951 |
| 1.3911646 | 3.96765 | 25.352 | 4649.5 | 9.4559 | 4659.0 | 0.00 | 0.8912 |
| 1.3918353 | 3.88801 | 38.170 | 6997.1 | 9.4565 | 7006.5 | 0.00 | 0.8908 |
| 1.3921326 | 6.54188 | 38.158 | 6993.2 | 9.4568 | 7002.7 | 0.00 | 0.8906 |
| 1.3990933 | 17.9314 | 37.860 | 6904.1 | 9.4636 | 6913.6 | 0.00 | 0.8862 |
| 1.4060887 | 21.6526 | 37.564 | 6816.1 | 9.4701 | 6825.6 | 0.00 | 0.8818 |
| 1.4131192 | 24.1870 | 37.271 | 6729.3 | 9.4766 | 6738.8 | 0.00 | 0.8774 |
| 1.4201848 | 26.1718 | 36.980 | 6643.6 | 9.4828 | 6653.1 | 0.00 | 0.8730 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ho ($Z=67$) | | | | | | | |
| 1.4272857 | 27.8253 | 36.692 | 6559.0 | 9.4889 | 6568.5 | 0.00 | 0.8687 |
| 1.4344221 | 29.2520 | 36.406 | 6475.5 | 9.4949 | 6485.0 | 0.00 | 0.8643 |
| 1.4415942 | 30.5108 | 36.122 | 6393.0 | 9.5007 | 6402.5 | 0.00 | 0.8600 |
| 1.4488022 | 31.6391 | 35.840 | 6311.7 | 9.5064 | 6321.2 | 0.00 | 0.8558 |
| 1.4560462 | 32.6620 | 35.561 | 6231.3 | 9.5119 | 6240.8 | 0.00 | 0.8515 |
| 1.4633265 | 33.5976 | 35.284 | 6152.0 | 9.5172 | 6161.6 | 0.00 | 0.8473 |
| 1.4706431 | 34.4594 | 35.010 | 6073.8 | 9.5224 | 6083.3 | 0.00 | 0.8431 |
| 1.4779963 | 35.2575 | 34.737 | 5996.5 | 9.5275 | 6006.1 | 0.00 | 0.8389 |
| 1.4853863 | 36.0001 | 34.467 | 5920.3 | 9.5323 | 5929.8 | 0.00 | 0.8347 |
| 1.4928132 | 36.6936 | 34.199 | 5845.0 | 9.5371 | 5854.5 | 0.00 | 0.8305 |
| 1.5002773 | 37.3433 | 33.933 | 5770.7 | 9.5417 | 5780.2 | 0.00 | 0.8264 |
| 1.5077787 | 37.9536 | 33.669 | 5697.3 | 9.5461 | 5706.9 | 0.00 | 0.8223 |
| 1.5153176 | 38.5279 | 33.407 | 5624.9 | 9.5504 | 5634.5 | 0.00 | 0.8182 |
| 1.5228942 | 39.0695 | 33.148 | 5553.5 | 9.5545 | 5563.0 | 0.00 | 0.8141 |
| 1.5305086 | 39.5808 | 32.890 | 5482.9 | 9.5584 | 5492.5 | 0.00 | 0.8101 |
| 1.5381612 | 40.0641 | 32.635 | 5413.3 | 9.5623 | 5422.8 | 0.00 | 0.8061 |
| 1.5458520 | 40.5212 | 32.382 | 5344.5 | 9.5659 | 5354.1 | 0.00 | 0.8020 |
| 1.5535812 | 40.9537 | 32.130 | 5276.7 | 9.5694 | 5286.3 | 0.00 | 0.7981 |
| 1.5613491 | 41.3631 | 31.881 | 5209.7 | 9.5728 | 5219.3 | 0.00 | 0.7941 |
| 1.5691559 | 41.7504 | 31.634 | 5143.6 | 9.5760 | 5153.2 | 0.00 | 0.7901 |
| 1.5770017 | 42.1167 | 31.389 | 5078.3 | 9.5790 | 5087.9 | 0.00 | 0.7862 |
| 1.5848867 | 42.4626 | 31.145 | 5013.9 | 9.5819 | 5023.5 | 0.00 | 0.7823 |
| 1.5928111 | 42.7889 | 30.904 | 4950.3 | 9.5846 | 4959.9 | 0.00 | 0.7784 |
| 1.6007752 | 43.0961 | 30.665 | 4887.5 | 9.5872 | 4897.1 | 0.00 | 0.7745 |
| 1.6087790 | 43.3842 | 30.427 | 4825.5 | 9.5896 | 4835.1 | 0.00 | 0.7707 |
| 1.6168229 | 43.6536 | 30.192 | 4764.4 | 9.5919 | 4774.0 | 0.00 | 0.7668 |
| 1.6249070 | 43.9041 | 29.958 | 4704.0 | 9.5940 | 4713.6 | 0.00 | 0.7630 |
| 1.6330316 | 44.1353 | 29.726 | 4644.4 | 9.5959 | 4654.0 | 0.00 | 0.7592 |
| 1.6411967 | 44.3466 | 29.497 | 4585.5 | 9.5977 | 4595.1 | 0.00 | 0.7555 |
| 1.6494027 | 44.5370 | 29.268 | 4527.4 | 9.5994 | 4537.0 | 0.00 | 0.7517 |
| 1.6576497 | 44.7050 | 29.042 | 4470.1 | 9.6009 | 4479.7 | 0.00 | 0.7480 |
| 1.6659380 | 44.8485 | 28.818 | 4413.5 | 9.6022 | 4423.1 | 0.00 | 0.7442 |
| 1.6742677 | 44.9643 | 28.595 | 4357.6 | 9.6034 | 4367.2 | 0.00 | 0.7405 |
| 1.6826390 | 45.0477 | 28.374 | 4302.4 | 9.6044 | 4312.0 | 0.00 | 0.7368 |
| 1.6910522 | 45.0918 | 28.154 | 4247.8 | 9.6053 | 4257.4 | 0.00 | 0.7332 |
| 1.6995075 | 45.0849 | 27.936 | 4193.9 | 9.6060 | 4203.5 | 0.00 | 0.7295 |
| 1.7080050 | 45.0075 | 27.719 | 4140.7 | 9.6066 | 4150.3 | 0.00 | 0.7259 |
| 1.7165450 | 44.8213 | 27.505 | 4088.2 | 9.6070 | 4097.8 | 0.00 | 0.7223 |
| 1.7251278 | 44.4371 | 27.292 | 4036.3 | 9.6072 | 4045.9 | 0.00 | 0.7187 |
| 1.7337534 | 43.5431 | 27.080 | 3985.1 | 9.6073 | 3994.7 | 0.00 | 0.7151 |
| 1.7394239 | 41.5726 | 26.943 | 3952.0 | 9.6073 | 3961.6 | 0.00 | 0.7128 |
| 1.7424222 | 41.0342 | 31.568 | 4622.4 | 9.6073 | 4632.0 | 0.00 | 0.7116 |
| 1.7429760 | 41.6119 | 31.550 | 4618.4 | 9.6073 | 4628.0 | 0.00 | 0.7113 |
| 1.7511343 | 44.4274 | 31.301 | 4560.6 | 9.6071 | 4570.2 | 0.00 | 0.7080 |
| 1.7598899 | 45.5999 | 31.037 | 4499.6 | 9.6067 | 4509.2 | 0.00 | 0.7045 |
| 1.7686894 | 46.3850 | 30.775 | 4439.4 | 9.6062 | 4449.0 | 0.00 | 0.7010 |
| 1.7775328 | 46.9944 | 30.515 | 4380.0 | 9.6056 | 4389.6 | 0.00 | 0.6975 |
| 1.7864205 | 47.4994 | 30.257 | 4321.4 | 9.6047 | 4331.0 | 0.00 | 0.6940 |
| 1.7953526 | 47.9326 | 30.002 | 4263.6 | 9.6038 | 4273.2 | 0.00 | 0.6906 |
| 1.8043294 | 48.3114 | 29.749 | 4206.6 | 9.6026 | 4216.2 | 0.00 | 0.6871 |
| 1.8133510 | 48.6457 | 29.498 | 4150.3 | 9.6014 | 4159.9 | 0.00 | 0.6837 |
| 1.8224178 | 48.9403 | 29.248 | 4094.8 | 9.5999 | 4104.4 | 0.00 | 0.6803 |
| 1.8315299 | 49.1977 | 29.013 | 4041.6 | 9.5984 | 4051.2 | 0.00 | 0.6769 |
| 1.8406875 | 49.4321 | 28.792 | 3990.9 | 9.5966 | 4000.4 | 0.00 | 0.6736 |
| 1.8498909 | 49.6449 | 28.574 | 3941.0 | 9.5947 | 3950.6 | 0.00 | 0.6702 |
| 1.8591404 | 49.8346 | 28.359 | 3891.9 | 9.5927 | 3901.5 | 0.00 | 0.6669 |
| 1.8684361 | 49.9991 | 28.148 | 3843.6 | 9.5905 | 3853.2 | 0.00 | 0.6636 |
| 1.8777783 | 50.1343 | 27.939 | 3796.1 | 9.5882 | 3805.7 | 0.00 | 0.6603 |
| 1.8871672 | 50.2326 | 27.733 | 3749.4 | 9.5857 | 3759.0 | 0.00 | 0.6570 |
| 1.8966030 | 50.2778 | 27.530 | 3703.4 | 9.5830 | 3713.0 | 0.00 | 0.6537 |
| 1.9060860 | 50.2299 | 27.329 | 3658.1 | 9.5803 | 3667.7 | 0.00 | 0.6505 |
| 1.9156165 | 49.9370 | 27.131 | 3613.6 | 9.5773 | 3623.1 | 0.00 | 0.6472 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ho ($Z=67$) | | | | | | | |
| 1.9208002 | 49.2783 | 27.025 | 3589.7 | 9.5757 | 3599.3 | 0.00 | 0.6455 |
| 1.9247997 | 49.3413 | 28.854 | 3824.7 | 9.5743 | 3834.3 | 0.00 | 0.6441 |
| 1.9251945 | 49.4604 | 28.845 | 3822.7 | 9.5742 | 3832.3 | 0.00 | 0.6440 |
| 1.9348205 | 50.6537 | 28.626 | 3774.9 | 9.5710 | 3784.5 | 0.00 | 0.6408 |
| 1.9444946 | 51.2077 | 28.411 | 3727.8 | 9.5676 | 3737.4 | 0.00 | 0.6376 |
| 1.9542171 | 51.6160 | 28.198 | 3681.4 | 9.5640 | 3691.0 | 0.00 | 0.6344 |
| 1.9639882 | 51.9535 | 27.987 | 3635.8 | 9.5604 | 3645.3 | 0.00 | 0.6313 |
| 1.9738081 | 52.2468 | 27.779 | 3590.8 | 9.5565 | 3600.3 | 0.00 | 0.6281 |
| 1.9836772 | 52.5085 | 27.573 | 3546.5 | 9.5525 | 3556.0 | 0.00 | 0.6250 |
| 1.9935955 | 52.7452 | 27.370 | 3502.8 | 9.5484 | 3512.3 | 0.00 | 0.6219 |
| 2.0035635 | 52.9608 | 27.169 | 3459.7 | 9.5441 | 3469.3 | 0.00 | 0.6188 |
| 2.0135813 | 53.1570 | 26.970 | 3417.3 | 9.5397 | 3426.8 | 0.00 | 0.6157 |
| 2.0236492 | 53.3351 | 26.780 | 3376.4 | 9.5351 | 3385.9 | 0.00 | 0.6127 |
| 2.0337675 | 53.5019 | 26.597 | 3336.7 | 9.5304 | 3346.2 | 0.00 | 0.6096 |
| 2.0439363 | 53.6573 | 26.417 | 3297.6 | 9.5255 | 3307.1 | 0.00 | 0.6066 |
| 2.0541560 | 53.8004 | 26.240 | 3259.2 | 9.5205 | 3268.7 | 0.00 | 0.6036 |
| 2.0644268 | 53.9300 | 26.065 | 3221.3 | 9.5153 | 3230.8 | 0.00 | 0.6006 |
| 2.0747489 | 54.0439 | 25.892 | 3184.0 | 9.5100 | 3193.5 | 0.00 | 0.5976 |
| 2.0851227 | 54.1380 | 25.721 | 3147.3 | 9.5046 | 3156.8 | 0.00 | 0.5946 |
| 2.0955483 | 54.2047 | 25.552 | 3111.1 | 9.4990 | 3120.6 | 0.00 | 0.5917 |
| 2.1060260 | 54.2263 | 25.386 | 3075.4 | 9.4933 | 3084.9 | 0.00 | 0.5887 |
| 2.1165562 | 54.1485 | 25.221 | 3040.2 | 9.4874 | 3049.7 | 0.00 | 0.5858 |
| 2.1244052 | 53.8523 | 25.100 | 3014.5 | 9.4829 | 3024.0 | 0.00 | 0.5836 |
| 2.1271389 | 53.4378 | 25.058 | 3005.6 | 9.4813 | 3015.1 | 0.00 | 0.5829 |
| 2.1321947 | 53.9589 | 26.163 | 3130.7 | 9.4784 | 3140.2 | 0.00 | 0.5815 |
| 2.1377746 | 54.3759 | 26.076 | 3112.2 | 9.4752 | 3121.7 | 0.00 | 0.5800 |
| 2.1484635 | 54.8132 | 25.912 | 3077.2 | 9.4689 | 3086.6 | 0.00 | 0.5771 |
| 2.1592058 | 55.1226 | 25.749 | 3042.6 | 9.4624 | 3052.1 | 0.00 | 0.5742 |
| 2.1700018 | 55.3804 | 25.588 | 3008.6 | 9.4558 | 3018.0 | 0.00 | 0.5714 |
| 2.1808519 | 55.6091 | 25.429 | 2974.9 | 9.4491 | 2984.4 | 0.00 | 0.5685 |
| 2.1917561 | 55.8188 | 25.271 | 2941.7 | 9.4422 | 2951.2 | 0.00 | 0.5657 |
| 2.2027149 | 56.0145 | 25.114 | 2909.0 | 9.4352 | 2918.4 | 0.00 | 0.5629 |
| 2.2137285 | 56.1996 | 24.959 | 2876.6 | 9.4280 | 2886.0 | 0.00 | 0.5601 |
| 2.2247971 | 56.3761 | 24.805 | 2844.7 | 9.4207 | 2854.1 | 0.00 | 0.5573 |
| 2.2359211 | 56.5451 | 24.653 | 2813.2 | 9.4133 | 2822.6 | 0.00 | 0.5545 |
| 2.2471007 | 56.7088 | 24.504 | 2782.2 | 9.4057 | 2791.6 | 0.00 | 0.5518 |
| 2.2583362 | 56.8683 | 24.356 | 2751.6 | 9.3980 | 2761.0 | 0.00 | 0.5490 |
| 2.2696279 | 57.0237 | 24.205 | 2721.0 | 9.3901 | 2730.4 | 0.00 | 0.5463 |
| 2.2809760 | 57.1737 | 24.053 | 2690.4 | 9.3821 | 2699.8 | 0.00 | 0.5436 |
| 2.2923809 | 57.3191 | 23.901 | 2660.2 | 9.3740 | 2669.6 | 0.00 | 0.5409 |
| 2.3038428 | 57.4601 | 23.751 | 2630.4 | 9.3657 | 2639.7 | 0.00 | 0.5382 |
| 2.3153620 | 57.5972 | 23.602 | 2600.8 | 9.3573 | 2610.2 | 0.00 | 0.5355 |
| 2.3269388 | 57.7308 | 23.454 | 2571.7 | 9.3488 | 2581.0 | 0.00 | 0.5328 |
| 2.3385735 | 57.8610 | 23.308 | 2542.9 | 9.3401 | 2552.2 | 0.00 | 0.5302 |
| 2.3502664 | 57.9882 | 23.162 | 2514.4 | 9.3313 | 2523.7 | 0.00 | 0.5275 |
| 2.3620177 | 58.1124 | 23.017 | 2486.2 | 9.3224 | 2495.6 | 0.00 | 0.5249 |
| 2.3738278 | 58.2340 | 22.873 | 2458.4 | 9.3133 | 2467.7 | 0.00 | 0.5223 |
| 2.3856970 | 58.3530 | 22.730 | 2430.9 | 9.3041 | 2440.2 | 0.00 | 0.5197 |
| 2.3976254 | 58.4696 | 22.589 | 2403.7 | 9.2948 | 2413.0 | 0.00 | 0.5171 |
| 2.4096136 | 58.5839 | 22.448 | 2376.9 | 9.2853 | 2386.1 | 0.00 | 0.5145 |
| 2.4216616 | 58.6960 | 22.308 | 2350.3 | 9.2757 | 2359.6 | 0.00 | 0.5120 |
| 2.4337699 | 58.8061 | 22.169 | 2324.0 | 9.2660 | 2333.3 | 0.00 | 0.5094 |
| 2.4459388 | 58.9142 | 22.030 | 2298.0 | 9.2561 | 2307.3 | 0.00 | 0.5069 |
| 2.4581685 | 59.0205 | 21.893 | 2272.3 | 9.2461 | 2281.6 | 0.00 | 0.5044 |
| 2.4704593 | 59.1251 | 21.757 | 2246.9 | 9.2360 | 2256.2 | 0.00 | 0.5019 |
| 2.4828116 | 59.2282 | 21.621 | 2221.8 | 9.2258 | 2231.0 | 0.00 | 0.4994 |
| 2.4952257 | 59.3298 | 21.486 | 2197.0 | 9.2154 | 2206.2 | 0.00 | 0.4969 |
| 2.5077018 | 59.4298 | 21.350 | 2172.2 | 9.2049 | 2181.4 | 0.00 | 0.4944 |
| 2.5202403 | 59.5276 | 21.214 | 2147.6 | 9.1942 | 2156.8 | 0.00 | 0.4920 |
| 2.5328415 | 59.6233 | 21.078 | 2123.3 | 9.1835 | 2132.5 | 0.00 | 0.4895 |
| 2.5455057 | 59.7171 | 20.944 | 2099.2 | 9.1726 | 2108.4 | 0.00 | 0.4871 |
| 2.5582333 | 59.8091 | 20.810 | 2075.4 | 9.1616 | 2084.6 | 0.00 | 0.4846 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ho ($Z=67$) | | | | | | | |
| 2.5710244 | 59.8993 | 20.677 | 2051.9 | 9.1505 | 2061.1 | 0.00 | 0.4822 |
| 2.5838796 | 59.9879 | 20.545 | 2028.7 | 9.1392 | 2037.8 | 0.00 | 0.4798 |
| 2.5967990 | 60.0748 | 20.414 | 2005.7 | 9.1278 | 2014.8 | 0.00 | 0.4775 |
| 2.6097829 | 60.1603 | 20.283 | 1982.9 | 9.1163 | 1992.0 | 0.00 | 0.4751 |
| 2.6228319 | 60.2443 | 20.153 | 1960.4 | 9.1047 | 1969.5 | 0.00 | 0.4727 |
| 2.6359460 | 60.3268 | 20.024 | 1938.2 | 9.0930 | 1947.3 | 0.00 | 0.4704 |
| 2.6491257 | 60.4081 | 19.896 | 1916.2 | 9.0811 | 1925.3 | 0.00 | 0.4680 |
| 2.6623714 | 60.4880 | 19.769 | 1894.5 | 9.0691 | 1903.5 | 0.00 | 0.4657 |
| 2.6756832 | 60.5667 | 19.642 | 1873.0 | 9.0570 | 1882.0 | 0.00 | 0.4634 |
| 2.6890617 | 60.6442 | 19.516 | 1851.7 | 9.0448 | 1860.8 | 0.00 | 0.4611 |
| 2.7025070 | 60.7206 | 19.391 | 1830.7 | 9.0324 | 1839.7 | 0.00 | 0.4588 |
| 2.7160195 | 60.9983 | 19.263 | 1809.6 | 9.0200 | 1818.6 | 0.00 | 0.4565 |
| 2.7295996 | 61.0715 | 19.136 | 1788.7 | 9.0074 | 1797.7 | 0.00 | 0.4542 |
| 2.7432476 | 61.1433 | 19.010 | 1768.1 | 8.9947 | 1777.1 | 0.00 | 0.4520 |
| 2.7569638 | 61.2137 | 18.885 | 1747.7 | 8.9819 | 1756.7 | 0.00 | 0.4497 |
| 2.7707486 | 61.2830 | 18.760 | 1727.5 | 8.9690 | 1736.5 | 0.00 | 0.4475 |
| 2.7846024 | 61.4922 | 18.636 | 1707.5 | 8.9559 | 1716.4 | 0.00 | 0.4452 |
| 2.7985254 | 61.5586 | 18.510 | 1687.5 | 8.9428 | 1696.5 | 0.00 | 0.4430 |
| 2.8125180 | 61.6236 | 18.385 | 1667.8 | 8.9295 | 1676.7 | 0.00 | 0.4408 |
| 2.8265806 | 61.6872 | 18.261 | 1648.3 | 8.9161 | 1657.2 | 0.00 | 0.4386 |
| 2.8407135 | 61.7495 | 18.138 | 1629.1 | 8.9026 | 1638.0 | 0.00 | 0.4365 |
| 2.8549171 | 61.8106 | 18.016 | 1610.1 | 8.8890 | 1619.0 | 0.00 | 0.4343 |
| 2.8691917 | 61.8707 | 17.895 | 1591.3 | 8.8753 | 1600.2 | 0.00 | 0.4321 |
| 2.8835376 | 61.9297 | 17.774 | 1572.7 | 8.8615 | 1581.6 | 0.00 | 0.4300 |
| 2.8979553 | 61.9878 | 17.655 | 1554.4 | 8.8476 | 1563.2 | 0.00 | 0.4278 |
| 2.9124451 | 62.0452 | 17.537 | 1536.3 | 8.8335 | 1545.1 | 0.00 | 0.4257 |
| 2.9270073 | 62.1020 | 17.419 | 1518.4 | 8.8194 | 1527.2 | 0.00 | 0.4236 |
| 2.9416424 | 62.1583 | 17.302 | 1500.7 | 8.8051 | 1509.5 | 0.00 | 0.4215 |
| 2.9563506 | 62.2144 | 17.187 | 1483.3 | 8.7908 | 1492.1 | 0.00 | 0.4194 |
| 2.9711323 | 62.2708 | 17.072 | 1466.0 | 8.7763 | 1474.8 | 0.00 | 0.4173 |
| 2.9859880 | 62.3279 | 16.958 | 1449.0 | 8.7618 | 1457.8 | 0.00 | 0.4152 |
| 3.0009179 | 62.3911 | 16.844 | 1432.1 | 8.7471 | 1440.8 | 0.00 | 0.4132 |
| 3.0159225 | 62.4781 | 16.713 | 1413.9 | 8.7323 | 1422.6 | 0.00 | 0.4111 |
| 3.0310021 | 62.5382 | 16.583 | 1395.9 | 8.7174 | 1404.6 | 0.00 | 0.4091 |
| 3.0461571 | 62.5903 | 16.452 | 1378.0 | 8.7024 | 1386.7 | 0.00 | 0.4070 |
| 3.0613879 | 62.6380 | 16.322 | 1360.3 | 8.6874 | 1369.0 | 0.00 | 0.4050 |
| 3.0766949 | 62.6828 | 16.194 | 1342.9 | 8.6722 | 1351.6 | 0.00 | 0.4030 |
| 3.0920783 | 62.7251 | 16.067 | 1325.8 | 8.6569 | 1334.4 | 0.00 | 0.4010 |
| 3.1075387 | 62.7655 | 15.941 | 1308.8 | 8.6415 | 1317.5 | 0.00 | 0.3990 |
| 3.1230764 | 62.8040 | 15.816 | 1292.1 | 8.6260 | 1300.7 | 0.00 | 0.3970 |
| 3.1386918 | 62.8409 | 15.693 | 1275.6 | 8.6105 | 1284.3 | 0.00 | 0.3950 |
| 3.1543853 | 62.8762 | 15.570 | 1259.4 | 8.5948 | 1268.0 | 0.00 | 0.3931 |
| 3.1701572 | 62.9101 | 15.449 | 1243.4 | 8.5790 | 1251.9 | 0.00 | 0.3911 |
| 3.1860080 | 62.9427 | 15.329 | 1227.6 | 8.5631 | 1236.1 | 0.00 | 0.3892 |
| 3.2019380 | 62.9740 | 15.210 | 1212.0 | 8.5472 | 1220.5 | 0.00 | 0.3872 |
| 3.2179477 | 63.0041 | 15.092 | 1196.6 | 8.5311 | 1205.1 | 0.00 | 0.3853 |
| 3.2340374 | 63.0330 | 14.975 | 1181.4 | 8.5150 | 1189.9 | 0.00 | 0.3834 |
| 3.2502076 | 63.0608 | 14.859 | 1166.4 | 8.4987 | 1174.9 | 0.00 | 0.3815 |
| 3.2664587 | 63.0876 | 14.744 | 1151.6 | 8.4824 | 1160.1 | 0.00 | 0.3796 |
| 3.2827910 | 63.1133 | 14.630 | 1137.1 | 8.4660 | 1145.5 | 0.00 | 0.3777 |
| 3.2992049 | 63.1381 | 14.518 | 1122.7 | 8.4495 | 1131.1 | 0.00 | 0.3758 |
| 3.3157009 | 63.1619 | 14.406 | 1108.5 | 8.4329 | 1116.9 | 0.00 | 0.3739 |
| 3.3322794 | 63.1848 | 14.295 | 1094.5 | 8.4162 | 1102.9 | 0.00 | 0.3721 |
| 3.3489408 | 63.2068 | 14.185 | 1080.7 | 8.3994 | 1089.1 | 0.00 | 0.3702 |
| 3.3656856 | 63.2280 | 14.077 | 1067.1 | 8.3825 | 1075.5 | 0.00 | 0.3684 |
| 3.3825140 | 63.2485 | 13.969 | 1053.7 | 8.3656 | 1062.0 | 0.00 | 0.3665 |
| 3.3994265 | 63.2681 | 13.862 | 1040.4 | 8.3486 | 1048.8 | 0.00 | 0.3647 |
| 3.4164237 | 63.2870 | 13.757 | 1027.3 | 8.3314 | 1035.7 | 0.00 | 0.3629 |
| 3.4335058 | 63.3053 | 13.652 | 1014.5 | 8.3142 | 1022.8 | 0.00 | 0.3611 |
| 3.4506733 | 63.3228 | 13.548 | 1001.7 | 8.2969 | 1010.0 | 0.00 | 0.3593 |
| 3.4679267 | 63.3398 | 13.445 | 989.17 | 8.2796 | 997.45 | 0.00 | 0.3575 |
| 3.4852663 | 63.4590 | 13.342 | 976.74 | 8.2621 | 985.00 | 0.00 | 0.3557 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ho ($Z=67$) | | | | | | | |
| 3.5026927 | 63.4754 | 13.237 | 964.23 | 8.2446 | 972.48 | 0.00 | 0.3540 |
| 3.5202061 | 63.4908 | 13.133 | 951.90 | 8.2270 | 960.12 | 0.00 | 0.3522 |
| 3.5378072 | 63.5051 | 13.030 | 939.73 | 8.2093 | 947.94 | 0.00 | 0.3505 |
| 3.5554962 | 63.5186 | 12.928 | 927.72 | 8.1915 | 935.92 | 0.00 | 0.3487 |
| 3.5732737 | 63.5312 | 12.827 | 915.88 | 8.1737 | 924.06 | 0.00 | 0.3470 |
| 3.5911400 | 63.5430 | 12.727 | 904.20 | 8.1557 | 912.35 | 0.00 | 0.3453 |
| 3.6090957 | 63.5540 | 12.627 | 892.67 | 8.1377 | 900.81 | 0.00 | 0.3435 |
| 3.6271412 | 63.5643 | 12.529 | 881.31 | 8.1196 | 889.42 | 0.00 | 0.3418 |
| 3.6452769 | 63.5738 | 12.431 | 870.09 | 8.1015 | 878.19 | 0.00 | 0.3401 |
| 3.6635033 | 63.5826 | 12.335 | 859.02 | 8.0833 | 867.11 | 0.00 | 0.3384 |
| 3.6818208 | 63.5908 | 12.239 | 848.11 | 8.0650 | 856.17 | 0.00 | 0.3367 |
| 3.7002299 | 63.5983 | 12.144 | 837.34 | 8.0466 | 845.38 | 0.00 | 0.3351 |
| 3.7187311 | 63.6052 | 12.050 | 826.71 | 8.0281 | 834.74 | 0.00 | 0.3334 |
| 3.7373247 | 63.6115 | 11.956 | 816.23 | 8.0096 | 824.24 | 0.00 | 0.3317 |
| 3.7560114 | 63.6172 | 11.864 | 805.89 | 7.9910 | 813.88 | 0.00 | 0.3301 |
| 3.7747914 | 63.6224 | 11.772 | 795.69 | 7.9724 | 803.66 | 0.00 | 0.3285 |
| 3.7936654 | 63.6271 | 11.681 | 785.62 | 7.9537 | 793.58 | 0.00 | 0.3268 |
| 3.8126337 | 63.6313 | 11.591 | 775.69 | 7.9349 | 783.63 | 0.00 | 0.3252 |
| 3.8316969 | 63.6349 | 11.502 | 765.89 | 7.9160 | 773.81 | 0.00 | 0.3236 |
| 3.8508554 | 63.6885 | 11.413 | 756.18 | 7.8971 | 764.08 | 0.00 | 0.3220 |
| 3.8701096 | 63.6917 | 11.323 | 746.50 | 7.8781 | 754.37 | 0.00 | 0.3204 |
| 3.8894602 | 63.6941 | 11.234 | 736.94 | 7.8591 | 744.80 | 0.00 | 0.3188 |
| 3.9089075 | 63.6959 | 11.146 | 727.51 | 7.8399 | 735.35 | 0.00 | 0.3172 |
| 3.9284520 | 63.6970 | 11.058 | 718.20 | 7.8208 | 726.02 | 0.00 | 0.3156 |
| 3.9480943 | 63.6975 | 10.972 | 709.03 | 7.8015 | 716.83 | 0.00 | 0.3140 |
| 3.9678347 | 63.6975 | 10.886 | 699.97 | 7.7822 | 707.75 | 0.00 | 0.3125 |
| 3.9876739 | 63.6969 | 10.800 | 691.04 | 7.7628 | 698.80 | 0.00 | 0.3109 |
| Er ($Z=68$) | | | | | | | |
| Atomic weight: $A_r=167.2600 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=9.0390$ | | | | | | | |
| $\sigma_a (\text{barns/atom})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 277.742$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2(e \text{ atom}^{-1})\times 2.51586\times 10^5$ | | | | | | | |
| 19 edges. Edge energies (keV) | | | | | | | |
| K | 57.4855 | L I | 9.75130 | L II | 9.26430 | L III | 8.35790 |
| M I | 2.20650 | M II | 2.00580 | M III | 1.81180 | M IV | 1.45330 |
| M V | 1.40930 | N I | 0.449100 | N II | 0.0366200 | N III | 0.320000 |
| N IV | 0.176700 | N V | 0.167600 | N VI | 0.00430000 | N VII | 0.00430000 |
| O I | 0.0598000 | O II | 0.0294000 | O III | 0.0294000 | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H}82,3/5\text{CL})=(-1.1649, -0.69660) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.015166 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 20.7708 | 10.169 | 25585 | 0.48040 | 25585 | 0.00 | 12.40 |
| 0.10050000 | 20.8075 | 10.189 | 25507 | 0.48580 | 25508 | 0.00 | 12.34 |
| 0.10100250 | 20.8444 | 10.209 | 25430 | 0.49125 | 25430 | 0.00 | 12.28 |
| 0.10150751 | 20.8813 | 10.229 | 25352 | 0.49675 | 25353 | 0.00 | 12.21 |
| 0.10201505 | 20.9183 | 10.248 | 25274 | 0.50231 | 25274 | 0.00 | 12.15 |
| 0.10252513 | 20.9554 | 10.268 | 25196 | 0.50791 | 25196 | 0.00 | 12.09 |
| 0.10303775 | 20.9925 | 10.287 | 25117 | 0.51356 | 25118 | 0.00 | 12.03 |
| 0.10355294 | 21.0297 | 10.306 | 25038 | 0.51927 | 25039 | 0.00 | 11.97 |
| 0.10407070 | 21.0670 | 10.325 | 24959 | 0.52502 | 24960 | 0.00 | 11.91 |
| 0.10459106 | 21.1043 | 10.343 | 24880 | 0.53083 | 24881 | 0.00 | 11.85 |
| 0.10511401 | 21.1417 | 10.362 | 24801 | 0.53669 | 24801 | 0.00 | 11.80 |
| 0.10563958 | 21.1791 | 10.380 | 24721 | 0.54260 | 24721 | 0.00 | 11.74 |
| 0.10616778 | 21.2165 | 10.398 | 24641 | 0.54856 | 24641 | 0.00 | 11.68 |
| 0.10669862 | 21.2540 | 10.416 | 24561 | 0.55458 | 24561 | 0.00 | 11.62 |
| 0.10723211 | 21.2915 | 10.434 | 24480 | 0.56065 | 24481 | 0.00 | 11.56 |
| 0.10776827 | 21.3291 | 10.452 | 24399 | 0.56677 | 24400 | 0.00 | 11.50 |
| 0.10830712 | 21.3666 | 10.469 | 24318 | 0.57295 | 24319 | 0.00 | 11.45 |
| 0.10884865 | 21.4042 | 10.486 | 24237 | 0.57918 | 24238 | 0.00 | 11.39 |
| 0.10939289 | 21.4417 | 10.503 | 24156 | 0.58546 | 24156 | 0.00 | 11.33 |
| 0.10993986 | 21.4793 | 10.520 | 24074 | 0.59180 | 24075 | 0.00 | 11.28 |
| 0.11048956 | 21.5168 | 10.537 | 23992 | 0.59820 | 23993 | 0.00 | 11.22 |
| 0.11104201 | 21.5543 | 10.553 | 23910 | 0.60465 | 23911 | 0.00 | 11.17 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Er ($Z=68$) | | | | | | | |
| 0.11159722 | 21.5918 | 10.569 | 23828 | 0.61116 | 23828 | 0.00 | 11.11 |
| 0.11215520 | 21.6293 | 10.585 | 23745 | 0.61772 | 23746 | 0.00 | 11.05 |
| 0.11271598 | 21.6668 | 10.601 | 23662 | 0.62434 | 23663 | 0.00 | 11.00 |
| 0.11327956 | 21.7041 | 10.617 | 23579 | 0.63101 | 23580 | 0.00 | 10.94 |
| 0.11384596 | 21.7415 | 10.632 | 23496 | 0.63774 | 23496 | 0.00 | 10.89 |
| 0.11441519 | 21.7787 | 10.647 | 23412 | 0.64453 | 23413 | 0.00 | 10.84 |
| 0.11498726 | 21.8159 | 10.662 | 23328 | 0.65138 | 23329 | 0.00 | 10.78 |
| 0.11556220 | 21.8531 | 10.677 | 23244 | 0.65828 | 23245 | 0.00 | 10.73 |
| 0.11614001 | 21.8901 | 10.691 | 23160 | 0.66524 | 23161 | 0.00 | 10.68 |
| 0.11672071 | 21.9270 | 10.706 | 23076 | 0.67226 | 23076 | 0.00 | 10.62 |
| 0.11730431 | 21.9638 | 10.720 | 22991 | 0.67934 | 22992 | 0.00 | 10.57 |
| 0.11789083 | 22.0005 | 10.734 | 22906 | 0.68648 | 22907 | 0.00 | 10.52 |
| 0.11848029 | 22.0370 | 10.747 | 22821 | 0.69368 | 22822 | 0.00 | 10.46 |
| 0.11907269 | 22.0734 | 10.761 | 22736 | 0.70093 | 22737 | 0.00 | 10.41 |
| 0.11966805 | 22.1096 | 10.774 | 22650 | 0.70825 | 22651 | 0.00 | 10.36 |
| 0.12026639 | 22.1457 | 10.787 | 22565 | 0.71563 | 22566 | 0.00 | 10.31 |
| 0.12086772 | 22.1816 | 10.799 | 22479 | 0.72307 | 22480 | 0.00 | 10.26 |
| 0.12147206 | 22.2173 | 10.812 | 22393 | 0.73056 | 22394 | 0.00 | 10.21 |
| 0.12207942 | 22.2528 | 10.824 | 22307 | 0.73812 | 22307 | 0.00 | 10.16 |
| 0.12268982 | 22.2880 | 10.836 | 22220 | 0.74574 | 22221 | 0.00 | 10.11 |
| 0.12330327 | 22.3230 | 10.848 | 22134 | 0.75343 | 22134 | 0.00 | 10.06 |
| 0.12391979 | 22.3578 | 10.859 | 22047 | 0.76117 | 22048 | 0.00 | 10.01 |
| 0.12453939 | 22.3922 | 10.871 | 21960 | 0.76898 | 21961 | 0.00 | 9.955 |
| 0.12516208 | 22.4264 | 10.882 | 21873 | 0.77685 | 21874 | 0.00 | 9.906 |
| 0.12578789 | 22.4603 | 10.892 | 21786 | 0.78478 | 21786 | 0.00 | 9.857 |
| 0.12641683 | 22.4938 | 10.903 | 21698 | 0.79277 | 21699 | 0.00 | 9.808 |
| 0.12704892 | 22.5270 | 10.913 | 21611 | 0.80083 | 21611 | 0.00 | 9.759 |
| 0.12768416 | 22.5598 | 10.923 | 21523 | 0.80896 | 21524 | 0.00 | 9.710 |
| 0.12832258 | 22.5922 | 10.933 | 21435 | 0.81714 | 21436 | 0.00 | 9.662 |
| 0.12896419 | 22.6242 | 10.942 | 21347 | 0.82539 | 21348 | 0.00 | 9.614 |
| 0.12960902 | 22.6557 | 10.952 | 21258 | 0.83371 | 21259 | 0.00 | 9.566 |
| 0.13025706 | 22.6868 | 10.961 | 21170 | 0.84209 | 21171 | 0.00 | 9.518 |
| 0.13090835 | 22.7173 | 10.969 | 21082 | 0.85053 | 21082 | 0.00 | 9.471 |
| 0.13156289 | 22.7473 | 10.978 | 20993 | 0.85904 | 20994 | 0.00 | 9.424 |
| 0.13222070 | 22.7768 | 10.986 | 20904 | 0.86762 | 20905 | 0.00 | 9.377 |
| 0.13288181 | 22.8056 | 10.994 | 20815 | 0.87626 | 20816 | 0.00 | 9.330 |
| 0.13354621 | 22.8338 | 11.002 | 20726 | 0.88497 | 20727 | 0.00 | 9.284 |
| 0.13421395 | 22.8614 | 11.009 | 20637 | 0.89375 | 20638 | 0.00 | 9.238 |
| 0.13488502 | 22.8882 | 11.016 | 20548 | 0.90259 | 20549 | 0.00 | 9.192 |
| 0.13555944 | 22.9142 | 11.023 | 20458 | 0.91150 | 20459 | 0.00 | 9.146 |
| 0.13623724 | 22.9394 | 11.030 | 20369 | 0.92048 | 20370 | 0.00 | 9.101 |
| 0.13691842 | 22.9638 | 11.036 | 20279 | 0.92952 | 20280 | 0.00 | 9.055 |
| 0.13760302 | 22.9872 | 11.043 | 20190 | 0.93863 | 20191 | 0.00 | 9.010 |
| 0.13829103 | 23.0097 | 11.048 | 20100 | 0.94781 | 20101 | 0.00 | 8.965 |
| 0.13898249 | 23.0311 | 11.054 | 20010 | 0.95706 | 20011 | 0.00 | 8.921 |
| 0.13967740 | 23.0514 | 11.059 | 19920 | 0.96638 | 19921 | 0.00 | 8.876 |
| 0.14037579 | 23.0705 | 11.064 | 19830 | 0.97577 | 19831 | 0.00 | 8.832 |
| 0.14107766 | 23.0883 | 11.069 | 19740 | 0.98523 | 19741 | 0.00 | 8.788 |
| 0.14178305 | 23.1047 | 11.074 | 19650 | 0.99475 | 19651 | 0.00 | 8.745 |
| 0.14249197 | 23.1197 | 11.078 | 19559 | 1.0043 | 19560 | 0.00 | 8.701 |
| 0.14320443 | 23.1331 | 11.082 | 19469 | 1.0140 | 19470 | 0.00 | 8.658 |
| 0.14392045 | 23.1448 | 11.086 | 19378 | 1.0237 | 19380 | 0.00 | 8.615 |
| 0.14464005 | 23.1547 | 11.089 | 19288 | 1.0336 | 19289 | 0.00 | 8.572 |
| 0.14536325 | 23.1626 | 11.092 | 19197 | 1.0434 | 19199 | 0.00 | 8.529 |
| 0.14609007 | 23.1683 | 11.095 | 19107 | 1.0534 | 19108 | 0.00 | 8.487 |
| 0.14682052 | 23.1717 | 11.098 | 19016 | 1.0634 | 19017 | 0.00 | 8.445 |
| 0.14755462 | 23.1726 | 11.100 | 18926 | 1.0735 | 18927 | 0.00 | 8.403 |
| 0.14829239 | 23.1707 | 11.102 | 18835 | 1.0837 | 18836 | 0.00 | 8.361 |
| 0.14903386 | 23.1658 | 11.104 | 18744 | 1.0939 | 18745 | 0.00 | 8.319 |
| 0.14977903 | 23.1576 | 11.105 | 18653 | 1.1042 | 18655 | 0.00 | 8.278 |
| 0.15052792 | 23.1458 | 11.106 | 18563 | 1.1146 | 18564 | 0.00 | 8.237 |
| 0.15128056 | 23.1299 | 11.107 | 18472 | 1.1250 | 18473 | 0.00 | 8.196 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Er ($Z=68$) | | | | | | | |
| 0.15203696 | 23.1095 | 11.108 | 18381 | 1.1356 | 18382 | 0.00 | 8.155 |
| 0.15279715 | 23.0842 | 11.108 | 18290 | 1.1462 | 18291 | 0.00 | 8.114 |
| 0.15356113 | 23.0532 | 11.108 | 18199 | 1.1568 | 18201 | 0.00 | 8.074 |
| 0.15432894 | 23.0158 | 11.108 | 18109 | 1.1676 | 18110 | 0.00 | 8.034 |
| 0.15510058 | 22.9713 | 11.108 | 18018 | 1.1784 | 18019 | 0.00 | 7.994 |
| 0.15587609 | 22.9186 | 11.107 | 17927 | 1.1893 | 17928 | 0.00 | 7.954 |
| 0.15665547 | 22.8563 | 11.106 | 17836 | 1.2003 | 17837 | 0.00 | 7.914 |
| 0.15743875 | 22.7829 | 11.105 | 17745 | 1.2113 | 17747 | 0.00 | 7.875 |
| 0.15822594 | 22.6965 | 11.103 | 17655 | 1.2224 | 17656 | 0.00 | 7.836 |
| 0.15901707 | 22.5945 | 11.101 | 17564 | 1.2336 | 17565 | 0.00 | 7.797 |
| 0.15981215 | 22.4735 | 11.099 | 17473 | 1.2449 | 17475 | 0.00 | 7.758 |
| 0.16061121 | 22.3291 | 11.097 | 17383 | 1.2562 | 17384 | 0.00 | 7.720 |
| 0.16141427 | 22.1551 | 11.094 | 17292 | 1.2676 | 17293 | 0.00 | 7.681 |
| 0.16222134 | 21.9426 | 11.091 | 17201 | 1.2791 | 17203 | 0.00 | 7.643 |
| 0.16303245 | 21.6779 | 11.088 | 17111 | 1.2907 | 17112 | 0.00 | 7.605 |
| 0.16384761 | 21.3391 | 11.085 | 17020 | 1.3024 | 17022 | 0.00 | 7.567 |
| 0.16466685 | 20.8872 | 11.081 | 16930 | 1.3141 | 16931 | 0.00 | 7.529 |
| 0.16549018 | 20.2424 | 11.077 | 16840 | 1.3259 | 16841 | 0.00 | 7.492 |
| 0.16631763 | 19.1976 | 11.073 | 16749 | 1.3378 | 16751 | 0.00 | 7.455 |
| 0.16714922 | 16.8073 | 11.068 | 16659 | 1.3497 | 16660 | 0.00 | 7.418 |
| 0.16751369 | 12.7085 | 11.066 | 16620 | 1.3550 | 16621 | 0.00 | 7.401 |
| 0.16768632 | 12.8511 | 19.211 | 28823 | 1.3574 | 28824 | 0.00 | 7.394 |
| 0.16798497 | 16.9178 | 19.050 | 28531 | 1.3617 | 28532 | 0.00 | 7.381 |
| 0.16882489 | 20.2020 | 18.615 | 27740 | 1.3739 | 27742 | 0.00 | 7.344 |
| 0.16966902 | 21.6970 | 18.203 | 26991 | 1.3860 | 26993 | 0.00 | 7.307 |
| 0.17051736 | 22.6320 | 17.812 | 26281 | 1.3983 | 26282 | 0.00 | 7.271 |
| 0.17136995 | 23.2653 | 17.442 | 25607 | 1.4106 | 25608 | 0.00 | 7.235 |
| 0.17222680 | 23.6915 | 17.091 | 24967 | 1.4231 | 24968 | 0.00 | 7.199 |
| 0.17308793 | 23.9468 | 16.759 | 24359 | 1.4356 | 24361 | 0.00 | 7.163 |
| 0.17395337 | 24.0300 | 16.444 | 23782 | 1.4481 | 23784 | 0.00 | 7.127 |
| 0.17482314 | 23.8895 | 16.145 | 23234 | 1.4608 | 23235 | 0.00 | 7.092 |
| 0.17569726 | 23.3199 | 15.861 | 22712 | 1.4735 | 22714 | 0.00 | 7.057 |
| 0.17657574 | 20.3429 | 15.593 | 22216 | 1.4863 | 22218 | 0.00 | 7.022 |
| 0.17660087 | 19.9814 | 15.585 | 22203 | 1.4867 | 22204 | 0.00 | 7.021 |
| 0.17679912 | 20.1340 | 20.764 | 29547 | 1.4896 | 29549 | 0.00 | 7.013 |
| 0.17745862 | 23.9084 | 20.369 | 28877 | 1.4992 | 28879 | 0.00 | 6.987 |
| 0.17834591 | 25.5540 | 19.863 | 28021 | 1.5122 | 28022 | 0.00 | 6.952 |
| 0.17923764 | 26.5431 | 19.384 | 27209 | 1.5252 | 27210 | 0.00 | 6.917 |
| 0.18013383 | 27.2564 | 18.930 | 26438 | 1.5384 | 26440 | 0.00 | 6.883 |
| 0.18103450 | 27.8061 | 18.499 | 25708 | 1.5516 | 25709 | 0.00 | 6.849 |
| 0.18193967 | 28.2463 | 18.089 | 25014 | 1.5649 | 25016 | 0.00 | 6.815 |
| 0.18284937 | 28.6060 | 17.701 | 24356 | 1.5782 | 24357 | 0.00 | 6.781 |
| 0.18376362 | 28.9034 | 17.333 | 23730 | 1.5917 | 23732 | 0.00 | 6.747 |
| 0.18468244 | 29.1503 | 16.984 | 23136 | 1.6052 | 23138 | 0.00 | 6.713 |
| 0.18560585 | 29.3557 | 16.655 | 22575 | 1.6188 | 22577 | 0.00 | 6.680 |
| 0.18653388 | 29.5275 | 16.346 | 22047 | 1.6325 | 22049 | 0.00 | 6.647 |
| 0.18746655 | 29.6720 | 16.057 | 21548 | 1.6463 | 21550 | 0.00 | 6.614 |
| 0.18840388 | 29.7938 | 15.784 | 21077 | 1.6601 | 21079 | 0.00 | 6.581 |
| 0.18934590 | 29.8966 | 15.528 | 20632 | 1.6740 | 20634 | 0.00 | 6.548 |
| 0.19029263 | 29.9834 | 15.287 | 20211 | 1.6881 | 20212 | 0.00 | 6.515 |
| 0.19124409 | 30.0563 | 15.059 | 19811 | 1.7021 | 19813 | 0.00 | 6.483 |
| 0.19220031 | 30.1174 | 14.845 | 19432 | 1.7163 | 19433 | 0.00 | 6.451 |
| 0.19316131 | 30.1680 | 14.642 | 19071 | 1.7306 | 19073 | 0.00 | 6.419 |
| 0.19412712 | 30.2094 | 14.451 | 18729 | 1.7449 | 18730 | 0.00 | 6.387 |
| 0.19509776 | 30.2423 | 14.271 | 18403 | 1.7593 | 18405 | 0.00 | 6.355 |
| 0.19607325 | 30.2681 | 14.103 | 18095 | 1.7738 | 18097 | 0.00 | 6.323 |
| 0.19705361 | 30.2886 | 13.945 | 17805 | 1.7884 | 17807 | 0.00 | 6.292 |
| 0.19803888 | 30.3049 | 13.799 | 17530 | 1.8030 | 17531 | 0.00 | 6.261 |
| 0.19902907 | 30.3180 | 13.661 | 17269 | 1.8178 | 17270 | 0.00 | 6.229 |
| 0.20002422 | 30.3287 | 13.532 | 17021 | 1.8326 | 17022 | 0.00 | 6.198 |
| 0.20102434 | 30.3374 | 13.411 | 16784 | 1.8475 | 16786 | 0.00 | 6.168 |
| 0.20202946 | 30.3447 | 13.297 | 16559 | 1.8625 | 16561 | 0.00 | 6.137 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Er ($Z=68$) | | | | | | | |
| 0.20303961 | 30.3508 | 13.190 | 16344 | 1.8775 | 16346 | 0.00 | 6.106 |
| 0.20405481 | 30.3562 | 13.089 | 16138 | 1.8927 | 16140 | 0.00 | 6.076 |
| 0.20507508 | 30.3609 | 12.993 | 15940 | 1.9079 | 15942 | 0.00 | 6.046 |
| 0.20610046 | 30.3653 | 12.903 | 15751 | 1.9232 | 15753 | 0.00 | 6.016 |
| 0.20713096 | 30.3695 | 12.817 | 15568 | 1.9386 | 15570 | 0.00 | 5.986 |
| 0.20816661 | 30.3736 | 12.736 | 15393 | 1.9541 | 15395 | 0.00 | 5.956 |
| 0.20920745 | 30.3778 | 12.659 | 15223 | 1.9696 | 15225 | 0.00 | 5.926 |
| 0.21025348 | 30.3820 | 12.586 | 15060 | 1.9853 | 15062 | 0.00 | 5.897 |
| 0.21130475 | 30.3864 | 12.516 | 14901 | 2.0010 | 14903 | 0.00 | 5.868 |
| 0.21236128 | 30.3910 | 12.449 | 14748 | 2.0168 | 14750 | 0.00 | 5.838 |
| 0.21342308 | 30.3958 | 12.385 | 14600 | 2.0327 | 14602 | 0.00 | 5.809 |
| 0.21449020 | 30.4009 | 12.324 | 14456 | 2.0486 | 14458 | 0.00 | 5.780 |
| 0.21556265 | 30.4064 | 12.266 | 14316 | 2.0647 | 14318 | 0.00 | 5.752 |
| 0.21664046 | 30.4121 | 12.210 | 14179 | 2.0808 | 14181 | 0.00 | 5.723 |
| 0.21772366 | 30.4182 | 12.156 | 14047 | 2.0970 | 14049 | 0.00 | 5.695 |
| 0.21881228 | 30.4246 | 12.104 | 13917 | 2.1133 | 13920 | 0.00 | 5.666 |
| 0.21990634 | 30.4313 | 12.055 | 13791 | 2.1296 | 13793 | 0.00 | 5.638 |
| 0.22100588 | 30.4384 | 12.007 | 13668 | 2.1461 | 13670 | 0.00 | 5.610 |
| 0.22211090 | 30.4457 | 11.961 | 13548 | 2.1626 | 13550 | 0.00 | 5.582 |
| 0.22322146 | 30.4534 | 11.916 | 13430 | 2.1792 | 13433 | 0.00 | 5.554 |
| 0.22433757 | 30.4613 | 11.873 | 13315 | 2.1959 | 13317 | 0.00 | 5.527 |
| 0.22545925 | 30.4695 | 11.831 | 13203 | 2.2127 | 13205 | 0.00 | 5.499 |
| 0.22658655 | 30.4780 | 11.791 | 13092 | 2.2296 | 13094 | 0.00 | 5.472 |
| 0.22771948 | 30.4868 | 11.752 | 12984 | 2.2465 | 12986 | 0.00 | 5.445 |
| 0.22885808 | 30.4957 | 11.714 | 12878 | 2.2635 | 12880 | 0.00 | 5.418 |
| 0.23000237 | 30.5049 | 11.677 | 12773 | 2.2806 | 12776 | 0.00 | 5.391 |
| 0.23115238 | 30.5143 | 11.642 | 12671 | 2.2978 | 12673 | 0.00 | 5.364 |
| 0.23230814 | 30.5239 | 11.607 | 12570 | 2.3151 | 12572 | 0.00 | 5.337 |
| 0.23346969 | 30.5336 | 11.573 | 12471 | 2.3324 | 12473 | 0.00 | 5.311 |
| 0.23463703 | 30.5434 | 11.540 | 12374 | 2.3498 | 12376 | 0.00 | 5.284 |
| 0.23581022 | 30.5534 | 11.508 | 12278 | 2.3673 | 12280 | 0.00 | 5.258 |
| 0.23698927 | 30.5635 | 11.477 | 12184 | 2.3849 | 12186 | 0.00 | 5.232 |
| 0.23817422 | 30.5737 | 11.446 | 12091 | 2.4026 | 12093 | 0.00 | 5.206 |
| 0.23936509 | 30.5840 | 11.416 | 11999 | 2.4203 | 12002 | 0.00 | 5.180 |
| 0.24056191 | 30.5943 | 11.387 | 11909 | 2.4381 | 11911 | 0.00 | 5.154 |
| 0.24176472 | 30.6047 | 11.359 | 11820 | 2.4561 | 11823 | 0.00 | 5.128 |
| 0.24297355 | 30.6150 | 11.331 | 11732 | 2.4740 | 11735 | 0.00 | 5.103 |
| 0.24418841 | 30.6254 | 11.303 | 11646 | 2.4921 | 11648 | 0.00 | 5.077 |
| 0.24540936 | 30.6358 | 11.277 | 11561 | 2.5102 | 11563 | 0.00 | 5.052 |
| 0.24663640 | 30.6461 | 11.251 | 11476 | 2.5285 | 11479 | 0.00 | 5.027 |
| 0.24786959 | 30.6564 | 11.225 | 11393 | 2.5468 | 11396 | 0.00 | 5.002 |
| 0.24910893 | 30.6666 | 11.200 | 11311 | 2.5651 | 11314 | 0.00 | 4.977 |
| 0.25035448 | 30.6767 | 11.175 | 11230 | 2.5836 | 11233 | 0.00 | 4.952 |
| 0.25160625 | 30.6868 | 11.151 | 11150 | 2.6021 | 11153 | 0.00 | 4.928 |
| 0.25286428 | 30.6967 | 11.127 | 11071 | 2.6208 | 11074 | 0.00 | 4.903 |
| 0.25412860 | 30.7064 | 11.104 | 10993 | 2.6395 | 10996 | 0.00 | 4.879 |
| 0.25539925 | 30.7161 | 11.081 | 10916 | 2.6582 | 10918 | 0.00 | 4.855 |
| 0.25667624 | 30.7255 | 11.059 | 10840 | 2.6771 | 10842 | 0.00 | 4.830 |
| 0.25795962 | 30.7348 | 11.037 | 10764 | 2.6960 | 10767 | 0.00 | 4.806 |
| 0.25924942 | 30.7438 | 11.015 | 10690 | 2.7150 | 10692 | 0.00 | 4.782 |
| 0.26054567 | 30.7526 | 10.994 | 10616 | 2.7341 | 10619 | 0.00 | 4.759 |
| 0.26184840 | 30.7612 | 10.973 | 10543 | 2.7533 | 10546 | 0.00 | 4.735 |
| 0.26315764 | 30.7695 | 10.953 | 10471 | 2.7725 | 10474 | 0.00 | 4.711 |
| 0.26447343 | 30.7776 | 10.933 | 10400 | 2.7918 | 10403 | 0.00 | 4.688 |
| 0.26579579 | 30.7853 | 10.913 | 10329 | 2.8112 | 10332 | 0.00 | 4.665 |
| 0.26712477 | 30.7927 | 10.893 | 10260 | 2.8307 | 10262 | 0.00 | 4.641 |
| 0.26846040 | 30.7997 | 10.874 | 10191 | 2.8502 | 10194 | 0.00 | 4.618 |
| 0.26980270 | 30.8064 | 10.855 | 10123 | 2.8698 | 10125 | 0.00 | 4.595 |
| 0.27115171 | 30.8127 | 10.837 | 10055 | 2.8895 | 10058 | 0.00 | 4.573 |
| 0.27250747 | 30.8186 | 10.819 | 9988.4 | 2.9093 | 9991.3 | 0.00 | 4.550 |
| 0.27387001 | 30.8240 | 10.801 | 9922.3 | 2.9292 | 9925.3 | 0.00 | 4.527 |
| 0.27523936 | 30.8290 | 10.784 | 9857.0 | 2.9491 | 9860.0 | 0.00 | 4.505 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Er ($Z=68$) | | | | | | | |
| 0.27661556 | 30.8334 | 10.767 | 9792.4 | 2.9691 | 9795.4 | 0.00 | 4.482 |
| 0.27799863 | 30.8373 | 10.750 | 9728.5 | 2.9891 | 9731.5 | 0.00 | 4.460 |
| 0.27938863 | 30.8406 | 10.733 | 9665.2 | 3.0093 | 9668.2 | 0.00 | 4.438 |
| 0.28078557 | 30.8433 | 10.717 | 9602.6 | 3.0295 | 9605.6 | 0.00 | 4.416 |
| 0.28218950 | 30.8453 | 10.701 | 9540.7 | 3.0498 | 9543.7 | 0.00 | 4.394 |
| 0.28360044 | 30.8466 | 10.686 | 9479.4 | 3.0702 | 9482.4 | 0.00 | 4.372 |
| 0.28501845 | 30.8471 | 10.670 | 9418.7 | 3.0906 | 9421.8 | 0.00 | 4.350 |
| 0.28644354 | 30.8468 | 10.655 | 9358.7 | 3.1111 | 9361.8 | 0.00 | 4.328 |
| 0.28787576 | 30.8456 | 10.641 | 9299.3 | 3.1317 | 9302.5 | 0.00 | 4.307 |
| 0.28931514 | 30.8434 | 10.626 | 9240.6 | 3.1523 | 9243.7 | 0.00 | 4.285 |
| 0.29076171 | 30.8401 | 10.612 | 9182.4 | 3.1730 | 9185.6 | 0.00 | 4.264 |
| 0.29221552 | 30.8356 | 10.598 | 9124.9 | 3.1938 | 9128.1 | 0.00 | 4.243 |
| 0.29367660 | 30.8299 | 10.585 | 9067.9 | 3.2147 | 9071.2 | 0.00 | 4.222 |
| 0.29514498 | 30.8227 | 10.572 | 9011.6 | 3.2356 | 9014.8 | 0.00 | 4.201 |
| 0.29662071 | 30.8138 | 10.559 | 8955.8 | 3.2566 | 8959.1 | 0.00 | 4.180 |
| 0.29810381 | 30.8032 | 10.546 | 8900.7 | 3.2777 | 8903.9 | 0.00 | 4.159 |
| 0.29959433 | 30.7905 | 10.534 | 8846.1 | 3.2989 | 8849.4 | 0.00 | 4.138 |
| 0.30109230 | 30.7754 | 10.522 | 8792.0 | 3.3201 | 8795.4 | 0.00 | 4.118 |
| 0.30259776 | 30.7576 | 10.510 | 8738.6 | 3.3414 | 8741.9 | 0.00 | 4.097 |
| 0.30411075 | 30.7365 | 10.499 | 8685.7 | 3.3627 | 8689.1 | 0.00 | 4.077 |
| 0.30563130 | 30.7116 | 10.488 | 8633.4 | 3.3841 | 8636.7 | 0.00 | 4.057 |
| 0.30715946 | 30.6819 | 10.477 | 8581.6 | 3.4056 | 8585.0 | 0.00 | 4.036 |
| 0.30869526 | 30.6463 | 10.467 | 8530.3 | 3.4271 | 8533.7 | 0.00 | 4.016 |
| 0.31023873 | 30.6031 | 10.456 | 8479.6 | 3.4488 | 8483.1 | 0.00 | 3.996 |
| 0.31178993 | 30.5497 | 10.447 | 8429.4 | 3.4704 | 8432.9 | 0.00 | 3.977 |
| 0.31334888 | 30.4818 | 10.437 | 8379.8 | 3.4922 | 8383.3 | 0.00 | 3.957 |
| 0.31491562 | 30.3915 | 10.428 | 8330.7 | 3.5140 | 8334.2 | 0.00 | 3.937 |
| 0.31649020 | 30.2622 | 10.419 | 8282.0 | 3.5359 | 8285.6 | 0.00 | 3.917 |
| 0.31807265 | 30.0460 | 10.410 | 8234.0 | 3.5578 | 8237.5 | 0.00 | 3.898 |
| 0.31966301 | 29.3972 | 10.402 | 8186.4 | 3.5798 | 8189.9 | 0.00 | 3.879 |
| 0.32033919 | 29.4022 | 11.582 | 9096.1 | 3.5892 | 9099.7 | 0.00 | 3.870 |
| 0.32126133 | 29.9010 | 11.580 | 9068.3 | 3.6019 | 9071.9 | 0.00 | 3.859 |
| 0.32286764 | 30.2189 | 11.576 | 9020.4 | 3.6240 | 9024.0 | 0.00 | 3.840 |
| 0.32448197 | 30.3963 | 11.573 | 8972.9 | 3.6462 | 8976.6 | 0.00 | 3.821 |
| 0.32610438 | 30.5222 | 11.570 | 8926.0 | 3.6685 | 8929.7 | 0.00 | 3.802 |
| 0.32773491 | 30.6210 | 11.567 | 8879.5 | 3.6908 | 8883.2 | 0.00 | 3.783 |
| 0.32937358 | 30.7031 | 11.565 | 8833.5 | 3.7132 | 8837.3 | 0.00 | 3.764 |
| 0.33102045 | 30.7738 | 11.563 | 8788.0 | 3.7356 | 8791.8 | 0.00 | 3.746 |
| 0.33267555 | 30.8362 | 11.561 | 8743.0 | 3.7581 | 8746.7 | 0.00 | 3.727 |
| 0.33433893 | 30.8922 | 11.560 | 8698.4 | 3.7807 | 8702.2 | 0.00 | 3.708 |
| 0.33601062 | 30.9432 | 11.558 | 8654.3 | 3.8033 | 8658.1 | 0.00 | 3.690 |
| 0.33769068 | 30.9899 | 11.558 | 8610.6 | 3.8260 | 8614.4 | 0.00 | 3.672 |
| 0.33937913 | 31.0332 | 11.557 | 8567.3 | 3.8487 | 8571.2 | 0.00 | 3.653 |
| 0.34107602 | 31.0734 | 11.557 | 8524.5 | 3.8715 | 8528.4 | 0.00 | 3.635 |
| 0.34278140 | 31.1110 | 11.557 | 8482.2 | 3.8944 | 8486.1 | 0.00 | 3.617 |
| 0.34449531 | 31.1460 | 11.557 | 8440.2 | 3.9173 | 8444.1 | 0.00 | 3.599 |
| 0.34621779 | 31.1788 | 11.558 | 8398.7 | 3.9402 | 8402.6 | 0.00 | 3.581 |
| 0.34794888 | 31.2093 | 11.559 | 8357.6 | 3.9632 | 8361.6 | 0.00 | 3.563 |
| 0.34968862 | 31.2376 | 11.560 | 8316.9 | 3.9863 | 8320.9 | 0.00 | 3.546 |
| 0.35143706 | 31.2635 | 11.561 | 8276.6 | 4.0094 | 8280.6 | 0.00 | 3.528 |
| 0.35319425 | 31.2869 | 11.563 | 8236.7 | 4.0326 | 8240.7 | 0.00 | 3.510 |
| 0.35496022 | 31.3075 | 11.565 | 8197.2 | 4.0559 | 8201.2 | 0.00 | 3.493 |
| 0.35673502 | 31.3245 | 11.568 | 8158.0 | 4.0791 | 8162.1 | 0.00 | 3.476 |
| 0.35851870 | 31.3368 | 11.570 | 8119.2 | 4.1025 | 8123.3 | 0.00 | 3.458 |
| 0.36031129 | 31.3425 | 11.573 | 8080.7 | 4.1259 | 8084.9 | 0.00 | 3.441 |
| 0.36211285 | 31.3371 | 11.576 | 8042.6 | 4.1493 | 8046.8 | 0.00 | 3.424 |
| 0.36392341 | 31.3077 | 11.579 | 8004.9 | 4.1728 | 8009.0 | 0.00 | 3.407 |
| 0.36574303 | 31.1700 | 11.583 | 7967.4 | 4.1963 | 7971.6 | 0.00 | 3.390 |
| 0.36576056 | 31.1662 | 11.583 | 7967.1 | 4.1966 | 7971.3 | 0.00 | 3.390 |
| 0.36663944 | 31.1807 | 11.915 | 8176.2 | 4.2079 | 8180.4 | 0.00 | 3.382 |
| 0.36757174 | 31.3160 | 11.918 | 8157.4 | 4.2199 | 8161.6 | 0.00 | 3.373 |
| 0.36940960 | 31.4363 | 11.924 | 8120.6 | 4.2436 | 8124.9 | 0.00 | 3.356 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Er ($Z=68$) | | | | | | | |
| 0.37125665 | 31.5149 | 11.930 | 8084.2 | 4.2672 | 8088.5 | 0.00 | 3.340 |
| 0.37311293 | 31.5786 | 11.936 | 8048.1 | 4.2910 | 8052.4 | 0.00 | 3.323 |
| 0.37497850 | 31.6344 | 11.942 | 8012.2 | 4.3148 | 8016.6 | 0.00 | 3.306 |
| 0.37685339 | 31.6853 | 11.948 | 7976.7 | 4.3386 | 7981.1 | 0.00 | 3.290 |
| 0.37873766 | 31.7328 | 11.955 | 7941.5 | 4.3625 | 7945.8 | 0.00 | 3.274 |
| 0.38063135 | 31.7778 | 11.962 | 7906.5 | 4.3864 | 7910.9 | 0.00 | 3.257 |
| 0.38253450 | 31.8210 | 11.969 | 7871.9 | 4.4103 | 7876.3 | 0.00 | 3.241 |
| 0.38444718 | 31.8627 | 11.976 | 7837.5 | 4.4343 | 7841.9 | 0.00 | 3.225 |
| 0.38636941 | 31.9031 | 11.984 | 7803.3 | 4.4584 | 7807.8 | 0.00 | 3.209 |
| 0.38830126 | 31.9424 | 11.991 | 7769.4 | 4.4825 | 7773.9 | 0.00 | 3.193 |
| 0.39024276 | 31.9809 | 11.999 | 7735.8 | 4.5066 | 7740.3 | 0.00 | 3.177 |
| 0.39219398 | 32.0186 | 12.007 | 7702.4 | 4.5308 | 7706.9 | 0.00 | 3.161 |
| 0.39415495 | 32.0557 | 12.015 | 7669.2 | 4.5550 | 7673.8 | 0.00 | 3.146 |
| 0.39612572 | 32.0921 | 12.023 | 7636.3 | 4.5792 | 7640.9 | 0.00 | 3.130 |
| 0.39810635 | 32.1279 | 12.032 | 7603.6 | 4.6035 | 7608.2 | 0.00 | 3.114 |
| 0.40009688 | 32.1632 | 12.040 | 7571.1 | 4.6278 | 7575.8 | 0.00 | 3.099 |
| 0.40209737 | 32.1980 | 12.049 | 7538.9 | 4.6522 | 7543.5 | 0.00 | 3.083 |
| 0.40410785 | 32.2323 | 12.058 | 7506.8 | 4.6766 | 7511.5 | 0.00 | 3.068 |
| 0.40612839 | 32.2661 | 12.067 | 7475.0 | 4.7010 | 7479.7 | 0.00 | 3.053 |
| 0.40815904 | 32.2994 | 12.076 | 7443.3 | 4.7255 | 7448.0 | 0.00 | 3.038 |
| 0.41019983 | 32.3322 | 12.085 | 7411.8 | 4.7500 | 7416.6 | 0.00 | 3.023 |
| 0.41225083 | 32.3645 | 12.094 | 7380.5 | 4.7745 | 7385.3 | 0.00 | 3.007 |
| 0.41431208 | 32.3962 | 12.103 | 7349.4 | 4.7991 | 7354.2 | 0.00 | 2.993 |
| 0.41638364 | 32.4272 | 12.112 | 7318.4 | 4.8237 | 7323.2 | 0.00 | 2.978 |
| 0.41846556 | 32.4576 | 12.122 | 7287.6 | 4.8483 | 7292.5 | 0.00 | 2.963 |
| 0.42055789 | 32.4872 | 12.131 | 7257.0 | 4.8730 | 7261.9 | 0.00 | 2.948 |
| 0.42266068 | 32.5159 | 12.140 | 7226.5 | 4.8977 | 7231.4 | 0.00 | 2.933 |
| 0.42477398 | 32.5436 | 12.150 | 7196.1 | 4.9224 | 7201.1 | 0.00 | 2.919 |
| 0.42689785 | 32.5700 | 12.159 | 7165.9 | 4.9471 | 7170.9 | 0.00 | 2.904 |
| 0.42903234 | 32.5948 | 12.169 | 7135.8 | 4.9719 | 7140.8 | 0.00 | 2.890 |
| 0.43117750 | 32.6178 | 12.178 | 7105.9 | 4.9967 | 7110.9 | 0.00 | 2.875 |
| 0.43333339 | 32.6384 | 12.188 | 7076.0 | 5.0216 | 7081.1 | 0.00 | 2.861 |
| 0.43550006 | 32.6558 | 12.197 | 7046.3 | 5.0464 | 7051.4 | 0.00 | 2.847 |
| 0.43767756 | 32.6689 | 12.207 | 7016.7 | 5.0713 | 7021.8 | 0.00 | 2.833 |
| 0.43986595 | 32.6758 | 12.216 | 6987.2 | 5.0962 | 6992.3 | 0.00 | 2.819 |
| 0.44206528 | 32.6730 | 12.226 | 6957.8 | 5.1211 | 6962.9 | 0.00 | 2.805 |
| 0.44427560 | 32.6529 | 12.235 | 6928.5 | 5.1461 | 6933.6 | 0.00 | 2.791 |
| 0.44649698 | 32.5932 | 12.244 | 6899.2 | 5.1710 | 6904.4 | 0.00 | 2.777 |
| 0.44843083 | 32.4053 | 12.252 | 6874.0 | 5.1927 | 6879.2 | 0.00 | 2.765 |
| 0.44872947 | 32.3132 | 12.254 | 6870.1 | 5.1960 | 6875.3 | 0.00 | 2.763 |
| 0.44976915 | 32.4302 | 12.777 | 7146.9 | 5.2076 | 7152.1 | 0.00 | 2.757 |
| 0.45097311 | 32.6227 | 12.782 | 7130.9 | 5.2210 | 7136.1 | 0.00 | 2.749 |
| 0.45322798 | 32.7958 | 12.793 | 7101.1 | 5.2461 | 7106.4 | 0.00 | 2.736 |
| 0.45549412 | 32.9111 | 12.803 | 7071.4 | 5.2711 | 7076.7 | 0.00 | 2.722 |
| 0.45777159 | 33.0047 | 12.813 | 7041.7 | 5.2962 | 7047.0 | 0.00 | 2.708 |
| 0.46006045 | 33.0871 | 12.823 | 7012.2 | 5.3213 | 7017.5 | 0.00 | 2.695 |
| 0.46236075 | 33.1625 | 12.833 | 6982.6 | 5.3464 | 6988.0 | 0.00 | 2.682 |
| 0.46467255 | 33.2332 | 12.842 | 6953.1 | 5.3715 | 6958.5 | 0.00 | 2.668 |
| 0.46699592 | 33.3006 | 12.852 | 6923.7 | 5.3966 | 6929.1 | 0.00 | 2.655 |
| 0.46933090 | 33.3656 | 12.861 | 6894.3 | 5.4217 | 6899.7 | 0.00 | 2.642 |
| 0.47167755 | 33.4287 | 12.871 | 6865.0 | 5.4469 | 6870.4 | 0.00 | 2.629 |
| 0.47403594 | 33.4903 | 12.880 | 6835.7 | 5.4721 | 6841.1 | 0.00 | 2.616 |
| 0.47640612 | 33.5507 | 12.889 | 6806.4 | 5.4972 | 6811.9 | 0.00 | 2.602 |
| 0.47878815 | 33.6101 | 12.897 | 6777.2 | 5.5224 | 6782.7 | 0.00 | 2.590 |
| 0.48118209 | 33.6688 | 12.906 | 6747.9 | 5.5476 | 6753.5 | 0.00 | 2.577 |
| 0.48358800 | 33.7269 | 12.914 | 6718.8 | 5.5728 | 6724.3 | 0.00 | 2.564 |
| 0.48600594 | 33.7844 | 12.923 | 6689.6 | 5.5980 | 6695.2 | 0.00 | 2.551 |
| 0.48843597 | 33.8415 | 12.931 | 6660.4 | 5.6232 | 6666.1 | 0.00 | 2.538 |
| 0.49087815 | 33.8983 | 12.939 | 6631.3 | 5.6485 | 6636.9 | 0.00 | 2.526 |
| 0.49333254 | 33.9547 | 12.946 | 6602.2 | 5.6737 | 6607.8 | 0.00 | 2.513 |
| 0.49579920 | 34.0109 | 12.953 | 6573.0 | 5.6989 | 6578.7 | 0.00 | 2.501 |
| 0.49827820 | 34.0669 | 12.961 | 6543.9 | 5.7241 | 6549.6 | 0.00 | 2.488 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Er ($Z=68$) | | | | | | | |
| 0.50076959 | 34.1227 | 12.967 | 6514.8 | 5.7494 | 6520.5 | 0.00 | 2.476 |
| 0.50327344 | 34.1920 | 12.974 | 6485.6 | 5.7746 | 6491.4 | 0.00 | 2.464 |
| 0.50578980 | 34.2476 | 12.980 | 6456.5 | 5.7998 | 6462.3 | 0.00 | 2.451 |
| 0.50831875 | 34.3031 | 12.986 | 6427.3 | 5.8251 | 6433.1 | 0.00 | 2.439 |
| 0.51086035 | 34.3584 | 12.992 | 6398.1 | 5.8503 | 6403.9 | 0.00 | 2.427 |
| 0.51341465 | 34.4137 | 12.997 | 6368.8 | 5.8755 | 6374.7 | 0.00 | 2.415 |
| 0.51598172 | 34.4689 | 13.002 | 6339.6 | 5.9008 | 6345.5 | 0.00 | 2.403 |
| 0.51856163 | 34.5240 | 13.007 | 6310.3 | 5.9260 | 6316.3 | 0.00 | 2.391 |
| 0.52115444 | 34.5790 | 13.011 | 6281.0 | 5.9512 | 6287.0 | 0.00 | 2.379 |
| 0.52376021 | 34.6340 | 13.015 | 6251.7 | 5.9764 | 6257.7 | 0.00 | 2.367 |
| 0.52637901 | 34.6890 | 13.019 | 6222.4 | 6.0016 | 6228.4 | 0.00 | 2.355 |
| 0.52901091 | 34.7439 | 13.022 | 6193.0 | 6.0268 | 6199.0 | 0.00 | 2.344 |
| 0.53165596 | 34.8116 | 13.025 | 6163.6 | 6.0520 | 6169.7 | 0.00 | 2.332 |
| 0.53431424 | 34.8665 | 13.028 | 6134.2 | 6.0772 | 6140.3 | 0.00 | 2.320 |
| 0.53698581 | 34.9213 | 13.030 | 6104.7 | 6.1023 | 6110.9 | 0.00 | 2.309 |
| 0.53967074 | 34.9760 | 13.032 | 6075.3 | 6.1275 | 6081.4 | 0.00 | 2.297 |
| 0.54236910 | 35.0307 | 13.033 | 6045.8 | 6.1526 | 6051.9 | 0.00 | 2.286 |
| 0.54508094 | 35.0853 | 13.035 | 6016.2 | 6.1777 | 6022.4 | 0.00 | 2.275 |
| 0.54780635 | 35.1399 | 13.035 | 5986.6 | 6.2029 | 5992.9 | 0.00 | 2.263 |
| 0.55054538 | 35.1944 | 13.036 | 5957.0 | 6.2280 | 5963.3 | 0.00 | 2.252 |
| 0.55329810 | 35.2489 | 13.036 | 5927.4 | 6.2530 | 5933.7 | 0.00 | 2.241 |
| 0.55606460 | 35.3032 | 13.035 | 5897.7 | 6.2781 | 5904.0 | 0.00 | 2.230 |
| 0.55884492 | 35.3575 | 13.034 | 5868.0 | 6.3031 | 5874.3 | 0.00 | 2.219 |
| 0.56163914 | 35.4118 | 13.033 | 5838.2 | 6.3282 | 5844.5 | 0.00 | 2.208 |
| 0.56444734 | 35.4659 | 13.031 | 5808.4 | 6.3532 | 5814.8 | 0.00 | 2.197 |
| 0.56726958 | 35.5200 | 13.029 | 5778.6 | 6.3782 | 5785.0 | 0.00 | 2.186 |
| 0.57010592 | 35.5739 | 13.027 | 5748.8 | 6.4031 | 5755.2 | 0.00 | 2.175 |
| 0.57295645 | 35.6278 | 13.024 | 5718.9 | 6.4281 | 5725.3 | 0.00 | 2.164 |
| 0.57582123 | 35.6815 | 13.021 | 5689.0 | 6.4530 | 5695.4 | 0.00 | 2.153 |
| 0.57870034 | 35.7351 | 13.017 | 5659.1 | 6.4779 | 5665.6 | 0.00 | 2.142 |
| 0.58159384 | 35.7886 | 13.013 | 5629.1 | 6.5027 | 5635.6 | 0.00 | 2.132 |
| 0.58450181 | 35.8419 | 13.008 | 5599.2 | 6.5276 | 5605.7 | 0.00 | 2.121 |
| 0.58742432 | 35.8951 | 13.003 | 5569.2 | 6.5524 | 5575.7 | 0.00 | 2.111 |
| 0.59036144 | 35.9482 | 12.998 | 5539.2 | 6.5772 | 5545.8 | 0.00 | 2.100 |
| 0.59331325 | 36.0011 | 12.992 | 5509.2 | 6.6019 | 5515.8 | 0.00 | 2.090 |
| 0.59627982 | 36.0539 | 12.986 | 5479.1 | 6.6267 | 5485.7 | 0.00 | 2.079 |
| 0.59926122 | 36.1064 | 12.979 | 5449.0 | 6.6513 | 5455.7 | 0.00 | 2.069 |
| 0.60225752 | 36.1588 | 12.972 | 5419.0 | 6.6760 | 5425.7 | 0.00 | 2.059 |
| 0.60526881 | 36.2110 | 12.965 | 5388.9 | 6.7006 | 5395.6 | 0.00 | 2.048 |
| 0.60829515 | 36.2630 | 12.957 | 5358.8 | 6.7252 | 5365.5 | 0.00 | 2.038 |
| 0.61133663 | 36.3148 | 12.948 | 5328.7 | 6.7498 | 5335.4 | 0.00 | 2.028 |
| 0.61439331 | 36.3664 | 12.940 | 5298.6 | 6.7743 | 5305.3 | 0.00 | 2.018 |
| 0.61746528 | 36.4178 | 12.930 | 5268.4 | 6.7988 | 5275.2 | 0.00 | 2.008 |
| 0.62055260 | 36.4689 | 12.921 | 5238.3 | 6.8232 | 5245.1 | 0.00 | 1.998 |
| 0.62365537 | 36.5198 | 12.911 | 5208.2 | 6.8476 | 5215.0 | 0.00 | 1.988 |
| 0.62677364 | 36.5705 | 12.900 | 5178.1 | 6.8720 | 5184.9 | 0.00 | 1.978 |
| 0.62990751 | 36.6209 | 12.889 | 5147.9 | 6.8963 | 5154.8 | 0.00 | 1.968 |
| 0.63305705 | 36.6710 | 12.878 | 5117.8 | 6.9206 | 5124.7 | 0.00 | 1.959 |
| 0.63622234 | 36.7208 | 12.866 | 5087.7 | 6.9448 | 5094.6 | 0.00 | 1.949 |
| 0.63940345 | 36.7704 | 12.854 | 5057.6 | 6.9690 | 5064.5 | 0.00 | 1.939 |
| 0.64260046 | 36.8197 | 12.841 | 5027.4 | 6.9932 | 5034.4 | 0.00 | 1.929 |
| 0.64581347 | 36.8687 | 12.828 | 4997.4 | 7.0173 | 5004.4 | 0.00 | 1.920 |
| 0.64904253 | 36.9173 | 12.815 | 4967.3 | 7.0414 | 4974.3 | 0.00 | 1.910 |
| 0.65228775 | 36.9657 | 12.801 | 4937.2 | 7.0654 | 4944.3 | 0.00 | 1.901 |
| 0.65554919 | 37.0137 | 12.786 | 4907.1 | 7.0893 | 4914.2 | 0.00 | 1.891 |
| 0.65882693 | 37.0614 | 12.772 | 4877.1 | 7.1132 | 4884.2 | 0.00 | 1.882 |
| 0.66212107 | 37.1088 | 12.757 | 4847.1 | 7.1371 | 4854.2 | 0.00 | 1.873 |
| 0.66543167 | 37.1558 | 12.741 | 4817.1 | 7.1609 | 4824.3 | 0.00 | 1.863 |
| 0.66875883 | 37.2024 | 12.725 | 4787.2 | 7.1847 | 4794.3 | 0.00 | 1.854 |
| 0.67210262 | 37.2487 | 12.709 | 4757.2 | 7.2084 | 4764.4 | 0.00 | 1.845 |
| 0.67546314 | 37.2946 | 12.692 | 4727.3 | 7.2320 | 4734.5 | 0.00 | 1.836 |
| 0.67884045 | 37.3401 | 12.675 | 4697.4 | 7.2556 | 4704.6 | 0.00 | 1.826 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Er ($Z=68$) | | | | | | | |
| 0.68223466 | 37.3852 | 12.657 | 4667.5 | 7.2791 | 4674.8 | 0.00 | 1.817 |
| 0.68564583 | 37.4298 | 12.639 | 4637.6 | 7.3026 | 4644.9 | 0.00 | 1.808 |
| 0.68907406 | 37.4741 | 12.620 | 4607.8 | 7.3260 | 4615.1 | 0.00 | 1.799 |
| 0.69251943 | 37.5178 | 12.601 | 4577.9 | 7.3494 | 4585.3 | 0.00 | 1.790 |
| 0.69598202 | 37.5612 | 12.582 | 4548.1 | 7.3727 | 4555.5 | 0.00 | 1.781 |
| 0.69946194 | 37.6040 | 12.562 | 4518.4 | 7.3959 | 4525.8 | 0.00 | 1.773 |
| 0.70295924 | 37.6464 | 12.542 | 4488.6 | 7.4191 | 4496.0 | 0.00 | 1.764 |
| 0.70647404 | 37.6883 | 12.521 | 4458.9 | 7.4422 | 4466.4 | 0.00 | 1.755 |
| 0.71000641 | 37.7297 | 12.500 | 4429.3 | 7.4653 | 4436.7 | 0.00 | 1.746 |
| 0.71355644 | 37.7705 | 12.478 | 4399.7 | 7.4883 | 4407.1 | 0.00 | 1.738 |
| 0.71712423 | 37.8108 | 12.457 | 4370.1 | 7.5112 | 4377.6 | 0.00 | 1.729 |
| 0.72070985 | 37.8506 | 12.434 | 4340.5 | 7.5340 | 4348.1 | 0.00 | 1.720 |
| 0.72431340 | 37.8898 | 12.411 | 4311.0 | 7.5568 | 4318.6 | 0.00 | 1.712 |
| 0.72793496 | 37.9284 | 12.388 | 4281.6 | 7.5796 | 4289.2 | 0.00 | 1.703 |
| 0.73157464 | 37.9665 | 12.365 | 4252.2 | 7.6022 | 4259.8 | 0.00 | 1.695 |
| 0.73523251 | 38.0039 | 12.341 | 4222.8 | 7.6248 | 4230.5 | 0.00 | 1.686 |
| 0.73890867 | 38.0408 | 12.317 | 4193.6 | 7.6473 | 4201.2 | 0.00 | 1.678 |
| 0.74260322 | 38.0770 | 12.292 | 4164.4 | 7.6697 | 4172.0 | 0.00 | 1.670 |
| 0.74631623 | 38.1126 | 12.267 | 4135.2 | 7.6921 | 4142.9 | 0.00 | 1.661 |
| 0.75004781 | 38.1476 | 12.242 | 4106.1 | 7.7143 | 4113.9 | 0.00 | 1.653 |
| 0.75379805 | 38.1819 | 12.216 | 4077.1 | 7.7366 | 4084.9 | 0.00 | 1.645 |
| 0.75756704 | 38.2156 | 12.190 | 4048.2 | 7.7587 | 4056.0 | 0.00 | 1.637 |
| 0.76135488 | 38.2485 | 12.163 | 4019.3 | 7.7807 | 4027.1 | 0.00 | 1.628 |
| 0.76516165 | 38.2808 | 12.136 | 3990.4 | 7.8027 | 3998.2 | 0.00 | 1.620 |
| 0.76898746 | 38.3123 | 12.109 | 3961.6 | 7.8246 | 3969.5 | 0.00 | 1.612 |
| 0.77283240 | 38.3430 | 12.081 | 3932.9 | 7.8464 | 3940.8 | 0.00 | 1.604 |
| 0.77669656 | 38.3730 | 12.053 | 3904.3 | 7.8682 | 3912.2 | 0.00 | 1.596 |
| 0.78058004 | 38.4022 | 12.025 | 3875.8 | 7.8898 | 3883.7 | 0.00 | 1.588 |
| 0.78448294 | 38.4306 | 11.997 | 3847.4 | 7.9114 | 3855.3 | 0.00 | 1.580 |
| 0.78840536 | 38.4582 | 11.968 | 3819.1 | 7.9329 | 3827.0 | 0.00 | 1.573 |
| 0.79234738 | 38.4850 | 11.939 | 3790.9 | 7.9543 | 3798.8 | 0.00 | 1.565 |
| 0.79630912 | 38.5111 | 11.910 | 3762.8 | 7.9756 | 3770.7 | 0.00 | 1.557 |
| 0.80029067 | 38.5363 | 11.880 | 3734.8 | 7.9968 | 3742.8 | 0.00 | 1.549 |
| 0.80429212 | 38.5606 | 11.850 | 3706.9 | 8.0180 | 3714.9 | 0.00 | 1.542 |
| 0.80831358 | 38.5842 | 11.821 | 3679.1 | 8.0390 | 3687.2 | 0.00 | 1.534 |
| 0.81235515 | 38.6069 | 11.790 | 3651.5 | 8.0600 | 3659.5 | 0.00 | 1.526 |
| 0.81641693 | 38.6287 | 11.760 | 3624.0 | 8.0809 | 3632.0 | 0.00 | 1.519 |
| 0.82049901 | 38.6497 | 11.729 | 3596.6 | 8.1017 | 3604.7 | 0.00 | 1.511 |
| 0.82460150 | 38.6698 | 11.699 | 3569.3 | 8.1224 | 3577.4 | 0.00 | 1.504 |
| 0.82872451 | 38.6890 | 11.668 | 3542.1 | 8.1430 | 3550.3 | 0.00 | 1.496 |
| 0.83286813 | 38.7073 | 11.637 | 3515.1 | 8.1635 | 3523.3 | 0.00 | 1.489 |
| 0.83703248 | 38.7247 | 11.605 | 3488.2 | 8.1839 | 3496.4 | 0.00 | 1.481 |
| 0.84121764 | 38.7412 | 11.574 | 3461.4 | 8.2042 | 3469.6 | 0.00 | 1.474 |
| 0.84542373 | 38.7567 | 11.542 | 3434.8 | 8.2245 | 3443.0 | 0.00 | 1.467 |
| 0.84965084 | 38.7713 | 11.511 | 3408.3 | 8.2446 | 3416.6 | 0.00 | 1.459 |
| 0.85389910 | 38.7850 | 11.479 | 3382.0 | 8.2646 | 3390.2 | 0.00 | 1.452 |
| 0.85816859 | 38.7977 | 11.447 | 3355.8 | 8.2846 | 3364.0 | 0.00 | 1.445 |
| 0.86245944 | 38.8094 | 11.414 | 3329.7 | 8.3044 | 3338.0 | 0.00 | 1.438 |
| 0.86677173 | 38.8201 | 11.382 | 3303.8 | 8.3241 | 3312.1 | 0.00 | 1.430 |
| 0.87110559 | 38.8298 | 11.350 | 3278.0 | 8.3437 | 3286.3 | 0.00 | 1.423 |
| 0.87546112 | 38.8386 | 11.317 | 3252.3 | 8.3633 | 3260.7 | 0.00 | 1.416 |
| 0.87983843 | 38.8463 | 11.285 | 3226.8 | 8.3827 | 3235.2 | 0.00 | 1.409 |
| 0.88423762 | 38.8529 | 11.252 | 3201.5 | 8.4020 | 3209.9 | 0.00 | 1.402 |
| 0.88865881 | 38.8585 | 11.219 | 3176.3 | 8.4213 | 3184.7 | 0.00 | 1.395 |
| 0.89310210 | 38.8631 | 11.186 | 3151.2 | 8.4404 | 3159.7 | 0.00 | 1.388 |
| 0.89756761 | 38.8665 | 11.154 | 3126.3 | 8.4594 | 3134.8 | 0.00 | 1.381 |
| 0.90205545 | 38.8689 | 11.121 | 3101.6 | 8.4783 | 3110.0 | 0.00 | 1.374 |
| 0.90656573 | 38.8702 | 11.088 | 3077.0 | 8.4971 | 3085.5 | 0.00 | 1.368 |
| 0.91109856 | 38.8703 | 11.054 | 3052.5 | 8.5158 | 3061.0 | 0.00 | 1.361 |
| 0.91565405 | 38.8693 | 11.021 | 3028.2 | 8.5343 | 3036.8 | 0.00 | 1.354 |
| 0.92023232 | 38.8672 | 10.988 | 3004.1 | 8.5528 | 3012.6 | 0.00 | 1.347 |
| 0.92483348 | 38.8639 | 10.955 | 2980.1 | 8.5712 | 2988.7 | 0.00 | 1.341 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Er ($Z=68$) | | | | | | | |
| 0.92945765 | 38.8594 | 10.922 | 2956.3 | 8.5894 | 2964.8 | 0.00 | 1.334 |
| 0.93410494 | 38.8537 | 10.888 | 2932.6 | 8.6075 | 2941.2 | 0.00 | 1.327 |
| 0.93877546 | 38.8467 | 10.855 | 2909.1 | 8.6256 | 2917.7 | 0.00 | 1.321 |
| 0.94346934 | 38.8386 | 10.822 | 2885.7 | 8.6435 | 2894.3 | 0.00 | 1.314 |
| 0.94818668 | 38.8291 | 10.788 | 2862.5 | 8.6613 | 2871.2 | 0.00 | 1.308 |
| 0.95292762 | 38.8184 | 10.755 | 2839.4 | 8.6789 | 2848.1 | 0.00 | 1.301 |
| 0.95769226 | 38.8064 | 10.722 | 2816.6 | 8.6965 | 2825.3 | 0.00 | 1.295 |
| 0.96248072 | 38.7929 | 10.688 | 2793.8 | 8.7139 | 2802.5 | 0.00 | 1.288 |
| 0.96729312 | 38.7782 | 10.655 | 2771.2 | 8.7313 | 2780.0 | 0.00 | 1.282 |
| 0.97212959 | 38.7622 | 10.621 | 2748.8 | 8.7485 | 2757.6 | 0.00 | 1.275 |
| 0.97699023 | 38.7448 | 10.588 | 2726.6 | 8.7656 | 2735.3 | 0.00 | 1.269 |
| 0.98187519 | 38.7260 | 10.555 | 2704.5 | 8.7825 | 2713.3 | 0.00 | 1.263 |
| 0.98678456 | 38.7057 | 10.522 | 2682.5 | 8.7994 | 2691.3 | 0.00 | 1.256 |
| 0.99171848 | 38.6840 | 10.488 | 2660.8 | 8.8161 | 2669.6 | 0.00 | 1.250 |
| 0.99667708 | 38.6607 | 10.455 | 2639.1 | 8.8327 | 2648.0 | 0.00 | 1.244 |
| 1.0016605 | 38.6781 | 10.412 | 2615.2 | 8.8492 | 2624.1 | 0.00 | 1.238 |
| 1.0066688 | 38.7605 | 10.350 | 2586.7 | 8.8655 | 2595.5 | 0.00 | 1.232 |
| 1.0117021 | 38.8201 | 10.288 | 2558.5 | 8.8818 | 2567.3 | 0.00 | 1.226 |
| 1.0167606 | 38.8620 | 10.227 | 2530.6 | 8.8979 | 2539.5 | 0.00 | 1.219 |
| 1.0218444 | 38.8895 | 10.166 | 2503.0 | 8.9139 | 2511.9 | 0.00 | 1.213 |
| 1.0269536 | 38.9049 | 10.106 | 2475.8 | 8.9297 | 2484.7 | 0.00 | 1.207 |
| 1.0320884 | 38.9099 | 10.046 | 2448.8 | 8.9455 | 2457.8 | 0.00 | 1.201 |
| 1.0372489 | 38.9060 | 9.9865 | 2422.2 | 8.9611 | 2431.2 | 0.00 | 1.195 |
| 1.0424351 | 38.8941 | 9.9274 | 2395.9 | 8.9766 | 2404.9 | 0.00 | 1.189 |
| 1.0476473 | 38.8750 | 9.8688 | 2369.9 | 8.9919 | 2378.9 | 0.00 | 1.183 |
| 1.0528855 | 38.8493 | 9.8106 | 2344.2 | 9.0071 | 2353.2 | 0.00 | 1.178 |
| 1.0581499 | 38.8175 | 9.7528 | 2318.8 | 9.0222 | 2327.9 | 0.00 | 1.172 |
| 1.0634407 | 38.7800 | 9.6955 | 2293.7 | 9.0372 | 2302.8 | 0.00 | 1.166 |
| 1.0687579 | 38.7372 | 9.6386 | 2268.9 | 9.0520 | 2278.0 | 0.00 | 1.160 |
| 1.0741017 | 38.6892 | 9.5820 | 2244.4 | 9.0667 | 2253.5 | 0.00 | 1.154 |
| 1.0794722 | 38.6362 | 9.5259 | 2220.2 | 9.0813 | 2229.2 | 0.00 | 1.149 |
| 1.0848695 | 38.5784 | 9.4702 | 2196.2 | 9.0957 | 2205.3 | 0.00 | 1.143 |
| 1.0902939 | 38.5159 | 9.4149 | 2172.5 | 9.1100 | 2181.6 | 0.00 | 1.137 |
| 1.0957454 | 38.4487 | 9.3600 | 2149.1 | 9.1242 | 2158.2 | 0.00 | 1.132 |
| 1.1012241 | 38.3780 | 9.3055 | 2125.9 | 9.1382 | 2135.1 | 0.00 | 1.126 |
| 1.1067302 | 38.3015 | 9.2514 | 2103.1 | 9.1521 | 2112.2 | 0.00 | 1.120 |
| 1.1122639 | 38.2205 | 9.1977 | 2080.5 | 9.1659 | 2089.6 | 0.00 | 1.115 |
| 1.1178252 | 38.1347 | 9.1444 | 2058.1 | 9.1795 | 2067.3 | 0.00 | 1.109 |
| 1.1234143 | 38.0443 | 9.0914 | 2036.0 | 9.1930 | 2045.2 | 0.00 | 1.104 |
| 1.1290314 | 37.9490 | 9.0388 | 2014.2 | 9.2063 | 2023.4 | 0.00 | 1.098 |
| 1.1346765 | 37.8488 | 8.9866 | 1992.5 | 9.2195 | 2001.8 | 0.00 | 1.093 |
| 1.1403499 | 37.7437 | 8.9347 | 1971.2 | 9.2326 | 1980.4 | 0.00 | 1.087 |
| 1.1460517 | 37.6333 | 8.8832 | 1950.1 | 9.2455 | 1959.3 | 0.00 | 1.082 |
| 1.1517819 | 37.5177 | 8.8321 | 1929.2 | 9.2583 | 1938.5 | 0.00 | 1.076 |
| 1.1575408 | 37.3966 | 8.7813 | 1908.6 | 9.2710 | 1917.9 | 0.00 | 1.071 |
| 1.1633285 | 37.2698 | 8.7309 | 1888.2 | 9.2835 | 1897.5 | 0.00 | 1.066 |
| 1.1691452 | 37.1371 | 8.6809 | 1868.0 | 9.2959 | 1877.3 | 0.00 | 1.060 |
| 1.1749909 | 36.9982 | 8.6312 | 1848.1 | 9.3081 | 1857.4 | 0.00 | 1.055 |
| 1.1808659 | 36.8529 | 8.5819 | 1828.4 | 9.3202 | 1837.7 | 0.00 | 1.050 |
| 1.1867702 | 36.7010 | 8.5329 | 1808.9 | 9.3321 | 1818.2 | 0.00 | 1.045 |
| 1.1927040 | 36.5419 | 8.4843 | 1789.7 | 9.3439 | 1799.0 | 0.00 | 1.040 |
| 1.1986676 | 36.3755 | 8.4360 | 1770.6 | 9.3556 | 1780.0 | 0.00 | 1.034 |
| 1.2046609 | 36.2012 | 8.3881 | 1751.8 | 9.3671 | 1761.2 | 0.00 | 1.029 |
| 1.2106842 | 36.0187 | 8.3405 | 1733.2 | 9.3785 | 1742.6 | 0.00 | 1.024 |
| 1.2167376 | 35.8274 | 8.2933 | 1714.8 | 9.3897 | 1724.2 | 0.00 | 1.019 |
| 1.2228213 | 35.6267 | 8.2464 | 1696.6 | 9.4008 | 1706.0 | 0.00 | 1.014 |
| 1.2289354 | 35.4162 | 8.1998 | 1678.7 | 9.4117 | 1688.1 | 0.00 | 1.009 |
| 1.2350801 | 35.1950 | 8.1536 | 1660.9 | 9.4225 | 1670.3 | 0.00 | 1.004 |
| 1.2412555 | 34.9624 | 8.1076 | 1643.3 | 9.4331 | 1652.7 | 0.00 | 0.9989 |
| 1.2474618 | 34.7177 | 8.0621 | 1625.9 | 9.4436 | 1635.4 | 0.00 | 0.9939 |
| 1.2536991 | 34.4597 | 8.0168 | 1608.8 | 9.4540 | 1618.2 | 0.00 | 0.9889 |
| 1.2599676 | 34.1875 | 7.9719 | 1591.8 | 9.4642 | 1601.3 | 0.00 | 0.9840 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Er ($Z=68$) | | | | | | | |
| 1.2662674 | 33.8997 | 7.9272 | 1575.0 | 9.4742 | 1584.5 | 0.00 | 0.9791 |
| 1.2725988 | 33.5950 | 7.8829 | 1558.4 | 9.4841 | 1567.9 | 0.00 | 0.9743 |
| 1.2789618 | 33.2718 | 7.8390 | 1542.0 | 9.4939 | 1551.5 | 0.00 | 0.9694 |
| 1.2853566 | 32.9281 | 7.7938 | 1525.5 | 9.5035 | 1535.0 | 0.00 | 0.9646 |
| 1.2917833 | 32.5616 | 7.7486 | 1509.1 | 9.5130 | 1518.6 | 0.00 | 0.9598 |
| 1.2982423 | 32.1700 | 7.7038 | 1492.9 | 9.5223 | 1502.4 | 0.00 | 0.9550 |
| 1.3047335 | 31.7500 | 7.6593 | 1476.9 | 9.5314 | 1486.4 | 0.00 | 0.9503 |
| 1.3112571 | 31.2982 | 7.6151 | 1461.1 | 9.5404 | 1470.6 | 0.00 | 0.9455 |
| 1.3178134 | 30.8101 | 7.5713 | 1445.4 | 9.5493 | 1455.0 | 0.00 | 0.9408 |
| 1.3244025 | 30.2806 | 7.5277 | 1430.0 | 9.5580 | 1439.5 | 0.00 | 0.9362 |
| 1.3310245 | 29.7029 | 7.4845 | 1414.7 | 9.5665 | 1424.3 | 0.00 | 0.9315 |
| 1.3376796 | 29.0689 | 7.4416 | 1399.6 | 9.5749 | 1409.2 | 0.00 | 0.9269 |
| 1.3443680 | 28.3678 | 7.3990 | 1384.7 | 9.5832 | 1394.2 | 0.00 | 0.9222 |
| 1.3510899 | 27.5859 | 7.3567 | 1369.9 | 9.5913 | 1379.5 | 0.00 | 0.9177 |
| 1.3578453 | 26.7029 | 7.3147 | 1355.3 | 9.5992 | 1364.9 | 0.00 | 0.9131 |
| 1.3646345 | 25.6921 | 7.2730 | 1340.9 | 9.6070 | 1350.5 | 0.00 | 0.9086 |
| 1.3714577 | 24.5128 | 7.2316 | 1326.6 | 9.6146 | 1336.2 | 0.00 | 0.9040 |
| 1.3783150 | 23.1005 | 7.1905 | 1312.5 | 9.6221 | 1322.1 | 0.00 | 0.8995 |
| 1.3852066 | 21.3426 | 7.1496 | 1298.5 | 9.6294 | 1308.2 | 0.00 | 0.8951 |
| 1.3921326 | 19.0125 | 7.1091 | 1284.8 | 9.6366 | 1294.4 | 0.00 | 0.8906 |
| 1.3990933 | 15.5226 | 7.0689 | 1271.1 | 9.6436 | 1280.8 | 0.00 | 0.8862 |
| 1.4060887 | 8.03916 | 7.0289 | 1257.7 | 9.6505 | 1267.3 | 0.00 | 0.8818 |
| 1.4090970 | -9.27823 | 7.0119 | 1251.9 | 9.6534 | 1261.6 | 0.00 | 0.8799 |
| 1.4095029 | -9.62017 | 26.576 | 4743.6 | 9.6538 | 4753.3 | 0.00 | 0.8796 |
| 1.4131192 | 8.49489 | 26.471 | 4712.8 | 9.6572 | 4722.4 | 0.00 | 0.8774 |
| 1.4201848 | 14.5127 | 26.268 | 4653.3 | 9.6638 | 4663.0 | 0.00 | 0.8730 |
| 1.4272857 | 16.9061 | 26.066 | 4594.7 | 9.6702 | 4604.3 | 0.00 | 0.8687 |
| 1.4344221 | 17.9144 | 25.866 | 4536.7 | 9.6764 | 4546.4 | 0.00 | 0.8643 |
| 1.4415942 | 17.7593 | 25.668 | 4479.6 | 9.6825 | 4489.2 | 0.00 | 0.8600 |
| 1.4488022 | 15.3518 | 25.471 | 4423.1 | 9.6884 | 4432.8 | 0.00 | 0.8558 |
| 1.4529192 | 6.05814 | 25.360 | 4391.3 | 9.6917 | 4401.0 | 0.00 | 0.8533 |
| 1.4536808 | 5.98292 | 38.139 | 6600.7 | 9.6923 | 6610.4 | 0.00 | 0.8529 |
| 1.4560462 | 14.4499 | 38.042 | 6573.2 | 9.6942 | 6582.9 | 0.00 | 0.8515 |
| 1.4633265 | 20.8507 | 37.746 | 6489.5 | 9.6998 | 6499.2 | 0.00 | 0.8473 |
| 1.4706431 | 24.0594 | 37.451 | 6406.8 | 9.7053 | 6416.5 | 0.00 | 0.8431 |
| 1.4779963 | 26.3660 | 37.158 | 6325.1 | 9.7106 | 6334.8 | 0.00 | 0.8389 |
| 1.4853863 | 28.2119 | 36.868 | 6244.5 | 9.7158 | 6254.2 | 0.00 | 0.8347 |
| 1.4928132 | 29.7680 | 36.580 | 6164.9 | 9.7208 | 6174.6 | 0.00 | 0.8305 |
| 1.5002773 | 31.1205 | 36.295 | 6086.3 | 9.7256 | 6096.1 | 0.00 | 0.8264 |
| 1.5077787 | 32.3200 | 36.011 | 6008.8 | 9.7303 | 6018.5 | 0.00 | 0.8223 |
| 1.5153176 | 33.3990 | 35.730 | 5932.3 | 9.7348 | 5942.0 | 0.00 | 0.8182 |
| 1.5228942 | 34.3800 | 35.452 | 5856.7 | 9.7392 | 5866.5 | 0.00 | 0.8141 |
| 1.5305086 | 35.2792 | 35.175 | 5782.2 | 9.7434 | 5791.9 | 0.00 | 0.8101 |
| 1.5381612 | 36.1088 | 34.901 | 5708.6 | 9.7474 | 5718.3 | 0.00 | 0.8061 |
| 1.5458520 | 36.8781 | 34.629 | 5635.9 | 9.7513 | 5645.7 | 0.00 | 0.8020 |
| 1.5535812 | 37.5947 | 34.360 | 5564.2 | 9.7551 | 5573.9 | 0.00 | 0.7981 |
| 1.5613491 | 38.2644 | 34.092 | 5493.4 | 9.7587 | 5503.2 | 0.00 | 0.7941 |
| 1.5691559 | 38.8921 | 33.827 | 5423.5 | 9.7621 | 5433.3 | 0.00 | 0.7901 |
| 1.5770017 | 39.4818 | 33.564 | 5354.5 | 9.7653 | 5364.3 | 0.00 | 0.7862 |
| 1.5848867 | 40.0370 | 33.302 | 5286.5 | 9.7685 | 5296.2 | 0.00 | 0.7823 |
| 1.5928111 | 40.5605 | 33.043 | 5219.3 | 9.7714 | 5229.0 | 0.00 | 0.7784 |
| 1.6007752 | 41.0546 | 32.787 | 5152.9 | 9.7742 | 5162.7 | 0.00 | 0.7745 |
| 1.6087790 | 41.5215 | 32.532 | 5087.4 | 9.7768 | 5097.2 | 0.00 | 0.7707 |
| 1.6168229 | 41.9628 | 32.279 | 5022.8 | 9.7793 | 5032.6 | 0.00 | 0.7668 |
| 1.6249070 | 42.3800 | 32.028 | 4959.0 | 9.7816 | 4968.8 | 0.00 | 0.7630 |
| 1.6330316 | 42.7745 | 31.780 | 4896.0 | 9.7838 | 4905.8 | 0.00 | 0.7592 |
| 1.6411967 | 43.1472 | 31.533 | 4833.8 | 9.7858 | 4843.6 | 0.00 | 0.7555 |
| 1.6494027 | 43.4990 | 31.288 | 4772.5 | 9.7876 | 4782.3 | 0.00 | 0.7517 |
| 1.6576497 | 43.8306 | 31.046 | 4711.9 | 9.7893 | 4721.7 | 0.00 | 0.7480 |
| 1.6659380 | 44.1425 | 30.805 | 4652.1 | 9.7909 | 4661.9 | 0.00 | 0.7442 |
| 1.6742677 | 44.4350 | 30.566 | 4593.1 | 9.7922 | 4602.9 | 0.00 | 0.7405 |
| 1.6826390 | 44.7083 | 30.329 | 4534.8 | 9.7935 | 4544.6 | 0.00 | 0.7368 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Er ($Z=68$) | | | | | | | |
| 1.6910522 | 44.9622 | 30.095 | 4477.3 | 9.7945 | 4487.1 | 0.00 | 0.7332 |
| 1.6995075 | 45.1965 | 29.862 | 4420.5 | 9.7954 | 4430.3 | 0.00 | 0.7295 |
| 1.7080050 | 45.4105 | 29.630 | 4364.5 | 9.7962 | 4374.3 | 0.00 | 0.7259 |
| 1.7165450 | 45.6033 | 29.401 | 4309.2 | 9.7968 | 4319.0 | 0.00 | 0.7223 |
| 1.7251278 | 45.7732 | 29.174 | 4254.6 | 9.7972 | 4264.4 | 0.00 | 0.7187 |
| 1.7337534 | 45.9182 | 28.948 | 4200.7 | 9.7975 | 4210.5 | 0.00 | 0.7151 |
| 1.7424222 | 46.0350 | 28.724 | 4147.5 | 9.7976 | 4157.3 | 0.00 | 0.7116 |
| 1.7511343 | 46.1189 | 28.502 | 4094.9 | 9.7975 | 4104.7 | 0.00 | 0.7080 |
| 1.7598899 | 46.1625 | 28.282 | 4043.1 | 9.7974 | 4052.9 | 0.00 | 0.7045 |
| 1.7686894 | 46.1543 | 28.064 | 3991.9 | 9.7970 | 4001.7 | 0.00 | 0.7010 |
| 1.7775328 | 46.0738 | 27.847 | 3941.4 | 9.7965 | 3951.2 | 0.00 | 0.6975 |
| 1.7864205 | 45.8818 | 27.632 | 3891.5 | 9.7958 | 3901.3 | 0.00 | 0.6940 |
| 1.7953526 | 45.4850 | 27.419 | 3842.3 | 9.7950 | 3852.1 | 0.00 | 0.6906 |
| 1.8043294 | 44.5513 | 27.207 | 3793.6 | 9.7940 | 3803.4 | 0.00 | 0.6871 |
| 1.8098795 | 42.6606 | 27.078 | 3764.0 | 9.7934 | 3773.8 | 0.00 | 0.6850 |
| 1.8133510 | 42.3695 | 31.752 | 4405.3 | 9.7929 | 4415.0 | 0.00 | 0.6837 |
| 1.8137205 | 42.7054 | 31.741 | 4402.8 | 9.7929 | 4412.6 | 0.00 | 0.6836 |
| 1.8224178 | 45.5466 | 31.481 | 4346.0 | 9.7916 | 4355.8 | 0.00 | 0.6803 |
| 1.8315299 | 46.7160 | 31.213 | 4287.6 | 9.7902 | 4297.3 | 0.00 | 0.6769 |
| 1.8406875 | 47.5047 | 30.947 | 4229.8 | 9.7886 | 4239.6 | 0.00 | 0.6736 |
| 1.8498909 | 48.1184 | 30.683 | 4172.9 | 9.7868 | 4182.7 | 0.00 | 0.6702 |
| 1.8591404 | 48.6274 | 30.421 | 4116.7 | 9.7849 | 4126.5 | 0.00 | 0.6669 |
| 1.8684361 | 49.0644 | 30.162 | 4061.4 | 9.7828 | 4071.2 | 0.00 | 0.6636 |
| 1.8777783 | 49.4466 | 29.906 | 4006.8 | 9.7806 | 4016.5 | 0.00 | 0.6603 |
| 1.8871672 | 49.7839 | 29.651 | 3952.9 | 9.7783 | 3962.7 | 0.00 | 0.6570 |
| 1.8966030 | 50.0811 | 29.398 | 3899.7 | 9.7757 | 3909.4 | 0.00 | 0.6537 |
| 1.9060860 | 50.3408 | 29.160 | 3848.9 | 9.7731 | 3858.7 | 0.00 | 0.6505 |
| 1.9156165 | 50.5784 | 28.938 | 3800.5 | 9.7702 | 3810.3 | 0.00 | 0.6472 |
| 1.9251945 | 50.7951 | 28.718 | 3752.9 | 9.7672 | 3762.7 | 0.00 | 0.6440 |
| 1.9348205 | 50.9898 | 28.502 | 3706.1 | 9.7641 | 3715.9 | 0.00 | 0.6408 |
| 1.9444946 | 51.1607 | 28.289 | 3660.1 | 9.7608 | 3669.9 | 0.00 | 0.6376 |
| 1.9542171 | 51.3050 | 28.079 | 3614.9 | 9.7574 | 3624.6 | 0.00 | 0.6344 |
| 1.9639882 | 51.4170 | 27.871 | 3570.2 | 9.7538 | 3580.0 | 0.00 | 0.6313 |
| 1.9738081 | 51.4853 | 27.665 | 3526.3 | 9.7500 | 3536.0 | 0.00 | 0.6281 |
| 1.9836772 | 51.4844 | 27.463 | 3483.0 | 9.7461 | 3492.8 | 0.00 | 0.6250 |
| 1.9935955 | 51.3397 | 27.263 | 3440.5 | 9.7421 | 3450.2 | 0.00 | 0.6219 |
| 2.0035635 | 50.5184 | 27.065 | 3398.6 | 9.7379 | 3408.3 | 0.00 | 0.6188 |
| 2.0036337 | 50.5004 | 27.064 | 3398.3 | 9.7378 | 3408.0 | 0.00 | 0.6188 |
| 2.0079663 | 50.5651 | 28.901 | 3621.1 | 9.7360 | 3630.9 | 0.00 | 0.6175 |
| 2.0135813 | 51.4684 | 28.777 | 3595.6 | 9.7335 | 3605.3 | 0.00 | 0.6157 |
| 2.0236492 | 52.1751 | 28.558 | 3550.4 | 9.7290 | 3560.2 | 0.00 | 0.6127 |
| 2.0337675 | 52.6349 | 28.342 | 3506.0 | 9.7244 | 3515.7 | 0.00 | 0.6096 |
| 2.0439363 | 52.9986 | 28.128 | 3462.3 | 9.7196 | 3472.0 | 0.00 | 0.6066 |
| 2.0541560 | 53.3076 | 27.917 | 3419.2 | 9.7146 | 3428.9 | 0.00 | 0.6036 |
| 2.0644268 | 53.5797 | 27.709 | 3376.8 | 9.7095 | 3386.5 | 0.00 | 0.6006 |
| 2.0747489 | 53.8235 | 27.502 | 3335.0 | 9.7043 | 3344.7 | 0.00 | 0.5976 |
| 2.0851227 | 54.0442 | 27.298 | 3293.8 | 9.6989 | 3303.5 | 0.00 | 0.5946 |
| 2.0955483 | 54.2441 | 27.097 | 3253.2 | 9.6933 | 3262.9 | 0.00 | 0.5917 |
| 2.1060260 | 54.4238 | 26.899 | 3213.4 | 9.6877 | 3223.1 | 0.00 | 0.5887 |
| 2.1165562 | 54.5884 | 26.715 | 3175.5 | 9.6818 | 3185.1 | 0.00 | 0.5858 |
| 2.1271389 | 54.7410 | 26.533 | 3138.2 | 9.6758 | 3147.8 | 0.00 | 0.5829 |
| 2.1377746 | 54.8801 | 26.353 | 3101.4 | 9.6697 | 3111.1 | 0.00 | 0.5800 |
| 2.1484635 | 55.0036 | 26.177 | 3065.3 | 9.6634 | 3075.0 | 0.00 | 0.5771 |
| 2.1592058 | 55.1081 | 26.002 | 3029.7 | 9.6570 | 3039.4 | 0.00 | 0.5742 |
| 2.1700018 | 55.1871 | 25.830 | 2994.7 | 9.6504 | 3004.3 | 0.00 | 0.5714 |
| 2.1808519 | 55.2263 | 25.660 | 2960.1 | 9.6437 | 2969.8 | 0.00 | 0.5685 |
| 2.1917561 | 55.1860 | 25.492 | 2926.1 | 9.6369 | 2935.8 | 0.00 | 0.5657 |
| 2.2022856 | 54.8733 | 25.332 | 2893.9 | 9.6302 | 2903.5 | 0.00 | 0.5630 |
| 2.2027149 | 54.8392 | 25.326 | 2892.6 | 9.6299 | 2902.2 | 0.00 | 0.5629 |
| 2.2107145 | 54.9879 | 26.387 | 3002.9 | 9.6247 | 3012.6 | 0.00 | 0.5608 |
| 2.2137285 | 55.2349 | 26.341 | 2993.6 | 9.6227 | 3003.2 | 0.00 | 0.5601 |
| 2.2247971 | 55.7415 | 26.174 | 2959.8 | 9.6154 | 2969.4 | 0.00 | 0.5573 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Er ($Z=68$) | | | | | | | |
| 2.2359211 | 56.0726 | 26.008 | 2926.4 | 9.6080 | 2936.0 | 0.00 | 0.5545 |
| 2.2471007 | 56.3423 | 25.844 | 2893.5 | 9.6005 | 2903.1 | 0.00 | 0.5518 |
| 2.2583362 | 56.5792 | 25.682 | 2861.0 | 9.5927 | 2870.6 | 0.00 | 0.5490 |
| 2.2696279 | 56.7951 | 25.521 | 2829.0 | 9.5849 | 2838.6 | 0.00 | 0.5463 |
| 2.2809760 | 56.9959 | 25.362 | 2797.3 | 9.5769 | 2806.9 | 0.00 | 0.5436 |
| 2.2923809 | 57.1853 | 25.204 | 2766.1 | 9.5688 | 2775.7 | 0.00 | 0.5409 |
| 2.3038428 | 57.3655 | 25.048 | 2735.3 | 9.5605 | 2744.8 | 0.00 | 0.5382 |
| 2.3153620 | 57.5378 | 24.893 | 2704.8 | 9.5521 | 2714.4 | 0.00 | 0.5355 |
| 2.3269388 | 57.7040 | 24.741 | 2675.0 | 9.5435 | 2684.5 | 0.00 | 0.5328 |
| 2.3385735 | 57.8655 | 24.591 | 2645.5 | 9.5348 | 2655.0 | 0.00 | 0.5302 |
| 2.3502664 | 58.0232 | 24.442 | 2616.4 | 9.5260 | 2625.9 | 0.00 | 0.5275 |
| 2.3620177 | 58.1770 | 24.290 | 2587.2 | 9.5171 | 2596.7 | 0.00 | 0.5249 |
| 2.3738278 | 58.3257 | 24.137 | 2558.1 | 9.5080 | 2567.6 | 0.00 | 0.5223 |
| 2.3856970 | 58.4699 | 23.984 | 2529.3 | 9.4987 | 2538.8 | 0.00 | 0.5197 |
| 2.3976254 | 58.6099 | 23.833 | 2500.9 | 9.4894 | 2510.3 | 0.00 | 0.5171 |
| 2.4096136 | 58.7462 | 23.683 | 2472.8 | 9.4799 | 2482.2 | 0.00 | 0.5145 |
| 2.4216616 | 58.8791 | 23.535 | 2445.0 | 9.4702 | 2454.5 | 0.00 | 0.5120 |
| 2.4337699 | 59.0087 | 23.387 | 2417.6 | 9.4604 | 2427.0 | 0.00 | 0.5094 |
| 2.4459388 | 59.1353 | 23.240 | 2390.4 | 9.4505 | 2399.9 | 0.00 | 0.5069 |
| 2.4581685 | 59.2591 | 23.094 | 2363.6 | 9.4405 | 2373.1 | 0.00 | 0.5044 |
| 2.4704593 | 59.3802 | 22.950 | 2337.1 | 9.4303 | 2346.6 | 0.00 | 0.5019 |
| 2.4828116 | 59.4988 | 22.806 | 2310.9 | 9.4200 | 2320.4 | 0.00 | 0.4994 |
| 2.4952257 | 59.6151 | 22.663 | 2285.0 | 9.4096 | 2294.4 | 0.00 | 0.4969 |
| 2.5077018 | 59.7291 | 22.521 | 2259.4 | 9.3990 | 2268.8 | 0.00 | 0.4944 |
| 2.5202403 | 59.8409 | 22.380 | 2234.1 | 9.3883 | 2243.5 | 0.00 | 0.4920 |
| 2.5328415 | 59.9507 | 22.240 | 2209.1 | 9.3775 | 2218.5 | 0.00 | 0.4895 |
| 2.5455057 | 60.0586 | 22.101 | 2184.3 | 9.3666 | 2193.7 | 0.00 | 0.4871 |
| 2.5582333 | 60.1646 | 21.962 | 2159.8 | 9.3555 | 2169.2 | 0.00 | 0.4846 |
| 2.5710244 | 60.2689 | 21.825 | 2135.6 | 9.3443 | 2145.0 | 0.00 | 0.4822 |
| 2.5838796 | 60.3715 | 21.688 | 2111.7 | 9.3329 | 2121.0 | 0.00 | 0.4798 |
| 2.5967990 | 60.4727 | 21.552 | 2088.0 | 9.3215 | 2097.3 | 0.00 | 0.4775 |
| 2.6097829 | 60.5725 | 21.416 | 2064.6 | 9.3099 | 2073.9 | 0.00 | 0.4751 |
| 2.6228319 | 60.6703 | 21.279 | 2041.1 | 9.2982 | 2050.4 | 0.00 | 0.4727 |
| 2.6359460 | 60.7660 | 21.143 | 2018.0 | 9.2863 | 2027.3 | 0.00 | 0.4704 |
| 2.6491257 | 60.8597 | 21.007 | 1995.1 | 9.2744 | 2004.3 | 0.00 | 0.4680 |
| 2.6623714 | 60.9517 | 20.873 | 1972.4 | 9.2623 | 1981.7 | 0.00 | 0.4657 |
| 2.6756832 | 61.0419 | 20.739 | 1950.0 | 9.2501 | 1959.3 | 0.00 | 0.4634 |
| 2.6890617 | 61.1305 | 20.606 | 1927.9 | 9.2378 | 1937.1 | 0.00 | 0.4611 |
| 2.7025070 | 61.2175 | 20.474 | 1906.0 | 9.2253 | 1915.2 | 0.00 | 0.4588 |
| 2.7160195 | 61.3030 | 20.342 | 1884.3 | 9.2127 | 1893.5 | 0.00 | 0.4565 |
| 2.7295996 | 61.3870 | 20.212 | 1862.9 | 9.2001 | 1872.1 | 0.00 | 0.4542 |
| 2.7432476 | 61.4697 | 20.082 | 1841.7 | 9.1872 | 1850.9 | 0.00 | 0.4520 |
| 2.7569638 | 61.5510 | 19.953 | 1820.8 | 9.1743 | 1830.0 | 0.00 | 0.4497 |
| 2.7707486 | 61.6310 | 19.825 | 1800.1 | 9.1613 | 1809.3 | 0.00 | 0.4475 |
| 2.7846024 | 61.7099 | 19.697 | 1779.6 | 9.1481 | 1788.8 | 0.00 | 0.4452 |
| 2.7985254 | 61.7876 | 19.571 | 1759.4 | 9.1348 | 1768.5 | 0.00 | 0.4430 |
| 2.8125180 | 61.8643 | 19.445 | 1739.4 | 9.1214 | 1748.5 | 0.00 | 0.4408 |
| 2.8265806 | 62.1510 | 19.318 | 1719.5 | 9.1079 | 1728.6 | 0.00 | 0.4386 |
| 2.8407135 | 62.2255 | 19.191 | 1699.6 | 9.0943 | 1708.7 | 0.00 | 0.4365 |
| 2.8549171 | 62.2989 | 19.064 | 1680.0 | 9.0806 | 1689.1 | 0.00 | 0.4343 |
| 2.8691917 | 62.3712 | 18.939 | 1660.7 | 9.0667 | 1669.7 | 0.00 | 0.4321 |
| 2.8835376 | 62.4424 | 18.814 | 1641.5 | 9.0527 | 1650.5 | 0.00 | 0.4300 |
| 2.8979553 | 62.5128 | 18.689 | 1622.5 | 9.0387 | 1631.5 | 0.00 | 0.4278 |
| 2.9124451 | 62.7315 | 18.565 | 1603.7 | 9.0245 | 1612.7 | 0.00 | 0.4257 |
| 2.9270073 | 62.8009 | 18.440 | 1585.0 | 9.0102 | 1594.0 | 0.00 | 0.4236 |
| 2.9416424 | 62.8699 | 18.317 | 1566.5 | 8.9958 | 1575.5 | 0.00 | 0.4215 |
| 2.9563506 | 62.9388 | 18.194 | 1548.3 | 8.9813 | 1557.3 | 0.00 | 0.4194 |
| 2.9711323 | 63.0083 | 18.072 | 1530.3 | 8.9666 | 1539.3 | 0.00 | 0.4173 |
| 2.9859880 | 63.0795 | 17.951 | 1512.5 | 8.9519 | 1521.4 | 0.00 | 0.4152 |
| 3.0009179 | 63.1550 | 17.830 | 1494.8 | 8.9371 | 1503.8 | 0.00 | 0.4132 |
| 3.0159225 | 63.2207 | 17.691 | 1475.8 | 8.9221 | 1484.7 | 0.00 | 0.4111 |
| 3.0310021 | 63.2811 | 17.553 | 1457.0 | 8.9071 | 1465.9 | 0.00 | 0.4091 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Er ($Z=68$) | | | | | | | |
| 3.0461571 | 63.3383 | 17.416 | 1438.4 | 8.8919 | 1447.3 | 0.00 | 0.4070 |
| 3.0613879 | 63.3929 | 17.281 | 1420.1 | 8.8766 | 1429.0 | 0.00 | 0.4050 |
| 3.0766949 | 63.4452 | 17.146 | 1402.1 | 8.8613 | 1410.9 | 0.00 | 0.4030 |
| 3.0920783 | 63.4955 | 17.013 | 1384.3 | 8.8458 | 1.3931 | 0.00 | 0.4010 |
| 3.1075387 | 63.5439 | 16.881 | 1366.7 | 8.8303 | 1.3755 | 0.00 | 0.3990 |
| 3.1230764 | 63.5904 | 16.751 | 1349.4 | 8.8146 | 1358.2 | 0.00 | 0.3970 |
| 3.1386918 | 63.6352 | 16.621 | 1332.3 | 8.7988 | 1341.1 | 0.00 | 0.3950 |
| 3.1543853 | 63.6785 | 16.492 | 1315.4 | 8.7829 | 1324.2 | 0.00 | 0.3931 |
| 3.1701572 | 63.7201 | 16.364 | 1298.7 | 8.7670 | 1307.4 | 0.00 | 0.3911 |
| 3.1860080 | 63.7602 | 16.237 | 1282.1 | 8.7509 | 1290.9 | 0.00 | 0.3892 |
| 3.2019380 | 63.7989 | 16.111 | 1265.9 | 8.7348 | 1274.6 | 0.00 | 0.3872 |
| 3.2179477 | 63.8361 | 15.986 | 1249.8 | 8.7185 | 1258.5 | 0.00 | 0.3853 |
| 3.2340374 | 63.8720 | 15.862 | 1233.9 | 8.7021 | 1242.6 | 0.00 | 0.3834 |
| 3.2502076 | 63.9066 | 15.739 | 1218.3 | 8.6857 | 1227.0 | 0.00 | 0.3815 |
| 3.2664587 | 63.9399 | 15.618 | 1202.9 | 8.6692 | 1211.5 | 0.00 | 0.3796 |
| 3.2827910 | 63.9721 | 15.497 | 1187.7 | 8.6525 | 1196.3 | 0.00 | 0.3777 |
| 3.2992049 | 64.0031 | 15.378 | 1172.7 | 8.6358 | 1181.3 | 0.00 | 0.3758 |
| 3.3157009 | 64.0330 | 15.259 | 1157.8 | 8.6190 | 1166.5 | 0.00 | 0.3739 |
| 3.3322794 | 64.0618 | 15.142 | 1143.2 | 8.6021 | 1151.8 | 0.00 | 0.3721 |
| 3.3489408 | 64.0896 | 15.025 | 1128.7 | 8.5850 | 1137.3 | 0.00 | 0.3702 |
| 3.3656856 | 64.1163 | 14.909 | 1114.4 | 8.5680 | 1123.0 | 0.00 | 0.3684 |
| 3.3825140 | 64.1420 | 14.794 | 1100.3 | 8.5508 | 1108.9 | 0.00 | 0.3665 |
| 3.3994265 | 64.1668 | 14.680 | 1086.5 | 8.5335 | 1095.0 | 0.00 | 0.3647 |
| 3.4164237 | 64.1907 | 14.567 | 1072.7 | 8.5161 | 1081.3 | 0.00 | 0.3629 |
| 3.4335058 | 64.2137 | 14.456 | 1059.2 | 8.4987 | 1067.7 | 0.00 | 0.3611 |
| 3.4506733 | 64.2358 | 14.345 | 1045.9 | 8.4812 | 1054.4 | 0.00 | 0.3593 |
| 3.4679267 | 64.2571 | 14.235 | 1032.7 | 8.4636 | 1041.2 | 0.00 | 0.3575 |
| 3.4852663 | 64.2776 | 14.127 | 1019.7 | 8.4459 | 1028.2 | 0.00 | 0.3557 |
| 3.5026927 | 64.2973 | 14.019 | 1006.9 | 8.4281 | 1015.4 | 0.00 | 0.3540 |
| 3.5202061 | 64.3163 | 13.912 | 994.29 | 8.4102 | 1.0027 | 0.00 | 0.3522 |
| 3.5378072 | 64.3346 | 13.806 | 981.83 | 8.3923 | 990.22 | 0.00 | 0.3505 |
| 3.5554962 | 64.3522 | 13.702 | 969.53 | 8.3742 | 977.90 | 0.00 | 0.3487 |
| 3.5732737 | 64.3692 | 13.598 | 957.39 | 8.3561 | 965.75 | 0.00 | 0.3470 |
| 3.5911400 | 64.3855 | 13.495 | 945.42 | 8.3380 | 953.76 | 0.00 | 0.3453 |
| 3.6090957 | 64.4013 | 13.393 | 933.61 | 8.3197 | 941.93 | 0.00 | 0.3435 |
| 3.6271412 | 64.5202 | 13.291 | 921.90 | 8.3013 | 930.20 | 0.00 | 0.3418 |
| 3.6452769 | 64.5356 | 13.187 | 910.12 | 8.2829 | 918.40 | 0.00 | 0.3401 |
| 3.6635033 | 64.5500 | 13.084 | 898.49 | 8.2644 | 906.76 | 0.00 | 0.3384 |
| 3.6818208 | 64.5634 | 12.981 | 887.03 | 8.2459 | 895.28 | 0.00 | 0.3367 |
| 3.7002299 | 64.5759 | 12.880 | 875.72 | 8.2272 | 883.95 | 0.00 | 0.3351 |
| 3.7187311 | 64.5876 | 12.779 | 864.56 | 8.2085 | 872.77 | 0.00 | 0.3334 |
| 3.7373247 | 64.5985 | 12.680 | 853.56 | 8.1897 | 861.75 | 0.00 | 0.3317 |
| 3.7560114 | 64.6087 | 12.581 | 842.70 | 8.1708 | 850.87 | 0.00 | 0.3301 |
| 3.7747914 | 64.6181 | 12.483 | 831.99 | 8.1519 | 840.14 | 0.00 | 0.3285 |
| 3.7936654 | 64.6267 | 12.386 | 821.42 | 8.1329 | 829.55 | 0.00 | 0.3268 |
| 3.8126337 | 64.6348 | 12.290 | 810.99 | 8.1138 | 819.11 | 0.00 | 0.3252 |
| 3.8316969 | 64.6421 | 12.195 | 800.71 | 8.0947 | 808.80 | 0.00 | 0.3236 |
| 3.8508554 | 64.6489 | 12.101 | 790.56 | 8.0754 | 798.64 | 0.00 | 0.3220 |
| 3.8701096 | 64.6550 | 12.007 | 780.55 | 8.0562 | 788.61 | 0.00 | 0.3204 |
| 3.8894602 | 64.6606 | 11.914 | 770.67 | 8.0368 | 778.71 | 0.00 | 0.3188 |
| 3.9089075 | 64.6656 | 11.823 | 760.93 | 8.0174 | 768.94 | 0.00 | 0.3172 |
| 3.9284520 | 64.6701 | 11.732 | 751.31 | 7.9979 | 759.31 | 0.00 | 0.3156 |
| 3.9480943 | 64.6741 | 11.641 | 741.83 | 7.9784 | 749.81 | 0.00 | 0.3140 |
| 3.9678347 | 64.6776 | 11.552 | 732.47 | 7.9588 | 740.43 | 0.00 | 0.3125 |
| 3.9876739 | 64.6807 | 11.463 | 723.24 | 7.9391 | 731.18 | 0.00 | 0.3109 |

Tm ($Z=69$)Atomic weight: $A_r = 168.9342 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3}) = 9.2940$ $\sigma_a (\text{barns/atom}) = [\mu/\rho] (\text{cm}^2 \text{ g}^{-1}) \times 280.522$ $E(\text{eV}) [\mu/\rho] (\text{cm}^2 \text{ g}^{-1}) = f_2 (e \text{ atom}^{-1}) \times 2.49093 \times 10^5$

19 edges. Edge energies (keV)

| | | | | | | | |
|---|---------|-----|---------|------|---------|-------|---------|
| K | 59.3896 | L I | 10.1157 | L II | 9.61690 | L III | 8.64800 |
|---|---------|-----|---------|------|---------|-------|---------|

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| M I | 2.30680 | M II | 2.08980 | M III | 1.88450 | M IV | 1.51460 |
| M V | 1.46770 | N I | 0.471700 | N II | 0.385900 | N III | 0.336600 |
| N IV | 0.179600 | N V | 0.179600 | N VI | 0.00530000 | N VII | 0.00530000 |
| O I | 0.0532000 | O II | 0.0323000 | O III | 0.0323000 | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-1.2098, -0.72240) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.015460 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 19.0910 | 11.363 | 28304 | 0.48482 | 28305 | 0.00 | 12.40 |
| 0.10050000 | 19.1424 | 11.390 | 28230 | 0.49029 | 28230 | 0.00 | 12.34 |
| 0.10100250 | 19.1938 | 11.416 | 28155 | 0.49581 | 28156 | 0.00 | 12.28 |
| 0.10150751 | 19.2449 | 11.443 | 28080 | 0.50137 | 28080 | 0.00 | 12.21 |
| 0.10201505 | 19.2960 | 11.469 | 28005 | 0.50699 | 28005 | 0.00 | 12.15 |
| 0.10252513 | 19.3470 | 11.495 | 27929 | 0.51266 | 27929 | 0.00 | 12.09 |
| 0.10303775 | 19.3979 | 11.521 | 27853 | 0.51838 | 27853 | 0.00 | 12.03 |
| 0.10355294 | 19.4486 | 11.547 | 27776 | 0.52415 | 27777 | 0.00 | 11.97 |
| 0.10407070 | 19.4993 | 11.573 | 27699 | 0.52998 | 27700 | 0.00 | 11.91 |
| 0.10459106 | 19.5500 | 11.598 | 27622 | 0.53586 | 27623 | 0.00 | 11.85 |
| 0.10511401 | 19.6005 | 11.624 | 27545 | 0.54179 | 27546 | 0.00 | 11.80 |
| 0.10563958 | 19.6510 | 11.649 | 27467 | 0.54777 | 27468 | 0.00 | 11.74 |
| 0.10616778 | 19.7015 | 11.674 | 27389 | 0.55381 | 27390 | 0.00 | 11.68 |
| 0.10669862 | 19.7519 | 11.699 | 27311 | 0.55990 | 27311 | 0.00 | 11.62 |
| 0.10723211 | 19.8022 | 11.723 | 27232 | 0.56604 | 27233 | 0.00 | 11.56 |
| 0.10776827 | 19.8525 | 11.747 | 27153 | 0.57224 | 27153 | 0.00 | 11.50 |
| 0.10830712 | 19.9028 | 11.772 | 27073 | 0.57849 | 27074 | 0.00 | 11.45 |
| 0.10884865 | 19.9530 | 11.796 | 26994 | 0.58480 | 26994 | 0.00 | 11.39 |
| 0.10939289 | 20.0032 | 11.819 | 26913 | 0.59116 | 26914 | 0.00 | 11.33 |
| 0.10993986 | 20.0533 | 11.843 | 26833 | 0.59758 | 26834 | 0.00 | 11.28 |
| 0.11048956 | 20.1034 | 11.866 | 26752 | 0.60406 | 26753 | 0.00 | 11.22 |
| 0.11104201 | 20.1535 | 11.890 | 26671 | 0.61059 | 26672 | 0.00 | 11.17 |
| 0.11159722 | 20.2035 | 11.912 | 26589 | 0.61717 | 26590 | 0.00 | 11.11 |
| 0.11215520 | 20.2535 | 11.935 | 26508 | 0.62382 | 26508 | 0.00 | 11.05 |
| 0.11271598 | 20.3035 | 11.958 | 26425 | 0.63052 | 26426 | 0.00 | 11.00 |
| 0.11327956 | 20.3534 | 11.980 | 26343 | 0.63728 | 26344 | 0.00 | 10.94 |
| 0.11384596 | 20.4033 | 12.002 | 26260 | 0.64410 | 26261 | 0.00 | 10.89 |
| 0.11441519 | 20.4531 | 12.024 | 26177 | 0.65097 | 26177 | 0.00 | 10.84 |
| 0.11498726 | 20.5029 | 12.045 | 26093 | 0.65790 | 26094 | 0.00 | 10.78 |
| 0.11556220 | 20.5526 | 12.067 | 26009 | 0.66490 | 26010 | 0.00 | 10.73 |
| 0.11614001 | 20.6023 | 12.088 | 25925 | 0.67195 | 25926 | 0.00 | 10.68 |
| 0.11672071 | 20.6519 | 12.109 | 25841 | 0.67906 | 25841 | 0.00 | 10.62 |
| 0.11730431 | 20.7014 | 12.129 | 25756 | 0.68623 | 25757 | 0.00 | 10.57 |
| 0.11789083 | 20.7509 | 12.149 | 25671 | 0.69346 | 25671 | 0.00 | 10.52 |
| 0.11848029 | 20.8003 | 12.170 | 25585 | 0.70075 | 25586 | 0.00 | 10.46 |
| 0.11907269 | 20.8496 | 12.189 | 25499 | 0.70810 | 25500 | 0.00 | 10.41 |
| 0.11966805 | 20.8989 | 12.209 | 25413 | 0.71551 | 25414 | 0.00 | 10.36 |
| 0.12026639 | 20.9480 | 12.228 | 25327 | 0.72298 | 25328 | 0.00 | 10.31 |
| 0.12086772 | 20.9971 | 12.247 | 25240 | 0.73052 | 25241 | 0.00 | 10.26 |
| 0.12147206 | 21.0460 | 12.266 | 25153 | 0.73811 | 25154 | 0.00 | 10.21 |
| 0.12207942 | 21.0948 | 12.285 | 25066 | 0.74577 | 25066 | 0.00 | 10.16 |
| 0.12268982 | 21.1436 | 12.303 | 24978 | 0.75349 | 24979 | 0.00 | 10.11 |
| 0.12330327 | 21.1921 | 12.321 | 24890 | 0.76128 | 24891 | 0.00 | 10.06 |
| 0.12391979 | 21.2406 | 12.338 | 24802 | 0.76912 | 24802 | 0.00 | 10.01 |
| 0.12453939 | 21.2889 | 12.356 | 24713 | 0.77703 | 24714 | 0.00 | 9.955 |
| 0.12516208 | 21.3370 | 12.373 | 24624 | 0.78501 | 24625 | 0.00 | 9.906 |
| 0.12578789 | 21.3850 | 12.390 | 24535 | 0.79304 | 24536 | 0.00 | 9.857 |
| 0.12641683 | 21.4328 | 12.406 | 24446 | 0.80114 | 24446 | 0.00 | 9.808 |
| 0.12704892 | 21.4804 | 12.423 | 24356 | 0.80931 | 24357 | 0.00 | 9.759 |
| 0.12768416 | 21.5278 | 12.439 | 24266 | 0.81754 | 24267 | 0.00 | 9.710 |
| 0.12832258 | 21.5750 | 12.454 | 24176 | 0.82584 | 24176 | 0.00 | 9.662 |
| 0.12896419 | 21.6219 | 12.470 | 24085 | 0.83420 | 24086 | 0.00 | 9.614 |
| 0.12960902 | 21.6686 | 12.485 | 23994 | 0.84263 | 23995 | 0.00 | 9.566 |
| 0.13025706 | 21.7151 | 12.500 | 23903 | 0.85112 | 23904 | 0.00 | 9.518 |
| 0.13090835 | 21.7612 | 12.514 | 23812 | 0.85968 | 23813 | 0.00 | 9.471 |
| 0.13156289 | 21.8071 | 12.528 | 23720 | 0.86831 | 23721 | 0.00 | 9.424 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 0.13222070 | 21.8527 | 12.542 | 23629 | 0.87700 | 23629 | 0.00 | 9.377 |
| 0.13288181 | 21.8980 | 12.556 | 23537 | 0.88576 | 23537 | 0.00 | 9.330 |
| 0.13354621 | 21.9429 | 12.569 | 23444 | 0.89459 | 23445 | 0.00 | 9.284 |
| 0.13421395 | 21.9874 | 12.582 | 23352 | 0.90349 | 23353 | 0.00 | 9.238 |
| 0.13488502 | 22.0316 | 12.595 | 23259 | 0.91245 | 23260 | 0.00 | 9.192 |
| 0.13555944 | 22.0753 | 12.607 | 23166 | 0.92148 | 23167 | 0.00 | 9.146 |
| 0.13623724 | 22.1187 | 12.619 | 23073 | 0.93058 | 23074 | 0.00 | 9.101 |
| 0.13691842 | 22.1615 | 12.631 | 22980 | 0.93975 | 22980 | 0.00 | 9.055 |
| 0.13760302 | 22.2039 | 12.643 | 22886 | 0.94899 | 22887 | 0.00 | 9.010 |
| 0.13829103 | 22.2458 | 12.654 | 22792 | 0.95830 | 22793 | 0.00 | 8.965 |
| 0.13898249 | 22.2871 | 12.665 | 22698 | 0.96768 | 22699 | 0.00 | 8.921 |
| 0.13967740 | 22.3279 | 12.675 | 22604 | 0.97713 | 22605 | 0.00 | 8.876 |
| 0.14037579 | 22.3680 | 12.685 | 22510 | 0.98665 | 22511 | 0.00 | 8.832 |
| 0.14107766 | 22.4075 | 12.695 | 22415 | 0.99624 | 22416 | 0.00 | 8.788 |
| 0.14178305 | 22.4464 | 12.705 | 22320 | 1.0059 | 22321 | 0.00 | 8.745 |
| 0.14249197 | 22.4845 | 12.714 | 22225 | 1.0156 | 22226 | 0.00 | 8.701 |
| 0.14320443 | 22.5218 | 12.723 | 22130 | 1.0254 | 22131 | 0.00 | 8.658 |
| 0.14392045 | 22.5583 | 12.731 | 22035 | 1.0353 | 22036 | 0.00 | 8.615 |
| 0.14464005 | 22.5940 | 12.740 | 21940 | 1.0453 | 21941 | 0.00 | 8.572 |
| 0.14536325 | 22.6288 | 12.748 | 21844 | 1.0553 | 21845 | 0.00 | 8.529 |
| 0.14609007 | 22.6625 | 12.755 | 21748 | 1.0654 | 21749 | 0.00 | 8.487 |
| 0.14682052 | 22.6953 | 12.762 | 21652 | 1.0755 | 21654 | 0.00 | 8.445 |
| 0.14755462 | 22.7269 | 12.769 | 21556 | 1.0858 | 21558 | 0.00 | 8.403 |
| 0.14829239 | 22.7573 | 12.776 | 21460 | 1.0961 | 21461 | 0.00 | 8.361 |
| 0.14903386 | 22.7865 | 12.782 | 21364 | 1.1065 | 21365 | 0.00 | 8.319 |
| 0.14977903 | 22.8143 | 12.788 | 21268 | 1.1169 | 21269 | 0.00 | 8.278 |
| 0.15052792 | 22.8407 | 12.794 | 21171 | 1.1274 | 21172 | 0.00 | 8.237 |
| 0.15128056 | 22.8655 | 12.799 | 21075 | 1.1380 | 21076 | 0.00 | 8.196 |
| 0.15203696 | 22.8887 | 12.804 | 20978 | 1.1487 | 20979 | 0.00 | 8.155 |
| 0.15279715 | 22.9101 | 12.809 | 20881 | 1.1595 | 20882 | 0.00 | 8.114 |
| 0.15356113 | 22.9295 | 12.813 | 20784 | 1.1703 | 20785 | 0.00 | 8.074 |
| 0.15432894 | 22.9469 | 12.817 | 20687 | 1.1812 | 20688 | 0.00 | 8.034 |
| 0.15510058 | 22.9620 | 12.821 | 20590 | 1.1922 | 20591 | 0.00 | 7.994 |
| 0.15587609 | 22.9747 | 12.824 | 20493 | 1.2032 | 20494 | 0.00 | 7.954 |
| 0.15665547 | 22.9847 | 12.827 | 20395 | 1.2144 | 20397 | 0.00 | 7.914 |
| 0.15743875 | 22.9918 | 12.829 | 20298 | 1.2256 | 20299 | 0.00 | 7.875 |
| 0.15822594 | 22.9957 | 12.832 | 20201 | 1.2369 | 20202 | 0.00 | 7.836 |
| 0.15901707 | 22.9962 | 12.834 | 20103 | 1.2482 | 20104 | 0.00 | 7.797 |
| 0.15981215 | 22.9944 | 12.835 | 20006 | 1.2597 | 20007 | 0.00 | 7.758 |
| 0.16061121 | 22.9868 | 12.836 | 19908 | 1.2712 | 19909 | 0.00 | 7.720 |
| 0.16141427 | 22.9746 | 12.837 | 19810 | 1.2828 | 19812 | 0.00 | 7.681 |
| 0.16222134 | 22.9572 | 12.838 | 19713 | 1.2944 | 19714 | 0.00 | 7.643 |
| 0.16303245 | 22.9340 | 12.838 | 19615 | 1.3062 | 19616 | 0.00 | 7.605 |
| 0.16384761 | 22.9042 | 12.838 | 19517 | 1.3180 | 19519 | 0.00 | 7.567 |
| 0.16466685 | 22.8671 | 12.838 | 19420 | 1.3299 | 19421 | 0.00 | 7.529 |
| 0.16549018 | 22.8215 | 12.837 | 19322 | 1.3419 | 19323 | 0.00 | 7.492 |
| 0.16631763 | 22.7663 | 12.836 | 19224 | 1.3539 | 19225 | 0.00 | 7.455 |
| 0.16714922 | 22.7000 | 12.834 | 19126 | 1.3661 | 19128 | 0.00 | 7.418 |
| 0.16798497 | 22.6207 | 12.832 | 19028 | 1.3783 | 19030 | 0.00 | 7.381 |
| 0.16882489 | 22.5262 | 12.830 | 18931 | 1.3906 | 18932 | 0.00 | 7.344 |
| 0.16966902 | 22.4134 | 12.828 | 18833 | 1.4029 | 18834 | 0.00 | 7.307 |
| 0.17051736 | 22.2785 | 12.825 | 18735 | 1.4154 | 18736 | 0.00 | 7.271 |
| 0.17136995 | 22.1165 | 12.822 | 18637 | 1.4279 | 18639 | 0.00 | 7.235 |
| 0.17222680 | 21.9205 | 12.819 | 18540 | 1.4405 | 18541 | 0.00 | 7.199 |
| 0.17308793 | 21.6808 | 12.815 | 18442 | 1.4532 | 18443 | 0.00 | 7.163 |
| 0.17395337 | 21.3833 | 12.811 | 18344 | 1.4660 | 18346 | 0.00 | 7.127 |
| 0.17482314 | 21.0060 | 12.806 | 18247 | 1.4788 | 18248 | 0.00 | 7.092 |
| 0.17569726 | 20.5130 | 12.801 | 18149 | 1.4918 | 18150 | 0.00 | 7.057 |
| 0.17657574 | 19.8386 | 12.796 | 18051 | 1.5048 | 18053 | 0.00 | 7.022 |
| 0.17745862 | 18.8450 | 12.791 | 17954 | 1.5179 | 17955 | 0.00 | 6.987 |
| 0.17834591 | 17.1548 | 12.785 | 17857 | 1.5311 | 17858 | 0.00 | 6.952 |
| 0.17923764 | 12.7504 | 12.779 | 17759 | 1.5443 | 17761 | 0.00 | 6.917 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 0.17946997 | 8.81247 | 12.777 | 17734 | 1.5478 | 17735 | 0.00 | 6.908 |
| 0.17949044 | 8.13869 | 12.777 | 17732 | 1.5481 | 17733 | 0.00 | 6.908 |
| 0.17970956 | 8.41529 | 25.450 | 35276 | 1.5513 | 35278 | 0.00 | 6.899 |
| 0.17973003 | 9.13343 | 25.435 | 35251 | 1.5516 | 35252 | 0.00 | 6.898 |
| 0.18013383 | 15.2124 | 25.131 | 34752 | 1.5576 | 34754 | 0.00 | 6.883 |
| 0.18103450 | 19.7264 | 24.482 | 33686 | 1.5711 | 33687 | 0.00 | 6.849 |
| 0.18193967 | 22.0462 | 23.866 | 32675 | 1.5846 | 32676 | 0.00 | 6.815 |
| 0.18284937 | 23.6141 | 23.281 | 31716 | 1.5981 | 31717 | 0.00 | 6.781 |
| 0.18376362 | 24.7851 | 22.726 | 30805 | 1.6118 | 30807 | 0.00 | 6.747 |
| 0.18468244 | 25.7057 | 22.199 | 29941 | 1.6255 | 29943 | 0.00 | 6.713 |
| 0.18560585 | 26.4522 | 21.699 | 29121 | 1.6394 | 29122 | 0.00 | 6.680 |
| 0.18653388 | 27.0700 | 21.224 | 28341 | 1.6533 | 28343 | 0.00 | 6.647 |
| 0.18746655 | 27.5885 | 20.772 | 27601 | 1.6672 | 27603 | 0.00 | 6.614 |
| 0.18840388 | 28.0278 | 20.344 | 26897 | 1.6813 | 26899 | 0.00 | 6.581 |
| 0.18934590 | 28.4029 | 19.937 | 26228 | 1.6955 | 26229 | 0.00 | 6.548 |
| 0.19029263 | 28.7246 | 19.550 | 25591 | 1.7097 | 25593 | 0.00 | 6.515 |
| 0.19124409 | 29.0014 | 19.183 | 24985 | 1.7240 | 24987 | 0.00 | 6.483 |
| 0.19220031 | 29.2401 | 18.833 | 24408 | 1.7384 | 24410 | 0.00 | 6.451 |
| 0.19316131 | 29.4459 | 18.501 | 23859 | 1.7529 | 23860 | 0.00 | 6.419 |
| 0.19412712 | 29.6232 | 18.186 | 23335 | 1.7675 | 23337 | 0.00 | 6.387 |
| 0.19509776 | 29.7754 | 17.886 | 22836 | 1.7821 | 22838 | 0.00 | 6.355 |
| 0.19607325 | 29.9052 | 17.600 | 22360 | 1.7968 | 22361 | 0.00 | 6.323 |
| 0.19705361 | 30.0149 | 17.329 | 21905 | 1.8116 | 21907 | 0.00 | 6.292 |
| 0.19803888 | 30.1058 | 17.071 | 21472 | 1.8265 | 21474 | 0.00 | 6.261 |
| 0.19902907 | 30.1799 | 16.830 | 21064 | 1.8415 | 21066 | 0.00 | 6.229 |
| 0.20002422 | 30.2412 | 16.607 | 20681 | 1.8566 | 20683 | 0.00 | 6.198 |
| 0.20102434 | 30.2925 | 16.400 | 20321 | 1.8717 | 20323 | 0.00 | 6.168 |
| 0.20202946 | 30.3359 | 16.207 | 19982 | 1.8870 | 19984 | 0.00 | 6.137 |
| 0.20303961 | 30.3731 | 16.027 | 19662 | 1.9023 | 19664 | 0.00 | 6.106 |
| 0.20405481 | 30.4052 | 15.858 | 19359 | 1.9177 | 19360 | 0.00 | 6.076 |
| 0.20507508 | 30.4334 | 15.701 | 19071 | 1.9331 | 19073 | 0.00 | 6.046 |
| 0.20610046 | 30.4584 | 15.554 | 18798 | 1.9487 | 18800 | 0.00 | 6.016 |
| 0.20713096 | 30.4808 | 15.415 | 18538 | 1.9643 | 18540 | 0.00 | 5.986 |
| 0.20816661 | 30.5012 | 15.285 | 18291 | 1.9801 | 18293 | 0.00 | 5.956 |
| 0.20920745 | 30.5200 | 15.163 | 18054 | 1.9959 | 18056 | 0.00 | 5.926 |
| 0.21025348 | 30.5376 | 15.048 | 17827 | 2.0118 | 17829 | 0.00 | 5.897 |
| 0.21130475 | 30.5542 | 14.939 | 17610 | 2.0278 | 17612 | 0.00 | 5.868 |
| 0.21236128 | 30.5702 | 14.836 | 17402 | 2.0438 | 17404 | 0.00 | 5.838 |
| 0.21342308 | 30.5857 | 14.738 | 17202 | 2.0600 | 17204 | 0.00 | 5.809 |
| 0.21449020 | 30.6009 | 14.646 | 17009 | 2.0762 | 17011 | 0.00 | 5.780 |
| 0.21556265 | 30.6158 | 14.558 | 16823 | 2.0925 | 16825 | 0.00 | 5.752 |
| 0.21664046 | 30.6307 | 14.475 | 16643 | 2.1089 | 16645 | 0.00 | 5.723 |
| 0.21772366 | 30.6456 | 14.395 | 16469 | 2.1254 | 16471 | 0.00 | 5.695 |
| 0.21881228 | 30.6606 | 14.319 | 16301 | 2.1420 | 16303 | 0.00 | 5.666 |
| 0.21990634 | 30.6758 | 14.247 | 16137 | 2.1586 | 16140 | 0.00 | 5.638 |
| 0.22100588 | 30.6911 | 14.177 | 15979 | 2.1753 | 15981 | 0.00 | 5.610 |
| 0.22211090 | 30.7066 | 14.111 | 15825 | 2.1921 | 15827 | 0.00 | 5.582 |
| 0.22322146 | 30.7224 | 14.047 | 15675 | 2.2090 | 15677 | 0.00 | 5.554 |
| 0.22433757 | 30.7384 | 13.986 | 15529 | 2.2260 | 15531 | 0.00 | 5.527 |
| 0.22545925 | 30.7547 | 13.927 | 15387 | 2.2431 | 15389 | 0.00 | 5.499 |
| 0.22658655 | 30.7713 | 13.870 | 15248 | 2.2602 | 15250 | 0.00 | 5.472 |
| 0.22771948 | 30.7881 | 13.816 | 15113 | 2.2775 | 15115 | 0.00 | 5.445 |
| 0.22885808 | 30.8053 | 13.763 | 14980 | 2.2948 | 14982 | 0.00 | 5.418 |
| 0.23000237 | 30.8227 | 13.712 | 14850 | 2.3122 | 14853 | 0.00 | 5.391 |
| 0.23115238 | 30.8403 | 13.663 | 14723 | 2.3297 | 14726 | 0.00 | 5.364 |
| 0.23230814 | 30.8582 | 13.615 | 14599 | 2.3472 | 14601 | 0.00 | 5.337 |
| 0.23346969 | 30.8763 | 13.569 | 14477 | 2.3649 | 14479 | 0.00 | 5.311 |
| 0.23463703 | 30.8947 | 13.524 | 14357 | 2.3826 | 14360 | 0.00 | 5.284 |
| 0.23581022 | 30.9133 | 13.481 | 14240 | 2.4004 | 14242 | 0.00 | 5.258 |
| 0.23698927 | 30.9320 | 13.438 | 14125 | 2.4183 | 14127 | 0.00 | 5.232 |
| 0.23817422 | 30.9510 | 13.397 | 14011 | 2.4363 | 14014 | 0.00 | 5.206 |
| 0.23936509 | 30.9701 | 13.357 | 13900 | 2.4543 | 13902 | 0.00 | 5.180 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 0.24056191 | 30.9894 | 13.318 | 13790 | 2.4725 | 13792 | 0.00 | 5.154 |
| 0.24176472 | 31.0088 | 13.280 | 13682 | 2.4907 | 13685 | 0.00 | 5.128 |
| 0.24297355 | 31.0283 | 13.242 | 13576 | 2.5090 | 13578 | 0.00 | 5.103 |
| 0.24418841 | 31.0479 | 13.206 | 13471 | 2.5274 | 13474 | 0.00 | 5.077 |
| 0.24540936 | 31.0676 | 13.170 | 13368 | 2.5458 | 13370 | 0.00 | 5.052 |
| 0.24663640 | 31.0873 | 13.135 | 13266 | 2.5644 | 13269 | 0.00 | 5.027 |
| 0.24786959 | 31.1071 | 13.101 | 13166 | 2.5830 | 13168 | 0.00 | 5.002 |
| 0.24910893 | 31.1269 | 13.068 | 13067 | 2.6017 | 13069 | 0.00 | 4.977 |
| 0.25035448 | 31.1468 | 13.035 | 12969 | 2.6205 | 12972 | 0.00 | 4.952 |
| 0.25160625 | 31.1666 | 13.003 | 12873 | 2.6394 | 12875 | 0.00 | 4.928 |
| 0.25286428 | 31.1864 | 12.971 | 12778 | 2.6583 | 12780 | 0.00 | 4.903 |
| 0.25412860 | 31.2062 | 12.940 | 12684 | 2.6774 | 12686 | 0.00 | 4.879 |
| 0.25539925 | 31.2259 | 12.909 | 12591 | 2.6965 | 12593 | 0.00 | 4.855 |
| 0.25667624 | 31.2455 | 12.879 | 12499 | 2.7157 | 12502 | 0.00 | 4.830 |
| 0.25795962 | 31.2650 | 12.850 | 12408 | 2.7349 | 12411 | 0.00 | 4.806 |
| 0.25924942 | 31.2845 | 12.821 | 12319 | 2.7543 | 12321 | 0.00 | 4.782 |
| 0.26054567 | 31.3038 | 12.792 | 12230 | 2.7737 | 12233 | 0.00 | 4.759 |
| 0.26184840 | 31.3229 | 12.764 | 12143 | 2.7932 | 12145 | 0.00 | 4.735 |
| 0.26315764 | 31.3420 | 12.737 | 12056 | 2.8128 | 12059 | 0.00 | 4.711 |
| 0.26447343 | 31.3608 | 12.709 | 11970 | 2.8325 | 11973 | 0.00 | 4.688 |
| 0.26579579 | 31.3795 | 12.683 | 11886 | 2.8522 | 11888 | 0.00 | 4.665 |
| 0.26712477 | 31.3979 | 12.656 | 11802 | 2.8721 | 11805 | 0.00 | 4.641 |
| 0.26846040 | 31.4162 | 12.630 | 11719 | 2.8920 | 11722 | 0.00 | 4.618 |
| 0.26980270 | 31.4342 | 12.604 | 11637 | 2.9120 | 11640 | 0.00 | 4.595 |
| 0.27115171 | 31.4519 | 12.579 | 11556 | 2.9320 | 11559 | 0.00 | 4.573 |
| 0.27250747 | 31.4694 | 12.554 | 11475 | 2.9522 | 11478 | 0.00 | 4.550 |
| 0.27387001 | 31.4866 | 12.529 | 11396 | 2.9724 | 11399 | 0.00 | 4.527 |
| 0.27523936 | 31.5035 | 12.505 | 11317 | 2.9927 | 11320 | 0.00 | 4.505 |
| 0.27661556 | 31.5200 | 12.481 | 11239 | 3.0130 | 11242 | 0.00 | 4.482 |
| 0.27799863 | 31.5363 | 12.457 | 11162 | 3.0335 | 11165 | 0.00 | 4.460 |
| 0.27938863 | 31.5521 | 12.434 | 11086 | 3.0540 | 11089 | 0.00 | 4.438 |
| 0.28078557 | 31.5676 | 12.411 | 11010 | 3.0746 | 11013 | 0.00 | 4.416 |
| 0.28218950 | 31.5827 | 12.388 | 10935 | 3.0953 | 10938 | 0.00 | 4.394 |
| 0.28360044 | 31.5973 | 12.366 | 10861 | 3.1160 | 10864 | 0.00 | 4.372 |
| 0.28501845 | 31.6115 | 12.344 | 10788 | 3.1368 | 10791 | 0.00 | 4.350 |
| 0.28644354 | 31.6252 | 12.322 | 10715 | 3.1577 | 10718 | 0.00 | 4.328 |
| 0.28787576 | 31.6384 | 12.301 | 10643 | 3.1787 | 10647 | 0.00 | 4.307 |
| 0.28931514 | 31.6511 | 12.279 | 10572 | 3.1997 | 10575 | 0.00 | 4.285 |
| 0.29076171 | 31.6632 | 12.258 | 10502 | 3.2208 | 10505 | 0.00 | 4.264 |
| 0.29221552 | 31.6747 | 12.238 | 10432 | 3.2420 | 10435 | 0.00 | 4.243 |
| 0.29367660 | 31.6856 | 12.217 | 10363 | 3.2633 | 10366 | 0.00 | 4.222 |
| 0.29514498 | 31.6958 | 12.197 | 10294 | 3.2846 | 10297 | 0.00 | 4.201 |
| 0.29662071 | 31.7053 | 12.178 | 10226 | 3.3060 | 10230 | 0.00 | 4.180 |
| 0.29810381 | 31.7141 | 12.158 | 10159 | 3.3275 | 10162 | 0.00 | 4.159 |
| 0.29959433 | 31.7220 | 12.139 | 10093 | 3.3491 | 10096 | 0.00 | 4.138 |
| 0.30109230 | 31.7290 | 12.120 | 10027 | 3.3707 | 10030 | 0.00 | 4.118 |
| 0.30259776 | 31.7351 | 12.101 | 9961.5 | 3.3924 | 9964.9 | 0.00 | 4.097 |
| 0.30411075 | 31.7401 | 12.083 | 9896.9 | 3.4141 | 9900.3 | 0.00 | 4.077 |
| 0.30563130 | 31.7440 | 12.065 | 9833.0 | 3.4359 | 9836.4 | 0.00 | 4.057 |
| 0.30715946 | 31.7468 | 12.047 | 9769.6 | 3.4578 | 9773.1 | 0.00 | 4.036 |
| 0.30869526 | 31.7481 | 12.029 | 9706.9 | 3.4798 | 9710.3 | 0.00 | 4.016 |
| 0.31023873 | 31.7480 | 12.012 | 9644.7 | 3.5019 | 9648.2 | 0.00 | 3.996 |
| 0.31178993 | 31.7462 | 11.995 | 9583.2 | 3.5240 | 9586.7 | 0.00 | 3.977 |
| 0.31334888 | 31.7426 | 11.979 | 9522.3 | 3.5461 | 9525.8 | 0.00 | 3.957 |
| 0.31491562 | 31.7369 | 11.962 | 9462.0 | 3.5684 | 9465.5 | 0.00 | 3.937 |
| 0.31649020 | 31.7288 | 11.946 | 9402.2 | 3.5907 | 9405.8 | 0.00 | 3.917 |
| 0.31807265 | 31.7179 | 11.930 | 9343.1 | 3.6130 | 9346.7 | 0.00 | 3.898 |
| 0.31966301 | 31.7038 | 11.915 | 9284.5 | 3.6355 | 9288.1 | 0.00 | 3.879 |
| 0.32126133 | 31.6858 | 11.900 | 9226.5 | 3.6580 | 9230.1 | 0.00 | 3.859 |
| 0.32286764 | 31.6631 | 11.885 | 9169.0 | 3.6806 | 9172.7 | 0.00 | 3.840 |
| 0.32448197 | 31.6346 | 11.870 | 9112.2 | 3.7032 | 9115.9 | 0.00 | 3.821 |
| 0.32610438 | 31.5986 | 11.856 | 9055.9 | 3.7259 | 9059.6 | 0.00 | 3.802 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 0.32773491 | 31.5527 | 11.842 | 9000.1 | 3.7487 | 9003.8 | 0.00 | 3.783 |
| 0.32937358 | 31.4927 | 11.828 | 8944.9 | 3.7715 | 8948.6 | 0.00 | 3.764 |
| 0.33102045 | 31.4116 | 11.814 | 8890.2 | 3.7944 | 8894.0 | 0.00 | 3.746 |
| 0.33267555 | 31.2942 | 11.801 | 8836.0 | 3.8173 | 8839.9 | 0.00 | 3.727 |
| 0.33433893 | 31.0997 | 11.788 | 8782.4 | 3.8403 | 8786.3 | 0.00 | 3.708 |
| 0.33601062 | 30.6005 | 11.775 | 8729.4 | 3.8634 | 8733.2 | 0.00 | 3.690 |
| 0.33621965 | 30.4348 | 11.774 | 8722.8 | 3.8663 | 8726.6 | 0.00 | 3.688 |
| 0.33698036 | 30.4405 | 12.970 | 9587.3 | 3.8768 | 9591.1 | 0.00 | 3.679 |
| 0.33769068 | 30.8490 | 12.967 | 9564.6 | 3.8865 | 9568.5 | 0.00 | 3.672 |
| 0.33937913 | 31.2216 | 12.959 | 9511.3 | 3.9097 | 9515.2 | 0.00 | 3.653 |
| 0.34107602 | 31.4195 | 12.951 | 9458.4 | 3.9330 | 9462.4 | 0.00 | 3.635 |
| 0.34278140 | 31.5590 | 12.944 | 9406.1 | 3.9563 | 9410.1 | 0.00 | 3.617 |
| 0.34449531 | 31.6687 | 12.937 | 9354.3 | 3.9796 | 9358.3 | 0.00 | 3.599 |
| 0.34621779 | 31.7604 | 12.930 | 9303.0 | 4.0031 | 9307.0 | 0.00 | 3.581 |
| 0.34794888 | 31.8399 | 12.924 | 9252.2 | 4.0266 | 9256.2 | 0.00 | 3.563 |
| 0.34968862 | 31.9106 | 12.918 | 9201.9 | 4.0501 | 9205.9 | 0.00 | 3.546 |
| 0.35143706 | 31.9746 | 12.912 | 9152.0 | 4.0737 | 9156.1 | 0.00 | 3.528 |
| 0.35319425 | 32.0333 | 12.907 | 9102.7 | 4.0973 | 9106.8 | 0.00 | 3.510 |
| 0.35496022 | 32.0876 | 12.902 | 9053.8 | 4.1211 | 9057.9 | 0.00 | 3.493 |
| 0.35673502 | 32.1383 | 12.897 | 9005.3 | 4.1448 | 9009.5 | 0.00 | 3.476 |
| 0.35851870 | 32.1859 | 12.892 | 8957.4 | 4.1686 | 8961.5 | 0.00 | 3.458 |
| 0.36031129 | 32.2307 | 12.888 | 8909.8 | 4.1925 | 8914.0 | 0.00 | 3.441 |
| 0.36211285 | 32.2730 | 12.884 | 8862.8 | 4.2164 | 8867.0 | 0.00 | 3.424 |
| 0.36392341 | 32.3129 | 12.880 | 8816.1 | 4.2404 | 8820.4 | 0.00 | 3.407 |
| 0.36574303 | 32.3506 | 12.877 | 8769.9 | 4.2644 | 8774.2 | 0.00 | 3.390 |
| 0.36757174 | 32.3861 | 12.874 | 8724.2 | 4.2885 | 8728.5 | 0.00 | 3.373 |
| 0.36940960 | 32.4194 | 12.871 | 8678.8 | 4.3126 | 8683.1 | 0.00 | 3.356 |
| 0.37125665 | 32.4503 | 12.868 | 8633.9 | 4.3368 | 8638.3 | 0.00 | 3.340 |
| 0.37311293 | 32.4785 | 12.866 | 8589.4 | 4.3610 | 8593.7 | 0.00 | 3.323 |
| 0.37497850 | 32.5035 | 12.864 | 8545.2 | 4.3853 | 8549.6 | 0.00 | 3.306 |
| 0.37685339 | 32.5246 | 12.862 | 8501.5 | 4.4096 | 8505.9 | 0.00 | 3.290 |
| 0.37873766 | 32.5402 | 12.860 | 8458.1 | 4.4340 | 8462.5 | 0.00 | 3.274 |
| 0.38063135 | 32.5474 | 12.859 | 8415.1 | 4.4584 | 8419.5 | 0.00 | 3.257 |
| 0.38253450 | 32.5391 | 12.858 | 8372.4 | 4.4829 | 8376.9 | 0.00 | 3.241 |
| 0.38444718 | 32.4890 | 12.857 | 8330.1 | 4.5074 | 8334.6 | 0.00 | 3.225 |
| 0.38540604 | 32.3946 | 12.856 | 8309.1 | 4.5196 | 8313.6 | 0.00 | 3.217 |
| 0.38636941 | 32.4074 | 13.185 | 8500.3 | 4.5319 | 8504.9 | 0.00 | 3.209 |
| 0.38639394 | 32.4131 | 13.185 | 8499.8 | 4.5322 | 8504.3 | 0.00 | 3.209 |
| 0.38830126 | 32.6148 | 13.186 | 8458.8 | 4.5565 | 8463.3 | 0.00 | 3.193 |
| 0.39024276 | 32.7137 | 13.187 | 8417.6 | 4.5812 | 8422.1 | 0.00 | 3.177 |
| 0.39219398 | 32.7893 | 13.189 | 8376.7 | 4.6058 | 8381.3 | 0.00 | 3.161 |
| 0.39415495 | 32.8543 | 13.191 | 8336.1 | 4.6306 | 8340.7 | 0.00 | 3.146 |
| 0.39612572 | 32.9132 | 13.193 | 8295.9 | 4.6553 | 8300.5 | 0.00 | 3.130 |
| 0.39810635 | 32.9681 | 13.195 | 8255.9 | 4.6801 | 8260.6 | 0.00 | 3.114 |
| 0.40009688 | 33.0201 | 13.197 | 8216.3 | 4.7050 | 8221.0 | 0.00 | 3.099 |
| 0.40209737 | 33.0700 | 13.200 | 8177.0 | 4.7299 | 8181.7 | 0.00 | 3.083 |
| 0.40410785 | 33.1182 | 13.202 | 8138.0 | 4.7548 | 8142.7 | 0.00 | 3.068 |
| 0.40612839 | 33.1649 | 13.205 | 8099.2 | 4.7797 | 8104.0 | 0.00 | 3.053 |
| 0.40815904 | 33.2106 | 13.208 | 8060.7 | 4.8047 | 8065.5 | 0.00 | 3.038 |
| 0.41019983 | 33.2552 | 13.211 | 8022.5 | 4.8298 | 8027.4 | 0.00 | 3.023 |
| 0.41225083 | 33.2990 | 13.215 | 7984.6 | 4.8548 | 7989.5 | 0.00 | 3.007 |
| 0.41431208 | 33.3421 | 13.218 | 7946.9 | 4.8799 | 7951.8 | 0.00 | 2.993 |
| 0.41638364 | 33.3845 | 13.222 | 7909.5 | 4.9051 | 7914.4 | 0.00 | 2.978 |
| 0.41846556 | 33.4262 | 13.225 | 7872.4 | 4.9302 | 7877.3 | 0.00 | 2.963 |
| 0.42055789 | 33.4674 | 13.229 | 7835.4 | 4.9554 | 7840.4 | 0.00 | 2.948 |
| 0.42266068 | 33.5080 | 13.233 | 7798.7 | 4.9806 | 7803.7 | 0.00 | 2.933 |
| 0.42477398 | 33.5481 | 13.237 | 7762.3 | 5.0059 | 7767.3 | 0.00 | 2.919 |
| 0.42689785 | 33.5877 | 13.241 | 7726.0 | 5.0312 | 7731.1 | 0.00 | 2.904 |
| 0.42903234 | 33.6267 | 13.245 | 7690.0 | 5.0565 | 7695.1 | 0.00 | 2.890 |
| 0.43117750 | 33.6652 | 13.249 | 7654.2 | 5.0819 | 7659.3 | 0.00 | 2.875 |
| 0.43333339 | 33.7031 | 13.254 | 7618.6 | 5.1072 | 7623.7 | 0.00 | 2.861 |
| 0.43550006 | 33.7404 | 13.258 | 7583.2 | 5.1327 | 7588.3 | 0.00 | 2.847 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 0.43767756 | 33.7770 | 13.262 | 7548.0 | 5.1581 | 7553.1 | 0.00 | 2.833 |
| 0.43986595 | 33.8129 | 13.267 | 7512.9 | 5.1835 | 7518.1 | 0.00 | 2.819 |
| 0.44206528 | 33.8480 | 13.271 | 7478.1 | 5.2090 | 7483.3 | 0.00 | 2.805 |
| 0.44427560 | 33.8822 | 13.276 | 7443.4 | 5.2345 | 7448.6 | 0.00 | 2.791 |
| 0.44649698 | 33.9152 | 13.280 | 7408.9 | 5.2600 | 7414.2 | 0.00 | 2.777 |
| 0.44872947 | 33.9469 | 13.285 | 7374.5 | 5.2856 | 7379.8 | 0.00 | 2.763 |
| 0.45097311 | 33.9770 | 13.289 | 7340.4 | 5.3112 | 7345.7 | 0.00 | 2.749 |
| 0.45322798 | 34.0052 | 13.294 | 7306.3 | 5.3368 | 7311.6 | 0.00 | 2.736 |
| 0.45549412 | 34.0308 | 13.298 | 7272.4 | 5.3624 | 7277.8 | 0.00 | 2.722 |
| 0.45777159 | 34.0532 | 13.303 | 7238.7 | 5.3880 | 7244.0 | 0.00 | 2.708 |
| 0.46006045 | 34.0709 | 13.307 | 7205.0 | 5.4136 | 7210.5 | 0.00 | 2.695 |
| 0.46236075 | 34.0821 | 13.312 | 7171.5 | 5.4393 | 7177.0 | 0.00 | 2.682 |
| 0.46467255 | 34.0828 | 13.316 | 7138.2 | 5.4650 | 7143.6 | 0.00 | 2.668 |
| 0.46699592 | 34.0642 | 13.320 | 7104.9 | 5.4907 | 7110.4 | 0.00 | 2.655 |
| 0.46933090 | 33.9988 | 13.324 | 7071.8 | 5.5164 | 7077.3 | 0.00 | 2.642 |
| 0.47099246 | 33.8336 | 13.327 | 7048.4 | 5.5346 | 7053.9 | 0.00 | 2.632 |
| 0.47167755 | 33.2805 | 13.329 | 7038.8 | 5.5421 | 7044.3 | 0.00 | 2.629 |
| 0.47240756 | 33.8619 | 13.846 | 7300.9 | 5.5501 | 7306.5 | 0.00 | 2.625 |
| 0.47403594 | 34.0908 | 13.850 | 7277.7 | 5.5678 | 7283.3 | 0.00 | 2.616 |
| 0.47640612 | 34.2537 | 13.855 | 7244.2 | 5.5936 | 7249.7 | 0.00 | 2.602 |
| 0.47878815 | 34.3692 | 13.860 | 7210.7 | 5.6193 | 7216.3 | 0.00 | 2.590 |
| 0.48118209 | 34.4655 | 13.865 | 7177.3 | 5.6451 | 7183.0 | 0.00 | 2.577 |
| 0.48358800 | 34.5515 | 13.869 | 7144.0 | 5.6709 | 7149.7 | 0.00 | 2.564 |
| 0.48600594 | 34.6309 | 13.874 | 7110.9 | 5.6967 | 7116.6 | 0.00 | 2.551 |
| 0.48843597 | 34.7059 | 13.878 | 7077.7 | 5.7225 | 7083.5 | 0.00 | 2.538 |
| 0.49087815 | 34.7778 | 13.883 | 7044.7 | 5.7483 | 7050.5 | 0.00 | 2.526 |
| 0.49333254 | 34.8473 | 13.887 | 7011.8 | 5.7741 | 7017.5 | 0.00 | 2.513 |
| 0.49579920 | 34.9149 | 13.891 | 6978.9 | 5.7999 | 6984.7 | 0.00 | 2.501 |
| 0.49827820 | 34.9811 | 13.895 | 6946.0 | 5.8257 | 6951.9 | 0.00 | 2.488 |
| 0.50076959 | 35.0462 | 13.898 | 6913.3 | 5.8515 | 6919.1 | 0.00 | 2.476 |
| 0.50327344 | 35.1103 | 13.902 | 6880.6 | 5.8773 | 6886.5 | 0.00 | 2.464 |
| 0.50578980 | 35.1736 | 13.905 | 6847.9 | 5.9032 | 6853.9 | 0.00 | 2.451 |
| 0.50831875 | 35.2363 | 13.908 | 6815.4 | 5.9290 | 6821.3 | 0.00 | 2.439 |
| 0.51086035 | 35.2985 | 13.911 | 6782.8 | 5.9548 | 6788.8 | 0.00 | 2.427 |
| 0.51341465 | 35.3602 | 13.913 | 6750.3 | 5.9806 | 6756.3 | 0.00 | 2.415 |
| 0.51598172 | 35.4215 | 13.916 | 6717.9 | 6.0064 | 6723.9 | 0.00 | 2.403 |
| 0.51856163 | 35.4825 | 13.918 | 6685.5 | 6.0323 | 6691.5 | 0.00 | 2.391 |
| 0.52115444 | 35.5433 | 13.920 | 6653.1 | 6.0581 | 6659.2 | 0.00 | 2.379 |
| 0.52376021 | 35.6038 | 13.921 | 6620.8 | 6.0839 | 6626.8 | 0.00 | 2.367 |
| 0.52637901 | 35.6641 | 13.923 | 6588.4 | 6.1097 | 6594.5 | 0.00 | 2.355 |
| 0.52901091 | 35.7242 | 13.924 | 6556.1 | 6.1355 | 6562.3 | 0.00 | 2.344 |
| 0.53165596 | 35.7842 | 13.924 | 6523.8 | 6.1612 | 6530.0 | 0.00 | 2.332 |
| 0.53431424 | 35.8441 | 13.925 | 6491.6 | 6.1870 | 6497.7 | 0.00 | 2.320 |
| 0.53698581 | 35.9038 | 13.925 | 6459.3 | 6.2128 | 6465.5 | 0.00 | 2.309 |
| 0.53967074 | 36.0000 | 13.924 | 6427.1 | 6.2385 | 6433.3 | 0.00 | 2.297 |
| 0.54236910 | 36.0596 | 13.924 | 6394.8 | 6.2643 | 6401.1 | 0.00 | 2.286 |
| 0.54508094 | 36.1191 | 13.923 | 6362.6 | 6.2900 | 6368.9 | 0.00 | 2.275 |
| 0.54780635 | 36.1785 | 13.922 | 6330.4 | 6.3157 | 6336.7 | 0.00 | 2.263 |
| 0.55054538 | 36.2378 | 13.920 | 6298.2 | 6.3414 | 6304.5 | 0.00 | 2.252 |
| 0.55329810 | 36.2970 | 13.918 | 6266.0 | 6.3671 | 6272.3 | 0.00 | 2.241 |
| 0.55606460 | 36.3562 | 13.916 | 6233.8 | 6.3928 | 6240.2 | 0.00 | 2.230 |
| 0.55884492 | 36.4152 | 13.913 | 6201.6 | 6.4184 | 6208.0 | 0.00 | 2.219 |
| 0.56163914 | 36.4742 | 13.910 | 6169.4 | 6.4441 | 6175.9 | 0.00 | 2.208 |
| 0.56444734 | 36.5332 | 13.907 | 6137.2 | 6.4697 | 6143.7 | 0.00 | 2.197 |
| 0.56726958 | 36.5920 | 13.903 | 6105.1 | 6.4953 | 6111.6 | 0.00 | 2.186 |
| 0.57010592 | 36.6508 | 13.899 | 6072.9 | 6.5209 | 6079.4 | 0.00 | 2.175 |
| 0.57295645 | 36.7095 | 13.895 | 6040.7 | 6.5464 | 6047.3 | 0.00 | 2.164 |
| 0.57582123 | 36.7681 | 13.890 | 6008.6 | 6.5719 | 6015.2 | 0.00 | 2.153 |
| 0.57870034 | 36.8266 | 13.885 | 5976.4 | 6.5974 | 5983.0 | 0.00 | 2.142 |
| 0.58159384 | 36.8850 | 13.879 | 5944.3 | 6.6229 | 5950.9 | 0.00 | 2.132 |
| 0.58450181 | 36.9433 | 13.873 | 5912.1 | 6.6484 | 5918.8 | 0.00 | 2.121 |
| 0.58742432 | 37.0015 | 13.867 | 5880.0 | 6.6738 | 5886.7 | 0.00 | 2.111 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 0.59036144 | 37.0597 | 13.860 | 5847.9 | 6.6992 | 5854.6 | 0.00 | 2.100 |
| 0.59331325 | 37.1177 | 13.852 | 5815.7 | 6.7246 | 5822.5 | 0.00 | 2.090 |
| 0.59627982 | 37.1756 | 13.845 | 5783.6 | 6.7499 | 5790.4 | 0.00 | 2.079 |
| 0.59926122 | 37.2334 | 13.837 | 5751.5 | 6.7752 | 5758.3 | 0.00 | 2.069 |
| 0.60225752 | 37.2910 | 13.828 | 5719.4 | 6.8005 | 5726.2 | 0.00 | 2.059 |
| 0.60526881 | 37.3485 | 13.820 | 5687.3 | 6.8257 | 5694.1 | 0.00 | 2.048 |
| 0.60829515 | 37.4059 | 13.810 | 5655.2 | 6.8509 | 5662.1 | 0.00 | 2.038 |
| 0.61133663 | 37.4632 | 13.800 | 5623.1 | 6.8761 | 5630.0 | 0.00 | 2.028 |
| 0.61439331 | 37.5202 | 13.790 | 5591.0 | 6.9012 | 5597.9 | 0.00 | 2.018 |
| 0.61746528 | 37.5772 | 13.780 | 5558.9 | 6.9263 | 5565.8 | 0.00 | 2.008 |
| 0.62055260 | 37.6339 | 13.769 | 5526.8 | 6.9514 | 5533.8 | 0.00 | 1.998 |
| 0.62365537 | 37.6905 | 13.757 | 5494.7 | 6.9764 | 5501.7 | 0.00 | 1.988 |
| 0.62677364 | 37.7469 | 13.745 | 5462.7 | 7.0014 | 5469.7 | 0.00 | 1.978 |
| 0.62990751 | 37.8031 | 13.733 | 5430.7 | 7.0264 | 5437.7 | 0.00 | 1.968 |
| 0.63305705 | 37.8591 | 13.720 | 5398.7 | 7.0513 | 5405.7 | 0.00 | 1.959 |
| 0.63622234 | 37.9149 | 13.707 | 5366.7 | 7.0761 | 5373.7 | 0.00 | 1.949 |
| 0.63940345 | 37.9704 | 13.694 | 5334.7 | 7.1009 | 5341.8 | 0.00 | 1.939 |
| 0.64260046 | 38.0258 | 13.680 | 5302.8 | 7.1257 | 5309.9 | 0.00 | 1.929 |
| 0.64581347 | 38.0809 | 13.666 | 5270.8 | 7.1504 | 5278.0 | 0.00 | 1.920 |
| 0.64904253 | 38.1358 | 13.651 | 5239.0 | 7.1751 | 5246.1 | 0.00 | 1.910 |
| 0.65228775 | 38.1905 | 13.636 | 5207.1 | 7.1997 | 5214.3 | 0.00 | 1.901 |
| 0.65554919 | 38.2449 | 13.620 | 5175.3 | 7.2243 | 5182.5 | 0.00 | 1.891 |
| 0.65882693 | 38.2990 | 13.604 | 5143.5 | 7.2489 | 5150.7 | 0.00 | 1.882 |
| 0.66212107 | 38.3529 | 13.588 | 5111.7 | 7.2733 | 5119.0 | 0.00 | 1.873 |
| 0.66543167 | 38.4065 | 13.571 | 5080.0 | 7.2978 | 5087.3 | 0.00 | 1.863 |
| 0.66875883 | 38.4599 | 13.554 | 5048.3 | 7.3221 | 5055.6 | 0.00 | 1.854 |
| 0.67210262 | 38.5129 | 13.536 | 5016.6 | 7.3465 | 5024.0 | 0.00 | 1.845 |
| 0.67546314 | 38.5656 | 13.518 | 4985.0 | 7.3707 | 4992.4 | 0.00 | 1.836 |
| 0.67884045 | 38.6181 | 13.499 | 4953.5 | 7.3950 | 4960.9 | 0.00 | 1.826 |
| 0.68223466 | 38.6702 | 13.481 | 4921.9 | 7.4191 | 4929.4 | 0.00 | 1.817 |
| 0.68564583 | 38.7220 | 13.461 | 4890.5 | 7.4432 | 4897.9 | 0.00 | 1.808 |
| 0.68907406 | 38.7735 | 13.442 | 4859.0 | 7.4673 | 4866.5 | 0.00 | 1.799 |
| 0.69251943 | 38.8247 | 13.422 | 4827.7 | 7.4912 | 4835.1 | 0.00 | 1.790 |
| 0.69598202 | 38.8755 | 13.401 | 4796.3 | 7.5152 | 4803.8 | 0.00 | 1.781 |
| 0.69946194 | 38.9260 | 13.380 | 4765.1 | 7.5390 | 4772.6 | 0.00 | 1.773 |
| 0.70295924 | 38.9761 | 13.359 | 4733.9 | 7.5628 | 4741.4 | 0.00 | 1.764 |
| 0.70647404 | 39.0259 | 13.338 | 4702.7 | 7.5865 | 4710.3 | 0.00 | 1.755 |
| 0.71000641 | 39.0753 | 13.316 | 4671.6 | 7.6102 | 4679.2 | 0.00 | 1.746 |
| 0.71355644 | 39.1244 | 13.293 | 4640.6 | 7.6338 | 4648.2 | 0.00 | 1.738 |
| 0.71712423 | 39.1731 | 13.271 | 4609.6 | 7.6574 | 4617.3 | 0.00 | 1.729 |
| 0.72070985 | 39.2214 | 13.248 | 4578.7 | 7.6808 | 4586.4 | 0.00 | 1.720 |
| 0.72431340 | 39.2693 | 13.224 | 4547.8 | 7.7042 | 4555.5 | 0.00 | 1.712 |
| 0.72793496 | 39.3168 | 13.200 | 4517.0 | 7.7276 | 4524.7 | 0.00 | 1.703 |
| 0.73157464 | 39.3638 | 13.176 | 4486.2 | 7.7508 | 4494.0 | 0.00 | 1.695 |
| 0.73523251 | 39.4105 | 13.151 | 4455.5 | 7.7740 | 4463.3 | 0.00 | 1.686 |
| 0.73890867 | 39.4566 | 13.126 | 4424.8 | 7.7971 | 4432.6 | 0.00 | 1.678 |
| 0.74260322 | 39.5024 | 13.100 | 4394.2 | 7.8202 | 4402.0 | 0.00 | 1.670 |
| 0.74631623 | 39.5476 | 13.074 | 4363.6 | 7.8432 | 4371.4 | 0.00 | 1.661 |
| 0.75004781 | 39.5924 | 13.047 | 4333.1 | 7.8660 | 4340.9 | 0.00 | 1.653 |
| 0.75379805 | 39.6366 | 13.021 | 4302.6 | 7.8889 | 4310.5 | 0.00 | 1.645 |
| 0.75756704 | 39.6804 | 12.993 | 4272.3 | 7.9116 | 4280.2 | 0.00 | 1.637 |
| 0.76135488 | 39.7236 | 12.966 | 4242.0 | 7.9343 | 4249.9 | 0.00 | 1.628 |
| 0.76516165 | 39.7663 | 12.938 | 4211.8 | 7.9569 | 4219.7 | 0.00 | 1.620 |
| 0.76898746 | 39.8085 | 12.909 | 4181.6 | 7.9794 | 4189.6 | 0.00 | 1.612 |
| 0.77283240 | 39.8502 | 12.881 | 4151.6 | 8.0018 | 4159.6 | 0.00 | 1.604 |
| 0.77669656 | 39.8913 | 12.852 | 4121.6 | 8.0242 | 4129.7 | 0.00 | 1.596 |
| 0.78058004 | 39.9319 | 12.822 | 4091.8 | 8.0464 | 4099.8 | 0.00 | 1.588 |
| 0.78448294 | 39.9719 | 12.793 | 4062.0 | 8.0686 | 4070.1 | 0.00 | 1.580 |
| 0.78840536 | 40.0114 | 12.763 | 4032.3 | 8.0907 | 4040.4 | 0.00 | 1.573 |
| 0.79234738 | 40.0503 | 12.733 | 4002.8 | 8.1127 | 4010.9 | 0.00 | 1.565 |
| 0.79630912 | 40.0886 | 12.702 | 3973.3 | 8.1346 | 3981.5 | 0.00 | 1.557 |
| 0.80029067 | 40.1264 | 12.671 | 3943.9 | 8.1565 | 3952.1 | 0.00 | 1.549 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 0.80429212 | 40.1635 | 12.640 | 3914.5 | 8.1782 | 3922.7 | 0.00 | 1.542 |
| 0.80831358 | 40.2000 | 12.608 | 3885.3 | 8.1999 | 3893.5 | 0.00 | 1.534 |
| 0.81235515 | 40.2359 | 12.576 | 3856.2 | 8.2214 | 3864.4 | 0.00 | 1.526 |
| 0.81641693 | 40.2711 | 12.544 | 3827.2 | 8.2429 | 3835.4 | 0.00 | 1.519 |
| 0.82049901 | 40.3058 | 12.511 | 3798.3 | 8.2643 | 3806.6 | 0.00 | 1.511 |
| 0.82460150 | 40.3397 | 12.479 | 3769.5 | 8.2856 | 3777.8 | 0.00 | 1.504 |
| 0.82872451 | 40.3731 | 12.446 | 3740.9 | 8.3068 | 3749.2 | 0.00 | 1.496 |
| 0.83286813 | 40.4058 | 12.413 | 3712.4 | 8.3279 | 3720.7 | 0.00 | 1.489 |
| 0.83703248 | 40.4379 | 12.380 | 3684.0 | 8.3489 | 3692.4 | 0.00 | 1.481 |
| 0.84121764 | 40.4694 | 12.346 | 3655.8 | 8.3698 | 3664.2 | 0.00 | 1.474 |
| 0.84542373 | 40.5002 | 12.312 | 3627.7 | 8.3907 | 3636.1 | 0.00 | 1.467 |
| 0.84965084 | 40.5304 | 12.279 | 3599.7 | 8.4114 | 3608.2 | 0.00 | 1.459 |
| 0.85389910 | 40.5600 | 12.245 | 3571.9 | 8.4320 | 3580.3 | 0.00 | 1.452 |
| 0.85816859 | 40.5890 | 12.211 | 3544.2 | 8.4525 | 3552.7 | 0.00 | 1.445 |
| 0.86245944 | 40.6174 | 12.176 | 3516.7 | 8.4729 | 3525.2 | 0.00 | 1.438 |
| 0.86677173 | 40.6451 | 12.142 | 3489.3 | 8.4933 | 3497.8 | 0.00 | 1.430 |
| 0.87110559 | 40.6722 | 12.107 | 3462.1 | 8.5135 | 3470.6 | 0.00 | 1.423 |
| 0.87546112 | 40.6988 | 12.073 | 3435.0 | 8.5336 | 3443.5 | 0.00 | 1.416 |
| 0.87983843 | 40.7247 | 12.038 | 3408.0 | 8.5536 | 3416.6 | 0.00 | 1.409 |
| 0.88423762 | 40.7501 | 12.003 | 3381.2 | 8.5735 | 3389.8 | 0.00 | 1.402 |
| 0.88865881 | 40.7749 | 11.968 | 3354.6 | 8.5933 | 3363.2 | 0.00 | 1.395 |
| 0.89310210 | 40.7991 | 11.933 | 3328.1 | 8.6130 | 3336.7 | 0.00 | 1.388 |
| 0.89756761 | 40.8227 | 11.897 | 3301.8 | 8.6326 | 3310.4 | 0.00 | 1.381 |
| 0.90205545 | 40.8459 | 11.862 | 3275.6 | 8.6521 | 3284.2 | 0.00 | 1.374 |
| 0.90656573 | 40.8685 | 11.827 | 3249.6 | 8.6714 | 3258.2 | 0.00 | 1.368 |
| 0.91109856 | 40.8906 | 11.791 | 3223.7 | 8.6907 | 3232.4 | 0.00 | 1.361 |
| 0.91565405 | 40.9122 | 11.756 | 3198.0 | 8.7099 | 3206.7 | 0.00 | 1.354 |
| 0.92023232 | 40.9334 | 11.720 | 3172.5 | 8.7289 | 3181.2 | 0.00 | 1.347 |
| 0.92483348 | 40.9541 | 11.685 | 3147.1 | 8.7478 | 3155.9 | 0.00 | 1.341 |
| 0.92945765 | 40.9744 | 11.649 | 3121.9 | 8.7666 | 3130.7 | 0.00 | 1.334 |
| 0.93410494 | 40.9943 | 11.613 | 3096.8 | 8.7853 | 3105.6 | 0.00 | 1.327 |
| 0.93877546 | 41.0139 | 11.578 | 3072.0 | 8.8039 | 3080.8 | 0.00 | 1.321 |
| 0.94346934 | 41.0331 | 11.542 | 3047.2 | 8.8224 | 3056.1 | 0.00 | 1.314 |
| 0.94818668 | 41.0521 | 11.506 | 3022.7 | 8.8407 | 3031.5 | 0.00 | 1.308 |
| 0.95292762 | 41.0708 | 11.470 | 2998.3 | 8.8590 | 3007.2 | 0.00 | 1.301 |
| 0.95769226 | 41.0894 | 11.434 | 2974.1 | 8.8771 | 2983.0 | 0.00 | 1.295 |
| 0.96248072 | 41.1079 | 11.399 | 2950.0 | 8.8951 | 2958.9 | 0.00 | 1.288 |
| 0.96729312 | 41.1263 | 11.363 | 2926.1 | 8.9130 | 2935.0 | 0.00 | 1.282 |
| 0.97212959 | 41.1448 | 11.327 | 2902.4 | 8.9307 | 2911.3 | 0.00 | 1.275 |
| 0.97699023 | 41.1634 | 11.291 | 2878.8 | 8.9484 | 2887.8 | 0.00 | 1.269 |
| 0.98187519 | 41.1822 | 11.256 | 2855.5 | 8.9659 | 2864.4 | 0.00 | 1.263 |
| 0.98678456 | 41.2014 | 11.220 | 2832.2 | 8.9833 | 2841.2 | 0.00 | 1.256 |
| 0.99171848 | 41.2210 | 11.184 | 2809.2 | 9.0005 | 2818.2 | 0.00 | 1.250 |
| 0.99667708 | 41.2412 | 11.149 | 2786.3 | 9.0177 | 2795.3 | 0.00 | 1.244 |
| 1.0016605 | 41.2515 | 11.102 | 2760.8 | 9.0347 | 2769.9 | 0.00 | 1.238 |
| 1.0066688 | 41.2383 | 11.034 | 2730.2 | 9.0516 | 2739.2 | 0.00 | 1.232 |
| 1.0117021 | 41.2230 | 10.966 | 2699.9 | 9.0684 | 2708.9 | 0.00 | 1.226 |
| 1.0167606 | 41.2037 | 10.898 | 2669.9 | 9.0850 | 2679.0 | 0.00 | 1.219 |
| 1.0218444 | 41.1816 | 10.831 | 2640.4 | 9.1015 | 2649.5 | 0.00 | 1.213 |
| 1.0269536 | 41.1566 | 10.765 | 2611.1 | 9.1179 | 2620.2 | 0.00 | 1.207 |
| 1.0320884 | 41.1288 | 10.699 | 2582.3 | 9.1342 | 2591.4 | 0.00 | 1.201 |
| 1.0372489 | 41.0983 | 10.634 | 2553.7 | 9.1503 | 2562.9 | 0.00 | 1.195 |
| 1.0424351 | 41.0651 | 10.569 | 2525.5 | 9.1663 | 2534.7 | 0.00 | 1.189 |
| 1.0476473 | 41.0293 | 10.505 | 2497.7 | 9.1822 | 2506.9 | 0.00 | 1.183 |
| 1.0528855 | 40.9908 | 10.441 | 2470.2 | 9.1979 | 2479.4 | 0.00 | 1.178 |
| 1.0581499 | 40.9497 | 10.378 | 2443.0 | 9.2135 | 2452.2 | 0.00 | 1.172 |
| 1.0634407 | 40.9059 | 10.315 | 2416.1 | 9.2290 | 2425.3 | 0.00 | 1.166 |
| 1.0687579 | 40.8595 | 10.253 | 2389.5 | 9.2444 | 2398.8 | 0.00 | 1.160 |
| 1.0741017 | 40.8104 | 10.191 | 2363.3 | 9.2596 | 2372.6 | 0.00 | 1.154 |
| 1.0794722 | 40.7587 | 10.129 | 2337.4 | 9.2746 | 2346.7 | 0.00 | 1.149 |
| 1.0848695 | 40.7042 | 10.068 | 2311.8 | 9.2896 | 2321.1 | 0.00 | 1.143 |
| 1.0902939 | 40.6470 | 10.008 | 2286.5 | 9.3044 | 2295.8 | 0.00 | 1.137 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 1.0957454 | 40.5871 | 9.9479 | 2261.4 | 9.3190 | 2270.8 | 0.00 | 1.132 |
| 1.1012241 | 40.5243 | 9.8884 | 2236.7 | 9.3336 | 2246.0 | 0.00 | 1.126 |
| 1.1067302 | 40.4586 | 9.8293 | 2212.3 | 9.3480 | 2221.6 | 0.00 | 1.120 |
| 1.1122639 | 40.3901 | 9.7706 | 2188.1 | 9.3622 | 2197.5 | 0.00 | 1.115 |
| 1.1178252 | 40.3185 | 9.7124 | 2164.3 | 9.3763 | 2173.7 | 0.00 | 1.109 |
| 1.1234143 | 40.2439 | 9.6547 | 2140.7 | 9.3903 | 2150.1 | 0.00 | 1.104 |
| 1.1290314 | 40.1661 | 9.5973 | 2117.4 | 9.4041 | 2126.8 | 0.00 | 1.098 |
| 1.1346765 | 40.0851 | 9.5404 | 2094.4 | 9.4178 | 2103.8 | 0.00 | 1.093 |
| 1.1403499 | 40.0008 | 9.4840 | 2071.6 | 9.4314 | 2081.1 | 0.00 | 1.087 |
| 1.1460517 | 39.9131 | 9.4279 | 2049.2 | 9.4448 | 2058.6 | 0.00 | 1.082 |
| 1.1517819 | 39.8219 | 9.3723 | 2026.9 | 9.4581 | 2036.4 | 0.00 | 1.076 |
| 1.1575408 | 39.7271 | 9.3171 | 2005.0 | 9.4712 | 2014.4 | 0.00 | 1.071 |
| 1.1633285 | 39.6269 | 9.2623 | 1983.3 | 9.4842 | 1992.7 | 0.00 | 1.066 |
| 1.1691452 | 39.5244 | 9.2080 | 1961.8 | 9.4970 | 1971.3 | 0.00 | 1.060 |
| 1.1749909 | 39.4179 | 9.1540 | 1940.6 | 9.5097 | 1950.1 | 0.00 | 1.055 |
| 1.1808659 | 39.3073 | 9.1004 | 1919.7 | 9.5223 | 1929.2 | 0.00 | 1.050 |
| 1.1867702 | 39.1922 | 9.0473 | 1898.9 | 9.5347 | 1908.5 | 0.00 | 1.045 |
| 1.1927040 | 39.0726 | 8.9945 | 1878.5 | 9.5469 | 1888.0 | 0.00 | 1.040 |
| 1.1986676 | 38.9483 | 8.9421 | 1858.2 | 9.5590 | 1867.8 | 0.00 | 1.034 |
| 1.2046609 | 38.8190 | 8.8901 | 1838.3 | 9.5710 | 1847.8 | 0.00 | 1.029 |
| 1.2106842 | 38.6846 | 8.8385 | 1818.5 | 9.5828 | 1828.1 | 0.00 | 1.024 |
| 1.2167376 | 38.5447 | 8.7873 | 1799.0 | 9.5945 | 1808.6 | 0.00 | 1.019 |
| 1.2228213 | 38.3992 | 8.7365 | 1779.7 | 9.6060 | 1789.3 | 0.00 | 1.014 |
| 1.2289354 | 38.2476 | 8.6860 | 1760.6 | 9.6174 | 1770.2 | 0.00 | 1.009 |
| 1.2350801 | 38.0898 | 8.6359 | 1741.7 | 9.6286 | 1751.3 | 0.00 | 1.004 |
| 1.2412555 | 37.9253 | 8.5862 | 1723.1 | 9.6397 | 1732.7 | 0.00 | 0.9989 |
| 1.2474618 | 37.7537 | 8.5369 | 1704.6 | 9.6506 | 1714.3 | 0.00 | 0.9939 |
| 1.2536991 | 37.5747 | 8.4879 | 1686.4 | 9.6614 | 1696.1 | 0.00 | 0.9889 |
| 1.2599676 | 37.3878 | 8.4393 | 1668.4 | 9.6720 | 1678.1 | 0.00 | 0.9840 |
| 1.2662674 | 37.1925 | 8.3910 | 1650.6 | 9.6825 | 1660.3 | 0.00 | 0.9791 |
| 1.2725988 | 36.9883 | 8.3431 | 1633.0 | 9.6928 | 1642.7 | 0.00 | 0.9743 |
| 1.2789618 | 36.7744 | 8.2955 | 1615.7 | 9.7030 | 1625.4 | 0.00 | 0.9694 |
| 1.2853566 | 36.5503 | 8.2483 | 1598.5 | 9.7130 | 1608.2 | 0.00 | 0.9646 |
| 1.2917833 | 36.3152 | 8.2015 | 1581.5 | 9.7229 | 1591.2 | 0.00 | 0.9598 |
| 1.2982423 | 36.0682 | 8.1550 | 1564.7 | 9.7326 | 1574.4 | 0.00 | 0.9550 |
| 1.3047335 | 35.8083 | 8.1088 | 1548.1 | 9.7422 | 1557.8 | 0.00 | 0.9503 |
| 1.3112571 | 35.5346 | 8.0630 | 1531.7 | 9.7516 | 1541.4 | 0.00 | 0.9455 |
| 1.3178134 | 35.2458 | 8.0175 | 1515.5 | 9.7608 | 1525.2 | 0.00 | 0.9408 |
| 1.3244025 | 34.9405 | 7.9723 | 1499.4 | 9.7699 | 1509.2 | 0.00 | 0.9362 |
| 1.3310245 | 34.6172 | 7.9275 | 1483.6 | 9.7789 | 1493.4 | 0.00 | 0.9315 |
| 1.3376796 | 34.2739 | 7.8830 | 1467.9 | 9.7876 | 1477.7 | 0.00 | 0.9269 |
| 1.3443680 | 33.9086 | 7.8388 | 1452.4 | 9.7963 | 1462.2 | 0.00 | 0.9222 |
| 1.3510899 | 33.5188 | 7.7937 | 1436.9 | 9.8048 | 1446.7 | 0.00 | 0.9177 |
| 1.3578453 | 33.1015 | 7.7484 | 1421.4 | 9.8131 | 1431.2 | 0.00 | 0.9131 |
| 1.3646345 | 32.6531 | 7.7035 | 1406.2 | 9.8212 | 1416.0 | 0.00 | 0.9086 |
| 1.3714577 | 32.1695 | 7.6589 | 1391.1 | 9.8293 | 1400.9 | 0.00 | 0.9040 |
| 1.3783150 | 31.6455 | 7.6146 | 1376.1 | 9.8371 | 1386.0 | 0.00 | 0.8995 |
| 1.3852066 | 31.0748 | 7.5707 | 1361.4 | 9.8448 | 1371.2 | 0.00 | 0.8951 |
| 1.3921326 | 30.4494 | 7.5271 | 1346.8 | 9.8523 | 1356.7 | 0.00 | 0.8906 |
| 1.3990933 | 29.7590 | 7.4837 | 1332.4 | 9.8597 | 1342.3 | 0.00 | 0.8862 |
| 1.4060887 | 28.9902 | 7.4408 | 1318.2 | 9.8669 | 1328.0 | 0.00 | 0.8818 |
| 1.4131192 | 28.1245 | 7.3981 | 1304.1 | 9.8740 | 1313.9 | 0.00 | 0.8774 |
| 1.4201848 | 27.1371 | 7.3557 | 1290.2 | 9.8809 | 1300.0 | 0.00 | 0.8730 |
| 1.4272857 | 25.9882 | 7.3137 | 1276.4 | 9.8876 | 1286.3 | 0.00 | 0.8687 |
| 1.4344221 | 24.6188 | 7.2719 | 1262.8 | 9.8942 | 1272.7 | 0.00 | 0.8643 |
| 1.4415942 | 22.9259 | 7.2305 | 1249.4 | 9.9007 | 1259.3 | 0.00 | 0.8600 |
| 1.4488022 | 20.7073 | 7.1894 | 1236.1 | 9.9069 | 1246.0 | 0.00 | 0.8558 |
| 1.4560462 | 17.4624 | 7.1485 | 1222.9 | 9.9130 | 1232.8 | 0.00 | 0.8515 |
| 1.4633265 | 11.1020 | 7.1080 | 1210.0 | 9.9190 | 1219.9 | 0.00 | 0.8473 |
| 1.4674798 | -7.62740 | 7.0851 | 1202.6 | 9.9223 | 1212.6 | 0.00 | 0.8449 |
| 1.4679202 | -7.97086 | 26.608 | 4515.2 | 9.9227 | 4525.1 | 0.00 | 0.8446 |
| 1.4706431 | 8.04023 | 26.532 | 4494.0 | 9.9248 | 4503.9 | 0.00 | 0.8431 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 1.4779963 | 15.3680 | 26.329 | 4437.3 | 9.9304 | 4447.2 | 0.00 | 0.8389 |
| 1.4853863 | 18.0630 | 26.127 | 4381.3 | 9.9359 | 4391.2 | 0.00 | 0.8347 |
| 1.4928132 | 19.2819 | 25.926 | 4326.1 | 9.9412 | 4336.0 | 0.00 | 0.8305 |
| 1.5002773 | 19.4196 | 25.727 | 4271.6 | 9.9464 | 4281.5 | 0.00 | 0.8264 |
| 1.5077787 | 17.9223 | 25.530 | 4217.7 | 9.9513 | 4227.7 | 0.00 | 0.8223 |
| 1.5141684 | 7.84877 | 25.364 | 4172.7 | 9.9555 | 4182.6 | 0.00 | 0.8188 |
| 1.5150317 | 7.78268 | 38.095 | 6263.3 | 9.9560 | 6273.3 | 0.00 | 0.8184 |
| 1.5153176 | 9.89537 | 38.084 | 6260.3 | 9.9562 | 6270.3 | 0.00 | 0.8182 |
| 1.5228942 | 20.9882 | 37.787 | 6180.7 | 9.9609 | 6190.6 | 0.00 | 0.8141 |
| 1.5305086 | 24.6248 | 37.493 | 6102.0 | 9.9654 | 6112.0 | 0.00 | 0.8101 |
| 1.5381612 | 27.0972 | 37.201 | 6024.4 | 9.9697 | 6034.4 | 0.00 | 0.8061 |
| 1.5458520 | 29.0321 | 36.912 | 5947.8 | 9.9739 | 5957.8 | 0.00 | 0.8020 |
| 1.5535812 | 30.6439 | 36.624 | 5872.1 | 9.9779 | 5882.0 | 0.00 | 0.7981 |
| 1.5613491 | 32.0345 | 36.338 | 5797.3 | 9.9818 | 5807.3 | 0.00 | 0.7941 |
| 1.5691559 | 33.2616 | 36.055 | 5723.5 | 9.9855 | 5733.5 | 0.00 | 0.7901 |
| 1.5770017 | 34.3615 | 35.774 | 5650.7 | 9.9890 | 5660.7 | 0.00 | 0.7862 |
| 1.5848867 | 35.3588 | 35.496 | 5578.8 | 9.9924 | 5588.8 | 0.00 | 0.7823 |
| 1.5928111 | 36.2710 | 35.219 | 5507.8 | 9.9956 | 5517.8 | 0.00 | 0.7784 |
| 1.6007752 | 37.1112 | 34.945 | 5437.8 | 9.9987 | 5447.8 | 0.00 | 0.7745 |
| 1.6087790 | 37.8892 | 34.673 | 5368.6 | 10.002 | 5378.6 | 0.00 | 0.7707 |
| 1.6168229 | 38.6130 | 34.404 | 5300.4 | 10.004 | 5310.4 | 0.00 | 0.7668 |
| 1.6249070 | 39.2887 | 34.136 | 5233.0 | 10.007 | 5243.0 | 0.00 | 0.7630 |
| 1.6330316 | 39.9216 | 33.871 | 5166.5 | 10.009 | 5176.5 | 0.00 | 0.7592 |
| 1.6411967 | 40.5157 | 33.608 | 5100.9 | 10.012 | 5110.9 | 0.00 | 0.7555 |
| 1.6494027 | 41.0746 | 33.347 | 5036.1 | 10.014 | 5046.1 | 0.00 | 0.7517 |
| 1.6576497 | 41.6013 | 33.088 | 4972.1 | 10.016 | 4982.1 | 0.00 | 0.7480 |
| 1.6659380 | 42.0982 | 32.831 | 4909.0 | 10.017 | 4919.0 | 0.00 | 0.7442 |
| 1.6742677 | 42.5674 | 32.577 | 4846.7 | 10.019 | 4856.7 | 0.00 | 0.7405 |
| 1.6826390 | 43.0107 | 32.324 | 4785.1 | 10.020 | 4795.2 | 0.00 | 0.7368 |
| 1.6910522 | 43.4297 | 32.073 | 4724.4 | 10.022 | 4734.4 | 0.00 | 0.7332 |
| 1.6995075 | 43.8256 | 31.825 | 4664.5 | 10.023 | 4674.5 | 0.00 | 0.7295 |
| 1.7080050 | 44.1996 | 31.578 | 4605.3 | 10.024 | 4615.4 | 0.00 | 0.7259 |
| 1.7165450 | 44.5524 | 31.334 | 4546.9 | 10.025 | 4557.0 | 0.00 | 0.7223 |
| 1.7251278 | 44.8848 | 31.091 | 4489.3 | 10.025 | 4499.3 | 0.00 | 0.7187 |
| 1.7337534 | 45.1973 | 30.851 | 4432.4 | 10.026 | 4442.4 | 0.00 | 0.7151 |
| 1.7424222 | 45.4903 | 30.612 | 4376.2 | 10.026 | 4386.2 | 0.00 | 0.7116 |
| 1.7511343 | 45.7638 | 30.375 | 4320.8 | 10.026 | 4330.8 | 0.00 | 0.7080 |
| 1.7598899 | 46.0179 | 30.140 | 4266.0 | 10.026 | 4276.0 | 0.00 | 0.7045 |
| 1.7686894 | 46.2520 | 29.907 | 4212.0 | 10.026 | 4222.0 | 0.00 | 0.7010 |
| 1.7775328 | 46.4657 | 29.676 | 4158.7 | 10.026 | 4168.7 | 0.00 | 0.6975 |
| 1.7864205 | 46.6579 | 29.447 | 4106.0 | 10.025 | 4116.0 | 0.00 | 0.6940 |
| 1.7953526 | 46.8271 | 29.220 | 4054.0 | 10.025 | 4064.1 | 0.00 | 0.6906 |
| 1.8043294 | 46.9709 | 28.994 | 4002.7 | 10.024 | 4012.8 | 0.00 | 0.6871 |
| 1.8133510 | 47.0860 | 28.771 | 3952.1 | 10.023 | 3962.1 | 0.00 | 0.6837 |
| 1.8224178 | 47.1676 | 28.549 | 3902.1 | 10.022 | 3912.1 | 0.00 | 0.6803 |
| 1.8315299 | 47.2079 | 28.329 | 3852.8 | 10.020 | 3862.8 | 0.00 | 0.6769 |
| 1.8406875 | 47.1947 | 28.110 | 3804.1 | 10.019 | 3814.1 | 0.00 | 0.6736 |
| 1.8498909 | 47.1065 | 27.894 | 3756.0 | 10.017 | 3766.0 | 0.00 | 0.6702 |
| 1.8591404 | 46.9006 | 27.679 | 3708.5 | 10.016 | 3718.5 | 0.00 | 0.6669 |
| 1.8684361 | 46.4731 | 27.466 | 3661.7 | 10.014 | 3671.7 | 0.00 | 0.6636 |
| 1.8777783 | 45.4244 | 27.255 | 3615.4 | 10.012 | 3625.4 | 0.00 | 0.6603 |
| 1.8824082 | 43.8040 | 27.151 | 3592.8 | 10.011 | 3602.8 | 0.00 | 0.6586 |
| 1.8865918 | 43.8500 | 31.766 | 4194.2 | 10.010 | 4204.2 | 0.00 | 0.6572 |
| 1.8871672 | 44.2318 | 31.750 | 4190.8 | 10.009 | 4200.8 | 0.00 | 0.6570 |
| 1.8966030 | 46.7542 | 31.488 | 4135.5 | 10.007 | 4145.5 | 0.00 | 0.6537 |
| 1.9060860 | 47.8491 | 31.229 | 4081.1 | 10.005 | 4091.1 | 0.00 | 0.6505 |
| 1.9156165 | 48.6072 | 30.971 | 4027.2 | 10.002 | 4037.2 | 0.00 | 0.6472 |
| 1.9251945 | 49.2042 | 30.714 | 3974.0 | 9.9990 | 3984.0 | 0.00 | 0.6440 |
| 1.9348205 | 49.7033 | 30.460 | 3921.5 | 9.9959 | 3931.5 | 0.00 | 0.6408 |
| 1.9444946 | 50.1343 | 30.209 | 3869.8 | 9.9928 | 3879.8 | 0.00 | 0.6376 |
| 1.9542171 | 50.5134 | 29.959 | 3818.7 | 9.9894 | 3828.7 | 0.00 | 0.6344 |
| 1.9639882 | 50.8498 | 29.712 | 3768.3 | 9.9860 | 3778.3 | 0.00 | 0.6313 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 1.9738081 | 51.1481 | 29.466 | 3718.5 | 9.9823 | 3728.5 | 0.00 | 0.6281 |
| 1.9836772 | 51.4118 | 29.235 | 3671.1 | 9.9785 | 3681.0 | 0.00 | 0.6250 |
| 1.9935955 | 51.6542 | 29.014 | 3625.3 | 9.9746 | 3635.2 | 0.00 | 0.6219 |
| 2.0035635 | 51.8756 | 28.797 | 3580.2 | 9.9705 | 3590.2 | 0.00 | 0.6188 |
| 2.0135813 | 52.0754 | 28.583 | 3535.9 | 9.9662 | 3545.8 | 0.00 | 0.6157 |
| 2.0236492 | 52.2523 | 28.371 | 3492.2 | 9.9618 | 3502.2 | 0.00 | 0.6127 |
| 2.0337675 | 52.4038 | 28.162 | 3449.3 | 9.9572 | 3459.2 | 0.00 | 0.6096 |
| 2.0439363 | 52.5249 | 27.956 | 3407.0 | 9.9525 | 3416.9 | 0.00 | 0.6066 |
| 2.0541560 | 52.6060 | 27.753 | 3365.4 | 9.9476 | 3375.3 | 0.00 | 0.6036 |
| 2.0644268 | 52.6266 | 27.552 | 3324.4 | 9.9426 | 3334.3 | 0.00 | 0.6006 |
| 2.0747489 | 52.5309 | 27.353 | 3284.0 | 9.9374 | 3293.9 | 0.00 | 0.5976 |
| 2.0851227 | 52.0407 | 27.157 | 3244.2 | 9.9321 | 3254.1 | 0.00 | 0.5946 |
| 2.0874384 | 51.6756 | 27.113 | 3235.4 | 9.9309 | 3245.4 | 0.00 | 0.5940 |
| 2.0921614 | 51.7443 | 28.924 | 3443.7 | 9.9284 | 3453.7 | 0.00 | 0.5926 |
| 2.0955483 | 52.3530 | 28.854 | 3429.8 | 9.9266 | 3439.7 | 0.00 | 0.5917 |
| 2.1060260 | 53.1829 | 28.638 | 3387.2 | 9.9210 | 3397.2 | 0.00 | 0.5887 |
| 2.1165562 | 53.6739 | 28.425 | 3345.3 | 9.9152 | 3355.2 | 0.00 | 0.5858 |
| 2.1271389 | 54.0531 | 28.214 | 3304.0 | 9.9093 | 3313.9 | 0.00 | 0.5829 |
| 2.1377746 | 54.3726 | 28.006 | 3263.2 | 9.9032 | 3273.1 | 0.00 | 0.5800 |
| 2.1484635 | 54.6529 | 27.800 | 3223.1 | 9.8969 | 3233.0 | 0.00 | 0.5771 |
| 2.1592058 | 54.9043 | 27.596 | 3183.5 | 9.8906 | 3193.4 | 0.00 | 0.5742 |
| 2.1700018 | 55.1323 | 27.394 | 3144.5 | 9.8840 | 3154.4 | 0.00 | 0.5714 |
| 2.1808519 | 55.3400 | 27.194 | 3106.1 | 9.8773 | 3115.9 | 0.00 | 0.5685 |
| 2.1917561 | 55.5284 | 26.996 | 3068.1 | 9.8705 | 3078.0 | 0.00 | 0.5657 |
| 2.2027149 | 55.7004 | 26.811 | 3031.9 | 9.8635 | 3041.8 | 0.00 | 0.5629 |
| 2.2137285 | 55.8613 | 26.629 | 2996.4 | 9.8564 | 3006.2 | 0.00 | 0.5601 |
| 2.2247971 | 56.0099 | 26.450 | 2961.4 | 9.8491 | 2971.2 | 0.00 | 0.5573 |
| 2.2359211 | 56.1451 | 26.273 | 2926.9 | 9.8417 | 2936.7 | 0.00 | 0.5545 |
| 2.2471007 | 56.2648 | 26.098 | 2893.0 | 9.8342 | 2902.8 | 0.00 | 0.5518 |
| 2.2583362 | 56.3654 | 25.925 | 2859.5 | 9.8264 | 2869.3 | 0.00 | 0.5490 |
| 2.2696279 | 56.4399 | 25.754 | 2826.5 | 9.8186 | 2836.3 | 0.00 | 0.5463 |
| 2.2809760 | 56.4730 | 25.585 | 2794.0 | 9.8106 | 2803.8 | 0.00 | 0.5436 |
| 2.2923809 | 56.4203 | 25.418 | 2762.0 | 9.8025 | 2771.8 | 0.00 | 0.5409 |
| 2.3022094 | 56.1306 | 25.276 | 2734.8 | 9.7954 | 2744.6 | 0.00 | 0.5385 |
| 2.3038428 | 55.9885 | 25.253 | 2730.4 | 9.7942 | 2740.2 | 0.00 | 0.5382 |
| 2.3113904 | 56.2497 | 26.325 | 2837.0 | 9.7887 | 2846.7 | 0.00 | 0.5364 |
| 2.3153620 | 56.5389 | 26.267 | 2825.9 | 9.7857 | 2835.6 | 0.00 | 0.5355 |
| 2.3269388 | 57.0159 | 26.100 | 2793.9 | 9.7772 | 2803.7 | 0.00 | 0.5328 |
| 2.3385735 | 57.3383 | 25.934 | 2762.4 | 9.7685 | 2772.2 | 0.00 | 0.5302 |
| 2.3502664 | 57.6033 | 25.770 | 2731.3 | 9.7596 | 2741.0 | 0.00 | 0.5275 |
| 2.3620177 | 57.8370 | 25.608 | 2700.6 | 9.7506 | 2710.3 | 0.00 | 0.5249 |
| 2.3738278 | 58.0503 | 25.447 | 2670.2 | 9.7415 | 2680.0 | 0.00 | 0.5223 |
| 2.3856970 | 58.2491 | 25.288 | 2640.3 | 9.7322 | 2650.0 | 0.00 | 0.5197 |
| 2.3976254 | 58.4366 | 25.129 | 2610.7 | 9.7228 | 2620.4 | 0.00 | 0.5171 |
| 2.4096136 | 58.6151 | 24.972 | 2581.5 | 9.7132 | 2591.2 | 0.00 | 0.5145 |
| 2.4216616 | 58.7858 | 24.816 | 2552.6 | 9.7035 | 2562.3 | 0.00 | 0.5120 |
| 2.4337699 | 58.9506 | 24.663 | 2524.2 | 9.6937 | 2533.9 | 0.00 | 0.5094 |
| 2.4459388 | 59.1110 | 24.511 | 2496.2 | 9.6837 | 2505.9 | 0.00 | 0.5069 |
| 2.4581685 | 59.2668 | 24.357 | 2468.2 | 9.6736 | 2477.8 | 0.00 | 0.5044 |
| 2.4704593 | 59.4173 | 24.202 | 2440.3 | 9.6634 | 2449.9 | 0.00 | 0.5019 |
| 2.4828116 | 59.5631 | 24.048 | 2412.7 | 9.6530 | 2422.4 | 0.00 | 0.4994 |
| 2.4952257 | 59.7047 | 23.896 | 2385.5 | 9.6425 | 2395.1 | 0.00 | 0.4969 |
| 2.5077018 | 59.8424 | 23.744 | 2358.6 | 9.6319 | 2368.2 | 0.00 | 0.4944 |
| 2.5202403 | 59.9765 | 23.594 | 2332.0 | 9.6211 | 2341.6 | 0.00 | 0.4920 |
| 2.5328415 | 60.1072 | 23.445 | 2305.7 | 9.6102 | 2315.3 | 0.00 | 0.4895 |
| 2.5455057 | 60.2349 | 23.297 | 2279.7 | 9.5991 | 2289.3 | 0.00 | 0.4871 |
| 2.5582333 | 60.3597 | 23.150 | 2254.1 | 9.5880 | 2263.6 | 0.00 | 0.4846 |
| 2.5710244 | 60.4817 | 23.003 | 2228.7 | 9.5767 | 2238.3 | 0.00 | 0.4822 |
| 2.5838796 | 60.6011 | 22.858 | 2203.6 | 9.5652 | 2213.2 | 0.00 | 0.4798 |
| 2.5967990 | 60.7181 | 22.714 | 2178.8 | 9.5537 | 2188.4 | 0.00 | 0.4775 |
| 2.6097829 | 60.8327 | 22.571 | 2154.3 | 9.5420 | 2163.8 | 0.00 | 0.4751 |
| 2.6228319 | 60.9452 | 22.428 | 2130.0 | 9.5301 | 2139.6 | 0.00 | 0.4727 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 2.6359460 | 61.0555 | 22.287 | 2106.1 | 9.5182 | 2115.6 | 0.00 | 0.4704 |
| 2.6491257 | 61.1638 | 22.146 | 2082.4 | 9.5061 | 2091.9 | 0.00 | 0.4680 |
| 2.6623714 | 61.2702 | 22.007 | 2058.9 | 9.4939 | 2068.4 | 0.00 | 0.4657 |
| 2.6756832 | 61.3748 | 21.868 | 2035.8 | 9.4816 | 2045.3 | 0.00 | 0.4634 |
| 2.6890617 | 61.4777 | 21.730 | 2012.9 | 9.4691 | 2022.3 | 0.00 | 0.4611 |
| 2.7025070 | 61.5790 | 21.592 | 1990.2 | 9.4565 | 1999.6 | 0.00 | 0.4588 |
| 2.7160195 | 61.6788 | 21.456 | 1967.8 | 9.4438 | 1977.2 | 0.00 | 0.4565 |
| 2.7295996 | 61.7768 | 21.318 | 1945.4 | 9.4310 | 1954.9 | 0.00 | 0.4542 |
| 2.7432476 | 61.8728 | 21.181 | 1923.3 | 9.4180 | 1932.7 | 0.00 | 0.4520 |
| 2.7569638 | 61.9669 | 21.045 | 1901.4 | 9.4050 | 1910.9 | 0.00 | 0.4497 |
| 2.7707486 | 62.0592 | 20.910 | 1879.8 | 9.3918 | 1889.2 | 0.00 | 0.4475 |
| 2.7846024 | 62.1499 | 20.776 | 1858.5 | 9.3785 | 1867.8 | 0.00 | 0.4452 |
| 2.7985254 | 62.2390 | 20.642 | 1837.3 | 9.3650 | 1846.7 | 0.00 | 0.4430 |
| 2.8125180 | 62.3265 | 20.509 | 1816.4 | 9.3515 | 1825.8 | 0.00 | 0.4408 |
| 2.8265806 | 62.4126 | 20.377 | 1795.8 | 9.3378 | 1805.1 | 0.00 | 0.4386 |
| 2.8407135 | 62.4974 | 20.246 | 1775.3 | 9.3240 | 1784.7 | 0.00 | 0.4365 |
| 2.8549171 | 62.5808 | 20.116 | 1755.2 | 9.3101 | 1764.5 | 0.00 | 0.4343 |
| 2.8691917 | 62.6630 | 19.987 | 1735.2 | 9.2960 | 1744.5 | 0.00 | 0.4321 |
| 2.8835376 | 62.7441 | 19.858 | 1715.5 | 9.2819 | 1724.7 | 0.00 | 0.4300 |
| 2.8979553 | 62.8241 | 19.731 | 1696.0 | 9.2676 | 1705.2 | 0.00 | 0.4278 |
| 2.9124451 | 62.9032 | 19.604 | 1676.7 | 9.2533 | 1685.9 | 0.00 | 0.4257 |
| 2.9270073 | 62.9813 | 19.478 | 1657.6 | 9.2388 | 1666.9 | 0.00 | 0.4236 |
| 2.9416424 | 63.2813 | 19.352 | 1638.7 | 9.2242 | 1647.9 | 0.00 | 0.4215 |
| 2.9563506 | 63.3587 | 19.225 | 1619.8 | 9.2095 | 1629.0 | 0.00 | 0.4194 |
| 2.9711323 | 63.4355 | 19.098 | 1601.2 | 9.1946 | 1610.3 | 0.00 | 0.4173 |
| 2.9859880 | 63.5120 | 18.973 | 1582.7 | 9.1797 | 1591.9 | 0.00 | 0.4152 |
| 3.0009179 | 63.5908 | 18.847 | 1564.4 | 9.1646 | 1573.6 | 0.00 | 0.4132 |
| 3.0159225 | 63.6825 | 18.704 | 1544.8 | 9.1495 | 1553.9 | 0.00 | 0.4111 |
| 3.0310021 | 63.9106 | 18.561 | 1525.4 | 9.1342 | 1534.5 | 0.00 | 0.4091 |
| 3.0461571 | 63.9821 | 18.416 | 1505.9 | 9.1189 | 1515.0 | 0.00 | 0.4070 |
| 3.0613879 | 64.0500 | 18.271 | 1486.7 | 9.1034 | 1495.8 | 0.00 | 0.4050 |
| 3.0766949 | 64.1148 | 18.129 | 1467.7 | 9.0878 | 1476.8 | 0.00 | 0.4030 |
| 3.0920783 | 64.1769 | 17.987 | 1449.0 | 9.0721 | 1458.1 | 0.00 | 0.4010 |
| 3.1075387 | 64.2364 | 17.847 | 1430.6 | 9.0563 | 1439.6 | 0.00 | 0.3990 |
| 3.1230764 | 64.2936 | 17.708 | 1412.4 | 9.0404 | 1421.4 | 0.00 | 0.3970 |
| 3.1386918 | 64.3486 | 17.570 | 1394.4 | 9.0244 | 1403.4 | 0.00 | 0.3950 |
| 3.1543853 | 64.4016 | 17.434 | 1376.7 | 9.0083 | 1385.7 | 0.00 | 0.3931 |
| 3.1701572 | 64.4526 | 17.299 | 1359.2 | 8.9921 | 1368.2 | 0.00 | 0.3911 |
| 3.1860080 | 64.5018 | 17.165 | 1342.0 | 8.9757 | 1351.0 | 0.00 | 0.3892 |
| 3.2019380 | 64.5492 | 17.032 | 1325.0 | 8.9593 | 1334.0 | 0.00 | 0.3872 |
| 3.2179477 | 64.5949 | 16.901 | 1308.2 | 8.9428 | 1317.2 | 0.00 | 0.3853 |
| 3.2340374 | 64.6390 | 16.770 | 1291.7 | 8.9262 | 1300.6 | 0.00 | 0.3834 |
| 3.2502076 | 64.6816 | 16.641 | 1275.4 | 8.9095 | 1284.3 | 0.00 | 0.3815 |
| 3.2664587 | 64.7227 | 16.513 | 1259.3 | 8.8927 | 1268.2 | 0.00 | 0.3796 |
| 3.2827910 | 64.7624 | 16.387 | 1243.4 | 8.8758 | 1252.3 | 0.00 | 0.3777 |
| 3.2992049 | 64.8007 | 16.261 | 1227.7 | 8.8588 | 1236.6 | 0.00 | 0.3758 |
| 3.3157009 | 64.8378 | 16.137 | 1212.3 | 8.8417 | 1221.1 | 0.00 | 0.3739 |
| 3.3322794 | 64.8736 | 16.013 | 1197.0 | 8.8245 | 1205.8 | 0.00 | 0.3721 |
| 3.3489408 | 64.9081 | 15.891 | 1182.0 | 8.8072 | 1190.8 | 0.00 | 0.3702 |
| 3.3656856 | 64.9416 | 15.770 | 1167.1 | 8.7899 | 1175.9 | 0.00 | 0.3684 |
| 3.3825140 | 64.9739 | 15.648 | 1152.4 | 8.7724 | 1161.1 | 0.00 | 0.3665 |
| 3.3994265 | 65.0051 | 15.527 | 1137.8 | 8.7548 | 1146.5 | 0.00 | 0.3647 |
| 3.4164237 | 65.0351 | 15.407 | 1123.4 | 8.7372 | 1132.1 | 0.00 | 0.3629 |
| 3.4335058 | 65.0641 | 15.288 | 1109.1 | 8.7194 | 1117.9 | 0.00 | 0.3611 |
| 3.4506733 | 65.0920 | 15.171 | 1095.1 | 8.7016 | 1103.8 | 0.00 | 0.3593 |
| 3.4679267 | 65.1188 | 15.054 | 1081.3 | 8.6837 | 1090.0 | 0.00 | 0.3575 |
| 3.4852663 | 65.1447 | 14.938 | 1067.6 | 8.6657 | 1076.3 | 0.00 | 0.3557 |
| 3.5026927 | 65.1696 | 14.824 | 1054.2 | 8.6476 | 1062.8 | 0.00 | 0.3540 |
| 3.5202061 | 65.1936 | 14.710 | 1040.9 | 8.6294 | 1049.5 | 0.00 | 0.3522 |
| 3.5378072 | 65.2168 | 14.597 | 1027.8 | 8.6112 | 1036.4 | 0.00 | 0.3505 |
| 3.5554962 | 65.2390 | 14.486 | 1014.9 | 8.5928 | 1023.5 | 0.00 | 0.3487 |
| 3.5732737 | 65.2605 | 14.375 | 1002.1 | 8.5744 | 1010.7 | 0.00 | 0.3470 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Tm ($Z=69$) | | | | | | | |
| 3.5911400 | 65.2811 | 14.266 | 989.53 | 8.5559 | 998.09 | 0.00 | 0.3453 |
| 3.6090957 | 65.3010 | 14.157 | 977.12 | 8.5373 | 985.66 | 0.00 | 0.3435 |
| 3.6271412 | 65.3201 | 14.050 | 964.88 | 8.5186 | 973.39 | 0.00 | 0.3418 |
| 3.6452769 | 65.3386 | 13.943 | 952.80 | 8.4999 | 961.30 | 0.00 | 0.3401 |
| 3.6635033 | 65.3563 | 13.838 | 940.88 | 8.4811 | 949.36 | 0.00 | 0.3384 |
| 3.6818208 | 65.3734 | 13.733 | 929.12 | 8.4622 | 937.58 | 0.00 | 0.3367 |
| 3.7002299 | 65.3899 | 13.630 | 917.52 | 8.4432 | 925.96 | 0.00 | 0.3351 |
| 3.7187311 | 65.4057 | 13.527 | 906.07 | 8.4241 | 914.49 | 0.00 | 0.3334 |
| 3.7373247 | 65.4210 | 13.425 | 894.78 | 8.4050 | 903.18 | 0.00 | 0.3317 |
| 3.7560114 | 65.4358 | 13.324 | 883.63 | 8.3858 | 892.02 | 0.00 | 0.3301 |
| 3.7747914 | 65.5572 | 13.223 | 872.55 | 8.3665 | 880.92 | 0.00 | 0.3285 |
| 3.7936654 | 65.5716 | 13.119 | 861.43 | 8.3471 | 869.77 | 0.00 | 0.3268 |
| 3.8126337 | 65.5850 | 13.017 | 850.45 | 8.3277 | 858.78 | 0.00 | 0.3252 |
| 3.8316969 | 65.5975 | 12.916 | 839.62 | 8.3082 | 847.93 | 0.00 | 0.3236 |
| 3.8508554 | 65.6091 | 12.815 | 828.94 | 8.2886 | 837.23 | 0.00 | 0.3220 |
| 3.8701096 | 65.6199 | 12.715 | 818.40 | 8.2690 | 826.67 | 0.00 | 0.3204 |
| 3.8894602 | 65.6299 | 12.617 | 808.00 | 8.2493 | 816.25 | 0.00 | 0.3188 |
| 3.9089075 | 65.6392 | 12.519 | 797.75 | 8.2295 | 805.98 | 0.00 | 0.3172 |
| 3.9284520 | 65.6478 | 12.422 | 787.63 | 8.2096 | 795.84 | 0.00 | 0.3156 |
| 3.9480943 | 65.6557 | 12.326 | 777.64 | 8.1897 | 785.83 | 0.00 | 0.3140 |
| 3.9678347 | 65.6629 | 12.230 | 767.80 | 8.1697 | 775.96 | 0.00 | 0.3125 |
| 3.9876739 | 65.6695 | 12.136 | 758.08 | 8.1497 | 766.23 | 0.00 | 0.3109 |
| Yb ($Z=70$) | | | | | | | |
| Atomic weight: $A_r = 173.0400 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3}) = 6.9530$ | | | | | | | |
| $\sigma_a (\text{barns/atom}) = [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 287.340$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) = f_2(e \text{ atom}^{-1}) \times 2.43183 \times 10^5$ | | | | | | | |
| 19 edges. Edge energies (keV) | | | | | | | |
| K | 61.3323 | L I | 10.4864 | L II | 9.97820 | L III | 8.94360 |
| M I | 2.39810 | M II | 2.17300 | M III | 1.94980 | M IV | 1.57630 |
| M V | 1.57780 | N I | 0.487200 | N II | 0.396700 | N III | 0.343500 |
| N IV | 0.198100 | N V | 0.184900 | N VI | 0.00630000 | N VII | 0.00630000 |
| O I | 0.0541000 | O II | 0.0234000 | O III | 0.0234000 | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL}) = (-1.2559, -0.74880) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}} = -0.015534 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 17.1539 | 11.101 | 26997 | 0.47950 | 26997 | 0.00 | 12.40 |
| 0.10050000 | 17.1878 | 11.165 | 27015 | 0.48493 | 27016 | 0.00 | 12.34 |
| 0.10100250 | 17.2224 | 11.228 | 27034 | 0.49041 | 27034 | 0.00 | 12.28 |
| 0.10150751 | 17.2578 | 11.292 | 27052 | 0.49594 | 27052 | 0.00 | 12.21 |
| 0.10201505 | 17.2940 | 11.356 | 27070 | 0.50152 | 27070 | 0.00 | 12.15 |
| 0.10252513 | 17.3310 | 11.420 | 27087 | 0.50715 | 27088 | 0.00 | 12.09 |
| 0.10303775 | 17.3688 | 11.484 | 27105 | 0.51283 | 27105 | 0.00 | 12.03 |
| 0.10355294 | 17.4075 | 11.549 | 27122 | 0.51857 | 27122 | 0.00 | 11.97 |
| 0.10407070 | 17.4470 | 11.614 | 27139 | 0.52435 | 27139 | 0.00 | 11.91 |
| 0.10459106 | 17.4874 | 11.679 | 27156 | 0.53019 | 27156 | 0.00 | 11.85 |
| 0.10511401 | 17.5286 | 11.745 | 27172 | 0.53608 | 27173 | 0.00 | 11.80 |
| 0.10563958 | 17.5708 | 11.811 | 27189 | 0.54203 | 27189 | 0.00 | 11.74 |
| 0.10616778 | 17.6138 | 11.877 | 27205 | 0.54803 | 27205 | 0.00 | 11.68 |
| 0.10669862 | 17.6578 | 11.943 | 27221 | 0.55408 | 27221 | 0.00 | 11.62 |
| 0.10723211 | 17.7027 | 12.010 | 27236 | 0.56018 | 27237 | 0.00 | 11.56 |
| 0.10776827 | 17.7485 | 12.077 | 27252 | 0.56634 | 27252 | 0.00 | 11.50 |
| 0.10830712 | 17.7954 | 12.144 | 27267 | 0.57256 | 27267 | 0.00 | 11.45 |
| 0.10884865 | 17.8432 | 12.211 | 27282 | 0.57883 | 27282 | 0.00 | 11.39 |
| 0.10939289 | 17.8921 | 12.279 | 27296 | 0.58515 | 27297 | 0.00 | 11.33 |
| 0.10993986 | 17.9420 | 12.347 | 27310 | 0.59153 | 27311 | 0.00 | 11.28 |
| 0.11048956 | 17.9929 | 12.415 | 27325 | 0.59797 | 27325 | 0.00 | 11.22 |
| 0.11104201 | 18.0450 | 12.483 | 27338 | 0.60446 | 27339 | 0.00 | 11.17 |
| 0.11159722 | 18.0981 | 12.552 | 27352 | 0.61101 | 27352 | 0.00 | 11.11 |
| 0.11215520 | 18.1524 | 12.621 | 27365 | 0.61761 | 27366 | 0.00 | 11.05 |
| 0.11271598 | 18.2078 | 12.690 | 27378 | 0.62428 | 27379 | 0.00 | 11.00 |
| 0.11327956 | 18.2644 | 12.759 | 27391 | 0.63100 | 27391 | 0.00 | 10.94 |
| 0.11384596 | 18.3222 | 12.829 | 27403 | 0.63777 | 27404 | 0.00 | 10.89 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Yb ($Z=70$) | | | | | | | |
| 0.11441519 | 18.3813 | 12.899 | 27415 | 0.64461 | 27416 | 0.00 | 10.84 |
| 0.11498726 | 18.4416 | 12.969 | 27427 | 0.65151 | 27428 | 0.00 | 10.78 |
| 0.11556220 | 18.5032 | 13.039 | 27438 | 0.65846 | 27439 | 0.00 | 10.73 |
| 0.11614001 | 18.5662 | 13.110 | 27450 | 0.66547 | 27450 | 0.00 | 10.68 |
| 0.11672071 | 18.6305 | 13.180 | 27461 | 0.67254 | 27461 | 0.00 | 10.62 |
| 0.11730431 | 18.6962 | 13.251 | 27471 | 0.67967 | 27472 | 0.00 | 10.57 |
| 0.11789083 | 18.7634 | 13.323 | 27481 | 0.68686 | 27482 | 0.00 | 10.52 |
| 0.11848029 | 18.8325 | 13.381 | 27465 | 0.69412 | 27466 | 0.00 | 10.46 |
| 0.11907269 | 18.9028 | 13.410 | 27387 | 0.70143 | 27388 | 0.00 | 10.41 |
| 0.11966805 | 18.9727 | 13.438 | 27308 | 0.70880 | 27309 | 0.00 | 10.36 |
| 0.12026639 | 19.0423 | 13.466 | 27229 | 0.71624 | 27230 | 0.00 | 10.31 |
| 0.12086772 | 19.1115 | 13.494 | 27149 | 0.72373 | 27150 | 0.00 | 10.26 |
| 0.12147206 | 19.1804 | 13.521 | 27069 | 0.73129 | 27069 | 0.00 | 10.21 |
| 0.12207942 | 19.2489 | 13.548 | 26988 | 0.73891 | 26989 | 0.00 | 10.16 |
| 0.12268982 | 19.3172 | 13.575 | 26907 | 0.74659 | 26907 | 0.00 | 10.11 |
| 0.12330327 | 19.3852 | 13.601 | 26825 | 0.75434 | 26826 | 0.00 | 10.06 |
| 0.12391979 | 19.4528 | 13.627 | 26743 | 0.76215 | 26743 | 0.00 | 10.01 |
| 0.12453939 | 19.5202 | 13.653 | 26660 | 0.77002 | 26661 | 0.00 | 9.955 |
| 0.12516208 | 19.5873 | 13.679 | 26577 | 0.77795 | 26578 | 0.00 | 9.906 |
| 0.12578789 | 19.6541 | 13.704 | 26493 | 0.78595 | 26494 | 0.00 | 9.857 |
| 0.12641683 | 19.7206 | 13.729 | 26409 | 0.79402 | 26410 | 0.00 | 9.808 |
| 0.12704892 | 19.7869 | 13.753 | 26325 | 0.80215 | 26325 | 0.00 | 9.759 |
| 0.12768416 | 19.8529 | 13.777 | 26240 | 0.81034 | 26240 | 0.00 | 9.710 |
| 0.12832258 | 19.9186 | 13.801 | 26154 | 0.81860 | 26155 | 0.00 | 9.662 |
| 0.12896419 | 19.9840 | 13.825 | 26068 | 0.82692 | 26069 | 0.00 | 9.614 |
| 0.12960902 | 20.0492 | 13.848 | 25982 | 0.83531 | 25983 | 0.00 | 9.566 |
| 0.13025706 | 20.1141 | 13.870 | 25895 | 0.84377 | 25896 | 0.00 | 9.518 |
| 0.13090835 | 20.1787 | 13.893 | 25808 | 0.85229 | 25809 | 0.00 | 9.471 |
| 0.13156289 | 20.2430 | 13.915 | 25721 | 0.86088 | 25721 | 0.00 | 9.424 |
| 0.13222070 | 20.3071 | 13.937 | 25633 | 0.86954 | 25634 | 0.00 | 9.377 |
| 0.13288181 | 20.3708 | 13.958 | 25544 | 0.87826 | 25545 | 0.00 | 9.330 |
| 0.13354621 | 20.4343 | 13.979 | 25456 | 0.88705 | 25456 | 0.00 | 9.284 |
| 0.13421395 | 20.4974 | 14.000 | 25366 | 0.89591 | 25367 | 0.00 | 9.238 |
| 0.13488502 | 20.5602 | 14.020 | 25277 | 0.90484 | 25278 | 0.00 | 9.192 |
| 0.13555944 | 20.6227 | 14.040 | 25187 | 0.91384 | 25188 | 0.00 | 9.146 |
| 0.13623724 | 20.6849 | 14.060 | 25097 | 0.92290 | 25097 | 0.00 | 9.101 |
| 0.13691842 | 20.7467 | 14.079 | 25006 | 0.93204 | 25007 | 0.00 | 9.055 |
| 0.13760302 | 20.8082 | 14.098 | 24915 | 0.94124 | 24916 | 0.00 | 9.010 |
| 0.13829103 | 20.8693 | 14.116 | 24823 | 0.95051 | 24824 | 0.00 | 8.965 |
| 0.13898249 | 20.9300 | 14.134 | 24732 | 0.95986 | 24733 | 0.00 | 8.921 |
| 0.13967740 | 20.9904 | 14.152 | 24639 | 0.96927 | 24640 | 0.00 | 8.876 |
| 0.14037579 | 21.0503 | 14.170 | 24547 | 0.97876 | 24548 | 0.00 | 8.832 |
| 0.14107766 | 21.1098 | 14.187 | 24454 | 0.98831 | 24455 | 0.00 | 8.788 |
| 0.14178305 | 21.1688 | 14.203 | 24361 | 0.99794 | 24362 | 0.00 | 8.745 |
| 0.14249197 | 21.2274 | 14.219 | 24268 | 1.0076 | 24269 | 0.00 | 8.701 |
| 0.14320443 | 21.2855 | 14.235 | 24174 | 1.0174 | 24175 | 0.00 | 8.658 |
| 0.14392045 | 21.3430 | 14.251 | 24080 | 1.0272 | 24081 | 0.00 | 8.615 |
| 0.14464005 | 21.4001 | 14.266 | 23985 | 1.0372 | 23986 | 0.00 | 8.572 |
| 0.14536325 | 21.4566 | 14.281 | 23891 | 1.0471 | 23892 | 0.00 | 8.529 |
| 0.14609007 | 21.5125 | 14.295 | 23796 | 1.0572 | 23797 | 0.00 | 8.487 |
| 0.14682052 | 21.5677 | 14.309 | 23700 | 1.0673 | 23701 | 0.00 | 8.445 |
| 0.14755462 | 21.6223 | 14.323 | 23605 | 1.0775 | 23606 | 0.00 | 8.403 |
| 0.14829239 | 21.6763 | 14.336 | 23509 | 1.0878 | 23510 | 0.00 | 8.361 |
| 0.14903386 | 21.7295 | 14.348 | 23413 | 1.0982 | 23414 | 0.00 | 8.319 |
| 0.14977903 | 21.7820 | 14.361 | 23316 | 1.1086 | 23317 | 0.00 | 8.278 |
| 0.15052792 | 21.8336 | 14.373 | 23220 | 1.1191 | 23221 | 0.00 | 8.237 |
| 0.15128056 | 21.8844 | 14.384 | 23123 | 1.1297 | 23124 | 0.00 | 8.196 |
| 0.15203696 | 21.9343 | 14.396 | 23026 | 1.1403 | 23027 | 0.00 | 8.155 |
| 0.15279715 | 21.9833 | 14.406 | 22928 | 1.1510 | 22929 | 0.00 | 8.114 |
| 0.15356113 | 22.0312 | 14.417 | 22831 | 1.1618 | 22832 | 0.00 | 8.074 |
| 0.15432894 | 22.0781 | 14.427 | 22733 | 1.1727 | 22734 | 0.00 | 8.034 |
| 0.15510058 | 22.1238 | 14.436 | 22635 | 1.1836 | 22636 | 0.00 | 7.994 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Yb ($Z=70$) | | | | | | | |
| 0.15587609 | 22.1683 | 14.446 | 22537 | 1.1947 | 22538 | 0.00 | 7.954 |
| 0.15665547 | 22.2115 | 14.454 | 22438 | 1.2058 | 22439 | 0.00 | 7.914 |
| 0.15743875 | 22.2533 | 14.463 | 22339 | 1.2170 | 22341 | 0.00 | 7.875 |
| 0.15822594 | 22.2936 | 14.471 | 22241 | 1.2282 | 22242 | 0.00 | 7.836 |
| 0.15901707 | 22.3323 | 14.478 | 22142 | 1.2395 | 22143 | 0.00 | 7.797 |
| 0.15981215 | 22.3693 | 14.486 | 22042 | 1.2509 | 22044 | 0.00 | 7.758 |
| 0.16061121 | 22.4044 | 14.492 | 21943 | 1.2624 | 21944 | 0.00 | 7.720 |
| 0.16141427 | 22.4376 | 14.499 | 21843 | 1.2740 | 21845 | 0.00 | 7.681 |
| 0.16222134 | 22.4685 | 14.505 | 21744 | 1.2856 | 21745 | 0.00 | 7.643 |
| 0.16303245 | 22.4987 | 14.510 | 21644 | 1.2974 | 21645 | 0.00 | 7.605 |
| 0.16384761 | 22.5247 | 14.515 | 21544 | 1.3091 | 21545 | 0.00 | 7.567 |
| 0.16466685 | 22.5480 | 14.520 | 21444 | 1.3210 | 21445 | 0.00 | 7.529 |
| 0.16549018 | 22.5681 | 14.525 | 21343 | 1.3330 | 21345 | 0.00 | 7.492 |
| 0.16631763 | 22.5849 | 14.528 | 21243 | 1.3450 | 21244 | 0.00 | 7.455 |
| 0.16714922 | 22.5979 | 14.532 | 21142 | 1.3571 | 21144 | 0.00 | 7.418 |
| 0.16798497 | 22.6067 | 14.535 | 21042 | 1.3693 | 21043 | 0.00 | 7.381 |
| 0.16882489 | 22.6109 | 14.538 | 20941 | 1.3816 | 20942 | 0.00 | 7.344 |
| 0.16966902 | 22.6099 | 14.540 | 20840 | 1.3939 | 20841 | 0.00 | 7.307 |
| 0.17051736 | 22.6030 | 14.542 | 20739 | 1.4064 | 20740 | 0.00 | 7.271 |
| 0.17136995 | 22.5894 | 14.544 | 20638 | 1.4189 | 20639 | 0.00 | 7.235 |
| 0.17222680 | 22.5682 | 14.545 | 20537 | 1.4315 | 20538 | 0.00 | 7.199 |
| 0.17308793 | 22.5381 | 14.545 | 20436 | 1.4441 | 20437 | 0.00 | 7.163 |
| 0.17395337 | 22.4976 | 14.546 | 20334 | 1.4569 | 20336 | 0.00 | 7.127 |
| 0.17482314 | 22.4448 | 14.545 | 20233 | 1.4697 | 20234 | 0.00 | 7.092 |
| 0.17569726 | 22.3773 | 14.545 | 20132 | 1.4826 | 20133 | 0.00 | 7.057 |
| 0.17657574 | 22.2918 | 14.544 | 20030 | 1.4956 | 20032 | 0.00 | 7.022 |
| 0.17745862 | 22.1839 | 14.543 | 19929 | 1.5087 | 19930 | 0.00 | 6.987 |
| 0.17834591 | 22.0474 | 14.541 | 19827 | 1.5218 | 19829 | 0.00 | 6.952 |
| 0.17923764 | 21.8733 | 14.539 | 19725 | 1.5351 | 19727 | 0.00 | 6.917 |
| 0.18013383 | 21.6475 | 14.536 | 19624 | 1.5484 | 19625 | 0.00 | 6.883 |
| 0.18103450 | 21.3465 | 14.533 | 19522 | 1.5618 | 19524 | 0.00 | 6.849 |
| 0.18193967 | 20.9273 | 14.530 | 19421 | 1.5753 | 19422 | 0.00 | 6.815 |
| 0.18284937 | 20.2960 | 14.526 | 19319 | 1.5888 | 19321 | 0.00 | 6.781 |
| 0.18376362 | 19.1799 | 14.522 | 19217 | 1.6025 | 19219 | 0.00 | 6.747 |
| 0.18468244 | 15.6490 | 14.517 | 19116 | 1.6162 | 19117 | 0.00 | 6.713 |
| 0.18476613 | 14.5455 | 14.517 | 19106 | 1.6174 | 19108 | 0.00 | 6.710 |
| 0.18503387 | 14.7266 | 21.900 | 28782 | 1.6215 | 28783 | 0.00 | 6.701 |
| 0.18560585 | 18.9116 | 21.659 | 28378 | 1.6300 | 28379 | 0.00 | 6.680 |
| 0.18653388 | 21.1444 | 21.285 | 27749 | 1.6439 | 27751 | 0.00 | 6.647 |
| 0.18746655 | 22.3655 | 20.930 | 27151 | 1.6579 | 27152 | 0.00 | 6.614 |
| 0.18840388 | 23.1919 | 20.593 | 26580 | 1.6719 | 26582 | 0.00 | 6.581 |
| 0.18934590 | 23.7954 | 20.272 | 26036 | 1.6861 | 26038 | 0.00 | 6.548 |
| 0.19029263 | 24.2488 | 19.967 | 25517 | 1.7003 | 25519 | 0.00 | 6.515 |
| 0.19124409 | 24.5883 | 19.677 | 25021 | 1.7146 | 25023 | 0.00 | 6.483 |
| 0.19220031 | 24.8323 | 19.401 | 24548 | 1.7290 | 24549 | 0.00 | 6.451 |
| 0.19316131 | 24.9873 | 19.139 | 24095 | 1.7435 | 24097 | 0.00 | 6.419 |
| 0.19412712 | 25.0483 | 18.889 | 23663 | 1.7580 | 23664 | 0.00 | 6.387 |
| 0.19509776 | 24.9927 | 18.652 | 23249 | 1.7727 | 23250 | 0.00 | 6.355 |
| 0.19607325 | 24.7576 | 18.425 | 22852 | 1.7874 | 22854 | 0.00 | 6.323 |
| 0.19705361 | 24.1288 | 18.210 | 22473 | 1.8022 | 22475 | 0.00 | 6.292 |
| 0.19791478 | 21.9002 | 18.030 | 22154 | 1.8152 | 22156 | 0.00 | 6.265 |
| 0.19803888 | 20.3066 | 18.005 | 22109 | 1.8171 | 22111 | 0.00 | 6.261 |
| 0.19828522 | 22.0937 | 22.599 | 27716 | 1.8208 | 27718 | 0.00 | 6.253 |
| 0.19902907 | 24.7765 | 22.280 | 27223 | 1.8320 | 27225 | 0.00 | 6.229 |
| 0.20002422 | 26.1333 | 21.873 | 26593 | 1.8471 | 26595 | 0.00 | 6.198 |
| 0.20102434 | 26.9668 | 21.486 | 25992 | 1.8622 | 25994 | 0.00 | 6.168 |
| 0.20202946 | 27.5734 | 21.117 | 25418 | 1.8775 | 25420 | 0.00 | 6.137 |
| 0.20303961 | 28.0466 | 20.766 | 24871 | 1.8928 | 24873 | 0.00 | 6.106 |
| 0.20405481 | 28.4290 | 20.431 | 24349 | 1.9082 | 24351 | 0.00 | 6.076 |
| 0.20507508 | 28.7451 | 20.116 | 23854 | 1.9236 | 23856 | 0.00 | 6.046 |
| 0.20610046 | 29.0112 | 19.819 | 23385 | 1.9392 | 23387 | 0.00 | 6.016 |
| 0.20713096 | 29.2382 | 19.539 | 22940 | 1.9549 | 22942 | 0.00 | 5.986 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Yb ($Z=70$) | | | | | | | |
| 0.20816661 | 29.4338 | 19.275 | 22517 | 1.9706 | 22519 | 0.00 | 5.956 |
| 0.20920745 | 29.6038 | 19.025 | 22115 | 1.9864 | 22117 | 0.00 | 5.926 |
| 0.21025348 | 29.7524 | 18.789 | 21732 | 2.0023 | 21734 | 0.00 | 5.897 |
| 0.21130475 | 29.8831 | 18.565 | 21366 | 2.0183 | 21368 | 0.00 | 5.868 |
| 0.21236128 | 29.9985 | 18.354 | 21017 | 2.0343 | 21019 | 0.00 | 5.838 |
| 0.21342308 | 30.1008 | 18.153 | 20684 | 2.0505 | 20686 | 0.00 | 5.809 |
| 0.21449020 | 30.1918 | 17.962 | 20365 | 2.0667 | 20367 | 0.00 | 5.780 |
| 0.21556265 | 30.2727 | 17.781 | 20059 | 2.0830 | 20061 | 0.00 | 5.752 |
| 0.21664046 | 30.3448 | 17.609 | 19766 | 2.0995 | 19768 | 0.00 | 5.723 |
| 0.21772366 | 30.4088 | 17.445 | 19485 | 2.1159 | 19487 | 0.00 | 5.695 |
| 0.21881228 | 30.4655 | 17.289 | 19215 | 2.1325 | 19217 | 0.00 | 5.666 |
| 0.21990634 | 30.5158 | 17.144 | 18958 | 2.1492 | 18960 | 0.00 | 5.638 |
| 0.22100588 | 30.5614 | 17.007 | 18713 | 2.1659 | 18715 | 0.00 | 5.610 |
| 0.22211090 | 30.6032 | 16.878 | 18479 | 2.1827 | 18481 | 0.00 | 5.582 |
| 0.22322146 | 30.6421 | 16.756 | 18255 | 2.1996 | 18257 | 0.00 | 5.554 |
| 0.22433757 | 30.6786 | 16.642 | 18040 | 2.2166 | 18042 | 0.00 | 5.527 |
| 0.22545925 | 30.7131 | 16.533 | 17833 | 2.2337 | 17835 | 0.00 | 5.499 |
| 0.22658655 | 30.7462 | 16.430 | 17634 | 2.2509 | 17636 | 0.00 | 5.472 |
| 0.22771948 | 30.7781 | 16.333 | 17442 | 2.2681 | 17444 | 0.00 | 5.445 |
| 0.22885808 | 30.8090 | 16.241 | 17257 | 2.2855 | 17259 | 0.00 | 5.418 |
| 0.23000237 | 30.8391 | 16.152 | 17078 | 2.3029 | 17080 | 0.00 | 5.391 |
| 0.23115238 | 30.8687 | 16.068 | 16905 | 2.3204 | 16907 | 0.00 | 5.364 |
| 0.23230814 | 30.8978 | 15.988 | 16737 | 2.3379 | 16739 | 0.00 | 5.337 |
| 0.23346969 | 30.9266 | 15.912 | 16574 | 2.3556 | 16576 | 0.00 | 5.311 |
| 0.23463703 | 30.9551 | 15.838 | 16415 | 2.3734 | 16417 | 0.00 | 5.284 |
| 0.23581022 | 30.9835 | 15.768 | 16261 | 2.3912 | 16263 | 0.00 | 5.258 |
| 0.23698927 | 31.0118 | 15.700 | 16111 | 2.4091 | 16113 | 0.00 | 5.232 |
| 0.23817422 | 31.0400 | 15.635 | 15964 | 2.4271 | 15967 | 0.00 | 5.206 |
| 0.23936509 | 31.0681 | 15.573 | 15821 | 2.4452 | 15824 | 0.00 | 5.180 |
| 0.24056191 | 31.0963 | 15.512 | 15681 | 2.4633 | 15684 | 0.00 | 5.154 |
| 0.24176472 | 31.1245 | 15.454 | 15545 | 2.4816 | 15547 | 0.00 | 5.128 |
| 0.24297355 | 31.1527 | 15.398 | 15411 | 2.4999 | 15414 | 0.00 | 5.103 |
| 0.24418841 | 31.1810 | 15.343 | 15280 | 2.5183 | 15283 | 0.00 | 5.077 |
| 0.24540936 | 31.2093 | 15.290 | 15152 | 2.5368 | 15154 | 0.00 | 5.052 |
| 0.24663640 | 31.2377 | 15.239 | 15026 | 2.5554 | 15028 | 0.00 | 5.027 |
| 0.24786959 | 31.2661 | 15.189 | 14902 | 2.5741 | 14905 | 0.00 | 5.002 |
| 0.24910893 | 31.2946 | 15.141 | 14781 | 2.5928 | 14783 | 0.00 | 4.977 |
| 0.25035448 | 31.3231 | 15.094 | 14661 | 2.6116 | 14664 | 0.00 | 4.952 |
| 0.25160625 | 31.3516 | 15.048 | 14544 | 2.6305 | 14547 | 0.00 | 4.928 |
| 0.25286428 | 31.3802 | 15.003 | 14429 | 2.6495 | 14431 | 0.00 | 4.903 |
| 0.25412860 | 31.4087 | 14.959 | 14315 | 2.6686 | 14318 | 0.00 | 4.879 |
| 0.25539925 | 31.4373 | 14.916 | 14203 | 2.6878 | 14206 | 0.00 | 4.855 |
| 0.25667624 | 31.4658 | 14.875 | 14093 | 2.7070 | 14095 | 0.00 | 4.830 |
| 0.25795962 | 31.4943 | 14.834 | 13984 | 2.7263 | 13987 | 0.00 | 4.806 |
| 0.25924942 | 31.5228 | 14.794 | 13877 | 2.7457 | 13880 | 0.00 | 4.782 |
| 0.26054567 | 31.5512 | 14.754 | 13771 | 2.7652 | 13774 | 0.00 | 4.759 |
| 0.26184840 | 31.5795 | 14.716 | 13667 | 2.7847 | 13670 | 0.00 | 4.735 |
| 0.26315764 | 31.6077 | 14.678 | 13564 | 2.8044 | 13567 | 0.00 | 4.711 |
| 0.26447343 | 31.6358 | 14.641 | 13462 | 2.8241 | 13465 | 0.00 | 4.688 |
| 0.26579579 | 31.6638 | 14.604 | 13362 | 2.8439 | 13365 | 0.00 | 4.665 |
| 0.26712477 | 31.6917 | 14.568 | 13263 | 2.8637 | 13266 | 0.00 | 4.641 |
| 0.26846040 | 31.7194 | 14.533 | 13165 | 2.8837 | 13168 | 0.00 | 4.618 |
| 0.26980270 | 31.7469 | 14.498 | 13068 | 2.9037 | 13071 | 0.00 | 4.595 |
| 0.27115171 | 31.7742 | 14.464 | 12972 | 2.9238 | 12975 | 0.00 | 4.573 |
| 0.27250747 | 31.8013 | 14.430 | 12878 | 2.9440 | 12880 | 0.00 | 4.550 |
| 0.27387001 | 31.8282 | 14.397 | 12784 | 2.9643 | 12787 | 0.00 | 4.527 |
| 0.27523936 | 31.8549 | 14.364 | 12691 | 2.9846 | 12694 | 0.00 | 4.505 |
| 0.27661556 | 31.8812 | 14.332 | 12600 | 3.0051 | 12603 | 0.00 | 4.482 |
| 0.27799863 | 31.9073 | 14.300 | 12509 | 3.0256 | 12512 | 0.00 | 4.460 |
| 0.27938863 | 31.9331 | 14.269 | 12420 | 3.0461 | 12423 | 0.00 | 4.438 |
| 0.28078557 | 31.9586 | 14.238 | 12331 | 3.0668 | 12334 | 0.00 | 4.416 |
| 0.28218950 | 31.9838 | 14.207 | 12243 | 3.0875 | 12246 | 0.00 | 4.394 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Yb ($Z=70$) | | | | | | | |
| 0.28360044 | 32.0085 | 14.177 | 12156 | 3.1083 | 12159 | 0.00 | 4.372 |
| 0.28501845 | 32.0329 | 14.147 | 12070 | 3.1292 | 12073 | 0.00 | 4.350 |
| 0.28644354 | 32.0569 | 14.117 | 11985 | 3.1502 | 11988 | 0.00 | 4.328 |
| 0.28787576 | 32.0805 | 14.088 | 11901 | 3.1712 | 11904 | 0.00 | 4.307 |
| 0.28931514 | 32.1036 | 14.059 | 11817 | 3.1923 | 11820 | 0.00 | 4.285 |
| 0.29076171 | 32.1262 | 14.030 | 11734 | 3.2135 | 11738 | 0.00 | 4.264 |
| 0.29221552 | 32.1484 | 14.002 | 11652 | 3.2347 | 11656 | 0.00 | 4.243 |
| 0.29367660 | 32.1700 | 13.974 | 11571 | 3.2561 | 11575 | 0.00 | 4.222 |
| 0.29514498 | 32.1910 | 13.946 | 11491 | 3.2775 | 11494 | 0.00 | 4.201 |
| 0.29662071 | 32.2115 | 13.919 | 11411 | 3.2990 | 11415 | 0.00 | 4.180 |
| 0.29810381 | 32.2313 | 13.892 | 11333 | 3.3205 | 11336 | 0.00 | 4.159 |
| 0.29959433 | 32.2504 | 13.865 | 11255 | 3.3421 | 11258 | 0.00 | 4.138 |
| 0.30109230 | 32.2689 | 13.839 | 11177 | 3.3638 | 11181 | 0.00 | 4.118 |
| 0.30259776 | 32.2865 | 13.813 | 11101 | 3.3856 | 11104 | 0.00 | 4.097 |
| 0.30411075 | 32.3034 | 13.787 | 11025 | 3.4074 | 11028 | 0.00 | 4.077 |
| 0.30563130 | 32.3194 | 13.761 | 10950 | 3.4293 | 10953 | 0.00 | 4.057 |
| 0.30715946 | 32.3345 | 13.736 | 10875 | 3.4513 | 10879 | 0.00 | 4.036 |
| 0.30869526 | 32.3486 | 13.711 | 10801 | 3.4734 | 10805 | 0.00 | 4.016 |
| 0.31023873 | 32.3616 | 13.686 | 10728 | 3.4955 | 10732 | 0.00 | 3.996 |
| 0.31178993 | 32.3735 | 13.662 | 10656 | 3.5177 | 10659 | 0.00 | 3.977 |
| 0.31334888 | 32.3840 | 13.638 | 10584 | 3.5399 | 10588 | 0.00 | 3.957 |
| 0.31491562 | 32.3932 | 13.614 | 10513 | 3.5623 | 10516 | 0.00 | 3.937 |
| 0.31649020 | 32.4009 | 13.590 | 10443 | 3.5847 | 10446 | 0.00 | 3.917 |
| 0.31807265 | 32.4068 | 13.567 | 10373 | 3.6071 | 10376 | 0.00 | 3.898 |
| 0.31966301 | 32.4109 | 13.544 | 10304 | 3.6297 | 10307 | 0.00 | 3.879 |
| 0.32126133 | 32.4128 | 13.521 | 10235 | 3.6523 | 10239 | 0.00 | 3.859 |
| 0.32286764 | 32.4122 | 13.499 | 10167 | 3.6749 | 10171 | 0.00 | 3.840 |
| 0.32448197 | 32.4089 | 13.477 | 10100 | 3.6976 | 10104 | 0.00 | 3.821 |
| 0.32610438 | 32.4022 | 13.455 | 10033 | 3.7204 | 10037 | 0.00 | 3.802 |
| 0.32773491 | 32.3917 | 13.433 | 9967.5 | 3.7433 | 9971.2 | 0.00 | 3.783 |
| 0.32937358 | 32.3764 | 13.412 | 9902.1 | 3.7662 | 9905.9 | 0.00 | 3.764 |
| 0.33102045 | 32.3552 | 13.391 | 9837.4 | 3.7892 | 9841.1 | 0.00 | 3.746 |
| 0.33267555 | 32.3265 | 13.370 | 9773.2 | 3.8123 | 9777.0 | 0.00 | 3.727 |
| 0.33433893 | 32.2880 | 13.349 | 9709.6 | 3.8354 | 9713.5 | 0.00 | 3.708 |
| 0.33601062 | 32.2355 | 13.329 | 9646.7 | 3.8586 | 9650.5 | 0.00 | 3.690 |
| 0.33769068 | 32.1621 | 13.309 | 9584.3 | 3.8818 | 9588.2 | 0.00 | 3.672 |
| 0.33937913 | 32.0535 | 13.289 | 9522.5 | 3.9051 | 9526.4 | 0.00 | 3.653 |
| 0.34107602 | 31.8715 | 13.270 | 9461.3 | 3.9285 | 9465.2 | 0.00 | 3.635 |
| 0.34278140 | 31.4224 | 13.251 | 9400.6 | 3.9519 | 9404.6 | 0.00 | 3.617 |
| 0.34308435 | 31.2139 | 13.247 | 9389.9 | 3.9560 | 9393.9 | 0.00 | 3.614 |
| 0.34391562 | 31.2236 | 14.457 | 10222 | 3.9674 | 10226 | 0.00 | 3.605 |
| 0.34449531 | 31.5691 | 14.452 | 10202 | 3.9754 | 10206 | 0.00 | 3.599 |
| 0.34621779 | 31.9806 | 14.438 | 10141 | 3.9989 | 10145 | 0.00 | 3.581 |
| 0.34794888 | 32.1944 | 14.423 | 10081 | 4.0225 | 10085 | 0.00 | 3.563 |
| 0.34968862 | 32.3455 | 14.410 | 10021 | 4.0462 | 10025 | 0.00 | 3.546 |
| 0.35143706 | 32.4651 | 14.396 | 9961.7 | 4.0699 | 9965.7 | 0.00 | 3.528 |
| 0.35319425 | 32.5659 | 14.383 | 9903.0 | 4.0936 | 9907.1 | 0.00 | 3.510 |
| 0.35496022 | 32.6539 | 14.370 | 9844.9 | 4.1175 | 9849.0 | 0.00 | 3.493 |
| 0.35673502 | 32.7328 | 14.357 | 9787.3 | 4.1414 | 9791.5 | 0.00 | 3.476 |
| 0.35851870 | 32.8048 | 14.345 | 9730.3 | 4.1653 | 9734.5 | 0.00 | 3.458 |
| 0.36031129 | 32.8713 | 14.333 | 9673.8 | 4.1893 | 9678.0 | 0.00 | 3.441 |
| 0.36211285 | 32.9333 | 14.321 | 9617.8 | 4.2133 | 9622.0 | 0.00 | 3.424 |
| 0.36392341 | 32.9916 | 14.310 | 9562.3 | 4.2374 | 9566.5 | 0.00 | 3.407 |
| 0.36574303 | 33.0466 | 14.299 | 9507.3 | 4.2616 | 9511.5 | 0.00 | 3.390 |
| 0.36757174 | 33.0989 | 14.288 | 9452.8 | 4.2858 | 9457.1 | 0.00 | 3.373 |
| 0.36940960 | 33.1487 | 14.277 | 9398.8 | 4.3101 | 9403.1 | 0.00 | 3.356 |
| 0.37125665 | 33.1961 | 14.267 | 9345.3 | 4.3344 | 9349.6 | 0.00 | 3.340 |
| 0.37311293 | 33.2414 | 14.257 | 9292.3 | 4.3587 | 9296.7 | 0.00 | 3.323 |
| 0.37497850 | 33.2846 | 14.247 | 9239.8 | 4.3831 | 9244.2 | 0.00 | 3.306 |
| 0.37685339 | 33.3258 | 14.238 | 9187.7 | 4.4076 | 9192.1 | 0.00 | 3.290 |
| 0.37873766 | 33.3649 | 14.229 | 9136.1 | 4.4321 | 9140.6 | 0.00 | 3.274 |
| 0.38063135 | 33.4018 | 14.220 | 9085.0 | 4.4567 | 9089.5 | 0.00 | 3.257 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Yb ($Z=70$) | | | | | | | |
| 0.38253450 | 33.4363 | 14.211 | 9034.3 | 4.4813 | 9038.8 | 0.00 | 3.241 |
| 0.38444718 | 33.4680 | 14.203 | 8984.0 | 4.5059 | 8988.5 | 0.00 | 3.225 |
| 0.38636941 | 33.4962 | 14.195 | 8934.2 | 4.5306 | 8938.7 | 0.00 | 3.209 |
| 0.38830126 | 33.5199 | 14.187 | 8884.8 | 4.5554 | 8889.3 | 0.00 | 3.193 |
| 0.39024276 | 33.5371 | 14.179 | 8835.8 | 4.5802 | 8840.4 | 0.00 | 3.177 |
| 0.39219398 | 33.5435 | 14.172 | 8787.2 | 4.6050 | 8791.8 | 0.00 | 3.161 |
| 0.39415495 | 33.5272 | 14.164 | 8739.0 | 4.6299 | 8743.6 | 0.00 | 3.146 |
| 0.39612572 | 33.4144 | 14.157 | 8691.2 | 4.6548 | 8695.9 | 0.00 | 3.130 |
| 0.39615652 | 33.4093 | 14.157 | 8690.5 | 4.6552 | 8695.1 | 0.00 | 3.130 |
| 0.39724347 | 33.4318 | 14.481 | 8864.8 | 4.6689 | 8869.4 | 0.00 | 3.121 |
| 0.39810635 | 33.5488 | 14.479 | 8844.2 | 4.6797 | 8848.9 | 0.00 | 3.114 |
| 0.40009688 | 33.6822 | 14.474 | 8797.3 | 4.7047 | 8802.0 | 0.00 | 3.099 |
| 0.40209737 | 33.7720 | 14.469 | 8750.7 | 4.7298 | 8755.4 | 0.00 | 3.083 |
| 0.40410785 | 33.8464 | 14.465 | 8704.5 | 4.7548 | 8709.2 | 0.00 | 3.068 |
| 0.40612839 | 33.9128 | 14.460 | 8658.6 | 4.7800 | 8663.4 | 0.00 | 3.053 |
| 0.40815904 | 33.9743 | 14.456 | 8613.2 | 4.8051 | 8618.0 | 0.00 | 3.038 |
| 0.41019983 | 34.0323 | 14.453 | 8568.0 | 4.8303 | 8572.9 | 0.00 | 3.023 |
| 0.41225083 | 34.0878 | 14.449 | 8523.3 | 4.8555 | 8528.1 | 0.00 | 3.007 |
| 0.41431208 | 34.1414 | 14.445 | 8478.8 | 4.8808 | 8483.7 | 0.00 | 2.993 |
| 0.41638364 | 34.1934 | 14.442 | 8434.8 | 4.9061 | 8439.7 | 0.00 | 2.978 |
| 0.41846556 | 34.2441 | 14.439 | 8391.0 | 4.9315 | 8395.9 | 0.00 | 2.963 |
| 0.42055789 | 34.2937 | 14.436 | 8347.6 | 4.9568 | 8352.5 | 0.00 | 2.948 |
| 0.42266068 | 34.3424 | 14.433 | 8304.4 | 4.9822 | 8309.4 | 0.00 | 2.933 |
| 0.42477398 | 34.3903 | 14.431 | 8261.6 | 5.0077 | 8266.7 | 0.00 | 2.919 |
| 0.42689785 | 34.4375 | 14.428 | 8219.2 | 5.0331 | 8224.2 | 0.00 | 2.904 |
| 0.42903234 | 34.4839 | 14.426 | 8177.0 | 5.0586 | 8182.0 | 0.00 | 2.890 |
| 0.43117750 | 34.5298 | 14.424 | 8135.1 | 5.0842 | 8140.1 | 0.00 | 2.875 |
| 0.43333339 | 34.5751 | 14.422 | 8093.5 | 5.1097 | 8098.6 | 0.00 | 2.861 |
| 0.43550006 | 34.6198 | 14.420 | 8052.1 | 5.1353 | 8057.3 | 0.00 | 2.847 |
| 0.43767756 | 34.6639 | 14.418 | 8011.1 | 5.1609 | 8016.2 | 0.00 | 2.833 |
| 0.43986595 | 34.7076 | 14.417 | 7970.3 | 5.1865 | 7975.5 | 0.00 | 2.819 |
| 0.44206528 | 34.7507 | 14.415 | 7929.8 | 5.2122 | 7935.0 | 0.00 | 2.805 |
| 0.44427560 | 34.7933 | 14.414 | 7889.5 | 5.2379 | 7894.8 | 0.00 | 2.791 |
| 0.44649698 | 34.8352 | 14.412 | 7849.5 | 5.2636 | 7854.8 | 0.00 | 2.777 |
| 0.44872947 | 34.8766 | 14.411 | 7809.8 | 5.2894 | 7815.1 | 0.00 | 2.763 |
| 0.45097311 | 34.9174 | 14.410 | 7770.3 | 5.3151 | 7775.6 | 0.00 | 2.749 |
| 0.45322798 | 34.9574 | 14.409 | 7731.0 | 5.3409 | 7736.3 | 0.00 | 2.736 |
| 0.45549412 | 34.9966 | 14.407 | 7692.0 | 5.3667 | 7697.3 | 0.00 | 2.722 |
| 0.45777159 | 35.0349 | 14.406 | 7653.1 | 5.3925 | 7658.5 | 0.00 | 2.708 |
| 0.46006045 | 35.0722 | 14.405 | 7614.5 | 5.4184 | 7619.9 | 0.00 | 2.695 |
| 0.46236075 | 35.1082 | 14.404 | 7576.1 | 5.4442 | 7581.5 | 0.00 | 2.682 |
| 0.46467255 | 35.1428 | 14.403 | 7537.9 | 5.4701 | 7543.4 | 0.00 | 2.668 |
| 0.46699592 | 35.1756 | 14.402 | 7499.9 | 5.4960 | 7505.4 | 0.00 | 2.655 |
| 0.46933090 | 35.2062 | 14.401 | 7462.1 | 5.5219 | 7467.6 | 0.00 | 2.642 |
| 0.47167755 | 35.2339 | 14.401 | 7424.5 | 5.5479 | 7430.0 | 0.00 | 2.629 |
| 0.47403594 | 35.2576 | 14.400 | 7387.0 | 5.5738 | 7392.6 | 0.00 | 2.616 |
| 0.47640612 | 35.2759 | 14.399 | 7349.8 | 5.5998 | 7355.4 | 0.00 | 2.602 |
| 0.47878815 | 35.2860 | 14.398 | 7312.7 | 5.6257 | 7318.3 | 0.00 | 2.590 |
| 0.48118209 | 35.2820 | 14.396 | 7275.8 | 5.6517 | 7281.4 | 0.00 | 2.577 |
| 0.48358800 | 35.2493 | 14.395 | 7239.0 | 5.6777 | 7244.7 | 0.00 | 2.564 |
| 0.48600594 | 35.1189 | 14.394 | 7202.4 | 5.7037 | 7208.1 | 0.00 | 2.551 |
| 0.48646432 | 35.0492 | 14.394 | 7195.5 | 5.7086 | 7201.2 | 0.00 | 2.549 |
| 0.48793566 | 35.0796 | 14.907 | 7429.6 | 5.7244 | 7435.3 | 0.00 | 2.541 |
| 0.48843597 | 35.1748 | 14.907 | 7421.9 | 5.7297 | 7427.7 | 0.00 | 2.538 |
| 0.49087815 | 35.4040 | 14.907 | 7384.9 | 5.7557 | 7390.7 | 0.00 | 2.526 |
| 0.49333254 | 35.5389 | 14.907 | 7348.1 | 5.7817 | 7353.8 | 0.00 | 2.513 |
| 0.49579920 | 35.6457 | 14.906 | 7311.3 | 5.8078 | 7317.1 | 0.00 | 2.501 |
| 0.49827820 | 35.7390 | 14.906 | 7274.7 | 5.8338 | 7280.6 | 0.00 | 2.488 |
| 0.50076959 | 35.8242 | 14.905 | 7238.3 | 5.8598 | 7244.1 | 0.00 | 2.476 |
| 0.50327344 | 35.9042 | 14.905 | 7202.0 | 5.8859 | 7207.8 | 0.00 | 2.464 |
| 0.50578980 | 35.9805 | 14.904 | 7165.7 | 5.9119 | 7171.7 | 0.00 | 2.451 |
| 0.50831875 | 36.0540 | 14.903 | 7129.7 | 5.9380 | 7135.6 | 0.00 | 2.439 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Yb ($Z=70$) | | | | | | | |
| 0.51086035 | 36.1255 | 14.902 | 7093.7 | 5.9640 | 7099.6 | 0.00 | 2.427 |
| 0.51341465 | 36.1953 | 14.901 | 7057.8 | 5.9901 | 7063.8 | 0.00 | 2.415 |
| 0.51598172 | 36.2638 | 14.899 | 7022.1 | 6.0161 | 7028.1 | 0.00 | 2.403 |
| 0.51856163 | 36.3313 | 14.898 | 6986.4 | 6.0422 | 6992.4 | 0.00 | 2.391 |
| 0.52115444 | 36.3979 | 14.896 | 6950.8 | 6.0682 | 6956.9 | 0.00 | 2.379 |
| 0.52376021 | 36.4638 | 14.894 | 6915.4 | 6.0943 | 6921.5 | 0.00 | 2.367 |
| 0.52637901 | 36.5290 | 14.892 | 6880.0 | 6.1203 | 6886.1 | 0.00 | 2.355 |
| 0.52901091 | 36.5938 | 14.890 | 6844.7 | 6.1463 | 6850.9 | 0.00 | 2.344 |
| 0.53165596 | 36.6581 | 14.887 | 6809.6 | 6.1724 | 6815.7 | 0.00 | 2.332 |
| 0.53431424 | 36.7221 | 14.885 | 6774.5 | 6.1984 | 6780.7 | 0.00 | 2.320 |
| 0.53698581 | 36.7857 | 14.882 | 6739.4 | 6.2244 | 6745.7 | 0.00 | 2.309 |
| 0.53967074 | 36.8491 | 14.879 | 6704.5 | 6.2504 | 6710.7 | 0.00 | 2.297 |
| 0.54236910 | 36.9123 | 14.875 | 6669.6 | 6.2764 | 6675.9 | 0.00 | 2.286 |
| 0.54508094 | 36.9752 | 14.871 | 6634.8 | 6.3023 | 6641.1 | 0.00 | 2.275 |
| 0.54780635 | 37.0380 | 14.867 | 6600.0 | 6.3283 | 6606.3 | 0.00 | 2.263 |
| 0.55054538 | 37.1006 | 14.863 | 6565.3 | 6.3543 | 6571.6 | 0.00 | 2.252 |
| 0.55329810 | 37.1630 | 14.859 | 6530.6 | 6.3802 | 6537.0 | 0.00 | 2.241 |
| 0.55606460 | 37.2514 | 14.854 | 6496.0 | 6.4061 | 6502.4 | 0.00 | 2.230 |
| 0.55884492 | 37.3137 | 14.849 | 6461.5 | 6.4320 | 6467.9 | 0.00 | 2.219 |
| 0.56163914 | 37.3758 | 14.843 | 6427.0 | 6.4579 | 6433.4 | 0.00 | 2.208 |
| 0.56444734 | 37.4378 | 14.838 | 6392.5 | 6.4838 | 6399.0 | 0.00 | 2.197 |
| 0.56726958 | 37.4997 | 14.831 | 6358.1 | 6.5096 | 6364.6 | 0.00 | 2.186 |
| 0.57010592 | 37.5615 | 14.825 | 6323.7 | 6.5355 | 6330.3 | 0.00 | 2.175 |
| 0.57295645 | 37.6232 | 14.818 | 6289.4 | 6.5613 | 6296.0 | 0.00 | 2.164 |
| 0.57582123 | 37.6848 | 14.811 | 6255.1 | 6.5871 | 6261.7 | 0.00 | 2.153 |
| 0.57870034 | 37.7463 | 14.804 | 6220.9 | 6.6128 | 6227.5 | 0.00 | 2.142 |
| 0.58159384 | 37.8077 | 14.796 | 6186.7 | 6.6386 | 6193.4 | 0.00 | 2.132 |
| 0.58450181 | 37.8691 | 14.788 | 6152.6 | 6.6643 | 6159.2 | 0.00 | 2.121 |
| 0.58742432 | 37.9303 | 14.780 | 6118.5 | 6.6900 | 6125.2 | 0.00 | 2.111 |
| 0.59036144 | 37.9915 | 14.771 | 6084.4 | 6.7157 | 6091.1 | 0.00 | 2.100 |
| 0.59331325 | 38.0525 | 14.762 | 6050.4 | 6.7413 | 6057.1 | 0.00 | 2.090 |
| 0.59627982 | 38.1187 | 14.752 | 6016.4 | 6.7669 | 6023.2 | 0.00 | 2.079 |
| 0.59926122 | 38.1795 | 14.742 | 5982.4 | 6.7925 | 5989.2 | 0.00 | 2.069 |
| 0.60225752 | 38.2402 | 14.732 | 5948.5 | 6.8180 | 5955.4 | 0.00 | 2.059 |
| 0.60526881 | 38.3008 | 14.721 | 5914.7 | 6.8435 | 5921.5 | 0.00 | 2.048 |
| 0.60829515 | 38.3613 | 14.710 | 5880.8 | 6.8690 | 5887.7 | 0.00 | 2.038 |
| 0.61133663 | 38.4216 | 14.699 | 5847.0 | 6.8945 | 5853.9 | 0.00 | 2.028 |
| 0.61439331 | 38.4818 | 14.687 | 5813.3 | 6.9199 | 5820.2 | 0.00 | 2.018 |
| 0.61746528 | 38.5419 | 14.675 | 5779.6 | 6.9453 | 5786.5 | 0.00 | 2.008 |
| 0.62055260 | 38.6018 | 14.662 | 5745.9 | 6.9706 | 5752.9 | 0.00 | 1.998 |
| 0.62365537 | 38.6616 | 14.649 | 5712.3 | 6.9959 | 5719.3 | 0.00 | 1.988 |
| 0.62677364 | 38.7213 | 14.636 | 5678.7 | 7.0212 | 5685.7 | 0.00 | 1.978 |
| 0.62990751 | 38.7807 | 14.622 | 5645.1 | 7.0464 | 5652.2 | 0.00 | 1.968 |
| 0.63305705 | 38.8401 | 14.608 | 5611.6 | 7.0716 | 5618.7 | 0.00 | 1.959 |
| 0.63622234 | 38.8992 | 14.594 | 5578.1 | 7.0967 | 5585.2 | 0.00 | 1.949 |
| 0.63940345 | 38.9582 | 14.579 | 5544.7 | 7.1218 | 5551.8 | 0.00 | 1.939 |
| 0.64260046 | 39.0169 | 14.563 | 5511.3 | 7.1469 | 5518.5 | 0.00 | 1.929 |
| 0.64581347 | 39.0755 | 14.548 | 5478.0 | 7.1719 | 5485.1 | 0.00 | 1.920 |
| 0.64904253 | 39.1339 | 14.532 | 5444.7 | 7.1969 | 5451.9 | 0.00 | 1.910 |
| 0.65228775 | 39.1921 | 14.515 | 5411.4 | 7.2218 | 5418.7 | 0.00 | 1.901 |
| 0.65554919 | 39.2501 | 14.498 | 5378.2 | 7.2467 | 5385.5 | 0.00 | 1.891 |
| 0.65882693 | 39.3078 | 14.481 | 5345.1 | 7.2715 | 5352.4 | 0.00 | 1.882 |
| 0.66212107 | 39.3654 | 14.463 | 5312.0 | 7.2963 | 5319.3 | 0.00 | 1.873 |
| 0.66543167 | 39.4226 | 14.445 | 5278.9 | 7.3210 | 5286.3 | 0.00 | 1.863 |
| 0.66875883 | 39.4797 | 14.426 | 5245.9 | 7.3457 | 5253.3 | 0.00 | 1.854 |
| 0.67210262 | 39.5365 | 14.408 | 5213.0 | 7.3703 | 5220.4 | 0.00 | 1.845 |
| 0.67546314 | 39.5930 | 14.388 | 5180.1 | 7.3949 | 5187.5 | 0.00 | 1.836 |
| 0.67884045 | 39.6493 | 14.369 | 5147.3 | 7.4194 | 5154.7 | 0.00 | 1.826 |
| 0.68223466 | 39.7052 | 14.348 | 5114.5 | 7.4438 | 5121.9 | 0.00 | 1.817 |
| 0.68564583 | 39.7609 | 14.328 | 5081.8 | 7.4682 | 5089.2 | 0.00 | 1.808 |
| 0.68907406 | 39.8163 | 14.307 | 5049.1 | 7.4926 | 5056.6 | 0.00 | 1.799 |
| 0.69251943 | 39.8715 | 14.286 | 5016.5 | 7.5169 | 5024.0 | 0.00 | 1.790 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Yb ($Z=70$) | | | | | | | |
| 0.69598202 | 39.9263 | 14.264 | 4984.0 | 7.5411 | 4991.5 | 0.00 | 1.781 |
| 0.69946194 | 39.9808 | 14.242 | 4951.5 | 7.5652 | 4959.1 | 0.00 | 1.773 |
| 0.70295924 | 40.0349 | 14.220 | 4919.1 | 7.5893 | 4926.7 | 0.00 | 1.764 |
| 0.70647404 | 40.0888 | 14.197 | 4886.8 | 7.6134 | 4894.4 | 0.00 | 1.755 |
| 0.71000641 | 40.1423 | 14.173 | 4854.5 | 7.6374 | 4862.2 | 0.00 | 1.746 |
| 0.71355644 | 40.1954 | 14.150 | 4822.3 | 7.6613 | 4830.0 | 0.00 | 1.738 |
| 0.71712423 | 40.2482 | 14.126 | 4790.2 | 7.6851 | 4797.9 | 0.00 | 1.729 |
| 0.72070985 | 40.3007 | 14.102 | 4758.2 | 7.7089 | 4765.9 | 0.00 | 1.720 |
| 0.72431340 | 40.3528 | 14.077 | 4726.2 | 7.7326 | 4733.9 | 0.00 | 1.712 |
| 0.72793496 | 40.4045 | 14.052 | 4694.3 | 7.7563 | 4702.0 | 0.00 | 1.703 |
| 0.73157464 | 40.4558 | 14.026 | 4662.5 | 7.7798 | 4670.3 | 0.00 | 1.695 |
| 0.73523251 | 40.5068 | 14.000 | 4630.7 | 7.8033 | 4638.5 | 0.00 | 1.686 |
| 0.73890867 | 40.5573 | 13.974 | 4599.1 | 7.8268 | 4606.9 | 0.00 | 1.678 |
| 0.74260322 | 40.6075 | 13.948 | 4567.5 | 7.8501 | 4575.4 | 0.00 | 1.670 |
| 0.74631623 | 40.6572 | 13.921 | 4536.0 | 7.8734 | 4543.9 | 0.00 | 1.661 |
| 0.75004781 | 40.7065 | 13.893 | 4504.6 | 7.8966 | 4512.5 | 0.00 | 1.653 |
| 0.75379805 | 40.7554 | 13.866 | 4473.2 | 7.9198 | 4481.1 | 0.00 | 1.645 |
| 0.75756704 | 40.8038 | 13.838 | 4441.9 | 7.9428 | 4449.9 | 0.00 | 1.637 |
| 0.76135488 | 40.8518 | 13.809 | 4410.7 | 7.9658 | 4418.7 | 0.00 | 1.628 |
| 0.76516165 | 40.8993 | 13.780 | 4379.6 | 7.9887 | 4387.6 | 0.00 | 1.620 |
| 0.76898746 | 40.9463 | 13.751 | 4348.5 | 8.0116 | 4356.6 | 0.00 | 1.612 |
| 0.77283240 | 40.9928 | 13.721 | 4317.6 | 8.0343 | 4325.6 | 0.00 | 1.604 |
| 0.77669656 | 41.0388 | 13.691 | 4286.7 | 8.0570 | 4294.8 | 0.00 | 1.596 |
| 0.78058004 | 41.0843 | 13.661 | 4256.0 | 8.0796 | 4264.0 | 0.00 | 1.588 |
| 0.78448294 | 41.1293 | 13.630 | 4225.3 | 8.1021 | 4233.4 | 0.00 | 1.580 |
| 0.78840536 | 41.1737 | 13.599 | 4194.7 | 8.1245 | 4202.8 | 0.00 | 1.573 |
| 0.79234738 | 41.2176 | 13.568 | 4164.2 | 8.1468 | 4172.4 | 0.00 | 1.565 |
| 0.79630912 | 41.2610 | 13.536 | 4133.9 | 8.1691 | 4142.0 | 0.00 | 1.557 |
| 0.80029067 | 41.3039 | 13.504 | 4103.6 | 8.1912 | 4111.8 | 0.00 | 1.549 |
| 0.80429212 | 41.3461 | 13.472 | 4073.4 | 8.2133 | 4081.6 | 0.00 | 1.542 |
| 0.80831358 | 41.3878 | 13.440 | 4043.3 | 8.2353 | 4051.5 | 0.00 | 1.534 |
| 0.81235515 | 41.4290 | 13.407 | 4013.3 | 8.2572 | 4021.6 | 0.00 | 1.526 |
| 0.81641693 | 41.4695 | 13.373 | 3983.5 | 8.2790 | 3991.7 | 0.00 | 1.519 |
| 0.82049901 | 41.5095 | 13.340 | 3953.7 | 8.3007 | 3962.0 | 0.00 | 1.511 |
| 0.82460150 | 41.5488 | 13.306 | 3924.0 | 8.3223 | 3932.4 | 0.00 | 1.504 |
| 0.82872451 | 41.5875 | 13.272 | 3894.4 | 8.3439 | 3902.8 | 0.00 | 1.496 |
| 0.83286813 | 41.6255 | 13.237 | 3864.9 | 8.3653 | 3873.3 | 0.00 | 1.489 |
| 0.83703248 | 41.6628 | 13.202 | 3835.5 | 8.3866 | 3843.9 | 0.00 | 1.481 |
| 0.84121764 | 41.6995 | 13.167 | 3806.3 | 8.4079 | 3814.7 | 0.00 | 1.474 |
| 0.84542373 | 41.7355 | 13.131 | 3777.2 | 8.4290 | 3785.6 | 0.00 | 1.467 |
| 0.84965084 | 41.7708 | 13.096 | 3748.2 | 8.4501 | 3756.6 | 0.00 | 1.459 |
| 0.85389910 | 41.8053 | 13.060 | 3719.3 | 8.4710 | 3727.8 | 0.00 | 1.452 |
| 0.85816859 | 41.8392 | 13.024 | 3690.6 | 8.4919 | 3699.1 | 0.00 | 1.445 |
| 0.86245944 | 41.8724 | 12.987 | 3662.0 | 8.5127 | 3670.5 | 0.00 | 1.438 |
| 0.86677173 | 41.9049 | 12.951 | 3633.5 | 8.5333 | 3642.1 | 0.00 | 1.430 |
| 0.87110559 | 41.9367 | 12.914 | 3605.2 | 8.5539 | 3613.8 | 0.00 | 1.423 |
| 0.87546112 | 41.9677 | 12.878 | 3577.1 | 8.5743 | 3585.7 | 0.00 | 1.416 |
| 0.87983843 | 41.9981 | 12.841 | 3549.1 | 8.5946 | 3557.7 | 0.00 | 1.409 |
| 0.88423762 | 42.0277 | 12.804 | 3521.2 | 8.6149 | 3529.8 | 0.00 | 1.402 |
| 0.88865881 | 42.0565 | 12.766 | 3493.5 | 8.6350 | 3502.1 | 0.00 | 1.395 |
| 0.89310210 | 42.0847 | 12.729 | 3466.0 | 8.6551 | 3474.6 | 0.00 | 1.388 |
| 0.89756761 | 42.1121 | 12.691 | 3438.6 | 8.6750 | 3447.2 | 0.00 | 1.381 |
| 0.90205545 | 42.1388 | 12.654 | 3411.3 | 8.6948 | 3420.0 | 0.00 | 1.374 |
| 0.90656573 | 42.1648 | 12.616 | 3384.2 | 8.7145 | 3392.9 | 0.00 | 1.368 |
| 0.91109856 | 42.1900 | 12.578 | 3357.3 | 8.7341 | 3366.0 | 0.00 | 1.361 |
| 0.91565405 | 42.2144 | 12.540 | 3330.5 | 8.7536 | 3339.3 | 0.00 | 1.354 |
| 0.92023232 | 42.2382 | 12.503 | 3303.9 | 8.7729 | 3312.7 | 0.00 | 1.347 |
| 0.92483348 | 42.2611 | 12.465 | 3277.5 | 8.7922 | 3286.3 | 0.00 | 1.341 |
| 0.92945765 | 42.2834 | 12.426 | 3251.2 | 8.8114 | 3260.1 | 0.00 | 1.334 |
| 0.93410494 | 42.3049 | 12.388 | 3225.1 | 8.8304 | 3234.0 | 0.00 | 1.327 |
| 0.93877546 | 42.3256 | 12.350 | 3199.2 | 8.8493 | 3208.0 | 0.00 | 1.321 |
| 0.94346934 | 42.3456 | 12.312 | 3173.4 | 8.8681 | 3182.3 | 0.00 | 1.314 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Yb ($Z=70$) | | | | | | | |
| 0.94818668 | 42.3649 | 12.274 | 3147.8 | 8.8868 | 3156.7 | 0.00 | 1.308 |
| 0.95292762 | 42.3834 | 12.235 | 3122.4 | 8.9054 | 3131.3 | 0.00 | 1.301 |
| 0.95769226 | 42.4012 | 12.197 | 3097.1 | 8.9238 | 3106.1 | 0.00 | 1.295 |
| 0.96248072 | 42.4182 | 12.159 | 3072.1 | 8.9422 | 3081.0 | 0.00 | 1.288 |
| 0.96729312 | 42.4345 | 12.120 | 3047.1 | 8.9604 | 3056.1 | 0.00 | 1.282 |
| 0.97212959 | 42.4501 | 12.082 | 3022.4 | 8.9785 | 3031.4 | 0.00 | 1.275 |
| 0.97699023 | 42.4649 | 12.044 | 2997.8 | 8.9965 | 3006.8 | 0.00 | 1.269 |
| 0.98187519 | 42.4790 | 12.006 | 2973.4 | 9.0143 | 2982.5 | 0.00 | 1.263 |
| 0.98678456 | 42.4924 | 11.967 | 2949.2 | 9.0320 | 2958.3 | 0.00 | 1.256 |
| 0.99171848 | 42.5051 | 11.929 | 2925.2 | 9.0496 | 2934.2 | 0.00 | 1.250 |
| 0.99667708 | 42.5171 | 11.891 | 2901.3 | 9.0671 | 2910.4 | 0.00 | 1.244 |
| 1.0016605 | 42.5334 | 11.840 | 2874.6 | 9.0845 | 2883.7 | 0.00 | 1.238 |
| 1.0066688 | 42.5528 | 11.765 | 2842.1 | 9.1017 | 2851.2 | 0.00 | 1.232 |
| 1.0117021 | 42.5643 | 11.690 | 2810.0 | 9.1188 | 2819.1 | 0.00 | 1.226 |
| 1.0167606 | 42.5695 | 11.616 | 2778.3 | 9.1358 | 2787.4 | 0.00 | 1.219 |
| 1.0218444 | 42.5694 | 11.543 | 2747.0 | 9.1527 | 2756.1 | 0.00 | 1.213 |
| 1.0269536 | 42.5649 | 11.470 | 2716.0 | 9.1694 | 2725.2 | 0.00 | 1.207 |
| 1.0320884 | 42.5578 | 11.397 | 2685.5 | 9.1860 | 2694.7 | 0.00 | 1.201 |
| 1.0372489 | 42.5458 | 11.326 | 2655.3 | 9.2025 | 2664.5 | 0.00 | 1.195 |
| 1.0424351 | 42.5305 | 11.255 | 2625.5 | 9.2188 | 2634.7 | 0.00 | 1.189 |
| 1.0476473 | 42.5121 | 11.184 | 2596.1 | 9.2350 | 2605.3 | 0.00 | 1.183 |
| 1.0528855 | 42.4908 | 11.114 | 2567.0 | 9.2511 | 2576.2 | 0.00 | 1.178 |
| 1.0581499 | 42.4667 | 11.045 | 2538.3 | 9.2670 | 2547.5 | 0.00 | 1.172 |
| 1.0634407 | 42.4399 | 10.976 | 2509.9 | 9.2828 | 2519.2 | 0.00 | 1.166 |
| 1.0687579 | 42.4105 | 10.907 | 2481.8 | 9.2985 | 2491.1 | 0.00 | 1.160 |
| 1.0741017 | 42.3786 | 10.840 | 2454.2 | 9.3141 | 2463.5 | 0.00 | 1.154 |
| 1.0794722 | 42.3441 | 10.772 | 2426.8 | 9.3295 | 2436.1 | 0.00 | 1.149 |
| 1.0848695 | 42.3071 | 10.706 | 2399.8 | 9.3447 | 2409.1 | 0.00 | 1.143 |
| 1.0902939 | 42.2676 | 10.640 | 2373.1 | 9.3599 | 2382.5 | 0.00 | 1.137 |
| 1.0957454 | 42.2256 | 10.574 | 2346.7 | 9.3749 | 2356.1 | 0.00 | 1.132 |
| 1.1012241 | 42.1812 | 10.509 | 2320.7 | 9.3897 | 2330.1 | 0.00 | 1.126 |
| 1.1067302 | 42.1343 | 10.444 | 2295.0 | 9.4045 | 2304.4 | 0.00 | 1.120 |
| 1.1122639 | 42.0849 | 10.380 | 2269.5 | 9.4190 | 2279.0 | 0.00 | 1.115 |
| 1.1178252 | 42.0330 | 10.317 | 2244.4 | 9.4335 | 2253.9 | 0.00 | 1.109 |
| 1.1234143 | 41.9785 | 10.254 | 2219.6 | 9.4478 | 2229.1 | 0.00 | 1.104 |
| 1.1290314 | 41.9214 | 10.191 | 2195.1 | 9.4620 | 2204.6 | 0.00 | 1.098 |
| 1.1346765 | 41.8617 | 10.129 | 2170.9 | 9.4760 | 2180.4 | 0.00 | 1.093 |
| 1.1403499 | 41.7994 | 10.068 | 2147.0 | 9.4899 | 2156.4 | 0.00 | 1.087 |
| 1.1460517 | 41.7343 | 10.007 | 2123.3 | 9.5036 | 2132.8 | 0.00 | 1.082 |
| 1.1517819 | 41.6664 | 9.9460 | 2100.0 | 9.5172 | 2109.5 | 0.00 | 1.076 |
| 1.1575408 | 41.5958 | 9.8859 | 2076.9 | 9.5307 | 2086.4 | 0.00 | 1.071 |
| 1.1633285 | 41.5222 | 9.8263 | 2054.1 | 9.5440 | 2063.6 | 0.00 | 1.066 |
| 1.1691452 | 41.4456 | 9.7672 | 2031.6 | 9.5571 | 2041.1 | 0.00 | 1.060 |
| 1.1749909 | 41.3660 | 9.7085 | 2009.3 | 9.5702 | 2018.9 | 0.00 | 1.055 |
| 1.1808659 | 41.2832 | 9.6502 | 1987.3 | 9.5830 | 1996.9 | 0.00 | 1.050 |
| 1.1867702 | 41.1972 | 9.5925 | 1965.6 | 9.5958 | 1975.2 | 0.00 | 1.045 |
| 1.1927040 | 41.1064 | 9.5351 | 1944.1 | 9.6084 | 1953.7 | 0.00 | 1.040 |
| 1.1986676 | 41.0136 | 9.4783 | 1922.9 | 9.6208 | 1932.5 | 0.00 | 1.034 |
| 1.2046609 | 40.9172 | 9.4218 | 1902.0 | 9.6331 | 1911.6 | 0.00 | 1.029 |
| 1.2106842 | 40.8172 | 9.3658 | 1881.3 | 9.6452 | 1890.9 | 0.00 | 1.024 |
| 1.2167376 | 40.7133 | 9.3103 | 1860.8 | 9.6572 | 1870.4 | 0.00 | 1.019 |
| 1.2228213 | 40.6055 | 9.2551 | 1840.6 | 9.6691 | 1850.2 | 0.00 | 1.014 |
| 1.2289354 | 40.4935 | 9.2004 | 1820.6 | 9.6808 | 1830.3 | 0.00 | 1.009 |
| 1.2350801 | 40.3772 | 9.1462 | 1800.8 | 9.6923 | 1810.5 | 0.00 | 1.004 |
| 1.2412555 | 40.2564 | 9.0923 | 1781.3 | 9.7037 | 1791.0 | 0.00 | 0.999 |
| 1.2474618 | 40.1310 | 9.0389 | 1762.1 | 9.7150 | 1771.8 | 0.00 | 0.9939 |
| 1.2536991 | 40.0006 | 8.9858 | 1743.0 | 9.7260 | 1752.7 | 0.00 | 0.9889 |
| 1.2599676 | 39.8652 | 8.9332 | 1724.2 | 9.7370 | 1733.9 | 0.00 | 0.9840 |
| 1.2662674 | 39.7243 | 8.8810 | 1705.6 | 9.7478 | 1715.3 | 0.00 | 0.9791 |
| 1.2725988 | 39.5778 | 8.8292 | 1687.2 | 9.7584 | 1696.9 | 0.00 | 0.9743 |
| 1.2789618 | 39.4254 | 8.7778 | 1669.0 | 9.7689 | 1678.8 | 0.00 | 0.9694 |
| 1.2853566 | 39.2667 | 8.7268 | 1651.1 | 9.7792 | 1660.8 | 0.00 | 0.9646 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Yb ($Z=70$) | | | | | | | |
| 1.2917833 | 39.1014 | 8.6761 | 1633.3 | 9.7894 | 1643.1 | 0.00 | 0.9598 |
| 1.2982423 | 38.9292 | 8.6259 | 1615.8 | 9.7994 | 1625.6 | 0.00 | 0.9550 |
| 1.3047335 | 38.7495 | 8.5760 | 1598.4 | 9.8093 | 1608.3 | 0.00 | 0.9503 |
| 1.3112571 | 38.5620 | 8.5266 | 1581.3 | 9.8190 | 1591.1 | 0.00 | 0.9455 |
| 1.3178134 | 38.3662 | 8.4775 | 1564.4 | 9.8286 | 1574.2 | 0.00 | 0.9408 |
| 1.3244025 | 38.1614 | 8.4287 | 1547.7 | 9.8380 | 1557.5 | 0.00 | 0.9362 |
| 1.3310245 | 37.9471 | 8.3804 | 1531.1 | 9.8473 | 1541.0 | 0.00 | 0.9315 |
| 1.3376796 | 37.7227 | 8.3324 | 1514.8 | 9.8563 | 1524.6 | 0.00 | 0.9269 |
| 1.3443680 | 37.4873 | 8.2848 | 1498.6 | 9.8653 | 1508.5 | 0.00 | 0.9222 |
| 1.3510899 | 37.2401 | 8.2375 | 1482.7 | 9.8741 | 1492.5 | 0.00 | 0.9177 |
| 1.3578453 | 36.9801 | 8.1906 | 1466.9 | 9.8827 | 1476.8 | 0.00 | 0.9131 |
| 1.3646345 | 36.7064 | 8.1441 | 1451.3 | 9.8912 | 1461.2 | 0.00 | 0.9086 |
| 1.3714577 | 36.4177 | 8.0979 | 1435.9 | 9.8995 | 1445.8 | 0.00 | 0.9040 |
| 1.3783150 | 36.1126 | 8.0509 | 1420.5 | 9.9076 | 1430.4 | 0.00 | 0.8995 |
| 1.3852066 | 35.7894 | 8.0037 | 1405.1 | 9.9156 | 1415.0 | 0.00 | 0.8951 |
| 1.3921326 | 35.4463 | 7.9568 | 1389.9 | 9.9234 | 1399.8 | 0.00 | 0.8906 |
| 1.3990933 | 35.0812 | 7.9103 | 1374.9 | 9.9311 | 1384.9 | 0.00 | 0.8862 |
| 1.4060887 | 34.6916 | 7.8641 | 1360.1 | 9.9386 | 1370.0 | 0.00 | 0.8818 |
| 1.4131192 | 34.2747 | 7.8183 | 1345.4 | 9.9460 | 1355.4 | 0.00 | 0.8774 |
| 1.4201848 | 33.8270 | 7.7728 | 1331.0 | 9.9532 | 1340.9 | 0.00 | 0.8730 |
| 1.4272857 | 33.3443 | 7.7277 | 1316.7 | 9.9602 | 1326.6 | 0.00 | 0.8687 |
| 1.4344221 | 32.8216 | 7.6829 | 1302.5 | 9.9671 | 1312.5 | 0.00 | 0.8643 |
| 1.4415942 | 32.2526 | 7.6385 | 1288.5 | 9.9738 | 1298.5 | 0.00 | 0.8600 |
| 1.4488022 | 31.6294 | 7.5944 | 1274.7 | 9.9804 | 1284.7 | 0.00 | 0.8558 |
| 1.4560462 | 30.9419 | 7.5506 | 1261.1 | 9.9868 | 1271.1 | 0.00 | 0.8515 |
| 1.4633265 | 30.1780 | 7.5072 | 1247.6 | 9.9930 | 1257.6 | 0.00 | 0.8473 |
| 1.4706431 | 29.3172 | 7.4641 | 1234.2 | 9.9991 | 1244.2 | 0.00 | 0.8431 |
| 1.4779963 | 28.3353 | 7.4213 | 1221.1 | 10.005 | 1231.1 | 0.00 | 0.8389 |
| 1.4853863 | 27.1953 | 7.3788 | 1208.0 | 10.011 | 1218.0 | 0.00 | 0.8347 |
| 1.4928132 | 25.8385 | 7.3366 | 1195.2 | 10.016 | 1205.2 | 0.00 | 0.8305 |
| 1.5002773 | 24.1652 | 7.2948 | 1182.4 | 10.022 | 1192.4 | 0.00 | 0.8264 |
| 1.5077787 | 21.9805 | 7.2533 | 1169.8 | 10.027 | 1179.9 | 0.00 | 0.8223 |
| 1.5153176 | 18.8094 | 7.2120 | 1157.4 | 10.032 | 1167.4 | 0.00 | 0.8182 |
| 1.5228942 | 12.7485 | 7.1711 | 1145.1 | 10.037 | 1155.2 | 0.00 | 0.8141 |
| 1.5275616 | −6.16539 | 7.1462 | 1137.6 | 10.040 | 1147.7 | 0.00 | 0.8116 |
| 1.5280383 | −6.50870 | 2.6615 | 4235.7 | 10.040 | 4245.8 | 0.00 | 0.8114 |
| 1.5305086 | 8.46563 | 2.6549 | 4218.4 | 10.042 | 4228.4 | 0.00 | 0.8101 |
| 1.5381612 | 16.3279 | 26.345 | 4165.2 | 10.047 | 4175.2 | 0.00 | 0.8061 |
| 1.5458520 | 19.1031 | 26.144 | 4112.7 | 10.051 | 4122.8 | 0.00 | 0.8020 |
| 1.5535812 | 20.3540 | 25.943 | 4060.9 | 10.055 | 4071.0 | 0.00 | 0.7981 |
| 1.5613491 | 20.5113 | 25.745 | 4009.8 | 10.059 | 4019.8 | 0.00 | 0.7941 |
| 1.5691559 | 19.0375 | 25.548 | 3959.3 | 10.063 | 3969.4 | 0.00 | 0.7901 |
| 1.5758114 | 9.29434 | 25.382 | 3917.0 | 10.067 | 3927.1 | 0.00 | 0.7868 |
| 1.5767887 | 9.24297 | 38.098 | 5875.7 | 10.067 | 5885.8 | 0.00 | 0.7863 |
| 1.5770017 | 10.7459 | 38.090 | 5873.7 | 10.067 | 5883.7 | 0.00 | 0.7862 |
| 1.5848867 | 22.0634 | 37.793 | 5799.0 | 10.071 | 5809.0 | 0.00 | 0.7823 |
| 1.5928111 | 25.7088 | 37.499 | 5725.1 | 10.074 | 5735.2 | 0.00 | 0.7784 |
| 1.6007752 | 28.1835 | 37.206 | 5652.2 | 10.078 | 5662.3 | 0.00 | 0.7745 |
| 1.6087790 | 30.1187 | 36.916 | 5580.2 | 10.081 | 5590.3 | 0.00 | 0.7707 |
| 1.6168229 | 31.7298 | 36.629 | 5509.2 | 10.084 | 5519.3 | 0.00 | 0.7668 |
| 1.6249070 | 33.1192 | 36.343 | 5439.1 | 10.087 | 5449.2 | 0.00 | 0.7630 |
| 1.6330316 | 34.3448 | 36.060 | 5369.9 | 10.089 | 5380.0 | 0.00 | 0.7592 |
| 1.6411967 | 35.4429 | 35.779 | 5301.6 | 10.092 | 5311.7 | 0.00 | 0.7555 |
| 1.6494027 | 36.4381 | 35.501 | 5234.2 | 10.094 | 5244.2 | 0.00 | 0.7517 |
| 1.6576497 | 37.3481 | 35.225 | 5167.6 | 10.096 | 5177.7 | 0.00 | 0.7480 |
| 1.6659380 | 38.1859 | 34.951 | 5101.9 | 10.098 | 5112.0 | 0.00 | 0.7442 |
| 1.6742677 | 38.9614 | 34.679 | 5037.1 | 10.100 | 5047.2 | 0.00 | 0.7405 |
| 1.6826390 | 39.6825 | 34.410 | 4973.1 | 10.102 | 4983.2 | 0.00 | 0.7368 |
| 1.6910522 | 40.3554 | 34.142 | 4909.9 | 10.104 | 4920.0 | 0.00 | 0.7332 |
| 1.6995075 | 40.9853 | 33.877 | 4847.5 | 10.105 | 4857.6 | 0.00 | 0.7295 |
| 1.7080050 | 41.5763 | 33.614 | 4786.0 | 10.106 | 4796.1 | 0.00 | 0.7259 |
| 1.7165450 | 42.1319 | 33.354 | 4725.2 | 10.107 | 4735.3 | 0.00 | 0.7223 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Yb ($Z=70$) | | | | | | | |
| 1.7251278 | 42.6550 | 33.095 | 4665.2 | 10.108 | 4675.3 | 0.00 | 0.7187 |
| 1.7337534 | 43.1481 | 32.838 | 4606.0 | 10.109 | 4616.1 | 0.00 | 0.7151 |
| 1.7424222 | 43.6134 | 32.584 | 4547.6 | 10.109 | 4557.7 | 0.00 | 0.7116 |
| 1.7511343 | 44.0524 | 32.331 | 4489.9 | 10.110 | 4500.0 | 0.00 | 0.7080 |
| 1.7598899 | 44.4668 | 32.081 | 4432.9 | 10.110 | 4443.1 | 0.00 | 0.7045 |
| 1.7686894 | 44.8578 | 31.832 | 4376.7 | 10.110 | 4386.8 | 0.00 | 0.7010 |
| 1.7775328 | 45.2264 | 31.586 | 4321.3 | 10.110 | 4331.4 | 0.00 | 0.6975 |
| 1.7864205 | 45.5733 | 31.342 | 4266.5 | 10.110 | 4276.6 | 0.00 | 0.6940 |
| 1.7953526 | 45.8993 | 31.099 | 4212.4 | 10.109 | 4222.5 | 0.00 | 0.6906 |
| 1.8043294 | 46.2047 | 30.859 | 4159.1 | 10.109 | 4169.2 | 0.00 | 0.6871 |
| 1.8133510 | 46.4896 | 30.620 | 4106.4 | 10.108 | 4116.5 | 0.00 | 0.6837 |
| 1.8224178 | 46.7541 | 30.384 | 4054.4 | 10.107 | 4064.5 | 0.00 | 0.6803 |
| 1.8315299 | 46.9979 | 30.149 | 4003.1 | 10.106 | 4013.2 | 0.00 | 0.6769 |
| 1.8406875 | 47.2202 | 29.916 | 3952.4 | 10.105 | 3962.5 | 0.00 | 0.6736 |
| 1.8498909 | 47.4201 | 29.686 | 3902.4 | 10.103 | 3912.5 | 0.00 | 0.6702 |
| 1.8591404 | 47.5958 | 29.457 | 3853.0 | 10.102 | 3863.1 | 0.00 | 0.6669 |
| 1.8684361 | 47.7450 | 29.230 | 3804.3 | 10.100 | 3814.4 | 0.00 | 0.6636 |
| 1.8777783 | 47.8640 | 29.004 | 3756.2 | 10.098 | 3766.3 | 0.00 | 0.6603 |
| 1.8871672 | 47.9476 | 28.781 | 3708.7 | 10.096 | 3718.8 | 0.00 | 0.6570 |
| 1.8966030 | 47.9874 | 28.559 | 3661.9 | 10.094 | 3671.9 | 0.00 | 0.6537 |
| 1.9060860 | 47.9698 | 28.339 | 3615.6 | 10.092 | 3625.7 | 0.00 | 0.6505 |
| 1.9156165 | 47.8704 | 28.121 | 3569.9 | 10.089 | 3580.0 | 0.00 | 0.6472 |
| 1.9251945 | 47.6397 | 27.905 | 3524.8 | 10.087 | 3534.9 | 0.00 | 0.6440 |
| 1.9348205 | 47.1503 | 27.690 | 3480.3 | 10.084 | 3490.4 | 0.00 | 0.6408 |
| 1.9444946 | 45.8346 | 27.477 | 3436.4 | 10.081 | 3446.5 | 0.00 | 0.6376 |
| 1.9475382 | 44.6174 | 27.411 | 3422.7 | 10.080 | 3432.8 | 0.00 | 0.6366 |
| 1.9520618 | 44.6759 | 32.118 | 4001.2 | 10.078 | 4011.3 | 0.00 | 0.6351 |
| 1.9542171 | 45.7658 | 32.058 | 3989.3 | 10.078 | 3999.4 | 0.00 | 0.6344 |
| 1.9639882 | 47.8151 | 31.786 | 3935.8 | 10.074 | 3945.9 | 0.00 | 0.6313 |
| 1.9738081 | 48.8564 | 31.517 | 3883.1 | 10.071 | 3893.1 | 0.00 | 0.6281 |
| 1.9836772 | 49.6011 | 31.250 | 3831.0 | 10.067 | 3841.1 | 0.00 | 0.6250 |
| 1.9935955 | 50.1960 | 30.985 | 3779.6 | 10.064 | 3789.7 | 0.00 | 0.6219 |
| 2.0035635 | 50.6968 | 30.722 | 3728.9 | 10.060 | 3738.9 | 0.00 | 0.6188 |
| 2.0135813 | 51.1310 | 30.461 | 3678.8 | 10.056 | 3688.9 | 0.00 | 0.6157 |
| 2.0236492 | 51.5135 | 30.202 | 3629.4 | 10.051 | 3639.5 | 0.00 | 0.6127 |
| 2.0337675 | 51.8530 | 29.946 | 3580.8 | 10.047 | 3590.8 | 0.00 | 0.6096 |
| 2.0439363 | 52.1534 | 29.692 | 3532.7 | 10.042 | 3542.8 | 0.00 | 0.6066 |
| 2.0541560 | 52.4207 | 29.461 | 3487.8 | 10.038 | 3497.8 | 0.00 | 0.6036 |
| 2.0644268 | 52.6687 | 29.237 | 3444.0 | 10.033 | 3454.0 | 0.00 | 0.6006 |
| 2.0747489 | 52.8970 | 29.016 | 3401.0 | 10.028 | 3411.0 | 0.00 | 0.5976 |
| 2.0851227 | 53.1051 | 28.799 | 3358.7 | 10.023 | 3368.7 | 0.00 | 0.5946 |
| 2.0955483 | 53.2923 | 28.584 | 3317.1 | 10.017 | 3327.1 | 0.00 | 0.5917 |
| 2.1060260 | 53.4572 | 28.373 | 3276.2 | 10.012 | 3286.2 | 0.00 | 0.5887 |
| 2.1165562 | 53.5967 | 28.164 | 3235.9 | 10.006 | 3245.9 | 0.00 | 0.5858 |
| 2.1271389 | 53.7051 | 27.958 | 3196.3 | 10.001 | 3206.3 | 0.00 | 0.5829 |
| 2.1377746 | 53.7715 | 27.755 | 3157.3 | 9.9946 | 3167.3 | 0.00 | 0.5800 |
| 2.1484635 | 53.7716 | 27.554 | 3118.9 | 9.9886 | 3128.9 | 0.00 | 0.5771 |
| 2.1592058 | 53.6356 | 27.356 | 3081.0 | 9.9823 | 3091.0 | 0.00 | 0.5742 |
| 2.1700018 | 52.9164 | 27.161 | 3043.8 | 9.9760 | 3053.8 | 0.00 | 0.5714 |
| 2.1704360 | 52.8293 | 27.153 | 3042.3 | 9.9757 | 3052.3 | 0.00 | 0.5712 |
| 2.1755642 | 52.9028 | 28.982 | 3239.6 | 9.9726 | 3249.5 | 0.00 | 0.5699 |
| 2.1808519 | 53.6916 | 28.875 | 3219.8 | 9.9694 | 3229.8 | 0.00 | 0.5685 |
| 2.1917561 | 54.4223 | 28.658 | 3179.7 | 9.9628 | 3189.6 | 0.00 | 0.5657 |
| 2.2027149 | 54.8883 | 28.443 | 3140.1 | 9.9559 | 3150.1 | 0.00 | 0.5629 |
| 2.2137285 | 55.2548 | 28.230 | 3101.1 | 9.9490 | 3111.1 | 0.00 | 0.5601 |
| 2.2247971 | 55.5658 | 28.020 | 3062.8 | 9.9418 | 3072.7 | 0.00 | 0.5573 |
| 2.2359211 | 55.8396 | 27.812 | 3024.9 | 9.9346 | 3034.9 | 0.00 | 0.5545 |
| 2.2471007 | 56.0852 | 27.607 | 2987.6 | 9.9271 | 2997.6 | 0.00 | 0.5518 |
| 2.2583362 | 56.3078 | 27.404 | 2950.9 | 9.9196 | 2960.8 | 0.00 | 0.5490 |
| 2.2696279 | 56.5101 | 27.203 | 2914.7 | 9.9119 | 2924.6 | 0.00 | 0.5463 |
| 2.2809760 | 56.6927 | 27.005 | 2879.1 | 9.9040 | 2889.0 | 0.00 | 0.5436 |
| 2.2923809 | 56.8603 | 26.821 | 2845.3 | 9.8960 | 2855.2 | 0.00 | 0.5409 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Yb ($Z=70$) | | | | | | | |
| 2.3038428 | 57.0170 | 26.640 | 2812.0 | 9.8878 | 2821.9 | 0.00 | 0.5382 |
| 2.3153620 | 57.1615 | 26.461 | 2779.2 | 9.8795 | 2789.1 | 0.00 | 0.5355 |
| 2.3269388 | 57.2923 | 26.284 | 2746.9 | 9.8711 | 2756.8 | 0.00 | 0.5328 |
| 2.3385735 | 57.4073 | 26.110 | 2715.1 | 9.8625 | 2725.0 | 0.00 | 0.5302 |
| 2.3502664 | 57.5023 | 25.938 | 2683.8 | 9.8538 | 2693.7 | 0.00 | 0.5275 |
| 2.3620177 | 57.5690 | 25.768 | 2653.0 | 9.8449 | 2662.8 | 0.00 | 0.5249 |
| 2.3738278 | 57.5888 | 25.600 | 2622.6 | 9.8359 | 2632.4 | 0.00 | 0.5223 |
| 2.3856970 | 57.5021 | 25.434 | 2592.6 | 9.8267 | 2602.4 | 0.00 | 0.5197 |
| 2.3931119 | 57.2620 | 25.331 | 2574.1 | 9.8210 | 2583.9 | 0.00 | 0.5181 |
| 2.3976254 | 56.4412 | 25.270 | 2563.0 | 9.8175 | 2572.8 | 0.00 | 0.5171 |
| 2.4030879 | 57.3875 | 26.372 | 2668.7 | 9.8132 | 2678.5 | 0.00 | 0.5159 |
| 2.4096136 | 57.7872 | 26.280 | 2652.3 | 9.8080 | 2662.1 | 0.00 | 0.5145 |
| 2.4216616 | 58.2101 | 26.114 | 2622.4 | 9.7984 | 2632.2 | 0.00 | 0.5120 |
| 2.4337699 | 58.5158 | 25.950 | 2592.9 | 9.7887 | 2602.7 | 0.00 | 0.5094 |
| 2.4459388 | 58.7724 | 25.786 | 2563.8 | 9.7789 | 2573.5 | 0.00 | 0.5069 |
| 2.4581685 | 59.0011 | 25.625 | 2535.0 | 9.7689 | 2544.8 | 0.00 | 0.5044 |
| 2.4704593 | 59.2111 | 25.465 | 2506.6 | 9.7587 | 2516.4 | 0.00 | 0.5019 |
| 2.4828116 | 59.4075 | 25.306 | 2478.6 | 9.7485 | 2488.4 | 0.00 | 0.4994 |
| 2.4952257 | 59.5935 | 25.148 | 2450.9 | 9.7381 | 2460.6 | 0.00 | 0.4969 |
| 2.5077018 | 59.7708 | 24.992 | 2423.6 | 9.7275 | 2433.3 | 0.00 | 0.4944 |
| 2.5202403 | 59.9408 | 24.837 | 2396.6 | 9.7168 | 2406.3 | 0.00 | 0.4920 |
| 2.5328415 | 60.1056 | 24.685 | 2370.1 | 9.7060 | 2379.8 | 0.00 | 0.4895 |
| 2.5455057 | 60.2653 | 24.530 | 2343.4 | 9.6951 | 2353.1 | 0.00 | 0.4871 |
| 2.5582333 | 60.4194 | 24.375 | 2317.0 | 9.6840 | 2326.7 | 0.00 | 0.4846 |
| 2.5710244 | 60.5687 | 24.221 | 2290.9 | 9.6728 | 2300.6 | 0.00 | 0.4822 |
| 2.5838796 | 60.7135 | 24.068 | 2265.2 | 9.6614 | 2274.8 | 0.00 | 0.4798 |
| 2.5967990 | 60.8544 | 23.916 | 2239.7 | 9.6499 | 2249.4 | 0.00 | 0.4775 |
| 2.6097829 | 60.9915 | 23.766 | 2214.5 | 9.6383 | 2224.2 | 0.00 | 0.4751 |
| 2.6228319 | 61.1252 | 23.616 | 2189.7 | 9.6266 | 2199.3 | 0.00 | 0.4727 |
| 2.6359460 | 61.2558 | 23.468 | 2165.1 | 9.6147 | 2174.7 | 0.00 | 0.4704 |
| 2.6491257 | 61.3833 | 23.321 | 2140.8 | 9.6027 | 2150.4 | 0.00 | 0.4680 |
| 2.6623714 | 61.5081 | 23.174 | 2116.7 | 9.5906 | 2126.3 | 0.00 | 0.4657 |
| 2.6756832 | 61.6302 | 23.029 | 2093.0 | 9.5783 | 2102.6 | 0.00 | 0.4634 |
| 2.6890617 | 61.7499 | 22.884 | 2069.5 | 9.5659 | 2079.1 | 0.00 | 0.4611 |
| 2.7025070 | 61.8672 | 22.740 | 2046.3 | 9.5534 | 2055.8 | 0.00 | 0.4588 |
| 2.7160195 | 61.9822 | 22.597 | 2023.3 | 9.5408 | 2032.8 | 0.00 | 0.4565 |
| 2.7295996 | 62.0951 | 22.455 | 2000.6 | 9.5280 | 2010.1 | 0.00 | 0.4542 |
| 2.7432476 | 62.2059 | 22.314 | 1978.1 | 9.5151 | 1987.6 | 0.00 | 0.4520 |
| 2.7569638 | 62.3149 | 22.174 | 1955.9 | 9.5021 | 1965.4 | 0.00 | 0.4497 |
| 2.7707486 | 62.4219 | 22.035 | 1933.9 | 9.4890 | 1943.4 | 0.00 | 0.4475 |
| 2.7846024 | 62.5273 | 21.896 | 1912.2 | 9.4757 | 1921.7 | 0.00 | 0.4452 |
| 2.7985254 | 62.6309 | 21.758 | 1890.7 | 9.4623 | 1900.2 | 0.00 | 0.4430 |
| 2.8125180 | 62.7331 | 21.621 | 1869.4 | 9.4488 | 1878.9 | 0.00 | 0.4408 |
| 2.8265806 | 62.8338 | 21.484 | 1848.4 | 9.4352 | 1857.8 | 0.00 | 0.4386 |
| 2.8407135 | 62.9327 | 21.347 | 1827.4 | 9.4214 | 1836.8 | 0.00 | 0.4365 |
| 2.8549171 | 63.0297 | 21.210 | 1806.7 | 9.4076 | 1816.1 | 0.00 | 0.4343 |
| 2.8691917 | 63.1251 | 21.074 | 1786.2 | 9.3936 | 1795.6 | 0.00 | 0.4321 |
| 2.8835376 | 63.2191 | 20.939 | 1765.9 | 9.3795 | 1775.3 | 0.00 | 0.4300 |
| 2.8979553 | 63.3116 | 20.805 | 1745.8 | 9.3652 | 1755.2 | 0.00 | 0.4278 |
| 2.9124451 | 63.4028 | 20.671 | 1726.0 | 9.3509 | 1735.3 | 0.00 | 0.4257 |
| 2.9270073 | 63.4930 | 20.538 | 1706.4 | 9.3365 | 1715.7 | 0.00 | 0.4236 |
| 2.9416424 | 63.5823 | 20.406 | 1687.0 | 9.3219 | 1696.3 | 0.00 | 0.4215 |
| 2.9563506 | 63.6712 | 20.275 | 1667.8 | 9.3072 | 1677.1 | 0.00 | 0.4194 |
| 2.9711323 | 63.7602 | 20.145 | 1648.9 | 9.2924 | 1658.2 | 0.00 | 0.4173 |
| 2.9859880 | 63.8504 | 20.016 | 1630.1 | 9.2775 | 1639.4 | 0.00 | 0.4152 |
| 3.0009179 | 63.9454 | 19.887 | 1611.5 | 9.2625 | 1620.8 | 0.00 | 0.4132 |
| 3.0159225 | 64.0414 | 19.743 | 1591.9 | 9.2473 | 1601.2 | 0.00 | 0.4111 |
| 3.0310021 | 64.1313 | 19.600 | 1572.5 | 9.2321 | 1581.8 | 0.00 | 0.4091 |
| 3.0461571 | 64.2174 | 19.458 | 1553.4 | 9.2167 | 1562.6 | 0.00 | 0.4070 |
| 3.0613879 | 64.3182 | 19.315 | 1534.3 | 9.2013 | 1543.5 | 0.00 | 0.4050 |
| 3.0766949 | 64.3976 | 19.168 | 1515.0 | 9.1857 | 1524.2 | 0.00 | 0.4030 |
| 3.0920783 | 64.6741 | 19.023 | 1496.1 | 9.1700 | 1505.2 | 0.00 | 0.4010 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, Z=60–74, from E=0.1 keV to E=3.98 keV—Continued

| <i>E</i> keV | <i>f</i> ₁ <i>e</i> atom ^{−1} | <i>f</i> ₂ <i>e</i> atom ^{−1} | [<i>μ</i> / <i>ρ</i>] photoelectric cm ² g ^{−1} | [<i>σ</i> / <i>ρ</i>] coh+inc cm ² g ^{−1} | [<i>μ</i> / <i>ρ</i>] total cm ² g ^{−1} | [<i>μ</i> / <i>ρ</i>] <i>K</i> cm ² g ^{−1} | <i>λ</i> nm |
|--|--|--|---|---|---|---|----------------|
| Yb (Z=70) | | | | | | | |
| 3.1075387 | 64.7478 | 18.879 | 1477.4 | 9.1542 | 1486.5 | 0.00 | 0.3990 |
| 3.1230764 | 64.8190 | 18.736 | 1458.9 | 9.1383 | 1468.0 | 0.00 | 0.3970 |
| 3.1386918 | 64.8878 | 18.593 | 1440.6 | 9.1223 | 1449.7 | 0.00 | 0.3950 |
| 3.1543853 | 65.0964 | 18.452 | 1422.5 | 9.1062 | 1431.6 | 0.00 | 0.3931 |
| 3.1701572 | 65.1611 | 18.308 | 1404.4 | 9.0900 | 1413.5 | 0.00 | 0.3911 |
| 3.1860080 | 65.2232 | 18.165 | 1386.5 | 9.0737 | 1395.5 | 0.00 | 0.3892 |
| 3.2019380 | 65.2829 | 18.023 | 1368.8 | 9.0573 | 1377.9 | 0.00 | 0.3872 |
| 3.2179477 | 65.3402 | 17.882 | 1351.4 | 9.0408 | 1360.4 | 0.00 | 0.3853 |
| 3.2340374 | 65.3954 | 17.743 | 1334.2 | 9.0242 | 1343.2 | 0.00 | 0.3834 |
| 3.2502076 | 65.4485 | 17.606 | 1317.3 | 9.0074 | 1326.3 | 0.00 | 0.3815 |
| 3.2664587 | 65.4997 | 17.469 | 1300.5 | 8.9906 | 1309.5 | 0.00 | 0.3796 |
| 3.2827910 | 65.5490 | 17.334 | 1284.0 | 8.9737 | 1293.0 | 0.00 | 0.3777 |
| 3.2992049 | 65.5966 | 17.200 | 1267.8 | 8.9567 | 1276.7 | 0.00 | 0.3758 |
| 3.3157009 | 65.6425 | 17.067 | 1251.7 | 8.9396 | 1260.7 | 0.00 | 0.3739 |
| 3.3322794 | 65.6868 | 16.935 | 1235.9 | 8.9224 | 1244.8 | 0.00 | 0.3721 |
| 3.3489408 | 65.7295 | 16.805 | 1220.3 | 8.9051 | 1229.2 | 0.00 | 0.3702 |
| 3.3656856 | 65.7708 | 16.675 | 1204.8 | 8.8877 | 1213.7 | 0.00 | 0.3684 |
| 3.3825140 | 65.8106 | 16.547 | 1189.6 | 8.8702 | 1198.5 | 0.00 | 0.3665 |
| 3.3994265 | 65.8491 | 16.420 | 1174.6 | 8.8526 | 1183.5 | 0.00 | 0.3647 |
| 3.4164237 | 65.8863 | 16.294 | 1159.8 | 8.8349 | 1168.7 | 0.00 | 0.3629 |
| 3.4335058 | 65.9222 | 16.170 | 1145.2 | 8.8172 | 1154.1 | 0.00 | 0.3611 |
| 3.4506733 | 65.9569 | 16.046 | 1130.8 | 8.7993 | 1139.6 | 0.00 | 0.3593 |
| 3.4679267 | 65.9904 | 15.924 | 1116.6 | 8.7814 | 1125.4 | 0.00 | 0.3575 |
| 3.4852663 | 66.0228 | 15.802 | 1102.5 | 8.7633 | 1111.3 | 0.00 | 0.3557 |
| 3.5026927 | 66.0541 | 15.680 | 1088.6 | 8.7452 | 1097.4 | 0.00 | 0.3540 |
| 3.5202061 | 66.0843 | 15.560 | 1074.9 | 8.7270 | 1083.6 | 0.00 | 0.3522 |
| 3.5378072 | 66.1134 | 15.440 | 1061.4 | 8.7087 | 1070.1 | 0.00 | 0.3505 |
| 3.5554962 | 66.1415 | 15.322 | 1048.0 | 8.6903 | 1056.7 | 0.00 | 0.3487 |
| 3.5732737 | 66.1686 | 15.205 | 1034.8 | 8.6718 | 1043.5 | 0.00 | 0.3470 |
| 3.5911400 | 66.1948 | 15.089 | 1021.8 | 8.6533 | 1030.4 | 0.00 | 0.3453 |
| 3.6090957 | 66.2200 | 14.974 | 1009.0 | 8.6347 | 1017.6 | 0.00 | 0.3435 |
| 3.6271412 | 66.2443 | 14.860 | 996.30 | 8.6159 | 1004.9 | 0.00 | 0.3418 |
| 3.6452769 | 66.2678 | 14.747 | 983.81 | 8.5971 | 992.41 | 0.00 | 0.3401 |
| 3.6635033 | 66.2904 | 14.635 | 971.49 | 8.5783 | 980.07 | 0.00 | 0.3384 |
| 3.6818208 | 66.3122 | 14.524 | 959.33 | 8.5593 | 967.89 | 0.00 | 0.3367 |
| 3.7002299 | 66.3332 | 14.415 | 947.34 | 8.5403 | 955.88 | 0.00 | 0.3351 |
| 3.7187311 | 66.3535 | 14.306 | 935.51 | 8.5211 | 944.03 | 0.00 | 0.3334 |
| 3.7373247 | 66.3731 | 14.197 | 923.78 | 8.5019 | 932.29 | 0.00 | 0.3317 |
| 3.7560114 | 66.3920 | 14.089 | 912.22 | 8.4827 | 920.70 | 0.00 | 0.3301 |
| 3.7747914 | 66.4102 | 13.983 | 900.80 | 8.4633 | 909.27 | 0.00 | 0.3285 |
| 3.7936654 | 66.4276 | 13.877 | 889.54 | 8.4439 | 897.99 | 0.00 | 0.3268 |
| 3.8126337 | 66.4445 | 13.772 | 878.43 | 8.4244 | 886.86 | 0.00 | 0.3252 |
| 3.8316969 | 66.4608 | 13.668 | 867.47 | 8.4048 | 875.88 | 0.00 | 0.3236 |
| 3.8508554 | 66.4764 | 13.565 | 856.66 | 8.3852 | 865.04 | 0.00 | 0.3220 |
| 3.8701096 | 66.4915 | 13.463 | 845.99 | 8.3655 | 854.35 | 0.00 | 0.3204 |
| 3.8894602 | 66.5061 | 13.362 | 835.46 | 8.3457 | 843.81 | 0.00 | 0.3188 |
| 3.9089075 | 66.6298 | 13.260 | 824.94 | 8.3258 | 833.27 | 0.00 | 0.3172 |
| 3.9284520 | 66.6439 | 13.156 | 814.42 | 8.3059 | 822.73 | 0.00 | 0.3156 |
| 3.9480943 | 66.6571 | 13.054 | 804.04 | 8.2859 | 812.33 | 0.00 | 0.3140 |
| 3.9678347 | 66.6694 | 12.952 | 793.81 | 8.2658 | 802.07 | 0.00 | 0.3125 |
| 3.9876739 | 66.6808 | 12.851 | 783.71 | 8.2457 | 791.95 | 0.00 | 0.3109 |
| Lu (Z=71) | | | | | | | |
| Atomic weight: <i>A_r</i> =174.9670 g mol ^{−1} Nominal density: <i>ρ</i> (g cm ^{−3})=9.8110 | | | | | | | |
| <i>σ_a</i> (barns/atom)=[<i>μ</i> / <i>ρ</i>](cm ² g ^{−1})×290.540 | | | | | | | |
| <i>E</i> (eV) [<i>μ</i> / <i>ρ</i>](cm ² g ^{−1})= <i>f</i> ₂ (<i>e</i> atom ^{−1})×2.40504×10 ⁵ | | | | | | | |
| 19 edges. Edge energies (keV) | | | | | | | |
| K | 63.3138 | L I | 10.8704 | L II | 10.3486 | L III | 9.24410 |
| M I | 2.49120 | M II | 2.26350 | M III | 2.02360 | M IV | 1.63940 |
| M V | 1.58850 | N I | 0.506200 | N II | 0.410100 | N III | 0.3590300 |
| N IV | 0.204800 | N V | 0.195000 | N VI | 0.00690000 | N VII | 0.00690000 |
| O I | 0.0568000 | O II | 0.0280000 | O III | 0.0280000 | | |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL}) = * - 1.3030, -0.77580) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}} = -0.015805 e \text{ atom}^{-1}$ | | | | | | | |
| 0.1000000 | 16.2066 | 10.906 | 26230 | 0.48403 | 26230 | 0.00 | 12.40 |
| 0.1005000 | 16.2342 | 10.973 | 26258 | 0.48951 | 26259 | 0.00 | 12.34 |
| 0.10100250 | 16.2624 | 11.039 | 26286 | 0.49504 | 26287 | 0.00 | 12.28 |
| 0.10150751 | 16.2914 | 11.106 | 26314 | 0.50062 | 26314 | 0.00 | 12.21 |
| 0.10201505 | 16.3211 | 11.173 | 26342 | 0.50625 | 26342 | 0.00 | 12.15 |
| 0.10252513 | 16.3515 | 11.241 | 26369 | 0.51194 | 26370 | 0.00 | 12.09 |
| 0.10303775 | 16.3826 | 11.309 | 26396 | 0.51768 | 26397 | 0.00 | 12.03 |
| 0.10355294 | 16.4144 | 11.377 | 26424 | 0.52347 | 26424 | 0.00 | 11.97 |
| 0.10407070 | 16.4470 | 11.446 | 26450 | 0.52931 | 26451 | 0.00 | 11.91 |
| 0.10459106 | 16.4804 | 11.514 | 26477 | 0.53520 | 26478 | 0.00 | 11.85 |
| 0.10511401 | 16.5145 | 11.584 | 26504 | 0.54115 | 26504 | 0.00 | 11.80 |
| 0.10563958 | 16.5493 | 11.653 | 26530 | 0.54715 | 26530 | 0.00 | 11.74 |
| 0.10616778 | 16.5850 | 11.723 | 26556 | 0.55321 | 26556 | 0.00 | 11.68 |
| 0.10669862 | 16.6214 | 11.793 | 26582 | 0.55932 | 26582 | 0.00 | 11.62 |
| 0.10723211 | 16.6587 | 11.863 | 26607 | 0.56548 | 26608 | 0.00 | 11.56 |
| 0.10776827 | 16.6967 | 11.934 | 26633 | 0.57170 | 26633 | 0.00 | 11.50 |
| 0.10830712 | 16.7356 | 12.005 | 26658 | 0.57798 | 26658 | 0.00 | 11.45 |
| 0.10884865 | 16.7753 | 12.076 | 26682 | 0.58431 | 26683 | 0.00 | 11.39 |
| 0.10939289 | 16.8159 | 12.148 | 26707 | 0.59069 | 26707 | 0.00 | 11.33 |
| 0.10993986 | 16.8573 | 12.219 | 26731 | 0.59713 | 26732 | 0.00 | 11.28 |
| 0.11048956 | 16.8997 | 12.292 | 26755 | 0.60363 | 26756 | 0.00 | 11.22 |
| 0.11104201 | 16.9429 | 12.364 | 26779 | 0.61019 | 26779 | 0.00 | 11.17 |
| 0.11159722 | 16.9870 | 12.437 | 26802 | 0.61680 | 26803 | 0.00 | 11.11 |
| 0.11215520 | 17.0320 | 12.510 | 26825 | 0.62347 | 26826 | 0.00 | 11.05 |
| 0.11271598 | 17.0780 | 12.583 | 26848 | 0.63020 | 26849 | 0.00 | 11.00 |
| 0.11327956 | 17.1249 | 12.656 | 26871 | 0.63698 | 26871 | 0.00 | 10.94 |
| 0.11384596 | 17.1727 | 12.730 | 26893 | 0.64383 | 26894 | 0.00 | 10.89 |
| 0.11441519 | 17.2216 | 12.804 | 26915 | 0.65073 | 26916 | 0.00 | 10.84 |
| 0.11498726 | 17.2714 | 12.879 | 26937 | 0.65769 | 26937 | 0.00 | 10.78 |
| 0.11556220 | 17.3223 | 12.953 | 26958 | 0.66471 | 26959 | 0.00 | 10.73 |
| 0.11614001 | 17.3742 | 13.028 | 26979 | 0.67179 | 26980 | 0.00 | 10.68 |
| 0.11672071 | 17.4272 | 13.104 | 27000 | 0.67893 | 27001 | 0.00 | 10.62 |
| 0.11730431 | 17.4812 | 13.179 | 27021 | 0.68613 | 27021 | 0.00 | 10.57 |
| 0.11789083 | 17.5364 | 13.255 | 27041 | 0.69340 | 27041 | 0.00 | 10.52 |
| 0.11848029 | 17.5927 | 13.331 | 27061 | 0.70072 | 27061 | 0.00 | 10.46 |
| 0.11907269 | 17.6501 | 13.407 | 27080 | 0.70810 | 27081 | 0.00 | 10.41 |
| 0.11966805 | 17.7086 | 13.484 | 27099 | 0.71555 | 27100 | 0.00 | 10.36 |
| 0.12026639 | 17.7684 | 13.561 | 27118 | 0.72305 | 27119 | 0.00 | 10.31 |
| 0.12086772 | 17.8294 | 13.638 | 27137 | 0.73062 | 27137 | 0.00 | 10.26 |
| 0.12147206 | 17.8916 | 13.715 | 27155 | 0.73826 | 27156 | 0.00 | 10.21 |
| 0.12207942 | 17.9551 | 13.793 | 27173 | 0.74595 | 27173 | 0.00 | 10.16 |
| 0.12268982 | 18.0199 | 13.871 | 27190 | 0.75371 | 27191 | 0.00 | 10.11 |
| 0.12330327 | 18.0860 | 13.949 | 27207 | 0.76153 | 27208 | 0.00 | 10.06 |
| 0.12391979 | 18.1534 | 14.027 | 27224 | 0.76942 | 27225 | 0.00 | 10.01 |
| 0.12453939 | 18.2223 | 14.106 | 27241 | 0.77737 | 27242 | 0.00 | 9.955 |
| 0.12516208 | 18.2926 | 14.185 | 27257 | 0.78538 | 27258 | 0.00 | 9.906 |
| 0.12578789 | 18.3644 | 14.264 | 27273 | 0.79346 | 27274 | 0.00 | 9.857 |
| 0.12641683 | 18.4376 | 14.344 | 27288 | 0.80160 | 27289 | 0.00 | 9.808 |
| 0.12704892 | 18.5124 | 14.423 | 27303 | 0.80981 | 27304 | 0.00 | 9.759 |
| 0.12768416 | 18.5888 | 14.503 | 27318 | 0.81809 | 27319 | 0.00 | 9.710 |
| 0.12832258 | 18.6668 | 14.583 | 27332 | 0.82643 | 27333 | 0.00 | 9.662 |
| 0.12896419 | 18.7465 | 14.664 | 27346 | 0.83483 | 27347 | 0.00 | 9.614 |
| 0.12960902 | 18.8279 | 14.742 | 27355 | 0.84331 | 27356 | 0.00 | 9.566 |
| 0.13025706 | 18.9117 | 14.772 | 27276 | 0.85185 | 27276 | 0.00 | 9.518 |
| 0.13090835 | 18.9951 | 14.803 | 27196 | 0.86046 | 27197 | 0.00 | 9.471 |
| 0.13156289 | 19.0780 | 14.833 | 27116 | 0.86913 | 27117 | 0.00 | 9.424 |
| 0.13222070 | 19.1605 | 14.863 | 27035 | 0.87787 | 27036 | 0.00 | 9.377 |
| 0.13288181 | 19.2426 | 14.892 | 26953 | 0.88668 | 26954 | 0.00 | 9.330 |
| 0.13354621 | 19.3244 | 14.921 | 26871 | 0.89556 | 26872 | 0.00 | 9.284 |
| 0.13421395 | 19.4058 | 14.950 | 26789 | 0.90451 | 26790 | 0.00 | 9.238 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Lu ($Z=71$) | | | | | | | |
| 0.13488502 | 19.4868 | 14.978 | 26706 | 0.91353 | 26707 | 0.00 | 9.192 |
| 0.13555944 | 19.5675 | 15.006 | 26622 | 0.92262 | 26623 | 0.00 | 9.146 |
| 0.13623724 | 19.6479 | 15.033 | 26538 | 0.93177 | 26539 | 0.00 | 9.101 |
| 0.13691842 | 19.7279 | 15.060 | 26453 | 0.94100 | 26454 | 0.00 | 9.055 |
| 0.13760302 | 19.8076 | 15.086 | 26368 | 0.95029 | 26369 | 0.00 | 9.010 |
| 0.13829103 | 19.8869 | 15.112 | 26282 | 0.95966 | 26283 | 0.00 | 8.965 |
| 0.13898249 | 19.9660 | 15.138 | 26196 | 0.96910 | 26197 | 0.00 | 8.921 |
| 0.13967740 | 20.0447 | 15.163 | 26109 | 0.97860 | 26110 | 0.00 | 8.876 |
| 0.14037579 | 20.1231 | 15.188 | 26022 | 0.98818 | 26023 | 0.00 | 8.832 |
| 0.14107766 | 20.2012 | 15.213 | 25934 | 0.99783 | 25935 | 0.00 | 8.788 |
| 0.14178305 | 20.2790 | 15.237 | 25846 | 1.0076 | 25847 | 0.00 | 8.745 |
| 0.14249197 | 20.3564 | 15.260 | 25757 | 1.0174 | 25758 | 0.00 | 8.701 |
| 0.14320443 | 20.4336 | 15.283 | 25668 | 1.0272 | 25669 | 0.00 | 8.658 |
| 0.14392045 | 20.5104 | 15.306 | 25578 | 1.0372 | 25579 | 0.00 | 8.615 |
| 0.14464005 | 20.5868 | 15.329 | 25488 | 1.0472 | 25489 | 0.00 | 8.572 |
| 0.14536325 | 20.6630 | 15.350 | 25397 | 1.0573 | 25398 | 0.00 | 8.529 |
| 0.14609007 | 20.7388 | 15.372 | 25306 | 1.0674 | 25307 | 0.00 | 8.487 |
| 0.14682052 | 20.8142 | 15.393 | 25215 | 1.0777 | 25216 | 0.00 | 8.445 |
| 0.14755462 | 20.8893 | 15.413 | 25123 | 1.0880 | 25124 | 0.00 | 8.403 |
| 0.14829239 | 20.9640 | 15.433 | 25030 | 1.0983 | 25031 | 0.00 | 8.361 |
| 0.14903386 | 21.0384 | 15.453 | 24937 | 1.1088 | 24939 | 0.00 | 8.319 |
| 0.14977903 | 21.1123 | 15.472 | 24844 | 1.1193 | 24845 | 0.00 | 8.278 |
| 0.15052792 | 21.1859 | 15.491 | 24751 | 1.1299 | 24752 | 0.00 | 8.237 |
| 0.15128056 | 21.2590 | 15.509 | 24657 | 1.1406 | 24658 | 0.00 | 8.196 |
| 0.15203696 | 21.3317 | 15.527 | 24562 | 1.1514 | 24563 | 0.00 | 8.155 |
| 0.15279715 | 21.4040 | 15.545 | 24467 | 1.1622 | 24468 | 0.00 | 8.114 |
| 0.15356113 | 21.4757 | 15.562 | 24372 | 1.1731 | 24373 | 0.00 | 8.074 |
| 0.15432894 | 21.5470 | 15.578 | 24277 | 1.1841 | 24278 | 0.00 | 8.034 |
| 0.15510058 | 21.6178 | 15.594 | 24181 | 1.1952 | 24182 | 0.00 | 7.994 |
| 0.15587609 | 21.6881 | 15.610 | 24084 | 1.2063 | 24086 | 0.00 | 7.954 |
| 0.15665547 | 21.7578 | 15.625 | 23988 | 1.2175 | 23989 | 0.00 | 7.914 |
| 0.15743875 | 21.8269 | 15.639 | 23891 | 1.2288 | 23892 | 0.00 | 7.875 |
| 0.15822594 | 21.8955 | 15.654 | 23793 | 1.2402 | 23795 | 0.00 | 7.836 |
| 0.15901707 | 21.9633 | 15.667 | 23696 | 1.2516 | 23697 | 0.00 | 7.797 |
| 0.15981215 | 22.0306 | 15.680 | 23598 | 1.2632 | 23599 | 0.00 | 7.758 |
| 0.16061121 | 22.0971 | 15.693 | 23500 | 1.2748 | 23501 | 0.00 | 7.720 |
| 0.16141427 | 22.1628 | 15.706 | 23401 | 1.2864 | 23402 | 0.00 | 7.681 |
| 0.16222134 | 22.2278 | 15.717 | 23302 | 1.2982 | 23304 | 0.00 | 7.643 |
| 0.16303245 | 22.2919 | 15.729 | 23203 | 1.3100 | 23204 | 0.00 | 7.605 |
| 0.16384761 | 22.3552 | 15.740 | 23104 | 1.3220 | 23105 | 0.00 | 7.567 |
| 0.16466685 | 22.4175 | 15.750 | 23004 | 1.3340 | 23005 | 0.00 | 7.529 |
| 0.16549018 | 22.4789 | 15.760 | 22904 | 1.3460 | 22905 | 0.00 | 7.492 |
| 0.16631763 | 22.5391 | 15.770 | 22804 | 1.3582 | 22805 | 0.00 | 7.455 |
| 0.16714922 | 22.5983 | 15.779 | 22703 | 1.3704 | 22705 | 0.00 | 7.418 |
| 0.16798497 | 22.6562 | 15.787 | 22603 | 1.3827 | 22604 | 0.00 | 7.381 |
| 0.16882489 | 22.7128 | 15.795 | 22502 | 1.3951 | 22503 | 0.00 | 7.344 |
| 0.16966902 | 22.7681 | 15.803 | 22401 | 1.4076 | 22402 | 0.00 | 7.307 |
| 0.17051736 | 22.8236 | 15.810 | 22299 | 1.4202 | 22301 | 0.00 | 7.271 |
| 0.17136995 | 22.8758 | 15.817 | 22198 | 1.4328 | 22199 | 0.00 | 7.235 |
| 0.17222680 | 22.9262 | 15.823 | 22096 | 1.4455 | 22097 | 0.00 | 7.199 |
| 0.17308793 | 22.9747 | 15.829 | 21994 | 1.4583 | 21995 | 0.00 | 7.163 |
| 0.17395337 | 23.0211 | 15.834 | 21892 | 1.4712 | 21893 | 0.00 | 7.127 |
| 0.17482314 | 23.0653 | 15.839 | 21789 | 1.4842 | 21791 | 0.00 | 7.092 |
| 0.17569726 | 23.1071 | 15.843 | 21687 | 1.4972 | 21688 | 0.00 | 7.057 |
| 0.17657574 | 23.1461 | 15.847 | 21584 | 1.5104 | 21586 | 0.00 | 7.022 |
| 0.17745862 | 23.1821 | 15.850 | 21481 | 1.5236 | 21483 | 0.00 | 6.987 |
| 0.17834591 | 23.2148 | 15.853 | 21378 | 1.5369 | 21380 | 0.00 | 6.952 |
| 0.17923764 | 23.2437 | 15.855 | 21275 | 1.5502 | 21277 | 0.00 | 6.917 |
| 0.18013383 | 23.2685 | 15.857 | 21172 | 1.5637 | 21173 | 0.00 | 6.883 |
| 0.18103450 | 23.2885 | 15.859 | 21068 | 1.5772 | 21070 | 0.00 | 6.849 |
| 0.18193967 | 23.3030 | 15.860 | 20965 | 1.5909 | 20966 | 0.00 | 6.815 |
| 0.18284937 | 23.3113 | 15.860 | 20861 | 1.6046 | 20863 | 0.00 | 6.781 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Lu ($Z=71$) | | | | | | | |
| 0.18376362 | 23.3123 | 15.860 | 20757 | 1.6184 | 20759 | 0.00 | 6.747 |
| 0.18468244 | 23.3048 | 15.860 | 20654 | 1.6322 | 20655 | 0.00 | 6.713 |
| 0.18560585 | 23.2869 | 15.859 | 20550 | 1.6462 | 20551 | 0.00 | 6.680 |
| 0.18653388 | 23.2566 | 15.858 | 20446 | 1.6602 | 20447 | 0.00 | 6.647 |
| 0.18746655 | 23.2107 | 15.856 | 20342 | 1.6744 | 20343 | 0.00 | 6.614 |
| 0.18840388 | 23.1449 | 15.853 | 20237 | 1.6886 | 20239 | 0.00 | 6.581 |
| 0.18934590 | 23.0531 | 15.851 | 20133 | 1.7029 | 20135 | 0.00 | 6.548 |
| 0.19029263 | 22.9251 | 15.847 | 20029 | 1.7172 | 20031 | 0.00 | 6.515 |
| 0.19124409 | 22.7442 | 15.844 | 19925 | 1.7317 | 19926 | 0.00 | 6.483 |
| 0.19220031 | 22.4780 | 15.840 | 19820 | 1.7462 | 19822 | 0.00 | 6.451 |
| 0.19316131 | 22.0516 | 15.835 | 19716 | 1.7609 | 19718 | 0.00 | 6.419 |
| 0.19412712 | 21.2081 | 15.830 | 19612 | 1.7756 | 19613 | 0.00 | 6.387 |
| 0.19485647 | 18.9299 | 15.826 | 19533 | 1.7867 | 19535 | 0.00 | 6.363 |
| 0.19509776 | 18.4860 | 20.045 | 24710 | 1.7904 | 24712 | 0.00 | 6.355 |
| 0.19514351 | 19.0163 | 20.037 | 24695 | 1.7911 | 24696 | 0.00 | 6.353 |
| 0.19607325 | 21.8997 | 19.876 | 24380 | 1.8053 | 24382 | 0.00 | 6.323 |
| 0.19705361 | 22.8823 | 19.713 | 24060 | 1.8202 | 24062 | 0.00 | 6.292 |
| 0.19803888 | 23.4754 | 19.555 | 23749 | 1.8353 | 23751 | 0.00 | 6.261 |
| 0.19902907 | 23.8829 | 19.403 | 23447 | 1.8504 | 23449 | 0.00 | 6.229 |
| 0.20002422 | 24.1682 | 19.256 | 23153 | 1.8656 | 23155 | 0.00 | 6.198 |
| 0.20102434 | 24.3518 | 19.114 | 22868 | 1.8809 | 22870 | 0.00 | 6.168 |
| 0.20202946 | 24.4274 | 18.977 | 22591 | 1.8963 | 22593 | 0.00 | 6.137 |
| 0.20303961 | 24.3464 | 18.844 | 22321 | 1.9118 | 22323 | 0.00 | 6.106 |
| 0.20405481 | 23.8847 | 18.715 | 22058 | 1.9274 | 22060 | 0.00 | 6.076 |
| 0.20462018 | 22.7717 | 18.646 | 21916 | 1.9360 | 21918 | 0.00 | 6.059 |
| 0.20497981 | 22.9072 | 21.463 | 25183 | 1.9416 | 25184 | 0.00 | 6.049 |
| 0.20507508 | 23.3293 | 21.441 | 25145 | 1.9430 | 25147 | 0.00 | 6.046 |
| 0.20610046 | 25.0450 | 21.211 | 24752 | 1.9587 | 24754 | 0.00 | 6.016 |
| 0.20713096 | 25.8196 | 20.989 | 24371 | 1.9746 | 24373 | 0.00 | 5.986 |
| 0.20816661 | 26.3637 | 20.774 | 24002 | 1.9905 | 24004 | 0.00 | 5.956 |
| 0.20920745 | 26.7927 | 20.567 | 23644 | 2.0065 | 23646 | 0.00 | 5.926 |
| 0.21025348 | 27.1494 | 20.367 | 23298 | 2.0225 | 23300 | 0.00 | 5.897 |
| 0.21130475 | 27.4552 | 20.174 | 22962 | 2.0387 | 22964 | 0.00 | 5.868 |
| 0.21236128 | 27.7223 | 19.988 | 22637 | 2.0549 | 22639 | 0.00 | 5.838 |
| 0.21342308 | 27.9584 | 19.807 | 22321 | 2.0713 | 22323 | 0.00 | 5.809 |
| 0.21449020 | 28.1689 | 19.633 | 22014 | 2.0877 | 22016 | 0.00 | 5.780 |
| 0.21556265 | 28.3576 | 19.465 | 21717 | 2.1042 | 21719 | 0.00 | 5.752 |
| 0.21664046 | 28.5278 | 19.305 | 21432 | 2.1208 | 21434 | 0.00 | 5.723 |
| 0.21772366 | 28.6828 | 19.152 | 21156 | 2.1374 | 21158 | 0.00 | 5.695 |
| 0.21881228 | 28.8248 | 19.006 | 20890 | 2.1542 | 20892 | 0.00 | 5.666 |
| 0.21990634 | 28.9556 | 18.866 | 20633 | 2.1710 | 20636 | 0.00 | 5.638 |
| 0.22100588 | 29.0766 | 18.732 | 20385 | 2.1880 | 20387 | 0.00 | 5.610 |
| 0.22211090 | 29.1891 | 18.604 | 20145 | 2.2050 | 20147 | 0.00 | 5.582 |
| 0.22322146 | 29.2938 | 18.481 | 19912 | 2.2221 | 19914 | 0.00 | 5.554 |
| 0.22433757 | 29.3916 | 18.362 | 19686 | 2.2393 | 19688 | 0.00 | 5.527 |
| 0.22545925 | 29.4829 | 18.249 | 19466 | 2.2565 | 19469 | 0.00 | 5.499 |
| 0.22658655 | 29.5683 | 18.140 | 19254 | 2.2739 | 19256 | 0.00 | 5.472 |
| 0.22771948 | 29.6486 | 18.037 | 19049 | 2.2913 | 19052 | 0.00 | 5.445 |
| 0.22885808 | 29.7249 | 17.939 | 18852 | 2.3088 | 18854 | 0.00 | 5.418 |
| 0.23000237 | 29.7976 | 17.845 | 18660 | 2.3264 | 18662 | 0.00 | 5.391 |
| 0.23115238 | 29.8674 | 17.756 | 18475 | 2.3441 | 18477 | 0.00 | 5.364 |
| 0.23230814 | 29.9346 | 17.671 | 18295 | 2.3619 | 18297 | 0.00 | 5.337 |
| 0.23346969 | 29.9996 | 17.590 | 18120 | 2.3798 | 18122 | 0.00 | 5.311 |
| 0.23463703 | 30.0627 | 17.512 | 17950 | 2.3977 | 17952 | 0.00 | 5.284 |
| 0.23581022 | 30.1241 | 17.437 | 17784 | 2.4158 | 17787 | 0.00 | 5.258 |
| 0.23698927 | 30.1841 | 17.365 | 17623 | 2.4339 | 17625 | 0.00 | 5.232 |
| 0.23817422 | 30.2427 | 17.296 | 17466 | 2.4521 | 17468 | 0.00 | 5.206 |
| 0.23936509 | 30.3002 | 17.230 | 17312 | 2.4704 | 17314 | 0.00 | 5.180 |
| 0.24056191 | 30.3566 | 17.166 | 17162 | 2.4888 | 17164 | 0.00 | 5.154 |
| 0.24176472 | 30.4122 | 17.104 | 17015 | 2.5072 | 17017 | 0.00 | 5.128 |
| 0.24297355 | 30.4668 | 17.044 | 16871 | 2.5257 | 16873 | 0.00 | 5.103 |
| 0.24418841 | 30.5207 | 16.986 | 16730 | 2.5444 | 16732 | 0.00 | 5.077 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Lu ($Z=71$) | | | | | | | |
| 0.24540936 | 30.5739 | 16.930 | 16591 | 2.5631 | 16594 | 0.00 | 5.052 |
| 0.24663640 | 30.6265 | 16.875 | 16456 | 2.5819 | 16458 | 0.00 | 5.027 |
| 0.24786959 | 30.6784 | 16.822 | 16322 | 2.6007 | 16325 | 0.00 | 5.002 |
| 0.24910893 | 30.7298 | 16.771 | 16191 | 2.6197 | 16194 | 0.00 | 4.977 |
| 0.25035448 | 30.7807 | 16.720 | 16063 | 2.6387 | 16065 | 0.00 | 4.952 |
| 0.25160625 | 30.8312 | 16.672 | 15936 | 2.6579 | 15939 | 0.00 | 4.928 |
| 0.25286428 | 30.8811 | 16.624 | 15811 | 2.6771 | 15814 | 0.00 | 4.903 |
| 0.25412860 | 30.9306 | 16.577 | 15688 | 2.6964 | 15691 | 0.00 | 4.879 |
| 0.25539925 | 30.9797 | 16.532 | 15568 | 2.7157 | 15570 | 0.00 | 4.855 |
| 0.25667624 | 31.0284 | 16.487 | 15448 | 2.7352 | 15451 | 0.00 | 4.830 |
| 0.25795962 | 31.0766 | 16.443 | 15331 | 2.7547 | 15333 | 0.00 | 4.806 |
| 0.25924942 | 31.1245 | 16.401 | 15215 | 2.7744 | 15218 | 0.00 | 4.782 |
| 0.26054567 | 31.1720 | 16.359 | 15100 | 2.7941 | 15103 | 0.00 | 4.759 |
| 0.26184840 | 31.2192 | 16.317 | 14987 | 2.8138 | 14990 | 0.00 | 4.735 |
| 0.26315764 | 31.2659 | 16.277 | 14876 | 2.8337 | 14879 | 0.00 | 4.711 |
| 0.26447343 | 31.3123 | 16.237 | 14766 | 2.8536 | 14768 | 0.00 | 4.688 |
| 0.26579579 | 31.3583 | 16.198 | 14657 | 2.8737 | 14660 | 0.00 | 4.665 |
| 0.26712477 | 31.4040 | 16.160 | 14549 | 2.8938 | 14552 | 0.00 | 4.641 |
| 0.26846040 | 31.4493 | 16.122 | 14443 | 2.9140 | 14446 | 0.00 | 4.618 |
| 0.26980270 | 31.4942 | 16.084 | 14338 | 2.9342 | 14341 | 0.00 | 4.595 |
| 0.27115171 | 31.5387 | 16.048 | 14234 | 2.9546 | 14237 | 0.00 | 4.573 |
| 0.27250747 | 31.5829 | 16.011 | 14131 | 2.9750 | 14134 | 0.00 | 4.550 |
| 0.27387001 | 31.6266 | 15.975 | 14029 | 2.9955 | 14032 | 0.00 | 4.527 |
| 0.27523936 | 31.6700 | 15.940 | 13928 | 3.0161 | 13931 | 0.00 | 4.505 |
| 0.27661556 | 31.7130 | 15.905 | 13829 | 3.0368 | 13832 | 0.00 | 4.482 |
| 0.27799863 | 31.7555 | 15.871 | 13730 | 3.0575 | 13733 | 0.00 | 4.460 |
| 0.27938863 | 31.7977 | 15.836 | 13632 | 3.0783 | 13635 | 0.00 | 4.438 |
| 0.28078557 | 31.8394 | 15.803 | 13536 | 3.0992 | 13539 | 0.00 | 4.416 |
| 0.28218950 | 31.8807 | 15.769 | 13440 | 3.1202 | 13443 | 0.00 | 4.394 |
| 0.28360044 | 31.9216 | 15.736 | 13345 | 3.1413 | 13348 | 0.00 | 4.372 |
| 0.28501845 | 31.9620 | 15.704 | 13251 | 3.1624 | 13254 | 0.00 | 4.350 |
| 0.28644354 | 32.0020 | 15.672 | 13158 | 3.1836 | 13161 | 0.00 | 4.328 |
| 0.28787576 | 32.0415 | 15.640 | 13066 | 3.2049 | 13069 | 0.00 | 4.307 |
| 0.28931514 | 32.0805 | 15.608 | 12975 | 3.2263 | 12978 | 0.00 | 4.285 |
| 0.29076171 | 32.1191 | 15.577 | 12884 | 3.2477 | 12887 | 0.00 | 4.264 |
| 0.29221552 | 32.1571 | 15.546 | 12795 | 3.2692 | 12798 | 0.00 | 4.243 |
| 0.29367660 | 32.1947 | 15.515 | 12706 | 3.2908 | 12709 | 0.00 | 4.222 |
| 0.29514498 | 32.2317 | 15.484 | 12618 | 3.3125 | 12621 | 0.00 | 4.201 |
| 0.29662071 | 32.2681 | 15.454 | 12530 | 3.3342 | 12534 | 0.00 | 4.180 |
| 0.29810381 | 32.3040 | 15.424 | 12444 | 3.3560 | 12447 | 0.00 | 4.159 |
| 0.29959433 | 32.3394 | 15.395 | 12358 | 3.3779 | 12362 | 0.00 | 4.138 |
| 0.30109230 | 32.3741 | 15.365 | 12273 | 3.3999 | 12277 | 0.00 | 4.118 |
| 0.30259776 | 32.4082 | 15.336 | 12189 | 3.4219 | 12193 | 0.00 | 4.097 |
| 0.30411075 | 32.4417 | 15.307 | 12106 | 3.4440 | 12109 | 0.00 | 4.077 |
| 0.30563130 | 32.4746 | 15.279 | 12023 | 3.4662 | 12027 | 0.00 | 4.057 |
| 0.30715946 | 32.5067 | 15.251 | 11941 | 3.4884 | 11945 | 0.00 | 4.036 |
| 0.30869526 | 32.5382 | 15.222 | 11860 | 3.5108 | 11863 | 0.00 | 4.016 |
| 0.31023873 | 32.5689 | 15.195 | 11779 | 3.5331 | 11783 | 0.00 | 3.996 |
| 0.31178993 | 32.5988 | 15.167 | 11699 | 3.5556 | 11703 | 0.00 | 3.977 |
| 0.31334888 | 32.6280 | 15.140 | 11620 | 3.5781 | 11624 | 0.00 | 3.957 |
| 0.31491562 | 32.6563 | 15.113 | 11542 | 3.6007 | 11545 | 0.00 | 3.937 |
| 0.31649020 | 32.6837 | 15.086 | 11464 | 3.6234 | 11467 | 0.00 | 3.917 |
| 0.31807265 | 32.7102 | 15.059 | 11387 | 3.6462 | 11390 | 0.00 | 3.898 |
| 0.31966301 | 32.7357 | 15.033 | 11310 | 3.6690 | 11314 | 0.00 | 3.879 |
| 0.32126133 | 32.7601 | 15.007 | 11234 | 3.6919 | 11238 | 0.00 | 3.859 |
| 0.32286764 | 32.7835 | 14.981 | 11159 | 3.7148 | 11163 | 0.00 | 3.840 |
| 0.32448197 | 32.8056 | 14.955 | 11085 | 3.7378 | 11088 | 0.00 | 3.821 |
| 0.32610438 | 32.8264 | 14.930 | 11011 | 3.7609 | 11015 | 0.00 | 3.802 |
| 0.32773491 | 32.8459 | 14.905 | 10938 | 3.7840 | 10941 | 0.00 | 3.783 |
| 0.32937358 | 32.8638 | 14.880 | 10865 | 3.8072 | 10869 | 0.00 | 3.764 |
| 0.33102045 | 32.8800 | 14.855 | 10793 | 3.8305 | 10797 | 0.00 | 3.746 |
| 0.33267555 | 32.8944 | 14.831 | 10722 | 3.8539 | 10726 | 0.00 | 3.727 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Lu ($Z=71$) | | | | | | | |
| 0.33433893 | 32.9068 | 14.806 | 10651 | 3.8773 | 10655 | 0.00 | 3.708 |
| 0.33601062 | 32.9169 | 14.783 | 10581 | 3.9007 | 10585 | 0.00 | 3.690 |
| 0.33769068 | 32.9243 | 14.759 | 10511 | 3.9243 | 10515 | 0.00 | 3.672 |
| 0.33937913 | 32.9288 | 14.735 | 10442 | 3.9479 | 10446 | 0.00 | 3.653 |
| 0.34107602 | 32.9298 | 14.712 | 10374 | 3.9715 | 10378 | 0.00 | 3.635 |
| 0.34278140 | 32.9266 | 14.689 | 10306 | 3.9952 | 10310 | 0.00 | 3.617 |
| 0.34449531 | 32.9185 | 14.666 | 10239 | 4.0190 | 10243 | 0.00 | 3.599 |
| 0.34621779 | 32.9042 | 14.644 | 10173 | 4.0429 | 10177 | 0.00 | 3.581 |
| 0.34794888 | 32.8821 | 14.622 | 10107 | 4.0668 | 10111 | 0.00 | 3.563 |
| 0.34968862 | 32.8496 | 14.600 | 10041 | 4.0907 | 10045 | 0.00 | 3.546 |
| 0.35143706 | 32.8026 | 14.578 | 9976.3 | 4.1148 | 9980.5 | 0.00 | 3.528 |
| 0.35319425 | 32.7339 | 14.556 | 9912.1 | 4.1388 | 9916.2 | 0.00 | 3.510 |
| 0.35496022 | 32.6287 | 14.535 | 9848.3 | 4.1630 | 9852.5 | 0.00 | 3.493 |
| 0.35673502 | 32.4476 | 14.514 | 9785.2 | 4.1872 | 9789.4 | 0.00 | 3.476 |
| 0.35851870 | 31.9961 | 14.493 | 9722.6 | 4.2114 | 9726.8 | 0.00 | 3.458 |
| 0.35885446 | 31.7736 | 14.489 | 9710.9 | 4.2160 | 9715.1 | 0.00 | 3.455 |
| 0.35974552 | 31.7880 | 15.756 | 10533 | 4.2280 | 10537 | 0.00 | 3.446 |
| 0.36031129 | 32.1302 | 15.750 | 10513 | 4.2357 | 10517 | 0.00 | 3.441 |
| 0.36211285 | 32.5763 | 15.734 | 10450 | 4.2601 | 10454 | 0.00 | 3.424 |
| 0.36392341 | 32.8094 | 15.718 | 10387 | 4.2845 | 10392 | 0.00 | 3.407 |
| 0.36574303 | 32.9756 | 15.702 | 10325 | 4.3090 | 10330 | 0.00 | 3.390 |
| 0.36757174 | 33.1086 | 15.686 | 10264 | 4.3335 | 10268 | 0.00 | 3.373 |
| 0.36940960 | 33.2215 | 15.671 | 10203 | 4.3581 | 10207 | 0.00 | 3.356 |
| 0.37125665 | 33.3210 | 15.656 | 10142 | 4.3827 | 10146 | 0.00 | 3.340 |
| 0.37311293 | 33.4107 | 15.641 | 10082 | 4.4074 | 10086 | 0.00 | 3.323 |
| 0.37497850 | 33.4930 | 15.627 | 10023 | 4.4321 | 10027 | 0.00 | 3.306 |
| 0.37685339 | 33.5695 | 15.612 | 9963.5 | 4.4569 | 9968.0 | 0.00 | 3.290 |
| 0.37873766 | 33.6411 | 15.598 | 9905.0 | 4.4817 | 9909.5 | 0.00 | 3.274 |
| 0.38063135 | 33.7086 | 15.584 | 9847.0 | 4.5066 | 9851.5 | 0.00 | 3.257 |
| 0.38253450 | 33.7727 | 15.571 | 9789.4 | 4.5315 | 9794.0 | 0.00 | 3.241 |
| 0.38444718 | 33.8336 | 15.557 | 9732.4 | 4.5565 | 9736.9 | 0.00 | 3.225 |
| 0.38636941 | 33.8917 | 15.544 | 9675.8 | 4.5815 | 9680.4 | 0.00 | 3.209 |
| 0.38830126 | 33.9470 | 15.531 | 9619.7 | 4.6066 | 9624.3 | 0.00 | 3.193 |
| 0.39024276 | 33.9998 | 15.519 | 9564.0 | 4.6317 | 9568.7 | 0.00 | 3.177 |
| 0.39219398 | 34.0501 | 15.506 | 9508.8 | 4.6569 | 9513.5 | 0.00 | 3.161 |
| 0.39415495 | 34.0976 | 15.494 | 9454.1 | 4.6821 | 9458.8 | 0.00 | 3.146 |
| 0.39612572 | 34.1422 | 15.482 | 9399.8 | 4.7073 | 9404.5 | 0.00 | 3.130 |
| 0.39810635 | 34.1836 | 15.470 | 9345.9 | 4.7326 | 9350.7 | 0.00 | 3.114 |
| 0.40009688 | 34.2208 | 15.459 | 9292.5 | 4.7580 | 9297.3 | 0.00 | 3.099 |
| 0.40209737 | 34.2527 | 15.447 | 9239.5 | 4.7833 | 9244.3 | 0.00 | 3.083 |
| 0.40410785 | 34.2766 | 15.436 | 9186.9 | 4.8087 | 9191.7 | 0.00 | 3.068 |
| 0.40612839 | 34.2867 | 15.425 | 9134.7 | 4.8342 | 9139.5 | 0.00 | 3.053 |
| 0.40815904 | 34.2633 | 15.415 | 9082.9 | 4.8597 | 9087.8 | 0.00 | 3.038 |
| 0.40952587 | 34.1682 | 15.407 | 9048.4 | 4.8768 | 9053.3 | 0.00 | 3.028 |
| 0.41019983 | 33.9986 | 15.739 | 9227.9 | 4.8852 | 9232.7 | 0.00 | 3.023 |
| 0.41067415 | 34.1968 | 15.737 | 9216.0 | 4.8912 | 9220.9 | 0.00 | 3.019 |
| 0.41225083 | 34.3770 | 15.730 | 9176.8 | 4.9108 | 9181.7 | 0.00 | 3.007 |
| 0.41431208 | 34.4999 | 15.722 | 9126.2 | 4.9364 | 9131.1 | 0.00 | 2.993 |
| 0.41638364 | 34.5937 | 15.713 | 9076.0 | 4.9621 | 9080.9 | 0.00 | 2.978 |
| 0.41846556 | 34.6750 | 15.705 | 9026.1 | 4.9877 | 9031.1 | 0.00 | 2.963 |
| 0.42055789 | 34.7494 | 15.697 | 8976.6 | 5.0135 | 8981.6 | 0.00 | 2.948 |
| 0.42266068 | 34.8192 | 15.689 | 8927.4 | 5.0392 | 8932.4 | 0.00 | 2.933 |
| 0.42477398 | 34.8858 | 15.681 | 8878.6 | 5.0650 | 8883.7 | 0.00 | 2.919 |
| 0.42689785 | 34.9499 | 15.674 | 8830.1 | 5.0908 | 8835.2 | 0.00 | 2.904 |
| 0.42903234 | 35.0121 | 15.666 | 8782.0 | 5.1167 | 8787.2 | 0.00 | 2.890 |
| 0.43117750 | 35.0728 | 15.659 | 8734.3 | 5.1425 | 8739.4 | 0.00 | 2.875 |
| 0.43333339 | 35.1321 | 15.652 | 8686.8 | 5.1685 | 8692.0 | 0.00 | 2.861 |
| 0.43550006 | 35.1903 | 15.645 | 8639.7 | 5.1944 | 8644.9 | 0.00 | 2.847 |
| 0.43767756 | 35.2475 | 15.638 | 8592.9 | 5.2204 | 8598.1 | 0.00 | 2.833 |
| 0.43986595 | 35.3038 | 15.631 | 8546.4 | 5.2464 | 8551.7 | 0.00 | 2.819 |
| 0.44206528 | 35.3593 | 15.624 | 8500.2 | 5.2724 | 8505.5 | 0.00 | 2.805 |
| 0.44427560 | 35.4141 | 15.617 | 8454.4 | 5.2984 | 8459.7 | 0.00 | 2.791 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Lu ($Z=71$) | | | | | | | |
| 0.44649698 | 35.4683 | 15.611 | 8408.8 | 5.3245 | 8414.1 | 0.00 | 2.777 |
| 0.44872947 | 35.5218 | 15.604 | 8363.5 | 5.3506 | 8368.9 | 0.00 | 2.763 |
| 0.45097311 | 35.5746 | 15.598 | 8318.5 | 5.3767 | 8323.9 | 0.00 | 2.749 |
| 0.45322798 | 35.6269 | 15.592 | 8273.8 | 5.4029 | 8279.2 | 0.00 | 2.736 |
| 0.45549412 | 35.6786 | 15.586 | 8229.3 | 5.4290 | 8234.8 | 0.00 | 2.722 |
| 0.45777159 | 35.7298 | 15.579 | 8185.1 | 5.4552 | 8190.6 | 0.00 | 2.708 |
| 0.46006045 | 35.7803 | 15.573 | 8141.2 | 5.4814 | 8146.7 | 0.00 | 2.695 |
| 0.46236075 | 35.8302 | 15.567 | 8097.6 | 5.5077 | 8103.1 | 0.00 | 2.682 |
| 0.46467255 | 35.8795 | 15.561 | 8054.1 | 5.5339 | 8059.7 | 0.00 | 2.668 |
| 0.46699592 | 35.9281 | 15.555 | 8011.0 | 5.5602 | 8016.5 | 0.00 | 2.655 |
| 0.46933090 | 35.9760 | 15.549 | 7968.0 | 5.5865 | 7973.6 | 0.00 | 2.642 |
| 0.47167755 | 36.0230 | 15.543 | 7925.3 | 5.6128 | 7931.0 | 0.00 | 2.629 |
| 0.47403594 | 36.0692 | 15.537 | 7882.9 | 5.6391 | 7888.5 | 0.00 | 2.616 |
| 0.47640612 | 36.1143 | 15.531 | 7840.6 | 5.6654 | 7846.3 | 0.00 | 2.602 |
| 0.47878815 | 36.1583 | 15.525 | 7798.6 | 5.6918 | 7804.3 | 0.00 | 2.590 |
| 0.48118209 | 36.2009 | 15.519 | 7756.8 | 5.7181 | 7762.5 | 0.00 | 2.577 |
| 0.48358800 | 36.2418 | 15.513 | 7715.2 | 5.7445 | 7720.9 | 0.00 | 2.564 |
| 0.48600594 | 36.2807 | 15.507 | 7673.8 | 5.7709 | 7679.6 | 0.00 | 2.551 |
| 0.48843597 | 36.3171 | 15.501 | 7632.6 | 5.7972 | 7638.4 | 0.00 | 2.538 |
| 0.49087815 | 36.3502 | 15.495 | 7591.6 | 5.8236 | 7597.4 | 0.00 | 2.526 |
| 0.49333254 | 36.3789 | 15.488 | 7550.8 | 5.8500 | 7556.6 | 0.00 | 2.513 |
| 0.49579920 | 36.4012 | 15.482 | 7510.1 | 5.8765 | 7516.0 | 0.00 | 2.501 |
| 0.49827820 | 36.4136 | 15.476 | 7469.7 | 5.9029 | 7475.6 | 0.00 | 2.488 |
| 0.50076959 | 36.4085 | 15.469 | 7429.4 | 5.9293 | 7435.4 | 0.00 | 2.476 |
| 0.50327344 | 36.3633 | 15.463 | 7389.3 | 5.9557 | 7395.3 | 0.00 | 2.464 |
| 0.50541541 | 36.1934 | 15.457 | 7355.3 | 5.9782 | 7361.3 | 0.00 | 2.453 |
| 0.50578980 | 36.0943 | 15.456 | 7349.4 | 5.9822 | 7355.4 | 0.00 | 2.451 |
| 0.50698463 | 36.2288 | 15.974 | 7578.0 | 5.9947 | 7584.0 | 0.00 | 2.446 |
| 0.50831875 | 36.4238 | 15.971 | 7556.7 | 6.0086 | 7562.7 | 0.00 | 2.439 |
| 0.51086035 | 36.6121 | 15.966 | 7516.3 | 6.0350 | 7522.3 | 0.00 | 2.427 |
| 0.51341465 | 36.7424 | 15.960 | 7476.1 | 6.0615 | 7482.2 | 0.00 | 2.415 |
| 0.51598172 | 36.8509 | 15.953 | 7436.0 | 6.0879 | 7442.1 | 0.00 | 2.403 |
| 0.51856163 | 36.9478 | 15.947 | 7396.1 | 6.1143 | 7402.3 | 0.00 | 2.391 |
| 0.52115444 | 37.0377 | 15.941 | 7356.4 | 6.1408 | 7362.5 | 0.00 | 2.379 |
| 0.5.2376021 | 37.1227 | 15.934 | 7316.8 | 6.1672 | 7322.9 | 0.00 | 2.367 |
| 0.5.2637901 | 37.2042 | 15.927 | 7277.3 | 6.1936 | 7283.5 | 0.00 | 2.355 |
| 0.5.2901091 | 37.2831 | 15.921 | 7237.9 | 6.2200 | 7244.2 | 0.00 | 2.344 |
| 0.5.3165596 | 37.3600 | 15.913 | 7198.7 | 6.2465 | 7205.0 | 0.00 | 2.332 |
| 0.5.3431424 | 37.4353 | 15.906 | 7159.6 | 6.2729 | 7165.9 | 0.00 | 2.320 |
| 0.5.3698581 | 37.5093 | 15.899 | 7120.7 | 6.2993 | 7127.0 | 0.00 | 2.309 |
| 0.53967074 | 37.5821 | 15.891 | 7081.8 | 6.3257 | 7088.1 | 0.00 | 2.297 |
| 0.54236910 | 37.6541 | 15.883 | 7043.1 | 6.3520 | 7049.5 | 0.00 | 2.286 |
| 0.54508094 | 37.7252 | 15.875 | 7004.5 | 6.3784 | 7010.9 | 0.00 | 2.275 |
| 0.54780635 | 37.7957 | 15.867 | 6966.0 | 6.4048 | 6972.4 | 0.00 | 2.263 |
| 0.55054538 | 37.8656 | 15.858 | 6927.7 | 6.4311 | 6934.1 | 0.00 | 2.252 |
| 0.55329810 | 37.9350 | 15.850 | 6889.4 | 6.4574 | 6895.9 | 0.00 | 2.241 |
| 0.55606460 | 38.0040 | 15.841 | 6851.3 | 6.4838 | 6857.8 | 0.00 | 2.230 |
| 0.55884492 | 38.0725 | 15.831 | 6813.2 | 6.5101 | 6819.7 | 0.00 | 2.219 |
| 0.56163914 | 38.1407 | 15.822 | 6775.3 | 6.5364 | 6781.8 | 0.00 | 2.208 |
| 0.56444734 | 38.2086 | 15.812 | 6737.4 | 6.5626 | 6744.0 | 0.00 | 2.197 |
| 0.56726958 | 38.2763 | 15.802 | 6699.7 | 6.5889 | 6706.3 | 0.00 | 2.186 |
| 0.57010592 | 38.3436 | 15.792 | 6662.0 | 6.6151 | 6668.6 | 0.00 | 2.175 |
| 0.57295645 | 38.4107 | 15.782 | 6624.5 | 6.6413 | 6631.1 | 0.00 | 2.164 |
| 0.57582123 | 38.4775 | 15.771 | 6587.0 | 6.6675 | 6593.6 | 0.00 | 2.153 |
| 0.57870034 | 38.5442 | 15.760 | 6549.6 | 6.6937 | 6556.3 | 0.00 | 2.142 |
| 0.58159384 | 38.6106 | 15.748 | 6512.3 | 6.7198 | 6519.0 | 0.00 | 2.132 |
| 0.58450181 | 38.6768 | 15.736 | 6475.0 | 6.7460 | 6481.8 | 0.00 | 2.121 |
| 0.58742432 | 38.7608 | 15.724 | 6437.9 | 6.7720 | 6444.7 | 0.00 | 2.111 |
| 0.59036144 | 38.8266 | 15.712 | 6400.8 | 6.7981 | 6407.6 | 0.00 | 2.100 |
| 0.59331325 | 38.8922 | 15.699 | 6363.8 | 6.8242 | 6370.7 | 0.00 | 2.090 |
| 0.59627982 | 38.9577 | 15.686 | 6326.9 | 6.8502 | 6333.8 | 0.00 | 2.079 |
| 0.59926122 | 39.0230 | 15.673 | 6290.1 | 6.8762 | 6297.0 | 0.00 | 2.069 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Lu ($Z=71$) | | | | | | | |
| 0.60225752 | 39.0881 | 15.659 | 6253.4 | 6.9021 | 6260.3 | 0.00 | 2.059 |
| 0.60526881 | 39.1531 | 15.645 | 6216.7 | 6.9280 | 6223.6 | 0.00 | 2.048 |
| 0.60829515 | 39.2178 | 15.631 | 6180.1 | 6.9539 | 6187.1 | 0.00 | 2.038 |
| 0.61133663 | 39.2824 | 15.616 | 6143.6 | 6.9798 | 6150.6 | 0.00 | 2.028 |
| 0.61439331 | 39.3469 | 15.601 | 6107.2 | 7.0056 | 6114.2 | 0.00 | 2.018 |
| 0.61746528 | 39.4010 | 15.586 | 6070.9 | 7.0314 | 6077.9 | 0.00 | 2.008 |
| 0.62055260 | 39.4650 | 15.571 | 6034.6 | 7.0571 | 6041.6 | 0.00 | 1.998 |
| 0.62365537 | 39.5288 | 15.555 | 5998.4 | 7.0829 | 6005.5 | 0.00 | 1.988 |
| 0.62677364 | 39.5924 | 15.538 | 5962.3 | 7.1085 | 5969.4 | 0.00 | 1.978 |
| 0.62990751 | 39.6558 | 15.521 | 5926.2 | 7.1342 | 5933.4 | 0.00 | 1.968 |
| 0.63305705 | 39.7190 | 15.504 | 5890.3 | 7.1598 | 5897.4 | 0.00 | 1.959 |
| 0.63622234 | 39.7821 | 15.487 | 5854.4 | 7.1853 | 5861.6 | 0.00 | 1.949 |
| 0.63940345 | 39.8449 | 15.469 | 5818.6 | 7.2108 | 5825.8 | 0.00 | 1.939 |
| 0.64260046 | 39.9075 | 15.451 | 5782.9 | 7.2363 | 5790.1 | 0.00 | 1.929 |
| 0.64581347 | 39.9700 | 15.433 | 5747.2 | 7.2617 | 5754.5 | 0.00 | 1.920 |
| 0.64904253 | 40.0322 | 15.414 | 5711.7 | 7.2871 | 5719.0 | 0.00 | 1.910 |
| 0.65228775 | 40.0942 | 15.395 | 5676.2 | 7.3124 | 5683.5 | 0.00 | 1.901 |
| 0.65554919 | 40.1560 | 15.375 | 5640.8 | 7.3377 | 5648.1 | 0.00 | 1.891 |
| 0.65882693 | 40.2176 | 15.355 | 5605.5 | 7.3630 | 5612.8 | 0.00 | 1.882 |
| 0.66212107 | 40.2789 | 15.335 | 5570.2 | 7.3882 | 5577.6 | 0.00 | 1.873 |
| 0.66543167 | 40.3401 | 15.315 | 5535.1 | 7.4133 | 5542.5 | 0.00 | 1.863 |
| 0.66875883 | 40.4009 | 15.294 | 5500.0 | 7.4384 | 5507.4 | 0.00 | 1.854 |
| 0.67210262 | 40.4616 | 15.272 | 5465.0 | 7.4634 | 5472.5 | 0.00 | 1.845 |
| 0.67546314 | 40.5220 | 15.251 | 5430.1 | 7.4884 | 5437.6 | 0.00 | 1.836 |
| 0.67884045 | 40.5822 | 15.229 | 5395.3 | 7.5133 | 5402.8 | 0.00 | 1.826 |
| 0.68223466 | 40.6421 | 15.206 | 5360.6 | 7.5382 | 5368.1 | 0.00 | 1.817 |
| 0.68564583 | 40.7018 | 15.184 | 5325.9 | 7.5630 | 5333.5 | 0.00 | 1.808 |
| 0.68907406 | 40.7612 | 15.160 | 5291.4 | 7.5878 | 5299.0 | 0.00 | 1.799 |
| 0.69251943 | 40.8204 | 15.137 | 5256.9 | 7.6125 | 5264.5 | 0.00 | 1.790 |
| 0.69598202 | 40.8793 | 15.113 | 5222.4 | 7.6371 | 5230.0 | 0.00 | 1.781 |
| 0.69946194 | 40.9378 | 15.088 | 5188.0 | 7.6617 | 5195.6 | 0.00 | 1.773 |
| 0.70295924 | 40.9960 | 15.063 | 5153.6 | 7.6862 | 5161.3 | 0.00 | 1.764 |
| 0.70647404 | 41.0538 | 15.038 | 5119.3 | 7.7107 | 5127.0 | 0.00 | 1.755 |
| 0.71000641 | 41.1113 | 15.012 | 5085.2 | 7.7351 | 5092.9 | 0.00 | 1.746 |
| 0.71355644 | 41.1684 | 14.986 | 5051.1 | 7.7594 | 5058.8 | 0.00 | 1.738 |
| 0.71712423 | 41.2252 | 14.960 | 5017.1 | 7.7836 | 5024.9 | 0.00 | 1.729 |
| 0.72070985 | 41.2815 | 14.933 | 4983.2 | 7.8078 | 4991.0 | 0.00 | 1.720 |
| 0.72431340 | 41.3375 | 14.906 | 4949.4 | 7.8320 | 4957.2 | 0.00 | 1.712 |
| 0.72793496 | 41.3932 | 14.878 | 4915.7 | 7.8560 | 4923.6 | 0.00 | 1.703 |
| 0.73157464 | 41.4484 | 14.851 | 4882.1 | 7.8800 | 4890.0 | 0.00 | 1.695 |
| 0.73523251 | 41.5033 | 14.822 | 4848.6 | 7.9039 | 4856.5 | 0.00 | 1.686 |
| 0.73890867 | 41.5577 | 14.794 | 4815.2 | 7.9278 | 4823.2 | 0.00 | 1.678 |
| 0.74260322 | 41.6118 | 14.765 | 4782.0 | 7.9516 | 4789.9 | 0.00 | 1.670 |
| 0.74631623 | 41.6654 | 14.736 | 4748.8 | 7.9753 | 4756.8 | 0.00 | 1.661 |
| 0.75004781 | 41.7186 | 14.707 | 4715.7 | 7.9989 | 4723.7 | 0.00 | 1.653 |
| 0.75379805 | 41.7714 | 14.677 | 4682.8 | 8.0224 | 4690.8 | 0.00 | 1.645 |
| 0.75756704 | 41.8238 | 14.647 | 4649.9 | 8.0459 | 4658.0 | 0.00 | 1.637 |
| 0.76135488 | 41.8757 | 14.616 | 4617.2 | 8.0693 | 4625.3 | 0.00 | 1.628 |
| 0.76516165 | 41.9272 | 14.586 | 4584.6 | 8.0926 | 4592.7 | 0.00 | 1.620 |
| 0.76898746 | 41.9783 | 14.555 | 4552.0 | 8.1159 | 4560.2 | 0.00 | 1.612 |
| 0.77283240 | 42.0289 | 14.523 | 4519.7 | 8.1390 | 4527.8 | 0.00 | 1.604 |
| 0.77669656 | 42.0790 | 14.492 | 4487.4 | 8.1621 | 4495.5 | 0.00 | 1.596 |
| 0.78058004 | 42.1287 | 14.460 | 4455.2 | 8.1851 | 4463.4 | 0.00 | 1.588 |
| 0.78448294 | 42.1779 | 14.428 | 4423.2 | 8.2080 | 4431.4 | 0.00 | 1.580 |
| 0.78840536 | 42.2267 | 14.395 | 4391.2 | 8.2309 | 4399.4 | 0.00 | 1.573 |
| 0.79234738 | 42.2749 | 14.362 | 4359.4 | 8.2536 | 4367.6 | 0.00 | 1.565 |
| 0.79630912 | 42.3226 | 14.329 | 4327.6 | 8.2763 | 4335.9 | 0.00 | 1.557 |
| 0.80029067 | 42.3699 | 14.295 | 4296.0 | 8.2989 | 4304.3 | 0.00 | 1.549 |
| 0.80429212 | 42.4166 | 14.261 | 4264.5 | 8.3213 | 4272.8 | 0.00 | 1.542 |
| 0.80831358 | 42.4627 | 14.227 | 4233.1 | 8.3437 | 4241.5 | 0.00 | 1.534 |
| 0.81235515 | 42.5084 | 14.193 | 4201.9 | 8.3660 | 4210.2 | 0.00 | 1.526 |
| 0.81641693 | 42.5534 | 14.158 | 4170.7 | 8.3883 | 4179.1 | 0.00 | 1.519 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Lu ($Z=71$) | | | | | | | |
| 0.82049901 | 42.5979 | 14.123 | 4139.7 | 8.4104 | 4148.1 | 0.00 | 1.511 |
| 0.82460150 | 42.6419 | 14.088 | 4108.8 | 8.4324 | 4117.2 | 0.00 | 1.504 |
| 0.82872451 | 42.6853 | 14.052 | 4078.0 | 8.4544 | 4086.5 | 0.00 | 1.496 |
| 0.83286813 | 42.7281 | 14.016 | 4047.3 | 8.4762 | 4055.8 | 0.00 | 1.489 |
| 0.83703248 | 42.7703 | 13.980 | 4016.8 | 8.4980 | 4025.3 | 0.00 | 1.481 |
| 0.84121764 | 42.8119 | 13.943 | 3986.4 | 8.5196 | 3994.9 | 0.00 | 1.474 |
| 0.84542373 | 42.8529 | 13.907 | 3956.1 | 8.5412 | 3964.7 | 0.00 | 1.467 |
| 0.84965084 | 42.8933 | 13.870 | 3926.0 | 8.5626 | 3934.5 | 0.00 | 1.459 |
| 0.85389910 | 42.9330 | 13.832 | 3896.0 | 8.5840 | 3904.6 | 0.00 | 1.452 |
| 0.85816859 | 42.9721 | 13.795 | 3866.1 | 8.6053 | 3874.7 | 0.00 | 1.445 |
| 0.86245944 | 43.0106 | 13.757 | 3836.3 | 8.6264 | 3844.9 | 0.00 | 1.438 |
| 0.86677173 | 43.0483 | 13.719 | 3806.6 | 8.6475 | 3815.2 | 0.00 | 1.430 |
| 0.87110559 | 43.0854 | 13.681 | 3777.1 | 8.6684 | 3785.7 | 0.00 | 1.423 |
| 0.87546112 | 43.1217 | 13.642 | 3747.7 | 8.6893 | 3756.4 | 0.00 | 1.416 |
| 0.87983843 | 43.1574 | 13.603 | 3718.5 | 8.7100 | 3727.2 | 0.00 | 1.409 |
| 0.88423762 | 43.1923 | 13.565 | 3689.4 | 8.7307 | 3698.2 | 0.00 | 1.402 |
| 0.88865881 | 43.2266 | 13.526 | 3660.5 | 8.7512 | 3669.3 | 0.00 | 1.395 |
| 0.89310210 | 43.2601 | 13.487 | 3631.8 | 8.7716 | 3640.6 | 0.00 | 1.388 |
| 0.89756761 | 43.2929 | 13.447 | 3603.2 | 8.7920 | 3612.0 | 0.00 | 1.381 |
| 0.90205545 | 43.3250 | 13.408 | 3574.8 | 8.8122 | 3583.6 | 0.00 | 1.374 |
| 0.90656573 | 43.3564 | 13.368 | 3546.5 | 8.8323 | 3555.4 | 0.00 | 1.368 |
| 0.91109856 | 43.3870 | 13.329 | 3518.4 | 8.8523 | 3527.3 | 0.00 | 1.361 |
| 0.91565405 | 43.4170 | 13.289 | 3490.5 | 8.8721 | 3499.4 | 0.00 | 1.354 |
| 0.92023232 | 43.4462 | 13.249 | 3462.8 | 8.8919 | 3471.7 | 0.00 | 1.347 |
| 0.92483348 | 43.4747 | 13.210 | 3435.2 | 8.9116 | 3444.1 | 0.00 | 1.341 |
| 0.92945765 | 43.5024 | 13.170 | 3407.8 | 8.9311 | 3416.7 | 0.00 | 1.334 |
| 0.93410494 | 43.5294 | 13.130 | 3380.6 | 8.9505 | 3389.5 | 0.00 | 1.327 |
| 0.93877546 | 43.5557 | 13.090 | 3353.5 | 8.9699 | 3362.5 | 0.00 | 1.321 |
| 0.94346934 | 43.5813 | 13.050 | 3326.6 | 8.9891 | 3335.6 | 0.00 | 1.314 |
| 0.94818668 | 43.6062 | 13.010 | 3299.9 | 9.0081 | 3308.9 | 0.00 | 1.308 |
| 0.95292762 | 43.6303 | 12.970 | 3273.4 | 9.0271 | 3282.4 | 0.00 | 1.301 |
| 0.95769226 | 43.6537 | 12.930 | 3247.0 | 9.0459 | 3256.1 | 0.00 | 1.295 |
| 0.96248072 | 43.6764 | 12.890 | 3220.9 | 9.0647 | 3229.9 | 0.00 | 1.288 |
| 0.96729312 | 43.6984 | 12.850 | 3194.9 | 9.0833 | 3204.0 | 0.00 | 1.282 |
| 0.97212959 | 43.7197 | 12.810 | 3169.1 | 9.1018 | 3178.2 | 0.00 | 1.275 |
| 0.97699023 | 43.7404 | 12.770 | 3143.5 | 9.1201 | 3152.6 | 0.00 | 1.269 |
| 0.98187519 | 43.7606 | 12.730 | 3118.0 | 9.1384 | 3127.2 | 0.00 | 1.263 |
| 0.98678456 | 43.7804 | 12.690 | 3092.8 | 9.1565 | 3101.9 | 0.00 | 1.256 |
| 0.99171848 | 43.8005 | 12.650 | 3067.7 | 9.1745 | 3076.9 | 0.00 | 1.250 |
| 0.99667708 | 43.8254 | 12.610 | 3042.8 | 9.1923 | 3052.0 | 0.00 | 1.244 |
| 1.0016605 | 44.0197 | 12.556 | 3014.8 | 9.2101 | 3024.0 | 0.00 | 1.238 |
| 1.0066688 | 44.0422 | 12.475 | 2980.3 | 9.2277 | 2989.6 | 0.00 | 1.232 |
| 1.0117021 | 44.0588 | 12.394 | 2946.3 | 9.2452 | 2955.6 | 0.00 | 1.226 |
| 1.0167606 | 44.0703 | 12.314 | 2912.8 | 9.2626 | 2922.0 | 0.00 | 1.219 |
| 1.0218444 | 44.0775 | 12.235 | 2879.6 | 9.2798 | 2888.9 | 0.00 | 1.213 |
| 1.0269536 | 44.0810 | 12.156 | 2846.9 | 9.2969 | 2856.2 | 0.00 | 1.207 |
| 1.0320884 | 44.0811 | 12.078 | 2814.6 | 9.3139 | 2823.9 | 0.00 | 1.201 |
| 1.0372489 | 44.0781 | 12.001 | 2782.6 | 9.3307 | 2792.0 | 0.00 | 1.195 |
| 1.0424351 | 44.0722 | 11.924 | 2751.1 | 9.3474 | 2760.5 | 0.00 | 1.189 |
| 1.0476473 | 44.0636 | 11.848 | 2720.0 | 9.3640 | 2729.3 | 0.00 | 1.183 |
| 1.0528855 | 44.0524 | 11.773 | 2689.2 | 9.3804 | 2698.6 | 0.00 | 1.178 |
| 1.0581499 | 44.0388 | 11.698 | 2658.9 | 9.3968 | 2668.3 | 0.00 | 1.172 |
| 1.0634407 | 44.0228 | 11.624 | 2628.9 | 9.4129 | 2638.3 | 0.00 | 1.166 |
| 1.0687579 | 44.0046 | 11.551 | 2599.3 | 9.4290 | 2608.7 | 0.00 | 1.160 |
| 1.0741017 | 43.9841 | 11.478 | 2570.0 | 9.4449 | 2579.5 | 0.00 | 1.154 |
| 1.0794722 | 43.9634 | 11.405 | 2541.1 | 9.4607 | 2550.6 | 0.00 | 1.149 |
| 1.0848695 | 43.9386 | 11.334 | 2512.6 | 9.4763 | 2522.0 | 0.00 | 1.143 |
| 1.0902939 | 43.9117 | 11.263 | 2484.4 | 9.4918 | 2493.9 | 0.00 | 1.137 |
| 1.0957454 | 43.8826 | 11.192 | 2456.5 | 9.5072 | 2466.0 | 0.00 | 1.132 |
| 1.1012241 | 43.8515 | 11.122 | 2429.0 | 9.5224 | 2438.6 | 0.00 | 1.126 |
| 1.1067302 | 43.8182 | 11.053 | 2401.9 | 9.5375 | 2411.4 | 0.00 | 1.120 |
| 1.1122639 | 43.7828 | 10.984 | 2375.1 | 9.5524 | 2384.6 | 0.00 | 1.115 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Lu ($Z=71$) | | | | | | | |
| 1.1178252 | 43.7453 | 10.916 | 2348.6 | 9.5672 | 2358.1 | 0.00 | 1.109 |
| 1.1234143 | 43.7057 | 10.848 | 2322.4 | 9.5819 | 2332.0 | 0.00 | 1.104 |
| 1.1290314 | 43.6639 | 10.781 | 2296.5 | 9.5964 | 2306.1 | 0.00 | 1.098 |
| 1.1346765 | 43.6200 | 10.714 | 2271.0 | 9.6108 | 2280.6 | 0.00 | 1.093 |
| 1.1403499 | 43.5739 | 10.648 | 2245.8 | 9.6250 | 2255.4 | 0.00 | 1.087 |
| 1.1460517 | 43.5255 | 10.583 | 2220.9 | 9.6391 | 2230.5 | 0.00 | 1.082 |
| 1.1517819 | 43.4749 | 10.518 | 2196.3 | 9.6530 | 2205.9 | 0.00 | 1.076 |
| 1.1575408 | 43.4221 | 10.454 | 2172.0 | 9.6668 | 2181.6 | 0.00 | 1.071 |
| 1.1633285 | 43.3669 | 10.390 | 2147.9 | 9.6805 | 2157.6 | 0.00 | 1.066 |
| 1.1691452 | 43.3094 | 10.326 | 2124.2 | 9.6940 | 2133.9 | 0.00 | 1.060 |
| 1.1749909 | 43.2494 | 10.263 | 2100.8 | 9.7074 | 2110.5 | 0.00 | 1.055 |
| 1.1808659 | 43.1870 | 10.201 | 2077.6 | 9.7206 | 2087.4 | 0.00 | 1.050 |
| 1.1867702 | 43.1220 | 10.139 | 2054.8 | 9.7337 | 2064.5 | 0.00 | 1.045 |
| 1.1927040 | 43.0545 | 10.078 | 2032.2 | 9.7466 | 2041.9 | 0.00 | 1.040 |
| 1.1986676 | 42.9844 | 10.017 | 2009.9 | 9.7593 | 2019.6 | 0.00 | 1.034 |
| 1.2046609 | 42.9115 | 9.9568 | 1987.8 | 9.7720 | 1997.6 | 0.00 | 1.029 |
| 1.2106842 | 42.8359 | 9.8969 | 1966.0 | 9.7844 | 1975.8 | 0.00 | 1.024 |
| 1.2167376 | 42.7573 | 9.8375 | 1944.5 | 9.7968 | 1954.3 | 0.00 | 1.019 |
| 1.2228213 | 42.6759 | 9.7786 | 1923.3 | 9.8089 | 1933.1 | 0.00 | 1.014 |
| 1.2289354 | 42.5914 | 9.7202 | 1902.3 | 9.8210 | 1912.1 | 0.00 | 1.009 |
| 1.2350801 | 42.5047 | 9.6622 | 1881.5 | 9.8328 | 1891.3 | 0.00 | 1.004 |
| 1.2412555 | 42.4138 | 9.6047 | 1861.0 | 9.8446 | 1870.8 | 0.00 | 0.9989 |
| 1.2474618 | 42.3196 | 9.5477 | 1840.7 | 9.8561 | 1850.6 | 0.00 | 0.9939 |
| 1.2536991 | 42.2218 | 9.4911 | 1820.7 | 9.8676 | 1830.6 | 0.00 | 0.9889 |
| 1.2599676 | 42.1205 | 9.4349 | 1801.0 | 9.8788 | 1810.8 | 0.00 | 0.9840 |
| 1.2662674 | 42.0154 | 9.3792 | 1781.4 | 9.8899 | 1791.3 | 0.00 | 0.9791 |
| 1.2725988 | 41.9064 | 9.3240 | 1762.1 | 9.9009 | 1772.0 | 0.00 | 0.9743 |
| 1.2789618 | 41.7933 | 9.2692 | 1743.0 | 9.9117 | 1752.9 | 0.00 | 0.9694 |
| 1.2853566 | 41.6761 | 9.2148 | 1724.2 | 9.9223 | 1734.1 | 0.00 | 0.9646 |
| 1.2917833 | 41.5544 | 9.1609 | 1705.6 | 9.9328 | 1715.5 | 0.00 | 0.9598 |
| 1.2982423 | 41.4281 | 9.1073 | 1687.2 | 9.9432 | 1697.1 | 0.00 | 0.9550 |
| 1.3047335 | 41.2970 | 9.0542 | 1669.0 | 9.9533 | 1678.9 | 0.00 | 0.9503 |
| 1.3112571 | 41.1609 | 9.0015 | 1651.0 | 9.9634 | 1661.0 | 0.00 | 0.9455 |
| 1.3178134 | 41.0194 | 8.9493 | 1633.3 | 9.9732 | 1643.2 | 0.00 | 0.9408 |
| 1.3244025 | 40.8724 | 8.8974 | 1615.7 | 9.9829 | 1625.7 | 0.00 | 0.9362 |
| 1.3310245 | 40.7195 | 8.8460 | 1598.4 | 9.9925 | 1608.4 | 0.00 | 0.9315 |
| 1.3376796 | 40.5604 | 8.7949 | 1581.3 | 10.002 | 1591.3 | 0.00 | 0.9269 |
| 1.3443680 | 40.3948 | 8.7443 | 1564.3 | 10.011 | 1574.3 | 0.00 | 0.9222 |
| 1.3510899 | 40.2223 | 8.6940 | 1547.6 | 10.020 | 1557.6 | 0.00 | 0.9177 |
| 1.3578453 | 40.0424 | 8.6442 | 1531.1 | 10.029 | 1541.1 | 0.00 | 0.9131 |
| 1.3646345 | 39.8548 | 8.5947 | 1514.7 | 10.038 | 1524.8 | 0.00 | 0.9086 |
| 1.3714577 | 39.6588 | 8.5456 | 1498.6 | 10.046 | 1508.6 | 0.00 | 0.9040 |
| 1.3783150 | 39.4541 | 8.4969 | 1482.6 | 10.055 | 1492.7 | 0.00 | 0.8995 |
| 1.3852066 | 39.2398 | 8.4486 | 1466.9 | 10.063 | 1476.9 | 0.00 | 0.8951 |
| 1.3921326 | 39.0155 | 8.4006 | 1451.3 | 10.071 | 1461.4 | 0.00 | 0.8906 |
| 1.3990933 | 38.7802 | 8.3530 | 1435.9 | 10.079 | 1446.0 | 0.00 | 0.8862 |
| 1.4060887 | 38.5332 | 8.3058 | 1420.7 | 10.087 | 1430.8 | 0.00 | 0.8818 |
| 1.4131192 | 38.2736 | 8.2590 | 1405.6 | 10.095 | 1415.7 | 0.00 | 0.8774 |
| 1.4201848 | 38.0001 | 8.2125 | 1390.8 | 10.102 | 1400.9 | 0.00 | 0.8730 |
| 1.4272857 | 37.7117 | 8.1664 | 1376.1 | 10.109 | 1386.2 | 0.00 | 0.8687 |
| 1.4344221 | 37.4070 | 8.1206 | 1361.6 | 10.117 | 1371.7 | 0.00 | 0.8643 |
| 1.4415942 | 37.0843 | 8.0741 | 1347.0 | 10.124 | 1357.2 | 0.00 | 0.8600 |
| 1.4488022 | 36.7416 | 8.0274 | 1332.6 | 10.130 | 1342.7 | 0.00 | 0.8558 |
| 1.4560462 | 36.3770 | 7.9810 | 1318.3 | 10.137 | 1328.4 | 0.00 | 0.8515 |
| 1.4633265 | 35.9879 | 7.9350 | 1304.2 | 10.144 | 1314.3 | 0.00 | 0.8473 |
| 1.4706431 | 35.5713 | 7.8893 | 1290.2 | 10.150 | 1300.3 | 0.00 | 0.8431 |
| 1.4779963 | 35.1237 | 7.8440 | 1276.4 | 10.156 | 1286.6 | 0.00 | 0.8389 |
| 1.4853863 | 34.6410 | 7.7991 | 1262.8 | 10.162 | 1272.9 | 0.00 | 0.8347 |
| 1.4928132 | 34.1180 | 7.7545 | 1249.3 | 10.168 | 1259.5 | 0.00 | 0.8305 |
| 1.5002773 | 33.5481 | 7.7102 | 1236.0 | 10.174 | 1246.2 | 0.00 | 0.8264 |
| 1.5077787 | 32.9234 | 7.6663 | 1222.8 | 10.179 | 1233.0 | 0.00 | 0.8223 |
| 1.5153176 | 32.2334 | 7.6227 | 1209.8 | 10.185 | 1220.0 | 0.00 | 0.8182 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Lu ($Z=71$) | | | | | | | |
| 1.5228942 | 31.4659 | 7.5794 | 1197.0 | 10.190 | 1207.2 | 0.00 | 0.8141 |
| 1.5305086 | 30.5989 | 7.5365 | 1184.3 | 10.195 | 1194.5 | 0.00 | 0.8101 |
| 1.5381612 | 29.6074 | 7.4939 | 1171.7 | 10.200 | 1181.9 | 0.00 | 0.8061 |
| 1.5458520 | 28.4518 | 7.4516 | 1159.3 | 10.204 | 1169.5 | 0.00 | 0.8020 |
| 1.5535812 | 27.0693 | 7.4096 | 1147.1 | 10.209 | 1157.3 | 0.00 | 0.7981 |
| 1.5613491 | 25.3499 | 7.3680 | 1134.9 | 10.213 | 1145.2 | 0.00 | 0.7941 |
| 1.5691559 | 23.0725 | 7.3267 | 1123.0 | 10.217 | 1133.2 | 0.00 | 0.7901 |
| 1.5770017 | 19.6632 | 7.2857 | 1111.1 | 10.222 | 1121.3 | 0.00 | 0.7862 |
| 1.5848867 | 12.3501 | 7.2450 | 1099.4 | 10.225 | 1109.6 | 0.00 | 0.7823 |
| 1.5882395 | -3.75676 | 7.2278 | 1094.5 | 10.227 | 1104.7 | 0.00 | 0.7806 |
| 1.5887605 | -4.09227 | 26.332 | 3986.0 | 10.227 | 3996.3 | 0.00 | 0.7804 |
| 1.5928111 | 12.8184 | 26.231 | 3960.7 | 10.229 | 3970.9 | 0.00 | 0.7784 |
| 1.6007752 | 18.7021 | 26.034 | 3911.5 | 10.233 | 3921.7 | 0.00 | 0.7745 |
| 1.6087790 | 21.0642 | 25.840 | 3862.9 | 10.236 | 3873.1 | 0.00 | 0.7707 |
| 1.6168229 | 22.1012 | 25.646 | 3814.9 | 10.239 | 3825.2 | 0.00 | 0.7668 |
| 1.6249070 | 22.0761 | 25.455 | 3767.6 | 10.242 | 3777.8 | 0.00 | 0.7630 |
| 1.6330316 | 20.2447 | 25.265 | 3720.8 | 10.245 | 3731.1 | 0.00 | 0.7592 |
| 1.6388836 | 11.1683 | 25.129 | 3687.7 | 10.247 | 3697.9 | 0.00 | 0.7565 |
| 1.6399164 | 11.1210 | 37.610 | 5515.7 | 10.247 | 5525.9 | 0.00 | 0.7560 |
| 1.6411967 | 16.2781 | 37.565 | 5504.8 | 10.248 | 5515.1 | 0.00 | 0.7555 |
| 1.6494027 | 24.2105 | 37.278 | 5435.7 | 10.250 | 5445.9 | 0.00 | 0.7517 |
| 1.6576497 | 27.5530 | 36.994 | 5367.4 | 10.253 | 5377.7 | 0.00 | 0.7480 |
| 1.6659380 | 29.8847 | 36.712 | 5300.0 | 10.255 | 5310.3 | 0.00 | 0.7442 |
| 1.6742677 | 31.7276 | 36.433 | 5233.5 | 10.257 | 5243.7 | 0.00 | 0.7405 |
| 1.6826390 | 33.2704 | 36.155 | 5167.8 | 10.259 | 5178.1 | 0.00 | 0.7368 |
| 1.6910522 | 34.6057 | 35.880 | 5103.0 | 10.261 | 5113.2 | 0.00 | 0.7332 |
| 1.6995075 | 35.7863 | 35.607 | 5038.9 | 10.262 | 5049.2 | 0.00 | 0.7295 |
| 1.7080050 | 36.8459 | 35.337 | 4975.7 | 10.264 | 4986.0 | 0.00 | 0.7259 |
| 1.7165450 | 37.8077 | 35.068 | 4913.3 | 10.265 | 4923.6 | 0.00 | 0.7223 |
| 1.7251278 | 38.6880 | 34.801 | 4851.8 | 10.266 | 4862.0 | 0.00 | 0.7187 |
| 1.7337534 | 39.4991 | 34.537 | 4790.9 | 10.267 | 4801.2 | 0.00 | 0.7151 |
| 1.7424222 | 40.2505 | 34.275 | 4730.9 | 10.268 | 4741.2 | 0.00 | 0.7116 |
| 1.7511343 | 40.9496 | 34.015 | 4671.6 | 10.268 | 4681.9 | 0.00 | 0.7080 |
| 1.7598899 | 41.6024 | 33.757 | 4613.1 | 10.269 | 4623.4 | 0.00 | 0.7045 |
| 1.7686894 | 42.2135 | 33.500 | 4555.4 | 10.269 | 4565.6 | 0.00 | 0.7010 |
| 1.7775328 | 42.7872 | 33.246 | 4498.3 | 10.269 | 4508.6 | 0.00 | 0.6975 |
| 1.7864205 | 43.3266 | 32.994 | 4442.0 | 10.269 | 4452.3 | 0.00 | 0.6940 |
| 1.7953526 | 43.8346 | 32.744 | 4386.4 | 10.269 | 4396.7 | 0.00 | 0.6906 |
| 1.8043294 | 44.3134 | 32.496 | 4331.5 | 10.268 | 4341.8 | 0.00 | 0.6871 |
| 1.8133510 | 44.7651 | 32.250 | 4277.4 | 10.268 | 4287.6 | 0.00 | 0.6837 |
| 1.8224178 | 45.1914 | 32.006 | 4223.9 | 10.267 | 4234.1 | 0.00 | 0.6803 |
| 1.8315299 | 45.5935 | 31.764 | 4171.1 | 10.266 | 4181.3 | 0.00 | 0.6769 |
| 1.8406875 | 45.9728 | 31.524 | 4118.9 | 10.265 | 4129.2 | 0.00 | 0.6736 |
| 1.8498909 | 46.3300 | 31.286 | 4067.4 | 10.264 | 4077.7 | 0.00 | 0.6702 |
| 1.8591404 | 46.6660 | 31.049 | 4016.6 | 10.262 | 4026.9 | 0.00 | 0.6669 |
| 1.8684361 | 46.9813 | 30.815 | 3966.5 | 10.261 | 3976.7 | 0.00 | 0.6636 |
| 1.8777783 | 47.2760 | 30.582 | 3916.9 | 10.259 | 3927.2 | 0.00 | 0.6603 |
| 1.8871672 | 47.5504 | 30.351 | 3868.0 | 10.257 | 3878.3 | 0.00 | 0.6570 |
| 1.8966030 | 47.8043 | 30.122 | 3819.7 | 10.255 | 3830.0 | 0.00 | 0.6537 |
| 1.9060860 | 48.0371 | 29.895 | 3772.1 | 10.253 | 3782.3 | 0.00 | 0.6505 |
| 1.9156165 | 48.2481 | 29.670 | 3725.0 | 10.251 | 3735.2 | 0.00 | 0.6472 |
| 1.9251945 | 48.4357 | 29.446 | 3678.5 | 10.248 | 3688.8 | 0.00 | 0.6440 |
| 1.9348205 | 48.5981 | 29.224 | 3632.6 | 10.246 | 3642.9 | 0.00 | 0.6408 |
| 1.9444946 | 48.7323 | 29.004 | 3587.3 | 10.243 | 3597.6 | 0.00 | 0.6376 |
| 1.9542171 | 48.8337 | 28.786 | 3542.6 | 10.240 | 3552.9 | 0.00 | 0.6344 |
| 1.9639882 | 48.8955 | 28.569 | 3498.5 | 10.237 | 3508.7 | 0.00 | 0.6313 |
| 1.9738081 | 48.9070 | 28.354 | 3454.9 | 10.233 | 3465.1 | 0.00 | 0.6281 |
| 1.9836772 | 48.8495 | 28.141 | 3411.8 | 10.230 | 3422.1 | 0.00 | 0.6250 |
| 1.9935955 | 48.6876 | 27.929 | 3369.4 | 10.226 | 3379.6 | 0.00 | 0.6219 |
| 2.0035635 | 48.3410 | 27.720 | 3327.4 | 10.222 | 3337.6 | 0.00 | 0.6188 |
| 2.0135813 | 47.5503 | 27.511 | 3286.0 | 10.218 | 3296.2 | 0.00 | 0.6157 |
| 2.0213134 | 45.4969 | 27.352 | 3254.5 | 10.215 | 3264.7 | 0.00 | 0.6134 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Lu ($Z=71$) | | | | | | | |
| 2.0236492 | 39.5706 | 32.141 | 3819.8 | 10.214 | 3830.0 | 0.00 | 0.6127 |
| 2.0258868 | 45.5521 | 32.081 | 3808.5 | 10.213 | 3818.7 | 0.00 | 0.6120 |
| 2.0337675 | 48.0629 | 31.873 | 3769.1 | 10.210 | 3779.4 | 0.00 | 0.6096 |
| 2.0439363 | 49.3775 | 31.608 | 3719.2 | 10.205 | 3729.4 | 0.00 | 0.6066 |
| 2.0541560 | 50.2322 | 31.345 | 3669.9 | 10.201 | 3680.1 | 0.00 | 0.6036 |
| 2.0644268 | 50.8904 | 31.084 | 3621.3 | 10.196 | 3631.5 | 0.00 | 0.6006 |
| 2.0747489 | 51.4348 | 30.823 | 3573.0 | 10.191 | 3583.2 | 0.00 | 0.5976 |
| 2.0851227 | 51.9021 | 30.564 | 3525.4 | 10.186 | 3535.6 | 0.00 | 0.5946 |
| 2.0955483 | 52.3120 | 30.308 | 3478.4 | 10.181 | 3488.6 | 0.00 | 0.5917 |
| 2.1060260 | 52.6757 | 30.054 | 3432.1 | 10.176 | 3442.2 | 0.00 | 0.5887 |
| 2.1165562 | 52.9993 | 29.801 | 3386.3 | 10.170 | 3396.5 | 0.00 | 0.5858 |
| 2.1271389 | 53.2853 | 29.561 | 3342.3 | 10.164 | 3352.5 | 0.00 | 0.5829 |
| 2.1377746 | 53.5488 | 29.338 | 3300.6 | 10.159 | 3310.8 | 0.00 | 0.5800 |
| 2.1484635 | 53.7932 | 29.118 | 3259.5 | 10.153 | 3269.7 | 0.00 | 0.5771 |
| 2.1592058 | 54.0184 | 28.901 | 3219.1 | 10.146 | 3229.3 | 0.00 | 0.5742 |
| 2.1700018 | 54.2241 | 28.687 | 3179.4 | 10.140 | 3189.5 | 0.00 | 0.5714 |
| 2.1808519 | 54.4098 | 28.475 | 3140.3 | 10.134 | 3150.4 | 0.00 | 0.5685 |
| 2.1917561 | 54.5741 | 28.267 | 3101.8 | 10.127 | 3111.9 | 0.00 | 0.5657 |
| 2.2027149 | 54.7142 | 28.062 | 3063.9 | 10.120 | 3074.0 | 0.00 | 0.5629 |
| 2.2137285 | 54.8252 | 27.859 | 3026.6 | 10.113 | 3036.8 | 0.00 | 0.5601 |
| 2.2247971 | 54.8972 | 27.659 | 2989.9 | 10.106 | 3000.0 | 0.00 | 0.5573 |
| 2.2359211 | 54.9095 | 27.461 | 2953.8 | 10.099 | 2963.9 | 0.00 | 0.5545 |
| 2.2471007 | 54.8064 | 27.265 | 2918.2 | 10.092 | 2928.3 | 0.00 | 0.5518 |
| 2.2583362 | 54.3130 | 27.072 | 2883.1 | 10.084 | 2893.2 | 0.00 | 0.5490 |
| 2.2608064 | 53.9624 | 27.030 | 2875.5 | 10.083 | 2885.6 | 0.00 | 0.5484 |
| 2.2661935 | 54.0354 | 28.855 | 3062.3 | 10.079 | 3072.4 | 0.00 | 0.5471 |
| 2.2696279 | 54.6022 | 28.789 | 3050.7 | 10.077 | 3060.8 | 0.00 | 0.5463 |
| 2.2809760 | 55.4404 | 28.574 | 3012.8 | 10.069 | 3022.9 | 0.00 | 0.5436 |
| 2.2923809 | 55.9313 | 28.361 | 2975.5 | 10.061 | 2985.6 | 0.00 | 0.5409 |
| 2.3038428 | 56.3087 | 28.151 | 2938.7 | 10.053 | 2948.8 | 0.00 | 0.5382 |
| 2.3153620 | 56.6256 | 27.943 | 2902.5 | 10.044 | 2912.6 | 0.00 | 0.5355 |
| 2.3269388 | 56.9029 | 27.737 | 2866.8 | 10.036 | 2876.8 | 0.00 | 0.5328 |
| 2.3385735 | 57.1509 | 27.533 | 2831.6 | 10.027 | 2841.6 | 0.00 | 0.5302 |
| 2.3502664 | 57.3751 | 27.332 | 2796.9 | 10.019 | 2806.9 | 0.00 | 0.5275 |
| 2.3620177 | 57.5785 | 27.133 | 2762.7 | 10.010 | 2772.7 | 0.00 | 0.5249 |
| 2.3738278 | 57.7621 | 26.935 | 2728.9 | 10.001 | 2738.9 | 0.00 | 0.5223 |
| 2.3856970 | 57.9287 | 26.752 | 2696.9 | 9.9918 | 2706.9 | 0.00 | 0.5197 |
| 2.3976254 | 58.0841 | 26.572 | 2665.4 | 9.9825 | 2675.4 | 0.00 | 0.5171 |
| 2.4096136 | 58.2269 | 26.395 | 2634.5 | 9.9731 | 2644.4 | 0.00 | 0.5145 |
| 2.4216616 | 58.3553 | 26.220 | 2604.0 | 9.9635 | 2613.9 | 0.00 | 0.5120 |
| 2.4337699 | 58.4665 | 26.047 | 2573.9 | 9.9538 | 2583.9 | 0.00 | 0.5094 |
| 2.4459388 | 58.5554 | 25.876 | 2544.3 | 9.9440 | 2554.3 | 0.00 | 0.5069 |
| 2.4581685 | 58.6112 | 25.707 | 2515.2 | 9.9340 | 2525.1 | 0.00 | 0.5044 |
| 2.4704593 | 58.6071 | 25.541 | 2486.4 | 9.9239 | 2496.4 | 0.00 | 0.5019 |
| 2.4828116 | 58.4361 | 25.376 | 2458.1 | 9.9136 | 2468.0 | 0.00 | 0.4994 |
| 2.4861428 | 58.2920 | 25.332 | 2450.5 | 9.9108 | 2460.4 | 0.00 | 0.4987 |
| 2.4952257 | 58.3177 | 26.380 | 2542.7 | 9.9032 | 2552.6 | 0.00 | 0.4969 |
| 2.4962571 | 58.4160 | 26.366 | 2540.3 | 9.9023 | 2550.2 | 0.00 | 0.4967 |
| 2.5077018 | 59.0018 | 26.214 | 2514.1 | 9.8927 | 2523.9 | 0.00 | 0.4944 |
| 2.5202403 | 59.3665 | 26.049 | 2485.8 | 9.8820 | 2495.7 | 0.00 | 0.4920 |
| 2.5328415 | 59.6510 | 25.885 | 2457.9 | 9.8711 | 2467.8 | 0.00 | 0.4895 |
| 2.5455057 | 59.8968 | 25.724 | 2430.4 | 9.8602 | 2440.3 | 0.00 | 0.4871 |
| 2.5582333 | 60.1188 | 25.563 | 2403.2 | 9.8491 | 2413.1 | 0.00 | 0.4846 |
| 2.5710244 | 60.3246 | 25.404 | 2376.4 | 9.8379 | 2386.2 | 0.00 | 0.4822 |
| 2.5838796 | 60.5180 | 25.246 | 2349.9 | 9.8265 | 2359.7 | 0.00 | 0.4798 |
| 2.5967990 | 60.7018 | 25.089 | 2323.7 | 9.8150 | 2333.5 | 0.00 | 0.4775 |
| 2.6097829 | 60.8776 | 24.934 | 2297.8 | 9.8034 | 2307.6 | 0.00 | 0.4751 |
| 2.6228319 | 61.0466 | 24.781 | 2272.3 | 9.7916 | 2282.1 | 0.00 | 0.4727 |
| 2.6359460 | 61.2107 | 24.627 | 2247.0 | 9.7797 | 2256.8 | 0.00 | 0.4704 |
| 2.6491257 | 61.3691 | 24.472 | 2221.7 | 9.7677 | 2231.5 | 0.00 | 0.4680 |
| 2.6623714 | 61.5223 | 24.318 | 2196.8 | 9.7555 | 2206.5 | 0.00 | 0.4657 |
| 2.6756832 | 61.6710 | 24.166 | 2172.1 | 9.7432 | 2181.9 | 0.00 | 0.4634 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Lu ($Z=71$) | | | | | | | |
| 2.6890617 | 61.8155 | 24.014 | 2147.8 | 9.7308 | 2157.5 | 0.00 | 0.4611 |
| 2.7025070 | 61.9562 | 23.863 | 2123.7 | 9.7182 | 2133.4 | 0.00 | 0.4588 |
| 2.7160195 | 62.0933 | 23.714 | 2099.9 | 9.7055 | 2109.6 | 0.00 | 0.4565 |
| 2.7295996 | 62.2273 | 23.565 | 2076.3 | 9.6927 | 2086.0 | 0.00 | 0.4542 |
| 2.7432476 | 62.3581 | 23.418 | 2053.1 | 9.6798 | 2062.7 | 0.00 | 0.4520 |
| 2.7569638 | 62.4862 | 23.271 | 2030.1 | 9.6667 | 2039.7 | 0.00 | 0.4497 |
| 2.7707486 | 62.6115 | 23.125 | 2007.3 | 9.6535 | 2017.0 | 0.00 | 0.4475 |
| 2.7846024 | 62.7344 | 22.981 | 1984.8 | 9.6402 | 1994.5 | 0.00 | 0.4452 |
| 2.7985254 | 62.8549 | 22.837 | 1962.6 | 9.6268 | 1972.2 | 0.00 | 0.4430 |
| 2.8125180 | 62.9732 | 22.694 | 1940.6 | 9.6132 | 1950.2 | 0.00 | 0.4408 |
| 2.8265806 | 63.0894 | 22.552 | 1918.9 | 9.5995 | 1928.5 | 0.00 | 0.4386 |
| 2.8407135 | 63.2036 | 22.410 | 1897.3 | 9.5857 | 1906.9 | 0.00 | 0.4365 |
| 2.8549171 | 63.3160 | 22.270 | 1876.1 | 9.5718 | 1885.6 | 0.00 | 0.4343 |
| 2.8691917 | 63.4266 | 22.130 | 1855.0 | 9.5577 | 1864.6 | 0.00 | 0.4321 |
| 2.8835376 | 63.5356 | 21.991 | 1834.2 | 9.5435 | 1843.7 | 0.00 | 0.4300 |
| 2.8979553 | 63.6432 | 21.853 | 1813.6 | 9.5292 | 1823.1 | 0.00 | 0.4278 |
| 2.9124451 | 63.7495 | 21.716 | 1793.2 | 9.5148 | 1802.8 | 0.00 | 0.4257 |
| 2.9270073 | 63.8548 | 21.579 | 1773.1 | 9.5003 | 1782.6 | 0.00 | 0.4236 |
| 2.9416424 | 63.9593 | 21.443 | 1753.2 | 9.4856 | 1762.6 | 0.00 | 0.4215 |
| 2.9563506 | 64.0632 | 21.307 | 1733.3 | 9.4709 | 1742.8 | 0.00 | 0.4194 |
| 2.9711323 | 64.1671 | 21.171 | 1713.8 | 9.4560 | 1723.2 | 0.00 | 0.4173 |
| 2.9859880 | 64.2727 | 21.037 | 1694.4 | 9.4410 | 1703.8 | 0.00 | 0.4152 |
| 3.0009179 | 64.3872 | 20.902 | 1675.2 | 9.4259 | 1684.6 | 0.00 | 0.4132 |
| 3.0159225 | 64.4921 | 20.751 | 1654.8 | 9.4106 | 1664.2 | 0.00 | 0.4111 |
| 3.0310021 | 64.5929 | 20.602 | 1634.7 | 9.3953 | 1644.1 | 0.00 | 0.4091 |
| 3.0461571 | 64.6902 | 20.453 | 1614.8 | 9.3798 | 1624.2 | 0.00 | 0.4070 |
| 3.0613879 | 64.7842 | 20.306 | 1595.2 | 9.3643 | 1604.6 | 0.00 | 0.4050 |
| 3.0766949 | 64.8752 | 20.159 | 1575.9 | 9.3486 | 1585.2 | 0.00 | 0.4030 |
| 3.0920783 | 64.9635 | 20.014 | 1556.7 | 9.3328 | 1566.1 | 0.00 | 0.4010 |
| 3.1075387 | 65.0491 | 19.870 | 1537.8 | 9.3169 | 1547.1 | 0.00 | 0.3990 |
| 3.1230764 | 65.1324 | 19.727 | 1519.2 | 9.3009 | 1528.5 | 0.00 | 0.3970 |
| 3.1386918 | 65.2134 | 19.585 | 1500.7 | 9.2848 | 1510.0 | 0.00 | 0.3950 |
| 3.1543853 | 65.2924 | 19.444 | 1482.5 | 9.2686 | 1491.8 | 0.00 | 0.3931 |
| 3.1701572 | 65.3695 | 19.304 | 1464.5 | 9.2522 | 1473.8 | 0.00 | 0.3911 |
| 3.1860080 | 65.6549 | 19.161 | 1446.4 | 9.2358 | 1455.7 | 0.00 | 0.3892 |
| 3.2019380 | 65.7286 | 19.016 | 1428.4 | 9.2193 | 1437.6 | 0.00 | 0.3872 |
| 3.2179477 | 65.7998 | 18.873 | 1410.5 | 9.2026 | 1419.7 | 0.00 | 0.3853 |
| 3.2340374 | 65.8688 | 18.730 | 1392.9 | 9.1859 | 1402.1 | 0.00 | 0.3834 |
| 3.2502076 | 65.9355 | 18.589 | 1375.5 | 9.1690 | 1384.7 | 0.00 | 0.3815 |
| 3.2664587 | 66.0001 | 18.448 | 1358.3 | 9.1521 | 1367.5 | 0.00 | 0.3796 |
| 3.2827910 | 66.2105 | 18.308 | 1341.3 | 9.1350 | 1350.4 | 0.00 | 0.3777 |
| 3.2992049 | 66.2710 | 18.165 | 1324.2 | 9.1179 | 1333.3 | 0.00 | 0.3758 |
| 3.3157009 | 66.3292 | 18.023 | 1307.3 | 9.1006 | 1316.4 | 0.00 | 0.3739 |
| 3.3322794 | 66.3852 | 17.883 | 1290.7 | 9.0833 | 1299.8 | 0.00 | 0.3721 |
| 3.3489408 | 66.4391 | 17.744 | 1274.3 | 9.0658 | 1283.3 | 0.00 | 0.3702 |
| 3.3656856 | 66.4910 | 17.606 | 1258.1 | 9.0483 | 1267.1 | 0.00 | 0.3684 |
| 3.3825140 | 66.5410 | 17.470 | 1242.1 | 9.0307 | 1251.2 | 0.00 | 0.3665 |
| 3.3994265 | 66.5892 | 17.335 | 1226.4 | 9.0129 | 1235.4 | 0.00 | 0.3647 |
| 3.4164237 | 66.6357 | 17.201 | 1210.9 | 8.9951 | 1219.9 | 0.00 | 0.3629 |
| 3.4335058 | 66.6806 | 17.068 | 1195.5 | 8.9772 | 1204.5 | 0.00 | 0.3611 |
| 3.4506733 | 66.7239 | 16.936 | 1180.4 | 8.9592 | 1189.4 | 0.00 | 0.3593 |
| 3.4679267 | 66.7658 | 16.806 | 1165.5 | 8.9410 | 1174.5 | 0.00 | 0.3575 |
| 3.4852663 | 66.8062 | 16.677 | 1150.8 | 8.9228 | 1159.7 | 0.00 | 0.3557 |
| 3.5026927 | 66.8452 | 16.549 | 1136.3 | 8.9046 | 1145.2 | 0.00 | 0.3540 |
| 3.5202061 | 66.8829 | 16.422 | 1122.0 | 8.8862 | 1130.9 | 0.00 | 0.3522 |
| 3.5378072 | 66.9193 | 16.296 | 1107.9 | 8.8677 | 1116.7 | 0.00 | 0.3505 |
| 3.5554962 | 66.9545 | 16.172 | 1093.9 | 8.8492 | 1102.8 | 0.00 | 0.3487 |
| 3.5732737 | 66.9885 | 16.049 | 1080.2 | 8.8305 | 1089.0 | 0.00 | 0.3470 |
| 3.5911400 | 67.0214 | 15.926 | 1066.6 | 8.8118 | 1075.4 | 0.00 | 0.3453 |
| 3.6090957 | 67.0532 | 15.805 | 1053.2 | 8.7930 | 1062.0 | 0.00 | 0.3435 |
| 3.6271412 | 67.0839 | 15.685 | 1040.0 | 8.7741 | 1048.8 | 0.00 | 0.3418 |
| 3.6452769 | 67.1136 | 15.566 | 1027.0 | 8.7551 | 1035.8 | 0.00 | 0.3401 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Lu ($Z=71$) | | | | | | | |
| 3.6635033 | 67.1423 | 15.448 | 1014.2 | 8.7360 | 1022.9 | 0.00 | 0.3384 |
| 3.6818208 | 67.1700 | 15.330 | 1001.4 | 8.7169 | 1010.1 | 0.00 | 0.3367 |
| 3.7002299 | 67.1968 | 15.213 | 988.80 | 8.6976 | 997.50 | 0.00 | 0.3351 |
| 3.7187311 | 67.2226 | 15.097 | 976.38 | 8.6783 | 985.06 | 0.00 | 0.3334 |
| 3.7373247 | 67.2475 | 14.982 | 964.13 | 8.6589 | 972.79 | 0.00 | 0.3317 |
| 3.7560114 | 67.2716 | 14.868 | 952.04 | 8.6395 | 960.68 | 0.00 | 0.3301 |
| 3.7747914 | 67.2948 | 14.755 | 940.12 | 8.6199 | 948.74 | 0.00 | 0.3285 |
| 3.7936654 | 67.3171 | 14.644 | 928.35 | 8.6003 | 936.95 | 0.00 | 0.3268 |
| 3.8126337 | 67.3387 | 14.533 | 916.75 | 8.5806 | 925.33 | 0.00 | 0.3252 |
| 3.8316969 | 67.3595 | 14.423 | 905.30 | 8.5608 | 913.86 | 0.00 | 0.3236 |
| 3.8508554 | 67.3796 | 14.314 | 893.98 | 8.5410 | 902.53 | 0.00 | 0.3220 |
| 3.8701096 | 67.3989 | 14.206 | 882.79 | 8.5210 | 891.31 | 0.00 | 0.3204 |
| 3.8894602 | 67.4176 | 14.098 | 871.74 | 8.5010 | 880.24 | 0.00 | 0.3188 |
| 3.9089075 | 67.4355 | 13.991 | 860.84 | 8.4810 | 869.33 | 0.00 | 0.3172 |
| 3.9284520 | 67.4528 | 13.886 | 850.09 | 8.4608 | 858.55 | 0.00 | 0.3156 |
| 3.9480943 | 67.4695 | 13.781 | 839.49 | 8.4406 | 847.93 | 0.00 | 0.3140 |
| 3.9678347 | 67.4855 | 13.677 | 829.02 | 8.4203 | 837.44 | 0.00 | 0.3125 |
| 3.9876739 | 67.5010 | 13.574 | 818.70 | 8.4000 | 827.10 | 0.00 | 0.3109 |
| Hf ($Z=72$) | | | | | | | |
| Atomic weight: $A_r=178.4900 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=13.290$ | | | | | | | |
| $\sigma_a (\text{barns/atom})=[\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 296.390$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1})=f_2(e \text{ atom}^{-1}) \times 2.35757 \times 10^5$ | | | | | | | |
| 20 edges. Edge energies (keV) | | | | | | | |
| K | 65.3508 | L I | 11.2707 | L II | 10.7394 | L III | 9.56070 |
| M I | 2.60090 | M II | 2.36540 | M III | 2.10760 | M IV | 1.71640 |
| M V | 1.66170 | N I | 0.538100 | N II | 0.437000 | N III | 0.380400 |
| N IV | 0.223800 | N V | 0.213700 | N VI | 0.0171000 | N VII | 0.0171000 |
| O I | 0.0649000 | O II | 0.0381000 | O III | 0.0306000 | O IV | 0.00500000 |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-1.3514, -0.80280) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.015933 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 14.0652 | 9.9402 | 23435 | 0.48906 | 23435 | 0.00 | 12.40 |
| 0.10050000 | 14.0864 | 9.9998 | 23458 | 0.49459 | 23459 | 0.00 | 12.34 |
| 0.10100250 | 14.1083 | 10.060 | 23481 | 0.50017 | 23481 | 0.00 | 12.28 |
| 0.10150751 | 14.1307 | 10.119 | 23503 | 0.50580 | 23503 | 0.00 | 12.21 |
| 0.10201505 | 14.1537 | 10.179 | 23524 | 0.51148 | 23525 | 0.00 | 12.15 |
| 0.10252513 | 14.1773 | 10.239 | 23545 | 0.51721 | 23545 | 0.00 | 12.09 |
| 0.10303775 | 14.2014 | 10.299 | 23565 | 0.52299 | 23565 | 0.00 | 12.03 |
| 0.10355294 | 14.2260 | 10.359 | 23584 | 0.52883 | 23585 | 0.00 | 11.97 |
| 0.10407070 | 14.2512 | 10.419 | 23603 | 0.53472 | 23603 | 0.00 | 11.91 |
| 0.10459106 | 14.2770 | 10.479 | 23621 | 0.54066 | 23621 | 0.00 | 11.85 |
| 0.10511401 | 14.3033 | 10.539 | 23638 | 0.54666 | 23639 | 0.00 | 11.80 |
| 0.10563958 | 14.3301 | 10.599 | 23654 | 0.55271 | 23655 | 0.00 | 11.74 |
| 0.10616778 | 14.3575 | 10.659 | 23670 | 0.55881 | 23671 | 0.00 | 11.68 |
| 0.10669862 | 14.3854 | 10.719 | 23685 | 0.56497 | 23686 | 0.00 | 11.62 |
| 0.10723211 | 14.4139 | 10.779 | 23699 | 0.57119 | 23700 | 0.00 | 11.56 |
| 0.10776827 | 14.4429 | 10.840 | 23713 | 0.57745 | 23713 | 0.00 | 11.50 |
| 0.10830712 | 14.4724 | 10.900 | 23726 | 0.58378 | 23726 | 0.00 | 11.45 |
| 0.10884865 | 14.5025 | 10.960 | 23738 | 0.59016 | 23738 | 0.00 | 11.39 |
| 0.10939289 | 14.5330 | 11.020 | 23749 | 0.59660 | 23749 | 0.00 | 11.33 |
| 0.10993986 | 14.5641 | 11.080 | 23759 | 0.60309 | 23760 | 0.00 | 11.28 |
| 0.11048956 | 14.5958 | 11.139 | 23769 | 0.60964 | 23770 | 0.00 | 11.22 |
| 0.11104201 | 14.6279 | 11.199 | 23778 | 0.61624 | 23778 | 0.00 | 11.17 |
| 0.11159722 | 14.6605 | 11.259 | 23786 | 0.62291 | 23786 | 0.00 | 11.11 |
| 0.11215520 | 14.6936 | 11.319 | 23793 | 0.62963 | 23794 | 0.00 | 11.05 |
| 0.11271598 | 14.7273 | 11.379 | 23800 | 0.63641 | 23800 | 0.00 | 11.00 |
| 0.11327956 | 14.7614 | 11.438 | 23805 | 0.64325 | 23806 | 0.00 | 10.94 |
| 0.11384596 | 14.7960 | 11.498 | 23810 | 0.65015 | 23811 | 0.00 | 10.89 |
| 0.11441519 | 14.8312 | 11.557 | 23814 | 0.65710 | 23815 | 0.00 | 10.84 |
| 0.11498726 | 14.8668 | 11.617 | 23818 | 0.66412 | 23818 | 0.00 | 10.78 |
| 0.11556220 | 14.9029 | 11.676 | 23820 | 0.67119 | 23821 | 0.00 | 10.73 |
| 0.11614001 | 14.9394 | 11.735 | 23822 | 0.67833 | 23823 | 0.00 | 10.68 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 0.11672071 | 14.9765 | 11.794 | 23823 | 0.68552 | 23823 | 0.00 | 10.62 |
| 0.11730431 | 15.0140 | 11.853 | 23823 | 0.69278 | 23824 | 0.00 | 10.57 |
| 0.11789083 | 15.0520 | 11.912 | 23822 | 0.70010 | 23823 | 0.00 | 10.52 |
| 0.11848029 | 15.0904 | 11.971 | 23821 | 0.70747 | 23821 | 0.00 | 10.46 |
| 0.11907269 | 15.1293 | 12.030 | 23818 | 0.71491 | 23819 | 0.00 | 10.41 |
| 0.11966805 | 15.1687 | 12.088 | 23815 | 0.72242 | 23816 | 0.00 | 10.36 |
| 0.12026639 | 15.2085 | 12.147 | 23811 | 0.72998 | 23812 | 0.00 | 10.31 |
| 0.12086772 | 15.2488 | 12.205 | 23807 | 0.73761 | 23807 | 0.00 | 10.26 |
| 0.12147206 | 15.2895 | 12.263 | 23801 | 0.74530 | 23802 | 0.00 | 10.21 |
| 0.12207942 | 15.3306 | 12.321 | 23795 | 0.75305 | 23795 | 0.00 | 10.16 |
| 0.12268982 | 15.3722 | 12.379 | 23788 | 0.76087 | 23788 | 0.00 | 10.11 |
| 0.12330327 | 15.4142 | 12.437 | 23780 | 0.76875 | 23780 | 0.00 | 10.06 |
| 0.12391979 | 15.4566 | 12.495 | 23771 | 0.77669 | 23772 | 0.00 | 10.01 |
| 0.12453939 | 15.4994 | 12.552 | 23762 | 0.78470 | 23762 | 0.00 | 9.955 |
| 0.12516208 | 15.5427 | 12.609 | 23751 | 0.79277 | 23752 | 0.00 | 9.906 |
| 0.12578789 | 15.5863 | 12.667 | 23740 | 0.80091 | 23741 | 0.00 | 9.857 |
| 0.12641683 | 15.6304 | 12.724 | 23728 | 0.80911 | 23729 | 0.00 | 9.808 |
| 0.12704892 | 15.6748 | 12.780 | 23716 | 0.81738 | 23717 | 0.00 | 9.759 |
| 0.12768416 | 15.7197 | 12.837 | 23702 | 0.82572 | 23703 | 0.00 | 9.710 |
| 0.12832258 | 15.7649 | 12.894 | 23688 | 0.83412 | 23689 | 0.00 | 9.662 |
| 0.12896419 | 15.8106 | 12.950 | 23673 | 0.84259 | 23674 | 0.00 | 9.614 |
| 0.12960902 | 15.8566 | 13.006 | 23658 | 0.85113 | 23659 | 0.00 | 9.566 |
| 0.13025706 | 15.9030 | 13.062 | 23641 | 0.85973 | 23642 | 0.00 | 9.518 |
| 0.13090835 | 15.9497 | 13.118 | 23624 | 0.86840 | 23625 | 0.00 | 9.471 |
| 0.13156289 | 15.9968 | 13.173 | 23606 | 0.87714 | 23607 | 0.00 | 9.424 |
| 0.13222070 | 16.0443 | 13.229 | 23587 | 0.88594 | 23588 | 0.00 | 9.377 |
| 0.13288181 | 16.0921 | 13.284 | 23568 | 0.89482 | 23569 | 0.00 | 9.330 |
| 0.13354621 | 16.1403 | 13.339 | 23548 | 0.90376 | 23549 | 0.00 | 9.284 |
| 0.13421395 | 16.1888 | 13.394 | 23527 | 0.91277 | 23528 | 0.00 | 9.238 |
| 0.13488502 | 16.2377 | 13.448 | 23505 | 0.92186 | 23506 | 0.00 | 9.192 |
| 0.13555944 | 16.2869 | 13.503 | 23483 | 0.93101 | 23484 | 0.00 | 9.146 |
| 0.13623724 | 16.3364 | 13.557 | 23460 | 0.94023 | 23461 | 0.00 | 9.101 |
| 0.13691842 | 16.3862 | 13.611 | 23436 | 0.94952 | 23437 | 0.00 | 9.055 |
| 0.13760302 | 16.4364 | 13.665 | 23412 | 0.95888 | 23413 | 0.00 | 9.010 |
| 0.13829103 | 16.4868 | 13.718 | 23387 | 0.96832 | 23388 | 0.00 | 8.965 |
| 0.13898249 | 16.5376 | 13.772 | 23361 | 0.97782 | 23362 | 0.00 | 8.921 |
| 0.13967740 | 16.5886 | 13.825 | 23334 | 0.98739 | 23335 | 0.00 | 8.876 |
| 0.14037579 | 16.6400 | 13.878 | 23307 | 0.99704 | 23308 | 0.00 | 8.832 |
| 0.14107766 | 16.6916 | 13.930 | 23279 | 1.0068 | 23280 | 0.00 | 8.788 |
| 0.14178305 | 16.7435 | 13.983 | 23251 | 1.0166 | 23252 | 0.00 | 8.745 |
| 0.14249197 | 16.7957 | 14.035 | 23222 | 1.0264 | 23223 | 0.00 | 8.701 |
| 0.14320443 | 16.8482 | 14.087 | 23192 | 1.0364 | 23193 | 0.00 | 8.658 |
| 0.14392045 | 16.9009 | 14.139 | 23161 | 1.0464 | 23162 | 0.00 | 8.615 |
| 0.14464005 | 16.9538 | 14.191 | 23130 | 1.0564 | 23131 | 0.00 | 8.572 |
| 0.14536325 | 17.0070 | 14.242 | 23098 | 1.0666 | 23099 | 0.00 | 8.529 |
| 0.14609007 | 17.0605 | 14.293 | 23066 | 1.0768 | 23067 | 0.00 | 8.487 |
| 0.14682052 | 17.1142 | 14.344 | 23033 | 1.0871 | 23034 | 0.00 | 8.445 |
| 0.14755462 | 17.1681 | 14.395 | 22999 | 1.0975 | 23000 | 0.00 | 8.403 |
| 0.14829239 | 17.2222 | 14.445 | 22965 | 1.1080 | 22966 | 0.00 | 8.361 |
| 0.14903386 | 17.2765 | 14.495 | 22930 | 1.1185 | 22931 | 0.00 | 8.319 |
| 0.14977903 | 17.3311 | 14.545 | 22895 | 1.1291 | 22896 | 0.00 | 8.278 |
| 0.15052792 | 17.3858 | 14.595 | 22859 | 1.1398 | 22860 | 0.00 | 8.237 |
| 0.15128056 | 17.4407 | 14.644 | 22822 | 1.1505 | 22823 | 0.00 | 8.196 |
| 0.15203696 | 17.4958 | 14.694 | 22785 | 1.1614 | 22786 | 0.00 | 8.155 |
| 0.15279715 | 17.5511 | 14.743 | 22747 | 1.1723 | 22748 | 0.00 | 8.114 |
| 0.15356113 | 17.6066 | 14.791 | 22709 | 1.1833 | 22710 | 0.00 | 8.074 |
| 0.15432894 | 17.6622 | 14.840 | 22670 | 1.1943 | 22671 | 0.00 | 8.034 |
| 0.15510058 | 17.7179 | 14.888 | 22631 | 1.2054 | 22632 | 0.00 | 7.994 |
| 0.15587609 | 17.7738 | 14.936 | 22591 | 1.2167 | 22592 | 0.00 | 7.954 |
| 0.15665547 | 17.8298 | 14.984 | 22550 | 1.2280 | 22551 | 0.00 | 7.914 |
| 0.15743875 | 17.8859 | 15.032 | 22509 | 1.2393 | 22511 | 0.00 | 7.875 |
| 0.15822594 | 17.9422 | 15.079 | 22468 | 1.2508 | 22469 | 0.00 | 7.836 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 0.15901707 | 17.9985 | 15.126 | 22426 | 1.2623 | 22427 | 0.00 | 7.797 |
| 0.15981215 | 18.0550 | 15.173 | 22383 | 1.2739 | 22385 | 0.00 | 7.758 |
| 0.16061121 | 18.1115 | 15.220 | 22340 | 1.2856 | 22342 | 0.00 | 7.720 |
| 0.16141427 | 18.1681 | 15.266 | 22297 | 1.2973 | 22298 | 0.00 | 7.681 |
| 0.16222134 | 18.2247 | 15.312 | 22253 | 1.3092 | 22254 | 0.00 | 7.643 |
| 0.16303245 | 18.2814 | 15.358 | 22209 | 1.3211 | 22210 | 0.00 | 7.605 |
| 0.16384761 | 18.3382 | 15.404 | 22164 | 1.3331 | 22165 | 0.00 | 7.567 |
| 0.16466685 | 18.3949 | 15.449 | 22119 | 1.3452 | 22120 | 0.00 | 7.529 |
| 0.16549018 | 18.4517 | 15.494 | 22073 | 1.3573 | 22074 | 0.00 | 7.492 |
| 0.16631763 | 18.5085 | 15.539 | 22027 | 1.3696 | 22028 | 0.00 | 7.455 |
| 0.16714922 | 18.5652 | 15.584 | 21980 | 1.3819 | 21981 | 0.00 | 7.418 |
| 0.16798497 | 18.6219 | 15.628 | 21933 | 1.3943 | 21934 | 0.00 | 7.381 |
| 0.16882489 | 18.6786 | 15.672 | 21886 | 1.4068 | 21887 | 0.00 | 7.344 |
| 0.16966902 | 18.7352 | 15.716 | 21838 | 1.4193 | 21839 | 0.00 | 7.307 |
| 0.17051736 | 18.7917 | 15.760 | 21790 | 1.4320 | 21791 | 0.00 | 7.271 |
| 0.17136995 | 18.8481 | 15.803 | 21741 | 1.4447 | 21742 | 0.00 | 7.235 |
| 0.17222680 | 18.9044 | 15.847 | 21692 | 1.4575 | 21693 | 0.00 | 7.199 |
| 0.17308793 | 18.9605 | 15.890 | 21643 | 1.4704 | 21644 | 0.00 | 7.163 |
| 0.17395337 | 19.0165 | 15.932 | 21593 | 1.4833 | 21594 | 0.00 | 7.127 |
| 0.17482314 | 19.0723 | 15.975 | 21543 | 1.4964 | 21544 | 0.00 | 7.092 |
| 0.17569726 | 19.1279 | 16.017 | 21492 | 1.5095 | 21494 | 0.00 | 7.057 |
| 0.17657574 | 19.1832 | 16.059 | 21442 | 1.5227 | 21443 | 0.00 | 7.022 |
| 0.17745862 | 19.2383 | 16.101 | 21390 | 1.5360 | 21392 | 0.00 | 6.987 |
| 0.17834591 | 19.2930 | 16.143 | 21339 | 1.5494 | 21341 | 0.00 | 6.952 |
| 0.17923764 | 19.3475 | 16.184 | 21287 | 1.5629 | 21289 | 0.00 | 6.917 |
| 0.18013383 | 19.4015 | 16.225 | 21235 | 1.5764 | 21237 | 0.00 | 6.883 |
| 0.18103450 | 19.4552 | 16.266 | 21183 | 1.5900 | 21184 | 0.00 | 6.849 |
| 0.18193967 | 19.5084 | 16.307 | 21130 | 1.6038 | 21132 | 0.00 | 6.815 |
| 0.18284937 | 19.5611 | 16.347 | 21077 | 1.6175 | 21079 | 0.00 | 6.781 |
| 0.18376362 | 19.6133 | 16.387 | 21024 | 1.6314 | 21025 | 0.00 | 6.747 |
| 0.18468244 | 19.6649 | 16.427 | 20970 | 1.6454 | 20972 | 0.00 | 6.713 |
| 0.18560585 | 19.7158 | 16.467 | 20916 | 1.6594 | 20918 | 0.00 | 6.680 |
| 0.18653388 | 19.7659 | 16.506 | 20862 | 1.6736 | 20864 | 0.00 | 6.647 |
| 0.18746655 | 19.8153 | 16.546 | 20808 | 1.6878 | 20810 | 0.00 | 6.614 |
| 0.18840388 | 19.8638 | 16.585 | 20753 | 1.7021 | 20755 | 0.00 | 6.581 |
| 0.18934590 | 19.9113 | 16.624 | 20698 | 1.7164 | 20700 | 0.00 | 6.548 |
| 0.19029263 | 19.9577 | 16.662 | 20643 | 1.7309 | 20645 | 0.00 | 6.515 |
| 0.19124409 | 20.0030 | 16.701 | 20588 | 1.7455 | 20590 | 0.00 | 6.483 |
| 0.19220031 | 20.0469 | 16.739 | 20532 | 1.7601 | 20534 | 0.00 | 6.451 |
| 0.19316131 | 20.0893 | 16.777 | 20477 | 1.7748 | 20478 | 0.00 | 6.419 |
| 0.19412712 | 20.1300 | 16.815 | 20421 | 1.7896 | 20422 | 0.00 | 6.387 |
| 0.19509776 | 20.1710 | 16.852 | 20365 | 1.8045 | 20366 | 0.00 | 6.355 |
| 0.19607325 | 20.2078 | 16.890 | 20308 | 1.8195 | 20310 | 0.00 | 6.323 |
| 0.19705361 | 20.2422 | 16.927 | 20252 | 1.8345 | 20253 | 0.00 | 6.292 |
| 0.19803888 | 20.2739 | 16.964 | 20195 | 1.8497 | 20197 | 0.00 | 6.261 |
| 0.19902907 | 20.3025 | 17.001 | 20138 | 1.8649 | 20140 | 0.00 | 6.229 |
| 0.20002422 | 20.3275 | 17.037 | 20081 | 1.8802 | 20083 | 0.00 | 6.198 |
| 0.20102434 | 20.3483 | 17.074 | 20024 | 1.8956 | 20025 | 0.00 | 6.168 |
| 0.20202946 | 20.3642 | 17.110 | 19966 | 1.9111 | 19968 | 0.00 | 6.137 |
| 0.20303961 | 20.3743 | 17.146 | 19909 | 1.9267 | 19911 | 0.00 | 6.106 |
| 0.20405481 | 20.3772 | 17.182 | 19851 | 1.9423 | 19853 | 0.00 | 6.076 |
| 0.20507508 | 20.3713 | 17.217 | 19793 | 1.9581 | 19795 | 0.00 | 6.046 |
| 0.20610046 | 20.3544 | 17.253 | 19735 | 1.9739 | 19737 | 0.00 | 6.016 |
| 0.20713096 | 20.3232 | 17.288 | 19677 | 1.9898 | 19679 | 0.00 | 5.986 |
| 0.20816661 | 20.2725 | 17.323 | 19619 | 2.0058 | 19621 | 0.00 | 5.956 |
| 0.20920745 | 20.1942 | 17.358 | 19560 | 2.0219 | 19562 | 0.00 | 5.926 |
| 0.21025348 | 20.0733 | 17.392 | 19502 | 2.0381 | 19504 | 0.00 | 5.897 |
| 0.21130475 | 19.8782 | 17.427 | 19443 | 2.0543 | 19445 | 0.00 | 5.868 |
| 0.21236128 | 19.5191 | 17.461 | 19385 | 2.0707 | 19387 | 0.00 | 5.838 |
| 0.21342308 | 18.4033 | 17.495 | 19326 | 2.0871 | 19328 | 0.00 | 5.809 |
| 0.21354015 | 17.9915 | 17.499 | 19320 | 2.0889 | 19322 | 0.00 | 5.806 |
| 0.21385984 | 18.0336 | 19.932 | 21973 | 2.0939 | 21975 | 0.00 | 5.797 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 0.21449020 | 19.3322 | 19.917 | 21891 | 2.1036 | 21893 | 0.00 | 5.780 |
| 0.21556265 | 20.0728 | 19.891 | 21755 | 2.1202 | 21757 | 0.00 | 5.752 |
| 0.21664046 | 20.4815 | 19.868 | 21621 | 2.1369 | 21623 | 0.00 | 5.723 |
| 0.21772366 | 20.7598 | 19.845 | 21489 | 2.1537 | 21491 | 0.00 | 5.695 |
| 0.21881228 | 20.9582 | 19.824 | 21359 | 2.1706 | 21361 | 0.00 | 5.666 |
| 0.21990634 | 21.0913 | 19.803 | 21231 | 2.1875 | 21233 | 0.00 | 5.638 |
| 0.22100588 | 21.1533 | 19.784 | 21105 | 2.2045 | 21107 | 0.00 | 5.610 |
| 0.22211090 | 21.1048 | 19.766 | 20981 | 2.2216 | 20983 | 0.00 | 5.582 |
| 0.22322146 | 20.7351 | 19.750 | 20859 | 2.2388 | 20861 | 0.00 | 5.554 |
| 0.22361559 | 20.1824 | 19.744 | 20816 | 2.2449 | 20818 | 0.00 | 5.545 |
| 0.22398441 | 20.2635 | 21.474 | 22603 | 2.2507 | 22605 | 0.00 | 5.535 |
| 0.22433757 | 20.9271 | 21.455 | 22547 | 2.2561 | 22549 | 0.00 | 5.527 |
| 0.22545925 | 21.7506 | 21.396 | 22373 | 2.2735 | 22375 | 0.00 | 5.499 |
| 0.22658655 | 22.2159 | 21.339 | 22202 | 2.2910 | 22205 | 0.00 | 5.472 |
| 0.22771948 | 22.5684 | 21.284 | 22035 | 2.3085 | 22037 | 0.00 | 5.445 |
| 0.22885808 | 22.8618 | 21.231 | 21871 | 2.3261 | 21873 | 0.00 | 5.418 |
| 0.23000237 | 23.1173 | 21.180 | 21710 | 2.3438 | 21712 | 0.00 | 5.391 |
| 0.23115238 | 23.3457 | 21.131 | 21552 | 2.3616 | 21554 | 0.00 | 5.364 |
| 0.23230814 | 23.5535 | 21.084 | 21397 | 2.3795 | 21399 | 0.00 | 5.337 |
| 0.23346969 | 23.7447 | 21.039 | 21245 | 2.3975 | 21247 | 0.00 | 5.311 |
| 0.23463703 | 23.9221 | 20.995 | 21095 | 2.4156 | 21098 | 0.00 | 5.284 |
| 0.23581022 | 24.0876 | 20.954 | 20949 | 2.4337 | 20951 | 0.00 | 5.258 |
| 0.23698927 | 24.2428 | 20.915 | 20806 | 2.4519 | 20809 | 0.00 | 5.232 |
| 0.23817422 | 24.3895 | 20.879 | 20667 | 2.4702 | 20670 | 0.00 | 5.206 |
| 0.23936509 | 24.5288 | 20.846 | 20532 | 2.4886 | 20535 | 0.00 | 5.180 |
| 0.24056191 | 24.6618 | 20.816 | 20400 | 2.5071 | 20403 | 0.00 | 5.154 |
| 0.24176472 | 24.7893 | 20.788 | 20271 | 2.5257 | 20274 | 0.00 | 5.128 |
| 0.24297355 | 24.9118 | 20.762 | 20146 | 2.5443 | 20148 | 0.00 | 5.103 |
| 0.24418841 | 25.0299 | 20.739 | 20023 | 2.5631 | 20026 | 0.00 | 5.077 |
| 0.24540936 | 25.1440 | 20.718 | 19903 | 2.5819 | 19906 | 0.00 | 5.052 |
| 0.24663640 | 25.2543 | 20.699 | 19786 | 2.6008 | 19788 | 0.00 | 5.027 |
| 0.24786959 | 25.3612 | 20.682 | 19671 | 2.6198 | 19674 | 0.00 | 5.002 |
| 0.24910893 | 25.4652 | 20.668 | 19561 | 2.6388 | 19563 | 0.00 | 4.977 |
| 0.25035448 | 25.5668 | 20.657 | 19453 | 2.6580 | 19455 | 0.00 | 4.952 |
| 0.25160625 | 25.6664 | 20.648 | 19348 | 2.6772 | 19350 | 0.00 | 4.928 |
| 0.25286428 | 25.7644 | 20.642 | 19245 | 2.6965 | 19248 | 0.00 | 4.903 |
| 0.25412860 | 25.8609 | 20.637 | 19145 | 2.7159 | 19148 | 0.00 | 4.879 |
| 0.25539925 | 25.9563 | 20.635 | 19048 | 2.7354 | 19051 | 0.00 | 4.855 |
| 0.25667624 | 26.0507 | 20.635 | 18953 | 2.7550 | 18956 | 0.00 | 4.830 |
| 0.25795962 | 26.1443 | 20.636 | 18860 | 2.7747 | 18863 | 0.00 | 4.806 |
| 0.25924942 | 26.2373 | 20.639 | 18769 | 2.7944 | 18772 | 0.00 | 4.782 |
| 0.26054567 | 26.3297 | 20.644 | 18680 | 2.8142 | 18683 | 0.00 | 4.759 |
| 0.26184840 | 26.4216 | 20.650 | 18593 | 2.8341 | 18595 | 0.00 | 4.735 |
| 0.26315764 | 26.5133 | 20.658 | 18507 | 2.8541 | 18510 | 0.00 | 4.711 |
| 0.26447343 | 26.6048 | 20.667 | 18423 | 2.8741 | 18426 | 0.00 | 4.688 |
| 0.26579579 | 26.6961 | 20.678 | 18341 | 2.8943 | 18344 | 0.00 | 4.665 |
| 0.26712477 | 26.7874 | 20.690 | 18260 | 2.9145 | 18263 | 0.00 | 4.641 |
| 0.26846040 | 26.8787 | 20.703 | 18181 | 2.9348 | 18184 | 0.00 | 4.618 |
| 0.26980270 | 26.9702 | 20.717 | 18103 | 2.9552 | 18105 | 0.00 | 4.595 |
| 0.27115171 | 27.0617 | 20.732 | 18026 | 2.9757 | 18029 | 0.00 | 4.573 |
| 0.27250747 | 27.1535 | 20.748 | 17950 | 2.9962 | 17953 | 0.00 | 4.550 |
| 0.27387001 | 27.2455 | 20.766 | 17876 | 3.0168 | 17879 | 0.00 | 4.527 |
| 0.27523936 | 27.3379 | 20.784 | 17803 | 3.0375 | 17806 | 0.00 | 4.505 |
| 0.27661556 | 27.4306 | 20.803 | 17730 | 3.0583 | 17734 | 0.00 | 4.482 |
| 0.27799863 | 27.5237 | 20.823 | 17659 | 3.0792 | 17662 | 0.00 | 4.460 |
| 0.27938863 | 27.6173 | 20.845 | 17589 | 3.1001 | 17592 | 0.00 | 4.438 |
| 0.28078557 | 27.7114 | 20.866 | 17520 | 3.1211 | 17523 | 0.00 | 4.416 |
| 0.28218950 | 27.8060 | 20.889 | 17452 | 3.1422 | 17455 | 0.00 | 4.394 |
| 0.28360044 | 27.9012 | 20.913 | 17385 | 3.1634 | 17388 | 0.00 | 4.372 |
| 0.28501845 | 27.9970 | 20.937 | 17318 | 3.1847 | 17322 | 0.00 | 4.350 |
| 0.28644354 | 28.0934 | 20.962 | 17253 | 3.2060 | 17256 | 0.00 | 4.328 |
| 0.28787576 | 28.1962 | 20.979 | 17181 | 3.2274 | 17184 | 0.00 | 4.307 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 0.28931514 | 28.3021 | 20.990 | 17105 | 3.2489 | 17108 | 0.00 | 4.285 |
| 0.29076171 | 28.4080 | 21.003 | 17030 | 3.2705 | 17033 | 0.00 | 4.264 |
| 0.29221552 | 28.5140 | 21.016 | 16955 | 3.2921 | 16959 | 0.00 | 4.243 |
| 0.29367660 | 28.6200 | 21.029 | 16882 | 3.3138 | 16885 | 0.00 | 4.222 |
| 0.29514498 | 28.7262 | 21.043 | 16809 | 3.3356 | 16812 | 0.00 | 4.201 |
| 0.29662071 | 28.8325 | 21.057 | 16736 | 3.3575 | 16740 | 0.00 | 4.180 |
| 0.29810381 | 28.9391 | 21.072 | 16665 | 3.3794 | 16668 | 0.00 | 4.159 |
| 0.29959433 | 29.0460 | 21.087 | 16594 | 3.4014 | 16597 | 0.00 | 4.138 |
| 0.30109230 | 29.1532 | 21.102 | 16523 | 3.4235 | 16527 | 0.00 | 4.118 |
| 0.30259776 | 29.2608 | 21.118 | 16454 | 3.4457 | 16457 | 0.00 | 4.097 |
| 0.30411075 | 29.3689 | 21.135 | 16384 | 3.4679 | 16388 | 0.00 | 4.077 |
| 0.30563130 | 29.4773 | 21.152 | 16316 | 3.4902 | 16319 | 0.00 | 4.057 |
| 0.30715946 | 29.5883 | 21.161 | 16242 | 3.5126 | 16245 | 0.00 | 4.036 |
| 0.30869526 | 29.7002 | 21.167 | 16166 | 3.5350 | 16169 | 0.00 | 4.016 |
| 0.31023873 | 29.8122 | 21.173 | 16090 | 3.5576 | 16093 | 0.00 | 3.996 |
| 0.31178993 | 29.9243 | 21.179 | 16015 | 3.5801 | 16018 | 0.00 | 3.977 |
| 0.31334888 | 30.0365 | 21.186 | 15940 | 3.6028 | 15943 | 0.00 | 3.957 |
| 0.31491562 | 30.1490 | 21.193 | 15866 | 3.6255 | 15869 | 0.00 | 3.937 |
| 0.31649020 | 30.2617 | 21.200 | 15792 | 3.6483 | 15796 | 0.00 | 3.917 |
| 0.31807265 | 30.3746 | 21.207 | 15719 | 3.6712 | 15722 | 0.00 | 3.898 |
| 0.31966301 | 30.4878 | 21.215 | 15646 | 3.6942 | 15650 | 0.00 | 3.879 |
| 0.32126133 | 30.6016 | 21.216 | 15570 | 3.7172 | 15573 | 0.00 | 3.859 |
| 0.32286764 | 30.7163 | 21.163 | 15453 | 3.7402 | 15457 | 0.00 | 3.840 |
| 0.32448197 | 30.8286 | 21.109 | 15337 | 3.7634 | 15341 | 0.00 | 3.821 |
| 0.32610438 | 30.9386 | 21.056 | 15222 | 3.7866 | 15226 | 0.00 | 3.802 |
| 0.32773491 | 31.0463 | 21.003 | 15108 | 3.8099 | 15112 | 0.00 | 3.783 |
| 0.32937358 | 31.1517 | 20.949 | 14995 | 3.8332 | 14999 | 0.00 | 3.764 |
| 0.33102045 | 31.2549 | 20.896 | 14882 | 3.8566 | 14886 | 0.00 | 3.746 |
| 0.33267555 | 31.3558 | 20.843 | 14771 | 3.8801 | 14775 | 0.00 | 3.727 |
| 0.33433893 | 31.4544 | 20.790 | 14660 | 3.9036 | 14664 | 0.00 | 3.708 |
| 0.33601062 | 31.5508 | 20.737 | 14550 | 3.9272 | 14554 | 0.00 | 3.690 |
| 0.33769068 | 31.6450 | 20.684 | 14440 | 3.9509 | 14444 | 0.00 | 3.672 |
| 0.33937913 | 31.7368 | 20.631 | 14332 | 3.9746 | 14336 | 0.00 | 3.653 |
| 0.34107602 | 31.8263 | 20.578 | 14224 | 3.9984 | 14228 | 0.00 | 3.635 |
| 0.34278140 | 31.9135 | 20.525 | 14117 | 4.0223 | 14121 | 0.00 | 3.617 |
| 0.34449531 | 31.9982 | 20.472 | 14010 | 4.0462 | 14014 | 0.00 | 3.599 |
| 0.34621779 | 32.0804 | 20.420 | 13905 | 4.0702 | 13909 | 0.00 | 3.581 |
| 0.34794888 | 32.1600 | 20.367 | 13800 | 4.0942 | 13804 | 0.00 | 3.563 |
| 0.34968862 | 32.2369 | 20.315 | 13696 | 4.1183 | 13700 | 0.00 | 3.546 |
| 0.35143706 | 32.3109 | 20.262 | 13593 | 4.1425 | 13597 | 0.00 | 3.528 |
| 0.35319425 | 32.3819 | 20.210 | 13490 | 4.1667 | 13494 | 0.00 | 3.510 |
| 0.35496022 | 32.4497 | 20.158 | 13388 | 4.1910 | 13393 | 0.00 | 3.493 |
| 0.35673502 | 32.5140 | 20.106 | 13288 | 4.2153 | 13292 | 0.00 | 3.476 |
| 0.35851870 | 32.5744 | 20.054 | 13187 | 4.2397 | 13192 | 0.00 | 3.458 |
| 0.36031129 | 32.6305 | 20.002 | 13088 | 4.2641 | 13092 | 0.00 | 3.441 |
| 0.36211285 | 32.6818 | 19.951 | 12989 | 4.2886 | 12993 | 0.00 | 3.424 |
| 0.36392341 | 32.7275 | 19.899 | 12891 | 4.3132 | 12895 | 0.00 | 3.407 |
| 0.36574303 | 32.7665 | 19.848 | 12794 | 4.3378 | 12798 | 0.00 | 3.390 |
| 0.36757174 | 32.7974 | 19.796 | 12697 | 4.3625 | 12702 | 0.00 | 3.373 |
| 0.36940960 | 32.8179 | 19.745 | 12602 | 4.3872 | 12606 | 0.00 | 3.356 |
| 0.37125665 | 32.8248 | 19.694 | 12506 | 4.4119 | 12511 | 0.00 | 3.340 |
| 0.37311293 | 32.8122 | 19.644 | 12412 | 4.4368 | 12417 | 0.00 | 3.323 |
| 0.37497850 | 32.7692 | 19.593 | 12319 | 4.4616 | 12323 | 0.00 | 3.306 |
| 0.37685339 | 32.6703 | 19.543 | 12226 | 4.4866 | 12230 | 0.00 | 3.290 |
| 0.37873766 | 32.4286 | 19.492 | 12134 | 4.5115 | 12138 | 0.00 | 3.274 |
| 0.37992070 | 31.9507 | 19.461 | 12076 | 4.5272 | 12081 | 0.00 | 3.263 |
| 0.38063135 | 31.6709 | 20.771 | 12865 | 4.5366 | 12870 | 0.00 | 3.257 |
| 0.38087931 | 31.9886 | 20.765 | 12853 | 4.5398 | 12857 | 0.00 | 3.255 |
| 0.38253450 | 32.6859 | 20.724 | 12772 | 4.5616 | 12777 | 0.00 | 3.241 |
| 0.38444718 | 33.0324 | 20.678 | 12681 | 4.5867 | 12685 | 0.00 | 3.225 |
| 0.38636941 | 33.2722 | 20.632 | 12590 | 4.6119 | 12594 | 0.00 | 3.209 |
| 0.38830126 | 33.4656 | 20.587 | 12499 | 4.6371 | 12504 | 0.00 | 3.193 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 0.39024276 | 33.6327 | 20.541 | 12410 | 4.6624 | 12414 | 0.00 | 3.177 |
| 0.39219398 | 33.7826 | 20.496 | 12321 | 4.6877 | 12325 | 0.00 | 3.161 |
| 0.39415495 | 33.9203 | 20.451 | 12232 | 4.7130 | 12237 | 0.00 | 3.146 |
| 0.39612572 | 34.0487 | 20.406 | 12145 | 4.7384 | 12150 | 0.00 | 3.130 |
| 0.39810635 | 34.1698 | 20.361 | 12058 | 4.7639 | 12063 | 0.00 | 3.114 |
| 0.40009688 | 34.2848 | 20.317 | 11972 | 4.7894 | 11977 | 0.00 | 3.099 |
| 0.40209737 | 34.3947 | 20.273 | 11886 | 4.8149 | 11891 | 0.00 | 3.083 |
| 0.40410785 | 34.5002 | 20.228 | 11801 | 4.8404 | 11806 | 0.00 | 3.068 |
| 0.40612839 | 34.6018 | 20.185 | 11717 | 4.8660 | 11722 | 0.00 | 3.053 |
| 0.40815904 | 34.6998 | 20.141 | 11634 | 4.8917 | 11638 | 0.00 | 3.038 |
| 0.41019983 | 34.7946 | 20.097 | 11551 | 4.9174 | 11556 | 0.00 | 3.023 |
| 0.41225083 | 34.8862 | 20.054 | 11469 | 4.9431 | 11473 | 0.00 | 3.007 |
| 0.41431208 | 34.9748 | 20.011 | 11387 | 4.9689 | 11392 | 0.00 | 2.993 |
| 0.41638364 | 35.0605 | 19.968 | 11306 | 4.9947 | 11311 | 0.00 | 2.978 |
| 0.41846556 | 35.1431 | 19.925 | 11226 | 5.0205 | 11231 | 0.00 | 2.963 |
| 0.42055789 | 35.2226 | 19.883 | 11146 | 5.0463 | 11151 | 0.00 | 2.948 |
| 0.42266068 | 35.2986 | 19.841 | 11067 | 5.0722 | 11072 | 0.00 | 2.933 |
| 0.42477398 | 35.3706 | 19.799 | 10989 | 5.0982 | 10994 | 0.00 | 2.919 |
| 0.42689785 | 35.4378 | 19.757 | 10911 | 5.1242 | 10916 | 0.00 | 2.904 |
| 0.42903234 | 35.4985 | 19.715 | 10833 | 5.1502 | 10839 | 0.00 | 2.890 |
| 0.43117750 | 35.5496 | 19.673 | 10757 | 5.1762 | 10762 | 0.00 | 2.875 |
| 0.43333339 | 35.5832 | 19.632 | 10681 | 5.2022 | 10686 | 0.00 | 2.861 |
| 0.43550006 | 35.5686 | 19.591 | 10605 | 5.2283 | 10611 | 0.00 | 2.847 |
| 0.43637510 | 35.5062 | 19.574 | 10575 | 5.2388 | 10580 | 0.00 | 2.841 |
| 0.43762492 | 35.5521 | 19.892 | 10716 | 5.2538 | 10721 | 0.00 | 2.833 |
| 0.43767756 | 35.5628 | 19.891 | 10714 | 5.2545 | 10719 | 0.00 | 2.833 |
| 0.43986595 | 35.7992 | 19.851 | 10640 | 5.2806 | 10645 | 0.00 | 2.819 |
| 0.44206528 | 35.9405 | 19.812 | 10566 | 5.3068 | 10571 | 0.00 | 2.805 |
| 0.44427560 | 36.0587 | 19.774 | 10493 | 5.3330 | 10498 | 0.00 | 2.791 |
| 0.44649698 | 36.1657 | 19.735 | 10420 | 5.3592 | 10426 | 0.00 | 2.777 |
| 0.44872947 | 36.2660 | 19.696 | 10348 | 5.3855 | 10354 | 0.00 | 2.763 |
| 0.45097311 | 36.3617 | 19.658 | 10277 | 5.4117 | 10282 | 0.00 | 2.749 |
| 0.45322798 | 36.4539 | 19.620 | 10206 | 5.4380 | 10211 | 0.00 | 2.736 |
| 0.45549412 | 36.5433 | 19.582 | 10135 | 5.4644 | 10141 | 0.00 | 2.722 |
| 0.45777159 | 36.6305 | 19.544 | 10065 | 5.4907 | 10071 | 0.00 | 2.708 |
| 0.46006045 | 36.7157 | 19.506 | 9995.9 | 5.5171 | 10001 | 0.00 | 2.695 |
| 0.46236075 | 36.7992 | 19.469 | 9927.0 | 5.5435 | 9932.6 | 0.00 | 2.682 |
| 0.46467255 | 36.8811 | 19.431 | 9858.6 | 5.5699 | 9864.2 | 0.00 | 2.668 |
| 0.46699592 | 36.9617 | 19.394 | 9790.7 | 5.5963 | 9796.3 | 0.00 | 2.655 |
| 0.46933090 | 37.0409 | 19.357 | 9723.4 | 5.6227 | 9729.0 | 0.00 | 2.642 |
| 0.47167755 | 37.1190 | 19.320 | 9656.5 | 5.6492 | 9662.1 | 0.00 | 2.629 |
| 0.47403594 | 37.1959 | 19.283 | 9590.0 | 5.6756 | 9595.7 | 0.00 | 2.616 |
| 0.47640612 | 37.2717 | 19.246 | 9524.1 | 5.7021 | 9529.8 | 0.00 | 2.602 |
| 0.47878815 | 37.3465 | 19.209 | 9458.7 | 5.7286 | 9464.4 | 0.00 | 2.590 |
| 0.48118209 | 37.4203 | 19.173 | 9393.7 | 5.7551 | 9399.4 | 0.00 | 2.577 |
| 0.48358800 | 37.4930 | 19.136 | 9329.2 | 5.7817 | 9334.9 | 0.00 | 2.564 |
| 0.48600594 | 37.5648 | 19.100 | 9265.1 | 5.8082 | 9270.9 | 0.00 | 2.551 |
| 0.48843597 | 37.6356 | 19.063 | 9201.5 | 5.8347 | 9207.3 | 0.00 | 2.538 |
| 0.49087815 | 37.7053 | 19.027 | 9138.3 | 5.8613 | 9144.2 | 0.00 | 2.526 |
| 0.49333254 | 37.7740 | 18.991 | 9075.6 | 5.8879 | 9081.4 | 0.00 | 2.513 |
| 0.49579920 | 37.8417 | 18.955 | 9013.3 | 5.9144 | 9019.2 | 0.00 | 2.501 |
| 0.49827820 | 37.9082 | 18.919 | 8951.4 | 5.9410 | 8957.3 | 0.00 | 2.488 |
| 0.50076959 | 37.9735 | 18.883 | 8889.9 | 5.9676 | 8895.9 | 0.00 | 2.476 |
| 0.50327344 | 38.0376 | 18.847 | 8828.9 | 5.9942 | 8834.9 | 0.00 | 2.464 |
| 0.50578980 | 38.1004 | 18.811 | 8768.3 | 6.0208 | 8774.3 | 0.00 | 2.451 |
| 0.50831875 | 38.1616 | 18.776 | 8708.1 | 6.0474 | 8714.1 | 0.00 | 2.439 |
| 0.51086035 | 38.2211 | 18.740 | 8648.2 | 6.0739 | 8654.3 | 0.00 | 2.427 |
| 0.51341465 | 38.2786 | 18.704 | 8588.8 | 6.1005 | 8594.9 | 0.00 | 2.415 |
| 0.51598172 | 38.3339 | 18.668 | 8529.8 | 6.1271 | 8535.9 | 0.00 | 2.403 |
| 0.51856163 | 38.3864 | 18.633 | 8471.1 | 6.1537 | 8477.3 | 0.00 | 2.391 |
| 0.52115444 | 38.4355 | 18.597 | 8412.9 | 6.1803 | 8419.0 | 0.00 | 2.379 |
| 0.52376021 | 38.4801 | 18.561 | 8355.0 | 6.2069 | 8361.2 | 0.00 | 2.367 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 0.52637901 | 38.5185 | 18.526 | 8297.5 | 6.2335 | 8303.7 | 0.00 | 2.355 |
| 0.52901091 | 38.5477 | 18.490 | 8240.3 | 6.2601 | 8246.6 | 0.00 | 2.344 |
| 0.53165596 | 38.5615 | 18.455 | 8183.5 | 6.2867 | 8189.8 | 0.00 | 2.332 |
| 0.53431424 | 38.5434 | 18.419 | 8127.1 | 6.3132 | 8133.4 | 0.00 | 2.320 |
| 0.53698581 | 38.4090 | 18.383 | 8071.0 | 6.3398 | 8077.3 | 0.00 | 2.309 |
| 0.53724443 | 38.3715 | 18.380 | 8065.6 | 6.3424 | 8071.9 | 0.00 | 2.308 |
| 0.53895558 | 38.4161 | 18.884 | 8260.3 | 6.3593 | 8266.6 | 0.00 | 2.300 |
| 0.53967074 | 38.5364 | 18.874 | 8245.3 | 6.3664 | 8251.7 | 0.00 | 2.297 |
| 0.54236910 | 38.7738 | 18.839 | 8189.2 | 6.3929 | 8195.6 | 0.00 | 2.286 |
| 0.54508094 | 38.9261 | 18.805 | 8133.4 | 6.4194 | 8139.8 | 0.00 | 2.275 |
| 0.54780635 | 39.0511 | 18.770 | 8077.9 | 6.4460 | 8084.3 | 0.00 | 2.263 |
| 0.55054538 | 39.1623 | 18.735 | 8022.8 | 6.4725 | 8029.2 | 0.00 | 2.252 |
| 0.55329810 | 39.2652 | 18.700 | 7968.0 | 6.4990 | 7974.5 | 0.00 | 2.241 |
| 0.55606460 | 39.3625 | 18.665 | 7913.5 | 6.5255 | 7920.0 | 0.00 | 2.230 |
| 0.55884492 | 39.4556 | 18.630 | 7859.3 | 6.5519 | 7865.9 | 0.00 | 2.219 |
| 0.56163914 | 39.5456 | 18.595 | 7805.5 | 6.5784 | 7812.1 | 0.00 | 2.208 |
| 0.56444734 | 39.6331 | 18.560 | 7752.0 | 6.6048 | 7758.6 | 0.00 | 2.197 |
| 0.56726958 | 39.7186 | 18.524 | 7698.8 | 6.6312 | 7705.4 | 0.00 | 2.186 |
| 0.57010592 | 39.8024 | 18.489 | 7645.8 | 6.6576 | 7652.5 | 0.00 | 2.175 |
| 0.57295645 | 39.8847 | 18.454 | 7593.2 | 6.6840 | 7599.9 | 0.00 | 2.164 |
| 0.57582123 | 39.9658 | 18.418 | 7540.9 | 6.7104 | 7547.6 | 0.00 | 2.153 |
| 0.57870034 | 40.0457 | 18.382 | 7488.8 | 6.7367 | 7495.6 | 0.00 | 2.142 |
| 0.58159384 | 40.1247 | 18.347 | 7437.1 | 6.7630 | 7443.8 | 0.00 | 2.132 |
| 0.58450181 | 40.2027 | 18.311 | 7385.6 | 6.7893 | 7392.4 | 0.00 | 2.121 |
| 0.58742432 | 40.2800 | 18.275 | 7334.4 | 6.8156 | 7341.2 | 0.00 | 2.111 |
| 0.59036144 | 40.3565 | 18.239 | 7283.5 | 6.8418 | 7290.3 | 0.00 | 2.100 |
| 0.59331325 | 40.4323 | 18.202 | 7232.9 | 6.8680 | 7239.7 | 0.00 | 2.090 |
| 0.59627982 | 40.5074 | 18.166 | 7182.5 | 6.8942 | 7189.4 | 0.00 | 2.079 |
| 0.59926122 | 40.5820 | 18.130 | 7132.4 | 6.9203 | 7139.3 | 0.00 | 2.069 |
| 0.60225752 | 40.6560 | 18.093 | 7082.6 | 6.9465 | 7089.5 | 0.00 | 2.059 |
| 0.60526881 | 40.7295 | 18.056 | 7033.0 | 6.9725 | 7040.0 | 0.00 | 2.048 |
| 0.60829515 | 40.8024 | 18.019 | 6983.7 | 6.9986 | 6990.7 | 0.00 | 2.038 |
| 0.61133663 | 40.8749 | 17.982 | 6934.6 | 7.0246 | 6941.7 | 0.00 | 2.028 |
| 0.61439331 | 40.9468 | 17.945 | 6885.8 | 7.0506 | 6892.9 | 0.00 | 2.018 |
| 0.61746528 | 41.0183 | 17.907 | 6837.3 | 7.0766 | 6844.4 | 0.00 | 2.008 |
| 0.62055260 | 41.0893 | 17.870 | 6789.0 | 7.1025 | 6796.1 | 0.00 | 1.998 |
| 0.62365537 | 41.1599 | 17.832 | 6741.0 | 7.1284 | 6748.1 | 0.00 | 1.988 |
| 0.62677364 | 41.2301 | 17.794 | 6693.2 | 7.1542 | 6700.3 | 0.00 | 1.978 |
| 0.62990751 | 41.2999 | 17.756 | 6645.6 | 7.1800 | 6652.8 | 0.00 | 1.968 |
| 0.63305705 | 41.3692 | 17.718 | 6598.3 | 7.2058 | 6605.5 | 0.00 | 1.959 |
| 0.63622234 | 41.4381 | 17.679 | 6551.2 | 7.2315 | 6558.4 | 0.00 | 1.949 |
| 0.63940345 | 41.5066 | 17.641 | 6504.4 | 7.2572 | 6511.6 | 0.00 | 1.939 |
| 0.64260046 | 41.5614 | 17.602 | 6457.8 | 7.2828 | 6465.1 | 0.00 | 1.929 |
| 0.64581347 | 41.6290 | 17.563 | 6411.4 | 7.3084 | 6418.7 | 0.00 | 1.920 |
| 0.64904253 | 41.6963 | 17.524 | 6365.3 | 7.3340 | 6372.6 | 0.00 | 1.910 |
| 0.65228775 | 41.7632 | 17.484 | 6319.4 | 7.3595 | 6326.8 | 0.00 | 1.901 |
| 0.65554919 | 41.8297 | 17.445 | 6273.7 | 7.3849 | 6281.1 | 0.00 | 1.891 |
| 0.65882693 | 41.8958 | 17.405 | 6228.3 | 7.4103 | 6235.7 | 0.00 | 1.882 |
| 0.66212107 | 41.9616 | 17.365 | 6183.1 | 7.4357 | 6190.5 | 0.00 | 1.873 |
| 0.66543167 | 42.0269 | 17.325 | 6138.1 | 7.4610 | 6145.6 | 0.00 | 1.863 |
| 0.66875883 | 42.0919 | 17.285 | 6093.4 | 7.4863 | 6100.9 | 0.00 | 1.854 |
| 0.67210262 | 42.1505 | 17.244 | 6048.9 | 7.5115 | 6056.4 | 0.00 | 1.845 |
| 0.67546314 | 42.2147 | 17.204 | 6004.6 | 7.5366 | 6012.1 | 0.00 | 1.836 |
| 0.67884045 | 42.2786 | 17.163 | 5960.5 | 7.5617 | 5968.1 | 0.00 | 1.826 |
| 0.68223466 | 42.3421 | 17.122 | 5916.7 | 7.5868 | 5924.3 | 0.00 | 1.817 |
| 0.68564583 | 42.4052 | 17.080 | 5873.1 | 7.6117 | 5880.7 | 0.00 | 1.808 |
| 0.68907406 | 42.4680 | 17.039 | 5829.7 | 7.6367 | 5837.3 | 0.00 | 1.799 |
| 0.69251943 | 42.5303 | 16.997 | 5786.5 | 7.6615 | 5794.1 | 0.00 | 1.790 |
| 0.69598202 | 42.5923 | 16.956 | 5743.5 | 7.6864 | 5751.2 | 0.00 | 1.781 |
| 0.69946194 | 42.6540 | 16.913 | 5700.8 | 7.7111 | 5708.5 | 0.00 | 1.773 |
| 0.70295924 | 42.7152 | 16.871 | 5658.3 | 7.7358 | 5666.0 | 0.00 | 1.764 |
| 0.70647404 | 42.7761 | 16.829 | 5616.0 | 7.7604 | 5623.7 | 0.00 | 1.755 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 0.71000641 | 42.8366 | 16.786 | 5573.9 | 7.7850 | 5581.7 | 0.00 | 1.746 |
| 0.71355644 | 42.8967 | 16.744 | 5532.0 | 7.8095 | 5539.8 | 0.00 | 1.738 |
| 0.71712423 | 42.9565 | 16.701 | 5490.4 | 7.8339 | 5498.2 | 0.00 | 1.729 |
| 0.72070985 | 43.0159 | 16.657 | 5448.9 | 7.8583 | 5456.8 | 0.00 | 1.720 |
| 0.72431340 | 43.0749 | 16.614 | 5407.7 | 7.8826 | 5415.6 | 0.00 | 1.712 |
| 0.72793496 | 43.1336 | 16.571 | 5366.7 | 7.9068 | 5374.6 | 0.00 | 1.703 |
| 0.73157464 | 43.1919 | 16.527 | 5325.9 | 7.9310 | 5333.9 | 0.00 | 1.695 |
| 0.73523251 | 43.2499 | 16.483 | 5285.4 | 7.9551 | 5293.3 | 0.00 | 1.686 |
| 0.73890867 | 43.3075 | 16.439 | 5245.0 | 7.9791 | 5253.0 | 0.00 | 1.678 |
| 0.74260322 | 43.3646 | 16.394 | 5204.7 | 8.0030 | 5212.7 | 0.00 | 1.670 |
| 0.74631623 | 43.4214 | 16.349 | 5164.6 | 8.0269 | 5172.7 | 0.00 | 1.661 |
| 0.75004781 | 43.4776 | 16.304 | 5124.8 | 8.0507 | 5132.8 | 0.00 | 1.653 |
| 0.75379805 | 43.5335 | 16.259 | 5085.1 | 8.0744 | 5093.2 | 0.00 | 1.645 |
| 0.75756704 | 43.5889 | 16.213 | 5045.7 | 8.0981 | 5053.8 | 0.00 | 1.637 |
| 0.76135488 | 43.6440 | 16.168 | 5006.4 | 8.1216 | 5014.5 | 0.00 | 1.628 |
| 0.76516165 | 43.6985 | 16.122 | 4967.4 | 8.1451 | 4975.5 | 0.00 | 1.620 |
| 0.76898746 | 43.7527 | 16.076 | 4928.6 | 8.1685 | 4936.8 | 0.00 | 1.612 |
| 0.77283240 | 43.8064 | 16.030 | 4890.0 | 8.1919 | 4898.2 | 0.00 | 1.604 |
| 0.77669656 | 43.8597 | 15.983 | 4851.6 | 8.2151 | 4859.8 | 0.00 | 1.596 |
| 0.78058004 | 43.9126 | 15.937 | 4813.4 | 8.2383 | 4821.6 | 0.00 | 1.588 |
| 0.78448294 | 43.9651 | 15.890 | 4775.4 | 8.2614 | 4783.7 | 0.00 | 1.580 |
| 0.78840536 | 44.0172 | 15.843 | 4737.7 | 8.2844 | 4746.0 | 0.00 | 1.573 |
| 0.79234738 | 44.0688 | 15.796 | 4700.1 | 8.3073 | 4708.4 | 0.00 | 1.565 |
| 0.79630912 | 44.1200 | 15.749 | 4662.8 | 8.3301 | 4671.1 | 0.00 | 1.557 |
| 0.80029067 | 44.1708 | 15.702 | 4625.6 | 8.3529 | 4634.0 | 0.00 | 1.549 |
| 0.80429212 | 44.2213 | 15.655 | 4588.7 | 8.3755 | 4597.1 | 0.00 | 1.542 |
| 0.80831358 | 44.2713 | 15.607 | 4552.0 | 8.3981 | 4560.4 | 0.00 | 1.534 |
| 0.81235515 | 44.3209 | 15.559 | 4515.5 | 8.4206 | 4523.9 | 0.00 | 1.526 |
| 0.81641693 | 44.3701 | 15.511 | 4479.2 | 8.4430 | 4487.7 | 0.00 | 1.519 |
| 0.82049901 | 44.4189 | 15.463 | 4443.1 | 8.4653 | 4451.6 | 0.00 | 1.511 |
| 0.82460150 | 44.4674 | 15.415 | 4407.3 | 8.4875 | 4415.8 | 0.00 | 1.504 |
| 0.82872451 | 44.5154 | 15.367 | 4371.6 | 8.5096 | 4380.1 | 0.00 | 1.496 |
| 0.83286813 | 44.5631 | 15.319 | 4336.2 | 8.5316 | 4344.7 | 0.00 | 1.489 |
| 0.83703248 | 44.6105 | 15.270 | 4300.9 | 8.5535 | 4309.5 | 0.00 | 1.481 |
| 0.84121764 | 44.6575 | 15.221 | 4265.9 | 8.5754 | 4274.5 | 0.00 | 1.474 |
| 0.84542373 | 44.7041 | 15.173 | 4231.1 | 8.5971 | 4239.7 | 0.00 | 1.467 |
| 0.84965084 | 44.7504 | 15.124 | 4196.5 | 8.6187 | 4205.1 | 0.00 | 1.459 |
| 0.85389910 | 44.7964 | 15.075 | 4162.1 | 8.6402 | 4170.7 | 0.00 | 1.452 |
| 0.85816859 | 44.8421 | 15.026 | 4127.9 | 8.6617 | 4136.5 | 0.00 | 1.445 |
| 0.86245944 | 44.8875 | 14.976 | 4093.9 | 8.6830 | 4102.5 | 0.00 | 1.438 |
| 0.86677173 | 44.9327 | 14.927 | 4060.1 | 8.7042 | 4068.8 | 0.00 | 1.430 |
| 0.87110559 | 44.9776 | 14.877 | 4026.5 | 8.7253 | 4035.2 | 0.00 | 1.423 |
| 0.87546112 | 45.0222 | 14.828 | 3993.1 | 8.7464 | 4001.8 | 0.00 | 1.416 |
| 0.87983843 | 45.0666 | 14.778 | 3959.9 | 8.7673 | 3968.6 | 0.00 | 1.409 |
| 0.88423762 | 45.1108 | 14.728 | 3926.9 | 8.7881 | 3935.6 | 0.00 | 1.402 |
| 0.88865881 | 45.1549 | 14.678 | 3894.1 | 8.8088 | 3902.9 | 0.00 | 1.395 |
| 0.89310210 | 45.1988 | 14.628 | 3861.5 | 8.8294 | 3870.3 | 0.00 | 1.388 |
| 0.89756761 | 45.2426 | 14.578 | 3829.1 | 8.8499 | 3837.9 | 0.00 | 1.381 |
| 0.90205545 | 45.2863 | 14.528 | 3796.9 | 8.8703 | 3805.8 | 0.00 | 1.374 |
| 0.90656573 | 45.3301 | 14.477 | 3764.9 | 8.8905 | 3773.8 | 0.00 | 1.368 |
| 0.91109856 | 45.3739 | 14.427 | 3733.1 | 8.9107 | 3742.1 | 0.00 | 1.361 |
| 0.91565405 | 45.4177 | 14.376 | 3701.5 | 8.9308 | 3710.4 | 0.00 | 1.354 |
| 0.92023232 | 45.4617 | 14.325 | 3670.1 | 8.9507 | 3679.0 | 0.00 | 1.347 |
| 0.92483348 | 45.5058 | 14.275 | 3638.9 | 8.9705 | 3647.8 | 0.00 | 1.341 |
| 0.92945765 | 45.5503 | 14.224 | 3607.9 | 8.9902 | 3616.8 | 0.00 | 1.334 |
| 0.93410494 | 45.5951 | 14.173 | 3577.1 | 9.0098 | 3586.1 | 0.00 | 1.327 |
| 0.93877546 | 45.6404 | 14.122 | 3546.5 | 9.0293 | 3555.5 | 0.00 | 1.321 |
| 0.94346934 | 45.6864 | 14.071 | 3516.1 | 9.0487 | 3525.2 | 0.00 | 1.314 |
| 0.94818668 | 45.7333 | 14.020 | 3486.0 | 9.0679 | 3495.1 | 0.00 | 1.308 |
| 0.95292762 | 45.7811 | 13.969 | 3456.1 | 9.0871 | 3465.2 | 0.00 | 1.301 |
| 0.95769226 | 45.8301 | 13.919 | 3426.4 | 9.1061 | 3435.5 | 0.00 | 1.295 |
| 0.96248072 | 45.8807 | 13.868 | 3396.9 | 9.1250 | 3406.1 | 0.00 | 1.288 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 0.96729312 | 45.9330 | 13.817 | 3367.7 | 9.1437 | 3376.9 | 0.00 | 1.282 |
| 0.97212959 | 45.9876 | 13.767 | 3338.7 | 9.1624 | 3347.9 | 0.00 | 1.275 |
| 0.97699023 | 46.0449 | 13.716 | 3309.9 | 9.1809 | 3319.1 | 0.00 | 1.269 |
| 0.98187519 | 46.1055 | 13.666 | 3281.4 | 9.1993 | 3290.6 | 0.00 | 1.263 |
| 0.98678456 | 46.1702 | 13.616 | 3253.0 | 9.2176 | 3262.3 | 0.00 | 1.256 |
| 0.99171848 | 46.2401 | 13.566 | 3225.0 | 9.2358 | 3234.2 | 0.00 | 1.250 |
| 0.99667708 | 46.3166 | 13.516 | 3197.1 | 9.2538 | 3206.4 | 0.00 | 1.244 |
| 1.0016605 | 46.3740 | 13.453 | 3166.4 | 9.2717 | 3175.7 | 0.00 | 1.238 |
| 1.0066688 | 46.3772 | 13.365 | 3130.0 | 9.2895 | 3139.3 | 0.00 | 1.232 |
| 1.0117021 | 46.3782 | 13.277 | 3094.1 | 9.3071 | 3103.4 | 0.00 | 1.226 |
| 1.0167606 | 46.3771 | 13.191 | 3058.6 | 9.3246 | 3067.9 | 0.00 | 1.219 |
| 1.0218444 | 46.3742 | 13.105 | 3023.5 | 9.3420 | 3032.9 | 0.00 | 1.213 |
| 1.0269536 | 46.3696 | 13.020 | 2988.9 | 9.3593 | 2998.3 | 0.00 | 1.207 |
| 1.0320884 | 46.3632 | 12.935 | 2954.7 | 9.3764 | 2964.1 | 0.00 | 1.201 |
| 1.0372489 | 46.3551 | 12.851 | 2921.0 | 9.3935 | 2930.4 | 0.00 | 1.195 |
| 1.0424351 | 46.3454 | 12.768 | 2887.7 | 9.4103 | 2897.1 | 0.00 | 1.189 |
| 1.0476473 | 46.3341 | 12.686 | 2854.8 | 9.4271 | 2864.2 | 0.00 | 1.183 |
| 1.0528855 | 46.3212 | 12.604 | 2822.3 | 9.4437 | 2831.7 | 0.00 | 1.178 |
| 1.0581499 | 46.3067 | 12.523 | 2790.2 | 9.4601 | 2799.7 | 0.00 | 1.172 |
| 1.0634407 | 46.2907 | 12.443 | 2758.5 | 9.4765 | 2768.0 | 0.00 | 1.166 |
| 1.0687579 | 46.2731 | 12.364 | 2727.3 | 9.4927 | 2736.8 | 0.00 | 1.160 |
| 1.0741017 | 46.2539 | 12.285 | 2696.4 | 9.5088 | 2705.9 | 0.00 | 1.154 |
| 1.0794722 | 46.2332 | 12.206 | 2665.9 | 9.5247 | 2675.4 | 0.00 | 1.149 |
| 1.0848695 | 46.2109 | 12.129 | 2635.8 | 9.5405 | 2645.3 | 0.00 | 1.143 |
| 1.0902939 | 46.1871 | 12.052 | 2606.0 | 9.5561 | 2615.6 | 0.00 | 1.137 |
| 1.0957454 | 46.1617 | 11.976 | 2576.6 | 9.5717 | 2586.2 | 0.00 | 1.132 |
| 1.1012241 | 46.1347 | 11.900 | 2547.6 | 9.5870 | 2557.2 | 0.00 | 1.126 |
| 1.1067302 | 46.1062 | 11.825 | 2519.0 | 9.6023 | 2528.6 | 0.00 | 1.120 |
| 1.1122639 | 46.0760 | 11.751 | 2490.7 | 9.6174 | 2500.3 | 0.00 | 1.115 |
| 1.1178252 | 46.0443 | 11.677 | 2462.7 | 9.6323 | 2472.4 | 0.00 | 1.109 |
| 1.1234143 | 46.0110 | 11.604 | 2435.1 | 9.6472 | 2444.8 | 0.00 | 1.104 |
| 1.1290314 | 45.9760 | 11.531 | 2407.9 | 9.6618 | 2417.5 | 0.00 | 1.098 |
| 1.1346765 | 45.9394 | 11.459 | 2380.9 | 9.6764 | 2390.6 | 0.00 | 1.093 |
| 1.1403499 | 45.9011 | 11.388 | 2354.3 | 9.6908 | 2364.0 | 0.00 | 1.087 |
| 1.1460517 | 45.8595 | 11.317 | 2328.1 | 9.7050 | 2337.8 | 0.00 | 1.082 |
| 1.1517819 | 45.8179 | 11.247 | 2302.1 | 9.7191 | 2311.9 | 0.00 | 1.076 |
| 1.1575408 | 45.7745 | 11.177 | 2276.5 | 9.7331 | 2286.2 | 0.00 | 1.071 |
| 1.1633285 | 45.7294 | 11.108 | 2251.2 | 9.7469 | 2260.9 | 0.00 | 1.066 |
| 1.1691452 | 45.6825 | 11.040 | 2226.2 | 9.7605 | 2236.0 | 0.00 | 1.060 |
| 1.1749909 | 45.6339 | 10.972 | 2201.5 | 9.7741 | 2211.3 | 0.00 | 1.055 |
| 1.1808659 | 45.5833 | 10.905 | 2177.1 | 9.7874 | 2186.9 | 0.00 | 1.050 |
| 1.1867702 | 45.5309 | 10.838 | 2153.0 | 9.8007 | 2162.8 | 0.00 | 1.045 |
| 1.1927040 | 45.4766 | 10.772 | 2129.2 | 9.8137 | 2139.0 | 0.00 | 1.040 |
| 1.1986676 | 45.4203 | 10.706 | 2105.7 | 9.8267 | 2115.5 | 0.00 | 1.034 |
| 1.2046609 | 45.3620 | 10.641 | 2082.5 | 9.8394 | 2092.3 | 0.00 | 1.029 |
| 1.2106842 | 45.3017 | 10.576 | 2059.5 | 9.8521 | 2069.4 | 0.00 | 1.024 |
| 1.2167376 | 45.2393 | 10.512 | 2036.9 | 9.8645 | 2046.7 | 0.00 | 1.019 |
| 1.2228213 | 45.1747 | 10.449 | 2014.5 | 9.8769 | 2024.4 | 0.00 | 1.014 |
| 1.2289354 | 45.1080 | 10.386 | 1992.3 | 9.8890 | 2002.2 | 0.00 | 1.009 |
| 1.2350801 | 45.0390 | 10.323 | 1970.5 | 9.9010 | 1980.4 | 0.00 | 1.004 |
| 1.2412555 | 44.9677 | 10.261 | 1948.9 | 9.9129 | 1958.8 | 0.00 | 0.9989 |
| 1.2474618 | 44.8940 | 10.199 | 1927.6 | 9.9246 | 1937.5 | 0.00 | 0.9939 |
| 1.2536991 | 44.8179 | 10.138 | 1906.5 | 9.9362 | 1916.4 | 0.00 | 0.9889 |
| 1.2599676 | 44.7392 | 10.078 | 1885.6 | 9.9476 | 1895.6 | 0.00 | 0.9840 |
| 1.2662674 | 44.6579 | 10.017 | 1865.1 | 9.9589 | 1875.0 | 0.00 | 0.9791 |
| 1.2725988 | 44.5740 | 9.9578 | 1844.7 | 9.9700 | 1854.7 | 0.00 | 0.9743 |
| 1.2789618 | 44.4873 | 9.8986 | 1824.7 | 9.9809 | 1834.6 | 0.00 | 0.9694 |
| 1.2853566 | 44.3977 | 9.8399 | 1804.8 | 9.9917 | 1814.8 | 0.00 | 0.9646 |
| 1.2917833 | 44.3052 | 9.7817 | 1785.2 | 10.002 | 1795.2 | 0.00 | 0.9598 |
| 1.2982423 | 44.2095 | 9.7239 | 1765.8 | 10.013 | 1775.9 | 0.00 | 0.9550 |
| 1.3047335 | 44.1107 | 9.6666 | 1746.7 | 10.023 | 1756.7 | 0.00 | 0.9503 |
| 1.3112571 | 44.0095 | 9.6098 | 1727.8 | 10.033 | 1737.8 | 0.00 | 0.9455 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 1.3178134 | 43.9040 | 9.5534 | 1709.1 | 10.043 | 1719.1 | 0.00 | 0.9408 |
| 1.3244025 | 43.7949 | 9.4974 | 1690.6 | 10.053 | 1700.7 | 0.00 | 0.9362 |
| 1.3310245 | 43.6821 | 9.4419 | 1672.4 | 10.063 | 1682.5 | 0.00 | 0.9315 |
| 1.3376796 | 43.5654 | 9.3869 | 1654.4 | 10.072 | 1664.4 | 0.00 | 0.9269 |
| 1.3443680 | 43.4447 | 9.3322 | 1636.6 | 10.082 | 1646.6 | 0.00 | 0.9222 |
| 1.3510899 | 43.3197 | 9.2780 | 1619.0 | 10.091 | 1629.1 | 0.00 | 0.9177 |
| 1.3578453 | 43.1903 | 9.2242 | 1601.6 | 10.100 | 1611.7 | 0.00 | 0.9131 |
| 1.3646345 | 43.0563 | 9.1709 | 1584.4 | 10.109 | 1594.5 | 0.00 | 0.9086 |
| 1.3714577 | 42.9174 | 9.1180 | 1567.4 | 10.118 | 1577.5 | 0.00 | 0.9040 |
| 1.3783150 | 42.7733 | 9.0654 | 1550.6 | 10.126 | 1560.7 | 0.00 | 0.8995 |
| 1.3852066 | 42.6239 | 9.0133 | 1534.0 | 10.135 | 1544.2 | 0.00 | 0.8951 |
| 1.3921326 | 42.4689 | 8.9616 | 1517.6 | 10.143 | 1527.8 | 0.00 | 0.8906 |
| 1.3990933 | 42.3078 | 8.9103 | 1501.5 | 10.151 | 1511.6 | 0.00 | 0.8862 |
| 1.4060887 | 42.1404 | 8.8594 | 1485.4 | 10.159 | 1495.6 | 0.00 | 0.8818 |
| 1.4131192 | 41.9663 | 8.8089 | 1469.6 | 10.167 | 1479.8 | 0.00 | 0.8774 |
| 1.4201848 | 41.7852 | 8.7588 | 1454.0 | 10.174 | 1464.2 | 0.00 | 0.8730 |
| 1.4272857 | 41.5964 | 8.7091 | 1438.6 | 10.182 | 1448.7 | 0.00 | 0.8687 |
| 1.4344221 | 41.3996 | 8.6597 | 1423.3 | 10.189 | 1433.5 | 0.00 | 0.8643 |
| 1.4415942 | 41.1943 | 8.6108 | 1408.2 | 10.196 | 1418.4 | 0.00 | 0.8600 |
| 1.4488022 | 40.9797 | 8.5622 | 1393.3 | 10.203 | 1403.5 | 0.00 | 0.8558 |
| 1.4560462 | 40.7553 | 8.5140 | 1378.6 | 10.210 | 1388.8 | 0.00 | 0.8515 |
| 1.4633265 | 40.5203 | 8.4662 | 1364.0 | 10.217 | 1374.2 | 0.00 | 0.8473 |
| 1.4706431 | 40.2739 | 8.4187 | 1349.6 | 10.223 | 1359.8 | 0.00 | 0.8431 |
| 1.4779963 | 40.0152 | 8.3716 | 1335.4 | 10.229 | 1345.6 | 0.00 | 0.8389 |
| 1.4853863 | 39.7431 | 8.3249 | 1321.3 | 10.235 | 1331.5 | 0.00 | 0.8347 |
| 1.4928132 | 39.4564 | 8.2785 | 1307.4 | 10.241 | 1317.6 | 0.00 | 0.8305 |
| 1.5002773 | 39.1538 | 8.2325 | 1293.7 | 10.247 | 1303.9 | 0.00 | 0.8264 |
| 1.5077787 | 38.8338 | 8.1868 | 1280.1 | 10.253 | 1290.3 | 0.00 | 0.8223 |
| 1.5153176 | 38.4945 | 8.1415 | 1266.7 | 10.258 | 1276.9 | 0.00 | 0.8182 |
| 1.5228942 | 38.1339 | 8.0962 | 1253.4 | 10.264 | 1263.6 | 0.00 | 0.8141 |
| 1.5305086 | 37.7496 | 8.0500 | 1240.0 | 10.269 | 1250.3 | 0.00 | 0.8101 |
| 1.5381612 | 37.3385 | 8.0041 | 1226.8 | 10.274 | 1237.1 | 0.00 | 0.8061 |
| 1.5458520 | 36.8973 | 7.9586 | 1213.8 | 10.279 | 1224.0 | 0.00 | 0.8020 |
| 1.5535812 | 36.4219 | 7.9134 | 1200.9 | 10.283 | 1211.2 | 0.00 | 0.7981 |
| 1.5613491 | 35.9073 | 7.8686 | 1188.1 | 10.288 | 1198.4 | 0.00 | 0.7941 |
| 1.5691559 | 35.3473 | 7.8241 | 1175.5 | 10.292 | 1185.8 | 0.00 | 0.7901 |
| 1.5770017 | 34.7340 | 7.7800 | 1163.1 | 10.296 | 1173.4 | 0.00 | 0.7862 |
| 1.5848867 | 34.0573 | 7.7362 | 1150.8 | 10.300 | 1161.1 | 0.00 | 0.7823 |
| 1.5928111 | 33.3039 | 7.6927 | 1138.6 | 10.304 | 1148.9 | 0.00 | 0.7784 |
| 1.6007752 | 32.4556 | 7.6496 | 1126.6 | 10.308 | 1136.9 | 0.00 | 0.7745 |
| 1.6087790 | 31.4868 | 7.6067 | 1114.7 | 10.311 | 1125.0 | 0.00 | 0.7707 |
| 1.6168229 | 30.3613 | 7.5643 | 1103.0 | 10.315 | 1113.3 | 0.00 | 0.7668 |
| 1.6249070 | 29.0148 | 7.5221 | 1091.4 | 10.318 | 1101.7 | 0.00 | 0.7630 |
| 1.6330316 | 27.3439 | 7.4802 | 1079.9 | 10.321 | 1090.2 | 0.00 | 0.7592 |
| 1.6411967 | 25.1380 | 7.4387 | 1068.6 | 10.324 | 1078.9 | 0.00 | 0.7555 |
| 1.6494027 | 21.8562 | 7.3975 | 1057.4 | 10.326 | 1067.7 | 0.00 | 0.7517 |
| 1.6576497 | 14.9802 | 7.3566 | 1046.3 | 10.329 | 1056.6 | 0.00 | 0.7480 |
| 1.6614142 | -0.922329 | 7.3381 | 1041.3 | 10.330 | 1051.6 | 0.00 | 0.7463 |
| 1.6619858 | -1.24775 | 26.040 | 3693.8 | 10.330 | 3704.1 | 0.00 | 0.7460 |
| 1.6659380 | 14.6692 | 25.949 | 3672.2 | 10.331 | 3682.5 | 0.00 | 0.7442 |
| 1.6742677 | 20.6909 | 25.759 | 3627.1 | 10.333 | 3637.5 | 0.00 | 0.7405 |
| 1.6826390 | 23.0870 | 25.570 | 3582.7 | 10.335 | 3593.0 | 0.00 | 0.7368 |
| 1.6910522 | 24.1856 | 25.383 | 3538.8 | 10.337 | 3549.1 | 0.00 | 0.7332 |
| 1.6995075 | 24.3088 | 25.198 | 3495.5 | 10.339 | 3505.8 | 0.00 | 0.7295 |
| 1.7080050 | 22.9893 | 25.014 | 3452.7 | 10.340 | 3463.0 | 0.00 | 0.7259 |
| 1.7158508 | 13.4871 | 24.846 | 3413.8 | 10.342 | 3424.2 | 0.00 | 0.7226 |
| 1.7165450 | 8.18242 | 37.092 | 5094.3 | 10.342 | 5104.7 | 0.00 | 0.7223 |
| 1.7169493 | 13.4382 | 37.079 | 5091.4 | 10.342 | 5101.7 | 0.00 | 0.7221 |
| 1.7251278 | 25.2606 | 36.816 | 5031.3 | 10.343 | 5041.7 | 0.00 | 0.7187 |
| 1.7337534 | 28.8729 | 36.543 | 4969.1 | 10.344 | 4979.5 | 0.00 | 0.7151 |
| 1.7424222 | 31.2774 | 36.272 | 4907.7 | 10.345 | 4918.1 | 0.00 | 0.7116 |
| 1.7511343 | 33.1437 | 36.002 | 4847.0 | 10.345 | 4857.4 | 0.00 | 0.7080 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 1.7598899 | 34.6916 | 35.734 | 4787.0 | 10.346 | 4797.4 | 0.00 | 0.7045 |
| 1.7686894 | 36.0234 | 35.468 | 4727.7 | 10.346 | 4738.1 | 0.00 | 0.7010 |
| 1.7775328 | 37.1964 | 35.204 | 4669.2 | 10.346 | 4679.6 | 0.00 | 0.6975 |
| 1.7864205 | 38.2463 | 34.943 | 4611.5 | 10.346 | 4621.8 | 0.00 | 0.6940 |
| 1.7953526 | 39.1971 | 34.683 | 4554.4 | 10.346 | 4564.7 | 0.00 | 0.6906 |
| 1.8043294 | 40.0660 | 34.425 | 4498.1 | 10.346 | 4508.4 | 0.00 | 0.6871 |
| 1.8133510 | 40.8655 | 34.169 | 4442.4 | 10.345 | 4452.8 | 0.00 | 0.6837 |
| 1.8224178 | 41.6053 | 33.916 | 4387.5 | 10.345 | 4397.9 | 0.00 | 0.6803 |
| 1.8315299 | 42.2928 | 33.664 | 4333.3 | 10.344 | 4343.6 | 0.00 | 0.6769 |
| 1.8406875 | 42.9342 | 33.414 | 4279.7 | 10.343 | 4290.1 | 0.00 | 0.6736 |
| 1.8498909 | 43.5342 | 33.166 | 4226.9 | 10.342 | 4237.2 | 0.00 | 0.6702 |
| 1.8591404 | 44.0969 | 32.920 | 4174.6 | 10.341 | 4185.0 | 0.00 | 0.6669 |
| 1.8684361 | 44.6256 | 32.676 | 4123.1 | 10.339 | 4133.4 | 0.00 | 0.6636 |
| 1.8777783 | 45.1230 | 32.434 | 4072.2 | 10.338 | 4082.5 | 0.00 | 0.6603 |
| 1.8871672 | 45.5915 | 32.194 | 4021.9 | 10.336 | 4032.2 | 0.00 | 0.6570 |
| 1.8966030 | 46.0330 | 31.956 | 3972.3 | 10.334 | 3982.6 | 0.00 | 0.6537 |
| 1.9060860 | 46.4492 | 31.719 | 3923.3 | 10.332 | 3933.6 | 0.00 | 0.6505 |
| 1.9156165 | 46.8414 | 31.485 | 3874.9 | 10.329 | 3885.2 | 0.00 | 0.6472 |
| 1.9251945 | 47.2106 | 31.252 | 3827.1 | 10.327 | 3837.4 | 0.00 | 0.6440 |
| 1.9348205 | 47.5578 | 31.021 | 3779.9 | 10.324 | 3790.2 | 0.00 | 0.6408 |
| 1.9444946 | 47.8837 | 30.792 | 3733.3 | 10.322 | 3743.6 | 0.00 | 0.6376 |
| 1.9542171 | 48.1885 | 30.564 | 3687.3 | 10.319 | 3697.6 | 0.00 | 0.6344 |
| 1.9639882 | 48.4726 | 30.339 | 3641.8 | 10.316 | 3652.2 | 0.00 | 0.6313 |
| 1.9738081 | 48.7359 | 30.115 | 3597.0 | 10.312 | 3607.3 | 0.00 | 0.6281 |
| 1.9836772 | 48.9779 | 29.892 | 3552.7 | 10.309 | 3563.0 | 0.00 | 0.6250 |
| 1.9935955 | 49.1980 | 29.672 | 3508.9 | 10.305 | 3519.2 | 0.00 | 0.6219 |
| 2.0035635 | 49.3949 | 29.453 | 3465.7 | 10.302 | 3476.0 | 0.00 | 0.6188 |
| 2.0135813 | 49.5668 | 29.236 | 3423.1 | 10.298 | 3433.4 | 0.00 | 0.6157 |
| 2.0236492 | 49.7109 | 29.021 | 3381.0 | 10.294 | 3391.2 | 0.00 | 0.6127 |
| 2.0337675 | 49.8232 | 28.807 | 3339.4 | 10.290 | 3349.7 | 0.00 | 0.6096 |
| 2.0439363 | 49.8973 | 28.595 | 3298.3 | 10.285 | 3308.6 | 0.00 | 0.6066 |
| 2.0541560 | 49.9234 | 28.385 | 3257.7 | 10.281 | 3268.0 | 0.00 | 0.6036 |
| 2.0644268 | 49.8846 | 28.176 | 3217.7 | 10.276 | 3228.0 | 0.00 | 0.6006 |
| 2.0747489 | 49.7497 | 27.969 | 3178.1 | 10.271 | 3188.4 | 0.00 | 0.5976 |
| 2.0851227 | 49.4500 | 27.763 | 3139.1 | 10.266 | 3149.4 | 0.00 | 0.5946 |
| 2.0955483 | 48.7803 | 27.559 | 3100.5 | 10.261 | 3110.8 | 0.00 | 0.5917 |
| 2.1052605 | 46.5603 | 27.372 | 3065.2 | 10.256 | 3075.5 | 0.00 | 0.5889 |
| 2.1060260 | 45.9823 | 27.357 | 3062.4 | 10.256 | 3072.7 | 0.00 | 0.5887 |
| 2.1099394 | 46.6100 | 32.023 | 3578.1 | 10.254 | 3588.4 | 0.00 | 0.5876 |
| 2.1165562 | 48.8117 | 31.865 | 3549.4 | 10.250 | 3559.6 | 0.00 | 0.5858 |
| 2.1271389 | 50.2415 | 31.616 | 3504.1 | 10.245 | 3514.4 | 0.00 | 0.5829 |
| 2.1377746 | 51.1310 | 31.369 | 3459.4 | 10.239 | 3469.7 | 0.00 | 0.5800 |
| 2.1484635 | 51.8076 | 31.124 | 3415.3 | 10.233 | 3425.5 | 0.00 | 0.5771 |
| 2.1592058 | 52.3662 | 30.880 | 3371.7 | 10.227 | 3382.0 | 0.00 | 0.5742 |
| 2.1700018 | 52.8464 | 30.634 | 3328.2 | 10.221 | 3338.5 | 0.00 | 0.5714 |
| 2.1808519 | 53.2687 | 30.390 | 3285.2 | 10.214 | 3295.5 | 0.00 | 0.5685 |
| 2.1917561 | 53.6453 | 30.147 | 3242.8 | 10.208 | 3253.0 | 0.00 | 0.5657 |
| 2.2027149 | 53.9832 | 29.907 | 3200.9 | 10.201 | 3211.1 | 0.00 | 0.5629 |
| 2.2137285 | 54.2854 | 29.672 | 3160.0 | 10.194 | 3170.2 | 0.00 | 0.5601 |
| 2.2247971 | 54.5633 | 29.456 | 3121.4 | 10.187 | 3131.6 | 0.00 | 0.5573 |
| 2.2359211 | 54.8228 | 29.241 | 3083.2 | 10.180 | 3093.4 | 0.00 | 0.5545 |
| 2.2471007 | 55.0631 | 29.027 | 3045.4 | 10.173 | 3055.6 | 0.00 | 0.5518 |
| 2.2583362 | 55.2843 | 28.816 | 3008.2 | 10.165 | 3018.4 | 0.00 | 0.5490 |
| 2.2696279 | 55.4865 | 28.607 | 2971.6 | 10.158 | 2981.7 | 0.00 | 0.5463 |
| 2.2809760 | 55.6691 | 28.401 | 2935.4 | 10.150 | 2945.6 | 0.00 | 0.5436 |
| 2.2923809 | 55.8303 | 28.197 | 2899.9 | 10.142 | 2910.0 | 0.00 | 0.5409 |
| 2.3038428 | 55.9673 | 27.995 | 2864.8 | 10.134 | 2874.9 | 0.00 | 0.5382 |
| 2.3153620 | 56.0743 | 27.796 | 2830.3 | 10.126 | 2840.4 | 0.00 | 0.5355 |
| 2.3269388 | 56.1405 | 27.599 | 2796.2 | 10.117 | 2806.3 | 0.00 | 0.5328 |
| 2.3385735 | 56.1421 | 27.404 | 2762.7 | 10.109 | 2772.8 | 0.00 | 0.5302 |
| 2.3502664 | 56.0115 | 27.211 | 2729.6 | 10.100 | 2739.7 | 0.00 | 0.5275 |
| 2.3620177 | 55.3232 | 27.020 | 2696.9 | 10.091 | 2707.0 | 0.00 | 0.5249 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 2.3625852 | 55.2231 | 27.011 | 2695.4 | 10.091 | 2705.5 | 0.00 | 0.5248 |
| 2.3682149 | 55.2961 | 28.804 | 2867.5 | 10.087 | 2877.6 | 0.00 | 0.5235 |
| 2.3738278 | 56.0536 | 28.704 | 2850.7 | 10.082 | 2860.8 | 0.00 | 0.5223 |
| 2.3856970 | 56.7760 | 28.494 | 2815.8 | 10.073 | 2825.9 | 0.00 | 0.5197 |
| 2.3976254 | 57.2360 | 28.286 | 2781.3 | 10.064 | 2791.4 | 0.00 | 0.5171 |
| 2.4096136 | 57.5983 | 28.080 | 2747.3 | 10.055 | 2757.4 | 0.00 | 0.5145 |
| 2.4216616 | 57.9062 | 27.876 | 2713.8 | 10.045 | 2723.9 | 0.00 | 0.5120 |
| 2.4337699 | 58.1776 | 27.674 | 2680.8 | 10.035 | 2690.8 | 0.00 | 0.5094 |
| 2.4459388 | 58.4214 | 27.474 | 2648.1 | 10.026 | 2658.2 | 0.00 | 0.5069 |
| 2.4581685 | 58.6426 | 27.276 | 2615.9 | 10.016 | 2626.0 | 0.00 | 0.5044 |
| 2.4704593 | 58.8438 | 27.079 | 2584.2 | 10.006 | 259.42 | 0.00 | 0.5019 |
| 2.4828116 | 59.0255 | 26.886 | 2552.9 | 9.9954 | 2562.9 | 0.00 | 0.4994 |
| 2.4952257 | 59.1919 | 26.704 | 2523.1 | 9.9850 | 2533.1 | 0.00 | 0.4969 |
| 2.5077018 | 59.3466 | 26.526 | 2493.8 | 9.9745 | 2503.8 | 0.00 | 0.4944 |
| 2.5202403 | 59.4879 | 26.349 | 2464.9 | 9.9638 | 2474.8 | 0.00 | 0.4920 |
| 2.5328415 | 59.6140 | 26.175 | 2436.4 | 9.9530 | 2446.3 | 0.00 | 0.4895 |
| 2.5455057 | 59.7214 | 26.002 | 2408.3 | 9.9421 | 2418.2 | 0.00 | 0.4871 |
| 2.5582333 | 59.8036 | 25.832 | 2380.6 | 9.9310 | 2390.5 | 0.00 | 0.4846 |
| 2.5710244 | 59.8462 | 25.663 | 2353.3 | 9.9198 | 2363.2 | 0.00 | 0.4822 |
| 2.5838796 | 59.8088 | 25.496 | 2326.3 | 9.9085 | 2336.2 | 0.00 | 0.4798 |
| 2.5957502 | 59.5217 | 25.344 | 2301.9 | 9.8979 | 2311.8 | 0.00 | 0.4776 |
| 2.5967990 | 59.4512 | 25.331 | 2299.7 | 9.8970 | 2309.6 | 0.00 | 0.4775 |
| 2.6060497 | 59.6441 | 26.371 | 2385.6 | 9.8887 | 2395.5 | 0.00 | 0.4758 |
| 2.6097829 | 59.8917 | 26.323 | 2377.9 | 9.8854 | 2387.8 | 0.00 | 0.4751 |
| 2.6228319 | 60.3839 | 26.156 | 2351.1 | 9.8736 | 2361.0 | 0.00 | 0.4727 |
| 2.6359460 | 60.7114 | 25.991 | 2324.6 | 9.8617 | 2334.5 | 0.00 | 0.4704 |
| 2.6491257 | 60.9801 | 25.828 | 2298.5 | 9.8497 | 2308.4 | 0.00 | 0.4680 |
| 2.6623714 | 61.2172 | 25.666 | 2272.7 | 9.8376 | 2282.6 | 0.00 | 0.4657 |
| 2.6756832 | 61.4339 | 25.505 | 2247.2 | 9.8253 | 2257.1 | 0.00 | 0.4634 |
| 2.6890617 | 61.6361 | 25.345 | 2222.1 | 9.8129 | 2231.9 | 0.00 | 0.4611 |
| 2.7025070 | 61.8272 | 25.186 | 2197.2 | 9.8003 | 2207.0 | 0.00 | 0.4588 |
| 2.7160195 | 62.0092 | 25.029 | 2172.6 | 9.7877 | 2182.4 | 0.00 | 0.4565 |
| 2.7295996 | 62.1837 | 24.873 | 2148.3 | 9.7749 | 2158.1 | 0.00 | 0.4542 |
| 2.7432476 | 62.3521 | 24.718 | 2124.3 | 9.7619 | 2134.1 | 0.00 | 0.4520 |
| 2.7569638 | 62.5148 | 24.563 | 2100.4 | 9.7489 | 2110.2 | 0.00 | 0.4497 |
| 2.7707486 | 62.6724 | 24.408 | 2076.8 | 9.7357 | 2086.6 | 0.00 | 0.4475 |
| 2.7846024 | 62.8253 | 24.254 | 2053.5 | 9.7224 | 2063.2 | 0.00 | 0.4452 |
| 2.7985254 | 62.9741 | 24.102 | 2030.4 | 9.7089 | 2040.1 | 0.00 | 0.4430 |
| 2.8125180 | 63.1191 | 23.951 | 2007.6 | 9.6954 | 2017.3 | 0.00 | 0.4408 |
| 2.8265806 | 63.2608 | 23.800 | 1985.1 | 9.6817 | 1994.8 | 0.00 | 0.4386 |
| 2.8407135 | 63.3993 | 23.651 | 1962.8 | 9.6679 | 1972.5 | 0.00 | 0.4365 |
| 2.8549171 | 63.5351 | 23.503 | 1940.8 | 9.6539 | 1950.5 | 0.00 | 0.4343 |
| 2.8691917 | 63.6683 | 23.355 | 1919.1 | 9.6399 | 1928.7 | 0.00 | 0.4321 |
| 2.8835376 | 63.7992 | 23.209 | 1897.5 | 9.6257 | 1907.2 | 0.00 | 0.4300 |
| 2.8979553 | 63.9282 | 23.063 | 1876.3 | 9.6114 | 1885.9 | 0.00 | 0.4278 |
| 2.9124451 | 64.0556 | 22.919 | 1855.2 | 9.5970 | 1864.8 | 0.00 | 0.4257 |
| 2.9270073 | 64.1816 | 22.775 | 1834.4 | 9.5824 | 1844.0 | 0.00 | 0.4236 |
| 2.9416424 | 64.3070 | 22.632 | 1813.9 | 9.5678 | 1823.4 | 0.00 | 0.4215 |
| 2.9563506 | 64.4323 | 22.490 | 1793.5 | 9.5530 | 1803.1 | 0.00 | 0.4194 |
| 2.9711323 | 64.5588 | 22.349 | 1773.4 | 9.5381 | 1782.9 | 0.00 | 0.4173 |
| 2.9859880 | 64.6888 | 22.209 | 1753.5 | 9.5231 | 1763.0 | 0.00 | 0.4152 |
| 3.0009179 | 64.8273 | 22.068 | 1733.7 | 9.5080 | 1743.2 | 0.00 | 0.4132 |
| 3.0159225 | 64.9674 | 21.910 | 1712.7 | 9.4927 | 1722.2 | 0.00 | 0.4111 |
| 3.0310021 | 65.0948 | 21.753 | 1692.0 | 9.4774 | 1701.4 | 0.00 | 0.4091 |
| 3.0461571 | 65.2135 | 21.597 | 1671.5 | 9.4619 | 1680.9 | 0.00 | 0.4070 |
| 3.0613879 | 65.3258 | 21.442 | 1651.2 | 9.4463 | 1660.7 | 0.00 | 0.4050 |
| 3.0766949 | 65.4330 | 21.288 | 1631.2 | 9.4306 | 1640.6 | 0.00 | 0.4030 |
| 3.0920783 | 65.5355 | 21.133 | 1611.3 | 9.4148 | 1620.7 | 0.00 | 0.4010 |
| 3.1075387 | 65.6339 | 20.980 | 1591.7 | 9.3989 | 1601.1 | 0.00 | 0.3990 |
| 3.1230764 | 65.7287 | 20.828 | 1572.3 | 9.3829 | 1581.7 | 0.00 | 0.3970 |
| 3.1386918 | 65.8203 | 20.678 | 1553.2 | 9.3668 | 1562.5 | 0.00 | 0.3950 |
| 3.1543853 | 65.9090 | 20.528 | 1534.3 | 9.3505 | 1543.6 | 0.00 | 0.3931 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Hf ($Z=72$) | | | | | | | |
| 3.1701572 | 65.9951 | 20.380 | 1515.6 | 9.3342 | 1524.9 | 0.00 | 0.3911 |
| 3.1860080 | 66.0786 | 20.232 | 1497.2 | 9.3177 | 1506.5 | 0.00 | 0.3892 |
| 3.2019380 | 66.1599 | 20.086 | 1478.9 | 9.3011 | 1488.2 | 0.00 | 0.3872 |
| 3.2179477 | 66.2390 | 19.941 | 1461.0 | 9.2845 | 1470.3 | 0.00 | 0.3853 |
| 3.2340374 | 66.3161 | 19.798 | 1443.2 | 9.2677 | 1452.5 | 0.00 | 0.3834 |
| 3.2502076 | 66.3913 | 19.655 | 1425.7 | 9.2508 | 1434.9 | 0.00 | 0.3815 |
| 3.2664587 | 66.4647 | 19.513 | 1408.4 | 9.2338 | 1417.6 | 0.00 | 0.3796 |
| 3.2827910 | 66.5365 | 19.373 | 1391.3 | 9.2167 | 1400.5 | 0.00 | 0.3777 |
| 3.2992049 | 66.6066 | 19.234 | 1374.4 | 9.1996 | 1383.6 | 0.00 | 0.3758 |
| 3.3157009 | 66.6753 | 19.096 | 1357.8 | 9.1823 | 1366.9 | 0.00 | 0.3739 |
| 3.3322794 | 66.9563 | 18.955 | 1341.0 | 9.1649 | 1350.2 | 0.00 | 0.3721 |
| 3.3489408 | 67.0220 | 18.811 | 1324.3 | 9.1474 | 1333.4 | 0.00 | 0.3702 |
| 3.3656856 | 67.0856 | 18.669 | 1307.7 | 9.1298 | 1316.9 | 0.00 | 0.3684 |
| 3.3825140 | 67.1473 | 18.528 | 1291.4 | 9.1122 | 1300.5 | 0.00 | 0.3665 |
| 3.3994265 | 67.2070 | 18.388 | 1275.2 | 9.0944 | 1284.3 | 0.00 | 0.3647 |
| 3.4164237 | 67.2649 | 18.249 | 1259.3 | 9.0765 | 1268.4 | 0.00 | 0.3629 |
| 3.4335058 | 67.4643 | 18.111 | 1243.6 | 9.0585 | 1252.6 | 0.00 | 0.3611 |
| 3.4506733 | 67.5190 | 17.969 | 1227.7 | 9.0405 | 1236.7 | 0.00 | 0.3593 |
| 3.4679267 | 67.5714 | 17.829 | 1212.1 | 9.0223 | 1221.1 | 0.00 | 0.3575 |
| 3.4852663 | 67.6219 | 17.690 | 1196.6 | 9.0041 | 1205.6 | 0.00 | 0.3557 |
| 3.5026927 | 67.6704 | 17.553 | 1181.4 | 8.9858 | 1190.4 | 0.00 | 0.3540 |
| 3.5202061 | 67.7171 | 17.416 | 1166.4 | 8.9673 | 1175.4 | 0.00 | 0.3522 |
| 3.5378072 | 67.7622 | 17.281 | 1151.6 | 8.9488 | 1160.6 | 0.00 | 0.3505 |
| 3.5554962 | 67.8056 | 17.147 | 1137.0 | 8.9302 | 1145.9 | 0.00 | 0.3487 |
| 3.5732737 | 67.8474 | 17.015 | 1122.6 | 8.9115 | 1131.5 | 0.00 | 0.3470 |
| 3.5911400 | 67.8877 | 16.883 | 1108.4 | 8.8927 | 1117.3 | 0.00 | 0.3453 |
| 3.6090957 | 67.9266 | 16.753 | 1094.4 | 8.8739 | 1103.2 | 0.00 | 0.3435 |
| 3.6271412 | 67.9642 | 16.624 | 1080.5 | 8.8549 | 1089.4 | 0.00 | 0.3418 |
| 3.6452769 | 68.0004 | 16.496 | 1066.9 | 8.8359 | 1075.7 | 0.00 | 0.3401 |
| 3.6635033 | 68.0354 | 16.369 | 1053.4 | 8.8168 | 1062.2 | 0.00 | 0.3384 |
| 3.6818208 | 68.0691 | 16.244 | 1040.1 | 8.7975 | 1048.9 | 0.00 | 0.3367 |
| 3.7002299 | 68.1017 | 16.119 | 1027.0 | 8.7783 | 1035.8 | 0.00 | 0.3351 |
| 3.7187311 | 68.1331 | 15.996 | 1014.1 | 8.7589 | 1022.9 | 0.00 | 0.3334 |
| 3.7373247 | 68.1635 | 15.874 | 1001.4 | 8.7394 | 1010.1 | 0.00 | 0.3317 |
| 3.7560114 | 68.1928 | 15.753 | 988.79 | 8.7199 | 997.51 | 0.00 | 0.3301 |
| 3.7747914 | 68.2211 | 15.633 | 976.38 | 8.7003 | 985.08 | 0.00 | 0.3285 |
| 3.7936654 | 68.2484 | 15.514 | 964.14 | 8.6806 | 972.82 | 0.00 | 0.3268 |
| 3.8126337 | 68.2748 | 15.397 | 952.06 | 8.6608 | 960.72 | 0.00 | 0.3252 |
| 3.8316969 | 68.3002 | 15.280 | 940.15 | 8.6410 | 948.79 | 0.00 | 0.3236 |
| 3.8508554 | 68.3248 | 15.164 | 928.39 | 8.6211 | 937.01 | 0.00 | 0.3220 |
| 3.8701096 | 68.3485 | 15.050 | 916.79 | 8.6011 | 925.39 | 0.00 | 0.3204 |
| 3.8894602 | 68.3714 | 14.936 | 905.35 | 8.5810 | 913.93 | 0.00 | 0.3188 |
| 3.9089075 | 68.3935 | 14.824 | 894.06 | 8.5609 | 902.62 | 0.00 | 0.3172 |
| 3.9284520 | 68.4148 | 14.712 | 882.92 | 8.5407 | 891.46 | 0.00 | 0.3156 |
| 3.9480943 | 68.4354 | 14.602 | 871.93 | 8.5204 | 880.45 | 0.00 | 0.3140 |
| 3.9678347 | 68.4552 | 14.492 | 861.08 | 8.5000 | 869.58 | 0.00 | 0.3125 |
| 3.9876739 | 68.4744 | 14.384 | 850.38 | 8.4796 | 858.86 | 0.00 | 0.3109 |
| Ta ($Z=73$) | | | | | | | |
| Atomic weight: $A_r=180.9479 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=16.624$ | | | | | | | |
| σ_a (barns/atom) $=[\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 300.471$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1})=f_2(e \text{ atom}^{-1}) \times 2.32555 \times 10^5$ | | | | | | | |
| 20 edges. Edge energies (keV) | | | | | | | |
| K | 67.4164 | L I | 11.6815 | L II | 11.1361 | L III | 9.88110 |
| M I | 2.70800 | M II | 2.46870 | M III | 2.19400 | M IV | 1.79320 |
| M V | 1.73510 | N I | 0.565500 | N II | 0.464800 | N III | 0.404500 |
| N IV | 0.241300 | N V | 0.229300 | N VI | 0.0250000 | N VII | 0.0250000 |
| O I | 0.0711000 | O II | 0.0449000 | O III | 0.0364000 | O IV | 0.00570000 |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-1.4008, -0.83100) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.016156 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 12.8748 | 8.5641 | 19916 | 0.49863 | 19917 | 0.00 | 12.40 |
| 0.10050000 | 12.8726 | 8.6395 | 19992 | 0.50425 | 19992 | 0.00 | 12.34 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|------------------------------|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | photoelectric $\text{cm}^2 \text{ g}^{-1}$ | coh+inc $\text{cm}^2 \text{ g}^{-1}$ | total $\text{cm}^2 \text{ g}^{-1}$ | $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Ta ($Z=73$) | | | | | | | |
| 0.10100250 | 12.8714 | 8.7155 | 20067 | 0.50992 | 20068 | 0.00 | 12.28 |
| 0.10150751 | 12.8712 | 8.7918 | 20142 | 0.51564 | 20143 | 0.00 | 12.21 |
| 0.10201505 | 12.8719 | 8.8686 | 20217 | 0.52142 | 20217 | 0.00 | 12.15 |
| 0.10252513 | 12.8735 | 8.9457 | 20291 | 0.52725 | 20292 | 0.00 | 12.09 |
| 0.10303775 | 12.8761 | 9.0233 | 20366 | 0.53313 | 20366 | 0.00 | 12.03 |
| 0.10355294 | 12.8797 | 9.1013 | 20439 | 0.53906 | 20440 | 0.00 | 11.97 |
| 0.10407070 | 12.8842 | 9.1796 | 20513 | 0.54505 | 20513 | 0.00 | 11.91 |
| 0.10459106 | 12.8896 | 9.2583 | 20585 | 0.55109 | 20586 | 0.00 | 11.85 |
| 0.10511401 | 12.8960 | 9.3373 | 20658 | 0.55719 | 20658 | 0.00 | 11.80 |
| 0.10563958 | 12.9034 | 9.4166 | 20730 | 0.56334 | 20730 | 0.00 | 11.74 |
| 0.10616778 | 12.9116 | 9.4962 | 20801 | 0.56955 | 20802 | 0.00 | 11.68 |
| 0.10669862 | 12.9209 | 9.5762 | 20872 | 0.57581 | 20872 | 0.00 | 11.62 |
| 0.10723211 | 12.9310 | 9.6566 | 20942 | 0.58212 | 20943 | 0.00 | 11.56 |
| 0.10776827 | 12.9422 | 9.7375 | 21013 | 0.58850 | 21013 | 0.00 | 11.50 |
| 0.10830712 | 12.9542 | 9.8187 | 21083 | 0.59493 | 21083 | 0.00 | 11.45 |
| 0.10884865 | 12.9673 | 9.9001 | 21152 | 0.60141 | 21152 | 0.00 | 11.39 |
| 0.10939289 | 12.9802 | 9.9818 | 21220 | 0.60795 | 21221 | 0.00 | 11.33 |
| 0.10993986 | 12.9951 | 10.064 | 21288 | 0.61455 | 21288 | 0.00 | 11.28 |
| 0.11048956 | 13.0110 | 10.146 | 21354 | 0.62121 | 21355 | 0.00 | 11.22 |
| 0.11104201 | 13.0279 | 10.228 | 21420 | 0.62792 | 21421 | 0.00 | 11.17 |
| 0.11159722 | 13.0457 | 10.310 | 21486 | 0.63470 | 21486 | 0.00 | 11.11 |
| 0.11215520 | 13.0645 | 10.393 | 21550 | 0.64153 | 21551 | 0.00 | 11.05 |
| 0.11271598 | 13.0842 | 10.476 | 21613 | 0.64842 | 21614 | 0.00 | 11.00 |
| 0.11327956 | 13.1049 | 10.559 | 21676 | 0.65537 | 21677 | 0.00 | 10.94 |
| 0.11384596 | 13.1265 | 10.642 | 21738 | 0.66238 | 21738 | 0.00 | 10.89 |
| 0.11441519 | 13.1490 | 10.725 | 21798 | 0.66945 | 21799 | 0.00 | 10.84 |
| 0.11498726 | 13.1725 | 10.808 | 21858 | 0.67658 | 21859 | 0.00 | 10.78 |
| 0.11556220 | 13.1969 | 10.891 | 21917 | 0.68376 | 21918 | 0.00 | 10.73 |
| 0.11614001 | 13.2223 | 10.974 | 21975 | 0.69101 | 21975 | 0.00 | 10.68 |
| 0.11672071 | 13.2486 | 11.058 | 22031 | 0.69833 | 22032 | 0.00 | 10.62 |
| 0.11730431 | 13.2758 | 11.141 | 22087 | 0.70570 | 22088 | 0.00 | 10.57 |
| 0.11789083 | 13.3039 | 11.225 | 22142 | 0.71313 | 22143 | 0.00 | 10.52 |
| 0.11848029 | 13.3330 | 11.308 | 22195 | 0.72063 | 22196 | 0.00 | 10.46 |
| 0.11907269 | 13.3630 | 11.391 | 22248 | 0.72819 | 22249 | 0.00 | 10.41 |
| 0.11966805 | 13.3939 | 11.475 | 22300 | 0.73581 | 22300 | 0.00 | 10.36 |
| 0.12026639 | 13.4257 | 11.558 | 22350 | 0.74350 | 22351 | 0.00 | 10.31 |
| 0.12086772 | 13.4584 | 11.642 | 22399 | 0.75124 | 22400 | 0.00 | 10.26 |
| 0.12147206 | 13.4920 | 11.725 | 22447 | 0.75906 | 22448 | 0.00 | 10.21 |
| 0.12207942 | 13.5265 | 11.808 | 22494 | 0.76693 | 22495 | 0.00 | 10.16 |
| 0.12268982 | 13.5620 | 11.891 | 22540 | 0.77487 | 22541 | 0.00 | 10.11 |
| 0.12330327 | 13.5983 | 11.975 | 22585 | 0.78288 | 22585 | 0.00 | 10.06 |
| 0.12391979 | 13.6354 | 12.058 | 22628 | 0.79095 | 22629 | 0.00 | 10.01 |
| 0.12453939 | 13.6735 | 12.141 | 22670 | 0.79908 | 22671 | 0.00 | 9.955 |
| 0.12516208 | 13.7124 | 12.223 | 22711 | 0.80728 | 22712 | 0.00 | 9.906 |
| 0.12578789 | 13.7522 | 12.306 | 22751 | 0.81555 | 22752 | 0.00 | 9.857 |
| 0.12641683 | 13.7929 | 12.388 | 22790 | 0.82388 | 22791 | 0.00 | 9.808 |
| 0.12704892 | 13.8344 | 12.471 | 22827 | 0.83228 | 22828 | 0.00 | 9.759 |
| 0.12768416 | 13.8768 | 12.553 | 22863 | 0.84075 | 22864 | 0.00 | 9.710 |
| 0.12832258 | 13.9200 | 12.635 | 22898 | 0.84928 | 22899 | 0.00 | 9.662 |
| 0.12896419 | 13.9640 | 12.717 | 22932 | 0.85788 | 22933 | 0.00 | 9.614 |
| 0.12960902 | 14.0089 | 12.799 | 22964 | 0.86655 | 22965 | 0.00 | 9.566 |
| 0.13025706 | 14.0546 | 12.880 | 22995 | 0.87529 | 22996 | 0.00 | 9.518 |
| 0.13090835 | 14.1012 | 12.961 | 23025 | 0.88410 | 23026 | 0.00 | 9.471 |
| 0.13156289 | 14.1485 | 13.042 | 23054 | 0.89297 | 23055 | 0.00 | 9.424 |
| 0.13222070 | 14.1967 | 13.123 | 23081 | 0.90191 | 23082 | 0.00 | 9.377 |
| 0.13288181 | 14.2456 | 13.203 | 23107 | 0.91093 | 23108 | 0.00 | 9.330 |
| 0.13354621 | 14.2954 | 13.284 | 23132 | 0.92001 | 23133 | 0.00 | 9.284 |
| 0.13421395 | 14.3459 | 13.364 | 23155 | 0.92916 | 23156 | 0.00 | 9.238 |
| 0.13488502 | 14.3974 | 13.443 | 23178 | 0.93838 | 23179 | 0.00 | 9.192 |
| 0.13555944 | 14.4494 | 13.523 | 23199 | 0.94767 | 23200 | 0.00 | 9.146 |
| 0.13623724 | 14.5023 | 13.602 | 23218 | 0.95704 | 23219 | 0.00 | 9.101 |
| 0.13691842 | 14.5559 | 13.681 | 23237 | 0.96647 | 23238 | 0.00 | 9.055 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 0.13760302 | 14.6102 | 13.759 | 23254 | 0.97598 | 23255 | 0.00 | 9.010 |
| 0.13829103 | 14.6653 | 13.837 | 23269 | 0.98555 | 23270 | 0.00 | 8.965 |
| 0.13898249 | 14.7211 | 13.915 | 23284 | 0.99520 | 23285 | 0.00 | 8.921 |
| 0.13967740 | 14.7776 | 13.993 | 23297 | 1.0049 | 23298 | 0.00 | 8.876 |
| 0.14037579 | 14.8348 | 14.070 | 23309 | 1.0147 | 23310 | 0.00 | 8.832 |
| 0.14107766 | 14.8928 | 14.147 | 23320 | 1.0246 | 23321 | 0.00 | 8.788 |
| 0.14178305 | 14.9514 | 14.223 | 23329 | 1.0345 | 23330 | 0.00 | 8.745 |
| 0.14249197 | 15.0108 | 14.299 | 23337 | 1.0445 | 23338 | 0.00 | 8.701 |
| 0.14320443 | 15.0708 | 14.375 | 23344 | 1.0546 | 23345 | 0.00 | 8.658 |
| 0.14392045 | 15.1314 | 14.450 | 23349 | 1.0648 | 23350 | 0.00 | 8.615 |
| 0.14464005 | 15.1928 | 14.525 | 23354 | 1.0750 | 23355 | 0.00 | 8.572 |
| 0.14536325 | 15.2548 | 14.600 | 23357 | 1.0853 | 23358 | 0.00 | 8.529 |
| 0.14609007 | 15.3174 | 14.674 | 23358 | 1.0957 | 23359 | 0.00 | 8.487 |
| 0.14682052 | 15.3807 | 14.747 | 23359 | 1.1062 | 23360 | 0.00 | 8.445 |
| 0.14755462 | 15.4445 | 14.821 | 23358 | 1.1167 | 23359 | 0.00 | 8.403 |
| 0.14829239 | 15.5090 | 14.893 | 23356 | 1.1273 | 23357 | 0.00 | 8.361 |
| 0.14903386 | 15.5741 | 14.966 | 23353 | 1.1380 | 23354 | 0.00 | 8.319 |
| 0.14977903 | 15.6398 | 15.038 | 23348 | 1.1488 | 23349 | 0.00 | 8.278 |
| 0.15052792 | 15.7061 | 15.109 | 23343 | 1.1596 | 23344 | 0.00 | 8.237 |
| 0.15128056 | 15.7729 | 15.180 | 23336 | 1.1705 | 23337 | 0.00 | 8.196 |
| 0.15203696 | 15.8404 | 15.251 | 23328 | 1.1815 | 23329 | 0.00 | 8.155 |
| 0.15279715 | 15.9083 | 15.321 | 23318 | 1.1926 | 23319 | 0.00 | 8.114 |
| 0.15356113 | 15.9768 | 15.391 | 23308 | 1.2037 | 23309 | 0.00 | 8.074 |
| 0.15432894 | 16.0459 | 15.460 | 23296 | 1.2150 | 23297 | 0.00 | 8.034 |
| 0.15510058 | 16.1154 | 15.529 | 23283 | 1.2263 | 23284 | 0.00 | 7.994 |
| 0.15587609 | 16.1855 | 15.597 | 23269 | 1.2376 | 23270 | 0.00 | 7.954 |
| 0.15665547 | 16.2561 | 15.664 | 23254 | 1.2491 | 23255 | 0.00 | 7.914 |
| 0.15743875 | 16.3272 | 15.732 | 23238 | 1.2606 | 23239 | 0.00 | 7.875 |
| 0.15822594 | 16.3987 | 15.798 | 23220 | 1.2723 | 23221 | 0.00 | 7.836 |
| 0.15901707 | 16.4707 | 15.865 | 23201 | 1.2839 | 23203 | 0.00 | 7.797 |
| 0.15981215 | 16.5432 | 15.930 | 23182 | 1.2957 | 23183 | 0.00 | 7.758 |
| 0.16061121 | 16.6161 | 15.996 | 23161 | 1.3076 | 23162 | 0.00 | 7.720 |
| 0.16141427 | 16.6895 | 16.060 | 23139 | 1.3195 | 23140 | 0.00 | 7.681 |
| 0.16222134 | 16.7632 | 16.125 | 23116 | 1.3315 | 23117 | 0.00 | 7.643 |
| 0.16303245 | 16.8374 | 16.188 | 23091 | 1.3436 | 23093 | 0.00 | 7.605 |
| 0.16384761 | 16.9120 | 16.251 | 23066 | 1.3558 | 23068 | 0.00 | 7.567 |
| 0.16466685 | 16.9870 | 16.314 | 23040 | 1.3680 | 23041 | 0.00 | 7.529 |
| 0.16549018 | 17.0623 | 16.376 | 23013 | 1.3804 | 23014 | 0.00 | 7.492 |
| 0.16631763 | 17.1380 | 16.438 | 22984 | 1.3928 | 22986 | 0.00 | 7.455 |
| 0.16714922 | 17.2141 | 16.499 | 22955 | 1.4053 | 22956 | 0.00 | 7.418 |
| 0.16798497 | 17.2905 | 16.559 | 22924 | 1.4179 | 22926 | 0.00 | 7.381 |
| 0.16882489 | 17.3672 | 16.619 | 22893 | 1.4305 | 22894 | 0.00 | 7.344 |
| 0.16966902 | 17.4443 | 16.679 | 22860 | 1.4433 | 22862 | 0.00 | 7.307 |
| 0.17051736 | 17.5216 | 16.737 | 22827 | 1.4561 | 22828 | 0.00 | 7.271 |
| 0.17136995 | 17.5992 | 16.796 | 22792 | 1.4690 | 22794 | 0.00 | 7.235 |
| 0.17222680 | 17.6771 | 16.854 | 22757 | 1.4820 | 22759 | 0.00 | 7.199 |
| 0.17308793 | 17.7552 | 16.911 | 22721 | 1.4951 | 22722 | 0.00 | 7.163 |
| 0.17395337 | 17.8336 | 16.967 | 22683 | 1.5082 | 22685 | 0.00 | 7.127 |
| 0.17482314 | 17.9123 | 17.024 | 22645 | 1.5215 | 22647 | 0.00 | 7.092 |
| 0.17569726 | 17.9911 | 17.079 | 22606 | 1.5348 | 22608 | 0.00 | 7.057 |
| 0.17657574 | 18.0701 | 17.134 | 22566 | 1.5482 | 22568 | 0.00 | 7.022 |
| 0.17745862 | 18.1494 | 17.189 | 22525 | 1.5617 | 22527 | 0.00 | 6.987 |
| 0.17834591 | 18.2288 | 17.243 | 22483 | 1.5752 | 22485 | 0.00 | 6.952 |
| 0.17923764 | 18.3083 | 17.296 | 22441 | 1.5889 | 22442 | 0.00 | 6.917 |
| 0.18013383 | 18.3880 | 17.349 | 22397 | 1.6026 | 22399 | 0.00 | 6.883 |
| 0.18103450 | 18.4678 | 17.401 | 22353 | 1.6165 | 22355 | 0.00 | 6.849 |
| 0.18193967 | 18.5477 | 17.453 | 22308 | 1.6304 | 22309 | 0.00 | 6.815 |
| 0.18284937 | 18.6277 | 17.504 | 22262 | 1.6443 | 22264 | 0.00 | 6.781 |
| 0.18376362 | 18.7078 | 17.554 | 22215 | 1.6584 | 22217 | 0.00 | 6.747 |
| 0.18468244 | 18.7879 | 17.604 | 22168 | 1.6726 | 22169 | 0.00 | 6.713 |
| 0.18560585 | 18.8680 | 17.654 | 22119 | 1.6868 | 22121 | 0.00 | 6.680 |
| 0.18653388 | 18.9482 | 17.703 | 22070 | 1.7012 | 22072 | 0.00 | 6.647 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 0.18746655 | 19.0283 | 17.751 | 22020 | 1.7156 | 22022 | 0.00 | 6.614 |
| 0.18840388 | 19.1084 | 17.799 | 21970 | 1.7301 | 21972 | 0.00 | 6.581 |
| 0.18934590 | 19.1884 | 17.846 | 21919 | 1.7447 | 21920 | 0.00 | 6.548 |
| 0.19029263 | 19.2683 | 17.893 | 21867 | 1.7593 | 21868 | 0.00 | 6.515 |
| 0.19124409 | 19.3481 | 17.939 | 21814 | 1.7741 | 21816 | 0.00 | 6.483 |
| 0.19220031 | 19.4278 | 17.984 | 21761 | 1.7889 | 21762 | 0.00 | 6.451 |
| 0.19316131 | 19.5073 | 18.030 | 21706 | 1.8038 | 21708 | 0.00 | 6.419 |
| 0.19412712 | 19.5866 | 18.074 | 21652 | 1.8189 | 21654 | 0.00 | 6.387 |
| 0.19509776 | 19.6657 | 18.118 | 21596 | 1.8340 | 21598 | 0.00 | 6.355 |
| 0.19607325 | 19.7444 | 18.161 | 21540 | 1.8491 | 21542 | 0.00 | 6.323 |
| 0.19705361 | 19.8229 | 18.204 | 21484 | 1.8644 | 21486 | 0.00 | 6.292 |
| 0.19803888 | 19.9010 | 18.247 | 21427 | 1.8798 | 21429 | 0.00 | 6.261 |
| 0.19902907 | 19.9787 | 18.288 | 21369 | 1.8952 | 21371 | 0.00 | 6.229 |
| 0.20002422 | 20.0559 | 18.330 | 21311 | 1.9107 | 21312 | 0.00 | 6.198 |
| 0.20102434 | 20.1327 | 18.370 | 21252 | 1.9264 | 21254 | 0.00 | 6.168 |
| 0.20202946 | 20.2088 | 18.410 | 21192 | 1.9421 | 21194 | 0.00 | 6.137 |
| 0.20303961 | 20.2844 | 18.450 | 21132 | 1.9578 | 21134 | 0.00 | 6.106 |
| 0.20405481 | 20.3592 | 18.489 | 21072 | 1.9737 | 21074 | 0.00 | 6.076 |
| 0.20507508 | 20.4332 | 18.528 | 21011 | 1.9897 | 21013 | 0.00 | 6.046 |
| 0.20610046 | 20.5063 | 18.566 | 20949 | 2.0057 | 20951 | 0.00 | 6.016 |
| 0.20713096 | 20.5785 | 18.603 | 20887 | 2.0219 | 20889 | 0.00 | 5.986 |
| 0.20816661 | 20.6495 | 18.640 | 20824 | 2.0381 | 20826 | 0.00 | 5.956 |
| 0.20920745 | 20.7192 | 18.677 | 20761 | 2.0544 | 20763 | 0.00 | 5.926 |
| 0.21025348 | 20.7876 | 18.713 | 20698 | 2.0708 | 20700 | 0.00 | 5.897 |
| 0.21130475 | 20.8543 | 18.748 | 20634 | 2.0873 | 20636 | 0.00 | 5.868 |
| 0.21236128 | 20.9192 | 18.783 | 20570 | 2.1038 | 20572 | 0.00 | 5.838 |
| 0.21342308 | 20.9841 | 18.818 | 20505 | 2.1205 | 20507 | 0.00 | 5.809 |
| 0.21449020 | 21.0445 | 18.852 | 20440 | 2.1372 | 20442 | 0.00 | 5.780 |
| 0.21556265 | 21.1022 | 18.885 | 20374 | 2.1541 | 20376 | 0.00 | 5.752 |
| 0.21664046 | 21.1565 | 18.918 | 20308 | 2.1710 | 20310 | 0.00 | 5.723 |
| 0.21772366 | 21.2070 | 18.951 | 20242 | 2.1880 | 20244 | 0.00 | 5.695 |
| 0.21881228 | 21.2528 | 18.983 | 20175 | 2.2051 | 20177 | 0.00 | 5.666 |
| 0.21990634 | 21.2929 | 19.014 | 20108 | 2.2223 | 20110 | 0.00 | 5.638 |
| 0.22100588 | 21.3258 | 19.045 | 20041 | 2.2395 | 20043 | 0.00 | 5.610 |
| 0.22211090 | 21.3495 | 19.076 | 19973 | 2.2569 | 19975 | 0.00 | 5.582 |
| 0.22322146 | 21.3608 | 19.106 | 19905 | 2.2743 | 19907 | 0.00 | 5.554 |
| 0.22433757 | 21.3548 | 19.136 | 19837 | 2.2918 | 19839 | 0.00 | 5.527 |
| 0.22545925 | 21.3227 | 19.165 | 19768 | 2.3094 | 19770 | 0.00 | 5.499 |
| 0.22658655 | 21.2460 | 19.194 | 19699 | 2.3271 | 19702 | 0.00 | 5.472 |
| 0.22771948 | 21.0755 | 19.222 | 19630 | 2.3449 | 19632 | 0.00 | 5.445 |
| 0.22885808 | 20.5488 | 19.250 | 19561 | 2.3628 | 19563 | 0.00 | 5.418 |
| 0.22912551 | 20.1182 | 19.256 | 19544 | 2.3670 | 19547 | 0.00 | 5.411 |
| 0.22947450 | 20.1515 | 20.798 | 21077 | 2.3725 | 21080 | 0.00 | 5.403 |
| 0.23000237 | 20.8776 | 20.801 | 21032 | 2.3807 | 21035 | 0.00 | 5.391 |
| 0.23115238 | 21.4396 | 20.809 | 20935 | 2.3988 | 20937 | 0.00 | 5.364 |
| 0.23230814 | 21.7556 | 20.816 | 20838 | 2.4169 | 20840 | 0.00 | 5.337 |
| 0.23346969 | 21.9858 | 20.822 | 20741 | 2.4351 | 20743 | 0.00 | 5.311 |
| 0.23463703 | 22.1673 | 20.829 | 20644 | 2.4534 | 20647 | 0.00 | 5.284 |
| 0.23581022 | 22.3129 | 20.836 | 20548 | 2.4718 | 20550 | 0.00 | 5.258 |
| 0.23698927 | 22.4251 | 20.842 | 20452 | 2.4903 | 20454 | 0.00 | 5.232 |
| 0.23817422 | 22.4973 | 20.848 | 20356 | 2.5088 | 20359 | 0.00 | 5.206 |
| 0.23936509 | 22.5048 | 20.854 | 20260 | 2.5275 | 20263 | 0.00 | 5.180 |
| 0.24056191 | 22.3329 | 20.860 | 20165 | 2.5462 | 20168 | 0.00 | 5.154 |
| 0.24111348 | 21.9165 | 20.862 | 20122 | 2.5548 | 20124 | 0.00 | 5.142 |
| 0.24148653 | 21.9736 | 21.999 | 21186 | 2.5607 | 21188 | 0.00 | 5.134 |
| 0.24176472 | 22.3450 | 21.997 | 21159 | 2.5650 | 21161 | 0.00 | 5.128 |
| 0.24297355 | 22.9759 | 21.985 | 21043 | 2.5839 | 21045 | 0.00 | 5.103 |
| 0.24418841 | 23.3313 | 21.974 | 20927 | 2.6029 | 20930 | 0.00 | 5.077 |
| 0.24540936 | 23.6106 | 21.963 | 20812 | 2.6220 | 20815 | 0.00 | 5.052 |
| 0.24663640 | 23.8518 | 21.951 | 20698 | 2.6411 | 20701 | 0.00 | 5.027 |
| 0.24786959 | 24.0694 | 21.940 | 20585 | 2.6604 | 20587 | 0.00 | 5.002 |
| 0.24910893 | 24.2706 | 21.929 | 20472 | 2.6797 | 20475 | 0.00 | 4.977 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 0.25035448 | 24.4594 | 21.918 | 20360 | 2.6991 | 20363 | 0.00 | 4.952 |
| 0.25160625 | 24.6386 | 21.907 | 20248 | 2.7186 | 20251 | 0.00 | 4.928 |
| 0.25286428 | 24.8097 | 21.895 | 20137 | 2.7382 | 20139 | 0.00 | 4.903 |
| 0.25412860 | 24.9737 | 21.875 | 20018 | 2.7578 | 20021 | 0.00 | 4.879 |
| 0.25539925 | 25.1317 | 21.856 | 19901 | 2.7776 | 19904 | 0.00 | 4.855 |
| 0.25667624 | 25.2844 | 21.837 | 19785 | 2.7974 | 19788 | 0.00 | 4.830 |
| 0.25795962 | 25.4326 | 21.819 | 19670 | 2.8173 | 19673 | 0.00 | 4.806 |
| 0.25924942 | 25.5769 | 21.801 | 19556 | 2.8373 | 19559 | 0.00 | 4.782 |
| 0.26054567 | 25.7176 | 21.784 | 19444 | 2.8574 | 19447 | 0.00 | 4.759 |
| 0.26184840 | 25.8552 | 21.767 | 19332 | 2.8776 | 19335 | 0.00 | 4.735 |
| 0.26315764 | 25.9882 | 21.743 | 19215 | 2.8978 | 19218 | 0.00 | 4.711 |
| 0.26447343 | 26.1181 | 21.719 | 19098 | 2.9181 | 19101 | 0.00 | 4.688 |
| 0.26579579 | 26.2449 | 21.696 | 18983 | 2.9386 | 18985 | 0.00 | 4.665 |
| 0.26712477 | 26.3690 | 21.673 | 18868 | 2.9590 | 18871 | 0.00 | 4.641 |
| 0.26846040 | 26.4904 | 21.650 | 18755 | 2.9796 | 18758 | 0.00 | 4.618 |
| 0.26980270 | 26.6096 | 21.629 | 18643 | 3.0003 | 18646 | 0.00 | 4.595 |
| 0.27115171 | 26.7268 | 21.608 | 18532 | 3.0210 | 18535 | 0.00 | 4.573 |
| 0.27250747 | 26.8421 | 21.587 | 18422 | 3.0418 | 18425 | 0.00 | 4.550 |
| 0.27387001 | 26.9557 | 21.567 | 18314 | 3.0627 | 18317 | 0.00 | 4.527 |
| 0.27523936 | 27.0677 | 21.548 | 18206 | 3.0837 | 18209 | 0.00 | 4.505 |
| 0.27661556 | 27.1783 | 21.529 | 18100 | 3.1048 | 18103 | 0.00 | 4.482 |
| 0.27799863 | 27.2875 | 21.510 | 17994 | 3.1259 | 17997 | 0.00 | 4.460 |
| 0.27938863 | 27.3954 | 21.492 | 17889 | 3.1471 | 17893 | 0.00 | 4.438 |
| 0.28078557 | 27.5021 | 21.474 | 17786 | 3.1684 | 17789 | 0.00 | 4.416 |
| 0.28218950 | 27.6077 | 21.457 | 17683 | 3.1898 | 17686 | 0.00 | 4.394 |
| 0.28360044 | 27.7122 | 21.439 | 17581 | 3.2112 | 17584 | 0.00 | 4.372 |
| 0.28501845 | 27.8157 | 21.422 | 17479 | 3.2328 | 17482 | 0.00 | 4.350 |
| 0.28644354 | 27.9182 | 21.406 | 17379 | 3.2544 | 17382 | 0.00 | 4.328 |
| 0.28787576 | 28.0198 | 21.389 | 17279 | 3.2761 | 17282 | 0.00 | 4.307 |
| 0.28931514 | 28.1205 | 21.373 | 17180 | 3.2978 | 17183 | 0.00 | 4.285 |
| 0.29076171 | 28.2203 | 21.357 | 17081 | 3.3197 | 17085 | 0.00 | 4.264 |
| 0.29221552 | 28.3193 | 21.341 | 16984 | 3.3416 | 16987 | 0.00 | 4.243 |
| 0.29367660 | 28.4174 | 21.325 | 16887 | 3.3636 | 16890 | 0.00 | 4.222 |
| 0.29514498 | 28.5149 | 21.309 | 16790 | 3.3857 | 16794 | 0.00 | 4.201 |
| 0.29662071 | 28.6115 | 21.294 | 16695 | 3.4078 | 16698 | 0.00 | 4.180 |
| 0.29810381 | 28.7074 | 21.278 | 16600 | 3.4300 | 16603 | 0.00 | 4.159 |
| 0.29959433 | 28.8026 | 21.263 | 16505 | 3.4523 | 16509 | 0.00 | 4.138 |
| 0.30109230 | 28.8971 | 21.248 | 16411 | 3.4747 | 16415 | 0.00 | 4.118 |
| 0.30259776 | 28.9909 | 21.233 | 16318 | 3.4972 | 16322 | 0.00 | 4.097 |
| 0.30411075 | 29.0841 | 21.218 | 16225 | 3.5197 | 16229 | 0.00 | 4.077 |
| 0.30563130 | 29.1766 | 21.203 | 16133 | 3.5423 | 16137 | 0.00 | 4.057 |
| 0.30715946 | 29.2684 | 21.188 | 16042 | 3.5649 | 16045 | 0.00 | 4.036 |
| 0.30869526 | 29.3596 | 21.173 | 15951 | 3.5877 | 15954 | 0.00 | 4.016 |
| 0.31023873 | 29.4502 | 21.159 | 15861 | 3.6105 | 15864 | 0.00 | 3.996 |
| 0.31178993 | 29.5401 | 21.144 | 15771 | 3.6334 | 15774 | 0.00 | 3.977 |
| 0.31334888 | 29.6295 | 21.129 | 15681 | 3.6563 | 15685 | 0.00 | 3.957 |
| 0.31491562 | 29.7182 | 21.115 | 15593 | 3.6794 | 15596 | 0.00 | 3.937 |
| 0.31649020 | 29.8063 | 21.100 | 15504 | 3.7025 | 15508 | 0.00 | 3.917 |
| 0.31807265 | 29.8938 | 21.086 | 15417 | 3.7256 | 15420 | 0.00 | 3.898 |
| 0.31966301 | 29.9807 | 21.071 | 15329 | 3.7489 | 15333 | 0.00 | 3.879 |
| 0.32126133 | 30.0670 | 21.057 | 15243 | 3.7722 | 15246 | 0.00 | 3.859 |
| 0.32286764 | 30.1527 | 21.043 | 15157 | 3.7956 | 15160 | 0.00 | 3.840 |
| 0.32448197 | 30.2378 | 21.028 | 15071 | 3.8190 | 15075 | 0.00 | 3.821 |
| 0.32610438 | 30.3224 | 21.014 | 14986 | 3.8425 | 14990 | 0.00 | 3.802 |
| 0.32773491 | 30.4063 | 21.000 | 14901 | 3.8661 | 14905 | 0.00 | 3.783 |
| 0.32937358 | 30.4896 | 20.986 | 14817 | 3.8897 | 14821 | 0.00 | 3.764 |
| 0.33102045 | 30.5722 | 20.971 | 14733 | 3.9134 | 14737 | 0.00 | 3.746 |
| 0.33267555 | 30.6543 | 20.957 | 14650 | 3.9372 | 14654 | 0.00 | 3.727 |
| 0.33433893 | 30.7358 | 20.943 | 14567 | 3.9611 | 14571 | 0.00 | 3.708 |
| 0.33601062 | 30.8166 | 20.929 | 14485 | 3.9850 | 14489 | 0.00 | 3.690 |
| 0.33769068 | 30.8968 | 20.915 | 14403 | 4.0089 | 14407 | 0.00 | 3.672 |
| 0.33937913 | 30.9763 | 20.901 | 14322 | 4.0330 | 14326 | 0.00 | 3.653 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 0.34107602 | 31.0552 | 20.887 | 14241 | 4.0571 | 14245 | 0.00 | 3.635 |
| 0.34278140 | 31.1333 | 20.873 | 14161 | 4.0812 | 14165 | 0.00 | 3.617 |
| 0.34449531 | 31.2108 | 20.859 | 14081 | 4.1055 | 14085 | 0.00 | 3.599 |
| 0.34621779 | 31.2876 | 20.845 | 14002 | 4.1297 | 14006 | 0.00 | 3.581 |
| 0.34794888 | 31.3637 | 20.832 | 13923 | 4.1541 | 13927 | 0.00 | 3.563 |
| 0.34968862 | 31.4390 | 20.818 | 13845 | 4.1785 | 13849 | 0.00 | 3.546 |
| 0.35143706 | 31.5135 | 20.804 | 13767 | 4.2030 | 13771 | 0.00 | 3.528 |
| 0.35319425 | 31.5871 | 20.791 | 13689 | 4.2275 | 13693 | 0.00 | 3.510 |
| 0.35496022 | 31.6600 | 20.777 | 13612 | 4.2521 | 13616 | 0.00 | 3.493 |
| 0.35673502 | 31.7319 | 20.764 | 13536 | 4.2767 | 13540 | 0.00 | 3.476 |
| 0.35851870 | 31.8029 | 20.750 | 13460 | 4.3014 | 13464 | 0.00 | 3.458 |
| 0.36031129 | 31.8729 | 20.737 | 13384 | 4.3262 | 13388 | 0.00 | 3.441 |
| 0.36211285 | 31.9419 | 20.723 | 13309 | 4.3510 | 13313 | 0.00 | 3.424 |
| 0.36392341 | 32.0097 | 20.710 | 13234 | 4.3759 | 13238 | 0.00 | 3.407 |
| 0.36574303 | 32.0764 | 20.697 | 13160 | 4.4008 | 13164 | 0.00 | 3.390 |
| 0.36757174 | 32.1417 | 20.684 | 13086 | 4.4258 | 13090 | 0.00 | 3.373 |
| 0.36940960 | 32.2056 | 20.670 | 13013 | 4.4508 | 13017 | 0.00 | 3.356 |
| 0.37125665 | 32.2680 | 20.657 | 12940 | 4.4759 | 12944 | 0.00 | 3.340 |
| 0.37311293 | 32.3287 | 20.644 | 12867 | 4.5010 | 12872 | 0.00 | 3.323 |
| 0.37497850 | 32.3875 | 20.631 | 12795 | 4.5262 | 12800 | 0.00 | 3.306 |
| 0.37685339 | 32.4442 | 20.619 | 12724 | 4.5514 | 12728 | 0.00 | 3.290 |
| 0.37873766 | 32.4985 | 20.606 | 12653 | 4.5767 | 12657 | 0.00 | 3.274 |
| 0.38063135 | 32.5500 | 20.593 | 12582 | 4.6021 | 12586 | 0.00 | 3.257 |
| 0.38253450 | 32.5984 | 20.580 | 12512 | 4.6275 | 12516 | 0.00 | 3.241 |
| 0.38444718 | 32.6431 | 20.568 | 12442 | 4.6529 | 12446 | 0.00 | 3.225 |
| 0.38636941 | 32.6833 | 20.555 | 12372 | 4.6784 | 12377 | 0.00 | 3.209 |
| 0.38830126 | 32.7181 | 20.543 | 12303 | 4.7039 | 12308 | 0.00 | 3.193 |
| 0.39024276 | 32.7460 | 20.531 | 12235 | 4.7295 | 12239 | 0.00 | 3.177 |
| 0.39219398 | 32.7651 | 20.518 | 12167 | 4.7551 | 12171 | 0.00 | 3.161 |
| 0.39415495 | 32.7724 | 20.506 | 12099 | 4.7808 | 12104 | 0.00 | 3.146 |
| 0.39612572 | 32.7627 | 20.494 | 12031 | 4.8065 | 12036 | 0.00 | 3.130 |
| 0.39810635 | 32.7270 | 20.482 | 11965 | 4.8323 | 11969 | 0.00 | 3.114 |
| 0.40009688 | 32.6455 | 20.470 | 11898 | 4.8581 | 11903 | 0.00 | 3.099 |
| 0.40209737 | 32.4609 | 20.458 | 11832 | 4.8839 | 11837 | 0.00 | 3.083 |
| 0.40397820 | 31.8647 | 20.447 | 11771 | 4.9082 | 11775 | 0.00 | 3.069 |
| 0.40410785 | 31.7442 | 20.446 | 11766 | 4.9098 | 11771 | 0.00 | 3.068 |
| 0.40502181 | 31.9057 | 21.823 | 12531 | 4.9216 | 12535 | 0.00 | 3.061 |
| 0.40612839 | 32.4501 | 21.819 | 12494 | 4.9358 | 12499 | 0.00 | 3.053 |
| 0.40815904 | 32.8876 | 21.811 | 12427 | 4.9617 | 12432 | 0.00 | 3.038 |
| 0.41019983 | 33.1646 | 21.803 | 12361 | 4.9877 | 12366 | 0.00 | 3.023 |
| 0.41225083 | 33.3823 | 21.795 | 12295 | 5.0138 | 12300 | 0.00 | 3.007 |
| 0.41431208 | 33.5687 | 21.788 | 12229 | 5.0399 | 12235 | 0.00 | 2.993 |
| 0.41638364 | 33.7359 | 21.780 | 12164 | 5.0660 | 12169 | 0.00 | 2.978 |
| 0.41846556 | 33.8900 | 21.772 | 12100 | 5.0921 | 12105 | 0.00 | 2.963 |
| 0.42055789 | 34.0346 | 21.765 | 12035 | 5.1183 | 12040 | 0.00 | 2.948 |
| 0.42266068 | 34.1720 | 21.757 | 11971 | 5.1446 | 11976 | 0.00 | 2.933 |
| 0.42477398 | 34.3037 | 21.750 | 11908 | 5.1708 | 11913 | 0.00 | 2.919 |
| 0.42689785 | 34.4309 | 21.743 | 11845 | 5.1971 | 11850 | 0.00 | 2.904 |
| 0.42903234 | 34.5542 | 21.736 | 11782 | 5.2235 | 11787 | 0.00 | 2.890 |
| 0.43117750 | 34.6744 | 21.729 | 11719 | 5.2498 | 11724 | 0.00 | 2.875 |
| 0.43333339 | 34.7917 | 21.721 | 11657 | 5.2762 | 11662 | 0.00 | 2.861 |
| 0.43550006 | 34.9065 | 21.714 | 11595 | 5.3026 | 11601 | 0.00 | 2.847 |
| 0.43767756 | 35.0190 | 21.707 | 11534 | 5.3291 | 11539 | 0.00 | 2.833 |
| 0.43986595 | 35.1294 | 21.701 | 11473 | 5.3556 | 11478 | 0.00 | 2.819 |
| 0.44206528 | 35.2378 | 21.694 | 11412 | 5.3821 | 11418 | 0.00 | 2.805 |
| 0.44427560 | 35.3441 | 21.687 | 11352 | 5.4086 | 11357 | 0.00 | 2.791 |
| 0.44649698 | 35.4482 | 21.680 | 11292 | 5.4352 | 11297 | 0.00 | 2.777 |
| 0.44872947 | 35.5500 | 21.673 | 11232 | 5.4617 | 11238 | 0.00 | 2.763 |
| 0.45097311 | 35.6489 | 21.667 | 11173 | 5.4884 | 11178 | 0.00 | 2.749 |
| 0.45322798 | 35.7443 | 21.660 | 11114 | 5.5150 | 11119 | 0.00 | 2.736 |
| 0.45549412 | 35.8349 | 21.653 | 11055 | 5.5416 | 11061 | 0.00 | 2.722 |
| 0.45777159 | 35.9182 | 21.647 | 10997 | 5.5683 | 11002 | 0.00 | 2.708 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 0.46006045 | 35.9887 | 21.640 | 10939 | 5.5950 | 10944 | 0.00 | 2.695 |
| 0.46236075 | 36.0289 | 21.633 | 10881 | 5.6217 | 10887 | 0.00 | 2.682 |
| 0.46412139 | 35.9738 | 21.628 | 10837 | 5.6421 | 10843 | 0.00 | 2.671 |
| 0.46467255 | 35.8159 | 21.627 | 10823 | 5.6485 | 10829 | 0.00 | 2.668 |
| 0.46547861 | 36.0396 | 21.972 | 10977 | 5.6578 | 10983 | 0.00 | 2.664 |
| 0.46699592 | 36.2432 | 21.969 | 10940 | 5.6752 | 10946 | 0.00 | 2.655 |
| 0.46933090 | 36.4370 | 21.964 | 10883 | 5.7020 | 10889 | 0.00 | 2.642 |
| 0.47167755 | 36.5981 | 21.915 | 10805 | 5.7288 | 10811 | 0.00 | 2.629 |
| 0.47403594 | 36.7442 | 21.864 | 10726 | 5.7556 | 10732 | 0.00 | 2.616 |
| 0.47640612 | 36.8813 | 21.813 | 10648 | 5.7824 | 10654 | 0.00 | 2.602 |
| 0.47878815 | 37.0123 | 21.762 | 10570 | 5.8093 | 10576 | 0.00 | 2.590 |
| 0.48118209 | 37.1385 | 21.712 | 10493 | 5.8361 | 10499 | 0.00 | 2.577 |
| 0.48358800 | 37.2609 | 21.661 | 10417 | 5.8630 | 10422 | 0.00 | 2.564 |
| 0.48600594 | 37.3800 | 21.610 | 10340 | 5.8898 | 10346 | 0.00 | 2.551 |
| 0.48843597 | 37.4963 | 21.559 | 10265 | 5.9167 | 10271 | 0.00 | 2.538 |
| 0.49087815 | 37.6100 | 21.509 | 10190 | 5.9436 | 10196 | 0.00 | 2.526 |
| 0.49333254 | 37.7214 | 21.458 | 10115 | 5.9705 | 10121 | 0.00 | 2.513 |
| 0.49579920 | 37.8307 | 21.407 | 10041 | 5.9974 | 10047 | 0.00 | 2.501 |
| 0.49827820 | 37.9379 | 21.357 | 9967.5 | 6.0243 | 9973.5 | 0.00 | 2.488 |
| 0.50076959 | 38.0432 | 21.306 | 9894.4 | 6.0512 | 9900.5 | 0.00 | 2.476 |
| 0.50327344 | 38.1467 | 21.256 | 9821.8 | 6.0782 | 9827.9 | 0.00 | 2.464 |
| 0.50578980 | 38.2484 | 21.205 | 9749.7 | 6.1051 | 9755.9 | 0.00 | 2.451 |
| 0.50831875 | 38.3484 | 21.154 | 9678.1 | 6.1320 | 9684.3 | 0.00 | 2.439 |
| 0.51086035 | 38.4467 | 21.104 | 9607.0 | 6.1589 | 9613.2 | 0.00 | 2.427 |
| 0.51341465 | 38.5433 | 21.054 | 9536.4 | 6.1859 | 9542.5 | 0.00 | 2.415 |
| 0.51598172 | 38.6383 | 21.003 | 9466.2 | 6.2128 | 9472.4 | 0.00 | 2.403 |
| 0.51856163 | 38.7317 | 20.953 | 9396.5 | 6.2397 | 9402.7 | 0.00 | 2.391 |
| 0.52115444 | 38.8234 | 20.902 | 9327.2 | 6.2667 | 9333.5 | 0.00 | 2.379 |
| 0.52376021 | 38.9134 | 20.852 | 9258.4 | 6.2936 | 9264.7 | 0.00 | 2.367 |
| 0.52637901 | 39.0017 | 20.801 | 9190.1 | 6.3205 | 9196.4 | 0.00 | 2.355 |
| 0.52901091 | 39.0882 | 20.751 | 9122.2 | 6.3475 | 9128.6 | 0.00 | 2.344 |
| 0.53165596 | 39.1728 | 20.701 | 9054.8 | 6.3744 | 9061.1 | 0.00 | 2.332 |
| 0.53431424 | 39.2553 | 20.650 | 8987.8 | 6.4013 | 8994.2 | 0.00 | 2.320 |
| 0.53698581 | 39.3356 | 20.600 | 8921.2 | 6.4282 | 8927.7 | 0.00 | 2.309 |
| 0.53967074 | 39.4135 | 20.549 | 8855.1 | 6.4551 | 8861.6 | 0.00 | 2.297 |
| 0.54236910 | 39.4885 | 20.499 | 8789.4 | 6.4819 | 8795.9 | 0.00 | 2.286 |
| 0.54508094 | 39.5603 | 20.448 | 8724.2 | 6.5088 | 8730.7 | 0.00 | 2.275 |
| 0.54780635 | 39.6281 | 20.398 | 8659.3 | 6.5357 | 8665.9 | 0.00 | 2.263 |
| 0.55054538 | 39.6910 | 20.347 | 8594.9 | 6.5625 | 8601.5 | 0.00 | 2.252 |
| 0.55329810 | 39.7470 | 20.297 | 8530.9 | 6.5894 | 8537.5 | 0.00 | 2.241 |
| 0.55606460 | 39.7932 | 20.246 | 8467.4 | 6.6162 | 8474.0 | 0.00 | 2.230 |
| 0.55884492 | 39.8231 | 20.196 | 8404.2 | 6.6430 | 8410.8 | 0.00 | 2.219 |
| 0.56163914 | 39.8191 | 20.145 | 8341.4 | 6.6698 | 8348.1 | 0.00 | 2.208 |
| 0.56444734 | 39.6866 | 20.095 | 8279.1 | 6.6966 | 8285.8 | 0.00 | 2.197 |
| 0.56457826 | 39.6682 | 20.092 | 8276.2 | 6.6978 | 8282.9 | 0.00 | 2.196 |
| 0.56642179 | 39.7246 | 20.590 | 8453.6 | 6.7153 | 8460.3 | 0.00 | 2.189 |
| 0.56726958 | 39.8605 | 20.575 | 8434.9 | 6.7233 | 8441.6 | 0.00 | 2.186 |
| 0.57010592 | 40.1080 | 20.525 | 8372.6 | 6.7500 | 8379.3 | 0.00 | 2.175 |
| 0.57295645 | 40.2747 | 20.475 | 8310.6 | 6.7768 | 8317.4 | 0.00 | 2.164 |
| 0.57582123 | 40.4145 | 20.425 | 8249.1 | 6.8034 | 8255.9 | 0.00 | 2.153 |
| 0.57870034 | 40.5403 | 20.375 | 8188.0 | 6.8301 | 8194.8 | 0.00 | 2.142 |
| 0.58159384 | 40.6575 | 20.325 | 8127.2 | 6.8568 | 8134.1 | 0.00 | 2.132 |
| 0.58450181 | 40.7687 | 20.275 | 8066.9 | 6.8834 | 8073.7 | 0.00 | 2.121 |
| 0.58742432 | 40.8755 | 20.225 | 8006.9 | 6.9100 | 8013.8 | 0.00 | 2.111 |
| 0.59036144 | 40.9788 | 20.175 | 7947.3 | 6.9366 | 7954.2 | 0.00 | 2.100 |
| 0.59331325 | 41.0792 | 20.125 | 7888.0 | 6.9631 | 7895.0 | 0.00 | 2.090 |
| 0.59627982 | 41.1773 | 20.074 | 7829.2 | 6.9896 | 7836.2 | 0.00 | 2.079 |
| 0.59926122 | 41.2734 | 20.024 | 7770.7 | 7.0161 | 7777.7 | 0.00 | 2.069 |
| 0.60225752 | 41.3676 | 19.973 | 7712.5 | 7.0426 | 7719.6 | 0.00 | 2.059 |
| 0.60526881 | 41.4602 | 19.923 | 7654.8 | 7.0690 | 7661.8 | 0.00 | 2.048 |
| 0.60829515 | 41.5515 | 19.872 | 7597.3 | 7.0954 | 7604.4 | 0.00 | 2.038 |
| 0.61133663 | 41.6414 | 19.822 | 7540.3 | 7.1217 | 7547.4 | 0.00 | 2.028 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 0.61439331 | 41.7300 | 19.771 | 7483.6 | 7.1481 | 7490.7 | 0.00 | 2.018 |
| 0.61746528 | 41.8176 | 19.720 | 7427.2 | 7.1743 | 7434.4 | 0.00 | 2.008 |
| 0.62055260 | 41.9041 | 19.669 | 7371.2 | 7.2006 | 7378.4 | 0.00 | 1.998 |
| 0.62365537 | 41.9897 | 19.619 | 7315.6 | 7.2268 | 7322.8 | 0.00 | 1.988 |
| 0.62677364 | 42.0743 | 19.568 | 7260.2 | 7.2530 | 7267.5 | 0.00 | 1.978 |
| 0.62990751 | 42.1580 | 19.516 | 7205.3 | 7.2791 | 7212.5 | 0.00 | 1.968 |
| 0.63305705 | 42.2409 | 19.465 | 7150.6 | 7.3052 | 7157.9 | 0.00 | 1.959 |
| 0.63622234 | 42.3229 | 19.414 | 7096.3 | 7.3313 | 7103.6 | 0.00 | 1.949 |
| 0.63940345 | 42.4041 | 19.363 | 7042.3 | 7.3573 | 7049.6 | 0.00 | 1.939 |
| 0.64260046 | 42.4846 | 19.311 | 6988.6 | 7.3833 | 6996.0 | 0.00 | 1.929 |
| 0.64581347 | 42.5643 | 19.259 | 6935.3 | 7.4092 | 6942.7 | 0.00 | 1.920 |
| 0.64904253 | 42.6433 | 19.208 | 6882.2 | 7.4351 | 6889.7 | 0.00 | 1.910 |
| 0.65228775 | 42.7216 | 19.156 | 6829.5 | 7.4609 | 6837.0 | 0.00 | 1.901 |
| 0.65554919 | 42.7991 | 19.104 | 6777.1 | 7.4867 | 6784.6 | 0.00 | 1.891 |
| 0.65882693 | 42.8760 | 19.052 | 6725.1 | 7.5124 | 6732.6 | 0.00 | 1.882 |
| 0.66212107 | 42.9523 | 19.000 | 6673.3 | 7.5381 | 6680.8 | 0.00 | 1.873 |
| 0.66543167 | 43.0278 | 18.948 | 6621.8 | 7.5637 | 6629.4 | 0.00 | 1.863 |
| 0.66875883 | 43.1027 | 18.895 | 6570.7 | 7.5893 | 6578.3 | 0.00 | 1.854 |
| 0.67210262 | 43.1770 | 18.843 | 6519.9 | 7.6148 | 6527.5 | 0.00 | 1.845 |
| 0.67546314 | 43.2507 | 18.790 | 6469.3 | 7.6403 | 6477.0 | 0.00 | 1.836 |
| 0.67884045 | 43.3237 | 18.738 | 6419.1 | 7.6657 | 6426.8 | 0.00 | 1.826 |
| 0.68223466 | 43.3961 | 18.685 | 6369.2 | 7.6911 | 6376.9 | 0.00 | 1.817 |
| 0.68564583 | 43.4679 | 18.632 | 6319.6 | 7.7164 | 6327.3 | 0.00 | 1.808 |
| 0.68907406 | 43.5370 | 18.579 | 6270.2 | 7.7417 | 6277.9 | 0.00 | 1.799 |
| 0.69251943 | 43.6076 | 18.526 | 6221.1 | 7.7669 | 6228.9 | 0.00 | 1.790 |
| 0.69598202 | 43.6776 | 18.472 | 6172.4 | 7.7920 | 6180.2 | 0.00 | 1.781 |
| 0.69946194 | 43.7471 | 18.419 | 6123.9 | 7.8171 | 6131.7 | 0.00 | 1.773 |
| 0.70295924 | 43.8159 | 18.365 | 6075.7 | 7.8421 | 6083.6 | 0.00 | 1.764 |
| 0.70647404 | 43.8842 | 18.312 | 6027.8 | 7.8670 | 6035.7 | 0.00 | 1.755 |
| 0.71000641 | 43.9519 | 18.258 | 5980.2 | 7.8919 | 5988.1 | 0.00 | 1.746 |
| 0.71355644 | 44.0190 | 18.204 | 5932.9 | 7.9167 | 5940.9 | 0.00 | 1.738 |
| 0.71712423 | 44.0855 | 18.150 | 5885.9 | 7.9415 | 5893.9 | 0.00 | 1.729 |
| 0.72070985 | 44.1515 | 18.096 | 5839.2 | 7.9662 | 5847.2 | 0.00 | 1.720 |
| 0.72431340 | 44.2237 | 18.042 | 5792.8 | 7.9908 | 5800.7 | 0.00 | 1.712 |
| 0.72793496 | 44.2886 | 17.988 | 5746.6 | 8.0153 | 5754.6 | 0.00 | 1.703 |
| 0.73157464 | 44.3529 | 17.933 | 5700.7 | 8.0398 | 5708.8 | 0.00 | 1.695 |
| 0.73523251 | 44.4167 | 17.879 | 5655.2 | 8.0642 | 5663.2 | 0.00 | 1.686 |
| 0.73890867 | 44.4799 | 17.824 | 5609.8 | 8.0886 | 5617.9 | 0.00 | 1.678 |
| 0.74260322 | 44.5426 | 17.770 | 5564.8 | 8.1128 | 5572.9 | 0.00 | 1.670 |
| 0.74631623 | 44.6047 | 17.715 | 5520.1 | 8.1370 | 5528.2 | 0.00 | 1.661 |
| 0.75004781 | 44.6662 | 17.660 | 5475.6 | 8.1611 | 5483.8 | 0.00 | 1.653 |
| 0.75379805 | 44.7272 | 17.605 | 5431.4 | 8.1852 | 5439.6 | 0.00 | 1.645 |
| 0.75756704 | 44.7876 | 17.550 | 5387.5 | 8.2091 | 5395.7 | 0.00 | 1.637 |
| 0.76135488 | 44.8475 | 17.495 | 5343.9 | 8.2330 | 5352.1 | 0.00 | 1.628 |
| 0.76516165 | 44.9069 | 17.440 | 5300.5 | 8.2568 | 5308.8 | 0.00 | 1.620 |
| 0.76898746 | 44.9657 | 17.385 | 5257.5 | 8.2805 | 5265.7 | 0.00 | 1.612 |
| 0.77283240 | 45.0239 | 17.329 | 5214.7 | 8.3042 | 5223.0 | 0.00 | 1.604 |
| 0.77669656 | 45.0817 | 17.274 | 5172.1 | 8.3277 | 5180.4 | 0.00 | 1.596 |
| 0.78058004 | 45.1389 | 17.219 | 5129.9 | 8.3512 | 5138.2 | 0.00 | 1.588 |
| 0.78448294 | 45.1956 | 17.163 | 5087.9 | 8.3746 | 5096.2 | 0.00 | 1.580 |
| 0.78840536 | 45.2517 | 17.107 | 5046.0 | 8.3979 | 5054.4 | 0.00 | 1.573 |
| 0.79234738 | 45.3072 | 17.051 | 5004.4 | 8.4212 | 5012.9 | 0.00 | 1.565 |
| 0.79630912 | 45.3622 | 16.995 | 4963.1 | 8.4443 | 4971.6 | 0.00 | 1.557 |
| 0.80029067 | 45.4165 | 16.938 | 4922.1 | 8.4673 | 4930.5 | 0.00 | 1.549 |
| 0.80429212 | 45.4703 | 16.882 | 4881.3 | 8.4903 | 4889.7 | 0.00 | 1.542 |
| 0.80831358 | 45.5234 | 16.825 | 4840.7 | 8.5132 | 4849.2 | 0.00 | 1.534 |
| 0.81235515 | 45.5760 | 16.769 | 4800.4 | 8.5360 | 4809.0 | 0.00 | 1.526 |
| 0.81641693 | 45.6280 | 16.712 | 4760.4 | 8.5586 | 4769.0 | 0.00 | 1.519 |
| 0.82049901 | 45.6794 | 16.656 | 4720.7 | 8.5812 | 4729.3 | 0.00 | 1.511 |
| 0.82460150 | 45.7303 | 16.599 | 4681.2 | 8.6037 | 4689.8 | 0.00 | 1.504 |
| 0.82872451 | 45.7806 | 16.542 | 4642.0 | 8.6262 | 4650.6 | 0.00 | 1.496 |
| 0.83286813 | 45.8303 | 16.485 | 4603.0 | 8.6485 | 4611.6 | 0.00 | 1.489 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 0.83703248 | 45.8794 | 16.428 | 4564.3 | 8.6707 | 4573.0 | 0.00 | 1.481 |
| 0.84121764 | 45.9280 | 16.371 | 4525.8 | 8.6928 | 4534.5 | 0.00 | 1.474 |
| 0.84542373 | 45.9760 | 16.314 | 4487.6 | 8.7148 | 4496.3 | 0.00 | 1.467 |
| 0.84965084 | 46.0234 | 16.257 | 4449.7 | 8.7368 | 4458.4 | 0.00 | 1.459 |
| 0.85389910 | 46.0702 | 16.200 | 4412.0 | 8.7586 | 4420.8 | 0.00 | 1.452 |
| 0.85816859 | 46.1166 | 16.143 | 4374.6 | 8.7803 | 4383.3 | 0.00 | 1.445 |
| 0.86245944 | 46.1623 | 16.086 | 4337.4 | 8.8019 | 4346.2 | 0.00 | 1.438 |
| 0.86677173 | 46.2075 | 16.029 | 4300.5 | 8.8234 | 4309.3 | 0.00 | 1.430 |
| 0.87110559 | 46.2522 | 15.971 | 4263.8 | 8.8449 | 4272.6 | 0.00 | 1.423 |
| 0.87546112 | 46.2963 | 15.914 | 4227.4 | 8.8662 | 4236.2 | 0.00 | 1.416 |
| 0.87983843 | 46.3398 | 15.857 | 4191.2 | 8.8874 | 4200.1 | 0.00 | 1.409 |
| 0.88423762 | 46.3829 | 15.799 | 4155.3 | 8.9085 | 4164.2 | 0.00 | 1.402 |
| 0.88865881 | 46.4254 | 15.742 | 4119.6 | 8.9295 | 4128.5 | 0.00 | 1.395 |
| 0.89310210 | 46.4674 | 15.685 | 4084.2 | 8.9503 | 4093.1 | 0.00 | 1.388 |
| 0.89756761 | 46.5089 | 15.627 | 4049.0 | 8.9711 | 4058.0 | 0.00 | 1.381 |
| 0.90205545 | 46.5499 | 15.570 | 4014.1 | 8.9918 | 4023.0 | 0.00 | 1.374 |
| 0.90656573 | 46.5903 | 15.513 | 3979.4 | 9.0123 | 3988.4 | 0.00 | 1.368 |
| 0.91109856 | 46.6304 | 15.455 | 3944.9 | 9.0328 | 3954.0 | 0.00 | 1.361 |
| 0.91565405 | 46.6699 | 15.398 | 3910.7 | 9.0531 | 3919.8 | 0.00 | 1.354 |
| 0.92023232 | 46.7090 | 15.341 | 3876.8 | 9.0733 | 3885.9 | 0.00 | 1.347 |
| 0.92483348 | 46.7477 | 15.283 | 3843.1 | 9.0934 | 3852.2 | 0.00 | 1.341 |
| 0.92945765 | 46.7859 | 15.226 | 3809.6 | 9.1134 | 3818.7 | 0.00 | 1.334 |
| 0.93410494 | 46.8237 | 15.169 | 3776.4 | 9.1333 | 3785.5 | 0.00 | 1.327 |
| 0.93877546 | 46.8612 | 15.111 | 3743.4 | 9.1530 | 3752.5 | 0.00 | 1.321 |
| 0.94346934 | 46.8983 | 15.054 | 3710.6 | 9.1727 | 3719.8 | 0.00 | 1.314 |
| 0.94818668 | 46.9350 | 14.996 | 3678.1 | 9.1922 | 3687.2 | 0.00 | 1.308 |
| 0.95292762 | 46.9715 | 14.939 | 3645.8 | 9.2116 | 3655.0 | 0.00 | 1.301 |
| 0.95769226 | 47.0078 | 14.882 | 3613.7 | 9.2309 | 3622.9 | 0.00 | 1.295 |
| 0.96248072 | 47.0438 | 14.824 | 3581.8 | 9.2500 | 3591.1 | 0.00 | 1.288 |
| 0.96729312 | 47.0796 | 14.767 | 3550.2 | 9.2691 | 3559.5 | 0.00 | 1.282 |
| 0.97212959 | 47.1154 | 14.709 | 3518.8 | 9.2880 | 3528.1 | 0.00 | 1.275 |
| 0.97699023 | 47.1512 | 14.652 | 3487.7 | 9.3068 | 3497.0 | 0.00 | 1.269 |
| 0.98187519 | 47.1871 | 14.595 | 3456.8 | 9.3255 | 3466.1 | 0.00 | 1.263 |
| 0.98678456 | 47.2233 | 14.538 | 3426.2 | 9.3440 | 3435.5 | 0.00 | 1.256 |
| 0.99171848 | 47.2599 | 14.481 | 3395.8 | 9.3624 | 3405.2 | 0.00 | 1.250 |
| 0.99667708 | 47.2974 | 14.424 | 3365.7 | 9.3807 | 3375.0 | 0.00 | 1.244 |
| 1.0016605 | 47.3377 | 14.355 | 3332.8 | 9.3989 | 3342.2 | 0.00 | 1.238 |
| 1.0066688 | 47.3679 | 14.260 | 3294.3 | 9.4169 | 3303.7 | 0.00 | 1.232 |
| 1.0117021 | 47.3922 | 14.166 | 3256.2 | 9.4348 | 3265.7 | 0.00 | 1.226 |
| 1.0167606 | 47.4135 | 14.073 | 3218.7 | 9.4526 | 3228.2 | 0.00 | 1.219 |
| 1.0218444 | 47.4322 | 13.980 | 3181.6 | 9.4702 | 3191.1 | 0.00 | 1.213 |
| 1.0269536 | 47.4487 | 13.888 | 3145.1 | 9.4878 | 3154.5 | 0.00 | 1.207 |
| 1.0320884 | 47.4631 | 13.798 | 3108.9 | 9.5052 | 3118.4 | 0.00 | 1.201 |
| 1.0372489 | 47.4754 | 13.707 | 3073.3 | 9.5224 | 3082.8 | 0.00 | 1.195 |
| 1.0424351 | 47.4857 | 13.618 | 3038.0 | 9.5395 | 3047.6 | 0.00 | 1.189 |
| 1.0476473 | 47.4940 | 13.530 | 3003.3 | 9.5565 | 3012.8 | 0.00 | 1.183 |
| 1.0528855 | 47.5005 | 13.442 | 2968.9 | 9.5734 | 2978.5 | 0.00 | 1.178 |
| 1.0581499 | 47.5051 | 13.355 | 2935.0 | 9.5901 | 2944.6 | 0.00 | 1.172 |
| 1.0634407 | 47.5079 | 13.268 | 2901.6 | 9.6067 | 2911.2 | 0.00 | 1.166 |
| 1.0687579 | 47.5088 | 13.183 | 2868.5 | 9.6231 | 2878.1 | 0.00 | 1.160 |
| 1.0741017 | 47.5080 | 13.098 | 2835.9 | 9.6394 | 2845.5 | 0.00 | 1.154 |
| 1.0794722 | 47.5055 | 13.014 | 2803.6 | 9.6556 | 2813.3 | 0.00 | 1.149 |
| 1.0848695 | 47.5012 | 12.930 | 2771.8 | 9.6716 | 2781.5 | 0.00 | 1.143 |
| 1.0902939 | 47.4952 | 12.848 | 2740.4 | 9.6875 | 2750.1 | 0.00 | 1.137 |
| 1.0957454 | 47.4875 | 12.766 | 2709.3 | 9.7033 | 2719.1 | 0.00 | 1.132 |
| 1.1012241 | 47.4781 | 12.685 | 2678.7 | 9.7189 | 2688.4 | 0.00 | 1.126 |
| 1.1067302 | 47.4670 | 12.604 | 2648.4 | 9.7344 | 2658.2 | 0.00 | 1.120 |
| 1.1122639 | 47.4543 | 12.524 | 2618.5 | 9.7497 | 2628.3 | 0.00 | 1.115 |
| 1.1178252 | 47.4400 | 12.445 | 2589.0 | 9.7649 | 2598.8 | 0.00 | 1.109 |
| 1.1234143 | 47.4239 | 12.366 | 2559.9 | 9.7799 | 2569.7 | 0.00 | 1.104 |
| 1.1290314 | 47.4063 | 12.288 | 2531.1 | 9.7948 | 2540.9 | 0.00 | 1.098 |
| 1.1346765 | 47.3870 | 12.211 | 2502.7 | 9.8096 | 2512.5 | 0.00 | 1.093 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 1.1403499 | 47.3660 | 12.134 | 2474.6 | 9.8242 | 2484.4 | 0.00 | 1.087 |
| 1.1460517 | 47.3434 | 12.058 | 2446.9 | 9.8387 | 2456.7 | 0.00 | 1.082 |
| 1.1517819 | 47.3191 | 11.983 | 2419.5 | 9.8530 | 2429.3 | 0.00 | 1.076 |
| 1.1575408 | 47.2932 | 11.908 | 2392.4 | 9.8672 | 2402.3 | 0.00 | 1.071 |
| 1.1633285 | 47.2657 | 11.834 | 2365.7 | 9.8812 | 2375.6 | 0.00 | 1.066 |
| 1.1691452 | 47.2364 | 11.761 | 2339.3 | 9.8951 | 2349.2 | 0.00 | 1.060 |
| 1.1749909 | 47.2055 | 11.688 | 2313.3 | 9.9088 | 2323.2 | 0.00 | 1.055 |
| 1.1808659 | 47.1729 | 11.616 | 2287.5 | 9.9224 | 2297.4 | 0.00 | 1.050 |
| 1.1867702 | 47.1386 | 11.544 | 2262.1 | 9.9358 | 2272.0 | 0.00 | 1.045 |
| 1.1927040 | 47.1026 | 11.473 | 2237.0 | 9.9491 | 2246.9 | 0.00 | 1.040 |
| 1.1986676 | 47.0648 | 11.402 | 2212.2 | 9.9622 | 2222.1 | 0.00 | 1.034 |
| 1.2046609 | 47.0253 | 11.332 | 2187.7 | 9.9752 | 2197.6 | 0.00 | 1.029 |
| 1.2106842 | 46.9840 | 11.263 | 2163.4 | 9.9881 | 2173.4 | 0.00 | 1.024 |
| 1.2167376 | 46.9387 | 11.194 | 2139.5 | 10.001 | 2149.5 | 0.00 | 1.019 |
| 1.2228213 | 46.8938 | 11.126 | 2115.9 | 10.013 | 2125.9 | 0.00 | 1.014 |
| 1.2289354 | 46.8471 | 11.058 | 2092.6 | 10.026 | 2102.6 | 0.00 | 1.009 |
| 1.2350801 | 46.7984 | 10.991 | 2069.5 | 10.038 | 2079.6 | 0.00 | 1.004 |
| 1.2412555 | 46.7478 | 10.925 | 2046.8 | 10.050 | 2056.8 | 0.00 | 0.9989 |
| 1.2474618 | 46.6953 | 10.859 | 2024.3 | 10.062 | 2034.3 | 0.00 | 0.9939 |
| 1.2536991 | 46.6408 | 10.793 | 2002.1 | 10.074 | 2012.1 | 0.00 | 0.9889 |
| 1.2599676 | 46.5842 | 10.728 | 1980.1 | 10.085 | 1990.2 | 0.00 | 0.9840 |
| 1.2662674 | 46.5256 | 10.664 | 1958.4 | 10.097 | 1968.5 | 0.00 | 0.9791 |
| 1.2725988 | 46.4648 | 10.600 | 1937.0 | 10.108 | 1947.1 | 0.00 | 0.9743 |
| 1.2789618 | 46.4019 | 10.536 | 1915.8 | 10.119 | 1925.9 | 0.00 | 0.9694 |
| 1.2853566 | 46.3368 | 10.473 | 1894.9 | 10.130 | 1905.0 | 0.00 | 0.9646 |
| 1.2917833 | 46.2693 | 10.411 | 1874.3 | 10.141 | 1884.4 | 0.00 | 0.9598 |
| 1.2982423 | 46.1996 | 10.349 | 1853.8 | 10.152 | 1864.0 | 0.00 | 0.9550 |
| 1.3047335 | 46.1274 | 10.288 | 1833.7 | 10.162 | 1843.8 | 0.00 | 0.9503 |
| 1.3112571 | 46.0527 | 10.227 | 1813.8 | 10.172 | 1823.9 | 0.00 | 0.9455 |
| 1.3178134 | 45.9756 | 10.166 | 1794.1 | 10.183 | 1804.3 | 0.00 | 0.9408 |
| 1.3244025 | 45.8958 | 10.106 | 1774.6 | 10.193 | 1784.8 | 0.00 | 0.9362 |
| 1.3310245 | 45.8132 | 10.047 | 1755.4 | 10.202 | 1765.6 | 0.00 | 0.9315 |
| 1.3376796 | 45.7280 | 9.9880 | 1736.4 | 10.212 | 1746.6 | 0.00 | 0.9269 |
| 1.3443680 | 45.6398 | 9.9294 | 1717.6 | 10.222 | 1727.9 | 0.00 | 0.9222 |
| 1.3510899 | 45.5486 | 9.8713 | 1699.1 | 10.231 | 1709.3 | 0.00 | 0.9177 |
| 1.3578453 | 45.4544 | 9.8137 | 1680.8 | 10.240 | 1691.0 | 0.00 | 0.9131 |
| 1.3646345 | 45.3569 | 9.7565 | 1662.7 | 10.249 | 1672.9 | 0.00 | 0.9086 |
| 1.3714577 | 45.2561 | 9.6997 | 1644.8 | 10.258 | 1655.0 | 0.00 | 0.9040 |
| 1.3783150 | 45.1519 | 9.6434 | 1627.1 | 10.267 | 1637.3 | 0.00 | 0.8995 |
| 1.3852066 | 45.0441 | 9.5875 | 1609.6 | 10.276 | 1619.9 | 0.00 | 0.8951 |
| 1.3921326 | 44.9325 | 9.5321 | 1592.3 | 10.284 | 1602.6 | 0.00 | 0.8906 |
| 1.3990933 | 44.8183 | 9.4771 | 1575.3 | 10.292 | 1585.6 | 0.00 | 0.8862 |
| 1.4060887 | 44.6988 | 9.4226 | 1558.4 | 10.300 | 1568.7 | 0.00 | 0.8818 |
| 1.4131192 | 44.5751 | 9.3684 | 1541.7 | 10.308 | 1552.1 | 0.00 | 0.8774 |
| 1.4201848 | 44.4469 | 9.3147 | 1525.3 | 10.316 | 1535.6 | 0.00 | 0.8730 |
| 1.4272857 | 44.3141 | 9.2614 | 1509.0 | 10.324 | 1519.3 | 0.00 | 0.8687 |
| 1.4344221 | 44.1763 | 9.2086 | 1492.9 | 10.331 | 1503.3 | 0.00 | 0.8643 |
| 1.4415942 | 44.0335 | 9.1561 | 1477.0 | 10.338 | 1487.4 | 0.00 | 0.8600 |
| 1.4488022 | 43.8852 | 9.1040 | 1461.3 | 10.345 | 1471.7 | 0.00 | 0.8558 |
| 1.4560462 | 43.7312 | 9.0524 | 1445.8 | 10.352 | 1456.2 | 0.00 | 0.8515 |
| 1.4633265 | 43.5713 | 9.0011 | 1430.5 | 10.359 | 1440.8 | 0.00 | 0.8473 |
| 1.4706431 | 43.4049 | 8.9502 | 1415.3 | 10.366 | 1425.7 | 0.00 | 0.8431 |
| 1.4779963 | 43.2318 | 8.8998 | 1400.3 | 10.372 | 1410.7 | 0.00 | 0.8389 |
| 1.4853863 | 43.0516 | 8.8497 | 1385.5 | 10.378 | 1395.9 | 0.00 | 0.8347 |
| 1.4928132 | 42.8638 | 8.8000 | 1370.9 | 10.385 | 1381.3 | 0.00 | 0.8305 |
| 1.5002773 | 42.6679 | 8.7507 | 1356.4 | 10.391 | 1366.8 | 0.00 | 0.8264 |
| 1.5077787 | 42.4634 | 8.7017 | 1342.1 | 10.396 | 1352.5 | 0.00 | 0.8223 |
| 1.5153176 | 42.2496 | 8.6532 | 1328.0 | 10.402 | 1338.4 | 0.00 | 0.8182 |
| 1.5228942 | 42.0259 | 8.6050 | 1314.0 | 10.407 | 1324.4 | 0.00 | 0.8141 |
| 1.5305086 | 41.7915 | 8.5571 | 1300.2 | 10.413 | 1310.6 | 0.00 | 0.8101 |
| 1.5381612 | 41.5455 | 8.5097 | 1286.6 | 10.418 | 1297.0 | 0.00 | 0.8061 |
| 1.5458520 | 41.2872 | 8.4626 | 1273.1 | 10.423 | 1283.5 | 0.00 | 0.8020 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 1.5535812 | 41.0153 | 8.4158 | 1259.8 | 10.427 | 1270.2 | 0.00 | 0.7981 |
| 1.5613491 | 40.7286 | 8.3694 | 1246.6 | 10.432 | 1257.0 | 0.00 | 0.7941 |
| 1.5691559 | 40.4259 | 8.3234 | 1233.6 | 10.437 | 1244.0 | 0.00 | 0.7901 |
| 1.5770017 | 40.1054 | 8.2777 | 1220.7 | 10.441 | 1231.1 | 0.00 | 0.7862 |
| 1.5848867 | 39.7655 | 8.2324 | 1208.0 | 10.445 | 1218.4 | 0.00 | 0.7823 |
| 1.5928111 | 39.4038 | 8.1874 | 1195.4 | 10.449 | 1205.8 | 0.00 | 0.7784 |
| 1.6007752 | 39.0180 | 8.1427 | 1182.9 | 10.453 | 1193.4 | 0.00 | 0.7745 |
| 1.6087790 | 38.6051 | 8.0984 | 1170.7 | 10.456 | 1181.1 | 0.00 | 0.7707 |
| 1.6168229 | 38.1615 | 8.0544 | 1158.5 | 10.460 | 1169.0 | 0.00 | 0.7668 |
| 1.6249070 | 37.6829 | 8.0094 | 1146.3 | 10.463 | 1156.8 | 0.00 | 0.7630 |
| 1.6330316 | 37.1639 | 7.9646 | 1134.2 | 10.466 | 1144.7 | 0.00 | 0.7592 |
| 1.6411967 | 36.5981 | 7.9201 | 1122.3 | 10.469 | 1132.7 | 0.00 | 0.7555 |
| 1.6494027 | 35.9770 | 7.8760 | 1110.5 | 10.472 | 1120.9 | 0.00 | 0.7517 |
| 1.6576497 | 35.2899 | 7.8322 | 1098.8 | 10.474 | 1109.3 | 0.00 | 0.7480 |
| 1.6659380 | 34.5223 | 7.7887 | 1087.3 | 10.477 | 1097.7 | 0.00 | 0.7442 |
| 1.6742677 | 33.6544 | 7.7455 | 1075.9 | 10.479 | 1086.3 | 0.00 | 0.7405 |
| 1.6826390 | 32.6576 | 7.7027 | 1064.6 | 10.481 | 1075.1 | 0.00 | 0.7368 |
| 1.6910522 | 31.4889 | 7.6602 | 1053.4 | 10.483 | 1063.9 | 0.00 | 0.7332 |
| 1.6995075 | 30.0801 | 7.6180 | 1042.4 | 10.485 | 1052.9 | 0.00 | 0.7295 |
| 1.7080050 | 28.2994 | 7.5761 | 1031.5 | 10.486 | 1042.0 | 0.00 | 0.7259 |
| 1.7165450 | 25.8762 | 7.5346 | 1020.8 | 10.488 | 1031.3 | 0.00 | 0.7223 |
| 1.7251278 | 22.0117 | 7.4933 | 1010.1 | 10.489 | 1020.6 | 0.00 | 0.7187 |
| 1.7337534 | 10.0711 | 7.4524 | 999.62 | 10.490 | 1010.1 | 0.00 | 0.7151 |
| 1.7347877 | 1.51614 | 7.4475 | 998.37 | 10.490 | 1008.9 | 0.00 | 0.7147 |
| 1.7354123 | 1.19537 | 25.774 | 3453.9 | 10.490 | 3464.4 | 0.00 | 0.7144 |
| 1.7424222 | 19.3420 | 25.625 | 3420.0 | 10.491 | 3430.5 | 0.00 | 0.7116 |
| 1.7511343 | 23.4233 | 25.441 | 3378.6 | 10.492 | 3389.1 | 0.00 | 0.7080 |
| 1.7598899 | 25.2767 | 25.259 | 3337.8 | 10.492 | 3348.2 | 0.00 | 0.7045 |
| 1.7686894 | 26.0669 | 25.078 | 3297.4 | 10.493 | 3307.9 | 0.00 | 0.7010 |
| 1.7775328 | 25.9037 | 24.899 | 3257.5 | 10.493 | 3268.0 | 0.00 | 0.6975 |
| 1.7864205 | 23.9938 | 24.721 | 3218.1 | 10.493 | 3228.6 | 0.00 | 0.6940 |
| 1.7926172 | 15.3905 | 24.598 | 3191.1 | 10.493 | 3201.6 | 0.00 | 0.6916 |
| 1.7937828 | 15.3399 | 36.635 | 4749.6 | 10.493 | 4760.1 | 0.00 | 0.6912 |
| 1.7953526 | 20.5553 | 36.588 | 4739.3 | 10.493 | 4749.8 | 0.00 | 0.6906 |
| 1.8043294 | 27.8700 | 36.322 | 4681.4 | 10.493 | 4691.9 | 0.00 | 0.6871 |
| 1.8133510 | 31.0235 | 36.057 | 4624.2 | 10.492 | 4634.6 | 0.00 | 0.6837 |
| 1.8224178 | 33.2274 | 35.794 | 4567.6 | 10.492 | 4578.1 | 0.00 | 0.6803 |
| 1.8315299 | 34.9701 | 35.534 | 4511.8 | 10.491 | 4522.3 | 0.00 | 0.6769 |
| 1.8406875 | 36.4297 | 35.275 | 4456.7 | 10.490 | 4467.2 | 0.00 | 0.6736 |
| 1.8498909 | 37.6932 | 35.019 | 4402.3 | 10.489 | 4412.8 | 0.00 | 0.6702 |
| 1.8591404 | 38.8107 | 34.764 | 4348.6 | 10.488 | 4359.0 | 0.00 | 0.6669 |
| 1.8684361 | 39.8139 | 34.510 | 4295.3 | 10.486 | 4305.8 | 0.00 | 0.6636 |
| 1.8777783 | 40.7245 | 34.259 | 4242.8 | 10.485 | 4253.3 | 0.00 | 0.6603 |
| 1.8871672 | 41.5580 | 34.009 | 4190.9 | 10.483 | 4201.4 | 0.00 | 0.6570 |
| 1.8966030 | 42.3260 | 33.761 | 4139.7 | 10.481 | 4150.2 | 0.00 | 0.6537 |
| 1.9060860 | 43.0373 | 33.515 | 4089.1 | 10.479 | 4099.5 | 0.00 | 0.6505 |
| 1.9156165 | 43.6990 | 33.271 | 4039.1 | 10.477 | 4049.6 | 0.00 | 0.6472 |
| 1.9251945 | 44.3166 | 33.029 | 3989.7 | 10.475 | 4000.2 | 0.00 | 0.6440 |
| 1.9348205 | 44.8947 | 32.788 | 3941.0 | 10.472 | 3951.5 | 0.00 | 0.6408 |
| 1.9444946 | 45.4369 | 32.550 | 3892.9 | 10.469 | 3903.3 | 0.00 | 0.6376 |
| 1.9542171 | 45.9464 | 32.313 | 3845.3 | 10.466 | 3855.8 | 0.00 | 0.6344 |
| 1.9639882 | 46.4258 | 32.078 | 3798.4 | 10.463 | 3808.8 | 0.00 | 0.6313 |
| 1.9738081 | 46.8771 | 31.845 | 3752.0 | 10.460 | 3762.5 | 0.00 | 0.6281 |
| 1.9836772 | 47.3022 | 31.614 | 3706.2 | 10.457 | 3716.7 | 0.00 | 0.6250 |
| 1.9935955 | 47.7026 | 31.384 | 3661.0 | 10.453 | 3671.5 | 0.00 | 0.6219 |
| 2.0035635 | 48.0794 | 31.157 | 3616.4 | 10.449 | 3626.8 | 0.00 | 0.6188 |
| 2.0135813 | 48.4337 | 30.931 | 3572.3 | 10.446 | 3582.7 | 0.00 | 0.6157 |
| 2.0236492 | 48.7662 | 30.706 | 3528.7 | 10.442 | 3539.2 | 0.00 | 0.6127 |
| 2.0337675 | 49.0774 | 30.484 | 3485.7 | 10.437 | 3496.1 | 0.00 | 0.6096 |
| 2.0439363 | 49.3674 | 30.263 | 3443.2 | 10.433 | 3453.7 | 0.00 | 0.6066 |
| 2.0541560 | 49.6364 | 30.043 | 3401.3 | 10.429 | 3411.7 | 0.00 | 0.6036 |
| 2.0644268 | 49.8840 | 29.826 | 3359.9 | 10.424 | 3370.3 | 0.00 | 0.6006 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 2.0747489 | 50.1095 | 29.610 | 3318.9 | 10.419 | 3329.4 | 0.00 | 0.5976 |
| 2.0851227 | 50.3117 | 29.396 | 3278.5 | 10.414 | 3288.9 | 0.00 | 0.5946 |
| 2.0955483 | 50.4889 | 29.183 | 3238.6 | 10.409 | 3249.0 | 0.00 | 0.5917 |
| 2.1060260 | 50.6384 | 28.972 | 3199.2 | 10.404 | 3209.6 | 0.00 | 0.5887 |
| 2.1165562 | 50.7562 | 28.763 | 3160.3 | 10.398 | 3170.7 | 0.00 | 0.5858 |
| 2.1271389 | 50.8362 | 28.555 | 3121.8 | 10.392 | 3132.2 | 0.00 | 0.5829 |
| 2.1377746 | 50.8686 | 28.349 | 3083.9 | 10.387 | 3094.3 | 0.00 | 0.5800 |
| 2.1484635 | 50.8373 | 28.144 | 3046.4 | 10.381 | 3056.8 | 0.00 | 0.5771 |
| 2.1592058 | 50.7121 | 27.941 | 3009.4 | 10.375 | 3019.7 | 0.00 | 0.5742 |
| 2.1700018 | 50.4274 | 27.740 | 2972.8 | 10.368 | 2983.2 | 0.00 | 0.5714 |
| 2.1808519 | 49.7924 | 27.540 | 2936.7 | 10.362 | 2947.0 | 0.00 | 0.5685 |
| 2.1917561 | 47.3967 | 27.341 | 2901.0 | 10.355 | 2911.4 | 0.00 | 0.5657 |
| 2.1963695 | 47.5241 | 32.008 | 3389.1 | 10.353 | 3399.4 | 0.00 | 0.5645 |
| 2.2027149 | 49.6584 | 31.866 | 3364.3 | 10.349 | 3374.6 | 0.00 | 0.5629 |
| 2.2137285 | 51.1518 | 31.621 | 3321.8 | 10.342 | 3332.1 | 0.00 | 0.5601 |
| 2.2247971 | 52.0640 | 31.377 | 3279.8 | 10.335 | 3290.2 | 0.00 | 0.5573 |
| 2.2359211 | 52.7545 | 31.136 | 3238.4 | 10.328 | 3248.8 | 0.00 | 0.5545 |
| 2.2471007 | 53.3238 | 30.897 | 3197.6 | 10.320 | 3207.9 | 0.00 | 0.5518 |
| 2.2583362 | 53.8141 | 30.658 | 3157.1 | 10.313 | 3167.4 | 0.00 | 0.5490 |
| 2.2696279 | 54.2458 | 30.416 | 3116.6 | 10.305 | 3126.9 | 0.00 | 0.5463 |
| 2.2809760 | 54.6310 | 30.176 | 3076.5 | 10.297 | 3086.8 | 0.00 | 0.5436 |
| 2.2923809 | 54.9771 | 29.937 | 3037.0 | 10.289 | 3047.3 | 0.00 | 0.5409 |
| 2.3038428 | 55.2874 | 29.704 | 2998.4 | 10.281 | 3008.6 | 0.00 | 0.5382 |
| 2.3153620 | 55.5725 | 29.489 | 2961.9 | 10.273 | 2972.2 | 0.00 | 0.5355 |
| 2.3269388 | 55.8396 | 29.278 | 2926.0 | 10.265 | 2936.3 | 0.00 | 0.5328 |
| 2.3385735 | 56.0885 | 29.066 | 2890.4 | 10.256 | 2900.7 | 0.00 | 0.5302 |
| 2.3502664 | 56.3185 | 28.856 | 2855.2 | 10.247 | 2865.5 | 0.00 | 0.5275 |
| 2.3620177 | 56.5300 | 28.648 | 2820.5 | 10.239 | 2830.8 | 0.00 | 0.5249 |
| 2.3738278 | 56.7226 | 28.442 | 2786.4 | 10.230 | 2796.6 | 0.00 | 0.5223 |
| 2.3856970 | 56.8952 | 28.239 | 2752.7 | 10.221 | 2762.9 | 0.00 | 0.5197 |
| 2.3976254 | 57.0457 | 28.038 | 2719.5 | 10.211 | 2729.7 | 0.00 | 0.5171 |
| 2.4096136 | 57.1701 | 27.840 | 2686.8 | 10.202 | 2697.0 | 0.00 | 0.5145 |
| 2.4216616 | 57.2608 | 27.643 | 2654.6 | 10.192 | 2664.8 | 0.00 | 0.5120 |
| 2.4337699 | 57.3030 | 27.449 | 2622.8 | 10.182 | 2633.0 | 0.00 | 0.5094 |
| 2.4459388 | 57.2607 | 27.256 | 2591.5 | 10.173 | 2601.6 | 0.00 | 0.5069 |
| 2.4581685 | 57.0077 | 27.066 | 2560.6 | 10.163 | 2570.7 | 0.00 | 0.5044 |
| 2.4657375 | 56.3718 | 26.949 | 2541.7 | 10.156 | 2551.9 | 0.00 | 0.5028 |
| 2.4704593 | 56.1112 | 28.778 | 2709.0 | 10.152 | 2719.2 | 0.00 | 0.5019 |
| 2.4716624 | 56.4484 | 28.758 | 2705.8 | 10.151 | 2715.9 | 0.00 | 0.5016 |
| 2.4828116 | 57.5794 | 28.566 | 2675.7 | 10.142 | 2685.8 | 0.00 | 0.4994 |
| 2.4952257 | 58.1520 | 28.356 | 2642.8 | 10.132 | 2652.9 | 0.00 | 0.4969 |
| 2.5077018 | 58.5644 | 28.148 | 2610.3 | 10.121 | 2620.5 | 0.00 | 0.4944 |
| 2.5202403 | 58.9024 | 27.942 | 2578.3 | 10.110 | 2588.4 | 0.00 | 0.4920 |
| 2.5328415 | 59.1946 | 27.738 | 2546.8 | 10.100 | 2556.9 | 0.00 | 0.4895 |
| 2.5455057 | 59.4544 | 27.536 | 2515.6 | 10.089 | 2525.7 | 0.00 | 0.4871 |
| 2.5582333 | 59.6887 | 27.335 | 2484.9 | 10.077 | 2495.0 | 0.00 | 0.4846 |
| 2.5710244 | 59.9011 | 27.137 | 2454.6 | 10.066 | 2464.6 | 0.00 | 0.4822 |
| 2.5838796 | 60.0933 | 26.940 | 2424.6 | 10.055 | 2434.7 | 0.00 | 0.4798 |
| 2.5967990 | 60.2657 | 26.752 | 2395.7 | 10.043 | 2405.8 | 0.00 | 0.4775 |
| 2.6097829 | 60.4255 | 26.572 | 2367.8 | 10.031 | 2377.8 | 0.00 | 0.4751 |
| 2.6228319 | 60.5724 | 26.395 | 2340.3 | 10.020 | 2350.3 | 0.00 | 0.4727 |
| 2.6359460 | 60.7044 | 26.220 | 2313.2 | 10.008 | 2323.2 | 0.00 | 0.4704 |
| 2.6491257 | 60.8183 | 26.047 | 2286.6 | 9.9955 | 2296.6 | 0.00 | 0.4680 |
| 2.6623714 | 60.9079 | 25.876 | 2260.3 | 9.9833 | 2270.3 | 0.00 | 0.4657 |
| 2.6756832 | 60.9602 | 25.707 | 2234.3 | 9.9709 | 2244.3 | 0.00 | 0.4634 |
| 2.6890617 | 60.9393 | 25.540 | 2208.8 | 9.9584 | 2218.7 | 0.00 | 0.4611 |
| 2.7025070 | 60.6585 | 25.375 | 2183.5 | 9.9458 | 2193.5 | 0.00 | 0.4588 |
| 2.7027735 | 60.6437 | 25.372 | 2183.1 | 9.9455 | 2193.0 | 0.00 | 0.4587 |
| 2.7132264 | 60.7657 | 26.390 | 2261.9 | 9.9357 | 2271.9 | 0.00 | 0.4570 |
| 2.7160195 | 60.9564 | 26.356 | 2256.7 | 9.9330 | 2266.6 | 0.00 | 0.4565 |
| 2.7295996 | 61.4815 | 26.190 | 2231.3 | 9.9201 | 2241.2 | 0.00 | 0.4542 |
| 2.7432476 | 61.8198 | 26.026 | 2206.3 | 9.9071 | 2216.2 | 0.00 | 0.4520 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 2.7569638 | 62.0959 | 25.863 | 2181.6 | 9.8939 | 2191.5 | 0.00 | 0.4497 |
| 2.7707486 | 62.3394 | 25.701 | 2157.2 | 9.8806 | 2167.0 | 0.00 | 0.4475 |
| 2.7846024 | 62.5624 | 25.541 | 2133.0 | 9.8672 | 2142.9 | 0.00 | 0.4452 |
| 2.7985254 | 62.7708 | 25.382 | 2109.2 | 9.8537 | 2119.1 | 0.00 | 0.4430 |
| 2.8125180 | 62.9684 | 25.224 | 2085.6 | 9.8400 | 2095.5 | 0.00 | 0.4408 |
| 2.8265806 | 63.1572 | 25.067 | 2062.3 | 9.8262 | 2072.2 | 0.00 | 0.4386 |
| 2.8407135 | 63.3389 | 24.911 | 2039.3 | 9.8123 | 2049.1 | 0.00 | 0.4365 |
| 2.8549171 | 63.5148 | 24.757 | 2016.6 | 9.7982 | 2026.4 | 0.00 | 0.4343 |
| 2.8691917 | 63.6858 | 24.602 | 1994.0 | 9.7840 | 2003.8 | 0.00 | 0.4321 |
| 2.8835376 | 63.8525 | 24.448 | 1971.7 | 9.7697 | 1981.5 | 0.00 | 0.4300 |
| 2.8979553 | 64.0155 | 24.295 | 1949.6 | 9.7553 | 1959.4 | 0.00 | 0.4278 |
| 2.9124451 | 64.1756 | 24.144 | 1927.8 | 9.7408 | 1937.6 | 0.00 | 0.4257 |
| 2.9270073 | 64.3333 | 23.993 | 1906.3 | 9.7261 | 1916.0 | 0.00 | 0.4236 |
| 2.9416424 | 64.4893 | 23.843 | 1885.0 | 9.7113 | 1894.7 | 0.00 | 0.4215 |
| 2.9563506 | 64.6444 | 23.695 | 1863.9 | 9.6964 | 1873.6 | 0.00 | 0.4194 |
| 2.9711323 | 64.7995 | 23.547 | 1843.1 | 9.6814 | 1852.7 | 0.00 | 0.4173 |
| 2.9859880 | 64.9561 | 23.400 | 1822.5 | 9.6663 | 1832.1 | 0.00 | 0.4152 |
| 3.0009179 | 65.1254 | 23.253 | 1802.0 | 9.6510 | 1811.6 | 0.00 | 0.4132 |
| 3.0159225 | 65.2708 | 23.086 | 1780.2 | 9.6356 | 1789.8 | 0.00 | 0.4111 |
| 3.0310021 | 65.4014 | 22.921 | 1758.6 | 9.6201 | 1768.2 | 0.00 | 0.4091 |
| 3.0461571 | 65.5258 | 22.756 | 1737.3 | 9.6045 | 1746.9 | 0.00 | 0.4070 |
| 3.0613879 | 65.6455 | 22.593 | 1716.2 | 9.5888 | 1725.8 | 0.00 | 0.4050 |
| 3.0766949 | 65.7613 | 22.430 | 1695.4 | 9.5730 | 1705.0 | 0.00 | 0.4030 |
| 3.0920783 | 65.8737 | 22.269 | 1674.9 | 9.5570 | 1684.4 | 0.00 | 0.4010 |
| 3.1075387 | 65.9828 | 22.109 | 1654.6 | 9.5410 | 1664.1 | 0.00 | 0.3990 |
| 3.1230764 | 66.0889 | 21.950 | 1634.5 | 9.5248 | 1644.0 | 0.00 | 0.3970 |
| 3.1386918 | 66.1921 | 21.793 | 1614.7 | 9.5085 | 1624.2 | 0.00 | 0.3950 |
| 3.1543853 | 66.2928 | 21.636 | 1595.1 | 9.4921 | 1604.6 | 0.00 | 0.3931 |
| 3.1701572 | 66.3909 | 21.481 | 1575.8 | 9.4756 | 1585.2 | 0.00 | 0.3911 |
| 3.1860080 | 66.4866 | 21.326 | 1556.7 | 9.4590 | 1566.1 | 0.00 | 0.3892 |
| 3.2019380 | 66.5802 | 21.173 | 1537.8 | 9.4423 | 1547.2 | 0.00 | 0.3872 |
| 3.2179477 | 66.6716 | 21.020 | 1519.1 | 9.4254 | 1528.5 | 0.00 | 0.3853 |
| 3.2340374 | 66.7605 | 20.868 | 1500.6 | 9.4085 | 1510.0 | 0.00 | 0.3834 |
| 3.2502076 | 66.8471 | 20.717 | 1482.3 | 9.3915 | 1491.7 | 0.00 | 0.3815 |
| 3.2664587 | 66.9315 | 20.567 | 1464.3 | 9.3743 | 1473.6 | 0.00 | 0.3796 |
| 3.2827910 | 67.0138 | 20.418 | 1446.4 | 9.3571 | 1455.8 | 0.00 | 0.3777 |
| 3.2992049 | 67.0941 | 20.271 | 1428.8 | 9.3397 | 1438.2 | 0.00 | 0.3758 |
| 3.3157009 | 67.1725 | 20.124 | 1411.5 | 9.3223 | 1420.8 | 0.00 | 0.3739 |
| 3.3322794 | 67.2491 | 19.979 | 1394.3 | 9.3047 | 1403.6 | 0.00 | 0.3721 |
| 3.3489408 | 67.3240 | 19.835 | 1377.4 | 9.2871 | 1386.6 | 0.00 | 0.3702 |
| 3.3656856 | 67.3972 | 19.692 | 1360.6 | 9.2693 | 1369.9 | 0.00 | 0.3684 |
| 3.3825140 | 67.4688 | 19.550 | 1344.1 | 9.2515 | 1353.3 | 0.00 | 0.3665 |
| 3.3994265 | 67.5389 | 19.409 | 1327.8 | 9.2335 | 1337.0 | 0.00 | 0.3647 |
| 3.4164237 | 67.6075 | 19.270 | 1311.7 | 9.2155 | 1320.9 | 0.00 | 0.3629 |
| 3.4335058 | 67.6748 | 19.131 | 1295.8 | 9.1973 | 1305.0 | 0.00 | 0.3611 |
| 3.4506733 | 67.7408 | 18.994 | 1280.1 | 9.1791 | 1289.2 | 0.00 | 0.3593 |
| 3.4679267 | 67.8056 | 18.858 | 1264.6 | 9.1608 | 1273.7 | 0.00 | 0.3575 |
| 3.4852663 | 68.0766 | 18.716 | 1248.8 | 9.1423 | 1257.9 | 0.00 | 0.3557 |
| 3.5026927 | 68.1386 | 18.574 | 1233.2 | 9.1238 | 1242.3 | 0.00 | 0.3540 |
| 3.5202061 | 68.1987 | 18.434 | 1217.8 | 9.1052 | 1226.9 | 0.00 | 0.3522 |
| 3.5378072 | 68.2569 | 18.294 | 1202.5 | 9.0865 | 1211.6 | 0.00 | 0.3505 |
| 3.5554962 | 68.3133 | 18.156 | 1187.5 | 9.0677 | 1196.6 | 0.00 | 0.3487 |
| 3.5732737 | 68.3681 | 18.018 | 1172.7 | 9.0488 | 1181.7 | 0.00 | 0.3470 |
| 3.5911400 | 68.5614 | 17.881 | 1157.9 | 9.0299 | 1167.0 | 0.00 | 0.3453 |
| 3.6090957 | 68.6131 | 17.741 | 1143.2 | 9.0108 | 1152.2 | 0.00 | 0.3435 |
| 3.6271412 | 68.6628 | 17.603 | 1128.6 | 8.9916 | 1137.6 | 0.00 | 0.3418 |
| 3.6452769 | 68.7107 | 17.466 | 1114.2 | 8.9724 | 1123.2 | 0.00 | 0.3401 |
| 3.6635033 | 68.7567 | 17.330 | 1100.1 | 8.9531 | 1109.0 | 0.00 | 0.3384 |
| 3.6818208 | 68.8009 | 17.195 | 1086.1 | 8.9337 | 1095.0 | 0.00 | 0.3367 |
| 3.7002299 | 68.8436 | 17.061 | 1072.3 | 8.9142 | 1081.2 | 0.00 | 0.3351 |
| 3.7187311 | 68.8847 | 16.929 | 1058.7 | 8.8946 | 1067.6 | 0.00 | 0.3334 |
| 3.7373247 | 68.9244 | 16.798 | 1045.3 | 8.8750 | 1054.1 | 0.00 | 0.3317 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| Ta ($Z=73$) | | | | | | | |
| 3.7560114 | 68.9626 | 16.668 | 1032.0 | 8.8552 | 1040.9 | 0.00 | 0.3301 |
| 3.7747914 | 68.9994 | 16.540 | 1019.0 | 8.8354 | 1027.8 | 0.00 | 0.3285 |
| 3.7936654 | 69.0350 | 16.412 | 1006.1 | 8.8155 | 1014.9 | 0.00 | 0.3268 |
| 3.8126337 | 69.0693 | 16.286 | 993.38 | 8.7955 | 1002.2 | 0.00 | 0.3252 |
| 3.8316969 | 69.1024 | 16.161 | 980.85 | 8.7755 | 989.62 | 0.00 | 0.3236 |
| 3.8508554 | 69.1343 | 16.037 | 968.48 | 8.7554 | 977.24 | 0.00 | 0.3220 |
| 3.8701096 | 69.1651 | 15.914 | 956.28 | 8.7352 | 965.02 | 0.00 | 0.3204 |
| 3.8894602 | 69.1948 | 15.792 | 944.25 | 8.7149 | 952.96 | 0.00 | 0.3188 |
| 3.9089075 | 69.2235 | 15.672 | 932.38 | 8.6945 | 941.07 | 0.00 | 0.3172 |
| 3.9284520 | 69.2511 | 15.552 | 920.66 | 8.6741 | 929.34 | 0.00 | 0.3156 |
| 3.9480943 | 69.2778 | 15.434 | 909.11 | 8.6536 | 917.76 | 0.00 | 0.3140 |
| 3.9678347 | 69.3036 | 15.317 | 897.71 | 8.6330 | 906.34 | 0.00 | 0.3125 |
| 3.9876739 | 69.3284 | 15.200 | 886.46 | 8.6124 | 895.08 | 0.00 | 0.3109 |
| W ($Z=74$) | | | | | | | |
| Atomic weight: $A_r = 183.8500 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3}) = 19.300$ | | | | | | | |
| σ_a (barns/atom) = $[\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 305.290$ | | | | | | | |
| $E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) = f_2(e \text{ atom}^{-1}) \times 2.28884 \times 10^5$ | | | | | | | |
| 20 edges. Edge energies (keV) | | | | | | | |
| K | 69.5250 | L I | 12.0998 | L II | 11.5440 | L III | 10.2068 |
| M I | 2.81960 | M II | 2.57490 | M III | 2.28100 | M IV | 1.87160 |
| M V | 1.80920 | N I | 0.595000 | N II | 0.491600 | N III | 0.425300 |
| N IV | 0.258800 | N V | 0.245400 | N VI | 0.0365000 | N VII | 0.0336000 |
| O I | 0.0771000 | O II | 0.0468000 | O II | 0.0356000 | O III | 0.00610000 |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H}82,3/5\text{CL}) = (-1.4515, -0.85980) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}} = -0.016340 e \text{ atom}^{-1}$ | | | | | | | |
| 0.10000000 | 13.0562 | 6.3475 | 14528 | 0.50656 | 14529 | 0.00 | 12.40 |
| 0.10050000 | 13.0233 | 6.4128 | 14605 | 0.51226 | 14605 | 0.00 | 12.34 |
| 0.10100250 | 12.9096 | 6.4792 | 14683 | 0.51801 | 14683 | 0.00 | 12.28 |
| 0.10150751 | 12.8777 | 6.5465 | 14761 | 0.52381 | 14762 | 0.00 | 12.21 |
| 0.10201505 | 12.8465 | 6.6148 | 14841 | 0.52967 | 14842 | 0.00 | 12.15 |
| 0.10252513 | 12.8158 | 6.6841 | 14922 | 0.53558 | 14923 | 0.00 | 12.09 |
| 0.10303775 | 12.7857 | 6.7544 | 15004 | 0.54154 | 15004 | 0.00 | 12.03 |
| 0.10355294 | 12.7562 | 6.8257 | 15087 | 0.54755 | 15087 | 0.00 | 11.97 |
| 0.10407070 | 12.7273 | 6.8979 | 15171 | 0.55362 | 15171 | 0.00 | 11.91 |
| 0.10459106 | 12.6990 | 6.9712 | 15256 | 0.55975 | 15256 | 0.00 | 11.85 |
| 0.10511401 | 12.6714 | 7.0454 | 15341 | 0.56593 | 15342 | 0.00 | 11.80 |
| 0.10563958 | 12.6445 | 7.1206 | 15428 | 0.57216 | 15428 | 0.00 | 11.74 |
| 0.10616778 | 12.6183 | 7.1967 | 15515 | 0.57845 | 15516 | 0.00 | 11.68 |
| 0.10669862 | 12.5927 | 7.2738 | 15603 | 0.58480 | 15604 | 0.00 | 11.62 |
| 0.10723211 | 12.5679 | 7.3518 | 15692 | 0.59120 | 15693 | 0.00 | 11.56 |
| 0.10776827 | 12.5437 | 7.4307 | 15782 | 0.59766 | 15782 | 0.00 | 11.50 |
| 0.10830712 | 12.5204 | 7.5106 | 15872 | 0.60417 | 15873 | 0.00 | 11.45 |
| 0.10884865 | 12.4977 | 7.5914 | 15963 | 0.61075 | 15964 | 0.00 | 11.39 |
| 0.10939289 | 12.4759 | 7.6732 | 16055 | 0.61738 | 16055 | 0.00 | 11.33 |
| 0.10993986 | 12.3657 | 7.7558 | 16147 | 0.62406 | 16147 | 0.00 | 11.28 |
| 0.11048956 | 12.3454 | 7.8393 | 16240 | 0.63081 | 16240 | 0.00 | 11.22 |
| 0.11104201 | 12.3259 | 7.9238 | 16333 | 0.63762 | 16333 | 0.00 | 11.17 |
| 0.11159722 | 12.3073 | 8.0091 | 16426 | 0.64448 | 16427 | 0.00 | 11.11 |
| 0.11215520 | 12.2895 | 8.0953 | 16521 | 0.65140 | 16521 | 0.00 | 11.05 |
| 0.11271598 | 12.2726 | 8.1823 | 16615 | 0.65838 | 16616 | 0.00 | 11.00 |
| 0.11327956 | 12.2565 | 8.2703 | 16710 | 0.66543 | 16711 | 0.00 | 10.94 |
| 0.11384596 | 12.2414 | 8.3590 | 16806 | 0.67253 | 16806 | 0.00 | 10.89 |
| 0.11441519 | 12.2271 | 8.4486 | 16901 | 0.67969 | 16902 | 0.00 | 10.84 |
| 0.11498726 | 12.2137 | 8.5396 | 16998 | 0.68692 | 16999 | 0.00 | 10.78 |
| 0.11556220 | 12.2013 | 8.6315 | 17096 | 0.69420 | 17096 | 0.00 | 10.73 |
| 0.11614001 | 12.1899 | 8.7242 | 17193 | 0.70155 | 17194 | 0.00 | 10.68 |
| 0.11672071 | 12.1794 | 8.8177 | 17291 | 0.70895 | 17292 | 0.00 | 10.62 |
| 0.11730431 | 12.1700 | 8.9120 | 17389 | 0.71642 | 17390 | 0.00 | 10.57 |
| 0.11789083 | 12.1616 | 9.0070 | 17487 | 0.72396 | 17488 | 0.00 | 10.52 |
| 0.11848029 | 12.1542 | 9.1028 | 17585 | 0.73155 | 17586 | 0.00 | 10.46 |
| 0.11907269 | 12.1478 | 9.1994 | 17683 | 0.73921 | 17684 | 0.00 | 10.41 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 0.11966805 | 12.1426 | 9.2967 | 17781 | 0.74693 | 17782 | 0.00 | 10.36 |
| 0.12026639 | 12.1384 | 9.3948 | 17880 | 0.75472 | 17880 | 0.00 | 10.31 |
| 0.12086772 | 12.1352 | 9.4935 | 17978 | 0.76257 | 17978 | 0.00 | 10.26 |
| 0.12147206 | 12.1332 | 9.5930 | 18076 | 0.77048 | 18076 | 0.00 | 10.21 |
| 0.12207942 | 12.1323 | 9.6932 | 18173 | 0.77846 | 18174 | 0.00 | 10.16 |
| 0.12268982 | 12.1325 | 9.7940 | 18271 | 0.78650 | 18272 | 0.00 | 10.11 |
| 0.12330327 | 12.1339 | 9.8955 | 18369 | 0.79461 | 18369 | 0.00 | 10.06 |
| 0.12391979 | 12.1364 | 9.9977 | 18466 | 0.80279 | 18467 | 0.00 | 10.01 |
| 0.12453939 | 12.1401 | 10.100 | 18563 | 0.81103 | 18564 | 0.00 | 9.955 |
| 0.12516208 | 12.1450 | 10.204 | 18660 | 0.81934 | 18661 | 0.00 | 9.906 |
| 0.12578789 | 12.1511 | 10.308 | 18756 | 0.82771 | 18757 | 0.00 | 9.857 |
| 0.12641683 | 12.1584 | 10.413 | 18852 | 0.83615 | 18853 | 0.00 | 9.808 |
| 0.12704892 | 12.1670 | 10.518 | 18948 | 0.84466 | 18949 | 0.00 | 9.759 |
| 0.12768416 | 12.1768 | 10.624 | 19044 | 0.85323 | 19044 | 0.00 | 9.710 |
| 0.12832258 | 12.1878 | 10.730 | 19138 | 0.86188 | 19139 | 0.00 | 9.662 |
| 0.12896419 | 12.2002 | 10.837 | 19233 | 0.87059 | 19234 | 0.00 | 9.614 |
| 0.12960902 | 12.2138 | 10.944 | 19327 | 0.87937 | 19328 | 0.00 | 9.566 |
| 0.13025706 | 12.2287 | 11.052 | 19420 | 0.88822 | 19421 | 0.00 | 9.518 |
| 0.13090835 | 12.2450 | 11.161 | 19513 | 0.89714 | 19514 | 0.00 | 9.471 |
| 0.13156289 | 12.2626 | 11.269 | 19606 | 0.90612 | 19607 | 0.00 | 9.424 |
| 0.13222070 | 12.2816 | 11.379 | 19698 | 0.91518 | 19698 | 0.00 | 9.377 |
| 0.13288181 | 12.3019 | 11.489 | 19789 | 0.92431 | 19790 | 0.00 | 9.330 |
| 0.13354621 | 12.3237 | 11.599 | 19879 | 0.93350 | 19880 | 0.00 | 9.284 |
| 0.13421395 | 12.3468 | 11.709 | 19969 | 0.94277 | 19970 | 0.00 | 9.238 |
| 0.13488502 | 12.3714 | 11.820 | 20058 | 0.95211 | 20059 | 0.00 | 9.192 |
| 0.13555944 | 12.3974 | 11.932 | 20146 | 0.96152 | 20147 | 0.00 | 9.146 |
| 0.13623724 | 12.4248 | 12.043 | 20233 | 0.97100 | 20234 | 0.00 | 9.101 |
| 0.13691842 | 12.4537 | 12.155 | 20319 | 0.98056 | 20320 | 0.00 | 9.055 |
| 0.13760302 | 12.4840 | 12.266 | 20403 | 0.99018 | 20404 | 0.00 | 9.010 |
| 0.13829103 | 12.5158 | 12.378 | 20487 | 0.99988 | 20488 | 0.00 | 8.965 |
| 0.13898249 | 12.5489 | 12.490 | 20569 | 1.0097 | 20570 | 0.00 | 8.921 |
| 0.13967740 | 12.5835 | 12.602 | 20650 | 1.0195 | 20651 | 0.00 | 8.876 |
| 0.14037579 | 12.6195 | 12.714 | 20730 | 1.0294 | 20731 | 0.00 | 8.832 |
| 0.14107766 | 12.6583 | 12.826 | 20809 | 1.0394 | 20810 | 0.00 | 8.788 |
| 0.14178305 | 12.6972 | 12.938 | 20886 | 1.0495 | 20887 | 0.00 | 8.745 |
| 0.14249197 | 12.7375 | 13.050 | 20963 | 1.0596 | 20964 | 0.00 | 8.701 |
| 0.14320443 | 12.7792 | 13.162 | 21037 | 1.0698 | 21038 | 0.00 | 8.658 |
| 0.14392045 | 12.8224 | 13.274 | 21111 | 1.0801 | 21112 | 0.00 | 8.615 |
| 0.14464005 | 12.8670 | 13.386 | 21183 | 1.0905 | 21184 | 0.00 | 8.572 |
| 0.14536325 | 12.9130 | 13.498 | 21254 | 1.1009 | 21255 | 0.00 | 8.529 |
| 0.14609007 | 12.9605 | 13.610 | 21323 | 1.1114 | 21325 | 0.00 | 8.487 |
| 0.14682052 | 13.0094 | 13.722 | 21391 | 1.1220 | 21392 | 0.00 | 8.445 |
| 0.14755462 | 13.0597 | 13.833 | 21458 | 1.1327 | 21459 | 0.00 | 8.403 |
| 0.14829239 | 13.1114 | 13.944 | 21522 | 1.1434 | 21523 | 0.00 | 8.361 |
| 0.14903386 | 13.1645 | 14.055 | 21585 | 1.1542 | 21586 | 0.00 | 8.319 |
| 0.14977903 | 13.2190 | 14.165 | 21647 | 1.1651 | 21648 | 0.00 | 8.278 |
| 0.15052792 | 13.2749 | 14.275 | 21706 | 1.1761 | 21707 | 0.00 | 8.237 |
| 0.15128056 | 13.3321 | 14.385 | 21764 | 1.1872 | 21765 | 0.00 | 8.196 |
| 0.15203696 | 13.3907 | 14.494 | 21820 | 1.1983 | 21821 | 0.00 | 8.155 |
| 0.15279715 | 13.4505 | 14.603 | 21875 | 1.2095 | 21876 | 0.00 | 8.114 |
| 0.15356113 | 13.5117 | 14.711 | 21927 | 1.2208 | 21929 | 0.00 | 8.074 |
| 0.15432894 | 13.5742 | 14.819 | 21978 | 1.2321 | 21980 | 0.00 | 8.034 |
| 0.15510058 | 13.6379 | 14.927 | 22028 | 1.2436 | 22029 | 0.00 | 7.994 |
| 0.15587609 | 13.7030 | 15.034 | 22075 | 1.2551 | 22076 | 0.00 | 7.954 |
| 0.15665547 | 13.7692 | 15.140 | 22121 | 1.2667 | 22122 | 0.00 | 7.914 |
| 0.15743875 | 13.8367 | 15.246 | 22165 | 1.2784 | 22166 | 0.00 | 7.875 |
| 0.15822594 | 13.9054 | 15.352 | 22207 | 1.2901 | 22208 | 0.00 | 7.836 |
| 0.15901707 | 13.9754 | 15.456 | 22247 | 1.3020 | 22249 | 0.00 | 7.797 |
| 0.15981215 | 14.0465 | 15.561 | 22286 | 1.3139 | 22287 | 0.00 | 7.758 |
| 0.16061121 | 14.1188 | 15.664 | 22323 | 1.3259 | 22324 | 0.00 | 7.720 |
| 0.16141427 | 14.1922 | 15.767 | 22358 | 1.3380 | 22359 | 0.00 | 7.681 |
| 0.16222134 | 14.2668 | 15.870 | 22391 | 1.3501 | 22393 | 0.00 | 7.643 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 0.16303245 | 14.3426 | 15.972 | 22423 | 1.3624 | 22424 | 0.00 | 7.605 |
| 0.16384761 | 14.4194 | 16.073 | 22453 | 1.3747 | 22454 | 0.00 | 7.567 |
| 0.16466685 | 14.4973 | 16.173 | 22481 | 1.3871 | 22482 | 0.00 | 7.529 |
| 0.16549018 | 14.5763 | 16.273 | 22507 | 1.3996 | 22508 | 0.00 | 7.492 |
| 0.16631763 | 14.6564 | 16.372 | 22531 | 1.4121 | 22533 | 0.00 | 7.455 |
| 0.16714922 | 14.7375 | 16.471 | 22554 | 1.4248 | 22555 | 0.00 | 7.418 |
| 0.16798497 | 14.8197 | 16.568 | 22575 | 1.4375 | 22576 | 0.00 | 7.381 |
| 0.16882489 | 14.9029 | 16.665 | 22594 | 1.4503 | 22595 | 0.00 | 7.344 |
| 0.16966902 | 14.9870 | 16.761 | 22611 | 1.4632 | 22613 | 0.00 | 7.307 |
| 0.17051736 | 15.0721 | 16.857 | 22627 | 1.4762 | 22628 | 0.00 | 7.271 |
| 0.17136995 | 15.1582 | 16.952 | 22641 | 1.4893 | 22642 | 0.00 | 7.235 |
| 0.17222680 | 15.2453 | 17.045 | 22653 | 1.5024 | 22654 | 0.00 | 7.199 |
| 0.17308793 | 15.3332 | 17.138 | 22663 | 1.5156 | 22665 | 0.00 | 7.163 |
| 0.17395337 | 15.4221 | 17.231 | 22672 | 1.5289 | 22673 | 0.00 | 7.127 |
| 0.17482314 | 15.5118 | 17.322 | 22679 | 1.5423 | 22680 | 0.00 | 7.092 |
| 0.17569726 | 15.6025 | 17.413 | 22684 | 1.5558 | 22685 | 0.00 | 7.057 |
| 0.17657574 | 15.6939 | 17.503 | 22687 | 1.5694 | 22689 | 0.00 | 7.022 |
| 0.17745862 | 15.7862 | 17.591 | 22689 | 1.5830 | 22691 | 0.00 | 6.987 |
| 0.17834591 | 15.8794 | 17.679 | 22689 | 1.5967 | 22691 | 0.00 | 6.952 |
| 0.17923764 | 15.9733 | 17.767 | 22688 | 1.6106 | 22689 | 0.00 | 6.917 |
| 0.18013383 | 16.0679 | 17.853 | 22685 | 1.6245 | 22686 | 0.00 | 6.883 |
| 0.18103450 | 16.1634 | 17.938 | 22680 | 1.6385 | 22681 | 0.00 | 6.849 |
| 0.18193967 | 16.2595 | 18.023 | 22673 | 1.6525 | 22675 | 0.00 | 6.815 |
| 0.18284937 | 16.3564 | 18.106 | 22665 | 1.6667 | 22667 | 0.00 | 6.781 |
| 0.18376362 | 16.4540 | 18.189 | 22655 | 1.6809 | 22657 | 0.00 | 6.747 |
| 0.18468244 | 16.5522 | 18.271 | 22644 | 1.6952 | 22646 | 0.00 | 6.713 |
| 0.18560585 | 16.6511 | 18.352 | 22631 | 1.7097 | 22633 | 0.00 | 6.680 |
| 0.18653388 | 16.7507 | 18.432 | 22616 | 1.7242 | 22618 | 0.00 | 6.647 |
| 0.18746655 | 16.8508 | 18.511 | 22600 | 1.7387 | 22602 | 0.00 | 6.614 |
| 0.18840388 | 16.9515 | 18.589 | 22583 | 1.7534 | 22584 | 0.00 | 6.581 |
| 0.18934590 | 17.0528 | 18.666 | 22564 | 1.7682 | 22565 | 0.00 | 6.548 |
| 0.19029263 | 17.1547 | 18.742 | 22543 | 1.7830 | 22545 | 0.00 | 6.515 |
| 0.19124409 | 17.2570 | 18.817 | 22521 | 1.7979 | 22523 | 0.00 | 6.483 |
| 0.19220031 | 17.3599 | 18.891 | 22497 | 1.8129 | 22499 | 0.00 | 6.451 |
| 0.19316131 | 17.4633 | 18.965 | 22472 | 1.8280 | 22474 | 0.00 | 6.419 |
| 0.19412712 | 17.5671 | 19.037 | 22445 | 1.8432 | 22447 | 0.00 | 6.387 |
| 0.19509776 | 17.6713 | 19.108 | 22417 | 1.8585 | 22419 | 0.00 | 6.355 |
| 0.19607325 | 17.7760 | 19.179 | 22388 | 1.8739 | 22390 | 0.00 | 6.323 |
| 0.19705361 | 17.8810 | 19.248 | 22357 | 1.8893 | 22359 | 0.00 | 6.292 |
| 0.19803888 | 17.9864 | 19.316 | 22325 | 1.9049 | 22327 | 0.00 | 6.261 |
| 0.19902907 | 18.0922 | 19.384 | 22291 | 1.9205 | 22293 | 0.00 | 6.229 |
| 0.20002422 | 18.1983 | 19.450 | 22256 | 1.9362 | 22258 | 0.00 | 6.198 |
| 0.20102434 | 18.3046 | 19.516 | 22220 | 1.9520 | 22222 | 0.00 | 6.168 |
| 0.20202946 | 18.4112 | 19.580 | 22183 | 1.9679 | 22185 | 0.00 | 6.137 |
| 0.20303961 | 18.5181 | 19.643 | 22144 | 1.9838 | 22146 | 0.00 | 6.106 |
| 0.20405481 | 18.6251 | 19.706 | 22104 | 1.9999 | 22106 | 0.00 | 6.076 |
| 0.20507508 | 18.7324 | 19.767 | 22062 | 2.0160 | 22064 | 0.00 | 6.046 |
| 0.20610046 | 18.8398 | 19.828 | 22020 | 2.0323 | 22022 | 0.00 | 6.016 |
| 0.20713096 | 18.9473 | 19.887 | 21976 | 2.0486 | 21978 | 0.00 | 5.986 |
| 0.20816661 | 19.0549 | 19.946 | 21931 | 2.0650 | 21933 | 0.00 | 5.956 |
| 0.20920745 | 19.1626 | 20.003 | 21885 | 2.0815 | 21887 | 0.00 | 5.926 |
| 0.21025348 | 19.2702 | 20.060 | 21837 | 2.0981 | 21839 | 0.00 | 5.897 |
| 0.21130475 | 19.3779 | 20.115 | 21789 | 2.1147 | 21791 | 0.00 | 5.868 |
| 0.21236128 | 19.4855 | 20.170 | 21739 | 2.1315 | 21741 | 0.00 | 5.838 |
| 0.21342308 | 19.5931 | 20.223 | 21688 | 2.1484 | 21690 | 0.00 | 5.809 |
| 0.21449020 | 19.7004 | 20.276 | 21636 | 2.1653 | 21638 | 0.00 | 5.780 |
| 0.21556265 | 19.8077 | 20.327 | 21583 | 2.1823 | 21586 | 0.00 | 5.752 |
| 0.21664046 | 19.9147 | 20.378 | 21529 | 2.1994 | 21532 | 0.00 | 5.723 |
| 0.21772366 | 20.0214 | 20.427 | 21474 | 2.2166 | 21477 | 0.00 | 5.695 |
| 0.21881228 | 20.1277 | 20.476 | 21418 | 2.2339 | 21421 | 0.00 | 5.666 |
| 0.21990634 | 20.2337 | 20.524 | 21361 | 2.2513 | 21364 | 0.00 | 5.638 |
| 0.22100588 | 20.3392 | 20.570 | 21303 | 2.2687 | 21306 | 0.00 | 5.610 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 0.22211090 | 20.4442 | 20.616 | 21245 | 2.2863 | 21247 | 0.00 | 5.582 |
| 0.22322146 | 20.5485 | 20.661 | 21185 | 2.3039 | 21187 | 0.00 | 5.554 |
| 0.22433757 | 20.6521 | 20.704 | 21124 | 2.3216 | 21126 | 0.00 | 5.527 |
| 0.22545925 | 20.7549 | 20.747 | 21062 | 2.3394 | 21065 | 0.00 | 5.499 |
| 0.22658655 | 20.8567 | 20.789 | 21000 | 2.3573 | 21002 | 0.00 | 5.472 |
| 0.22771948 | 20.9573 | 20.830 | 20936 | 2.3753 | 20939 | 0.00 | 5.445 |
| 0.22885808 | 21.0567 | 20.870 | 20872 | 2.3934 | 20875 | 0.00 | 5.418 |
| 0.23000237 | 21.1545 | 20.909 | 20807 | 2.4115 | 20810 | 0.00 | 5.391 |
| 0.23115238 | 21.2506 | 20.947 | 20741 | 2.4298 | 20744 | 0.00 | 5.364 |
| 0.23230814 | 21.3466 | 20.984 | 20675 | 2.4481 | 20677 | 0.00 | 5.337 |
| 0.23346969 | 21.4379 | 21.020 | 20608 | 2.4665 | 20610 | 0.00 | 5.311 |
| 0.23463703 | 21.5261 | 21.056 | 20539 | 2.4851 | 20542 | 0.00 | 5.284 |
| 0.23581022 | 21.6104 | 21.090 | 20471 | 2.5036 | 20473 | 0.00 | 5.258 |
| 0.23698927 | 21.6897 | 21.124 | 20401 | 2.5223 | 20404 | 0.00 | 5.232 |
| 0.23817422 | 21.7625 | 21.156 | 20331 | 2.5411 | 20334 | 0.00 | 5.206 |
| 0.23936509 | 21.8262 | 21.188 | 20260 | 2.5599 | 20263 | 0.00 | 5.180 |
| 0.24056191 | 21.8767 | 21.219 | 20189 | 2.5789 | 20191 | 0.00 | 5.154 |
| 0.24176472 | 21.9062 | 21.249 | 20117 | 2.5979 | 20119 | 0.00 | 5.128 |
| 0.24297355 | 21.8968 | 21.278 | 20044 | 2.6170 | 20046 | 0.00 | 5.103 |
| 0.24418841 | 21.7913 | 21.306 | 19971 | 2.6362 | 19973 | 0.00 | 5.077 |
| 0.24521055 | 21.2760 | 21.328 | 19908 | 2.6524 | 19911 | 0.00 | 5.056 |
| 0.24540936 | 20.2858 | 22.386 | 20879 | 2.6555 | 20881 | 0.00 | 5.052 |
| 0.24558945 | 21.3122 | 22.389 | 20866 | 2.6583 | 20869 | 0.00 | 5.048 |
| 0.24663640 | 22.0383 | 22.404 | 20791 | 2.6749 | 20794 | 0.00 | 5.027 |
| 0.24786959 | 22.3776 | 22.417 | 20700 | 2.6943 | 20702 | 0.00 | 5.002 |
| 0.24910893 | 22.6171 | 22.428 | 20608 | 2.7139 | 20610 | 0.00 | 4.977 |
| 0.25035448 | 22.8125 | 22.439 | 20515 | 2.7335 | 20518 | 0.00 | 4.952 |
| 0.25160625 | 22.9801 | 22.449 | 20421 | 2.7532 | 20424 | 0.00 | 4.928 |
| 0.25286428 | 23.1256 | 22.457 | 20327 | 2.7730 | 20330 | 0.00 | 4.903 |
| 0.25412860 | 23.2494 | 22.465 | 20233 | 2.7929 | 20236 | 0.00 | 4.879 |
| 0.25539925 | 23.3463 | 22.471 | 20138 | 2.8128 | 20141 | 0.00 | 4.855 |
| 0.25667624 | 23.3987 | 22.476 | 20042 | 2.8329 | 20045 | 0.00 | 4.830 |
| 0.25795962 | 23.3312 | 22.480 | 19946 | 2.8530 | 19949 | 0.00 | 4.806 |
| 0.25859581 | 23.0534 | 22.481 | 19898 | 2.8630 | 19901 | 0.00 | 4.795 |
| 0.25900419 | 23.1065 | 23.281 | 20574 | 2.8694 | 20577 | 0.00 | 4.787 |
| 0.25924942 | 23.3386 | 23.281 | 20554 | 2.8732 | 20557 | 0.00 | 4.782 |
| 0.26054567 | 23.8455 | 23.279 | 20450 | 2.8936 | 20453 | 0.00 | 4.759 |
| 0.26184840 | 24.1448 | 23.275 | 20345 | 2.9139 | 20348 | 0.00 | 4.735 |
| 0.26315764 | 24.3900 | 23.271 | 20240 | 2.9344 | 20243 | 0.00 | 4.711 |
| 0.26447343 | 24.6085 | 23.265 | 20134 | 2.9550 | 20137 | 0.00 | 4.688 |
| 0.26579579 | 24.8106 | 23.258 | 20028 | 2.9756 | 20031 | 0.00 | 4.665 |
| 0.26712477 | 25.0014 | 23.251 | 19922 | 2.9963 | 19925 | 0.00 | 4.641 |
| 0.26846040 | 25.1835 | 23.242 | 19816 | 3.0171 | 19819 | 0.00 | 4.618 |
| 0.26980270 | 25.3587 | 23.232 | 19709 | 3.0380 | 19712 | 0.00 | 4.595 |
| 0.27115171 | 25.5282 | 23.222 | 19602 | 3.0590 | 19605 | 0.00 | 4.573 |
| 0.27250747 | 25.6928 | 23.210 | 19495 | 3.0800 | 19498 | 0.00 | 4.550 |
| 0.27387001 | 25.8531 | 23.199 | 19388 | 3.1011 | 19391 | 0.00 | 4.527 |
| 0.27523936 | 26.0099 | 23.186 | 19281 | 3.1223 | 19284 | 0.00 | 4.505 |
| 0.27661556 | 26.1634 | 23.173 | 19175 | 3.1436 | 19178 | 0.00 | 4.482 |
| 0.27799863 | 26.3140 | 23.160 | 19068 | 3.1650 | 19071 | 0.00 | 4.460 |
| 0.27938863 | 26.4619 | 23.145 | 18961 | 3.1865 | 18965 | 0.00 | 4.438 |
| 0.28078557 | 26.6073 | 23.130 | 18855 | 3.2080 | 18858 | 0.00 | 4.416 |
| 0.28218950 | 26.7504 | 23.115 | 18749 | 3.2296 | 18752 | 0.00 | 4.394 |
| 0.28360044 | 26.8914 | 23.099 | 18642 | 3.2513 | 18646 | 0.00 | 4.372 |
| 0.28501845 | 27.0301 | 23.082 | 18536 | 3.2731 | 18539 | 0.00 | 4.350 |
| 0.28644354 | 27.1668 | 23.065 | 18430 | 3.2949 | 18434 | 0.00 | 4.328 |
| 0.28787576 | 27.3016 | 23.048 | 18325 | 3.3168 | 18328 | 0.00 | 4.307 |
| 0.28931514 | 27.4346 | 23.030 | 18220 | 3.3388 | 18223 | 0.00 | 4.285 |
| 0.29076171 | 27.5660 | 23.012 | 18115 | 3.3609 | 18118 | 0.00 | 4.264 |
| 0.29221552 | 27.6959 | 22.994 | 18011 | 3.3831 | 18014 | 0.00 | 4.243 |
| 0.29367660 | 27.8244 | 22.975 | 17906 | 3.4053 | 17910 | 0.00 | 4.222 |
| 0.29514498 | 27.9514 | 22.957 | 17803 | 3.4276 | 17806 | 0.00 | 4.201 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 0.29662071 | 28.0772 | 22.938 | 17700 | 3.4500 | 17703 | 0.00 | 4.180 |
| 0.29810381 | 28.2017 | 22.918 | 17597 | 3.4725 | 17600 | 0.00 | 4.159 |
| 0.29959433 | 28.3250 | 22.898 | 17494 | 3.4950 | 17497 | 0.00 | 4.138 |
| 0.30109230 | 28.4471 | 22.878 | 17392 | 3.5176 | 17395 | 0.00 | 4.118 |
| 0.30259776 | 28.5681 | 22.858 | 17290 | 3.5403 | 17293 | 0.00 | 4.097 |
| 0.30411075 | 28.6879 | 22.837 | 17188 | 3.5631 | 17192 | 0.00 | 4.077 |
| 0.30563130 | 28.8067 | 22.816 | 17087 | 3.5859 | 17091 | 0.00 | 4.057 |
| 0.30715946 | 28.9245 | 22.795 | 16986 | 3.6089 | 16990 | 0.00 | 4.036 |
| 0.30869526 | 29.0412 | 22.774 | 16886 | 3.6318 | 16889 | 0.00 | 4.016 |
| 0.31023873 | 29.1569 | 22.752 | 16785 | 3.6549 | 16789 | 0.00 | 3.996 |
| 0.31178993 | 29.2715 | 22.729 | 16686 | 3.6780 | 16689 | 0.00 | 3.977 |
| 0.31334888 | 29.3853 | 22.707 | 16586 | 3.7013 | 16590 | 0.00 | 3.957 |
| 0.31491562 | 29.4980 | 22.684 | 16487 | 3.7245 | 16491 | 0.00 | 3.937 |
| 0.31649020 | 29.6098 | 22.661 | 16388 | 3.7479 | 16392 | 0.00 | 3.917 |
| 0.31807265 | 29.7206 | 22.638 | 16290 | 3.7713 | 16294 | 0.00 | 3.898 |
| 0.31966301 | 29.8305 | 22.614 | 16192 | 3.7948 | 16196 | 0.00 | 3.879 |
| 0.32126133 | 29.9395 | 22.590 | 16094 | 3.8183 | 16098 | 0.00 | 3.859 |
| 0.32286764 | 30.0476 | 22.566 | 15997 | 3.8420 | 16001 | 0.00 | 3.840 |
| 0.32448197 | 30.1547 | 22.541 | 15900 | 3.8657 | 15904 | 0.00 | 3.821 |
| 0.32610438 | 30.2609 | 22.516 | 15803 | 3.8894 | 15807 | 0.00 | 3.802 |
| 0.32773491 | 30.3663 | 22.491 | 15707 | 3.9133 | 15711 | 0.00 | 3.783 |
| 0.32937358 | 30.4707 | 22.466 | 15611 | 3.9372 | 15615 | 0.00 | 3.764 |
| 0.33102045 | 30.5742 | 22.440 | 15516 | 3.9611 | 15520 | 0.00 | 3.746 |
| 0.33267555 | 30.6768 | 22.414 | 15421 | 3.9852 | 15425 | 0.00 | 3.727 |
| 0.33433893 | 30.7785 | 22.388 | 15326 | 4.0093 | 15330 | 0.00 | 3.708 |
| 0.33601062 | 30.8793 | 22.362 | 15232 | 4.0334 | 15236 | 0.00 | 3.690 |
| 0.33769068 | 30.9792 | 22.335 | 15138 | 4.0577 | 15142 | 0.00 | 3.672 |
| 0.33937913 | 31.0782 | 22.308 | 15045 | 4.0820 | 15049 | 0.00 | 3.653 |
| 0.34107602 | 31.1763 | 22.281 | 14952 | 4.1063 | 14956 | 0.00 | 3.635 |
| 0.34278140 | 31.2735 | 22.254 | 14859 | 4.1307 | 14864 | 0.00 | 3.617 |
| 0.34449531 | 31.3697 | 22.226 | 14767 | 4.1552 | 14771 | 0.00 | 3.599 |
| 0.34621779 | 31.4650 | 22.199 | 14675 | 4.1798 | 14680 | 0.00 | 3.581 |
| 0.34794888 | 31.5594 | 22.171 | 14584 | 4.2044 | 14588 | 0.00 | 3.563 |
| 0.34968862 | 31.6529 | 22.143 | 14493 | 4.2291 | 14497 | 0.00 | 3.546 |
| 0.35143706 | 31.7454 | 22.114 | 14403 | 4.2538 | 14407 | 0.00 | 3.528 |
| 0.35319425 | 31.8370 | 22.086 | 14313 | 4.2786 | 14317 | 0.00 | 3.510 |
| 0.35496022 | 31.9276 | 22.057 | 14223 | 4.3034 | 14227 | 0.00 | 3.493 |
| 0.35673502 | 32.0171 | 22.029 | 14134 | 4.3283 | 14138 | 0.00 | 3.476 |
| 0.35851870 | 32.1057 | 22.000 | 14045 | 4.3533 | 14049 | 0.00 | 3.458 |
| 0.36031129 | 32.1933 | 21.971 | 13957 | 4.3783 | 13961 | 0.00 | 3.441 |
| 0.36211285 | 32.2799 | 21.941 | 13869 | 4.4034 | 13873 | 0.00 | 3.424 |
| 0.36392341 | 32.3654 | 21.912 | 13781 | 4.4285 | 13786 | 0.00 | 3.407 |
| 0.36574303 | 32.4498 | 21.882 | 13694 | 4.4537 | 13699 | 0.00 | 3.390 |
| 0.36757174 | 32.5330 | 21.853 | 13608 | 4.4790 | 13612 | 0.00 | 3.373 |
| 0.36940960 | 32.6152 | 21.823 | 13521 | 4.5043 | 13526 | 0.00 | 3.356 |
| 0.37125665 | 32.6962 | 21.793 | 13436 | 4.5296 | 13440 | 0.00 | 3.340 |
| 0.37311293 | 32.7759 | 21.763 | 13351 | 4.5550 | 13355 | 0.00 | 3.323 |
| 0.37497850 | 32.8544 | 21.733 | 13266 | 4.5805 | 13270 | 0.00 | 3.306 |
| 0.37685339 | 32.9316 | 21.703 | 13181 | 4.6060 | 13186 | 0.00 | 3.290 |
| 0.37873766 | 33.0075 | 21.673 | 13098 | 4.6316 | 13102 | 0.00 | 3.274 |
| 0.38063135 | 33.0818 | 21.642 | 13014 | 4.6572 | 13019 | 0.00 | 3.257 |
| 0.38253450 | 33.1547 | 21.612 | 12931 | 4.6829 | 12936 | 0.00 | 3.241 |
| 0.38444718 | 33.2260 | 21.581 | 12849 | 4.7086 | 12853 | 0.00 | 3.225 |
| 0.38636941 | 33.2956 | 21.551 | 12767 | 4.7343 | 12771 | 0.00 | 3.209 |
| 0.38830126 | 33.3634 | 21.520 | 12685 | 4.7601 | 12690 | 0.00 | 3.193 |
| 0.39024276 | 33.4292 | 21.489 | 12604 | 4.7860 | 12609 | 0.00 | 3.177 |
| 0.39219398 | 33.4929 | 21.459 | 12523 | 4.8119 | 12528 | 0.00 | 3.161 |
| 0.39415495 | 33.5543 | 21.428 | 12443 | 4.8378 | 12448 | 0.00 | 3.146 |
| 0.39612572 | 33.6132 | 21.397 | 12363 | 4.8638 | 12368 | 0.00 | 3.130 |
| 0.39810635 | 33.6692 | 21.366 | 12284 | 4.8899 | 12289 | 0.00 | 3.114 |
| 0.40009688 | 33.7221 | 21.335 | 12205 | 4.9160 | 12210 | 0.00 | 3.099 |
| 0.40209737 | 33.7712 | 21.304 | 12127 | 4.9421 | 12132 | 0.00 | 3.083 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 0.40410785 | 33.8162 | 21.273 | 12049 | 4.9682 | 12054 | 0.00 | 3.068 |
| 0.40612839 | 33.8562 | 21.242 | 11972 | 4.9945 | 11977 | 0.00 | 3.053 |
| 0.40815904 | 33.8902 | 21.211 | 11895 | 5.0207 | 11900 | 0.00 | 3.038 |
| 0.41019983 | 33.9168 | 21.180 | 11818 | 5.0470 | 11823 | 0.00 | 3.023 |
| 0.41225083 | 33.9340 | 21.149 | 11742 | 5.0733 | 11747 | 0.00 | 3.007 |
| 0.41431208 | 33.9387 | 21.118 | 11666 | 5.0997 | 11671 | 0.00 | 2.993 |
| 0.41638364 | 33.9257 | 21.087 | 11591 | 5.1261 | 11596 | 0.00 | 2.978 |
| 0.41846556 | 33.8860 | 21.055 | 11516 | 5.1525 | 11522 | 0.00 | 2.963 |
| 0.42055789 | 33.7998 | 21.024 | 11442 | 5.1790 | 11447 | 0.00 | 2.948 |
| 0.42266068 | 33.6117 | 20.993 | 11368 | 5.2055 | 11374 | 0.00 | 2.933 |
| 0.42477398 | 32.9521 | 20.962 | 11295 | 5.2321 | 11300 | 0.00 | 2.919 |
| 0.42477688 | 32.9497 | 20.962 | 11295 | 5.2321 | 11300 | 0.00 | 2.919 |
| 0.42582312 | 32.9876 | 22.384 | 12032 | 5.2452 | 12037 | 0.00 | 2.912 |
| 0.42689785 | 33.5375 | 22.370 | 11994 | 5.2586 | 11999 | 0.00 | 2.904 |
| 0.42903234 | 34.0037 | 22.343 | 11920 | 5.2852 | 11925 | 0.00 | 2.890 |
| 0.43117750 | 34.2898 | 22.315 | 11846 | 5.3119 | 11851 | 0.00 | 2.875 |
| 0.43333339 | 34.5110 | 22.288 | 11772 | 5.3386 | 11777 | 0.00 | 2.861 |
| 0.43550006 | 34.6984 | 22.260 | 11699 | 5.3653 | 11704 | 0.00 | 2.847 |
| 0.43767756 | 34.8647 | 22.232 | 11626 | 5.3920 | 11632 | 0.00 | 2.833 |
| 0.43986595 | 35.0166 | 22.205 | 11554 | 5.4188 | 11560 | 0.00 | 2.819 |
| 0.44206528 | 35.1580 | 22.177 | 11482 | 5.4456 | 11488 | 0.00 | 2.805 |
| 0.44427560 | 35.2914 | 22.150 | 11411 | 5.4724 | 11417 | 0.00 | 2.791 |
| 0.44649698 | 35.4183 | 22.122 | 11340 | 5.4992 | 11346 | 0.00 | 2.777 |
| 0.44872947 | 35.5398 | 22.095 | 11270 | 5.5261 | 11275 | 0.00 | 2.763 |
| 0.45097311 | 35.6569 | 22.067 | 11200 | 5.5530 | 11205 | 0.00 | 2.749 |
| 0.45322798 | 35.7701 | 22.040 | 11130 | 5.5799 | 11136 | 0.00 | 2.736 |
| 0.45549412 | 35.8798 | 22.012 | 11061 | 5.6068 | 11067 | 0.00 | 2.722 |
| 0.45777159 | 35.9865 | 21.985 | 10992 | 5.6338 | 10998 | 0.00 | 2.708 |
| 0.46006045 | 36.0903 | 21.957 | 10924 | 5.6608 | 10930 | 0.00 | 2.695 |
| 0.46236075 | 36.1914 | 21.930 | 10856 | 5.6878 | 10862 | 0.00 | 2.682 |
| 0.46467255 | 36.2899 | 21.902 | 10788 | 5.7148 | 10794 | 0.00 | 2.668 |
| 0.46699592 | 36.3859 | 21.875 | 10721 | 5.7419 | 10727 | 0.00 | 2.655 |
| 0.46933090 | 36.4793 | 21.847 | 10655 | 5.7689 | 10660 | 0.00 | 2.642 |
| 0.47167755 | 36.5701 | 21.820 | 10588 | 5.7960 | 10594 | 0.00 | 2.629 |
| 0.47403594 | 36.6579 | 21.793 | 10522 | 5.8231 | 10528 | 0.00 | 2.616 |
| 0.47640612 | 36.7424 | 21.765 | 10457 | 5.8502 | 10463 | 0.00 | 2.602 |
| 0.47878815 | 36.8229 | 21.737 | 10392 | 5.8773 | 10397 | 0.00 | 2.590 |
| 0.48118209 | 36.8983 | 21.710 | 10327 | 5.9045 | 10333 | 0.00 | 2.577 |
| 0.48358800 | 36.9663 | 21.682 | 10262 | 5.9316 | 10268 | 0.00 | 2.564 |
| 0.48600594 | 37.0224 | 21.655 | 10198 | 5.9588 | 10204 | 0.00 | 2.551 |
| 0.48843597 | 37.0537 | 21.627 | 10135 | 5.9859 | 10141 | 0.00 | 2.538 |
| 0.49087815 | 36.9815 | 21.599 | 10071 | 6.0131 | 10077 | 0.00 | 2.526 |
| 0.49092160 | 36.9762 | 21.599 | 10070 | 6.0136 | 10076 | 0.00 | 2.526 |
| 0.49227841 | 37.0276 | 21.937 | 10200 | 6.0286 | 10206 | 0.00 | 2.519 |
| 0.49333254 | 37.1730 | 21.926 | 10173 | 6.0403 | 10179 | 0.00 | 2.513 |
| 0.49579920 | 37.3657 | 21.900 | 10110 | 6.0675 | 10116 | 0.00 | 2.501 |
| 0.49827820 | 37.5106 | 21.874 | 10048 | 6.0947 | 10054 | 0.00 | 2.488 |
| 0.50076959 | 37.6386 | 21.848 | 9986.0 | 6.1219 | 9992.1 | 0.00 | 2.476 |
| 0.50327344 | 37.7577 | 21.822 | 9924.4 | 6.1491 | 9930.5 | 0.00 | 2.464 |
| 0.50578980 | 37.8710 | 21.796 | 9863.1 | 6.1763 | 9869.3 | 0.00 | 2.451 |
| 0.50831875 | 37.9804 | 21.769 | 9802.2 | 6.2036 | 9808.4 | 0.00 | 2.439 |
| 0.51086035 | 38.0868 | 21.743 | 9741.6 | 6.2308 | 9747.9 | 0.00 | 2.427 |
| 0.51341465 | 38.1908 | 21.717 | 9681.4 | 6.2580 | 9687.6 | 0.00 | 2.415 |
| 0.51598172 | 38.2928 | 21.690 | 9621.5 | 6.2852 | 9627.8 | 0.00 | 2.403 |
| 0.51856163 | 38.3931 | 21.664 | 9561.9 | 6.3125 | 9568.2 | 0.00 | 2.391 |
| 0.52115444 | 38.4920 | 21.637 | 9502.6 | 6.3397 | 9509.0 | 0.00 | 2.379 |
| 0.52376021 | 38.5895 | 21.610 | 9443.7 | 6.3669 | 9450.1 | 0.00 | 2.367 |
| 0.52637901 | 38.6859 | 21.583 | 9385.1 | 6.3941 | 9391.5 | 0.00 | 2.355 |
| 0.52901091 | 38.7811 | 21.557 | 9326.8 | 6.4213 | 9333.2 | 0.00 | 2.344 |
| 0.53165596 | 38.8754 | 21.530 | 9268.8 | 6.4485 | 9275.2 | 0.00 | 2.332 |
| 0.53431424 | 38.9686 | 21.503 | 9211.1 | 6.4757 | 9217.5 | 0.00 | 2.320 |
| 0.53698581 | 39.0609 | 21.476 | 9153.7 | 6.5029 | 9160.2 | 0.00 | 2.309 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 0.53967074 | 39.1523 | 21.448 | 9096.6 | 6.5301 | 9103.1 | 0.00 | 2.297 |
| 0.54236910 | 39.2428 | 21.421 | 9039.8 | 6.5573 | 9046.4 | 0.00 | 2.286 |
| 0.54508094 | 39.3323 | 21.394 | 8983.4 | 6.5844 | 8989.9 | 0.00 | 2.275 |
| 0.54780635 | 39.4208 | 21.366 | 8927.2 | 6.6116 | 8933.8 | 0.00 | 2.263 |
| 0.55054538 | 39.5084 | 21.338 | 8871.3 | 6.6387 | 8877.9 | 0.00 | 2.252 |
| 0.55329810 | 39.5949 | 21.311 | 8815.6 | 6.6659 | 8822.3 | 0.00 | 2.241 |
| 0.55606460 | 39.6803 | 21.283 | 8760.3 | 6.6930 | 8767.0 | 0.00 | 2.230 |
| 0.55884492 | 39.7645 | 21.255 | 8705.3 | 6.7201 | 8712.0 | 0.00 | 2.219 |
| 0.56163914 | 39.8473 | 21.227 | 8650.5 | 6.7471 | 8657.2 | 0.00 | 2.208 |
| 0.56444734 | 39.9286 | 21.198 | 8596.0 | 6.7742 | 8602.8 | 0.00 | 2.197 |
| 0.56726958 | 40.0082 | 21.170 | 8541.8 | 6.8012 | 8548.6 | 0.00 | 2.186 |
| 0.57010592 | 40.0856 | 21.141 | 8487.8 | 6.8283 | 8494.6 | 0.00 | 2.175 |
| 0.57295645 | 40.1605 | 21.113 | 8434.1 | 6.8553 | 8441.0 | 0.00 | 2.164 |
| 0.57582123 | 40.2323 | 21.084 | 8380.7 | 6.8823 | 8387.6 | 0.00 | 2.153 |
| 0.57870034 | 40.2998 | 21.055 | 8327.5 | 6.9092 | 8334.4 | 0.00 | 2.142 |
| 0.58159384 | 40.3616 | 21.026 | 8274.6 | 6.9362 | 8281.6 | 0.00 | 2.132 |
| 0.58450181 | 40.4149 | 20.997 | 8222.0 | 6.9631 | 8229.0 | 0.00 | 2.121 |
| 0.58742432 | 40.4542 | 20.967 | 8169.6 | 6.9900 | 8176.6 | 0.00 | 2.111 |
| 0.59036144 | 40.4654 | 20.937 | 8117.5 | 7.0168 | 8124.5 | 0.00 | 2.100 |
| 05.9331325 | 40.3880 | 20.908 | 8065.6 | 7.0437 | 8072.7 | 0.00 | 2.090 |
| 0.59410753 | 40.3052 | 20.900 | 8051.7 | 7.0508 | 8058.8 | 0.00 | 2.087 |
| 0.59589253 | 40.3616 | 21.414 | 8225.3 | 7.0670 | 8232.4 | 0.00 | 2.081 |
| 0.59627982 | 40.4348 | 21.411 | 8218.5 | 7.0705 | 8225.6 | 0.00 | 2.079 |
| 0.59926122 | 40.7326 | 21.381 | 8166.4 | 7.0972 | 8173.5 | 0.00 | 2.069 |
| 0.60225752 | 40.9169 | 21.352 | 8114.6 | 7.1240 | 8121.7 | 0.00 | 2.059 |
| 0.60526881 | 41.0698 | 21.322 | 8063.0 | 7.1507 | 8070.2 | 0.00 | 2.048 |
| 0.60829515 | 41.2078 | 21.292 | 8011.7 | 7.1774 | 8018.9 | 0.00 | 2.038 |
| 0.61133663 | 41.3369 | 21.262 | 7960.6 | 7.2040 | 7967.8 | 0.00 | 2.028 |
| 0.61439331 | 41.4602 | 21.232 | 7909.8 | 7.2306 | 7917.0 | 0.00 | 2.018 |
| 0.61746528 | 41.5795 | 21.202 | 7859.2 | 7.2572 | 7866.4 | 0.00 | 2.008 |
| 0.62055260 | 41.6956 | 21.171 | 7808.8 | 7.2838 | 7816.1 | 0.00 | 1.998 |
| 0.62365537 | 41.8095 | 21.141 | 7758.7 | 7.3103 | 7766.0 | 0.00 | 1.988 |
| 0.62677364 | 41.9215 | 21.110 | 7708.8 | 7.3367 | 7716.1 | 0.00 | 1.978 |
| 0.62990751 | 42.0320 | 21.079 | 7659.1 | 7.3632 | 7666.5 | 0.00 | 1.968 |
| 0.63305705 | 42.1416 | 21.036 | 7605.5 | 7.3895 | 7612.9 | 0.00 | 1.959 |
| 0.63622234 | 42.2496 | 20.987 | 7550.0 | 7.4159 | 7557.4 | 0.00 | 1.949 |
| 0.63940345 | 42.3560 | 20.937 | 7494.9 | 7.4422 | 7502.3 | 0.00 | 1.939 |
| 0.64260046 | 42.4610 | 20.888 | 7440.0 | 7.4684 | 7447.5 | 0.00 | 1.929 |
| 0.64581347 | 42.5646 | 20.839 | 7385.5 | 7.4946 | 7393.0 | 0.00 | 1.920 |
| 0.64904253 | 42.6670 | 20.789 | 7331.3 | 7.5208 | 7338.9 | 0.00 | 1.910 |
| 0.65228775 | 42.7682 | 20.740 | 7277.5 | 7.5469 | 7285.0 | 0.00 | 1.901 |
| 0.65554919 | 42.8684 | 20.690 | 7223.9 | 7.5730 | 7231.5 | 0.00 | 1.891 |
| 0.65882693 | 42.9676 | 20.640 | 7170.6 | 7.5990 | 7178.2 | 0.00 | 1.882 |
| 0.66212107 | 43.0658 | 20.590 | 7117.7 | 7.6250 | 7125.3 | 0.00 | 1.873 |
| 0.66543167 | 43.1631 | 20.540 | 7065.0 | 7.6509 | 7072.7 | 0.00 | 1.863 |
| 0.66875883 | 43.2595 | 20.490 | 7012.7 | 7.6768 | 7020.3 | 0.00 | 1.854 |
| 0.67210262 | 43.3552 | 20.439 | 6960.6 | 7.7026 | 6968.3 | 0.00 | 1.845 |
| 0.67546314 | 43.4500 | 20.389 | 6908.8 | 7.7284 | 6916.5 | 0.00 | 1.836 |
| 0.67884045 | 43.5441 | 20.338 | 6857.2 | 7.7541 | 6865.0 | 0.00 | 1.826 |
| 0.68223466 | 43.6375 | 20.287 | 6806.0 | 7.7797 | 6813.8 | 0.00 | 1.817 |
| 0.68564583 | 43.7303 | 20.235 | 6754.9 | 7.8053 | 6762.7 | 0.00 | 1.808 |
| 0.68907406 | 43.8225 | 20.172 | 6700.4 | 7.8308 | 6708.2 | 0.00 | 1.799 |
| 0.69251943 | 43.9136 | 20.109 | 6646.3 | 7.8563 | 6654.1 | 0.00 | 1.790 |
| 0.69598202 | 44.0035 | 20.046 | 6592.5 | 7.8817 | 6600.4 | 0.00 | 1.781 |
| 0.69946194 | 44.0924 | 19.983 | 6539.1 | 7.9071 | 6547.0 | 0.00 | 1.773 |
| 0.70295924 | 44.1802 | 19.920 | 6486.0 | 7.9324 | 6493.9 | 0.00 | 1.764 |
| 0.70647404 | 44.2670 | 19.857 | 6433.3 | 7.9576 | 6441.2 | 0.00 | 1.755 |
| 0.71000641 | 44.3529 | 19.794 | 6380.9 | 7.9828 | 6388.9 | 0.00 | 1.746 |
| 0.71355644 | 44.4378 | 19.730 | 6328.8 | 8.0079 | 6336.8 | 0.00 | 1.738 |
| 0.71712423 | 44.5218 | 19.667 | 6277.1 | 8.0329 | 6285.2 | 0.00 | 1.729 |
| 0.72070985 | 44.6048 | 19.603 | 6225.6 | 8.0579 | 6233.6 | 0.00 | 1.720 |
| 0.72431340 | 44.6867 | 19.538 | 6174.2 | 8.0828 | 6182.2 | 0.00 | 1.712 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 0.72793496 | 44.7676 | 19.474 | 6123.1 | 8.1076 | 6131.2 | 0.00 | 1.703 |
| 0.73157464 | 44.8474 | 19.409 | 6072.3 | 8.1323 | 6080.5 | 0.00 | 1.695 |
| 0.73523251 | 44.9262 | 19.344 | 6021.9 | 8.1570 | 6030.1 | 0.00 | 1.686 |
| 0.73890867 | 45.0187 | 19.279 | 5971.9 | 8.1816 | 5980.1 | 0.00 | 1.678 |
| 0.74260322 | 45.0957 | 19.214 | 5922.1 | 8.2062 | 5930.3 | 0.00 | 1.670 |
| 0.74631623 | 45.1718 | 19.149 | 5872.7 | 8.2306 | 5881.0 | 0.00 | 1.661 |
| 0.75004781 | 45.2469 | 19.084 | 5823.7 | 8.2550 | 5831.9 | 0.00 | 1.653 |
| 0.75379805 | 45.3211 | 19.019 | 5774.9 | 8.2793 | 5783.2 | 0.00 | 1.645 |
| 0.75756704 | 45.3944 | 18.954 | 5726.5 | 8.3036 | 5734.8 | 0.00 | 1.637 |
| 0.76135488 | 45.4667 | 18.889 | 5678.4 | 8.3277 | 5686.8 | 0.00 | 1.628 |
| 0.76516165 | 45.5382 | 18.823 | 5630.7 | 8.3518 | 5639.0 | 0.00 | 1.620 |
| 0.76898746 | 45.6088 | 18.758 | 5583.2 | 8.3758 | 5591.6 | 0.00 | 1.612 |
| 0.77283240 | 45.6786 | 18.693 | 5536.1 | 8.3997 | 5544.5 | 0.00 | 1.604 |
| 0.77669656 | 45.7586 | 18.628 | 5489.4 | 8.4235 | 5497.8 | 0.00 | 1.596 |
| 0.78058004 | 45.8268 | 18.562 | 5442.9 | 8.4473 | 5451.3 | 0.00 | 1.588 |
| 0.78448294 | 45.8941 | 18.497 | 5396.8 | 8.4710 | 5405.2 | 0.00 | 1.580 |
| 0.78840536 | 45.9606 | 18.432 | 5351.0 | 8.4945 | 5359.4 | 0.00 | 1.573 |
| 0.79234738 | 46.0263 | 18.366 | 5305.5 | 8.5180 | 5314.0 | 0.00 | 1.565 |
| 0.79630912 | 46.0912 | 18.301 | 5260.3 | 8.5414 | 5268.8 | 0.00 | 1.557 |
| 0.80029067 | 46.1553 | 18.236 | 5215.4 | 8.5648 | 5224.0 | 0.00 | 1.549 |
| 0.80429212 | 46.2186 | 18.170 | 5170.9 | 8.5880 | 5179.5 | 0.00 | 1.542 |
| 0.80831358 | 46.2811 | 18.105 | 5126.7 | 8.6111 | 5135.3 | 0.00 | 1.534 |
| 0.81235515 | 46.3428 | 18.040 | 5082.8 | 8.6342 | 5091.4 | 0.00 | 1.526 |
| 0.81641693 | 46.4038 | 17.975 | 5039.2 | 8.6571 | 5047.9 | 0.00 | 1.519 |
| 0.82049901 | 46.4640 | 17.909 | 4995.9 | 8.6800 | 5004.6 | 0.00 | 1.511 |
| 0.82460150 | 46.5235 | 17.844 | 4953.0 | 8.7027 | 4961.7 | 0.00 | 1.504 |
| 0.82872451 | 46.5823 | 17.779 | 4910.3 | 8.7254 | 4919.0 | 0.00 | 1.496 |
| 0.83286813 | 46.6403 | 17.713 | 4867.9 | 8.7480 | 4876.7 | 0.00 | 1.489 |
| 0.83703248 | 46.6975 | 17.648 | 4825.8 | 8.7705 | 4834.5 | 0.00 | 1.481 |
| 0.84121764 | 46.7539 | 17.582 | 4783.9 | 8.7929 | 4792.7 | 0.00 | 1.474 |
| 0.84542373 | 46.8096 | 17.517 | 4742.4 | 8.8151 | 4751.2 | 0.00 | 1.467 |
| 0.84965084 | 46.8645 | 17.451 | 4701.1 | 8.8373 | 4710.0 | 0.00 | 1.459 |
| 0.85389910 | 46.9187 | 17.386 | 4660.2 | 8.8594 | 4669.1 | 0.00 | 1.452 |
| 0.85816859 | 46.9721 | 17.320 | 4619.6 | 8.8814 | 4628.5 | 0.00 | 1.445 |
| 0.86245944 | 47.0247 | 17.255 | 4579.2 | 8.9033 | 4588.1 | 0.00 | 1.438 |
| 0.86677173 | 47.0767 | 17.190 | 4539.2 | 8.9250 | 4548.1 | 0.00 | 1.430 |
| 0.87110559 | 47.1279 | 17.124 | 4499.5 | 8.9467 | 4508.4 | 0.00 | 1.423 |
| 0.87546112 | 47.1784 | 17.059 | 4460.0 | 8.9683 | 4469.0 | 0.00 | 1.416 |
| 0.87983843 | 47.2281 | 16.994 | 4420.9 | 8.9897 | 4429.9 | 0.00 | 1.409 |
| 0.88423762 | 47.2772 | 16.929 | 4382.1 | 9.0111 | 4391.1 | 0.00 | 1.402 |
| 0.88865881 | 47.3256 | 16.864 | 4343.5 | 9.0323 | 4352.5 | 0.00 | 1.395 |
| 0.89310210 | 47.3733 | 16.799 | 4305.2 | 9.0534 | 4314.3 | 0.00 | 1.388 |
| 0.89756761 | 47.4203 | 16.734 | 4267.3 | 9.0745 | 4276.3 | 0.00 | 1.381 |
| 0.90205545 | 47.4666 | 16.669 | 4229.6 | 9.0954 | 4238.7 | 0.00 | 1.374 |
| 0.90656573 | 47.5122 | 16.605 | 4192.2 | 9.1162 | 4201.3 | 0.00 | 1.368 |
| 0.91109856 | 47.5572 | 16.540 | 4155.1 | 9.1369 | 4164.2 | 0.00 | 1.361 |
| 0.91565405 | 47.6016 | 16.475 | 4118.3 | 9.1574 | 4127.5 | 0.00 | 1.354 |
| 0.92023232 | 47.6453 | 16.411 | 4081.8 | 9.1779 | 4091.0 | 0.00 | 1.347 |
| 0.92483348 | 47.6884 | 16.346 | 4045.5 | 9.1983 | 4054.7 | 0.00 | 1.341 |
| 0.92945765 | 47.7309 | 16.282 | 4009.6 | 9.2185 | 4018.8 | 0.00 | 1.334 |
| 0.93410494 | 47.7727 | 16.218 | 3973.9 | 9.2386 | 3983.1 | 0.00 | 1.327 |
| 0.93877546 | 47.8140 | 16.154 | 3938.5 | 9.2586 | 3947.8 | 0.00 | 1.321 |
| 0.94346934 | 47.8547 | 16.090 | 3903.4 | 9.2785 | 3912.7 | 0.00 | 1.314 |
| 0.94818668 | 47.8948 | 16.026 | 3868.6 | 9.2982 | 3877.9 | 0.00 | 1.308 |
| 0.95292762 | 47.9344 | 15.962 | 3834.0 | 9.3179 | 3843.3 | 0.00 | 1.301 |
| 0.95769226 | 47.9735 | 15.899 | 3799.7 | 9.3374 | 3809.1 | 0.00 | 1.295 |
| 0.96248072 | 48.0121 | 15.835 | 3765.7 | 9.3568 | 3775.1 | 0.00 | 1.288 |
| 0.96729312 | 48.0502 | 15.772 | 3732.0 | 9.3761 | 3741.4 | 0.00 | 1.282 |
| 0.97212959 | 48.0878 | 15.709 | 3698.6 | 9.3952 | 3707.9 | 0.00 | 1.275 |
| 0.97699023 | 48.1250 | 15.646 | 3665.4 | 9.4142 | 3674.8 | 0.00 | 1.269 |
| 0.98187519 | 48.1618 | 15.583 | 3632.5 | 9.4331 | 3641.9 | 0.00 | 1.263 |
| 0.98678456 | 48.1983 | 15.520 | 3599.8 | 9.4519 | 3609.3 | 0.00 | 1.256 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 0.99171848 | 48.2345 | 15.457 | 3567.4 | 9.4706 | 3576.9 | 0.00 | 1.250 |
| 0.99667708 | 48.2704 | 15.395 | 3535.3 | 9.4891 | 3544.8 | 0.00 | 1.244 |
| 1.0016605 | 48.6747 | 15.321 | 3501.0 | 9.5075 | 3510.5 | 0.00 | 1.238 |
| 1.0066688 | 48.7529 | 15.226 | 3461.9 | 9.5257 | 3471.5 | 0.00 | 1.232 |
| 1.0117021 | 48.8078 | 15.131 | 3423.3 | 9.5439 | 3432.8 | 0.00 | 1.226 |
| 1.0167606 | 48.8558 | 15.038 | 3385.1 | 9.5619 | 3394.7 | 0.00 | 1.219 |
| 1.0218444 | 48.8986 | 14.944 | 3347.4 | 9.5798 | 3357.0 | 0.00 | 1.213 |
| 1.0269536 | 48.9373 | 14.852 | 3310.2 | 9.5975 | 3319.8 | 0.00 | 1.207 |
| 1.0320884 | 48.9722 | 14.760 | 3273.4 | 9.6151 | 3283.0 | 0.00 | 1.201 |
| 1.0372489 | 49.0039 | 14.667 | 3236.4 | 9.6326 | 3246.0 | 0.00 | 1.195 |
| 1.0424351 | 49.0320 | 14.569 | 3198.9 | 9.6499 | 3208.6 | 0.00 | 1.189 |
| 1.0476473 | 49.0568 | 14.473 | 3161.9 | 9.6671 | 3171.6 | 0.00 | 1.183 |
| 1.0528855 | 49.0786 | 14.377 | 3125.4 | 9.6842 | 3135.1 | 0.00 | 1.178 |
| 1.0581499 | 49.0975 | 14.282 | 3089.3 | 9.7011 | 3099.0 | 0.00 | 1.172 |
| 1.0634407 | 49.1137 | 14.188 | 3053.7 | 9.7179 | 3063.5 | 0.00 | 1.166 |
| 1.0687579 | 49.1273 | 14.095 | 3018.6 | 9.7346 | 3028.3 | 0.00 | 1.160 |
| 1.0741017 | 49.1385 | 14.003 | 2983.9 | 9.7511 | 2993.7 | 0.00 | 1.154 |
| 1.0794722 | 49.1474 | 13.911 | 2949.7 | 9.7675 | 2959.4 | 0.00 | 1.149 |
| 1.0848695 | 49.1540 | 13.821 | 2915.8 | 9.7838 | 2925.6 | 0.00 | 1.143 |
| 1.0902939 | 49.1585 | 13.731 | 2882.5 | 9.7999 | 2892.3 | 0.00 | 1.137 |
| 1.0957454 | 49.1609 | 13.642 | 2849.5 | 9.8158 | 2859.3 | 0.00 | 1.132 |
| 1.1012241 | 49.1614 | 13.553 | 2817.0 | 9.8317 | 2826.8 | 0.00 | 1.126 |
| 1.1067302 | 49.1599 | 13.466 | 2784.8 | 9.8473 | 2794.7 | 0.00 | 1.120 |
| 1.1122639 | 49.1566 | 13.379 | 2753.1 | 9.8629 | 2763.0 | 0.00 | 1.115 |
| 1.1178252 | 49.1514 | 13.293 | 2721.8 | 9.8783 | 2731.7 | 0.00 | 1.109 |
| 1.1234143 | 49.1444 | 13.207 | 2690.9 | 9.8935 | 2700.8 | 0.00 | 1.104 |
| 1.1290314 | 49.1357 | 13.123 | 2660.3 | 9.9086 | 2670.2 | 0.00 | 1.098 |
| 1.1346765 | 49.1252 | 13.039 | 2630.2 | 9.9236 | 2640.1 | 0.00 | 1.093 |
| 1.1403499 | 49.1131 | 12.956 | 2600.4 | 9.9384 | 2610.4 | 0.00 | 1.087 |
| 1.1460517 | 49.0993 | 12.873 | 2571.0 | 9.9530 | 2581.0 | 0.00 | 1.082 |
| 1.1517819 | 49.0838 | 12.792 | 2542.0 | 9.9676 | 2552.0 | 0.00 | 1.076 |
| 1.1575408 | 49.0668 | 12.711 | 2513.3 | 9.9819 | 2523.3 | 0.00 | 1.071 |
| 1.1633285 | 49.0481 | 12.630 | 2485.0 | 9.9962 | 2495.0 | 0.00 | 1.066 |
| 1.1691452 | 49.0278 | 12.551 | 2457.1 | 10.010 | 2467.1 | 0.00 | 1.060 |
| 1.1749909 | 49.0060 | 12.472 | 2429.5 | 10.024 | 2439.5 | 0.00 | 1.055 |
| 1.1808659 | 48.9825 | 12.394 | 2402.2 | 10.038 | 2412.3 | 0.00 | 1.050 |
| 1.1867702 | 48.9575 | 12.316 | 2375.3 | 10.052 | 2385.4 | 0.00 | 1.045 |
| 1.1927040 | 48.9309 | 12.239 | 2348.7 | 10.065 | 2358.8 | 0.00 | 1.040 |
| 1.1986676 | 48.9027 | 12.163 | 2322.5 | 10.078 | 2332.6 | 0.00 | 1.034 |
| 1.2046609 | 48.8730 | 12.087 | 2296.6 | 10.092 | 2306.7 | 0.00 | 1.029 |
| 1.2106842 | 48.8417 | 12.012 | 2271.0 | 10.105 | 2281.1 | 0.00 | 1.024 |
| 1.2167376 | 48.8088 | 11.938 | 2245.7 | 10.117 | 2255.8 | 0.00 | 1.019 |
| 1.2228213 | 48.7743 | 11.864 | 2220.7 | 10.130 | 2230.9 | 0.00 | 1.014 |
| 1.2289354 | 48.7382 | 11.791 | 2196.1 | 10.143 | 2206.2 | 0.00 | 1.009 |
| 1.2350801 | 48.7005 | 11.719 | 2171.7 | 10.155 | 2181.9 | 0.00 | 1.004 |
| 1.2412555 | 48.6611 | 11.647 | 2147.7 | 10.167 | 2157.8 | 0.00 | 0.9989 |
| 1.2474618 | 48.6201 | 11.576 | 2123.9 | 10.179 | 2134.1 | 0.00 | 0.9939 |
| 1.2536991 | 48.5775 | 11.505 | 2100.4 | 10.191 | 2110.6 | 0.00 | 0.9889 |
| 1.2599676 | 48.5332 | 11.435 | 2077.3 | 10.203 | 2087.5 | 0.00 | 0.9840 |
| 1.2662674 | 48.4871 | 11.365 | 2054.4 | 10.215 | 2064.6 | 0.00 | 0.9791 |
| 1.2725988 | 48.4394 | 11.297 | 2031.8 | 10.226 | 2042.0 | 0.00 | 0.9743 |
| 1.2789618 | 48.3920 | 11.228 | 2009.4 | 10.237 | 2019.7 | 0.00 | 0.9694 |
| 1.2853566 | 48.3407 | 11.161 | 1987.4 | 10.249 | 1997.6 | 0.00 | 0.9646 |
| 1.2917833 | 48.2876 | 11.093 | 1965.6 | 10.260 | 1975.8 | 0.00 | 0.9598 |
| 1.2982423 | 48.2326 | 11.027 | 1944.0 | 10.270 | 1954.3 | 0.00 | 0.9550 |
| 1.3047335 | 48.1757 | 10.961 | 1922.8 | 10.281 | 1933.1 | 0.00 | 0.9503 |
| 1.3112571 | 48.1170 | 10.895 | 1901.8 | 10.292 | 1912.1 | 0.00 | 0.9455 |
| 1.3178134 | 48.0562 | 10.830 | 1881.0 | 10.302 | 1891.3 | 0.00 | 0.9408 |
| 1.3244025 | 47.9934 | 10.766 | 1860.5 | 10.312 | 1870.8 | 0.00 | 0.9362 |
| 1.3310245 | 47.9286 | 10.702 | 1840.3 | 10.322 | 1850.6 | 0.00 | 0.9315 |
| 1.3376796 | 47.8617 | 10.638 | 1820.3 | 10.332 | 1830.6 | 0.00 | 0.9269 |
| 1.3443680 | 47.7926 | 10.575 | 1800.5 | 10.342 | 1810.9 | 0.00 | 0.9222 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 1.3510899 | 47.7213 | 10.513 | 1781.0 | 10.351 | 1791.3 | 0.00 | 0.9177 |
| 1.3578453 | 47.6477 | 10.451 | 1761.7 | 10.361 | 1772.1 | 0.00 | 0.9131 |
| 1.3646345 | 47.5717 | 10.390 | 1742.7 | 10.370 | 1753.0 | 0.00 | 0.9086 |
| 1.3714577 | 47.4934 | 10.329 | 1723.8 | 10.379 | 1734.2 | 0.00 | 0.9040 |
| 1.3783150 | 47.4125 | 10.269 | 1705.2 | 10.388 | 1715.6 | 0.00 | 0.8995 |
| 1.3852066 | 47.3291 | 10.209 | 1686.9 | 10.397 | 1697.3 | 0.00 | 0.8951 |
| 1.3921326 | 47.2430 | 10.149 | 1668.7 | 10.405 | 1679.1 | 0.00 | 0.8906 |
| 1.3990933 | 47.1542 | 10.091 | 1650.8 | 10.413 | 1661.2 | 0.00 | 0.8862 |
| 1.4060887 | 47.0625 | 10.032 | 1633.0 | 10.422 | 1643.5 | 0.00 | 0.8818 |
| 1.4131192 | 46.9679 | 9.9742 | 1615.5 | 10.430 | 1626.0 | 0.00 | 0.8774 |
| 1.4201848 | 46.8702 | 9.9168 | 1598.2 | 10.438 | 1608.7 | 0.00 | 0.8730 |
| 1.4272857 | 46.7693 | 9.8598 | 1581.1 | 10.445 | 1591.6 | 0.00 | 0.8687 |
| 1.4344221 | 46.6652 | 9.8032 | 1564.3 | 10.453 | 1574.7 | 0.00 | 0.8643 |
| 1.4415942 | 46.5576 | 9.7471 | 1547.6 | 10.460 | 1558.0 | 0.00 | 0.8600 |
| 1.4488022 | 46.4465 | 9.6915 | 1531.1 | 10.468 | 1541.5 | 0.00 | 0.8558 |
| 1.4560462 | 46.3316 | 9.6362 | 1514.8 | 10.475 | 1525.2 | 0.00 | 0.8515 |
| 1.4633265 | 46.2129 | 9.5814 | 1498.7 | 10.482 | 1509.1 | 0.00 | 0.8473 |
| 1.4706431 | 46.0901 | 9.5270 | 1482.7 | 10.488 | 1493.2 | 0.00 | 0.8431 |
| 1.4779963 | 45.9654 | 9.4730 | 1467.0 | 10.495 | 1477.5 | 0.00 | 0.8389 |
| 1.4853863 | 45.8339 | 9.4195 | 1451.5 | 10.501 | 1462.0 | 0.00 | 0.8347 |
| 1.4928132 | 45.6978 | 9.3664 | 1436.1 | 10.507 | 1446.6 | 0.00 | 0.8305 |
| 1.5002773 | 45.5567 | 9.3137 | 1420.9 | 10.514 | 1431.4 | 0.00 | 0.8264 |
| 1.5077787 | 45.4105 | 9.2615 | 1405.9 | 10.519 | 1416.4 | 0.00 | 0.8223 |
| 1.5153176 | 45.2588 | 9.2096 | 1391.1 | 10.525 | 1401.6 | 0.00 | 0.8182 |
| 1.5228942 | 45.1013 | 9.1582 | 1376.4 | 10.531 | 1387.0 | 0.00 | 0.8141 |
| 1.5305086 | 44.9378 | 9.1072 | 1362.0 | 10.536 | 1372.5 | 0.00 | 0.8101 |
| 1.5381612 | 44.7679 | 9.0565 | 1347.6 | 10.541 | 1358.2 | 0.00 | 0.8061 |
| 1.5458520 | 44.5911 | 9.0063 | 1333.5 | 10.546 | 1344.0 | 0.00 | 0.8020 |
| 1.5535812 | 44.4071 | 8.9565 | 1319.5 | 10.551 | 1330.1 | 0.00 | 0.7981 |
| 1.5613491 | 44.2154 | 8.9070 | 1305.7 | 10.556 | 1316.3 | 0.00 | 0.7941 |
| 1.5691559 | 44.0154 | 8.8580 | 1292.1 | 10.561 | 1302.6 | 0.00 | 0.7901 |
| 1.5770017 | 43.8066 | 8.8093 | 1278.6 | 10.565 | 1289.1 | 0.00 | 0.7862 |
| 1.5848867 | 43.5884 | 8.7610 | 1265.2 | 10.569 | 1275.8 | 0.00 | 0.7823 |
| 1.5928111 | 43.3600 | 8.7131 | 1252.0 | 10.573 | 1262.6 | 0.00 | 0.7784 |
| 1.6007752 | 43.1207 | 8.6655 | 1239.0 | 10.577 | 1249.6 | 0.00 | 0.7745 |
| 1.6087790 | 42.8695 | 8.6183 | 1226.1 | 10.581 | 1236.7 | 0.00 | 0.7707 |
| 1.6168229 | 42.6055 | 8.5715 | 1213.4 | 10.584 | 1224.0 | 0.00 | 0.7668 |
| 1.6249070 | 42.3276 | 8.5250 | 1200.8 | 10.588 | 1211.4 | 0.00 | 0.7630 |
| 1.6330316 | 42.0344 | 8.4789 | 1188.4 | 10.591 | 1199.0 | 0.00 | 0.7592 |
| 1.6411967 | 41.7244 | 8.4332 | 1176.1 | 10.594 | 1186.7 | 0.00 | 0.7555 |
| 1.6494027 | 41.3961 | 8.3878 | 1164.0 | 10.597 | 1174.6 | 0.00 | 0.7517 |
| 1.6576497 | 41.0474 | 8.3428 | 1151.9 | 10.599 | 1162.5 | 0.00 | 0.7480 |
| 1.6659380 | 40.6759 | 8.2981 | 1140.1 | 10.602 | 1150.7 | 0.00 | 0.7442 |
| 1.6742677 | 40.2791 | 8.2537 | 1128.3 | 10.604 | 1138.9 | 0.00 | 0.7405 |
| 1.6826390 | 39.8536 | 8.2097 | 1116.7 | 10.606 | 1127.3 | 0.00 | 0.7368 |
| 1.6910522 | 39.3956 | 8.1660 | 1105.3 | 10.609 | 1115.9 | 0.00 | 0.7332 |
| 1.6995075 | 38.9003 | 8.1227 | 1093.9 | 10.610 | 1104.5 | 0.00 | 0.7295 |
| 1.7080050 | 38.3617 | 8.0781 | 1082.5 | 10.612 | 1093.1 | 0.00 | 0.7259 |
| 1.7165450 | 37.7723 | 8.0334 | 1071.2 | 10.614 | 1081.8 | 0.00 | 0.7223 |
| 1.7251278 | 37.1225 | 7.9890 | 1060.0 | 10.615 | 1070.6 | 0.00 | 0.7187 |
| 1.7337534 | 36.3998 | 7.9450 | 1048.9 | 10.616 | 1059.5 | 0.00 | 0.7151 |
| 1.7424222 | 35.5869 | 7.9014 | 1037.9 | 10.617 | 1048.5 | 0.00 | 0.7116 |
| 1.7511343 | 34.6597 | 7.8580 | 1027.1 | 10.618 | 1037.7 | 0.00 | 0.7080 |
| 1.7598899 | 33.5823 | 7.8150 | 1016.4 | 10.618 | 1027.0 | 0.00 | 0.7045 |
| 1.7686894 | 32.2981 | 7.7723 | 1005.8 | 10.619 | 1016.4 | 0.00 | 0.7010 |
| 1.7775328 | 30.7091 | 7.7299 | 995.34 | 10.619 | 1006.0 | 0.00 | 0.6975 |
| 1.7864205 | 28.6218 | 7.6878 | 984.99 | 10.619 | 995.61 | 0.00 | 0.6940 |
| 1.7953526 | 25.5410 | 7.6460 | 974.77 | 10.619 | 985.39 | 0.00 | 0.6906 |
| 1.8043294 | 19.2952 | 7.6046 | 964.66 | 10.619 | 975.28 | 0.00 | 0.6871 |
| 1.8088491 | 4.06674 | 7.5839 | 959.64 | 10.619 | 970.25 | 0.00 | 0.6854 |
| 1.8095510 | 3.74869 | 25.626 | 3241.3 | 10.619 | 3252.0 | 0.00 | 0.6852 |
| 1.8133510 | 17.8305 | 25.549 | 3224.9 | 10.619 | 3235.5 | 0.00 | 0.6837 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 1.8224178 | 24.0826 | 25.369 | 3186.1 | 10.618 | 3196.8 | 0.00 | 0.6803 |
| 1.8315299 | 26.5264 | 25.189 | 3147.9 | 10.618 | 3158.5 | 0.00 | 0.6769 |
| 1.8406875 | 27.7107 | 25.011 | 3110.1 | 10.617 | 3120.7 | 0.00 | 0.6736 |
| 1.8498909 | 28.0311 | 24.835 | 3072.8 | 10.616 | 3083.4 | 0.00 | 0.6702 |
| 1.8591404 | 27.2913 | 24.659 | 3035.9 | 10.615 | 3046.5 | 0.00 | 0.6669 |
| 1.8684361 | 23.2827 | 24.485 | 2999.5 | 10.613 | 3010.1 | 0.00 | 0.6636 |
| 1.8709394 | 17.6545 | 24.439 | 2989.8 | 10.613 | 3000.4 | 0.00 | 0.6627 |
| 1.8722607 | 17.6137 | 36.298 | 4437.5 | 10.613 | 4448.1 | 0.00 | 0.6622 |
| 1.8777783 | 26.6817 | 36.144 | 4405.6 | 10.612 | 4416.2 | 0.00 | 0.6603 |
| 1.8871672 | 31.0855 | 35.884 | 4352.1 | 10.610 | 4362.7 | 0.00 | 0.6570 |
| 1.8966030 | 33.6780 | 35.625 | 4299.3 | 10.608 | 4309.9 | 0.00 | 0.6537 |
| 1.9060860 | 35.6113 | 35.369 | 4247.1 | 10.606 | 4257.7 | 0.00 | 0.6505 |
| 1.9156165 | 37.1838 | 35.115 | 4195.6 | 10.604 | 4206.2 | 0.00 | 0.6472 |
| 1.9251945 | 38.5216 | 34.862 | 4144.7 | 10.602 | 4155.3 | 0.00 | 0.6440 |
| 1.9348205 | 39.6913 | 34.612 | 4094.5 | 10.599 | 4105.1 | 0.00 | 0.6408 |
| 1.9444946 | 40.7328 | 34.363 | 4044.9 | 10.596 | 4055.4 | 0.00 | 0.6376 |
| 1.9542171 | 41.6726 | 34.117 | 3995.8 | 10.593 | 4006.4 | 0.00 | 0.6344 |
| 1.9639882 | 42.5289 | 33.872 | 3947.4 | 10.590 | 3958.0 | 0.00 | 0.6313 |
| 1.9738081 | 43.3150 | 33.628 | 3899.5 | 10.587 | 3910.1 | 0.00 | 0.6281 |
| 1.9836772 | 44.0410 | 33.386 | 3852.2 | 10.584 | 3862.8 | 0.00 | 0.6250 |
| 1.9935955 | 44.7146 | 33.146 | 3805.4 | 10.580 | 3816.0 | 0.00 | 0.6219 |
| 2.0035635 | 45.3419 | 32.907 | 3759.3 | 10.577 | 3769.8 | 0.00 | 0.6188 |
| 2.0135813 | 45.9281 | 32.670 | 3713.7 | 10.573 | 3724.2 | 0.00 | 0.6157 |
| 2.0236492 | 46.4771 | 32.436 | 3668.6 | 10.569 | 3679.2 | 0.00 | 0.6127 |
| 2.0337675 | 46.9922 | 32.202 | 3624.1 | 10.565 | 3634.7 | 0.00 | 0.6096 |
| 2.0439363 | 47.4762 | 31.971 | 3580.2 | 10.560 | 3590.8 | 0.00 | 0.6066 |
| 2.0541560 | 47.9314 | 31.742 | 3536.8 | 10.556 | 3547.4 | 0.00 | 0.6036 |
| 2.0644268 | 48.3597 | 31.514 | 3493.9 | 10.551 | 3504.5 | 0.00 | 0.6006 |
| 2.0747489 | 48.7627 | 31.288 | 3451.6 | 10.546 | 3462.2 | 0.00 | 0.5976 |
| 2.0851227 | 49.1417 | 31.063 | 3409.8 | 10.541 | 3420.3 | 0.00 | 0.5946 |
| 2.0955483 | 49.4977 | 30.840 | 3368.5 | 10.536 | 3379.1 | 0.00 | 0.5917 |
| 2.1060260 | 49.8314 | 30.619 | 3327.7 | 10.531 | 3338.3 | 0.00 | 0.5887 |
| 2.1165562 | 50.1433 | 30.400 | 3287.5 | 10.526 | 3298.0 | 0.00 | 0.5858 |
| 2.1271389 | 50.4338 | 30.182 | 3247.7 | 10.520 | 3258.2 | 0.00 | 0.5829 |
| 2.1377746 | 50.7027 | 29.966 | 3208.4 | 10.514 | 3218.9 | 0.00 | 0.5800 |
| 2.1484635 | 50.9498 | 29.752 | 3169.6 | 10.508 | 3180.1 | 0.00 | 0.5771 |
| 2.1592058 | 51.1743 | 29.539 | 3131.3 | 10.502 | 3141.8 | 0.00 | 0.5742 |
| 2.1700018 | 51.3749 | 29.328 | 3093.4 | 10.496 | 3103.9 | 0.00 | 0.5714 |
| 2.1808519 | 51.5496 | 29.118 | 3056.0 | 10.489 | 3066.5 | 0.00 | 0.5685 |
| 2.1917561 | 51.6957 | 28.910 | 3019.1 | 10.483 | 3029.6 | 0.00 | 0.5657 |
| 2.2027149 | 51.8086 | 28.704 | 2982.6 | 10.476 | 2993.1 | 0.00 | 0.5629 |
| 2.2137285 | 51.8817 | 28.499 | 2946.6 | 10.469 | 2957.1 | 0.00 | 0.5601 |
| 2.2247971 | 51.9041 | 28.296 | 2911.0 | 10.462 | 2921.5 | 0.00 | 0.5573 |
| 2.2359211 | 51.8573 | 28.094 | 2875.9 | 10.455 | 2886.3 | 0.00 | 0.5545 |
| 2.2471007 | 51.7061 | 27.893 | 2841.1 | 10.448 | 2851.6 | 0.00 | 0.5518 |
| 2.2583362 | 51.3704 | 27.695 | 2806.9 | 10.440 | 2817.3 | 0.00 | 0.5490 |
| 2.2696279 | 50.5932 | 27.497 | 2773.0 | 10.433 | 2783.4 | 0.00 | 0.5463 |
| 2.2786505 | 48.3982 | 27.341 | 2746.4 | 10.426 | 2756.8 | 0.00 | 0.5441 |
| 2.2809760 | 41.3917 | 27.301 | 2739.6 | 10.425 | 2750.0 | 0.00 | 0.5436 |
| 2.2833493 | 48.4449 | 32.090 | 3216.7 | 10.423 | 3227.1 | 0.00 | 0.5430 |
| 2.2923809 | 51.1010 | 31.891 | 3184.1 | 10.417 | 3194.6 | 0.00 | 0.5409 |
| 2.3038428 | 52.4327 | 31.641 | 3143.5 | 10.409 | 3153.9 | 0.00 | 0.5382 |
| 2.3153620 | 53.3017 | 31.393 | 3103.4 | 10.400 | 3113.8 | 0.00 | 0.5355 |
| 2.3269388 | 53.9744 | 31.148 | 3063.8 | 10.392 | 3074.2 | 0.00 | 0.5328 |
| 2.3385735 | 54.5346 | 30.904 | 3024.7 | 10.383 | 3035.1 | 0.00 | 0.5302 |
| 2.3502664 | 55.0199 | 30.663 | 2986.2 | 10.375 | 2996.5 | 0.00 | 0.5275 |
| 2.3620177 | 55.4489 | 30.417 | 2947.5 | 10.366 | 2957.9 | 0.00 | 0.5249 |
| 2.3738278 | 55.8317 | 30.172 | 2909.2 | 10.357 | 2919.6 | 0.00 | 0.5223 |
| 2.3856970 | 56.1749 | 29.929 | 2871.4 | 10.348 | 2881.7 | 0.00 | 0.5197 |
| 2.3976254 | 56.4813 | 29.696 | 2834.9 | 10.338 | 2845.2 | 0.00 | 0.5171 |
| 2.4096136 | 56.7657 | 29.481 | 2800.4 | 10.329 | 2810.7 | 0.00 | 0.5145 |
| 2.4216616 | 57.0327 | 29.270 | 2766.4 | 10.319 | 2776.8 | 0.00 | 0.5120 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 2.4337699 | 57.2825 | 29.061 | 2733.0 | 10.309 | 2743.3 | 0.00 | 0.5094 |
| 2.4459388 | 57.5145 | 28.850 | 2699.7 | 10.300 | 2710.0 | 0.00 | 0.5069 |
| 2.4581685 | 57.7286 | 28.642 | 2666.9 | 10.289 | 2677.2 | 0.00 | 0.5044 |
| 2.4704593 | 57.9246 | 28.436 | 2634.6 | 10.279 | 2644.9 | 0.00 | 0.5019 |
| 2.4828116 | 58.1017 | 28.233 | 2602.8 | 10.269 | 2613.0 | 0.00 | 0.4994 |
| 2.4952257 | 58.2584 | 28.033 | 2571.4 | 10.258 | 2581.7 | 0.00 | 0.4969 |
| 2.5077018 | 58.3915 | 27.835 | 2540.5 | 10.248 | 2550.8 | 0.00 | 0.4944 |
| 2.5202403 | 58.4954 | 27.639 | 2510.1 | 10.237 | 2520.3 | 0.00 | 0.4920 |
| 2.5328415 | 58.5591 | 27.445 | 2480.1 | 10.226 | 2490.3 | 0.00 | 0.4895 |
| 2.5455057 | 58.5592 | 27.253 | 2450.5 | 10.215 | 2460.7 | 0.00 | 0.4871 |
| 2.5582333 | 58.4289 | 27.064 | 2421.4 | 10.204 | 2431.6 | 0.00 | 0.4846 |
| 2.5710244 | 57.7597 | 26.876 | 2392.6 | 10.192 | 2402.8 | 0.00 | 0.4822 |
| 2.5716555 | 57.6629 | 26.867 | 2391.2 | 10.192 | 2401.4 | 0.00 | 0.4821 |
| 2.5781443 | 57.7438 | 28.665 | 2544.9 | 10.186 | 2555.1 | 0.00 | 0.4809 |
| 2.5838796 | 58.4515 | 28.571 | 2530.9 | 10.181 | 2541.1 | 0.00 | 0.4798 |
| 2.5967990 | 59.1845 | 28.362 | 2499.8 | 10.169 | 2510.0 | 0.00 | 0.4775 |
| 2.6097829 | 59.6478 | 28.154 | 2469.2 | 10.158 | 2479.3 | 0.00 | 0.4751 |
| 2.6228319 | 60.0117 | 27.949 | 2439.0 | 10.146 | 2449.1 | 0.00 | 0.4727 |
| 2.6359460 | 60.3202 | 27.745 | 2409.2 | 10.134 | 2419.3 | 0.00 | 0.4704 |
| 2.6491257 | 60.5917 | 27.544 | 2379.8 | 10.121 | 2389.9 | 0.00 | 0.4680 |
| 2.6623714 | 60.8352 | 27.344 | 2350.7 | 10.109 | 2360.9 | 0.00 | 0.4657 |
| 2.6756832 | 61.0555 | 27.146 | 2322.1 | 10.097 | 2332.2 | 0.00 | 0.4634 |
| 2.6890617 | 61.2549 | 26.950 | 2293.9 | 10.084 | 2303.9 | 0.00 | 0.4611 |
| 2.7025070 | 61.4337 | 26.756 | 2266.0 | 10.071 | 2276.1 | 0.00 | 0.4588 |
| 2.7160195 | 61.5963 | 26.578 | 2239.7 | 10.059 | 2249.8 | 0.00 | 0.4565 |
| 2.7295996 | 61.7470 | 26.402 | 2213.9 | 10.046 | 2223.9 | 0.00 | 0.4542 |
| 2.7432476 | 61.8834 | 26.228 | 2188.4 | 10.033 | 2198.4 | 0.00 | 0.4520 |
| 2.7569638 | 62.0023 | 26.057 | 2163.3 | 10.019 | 2173.3 | 0.00 | 0.4497 |
| 2.7707486 | 62.0982 | 25.888 | 2138.5 | 10.006 | 2148.5 | 0.00 | 0.4475 |
| 2.7846024 | 62.1590 | 25.720 | 2114.1 | 9.9924 | 2124.1 | 0.00 | 0.4452 |
| 2.7985254 | 62.1531 | 25.554 | 2090.0 | 9.9788 | 2100.0 | 0.00 | 0.4430 |
| 2.8125180 | 61.9324 | 25.390 | 2066.3 | 9.9650 | 2076.2 | 0.00 | 0.4408 |
| 2.8140455 | 61.8632 | 25.373 | 2063.7 | 9.9635 | 2073.7 | 0.00 | 0.4406 |
| 2.8251547 | 61.9917 | 26.383 | 2137.4 | 9.9525 | 2147.4 | 0.00 | 0.4389 |
| 2.8265806 | 62.0919 | 26.366 | 2135.0 | 9.9511 | 2145.0 | 0.00 | 0.4386 |
| 2.8407135 | 62.6619 | 26.201 | 2111.1 | 9.9371 | 2121.1 | 0.00 | 0.4365 |
| 2.8549171 | 63.0133 | 26.038 | 2087.5 | 9.9229 | 2097.5 | 0.00 | 0.4343 |
| 2.8691917 | 63.2980 | 25.876 | 2064.2 | 9.9087 | 2074.1 | 0.00 | 0.4321 |
| 2.8835376 | 63.5490 | 25.715 | 2041.2 | 9.8943 | 2051.1 | 0.00 | 0.4300 |
| 2.8979553 | 63.7792 | 25.556 | 2018.4 | 9.8798 | 2028.3 | 0.00 | 0.4278 |
| 2.9124451 | 63.9949 | 25.397 | 1995.9 | 9.8651 | 2005.7 | 0.00 | 0.4257 |
| 2.9270073 | 64.2001 | 25.239 | 1973.6 | 9.8503 | 1983.5 | 0.00 | 0.4236 |
| 2.9416424 | 64.3972 | 25.082 | 1951.6 | 9.8355 | 1961.4 | 0.00 | 0.4215 |
| 2.9563506 | 64.5879 | 24.926 | 1929.8 | 9.8205 | 1939.6 | 0.00 | 0.4194 |
| 2.9711323 | 64.7745 | 24.772 | 1908.3 | 9.8053 | 1918.1 | 0.00 | 0.4173 |
| 2.9859880 | 64.9610 | 24.619 | 1887.1 | 9.7901 | 1896.9 | 0.00 | 0.4152 |
| 3.0009179 | 65.1549 | 24.466 | 1866.0 | 9.7747 | 1875.8 | 0.00 | 0.4132 |
| 3.0159225 | 65.3159 | 24.291 | 1843.5 | 9.7592 | 1853.2 | 0.00 | 0.4111 |
| 3.0310021 | 65.4708 | 24.117 | 1821.2 | 9.7436 | 1830.9 | 0.00 | 0.4091 |
| 3.0461571 | 65.6203 | 23.944 | 1799.1 | 9.7279 | 1808.9 | 0.00 | 0.4070 |
| 3.0613879 | 65.7647 | 23.773 | 1777.4 | 9.7120 | 1787.1 | 0.00 | 0.4050 |
| 3.0766949 | 65.9045 | 23.603 | 1755.9 | 9.6961 | 1765.6 | 0.00 | 0.4030 |
| 3.0920783 | 66.0400 | 23.434 | 1734.6 | 9.6800 | 1744.3 | 0.00 | 0.4010 |
| 3.1075387 | 66.1714 | 23.266 | 1713.6 | 9.6638 | 1723.3 | 0.00 | 0.3990 |
| 3.1230764 | 66.2990 | 23.099 | 1692.9 | 9.6475 | 1702.5 | 0.00 | 0.3970 |
| 3.1386918 | 66.4231 | 22.934 | 1672.4 | 9.6311 | 1682.0 | 0.00 | 0.3950 |
| 3.1543853 | 66.5437 | 22.769 | 1652.2 | 9.6146 | 1661.8 | 0.00 | 0.3931 |
| 3.1701572 | 66.6610 | 22.606 | 1632.2 | 9.5980 | 1641.8 | 0.00 | 0.3911 |
| 3.1860080 | 66.7752 | 22.444 | 1612.4 | 9.5812 | 1622.0 | 0.00 | 0.3892 |
| 3.2019380 | 66.8864 | 22.283 | 1592.9 | 9.5644 | 1602.4 | 0.00 | 0.3872 |
| 3.2179477 | 66.9948 | 22.123 | 1573.6 | 9.5474 | 1583.1 | 0.00 | 0.3853 |
| 3.2340374 | 67.1004 | 21.964 | 1554.5 | 9.5304 | 1564.0 | 0.00 | 0.3834 |

TABLE 4. Form factors, attenuation, and scattering cross-sections, $Z=60-74$, from $E=0.1$ keV to $E=3.98$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]K$ $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|---|-----------------|
| W ($Z=74$) | | | | | | | |
| 3.2502076 | 67.2033 | 21.807 | 1535.7 | 9.5132 | 1545.2 | 0.00 | 0.3815 |
| 3.2664587 | 67.3037 | 21.650 | 1517.0 | 9.4959 | 1526.5 | 0.00 | 0.3796 |
| 3.2827910 | 67.4017 | 21.495 | 1498.7 | 9.4785 | 1508.1 | 0.00 | 0.3777 |
| 3.2992049 | 67.4973 | 21.340 | 1480.5 | 9.4611 | 1490.0 | 0.00 | 0.3758 |
| 3.3157009 | 67.5906 | 21.187 | 1462.5 | 9.4435 | 1472.0 | 0.00 | 0.3739 |
| 3.3322794 | 67.6819 | 21.035 | 1444.8 | 9.4258 | 1454.2 | 0.00 | 0.3721 |
| 3.3489408 | 67.7711 | 20.884 | 1427.3 | 9.4080 | 1436.7 | 0.00 | 0.3702 |
| 3.3656856 | 67.8581 | 20.733 | 1409.9 | 9.3901 | 1419.3 | 0.00 | 0.3684 |
| 3.3825140 | 67.9429 | 20.583 | 1392.8 | 9.3721 | 1402.1 | 0.00 | 0.3665 |
| 3.3994265 | 68.0255 | 20.434 | 1375.8 | 9.3540 | 1385.2 | 0.00 | 0.3647 |
| 3.4164237 | 68.1062 | 20.286 | 1359.1 | 9.3358 | 1368.4 | 0.00 | 0.3629 |
| 3.4335058 | 68.1849 | 20.140 | 1342.5 | 9.3175 | 1351.9 | 0.00 | 0.3611 |
| 3.4506733 | 68.2617 | 19.994 | 1326.2 | 9.2991 | 1335.5 | 0.00 | 0.3593 |
| 3.4679267 | 68.3368 | 19.850 | 1310.1 | 9.2806 | 1319.4 | 0.00 | 0.3575 |
| 3.4852663 | 68.4102 | 19.707 | 1294.2 | 9.2620 | 1303.4 | 0.00 | 0.3557 |
| 3.5026927 | 68.4819 | 19.565 | 1278.4 | 9.2434 | 1287.7 | 0.00 | 0.3540 |
| 3.5202061 | 68.5521 | 19.424 | 1262.9 | 9.2246 | 1272.1 | 0.00 | 0.3522 |
| 3.5378072 | 68.6208 | 19.284 | 1247.6 | 9.2057 | 1256.8 | 0.00 | 0.3505 |
| 3.5554962 | 68.6880 | 19.145 | 1232.5 | 9.1868 | 1241.6 | 0.00 | 0.3487 |
| 3.5732737 | 68.7538 | 19.007 | 1217.5 | 9.1677 | 1226.7 | 0.00 | 0.3470 |
| 3.5911400 | 68.8184 | 18.871 | 1202.7 | 9.1486 | 1211.9 | 0.00 | 0.3453 |
| 3.6090957 | 68.8817 | 18.735 | 1188.2 | 9.1294 | 1197.3 | 0.00 | 0.3435 |
| 3.6271412 | 69.1474 | 18.597 | 1173.5 | 9.1101 | 1182.6 | 0.00 | 0.3418 |
| 3.6452769 | 69.2084 | 18.456 | 1158.8 | 9.0907 | 1167.9 | 0.00 | 0.3401 |
| 3.6635033 | 69.2674 | 18.316 | 1144.3 | 9.0712 | 1153.4 | 0.00 | 0.3384 |
| 3.6818208 | 69.3244 | 18.177 | 1130.0 | 9.0516 | 1139.1 | 0.00 | 0.3367 |
| 3.7002299 | 69.3798 | 18.040 | 1115.9 | 9.0319 | 1124.9 | 0.00 | 0.3351 |
| 3.7187311 | 69.4334 | 17.904 | 1102.0 | 9.0122 | 1111.0 | 0.00 | 0.3334 |
| 3.7373247 | 69.4855 | 17.769 | 1088.2 | 8.9924 | 1097.2 | 0.00 | 0.3317 |
| 3.7560114 | 69.6769 | 17.631 | 1074.4 | 8.9725 | 1083.4 | 0.00 | 0.3301 |
| 3.7747914 | 69.7259 | 17.493 | 1060.7 | 8.9525 | 1069.7 | 0.00 | 0.3285 |
| 3.7936654 | 69.7730 | 17.357 | 1047.2 | 8.9324 | 1056.1 | 0.00 | 0.3268 |
| 3.8126337 | 69.8183 | 17.222 | 1033.9 | 8.9122 | 1042.8 | 0.00 | 0.3252 |
| 3.8316969 | 69.8618 | 17.088 | 1020.7 | 8.8920 | 1029.6 | 0.00 | 0.3236 |
| 3.8508554 | 69.9037 | 16.955 | 1007.8 | 8.8717 | 1016.6 | 0.00 | 0.3220 |
| 3.8701096 | 69.9441 | 16.823 | 994.97 | 8.8513 | 1003.8 | 0.00 | 0.3204 |
| 3.8894602 | 69.9829 | 16.693 | 982.35 | 8.8308 | 991.18 | 0.00 | 0.3188 |
| 3.9089075 | 70.0204 | 16.564 | 969.90 | 8.8103 | 978.71 | 0.00 | 0.3172 |
| 3.9284520 | 70.0565 | 16.436 | 957.62 | 8.7897 | 966.41 | 0.00 | 0.3156 |
| 3.9480943 | 70.0913 | 16.309 | 945.51 | 8.7690 | 954.28 | 0.00 | 0.3140 |
| 3.9678347 | 70.1248 | 16.184 | 933.57 | 8.7482 | 942.32 | 0.00 | 0.3125 |
| 3.9876739 | 70.1571 | 16.060 | 921.78 | 8.7274 | 930.51 | 0.00 | 0.3109 |

TABLE 5. Form factors, attenuation and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV

| Re (Z=75) | | | | | | | |
|--|-----------------------|-----------------------|--|--|--|--|------------|
| Atomic weight: $A_r = 186.2070$ g mol ⁻¹ Nominal density: ρ (g cm ³) = 20.980 | | | | | | | |
| σ_a (barns atom ⁻¹) = $[\mu/\rho](\text{cm}^2\text{g}^{-1}) \times 309.204$ E(eV) $[\mu/\rho](\text{cm}^2\text{g}^{-1}) = f_2 (e \text{ atom}^{-1}) \times 2.25987 \times 10^5$ | | | | | | | |
| 21 edges. Edge energies (keV) | | | | | | | |
| K | 71.6764 | L I | 12.5267 | L II | 11.9587 | L III | 10.5353 |
| M I | 2.93170 | M II | 2.68160 | M III | 2.36730 | M IV | 1.94890 |
| M V | 1.88290 | N I | 0.625000 | N II | 0.517900 | N III | 0.444400 |
| N IV | 0.273700 | N V | 0.260200 | N VI | 0.0406000 | N VII | 0.0406000 |
| O I | 0.0828000 | O II | 0.0456000 | O III | 0.0346000 | O IV | 0.00606267 |
| O V | 0.00520913 | | | | | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL}) = (-1.5033, -0.88920) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}} = -0.016572 e \text{ atom}^{-1}$ | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]_{\text{K}}$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric cm ² g ⁻¹ | Coh+inc cm ² g ⁻¹ | Total cm ² g ⁻¹ | K-shell cm ² g ⁻¹ | nm |
| 0.50000000 | 38.1737 | 22.620 | 10223 | 6.1964 | 10230 | 0.00 | 2.480 |
| 0.50250000 | 38.2614 | 22.582 | 10156 | 6.2240 | 10162 | 0.00 | 2.467 |
| 0.50501250 | 38.3446 | 22.545 | 10089 | 6.2516 | 10095 | 0.00 | 2.455 |
| 0.50753756 | 38.4222 | 22.508 | 10022 | 6.2792 | 10028 | 0.00 | 2.443 |
| 0.51007525 | 38.4914 | 22.471 | 9955.6 | 6.3068 | 9961.9 | 0.00 | 2.431 |
| 0.51262563 | 38.5464 | 22.433 | 9889.6 | 6.3344 | 9896.0 | 0.00 | 2.419 |
| 0.51518875 | 38.5692 | 22.396 | 9824.0 | 6.3620 | 9830.3 | 0.00 | 2.407 |
| 0.51717493 | 38.4935 | 22.367 | 9773.6 | 6.3833 | 9780.0 | 0.00 | 2.397 |
| 0.51776470 | 38.3234 | 22.358 | 9758.7 | 6.3896 | 9765.1 | 0.00 | 2.395 |
| 0.51862505 | 38.5476 | 22.706 | 9894.0 | 6.3988 | 9900.4 | 0.00 | 2.391 |
| 0.52035352 | 38.7517 | 22.682 | 9850.8 | 6.4172 | 9857.2 | 0.00 | 2.383 |
| 0.52295529 | 38.9309 | 22.646 | 9786.3 | 6.4448 | 9792.7 | 0.00 | 2.371 |
| 0.52557007 | 39.0747 | 22.610 | 9722.1 | 6.4724 | 9728.6 | 0.00 | 2.359 |
| 0.52819792 | 39.2038 | 22.574 | 9658.3 | 6.5000 | 9664.8 | 0.00 | 2.347 |
| 0.53083891 | 39.3248 | 22.538 | 9594.8 | 6.5276 | 9601.3 | 0.00 | 2.336 |
| 0.53349310 | 39.4403 | 22.502 | 9531.7 | 6.5552 | 9538.3 | 0.00 | 2.324 |
| 0.53616057 | 39.5520 | 22.465 | 9469.0 | 6.5828 | 9475.5 | 0.00 | 2.312 |
| 0.53884137 | 39.6606 | 22.429 | 9406.6 | 6.6103 | 9413.2 | 0.00 | 2.301 |
| 0.54153558 | 39.7667 | 22.392 | 9344.5 | 6.6379 | 9351.1 | 0.00 | 2.289 |
| 0.54424325 | 39.8708 | 22.356 | 9282.8 | 6.6655 | 9289.5 | 0.00 | 2.278 |
| 0.54696447 | 39.9731 | 22.319 | 9221.4 | 6.6930 | 9228.1 | 0.00 | 2.267 |
| 0.54969929 | 40.0738 | 22.282 | 9160.4 | 6.7205 | 9167.1 | 0.00 | 2.255 |
| 0.55244779 | 40.1730 | 22.245 | 9099.7 | 6.7480 | 9106.5 | 0.00 | 2.244 |
| 0.55521003 | 40.2708 | 22.208 | 9039.4 | 6.7755 | 9046.1 | 0.00 | 2.233 |
| 0.55798608 | 40.3674 | 22.171 | 8979.3 | 6.8030 | 8986.1 | 0.00 | 2.222 |
| 0.56077601 | 40.4628 | 22.134 | 8919.6 | 6.8305 | 8926.5 | 0.00 | 2.211 |
| 0.56357989 | 40.5570 | 22.096 | 8860.3 | 6.8579 | 8867.1 | 0.00 | 2.200 |
| 0.56639779 | 40.6501 | 22.059 | 8801.2 | 6.8854 | 8808.1 | 0.00 | 2.189 |
| 0.56922978 | 40.7420 | 22.021 | 8742.5 | 6.9128 | 8749.4 | 0.00 | 2.178 |
| 0.57207593 | 40.8328 | 21.984 | 8684.1 | 6.9402 | 8691.1 | 0.00 | 2.167 |
| 0.57493630 | 40.9224 | 21.946 | 8626.1 | 6.9676 | 8633.0 | 0.00 | 2.156 |
| 0.57781099 | 41.0109 | 21.908 | 8568.3 | 6.9949 | 8575.3 | 0.00 | 2.146 |
| 0.58070004 | 41.0981 | 21.870 | 8510.8 | 7.0222 | 8517.9 | 0.00 | 2.135 |
| 0.58360354 | 41.1840 | 21.831 | 8453.7 | 7.0496 | 8460.7 | 0.00 | 2.124 |
| 0.58652156 | 41.2685 | 21.793 | 8396.9 | 7.0768 | 8403.9 | 0.00 | 2.114 |
| 0.58945417 | 41.3514 | 21.755 | 8340.3 | 7.1041 | 8347.4 | 0.00 | 2.103 |
| 0.59240144 | 41.4327 | 21.716 | 8284.1 | 7.1313 | 8291.2 | 0.00 | 2.093 |
| 0.59536345 | 41.5120 | 21.677 | 8228.2 | 7.1585 | 8235.3 | 0.00 | 2.082 |
| 0.59834026 | 41.5891 | 21.638 | 8172.5 | 7.1857 | 8179.7 | 0.00 | 2.072 |
| 0.60133196 | 41.6635 | 21.599 | 8117.2 | 7.2128 | 8124.4 | 0.00 | 2.062 |
| 0.60433862 | 41.7346 | 21.560 | 8062.2 | 7.2399 | 8069.4 | 0.00 | 2.052 |
| 0.60736032 | 41.8015 | 21.521 | 8007.4 | 7.2670 | 8014.7 | 0.00 | 2.041 |
| 0.61039712 | 41.8628 | 21.481 | 7952.9 | 7.2941 | 7960.2 | 0.00 | 2.031 |
| 0.61344910 | 41.9160 | 21.442 | 7898.8 | 7.3211 | 7906.1 | 0.00 | 2.021 |
| 0.61651635 | 41.9562 | 21.402 | 7844.9 | 7.3480 | 7852.2 | 0.00 | 2.011 |
| 0.61959893 | 41.9716 | 21.362 | 7791.3 | 7.3750 | 7798.7 | 0.00 | 2.001 |
| 0.62269693 | 41.9186 | 21.322 | 7738.0 | 7.4019 | 7745.4 | 0.00 | 1.991 |
| 0.62404375 | 41.8089 | 21.304 | 7715.0 | 7.4135 | 7722.4 | 0.00 | 1.987 |
| 0.62581041 | 41.8323 | 21.814 | 7877.4 | 7.4287 | 7884.9 | 0.00 | 1.981 |
| 0.62595625 | 41.8646 | 21.813 | 7874.9 | 7.4300 | 7882.4 | 0.00 | 1.981 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Re ($Z=75$) | | | | | | | |
| 0.62893946 | 42.1912 | 21.775 | 7824.1 | 7.4556 | 7831.5 | 0.00 | 1.971 |
| 0.63208416 | 42.3815 | 21.735 | 7771.0 | 7.4823 | 7778.4 | 0.00 | 1.962 |
| 0.63524458 | 42.5346 | 21.696 | 7718.2 | 7.5091 | 7725.7 | 0.00 | 1.952 |
| 0.63842080 | 42.6708 | 21.656 | 7665.6 | 7.5358 | 7673.2 | 0.00 | 1.942 |
| 0.64161291 | 42.7972 | 21.616 | 7613.4 | 7.5624 | 7620.9 | 0.00 | 1.932 |
| 0.64482097 | 42.9171 | 21.575 | 7561.4 | 7.5890 | 7569.0 | 0.00 | 1.923 |
| 0.64804508 | 43.0325 | 21.535 | 7509.7 | 7.6156 | 7517.3 | 0.00 | 1.913 |
| 0.65128530 | 43.1444 | 21.494 | 7458.2 | 7.6421 | 7465.8 | 0.00 | 1.904 |
| 0.65454173 | 43.2535 | 21.453 | 7407.0 | 7.6686 | 7414.7 | 0.00 | 1.894 |
| 0.65781444 | 43.3605 | 21.412 | 7356.0 | 7.6950 | 7363.7 | 0.00 | 1.885 |
| 0.66110351 | 43.4656 | 21.371 | 7305.4 | 7.7214 | 7313.1 | 0.00 | 1.875 |
| 0.66440903 | 43.5692 | 21.330 | 7254.9 | 7.7477 | 7262.7 | 0.00 | 1.866 |
| 0.66773107 | 43.6714 | 21.288 | 7204.8 | 7.7739 | 7212.6 | 0.00 | 1.857 |
| 0.67106973 | 43.7725 | 21.247 | 7154.9 | 7.8002 | 7162.7 | 0.00 | 1.848 |
| 0.67442508 | 43.8725 | 21.205 | 7105.3 | 7.8263 | 7113.1 | 0.00 | 1.838 |
| 0.67779720 | 43.9716 | 21.163 | 7055.9 | 7.8524 | 7063.8 | 0.00 | 1.829 |
| 0.68118619 | 44.0699 | 21.120 | 7006.8 | 7.8785 | 7014.7 | 0.00 | 1.820 |
| 0.68459212 | 44.1675 | 21.078 | 6958.0 | 7.9044 | 6965.9 | 0.00 | 1.811 |
| 0.68801508 | 44.2644 | 21.036 | 6909.4 | 7.9304 | 6917.3 | 0.00 | 1.802 |
| 0.69145515 | 44.3607 | 20.993 | 6861.1 | 7.9562 | 6869.0 | 0.00 | 1.793 |
| 0.69491243 | 44.4564 | 20.950 | 6813.0 | 7.9821 | 6821.0 | 0.00 | 1.784 |
| 0.69838699 | 44.5516 | 20.907 | 6765.2 | 8.0078 | 6773.2 | 0.00 | 1.775 |
| 0.70187893 | 44.6463 | 20.864 | 6717.6 | 8.0335 | 6725.6 | 0.00 | 1.766 |
| 0.70538832 | 44.7405 | 20.820 | 6670.2 | 8.0591 | 6678.3 | 0.00 | 1.758 |
| 0.70891526 | 44.8344 | 20.777 | 6623.1 | 8.0847 | 6631.2 | 0.00 | 1.749 |
| 0.71245984 | 44.9278 | 20.733 | 6576.3 | 8.1102 | 6584.4 | 0.00 | 1.740 |
| 0.71602214 | 45.0208 | 20.689 | 6529.7 | 8.1356 | 6537.8 | 0.00 | 1.732 |
| 0.71960225 | 45.1135 | 20.645 | 6483.3 | 8.1610 | 6491.5 | 0.00 | 1.723 |
| 0.72320026 | 45.2059 | 20.600 | 6437.2 | 8.1862 | 6445.4 | 0.00 | 1.714 |
| 0.72681626 | 45.2980 | 20.556 | 6391.3 | 8.2115 | 6399.5 | 0.00 | 1.706 |
| 0.73045034 | 45.3899 | 20.511 | 6345.7 | 8.2366 | 6353.9 | 0.00 | 1.697 |
| 0.73410260 | 45.4814 | 20.466 | 6300.3 | 8.2617 | 6308.5 | 0.00 | 1.689 |
| 0.73777311 | 45.5728 | 20.421 | 6255.1 | 8.2867 | 6263.4 | 0.00 | 1.681 |
| 0.74146197 | 45.6640 | 20.376 | 6210.2 | 8.3116 | 6218.5 | 0.00 | 1.672 |
| 0.74516928 | 45.7550 | 20.330 | 6165.5 | 8.3365 | 6173.8 | 0.00 | 1.664 |
| 0.74889513 | 45.8458 | 20.285 | 6121.1 | 8.3613 | 6129.4 | 0.00 | 1.656 |
| 0.75263961 | 45.9366 | 20.238 | 6076.7 | 8.3860 | 6085.1 | 0.00 | 1.647 |
| 0.75640280 | 46.0270 | 20.191 | 6032.4 | 8.4106 | 6040.8 | 0.00 | 1.639 |
| 0.76018482 | 46.1171 | 20.144 | 5988.3 | 8.4351 | 5996.8 | 0.00 | 1.631 |
| 0.76398574 | 46.2073 | 20.087 | 5941.6 | 8.4596 | 5950.1 | 0.00 | 1.623 |
| 0.76780567 | 46.2969 | 20.016 | 5891.2 | 8.4840 | 5899.7 | 0.00 | 1.615 |
| 0.77164470 | 46.3852 | 19.945 | 5841.1 | 8.5083 | 5849.6 | 0.00 | 1.607 |
| 0.77550292 | 46.4724 | 19.874 | 5791.4 | 8.5325 | 5799.9 | 0.00 | 1.599 |
| 0.77938044 | 46.5584 | 19.803 | 5742.0 | 8.5567 | 5750.5 | 0.00 | 1.591 |
| 0.78327734 | 46.6603 | 19.732 | 5692.9 | 8.5807 | 5701.5 | 0.00 | 1.583 |
| 0.78719373 | 46.7442 | 19.661 | 5644.1 | 8.6047 | 5652.7 | 0.00 | 1.575 |
| 0.79112969 | 46.8271 | 19.589 | 5595.7 | 8.6286 | 5604.4 | 0.00 | 1.567 |
| 0.79508534 | 46.9089 | 19.518 | 5547.7 | 8.6524 | 5556.3 | 0.00 | 1.559 |
| 0.79906077 | 46.9896 | 19.447 | 5499.9 | 8.6761 | 5508.6 | 0.00 | 1.552 |
| 0.80305607 | 47.0694 | 19.376 | 5452.5 | 8.6997 | 5461.2 | 0.00 | 1.544 |
| 0.80707135 | 47.1481 | 19.305 | 5405.5 | 8.7232 | 5414.2 | 0.00 | 1.536 |
| 0.81110671 | 47.2259 | 19.233 | 5358.7 | 8.7466 | 5367.5 | 0.00 | 1.529 |
| 0.81516224 | 47.3028 | 19.162 | 5312.3 | 8.7700 | 5321.1 | 0.00 | 1.521 |
| 0.81923806 | 47.3787 | 19.091 | 5266.3 | 8.7932 | 5275.1 | 0.00 | 1.513 |
| 0.82333425 | 47.4642 | 19.020 | 5220.5 | 8.8164 | 5229.4 | 0.00 | 1.506 |
| 0.82745092 | 47.5385 | 18.949 | 5175.1 | 8.8394 | 5184.0 | 0.00 | 1.498 |
| 0.83158817 | 47.6119 | 18.878 | 5130.1 | 8.8624 | 5138.9 | 0.00 | 1.491 |
| 0.83574611 | 47.6846 | 18.807 | 5085.3 | 8.8852 | 5094.2 | 0.00 | 1.484 |
| 0.83992484 | 47.7564 | 18.736 | 5040.9 | 8.9080 | 5049.8 | 0.00 | 1.476 |
| 0.84412447 | 47.8274 | 18.665 | 4996.8 | 8.9306 | 5005.8 | 0.00 | 1.469 |
| 0.84834509 | 47.8977 | 18.594 | 4953.1 | 8.9532 | 4962.0 | 0.00 | 1.461 |
| 0.85258682 | 47.9672 | 18.523 | 4909.7 | 8.9757 | 4918.6 | 0.00 | 1.454 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Re ($Z=75$) | | | | | | | |
| 0.85684975 | 48.0360 | 18.452 | 4866.6 | 8.9980 | 4875.6 | 0.00 | 1.447 |
| 0.86113400 | 48.1042 | 18.381 | 4823.8 | 9.0203 | 4832.8 | 0.00 | 1.440 |
| 0.86543967 | 48.1717 | 18.311 | 4781.3 | 9.0424 | 4790.4 | 0.00 | 1.433 |
| 0.86976687 | 48.2386 | 18.240 | 4739.2 | 9.0645 | 4748.3 | 0.00 | 1.425 |
| 0.87411570 | 48.3049 | 18.169 | 4697.4 | 9.0864 | 4706.5 | 0.00 | 1.418 |
| 0.87848628 | 48.3706 | 18.099 | 4655.8 | 9.1082 | 4664.9 | 0.00 | 1.411 |
| 0.88287871 | 48.4356 | 18.028 | 4614.5 | 9.1300 | 4623.7 | 0.00 | 1.404 |
| 0.88729310 | 48.5001 | 17.957 | 4573.6 | 9.1516 | 4582.7 | 0.00 | 1.397 |
| 0.89172957 | 48.5641 | 17.887 | 4532.9 | 9.1731 | 4542.1 | 0.00 | 1.390 |
| 0.89618822 | 48.6275 | 17.816 | 4492.6 | 9.1945 | 4501.8 | 0.00 | 1.383 |
| 0.90066916 | 48.6905 | 17.746 | 4452.6 | 9.2158 | 4461.8 | 0.00 | 1.377 |
| 0.90517250 | 48.7531 | 17.676 | 4412.9 | 9.2369 | 4422.1 | 0.00 | 1.370 |
| 0.90969837 | 48.8152 | 17.605 | 4373.5 | 9.2580 | 4382.8 | 0.00 | 1.363 |
| 0.91424686 | 48.8771 | 17.535 | 4334.4 | 9.2789 | 4343.7 | 0.00 | 1.356 |
| 0.91881809 | 48.9386 | 17.465 | 4295.7 | 9.2998 | 4305.0 | 0.00 | 1.349 |
| 0.92341218 | 48.9999 | 17.395 | 4257.2 | 9.3205 | 4266.5 | 0.00 | 1.343 |
| 0.92802924 | 49.0610 | 17.326 | 4219.0 | 9.3411 | 4228.4 | 0.00 | 1.336 |
| 0.93266939 | 49.1220 | 17.256 | 4181.2 | 9.3616 | 4190.5 | 0.00 | 1.329 |
| 0.93733274 | 49.1830 | 17.187 | 4143.6 | 9.3819 | 4153.0 | 0.00 | 1.323 |
| 0.94201940 | 49.2439 | 17.117 | 4106.4 | 9.4022 | 4115.8 | 0.00 | 1.316 |
| 0.94672950 | 49.3050 | 17.048 | 4069.5 | 9.4223 | 4078.9 | 0.00 | 1.310 |
| 0.95146315 | 49.3663 | 16.979 | 4032.8 | 9.4423 | 4042.3 | 0.00 | 1.303 |
| 0.95622046 | 49.4279 | 16.910 | 3996.5 | 9.4621 | 4005.9 | 0.00 | 1.297 |
| 0.96100156 | 49.4899 | 16.842 | 3960.4 | 9.4819 | 3969.9 | 0.00 | 1.290 |
| 0.96580657 | 49.5525 | 16.773 | 3924.7 | 9.5015 | 3934.2 | 0.00 | 1.284 |
| 0.97063560 | 49.6158 | 16.705 | 3889.3 | 9.5210 | 3898.8 | 0.00 | 1.277 |
| 0.97548878 | 49.6800 | 16.637 | 3854.1 | 9.5404 | 3863.6 | 0.00 | 1.271 |
| 0.98036623 | 49.7453 | 16.568 | 3819.2 | 9.5597 | 3828.8 | 0.00 | 1.265 |
| 0.98526806 | 49.8119 | 16.501 | 3784.7 | 9.5788 | 3794.3 | 0.00 | 1.258 |
| 0.99019440 | 49.8802 | 16.433 | 3750.4 | 9.5978 | 3760.0 | 0.00 | 1.252 |
| 0.99514537 | 49.9503 | 16.365 | 3716.4 | 9.6167 | 3726.0 | 0.00 | 1.246 |
| 1.0001211 | 50.0219 | 16.298 | 3682.6 | 9.6354 | 3692.2 | 0.00 | 1.240 |
| 1.0051217 | 50.0610 | 16.208 | 3644.1 | 9.6540 | 3653.7 | 0.00 | 1.234 |
| 1.0101473 | 50.0969 | 16.118 | 3606.0 | 9.6725 | 3615.6 | 0.00 | 1.227 |
| 1.0151980 | 50.1305 | 16.030 | 3568.3 | 9.6909 | 3578.0 | 0.00 | 1.221 |
| 1.0202740 | 50.1623 | 15.942 | 3531.0 | 9.7091 | 3540.7 | 0.00 | 1.215 |
| 1.0253754 | 50.1926 | 15.854 | 3494.1 | 9.7272 | 3503.9 | 0.00 | 1.209 |
| 1.0305023 | 50.2215 | 15.767 | 3457.7 | 9.7451 | 3467.4 | 0.00 | 1.203 |
| 1.0356548 | 50.2493 | 15.681 | 3421.7 | 9.7629 | 3431.4 | 0.00 | 1.197 |
| 1.0408331 | 50.2761 | 15.595 | 3386.0 | 9.7806 | 3395.8 | 0.00 | 1.191 |
| 1.0460372 | 50.3014 | 15.499 | 3348.4 | 9.7982 | 3358.2 | 0.00 | 1.185 |
| 1.0512674 | 50.3249 | 15.404 | 3311.3 | 9.8156 | 3321.1 | 0.00 | 1.179 |
| 1.0565238 | 50.3467 | 15.309 | 3274.6 | 9.8328 | 3284.4 | 0.00 | 1.174 |
| 1.0618064 | 50.3668 | 15.215 | 3238.2 | 9.8500 | 3248.1 | 0.00 | 1.168 |
| 1.0671154 | 50.3853 | 15.121 | 3202.3 | 9.8670 | 3212.2 | 0.00 | 1.162 |
| 1.0724510 | 50.4022 | 15.029 | 3166.9 | 9.8838 | 3176.8 | 0.00 | 1.156 |
| 1.0778132 | 50.4177 | 14.937 | 3131.8 | 9.9005 | 3141.7 | 0.00 | 1.150 |
| 1.0832023 | 50.4316 | 14.846 | 3097.3 | 9.9171 | 3107.2 | 0.00 | 1.145 |
| 1.0886183 | 50.4442 | 14.755 | 3063.1 | 9.9335 | 3073.0 | 0.00 | 1.139 |
| 1.0940614 | 50.4554 | 14.666 | 3029.3 | 9.9498 | 3039.3 | 0.00 | 1.133 |
| 1.0995317 | 50.4650 | 14.571 | 2994.7 | 9.9660 | 3004.7 | 0.00 | 1.128 |
| 1.1050294 | 50.4729 | 14.476 | 2960.4 | 9.9820 | 2970.4 | 0.00 | 1.122 |
| 1.1105545 | 50.4790 | 14.382 | 2926.5 | 9.9978 | 2936.5 | 0.00 | 1.116 |
| 1.1161073 | 50.4833 | 14.288 | 2893.0 | 10.014 | 2903.0 | 0.00 | 1.111 |
| 1.1216878 | 50.4859 | 14.195 | 2860.0 | 10.029 | 2870.0 | 0.00 | 1.105 |
| 1.1272963 | 50.4869 | 14.104 | 2827.3 | 10.045 | 2837.4 | 0.00 | 1.100 |
| 1.1329328 | 50.4862 | 14.013 | 2795.1 | 10.060 | 2805.2 | 0.00 | 1.094 |
| 1.1385974 | 50.4839 | 13.922 | 2763.3 | 10.075 | 2773.4 | 0.00 | 1.089 |
| 1.1442904 | 50.4801 | 13.833 | 2731.9 | 10.090 | 2742.0 | 0.00 | 1.084 |
| 1.1500119 | 50.4747 | 13.744 | 2700.9 | 10.105 | 2711.0 | 0.00 | 1.078 |
| 1.1557619 | 50.4678 | 13.656 | 2670.2 | 10.119 | 2680.4 | 0.00 | 1.073 |
| 1.1615407 | 50.4594 | 13.569 | 2640.0 | 10.134 | 2650.1 | 0.00 | 1.067 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Re ($Z=75$) | | | | | | | |
| 1.1673484 | 50.4495 | 13.483 | 2610.1 | 10.148 | 2620.3 | 0.00 | 1.062 |
| 1.1731852 | 50.4381 | 13.397 | 2580.6 | 10.163 | 2590.8 | 0.00 | 1.057 |
| 1.1790511 | 50.4252 | 13.312 | 2551.5 | 10.177 | 2561.7 | 0.00 | 1.052 |
| 1.1849464 | 50.4109 | 13.228 | 2522.8 | 10.191 | 2533.0 | 0.00 | 1.046 |
| 1.1908711 | 50.3951 | 13.144 | 2494.4 | 10.204 | 2504.6 | 0.00 | 1.041 |
| 1.1968254 | 50.3779 | 13.062 | 2466.3 | 10.218 | 2476.5 | 0.00 | 1.036 |
| 1.2028096 | 50.3593 | 12.980 | 2438.6 | 10.231 | 2448.9 | 0.00 | 1.031 |
| 1.2088236 | 50.3392 | 12.898 | 2411.3 | 10.245 | 2421.5 | 0.00 | 1.026 |
| 1.2148677 | 50.3177 | 12.817 | 2384.3 | 10.258 | 2394.5 | 0.00 | 1.021 |
| 1.2209421 | 50.2948 | 12.737 | 2357.6 | 10.271 | 2367.9 | 0.00 | 1.015 |
| 1.2270468 | 50.2704 | 12.658 | 2331.3 | 10.284 | 2341.5 | 0.00 | 1.010 |
| 1.2331820 | 50.2446 | 12.579 | 2305.2 | 10.296 | 2315.5 | 0.00 | 1.005 |
| 1.2393479 | 50.2173 | 12.501 | 2279.5 | 10.309 | 2289.9 | 0.00 | 1.000 |
| 1.2455447 | 50.1886 | 12.424 | 2254.2 | 10.321 | 2264.5 | 0.00 | 0.9954 |
| 1.2517724 | 50.1584 | 12.347 | 2229.1 | 10.334 | 2239.4 | 0.00 | 0.9905 |
| 1.2580312 | 50.1268 | 12.271 | 2204.3 | 10.346 | 2214.7 | 0.00 | 0.9855 |
| 1.2643214 | 50.0936 | 12.196 | 2179.9 | 10.357 | 2190.3 | 0.00 | 0.9806 |
| 1.2706430 | 50.0590 | 12.121 | 2155.7 | 10.369 | 2166.1 | 0.00 | 0.9758 |
| 1.2769962 | 50.0229 | 12.047 | 2131.9 | 10.381 | 2142.3 | 0.00 | 0.9709 |
| 1.2833812 | 49.9853 | 11.973 | 2108.3 | 10.392 | 2118.7 | 0.00 | 0.9661 |
| 1.2897981 | 49.9461 | 11.900 | 2085.1 | 10.403 | 2095.5 | 0.00 | 0.9613 |
| 1.2962471 | 49.9054 | 11.828 | 2062.1 | 10.415 | 2072.5 | 0.00 | 0.9565 |
| 1.3027283 | 49.8630 | 11.756 | 2039.4 | 10.425 | 2049.8 | 0.00 | 0.9517 |
| 1.3092420 | 49.8191 | 11.685 | 2017.0 | 10.436 | 2027.4 | 0.00 | 0.9470 |
| 1.3157882 | 49.7736 | 11.615 | 1994.8 | 10.447 | 2005.2 | 0.00 | 0.9423 |
| 1.3223671 | 49.7263 | 11.545 | 1972.9 | 10.457 | 1983.4 | 0.00 | 0.9376 |
| 1.3289790 | 49.6775 | 11.475 | 1951.3 | 10.468 | 1961.8 | 0.00 | 0.9329 |
| 1.3356239 | 49.6284 | 11.406 | 1929.9 | 10.478 | 1940.4 | 0.00 | 0.9283 |
| 1.3423020 | 49.5761 | 11.338 | 1908.9 | 10.488 | 1919.3 | 0.00 | 0.9237 |
| 1.3490135 | 49.5220 | 11.270 | 1888.0 | 10.497 | 1898.5 | 0.00 | 0.9191 |
| 1.3557586 | 49.4661 | 11.203 | 1867.4 | 10.507 | 1877.9 | 0.00 | 0.9145 |
| 1.3625374 | 49.4083 | 11.137 | 1847.1 | 10.517 | 1857.6 | 0.00 | 0.9100 |
| 1.3693500 | 49.3487 | 11.071 | 1827.0 | 10.526 | 1837.5 | 0.00 | 0.9054 |
| 1.3761968 | 49.2871 | 11.005 | 1807.2 | 10.535 | 1817.7 | 0.00 | 0.9009 |
| 1.3830778 | 49.2235 | 10.940 | 1787.5 | 10.544 | 1798.1 | 0.00 | 0.8964 |
| 1.3899932 | 49.1578 | 10.876 | 1768.2 | 10.553 | 1778.7 | 0.00 | 0.8920 |
| 1.3969431 | 49.0900 | 10.812 | 1749.0 | 10.561 | 1759.6 | 0.00 | 0.8875 |
| 1.4039278 | 49.0201 | 10.748 | 1730.1 | 10.570 | 1740.7 | 0.00 | 0.8831 |
| 1.4109475 | 48.9480 | 10.685 | 1711.4 | 10.578 | 1722.0 | 0.00 | 0.8787 |
| 1.4180022 | 48.8736 | 10.623 | 1693.0 | 10.586 | 1703.6 | 0.00 | 0.8744 |
| 1.4250922 | 48.7969 | 10.561 | 1674.8 | 10.594 | 1685.3 | 0.00 | 0.8700 |
| 1.4322177 | 48.7177 | 10.500 | 1656.7 | 10.602 | 1667.3 | 0.00 | 0.8657 |
| 1.4393788 | 48.6360 | 10.439 | 1638.9 | 10.610 | 1649.5 | 0.00 | 0.8614 |
| 1.4465757 | 48.5518 | 10.378 | 1621.3 | 10.617 | 1632.0 | 0.00 | 0.8571 |
| 1.4538086 | 48.4648 | 10.319 | 1604.0 | 10.624 | 1614.6 | 0.00 | 0.8528 |
| 1.4610776 | 48.3751 | 10.259 | 1586.8 | 10.632 | 1597.4 | 0.00 | 0.8486 |
| 1.4683830 | 48.2826 | 10.200 | 1569.8 | 10.639 | 1580.5 | 0.00 | 0.8444 |
| 1.4757249 | 48.1871 | 10.142 | 1553.0 | 10.645 | 1563.7 | 0.00 | 0.8402 |
| 1.4831035 | 48.0885 | 10.084 | 1536.5 | 10.652 | 1547.1 | 0.00 | 0.8360 |
| 1.4905190 | 47.9867 | 10.026 | 1520.1 | 10.658 | 1530.8 | 0.00 | 0.8318 |
| 1.4979716 | 47.8815 | 9.9689 | 1503.9 | 10.665 | 1514.6 | 0.00 | 0.8277 |
| 1.5054615 | 47.7729 | 9.9123 | 1487.9 | 10.671 | 1498.6 | 0.00 | 0.8236 |
| 1.5129888 | 47.6607 | 9.8561 | 1472.1 | 10.677 | 1482.8 | 0.00 | 0.8195 |
| 1.5205537 | 47.5447 | 9.8003 | 1456.5 | 10.682 | 1467.2 | 0.00 | 0.8154 |
| 1.5281565 | 47.4247 | 9.7450 | 1441.1 | 10.688 | 1451.8 | 0.00 | 0.8113 |
| 1.5357973 | 47.3007 | 9.6901 | 1425.9 | 10.694 | 1436.6 | 0.00 | 0.8073 |
| 1.5434763 | 47.1723 | 9.6356 | 1410.8 | 10.699 | 1421.5 | 0.00 | 0.8033 |
| 1.5511937 | 47.0393 | 9.5816 | 1395.9 | 10.704 | 1406.6 | 0.00 | 0.7993 |
| 1.5589496 | 46.9051 | 9.5280 | 1381.2 | 10.709 | 1391.9 | 0.00 | 0.7953 |
| 1.5667444 | 46.7624 | 9.4747 | 1366.6 | 10.714 | 1377.3 | 0.00 | 0.7913 |
| 1.5745781 | 46.6145 | 9.4219 | 1352.2 | 10.718 | 1363.0 | 0.00 | 0.7874 |
| 1.5824510 | 46.4609 | 9.3695 | 1338.0 | 10.722 | 1348.8 | 0.00 | 0.7835 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Re ($Z=75$) | | | | | | | |
| 1.5903633 | 46.3015 | 9.3174 | 1324.0 | 10.727 | 1334.7 | 0.00 | 0.7796 |
| 1.5983151 | 46.1358 | 9.2658 | 1310.1 | 10.731 | 1320.8 | 0.00 | 0.7757 |
| 1.6063066 | 45.9636 | 9.2146 | 1296.4 | 10.735 | 1307.1 | 0.00 | 0.7719 |
| 1.6143382 | 45.7843 | 9.1638 | 1282.8 | 10.738 | 1293.6 | 0.00 | 0.7680 |
| 1.6224099 | 45.5976 | 9.1134 | 1269.4 | 10.742 | 1280.2 | 0.00 | 0.7642 |
| 1.6305219 | 45.4029 | 9.0634 | 1256.2 | 10.745 | 1266.9 | 0.00 | 0.7604 |
| 1.6386745 | 45.1997 | 9.0138 | 1243.1 | 10.748 | 1253.8 | 0.00 | 0.7566 |
| 1.6468679 | 44.9874 | 8.9645 | 1230.1 | 10.752 | 1240.9 | 0.00 | 0.7528 |
| 1.6551022 | 44.7653 | 8.9156 | 1217.3 | 10.754 | 1228.1 | 0.00 | 0.7491 |
| 1.6633777 | 44.5327 | 8.8671 | 1204.7 | 10.757 | 1215.4 | 0.00 | 0.7454 |
| 1.6716946 | 44.2886 | 8.8190 | 1192.2 | 10.760 | 1202.9 | 0.00 | 0.7417 |
| 1.6800531 | 44.0323 | 8.7712 | 1179.8 | 10.762 | 1190.6 | 0.00 | 0.7380 |
| 1.6884534 | 43.7625 | 8.7238 | 1167.6 | 10.764 | 1178.4 | 0.00 | 0.7343 |
| 1.6968956 | 43.4782 | 8.6768 | 1155.5 | 10.766 | 1166.3 | 0.00 | 0.7307 |
| 1.7053801 | 43.1778 | 8.6301 | 1143.6 | 10.768 | 1154.4 | 0.00 | 0.7270 |
| 1.7139070 | 42.8598 | 8.5838 | 1131.8 | 10.770 | 1142.6 | 0.00 | 0.7234 |
| 1.7224766 | 42.5224 | 8.5379 | 1120.2 | 10.771 | 1130.9 | 0.00 | 0.7198 |
| 1.7310889 | 42.1634 | 8.4922 | 1108.6 | 10.772 | 1119.4 | 0.00 | 0.7162 |
| 1.7397444 | 41.7802 | 8.4470 | 1097.2 | 10.773 | 1108.0 | 0.00 | 0.7127 |
| 1.7484431 | 41.3698 | 8.4020 | 1086.0 | 10.774 | 1096.7 | 0.00 | 0.7091 |
| 1.7571853 | 40.9287 | 8.3574 | 1074.8 | 10.775 | 1085.6 | 0.00 | 0.7056 |
| 1.7659712 | 40.4524 | 8.3132 | 1063.8 | 10.776 | 1074.6 | 0.00 | 0.7021 |
| 1.7748011 | 39.9355 | 8.2693 | 1052.9 | 10.776 | 1063.7 | 0.00 | 0.6986 |
| 1.7836751 | 39.3712 | 8.2243 | 1042.0 | 10.777 | 1052.8 | 0.00 | 0.6951 |
| 1.7925935 | 38.7506 | 8.1791 | 1031.1 | 10.777 | 1041.9 | 0.00 | 0.6916 |
| 1.8015565 | 38.0624 | 8.1342 | 1020.4 | 10.777 | 1031.1 | 0.00 | 0.6882 |
| 1.8105642 | 37.2913 | 8.0896 | 1009.7 | 10.776 | 1020.5 | 0.00 | 0.6848 |
| 1.8196171 | 36.4161 | 8.0454 | 999.20 | 10.776 | 1010.0 | 0.00 | 0.6814 |
| 1.8287151 | 35.4057 | 8.0015 | 988.80 | 10.775 | 999.58 | 0.00 | 0.6780 |
| 1.8378587 | 34.2121 | 7.9579 | 978.52 | 10.775 | 989.30 | 0.00 | 0.6746 |
| 1.8470480 | 32.7551 | 7.9147 | 968.36 | 10.774 | 979.14 | 0.00 | 0.6713 |
| 1.8562833 | 30.8827 | 7.8717 | 958.32 | 10.773 | 969.09 | 0.00 | 0.6679 |
| 1.8655647 | 28.2448 | 7.8291 | 948.39 | 10.772 | 959.16 | 0.00 | 0.6646 |
| 1.8748925 | 23.6363 | 7.7868 | 938.57 | 10.770 | 949.34 | 0.00 | 0.6613 |
| 1.8825065 | 6.36850 | 7.7527 | 930.67 | 10.769 | 941.44 | 0.00 | 0.6586 |
| 1.8832935 | 6.05504 | 25.555 | 3066.5 | 10.769 | 3077.3 | 0.00 | 0.6583 |
| 1.8842670 | 13.0938 | 25.537 | 3062.7 | 10.769 | 3073.5 | 0.00 | 0.6580 |
| 1.8936883 | 24.4712 | 25.357 | 3026.1 | 10.767 | 3036.8 | 0.00 | 0.6547 |
| 1.9031567 | 27.5494 | 25.179 | 2989.9 | 10.765 | 3000.7 | 0.00 | 0.6515 |
| 1.9126725 | 29.0524 | 25.003 | 2954.1 | 10.763 | 2964.9 | 0.00 | 0.6482 |
| 1.9222359 | 29.6683 | 24.828 | 2918.8 | 10.760 | 2929.6 | 0.00 | 0.6450 |
| 1.9318471 | 29.4164 | 24.654 | 2884.0 | 10.758 | 2894.7 | 0.00 | 0.6418 |
| 1.9415063 | 27.4998 | 24.481 | 2849.5 | 10.755 | 2860.3 | 0.00 | 0.6386 |
| 1.9481516 | 19.6941 | 24.364 | 2826.2 | 10.754 | 2836.9 | 0.00 | 0.6364 |
| 1.9496484 | 19.6648 | 36.070 | 4180.9 | 10.753 | 4191.7 | 0.00 | 0.6359 |
| 1.9512138 | 24.0511 | 36.028 | 4172.8 | 10.753 | 4183.5 | 0.00 | 0.6354 |
| 1.9609699 | 31.1633 | 35.771 | 4122.3 | 10.750 | 4133.1 | 0.00 | 0.6323 |
| 1.9707747 | 34.2046 | 35.515 | 4072.5 | 10.747 | 4083.2 | 0.00 | 0.6291 |
| 1.9806286 | 36.3252 | 35.262 | 4023.3 | 10.743 | 4034.0 | 0.00 | 0.6260 |
| 1.9905318 | 38.0003 | 35.010 | 3974.7 | 10.740 | 3985.4 | 0.00 | 0.6229 |
| 2.0004844 | 39.4024 | 34.760 | 3926.7 | 10.736 | 3937.4 | 0.00 | 0.6198 |
| 2.0104868 | 40.6159 | 34.512 | 3879.3 | 10.733 | 3890.0 | 0.00 | 0.6167 |
| 2.0205393 | 41.6890 | 34.266 | 3832.5 | 10.729 | 3843.2 | 0.00 | 0.6136 |
| 2.0306420 | 42.6523 | 34.022 | 3786.2 | 10.725 | 3797.0 | 0.00 | 0.6106 |
| 2.0407952 | 43.5266 | 33.779 | 3740.6 | 10.720 | 3751.3 | 0.00 | 0.6075 |
| 2.0509992 | 44.3268 | 33.539 | 3695.4 | 10.716 | 3706.2 | 0.00 | 0.6045 |
| 2.0612542 | 45.0641 | 33.300 | 3650.9 | 10.711 | 3661.6 | 0.00 | 0.6015 |
| 2.0715604 | 45.7469 | 33.063 | 3606.9 | 10.707 | 3617.6 | 0.00 | 0.5985 |
| 2.0819182 | 46.3818 | 32.827 | 3563.3 | 10.702 | 3574.0 | 0.00 | 0.5955 |
| 2.0923278 | 46.9742 | 32.593 | 3520.2 | 10.697 | 3530.9 | 0.00 | 0.5926 |
| 2.1027895 | 47.5283 | 32.360 | 3477.7 | 10.691 | 3488.4 | 0.00 | 0.5896 |
| 2.1133034 | 48.0476 | 32.129 | 3435.7 | 10.686 | 3446.4 | 0.00 | 0.5867 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Re ($Z=75$) | | | | | | | |
| 2.1238699 | 48.5352 | 31.900 | 3394.3 | 10.680 | 3405.0 | 0.00 | 0.5838 |
| 2.1344893 | 48.9933 | 31.673 | 3353.3 | 10.675 | 3364.0 | 0.00 | 0.5809 |
| 2.1451617 | 49.4240 | 31.447 | 3312.8 | 10.669 | 3323.5 | 0.00 | 0.5780 |
| 2.1558875 | 49.8290 | 31.223 | 3272.9 | 10.663 | 3283.5 | 0.00 | 0.5751 |
| 2.1666670 | 50.2095 | 31.001 | 3233.4 | 10.656 | 3244.1 | 0.00 | 0.5722 |
| 2.1775003 | 50.5667 | 30.780 | 3194.4 | 10.650 | 3205.1 | 0.00 | 0.5694 |
| 2.1883878 | 50.9012 | 30.561 | 3155.9 | 10.644 | 3166.6 | 0.00 | 0.5666 |
| 2.1993297 | 51.2137 | 30.344 | 3117.9 | 10.637 | 3128.5 | 0.00 | 0.5637 |
| 2.2103264 | 51.5044 | 30.128 | 3080.3 | 10.630 | 3090.9 | 0.00 | 0.5609 |
| 2.2213780 | 51.7732 | 29.914 | 3043.2 | 10.623 | 3053.8 | 0.00 | 0.5581 |
| 2.2324849 | 52.0198 | 29.701 | 3006.6 | 10.616 | 3017.2 | 0.00 | 0.5554 |
| 2.2436473 | 52.2434 | 29.490 | 2970.4 | 10.608 | 2981.0 | 0.00 | 0.5526 |
| 2.2548656 | 52.4425 | 29.281 | 2934.6 | 10.601 | 2945.2 | 0.00 | 0.5499 |
| 2.2661399 | 52.6152 | 29.073 | 2899.3 | 10.593 | 2909.9 | 0.00 | 0.5471 |
| 2.2774706 | 52.7583 | 28.867 | 2864.4 | 10.586 | 2875.0 | 0.00 | 0.5444 |
| 2.2888579 | 52.8670 | 28.662 | 2829.9 | 10.578 | 2840.5 | 0.00 | 0.5417 |
| 2.3003022 | 52.9340 | 28.459 | 2795.9 | 10.569 | 2806.5 | 0.00 | 0.5390 |
| 2.3118037 | 52.9471 | 28.258 | 2762.3 | 10.561 | 2772.9 | 0.00 | 0.5363 |
| 2.3233628 | 52.8855 | 28.058 | 2729.1 | 10.553 | 2739.6 | 0.00 | 0.5336 |
| 2.3349796 | 52.7075 | 27.859 | 2696.3 | 10.544 | 2706.8 | 0.00 | 0.5310 |
| 2.3466545 | 52.3133 | 27.662 | 2663.9 | 10.535 | 2674.4 | 0.00 | 0.5283 |
| 2.3583878 | 51.3290 | 27.466 | 2631.9 | 10.527 | 2642.4 | 0.00 | 0.5257 |
| 2.3649801 | 49.4646 | 27.357 | 2614.2 | 10.522 | 2624.7 | 0.00 | 0.5243 |
| 2.3696200 | 49.5016 | 32.000 | 3051.7 | 10.518 | 3062.3 | 0.00 | 0.5232 |
| 2.3701797 | 49.8406 | 31.988 | 3050.0 | 10.518 | 3060.5 | 0.00 | 0.5231 |
| 2.3820306 | 52.5668 | 31.753 | 3012.4 | 10.508 | 3023.0 | 0.00 | 0.5205 |
| 2.3939407 | 53.7078 | 31.519 | 2975.4 | 10.499 | 2985.9 | 0.00 | 0.5179 |
| 2.4059104 | 54.5014 | 31.287 | 2938.8 | 10.490 | 2949.3 | 0.00 | 0.5153 |
| 2.4179400 | 55.1326 | 31.057 | 2902.7 | 10.480 | 2913.2 | 0.00 | 0.5128 |
| 2.4300297 | 55.6670 | 30.829 | 2867.0 | 10.470 | 2877.5 | 0.00 | 0.5102 |
| 2.4421798 | 56.1356 | 30.603 | 2831.8 | 10.460 | 2842.3 | 0.00 | 0.5077 |
| 2.4543907 | 56.5546 | 30.374 | 2796.6 | 10.450 | 2807.1 | 0.00 | 0.5052 |
| 2.4666627 | 56.9319 | 30.142 | 2761.5 | 10.440 | 2772.0 | 0.00 | 0.5026 |
| 2.4789960 | 57.2732 | 29.913 | 2726.9 | 10.430 | 2737.3 | 0.00 | 0.5001 |
| 2.4913910 | 57.5828 | 29.695 | 2693.6 | 10.419 | 2704.0 | 0.00 | 0.4977 |
| 2.5038479 | 57.8726 | 29.486 | 2661.3 | 10.408 | 2671.7 | 0.00 | 0.4952 |
| 2.5163672 | 58.1446 | 29.280 | 2629.6 | 10.398 | 2640.0 | 0.00 | 0.4927 |
| 2.5289490 | 58.3997 | 29.076 | 2598.3 | 10.387 | 2608.7 | 0.00 | 0.4903 |
| 2.5415938 | 58.6382 | 28.872 | 2567.1 | 10.376 | 2577.5 | 0.00 | 0.4878 |
| 2.5543017 | 58.8592 | 28.667 | 2536.3 | 10.364 | 2546.6 | 0.00 | 0.4854 |
| 2.5670732 | 59.0629 | 28.465 | 2505.8 | 10.353 | 2516.2 | 0.00 | 0.4830 |
| 2.5799086 | 59.2488 | 28.265 | 2475.8 | 10.341 | 2486.2 | 0.00 | 0.4806 |
| 2.5928082 | 59.4157 | 28.066 | 2446.2 | 10.330 | 2456.6 | 0.00 | 0.4782 |
| 2.6057722 | 59.5611 | 27.870 | 2417.1 | 10.318 | 2427.4 | 0.00 | 0.4758 |
| 2.6188011 | 59.6808 | 27.676 | 2388.3 | 10.306 | 2398.6 | 0.00 | 0.4734 |
| 2.6318951 | 59.7670 | 27.484 | 2359.9 | 10.294 | 2370.2 | 0.00 | 0.4711 |
| 2.6450545 | 59.8035 | 27.293 | 2331.8 | 10.282 | 2342.1 | 0.00 | 0.4687 |
| 2.6582798 | 59.7515 | 27.104 | 2304.2 | 10.269 | 2314.5 | 0.00 | 0.4664 |
| 2.6715712 | 59.4635 | 26.917 | 2276.9 | 10.257 | 2287.1 | 0.00 | 0.4641 |
| 2.6780604 | 58.9517 | 26.826 | 2263.7 | 10.251 | 2274.0 | 0.00 | 0.4630 |
| 2.6849291 | 58.9966 | 28.579 | 2405.5 | 10.244 | 2415.7 | 0.00 | 0.4618 |
| 2.6851398 | 59.0361 | 28.576 | 2405.0 | 10.244 | 2415.2 | 0.00 | 0.4617 |
| 2.6983537 | 60.1491 | 28.374 | 2376.3 | 10.231 | 2386.6 | 0.00 | 0.4595 |
| 2.7118455 | 60.6837 | 28.171 | 2347.6 | 10.218 | 2357.8 | 0.00 | 0.4572 |
| 2.7254047 | 61.0784 | 27.970 | 2319.2 | 10.205 | 2329.4 | 0.00 | 0.4549 |
| 2.7390317 | 61.4054 | 27.770 | 2291.2 | 10.192 | 2301.4 | 0.00 | 0.4527 |
| 2.7527269 | 61.6901 | 27.572 | 2263.5 | 10.179 | 2273.7 | 0.00 | 0.4504 |
| 2.7664905 | 61.9444 | 27.375 | 2236.2 | 10.165 | 2246.4 | 0.00 | 0.4482 |
| 2.7803230 | 62.1744 | 27.180 | 2209.2 | 10.152 | 2219.4 | 0.00 | 0.4459 |
| 2.7942246 | 62.3834 | 26.986 | 2182.6 | 10.138 | 2192.7 | 0.00 | 0.4437 |
| 2.8081957 | 62.5725 | 26.794 | 2156.2 | 10.124 | 2166.4 | 0.00 | 0.4415 |
| 2.8222367 | 62.7423 | 26.612 | 2130.9 | 10.110 | 2141.0 | 0.00 | 0.4393 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Re ($Z=75$) | | | | | | | |
| 2.8363479 | 62.8995 | 26.436 | 2106.3 | 10.096 | 2116.4 | 0.00 | 0.4371 |
| 2.8505296 | 63.0430 | 26.263 | 2082.1 | 10.082 | 2092.2 | 0.00 | 0.4350 |
| 2.8647823 | 63.1698 | 26.093 | 2058.3 | 10.068 | 2068.4 | 0.00 | 0.4328 |
| 2.8791062 | 63.2748 | 25.924 | 2034.8 | 10.053 | 2044.9 | 0.00 | 0.4306 |
| 2.8935017 | 63.3474 | 25.757 | 2011.6 | 10.038 | 2021.7 | 0.00 | 0.4285 |
| 2.9079692 | 63.3605 | 25.591 | 1988.8 | 10.024 | 1998.8 | 0.00 | 0.4264 |
| 2.9225091 | 63.2012 | 25.427 | 1966.2 | 10.009 | 1976.2 | 0.00 | 0.4242 |
| 2.9258366 | 63.0810 | 25.390 | 1961.1 | 10.005 | 1971.1 | 0.00 | 0.4238 |
| 2.9371216 | 63.1838 | 26.391 | 2030.6 | 9.9938 | 2040.6 | 0.00 | 0.4221 |
| 2.9375634 | 63.2173 | 26.386 | 2029.9 | 9.9934 | 2039.9 | 0.00 | 0.4221 |
| 2.9518072 | 63.8305 | 26.225 | 2007.8 | 9.9787 | 2017.7 | 0.00 | 0.4200 |
| 2.9665662 | 64.2004 | 26.060 | 1985.2 | 9.9634 | 1995.2 | 0.00 | 0.4179 |
| 2.9813991 | 64.4973 | 25.896 | 1962.9 | 9.9481 | 1972.8 | 0.00 | 0.4159 |
| 2.9963061 | 64.7594 | 25.733 | 1940.8 | 9.9326 | 1950.8 | 0.00 | 0.4138 |
| 3.0112876 | 64.9992 | 25.556 | 1917.9 | 9.9170 | 1927.8 | 0.00 | 0.4117 |
| 3.0263440 | 65.2189 | 25.376 | 1894.9 | 9.9013 | 1904.8 | 0.00 | 0.4097 |
| 3.0414758 | 65.4241 | 25.197 | 1872.2 | 9.8854 | 1882.1 | 0.00 | 0.4076 |
| 3.0566831 | 65.6181 | 25.020 | 1849.8 | 9.8695 | 1859.6 | 0.00 | 0.4056 |
| 3.0719666 | 65.8030 | 24.844 | 1827.6 | 9.8534 | 1837.5 | 0.00 | 0.4036 |
| 3.0873264 | 65.9800 | 24.667 | 1805.6 | 9.8372 | 1815.4 | 0.00 | 0.4016 |
| 3.1027630 | 66.1492 | 24.491 | 1783.8 | 9.8209 | 1793.6 | 0.00 | 0.3996 |
| 3.1182768 | 66.3114 | 24.316 | 1762.2 | 9.8044 | 1772.0 | 0.00 | 0.3976 |
| 3.1338682 | 66.4675 | 24.142 | 1740.9 | 9.7879 | 1750.7 | 0.00 | 0.3956 |
| 3.1495376 | 66.6181 | 23.969 | 1719.9 | 9.7712 | 1729.6 | 0.00 | 0.3937 |
| 3.1652853 | 66.7636 | 23.798 | 1699.1 | 9.7545 | 1708.8 | 0.00 | 0.3917 |
| 3.1811117 | 66.9043 | 23.628 | 1678.5 | 9.7376 | 1688.3 | 0.00 | 0.3898 |
| 3.1970172 | 67.0407 | 23.459 | 1658.2 | 9.7206 | 1668.0 | 0.00 | 0.3878 |
| 3.2130023 | 67.1730 | 23.291 | 1638.2 | 9.7035 | 1647.9 | 0.00 | 0.3859 |
| 3.2290673 | 67.3014 | 23.125 | 1618.4 | 9.6863 | 1628.1 | 0.00 | 0.3840 |
| 3.2452127 | 67.4261 | 22.959 | 1598.8 | 9.6689 | 1608.5 | 0.00 | 0.3821 |
| 3.2614387 | 67.5473 | 22.795 | 1579.5 | 9.6515 | 1589.1 | 0.00 | 0.3802 |
| 3.2777459 | 67.6653 | 22.631 | 1560.3 | 9.6340 | 1570.0 | 0.00 | 0.3783 |
| 3.2941347 | 67.7800 | 22.469 | 1541.5 | 9.6163 | 1551.1 | 0.00 | 0.3764 |
| 3.3106053 | 67.8917 | 22.308 | 1522.8 | 9.5986 | 1532.4 | 0.00 | 0.3745 |
| 3.3271584 | 68.0005 | 22.148 | 1504.4 | 9.5807 | 1513.9 | 0.00 | 0.3726 |
| 3.3437941 | 68.1065 | 21.989 | 1486.1 | 9.5628 | 1495.7 | 0.00 | 0.3708 |
| 3.3605131 | 68.2098 | 21.832 | 1468.1 | 9.5447 | 1477.7 | 0.00 | 0.3689 |
| 3.3773157 | 68.3105 | 21.675 | 1450.3 | 9.5265 | 1459.9 | 0.00 | 0.3671 |
| 3.3942023 | 68.4087 | 21.519 | 1432.8 | 9.5083 | 1442.3 | 0.00 | 0.3653 |
| 3.4111733 | 68.5045 | 21.365 | 1415.4 | 9.4899 | 1424.9 | 0.00 | 0.3635 |
| 3.4282291 | 68.5980 | 21.211 | 1398.2 | 9.4714 | 1407.7 | 0.00 | 0.3617 |
| 3.4453703 | 68.6892 | 21.059 | 1381.3 | 9.4529 | 1390.7 | 0.00 | 0.3599 |
| 3.4625971 | 68.7783 | 20.908 | 1364.5 | 9.4342 | 1374.0 | 0.00 | 0.3581 |
| 3.4799101 | 68.8653 | 20.758 | 1348.0 | 9.4154 | 1357.4 | 0.00 | 0.3563 |
| 3.4973097 | 68.9504 | 20.608 | 1331.6 | 9.3966 | 1341.0 | 0.00 | 0.3545 |
| 3.5147962 | 69.0332 | 20.459 | 1315.4 | 9.3776 | 1324.8 | 0.00 | 0.3527 |
| 3.5323702 | 69.1141 | 20.312 | 1299.5 | 9.3586 | 1308.8 | 0.00 | 0.3510 |
| 3.5500321 | 69.1929 | 20.165 | 1283.7 | 9.3394 | 1293.0 | 0.00 | 0.3492 |
| 3.5677822 | 69.2699 | 20.020 | 1268.1 | 9.3202 | 1277.4 | 0.00 | 0.3475 |
| 3.5856211 | 69.3451 | 19.875 | 1252.7 | 9.3009 | 1262.0 | 0.00 | 0.3458 |
| 3.6035492 | 69.4186 | 19.732 | 1237.4 | 9.2815 | 1246.7 | 0.00 | 0.3441 |
| 3.6215670 | 69.4904 | 19.590 | 1222.4 | 9.2619 | 1231.7 | 0.00 | 0.3423 |
| 3.6396748 | 69.5606 | 19.449 | 1207.6 | 9.2423 | 1216.8 | 0.00 | 0.3406 |
| 3.6578732 | 69.6293 | 19.309 | 1192.9 | 9.2227 | 1202.2 | 0.00 | 0.3390 |
| 3.6761626 | 69.6965 | 19.170 | 1178.5 | 9.2029 | 1187.7 | 0.00 | 0.3373 |
| 3.6945434 | 69.7623 | 19.033 | 1164.2 | 9.1830 | 1173.4 | 0.00 | 0.3356 |
| 3.7130161 | 69.8267 | 18.896 | 1150.1 | 9.1631 | 1159.2 | 0.00 | 0.3339 |
| 3.7315812 | 69.8899 | 18.760 | 1136.1 | 9.1430 | 1145.3 | 0.00 | 0.3323 |
| 3.7502391 | 69.9518 | 18.626 | 1122.4 | 9.1229 | 1131.5 | 0.00 | 0.3306 |
| 3.7689903 | 70.2170 | 18.491 | 1108.7 | 9.1027 | 1117.8 | 0.00 | 0.3290 |
| 3.7878352 | 70.2769 | 18.351 | 1094.8 | 9.0824 | 1103.9 | 0.00 | 0.3273 |
| 3.8067744 | 70.3348 | 18.212 | 1081.1 | 9.0621 | 1090.2 | 0.00 | 0.3257 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Re ($Z=75$) | | | | | | | |
| 3.8258083 | 70.3908 | 18.074 | 1067.6 | 9.0416 | 1076.6 | 0.00 | 0.3241 |
| 3.8449373 | 70.4451 | 17.937 | 1054.3 | 9.0211 | 1063.3 | 0.00 | 0.3225 |
| 3.8641620 | 70.4976 | 17.802 | 1041.1 | 9.0005 | 1050.1 | 0.00 | 0.3209 |
| 3.8834828 | 70.5487 | 17.668 | 1028.1 | 8.9798 | 1037.1 | 0.00 | 0.3193 |
| 3.9029002 | 70.7387 | 17.533 | 1015.2 | 8.9590 | 1024.2 | 0.00 | 0.3177 |
| 3.9224147 | 70.7870 | 17.396 | 1002.3 | 8.9382 | 1011.2 | 0.00 | 0.3161 |
| 3.9420268 | 70.8333 | 17.260 | 989.48 | 8.9173 | 998.40 | 0.00 | 0.3145 |
| 3.9617369 | 70.8778 | 17.126 | 976.89 | 8.8963 | 985.78 | 0.00 | 0.3130 |
| 3.9815456 | 70.9206 | 16.992 | 964.46 | 8.8752 | 973.33 | 0.00 | 0.3114 |
| 4.0014533 | 70.9617 | 16.860 | 952.20 | 8.8541 | 961.05 | 0.00 | 0.3098 |
| 4.0214606 | 71.0013 | 16.729 | 940.11 | 8.8328 | 948.94 | 0.00 | 0.3083 |
| 4.0415679 | 71.0393 | 16.600 | 928.18 | 8.8116 | 937.00 | 0.00 | 0.3068 |
| 4.0617757 | 71.0760 | 16.471 | 916.42 | 8.7902 | 925.21 | 0.00 | 0.3052 |
| 4.0820846 | 71.1113 | 16.344 | 904.82 | 8.7688 | 913.58 | 0.00 | 0.3037 |
| 4.1024950 | 71.1453 | 16.218 | 893.37 | 8.7473 | 902.12 | 0.00 | 0.3022 |
| 4.1230075 | 71.1780 | 16.093 | 882.08 | 8.7257 | 890.80 | 0.00 | 0.3007 |
| 4.1436226 | 71.2096 | 15.969 | 870.94 | 8.7041 | 879.64 | 0.00 | 0.2992 |
| 4.1643407 | 71.2399 | 15.847 | 859.95 | 8.6824 | 868.63 | 0.00 | 0.2977 |
| 4.1851624 | 71.2692 | 15.725 | 849.11 | 8.6606 | 857.77 | 0.00 | 0.2962 |
| 4.2060882 | 71.2974 | 15.605 | 838.42 | 8.6388 | 847.06 | 0.00 | 0.2948 |
| 4.2271186 | 71.3246 | 15.485 | 827.87 | 8.6169 | 836.49 | 0.00 | 0.2933 |
| 4.2482542 | 71.3507 | 15.367 | 817.46 | 8.5950 | 826.06 | 0.00 | 0.2918 |
| 4.2694955 | 71.3759 | 15.250 | 807.20 | 8.5730 | 815.77 | 0.00 | 0.2904 |
| 4.2908430 | 71.4002 | 15.134 | 797.07 | 8.5509 | 805.62 | 0.00 | 0.2890 |
| 4.3122972 | 71.4236 | 15.019 | 787.08 | 8.5287 | 795.61 | 0.00 | 0.2875 |
| 4.3338587 | 71.4461 | 14.905 | 777.22 | 8.5065 | 785.73 | 0.00 | 0.2861 |
| 4.3555280 | 71.4677 | 14.792 | 767.50 | 8.4843 | 775.98 | 0.00 | 0.2847 |
| 4.3773056 | 71.4886 | 14.680 | 757.91 | 8.4620 | 766.37 | 0.00 | 0.2832 |
| 4.3991921 | 71.5087 | 14.570 | 748.44 | 8.4396 | 756.88 | 0.00 | 0.2818 |
| 4.4211881 | 71.5280 | 14.460 | 739.10 | 8.4172 | 747.52 | 0.00 | 0.2804 |
| 4.4432940 | 71.5466 | 14.351 | 729.89 | 8.3947 | 738.29 | 0.00 | 0.2790 |
| 4.4655105 | 71.5645 | 14.243 | 720.80 | 8.3722 | 729.17 | 0.00 | 0.2776 |
| 4.4878381 | 71.5817 | 14.136 | 711.84 | 8.3496 | 720.18 | 0.00 | 0.2763 |
| 4.5102772 | 71.5983 | 14.030 | 702.99 | 8.3269 | 711.31 | 0.00 | 0.2749 |
| 4.5328286 | 71.6142 | 13.925 | 694.26 | 8.3043 | 702.56 | 0.00 | 0.2735 |
| 4.5554928 | 71.6295 | 13.821 | 685.65 | 8.2815 | 693.93 | 0.00 | 0.2722 |
| 4.5782702 | 71.6443 | 13.718 | 677.15 | 8.2587 | 685.41 | 0.00 | 0.2708 |
| 4.6011616 | 71.6585 | 13.616 | 668.76 | 8.2359 | 677.00 | 0.00 | 0.2695 |
| 4.6241674 | 71.6722 | 13.515 | 660.49 | 8.2130 | 668.70 | 0.00 | 0.2681 |
| 4.6472882 | 71.6854 | 13.415 | 652.33 | 8.1901 | 660.52 | 0.00 | 0.2668 |
| 4.6705247 | 71.6981 | 13.315 | 644.27 | 8.1671 | 652.44 | 0.00 | 0.2655 |
| 4.6938773 | 71.7103 | 13.217 | 636.33 | 8.1440 | 644.47 | 0.00 | 0.2641 |
| 4.7173467 | 71.7221 | 13.119 | 628.48 | 8.1210 | 636.61 | 0.00 | 0.2628 |
| 4.7409334 | 71.8385 | 13.021 | 620.69 | 8.0979 | 628.79 | 0.00 | 0.2615 |
| 4.7646381 | 71.8502 | 12.921 | 612.84 | 8.0747 | 620.91 | 0.00 | 0.2602 |
| 4.7884613 | 71.8611 | 12.821 | 605.10 | 8.0515 | 613.15 | 0.00 | 0.2589 |
| 4.8124036 | 71.8710 | 12.723 | 597.46 | 8.0282 | 605.49 | 0.00 | 0.2576 |
| 4.8364656 | 71.8802 | 12.625 | 589.92 | 8.0050 | 597.93 | 0.00 | 0.2564 |
| 4.8606479 | 71.8887 | 12.528 | 582.49 | 7.9816 | 590.47 | 0.00 | 0.2551 |
| 4.8849512 | 71.8964 | 12.432 | 575.15 | 7.9583 | 583.11 | 0.00 | 0.2538 |
| 4.9093759 | 71.9035 | 12.336 | 567.87 | 7.9349 | 575.80 | 0.00 | 0.2525 |
| 4.9339228 | 71.9098 | 12.241 | 560.68 | 7.9114 | 568.59 | 0.00 | 0.2513 |
| 4.9585924 | 71.9156 | 12.147 | 553.59 | 7.8880 | 561.48 | 0.00 | 0.2500 |
| 4.9833854 | 71.9207 | 12.053 | 546.59 | 7.8644 | 554.46 | 0.00 | 0.2488 |
| 5.0083023 | 71.9251 | 11.961 | 539.69 | 7.8409 | 547.53 | 0.00 | 0.2476 |
| 5.0333438 | 71.9290 | 11.869 | 532.88 | 7.8173 | 540.70 | 0.00 | 0.2463 |
| 5.0585105 | 71.9324 | 11.778 | 526.17 | 7.7937 | 533.96 | 0.00 | 0.2451 |
| 5.0838031 | 71.9352 | 11.688 | 519.54 | 7.7701 | 527.31 | 0.00 | 0.2439 |
| 5.1092221 | 71.9375 | 11.598 | 513.00 | 7.7464 | 520.75 | 0.00 | 0.2427 |
| 5.1347682 | 71.9392 | 11.510 | 506.55 | 7.7227 | 514.28 | 0.00 | 0.2415 |
| 5.1604421 | 71.9406 | 11.421 | 500.17 | 7.6989 | 507.86 | 0.00 | 0.2403 |
| 5.1862443 | 71.9414 | 11.334 | 493.86 | 7.6752 | 501.53 | 0.00 | 0.2391 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Re ($Z=75$) | | | | | | | |
| 5.2121755 | 71.9417 | 11.247 | 487.64 | 7.6514 | 495.29 | 0.00 | 0.2379 |
| 5.2382364 | 71.9416 | 11.161 | 481.50 | 7.6275 | 489.13 | 0.00 | 0.2367 |
| 5.2644276 | 71.9411 | 11.076 | 475.44 | 7.6037 | 483.05 | 0.00 | 0.2355 |
| 5.2907497 | 71.9401 | 10.991 | 469.47 | 7.5798 | 477.05 | 0.00 | 0.2343 |
| 5.3172034 | 71.9388 | 10.907 | 463.58 | 7.5559 | 471.13 | 0.00 | 0.2332 |
| 5.3437895 | 71.9370 | 10.824 | 457.76 | 7.5320 | 465.29 | 0.00 | 0.2320 |
| 5.3705084 | 71.9807 | 10.742 | 452.00 | 7.5081 | 459.51 | 0.00 | 0.2309 |
| 5.3973609 | 71.9786 | 10.658 | 446.24 | 7.4841 | 453.73 | 0.00 | 0.2297 |
| 5.4243477 | 71.9759 | 10.575 | 440.57 | 7.4601 | 448.03 | 0.00 | 0.2286 |
| 5.4514695 | 71.9727 | 10.493 | 434.97 | 7.4361 | 442.40 | 0.00 | 0.2274 |
| 5.4787268 | 71.9689 | 10.411 | 429.44 | 7.4120 | 436.85 | 0.00 | 0.2263 |
| 5.5061205 | 71.9646 | 10.330 | 423.99 | 7.3880 | 431.38 | 0.00 | 0.2252 |
| 5.5336511 | 71.9598 | 10.250 | 418.61 | 7.3639 | 425.98 | 0.00 | 0.2241 |
| 5.5613193 | 71.9544 | 10.171 | 413.31 | 7.3398 | 420.65 | 0.00 | 0.2229 |
| 5.5891259 | 71.9487 | 10.093 | 408.07 | 7.3157 | 415.39 | 0.00 | 0.2218 |
| 5.6170716 | 71.9425 | 10.015 | 402.91 | 7.2916 | 410.20 | 0.00 | 0.2207 |
| 5.6451569 | 71.9358 | 9.9374 | 397.81 | 7.2675 | 405.08 | 0.00 | 0.2196 |
| 5.6733827 | 71.9287 | 9.8608 | 392.78 | 7.2433 | 400.03 | 0.00 | 0.2185 |
| 5.7017496 | 71.9213 | 9.7850 | 387.82 | 7.2192 | 395.04 | 0.00 | 0.2174 |
| 5.7302584 | 71.9134 | 9.7098 | 382.93 | 7.1950 | 390.12 | 0.00 | 0.2164 |
| 5.7589096 | 71.9051 | 9.6353 | 378.10 | 7.1708 | 385.27 | 0.00 | 0.2153 |
| 5.7877042 | 71.8965 | 9.5614 | 373.34 | 7.1466 | 380.48 | 0.00 | 0.2142 |
| 5.8166427 | 71.8875 | 9.4882 | 368.63 | 7.1224 | 375.76 | 0.00 | 0.2132 |
| 5.8457259 | 71.8782 | 9.4157 | 364.00 | 7.0981 | 371.09 | 0.00 | 0.2121 |
| 5.8749546 | 71.8871 | 9.3434 | 359.41 | 7.0739 | 366.48 | 0.00 | 0.2110 |
| 5.9043293 | 71.8773 | 9.2714 | 354.86 | 7.0497 | 361.91 | 0.00 | 0.2100 |
| 5.9338510 | 71.8670 | 9.2000 | 350.37 | 7.0254 | 357.40 | 0.00 | 0.2089 |
| 5.9635202 | 71.8563 | 9.1292 | 345.95 | 7.0011 | 352.95 | 0.00 | 0.2079 |
| 5.9933378 | 71.8452 | 9.0590 | 341.58 | 6.9769 | 348.56 | 0.00 | 0.2069 |
| 6.0233045 | 71.8337 | 8.9894 | 337.27 | 6.9526 | 344.23 | 0.00 | 0.2058 |
| 6.0534210 | 71.8219 | 8.9205 | 333.02 | 6.9283 | 339.95 | 0.00 | 0.2048 |
| 6.0836882 | 71.8096 | 8.8522 | 328.83 | 6.9041 | 335.73 | 0.00 | 0.2038 |
| 6.1141066 | 71.7971 | 8.7844 | 324.69 | 6.8798 | 331.56 | 0.00 | 0.2028 |
| 6.1446771 | 71.7841 | 8.7173 | 320.60 | 6.8555 | 327.46 | 0.00 | 0.2018 |
| 6.1754005 | 71.7708 | 8.6507 | 316.57 | 6.8312 | 323.40 | 0.00 | 0.2008 |
| 6.2062775 | 71.7572 | 8.5847 | 312.59 | 6.8069 | 319.40 | 0.00 | 0.1998 |
| 6.2373089 | 71.7432 | 8.5193 | 308.67 | 6.7826 | 315.45 | 0.00 | 0.1988 |
| 6.2684954 | 71.7289 | 8.4544 | 304.79 | 6.7583 | 311.55 | 0.00 | 0.1978 |
| 6.2998379 | 71.7143 | 8.3902 | 300.97 | 6.7340 | 307.70 | 0.00 | 0.1968 |
| 6.3313371 | 71.6994 | 8.3264 | 297.20 | 6.7097 | 303.91 | 0.00 | 0.1958 |
| 6.3629938 | 71.6841 | 8.2633 | 293.48 | 6.6855 | 300.16 | 0.00 | 0.1949 |
| 6.3948088 | 71.6685 | 8.2007 | 289.80 | 6.6612 | 296.46 | 0.00 | 0.1939 |
| 6.4267828 | 71.6526 | 8.1386 | 286.18 | 6.6369 | 292.82 | 0.00 | 0.1929 |
| 6.4589167 | 71.6363 | 8.0770 | 282.60 | 6.6126 | 289.21 | 0.00 | 0.1920 |
| 6.4912113 | 71.6198 | 8.0160 | 279.07 | 6.5883 | 285.66 | 0.00 | 0.1910 |
| 6.5236674 | 71.6029 | 7.9556 | 275.59 | 6.5641 | 282.15 | 0.00 | 0.1901 |
| 6.5562857 | 71.5857 | 7.8956 | 272.15 | 6.5398 | 278.69 | 0.00 | 0.1891 |
| 6.5890671 | 71.5683 | 7.8362 | 268.76 | 6.5156 | 275.27 | 0.00 | 0.1882 |
| 6.6220125 | 71.5505 | 7.7772 | 265.41 | 6.4913 | 271.90 | 0.00 | 0.1872 |
| 6.6551225 | 71.5324 | 7.7188 | 262.11 | 6.4671 | 268.57 | 0.00 | 0.1863 |
| 6.6883981 | 71.5139 | 7.6609 | 258.85 | 6.4429 | 265.29 | 0.00 | 0.1854 |
| 6.7218401 | 71.4952 | 7.6035 | 255.63 | 6.4186 | 262.05 | 0.00 | 0.1844 |
| 6.7554493 | 71.4762 | 7.5466 | 252.45 | 6.3944 | 258.85 | 0.00 | 0.1835 |
| 6.7892266 | 71.4568 | 7.4901 | 249.32 | 6.3702 | 255.69 | 0.00 | 0.1826 |
| 6.8231727 | 71.4371 | 7.4342 | 246.22 | 6.3460 | 252.57 | 0.00 | 0.1817 |
| 6.8572886 | 71.4172 | 7.3787 | 243.17 | 6.3219 | 249.49 | 0.00 | 0.1808 |
| 6.8915750 | 71.3969 | 7.3237 | 240.16 | 6.2977 | 246.45 | 0.00 | 0.1799 |
| 6.9260329 | 71.3762 | 7.2692 | 237.18 | 6.2736 | 243.46 | 0.00 | 0.1790 |
| 6.9606631 | 71.3553 | 7.2151 | 234.25 | 6.2494 | 240.50 | 0.00 | 0.1781 |
| 6.9954664 | 71.3340 | 7.1615 | 231.35 | 6.2253 | 237.58 | 0.00 | 0.1772 |
| 7.0304437 | 71.3124 | 7.1084 | 228.49 | 6.2012 | 234.69 | 0.00 | 0.1764 |
| 7.0655959 | 71.2905 | 7.0557 | 225.67 | 6.1771 | 231.85 | 0.00 | 0.1755 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Re ($Z=75$) | | | | | | | |
| 7.1009239 | 71.2683 | 7.0034 | 222.88 | 6.1530 | 229.04 | 0.00 | 0.1746 |
| 7.1364285 | 71.2457 | 6.9516 | 220.14 | 6.1290 | 226.26 | 0.00 | 0.1737 |
| 7.1721107 | 71.2227 | 6.9003 | 217.42 | 6.1049 | 223.53 | 0.00 | 0.1729 |
| 7.2079712 | 71.1994 | 6.8494 | 214.74 | 6.0809 | 220.82 | 0.00 | 0.1720 |
| 7.2440111 | 71.1758 | 6.7989 | 212.10 | 6.0569 | 218.16 | 0.00 | 0.1712 |
| 7.2802311 | 71.1518 | 6.7488 | 209.49 | 6.0329 | 215.52 | 0.00 | 0.1703 |
| 7.3166323 | 71.1275 | 6.6992 | 206.92 | 6.0090 | 212.92 | 0.00 | 0.1695 |
| 7.3532155 | 71.1027 | 6.6500 | 204.37 | 5.9850 | 210.36 | 0.00 | 0.1686 |
| 7.3899815 | 71.0776 | 6.6011 | 201.86 | 5.9611 | 207.83 | 0.00 | 0.1678 |
| 7.4269314 | 71.0521 | 6.5528 | 199.39 | 5.9372 | 205.32 | 0.00 | 0.1669 |
| 7.4640661 | 71.0262 | 6.5048 | 196.94 | 5.9133 | 202.86 | 0.00 | 0.1661 |
| 7.5013864 | 71.0000 | 6.4572 | 194.53 | 5.8895 | 200.42 | 0.00 | 0.1653 |
| 7.5388934 | 70.9733 | 6.4100 | 192.15 | 5.8657 | 198.01 | 0.00 | 0.1645 |
| 7.5765878 | 70.9462 | 6.3632 | 189.80 | 5.8419 | 195.64 | 0.00 | 0.1636 |
| 7.6144708 | 70.9186 | 6.3169 | 187.48 | 5.8181 | 193.29 | 0.00 | 0.1628 |
| 7.6525431 | 70.8907 | 6.2709 | 185.18 | 5.7943 | 190.98 | 0.00 | 0.1620 |
| 7.6908058 | 70.8622 | 6.2252 | 182.92 | 5.7706 | 188.69 | 0.00 | 0.1612 |
| 7.7292599 | 70.8334 | 6.1800 | 180.69 | 5.7469 | 186.44 | 0.00 | 0.1604 |
| 7.7679062 | 70.8040 | 6.1352 | 178.49 | 5.7232 | 184.21 | 0.00 | 0.1596 |
| 7.8067457 | 70.7742 | 6.0907 | 176.31 | 5.6996 | 182.01 | 0.00 | 0.1588 |
| 7.8457794 | 70.7439 | 6.0466 | 174.16 | 5.6760 | 179.84 | 0.00 | 0.1580 |
| 7.8850083 | 70.7130 | 6.0028 | 172.04 | 5.6524 | 177.70 | 0.00 | 0.1572 |
| 7.9244334 | 70.6817 | 5.9595 | 169.95 | 5.6288 | 175.58 | 0.00 | 0.1565 |
| 7.9640555 | 70.6498 | 5.9165 | 167.88 | 5.6053 | 173.49 | 0.00 | 0.1557 |
| 8.0038758 | 70.6173 | 5.8738 | 165.84 | 5.5818 | 171.43 | 0.00 | 0.1549 |
| 8.0438952 | 70.5843 | 5.8315 | 163.83 | 5.5583 | 169.39 | 0.00 | 0.1541 |
| 8.0841147 | 70.5507 | 5.7896 | 161.84 | 5.5349 | 167.38 | 0.00 | 0.1534 |
| 8.1245352 | 70.5164 | 5.7480 | 159.88 | 5.5114 | 165.39 | 0.00 | 0.1526 |
| 8.1651579 | 70.4816 | 5.7065 | 157.94 | 5.4881 | 163.43 | 0.00 | 0.1518 |
| 8.2059837 | 70.4460 | 5.6644 | 155.99 | 5.4647 | 161.46 | 0.00 | 0.1511 |
| 8.2470136 | 70.4097 | 5.6227 | 154.07 | 5.4414 | 159.52 | 0.00 | 0.1503 |
| 8.2882487 | 70.3726 | 5.5813 | 152.18 | 5.4181 | 157.60 | 0.00 | 0.1496 |
| 8.3296899 | 70.3347 | 5.5403 | 150.31 | 5.3949 | 155.71 | 0.00 | 0.1488 |
| 8.3713384 | 70.2959 | 5.4994 | 148.46 | 5.3717 | 153.83 | 0.00 | 0.1481 |
| 8.4131951 | 70.2562 | 5.4588 | 146.63 | 5.3485 | 151.98 | 0.00 | 0.1474 |
| 8.4552610 | 70.2157 | 5.4183 | 144.82 | 5.3254 | 150.14 | 0.00 | 0.1466 |
| 8.4975373 | 70.1741 | 5.3776 | 143.01 | 5.3023 | 148.32 | 0.00 | 0.1459 |
| 8.5400250 | 70.1315 | 5.3372 | 141.23 | 5.2792 | 146.51 | 0.00 | 0.1452 |
| Os ($Z=76$) | | | | | | | |
| Atomic weight: $A_r=190.2000 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^3)=22.530$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 315.835 E(\text{eV}) [\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2 (e \text{ atom}^{-1})\times 2.21242\times 10^5$ | | | | | | | |
| 21 edges. Edge energies (keV) | | | | | | | |
| K | 73.8708 | L I | 12.9690 | L II | 12.3850 | L III | 10.8709 |
| M I | 3.04850 | M II | 2.79220 | M III | 2.45720 | M IV | 2.03080 |
| M V | 1.96010 | N I | 0.654300 | N II | 0.546500 | N III | 0.468200 |
| N IV | 0.289400 | N V | 0.272800 | N VI | 0.0463000 | N VII | 0.0463000 |
| O I | 0.0837000 | OII | 0.0580000 | O III | 0.0454000 | O IV | 0.00705265 |
| O V | 0.00602794 | | | | | | |
| Relativistic correction estimate: $f_{\text{rel}} (\text{H82,3/5CL})=(-1.5563, -0.91920) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.016659 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 38.4805 | 23.970 | 10606 | 6.2208 | 10612 | 0.00 | 2.480 |
| 0.50250000 | 38.6059 | 23.926 | 10534 | 6.2486 | 10540 | 0.00 | 2.467 |
| 0.50501250 | 38.7279 | 23.881 | 10462 | 6.2763 | 10468 | 0.00 | 2.455 |
| 0.50753756 | 38.8468 | 23.837 | 10391 | 6.3041 | 10397 | 0.00 | 2.443 |
| 0.51007525 | 38.9629 | 23.792 | 10320 | 6.3319 | 10326 | 0.00 | 2.431 |
| 0.51262563 | 39.0762 | 23.747 | 10249 | 6.3596 | 10255 | 0.00 | 2.419 |
| 0.51518875 | 39.1868 | 23.702 | 10179 | 6.3874 | 10185 | 0.00 | 2.407 |
| 0.51776470 | 39.2949 | 23.658 | 10109 | 6.4152 | 10115 | 0.00 | 2.395 |
| 0.52035352 | 39.4002 | 23.612 | 10039 | 6.4429 | 10046 | 0.00 | 2.383 |
| 0.52295529 | 39.5028 | 23.567 | 9970.4 | 6.4707 | 9976.9 | 0.00 | 2.371 |
| 0.52557007 | 39.6023 | 23.522 | 9901.7 | 6.4984 | 9908.2 | 0.00 | 2.359 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Os ($Z=76$) | | | | | | | |
| 0.52819792 | 39.6985 | 23.476 | 9833.3 | 6.5262 | 9839.9 | 0.00 | 2.347 |
| 0.53083891 | 39.7909 | 23.431 | 9765.4 | 6.5540 | 9771.9 | 0.00 | 2.336 |
| 0.53349310 | 39.8784 | 23.385 | 9697.8 | 6.5817 | 9704.4 | 0.00 | 2.324 |
| 0.53616057 | 39.9595 | 23.339 | 9630.6 | 6.6095 | 9637.2 | 0.00 | 2.312 |
| 0.53884137 | 40.0312 | 23.293 | 9563.8 | 6.6372 | 9570.4 | 0.00 | 2.301 |
| 0.54153558 | 40.0860 | 23.247 | 9497.3 | 6.6649 | 9504.0 | 0.00 | 2.289 |
| 0.54424325 | 40.0981 | 23.200 | 9431.2 | 6.6926 | 9437.9 | 0.00 | 2.278 |
| 0.54571853 | 40.0302 | 23.175 | 9395.5 | 6.7077 | 9402.2 | 0.00 | 2.272 |
| 0.54696447 | 40.0160 | 23.520 | 9513.5 | 6.7203 | 9520.2 | 0.00 | 2.267 |
| 0.54728152 | 40.0883 | 23.514 | 9505.9 | 6.7236 | 9512.6 | 0.00 | 2.265 |
| 0.54969929 | 40.3421 | 23.475 | 9448.2 | 6.7480 | 9454.9 | 0.00 | 2.255 |
| 0.55244779 | 40.5153 | 23.430 | 9383.2 | 6.7757 | 9389.9 | 0.00 | 2.244 |
| 0.55521003 | 40.6601 | 23.385 | 9318.5 | 6.8034 | 9325.3 | 0.00 | 2.233 |
| 0.55798608 | 40.7920 | 23.340 | 9254.3 | 6.8310 | 9261.1 | 0.00 | 2.222 |
| 0.56077601 | 40.9163 | 23.295 | 9190.4 | 6.8587 | 9197.2 | 0.00 | 2.211 |
| 0.56357989 | 41.0353 | 23.249 | 9126.8 | 6.8863 | 9133.7 | 0.00 | 2.200 |
| 0.56639779 | 41.1504 | 23.204 | 9063.6 | 6.9139 | 9070.5 | 0.00 | 2.189 |
| 0.56922978 | 41.2625 | 23.158 | 9000.8 | 6.9415 | 9007.7 | 0.00 | 2.178 |
| 0.57207593 | 41.3720 | 23.112 | 8938.3 | 6.9690 | 8945.3 | 0.00 | 2.167 |
| 0.57493630 | 41.4793 | 23.066 | 8876.1 | 6.9966 | 8883.1 | 0.00 | 2.156 |
| 0.57781099 | 41.5847 | 23.020 | 8814.4 | 7.0241 | 8821.4 | 0.00 | 2.146 |
| 0.58070004 | 41.6883 | 22.974 | 8752.9 | 7.0516 | 8760.0 | 0.00 | 2.135 |
| 0.58360354 | 41.7903 | 22.928 | 8691.8 | 7.0791 | 8698.9 | 0.00 | 2.124 |
| 0.58652156 | 41.8908 | 22.881 | 8631.1 | 7.1065 | 8638.2 | 0.00 | 2.114 |
| 0.58945417 | 41.9898 | 22.835 | 8570.7 | 7.1340 | 8577.8 | 0.00 | 2.103 |
| 0.59240144 | 42.0874 | 22.788 | 8510.6 | 7.1614 | 8517.7 | 0.00 | 2.093 |
| 0.59536345 | 42.1836 | 22.741 | 8450.9 | 7.1887 | 8458.0 | 0.00 | 2.082 |
| 0.59834026 | 42.2784 | 22.694 | 8391.5 | 7.2161 | 8398.7 | 0.00 | 2.072 |
| 0.60133196 | 42.3719 | 22.647 | 8332.4 | 7.2434 | 8339.6 | 0.00 | 2.062 |
| 0.60433862 | 42.4640 | 22.600 | 8273.7 | 7.2707 | 8281.0 | 0.00 | 2.052 |
| 0.60736032 | 42.5547 | 22.553 | 8215.3 | 7.2979 | 8222.6 | 0.00 | 2.041 |
| 0.61039712 | 42.6439 | 22.505 | 8157.2 | 7.3251 | 8164.5 | 0.00 | 2.031 |
| 0.61344910 | 42.7315 | 22.458 | 8099.5 | 7.3523 | 8106.8 | 0.00 | 2.021 |
| 0.61651635 | 42.8174 | 22.410 | 8042.0 | 7.3795 | 8049.4 | 0.00 | 2.011 |
| 0.61959893 | 42.9014 | 22.362 | 7984.9 | 7.4066 | 7992.4 | 0.00 | 2.001 |
| 0.62269693 | 42.9834 | 22.314 | 7928.2 | 7.4337 | 7935.6 | 0.00 | 1.991 |
| 0.62581041 | 43.0630 | 22.266 | 7871.7 | 7.4607 | 7879.2 | 0.00 | 1.981 |
| 0.62893946 | 43.1398 | 22.218 | 7815.6 | 7.4877 | 7823.0 | 0.00 | 1.971 |
| 0.63208416 | 43.2133 | 22.169 | 7759.7 | 7.5147 | 7767.2 | 0.00 | 1.962 |
| 0.63524458 | 43.2827 | 22.121 | 7704.2 | 7.5416 | 7711.7 | 0.00 | 1.952 |
| 0.63842080 | 43.3465 | 22.072 | 7649.0 | 7.5684 | 7656.6 | 0.00 | 1.942 |
| 0.64161291 | 43.4026 | 22.023 | 7594.1 | 7.5953 | 7601.7 | 0.00 | 1.932 |
| 0.64482097 | 43.4467 | 21.974 | 7539.5 | 7.6221 | 7547.1 | 0.00 | 1.923 |
| 0.64804508 | 43.4690 | 21.925 | 7485.2 | 7.6488 | 7492.9 | 0.00 | 1.913 |
| 0.65128530 | 43.4371 | 21.876 | 7431.3 | 7.6755 | 7438.9 | 0.00 | 1.904 |
| 0.65327272 | 43.3097 | 21.846 | 7398.4 | 7.6918 | 7406.1 | 0.00 | 1.898 |
| 0.65454173 | 43.0989 | 22.362 | 7558.5 | 7.7021 | 7566.2 | 0.00 | 1.894 |
| 0.65532723 | 43.3672 | 22.350 | 7545.5 | 7.7085 | 7553.2 | 0.00 | 1.892 |
| 0.65781444 | 43.6460 | 22.313 | 7504.5 | 7.7287 | 7512.3 | 0.00 | 1.885 |
| 0.66110351 | 43.8496 | 22.264 | 7450.9 | 7.7553 | 7458.6 | 0.00 | 1.875 |
| 0.66440903 | 44.0079 | 22.215 | 7397.5 | 7.7818 | 7405.3 | 0.00 | 1.866 |
| 0.66773107 | 44.1467 | 22.166 | 7344.5 | 7.8082 | 7352.3 | 0.00 | 1.857 |
| 0.67106973 | 44.2746 | 22.117 | 7291.7 | 7.8346 | 7299.6 | 0.00 | 1.848 |
| 0.67442508 | 44.3953 | 22.068 | 7239.3 | 7.8610 | 7247.2 | 0.00 | 1.838 |
| 0.67779720 | 44.5110 | 22.018 | 7187.1 | 7.8872 | 7195.0 | 0.00 | 1.829 |
| 0.68118619 | 44.6228 | 21.969 | 7135.3 | 7.9135 | 7143.2 | 0.00 | 1.820 |
| 0.68459212 | 44.7317 | 21.919 | 7083.7 | 7.9396 | 7091.7 | 0.00 | 1.811 |
| 0.68801508 | 44.8380 | 21.869 | 7032.5 | 7.9657 | 7040.4 | 0.00 | 1.802 |
| 0.69145515 | 44.9424 | 21.819 | 6981.5 | 7.9918 | 6989.5 | 0.00 | 1.793 |
| 0.69491243 | 45.0449 | 21.769 | 6930.8 | 8.0178 | 6938.8 | 0.00 | 1.784 |
| 0.69838699 | 45.1459 | 21.719 | 6880.4 | 8.0437 | 6888.4 | 0.00 | 1.775 |
| 0.70187893 | 45.2455 | 21.669 | 6830.3 | 8.0696 | 6838.4 | 0.00 | 1.766 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Os ($Z=76$) | | | | | | | |
| 0.70538832 | 45.3440 | 21.618 | 6780.5 | 8.0954 | 6788.6 | 0.00 | 1.758 |
| 0.70891526 | 45.4413 | 21.568 | 6731.0 | 8.1211 | 6739.1 | 0.00 | 1.749 |
| 0.71245984 | 45.5376 | 21.517 | 6681.7 | 8.1468 | 6689.9 | 0.00 | 1.740 |
| 0.71602214 | 45.6329 | 21.466 | 6632.8 | 8.1724 | 6640.9 | 0.00 | 1.732 |
| 0.71960225 | 45.7275 | 21.415 | 6584.1 | 8.1980 | 6592.3 | 0.00 | 1.723 |
| 0.72320026 | 45.8212 | 21.364 | 6535.7 | 8.2234 | 6543.9 | 0.00 | 1.714 |
| 0.72681626 | 45.9141 | 21.313 | 6487.6 | 8.2488 | 6495.8 | 0.00 | 1.706 |
| 0.73045034 | 46.0064 | 21.261 | 6439.7 | 8.2742 | 6448.0 | 0.00 | 1.697 |
| 0.73410260 | 46.0980 | 21.210 | 6392.2 | 8.2994 | 6400.5 | 0.00 | 1.689 |
| 0.73777311 | 46.1889 | 21.158 | 6344.9 | 8.3246 | 6353.2 | 0.00 | 1.681 |
| 0.74146197 | 46.2792 | 21.106 | 6297.8 | 8.3497 | 6306.2 | 0.00 | 1.672 |
| 0.74516928 | 46.3690 | 21.054 | 6251.1 | 8.3748 | 6259.4 | 0.00 | 1.664 |
| 0.74889513 | 46.4581 | 21.002 | 6204.6 | 8.3997 | 6213.0 | 0.00 | 1.656 |
| 0.75263961 | 46.5467 | 20.950 | 6158.3 | 8.4246 | 6166.8 | 0.00 | 1.647 |
| 0.75640280 | 46.6348 | 20.898 | 6112.4 | 8.4494 | 6120.8 | 0.00 | 1.639 |
| 0.76018482 | 46.7224 | 20.845 | 6066.7 | 8.4742 | 6075.2 | 0.00 | 1.631 |
| 0.76398574 | 46.8095 | 20.792 | 6021.3 | 8.4988 | 6029.8 | 0.00 | 1.623 |
| 0.76780567 | 46.8961 | 20.740 | 5976.1 | 8.5234 | 5984.6 | 0.00 | 1.615 |
| 0.77164470 | 46.9823 | 20.687 | 5931.2 | 8.5479 | 5939.7 | 0.00 | 1.607 |
| 0.77550292 | 47.0681 | 20.634 | 5886.6 | 8.5723 | 5895.1 | 0.00 | 1.599 |
| 0.77938044 | 47.1535 | 20.581 | 5842.2 | 8.5966 | 5850.8 | 0.00 | 1.591 |
| 0.78327734 | 47.2384 | 20.527 | 5798.1 | 8.6209 | 5806.7 | 0.00 | 1.583 |
| 0.78719373 | 47.3231 | 20.474 | 5754.2 | 8.6450 | 5762.9 | 0.00 | 1.575 |
| 0.79112969 | 47.4074 | 20.420 | 5710.7 | 8.6691 | 5719.3 | 0.00 | 1.567 |
| 0.79508534 | 47.4912 | 20.366 | 5667.0 | 8.6930 | 5675.7 | 0.00 | 1.559 |
| 0.79906077 | 47.5745 | 20.311 | 5623.7 | 8.7169 | 5632.4 | 0.00 | 1.552 |
| 0.80305607 | 47.6574 | 20.256 | 5580.6 | 8.7407 | 5589.3 | 0.00 | 1.544 |
| 0.80707135 | 47.7398 | 20.201 | 5537.7 | 8.7644 | 5546.5 | 0.00 | 1.536 |
| 0.81110671 | 47.8217 | 20.146 | 5495.1 | 8.7881 | 5503.9 | 0.00 | 1.529 |
| 0.81516224 | 47.9032 | 20.091 | 5452.8 | 8.8116 | 5461.6 | 0.00 | 1.521 |
| 0.81923806 | 48.0002 | 20.035 | 5410.7 | 8.8350 | 5419.5 | 0.00 | 1.513 |
| 0.82333425 | 48.0811 | 19.980 | 5368.8 | 8.8583 | 5377.7 | 0.00 | 1.506 |
| 0.82745092 | 48.1617 | 19.924 | 5327.3 | 8.8816 | 5336.1 | 0.00 | 1.498 |
| 0.83158817 | 48.2418 | 19.868 | 5285.9 | 8.9047 | 5294.8 | 0.00 | 1.491 |
| 0.83574611 | 48.3216 | 19.812 | 5244.8 | 8.9278 | 5253.8 | 0.00 | 1.484 |
| 0.83992484 | 48.4011 | 19.756 | 5204.0 | 8.9507 | 5213.0 | 0.00 | 1.476 |
| 0.84412447 | 48.4802 | 19.700 | 5163.4 | 8.9736 | 5172.4 | 0.00 | 1.469 |
| 0.84834509 | 48.5591 | 19.644 | 5123.1 | 8.9963 | 5132.1 | 0.00 | 1.461 |
| 0.85258682 | 48.6376 | 19.588 | 5083.0 | 9.0189 | 5092.0 | 0.00 | 1.454 |
| 0.85684975 | 48.7158 | 19.532 | 5043.1 | 9.0415 | 5052.2 | 0.00 | 1.447 |
| 0.86113400 | 48.7938 | 19.475 | 5003.5 | 9.0639 | 5012.6 | 0.00 | 1.440 |
| 0.86543967 | 48.8715 | 19.418 | 4964.1 | 9.0863 | 4973.2 | 0.00 | 1.433 |
| 0.86976687 | 48.9580 | 19.360 | 4924.6 | 9.1085 | 4933.8 | 0.00 | 1.425 |
| 0.87411570 | 49.0356 | 19.284 | 4881.0 | 9.1306 | 4890.1 | 0.00 | 1.418 |
| 0.87848628 | 49.1121 | 19.209 | 4837.6 | 9.1526 | 4846.8 | 0.00 | 1.411 |
| 0.88287871 | 49.1876 | 19.133 | 4794.6 | 9.1745 | 4803.8 | 0.00 | 1.404 |
| 0.88729310 | 49.2620 | 19.058 | 4751.9 | 9.1963 | 4761.1 | 0.00 | 1.397 |
| 0.89172957 | 49.3355 | 18.982 | 4709.6 | 9.2180 | 4718.8 | 0.00 | 1.390 |
| 0.89618822 | 49.4081 | 18.907 | 4667.5 | 9.2396 | 4676.8 | 0.00 | 1.383 |
| 0.90066916 | 49.4797 | 18.831 | 4625.8 | 9.2611 | 4635.1 | 0.00 | 1.377 |
| 0.90517250 | 49.5505 | 18.756 | 4584.4 | 9.2824 | 4593.7 | 0.00 | 1.370 |
| 0.90969837 | 49.6204 | 18.681 | 4543.3 | 9.3037 | 4552.6 | 0.00 | 1.363 |
| 0.91424686 | 49.6895 | 18.606 | 4502.6 | 9.3248 | 4511.9 | 0.00 | 1.356 |
| 0.91881809 | 49.7578 | 18.531 | 4462.1 | 9.3458 | 4471.5 | 0.00 | 1.349 |
| 0.92341218 | 49.8253 | 18.456 | 4422.0 | 9.3667 | 4431.4 | 0.00 | 1.343 |
| 0.92802924 | 49.8921 | 18.381 | 4382.1 | 9.3875 | 4391.5 | 0.00 | 1.336 |
| 0.93266939 | 49.9581 | 18.307 | 4342.6 | 9.4081 | 4352.0 | 0.00 | 1.329 |
| 0.93733274 | 50.0233 | 18.232 | 4303.3 | 9.4287 | 4312.7 | 0.00 | 1.323 |
| 0.94201940 | 50.0879 | 18.157 | 4264.4 | 9.4491 | 4273.8 | 0.00 | 1.316 |
| 0.94672950 | 50.1518 | 18.083 | 4225.8 | 9.4694 | 4235.2 | 0.00 | 1.310 |
| 0.95146315 | 50.2151 | 18.008 | 4187.5 | 9.4896 | 4197.0 | 0.00 | 1.303 |
| 0.95622046 | 50.2779 | 17.934 | 4149.5 | 9.5096 | 4159.0 | 0.00 | 1.297 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Os ($Z=76$) | | | | | | | |
| 0.96100156 | 50.3401 | 17.860 | 4111.8 | 9.5296 | 4121.4 | 0.00 | 1.290 |
| 0.96580657 | 50.4019 | 17.787 | 4074.5 | 9.5494 | 4084.0 | 0.00 | 1.284 |
| 0.97063560 | 50.4632 | 17.713 | 4037.4 | 9.5691 | 4047.0 | 0.00 | 1.277 |
| 0.97548878 | 50.5242 | 17.640 | 4000.7 | 9.5886 | 4010.3 | 0.00 | 1.271 |
| 0.98036623 | 50.5850 | 17.566 | 3964.3 | 9.6081 | 3973.9 | 0.00 | 1.265 |
| 0.98526806 | 50.6457 | 17.493 | 3928.2 | 9.6274 | 3937.8 | 0.00 | 1.258 |
| 0.99019440 | 50.7064 | 17.421 | 3892.4 | 9.6465 | 3902.0 | 0.00 | 1.252 |
| 0.99514537 | 50.7674 | 17.348 | 3856.9 | 9.6656 | 3866.5 | 0.00 | 1.246 |
| 1.0001211 | 50.8291 | 17.275 | 3821.6 | 9.6845 | 3831.2 | 0.00 | 1.240 |
| 1.0051217 | 50.8794 | 17.180 | 3781.5 | 9.7033 | 3791.2 | 0.00 | 1.234 |
| 1.0101473 | 50.9231 | 17.084 | 3741.8 | 9.7220 | 3751.5 | 0.00 | 1.227 |
| 1.0151980 | 50.9648 | 16.990 | 3702.6 | 9.7405 | 3712.3 | 0.00 | 1.221 |
| 1.0202740 | 51.0051 | 16.896 | 3663.8 | 9.7589 | 3673.6 | 0.00 | 1.215 |
| 1.0253754 | 51.0441 | 16.803 | 3625.4 | 9.7771 | 3635.2 | 0.00 | 1.209 |
| 1.0305023 | 51.0818 | 16.710 | 3587.5 | 9.7953 | 3597.3 | 0.00 | 1.203 |
| 1.0356548 | 51.1182 | 16.618 | 3549.9 | 9.8133 | 3559.8 | 0.00 | 1.197 |
| 1.0408331 | 51.1535 | 16.526 | 3512.8 | 9.8311 | 3522.7 | 0.00 | 1.191 |
| 1.0460372 | 51.1875 | 16.435 | 3476.1 | 9.8488 | 3486.0 | 0.00 | 1.185 |
| 1.0512674 | 51.2205 | 16.345 | 3439.8 | 9.8664 | 3449.7 | 0.00 | 1.179 |
| 1.0565238 | 51.2523 | 16.255 | 3403.9 | 9.8839 | 3413.8 | 0.00 | 1.174 |
| 1.0618064 | 51.2830 | 16.166 | 3368.4 | 9.9012 | 3378.3 | 0.00 | 1.168 |
| 1.0671154 | 51.3127 | 16.078 | 3333.4 | 9.9183 | 3343.3 | 0.00 | 1.162 |
| 1.0724510 | 51.3414 | 15.990 | 3298.7 | 9.9354 | 3308.6 | 0.00 | 1.156 |
| 1.0778132 | 51.3692 | 15.903 | 3264.4 | 9.9523 | 3274.3 | 0.00 | 1.150 |
| 1.0832023 | 51.3959 | 15.816 | 3230.5 | 9.9690 | 3240.4 | 0.00 | 1.145 |
| 1.0886183 | 51.4218 | 15.731 | 3196.9 | 9.9856 | 3206.9 | 0.00 | 1.139 |
| 1.0940614 | 51.4468 | 15.640 | 3162.7 | 10.002 | 3172.7 | 0.00 | 1.133 |
| 1.0995317 | 51.4702 | 15.544 | 3127.8 | 10.018 | 3137.8 | 0.00 | 1.128 |
| 1.1050294 | 51.4919 | 15.450 | 3093.3 | 10.035 | 3103.3 | 0.00 | 1.122 |
| 1.1105545 | 51.5120 | 15.356 | 3059.2 | 10.051 | 3069.2 | 0.00 | 1.116 |
| 1.1161073 | 51.5306 | 15.262 | 3025.4 | 10.066 | 3035.5 | 0.00 | 1.111 |
| 1.1216878 | 51.5475 | 15.170 | 2992.1 | 10.082 | 3002.2 | 0.00 | 1.105 |
| 1.1272963 | 51.5630 | 15.078 | 2959.2 | 10.098 | 2969.3 | 0.00 | 1.100 |
| 1.1329328 | 51.5770 | 14.987 | 2926.7 | 10.113 | 2936.8 | 0.00 | 1.094 |
| 1.1385974 | 51.5897 | 14.896 | 2894.5 | 10.129 | 2904.7 | 0.00 | 1.089 |
| 1.1442904 | 51.6009 | 14.807 | 2862.8 | 10.144 | 2872.9 | 0.00 | 1.084 |
| 1.1500119 | 51.6108 | 14.718 | 2831.4 | 10.159 | 2841.6 | 0.00 | 1.078 |
| 1.1557619 | 51.6194 | 14.630 | 2800.5 | 10.174 | 2810.7 | 0.00 | 1.073 |
| 1.1615407 | 51.6267 | 14.538 | 2769.0 | 10.188 | 2779.2 | 0.00 | 1.067 |
| 1.1673484 | 51.6322 | 14.444 | 2737.6 | 10.203 | 2747.8 | 0.00 | 1.062 |
| 1.1731852 | 51.6359 | 14.352 | 2706.5 | 10.217 | 2716.7 | 0.00 | 1.057 |
| 1.1790511 | 51.6380 | 14.260 | 2675.8 | 10.231 | 2686.0 | 0.00 | 1.052 |
| 1.1849464 | 51.6384 | 14.169 | 2645.5 | 10.245 | 2655.7 | 0.00 | 1.046 |
| 1.1908711 | 51.6372 | 14.079 | 2615.5 | 10.259 | 2625.8 | 0.00 | 1.041 |
| 1.1968254 | 51.6344 | 13.989 | 2586.0 | 10.273 | 2596.3 | 0.00 | 1.036 |
| 1.2028096 | 51.6300 | 13.900 | 2556.8 | 10.287 | 2567.1 | 0.00 | 1.031 |
| 1.2088236 | 51.6240 | 13.812 | 2528.0 | 10.300 | 2538.3 | 0.00 | 1.026 |
| 1.2148677 | 51.6166 | 13.725 | 2499.5 | 10.314 | 2509.8 | 0.00 | 1.021 |
| 1.2209421 | 51.6076 | 13.639 | 2471.4 | 10.327 | 2481.8 | 0.00 | 1.015 |
| 1.2270468 | 51.5971 | 13.553 | 2443.7 | 10.340 | 2454.0 | 0.00 | 1.010 |
| 1.2331820 | 51.5851 | 13.468 | 2416.3 | 10.353 | 2426.6 | 0.00 | 1.005 |
| 1.2393479 | 51.5716 | 13.384 | 2389.2 | 10.365 | 2399.5 | 0.00 | 1.000 |
| 1.2455447 | 51.5566 | 13.300 | 2362.4 | 10.378 | 2372.8 | 0.00 | 0.9954 |
| 1.2517724 | 51.5402 | 13.217 | 2336.0 | 10.390 | 2346.4 | 0.00 | 0.9905 |
| 1.2580312 | 51.5223 | 13.135 | 2309.9 | 10.402 | 2320.3 | 0.00 | 0.9855 |
| 1.2643214 | 51.5030 | 13.053 | 2284.2 | 10.414 | 2294.6 | 0.00 | 0.9806 |
| 1.2706430 | 51.4822 | 12.972 | 2258.7 | 10.426 | 2269.2 | 0.00 | 0.9758 |
| 1.2769962 | 51.4599 | 12.892 | 2233.6 | 10.438 | 2244.1 | 0.00 | 0.9709 |
| 1.2833812 | 51.4362 | 12.813 | 2208.8 | 10.450 | 2219.2 | 0.00 | 0.9661 |
| 1.2897981 | 51.4110 | 12.734 | 2184.3 | 10.461 | 2194.7 | 0.00 | 0.9613 |
| 1.2962471 | 51.3844 | 12.656 | 2160.1 | 10.472 | 2170.5 | 0.00 | 0.9565 |
| 1.3027283 | 51.3562 | 12.578 | 2136.1 | 10.483 | 2146.6 | 0.00 | 0.9517 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Os ($Z=76$) | | | | | | | |
| 1.3092420 | 51.3266 | 12.501 | 2112.5 | 10.494 | 2123.0 | 0.00 | 0.9470 |
| 1.3157882 | 51.2955 | 12.425 | 2089.2 | 10.505 | 2099.7 | 0.00 | 0.9423 |
| 1.3223671 | 51.2629 | 12.349 | 2066.1 | 10.516 | 2076.6 | 0.00 | 0.9376 |
| 1.3289790 | 51.2288 | 12.274 | 2043.4 | 10.526 | 2053.9 | 0.00 | 0.9329 |
| 1.3356239 | 51.1931 | 12.200 | 2020.9 | 10.536 | 2031.4 | 0.00 | 0.9283 |
| 1.3423020 | 51.1559 | 12.126 | 1998.6 | 10.547 | 2009.2 | 0.00 | 0.9237 |
| 1.3490135 | 51.1172 | 12.053 | 1976.7 | 10.556 | 1987.3 | 0.00 | 0.9191 |
| 1.3557586 | 51.0768 | 11.980 | 1955.0 | 10.566 | 1965.6 | 0.00 | 0.9145 |
| 1.3625374 | 51.0348 | 11.908 | 1933.6 | 10.576 | 1944.2 | 0.00 | 0.9100 |
| 1.3693500 | 50.9912 | 11.837 | 1912.4 | 10.585 | 1923.0 | 0.00 | 0.9054 |
| 1.3761968 | 50.9459 | 11.766 | 1891.5 | 10.595 | 1902.1 | 0.00 | 0.9009 |
| 1.3830778 | 50.8990 | 11.696 | 1870.9 | 10.604 | 1881.5 | 0.00 | 0.8964 |
| 1.3899932 | 50.8503 | 11.626 | 1850.5 | 10.613 | 1861.1 | 0.00 | 0.8920 |
| 1.3969431 | 50.7999 | 11.557 | 1830.3 | 10.621 | 1840.9 | 0.00 | 0.8875 |
| 1.4039278 | 50.7477 | 11.488 | 1810.4 | 10.630 | 1821.0 | 0.00 | 0.8831 |
| 1.4109475 | 50.6965 | 11.420 | 1790.7 | 10.638 | 1801.4 | 0.00 | 0.8787 |
| 1.4180022 | 50.6406 | 11.353 | 1771.3 | 10.647 | 1781.9 | 0.00 | 0.8744 |
| 1.4250922 | 50.5829 | 11.286 | 1752.1 | 10.655 | 1762.8 | 0.00 | 0.8700 |
| 1.4322177 | 50.5233 | 11.219 | 1733.1 | 10.663 | 1743.8 | 0.00 | 0.8657 |
| 1.4393788 | 50.4617 | 11.154 | 1714.4 | 10.671 | 1725.1 | 0.00 | 0.8614 |
| 1.4465757 | 50.3980 | 11.088 | 1695.9 | 10.678 | 1706.5 | 0.00 | 0.8571 |
| 1.4538086 | 50.3322 | 11.023 | 1677.6 | 10.686 | 1688.2 | 0.00 | 0.8528 |
| 1.4610776 | 50.2643 | 10.959 | 1659.5 | 10.693 | 1670.2 | 0.00 | 0.8486 |
| 1.4683830 | 50.1942 | 10.895 | 1641.6 | 10.700 | 1652.3 | 0.00 | 0.8444 |
| 1.4757249 | 50.1218 | 10.832 | 1624.0 | 10.707 | 1634.7 | 0.00 | 0.8402 |
| 1.4831035 | 50.0471 | 10.769 | 1606.5 | 10.714 | 1617.2 | 0.00 | 0.8360 |
| 1.4905190 | 49.9700 | 10.707 | 1589.3 | 10.720 | 1600.0 | 0.00 | 0.8318 |
| 1.4979716 | 49.8904 | 10.645 | 1572.3 | 10.727 | 1583.0 | 0.00 | 0.8277 |
| 1.5054615 | 49.8083 | 10.584 | 1555.4 | 10.733 | 1566.2 | 0.00 | 0.8236 |
| 1.5129888 | 49.7235 | 10.523 | 1538.8 | 10.739 | 1549.5 | 0.00 | 0.8195 |
| 1.5205537 | 49.6359 | 10.463 | 1522.4 | 10.745 | 1533.1 | 0.00 | 0.8154 |
| 1.5281565 | 49.5455 | 10.403 | 1506.1 | 10.750 | 1516.9 | 0.00 | 0.8113 |
| 1.5357973 | 49.4522 | 10.344 | 1490.1 | 10.756 | 1500.8 | 0.00 | 0.8073 |
| 1.5434763 | 49.3559 | 10.285 | 1474.2 | 10.761 | 1485.0 | 0.00 | 0.8033 |
| 1.5511937 | 49.2563 | 10.226 | 1458.6 | 10.767 | 1469.3 | 0.00 | 0.7993 |
| 1.5589496 | 49.1535 | 10.168 | 1443.1 | 10.772 | 1453.9 | 0.00 | 0.7953 |
| 1.5667444 | 49.0472 | 10.111 | 1427.8 | 10.777 | 1438.6 | 0.00 | 0.7913 |
| 1.5745781 | 48.9373 | 10.054 | 1412.6 | 10.781 | 1423.4 | 0.00 | 0.7874 |
| 1.5824510 | 48.8238 | 9.9971 | 1397.7 | 10.786 | 1408.5 | 0.00 | 0.7835 |
| 1.5903633 | 48.7063 | 9.9408 | 1382.9 | 10.790 | 1393.7 | 0.00 | 0.7796 |
| 1.5983151 | 48.5847 | 9.8850 | 1368.3 | 10.794 | 1379.1 | 0.00 | 0.7757 |
| 1.6063066 | 48.4589 | 9.8297 | 1353.9 | 10.798 | 1364.7 | 0.00 | 0.7719 |
| 1.6143382 | 48.3286 | 9.7747 | 1339.6 | 10.802 | 1350.4 | 0.00 | 0.7680 |
| 1.6224099 | 48.1935 | 9.7202 | 1325.5 | 10.806 | 1336.3 | 0.00 | 0.7642 |
| 1.6305219 | 48.0536 | 9.6661 | 1311.6 | 10.809 | 1322.4 | 0.00 | 0.7604 |
| 1.6386745 | 47.9084 | 9.6124 | 1297.8 | 10.813 | 1308.6 | 0.00 | 0.7566 |
| 1.6468679 | 47.7619 | 9.5591 | 1284.2 | 10.816 | 1295.0 | 0.00 | 0.7528 |
| 1.6551022 | 47.6054 | 9.5062 | 1270.7 | 10.819 | 1281.5 | 0.00 | 0.7491 |
| 1.6633777 | 47.4428 | 9.4538 | 1257.4 | 10.821 | 1268.2 | 0.00 | 0.7454 |
| 1.6716946 | 47.2738 | 9.4017 | 1244.3 | 10.824 | 1255.1 | 0.00 | 0.7417 |
| 1.6800531 | 47.0978 | 9.3501 | 1231.3 | 10.827 | 1242.1 | 0.00 | 0.7380 |
| 1.6884534 | 46.9144 | 9.2988 | 1218.4 | 10.829 | 1229.3 | 0.00 | 0.7343 |
| 1.6968956 | 46.7232 | 9.2479 | 1205.8 | 10.831 | 1216.6 | 0.00 | 0.7307 |
| 1.7053801 | 46.5237 | 9.1974 | 1193.2 | 10.833 | 1204.0 | 0.00 | 0.7270 |
| 1.7139070 | 46.3152 | 9.1473 | 1180.8 | 10.835 | 1191.6 | 0.00 | 0.7234 |
| 1.7224766 | 46.0970 | 9.0976 | 1168.5 | 10.836 | 1179.4 | 0.00 | 0.7198 |
| 1.7310889 | 45.8685 | 9.0483 | 1156.4 | 10.838 | 1167.3 | 0.00 | 0.7162 |
| 1.7397444 | 45.6289 | 8.9993 | 1144.4 | 10.839 | 1155.3 | 0.00 | 0.7127 |
| 1.7484431 | 45.3771 | 8.9507 | 1132.6 | 10.840 | 1143.4 | 0.00 | 0.7091 |
| 1.7571853 | 45.1121 | 8.9025 | 1120.9 | 10.841 | 1131.7 | 0.00 | 0.7056 |
| 1.7659712 | 44.8328 | 8.8546 | 1109.3 | 10.842 | 1120.2 | 0.00 | 0.7021 |
| 1.7748011 | 44.5378 | 8.8071 | 1097.9 | 10.842 | 1108.7 | 0.00 | 0.6986 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Os ($Z=76$) | | | | | | | |
| 1.7836751 | 44.2255 | 8.7600 | 1086.6 | 10.843 | 1097.4 | 0.00 | 0.6951 |
| 1.7925935 | 43.8942 | 8.7132 | 1075.4 | 10.843 | 1086.2 | 0.00 | 0.6916 |
| 1.8015565 | 43.5416 | 8.6667 | 1064.3 | 10.843 | 1075.2 | 0.00 | 0.6882 |
| 1.8105642 | 43.1655 | 8.6206 | 1053.4 | 10.843 | 1064.2 | 0.00 | 0.6848 |
| 1.8196171 | 42.7627 | 8.5749 | 1042.6 | 10.842 | 1053.4 | 0.00 | 0.6814 |
| 1.8287151 | 42.3298 | 8.5295 | 1031.9 | 10.842 | 1042.8 | 0.00 | 0.6780 |
| 1.8378587 | 41.8625 | 8.4844 | 1021.4 | 10.841 | 1032.2 | 0.00 | 0.6746 |
| 1.8470480 | 41.3555 | 8.4397 | 1010.9 | 10.840 | 1021.8 | 0.00 | 0.6713 |
| 1.8562833 | 40.8023 | 8.3953 | 1000.6 | 10.839 | 1011.4 | 0.00 | 0.6679 |
| 1.8655647 | 40.1943 | 8.3512 | 990.39 | 10.838 | 1001.2 | 0.00 | 0.6646 |
| 1.8748925 | 39.5206 | 8.3070 | 980.25 | 10.837 | 991.09 | 0.00 | 0.6613 |
| 1.8842670 | 38.7663 | 8.2616 | 970.05 | 10.835 | 980.88 | 0.00 | 0.6580 |
| 1.8936883 | 37.9108 | 8.2166 | 959.96 | 10.834 | 970.79 | 0.00 | 0.6547 |
| 1.9031567 | 36.9241 | 8.1719 | 949.99 | 10.832 | 960.82 | 0.00 | 0.6515 |
| 1.9126725 | 35.7604 | 8.1275 | 940.13 | 10.830 | 950.96 | 0.00 | 0.6482 |
| 1.9222359 | 34.3427 | 8.0835 | 930.38 | 10.828 | 941.21 | 0.00 | 0.6450 |
| 1.9318471 | 32.5270 | 8.0397 | 920.74 | 10.825 | 931.57 | 0.00 | 0.6418 |
| 1.9415063 | 29.9862 | 7.9963 | 911.21 | 10.823 | 922.03 | 0.00 | 0.6386 |
| 1.9512138 | 25.6313 | 7.9532 | 901.79 | 10.820 | 912.61 | 0.00 | 0.6354 |
| 1.9596590 | 8.61191 | 7.9161 | 893.72 | 10.818 | 904.54 | 0.00 | 0.6327 |
| 1.9605411 | 8.30119 | 25.515 | 2879.3 | 10.817 | 2890.2 | 0.00 | 0.6324 |
| 1.9609699 | 12.1007 | 25.507 | 2877.8 | 10.817 | 2888.6 | 0.00 | 0.6323 |
| 1.9707747 | 25.8504 | 25.329 | 2843.5 | 10.814 | 2854.3 | 0.00 | 0.6291 |
| 1.9806286 | 29.0594 | 25.152 | 2809.5 | 10.811 | 2820.3 | 0.00 | 0.6260 |
| 1.9905318 | 30.6406 | 24.976 | 2776.0 | 10.808 | 2786.8 | 0.00 | 0.6229 |
| 2.0004844 | 31.3542 | 24.801 | 2742.9 | 10.804 | 2753.7 | 0.00 | 0.6198 |
| 2.0104868 | 31.2867 | 24.628 | 2710.2 | 10.800 | 2721.0 | 0.00 | 0.6167 |
| 2.0205393 | 29.9555 | 24.456 | 2677.9 | 10.797 | 2688.7 | 0.00 | 0.6136 |
| 2.0299512 | 21.7230 | 24.297 | 2648.1 | 10.793 | 2658.9 | 0.00 | 0.6108 |
| 2.0306420 | 15.5705 | 24.285 | 2646.0 | 10.793 | 2656.7 | 0.00 | 0.6106 |
| 2.0316490 | 21.7027 | 35.899 | 3909.3 | 10.792 | 3920.1 | 0.00 | 0.6103 |
| 2.0407952 | 31.6850 | 35.668 | 3866.7 | 10.788 | 3877.5 | 0.00 | 0.6075 |
| 2.0509992 | 35.1111 | 35.413 | 3820.0 | 10.784 | 3830.8 | 0.00 | 0.6045 |
| 2.0612542 | 37.3616 | 35.160 | 3773.9 | 10.780 | 3784.6 | 0.00 | 0.6015 |
| 2.0715604 | 39.0993 | 34.909 | 3728.3 | 10.775 | 3739.1 | 0.00 | 0.5985 |
| 2.0819182 | 40.5368 | 34.660 | 3683.3 | 10.770 | 3694.1 | 0.00 | 0.5955 |
| 2.0923278 | 41.7719 | 34.413 | 3638.8 | 10.765 | 3649.6 | 0.00 | 0.5926 |
| 2.1027895 | 42.8590 | 34.168 | 3594.9 | 10.760 | 3605.7 | 0.00 | 0.5896 |
| 2.1133034 | 43.8315 | 33.924 | 3551.6 | 10.754 | 3562.3 | 0.00 | 0.5867 |
| 2.1238699 | 44.7118 | 33.683 | 3508.7 | 10.749 | 3519.5 | 0.00 | 0.5838 |
| 2.1344893 | 45.5160 | 33.443 | 3466.4 | 10.743 | 3477.2 | 0.00 | 0.5809 |
| 2.1451617 | 46.2557 | 33.205 | 3424.6 | 10.737 | 3435.4 | 0.00 | 0.5780 |
| 2.1558875 | 46.9397 | 32.969 | 3383.4 | 10.731 | 3394.1 | 0.00 | 0.5751 |
| 2.1666670 | 47.5751 | 32.735 | 3342.6 | 10.725 | 3353.3 | 0.00 | 0.5722 |
| 2.1775003 | 48.1673 | 32.502 | 3302.3 | 10.719 | 3313.1 | 0.00 | 0.5694 |
| 2.1883878 | 48.7207 | 32.271 | 3262.5 | 10.712 | 3273.3 | 0.00 | 0.5666 |
| 2.1993297 | 49.2390 | 32.041 | 3223.2 | 10.706 | 3233.9 | 0.00 | 0.5637 |
| 2.2103264 | 49.7251 | 31.812 | 3184.3 | 10.699 | 3195.0 | 0.00 | 0.5609 |
| 2.2213780 | 50.1815 | 31.586 | 3145.9 | 10.692 | 3156.5 | 0.00 | 0.5581 |
| 2.2324849 | 50.6101 | 31.361 | 3107.9 | 10.685 | 3118.6 | 0.00 | 0.5554 |
| 2.2436473 | 51.0126 | 31.138 | 3070.4 | 10.678 | 3081.1 | 0.00 | 0.5526 |
| 2.2548656 | 51.3903 | 30.916 | 3033.4 | 10.670 | 3044.1 | 0.00 | 0.5499 |
| 2.2661399 | 51.7444 | 30.696 | 2996.8 | 10.663 | 3007.5 | 0.00 | 0.5471 |
| 2.2774706 | 52.0754 | 30.478 | 2960.7 | 10.655 | 2971.4 | 0.00 | 0.5444 |
| 2.2888579 | 52.3840 | 30.261 | 2925.1 | 10.647 | 2935.7 | 0.00 | 0.5417 |
| 2.3003022 | 52.6702 | 30.046 | 2889.8 | 10.639 | 2900.5 | 0.00 | 0.5390 |
| 2.3118037 | 52.9340 | 29.833 | 2855.0 | 10.631 | 2865.7 | 0.00 | 0.5363 |
| 2.3233628 | 53.1748 | 29.621 | 2820.6 | 10.622 | 2831.3 | 0.00 | 0.5336 |
| 2.3349796 | 53.3915 | 29.411 | 2786.7 | 10.614 | 2797.3 | 0.00 | 0.5310 |
| 2.3466545 | 53.5826 | 29.202 | 2753.2 | 10.605 | 2763.8 | 0.00 | 0.5283 |
| 2.3583878 | 53.7454 | 28.995 | 2720.0 | 10.596 | 2730.6 | 0.00 | 0.5257 |
| 2.3701797 | 53.8762 | 28.789 | 2687.3 | 10.587 | 2697.9 | 0.00 | 0.5231 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Os ($Z=76$) | | | | | | | |
| 2.3820306 | 53.9689 | 28.585 | 2655.0 | 10.578 | 2665.6 | 0.00 | 0.5205 |
| 2.3939407 | 54.0142 | 28.383 | 2623.1 | 10.569 | 2633.7 | 0.00 | 0.5179 |
| 2.4059104 | 53.9961 | 28.182 | 2591.6 | 10.559 | 2602.1 | 0.00 | 0.5153 |
| 2.4179400 | 53.8854 | 27.983 | 2560.4 | 10.550 | 2571.0 | 0.00 | 0.5128 |
| 2.4300297 | 53.6185 | 27.785 | 2529.6 | 10.540 | 2540.2 | 0.00 | 0.5102 |
| 2.4421798 | 53.0125 | 27.588 | 2499.3 | 10.530 | 2509.8 | 0.00 | 0.5077 |
| 2.4543907 | 50.7883 | 27.393 | 2469.3 | 10.520 | 2479.8 | 0.00 | 0.5052 |
| 2.4549050 | 50.4981 | 27.385 | 2468.0 | 10.520 | 2478.5 | 0.00 | 0.5050 |
| 2.4594951 | 50.5312 | 32.005 | 2879.0 | 10.516 | 2889.5 | 0.00 | 0.5041 |
| 2.4666627 | 52.8129 | 31.869 | 2858.5 | 10.510 | 2869.0 | 0.00 | 0.5026 |
| 2.4789960 | 54.3202 | 31.639 | 2823.7 | 10.499 | 2834.2 | 0.00 | 0.5001 |
| 2.4913910 | 55.2373 | 31.410 | 2789.3 | 10.489 | 2799.8 | 0.00 | 0.4977 |
| 2.5038479 | 55.9333 | 31.183 | 2755.3 | 10.478 | 2765.8 | 0.00 | 0.4952 |
| 2.5163672 | 56.5092 | 30.957 | 2721.8 | 10.468 | 2732.3 | 0.00 | 0.4927 |
| 2.5289490 | 57.0078 | 30.733 | 2688.7 | 10.457 | 2699.1 | 0.00 | 0.4903 |
| 2.5415938 | 57.4511 | 30.511 | 2656.0 | 10.446 | 2666.4 | 0.00 | 0.4878 |
| 2.5543017 | 57.8515 | 30.287 | 2623.3 | 10.434 | 2633.7 | 0.00 | 0.4854 |
| 2.5670732 | 58.2143 | 30.060 | 2590.7 | 10.423 | 2601.1 | 0.00 | 0.4830 |
| 2.5799086 | 58.5432 | 29.836 | 2558.6 | 10.411 | 2569.0 | 0.00 | 0.4806 |
| 2.5928082 | 58.8474 | 29.628 | 2528.1 | 10.400 | 2538.5 | 0.00 | 0.4782 |
| 2.6057722 | 59.1334 | 29.422 | 2498.1 | 10.388 | 2508.5 | 0.00 | 0.4758 |
| 2.6188011 | 59.4021 | 29.219 | 2468.5 | 10.376 | 2478.8 | 0.00 | 0.4734 |
| 2.6318951 | 59.6547 | 29.017 | 2439.3 | 10.364 | 2449.6 | 0.00 | 0.4711 |
| 2.6450545 | 59.8917 | 28.816 | 2410.3 | 10.352 | 2420.7 | 0.00 | 0.4687 |
| 2.6582798 | 60.1122 | 28.614 | 2381.5 | 10.339 | 2391.8 | 0.00 | 0.4664 |
| 2.6715712 | 60.3159 | 28.414 | 2353.1 | 10.327 | 2363.4 | 0.00 | 0.4641 |
| 2.6849291 | 60.5026 | 28.216 | 2325.0 | 10.314 | 2335.4 | 0.00 | 0.4618 |
| 2.6983537 | 60.6709 | 28.020 | 2297.4 | 10.301 | 2307.7 | 0.00 | 0.4595 |
| 2.7118455 | 60.8188 | 27.825 | 2270.1 | 10.289 | 2280.4 | 0.00 | 0.4572 |
| 2.7254047 | 60.9420 | 27.633 | 2243.2 | 10.275 | 2253.4 | 0.00 | 0.4549 |
| 2.7390317 | 61.0334 | 27.442 | 2216.6 | 10.262 | 2226.8 | 0.00 | 0.4527 |
| 2.7527269 | 61.0781 | 27.253 | 2190.3 | 10.249 | 2200.6 | 0.00 | 0.4504 |
| 2.7664905 | 61.0415 | 27.065 | 2164.4 | 10.235 | 2174.7 | 0.00 | 0.4482 |
| 2.7803230 | 60.8010 | 26.879 | 2138.9 | 10.222 | 2149.1 | 0.00 | 0.4459 |
| 2.7883189 | 60.2693 | 26.772 | 2124.3 | 10.214 | 2134.5 | 0.00 | 0.4447 |
| 2.7942246 | 59.9526 | 28.526 | 2258.7 | 10.208 | 2268.9 | 0.00 | 0.4437 |
| 2.7960812 | 60.3609 | 28.499 | 2255.0 | 10.206 | 2265.2 | 0.00 | 0.4434 |
| 2.8081957 | 61.3624 | 28.323 | 2231.4 | 10.194 | 2241.6 | 0.00 | 0.4415 |
| 2.8222367 | 61.9197 | 28.122 | 2204.6 | 10.180 | 2214.7 | 0.00 | 0.4393 |
| 2.8363479 | 62.3245 | 27.922 | 2178.0 | 10.166 | 2188.2 | 0.00 | 0.4371 |
| 2.8505296 | 62.6585 | 27.724 | 2151.8 | 10.152 | 2161.9 | 0.00 | 0.4350 |
| 2.8647823 | 62.9495 | 27.528 | 2125.9 | 10.138 | 2136.0 | 0.00 | 0.4328 |
| 2.8791062 | 63.2100 | 27.332 | 2100.3 | 10.123 | 2110.5 | 0.00 | 0.4306 |
| 2.8935017 | 63.4467 | 27.139 | 2075.1 | 10.108 | 2085.2 | 0.00 | 0.4285 |
| 2.9079692 | 63.6630 | 26.946 | 2050.1 | 10.094 | 2060.2 | 0.00 | 0.4264 |
| 2.9225091 | 63.8605 | 26.756 | 2025.5 | 10.079 | 2035.6 | 0.00 | 0.4242 |
| 2.9371216 | 64.0395 | 26.574 | 2001.7 | 10.064 | 2011.8 | 0.00 | 0.4221 |
| 2.9518072 | 64.2081 | 26.401 | 1978.8 | 10.049 | 1988.9 | 0.00 | 0.4200 |
| 2.9665662 | 64.3669 | 26.231 | 1956.3 | 10.033 | 1966.3 | 0.00 | 0.4179 |
| 2.9813991 | 64.5145 | 26.063 | 1934.1 | 10.018 | 1944.1 | 0.00 | 0.4159 |
| 2.9963061 | 64.6501 | 25.896 | 1912.1 | 10.003 | 1922.1 | 0.00 | 0.4138 |
| 3.0112876 | 64.7310 | 25.713 | 1889.2 | 9.9869 | 1899.1 | 0.00 | 0.4117 |
| 3.0263440 | 64.7300 | 25.525 | 1866.0 | 9.9711 | 1876.0 | 0.00 | 0.4097 |
| 3.0414758 | 64.4990 | 25.339 | 1843.2 | 9.9553 | 1853.2 | 0.00 | 0.4076 |
| 3.0422811 | 64.4650 | 25.329 | 1842.0 | 9.9544 | 1852.0 | 0.00 | 0.4075 |
| 3.0547190 | 64.5986 | 26.294 | 1904.4 | 9.9413 | 1914.3 | 0.00 | 0.4059 |
| 3.0566831 | 64.7181 | 26.270 | 1901.4 | 9.9393 | 1911.4 | 0.00 | 0.4056 |
| 3.0719666 | 65.2592 | 26.085 | 1878.6 | 9.9232 | 1888.5 | 0.00 | 0.4036 |
| 3.0873264 | 65.5995 | 25.900 | 1856.1 | 9.9069 | 1866.0 | 0.00 | 0.4016 |
| 3.1027630 | 65.8751 | 25.717 | 1833.8 | 9.8906 | 1843.7 | 0.00 | 0.3996 |
| 3.1182768 | 66.1167 | 25.536 | 1811.8 | 9.8741 | 1821.7 | 0.00 | 0.3976 |
| 3.1338682 | 66.3365 | 25.356 | 1790.0 | 9.8576 | 1799.9 | 0.00 | 0.3956 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Os ($Z=76$) | | | | | | | |
| 3.1495376 | 66.5407 | 25.177 | 1768.6 | 9.8409 | 1778.4 | 0.00 | 0.3937 |
| 3.1652853 | 66.7329 | 24.999 | 1747.3 | 9.8241 | 1757.2 | 0.00 | 0.3917 |
| 3.1811117 | 66.9155 | 24.822 | 1726.4 | 9.8072 | 1736.2 | 0.00 | 0.3898 |
| 3.1970172 | 67.0899 | 24.646 | 1705.6 | 9.7901 | 1715.4 | 0.00 | 0.3878 |
| 3.2130023 | 67.2567 | 24.469 | 1684.9 | 9.7730 | 1694.7 | 0.00 | 0.3859 |
| 3.2290673 | 67.4166 | 24.294 | 1664.5 | 9.7557 | 1674.3 | 0.00 | 0.3840 |
| 3.2452127 | 67.5705 | 24.119 | 1644.3 | 9.7384 | 1654.1 | 0.00 | 0.3821 |
| 3.2614387 | 67.7188 | 23.946 | 1624.4 | 9.7209 | 1634.1 | 0.00 | 0.3802 |
| 3.2777459 | 67.8620 | 23.774 | 1604.7 | 9.7033 | 1614.4 | 0.00 | 0.3783 |
| 3.2941347 | 68.0005 | 23.603 | 1585.2 | 9.6856 | 1594.9 | 0.00 | 0.3764 |
| 3.3106053 | 68.1346 | 23.433 | 1566.0 | 9.6678 | 1575.6 | 0.00 | 0.3745 |
| 3.3271584 | 68.2647 | 23.264 | 1547.0 | 9.6499 | 1556.6 | 0.00 | 0.3726 |
| 3.3437941 | 68.3908 | 23.096 | 1528.2 | 9.6319 | 1537.8 | 0.00 | 0.3708 |
| 3.3605131 | 68.5133 | 22.930 | 1509.6 | 9.6138 | 1519.2 | 0.00 | 0.3689 |
| 3.3773157 | 68.6322 | 22.765 | 1491.3 | 9.5956 | 1500.9 | 0.00 | 0.3671 |
| 3.3942023 | 68.7479 | 22.601 | 1473.2 | 9.5773 | 1482.7 | 0.00 | 0.3653 |
| 3.4111733 | 68.8603 | 22.438 | 1455.3 | 9.5589 | 1464.8 | 0.00 | 0.3635 |
| 3.4282291 | 68.9697 | 22.276 | 1437.6 | 9.5404 | 1447.1 | 0.00 | 0.3617 |
| 3.4453703 | 69.0762 | 22.115 | 1420.1 | 9.5217 | 1429.6 | 0.00 | 0.3599 |
| 3.4625971 | 69.1798 | 21.955 | 1402.8 | 9.5030 | 1412.3 | 0.00 | 0.3581 |
| 3.4799101 | 69.2807 | 21.797 | 1385.8 | 9.4842 | 1395.3 | 0.00 | 0.3563 |
| 3.4973097 | 69.3790 | 21.640 | 1368.9 | 9.4653 | 1378.4 | 0.00 | 0.3545 |
| 3.5147962 | 69.4748 | 21.483 | 1352.3 | 9.4463 | 1361.7 | 0.00 | 0.3527 |
| 3.5323702 | 69.5681 | 21.328 | 1335.9 | 9.4272 | 1345.3 | 0.00 | 0.3510 |
| 3.5500321 | 69.6590 | 21.175 | 1319.6 | 9.4080 | 1329.0 | 0.00 | 0.3492 |
| 3.5677822 | 69.7477 | 21.022 | 1303.6 | 9.3887 | 1313.0 | 0.00 | 0.3475 |
| 3.5856211 | 69.8343 | 20.870 | 1287.8 | 9.3693 | 1297.1 | 0.00 | 0.3458 |
| 3.6035492 | 69.9186 | 20.720 | 1272.1 | 9.3498 | 1281.5 | 0.00 | 0.3441 |
| 3.6215670 | 70.0010 | 20.571 | 1256.7 | 9.3303 | 1266.0 | 0.00 | 0.3423 |
| 3.6396748 | 70.0814 | 20.423 | 1241.4 | 9.3106 | 1250.7 | 0.00 | 0.3406 |
| 3.6578732 | 70.1598 | 20.276 | 1226.4 | 9.2908 | 1235.7 | 0.00 | 0.3390 |
| 3.6761626 | 70.2365 | 20.130 | 1211.5 | 9.2710 | 1220.8 | 0.00 | 0.3373 |
| 3.6945434 | 70.3114 | 19.986 | 1196.8 | 9.2511 | 1206.1 | 0.00 | 0.3356 |
| 3.7130161 | 70.3846 | 19.843 | 1182.3 | 9.2310 | 1191.6 | 0.00 | 0.3339 |
| 3.7315812 | 70.4562 | 19.700 | 1168.0 | 9.2109 | 1177.2 | 0.00 | 0.3323 |
| 3.7502391 | 70.5263 | 19.559 | 1153.9 | 9.1908 | 1163.1 | 0.00 | 0.3306 |
| 3.7689903 | 70.5948 | 19.420 | 1139.9 | 9.1705 | 1149.1 | 0.00 | 0.3290 |
| 3.7878352 | 70.6620 | 19.281 | 1126.2 | 9.1501 | 1135.3 | 0.00 | 0.3273 |
| 3.8067744 | 70.7278 | 19.143 | 1112.6 | 9.1297 | 1121.7 | 0.00 | 0.3257 |
| 3.8258083 | 70.7923 | 19.007 | 1099.1 | 9.1092 | 1108.3 | 0.00 | 0.3241 |
| 3.8449373 | 70.8555 | 18.871 | 1085.9 | 9.0886 | 1095.0 | 0.00 | 0.3225 |
| 3.8641620 | 70.9176 | 18.737 | 1072.8 | 9.0679 | 1081.9 | 0.00 | 0.3209 |
| 3.8834828 | 70.9786 | 18.604 | 1059.9 | 9.0471 | 1068.9 | 0.00 | 0.3193 |
| 3.9029002 | 71.0386 | 18.472 | 1047.1 | 9.0263 | 1056.1 | 0.00 | 0.3177 |
| 3.9224147 | 71.3005 | 18.340 | 1034.5 | 9.0053 | 1043.5 | 0.00 | 0.3161 |
| 3.9420268 | 71.3589 | 18.202 | 1021.6 | 8.9844 | 1030.5 | 0.00 | 0.3145 |
| 3.9617369 | 71.4155 | 18.065 | 1008.8 | 8.9633 | 1017.8 | 0.00 | 0.3130 |
| 3.9815456 | 71.4702 | 17.929 | 996.24 | 8.9421 | 1005.2 | 0.00 | 0.3114 |
| 4.0014533 | 71.5232 | 17.793 | 983.81 | 8.9209 | 992.73 | 0.00 | 0.3098 |
| 4.0214606 | 71.5746 | 17.659 | 971.54 | 8.8996 | 980.44 | 0.00 | 0.3083 |
| 4.0415679 | 71.6243 | 17.526 | 959.43 | 8.8782 | 968.31 | 0.00 | 0.3068 |
| 4.0617757 | 71.8105 | 17.395 | 947.48 | 8.8568 | 956.34 | 0.00 | 0.3052 |
| 4.0820846 | 71.8578 | 17.259 | 935.40 | 8.8353 | 944.24 | 0.00 | 0.3037 |
| 4.1024950 | 71.9031 | 17.124 | 923.49 | 8.8137 | 932.30 | 0.00 | 0.3022 |
| 4.1230075 | 71.9466 | 16.991 | 911.74 | 8.7921 | 920.53 | 0.00 | 0.3007 |
| 4.1436226 | 71.9883 | 16.859 | 900.15 | 8.7703 | 908.92 | 0.00 | 0.2992 |
| 4.1643407 | 72.0284 | 16.728 | 888.71 | 8.7486 | 897.46 | 0.00 | 0.2977 |
| 4.1851624 | 72.0670 | 16.598 | 877.44 | 8.7267 | 886.16 | 0.00 | 0.2962 |
| 4.2060882 | 72.1041 | 16.470 | 866.31 | 8.7048 | 875.01 | 0.00 | 0.2948 |
| 4.2271186 | 72.1398 | 16.342 | 855.33 | 8.6828 | 864.02 | 0.00 | 0.2933 |
| 4.2482542 | 72.1741 | 16.216 | 844.51 | 8.6608 | 853.17 | 0.00 | 0.2918 |
| 4.2694955 | 72.2071 | 16.091 | 833.83 | 8.6387 | 842.47 | 0.00 | 0.2904 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Os ($Z=76$) | | | | | | | |
| 4.2908430 | 72.2390 | 15.967 | 823.29 | 8.6165 | 831.91 | 0.00 | 0.2890 |
| 4.3122972 | 72.2696 | 15.844 | 812.90 | 8.5943 | 821.49 | 0.00 | 0.2875 |
| 4.3338587 | 72.2991 | 15.723 | 802.65 | 8.5720 | 811.22 | 0.00 | 0.2861 |
| 4.3555280 | 72.3275 | 15.602 | 792.53 | 8.5496 | 801.08 | 0.00 | 0.2847 |
| 4.3773056 | 72.3548 | 15.483 | 782.56 | 8.5272 | 791.08 | 0.00 | 0.2832 |
| 4.3991921 | 72.3811 | 15.365 | 772.71 | 8.5047 | 781.22 | 0.00 | 0.2818 |
| 4.4211881 | 72.4064 | 15.247 | 763.00 | 8.4822 | 771.48 | 0.00 | 0.2804 |
| 4.4432940 | 72.4308 | 15.131 | 753.42 | 8.4596 | 761.88 | 0.00 | 0.2790 |
| 4.4655105 | 72.4543 | 15.016 | 743.97 | 8.4370 | 752.41 | 0.00 | 0.2776 |
| 4.4878381 | 72.4769 | 14.902 | 734.65 | 8.4143 | 743.06 | 0.00 | 0.2763 |
| 4.5102772 | 72.4986 | 14.789 | 725.45 | 8.3916 | 733.84 | 0.00 | 0.2749 |
| 4.5328286 | 72.5195 | 14.677 | 716.37 | 8.3688 | 724.74 | 0.00 | 0.2735 |
| 4.5554928 | 72.5396 | 14.566 | 707.42 | 8.3459 | 715.76 | 0.00 | 0.2722 |
| 4.5782702 | 72.5590 | 14.456 | 698.58 | 8.3230 | 706.90 | 0.00 | 0.2708 |
| 4.6011616 | 72.5776 | 14.347 | 689.87 | 8.3001 | 698.17 | 0.00 | 0.2695 |
| 4.6241674 | 72.5954 | 14.239 | 681.27 | 8.2771 | 689.54 | 0.00 | 0.2681 |
| 4.6472882 | 72.6126 | 14.132 | 672.78 | 8.2540 | 681.04 | 0.00 | 0.2668 |
| 4.6705247 | 72.6291 | 14.026 | 664.41 | 8.2309 | 672.64 | 0.00 | 0.2655 |
| 4.6938773 | 72.6450 | 13.921 | 656.15 | 8.2078 | 664.36 | 0.00 | 0.2641 |
| 4.7173467 | 72.6603 | 13.817 | 648.00 | 8.1846 | 656.19 | 0.00 | 0.2628 |
| 4.7409334 | 72.6750 | 13.714 | 639.96 | 8.1614 | 648.12 | 0.00 | 0.2615 |
| 4.7646381 | 72.6891 | 13.611 | 632.03 | 8.1381 | 640.17 | 0.00 | 0.2602 |
| 4.7884613 | 72.7026 | 13.510 | 624.20 | 8.1148 | 632.31 | 0.00 | 0.2589 |
| 4.8124036 | 72.7157 | 13.409 | 616.48 | 8.0914 | 624.57 | 0.00 | 0.2576 |
| 4.8364656 | 72.7282 | 13.310 | 608.85 | 8.0680 | 616.92 | 0.00 | 0.2564 |
| 4.8606479 | 72.7403 | 13.211 | 601.33 | 8.0446 | 609.38 | 0.00 | 0.2551 |
| 4.8849512 | 72.7519 | 13.113 | 593.91 | 8.0211 | 601.93 | 0.00 | 0.2538 |
| 4.9093759 | 72.7631 | 13.016 | 586.59 | 7.9976 | 594.59 | 0.00 | 0.2525 |
| 4.9339228 | 72.8768 | 12.917 | 579.21 | 7.9740 | 587.18 | 0.00 | 0.2513 |
| 4.9585924 | 72.8876 | 12.817 | 571.89 | 7.9505 | 579.84 | 0.00 | 0.2500 |
| 4.9833854 | 72.8976 | 12.719 | 564.67 | 7.9268 | 572.59 | 0.00 | 0.2488 |
| 5.0083023 | 72.9067 | 12.621 | 557.54 | 7.9032 | 565.44 | 0.00 | 0.2476 |
| 5.0333438 | 72.9151 | 12.524 | 550.51 | 7.8795 | 558.39 | 0.00 | 0.2463 |
| 5.0585105 | 72.9227 | 12.428 | 543.57 | 7.8557 | 551.43 | 0.00 | 0.2451 |
| 5.0838031 | 72.9297 | 12.333 | 536.73 | 7.8320 | 544.56 | 0.00 | 0.2439 |
| 5.1092221 | 72.9361 | 12.239 | 529.98 | 7.8082 | 537.79 | 0.00 | 0.2427 |
| 5.1347682 | 72.9418 | 12.145 | 523.30 | 7.7843 | 531.08 | 0.00 | 0.2415 |
| 5.1604421 | 72.9469 | 12.051 | 516.68 | 7.7605 | 524.44 | 0.00 | 0.2403 |
| 5.1862443 | 72.9513 | 11.959 | 510.15 | 7.7366 | 517.89 | 0.00 | 0.2391 |
| 5.2121755 | 72.9552 | 11.867 | 503.71 | 7.7127 | 511.43 | 0.00 | 0.2379 |
| 5.2382364 | 72.9585 | 11.776 | 497.36 | 7.6887 | 505.05 | 0.00 | 0.2367 |
| 5.2644276 | 72.9613 | 11.685 | 491.09 | 7.6647 | 498.76 | 0.00 | 0.2355 |
| 5.2907497 | 72.9635 | 11.596 | 484.91 | 7.6407 | 492.55 | 0.00 | 0.2343 |
| 5.3172034 | 72.9653 | 11.507 | 478.81 | 7.6167 | 486.42 | 0.00 | 0.2332 |
| 5.3437895 | 72.9665 | 11.419 | 472.79 | 7.5927 | 480.38 | 0.00 | 0.2320 |
| 5.3705084 | 72.9673 | 11.332 | 466.85 | 7.5686 | 474.42 | 0.00 | 0.2309 |
| 5.3973609 | 72.9676 | 11.246 | 460.99 | 7.5445 | 468.53 | 0.00 | 0.2297 |
| 5.4243477 | 72.9674 | 11.161 | 455.21 | 7.5204 | 462.73 | 0.00 | 0.2286 |
| 5.4514695 | 72.9669 | 11.075 | 449.49 | 7.4962 | 456.98 | 0.00 | 0.2274 |
| 5.4787268 | 72.9659 | 10.991 | 443.83 | 7.4721 | 451.31 | 0.00 | 0.2263 |
| 5.5061205 | 72.9645 | 10.907 | 438.26 | 7.4479 | 445.70 | 0.00 | 0.2252 |
| 5.5336511 | 72.9627 | 10.824 | 432.75 | 7.4237 | 440.18 | 0.00 | 0.2241 |
| 5.5613193 | 72.9605 | 10.742 | 427.33 | 7.3994 | 434.72 | 0.00 | 0.2229 |
| 5.5891259 | 73.0031 | 10.660 | 421.95 | 7.3752 | 429.33 | 0.00 | 0.2218 |
| 5.6170716 | 73.0006 | 10.577 | 416.59 | 7.3509 | 423.94 | 0.00 | 0.2207 |
| 5.6451569 | 72.9975 | 10.494 | 411.29 | 7.3267 | 418.62 | 0.00 | 0.2196 |
| 5.6733827 | 72.9938 | 10.413 | 406.06 | 7.3024 | 413.37 | 0.00 | 0.2185 |
| 5.7017496 | 72.9896 | 10.332 | 400.91 | 7.2781 | 408.19 | 0.00 | 0.2174 |
| 5.7302584 | 72.9849 | 10.252 | 395.82 | 7.2538 | 403.08 | 0.00 | 0.2164 |
| 5.7589096 | 72.9797 | 10.173 | 390.81 | 7.2294 | 398.04 | 0.00 | 0.2153 |
| 5.7877042 | 72.9740 | 10.094 | 385.85 | 7.2051 | 393.06 | 0.00 | 0.2142 |
| 5.8166427 | 72.9678 | 10.016 | 380.97 | 7.1807 | 388.15 | 0.00 | 0.2132 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Os ($Z=76$) | | | | | | | |
| 5.8457259 | 72.9612 | 9.9388 | 376.15 | 7.1564 | 383.31 | 0.00 | 0.2121 |
| 5.8749546 | 72.9542 | 9.8622 | 371.40 | 7.1320 | 378.53 | 0.00 | 0.2110 |
| 5.9043293 | 72.9468 | 9.7863 | 366.70 | 7.1076 | 373.81 | 0.00 | 0.2100 |
| 5.9338510 | 72.9389 | 9.7111 | 362.08 | 7.0832 | 369.16 | 0.00 | 0.2089 |
| 5.9635202 | 72.9307 | 9.6365 | 357.51 | 7.0588 | 364.57 | 0.00 | 0.2079 |
| 5.9933378 | 72.9220 | 9.5626 | 353.00 | 7.0344 | 360.04 | 0.00 | 0.2069 |
| 6.0233045 | 72.9130 | 9.4894 | 348.56 | 7.0100 | 355.57 | 0.00 | 0.2058 |
| 6.0534210 | 72.9037 | 9.4168 | 344.17 | 6.9856 | 351.15 | 0.00 | 0.2048 |
| 6.0836882 | 72.8940 | 9.3449 | 339.84 | 6.9612 | 346.80 | 0.00 | 0.2038 |
| 6.1141066 | 72.9019 | 9.2732 | 335.56 | 6.9368 | 342.49 | 0.00 | 0.2028 |
| 6.1446771 | 72.8917 | 9.2019 | 331.32 | 6.9123 | 338.23 | 0.00 | 0.2018 |
| 6.1754005 | 72.8810 | 9.1312 | 327.14 | 6.8879 | 334.03 | 0.00 | 0.2008 |
| 6.2062775 | 72.8699 | 9.0611 | 323.01 | 6.8635 | 329.88 | 0.00 | 0.1998 |
| 6.2373089 | 72.8585 | 8.9917 | 318.94 | 6.8390 | 325.78 | 0.00 | 0.1988 |
| 6.2684954 | 72.8466 | 8.9228 | 314.93 | 6.8146 | 321.74 | 0.00 | 0.1978 |
| 6.2998379 | 72.8345 | 8.8546 | 310.96 | 6.7901 | 317.75 | 0.00 | 0.1968 |
| 6.3313371 | 72.8219 | 8.7870 | 307.05 | 6.7657 | 313.82 | 0.00 | 0.1958 |
| 6.3629938 | 72.8090 | 8.7199 | 303.19 | 6.7413 | 309.93 | 0.00 | 0.1949 |
| 6.3948088 | 72.7958 | 8.6534 | 299.39 | 6.7168 | 306.10 | 0.00 | 0.1939 |
| 6.4267828 | 72.7822 | 8.5876 | 295.63 | 6.6924 | 302.32 | 0.00 | 0.1929 |
| 6.4589167 | 72.7683 | 8.5223 | 291.92 | 6.6680 | 298.59 | 0.00 | 0.1920 |
| 6.4912113 | 72.7540 | 8.4575 | 288.26 | 6.6436 | 294.90 | 0.00 | 0.1910 |
| 6.5236674 | 72.7394 | 8.3934 | 284.65 | 6.6192 | 291.27 | 0.00 | 0.1901 |
| 6.5562857 | 72.7245 | 8.3297 | 281.09 | 6.5947 | 287.68 | 0.00 | 0.1891 |
| 6.5890671 | 72.7093 | 8.2667 | 277.57 | 6.5703 | 284.14 | 0.00 | 0.1882 |
| 6.6220125 | 72.6938 | 8.2042 | 274.10 | 6.5460 | 280.65 | 0.00 | 0.1872 |
| 6.6551225 | 72.6779 | 8.1422 | 270.68 | 6.5216 | 277.20 | 0.00 | 0.1863 |
| 6.6883981 | 72.6617 | 8.0808 | 267.30 | 6.4972 | 273.80 | 0.00 | 0.1854 |
| 6.7218401 | 72.6452 | 8.0199 | 263.97 | 6.4728 | 270.44 | 0.00 | 0.1844 |
| 6.7554493 | 72.6284 | 7.9595 | 260.67 | 6.4485 | 267.12 | 0.00 | 0.1835 |
| 6.7892266 | 72.6113 | 7.8996 | 257.43 | 6.4241 | 263.85 | 0.00 | 0.1826 |
| 6.8231727 | 72.5939 | 7.8403 | 254.22 | 6.3998 | 260.62 | 0.00 | 0.1817 |
| 6.8572886 | 72.5762 | 7.7815 | 251.06 | 6.3754 | 257.44 | 0.00 | 0.1808 |
| 6.8915750 | 72.5582 | 7.7232 | 247.94 | 6.3511 | 254.29 | 0.00 | 0.1799 |
| 6.9260329 | 72.5398 | 7.6653 | 244.86 | 6.3268 | 251.19 | 0.00 | 0.1790 |
| 6.9606631 | 72.5212 | 7.6080 | 241.82 | 6.3025 | 248.12 | 0.00 | 0.1781 |
| 6.9954664 | 72.5023 | 7.5512 | 238.82 | 6.2783 | 245.10 | 0.00 | 0.1772 |
| 7.0304437 | 72.4830 | 7.4949 | 235.86 | 6.2540 | 242.11 | 0.00 | 0.1764 |
| 7.0655959 | 72.4634 | 7.4390 | 232.94 | 6.2298 | 239.17 | 0.00 | 0.1755 |
| 7.1009239 | 72.4435 | 7.3836 | 230.05 | 6.2055 | 236.26 | 0.00 | 0.1746 |
| 7.1364285 | 72.4233 | 7.3288 | 227.20 | 6.1813 | 233.39 | 0.00 | 0.1737 |
| 7.1721107 | 72.4028 | 7.2743 | 224.40 | 6.1571 | 230.55 | 0.00 | 0.1729 |
| 7.2079712 | 72.3820 | 7.2204 | 221.62 | 6.1330 | 227.76 | 0.00 | 0.1720 |
| 7.2440111 | 72.3608 | 7.1669 | 218.89 | 6.1088 | 224.99 | 0.00 | 0.1712 |
| 7.2802311 | 72.3394 | 7.1138 | 216.19 | 6.0847 | 222.27 | 0.00 | 0.1703 |
| 7.3166323 | 72.3176 | 7.0612 | 213.52 | 6.0605 | 219.58 | 0.00 | 0.1695 |
| 7.3532155 | 72.2954 | 7.0091 | 210.89 | 6.0365 | 216.92 | 0.00 | 0.1686 |
| 7.3899815 | 72.2729 | 6.9574 | 208.29 | 6.0124 | 214.30 | 0.00 | 0.1678 |
| 7.4269314 | 72.2501 | 6.9061 | 205.73 | 5.9883 | 211.72 | 0.00 | 0.1669 |
| 7.4640661 | 72.2270 | 6.8553 | 203.20 | 5.9643 | 209.16 | 0.00 | 0.1661 |
| 7.5013864 | 72.2035 | 6.8049 | 200.70 | 5.9403 | 206.64 | 0.00 | 0.1653 |
| 7.5388934 | 72.1796 | 6.7549 | 198.24 | 5.9163 | 204.15 | 0.00 | 0.1645 |
| 7.5765878 | 72.1554 | 6.7054 | 195.80 | 5.8923 | 201.70 | 0.00 | 0.1636 |
| 7.6144708 | 72.1309 | 6.6563 | 193.40 | 5.8684 | 199.27 | 0.00 | 0.1628 |
| 7.6525431 | 72.1059 | 6.6076 | 191.03 | 5.8445 | 196.88 | 0.00 | 0.1620 |
| 7.6908058 | 72.0806 | 6.5593 | 188.69 | 5.8206 | 194.51 | 0.00 | 0.1612 |
| 7.7292599 | 72.0549 | 6.5114 | 186.38 | 5.7967 | 192.18 | 0.00 | 0.1604 |
| 7.7679062 | 72.0288 | 6.4639 | 184.10 | 5.7729 | 189.87 | 0.00 | 0.1596 |
| 7.8067457 | 72.0023 | 6.4168 | 181.85 | 5.7491 | 187.60 | 0.00 | 0.1588 |
| 7.8457794 | 71.9754 | 6.3701 | 179.63 | 5.7253 | 185.36 | 0.00 | 0.1580 |
| 7.8850083 | 71.9480 | 6.3238 | 177.44 | 5.7016 | 183.14 | 0.00 | 0.1572 |
| 7.9244334 | 71.9203 | 6.2779 | 175.27 | 5.6778 | 180.95 | 0.00 | 0.1565 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Os ($Z=76$) | | | | | | | |
| 7.9640555 | 71.8921 | 6.2324 | 173.14 | 5.6542 | 178.79 | 0.00 | 0.1557 |
| 8.0038758 | 71.8635 | 6.1872 | 171.03 | 5.6305 | 176.66 | 0.00 | 0.1549 |
| 8.0438952 | 71.8344 | 6.1425 | 168.95 | 5.6069 | 174.55 | 0.00 | 0.1541 |
| 8.0841147 | 71.8048 | 6.0981 | 166.89 | 5.5833 | 172.47 | 0.00 | 0.1534 |
| 8.1245352 | 71.7748 | 6.0541 | 164.86 | 5.5597 | 170.42 | 0.00 | 0.1526 |
| 8.1651579 | 71.7443 | 6.0104 | 162.86 | 5.5362 | 168.39 | 0.00 | 0.1518 |
| 8.2059837 | 71.7133 | 5.9671 | 160.88 | 5.5127 | 166.39 | 0.00 | 0.1511 |
| 8.2470136 | 71.6817 | 5.9242 | 158.93 | 5.4892 | 164.42 | 0.00 | 0.1503 |
| 8.2882487 | 71.6497 | 5.8816 | 157.00 | 5.4657 | 162.47 | 0.00 | 0.1496 |
| 8.3296899 | 71.6171 | 5.8394 | 155.10 | 5.4423 | 160.54 | 0.00 | 0.1488 |
| 8.3713384 | 71.5839 | 5.7976 | 153.22 | 5.4190 | 158.64 | 0.00 | 0.1481 |
| 8.4131951 | 71.5502 | 5.7560 | 151.37 | 5.3956 | 156.76 | 0.00 | 0.1474 |
| 8.4552610 | 71.5160 | 5.7149 | 149.54 | 5.3723 | 154.91 | 0.00 | 0.1466 |
| 8.4975373 | 71.4811 | 5.6739 | 147.73 | 5.3491 | 153.08 | 0.00 | 0.1459 |
| 8.5400250 | 71.4457 | 5.6323 | 145.91 | 5.3258 | 151.24 | 0.00 | 0.1452 |
| Ir ($Z=77$) | | | | | | | |
| Atomic weight: $A_r=192.2200 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^3)=22.390$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1})=[\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 319.189 E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1})=f_2 (e \text{ atom}^{-1}) \times 2.18917 \times 10^5$ | | | | | | | |
| 21 edges. Edge energies (keV) | | | | | | | |
| K | 76.1110 | L I | 13.4185 | L II | 12.8241 | L III | 11.2152 |
| M I | 3.17370 | M II | 2.98070 | M III | 2.55070 | M IV | 2.11610 |
| M V | 2.04040 | N I | 0.690100 | N II | 0.577100 | N III | 0.494300 |
| N IV | 0.311400 | N V | 0.294900 | N VI | 0.0634000 | N VII | 0.0605000 |
| O I | 0.0952000 | OII | 0.0630000 | O III | 0.0505000 | O IV | 0.00806275 |
| OV | 0.00685456 | | | | | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-1.6105, -0.94980) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.016921 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 37.4872 | 26.241 | 11489 | 6.3034 | 11495 | 0.00 | 2.480 |
| 0.50250000 | 37.7853 | 26.186 | 11408 | 6.3316 | 11414 | 0.00 | 2.467 |
| 0.50501250 | 38.0335 | 26.131 | 11328 | 6.3599 | 11334 | 0.00 | 2.455 |
| 0.50753756 | 38.2526 | 26.076 | 11247 | 6.3881 | 11254 | 0.00 | 2.443 |
| 0.51007525 | 38.4523 | 26.020 | 11168 | 6.4163 | 11174 | 0.00 | 2.431 |
| 0.51262563 | 38.6381 | 25.964 | 11088 | 6.4446 | 11095 | 0.00 | 2.419 |
| 0.51518875 | 38.8133 | 25.908 | 11009 | 6.4728 | 11016 | 0.00 | 2.407 |
| 0.51776470 | 38.9802 | 25.852 | 10930 | 6.5010 | 10937 | 0.00 | 2.395 |
| 0.52035352 | 39.1402 | 25.795 | 10852 | 6.5293 | 10859 | 0.00 | 2.383 |
| 0.52295529 | 39.2943 | 25.738 | 10774 | 6.5575 | 10781 | 0.00 | 2.371 |
| 0.52557007 | 39.4434 | 25.681 | 10697 | 6.5858 | 10704 | 0.00 | 2.359 |
| 0.52819792 | 39.5880 | 25.624 | 10620 | 6.6140 | 10627 | 0.00 | 2.347 |
| 0.53083891 | 39.7286 | 25.566 | 10543 | 6.6422 | 10550 | 0.00 | 2.336 |
| 0.53349310 | 39.8656 | 25.508 | 10467 | 6.6705 | 10474 | 0.00 | 2.324 |
| 0.53616057 | 39.9991 | 25.450 | 10391 | 6.6987 | 10398 | 0.00 | 2.312 |
| 0.53884137 | 40.1295 | 25.392 | 10316 | 6.7269 | 10323 | 0.00 | 2.301 |
| 0.54153558 | 40.2568 | 25.333 | 10241 | 6.7551 | 10248 | 0.00 | 2.289 |
| 0.54424325 | 40.3811 | 25.274 | 10166 | 6.7833 | 10173 | 0.00 | 2.278 |
| 0.54696447 | 40.5024 | 25.215 | 10092 | 6.8115 | 10099 | 0.00 | 2.267 |
| 0.54969929 | 40.6207 | 25.156 | 10018 | 6.8397 | 10025 | 0.00 | 2.255 |
| 0.55244779 | 40.7359 | 25.097 | 9945.1 | 6.8678 | 9951.9 | 0.00 | 2.244 |
| 0.55521003 | 40.8478 | 25.037 | 9872.1 | 6.8960 | 9879.0 | 0.00 | 2.233 |
| 0.55798608 | 40.9559 | 24.977 | 9799.5 | 6.9241 | 9806.4 | 0.00 | 2.222 |
| 0.56077601 | 41.0597 | 24.917 | 9727.3 | 6.9523 | 9734.2 | 0.00 | 2.211 |
| 0.56357989 | 41.1583 | 24.857 | 9655.5 | 6.9804 | 9662.5 | 0.00 | 2.200 |
| 0.56639779 | 41.2499 | 24.797 | 9584.1 | 7.0085 | 9591.1 | 0.00 | 2.189 |
| 0.56922978 | 41.3313 | 24.736 | 9513.1 | 7.0365 | 9520.1 | 0.00 | 2.178 |
| 0.57207593 | 41.3942 | 24.675 | 9442.5 | 7.0646 | 9449.5 | 0.00 | 2.167 |
| 0.57493630 | 41.4089 | 24.614 | 9372.2 | 7.0926 | 9379.3 | 0.00 | 2.156 |
| 0.57626318 | 41.3485 | 24.586 | 9339.9 | 7.1056 | 9347.0 | 0.00 | 2.152 |
| 0.57781099 | 41.3893 | 24.925 | 9443.6 | 7.1206 | 9450.7 | 0.00 | 2.146 |
| 0.57793677 | 41.4134 | 24.923 | 9440.6 | 7.1218 | 9447.7 | 0.00 | 2.145 |
| 0.58070004 | 41.6930 | 24.866 | 9374.2 | 7.1486 | 9381.3 | 0.00 | 2.135 |
| 0.58360354 | 41.8739 | 24.806 | 9305.1 | 7.1766 | 9312.3 | 0.00 | 2.124 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ir ($Z=77$) | | | | | | | |
| 0.58652156 | 42.0278 | 24.746 | 9236.5 | 7.2045 | 9243.7 | 0.00 | 2.114 |
| 0.58945417 | 42.1688 | 24.686 | 9168.2 | 7.2324 | 9175.4 | 0.00 | 2.103 |
| 0.59240144 | 42.3020 | 24.626 | 9100.3 | 7.2603 | 9107.6 | 0.00 | 2.093 |
| 0.59536345 | 42.4297 | 24.566 | 9032.9 | 7.2882 | 9040.1 | 0.00 | 2.082 |
| 0.59834026 | 42.5534 | 24.505 | 8965.8 | 7.3160 | 8973.1 | 0.00 | 2.072 |
| 0.60133196 | 42.6736 | 24.444 | 8899.1 | 7.3438 | 8906.4 | 0.00 | 2.062 |
| 0.60433862 | 42.7911 | 24.384 | 8832.8 | 7.3716 | 8840.2 | 0.00 | 2.052 |
| 0.60736032 | 42.9060 | 24.323 | 8766.9 | 7.3994 | 8774.3 | 0.00 | 2.041 |
| 0.61039712 | 43.0188 | 24.262 | 8701.4 | 7.4271 | 8708.8 | 0.00 | 2.031 |
| 0.61344910 | 43.1295 | 24.200 | 8636.2 | 7.4547 | 8643.7 | 0.00 | 2.021 |
| 0.61651635 | 43.2383 | 24.139 | 8571.5 | 7.4824 | 8579.0 | 0.00 | 2.011 |
| 0.61959893 | 43.3453 | 24.078 | 8507.1 | 7.5100 | 8514.6 | 0.00 | 2.001 |
| 0.62269693 | 43.4505 | 24.016 | 8443.1 | 7.5376 | 8450.7 | 0.00 | 1.991 |
| 0.62581041 | 43.5541 | 23.954 | 8379.6 | 7.5651 | 8387.1 | 0.00 | 1.981 |
| 0.62893946 | 43.6560 | 23.892 | 8316.3 | 7.5926 | 8323.9 | 0.00 | 1.971 |
| 0.63208416 | 43.7563 | 23.831 | 8253.5 | 7.6200 | 8261.1 | 0.00 | 1.962 |
| 0.63524458 | 43.8549 | 23.768 | 8191.1 | 7.6474 | 8198.7 | 0.00 | 1.952 |
| 0.63842080 | 43.9518 | 23.706 | 8129.0 | 7.6748 | 8136.7 | 0.00 | 1.942 |
| 0.64161291 | 44.0471 | 23.644 | 8067.3 | 7.7021 | 8075.0 | 0.00 | 1.932 |
| 0.64482097 | 44.1405 | 23.582 | 8006.0 | 7.7294 | 8013.7 | 0.00 | 1.923 |
| 0.64804508 | 44.2321 | 23.519 | 7945.1 | 7.7566 | 7952.8 | 0.00 | 1.913 |
| 0.65128530 | 44.3216 | 23.457 | 7884.5 | 7.7838 | 7892.3 | 0.00 | 1.904 |
| 0.65454173 | 44.4090 | 23.394 | 7824.3 | 7.8110 | 7832.1 | 0.00 | 1.894 |
| 0.65781444 | 44.4939 | 23.331 | 7764.5 | 7.8381 | 7772.3 | 0.00 | 1.885 |
| 0.66110351 | 44.5762 | 23.268 | 7705.0 | 7.8651 | 7712.9 | 0.00 | 1.875 |
| 0.66440903 | 44.6552 | 23.205 | 7645.9 | 7.8921 | 7653.8 | 0.00 | 1.866 |
| 0.66773107 | 44.7304 | 23.142 | 7587.2 | 7.9190 | 7595.1 | 0.00 | 1.857 |
| 0.67106973 | 44.8008 | 23.079 | 7528.8 | 7.9459 | 7536.7 | 0.00 | 1.848 |
| 0.67442508 | 44.8648 | 23.015 | 7470.8 | 7.9727 | 7478.8 | 0.00 | 1.838 |
| 0.67779720 | 44.9197 | 22.952 | 7413.2 | 7.9995 | 7421.1 | 0.00 | 1.829 |
| 0.68118619 | 44.9601 | 22.889 | 7355.9 | 8.0262 | 7363.9 | 0.00 | 1.820 |
| 0.68459212 | 44.9722 | 22.825 | 7298.9 | 8.0529 | 7307.0 | 0.00 | 1.811 |
| 0.68801508 | 44.8994 | 22.761 | 7242.4 | 8.0795 | 7250.5 | 0.00 | 1.802 |
| 0.68899585 | 44.8169 | 22.743 | 7226.3 | 8.0871 | 7234.4 | 0.00 | 1.799 |
| 0.69120417 | 44.8764 | 23.242 | 7361.1 | 8.1041 | 7369.2 | 0.00 | 1.794 |
| 0.69145515 | 44.9183 | 23.237 | 7357.0 | 8.1060 | 7365.1 | 0.00 | 1.793 |
| 0.69491243 | 45.2283 | 23.174 | 7300.5 | 8.1325 | 7308.7 | 0.00 | 1.784 |
| 0.69838699 | 45.4135 | 23.111 | 7244.4 | 8.1590 | 7252.6 | 0.00 | 1.775 |
| 0.70187893 | 45.5652 | 23.048 | 7188.7 | 8.1853 | 7196.9 | 0.00 | 1.766 |
| 0.70538832 | 45.7008 | 22.985 | 7133.3 | 8.2116 | 7141.5 | 0.00 | 1.758 |
| 0.70891526 | 45.8266 | 22.921 | 7078.2 | 8.2378 | 7086.5 | 0.00 | 1.749 |
| 0.71245984 | 45.9457 | 22.858 | 7023.5 | 8.2640 | 7031.8 | 0.00 | 1.740 |
| 0.71602214 | 46.0600 | 22.794 | 6969.2 | 8.2901 | 6977.5 | 0.00 | 1.732 |
| 0.71960225 | 46.1705 | 22.731 | 6915.2 | 8.3161 | 6923.5 | 0.00 | 1.723 |
| 0.72320026 | 46.2779 | 22.667 | 6861.5 | 8.3421 | 6869.9 | 0.00 | 1.714 |
| 0.72681626 | 46.3828 | 22.604 | 6808.2 | 8.3680 | 6816.6 | 0.00 | 1.706 |
| 0.73045034 | 46.4855 | 22.540 | 6755.3 | 8.3938 | 6763.7 | 0.00 | 1.697 |
| 0.73410260 | 46.5862 | 22.476 | 6702.6 | 8.4196 | 6711.1 | 0.00 | 1.689 |
| 0.73777311 | 46.6852 | 22.412 | 6650.4 | 8.4452 | 6658.8 | 0.00 | 1.681 |
| 0.74146197 | 46.7827 | 22.349 | 6598.4 | 8.4708 | 6606.9 | 0.00 | 1.672 |
| 0.74516928 | 46.8787 | 22.285 | 6546.8 | 8.4964 | 6555.3 | 0.00 | 1.664 |
| 0.74889513 | 46.9735 | 22.221 | 6495.6 | 8.5218 | 6504.1 | 0.00 | 1.656 |
| 0.75263961 | 47.0670 | 22.157 | 6444.6 | 8.5472 | 6453.2 | 0.00 | 1.647 |
| 0.75640280 | 47.1594 | 22.093 | 6394.0 | 8.5725 | 6402.6 | 0.00 | 1.639 |
| 0.76018482 | 47.2507 | 22.029 | 6343.8 | 8.5977 | 6352.4 | 0.00 | 1.631 |
| 0.76398574 | 47.3410 | 21.964 | 6293.8 | 8.6228 | 6302.4 | 0.00 | 1.623 |
| 0.76780567 | 47.4303 | 21.900 | 6244.2 | 8.6479 | 6252.9 | 0.00 | 1.615 |
| 0.77164470 | 47.5187 | 21.836 | 6194.9 | 8.6729 | 6203.6 | 0.00 | 1.607 |
| 0.77550292 | 47.6063 | 21.772 | 6145.9 | 8.6978 | 6154.6 | 0.00 | 1.599 |
| 0.77938044 | 47.6929 | 21.707 | 6097.3 | 8.7226 | 6106.0 | 0.00 | 1.591 |
| 0.78327734 | 47.7787 | 21.643 | 6049.0 | 8.7473 | 6057.7 | 0.00 | 1.583 |
| 0.78719373 | 47.8637 | 21.578 | 6000.9 | 8.7719 | 6009.7 | 0.00 | 1.575 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ir ($Z=77$) | | | | | | | |
| 0.79112969 | 47.9479 | 21.514 | 5953.2 | 8.7964 | 5962.0 | 0.00 | 1.567 |
| 0.79508534 | 48.0314 | 21.449 | 5905.9 | 8.8209 | 5914.7 | 0.00 | 1.559 |
| 0.79906077 | 48.1141 | 21.385 | 5858.8 | 8.8453 | 5867.6 | 0.00 | 1.552 |
| 0.80305607 | 48.1961 | 21.320 | 5812.0 | 8.8695 | 5820.9 | 0.00 | 1.544 |
| 0.80707135 | 48.2773 | 21.256 | 5765.6 | 8.8937 | 5774.5 | 0.00 | 1.536 |
| 0.81110671 | 48.3579 | 21.191 | 5719.5 | 8.9178 | 5728.4 | 0.00 | 1.529 |
| 0.81516224 | 48.4378 | 21.126 | 5673.6 | 8.9418 | 5682.6 | 0.00 | 1.521 |
| 0.81923806 | 48.5171 | 21.062 | 5628.1 | 8.9657 | 5637.1 | 0.00 | 1.513 |
| 0.82333425 | 48.5957 | 20.997 | 5582.9 | 8.9895 | 5591.9 | 0.00 | 1.506 |
| 0.82745092 | 48.6737 | 20.932 | 5538.0 | 9.0132 | 5547.0 | 0.00 | 1.498 |
| 0.83158817 | 48.7511 | 20.867 | 5493.4 | 9.0368 | 5502.4 | 0.00 | 1.491 |
| 0.83574611 | 48.8280 | 20.803 | 5449.1 | 9.0604 | 5458.2 | 0.00 | 1.484 |
| 0.83992484 | 48.9041 | 20.737 | 5404.8 | 9.0838 | 5413.9 | 0.00 | 1.476 |
| 0.84412447 | 48.9795 | 20.671 | 5360.9 | 9.1071 | 5370.0 | 0.00 | 1.469 |
| 0.84834509 | 49.0541 | 20.605 | 5317.2 | 9.1303 | 5326.4 | 0.00 | 1.461 |
| 0.85258682 | 49.1281 | 20.539 | 5273.9 | 9.1534 | 5283.0 | 0.00 | 1.454 |
| 0.85684975 | 49.2014 | 20.474 | 5230.8 | 9.1764 | 5240.0 | 0.00 | 1.447 |
| 0.86113400 | 49.2740 | 20.408 | 5188.0 | 9.1993 | 5197.2 | 0.00 | 1.440 |
| 0.86543967 | 49.3460 | 20.342 | 5145.6 | 9.2221 | 5154.8 | 0.00 | 1.433 |
| 0.86976687 | 49.4173 | 20.276 | 5103.4 | 9.2448 | 5112.6 | 0.00 | 1.425 |
| 0.87411570 | 49.4880 | 20.210 | 5061.5 | 9.2674 | 5070.7 | 0.00 | 1.418 |
| 0.87848628 | 49.5580 | 20.144 | 5019.9 | 9.2899 | 5029.1 | 0.00 | 1.411 |
| 0.88287871 | 49.6275 | 20.078 | 4978.5 | 9.3122 | 4987.9 | 0.00 | 1.404 |
| 0.88729310 | 49.7090 | 20.012 | 4937.5 | 9.3345 | 4946.8 | 0.00 | 1.397 |
| 0.89172957 | 49.7773 | 19.946 | 4896.8 | 9.3566 | 4906.1 | 0.00 | 1.390 |
| 0.89618822 | 49.8450 | 19.880 | 4856.3 | 9.3787 | 4865.7 | 0.00 | 1.383 |
| 0.90066916 | 49.9121 | 19.814 | 4816.1 | 9.4006 | 4825.5 | 0.00 | 1.377 |
| 0.90517250 | 49.9787 | 19.749 | 4776.2 | 9.4224 | 4785.7 | 0.00 | 1.370 |
| 0.90969837 | 50.0446 | 19.683 | 4736.6 | 9.4441 | 4746.1 | 0.00 | 1.363 |
| 0.91424686 | 50.1100 | 19.617 | 4697.3 | 9.4656 | 4706.8 | 0.00 | 1.356 |
| 0.91881809 | 50.1748 | 19.551 | 4658.2 | 9.4871 | 4667.7 | 0.00 | 1.349 |
| 0.92341218 | 50.2391 | 19.485 | 4619.5 | 9.5084 | 4629.0 | 0.00 | 1.343 |
| 0.92802924 | 50.3029 | 19.420 | 4581.0 | 9.5297 | 4590.5 | 0.00 | 1.336 |
| 0.93266939 | 50.3661 | 19.354 | 4542.8 | 9.5508 | 4552.3 | 0.00 | 1.329 |
| 0.93733274 | 50.4365 | 19.288 | 4504.8 | 9.5718 | 4514.4 | 0.00 | 1.323 |
| 0.94201940 | 50.4988 | 19.223 | 4467.1 | 9.5926 | 4476.7 | 0.00 | 1.316 |
| 0.94672950 | 50.5606 | 19.157 | 4429.8 | 9.6134 | 4439.4 | 0.00 | 1.310 |
| 0.95146315 | 50.6219 | 19.091 | 4392.6 | 9.6340 | 4402.2 | 0.00 | 1.303 |
| 0.95622046 | 50.6828 | 19.026 | 4355.7 | 9.6545 | 4365.4 | 0.00 | 1.297 |
| 0.96100156 | 50.7432 | 18.960 | 4319.1 | 9.6748 | 4328.8 | 0.00 | 1.290 |
| 0.96580657 | 50.8031 | 18.894 | 4282.8 | 9.6951 | 4292.5 | 0.00 | 1.284 |
| 0.97063560 | 50.8627 | 18.829 | 4246.7 | 9.7152 | 4256.4 | 0.00 | 1.277 |
| 0.97548878 | 50.9220 | 18.764 | 4210.9 | 9.7352 | 4220.6 | 0.00 | 1.271 |
| 0.98036623 | 50.9808 | 18.698 | 4175.3 | 9.7550 | 4185.0 | 0.00 | 1.265 |
| 0.98526806 | 51.0392 | 18.632 | 4139.9 | 9.7748 | 4149.7 | 0.00 | 1.258 |
| 0.99019440 | 51.0974 | 18.567 | 4104.8 | 9.7944 | 4114.6 | 0.00 | 1.252 |
| 0.99514537 | 51.1553 | 18.501 | 4070.0 | 9.8139 | 4079.8 | 0.00 | 1.246 |
| 1.00012111 | 51.2133 | 18.435 | 4035.3 | 9.8332 | 4045.1 | 0.00 | 1.240 |
| 1.0051217 | 51.2831 | 18.349 | 3996.4 | 9.8524 | 4006.3 | 0.00 | 1.234 |
| 1.0101473 | 51.3507 | 18.263 | 3957.9 | 9.8715 | 3967.8 | 0.00 | 1.227 |
| 1.0151980 | 51.4160 | 18.177 | 3919.7 | 9.8904 | 3929.6 | 0.00 | 1.221 |
| 1.0202740 | 51.4793 | 18.092 | 3881.9 | 9.9092 | 3891.8 | 0.00 | 1.215 |
| 1.0253754 | 51.5405 | 18.007 | 3844.4 | 9.9279 | 3854.3 | 0.00 | 1.209 |
| 1.0305023 | 51.5998 | 17.922 | 3807.3 | 9.9465 | 3817.2 | 0.00 | 1.203 |
| 1.0356548 | 51.6573 | 17.837 | 3770.5 | 9.9649 | 3780.4 | 0.00 | 1.197 |
| 1.0408331 | 51.7131 | 17.753 | 3734.0 | 9.9831 | 3744.0 | 0.00 | 1.191 |
| 1.0460372 | 51.7671 | 17.670 | 3697.9 | 10.001 | 3707.9 | 0.00 | 1.185 |
| 1.0512674 | 51.8196 | 17.586 | 3662.1 | 10.019 | 3672.2 | 0.00 | 1.179 |
| 1.0565238 | 51.8705 | 17.503 | 3626.7 | 10.037 | 3636.7 | 0.00 | 1.174 |
| 1.0618064 | 51.9199 | 17.420 | 3591.6 | 10.055 | 3601.7 | 0.00 | 1.168 |
| 1.0671154 | 51.9679 | 17.338 | 3556.8 | 10.072 | 3566.9 | 0.00 | 1.162 |
| 1.0724510 | 52.0145 | 17.256 | 3522.4 | 10.090 | 3532.5 | 0.00 | 1.156 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ir ($Z=77$) | | | | | | | |
| 1.0778132 | 52.0598 | 17.174 | 3488.3 | 10.107 | 3498.4 | 0.00 | 1.150 |
| 1.0832023 | 52.1039 | 17.093 | 3454.5 | 10.124 | 3464.6 | 0.00 | 1.145 |
| 1.0886183 | 52.1466 | 17.012 | 3421.0 | 10.141 | 3431.2 | 0.00 | 1.139 |
| 1.0940614 | 52.1882 | 16.931 | 3387.9 | 10.158 | 3398.0 | 0.00 | 1.133 |
| 1.0995317 | 52.2286 | 16.851 | 3355.1 | 10.175 | 3365.2 | 0.00 | 1.128 |
| 1.1050294 | 52.2679 | 16.771 | 3322.6 | 10.191 | 3332.7 | 0.00 | 1.122 |
| 1.1105545 | 52.3062 | 16.692 | 3290.4 | 10.208 | 3300.6 | 0.00 | 1.116 |
| 1.1161073 | 52.3434 | 16.613 | 3258.5 | 10.224 | 3268.7 | 0.00 | 1.111 |
| 1.1216878 | 52.3795 | 16.534 | 3226.9 | 10.240 | 3237.2 | 0.00 | 1.105 |
| 1.1272963 | 52.4147 | 16.456 | 3195.7 | 10.256 | 3205.9 | 0.00 | 1.100 |
| 1.1329328 | 52.4490 | 16.378 | 3164.7 | 10.272 | 3175.0 | 0.00 | 1.094 |
| 1.1385974 | 52.4825 | 16.297 | 3133.3 | 10.288 | 3143.6 | 0.00 | 1.089 |
| 1.1442904 | 52.5149 | 16.211 | 3101.3 | 10.303 | 3111.6 | 0.00 | 1.084 |
| 1.1500119 | 52.5462 | 16.126 | 3069.7 | 10.318 | 3080.0 | 0.00 | 1.078 |
| 1.1557619 | 52.5762 | 16.041 | 3038.4 | 10.334 | 3048.7 | 0.00 | 1.073 |
| 1.1615407 | 52.6052 | 15.957 | 3007.4 | 10.349 | 3017.8 | 0.00 | 1.067 |
| 1.1673484 | 52.6331 | 15.873 | 2976.8 | 10.364 | 2987.2 | 0.00 | 1.062 |
| 1.1731852 | 52.6598 | 15.790 | 2946.4 | 10.378 | 2956.8 | 0.00 | 1.057 |
| 1.1790511 | 52.6855 | 15.707 | 2916.4 | 10.393 | 2926.8 | 0.00 | 1.052 |
| 1.1849464 | 52.7099 | 15.616 | 2885.1 | 10.407 | 2895.5 | 0.00 | 1.046 |
| 1.1908711 | 52.7325 | 15.524 | 2853.8 | 10.422 | 2864.2 | 0.00 | 1.041 |
| 1.1968254 | 52.7535 | 15.427 | 2821.8 | 10.436 | 2832.3 | 0.00 | 1.036 |
| 1.2028096 | 52.7725 | 15.331 | 2790.3 | 10.450 | 2800.7 | 0.00 | 1.031 |
| 1.2088236 | 52.7896 | 15.235 | 2759.1 | 10.464 | 2769.6 | 0.00 | 1.026 |
| 1.2148677 | 52.8050 | 15.141 | 2728.3 | 10.477 | 2738.8 | 0.00 | 1.021 |
| 1.2209421 | 52.8186 | 15.047 | 2697.9 | 10.491 | 2708.4 | 0.00 | 1.015 |
| 1.2270468 | 52.8305 | 14.954 | 2667.9 | 10.504 | 2678.4 | 0.00 | 1.010 |
| 1.2331820 | 52.8407 | 14.861 | 2638.2 | 10.517 | 2648.8 | 0.00 | 1.005 |
| 1.2393479 | 52.8493 | 14.770 | 2609.0 | 10.530 | 2619.5 | 0.00 | 1.000 |
| 1.2455447 | 52.8564 | 14.679 | 2580.0 | 10.543 | 2590.6 | 0.00 | 0.9954 |
| 1.2517724 | 52.8616 | 14.583 | 2550.4 | 10.556 | 2560.9 | 0.00 | 0.9905 |
| 1.2580312 | 52.8649 | 14.488 | 2521.1 | 10.568 | 2531.7 | 0.00 | 0.9855 |
| 1.2643214 | 52.8663 | 14.393 | 2492.2 | 10.581 | 2502.8 | 0.00 | 0.9806 |
| 1.2706430 | 52.8657 | 14.300 | 2463.7 | 10.593 | 2474.2 | 0.00 | 0.9758 |
| 1.2769962 | 52.8632 | 14.207 | 2435.5 | 10.605 | 2446.1 | 0.00 | 0.9709 |
| 1.2833812 | 52.8590 | 14.115 | 2407.6 | 10.617 | 2418.3 | 0.00 | 0.9661 |
| 1.2897981 | 52.8529 | 14.023 | 2380.2 | 10.629 | 2390.8 | 0.00 | 0.9613 |
| 1.2962471 | 52.8450 | 13.933 | 2353.0 | 10.640 | 2363.7 | 0.00 | 0.9565 |
| 1.3027283 | 52.8354 | 13.843 | 2326.3 | 10.652 | 2336.9 | 0.00 | 0.9517 |
| 1.3092420 | 52.8240 | 13.754 | 2299.8 | 10.663 | 2310.5 | 0.00 | 0.9470 |
| 1.3157882 | 52.8109 | 13.666 | 2273.7 | 10.674 | 2284.4 | 0.00 | 0.9423 |
| 1.3223671 | 52.7961 | 13.578 | 2247.9 | 10.685 | 2258.6 | 0.00 | 0.9376 |
| 1.3289790 | 52.7796 | 13.492 | 2222.4 | 10.696 | 2233.1 | 0.00 | 0.9329 |
| 1.3356239 | 52.7614 | 13.406 | 2197.3 | 10.706 | 2208.0 | 0.00 | 0.9283 |
| 1.3423020 | 52.7416 | 13.321 | 2172.5 | 10.717 | 2183.2 | 0.00 | 0.9237 |
| 1.3490135 | 52.7201 | 13.236 | 2148.0 | 10.727 | 2158.7 | 0.00 | 0.9191 |
| 1.3557586 | 52.6969 | 13.152 | 2123.7 | 10.737 | 2134.5 | 0.00 | 0.9145 |
| 1.3625374 | 52.6720 | 13.069 | 2099.8 | 10.747 | 2110.6 | 0.00 | 0.9100 |
| 1.3693500 | 52.6455 | 12.987 | 2076.2 | 10.756 | 2087.0 | 0.00 | 0.9054 |
| 1.3761968 | 52.6173 | 12.905 | 2052.9 | 10.766 | 2063.7 | 0.00 | 0.9009 |
| 1.3830778 | 52.5874 | 12.824 | 2029.9 | 10.775 | 2040.7 | 0.00 | 0.8964 |
| 1.3899932 | 52.5558 | 12.744 | 2007.1 | 10.785 | 2017.9 | 0.00 | 0.8920 |
| 1.3969431 | 52.5226 | 12.665 | 1984.7 | 10.794 | 1995.5 | 0.00 | 0.8875 |
| 1.4039278 | 52.4876 | 12.586 | 1962.5 | 10.803 | 1973.3 | 0.00 | 0.8831 |
| 1.4109475 | 52.4509 | 12.507 | 1940.6 | 10.811 | 1951.4 | 0.00 | 0.8787 |
| 1.4180022 | 52.4125 | 12.430 | 1919.0 | 10.820 | 1929.8 | 0.00 | 0.8744 |
| 1.4250922 | 52.3724 | 12.353 | 1897.6 | 10.828 | 1908.4 | 0.00 | 0.8700 |
| 1.4322177 | 52.3304 | 12.277 | 1876.5 | 10.836 | 1887.3 | 0.00 | 0.8657 |
| 1.4393788 | 52.2867 | 12.201 | 1855.7 | 10.844 | 1866.5 | 0.00 | 0.8614 |
| 1.4465757 | 52.2412 | 12.126 | 1835.1 | 10.852 | 1845.9 | 0.00 | 0.8571 |
| 1.4538086 | 52.1938 | 12.052 | 1814.7 | 10.860 | 1825.6 | 0.00 | 0.8528 |
| 1.4610776 | 52.1445 | 11.978 | 1794.7 | 10.867 | 1805.5 | 0.00 | 0.8486 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ir ($Z=77$) | | | | | | | |
| 1.4683830 | 52.0934 | 11.905 | 1774.8 | 10.875 | 1785.7 | 0.00 | 0.8444 |
| 1.4757249 | 52.0403 | 11.832 | 1755.2 | 10.882 | 1766.1 | 0.00 | 0.8402 |
| 1.4831035 | 51.9901 | 11.760 | 1735.9 | 10.889 | 1746.8 | 0.00 | 0.8360 |
| 1.4905190 | 51.9331 | 11.689 | 1716.8 | 10.896 | 1727.7 | 0.00 | 0.8318 |
| 1.4979716 | 51.8740 | 11.618 | 1697.9 | 10.902 | 1708.8 | 0.00 | 0.8277 |
| 1.5054615 | 51.8128 | 11.548 | 1679.2 | 10.909 | 1690.1 | 0.00 | 0.8236 |
| 1.5129888 | 51.7494 | 11.478 | 1660.8 | 10.915 | 1671.7 | 0.00 | 0.8195 |
| 1.5205537 | 51.6839 | 11.409 | 1642.6 | 10.921 | 1653.5 | 0.00 | 0.8154 |
| 1.5281565 | 51.6161 | 11.341 | 1624.6 | 10.927 | 1635.6 | 0.00 | 0.8113 |
| 1.5357973 | 51.5460 | 11.273 | 1606.9 | 10.933 | 1617.8 | 0.00 | 0.8073 |
| 1.5434763 | 51.4735 | 11.206 | 1589.3 | 10.939 | 1600.3 | 0.00 | 0.8033 |
| 1.5511937 | 51.3985 | 11.139 | 1572.0 | 10.944 | 1582.9 | 0.00 | 0.7993 |
| 1.5589496 | 51.3211 | 11.073 | 1554.9 | 10.949 | 1565.8 | 0.00 | 0.7953 |
| 1.5667444 | 51.2410 | 11.007 | 1538.0 | 10.954 | 1548.9 | 0.00 | 0.7913 |
| 1.5745781 | 51.1583 | 10.942 | 1521.2 | 10.959 | 1532.2 | 0.00 | 0.7874 |
| 1.5824510 | 51.0728 | 10.877 | 1504.7 | 10.964 | 1515.7 | 0.00 | 0.7835 |
| 1.5903633 | 50.9844 | 10.813 | 1488.4 | 10.968 | 1499.4 | 0.00 | 0.7796 |
| 1.5983151 | 50.8931 | 10.749 | 1472.3 | 10.973 | 1483.3 | 0.00 | 0.7757 |
| 1.6063066 | 50.7987 | 10.686 | 1456.4 | 10.977 | 1467.4 | 0.00 | 0.7719 |
| 1.6143382 | 50.7011 | 10.624 | 1440.7 | 10.981 | 1451.6 | 0.00 | 0.7680 |
| 1.6224099 | 50.6002 | 10.562 | 1425.1 | 10.985 | 1436.1 | 0.00 | 0.7642 |
| 1.6305219 | 50.4959 | 10.500 | 1409.8 | 10.989 | 1420.8 | 0.00 | 0.7604 |
| 1.6386745 | 50.3880 | 10.439 | 1394.6 | 10.992 | 1405.6 | 0.00 | 0.7566 |
| 1.6468679 | 50.2763 | 10.378 | 1379.6 | 10.995 | 1390.6 | 0.00 | 0.7528 |
| 1.6551022 | 50.1608 | 10.318 | 1364.8 | 10.999 | 1375.8 | 0.00 | 0.7491 |
| 1.6633777 | 50.0412 | 10.259 | 1350.2 | 11.002 | 1361.2 | 0.00 | 0.7454 |
| 1.6716946 | 49.9173 | 10.200 | 1335.7 | 11.004 | 1346.7 | 0.00 | 0.7417 |
| 1.6800531 | 49.7890 | 10.141 | 1321.4 | 11.007 | 1332.4 | 0.00 | 0.7380 |
| 1.6884534 | 49.6560 | 10.083 | 1307.3 | 11.009 | 1318.3 | 0.00 | 0.7343 |
| 1.6968956 | 49.5181 | 10.025 | 1293.3 | 11.012 | 1304.4 | 0.00 | 0.7307 |
| 1.7053801 | 49.3751 | 9.9678 | 1279.6 | 11.014 | 1290.6 | 0.00 | 0.7270 |
| 1.7139070 | 49.2266 | 9.9110 | 1265.9 | 11.016 | 1276.9 | 0.00 | 0.7234 |
| 1.7224766 | 49.0723 | 9.8546 | 1252.5 | 11.017 | 1263.5 | 0.00 | 0.7198 |
| 1.7310889 | 48.9119 | 9.7987 | 1239.2 | 11.019 | 1250.2 | 0.00 | 0.7162 |
| 1.7397444 | 48.7495 | 9.7432 | 1226.0 | 11.020 | 1237.0 | 0.00 | 0.7127 |
| 1.7484431 | 48.5759 | 9.6882 | 1213.0 | 11.022 | 1224.1 | 0.00 | 0.7091 |
| 1.7571853 | 48.3950 | 9.6336 | 1200.2 | 11.023 | 1211.2 | 0.00 | 0.7056 |
| 1.7659712 | 48.2064 | 9.5794 | 1187.5 | 11.023 | 1198.5 | 0.00 | 0.7021 |
| 1.7748011 | 48.0095 | 9.5257 | 1175.0 | 11.024 | 1186.0 | 0.00 | 0.6986 |
| 1.7836751 | 47.8037 | 9.4724 | 1162.6 | 11.025 | 1173.6 | 0.00 | 0.6951 |
| 1.7925935 | 47.5885 | 9.4194 | 1150.3 | 11.025 | 1161.4 | 0.00 | 0.6916 |
| 1.8015565 | 47.3630 | 9.3669 | 1138.2 | 11.025 | 1149.2 | 0.00 | 0.6882 |
| 1.8105642 | 47.1265 | 9.3147 | 1126.3 | 11.025 | 1137.3 | 0.00 | 0.6848 |
| 1.8196171 | 46.8780 | 9.2630 | 1114.4 | 11.025 | 1125.4 | 0.00 | 0.6814 |
| 1.8287151 | 46.6166 | 9.2116 | 1102.7 | 11.025 | 1113.8 | 0.00 | 0.6780 |
| 1.8378587 | 46.3410 | 9.1607 | 1091.2 | 11.024 | 1102.2 | 0.00 | 0.6746 |
| 1.8470480 | 46.0499 | 9.1101 | 1079.8 | 11.023 | 1090.8 | 0.00 | 0.6713 |
| 1.8562833 | 45.7419 | 9.0600 | 1068.5 | 11.022 | 1079.5 | 0.00 | 0.6679 |
| 1.8655647 | 45.4151 | 9.0102 | 1057.3 | 11.021 | 1068.3 | 0.00 | 0.6646 |
| 1.8748925 | 45.0674 | 8.9608 | 1046.3 | 11.020 | 1057.3 | 0.00 | 0.6613 |
| 1.8842670 | 44.6965 | 8.9118 | 1035.4 | 11.019 | 1046.4 | 0.00 | 0.6580 |
| 1.8936883 | 44.2995 | 8.8632 | 1024.6 | 11.017 | 1035.6 | 0.00 | 0.6547 |
| 1.9031567 | 43.8729 | 8.8149 | 1014.0 | 11.015 | 1025.0 | 0.00 | 0.6515 |
| 1.9126725 | 43.4125 | 8.7671 | 1003.4 | 11.014 | 1014.5 | 0.00 | 0.6482 |
| 1.9222359 | 42.9132 | 8.7195 | 993.04 | 11.011 | 1004.1 | 0.00 | 0.6450 |
| 1.9318471 | 42.3686 | 8.6724 | 982.76 | 11.009 | 993.77 | 0.00 | 0.6418 |
| 1.9415063 | 41.7703 | 8.6256 | 972.59 | 11.007 | 983.60 | 0.00 | 0.6386 |
| 1.9512138 | 41.1078 | 8.5791 | 962.54 | 11.004 | 973.55 | 0.00 | 0.6354 |
| 1.9609699 | 40.3666 | 8.5331 | 952.61 | 11.001 | 963.61 | 0.00 | 0.6323 |
| 1.9707747 | 39.5267 | 8.4873 | 942.79 | 10.998 | 953.79 | 0.00 | 0.6291 |
| 1.9806286 | 38.5591 | 8.4413 | 933.01 | 10.995 | 944.00 | 0.00 | 0.6260 |
| 1.9905318 | 37.4194 | 8.3943 | 923.20 | 10.992 | 934.19 | 0.00 | 0.6229 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ir ($Z=77$) | | | | | | | |
| 2.0004844 | 36.0335 | 8.3477 | 913.51 | 10.988 | 924.49 | 0.00 | 0.6198 |
| 2.0104868 | 34.2637 | 8.3014 | 903.92 | 10.985 | 914.91 | 0.00 | 0.6167 |
| 2.0205393 | 31.8011 | 8.2555 | 894.45 | 10.981 | 905.43 | 0.00 | 0.6136 |
| 2.0306420 | 27.6452 | 8.2099 | 885.09 | 10.977 | 896.07 | 0.00 | 0.6106 |
| 2.0399144 | 10.7769 | 8.1686 | 876.63 | 10.973 | 887.60 | 0.00 | 0.6078 |
| 2.0407952 | 9.32243 | 25.629 | 2749.2 | 10.973 | 2760.2 | 0.00 | 0.6075 |
| 2.0408856 | 10.4675 | 25.627 | 2748.9 | 10.973 | 2759.9 | 0.00 | 0.6075 |
| 2.0509992 | 27.3377 | 25.448 | 2716.2 | 10.969 | 2727.2 | 0.00 | 0.6045 |
| 2.0612542 | 30.6781 | 25.268 | 2683.6 | 10.964 | 2694.6 | 0.00 | 0.6015 |
| 2.0715604 | 32.3347 | 25.090 | 2651.4 | 10.959 | 2662.4 | 0.00 | 0.5985 |
| 2.0819182 | 33.1343 | 24.913 | 2619.6 | 10.955 | 2630.6 | 0.00 | 0.5955 |
| 2.0923278 | 33.2153 | 24.737 | 2588.2 | 10.950 | 2599.1 | 0.00 | 0.5926 |
| 2.1027895 | 32.2773 | 24.563 | 2557.2 | 10.944 | 2568.1 | 0.00 | 0.5896 |
| 2.1133034 | 27.5966 | 24.390 | 2526.5 | 10.939 | 2537.5 | 0.00 | 0.5867 |
| 2.1153256 | 23.0704 | 24.357 | 2520.7 | 10.938 | 2531.6 | 0.00 | 0.5861 |
| 2.1168746 | 23.0261 | 35.877 | 3710.2 | 10.937 | 3721.1 | 0.00 | 0.5857 |
| 2.1238699 | 32.1225 | 35.705 | 3680.3 | 10.934 | 3691.3 | 0.00 | 0.5838 |
| 2.1344893 | 36.1133 | 35.448 | 3635.6 | 10.928 | 3646.6 | 0.00 | 0.5809 |
| 2.1451617 | 38.5261 | 35.193 | 3591.5 | 10.922 | 3602.4 | 0.00 | 0.5780 |
| 2.1558875 | 40.3384 | 34.939 | 3547.9 | 10.916 | 3558.8 | 0.00 | 0.5751 |
| 2.1666670 | 41.8173 | 34.688 | 3504.8 | 10.910 | 3515.7 | 0.00 | 0.5722 |
| 2.1775003 | 43.0778 | 34.438 | 3462.3 | 10.904 | 3473.2 | 0.00 | 0.5694 |
| 2.1883878 | 44.1813 | 34.191 | 3420.3 | 10.897 | 3431.2 | 0.00 | 0.5666 |
| 2.1993297 | 45.1648 | 33.945 | 3378.8 | 10.891 | 3389.7 | 0.00 | 0.5637 |
| 2.2103264 | 46.0525 | 33.701 | 3337.9 | 10.884 | 3348.8 | 0.00 | 0.5609 |
| 2.2213780 | 46.8616 | 33.459 | 3297.4 | 10.877 | 3308.3 | 0.00 | 0.5581 |
| 2.2324849 | 47.6044 | 33.219 | 3257.5 | 10.870 | 3268.3 | 0.00 | 0.5554 |
| 2.2436473 | 48.2902 | 32.981 | 3218.0 | 10.862 | 3228.9 | 0.00 | 0.5526 |
| 2.2548656 | 48.9263 | 32.744 | 3179.0 | 10.855 | 3189.9 | 0.00 | 0.5499 |
| 2.2661399 | 49.5183 | 32.510 | 3140.6 | 10.847 | 3151.4 | 0.00 | 0.5471 |
| 2.2774706 | 50.0710 | 32.277 | 3102.5 | 10.840 | 3113.4 | 0.00 | 0.5444 |
| 2.2888579 | 50.5880 | 32.046 | 3065.0 | 10.832 | 3075.8 | 0.00 | 0.5417 |
| 2.3003022 | 51.0723 | 31.816 | 3027.9 | 10.824 | 3038.7 | 0.00 | 0.5390 |
| 2.3118037 | 51.5265 | 31.588 | 2991.3 | 10.815 | 3002.1 | 0.00 | 0.5363 |
| 2.3233628 | 51.9525 | 31.361 | 2955.0 | 10.807 | 2965.8 | 0.00 | 0.5336 |
| 2.3349796 | 52.3520 | 31.136 | 2919.2 | 10.798 | 2930.0 | 0.00 | 0.5310 |
| 2.3466545 | 52.7262 | 30.913 | 2883.8 | 10.790 | 2894.6 | 0.00 | 0.5283 |
| 2.3583878 | 53.0763 | 30.691 | 2848.9 | 10.781 | 2859.7 | 0.00 | 0.5257 |
| 2.3701797 | 53.4029 | 30.471 | 2814.4 | 10.772 | 2825.2 | 0.00 | 0.5231 |
| 2.3820306 | 53.7065 | 30.252 | 2780.3 | 10.762 | 2791.1 | 0.00 | 0.5205 |
| 2.3939407 | 53.9870 | 30.036 | 2746.7 | 10.753 | 2757.4 | 0.00 | 0.5179 |
| 2.4059104 | 54.2442 | 29.821 | 2713.4 | 10.744 | 2724.2 | 0.00 | 0.5153 |
| 2.4179400 | 54.4774 | 29.607 | 2680.6 | 10.734 | 2691.3 | 0.00 | 0.5128 |
| 2.4300297 | 54.6854 | 29.395 | 2648.2 | 10.724 | 2658.9 | 0.00 | 0.5102 |
| 2.4421798 | 54.8659 | 29.185 | 2616.1 | 10.714 | 2626.8 | 0.00 | 0.5077 |
| 2.4543907 | 55.0160 | 28.976 | 2584.5 | 10.704 | 2595.2 | 0.00 | 0.5052 |
| 2.4666627 | 55.1307 | 28.769 | 2553.3 | 10.694 | 2564.0 | 0.00 | 0.5026 |
| 2.4789960 | 55.2025 | 28.564 | 2522.4 | 10.683 | 2533.1 | 0.00 | 0.5001 |
| 2.4913910 | 55.2192 | 28.360 | 2491.9 | 10.673 | 2502.6 | 0.00 | 0.4977 |
| 2.5038479 | 55.1590 | 28.157 | 2461.8 | 10.662 | 2472.5 | 0.00 | 0.4952 |
| 2.5163672 | 54.9790 | 27.956 | 2432.1 | 10.651 | 2442.8 | 0.00 | 0.4927 |
| 2.5289490 | 54.5741 | 27.757 | 2402.8 | 10.640 | 2413.4 | 0.00 | 0.4903 |
| 2.5415938 | 53.5405 | 27.559 | 2373.8 | 10.629 | 2384.4 | 0.00 | 0.4878 |
| 2.5483176 | 51.6624 | 27.455 | 2358.5 | 10.623 | 2369.2 | 0.00 | 0.4865 |
| 2.5530823 | 51.6985 | 32.140 | 2755.9 | 10.619 | 2766.5 | 0.00 | 0.4856 |
| 2.5543017 | 52.3543 | 32.117 | 2752.6 | 10.618 | 2763.2 | 0.00 | 0.4854 |
| 2.5670732 | 54.9291 | 31.877 | 2718.4 | 10.606 | 2729.0 | 0.00 | 0.4830 |
| 2.5799086 | 56.0628 | 31.639 | 2684.7 | 10.595 | 2695.3 | 0.00 | 0.4806 |
| 2.5928082 | 56.8583 | 31.402 | 2651.4 | 10.583 | 2661.9 | 0.00 | 0.4782 |
| 2.6057722 | 57.4933 | 31.168 | 2618.5 | 10.571 | 2629.0 | 0.00 | 0.4758 |
| 2.6188011 | 58.0317 | 30.935 | 2586.0 | 10.559 | 2596.5 | 0.00 | 0.4734 |
| 2.6318951 | 58.5039 | 30.704 | 2553.9 | 10.547 | 2564.5 | 0.00 | 0.4711 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ir ($Z=77$) | | | | | | | |
| 2.6450545 | 58.9267 | 30.475 | 2522.3 | 10.534 | 2532.8 | 0.00 | 0.4687 |
| 2.6582798 | 59.3094 | 30.244 | 2490.7 | 10.522 | 2501.2 | 0.00 | 0.4664 |
| 2.6715712 | 59.6553 | 30.010 | 2459.2 | 10.509 | 2469.7 | 0.00 | 0.4641 |
| 2.6849291 | 59.9687 | 29.791 | 2429.1 | 10.496 | 2439.6 | 0.00 | 0.4618 |
| 2.6983537 | 60.2631 | 29.582 | 2400.0 | 10.484 | 2410.5 | 0.00 | 0.4595 |
| 2.7118455 | 60.5404 | 29.376 | 2371.4 | 10.470 | 2381.9 | 0.00 | 0.4572 |
| 2.7254047 | 60.8014 | 29.172 | 2343.3 | 10.457 | 2353.7 | 0.00 | 0.4549 |
| 2.7390317 | 61.0473 | 28.972 | 2315.6 | 10.444 | 2326.0 | 0.00 | 0.4527 |
| 2.7527269 | 61.2786 | 28.773 | 2288.2 | 10.431 | 2298.6 | 0.00 | 0.4504 |
| 2.7664905 | 61.4945 | 28.571 | 2260.9 | 10.417 | 2271.3 | 0.00 | 0.4482 |
| 2.7803230 | 61.6946 | 28.372 | 2234.0 | 10.403 | 2244.4 | 0.00 | 0.4459 |
| 2.7942246 | 61.8786 | 28.175 | 2207.4 | 10.389 | 2217.8 | 0.00 | 0.4437 |
| 2.8081957 | 62.0453 | 27.980 | 2181.2 | 10.375 | 2191.6 | 0.00 | 0.4415 |
| 2.8222367 | 62.1927 | 27.787 | 2155.4 | 10.361 | 2165.7 | 0.00 | 0.4393 |
| 2.8363479 | 62.3171 | 27.595 | 2129.9 | 10.347 | 2140.2 | 0.00 | 0.4371 |
| 2.8505296 | 62.4121 | 27.406 | 2104.7 | 10.333 | 2115.1 | 0.00 | 0.4350 |
| 2.8647823 | 62.4650 | 27.218 | 2079.9 | 10.318 | 2090.2 | 0.00 | 0.4328 |
| 2.8791062 | 62.4469 | 27.032 | 2055.4 | 10.303 | 2065.7 | 0.00 | 0.4306 |
| 2.8935017 | 62.2670 | 26.847 | 2031.2 | 10.289 | 2041.5 | 0.00 | 0.4285 |
| 2.9045696 | 61.6647 | 26.706 | 2012.9 | 10.277 | 2023.1 | 0.00 | 0.4269 |
| 2.9079692 | 60.6972 | 26.663 | 2007.3 | 10.274 | 2017.5 | 0.00 | 0.4264 |
| 2.9128303 | 61.7623 | 28.444 | 2137.7 | 10.269 | 2148.0 | 0.00 | 0.4256 |
| 2.9225091 | 62.6103 | 28.302 | 2120.0 | 10.259 | 2130.3 | 0.00 | 0.4242 |
| 2.9371216 | 63.2269 | 28.091 | 2093.7 | 10.243 | 2104.0 | 0.00 | 0.4221 |
| 2.9518072 | 63.6512 | 27.881 | 2067.8 | 10.228 | 2078.0 | 0.00 | 0.4200 |
| 2.9665662 | 63.9929 | 27.674 | 2042.2 | 10.213 | 2052.4 | 0.00 | 0.4179 |
| 2.9813991 | 64.2848 | 27.468 | 2016.9 | 10.197 | 2027.1 | 0.00 | 0.4159 |
| 2.9963061 | 64.5374 | 27.264 | 1991.9 | 10.181 | 2002.1 | 0.00 | 0.4138 |
| 3.0112876 | 64.7643 | 27.057 | 1967.0 | 10.166 | 1977.2 | 0.00 | 0.4117 |
| 3.0263440 | 64.9730 | 26.853 | 1942.5 | 10.150 | 1952.6 | 0.00 | 0.4097 |
| 3.0414758 | 65.1638 | 26.653 | 1918.4 | 10.134 | 1928.5 | 0.00 | 0.4076 |
| 3.0566831 | 65.3382 | 26.455 | 1894.7 | 10.117 | 1904.8 | 0.00 | 0.4056 |
| 3.0719666 | 65.4971 | 26.261 | 1871.5 | 10.101 | 1881.6 | 0.00 | 0.4036 |
| 3.0873264 | 65.6398 | 26.070 | 1848.6 | 10.085 | 1858.6 | 0.00 | 0.4016 |
| 3.1027630 | 65.7637 | 25.880 | 1826.0 | 10.068 | 1836.1 | 0.00 | 0.3996 |
| 3.1182768 | 65.8635 | 25.692 | 1803.7 | 10.051 | 1813.8 | 0.00 | 0.3976 |
| 3.1338682 | 65.9280 | 25.506 | 1781.7 | 10.035 | 1791.8 | 0.00 | 0.3956 |
| 3.1495376 | 65.9274 | 25.321 | 1760.0 | 10.018 | 1770.1 | 0.00 | 0.3937 |
| 3.1652853 | 65.7257 | 25.138 | 1738.6 | 10.001 | 1748.6 | 0.00 | 0.3917 |
| 3.1671623 | 65.6566 | 25.117 | 1736.1 | 9.9987 | 1746.1 | 0.00 | 0.3915 |
| 3.1802379 | 65.7879 | 26.078 | 1795.1 | 9.9846 | 1805.1 | 0.00 | 0.3899 |
| 3.1811117 | 65.8414 | 26.068 | 1793.9 | 9.9836 | 1803.9 | 0.00 | 0.3898 |
| 3.1970172 | 66.4097 | 25.885 | 1772.5 | 9.9664 | 1782.4 | 0.00 | 0.3878 |
| 3.2130023 | 66.7523 | 25.703 | 1751.3 | 9.9490 | 1761.2 | 0.00 | 0.3859 |
| 3.2290673 | 67.0270 | 25.523 | 1730.4 | 9.9315 | 1740.3 | 0.00 | 0.3840 |
| 3.2452127 | 67.2670 | 25.344 | 1709.7 | 9.9140 | 1719.6 | 0.00 | 0.3821 |
| 3.2614387 | 67.4850 | 25.166 | 1689.2 | 9.8963 | 1699.1 | 0.00 | 0.3802 |
| 3.2777459 | 67.6875 | 24.989 | 1669.0 | 9.8785 | 1678.9 | 0.00 | 0.3783 |
| 3.2941347 | 67.8780 | 24.814 | 1649.0 | 9.8605 | 1658.9 | 0.00 | 0.3764 |
| 3.3106053 | 68.0589 | 24.639 | 1629.3 | 9.8425 | 1639.1 | 0.00 | 0.3745 |
| 3.3271584 | 68.2316 | 24.464 | 1609.6 | 9.8244 | 1619.5 | 0.00 | 0.3726 |
| 3.3437941 | 68.3965 | 24.289 | 1590.2 | 9.8061 | 1600.0 | 0.00 | 0.3708 |
| 3.3605131 | 68.5549 | 24.115 | 1571.0 | 9.7878 | 1580.7 | 0.00 | 0.3689 |
| 3.3773157 | 68.7073 | 23.942 | 1552.0 | 9.7693 | 1561.7 | 0.00 | 0.3671 |
| 3.3942023 | 68.8543 | 23.771 | 1533.2 | 9.7508 | 1542.9 | 0.00 | 0.3653 |
| 3.4111733 | 68.9964 | 23.600 | 1514.6 | 9.7321 | 1524.3 | 0.00 | 0.3635 |
| 3.4282291 | 69.1339 | 23.431 | 1496.2 | 9.7133 | 1505.9 | 0.00 | 0.3617 |
| 3.4453703 | 69.2670 | 23.262 | 1478.1 | 9.6945 | 1487.7 | 0.00 | 0.3599 |
| 3.4625971 | 69.3961 | 23.094 | 1460.1 | 9.6755 | 1469.8 | 0.00 | 0.3581 |
| 3.4799101 | 69.5213 | 22.928 | 1442.3 | 9.6564 | 1452.0 | 0.00 | 0.3563 |
| 3.4973097 | 69.6428 | 22.762 | 1424.8 | 9.6373 | 1434.4 | 0.00 | 0.3545 |
| 3.5147962 | 69.7608 | 22.597 | 1407.5 | 9.6180 | 1417.1 | 0.00 | 0.3527 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ir ($Z=77$) | | | | | | | |
| 3.5323702 | 69.8754 | 22.434 | 1390.3 | 9.5986 | 1399.9 | 0.00 | 0.3510 |
| 3.5500321 | 69.9869 | 22.271 | 1373.4 | 9.5792 | 1382.9 | 0.00 | 0.3492 |
| 3.5677822 | 70.0952 | 22.109 | 1356.6 | 9.5596 | 1366.2 | 0.00 | 0.3475 |
| 3.5856211 | 70.2005 | 21.949 | 1340.1 | 9.5399 | 1349.6 | 0.00 | 0.3458 |
| 3.6035492 | 70.3028 | 21.789 | 1323.7 | 9.5202 | 1333.2 | 0.00 | 0.3441 |
| 3.6215670 | 70.4024 | 21.631 | 1307.5 | 9.5003 | 1317.0 | 0.00 | 0.3423 |
| 3.6396748 | 70.4993 | 21.473 | 1291.6 | 9.4804 | 1301.0 | 0.00 | 0.3406 |
| 3.6578732 | 70.5935 | 21.317 | 1275.8 | 9.4604 | 1285.2 | 0.00 | 0.3390 |
| 3.6761626 | 70.6851 | 21.161 | 1260.2 | 9.4402 | 1269.6 | 0.00 | 0.3373 |
| 3.6945434 | 70.7742 | 21.007 | 1244.8 | 9.4200 | 1254.2 | 0.00 | 0.3356 |
| 3.7130161 | 70.8609 | 20.854 | 1229.5 | 9.3997 | 1238.9 | 0.00 | 0.3339 |
| 3.7315812 | 70.9451 | 20.702 | 1214.5 | 9.3793 | 1223.9 | 0.00 | 0.3323 |
| 3.7502391 | 71.0270 | 20.551 | 1199.7 | 9.3589 | 1209.0 | 0.00 | 0.3306 |
| 3.7689903 | 71.1066 | 20.401 | 1185.0 | 9.3383 | 1194.3 | 0.00 | 0.3290 |
| 3.7878352 | 71.1840 | 20.254 | 1170.6 | 9.3176 | 1179.9 | 0.00 | 0.3273 |
| 3.8067744 | 71.2596 | 20.108 | 1156.4 | 9.2969 | 1165.7 | 0.00 | 0.3257 |
| 3.8258083 | 71.3337 | 19.964 | 1142.4 | 9.2761 | 1151.6 | 0.00 | 0.3241 |
| 3.8449373 | 71.4062 | 19.821 | 1128.5 | 9.2552 | 1137.8 | 0.00 | 0.3225 |
| 3.8641620 | 71.4771 | 19.679 | 1114.9 | 9.2342 | 1124.1 | 0.00 | 0.3209 |
| 3.8834828 | 71.5466 | 19.538 | 1101.4 | 9.2131 | 1110.6 | 0.00 | 0.3193 |
| 3.9029002 | 71.6147 | 19.399 | 1088.1 | 9.1920 | 1097.3 | 0.00 | 0.3177 |
| 3.9224147 | 71.6813 | 19.260 | 1074.9 | 9.1708 | 1084.1 | 0.00 | 0.3161 |
| 3.9420268 | 71.7466 | 19.123 | 1062.0 | 9.1494 | 1071.1 | 0.00 | 0.3145 |
| 3.9617369 | 71.8106 | 18.986 | 1049.2 | 9.1281 | 1058.3 | 0.00 | 0.3130 |
| 3.9815456 | 71.8734 | 18.851 | 1036.5 | 9.1066 | 1045.6 | 0.00 | 0.3114 |
| 4.0014533 | 71.9351 | 18.717 | 1024.0 | 9.0851 | 1033.1 | 0.00 | 0.3098 |
| 4.0214606 | 71.9956 | 18.584 | 1011.7 | 9.0635 | 1020.7 | 0.00 | 0.3083 |
| 4.0415679 | 72.0550 | 18.453 | 999.51 | 9.0418 | 1008.6 | 0.00 | 0.3068 |
| 4.0617757 | 72.1135 | 18.322 | 987.49 | 9.0200 | 996.51 | 0.00 | 0.3052 |
| 4.0820846 | 72.3705 | 18.192 | 975.59 | 8.9982 | 984.59 | 0.00 | 0.3037 |
| 4.1024950 | 72.4277 | 18.055 | 963.43 | 8.9763 | 972.40 | 0.00 | 0.3022 |
| 4.1230075 | 72.4830 | 17.919 | 951.43 | 8.9543 | 960.38 | 0.00 | 0.3007 |
| 4.1436226 | 72.5366 | 17.784 | 939.55 | 8.9323 | 948.48 | 0.00 | 0.2992 |
| 4.1643407 | 72.5884 | 17.649 | 927.82 | 8.9101 | 936.73 | 0.00 | 0.2977 |
| 4.1851624 | 72.6385 | 17.516 | 916.25 | 8.8880 | 925.14 | 0.00 | 0.2962 |
| 4.2060882 | 72.6871 | 17.385 | 904.83 | 8.8657 | 913.70 | 0.00 | 0.2948 |
| 4.2271186 | 72.7343 | 17.254 | 893.56 | 8.8434 | 902.41 | 0.00 | 0.2933 |
| 4.2482542 | 72.9168 | 17.120 | 882.24 | 8.8210 | 891.06 | 0.00 | 0.2918 |
| 4.2694955 | 72.9612 | 16.987 | 871.00 | 8.7986 | 879.80 | 0.00 | 0.2904 |
| 4.2908430 | 73.0036 | 16.855 | 859.91 | 8.7761 | 868.69 | 0.00 | 0.2890 |
| 4.3122972 | 73.0444 | 16.723 | 848.98 | 8.7535 | 857.73 | 0.00 | 0.2875 |
| 4.3338587 | 73.0836 | 16.594 | 838.20 | 8.7308 | 846.93 | 0.00 | 0.2861 |
| 4.3555280 | 73.1212 | 16.465 | 827.56 | 8.7081 | 836.26 | 0.00 | 0.2847 |
| 4.3773056 | 73.1574 | 16.337 | 817.06 | 8.6854 | 825.75 | 0.00 | 0.2832 |
| 4.3991921 | 73.1921 | 16.211 | 806.71 | 8.6626 | 815.37 | 0.00 | 0.2818 |
| 4.4211881 | 73.2255 | 16.086 | 796.50 | 8.6397 | 805.14 | 0.00 | 0.2804 |
| 4.4432940 | 73.2577 | 15.962 | 786.42 | 8.6168 | 795.04 | 0.00 | 0.2790 |
| 4.4655105 | 73.2886 | 15.839 | 776.49 | 8.5938 | 785.08 | 0.00 | 0.2776 |
| 4.4878381 | 73.3184 | 15.717 | 766.68 | 8.5707 | 775.25 | 0.00 | 0.2763 |
| 4.5102772 | 73.3470 | 15.596 | 757.01 | 8.5476 | 765.56 | 0.00 | 0.2749 |
| 4.5328286 | 73.3745 | 15.477 | 747.47 | 8.5245 | 756.00 | 0.00 | 0.2735 |
| 4.5554928 | 73.4010 | 15.358 | 738.06 | 8.5013 | 746.56 | 0.00 | 0.2722 |
| 4.5782702 | 73.4265 | 15.241 | 728.77 | 8.4780 | 737.25 | 0.00 | 0.2708 |
| 4.6011616 | 73.4510 | 15.125 | 719.61 | 8.4547 | 728.07 | 0.00 | 0.2695 |
| 4.6241674 | 73.4745 | 15.009 | 710.58 | 8.4314 | 719.01 | 0.00 | 0.2681 |
| 4.6472882 | 73.4972 | 14.895 | 701.66 | 8.4080 | 710.07 | 0.00 | 0.2668 |
| 4.6705247 | 73.5190 | 14.782 | 692.87 | 8.3845 | 701.25 | 0.00 | 0.2655 |
| 4.6938773 | 73.5399 | 14.670 | 684.19 | 8.3610 | 692.55 | 0.00 | 0.2641 |
| 4.7173467 | 73.5600 | 14.559 | 675.63 | 8.3374 | 683.97 | 0.00 | 0.2628 |
| 4.7409334 | 73.5794 | 14.449 | 667.18 | 8.3138 | 675.50 | 0.00 | 0.2615 |
| 4.7646381 | 73.5980 | 14.340 | 658.85 | 8.2902 | 667.14 | 0.00 | 0.2602 |
| 4.7884613 | 73.6158 | 14.231 | 650.63 | 8.2665 | 658.89 | 0.00 | 0.2589 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ir ($Z=77$) | | | | | | | |
| 4.8124036 | 73.6329 | 14.124 | 642.52 | 8.2428 | 650.76 | 0.00 | 0.2576 |
| 4.8364656 | 73.6494 | 14.018 | 634.51 | 8.2190 | 642.73 | 0.00 | 0.2564 |
| 4.8606479 | 73.6652 | 13.913 | 626.62 | 8.1952 | 634.81 | 0.00 | 0.2551 |
| 4.8849512 | 73.6803 | 13.809 | 618.83 | 8.1713 | 627.00 | 0.00 | 0.2538 |
| 4.9093759 | 73.6949 | 13.705 | 611.14 | 8.1474 | 619.29 | 0.00 | 0.2525 |
| 4.9339228 | 73.7088 | 13.603 | 603.55 | 8.1235 | 611.68 | 0.00 | 0.2513 |
| 4.9585924 | 73.7222 | 13.501 | 596.07 | 8.0995 | 604.17 | 0.00 | 0.2500 |
| 4.9833854 | 73.7351 | 13.401 | 588.69 | 8.0755 | 596.76 | 0.00 | 0.2488 |
| 5.0083023 | 73.7474 | 13.301 | 581.40 | 8.0515 | 589.45 | 0.00 | 0.2476 |
| 5.0333438 | 73.7592 | 13.202 | 574.21 | 8.0274 | 582.24 | 0.00 | 0.2463 |
| 5.0585105 | 73.7706 | 13.104 | 567.12 | 8.0033 | 575.12 | 0.00 | 0.2451 |
| 5.0838031 | 73.7816 | 13.007 | 560.12 | 7.9791 | 568.10 | 0.00 | 0.2439 |
| 5.1092221 | 73.8934 | 12.910 | 553.16 | 7.9549 | 561.11 | 0.00 | 0.2427 |
| 5.1347682 | 73.9041 | 12.810 | 546.17 | 7.9307 | 554.10 | 0.00 | 0.2415 |
| 5.1604421 | 73.9140 | 12.712 | 539.27 | 7.9065 | 547.18 | 0.00 | 0.2403 |
| 5.1862443 | 73.9230 | 12.614 | 532.46 | 7.8822 | 540.35 | 0.00 | 0.2391 |
| 5.2121755 | 73.9313 | 12.517 | 525.75 | 7.8579 | 533.61 | 0.00 | 0.2379 |
| 5.2382364 | 73.9388 | 12.422 | 519.12 | 7.8335 | 526.96 | 0.00 | 0.2367 |
| 5.2644276 | 73.9457 | 12.326 | 512.59 | 7.8092 | 520.40 | 0.00 | 0.2355 |
| 5.2907497 | 73.9518 | 12.232 | 506.14 | 7.7848 | 513.93 | 0.00 | 0.2343 |
| 5.3172034 | 73.9574 | 12.139 | 499.78 | 7.7603 | 507.54 | 0.00 | 0.2332 |
| 5.3437895 | 73.9623 | 12.046 | 493.50 | 7.7359 | 501.24 | 0.00 | 0.2320 |
| 5.3705084 | 73.9667 | 11.955 | 487.31 | 7.7114 | 495.02 | 0.00 | 0.2309 |
| 5.3973609 | 73.9705 | 11.864 | 481.20 | 7.6869 | 488.88 | 0.00 | 0.2297 |
| 5.4243477 | 73.9737 | 11.774 | 475.17 | 7.6624 | 482.83 | 0.00 | 0.2286 |
| 5.4514695 | 73.9764 | 11.684 | 469.22 | 7.6379 | 476.85 | 0.00 | 0.2274 |
| 5.4787268 | 73.9787 | 11.596 | 463.35 | 7.6133 | 470.96 | 0.00 | 0.2263 |
| 5.5061205 | 73.9804 | 11.508 | 457.55 | 7.5887 | 465.14 | 0.00 | 0.2252 |
| 5.5336511 | 73.9817 | 11.421 | 451.84 | 7.5641 | 459.40 | 0.00 | 0.2241 |
| 5.5613193 | 73.9826 | 11.334 | 446.17 | 7.5395 | 453.71 | 0.00 | 0.2229 |
| 5.5891259 | 73.9830 | 11.248 | 440.57 | 7.5148 | 448.08 | 0.00 | 0.2218 |
| 5.6170716 | 73.9829 | 11.162 | 435.04 | 7.4902 | 442.53 | 0.00 | 0.2207 |
| 5.6451569 | 73.9824 | 11.078 | 429.59 | 7.4655 | 437.06 | 0.00 | 0.2196 |
| 5.6733827 | 73.9814 | 10.994 | 424.21 | 7.4408 | 431.65 | 0.00 | 0.2185 |
| 5.7017496 | 73.9801 | 10.910 | 418.90 | 7.4161 | 426.32 | 0.00 | 0.2174 |
| 5.7302584 | 73.9783 | 10.828 | 413.67 | 7.3914 | 421.06 | 0.00 | 0.2164 |
| 5.7589096 | 73.9762 | 10.746 | 408.50 | 7.3666 | 415.87 | 0.00 | 0.2153 |
| 5.7877042 | 73.9737 | 10.665 | 403.40 | 7.3419 | 410.75 | 0.00 | 0.2142 |
| 5.8166427 | 73.9709 | 10.585 | 398.37 | 7.3171 | 405.69 | 0.00 | 0.2132 |
| 5.8457259 | 74.0126 | 10.503 | 393.34 | 7.2923 | 400.63 | 0.00 | 0.2121 |
| 5.8749546 | 74.0093 | 10.422 | 388.34 | 7.2675 | 395.61 | 0.00 | 0.2110 |
| 5.9043293 | 74.0054 | 10.341 | 383.42 | 7.2427 | 390.66 | 0.00 | 0.2100 |
| 5.9338510 | 74.0010 | 10.261 | 378.56 | 7.2179 | 385.77 | 0.00 | 0.2089 |
| 5.9635202 | 73.9962 | 10.182 | 373.76 | 7.1931 | 380.95 | 0.00 | 0.2079 |
| 5.9933378 | 73.9908 | 10.103 | 369.03 | 7.1683 | 376.20 | 0.00 | 0.2069 |
| 6.0233045 | 73.9849 | 10.025 | 364.36 | 7.1435 | 371.50 | 0.00 | 0.2058 |
| 6.0534210 | 73.9786 | 9.9478 | 359.75 | 7.1187 | 366.87 | 0.00 | 0.2048 |
| 6.0836882 | 73.9718 | 9.8712 | 355.21 | 7.0938 | 362.30 | 0.00 | 0.2038 |
| 6.1141066 | 73.9646 | 9.7953 | 350.73 | 7.0690 | 357.79 | 0.00 | 0.2028 |
| 6.1446771 | 73.9570 | 9.7201 | 346.30 | 7.0441 | 353.35 | 0.00 | 0.2018 |
| 6.1754005 | 73.9490 | 9.6456 | 341.94 | 7.0193 | 348.96 | 0.00 | 0.2008 |
| 6.2062775 | 73.9406 | 9.5718 | 337.63 | 6.9944 | 344.62 | 0.00 | 0.1998 |
| 6.2373089 | 73.9318 | 9.4985 | 333.38 | 6.9696 | 340.35 | 0.00 | 0.1988 |
| 6.2684954 | 73.9226 | 9.4260 | 329.19 | 6.9447 | 336.13 | 0.00 | 0.1978 |
| 6.2998379 | 73.9131 | 9.3541 | 325.05 | 6.9199 | 331.97 | 0.00 | 0.1968 |
| 6.3313371 | 73.9032 | 9.2828 | 320.97 | 6.8950 | 327.86 | 0.00 | 0.1958 |
| 6.3629938 | 73.9102 | 9.2118 | 316.93 | 6.8701 | 323.80 | 0.00 | 0.1949 |
| 6.3948088 | 73.8998 | 9.1412 | 312.94 | 6.8453 | 319.78 | 0.00 | 0.1939 |
| 6.4267828 | 73.8889 | 9.0712 | 309.00 | 6.8204 | 315.82 | 0.00 | 0.1929 |
| 6.4589167 | 73.8777 | 9.0018 | 305.11 | 6.7956 | 311.90 | 0.00 | 0.1920 |
| 6.4912113 | 73.8661 | 8.9330 | 301.27 | 6.7708 | 308.04 | 0.00 | 0.1910 |
| 6.5236674 | 73.8541 | 8.8649 | 297.48 | 6.7459 | 304.23 | 0.00 | 0.1901 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ir ($Z=77$) | | | | | | | |
| 6.5562857 | 73.8417 | 8.7973 | 293.75 | 6.7211 | 300.47 | 0.00 | 0.1891 |
| 6.5890671 | 73.8290 | 8.7303 | 290.06 | 6.6963 | 296.76 | 0.00 | 0.1882 |
| 6.6220125 | 73.8160 | 8.6639 | 286.42 | 6.6714 | 293.09 | 0.00 | 0.1872 |
| 6.6551225 | 73.8026 | 8.5981 | 282.83 | 6.6466 | 289.48 | 0.00 | 0.1863 |
| 6.6883981 | 73.7889 | 8.5329 | 279.29 | 6.6218 | 285.91 | 0.00 | 0.1854 |
| 6.7218401 | 73.7748 | 8.4682 | 275.79 | 6.5970 | 282.39 | 0.00 | 0.1844 |
| 6.7554493 | 73.7604 | 8.4041 | 272.34 | 6.5723 | 278.92 | 0.00 | 0.1835 |
| 6.7892266 | 73.7457 | 8.3405 | 268.94 | 6.5475 | 275.49 | 0.00 | 0.1826 |
| 6.8231727 | 73.7307 | 8.2775 | 265.58 | 6.5227 | 272.10 | 0.00 | 0.1817 |
| 6.8572886 | 73.7153 | 8.2151 | 262.26 | 6.4980 | 268.76 | 0.00 | 0.1808 |
| 6.8915750 | 73.6996 | 8.1532 | 258.99 | 6.4732 | 265.47 | 0.00 | 0.1799 |
| 6.9260329 | 73.6836 | 8.0918 | 255.77 | 6.4485 | 262.21 | 0.00 | 0.1790 |
| 6.9606631 | 73.6673 | 8.0310 | 252.58 | 6.4238 | 259.00 | 0.00 | 0.1781 |
| 6.9954664 | 73.6507 | 7.9707 | 249.44 | 6.3991 | 255.83 | 0.00 | 0.1772 |
| 7.0304437 | 73.6338 | 7.9109 | 246.33 | 6.3744 | 252.71 | 0.00 | 0.1764 |
| 7.0655959 | 73.6166 | 7.8516 | 243.27 | 6.3497 | 249.62 | 0.00 | 0.1755 |
| 7.1009239 | 73.5990 | 7.7928 | 240.25 | 6.3251 | 246.57 | 0.00 | 0.1746 |
| 7.1364285 | 73.5812 | 7.7346 | 237.27 | 6.3004 | 243.57 | 0.00 | 0.1737 |
| 7.1721107 | 73.5630 | 7.6768 | 234.32 | 6.2758 | 240.60 | 0.00 | 0.1729 |
| 7.2079712 | 73.5445 | 7.6196 | 231.42 | 6.2512 | 237.67 | 0.00 | 0.1720 |
| 7.2440111 | 73.5258 | 7.5628 | 228.55 | 6.2266 | 234.78 | 0.00 | 0.1712 |
| 7.2802311 | 73.5067 | 7.5066 | 225.72 | 6.2021 | 231.93 | 0.00 | 0.1703 |
| 7.3166323 | 73.4873 | 7.4508 | 222.93 | 6.1775 | 229.11 | 0.00 | 0.1695 |
| 7.3532155 | 73.4676 | 7.3955 | 220.18 | 6.1530 | 226.33 | 0.00 | 0.1686 |
| 7.3899815 | 73.4476 | 7.3406 | 217.46 | 6.1285 | 223.58 | 0.00 | 0.1678 |
| 7.4269314 | 73.4273 | 7.2863 | 214.77 | 6.1040 | 220.88 | 0.00 | 0.1669 |
| 7.4640661 | 73.4066 | 7.2324 | 212.12 | 6.0796 | 218.20 | 0.00 | 0.1661 |
| 7.5013864 | 73.3857 | 7.1789 | 209.51 | 6.0551 | 215.56 | 0.00 | 0.1653 |
| 7.5388934 | 73.3644 | 7.1259 | 206.93 | 6.0307 | 212.96 | 0.00 | 0.1645 |
| 7.5765878 | 73.3428 | 7.0734 | 204.38 | 6.0063 | 210.39 | 0.00 | 0.1636 |
| 7.6144708 | 73.3208 | 7.0213 | 201.86 | 5.9820 | 207.85 | 0.00 | 0.1628 |
| 7.6525431 | 73.2986 | 6.9697 | 199.38 | 5.9576 | 205.34 | 0.00 | 0.1620 |
| 7.6908058 | 73.2760 | 6.9185 | 196.93 | 5.9333 | 202.87 | 0.00 | 0.1612 |
| 7.7292599 | 73.2530 | 6.8677 | 194.52 | 5.9090 | 200.43 | 0.00 | 0.1604 |
| 7.7679062 | 73.2297 | 6.8174 | 192.13 | 5.8848 | 198.01 | 0.00 | 0.1596 |
| 7.8067457 | 73.2061 | 6.7675 | 189.77 | 5.8606 | 195.64 | 0.00 | 0.1588 |
| 7.8457794 | 73.1821 | 6.7180 | 187.45 | 5.8363 | 193.29 | 0.00 | 0.1580 |
| 7.8850083 | 73.1578 | 6.6689 | 185.15 | 5.8122 | 190.97 | 0.00 | 0.1572 |
| 7.9244334 | 73.1331 | 6.6203 | 182.89 | 5.7880 | 188.68 | 0.00 | 0.1565 |
| 7.9640555 | 73.1080 | 6.5721 | 180.65 | 5.7639 | 186.42 | 0.00 | 0.1557 |
| 8.0038758 | 73.0826 | 6.5242 | 178.45 | 5.7398 | 184.19 | 0.00 | 0.1549 |
| 8.0438952 | 73.0567 | 6.4768 | 176.27 | 5.7158 | 181.98 | 0.00 | 0.1541 |
| 8.0841147 | 73.0305 | 6.4298 | 174.12 | 5.6917 | 179.81 | 0.00 | 0.1534 |
| 8.1245352 | 73.0039 | 6.3831 | 172.00 | 5.6677 | 177.66 | 0.00 | 0.1526 |
| 8.1651579 | 72.9768 | 6.3369 | 169.90 | 5.6438 | 175.54 | 0.00 | 0.1518 |
| 8.2059837 | 72.9494 | 6.2910 | 167.83 | 5.6199 | 173.45 | 0.00 | 0.1511 |
| 8.2470136 | 72.9216 | 6.2456 | 165.79 | 5.5960 | 171.39 | 0.00 | 0.1503 |
| 8.2882487 | 72.8933 | 6.2005 | 163.77 | 5.5721 | 169.35 | 0.00 | 0.1496 |
| 8.3296899 | 72.8646 | 6.1558 | 161.78 | 5.5483 | 167.33 | 0.00 | 0.1488 |
| 8.3713384 | 72.8354 | 6.1115 | 159.82 | 5.5245 | 165.34 | 0.00 | 0.1481 |
| 8.4131951 | 72.8058 | 6.0675 | 157.88 | 5.5007 | 163.38 | 0.00 | 0.1474 |
| 8.4552610 | 72.7758 | 6.0239 | 155.97 | 5.4770 | 161.44 | 0.00 | 0.1466 |
| 8.4975373 | 72.7453 | 5.9807 | 154.08 | 5.4533 | 159.53 | 0.00 | 0.1459 |
| 8.5400250 | 72.7143 | 5.9378 | 152.21 | 5.4297 | 157.64 | 0.00 | 0.1452 |
| Pt ($Z=78$) | | | | | | | |
| Atomic weight: $A_r=195.0800 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^3)=21.410$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 323.938$ $E(\text{eV})$ $[\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2 (e \text{ atom}^{-1})\times 2.15708\times 10^5$ | | | | | | | |
| 21 edges. Edge energies (keV) | | | | | | | |
| K | 78.3948 | L I | 13.8799 | L II | 13.2726 | L III | 11.5637 |
| MI | 3.29600 | M II | 3.02650 | M III | 2.64540 | M IV | 2.20190 |
| MV | 2.12160 | NI | 0.722000 | N II | 0.609200 | N III | 0.519000 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| NIV | 0.330800 | N V | 0.313300 | N VI | 0.0743000 | N VII | 0.0711000 |
| OI | 0.101700 | OII | 0.0653000 | O III | 0.0517000 | O IV | 0.00743991 |
| OV | 0.00612538 | | | | | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-1.6659, -0.98160) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.017109 e \text{ atom}^{-1}$ | | | | | | | |
| 0.5000000 | 37.3774 | 26.748 | 11539 | 6.3808 | 11546 | 0.00 | 2.480 |
| 0.5025000 | 37.4426 | 26.689 | 11457 | 6.4095 | 11463 | 0.00 | 2.467 |
| 0.50501250 | 37.4938 | 26.629 | 11374 | 6.4382 | 11381 | 0.00 | 2.455 |
| 0.50753756 | 37.5258 | 26.569 | 11292 | 6.4669 | 11298 | 0.00 | 2.443 |
| 0.51007525 | 37.5295 | 26.508 | 11210 | 6.4956 | 11217 | 0.00 | 2.431 |
| 0.51262563 | 37.4861 | 26.447 | 11129 | 6.5243 | 11135 | 0.00 | 2.419 |
| 0.51518875 | 37.3474 | 26.385 | 11047 | 6.5530 | 11054 | 0.00 | 2.407 |
| 0.51776470 | 36.8834 | 26.322 | 10966 | 6.5818 | 10973 | 0.00 | 2.395 |
| 0.51833567 | 36.5845 | 26.308 | 10948 | 6.5881 | 10955 | 0.00 | 2.392 |
| 0.51966431 | 36.6506 | 27.935 | 11596 | 6.6029 | 11602 | 0.00 | 2.386 |
| 0.52035352 | 37.0606 | 27.919 | 11574 | 6.6105 | 11580 | 0.00 | 2.383 |
| 0.52295529 | 37.7556 | 27.859 | 11491 | 6.6392 | 11498 | 0.00 | 2.371 |
| 0.52557007 | 38.1518 | 27.797 | 11409 | 6.6679 | 11415 | 0.00 | 2.359 |
| 0.52819792 | 38.4568 | 27.736 | 11327 | 6.6967 | 11334 | 0.00 | 2.347 |
| 0.53083891 | 38.7166 | 27.674 | 11245 | 6.7254 | 11252 | 0.00 | 2.336 |
| 0.53349310 | 38.9489 | 27.611 | 11164 | 6.7541 | 11171 | 0.00 | 2.324 |
| 0.53616057 | 39.1625 | 27.548 | 11083 | 6.7828 | 11090 | 0.00 | 2.312 |
| 0.53884137 | 39.3625 | 27.485 | 11003 | 6.8115 | 11009 | 0.00 | 2.301 |
| 0.54153558 | 39.5520 | 27.421 | 10922 | 6.8402 | 10929 | 0.00 | 2.289 |
| 0.54424325 | 39.7330 | 27.357 | 10843 | 6.8689 | 10850 | 0.00 | 2.278 |
| 0.54696447 | 39.9071 | 27.292 | 10763 | 6.8976 | 10770 | 0.00 | 2.267 |
| 0.54969929 | 40.0751 | 27.227 | 10684 | 6.9262 | 10691 | 0.00 | 2.255 |
| 0.55244779 | 40.2380 | 27.162 | 10606 | 6.9549 | 10613 | 0.00 | 2.244 |
| 0.55521003 | 40.3962 | 27.096 | 10527 | 6.9835 | 10534 | 0.00 | 2.233 |
| 0.55798608 | 40.5502 | 27.030 | 10449 | 7.0122 | 10456 | 0.00 | 2.222 |
| 0.56077601 | 40.7004 | 26.964 | 10372 | 7.0408 | 10379 | 0.00 | 2.211 |
| 0.56357989 | 40.8471 | 26.897 | 10295 | 7.0694 | 10302 | 0.00 | 2.200 |
| 0.56639779 | 40.9903 | 26.830 | 10218 | 7.0980 | 10225 | 0.00 | 2.189 |
| 0.56922978 | 41.1304 | 26.763 | 10142 | 7.1266 | 10149 | 0.00 | 2.178 |
| 0.57207593 | 41.2673 | 26.696 | 10066 | 7.1551 | 10073 | 0.00 | 2.167 |
| 0.57493630 | 41.4011 | 26.628 | 9990.5 | 7.1836 | 9997.7 | 0.00 | 2.156 |
| 0.57781099 | 41.5319 | 26.560 | 9915.4 | 7.2121 | 9922.6 | 0.00 | 2.146 |
| 0.58070004 | 41.6595 | 26.492 | 9840.7 | 7.2406 | 9847.9 | 0.00 | 2.135 |
| 0.58360354 | 41.7837 | 26.423 | 9766.4 | 7.2691 | 9773.6 | 0.00 | 2.124 |
| 0.58652156 | 41.9044 | 26.354 | 9692.4 | 7.2975 | 9699.7 | 0.00 | 2.114 |
| 0.58945417 | 42.0212 | 26.285 | 9618.9 | 7.3259 | 9626.3 | 0.00 | 2.103 |
| 0.59240144 | 42.1333 | 26.216 | 9545.8 | 7.3543 | 9553.2 | 0.00 | 2.093 |
| 0.59536345 | 42.2398 | 26.146 | 9473.1 | 7.3827 | 9480.5 | 0.00 | 2.082 |
| 0.59834026 | 42.3387 | 26.076 | 9400.8 | 7.4110 | 9408.2 | 0.00 | 2.072 |
| 0.60133196 | 42.4263 | 26.006 | 9328.9 | 7.4393 | 9336.3 | 0.00 | 2.062 |
| 0.60433862 | 42.4930 | 25.936 | 9257.4 | 7.4676 | 9264.9 | 0.00 | 2.052 |
| 0.60736032 | 42.4988 | 25.865 | 9186.3 | 7.4958 | 9193.8 | 0.00 | 2.041 |
| 0.60832884 | 42.4477 | 25.843 | 9163.7 | 7.5049 | 9171.2 | 0.00 | 2.038 |
| 0.61007116 | 42.5165 | 26.181 | 9256.9 | 7.5210 | 9264.4 | 0.00 | 2.032 |
| 0.61039712 | 42.5675 | 26.173 | 9249.3 | 7.5240 | 9256.8 | 0.00 | 2.031 |
| 0.61344910 | 42.8395 | 26.104 | 9179.0 | 7.5522 | 9186.5 | 0.00 | 2.021 |
| 0.61651635 | 43.0235 | 26.035 | 9109.1 | 7.5804 | 9116.7 | 0.00 | 2.011 |
| 0.61959893 | 43.1834 | 25.965 | 9039.6 | 7.6085 | 9047.2 | 0.00 | 2.001 |
| 0.62269693 | 43.3310 | 25.896 | 8970.4 | 7.6365 | 8978.1 | 0.00 | 1.991 |
| 0.62581041 | 43.4711 | 25.826 | 8901.7 | 7.6646 | 8909.4 | 0.00 | 1.981 |
| 0.62893946 | 43.6057 | 25.756 | 8833.4 | 7.6926 | 8841.1 | 0.00 | 1.971 |
| 0.63208416 | 43.7361 | 25.685 | 8765.6 | 7.7205 | 8773.3 | 0.00 | 1.962 |
| 0.63524458 | 43.8630 | 25.615 | 8698.1 | 7.7484 | 8705.8 | 0.00 | 1.952 |
| 0.63842080 | 43.9869 | 25.545 | 8631.0 | 7.7763 | 8638.8 | 0.00 | 1.942 |
| 0.64161291 | 44.1081 | 25.474 | 8564.3 | 7.8041 | 8572.1 | 0.00 | 1.932 |
| 0.64482097 | 44.2270 | 25.403 | 8498.0 | 7.8319 | 8505.9 | 0.00 | 1.923 |
| 0.64804508 | 44.3436 | 25.333 | 8432.2 | 7.8596 | 8440.0 | 0.00 | 1.913 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pt ($Z=78$) | | | | | | | |
| 0.65128530 | 44.4581 | 25.262 | 8366.7 | 7.8873 | 8374.6 | 0.00 | 1.904 |
| 0.65454173 | 44.5706 | 25.190 | 8301.7 | 7.9150 | 8309.6 | 0.00 | 1.894 |
| 0.65781444 | 44.6811 | 25.119 | 8237.0 | 7.9425 | 8245.0 | 0.00 | 1.885 |
| 0.66110351 | 44.7897 | 25.048 | 8172.8 | 7.9701 | 8180.7 | 0.00 | 1.875 |
| 0.66440903 | 44.8964 | 24.977 | 8108.9 | 7.9976 | 8116.9 | 0.00 | 1.866 |
| 0.66773107 | 45.0012 | 24.905 | 8045.5 | 8.0250 | 8053.5 | 0.00 | 1.857 |
| 0.67106973 | 45.1040 | 24.833 | 7982.4 | 8.0524 | 7990.5 | 0.00 | 1.848 |
| 0.67442508 | 45.2048 | 24.762 | 7919.8 | 8.0797 | 7927.9 | 0.00 | 1.838 |
| 0.67779720 | 45.3036 | 24.690 | 7857.5 | 8.1070 | 7865.6 | 0.00 | 1.829 |
| 0.68118619 | 45.4002 | 24.618 | 7795.7 | 8.1342 | 7803.8 | 0.00 | 1.820 |
| 0.68459212 | 45.4944 | 24.546 | 7734.2 | 8.1614 | 7742.4 | 0.00 | 1.811 |
| 0.68801508 | 45.5860 | 24.474 | 7673.2 | 8.1885 | 7681.3 | 0.00 | 1.802 |
| 0.69145515 | 45.6747 | 24.402 | 7612.5 | 8.2155 | 7620.7 | 0.00 | 1.793 |
| 0.69491243 | 45.7602 | 24.330 | 7552.2 | 8.2425 | 7560.4 | 0.00 | 1.784 |
| 0.69838699 | 45.8416 | 24.257 | 7492.3 | 8.2694 | 7500.6 | 0.00 | 1.775 |
| 0.70187893 | 45.9183 | 24.185 | 7432.8 | 8.2963 | 7441.1 | 0.00 | 1.766 |
| 0.70538832 | 45.9885 | 24.113 | 7373.7 | 8.3231 | 7382.0 | 0.00 | 1.758 |
| 0.70891526 | 46.0497 | 24.040 | 7315.0 | 8.3498 | 7323.3 | 0.00 | 1.749 |
| 0.71245984 | 46.0968 | 23.968 | 7256.6 | 8.3765 | 7265.0 | 0.00 | 1.740 |
| 0.71602214 | 46.1171 | 23.895 | 7198.7 | 8.4031 | 7207.1 | 0.00 | 1.732 |
| 0.71960225 | 46.0602 | 23.823 | 7141.1 | 8.4296 | 7149.5 | 0.00 | 1.723 |
| 0.72085202 | 45.9688 | 23.797 | 7121.1 | 8.4388 | 7129.6 | 0.00 | 1.720 |
| 0.72320026 | 46.0399 | 24.286 | 7243.6 | 8.4560 | 7252.1 | 0.00 | 1.714 |
| 0.72681626 | 46.3737 | 24.214 | 7186.3 | 8.4824 | 7194.8 | 0.00 | 1.706 |
| 0.73045034 | 46.5660 | 24.142 | 7129.3 | 8.5087 | 7137.9 | 0.00 | 1.697 |
| 0.73410260 | 46.7230 | 24.070 | 7072.8 | 8.5350 | 7081.3 | 0.00 | 1.689 |
| 0.73777311 | 46.8632 | 23.998 | 7016.6 | 8.5612 | 7025.1 | 0.00 | 1.681 |
| 0.74146197 | 46.9933 | 23.926 | 6960.7 | 8.5872 | 6969.3 | 0.00 | 1.672 |
| 0.74516928 | 47.1166 | 23.855 | 6905.3 | 8.6133 | 6913.9 | 0.00 | 1.664 |
| 0.74889513 | 47.2348 | 23.783 | 6850.2 | 8.6392 | 6858.9 | 0.00 | 1.656 |
| 0.75263961 | 47.3492 | 23.711 | 6795.5 | 8.6651 | 6804.2 | 0.00 | 1.647 |
| 0.75640280 | 47.4603 | 23.639 | 6741.2 | 8.6908 | 6749.9 | 0.00 | 1.639 |
| 0.76018482 | 47.5687 | 23.567 | 6687.2 | 8.7166 | 6695.9 | 0.00 | 1.631 |
| 0.76398574 | 47.6749 | 23.495 | 6633.6 | 8.7422 | 6642.4 | 0.00 | 1.623 |
| 0.76780567 | 47.7789 | 23.423 | 6580.4 | 8.7677 | 6589.2 | 0.00 | 1.615 |
| 0.77164470 | 47.8812 | 23.351 | 6527.5 | 8.7932 | 6536.3 | 0.00 | 1.607 |
| 0.77550292 | 47.9818 | 23.279 | 6475.0 | 8.8185 | 6483.9 | 0.00 | 1.599 |
| 0.77938044 | 48.0809 | 23.207 | 6422.9 | 8.8438 | 6431.7 | 0.00 | 1.591 |
| 0.78327734 | 48.1786 | 23.135 | 6371.1 | 8.8690 | 6380.0 | 0.00 | 1.583 |
| 0.78719373 | 48.2750 | 23.063 | 6319.7 | 8.8941 | 6328.6 | 0.00 | 1.575 |
| 0.79112969 | 48.3702 | 22.991 | 6268.6 | 8.9192 | 6277.6 | 0.00 | 1.567 |
| 0.79508534 | 48.4642 | 22.919 | 6217.9 | 8.9441 | 6226.9 | 0.00 | 1.559 |
| 0.79906077 | 48.5571 | 22.847 | 6167.6 | 8.9690 | 6176.5 | 0.00 | 1.552 |
| 0.80305607 | 48.6490 | 22.775 | 6117.6 | 8.9937 | 6126.6 | 0.00 | 1.544 |
| 0.80707135 | 48.7399 | 22.703 | 6067.9 | 9.0184 | 6076.9 | 0.00 | 1.536 |
| 0.81110671 | 48.8298 | 22.631 | 6018.6 | 9.0429 | 6027.6 | 0.00 | 1.529 |
| 0.81516224 | 48.9187 | 22.559 | 5969.6 | 9.0674 | 5978.7 | 0.00 | 1.521 |
| 0.81923806 | 49.0068 | 22.487 | 5920.9 | 9.0918 | 5930.0 | 0.00 | 1.513 |
| 0.82333425 | 49.0939 | 22.415 | 5872.6 | 9.1161 | 5881.7 | 0.00 | 1.506 |
| 0.82745092 | 49.1802 | 22.343 | 5824.7 | 9.1402 | 5833.8 | 0.00 | 1.498 |
| 0.83158817 | 49.2657 | 22.271 | 5777.0 | 9.1643 | 5786.2 | 0.00 | 1.491 |
| 0.83574611 | 49.3504 | 22.199 | 5729.7 | 9.1883 | 5738.9 | 0.00 | 1.484 |
| 0.83992484 | 49.4342 | 22.128 | 5682.8 | 9.2122 | 5692.0 | 0.00 | 1.476 |
| 0.84412447 | 49.5173 | 22.056 | 5636.1 | 9.2360 | 5645.4 | 0.00 | 1.469 |
| 0.84834509 | 49.5997 | 21.984 | 5589.8 | 9.2597 | 5599.1 | 0.00 | 1.461 |
| 0.85258682 | 49.6813 | 21.912 | 5543.8 | 9.2832 | 5553.1 | 0.00 | 1.454 |
| 0.85684975 | 49.7622 | 21.840 | 5498.2 | 9.3067 | 5507.5 | 0.00 | 1.447 |
| 0.86113400 | 49.8425 | 21.769 | 5452.9 | 9.3301 | 5462.2 | 0.00 | 1.440 |
| 0.86543967 | 49.9221 | 21.697 | 5407.9 | 9.3533 | 5417.2 | 0.00 | 1.433 |
| 0.86976687 | 50.0011 | 21.625 | 5363.2 | 9.3765 | 5372.6 | 0.00 | 1.425 |
| 0.87411570 | 50.0794 | 21.554 | 5318.8 | 9.3995 | 5328.2 | 0.00 | 1.418 |
| 0.87848628 | 50.1572 | 21.482 | 5274.7 | 9.4224 | 5284.2 | 0.00 | 1.411 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pt ($Z=78$) | | | | | | | |
| 0.88287871 | 50.2342 | 21.409 | 5230.8 | 9.4453 | 5240.2 | 0.00 | 1.404 |
| 0.88729310 | 50.3105 | 21.337 | 5187.2 | 9.4680 | 5196.6 | 0.00 | 1.397 |
| 0.89172957 | 50.3862 | 21.265 | 5143.9 | 9.4906 | 5153.4 | 0.00 | 1.390 |
| 0.89618822 | 50.4612 | 21.192 | 5100.9 | 9.5130 | 5110.4 | 0.00 | 1.383 |
| 0.90066916 | 50.5356 | 21.120 | 5058.2 | 9.5354 | 5067.7 | 0.00 | 1.377 |
| 0.90517250 | 50.6094 | 21.048 | 5015.8 | 9.5577 | 5025.4 | 0.00 | 1.370 |
| 0.90969837 | 50.6826 | 20.976 | 4973.8 | 9.5798 | 4983.3 | 0.00 | 1.363 |
| 0.91424686 | 50.7553 | 20.904 | 4932.0 | 9.6018 | 4941.6 | 0.00 | 1.356 |
| 0.91881809 | 50.8275 | 20.832 | 4890.6 | 9.6237 | 4900.2 | 0.00 | 1.349 |
| 0.92341218 | 50.8992 | 20.760 | 4849.4 | 9.6455 | 4859.0 | 0.00 | 1.343 |
| 0.92802924 | 50.9705 | 20.688 | 4808.6 | 9.6672 | 4818.2 | 0.00 | 1.336 |
| 0.93266939 | 51.0415 | 20.616 | 4768.0 | 9.6887 | 4777.7 | 0.00 | 1.329 |
| 0.93733274 | 51.1122 | 20.544 | 4727.8 | 9.7101 | 4737.5 | 0.00 | 1.323 |
| 0.94201940 | 51.1945 | 20.472 | 4687.8 | 9.7314 | 4697.6 | 0.00 | 1.316 |
| 0.94672950 | 51.2650 | 20.401 | 4648.2 | 9.7526 | 4657.9 | 0.00 | 1.310 |
| 0.95146315 | 51.3357 | 20.329 | 4608.9 | 9.7737 | 4618.6 | 0.00 | 1.303 |
| 0.95622046 | 51.4065 | 20.258 | 4569.8 | 9.7946 | 4579.6 | 0.00 | 1.297 |
| 0.96100156 | 51.4780 | 20.186 | 4531.1 | 9.8154 | 4540.9 | 0.00 | 1.290 |
| 0.96580657 | 51.5503 | 20.115 | 4492.6 | 9.8361 | 4502.4 | 0.00 | 1.284 |
| 0.97063560 | 51.6240 | 20.044 | 4454.4 | 9.8566 | 4464.3 | 0.00 | 1.277 |
| 0.97548878 | 51.7000 | 19.973 | 4416.5 | 9.8770 | 4426.4 | 0.00 | 1.271 |
| 0.98036623 | 51.7797 | 19.901 | 4378.9 | 9.8973 | 4388.8 | 0.00 | 1.265 |
| 0.98526806 | 51.8653 | 19.830 | 4341.6 | 9.9175 | 4351.5 | 0.00 | 1.258 |
| 0.99019440 | 51.9615 | 19.760 | 4304.5 | 9.9375 | 4314.4 | 0.00 | 1.252 |
| 0.99514537 | 52.0885 | 19.689 | 4267.7 | 9.9574 | 4277.7 | 0.00 | 1.246 |
| 1.0001211 | 52.2511 | 19.617 | 4231.1 | 9.9771 | 4241.1 | 0.00 | 1.240 |
| 1.0051217 | 52.3662 | 19.523 | 4189.8 | 9.9968 | 4199.8 | 0.00 | 1.234 |
| 1.0101473 | 52.4653 | 19.429 | 4148.9 | 10.016 | 4158.9 | 0.00 | 1.227 |
| 1.0151980 | 52.5532 | 19.335 | 4108.3 | 10.036 | 4118.4 | 0.00 | 1.221 |
| 1.0202740 | 52.6328 | 19.242 | 4068.2 | 10.055 | 4078.2 | 0.00 | 1.215 |
| 1.0253754 | 52.7062 | 19.149 | 4028.4 | 10.074 | 4038.5 | 0.00 | 1.209 |
| 1.0305023 | 52.7744 | 19.056 | 3989.0 | 10.093 | 3999.0 | 0.00 | 1.203 |
| 1.0356548 | 52.8385 | 18.963 | 3949.7 | 10.112 | 3959.9 | 0.00 | 1.197 |
| 1.0408331 | 52.8989 | 18.871 | 3910.9 | 10.130 | 3921.0 | 0.00 | 1.191 |
| 1.0460372 | 52.9562 | 18.779 | 3872.4 | 10.149 | 3882.6 | 0.00 | 1.185 |
| 1.0512674 | 53.0109 | 18.687 | 3834.4 | 10.167 | 3844.5 | 0.00 | 1.179 |
| 1.0565238 | 53.0631 | 18.596 | 3796.6 | 10.185 | 3806.8 | 0.00 | 1.174 |
| 1.0618064 | 53.1132 | 18.505 | 3759.3 | 10.204 | 3769.5 | 0.00 | 1.168 |
| 1.0671154 | 53.1614 | 18.414 | 3722.3 | 10.222 | 3732.5 | 0.00 | 1.162 |
| 1.0724510 | 53.2077 | 18.324 | 3685.6 | 10.239 | 3695.9 | 0.00 | 1.156 |
| 1.0778132 | 53.2524 | 18.234 | 3649.4 | 10.257 | 3659.6 | 0.00 | 1.150 |
| 1.0832023 | 53.2955 | 18.145 | 3613.4 | 10.274 | 3623.7 | 0.00 | 1.145 |
| 1.0886183 | 53.3371 | 18.056 | 3577.8 | 10.292 | 3588.1 | 0.00 | 1.139 |
| 1.0940614 | 53.3773 | 17.968 | 3542.6 | 10.309 | 3552.9 | 0.00 | 1.133 |
| 1.0995317 | 53.4162 | 17.880 | 3507.7 | 10.326 | 3518.1 | 0.00 | 1.128 |
| 1.1050294 | 53.4538 | 17.792 | 3473.2 | 10.343 | 3483.5 | 0.00 | 1.122 |
| 1.1105545 | 53.4902 | 17.705 | 3439.0 | 10.360 | 3449.4 | 0.00 | 1.116 |
| 1.1161073 | 53.5254 | 17.619 | 3405.1 | 10.377 | 3415.5 | 0.00 | 1.111 |
| 1.1216878 | 53.5595 | 17.532 | 3371.6 | 10.393 | 3382.0 | 0.00 | 1.105 |
| 1.1272963 | 53.5925 | 17.447 | 3338.4 | 10.409 | 3348.8 | 0.00 | 1.100 |
| 1.1329328 | 53.6245 | 17.361 | 3305.5 | 10.426 | 3316.0 | 0.00 | 1.094 |
| 1.1385974 | 53.6554 | 17.276 | 3273.0 | 10.442 | 3283.5 | 0.00 | 1.089 |
| 1.1442904 | 53.6852 | 17.192 | 3240.8 | 10.457 | 3251.3 | 0.00 | 1.084 |
| 1.1500119 | 53.7141 | 17.108 | 3208.9 | 10.473 | 3219.4 | 0.00 | 1.078 |
| 1.1557619 | 53.7421 | 17.024 | 3177.3 | 10.489 | 3187.8 | 0.00 | 1.073 |
| 1.1615407 | 53.7691 | 16.941 | 3146.1 | 10.504 | 3156.6 | 0.00 | 1.067 |
| 1.1673484 | 53.7952 | 16.858 | 3115.1 | 10.519 | 3125.7 | 0.00 | 1.062 |
| 1.1731852 | 53.8205 | 16.776 | 3084.5 | 10.534 | 3095.0 | 0.00 | 1.057 |
| 1.1790511 | 53.8448 | 16.694 | 3054.2 | 10.549 | 3064.7 | 0.00 | 1.052 |
| 1.1849464 | 53.8683 | 16.613 | 3024.2 | 10.564 | 3034.7 | 0.00 | 1.046 |
| 1.1908711 | 53.8910 | 16.532 | 2994.5 | 10.579 | 3005.1 | 0.00 | 1.041 |
| 1.1968254 | 53.9129 | 16.451 | 2965.1 | 10.593 | 2975.7 | 0.00 | 1.036 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pt ($Z=78$) | | | | | | | |
| 1.2028096 | 53.9341 | 16.371 | 2936.0 | 10.608 | 2946.6 | 0.00 | 1.031 |
| 1.2088236 | 53.9544 | 16.292 | 2907.2 | 10.622 | 2917.8 | 0.00 | 1.026 |
| 1.2148677 | 53.9741 | 16.213 | 2878.6 | 10.636 | 2889.3 | 0.00 | 1.021 |
| 1.2209421 | 53.9930 | 16.134 | 2850.4 | 10.650 | 2861.1 | 0.00 | 1.015 |
| 1.2270468 | 54.0111 | 16.055 | 2822.4 | 10.663 | 2833.0 | 0.00 | 1.010 |
| 1.2331820 | 54.0285 | 15.976 | 2794.6 | 10.677 | 2805.3 | 0.00 | 1.005 |
| 1.2393479 | 54.0452 | 15.898 | 2767.1 | 10.690 | 2777.8 | 0.00 | 1.000 |
| 1.2455447 | 54.0611 | 15.821 | 2739.9 | 10.703 | 2750.6 | 0.00 | 0.9954 |
| 1.2517724 | 54.0763 | 15.744 | 2713.0 | 10.716 | 2723.7 | 0.00 | 0.9905 |
| 1.2580312 | 54.0907 | 15.660 | 2685.1 | 10.729 | 2695.8 | 0.00 | 0.9855 |
| 1.2643214 | 54.1037 | 15.574 | 2657.2 | 10.742 | 2667.9 | 0.00 | 0.9806 |
| 1.2706430 | 54.1153 | 15.489 | 2629.5 | 10.754 | 2640.3 | 0.00 | 0.9758 |
| 1.2769962 | 54.1256 | 15.405 | 2602.2 | 10.767 | 2613.0 | 0.00 | 0.9709 |
| 1.2833812 | 54.1346 | 15.321 | 2575.2 | 10.779 | 2585.9 | 0.00 | 0.9661 |
| 1.2897981 | 54.1424 | 15.238 | 2548.4 | 10.791 | 2559.2 | 0.00 | 0.9613 |
| 1.2962471 | 54.1490 | 15.155 | 2522.0 | 10.803 | 2532.8 | 0.00 | 0.9565 |
| 1.3027283 | 54.1543 | 15.073 | 2495.8 | 10.814 | 2506.6 | 0.00 | 0.9517 |
| 1.3092420 | 54.1585 | 14.992 | 2470.0 | 10.826 | 2480.8 | 0.00 | 0.9470 |
| 1.3157882 | 54.1616 | 14.910 | 2444.4 | 10.837 | 2455.2 | 0.00 | 0.9423 |
| 1.3223671 | 54.1635 | 14.830 | 2419.1 | 10.848 | 2430.0 | 0.00 | 0.9376 |
| 1.3289790 | 54.1642 | 14.745 | 2393.2 | 10.859 | 2404.1 | 0.00 | 0.9329 |
| 1.3356239 | 54.1633 | 14.659 | 2367.5 | 10.870 | 2378.3 | 0.00 | 0.9283 |
| 1.3423020 | 54.1610 | 14.567 | 2341.0 | 10.881 | 2351.8 | 0.00 | 0.9237 |
| 1.3490135 | 54.1568 | 14.476 | 2314.8 | 10.891 | 2325.6 | 0.00 | 0.9191 |
| 1.3557586 | 54.1508 | 14.386 | 2288.9 | 10.902 | 2299.8 | 0.00 | 0.9145 |
| 1.3625374 | 54.1431 | 14.296 | 2263.3 | 10.912 | 2274.2 | 0.00 | 0.9100 |
| 1.3693500 | 54.1337 | 14.208 | 2238.1 | 10.922 | 2249.0 | 0.00 | 0.9054 |
| 1.3761968 | 54.1225 | 14.120 | 2213.1 | 10.932 | 2224.1 | 0.00 | 0.9009 |
| 1.3830778 | 54.1096 | 14.032 | 2188.5 | 10.941 | 2199.4 | 0.00 | 0.8964 |
| 1.3899932 | 54.0951 | 13.946 | 2164.2 | 10.951 | 2175.1 | 0.00 | 0.8920 |
| 1.3969431 | 54.0789 | 13.858 | 2139.9 | 10.960 | 2150.9 | 0.00 | 0.8875 |
| 1.4039278 | 54.0610 | 13.768 | 2115.4 | 10.969 | 2126.4 | 0.00 | 0.8831 |
| 1.4109475 | 54.0413 | 13.679 | 2091.2 | 10.978 | 2102.2 | 0.00 | 0.8787 |
| 1.4180022 | 54.0197 | 13.590 | 2067.3 | 10.987 | 2078.3 | 0.00 | 0.8744 |
| 1.4250922 | 53.9962 | 13.502 | 2043.7 | 10.996 | 2054.7 | 0.00 | 0.8700 |
| 1.4322177 | 53.9709 | 13.415 | 2020.4 | 11.004 | 2031.4 | 0.00 | 0.8657 |
| 1.4393788 | 53.9438 | 13.328 | 1997.4 | 11.012 | 2008.4 | 0.00 | 0.8614 |
| 1.4465757 | 53.9148 | 13.243 | 1974.7 | 11.020 | 1985.7 | 0.00 | 0.8571 |
| 1.4538086 | 53.8840 | 13.158 | 1952.3 | 11.028 | 1963.3 | 0.00 | 0.8528 |
| 1.4610776 | 53.8514 | 13.074 | 1930.1 | 11.036 | 1941.2 | 0.00 | 0.8486 |
| 1.4683830 | 53.8169 | 12.990 | 1908.3 | 11.044 | 1919.3 | 0.00 | 0.8444 |
| 1.4757249 | 53.7805 | 12.908 | 1886.7 | 11.051 | 1897.8 | 0.00 | 0.8402 |
| 1.4831035 | 53.7423 | 12.826 | 1865.4 | 11.058 | 1876.4 | 0.00 | 0.8360 |
| 1.4905190 | 53.7022 | 12.744 | 1844.3 | 11.065 | 1855.4 | 0.00 | 0.8318 |
| 1.4979716 | 53.6602 | 12.664 | 1823.6 | 11.072 | 1834.6 | 0.00 | 0.8277 |
| 1.5054615 | 53.6163 | 12.584 | 1803.0 | 11.079 | 1814.1 | 0.00 | 0.8236 |
| 1.5129888 | 53.5704 | 12.505 | 1782.8 | 11.085 | 1793.9 | 0.00 | 0.8195 |
| 1.5205537 | 53.5226 | 12.426 | 1762.8 | 11.092 | 1773.9 | 0.00 | 0.8154 |
| 1.5281565 | 53.4728 | 12.348 | 1743.0 | 11.098 | 1754.1 | 0.00 | 0.8113 |
| 1.5357973 | 53.4210 | 12.271 | 1723.5 | 11.104 | 1734.6 | 0.00 | 0.8073 |
| 1.5434763 | 53.3671 | 12.194 | 1704.2 | 11.109 | 1715.3 | 0.00 | 0.8033 |
| 1.5511937 | 53.3112 | 12.119 | 1685.2 | 11.115 | 1696.3 | 0.00 | 0.7993 |
| 1.5589496 | 53.2599 | 12.043 | 1666.4 | 11.121 | 1677.5 | 0.00 | 0.7953 |
| 1.5667444 | 53.1997 | 11.969 | 1647.8 | 11.126 | 1659.0 | 0.00 | 0.7913 |
| 1.5745781 | 53.1373 | 11.895 | 1629.5 | 11.131 | 1640.6 | 0.00 | 0.7874 |
| 1.5824510 | 53.0726 | 11.821 | 1611.4 | 11.136 | 1622.5 | 0.00 | 0.7835 |
| 1.5903633 | 53.0056 | 11.749 | 1593.5 | 11.140 | 1604.7 | 0.00 | 0.7796 |
| 1.5983151 | 52.9363 | 11.677 | 1575.9 | 11.145 | 1587.0 | 0.00 | 0.7757 |
| 1.6063066 | 52.8645 | 11.605 | 1558.4 | 11.149 | 1569.6 | 0.00 | 0.7719 |
| 1.6143382 | 52.7902 | 11.534 | 1541.2 | 11.154 | 1552.3 | 0.00 | 0.7680 |
| 1.6224099 | 52.7134 | 11.464 | 1524.2 | 11.158 | 1535.3 | 0.00 | 0.7642 |
| 1.6305219 | 52.6339 | 11.394 | 1507.4 | 11.161 | 1518.5 | 0.00 | 0.7604 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pt ($Z=78$) | | | | | | | |
| 1.6386745 | 52.5517 | 11.325 | 1490.8 | 11.165 | 1501.9 | 0.00 | 0.7566 |
| 1.6468679 | 52.4667 | 11.256 | 1474.4 | 11.168 | 1485.5 | 0.00 | 0.7528 |
| 1.6551022 | 52.3788 | 11.188 | 1458.2 | 11.172 | 1469.4 | 0.00 | 0.7491 |
| 1.6633777 | 52.2879 | 11.121 | 1442.2 | 11.175 | 1453.4 | 0.00 | 0.7454 |
| 1.6716946 | 52.1939 | 11.054 | 1426.4 | 11.178 | 1437.6 | 0.00 | 0.7417 |
| 1.6800531 | 52.0967 | 10.988 | 1410.8 | 11.181 | 1422.0 | 0.00 | 0.7380 |
| 1.6884534 | 51.9961 | 10.922 | 1395.4 | 11.183 | 1406.5 | 0.00 | 0.7343 |
| 1.6968956 | 51.8921 | 10.857 | 1380.1 | 11.186 | 1391.3 | 0.00 | 0.7307 |
| 1.7053801 | 51.7845 | 10.792 | 1365.1 | 11.188 | 1376.3 | 0.00 | 0.7270 |
| 1.7139070 | 51.6731 | 10.728 | 1350.2 | 11.190 | 1361.4 | 0.00 | 0.7234 |
| 1.7224766 | 51.5578 | 10.665 | 1335.5 | 11.192 | 1346.7 | 0.00 | 0.7198 |
| 1.7310889 | 51.4384 | 10.602 | 1321.0 | 11.193 | 1332.2 | 0.00 | 0.7162 |
| 1.7397444 | 51.3148 | 10.539 | 1306.7 | 11.195 | 1317.9 | 0.00 | 0.7127 |
| 1.7484431 | 51.1867 | 10.477 | 1292.6 | 11.196 | 1303.7 | 0.00 | 0.7091 |
| 1.7571853 | 51.0538 | 10.415 | 1278.6 | 11.197 | 1289.8 | 0.00 | 0.7056 |
| 1.7659712 | 50.9161 | 10.354 | 1264.8 | 11.198 | 1276.0 | 0.00 | 0.7021 |
| 1.7748011 | 50.7731 | 10.294 | 1251.1 | 11.199 | 1262.3 | 0.00 | 0.6986 |
| 1.7836751 | 50.6247 | 10.234 | 1237.6 | 11.200 | 1248.8 | 0.00 | 0.6951 |
| 1.7925935 | 50.4705 | 10.174 | 1224.3 | 11.200 | 1235.5 | 0.00 | 0.6916 |
| 1.8015565 | 50.3102 | 10.115 | 1211.1 | 11.200 | 1222.3 | 0.00 | 0.6882 |
| 1.8105642 | 50.1434 | 10.057 | 1198.1 | 11.200 | 1209.3 | 0.00 | 0.6848 |
| 1.8196171 | 49.9698 | 9.9984 | 1185.3 | 11.200 | 1196.5 | 0.00 | 0.6814 |
| 1.8287151 | 49.7898 | 9.9408 | 1172.6 | 11.200 | 1183.8 | 0.00 | 0.6780 |
| 1.8378587 | 49.6011 | 9.8836 | 1160.0 | 11.200 | 1171.2 | 0.00 | 0.6746 |
| 1.8470480 | 49.4042 | 9.8269 | 1147.6 | 11.199 | 1158.8 | 0.00 | 0.6713 |
| 1.8562833 | 49.1983 | 9.7706 | 1135.4 | 11.198 | 1146.6 | 0.00 | 0.6679 |
| 1.8655647 | 48.9829 | 9.7148 | 1123.3 | 11.197 | 1134.5 | 0.00 | 0.6646 |
| 1.8748925 | 48.7572 | 9.6594 | 1111.3 | 11.196 | 1122.5 | 0.00 | 0.6613 |
| 1.8842670 | 48.5205 | 9.6045 | 1099.5 | 11.195 | 1110.7 | 0.00 | 0.6580 |
| 1.8936883 | 48.2717 | 9.5500 | 1087.8 | 11.193 | 1099.0 | 0.00 | 0.6547 |
| 1.9031567 | 48.0099 | 9.4960 | 1076.3 | 11.191 | 1087.5 | 0.00 | 0.6515 |
| 1.9126725 | 47.7339 | 9.4424 | 1064.9 | 11.190 | 1076.1 | 0.00 | 0.6482 |
| 1.9222359 | 47.4424 | 9.3891 | 1053.6 | 11.187 | 1064.8 | 0.00 | 0.6450 |
| 1.9318471 | 47.1337 | 9.3363 | 1042.5 | 11.185 | 1053.7 | 0.00 | 0.6418 |
| 1.9415063 | 46.8061 | 9.2839 | 1031.5 | 11.183 | 1042.7 | 0.00 | 0.6386 |
| 1.9512138 | 46.4575 | 9.2319 | 1020.6 | 11.180 | 1031.8 | 0.00 | 0.6354 |
| 1.9609699 | 46.0855 | 9.1803 | 1009.8 | 11.178 | 1021.0 | 0.00 | 0.6323 |
| 1.9707747 | 45.6870 | 9.1291 | 999.21 | 11.175 | 1010.4 | 0.00 | 0.6291 |
| 1.9806286 | 45.2586 | 9.0783 | 988.71 | 11.172 | 999.88 | 0.00 | 0.6260 |
| 1.9905318 | 44.7960 | 9.0279 | 978.33 | 11.168 | 989.50 | 0.00 | 0.6229 |
| 2.0004844 | 44.2939 | 8.9779 | 968.07 | 11.165 | 979.24 | 0.00 | 0.6198 |
| 2.0104868 | 43.7457 | 8.9283 | 957.94 | 11.161 | 969.10 | 0.00 | 0.6167 |
| 2.0205393 | 43.1428 | 8.8791 | 947.92 | 11.157 | 959.07 | 0.00 | 0.6136 |
| 2.0306420 | 42.4742 | 8.8303 | 938.01 | 11.153 | 949.17 | 0.00 | 0.6106 |
| 2.0407952 | 41.7247 | 8.7819 | 928.23 | 11.149 | 939.38 | 0.00 | 0.6075 |
| 2.0509992 | 40.8734 | 8.7338 | 918.55 | 11.145 | 929.70 | 0.00 | 0.6045 |
| 2.0612542 | 39.8895 | 8.6861 | 908.99 | 11.141 | 920.13 | 0.00 | 0.6015 |
| 2.0715604 | 38.7253 | 8.6388 | 899.54 | 11.136 | 910.68 | 0.00 | 0.5985 |
| 2.0819182 | 37.2998 | 8.5908 | 890.09 | 11.131 | 901.22 | 0.00 | 0.5955 |
| 2.0923278 | 35.4583 | 8.5423 | 880.66 | 11.126 | 891.79 | 0.00 | 0.5926 |
| 2.1027895 | 32.8376 | 8.4942 | 871.35 | 11.121 | 882.47 | 0.00 | 0.5896 |
| 2.1133034 | 28.1254 | 8.4464 | 862.14 | 11.116 | 873.25 | 0.00 | 0.5867 |
| 2.1210653 | 12.8681 | 8.4116 | 855.44 | 11.112 | 866.55 | 0.00 | 0.5845 |
| 2.1221346 | 12.5624 | 25.721 | 2614.5 | 11.111 | 2625.6 | 0.00 | 0.5842 |
| 2.1238699 | 20.5054 | 25.691 | 2609.3 | 11.110 | 2620.4 | 0.00 | 0.5838 |
| 2.1344893 | 29.7864 | 25.509 | 2577.9 | 11.104 | 2589.0 | 0.00 | 0.5809 |
| 2.1451617 | 32.6834 | 25.328 | 2546.9 | 11.099 | 2558.0 | 0.00 | 0.5780 |
| 2.1558875 | 34.1696 | 25.148 | 2516.2 | 11.093 | 2527.3 | 0.00 | 0.5751 |
| 2.1666670 | 34.8770 | 24.970 | 2486.0 | 11.086 | 2497.1 | 0.00 | 0.5722 |
| 2.1775003 | 34.8926 | 24.793 | 2456.1 | 11.080 | 2467.2 | 0.00 | 0.5694 |
| 2.1883878 | 33.8880 | 24.618 | 2426.6 | 11.073 | 2437.7 | 0.00 | 0.5666 |
| 2.1993297 | 28.8564 | 24.444 | 2397.4 | 11.067 | 2408.5 | 0.00 | 0.5637 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pt ($Z=78$) | | | | | | | |
| 2.2011954 | 24.3030 | 24.415 | 2392.5 | 11.066 | 2403.6 | 0.00 | 0.5633 |
| 2.2026046 | 24.2383 | 35.850 | 3510.9 | 11.065 | 3522.0 | 0.00 | 0.5629 |
| 2.2103264 | 33.9315 | 35.668 | 3480.9 | 11.060 | 3491.9 | 0.00 | 0.5609 |
| 2.2213780 | 37.7893 | 35.410 | 3438.5 | 11.053 | 3449.5 | 0.00 | 0.5581 |
| 2.2324849 | 40.1466 | 35.154 | 3396.7 | 11.046 | 3407.7 | 0.00 | 0.5554 |
| 2.2436473 | 41.9226 | 34.900 | 3355.3 | 11.038 | 3366.4 | 0.00 | 0.5526 |
| 2.2548656 | 43.3738 | 34.648 | 3314.5 | 11.031 | 3325.6 | 0.00 | 0.5499 |
| 2.2661399 | 44.6117 | 34.398 | 3274.2 | 11.023 | 3285.3 | 0.00 | 0.5471 |
| 2.2774706 | 45.6958 | 34.149 | 3234.4 | 11.015 | 3245.4 | 0.00 | 0.5444 |
| 2.2888579 | 46.6622 | 33.903 | 3195.1 | 11.007 | 3206.1 | 0.00 | 0.5417 |
| 2.3003022 | 47.5347 | 33.659 | 3156.3 | 10.999 | 3167.3 | 0.00 | 0.5390 |
| 2.3118037 | 48.3299 | 33.416 | 3118.0 | 10.991 | 3129.0 | 0.00 | 0.5363 |
| 2.3233628 | 49.0598 | 33.176 | 3080.1 | 10.982 | 3091.1 | 0.00 | 0.5336 |
| 2.3349796 | 49.7337 | 32.937 | 3042.7 | 10.974 | 3053.7 | 0.00 | 0.5310 |
| 2.3466545 | 50.3585 | 32.700 | 3005.8 | 10.965 | 3016.8 | 0.00 | 0.5283 |
| 2.3583878 | 50.9399 | 32.465 | 2969.4 | 10.956 | 2980.3 | 0.00 | 0.5257 |
| 2.3701797 | 51.4823 | 32.231 | 2933.3 | 10.947 | 2944.3 | 0.00 | 0.5231 |
| 2.3820306 | 51.9894 | 32.000 | 2897.8 | 10.938 | 2908.7 | 0.00 | 0.5205 |
| 2.3939407 | 52.4641 | 31.770 | 2862.7 | 10.928 | 2873.6 | 0.00 | 0.5179 |
| 2.4059104 | 52.9089 | 31.542 | 2828.0 | 10.919 | 2838.9 | 0.00 | 0.5153 |
| 2.4179400 | 53.3257 | 31.316 | 2793.7 | 10.909 | 2804.6 | 0.00 | 0.5128 |
| 2.4300297 | 53.7160 | 31.091 | 2759.9 | 10.899 | 2770.8 | 0.00 | 0.5102 |
| 2.4421798 | 54.0812 | 30.868 | 2726.4 | 10.889 | 2737.3 | 0.00 | 0.5077 |
| 2.4543907 | 54.4221 | 30.646 | 2693.3 | 10.879 | 2704.2 | 0.00 | 0.5052 |
| 2.4666627 | 54.7392 | 30.425 | 2660.7 | 10.868 | 2671.5 | 0.00 | 0.5026 |
| 2.4789960 | 55.0328 | 30.206 | 2628.4 | 10.858 | 2639.2 | 0.00 | 0.5001 |
| 2.4913910 | 55.3029 | 29.989 | 2596.5 | 10.847 | 2607.4 | 0.00 | 0.4977 |
| 2.5038479 | 55.5489 | 29.774 | 2565.0 | 10.836 | 2575.9 | 0.00 | 0.4952 |
| 2.5163672 | 55.7698 | 29.560 | 2533.9 | 10.825 | 2544.8 | 0.00 | 0.4927 |
| 2.5289490 | 55.9639 | 29.348 | 2503.2 | 10.814 | 2514.1 | 0.00 | 0.4903 |
| 2.5415938 | 56.1284 | 29.137 | 2472.9 | 10.803 | 2483.7 | 0.00 | 0.4878 |
| 2.5543017 | 56.2593 | 28.928 | 2443.0 | 10.791 | 2453.8 | 0.00 | 0.4854 |
| 2.5670732 | 56.3501 | 28.721 | 2413.4 | 10.780 | 2424.2 | 0.00 | 0.4830 |
| 2.5799086 | 56.3905 | 28.515 | 2384.2 | 10.768 | 2395.0 | 0.00 | 0.4806 |
| 2.5928082 | 56.3628 | 28.311 | 2355.3 | 10.756 | 2366.1 | 0.00 | 0.4782 |
| 2.6057722 | 56.2333 | 28.108 | 2326.8 | 10.744 | 2337.6 | 0.00 | 0.4758 |
| 2.6188011 | 55.9261 | 27.907 | 2298.7 | 10.732 | 2309.4 | 0.00 | 0.4734 |
| 2.6318951 | 55.2002 | 27.708 | 2270.9 | 10.719 | 2281.6 | 0.00 | 0.4711 |
| 2.6429266 | 52.9149 | 27.541 | 2247.9 | 10.709 | 2258.6 | 0.00 | 0.4691 |
| 2.6450545 | 50.0359 | 27.510 | 2243.5 | 10.707 | 2254.2 | 0.00 | 0.4687 |
| 2.6478735 | 52.9484 | 32.133 | 2617.7 | 10.704 | 2628.4 | 0.00 | 0.4682 |
| 2.6582798 | 55.6183 | 31.952 | 2592.8 | 10.694 | 2603.5 | 0.00 | 0.4664 |
| 2.6715712 | 56.9294 | 31.724 | 2561.4 | 10.681 | 2572.1 | 0.00 | 0.4641 |
| 2.6849291 | 57.7856 | 31.497 | 2530.5 | 10.669 | 2541.2 | 0.00 | 0.4618 |
| 2.6983537 | 58.4520 | 31.272 | 2499.9 | 10.656 | 2510.6 | 0.00 | 0.4595 |
| 2.7118455 | 59.0107 | 31.049 | 2469.7 | 10.642 | 2480.4 | 0.00 | 0.4572 |
| 2.7254047 | 59.4983 | 30.827 | 2439.9 | 10.629 | 2450.5 | 0.00 | 0.4549 |
| 2.7390317 | 59.9343 | 30.607 | 2410.4 | 10.615 | 2421.0 | 0.00 | 0.4527 |
| 2.7527269 | 60.3302 | 30.389 | 2381.3 | 10.602 | 2391.9 | 0.00 | 0.4504 |
| 2.7664905 | 60.6921 | 30.167 | 2352.2 | 10.588 | 2362.8 | 0.00 | 0.4482 |
| 2.7803230 | 61.0216 | 29.949 | 2323.5 | 10.574 | 2334.1 | 0.00 | 0.4459 |
| 2.7942246 | 61.3290 | 29.741 | 2296.0 | 10.560 | 2306.5 | 0.00 | 0.4437 |
| 2.8081957 | 61.6185 | 29.537 | 2268.8 | 10.546 | 2279.4 | 0.00 | 0.4415 |
| 2.8222367 | 61.8915 | 29.334 | 2242.1 | 10.532 | 2252.6 | 0.00 | 0.4393 |
| 2.8363479 | 62.1491 | 29.134 | 2215.7 | 10.517 | 2226.2 | 0.00 | 0.4371 |
| 2.8505296 | 62.3923 | 28.936 | 2189.7 | 10.503 | 2200.2 | 0.00 | 0.4350 |
| 2.8647823 | 62.6218 | 28.740 | 2164.0 | 10.488 | 2174.5 | 0.00 | 0.4328 |
| 2.8791062 | 62.8365 | 28.541 | 2138.3 | 10.473 | 2148.8 | 0.00 | 0.4306 |
| 2.8935017 | 63.0361 | 28.344 | 2113.0 | 10.458 | 2123.5 | 0.00 | 0.4285 |
| 2.9079692 | 63.2201 | 28.148 | 2088.0 | 10.443 | 2098.4 | 0.00 | 0.4264 |
| 2.9225091 | 63.3874 | 27.954 | 2063.3 | 10.428 | 2073.7 | 0.00 | 0.4242 |
| 2.9371216 | 63.5359 | 27.761 | 2038.9 | 10.412 | 2049.3 | 0.00 | 0.4221 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pt ($Z=78$) | | | | | | | |
| 2.9518072 | 63.6620 | 27.571 | 2014.8 | 10.397 | 2025.2 | 0.00 | 0.4200 |
| 2.9665662 | 63.7592 | 27.381 | 1991.0 | 10.381 | 2001.4 | 0.00 | 0.4179 |
| 2.9813991 | 63.8150 | 27.193 | 1967.5 | 10.365 | 1977.8 | 0.00 | 0.4159 |
| 2.9963061 | 63.8003 | 27.007 | 1944.3 | 10.349 | 1954.6 | 0.00 | 0.4138 |
| 3.0112876 | 63.6373 | 26.803 | 1920.0 | 10.333 | 1930.3 | 0.00 | 0.4117 |
| 3.0221418 | 63.0881 | 26.653 | 1902.3 | 10.322 | 1912.7 | 0.00 | 0.4103 |
| 3.0263440 | 61.2660 | 26.595 | 1895.6 | 10.317 | 1905.9 | 0.00 | 0.4097 |
| 3.0308581 | 63.1851 | 28.305 | 2014.5 | 10.312 | 2024.8 | 0.00 | 0.4091 |
| 3.0414758 | 64.0249 | 28.149 | 1996.4 | 10.301 | 2006.7 | 0.00 | 0.4076 |
| 3.0566831 | 64.6111 | 27.929 | 1970.9 | 10.284 | 1981.2 | 0.00 | 0.4056 |
| 3.0719666 | 65.0211 | 27.711 | 1945.8 | 10.268 | 1956.1 | 0.00 | 0.4036 |
| 3.0873264 | 65.3540 | 27.494 | 1921.0 | 10.251 | 1931.2 | 0.00 | 0.4016 |
| 3.1027630 | 65.6406 | 27.279 | 1896.4 | 10.234 | 1906.7 | 0.00 | 0.3996 |
| 3.1182768 | 65.8946 | 27.065 | 1872.2 | 10.218 | 1882.4 | 0.00 | 0.3976 |
| 3.1338682 | 66.1231 | 26.853 | 1848.3 | 10.201 | 1858.5 | 0.00 | 0.3956 |
| 3.1495376 | 66.3300 | 26.642 | 1824.7 | 10.183 | 1834.9 | 0.00 | 0.3937 |
| 3.1652853 | 66.5170 | 26.433 | 1801.4 | 10.166 | 1811.5 | 0.00 | 0.3917 |
| 3.1811117 | 66.6847 | 26.228 | 1778.5 | 10.149 | 1788.7 | 0.00 | 0.3898 |
| 3.1970172 | 66.8356 | 26.029 | 1756.2 | 10.131 | 1766.3 | 0.00 | 0.3878 |
| 3.2130023 | 66.9692 | 25.831 | 1734.2 | 10.114 | 1744.3 | 0.00 | 0.3859 |
| 3.2290673 | 67.0817 | 25.636 | 1712.5 | 10.096 | 1722.6 | 0.00 | 0.3840 |
| 3.2452127 | 67.1661 | 25.442 | 1691.1 | 10.078 | 1701.2 | 0.00 | 0.3821 |
| 3.2614387 | 67.2060 | 25.250 | 1670.0 | 10.060 | 1680.1 | 0.00 | 0.3802 |
| 3.2777459 | 67.1514 | 25.060 | 1649.2 | 10.042 | 1659.2 | 0.00 | 0.3783 |
| 3.2891773 | 66.9216 | 24.928 | 1634.8 | 10.029 | 1644.8 | 0.00 | 0.3769 |
| 3.2941347 | 66.5163 | 24.871 | 1628.6 | 10.024 | 1638.7 | 0.00 | 0.3764 |
| 3.3028227 | 67.0492 | 25.873 | 1689.8 | 10.014 | 1699.8 | 0.00 | 0.3754 |
| 3.3106053 | 67.3904 | 25.784 | 1680.0 | 10.006 | 1690.0 | 0.00 | 0.3745 |
| 3.3271584 | 67.8095 | 25.597 | 1659.5 | 9.9872 | 1669.5 | 0.00 | 0.3726 |
| 3.3437941 | 68.1080 | 25.411 | 1639.3 | 9.9687 | 1649.2 | 0.00 | 0.3708 |
| 3.3605131 | 68.3571 | 25.227 | 1619.3 | 9.9500 | 1629.3 | 0.00 | 0.3689 |
| 3.3773157 | 68.5780 | 25.045 | 1599.6 | 9.9313 | 1609.6 | 0.00 | 0.3671 |
| 3.3942023 | 68.7799 | 24.865 | 1580.2 | 9.9125 | 1590.1 | 0.00 | 0.3653 |
| 3.4111733 | 68.9679 | 24.686 | 1561.0 | 9.8935 | 1570.9 | 0.00 | 0.3635 |
| 3.4282291 | 69.1449 | 24.509 | 1542.1 | 9.8745 | 1552.0 | 0.00 | 0.3617 |
| 3.4453703 | 69.3130 | 24.332 | 1523.4 | 9.8553 | 1533.2 | 0.00 | 0.3599 |
| 3.4625971 | 69.4729 | 24.155 | 1504.8 | 9.8361 | 1514.6 | 0.00 | 0.3581 |
| 3.4799101 | 69.6255 | 23.981 | 1486.5 | 9.8167 | 1496.3 | 0.00 | 0.3563 |
| 3.4973097 | 69.7719 | 23.807 | 1468.4 | 9.7973 | 1478.2 | 0.00 | 0.3545 |
| 3.5147962 | 69.9126 | 23.636 | 1450.6 | 9.7777 | 1460.3 | 0.00 | 0.3527 |
| 3.5323702 | 70.0482 | 23.466 | 1433.0 | 9.7580 | 1442.7 | 0.00 | 0.3510 |
| 3.5500321 | 70.1792 | 23.297 | 1415.6 | 9.7383 | 1425.3 | 0.00 | 0.3492 |
| 3.5677822 | 70.3058 | 23.130 | 1398.5 | 9.7184 | 1408.2 | 0.00 | 0.3475 |
| 3.5856211 | 70.4284 | 22.965 | 1381.5 | 9.6984 | 1391.2 | 0.00 | 0.3458 |
| 3.6035492 | 70.5473 | 22.801 | 1364.9 | 9.6784 | 1374.5 | 0.00 | 0.3441 |
| 3.6215670 | 70.6627 | 22.638 | 1348.4 | 9.6582 | 1358.0 | 0.00 | 0.3423 |
| 3.6396748 | 70.7749 | 22.477 | 1332.1 | 9.6380 | 1341.8 | 0.00 | 0.3406 |
| 3.6578732 | 70.8839 | 22.318 | 1316.1 | 9.6176 | 1325.7 | 0.00 | 0.3390 |
| 3.6761626 | 70.9900 | 22.159 | 1300.3 | 9.5972 | 1309.8 | 0.00 | 0.3373 |
| 3.6945434 | 71.0934 | 22.002 | 1284.6 | 9.5767 | 1294.2 | 0.00 | 0.3356 |
| 3.7130161 | 71.1941 | 21.847 | 1269.2 | 9.5561 | 1278.8 | 0.00 | 0.3339 |
| 3.7315812 | 71.2923 | 21.693 | 1254.0 | 9.5354 | 1263.5 | 0.00 | 0.3323 |
| 3.7502391 | 71.3882 | 21.540 | 1238.9 | 9.5146 | 1248.4 | 0.00 | 0.3306 |
| 3.7689903 | 71.4818 | 21.388 | 1224.1 | 9.4937 | 1233.6 | 0.00 | 0.3290 |
| 3.7878352 | 71.5732 | 21.238 | 1209.4 | 9.4727 | 1218.9 | 0.00 | 0.3273 |
| 3.8067744 | 71.6626 | 21.089 | 1195.0 | 9.4517 | 1204.4 | 0.00 | 0.3257 |
| 3.8258083 | 71.7501 | 20.941 | 1180.7 | 9.4305 | 1190.1 | 0.00 | 0.3241 |
| 3.8449373 | 71.8357 | 20.795 | 1166.6 | 9.4093 | 1176.0 | 0.00 | 0.3225 |
| 3.8641620 | 71.9197 | 20.649 | 1152.7 | 9.3880 | 1162.1 | 0.00 | 0.3209 |
| 3.8834828 | 72.0020 | 20.505 | 1139.0 | 9.3666 | 1148.3 | 0.00 | 0.3193 |
| 3.9029002 | 72.0829 | 20.362 | 1125.4 | 9.3451 | 1134.7 | 0.00 | 0.3177 |
| 3.9224147 | 72.1624 | 20.221 | 1112.0 | 9.3235 | 1121.3 | 0.00 | 0.3161 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pt ($Z=78$) | | | | | | | |
| 3.9420268 | 72.2406 | 20.079 | 1098.7 | 9.3019 | 1108.0 | 0.00 | 0.3145 |
| 3.9617369 | 72.3169 | 19.936 | 1085.5 | 9.2802 | 1094.8 | 0.00 | 0.3130 |
| 3.9815456 | 72.3912 | 19.795 | 1072.4 | 9.2584 | 1081.7 | 0.00 | 0.3114 |
| 4.0014533 | 72.4637 | 19.655 | 1059.5 | 9.2365 | 1068.8 | 0.00 | 0.3098 |
| 4.0214606 | 72.5346 | 19.516 | 1046.8 | 9.2145 | 1056.0 | 0.00 | 0.3083 |
| 4.0415679 | 72.6038 | 19.378 | 1034.2 | 9.1925 | 1043.4 | 0.00 | 0.3068 |
| 4.0617757 | 72.6716 | 19.241 | 1021.8 | 9.1704 | 1031.0 | 0.00 | 0.3052 |
| 4.0820846 | 72.7379 | 19.105 | 1009.6 | 9.1482 | 1018.7 | 0.00 | 0.3037 |
| 4.1024950 | 72.8028 | 18.970 | 997.45 | 9.1260 | 1006.6 | 0.00 | 0.3022 |
| 4.1230075 | 72.8664 | 18.836 | 985.49 | 9.1036 | 994.59 | 0.00 | 0.3007 |
| 4.1436226 | 72.9288 | 18.704 | 973.67 | 9.0812 | 982.75 | 0.00 | 0.2992 |
| 4.1643407 | 72.9901 | 18.572 | 962.01 | 9.0588 | 971.07 | 0.00 | 0.2977 |
| 4.1851624 | 73.0502 | 18.441 | 950.49 | 9.0362 | 959.52 | 0.00 | 0.2962 |
| 4.2060882 | 73.1093 | 18.312 | 939.11 | 9.0136 | 948.12 | 0.00 | 0.2948 |
| 4.2271186 | 73.1674 | 18.183 | 927.87 | 8.9909 | 936.86 | 0.00 | 0.2933 |
| 4.2482542 | 73.4221 | 18.053 | 916.67 | 8.9682 | 925.64 | 0.00 | 0.2918 |
| 4.2694955 | 73.4787 | 17.919 | 905.30 | 8.9454 | 914.24 | 0.00 | 0.2904 |
| 4.2908430 | 73.5336 | 17.785 | 894.06 | 8.9225 | 902.99 | 0.00 | 0.2890 |
| 4.3122972 | 73.5866 | 17.651 | 882.95 | 8.8996 | 891.85 | 0.00 | 0.2875 |
| 4.3338587 | 73.6378 | 17.519 | 871.98 | 8.8766 | 880.85 | 0.00 | 0.2861 |
| 4.3555280 | 73.6875 | 17.388 | 861.15 | 8.8535 | 870.00 | 0.00 | 0.2847 |
| 4.3773056 | 73.7357 | 17.258 | 850.46 | 8.8304 | 859.29 | 0.00 | 0.2832 |
| 4.3991921 | 73.7825 | 17.129 | 839.91 | 8.8072 | 848.72 | 0.00 | 0.2818 |
| 4.4211881 | 73.9631 | 16.997 | 829.30 | 8.7840 | 838.08 | 0.00 | 0.2804 |
| 4.4432940 | 74.0071 | 16.866 | 818.78 | 8.7607 | 827.54 | 0.00 | 0.2790 |
| 4.4655105 | 74.0492 | 16.735 | 808.39 | 8.7373 | 817.13 | 0.00 | 0.2776 |
| 4.4878381 | 74.0897 | 16.606 | 798.15 | 8.7139 | 806.86 | 0.00 | 0.2763 |
| 4.5102772 | 74.1286 | 16.477 | 788.04 | 8.6904 | 796.73 | 0.00 | 0.2749 |
| 4.5328286 | 74.1660 | 16.350 | 778.07 | 8.6669 | 786.74 | 0.00 | 0.2735 |
| 4.5554928 | 74.2019 | 16.224 | 768.23 | 8.6433 | 776.88 | 0.00 | 0.2722 |
| 4.5782702 | 74.2364 | 16.099 | 758.52 | 8.6197 | 767.14 | 0.00 | 0.2708 |
| 4.6011616 | 74.2697 | 15.975 | 748.95 | 8.5960 | 757.54 | 0.00 | 0.2695 |
| 4.6241674 | 74.3016 | 15.853 | 739.50 | 8.5722 | 748.07 | 0.00 | 0.2681 |
| 4.6472882 | 74.3324 | 15.731 | 730.17 | 8.5485 | 738.72 | 0.00 | 0.2668 |
| 4.6705247 | 74.3620 | 15.610 | 720.97 | 8.5246 | 729.49 | 0.00 | 0.2655 |
| 4.6938773 | 74.3904 | 15.491 | 711.89 | 8.5007 | 720.39 | 0.00 | 0.2641 |
| 4.7173467 | 74.4178 | 15.373 | 702.93 | 8.4768 | 711.41 | 0.00 | 0.2628 |
| 4.7409334 | 74.4441 | 15.255 | 694.10 | 8.4528 | 702.55 | 0.00 | 0.2615 |
| 4.7646381 | 74.4694 | 15.139 | 685.38 | 8.4288 | 693.80 | 0.00 | 0.2602 |
| 4.7884613 | 74.4938 | 15.023 | 676.77 | 8.4047 | 685.17 | 0.00 | 0.2589 |
| 4.8124036 | 74.5172 | 14.909 | 668.28 | 8.3806 | 676.66 | 0.00 | 0.2576 |
| 4.8364656 | 74.5397 | 14.796 | 659.90 | 8.3564 | 668.26 | 0.00 | 0.2564 |
| 4.8606479 | 74.5613 | 14.684 | 651.63 | 8.3322 | 659.97 | 0.00 | 0.2551 |
| 4.8849512 | 74.5821 | 14.572 | 643.48 | 8.3079 | 651.78 | 0.00 | 0.2538 |
| 4.9093759 | 74.6020 | 14.462 | 635.43 | 8.2837 | 643.71 | 0.00 | 0.2525 |
| 4.9339228 | 74.6212 | 14.353 | 627.49 | 8.2593 | 635.74 | 0.00 | 0.2513 |
| 4.9585924 | 74.6396 | 14.244 | 619.65 | 8.2349 | 627.88 | 0.00 | 0.2500 |
| 4.9833854 | 74.6572 | 14.137 | 611.92 | 8.2105 | 620.13 | 0.00 | 0.2488 |
| 5.0083023 | 74.6741 | 14.030 | 604.28 | 8.1861 | 612.47 | 0.00 | 0.2476 |
| 5.0333438 | 74.6904 | 13.925 | 596.75 | 8.1616 | 604.92 | 0.00 | 0.2463 |
| 5.0585105 | 74.7059 | 13.820 | 589.32 | 8.1371 | 597.46 | 0.00 | 0.2451 |
| 5.0838031 | 74.7208 | 13.716 | 581.99 | 8.1125 | 590.10 | 0.00 | 0.2439 |
| 5.1092221 | 74.7351 | 13.614 | 574.76 | 8.0880 | 582.84 | 0.00 | 0.2427 |
| 5.1347682 | 74.7488 | 13.512 | 567.62 | 8.0633 | 575.68 | 0.00 | 0.2415 |
| 5.1604421 | 74.7619 | 13.411 | 560.57 | 8.0387 | 568.61 | 0.00 | 0.2403 |
| 5.1862443 | 74.7745 | 13.311 | 553.62 | 8.0140 | 561.63 | 0.00 | 0.2391 |
| 5.2121755 | 74.7865 | 13.211 | 546.76 | 7.9893 | 554.75 | 0.00 | 0.2379 |
| 5.2382364 | 74.7981 | 13.113 | 539.99 | 7.9645 | 547.96 | 0.00 | 0.2367 |
| 5.2644276 | 74.8091 | 13.016 | 533.31 | 7.9398 | 541.25 | 0.00 | 0.2355 |
| 5.2907497 | 74.8198 | 12.919 | 526.72 | 7.9150 | 534.63 | 0.00 | 0.2343 |
| 5.3172034 | 74.9308 | 12.819 | 520.05 | 7.8901 | 527.94 | 0.00 | 0.2332 |
| 5.3437895 | 74.9408 | 12.720 | 513.47 | 7.8653 | 521.34 | 0.00 | 0.2320 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pt ($Z=78$) | | | | | | | |
| 5.3705084 | 74.9499 | 12.622 | 506.98 | 7.8404 | 514.82 | 0.00 | 0.2309 |
| 5.3973609 | 74.9583 | 12.525 | 500.58 | 7.8155 | 508.40 | 0.00 | 0.2297 |
| 5.4243477 | 74.9659 | 12.429 | 494.26 | 7.7905 | 502.05 | 0.00 | 0.2286 |
| 5.4514695 | 74.9728 | 12.334 | 488.03 | 7.7656 | 495.79 | 0.00 | 0.2274 |
| 5.4787268 | 74.9790 | 12.239 | 481.88 | 7.7406 | 489.62 | 0.00 | 0.2263 |
| 5.5061205 | 74.9845 | 12.145 | 475.81 | 7.7156 | 483.53 | 0.00 | 0.2252 |
| 5.5336511 | 74.9894 | 12.053 | 469.82 | 7.6906 | 477.51 | 0.00 | 0.2241 |
| 5.5613193 | 74.9937 | 11.960 | 463.91 | 7.6656 | 471.58 | 0.00 | 0.2229 |
| 5.5891259 | 74.9974 | 11.869 | 458.08 | 7.6405 | 465.73 | 0.00 | 0.2218 |
| 5.6170716 | 75.0005 | 11.779 | 452.33 | 7.6154 | 459.95 | 0.00 | 0.2207 |
| 5.6451569 | 75.0031 | 11.689 | 446.66 | 7.5903 | 454.25 | 0.00 | 0.2196 |
| 5.6733827 | 75.0052 | 11.600 | 441.06 | 7.5652 | 448.62 | 0.00 | 0.2185 |
| 5.7017496 | 75.0067 | 11.512 | 435.53 | 7.5401 | 443.07 | 0.00 | 0.2174 |
| 5.7302584 | 75.0078 | 11.425 | 430.08 | 7.5150 | 437.60 | 0.00 | 0.2164 |
| 5.7589096 | 75.0084 | 11.339 | 424.70 | 7.4898 | 432.19 | 0.00 | 0.2153 |
| 5.7877042 | 75.0085 | 11.253 | 419.39 | 7.4646 | 426.86 | 0.00 | 0.2142 |
| 5.8166427 | 75.0082 | 11.168 | 414.16 | 7.4395 | 421.60 | 0.00 | 0.2132 |
| 5.8457259 | 75.0075 | 11.084 | 408.99 | 7.4143 | 416.40 | 0.00 | 0.2121 |
| 5.8749546 | 75.0063 | 11.000 | 403.89 | 7.3891 | 411.28 | 0.00 | 0.2110 |
| 5.9043293 | 75.0048 | 10.917 | 398.83 | 7.3639 | 406.20 | 0.00 | 0.2100 |
| 5.9338510 | 75.0028 | 10.834 | 393.84 | 7.3386 | 401.17 | 0.00 | 0.2089 |
| 5.9635202 | 75.0005 | 10.752 | 388.91 | 7.3134 | 396.22 | 0.00 | 0.2079 |
| 5.9933378 | 74.9977 | 10.670 | 384.04 | 7.2882 | 391.33 | 0.00 | 0.2069 |
| 6.0233045 | 74.9946 | 10.590 | 379.24 | 7.2629 | 386.50 | 0.00 | 0.2058 |
| 6.0534210 | 75.0335 | 10.510 | 374.51 | 7.2377 | 381.74 | 0.00 | 0.2048 |
| 6.0836882 | 75.0299 | 10.429 | 369.78 | 7.2124 | 376.99 | 0.00 | 0.2038 |
| 6.1141066 | 75.0259 | 10.349 | 365.12 | 7.1871 | 372.31 | 0.00 | 0.2028 |
| 6.1446771 | 75.0213 | 10.270 | 360.52 | 7.1619 | 367.68 | 0.00 | 0.2018 |
| 6.1754005 | 75.0163 | 10.191 | 355.98 | 7.1366 | 363.12 | 0.00 | 0.2008 |
| 6.2062775 | 75.0108 | 10.113 | 351.51 | 7.1113 | 358.62 | 0.00 | 0.1998 |
| 6.2373089 | 75.0049 | 10.036 | 347.07 | 7.0861 | 354.16 | 0.00 | 0.1988 |
| 6.2684954 | 74.9985 | 9.9587 | 342.69 | 7.0608 | 349.75 | 0.00 | 0.1978 |
| 6.2998379 | 74.9918 | 9.8823 | 338.37 | 7.0355 | 345.41 | 0.00 | 0.1968 |
| 6.3313371 | 74.9845 | 9.8066 | 334.11 | 7.0102 | 341.12 | 0.00 | 0.1958 |
| 6.3629938 | 74.9769 | 9.7316 | 329.91 | 6.9850 | 336.89 | 0.00 | 0.1949 |
| 6.3948088 | 74.9689 | 9.6573 | 325.76 | 6.9597 | 332.72 | 0.00 | 0.1939 |
| 6.4267828 | 74.9605 | 9.5836 | 321.66 | 6.9344 | 328.60 | 0.00 | 0.1929 |
| 6.4589167 | 74.9517 | 9.5105 | 317.62 | 6.9091 | 324.53 | 0.00 | 0.1920 |
| 6.4912113 | 74.9426 | 9.4381 | 313.64 | 6.8839 | 320.52 | 0.00 | 0.1910 |
| 6.5236674 | 74.9330 | 9.3664 | 309.70 | 6.8586 | 316.56 | 0.00 | 0.1901 |
| 6.5562857 | 74.9232 | 9.2952 | 305.82 | 6.8334 | 312.66 | 0.00 | 0.1891 |
| 6.5890671 | 74.9130 | 9.2247 | 301.99 | 6.8081 | 308.80 | 0.00 | 0.1882 |
| 6.6220125 | 74.9187 | 9.1543 | 298.20 | 6.7829 | 304.98 | 0.00 | 0.1872 |
| 6.6551225 | 74.9079 | 9.0845 | 294.45 | 6.7576 | 301.21 | 0.00 | 0.1863 |
| 6.6883981 | 74.8967 | 9.0153 | 290.75 | 6.7324 | 297.48 | 0.00 | 0.1854 |
| 6.7218401 | 74.8852 | 8.9467 | 287.10 | 6.7072 | 293.81 | 0.00 | 0.1844 |
| 6.7554493 | 74.8733 | 8.8786 | 283.50 | 6.6820 | 290.19 | 0.00 | 0.1835 |
| 6.7892266 | 74.8610 | 8.8112 | 279.95 | 6.6568 | 286.61 | 0.00 | 0.1826 |
| 6.8231727 | 74.8484 | 8.7444 | 276.45 | 6.6316 | 283.08 | 0.00 | 0.1817 |
| 6.8572886 | 74.8355 | 8.6782 | 272.99 | 6.6064 | 279.59 | 0.00 | 0.1808 |
| 6.8915750 | 74.8222 | 8.6125 | 269.57 | 6.5813 | 276.15 | 0.00 | 0.1799 |
| 6.9260329 | 74.8085 | 8.5474 | 266.20 | 6.5561 | 272.76 | 0.00 | 0.1790 |
| 6.9606631 | 74.7946 | 8.4829 | 262.88 | 6.5310 | 269.41 | 0.00 | 0.1781 |
| 6.9954664 | 74.7803 | 8.4189 | 259.60 | 6.5059 | 266.11 | 0.00 | 0.1772 |
| 7.0304437 | 74.7657 | 8.3555 | 256.36 | 6.4808 | 262.84 | 0.00 | 0.1764 |
| 7.0655959 | 74.7507 | 8.2926 | 253.17 | 6.4557 | 259.62 | 0.00 | 0.1755 |
| 7.1009239 | 74.7355 | 8.2303 | 250.02 | 6.4306 | 256.45 | 0.00 | 0.1746 |
| 7.1364285 | 74.7199 | 8.1686 | 246.91 | 6.4056 | 253.31 | 0.00 | 0.1737 |
| 7.1721107 | 74.7041 | 8.1073 | 243.84 | 6.3805 | 250.22 | 0.00 | 0.1729 |
| 7.2079712 | 74.6879 | 8.0466 | 240.81 | 6.3555 | 247.16 | 0.00 | 0.1720 |
| 7.2440111 | 74.6714 | 7.9864 | 237.82 | 6.3305 | 244.15 | 0.00 | 0.1712 |
| 7.2802311 | 74.6546 | 7.9268 | 234.87 | 6.3055 | 241.17 | 0.00 | 0.1703 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pt ($Z=78$) | | | | | | | |
| 7.3166323 | 74.6376 | 7.8676 | 231.95 | 6.2806 | 238.23 | 0.00 | 0.1695 |
| 7.3532155 | 74.6202 | 7.8090 | 229.08 | 6.2556 | 235.33 | 0.00 | 0.1686 |
| 7.3899815 | 74.6025 | 7.7509 | 226.24 | 6.2307 | 232.47 | 0.00 | 0.1678 |
| 7.4269314 | 74.5845 | 7.6933 | 223.44 | 6.2058 | 229.65 | 0.00 | 0.1669 |
| 7.4640661 | 74.5662 | 7.6361 | 220.68 | 6.1809 | 226.86 | 0.00 | 0.1661 |
| 7.5013864 | 74.5476 | 7.5795 | 217.95 | 6.1561 | 224.11 | 0.00 | 0.1653 |
| 7.5388934 | 74.5287 | 7.5233 | 215.26 | 6.1312 | 221.39 | 0.00 | 0.1645 |
| 7.5765878 | 74.5095 | 7.4677 | 212.61 | 6.1064 | 218.71 | 0.00 | 0.1636 |
| 7.6144708 | 74.4900 | 7.4125 | 209.99 | 6.0816 | 216.07 | 0.00 | 0.1628 |
| 7.6525431 | 74.4701 | 7.3577 | 207.40 | 6.0569 | 213.46 | 0.00 | 0.1620 |
| 7.6908058 | 74.4500 | 7.3035 | 204.84 | 6.0322 | 210.88 | 0.00 | 0.1612 |
| 7.7292599 | 74.4296 | 7.2497 | 202.32 | 6.0075 | 208.33 | 0.00 | 0.1604 |
| 7.7679062 | 74.4089 | 7.1964 | 199.84 | 5.9828 | 205.82 | 0.00 | 0.1596 |
| 7.8067457 | 74.3878 | 7.1435 | 197.38 | 5.9581 | 203.34 | 0.00 | 0.1588 |
| 7.8457794 | 74.3664 | 7.0911 | 194.96 | 5.9335 | 200.89 | 0.00 | 0.1580 |
| 7.8850083 | 74.3448 | 7.0391 | 192.57 | 5.9089 | 198.47 | 0.00 | 0.1572 |
| 7.9244334 | 74.3228 | 6.9875 | 190.21 | 5.8844 | 196.09 | 0.00 | 0.1565 |
| 7.9640555 | 74.3004 | 6.9364 | 187.87 | 5.8598 | 193.73 | 0.00 | 0.1557 |
| 8.0038758 | 74.2778 | 6.8858 | 185.57 | 5.8353 | 191.41 | 0.00 | 0.1549 |
| 8.0438952 | 74.2548 | 6.8355 | 183.30 | 5.8109 | 189.11 | 0.00 | 0.1541 |
| 8.0841147 | 74.2315 | 6.7857 | 181.06 | 5.7864 | 186.85 | 0.00 | 0.1534 |
| 8.1245352 | 74.2079 | 6.7363 | 178.85 | 5.7620 | 184.61 | 0.00 | 0.1526 |
| 8.1651579 | 74.1839 | 6.6873 | 176.67 | 5.7377 | 182.40 | 0.00 | 0.1518 |
| 8.2059837 | 74.1596 | 6.6388 | 174.51 | 5.7133 | 180.22 | 0.00 | 0.1511 |
| 8.2470136 | 74.1350 | 6.5906 | 172.38 | 5.6890 | 178.07 | 0.00 | 0.1503 |
| 8.2882487 | 74.1100 | 6.5429 | 170.28 | 5.6647 | 175.95 | 0.00 | 0.1496 |
| 8.3296899 | 74.0847 | 6.4955 | 168.21 | 5.6405 | 173.85 | 0.00 | 0.1488 |
| 8.3713384 | 74.0590 | 6.4486 | 166.16 | 5.6163 | 171.78 | 0.00 | 0.1481 |
| 8.4131951 | 74.0330 | 6.4021 | 164.14 | 5.5921 | 169.74 | 0.00 | 0.1474 |
| 8.4552610 | 74.0066 | 6.3559 | 162.15 | 5.5680 | 167.72 | 0.00 | 0.1466 |
| 8.4975373 | 73.9799 | 6.3101 | 160.18 | 5.5439 | 165.72 | 0.00 | 0.1459 |
| 8.5400250 | 73.9529 | 6.2647 | 158.24 | 5.5199 | 163.76 | 0.00 | 0.1452 |
| Au ($Z=79$) | | | | | | | |
| Atomic weight: $A_r=196.9665 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^3)=18.850$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 327.071 E(\text{eV}) [\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2 (e \text{ atom}^{-1})\times 2.13642\times 10^5$ | | | | | | | |
| 21 edges. Edge energies (keV) | | | | | | | |
| K | 80.7249 | L I | 14.3528 | L II | 13.7336 | L III | 11.9187 |
| M I | 3.42490 | M II | 3.14780 | M III | 2.74300 | M IV | 2.29110 |
| M V | 2.20570 | N I | 0.758800 | N II | 0.643700 | N III | 0.545400 |
| N IV | 0.352000 | N V | 0.333900 | N VI | 0.0864000 | N VII | 0.0828000 |
| O I | 0.107800 | O II | 0.0717000 | O III | 0.0537000 | O IV | 0.00803838 |
| O V | 0.00679032 | | | | | | |
| Relativistic correction estimate: $f_{\text{rel}} (\text{H82,3/5CL})=(-1.7226 -1.0134) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.017382 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 36.8596 | 28.559 | 12203 | 6.4500 | 12209 | 0.00 | 2.480 |
| 0.50250000 | 36.9982 | 28.506 | 12120 | 6.4793 | 12126 | 0.00 | 2.467 |
| 0.50501250 | 37.1334 | 28.452 | 12037 | 6.5085 | 12043 | 0.00 | 2.455 |
| 0.50753756 | 37.2650 | 28.398 | 11954 | 6.5377 | 11960 | 0.00 | 2.443 |
| 0.51007525 | 37.3927 | 28.342 | 11871 | 6.5670 | 11878 | 0.00 | 2.431 |
| 0.51262563 | 37.5160 | 28.286 | 11788 | 6.5962 | 11795 | 0.00 | 2.419 |
| 0.51518875 | 37.6344 | 28.228 | 11706 | 6.6255 | 11713 | 0.00 | 2.407 |
| 0.51776470 | 37.7473 | 28.170 | 11624 | 6.6548 | 11630 | 0.00 | 2.395 |
| 0.52035352 | 37.8538 | 28.111 | 11542 | 6.6840 | 11548 | 0.00 | 2.383 |
| 0.52295529 | 37.9528 | 28.051 | 11460 | 6.7133 | 11466 | 0.00 | 2.371 |
| 0.52557007 | 38.0427 | 27.990 | 11378 | 6.7426 | 11385 | 0.00 | 2.359 |
| 0.52819792 | 38.1212 | 27.928 | 11296 | 6.7718 | 11303 | 0.00 | 2.347 |
| 0.53083891 | 38.1850 | 27.866 | 11215 | 6.8011 | 11222 | 0.00 | 2.336 |
| 0.53349310 | 38.2285 | 27.802 | 11134 | 6.8303 | 11141 | 0.00 | 2.324 |
| 0.53616057 | 38.2419 | 27.738 | 11053 | 6.8596 | 11060 | 0.00 | 2.312 |
| 0.53884137 | 38.2052 | 27.673 | 10972 | 6.8889 | 10979 | 0.00 | 2.301 |
| 0.54153558 | 38.0654 | 27.608 | 10892 | 6.9181 | 10899 | 0.00 | 2.289 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Au ($Z=79$) | | | | | | | |
| 0.54424325 | 37.5543 | 27.542 | 10811 | 6.9473 | 10818 | 0.00 | 2.278 |
| 0.54469646 | 37.3074 | 27.531 | 10798 | 6.9522 | 10805 | 0.00 | 2.276 |
| 0.54610359 | 37.3821 | 29.209 | 11427 | 6.9673 | 11434 | 0.00 | 2.270 |
| 0.54696447 | 37.8633 | 29.188 | 11401 | 6.9766 | 11408 | 0.00 | 2.267 |
| 0.54969929 | 38.5583 | 29.123 | 11319 | 7.0058 | 11326 | 0.00 | 2.255 |
| 0.55244779 | 38.9711 | 29.058 | 11237 | 7.0350 | 11244 | 0.00 | 2.244 |
| 0.55521003 | 39.2936 | 28.991 | 11156 | 7.0642 | 11163 | 0.00 | 2.233 |
| 0.55798608 | 39.5706 | 28.924 | 11074 | 7.0934 | 11082 | 0.00 | 2.222 |
| 0.56077601 | 39.8197 | 28.856 | 10994 | 7.1226 | 11001 | 0.00 | 2.211 |
| 0.56357989 | 40.0498 | 28.788 | 10913 | 7.1517 | 10920 | 0.00 | 2.200 |
| 0.56639779 | 40.2659 | 28.720 | 10833 | 7.1809 | 10840 | 0.00 | 2.189 |
| 0.56922978 | 40.4711 | 28.650 | 10753 | 7.2100 | 10760 | 0.00 | 2.178 |
| 0.57207593 | 40.6676 | 28.581 | 10673 | 7.2391 | 10681 | 0.00 | 2.167 |
| 0.57493630 | 40.8568 | 28.510 | 10594 | 7.2682 | 10601 | 0.00 | 2.156 |
| 0.57781099 | 41.0397 | 28.439 | 10515 | 7.2973 | 10523 | 0.00 | 2.146 |
| 0.58070004 | 41.2172 | 28.368 | 10437 | 7.3264 | 10444 | 0.00 | 2.135 |
| 0.58360354 | 41.3899 | 28.296 | 10359 | 7.3554 | 10366 | 0.00 | 2.124 |
| 0.58652156 | 41.5581 | 28.224 | 10281 | 7.3844 | 10288 | 0.00 | 2.114 |
| 0.58945417 | 41.7223 | 28.152 | 10203 | 7.4134 | 10211 | 0.00 | 2.103 |
| 0.59240144 | 41.8828 | 28.079 | 10126 | 7.4423 | 10134 | 0.00 | 2.093 |
| 0.59536345 | 42.0397 | 28.005 | 10049 | 7.4713 | 10057 | 0.00 | 2.082 |
| 0.59834026 | 42.1933 | 27.931 | 9973.1 | 7.5002 | 9980.6 | 0.00 | 2.072 |
| 0.60133196 | 42.3436 | 27.857 | 9897.2 | 7.5291 | 9904.7 | 0.00 | 2.062 |
| 0.60433862 | 42.4907 | 27.783 | 9821.6 | 7.5579 | 9829.1 | 0.00 | 2.052 |
| 0.60736032 | 42.6347 | 27.708 | 9746.3 | 7.5867 | 9753.9 | 0.00 | 2.041 |
| 0.61039712 | 42.7755 | 27.632 | 9671.5 | 7.6155 | 9679.1 | 0.00 | 2.031 |
| 0.61344910 | 42.9130 | 27.557 | 9597.0 | 7.6443 | 9604.7 | 0.00 | 2.021 |
| 0.61651635 | 43.0471 | 27.481 | 9522.9 | 7.6730 | 9530.6 | 0.00 | 2.011 |
| 0.61959893 | 43.1775 | 27.404 | 9449.3 | 7.7017 | 9457.0 | 0.00 | 2.001 |
| 0.62269693 | 43.3038 | 27.328 | 9376.0 | 7.7303 | 9383.7 | 0.00 | 1.991 |
| 0.62581041 | 43.4254 | 27.251 | 9303.0 | 7.7589 | 9310.8 | 0.00 | 1.981 |
| 0.62893946 | 43.5413 | 27.174 | 9230.5 | 7.7875 | 9238.3 | 0.00 | 1.971 |
| 0.63208416 | 43.6495 | 27.096 | 9158.4 | 7.8160 | 9166.2 | 0.00 | 1.962 |
| 0.63524458 | 43.7464 | 27.018 | 9086.7 | 7.8445 | 9094.5 | 0.00 | 1.952 |
| 0.63842080 | 43.8227 | 26.940 | 9015.4 | 7.8730 | 9023.2 | 0.00 | 1.942 |
| 0.64161291 | 43.8414 | 26.862 | 8944.4 | 7.9014 | 8952.3 | 0.00 | 1.932 |
| 0.64278595 | 43.7886 | 26.833 | 8918.6 | 7.9118 | 8926.5 | 0.00 | 1.929 |
| 0.64461406 | 43.8618 | 27.171 | 9005.2 | 7.9279 | 9013.1 | 0.00 | 1.923 |
| 0.64482097 | 43.8949 | 27.166 | 9000.6 | 7.9297 | 9008.6 | 0.00 | 1.923 |
| 0.64804508 | 44.1878 | 27.089 | 8930.5 | 7.9580 | 8938.4 | 0.00 | 1.913 |
| 0.65128530 | 44.3826 | 27.012 | 8860.7 | 7.9863 | 8868.7 | 0.00 | 1.904 |
| 0.65454173 | 44.5518 | 26.934 | 8791.4 | 8.0145 | 8799.4 | 0.00 | 1.894 |
| 0.65781444 | 44.7084 | 26.857 | 8722.5 | 8.0427 | 8730.5 | 0.00 | 1.885 |
| 0.66110351 | 44.8569 | 26.779 | 8653.9 | 8.0708 | 8662.0 | 0.00 | 1.875 |
| 0.66440903 | 44.9998 | 26.701 | 8585.8 | 8.0989 | 8593.9 | 0.00 | 1.866 |
| 0.66773107 | 45.1382 | 26.623 | 8518.1 | 8.1269 | 8526.2 | 0.00 | 1.857 |
| 0.67106973 | 45.2729 | 26.545 | 8450.8 | 8.1549 | 8459.0 | 0.00 | 1.848 |
| 0.67442508 | 45.4044 | 26.466 | 8383.9 | 8.1828 | 8392.1 | 0.00 | 1.838 |
| 0.67779720 | 45.5331 | 26.388 | 8317.4 | 8.2107 | 8325.7 | 0.00 | 1.829 |
| 0.68118619 | 45.6593 | 26.309 | 8251.4 | 8.2385 | 8259.6 | 0.00 | 1.820 |
| 0.68459212 | 45.7830 | 26.230 | 8185.7 | 8.2662 | 8194.0 | 0.00 | 1.811 |
| 0.68801508 | 45.9045 | 26.151 | 8120.5 | 8.2939 | 8128.8 | 0.00 | 1.802 |
| 0.69145515 | 46.0238 | 26.072 | 8055.6 | 8.3216 | 8064.0 | 0.00 | 1.793 |
| 0.69491243 | 46.1409 | 25.993 | 7991.2 | 8.3491 | 7999.6 | 0.00 | 1.784 |
| 0.69838699 | 46.2559 | 25.914 | 7927.2 | 8.3767 | 7935.6 | 0.00 | 1.775 |
| 0.70187893 | 46.3689 | 25.834 | 7863.6 | 8.4041 | 7872.0 | 0.00 | 1.766 |
| 0.70538832 | 46.4797 | 25.755 | 7800.4 | 8.4315 | 7808.8 | 0.00 | 1.758 |
| 0.70891526 | 46.5884 | 25.675 | 7737.6 | 8.4588 | 7746.1 | 0.00 | 1.749 |
| 0.71245984 | 46.6948 | 25.596 | 7675.3 | 8.4860 | 7683.7 | 0.00 | 1.740 |
| 0.71602214 | 46.7990 | 25.516 | 7613.3 | 8.5132 | 7621.8 | 0.00 | 1.732 |
| 0.71960225 | 46.9006 | 25.436 | 7551.7 | 8.5404 | 7560.3 | 0.00 | 1.723 |
| 0.72320026 | 46.9995 | 25.356 | 7490.6 | 8.5674 | 7499.1 | 0.00 | 1.714 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Au ($Z=79$) | | | | | | | |
| 0.72681626 | 47.0954 | 25.276 | 7429.8 | 8.5944 | 7438.4 | 0.00 | 1.706 |
| 0.73045034 | 47.1878 | 25.197 | 7369.5 | 8.6213 | 7378.1 | 0.00 | 1.697 |
| 0.73410260 | 47.2762 | 25.117 | 7309.5 | 8.6481 | 7318.2 | 0.00 | 1.689 |
| 0.73777311 | 47.3596 | 25.036 | 7250.0 | 8.6749 | 7258.7 | 0.00 | 1.681 |
| 0.74146197 | 47.4364 | 24.956 | 7190.8 | 8.7016 | 7199.5 | 0.00 | 1.672 |
| 0.74516928 | 47.5040 | 24.876 | 7132.1 | 8.7282 | 7140.8 | 0.00 | 1.664 |
| 0.74889513 | 47.5571 | 24.796 | 7073.8 | 8.7547 | 7082.5 | 0.00 | 1.656 |
| 0.75263961 | 47.5825 | 24.716 | 7015.8 | 8.7811 | 7024.6 | 0.00 | 1.647 |
| 0.75640280 | 47.5268 | 24.636 | 6958.3 | 8.8075 | 6967.1 | 0.00 | 1.639 |
| 0.75759354 | 47.4426 | 24.611 | 6940.2 | 8.8158 | 6949.0 | 0.00 | 1.637 |
| 0.76000652 | 47.5088 | 25.095 | 7054.5 | 8.8326 | 7063.3 | 0.00 | 1.631 |
| 0.76018482 | 47.5372 | 25.092 | 7051.8 | 8.8338 | 7060.6 | 0.00 | 1.631 |
| 0.76398574 | 47.8657 | 25.012 | 6994.5 | 8.8600 | 7003.4 | 0.00 | 1.623 |
| 0.76780567 | 48.0626 | 24.933 | 6937.7 | 8.8861 | 6946.6 | 0.00 | 1.615 |
| 0.77164470 | 48.2251 | 24.854 | 6881.2 | 8.9122 | 6890.1 | 0.00 | 1.607 |
| 0.77550292 | 48.3711 | 24.775 | 6825.1 | 8.9382 | 6834.1 | 0.00 | 1.599 |
| 0.77938044 | 48.5071 | 24.695 | 6769.5 | 8.9640 | 6778.4 | 0.00 | 1.591 |
| 0.78327734 | 48.6363 | 24.616 | 6714.2 | 8.9898 | 6723.2 | 0.00 | 1.583 |
| 0.78719373 | 48.7605 | 24.537 | 6659.3 | 9.0155 | 6668.3 | 0.00 | 1.575 |
| 0.79112969 | 48.8808 | 24.458 | 6604.8 | 9.0411 | 6613.8 | 0.00 | 1.567 |
| 0.79508534 | 48.9978 | 24.379 | 6550.6 | 9.0666 | 6559.7 | 0.00 | 1.559 |
| 0.79906077 | 49.1121 | 24.300 | 6496.9 | 9.0921 | 6506.0 | 0.00 | 1.552 |
| 0.80305607 | 49.2241 | 24.221 | 6443.5 | 9.1174 | 6452.7 | 0.00 | 1.544 |
| 0.80707135 | 49.3341 | 24.141 | 6390.6 | 9.1427 | 6399.7 | 0.00 | 1.536 |
| 0.81110671 | 49.4422 | 24.063 | 6338.0 | 9.1678 | 6347.1 | 0.00 | 1.529 |
| 0.81516224 | 49.5487 | 23.984 | 6285.7 | 9.1929 | 6294.9 | 0.00 | 1.521 |
| 0.81923806 | 49.6537 | 23.905 | 6233.9 | 9.2178 | 6243.1 | 0.00 | 1.513 |
| 0.82333425 | 49.7573 | 23.826 | 6182.4 | 9.2427 | 6191.7 | 0.00 | 1.506 |
| 0.82745092 | 49.8596 | 23.747 | 6131.3 | 9.2674 | 6140.6 | 0.00 | 1.498 |
| 0.83158817 | 49.9607 | 23.668 | 6080.6 | 9.2921 | 6089.9 | 0.00 | 1.491 |
| 0.83574611 | 50.0607 | 23.590 | 6030.3 | 9.3167 | 6039.6 | 0.00 | 1.484 |
| 0.83992484 | 50.1597 | 23.511 | 5980.3 | 9.3411 | 5989.6 | 0.00 | 1.476 |
| 0.84412447 | 50.2577 | 23.433 | 5930.6 | 9.3655 | 5940.0 | 0.00 | 1.469 |
| 0.84834509 | 50.3547 | 23.354 | 5881.4 | 9.3897 | 5890.8 | 0.00 | 1.461 |
| 0.85258682 | 50.4508 | 23.276 | 5832.5 | 9.4139 | 5841.9 | 0.00 | 1.454 |
| 0.85684975 | 50.5461 | 23.197 | 5783.9 | 9.4379 | 5793.3 | 0.00 | 1.447 |
| 0.86113400 | 50.6405 | 23.119 | 5735.7 | 9.4619 | 5745.2 | 0.00 | 1.440 |
| 0.86543967 | 50.7342 | 23.041 | 5687.8 | 9.4857 | 5697.3 | 0.00 | 1.433 |
| 0.86976687 | 50.8271 | 22.963 | 5640.3 | 9.5094 | 5649.8 | 0.00 | 1.425 |
| 0.87411570 | 50.9193 | 22.884 | 5593.2 | 9.5331 | 5602.7 | 0.00 | 1.418 |
| 0.87848628 | 51.0108 | 22.806 | 5546.4 | 9.5566 | 5555.9 | 0.00 | 1.411 |
| 0.88287871 | 51.1017 | 22.728 | 5499.9 | 9.5799 | 5509.5 | 0.00 | 1.404 |
| 0.88729310 | 51.1919 | 22.651 | 5453.8 | 9.6032 | 5463.4 | 0.00 | 1.397 |
| 0.89172957 | 51.2816 | 22.573 | 5408.0 | 9.6264 | 5417.6 | 0.00 | 1.390 |
| 0.89618822 | 51.3708 | 22.495 | 5362.6 | 9.6494 | 5372.2 | 0.00 | 1.383 |
| 0.90066916 | 51.4595 | 22.417 | 5317.5 | 9.6724 | 5327.2 | 0.00 | 1.377 |
| 0.90517250 | 51.5477 | 22.340 | 5272.7 | 9.6952 | 5282.4 | 0.00 | 1.370 |
| 0.90969837 | 51.6355 | 22.262 | 5228.3 | 9.7179 | 5238.0 | 0.00 | 1.363 |
| 0.91424686 | 51.7230 | 22.185 | 5184.2 | 9.7405 | 5194.0 | 0.00 | 1.356 |
| 0.91881809 | 51.8101 | 22.108 | 5140.5 | 9.7629 | 5150.3 | 0.00 | 1.349 |
| 0.92341218 | 51.8970 | 22.031 | 5097.0 | 9.7853 | 5106.8 | 0.00 | 1.343 |
| 0.92802924 | 51.9834 | 21.953 | 5053.8 | 9.8075 | 5063.6 | 0.00 | 1.336 |
| 0.93266939 | 52.0696 | 21.875 | 5010.8 | 9.8296 | 5020.6 | 0.00 | 1.329 |
| 0.93733274 | 52.1555 | 21.797 | 4968.2 | 9.8516 | 4978.0 | 0.00 | 1.323 |
| 0.94201940 | 52.2412 | 21.720 | 4925.9 | 9.8734 | 4935.8 | 0.00 | 1.316 |
| 0.94672950 | 52.3267 | 21.643 | 4883.9 | 9.8952 | 4893.8 | 0.00 | 1.310 |
| 0.95146315 | 52.4122 | 21.565 | 4842.3 | 9.9168 | 4852.2 | 0.00 | 1.303 |
| 0.95622046 | 52.4977 | 21.488 | 4801.0 | 9.9382 | 4810.9 | 0.00 | 1.297 |
| 0.96100156 | 52.5833 | 21.411 | 4759.9 | 9.9596 | 4769.9 | 0.00 | 1.290 |
| 0.96580657 | 52.6691 | 21.334 | 4719.3 | 9.9808 | 4729.2 | 0.00 | 1.284 |
| 0.97063560 | 52.7551 | 21.257 | 4678.9 | 10.002 | 4688.9 | 0.00 | 1.277 |
| 0.97548878 | 52.8415 | 21.181 | 4638.8 | 10.023 | 4648.8 | 0.00 | 1.271 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Au ($Z=79$) | | | | | | | |
| 0.98036623 | 52.9284 | 21.104 | 4599.1 | 10.044 | 4609.1 | 0.00 | 1.265 |
| 0.98526806 | 53.0160 | 21.028 | 4559.6 | 10.064 | 4569.7 | 0.00 | 1.258 |
| 0.99019440 | 53.1045 | 20.952 | 4520.5 | 10.085 | 4530.6 | 0.00 | 1.252 |
| 0.99514537 | 53.1943 | 20.876 | 4481.7 | 10.105 | 4491.8 | 0.00 | 1.246 |
| 1.00012111 | 53.2862 | 20.799 | 4443.0 | 10.126 | 4453.2 | 0.00 | 1.240 |
| 1.0051217 | 53.3772 | 20.696 | 4399.0 | 10.146 | 4409.1 | 0.00 | 1.234 |
| 1.0101473 | 53.4425 | 20.593 | 4355.3 | 10.166 | 4365.4 | 0.00 | 1.227 |
| 1.0151980 | 53.5046 | 20.490 | 4312.0 | 10.186 | 4322.2 | 0.00 | 1.221 |
| 1.0202740 | 53.5648 | 20.388 | 4269.1 | 10.205 | 4279.3 | 0.00 | 1.215 |
| 1.0253754 | 53.6233 | 20.286 | 4226.7 | 10.225 | 4236.9 | 0.00 | 1.209 |
| 1.0305023 | 53.6804 | 20.185 | 4184.6 | 10.245 | 4194.9 | 0.00 | 1.203 |
| 1.0356548 | 53.7361 | 20.084 | 4143.0 | 10.264 | 4153.3 | 0.00 | 1.197 |
| 1.0408331 | 53.7905 | 19.984 | 4101.8 | 10.283 | 4112.1 | 0.00 | 1.191 |
| 1.0460372 | 53.8437 | 19.884 | 4061.1 | 10.302 | 4071.4 | 0.00 | 1.185 |
| 1.0512674 | 53.8957 | 19.785 | 4020.7 | 10.321 | 4031.0 | 0.00 | 1.179 |
| 1.0565238 | 53.9595 | 19.686 | 3980.7 | 10.340 | 3991.0 | 0.00 | 1.174 |
| 1.0618064 | 54.0092 | 19.587 | 3941.1 | 10.358 | 3951.5 | 0.00 | 1.168 |
| 1.0671154 | 54.0578 | 19.490 | 3901.9 | 10.377 | 3912.3 | 0.00 | 1.162 |
| 1.0724510 | 54.1054 | 19.392 | 3863.1 | 10.395 | 3873.5 | 0.00 | 1.156 |
| 1.0778132 | 54.1518 | 19.296 | 3824.7 | 10.413 | 3835.1 | 0.00 | 1.150 |
| 1.0832023 | 54.1973 | 19.199 | 3786.7 | 10.431 | 3797.1 | 0.00 | 1.145 |
| 1.0886183 | 54.2417 | 19.103 | 3749.1 | 10.449 | 3759.5 | 0.00 | 1.139 |
| 1.0940614 | 54.2850 | 19.007 | 3711.6 | 10.467 | 3722.1 | 0.00 | 1.133 |
| 1.0995317 | 54.3271 | 18.911 | 3674.5 | 10.485 | 3685.0 | 0.00 | 1.128 |
| 1.1050294 | 54.3681 | 18.816 | 3637.8 | 10.502 | 3648.3 | 0.00 | 1.122 |
| 1.1105545 | 54.4080 | 18.721 | 3601.5 | 10.519 | 3612.0 | 0.00 | 1.116 |
| 1.1161073 | 54.4468 | 18.627 | 3565.5 | 10.536 | 3576.1 | 0.00 | 1.111 |
| 1.1216878 | 54.4846 | 18.533 | 3529.9 | 10.553 | 3540.5 | 0.00 | 1.105 |
| 1.1272963 | 54.5214 | 18.440 | 3494.7 | 10.570 | 3505.2 | 0.00 | 1.100 |
| 1.1329328 | 54.5571 | 18.347 | 3459.8 | 10.587 | 3470.4 | 0.00 | 1.094 |
| 1.1385974 | 54.5918 | 18.255 | 3425.2 | 10.603 | 3435.8 | 0.00 | 1.089 |
| 1.1442904 | 54.6255 | 18.163 | 3391.0 | 10.620 | 3401.7 | 0.00 | 1.084 |
| 1.1500119 | 54.6582 | 18.071 | 3357.2 | 10.636 | 3367.8 | 0.00 | 1.078 |
| 1.1557619 | 54.6899 | 17.981 | 3323.7 | 10.652 | 3334.3 | 0.00 | 1.073 |
| 1.1615407 | 54.7207 | 17.890 | 3290.5 | 10.668 | 3301.2 | 0.00 | 1.067 |
| 1.1673484 | 54.7505 | 17.800 | 3257.7 | 10.684 | 3268.4 | 0.00 | 1.062 |
| 1.1731852 | 54.7793 | 17.711 | 3225.2 | 10.699 | 3235.9 | 0.00 | 1.057 |
| 1.1790511 | 54.8073 | 17.622 | 3193.1 | 10.715 | 3203.8 | 0.00 | 1.052 |
| 1.1849464 | 54.8343 | 17.533 | 3161.2 | 10.730 | 3172.0 | 0.00 | 1.046 |
| 1.1908711 | 54.8604 | 17.446 | 3129.7 | 10.745 | 3140.5 | 0.00 | 1.041 |
| 1.1968254 | 54.8856 | 17.358 | 3098.5 | 10.760 | 3109.3 | 0.00 | 1.036 |
| 1.2028096 | 54.9100 | 17.271 | 3067.7 | 10.775 | 3078.4 | 0.00 | 1.031 |
| 1.2088236 | 54.9334 | 17.185 | 3037.1 | 10.789 | 3047.9 | 0.00 | 1.026 |
| 1.2148677 | 54.9560 | 17.099 | 3006.9 | 10.804 | 3017.7 | 0.00 | 1.021 |
| 1.2209421 | 54.9777 | 17.013 | 2977.0 | 10.818 | 2987.8 | 0.00 | 1.015 |
| 1.2270468 | 54.9986 | 16.928 | 2947.4 | 10.832 | 2958.2 | 0.00 | 1.010 |
| 1.2331820 | 55.0186 | 16.844 | 2918.1 | 10.846 | 2928.9 | 0.00 | 1.005 |
| 1.2393479 | 55.0378 | 16.759 | 2889.0 | 10.860 | 2899.9 | 0.00 | 1.000 |
| 1.2455447 | 55.0562 | 16.676 | 2860.3 | 10.873 | 2871.2 | 0.00 | 0.9954 |
| 1.2517724 | 55.0738 | 16.593 | 2831.9 | 10.887 | 2842.8 | 0.00 | 0.9905 |
| 1.2580312 | 55.0906 | 16.510 | 2803.8 | 10.900 | 2814.7 | 0.00 | 0.9855 |
| 1.2643214 | 55.1066 | 16.428 | 2776.0 | 10.913 | 2786.9 | 0.00 | 0.9806 |
| 1.2706430 | 55.1219 | 16.347 | 2748.5 | 10.926 | 2759.4 | 0.00 | 0.9758 |
| 1.2769962 | 55.1364 | 16.265 | 2721.2 | 10.939 | 2732.1 | 0.00 | 0.9709 |
| 1.2833812 | 55.1502 | 16.185 | 2694.2 | 10.951 | 2705.2 | 0.00 | 0.9661 |
| 1.2897981 | 55.1631 | 16.104 | 2667.5 | 10.964 | 2678.4 | 0.00 | 0.9613 |
| 1.2962471 | 55.1753 | 16.024 | 2640.9 | 10.976 | 2651.9 | 0.00 | 0.9565 |
| 1.3027283 | 55.1866 | 15.944 | 2614.7 | 10.988 | 2625.7 | 0.00 | 0.9517 |
| 1.3092420 | 55.1972 | 15.865 | 2588.8 | 11.000 | 2599.8 | 0.00 | 0.9470 |
| 1.3157882 | 55.2070 | 15.786 | 2563.1 | 11.012 | 2574.1 | 0.00 | 0.9423 |
| 1.3223671 | 55.2161 | 15.707 | 2537.7 | 11.024 | 2548.7 | 0.00 | 0.9376 |
| 1.3289790 | 55.2245 | 15.629 | 2512.5 | 11.035 | 2523.6 | 0.00 | 0.9329 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Au ($Z=79$) | | | | | | | |
| 1.3356239 | 55.2322 | 15.552 | 2487.7 | 11.046 | 2498.7 | 0.00 | 0.9283 |
| 1.3423020 | 55.2388 | 15.466 | 2461.6 | 11.057 | 2472.7 | 0.00 | 0.9237 |
| 1.3490135 | 55.2440 | 15.381 | 2435.9 | 11.068 | 2446.9 | 0.00 | 0.9191 |
| 1.3557586 | 55.2479 | 15.296 | 2410.4 | 11.079 | 2421.5 | 0.00 | 0.9145 |
| 1.3625374 | 55.2505 | 15.212 | 2385.2 | 11.089 | 2396.3 | 0.00 | 0.9100 |
| 1.3693500 | 55.2518 | 15.128 | 2360.3 | 11.100 | 2371.4 | 0.00 | 0.9054 |
| 1.3761968 | 55.2518 | 15.045 | 2335.6 | 11.110 | 2346.7 | 0.00 | 0.9009 |
| 1.3830778 | 55.2505 | 14.963 | 2311.3 | 11.120 | 2322.4 | 0.00 | 0.8964 |
| 1.3899932 | 55.2480 | 14.881 | 2287.2 | 11.130 | 2298.3 | 0.00 | 0.8920 |
| 1.3969431 | 55.2443 | 14.799 | 2263.3 | 11.140 | 2274.5 | 0.00 | 0.8875 |
| 1.4039278 | 55.2394 | 14.719 | 2239.8 | 11.149 | 2250.9 | 0.00 | 0.8831 |
| 1.4109475 | 55.2333 | 14.636 | 2216.1 | 11.158 | 2227.3 | 0.00 | 0.8787 |
| 1.4180022 | 55.2256 | 14.551 | 2192.2 | 11.168 | 2203.4 | 0.00 | 0.8744 |
| 1.4250922 | 55.2163 | 14.466 | 2168.6 | 11.176 | 2179.8 | 0.00 | 0.8700 |
| 1.4322177 | 55.2055 | 14.382 | 2145.3 | 11.185 | 2156.5 | 0.00 | 0.8657 |
| 1.4393788 | 55.1930 | 14.298 | 2122.2 | 11.194 | 2133.4 | 0.00 | 0.8614 |
| 1.4465757 | 55.1790 | 14.215 | 2099.4 | 11.202 | 2110.6 | 0.00 | 0.8571 |
| 1.4538086 | 55.1634 | 14.133 | 2076.9 | 11.211 | 2088.1 | 0.00 | 0.8528 |
| 1.4610776 | 55.1463 | 14.051 | 2054.6 | 11.219 | 2065.8 | 0.00 | 0.8486 |
| 1.4683830 | 55.1277 | 13.970 | 2032.5 | 11.227 | 2043.8 | 0.00 | 0.8444 |
| 1.4757249 | 55.1075 | 13.889 | 2010.8 | 11.234 | 2022.0 | 0.00 | 0.8402 |
| 1.4831035 | 55.0857 | 13.809 | 1989.2 | 11.242 | 2000.5 | 0.00 | 0.8360 |
| 1.4905190 | 55.0624 | 13.730 | 1968.0 | 11.249 | 1979.2 | 0.00 | 0.8318 |
| 1.4979716 | 55.0376 | 13.651 | 1946.9 | 11.256 | 1958.2 | 0.00 | 0.8277 |
| 1.5054615 | 55.0112 | 13.573 | 1926.1 | 11.263 | 1937.4 | 0.00 | 0.8236 |
| 1.5129888 | 54.9832 | 13.495 | 1905.6 | 11.270 | 1916.8 | 0.00 | 0.8195 |
| 1.5205537 | 54.9537 | 13.418 | 1885.2 | 11.277 | 1896.5 | 0.00 | 0.8154 |
| 1.5281565 | 54.9226 | 13.341 | 1865.1 | 11.283 | 1876.4 | 0.00 | 0.8113 |
| 1.5357973 | 54.8898 | 13.265 | 1845.3 | 11.290 | 1856.6 | 0.00 | 0.8073 |
| 1.5434763 | 54.8555 | 13.189 | 1825.6 | 11.296 | 1836.9 | 0.00 | 0.8033 |
| 1.5511937 | 54.8194 | 13.114 | 1806.2 | 11.302 | 1817.5 | 0.00 | 0.7993 |
| 1.5589496 | 54.7818 | 13.037 | 1786.6 | 11.307 | 1797.9 | 0.00 | 0.7953 |
| 1.5667444 | 54.7424 | 12.957 | 1766.9 | 11.313 | 1778.2 | 0.00 | 0.7913 |
| 1.5745781 | 54.7010 | 12.878 | 1747.4 | 11.318 | 1758.7 | 0.00 | 0.7874 |
| 1.5824510 | 54.6577 | 12.800 | 1728.1 | 11.323 | 1739.4 | 0.00 | 0.7835 |
| 1.5903633 | 54.6123 | 12.722 | 1709.1 | 11.328 | 1720.4 | 0.00 | 0.7796 |
| 1.5983151 | 54.5649 | 12.645 | 1690.3 | 11.333 | 1701.6 | 0.00 | 0.7757 |
| 1.6063066 | 54.5154 | 12.569 | 1671.7 | 11.338 | 1683.1 | 0.00 | 0.7719 |
| 1.6143382 | 54.4639 | 12.493 | 1653.4 | 11.342 | 1664.7 | 0.00 | 0.7680 |
| 1.6224099 | 54.4102 | 12.418 | 1635.2 | 11.347 | 1646.6 | 0.00 | 0.7642 |
| 1.6305219 | 54.3544 | 12.340 | 1616.8 | 11.351 | 1628.2 | 0.00 | 0.7604 |
| 1.6386745 | 54.3040 | 12.262 | 1598.6 | 11.355 | 1610.0 | 0.00 | 0.7566 |
| 1.6468679 | 54.2434 | 12.184 | 1580.6 | 11.358 | 1592.0 | 0.00 | 0.7528 |
| 1.6551022 | 54.1804 | 12.108 | 1562.9 | 11.362 | 1574.2 | 0.00 | 0.7491 |
| 1.6633777 | 54.1148 | 12.032 | 1545.4 | 11.365 | 1556.7 | 0.00 | 0.7454 |
| 1.6716946 | 54.0467 | 11.957 | 1528.0 | 11.368 | 1539.4 | 0.00 | 0.7417 |
| 1.6800531 | 53.9759 | 11.882 | 1511.0 | 11.371 | 1522.3 | 0.00 | 0.7380 |
| 1.6884534 | 53.9024 | 11.808 | 1494.1 | 11.374 | 1505.4 | 0.00 | 0.7343 |
| 1.6968956 | 53.8261 | 11.735 | 1477.4 | 11.377 | 1488.8 | 0.00 | 0.7307 |
| 1.7053801 | 53.7470 | 11.662 | 1460.9 | 11.379 | 1472.3 | 0.00 | 0.7270 |
| 1.7139070 | 53.6650 | 11.590 | 1444.7 | 11.382 | 1456.1 | 0.00 | 0.7234 |
| 1.7224766 | 53.5799 | 11.518 | 1428.6 | 11.384 | 1440.0 | 0.00 | 0.7198 |
| 1.7310889 | 53.4918 | 11.447 | 1412.8 | 11.386 | 1424.2 | 0.00 | 0.7162 |
| 1.7397444 | 53.4004 | 11.377 | 1397.1 | 11.387 | 1408.5 | 0.00 | 0.7127 |
| 1.7484431 | 53.3057 | 11.307 | 1381.7 | 11.389 | 1393.0 | 0.00 | 0.7091 |
| 1.7571853 | 53.2076 | 11.238 | 1366.4 | 11.390 | 1377.8 | 0.00 | 0.7056 |
| 1.7659712 | 53.1060 | 11.170 | 1351.3 | 11.391 | 1362.7 | 0.00 | 0.7021 |
| 1.7748011 | 53.0006 | 11.102 | 1336.4 | 11.392 | 1347.8 | 0.00 | 0.6986 |
| 1.7836751 | 52.8914 | 11.035 | 1321.7 | 11.393 | 1333.1 | 0.00 | 0.6951 |
| 1.7925935 | 52.7782 | 10.968 | 1307.2 | 11.394 | 1318.5 | 0.00 | 0.6916 |
| 1.8015565 | 52.6608 | 10.902 | 1292.8 | 11.394 | 1304.2 | 0.00 | 0.6882 |
| 1.8105642 | 52.5391 | 10.836 | 1278.6 | 11.394 | 1290.0 | 0.00 | 0.6848 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Au ($Z=79$) | | | | | | | |
| 1.8196171 | 52.4128 | 10.771 | 1264.6 | 11.395 | 1276.0 | 0.00 | 0.6814 |
| 1.8287151 | 52.2817 | 10.706 | 1250.8 | 11.394 | 1262.2 | 0.00 | 0.6780 |
| 1.8378587 | 52.1456 | 10.642 | 1237.1 | 11.394 | 1248.5 | 0.00 | 0.6746 |
| 1.8470480 | 52.0043 | 10.579 | 1223.6 | 11.394 | 1235.0 | 0.00 | 0.6713 |
| 1.8562833 | 51.8574 | 10.516 | 1210.3 | 11.393 | 1221.7 | 0.00 | 0.6679 |
| 1.8655647 | 51.7047 | 10.453 | 1197.1 | 11.392 | 1208.5 | 0.00 | 0.6646 |
| 1.8748925 | 51.5457 | 10.391 | 1184.1 | 11.391 | 1195.5 | 0.00 | 0.6613 |
| 1.8842670 | 51.3803 | 10.330 | 1171.2 | 11.390 | 1182.6 | 0.00 | 0.6580 |
| 1.8936883 | 51.2079 | 10.269 | 1158.5 | 11.389 | 1169.9 | 0.00 | 0.6547 |
| 1.9031567 | 51.0281 | 10.209 | 1146.0 | 11.387 | 1157.4 | 0.00 | 0.6515 |
| 1.9126725 | 50.8404 | 10.149 | 1133.6 | 11.385 | 1145.0 | 0.00 | 0.6482 |
| 1.9222359 | 50.6444 | 10.089 | 1121.3 | 11.384 | 1132.7 | 0.00 | 0.6450 |
| 1.9318471 | 50.4395 | 10.030 | 1109.3 | 11.381 | 1120.6 | 0.00 | 0.6418 |
| 1.9415063 | 50.2249 | 9.9719 | 1097.3 | 11.379 | 1108.7 | 0.00 | 0.6386 |
| 1.9512138 | 49.9998 | 9.9140 | 1085.5 | 11.377 | 1096.9 | 0.00 | 0.6354 |
| 1.9609699 | 49.7636 | 9.8565 | 1073.8 | 11.374 | 1085.2 | 0.00 | 0.6323 |
| 1.9707747 | 49.5152 | 9.7994 | 1062.3 | 11.371 | 1073.7 | 0.00 | 0.6291 |
| 1.9806286 | 49.2537 | 9.7429 | 1050.9 | 11.368 | 1062.3 | 0.00 | 0.6260 |
| 1.9905318 | 48.9778 | 9.6868 | 1039.7 | 11.365 | 1051.0 | 0.00 | 0.6229 |
| 2.0004844 | 48.6861 | 9.6311 | 1028.6 | 11.362 | 1039.9 | 0.00 | 0.6198 |
| 2.0104868 | 48.3770 | 9.5759 | 1017.6 | 11.358 | 1028.9 | 0.00 | 0.6167 |
| 2.0205393 | 48.0488 | 9.5212 | 1006.7 | 11.355 | 1018.1 | 0.00 | 0.6136 |
| 2.0306420 | 47.6993 | 9.4668 | 996.00 | 11.351 | 1007.3 | 0.00 | 0.6106 |
| 2.0407952 | 47.3259 | 9.4129 | 985.39 | 11.347 | 996.74 | 0.00 | 0.6075 |
| 2.0509992 | 46.9257 | 9.3594 | 974.92 | 11.343 | 986.26 | 0.00 | 0.6045 |
| 2.0612542 | 46.4950 | 9.3063 | 964.57 | 11.338 | 975.91 | 0.00 | 0.6015 |
| 2.0715604 | 46.0294 | 9.2537 | 954.34 | 11.334 | 965.67 | 0.00 | 0.5985 |
| 2.0819182 | 45.5233 | 9.2015 | 944.23 | 11.329 | 955.56 | 0.00 | 0.5955 |
| 2.0923278 | 44.9700 | 9.1496 | 934.25 | 11.324 | 945.57 | 0.00 | 0.5926 |
| 2.1027895 | 44.3604 | 9.0983 | 924.38 | 11.319 | 935.70 | 0.00 | 0.5896 |
| 2.1133034 | 43.6829 | 9.0473 | 914.62 | 11.314 | 925.94 | 0.00 | 0.5867 |
| 2.1238699 | 42.9216 | 8.9967 | 904.98 | 11.308 | 916.29 | 0.00 | 0.5838 |
| 2.1344893 | 42.0539 | 8.9465 | 895.46 | 11.303 | 906.76 | 0.00 | 0.5809 |
| 2.1451617 | 41.0468 | 8.8967 | 886.05 | 11.297 | 897.34 | 0.00 | 0.5780 |
| 2.1558875 | 39.8476 | 8.8473 | 876.74 | 11.291 | 888.04 | 0.00 | 0.5751 |
| 2.1666670 | 38.3658 | 8.7983 | 867.55 | 11.285 | 878.84 | 0.00 | 0.5722 |
| 2.1775003 | 36.4219 | 8.7497 | 858.47 | 11.278 | 869.74 | 0.00 | 0.5694 |
| 2.1883878 | 33.5677 | 8.7003 | 849.37 | 11.272 | 860.64 | 0.00 | 0.5666 |
| 2.1993297 | 27.8928 | 8.6506 | 840.32 | 11.265 | 851.58 | 0.00 | 0.5637 |
| 2.2051132 | 14.7180 | 8.6246 | 835.59 | 11.262 | 846.85 | 0.00 | 0.5623 |
| 2.2062866 | 14.4147 | 25.848 | 2503.0 | 11.261 | 2514.2 | 0.00 | 0.5620 |
| 2.2103264 | 25.6735 | 25.780 | 2491.8 | 11.259 | 2503.1 | 0.00 | 0.5609 |
| 2.2213780 | 32.0631 | 25.595 | 2461.6 | 11.252 | 2472.8 | 0.00 | 0.5581 |
| 2.2324849 | 34.5666 | 25.411 | 2431.7 | 11.244 | 2443.0 | 0.00 | 0.5554 |
| 2.2436473 | 35.8899 | 25.228 | 2402.2 | 11.237 | 2413.5 | 0.00 | 0.5526 |
| 2.2548656 | 36.5015 | 25.047 | 2373.1 | 11.230 | 2384.3 | 0.00 | 0.5499 |
| 2.2661399 | 36.4465 | 24.867 | 2344.4 | 11.222 | 2355.6 | 0.00 | 0.5471 |
| 2.2774706 | 35.3612 | 24.689 | 2316.0 | 11.214 | 2327.2 | 0.00 | 0.5444 |
| 2.2888579 | 29.7952 | 24.512 | 2287.9 | 11.206 | 2299.2 | 0.00 | 0.5417 |
| 2.2904585 | 25.3813 | 24.487 | 2284.0 | 11.205 | 2295.3 | 0.00 | 0.5413 |
| 2.2917415 | 25.2987 | 35.886 | 3345.4 | 11.204 | 3356.6 | 0.00 | 0.5410 |
| 2.3003022 | 35.6491 | 35.689 | 3314.7 | 11.198 | 3325.9 | 0.00 | 0.5390 |
| 2.3118037 | 39.3788 | 35.427 | 3274.0 | 11.190 | 3285.2 | 0.00 | 0.5363 |
| 2.3233628 | 41.6868 | 35.168 | 3233.8 | 11.181 | 3245.0 | 0.00 | 0.5336 |
| 2.3349796 | 43.4321 | 34.910 | 3194.1 | 11.173 | 3205.3 | 0.00 | 0.5310 |
| 2.3466545 | 44.8607 | 34.654 | 3154.9 | 11.164 | 3166.1 | 0.00 | 0.5283 |
| 2.3583878 | 46.0806 | 34.400 | 3116.2 | 11.155 | 3127.4 | 0.00 | 0.5257 |
| 2.3701797 | 47.1495 | 34.148 | 3078.0 | 11.146 | 3089.2 | 0.00 | 0.5231 |
| 2.3820306 | 48.1028 | 33.898 | 3040.3 | 11.136 | 3051.5 | 0.00 | 0.5205 |
| 2.3939407 | 48.9635 | 33.650 | 3003.1 | 11.127 | 3014.2 | 0.00 | 0.5179 |
| 2.4059104 | 49.7480 | 33.405 | 2966.3 | 11.117 | 2977.4 | 0.00 | 0.5153 |
| 2.4179400 | 50.4680 | 33.160 | 2930.0 | 11.107 | 2941.1 | 0.00 | 0.5128 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Au ($Z=79$) | | | | | | | |
| 2.4300297 | 51.1326 | 32.918 | 2894.1 | 11.097 | 2905.2 | 0.00 | 0.5102 |
| 2.4421798 | 51.7487 | 32.678 | 2858.7 | 11.087 | 2869.8 | 0.00 | 0.5077 |
| 2.4543907 | 52.3217 | 32.440 | 2823.7 | 11.077 | 2834.8 | 0.00 | 0.5052 |
| 2.4666627 | 52.8561 | 32.203 | 2789.2 | 11.067 | 2800.2 | 0.00 | 0.5026 |
| 2.4789960 | 53.3553 | 31.968 | 2755.1 | 11.056 | 2766.1 | 0.00 | 0.5001 |
| 2.4913910 | 53.8222 | 31.736 | 2721.4 | 11.045 | 2732.4 | 0.00 | 0.4977 |
| 2.5038479 | 54.2592 | 31.504 | 2688.1 | 11.034 | 2699.2 | 0.00 | 0.4952 |
| 2.5163672 | 54.6683 | 31.275 | 2655.3 | 11.023 | 2666.3 | 0.00 | 0.4927 |
| 2.5289490 | 55.0508 | 31.048 | 2622.9 | 11.012 | 2633.9 | 0.00 | 0.4903 |
| 2.5415938 | 55.4079 | 30.822 | 2590.8 | 11.001 | 2601.8 | 0.00 | 0.4878 |
| 2.5543017 | 55.7405 | 30.598 | 2559.2 | 10.989 | 2570.2 | 0.00 | 0.4854 |
| 2.5670732 | 56.0490 | 30.376 | 2528.0 | 10.978 | 2539.0 | 0.00 | 0.4830 |
| 2.5799086 | 56.3336 | 30.155 | 2497.1 | 10.966 | 2508.1 | 0.00 | 0.4806 |
| 2.5928082 | 56.5938 | 29.935 | 2466.6 | 10.954 | 2477.6 | 0.00 | 0.4782 |
| 2.6057722 | 56.8290 | 29.717 | 2436.5 | 10.942 | 2447.4 | 0.00 | 0.4758 |
| 2.6188011 | 57.0376 | 29.501 | 2406.7 | 10.929 | 2417.6 | 0.00 | 0.4734 |
| 2.6318951 | 57.2174 | 29.286 | 2377.3 | 10.917 | 2388.2 | 0.00 | 0.4711 |
| 2.6450545 | 57.3650 | 29.073 | 2348.3 | 10.904 | 2359.2 | 0.00 | 0.4687 |
| 2.6582798 | 57.4747 | 28.862 | 2319.6 | 10.892 | 2330.5 | 0.00 | 0.4664 |
| 2.6715712 | 57.5380 | 28.652 | 2291.3 | 10.879 | 2302.2 | 0.00 | 0.4641 |
| 2.6849291 | 57.5399 | 28.444 | 2263.3 | 10.866 | 2274.2 | 0.00 | 0.4618 |
| 2.6983537 | 57.4535 | 28.238 | 2235.7 | 10.853 | 2246.6 | 0.00 | 0.4595 |
| 2.7118455 | 57.2210 | 28.033 | 2208.5 | 10.839 | 2219.3 | 0.00 | 0.4572 |
| 2.7254047 | 56.6801 | 27.830 | 2181.5 | 10.826 | 2192.4 | 0.00 | 0.4549 |
| 2.7390317 | 54.8263 | 27.628 | 2155.0 | 10.812 | 2165.8 | 0.00 | 0.4527 |
| 2.7404353 | 54.2320 | 27.607 | 2152.2 | 10.811 | 2163.1 | 0.00 | 0.4524 |
| 2.7455647 | 54.2566 | 32.004 | 2490.4 | 10.806 | 2501.2 | 0.00 | 0.4516 |
| 2.7527269 | 56.2907 | 31.894 | 2475.3 | 10.798 | 2486.1 | 0.00 | 0.4504 |
| 2.7664905 | 57.7964 | 31.684 | 2446.8 | 10.785 | 2457.6 | 0.00 | 0.4482 |
| 2.7803230 | 58.6963 | 31.476 | 2418.7 | 10.771 | 2429.4 | 0.00 | 0.4459 |
| 2.7942246 | 59.3792 | 31.270 | 2390.8 | 10.756 | 2401.6 | 0.00 | 0.4437 |
| 2.8081957 | 59.9469 | 31.064 | 2363.3 | 10.742 | 2374.1 | 0.00 | 0.4415 |
| 2.8222367 | 60.4418 | 30.861 | 2336.2 | 10.728 | 2346.9 | 0.00 | 0.4393 |
| 2.8363479 | 60.8855 | 30.659 | 2309.3 | 10.713 | 2320.0 | 0.00 | 0.4371 |
| 2.8505296 | 61.2908 | 30.458 | 2282.8 | 10.698 | 2293.5 | 0.00 | 0.4350 |
| 2.8647823 | 61.6661 | 30.259 | 2256.6 | 10.683 | 2267.3 | 0.00 | 0.4328 |
| 2.8791062 | 62.0157 | 30.055 | 2230.2 | 10.668 | 2240.9 | 0.00 | 0.4306 |
| 2.8935017 | 62.3422 | 29.851 | 2204.1 | 10.653 | 2214.7 | 0.00 | 0.4285 |
| 2.9079692 | 62.6487 | 29.649 | 2178.3 | 10.638 | 2188.9 | 0.00 | 0.4264 |
| 2.9225091 | 62.9375 | 29.448 | 2152.7 | 10.622 | 2163.4 | 0.00 | 0.4242 |
| 2.9371216 | 63.2102 | 29.249 | 2127.5 | 10.607 | 2138.1 | 0.00 | 0.4221 |
| 2.9518072 | 63.4683 | 29.051 | 2102.6 | 10.591 | 2113.2 | 0.00 | 0.4200 |
| 2.9665662 | 63.7128 | 28.854 | 2078.0 | 10.575 | 2088.5 | 0.00 | 0.4179 |
| 2.9813991 | 63.9446 | 28.658 | 2053.6 | 10.559 | 2064.1 | 0.00 | 0.4159 |
| 2.9963061 | 64.1630 | 28.460 | 2029.2 | 10.543 | 2039.8 | 0.00 | 0.4138 |
| 3.0112876 | 64.3822 | 28.244 | 2003.8 | 10.527 | 2014.3 | 0.00 | 0.4117 |
| 3.0263440 | 64.5811 | 28.023 | 1978.3 | 10.511 | 1988.8 | 0.00 | 0.4097 |
| 3.0414758 | 64.7577 | 27.805 | 1953.1 | 10.494 | 1963.6 | 0.00 | 0.4076 |
| 3.0566831 | 64.9116 | 27.587 | 1928.2 | 10.478 | 1938.6 | 0.00 | 0.4056 |
| 3.0719666 | 65.0396 | 27.372 | 1903.6 | 10.461 | 1914.0 | 0.00 | 0.4036 |
| 3.0873264 | 65.1351 | 27.158 | 1879.3 | 10.444 | 1889.7 | 0.00 | 0.4016 |
| 3.1027630 | 65.1847 | 26.945 | 1855.3 | 10.427 | 1865.7 | 0.00 | 0.3996 |
| 3.1182768 | 65.1563 | 26.734 | 1831.6 | 10.410 | 1842.0 | 0.00 | 0.3976 |
| 3.1338682 | 64.9396 | 26.525 | 1808.3 | 10.393 | 1818.6 | 0.00 | 0.3956 |
| 3.1431727 | 64.4455 | 26.401 | 1794.5 | 10.383 | 1804.9 | 0.00 | 0.3945 |
| 3.1495376 | 63.9561 | 28.058 | 1903.2 | 10.375 | 1913.6 | 0.00 | 0.3937 |
| 3.1524272 | 64.5350 | 28.018 | 1898.8 | 10.372 | 1909.1 | 0.00 | 0.3933 |
| 3.1652853 | 65.4239 | 27.839 | 1879.0 | 10.358 | 1889.4 | 0.00 | 0.3917 |
| 3.1811117 | 65.9569 | 27.623 | 1855.1 | 10.340 | 1865.5 | 0.00 | 0.3898 |
| 3.1970172 | 66.3394 | 27.408 | 1831.5 | 10.323 | 1841.9 | 0.00 | 0.3878 |
| 3.2130023 | 66.6525 | 27.195 | 1808.3 | 10.305 | 1818.6 | 0.00 | 0.3859 |
| 3.2290673 | 66.9232 | 26.983 | 1785.3 | 10.287 | 1795.5 | 0.00 | 0.3840 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Au ($Z=79$) | | | | | | | |
| 3.2452127 | 67.1635 | 26.773 | 1762.6 | 10.269 | 1772.8 | 0.00 | 0.3821 |
| 3.2614387 | 67.3798 | 26.565 | 1740.2 | 10.251 | 1750.4 | 0.00 | 0.3802 |
| 3.2777459 | 67.5756 | 26.358 | 1718.0 | 10.232 | 1728.3 | 0.00 | 0.3783 |
| 3.2941347 | 67.7524 | 26.153 | 1696.2 | 10.214 | 1706.4 | 0.00 | 0.3764 |
| 3.3106053 | 67.9105 | 25.953 | 1674.8 | 10.195 | 1685.0 | 0.00 | 0.3745 |
| 3.3271584 | 68.0521 | 25.756 | 1653.8 | 10.177 | 1664.0 | 0.00 | 0.3726 |
| 3.3437941 | 68.1757 | 25.562 | 1633.2 | 10.158 | 1643.4 | 0.00 | 0.3708 |
| 3.3605131 | 68.2767 | 25.369 | 1612.8 | 10.139 | 1623.0 | 0.00 | 0.3689 |
| 3.3773157 | 68.3466 | 25.179 | 1592.7 | 10.120 | 1602.9 | 0.00 | 0.3671 |
| 3.3942023 | 68.3634 | 24.990 | 1572.9 | 10.101 | 1583.0 | 0.00 | 0.3653 |
| 3.4111733 | 68.2480 | 24.802 | 1553.4 | 10.082 | 1563.5 | 0.00 | 0.3635 |
| 3.4177420 | 68.0844 | 24.731 | 1545.9 | 10.074 | 1556.0 | 0.00 | 0.3628 |
| 3.4282291 | 67.9097 | 25.703 | 1601.8 | 10.062 | 1611.8 | 0.00 | 0.3617 |
| 3.4320581 | 68.2092 | 25.662 | 1597.4 | 10.058 | 1607.5 | 0.00 | 0.3613 |
| 3.4453703 | 68.6908 | 25.518 | 1582.3 | 10.043 | 1592.4 | 0.00 | 0.3599 |
| 3.4625971 | 69.0500 | 25.335 | 1563.2 | 10.024 | 1573.2 | 0.00 | 0.3581 |
| 3.4799101 | 69.3243 | 25.153 | 1544.2 | 10.004 | 1554.2 | 0.00 | 0.3563 |
| 3.4973097 | 69.5588 | 24.973 | 1525.6 | 9.9842 | 1535.5 | 0.00 | 0.3545 |
| 3.5147962 | 69.7692 | 24.795 | 1507.1 | 9.9643 | 1517.1 | 0.00 | 0.3527 |
| 3.5323702 | 69.9630 | 24.618 | 1488.9 | 9.9444 | 1498.9 | 0.00 | 0.3510 |
| 3.5500321 | 70.1445 | 24.443 | 1471.0 | 9.9243 | 1480.9 | 0.00 | 0.3492 |
| 3.5677822 | 70.3163 | 24.269 | 1453.3 | 9.9042 | 1463.2 | 0.00 | 0.3475 |
| 3.5856211 | 70.4792 | 24.094 | 1435.6 | 9.8839 | 1445.5 | 0.00 | 0.3458 |
| 3.6035492 | 70.6344 | 23.920 | 1418.1 | 9.8636 | 1428.0 | 0.00 | 0.3441 |
| 3.6215670 | 70.7828 | 23.748 | 1400.9 | 9.8431 | 1410.7 | 0.00 | 0.3423 |
| 3.6396748 | 70.9251 | 23.577 | 1383.9 | 9.8226 | 1393.7 | 0.00 | 0.3406 |
| 3.6578732 | 71.0619 | 23.407 | 1367.1 | 9.8020 | 1376.9 | 0.00 | 0.3390 |
| 3.6761626 | 71.1939 | 23.239 | 1350.6 | 9.7812 | 1360.3 | 0.00 | 0.3373 |
| 3.6945434 | 71.3213 | 23.073 | 1334.2 | 9.7604 | 1344.0 | 0.00 | 0.3356 |
| 3.7130161 | 71.4445 | 22.908 | 1318.1 | 9.7395 | 1327.8 | 0.00 | 0.3339 |
| 3.7315812 | 71.5639 | 22.744 | 1302.2 | 9.7185 | 1311.9 | 0.00 | 0.3323 |
| 3.7502391 | 71.6797 | 22.582 | 1286.4 | 9.6974 | 1296.1 | 0.00 | 0.3306 |
| 3.7689903 | 71.7921 | 22.421 | 1270.9 | 9.6762 | 1280.6 | 0.00 | 0.3290 |
| 3.7878352 | 71.9013 | 22.262 | 1255.6 | 9.6549 | 1265.3 | 0.00 | 0.3273 |
| 3.8067744 | 72.0075 | 22.104 | 1240.5 | 9.6335 | 1250.1 | 0.00 | 0.3257 |
| 3.8258083 | 72.1108 | 21.947 | 1225.6 | 9.6120 | 1235.2 | 0.00 | 0.3241 |
| 3.8449373 | 72.2114 | 21.792 | 1210.8 | 9.5905 | 1220.4 | 0.00 | 0.3225 |
| 3.8641620 | 72.3095 | 21.638 | 1196.3 | 9.5688 | 1205.9 | 0.00 | 0.3209 |
| 3.8834828 | 72.4051 | 21.485 | 1181.9 | 9.5471 | 1191.5 | 0.00 | 0.3193 |
| 3.9029002 | 72.4984 | 21.333 | 1167.8 | 9.5253 | 1177.3 | 0.00 | 0.3177 |
| 3.9224147 | 72.5895 | 21.183 | 1153.8 | 9.5034 | 1163.3 | 0.00 | 0.3161 |
| 3.9420268 | 72.6785 | 21.034 | 1140.0 | 9.4814 | 1149.4 | 0.00 | 0.3145 |
| 3.9617369 | 72.7655 | 20.886 | 1126.3 | 9.4593 | 1135.8 | 0.00 | 0.3130 |
| 3.9815456 | 72.8506 | 20.740 | 1112.9 | 9.4372 | 1122.3 | 0.00 | 0.3114 |
| 4.0014533 | 72.9338 | 20.595 | 1099.6 | 9.4150 | 1109.0 | 0.00 | 0.3098 |
| 4.0214606 | 73.0154 | 20.451 | 1086.4 | 9.3927 | 1095.8 | 0.00 | 0.3083 |
| 4.0415679 | 73.0954 | 20.308 | 1073.5 | 9.3703 | 1082.9 | 0.00 | 0.3068 |
| 4.0617757 | 73.1740 | 20.166 | 1060.7 | 9.3478 | 1070.0 | 0.00 | 0.3052 |
| 4.0820846 | 73.2512 | 20.025 | 1048.1 | 9.3253 | 1057.4 | 0.00 | 0.3037 |
| 4.1024950 | 73.3271 | 19.884 | 1035.5 | 9.3027 | 1044.8 | 0.00 | 0.3022 |
| 4.1230075 | 73.4010 | 19.743 | 1023.0 | 9.2800 | 1032.3 | 0.00 | 0.3007 |
| 4.1436226 | 73.4730 | 19.603 | 1010.7 | 9.2573 | 1020.0 | 0.00 | 0.2992 |
| 4.1643407 | 73.5433 | 19.464 | 998.57 | 9.2344 | 1007.8 | 0.00 | 0.2977 |
| 4.1851624 | 73.6120 | 19.326 | 986.57 | 9.2115 | 995.78 | 0.00 | 0.2962 |
| 4.2060882 | 73.6791 | 19.190 | 974.71 | 9.1886 | 983.90 | 0.00 | 0.2948 |
| 4.2271186 | 73.7447 | 19.054 | 963.01 | 9.1655 | 972.17 | 0.00 | 0.2933 |
| 4.2482542 | 73.8090 | 18.919 | 951.45 | 9.1424 | 960.59 | 0.00 | 0.2918 |
| 4.2694955 | 73.8719 | 18.786 | 940.03 | 9.1192 | 949.15 | 0.00 | 0.2904 |
| 4.2908430 | 73.9335 | 18.653 | 928.75 | 9.0960 | 937.85 | 0.00 | 0.2890 |
| 4.3122972 | 73.9939 | 18.522 | 917.61 | 9.0727 | 926.69 | 0.00 | 0.2875 |
| 4.3338587 | 74.0532 | 18.391 | 906.62 | 9.0493 | 915.67 | 0.00 | 0.2861 |
| 4.3555280 | 74.1114 | 18.262 | 895.76 | 9.0259 | 904.78 | 0.00 | 0.2847 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Au ($Z=79$) | | | | | | | |
| 4.3773056 | 74.1685 | 18.133 | 885.03 | 9.0024 | 894.03 | 0.00 | 0.2832 |
| 4.3991921 | 74.2247 | 18.006 | 874.43 | 8.9788 | 883.41 | 0.00 | 0.2818 |
| 4.4211881 | 74.4747 | 17.876 | 863.80 | 8.9552 | 872.75 | 0.00 | 0.2804 |
| 4.4432940 | 74.5292 | 17.742 | 853.09 | 8.9315 | 862.02 | 0.00 | 0.2790 |
| 4.4655105 | 74.5820 | 17.610 | 842.49 | 8.9077 | 851.40 | 0.00 | 0.2776 |
| 4.4878381 | 74.6330 | 17.478 | 832.03 | 8.8839 | 840.91 | 0.00 | 0.2763 |
| 4.5102772 | 74.6823 | 17.347 | 821.70 | 8.8600 | 830.56 | 0.00 | 0.2749 |
| 4.5328286 | 74.7301 | 17.218 | 811.50 | 8.8361 | 820.34 | 0.00 | 0.2735 |
| 4.5554928 | 74.7765 | 17.089 | 801.44 | 8.8121 | 810.25 | 0.00 | 0.2722 |
| 4.5782702 | 74.8214 | 16.962 | 791.50 | 8.7881 | 800.29 | 0.00 | 0.2708 |
| 4.6011616 | 74.9982 | 16.831 | 781.50 | 8.7640 | 790.27 | 0.00 | 0.2695 |
| 4.6241674 | 75.0404 | 16.701 | 771.60 | 8.7399 | 780.34 | 0.00 | 0.2681 |
| 4.6472882 | 75.0809 | 16.572 | 761.83 | 8.7157 | 770.54 | 0.00 | 0.2668 |
| 4.6705247 | 75.1197 | 16.444 | 752.18 | 8.6914 | 760.87 | 0.00 | 0.2655 |
| 4.6938773 | 75.1570 | 16.317 | 742.67 | 8.6671 | 751.34 | 0.00 | 0.2641 |
| 4.7173467 | 75.1929 | 16.191 | 733.28 | 8.6428 | 741.93 | 0.00 | 0.2628 |
| 4.7409334 | 75.2273 | 16.067 | 724.02 | 8.6184 | 732.64 | 0.00 | 0.2615 |
| 4.7646381 | 75.2604 | 15.943 | 714.89 | 8.5939 | 723.48 | 0.00 | 0.2602 |
| 4.7884613 | 75.2922 | 15.821 | 705.87 | 8.5695 | 714.44 | 0.00 | 0.2589 |
| 4.8124036 | 75.3228 | 15.700 | 696.98 | 8.5449 | 705.52 | 0.00 | 0.2576 |
| 4.8364656 | 75.3522 | 15.580 | 688.20 | 8.5203 | 696.72 | 0.00 | 0.2564 |
| 4.8606479 | 75.3804 | 15.460 | 679.54 | 8.4957 | 688.04 | 0.00 | 0.2551 |
| 4.8849512 | 75.4076 | 15.342 | 671.00 | 8.4710 | 679.47 | 0.00 | 0.2538 |
| 4.9093759 | 75.4337 | 15.225 | 662.57 | 8.4463 | 671.01 | 0.00 | 0.2525 |
| 4.9339228 | 75.4588 | 15.109 | 654.25 | 8.4216 | 662.67 | 0.00 | 0.2513 |
| 4.9585924 | 75.4830 | 14.994 | 646.04 | 8.3968 | 654.44 | 0.00 | 0.2500 |
| 4.9833854 | 75.5061 | 14.881 | 637.94 | 8.3719 | 646.31 | 0.00 | 0.2488 |
| 5.0083023 | 75.5284 | 14.768 | 629.95 | 8.3471 | 638.30 | 0.00 | 0.2476 |
| 5.0333438 | 75.5498 | 14.656 | 622.07 | 8.3222 | 630.39 | 0.00 | 0.2463 |
| 5.0585105 | 75.5703 | 14.545 | 614.29 | 8.2972 | 622.58 | 0.00 | 0.2451 |
| 5.0838031 | 75.5900 | 14.435 | 606.61 | 8.2722 | 614.88 | 0.00 | 0.2439 |
| 5.1092221 | 75.6090 | 14.326 | 599.03 | 8.2472 | 607.28 | 0.00 | 0.2427 |
| 5.1347682 | 75.6271 | 14.218 | 591.56 | 8.2221 | 599.78 | 0.00 | 0.2415 |
| 5.1604421 | 75.6445 | 14.111 | 584.18 | 8.1971 | 592.38 | 0.00 | 0.2403 |
| 5.1862443 | 75.6612 | 14.005 | 576.90 | 8.1719 | 585.08 | 0.00 | 0.2391 |
| 5.2121755 | 75.6772 | 13.899 | 569.72 | 8.1468 | 577.87 | 0.00 | 0.2379 |
| 5.2382364 | 75.6925 | 13.795 | 562.64 | 8.1216 | 570.76 | 0.00 | 0.2367 |
| 5.2644276 | 75.7071 | 13.692 | 555.64 | 8.0964 | 563.74 | 0.00 | 0.2355 |
| 5.2907497 | 75.7212 | 13.589 | 548.74 | 8.0711 | 556.81 | 0.00 | 0.2343 |
| 5.3172034 | 75.7346 | 13.488 | 541.93 | 8.0459 | 549.98 | 0.00 | 0.2332 |
| 5.3437895 | 75.7475 | 13.387 | 535.22 | 8.0206 | 543.24 | 0.00 | 0.2320 |
| 5.3705084 | 75.7598 | 13.288 | 528.58 | 7.9952 | 536.58 | 0.00 | 0.2309 |
| 5.3973609 | 75.7716 | 13.189 | 522.04 | 7.9699 | 530.01 | 0.00 | 0.2297 |
| 5.4243477 | 75.7828 | 13.091 | 515.59 | 7.9445 | 523.53 | 0.00 | 0.2286 |
| 5.4514695 | 75.7936 | 12.994 | 509.21 | 7.9191 | 517.13 | 0.00 | 0.2274 |
| 5.4787268 | 75.8040 | 12.897 | 502.93 | 7.8937 | 510.82 | 0.00 | 0.2263 |
| 5.5061205 | 75.9134 | 12.799 | 496.61 | 7.8682 | 504.48 | 0.00 | 0.2252 |
| 5.5336511 | 75.9232 | 12.701 | 490.35 | 7.8428 | 498.19 | 0.00 | 0.2241 |
| 5.5613193 | 75.9322 | 12.603 | 484.16 | 7.8173 | 491.98 | 0.00 | 0.2229 |
| 5.5891259 | 75.9404 | 12.507 | 478.06 | 7.7918 | 485.85 | 0.00 | 0.2218 |
| 5.6170716 | 75.9478 | 12.411 | 472.04 | 7.7662 | 479.80 | 0.00 | 0.2207 |
| 5.6451569 | 75.9546 | 12.316 | 466.10 | 7.7407 | 473.84 | 0.00 | 0.2196 |
| 5.6733827 | 75.9606 | 12.222 | 460.24 | 7.7151 | 467.95 | 0.00 | 0.2185 |
| 5.7017496 | 75.9660 | 12.129 | 454.45 | 7.6895 | 462.14 | 0.00 | 0.2174 |
| 5.7302584 | 75.9708 | 12.036 | 448.75 | 7.6639 | 456.41 | 0.00 | 0.2164 |
| 5.7589096 | 75.9750 | 11.945 | 443.12 | 7.6383 | 450.75 | 0.00 | 0.2153 |
| 5.7877042 | 75.9785 | 11.854 | 437.56 | 7.6127 | 445.17 | 0.00 | 0.2142 |
| 5.8166427 | 75.9816 | 11.764 | 432.08 | 7.5871 | 439.66 | 0.00 | 0.2132 |
| 5.8457259 | 75.9841 | 11.675 | 426.67 | 7.5614 | 434.23 | 0.00 | 0.2121 |
| 5.8749546 | 75.9860 | 11.586 | 421.33 | 7.5357 | 428.87 | 0.00 | 0.2110 |
| 5.9043293 | 75.9875 | 11.499 | 416.06 | 7.5101 | 423.57 | 0.00 | 0.2100 |
| 5.9338510 | 75.9884 | 11.412 | 410.87 | 7.4844 | 418.35 | 0.00 | 0.2089 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Au ($Z=79$) | | | | | | | |
| 5.9635202 | 75.9890 | 11.326 | 405.74 | 7.4587 | 413.20 | 0.00 | 0.2079 |
| 5.9933378 | 75.9890 | 11.240 | 400.68 | 7.4330 | 408.11 | 0.00 | 0.2069 |
| 6.0233045 | 75.9886 | 11.156 | 395.69 | 7.4073 | 403.10 | 0.00 | 0.2058 |
| 6.0534210 | 75.9878 | 11.072 | 390.76 | 7.3815 | 398.14 | 0.00 | 0.2048 |
| 6.0836882 | 75.9865 | 10.989 | 385.90 | 7.3558 | 393.26 | 0.00 | 0.2038 |
| 6.1141066 | 75.9849 | 10.907 | 381.10 | 7.3301 | 388.43 | 0.00 | 0.2028 |
| 6.1446771 | 75.9829 | 10.825 | 376.37 | 7.3044 | 383.67 | 0.00 | 0.2018 |
| 6.1754005 | 75.9805 | 10.744 | 371.70 | 7.2786 | 378.98 | 0.00 | 0.2008 |
| 6.2062775 | 75.9777 | 10.664 | 367.09 | 7.2529 | 374.34 | 0.00 | 0.1998 |
| 6.2373089 | 75.9746 | 10.584 | 362.54 | 7.2271 | 369.77 | 0.00 | 0.1988 |
| 6.2684954 | 75.9712 | 10.506 | 358.05 | 7.2014 | 365.25 | 0.00 | 0.1978 |
| 6.2998379 | 76.0088 | 10.427 | 353.59 | 7.1756 | 360.77 | 0.00 | 0.1968 |
| 6.3313371 | 76.0049 | 10.347 | 349.14 | 7.1499 | 356.29 | 0.00 | 0.1958 |
| 6.3629938 | 76.0006 | 10.268 | 344.76 | 7.1241 | 351.88 | 0.00 | 0.1949 |
| 6.3948088 | 75.9959 | 10.190 | 340.43 | 7.0984 | 347.53 | 0.00 | 0.1939 |
| 6.4267828 | 75.9906 | 10.112 | 336.16 | 7.0726 | 343.23 | 0.00 | 0.1929 |
| 6.4589167 | 75.9849 | 10.035 | 331.94 | 7.0469 | 338.99 | 0.00 | 0.1920 |
| 6.4912113 | 75.9788 | 9.9592 | 327.78 | 7.0212 | 334.80 | 0.00 | 0.1910 |
| 6.5236674 | 75.9722 | 9.8836 | 323.68 | 6.9954 | 330.67 | 0.00 | 0.1901 |
| 6.5562857 | 75.9653 | 9.8088 | 319.63 | 6.9697 | 326.60 | 0.00 | 0.1891 |
| 6.5890671 | 75.9579 | 9.7346 | 315.63 | 6.9440 | 322.57 | 0.00 | 0.1882 |
| 6.6220125 | 75.9502 | 9.6608 | 311.68 | 6.9183 | 318.60 | 0.00 | 0.1872 |
| 6.6551225 | 75.9421 | 9.5874 | 307.77 | 6.8926 | 314.67 | 0.00 | 0.1863 |
| 6.6883981 | 75.9337 | 9.5146 | 303.92 | 6.8669 | 310.78 | 0.00 | 0.1854 |
| 6.7218401 | 75.9248 | 9.4424 | 300.11 | 6.8412 | 306.95 | 0.00 | 0.1844 |
| 6.7554493 | 75.9156 | 9.3709 | 296.36 | 6.8155 | 303.17 | 0.00 | 0.1835 |
| 6.7892266 | 75.9061 | 9.3000 | 292.65 | 6.7898 | 299.44 | 0.00 | 0.1826 |
| 6.8231727 | 75.8961 | 9.2297 | 288.99 | 6.7641 | 295.76 | 0.00 | 0.1817 |
| 6.8572886 | 75.9023 | 9.1600 | 285.38 | 6.7385 | 292.12 | 0.00 | 0.1808 |
| 6.8915750 | 75.8919 | 9.0904 | 281.81 | 6.7129 | 288.52 | 0.00 | 0.1799 |
| 6.9260329 | 75.8810 | 9.0214 | 278.28 | 6.6872 | 284.96 | 0.00 | 0.1790 |
| 6.9606631 | 75.8698 | 8.9530 | 274.79 | 6.6616 | 281.45 | 0.00 | 0.1781 |
| 6.9954664 | 75.8583 | 8.8852 | 271.36 | 6.6360 | 277.99 | 0.00 | 0.1772 |
| 7.0304437 | 75.8463 | 8.8181 | 267.96 | 6.6104 | 274.57 | 0.00 | 0.1764 |
| 7.0655959 | 75.8340 | 8.7515 | 264.62 | 6.5849 | 271.20 | 0.00 | 0.1755 |
| 7.1009239 | 75.8214 | 8.6855 | 261.31 | 6.5593 | 267.87 | 0.00 | 0.1746 |
| 7.1364285 | 75.8084 | 8.6200 | 258.06 | 6.5338 | 264.59 | 0.00 | 0.1737 |
| 7.1721107 | 75.7951 | 8.5551 | 254.84 | 6.5083 | 261.35 | 0.00 | 0.1729 |
| 7.2079712 | 75.7815 | 8.4908 | 251.67 | 6.4828 | 258.15 | 0.00 | 0.1720 |
| 7.2440111 | 75.7676 | 8.4271 | 248.53 | 6.4573 | 254.99 | 0.00 | 0.1712 |
| 7.2802311 | 75.7533 | 8.3639 | 245.44 | 6.4318 | 251.87 | 0.00 | 0.1703 |
| 7.3166323 | 75.7387 | 8.3012 | 242.39 | 6.4064 | 248.80 | 0.00 | 0.1695 |
| 7.3532155 | 75.7238 | 8.2391 | 239.38 | 6.3810 | 245.76 | 0.00 | 0.1686 |
| 7.3899815 | 75.7086 | 8.1776 | 236.41 | 6.3556 | 242.77 | 0.00 | 0.1678 |
| 7.4269314 | 75.6931 | 8.1165 | 233.48 | 6.3302 | 239.81 | 0.00 | 0.1669 |
| 7.4640661 | 75.6773 | 8.0560 | 230.59 | 6.3048 | 236.89 | 0.00 | 0.1661 |
| 7.5013864 | 75.6611 | 7.9961 | 227.73 | 6.2795 | 234.01 | 0.00 | 0.1653 |
| 7.5388934 | 75.6447 | 7.9366 | 224.91 | 6.2542 | 231.17 | 0.00 | 0.1645 |
| 7.5765878 | 75.6280 | 7.8776 | 222.13 | 6.2289 | 228.36 | 0.00 | 0.1636 |
| 7.6144708 | 75.6110 | 7.8192 | 219.39 | 6.2037 | 225.59 | 0.00 | 0.1628 |
| 7.6525431 | 75.5937 | 7.7613 | 216.68 | 6.1784 | 222.86 | 0.00 | 0.1620 |
| 7.6908058 | 75.5761 | 7.7038 | 214.00 | 6.1532 | 220.16 | 0.00 | 0.1612 |
| 7.7292599 | 75.5582 | 7.6469 | 211.36 | 6.1280 | 217.49 | 0.00 | 0.1604 |
| 7.7679062 | 75.5400 | 7.5904 | 208.76 | 6.1029 | 214.86 | 0.00 | 0.1596 |
| 7.8067457 | 75.5215 | 7.5344 | 206.19 | 6.0778 | 212.27 | 0.00 | 0.1588 |
| 7.8457794 | 75.5028 | 7.4789 | 203.65 | 6.0527 | 209.70 | 0.00 | 0.1580 |
| 7.8850083 | 75.4837 | 7.4239 | 201.15 | 6.0276 | 207.18 | 0.00 | 0.1572 |
| 7.9244334 | 75.4644 | 7.3693 | 198.68 | 6.0026 | 204.68 | 0.00 | 0.1565 |
| 7.9640555 | 75.4447 | 7.3152 | 196.24 | 5.9775 | 202.21 | 0.00 | 0.1557 |
| 8.0038758 | 75.4248 | 7.2616 | 193.83 | 5.9526 | 199.78 | 0.00 | 0.1549 |
| 8.0438952 | 75.4046 | 7.2084 | 191.45 | 5.9276 | 197.38 | 0.00 | 0.1541 |
| 8.0841147 | 75.3841 | 7.1557 | 189.11 | 5.9027 | 195.01 | 0.00 | 0.1534 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Au ($Z=79$) | | | | | | | |
| 8.1245352 | 75.3633 | 7.1035 | 186.79 | 5.8778 | 192.67 | 0.00 | 0.1526 |
| 8.1651579 | 75.3422 | 7.0516 | 184.51 | 5.8530 | 190.36 | 0.00 | 0.1518 |
| 8.2059837 | 75.3208 | 7.0002 | 182.25 | 5.8282 | 188.08 | 0.00 | 0.1511 |
| 8.2470136 | 75.2992 | 6.9493 | 180.02 | 5.8034 | 185.83 | 0.00 | 0.1503 |
| 8.2882487 | 75.2772 | 6.8988 | 177.83 | 5.7786 | 183.60 | 0.00 | 0.1496 |
| 8.3296899 | 75.2550 | 6.8487 | 175.66 | 5.7539 | 181.41 | 0.00 | 0.1488 |
| 8.3713384 | 75.2325 | 6.7990 | 173.52 | 5.7293 | 179.24 | 0.00 | 0.1481 |
| 8.4131951 | 75.2097 | 6.7498 | 171.40 | 5.7046 | 177.11 | 0.00 | 0.1474 |
| 8.4552610 | 75.1867 | 6.7009 | 169.31 | 5.6800 | 174.99 | 0.00 | 0.1466 |
| 8.4975373 | 75.1634 | 6.6525 | 167.25 | 5.6555 | 172.91 | 0.00 | 0.1459 |
| 8.5400250 | 75.1399 | 6.6045 | 165.22 | 5.6309 | 170.85 | 0.00 | 0.1452 |
| Hg ($Z=80$) | | | | | | | |
| Atomic weight: $A_r=200.5900 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^3)=13.522$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1})=[\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 333.088 E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1})=f_2 (e \text{ atom}^{-1}) \times 2.09783 \times 10^5$ | | | | | | | |
| 22 edges. Edge energies (keV) | | | | | | | |
| K | 83.1023 | L I | 14.8393 | L II | 14.2087 | L III | 12.2839 |
| M I | 3.56160 | M II | 3.27850 | M III | 2.84710 | M IV | 2.38490 |
| M V | 2.29490 | N I | 0.800300 | N II | 0.676900 | N III | 0.571000 |
| N IV | 0.378300 | N V | 0.359800 | N VI | 0.102200 | N VII | 0.0985000 |
| O I | 0.120300 | O II | 0.0805000 | O III | 0.0576000 | O IV | 0.00640000 |
| O V | 0.00640000 | P I | 0.00771361 | | | | |
| Relativistic correction estimate: $f_{\text{rel}} (\text{H82,3/5CL})=(-1.7805, -1.0458) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.017503 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 35.5563 | 30.041 | 12604 | 6.4360 | 12611 | 0.00 | 2.480 |
| 0.50250000 | 35.7355 | 30.007 | 12527 | 6.4653 | 12534 | 0.00 | 2.467 |
| 0.50501250 | 35.9127 | 29.972 | 12450 | 6.4947 | 12457 | 0.00 | 2.455 |
| 0.50753756 | 36.0877 | 29.935 | 12373 | 6.5241 | 12380 | 0.00 | 2.443 |
| 0.51007525 | 36.2605 | 29.896 | 12296 | 6.5535 | 12302 | 0.00 | 2.431 |
| 0.51262563 | 36.4309 | 29.856 | 12218 | 6.5830 | 12224 | 0.00 | 2.419 |
| 0.51518875 | 36.5988 | 29.814 | 12140 | 6.6124 | 12147 | 0.00 | 2.407 |
| 0.51776470 | 36.7641 | 29.771 | 12062 | 6.6418 | 12069 | 0.00 | 2.395 |
| 0.52035352 | 36.9267 | 29.726 | 11984 | 6.6712 | 11991 | 0.00 | 2.383 |
| 0.52295529 | 37.0863 | 29.680 | 11906 | 6.7007 | 11913 | 0.00 | 2.371 |
| 0.52557007 | 37.2427 | 29.632 | 11828 | 6.7301 | 11834 | 0.00 | 2.359 |
| 0.52819792 | 37.3958 | 29.583 | 11749 | 6.7595 | 11756 | 0.00 | 2.347 |
| 0.53083891 | 37.5452 | 29.533 | 11671 | 6.7890 | 11678 | 0.00 | 2.336 |
| 0.53349310 | 37.6906 | 29.481 | 11593 | 6.8184 | 11600 | 0.00 | 2.324 |
| 0.53616057 | 37.8316 | 29.428 | 11514 | 6.8478 | 11521 | 0.00 | 2.312 |
| 0.53884137 | 37.9677 | 29.374 | 11436 | 6.8773 | 11443 | 0.00 | 2.301 |
| 0.54153558 | 38.0981 | 29.319 | 11358 | 6.9067 | 11365 | 0.00 | 2.289 |
| 0.54424325 | 38.2222 | 29.262 | 11279 | 6.9361 | 11286 | 0.00 | 2.278 |
| 0.54696447 | 38.3387 | 29.204 | 11201 | 6.9655 | 11208 | 0.00 | 2.267 |
| 0.54969929 | 38.4461 | 29.146 | 11123 | 6.9949 | 11130 | 0.00 | 2.255 |
| 0.55244779 | 38.5423 | 29.085 | 11045 | 7.0243 | 11052 | 0.00 | 2.244 |
| 0.55521003 | 38.6240 | 29.024 | 10967 | 7.0537 | 10974 | 0.00 | 2.233 |
| 0.55798608 | 38.6861 | 28.962 | 10889 | 7.0831 | 10896 | 0.00 | 2.222 |
| 0.56077601 | 38.7198 | 28.899 | 10811 | 7.1124 | 10818 | 0.00 | 2.211 |
| 0.56357989 | 38.7072 | 28.835 | 10733 | 7.1418 | 10740 | 0.00 | 2.200 |
| 0.56639779 | 38.6046 | 28.769 | 10656 | 7.1711 | 10663 | 0.00 | 2.189 |
| 0.56922978 | 38.2315 | 28.703 | 10578 | 7.2005 | 10585 | 0.00 | 2.178 |
| 0.57028052 | 37.7853 | 28.678 | 10550 | 7.2113 | 10557 | 0.00 | 2.174 |
| 0.57171944 | 37.8670 | 30.411 | 11159 | 7.2261 | 11166 | 0.00 | 2.169 |
| 0.57207593 | 38.1133 | 30.402 | 11149 | 7.2298 | 11156 | 0.00 | 2.167 |
| 0.57493630 | 39.0033 | 30.336 | 11069 | 7.2590 | 11076 | 0.00 | 2.156 |
| 0.57781099 | 39.4715 | 30.270 | 10990 | 7.2883 | 10997 | 0.00 | 2.146 |
| 0.58070004 | 39.8291 | 30.202 | 10911 | 7.3176 | 10918 | 0.00 | 2.135 |
| 0.58360354 | 40.1339 | 30.133 | 10832 | 7.3468 | 10839 | 0.00 | 2.124 |
| 0.58652156 | 40.4073 | 30.064 | 10753 | 7.3760 | 10760 | 0.00 | 2.114 |
| 0.58945417 | 40.6595 | 29.994 | 10675 | 7.4052 | 10682 | 0.00 | 2.103 |
| 0.59240144 | 40.8963 | 29.923 | 10596 | 7.4344 | 10604 | 0.00 | 2.093 |
| 0.59536345 | 41.1213 | 29.851 | 10518 | 7.4635 | 10526 | 0.00 | 2.082 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Hg ($Z=80$) | | | | | | | |
| 0.59834026 | 41.3368 | 29.779 | 10441 | 7.4926 | 10448 | 0.00 | 2.072 |
| 0.60133196 | 41.5444 | 29.705 | 10363 | 7.5217 | 10371 | 0.00 | 2.062 |
| 0.60433862 | 41.7452 | 29.632 | 10286 | 7.5507 | 10293 | 0.00 | 2.052 |
| 0.60736032 | 41.9402 | 29.557 | 10209 | 7.5798 | 10217 | 0.00 | 2.041 |
| 0.61039712 | 42.1300 | 29.482 | 10132 | 7.6088 | 10140 | 0.00 | 2.031 |
| 0.61344910 | 42.3150 | 29.406 | 10056 | 7.6377 | 10064 | 0.00 | 2.021 |
| 0.61651635 | 42.4957 | 29.329 | 9980.0 | 7.6667 | 9987.6 | 0.00 | 2.011 |
| 0.61959893 | 42.6724 | 29.252 | 9904.2 | 7.6956 | 9911.9 | 0.00 | 2.001 |
| 0.62269693 | 42.8453 | 29.175 | 9828.8 | 7.7244 | 9836.5 | 0.00 | 1.991 |
| 0.62581041 | 43.0146 | 29.097 | 9753.7 | 7.7533 | 9761.5 | 0.00 | 1.981 |
| 0.62893946 | 43.1805 | 29.018 | 9678.9 | 7.7821 | 9686.7 | 0.00 | 1.971 |
| 0.63208416 | 43.3430 | 28.939 | 9604.5 | 7.8108 | 9612.3 | 0.00 | 1.962 |
| 0.63524458 | 43.5022 | 28.859 | 9530.3 | 7.8395 | 9538.2 | 0.00 | 1.952 |
| 0.63842080 | 43.6582 | 28.779 | 9456.5 | 7.8682 | 9464.4 | 0.00 | 1.942 |
| 0.64161291 | 43.8108 | 28.698 | 9383.1 | 7.8968 | 9391.0 | 0.00 | 1.932 |
| 0.64482097 | 43.9600 | 28.617 | 9310.0 | 7.9254 | 9317.9 | 0.00 | 1.923 |
| 0.64804508 | 44.1056 | 28.535 | 9237.2 | 7.9540 | 9245.2 | 0.00 | 1.913 |
| 0.65128530 | 44.2475 | 28.453 | 9164.8 | 7.9825 | 9172.8 | 0.00 | 1.904 |
| 0.65454173 | 44.3851 | 28.370 | 9092.7 | 8.0109 | 9100.8 | 0.00 | 1.894 |
| 0.65781444 | 44.5179 | 28.287 | 9021.1 | 8.0393 | 9029.1 | 0.00 | 1.885 |
| 0.66110351 | 44.6448 | 28.204 | 8949.7 | 8.0677 | 8957.8 | 0.00 | 1.875 |
| 0.66440903 | 44.7640 | 28.120 | 8878.8 | 8.0960 | 8886.8 | 0.00 | 1.866 |
| 0.66773107 | 44.8721 | 28.036 | 8808.2 | 8.1243 | 8816.3 | 0.00 | 1.857 |
| 0.67106973 | 44.9604 | 27.952 | 8737.9 | 8.1525 | 8746.1 | 0.00 | 1.848 |
| 0.67442508 | 44.9967 | 27.867 | 8668.1 | 8.1807 | 8676.3 | 0.00 | 1.838 |
| 0.67594560 | 44.9425 | 27.828 | 8636.7 | 8.1933 | 8644.9 | 0.00 | 1.834 |
| 0.67779720 | 45.0110 | 28.169 | 8718.6 | 8.2088 | 8726.8 | 0.00 | 1.829 |
| 0.67785446 | 45.0209 | 28.168 | 8717.4 | 8.2092 | 8725.6 | 0.00 | 1.829 |
| 0.68118619 | 45.3418 | 28.086 | 8649.5 | 8.2368 | 8657.7 | 0.00 | 1.820 |
| 0.68459212 | 45.5509 | 28.002 | 8580.7 | 8.2648 | 8589.0 | 0.00 | 1.811 |
| 0.68801508 | 45.7317 | 27.918 | 8512.4 | 8.2927 | 8520.7 | 0.00 | 1.802 |
| 0.69145515 | 45.8990 | 27.833 | 8444.4 | 8.3206 | 8452.8 | 0.00 | 1.793 |
| 0.69491243 | 46.0577 | 27.749 | 8376.9 | 8.3484 | 8385.2 | 0.00 | 1.784 |
| 0.69838699 | 46.2104 | 27.664 | 8309.7 | 8.3762 | 8318.1 | 0.00 | 1.775 |
| 0.70187893 | 46.3584 | 27.579 | 8242.9 | 8.4039 | 8251.3 | 0.00 | 1.766 |
| 0.70538832 | 46.5024 | 27.493 | 8176.5 | 8.4315 | 8184.9 | 0.00 | 1.758 |
| 0.70891526 | 46.6431 | 27.408 | 8110.5 | 8.4591 | 8119.0 | 0.00 | 1.749 |
| 0.71245984 | 46.7807 | 27.322 | 8044.9 | 8.4866 | 8053.4 | 0.00 | 1.740 |
| 0.71602214 | 46.9156 | 27.236 | 7979.7 | 8.5140 | 7988.2 | 0.00 | 1.732 |
| 0.71960225 | 47.0479 | 27.150 | 7914.9 | 8.5414 | 7923.5 | 0.00 | 1.723 |
| 0.72320026 | 47.1777 | 27.064 | 7850.5 | 8.5687 | 7859.1 | 0.00 | 1.714 |
| 0.72681626 | 47.3052 | 26.977 | 7786.5 | 8.5959 | 7795.1 | 0.00 | 1.706 |
| 0.73045034 | 47.4305 | 26.891 | 7723.0 | 8.6231 | 7731.6 | 0.00 | 1.697 |
| 0.73410260 | 47.5535 | 26.804 | 7659.8 | 8.6502 | 7668.4 | 0.00 | 1.689 |
| 0.73777311 | 47.6742 | 26.717 | 7597.0 | 8.6772 | 7605.7 | 0.00 | 1.681 |
| 0.74146197 | 47.7928 | 26.631 | 7534.6 | 8.7042 | 7543.3 | 0.00 | 1.672 |
| 0.74516928 | 47.9091 | 26.544 | 7472.6 | 8.7310 | 7481.4 | 0.00 | 1.664 |
| 0.74889513 | 48.0231 | 26.457 | 7411.1 | 8.7578 | 7419.8 | 0.00 | 1.656 |
| 0.75263961 | 48.1347 | 26.369 | 7349.9 | 8.7846 | 7358.7 | 0.00 | 1.647 |
| 0.75640280 | 48.2437 | 26.282 | 7289.2 | 8.8112 | 7298.0 | 0.00 | 1.639 |
| 0.76018482 | 48.3501 | 26.195 | 7228.8 | 8.8378 | 7237.6 | 0.00 | 1.631 |
| 0.76398574 | 48.4535 | 26.107 | 7168.8 | 8.8642 | 7177.7 | 0.00 | 1.623 |
| 0.76780567 | 48.5536 | 26.020 | 7109.3 | 8.8906 | 7118.2 | 0.00 | 1.615 |
| 0.77164470 | 48.6500 | 25.933 | 7050.1 | 8.9170 | 7059.0 | 0.00 | 1.607 |
| 0.77550292 | 48.7418 | 25.845 | 6991.4 | 8.9432 | 7000.3 | 0.00 | 1.599 |
| 0.77938044 | 48.8280 | 25.757 | 6933.0 | 8.9693 | 6942.0 | 0.00 | 1.591 |
| 0.78327734 | 48.9068 | 25.670 | 6875.1 | 8.9954 | 6884.1 | 0.00 | 1.583 |
| 0.78719373 | 48.9748 | 25.582 | 6817.5 | 9.0214 | 6826.5 | 0.00 | 1.575 |
| 0.79112969 | 49.0250 | 25.495 | 6760.4 | 9.0473 | 6769.4 | 0.00 | 1.567 |
| 0.79508534 | 49.0382 | 25.407 | 6703.6 | 9.0731 | 6712.7 | 0.00 | 1.559 |
| 0.79906077 | 48.8992 | 25.319 | 6647.3 | 9.0988 | 6656.4 | 0.00 | 1.552 |
| 0.79906754 | 48.8984 | 25.319 | 6647.2 | 9.0988 | 6656.3 | 0.00 | 1.552 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Hg ($Z=80$) | | | | | | | |
| 0.80153246 | 48.9654 | 25.809 | 6754.8 | 9.1146 | 6763.9 | 0.00 | 1.547 |
| 0.80305607 | 49.1457 | 25.776 | 6733.4 | 9.1244 | 6742.5 | 0.00 | 1.544 |
| 0.80707135 | 49.4087 | 25.689 | 6677.3 | 9.1499 | 6686.4 | 0.00 | 1.536 |
| 0.81110671 | 49.5963 | 25.602 | 6621.6 | 9.1753 | 6630.8 | 0.00 | 1.529 |
| 0.81516224 | 49.7572 | 25.515 | 6566.3 | 9.2007 | 6575.5 | 0.00 | 1.521 |
| 0.81923806 | 49.9039 | 25.428 | 6511.4 | 9.2259 | 6520.7 | 0.00 | 1.513 |
| 0.82333425 | 50.0417 | 25.342 | 6456.9 | 9.2511 | 6466.2 | 0.00 | 1.506 |
| 0.82745092 | 50.1731 | 25.255 | 6402.8 | 9.2761 | 6412.1 | 0.00 | 1.498 |
| 0.83158817 | 50.2998 | 25.168 | 6349.1 | 9.3011 | 6358.4 | 0.00 | 1.491 |
| 0.83574611 | 50.4226 | 25.082 | 6295.8 | 9.3259 | 6305.1 | 0.00 | 1.484 |
| 0.83992484 | 50.5422 | 24.995 | 6242.9 | 9.3507 | 6252.2 | 0.00 | 1.476 |
| 0.84412447 | 50.6591 | 24.909 | 6190.3 | 9.3753 | 6199.7 | 0.00 | 1.469 |
| 0.84834509 | 50.7736 | 24.822 | 6138.2 | 9.3998 | 6147.6 | 0.00 | 1.461 |
| 0.85258682 | 50.8860 | 24.736 | 6086.4 | 9.4243 | 6095.8 | 0.00 | 1.454 |
| 0.85684975 | 50.9965 | 24.650 | 6035.0 | 9.4486 | 6044.4 | 0.00 | 1.447 |
| 0.86113400 | 51.1052 | 24.564 | 5984.0 | 9.4729 | 5993.5 | 0.00 | 1.440 |
| 0.86543967 | 51.2124 | 24.478 | 5933.4 | 9.4970 | 5942.9 | 0.00 | 1.433 |
| 0.86976687 | 51.3180 | 24.392 | 5883.1 | 9.5210 | 5892.7 | 0.00 | 1.425 |
| 0.87411570 | 51.4223 | 24.306 | 5833.3 | 9.5449 | 5842.8 | 0.00 | 1.418 |
| 0.87848628 | 51.5253 | 24.220 | 5783.8 | 9.5687 | 5793.3 | 0.00 | 1.411 |
| 0.88287871 | 51.6270 | 24.135 | 5734.7 | 9.5924 | 5744.3 | 0.00 | 1.404 |
| 0.88729310 | 51.7276 | 24.049 | 5685.9 | 9.6160 | 5695.5 | 0.00 | 1.397 |
| 0.89172957 | 51.8271 | 23.964 | 5637.5 | 9.6394 | 5647.2 | 0.00 | 1.390 |
| 0.89618822 | 51.9256 | 23.878 | 5589.5 | 9.6628 | 5599.2 | 0.00 | 1.383 |
| 0.90066916 | 52.0230 | 23.793 | 5541.9 | 9.6860 | 5551.6 | 0.00 | 1.377 |
| 0.90517250 | 52.1194 | 23.708 | 5494.6 | 9.7091 | 5504.3 | 0.00 | 1.370 |
| 0.90969837 | 52.2149 | 23.623 | 5447.7 | 9.7321 | 5457.4 | 0.00 | 1.363 |
| 0.91424686 | 52.3095 | 23.538 | 5401.1 | 9.7550 | 5410.9 | 0.00 | 1.356 |
| 0.91881809 | 52.4032 | 23.454 | 5354.9 | 9.7777 | 5364.7 | 0.00 | 1.349 |
| 0.92341218 | 52.4961 | 23.369 | 5309.0 | 9.8004 | 5318.8 | 0.00 | 1.343 |
| 0.92802924 | 52.5882 | 23.285 | 5263.6 | 9.8229 | 5273.4 | 0.00 | 1.336 |
| 0.93266939 | 52.6796 | 23.200 | 5218.4 | 9.8453 | 5228.3 | 0.00 | 1.329 |
| 0.93733274 | 52.7702 | 23.116 | 5173.6 | 9.8676 | 5183.5 | 0.00 | 1.323 |
| 0.94201940 | 52.8601 | 23.032 | 5129.2 | 9.8897 | 5139.1 | 0.00 | 1.316 |
| 0.94672950 | 52.9495 | 22.948 | 5085.1 | 9.9118 | 5095.0 | 0.00 | 1.310 |
| 0.95146315 | 53.0382 | 22.865 | 5041.3 | 9.9337 | 5051.3 | 0.00 | 1.303 |
| 0.95622046 | 53.1263 | 22.781 | 4997.9 | 9.9555 | 5007.9 | 0.00 | 1.297 |
| 0.96100156 | 53.2139 | 22.698 | 4954.9 | 9.9771 | 4964.9 | 0.00 | 1.290 |
| 0.96580657 | 53.3011 | 22.615 | 4912.1 | 9.9986 | 4922.1 | 0.00 | 1.284 |
| 0.97063560 | 53.3877 | 22.531 | 4869.6 | 10.020 | 4879.6 | 0.00 | 1.277 |
| 0.97548878 | 53.4738 | 22.447 | 4827.4 | 10.041 | 4837.4 | 0.00 | 1.271 |
| 0.98036623 | 53.5595 | 22.364 | 4785.5 | 10.062 | 4795.6 | 0.00 | 1.265 |
| 0.98526806 | 53.6449 | 22.281 | 4744.0 | 10.083 | 4754.1 | 0.00 | 1.258 |
| 0.99019440 | 53.7300 | 22.198 | 4702.8 | 10.104 | 4712.9 | 0.00 | 1.252 |
| 0.99514537 | 53.8151 | 22.115 | 4662.0 | 10.125 | 4672.1 | 0.00 | 1.246 |
| 1.0001211 | 53.9003 | 22.032 | 4621.3 | 10.146 | 4631.4 | 0.00 | 1.240 |
| 1.0051217 | 53.9836 | 21.918 | 4574.5 | 10.166 | 4584.7 | 0.00 | 1.234 |
| 1.0101473 | 54.0644 | 21.804 | 4528.2 | 10.186 | 4538.4 | 0.00 | 1.227 |
| 1.0151980 | 54.1431 | 21.692 | 4482.4 | 10.207 | 4492.7 | 0.00 | 1.221 |
| 1.0202740 | 54.2195 | 21.580 | 4437.1 | 10.227 | 4447.3 | 0.00 | 1.215 |
| 1.0253754 | 54.2940 | 21.468 | 4392.3 | 10.247 | 4402.5 | 0.00 | 1.209 |
| 1.0305023 | 54.3665 | 21.358 | 4347.9 | 10.266 | 4358.1 | 0.00 | 1.203 |
| 1.0356548 | 54.4372 | 21.248 | 4303.9 | 10.286 | 4314.2 | 0.00 | 1.197 |
| 1.0408331 | 54.5060 | 21.138 | 4260.4 | 10.305 | 4270.7 | 0.00 | 1.191 |
| 1.0460372 | 54.5731 | 21.029 | 4217.4 | 10.325 | 4227.7 | 0.00 | 1.185 |
| 1.0512674 | 54.6385 | 20.921 | 4174.8 | 10.344 | 4185.1 | 0.00 | 1.179 |
| 1.0565238 | 54.7022 | 20.813 | 4132.6 | 10.363 | 4143.0 | 0.00 | 1.174 |
| 1.0618064 | 54.7643 | 20.706 | 4090.9 | 10.382 | 4101.2 | 0.00 | 1.168 |
| 1.0671154 | 54.8248 | 20.599 | 4049.6 | 10.401 | 4060.0 | 0.00 | 1.162 |
| 1.0724510 | 54.8839 | 20.493 | 4008.7 | 10.419 | 4019.1 | 0.00 | 1.156 |
| 1.0778132 | 54.9414 | 20.388 | 3968.2 | 10.438 | 3978.7 | 0.00 | 1.150 |
| 1.0832023 | 55.0167 | 20.283 | 3928.2 | 10.456 | 3938.6 | 0.00 | 1.145 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Hg ($Z=80$) | | | | | | | |
| 1.0886183 | 55.0715 | 20.178 | 3888.5 | 10.474 | 3898.9 | 0.00 | 1.139 |
| 1.0940614 | 55.1249 | 20.074 | 3849.2 | 10.492 | 3859.7 | 0.00 | 1.133 |
| 1.0995317 | 55.1770 | 19.971 | 3810.3 | 10.510 | 3820.8 | 0.00 | 1.128 |
| 1.1050294 | 55.2278 | 19.868 | 3771.8 | 10.528 | 3782.3 | 0.00 | 1.122 |
| 1.1105545 | 55.2772 | 19.766 | 3733.7 | 10.546 | 3744.3 | 0.00 | 1.116 |
| 1.1161073 | 55.3254 | 19.664 | 3696.0 | 10.563 | 3706.6 | 0.00 | 1.111 |
| 1.1216878 | 55.3724 | 19.563 | 3658.7 | 10.580 | 3669.3 | 0.00 | 1.105 |
| 1.1272963 | 55.4182 | 19.462 | 3621.8 | 10.598 | 3632.4 | 0.00 | 1.100 |
| 1.1329328 | 55.4629 | 19.362 | 3585.3 | 10.615 | 3595.9 | 0.00 | 1.094 |
| 1.1385974 | 55.5107 | 19.263 | 3549.2 | 10.631 | 3559.8 | 0.00 | 1.089 |
| 1.1442904 | 55.5533 | 19.164 | 3513.4 | 10.648 | 3524.0 | 0.00 | 1.084 |
| 1.1500119 | 55.5945 | 19.065 | 3477.8 | 10.665 | 3488.4 | 0.00 | 1.078 |
| 1.1557619 | 55.6345 | 18.966 | 3442.6 | 10.681 | 3453.2 | 0.00 | 1.073 |
| 1.1615407 | 55.6733 | 18.868 | 3407.7 | 10.697 | 3418.4 | 0.00 | 1.067 |
| 1.1673484 | 55.7110 | 18.770 | 3373.2 | 10.713 | 3383.9 | 0.00 | 1.062 |
| 1.1731852 | 55.7474 | 18.673 | 3339.1 | 10.729 | 3349.8 | 0.00 | 1.057 |
| 1.1790511 | 55.7828 | 18.577 | 3305.3 | 10.745 | 3316.0 | 0.00 | 1.052 |
| 1.1849464 | 55.8170 | 18.481 | 3271.8 | 10.760 | 3282.6 | 0.00 | 1.046 |
| 1.1908711 | 55.8501 | 18.385 | 3238.7 | 10.776 | 3249.5 | 0.00 | 1.041 |
| 1.1968254 | 55.8821 | 18.290 | 3206.0 | 10.791 | 3216.8 | 0.00 | 1.036 |
| 1.2028096 | 55.9131 | 18.196 | 3173.6 | 10.806 | 3184.4 | 0.00 | 1.031 |
| 1.2088236 | 55.9430 | 18.102 | 3141.5 | 10.821 | 3152.3 | 0.00 | 1.026 |
| 1.2148677 | 55.9719 | 18.009 | 3109.8 | 10.836 | 3120.6 | 0.00 | 1.021 |
| 1.2209421 | 55.9997 | 17.916 | 3078.4 | 10.850 | 3089.2 | 0.00 | 1.015 |
| 1.2270468 | 56.0266 | 17.824 | 3047.3 | 10.865 | 3058.2 | 0.00 | 1.010 |
| 1.2331820 | 56.0524 | 17.732 | 3016.6 | 10.879 | 3027.4 | 0.00 | 1.005 |
| 1.2393479 | 56.0772 | 17.641 | 2986.1 | 10.893 | 2997.0 | 0.00 | 1.000 |
| 1.2455447 | 56.1011 | 17.551 | 2956.0 | 10.907 | 2966.9 | 0.00 | 0.9954 |
| 1.2517724 | 56.1240 | 17.461 | 2926.2 | 10.921 | 2937.1 | 0.00 | 0.9905 |
| 1.2580312 | 56.1460 | 17.371 | 2896.7 | 10.934 | 2907.7 | 0.00 | 0.9855 |
| 1.2643214 | 56.1670 | 17.282 | 2867.5 | 10.948 | 2878.5 | 0.00 | 0.9806 |
| 1.2706430 | 56.1870 | 17.194 | 2838.7 | 10.961 | 2849.6 | 0.00 | 0.9758 |
| 1.2769962 | 56.2061 | 17.106 | 2810.1 | 10.974 | 2821.1 | 0.00 | 0.9709 |
| 1.2833812 | 56.2244 | 17.018 | 2781.8 | 10.987 | 2792.8 | 0.00 | 0.9661 |
| 1.2897981 | 56.2417 | 16.931 | 2753.8 | 11.000 | 2764.8 | 0.00 | 0.9613 |
| 1.2962471 | 56.2581 | 16.845 | 2726.2 | 11.012 | 2737.2 | 0.00 | 0.9565 |
| 1.3027283 | 56.2736 | 16.759 | 2698.8 | 11.025 | 2709.8 | 0.00 | 0.9517 |
| 1.3092420 | 56.2882 | 16.674 | 2671.7 | 11.037 | 2682.7 | 0.00 | 0.9470 |
| 1.3157882 | 56.3020 | 16.589 | 2644.9 | 11.049 | 2655.9 | 0.00 | 0.9423 |
| 1.3223671 | 56.3149 | 16.505 | 2618.3 | 11.061 | 2629.4 | 0.00 | 0.9376 |
| 1.3289790 | 56.3269 | 16.421 | 2592.1 | 11.072 | 2603.1 | 0.00 | 0.9329 |
| 1.3356239 | 56.3381 | 16.337 | 2566.1 | 11.084 | 2577.2 | 0.00 | 0.9283 |
| 1.3423020 | 56.3485 | 16.255 | 2540.4 | 11.095 | 2551.5 | 0.00 | 0.9237 |
| 1.3490135 | 56.3581 | 16.172 | 2514.9 | 11.107 | 2526.1 | 0.00 | 0.9191 |
| 1.3557586 | 56.3668 | 16.090 | 2489.7 | 11.118 | 2500.9 | 0.00 | 0.9145 |
| 1.3625374 | 56.3746 | 16.008 | 2464.7 | 11.128 | 2475.9 | 0.00 | 0.9100 |
| 1.3693500 | 56.3815 | 15.927 | 2440.0 | 11.139 | 2451.1 | 0.00 | 0.9054 |
| 1.3761968 | 56.3876 | 15.846 | 2415.5 | 11.150 | 2426.7 | 0.00 | 0.9009 |
| 1.3830778 | 56.3927 | 15.766 | 2391.3 | 11.160 | 2402.5 | 0.00 | 0.8964 |
| 1.3899932 | 56.3970 | 15.686 | 2367.4 | 11.170 | 2378.5 | 0.00 | 0.8920 |
| 1.3969431 | 56.4005 | 15.607 | 2343.7 | 11.180 | 2354.9 | 0.00 | 0.8875 |
| 1.4039278 | 56.4031 | 15.528 | 2320.2 | 11.190 | 2331.4 | 0.00 | 0.8831 |
| 1.4109475 | 56.4049 | 15.449 | 2297.0 | 11.199 | 2308.2 | 0.00 | 0.8787 |
| 1.4180022 | 56.4059 | 15.371 | 2274.1 | 11.209 | 2285.3 | 0.00 | 0.8744 |
| 1.4250922 | 56.4060 | 15.294 | 2251.4 | 11.218 | 2262.6 | 0.00 | 0.8700 |
| 1.4322177 | 56.4054 | 15.217 | 2228.9 | 11.227 | 2240.1 | 0.00 | 0.8657 |
| 1.4393788 | 56.4040 | 15.140 | 2206.6 | 11.236 | 2217.9 | 0.00 | 0.8614 |
| 1.4465757 | 56.4015 | 15.056 | 2183.4 | 11.245 | 2194.7 | 0.00 | 0.8571 |
| 1.4538086 | 56.3975 | 14.972 | 2160.5 | 11.253 | 2171.8 | 0.00 | 0.8528 |
| 1.4610776 | 56.3921 | 14.889 | 2137.8 | 11.262 | 2149.1 | 0.00 | 0.8486 |
| 1.4683830 | 56.3854 | 14.807 | 2115.4 | 11.270 | 2126.7 | 0.00 | 0.8444 |
| 1.4757249 | 56.3773 | 14.725 | 2093.2 | 11.278 | 2104.5 | 0.00 | 0.8402 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Hg ($Z=80$) | | | | | | | |
| 1.4831035 | 56.3679 | 14.644 | 2071.3 | 11.286 | 2082.6 | 0.00 | 0.8360 |
| 1.4905190 | 56.3571 | 14.563 | 2049.7 | 11.293 | 2061.0 | 0.00 | 0.8318 |
| 1.4979716 | 56.3451 | 14.483 | 2028.2 | 11.301 | 2039.5 | 0.00 | 0.8277 |
| 1.5054615 | 56.3317 | 14.403 | 2007.0 | 11.308 | 2018.4 | 0.00 | 0.8236 |
| 1.5129888 | 56.3171 | 14.324 | 1986.1 | 11.315 | 1997.4 | 0.00 | 0.8195 |
| 1.5205537 | 56.3009 | 14.240 | 1964.6 | 11.322 | 1976.0 | 0.00 | 0.8154 |
| 1.5281565 | 56.2830 | 14.157 | 1943.4 | 11.329 | 1954.8 | 0.00 | 0.8113 |
| 1.5357973 | 56.2635 | 14.074 | 1922.5 | 11.335 | 1933.8 | 0.00 | 0.8073 |
| 1.5434763 | 56.2423 | 13.992 | 1901.7 | 11.342 | 1913.1 | 0.00 | 0.8033 |
| 1.5511937 | 56.2193 | 13.910 | 1881.2 | 11.348 | 1892.6 | 0.00 | 0.7993 |
| 1.5589496 | 56.1947 | 13.830 | 1861.0 | 11.354 | 1872.3 | 0.00 | 0.7953 |
| 1.5667444 | 56.1684 | 13.749 | 1841.0 | 11.360 | 1852.3 | 0.00 | 0.7913 |
| 1.5745781 | 56.1405 | 13.669 | 1821.2 | 11.365 | 1832.6 | 0.00 | 0.7874 |
| 1.5824510 | 56.1108 | 13.590 | 1801.6 | 11.371 | 1813.0 | 0.00 | 0.7835 |
| 1.5903633 | 56.0794 | 13.512 | 1782.3 | 11.376 | 1793.7 | 0.00 | 0.7796 |
| 1.5983151 | 56.0463 | 13.434 | 1763.2 | 11.381 | 1774.6 | 0.00 | 0.7757 |
| 1.6063066 | 56.0115 | 13.356 | 1744.3 | 11.386 | 1755.7 | 0.00 | 0.7719 |
| 1.6143382 | 55.9750 | 13.279 | 1725.6 | 11.391 | 1737.0 | 0.00 | 0.7680 |
| 1.6224099 | 55.9367 | 13.203 | 1707.2 | 11.395 | 1718.6 | 0.00 | 0.7642 |
| 1.6305219 | 55.8966 | 13.127 | 1688.9 | 11.400 | 1700.3 | 0.00 | 0.7604 |
| 1.6386745 | 55.8546 | 13.052 | 1670.9 | 11.404 | 1682.3 | 0.00 | 0.7566 |
| 1.6468679 | 55.8109 | 12.977 | 1653.0 | 11.408 | 1664.4 | 0.00 | 0.7528 |
| 1.6551022 | 55.7653 | 12.903 | 1635.4 | 11.412 | 1646.8 | 0.00 | 0.7491 |
| 1.6633777 | 55.7178 | 12.829 | 1618.0 | 11.415 | 1629.4 | 0.00 | 0.7454 |
| 1.6716946 | 55.6683 | 12.756 | 1600.8 | 11.419 | 1612.2 | 0.00 | 0.7417 |
| 1.6800531 | 55.6169 | 12.683 | 1583.7 | 11.422 | 1595.1 | 0.00 | 0.7380 |
| 1.6884534 | 55.5635 | 12.611 | 1566.9 | 11.425 | 1578.3 | 0.00 | 0.7343 |
| 1.6968956 | 55.5080 | 12.540 | 1550.2 | 11.428 | 1561.7 | 0.00 | 0.7307 |
| 1.7053801 | 55.4504 | 12.469 | 1533.8 | 11.431 | 1545.2 | 0.00 | 0.7270 |
| 1.7139070 | 55.3995 | 12.398 | 1517.5 | 11.433 | 1528.9 | 0.00 | 0.7234 |
| 1.7224766 | 55.3376 | 12.328 | 1501.4 | 11.436 | 1512.9 | 0.00 | 0.7198 |
| 1.7310889 | 55.2734 | 12.258 | 1485.5 | 11.438 | 1497.0 | 0.00 | 0.7162 |
| 1.7397444 | 55.2068 | 12.189 | 1469.8 | 11.440 | 1481.2 | 0.00 | 0.7127 |
| 1.7484431 | 55.1379 | 12.121 | 1454.3 | 11.442 | 1465.7 | 0.00 | 0.7091 |
| 1.7571853 | 55.0665 | 12.053 | 1438.9 | 11.443 | 1450.3 | 0.00 | 0.7056 |
| 1.7659712 | 54.9926 | 11.985 | 1423.7 | 11.445 | 1435.2 | 0.00 | 0.7021 |
| 1.7748011 | 54.9160 | 11.918 | 1408.7 | 11.446 | 1420.1 | 0.00 | 0.6986 |
| 1.7836751 | 54.8367 | 11.851 | 1393.8 | 11.447 | 1405.3 | 0.00 | 0.6951 |
| 1.7925935 | 54.7546 | 11.785 | 1379.2 | 11.448 | 1390.6 | 0.00 | 0.6916 |
| 1.8015565 | 54.6696 | 11.719 | 1364.6 | 11.448 | 1376.1 | 0.00 | 0.6882 |
| 1.8105642 | 54.5816 | 11.654 | 1350.3 | 11.449 | 1361.7 | 0.00 | 0.6848 |
| 1.8196171 | 54.4904 | 11.589 | 1336.1 | 11.449 | 1347.6 | 0.00 | 0.6814 |
| 1.8287151 | 54.3960 | 11.525 | 1322.1 | 11.449 | 1333.5 | 0.00 | 0.6780 |
| 1.8378587 | 54.2982 | 11.461 | 1308.2 | 11.449 | 1319.7 | 0.00 | 0.6746 |
| 1.8470480 | 54.1969 | 11.397 | 1294.5 | 11.449 | 1305.9 | 0.00 | 0.6713 |
| 1.8562833 | 54.0920 | 11.331 | 1280.6 | 11.449 | 1292.0 | 0.00 | 0.6679 |
| 1.8655647 | 53.9831 | 11.265 | 1266.7 | 11.448 | 1278.2 | 0.00 | 0.6646 |
| 1.8748925 | 53.8700 | 11.199 | 1253.0 | 11.447 | 1264.5 | 0.00 | 0.6613 |
| 1.8842670 | 53.7525 | 11.133 | 1239.5 | 11.446 | 1250.9 | 0.00 | 0.6580 |
| 1.8936883 | 53.6305 | 11.068 | 1226.1 | 11.445 | 1237.5 | 0.00 | 0.6547 |
| 1.9031567 | 53.5037 | 11.003 | 1212.9 | 11.444 | 1224.3 | 0.00 | 0.6515 |
| 1.9126725 | 53.3719 | 10.939 | 1199.8 | 11.442 | 1211.2 | 0.00 | 0.6482 |
| 1.9222359 | 53.2348 | 10.875 | 1186.8 | 11.441 | 1198.2 | 0.00 | 0.6450 |
| 1.9318471 | 53.0921 | 10.808 | 1173.7 | 11.439 | 1185.1 | 0.00 | 0.6418 |
| 1.9415063 | 52.9435 | 10.743 | 1160.8 | 11.437 | 1172.2 | 0.00 | 0.6386 |
| 1.9512138 | 52.7886 | 10.678 | 1148.0 | 11.435 | 1159.4 | 0.00 | 0.6354 |
| 1.9609699 | 52.6270 | 10.613 | 1135.4 | 11.432 | 1146.8 | 0.00 | 0.6323 |
| 1.9707747 | 52.4584 | 10.549 | 1123.0 | 11.430 | 1134.4 | 0.00 | 0.6291 |
| 1.9806286 | 52.2823 | 10.486 | 1110.7 | 11.427 | 1122.1 | 0.00 | 0.6260 |
| 1.9905318 | 52.0982 | 10.423 | 1098.5 | 11.424 | 1109.9 | 0.00 | 0.6229 |
| 2.0004844 | 51.9057 | 10.361 | 1086.5 | 11.421 | 1097.9 | 0.00 | 0.6198 |
| 2.0104868 | 51.7041 | 10.299 | 1074.7 | 11.418 | 1086.1 | 0.00 | 0.6167 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Hg ($Z=80$) | | | | | | | |
| 2.0205393 | 51.4927 | 10.238 | 1062.9 | 11.414 | 1074.4 | 0.00 | 0.6136 |
| 2.0306420 | 51.2709 | 10.177 | 1051.4 | 11.410 | 1062.8 | 0.00 | 0.6106 |
| 2.0407952 | 51.0388 | 10.117 | 1040.0 | 11.407 | 1051.4 | 0.00 | 0.6075 |
| 2.0509992 | 50.7935 | 10.057 | 1028.7 | 11.403 | 1040.1 | 0.00 | 0.6045 |
| 2.0612542 | 50.5350 | 9.9978 | 1017.5 | 11.398 | 1028.9 | 0.00 | 0.6015 |
| 2.0715604 | 50.2621 | 9.9390 | 1006.5 | 11.394 | 1017.9 | 0.00 | 0.5985 |
| 2.0819182 | 49.9733 | 9.8808 | 995.63 | 11.389 | 1007.0 | 0.00 | 0.5955 |
| 2.0923278 | 49.6672 | 9.8230 | 984.88 | 11.385 | 996.26 | 0.00 | 0.5926 |
| 2.1027895 | 49.3418 | 9.7657 | 974.26 | 11.380 | 985.64 | 0.00 | 0.5896 |
| 2.1133034 | 48.9950 | 9.7088 | 963.77 | 11.375 | 975.15 | 0.00 | 0.5867 |
| 2.1238699 | 48.6243 | 9.6524 | 953.41 | 11.370 | 964.78 | 0.00 | 0.5838 |
| 2.1344893 | 48.2267 | 9.5965 | 943.17 | 11.364 | 954.53 | 0.00 | 0.5809 |
| 2.1451617 | 47.7985 | 9.5411 | 933.06 | 11.359 | 944.41 | 0.00 | 0.5780 |
| 2.1558875 | 47.3353 | 9.4861 | 923.06 | 11.353 | 934.41 | 0.00 | 0.5751 |
| 2.1666670 | 46.8315 | 9.4315 | 913.19 | 11.347 | 924.54 | 0.00 | 0.5722 |
| 2.1775003 | 46.2802 | 9.3774 | 903.43 | 11.341 | 914.77 | 0.00 | 0.5694 |
| 2.1883878 | 45.6724 | 9.3238 | 893.79 | 11.334 | 905.13 | 0.00 | 0.5666 |
| 2.1993297 | 44.9963 | 9.2706 | 884.27 | 11.328 | 895.60 | 0.00 | 0.5637 |
| 2.2103264 | 44.2358 | 9.2178 | 874.86 | 11.321 | 886.18 | 0.00 | 0.5609 |
| 2.2213780 | 43.3681 | 9.1654 | 865.56 | 11.315 | 876.88 | 0.00 | 0.5581 |
| 2.2324849 | 42.3593 | 9.1135 | 856.38 | 11.308 | 867.68 | 0.00 | 0.5554 |
| 2.2436473 | 41.1558 | 9.0619 | 847.30 | 11.300 | 858.60 | 0.00 | 0.5526 |
| 2.2548656 | 39.6644 | 9.0108 | 838.33 | 11.293 | 849.62 | 0.00 | 0.5499 |
| 2.2661399 | 37.6989 | 8.9601 | 829.46 | 11.286 | 840.75 | 0.00 | 0.5471 |
| 2.2774706 | 34.7858 | 8.9098 | 820.70 | 11.278 | 831.98 | 0.00 | 0.5444 |
| 2.2888579 | 28.8037 | 8.8590 | 811.96 | 11.270 | 823.23 | 0.00 | 0.5417 |
| 2.2942849 | 16.2146 | 8.8346 | 807.81 | 11.266 | 819.07 | 0.00 | 0.5404 |
| 2.2955150 | 15.9129 | 26.029 | 2378.7 | 11.265 | 2390.0 | 0.00 | 0.5401 |
| 2.3003022 | 27.7369 | 25.949 | 2366.5 | 11.262 | 2377.7 | 0.00 | 0.5390 |
| 2.3118037 | 33.6852 | 25.758 | 2337.3 | 11.254 | 2348.6 | 0.00 | 0.5363 |
| 2.3233628 | 36.1133 | 25.568 | 2308.6 | 11.246 | 2319.9 | 0.00 | 0.5336 |
| 2.3349796 | 37.4118 | 25.380 | 2280.2 | 11.237 | 2291.5 | 0.00 | 0.5310 |
| 2.3466545 | 38.0194 | 25.194 | 2252.2 | 11.228 | 2263.5 | 0.00 | 0.5283 |
| 2.3583878 | 37.9796 | 25.009 | 2224.6 | 11.220 | 2235.8 | 0.00 | 0.5257 |
| 2.3701797 | 36.9517 | 24.826 | 2197.3 | 11.211 | 2208.5 | 0.00 | 0.5231 |
| 2.3820306 | 32.0152 | 24.644 | 2170.3 | 11.202 | 2181.5 | 0.00 | 0.5205 |
| 2.3842276 | 26.9354 | 24.610 | 2165.4 | 11.200 | 2176.6 | 0.00 | 0.5200 |
| 2.3855726 | 26.8547 | 35.970 | 3163.1 | 11.199 | 3174.3 | 0.00 | 0.5197 |
| 2.3939407 | 36.8932 | 35.781 | 3135.5 | 11.192 | 3146.7 | 0.00 | 0.5179 |
| 2.4059104 | 40.7295 | 35.513 | 3096.5 | 11.183 | 3107.7 | 0.00 | 0.5153 |
| 2.4179400 | 43.0624 | 35.247 | 3058.1 | 11.173 | 3069.3 | 0.00 | 0.5128 |
| 2.4300297 | 44.8169 | 34.984 | 3020.1 | 11.163 | 3031.3 | 0.00 | 0.5102 |
| 2.4421798 | 46.2493 | 34.722 | 2982.7 | 11.153 | 2993.8 | 0.00 | 0.5077 |
| 2.4543907 | 47.4704 | 34.463 | 2945.7 | 11.143 | 2956.8 | 0.00 | 0.5052 |
| 2.4666627 | 48.5392 | 34.206 | 2909.1 | 11.133 | 2920.3 | 0.00 | 0.5026 |
| 2.4789960 | 49.4914 | 33.951 | 2873.1 | 11.122 | 2884.2 | 0.00 | 0.5001 |
| 2.4913910 | 50.3506 | 33.698 | 2837.5 | 11.112 | 2848.6 | 0.00 | 0.4977 |
| 2.5038479 | 51.1332 | 33.447 | 2802.3 | 11.101 | 2813.4 | 0.00 | 0.4952 |
| 2.5163672 | 51.8510 | 33.198 | 2767.6 | 11.090 | 2778.7 | 0.00 | 0.4927 |
| 2.5289490 | 52.5131 | 32.950 | 2733.3 | 11.079 | 2744.4 | 0.00 | 0.4903 |
| 2.5415938 | 53.1265 | 32.705 | 2699.5 | 11.068 | 2710.6 | 0.00 | 0.4878 |
| 2.5543017 | 53.6965 | 32.462 | 2666.1 | 11.056 | 2677.1 | 0.00 | 0.4854 |
| 2.5670732 | 54.2277 | 32.221 | 2633.1 | 11.045 | 2644.2 | 0.00 | 0.4830 |
| 2.5799086 | 54.7234 | 31.982 | 2600.5 | 11.033 | 2611.6 | 0.00 | 0.4806 |
| 2.5928082 | 55.1867 | 31.744 | 2568.4 | 11.021 | 2579.4 | 0.00 | 0.4782 |
| 2.6057722 | 55.6197 | 31.509 | 2536.7 | 11.009 | 2547.7 | 0.00 | 0.4758 |
| 2.6188011 | 56.0245 | 31.275 | 2505.3 | 10.997 | 2516.3 | 0.00 | 0.4734 |
| 2.6318951 | 56.4023 | 31.043 | 2474.4 | 10.985 | 2485.4 | 0.00 | 0.4711 |
| 2.6450545 | 56.7544 | 30.813 | 2443.8 | 10.972 | 2454.8 | 0.00 | 0.4687 |
| 2.6582798 | 57.0814 | 30.585 | 2413.7 | 10.960 | 2424.6 | 0.00 | 0.4664 |
| 2.6715712 | 57.3837 | 30.359 | 2383.9 | 10.947 | 2394.8 | 0.00 | 0.4641 |
| 2.6849291 | 57.6613 | 30.134 | 2354.5 | 10.934 | 2365.4 | 0.00 | 0.4618 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Hg ($Z=80$) | | | | | | | |
| 2.6983537 | 57.9137 | 29.911 | 2325.4 | 10.921 | 2336.4 | 0.00 | 0.4595 |
| 2.7118455 | 58.1399 | 29.690 | 2296.8 | 10.908 | 2307.7 | 0.00 | 0.4572 |
| 2.7254047 | 58.3380 | 29.470 | 2268.4 | 10.894 | 2279.3 | 0.00 | 0.4549 |
| 2.7390317 | 58.5052 | 29.252 | 2240.4 | 10.881 | 2251.3 | 0.00 | 0.4527 |
| 2.7527269 | 58.6369 | 29.035 | 2212.7 | 10.867 | 2223.6 | 0.00 | 0.4504 |
| 2.7664905 | 58.7262 | 28.820 | 2185.4 | 10.854 | 2196.3 | 0.00 | 0.4482 |
| 2.7803230 | 58.7616 | 28.607 | 2158.5 | 10.840 | 2169.3 | 0.00 | 0.4459 |
| 2.7942246 | 58.7228 | 28.395 | 2131.8 | 10.825 | 2142.7 | 0.00 | 0.4437 |
| 2.8081957 | 58.5700 | 28.185 | 2105.6 | 10.811 | 2116.4 | 0.00 | 0.4415 |
| 2.8222367 | 58.2069 | 27.977 | 2079.6 | 10.797 | 2090.4 | 0.00 | 0.4393 |
| 2.8363479 | 57.2756 | 27.771 | 2054.0 | 10.782 | 2064.8 | 0.00 | 0.4371 |
| 2.8443469 | 55.4687 | 27.655 | 2039.7 | 10.774 | 2050.4 | 0.00 | 0.4359 |
| 2.8498532 | 55.5003 | 32.096 | 2362.7 | 10.768 | 2373.4 | 0.00 | 0.4351 |
| 2.8505296 | 55.8297 | 32.086 | 2361.3 | 10.768 | 2372.1 | 0.00 | 0.4350 |
| 2.8647823 | 58.4538 | 31.866 | 2333.5 | 10.753 | 2344.2 | 0.00 | 0.4328 |
| 2.8791062 | 59.5579 | 31.648 | 2306.0 | 10.738 | 2316.7 | 0.00 | 0.4306 |
| 2.8935017 | 60.3325 | 31.432 | 2278.8 | 10.723 | 2289.6 | 0.00 | 0.4285 |
| 2.9079692 | 60.9542 | 31.217 | 2252.0 | 10.708 | 2262.7 | 0.00 | 0.4264 |
| 2.9225091 | 61.4855 | 31.003 | 2225.4 | 10.692 | 2236.1 | 0.00 | 0.4242 |
| 2.9371216 | 61.9557 | 30.791 | 2199.2 | 10.677 | 2209.9 | 0.00 | 0.4221 |
| 2.9518072 | 62.3814 | 30.580 | 2173.3 | 10.661 | 2184.0 | 0.00 | 0.4200 |
| 2.9665662 | 62.7725 | 30.371 | 2147.7 | 10.646 | 2158.4 | 0.00 | 0.4179 |
| 2.9813991 | 63.1359 | 30.164 | 2122.4 | 10.630 | 2133.1 | 0.00 | 0.4159 |
| 2.9963061 | 63.4754 | 29.955 | 2097.3 | 10.614 | 2107.9 | 0.00 | 0.4138 |
| 3.0112876 | 63.8311 | 29.729 | 2071.1 | 10.597 | 2081.7 | 0.00 | 0.4117 |
| 3.0263440 | 64.1655 | 29.499 | 2044.8 | 10.581 | 2055.4 | 0.00 | 0.4097 |
| 3.0414758 | 64.4728 | 29.271 | 2018.9 | 10.565 | 2029.5 | 0.00 | 0.4076 |
| 3.0566831 | 64.7575 | 29.045 | 1993.4 | 10.548 | 2003.9 | 0.00 | 0.4056 |
| 3.0719666 | 65.0223 | 28.820 | 1968.1 | 10.532 | 1978.6 | 0.00 | 0.4036 |
| 3.0873264 | 65.2691 | 28.597 | 1943.2 | 10.515 | 1953.7 | 0.00 | 0.4016 |
| 3.1027630 | 65.4990 | 28.376 | 1918.6 | 10.498 | 1929.1 | 0.00 | 0.3996 |
| 3.1182768 | 65.7117 | 28.154 | 1894.1 | 10.481 | 1904.6 | 0.00 | 0.3976 |
| 3.1338682 | 65.9074 | 27.934 | 1869.9 | 10.464 | 1880.4 | 0.00 | 0.3956 |
| 3.1495376 | 66.0857 | 27.715 | 1846.0 | 10.446 | 1856.5 | 0.00 | 0.3937 |
| 3.1652853 | 66.2456 | 27.499 | 1822.5 | 10.429 | 1832.9 | 0.00 | 0.3917 |
| 3.1811117 | 66.3851 | 27.284 | 1799.3 | 10.411 | 1809.7 | 0.00 | 0.3898 |
| 3.1970172 | 66.5007 | 27.070 | 1776.3 | 10.394 | 1786.7 | 0.00 | 0.3878 |
| 3.2130023 | 66.5860 | 26.859 | 1753.6 | 10.376 | 1764.0 | 0.00 | 0.3859 |
| 3.2290673 | 66.6285 | 26.648 | 1731.3 | 10.358 | 1741.6 | 0.00 | 0.3840 |
| 3.2452127 | 66.6002 | 26.440 | 1709.2 | 10.340 | 1719.5 | 0.00 | 0.3821 |
| 3.2614387 | 66.4119 | 26.233 | 1687.4 | 10.322 | 1697.7 | 0.00 | 0.3802 |
| 3.2736807 | 65.8359 | 26.079 | 1671.2 | 10.308 | 1681.5 | 0.00 | 0.3787 |
| 3.2777459 | 64.8291 | 26.028 | 1665.8 | 10.303 | 1676.1 | 0.00 | 0.3783 |
| 3.2833195 | 65.9237 | 27.740 | 1772.4 | 10.297 | 1782.7 | 0.00 | 0.3776 |
| 3.2941347 | 66.7125 | 27.594 | 1757.3 | 10.285 | 1767.5 | 0.00 | 0.3764 |
| 3.3106053 | 67.2914 | 27.373 | 1734.6 | 10.267 | 1744.8 | 0.00 | 0.3745 |
| 3.3271584 | 67.6869 | 27.155 | 1712.1 | 10.248 | 1722.4 | 0.00 | 0.3726 |
| 3.3437941 | 68.0037 | 26.938 | 1690.0 | 10.229 | 1700.3 | 0.00 | 0.3708 |
| 3.3605131 | 68.2737 | 26.723 | 1668.2 | 10.210 | 1678.4 | 0.00 | 0.3689 |
| 3.3773157 | 68.5110 | 26.509 | 1646.6 | 10.191 | 1656.8 | 0.00 | 0.3671 |
| 3.3942023 | 68.7226 | 26.298 | 1625.4 | 10.172 | 1635.5 | 0.00 | 0.3653 |
| 3.4111733 | 68.9123 | 26.088 | 1604.4 | 10.153 | 1614.5 | 0.00 | 0.3635 |
| 3.4282291 | 69.0819 | 25.880 | 1583.7 | 10.134 | 1593.8 | 0.00 | 0.3617 |
| 3.4453703 | 69.2312 | 25.676 | 1563.4 | 10.114 | 1573.5 | 0.00 | 0.3599 |
| 3.4625971 | 69.3634 | 25.480 | 1543.7 | 10.095 | 1553.8 | 0.00 | 0.3581 |
| 3.4799101 | 69.4775 | 25.286 | 1524.3 | 10.075 | 1534.4 | 0.00 | 0.3563 |
| 3.4973097 | 69.5685 | 25.094 | 1505.2 | 10.056 | 1515.3 | 0.00 | 0.3545 |
| 3.5147962 | 69.6263 | 24.903 | 1486.4 | 10.036 | 1496.4 | 0.00 | 0.3527 |
| 3.5323702 | 69.6255 | 24.715 | 1467.8 | 10.016 | 1477.8 | 0.00 | 0.3510 |
| 3.5500321 | 69.4622 | 24.529 | 1449.5 | 9.9958 | 1459.5 | 0.00 | 0.3492 |
| 3.5540850 | 69.3485 | 24.487 | 1445.3 | 9.9912 | 1455.3 | 0.00 | 0.3488 |
| 3.5677822 | 69.3913 | 25.428 | 1495.1 | 9.9756 | 1505.1 | 0.00 | 0.3475 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Hg ($Z=80$) | | | | | | | |
| 3.5691149 | 69.4698 | 25.414 | 1493.8 | 9.9741 | 1503.7 | 0.00 | 0.3474 |
| 3.5856211 | 70.0065 | 25.243 | 1476.9 | 9.9554 | 1486.9 | 0.00 | 0.3458 |
| 3.6035492 | 70.3407 | 25.060 | 1458.9 | 9.9351 | 1468.8 | 0.00 | 0.3441 |
| 3.6215670 | 70.6015 | 24.879 | 1441.2 | 9.9146 | 1451.1 | 0.00 | 0.3423 |
| 3.6396748 | 70.8260 | 24.700 | 1423.7 | 9.8941 | 1433.6 | 0.00 | 0.3406 |
| 3.6578732 | 71.0280 | 24.523 | 1406.4 | 9.8734 | 1416.3 | 0.00 | 0.3390 |
| 3.6761626 | 71.2143 | 24.347 | 1389.4 | 9.8527 | 1399.2 | 0.00 | 0.3373 |
| 3.6945434 | 71.3889 | 24.173 | 1372.6 | 9.8319 | 1382.4 | 0.00 | 0.3356 |
| 3.7130161 | 71.5539 | 23.998 | 1355.9 | 9.8109 | 1365.7 | 0.00 | 0.3339 |
| 3.7315812 | 71.7099 | 23.824 | 1339.3 | 9.7899 | 1349.1 | 0.00 | 0.3323 |
| 3.7502391 | 71.8583 | 23.651 | 1323.0 | 9.7688 | 1332.8 | 0.00 | 0.3306 |
| 3.7689903 | 72.0003 | 23.480 | 1306.9 | 9.7476 | 1316.7 | 0.00 | 0.3290 |
| 3.7878352 | 72.1364 | 23.311 | 1291.0 | 9.7263 | 1300.8 | 0.00 | 0.3273 |
| 3.8067744 | 72.2673 | 23.143 | 1275.4 | 9.7049 | 1285.1 | 0.00 | 0.3257 |
| 3.8258083 | 72.3934 | 22.977 | 1259.9 | 9.6834 | 1269.6 | 0.00 | 0.3241 |
| 3.8449373 | 72.5153 | 22.812 | 1244.6 | 9.6618 | 1254.3 | 0.00 | 0.3225 |
| 3.8641620 | 72.6331 | 22.649 | 1229.6 | 9.6401 | 1239.2 | 0.00 | 0.3209 |
| 3.8834828 | 72.7473 | 22.487 | 1214.8 | 9.6184 | 1224.4 | 0.00 | 0.3193 |
| 3.9029002 | 72.8580 | 22.327 | 1200.1 | 9.5965 | 1209.7 | 0.00 | 0.3177 |
| 3.9224147 | 72.9654 | 22.169 | 1185.7 | 9.5746 | 1195.2 | 0.00 | 0.3161 |
| 3.9420268 | 73.0699 | 22.012 | 1171.4 | 9.5526 | 1180.9 | 0.00 | 0.3145 |
| 3.9617369 | 73.1714 | 21.856 | 1157.3 | 9.5305 | 1166.8 | 0.00 | 0.3130 |
| 3.9815456 | 73.2703 | 21.701 | 1143.4 | 9.5084 | 1152.9 | 0.00 | 0.3114 |
| 4.0014533 | 73.3666 | 21.548 | 1129.7 | 9.4861 | 1139.2 | 0.00 | 0.3098 |
| 4.0214606 | 73.4604 | 21.397 | 1116.2 | 9.4638 | 1125.6 | 0.00 | 0.3083 |
| 4.0415679 | 73.5520 | 21.247 | 1102.8 | 9.4413 | 1112.3 | 0.00 | 0.3068 |
| 4.0617757 | 73.6414 | 21.098 | 1089.6 | 9.4188 | 1099.1 | 0.00 | 0.3052 |
| 4.0820846 | 73.7287 | 20.950 | 1076.6 | 9.3963 | 1086.0 | 0.00 | 0.3037 |
| 4.1024950 | 73.8141 | 20.803 | 1063.8 | 9.3736 | 1073.2 | 0.00 | 0.3022 |
| 4.1230075 | 73.8976 | 20.658 | 1051.1 | 9.3509 | 1060.5 | 0.00 | 0.3007 |
| 4.1436226 | 73.9793 | 20.514 | 1038.6 | 9.3281 | 1047.9 | 0.00 | 0.2992 |
| 4.1643407 | 74.0594 | 20.372 | 1026.2 | 9.3052 | 1035.5 | 0.00 | 0.2977 |
| 4.1851624 | 74.1379 | 20.230 | 1014.0 | 9.2823 | 1023.3 | 0.00 | 0.2962 |
| 4.2060882 | 74.2151 | 20.090 | 1002.0 | 9.2593 | 1011.3 | 0.00 | 0.2948 |
| 4.2271186 | 74.2908 | 19.951 | 990.10 | 9.2362 | 999.34 | 0.00 | 0.2933 |
| 4.2482542 | 74.3655 | 19.813 | 978.36 | 9.2130 | 987.58 | 0.00 | 0.2918 |
| 4.2694955 | 74.4390 | 19.675 | 966.71 | 9.1898 | 975.90 | 0.00 | 0.2904 |
| 4.2908430 | 74.5107 | 19.535 | 955.10 | 9.1665 | 964.27 | 0.00 | 0.2890 |
| 4.3122972 | 74.5805 | 19.397 | 943.64 | 9.1431 | 952.78 | 0.00 | 0.2875 |
| 4.3338587 | 74.6485 | 19.260 | 932.31 | 9.1197 | 941.43 | 0.00 | 0.2861 |
| 4.3555280 | 74.7150 | 19.125 | 921.13 | 9.0962 | 930.23 | 0.00 | 0.2847 |
| 4.3773056 | 74.7799 | 18.990 | 910.09 | 9.0726 | 919.16 | 0.00 | 0.2832 |
| 4.3991921 | 74.8435 | 18.856 | 899.18 | 9.0490 | 908.23 | 0.00 | 0.2818 |
| 4.4211881 | 74.9056 | 18.723 | 888.41 | 9.0253 | 897.43 | 0.00 | 0.2804 |
| 4.4432940 | 74.9665 | 18.592 | 877.77 | 9.0015 | 886.77 | 0.00 | 0.2790 |
| 4.4655105 | 75.0261 | 18.461 | 867.26 | 8.9777 | 876.24 | 0.00 | 0.2776 |
| 4.4878381 | 75.0846 | 18.331 | 856.88 | 8.9538 | 865.84 | 0.00 | 0.2763 |
| 4.5102772 | 75.1420 | 18.202 | 846.64 | 8.9299 | 855.57 | 0.00 | 0.2749 |
| 4.5328286 | 75.1983 | 18.075 | 836.51 | 8.9059 | 845.42 | 0.00 | 0.2735 |
| 4.5554928 | 75.2537 | 17.948 | 826.52 | 8.8818 | 835.40 | 0.00 | 0.2722 |
| 4.5782702 | 75.3081 | 17.822 | 816.64 | 8.8577 | 825.50 | 0.00 | 0.2708 |
| 4.6011616 | 75.3526 | 17.694 | 806.71 | 8.8336 | 815.55 | 0.00 | 0.2695 |
| 4.6241674 | 75.4054 | 17.562 | 796.73 | 8.8093 | 805.54 | 0.00 | 0.2681 |
| 4.6472882 | 75.4565 | 17.431 | 786.86 | 8.7851 | 795.64 | 0.00 | 0.2668 |
| 4.6705247 | 75.5058 | 17.301 | 777.10 | 8.7607 | 785.86 | 0.00 | 0.2655 |
| 4.6938773 | 75.5535 | 17.172 | 767.47 | 8.7364 | 776.21 | 0.00 | 0.2641 |
| 4.7173467 | 75.5997 | 17.044 | 757.97 | 8.7119 | 766.68 | 0.00 | 0.2628 |
| 4.7409334 | 75.6445 | 16.917 | 748.58 | 8.6875 | 757.27 | 0.00 | 0.2615 |
| 4.7646381 | 75.6880 | 16.792 | 739.32 | 8.6629 | 747.98 | 0.00 | 0.2602 |
| 4.7884613 | 75.7291 | 16.663 | 730.02 | 8.6383 | 738.65 | 0.00 | 0.2589 |
| 4.8124036 | 75.7699 | 16.535 | 720.79 | 8.6137 | 729.40 | 0.00 | 0.2576 |
| 4.8364656 | 75.8100 | 16.408 | 711.68 | 8.5891 | 720.27 | 0.00 | 0.2564 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Hg ($Z=80$) | | | | | | | |
| 4.8606479 | 76.1766 | 16.281 | 702.70 | 8.5643 | 711.26 | 0.00 | 0.2551 |
| 4.8849512 | 76.2126 | 16.156 | 693.83 | 8.5396 | 702.37 | 0.00 | 0.2538 |
| 4.9093759 | 76.2472 | 16.032 | 685.08 | 8.5148 | 693.60 | 0.00 | 0.2525 |
| 4.9339228 | 76.2804 | 15.910 | 676.45 | 8.4899 | 684.94 | 0.00 | 0.2513 |
| 4.9585924 | 76.3124 | 15.788 | 667.93 | 8.4650 | 676.40 | 0.00 | 0.2500 |
| 4.9833854 | 76.3431 | 15.667 | 659.53 | 8.4401 | 667.97 | 0.00 | 0.2488 |
| 5.0083023 | 76.3726 | 15.547 | 651.23 | 8.4151 | 659.65 | 0.00 | 0.2476 |
| 5.0333438 | 76.4009 | 15.429 | 643.05 | 8.3901 | 651.44 | 0.00 | 0.2463 |
| 5.0585105 | 76.4282 | 15.311 | 634.97 | 8.3651 | 643.34 | 0.00 | 0.2451 |
| 5.0838031 | 76.4544 | 15.195 | 627.01 | 8.3400 | 635.35 | 0.00 | 0.2439 |
| 5.1092221 | 76.4795 | 15.079 | 619.14 | 8.3149 | 627.46 | 0.00 | 0.2427 |
| 5.1347682 | 76.5037 | 14.965 | 611.38 | 8.2897 | 619.67 | 0.00 | 0.2415 |
| 5.1604421 | 76.5269 | 14.851 | 603.73 | 8.2645 | 611.99 | 0.00 | 0.2403 |
| 5.1862443 | 76.5492 | 14.739 | 596.17 | 8.2393 | 604.41 | 0.00 | 0.2391 |
| 5.2121755 | 76.5706 | 14.627 | 588.71 | 8.2140 | 596.93 | 0.00 | 0.2379 |
| 5.2382364 | 76.5911 | 14.516 | 581.36 | 8.1887 | 589.55 | 0.00 | 0.2367 |
| 5.2644276 | 76.6108 | 14.407 | 574.10 | 8.1634 | 582.26 | 0.00 | 0.2355 |
| 5.2907497 | 76.6297 | 14.298 | 566.93 | 8.1380 | 575.07 | 0.00 | 0.2343 |
| 5.3172034 | 76.6478 | 14.190 | 559.86 | 8.1127 | 567.97 | 0.00 | 0.2332 |
| 5.3437895 | 76.6652 | 14.084 | 552.88 | 8.0872 | 560.97 | 0.00 | 0.2320 |
| 5.3705084 | 76.6818 | 13.978 | 546.00 | 8.0618 | 554.06 | 0.00 | 0.2309 |
| 5.3973609 | 76.6977 | 13.873 | 539.21 | 8.0363 | 547.24 | 0.00 | 0.2297 |
| 5.4243477 | 76.7129 | 13.769 | 532.50 | 8.0108 | 540.51 | 0.00 | 0.2286 |
| 5.4514695 | 76.7275 | 13.666 | 525.89 | 7.9853 | 533.87 | 0.00 | 0.2274 |
| 5.4787268 | 76.7414 | 13.564 | 519.36 | 7.9598 | 527.32 | 0.00 | 0.2263 |
| 5.5061205 | 76.7548 | 13.462 | 512.91 | 7.9342 | 520.85 | 0.00 | 0.2252 |
| 5.5336511 | 76.7675 | 13.362 | 506.56 | 7.9086 | 514.46 | 0.00 | 0.2241 |
| 5.5613193 | 76.7797 | 13.262 | 500.28 | 7.8830 | 508.16 | 0.00 | 0.2229 |
| 5.5891259 | 76.7913 | 13.164 | 494.09 | 7.8574 | 501.95 | 0.00 | 0.2218 |
| 5.6170716 | 76.8024 | 13.066 | 487.98 | 7.8317 | 495.81 | 0.00 | 0.2207 |
| 5.6451569 | 76.8130 | 12.969 | 481.95 | 7.8060 | 489.76 | 0.00 | 0.2196 |
| 5.6733827 | 76.8231 | 12.873 | 476.00 | 7.7804 | 483.78 | 0.00 | 0.2185 |
| 5.7017496 | 76.9308 | 12.777 | 470.09 | 7.7546 | 477.85 | 0.00 | 0.2174 |
| 5.7302584 | 76.9406 | 12.679 | 464.16 | 7.7289 | 471.89 | 0.00 | 0.2164 |
| 5.7589096 | 76.9495 | 12.582 | 458.32 | 7.7032 | 466.02 | 0.00 | 0.2153 |
| 5.7877042 | 76.9576 | 12.485 | 452.55 | 7.6774 | 460.22 | 0.00 | 0.2142 |
| 5.8166427 | 76.9650 | 12.390 | 446.85 | 7.6516 | 454.50 | 0.00 | 0.2132 |
| 5.8457259 | 76.9716 | 12.295 | 441.23 | 7.6259 | 448.86 | 0.00 | 0.2121 |
| 5.8749546 | 76.9776 | 12.201 | 435.69 | 7.6001 | 443.29 | 0.00 | 0.2110 |
| 5.9043293 | 76.9829 | 12.109 | 430.22 | 7.5742 | 437.79 | 0.00 | 0.2100 |
| 5.9338510 | 76.9876 | 12.016 | 424.82 | 7.5484 | 432.37 | 0.00 | 0.2089 |
| 5.9635202 | 76.9916 | 11.925 | 419.50 | 7.5226 | 427.02 | 0.00 | 0.2079 |
| 5.9933378 | 76.9951 | 11.835 | 414.24 | 7.4968 | 421.74 | 0.00 | 0.2069 |
| 6.0233045 | 76.9980 | 11.745 | 409.06 | 7.4709 | 416.53 | 0.00 | 0.2058 |
| 6.0534210 | 77.0004 | 11.656 | 403.94 | 7.4450 | 411.38 | 0.00 | 0.2048 |
| 6.0836882 | 77.0022 | 11.568 | 398.89 | 7.4192 | 406.31 | 0.00 | 0.2038 |
| 6.1141066 | 77.0035 | 11.480 | 393.91 | 7.3933 | 401.30 | 0.00 | 0.2028 |
| 6.1446771 | 77.0044 | 11.394 | 388.99 | 7.3674 | 396.36 | 0.00 | 0.2018 |
| 6.1754005 | 77.0047 | 11.308 | 384.14 | 7.3416 | 391.49 | 0.00 | 0.2008 |
| 6.2062775 | 77.0046 | 11.223 | 379.36 | 7.3157 | 386.67 | 0.00 | 0.1998 |
| 6.2373089 | 77.0041 | 11.139 | 374.64 | 7.2898 | 381.93 | 0.00 | 0.1988 |
| 6.2684954 | 77.0031 | 11.055 | 369.98 | 7.2639 | 377.24 | 0.00 | 0.1978 |
| 6.2998379 | 77.0017 | 10.972 | 365.38 | 7.2380 | 372.62 | 0.00 | 0.1968 |
| 6.3313371 | 76.9999 | 10.890 | 360.84 | 7.2121 | 368.05 | 0.00 | 0.1958 |
| 6.3629938 | 76.9976 | 10.809 | 356.36 | 7.1862 | 363.55 | 0.00 | 0.1949 |
| 6.3948088 | 76.9951 | 10.728 | 351.94 | 7.1603 | 359.10 | 0.00 | 0.1939 |
| 6.4267828 | 76.9921 | 10.648 | 347.58 | 7.1344 | 354.72 | 0.00 | 0.1929 |
| 6.4589167 | 76.9888 | 10.569 | 343.28 | 7.1085 | 350.39 | 0.00 | 0.1920 |
| 6.4912113 | 76.9852 | 10.491 | 339.04 | 7.0826 | 346.12 | 0.00 | 0.1910 |
| 6.5236674 | 76.9812 | 10.413 | 334.85 | 7.0568 | 341.90 | 0.00 | 0.1901 |
| 6.5562857 | 76.9769 | 10.336 | 330.71 | 7.0309 | 337.74 | 0.00 | 0.1891 |
| 6.5890671 | 77.0119 | 10.258 | 326.59 | 7.0050 | 333.60 | 0.00 | 0.1882 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Hg ($Z=80$) | | | | | | | |
| 6.6220125 | 77.0071 | 10.181 | 322.53 | 6.9791 | 329.51 | 0.00 | 0.1872 |
| 6.6551225 | 77.0019 | 10.105 | 318.52 | 6.9533 | 325.47 | 0.00 | 0.1863 |
| 6.6883981 | 76.9963 | 10.029 | 314.56 | 6.9274 | 321.48 | 0.00 | 0.1854 |
| 6.7218401 | 76.9903 | 9.9538 | 310.65 | 6.9016 | 317.55 | 0.00 | 0.1844 |
| 6.7554493 | 76.9839 | 9.8794 | 306.79 | 6.8757 | 313.67 | 0.00 | 0.1835 |
| 6.7892266 | 76.9772 | 9.8049 | 302.96 | 6.8499 | 309.81 | 0.00 | 0.1826 |
| 6.8231727 | 76.9700 | 9.7310 | 299.19 | 6.8241 | 306.01 | 0.00 | 0.1817 |
| 6.8572886 | 76.9625 | 9.6577 | 295.46 | 6.7983 | 302.25 | 0.00 | 0.1808 |
| 6.8915750 | 76.9546 | 9.5851 | 291.78 | 6.7725 | 298.55 | 0.00 | 0.1799 |
| 6.9260329 | 76.9463 | 9.5132 | 288.14 | 6.7467 | 294.89 | 0.00 | 0.1790 |
| 6.9606631 | 76.9377 | 9.4418 | 284.56 | 6.7209 | 291.28 | 0.00 | 0.1781 |
| 6.9954664 | 76.9288 | 9.3711 | 281.02 | 6.6952 | 287.72 | 0.00 | 0.1772 |
| 7.0304437 | 76.9195 | 9.3010 | 277.53 | 6.6694 | 284.20 | 0.00 | 0.1764 |
| 7.0655959 | 76.9099 | 9.2315 | 274.09 | 6.6437 | 280.73 | 0.00 | 0.1755 |
| 7.1009239 | 76.8999 | 9.1626 | 270.69 | 6.6180 | 277.31 | 0.00 | 0.1746 |
| 7.1364285 | 76.9064 | 9.0937 | 267.32 | 6.5923 | 273.91 | 0.00 | 0.1737 |
| 7.1721107 | 76.8959 | 9.0250 | 263.98 | 6.5666 | 270.54 | 0.00 | 0.1729 |
| 7.2079712 | 76.8851 | 8.9569 | 260.68 | 6.5409 | 267.22 | 0.00 | 0.1720 |
| 7.2440111 | 76.8739 | 8.8894 | 257.43 | 6.5153 | 263.95 | 0.00 | 0.1712 |
| 7.2802311 | 76.8624 | 8.8224 | 254.22 | 6.4896 | 260.71 | 0.00 | 0.1703 |
| 7.3166323 | 76.8505 | 8.7561 | 251.06 | 6.4640 | 257.52 | 0.00 | 0.1695 |
| 7.3532155 | 76.8383 | 8.6903 | 247.93 | 6.4385 | 254.37 | 0.00 | 0.1686 |
| 7.3899815 | 76.8257 | 8.6252 | 244.85 | 6.4129 | 251.26 | 0.00 | 0.1678 |
| 7.4269314 | 76.8128 | 8.5605 | 241.80 | 6.3873 | 248.19 | 0.00 | 0.1669 |
| 7.4640661 | 76.7996 | 8.4965 | 238.80 | 6.3618 | 245.16 | 0.00 | 0.1661 |
| 7.5013864 | 76.7860 | 8.4330 | 235.84 | 6.3363 | 242.17 | 0.00 | 0.1653 |
| 7.5388934 | 76.7722 | 8.3700 | 232.91 | 6.3108 | 239.22 | 0.00 | 0.1645 |
| 7.5765878 | 76.7580 | 8.3076 | 230.02 | 6.2854 | 236.31 | 0.00 | 0.1636 |
| 7.6144708 | 76.7435 | 8.2458 | 227.18 | 6.2600 | 233.44 | 0.00 | 0.1628 |
| 7.6525431 | 76.7287 | 8.1844 | 224.36 | 6.2346 | 230.60 | 0.00 | 0.1620 |
| 7.6908058 | 76.7137 | 8.1236 | 221.59 | 6.2092 | 227.80 | 0.00 | 0.1612 |
| 7.7292599 | 76.6983 | 8.0633 | 218.85 | 6.1838 | 225.03 | 0.00 | 0.1604 |
| 7.7679062 | 76.6827 | 8.0036 | 216.15 | 6.1585 | 222.31 | 0.00 | 0.1596 |
| 7.8067457 | 76.6667 | 7.9443 | 213.48 | 6.1332 | 219.61 | 0.00 | 0.1588 |
| 7.8457794 | 76.6505 | 7.8856 | 210.85 | 6.1079 | 216.96 | 0.00 | 0.1580 |
| 7.8850083 | 76.6340 | 7.8274 | 208.25 | 6.0827 | 214.33 | 0.00 | 0.1572 |
| 7.9244334 | 76.6172 | 7.7697 | 205.69 | 6.0575 | 211.74 | 0.00 | 0.1565 |
| 7.9640555 | 76.6001 | 7.7124 | 203.15 | 6.0323 | 209.19 | 0.00 | 0.1557 |
| 8.0038758 | 76.5828 | 7.6557 | 200.66 | 6.0072 | 206.66 | 0.00 | 0.1549 |
| 8.0438952 | 76.5652 | 7.5994 | 198.19 | 5.9820 | 204.17 | 0.00 | 0.1541 |
| 8.0841147 | 76.5473 | 7.5436 | 195.76 | 5.9570 | 201.71 | 0.00 | 0.1534 |
| 8.1245352 | 76.5292 | 7.4883 | 193.36 | 5.9319 | 199.29 | 0.00 | 0.1526 |
| 8.1651579 | 76.5108 | 7.4335 | 190.98 | 5.9069 | 196.89 | 0.00 | 0.1518 |
| 8.2059837 | 76.4921 | 7.3791 | 188.64 | 5.8819 | 194.53 | 0.00 | 0.1511 |
| 8.2470136 | 76.4732 | 7.3252 | 186.34 | 5.8569 | 192.19 | 0.00 | 0.1503 |
| 8.2882487 | 76.4541 | 7.2718 | 184.06 | 5.8320 | 189.89 | 0.00 | 0.1496 |
| 8.3296899 | 76.4347 | 7.2188 | 181.81 | 5.8071 | 187.61 | 0.00 | 0.1488 |
| 8.3713384 | 76.4151 | 7.1663 | 179.58 | 5.7823 | 185.37 | 0.00 | 0.1481 |
| 8.4131951 | 76.3952 | 7.1142 | 177.39 | 5.7575 | 183.15 | 0.00 | 0.1474 |
| 8.4552610 | 76.3752 | 7.0625 | 175.23 | 5.7327 | 180.96 | 0.00 | 0.1466 |
| 8.4975373 | 76.3549 | 7.0113 | 173.09 | 5.7079 | 178.80 | 0.00 | 0.1459 |
| 8.5400250 | 76.3345 | 6.9606 | 170.98 | 5.6832 | 176.67 | 0.00 | 0.1452 |
| Tl ($Z=81$) | | | | | | | |
| Atomic weight: $A_r=204.3830 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^3)=11.830$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 339.386 E(\text{eV})$ $[\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2 (e \text{ atom}^{-1})\times 2.05890\times 10^5$ | | | | | | | |
| 22 edges. Edge energies (keV) | | | | | | | |
| K | 85.5304 | L I | 15.3467 | L II | 14.6979 | L III | 12.6575 |
| M I | 3.70410 | M II | 3.41570 | M III | 2.95660 | M IV | 2.48510 |
| M V | 2.38930 | N I | 0.845500 | N II | 0.721300 | N III | 0.609000 |
| N IV | 0.406600 | N V | 0.386200 | N VI | 0.122800 | N VII | 0.118500 |
| O I | 0.136300 | O II | 0.0996000 | O III | 0.0754000 | O IV | 0.0153000 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| O V | 0.0131000 | P I | 0.00966483 | | | | |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-1.8396, -1.0794) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.017610 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 33.7172 | 30.527 | 12570 | 6.4243 | 12577 | 0.00 | 2.480 |
| 0.50250000 | 33.9239 | 30.529 | 12509 | 6.4537 | 12515 | 0.00 | 2.467 |
| 0.50501250 | 34.1295 | 30.528 | 12446 | 6.4831 | 12453 | 0.00 | 2.455 |
| 0.50753756 | 34.3340 | 30.526 | 12383 | 6.5125 | 12390 | 0.00 | 2.443 |
| 0.51007525 | 34.5374 | 30.520 | 12319 | 6.5420 | 12326 | 0.00 | 2.431 |
| 0.51262563 | 34.7395 | 30.513 | 12255 | 6.5714 | 12262 | 0.00 | 2.419 |
| 0.51518875 | 34.9403 | 30.503 | 12190 | 6.6008 | 12197 | 0.00 | 2.407 |
| 0.51776470 | 35.1398 | 30.492 | 12125 | 6.6303 | 12132 | 0.00 | 2.395 |
| 0.52035352 | 35.3378 | 30.478 | 12059 | 6.6597 | 12066 | 0.00 | 2.383 |
| 0.52295529 | 35.5342 | 30.461 | 11993 | 6.6892 | 11999 | 0.00 | 2.371 |
| 0.52557007 | 35.7291 | 30.443 | 11926 | 6.7186 | 11933 | 0.00 | 2.359 |
| 0.52819792 | 35.9224 | 30.423 | 11859 | 6.7481 | 11865 | 0.00 | 2.347 |
| 0.53083891 | 36.1139 | 30.400 | 11791 | 6.7775 | 11798 | 0.00 | 2.336 |
| 0.53349310 | 36.3036 | 30.376 | 11723 | 6.8070 | 11730 | 0.00 | 2.324 |
| 0.53616057 | 36.4913 | 30.350 | 11654 | 6.8364 | 11661 | 0.00 | 2.312 |
| 0.53884137 | 36.6771 | 30.321 | 11586 | 6.8659 | 11593 | 0.00 | 2.301 |
| 0.54153558 | 36.8607 | 30.291 | 11517 | 6.8953 | 11523 | 0.00 | 2.289 |
| 0.54424325 | 37.0422 | 30.259 | 11447 | 6.9248 | 11454 | 0.00 | 2.278 |
| 0.54696447 | 37.2213 | 30.225 | 11377 | 6.9542 | 11384 | 0.00 | 2.267 |
| 0.54969929 | 37.3979 | 30.189 | 11307 | 6.9836 | 11314 | 0.00 | 2.255 |
| 0.55244779 | 37.5720 | 30.152 | 11237 | 7.0130 | 11244 | 0.00 | 2.244 |
| 0.55521003 | 37.7432 | 30.112 | 11167 | 7.0425 | 11174 | 0.00 | 2.233 |
| 0.55798608 | 37.9115 | 30.071 | 11096 | 7.0719 | 11103 | 0.00 | 2.222 |
| 0.56077601 | 38.0766 | 30.029 | 11025 | 7.1013 | 11032 | 0.00 | 2.211 |
| 0.56357989 | 38.2382 | 29.984 | 10954 | 7.1306 | 10961 | 0.00 | 2.200 |
| 0.56639779 | 38.3961 | 29.938 | 10883 | 7.1600 | 10890 | 0.00 | 2.189 |
| 0.56922978 | 38.5499 | 29.891 | 10811 | 7.1894 | 10819 | 0.00 | 2.178 |
| 0.57207593 | 38.6992 | 29.842 | 10740 | 7.2187 | 10747 | 0.00 | 2.167 |
| 0.57493630 | 38.8434 | 29.791 | 10668 | 7.2480 | 10676 | 0.00 | 2.156 |
| 0.57781099 | 38.9818 | 29.739 | 10597 | 7.2773 | 10604 | 0.00 | 2.146 |
| 0.58070004 | 39.1136 | 29.685 | 10525 | 7.3066 | 10532 | 0.00 | 2.135 |
| 0.58360354 | 39.2376 | 29.630 | 10453 | 7.3359 | 10461 | 0.00 | 2.124 |
| 0.58652156 | 39.3521 | 29.574 | 10382 | 7.3651 | 10389 | 0.00 | 2.114 |
| 0.58945417 | 39.4550 | 29.516 | 10310 | 7.3943 | 10317 | 0.00 | 2.103 |
| 0.59240144 | 39.5428 | 29.457 | 10238 | 7.4235 | 10245 | 0.00 | 2.093 |
| 0.59536345 | 39.6100 | 29.397 | 10166 | 7.4527 | 10174 | 0.00 | 2.082 |
| 0.59834026 | 39.6471 | 29.335 | 10094 | 7.4819 | 10102 | 0.00 | 2.072 |
| 0.60133196 | 39.6350 | 29.272 | 10023 | 7.5110 | 10030 | 0.00 | 2.062 |
| 0.60433862 | 39.5249 | 29.208 | 9950.9 | 7.5401 | 9958.4 | 0.00 | 2.052 |
| 0.60736032 | 39.0999 | 29.143 | 9879.3 | 7.5692 | 9886.9 | 0.00 | 2.041 |
| 0.60824487 | 38.7065 | 29.124 | 9858.4 | 7.5776 | 9866.0 | 0.00 | 2.038 |
| 0.60975519 | 38.7907 | 30.886 | 10429 | 7.5921 | 10437 | 0.00 | 2.033 |
| 0.61039712 | 39.1779 | 30.873 | 10414 | 7.5982 | 10421 | 0.00 | 2.031 |
| 0.61344910 | 40.0086 | 30.808 | 10340 | 7.6272 | 10348 | 0.00 | 2.021 |
| 0.61651635 | 40.4763 | 30.742 | 10267 | 7.6562 | 10274 | 0.00 | 2.011 |
| 0.61959893 | 40.8395 | 30.675 | 10193 | 7.6851 | 10201 | 0.00 | 2.001 |
| 0.62269693 | 41.1516 | 30.608 | 10120 | 7.7141 | 10128 | 0.00 | 1.991 |
| 0.62581041 | 41.4328 | 30.539 | 10047 | 7.7429 | 10055 | 0.00 | 1.981 |
| 0.62893946 | 41.6931 | 30.469 | 9974.2 | 7.7718 | 9982.0 | 0.00 | 1.971 |
| 0.63208416 | 41.9381 | 30.398 | 9901.5 | 7.8006 | 9909.3 | 0.00 | 1.962 |
| 0.63524458 | 42.1712 | 30.326 | 9829.0 | 7.8294 | 9836.9 | 0.00 | 1.952 |
| 0.63842080 | 42.3947 | 30.254 | 9756.7 | 7.8581 | 9764.6 | 0.00 | 1.942 |
| 0.64161291 | 42.6102 | 30.180 | 9684.6 | 7.8868 | 9692.5 | 0.00 | 1.932 |
| 0.64482097 | 42.8189 | 30.106 | 9612.6 | 7.9154 | 9620.6 | 0.00 | 1.923 |
| 0.64804508 | 43.0216 | 30.030 | 9540.9 | 7.9440 | 9548.9 | 0.00 | 1.913 |
| 0.65128530 | 43.2190 | 29.955 | 9469.5 | 7.9726 | 9477.4 | 0.00 | 1.904 |
| 0.65454173 | 43.4115 | 29.878 | 9398.2 | 8.0011 | 9406.2 | 0.00 | 1.894 |
| 0.65781444 | 43.5996 | 29.800 | 9327.2 | 8.0296 | 9335.3 | 0.00 | 1.885 |
| 0.66110351 | 43.7836 | 29.722 | 9256.5 | 8.0580 | 9264.5 | 0.00 | 1.875 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Tl ($Z=81$) | | | | | | | |
| 0.66440903 | 43.9636 | 29.643 | 9186.0 | 8.0864 | 9194.1 | 0.00 | 1.866 |
| 0.66773107 | 44.1400 | 29.564 | 9115.8 | 8.1147 | 9123.9 | 0.00 | 1.857 |
| 0.67106973 | 44.3127 | 29.484 | 9045.8 | 8.1430 | 9054.0 | 0.00 | 1.848 |
| 0.67442508 | 44.4820 | 29.403 | 8976.1 | 8.1712 | 8984.3 | 0.00 | 1.838 |
| 0.67779720 | 44.6479 | 29.321 | 8906.7 | 8.1993 | 8914.9 | 0.00 | 1.829 |
| 0.68118619 | 44.8103 | 29.239 | 8837.6 | 8.2275 | 8845.8 | 0.00 | 1.820 |
| 0.68459212 | 44.9692 | 29.156 | 8768.7 | 8.2555 | 8777.0 | 0.00 | 1.811 |
| 0.68801508 | 45.1245 | 29.073 | 8700.2 | 8.2835 | 8708.4 | 0.00 | 1.802 |
| 0.69145515 | 45.2760 | 28.989 | 8631.9 | 8.3115 | 8640.2 | 0.00 | 1.793 |
| 0.69491243 | 45.4234 | 28.905 | 8563.9 | 8.3394 | 8572.2 | 0.00 | 1.784 |
| 0.69838699 | 45.5663 | 28.820 | 8496.2 | 8.3672 | 8504.6 | 0.00 | 1.775 |
| 0.70187893 | 45.7040 | 28.734 | 8428.9 | 8.3950 | 8437.3 | 0.00 | 1.766 |
| 0.70538832 | 45.8352 | 28.648 | 8361.8 | 8.4227 | 8370.3 | 0.00 | 1.758 |
| 0.70891526 | 45.9578 | 28.562 | 8295.1 | 8.4503 | 8303.6 | 0.00 | 1.749 |
| 0.71245984 | 46.0675 | 28.475 | 8228.7 | 8.4779 | 8237.2 | 0.00 | 1.740 |
| 0.71602214 | 46.1526 | 28.387 | 8162.7 | 8.5054 | 8171.2 | 0.00 | 1.732 |
| 0.71960225 | 46.1582 | 28.299 | 8096.9 | 8.5328 | 8105.5 | 0.00 | 1.723 |
| 0.72029019 | 46.1213 | 28.283 | 8084.4 | 8.5381 | 8092.9 | 0.00 | 1.721 |
| 0.72230983 | 46.2022 | 28.625 | 8159.4 | 8.5535 | 8168.0 | 0.00 | 1.716 |
| 0.72320026 | 46.3166 | 28.604 | 8143.3 | 8.5602 | 8151.8 | 0.00 | 1.714 |
| 0.72681626 | 46.5926 | 28.517 | 8078.2 | 8.5875 | 8086.8 | 0.00 | 1.706 |
| 0.73045034 | 46.7975 | 28.430 | 8013.5 | 8.6148 | 8022.1 | 0.00 | 1.697 |
| 0.73410260 | 46.9796 | 28.343 | 7949.1 | 8.6420 | 7957.7 | 0.00 | 1.689 |
| 0.73777311 | 47.1495 | 28.255 | 7885.1 | 8.6691 | 7893.7 | 0.00 | 1.681 |
| 0.74146197 | 47.3115 | 28.167 | 7821.4 | 8.6961 | 7830.1 | 0.00 | 1.672 |
| 0.74516928 | 47.4676 | 28.079 | 7758.1 | 8.7230 | 7766.8 | 0.00 | 1.664 |
| 0.74889513 | 47.6190 | 27.990 | 7695.1 | 8.7499 | 7703.9 | 0.00 | 1.656 |
| 0.75263961 | 47.7665 | 27.901 | 7632.5 | 8.7767 | 7641.3 | 0.00 | 1.647 |
| 0.75640280 | 47.9105 | 27.812 | 7570.3 | 8.8035 | 7579.1 | 0.00 | 1.639 |
| 0.76018482 | 48.0514 | 27.723 | 7508.5 | 8.8301 | 7517.3 | 0.00 | 1.631 |
| 0.76398574 | 48.1893 | 27.633 | 7447.0 | 8.8567 | 7455.8 | 0.00 | 1.623 |
| 0.76780567 | 48.3245 | 27.543 | 7385.9 | 8.8832 | 7394.7 | 0.00 | 1.615 |
| 0.77164470 | 48.4571 | 27.454 | 7325.1 | 8.9096 | 7334.0 | 0.00 | 1.607 |
| 0.77550292 | 48.5871 | 27.363 | 7264.8 | 8.9359 | 7273.7 | 0.00 | 1.599 |
| 0.77938044 | 48.7147 | 27.273 | 7204.8 | 8.9621 | 7213.7 | 0.00 | 1.591 |
| 0.78327734 | 48.8397 | 27.183 | 7145.2 | 8.9883 | 7154.2 | 0.00 | 1.583 |
| 0.78719373 | 48.9622 | 27.092 | 7086.0 | 9.0144 | 7095.0 | 0.00 | 1.575 |
| 0.79112969 | 49.0822 | 27.002 | 7027.1 | 9.0403 | 7036.1 | 0.00 | 1.567 |
| 0.79508534 | 49.1996 | 26.911 | 6968.6 | 9.0662 | 6977.7 | 0.00 | 1.559 |
| 0.79906077 | 49.3142 | 26.820 | 6910.6 | 9.0920 | 6919.7 | 0.00 | 1.552 |
| 0.80305607 | 49.4260 | 26.729 | 6852.9 | 9.1178 | 6862.0 | 0.00 | 1.544 |
| 0.80707135 | 49.5346 | 26.638 | 6795.5 | 9.1434 | 6804.7 | 0.00 | 1.536 |
| 0.81110671 | 49.6398 | 26.547 | 6738.6 | 9.1689 | 6747.8 | 0.00 | 1.529 |
| 0.81516224 | 49.7410 | 26.456 | 6682.1 | 9.1944 | 6691.2 | 0.00 | 1.521 |
| 0.81923806 | 49.8375 | 26.364 | 6625.9 | 9.2197 | 6635.1 | 0.00 | 1.513 |
| 0.82333425 | 49.9282 | 26.273 | 6570.1 | 9.2449 | 6579.3 | 0.00 | 1.506 |
| 0.82745092 | 50.0114 | 26.182 | 6514.7 | 9.2701 | 6524.0 | 0.00 | 1.498 |
| 0.83158817 | 50.0836 | 26.091 | 6459.7 | 9.2952 | 6469.0 | 0.00 | 1.491 |
| 0.83574611 | 50.1381 | 25.999 | 6405.0 | 9.3201 | 6414.3 | 0.00 | 1.484 |
| 0.83992484 | 50.1557 | 25.908 | 6350.8 | 9.3450 | 6360.1 | 0.00 | 1.476 |
| 0.84412447 | 50.0257 | 25.817 | 6296.9 | 9.3697 | 6306.2 | 0.00 | 1.469 |
| 0.84423174 | 50.0145 | 25.814 | 6295.5 | 9.3703 | 6304.9 | 0.00 | 1.469 |
| 0.84676824 | 50.0820 | 26.306 | 6396.2 | 9.3852 | 6405.5 | 0.00 | 1.464 |
| 0.84834509 | 50.2642 | 26.272 | 6376.1 | 9.3944 | 6385.5 | 0.00 | 1.461 |
| 0.85258682 | 50.5341 | 26.181 | 6322.4 | 9.4189 | 6331.9 | 0.00 | 1.454 |
| 0.85684975 | 50.7262 | 26.091 | 6269.2 | 9.4434 | 6278.6 | 0.00 | 1.447 |
| 0.86113400 | 50.8910 | 26.000 | 6216.3 | 9.4677 | 6225.8 | 0.00 | 1.440 |
| 0.86543967 | 51.0413 | 25.909 | 6163.9 | 9.4919 | 6173.4 | 0.00 | 1.433 |
| 0.86976687 | 51.1825 | 25.819 | 6111.8 | 9.5161 | 6121.3 | 0.00 | 1.425 |
| 0.87411570 | 51.3172 | 25.728 | 6060.1 | 9.5401 | 6069.6 | 0.00 | 1.418 |
| 0.87848628 | 51.4469 | 25.638 | 6008.8 | 9.5640 | 6018.3 | 0.00 | 1.411 |
| 0.88287871 | 51.5726 | 25.548 | 5957.8 | 9.5878 | 5967.4 | 0.00 | 1.404 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Tl ($Z=81$) | | | | | | | |
| 0.88729310 | 51.6950 | 25.458 | 5907.2 | 9.6115 | 5916.9 | 0.00 | 1.397 |
| 0.89172957 | 51.8146 | 25.368 | 5857.1 | 9.6351 | 5866.7 | 0.00 | 1.390 |
| 0.89618822 | 51.9317 | 25.278 | 5807.2 | 9.6585 | 5816.9 | 0.00 | 1.383 |
| 0.90066916 | 52.0466 | 25.188 | 5757.8 | 9.6819 | 5767.5 | 0.00 | 1.377 |
| 0.90517250 | 52.1595 | 25.098 | 5708.7 | 9.7051 | 5718.4 | 0.00 | 1.370 |
| 0.90969837 | 52.2707 | 25.008 | 5660.1 | 9.7283 | 5669.8 | 0.00 | 1.363 |
| 0.91424686 | 52.3801 | 24.919 | 5611.7 | 9.7513 | 5621.5 | 0.00 | 1.356 |
| 0.91881809 | 52.4881 | 24.829 | 5563.8 | 9.7742 | 5573.6 | 0.00 | 1.349 |
| 0.92341218 | 52.5947 | 24.740 | 5516.2 | 9.7969 | 5526.0 | 0.00 | 1.343 |
| 0.92802924 | 52.6999 | 24.651 | 5469.0 | 9.8196 | 5478.8 | 0.00 | 1.336 |
| 0.93266939 | 52.8040 | 24.562 | 5422.2 | 9.8421 | 5432.0 | 0.00 | 1.329 |
| 0.93733274 | 52.9069 | 24.473 | 5375.7 | 9.8645 | 5385.6 | 0.00 | 1.323 |
| 0.94201940 | 53.0088 | 24.385 | 5329.6 | 9.8868 | 5339.5 | 0.00 | 1.316 |
| 0.94672950 | 53.1098 | 24.296 | 5283.8 | 9.9089 | 5293.7 | 0.00 | 1.310 |
| 0.95146315 | 53.2100 | 24.208 | 5238.4 | 9.9310 | 5248.3 | 0.00 | 1.303 |
| 0.95622046 | 53.3094 | 24.120 | 5193.3 | 9.9529 | 5203.3 | 0.00 | 1.297 |
| 0.96100156 | 53.4082 | 24.032 | 5148.7 | 9.9747 | 5158.6 | 0.00 | 1.290 |
| 0.96580657 | 53.5067 | 23.944 | 5104.3 | 9.9963 | 5114.3 | 0.00 | 1.284 |
| 0.97063560 | 53.6049 | 23.856 | 5060.3 | 10.018 | 5070.3 | 0.00 | 1.277 |
| 0.97548878 | 53.7032 | 23.769 | 5016.7 | 10.039 | 5026.7 | 0.00 | 1.271 |
| 0.98036623 | 53.8019 | 23.681 | 4973.4 | 10.061 | 4983.5 | 0.00 | 1.265 |
| 0.98526806 | 53.9017 | 23.594 | 4930.5 | 10.082 | 4940.5 | 0.00 | 1.258 |
| 0.99019440 | 54.0034 | 23.507 | 4887.9 | 10.103 | 4898.0 | 0.00 | 1.252 |
| 0.99514537 | 54.1085 | 23.421 | 4845.6 | 10.124 | 4855.7 | 0.00 | 1.246 |
| 1.0001211 | 54.2213 | 23.333 | 4803.5 | 10.144 | 4813.7 | 0.00 | 1.240 |
| 1.0051217 | 54.3845 | 23.209 | 4754.2 | 10.165 | 4764.4 | 0.00 | 1.234 |
| 1.0101473 | 54.5337 | 23.086 | 4705.4 | 10.185 | 4715.6 | 0.00 | 1.227 |
| 1.0151980 | 54.6718 | 22.963 | 4657.2 | 10.206 | 4667.4 | 0.00 | 1.221 |
| 1.0202740 | 54.8005 | 22.842 | 4609.4 | 10.226 | 4619.6 | 0.00 | 1.215 |
| 1.0253754 | 54.9214 | 22.721 | 4562.2 | 10.246 | 4572.4 | 0.00 | 1.209 |
| 1.0305023 | 55.0355 | 22.600 | 4515.3 | 10.266 | 4525.6 | 0.00 | 1.203 |
| 1.0356548 | 55.1433 | 22.478 | 4468.7 | 10.286 | 4479.0 | 0.00 | 1.197 |
| 1.0408331 | 55.2457 | 22.357 | 4422.6 | 10.305 | 4432.9 | 0.00 | 1.191 |
| 1.0460372 | 55.3432 | 22.237 | 4376.9 | 10.325 | 4387.2 | 0.00 | 1.185 |
| 1.0512674 | 55.4362 | 22.118 | 4331.8 | 10.344 | 4342.1 | 0.00 | 1.179 |
| 1.0565238 | 55.5253 | 21.999 | 4287.1 | 10.363 | 4297.5 | 0.00 | 1.174 |
| 1.0618064 | 55.6107 | 21.881 | 4242.9 | 10.382 | 4253.3 | 0.00 | 1.168 |
| 1.0671154 | 55.6928 | 21.764 | 4199.2 | 10.401 | 4209.6 | 0.00 | 1.162 |
| 1.0724510 | 55.7717 | 21.648 | 4155.9 | 10.420 | 4166.3 | 0.00 | 1.156 |
| 1.0778132 | 55.8478 | 21.532 | 4113.1 | 10.439 | 4123.6 | 0.00 | 1.150 |
| 1.0832023 | 55.9211 | 21.417 | 4070.8 | 10.457 | 4081.2 | 0.00 | 1.145 |
| 1.0886183 | 55.9919 | 21.302 | 4028.9 | 10.476 | 4039.4 | 0.00 | 1.139 |
| 1.0940614 | 56.0603 | 21.189 | 3987.4 | 10.494 | 3997.9 | 0.00 | 1.133 |
| 1.0995317 | 56.1265 | 21.076 | 3946.4 | 10.512 | 3957.0 | 0.00 | 1.128 |
| 1.1050294 | 56.1905 | 20.963 | 3905.9 | 10.530 | 3916.4 | 0.00 | 1.122 |
| 1.1105545 | 56.2524 | 20.852 | 3865.7 | 10.548 | 3876.3 | 0.00 | 1.116 |
| 1.1161073 | 56.3125 | 20.741 | 3826.0 | 10.565 | 3836.6 | 0.00 | 1.111 |
| 1.1216878 | 56.3706 | 20.630 | 3786.8 | 10.583 | 3797.3 | 0.00 | 1.105 |
| 1.1272963 | 56.4270 | 20.521 | 3747.9 | 10.600 | 3758.5 | 0.00 | 1.100 |
| 1.1329328 | 56.4816 | 20.412 | 3709.4 | 10.617 | 3720.1 | 0.00 | 1.094 |
| 1.1385974 | 56.5346 | 20.303 | 3671.4 | 10.634 | 3682.0 | 0.00 | 1.089 |
| 1.1442904 | 56.5860 | 20.196 | 3633.8 | 10.651 | 3644.4 | 0.00 | 1.084 |
| 1.1500119 | 56.6359 | 20.089 | 3596.5 | 10.667 | 3607.2 | 0.00 | 1.078 |
| 1.1557619 | 56.6843 | 19.982 | 3559.7 | 10.684 | 3570.4 | 0.00 | 1.073 |
| 1.1615407 | 56.7299 | 19.877 | 3523.3 | 10.700 | 3534.0 | 0.00 | 1.067 |
| 1.1673484 | 56.7756 | 19.772 | 3487.2 | 10.717 | 3497.9 | 0.00 | 1.062 |
| 1.1731852 | 56.8200 | 19.667 | 3451.5 | 10.733 | 3462.3 | 0.00 | 1.057 |
| 1.1790511 | 56.8630 | 19.563 | 3416.2 | 10.748 | 3427.0 | 0.00 | 1.052 |
| 1.1849464 | 56.9047 | 19.460 | 3381.3 | 10.764 | 3392.1 | 0.00 | 1.046 |
| 1.1908711 | 56.9452 | 19.358 | 3346.8 | 10.780 | 3357.6 | 0.00 | 1.041 |
| 1.1968254 | 56.9846 | 19.256 | 3312.6 | 10.795 | 3323.4 | 0.00 | 1.036 |
| 1.2028096 | 57.0227 | 19.155 | 3278.8 | 10.810 | 3289.6 | 0.00 | 1.031 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Tl ($Z=81$) | | | | | | | |
| 1.2088236 | 57.0598 | 19.054 | 3245.3 | 10.825 | 3256.2 | 0.00 | 1.026 |
| 1.2148677 | 57.0957 | 18.954 | 3212.3 | 10.840 | 3223.1 | 0.00 | 1.021 |
| 1.2209421 | 57.1319 | 18.854 | 3179.5 | 10.855 | 3190.3 | 0.00 | 1.015 |
| 1.2270468 | 57.1656 | 18.755 | 3146.9 | 10.870 | 3157.8 | 0.00 | 1.010 |
| 1.2331820 | 57.1980 | 18.655 | 3114.7 | 10.884 | 3125.5 | 0.00 | 1.005 |
| 1.2393479 | 57.2294 | 18.557 | 3082.8 | 10.898 | 3093.7 | 0.00 | 1.000 |
| 1.2455447 | 57.2595 | 18.459 | 3051.2 | 10.912 | 3062.1 | 0.00 | 0.9954 |
| 1.2517724 | 57.2885 | 18.361 | 3020.0 | 10.926 | 3030.9 | 0.00 | 0.9905 |
| 1.2580312 | 57.3165 | 18.264 | 2989.1 | 10.940 | 3000.1 | 0.00 | 0.9855 |
| 1.2643214 | 57.3433 | 18.168 | 2958.6 | 10.954 | 2969.5 | 0.00 | 0.9806 |
| 1.2706430 | 57.3691 | 18.072 | 2928.3 | 10.967 | 2939.3 | 0.00 | 0.9758 |
| 1.2769962 | 57.3938 | 17.977 | 2898.4 | 10.980 | 2909.4 | 0.00 | 0.9709 |
| 1.2833812 | 57.4175 | 17.883 | 2868.8 | 10.994 | 2879.8 | 0.00 | 0.9661 |
| 1.2897981 | 57.4402 | 17.789 | 2839.6 | 11.006 | 2850.6 | 0.00 | 0.9613 |
| 1.2962471 | 57.4618 | 17.695 | 2810.6 | 11.019 | 2821.6 | 0.00 | 0.9565 |
| 1.3027283 | 57.4825 | 17.602 | 2782.0 | 11.032 | 2793.0 | 0.00 | 0.9517 |
| 1.3092420 | 57.5021 | 17.510 | 2753.6 | 11.044 | 2764.7 | 0.00 | 0.9470 |
| 1.3157882 | 57.5209 | 17.418 | 2725.6 | 11.056 | 2736.6 | 0.00 | 0.9423 |
| 1.3223671 | 57.5386 | 17.327 | 2697.8 | 11.068 | 2708.9 | 0.00 | 0.9376 |
| 1.3289790 | 57.5554 | 17.237 | 2670.4 | 11.080 | 2681.5 | 0.00 | 0.9329 |
| 1.3356239 | 57.5712 | 17.147 | 2643.2 | 11.092 | 2654.3 | 0.00 | 0.9283 |
| 1.3423020 | 57.5862 | 17.057 | 2616.4 | 11.104 | 2627.5 | 0.00 | 0.9237 |
| 1.3490135 | 57.6002 | 16.969 | 2589.8 | 11.115 | 2600.9 | 0.00 | 0.9191 |
| 1.3557586 | 57.6132 | 16.880 | 2563.5 | 11.126 | 2574.6 | 0.00 | 0.9145 |
| 1.3625374 | 57.6254 | 16.792 | 2537.5 | 11.137 | 2548.6 | 0.00 | 0.9100 |
| 1.3693500 | 57.6367 | 16.705 | 2511.7 | 11.148 | 2522.9 | 0.00 | 0.9054 |
| 1.3761968 | 57.6470 | 16.619 | 2486.3 | 11.159 | 2497.4 | 0.00 | 0.9009 |
| 1.3830778 | 57.6565 | 16.532 | 2461.1 | 11.169 | 2472.2 | 0.00 | 0.8964 |
| 1.3899932 | 57.6651 | 16.447 | 2436.1 | 11.180 | 2447.3 | 0.00 | 0.8920 |
| 1.3969431 | 57.6729 | 16.362 | 2411.5 | 11.190 | 2422.7 | 0.00 | 0.8875 |
| 1.4039278 | 57.6798 | 16.277 | 2387.1 | 11.200 | 2398.3 | 0.00 | 0.8831 |
| 1.4109475 | 57.6858 | 16.193 | 2363.0 | 11.210 | 2374.2 | 0.00 | 0.8787 |
| 1.4180022 | 57.6910 | 16.110 | 2339.1 | 11.219 | 2350.3 | 0.00 | 0.8744 |
| 1.4250922 | 57.6953 | 16.026 | 2315.4 | 11.229 | 2326.6 | 0.00 | 0.8700 |
| 1.4322177 | 57.6988 | 15.943 | 2292.0 | 11.238 | 2303.2 | 0.00 | 0.8657 |
| 1.4393788 | 57.7013 | 15.861 | 2268.7 | 11.247 | 2280.0 | 0.00 | 0.8614 |
| 1.4465757 | 57.7029 | 15.778 | 2245.7 | 11.256 | 2257.0 | 0.00 | 0.8571 |
| 1.4538086 | 57.7035 | 15.696 | 2223.0 | 11.265 | 2234.2 | 0.00 | 0.8528 |
| 1.4610776 | 57.7033 | 15.615 | 2200.4 | 11.273 | 2211.7 | 0.00 | 0.8486 |
| 1.4683830 | 57.7021 | 15.534 | 2178.2 | 11.282 | 2189.4 | 0.00 | 0.8444 |
| 1.4757249 | 57.7000 | 15.454 | 2156.1 | 11.290 | 2167.4 | 0.00 | 0.8402 |
| 1.4831035 | 57.6970 | 15.374 | 2134.3 | 11.298 | 2145.6 | 0.00 | 0.8360 |
| 1.4905190 | 57.6931 | 15.295 | 2112.8 | 11.306 | 2124.1 | 0.00 | 0.8318 |
| 1.4979716 | 57.6883 | 15.216 | 2091.4 | 11.313 | 2102.7 | 0.00 | 0.8277 |
| 1.5054615 | 57.6826 | 15.138 | 2070.3 | 11.321 | 2081.7 | 0.00 | 0.8236 |
| 1.5129888 | 57.6760 | 15.061 | 2049.5 | 11.328 | 2060.8 | 0.00 | 0.8195 |
| 1.5205537 | 57.6685 | 14.983 | 2028.8 | 11.335 | 2040.1 | 0.00 | 0.8154 |
| 1.5281565 | 57.6602 | 14.907 | 2008.4 | 11.342 | 2019.7 | 0.00 | 0.8113 |
| 1.5357973 | 57.6510 | 14.830 | 1988.2 | 11.349 | 1999.5 | 0.00 | 0.8073 |
| 1.5434763 | 57.6409 | 14.755 | 1968.2 | 11.355 | 1979.5 | 0.00 | 0.8033 |
| 1.5511937 | 57.6298 | 14.673 | 1947.5 | 11.362 | 1958.9 | 0.00 | 0.7993 |
| 1.5589496 | 57.6172 | 14.591 | 1927.0 | 11.368 | 1938.4 | 0.00 | 0.7953 |
| 1.5667444 | 57.6032 | 14.509 | 1906.7 | 11.374 | 1918.0 | 0.00 | 0.7913 |
| 1.5745781 | 57.5877 | 14.428 | 1886.6 | 11.380 | 1897.9 | 0.00 | 0.7874 |
| 1.5824510 | 57.5708 | 14.347 | 1866.7 | 11.385 | 1878.1 | 0.00 | 0.7835 |
| 1.5903633 | 57.5524 | 14.267 | 1847.1 | 11.391 | 1858.5 | 0.00 | 0.7796 |
| 1.5983151 | 57.5327 | 14.188 | 1827.6 | 11.396 | 1839.0 | 0.00 | 0.7757 |
| 1.6063066 | 57.5116 | 14.109 | 1808.4 | 11.401 | 1819.8 | 0.00 | 0.7719 |
| 1.6143382 | 57.4890 | 14.031 | 1789.5 | 11.406 | 1800.9 | 0.00 | 0.7680 |
| 1.6224099 | 57.4651 | 13.953 | 1770.7 | 11.411 | 1782.1 | 0.00 | 0.7642 |
| 1.6305219 | 57.4397 | 13.873 | 1751.8 | 11.415 | 1763.2 | 0.00 | 0.7604 |
| 1.6386745 | 57.4126 | 13.792 | 1732.9 | 11.420 | 1744.3 | 0.00 | 0.7566 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Tl ($Z=81$) | | | | | | | |
| 1.6468679 | 57.3837 | 13.711 | 1714.1 | 11.424 | 1725.6 | 0.00 | 0.7528 |
| 1.6551022 | 57.3530 | 13.631 | 1695.6 | 11.428 | 1707.0 | 0.00 | 0.7491 |
| 1.6633777 | 57.3205 | 13.551 | 1677.3 | 11.432 | 1688.7 | 0.00 | 0.7454 |
| 1.6716946 | 57.2862 | 13.472 | 1659.2 | 11.435 | 1670.7 | 0.00 | 0.7417 |
| 1.6800531 | 57.2500 | 13.393 | 1641.4 | 11.439 | 1652.8 | 0.00 | 0.7380 |
| 1.6884534 | 57.2121 | 13.315 | 1623.7 | 11.442 | 1635.1 | 0.00 | 0.7343 |
| 1.6968956 | 57.1723 | 13.238 | 1606.2 | 11.445 | 1617.7 | 0.00 | 0.7307 |
| 1.7053801 | 57.1307 | 13.161 | 1589.0 | 11.448 | 1600.4 | 0.00 | 0.7270 |
| 1.7139070 | 57.0871 | 13.085 | 1571.9 | 11.451 | 1583.3 | 0.00 | 0.7234 |
| 1.7224766 | 57.0417 | 13.009 | 1555.0 | 11.453 | 1566.5 | 0.00 | 0.7198 |
| 1.7310889 | 56.9943 | 12.934 | 1538.3 | 11.456 | 1549.8 | 0.00 | 0.7162 |
| 1.7397444 | 56.9450 | 12.860 | 1521.9 | 11.458 | 1533.3 | 0.00 | 0.7127 |
| 1.7484431 | 56.8936 | 12.786 | 1505.6 | 11.460 | 1517.0 | 0.00 | 0.7091 |
| 1.7571853 | 56.8403 | 12.712 | 1489.5 | 11.462 | 1500.9 | 0.00 | 0.7056 |
| 1.7659712 | 56.7848 | 12.639 | 1473.6 | 11.463 | 1485.0 | 0.00 | 0.7021 |
| 1.7748011 | 56.7272 | 12.567 | 1457.8 | 11.465 | 1469.3 | 0.00 | 0.6986 |
| 1.7836751 | 56.6674 | 12.495 | 1442.3 | 11.466 | 1453.7 | 0.00 | 0.6951 |
| 1.7925935 | 56.6054 | 12.423 | 1426.9 | 11.467 | 1438.4 | 0.00 | 0.6916 |
| 1.8015565 | 56.5411 | 12.352 | 1411.7 | 11.468 | 1423.2 | 0.00 | 0.6882 |
| 1.8105642 | 56.4745 | 12.282 | 1396.7 | 11.469 | 1408.1 | 0.00 | 0.6848 |
| 1.8196171 | 56.4054 | 12.212 | 1381.8 | 11.469 | 1393.3 | 0.00 | 0.6814 |
| 1.8287151 | 56.3350 | 12.143 | 1367.1 | 11.469 | 1378.6 | 0.00 | 0.6780 |
| 1.8378587 | 56.2609 | 12.074 | 1352.6 | 11.470 | 1364.1 | 0.00 | 0.6746 |
| 1.8470480 | 56.1842 | 12.006 | 1338.3 | 11.470 | 1349.7 | 0.00 | 0.6713 |
| 1.8562833 | 56.1047 | 11.938 | 1324.1 | 11.469 | 1335.6 | 0.00 | 0.6679 |
| 1.8655647 | 56.0225 | 11.870 | 1310.1 | 11.469 | 1321.5 | 0.00 | 0.6646 |
| 1.8748925 | 55.9373 | 11.804 | 1296.2 | 11.468 | 1307.7 | 0.00 | 0.6613 |
| 1.8842670 | 55.8491 | 11.737 | 1282.5 | 11.468 | 1293.9 | 0.00 | 0.6580 |
| 1.8936883 | 55.7578 | 11.671 | 1268.9 | 11.467 | 1280.4 | 0.00 | 0.6547 |
| 1.9031567 | 55.6633 | 11.605 | 1255.5 | 11.466 | 1267.0 | 0.00 | 0.6515 |
| 1.9126725 | 55.5653 | 11.540 | 1242.2 | 11.464 | 1253.7 | 0.00 | 0.6482 |
| 1.9222359 | 55.4638 | 11.475 | 1229.1 | 11.463 | 1240.6 | 0.00 | 0.6450 |
| 1.9318471 | 55.3587 | 11.411 | 1216.2 | 11.461 | 1227.6 | 0.00 | 0.6418 |
| 1.9415063 | 55.2497 | 11.347 | 1203.4 | 11.459 | 1214.8 | 0.00 | 0.6386 |
| 1.9512138 | 55.1367 | 11.284 | 1190.7 | 11.457 | 1202.1 | 0.00 | 0.6354 |
| 1.9609699 | 55.0195 | 11.221 | 1178.2 | 11.455 | 1189.6 | 0.00 | 0.6323 |
| 1.9707747 | 54.8980 | 11.159 | 1165.8 | 11.453 | 1177.2 | 0.00 | 0.6291 |
| 1.9806286 | 54.7718 | 11.097 | 1153.5 | 11.450 | 1165.0 | 0.00 | 0.6260 |
| 1.9905318 | 54.6408 | 11.035 | 1141.4 | 11.447 | 1152.9 | 0.00 | 0.6229 |
| 2.0004844 | 54.5047 | 10.974 | 1129.5 | 11.444 | 1140.9 | 0.00 | 0.6198 |
| 2.0104868 | 54.3632 | 10.914 | 1117.6 | 11.441 | 1129.1 | 0.00 | 0.6167 |
| 2.0205393 | 54.2161 | 10.853 | 1105.9 | 11.438 | 1117.4 | 0.00 | 0.6136 |
| 2.0306420 | 54.0629 | 10.793 | 1094.4 | 11.434 | 1105.8 | 0.00 | 0.6106 |
| 2.0407952 | 53.9034 | 10.734 | 1082.9 | 11.431 | 1094.4 | 0.00 | 0.6075 |
| 2.0509992 | 53.7372 | 10.675 | 1071.6 | 11.427 | 1083.0 | 0.00 | 0.6045 |
| 2.0612542 | 53.5638 | 10.617 | 1060.4 | 11.423 | 1071.9 | 0.00 | 0.6015 |
| 2.0715604 | 53.3827 | 10.558 | 1049.4 | 11.419 | 1060.8 | 0.00 | 0.5985 |
| 2.0819182 | 53.1934 | 10.501 | 1038.5 | 11.414 | 1049.9 | 0.00 | 0.5955 |
| 2.0923278 | 52.9954 | 10.443 | 1027.6 | 11.410 | 1039.1 | 0.00 | 0.5926 |
| 2.1027895 | 52.7880 | 10.386 | 1017.0 | 11.405 | 1028.4 | 0.00 | 0.5896 |
| 2.1133034 | 52.5704 | 10.330 | 1006.4 | 11.400 | 1017.8 | 0.00 | 0.5867 |
| 2.1238699 | 52.3419 | 10.274 | 995.94 | 11.395 | 1007.3 | 0.00 | 0.5838 |
| 2.1344893 | 52.1016 | 10.218 | 985.61 | 11.390 | 997.00 | 0.00 | 0.5809 |
| 2.1451617 | 51.8483 | 10.163 | 975.39 | 11.385 | 986.77 | 0.00 | 0.5780 |
| 2.1558875 | 51.5810 | 10.108 | 965.28 | 11.379 | 976.66 | 0.00 | 0.5751 |
| 2.1666670 | 51.3005 | 10.053 | 955.29 | 11.373 | 966.67 | 0.00 | 0.5722 |
| 2.1775003 | 51.0009 | 9.9988 | 945.42 | 11.367 | 956.78 | 0.00 | 0.5694 |
| 2.1883878 | 50.6824 | 9.9449 | 935.65 | 11.361 | 947.01 | 0.00 | 0.5666 |
| 2.1993297 | 50.3432 | 9.8915 | 925.99 | 11.355 | 937.34 | 0.00 | 0.5637 |
| 2.2103264 | 49.9805 | 9.8384 | 916.43 | 11.349 | 927.78 | 0.00 | 0.5609 |
| 2.2213780 | 49.5916 | 9.7856 | 906.99 | 11.342 | 918.33 | 0.00 | 0.5581 |
| 2.2324849 | 49.1729 | 9.7313 | 897.46 | 11.335 | 908.80 | 0.00 | 0.5554 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Tl ($Z=81$) | | | | | | | |
| 2.2436473 | 48.7199 | 9.6763 | 887.95 | 11.328 | 899.28 | 0.00 | 0.5526 |
| 2.2548656 | 48.2272 | 9.6218 | 878.55 | 11.321 | 889.88 | 0.00 | 0.5499 |
| 2.2661399 | 47.6881 | 9.5677 | 869.27 | 11.314 | 880.58 | 0.00 | 0.5471 |
| 2.2774706 | 47.0938 | 9.5139 | 860.09 | 11.306 | 871.39 | 0.00 | 0.5444 |
| 2.2888579 | 46.4329 | 9.4607 | 851.01 | 11.299 | 862.31 | 0.00 | 0.5417 |
| 2.3003022 | 45.6899 | 9.4078 | 842.05 | 11.291 | 853.34 | 0.00 | 0.5390 |
| 2.3118037 | 44.8428 | 9.3542 | 833.08 | 11.283 | 844.37 | 0.00 | 0.5363 |
| 2.3233628 | 43.8592 | 9.2999 | 824.13 | 11.275 | 835.41 | 0.00 | 0.5336 |
| 2.3349796 | 42.6879 | 9.2461 | 815.29 | 11.266 | 826.56 | 0.00 | 0.5310 |
| 2.3466545 | 41.2408 | 9.1928 | 806.55 | 11.258 | 817.81 | 0.00 | 0.5283 |
| 2.3583878 | 39.3445 | 9.1399 | 797.92 | 11.249 | 809.17 | 0.00 | 0.5257 |
| 2.3701797 | 36.5691 | 9.0874 | 789.39 | 11.240 | 800.63 | 0.00 | 0.5231 |
| 2.3820306 | 31.1333 | 9.0354 | 780.97 | 11.231 | 792.20 | 0.00 | 0.5205 |
| 2.3886550 | 17.8561 | 9.0066 | 776.32 | 11.226 | 787.54 | 0.00 | 0.5191 |
| 2.3899452 | 17.5600 | 26.110 | 2249.3 | 11.225 | 2260.6 | 0.00 | 0.5188 |
| 2.3939407 | 28.2573 | 26.045 | 2240.0 | 11.222 | 2251.2 | 0.00 | 0.5179 |
| 2.4059104 | 34.9344 | 25.852 | 2212.3 | 11.213 | 2223.6 | 0.00 | 0.5153 |
| 2.4179400 | 37.5104 | 25.661 | 2185.1 | 11.204 | 2196.3 | 0.00 | 0.5128 |
| 2.4300297 | 38.8982 | 25.471 | 2158.1 | 11.194 | 2169.3 | 0.00 | 0.5102 |
| 2.4421798 | 39.5964 | 25.282 | 2131.4 | 11.184 | 2142.6 | 0.00 | 0.5077 |
| 2.4543907 | 39.6905 | 25.094 | 2105.0 | 11.174 | 2116.2 | 0.00 | 0.5052 |
| 2.4666627 | 38.9611 | 24.907 | 2079.0 | 11.164 | 2090.1 | 0.00 | 0.5026 |
| 2.4789960 | 35.9590 | 24.722 | 2053.3 | 11.154 | 2064.4 | 0.00 | 0.5001 |
| 2.4843943 | 28.5815 | 24.642 | 2042.1 | 11.149 | 2053.3 | 0.00 | 0.4991 |
| 2.4858058 | 28.5013 | 35.959 | 2978.3 | 11.148 | 2989.5 | 0.00 | 0.4988 |
| 2.4913910 | 36.8012 | 35.836 | 2961.5 | 11.143 | 2972.6 | 0.00 | 0.4977 |
| 2.5038479 | 41.5359 | 35.563 | 2924.3 | 11.133 | 2935.4 | 0.00 | 0.4952 |
| 2.5163672 | 44.0836 | 35.293 | 2887.6 | 11.122 | 2898.8 | 0.00 | 0.4927 |
| 2.5289490 | 45.9357 | 35.024 | 2851.4 | 11.111 | 2862.5 | 0.00 | 0.4903 |
| 2.5415938 | 47.4244 | 34.758 | 2815.7 | 11.100 | 2826.8 | 0.00 | 0.4878 |
| 2.5543017 | 48.6821 | 34.494 | 2780.4 | 11.089 | 2791.5 | 0.00 | 0.4854 |
| 2.5670732 | 49.7767 | 34.233 | 2745.6 | 11.077 | 2756.7 | 0.00 | 0.4830 |
| 2.5799086 | 50.7481 | 33.973 | 2711.2 | 11.066 | 2722.3 | 0.00 | 0.4806 |
| 2.5928082 | 51.6222 | 33.715 | 2677.3 | 11.054 | 2688.3 | 0.00 | 0.4782 |
| 2.6057722 | 52.4165 | 33.460 | 2643.8 | 11.042 | 2654.8 | 0.00 | 0.4758 |
| 2.6188011 | 53.1438 | 33.206 | 2610.7 | 11.030 | 2621.7 | 0.00 | 0.4734 |
| 2.6318951 | 53.8137 | 32.955 | 2578.0 | 11.018 | 2589.1 | 0.00 | 0.4711 |
| 2.6450545 | 54.4335 | 32.706 | 2545.8 | 11.006 | 2556.8 | 0.00 | 0.4687 |
| 2.6582798 | 55.0090 | 32.459 | 2514.0 | 10.993 | 2525.0 | 0.00 | 0.4664 |
| 2.6715712 | 55.5447 | 32.213 | 2482.6 | 10.981 | 2493.6 | 0.00 | 0.4641 |
| 2.6849291 | 56.0442 | 31.970 | 2451.6 | 10.968 | 2462.5 | 0.00 | 0.4618 |
| 2.6983537 | 56.5106 | 31.729 | 2421.0 | 10.955 | 2431.9 | 0.00 | 0.4595 |
| 2.7118455 | 56.9461 | 31.489 | 2390.7 | 10.942 | 2401.7 | 0.00 | 0.4572 |
| 2.7254047 | 57.3529 | 31.252 | 2360.9 | 10.929 | 2371.8 | 0.00 | 0.4549 |
| 2.7390317 | 57.7321 | 31.016 | 2331.5 | 10.915 | 2342.4 | 0.00 | 0.4527 |
| 2.7527269 | 58.0851 | 30.783 | 2302.4 | 10.902 | 2313.3 | 0.00 | 0.4504 |
| 2.7664905 | 58.4124 | 30.551 | 2273.7 | 10.888 | 2284.6 | 0.00 | 0.4482 |
| 2.7803230 | 58.7144 | 30.321 | 2245.4 | 10.875 | 2256.2 | 0.00 | 0.4459 |
| 2.7942246 | 58.9909 | 30.093 | 2217.4 | 10.861 | 2228.2 | 0.00 | 0.4437 |
| 2.8081957 | 59.2412 | 29.867 | 2189.8 | 10.847 | 2200.6 | 0.00 | 0.4415 |
| 2.8222367 | 59.4642 | 29.643 | 2162.5 | 10.832 | 2173.3 | 0.00 | 0.4393 |
| 2.8363479 | 59.6574 | 29.420 | 2135.6 | 10.818 | 2146.4 | 0.00 | 0.4371 |
| 2.8505296 | 59.8175 | 29.200 | 2109.0 | 10.803 | 2119.8 | 0.00 | 0.4350 |
| 2.8647823 | 59.9389 | 28.981 | 2082.8 | 10.789 | 2093.6 | 0.00 | 0.4328 |
| 2.8791062 | 60.0127 | 28.763 | 2056.9 | 10.774 | 2067.7 | 0.00 | 0.4306 |
| 2.8935017 | 60.0239 | 28.548 | 2031.3 | 10.759 | 2042.1 | 0.00 | 0.4285 |
| 2.9079692 | 59.9446 | 28.333 | 2006.0 | 10.744 | 2016.8 | 0.00 | 0.4264 |
| 2.9225091 | 59.7160 | 28.120 | 1981.1 | 10.729 | 1991.8 | 0.00 | 0.4242 |
| 2.9371216 | 59.1734 | 27.909 | 1956.4 | 10.713 | 1967.1 | 0.00 | 0.4221 |
| 2.9518072 | 57.3502 | 27.700 | 1932.1 | 10.698 | 1942.8 | 0.00 | 0.4200 |
| 2.9536434 | 56.6537 | 27.674 | 1929.1 | 10.696 | 1939.8 | 0.00 | 0.4198 |
| 2.9595566 | 56.7161 | 32.380 | 2252.6 | 10.690 | 2263.3 | 0.00 | 0.4189 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Tl ($Z=81$) | | | | | | | |
| 2.9665662 | 58.7250 | 32.253 | 2238.5 | 10.682 | 2249.2 | 0.00 | 0.4179 |
| 2.9813991 | 60.4119 | 31.988 | 2209.0 | 10.667 | 2219.7 | 0.00 | 0.4159 |
| 2.9963061 | 61.4038 | 31.725 | 2180.0 | 10.651 | 2190.6 | 0.00 | 0.4138 |
| 3.0112876 | 62.2697 | 31.455 | 2150.7 | 10.635 | 2161.3 | 0.00 | 0.4117 |
| 3.0263440 | 62.9126 | 31.187 | 2121.7 | 10.619 | 2132.4 | 0.00 | 0.4097 |
| 3.0414758 | 63.4445 | 30.924 | 2093.4 | 10.602 | 2104.0 | 0.00 | 0.4076 |
| 3.0566831 | 63.9078 | 30.665 | 2065.5 | 10.586 | 2076.1 | 0.00 | 0.4056 |
| 3.0719666 | 64.3214 | 30.409 | 2038.1 | 10.569 | 2048.6 | 0.00 | 0.4036 |
| 3.0873264 | 64.6956 | 30.156 | 2011.1 | 10.553 | 2021.6 | 0.00 | 0.4016 |
| 3.1027630 | 65.0359 | 29.907 | 1984.5 | 10.536 | 1995.0 | 0.00 | 0.3996 |
| 3.1182768 | 65.3500 | 29.670 | 1959.0 | 10.519 | 1969.6 | 0.00 | 0.3976 |
| 3.1338682 | 65.6450 | 29.436 | 1933.9 | 10.502 | 1944.4 | 0.00 | 0.3956 |
| 3.1495376 | 65.9220 | 29.204 | 1909.1 | 10.485 | 1919.6 | 0.00 | 0.3937 |
| 3.1652853 | 66.1822 | 28.975 | 1884.7 | 10.467 | 1895.2 | 0.00 | 0.3917 |
| 3.1811117 | 66.4270 | 28.748 | 1860.7 | 10.450 | 1871.1 | 0.00 | 0.3898 |
| 3.1970172 | 66.6571 | 28.524 | 1837.0 | 10.433 | 1847.4 | 0.00 | 0.3878 |
| 3.2130023 | 66.8732 | 28.302 | 1813.6 | 10.415 | 1824.0 | 0.00 | 0.3859 |
| 3.2290673 | 67.0758 | 28.082 | 1790.6 | 10.397 | 1800.9 | 0.00 | 0.3840 |
| 3.2452127 | 67.2644 | 27.861 | 1767.6 | 10.379 | 1778.0 | 0.00 | 0.3821 |
| 3.2614387 | 67.4384 | 27.643 | 1745.0 | 10.361 | 1755.4 | 0.00 | 0.3802 |
| 3.2777459 | 67.5971 | 27.426 | 1722.7 | 10.343 | 1733.1 | 0.00 | 0.3783 |
| 3.2941347 | 67.7395 | 27.211 | 1700.7 | 10.325 | 1711.1 | 0.00 | 0.3764 |
| 3.3106053 | 67.8635 | 26.998 | 1679.0 | 10.306 | 1689.3 | 0.00 | 0.3745 |
| 3.3271584 | 67.9660 | 26.787 | 1657.6 | 10.288 | 1667.9 | 0.00 | 0.3726 |
| 3.3437941 | 68.0410 | 26.578 | 1636.5 | 10.269 | 1646.8 | 0.00 | 0.3708 |
| 3.3605131 | 68.0778 | 26.371 | 1615.7 | 10.250 | 1625.9 | 0.00 | 0.3689 |
| 3.3773157 | 68.0529 | 26.165 | 1595.1 | 10.232 | 1605.3 | 0.00 | 0.3671 |
| 3.3942023 | 67.8992 | 25.961 | 1574.8 | 10.213 | 1585.0 | 0.00 | 0.3653 |
| 3.4107130 | 67.2314 | 25.764 | 1555.2 | 10.194 | 1565.4 | 0.00 | 0.3635 |
| 3.4111733 | 67.1804 | 25.758 | 1554.7 | 10.194 | 1564.9 | 0.00 | 0.3635 |
| 3.4206869 | 67.3136 | 27.454 | 1652.4 | 10.183 | 1662.6 | 0.00 | 0.3625 |
| 3.4282291 | 67.9227 | 27.355 | 1642.9 | 10.174 | 1653.0 | 0.00 | 0.3617 |
| 3.4453703 | 68.5836 | 27.133 | 1621.4 | 10.155 | 1631.6 | 0.00 | 0.3599 |
| 3.4625971 | 68.9994 | 26.913 | 1600.2 | 10.136 | 1610.4 | 0.00 | 0.3581 |
| 3.4799101 | 69.3225 | 26.694 | 1579.4 | 10.116 | 1589.5 | 0.00 | 0.3563 |
| 3.4973097 | 69.5934 | 26.478 | 1558.8 | 10.097 | 1568.9 | 0.00 | 0.3545 |
| 3.5147962 | 69.8287 | 26.263 | 1538.4 | 10.077 | 1548.5 | 0.00 | 0.3527 |
| 3.5323702 | 70.0367 | 26.050 | 1518.4 | 10.057 | 1528.4 | 0.00 | 0.3510 |
| 3.5500321 | 70.2218 | 25.839 | 1498.6 | 10.037 | 1508.6 | 0.00 | 0.3492 |
| 3.5677822 | 70.3858 | 25.629 | 1479.0 | 10.017 | 1489.0 | 0.00 | 0.3475 |
| 3.5856211 | 70.5286 | 25.423 | 1459.8 | 9.9969 | 1469.8 | 0.00 | 0.3458 |
| 3.6035492 | 70.6528 | 25.227 | 1441.3 | 9.9767 | 1451.3 | 0.00 | 0.3441 |
| 3.6215670 | 70.7590 | 25.033 | 1423.2 | 9.9563 | 1433.1 | 0.00 | 0.3423 |
| 3.6396748 | 70.8416 | 24.842 | 1405.3 | 9.9359 | 1415.2 | 0.00 | 0.3406 |
| 3.6578732 | 70.8892 | 24.653 | 1387.6 | 9.9154 | 1397.5 | 0.00 | 0.3390 |
| 3.6761626 | 70.8727 | 24.465 | 1370.2 | 9.8947 | 1380.1 | 0.00 | 0.3373 |
| 3.6945434 | 70.6565 | 24.280 | 1353.1 | 9.8740 | 1363.0 | 0.00 | 0.3356 |
| 3.6962102 | 70.6044 | 24.263 | 1351.5 | 9.8721 | 1361.4 | 0.00 | 0.3354 |
| 3.7119896 | 70.7221 | 25.181 | 1396.7 | 9.8543 | 1406.5 | 0.00 | 0.3340 |
| 3.7130161 | 70.7719 | 25.170 | 1395.7 | 9.8531 | 1405.6 | 0.00 | 0.3339 |
| 3.7315812 | 71.2981 | 24.987 | 1378.7 | 9.8322 | 1388.5 | 0.00 | 0.3323 |
| 3.7502391 | 71.6117 | 24.806 | 1361.8 | 9.8112 | 1371.6 | 0.00 | 0.3306 |
| 3.7689903 | 71.8606 | 24.626 | 1345.3 | 9.7901 | 1355.0 | 0.00 | 0.3290 |
| 3.7878352 | 72.0763 | 24.448 | 1328.9 | 9.7688 | 1338.7 | 0.00 | 0.3273 |
| 3.8067744 | 72.2709 | 24.272 | 1312.8 | 9.7475 | 1322.5 | 0.00 | 0.3257 |
| 3.8258083 | 72.4508 | 24.098 | 1296.9 | 9.7261 | 1306.6 | 0.00 | 0.3241 |
| 3.8449373 | 72.6195 | 23.925 | 1281.2 | 9.7046 | 1290.9 | 0.00 | 0.3225 |
| 3.8641620 | 72.7784 | 23.751 | 1265.5 | 9.6831 | 1275.2 | 0.00 | 0.3209 |
| 3.8834828 | 72.9288 | 23.578 | 1250.0 | 9.6614 | 1259.7 | 0.00 | 0.3193 |
| 3.9029002 | 73.0720 | 23.406 | 1234.8 | 9.6397 | 1244.4 | 0.00 | 0.3177 |
| 3.9224147 | 73.2088 | 23.237 | 1219.7 | 9.6178 | 1229.3 | 0.00 | 0.3161 |
| 3.9420268 | 73.3400 | 23.069 | 1204.9 | 9.5959 | 1214.5 | 0.00 | 0.3145 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Tl ($Z=81$) | | | | | | | |
| 3.9617369 | 73.4662 | 22.903 | 1190.2 | 9.5739 | 1199.8 | 0.00 | 0.3130 |
| 3.9815456 | 73.5878 | 22.738 | 1175.8 | 9.5518 | 1185.4 | 0.00 | 0.3114 |
| 4.0014533 | 73.7053 | 22.575 | 1161.6 | 9.5296 | 1171.1 | 0.00 | 0.3098 |
| 4.0214606 | 73.8189 | 22.414 | 1147.5 | 9.5073 | 1157.0 | 0.00 | 0.3083 |
| 4.0415679 | 73.9289 | 22.254 | 1133.7 | 9.4850 | 1143.2 | 0.00 | 0.3068 |
| 4.0617757 | 74.0356 | 22.095 | 1120.0 | 9.4626 | 1129.5 | 0.00 | 0.3052 |
| 4.0820846 | 74.1391 | 21.938 | 1106.5 | 9.4401 | 1116.0 | 0.00 | 0.3037 |
| 4.1024950 | 74.2398 | 21.783 | 1093.2 | 9.4175 | 1102.6 | 0.00 | 0.3022 |
| 4.1230075 | 74.3377 | 21.629 | 1080.1 | 9.3949 | 1089.5 | 0.00 | 0.3007 |
| 4.1436226 | 74.4330 | 21.476 | 1067.1 | 9.3721 | 1076.5 | 0.00 | 0.2992 |
| 4.1643407 | 74.5259 | 21.325 | 1054.3 | 9.3493 | 1063.7 | 0.00 | 0.2977 |
| 4.1851624 | 74.6164 | 21.175 | 1041.7 | 9.3264 | 1051.0 | 0.00 | 0.2962 |
| 4.2060882 | 74.7047 | 21.027 | 1029.3 | 9.3035 | 1038.6 | 0.00 | 0.2948 |
| 4.2271186 | 74.7910 | 20.879 | 1017.0 | 9.2805 | 1026.3 | 0.00 | 0.2933 |
| 4.2482542 | 74.8753 | 20.734 | 1004.8 | 9.2574 | 1014.1 | 0.00 | 0.2918 |
| 4.2694955 | 74.9577 | 20.589 | 992.87 | 9.2342 | 1002.1 | 0.00 | 0.2904 |
| 4.2908430 | 75.0383 | 20.445 | 981.05 | 9.2110 | 990.26 | 0.00 | 0.2890 |
| 4.3122972 | 75.1173 | 20.303 | 969.38 | 9.1877 | 978.57 | 0.00 | 0.2875 |
| 4.3338587 | 75.1947 | 20.162 | 957.86 | 9.1643 | 967.02 | 0.00 | 0.2861 |
| 4.3555280 | 75.2707 | 20.023 | 946.49 | 9.1408 | 955.63 | 0.00 | 0.2847 |
| 4.3773056 | 75.3453 | 19.884 | 935.26 | 9.1173 | 944.38 | 0.00 | 0.2832 |
| 4.3991921 | 75.4186 | 19.747 | 924.18 | 9.0937 | 933.27 | 0.00 | 0.2818 |
| 4.4211881 | 75.4910 | 19.610 | 913.23 | 9.0701 | 922.30 | 0.00 | 0.2804 |
| 4.4432940 | 75.5624 | 19.475 | 902.41 | 9.0464 | 911.45 | 0.00 | 0.2790 |
| 4.4655105 | 75.6320 | 19.337 | 891.56 | 9.0226 | 900.59 | 0.00 | 0.2776 |
| 4.4878381 | 75.6998 | 19.200 | 880.86 | 8.9988 | 889.86 | 0.00 | 0.2763 |
| 4.5102772 | 75.7659 | 19.065 | 870.28 | 8.9749 | 879.26 | 0.00 | 0.2749 |
| 4.5328286 | 75.8303 | 18.930 | 859.84 | 8.9510 | 868.79 | 0.00 | 0.2735 |
| 4.5554928 | 75.8933 | 18.797 | 849.53 | 8.9270 | 858.46 | 0.00 | 0.2722 |
| 4.5782702 | 75.9549 | 18.664 | 839.34 | 8.9029 | 848.25 | 0.00 | 0.2708 |
| 4.6011616 | 76.0150 | 18.533 | 829.28 | 8.8788 | 838.16 | 0.00 | 0.2695 |
| 4.6241674 | 76.0740 | 18.402 | 819.35 | 8.8546 | 828.20 | 0.00 | 0.2681 |
| 4.6472882 | 76.1317 | 18.273 | 809.54 | 8.8304 | 818.37 | 0.00 | 0.2668 |
| 4.6705247 | 76.1882 | 18.144 | 799.84 | 8.8061 | 808.65 | 0.00 | 0.2655 |
| 4.6938773 | 76.2437 | 18.017 | 790.27 | 8.7818 | 799.05 | 0.00 | 0.2641 |
| 4.7173467 | 76.2981 | 17.890 | 780.82 | 8.7574 | 789.57 | 0.00 | 0.2628 |
| 4.7409334 | 76.3515 | 17.764 | 771.48 | 8.7330 | 780.21 | 0.00 | 0.2615 |
| 4.7646381 | 76.4041 | 17.640 | 762.25 | 8.7085 | 770.96 | 0.00 | 0.2602 |
| 4.7884613 | 76.6394 | 17.513 | 753.01 | 8.6839 | 761.70 | 0.00 | 0.2589 |
| 4.8124036 | 76.6904 | 17.383 | 743.71 | 8.6593 | 752.37 | 0.00 | 0.2576 |
| 4.8364656 | 76.7396 | 17.254 | 734.50 | 8.6347 | 743.13 | 0.00 | 0.2564 |
| 4.8606479 | 76.7871 | 17.125 | 725.40 | 8.6100 | 734.01 | 0.00 | 0.2551 |
| 4.8849512 | 76.8331 | 16.998 | 716.42 | 8.5853 | 725.00 | 0.00 | 0.2538 |
| 4.9093759 | 76.8776 | 16.871 | 707.55 | 8.5605 | 716.11 | 0.00 | 0.2525 |
| 4.9339228 | 76.9207 | 16.746 | 698.80 | 8.5357 | 707.34 | 0.00 | 0.2513 |
| 4.9585924 | 76.9625 | 16.622 | 690.17 | 8.5108 | 698.68 | 0.00 | 0.2500 |
| 4.9833854 | 77.1287 | 16.496 | 681.54 | 8.4859 | 690.03 | 0.00 | 0.2488 |
| 5.0083023 | 77.1680 | 16.369 | 672.94 | 8.4610 | 681.40 | 0.00 | 0.2476 |
| 5.0333438 | 77.2057 | 16.244 | 664.46 | 8.4360 | 672.90 | 0.00 | 0.2463 |
| 5.0585105 | 77.2419 | 16.119 | 656.09 | 8.4110 | 664.50 | 0.00 | 0.2451 |
| 5.0838031 | 77.2766 | 15.996 | 647.83 | 8.3859 | 656.21 | 0.00 | 0.2439 |
| 5.1092221 | 77.3099 | 15.874 | 639.67 | 8.3608 | 648.03 | 0.00 | 0.2427 |
| 5.1347682 | 77.3419 | 15.752 | 631.63 | 8.3357 | 639.96 | 0.00 | 0.2415 |
| 5.1604421 | 77.3727 | 15.632 | 623.69 | 8.3105 | 632.00 | 0.00 | 0.2403 |
| 5.1862443 | 77.4022 | 15.513 | 615.86 | 8.2853 | 624.14 | 0.00 | 0.2391 |
| 5.2121755 | 77.4306 | 15.395 | 608.13 | 8.2600 | 616.39 | 0.00 | 0.2379 |
| 5.2382364 | 77.4578 | 15.278 | 600.50 | 8.2348 | 608.73 | 0.00 | 0.2367 |
| 5.2644276 | 77.4840 | 15.162 | 592.97 | 8.2095 | 601.18 | 0.00 | 0.2355 |
| 5.2907497 | 77.5092 | 15.047 | 585.54 | 8.1841 | 593.72 | 0.00 | 0.2343 |
| 5.3172034 | 77.5333 | 14.933 | 578.21 | 8.1588 | 586.37 | 0.00 | 0.2332 |
| 5.3437895 | 77.5565 | 14.819 | 570.98 | 8.1333 | 579.11 | 0.00 | 0.2320 |
| 5.3705084 | 77.5788 | 14.707 | 563.84 | 8.1079 | 571.94 | 0.00 | 0.2309 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Tl ($Z=81$) | | | | | | | |
| 5.3973609 | 77.6001 | 14.596 | 556.79 | 8.0825 | 564.87 | 0.00 | 0.2297 |
| 5.4243477 | 77.6206 | 14.486 | 549.84 | 8.0570 | 557.89 | 0.00 | 0.2286 |
| 5.4514695 | 77.6403 | 14.377 | 542.98 | 8.0315 | 551.01 | 0.00 | 0.2274 |
| 5.4787268 | 77.6591 | 14.268 | 536.21 | 8.0059 | 544.21 | 0.00 | 0.2263 |
| 5.5061205 | 77.6771 | 14.161 | 529.52 | 7.9804 | 537.50 | 0.00 | 0.2252 |
| 5.5336511 | 77.6944 | 14.055 | 522.93 | 7.9548 | 530.89 | 0.00 | 0.2241 |
| 5.5613193 | 77.7109 | 13.949 | 516.42 | 7.9292 | 524.35 | 0.00 | 0.2229 |
| 5.5891259 | 77.7268 | 13.845 | 510.00 | 7.9035 | 517.91 | 0.00 | 0.2218 |
| 5.6170716 | 77.7419 | 13.741 | 503.66 | 7.8779 | 511.54 | 0.00 | 0.2207 |
| 5.6451569 | 77.7564 | 13.638 | 497.41 | 7.8522 | 505.26 | 0.00 | 0.2196 |
| 5.6733827 | 77.7702 | 13.536 | 491.24 | 7.8265 | 499.07 | 0.00 | 0.2185 |
| 5.7017496 | 77.7834 | 13.435 | 485.15 | 7.8008 | 492.95 | 0.00 | 0.2174 |
| 5.7302584 | 77.7960 | 13.335 | 479.14 | 7.7751 | 486.91 | 0.00 | 0.2164 |
| 5.7589096 | 77.8080 | 13.236 | 473.21 | 7.7493 | 480.96 | 0.00 | 0.2153 |
| 5.7877042 | 77.8194 | 13.138 | 467.35 | 7.7236 | 475.08 | 0.00 | 0.2142 |
| 5.8166427 | 77.8304 | 13.040 | 461.58 | 7.6978 | 469.27 | 0.00 | 0.2132 |
| 5.8457259 | 77.8408 | 12.943 | 455.88 | 7.6720 | 463.55 | 0.00 | 0.2121 |
| 5.8749546 | 77.8507 | 12.848 | 450.25 | 7.6462 | 457.90 | 0.00 | 0.2110 |
| 5.9043293 | 77.8602 | 12.753 | 444.70 | 7.6204 | 452.32 | 0.00 | 0.2100 |
| 5.9338510 | 77.9663 | 12.656 | 439.14 | 7.5945 | 446.73 | 0.00 | 0.2089 |
| 5.9635202 | 77.9752 | 12.559 | 433.61 | 7.5687 | 441.18 | 0.00 | 0.2079 |
| 5.9933378 | 77.9834 | 12.463 | 428.15 | 7.5428 | 435.70 | 0.00 | 0.2069 |
| 6.0233045 | 77.9907 | 12.368 | 422.77 | 7.5170 | 430.29 | 0.00 | 0.2058 |
| 6.0534210 | 77.9974 | 12.274 | 417.46 | 7.4911 | 424.95 | 0.00 | 0.2048 |
| 6.0836882 | 78.0033 | 12.180 | 412.22 | 7.4652 | 419.68 | 0.00 | 0.2038 |
| 6.1141066 | 78.0086 | 12.088 | 407.05 | 7.4393 | 414.49 | 0.00 | 0.2028 |
| 6.1446771 | 78.0132 | 11.996 | 401.94 | 7.4134 | 409.36 | 0.00 | 0.2018 |
| 6.1754005 | 78.0172 | 11.905 | 396.91 | 7.3875 | 404.30 | 0.00 | 0.2008 |
| 6.2062775 | 78.0207 | 11.815 | 391.94 | 7.3616 | 399.30 | 0.00 | 0.1998 |
| 6.2373089 | 78.0235 | 11.725 | 387.04 | 7.3357 | 394.38 | 0.00 | 0.1988 |
| 6.2684954 | 78.0258 | 11.637 | 382.20 | 7.3098 | 389.51 | 0.00 | 0.1978 |
| 6.2998379 | 78.0276 | 11.549 | 377.43 | 7.2839 | 384.71 | 0.00 | 0.1968 |
| 6.3313371 | 78.0289 | 11.462 | 372.72 | 7.2580 | 379.98 | 0.00 | 0.1958 |
| 6.3629938 | 78.0297 | 11.375 | 368.07 | 7.2321 | 375.30 | 0.00 | 0.1949 |
| 6.3948088 | 78.0300 | 11.290 | 363.49 | 7.2061 | 370.69 | 0.00 | 0.1939 |
| 6.4267828 | 78.0298 | 11.205 | 358.96 | 7.1802 | 366.14 | 0.00 | 0.1929 |
| 6.4589167 | 78.0292 | 11.121 | 354.50 | 7.1543 | 361.65 | 0.00 | 0.1920 |
| 6.4912113 | 78.0281 | 11.038 | 350.09 | 7.1284 | 357.22 | 0.00 | 0.1910 |
| 6.5236674 | 78.0267 | 10.955 | 345.74 | 7.1025 | 352.85 | 0.00 | 0.1901 |
| 6.5562857 | 78.0248 | 10.873 | 341.45 | 7.0766 | 348.53 | 0.00 | 0.1891 |
| 6.5890671 | 78.0225 | 10.792 | 337.22 | 7.0507 | 344.27 | 0.00 | 0.1882 |
| 6.6220125 | 78.0198 | 10.712 | 333.04 | 7.0248 | 340.07 | 0.00 | 0.1872 |
| 6.6551225 | 78.0168 | 10.632 | 328.92 | 6.9989 | 335.92 | 0.00 | 0.1863 |
| 6.6883981 | 78.0134 | 10.553 | 324.85 | 6.9730 | 331.83 | 0.00 | 0.1854 |
| 6.7218401 | 78.0096 | 10.475 | 320.84 | 6.9471 | 327.79 | 0.00 | 0.1844 |
| 6.7554493 | 78.0055 | 10.397 | 316.88 | 6.9212 | 323.80 | 0.00 | 0.1835 |
| 6.7892266 | 78.0011 | 10.320 | 312.97 | 6.8954 | 319.87 | 0.00 | 0.1826 |
| 6.8231727 | 77.9964 | 10.244 | 309.11 | 6.8695 | 315.98 | 0.00 | 0.1817 |
| 6.8572886 | 78.0312 | 10.168 | 305.28 | 6.8436 | 312.13 | 0.00 | 0.1808 |
| 6.8915750 | 78.0261 | 10.092 | 301.49 | 6.8178 | 308.31 | 0.00 | 0.1799 |
| 6.9260329 | 78.0205 | 10.016 | 297.75 | 6.7920 | 304.54 | 0.00 | 0.1790 |
| 6.9606631 | 78.0145 | 9.9415 | 294.06 | 6.7662 | 300.83 | 0.00 | 0.1781 |
| 6.9954664 | 78.0082 | 9.8674 | 290.42 | 6.7404 | 297.16 | 0.00 | 0.1772 |
| 7.0304437 | 78.0015 | 9.7939 | 286.82 | 6.7146 | 293.53 | 0.00 | 0.1764 |
| 7.0655959 | 77.9944 | 9.7211 | 283.27 | 6.6888 | 289.96 | 0.00 | 0.1755 |
| 7.1009239 | 77.9870 | 9.6489 | 279.77 | 6.6630 | 286.43 | 0.00 | 0.1746 |
| 7.1364285 | 77.9793 | 9.5773 | 276.31 | 6.6373 | 282.95 | 0.00 | 0.1737 |
| 7.1721107 | 77.9712 | 9.5063 | 272.90 | 6.6116 | 279.51 | 0.00 | 0.1729 |
| 7.2079712 | 77.9628 | 9.4359 | 269.53 | 6.5859 | 276.12 | 0.00 | 0.1720 |
| 7.2440111 | 77.9541 | 9.3662 | 266.21 | 6.5602 | 272.77 | 0.00 | 0.1712 |
| 7.2802311 | 77.9451 | 9.2965 | 262.91 | 6.5345 | 269.44 | 0.00 | 0.1703 |
| 7.3166323 | 77.9357 | 9.2272 | 259.65 | 6.5088 | 266.16 | 0.00 | 0.1695 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Tl ($Z=81$) | | | | | | | |
| 7.3532155 | 77.9261 | 9.1585 | 256.44 | 6.4832 | 262.92 | 0.00 | 0.1686 |
| 7.3899815 | 77.9161 | 9.0904 | 253.26 | 6.4576 | 259.72 | 0.00 | 0.1678 |
| 7.4269314 | 77.9228 | 9.0227 | 250.13 | 6.4320 | 256.56 | 0.00 | 0.1669 |
| 7.4640661 | 77.9123 | 8.9553 | 247.02 | 6.4064 | 253.43 | 0.00 | 0.1661 |
| 7.5013864 | 77.9015 | 8.8885 | 243.96 | 6.3808 | 250.34 | 0.00 | 0.1653 |
| 7.5388934 | 77.8904 | 8.8223 | 240.94 | 6.3553 | 247.29 | 0.00 | 0.1645 |
| 7.5765878 | 77.8790 | 8.7566 | 237.96 | 6.3298 | 244.29 | 0.00 | 0.1636 |
| 7.6144708 | 77.8672 | 8.6915 | 235.01 | 6.3043 | 241.32 | 0.00 | 0.1628 |
| 7.6525431 | 77.8551 | 8.6268 | 232.10 | 6.2789 | 238.38 | 0.00 | 0.1620 |
| 7.6908058 | 77.8427 | 8.5623 | 229.22 | 6.2534 | 235.47 | 0.00 | 0.1612 |
| 7.7292599 | 77.8300 | 8.4984 | 226.38 | 6.2280 | 232.61 | 0.00 | 0.1604 |
| 7.7679062 | 77.8169 | 8.4351 | 223.57 | 6.2026 | 229.78 | 0.00 | 0.1596 |
| 7.8067457 | 77.8036 | 8.3723 | 220.81 | 6.1773 | 226.98 | 0.00 | 0.1588 |
| 7.8457794 | 77.7899 | 8.3101 | 218.07 | 6.1519 | 224.23 | 0.00 | 0.1580 |
| 7.8850083 | 77.7760 | 8.2484 | 215.38 | 6.1266 | 221.51 | 0.00 | 0.1572 |
| 7.9244334 | 77.7618 | 8.1872 | 212.72 | 6.1014 | 218.82 | 0.00 | 0.1565 |
| 7.9640555 | 77.7473 | 8.1266 | 210.09 | 6.0761 | 216.17 | 0.00 | 0.1557 |
| 8.0038758 | 77.7325 | 8.0665 | 207.50 | 6.0509 | 213.55 | 0.00 | 0.1549 |
| 8.0438952 | 77.7174 | 8.0069 | 204.94 | 6.0257 | 210.97 | 0.00 | 0.1541 |
| 8.0841147 | 77.7021 | 7.9478 | 202.42 | 6.0006 | 208.42 | 0.00 | 0.1534 |
| 8.1245352 | 77.6865 | 7.8892 | 199.93 | 5.9754 | 205.90 | 0.00 | 0.1526 |
| 8.1651579 | 77.6706 | 7.8312 | 197.47 | 5.9503 | 203.42 | 0.00 | 0.1518 |
| 8.2059837 | 77.6545 | 7.7736 | 195.04 | 5.9253 | 200.97 | 0.00 | 0.1511 |
| 8.2470136 | 77.6381 | 7.7165 | 192.65 | 5.9003 | 198.55 | 0.00 | 0.1503 |
| 8.2882487 | 77.6215 | 7.6599 | 190.28 | 5.8753 | 196.16 | 0.00 | 0.1496 |
| 8.3296899 | 77.6047 | 7.6038 | 187.95 | 5.8503 | 193.80 | 0.00 | 0.1488 |
| 8.3713384 | 77.5877 | 7.5482 | 185.64 | 5.8254 | 191.47 | 0.00 | 0.1481 |
| 8.4131951 | 77.5704 | 7.4930 | 183.37 | 5.8005 | 189.17 | 0.00 | 0.1474 |
| 8.4552610 | 77.5530 | 7.4384 | 181.13 | 5.7757 | 186.90 | 0.00 | 0.1466 |
| 8.4975373 | 77.5354 | 7.3841 | 178.91 | 5.7508 | 184.66 | 0.00 | 0.1459 |
| 8.5400250 | 77.5176 | 7.3304 | 176.73 | 5.7261 | 182.45 | 0.00 | 0.1452 |
| Pb ($Z=82$) | | | | | | | |
| Atomic weight: $A_r = 207.2000 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^3) = 11.330$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1}) = [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 344.064 \text{ E(eV)} [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) = f_2 (e \text{ atom}^{-1}) \times 2.03090 \times 10^5$ | | | | | | | |
| 23 edges. Edge energies (keV) | | | | | | | |
| K | 88.0045 | L I | 15.8608 | L II | 15.2000 | L III | 13.0352 |
| M I | 3.85070 | M II | 3.55420 | M III | 3.06640 | M IV | 2.58560 |
| M V | 2.48400 | N I | 0.893600 | N II | 0.763900 | N III | 0.644500 |
| N IV | 0.435200 | N V | 0.412900 | N VI | 0.142900 | N VII | 0.138100 |
| O I | 0.147300 | O II | 0.104800 | O III | 0.0860000 | O IV | 0.0218000 |
| O V | 0.0192000 | P I | 0.0116904 | P II | 0.00491166 | | |
| Relativistic correction estimate: $f_{\text{rel}} (\text{H82,3/5CL}) = (-1.9001, -1.1136) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}} = -0.017802 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 32.9286 | 31.090 | 12628 | 6.3895 | 12634 | 0.00 | 2.480 |
| 0.50250000 | 33.1489 | 31.112 | 12574 | 6.4191 | 12581 | 0.00 | 2.467 |
| 0.50501250 | 33.3686 | 31.131 | 12519 | 6.4488 | 12526 | 0.00 | 2.455 |
| 0.50753756 | 33.5874 | 31.149 | 12464 | 6.4785 | 12471 | 0.00 | 2.443 |
| 0.51007525 | 33.8055 | 31.163 | 12408 | 6.5082 | 12414 | 0.00 | 2.431 |
| 0.51262563 | 34.0228 | 31.176 | 12351 | 6.5379 | 12358 | 0.00 | 2.419 |
| 0.51518875 | 34.2391 | 31.186 | 12294 | 6.5676 | 12300 | 0.00 | 2.407 |
| 0.51776470 | 34.4546 | 31.194 | 12236 | 6.5973 | 12242 | 0.00 | 2.395 |
| 0.52035352 | 34.6691 | 31.200 | 12177 | 6.6270 | 12184 | 0.00 | 2.383 |
| 0.52295529 | 34.8826 | 31.204 | 12118 | 6.6568 | 12125 | 0.00 | 2.371 |
| 0.52557007 | 35.0951 | 31.205 | 12058 | 6.6865 | 12065 | 0.00 | 2.359 |
| 0.52819792 | 35.3065 | 31.204 | 11998 | 6.7162 | 12005 | 0.00 | 2.347 |
| 0.53083891 | 35.5167 | 31.201 | 11937 | 6.7460 | 11944 | 0.00 | 2.336 |
| 0.53349310 | 35.7259 | 31.196 | 11876 | 6.7757 | 11883 | 0.00 | 2.324 |
| 0.53616057 | 35.9338 | 31.189 | 11814 | 6.8055 | 11821 | 0.00 | 2.312 |
| 0.53884137 | 36.1404 | 31.180 | 11752 | 6.8352 | 11759 | 0.00 | 2.301 |
| 0.54153558 | 36.3457 | 31.169 | 11689 | 6.8650 | 11696 | 0.00 | 2.289 |
| 0.54424325 | 36.5497 | 31.155 | 11626 | 6.8947 | 11633 | 0.00 | 2.278 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pb ($Z=82$) | | | | | | | |
| 0.54696447 | 36.7523 | 31.140 | 11562 | 6.9245 | 11569 | 0.00 | 2.267 |
| 0.54969929 | 36.9535 | 31.123 | 11499 | 6.9542 | 11506 | 0.00 | 2.255 |
| 0.55244779 | 37.1531 | 31.104 | 11434 | 6.9839 | 11441 | 0.00 | 2.244 |
| 0.55521003 | 37.3512 | 31.083 | 11370 | 7.0137 | 11377 | 0.00 | 2.233 |
| 0.55798608 | 37.5477 | 31.059 | 11305 | 7.0434 | 11312 | 0.00 | 2.222 |
| 0.56077601 | 37.7424 | 31.034 | 11239 | 7.0731 | 11246 | 0.00 | 2.211 |
| 0.56357989 | 37.9353 | 31.007 | 11174 | 7.1028 | 11181 | 0.00 | 2.200 |
| 0.56639779 | 38.1263 | 30.978 | 11107 | 7.1325 | 11115 | 0.00 | 2.189 |
| 0.56922978 | 38.3153 | 30.946 | 11041 | 7.1622 | 11048 | 0.00 | 2.178 |
| 0.57207593 | 38.5022 | 30.913 | 10974 | 7.1918 | 10982 | 0.00 | 2.167 |
| 0.57493630 | 38.6869 | 30.878 | 10907 | 7.2215 | 10915 | 0.00 | 2.156 |
| 0.57781099 | 38.8693 | 30.842 | 10840 | 7.2511 | 10847 | 0.00 | 2.146 |
| 0.58070004 | 39.0492 | 30.803 | 10773 | 7.2808 | 10780 | 0.00 | 2.135 |
| 0.58360354 | 39.2264 | 30.762 | 10705 | 7.3104 | 10712 | 0.00 | 2.124 |
| 0.58652156 | 39.4008 | 30.720 | 10637 | 7.3400 | 10644 | 0.00 | 2.114 |
| 0.58945417 | 39.5721 | 30.675 | 10569 | 7.3695 | 10576 | 0.00 | 2.103 |
| 0.59240144 | 39.7403 | 30.630 | 10501 | 7.3991 | 10508 | 0.00 | 2.093 |
| 0.59536345 | 39.9049 | 30.582 | 10432 | 7.4286 | 10440 | 0.00 | 2.082 |
| 0.59834026 | 40.0658 | 30.533 | 10364 | 7.4581 | 10371 | 0.00 | 2.072 |
| 0.60133196 | 40.2226 | 30.482 | 10295 | 7.4876 | 10302 | 0.00 | 2.062 |
| 0.60433862 | 40.3748 | 30.430 | 10226 | 7.5171 | 10234 | 0.00 | 2.052 |
| 0.60736032 | 40.5220 | 30.377 | 10157 | 7.5465 | 10165 | 0.00 | 2.041 |
| 0.61039712 | 40.6634 | 30.322 | 10089 | 7.5759 | 10096 | 0.00 | 2.031 |
| 0.61344910 | 40.7984 | 30.266 | 10020 | 7.6053 | 10027 | 0.00 | 2.021 |
| 0.61651635 | 40.9259 | 30.208 | 9951.1 | 7.6347 | 9958.7 | 0.00 | 2.011 |
| 0.61959893 | 41.0443 | 30.149 | 9882.3 | 7.6640 | 9890.0 | 0.00 | 2.001 |
| 0.62269693 | 41.1517 | 30.090 | 9813.6 | 7.6933 | 9821.3 | 0.00 | 1.991 |
| 0.62581041 | 41.2451 | 30.029 | 9745.0 | 7.7225 | 9752.7 | 0.00 | 1.981 |
| 0.62893946 | 41.3198 | 29.966 | 9676.4 | 7.7517 | 9684.2 | 0.00 | 1.971 |
| 0.63208416 | 41.3679 | 29.903 | 9608.0 | 7.7809 | 9615.8 | 0.00 | 1.962 |
| 0.63524458 | 41.3747 | 29.839 | 9539.7 | 7.8101 | 9547.6 | 0.00 | 1.952 |
| 0.63842080 | 41.3056 | 29.774 | 9471.6 | 7.8392 | 9479.4 | 0.00 | 1.942 |
| 0.64161291 | 41.0450 | 29.708 | 9403.6 | 7.8683 | 9411.5 | 0.00 | 1.932 |
| 0.64372017 | 40.3933 | 29.665 | 9359.0 | 7.8874 | 9366.9 | 0.00 | 1.926 |
| 0.64482097 | 39.9332 | 31.478 | 9914.2 | 7.8973 | 9922.1 | 0.00 | 1.923 |
| 0.64527986 | 40.4764 | 31.469 | 9904.2 | 7.9015 | 9912.2 | 0.00 | 1.921 |
| 0.64804508 | 41.5080 | 31.413 | 9844.6 | 7.9263 | 9852.5 | 0.00 | 1.913 |
| 0.65128530 | 42.0580 | 31.348 | 9775.2 | 7.9553 | 9783.2 | 0.00 | 1.904 |
| 0.65454173 | 42.4568 | 31.282 | 9706.1 | 7.9842 | 9714.1 | 0.00 | 1.894 |
| 0.65781444 | 42.7904 | 31.215 | 9637.2 | 8.0131 | 9645.2 | 0.00 | 1.885 |
| 0.66110351 | 43.0870 | 31.148 | 9568.6 | 8.0419 | 9576.6 | 0.00 | 1.875 |
| 0.66440903 | 43.3597 | 31.080 | 9500.3 | 8.0707 | 9508.3 | 0.00 | 1.866 |
| 0.66773107 | 43.6154 | 31.012 | 9432.2 | 8.0994 | 9440.3 | 0.00 | 1.857 |
| 0.67106973 | 43.8584 | 30.943 | 9364.5 | 8.1281 | 9372.6 | 0.00 | 1.848 |
| 0.67442508 | 44.0915 | 30.874 | 9297.1 | 8.1567 | 9305.3 | 0.00 | 1.838 |
| 0.67779720 | 44.3166 | 30.804 | 9230.0 | 8.1853 | 9238.2 | 0.00 | 1.829 |
| 0.68118619 | 44.5352 | 30.735 | 9163.3 | 8.2138 | 9171.5 | 0.00 | 1.820 |
| 0.68459212 | 44.7484 | 30.665 | 9097.0 | 8.2423 | 9105.2 | 0.00 | 1.811 |
| 0.68801508 | 44.9569 | 30.594 | 9031.0 | 8.2707 | 9039.2 | 0.00 | 1.802 |
| 0.69145515 | 45.1617 | 30.524 | 8965.4 | 8.2991 | 8973.7 | 0.00 | 1.793 |
| 0.69491243 | 45.3633 | 30.454 | 8900.1 | 8.3274 | 8908.5 | 0.00 | 1.784 |
| 0.69838699 | 45.5622 | 30.381 | 8834.7 | 8.3557 | 8843.0 | 0.00 | 1.775 |
| 0.70187893 | 45.7561 | 30.296 | 8766.3 | 8.3839 | 8774.6 | 0.00 | 1.766 |
| 0.70538832 | 45.9457 | 30.211 | 8698.2 | 8.4120 | 8706.6 | 0.00 | 1.758 |
| 0.70891526 | 46.1312 | 30.126 | 8630.4 | 8.4401 | 8638.9 | 0.00 | 1.749 |
| 0.71245984 | 46.3130 | 30.040 | 8563.1 | 8.4681 | 8571.5 | 0.00 | 1.740 |
| 0.71602214 | 46.4911 | 29.954 | 8496.0 | 8.4961 | 8504.5 | 0.00 | 1.732 |
| 0.71960225 | 46.6657 | 29.867 | 8429.3 | 8.5240 | 8437.8 | 0.00 | 1.723 |
| 0.72320026 | 46.8370 | 29.780 | 8363.0 | 8.5518 | 8371.5 | 0.00 | 1.714 |
| 0.72681626 | 47.0048 | 29.693 | 8297.0 | 8.5795 | 8305.6 | 0.00 | 1.706 |
| 0.73045034 | 47.1693 | 29.606 | 8231.4 | 8.6072 | 8240.0 | 0.00 | 1.697 |
| 0.73410260 | 47.3304 | 29.518 | 8166.2 | 8.6348 | 8174.8 | 0.00 | 1.689 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]_{\text{K}}$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Pb ($Z=82$) | | | | | | | |
| 0.73777311 | 47.4870 | 29.425 | 8100.0 | 8.6624 | 8108.6 | 0.00 | 1.681 |
| 0.74146197 | 47.6378 | 29.329 | 8033.2 | 8.6899 | 8041.9 | 0.00 | 1.672 |
| 0.74516928 | 47.7820 | 29.232 | 7966.9 | 8.7173 | 7975.6 | 0.00 | 1.664 |
| 0.74889513 | 47.9182 | 29.135 | 7900.9 | 8.7446 | 7909.6 | 0.00 | 1.656 |
| 0.75263961 | 48.0434 | 29.037 | 7835.3 | 8.7719 | 7844.0 | 0.00 | 1.647 |
| 0.75640280 | 48.1506 | 28.939 | 7770.0 | 8.7991 | 7778.8 | 0.00 | 1.639 |
| 0.76018482 | 48.2177 | 28.841 | 7705.1 | 8.8262 | 7713.9 | 0.00 | 1.631 |
| 0.76283052 | 48.1669 | 28.772 | 7660.1 | 8.8450 | 7669.0 | 0.00 | 1.625 |
| 0.76398574 | 47.8935 | 29.140 | 7746.3 | 8.8532 | 7755.2 | 0.00 | 1.623 |
| 0.76496944 | 48.2518 | 29.115 | 7729.7 | 8.8602 | 7738.6 | 0.00 | 1.621 |
| 0.76780567 | 48.5275 | 29.043 | 7682.2 | 8.8802 | 7691.0 | 0.00 | 1.615 |
| 0.77164470 | 48.7632 | 28.946 | 7618.4 | 8.9070 | 7627.3 | 0.00 | 1.607 |
| 0.77550292 | 48.9616 | 28.849 | 7555.0 | 8.9338 | 7563.9 | 0.00 | 1.599 |
| 0.77938044 | 49.1433 | 28.751 | 7492.0 | 8.9605 | 7501.0 | 0.00 | 1.591 |
| 0.78327734 | 49.3150 | 28.654 | 7429.4 | 8.9872 | 7438.4 | 0.00 | 1.583 |
| 0.78719373 | 49.4796 | 28.556 | 7367.3 | 9.0137 | 7376.3 | 0.00 | 1.575 |
| 0.79112969 | 49.6387 | 28.458 | 7305.5 | 9.0402 | 7314.6 | 0.00 | 1.567 |
| 0.79508534 | 49.7933 | 28.360 | 7244.2 | 9.0665 | 7253.2 | 0.00 | 1.559 |
| 0.79906077 | 49.9439 | 28.263 | 7183.2 | 9.0928 | 7192.3 | 0.00 | 1.552 |
| 0.80305607 | 50.0911 | 28.165 | 7122.7 | 9.1190 | 7131.8 | 0.00 | 1.544 |
| 0.80707135 | 50.2351 | 28.067 | 7062.6 | 9.1451 | 7071.8 | 0.00 | 1.536 |
| 0.81110671 | 50.3762 | 27.969 | 7003.0 | 9.1711 | 7012.2 | 0.00 | 1.529 |
| 0.81516224 | 50.5144 | 27.871 | 6943.7 | 9.1971 | 6952.9 | 0.00 | 1.521 |
| 0.81923806 | 50.6500 | 27.773 | 6884.9 | 9.2229 | 6894.2 | 0.00 | 1.513 |
| 0.82333425 | 50.7829 | 27.675 | 6826.6 | 9.2486 | 6835.8 | 0.00 | 1.506 |
| 0.82745092 | 50.9134 | 27.577 | 6768.6 | 9.2743 | 6777.9 | 0.00 | 1.498 |
| 0.83158817 | 51.0413 | 27.480 | 6711.1 | 9.2998 | 6720.4 | 0.00 | 1.491 |
| 0.83574611 | 51.1667 | 27.382 | 6654.1 | 9.3253 | 6663.4 | 0.00 | 1.484 |
| 0.83992484 | 51.2896 | 27.285 | 6597.4 | 9.3506 | 6606.8 | 0.00 | 1.476 |
| 0.84412447 | 51.4098 | 27.188 | 6541.3 | 9.3759 | 6550.6 | 0.00 | 1.469 |
| 0.84834509 | 51.5272 | 27.091 | 6485.5 | 9.4010 | 6494.9 | 0.00 | 1.461 |
| 0.85258682 | 51.6417 | 26.994 | 6430.2 | 9.4260 | 6439.6 | 0.00 | 1.454 |
| 0.85684975 | 51.7529 | 26.898 | 6375.3 | 9.4510 | 6384.8 | 0.00 | 1.447 |
| 0.86113400 | 51.8605 | 26.801 | 6320.9 | 9.4758 | 6330.4 | 0.00 | 1.440 |
| 0.86543967 | 51.9637 | 26.705 | 6266.9 | 9.5006 | 6276.4 | 0.00 | 1.433 |
| 0.86976687 | 52.0616 | 26.610 | 6213.3 | 9.5252 | 6222.9 | 0.00 | 1.425 |
| 0.87411570 | 52.1525 | 26.514 | 6160.2 | 9.5497 | 6169.8 | 0.00 | 1.418 |
| 0.87848628 | 52.2333 | 26.419 | 6107.5 | 9.5741 | 6117.1 | 0.00 | 1.411 |
| 0.88287871 | 52.2978 | 26.324 | 6055.3 | 9.5984 | 6064.9 | 0.00 | 1.404 |
| 0.88729310 | 52.3291 | 26.229 | 6003.5 | 9.6226 | 6013.1 | 0.00 | 1.397 |
| 0.89172957 | 52.2414 | 26.135 | 5952.2 | 9.6467 | 5961.8 | 0.00 | 1.390 |
| 0.89230427 | 52.1938 | 26.123 | 5945.6 | 9.6498 | 5955.2 | 0.00 | 1.389 |
| 0.89489571 | 52.2641 | 26.610 | 6038.9 | 9.6638 | 6048.5 | 0.00 | 1.385 |
| 0.89618822 | 52.4183 | 26.583 | 6024.1 | 9.6707 | 6033.7 | 0.00 | 1.383 |
| 0.90066916 | 52.7122 | 26.490 | 5973.2 | 9.6946 | 5982.9 | 0.00 | 1.377 |
| 0.90517250 | 52.9177 | 26.398 | 5922.7 | 9.7183 | 5932.5 | 0.00 | 1.370 |
| 0.90969837 | 53.0949 | 26.306 | 5872.7 | 9.7419 | 5882.5 | 0.00 | 1.363 |
| 0.91424686 | 53.2579 | 26.214 | 5823.2 | 9.7654 | 5832.9 | 0.00 | 1.356 |
| 0.91881809 | 53.4124 | 26.123 | 5774.0 | 9.7888 | 5783.8 | 0.00 | 1.349 |
| 0.92341218 | 53.5613 | 26.032 | 5725.4 | 9.8121 | 5735.2 | 0.00 | 1.343 |
| 0.92802924 | 53.7064 | 25.942 | 5677.1 | 9.8353 | 5686.9 | 0.00 | 1.336 |
| 0.93266939 | 53.8488 | 25.852 | 5629.3 | 9.8583 | 5639.1 | 0.00 | 1.329 |
| 0.93733274 | 53.9892 | 25.762 | 5581.9 | 9.8812 | 5591.8 | 0.00 | 1.323 |
| 0.94201940 | 54.1285 | 25.673 | 5534.9 | 9.9040 | 5544.8 | 0.00 | 1.316 |
| 0.94672950 | 54.2670 | 25.585 | 5488.4 | 9.9267 | 5498.4 | 0.00 | 1.310 |
| 0.95146315 | 54.4053 | 25.497 | 5442.3 | 9.9493 | 5452.3 | 0.00 | 1.303 |
| 0.95622046 | 54.5439 | 25.409 | 5396.7 | 9.9717 | 5406.6 | 0.00 | 1.297 |
| 0.96100156 | 54.6831 | 25.322 | 5351.4 | 9.9940 | 5361.4 | 0.00 | 1.290 |
| 0.96580657 | 54.8235 | 25.236 | 5306.6 | 10.016 | 5316.6 | 0.00 | 1.284 |
| 0.97063560 | 54.9656 | 25.150 | 5262.2 | 10.038 | 5272.3 | 0.00 | 1.277 |
| 0.97548878 | 55.1099 | 25.065 | 5218.3 | 10.060 | 5228.3 | 0.00 | 1.271 |
| 0.98036623 | 55.2571 | 24.980 | 5174.7 | 10.082 | 5184.8 | 0.00 | 1.265 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pb ($Z=82$) | | | | | | | |
| 0.98526806 | 55.4081 | 24.895 | 5131.6 | 10.104 | 5141.7 | 0.00 | 1.258 |
| 0.99019440 | 55.5638 | 24.812 | 5088.9 | 10.125 | 5099.0 | 0.00 | 1.252 |
| 0.99514537 | 55.7256 | 24.728 | 5046.6 | 10.147 | 5056.7 | 0.00 | 1.246 |
| 1.0001211 | 55.8951 | 24.644 | 5004.4 | 10.168 | 5014.5 | 0.00 | 1.240 |
| 1.0051217 | 56.0068 | 24.499 | 4950.2 | 10.189 | 4960.4 | 0.00 | 1.234 |
| 1.0101473 | 56.1129 | 24.356 | 4896.7 | 10.210 | 4906.9 | 0.00 | 1.227 |
| 1.0151980 | 56.2144 | 24.213 | 4843.9 | 10.231 | 4854.1 | 0.00 | 1.221 |
| 1.0202740 | 56.3117 | 24.072 | 4791.7 | 10.251 | 4801.9 | 0.00 | 1.215 |
| 1.0253754 | 56.4053 | 23.932 | 4740.1 | 10.272 | 4750.3 | 0.00 | 1.209 |
| 1.0305023 | 56.4957 | 23.793 | 4689.1 | 10.292 | 4699.4 | 0.00 | 1.203 |
| 1.0356548 | 56.5830 | 23.655 | 4638.7 | 10.313 | 4649.0 | 0.00 | 1.197 |
| 1.0408331 | 56.6674 | 23.518 | 4589.0 | 10.333 | 4599.3 | 0.00 | 1.191 |
| 1.0460372 | 56.7493 | 23.383 | 4539.8 | 10.353 | 4550.1 | 0.00 | 1.185 |
| 1.0512674 | 56.8287 | 23.248 | 4491.2 | 10.373 | 4501.6 | 0.00 | 1.179 |
| 1.0565238 | 56.9058 | 23.114 | 4443.2 | 10.393 | 4453.6 | 0.00 | 1.174 |
| 1.0618064 | 56.9807 | 22.982 | 4395.7 | 10.412 | 4406.1 | 0.00 | 1.168 |
| 1.0671154 | 57.0536 | 22.851 | 4348.9 | 10.432 | 4359.3 | 0.00 | 1.162 |
| 1.0724510 | 57.1244 | 22.720 | 4302.5 | 10.451 | 4313.0 | 0.00 | 1.156 |
| 1.0778132 | 57.1934 | 22.591 | 4256.8 | 10.470 | 4267.2 | 0.00 | 1.150 |
| 1.0832023 | 57.2607 | 22.463 | 4211.6 | 10.489 | 4222.0 | 0.00 | 1.145 |
| 1.0886183 | 57.3263 | 22.336 | 4166.9 | 10.508 | 4177.4 | 0.00 | 1.139 |
| 1.0940614 | 57.3899 | 22.208 | 4122.4 | 10.527 | 4132.9 | 0.00 | 1.133 |
| 1.0995317 | 57.4517 | 22.080 | 4078.4 | 10.545 | 4088.9 | 0.00 | 1.128 |
| 1.1050294 | 57.5116 | 21.954 | 4034.9 | 10.564 | 4045.4 | 0.00 | 1.122 |
| 1.1105545 | 57.5698 | 21.829 | 3991.9 | 10.582 | 4002.5 | 0.00 | 1.116 |
| 1.1161073 | 57.6263 | 21.704 | 3949.4 | 10.600 | 3960.0 | 0.00 | 1.111 |
| 1.1216878 | 57.6812 | 21.581 | 3907.4 | 10.618 | 3918.1 | 0.00 | 1.105 |
| 1.1272963 | 57.7344 | 21.459 | 3866.0 | 10.636 | 3876.6 | 0.00 | 1.100 |
| 1.1329328 | 57.7862 | 21.338 | 3825.0 | 10.654 | 3835.6 | 0.00 | 1.094 |
| 1.1385974 | 57.8364 | 21.217 | 3784.5 | 10.671 | 3795.1 | 0.00 | 1.089 |
| 1.1442904 | 57.8852 | 21.098 | 3744.4 | 10.688 | 3755.1 | 0.00 | 1.084 |
| 1.1500119 | 57.9326 | 20.979 | 3704.9 | 10.706 | 3715.6 | 0.00 | 1.078 |
| 1.1557619 | 57.9787 | 20.862 | 3665.8 | 10.723 | 3676.5 | 0.00 | 1.073 |
| 1.1615407 | 58.0234 | 20.745 | 3627.1 | 10.739 | 3637.9 | 0.00 | 1.067 |
| 1.1673484 | 58.0667 | 20.629 | 3589.0 | 10.756 | 3599.7 | 0.00 | 1.062 |
| 1.1731852 | 58.1089 | 20.514 | 3551.2 | 10.773 | 3562.0 | 0.00 | 1.057 |
| 1.1790511 | 58.1497 | 20.400 | 3513.9 | 10.789 | 3524.7 | 0.00 | 1.052 |
| 1.1849464 | 58.1894 | 20.287 | 3477.1 | 10.805 | 3487.9 | 0.00 | 1.046 |
| 1.1908711 | 58.2279 | 20.175 | 3440.6 | 10.821 | 3451.5 | 0.00 | 1.041 |
| 1.1968254 | 58.2652 | 20.064 | 3404.6 | 10.837 | 3415.5 | 0.00 | 1.036 |
| 1.2028096 | 58.3014 | 19.953 | 3369.1 | 10.853 | 3379.9 | 0.00 | 1.031 |
| 1.2088236 | 58.3364 | 19.844 | 3333.9 | 10.869 | 3344.8 | 0.00 | 1.026 |
| 1.2148677 | 58.3704 | 19.735 | 3299.1 | 10.884 | 3310.0 | 0.00 | 1.021 |
| 1.2209421 | 58.4033 | 19.627 | 3264.8 | 10.899 | 3275.7 | 0.00 | 1.015 |
| 1.2270468 | 58.4352 | 19.520 | 3230.8 | 10.915 | 3241.7 | 0.00 | 1.010 |
| 1.2331820 | 58.4660 | 19.414 | 3197.3 | 10.929 | 3208.2 | 0.00 | 1.005 |
| 1.2393479 | 58.5221 | 19.309 | 3164.1 | 10.944 | 3175.1 | 0.00 | 1.000 |
| 1.2455447 | 58.5507 | 19.204 | 3131.3 | 10.959 | 3142.3 | 0.00 | 0.9954 |
| 1.2517724 | 58.5784 | 19.101 | 3098.9 | 10.973 | 3109.9 | 0.00 | 0.9905 |
| 1.2580312 | 58.6051 | 18.998 | 3066.9 | 10.988 | 3077.9 | 0.00 | 0.9855 |
| 1.2643214 | 58.6310 | 18.896 | 3035.2 | 11.002 | 3046.2 | 0.00 | 0.9806 |
| 1.2706430 | 58.6559 | 18.794 | 3004.0 | 11.016 | 3015.0 | 0.00 | 0.9758 |
| 1.2769962 | 58.6801 | 18.694 | 2973.0 | 11.029 | 2984.1 | 0.00 | 0.9709 |
| 1.2833812 | 58.7034 | 18.594 | 2942.5 | 11.043 | 2953.5 | 0.00 | 0.9661 |
| 1.2897981 | 58.7259 | 18.495 | 2912.2 | 11.056 | 2923.3 | 0.00 | 0.9613 |
| 1.2962471 | 58.7475 | 18.396 | 2882.2 | 11.070 | 2893.3 | 0.00 | 0.9565 |
| 1.3027283 | 58.7681 | 18.298 | 2852.5 | 11.083 | 2863.6 | 0.00 | 0.9517 |
| 1.3092420 | 58.7986 | 18.200 | 2823.2 | 11.096 | 2834.2 | 0.00 | 0.9470 |
| 1.3157882 | 58.8173 | 18.103 | 2794.1 | 11.108 | 2805.2 | 0.00 | 0.9423 |
| 1.3223671 | 58.8351 | 18.006 | 2765.4 | 11.121 | 2776.5 | 0.00 | 0.9376 |
| 1.3289790 | 58.8520 | 179.11 | 2737.1 | 11.133 | 2748.2 | 0.00 | 0.9329 |
| 1.3356239 | 58.8681 | 178.16 | 2709.0 | 11.146 | 2720.2 | 0.00 | 0.9283 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pb ($Z=82$) | | | | | | | |
| 1.3423020 | 58.8833 | 177.22 | 2681.3 | 111.58 | 2692.4 | 0.00 | 0.9237 |
| 1.3490135 | 58.8976 | 17.628 | 2653.9 | 11.169 | 2665.0 | 0.00 | 0.9191 |
| 1.3557586 | 58.9111 | 175.35 | 2626.8 | 111.81 | 2638.0 | 0.00 | 0.9145 |
| 1.3625374 | 58.9237 | 17.443 | 2600.0 | 11.193 | 2611.2 | 0.00 | 0.9100 |
| 1.3693500 | 58.9356 | 17.352 | 2573.5 | 11.204 | 2584.7 | 0.00 | 0.9054 |
| 1.3761968 | 58.9466 | 17.261 | 2547.3 | 11.215 | 2558.5 | 0.00 | 0.9009 |
| 1.3830778 | 58.9568 | 17.171 | 2521.4 | 11.226 | 2532.7 | 0.00 | 0.8964 |
| 1.3899932 | 58.9662 | 17.082 | 2495.9 | 11.237 | 2507.1 | 0.00 | 0.8920 |
| 1.3969431 | 58.9748 | 16.994 | 2470.6 | 11.248 | 2481.8 | 0.00 | 0.8875 |
| 1.4039278 | 58.9826 | 16.906 | 2445.5 | 11.258 | 2456.8 | 0.00 | 0.8831 |
| 1.4109475 | 58.9896 | 16.818 | 2420.8 | 11.268 | 2432.1 | 0.00 | 0.8787 |
| 1.4180022 | 58.9959 | 16.732 | 2396.4 | 11.278 | 2407.7 | 0.00 | 0.8744 |
| 1.4250922 | 59.0014 | 16.646 | 2372.2 | 11.288 | 2383.5 | 0.00 | 0.8700 |
| 1.4322177 | 59.0062 | 16.561 | 2348.3 | 11.298 | 2359.6 | 0.00 | 0.8657 |
| 1.4393788 | 59.0102 | 16.476 | 2324.7 | 11.308 | 2336.0 | 0.00 | 0.8614 |
| 1.4465757 | 59.0134 | 16.392 | 2301.3 | 11.317 | 2312.6 | 0.00 | 0.8571 |
| 1.4538086 | 59.0159 | 16.308 | 2278.2 | 11.326 | 2289.5 | 0.00 | 0.8528 |
| 1.4610776 | 59.0177 | 16.226 | 2255.4 | 11.335 | 2266.7 | 0.00 | 0.8486 |
| 1.4683830 | 59.0187 | 16.144 | 2232.8 | 11.344 | 2244.1 | 0.00 | 0.8444 |
| 1.4757249 | 59.0190 | 16.062 | 2210.5 | 11.353 | 2221.8 | 0.00 | 0.8402 |
| 1.4831035 | 59.0186 | 15.981 | 2188.4 | 11.361 | 2199.8 | 0.00 | 0.8360 |
| 1.4905190 | 59.0174 | 15.901 | 2166.6 | 11.370 | 2177.9 | 0.00 | 0.8318 |
| 1.4979716 | 59.0156 | 15.821 | 2145.0 | 11.378 | 2156.4 | 0.00 | 0.8277 |
| 1.5054615 | 59.0130 | 15.742 | 2123.6 | 11.386 | 2135.0 | 0.00 | 0.8236 |
| 1.5129888 | 59.0098 | 15.663 | 2102.5 | 11.393 | 2113.9 | 0.00 | 0.8195 |
| 1.5205537 | 59.0057 | 15.585 | 2081.6 | 11.401 | 2093.0 | 0.00 | 0.8154 |
| 1.5281565 | 59.0009 | 15.507 | 2060.9 | 11.408 | 2072.3 | 0.00 | 0.8113 |
| 1.5357973 | 58.9953 | 15.430 | 2040.4 | 11.415 | 2051.8 | 0.00 | 0.8073 |
| 1.5434763 | 58.9889 | 15.353 | 2020.1 | 11.422 | 2031.6 | 0.00 | 0.8033 |
| 1.5511937 | 58.9817 | 15.277 | 2000.1 | 11.429 | 2011.5 | 0.00 | 0.7993 |
| 1.5589496 | 58.9737 | 15.201 | 1980.3 | 11.436 | 1991.7 | 0.00 | 0.7953 |
| 1.5667444 | 58.9650 | 15.126 | 1960.7 | 11.442 | 1972.2 | 0.00 | 0.7913 |
| 1.5745781 | 58.9556 | 15.052 | 1941.4 | 11.449 | 1952.8 | 0.00 | 0.7874 |
| 1.5824510 | 58.9454 | 14.978 | 1922.2 | 11.455 | 1933.7 | 0.00 | 0.7835 |
| 1.5903633 | 58.9344 | 14.904 | 1903.3 | 11.461 | 1914.7 | 0.00 | 0.7796 |
| 1.5983151 | 58.9227 | 14.831 | 1884.5 | 11.466 | 1896.0 | 0.00 | 0.7757 |
| 1.6063066 | 58.9103 | 14.759 | 1866.0 | 11.472 | 1877.5 | 0.00 | 0.7719 |
| 1.6143382 | 58.8971 | 14.687 | 1847.7 | 11.477 | 1859.2 | 0.00 | 0.7680 |
| 1.6224099 | 58.8832 | 14.616 | 1829.6 | 11.482 | 1841.0 | 0.00 | 0.7642 |
| 1.6305219 | 58.8685 | 14.545 | 1811.6 | 11.487 | 1823.1 | 0.00 | 0.7604 |
| 1.6386745 | 58.8531 | 14.474 | 1793.8 | 11.492 | 1805.3 | 0.00 | 0.7566 |
| 1.6468679 | 58.8370 | 14.404 | 1776.3 | 11.497 | 1787.8 | 0.00 | 0.7528 |
| 1.6551022 | 58.8200 | 14.330 | 1758.4 | 11.501 | 1769.9 | 0.00 | 0.7491 |
| 1.6633777 | 58.8017 | 14.252 | 1740.0 | 11.506 | 1751.6 | 0.00 | 0.7454 |
| 1.6716946 | 58.7819 | 14.173 | 1721.9 | 11.510 | 1733.4 | 0.00 | 0.7417 |
| 1.6800531 | 58.7606 | 14.096 | 1704.0 | 11.513 | 1715.5 | 0.00 | 0.7380 |
| 1.6884534 | 58.7378 | 14.019 | 1686.2 | 11.517 | 1697.7 | 0.00 | 0.7343 |
| 1.6968956 | 58.7136 | 13.943 | 1668.7 | 11.521 | 1680.2 | 0.00 | 0.7307 |
| 1.7053801 | 58.6879 | 13.867 | 1651.4 | 11.524 | 1662.9 | 0.00 | 0.7270 |
| 1.7139070 | 58.6608 | 13.791 | 1634.2 | 11.527 | 1645.7 | 0.00 | 0.7234 |
| 1.7224766 | 58.6322 | 13.717 | 1617.3 | 11.530 | 1628.8 | 0.00 | 0.7198 |
| 1.7310889 | 58.6022 | 13.643 | 1600.5 | 11.533 | 1612.1 | 0.00 | 0.7162 |
| 1.7397444 | 58.5707 | 13.569 | 1584.0 | 11.535 | 1595.5 | 0.00 | 0.7127 |
| 1.7484431 | 58.5376 | 13.490 | 1566.9 | 11.538 | 1578.5 | 0.00 | 0.7091 |
| 1.7571853 | 58.5025 | 13.411 | 1550.0 | 11.540 | 1561.6 | 0.00 | 0.7056 |
| 1.7659712 | 58.4654 | 13.333 | 1533.3 | 11.542 | 1544.8 | 0.00 | 0.7021 |
| 1.7748011 | 58.4263 | 13.255 | 1516.7 | 11.544 | 1528.3 | 0.00 | 0.6986 |
| 1.7836751 | 58.3851 | 13.177 | 1500.4 | 11.545 | 1511.9 | 0.00 | 0.6951 |
| 1.7925935 | 58.3420 | 13.101 | 1484.2 | 11.547 | 1495.8 | 0.00 | 0.6916 |
| 1.8015565 | 58.2968 | 13.024 | 1468.3 | 11.548 | 1479.8 | 0.00 | 0.6882 |
| 1.8105642 | 58.2495 | 12.949 | 1452.5 | 11.549 | 1464.0 | 0.00 | 0.6848 |
| 1.8196171 | 58.2002 | 12.874 | 1436.9 | 11.550 | 1448.4 | 0.00 | 0.6814 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pb ($Z=82$) | | | | | | | |
| 1.8287151 | 58.1487 | 12.799 | 1421.4 | 11.551 | 1433.0 | 0.00 | 0.6780 |
| 1.8378587 | 58.0950 | 12.725 | 1406.2 | 11.551 | 1417.8 | 0.00 | 0.6746 |
| 1.8470480 | 58.0391 | 12.652 | 1391.1 | 11.552 | 1402.7 | 0.00 | 0.6713 |
| 1.8562833 | 57.9810 | 12.579 | 1376.2 | 11.552 | 1387.8 | 0.00 | 0.6679 |
| 1.8655647 | 57.9206 | 12.507 | 1361.5 | 11.552 | 1373.1 | 0.00 | 0.6646 |
| 1.8748925 | 57.8579 | 12.435 | 1347.0 | 11.552 | 1358.5 | 0.00 | 0.6613 |
| 1.8842670 | 57.7928 | 12.364 | 1332.6 | 11.551 | 1344.1 | 0.00 | 0.6580 |
| 1.8936883 | 57.7252 | 12.293 | 1318.4 | 11.551 | 1329.9 | 0.00 | 0.6547 |
| 1.9031567 | 57.6550 | 12.223 | 1304.3 | 11.550 | 1315.9 | 0.00 | 0.6515 |
| 1.9126725 | 57.5823 | 12.153 | 1290.4 | 11.549 | 1302.0 | 0.00 | 0.6482 |
| 1.9222359 | 57.5069 | 12.084 | 1276.7 | 11.548 | 1288.2 | 0.00 | 0.6450 |
| 1.9318471 | 57.4287 | 12.015 | 1263.1 | 11.546 | 1274.6 | 0.00 | 0.6418 |
| 1.9415063 | 57.3475 | 11.947 | 1249.7 | 11.545 | 1261.2 | 0.00 | 0.6386 |
| 1.9512138 | 57.2635 | 11.879 | 1236.4 | 11.543 | 1248.0 | 0.00 | 0.6354 |
| 1.9609699 | 57.1765 | 11.812 | 1223.3 | 11.541 | 1234.8 | 0.00 | 0.6323 |
| 1.9707747 | 57.0864 | 11.745 | 1210.3 | 11.539 | 1221.9 | 0.00 | 0.6291 |
| 1.9806286 | 56.9930 | 11.678 | 1197.5 | 11.537 | 1209.0 | 0.00 | 0.6260 |
| 1.9905318 | 56.8961 | 11.612 | 1184.8 | 11.535 | 1196.3 | 0.00 | 0.6229 |
| 2.0004844 | 56.7957 | 11.547 | 1172.3 | 11.532 | 1183.8 | 0.00 | 0.6198 |
| 2.0104868 | 56.6916 | 11.482 | 1159.9 | 11.529 | 1171.4 | 0.00 | 0.6167 |
| 2.0205393 | 56.5837 | 11.417 | 1147.6 | 11.526 | 1159.1 | 0.00 | 0.6136 |
| 2.0306420 | 56.4717 | 11.353 | 1135.5 | 11.523 | 1147.0 | 0.00 | 0.6106 |
| 2.0407952 | 56.3556 | 11.290 | 1123.5 | 11.520 | 1135.0 | 0.00 | 0.6075 |
| 2.0509992 | 56.2350 | 11.227 | 1111.7 | 11.516 | 1123.2 | 0.00 | 0.6045 |
| 2.0612542 | 56.1098 | 11.164 | 1099.9 | 11.513 | 1111.5 | 0.00 | 0.6015 |
| 2.0715604 | 55.9797 | 11.102 | 1088.4 | 11.509 | 1099.9 | 0.00 | 0.5985 |
| 2.0819182 | 55.8445 | 11.040 | 1076.9 | 11.505 | 1088.4 | 0.00 | 0.5955 |
| 2.0923278 | 55.7040 | 10.978 | 1065.6 | 11.500 | 1077.1 | 0.00 | 0.5926 |
| 2.1027895 | 55.5577 | 10.917 | 1054.4 | 11.496 | 1065.9 | 0.00 | 0.5896 |
| 2.1133034 | 55.4054 | 10.857 | 1043.4 | 11.491 | 1054.8 | 0.00 | 0.5867 |
| 2.1238699 | 55.2467 | 10.797 | 1032.4 | 11.487 | 1043.9 | 0.00 | 0.5838 |
| 2.1344893 | 55.0813 | 10.737 | 1021.6 | 11.482 | 1033.1 | 0.00 | 0.5809 |
| 2.1451617 | 54.9086 | 10.678 | 1010.9 | 11.477 | 1022.4 | 0.00 | 0.5780 |
| 2.1558875 | 54.7283 | 10.619 | 1000.3 | 11.471 | 1011.8 | 0.00 | 0.5751 |
| 2.1666670 | 54.5397 | 10.561 | 989.89 | 11.466 | 1001.4 | 0.00 | 0.5722 |
| 2.1775003 | 54.3424 | 10.503 | 979.56 | 11.460 | 991.02 | 0.00 | 0.5694 |
| 2.1883878 | 54.1355 | 10.445 | 969.34 | 11.454 | 980.79 | 0.00 | 0.5666 |
| 2.1993297 | 53.9185 | 10.388 | 959.24 | 11.448 | 970.68 | 0.00 | 0.5637 |
| 2.2103264 | 53.6905 | 10.331 | 949.25 | 11.442 | 960.69 | 0.00 | 0.5609 |
| 2.2213780 | 53.4505 | 10.275 | 939.37 | 11.436 | 950.81 | 0.00 | 0.5581 |
| 2.2324849 | 53.1975 | 10.219 | 929.60 | 11.429 | 941.03 | 0.00 | 0.5554 |
| 2.2436473 | 52.9304 | 10.163 | 919.95 | 11.423 | 931.37 | 0.00 | 0.5526 |
| 2.2548656 | 52.6477 | 10.108 | 910.40 | 11.416 | 921.81 | 0.00 | 0.5499 |
| 2.2661399 | 52.3478 | 10.053 | 900.95 | 11.409 | 912.36 | 0.00 | 0.5471 |
| 2.2774706 | 52.0290 | 9.9987 | 891.62 | 11.401 | 903.02 | 0.00 | 0.5444 |
| 2.2888579 | 51.6891 | 9.9446 | 882.38 | 11.394 | 893.78 | 0.00 | 0.5417 |
| 2.3003022 | 51.3286 | 9.8909 | 873.25 | 11.386 | 884.64 | 0.00 | 0.5390 |
| 2.3118037 | 50.9384 | 9.8376 | 864.23 | 11.379 | 875.60 | 0.00 | 0.5363 |
| 2.3233628 | 50.5178 | 9.7847 | 855.30 | 11.371 | 866.67 | 0.00 | 0.5336 |
| 2.3349796 | 50.0624 | 9.7321 | 846.47 | 11.363 | 857.83 | 0.00 | 0.5310 |
| 2.3466545 | 49.5667 | 9.6799 | 837.74 | 11.355 | 849.10 | 0.00 | 0.5283 |
| 2.3583878 | 49.0235 | 9.6280 | 829.11 | 11.346 | 840.46 | 0.00 | 0.5257 |
| 2.3701797 | 48.4238 | 9.5765 | 820.57 | 11.338 | 831.91 | 0.00 | 0.5231 |
| 2.3820306 | 47.7555 | 9.5254 | 812.13 | 11.329 | 823.46 | 0.00 | 0.5205 |
| 2.3939407 | 47.0021 | 9.4746 | 803.78 | 11.320 | 815.10 | 0.00 | 0.5179 |
| 2.4059104 | 46.1403 | 9.4242 | 795.53 | 11.311 | 806.84 | 0.00 | 0.5153 |
| 2.4179400 | 45.1349 | 9.3741 | 787.36 | 11.301 | 798.66 | 0.00 | 0.5128 |
| 2.4300297 | 43.9297 | 9.3244 | 779.29 | 11.292 | 790.58 | 0.00 | 0.5102 |
| 2.4421798 | 42.4256 | 9.2750 | 771.30 | 11.282 | 782.59 | 0.00 | 0.5077 |
| 2.4543907 | 40.4199 | 9.2260 | 763.41 | 11.273 | 774.68 | 0.00 | 0.5052 |
| 2.4666627 | 37.3738 | 9.1772 | 755.60 | 11.263 | 766.86 | 0.00 | 0.5026 |
| 2.4789960 | 30.4980 | 9.1289 | 747.88 | 11.253 | 759.13 | 0.00 | 0.5001 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pb ($Z=82$) | | | | | | | |
| 2.4833243 | 19.6236 | 9.1120 | 745.20 | 11.249 | 756.44 | 0.00 | 0.4993 |
| 2.4846756 | 19.3319 | 26.093 | 2132.8 | 11.248 | 2144.0 | 0.00 | 0.4990 |
| 2.4913910 | 32.1831 | 25.990 | 2118.6 | 11.243 | 2129.8 | 0.00 | 0.4977 |
| 2.5038479 | 37.2476 | 25.800 | 2092.6 | 11.232 | 2103.9 | 0.00 | 0.4952 |
| 2.5163672 | 39.4971 | 25.611 | 2067.0 | 11.222 | 2078.2 | 0.00 | 0.4927 |
| 2.5289490 | 40.7389 | 25.424 | 2041.7 | 11.211 | 2052.9 | 0.00 | 0.4903 |
| 2.5415938 | 41.3497 | 25.238 | 2016.7 | 11.200 | 2027.9 | 0.00 | 0.4878 |
| 2.5543017 | 41.3776 | 25.054 | 1992.0 | 11.189 | 2003.2 | 0.00 | 0.4854 |
| 2.5670732 | 40.5726 | 24.872 | 1967.7 | 11.178 | 1978.9 | 0.00 | 0.4830 |
| 2.5799086 | 37.3004 | 24.690 | 1943.6 | 11.166 | 1954.8 | 0.00 | 0.4806 |
| 2.5848604 | 30.3317 | 24.620 | 1934.4 | 11.162 | 1945.6 | 0.00 | 0.4797 |
| 2.5863394 | 30.2515 | 35.872 | 2816.8 | 11.161 | 2828.0 | 0.00 | 0.4794 |
| 2.5928082 | 38.8634 | 35.735 | 2799.1 | 11.155 | 2810.3 | 0.00 | 0.4782 |
| 2.6057722 | 43.3327 | 35.462 | 2763.8 | 11.143 | 2775.0 | 0.00 | 0.4758 |
| 2.6188011 | 45.8091 | 35.190 | 2729.0 | 11.131 | 2740.2 | 0.00 | 0.4734 |
| 2.6318951 | 47.6229 | 34.921 | 2694.7 | 11.119 | 2705.8 | 0.00 | 0.4711 |
| 2.6450545 | 49.0858 | 34.654 | 2660.7 | 11.107 | 2671.8 | 0.00 | 0.4687 |
| 2.6582798 | 50.3245 | 34.389 | 2627.3 | 11.095 | 2638.3 | 0.00 | 0.4664 |
| 2.6715712 | 51.4043 | 34.126 | 2594.2 | 11.082 | 2605.3 | 0.00 | 0.4641 |
| 2.6849291 | 52.3620 | 33.865 | 2561.6 | 11.070 | 2572.6 | 0.00 | 0.4618 |
| 2.6983537 | 53.2260 | 33.605 | 2529.2 | 11.057 | 2540.3 | 0.00 | 0.4595 |
| 2.7118455 | 54.0118 | 33.346 | 2497.3 | 11.044 | 2508.4 | 0.00 | 0.4572 |
| 2.7254047 | 54.7318 | 33.090 | 2465.8 | 11.031 | 2476.9 | 0.00 | 0.4549 |
| 2.7390317 | 55.3953 | 32.837 | 2434.7 | 11.018 | 2445.7 | 0.00 | 0.4527 |
| 2.7527269 | 56.0094 | 32.585 | 2404.0 | 11.004 | 2415.0 | 0.00 | 0.4504 |
| 2.7664905 | 56.5799 | 32.335 | 2373.8 | 10.991 | 2384.7 | 0.00 | 0.4482 |
| 2.7803230 | 57.1111 | 32.088 | 2343.9 | 10.977 | 2354.8 | 0.00 | 0.4459 |
| 2.7942246 | 57.6066 | 31.842 | 2314.3 | 10.964 | 2325.3 | 0.00 | 0.4437 |
| 2.8081957 | 58.0693 | 31.598 | 2285.2 | 10.950 | 2296.2 | 0.00 | 0.4415 |
| 2.8222367 | 58.5016 | 31.357 | 2256.4 | 10.935 | 2267.4 | 0.00 | 0.4393 |
| 2.8363479 | 58.9052 | 31.117 | 2228.1 | 10.921 | 2239.0 | 0.00 | 0.4371 |
| 2.8505296 | 59.2816 | 30.879 | 2200.0 | 10.907 | 2210.9 | 0.00 | 0.4350 |
| 2.8647823 | 59.6318 | 30.644 | 2172.4 | 10.892 | 2183.3 | 0.00 | 0.4328 |
| 2.8791062 | 59.9563 | 30.410 | 2145.1 | 10.878 | 2156.0 | 0.00 | 0.4306 |
| 2.8935017 | 60.2554 | 30.178 | 2118.1 | 10.863 | 2129.0 | 0.00 | 0.4285 |
| 2.9079692 | 60.5288 | 29.948 | 2091.5 | 10.848 | 2102.4 | 0.00 | 0.4264 |
| 2.9225091 | 60.7755 | 29.720 | 2065.3 | 10.833 | 2076.1 | 0.00 | 0.4242 |
| 2.9371216 | 60.9939 | 29.494 | 2039.4 | 10.817 | 2050.2 | 0.00 | 0.4221 |
| 2.9518072 | 61.1812 | 29.269 | 2013.8 | 10.802 | 2024.6 | 0.00 | 0.4200 |
| 2.9665662 | 61.3329 | 29.047 | 1988.5 | 10.787 | 1999.3 | 0.00 | 0.4179 |
| 2.9813991 | 61.4420 | 28.826 | 1963.6 | 10.771 | 1974.4 | 0.00 | 0.4159 |
| 2.9963061 | 61.4964 | 28.607 | 1939.0 | 10.755 | 1949.8 | 0.00 | 0.4138 |
| 3.0112876 | 61.4556 | 28.374 | 1913.6 | 10.739 | 1924.4 | 0.00 | 0.4117 |
| 3.0263440 | 61.2783 | 28.137 | 1888.2 | 10.723 | 1898.9 | 0.00 | 0.4097 |
| 3.0414758 | 60.8558 | 27.902 | 1863.1 | 10.707 | 1873.9 | 0.00 | 0.4076 |
| 3.0566831 | 59.7132 | 27.669 | 1838.4 | 10.691 | 1849.1 | 0.00 | 0.4056 |
| 3.0632417 | 58.1196 | 27.569 | 1827.8 | 10.683 | 1838.5 | 0.00 | 0.4047 |
| 3.0695584 | 58.1766 | 32.297 | 2136.9 | 10.677 | 2147.5 | 0.00 | 0.4039 |
| 3.0719666 | 59.0977 | 32.253 | 2132.2 | 10.674 | 2142.9 | 0.00 | 0.4036 |
| 3.0873264 | 61.4244 | 31.972 | 2103.2 | 10.657 | 2113.8 | 0.00 | 0.4016 |
| 3.1027630 | 62.5402 | 31.694 | 2074.5 | 10.641 | 2085.2 | 0.00 | 0.3996 |
| 3.1182768 | 63.3354 | 31.418 | 2046.3 | 10.624 | 2056.9 | 0.00 | 0.3976 |
| 3.1338682 | 63.9735 | 31.145 | 2018.4 | 10.607 | 2029.0 | 0.00 | 0.3956 |
| 3.1495376 | 64.5153 | 30.874 | 1990.9 | 10.590 | 2001.4 | 0.00 | 0.3937 |
| 3.1652853 | 64.9900 | 30.606 | 1963.7 | 10.573 | 1974.3 | 0.00 | 0.3917 |
| 3.1811117 | 65.4139 | 30.340 | 1937.0 | 10.555 | 1947.5 | 0.00 | 0.3898 |
| 3.1970172 | 65.7967 | 30.076 | 1910.6 | 10.538 | 1921.1 | 0.00 | 0.3878 |
| 3.2130023 | 66.1440 | 29.814 | 1884.5 | 10.520 | 1895.0 | 0.00 | 0.3859 |
| 3.2290673 | 66.4611 | 29.568 | 1859.7 | 10.502 | 1870.2 | 0.00 | 0.3840 |
| 3.2452127 | 66.7587 | 29.324 | 1835.2 | 10.484 | 1845.7 | 0.00 | 0.3821 |
| 3.2614387 | 67.0379 | 29.084 | 1811.1 | 10.466 | 1821.5 | 0.00 | 0.3802 |
| 3.2777459 | 67.2999 | 28.847 | 1787.4 | 10.448 | 1797.8 | 0.00 | 0.3783 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pb ($Z=82$) | | | | | | | |
| 3.2941347 | 67.5459 | 28.612 | 1764.0 | 10.430 | 1774.4 | 0.00 | 0.3764 |
| 3.3106053 | 67.7769 | 28.381 | 1741.0 | 10.412 | 1751.4 | 0.00 | 0.3745 |
| 3.3271584 | 67.9937 | 28.152 | 1718.4 | 10.393 | 1728.8 | 0.00 | 0.3726 |
| 3.3437941 | 68.1970 | 27.926 | 1696.1 | 10.375 | 1706.5 | 0.00 | 0.3708 |
| 3.3605131 | 68.3870 | 27.703 | 1674.2 | 10.356 | 1684.6 | 0.00 | 0.3689 |
| 3.3773157 | 68.5632 | 27.479 | 1652.4 | 10.337 | 1662.8 | 0.00 | 0.3671 |
| 3.3942023 | 68.7250 | 27.258 | 1631.0 | 10.318 | 1641.3 | 0.00 | 0.3653 |
| 3.4111733 | 68.8717 | 27.039 | 1609.8 | 10.299 | 1620.1 | 0.00 | 0.3635 |
| 3.4282291 | 69.0023 | 26.823 | 1589.0 | 10.280 | 1599.3 | 0.00 | 0.3617 |
| 3.4453703 | 69.1148 | 26.609 | 1568.5 | 10.261 | 1578.7 | 0.00 | 0.3599 |
| 3.4625971 | 69.2058 | 26.397 | 1548.3 | 10.241 | 1558.5 | 0.00 | 0.3581 |
| 3.4799101 | 69.2696 | 26.188 | 1528.4 | 10.222 | 1538.6 | 0.00 | 0.3563 |
| 3.4973097 | 69.2952 | 25.981 | 1508.8 | 10.202 | 1519.0 | 0.00 | 0.3545 |
| 3.5147962 | 69.2587 | 25.777 | 1489.4 | 10.182 | 1499.6 | 0.00 | 0.3527 |
| 3.5323702 | 69.0914 | 25.574 | 1470.4 | 10.162 | 1480.5 | 0.00 | 0.3510 |
| 3.5490108 | 68.4316 | 25.386 | 1452.7 | 10.144 | 1462.8 | 0.00 | 0.3493 |
| 3.5500321 | 68.3166 | 25.374 | 1451.6 | 10.142 | 1461.7 | 0.00 | 0.3492 |
| 3.5593891 | 68.5065 | 27.055 | 1543.7 | 10.132 | 1553.8 | 0.00 | 0.3483 |
| 3.5677822 | 69.1322 | 26.951 | 1534.1 | 10.122 | 1544.3 | 0.00 | 0.3475 |
| 3.5856211 | 69.7623 | 26.733 | 1514.2 | 10.102 | 1524.3 | 0.00 | 0.3458 |
| 3.6035492 | 70.1606 | 26.517 | 1494.5 | 10.082 | 1504.5 | 0.00 | 0.3441 |
| 3.6215670 | 70.4697 | 26.304 | 1475.0 | 10.062 | 1485.1 | 0.00 | 0.3423 |
| 3.6396748 | 70.7282 | 26.092 | 1455.9 | 10.041 | 1466.0 | 0.00 | 0.3406 |
| 3.6578732 | 70.9523 | 25.883 | 1437.1 | 10.021 | 1447.1 | 0.00 | 0.3390 |
| 3.6761626 | 71.1499 | 25.676 | 1418.5 | 9.9999 | 1428.5 | 0.00 | 0.3373 |
| 3.6945434 | 71.3251 | 25.471 | 1400.1 | 9.9791 | 1410.1 | 0.00 | 0.3356 |
| 3.7130161 | 71.4799 | 25.267 | 1382.1 | 9.9582 | 1392.0 | 0.00 | 0.3339 |
| 3.7315812 | 71.6138 | 25.068 | 1364.3 | 9.9372 | 1374.2 | 0.00 | 0.3323 |
| 3.7502391 | 71.7294 | 24.878 | 1347.3 | 9.9162 | 1357.2 | 0.00 | 0.3306 |
| 3.7689903 | 71.8265 | 24.691 | 1330.5 | 9.8950 | 1340.4 | 0.00 | 0.3290 |
| 3.7878352 | 71.8988 | 24.506 | 1313.9 | 9.8737 | 1323.8 | 0.00 | 0.3273 |
| 3.8067744 | 71.9330 | 24.324 | 1297.7 | 9.8524 | 1307.5 | 0.00 | 0.3257 |
| 3.8258083 | 71.8915 | 24.143 | 1281.6 | 9.8309 | 1291.5 | 0.00 | 0.3241 |
| 3.8424209 | 71.6468 | 23.988 | 1267.9 | 9.8122 | 1277.7 | 0.00 | 0.3227 |
| 3.8449373 | 71.5435 | 23.965 | 1265.8 | 9.8094 | 1275.6 | 0.00 | 0.3225 |
| 3.8589789 | 71.7617 | 24.895 | 1310.2 | 9.7936 | 1319.9 | 0.00 | 0.3213 |
| 3.8641620 | 71.9632 | 24.847 | 1305.9 | 9.7877 | 1315.7 | 0.00 | 0.3209 |
| 3.8834828 | 72.3999 | 24.672 | 1290.2 | 9.7660 | 1300.0 | 0.00 | 0.3193 |
| 3.9029002 | 72.6895 | 24.498 | 1274.8 | 9.7442 | 1284.5 | 0.00 | 0.3177 |
| 3.9224147 | 72.9259 | 24.327 | 1259.6 | 9.7223 | 1269.3 | 0.00 | 0.3161 |
| 3.9420268 | 73.1335 | 24.157 | 1244.5 | 9.7003 | 1254.2 | 0.00 | 0.3145 |
| 3.9617369 | 73.3228 | 23.989 | 1229.7 | 9.6782 | 1239.4 | 0.00 | 0.3130 |
| 3.9815456 | 73.4991 | 23.822 | 1215.1 | 9.6560 | 1224.8 | 0.00 | 0.3114 |
| 4.0014533 | 73.6649 | 23.653 | 1200.5 | 9.6338 | 1210.1 | 0.00 | 0.3098 |
| 4.0214606 | 73.8213 | 23.484 | 1186.0 | 9.6114 | 1195.6 | 0.00 | 0.3083 |
| 4.0415679 | 73.9697 | 23.317 | 1171.7 | 9.5890 | 1181.3 | 0.00 | 0.3068 |
| 4.0617757 | 74.1114 | 23.151 | 1157.6 | 9.5665 | 1167.1 | 0.00 | 0.3052 |
| 4.0820846 | 74.2469 | 22.986 | 1143.6 | 9.5439 | 1153.1 | 0.00 | 0.3037 |
| 4.1024950 | 74.3771 | 22.823 | 1129.8 | 9.5212 | 1139.4 | 0.00 | 0.3022 |
| 4.1230075 | 74.5025 | 22.661 | 1116.3 | 9.4985 | 1125.8 | 0.00 | 0.3007 |
| 4.1436226 | 74.6236 | 22.501 | 1102.8 | 9.4756 | 1112.3 | 0.00 | 0.2992 |
| 4.1643407 | 74.7406 | 22.342 | 1089.6 | 9.4527 | 1099.1 | 0.00 | 0.2977 |
| 4.1851624 | 74.8539 | 22.185 | 1076.6 | 9.4298 | 1086.0 | 0.00 | 0.2962 |
| 4.2060882 | 74.9638 | 22.029 | 1063.7 | 9.4067 | 1073.1 | 0.00 | 0.2948 |
| 4.2271186 | 75.0705 | 21.874 | 1050.9 | 9.3836 | 1060.3 | 0.00 | 0.2933 |
| 4.2482542 | 75.1742 | 21.721 | 1038.4 | 9.3604 | 1047.7 | 0.00 | 0.2918 |
| 4.2694955 | 75.2751 | 21.569 | 1026.0 | 9.3371 | 1035.3 | 0.00 | 0.2904 |
| 4.2908430 | 75.3733 | 21.418 | 1013.7 | 9.3137 | 1023.1 | 0.00 | 0.2890 |
| 4.3122972 | 75.4690 | 21.268 | 1001.7 | 9.2903 | 1010.9 | 0.00 | 0.2875 |
| 4.3338587 | 75.5623 | 21.120 | 989.72 | 9.2668 | 998.98 | 0.00 | 0.2861 |
| 4.3555280 | 75.6533 | 20.973 | 977.93 | 9.2432 | 987.18 | 0.00 | 0.2847 |
| 4.3773056 | 75.7422 | 20.827 | 966.30 | 9.2196 | 975.52 | 0.00 | 0.2832 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pb ($Z=82$) | | | | | | | |
| 4.3991921 | 75.8290 | 20.682 | 954.81 | 9.1959 | 964.01 | 0.00 | 0.2818 |
| 4.4211881 | 75.9139 | 20.539 | 943.46 | 9.1721 | 952.64 | 0.00 | 0.2804 |
| 4.4432940 | 75.9970 | 20.396 | 932.26 | 9.1483 | 941.41 | 0.00 | 0.2790 |
| 4.4655105 | 76.0783 | 20.255 | 921.19 | 9.1244 | 930.32 | 0.00 | 0.2776 |
| 4.4878381 | 76.1579 | 20.115 | 910.27 | 9.1004 | 919.37 | 0.00 | 0.2763 |
| 4.5102772 | 76.2360 | 19.976 | 899.47 | 9.0764 | 908.55 | 0.00 | 0.2749 |
| 4.5328286 | 76.3126 | 19.838 | 888.81 | 9.0523 | 897.86 | 0.00 | 0.2735 |
| 4.5554928 | 76.3879 | 19.701 | 878.28 | 9.0282 | 887.31 | 0.00 | 0.2722 |
| 4.5782702 | 76.4619 | 19.565 | 867.88 | 9.0040 | 876.89 | 0.00 | 0.2708 |
| 4.6011616 | 76.5348 | 19.430 | 857.61 | 8.9797 | 866.59 | 0.00 | 0.2695 |
| 4.6241674 | 76.6068 | 19.295 | 847.43 | 8.9554 | 856.39 | 0.00 | 0.2681 |
| 4.6472882 | 76.6770 | 19.159 | 837.25 | 8.9310 | 846.18 | 0.00 | 0.2668 |
| 4.6705247 | 76.7453 | 19.023 | 827.19 | 8.9066 | 836.10 | 0.00 | 0.2655 |
| 4.6938773 | 76.8119 | 18.889 | 817.25 | 8.8821 | 826.13 | 0.00 | 0.2641 |
| 4.7173467 | 76.8768 | 18.755 | 807.43 | 8.8576 | 816.29 | 0.00 | 0.2628 |
| 4.7409334 | 76.9402 | 18.622 | 797.73 | 8.8330 | 806.57 | 0.00 | 0.2615 |
| 4.7646381 | 77.0022 | 18.491 | 788.15 | 8.8083 | 796.96 | 0.00 | 0.2602 |
| 4.7884613 | 77.0627 | 18.360 | 778.68 | 8.7836 | 787.46 | 0.00 | 0.2589 |
| 4.8124036 | 77.1220 | 18.230 | 769.33 | 8.7588 | 778.09 | 0.00 | 0.2576 |
| 4.8364656 | 77.1799 | 18.101 | 760.09 | 8.7340 | 768.82 | 0.00 | 0.2564 |
| 4.8606479 | 77.2367 | 17.973 | 750.96 | 8.7092 | 759.66 | 0.00 | 0.2551 |
| 4.8849512 | 77.2924 | 17.846 | 741.94 | 8.6843 | 750.62 | 0.00 | 0.2538 |
| 4.9093759 | 77.3469 | 17.720 | 733.03 | 8.6594 | 741.68 | 0.00 | 0.2525 |
| 4.9339228 | 77.4004 | 17.594 | 724.22 | 8.6344 | 732.86 | 0.00 | 0.2513 |
| 4.9585924 | 77.4530 | 17.470 | 715.53 | 8.6093 | 724.14 | 0.00 | 0.2500 |
| 4.9833854 | 77.6836 | 17.342 | 706.76 | 8.5842 | 715.35 | 0.00 | 0.2488 |
| 5.0083023 | 77.7342 | 17.213 | 698.00 | 8.5591 | 706.56 | 0.00 | 0.2476 |
| 5.0333438 | 77.7830 | 17.084 | 689.33 | 8.5340 | 697.86 | 0.00 | 0.2463 |
| 5.0585105 | 77.8302 | 16.956 | 680.76 | 8.5087 | 689.27 | 0.00 | 0.2451 |
| 5.0838031 | 77.8758 | 16.829 | 672.31 | 8.4835 | 680.79 | 0.00 | 0.2439 |
| 5.1092221 | 77.9200 | 16.704 | 663.96 | 8.4582 | 672.42 | 0.00 | 0.2427 |
| 5.1347682 | 77.9627 | 16.579 | 655.72 | 8.4329 | 664.16 | 0.00 | 0.2415 |
| 5.1604421 | 78.0042 | 16.455 | 647.59 | 8.4075 | 656.00 | 0.00 | 0.2403 |
| 5.1862443 | 78.1673 | 16.330 | 639.46 | 8.3821 | 647.84 | 0.00 | 0.2391 |
| 5.2121755 | 78.2062 | 16.204 | 631.37 | 8.3567 | 639.73 | 0.00 | 0.2379 |
| 5.2382364 | 78.2434 | 16.079 | 623.39 | 8.3312 | 631.72 | 0.00 | 0.2367 |
| 5.2644276 | 78.2792 | 15.955 | 615.51 | 8.3057 | 623.82 | 0.00 | 0.2355 |
| 5.2907497 | 78.3134 | 15.832 | 607.74 | 8.2802 | 616.02 | 0.00 | 0.2343 |
| 5.3172034 | 78.3463 | 15.711 | 600.06 | 8.2546 | 608.32 | 0.00 | 0.2332 |
| 5.3437895 | 78.3778 | 15.590 | 592.49 | 8.2290 | 600.72 | 0.00 | 0.2320 |
| 5.3705084 | 78.4081 | 15.470 | 585.02 | 8.2034 | 593.22 | 0.00 | 0.2309 |
| 5.3973609 | 78.4371 | 15.352 | 577.64 | 8.1777 | 585.82 | 0.00 | 0.2297 |
| 5.4243477 | 78.4650 | 15.234 | 570.36 | 8.1520 | 578.52 | 0.00 | 0.2286 |
| 5.4514695 | 78.4918 | 15.117 | 563.18 | 8.1263 | 571.31 | 0.00 | 0.2274 |
| 5.4787268 | 78.5174 | 15.002 | 556.09 | 8.1005 | 564.19 | 0.00 | 0.2263 |
| 5.5061205 | 78.5420 | 14.887 | 549.10 | 8.0748 | 557.17 | 0.00 | 0.2252 |
| 5.5336511 | 78.5656 | 14.773 | 542.19 | 8.0490 | 550.24 | 0.00 | 0.2241 |
| 5.5613193 | 78.5882 | 14.661 | 535.38 | 8.0231 | 543.40 | 0.00 | 0.2229 |
| 5.5891259 | 78.6098 | 14.549 | 528.66 | 7.9973 | 536.66 | 0.00 | 0.2218 |
| 5.6170716 | 78.6305 | 14.438 | 522.02 | 7.9714 | 530.00 | 0.00 | 0.2207 |
| 5.6451569 | 78.6504 | 14.328 | 515.48 | 7.9455 | 523.42 | 0.00 | 0.2196 |
| 5.6733827 | 78.6693 | 14.220 | 509.02 | 7.9196 | 516.94 | 0.00 | 0.2185 |
| 5.7017496 | 78.6874 | 14.112 | 502.64 | 7.8937 | 510.54 | 0.00 | 0.2174 |
| 5.7302584 | 78.7048 | 14.005 | 496.35 | 7.8677 | 504.22 | 0.00 | 0.2164 |
| 5.7589096 | 78.7213 | 13.899 | 490.14 | 7.8418 | 497.99 | 0.00 | 0.2153 |
| 5.7877042 | 78.7371 | 13.794 | 484.02 | 7.8158 | 491.83 | 0.00 | 0.2142 |
| 5.8166427 | 78.7521 | 13.689 | 477.97 | 7.7898 | 485.76 | 0.00 | 0.2132 |
| 5.8457259 | 78.7664 | 13.586 | 472.01 | 7.7638 | 479.77 | 0.00 | 0.2121 |
| 5.8749546 | 78.7800 | 13.484 | 466.12 | 7.7377 | 473.86 | 0.00 | 0.2110 |
| 5.9043293 | 78.7930 | 13.382 | 460.31 | 7.7117 | 468.02 | 0.00 | 0.2100 |
| 5.9338510 | 78.8053 | 13.282 | 454.58 | 7.6856 | 462.27 | 0.00 | 0.2089 |
| 5.9635202 | 78.8170 | 13.182 | 448.93 | 7.6595 | 456.58 | 0.00 | 0.2079 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pb ($Z=82$) | | | | | | | |
| 5.9933378 | 78.8281 | 13.083 | 443.34 | 7.6334 | 450.98 | 0.00 | 0.2069 |
| 6.0233045 | 78.8386 | 12.985 | 437.84 | 7.6073 | 445.44 | 0.00 | 0.2058 |
| 6.0534210 | 78.8485 | 12.888 | 432.40 | 7.5812 | 439.98 | 0.00 | 0.2048 |
| 6.0836882 | 78.8579 | 12.792 | 427.04 | 7.5551 | 434.60 | 0.00 | 0.2038 |
| 6.1141066 | 78.8668 | 12.697 | 421.75 | 7.5290 | 429.28 | 0.00 | 0.2028 |
| 6.1446771 | 78.9685 | 12.601 | 416.50 | 7.5029 | 424.00 | 0.00 | 0.2018 |
| 6.1754005 | 78.9767 | 12.505 | 411.27 | 7.4767 | 418.74 | 0.00 | 0.2008 |
| 6.2062775 | 78.9842 | 12.410 | 406.11 | 7.4506 | 413.56 | 0.00 | 0.1998 |
| 6.2373089 | 78.9910 | 12.316 | 401.01 | 7.4244 | 408.44 | 0.00 | 0.1988 |
| 6.2684954 | 78.9971 | 12.222 | 395.99 | 7.3983 | 403.39 | 0.00 | 0.1978 |
| 6.2998379 | 79.0026 | 12.130 | 391.03 | 7.3721 | 398.40 | 0.00 | 0.1968 |
| 6.3313371 | 79.0075 | 12.038 | 386.14 | 7.3459 | 393.49 | 0.00 | 0.1958 |
| 6.3629938 | 79.0118 | 11.947 | 381.31 | 7.3198 | 388.63 | 0.00 | 0.1949 |
| 6.3948088 | 79.0155 | 11.857 | 376.55 | 7.2936 | 383.84 | 0.00 | 0.1939 |
| 6.4267828 | 79.0186 | 11.767 | 371.85 | 7.2674 | 379.12 | 0.00 | 0.1929 |
| 6.4589167 | 79.0213 | 11.678 | 367.21 | 7.2413 | 374.45 | 0.00 | 0.1920 |
| 6.4912113 | 79.0234 | 11.591 | 362.63 | 7.2151 | 369.85 | 0.00 | 0.1910 |
| 6.5236674 | 79.0250 | 11.503 | 358.12 | 7.1889 | 365.31 | 0.00 | 0.1901 |
| 6.5562857 | 79.0261 | 11.417 | 353.66 | 7.1628 | 360.82 | 0.00 | 0.1891 |
| 6.5890671 | 79.0267 | 11.332 | 349.26 | 7.1366 | 356.40 | 0.00 | 0.1882 |
| 6.6220125 | 79.0269 | 11.247 | 344.93 | 7.1104 | 352.04 | 0.00 | 0.1872 |
| 6.6551225 | 79.0266 | 11.163 | 340.64 | 7.0843 | 347.73 | 0.00 | 0.1863 |
| 6.6883981 | 79.0259 | 11.079 | 336.42 | 7.0581 | 343.48 | 0.00 | 0.1854 |
| 6.7218401 | 79.0248 | 10.997 | 332.25 | 7.0320 | 339.28 | 0.00 | 0.1844 |
| 6.7554493 | 79.0233 | 10.915 | 328.13 | 7.0059 | 335.14 | 0.00 | 0.1835 |
| 6.7892266 | 79.0214 | 10.834 | 324.07 | 6.9797 | 331.05 | 0.00 | 0.1826 |
| 6.8231727 | 79.0191 | 10.753 | 320.07 | 6.9536 | 327.02 | 0.00 | 0.1817 |
| 6.8572886 | 79.0164 | 10.674 | 316.11 | 6.9275 | 323.04 | 0.00 | 0.1808 |
| 6.8915750 | 79.0134 | 10.594 | 312.21 | 6.9014 | 319.11 | 0.00 | 0.1799 |
| 6.9260329 | 79.0100 | 10.516 | 308.36 | 6.8753 | 315.24 | 0.00 | 0.1790 |
| 6.9606631 | 79.0063 | 10.439 | 304.56 | 6.8492 | 311.41 | 0.00 | 0.1781 |
| 6.9954664 | 79.0022 | 10.362 | 300.81 | 6.8232 | 307.64 | 0.00 | 0.1772 |
| 7.0304437 | 78.9979 | 10.285 | 297.11 | 6.7971 | 303.91 | 0.00 | 0.1764 |
| 7.0655959 | 78.9932 | 10.210 | 293.46 | 6.7711 | 300.23 | 0.00 | 0.1755 |
| 7.1009239 | 78.9883 | 10.135 | 289.86 | 6.7450 | 296.60 | 0.00 | 0.1746 |
| 7.1364285 | 79.0233 | 10.060 | 286.28 | 6.7190 | 293.00 | 0.00 | 0.1737 |
| 7.1721107 | 79.0179 | 9.9849 | 282.74 | 6.6930 | 289.43 | 0.00 | 0.1729 |
| 7.2079712 | 79.0122 | 9.9108 | 279.24 | 6.6671 | 285.91 | 0.00 | 0.1720 |
| 7.2440111 | 79.0061 | 9.8373 | 275.80 | 6.6411 | 282.44 | 0.00 | 0.1712 |
| 7.2802311 | 78.9996 | 9.7645 | 272.39 | 6.6151 | 279.01 | 0.00 | 0.1703 |
| 7.3166323 | 78.9928 | 9.6923 | 269.03 | 6.5892 | 275.62 | 0.00 | 0.1695 |
| 7.3532155 | 78.9856 | 9.6208 | 265.72 | 6.5633 | 272.28 | 0.00 | 0.1686 |
| 7.3899815 | 78.9781 | 9.5498 | 262.45 | 6.5374 | 268.98 | 0.00 | 0.1678 |
| 7.4269314 | 78.9703 | 9.4795 | 259.22 | 6.5115 | 265.73 | 0.00 | 0.1669 |
| 7.4640661 | 78.9622 | 9.4097 | 256.03 | 6.4857 | 262.52 | 0.00 | 0.1661 |
| 7.5013864 | 78.9538 | 9.3406 | 252.88 | 6.4599 | 259.34 | 0.00 | 0.1653 |
| 7.5388934 | 78.9451 | 9.2721 | 249.78 | 6.4341 | 256.21 | 0.00 | 0.1645 |
| 7.5765878 | 78.9361 | 9.2041 | 246.72 | 6.4083 | 253.12 | 0.00 | 0.1636 |
| 7.6144708 | 78.9268 | 9.1367 | 243.69 | 6.3825 | 250.07 | 0.00 | 0.1628 |
| 7.6525431 | 78.9173 | 9.0699 | 240.71 | 6.3568 | 247.06 | 0.00 | 0.1620 |
| 7.6908058 | 78.9075 | 9.0037 | 237.76 | 6.3311 | 244.09 | 0.00 | 0.1612 |
| 7.7292599 | 78.9147 | 8.9377 | 234.84 | 6.3054 | 241.15 | 0.00 | 0.1604 |
| 7.7679062 | 78.9045 | 8.8719 | 231.95 | 6.2797 | 238.23 | 0.00 | 0.1596 |
| 7.8067457 | 78.8940 | 8.8062 | 229.09 | 6.2541 | 235.34 | 0.00 | 0.1588 |
| 7.8457794 | 78.8832 | 8.7411 | 226.27 | 6.2285 | 232.49 | 0.00 | 0.1580 |
| 7.8850083 | 78.8722 | 8.6765 | 223.48 | 6.2029 | 229.68 | 0.00 | 0.1572 |
| 7.9244334 | 78.8608 | 8.6125 | 220.72 | 6.1773 | 226.90 | 0.00 | 0.1565 |
| 7.9640555 | 78.8491 | 8.5490 | 218.01 | 6.1518 | 224.16 | 0.00 | 0.1557 |
| 8.0038758 | 78.8371 | 8.4861 | 215.33 | 6.1263 | 221.45 | 0.00 | 0.1549 |
| 8.0438952 | 78.8249 | 8.4238 | 212.68 | 6.1008 | 218.78 | 0.00 | 0.1541 |
| 8.0841147 | 78.8125 | 8.3619 | 210.07 | 6.0754 | 216.14 | 0.00 | 0.1534 |
| 8.1245352 | 78.7998 | 8.3006 | 207.49 | 6.0500 | 213.54 | 0.00 | 0.1526 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Pb ($Z=82$) | | | | | | | |
| 8.1651579 | 78.7868 | 8.2398 | 204.95 | 6.0246 | 210.97 | 0.00 | 0.1518 |
| 8.2059837 | 78.7736 | 8.1792 | 202.43 | 5.9993 | 208.43 | 0.00 | 0.1511 |
| 8.2470136 | 78.7602 | 8.1190 | 199.94 | 5.9740 | 205.91 | 0.00 | 0.1503 |
| 8.2882487 | 78.7466 | 8.0593 | 197.48 | 5.9487 | 203.43 | 0.00 | 0.1496 |
| 8.3296899 | 78.7328 | 8.0001 | 195.06 | 5.9235 | 200.98 | 0.00 | 0.1488 |
| 8.3713384 | 78.7187 | 7.9415 | 192.66 | 5.8983 | 198.56 | 0.00 | 0.1481 |
| 8.4131951 | 78.7045 | 7.8833 | 190.30 | 5.8731 | 196.17 | 0.00 | 0.1474 |
| 8.4552610 | 78.6901 | 7.8257 | 187.97 | 5.8480 | 193.82 | 0.00 | 0.1466 |
| 8.4975373 | 78.6756 | 7.7685 | 185.67 | 5.8229 | 191.49 | 0.00 | 0.1459 |
| 8.5400250 | 78.6610 | 7.7118 | 183.40 | 5.7978 | 189.19 | 0.00 | 0.1452 |
| Bi ($Z=83$) | | | | | | | |
| Atomic weight: $A_r=208.9804 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^3)=9.7300$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1})=[\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 347.020 E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1})=f_2 (e \text{ atom}^{-1}) \times 2.01360 \times 10^5$ | | | | | | | |
| 23 edges. Edge energies (keV) | | | | | | | |
| K | 90.5259 | L I | 16.3875 | L II | 15.7111 | L III | 13.4186 |
| M I | 3.99910 | M II | 3.69630 | M III | 3.17690 | M IV | 2.68760 |
| M V | 2.57960 | N I | 0.938200 | N II | 0.805300 | N III | 0.678900 |
| N IV | 0.463600 | N V | 0.440000 | N VI | 0.161900 | N VII | 0.157400 |
| O I | 0.159300 | O II | 0.116800 | O III | 0.0928000 | O IV | 0.0265000 |
| O V | 0.0244000 | P I | 0.0142334 | P II | 0.00616991 | | |
| Relativistic correction estimate: $f_{\text{rel}} (\text{H82,3/5CL})=(-1.9618, -01.1484) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.018084 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 32.1000 | 31.903 | 12848 | 6.3774 | 12854 | 0.00 | 2.480 |
| 0.50250000 | 32.3386 | 31.937 | 12798 | 6.4075 | 12804 | 0.00 | 2.467 |
| 0.50501250 | 32.5759 | 31.970 | 12747 | 6.4375 | 12754 | 0.00 | 2.455 |
| 0.50753756 | 32.8121 | 32.000 | 12696 | 6.4676 | 12702 | 0.00 | 2.443 |
| 0.51007525 | 33.0473 | 32.028 | 12644 | 6.4977 | 12650 | 0.00 | 2.431 |
| 0.51262563 | 33.2815 | 32.054 | 12591 | 6.5278 | 12597 | 0.00 | 2.419 |
| 0.51518875 | 33.5148 | 32.078 | 12537 | 6.5579 | 12544 | 0.00 | 2.407 |
| 0.51776470 | 33.7472 | 32.098 | 12483 | 6.5880 | 12490 | 0.00 | 2.395 |
| 0.52035352 | 33.9786 | 32.117 | 12428 | 6.6181 | 12435 | 0.00 | 2.383 |
| 0.52295529 | 34.2089 | 32.133 | 12373 | 6.6483 | 12379 | 0.00 | 2.371 |
| 0.52557007 | 34.4383 | 32.147 | 12316 | 6.6784 | 12323 | 0.00 | 2.359 |
| 0.52819792 | 34.6666 | 32.158 | 12259 | 6.7086 | 12266 | 0.00 | 2.347 |
| 0.53083891 | 34.8938 | 32.168 | 12202 | 6.7388 | 12209 | 0.00 | 2.336 |
| 0.53349310 | 35.1199 | 32.174 | 12144 | 6.7690 | 12151 | 0.00 | 2.324 |
| 0.53616057 | 35.3449 | 32.179 | 12085 | 6.7991 | 12092 | 0.00 | 2.312 |
| 0.53884137 | 35.5688 | 32.181 | 12026 | 6.8293 | 12033 | 0.00 | 2.301 |
| 0.54153558 | 35.7915 | 32.181 | 11966 | 6.8595 | 11973 | 0.00 | 2.289 |
| 0.54424325 | 36.0129 | 32.179 | 11906 | 6.8897 | 11912 | 0.00 | 2.278 |
| 0.54696447 | 36.2332 | 32.174 | 11845 | 6.9199 | 11852 | 0.00 | 2.267 |
| 0.54969929 | 36.4521 | 32.168 | 11783 | 6.9501 | 11790 | 0.00 | 2.255 |
| 0.55244779 | 36.6698 | 32.159 | 11722 | 6.9802 | 11729 | 0.00 | 2.244 |
| 0.55521003 | 36.8861 | 32.148 | 11659 | 7.0104 | 11666 | 0.00 | 2.233 |
| 0.55798608 | 37.1010 | 32.135 | 11597 | 7.0406 | 11604 | 0.00 | 2.222 |
| 0.56077601 | 37.3145 | 32.120 | 11534 | 7.0708 | 11541 | 0.00 | 2.211 |
| 0.56357989 | 37.5265 | 32.103 | 11470 | 7.1009 | 11477 | 0.00 | 2.200 |
| 0.56639779 | 37.7371 | 32.084 | 11406 | 7.1311 | 11413 | 0.00 | 2.189 |
| 0.56922978 | 37.9461 | 32.063 | 11342 | 7.1612 | 11349 | 0.00 | 2.178 |
| 0.57207593 | 38.1535 | 32.040 | 11278 | 7.1914 | 11285 | 0.00 | 2.167 |
| 0.57493630 | 38.3592 | 32.015 | 11213 | 7.2215 | 11220 | 0.00 | 2.156 |
| 0.57781099 | 38.5633 | 31.989 | 11148 | 7.2516 | 11155 | 0.00 | 2.146 |
| 0.58070004 | 38.7657 | 31.960 | 11082 | 7.2817 | 11090 | 0.00 | 2.135 |
| 0.58360354 | 38.9662 | 31.929 | 11017 | 7.3118 | 11024 | 0.00 | 2.124 |
| 0.58652156 | 39.1649 | 31.897 | 10951 | 7.3419 | 10958 | 0.00 | 2.114 |
| 0.58945417 | 39.3617 | 31.863 | 10885 | 7.3719 | 10892 | 0.00 | 2.103 |
| 0.59240144 | 39.5565 | 31.827 | 10818 | 7.4020 | 10826 | 0.00 | 2.093 |
| 0.59536345 | 39.7493 | 31.790 | 10752 | 7.4320 | 10759 | 0.00 | 2.082 |
| 0.59834026 | 39.9399 | 31.751 | 10685 | 7.4620 | 10693 | 0.00 | 2.072 |
| 0.60133196 | 40.1284 | 31.710 | 10618 | 7.4920 | 10626 | 0.00 | 2.062 |
| 0.60433862 | 40.3145 | 31.668 | 10551 | 7.5219 | 10559 | 0.00 | 2.052 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Bi ($Z=83$) | | | | | | | |
| 0.60736032 | 40.4983 | 31.624 | 10484 | 7.5519 | 10492 | 0.00 | 2.041 |
| 0.61039712 | 40.6795 | 31.579 | 10417 | 7.5818 | 10425 | 0.00 | 2.031 |
| 0.61344910 | 40.8581 | 31.532 | 10350 | 7.6117 | 10358 | 0.00 | 2.021 |
| 0.61651635 | 41.0340 | 31.483 | 10283 | 7.6415 | 10290 | 0.00 | 2.011 |
| 0.61959893 | 41.2068 | 31.433 | 10215 | 7.6713 | 10223 | 0.00 | 2.001 |
| 0.62269693 | 41.3766 | 31.382 | 10148 | 7.7011 | 10156 | 0.00 | 1.991 |
| 0.62581041 | 41.5430 | 31.330 | 10081 | 7.7309 | 10088 | 0.00 | 1.981 |
| 0.62893946 | 41.7058 | 31.276 | 10013 | 7.7607 | 10021 | 0.00 | 1.971 |
| 0.63208416 | 41.8647 | 31.221 | 9945.8 | 7.7904 | 9953.6 | 0.00 | 1.962 |
| 0.63524458 | 42.0192 | 31.164 | 9878.3 | 7.8200 | 9886.1 | 0.00 | 1.952 |
| 0.63842080 | 42.1690 | 31.106 | 9810.9 | 7.8497 | 9818.7 | 0.00 | 1.942 |
| 0.64161291 | 42.3134 | 31.046 | 9743.4 | 7.8793 | 9751.3 | 0.00 | 1.932 |
| 0.64482097 | 42.4516 | 30.986 | 9676.0 | 7.9089 | 9683.9 | 0.00 | 1.923 |
| 0.64804508 | 42.5827 | 30.924 | 9608.5 | 7.9384 | 9616.5 | 0.00 | 1.913 |
| 0.65128530 | 42.7053 | 30.860 | 9541.2 | 7.9679 | 9549.1 | 0.00 | 1.904 |
| 0.65454173 | 42.8177 | 30.796 | 9473.8 | 7.9973 | 9481.8 | 0.00 | 1.894 |
| 0.65781444 | 42.9172 | 30.730 | 9406.5 | 8.0267 | 9414.5 | 0.00 | 1.885 |
| 0.66110351 | 42.9999 | 30.663 | 9339.3 | 8.0561 | 9347.3 | 0.00 | 1.875 |
| 0.66440903 | 43.0593 | 30.594 | 9272.1 | 8.0854 | 9280.2 | 0.00 | 1.866 |
| 0.66773107 | 43.0839 | 30.525 | 9205.1 | 8.1147 | 9213.2 | 0.00 | 1.857 |
| 0.67106973 | 43.0497 | 30.455 | 9138.2 | 8.1440 | 9146.3 | 0.00 | 1.848 |
| 0.67442508 | 42.8903 | 30.383 | 9071.4 | 8.1731 | 9079.5 | 0.00 | 1.838 |
| 0.67779720 | 42.2211 | 30.311 | 9004.7 | 8.2023 | 9012.9 | 0.00 | 1.829 |
| 0.67809211 | 42.0486 | 30.304 | 8998.9 | 8.2048 | 9007.1 | 0.00 | 1.828 |
| 0.67970789 | 42.1317 | 32.165 | 9528.8 | 8.2187 | 9537.1 | 0.00 | 1.824 |
| 0.68118619 | 42.8350 | 32.134 | 9499.0 | 8.2314 | 9507.2 | 0.00 | 1.820 |
| 0.68459212 | 43.5588 | 32.063 | 9430.6 | 8.2604 | 9438.9 | 0.00 | 1.811 |
| 0.68801508 | 44.0154 | 31.990 | 9362.4 | 8.2894 | 9370.7 | 0.00 | 1.802 |
| 0.69145515 | 44.3798 | 31.917 | 9294.5 | 8.3183 | 9302.8 | 0.00 | 1.793 |
| 0.69491243 | 44.6967 | 31.842 | 9226.8 | 8.3472 | 9235.1 | 0.00 | 1.784 |
| 0.69838699 | 44.9840 | 31.768 | 9159.3 | 8.3760 | 9167.7 | 0.00 | 1.775 |
| 0.70187893 | 45.2510 | 31.692 | 9092.1 | 8.4048 | 9100.5 | 0.00 | 1.766 |
| 0.70538832 | 45.5031 | 31.616 | 9025.2 | 8.4335 | 9033.6 | 0.00 | 1.758 |
| 0.70891526 | 45.7436 | 31.540 | 8958.6 | 8.4622 | 8967.1 | 0.00 | 1.749 |
| 0.71245984 | 45.9749 | 31.463 | 8892.3 | 8.4907 | 8900.8 | 0.00 | 1.740 |
| 0.71602214 | 46.1985 | 31.386 | 8826.3 | 8.5193 | 8834.8 | 0.00 | 1.732 |
| 0.71960225 | 46.4157 | 31.308 | 8760.6 | 8.5477 | 8769.2 | 0.00 | 1.723 |
| 0.72320026 | 46.6274 | 31.230 | 8695.3 | 8.5761 | 8703.9 | 0.00 | 1.714 |
| 0.72681626 | 46.8344 | 31.151 | 8630.3 | 8.6045 | 8638.9 | 0.00 | 1.706 |
| 0.73045034 | 47.0373 | 31.073 | 8565.7 | 8.6328 | 8574.3 | 0.00 | 1.697 |
| 0.73410260 | 47.2366 | 30.994 | 8501.5 | 8.6610 | 8510.1 | 0.00 | 1.689 |
| 0.73777311 | 47.4328 | 30.915 | 8437.6 | 8.6891 | 8446.3 | 0.00 | 1.681 |
| 0.74146197 | 47.6263 | 30.836 | 8374.1 | 8.7172 | 8382.9 | 0.00 | 1.672 |
| 0.74516928 | 47.8169 | 30.752 | 8309.7 | 8.7452 | 8318.5 | 0.00 | 1.664 |
| 0.74889513 | 48.0030 | 30.660 | 8243.8 | 8.7731 | 8252.6 | 0.00 | 1.656 |
| 0.75263961 | 48.1852 | 30.568 | 8178.2 | 8.8010 | 8187.0 | 0.00 | 1.647 |
| 0.75640280 | 48.3634 | 30.476 | 8113.0 | 8.8287 | 8121.8 | 0.00 | 1.639 |
| 0.76018482 | 48.5379 | 30.383 | 8048.1 | 8.8564 | 8056.9 | 0.00 | 1.631 |
| 0.76398574 | 48.7087 | 30.291 | 7983.5 | 8.8841 | 7992.4 | 0.00 | 1.623 |
| 0.76780567 | 48.8759 | 30.197 | 7919.4 | 8.9116 | 7928.3 | 0.00 | 1.615 |
| 0.77164470 | 49.0392 | 30.104 | 7855.5 | 8.9391 | 7864.5 | 0.00 | 1.607 |
| 0.77550292 | 49.1987 | 30.010 | 7792.1 | 8.9665 | 7801.1 | 0.00 | 1.599 |
| 0.77938044 | 49.3538 | 29.916 | 7729.1 | 8.9938 | 7738.1 | 0.00 | 1.591 |
| 0.78327734 | 49.5042 | 29.822 | 7666.4 | 9.0210 | 7675.4 | 0.00 | 1.583 |
| 0.78719373 | 49.6475 | 29.721 | 7602.4 | 9.0482 | 7611.5 | 0.00 | 1.575 |
| 0.79112969 | 49.7815 | 29.619 | 7538.7 | 9.0753 | 7547.8 | 0.00 | 1.567 |
| 0.79508534 | 49.9021 | 29.517 | 7475.3 | 9.1022 | 7484.4 | 0.00 | 1.559 |
| 0.79906077 | 49.9987 | 29.414 | 7412.3 | 9.1291 | 7421.5 | 0.00 | 1.552 |
| 0.80305607 | 50.0244 | 29.312 | 7349.7 | 9.1559 | 7358.9 | 0.00 | 1.544 |
| 0.80418063 | 49.9786 | 29.283 | 7332.2 | 9.1635 | 7341.4 | 0.00 | 1.542 |
| 0.80641936 | 50.0640 | 29.629 | 7398.2 | 9.1783 | 7407.4 | 0.00 | 1.537 |
| 0.80707135 | 50.1476 | 29.612 | 7388.2 | 9.1827 | 7397.3 | 0.00 | 1.536 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Bi ($Z=83$) | | | | | | | |
| 0.81110671 | 50.4519 | 29.511 | 7326.3 | 9.2093 | 7335.5 | 0.00 | 1.529 |
| 0.81516224 | 50.6701 | 29.410 | 7264.8 | 9.2358 | 7274.0 | 0.00 | 1.521 |
| 0.81923806 | 50.8627 | 29.308 | 7203.7 | 9.2623 | 7213.0 | 0.00 | 1.513 |
| 0.82333425 | 51.0420 | 29.207 | 7143.0 | 9.2886 | 7152.3 | 0.00 | 1.506 |
| 0.82745092 | 51.2126 | 29.105 | 7082.7 | 9.3149 | 7092.0 | 0.00 | 1.498 |
| 0.83158817 | 51.3768 | 29.003 | 7022.8 | 9.3411 | 7032.2 | 0.00 | 1.491 |
| 0.83574611 | 51.5359 | 28.902 | 6963.4 | 9.3671 | 6972.7 | 0.00 | 1.484 |
| 0.83992484 | 51.6907 | 28.800 | 6904.3 | 9.3931 | 6913.7 | 0.00 | 1.476 |
| 0.84412447 | 51.8418 | 28.698 | 6845.7 | 9.4190 | 6855.1 | 0.00 | 1.469 |
| 0.84834509 | 51.9894 | 28.596 | 6787.5 | 9.4447 | 6796.9 | 0.00 | 1.461 |
| 0.85258682 | 52.1340 | 28.494 | 6729.7 | 9.4704 | 6739.2 | 0.00 | 1.454 |
| 0.85684975 | 52.2756 | 28.393 | 6672.3 | 9.4960 | 6681.8 | 0.00 | 1.447 |
| 0.86113400 | 52.4144 | 28.291 | 6615.4 | 9.5215 | 6624.9 | 0.00 | 1.440 |
| 0.86543967 | 52.5506 | 28.190 | 6558.9 | 9.5468 | 6568.4 | 0.00 | 1.433 |
| 0.86976687 | 52.6841 | 28.089 | 6502.8 | 9.5721 | 6512.4 | 0.00 | 1.425 |
| 0.87411570 | 52.8150 | 27.988 | 6447.2 | 9.5972 | 6456.8 | 0.00 | 1.418 |
| 0.87848628 | 52.9434 | 27.887 | 6392.0 | 9.6223 | 6401.6 | 0.00 | 1.411 |
| 0.88287871 | 53.0692 | 27.786 | 6337.2 | 9.6472 | 6346.9 | 0.00 | 1.404 |
| 0.88729310 | 53.1922 | 27.686 | 6282.9 | 9.6721 | 6292.6 | 0.00 | 1.397 |
| 0.89172957 | 53.3124 | 27.585 | 6229.0 | 9.6968 | 6238.7 | 0.00 | 1.390 |
| 0.89618822 | 53.4296 | 27.485 | 6175.5 | 9.7214 | 6185.3 | 0.00 | 1.383 |
| 0.90066916 | 53.5434 | 27.386 | 6122.5 | 9.7459 | 6132.3 | 0.00 | 1.377 |
| 0.90517250 | 53.6534 | 27.286 | 6069.9 | 9.7703 | 6079.7 | 0.00 | 1.370 |
| 0.90969837 | 53.7589 | 27.187 | 6017.8 | 9.7945 | 6027.6 | 0.00 | 1.363 |
| 0.91424686 | 53.8587 | 27.088 | 5966.1 | 9.8187 | 5975.9 | 0.00 | 1.356 |
| 0.91881809 | 53.9511 | 26.990 | 5914.8 | 9.8427 | 5924.7 | 0.00 | 1.349 |
| 0.92341218 | 54.0323 | 26.892 | 5864.0 | 9.8666 | 5873.9 | 0.00 | 1.343 |
| 0.92802924 | 54.0948 | 26.794 | 5813.6 | 9.8904 | 5823.5 | 0.00 | 1.336 |
| 0.93266939 | 54.1160 | 26.697 | 5763.7 | 9.9141 | 5773.6 | 0.00 | 1.329 |
| 0.93687713 | 53.9831 | 26.609 | 5719.0 | 9.9354 | 5728.9 | 0.00 | 1.323 |
| 0.93733274 | 53.9226 | 26.600 | 5714.2 | 9.9377 | 5724.1 | 0.00 | 1.323 |
| 0.93952286 | 54.0533 | 27.094 | 5806.9 | 9.9486 | 5816.8 | 0.00 | 1.320 |
| 0.94201940 | 54.3016 | 27.044 | 5780.7 | 9.9611 | 5790.6 | 0.00 | 1.316 |
| 0.94672950 | 54.5639 | 26.948 | 5731.7 | 9.9844 | 5741.7 | 0.00 | 1.310 |
| 0.95146315 | 54.7639 | 26.854 | 5683.1 | 10.008 | 5693.1 | 0.00 | 1.303 |
| 0.95622046 | 54.9407 | 26.760 | 5635.0 | 10.031 | 5645.1 | 0.00 | 1.297 |
| 0.96100156 | 55.1053 | 26.666 | 5587.4 | 10.054 | 5597.4 | 0.00 | 1.290 |
| 0.96580657 | 55.2626 | 26.573 | 5540.1 | 10.076 | 5550.2 | 0.00 | 1.284 |
| 0.97063560 | 55.4152 | 26.480 | 5493.3 | 10.099 | 5503.4 | 0.00 | 1.277 |
| 0.97548878 | 55.5648 | 26.388 | 5447.0 | 10.122 | 5457.1 | 0.00 | 1.271 |
| 0.98036623 | 55.7127 | 26.296 | 5401.0 | 10.144 | 5411.2 | 0.00 | 1.265 |
| 0.98526806 | 55.8600 | 26.205 | 5355.6 | 10.166 | 5365.7 | 0.00 | 1.258 |
| 0.99019440 | 56.0079 | 26.114 | 5310.5 | 10.189 | 5320.7 | 0.00 | 1.252 |
| 0.99514537 | 56.1581 | 26.024 | 5265.9 | 10.211 | 5276.1 | 0.00 | 1.246 |
| 1.0001211 | 56.3129 | 25.933 | 5221.3 | 10.232 | 5231.6 | 0.00 | 1.240 |
| 1.0051217 | 56.4625 | 25.777 | 5164.0 | 10.254 | 5174.3 | 0.00 | 1.234 |
| 1.0101473 | 56.6013 | 25.622 | 5107.5 | 10.276 | 5117.7 | 0.00 | 1.227 |
| 1.0151980 | 56.7321 | 25.468 | 5051.6 | 10.297 | 5061.9 | 0.00 | 1.221 |
| 1.0202740 | 56.8564 | 25.316 | 4996.4 | 10.319 | 5006.7 | 0.00 | 1.215 |
| 1.0253754 | 56.9753 | 25.165 | 4941.8 | 10.340 | 4952.2 | 0.00 | 1.209 |
| 1.0305023 | 57.0893 | 25.015 | 4887.9 | 10.361 | 4898.3 | 0.00 | 1.203 |
| 1.0356548 | 57.1990 | 24.866 | 4834.7 | 10.382 | 4845.1 | 0.00 | 1.197 |
| 1.0408331 | 57.3047 | 24.718 | 4782.0 | 10.403 | 4792.4 | 0.00 | 1.191 |
| 1.0460372 | 57.4067 | 24.572 | 4730.0 | 10.423 | 4740.4 | 0.00 | 1.185 |
| 1.0512674 | 57.5052 | 24.426 | 4678.6 | 10.444 | 4689.1 | 0.00 | 1.179 |
| 1.0565238 | 57.6005 | 24.282 | 4627.9 | 10.464 | 4638.3 | 0.00 | 1.174 |
| 1.0618064 | 57.6928 | 24.139 | 4577.7 | 10.485 | 4588.2 | 0.00 | 1.168 |
| 1.0671154 | 57.7823 | 23.997 | 4528.1 | 10.505 | 4538.7 | 0.00 | 1.162 |
| 1.0724510 | 57.8690 | 23.856 | 4479.2 | 10.525 | 4489.7 | 0.00 | 1.156 |
| 1.0778132 | 57.9532 | 23.717 | 4430.8 | 10.544 | 4441.4 | 0.00 | 1.150 |
| 1.0832023 | 58.0349 | 23.578 | 4383.1 | 10.564 | 4393.6 | 0.00 | 1.145 |
| 1.0886183 | 58.1143 | 23.441 | 4335.8 | 10.584 | 4346.4 | 0.00 | 1.139 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Bi ($Z=83$) | | | | | | | |
| 1.0940614 | 58.1914 | 23.305 | 4289.2 | 10.603 | 4299.8 | 0.00 | 1.133 |
| 1.0995317 | 58.2664 | 23.170 | 4243.1 | 10.622 | 4253.8 | 0.00 | 1.128 |
| 1.1050294 | 58.3393 | 23.036 | 4197.6 | 10.641 | 4208.3 | 0.00 | 1.122 |
| 1.1105545 | 58.4103 | 22.903 | 4152.6 | 10.660 | 4163.3 | 0.00 | 1.116 |
| 1.1161073 | 58.4793 | 22.771 | 4108.2 | 10.679 | 4118.9 | 0.00 | 1.111 |
| 1.1216878 | 58.5466 | 22.640 | 4064.3 | 10.697 | 4075.0 | 0.00 | 1.105 |
| 1.1272963 | 58.6121 | 22.511 | 4020.9 | 10.716 | 4031.6 | 0.00 | 1.100 |
| 1.1329328 | 58.6759 | 22.382 | 3978.1 | 10.734 | 3988.8 | 0.00 | 1.094 |
| 1.1385974 | 58.7382 | 22.255 | 3935.7 | 10.752 | 3946.5 | 0.00 | 1.089 |
| 1.1442904 | 58.7989 | 22.128 | 3893.9 | 10.770 | 3904.7 | 0.00 | 1.084 |
| 1.1500119 | 58.8581 | 22.002 | 3852.4 | 10.788 | 3863.2 | 0.00 | 1.078 |
| 1.1557619 | 58.9154 | 21.875 | 3811.1 | 10.806 | 3822.0 | 0.00 | 1.073 |
| 1.1615407 | 58.9710 | 21.749 | 3770.4 | 10.823 | 3781.2 | 0.00 | 1.067 |
| 1.1673484 | 59.0249 | 21.625 | 3730.1 | 10.841 | 3741.0 | 0.00 | 1.062 |
| 1.1731852 | 59.0772 | 21.501 | 3690.4 | 10.858 | 3701.2 | 0.00 | 1.057 |
| 1.1790511 | 59.1279 | 21.379 | 3651.1 | 10.875 | 3661.9 | 0.00 | 1.052 |
| 1.1849464 | 59.1772 | 21.257 | 3612.2 | 10.892 | 3623.1 | 0.00 | 1.046 |
| 1.1908711 | 59.2249 | 21.136 | 3573.8 | 10.908 | 3584.7 | 0.00 | 1.041 |
| 1.1968254 | 59.2713 | 21.016 | 3535.9 | 10.925 | 3546.8 | 0.00 | 1.036 |
| 1.2028096 | 59.3162 | 20.898 | 3498.4 | 10.941 | 3509.4 | 0.00 | 1.031 |
| 1.2088236 | 59.3598 | 20.780 | 3461.4 | 10.957 | 3472.4 | 0.00 | 1.026 |
| 1.2148677 | 59.4021 | 20.663 | 3424.8 | 10.973 | 3435.8 | 0.00 | 1.021 |
| 1.2209421 | 59.4430 | 20.547 | 3388.6 | 10.989 | 3399.6 | 0.00 | 1.015 |
| 1.2270468 | 59.4828 | 20.432 | 3352.9 | 11.005 | 3363.9 | 0.00 | 1.010 |
| 1.2331820 | 59.5212 | 20.318 | 3317.6 | 11.021 | 3328.6 | 0.00 | 1.005 |
| 1.2393479 | 59.5585 | 20.204 | 3282.7 | 11.036 | 3293.7 | 0.00 | 1.000 |
| 1.2455447 | 59.5946 | 20.092 | 3248.2 | 11.051 | 3259.2 | 0.00 | 0.9954 |
| 1.2517724 | 59.6296 | 19.981 | 3214.1 | 11.066 | 3225.1 | 0.00 | 0.9905 |
| 1.2580312 | 59.6635 | 19.870 | 3180.4 | 11.081 | 3191.5 | 0.00 | 0.9855 |
| 1.2643214 | 59.6962 | 19.760 | 3147.1 | 11.096 | 3158.2 | 0.00 | 0.9806 |
| 1.2706430 | 59.7278 | 19.651 | 3114.2 | 11.110 | 3125.3 | 0.00 | 0.9758 |
| 1.2769962 | 59.7585 | 19.544 | 3081.7 | 11.125 | 3092.8 | 0.00 | 0.9709 |
| 1.2833812 | 59.7880 | 19.436 | 3049.5 | 11.139 | 3060.7 | 0.00 | 0.9661 |
| 1.2897981 | 59.8166 | 19.330 | 3017.8 | 11.153 | 3028.9 | 0.00 | 0.9613 |
| 1.2962471 | 59.8441 | 19.225 | 2986.4 | 11.167 | 2997.5 | 0.00 | 0.9565 |
| 1.3027283 | 59.8707 | 19.120 | 2955.4 | 11.180 | 2966.5 | 0.00 | 0.9517 |
| 1.3092420 | 59.8963 | 19.016 | 2924.7 | 11.194 | 2935.9 | 0.00 | 0.9470 |
| 1.3157882 | 59.9210 | 18.913 | 2894.4 | 11.207 | 2905.6 | 0.00 | 0.9423 |
| 1.3223671 | 59.9584 | 18.811 | 2864.4 | 11.220 | 2875.6 | 0.00 | 0.9376 |
| 1.3289790 | 59.9815 | 18.710 | 2834.8 | 11.233 | 2846.1 | 0.00 | 0.9329 |
| 1.3356239 | 60.0036 | 18.609 | 2805.6 | 11.246 | 2816.8 | 0.00 | 0.9283 |
| 1.3423020 | 60.0249 | 18.510 | 2776.6 | 11.259 | 2787.9 | 0.00 | 0.9237 |
| 1.3490135 | 60.0454 | 18.411 | 2748.1 | 11.271 | 2759.3 | 0.00 | 0.9191 |
| 1.3557586 | 60.0651 | 18.312 | 2719.8 | 11.283 | 2731.1 | 0.00 | 0.9145 |
| 1.3625374 | 60.0839 | 18.215 | 2691.8 | 11.296 | 2703.1 | 0.00 | 0.9100 |
| 1.3693500 | 60.1018 | 18.117 | 2664.1 | 11.307 | 2675.4 | 0.00 | 0.9054 |
| 1.3761968 | 60.1188 | 18.020 | 2636.6 | 11.319 | 2647.9 | 0.00 | 0.9009 |
| 1.3830778 | 60.1348 | 17.923 | 2609.4 | 11.331 | 2620.8 | 0.00 | 0.8964 |
| 1.3899932 | 60.1498 | 17.828 | 2582.6 | 11.342 | 2594.0 | 0.00 | 0.8920 |
| 1.3969431 | 60.1713 | 17.733 | 2556.1 | 11.353 | 2567.4 | 0.00 | 0.8875 |
| 1.4039278 | 60.1847 | 17.639 | 2529.9 | 11.364 | 2541.2 | 0.00 | 0.8831 |
| 1.4109475 | 60.1974 | 17.545 | 2503.9 | 11.375 | 2515.3 | 0.00 | 0.8787 |
| 1.4180022 | 60.2091 | 17.453 | 2478.3 | 11.386 | 2489.7 | 0.00 | 0.8744 |
| 1.4250922 | 60.2200 | 17.361 | 2453.0 | 11.396 | 2464.4 | 0.00 | 0.8700 |
| 1.4322177 | 60.2301 | 17.269 | 2427.9 | 11.407 | 2439.3 | 0.00 | 0.8657 |
| 1.4393788 | 60.2393 | 17.179 | 2403.2 | 11.417 | 2414.6 | 0.00 | 0.8614 |
| 1.4465757 | 60.2477 | 17.089 | 2378.7 | 11.427 | 2390.1 | 0.00 | 0.8571 |
| 1.4538086 | 60.2553 | 16.999 | 2354.5 | 11.436 | 2366.0 | 0.00 | 0.8528 |
| 1.4610776 | 60.2621 | 16.911 | 2330.6 | 11.446 | 2342.0 | 0.00 | 0.8486 |
| 1.4683830 | 60.2681 | 16.823 | 2306.9 | 11.455 | 2318.4 | 0.00 | 0.8444 |
| 1.4757249 | 60.2732 | 16.736 | 2283.6 | 11.464 | 2295.0 | 0.00 | 0.8402 |
| 1.4831035 | 60.2776 | 16.649 | 2260.5 | 11.473 | 2271.9 | 0.00 | 0.8360 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Bi ($Z=83$) | | | | | | | |
| 1.4905190 | 60.2813 | 16.563 | 2237.6 | 11.482 | 2249.1 | 0.00 | 0.8318 |
| 1.4979716 | 60.2841 | 16.478 | 2215.0 | 11.491 | 2226.5 | 0.00 | 0.8277 |
| 1.5054615 | 60.2861 | 16.393 | 2192.7 | 11.499 | 2204.2 | 0.00 | 0.8236 |
| 1.5129888 | 60.2874 | 16.310 | 2170.6 | 11.508 | 2182.1 | 0.00 | 0.8195 |
| 1.5205537 | 60.2879 | 16.226 | 2148.8 | 11.516 | 2160.3 | 0.00 | 0.8154 |
| 1.5281565 | 60.2877 | 16.143 | 2127.2 | 11.524 | 2138.7 | 0.00 | 0.8113 |
| 1.5357973 | 60.2867 | 16.061 | 2105.8 | 11.531 | 2117.4 | 0.00 | 0.8073 |
| 1.5434763 | 60.2850 | 15.980 | 2084.7 | 11.539 | 2096.3 | 0.00 | 0.8033 |
| 1.5511937 | 60.2825 | 15.899 | 2063.9 | 11.546 | 2075.4 | 0.00 | 0.7993 |
| 1.5589496 | 60.2792 | 15.819 | 2043.2 | 11.553 | 2054.8 | 0.00 | 0.7953 |
| 1.5667444 | 60.2752 | 15.739 | 2022.8 | 11.560 | 2034.4 | 0.00 | 0.7913 |
| 1.5745781 | 60.2705 | 15.660 | 2002.7 | 11.567 | 2014.2 | 0.00 | 0.7874 |
| 1.5824510 | 60.2651 | 15.582 | 1982.7 | 11.574 | 1994.3 | 0.00 | 0.7835 |
| 1.5903633 | 60.2588 | 15.504 | 1963.0 | 11.580 | 1974.5 | 0.00 | 0.7796 |
| 1.5983151 | 60.2518 | 15.426 | 1943.4 | 11.586 | 1955.0 | 0.00 | 0.7757 |
| 1.6063066 | 60.2439 | 15.349 | 1924.0 | 11.592 | 1935.6 | 0.00 | 0.7719 |
| 1.6143382 | 60.2352 | 15.272 | 1904.9 | 11.598 | 1916.5 | 0.00 | 0.7680 |
| 1.6224099 | 60.2257 | 15.196 | 1886.0 | 11.604 | 1897.6 | 0.00 | 0.7642 |
| 1.6305219 | 60.2154 | 15.120 | 1867.3 | 11.609 | 1878.9 | 0.00 | 0.7604 |
| 1.6386745 | 60.2043 | 15.045 | 1848.8 | 11.615 | 1860.4 | 0.00 | 0.7566 |
| 1.6468679 | 60.1923 | 14.971 | 1830.5 | 11.620 | 1842.1 | 0.00 | 0.7528 |
| 1.6551022 | 60.1796 | 14.897 | 1812.4 | 11.625 | 1824.0 | 0.00 | 0.7491 |
| 1.6633777 | 60.1660 | 14.824 | 1794.5 | 11.629 | 1806.1 | 0.00 | 0.7454 |
| 1.6716946 | 60.1517 | 14.751 | 1776.8 | 11.634 | 1788.5 | 0.00 | 0.7417 |
| 1.6800531 | 60.1365 | 14.679 | 1759.3 | 11.638 | 1771.0 | 0.00 | 0.7380 |
| 1.6884534 | 60.1205 | 14.607 | 1742.0 | 11.642 | 1753.7 | 0.00 | 0.7343 |
| 1.6968956 | 60.1037 | 14.536 | 1724.9 | 11.646 | 1736.6 | 0.00 | 0.7307 |
| 1.7053801 | 60.0860 | 14.465 | 1708.0 | 11.650 | 1719.6 | 0.00 | 0.7270 |
| 1.7139070 | 60.0676 | 14.395 | 1691.3 | 11.653 | 1702.9 | 0.00 | 0.7234 |
| 1.7224766 | 60.0483 | 14.326 | 1674.7 | 11.657 | 1686.4 | 0.00 | 0.7198 |
| 1.7310889 | 60.0282 | 14.257 | 1658.3 | 11.660 | 1670.0 | 0.00 | 0.7162 |
| 1.7397444 | 60.0073 | 14.188 | 1642.2 | 11.663 | 1653.8 | 0.00 | 0.7127 |
| 1.7484431 | 59.9856 | 14.120 | 1626.1 | 11.666 | 1637.8 | 0.00 | 0.7091 |
| 1.7571853 | 59.9631 | 14.052 | 1610.2 | 11.669 | 1621.9 | 0.00 | 0.7056 |
| 1.7659712 | 59.9395 | 13.978 | 1593.8 | 11.671 | 1605.5 | 0.00 | 0.7021 |
| 1.7748011 | 59.9144 | 13.902 | 1577.2 | 11.673 | 1588.9 | 0.00 | 0.6986 |
| 1.7836751 | 59.8877 | 13.826 | 1560.8 | 11.675 | 1572.5 | 0.00 | 0.6951 |
| 1.7925935 | 59.8594 | 13.751 | 1544.6 | 11.677 | 1556.3 | 0.00 | 0.6916 |
| 1.8015565 | 59.8295 | 13.676 | 1528.6 | 11.679 | 1540.3 | 0.00 | 0.6882 |
| 1.8105642 | 59.7980 | 13.602 | 1512.7 | 11.680 | 1524.4 | 0.00 | 0.6848 |
| 1.8196171 | 59.7650 | 13.529 | 1497.1 | 11.682 | 1508.8 | 0.00 | 0.6814 |
| 1.8287151 | 59.7304 | 13.456 | 1481.6 | 11.683 | 1493.3 | 0.00 | 0.6780 |
| 1.8378587 | 59.6942 | 13.383 | 1466.3 | 11.684 | 1478.0 | 0.00 | 0.6746 |
| 1.8470480 | 59.6564 | 13.311 | 1451.2 | 11.684 | 1462.8 | 0.00 | 0.6713 |
| 1.8562833 | 59.6169 | 13.239 | 1436.1 | 11.685 | 1447.7 | 0.00 | 0.6679 |
| 1.8655647 | 59.5755 | 13.161 | 1420.6 | 11.685 | 1432.3 | 0.00 | 0.6646 |
| 1.8748925 | 59.5319 | 13.085 | 1405.3 | 11.685 | 1417.0 | 0.00 | 0.6613 |
| 1.8842670 | 59.4862 | 13.009 | 1390.1 | 11.685 | 1401.8 | 0.00 | 0.6580 |
| 1.8936883 | 59.4382 | 12.933 | 1375.2 | 11.685 | 1386.9 | 0.00 | 0.6547 |
| 1.9031567 | 59.3881 | 12.858 | 1360.4 | 11.685 | 1372.1 | 0.00 | 0.6515 |
| 1.9126725 | 59.3357 | 12.784 | 1345.8 | 11.684 | 1357.5 | 0.00 | 0.6482 |
| 1.9222359 | 59.2810 | 12.710 | 1331.4 | 11.683 | 1343.1 | 0.00 | 0.6450 |
| 1.9318471 | 59.2239 | 12.636 | 1317.1 | 11.683 | 1328.8 | 0.00 | 0.6418 |
| 1.9415063 | 59.1646 | 12.564 | 1303.0 | 11.681 | 1314.7 | 0.00 | 0.6386 |
| 1.9512138 | 59.1028 | 12.491 | 1289.1 | 11.680 | 1300.8 | 0.00 | 0.6354 |
| 1.9609699 | 59.0385 | 12.420 | 1275.3 | 11.679 | 1287.0 | 0.00 | 0.6323 |
| 1.9707747 | 58.9717 | 12.348 | 1261.7 | 11.677 | 1273.3 | 0.00 | 0.6291 |
| 1.9806286 | 58.9024 | 12.278 | 1248.2 | 11.675 | 1259.9 | 0.00 | 0.6260 |
| 1.9905318 | 58.8304 | 12.207 | 1234.9 | 11.673 | 1246.6 | 0.00 | 0.6229 |
| 2.0004844 | 58.7556 | 12.138 | 1221.7 | 11.671 | 1233.4 | 0.00 | 0.6198 |
| 2.0104868 | 58.6780 | 12.069 | 1208.7 | 11.668 | 1220.4 | 0.00 | 0.6167 |
| 2.0205393 | 58.5976 | 12.000 | 1195.9 | 11.666 | 1207.5 | 0.00 | 0.6136 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Bi ($Z=83$) | | | | | | | |
| 2.0306420 | 58.5141 | 11.932 | 1183.2 | 11.663 | 1194.8 | 0.00 | 0.6106 |
| 2.0407952 | 58.4292 | 11.864 | 1170.6 | 11.660 | 1182.3 | 0.00 | 0.6075 |
| 2.0509992 | 58.3394 | 11.797 | 1158.2 | 11.657 | 1169.8 | 0.00 | 0.6045 |
| 2.0612542 | 58.2464 | 11.730 | 1145.9 | 11.653 | 1157.6 | 0.00 | 0.6015 |
| 2.0715604 | 58.1498 | 11.664 | 1133.8 | 11.650 | 1145.4 | 0.00 | 0.5985 |
| 2.0819182 | 58.0497 | 11.598 | 1121.8 | 11.646 | 1133.4 | 0.00 | 0.5955 |
| 2.0923278 | 57.9459 | 11.533 | 1109.9 | 11.642 | 1121.6 | 0.00 | 0.5926 |
| 2.1027895 | 57.8381 | 11.468 | 1098.2 | 11.638 | 1109.8 | 0.00 | 0.5896 |
| 2.1133034 | 57.7263 | 11.404 | 1086.6 | 11.634 | 1098.2 | 0.00 | 0.5867 |
| 2.1238699 | 57.6102 | 11.340 | 1075.1 | 11.629 | 1086.8 | 0.00 | 0.5838 |
| 2.1344893 | 57.4896 | 11.277 | 1063.8 | 11.624 | 1075.4 | 0.00 | 0.5809 |
| 2.1451617 | 57.3644 | 11.214 | 1052.6 | 11.620 | 1064.2 | 0.00 | 0.5780 |
| 2.1558875 | 57.2342 | 11.151 | 1041.5 | 11.615 | 1053.2 | 0.00 | 0.5751 |
| 2.1666670 | 57.0989 | 11.089 | 1030.6 | 11.609 | 1042.2 | 0.00 | 0.5722 |
| 2.1775003 | 56.9580 | 11.028 | 1019.8 | 11.604 | 1031.4 | 0.00 | 0.5694 |
| 2.1883878 | 56.8114 | 10.967 | 1009.1 | 11.598 | 1020.7 | 0.00 | 0.5666 |
| 2.1993297 | 56.6587 | 10.906 | 998.49 | 11.593 | 1010.1 | 0.00 | 0.5637 |
| 2.2103264 | 56.4995 | 10.845 | 988.01 | 11.587 | 999.60 | 0.00 | 0.5609 |
| 2.2213780 | 56.3335 | 10.785 | 977.66 | 11.581 | 989.24 | 0.00 | 0.5581 |
| 2.2324849 | 56.1600 | 10.726 | 967.42 | 11.574 | 979.00 | 0.00 | 0.5554 |
| 2.2436473 | 55.9788 | 10.667 | 957.30 | 11.568 | 968.87 | 0.00 | 0.5526 |
| 2.2548656 | 55.7891 | 10.608 | 947.29 | 11.561 | 958.85 | 0.00 | 0.5499 |
| 2.2661399 | 55.5905 | 10.550 | 937.39 | 11.555 | 948.95 | 0.00 | 0.5471 |
| 2.2774706 | 55.3822 | 10.492 | 927.61 | 11.548 | 939.16 | 0.00 | 0.5444 |
| 2.2888579 | 55.1635 | 10.434 | 917.94 | 11.540 | 929.48 | 0.00 | 0.5417 |
| 2.3003022 | 54.9335 | 10.377 | 908.37 | 11.533 | 919.90 | 0.00 | 0.5390 |
| 2.3118037 | 54.6912 | 10.320 | 898.91 | 11.526 | 910.44 | 0.00 | 0.5363 |
| 2.3233628 | 54.4357 | 10.264 | 889.56 | 11.518 | 901.08 | 0.00 | 0.5336 |
| 2.3349796 | 54.1655 | 10.208 | 880.31 | 11.510 | 891.82 | 0.00 | 0.5310 |
| 2.3466545 | 53.8793 | 10.153 | 871.17 | 11.502 | 882.67 | 0.00 | 0.5283 |
| 2.3583878 | 53.5754 | 10.098 | 862.13 | 11.494 | 873.62 | 0.00 | 0.5257 |
| 2.3701797 | 53.2519 | 10.043 | 853.19 | 11.485 | 864.68 | 0.00 | 0.5231 |
| 2.3820306 | 52.9065 | 9.9884 | 844.35 | 11.477 | 855.83 | 0.00 | 0.5205 |
| 2.3939407 | 52.5365 | 9.9344 | 835.61 | 11.468 | 847.08 | 0.00 | 0.5179 |
| 2.4059104 | 52.1386 | 9.8809 | 826.97 | 11.459 | 838.43 | 0.00 | 0.5153 |
| 2.4179400 | 51.7125 | 9.8276 | 818.42 | 11.450 | 829.87 | 0.00 | 0.5128 |
| 2.4300297 | 51.2462 | 9.7748 | 809.97 | 11.441 | 821.41 | 0.00 | 0.5102 |
| 2.4421798 | 50.7372 | 9.7223 | 801.61 | 11.432 | 813.04 | 0.00 | 0.5077 |
| 2.4543907 | 50.1776 | 9.6702 | 793.35 | 11.422 | 804.77 | 0.00 | 0.5052 |
| 2.4666627 | 49.5575 | 9.6184 | 785.18 | 11.412 | 796.59 | 0.00 | 0.5026 |
| 2.4789960 | 48.8632 | 9.5670 | 777.09 | 11.402 | 788.50 | 0.00 | 0.5001 |
| 2.4913910 | 48.0758 | 9.5160 | 769.10 | 11.392 | 780.49 | 0.00 | 0.4977 |
| 2.5038479 | 47.1678 | 9.4653 | 761.20 | 11.382 | 772.58 | 0.00 | 0.4952 |
| 2.5163672 | 46.0971 | 9.4149 | 753.38 | 11.372 | 764.76 | 0.00 | 0.4927 |
| 2.5289490 | 44.7936 | 9.3649 | 745.66 | 11.361 | 757.02 | 0.00 | 0.4903 |
| 2.5415938 | 43.1265 | 9.3153 | 738.01 | 11.350 | 749.36 | 0.00 | 0.4878 |
| 2.5543017 | 40.8023 | 9.2660 | 730.45 | 11.339 | 741.79 | 0.00 | 0.4854 |
| 2.5670732 | 36.8771 | 9.2170 | 722.98 | 11.328 | 734.31 | 0.00 | 0.4830 |
| 2.5788933 | 21.2884 | 9.1722 | 716.17 | 11.318 | 727.48 | 0.00 | 0.4808 |
| 2.5799086 | 16.5394 | 26.074 | 2035.0 | 11.317 | 2046.3 | 0.00 | 0.4806 |
| 2.5803069 | 21.0000 | 26.068 | 2034.2 | 11.317 | 2045.6 | 0.00 | 0.4805 |
| 2.5928082 | 36.5808 | 25.879 | 2009.8 | 11.306 | 2021.1 | 0.00 | 0.4782 |
| 2.6057722 | 39.9542 | 25.686 | 1984.9 | 11.294 | 1996.2 | 0.00 | 0.4758 |
| 2.6188011 | 41.7054 | 25.495 | 1960.3 | 11.283 | 1971.6 | 0.00 | 0.4734 |
| 2.6318951 | 42.6865 | 25.305 | 1936.0 | 11.271 | 1947.3 | 0.00 | 0.4711 |
| 2.6450545 | 43.1094 | 25.117 | 1912.1 | 11.259 | 1923.3 | 0.00 | 0.4687 |
| 2.6582798 | 42.9465 | 24.930 | 1888.4 | 11.247 | 1899.7 | 0.00 | 0.4664 |
| 2.6715712 | 41.8129 | 24.745 | 1865.1 | 11.234 | 1876.3 | 0.00 | 0.4641 |
| 2.6849291 | 36.3620 | 24.561 | 1842.0 | 11.222 | 1853.2 | 0.00 | 0.4618 |
| 2.6868259 | 32.0847 | 24.535 | 1838.8 | 11.220 | 1850.0 | 0.00 | 0.4615 |
| 2.6883739 | 32.0049 | 35.686 | 2672.9 | 11.218 | 2684.1 | 0.00 | 0.4612 |
| 2.6983537 | 41.9890 | 35.482 | 2647.8 | 11.209 | 2659.0 | 0.00 | 0.4595 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Bi ($Z=83$) | | | | | | | |
| 2.7118455 | 45.6172 | 35.209 | 2614.3 | 11.196 | 2625.5 | 0.00 | 0.4572 |
| 2.7254047 | 47.8545 | 34.937 | 2581.2 | 11.183 | 2592.4 | 0.00 | 0.4549 |
| 2.7390317 | 49.5441 | 34.667 | 2548.5 | 11.170 | 2559.7 | 0.00 | 0.4527 |
| 2.7527269 | 50.9266 | 34.399 | 2516.3 | 11.157 | 2527.4 | 0.00 | 0.4504 |
| 2.7664905 | 52.1068 | 34.133 | 2484.4 | 11.143 | 2495.5 | 0.00 | 0.4482 |
| 2.7803230 | 53.1409 | 33.870 | 2452.9 | 11.130 | 2464.1 | 0.00 | 0.4459 |
| 2.7942246 | 54.0629 | 33.608 | 2421.9 | 11.116 | 2433.0 | 0.00 | 0.4437 |
| 2.8081957 | 54.8954 | 33.349 | 2391.3 | 11.102 | 2402.4 | 0.00 | 0.4415 |
| 2.8222367 | 55.6538 | 33.092 | 2361.0 | 11.088 | 2372.1 | 0.00 | 0.4393 |
| 2.8363479 | 56.3498 | 32.837 | 2331.2 | 11.074 | 2342.2 | 0.00 | 0.4371 |
| 2.8505296 | 56.9919 | 32.584 | 2301.7 | 11.060 | 2312.8 | 0.00 | 0.4350 |
| 2.8647823 | 57.5865 | 32.333 | 2272.6 | 11.045 | 2283.7 | 0.00 | 0.4328 |
| 2.8791062 | 58.1390 | 32.084 | 2243.9 | 11.031 | 2255.0 | 0.00 | 0.4306 |
| 2.8935017 | 58.6535 | 31.838 | 2215.6 | 11.016 | 2226.6 | 0.00 | 0.4285 |
| 2.9079692 | 59.1332 | 31.593 | 2187.6 | 11.001 | 2198.6 | 0.00 | 0.4264 |
| 2.9225091 | 59.5809 | 31.350 | 2160.0 | 10.986 | 2171.0 | 0.00 | 0.4242 |
| 2.9371216 | 59.9987 | 31.109 | 2132.8 | 10.971 | 2143.7 | 0.00 | 0.4221 |
| 2.9518072 | 60.3882 | 30.871 | 2105.9 | 10.955 | 2116.8 | 0.00 | 0.4200 |
| 2.9665662 | 60.7507 | 30.633 | 2079.2 | 10.940 | 2090.2 | 0.00 | 0.4179 |
| 2.9813991 | 61.0868 | 30.396 | 2052.9 | 10.924 | 2063.8 | 0.00 | 0.4159 |
| 2.9963061 | 61.3972 | 30.161 | 2026.9 | 10.908 | 2037.8 | 0.00 | 0.4138 |
| 3.0112876 | 61.6726 | 29.914 | 2000.3 | 10.892 | 2011.2 | 0.00 | 0.4117 |
| 3.0263440 | 61.9164 | 29.664 | 1973.7 | 10.876 | 1984.6 | 0.00 | 0.4097 |
| 3.0414758 | 62.1293 | 29.417 | 1947.5 | 10.860 | 1958.4 | 0.00 | 0.4076 |
| 3.0566831 | 62.3087 | 29.170 | 1921.6 | 10.844 | 1932.4 | 0.00 | 0.4056 |
| 3.0719666 | 62.4498 | 28.926 | 1896.0 | 10.827 | 1906.8 | 0.00 | 0.4036 |
| 3.0873264 | 62.5453 | 28.683 | 1870.8 | 10.811 | 1881.6 | 0.00 | 0.4016 |
| 3.1027630 | 62.5832 | 28.443 | 1845.9 | 10.794 | 1856.7 | 0.00 | 0.3996 |
| 3.1182768 | 62.5419 | 28.205 | 1821.3 | 10.777 | 1832.1 | 0.00 | 0.3976 |
| 3.1338682 | 62.3789 | 27.969 | 1797.1 | 10.760 | 1807.9 | 0.00 | 0.3956 |
| 3.1495376 | 61.9902 | 27.735 | 1773.2 | 10.743 | 1783.9 | 0.00 | 0.3937 |
| 3.1652853 | 60.9806 | 27.503 | 1749.6 | 10.726 | 1760.3 | 0.00 | 0.3917 |
| 3.1735006 | 59.2587 | 27.383 | 1737.5 | 10.717 | 1748.2 | 0.00 | 0.3907 |
| 3.1802992 | 59.3216 | 32.091 | 2031.8 | 10.709 | 2042.6 | 0.00 | 0.3899 |
| 3.1811117 | 59.6663 | 32.077 | 2030.4 | 10.708 | 2041.1 | 0.00 | 0.3898 |
| 3.1970172 | 62.3551 | 31.800 | 2002.9 | 10.691 | 2013.6 | 0.00 | 0.3878 |
| 3.2130023 | 63.5185 | 31.525 | 1975.7 | 10.673 | 1986.4 | 0.00 | 0.3859 |
| 3.2290673 | 64.3326 | 31.253 | 1948.9 | 10.655 | 1959.5 | 0.00 | 0.3840 |
| 3.2452127 | 64.9813 | 30.982 | 1922.4 | 10.638 | 1933.0 | 0.00 | 0.3821 |
| 3.2614387 | 65.5301 | 30.714 | 1896.3 | 10.620 | 1906.9 | 0.00 | 0.3802 |
| 3.2777459 | 66.0102 | 30.448 | 1870.5 | 10.601 | 1881.1 | 0.00 | 0.3783 |
| 3.2941347 | 66.4386 | 30.185 | 1845.1 | 10.583 | 1855.7 | 0.00 | 0.3764 |
| 3.3106053 | 66.8256 | 29.923 | 1820.0 | 10.565 | 1830.6 | 0.00 | 0.3745 |
| 3.3271584 | 67.1770 | 29.665 | 1795.3 | 10.546 | 1805.9 | 0.00 | 0.3726 |
| 3.3437941 | 67.4976 | 29.419 | 1771.6 | 10.527 | 1782.1 | 0.00 | 0.3708 |
| 3.3605131 | 67.7991 | 29.180 | 1748.4 | 10.509 | 1758.9 | 0.00 | 0.3689 |
| 3.3773157 | 68.0821 | 28.941 | 1725.5 | 10.490 | 1736.0 | 0.00 | 0.3671 |
| 3.3942023 | 68.3479 | 28.705 | 1702.9 | 10.471 | 1713.4 | 0.00 | 0.3653 |
| 3.4111733 | 68.5976 | 28.472 | 1680.7 | 10.452 | 1691.2 | 0.00 | 0.3635 |
| 3.4282291 | 68.8325 | 28.242 | 1658.8 | 10.432 | 1669.3 | 0.00 | 0.3617 |
| 3.4453703 | 69.0534 | 28.015 | 1637.3 | 10.413 | 1647.7 | 0.00 | 0.3599 |
| 3.4625971 | 69.2609 | 27.790 | 1616.1 | 10.394 | 1626.5 | 0.00 | 0.3581 |
| 3.4799101 | 69.4556 | 27.569 | 1595.2 | 10.374 | 1605.6 | 0.00 | 0.3563 |
| 3.4973097 | 69.6376 | 27.349 | 1574.6 | 10.354 | 1585.0 | 0.00 | 0.3545 |
| 3.5147962 | 69.8060 | 27.128 | 1554.2 | 10.334 | 1564.5 | 0.00 | 0.3527 |
| 3.5323702 | 69.9603 | 26.910 | 1534.0 | 10.314 | 1544.3 | 0.00 | 0.3510 |
| 3.5500321 | 70.0998 | 26.695 | 1514.2 | 10.294 | 1524.5 | 0.00 | 0.3492 |
| 3.5677822 | 70.2232 | 26.482 | 1494.6 | 10.274 | 1504.9 | 0.00 | 0.3475 |
| 3.5856211 | 70.3284 | 26.271 | 1475.3 | 10.254 | 1485.6 | 0.00 | 0.3458 |
| 3.6035492 | 70.4118 | 26.063 | 1456.4 | 10.234 | 1466.6 | 0.00 | 0.3441 |
| 3.6215670 | 70.4670 | 25.857 | 1437.7 | 10.213 | 1447.9 | 0.00 | 0.3423 |
| 3.6396748 | 70.4818 | 25.653 | 1419.2 | 10.193 | 1429.4 | 0.00 | 0.3406 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Bi ($Z=83$) | | | | | | | |
| 3.6578732 | 70.4290 | 25.451 | 1401.1 | 10.172 | 1411.2 | 0.00 | 0.3390 |
| 3.6761626 | 70.2250 | 25.252 | 1383.2 | 10.151 | 1393.3 | 0.00 | 0.3373 |
| 3.6909034 | 69.6035 | 25.093 | 1369.0 | 10.134 | 1379.1 | 0.00 | 0.3359 |
| 3.6945434 | 68.9929 | 25.054 | 1365.5 | 10.130 | 1375.6 | 0.00 | 0.3356 |
| 3.7016966 | 69.6780 | 26.777 | 1456.6 | 10.122 | 1466.7 | 0.00 | 0.3349 |
| 3.7130161 | 70.4262 | 26.642 | 1444.8 | 10.109 | 1454.9 | 0.00 | 0.3339 |
| 3.7315812 | 71.0039 | 26.424 | 1425.9 | 10.088 | 1435.9 | 0.00 | 0.3323 |
| 3.7502391 | 71.3851 | 26.208 | 1407.2 | 10.067 | 1417.2 | 0.00 | 0.3306 |
| 3.7689903 | 71.6842 | 25.994 | 1388.7 | 10.046 | 1398.8 | 0.00 | 0.3290 |
| 3.7878352 | 71.9352 | 25.782 | 1370.6 | 10.024 | 1380.6 | 0.00 | 0.3273 |
| 3.8067744 | 72.1526 | 25.573 | 1352.7 | 10.003 | 1362.7 | 0.00 | 0.3257 |
| 3.8258083 | 72.3438 | 25.365 | 1335.0 | 9.9810 | 1345.0 | 0.00 | 0.3241 |
| 3.8449373 | 72.5125 | 25.160 | 1317.6 | 9.9593 | 1327.6 | 0.00 | 0.3225 |
| 3.8641620 | 72.6600 | 24.957 | 1300.5 | 9.9375 | 1310.4 | 0.00 | 0.3209 |
| 3.8834828 | 72.7857 | 24.758 | 1283.7 | 9.9156 | 1293.6 | 0.00 | 0.3193 |
| 3.9029002 | 72.8929 | 24.570 | 1267.6 | 9.8936 | 1277.5 | 0.00 | 0.3177 |
| 3.9224147 | 72.9798 | 24.384 | 1251.8 | 9.8716 | 1261.7 | 0.00 | 0.3161 |
| 3.9420268 | 73.0380 | 24.201 | 1236.2 | 9.8494 | 1246.0 | 0.00 | 0.3145 |
| 3.9617369 | 73.0478 | 24.019 | 1220.8 | 9.8271 | 1230.6 | 0.00 | 0.3130 |
| 3.9815456 | 72.9420 | 23.840 | 1205.7 | 9.8048 | 1215.5 | 0.00 | 0.3114 |
| 3.9904219 | 72.7708 | 23.761 | 1199.0 | 9.7948 | 1208.8 | 0.00 | 0.3107 |
| 4.0014533 | 72.4061 | 24.711 | 1243.5 | 9.7824 | 1253.3 | 0.00 | 0.3098 |
| 4.0077780 | ?? | 24.655 | 1238.7 | 9.7752 | 1248.5 | 0.00 | 0.3094 |
| 4.0214606 | 73.2941 | 24.535 | 1228.5 | 9.7598 | 1238.3 | 0.00 | 0.3083 |
| 4.0415679 | 73.6411 | 24.362 | 1213.8 | 9.7372 | 1223.5 | 0.00 | 0.3068 |
| 4.0617757 | 73.9004 | 24.190 | 1199.2 | 9.7145 | 1208.9 | 0.00 | 0.3052 |
| 4.0820846 | 74.1203 | 24.021 | 1184.9 | 9.6918 | 1194.6 | 0.00 | 0.3037 |
| 4.1024950 | 74.3170 | 23.853 | 1170.8 | 9.6689 | 1180.4 | 0.00 | 0.3022 |
| 4.1230075 | 74.4982 | 23.687 | 1156.8 | 9.6460 | 1166.5 | 0.00 | 0.3007 |
| 4.1436226 | 74.6677 | 23.519 | 1142.9 | 9.6229 | 1152.5 | 0.00 | 0.2992 |
| 4.1643407 | 74.8266 | 23.350 | 1129.1 | 9.5998 | 1138.7 | 0.00 | 0.2977 |
| 4.1851624 | 74.9771 | 23.184 | 1115.4 | 9.5766 | 1125.0 | 0.00 | 0.2962 |
| 4.2060882 | 75.1204 | 23.018 | 1102.0 | 9.5534 | 1111.5 | 0.00 | 0.2948 |
| 4.2271186 | 75.2573 | 22.854 | 1088.6 | 9.5300 | 1098.2 | 0.00 | 0.2933 |
| 4.2482542 | 75.3885 | 22.691 | 1075.5 | 9.5066 | 1085.0 | 0.00 | 0.2918 |
| 4.2694955 | 75.5147 | 22.530 | 1062.6 | 9.4831 | 1072.0 | 0.00 | 0.2904 |
| 4.2908430 | 75.6362 | 22.370 | 1049.8 | 9.4595 | 1059.2 | 0.00 | 0.2890 |
| 4.3122972 | 75.7536 | 22.212 | 1037.2 | 9.4359 | 1046.6 | 0.00 | 0.2875 |
| 4.3338587 | 75.8672 | 22.055 | 1024.7 | 9.4122 | 1034.1 | 0.00 | 0.2861 |
| 4.3555280 | 75.9772 | 21.899 | 1012.4 | 9.3884 | 1021.8 | 0.00 | 0.2847 |
| 4.3773056 | 76.0839 | 21.745 | 1000.3 | 9.3645 | 1009.7 | 0.00 | 0.2832 |
| 4.3991921 | 76.1876 | 21.592 | 988.33 | 9.3406 | 997.67 | 0.00 | 0.2818 |
| 4.4211881 | 76.2884 | 21.441 | 976.51 | 9.3166 | 985.83 | 0.00 | 0.2804 |
| 4.4432940 | 76.3864 | 21.291 | 964.85 | 9.2925 | 974.14 | 0.00 | 0.2790 |
| 4.4655105 | 76.4819 | 21.142 | 953.33 | 9.2684 | 962.60 | 0.00 | 0.2776 |
| 4.4878381 | 76.5750 | 20.994 | 941.96 | 9.2442 | 951.21 | 0.00 | 0.2763 |
| 4.5102772 | 76.6658 | 20.848 | 930.74 | 9.2199 | 939.96 | 0.00 | 0.2749 |
| 4.5328286 | 76.7543 | 20.702 | 919.66 | 9.1956 | 928.85 | 0.00 | 0.2735 |
| 4.5554928 | 76.8409 | 20.558 | 908.72 | 9.1712 | 917.89 | 0.00 | 0.2722 |
| 4.5782702 | 76.9254 | 20.416 | 897.91 | 9.1468 | 907.06 | 0.00 | 0.2708 |
| 4.6011616 | 77.0081 | 20.274 | 887.24 | 9.1222 | 896.36 | 0.00 | 0.2695 |
| 4.6241674 | 77.0889 | 20.133 | 876.71 | 9.0977 | 885.80 | 0.00 | 0.2681 |
| 4.6472882 | 77.1682 | 19.994 | 866.30 | 9.0730 | 875.38 | 0.00 | 0.2668 |
| 4.6705247 | 77.2458 | 19.855 | 856.03 | 9.0483 | 865.08 | 0.00 | 0.2655 |
| 4.6938773 | 77.3219 | 19.718 | 845.88 | 9.0236 | 854.90 | 0.00 | 0.2641 |
| 4.7173467 | 77.3966 | 19.582 | 835.86 | 8.9988 | 844.85 | 0.00 | 0.2628 |
| 4.7409334 | 77.4701 | 19.447 | 825.96 | 8.9739 | 834.93 | 0.00 | 0.2615 |
| 4.7646381 | 77.5424 | 19.313 | 816.18 | 8.9490 | 825.13 | 0.00 | 0.2602 |
| 4.7884613 | 77.6137 | 19.180 | 806.52 | 8.9240 | 815.44 | 0.00 | 0.2589 |
| 4.8124036 | 77.6840 | 19.046 | 796.93 | 8.8990 | 805.83 | 0.00 | 0.2576 |
| 4.8364656 | 77.7525 | 18.911 | 787.34 | 8.8739 | 796.22 | 0.00 | 0.2564 |
| 4.8606479 | 77.8192 | 18.777 | 777.87 | 8.8488 | 786.72 | 0.00 | 0.2551 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Bi ($Z=83$) | | | | | | | |
| 4.8849512 | 77.8841 | 18.644 | 768.52 | 8.8236 | 777.34 | 0.00 | 0.2538 |
| 4.9093759 | 77.9474 | 18.512 | 759.27 | 8.7984 | 768.07 | 0.00 | 0.2525 |
| 4.9339228 | 78.0091 | 18.381 | 750.14 | 8.7731 | 758.91 | 0.00 | 0.2513 |
| 4.9585924 | 78.0695 | 18.250 | 741.12 | 8.7478 | 749.87 | 0.00 | 0.2500 |
| 4.9833854 | 78.1284 | 18.121 | 732.20 | 8.7224 | 740.93 | 0.00 | 0.2488 |
| 5.0083023 | 78.1861 | 17.993 | 723.40 | 8.6970 | 732.10 | 0.00 | 0.2476 |
| 5.0333438 | 78.2425 | 17.865 | 714.70 | 8.6715 | 723.37 | 0.00 | 0.2463 |
| 5.0585105 | 78.2977 | 17.739 | 706.10 | 8.6460 | 714.75 | 0.00 | 0.2451 |
| 5.0838031 | 78.3517 | 17.613 | 697.61 | 8.6205 | 706.23 | 0.00 | 0.2439 |
| 5.1092221 | 78.4047 | 17.488 | 689.23 | 8.5949 | 697.82 | 0.00 | 0.2427 |
| 5.1347682 | 78.4567 | 17.364 | 680.94 | 8.5692 | 689.51 | 0.00 | 0.2415 |
| 5.1604421 | 78.6824 | 17.241 | 672.74 | 8.5436 | 681.28 | 0.00 | 0.2403 |
| 5.1862443 | 78.7327 | 17.112 | 664.41 | 8.5179 | 672.92 | 0.00 | 0.2391 |
| 5.2121755 | 78.7814 | 16.985 | 656.17 | 8.4921 | 664.66 | 0.00 | 0.2379 |
| 5.2382364 | 78.8284 | 16.858 | 648.02 | 8.4663 | 656.49 | 0.00 | 0.2367 |
| 5.2644276 | 78.8738 | 16.732 | 639.98 | 8.4405 | 648.42 | 0.00 | 0.2355 |
| 5.2907497 | 78.9177 | 16.607 | 632.04 | 8.4147 | 640.46 | 0.00 | 0.2343 |
| 5.3172034 | 78.9602 | 16.483 | 624.20 | 8.3888 | 632.59 | 0.00 | 0.2332 |
| 5.3437895 | 79.0014 | 16.360 | 616.47 | 8.3629 | 624.83 | 0.00 | 0.2320 |
| 5.3705084 | 79.0413 | 16.238 | 608.83 | 8.3369 | 617.16 | 0.00 | 0.2309 |
| 5.3973609 | 79.2005 | 16.114 | 601.16 | 8.3109 | 609.48 | 0.00 | 0.2297 |
| 5.4243477 | 79.2379 | 15.990 | 593.58 | 8.2849 | 601.86 | 0.00 | 0.2286 |
| 5.4514695 | 79.2736 | 15.867 | 586.09 | 8.2589 | 594.35 | 0.00 | 0.2274 |
| 5.4787268 | 79.3080 | 15.746 | 578.70 | 8.2328 | 586.93 | 0.00 | 0.2263 |
| 5.5061205 | 79.3409 | 15.625 | 571.40 | 8.2067 | 579.61 | 0.00 | 0.2252 |
| 5.5336511 | 79.3725 | 15.505 | 564.20 | 8.1806 | 572.38 | 0.00 | 0.2241 |
| 5.5613193 | 79.4028 | 15.386 | 557.10 | 8.1544 | 565.25 | 0.00 | 0.2229 |
| 5.5891259 | 79.4320 | 15.269 | 550.09 | 8.1282 | 558.22 | 0.00 | 0.2218 |
| 5.6170716 | 79.4599 | 15.152 | 543.17 | 8.1020 | 551.27 | 0.00 | 0.2207 |
| 5.6451569 | 79.4867 | 15.036 | 536.34 | 8.0758 | 544.42 | 0.00 | 0.2196 |
| 5.6733827 | 79.5124 | 14.922 | 529.60 | 8.0495 | 537.65 | 0.00 | 0.2185 |
| 5.7017496 | 79.5371 | 14.808 | 522.95 | 8.0233 | 530.97 | 0.00 | 0.2174 |
| 5.7302584 | 79.5608 | 14.695 | 516.39 | 7.9970 | 524.38 | 0.00 | 0.2164 |
| 5.7589096 | 79.5835 | 14.583 | 509.91 | 7.9707 | 517.88 | 0.00 | 0.2153 |
| 5.7877042 | 79.6052 | 14.473 | 503.52 | 7.9443 | 511.46 | 0.00 | 0.2142 |
| 5.8166427 | 79.6260 | 14.363 | 497.21 | 7.9180 | 505.12 | 0.00 | 0.2132 |
| 5.8457259 | 79.6459 | 14.254 | 490.98 | 7.8916 | 498.87 | 0.00 | 0.2121 |
| 5.8749546 | 79.6650 | 14.146 | 484.84 | 7.8652 | 492.70 | 0.00 | 0.2110 |
| 5.9043293 | 79.6832 | 14.039 | 478.77 | 7.8388 | 486.61 | 0.00 | 0.2100 |
| 5.9338510 | 79.7006 | 13.933 | 472.79 | 7.8124 | 480.60 | 0.00 | 0.2089 |
| 5.9635202 | 79.7173 | 13.827 | 466.89 | 7.7860 | 474.67 | 0.00 | 0.2079 |
| 5.9933378 | 79.7332 | 13.723 | 461.06 | 7.7595 | 468.82 | 0.00 | 0.2069 |
| 6.0233045 | 79.7483 | 13.620 | 455.31 | 7.7331 | 463.04 | 0.00 | 0.2058 |
| 6.0534210 | 79.7627 | 13.517 | 449.64 | 7.7066 | 457.34 | 0.00 | 0.2048 |
| 6.0836882 | 79.7765 | 13.416 | 444.04 | 7.6801 | 451.72 | 0.00 | 0.2038 |
| 6.1141066 | 79.7896 | 13.315 | 438.51 | 7.6536 | 446.17 | 0.00 | 0.2028 |
| 6.1446771 | 79.8020 | 13.215 | 433.06 | 7.6271 | 440.69 | 0.00 | 0.2018 |
| 6.1754005 | 79.8138 | 13.116 | 427.68 | 7.6006 | 435.28 | 0.00 | 0.2008 |
| 6.2062775 | 79.8250 | 13.018 | 422.37 | 7.5741 | 429.95 | 0.00 | 0.1998 |
| 6.2373089 | 79.8356 | 12.921 | 417.13 | 7.5476 | 424.68 | 0.00 | 0.1988 |
| 6.2684954 | 79.8457 | 12.825 | 411.96 | 7.5211 | 419.48 | 0.00 | 0.1978 |
| 6.2998379 | 79.8552 | 12.729 | 406.86 | 7.4946 | 414.36 | 0.00 | 0.1968 |
| 6.3313371 | 79.8642 | 12.635 | 401.83 | 7.4680 | 409.30 | 0.00 | 0.1958 |
| 6.3629938 | 79.9627 | 12.540 | 396.84 | 7.4415 | 404.28 | 0.00 | 0.1949 |
| 6.3948088 | 79.9711 | 12.445 | 391.87 | 7.4149 | 399.28 | 0.00 | 0.1939 |
| 6.4267828 | 79.9787 | 12.351 | 386.96 | 7.3884 | 394.35 | 0.00 | 0.1929 |
| 6.4589167 | 79.9856 | 12.257 | 382.12 | 7.3619 | 389.48 | 0.00 | 0.1920 |
| 6.4912113 | 79.9919 | 12.164 | 377.34 | 7.3353 | 384.68 | 0.00 | 0.1910 |
| 6.5236674 | 79.9975 | 12.072 | 372.63 | 7.3088 | 379.93 | 0.00 | 0.1901 |
| 6.5562857 | 80.0026 | 11.981 | 367.97 | 7.2822 | 375.26 | 0.00 | 0.1891 |
| 6.5890671 | 80.0070 | 11.891 | 363.38 | 7.2557 | 370.64 | 0.00 | 0.1882 |
| 6.6220125 | 80.0109 | 11.801 | 358.85 | 7.2292 | 366.08 | 0.00 | 0.1872 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Bi ($Z=83$) | | | | | | | |
| 6.6551225 | 80.0142 | 11.713 | 354.38 | 7.2026 | 361.59 | 0.00 | 0.1863 |
| 6.6883981 | 80.0170 | 11.625 | 349.97 | 7.1761 | 357.15 | 0.00 | 0.1854 |
| 6.7218401 | 80.0193 | 11.538 | 345.62 | 7.1496 | 352.77 | 0.00 | 0.1844 |
| 6.7554493 | 80.0211 | 11.451 | 341.32 | 7.1231 | 348.45 | 0.00 | 0.1835 |
| 6.7892266 | 80.0224 | 11.365 | 337.09 | 7.0965 | 344.18 | 0.00 | 0.1826 |
| 6.8231727 | 80.0232 | 11.281 | 332.90 | 7.0700 | 339.97 | 0.00 | 0.1817 |
| 6.8572886 | 80.0236 | 11.196 | 328.78 | 7.0436 | 335.82 | 0.00 | 0.1808 |
| 6.8915750 | 80.0235 | 11.113 | 324.70 | 7.0171 | 331.72 | 0.00 | 0.1799 |
| 6.9260329 | 80.0230 | 11.030 | 320.68 | 6.9906 | 327.67 | 0.00 | 0.1790 |
| 6.9606631 | 80.0221 | 10.948 | 316.72 | 6.9641 | 323.68 | 0.00 | 0.1781 |
| 6.9954664 | 80.0208 | 10.867 | 312.80 | 6.9377 | 319.74 | 0.00 | 0.1772 |
| 7.0304437 | 80.0192 | 10.787 | 308.94 | 6.9112 | 315.85 | 0.00 | 0.1764 |
| 7.0655959 | 80.0171 | 10.707 | 305.13 | 6.8848 | 312.02 | 0.00 | 0.1755 |
| 7.1009239 | 80.0147 | 10.628 | 301.37 | 6.8584 | 308.23 | 0.00 | 0.1746 |
| 7.1364285 | 80.0119 | 10.549 | 297.66 | 6.8320 | 304.49 | 0.00 | 0.1737 |
| 7.1721107 | 80.0087 | 10.472 | 294.00 | 6.8056 | 300.80 | 0.00 | 0.1729 |
| 7.2079712 | 80.0053 | 10.395 | 290.38 | 6.7792 | 297.16 | 0.00 | 0.1720 |
| 7.2440111 | 80.0015 | 10.318 | 286.81 | 6.7529 | 293.57 | 0.00 | 0.1712 |
| 7.2802311 | 79.9974 | 10.243 | 283.29 | 6.7265 | 290.02 | 0.00 | 0.1703 |
| 7.3166323 | 79.9930 | 10.168 | 279.82 | 6.7002 | 286.52 | 0.00 | 0.1695 |
| 7.3532155 | 79.9883 | 10.093 | 276.39 | 6.6739 | 283.07 | 0.00 | 0.1686 |
| 7.3899815 | 79.9834 | 10.020 | 273.01 | 6.6476 | 279.66 | 0.00 | 0.1678 |
| 7.4269314 | 80.0187 | 9.9455 | 269.65 | 6.6213 | 276.27 | 0.00 | 0.1669 |
| 7.4640661 | 80.0134 | 9.8721 | 266.32 | 6.5951 | 272.92 | 0.00 | 0.1661 |
| 7.5013864 | 80.0077 | 9.7993 | 263.04 | 6.5689 | 269.61 | 0.00 | 0.1653 |
| 7.5388934 | 80.0016 | 9.7271 | 259.81 | 6.5427 | 266.35 | 0.00 | 0.1645 |
| 7.5765878 | 79.9953 | 9.6556 | 256.61 | 6.5165 | 263.13 | 0.00 | 0.1636 |
| 7.6144708 | 79.9885 | 9.5846 | 253.46 | 6.4903 | 259.95 | 0.00 | 0.1628 |
| 7.6525431 | 79.9815 | 9.5143 | 250.35 | 6.4642 | 256.81 | 0.00 | 0.1620 |
| 7.6908058 | 79.9742 | 9.4446 | 247.28 | 6.4381 | 253.72 | 0.00 | 0.1612 |
| 7.7292599 | 79.9666 | 9.3754 | 244.25 | 6.4120 | 250.66 | 0.00 | 0.1604 |
| 7.7679062 | 79.9587 | 9.3069 | 241.25 | 6.3859 | 247.64 | 0.00 | 0.1596 |
| 7.8067457 | 79.9505 | 9.2389 | 238.30 | 6.3599 | 244.66 | 0.00 | 0.1588 |
| 7.8457794 | 79.9421 | 9.1716 | 235.39 | 6.3339 | 241.72 | 0.00 | 0.1580 |
| 7.8850083 | 79.9334 | 9.1048 | 232.51 | 6.3079 | 238.82 | 0.00 | 0.1572 |
| 7.9244334 | 79.9245 | 9.0385 | 229.67 | 6.2820 | 235.95 | 0.00 | 0.1565 |
| 7.9640555 | 79.9153 | 8.9729 | 226.87 | 6.2560 | 233.12 | 0.00 | 0.1557 |
| 8.0038758 | 79.9218 | 8.9077 | 224.10 | 6.2301 | 230.33 | 0.00 | 0.1549 |
| 8.0438952 | 79.9123 | 8.8427 | 221.36 | 6.2043 | 227.56 | 0.00 | 0.1541 |
| 8.0841147 | 79.9025 | 8.7783 | 218.65 | 6.1784 | 224.83 | 0.00 | 0.1534 |
| 8.1245352 | 79.8925 | 8.7144 | 215.98 | 6.1526 | 222.13 | 0.00 | 0.1526 |
| 8.1651579 | 79.8822 | 8.6510 | 213.34 | 6.1269 | 219.47 | 0.00 | 0.1518 |
| 8.2059837 | 79.8717 | 8.5882 | 210.74 | 6.1011 | 216.84 | 0.00 | 0.1511 |
| 8.2470136 | 79.8610 | 8.5259 | 208.17 | 6.0754 | 214.25 | 0.00 | 0.1503 |
| 8.2882487 | 79.8501 | 8.4638 | 205.62 | 6.0497 | 211.67 | 0.00 | 0.1496 |
| 8.3296899 | 79.8390 | 8.4019 | 203.11 | 6.0241 | 209.13 | 0.00 | 0.1488 |
| 8.3713384 | 79.8277 | 8.3406 | 200.62 | 5.9985 | 206.62 | 0.00 | 0.1481 |
| 8.4131951 | 79.8163 | 8.2797 | 198.17 | 5.9729 | 204.14 | 0.00 | 0.1474 |
| 8.4552610 | 79.8047 | 8.2194 | 195.74 | 5.9474 | 201.69 | 0.00 | 0.1466 |
| 8.4975373 | 79.7929 | 8.1596 | 193.35 | 5.9219 | 199.28 | 0.00 | 0.1459 |
| 8.5400250 | 79.7811 | 8.1004 | 190.99 | 5.8964 | 196.89 | 0.00 | 0.1452 |
| Po ($Z=84$) | | | | | | | |
| Atomic weight: $A_r=209.0000 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^3)=9.3000$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 347.053 \text{ E(eV)} [\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2 (e \text{ atom}^{-1})\times 2.01341\times 10^5$ | | | | | | | |
| 24 edges. Edge energies (keV) | | | | | | | |
| K | 93.1050 | L I | 16.9393 | L II | 16.2443 | L III | 13.8138 |
| M I | 4.14940 | M II | 3.85410 | M III | 3.30190 | M IV | 2.79800 |
| M V | 2.68300 | N I | 0.995300 | N II | 0.851000 | N III | 0.705000 |
| N IV | 0.500200 | N V | 0.473400 | N VI | 0.175344 | N VII | 0.169362 |
| O I | 0.170906 | O II | 0.125695 | O III | 0.0983141 | O IV | 0.0314000 |
| O V | 0.0314000 | P I | 0.0167777 | P II | 0.00755974 | P II | 0.00539477 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-2.0246, -1.1838) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.018520 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 29.8543 | 31.936 | 12860 | 6.4607 | 12866 | 0.00 | 2.480 |
| 0.50056912 | 30.0971 | 32.917 | 13240 | 6.4677 | 13246 | 0.00 | 2.477 |
| 0.50250000 | 30.8473 | 32.943 | 13200 | 6.4914 | 13206 | 0.00 | 2.467 |
| 0.50501250 | 31.3145 | 32.975 | 13147 | 6.5222 | 13153 | 0.00 | 2.455 |
| 0.50753756 | 31.6828 | 33.005 | 13093 | 6.5530 | 13100 | 0.00 | 2.443 |
| 0.51007525 | 32.0415 | 33.033 | 13039 | 6.5838 | 13046 | 0.00 | 2.431 |
| 0.51262563 | 32.3479 | 33.059 | 12984 | 6.6146 | 12991 | 0.00 | 2.419 |
| 0.51518875 | 32.6413 | 33.083 | 12929 | 6.6454 | 12936 | 0.00 | 2.407 |
| 0.51776470 | 32.9232 | 33.106 | 12874 | 6.6763 | 12880 | 0.00 | 2.395 |
| 0.52035352 | 33.1976 | 33.126 | 12818 | 6.7071 | 12824 | 0.00 | 2.383 |
| 0.52295529 | 33.4661 | 33.145 | 12761 | 6.7380 | 12768 | 0.00 | 2.371 |
| 0.52557007 | 33.7299 | 33.162 | 12704 | 6.7689 | 12711 | 0.00 | 2.359 |
| 0.52819792 | 34.0177 | 33.176 | 12646 | 6.7998 | 12653 | 0.00 | 2.347 |
| 0.53083891 | 34.2740 | 33.189 | 12588 | 6.8307 | 12595 | 0.00 | 2.336 |
| 0.53349310 | 34.5272 | 33.199 | 12529 | 6.8616 | 12536 | 0.00 | 2.324 |
| 0.53616057 | 34.7775 | 33.207 | 12470 | 6.8925 | 12477 | 0.00 | 2.312 |
| 0.53884137 | 35.0253 | 33.213 | 12410 | 6.9234 | 12417 | 0.00 | 2.301 |
| 0.54153558 | 35.2706 | 33.216 | 12350 | 6.9543 | 12357 | 0.00 | 2.289 |
| 0.54424325 | 35.5138 | 33.218 | 12289 | 6.9853 | 12296 | 0.00 | 2.278 |
| 0.54696447 | 35.7550 | 33.218 | 12228 | 7.0162 | 12235 | 0.00 | 2.267 |
| 0.54969929 | 35.9943 | 33.216 | 12166 | 7.0471 | 12173 | 0.00 | 2.255 |
| 0.55244779 | 36.2318 | 33.212 | 12104 | 7.0781 | 12111 | 0.00 | 2.244 |
| 0.55521003 | 36.4677 | 33.206 | 12042 | 7.1090 | 12049 | 0.00 | 2.233 |
| 0.55798608 | 36.7019 | 33.197 | 11979 | 7.1399 | 11986 | 0.00 | 2.222 |
| 0.56077601 | 36.9344 | 33.187 | 11915 | 7.1709 | 11922 | 0.00 | 2.211 |
| 0.56357989 | 37.1652 | 33.174 | 11851 | 7.2018 | 11859 | 0.00 | 2.200 |
| 0.56639779 | 37.3942 | 33.159 | 11787 | 7.2327 | 11794 | 0.00 | 2.189 |
| 0.56922978 | 37.6216 | 33.142 | 11723 | 7.2636 | 11730 | 0.00 | 2.178 |
| 0.57207593 | 37.8472 | 33.123 | 11657 | 7.2945 | 11665 | 0.00 | 2.167 |
| 0.57493630 | 38.0710 | 33.101 | 11592 | 7.3254 | 11599 | 0.00 | 2.156 |
| 0.57781099 | 38.2931 | 33.078 | 11526 | 7.3563 | 11534 | 0.00 | 2.146 |
| 0.58070004 | 38.5135 | 33.053 | 11460 | 7.3871 | 11468 | 0.00 | 2.135 |
| 0.58360354 | 38.7320 | 33.026 | 11394 | 7.4180 | 11401 | 0.00 | 2.124 |
| 0.58652156 | 38.9487 | 32.997 | 11327 | 7.4488 | 11335 | 0.00 | 2.114 |
| 0.58945417 | 39.1636 | 32.966 | 11260 | 7.4797 | 11268 | 0.00 | 2.103 |
| 0.59240144 | 39.3765 | 32.934 | 11193 | 7.5105 | 11201 | 0.00 | 2.093 |
| 0.59536345 | 39.5876 | 32.900 | 11126 | 7.5413 | 11134 | 0.00 | 2.082 |
| 0.59834026 | 39.7968 | 32.865 | 11059 | 7.5721 | 11067 | 0.00 | 2.072 |
| 0.60133196 | 40.0040 | 32.827 | 10991 | 7.6028 | 10999 | 0.00 | 2.062 |
| 0.60433862 | 40.2092 | 32.788 | 10924 | 7.6336 | 10931 | 0.00 | 2.052 |
| 0.60736032 | 40.4124 | 32.747 | 10856 | 7.6643 | 10863 | 0.00 | 2.041 |
| 0.61039712 | 40.6135 | 32.705 | 10788 | 7.6950 | 10795 | 0.00 | 2.031 |
| 0.61344910 | 40.8124 | 32.661 | 10720 | 7.7256 | 10727 | 0.00 | 2.021 |
| 0.61651635 | 41.0091 | 32.615 | 10651 | 7.7563 | 10659 | 0.00 | 2.011 |
| 0.61959893 | 41.2036 | 32.567 | 10583 | 7.7869 | 10591 | 0.00 | 2.001 |
| 0.62269693 | 41.3956 | 32.518 | 10514 | 7.8175 | 10522 | 0.00 | 1.991 |
| 0.62581041 | 41.5853 | 32.468 | 10446 | 7.8481 | 10454 | 0.00 | 1.981 |
| 0.62893946 | 41.7724 | 32.416 | 10377 | 7.8786 | 10385 | 0.00 | 1.971 |
| 0.63208416 | 41.9568 | 32.362 | 10308 | 7.9091 | 10316 | 0.00 | 1.962 |
| 0.63524458 | 42.1385 | 32.307 | 10240 | 7.9396 | 10248 | 0.00 | 1.952 |
| 0.63842080 | 42.3174 | 32.250 | 10171 | 7.9700 | 10179 | 0.00 | 1.942 |
| 0.64161291 | 42.4931 | 32.193 | 10102 | 8.0004 | 10110 | 0.00 | 1.932 |
| 0.64482097 | 42.6657 | 32.133 | 10033 | 8.0308 | 10042 | 0.00 | 1.923 |
| 0.64804508 | 42.8349 | 32.073 | 9964.8 | 8.0611 | 9972.8 | 0.00 | 1.913 |
| 0.65128530 | 43.0003 | 32.011 | 9896.1 | 8.0914 | 9904.2 | 0.00 | 1.904 |
| 0.65454173 | 43.1619 | 31.948 | 9827.5 | 8.1216 | 9835.6 | 0.00 | 1.894 |
| 0.65781444 | 43.3191 | 31.884 | 9758.9 | 8.1518 | 9767.0 | 0.00 | 1.885 |
| 0.66110351 | 43.4716 | 31.818 | 9690.4 | 8.1820 | 9698.6 | 0.00 | 1.875 |
| 0.66440903 | 43.6189 | 31.752 | 9622.0 | 8.2121 | 9630.2 | 0.00 | 1.866 |
| 0.66773107 | 43.7603 | 31.684 | 9553.7 | 8.2422 | 9561.9 | 0.00 | 1.857 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Po ($Z=84$) | | | | | | | |
| 0.67106973 | 43.8949 | 31.615 | 9485.5 | 8.2723 | 9493.8 | 0.00 | 1.848 |
| 0.67442508 | 44.0216 | 31.545 | 9417.4 | 8.3023 | 9425.7 | 0.00 | 1.838 |
| 0.67779720 | 44.1389 | 31.474 | 9349.5 | 8.3322 | 9357.8 | 0.00 | 1.829 |
| 0.68118619 | 44.2447 | 31.402 | 9281.7 | 8.3621 | 9290.1 | 0.00 | 1.820 |
| 0.68459212 | 44.3358 | 31.329 | 9214.0 | 8.3919 | 9222.4 | 0.00 | 1.811 |
| 0.68801508 | 44.4072 | 31.255 | 9146.4 | 8.4217 | 9154.8 | 0.00 | 1.802 |
| 0.69145515 | 44.4505 | 31.179 | 9079.0 | 8.4515 | 9087.4 | 0.00 | 1.793 |
| 0.69491243 | 44.4498 | 31.103 | 9011.7 | 8.4812 | 9020.1 | 0.00 | 1.784 |
| 0.69838699 | 44.3684 | 31.026 | 8944.5 | 8.5108 | 8953.1 | 0.00 | 1.775 |
| 0.70187893 | 44.0818 | 30.947 | 8877.6 | 8.5404 | 8886.1 | 0.00 | 1.766 |
| 0.70406938 | 43.4430 | 30.898 | 8835.9 | 8.5588 | 8844.4 | 0.00 | 1.761 |
| 0.70538832 | 42.9682 | 32.812 | 9365.6 | 8.5699 | 9374.2 | 0.00 | 1.758 |
| 0.70593058 | 43.5357 | 32.800 | 9355.0 | 8.5744 | 9363.6 | 0.00 | 1.756 |
| 0.70891526 | 44.5722 | 32.734 | 9296.9 | 8.5994 | 9305.5 | 0.00 | 1.749 |
| 0.71245984 | 45.1446 | 32.655 | 9228.3 | 8.6288 | 9236.9 | 0.00 | 1.740 |
| 0.71602214 | 45.5585 | 32.575 | 9159.9 | 8.6581 | 9168.6 | 0.00 | 1.732 |
| 0.71960225 | 45.9035 | 32.494 | 9091.8 | 8.6874 | 9100.4 | 0.00 | 1.723 |
| 0.72320026 | 46.2095 | 32.413 | 9023.8 | 8.7166 | 9032.6 | 0.00 | 1.714 |
| 0.72681626 | 46.4898 | 32.331 | 8956.2 | 8.7458 | 8964.9 | 0.00 | 1.706 |
| 0.73045034 | 46.7520 | 32.248 | 8888.8 | 8.7748 | 8897.5 | 0.00 | 1.697 |
| 0.73410260 | 47.0003 | 32.164 | 8821.6 | 8.8039 | 8830.4 | 0.00 | 1.689 |
| 0.73777311 | 47.2377 | 32.080 | 8754.8 | 8.8328 | 8763.6 | 0.00 | 1.681 |
| 0.74146197 | 47.4661 | 31.995 | 8688.2 | 8.8617 | 8697.1 | 0.00 | 1.672 |
| 0.74516928 | 47.6871 | 31.910 | 8622.0 | 8.8905 | 8630.9 | 0.00 | 1.664 |
| 0.74889513 | 47.9015 | 31.825 | 8556.1 | 8.9193 | 8565.0 | 0.00 | 1.656 |
| 0.75263961 | 48.1103 | 31.738 | 8490.5 | 8.9479 | 8499.4 | 0.00 | 1.647 |
| 0.75640280 | 48.3141 | 31.652 | 8425.2 | 8.9765 | 8434.2 | 0.00 | 1.639 |
| 0.76018482 | 48.5134 | 31.565 | 8360.3 | 9.0050 | 8369.3 | 0.00 | 1.631 |
| 0.76398574 | 48.7087 | 31.478 | 8295.8 | 9.0335 | 8304.8 | 0.00 | 1.623 |
| 0.76780567 | 48.9002 | 31.391 | 8231.6 | 9.0618 | 8240.7 | 0.00 | 1.615 |
| 0.77164470 | 49.0883 | 31.303 | 8167.8 | 9.0901 | 8176.9 | 0.00 | 1.607 |
| 0.77550292 | 49.2733 | 31.216 | 8104.4 | 9.1183 | 8113.5 | 0.00 | 1.599 |
| 0.77938044 | 49.4554 | 31.128 | 8041.4 | 9.1465 | 8050.5 | 0.00 | 1.591 |
| 0.78327734 | 49.6348 | 31.040 | 7978.7 | 9.1745 | 7987.9 | 0.00 | 1.583 |
| 0.78719373 | 49.8118 | 30.952 | 7916.5 | 9.2025 | 7925.7 | 0.00 | 1.575 |
| 0.79112969 | 49.9864 | 30.863 | 7854.7 | 9.2304 | 7863.9 | 0.00 | 1.567 |
| 0.79508534 | 50.1589 | 30.775 | 7793.2 | 9.2582 | 7802.5 | 0.00 | 1.559 |
| 0.79906077 | 50.3294 | 30.687 | 7732.2 | 9.2859 | 7741.5 | 0.00 | 1.552 |
| 0.80305607 | 50.4968 | 30.591 | 7669.7 | 9.3135 | 7679.0 | 0.00 | 1.544 |
| 0.80707135 | 50.6603 | 30.492 | 7606.9 | 9.3410 | 7616.2 | 0.00 | 1.536 |
| 0.81110671 | 50.8200 | 30.393 | 7544.5 | 9.3684 | 7553.9 | 0.00 | 1.529 |
| 0.81516224 | 50.9759 | 30.294 | 7482.5 | 9.3958 | 7491.9 | 0.00 | 1.521 |
| 0.81923806 | 51.1277 | 30.195 | 7420.9 | 9.4231 | 7430.3 | 0.00 | 1.513 |
| 0.82333425 | 51.2751 | 30.095 | 7359.6 | 9.4502 | 7369.1 | 0.00 | 1.506 |
| 0.82745092 | 51.4174 | 29.996 | 7298.8 | 9.4773 | 7308.3 | 0.00 | 1.498 |
| 0.83158817 | 51.5535 | 29.896 | 7238.4 | 9.5043 | 7247.9 | 0.00 | 1.491 |
| 0.83574611 | 51.6817 | 29.797 | 7178.4 | 9.5311 | 7187.9 | 0.00 | 1.484 |
| 0.83992484 | 51.7978 | 29.697 | 7118.8 | 9.5579 | 7128.4 | 0.00 | 1.476 |
| 0.84412447 | 51.8920 | 29.598 | 7059.6 | 9.5846 | 7069.2 | 0.00 | 1.469 |
| 0.84834509 | 51.9223 | 29.494 | 6999.8 | 9.6112 | 7009.5 | 0.00 | 1.461 |
| 0.84973202 | 51.8761 | 29.459 | 6980.2 | 9.6198 | 6989.8 | 0.00 | 1.459 |
| 0.85226800 | 51.9655 | 29.803 | 7040.8 | 9.6356 | 7050.4 | 0.00 | 1.455 |
| 0.85258682 | 52.0058 | 29.795 | 7036.3 | 9.6376 | 7045.9 | 0.00 | 1.454 |
| 0.85684975 | 52.3234 | 29.691 | 6976.8 | 9.6640 | 6986.5 | 0.00 | 1.447 |
| 0.86113400 | 52.5415 | 29.587 | 6917.8 | 9.6903 | 6927.5 | 0.00 | 1.440 |
| 0.86543967 | 52.7324 | 29.483 | 6859.1 | 9.7164 | 6868.8 | 0.00 | 1.433 |
| 0.86976687 | 52.9096 | 29.379 | 6800.9 | 9.7425 | 6810.6 | 0.00 | 1.425 |
| 0.87411570 | 53.0779 | 29.275 | 6743.0 | 9.7684 | 6752.8 | 0.00 | 1.418 |
| 0.87848628 | 53.2398 | 29.171 | 6685.6 | 9.7943 | 6695.4 | 0.00 | 1.411 |
| 0.88287871 | 53.3966 | 29.067 | 6628.6 | 9.8200 | 6638.5 | 0.00 | 1.404 |
| 0.88729310 | 53.5493 | 28.963 | 6572.1 | 9.8456 | 6581.9 | 0.00 | 1.397 |
| 0.89172957 | 53.6983 | 28.859 | 6515.9 | 9.8712 | 6525.8 | 0.00 | 1.390 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Po ($Z=84$) | | | | | | | |
| 0.89618822 | 53.8441 | 28.755 | 6460.2 | 9.8965 | 6470.1 | 0.00 | 1.383 |
| 0.90066916 | 53.9870 | 28.651 | 6404.9 | 9.9218 | 6414.9 | 0.00 | 1.377 |
| 0.90517250 | 54.1272 | 28.548 | 6350.1 | 9.9470 | 6360.0 | 0.00 | 1.370 |
| 0.90969837 | 54.2648 | 28.445 | 6295.7 | 9.9721 | 6305.6 | 0.00 | 1.363 |
| 0.91424686 | 54.4000 | 28.342 | 6241.7 | 9.9970 | 6251.7 | 0.00 | 1.356 |
| 0.91881809 | 54.5328 | 28.240 | 6188.1 | 10.022 | 6198.2 | 0.00 | 1.349 |
| 0.92341218 | 54.6635 | 28.137 | 6135.0 | 10.047 | 6145.1 | 0.00 | 1.343 |
| 0.92802924 | 54.7919 | 28.035 | 6082.4 | 10.071 | 6092.4 | 0.00 | 1.336 |
| 0.93266939 | 54.9181 | 27.933 | 6030.2 | 10.096 | 6040.2 | 0.00 | 1.329 |
| 0.93733274 | 55.0421 | 27.832 | 5978.4 | 10.120 | 5988.5 | 0.00 | 1.323 |
| 0.94201940 | 55.1638 | 27.731 | 5927.0 | 10.144 | 5937.2 | 0.00 | 1.316 |
| 0.94672950 | 55.2832 | 27.630 | 5876.1 | 10.168 | 5886.3 | 0.00 | 1.310 |
| 0.95146315 | 55.4000 | 27.530 | 5825.7 | 10.192 | 5835.9 | 0.00 | 1.303 |
| 0.95622046 | 55.5139 | 27.430 | 5775.7 | 10.216 | 5785.9 | 0.00 | 1.297 |
| 0.96100156 | 55.6246 | 27.331 | 5726.1 | 10.240 | 5736.3 | 0.00 | 1.290 |
| 0.96580657 | 55.7312 | 27.232 | 5676.9 | 10.263 | 5687.2 | 0.00 | 1.284 |
| 0.97063560 | 55.8328 | 27.133 | 5628.3 | 10.287 | 5638.5 | 0.00 | 1.277 |
| 0.97548878 | 55.9271 | 27.035 | 5580.0 | 10310 | 5590.3 | 0.00 | 1.271 |
| 0.98036623 | 56.0104 | 26.937 | 5532.2 | 10.333 | 5542.5 | 0.00 | 1.265 |
| 0.98526806 | 56.0733 | 26.840 | 5484.8 | 10.356 | 5495.2 | 0.00 | 1.258 |
| 0.99019440 | 56.0866 | 26.744 | 5437.9 | 10.379 | 5448.3 | 0.00 | 1.252 |
| 0.99395634 | 55.9468 | 26.671 | 5402.5 | 10.397 | 5412.9 | 0.00 | 1.247 |
| 0.99514537 | 55.5822 | 26.648 | 5391.4 | 10.402 | 5401.8 | 0.00 | 1.246 |
| 0.99664365 | 56.0239 | 27.198 | 5494.4 | 10.409 | 5504.9 | 0.00 | 1.244 |
| 1.0001211 | 56.3594 | 27.128 | 5461.4 | 10.425 | 5471.8 | 0.00 | 1.240 |
| 1.0051217 | 56.6399 | 26.963 | 5401.1 | 10.447 | 5411.5 | 0.00 | 1.234 |
| 1.0101473 | 56.8589 | 26.799 | 5341.5 | 10.470 | 5352.0 | 0.00 | 1.227 |
| 1.0151980 | 57.0500 | 26.636 | 5282.7 | 10.492 | 5293.2 | 0.00 | 1.221 |
| 1.0202740 | 57.2236 | 26.475 | 5224.6 | 10.514 | 5235.1 | 0.00 | 1.215 |
| 1.0253754 | 57.3845 | 26.315 | 5167.2 | 10.536 | 5177.7 | 0.00 | 1.209 |
| 1.0305023 | 57.5356 | 26.156 | 5110.5 | 10.558 | 5121.0 | 0.00 | 1.203 |
| 1.0356548 | 57.6785 | 25.999 | 5054.4 | 10.579 | 5065.0 | 0.00 | 1.197 |
| 1.0408331 | 57.8144 | 25.843 | 4999.1 | 10.601 | 5009.7 | 0.00 | 1.191 |
| 1.0460372 | 57.9441 | 25.688 | 4944.4 | 10.622 | 4955.0 | 0.00 | 1.185 |
| 1.0512674 | 58.0682 | 25.534 | 4890.4 | 10.644 | 4901.0 | 0.00 | 1.179 |
| 1.0565238 | 58.1873 | 25.382 | 4837.0 | 10.665 | 4847.7 | 0.00 | 1.174 |
| 1.0618064 | 58.3018 | 25.231 | 4784.3 | 10.686 | 4795.0 | 0.00 | 1.168 |
| 1.0671154 | 58.4121 | 25.081 | 4732.2 | 10.706 | 4742.9 | 0.00 | 1.162 |
| 1.0724510 | 58.5183 | 24.932 | 4680.8 | 10.727 | 4691.5 | 0.00 | 1.156 |
| 1.0778132 | 58.6209 | 24.785 | 4630.0 | 10.748 | 4640.7 | 0.00 | 1.150 |
| 1.0832023 | 58.7199 | 24.639 | 4579.7 | 10.768 | 4590.5 | 0.00 | 1.145 |
| 1.0886183 | 58.8156 | 24.494 | 4530.1 | 10.788 | 4540.9 | 0.00 | 1.139 |
| 1.0940614 | 58.9081 | 24.350 | 4481.1 | 10.808 | 4491.9 | 0.00 | 1.133 |
| 1.0995317 | 58.9976 | 24.207 | 4432.7 | 10.828 | 4443.6 | 0.00 | 1.128 |
| 1.1050294 | 59.0844 | 24.066 | 4385.0 | 10.848 | 4395.8 | 0.00 | 1.122 |
| 1.1105545 | 59.1686 | 23.926 | 4337.8 | 10.867 | 4348.7 | 0.00 | 1.116 |
| 1.1161073 | 59.2503 | 23.788 | 4291.2 | 10.887 | 4302.1 | 0.00 | 1.111 |
| 1.1216878 | 59.3297 | 23.650 | 4245.1 | 10.906 | 4256.0 | 0.00 | 1.105 |
| 1.1272963 | 59.4067 | 23.514 | 4199.6 | 10.925 | 4210.6 | 0.00 | 1.100 |
| 1.1329328 | 59.4816 | 23.378 | 4154.7 | 10.944 | 4165.6 | 0.00 | 1.094 |
| 1.1385974 | 59.5544 | 23.244 | 4110.3 | 10.963 | 41213 | 0.00 | 1.089 |
| 1.1442904 | 59.6251 | 23.111 | 4066.4 | 10.982 | 4077.4 | 0.00 | 1.084 |
| 1.1500119 | 59.6940 | 22.979 | 4023.1 | 11.000 | 4034.1 | 0.00 | 1.078 |
| 1.1557619 | 59.7609 | 22.848 | 3980.2 | 11.019 | 3991.3 | 0.00 | 1.073 |
| 1.1615407 | 59.8261 | 22.718 | 3937.9 | 11.037 | 3949.0 | 0.00 | 1.067 |
| 1.1673484 | 59.8896 | 22.589 | 3896.1 | 11.055 | 3907.2 | 0.00 | 1.062 |
| 1.1731852 | 59.9514 | 22.461 | 3854.8 | 11.073 | 3865.9 | 0.00 | 1.057 |
| 1.1790511 | 60.0117 | 22.335 | 3814.0 | 11.090 | 3825.1 | 0.00 | 1.052 |
| 1.1849464 | 60.0705 | 22.209 | 3773.7 | 11.108 | 3784.8 | 0.00 | 1.046 |
| 1.1908711 | 60.1279 | 22.084 | 3733.8 | 11.125 | 3745.0 | 0.00 | 1.041 |
| 1.1968254 | 60.1836 | 21.959 | 3694.1 | 11.142 | 3705.3 | 0.00 | 1.036 |
| 1.2028096 | 60.2376 | 21.834 | 3654.8 | 11.159 | 3666.0 | 0.00 | 1.031 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Po ($Z=84$) | | | | | | | |
| 1.2088236 | 60.2899 | 21.710 | 3616.0 | 11.176 | 3627.2 | 0.00 | 1.026 |
| 1.2148677 | 60.3407 | 21.587 | 3577.6 | 11.193 | 3588.8 | 0.00 | 1.021 |
| 1.2209421 | 60.3899 | 21.465 | 3539.7 | 11.209 | 3551.0 | 0.00 | 1.015 |
| 1.2270468 | 60.4376 | 21.344 | 3502.3 | 11.226 | 3513.5 | 0.00 | 1.010 |
| 1.2331820 | 60.4838 | 21.224 | 3465.3 | 11.242 | 3476.5 | 0.00 | 1.005 |
| 1.2393479 | 60.5287 | 21.105 | 3428.7 | 11.258 | 3440.0 | 0.00 | 1.000 |
| 1.2455447 | 60.5722 | 20.987 | 3392.5 | 11.274 | 3403.8 | 0.00 | 0.9954 |
| 1.2517724 | 60.6144 | 20.870 | 3356.8 | 11.289 | 3368.1 | 0.00 | 0.9905 |
| 1.2580312 | 60.6554 | 20.754 | 3321.5 | 11.305 | 3332.8 | 0.00 | 0.9855 |
| 1.2643214 | 60.6950 | 20.638 | 3286.6 | 11.320 | 3298.0 | 0.00 | 0.9806 |
| 1.2706430 | 60.7334 | 20.524 | 3252.2 | 11.335 | 3263.5 | 0.00 | 0.9758 |
| 1.2769962 | 60.7707 | 20.411 | 3218.1 | 11.350 | 3229.4 | 0.00 | 0.9709 |
| 1.2833812 | 60.8067 | 20.298 | 3184.4 | 11.365 | 3195.8 | 0.00 | 0.9661 |
| 1.2897981 | 60.8417 | 20.186 | 3151.1 | 11.380 | 3162.5 | 0.00 | 0.9613 |
| 1.2962471 | 60.8755 | 20.075 | 3118.2 | 11.394 | 3129.6 | 0.00 | 0.9565 |
| 1.3027283 | 60.9082 | 19.966 | 3085.7 | 11.409 | 3097.2 | 0.00 | 0.9517 |
| 1.3092420 | 60.9398 | 19.856 | 3053.6 | 11.423 | 3065.0 | 0.00 | 0.9470 |
| 1.3157882 | 60.9704 | 19.748 | 3021.9 | 11.437 | 3033.3 | 0.00 | 0.9423 |
| 1.3223671 | 61.0000 | 19.641 | 2990.5 | 11.450 | 3001.9 | 0.00 | 0.9376 |
| 1.3289790 | 61.0285 | 19.534 | 2959.5 | 11.464 | 2970.9 | 0.00 | 0.9329 |
| 1.3356239 | 61.0561 | 19.429 | 2928.8 | 11.477 | 2940.3 | 0.00 | 0.9283 |
| 1.3423020 | 61.0827 | 19.324 | 2898.5 | 11.490 | 2910.0 | 0.00 | 0.9237 |
| 1.3490135 | 61.1084 | 19.220 | 2868.6 | 11.503 | 2880.1 | 0.00 | 0.9191 |
| 1.3557586 | 61.1331 | 19.117 | 2839.0 | 11.516 | 2850.5 | 0.00 | 0.9145 |
| 1.3625374 | 61.1569 | 19.014 | 2809.7 | 11.529 | 2821.3 | 0.00 | 0.9100 |
| 1.3693500 | 61.1798 | 18.913 | 2780.8 | 11.541 | 2792.3 | 0.00 | 0.9054 |
| 1.3761968 | 61.2018 | 18.812 | 2752.2 | 11.554 | 2763.8 | 0.00 | 0.9009 |
| 1.3830778 | 61.2230 | 18.712 | 2724.0 | 11.566 | 2735.5 | 0.00 | 0.8964 |
| 1.3899932 | 61.2433 | 18.613 | 2696.0 | 11.578 | 2707.6 | 0.00 | 0.8920 |
| 1.3969431 | 61.2628 | 18.514 | 2668.4 | 11.589 | 2680.0 | 0.00 | 0.8875 |
| 1.4039278 | 61.2814 | 18.416 | 2641.2 | 11.601 | 2652.8 | 0.00 | 0.8831 |
| 1.4109475 | 61.2993 | 18.320 | 2614.2 | 11.612 | 2625.8 | 0.00 | 0.8787 |
| 1.4180022 | 61.3164 | 18.223 | 2587.5 | 11.623 | 2599.1 | 0.00 | 0.8744 |
| 1.4250922 | 61.3461 | 18.128 | 2561.2 | 11.634 | 2572.8 | 0.00 | 0.8700 |
| 1.4322177 | 61.3620 | 18.033 | 2535.1 | 11.645 | 2546.8 | 0.00 | 0.8657 |
| 1.4393788 | 61.3772 | 17.939 | 2509.3 | 11.656 | 2521.0 | 0.00 | 0.8614 |
| 1.4465757 | 61.3914 | 17.845 | 2483.7 | 11.666 | 2495.4 | 0.00 | 0.8571 |
| 1.4538086 | 61.4047 | 17.751 | 2458.4 | 11.676 | 2470.0 | 0.00 | 0.8528 |
| 1.4610776 | 61.4171 | 17.658 | 2433.3 | 11.687 | 2445.0 | 0.00 | 0.8486 |
| 1.4683830 | 61.4287 | 17.566 | 2408.6 | 11.696 | 2420.2 | 0.00 | 0.8444 |
| 1.4757249 | 61.4394 | 17.474 | 2384.1 | 11.706 | 2395.8 | 0.00 | 0.8402 |
| 1.4831035 | 61.4493 | 17.383 | 2359.9 | 11.716 | 2371.6 | 0.00 | 0.8360 |
| 1.4905190 | 61.4583 | 17.293 | 2335.9 | 11.725 | 2347.6 | 0.00 | 0.8318 |
| 1.4979716 | 61.4666 | 17.203 | 2312.3 | 11.734 | 2324.0 | 0.00 | 0.8277 |
| 1.5054615 | 61.4876 | 17.114 | 2288.9 | 11.743 | 2300.6 | 0.00 | 0.8236 |
| 1.5129888 | 61.4944 | 17.026 | 2265.7 | 11.752 | 2277.5 | 0.00 | 0.8195 |
| 1.5205537 | 61.5003 | 16.938 | 2242.9 | 11.760 | 2254.6 | 0.00 | 0.8154 |
| 1.5281565 | 61.5055 | 16.851 | 2220.3 | 11.769 | 2232.0 | 0.00 | 0.8113 |
| 1.5357973 | 61.5099 | 16.765 | 2197.9 | 11.777 | 2209.7 | 0.00 | 0.8073 |
| 1.5434763 | 61.5135 | 16.680 | 2175.8 | 11.785 | 2187.6 | 0.00 | 0.8033 |
| 1.5511937 | 61.5163 | 16.595 | 2153.9 | 11.792 | 2165.7 | 0.00 | 0.7993 |
| 1.5589496 | 61.5184 | 16.510 | 2132.3 | 11.800 | 2144.1 | 0.00 | 0.7953 |
| 1.5667444 | 61.5197 | 16.426 | 2110.9 | 11.807 | 2122.8 | 0.00 | 0.7913 |
| 1.5745781 | 61.5202 | 16.343 | 2089.8 | 11.815 | 2101.6 | 0.00 | 0.7874 |
| 1.5824510 | 61.5200 | 16.261 | 2068.9 | 11.822 | 2080.7 | 0.00 | 0.7835 |
| 1.5903633 | 61.5190 | 16.179 | 2048.3 | 11.828 | 2060.1 | 0.00 | 0.7796 |
| 1.5983151 | 61.5173 | 16.098 | 2027.8 | 11.835 | 2039.7 | 0.00 | 0.7757 |
| 1.6063066 | 61.5148 | 16.017 | 2007.6 | 11.841 | 2019.5 | 0.00 | 0.7719 |
| 1.6143382 | 61.5116 | 15.937 | 1987.7 | 11.848 | 1999.5 | 0.00 | 0.7680 |
| 1.6224099 | 61.5076 | 15.857 | 1967.9 | 11.854 | 1979.8 | 0.00 | 0.7642 |
| 1.6305219 | 61.5028 | 15.778 | 1948.4 | 11.860 | 1960.2 | 0.00 | 0.7604 |
| 1.6386745 | 61.4973 | 15.700 | 1929.0 | 11.865 | 1940.9 | 0.00 | 0.7566 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Po ($Z=84$) | | | | | | | |
| 1.6468679 | 61.4911 | 15.622 | 1909.9 | 11.871 | 1921.8 | 0.00 | 0.7528 |
| 1.6551022 | 61.4841 | 15.545 | 1891.0 | 11.876 | 1902.9 | 0.00 | 0.7491 |
| 1.6633777 | 61.4764 | 15.469 | 1872.4 | 11.881 | 1884.2 | 0.00 | 0.7454 |
| 1.6716946 | 61.4680 | 15.392 | 1853.9 | 11.886 | 1865.8 | 0.00 | 0.7417 |
| 1.6800531 | 61.4588 | 15.317 | 1835.6 | 11.891 | 1847.5 | 0.00 | 0.7380 |
| 1.6884534 | 61.4488 | 15.241 | 1817.5 | 11.895 | 1829.4 | 0.00 | 0.7343 |
| 1.6968956 | 61.4379 | 15.166 | 1799.5 | 11.899 | 1811.4 | 0.00 | 0.7307 |
| 1.7053801 | 61.4261 | 15.092 | 1781.8 | 11.904 | 1793.7 | 0.00 | 0.7270 |
| 1.7139070 | 61.4135 | 15.018 | 1764.2 | 11.908 | 1776.1 | 0.00 | 0.7234 |
| 1.7224766 | 61.4001 | 14.944 | 1746.8 | 11.911 | 1758.7 | 0.00 | 0.7198 |
| 1.7310889 | 61.3857 | 14.871 | 1729.6 | 11.915 | 1741.6 | 0.00 | 0.7162 |
| 1.7397444 | 61.3705 | 14.799 | 1712.6 | 11.918 | 1724.6 | 0.00 | 0.7127 |
| 1.7484431 | 61.3544 | 14.727 | 1695.8 | 11.921 | 1707.8 | 0.00 | 0.7091 |
| 1.7571853 | 61.3374 | 14.655 | 1679.2 | 11.924 | 1691.1 | 0.00 | 0.7056 |
| 1.7659712 | 61.3196 | 14.584 | 1662.8 | 11.927 | 1674.7 | 0.00 | 0.7021 |
| 1.7748011 | 61.3009 | 14.514 | 1646.5 | 11.929 | 1658.4 | 0.00 | 0.6986 |
| 1.7836751 | 61.2812 | 14.444 | 1630.4 | 11.932 | 1642.4 | 0.00 | 0.6951 |
| 1.7925935 | 61.2607 | 14.374 | 1614.5 | 11.934 | 1626.4 | 0.00 | 0.6916 |
| 1.8015565 | 61.2393 | 14.305 | 1598.8 | 11.936 | 1610.7 | 0.00 | 0.6882 |
| 1.8105642 | 61.2169 | 14.237 | 1583.2 | 11.938 | 1595.1 | 0.00 | 0.6848 |
| 1.8196171 | 61.1936 | 14.169 | 1567.8 | 11.939 | 1579.8 | 0.00 | 0.6814 |
| 1.8287151 | 61.1694 | 14.102 | 1552.6 | 11.941 | 1564.5 | 0.00 | 0.6780 |
| 1.8378587 | 61.1442 | 14.035 | 1537.5 | 11.942 | 1549.5 | 0.00 | 0.6746 |
| 1.8470480 | 61.1181 | 13.968 | 1522.6 | 11.943 | 1534.6 | 0.00 | 0.6713 |
| 1.8562833 | 61.0910 | 13.902 | 1507.8 | 11.944 | 1519.8 | 0.00 | 0.6679 |
| 1.8655647 | 61.0629 | 13.836 | 1493.2 | 11.944 | 1505.2 | 0.00 | 0.6646 |
| 1.8748925 | 61.0339 | 13.770 | 1478.8 | 11.945 | 1490.7 | 0.00 | 0.6613 |
| 1.8842670 | 61.0038 | 13.705 | 1464.5 | 11.945 | 1476.4 | 0.00 | 0.6580 |
| 1.8936883 | 60.9727 | 13.641 | 1450.3 | 11.945 | 1462.3 | 0.00 | 0.6547 |
| 1.9031567 | 60.9402 | 13.568 | 1435.4 | 11.945 | 1447.3 | 0.00 | 0.6515 |
| 1.9126725 | 60.9060 | 13.495 | 1420.6 | 11.944 | 1432.5 | 0.00 | 0.6482 |
| 1.9222359 | 60.8699 | 13.423 | 1405.9 | 11.944 | 1417.9 | 0.00 | 0.6450 |
| 1.9318471 | 60.8321 | 13.351 | 1391.5 | 11.943 | 1403.4 | 0.00 | 0.6418 |
| 1.9415063 | 60.7925 | 13.280 | 1377.2 | 11.942 | 1389.1 | 0.00 | 0.6386 |
| 1.9512138 | 60.7511 | 13.209 | 1363.0 | 11.941 | 1375.0 | 0.00 | 0.6354 |
| 1.9609699 | 60.7078 | 13.139 | 1349.1 | 11.940 | 1361.0 | 0.00 | 0.6323 |
| 1.9707747 | 60.6627 | 13.070 | 1335.2 | 11.938 | 1347.2 | 0.00 | 0.6291 |
| 1.9806286 | 60.6158 | 13.001 | 1321.6 | 11.937 | 1333.5 | 0.00 | 0.6260 |
| 1.9905318 | 60.5669 | 12.932 | 1308.1 | 11.935 | 1320.0 | 0.00 | 0.6229 |
| 2.0004844 | 60.5161 | 12.864 | 1294.7 | 11.933 | 1306.6 | 0.00 | 0.6198 |
| 2.0104868 | 60.4632 | 12.790 | 1280.9 | 11.930 | 1292.8 | 0.00 | 0.6167 |
| 2.0205393 | 60.4077 | 12.717 | 1267.2 | 11.928 | 1279.1 | 0.00 | 0.6136 |
| 2.0306420 | 60.3497 | 12.644 | 1253.7 | 11.925 | 1265.6 | 0.00 | 0.6106 |
| 2.0407952 | 60.2891 | 12.572 | 1240.3 | 11.922 | 1252.3 | 0.00 | 0.6075 |
| 2.0509992 | 60.2259 | 12.500 | 1227.1 | 11.919 | 1239.0 | 0.00 | 0.6045 |
| 2.0612542 | 60.1601 | 12.429 | 1214.1 | 11.916 | 1226.0 | 0.00 | 0.6015 |
| 2.0715604 | 60.0915 | 12.358 | 1201.2 | 11.913 | 1213.1 | 0.00 | 0.5985 |
| 2.0819182 | 60.0200 | 12.288 | 1188.4 | 11.909 | 1200.3 | 0.00 | 0.5955 |
| 2.0923278 | 59.9458 | 12.219 | 1175.8 | 11.905 | 1187.7 | 0.00 | 0.5926 |
| 2.1027895 | 59.8685 | 12.149 | 1163.3 | 11.901 | 1175.2 | 0.00 | 0.5896 |
| 2.1133034 | 59.7882 | 12.081 | 1151.0 | 11.897 | 1162.9 | 0.00 | 0.5867 |
| 2.1238699 | 59.7080 | 12.013 | 1138.8 | 11.893 | 1150.7 | 0.00 | 0.5838 |
| 2.1344893 | 59.6213 | 11.945 | 1126.7 | 11.888 | 1138.6 | 0.00 | 0.5809 |
| 2.1451617 | 59.5313 | 11.878 | 1114.8 | 11.884 | 1126.7 | 0.00 | 0.5780 |
| 2.1558875 | 59.4378 | 11.811 | 1103.0 | 11.879 | 1114.9 | 0.00 | 0.5751 |
| 2.1666670 | 59.3407 | 11.745 | 1091.4 | 11.874 | 1103.3 | 0.00 | 0.5722 |
| 2.1775003 | 59.2399 | 11.679 | 1079.9 | 11.868 | 1091.7 | 0.00 | 0.5694 |
| 2.1883878 | 59.1351 | 11.613 | 1068.5 | 11.863 | 1080.4 | 0.00 | 0.5666 |
| 2.1993297 | 59.0262 | 11.549 | 1057.2 | 11.857 | 1069.1 | 0.00 | 0.5637 |
| 2.2103264 | 58.9130 | 11.484 | 1046.1 | 11.851 | 1058.0 | 0.00 | 0.5609 |
| 2.2213780 | 58.7954 | 11.420 | 1035.1 | 11.845 | 1047.0 | 0.00 | 0.5581 |
| 2.2324849 | 58.6731 | 11.357 | 1024.2 | 11.839 | 1036.1 | 0.00 | 0.5554 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Po ($Z=84$) | | | | | | | |
| 2.2436473 | 58.5458 | 11.294 | 1013.5 | 11.833 | 1025.3 | 0.00 | 0.5526 |
| 2.2548656 | 58.4134 | 11.231 | 1002.8 | 11.826 | 1014.7 | 0.00 | 0.5499 |
| 2.2661399 | 58.2755 | 11.169 | 992.34 | 11.819 | 1004.2 | 0.00 | 0.5471 |
| 2.2774706 | 58.1319 | 11.107 | 981.94 | 11.812 | 993.76 | 0.00 | 0.5444 |
| 2.2888579 | 57.9821 | 11.046 | 971.67 | 11.805 | 983.47 | 0.00 | 0.5417 |
| 2.3003022 | 57.8259 | 10.985 | 961.51 | 11.798 | 973.31 | 0.00 | 0.5390 |
| 2.3118037 | 57.6628 | 10.925 | 951.46 | 11.791 | 963.25 | 0.00 | 0.5363 |
| 2.3233628 | 57.4924 | 10.865 | 941.53 | 11.783 | 953.31 | 0.00 | 0.5336 |
| 2.3349796 | 57.3142 | 10.805 | 931.71 | 11.775 | 943.48 | 0.00 | 0.5310 |
| 2.3466545 | 57.1277 | 10.746 | 921.99 | 11.767 | 933.76 | 0.00 | 0.5283 |
| 2.3583878 | 56.9322 | 10.687 | 912.39 | 11.759 | 924.15 | 0.00 | 0.5257 |
| 2.3701797 | 56.7271 | 10.629 | 902.89 | 11.751 | 914.64 | 0.00 | 0.5231 |
| 2.3820306 | 56.5116 | 10.571 | 893.48 | 11.742 | 905.23 | 0.00 | 0.5205 |
| 2.3939407 | 56.2848 | 10.513 | 884.19 | 11.733 | 895.92 | 0.00 | 0.5179 |
| 2.4059104 | 56.0459 | 10.456 | 874.99 | 11.724 | 886.72 | 0.00 | 0.5153 |
| 2.4179400 | 55.7936 | 10.399 | 865.90 | 11.715 | 877.62 | 0.00 | 0.5128 |
| 2.4300297 | 55.5268 | 10.342 | 856.91 | 11.706 | 868.62 | 0.00 | 0.5102 |
| 2.4421798 | 55.2440 | 10.286 | 848.03 | 11.697 | 859.72 | 0.00 | 0.5077 |
| 2.4543907 | 54.9436 | 10.230 | 839.24 | 11.687 | 850.92 | 0.00 | 0.5052 |
| 2.4666627 | 54.6235 | 10.175 | 830.54 | 11.677 | 842.22 | 0.00 | 0.5026 |
| 2.4789960 | 54.2815 | 10.120 | 821.95 | 11.667 | 833.62 | 0.00 | 0.5001 |
| 2.4913910 | 53.9150 | 10.066 | 813.45 | 11.657 | 825.11 | 0.00 | 0.4977 |
| 2.5038479 | 53.5205 | 10.011 | 805.05 | 11.647 | 816.69 | 0.00 | 0.4952 |
| 2.5163672 | 53.0941 | 9.9576 | 796.73 | 11.636 | 808.37 | 0.00 | 0.4927 |
| 2.5289490 | 52.6310 | 9.9041 | 788.51 | 11.626 | 800.14 | 0.00 | 0.4903 |
| 2.5415938 | 52.1249 | 9.8511 | 780.39 | 11.615 | 792.00 | 0.00 | 0.4878 |
| 2.5543017 | 51.5679 | 9.7983 | 772.35 | 11.604 | 783.95 | 0.00 | 0.4854 |
| 2.5670732 | 50.9498 | 9.7460 | 764.40 | 11.593 | 775.99 | 0.00 | 0.4830 |
| 2.5799086 | 50.2566 | 9.6940 | 756.54 | 11.582 | 768.12 | 0.00 | 0.4806 |
| 2.5928082 | 49.4687 | 9.6424 | 748.76 | 11.570 | 760.33 | 0.00 | 0.4782 |
| 2.6057722 | 48.5579 | 9.5911 | 741.08 | 11.558 | 752.64 | 0.00 | 0.4758 |
| 2.6188011 | 47.4800 | 9.5401 | 733.47 | 11.547 | 745.02 | 0.00 | 0.4734 |
| 2.6318951 | 46.1608 | 9.4895 | 725.96 | 11.535 | 737.49 | 0.00 | 0.4711 |
| 2.6450545 | 44.4594 | 9.4393 | 718.52 | 11.523 | 730.04 | 0.00 | 0.4687 |
| 2.6582798 | 42.0500 | 9.3894 | 711.17 | 11.510 | 722.68 | 0.00 | 0.4664 |
| 2.6715712 | 37.8063 | 9.3399 | 703.89 | 11.498 | 715.39 | 0.00 | 0.4641 |
| 2.6822596 | 23.1295 | 9.3004 | 698.13 | 11.488 | 709.61 | 0.00 | 0.4622 |
| 2.6837406 | 22.8458 | 26.036 | 1953.3 | 11.486 | 1964.8 | 0.00 | 0.4620 |
| 2.6849291 | 27.9442 | 26.019 | 1951.1 | 11.485 | 1962.6 | 0.00 | 0.4618 |
| 2.6983537 | 38.8204 | 25.821 | 1926.7 | 11.472 | 1938.2 | 0.00 | 0.4595 |
| 2.7118455 | 41.8826 | 25.626 | 1902.6 | 11.459 | 1914.0 | 0.00 | 0.4572 |
| 2.7254047 | 43.5247 | 25.431 | 1878.8 | 11.446 | 1890.2 | 0.00 | 0.4549 |
| 2.7390317 | 44.4561 | 25.239 | 1855.3 | 11.433 | 1866.7 | 0.00 | 0.4527 |
| 2.7527269 | 44.8609 | 25.048 | 1832.1 | 11.420 | 1843.5 | 0.00 | 0.4504 |
| 2.7664905 | 44.7102 | 24.859 | 1809.2 | 11.406 | 1820.6 | 0.00 | 0.4482 |
| 2.7803230 | 43.6560 | 24.671 | 1786.6 | 11.392 | 1798.0 | 0.00 | 0.4459 |
| 2.7942246 | 39.0917 | 24.485 | 1764.3 | 11.378 | 1775.7 | 0.00 | 0.4437 |
| 2.7971803 | 33.8657 | 24.445 | 1759.6 | 11.375 | 1771.0 | 0.00 | 0.4432 |
| 2.7988199 | 33.7869 | 35.560 | 2558.1 | 11.374 | 2569.5 | 0.00 | 0.4430 |
| 2.8081957 | 43.2845 | 35.368 | 2535.8 | 11.364 | 2547.1 | 0.00 | 0.4415 |
| 2.8222367 | 47.0858 | 35.082 | 2502.8 | 11.350 | 2514.2 | 0.00 | 0.4393 |
| 2.8363479 | 49.3630 | 34.798 | 2470.2 | 11.336 | 2481.5 | 0.00 | 0.4371 |
| 2.8505296 | 51.0660 | 34.516 | 2438.0 | 11.321 | 2449.3 | 0.00 | 0.4350 |
| 2.8647823 | 52.4520 | 34.237 | 2406.2 | 11.307 | 2417.6 | 0.00 | 0.4328 |
| 2.8791062 | 53.6311 | 33.960 | 2374.9 | 11.292 | 2386.2 | 0.00 | 0.4306 |
| 2.8935017 | 54.6615 | 33.686 | 2344.0 | 11.277 | 2355.3 | 0.00 | 0.4285 |
| 2.9079692 | 55.5780 | 33.414 | 2313.5 | 11.262 | 2324.8 | 0.00 | 0.4264 |
| 2.9225091 | 56.4036 | 33.144 | 2283.4 | 11.246 | 2294.7 | 0.00 | 0.4242 |
| 2.9371216 | 57.1541 | 32.877 | 2253.7 | 11.231 | 2265.0 | 0.00 | 0.4221 |
| 2.9518072 | 57.8411 | 32.612 | 2224.4 | 11.215 | 2235.6 | 0.00 | 0.4200 |
| 2.9665662 | 58.4730 | 32.349 | 2195.5 | 11.200 | 2206.7 | 0.00 | 0.4179 |
| 2.9813991 | 59.0566 | 32.088 | 2167.0 | 11.184 | 2178.2 | 0.00 | 0.4159 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Po ($Z=84$) | | | | | | | |
| 2.9963061 | 59.5993 | 31.830 | 2138.9 | 11.168 | 2150.0 | 0.00 | 0.4138 |
| 3.0112876 | 60.0956 | 31.564 | 2110.4 | 11.152 | 2121.6 | 0.00 | 0.4117 |
| 3.0263440 | 60.5594 | 31.296 | 2082.1 | 11.135 | 2093.3 | 0.00 | 0.4097 |
| 3.0414758 | 60.9913 | 31.032 | 2054.3 | 11.119 | 2065.4 | 0.00 | 0.4076 |
| 3.0566831 | 61.3922 | 30.770 | 2026.8 | 11.102 | 2037.9 | 0.00 | 0.4056 |
| 3.0719666 | 61.7636 | 30.511 | 1999.8 | 11.086 | 2010.8 | 0.00 | 0.4036 |
| 3.0873264 | 62.1064 | 30.255 | 1973.1 | 11.069 | 1984.2 | 0.00 | 0.4016 |
| 3.1027630 | 62.4213 | 30.001 | 1946.8 | 11.052 | 1957.9 | 0.00 | 0.3996 |
| 3.1182768 | 62.7082 | 29.750 | 1920.9 | 11.035 | 1932.0 | 0.00 | 0.3976 |
| 3.1338682 | 62.9670 | 29.502 | 1895.4 | 11.017 | 1906.4 | 0.00 | 0.3956 |
| 3.1495376 | 63.1964 | 29.256 | 1870.2 | 11.000 | 1881.2 | 0.00 | 0.3937 |
| 3.1652853 | 63.3946 | 29.012 | 1845.4 | 10.982 | 1856.4 | 0.00 | 0.3917 |
| 3.1811117 | 63.5582 | 28.771 | 1821.0 | 10.965 | 1831.9 | 0.00 | 0.3898 |
| 3.1970172 | 63.6822 | 28.530 | 1796.8 | 10.947 | 1807.7 | 0.00 | 0.3878 |
| 3.2130023 | 63.7582 | 28.292 | 1772.9 | 10.929 | 1783.9 | 0.00 | 0.3859 |
| 3.2290673 | 63.7722 | 28.057 | 1749.4 | 10.911 | 1760.3 | 0.00 | 0.3840 |
| 3.2452127 | 63.6988 | 27.823 | 1726.2 | 10.893 | 1737.1 | 0.00 | 0.3821 |
| 3.2614387 | 63.4853 | 27.592 | 1703.4 | 10.874 | 1714.2 | 0.00 | 0.3802 |
| 3.2777459 | 62.9924 | 27.363 | 1680.8 | 10.856 | 1691.7 | 0.00 | 0.3783 |
| 3.2941347 | 61.5485 | 27.136 | 1658.6 | 10.837 | 1669.4 | 0.00 | 0.3764 |
| 3.2982348 | 60.4706 | 27.080 | 1653.1 | 10.833 | 1663.9 | 0.00 | 0.3759 |
| 3.3055650 | 60.5387 | 31.805 | 1937.2 | 10.824 | 1948.0 | 0.00 | 0.3751 |
| 3.3106053 | 61.9636 | 31.720 | 1929.1 | 10.819 | 1939.9 | 0.00 | 0.3745 |
| 3.3271584 | 63.8848 | 31.445 | 1902.9 | 10.800 | 1913.7 | 0.00 | 0.3726 |
| 3.3437941 | 64.9232 | 31.172 | 1877.0 | 10.781 | 1887.8 | 0.00 | 0.3708 |
| 3.3605131 | 65.6833 | 30.902 | 1851.5 | 10.762 | 1862.2 | 0.00 | 0.3689 |
| 3.3773157 | 66.3003 | 30.635 | 1826.3 | 10.742 | 1837.1 | 0.00 | 0.3671 |
| 3.3942023 | 66.8274 | 30.370 | 1801.5 | 10.723 | 1812.2 | 0.00 | 0.3653 |
| 3.4111733 | 67.2910 | 30.107 | 1777.0 | 10.704 | 1787.7 | 0.00 | 0.3635 |
| 3.4282291 | 67.7061 | 29.846 | 1752.9 | 10.684 | 1763.6 | 0.00 | 0.3617 |
| 3.4453703 | 68.0815 | 29.588 | 1729.1 | 10.664 | 1739.7 | 0.00 | 0.3599 |
| 3.4625971 | 68.4221 | 29.332 | 1705.6 | 10.644 | 1716.2 | 0.00 | 0.3581 |
| 3.4799101 | 68.7347 | 29.094 | 1683.3 | 10.624 | 1693.9 | 0.00 | 0.3563 |
| 3.4973097 | 69.0300 | 28.858 | 1661.4 | 10.604 | 1672.0 | 0.00 | 0.3545 |
| 3.5147962 | 69.3072 | 28.623 | 1639.6 | 10.584 | 1650.2 | 0.00 | 0.3527 |
| 3.5323702 | 69.5678 | 28.391 | 1618.2 | 10.564 | 1628.8 | 0.00 | 0.3510 |
| 3.5500321 | 69.8129 | 28.162 | 1597.2 | 10.543 | 1607.7 | 0.00 | 0.3492 |
| 3.5677822 | 70.0437 | 27.935 | 1576.5 | 10.523 | 1587.0 | 0.00 | 0.3475 |
| 3.5856211 | 70.2611 | 27.712 | 1556.1 | 10.502 | 1566.6 | 0.00 | 0.3458 |
| 3.6035492 | 70.4656 | 27.491 | 1536.0 | 10.481 | 1546.5 | 0.00 | 0.3441 |
| 3.6215670 | 70.6579 | 27.273 | 1516.2 | 10.461 | 1526.7 | 0.00 | 0.3423 |
| 3.6396748 | 70.8382 | 27.056 | 1496.7 | 10.440 | 1507.2 | 0.00 | 0.3406 |
| 3.6578732 | 71.0054 | 26.839 | 1477.3 | 10.418 | 1487.7 | 0.00 | 0.3390 |
| 3.6761626 | 71.1589 | 26.623 | 1458.1 | 10.397 | 1468.5 | 0.00 | 0.3373 |
| 3.6945434 | 71.2983 | 26.410 | 1439.3 | 10.376 | 1449.7 | 0.00 | 0.3356 |
| 3.7130161 | 71.4225 | 26.200 | 1420.7 | 10.355 | 1431.1 | 0.00 | 0.3339 |
| 3.7315812 | 71.5297 | 25.992 | 1402.4 | 10.333 | 1412.8 | 0.00 | 0.3323 |
| 3.7502391 | 71.6169 | 25.786 | 1384.4 | 10.311 | 1394.7 | 0.00 | 0.3306 |
| 3.7689903 | 71.6791 | 25.582 | 1366.6 | 10.290 | 1376.9 | 0.00 | 0.3290 |
| 3.7878352 | 71.7070 | 25.381 | 1349.1 | 10.268 | 1359.4 | 0.00 | 0.3273 |
| 3.8067744 | 71.6811 | 25.182 | 1331.9 | 10.246 | 1342.1 | 0.00 | 0.3257 |
| 3.8258083 | 71.5504 | 24.984 | 1314.9 | 10.224 | 1325.1 | 0.00 | 0.3241 |
| 3.8449373 | 71.0694 | 24.789 | 1298.1 | 10.202 | 1308.3 | 0.00 | 0.3225 |
| 3.8485501 | 70.8145 | 24.753 | 1295.0 | 10.198 | 1305.2 | 0.00 | 0.3222 |
| 3.8596499 | 70.8842 | 26.427 | 1378.6 | 10.185 | 1388.8 | 0.00 | 0.3212 |
| 3.8641620 | 71.2611 | 26.376 | 1374.3 | 10.179 | 1384.5 | 0.00 | 0.3209 |
| 3.8834828 | 72.0211 | 26.160 | 1356.3 | 10.157 | 1366.4 | 0.00 | 0.3193 |
| 3.9029002 | 72.4465 | 25.946 | 1338.5 | 10.135 | 1348.6 | 0.00 | 0.3177 |
| 3.9224147 | 72.7642 | 25.735 | 1321.0 | 10.112 | 1331.1 | 0.00 | 0.3161 |
| 3.9420268 | 73.0245 | 25.526 | 1303.7 | 10.090 | 1313.8 | 0.00 | 0.3145 |
| 3.9617369 | 73.2467 | 25.318 | 1286.7 | 10.067 | 1296.8 | 0.00 | 0.3130 |
| 3.9815456 | 73.4401 | 25.113 | 1269.9 | 10.044 | 1280.0 | 0.00 | 0.3114 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Po ($Z=84$) | | | | | | | |
| 4.0014533 | 73.6091 | 24.910 | 1253.4 | 10.021 | 1263.4 | 0.00 | 0.3098 |
| 4.0214606 | 73.7554 | 24.708 | 1237.1 | 9.9982 | 1247.1 | 0.00 | 0.3083 |
| 4.0415679 | 73.8785 | 24.509 | 1221.0 | 9.9751 | 1231.0 | 0.00 | 0.3068 |
| 4.0617757 | 73.9776 | 24.321 | 1205.6 | 9.9519 | 1215.5 | 0.00 | 0.3052 |
| 4.0820846 | 74.0522 | 24.137 | 1190.5 | 9.9287 | 1200.4 | 0.00 | 0.3037 |
| 4.1024950 | 74.0886 | 23.955 | 1175.7 | 9.9054 | 1185.6 | 0.00 | 0.3022 |
| 4.1230075 | 74.0483 | 23.775 | 1161.0 | 9.8819 | 1170.9 | 0.00 | 0.3007 |
| 4.1406035 | 73.8077 | 23.624 | 1148.7 | 9.8619 | 1158.6 | 0.00 | 0.2994 |
| 4.1436226 | 73.6888 | 23.598 | 1146.6 | 9.8584 | 1156.5 | 0.00 | 0.2992 |
| 4.1581970 | 73.9217 | 24.520 | 1187.3 | 9.8418 | 1197.1 | 0.00 | 0.2982 |
| 4.1643407 | 74.1397 | 24.468 | 1183.0 | 9.8348 | 1192.8 | 0.00 | 0.2977 |
| 4.1851624 | 74.5674 | 24.293 | 1168.7 | 9.8112 | 1178.5 | 0.00 | 0.2962 |
| 4.2060882 | 74.8537 | 24.119 | 1154.6 | 9.7874 | 1164.4 | 0.00 | 0.2948 |
| 4.2271186 | 75.0878 | 23.948 | 1140.7 | 9.7636 | 1150.4 | 0.00 | 0.2933 |
| 4.2482542 | 75.2936 | 23.779 | 1127.0 | 9.7396 | 1136.7 | 0.00 | 0.2918 |
| 4.2694955 | 75.4812 | 23.612 | 1113.5 | 9.7156 | 1123.2 | 0.00 | 0.2904 |
| 4.2908430 | 75.6559 | 23.446 | 1100.2 | 9.6916 | 1109.9 | 0.00 | 0.2890 |
| 4.3122972 | 75.8197 | 23.277 | 1086.8 | 9.6674 | 1096.5 | 0.00 | 0.2875 |
| 4.3338587 | 75.9739 | 23.108 | 1073.6 | 9.6432 | 1083.2 | 0.00 | 0.2861 |
| 4.3555280 | 76.1202 | 22.942 | 1060.5 | 9.6189 | 1070.1 | 0.00 | 0.2847 |
| 4.3773056 | 76.2596 | 22.776 | 1047.6 | 9.5945 | 1057.2 | 0.00 | 0.2832 |
| 4.3991921 | 76.3930 | 22.613 | 1034.9 | 9.5701 | 1044.5 | 0.00 | 0.2818 |
| 4.4211881 | 76.5210 | 22.451 | 1022.4 | 9.5456 | 1032.0 | 0.00 | 0.2804 |
| 4.4432940 | 76.6441 | 22.290 | 1010.1 | 9.5210 | 1019.6 | 0.00 | 0.2790 |
| 4.4655105 | 76.7629 | 22.131 | 997.86 | 9.4963 | 1007.4 | 0.00 | 0.2776 |
| 4.4878381 | 76.8777 | 21.974 | 985.83 | 9.4716 | 995.30 | 0.00 | 0.2763 |
| 4.5102772 | 76.9887 | 21.818 | 973.95 | 9.4468 | 983.40 | 0.00 | 0.2749 |
| 4.5328286 | 77.0963 | 21.663 | 962.23 | 9.4219 | 971.65 | 0.00 | 0.2735 |
| 4.5554928 | 77.2007 | 21.510 | 950.67 | 9.3970 | 960.06 | 0.00 | 0.2722 |
| 4.5782702 | 77.3021 | 21.358 | 939.25 | 9.3720 | 948.63 | 0.00 | 0.2708 |
| 4.6011616 | 77.4007 | 21.207 | 927.99 | 9.3469 | 937.34 | 0.00 | 0.2695 |
| 4.6241674 | 77.4965 | 21.058 | 916.87 | 9.3218 | 926.19 | 0.00 | 0.2681 |
| 4.6472882 | 77.5899 | 20.910 | 905.89 | 9.2966 | 915.19 | 0.00 | 0.2668 |
| 4.6705247 | 77.6809 | 20.763 | 895.06 | 9.2714 | 904.33 | 0.00 | 0.2655 |
| 4.6938773 | 77.7696 | 20.617 | 884.36 | 9.2461 | 893.61 | 0.00 | 0.2641 |
| 4.7173467 | 77.8561 | 20.473 | 873.80 | 9.2207 | 883.02 | 0.00 | 0.2628 |
| 4.7409334 | 77.9406 | 20.330 | 863.38 | 9.1953 | 872.57 | 0.00 | 0.2615 |
| 4.7646381 | 78.0232 | 20.188 | 853.08 | 9.1698 | 862.25 | 0.00 | 0.2602 |
| 4.7884613 | 78.1039 | 20.047 | 842.92 | 9.1443 | 852.06 | 0.00 | 0.2589 |
| 4.8124036 | 78.1828 | 19.907 | 832.88 | 9.1187 | 842.00 | 0.00 | 0.2576 |
| 4.8364656 | 78.2601 | 19.769 | 822.97 | 9.0930 | 832.07 | 0.00 | 0.2564 |
| 4.8606479 | 78.3358 | 19.631 | 813.19 | 9.0673 | 822.26 | 0.00 | 0.2551 |
| 4.8849512 | 78.4100 | 19.495 | 803.53 | 9.0416 | 812.57 | 0.00 | 0.2538 |
| 4.9093759 | 78.4828 | 19.360 | 793.98 | 9.0158 | 803.00 | 0.00 | 0.2525 |
| 4.9339228 | 78.5544 | 19.226 | 784.56 | 8.9899 | 793.55 | 0.00 | 0.2513 |
| 4.9585924 | 78.6248 | 19.093 | 775.25 | 8.9640 | 784.21 | 0.00 | 0.2500 |
| 4.9833854 | 78.6941 | 18.961 | 766.06 | 8.9381 | 774.99 | 0.00 | 0.2488 |
| 5.0083023 | 78.7627 | 18.830 | 756.98 | 8.9121 | 765.89 | 0.00 | 0.2476 |
| 5.0333438 | 78.8297 | 18.696 | 747.86 | 8.8861 | 756.75 | 0.00 | 0.2463 |
| 5.0585105 | 78.8948 | 18.563 | 738.85 | 8.8600 | 747.71 | 0.00 | 0.2451 |
| 5.0838031 | 78.9582 | 18.431 | 729.94 | 8.8338 | 738.78 | 0.00 | 0.2439 |
| 5.1092221 | 79.0200 | 18.300 | 721.15 | 8.8077 | 729.95 | 0.00 | 0.2427 |
| 5.1347682 | 79.0803 | 18.170 | 712.45 | 8.7815 | 721.24 | 0.00 | 0.2415 |
| 5.1604421 | 79.1391 | 18.040 | 703.87 | 8.7552 | 712.62 | 0.00 | 0.2403 |
| 5.1862443 | 79.1965 | 17.912 | 695.39 | 8.7289 | 704.12 | 0.00 | 0.2391 |
| 5.2121755 | 79.2526 | 17.785 | 687.01 | 8.7026 | 695.71 | 0.00 | 0.2379 |
| 5.2382364 | 79.3075 | 17.658 | 678.73 | 8.6762 | 687.41 | 0.00 | 0.2367 |
| 5.2644276 | 79.3613 | 17.533 | 670.56 | 8.6498 | 679.21 | 0.00 | 0.2355 |
| 5.2907497 | 79.4139 | 17.408 | 662.48 | 8.6233 | 671.10 | 0.00 | 0.2343 |
| 5.3172034 | 79.4654 | 17.285 | 654.50 | 8.5968 | 663.10 | 0.00 | 0.2332 |
| 5.3437895 | 79.5159 | 17.162 | 646.62 | 8.5703 | 655.19 | 0.00 | 0.2320 |
| 5.3705084 | 79.7360 | 17.039 | 638.80 | 8.5437 | 647.34 | 0.00 | 0.2309 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Po ($Z=84$) | | | | | | | |
| 5.3973609 | 79.7848 | 16.912 | 630.88 | 8.5172 | 639.40 | 0.00 | 0.2297 |
| 5.4243477 | 79.8319 | 16.786 | 623.05 | 8.4905 | 631.54 | 0.00 | 0.2286 |
| 5.4514695 | 79.8773 | 16.660 | 615.31 | 8.4639 | 623.78 | 0.00 | 0.2274 |
| 5.4787268 | 79.9212 | 16.536 | 607.68 | 8.4372 | 616.11 | 0.00 | 0.2263 |
| 5.5061205 | 79.9637 | 16.412 | 600.14 | 8.4105 | 608.55 | 0.00 | 0.2252 |
| 5.5336511 | 80.0047 | 16.290 | 592.69 | 8.3837 | 601.08 | 0.00 | 0.2241 |
| 5.5613193 | 80.0445 | 16.168 | 585.35 | 8.3570 | 593.70 | 0.00 | 0.2229 |
| 5.5891259 | 80.0831 | 16.047 | 578.09 | 8.3302 | 586.42 | 0.00 | 0.2218 |
| 5.6170716 | 80.2379 | 15.925 | 570.83 | 8.3034 | 579.14 | 0.00 | 0.2207 |
| 5.6451569 | 80.2739 | 15.803 | 563.64 | 8.2765 | 571.92 | 0.00 | 0.2196 |
| 5.6733827 | 80.3084 | 15.682 | 556.54 | 8.2496 | 564.79 | 0.00 | 0.2185 |
| 5.7017496 | 80.3415 | 15.562 | 549.53 | 8.2227 | 557.76 | 0.00 | 0.2174 |
| 5.7302584 | 80.3733 | 15.443 | 542.62 | 8.1958 | 550.81 | 0.00 | 0.2164 |
| 5.7589096 | 80.4038 | 15.325 | 535.79 | 8.1689 | 543.96 | 0.00 | 0.2153 |
| 5.7877042 | 80.4331 | 15.208 | 529.06 | 8.1419 | 537.20 | 0.00 | 0.2142 |
| 5.8166427 | 80.4612 | 15.092 | 522.41 | 8.1150 | 530.52 | 0.00 | 0.2132 |
| 5.8457259 | 80.4882 | 14.977 | 515.85 | 8.0880 | 523.94 | 0.00 | 0.2121 |
| 5.8749546 | 80.5141 | 14.863 | 509.37 | 8.0610 | 517.43 | 0.00 | 0.2110 |
| 5.9043293 | 80.5389 | 14.750 | 502.98 | 8.0339 | 511.02 | 0.00 | 0.2100 |
| 5.9338510 | 80.5627 | 14.638 | 496.68 | 8.0069 | 504.68 | 0.00 | 0.2089 |
| 5.9635202 | 80.5855 | 14.527 | 490.45 | 7.9798 | 498.43 | 0.00 | 0.2079 |
| 5.9933378 | 80.6074 | 14.416 | 484.31 | 7.9527 | 492.26 | 0.00 | 0.2069 |
| 6.0233045 | 80.6284 | 14.307 | 478.25 | 7.9257 | 486.17 | 0.00 | 0.2058 |
| 6.0534210 | 80.6484 | 14.199 | 472.27 | 7.8986 | 480.16 | 0.00 | 0.2048 |
| 6.0836882 | 80.6676 | 14.091 | 466.36 | 7.8714 | 474.23 | 0.00 | 0.2038 |
| 6.1141066 | 80.6860 | 13.985 | 460.54 | 7.8443 | 468.38 | 0.00 | 0.2028 |
| 6.1446771 | 80.7035 | 13.879 | 454.79 | 7.8172 | 462.60 | 0.00 | 0.2018 |
| 6.1754005 | 80.7203 | 13.775 | 449.11 | 7.7900 | 456.90 | 0.00 | 0.2008 |
| 6.2062775 | 80.7363 | 13.671 | 443.51 | 7.7629 | 451.27 | 0.00 | 0.1998 |
| 6.2373089 | 80.7516 | 13.568 | 437.99 | 7.7357 | 445.72 | 0.00 | 0.1988 |
| 6.2684954 | 80.7661 | 13.466 | 432.53 | 7.7086 | 440.24 | 0.00 | 0.1978 |
| 6.2998379 | 80.7800 | 13.365 | 427.15 | 7.6814 | 434.83 | 0.00 | 0.1968 |
| 6.3313371 | 80.7932 | 13.265 | 421.84 | 7.6542 | 429.50 | 0.00 | 0.1958 |
| 6.3629938 | 80.8057 | 13.166 | 416.60 | 7.6271 | 424.23 | 0.00 | 0.1949 |
| 6.3948088 | 80.8176 | 13.067 | 411.43 | 7.5999 | 419.03 | 0.00 | 0.1939 |
| 6.4267828 | 80.8289 | 12.970 | 406.33 | 7.5727 | 413.90 | 0.00 | 0.1929 |
| 6.4589167 | 80.8396 | 12.873 | 401.29 | 7.5455 | 408.84 | 0.00 | 0.1920 |
| 6.4912113 | 80.8498 | 12.777 | 396.32 | 7.5183 | 403.84 | 0.00 | 0.1910 |
| 6.5236674 | 80.8594 | 12.682 | 391.42 | 7.4911 | 398.91 | 0.00 | 0.1901 |
| 6.5562857 | 80.8685 | 12.588 | 386.58 | 7.4639 | 394.04 | 0.00 | 0.1891 |
| 6.5890671 | 80.8771 | 12.495 | 381.80 | 7.4368 | 389.24 | 0.00 | 0.1882 |
| 6.6220125 | 80.9737 | 12.401 | 377.06 | 7.4096 | 384.47 | 0.00 | 0.1872 |
| 6.6551225 | 80.9816 | 12.307 | 372.34 | 7.3824 | 379.73 | 0.00 | 0.1863 |
| 6.6883981 | 80.9888 | 12.214 | 367.69 | 7.3552 | 375.05 | 0.00 | 0.1854 |
| 6.7218401 | 80.9953 | 12.122 | 363.10 | 7.3281 | 370.43 | 0.00 | 0.1844 |
| 6.7554493 | 81.0011 | 12.031 | 358.57 | 7.3009 | 365.87 | 0.00 | 0.1835 |
| 6.7892266 | 81.0064 | 11.940 | 354.10 | 7.2737 | 361.38 | 0.00 | 0.1826 |
| 6.8231727 | 81.0111 | 11.851 | 349.69 | 7.2466 | 356.94 | 0.00 | 0.1817 |
| 6.8572886 | 81.0152 | 11.762 | 345.34 | 7.2194 | 352.56 | 0.00 | 0.1808 |
| 6.8915750 | 81.0188 | 11.674 | 341.05 | 7.1923 | 348.24 | 0.00 | 0.1799 |
| 6.9260329 | 81.0218 | 11.586 | 336.81 | 7.1652 | 343.98 | 0.00 | 0.1790 |
| 6.9606631 | 81.0243 | 11.499 | 332.63 | 7.1381 | 339.77 | 0.00 | 0.1781 |
| 6.9954664 | 81.0264 | 11.414 | 328.50 | 7.1110 | 335.61 | 0.00 | 0.1772 |
| 7.0304437 | 81.0280 | 11.328 | 324.43 | 7.0839 | 331.51 | 0.00 | 0.1764 |
| 7.0655959 | 81.0291 | 11.244 | 320.41 | 7.0568 | 327.47 | 0.00 | 0.1755 |
| 7.1009239 | 81.0297 | 11.160 | 316.45 | 7.0297 | 323.48 | 0.00 | 0.1746 |
| 7.1364285 | 81.0299 | 11.078 | 312.53 | 7.0027 | 319.54 | 0.00 | 0.1737 |
| 7.1721107 | 81.0297 | 10.995 | 308.67 | 6.9756 | 315.65 | 0.00 | 0.1729 |
| 7.2079712 | 81.0291 | 10.914 | 304.86 | 6.9486 | 311.81 | 0.00 | 0.1720 |
| 7.2440111 | 81.0281 | 10.833 | 301.10 | 6.9216 | 308.02 | 0.00 | 0.1712 |
| 7.2802311 | 81.0267 | 10.753 | 297.39 | 6.8946 | 304.28 | 0.00 | 0.1703 |
| 7.3166323 | 81.0250 | 10.674 | 293.73 | 6.8676 | 300.60 | 0.00 | 0.1695 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Po ($Z=84$) | | | | | | | |
| 7.3532155 | 81.0229 | 10.595 | 290.11 | 6.8407 | 296.95 | 0.00 | 0.1686 |
| 7.3899815 | 81.0204 | 10.517 | 286.55 | 6.8138 | 293.36 | 0.00 | 0.1678 |
| 7.4269314 | 81.0176 | 10.440 | 283.03 | 6.7868 | 289.81 | 0.00 | 0.1669 |
| 7.4640661 | 81.0145 | 10.364 | 279.55 | 6.7599 | 286.31 | 0.00 | 0.1661 |
| 7.5013864 | 81.0110 | 10.288 | 276.13 | 6.7331 | 282.86 | 0.00 | 0.1653 |
| 7.5388934 | 81.0073 | 10.212 | 272.74 | 6.7062 | 279.45 | 0.00 | 0.1645 |
| 7.5765878 | 81.0032 | 10.138 | 269.41 | 6.6794 | 276.09 | 0.00 | 0.1636 |
| 7.6144708 | 80.9989 | 10.064 | 266.11 | 6.6526 | 272.76 | 0.00 | 0.1628 |
| 7.6525431 | 80.9943 | 9.9907 | 262.86 | 6.6258 | 269.49 | 0.00 | 0.1620 |
| 7.6908058 | 80.9895 | 9.9181 | 259.65 | 6.5990 | 266.25 | 0.00 | 0.1612 |
| 7.7292599 | 81.0253 | 9.8456 | 256.47 | 6.5723 | 263.04 | 0.00 | 0.1604 |
| 7.7679062 | 81.0202 | 9.7733 | 253.32 | 6.5456 | 259.87 | 0.00 | 0.1596 |
| 7.8067457 | 81.0147 | 9.7016 | 250.21 | 6.5189 | 256.73 | 0.00 | 0.1588 |
| 7.8457794 | 81.0089 | 9.6305 | 247.14 | 6.4923 | 253.63 | 0.00 | 0.1580 |
| 7.8850083 | 81.0028 | 9.5600 | 244.11 | 6.4656 | 250.58 | 0.00 | 0.1572 |
| 7.9244334 | 80.9964 | 9.4902 | 241.12 | 6.4390 | 247.56 | 0.00 | 0.1565 |
| 7.9640555 | 80.9898 | 9.4209 | 238.17 | 6.4125 | 244.58 | 0.00 | 0.1557 |
| 8.0038758 | 80.9828 | 9.3522 | 235.26 | 6.3859 | 241.64 | 0.00 | 0.1549 |
| 8.0438952 | 80.9757 | 9.2841 | 232.38 | 6.3594 | 238.74 | 0.00 | 0.1541 |
| 8.0841147 | 80.9683 | 9.2166 | 229.55 | 6.3329 | 235.88 | 0.00 | 0.1534 |
| 8.1245352 | 80.9606 | 9.1496 | 226.75 | 6.3065 | 233.05 | 0.00 | 0.1526 |
| 8.1651579 | 80.9528 | 9.0833 | 223.98 | 6.2801 | 230.26 | 0.00 | 0.1518 |
| 8.2059837 | 80.9447 | 9.0175 | 221.25 | 6.2537 | 227.51 | 0.00 | 0.1511 |
| 8.2470136 | 80.9365 | 8.9522 | 218.56 | 6.2273 | 224.78 | 0.00 | 0.1503 |
| 8.2882487 | 80.9281 | 8.8875 | 215.90 | 6.2010 | 222.10 | 0.00 | 0.1496 |
| 8.3296899 | 80.9360 | 8.8231 | 213.27 | 6.1747 | 219.44 | 0.00 | 0.1488 |
| 8.3713384 | 80.9275 | 8.7591 | 210.67 | 6.1485 | 216.82 | 0.00 | 0.1481 |
| 8.4131951 | 80.9187 | 8.6956 | 208.10 | 6.1222 | 214.22 | 0.00 | 0.1474 |
| 8.4552610 | 80.9099 | 8.6327 | 205.57 | 6.0961 | 211.66 | 0.00 | 0.1466 |
| 8.4975373 | 80.9010 | 8.5704 | 203.07 | 6.0699 | 209.14 | 0.00 | 0.1459 |
| 8.5400250 | 80.8920 | 8.5085 | 200.60 | 6.0438 | 206.64 | 0.00 | 0.1452 |
| At($Z=85$) | | | | | | | |
| Atomic weight: $A_r = 210.0000 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^3) = 1.0000$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1}) = [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 348.713 \text{ E(eV)} [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) = f_2 (e \text{ atom}^{-1}) \times 2.00382 \times 10^5$ | | | | | | | |
| 24 edges. Edge energies (keV) | | | | | | | |
| K | 95.7299 | L I | 17.4930 | L II | 16.7847 | L III | 14.135 |
| M I | 4.31700 | M II | 4.00800 | M III | 3.42600 | M IV | 2.90870 |
| M V | 2.78670 | N I | 1.04299 | N II | 0.886000 | N III | 0.740000 |
| N IV | 0.533200 | N V | 0.475385 | N VI | 0.197076 | N VII | 0.190577 |
| O I | 0.1875617 | O II | 0.138499 | O III | 0.108426 | O IV | 0.0415942 |
| O V | 0.0376618 | P I | 0.0193390 | P II | 0.00903104 | P III | 0.00624450 |
| Relativistic correction estimate: $f_{\text{rel}} (\text{H82,3/5CL}) = (-2.0891, -1.2198) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}} = -0.018874 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 30.0410 | 33.537 | 13441 | 6.4716 | 13447 | 0.00 | 2.480 |
| 0.50250000 | 30.3027 | 33.567 | 13385 | 6.5028 | 13392 | 0.00 | 2.467 |
| 0.50501250 | 30.5564 | 33.593 | 13329 | 6.5340 | 13336 | 0.00 | 2.455 |
| 0.50753756 | 30.8023 | 33.617 | 13273 | 6.5653 | 13279 | 0.00 | 2.443 |
| 0.51007525 | 31.0402 | 33.639 | 13215 | 6.5965 | 13222 | 0.00 | 2.431 |
| 0.51262563 | 31.2695 | 33.658 | 13157 | 6.6278 | 13163 | 0.00 | 2.419 |
| 0.51518875 | 31.4893 | 33.674 | 13098 | 6.6591 | 13104 | 0.00 | 2.407 |
| 0.51776470 | 31.6980 | 33.688 | 13038 | 6.6905 | 13044 | 0.00 | 2.395 |
| 0.52035352 | 31.8926 | 33.700 | 12977 | 6.7218 | 12984 | 0.00 | 2.383 |
| 0.52295529 | 32.0683 | 33.709 | 12916 | 6.7532 | 12923 | 0.00 | 2.371 |
| 0.52557007 | 32.2157 | 33.715 | 12855 | 6.7846 | 12861 | 0.00 | 2.359 |
| 0.52819792 | 32.3124 | 33.719 | 12792 | 6.8159 | 12799 | 0.00 | 2.347 |
| 0.53083891 | 32.2834 | 33.721 | 12729 | 6.8473 | 12736 | 0.00 | 2.336 |
| 0.53281612 | 31.7932 | 33.720 | 12681 | 6.8708 | 12688 | 0.00 | 2.327 |
| 0.53349310 | 31.7529 | 34.879 | 13101 | 6.8787 | 13108 | 0.00 | 2.324 |
| 0.53358393 | 31.8604 | 34.879 | 13099 | 6.8798 | 13105 | 0.00 | 2.324 |
| 0.53616057 | 32.8451 | 34.889 | 13039 | 6.9102 | 13046 | 0.00 | 2.312 |
| 0.53884137 | 33.3256 | 34.898 | 12978 | 6.9416 | 12985 | 0.00 | 2.301 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]_{\text{K}}$ | λ |
|------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| At($Z=85$) | | | | | | | |
| 0.54153558 | 33.7128 | 34.903 | 12915 | 6.9730 | 12922 | 0.00 | 2.289 |
| 0.54424325 | 34.0594 | 34.907 | 12852 | 7.0045 | 12859 | 0.00 | 2.278 |
| 0.54696447 | 34.3829 | 34.908 | 12789 | 7.0359 | 12796 | 0.00 | 2.267 |
| 0.54969929 | 34.6912 | 34.907 | 12725 | 7.0674 | 12732 | 0.00 | 2.255 |
| 0.55244779 | 34.9885 | 34.903 | 12660 | 7.0988 | 12667 | 0.00 | 2.244 |
| 0.55521003 | 35.2774 | 34.898 | 12595 | 7.1303 | 12602 | 0.00 | 2.233 |
| 0.55798608 | 35.5611 | 34.890 | 12530 | 7.1617 | 12537 | 0.00 | 2.222 |
| 0.56077601 | 35.8375 | 34.880 | 12464 | 7.1932 | 12471 | 0.00 | 2.211 |
| 0.56357989 | 36.1091 | 34.868 | 12398 | 7.2246 | 12405 | 0.00 | 2.200 |
| 0.56639779 | 36.3765 | 34.855 | 12331 | 7.2561 | 12338 | 0.00 | 2.189 |
| 0.56922978 | 36.6401 | 34.839 | 12264 | 7.2875 | 12271 | 0.00 | 2.178 |
| 0.57207593 | 36.9494 | 34.821 | 12197 | 7.3190 | 12204 | 0.00 | 2.167 |
| 0.57493630 | 37.2065 | 34.801 | 12129 | 7.3504 | 12136 | 0.00 | 2.156 |
| 0.57781099 | 37.4606 | 34.779 | 12061 | 7.3818 | 12069 | 0.00 | 2.146 |
| 0.58070004 | 37.7120 | 34.755 | 11993 | 7.4132 | 12000 | 0.00 | 2.135 |
| 0.58360354 | 37.9608 | 34.730 | 11925 | 7.4446 | 11932 | 0.00 | 2.124 |
| 0.58652156 | 38.2072 | 34.703 | 11856 | 7.4760 | 11864 | 0.00 | 2.114 |
| 0.58945417 | 38.4513 | 34.674 | 11787 | 7.5074 | 11795 | 0.00 | 2.103 |
| 0.59240144 | 38.6893 | 34.643 | 11718 | 7.5388 | 11726 | 0.00 | 2.093 |
| 0.59536345 | 38.9289 | 34.610 | 11649 | 7.5701 | 11656 | 0.00 | 2.082 |
| 0.59834026 | 39.1663 | 34.575 | 11579 | 7.6015 | 11587 | 0.00 | 2.072 |
| 0.60133196 | 39.4015 | 34.538 | 11509 | 7.6328 | 11517 | 0.00 | 2.062 |
| 0.60433862 | 39.6345 | 34.499 | 11439 | 7.6641 | 11447 | 0.00 | 2.052 |
| 0.60736032 | 39.8652 | 34.458 | 11369 | 7.6954 | 11376 | 0.00 | 2.041 |
| 0.61039712 | 40.0938 | 34.416 | 11298 | 7.7267 | 11306 | 0.00 | 2.031 |
| 0.61344910 | 40.3201 | 34.371 | 11227 | 7.7579 | 11235 | 0.00 | 2.021 |
| 0.61651635 | 40.5442 | 34.325 | 11157 | 7.7891 | 11164 | 0.00 | 2.011 |
| 0.61959893 | 40.7661 | 34.278 | 11086 | 7.8203 | 11093 | 0.00 | 2.001 |
| 0.62269693 | 40.9857 | 34.228 | 11015 | 7.8515 | 11022 | 0.00 | 1.991 |
| 0.62581041 | 41.2031 | 34.177 | 10943 | 7.8826 | 10951 | 0.00 | 1.981 |
| 0.62893946 | 41.4181 | 34.124 | 10872 | 7.9138 | 10880 | 0.00 | 1.971 |
| 0.63208416 | 41.6308 | 34.070 | 10801 | 7.9448 | 10809 | 0.00 | 1.962 |
| 0.63524458 | 41.8412 | 34.014 | 10729 | 7.9759 | 10737 | 0.00 | 1.952 |
| 0.63842080 | 42.0491 | 33.957 | 10658 | 8.0069 | 10666 | 0.00 | 1.942 |
| 0.64161291 | 42.2546 | 33.898 | 10587 | 8.0379 | 10595 | 0.00 | 1.932 |
| 0.64482097 | 42.4577 | 33.837 | 10515 | 8.0689 | 10523 | 0.00 | 1.923 |
| 0.64804508 | 42.6581 | 33.775 | 10444 | 8.0998 | 10452 | 0.00 | 1.913 |
| 0.65128530 | 42.8560 | 33.712 | 10372 | 8.1307 | 10380 | 0.00 | 1.904 |
| 0.65454173 | 43.0512 | 33.647 | 10301 | 8.1616 | 10309 | 0.00 | 1.894 |
| 0.65781444 | 43.2444 | 33.581 | 10229 | 8.1924 | 10238 | 0.00 | 1.885 |
| 0.66110351 | 43.4355 | 33.513 | 10158 | 8.2231 | 10166 | 0.00 | 1.875 |
| 0.66440903 | 43.6228 | 33.444 | 10087 | 8.2539 | 10095 | 0.00 | 1.866 |
| 0.66773107 | 43.8067 | 33.374 | 10015 | 8.2846 | 10024 | 0.00 | 1.857 |
| 0.67106973 | 43.9871 | 33.302 | 9944.0 | 8.3152 | 9952.3 | 0.00 | 1.848 |
| 0.67442508 | 44.1641 | 33.229 | 9872.9 | 8.3458 | 9881.3 | 0.00 | 1.838 |
| 0.67779720 | 44.3375 | 33.155 | 9801.9 | 8.3764 | 9810.3 | 0.00 | 1.829 |
| 0.68118619 | 44.5071 | 33.080 | 9731.1 | 8.4069 | 9739.5 | 0.00 | 1.820 |
| 0.68459212 | 44.6727 | 33.004 | 9660.4 | 8.4374 | 9668.9 | 0.00 | 1.811 |
| 0.68801508 | 44.8339 | 32.927 | 9589.9 | 8.4678 | 9598.4 | 0.00 | 1.802 |
| 0.69145515 | 44.9904 | 32.849 | 9519.6 | 8.4981 | 9528.1 | 0.00 | 1.793 |
| 0.69491243 | 45.1417 | 32.770 | 9449.4 | 8.5285 | 9458.0 | 0.00 | 1.784 |
| 0.69838699 | 45.2874 | 32.690 | 9379.5 | 8.5587 | 9388.0 | 0.00 | 1.775 |
| 0.70187893 | 45.4266 | 32.609 | 9309.7 | 8.5889 | 9318.3 | 0.00 | 1.766 |
| 0.70538832 | 45.5585 | 32.527 | 9240.2 | 8.6191 | 9248.8 | 0.00 | 1.758 |
| 0.70891526 | 45.6818 | 32.445 | 9170.9 | 8.6492 | 9179.5 | 0.00 | 1.749 |
| 0.71245984 | 45.7948 | 32.361 | 9101.8 | 8.6792 | 9110.5 | 0.00 | 1.740 |
| 0.71602214 | 45.8950 | 32.277 | 9032.9 | 8.7092 | 9041.6 | 0.00 | 1.732 |
| 0.71960225 | 45.9789 | 32.192 | 8964.3 | 8.7391 | 8973.1 | 0.00 | 1.723 |
| 0.72320026 | 46.0406 | 32.107 | 8896.0 | 8.7690 | 8904.8 | 0.00 | 1.714 |
| 0.72681626 | 46.0700 | 32.020 | 8828.0 | 8.7987 | 8836.8 | 0.00 | 1.706 |
| 0.73045034 | 46.0470 | 31.933 | 8760.2 | 8.8285 | 8769.0 | 0.00 | 1.697 |
| 0.73410260 | 45.9211 | 31.846 | 8692.7 | 8.8581 | 8701.5 | 0.00 | 1.689 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| At($Z=85$) | | | | | | | |
| 0.73777311 | 45.4815 | 31.757 | 8625.5 | 8.8877 | 8634.4 | 0.00 | 1.681 |
| 0.73891221 | 45.0819 | 31.730 | 8604.7 | 8.8969 | 8613.6 | 0.00 | 1.678 |
| 0.74108781 | 45.1853 | 33.669 | 9103.6 | 8.9143 | 9112.5 | 0.00 | 1.673 |
| 0.74146197 | 45.3903 | 33.660 | 9096.6 | 8.9173 | 9105.6 | 0.00 | 1.672 |
| 0.74516928 | 46.3649 | 33.572 | 9027.9 | 8.9467 | 9036.8 | 0.00 | 1.664 |
| 0.74889513 | 46.8823 | 33.484 | 8959.4 | 8.9761 | 8968.4 | 0.00 | 1.656 |
| 0.75263961 | 47.2773 | 33.396 | 8891.3 | 9.0054 | 8900.3 | 0.00 | 1.647 |
| 0.75640280 | 47.6136 | 33.307 | 8823.6 | 9.0347 | 8832.6 | 0.00 | 1.639 |
| 0.76018482 | 47.9150 | 33.218 | 8756.2 | 9.0638 | 8765.2 | 0.00 | 1.631 |
| 0.76398574 | 48.1931 | 33.128 | 8689.1 | 9.0929 | 8698.2 | 0.00 | 1.623 |
| 0.76780567 | 48.4543 | 33.038 | 8622.3 | 9.1220 | 8631.5 | 0.00 | 1.615 |
| 0.77164470 | 48.7026 | 32.948 | 8555.9 | 9.1509 | 8565.1 | 0.00 | 1.607 |
| 0.77550292 | 48.9408 | 32.856 | 8489.8 | 9.1798 | 8498.9 | 0.00 | 1.599 |
| 0.77938044 | 49.1706 | 32.765 | 8423.9 | 9.2086 | 8433.1 | 0.00 | 1.591 |
| 0.78327734 | 49.3933 | 32.672 | 8358.5 | 9.2373 | 8367.7 | 0.00 | 1.583 |
| 0.78719373 | 49.6101 | 32.580 | 8293.4 | 9.2659 | 8302.6 | 0.00 | 1.575 |
| 0.79112969 | 49.8217 | 32.487 | 8228.6 | 9.2944 | 8237.9 | 0.00 | 1.567 |
| 0.79508534 | 50.0289 | 32.394 | 8164.2 | 9.3229 | 8173.5 | 0.00 | 1.559 |
| 0.79906077 | 50.2322 | 32.301 | 8100.2 | 9.3512 | 8109.6 | 0.00 | 1.552 |
| 0.80305607 | 50.4321 | 32.207 | 8036.6 | 9.3795 | 8045.9 | 0.00 | 1.544 |
| 0.80707135 | 50.6275 | 32.105 | 7971.2 | 9.4077 | 7980.6 | 0.00 | 1.536 |
| 0.81110671 | 50.8184 | 32.001 | 7905.9 | 9.4358 | 7915.3 | 0.00 | 1.529 |
| 0.81516224 | 51.0051 | 31.897 | 7841.0 | 9.4638 | 7850.4 | 0.00 | 1.521 |
| 0.81923806 | 51.1879 | 31.793 | 7776.4 | 9.4918 | 7785.9 | 0.00 | 1.513 |
| 0.82333425 | 51.3668 | 31.688 | 7712.2 | 9.5196 | 7721.7 | 0.00 | 1.506 |
| 0.82745092 | 51.5420 | 31.583 | 7648.3 | 9.5473 | 7657.9 | 0.00 | 1.498 |
| 0.83158817 | 51.7135 | 31.477 | 7584.8 | 9.5750 | 7594.4 | 0.00 | 1.491 |
| 0.83574611 | 51.8814 | 31.371 | 7521.7 | 9.6025 | 7531.3 | 0.00 | 1.484 |
| 0.83992484 | 52.0456 | 31.265 | 7459.0 | 9.6300 | 7468.6 | 0.00 | 1.476 |
| 0.84412447 | 52.2060 | 31.159 | 7396.6 | 9.6573 | 7406.3 | 0.00 | 1.469 |
| 0.84834509 | 52.3626 | 31.052 | 7334.7 | 9.6845 | 7344.3 | 0.00 | 1.461 |
| 0.85258682 | 52.5151 | 30.946 | 7273.1 | 9.7117 | 7282.8 | 0.00 | 1.454 |
| 0.85684975 | 52.6630 | 30.839 | 7212.0 | 9.7387 | 7221.7 | 0.00 | 1.447 |
| 0.86113400 | 52.8058 | 30.732 | 7151.2 | 9.7657 | 7161.0 | 0.00 | 1.440 |
| 0.86543967 | 52.9424 | 30.625 | 7090.9 | 9.7925 | 7100.7 | 0.00 | 1.433 |
| 0.86976687 | 53.0708 | 30.518 | 7031.0 | 9.8192 | 7040.8 | 0.00 | 1.425 |
| 0.87411570 | 53.1874 | 30.412 | 6971.6 | 9.8459 | 6981.4 | 0.00 | 1.418 |
| 0.87848628 | 53.2827 | 30.305 | 6912.5 | 9.8724 | 6922.4 | 0.00 | 1.411 |
| 0.88287871 | 53.3210 | 30.198 | 6853.9 | 9.8988 | 6863.8 | 0.00 | 1.404 |
| 0.88458238 | 53.2762 | 30.157 | 6831.4 | 9.9090 | 6841.3 | 0.00 | 1.402 |
| 0.88729310 | 53.3566 | 30.504 | 6888.9 | 9.9251 | 6898.8 | 0.00 | 1.397 |
| 0.88741758 | 53.3728 | 30.501 | 6887.3 | 9.9258 | 6897.2 | 0.00 | 1.397 |
| 0.89172957 | 53.7019 | 30.399 | 6831.1 | 9.9513 | 6841.1 | 0.00 | 1.390 |
| 0.89618822 | 53.9268 | 30.295 | 6773.8 | 9.9773 | 6783.8 | 0.00 | 1.383 |
| 0.90066916 | 54.1232 | 30.191 | 6716.9 | 10.003 | 6726.9 | 0.00 | 1.377 |
| 0.90517250 | 54.3051 | 30.082 | 6659.4 | 10.029 | 6669.4 | 0.00 | 1.370 |
| 0.90969837 | 54.4778 | 29.972 | 6602.1 | 10.055 | 6612.1 | 0.00 | 1.363 |
| 0.91424686 | 54.6439 | 29.863 | 6545.2 | 10.080 | 6555.3 | 0.00 | 1.356 |
| 0.91881809 | 54.8049 | 29.753 | 6488.8 | 10.106 | 6498.9 | 0.00 | 1.349 |
| 0.92341218 | 54.9617 | 29.644 | 6432.9 | 10.131 | 6443.0 | 0.00 | 1.343 |
| 0.92802924 | 55.1150 | 29.535 | 6377.3 | 10.157 | 6387.5 | 0.00 | 1.336 |
| 0.93266939 | 55.2652 | 29.426 | 6322.2 | 10.182 | 6332.4 | 0.00 | 1.329 |
| 0.93733274 | 55.4128 | 29.318 | 6267.6 | 10.207 | 6277.8 | 0.00 | 1.323 |
| 0.94201940 | 55.5579 | 29.210 | 6213.3 | 10.232 | 6223.6 | 0.00 | 1.316 |
| 0.94672950 | 55.7008 | 29.102 | 6159.6 | 10.256 | 6169.8 | 0.00 | 1.310 |
| 0.95146315 | 55.8418 | 28.994 | 6106.3 | 10.281 | 6116.6 | 0.00 | 1.303 |
| 0.95622046 | 55.9811 | 28.887 | 6053.4 | 10.306 | 6063.7 | 0.00 | 1.297 |
| 0.96100156 | 56.1189 | 28.780 | 6001.0 | 10.330 | 6011.3 | 0.00 | 1.290 |
| 0.96580657 | 56.2554 | 28.673 | 5949.1 | 10.354 | 5959.4 | 0.00 | 1.284 |
| 0.97063560 | 56.3908 | 28.567 | 5897.6 | 10.378 | 5908.0 | 0.00 | 1.277 |
| 0.97548878 | 56.5256 | 28.462 | 5846.5 | 10.402 | 5856.9 | 0.00 | 1.271 |
| 0.98036623 | 56.6599 | 28.357 | 5796.0 | 10.426 | 5806.4 | 0.00 | 1.265 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| At($Z=85$) | | | | | | | |
| 0.98526806 | 56.7944 | 28.252 | 5745.9 | 10.450 | 5756.3 | 0.00 | 1.258 |
| 0.99019440 | 56.9296 | 28.148 | 5696.2 | 10.473 | 5706.7 | 0.00 | 1.252 |
| 0.99514537 | 57.0667 | 28.044 | 5647.0 | 10.497 | 5657.5 | 0.00 | 1.246 |
| 1.0001211 | 57.2100 | 27.940 | 5597.9 | 10.520 | 5608.5 | 0.00 | 1.240 |
| 1.0051217 | 57.4350 | 27.766 | 5535.4 | 10.543 | 5546.0 | 0.00 | 1.234 |
| 1.0101473 | 57.6290 | 27.593 | 5473.7 | 10.567 | 5484.3 | 0.00 | 1.227 |
| 1.0151980 | 57.7974 | 27.422 | 5412.7 | 10.589 | 5423.3 | 0.00 | 1.221 |
| 1.0202740 | 57.9427 | 27.253 | 5352.5 | 10.612 | 5363.1 | 0.00 | 1.215 |
| 1.0253754 | 58.0643 | 27.085 | 5293.0 | 10.635 | 5303.6 | 0.00 | 1.209 |
| 1.0305023 | 58.1570 | 26.918 | 5234.2 | 10.657 | 5244.9 | 0.00 | 1.203 |
| 1.0356548 | 58.2008 | 26.752 | 5176.2 | 10.680 | 5186.8 | 0.00 | 1.197 |
| 1.0406559 | 58.0646 | 26.594 | 5120.8 | 10.701 | 5131.5 | 0.00 | 1.191 |
| 1.0408331 | 58.0446 | 26.588 | 5118.8 | 10.702 | 5129.5 | 0.00 | 1.191 |
| 1.0433442 | 58.1475 | 27.057 | 5196.5 | 10.713 | 5207.2 | 0.00 | 1.188 |
| 1.0460372 | 58.4062 | 26.973 | 5167.1 | 10.724 | 5177.8 | 0.00 | 1.185 |
| 1.0512674 | 58.6761 | 26.812 | 5110.7 | 10.746 | 5121.4 | 0.00 | 1.179 |
| 1.0565238 | 58.8740 | 26.652 | 5055.0 | 10.768 | 5065.7 | 0.00 | 1.174 |
| 1.0618064 | 59.0424 | 26.494 | 4999.9 | 10.789 | 5010.7 | 0.00 | 1.168 |
| 1.0671154 | 59.1935 | 26.337 | 4945.6 | 10.811 | 4956.4 | 0.00 | 1.162 |
| 1.0724510 | 59.3325 | 26.181 | 4891.8 | 10.832 | 4902.7 | 0.00 | 1.156 |
| 1.0778132 | 59.4622 | 26.027 | 4838.8 | 10.853 | 4849.6 | 0.00 | 1.150 |
| 1.0832023 | 59.5844 | 25.873 | 4786.4 | 10.874 | 4797.2 | 0.00 | 1.145 |
| 1.0886183 | 59.7003 | 25.721 | 4734.6 | 10.895 | 4745.5 | 0.00 | 1.139 |
| 1.0940614 | 59.8107 | 25.571 | 4683.4 | 10.916 | 4694.3 | 0.00 | 1.133 |
| 1.0995317 | 59.9162 | 25.421 | 4632.8 | 10.936 | 4643.8 | 0.00 | 1.128 |
| 1.1050294 | 60.0173 | 25.273 | 4582.9 | 10.957 | 4593.8 | 0.00 | 1.122 |
| 1.1105545 | 60.1145 | 25.125 | 4533.5 | 10.977 | 4544.5 | 0.00 | 1.116 |
| 1.1161073 | 60.2081 | 24.979 | 4484.7 | 10.997 | 4495.7 | 0.00 | 1.111 |
| 1.1216878 | 60.2983 | 24.835 | 4436.5 | 11.017 | 4447.6 | 0.00 | 1.105 |
| 1.1272963 | 60.3854 | 24.691 | 4388.9 | 11.037 | 4400.0 | 0.00 | 1.100 |
| 1.1329328 | 60.4696 | 24.548 | 4341.9 | 11.056 | 4353.0 | 0.00 | 1.094 |
| 1.1385974 | 60.5510 | 24.407 | 4295.4 | 11.076 | 4306.5 | 0.00 | 1.089 |
| 1.1442904 | 60.6299 | 24.267 | 4249.5 | 11.095 | 4260.6 | 0.00 | 1.084 |
| 1.1500119 | 60.7063 | 24.128 | 4204.1 | 11.114 | 4215.2 | 0.00 | 1.078 |
| 1.1557619 | 60.7804 | 23.990 | 4159.3 | 11.133 | 4170.4 | 0.00 | 1.073 |
| 1.1615407 | 60.8524 | 23.853 | 4115.0 | 11.152 | 4126.1 | 0.00 | 1.067 |
| 1.1673484 | 60.9222 | 23.717 | 4071.2 | 11.171 | 4082.4 | 0.00 | 1.062 |
| 1.1731852 | 60.9901 | 23.583 | 4028.0 | 11.189 | 4039.2 | 0.00 | 1.057 |
| 1.1790511 | 61.0560 | 23.449 | 3985.2 | 11.207 | 3996.4 | 0.00 | 1.052 |
| 1.1849464 | 61.1201 | 23.317 | 3943.0 | 11.226 | 3954.2 | 0.00 | 1.046 |
| 1.1908711 | 61.1825 | 23.185 | 3901.3 | 11.244 | 3912.5 | 0.00 | 1.041 |
| 1.1968254 | 61.2432 | 23.055 | 3860.0 | 11.261 | 3871.3 | 0.00 | 1.036 |
| 1.2028096 | 61.3023 | 22.926 | 3819.3 | 11.279 | 3830.6 | 0.00 | 1.031 |
| 1.2088236 | 61.3599 | 22.797 | 3779.0 | 11.297 | 3790.3 | 0.00 | 1.026 |
| 1.2148677 | 61.4160 | 22.670 | 3739.3 | 11.314 | 3750.6 | 0.00 | 1.021 |
| 1.2209421 | 61.4706 | 22.544 | 3699.9 | 11.331 | 3711.3 | 0.00 | 1.015 |
| 1.2270468 | 61.5239 | 22.419 | 3661.1 | 11.348 | 3672.4 | 0.00 | 1.010 |
| 1.2331820 | 61.5760 | 22.295 | 3622.7 | 11.365 | 3634.1 | 0.00 | 1.005 |
| 1.2393479 | 61.6268 | 22.171 | 3584.8 | 11.381 | 3596.1 | 0.00 | 1.000 |
| 1.2455447 | 61.6764 | 22.049 | 3547.3 | 11.398 | 3558.7 | 0.00 | 0.9954 |
| 1.2517724 | 61.7249 | 21.928 | 3510.1 | 11.414 | 3521.6 | 0.00 | 0.9905 |
| 1.2580312 | 61.7719 | 21.805 | 3473.1 | 11.430 | 3484.6 | 0.00 | 0.9855 |
| 1.2643214 | 61.8175 | 21.683 | 3436.6 | 11.446 | 3448.0 | 0.00 | 0.9806 |
| 1.2706430 | 61.8616 | 21.563 | 3400.4 | 11.462 | 3411.9 | 0.00 | 0.9758 |
| 1.2769962 | 61.9045 | 21.443 | 3364.7 | 11.477 | 3376.2 | 0.00 | 0.9709 |
| 1.2833812 | 61.9460 | 21.324 | 3329.4 | 11.493 | 3340.9 | 0.00 | 0.9661 |
| 1.2897981 | 61.9863 | 21.206 | 3294.5 | 11.508 | 3306.1 | 0.00 | 0.9613 |
| 1.2962471 | 62.0254 | 21.089 | 3260.1 | 11.523 | 3271.6 | 0.00 | 0.9565 |
| 1.3027283 | 62.0634 | 20.973 | 3226.0 | 11.538 | 3237.5 | 0.00 | 0.9517 |
| 1.3092420 | 62.1002 | 20.858 | 3192.3 | 11.552 | 3203.9 | 0.00 | 0.9470 |
| 1.3157882 | 62.1359 | 20.743 | 3159.0 | 11.567 | 3170.6 | 0.00 | 0.9423 |
| 1.3223671 | 62.1705 | 20.630 | 3126.1 | 11.581 | 3137.7 | 0.00 | 0.9376 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| At($Z=85$) | | | | | | | |
| 1.3289790 | 62.2041 | 20.517 | 3093.6 | 11.595 | 3105.2 | 0.00 | 0.9329 |
| 1.3356239 | 62.2367 | 20.406 | 3061.5 | 11.609 | 3073.1 | 0.00 | 0.9283 |
| 1.3423020 | 62.2683 | 20.295 | 3029.7 | 11.623 | 3041.3 | 0.00 | 0.9237 |
| 1.3490135 | 62.2990 | 20.185 | 2998.3 | 11.637 | 3009.9 | 0.00 | 0.9191 |
| 1.3557586 | 62.3287 | 20.076 | 2967.2 | 11.650 | 2978.9 | 0.00 | 0.9145 |
| 1.3625374 | 62.3575 | 19.967 | 2936.5 | 11.663 | 2948.2 | 0.00 | 0.9100 |
| 1.3693500 | 62.3852 | 19.859 | 2906.1 | 11.676 | 2917.8 | 0.00 | 0.9054 |
| 1.3761968 | 62.4120 | 19.752 | 2876.0 | 11.689 | 2887.7 | 0.00 | 0.9009 |
| 1.3830778 | 62.4378 | 19.646 | 2846.3 | 11.702 | 2858.0 | 0.00 | 0.8964 |
| 1.3899932 | 62.4627 | 19.540 | 2817.0 | 11.714 | 2828.7 | 0.00 | 0.8920 |
| 1.3969431 | 62.4866 | 19.436 | 2787.9 | 11.727 | 2799.6 | 0.00 | 0.8875 |
| 1.4039278 | 62.5097 | 19.332 | 2759.2 | 11.739 | 2771.0 | 0.00 | 0.8831 |
| 1.4109475 | 62.5318 | 19.229 | 2730.9 | 11.751 | 2742.6 | 0.00 | 0.8787 |
| 1.4180022 | 62.5532 | 19.126 | 2702.8 | 11.762 | 2714.6 | 0.00 | 0.8744 |
| 1.4250922 | 62.5736 | 19.025 | 2675.1 | 11.774 | 2686.9 | 0.00 | 0.8700 |
| 1.4322177 | 62.6075 | 18.924 | 2647.7 | 11.785 | 2659.5 | 0.00 | 0.8657 |
| 1.4393788 | 62.6266 | 18.824 | 2620.6 | 11.796 | 2632.4 | 0.00 | 0.8614 |
| 1.4465757 | 62.6450 | 18.725 | 2593.8 | 11.807 | 2605.6 | 0.00 | 0.8571 |
| 1.4538086 | 62.6625 | 18.627 | 2567.3 | 11.818 | 2579.2 | 0.00 | 0.8528 |
| 1.4610776 | 62.6793 | 18.529 | 2541.2 | 11.829 | 2553.0 | 0.00 | 0.8486 |
| 1.4683830 | 62.6953 | 18.432 | 2515.3 | 11.839 | 2527.1 | 0.00 | 0.8444 |
| 1.4757249 | 62.7106 | 18.336 | 2489.7 | 11.849 | 2501.6 | 0.00 | 0.8402 |
| 1.4831035 | 62.7253 | 18.240 | 2464.4 | 11.859 | 2476.3 | 0.00 | 0.8360 |
| 1.4905190 | 62.7392 | 18.145 | 2439.4 | 11.869 | 2451.3 | 0.00 | 0.8318 |
| 1.4979716 | 62.7525 | 18.051 | 2414.7 | 11.879 | 2426.6 | 0.00 | 0.8277 |
| 1.5054615 | 62.7649 | 17.957 | 2390.1 | 11.888 | 2402.0 | 0.00 | 0.8236 |
| 1.5129888 | 62.7764 | 17.863 | 2365.8 | 11.897 | 2377.7 | 0.00 | 0.8195 |
| 1.5205537 | 62.7871 | 17.770 | 2341.7 | 11.906 | 2353.6 | 0.00 | 0.8154 |
| 1.5281565 | 62.7970 | 17.677 | 2317.9 | 11.915 | 2329.8 | 0.00 | 0.8113 |
| 1.5357973 | 62.8061 | 17.585 | 2294.4 | 11.924 | 2306.3 | 0.00 | 0.8073 |
| 1.5434763 | 62.8143 | 17.494 | 2271.2 | 11.932 | 2283.1 | 0.00 | 0.8033 |
| 1.5511937 | 62.8218 | 17.404 | 2248.2 | 11.941 | 2260.1 | 0.00 | 0.7993 |
| 1.5589496 | 62.8285 | 17.314 | 2225.4 | 11.949 | 2237.4 | 0.00 | 0.7953 |
| 1.5667444 | 62.8344 | 17.225 | 2203.0 | 11.957 | 2214.9 | 0.00 | 0.7913 |
| 1.5745781 | 62.8396 | 17.136 | 2180.7 | 11.964 | 2192.7 | 0.00 | 0.7874 |
| 1.5824510 | 62.8439 | 17.048 | 2158.8 | 11.972 | 2170.7 | 0.00 | 0.7835 |
| 1.5903633 | 62.8476 | 16.961 | 2137.0 | 11.979 | 2149.0 | 0.00 | 0.7796 |
| 1.5983151 | 62.8504 | 16.874 | 2115.6 | 11.986 | 2127.5 | 0.00 | 0.7757 |
| 1.6063066 | 62.8710 | 16.788 | 2094.3 | 11.993 | 2106.3 | 0.00 | 0.7719 |
| 1.6143382 | 62.8725 | 16.703 | 2073.3 | 12.000 | 2085.3 | 0.00 | 0.7680 |
| 1.6224099 | 62.8732 | 16.618 | 2052.5 | 12.006 | 2064.5 | 0.00 | 0.7642 |
| 1.6305219 | 62.8732 | 16.534 | 2032.0 | 12.012 | 2044.0 | 0.00 | 0.7604 |
| 1.6386745 | 62.8725 | 16.451 | 2011.7 | 12.019 | 2023.7 | 0.00 | 0.7566 |
| 1.6468679 | 62.8710 | 16.368 | 1991.6 | 12.024 | 2003.6 | 0.00 | 0.7528 |
| 1.6551022 | 62.8688 | 16.286 | 1971.7 | 12.030 | 1983.7 | 0.00 | 0.7491 |
| 1.6633777 | 62.8658 | 16.204 | 1952.0 | 12.036 | 1964.1 | 0.00 | 0.7454 |
| 1.6716946 | 62.8621 | 16.123 | 1932.6 | 12.041 | 1944.7 | 0.00 | 0.7417 |
| 1.6800531 | 62.8577 | 16.042 | 1913.4 | 12.046 | 1925.5 | 0.00 | 0.7380 |
| 1.6884534 | 62.8525 | 15.963 | 1894.4 | 12.051 | 1906.5 | 0.00 | 0.7343 |
| 1.6968956 | 62.8466 | 15.883 | 1875.6 | 12.056 | 1887.7 | 0.00 | 0.7307 |
| 1.7053801 | 62.8400 | 15.804 | 1857.0 | 12.060 | 1869.1 | 0.00 | 0.7270 |
| 1.7139070 | 62.8326 | 15.726 | 1838.6 | 12.065 | 1850.7 | 0.00 | 0.7234 |
| 1.7224766 | 62.8244 | 15.649 | 1820.5 | 12.069 | 1832.5 | 0.00 | 0.7198 |
| 1.7310889 | 62.8156 | 15.572 | 1802.5 | 12.073 | 1814.6 | 0.00 | 0.7162 |
| 1.7397444 | 62.8060 | 15.495 | 1784.7 | 12.076 | 1796.8 | 0.00 | 0.7127 |
| 1.7484431 | 62.7956 | 15.419 | 1767.1 | 12.080 | 1779.2 | 0.00 | 0.7091 |
| 1.7571853 | 62.7845 | 15.344 | 1749.7 | 12.083 | 1761.8 | 0.00 | 0.7056 |
| 1.7659712 | 62.7726 | 15.269 | 1732.5 | 12.086 | 1744.6 | 0.00 | 0.7021 |
| 1.7748011 | 62.7599 | 15.195 | 1715.5 | 12.089 | 1727.6 | 0.00 | 0.6986 |
| 1.7836751 | 62.7465 | 15.121 | 1698.7 | 12.092 | 1710.8 | 0.00 | 0.6951 |
| 1.7925935 | 62.7324 | 15.047 | 1682.1 | 12.095 | 1694.2 | 0.00 | 0.6916 |
| 1.8015565 | 62.7174 | 14.975 | 1665.6 | 12.097 | 1677.7 | 0.00 | 0.6882 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| At($Z=85$) | | | | | | | |
| 1.8105642 | 62.7017 | 14.903 | 1649.3 | 12.099 | 1661.4 | 0.00 | 0.6848 |
| 1.8196171 | 62.6852 | 14.831 | 1633.2 | 12.101 | 1645.3 | 0.00 | 0.6814 |
| 1.8287151 | 62.6679 | 14.760 | 1617.3 | 12.103 | 1629.4 | 0.00 | 0.6780 |
| 1.8378587 | 62.6499 | 14.689 | 1601.5 | 12.104 | 1613.6 | 0.00 | 0.6746 |
| 1.8470480 | 62.6310 | 14.619 | 1586.0 | 12.106 | 1598.1 | 0.00 | 0.6713 |
| 1.8562833 | 62.6113 | 14.549 | 1570.6 | 12.107 | 1582.7 | 0.00 | 0.6679 |
| 1.8655647 | 62.5909 | 14.480 | 1555.3 | 12.108 | 1567.4 | 0.00 | 0.6646 |
| 1.8748925 | 62.5696 | 14.411 | 1540.2 | 12.109 | 1552.3 | 0.00 | 0.6613 |
| 1.8842670 | 62.5475 | 14.343 | 1525.3 | 12.109 | 1537.4 | 0.00 | 0.6580 |
| 1.8936883 | 62.5246 | 14.275 | 1510.6 | 12.110 | 1522.7 | 0.00 | 0.6547 |
| 1.9031567 | 62.5009 | 14.207 | 1495.8 | 12.110 | 1507.9 | 0.00 | 0.6515 |
| 1.9126725 | 62.4759 | 14.131 | 1480.4 | 12.110 | 1492.5 | 0.00 | 0.6482 |
| 1.9222359 | 62.4493 | 14.055 | 1465.2 | 12.110 | 1477.3 | 0.00 | 0.6450 |
| 1.9318471 | 62.4212 | 13.981 | 1450.2 | 12.109 | 1462.3 | 0.00 | 0.6418 |
| 1.9415063 | 62.3915 | 13.907 | 1435.3 | 12.109 | 1447.4 | 0.00 | 0.6386 |
| 1.9512138 | 62.3603 | 13.833 | 1420.6 | 12.108 | 1432.7 | 0.00 | 0.6354 |
| 1.9609699 | 62.3275 | 13.760 | 1406.0 | 12.107 | 1418.1 | 0.00 | 0.6323 |
| 1.9707747 | 62.2931 | 13.687 | 1391.7 | 12.106 | 1403.8 | 0.00 | 0.6291 |
| 1.9806286 | 62.2571 | 13.615 | 1377.4 | 12.104 | 1389.5 | 0.00 | 0.6260 |
| 1.9905318 | 62.2196 | 13.543 | 1363.4 | 12.103 | 1375.5 | 0.00 | 0.6229 |
| 2.0004844 | 62.1804 | 13.472 | 1349.5 | 12.101 | 1361.6 | 0.00 | 0.6198 |
| 2.0104868 | 62.1396 | 13.402 | 1335.7 | 12.099 | 1347.8 | 0.00 | 0.6167 |
| 2.0205393 | 62.0971 | 13.332 | 1322.1 | 12.097 | 1334.2 | 0.00 | 0.6136 |
| 2.0306420 | 62.0529 | 13.262 | 1308.7 | 12.094 | 1320.8 | 0.00 | 0.6106 |
| 2.0407952 | 62.0071 | 13.193 | 1295.4 | 12.092 | 1307.5 | 0.00 | 0.6075 |
| 2.0509992 | 61.9595 | 13.124 | 1282.2 | 12.089 | 1294.3 | 0.00 | 0.6045 |
| 2.0612542 | 61.9100 | 13.056 | 1269.2 | 12.086 | 1281.3 | 0.00 | 0.6015 |
| 2.0715604 | 61.8588 | 12.988 | 1256.3 | 12.083 | 1268.4 | 0.00 | 0.5985 |
| 2.0819182 | 61.8057 | 12.920 | 1243.6 | 12.079 | 1255.7 | 0.00 | 0.5955 |
| 2.0923278 | 61.7467 | 12.853 | 1230.9 | 12.076 | 1243.0 | 0.00 | 0.5926 |
| 2.1027895 | 61.6898 | 12.786 | 1218.4 | 12.072 | 1230.5 | 0.00 | 0.5896 |
| 2.1133034 | 61.6309 | 12.720 | 1206.1 | 12.068 | 1218.1 | 0.00 | 0.5867 |
| 2.1238699 | 61.5699 | 12.654 | 1193.8 | 12.064 | 1205.9 | 0.00 | 0.5838 |
| 2.1344893 | 61.5067 | 12.587 | 1181.7 | 12.060 | 1193.7 | 0.00 | 0.5809 |
| 2.1451617 | 61.4410 | 12.516 | 1169.1 | 12.055 | 1181.2 | 0.00 | 0.5780 |
| 2.1558875 | 61.3725 | 12.445 | 1156.8 | 12.051 | 1168.8 | 0.00 | 0.5751 |
| 2.1666670 | 61.3012 | 12.375 | 1144.5 | 12.046 | 1156.6 | 0.00 | 0.5722 |
| 2.1775003 | 61.2270 | 12.306 | 1132.4 | 12.041 | 1144.5 | 0.00 | 0.5694 |
| 2.1883878 | 61.1498 | 12.236 | 1120.4 | 12.035 | 1132.5 | 0.00 | 0.5666 |
| 2.1993297 | 61.0695 | 12.168 | 1108.6 | 12.030 | 1120.7 | 0.00 | 0.5637 |
| 2.2103264 | 60.9861 | 12.100 | 1096.9 | 12.024 | 1109.0 | 0.00 | 0.5609 |
| 2.2213780 | 60.9045 | 12.032 | 1085.4 | 12.019 | 1097.4 | 0.00 | 0.5581 |
| 2.2324849 | 60.8145 | 11.965 | 1073.9 | 12.013 | 1085.9 | 0.00 | 0.5554 |
| 2.2436473 | 60.7210 | 11.898 | 1062.6 | 12.006 | 1074.6 | 0.00 | 0.5526 |
| 2.2548656 | 60.6238 | 11.832 | 1051.5 | 12.000 | 1063.5 | 0.00 | 0.5499 |
| 2.2661399 | 60.5229 | 11.766 | 1040.4 | 11.993 | 1052.4 | 0.00 | 0.5471 |
| 2.2774706 | 60.4180 | 11.701 | 1029.5 | 11.987 | 1041.5 | 0.00 | 0.5444 |
| 2.2888579 | 60.3090 | 11.636 | 1018.7 | 11.980 | 1030.7 | 0.00 | 0.5417 |
| 2.3003022 | 60.1957 | 11.572 | 1008.0 | 11.973 | 1020.0 | 0.00 | 0.5390 |
| 2.3118037 | 60.0779 | 11.508 | 997.46 | 11.965 | 1009.4 | 0.00 | 0.5363 |
| 2.3233628 | 59.9554 | 11.444 | 987.02 | 11.958 | 998.98 | 0.00 | 0.5336 |
| 2.3349796 | 59.8280 | 11.381 | 976.70 | 11.950 | 988.65 | 0.00 | 0.5310 |
| 2.3466545 | 59.6953 | 11.318 | 966.49 | 11.942 | 978.44 | 0.00 | 0.5283 |
| 2.3583878 | 59.5571 | 11.256 | 956.40 | 11.934 | 968.34 | 0.00 | 0.5257 |
| 2.3701797 | 59.4131 | 11.195 | 946.43 | 11.926 | 958.35 | 0.00 | 0.5231 |
| 2.3820306 | 59.2630 | 11.133 | 936.56 | 11.917 | 948.48 | 0.00 | 0.5205 |
| 2.3939407 | 59.1063 | 11.072 | 926.81 | 11.909 | 938.72 | 0.00 | 0.5179 |
| 2.4059104 | 58.9427 | 11.012 | 917.16 | 11.900 | 929.06 | 0.00 | 0.5153 |
| 2.4179400 | 58.7717 | 10.952 | 907.62 | 11.891 | 919.52 | 0.00 | 0.5128 |
| 2.4300297 | 58.5928 | 10.892 | 898.19 | 11.882 | 910.07 | 0.00 | 0.5102 |
| 2.4421798 | 58.4054 | 10.833 | 888.87 | 11.873 | 900.74 | 0.00 | 0.5077 |
| 2.4543907 | 58.2090 | 10.774 | 879.65 | 11.863 | 891.51 | 0.00 | 0.5052 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| At($Z=85$) | | | | | | | |
| 2.4666627 | 58.0028 | 10.716 | 870.53 | 11.854 | 882.38 | 0.00 | 0.5026 |
| 2.4789960 | 57.7860 | 10.658 | 861.51 | 11.844 | 873.35 | 0.00 | 0.5001 |
| 2.4913910 | 57.5578 | 10.600 | 852.59 | 11.834 | 864.43 | 0.00 | 0.4977 |
| 2.5038479 | 57.3171 | 10.543 | 843.78 | 11.824 | 855.60 | 0.00 | 0.4952 |
| 2.5163672 | 57.0629 | 10.486 | 835.06 | 11.813 | 846.87 | 0.00 | 0.4927 |
| 2.5289490 | 56.7938 | 10.430 | 826.43 | 11.803 | 838.24 | 0.00 | 0.4903 |
| 2.5415938 | 56.5083 | 10.374 | 817.91 | 11.792 | 829.70 | 0.00 | 0.4878 |
| 2.5543017 | 56.2047 | 10.318 | 809.48 | 11.781 | 821.26 | 0.00 | 0.4854 |
| 2.5670732 | 55.8809 | 10.263 | 801.14 | 11.770 | 812.91 | 0.00 | 0.4830 |
| 2.5799086 | 55.5345 | 10.208 | 792.89 | 11.759 | 804.65 | 0.00 | 0.4806 |
| 2.5928082 | 55.1626 | 10.154 | 784.74 | 11.747 | 796.48 | 0.00 | 0.4782 |
| 2.6057722 | 54.7618 | 10.100 | 776.67 | 11.736 | 788.40 | 0.00 | 0.4758 |
| 2.6188011 | 54.3277 | 10.046 | 768.68 | 11.724 | 780.40 | 0.00 | 0.4734 |
| 2.6318951 | 53.8551 | 9.9924 | 760.78 | 11.712 | 772.49 | 0.00 | 0.4711 |
| 2.6450545 | 53.3372 | 9.9392 | 752.97 | 11.700 | 764.67 | 0.00 | 0.4687 |
| 2.6582798 | 52.7621 | 9.8864 | 745.24 | 11.688 | 756.93 | 0.00 | 0.4664 |
| 2.6715712 | 52.1250 | 9.8340 | 737.60 | 11.675 | 749.28 | 0.00 | 0.4641 |
| 2.6849291 | 51.4068 | 9.7819 | 730.04 | 11.663 | 741.71 | 0.00 | 0.4618 |
| 2.6983537 | 50.5855 | 9.7302 | 722.57 | 11.650 | 734.22 | 0.00 | 0.4595 |
| 2.7118455 | 49.6278 | 9.6788 | 715.18 | 11.637 | 726.82 | 0.00 | 0.4572 |
| 2.7254047 | 48.4808 | 9.6278 | 707.87 | 11.624 | 719.49 | 0.00 | 0.4549 |
| 2.7390317 | 47.0512 | 9.5771 | 700.64 | 11.611 | 712.25 | 0.00 | 0.4527 |
| 2.7527269 | 45.1506 | 9.5267 | 693.49 | 11.597 | 705.09 | 0.00 | 0.4504 |
| 2.7664905 | 42.2866 | 9.4767 | 686.42 | 11.584 | 698.00 | 0.00 | 0.4482 |
| 2.7803230 | 36.0743 | 9.4271 | 679.42 | 11.570 | 690.99 | 0.00 | 0.4459 |
| 2.7859225 | 24.9183 | 9.4071 | 676.63 | 11.564 | 688.19 | 0.00 | 0.4450 |
| 2.7874775 | 24.6386 | 26.001 | 1869.1 | 11.563 | 1880.7 | 0.00 | 0.4448 |
| 2.7942246 | 36.5860 | 25.901 | 1857.4 | 11.556 | 1869.0 | 0.00 | 0.4437 |
| 2.8081957 | 41.9162 | 25.695 | 1833.5 | 11.542 | 1845.1 | 0.00 | 0.4415 |
| 2.8222367 | 44.2477 | 25.491 | 1809.9 | 11.528 | 1821.4 | 0.00 | 0.4393 |
| 2.8363479 | 45.5720 | 25.289 | 1786.6 | 11.513 | 1798.2 | 0.00 | 0.4371 |
| 2.8505296 | 46.3024 | 25.089 | 1763.7 | 11.499 | 1775.2 | 0.00 | 0.4350 |
| 2.8647823 | 46.5380 | 24.890 | 1741.0 | 11.484 | 1752.5 | 0.00 | 0.4328 |
| 2.8791062 | 46.1883 | 24.694 | 1718.7 | 11.469 | 1730.1 | 0.00 | 0.4306 |
| 2.8935017 | 44.7409 | 24.499 | 1696.6 | 11.454 | 1708.0 | 0.00 | 0.4285 |
| 2.9079692 | 34.6640 | 24.305 | 1674.8 | 11.439 | 1686.3 | 0.00 | 0.4264 |
| 2.9095697 | 35.2111 | 35.654 | 2455.5 | 11.437 | 2467.0 | 0.00 | 0.4261 |
| 2.9225091 | 45.9635 | 35.360 | 2424.5 | 11.424 | 2435.9 | 0.00 | 0.4242 |
| 2.9371216 | 49.2886 | 35.032 | 2390.0 | 11.408 | 2401.4 | 0.00 | 0.4221 |
| 2.9518072 | 51.4263 | 34.708 | 2356.1 | 11.393 | 2367.5 | 0.00 | 0.4200 |
| 2.9665662 | 53.0571 | 34.386 | 2322.7 | 11.377 | 2334.1 | 0.00 | 0.4179 |
| 2.9813991 | 54.3935 | 34.067 | 2289.7 | 11.361 | 2301.0 | 0.00 | 0.4159 |
| 2.9963061 | 55.5315 | 33.751 | 2257.2 | 11.345 | 2268.5 | 0.00 | 0.4138 |
| 3.0112876 | 56.5390 | 33.427 | 2224.4 | 11.329 | 2235.7 | 0.00 | 0.4117 |
| 3.0263440 | 57.4338 | 33.103 | 2191.8 | 11.312 | 2203.2 | 0.00 | 0.4097 |
| 3.0414758 | 58.2322 | 32.783 | 2159.8 | 11.296 | 2171.1 | 0.00 | 0.4076 |
| 3.0566831 | 58.9481 | 32.472 | 2128.7 | 11.279 | 2140.0 | 0.00 | 0.4056 |
| 3.0719666 | 59.6009 | 32.177 | 2098.9 | 11.263 | 2110.2 | 0.00 | 0.4036 |
| 3.0873264 | 60.2011 | 31.888 | 2069.7 | 11.246 | 2080.9 | 0.00 | 0.4016 |
| 3.1027630 | 60.7542 | 31.603 | 2041.0 | 11.228 | 2052.2 | 0.00 | 0.3996 |
| 3.1182768 | 61.2649 | 31.323 | 2012.8 | 11.211 | 2024.0 | 0.00 | 0.3976 |
| 3.1338682 | 61.7370 | 31.046 | 1985.1 | 11.194 | 1996.3 | 0.00 | 0.3956 |
| 3.1495376 | 62.1737 | 30.774 | 1958.0 | 11.176 | 1969.1 | 0.00 | 0.3937 |
| 3.1652853 | 62.5775 | 30.507 | 1931.3 | 11.159 | 1942.4 | 0.00 | 0.3917 |
| 3.1811117 | 62.9504 | 30.243 | 1905.0 | 11.141 | 1916.2 | 0.00 | 0.3898 |
| 3.1970172 | 63.2938 | 29.982 | 1879.2 | 11.123 | 1890.3 | 0.00 | 0.3878 |
| 3.2130023 | 63.6087 | 29.726 | 1853.9 | 11.105 | 1865.0 | 0.00 | 0.3859 |
| 3.2290673 | 63.8955 | 29.472 | 1828.9 | 11.087 | 1840.0 | 0.00 | 0.3840 |
| 3.2452127 | 64.1543 | 29.223 | 1804.4 | 11.068 | 1815.5 | 0.00 | 0.3821 |
| 3.2614387 | 64.3844 | 28.976 | 1780.3 | 11.050 | 1791.4 | 0.00 | 0.3802 |
| 3.2777459 | 64.5842 | 28.733 | 1756.6 | 11.031 | 1767.6 | 0.00 | 0.3783 |
| 3.2941347 | 64.7511 | 28.493 | 1733.2 | 11.013 | 1744.2 | 0.00 | 0.3764 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| At($Z=85$) | | | | | | | |
| 3.3106053 | 64.8811 | 28.256 | 1710.3 | 10.994 | 1721.2 | 0.00 | 0.3745 |
| 3.3271584 | 64.9672 | 28.022 | 1687.6 | 10.975 | 1698.6 | 0.00 | 0.3726 |
| 3.3437941 | 64.9983 | 27.790 | 1665.4 | 10.956 | 1676.3 | 0.00 | 0.3708 |
| 3.3605131 | 64.9547 | 27.561 | 1643.4 | 10.936 | 1654.4 | 0.00 | 0.3689 |
| 3.3773157 | 64.7979 | 27.335 | 1621.8 | 10.917 | 1632.8 | 0.00 | 0.3671 |
| 3.3942023 | 64.4375 | 27.112 | 1600.6 | 10.897 | 1611.5 | 0.00 | 0.3653 |
| 3.4111733 | 63.5591 | 26.891 | 1579.6 | 10.878 | 1590.5 | 0.00 | 0.3635 |
| 3.4220602 | 61.7180 | 26.751 | 1566.4 | 10.865 | 1577.3 | 0.00 | 0.3623 |
| 3.4282291 | 60.8811 | 31.482 | 1840.1 | 10.858 | 1851.0 | 0.00 | 0.3617 |
| 3.4299400 | 61.7851 | 31.455 | 1837.6 | 10.856 | 1848.5 | 0.00 | 0.3615 |
| 3.4453703 | 64.4809 | 31.216 | 1815.5 | 10.838 | 1826.4 | 0.00 | 0.3599 |
| 3.4625971 | 65.7151 | 30.953 | 1791.3 | 10.818 | 1802.1 | 0.00 | 0.3581 |
| 3.4799101 | 66.5510 | 30.693 | 1767.4 | 10.798 | 1778.2 | 0.00 | 0.3563 |
| 3.4973097 | 67.2080 | 30.435 | 1743.8 | 10.778 | 1754.6 | 0.00 | 0.3545 |
| 3.5147962 | 67.7600 | 30.180 | 1720.6 | 10.757 | 1731.4 | 0.00 | 0.3527 |
| 3.5323702 | 68.2409 | 29.928 | 1697.7 | 10.737 | 1708.5 | 0.00 | 0.3510 |
| 3.5500321 | 68.6694 | 29.677 | 1675.1 | 10.716 | 1685.9 | 0.00 | 0.3492 |
| 3.5677822 | 69.0562 | 29.429 | 1652.8 | 10.696 | 1663.5 | 0.00 | 0.3475 |
| 3.5856211 | 69.4079 | 29.182 | 1630.8 | 10.675 | 1641.5 | 0.00 | 0.3458 |
| 3.6035492 | 69.7284 | 28.945 | 1609.6 | 10.654 | 1620.2 | 0.00 | 0.3441 |
| 3.6215670 | 70.0300 | 28.720 | 1589.1 | 10.633 | 1599.7 | 0.00 | 0.3423 |
| 3.6396748 | 70.3141 | 28.491 | 1568.5 | 10.611 | 1579.2 | 0.00 | 0.3406 |
| 3.6578732 | 70.5812 | 28.264 | 1548.3 | 10.590 | 1558.9 | 0.00 | 0.3390 |
| 3.6761626 | 70.8327 | 28.040 | 1528.4 | 10.569 | 1539.0 | 0.00 | 0.3373 |
| 3.6945434 | 71.0697 | 27.819 | 1508.8 | 10.547 | 1519.4 | 0.00 | 0.3356 |
| 3.7130161 | 71.2934 | 27.600 | 1489.5 | 10.526 | 1500.1 | 0.00 | 0.3339 |
| 3.7315812 | 71.5044 | 27.384 | 1470.5 | 10.504 | 1481.0 | 0.00 | 0.3323 |
| 3.7502391 | 71.7034 | 27.170 | 1451.7 | 10.482 | 1462.2 | 0.00 | 0.3306 |
| 3.7689903 | 71.8908 | 26.958 | 1433.3 | 10.460 | 1443.7 | 0.00 | 0.3290 |
| 3.7878352 | 72.0668 | 26.747 | 1415.0 | 10.438 | 1425.4 | 0.00 | 0.3273 |
| 3.8067744 | 72.2297 | 26.534 | 1396.7 | 10.416 | 1407.1 | 0.00 | 0.3257 |
| 3.8258083 | 72.3791 | 26.324 | 1378.8 | 10.393 | 1389.2 | 0.00 | 0.3241 |
| 3.8449373 | 72.5145 | 26.116 | 1361.0 | 10.371 | 1371.4 | 0.00 | 0.3225 |
| 3.8641620 | 72.6348 | 25.910 | 1343.6 | 10.349 | 1353.9 | 0.00 | 0.3209 |
| 3.8834828 | 72.7379 | 25.706 | 1326.4 | 10.326 | 1336.7 | 0.00 | 0.3193 |
| 3.9029002 | 72.8209 | 25.504 | 1309.4 | 10.303 | 1319.7 | 0.00 | 0.3177 |
| 3.9224147 | 72.8781 | 25.304 | 1292.7 | 10.281 | 1303.0 | 0.00 | 0.3161 |
| 3.9420268 | 72.8994 | 25.107 | 1276.2 | 10.258 | 1286.5 | 0.00 | 0.3145 |
| 3.9617369 | 72.8631 | 24.911 | 1260.0 | 10.235 | 1270.2 | 0.00 | 0.3130 |
| 3.9815456 | 72.7088 | 24.717 | 1244.0 | 10.212 | 1254.2 | 0.00 | 0.3114 |
| 4.0014533 | 72.0824 | 24.525 | 1228.2 | 10.188 | 1238.3 | 0.00 | 0.3098 |
| 4.0023486 | 72.0069 | 24.516 | 1227.4 | 10.187 | 1237.6 | 0.00 | 0.3098 |
| 4.0136512 | 72.0742 | 26.173 | 1306.7 | 10.174 | 1316.9 | 0.00 | 0.3089 |
| 4.0214606 | 72.6244 | 26.090 | 1300.0 | 10.165 | 1310.2 | 0.00 | 0.3083 |
| 4.0415679 | 73.2843 | 25.878 | 1283.0 | 10.142 | 1293.2 | 0.00 | 0.3068 |
| 4.0617757 | 73.6831 | 25.668 | 1266.3 | 10.118 | 1276.4 | 0.00 | 0.3052 |
| 4.0820846 | 73.9871 | 25.460 | 1249.8 | 10.095 | 1259.9 | 0.00 | 0.3037 |
| 4.1024950 | 74.2385 | 25.254 | 1233.5 | 10.071 | 1243.6 | 0.00 | 0.3022 |
| 4.1230075 | 74.4541 | 25.050 | 1217.5 | 10.048 | 1227.5 | 0.00 | 0.3007 |
| 4.1436226 | 74.6422 | 24.848 | 1201.6 | 10.024 | 1211.7 | 0.00 | 0.2992 |
| 4.1643407 | 74.8068 | 24.648 | 1186.0 | 9.9999 | 1196.0 | 0.00 | 0.2977 |
| 4.1851624 | 74.9494 | 24.450 | 1170.6 | 9.9759 | 1180.6 | 0.00 | 0.2962 |
| 4.2060882 | 75.0688 | 24.254 | 1155.5 | 9.9518 | 1165.4 | 0.00 | 0.2948 |
| 4.2271186 | 75.1655 | 24.070 | 1141.0 | 9.9277 | 1150.9 | 0.00 | 0.2933 |
| 4.2482542 | 75.2375 | 23.888 | 1126.7 | 9.9035 | 1136.6 | 0.00 | 0.2918 |
| 4.2694955 | 75.2703 | 23.708 | 1112.7 | 9.8792 | 1122.6 | 0.00 | 0.2904 |
| 4.2908430 | 75.2228 | 23.530 | 1098.9 | 9.8548 | 1108.7 | 0.00 | 0.2890 |
| 4.3080637 | 74.9852 | 23.389 | 1087.9 | 9.8352 | 1097.8 | 0.00 | 0.2878 |
| 4.3122972 | 74.8018 | 23.355 | 1085.3 | 9.8303 | 1095.1 | 0.00 | 0.2875 |
| 4.3259361 | 75.0946 | 24.280 | 1124.7 | 9.8148 | 1134.5 | 0.00 | 0.2866 |
| 4.3338587 | 75.3546 | 24.216 | 1119.7 | 9.8058 | 1129.5 | 0.00 | 0.2861 |
| 4.3555280 | 75.7624 | 24.043 | 1106.1 | 9.7812 | 1115.9 | 0.00 | 0.2847 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| At($Z=85$) | | | | | | | |
| 4.3773056 | 76.0413 | 23.872 | 1092.8 | 9.7565 | 1102.6 | 0.00 | 0.2832 |
| 4.3991921 | 76.2710 | 23.703 | 1079.7 | 9.7317 | 1089.4 | 0.00 | 0.2818 |
| 4.4211881 | 76.4735 | 23.535 | 1066.7 | 9.7069 | 1076.4 | 0.00 | 0.2804 |
| 4.4432940 | 76.6586 | 23.369 | 1053.9 | 9.6819 | 1063.6 | 0.00 | 0.2790 |
| 4.4655105 | 76.8307 | 23.202 | 1041.2 | 9.6569 | 1050.8 | 0.00 | 0.2776 |
| 4.4878381 | 76.9916 | 23.034 | 1028.5 | 9.6319 | 1038.1 | 0.00 | 0.2763 |
| 4.5102772 | 77.1433 | 22.868 | 1016.0 | 9.6067 | 1025.6 | 0.00 | 0.2749 |
| 4.5328286 | 77.2873 | 22.702 | 1003.6 | 9.5815 | 1013.2 | 0.00 | 0.2735 |
| 4.5554928 | 77.4247 | 22.538 | 991.39 | 9.5563 | 1001.0 | 0.00 | 0.2722 |
| 4.5782702 | 77.5560 | 22.376 | 979.35 | 9.5309 | 988.88 | 0.00 | 0.2708 |
| 4.6011616 | 77.6821 | 22.215 | 967.46 | 9.5055 | 976.97 | 0.00 | 0.2695 |
| 4.6241674 | 77.8034 | 22.055 | 955.73 | 9.4801 | 965.21 | 0.00 | 0.2681 |
| 4.6472882 | 77.9203 | 21.897 | 944.16 | 9.4545 | 953.62 | 0.00 | 0.2668 |
| 4.6705247 | 78.0333 | 21.740 | 932.74 | 9.4289 | 942.17 | 0.00 | 0.2655 |
| 4.6938773 | 78.1426 | 21.585 | 921.47 | 9.4033 | 930.87 | 0.00 | 0.2641 |
| 4.7173467 | 78.2484 | 21.431 | 910.34 | 9.3775 | 919.72 | 0.00 | 0.2628 |
| 4.7409334 | 78.3511 | 21.278 | 899.36 | 9.3518 | 908.71 | 0.00 | 0.2615 |
| 4.7646381 | 78.4507 | 21.127 | 888.53 | 9.3259 | 897.85 | 0.00 | 0.2602 |
| 4.7884613 | 78.5475 | 20.977 | 877.83 | 9.3000 | 887.13 | 0.00 | 0.2589 |
| 4.8124036 | 78.6417 | 20.828 | 867.27 | 9.2741 | 876.54 | 0.00 | 0.2576 |
| 4.8364656 | 78.7333 | 20.681 | 856.84 | 9.2480 | 866.09 | 0.00 | 0.2564 |
| 4.8606479 | 78.8225 | 20.535 | 846.55 | 9.2220 | 855.78 | 0.00 | 0.2551 |
| 4.8849512 | 78.9094 | 20.390 | 836.40 | 9.1959 | 845.59 | 0.00 | 0.2538 |
| 4.9093759 | 78.9942 | 20.246 | 826.37 | 9.1697 | 835.54 | 0.00 | 0.2525 |
| 4.9339228 | 79.0770 | 20.103 | 816.46 | 9.1434 | 825.61 | 0.00 | 0.2513 |
| 4.9585924 | 79.1577 | 19.962 | 806.69 | 9.1172 | 815.81 | 0.00 | 0.2500 |
| 4.9833854 | 79.2366 | 19.822 | 797.04 | 9.0908 | 806.13 | 0.00 | 0.2488 |
| 5.0083023 | 79.3138 | 19.683 | 787.51 | 9.0645 | 796.57 | 0.00 | 0.2476 |
| 5.0333438 | 79.3892 | 19.545 | 778.09 | 9.0380 | 787.13 | 0.00 | 0.2463 |
| 5.0585105 | 79.4631 | 19.408 | 768.80 | 9.0116 | 777.81 | 0.00 | 0.2451 |
| 5.0838031 | 79.5355 | 19.272 | 759.63 | 8.9850 | 768.61 | 0.00 | 0.2439 |
| 5.1092221 | 79.6065 | 19.137 | 750.56 | 8.9585 | 759.52 | 0.00 | 0.2427 |
| 5.1347682 | 79.6762 | 19.004 | 741.61 | 8.9319 | 750.55 | 0.00 | 0.2415 |
| 5.1604421 | 79.7447 | 18.871 | 732.78 | 8.9052 | 741.68 | 0.00 | 0.2403 |
| 5.1862443 | 79.8122 | 18.740 | 724.05 | 8.8785 | 732.93 | 0.00 | 0.2391 |
| 5.2121755 | 79.8789 | 18.609 | 715.42 | 8.8518 | 724.27 | 0.00 | 0.2379 |
| 5.2382364 | 79.9439 | 18.475 | 706.76 | 8.8250 | 715.58 | 0.00 | 0.2367 |
| 5.2644276 | 80.0070 | 18.343 | 698.20 | 8.7982 | 707.00 | 0.00 | 0.2355 |
| 5.2907497 | 80.0684 | 18.212 | 689.75 | 8.7713 | 698.52 | 0.00 | 0.2343 |
| 5.3172034 | 80.1281 | 18.081 | 681.40 | 8.7444 | 690.15 | 0.00 | 0.2332 |
| 5.3437895 | 80.1863 | 17.952 | 673.15 | 8.7175 | 681.87 | 0.00 | 0.2320 |
| 5.3705084 | 80.2431 | 17.823 | 665.01 | 8.6905 | 673.70 | 0.00 | 0.2309 |
| 5.3973609 | 80.2985 | 17.696 | 656.96 | 8.6635 | 665.63 | 0.00 | 0.2297 |
| 5.4243477 | 80.3526 | 17.569 | 649.02 | 8.6365 | 657.65 | 0.00 | 0.2286 |
| 5.4514695 | 80.4055 | 17.443 | 641.17 | 8.6094 | 649.78 | 0.00 | 0.2274 |
| 5.4787268 | 80.4572 | 17.318 | 633.41 | 8.5823 | 642.00 | 0.00 | 0.2263 |
| 5.5061205 | 80.5077 | 17.195 | 625.75 | 8.5552 | 634.31 | 0.00 | 0.2252 |
| 5.5336511 | 80.5572 | 17.072 | 618.19 | 8.5280 | 626.72 | 0.00 | 0.2241 |
| 5.5613193 | 80.6057 | 16.950 | 610.72 | 8.5008 | 619.22 | 0.00 | 0.2229 |
| 5.5891259 | 80.6195 | 16.825 | 603.23 | 8.4736 | 611.70 | 0.00 | 0.2218 |
| 5.6170716 | 80.6659 | 16.700 | 595.75 | 8.4463 | 604.19 | 0.00 | 0.2207 |
| 5.6451569 | 80.9106 | 16.575 | 588.34 | 8.4191 | 596.76 | 0.00 | 0.2196 |
| 5.6733827 | 80.9538 | 16.451 | 581.04 | 8.3918 | 589.43 | 0.00 | 0.2185 |
| 5.7017496 | 80.9955 | 16.328 | 573.82 | 8.3644 | 582.18 | 0.00 | 0.2174 |
| 5.7302584 | 81.0358 | 16.206 | 566.70 | 8.3371 | 575.03 | 0.00 | 0.2164 |
| 5.7589096 | 81.0748 | 16.085 | 559.67 | 8.3097 | 567.98 | 0.00 | 0.2153 |
| 5.7877042 | 81.1126 | 15.964 | 552.72 | 8.2823 | 561.01 | 0.00 | 0.2142 |
| 5.8166427 | 81.1491 | 15.845 | 545.87 | 8.2549 | 554.13 | 0.00 | 0.2132 |
| 5.8457259 | 81.2989 | 15.724 | 539.01 | 8.2275 | 547.23 | 0.00 | 0.2121 |
| 5.8749546 | 81.3329 | 15.604 | 532.23 | 8.2000 | 540.43 | 0.00 | 0.2110 |
| 5.9043293 | 81.3655 | 15.485 | 525.54 | 8.1726 | 533.71 | 0.00 | 0.2100 |
| 5.9338510 | 81.3968 | 15.367 | 518.94 | 8.1451 | 527.08 | 0.00 | 0.2089 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| At($Z=85$) | | | | | | | |
| 5.9635202 | 81.4269 | 15.250 | 512.42 | 8.1176 | 520.54 | 0.00 | 0.2079 |
| 5.9933378 | 81.4558 | 15.134 | 505.99 | 8.0901 | 514.08 | 0.00 | 0.2069 |
| 6.0233045 | 81.4835 | 15.019 | 499.65 | 8.0625 | 507.71 | 0.00 | 0.2058 |
| 6.0534210 | 81.5100 | 14.905 | 493.38 | 8.0350 | 501.42 | 0.00 | 0.2048 |
| 6.0836882 | 81.5356 | 14.792 | 487.20 | 8.0074 | 495.21 | 0.00 | 0.2038 |
| 6.1141066 | 81.5600 | 14.679 | 481.10 | 7.9799 | 489.08 | 0.00 | 0.2028 |
| 6.1446771 | 81.5835 | 14.568 | 475.08 | 7.9523 | 483.03 | 0.00 | 0.2018 |
| 6.1754005 | 81.6061 | 14.458 | 469.14 | 7.9247 | 477.06 | 0.00 | 0.2008 |
| 6.2062775 | 81.6277 | 14.349 | 463.27 | 7.8971 | 471.17 | 0.00 | 0.1998 |
| 6.2373089 | 81.6483 | 14.240 | 457.49 | 7.8695 | 465.36 | 0.00 | 0.1988 |
| 6.2684954 | 81.6682 | 14.133 | 451.78 | 7.8419 | 459.62 | 0.00 | 0.1978 |
| 6.2998379 | 81.6871 | 14.026 | 446.14 | 7.8143 | 453.95 | 0.00 | 0.1968 |
| 6.3313371 | 81.7053 | 13.921 | 440.58 | 7.7866 | 448.36 | 0.00 | 0.1958 |
| 6.3629938 | 81.7226 | 13.816 | 435.09 | 7.7590 | 442.85 | 0.00 | 0.1949 |
| 6.3948088 | 81.7392 | 13.712 | 429.67 | 7.7314 | 437.40 | 0.00 | 0.1939 |
| 6.4267828 | 81.7551 | 13.609 | 424.32 | 7.7037 | 432.03 | 0.00 | 0.1929 |
| 6.4589167 | 81.7702 | 13.507 | 419.05 | 7.6761 | 426.72 | 0.00 | 0.1920 |
| 6.4912113 | 81.7846 | 13.406 | 413.84 | 7.6484 | 421.49 | 0.00 | 0.1910 |
| 6.5236674 | 81.7983 | 13.306 | 408.70 | 7.6208 | 416.32 | 0.00 | 0.1901 |
| 6.5562857 | 81.8114 | 13.206 | 403.63 | 7.5931 | 411.22 | 0.00 | 0.1891 |
| 6.5890671 | 81.8238 | 13.108 | 398.63 | 7.5655 | 406.19 | 0.00 | 0.1882 |
| 6.6220125 | 81.8356 | 13.010 | 393.69 | 7.5378 | 401.23 | 0.00 | 0.1872 |
| 6.6551225 | 81.8468 | 12.913 | 388.82 | 7.5102 | 396.33 | 0.00 | 0.1863 |
| 6.6883981 | 81.8575 | 12.817 | 384.01 | 7.4826 | 391.49 | 0.00 | 0.1854 |
| 6.7218401 | 81.8676 | 12.722 | 379.26 | 7.4549 | 386.72 | 0.00 | 0.1844 |
| 6.7554493 | 81.8771 | 12.628 | 374.58 | 7.4273 | 382.01 | 0.00 | 0.1835 |
| 6.7892266 | 81.8862 | 12.535 | 369.96 | 7.3997 | 377.36 | 0.00 | 0.1826 |
| 6.8231727 | 81.8947 | 12.442 | 365.40 | 7.3721 | 372.77 | 0.00 | 0.1817 |
| 6.8572886 | 81.9920 | 12.350 | 360.89 | 7.3445 | 368.23 | 0.00 | 0.1808 |
| 6.8915750 | 81.9999 | 12.257 | 356.39 | 7.3169 | 363.71 | 0.00 | 0.1799 |
| 6.9260329 | 8.20071 | 12.165 | 351.95 | 7.2893 | 359.24 | 0.00 | 0.1790 |
| 6.9606631 | 82.0137 | 12.073 | 347.57 | 7.2617 | 354.83 | 0.00 | 0.1781 |
| 6.9954664 | 82.0197 | 11.983 | 343.24 | 7.2341 | 350.48 | 0.00 | 0.1772 |
| 7.0304437 | 82.0251 | 11.893 | 338.98 | 7.2066 | 346.18 | 0.00 | 0.1764 |
| 7.0655959 | 82.0299 | 11.804 | 334.77 | 7.1790 | 341.95 | 0.00 | 0.1755 |
| 7.1009239 | 82.0342 | 11.716 | 330.61 | 7.1515 | 337.76 | 0.00 | 0.1746 |
| 7.1364285 | 82.0380 | 11.628 | 326.51 | 7.1240 | 333.64 | 0.00 | 0.1737 |
| 7.1721107 | 82.0412 | 11.542 | 322.47 | 7.0964 | 329.56 | 0.00 | 0.1729 |
| 7.2079712 | 82.0439 | 11.456 | 318.47 | 7.0690 | 325.54 | 0.00 | 0.1720 |
| 7.2440111 | 82.0462 | 11.371 | 314.53 | 7.0415 | 321.57 | 0.00 | 0.1712 |
| 7.2802311 | 82.0480 | 11.286 | 310.64 | 7.0140 | 317.66 | 0.00 | 0.1703 |
| 7.3166323 | 82.0493 | 11.203 | 306.81 | 6.9866 | 313.79 | 0.00 | 0.1695 |
| 7.3532155 | 82.0503 | 11.120 | 303.02 | 6.9591 | 309.98 | 0.00 | 0.1686 |
| 7.3899815 | 82.0508 | 11.037 | 299.28 | 6.9317 | 306.22 | 0.00 | 0.1678 |
| 7.4269314 | 82.0509 | 10.956 | 295.60 | 6.9044 | 302.50 | 0.00 | 0.1669 |
| 7.4640661 | 82.0506 | 10.875 | 291.96 | 6.8770 | 298.83 | 0.00 | 0.1661 |
| 7.5013864 | 82.0499 | 10.795 | 288.37 | 6.8496 | 295.21 | 0.00 | 0.1653 |
| 7.5388934 | 82.0489 | 10.716 | 284.82 | 6.8223 | 291.64 | 0.00 | 0.1645 |
| 7.5765878 | 82.0475 | 10.637 | 281.32 | 6.7950 | 288.12 | 0.00 | 0.1636 |
| 7.6144708 | 82.0458 | 10.559 | 277.87 | 6.7677 | 284.64 | 0.00 | 0.1628 |
| 7.6525431 | 82.0437 | 10.482 | 274.46 | 6.7405 | 281.21 | 0.00 | 0.1620 |
| 7.6908058 | 82.0413 | 10.405 | 271.10 | 6.7132 | 277.82 | 0.00 | 0.1612 |
| 7.7292599 | 82.0387 | 10.329 | 267.78 | 6.6860 | 274.47 | 0.00 | 0.1604 |
| 7.7679062 | 82.0357 | 10.254 | 264.51 | 6.6588 | 271.17 | 0.00 | 0.1596 |
| 7.8067457 | 82.0325 | 10.179 | 261.28 | 6.6317 | 267.91 | 0.00 | 0.1588 |
| 7.8457794 | 82.0289 | 10.105 | 258.09 | 6.6046 | 264.69 | 0.00 | 0.1580 |
| 7.8850083 | 82.0252 | 10.032 | 254.94 | 6.5775 | 261.52 | 0.00 | 0.1572 |
| 7.9244334 | 82.0212 | 9.9593 | 251.84 | 6.5504 | 258.39 | 0.00 | 0.1565 |
| 7.9640555 | 82.0169 | 9.8872 | 248.77 | 6.5233 | 255.29 | 0.00 | 0.1557 |
| 8.0038758 | 82.0125 | 9.8158 | 245.75 | 6.4963 | 252.24 | 0.00 | 0.1549 |
| 8.0438952 | 82.0452 | 9.7444 | 242.74 | 6.4693 | 249.21 | 0.00 | 0.1541 |
| 8.0841147 | 82.0404 | 9.6733 | 239.77 | 6.4424 | 246.22 | 0.00 | 0.1534 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| At($Z=85$) | | | | | | | |
| 8.1245352 | 82.0354 | 9.6028 | 236.84 | 6.4155 | 243.26 | 0.00 | 0.1526 |
| 8.1651579 | 82.0300 | 9.5329 | 233.95 | 6.3886 | 240.34 | 0.00 | 0.1518 |
| 8.2059837 | 82.0244 | 9.4636 | 231.09 | 6.3617 | 237.45 | 0.00 | 0.1511 |
| 8.2470136 | 82.0186 | 9.3948 | 228.27 | 6.3349 | 234.61 | 0.00 | 0.1503 |
| 8.2882487 | 82.0126 | 9.3267 | 225.49 | 6.3081 | 231.80 | 0.00 | 0.1496 |
| 8.3296899 | 82.0064 | 9.2592 | 222.74 | 6.2813 | 229.02 | 0.00 | 0.1488 |
| 8.3713384 | 82.0000 | 9.1922 | 220.03 | 6.2546 | 226.29 | 0.00 | 0.1481 |
| 8.4131951 | 81.9934 | 9.1258 | 217.35 | 6.2279 | 223.58 | 0.00 | 0.1474 |
| 8.4552610 | 81.9867 | 9.0600 | 214.71 | 6.2013 | 220.91 | 0.00 | 0.1466 |
| 8.4975373 | 81.9799 | 8.9947 | 212.11 | 6.1747 | 218.28 | 0.00 | 0.1459 |
| 8.5400250 | 81.9730 | 8.9299 | 209.53 | 6.1481 | 215.68 | 0.00 | 0.1452 |
| Rn ($Z=86$) | | | | | | | |
| Atomic weight: $A_r=222.0000 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=0.00092300$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1})=[\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 368.640 E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1})=f_2 (e \text{ atom}^{-1}) \times 1.89551 \times 10^5$ | | | | | | | |
| 24 edges. Edge energies (keV) | | | | | | | |
| K | 98.4040 | LI | 18.0490 | LII | 17.3371 | LIII | 14.6194 |
| MI | 4.48200 | MII | 4.15900 | MIII | 3.53800 | MIV | 3.02150 |
| MV | 2.89240 | NI | 1.09700 | NII | 0.929000 | NIII | 0.768000 |
| NIV | 0.566600 | NV | 0.537000 | NVI | 0.219631 | NVII | 0.212588 |
| OI | 0.200831 | OII | 0.151771 | OIII | 0.118817 | OIV | 0.0486911 |
| OV | 0.0442550 | PI | 0.0219397 | PII | 0.0105762 | PIII | 0.00712588 |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-2.1548, -1.2570) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.018276 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 29.5309 | 32.803 | 12436 | 6.1908 | 12442 | 0.00 | 2.480 |
| 0.50250000 | 29.7362 | 32.825 | 12382 | 6.2211 | 12388 | 0.00 | 2.467 |
| 0.50501250 | 29.9351 | 32.843 | 12327 | 6.2513 | 12334 | 0.00 | 2.455 |
| 0.50753756 | 30.1269 | 32.858 | 12272 | 6.2816 | 12278 | 0.00 | 2.443 |
| 0.51007525 | 30.3105 | 32.870 | 12215 | 6.3118 | 12221 | 0.00 | 2.431 |
| 0.51262563 | 30.4844 | 32.878 | 12157 | 6.3421 | 12163 | 0.00 | 2.419 |
| 0.51518875 | 30.6471 | 32.882 | 12098 | 6.3725 | 12105 | 0.00 | 2.407 |
| 0.51776470 | 30.7960 | 32.884 | 12039 | 6.4028 | 12045 | 0.00 | 2.395 |
| 0.52035352 | 30.9280 | 32.881 | 11978 | 6.4332 | 11984 | 0.00 | 2.383 |
| 0.52295529 | 31.0380 | 32.876 | 11916 | 6.4635 | 11923 | 0.00 | 2.371 |
| 0.52557007 | 31.1182 | 32.867 | 11854 | 6.4939 | 11860 | 0.00 | 2.359 |
| 0.52819792 | 31.1544 | 32.855 | 11791 | 6.5243 | 11797 | 0.00 | 2.347 |
| 0.53083891 | 31.1176 | 32.840 | 11727 | 6.5548 | 11733 | 0.00 | 2.336 |
| 0.53349310 | 30.9285 | 32.822 | 11662 | 6.5852 | 11668 | 0.00 | 2.324 |
| 0.53616057 | 30.1218 | 32.801 | 11596 | 6.6156 | 11603 | 0.00 | 2.312 |
| 0.53662464 | 29.5906 | 32.797 | 11585 | 6.6209 | 11592 | 0.00 | 2.310 |
| 0.53737536 | 29.6396 | 34.991 | 12342 | 6.6295 | 12349 | 0.00 | 2.307 |
| 0.53884137 | 30.8512 | 34.990 | 12309 | 6.6461 | 12315 | 0.00 | 2.301 |
| 0.54153558 | 31.6665 | 34.986 | 12246 | 6.6766 | 12253 | 0.00 | 2.289 |
| 0.54424325 | 32.1760 | 34.979 | 12183 | 6.7070 | 12189 | 0.00 | 2.278 |
| 0.54696447 | 32.5751 | 34.969 | 12119 | 6.7375 | 12125 | 0.00 | 2.267 |
| 0.54969929 | 32.9118 | 34.958 | 12054 | 6.7680 | 12061 | 0.00 | 2.255 |
| 0.55244779 | 33.2033 | 34.943 | 11989 | 6.7985 | 11996 | 0.00 | 2.244 |
| 0.55521003 | 33.4546 | 34.926 | 11924 | 6.8290 | 11931 | 0.00 | 2.233 |
| 0.55798608 | 33.6619 | 34.907 | 11858 | 6.8595 | 11865 | 0.00 | 2.222 |
| 0.56077601 | 33.8074 | 34.886 | 11792 | 6.8900 | 11799 | 0.00 | 2.211 |
| 0.56357989 | 33.8277 | 34.862 | 11725 | 6.9205 | 11732 | 0.00 | 2.200 |
| 0.56620227 | 33.2339 | 34.838 | 11663 | 6.9489 | 11670 | 0.00 | 2.190 |
| 0.56639779 | 32.9664 | 34.836 | 11658 | 6.9510 | 11665 | 0.00 | 2.189 |
| 0.56699778 | 33.3106 | 36.163 | 12090 | 6.9575 | 12097 | 0.00 | 2.187 |
| 0.56922978 | 34.3287 | 36.153 | 12039 | 6.9815 | 12046 | 0.00 | 2.178 |
| 0.57207593 | 34.9154 | 36.137 | 11974 | 7.0120 | 11981 | 0.00 | 2.167 |
| 0.57493630 | 35.3665 | 36.120 | 11909 | 7.0425 | 11916 | 0.00 | 2.156 |
| 0.57781099 | 35.7617 | 36.101 | 11843 | 7.0730 | 11850 | 0.00 | 2.146 |
| 0.58070004 | 36.1253 | 36.081 | 11777 | 7.1034 | 11784 | 0.00 | 2.135 |
| 0.58360354 | 36.4681 | 36.058 | 11711 | 7.1339 | 11719 | 0.00 | 2.124 |
| 0.58652156 | 36.7957 | 36.034 | 11645 | 7.1644 | 11653 | 0.00 | 2.114 |
| 0.58945417 | 37.1118 | 36.008 | 11579 | 7.1948 | 11586 | 0.00 | 2.103 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Rn ($Z=86$) | | | | | | | |
| 0.59240144 | 37.4186 | 35.981 | 11513 | 7.2253 | 11520 | 0.00 | 2.093 |
| 0.59536345 | 37.7178 | 35.951 | 11446 | 7.2557 | 11453 | 0.00 | 2.082 |
| 0.59834026 | 38.0104 | 35.920 | 11379 | 7.2861 | 11387 | 0.00 | 2.072 |
| 0.60133196 | 38.2972 | 35.887 | 11312 | 7.3165 | 11319 | 0.00 | 2.062 |
| 0.60433862 | 38.5799 | 35.852 | 11245 | 7.3469 | 11252 | 0.00 | 2.052 |
| 0.60736032 | 38.8567 | 35.815 | 11177 | 7.3773 | 11185 | 0.00 | 2.041 |
| 0.61039712 | 39.1291 | 35.776 | 11110 | 7.4077 | 11117 | 0.00 | 2.031 |
| 0.61344910 | 39.3975 | 35.735 | 11042 | 7.4380 | 11049 | 0.00 | 2.021 |
| 0.61651635 | 39.6621 | 35.693 | 10974 | 7.4683 | 10982 | 0.00 | 2.011 |
| 0.61959893 | 39.9233 | 35.649 | 10906 | 7.4986 | 10914 | 0.00 | 2.001 |
| 0.62269693 | 40.1811 | 35.604 | 10838 | 7.5289 | 10845 | 0.00 | 1.991 |
| 0.62581041 | 40.4359 | 35.557 | 10770 | 7.5592 | 10777 | 0.00 | 1.981 |
| 0.62893946 | 40.6877 | 35.508 | 10701 | 7.5894 | 10709 | 0.00 | 1.971 |
| 0.63208416 | 40.9366 | 35.457 | 10633 | 7.6196 | 10641 | 0.00 | 1.962 |
| 0.63524458 | 41.1827 | 35.404 | 10564 | 7.6498 | 10572 | 0.00 | 1.952 |
| 0.63842080 | 41.3791 | 35.350 | 10496 | 7.6799 | 10503 | 0.00 | 1.942 |
| 0.64161291 | 41.6194 | 35.293 | 10427 | 7.7101 | 10434 | 0.00 | 1.932 |
| 0.64482097 | 41.8566 | 35.235 | 10358 | 7.7402 | 10365 | 0.00 | 1.923 |
| 0.64804508 | 42.0910 | 35.175 | 10288 | 7.7702 | 10296 | 0.00 | 1.913 |
| 0.65128530 | 42.3224 | 35.113 | 10219 | 7.8002 | 10227 | 0.00 | 1.904 |
| 0.65454173 | 42.5510 | 35.049 | 10150 | 7.8302 | 10158 | 0.00 | 1.894 |
| 0.65781444 | 42.7766 | 34.984 | 10081 | 7.8602 | 10089 | 0.00 | 1.885 |
| 0.66110351 | 42.9767 | 34.918 | 10012 | 7.8901 | 10019 | 0.00 | 1.875 |
| 0.66440903 | 43.1965 | 34.849 | 9942.3 | 7.9200 | 9950.2 | 0.00 | 1.866 |
| 0.66773107 | 43.4133 | 34.780 | 9873.1 | 7.9499 | 9881.0 | 0.00 | 1.857 |
| 0.67106973 | 43.6272 | 34.709 | 9803.9 | 7.9797 | 9811.8 | 0.00 | 1.848 |
| 0.67442508 | 43.8380 | 34.636 | 9734.7 | 8.0094 | 9742.7 | 0.00 | 1.838 |
| 0.67779720 | 44.0458 | 34.562 | 9665.6 | 8.0392 | 9673.7 | 0.00 | 1.829 |
| 0.68118619 | 44.2505 | 34.487 | 9596.6 | 8.0689 | 9604.7 | 0.00 | 1.820 |
| 0.68459212 | 44.4519 | 34.411 | 9527.7 | 8.0985 | 9535.8 | 0.00 | 1.811 |
| 0.68801508 | 44.6501 | 34.333 | 9458.9 | 8.1281 | 9467.0 | 0.00 | 1.802 |
| 0.69145515 | 44.8450 | 34.254 | 9390.2 | 8.1576 | 9398.3 | 0.00 | 1.793 |
| 0.69491243 | 45.0363 | 34.174 | 9321.6 | 8.1871 | 9329.8 | 0.00 | 1.784 |
| 0.69838699 | 45.2240 | 34.092 | 9253.1 | 8.2166 | 9261.3 | 0.00 | 1.775 |
| 0.70187893 | 45.4079 | 34.010 | 9184.8 | 8.2460 | 9193.1 | 0.00 | 1.766 |
| 0.70538832 | 45.5879 | 33.927 | 9116.7 | 8.2753 | 9125.0 | 0.00 | 1.758 |
| 0.70891526 | 45.7637 | 33.842 | 9048.7 | 8.3046 | 9057.0 | 0.00 | 1.749 |
| 0.71245984 | 45.9350 | 33.756 | 8980.9 | 8.3339 | 8989.3 | 0.00 | 1.740 |
| 0.71602214 | 46.1016 | 33.670 | 8913.4 | 8.3631 | 8921.7 | 0.00 | 1.732 |
| 0.71960225 | 46.2634 | 33.582 | 8845.8 | 8.3922 | 8854.2 | 0.00 | 1.723 |
| 0.72320026 | 46.4192 | 33.493 | 8778.5 | 8.4213 | 8786.9 | 0.00 | 1.714 |
| 0.72681626 | 46.5686 | 33.403 | 8711.4 | 8.4503 | 8719.8 | 0.00 | 1.706 |
| 0.73045034 | 46.7106 | 33.312 | 8644.5 | 8.4792 | 8653.0 | 0.00 | 1.697 |
| 0.73410260 | 46.8442 | 33.221 | 8577.8 | 8.5081 | 8586.4 | 0.00 | 1.689 |
| 0.73777311 | 46.9678 | 33.128 | 8511.4 | 8.5370 | 8520.0 | 0.00 | 1.681 |
| 0.74146197 | 47.0795 | 33.035 | 8445.3 | 8.5658 | 8453.9 | 0.00 | 1.672 |
| 0.74516928 | 47.1760 | 32.941 | 8379.4 | 8.5945 | 8388.0 | 0.00 | 1.664 |
| 0.74889513 | 47.2528 | 32.847 | 8313.8 | 8.6231 | 8322.4 | 0.00 | 1.656 |
| 0.75263961 | 47.3017 | 32.752 | 8248.5 | 8.6517 | 8257.1 | 0.00 | 1.647 |
| 0.75640280 | 47.3079 | 32.656 | 8183.4 | 8.6802 | 8192.1 | 0.00 | 1.639 |
| 0.76018482 | 47.2386 | 32.560 | 8118.7 | 8.7086 | 8127.4 | 0.00 | 1.631 |
| 0.76398574 | 46.9914 | 32.463 | 8054.3 | 8.7370 | 8063.0 | 0.00 | 1.623 |
| 0.76674817 | 46.3685 | 32.392 | 8007.8 | 8.7575 | 8016.6 | 0.00 | 1.617 |
| 0.76780567 | 45.2125 | 32.365 | 7990.1 | 8.7653 | 7998.9 | 0.00 | 1.615 |
| 0.76925185 | 46.4868 | 34.363 | 8467.4 | 8.7759 | 8476.2 | 0.00 | 1.612 |
| 0.77164470 | 47.2908 | 34.303 | 8426.4 | 8.7935 | 8435.2 | 0.00 | 1.607 |
| 0.77550292 | 47.9373 | 34.206 | 8360.8 | 8.8216 | 8369.7 | 0.00 | 1.599 |
| 0.77938044 | 48.3848 | 34.109 | 8295.6 | 8.8497 | 8304.5 | 0.00 | 1.591 |
| 0.78327734 | 48.7516 | 34.012 | 8230.7 | 8.8777 | 8239.6 | 0.00 | 1.583 |
| 0.78719373 | 49.0741 | 33.914 | 8166.2 | 8.9056 | 8175.1 | 0.00 | 1.575 |
| 0.79112969 | 49.3681 | 33.815 | 8102.0 | 8.9335 | 8111.0 | 0.00 | 1.567 |
| 0.79508534 | 49.6421 | 33.717 | 8038.2 | 8.9612 | 8047.2 | 0.00 | 1.559 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Rn ($Z=86$) | | | | | | | |
| 0.79906077 | 49.9010 | 33.618 | 7974.8 | 8.9889 | 7983.8 | 0.00 | 1.552 |
| 0.80305607 | 50.1481 | 33.519 | 7911.7 | 9.0165 | 7920.7 | 0.00 | 1.544 |
| 0.80707135 | 50.3857 | 33.419 | 7849.0 | 9.0440 | 7858.0 | 0.00 | 1.536 |
| 0.81110671 | 50.6152 | 33.320 | 7786.7 | 9.0715 | 7795.7 | 0.00 | 1.529 |
| 0.81516224 | 50.8379 | 33.220 | 7724.7 | 9.0988 | 7733.8 | 0.00 | 1.521 |
| 0.81923806 | 51.0546 | 33.120 | 7663.2 | 9.1261 | 7672.3 | 0.00 | 1.513 |
| 0.82333425 | 51.2662 | 33.020 | 7602.0 | 9.1532 | 7611.2 | 0.00 | 1.506 |
| 0.82745092 | 51.4730 | 32.920 | 7541.3 | 9.1803 | 7550.4 | 0.00 | 1.498 |
| 0.83158817 | 51.6756 | 32.820 | 7480.9 | 9.2073 | 7490.1 | 0.00 | 1.491 |
| 0.83574611 | 51.8744 | 32.719 | 7420.8 | 9.2342 | 7430.0 | 0.00 | 1.484 |
| 0.83992484 | 52.0697 | 32.618 | 7361.1 | 9.2610 | 7370.4 | 0.00 | 1.476 |
| 0.84412447 | 52.2617 | 32.517 | 7301.8 | 9.2877 | 7311.1 | 0.00 | 1.469 |
| 0.84834509 | 52.4507 | 32.416 | 7242.9 | 9.3143 | 7252.2 | 0.00 | 1.461 |
| 0.85258682 | 52.6369 | 32.315 | 7184.5 | 9.3409 | 7193.8 | 0.00 | 1.454 |
| 0.85684975 | 52.8203 | 32.214 | 7126.3 | 9.3673 | 7135.7 | 0.00 | 1.447 |
| 0.86113400 | 53.0013 | 32.113 | 7068.6 | 9.3936 | 7078.0 | 0.00 | 1.440 |
| 0.86543967 | 53.1797 | 32.012 | 7011.3 | 9.4199 | 7020.7 | 0.00 | 1.433 |
| 0.86976687 | 53.3559 | 31.910 | 6954.3 | 9.4460 | 6963.8 | 0.00 | 1.425 |
| 0.87411570 | 53.5297 | 31.809 | 6897.8 | 9.4720 | 6907.3 | 0.00 | 1.418 |
| 0.87848628 | 53.7013 | 31.708 | 6841.7 | 9.4979 | 6851.2 | 0.00 | 1.411 |
| 0.88287871 | 53.8706 | 31.607 | 6785.9 | 9.5238 | 6795.4 | 0.00 | 1.404 |
| 0.88729310 | 54.0377 | 31.506 | 6730.6 | 9.5495 | 6740.1 | 0.00 | 1.397 |
| 0.89172957 | 54.2024 | 31.405 | 6675.6 | 9.5751 | 6685.2 | 0.00 | 1.390 |
| 0.89618822 | 54.3645 | 31.304 | 6621.1 | 9.6006 | 6630.7 | 0.00 | 1.383 |
| 0.90066916 | 54.5238 | 31.204 | 6567.0 | 9.6260 | 6576.6 | 0.00 | 1.377 |
| 0.90517250 | 54.6795 | 31.103 | 6513.3 | 9.6513 | 6523.0 | 0.00 | 1.370 |
| 0.90969837 | 54.8299 | 30.998 | 6459.0 | 9.6764 | 6468.7 | 0.00 | 1.363 |
| 0.91424686 | 54.9710 | 30.888 | 6404.1 | 9.7015 | 6413.8 | 0.00 | 1.356 |
| 0.91881809 | 55.0973 | 30.778 | 6349.5 | 9.7264 | 6359.2 | 0.00 | 1.349 |
| 0.92341218 | 55.1925 | 30.668 | 6295.3 | 9.7513 | 6305.0 | 0.00 | 1.343 |
| 0.92741143 | 55.1769 | 30.572 | 6248.6 | 9.7727 | 6258.4 | 0.00 | 1.337 |
| 0.92802924 | 55.1352 | 30.558 | 6241.4 | 9.7760 | 6251.2 | 0.00 | 1.336 |
| 0.93058861 | 55.2949 | 30.911 | 6296.2 | 9.7896 | 6305.9 | 0.00 | 1.332 |
| 0.93266939 | 55.4822 | 30.862 | 6272.3 | 9.8006 | 6282.1 | 0.00 | 1.329 |
| 0.93733274 | 55.7633 | 30.754 | 6219.2 | 9.8251 | 6229.1 | 0.00 | 1.323 |
| 0.94201940 | 55.9960 | 30.646 | 6166.6 | 9.8495 | 6176.5 | 0.00 | 1.316 |
| 0.94672950 | 56.2118 | 30.539 | 6114.4 | 9.8737 | 6124.3 | 0.00 | 1.310 |
| 0.95146315 | 56.4197 | 30.432 | 6062.6 | 9.8979 | 6072.5 | 0.00 | 1.303 |
| 0.95622046 | 56.6239 | 30.325 | 6011.3 | 9.9219 | 6021.2 | 0.00 | 1.297 |
| 0.96100156 | 56.8263 | 30.214 | 5959.6 | 9.9458 | 5969.5 | 0.00 | 1.290 |
| 0.96580657 | 57.0283 | 30.102 | 5907.9 | 9.9695 | 5917.9 | 0.00 | 1.284 |
| 0.97063560 | 57.2318 | 29.991 | 5856.7 | 9.9932 | 5866.7 | 0.00 | 1.277 |
| 0.97548878 | 57.4383 | 29.879 | 5805.9 | 10.017 | 5815.9 | 0.00 | 1.271 |
| 0.98036623 | 57.6500 | 29.768 | 5755.6 | 10.040 | 5765.6 | 0.00 | 1.265 |
| 0.98526806 | 57.8693 | 29.657 | 5705.6 | 10.063 | 5715.7 | 0.00 | 1.258 |
| 0.99019440 | 58.0996 | 29.547 | 5656.2 | 10.086 | 5666.2 | 0.00 | 1.252 |
| 0.99514537 | 58.3452 | 29.438 | 5607.1 | 10.109 | 5617.2 | 0.00 | 1.246 |
| 1.0001211 | 58.6103 | 29.327 | 5558.2 | 10.132 | 5568.3 | 0.00 | 1.240 |
| 1.0051217 | 58.7658 | 29.144 | 5496.1 | 10.155 | 5506.3 | 0.00 | 1.234 |
| 1.0101473 | 58.9081 | 28.963 | 5434.8 | 10.178 | 5445.0 | 0.00 | 1.227 |
| 1.0151980 | 59.0411 | 28.784 | 5374.3 | 10.200 | 5384.5 | 0.00 | 1.221 |
| 1.0202740 | 59.1666 | 28.605 | 5314.4 | 10.223 | 5324.7 | 0.00 | 1.215 |
| 1.0253754 | 59.2858 | 28.429 | 5255.3 | 10.245 | 5265.6 | 0.00 | 1.209 |
| 1.0305023 | 59.3992 | 28.253 | 5196.9 | 10.267 | 5207.2 | 0.00 | 1.203 |
| 1.0356548 | 59.5072 | 28.079 | 5139.2 | 10.289 | 5149.5 | 0.00 | 1.197 |
| 1.0408331 | 59.6099 | 27.906 | 5082.2 | 10.311 | 5092.5 | 0.00 | 1.191 |
| 1.0460372 | 59.7075 | 27.735 | 5025.9 | 10.332 | 5036.2 | 0.00 | 1.185 |
| 1.0512674 | 59.7997 | 27.565 | 4970.2 | 10.354 | 4980.6 | 0.00 | 1.179 |
| 1.0565238 | 59.8863 | 27.397 | 4915.3 | 10.375 | 4925.6 | 0.00 | 1.174 |
| 1.0618064 | 59.9668 | 27.230 | 4861.0 | 10.396 | 4871.4 | 0.00 | 1.168 |
| 1.0671154 | 60.0404 | 27.064 | 4807.3 | 10.417 | 4817.8 | 0.00 | 1.162 |
| 1.0724510 | 60.1053 | 26.899 | 4754.4 | 10.438 | 4764.8 | 0.00 | 1.156 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Rn ($Z=86$) | | | | | | | |
| 1.0778132 | 60.1590 | 26.736 | 4702.0 | 10.459 | 4712.5 | 0.00 | 1.150 |
| 1.0832023 | 60.1956 | 26.574 | 4650.3 | 10.480 | 4660.8 | 0.00 | 1.145 |
| 1.0886183 | 60.2002 | 26.414 | 4599.2 | 10.500 | 4609.7 | 0.00 | 1.139 |
| 1.0940614 | 60.1063 | 26.255 | 4548.7 | 10.521 | 4559.2 | 0.00 | 1.133 |
| 1.0956507 | 59.9958 | 26.208 | 4534.1 | 10.527 | 4544.7 | 0.00 | 1.132 |
| 1.0983493 | 60.0526 | 26.680 | 4604.4 | 10.537 | 4614.9 | 0.00 | 1.129 |
| 1.0995317 | 60.1813 | 26.646 | 4593.6 | 10.541 | 4604.1 | 0.00 | 1.128 |
| 1.1050294 | 60.4681 | 26.489 | 4543.8 | 10.561 | 4554.4 | 0.00 | 1.122 |
| 1.1105545 | 60.6426 | 26.334 | 4494.7 | 10.581 | 4505.3 | 0.00 | 1.116 |
| 1.1161073 | 60.7835 | 26.180 | 4446.2 | 10.601 | 4456.8 | 0.00 | 1.111 |
| 1.1216878 | 60.9072 | 26.027 | 4398.2 | 10.620 | 4408.8 | 0.00 | 1.105 |
| 1.1272963 | 61.0200 | 25.875 | 4350.8 | 10.640 | 4361.4 | 0.00 | 1.100 |
| 1.1329328 | 61.1249 | 25.724 | 4304.0 | 10.659 | 4314.6 | 0.00 | 1.094 |
| 1.1385974 | 61.2238 | 25.575 | 4257.7 | 10.678 | 4268.4 | 0.00 | 1.089 |
| 1.1442904 | 61.3177 | 25.427 | 4212.0 | 10.697 | 4222.7 | 0.00 | 1.084 |
| 1.1500119 | 61.4074 | 25.280 | 4166.8 | 10.716 | 4177.5 | 0.00 | 1.078 |
| 1.1557619 | 61.4935 | 25.134 | 4122.2 | 10.735 | 4132.9 | 0.00 | 1.073 |
| 1.1615407 | 61.5764 | 24.990 | 4078.1 | 10.753 | 4088.8 | 0.00 | 1.067 |
| 1.1673484 | 61.6564 | 24.847 | 4034.5 | 10.772 | 4045.3 | 0.00 | 1.062 |
| 1.1731852 | 61.7338 | 24.704 | 3991.5 | 10.790 | 4002.3 | 0.00 | 1.057 |
| 1.1790511 | 61.8087 | 24.563 | 3948.9 | 10.808 | 3959.7 | 0.00 | 1.052 |
| 1.1849464 | 61.8813 | 24.423 | 3906.9 | 10.826 | 3917.7 | 0.00 | 1.046 |
| 1.1908711 | 61.9518 | 24.285 | 3865.4 | 10.844 | 3876.2 | 0.00 | 1.041 |
| 1.1968254 | 62.0202 | 24.147 | 3824.3 | 10.861 | 3835.2 | 0.00 | 1.036 |
| 1.2028096 | 62.0867 | 24.010 | 3783.8 | 10.879 | 3794.7 | 0.00 | 1.031 |
| 1.2088236 | 62.1515 | 23.875 | 3743.7 | 10.896 | 3754.6 | 0.00 | 1.026 |
| 1.2148677 | 62.2144 | 23.740 | 3704.1 | 10.913 | 3715.0 | 0.00 | 1.021 |
| 1.2209421 | 62.2758 | 23.607 | 3665.0 | 10.930 | 3675.9 | 0.00 | 1.015 |
| 1.2270468 | 62.3355 | 23.475 | 3626.3 | 10.947 | 3637.3 | 0.00 | 1.010 |
| 1.2331820 | 62.3937 | 23.344 | 3588.1 | 10.963 | 3599.1 | 0.00 | 1.005 |
| 1.2393479 | 62.4505 | 23.213 | 3550.4 | 10.980 | 3561.3 | 0.00 | 1.000 |
| 1.2455447 | 62.5058 | 23.084 | 3513.0 | 10.996 | 3524.0 | 0.00 | 0.9954 |
| 1.2517724 | 62.5598 | 22.956 | 3476.2 | 11.012 | 3487.2 | 0.00 | 0.9905 |
| 1.2580312 | 62.6125 | 22.829 | 3439.7 | 11.028 | 3450.7 | 0.00 | 0.9855 |
| 1.2643214 | 62.6640 | 22.703 | 3403.7 | 11.044 | 3414.7 | 0.00 | 0.9806 |
| 1.2706430 | 62.7142 | 22.578 | 3368.1 | 11.059 | 3379.2 | 0.00 | 0.9758 |
| 1.2769962 | 62.7634 | 22.454 | 3332.9 | 11.075 | 3344.0 | 0.00 | 0.9709 |
| 1.2833812 | 62.8114 | 22.331 | 3298.2 | 11.090 | 3309.2 | 0.00 | 0.9661 |
| 1.2897981 | 62.8584 | 22.208 | 3263.8 | 11.105 | 3274.9 | 0.00 | 0.9613 |
| 1.2962471 | 62.9044 | 22.087 | 3229.8 | 11.120 | 3241.0 | 0.00 | 0.9565 |
| 1.3027283 | 62.9493 | 21.965 | 3196.0 | 11.135 | 3207.1 | 0.00 | 0.9517 |
| 1.3092420 | 62.9927 | 21.844 | 3162.5 | 11.149 | 3173.6 | 0.00 | 0.9470 |
| 1.3157882 | 63.0349 | 21.723 | 3129.4 | 11.164 | 3140.5 | 0.00 | 0.9423 |
| 1.3223671 | 63.0758 | 21.603 | 3096.6 | 11.178 | 3107.8 | 0.00 | 0.9376 |
| 1.3289790 | 63.1156 | 21.484 | 3064.3 | 11.192 | 3075.4 | 0.00 | 0.9329 |
| 1.3356239 | 63.1542 | 21.366 | 3032.3 | 11.206 | 3043.5 | 0.00 | 0.9283 |
| 1.3423020 | 63.1916 | 21.249 | 3000.6 | 11.219 | 3011.9 | 0.00 | 0.9237 |
| 1.3490135 | 63.2280 | 21.133 | 2969.4 | 11.233 | 2980.6 | 0.00 | 0.9191 |
| 1.3557586 | 63.2633 | 21.018 | 2938.5 | 11.246 | 2949.7 | 0.00 | 0.9145 |
| 1.3625374 | 63.2976 | 20.903 | 2908.0 | 11.259 | 2919.2 | 0.00 | 0.9100 |
| 1.3693500 | 63.3309 | 20.790 | 2877.8 | 11.272 | 2889.0 | 0.00 | 0.9054 |
| 1.3761968 | 63.3632 | 20.677 | 2847.9 | 11.285 | 2859.2 | 0.00 | 0.9009 |
| 1.3830778 | 63.3945 | 20.565 | 2818.4 | 11.298 | 2829.7 | 0.00 | 0.8964 |
| 1.3899932 | 63.4249 | 20.454 | 2789.3 | 11.310 | 2800.6 | 0.00 | 0.8920 |
| 1.3969431 | 63.4544 | 20.344 | 2760.5 | 11.322 | 2771.8 | 0.00 | 0.8875 |
| 1.4039278 | 63.4830 | 20.235 | 2732.0 | 11.334 | 2743.3 | 0.00 | 0.8831 |
| 1.4109475 | 63.5108 | 20.126 | 2703.8 | 11.346 | 2715.2 | 0.00 | 0.8787 |
| 1.4180022 | 63.5377 | 20.019 | 2676.0 | 11.358 | 2687.3 | 0.00 | 0.8744 |
| 1.4250922 | 63.5638 | 19.912 | 2648.5 | 11.370 | 2659.8 | 0.00 | 0.8700 |
| 1.4322177 | 63.5891 | 19.805 | 2621.2 | 11.381 | 2632.6 | 0.00 | 0.8657 |
| 1.4393788 | 63.6134 | 19.699 | 2594.2 | 11.392 | 2605.6 | 0.00 | 0.8614 |
| 1.4465757 | 63.6368 | 19.594 | 2567.5 | 11.403 | 2578.9 | 0.00 | 0.8571 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Rn ($Z=86$) | | | | | | | |
| 1.4538086 | 63.6593 | 19.490 | 2541.2 | 11.414 | 2552.6 | 0.00 | 0.8528 |
| 1.4610776 | 63.6810 | 19.387 | 2515.1 | 11.424 | 2526.5 | 0.00 | 0.8486 |
| 1.4683830 | 63.7018 | 19.284 | 2489.3 | 11.435 | 2500.8 | 0.00 | 0.8444 |
| 1.4757249 | 63.7218 | 19.182 | 2463.9 | 11.445 | 2475.3 | 0.00 | 0.8402 |
| 1.4831035 | 63.7410 | 19.081 | 2438.7 | 11.455 | 2450.1 | 0.00 | 0.8360 |
| 1.4905190 | 63.7594 | 18.981 | 2413.8 | 11.465 | 2425.2 | 0.00 | 0.8318 |
| 1.4979716 | 63.7770 | 18.881 | 2389.2 | 11.475 | 2400.6 | 0.00 | 0.8277 |
| 1.5054615 | 63.7939 | 18.782 | 2364.8 | 11.484 | 2376.3 | 0.00 | 0.8236 |
| 1.5129888 | 63.8099 | 18.684 | 2340.7 | 11.493 | 2352.2 | 0.00 | 0.8195 |
| 1.5205537 | 63.8253 | 18.586 | 2317.0 | 11.502 | 2328.5 | 0.00 | 0.8154 |
| 1.5281565 | 63.8399 | 18.490 | 2293.4 | 11.511 | 2304.9 | 0.00 | 0.8113 |
| 1.5357973 | 63.8538 | 18.394 | 2270.2 | 11.520 | 2281.7 | 0.00 | 0.8073 |
| 1.5434763 | 63.8670 | 18.298 | 2247.2 | 11.529 | 2258.7 | 0.00 | 0.8033 |
| 1.5511937 | 63.8795 | 18.204 | 2224.4 | 11.537 | 2236.0 | 0.00 | 0.7993 |
| 1.5589496 | 63.8914 | 18.110 | 2201.9 | 11.545 | 2213.5 | 0.00 | 0.7953 |
| 1.5667444 | 63.9026 | 18.017 | 2179.7 | 11.553 | 2191.3 | 0.00 | 0.7913 |
| 1.5745781 | 63.9131 | 17.923 | 2157.7 | 11.561 | 2169.2 | 0.00 | 0.7874 |
| 1.5824510 | 63.9227 | 17.830 | 2135.8 | 11.568 | 2147.3 | 0.00 | 0.7835 |
| 1.5903633 | 63.9314 | 17.738 | 2114.1 | 11.576 | 2125.7 | 0.00 | 0.7796 |
| 1.5983151 | 63.9394 | 17.646 | 2092.7 | 11.583 | 2104.3 | 0.00 | 0.7757 |
| 1.6063066 | 63.9465 | 17.555 | 2071.6 | 11.590 | 2083.2 | 0.00 | 0.7719 |
| 1.6143382 | 63.9794 | 17.465 | 2050.7 | 11.597 | 2062.3 | 0.00 | 0.7680 |
| 1.6224099 | 63.9851 | 17.375 | 2030.0 | 11.604 | 2041.6 | 0.00 | 0.7642 |
| 1.6305219 | 63.9900 | 17.286 | 2009.5 | 11.610 | 2021.1 | 0.00 | 0.7604 |
| 1.6386745 | 63.9942 | 17.197 | 1989.3 | 11.616 | 2000.9 | 0.00 | 0.7566 |
| 1.6468679 | 63.9976 | 17.110 | 1969.3 | 11.622 | 1980.9 | 0.00 | 0.7528 |
| 1.6551022 | 64.0002 | 17.022 | 1949.5 | 11.628 | 1961.1 | 0.00 | 0.7491 |
| 1.6633777 | 64.0021 | 16.936 | 1929.9 | 11.634 | 1941.5 | 0.00 | 0.7454 |
| 1.6716946 | 64.0032 | 16.850 | 1910.6 | 11.639 | 1922.2 | 0.00 | 0.7417 |
| 1.6800531 | 64.0036 | 16.764 | 1891.4 | 11.645 | 1903.1 | 0.00 | 0.7380 |
| 1.6884534 | 64.0032 | 16.680 | 1872.5 | 11.650 | 1884.1 | 0.00 | 0.7343 |
| 1.6968956 | 64.0020 | 16.595 | 1853.8 | 11.655 | 1865.4 | 0.00 | 0.7307 |
| 1.7053801 | 64.0179 | 16.512 | 1835.3 | 11.660 | 1846.9 | 0.00 | 0.7270 |
| 1.7139070 | 64.0154 | 16.429 | 1817.0 | 11.664 | 1828.6 | 0.00 | 0.7234 |
| 1.7224766 | 64.0121 | 16.346 | 1798.9 | 11.668 | 1810.5 | 0.00 | 0.7198 |
| 1.7310889 | 64.0081 | 16.265 | 1780.9 | 11.673 | 1792.6 | 0.00 | 0.7162 |
| 1.7397444 | 64.0033 | 16.183 | 1763.2 | 11.676 | 1774.9 | 0.00 | 0.7127 |
| 1.7484431 | 63.9977 | 16.103 | 1745.7 | 11.680 | 1757.4 | 0.00 | 0.7091 |
| 1.7571853 | 63.9914 | 16.023 | 1728.4 | 11.684 | 1740.1 | 0.00 | 0.7056 |
| 1.7659712 | 63.9843 | 15.943 | 1711.3 | 11.687 | 1723.0 | 0.00 | 0.7021 |
| 1.7748011 | 63.9764 | 15.864 | 1694.3 | 11.690 | 1706.0 | 0.00 | 0.6986 |
| 1.7836751 | 63.9677 | 15.786 | 1677.6 | 11.693 | 1689.3 | 0.00 | 0.6951 |
| 1.7925935 | 63.9583 | 15.708 | 1661.0 | 11.696 | 1672.7 | 0.00 | 0.6916 |
| 1.8015565 | 63.9481 | 15.631 | 1644.6 | 11.699 | 1656.3 | 0.00 | 0.6882 |
| 1.8105642 | 63.9370 | 15.554 | 1628.4 | 11.701 | 1640.1 | 0.00 | 0.6848 |
| 1.8196171 | 63.9252 | 15.478 | 1612.3 | 11.703 | 1624.0 | 0.00 | 0.6814 |
| 1.8287151 | 63.9126 | 15.402 | 1596.5 | 11.705 | 1608.2 | 0.00 | 0.6780 |
| 1.8378587 | 63.8991 | 15.327 | 1580.8 | 11.707 | 1592.5 | 0.00 | 0.6746 |
| 1.8470480 | 63.8849 | 15.252 | 1565.2 | 11.709 | 1576.9 | 0.00 | 0.6713 |
| 1.8562833 | 63.8698 | 15.178 | 1549.9 | 11.710 | 1561.6 | 0.00 | 0.6679 |
| 1.8655647 | 63.8538 | 15.105 | 1534.7 | 11.712 | 1546.4 | 0.00 | 0.6646 |
| 1.8748925 | 63.8370 | 15.031 | 1519.7 | 11.713 | 1531.4 | 0.00 | 0.6613 |
| 1.8842670 | 63.8194 | 14.959 | 1504.8 | 11.714 | 1516.5 | 0.00 | 0.6580 |
| 1.8936883 | 63.8009 | 14.887 | 1490.1 | 11.714 | 1501.8 | 0.00 | 0.6547 |
| 1.9031567 | 63.7815 | 14.815 | 1475.6 | 11.715 | 1487.3 | 0.00 | 0.6515 |
| 1.9126725 | 63.7612 | 14.744 | 1461.2 | 11.715 | 1472.9 | 0.00 | 0.6482 |
| 1.9222359 | 63.7399 | 14.674 | 1447.0 | 11.715 | 1458.7 | 0.00 | 0.6450 |
| 1.9318471 | 63.7178 | 14.604 | 1432.9 | 11.715 | 1444.6 | 0.00 | 0.6418 |
| 1.9415063 | 63.6948 | 14.534 | 1419.0 | 11.715 | 1430.7 | 0.00 | 0.6386 |
| 1.9512138 | 63.6708 | 14.465 | 1405.2 | 11.714 | 1416.9 | 0.00 | 0.6354 |
| 1.9609699 | 63.6458 | 14.396 | 1391.6 | 11.714 | 1403.3 | 0.00 | 0.6323 |
| 1.9707747 | 63.6198 | 14.328 | 1378.1 | 11.713 | 1389.8 | 0.00 | 0.6291 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Rn ($Z=86$) | | | | | | | |
| 1.9806286 | 63.5929 | 14.261 | 1364.8 | 11.712 | 1376.5 | 0.00 | 0.6260 |
| 1.9905318 | 63.5649 | 14.193 | 1351.6 | 11.711 | 1363.3 | 0.00 | 0.6229 |
| 2.0004844 | 63.5360 | 14.127 | 1338.5 | 11.709 | 1350.2 | 0.00 | 0.6198 |
| 2.0104868 | 63.5059 | 14.060 | 1325.6 | 11.708 | 1337.3 | 0.00 | 0.6167 |
| 2.0205393 | 63.4748 | 13.995 | 1312.9 | 11.706 | 1324.6 | 0.00 | 0.6136 |
| 2.0306420 | 63.4426 | 13.929 | 1300.2 | 11.704 | 1311.9 | 0.00 | 0.6106 |
| 2.0407952 | 63.4093 | 13.864 | 1287.7 | 11.702 | 1299.4 | 0.00 | 0.6075 |
| 2.0509992 | 63.3749 | 13.800 | 1275.4 | 11.699 | 1287.1 | 0.00 | 0.6045 |
| 2.0612542 | 63.3393 | 13.736 | 1263.1 | 11.697 | 1274.8 | 0.00 | 0.6015 |
| 2.0715604 | 63.3025 | 13.672 | 1251.0 | 11.694 | 1262.7 | 0.00 | 0.5985 |
| 2.0819182 | 63.2646 | 13.609 | 1239.1 | 11.691 | 1250.8 | 0.00 | 0.5955 |
| 2.0923278 | 63.2254 | 13.547 | 1227.2 | 11.688 | 1238.9 | 0.00 | 0.5926 |
| 2.1027895 | 63.1849 | 13.484 | 1215.5 | 11.685 | 1227.2 | 0.00 | 0.5896 |
| 2.1133034 | 63.1432 | 13.422 | 1203.9 | 11.681 | 1215.6 | 0.00 | 0.5867 |
| 2.1238699 | 63.1002 | 13.361 | 1192.4 | 11.677 | 1204.1 | 0.00 | 0.5838 |
| 2.1344893 | 63.0558 | 13.300 | 1181.1 | 11.674 | 1192.8 | 0.00 | 0.5809 |
| 2.1451617 | 63.0100 | 13.240 | 1169.9 | 11.670 | 1181.5 | 0.00 | 0.5780 |
| 2.1558875 | 62.9627 | 13.173 | 1158.2 | 11.665 | 1169.9 | 0.00 | 0.5751 |
| 2.1666670 | 62.9132 | 13.105 | 1146.5 | 11.661 | 1158.1 | 0.00 | 0.5722 |
| 2.1775003 | 62.8616 | 13.037 | 1134.9 | 11.656 | 1146.5 | 0.00 | 0.5694 |
| 2.1883878 | 62.8078 | 12.970 | 1123.4 | 11.652 | 1135.0 | 0.00 | 0.5666 |
| 2.1993297 | 62.7472 | 12.902 | 1112.0 | 11.647 | 1123.7 | 0.00 | 0.5637 |
| 2.2103264 | 62.6890 | 12.836 | 1100.7 | 11.641 | 1112.4 | 0.00 | 0.5609 |
| 2.2213780 | 62.6284 | 12.769 | 1089.6 | 11.636 | 1101.2 | 0.00 | 0.5581 |
| 2.2324849 | 62.5654 | 12.703 | 1078.6 | 11.630 | 1090.2 | 0.00 | 0.5554 |
| 2.2436473 | 62.5000 | 12.637 | 1067.7 | 11.625 | 1079.3 | 0.00 | 0.5526 |
| 2.2548656 | 62.4319 | 12.572 | 1056.8 | 11.619 | 1068.5 | 0.00 | 0.5499 |
| 2.2661399 | 62.3613 | 12.507 | 1046.2 | 11.613 | 1057.8 | 0.00 | 0.5471 |
| 2.2774706 | 62.2877 | 12.437 | 1035.1 | 11.607 | 1046.7 | 0.00 | 0.5444 |
| 2.2888579 | 62.2108 | 12.367 | 1024.2 | 11.600 | 1035.8 | 0.00 | 0.5417 |
| 2.3003022 | 62.1306 | 12.298 | 1013.4 | 11.594 | 1025.0 | 0.00 | 0.5390 |
| 2.3118037 | 62.0527 | 12.229 | 1002.7 | 11.587 | 1014.3 | 0.00 | 0.5363 |
| 2.3233628 | 61.9656 | 12.160 | 992.11 | 11.580 | 1003.7 | 0.00 | 0.5336 |
| 2.3349796 | 61.8747 | 12.093 | 981.66 | 11.573 | 993.23 | 0.00 | 0.5310 |
| 2.3466545 | 61.7801 | 12.025 | 971.33 | 11.565 | 982.89 | 0.00 | 0.5283 |
| 2.3583878 | 61.6816 | 11.958 | 961.11 | 11.558 | 972.67 | 0.00 | 0.5257 |
| 2.3701797 | 61.5789 | 11.892 | 951.01 | 11.550 | 962.56 | 0.00 | 0.5231 |
| 2.3820306 | 61.4720 | 11.826 | 941.03 | 11.542 | 952.57 | 0.00 | 0.5205 |
| 2.3939407 | 61.3607 | 11.760 | 931.15 | 11.534 | 942.69 | 0.00 | 0.5179 |
| 2.4059104 | 61.2447 | 11.695 | 921.39 | 11.526 | 932.92 | 0.00 | 0.5153 |
| 2.4179400 | 61.1238 | 11.630 | 911.74 | 11.517 | 923.26 | 0.00 | 0.5128 |
| 2.4300297 | 60.9978 | 11.566 | 902.19 | 11.509 | 913.70 | 0.00 | 0.5102 |
| 2.4421798 | 60.8664 | 11.502 | 892.76 | 11.500 | 904.26 | 0.00 | 0.5077 |
| 2.4543907 | 60.7293 | 11.439 | 883.42 | 11.491 | 894.92 | 0.00 | 0.5052 |
| 2.4666627 | 60.5863 | 11.376 | 874.20 | 11.482 | 885.68 | 0.00 | 0.5026 |
| 2.4789960 | 60.4369 | 11.314 | 865.07 | 11.473 | 876.55 | 0.00 | 0.5001 |
| 2.4913910 | 60.2808 | 11.252 | 856.05 | 11.463 | 867.52 | 0.00 | 0.4977 |
| 2.5038479 | 60.1175 | 11.190 | 847.13 | 11.454 | 858.59 | 0.00 | 0.4952 |
| 2.5163672 | 59.9466 | 11.129 | 838.31 | 11.444 | 849.76 | 0.00 | 0.4927 |
| 2.5289490 | 59.7675 | 11.068 | 829.59 | 11.434 | 841.02 | 0.00 | 0.4903 |
| 2.5415938 | 59.5797 | 11.008 | 820.96 | 11.424 | 832.39 | 0.00 | 0.4878 |
| 2.5543017 | 59.3825 | 10.948 | 812.44 | 11.414 | 823.85 | 0.00 | 0.4854 |
| 2.5670732 | 59.1752 | 10.889 | 804.00 | 11.403 | 815.40 | 0.00 | 0.4830 |
| 2.5799086 | 58.9569 | 10.829 | 795.66 | 11.393 | 807.05 | 0.00 | 0.4806 |
| 2.5928082 | 58.7268 | 10.771 | 787.41 | 11.382 | 798.80 | 0.00 | 0.4782 |
| 2.6057722 | 58.4837 | 10.713 | 779.26 | 11.371 | 790.63 | 0.00 | 0.4758 |
| 2.6188011 | 58.2264 | 10.655 | 771.19 | 11.360 | 782.55 | 0.00 | 0.4734 |
| 2.6318951 | 57.9537 | 10.597 | 763.22 | 11.348 | 774.57 | 0.00 | 0.4711 |
| 2.6450545 | 57.6637 | 10.540 | 755.33 | 11.337 | 766.67 | 0.00 | 0.4687 |
| 2.6582798 | 57.3547 | 10.483 | 747.53 | 11.325 | 758.86 | 0.00 | 0.4664 |
| 2.6715712 | 57.0244 | 10.427 | 739.82 | 11.313 | 751.13 | 0.00 | 0.4641 |
| 2.6849291 | 56.6701 | 10.371 | 732.19 | 11.302 | 743.49 | 0.00 | 0.4618 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Rn ($Z=86$) | | | | | | | |
| 2.6983537 | 56.2888 | 10.316 | 724.65 | 11.289 | 735.94 | 0.00 | 0.4595 |
| 2.7118455 | 55.8765 | 10.261 | 717.19 | 11.277 | 728.47 | 0.00 | 0.4572 |
| 2.7254047 | 55.4284 | 10.206 | 709.81 | 11.265 | 721.08 | 0.00 | 0.4549 |
| 2.7390317 | 54.9385 | 10.151 | 702.52 | 11.252 | 713.77 | 0.00 | 0.4527 |
| 2.7527269 | 54.3992 | 10.097 | 695.30 | 11.239 | 706.54 | 0.00 | 0.4504 |
| 2.7664905 | 53.8004 | 10.044 | 688.17 | 11.226 | 699.39 | 0.00 | 0.4482 |
| 2.7803230 | 53.1286 | 9.9905 | 681.11 | 11.213 | 692.32 | 0.00 | 0.4459 |
| 2.7942246 | 52.3638 | 9.9375 | 674.13 | 11.200 | 685.33 | 0.00 | 0.4437 |
| 2.8081957 | 51.4805 | 9.8850 | 667.23 | 11.187 | 678.41 | 0.00 | 0.4415 |
| 2.8222367 | 50.4349 | 9.8328 | 660.40 | 11.173 | 671.57 | 0.00 | 0.4393 |
| 2.8363479 | 49.1554 | 9.7809 | 653.65 | 11.160 | 664.81 | 0.00 | 0.4371 |
| 2.8505296 | 47.5069 | 9.7294 | 646.97 | 11.146 | 658.12 | 0.00 | 0.4350 |
| 2.8647823 | 45.1815 | 9.6781 | 640.36 | 11.132 | 651.49 | 0.00 | 0.4328 |
| 2.8791062 | 41.1545 | 9.6271 | 633.82 | 11.117 | 644.93 | 0.00 | 0.4306 |
| 2.8915873 | 25.9768 | 9.5831 | 628.20 | 11.105 | 639.30 | 0.00 | 0.4288 |
| 2.8935017 | 27.3618 | 26.619 | 1743.8 | 11.103 | 1754.9 | 0.00 | 0.4285 |
| 2.9079692 | 41.6766 | 26.336 | 1716.6 | 11.089 | 1727.7 | 0.00 | 0.4264 |
| 2.9225091 | 45.0424 | 26.056 | 1690.0 | 11.074 | 1701.0 | 0.00 | 0.4242 |
| 2.9371216 | 46.8582 | 25.780 | 1663.7 | 11.059 | 1674.8 | 0.00 | 0.4221 |
| 2.9518072 | 47.9339 | 25.507 | 1637.9 | 11.044 | 1649.0 | 0.00 | 0.4200 |
| 2.9665662 | 48.4939 | 25.238 | 1612.6 | 11.029 | 1623.6 | 0.00 | 0.4179 |
| 2.9813991 | 48.5621 | 24.972 | 1587.6 | 11.014 | 1598.7 | 0.00 | 0.4159 |
| 2.9963061 | 47.9571 | 24.709 | 1563.1 | 10.999 | 1574.1 | 0.00 | 0.4138 |
| 3.0112876 | 45.8173 | 24.433 | 1538.0 | 10.983 | 1549.0 | 0.00 | 0.4117 |
| 3.0205816 | 38.0654 | 24.261 | 1522.5 | 10.974 | 1533.4 | 0.00 | 0.4105 |
| 3.0224186 | 37.9935 | 35.050 | 2198.2 | 10.972 | 2209.1 | 0.00 | 0.4102 |
| 3.0263440 | 43.9426 | 34.954 | 2189.3 | 10.968 | 2200.3 | 0.00 | 0.4097 |
| 3.0414758 | 49.5564 | 34.602 | 2156.5 | 10.952 | 2167.4 | 0.00 | 0.4076 |
| 3.0566831 | 52.1432 | 34.275 | 2125.5 | 10.936 | 2136.4 | 0.00 | 0.4056 |
| 3.0719666 | 53.9550 | 33.954 | 2095.1 | 10.920 | 2106.0 | 0.00 | 0.4036 |
| 3.0873264 | 55.3834 | 33.637 | 2065.2 | 10.904 | 2076.1 | 0.00 | 0.4016 |
| 3.1027630 | 56.5745 | 33.327 | 2036.0 | 10.887 | 2046.8 | 0.00 | 0.3996 |
| 3.1182768 | 57.6004 | 33.022 | 2007.3 | 10.871 | 2018.2 | 0.00 | 0.3976 |
| 3.1338682 | 58.5025 | 32.722 | 1979.2 | 10.854 | 1990.0 | 0.00 | 0.3956 |
| 3.1495376 | 59.3073 | 32.428 | 1951.6 | 10.837 | 1962.5 | 0.00 | 0.3937 |
| 3.1652853 | 60.0326 | 32.138 | 1924.6 | 10.821 | 1935.4 | 0.00 | 0.3917 |
| 3.1811117 | 60.6914 | 31.854 | 1898.1 | 10.803 | 1908.9 | 0.00 | 0.3898 |
| 3.1970172 | 61.2932 | 31.574 | 1872.0 | 10.786 | 1882.8 | 0.00 | 0.3878 |
| 3.2130023 | 61.8451 | 31.299 | 1846.5 | 10.769 | 1857.3 | 0.00 | 0.3859 |
| 3.2290673 | 62.3529 | 31.029 | 1821.4 | 10.752 | 1832.2 | 0.00 | 0.3840 |
| 3.2452127 | 62.8209 | 30.762 | 1796.8 | 10.734 | 1807.5 | 0.00 | 0.3821 |
| 3.2614387 | 63.2527 | 30.499 | 1772.6 | 10.716 | 1783.3 | 0.00 | 0.3802 |
| 3.2777459 | 63.6508 | 30.241 | 1748.8 | 10.698 | 1759.5 | 0.00 | 0.3783 |
| 3.2941347 | 64.0174 | 29.986 | 1725.4 | 10.680 | 1736.1 | 0.00 | 0.3764 |
| 3.3106053 | 64.3539 | 29.734 | 1702.5 | 10.662 | 1713.1 | 0.00 | 0.3745 |
| 3.3271584 | 64.6613 | 29.486 | 1679.9 | 10.644 | 1690.5 | 0.00 | 0.3726 |
| 3.3437941 | 64.9400 | 29.242 | 1657.6 | 10.626 | 1668.3 | 0.00 | 0.3708 |
| 3.3605131 | 65.1898 | 29.001 | 1635.8 | 10.607 | 1646.4 | 0.00 | 0.3689 |
| 3.3773157 | 65.4097 | 28.762 | 1614.3 | 10.589 | 1624.9 | 0.00 | 0.3671 |
| 3.3942023 | 65.5976 | 28.527 | 1593.1 | 10.570 | 1603.7 | 0.00 | 0.3653 |
| 3.4111733 | 65.7504 | 28.295 | 1572.3 | 10.551 | 1582.8 | 0.00 | 0.3635 |
| 3.4282291 | 65.8626 | 28.065 | 1551.8 | 10.532 | 1562.3 | 0.00 | 0.3617 |
| 3.4453703 | 65.9253 | 27.839 | 1531.6 | 10.513 | 1542.1 | 0.00 | 0.3599 |
| 3.4625971 | 65.9236 | 27.614 | 1511.7 | 10.494 | 1522.2 | 0.00 | 0.3581 |
| 3.4799101 | 65.8294 | 27.393 | 1492.1 | 10.474 | 1502.6 | 0.00 | 0.3563 |
| 3.4973097 | 65.5830 | 27.174 | 1472.8 | 10.455 | 1483.2 | 0.00 | 0.3545 |
| 3.5147962 | 65.0178 | 26.957 | 1453.8 | 10.435 | 1464.2 | 0.00 | 0.3527 |
| 3.5323702 | 63.1454 | 26.742 | 1435.0 | 10.416 | 1445.4 | 0.00 | 0.3510 |
| 3.5337899 | 62.7247 | 26.725 | 1433.5 | 10.414 | 1443.9 | 0.00 | 0.3509 |
| 3.5422103 | 62.7987 | 31.431 | 1681.9 | 10.405 | 1692.3 | 0.00 | 0.3500 |
| 3.5500321 | 64.5407 | 31.315 | 1672.0 | 10.396 | 1682.4 | 0.00 | 0.3492 |
| 3.5677822 | 66.2050 | 31.054 | 1649.9 | 10.376 | 1660.2 | 0.00 | 0.3475 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Rn ($Z=86$) | | | | | | | |
| 3.5856211 | 67.1795 | 30.796 | 1628.0 | 10.356 | 1638.4 | 0.00 | 0.3458 |
| 3.6035492 | 67.9089 | 30.541 | 1606.5 | 10.336 | 1616.8 | 0.00 | 0.3441 |
| 3.6215670 | 68.5076 | 30.288 | 1585.2 | 10.315 | 1595.5 | 0.00 | 0.3423 |
| 3.6396748 | 69.0227 | 30.037 | 1564.3 | 10.295 | 1574.6 | 0.00 | 0.3406 |
| 3.6578732 | 69.4782 | 29.788 | 1543.6 | 10.275 | 1553.9 | 0.00 | 0.3390 |
| 3.6761626 | 69.8877 | 29.542 | 1523.3 | 10.254 | 1533.5 | 0.00 | 0.3373 |
| 3.6945434 | 70.2597 | 29.298 | 1503.2 | 10.233 | 1513.4 | 0.00 | 0.3356 |
| 3.7130161 | 70.5984 | 29.057 | 1483.4 | 10.212 | 1493.6 | 0.00 | 0.3339 |
| 3.7315812 | 70.9125 | 28.834 | 1464.7 | 10.191 | 1474.8 | 0.00 | 0.3323 |
| 3.7502391 | 71.2108 | 28.613 | 1446.2 | 10.170 | 1456.4 | 0.00 | 0.3306 |
| 3.7689903 | 71.4936 | 28.390 | 1427.8 | 10.149 | 1438.0 | 0.00 | 0.3290 |
| 3.7878352 | 71.7594 | 28.164 | 1409.4 | 10.128 | 1419.5 | 0.00 | 0.3273 |
| 3.8067744 | 72.0095 | 27.941 | 1391.3 | 10.107 | 1401.4 | 0.00 | 0.3257 |
| 3.8258083 | 72.2452 | 27.720 | 1373.4 | 10.085 | 1383.5 | 0.00 | 0.3241 |
| 3.8449373 | 72.4675 | 27.502 | 1355.8 | 10.064 | 1365.9 | 0.00 | 0.3225 |
| 3.8641620 | 72.6771 | 27.286 | 1338.5 | 10.042 | 1348.5 | 0.00 | 0.3209 |
| 3.8834828 | 72.8747 | 27.073 | 1321.4 | 10.020 | 1331.4 | 0.00 | 0.3193 |
| 3.9029002 | 73.0606 | 26.862 | 1304.6 | 9.9984 | 1314.6 | 0.00 | 0.3177 |
| 3.9224147 | 73.2351 | 26.653 | 1288.0 | 9.9765 | 1298.0 | 0.00 | 0.3161 |
| 3.9420268 | 73.3978 | 26.445 | 1271.6 | 9.9544 | 1281.5 | 0.00 | 0.3145 |
| 3.9617369 | 73.5480 | 26.237 | 1255.3 | 9.9323 | 1265.3 | 0.00 | 0.3130 |
| 3.9815456 | 73.6851 | 26.032 | 1239.3 | 9.9101 | 1249.2 | 0.00 | 0.3114 |
| 4.0014533 | 73.8082 | 25.829 | 1223.5 | 9.8877 | 1233.4 | 0.00 | 0.3098 |
| 4.0214606 | 73.9157 | 25.627 | 1207.9 | 9.8653 | 1217.8 | 0.00 | 0.3083 |
| 4.0415679 | 74.0049 | 25.427 | 1192.5 | 9.8428 | 1202.4 | 0.00 | 0.3068 |
| 4.0617757 | 74.0715 | 25.229 | 1177.3 | 9.8202 | 1187.2 | 0.00 | 0.3052 |
| 4.0820846 | 74.1077 | 25.033 | 1162.4 | 9.7975 | 1172.2 | 0.00 | 0.3037 |
| 4.1024950 | 74.0981 | 24.838 | 1147.6 | 9.7747 | 1157.4 | 0.00 | 0.3022 |
| 4.1230075 | 74.0053 | 24.646 | 1133.1 | 9.7519 | 1142.8 | 0.00 | 0.3007 |
| 4.1436226 | 73.6876 | 24.454 | 1118.7 | 9.7289 | 1128.4 | 0.00 | 0.2992 |
| 4.1532189 | 73.2146 | 24.366 | 1112.1 | 9.7182 | 1121.8 | 0.00 | 0.2985 |
| 4.1643407 | 73.2317 | 26.017 | 1184.2 | 9.7059 | 1193.9 | 0.00 | 0.2977 |
| 4.1647809 | 73.2794 | 26.012 | 1183.9 | 9.7054 | 1193.6 | 0.00 | 0.2977 |
| 4.1851624 | 74.2703 | 25.805 | 1168.7 | 9.6828 | 1178.4 | 0.00 | 0.2962 |
| 4.2060882 | 74.7351 | 25.595 | 1153.5 | 9.6596 | 1163.1 | 0.00 | 0.2948 |
| 4.2271186 | 75.0676 | 25.388 | 1138.4 | 9.6363 | 1148.1 | 0.00 | 0.2933 |
| 4.2482542 | 75.3355 | 25.182 | 1123.6 | 9.6129 | 1133.2 | 0.00 | 0.2918 |
| 4.2694955 | 75.5626 | 24.978 | 1108.9 | 9.5894 | 1118.5 | 0.00 | 0.2904 |
| 4.2908430 | 75.7598 | 24.776 | 1094.5 | 9.5659 | 1104.1 | 0.00 | 0.2890 |
| 4.3122972 | 75.9326 | 24.576 | 1080.3 | 9.5423 | 1089.8 | 0.00 | 0.2875 |
| 4.3338587 | 76.0833 | 24.378 | 1066.2 | 9.5186 | 1075.7 | 0.00 | 0.2861 |
| 4.3555280 | 76.2121 | 24.181 | 1052.4 | 9.4949 | 1061.9 | 0.00 | 0.2847 |
| 4.3773056 | 76.3179 | 23.993 | 1039.0 | 9.4710 | 1048.5 | 0.00 | 0.2832 |
| 4.3991921 | 76.4025 | 23.811 | 1026.0 | 9.4471 | 1035.4 | 0.00 | 0.2818 |
| 4.4211881 | 76.4572 | 23.631 | 1013.2 | 9.4231 | 1022.6 | 0.00 | 0.2804 |
| 4.4432940 | 76.4600 | 23.454 | 1000.5 | 9.3991 | 1009.9 | 0.00 | 0.2790 |
| 4.4655105 | 76.3275 | 23.278 | 9880.9 | 9.3749 | 997.47 | 0.00 | 0.2776 |
| 4.4729462 | 76.1801 | 23.220 | 9839.8 | 9.3669 | 993.35 | 0.00 | 0.2772 |
| 4.4878381 | 76.1223 | 24.123 | 1018.9 | 9.3507 | 1028.2 | 0.00 | 0.2763 |
| 4.4910535 | 76.2843 | 24.098 | 1017.1 | 9.3472 | 1026.4 | 0.00 | 0.2761 |
| 4.5102772 | 76.7693 | 23.950 | 1006.5 | 9.3265 | 1015.9 | 0.00 | 0.2749 |
| 4.5328286 | 77.0907 | 23.780 | 994.40 | 9.3021 | 1003.7 | 0.00 | 0.2735 |
| 4.5554928 | 77.3380 | 23.611 | 982.43 | 9.2777 | 991.71 | 0.00 | 0.2722 |
| 4.5782702 | 77.5502 | 23.444 | 970.63 | 9.2532 | 979.88 | 0.00 | 0.2708 |
| 4.6011616 | 77.7414 | 23.278 | 958.97 | 9.2287 | 968.20 | 0.00 | 0.2695 |
| 4.6241674 | 77.9167 | 23.109 | 947.25 | 9.2041 | 956.46 | 0.00 | 0.2681 |
| 4.6472882 | 78.0797 | 22.941 | 935.69 | 9.1794 | 944.87 | 0.00 | 0.2668 |
| 4.6705247 | 78.2329 | 22.774 | 924.28 | 9.1547 | 933.44 | 0.00 | 0.2655 |
| 4.6938773 | 78.3780 | 22.610 | 913.03 | 9.1299 | 922.16 | 0.00 | 0.2641 |
| 4.7173467 | 78.5163 | 22.446 | 901.92 | 9.1050 | 911.02 | 0.00 | 0.2628 |
| 4.7409334 | 78.6483 | 22.284 | 890.94 | 9.0801 | 900.02 | 0.00 | 0.2615 |
| 4.7646381 | 78.7748 | 22.123 | 880.10 | 9.0552 | 889.15 | 0.00 | 0.2602 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Rn ($Z=86$) | | | | | | | |
| 4.7884613 | 78.8963 | 21.963 | 869.40 | 9.0301 | 878.43 | 0.00 | 0.2589 |
| 4.8124036 | 79.0133 | 21.804 | 858.83 | 9.0050 | 867.84 | 0.00 | 0.2576 |
| 4.8364656 | 79.1262 | 21.647 | 848.41 | 8.9799 | 857.39 | 0.00 | 0.2564 |
| 4.8606479 | 79.2353 | 21.492 | 838.12 | 8.9547 | 847.08 | 0.00 | 0.2551 |
| 4.8849512 | 79.3409 | 21.338 | 827.97 | 8.9295 | 836.90 | 0.00 | 0.2538 |
| 4.9093759 | 79.4432 | 21.185 | 817.95 | 8.9041 | 826.85 | 0.00 | 0.2525 |
| 4.9339228 | 79.5424 | 21.033 | 808.05 | 8.8788 | 816.93 | 0.00 | 0.2513 |
| 4.9585924 | 79.6387 | 20.883 | 798.29 | 8.8534 | 807.14 | 0.00 | 0.2500 |
| 4.9833854 | 79.7323 | 20.734 | 788.65 | 8.8279 | 797.48 | 0.00 | 0.2488 |
| 5.0083023 | 79.8233 | 20.586 | 779.14 | 8.8024 | 787.94 | 0.00 | 0.2476 |
| 5.0333438 | 79.9118 | 20.440 | 769.74 | 8.7769 | 778.52 | 0.00 | 0.2463 |
| 5.0585105 | 79.9980 | 20.295 | 760.47 | 8.7513 | 769.22 | 0.00 | 0.2451 |
| 5.0838031 | 80.0821 | 20.151 | 751.32 | 8.7256 | 760.04 | 0.00 | 0.2439 |
| 5.1092221 | 80.1640 | 20.008 | 742.28 | 8.6999 | 750.98 | 0.00 | 0.2427 |
| 5.1347682 | 80.2439 | 19.866 | 733.36 | 8.6742 | 742.03 | 0.00 | 0.2415 |
| 5.1604421 | 80.3219 | 19.726 | 724.55 | 8.6484 | 733.20 | 0.00 | 0.2403 |
| 5.1862443 | 80.3981 | 19.586 | 715.85 | 8.6226 | 724.48 | 0.00 | 0.2391 |
| 5.2121755 | 80.4726 | 19.448 | 707.27 | 8.5967 | 715.86 | 0.00 | 0.2379 |
| 5.2382364 | 80.5454 | 19.311 | 698.79 | 8.5708 | 707.36 | 0.00 | 0.2367 |
| 5.2644276 | 80.6167 | 19.175 | 690.42 | 8.5448 | 698.96 | 0.00 | 0.2355 |
| 5.2907497 | 80.6866 | 19.040 | 682.15 | 8.5189 | 690.67 | 0.00 | 0.2343 |
| 5.3172034 | 80.7551 | 18.906 | 673.98 | 8.4928 | 682.48 | 0.00 | 0.2332 |
| 5.3437895 | 80.8225 | 18.774 | 665.92 | 8.4668 | 674.39 | 0.00 | 0.2320 |
| 5.3705084 | 80.8887 | 18.642 | 657.96 | 8.4407 | 666.40 | 0.00 | 0.2309 |
| 5.3973609 | 80.9540 | 18.511 | 650.10 | 8.4146 | 658.51 | 0.00 | 0.2297 |
| 5.4243477 | 81.0181 | 18.379 | 642.25 | 8.3884 | 650.64 | 0.00 | 0.2286 |
| 5.4514695 | 81.0803 | 18.247 | 634.44 | 8.3622 | 642.81 | 0.00 | 0.2274 |
| 5.4787268 | 81.1406 | 18.115 | 626.74 | 8.3360 | 635.07 | 0.00 | 0.2263 |
| 5.5061205 | 81.1993 | 17.984 | 619.12 | 8.3097 | 627.43 | 0.00 | 0.2252 |
| 5.5336511 | 81.2564 | 17.855 | 611.60 | 8.2834 | 619.89 | 0.00 | 0.2241 |
| 5.5613193 | 81.3120 | 17.726 | 604.18 | 8.2571 | 612.43 | 0.00 | 0.2229 |
| 5.5891259 | 81.3662 | 17.599 | 596.84 | 8.2307 | 605.07 | 0.00 | 0.2218 |
| 5.6170716 | 81.4191 | 17.472 | 589.60 | 8.2044 | 597.80 | 0.00 | 0.2207 |
| 5.6451569 | 81.4706 | 17.346 | 582.44 | 8.1780 | 590.62 | 0.00 | 0.2196 |
| 5.6733827 | 81.5210 | 17.221 | 575.37 | 8.1515 | 583.53 | 0.00 | 0.2185 |
| 5.7017496 | 81.5701 | 17.097 | 568.39 | 8.1251 | 576.52 | 0.00 | 0.2174 |
| 5.7302584 | 81.6182 | 16.975 | 561.50 | 8.0986 | 569.60 | 0.00 | 0.2164 |
| 5.7589096 | 81.6652 | 16.853 | 554.69 | 8.0721 | 562.76 | 0.00 | 0.2153 |
| 5.7877042 | 81.721 | 16.731 | 547.95 | 8.0456 | 556.00 | 0.00 | 0.2142 |
| 5.8166427 | 81.9171 | 16.607 | 541.17 | 8.0190 | 549.19 | 0.00 | 0.2132 |
| 5.8457259 | 81.9606 | 16.483 | 534.46 | 7.9925 | 542.45 | 0.00 | 0.2121 |
| 5.8749546 | 82.0025 | 16.360 | 527.83 | 7.9659 | 535.80 | 0.00 | 0.2110 |
| 5.9043293 | 82.0431 | 16.238 | 521.29 | 7.9393 | 529.23 | 0.00 | 0.2100 |
| 5.9338510 | 82.0823 | 16.117 | 514.83 | 7.9127 | 522.74 | 0.00 | 0.2089 |
| 5.9635202 | 82.1203 | 15.997 | 508.45 | 7.8860 | 516.34 | 0.00 | 0.2079 |
| 5.9933378 | 82.1570 | 15.877 | 502.16 | 7.8594 | 510.02 | 0.00 | 0.2069 |
| 6.0233045 | 82.1926 | 15.759 | 495.94 | 7.8327 | 503.77 | 0.00 | 0.2058 |
| 6.0534210 | 82.3382 | 15.641 | 489.78 | 7.8060 | 497.58 | 0.00 | 0.2048 |
| 6.0836882 | 82.3714 | 15.523 | 483.64 | 7.7793 | 491.42 | 0.00 | 0.2038 |
| 6.1141066 | 82.4033 | 15.405 | 477.59 | 7.7526 | 485.34 | 0.00 | 0.2028 |
| 6.1446771 | 82.4340 | 15.288 | 471.61 | 7.7259 | 479.34 | 0.00 | 0.2018 |
| 6.1754005 | 82.4635 | 15.173 | 465.72 | 7.6992 | 473.42 | 0.00 | 0.2008 |
| 6.2062775 | 82.4918 | 15.058 | 459.89 | 7.6724 | 467.57 | 0.00 | 0.1998 |
| 6.2373089 | 82.5191 | 14.944 | 454.15 | 7.6457 | 461.79 | 0.00 | 0.1988 |
| 6.2684954 | 82.5452 | 14.831 | 448.47 | 7.6189 | 456.09 | 0.00 | 0.1978 |
| 6.2998379 | 82.5704 | 14.719 | 442.88 | 7.5922 | 450.47 | 0.00 | 0.1968 |
| 6.3313371 | 82.5945 | 14.608 | 437.35 | 7.5654 | 444.91 | 0.00 | 0.1958 |
| 6.3629938 | 82.6177 | 14.498 | 431.89 | 7.5386 | 439.43 | 0.00 | 0.1949 |
| 6.3948088 | 82.6399 | 14.389 | 426.51 | 7.5118 | 434.02 | 0.00 | 0.1939 |
| 6.4267828 | 82.6613 | 14.281 | 421.20 | 7.4850 | 428.68 | 0.00 | 0.1929 |
| 6.4589167 | 82.6818 | 14.173 | 415.95 | 7.4582 | 423.41 | 0.00 | 0.1920 |
| 6.4912113 | 82.7014 | 14.067 | 410.77 | 7.4315 | 418.20 | 0.00 | 0.1910 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Rn ($Z=86$) | | | | | | | |
| 6.5236674 | 82.7202 | 13.961 | 405.66 | 7.4047 | 413.07 | 0.00 | 0.1901 |
| 6.5562857 | 82.7382 | 13.857 | 400.62 | 7.3779 | 408.00 | 0.00 | 0.1891 |
| 6.5890671 | 82.7555 | 13.753 | 395.64 | 7.3511 | 402.99 | 0.00 | 0.1882 |
| 6.6220125 | 82.7719 | 13.650 | 390.73 | 7.3243 | 398.05 | 0.00 | 0.1872 |
| 6.6551225 | 82.7877 | 13.548 | 385.88 | 7.2975 | 393.18 | 0.00 | 0.1863 |
| 6.6883981 | 82.8027 | 13.447 | 381.09 | 7.2707 | 388.37 | 0.00 | 0.1854 |
| 6.7218401 | 82.8171 | 13.347 | 376.37 | 7.2439 | 383.62 | 0.00 | 0.1844 |
| 6.7554493 | 82.8308 | 13.247 | 371.71 | 7.2171 | 378.93 | 0.00 | 0.1835 |
| 6.7892266 | 82.8439 | 13.149 | 367.11 | 7.1903 | 374.30 | 0.00 | 0.1826 |
| 6.8231727 | 82.8563 | 13.051 | 362.57 | 7.1636 | 369.73 | 0.00 | 0.1817 |
| 6.8572886 | 82.8681 | 12.954 | 358.09 | 7.1368 | 365.23 | 0.00 | 0.1808 |
| 6.8915750 | 82.8794 | 12.858 | 353.67 | 7.1100 | 360.78 | 0.00 | 0.1799 |
| 6.9260329 | 82.8901 | 12.763 | 349.30 | 7.0833 | 356.38 | 0.00 | 0.1790 |
| 6.9606631 | 82.9002 | 12.669 | 344.99 | 7.0565 | 352.05 | 0.00 | 0.1781 |
| 6.9954664 | 82.9098 | 12.575 | 340.74 | 7.0298 | 347.77 | 0.00 | 0.1772 |
| 7.0304437 | 82.9189 | 12.483 | 336.55 | 7.0031 | 343.55 | 0.00 | 0.1764 |
| 7.0655959 | 82.9276 | 12.391 | 332.41 | 6.9764 | 339.38 | 0.00 | 0.1755 |
| 7.1009239 | 83.0258 | 12.298 | 328.29 | 6.9497 | 335.24 | 0.00 | 0.1746 |
| 7.1364285 | 83.0337 | 12.206 | 324.20 | 6.9230 | 331.13 | 0.00 | 0.1737 |
| 7.1721107 | 83.0410 | 12.115 | 320.18 | 6.8963 | 327.07 | 0.00 | 0.1729 |
| 7.2079712 | 83.0476 | 12.024 | 316.20 | 6.8696 | 323.07 | 0.00 | 0.1720 |
| 7.2440111 | 83.0536 | 11.934 | 312.28 | 6.8430 | 319.12 | 0.00 | 0.1712 |
| 7.2802311 | 83.0591 | 11.845 | 308.40 | 6.8164 | 315.22 | 0.00 | 0.1703 |
| 7.3166323 | 83.0641 | 11.757 | 304.58 | 6.7897 | 311.37 | 0.00 | 0.1695 |
| 7.3532155 | 83.0685 | 11.669 | 300.81 | 6.7631 | 307.57 | 0.00 | 0.1686 |
| 7.3899815 | 83.0724 | 11.5.83 | 297.09 | 6.7366 | 303.83 | 0.00 | 0.1678 |
| 7.4269314 | 83.0758 | 11.4.97 | 293.42 | 6.7100 | 300.13 | 0.00 | 0.1669 |
| 7.4640661 | 83.0787 | 11.4.11 | 289.79 | 6.6834 | 296.47 | 0.00 | 0.1661 |
| 7.5013864 | 83.0812 | 11.3.27 | 286.21 | 6.6569 | 292.87 | 0.00 | 0.1653 |
| 7.5388934 | 83.0832 | 112.43 | 282.68 | 6.6304 | 289.31 | 0.00 | 0.1645 |
| 7.5765878 | 83.0848 | 11.160 | 279.20 | 6.6039 | 285.80 | 0.00 | 0.1636 |
| 7.6144708 | 83.0860 | 11.078 | 275.76 | 6.5775 | 282.34 | 0.00 | 0.1628 |
| 7.6525431 | 83.0868 | 10.996 | 272.37 | 6.5510 | 278.92 | 0.00 | 0.1620 |
| 7.6908058 | 83.0872 | 10.915 | 269.02 | 6.5246 | 275.54 | 0.00 | 0.1612 |
| 7.7292599 | 83.0872 | 10.835 | 265.71 | 6.4982 | 272.21 | 0.00 | 0.1604 |
| 7.7679062 | 83.0869 | 10.755 | 262.45 | 6.4718 | 268.92 | 0.00 | 0.1596 |
| 7.8067457 | 83.0862 | 10.677 | 259.23 | 6.4455 | 265.68 | 0.00 | 0.1588 |
| 7.8457794 | 83.0852 | 1.0598 | 256.05 | 6.4191 | 262.47 | 0.00 | 0.1580 |
| 7.8850083 | 83.0839 | 10.521 | 252.92 | 6.3929 | 259.31 | 0.00 | 0.1572 |
| 7.9244334 | 83.0823 | 10.444 | 249.82 | 6.3666 | 256.19 | 0.00 | 0.1565 |
| 7.9640555 | 83.0803 | 10.368 | 246.77 | 6.3403 | 253.11 | 0.00 | 0.1557 |
| 8.0038758 | 83.0781 | 10.293 | 243.75 | 6.3141 | 250.07 | 0.00 | 0.1549 |
| 8.0438952 | 83.0757 | 10.218 | 240.78 | 6.2879 | 247.07 | 0.00 | 0.1541 |
| 8.0841147 | 83.0729 | 10.144 | 237.84 | 6.2618 | 244.10 | 0.00 | 0.1534 |
| 8.1245352 | 83.0700 | 10.070 | 234.94 | 6.2357 | 241.18 | 0.00 | 0.1526 |
| 8.1651579 | 83.0668 | 9.9973 | 232.08 | 6.2096 | 238.29 | 0.00 | 0.1518 |
| 8.2059837 | 83.0634 | 9.9251 | 229.26 | 6.1835 | 235.45 | 0.00 | 0.1511 |
| 8.2470136 | 83.0598 | 9.8535 | 226.48 | 6.1575 | 232.63 | 0.00 | 0.1503 |
| 8.2882487 | 83.0561 | 9.7826 | 223.73 | 6.1315 | 229.86 | 0.00 | 0.1496 |
| 8.3296899 | 83.0911 | 9.7120 | 221.01 | 6.1055 | 227.11 | 0.00 | 0.1488 |
| 8.3713384 | 83.0873 | 9.6414 | 218.31 | 6.0795 | 224.39 | 0.00 | 0.1481 |
| 8.4131951 | 83.0833 | 9.5713 | 215.64 | 6.0536 | 221.70 | 0.00 | 0.1474 |
| 8.4552610 | 83.0791 | 9.5019 | 213.01 | 6.0278 | 219.04 | 0.00 | 0.1466 |
| 8.4975373 | 83.0748 | 9.4331 | 210.42 | 6.0020 | 216.42 | 0.00 | 0.1459 |
| 8.5400250 | 83.0703 | 9.3648 | 207.86 | 5.9762 | 213.83 | 0.00 | 0.1452 |
| Fr ($Z=87$) | | | | | | | |
| Atomic weight: $A_r=223.0000 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=1.000$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1})=[\mu/\rho](\text{cm}^2\text{g}^{-1})\times 370.300 \text{ E(eV)} [\mu/\rho](\text{cm}^2\text{g}^{-1})=f_2 (e \text{ atom}^{-1})\times 1.88701\times 10^5$ | | | | | | | |
| 24 edges. Edge energies (keV) | | | | | | | |
| K | 101.137 | LI | 18.6390 | LII | 17.9065 | LIII | 15.0312 |
| MI | 4.65200 | MII | 4.32700 | MIII | 3.66300 | MIV | 3.13620 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|---|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| MV | 2.99970 | NI | 1.15300 | NII | 0.980000 | NIII | 0.810000 |
| NIV | 0.603300 | NV | 0.577000 | NVI | 0.246488 | NVII | 0.238863 |
| OI | 0.220035 | OII | 0.169009 | OIII | 0.132957 | OIV | 0.0595378 |
| OV | 0.0545529 | PI | 0.0278679 | PII | 0.0151650 | PIII | 0.0106123 |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL})=(-2.2217, -1.2942) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.018620 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 27.9322 | 34.274 | 12935 | 6.1662 | 12941 | 0.00 | 2.480 |
| 0.50250000 | 28.2216 | 34.332 | 12893 | 6.1967 | 12899 | 0.00 | 2.467 |
| 0.50501250 | 28.5084 | 34.385 | 12848 | 6.2272 | 12854 | 0.00 | 2.455 |
| 0.50753756 | 28.7939 | 34.433 | 12802 | 6.2578 | 12808 | 0.00 | 2.443 |
| 0.51007525 | 29.0749 | 34.475 | 12754 | 6.2883 | 12760 | 0.00 | 2.431 |
| 0.51262563 | 29.3526 | 34.513 | 12705 | 6.3189 | 12711 | 0.00 | 2.419 |
| 0.51518875 | 29.6269 | 34.546 | 12653 | 6.3495 | 12660 | 0.00 | 2.407 |
| 0.51776470 | 29.8974 | 34.574 | 12601 | 6.3801 | 12607 | 0.00 | 2.395 |
| 0.52035352 | 30.1639 | 34.598 | 12547 | 6.4108 | 12553 | 0.00 | 2.383 |
| 0.52295529 | 30.4261 | 34.617 | 12491 | 6.4414 | 12497 | 0.00 | 2.371 |
| 0.52557007 | 30.6836 | 34.631 | 12434 | 6.4721 | 12440 | 0.00 | 2.359 |
| 0.52819792 | 30.9361 | 34.641 | 12376 | 6.5028 | 12382 | 0.00 | 2.347 |
| 0.53083891 | 31.1833 | 34.647 | 12316 | 6.5335 | 12323 | 0.00 | 2.336 |
| 0.53349310 | 31.4245 | 34.648 | 12255 | 6.5643 | 12262 | 0.00 | 2.324 |
| 0.53616057 | 31.6594 | 34.645 | 12193 | 6.5950 | 12200 | 0.00 | 2.312 |
| 0.53884137 | 31.8872 | 34.638 | 12130 | 6.6258 | 12137 | 0.00 | 2.301 |
| 0.54153558 | 32.1073 | 34.627 | 12066 | 6.6566 | 12072 | 0.00 | 2.289 |
| 0.54424325 | 32.3188 | 34.612 | 12001 | 6.6873 | 12007 | 0.00 | 2.278 |
| 0.54696447 | 32.5205 | 34.593 | 11934 | 6.7181 | 11941 | 0.00 | 2.267 |
| 0.54969929 | 32.7112 | 34.570 | 11867 | 6.7489 | 11874 | 0.00 | 2.255 |
| 0.55244779 | 32.8890 | 34.543 | 11799 | 6.7798 | 11806 | 0.00 | 2.244 |
| 0.55521003 | 33.0516 | 34.513 | 11730 | 6.8106 | 11737 | 0.00 | 2.233 |
| 0.55798608 | 33.1958 | 34.479 | 11660 | 6.8414 | 11667 | 0.00 | 2.222 |
| 0.56077601 | 33.3167 | 34.442 | 11590 | 6.8722 | 11597 | 0.00 | 2.211 |
| 0.56357989 | 33.4071 | 34.402 | 11519 | 6.9031 | 11525 | 0.00 | 2.200 |
| 0.56639779 | 33.4545 | 34.358 | 11447 | 6.9339 | 11454 | 0.00 | 2.189 |
| 0.56922978 | 33.4350 | 34.311 | 11374 | 6.9647 | 11381 | 0.00 | 2.178 |
| 0.57207593 | 33.2919 | 34.260 | 11301 | 6.9956 | 11308 | 0.00 | 2.167 |
| 0.57493630 | 32.8112 | 34.207 | 11227 | 7.0264 | 11234 | 0.00 | 2.156 |
| 0.57662439 | 31.5810 | 34.174 | 11183 | 7.0445 | 11190 | 0.00 | 2.150 |
| 0.57737565 | 31.6271 | 36.636 | 11973 | 7.0526 | 11981 | 0.00 | 2.147 |
| 0.57781099 | 32.2603 | 36.630 | 11963 | 7.0572 | 11970 | 0.00 | 2.146 |
| 0.58070004 | 33.6387 | 36.594 | 11891 | 7.0881 | 11898 | 0.00 | 2.135 |
| 0.58360354 | 34.2731 | 36.555 | 11819 | 7.1189 | 11827 | 0.00 | 2.124 |
| 0.58652156 | 34.7286 | 36.513 | 11747 | 7.1497 | 11754 | 0.00 | 2.114 |
| 0.58945417 | 35.0911 | 36.468 | 11675 | 7.1805 | 11682 | 0.00 | 2.103 |
| 0.59240144 | 35.3850 | 36.422 | 11602 | 7.2113 | 11609 | 0.00 | 2.093 |
| 0.59536345 | 35.6106 | 36.372 | 11528 | 7.2421 | 11536 | 0.00 | 2.082 |
| 0.59834026 | 35.7396 | 36.321 | 11455 | 7.2729 | 11462 | 0.00 | 2.072 |
| 0.60133196 | 35.6320 | 36.267 | 11381 | 7.3037 | 11388 | 0.00 | 2.062 |
| 0.60290602 | 35.0309 | 36.238 | 11342 | 7.3198 | 11349 | 0.00 | 2.056 |
| 0.60369393 | 35.1112 | 37.725 | 11792 | 7.3279 | 11799 | 0.00 | 2.054 |
| 0.60433862 | 35.6398 | 37.716 | 11776 | 7.3345 | 11784 | 0.00 | 2.052 |
| 0.60736032 | 36.5982 | 37.673 | 11705 | 7.3652 | 11712 | 0.00 | 2.041 |
| 0.61039712 | 37.1673 | 37.628 | 11633 | 7.3959 | 11640 | 0.00 | 2.031 |
| 0.61344910 | 37.6346 | 37.582 | 11560 | 7.4267 | 11568 | 0.00 | 2.021 |
| 0.61651635 | 38.0516 | 37.533 | 11488 | 7.4574 | 11496 | 0.00 | 2.011 |
| 0.61959893 | 38.4375 | 37.483 | 11416 | 7.4881 | 11423 | 0.00 | 2.001 |
| 0.62269693 | 38.8015 | 37.432 | 11343 | 7.5187 | 11351 | 0.00 | 1.991 |
| 0.62581041 | 39.1491 | 37.379 | 11271 | 7.5494 | 11278 | 0.00 | 1.981 |
| 0.62893946 | 39.4836 | 37.324 | 11198 | 7.5800 | 11206 | 0.00 | 1.971 |
| 0.63208416 | 39.8075 | 37.268 | 11126 | 7.6106 | 11134 | 0.00 | 1.962 |
| 0.63524458 | 40.1225 | 37.211 | 11054 | 7.6412 | 11061 | 0.00 | 1.952 |
| 0.63842080 | 40.4297 | 37.152 | 10981 | 7.6717 | 10989 | 0.00 | 1.942 |
| 0.64161291 | 40.7302 | 37.091 | 10909 | 7.7022 | 10916 | 0.00 | 1.932 |
| 0.64482097 | 41.0244 | 37.029 | 10836 | 7.7327 | 10844 | 0.00 | 1.923 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Fr ($Z=87$) | | | | | | | |
| 0.64804508 | 41.3129 | 36.965 | 10764 | 7.7632 | 10771 | 0.00 | 1.913 |
| 0.65128530 | 41.5960 | 36.899 | 10691 | 7.7936 | 10699 | 0.00 | 1.904 |
| 0.65454173 | 41.8742 | 36.831 | 10618 | 7.8240 | 10626 | 0.00 | 1.894 |
| 0.65781444 | 42.1478 | 36.762 | 10546 | 7.8544 | 10553 | 0.00 | 1.885 |
| 0.66110351 | 42.4181 | 36.692 | 10473 | 7.8848 | 10481 | 0.00 | 1.875 |
| 0.66440903 | 42.6831 | 36.620 | 10400 | 7.9151 | 10408 | 0.00 | 1.866 |
| 0.66773107 | 42.9442 | 36.546 | 10328 | 7.9453 | 10336 | 0.00 | 1.857 |
| 0.67106973 | 43.2015 | 36.471 | 10255 | 7.9756 | 10263 | 0.00 | 1.848 |
| 0.67442508 | 43.4550 | 36.394 | 10183 | 8.0058 | 10191 | 0.00 | 1.838 |
| 0.677779720 | 43.7049 | 36.316 | 10110 | 8.0359 | 10118 | 0.00 | 1.829 |
| 0.68118619 | 43.9511 | 36.236 | 10038 | 8.0660 | 10046 | 0.00 | 1.820 |
| 0.68459212 | 44.1937 | 36.155 | 9965.6 | 8.0961 | 9973.7 | 0.00 | 1.811 |
| 0.68801508 | 44.4327 | 36.072 | 9893.4 | 8.1261 | 9901.5 | 0.00 | 1.802 |
| 0.69145515 | 44.6683 | 35.988 | 9821.2 | 8.1561 | 9829.3 | 0.00 | 1.793 |
| 0.69491243 | 44.9003 | 35.902 | 9749.1 | 8.1861 | 9757.3 | 0.00 | 1.784 |
| 0.69838699 | 45.1288 | 35.815 | 9677.1 | 8.2160 | 9685.3 | 0.00 | 1.775 |
| 0.70187893 | 45.3539 | 35.727 | 9605.3 | 8.2458 | 9613.5 | 0.00 | 1.766 |
| 0.70538832 | 45.5756 | 35.638 | 9533.6 | 8.2756 | 9541.9 | 0.00 | 1.758 |
| 0.70891526 | 45.7937 | 35.547 | 9462.1 | 8.3053 | 9470.4 | 0.00 | 1.749 |
| 0.71245984 | 46.0084 | 35.456 | 9390.8 | 8.3350 | 9399.1 | 0.00 | 1.740 |
| 0.71602214 | 46.2196 | 35.363 | 9319.6 | 8.3647 | 9327.9 | 0.00 | 1.732 |
| 0.71960225 | 46.4513 | 35.269 | 9248.5 | 8.3943 | 9256.9 | 0.00 | 1.723 |
| 0.72320026 | 46.6555 | 35.173 | 9177.6 | 8.4238 | 9186.0 | 0.00 | 1.714 |
| 0.72681626 | 46.8559 | 35.077 | 9106.9 | 8.4533 | 9115.4 | 0.00 | 1.706 |
| 0.73045034 | 47.0524 | 34.980 | 9036.5 | 8.4827 | 9045.0 | 0.00 | 1.697 |
| 0.73410260 | 47.2450 | 34.882 | 8966.3 | 8.5120 | 8974.8 | 0.00 | 1.689 |
| 0.73777311 | 47.4335 | 34.782 | 8896.3 | 8.5413 | 8904.9 | 0.00 | 1.681 |
| 0.74146197 | 47.6486 | 34.682 | 8826.6 | 8.5706 | 8835.2 | 0.00 | 1.672 |
| 0.74516928 | 47.8287 | 34.582 | 8757.2 | 8.5998 | 8765.8 | 0.00 | 1.664 |
| 0.74889513 | 48.0042 | 34.480 | 8688.0 | 8.6289 | 8696.6 | 0.00 | 1.656 |
| 0.75263961 | 48.1747 | 34.378 | 8619.1 | 8.6579 | 8627.8 | 0.00 | 1.647 |
| 0.75640280 | 48.3399 | 34.275 | 8550.5 | 8.6869 | 8559.2 | 0.00 | 1.639 |
| 0.76018482 | 48.4994 | 34.171 | 8482.2 | 8.7158 | 8490.9 | 0.00 | 1.631 |
| 0.76398574 | 48.6526 | 34.066 | 8414.2 | 8.7446 | 8423.0 | 0.00 | 1.623 |
| 0.76780567 | 48.7988 | 33.961 | 8346.6 | 8.7734 | 8355.3 | 0.00 | 1.615 |
| 0.77164470 | 48.9371 | 33.856 | 8279.2 | 8.8021 | 8288.0 | 0.00 | 1.607 |
| 0.77550292 | 49.0662 | 33.750 | 8212.2 | 8.8308 | 8221.0 | 0.00 | 1.599 |
| 0.77938044 | 49.1845 | 33.643 | 8145.5 | 8.8593 | 8154.4 | 0.00 | 1.591 |
| 0.78327734 | 49.2895 | 33.536 | 8079.2 | 8.8878 | 8088.1 | 0.00 | 1.583 |
| 0.78719373 | 49.3776 | 33.428 | 8013.2 | 8.9162 | 8022.1 | 0.00 | 1.575 |
| 0.79112969 | 49.4432 | 33.320 | 7947.6 | 8.9445 | 7956.5 | 0.00 | 1.567 |
| 0.79508534 | 49.4765 | 33.212 | 7882.4 | 8.9728 | 7891.3 | 0.00 | 1.559 |
| 0.79906077 | 49.4582 | 33.103 | 7817.5 | 9.0010 | 7826.5 | 0.00 | 1.552 |
| 0.80305607 | 49.3420 | 32.994 | 7753.0 | 9.0291 | 7762.0 | 0.00 | 1.544 |
| 0.80707135 | 48.9529 | 32.885 | 7688.8 | 9.0571 | 7697.9 | 0.00 | 1.536 |
| 0.80891460 | 48.3781 | 32.835 | 7659.6 | 9.0699 | 7668.7 | 0.00 | 1.533 |
| 0.81110671 | 48.4888 | 34.857 | 8109.3 | 9.0850 | 8118.4 | 0.00 | 1.529 |
| 0.81516224 | 49.6878 | 34.748 | 8043.8 | 9.1128 | 8053.0 | 0.00 | 1.521 |
| 0.81923806 | 50.2509 | 34.640 | 7978.8 | 9.1406 | 7988.0 | 0.00 | 1.513 |
| 0.82333425 | 50.6701 | 34.531 | 7914.2 | 9.1683 | 7923.4 | 0.00 | 1.506 |
| 0.82745092 | 51.0229 | 34.422 | 7850.0 | 9.1959 | 7859.2 | 0.00 | 1.498 |
| 0.83158817 | 51.3368 | 34.313 | 7786.2 | 9.2234 | 7795.4 | 0.00 | 1.491 |
| 0.83574611 | 51.6249 | 34.204 | 7722.8 | 9.2508 | 7732.1 | 0.00 | 1.484 |
| 0.83992484 | 51.8945 | 34.095 | 7659.9 | 9.2781 | 7669.1 | 0.00 | 1.476 |
| 0.84412447 | 52.1499 | 33.985 | 7597.3 | 9.3053 | 7606.6 | 0.00 | 1.469 |
| 0.84834509 | 52.3940 | 33.876 | 7535.2 | 9.3324 | 7544.6 | 0.00 | 1.461 |
| 0.85258682 | 52.6289 | 33.767 | 7473.5 | 9.3595 | 7482.9 | 0.00 | 1.454 |
| 0.85684975 | 52.8561 | 33.658 | 7412.3 | 9.3864 | 7421.7 | 0.00 | 1.447 |
| 0.86113400 | 53.0767 | 33.548 | 7351.5 | 9.4133 | 7360.9 | 0.00 | 1.440 |
| 0.86543967 | 53.2915 | 33.439 | 7291.1 | 9.4400 | 7300.6 | 0.00 | 1.433 |
| 0.86976687 | 53.5012 | 33.330 | 7231.2 | 9.4667 | 7240.7 | 0.00 | 1.425 |
| 0.87411570 | 53.7063 | 33.221 | 7171.7 | 9.4932 | 7181.2 | 0.00 | 1.418 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Fr ($Z=87$) | | | | | | | |
| 0.87848628 | 53.9072 | 33.113 | 7112.7 | 9.5196 | 7122.2 | 0.00 | 1.411 |
| 0.88287871 | 54.1045 | 33.004 | 7054.1 | 9.5460 | 7063.6 | 0.00 | 1.404 |
| 0.88729310 | 54.2983 | 32.896 | 6995.9 | 9.5722 | 7005.5 | 0.00 | 1.397 |
| 0.89172957 | 54.4890 | 32.787 | 6938.2 | 9.5984 | 6947.8 | 0.00 | 1.390 |
| 0.89618822 | 54.6767 | 32.679 | 6881.0 | 9.6244 | 6890.6 | 0.00 | 1.383 |
| 0.90066916 | 54.8618 | 32.572 | 6824.1 | 9.6503 | 6833.8 | 0.00 | 1.377 |
| 0.90517250 | 55.0442 | 32.464 | 6767.7 | 9.6761 | 6777.4 | 0.00 | 1.370 |
| 0.90969837 | 55.2242 | 32.357 | 6711.8 | 9.7018 | 6721.5 | 0.00 | 1.363 |
| 0.91424686 | 55.4019 | 32.249 | 6656.3 | 9.7274 | 6666.0 | 0.00 | 1.356 |
| 0.91881809 | 55.5774 | 32.142 | 6601.2 | 9.7529 | 6610.9 | 0.00 | 1.349 |
| 0.92341218 | 55.7507 | 32.036 | 6546.5 | 9.7783 | 6556.3 | 0.00 | 1.343 |
| 0.92802924 | 55.9219 | 31.929 | 6492.4 | 9.8035 | 6502.2 | 0.00 | 1.336 |
| 0.93266939 | 56.0910 | 31.823 | 6438.6 | 9.8287 | 6448.4 | 0.00 | 1.329 |
| 0.93733274 | 56.2579 | 31.718 | 6385.3 | 9.8537 | 6395.1 | 0.00 | 1.323 |
| 0.94201940 | 56.4225 | 31.612 | 6332.4 | 9.8786 | 6342.3 | 0.00 | 1.316 |
| 0.94672950 | 56.5846 | 31.507 | 6280.0 | 9.9034 | 6289.9 | 0.00 | 1.310 |
| 0.95146315 | 56.7437 | 31.403 | 6228.0 | 9.9280 | 6237.9 | 0.00 | 1.303 |
| 0.95622046 | 56.8991 | 31.298 | 6176.5 | 9.9526 | 6186.4 | 0.00 | 1.297 |
| 0.96100156 | 57.0492 | 31.195 | 6125.3 | 9.9770 | 6135.3 | 0.00 | 1.290 |
| 0.96580657 | 57.1911 | 31.091 | 6074.7 | 10.001 | 6084.7 | 0.00 | 1.284 |
| 0.97063560 | 57.3175 | 30.988 | 6024.4 | 10.026 | 6034.5 | 0.00 | 1.277 |
| 0.97548878 | 57.4036 | 30.885 | 5974.5 | 10.050 | 5984.6 | 0.00 | 1.271 |
| 0.97859862 | 57.3653 | 30.814 | 5941.7 | 10.065 | 5951.8 | 0.00 | 1.267 |
| 0.98036623 | 57.2538 | 31.188 | 6003.1 | 10.073 | 6013.1 | 0.00 | 1.265 |
| 0.98140142 | 57.4694 | 31.165 | 5992.2 | 10.079 | 6002.3 | 0.00 | 1.263 |
| 0.98526806 | 57.7884 | 31.078 | 5952.1 | 10.097 | 5962.2 | 0.00 | 1.258 |
| 0.99019440 | 58.0602 | 30.968 | 5901.6 | 10.121 | 5911.8 | 0.00 | 1.252 |
| 0.99514537 | 58.2997 | 30.859 | 5851.6 | 10.145 | 5861.7 | 0.00 | 1.246 |
| 1.00012111 | 58.5305 | 30.749 | 5801.7 | 10.168 | 5811.8 | 0.00 | 1.240 |
| 1.0051217 | 58.7261 | 30.568 | 5738.8 | 10.191 | 5749.0 | 0.00 | 1.234 |
| 1.0101473 | 58.9113 | 30.388 | 5676.7 | 10.214 | 5686.9 | 0.00 | 1.227 |
| 1.0151980 | 59.0881 | 30.210 | 5615.4 | 10.237 | 5625.6 | 0.00 | 1.221 |
| 1.0202740 | 59.2577 | 30.033 | 5554.6 | 10.260 | 5564.9 | 0.00 | 1.215 |
| 1.0253754 | 59.4197 | 29.850 | 5493.3 | 10.283 | 5503.6 | 0.00 | 1.209 |
| 1.0305023 | 59.5748 | 29.667 | 5432.5 | 10.306 | 5442.8 | 0.00 | 1.203 |
| 1.0356548 | 59.7237 | 29.485 | 5372.4 | 10.328 | 5382.7 | 0.00 | 1.197 |
| 1.0408331 | 59.8667 | 29.305 | 5313.0 | 10.351 | 5323.4 | 0.00 | 1.191 |
| 1.0460372 | 60.0043 | 29.127 | 5254.4 | 10.373 | 5264.8 | 0.00 | 1.185 |
| 1.0512674 | 60.1367 | 28.950 | 5196.4 | 10.395 | 5206.8 | 0.00 | 1.179 |
| 1.0565238 | 60.2641 | 28.774 | 5139.2 | 10.417 | 5149.6 | 0.00 | 1.174 |
| 1.0618064 | 60.3869 | 28.600 | 5082.7 | 10.438 | 5093.1 | 0.00 | 1.168 |
| 1.0671154 | 60.5051 | 28.427 | 5026.8 | 10.460 | 5037.3 | 0.00 | 1.162 |
| 1.0724510 | 60.6190 | 28.255 | 4971.6 | 10.482 | 4982.1 | 0.00 | 1.156 |
| 1.0778132 | 60.7285 | 28.085 | 4917.1 | 10.503 | 4927.6 | 0.00 | 1.150 |
| 1.0832023 | 60.8337 | 27.916 | 4863.2 | 10.524 | 4873.7 | 0.00 | 1.145 |
| 1.0886183 | 60.9345 | 27.748 | 4809.9 | 10.545 | 4820.5 | 0.00 | 1.139 |
| 1.0940614 | 61.0309 | 27.582 | 4757.3 | 10.566 | 4767.8 | 0.00 | 1.133 |
| 1.0995317 | 61.1226 | 27.417 | 4705.3 | 10.587 | 4715.9 | 0.00 | 1.128 |
| 1.1050294 | 61.2096 | 27.253 | 4653.9 | 10.608 | 4664.5 | 0.00 | 1.122 |
| 1.1105545 | 61.2913 | 27.090 | 4603.1 | 10.628 | 4613.7 | 0.00 | 1.116 |
| 1.1161073 | 61.3673 | 26.929 | 4552.9 | 10.648 | 4563.6 | 0.00 | 1.111 |
| 1.1216878 | 61.4365 | 26.768 | 4503.2 | 10.669 | 4513.9 | 0.00 | 1.105 |
| 1.1272963 | 61.4974 | 26.608 | 4454.0 | 10.689 | 4464.7 | 0.00 | 1.100 |
| 1.1329328 | 61.5470 | 26.449 | 4405.4 | 10.708 | 4416.1 | 0.00 | 1.094 |
| 1.1385974 | 61.5793 | 26.292 | 4357.4 | 10.728 | 4368.1 | 0.00 | 1.089 |
| 1.1442904 | 61.5791 | 26.135 | 4309.9 | 10.748 | 4320.7 | 0.00 | 1.084 |
| 1.1500119 | 61.4763 | 25.980 | 4263.0 | 10.767 | 4273.8 | 0.00 | 1.078 |
| 1.1516164 | 61.3637 | 25.937 | 4250.0 | 10.772 | 4260.8 | 0.00 | 1.077 |
| 1.1543836 | 61.4176 | 26.420 | 4318.8 | 10.782 | 4329.6 | 0.00 | 1.074 |
| 1.1557619 | 61.5604 | 26.383 | 4307.6 | 10.786 | 4318.4 | 0.00 | 1.073 |
| 1.1615407 | 61.8434 | 26.230 | 4261.2 | 10.805 | 4272.0 | 0.00 | 1.067 |
| 1.1673484 | 62.0159 | 26.077 | 4215.4 | 10.824 | 4226.2 | 0.00 | 1.062 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Fr ($Z=87$) | | | | | | | |
| 1.1731852 | 62.1549 | 25.926 | 4170.1 | 10.843 | 4181.0 | 0.00 | 1.057 |
| 1.1790511 | 62.2765 | 25.776 | 4125.4 | 10.862 | 4136.2 | 0.00 | 1.052 |
| 1.1849464 | 62.3872 | 25.627 | 4081.1 | 10.880 | 4092.0 | 0.00 | 1.046 |
| 1.1908711 | 62.4900 | 25.480 | 4037.4 | 10.898 | 4048.3 | 0.00 | 1.041 |
| 1.1968254 | 62.5866 | 25.333 | 3994.2 | 10.917 | 4005.1 | 0.00 | 1.036 |
| 1.2028096 | 62.6782 | 25.188 | 3951.5 | 10.934 | 3962.5 | 0.00 | 1.031 |
| 1.2088236 | 62.7655 | 25.044 | 3909.4 | 10.952 | 3920.3 | 0.00 | 1.026 |
| 1.2148677 | 62.8490 | 24.901 | 3867.8 | 10.970 | 3878.7 | 0.00 | 1.021 |
| 1.2209421 | 62.9295 | 24.759 | 3826.7 | 10.987 | 3837.6 | 0.00 | 1.015 |
| 1.2270468 | 63.0072 | 24.619 | 3786.0 | 11.005 | 3797.0 | 0.00 | 1.010 |
| 1.2331820 | 63.0823 | 24.480 | 3745.9 | 11.022 | 3756.9 | 0.00 | 1.005 |
| 1.2393479 | 63.1550 | 24.342 | 3706.3 | 11.039 | 3717.3 | 0.00 | 1.000 |
| 1.2455447 | 63.2254 | 24.205 | 3667.1 | 11.056 | 3678.1 | 0.00 | 0.9954 |
| 1.2517724 | 63.2938 | 24.069 | 3628.3 | 11.072 | 3639.4 | 0.00 | 0.9905 |
| 1.2580312 | 63.3602 | 23.934 | 3590.1 | 11.089 | 3601.2 | 0.00 | 0.9855 |
| 1.2643214 | 63.4247 | 23.801 | 3552.2 | 11.105 | 3563.4 | 0.00 | 0.9806 |
| 1.2706430 | 63.4875 | 23.668 | 3514.9 | 11.121 | 3526.0 | 0.00 | 0.9758 |
| 1.2769962 | 63.5485 | 23.536 | 3477.9 | 11.137 | 3489.1 | 0.00 | 0.9709 |
| 1.2833812 | 63.6080 | 23.406 | 3441.4 | 11.153 | 3452.6 | 0.00 | 0.9661 |
| 1.2897981 | 63.6659 | 23.276 | 3405.4 | 11.168 | 3416.5 | 0.00 | 0.9613 |
| 1.2962471 | 63.7223 | 23.148 | 3369.7 | 11.184 | 3380.9 | 0.00 | 0.9565 |
| 1.3027283 | 63.7773 | 23.020 | 3334.5 | 11.199 | 3345.7 | 0.00 | 0.9517 |
| 1.3092420 | 63.8309 | 22.894 | 3299.7 | 11.214 | 3310.9 | 0.00 | 0.9470 |
| 1.3157882 | 63.8832 | 22.768 | 3265.3 | 11.229 | 3276.5 | 0.00 | 0.9423 |
| 1.3223671 | 63.9343 | 22.644 | 3231.3 | 11.244 | 3242.5 | 0.00 | 0.9376 |
| 1.3289790 | 63.9841 | 22.520 | 3197.6 | 11.258 | 3208.9 | 0.00 | 0.9329 |
| 1.3356239 | 64.0328 | 22.398 | 3164.4 | 11.273 | 3175.7 | 0.00 | 0.9283 |
| 1.3423020 | 64.0803 | 22.276 | 3131.6 | 11.287 | 3142.9 | 0.00 | 0.9237 |
| 1.3490135 | 64.1268 | 22.156 | 3099.1 | 11.301 | 3110.4 | 0.00 | 0.9191 |
| 1.3557586 | 64.1723 | 22.036 | 3067.1 | 11.315 | 3078.4 | 0.00 | 0.9145 |
| 1.3625374 | 64.2169 | 21.917 | 3035.3 | 11.328 | 3046.7 | 0.00 | 0.9100 |
| 1.3693500 | 64.2605 | 21.799 | 3004.0 | 11.342 | 3015.3 | 0.00 | 0.9054 |
| 1.3761968 | 64.3028 | 21.680 | 2972.7 | 11.355 | 2984.0 | 0.00 | 0.9009 |
| 1.3830778 | 64.3439 | 21.561 | 2941.7 | 11.368 | 2953.1 | 0.00 | 0.8964 |
| 1.3899932 | 64.3837 | 21.444 | 2911.1 | 11.381 | 2922.5 | 0.00 | 0.8920 |
| 1.3969431 | 64.4223 | 21.327 | 2880.9 | 11.394 | 2892.3 | 0.00 | 0.8875 |
| 1.4039278 | 64.4599 | 21.211 | 2851.0 | 11.406 | 2862.4 | 0.00 | 0.8831 |
| 1.4109475 | 64.4963 | 21.097 | 2821.5 | 11.419 | 2832.9 | 0.00 | 0.8787 |
| 1.4180022 | 64.5317 | 20.982 | 2792.2 | 11.431 | 2803.7 | 0.00 | 0.8744 |
| 1.4250922 | 64.5660 | 20.869 | 2763.4 | 11.443 | 2774.8 | 0.00 | 0.8700 |
| 1.4322177 | 64.5993 | 20.757 | 2734.8 | 11.455 | 2746.3 | 0.00 | 0.8657 |
| 1.4393788 | 64.6317 | 20.646 | 2706.6 | 11.467 | 2718.1 | 0.00 | 0.8614 |
| 1.4465757 | 64.6630 | 20.535 | 2678.7 | 11.478 | 2690.2 | 0.00 | 0.8571 |
| 1.4538086 | 64.6935 | 20.425 | 2651.1 | 11.489 | 2662.6 | 0.00 | 0.8528 |
| 1.4610776 | 64.7230 | 20.316 | 2623.9 | 11.500 | 2635.4 | 0.00 | 0.8486 |
| 1.4683830 | 64.7517 | 20.208 | 2596.9 | 11.511 | 2608.4 | 0.00 | 0.8444 |
| 1.4757249 | 64.7795 | 20.100 | 2570.3 | 11.522 | 2581.8 | 0.00 | 0.8402 |
| 1.4831035 | 64.8064 | 19.994 | 2543.9 | 11.533 | 2555.4 | 0.00 | 0.8360 |
| 1.4905190 | 64.8326 | 19.888 | 2517.9 | 11.543 | 2529.4 | 0.00 | 0.8318 |
| 1.4979716 | 64.8579 | 19.783 | 2492.1 | 11.553 | 2503.7 | 0.00 | 0.8277 |
| 1.5054615 | 64.8825 | 19.678 | 2466.6 | 11.563 | 2478.1 | 0.00 | 0.8236 |
| 1.5129888 | 64.9060 | 19.574 | 2441.3 | 11.573 | 2452.9 | 0.00 | 0.8195 |
| 1.5205537 | 64.9287 | 19.471 | 2416.3 | 11.582 | 2427.9 | 0.00 | 0.8154 |
| 1.5281565 | 64.9506 | 19.368 | 2391.6 | 11.592 | 2403.2 | 0.00 | 0.8113 |
| 1.5357973 | 64.9715 | 19.266 | 2367.2 | 11.601 | 2378.8 | 0.00 | 0.8073 |
| 1.5434763 | 64.9916 | 19.165 | 2343.1 | 11.610 | 2354.7 | 0.00 | 0.8033 |
| 1.5511937 | 65.0109 | 19.065 | 2319.2 | 11.619 | 2330.8 | 0.00 | 0.7993 |
| 1.5589496 | 65.0295 | 18.965 | 2295.6 | 11.627 | 2307.2 | 0.00 | 0.7953 |
| 1.5667444 | 65.0472 | 18.866 | 2272.3 | 11.636 | 2283.9 | 0.00 | 0.7913 |
| 1.5745781 | 65.0641 | 18.768 | 2249.2 | 11.644 | 2260.9 | 0.00 | 0.7874 |
| 1.5824510 | 65.0803 | 18.671 | 2226.4 | 11.652 | 2238.0 | 0.00 | 0.7835 |
| 1.5903633 | 65.0957 | 18.574 | 2203.8 | 11.660 | 2215.5 | 0.00 | 0.7796 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Fr ($Z=87$) | | | | | | | |
| 1.5983151 | 65.1103 | 18.478 | 2181.5 | 11.668 | 2193.2 | 0.00 | 0.7757 |
| 1.6063066 | 65.1243 | 18.382 | 2159.5 | 11.675 | 2171.1 | 0.00 | 0.7719 |
| 1.6143382 | 65.1375 | 18.288 | 2137.6 | 11.682 | 2149.3 | 0.00 | 0.7680 |
| 1.6224099 | 65.1500 | 18.194 | 2116.1 | 11.690 | 2127.8 | 0.00 | 0.7642 |
| 1.6305219 | 65.1618 | 18.100 | 2094.7 | 11.696 | 2106.4 | 0.00 | 0.7604 |
| 1.6386745 | 65.1729 | 18.008 | 2073.7 | 11.703 | 2085.4 | 0.00 | 0.7566 |
| 1.6468679 | 65.1834 | 17.916 | 2052.8 | 11.710 | 2064.5 | 0.00 | 0.7528 |
| 1.6551022 | 65.1932 | 17.824 | 2032.2 | 11.716 | 2043.9 | 0.00 | 0.7491 |
| 1.6633777 | 65.2022 | 17.733 | 2011.7 | 11.722 | 2023.4 | 0.00 | 0.7454 |
| 1.6716946 | 65.2104 | 17.641 | 1991.4 | 11.728 | 2003.1 | 0.00 | 0.7417 |
| 1.6800531 | 65.2178 | 17.551 | 1971.3 | 11.734 | 1983.0 | 0.00 | 0.7380 |
| 1.6884534 | 65.2243 | 17.461 | 1951.4 | 11.739 | 1963.2 | 0.00 | 0.7343 |
| 1.6968956 | 65.2300 | 17.372 | 1931.8 | 11.745 | 1943.5 | 0.00 | 0.7307 |
| 1.7053801 | 65.2350 | 17.283 | 1912.4 | 11.750 | 1924.1 | 0.00 | 0.7270 |
| 1.7139070 | 65.2392 | 17.195 | 1893.2 | 11.755 | 1904.9 | 0.00 | 0.7234 |
| 1.7224766 | 65.2425 | 17.107 | 1874.2 | 11.760 | 1885.9 | 0.00 | 0.7198 |
| 1.7310889 | 65.2483 | 17.021 | 1855.4 | 11.764 | 1867.1 | 0.00 | 0.7162 |
| 1.7397444 | 65.2703 | 16.934 | 1836.8 | 11.769 | 1848.6 | 0.00 | 0.7127 |
| 1.7484431 | 65.2715 | 16.849 | 1818.4 | 11.773 | 1830.2 | 0.00 | 0.7091 |
| 1.7571853 | 65.2720 | 16.764 | 1800.2 | 11.777 | 1812.0 | 0.00 | 0.7056 |
| 1.7659712 | 65.2717 | 16.679 | 1782.3 | 11.781 | 1794.0 | 0.00 | 0.7021 |
| 1.7748011 | 65.2706 | 16.596 | 1764.5 | 11.784 | 1776.3 | 0.00 | 0.6986 |
| 1.7836751 | 65.2687 | 16.512 | 1746.9 | 11.788 | 1758.7 | 0.00 | 0.6951 |
| 1.7925935 | 65.2661 | 16.430 | 1729.5 | 11.791 | 1741.3 | 0.00 | 0.6916 |
| 1.8015565 | 65.2627 | 16.347 | 1712.3 | 11.794 | 1724.1 | 0.00 | 0.6882 |
| 1.8105642 | 65.2614 | 16.266 | 1695.3 | 11.797 | 1707.1 | 0.00 | 0.6848 |
| 1.8196171 | 65.2565 | 16.185 | 1678.4 | 11.799 | 1690.2 | 0.00 | 0.6814 |
| 1.8287151 | 65.2508 | 16.104 | 1661.8 | 11.802 | 1673.6 | 0.00 | 0.6780 |
| 1.8378587 | 65.2443 | 16.025 | 1645.3 | 11.804 | 1657.1 | 0.00 | 0.6746 |
| 1.8470480 | 65.2370 | 15.945 | 1629.0 | 11.806 | 1640.8 | 0.00 | 0.6713 |
| 1.8562833 | 65.2290 | 15.867 | 1612.9 | 11.808 | 1624.7 | 0.00 | 0.6679 |
| 1.8655647 | 65.2201 | 15.788 | 1597.0 | 11.809 | 1608.8 | 0.00 | 0.6646 |
| 1.8748925 | 65.2105 | 15.711 | 1581.2 | 11.811 | 1593.0 | 0.00 | 0.6613 |
| 1.8842670 | 65.2000 | 15.633 | 1565.6 | 11.812 | 1577.4 | 0.00 | 0.6580 |
| 1.8936883 | 65.1887 | 15.557 | 1550.2 | 11.813 | 1562.0 | 0.00 | 0.6547 |
| 1.9031567 | 65.1766 | 15.481 | 1534.9 | 11.814 | 1546.8 | 0.00 | 0.6515 |
| 1.9126725 | 65.1636 | 15.405 | 1519.9 | 11.815 | 1531.7 | 0.00 | 0.6482 |
| 1.9222359 | 65.1498 | 15.330 | 1504.9 | 11.815 | 1516.7 | 0.00 | 0.6450 |
| 1.9318471 | 65.1352 | 15.256 | 1490.2 | 11.815 | 1502.0 | 0.00 | 0.6418 |
| 1.9415063 | 65.1197 | 15.182 | 1475.5 | 11.816 | 1487.4 | 0.00 | 0.6386 |
| 1.9512138 | 65.1033 | 15.108 | 1461.1 | 11.815 | 1472.9 | 0.00 | 0.6354 |
| 1.9609699 | 65.0860 | 15.035 | 1446.8 | 11.815 | 1458.6 | 0.00 | 0.6323 |
| 1.9707747 | 65.0679 | 14.963 | 1432.7 | 11.815 | 1444.5 | 0.00 | 0.6291 |
| 1.9806286 | 65.0488 | 14.891 | 1418.7 | 11.814 | 1430.5 | 0.00 | 0.6260 |
| 1.9905318 | 65.0288 | 14.819 | 1404.8 | 11.813 | 1416.6 | 0.00 | 0.6229 |
| 2.0004844 | 65.0079 | 14.748 | 1391.1 | 11.812 | 1403.0 | 0.00 | 0.6198 |
| 2.0104868 | 64.9860 | 14.677 | 1377.6 | 11.811 | 1389.4 | 0.00 | 0.6167 |
| 2.0205393 | 64.9632 | 14.607 | 1364.2 | 11.809 | 1376.0 | 0.00 | 0.6136 |
| 2.0306420 | 64.9394 | 14.538 | 1351.0 | 11.808 | 1362.8 | 0.00 | 0.6106 |
| 2.0407952 | 64.9146 | 14.469 | 1337.8 | 11.806 | 1349.6 | 0.00 | 0.6075 |
| 2.0509992 | 64.8887 | 14.400 | 1324.9 | 11.804 | 1336.7 | 0.00 | 0.6045 |
| 2.0612542 | 64.8619 | 14.332 | 1312.0 | 11.801 | 1323.8 | 0.00 | 0.6015 |
| 2.0715604 | 64.8340 | 14.264 | 1299.3 | 11.799 | 1311.1 | 0.00 | 0.5985 |
| 2.0819182 | 64.8050 | 14.197 | 1286.8 | 11.796 | 1298.6 | 0.00 | 0.5955 |
| 2.0923278 | 64.7749 | 14.130 | 1274.4 | 11.794 | 1286.2 | 0.00 | 0.5926 |
| 2.1027895 | 64.7437 | 14.064 | 1262.1 | 11.791 | 1273.9 | 0.00 | 0.5896 |
| 2.1133034 | 64.7114 | 13.998 | 1249.9 | 11.787 | 1261.7 | 0.00 | 0.5867 |
| 2.1238699 | 64.6779 | 13.933 | 1237.9 | 11.784 | 1249.7 | 0.00 | 0.5838 |
| 2.1344893 | 64.6433 | 13.868 | 1226.0 | 11.781 | 1237.7 | 0.00 | 0.5809 |
| 2.1451617 | 64.6074 | 13.803 | 1214.2 | 11.777 | 1226.0 | 0.00 | 0.5780 |
| 2.1558875 | 64.5702 | 13.739 | 1202.5 | 11.773 | 1214.3 | 0.00 | 0.5751 |
| 2.1666670 | 64.5318 | 13.675 | 1191.0 | 11.769 | 1202.8 | 0.00 | 0.5722 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Fr ($Z=87$) | | | | | | | |
| 2.1775003 | 64.4921 | 13.612 | 1179.6 | 11.764 | 1191.4 | 0.00 | 0.5694 |
| 2.1883878 | 64.4511 | 13.549 | 1168.3 | 11.760 | 1180.1 | 0.00 | 0.5666 |
| 2.1993297 | 64.4086 | 13.487 | 1157.2 | 11.755 | 1168.9 | 0.00 | 0.5637 |
| 2.2103264 | 64.3648 | 13.425 | 1146.1 | 11.750 | 1157.9 | 0.00 | 0.5609 |
| 2.2213780 | 64.3196 | 13.363 | 1135.2 | 11.745 | 1146.9 | 0.00 | 0.5581 |
| 2.2324849 | 64.2728 | 13.302 | 1124.4 | 11.740 | 1136.1 | 0.00 | 0.5554 |
| 2.2436473 | 64.2245 | 13.241 | 1113.7 | 11.735 | 1125.4 | 0.00 | 0.5526 |
| 2.2548656 | 64.1747 | 13.181 | 1103.1 | 11.729 | 1114.8 | 0.00 | 0.5499 |
| 2.2661399 | 64.1233 | 13.121 | 1092.6 | 11.723 | 1104.3 | 0.00 | 0.5471 |
| 2.2774706 | 64.0702 | 13.062 | 1082.2 | 11.717 | 1093.9 | 0.00 | 0.5444 |
| 2.2888579 | 64.0154 | 13.003 | 1072.0 | 11.711 | 1083.7 | 0.00 | 0.5417 |
| 2.3003022 | 63.9588 | 12.944 | 1061.8 | 11.705 | 1073.5 | 0.00 | 0.5390 |
| 2.3118037 | 63.8966 | 12.883 | 1051.5 | 11.698 | 1063.2 | 0.00 | 0.5363 |
| 2.3233628 | 63.8359 | 12.816 | 1040.9 | 11.691 | 1052.6 | 0.00 | 0.5336 |
| 2.3349796 | 63.7726 | 12.750 | 1030.4 | 11.684 | 1042.1 | 0.00 | 0.5310 |
| 2.3466545 | 63.7066 | 12.684 | 1020.0 | 11.677 | 1031.6 | 0.00 | 0.5283 |
| 2.3583878 | 63.6378 | 12.619 | 1009.7 | 11.670 | 1021.3 | 0.00 | 0.5257 |
| 2.3701797 | 63.5662 | 12.554 | 999.48 | 11.663 | 1011.1 | 0.00 | 0.5231 |
| 2.3820306 | 63.4916 | 12.490 | 989.41 | 11.655 | 1001.1 | 0.00 | 0.5205 |
| 2.3939407 | 63.4141 | 12.426 | 979.46 | 11.647 | 991.10 | 0.00 | 0.5179 |
| 2.4059104 | 63.3334 | 12.362 | 969.60 | 11.639 | 981.24 | 0.00 | 0.5153 |
| 2.4179400 | 63.2495 | 12.297 | 959.69 | 11.631 | 971.32 | 0.00 | 0.5128 |
| 2.4300297 | 63.1683 | 12.229 | 949.62 | 11.623 | 961.25 | 0.00 | 0.5102 |
| 2.4421798 | 63.0769 | 12.161 | 939.67 | 11.614 | 951.28 | 0.00 | 0.5077 |
| 2.4543907 | 62.9814 | 12.094 | 929.83 | 11.605 | 941.43 | 0.00 | 0.5052 |
| 2.4666627 | 62.8818 | 12.027 | 920.09 | 11.596 | 931.69 | 0.00 | 0.5026 |
| 2.4789960 | 62.7778 | 11.961 | 910.47 | 11.587 | 922.06 | 0.00 | 0.5001 |
| 2.4913910 | 62.6692 | 11.895 | 900.95 | 11.578 | 912.53 | 0.00 | 0.4977 |
| 2.5038479 | 62.5559 | 11.830 | 891.53 | 11.569 | 903.10 | 0.00 | 0.4952 |
| 2.5163672 | 62.4376 | 11.764 | 882.20 | 11.559 | 893.76 | 0.00 | 0.4927 |
| 2.5289490 | 62.3142 | 11.700 | 872.98 | 11.549 | 884.53 | 0.00 | 0.4903 |
| 2.5415938 | 62.1852 | 11.635 | 863.86 | 11.539 | 875.40 | 0.00 | 0.4878 |
| 2.5543017 | 62.0504 | 11.571 | 854.84 | 11.529 | 866.37 | 0.00 | 0.4854 |
| 2.5670732 | 61.9096 | 11.508 | 845.92 | 11.519 | 857.44 | 0.00 | 0.4830 |
| 2.5799086 | 61.7623 | 11.445 | 837.10 | 11.509 | 848.61 | 0.00 | 0.4806 |
| 2.5928082 | 61.6081 | 11.382 | 828.38 | 11.498 | 839.88 | 0.00 | 0.4782 |
| 2.6057722 | 61.4466 | 11.320 | 819.76 | 11.487 | 831.24 | 0.00 | 0.4758 |
| 2.6188011 | 61.2773 | 11.258 | 811.23 | 11.476 | 822.71 | 0.00 | 0.4734 |
| 2.6318951 | 61.0997 | 11.197 | 802.80 | 11.465 | 814.26 | 0.00 | 0.4711 |
| 2.6450545 | 60.9132 | 11.136 | 794.46 | 11.454 | 805.91 | 0.00 | 0.4687 |
| 2.6582798 | 60.7171 | 11.076 | 786.21 | 11.442 | 797.66 | 0.00 | 0.4664 |
| 2.6715712 | 60.5106 | 11.016 | 778.06 | 11.431 | 789.49 | 0.00 | 0.4641 |
| 2.6849291 | 60.2928 | 10.956 | 770.00 | 11.419 | 781.41 | 0.00 | 0.4618 |
| 2.6983537 | 60.0629 | 10.897 | 762.02 | 11.407 | 773.43 | 0.00 | 0.4595 |
| 2.7118455 | 59.8196 | 10.838 | 754.14 | 11.395 | 765.53 | 0.00 | 0.4572 |
| 2.7254047 | 59.5617 | 10.779 | 746.34 | 11.383 | 757.72 | 0.00 | 0.4549 |
| 2.7390317 | 59.2877 | 10.721 | 738.63 | 11.370 | 750.00 | 0.00 | 0.4527 |
| 2.7527269 | 58.9959 | 10.664 | 731.00 | 11.357 | 742.36 | 0.00 | 0.4504 |
| 2.7664905 | 58.6842 | 10.606 | 723.46 | 11.345 | 734.80 | 0.00 | 0.4482 |
| 2.7803230 | 58.3502 | 10.550 | 716.00 | 11.332 | 727.33 | 0.00 | 0.4459 |
| 2.7942246 | 57.9911 | 10.493 | 708.62 | 11.319 | 719.94 | 0.00 | 0.4437 |
| 2.8081957 | 57.6033 | 10.437 | 701.33 | 11.305 | 712.63 | 0.00 | 0.4415 |
| 2.8222367 | 57.1826 | 10.381 | 694.12 | 11.292 | 705.41 | 0.00 | 0.4393 |
| 2.8363479 | 56.7236 | 1.0326 | 686.98 | 11.278 | 698.26 | 0.00 | 0.4371 |
| 2.8505296 | 56.2195 | 10.271 | 679.92 | 11.265 | 691.19 | 0.00 | 0.4350 |
| 2.8647823 | 55.6615 | 10.216 | 672.95 | 11.251 | 684.20 | 0.00 | 0.4328 |
| 2.8791062 | 55.0377 | 10.162 | 666.04 | 11.237 | 677.28 | 0.00 | 0.4306 |
| 2.8935017 | 54.3319 | 10.108 | 659.22 | 11.222 | 670.44 | 0.00 | 0.4285 |
| 2.9079692 | 53.5207 | 10.055 | 652.47 | 11.208 | 663.68 | 0.00 | 0.4264 |
| 2.9225091 | 52.5686 | 10.002 | 645.79 | 11.194 | 656.99 | 0.00 | 0.4242 |
| 2.9371216 | 51.4179 | 9.9489 | 639.19 | 11.179 | 650.37 | 0.00 | 0.4221 |
| 2.9518072 | 49.9695 | 9.8965 | 632.66 | 11.164 | 643.82 | 0.00 | 0.4200 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Fr ($Z=87$) | | | | | | | |
| 2.9665662 | 47.9916 | 9.8445 | 626.20 | 11.149 | 637.35 | 0.00 | 0.4179 |
| 2.9813991 | 44.8559 | 9.7928 | 619.81 | 11.134 | 630.94 | 0.00 | 0.4159 |
| 2.9963061 | 36.1443 | 9.7414 | 613.49 | 11.119 | 624.61 | 0.00 | 0.4138 |
| 2.9988482 | 29.0598 | 9.7327 | 612.43 | 11.116 | 623.54 | 0.00 | 0.4134 |
| 3.0005520 | 28.7932 | 25.805 | 1622.8 | 11.114 | 1633.9 | 0.00 | 0.4132 |
| 3.0112876 | 42.1044 | 25.649 | 1607.3 | 11.103 | 1618.4 | 0.00 | 0.4117 |
| 3.0263440 | 46.1755 | 25.434 | 1585.9 | 11.088 | 1597.0 | 0.00 | 0.4097 |
| 3.0414758 | 48.1844 | 25.220 | 1564.7 | 11.072 | 1575.8 | 0.00 | 0.4076 |
| 3.0566831 | 49.3687 | 25.009 | 1543.9 | 11.056 | 1554.9 | 0.00 | 0.4056 |
| 3.0719666 | 50.0364 | 24.799 | 1523.3 | 11.040 | 1534.4 | 0.00 | 0.4036 |
| 3.0873264 | 50.2632 | 24.591 | 1503.0 | 11.024 | 1514.1 | 0.00 | 0.4016 |
| 3.1027630 | 49.9701 | 24.385 | 1483.0 | 11.008 | 1494.1 | 0.00 | 0.3996 |
| 3.1182768 | 48.7402 | 24.181 | 1463.3 | 10.991 | 1474.3 | 0.00 | 0.3976 |
| 3.1338682 | 42.6489 | 23.979 | 1443.9 | 10.975 | 1454.8 | 0.00 | 0.3956 |
| 3.1352340 | 39.7354 | 23.962 | 1442.2 | 10.973 | 1453.2 | 0.00 | 0.3955 |
| 3.1371659 | 39.6606 | 34.572 | 2079.5 | 10.971 | 2090.5 | 0.00 | 0.3952 |
| 3.1495376 | 49.1388 | 34.343 | 2057.6 | 10.958 | 2068.6 | 0.00 | 0.3937 |
| 3.1652853 | 52.4315 | 34.055 | 2030.2 | 10.941 | 2041.1 | 0.00 | 0.3917 |
| 3.1811117 | 54.4860 | 33.769 | 2003.2 | 10.924 | 2014.1 | 0.00 | 0.3898 |
| 3.1970172 | 56.0404 | 33.486 | 1976.5 | 10.907 | 1987.4 | 0.00 | 0.3878 |
| 3.2130023 | 57.3118 | 33.206 | 1950.2 | 10.890 | 1961.1 | 0.00 | 0.3859 |
| 3.2290673 | 58.3958 | 32.928 | 1924.2 | 10.872 | 1935.1 | 0.00 | 0.3840 |
| 3.2452127 | 59.3438 | 32.652 | 1898.6 | 10.855 | 1909.5 | 0.00 | 0.3821 |
| 3.2614387 | 60.1871 | 32.377 | 1873.2 | 10.837 | 1884.1 | 0.00 | 0.3802 |
| 3.2777459 | 60.9461 | 32.104 | 1848.2 | 10.819 | 1859.1 | 0.00 | 0.3783 |
| 3.2941347 | 61.6351 | 31.834 | 1823.6 | 10.801 | 1834.4 | 0.00 | 0.3764 |
| 3.3106053 | 62.2646 | 31.566 | 1799.2 | 10.783 | 1810.0 | 0.00 | 0.3745 |
| 3.3271584 | 62.8423 | 31.301 | 1775.2 | 10.765 | 1786.0 | 0.00 | 0.3726 |
| 3.3437941 | 63.3742 | 31.038 | 1751.5 | 10.746 | 1762.3 | 0.00 | 0.3708 |
| 3.3605131 | 63.8649 | 30.777 | 1728.2 | 10.728 | 1738.9 | 0.00 | 0.3689 |
| 3.3773157 | 64.3180 | 30.518 | 1705.1 | 10.709 | 1715.9 | 0.00 | 0.3671 |
| 3.3942023 | 64.7364 | 30.262 | 1682.4 | 10.691 | 1693.1 | 0.00 | 0.3653 |
| 3.4111733 | 65.1221 | 30.008 | 1660.0 | 10.672 | 1670.7 | 0.00 | 0.3635 |
| 3.4282291 | 65.4767 | 29.756 | 1637.9 | 10.653 | 1648.5 | 0.00 | 0.3617 |
| 3.4453703 | 65.8011 | 29.507 | 1616.1 | 10.634 | 1626.7 | 0.00 | 0.3599 |
| 3.4625971 | 66.0957 | 29.259 | 1594.5 | 10.614 | 1605.2 | 0.00 | 0.3581 |
| 3.4799101 | 66.3603 | 29.014 | 1573.3 | 10.595 | 1583.9 | 0.00 | 0.3563 |
| 3.4973097 | 66.5938 | 28.771 | 1552.4 | 10.575 | 1563.0 | 0.00 | 0.3545 |
| 3.5147962 | 66.7943 | 28.530 | 1531.7 | 10.556 | 1542.3 | 0.00 | 0.3527 |
| 3.5323702 | 66.9584 | 28.291 | 1511.3 | 10.536 | 1521.9 | 0.00 | 0.3510 |
| 3.5500321 | 67.0806 | 28.055 | 1491.2 | 10.516 | 1501.8 | 0.00 | 0.3492 |
| 3.5677822 | 67.1519 | 27.820 | 1471.4 | 10.496 | 1481.9 | 0.00 | 0.3475 |
| 3.5856211 | 67.1568 | 27.587 | 1451.8 | 10.476 | 1462.3 | 0.00 | 0.3458 |
| 3.6035492 | 67.0666 | 27.357 | 1432.6 | 10.456 | 1443.0 | 0.00 | 0.3441 |
| 3.6215670 | 66.8193 | 27.128 | 1413.5 | 10.436 | 1424.0 | 0.00 | 0.3423 |
| 3.6396748 | 66.2394 | 26.902 | 1394.7 | 10.415 | 1405.2 | 0.00 | 0.3406 |
| 3.6578732 | 64.2154 | 26.677 | 1376.2 | 10.395 | 1386.6 | 0.00 | 0.3390 |
| 3.6585679 | 64.0033 | 26.669 | 1375.5 | 10.394 | 1385.9 | 0.00 | 0.3389 |
| 3.6674323 | 64.0829 | 31.386 | 1614.9 | 10.384 | 1625.3 | 0.00 | 0.3381 |
| 3.6761626 | 65.9033 | 31.255 | 1604.3 | 10.374 | 1614.7 | 0.00 | 0.3373 |
| 3.6945434 | 67.5280 | 30.981 | 1582.4 | 10.353 | 1592.7 | 0.00 | 0.3356 |
| 3.7130161 | 68.4959 | 30.711 | 1560.8 | 10.332 | 1571.1 | 0.00 | 0.3339 |
| 3.7315812 | 69.2238 | 30.442 | 1539.4 | 10.311 | 1549.7 | 0.00 | 0.3323 |
| 3.7502391 | 69.8219 | 30.176 | 1518.4 | 10.290 | 1528.7 | 0.00 | 0.3306 |
| 3.7689903 | 70.3363 | 29.913 | 1497.6 | 10.269 | 1507.9 | 0.00 | 0.3290 |
| 3.7878352 | 70.7903 | 29.652 | 1477.2 | 10.248 | 1487.4 | 0.00 | 0.3273 |
| 3.8067744 | 71.1976 | 29.393 | 1457.0 | 10.226 | 1467.3 | 0.00 | 0.3257 |
| 3.8258083 | 71.5662 | 29.137 | 1437.1 | 10.205 | 1447.3 | 0.00 | 0.3241 |
| 3.8449373 | 71.9002 | 28.885 | 1417.6 | 10.183 | 1427.8 | 0.00 | 0.3225 |
| 3.8641620 | 72.2091 | 28.652 | 1399.2 | 10.161 | 1409.3 | 0.00 | 0.3209 |
| 3.8834828 | 72.5011 | 28.422 | 1381.0 | 10.140 | 1391.2 | 0.00 | 0.3193 |
| 3.9029002 | 72.7771 | 28.194 | 1363.1 | 10.118 | 1373.3 | 0.00 | 0.3177 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Fr ($Z=87$) | | | | | | | |
| 3.9224147 | 73.0372 | 27.965 | 1345.4 | 10.096 | 1355.5 | 0.00 | 0.3161 |
| 3.9420268 | 73.2824 | 27.739 | 1327.8 | 10.073 | 1337.9 | 0.00 | 0.3145 |
| 3.9617369 | 73.5138 | 27.515 | 1310.6 | 10.051 | 1320.6 | 0.00 | 0.3130 |
| 3.9815456 | 73.7322 | 27.294 | 1293.6 | 10.029 | 1303.6 | 0.00 | 0.3114 |
| 4.0014533 | 73.9385 | 27.076 | 1276.8 | 10.006 | 1286.8 | 0.00 | 0.3098 |
| 4.0214606 | 74.1333 | 26.860 | 1260.4 | 9.9840 | 1270.3 | 0.00 | 0.3083 |
| 4.0415679 | 74.3170 | 26.647 | 1244.1 | 9.9613 | 1254.1 | 0.00 | 0.3068 |
| 4.0617757 | 74.4900 | 26.436 | 1228.2 | 9.9386 | 1238.1 | 0.00 | 0.3052 |
| 4.0820846 | 74.6524 | 26.227 | 1212.4 | 9.9158 | 1222.3 | 0.00 | 0.3037 |
| 4.1024950 | 74.8034 | 26.018 | 1196.7 | 9.8929 | 1206.6 | 0.00 | 0.3022 |
| 4.1230075 | 74.9424 | 25.811 | 1181.3 | 9.8699 | 1191.2 | 0.00 | 0.3007 |
| 4.1436226 | 75.0692 | 25.607 | 1166.1 | 9.8469 | 1176.0 | 0.00 | 0.2992 |
| 4.1643407 | 75.1826 | 25.405 | 1151.2 | 9.8237 | 1161.0 | 0.00 | 0.2977 |
| 4.1851624 | 75.2813 | 25.205 | 1136.4 | 9.8005 | 1146.2 | 0.00 | 0.2962 |
| 4.2060882 | 75.3628 | 25.007 | 1121.9 | 9.7771 | 1131.7 | 0.00 | 0.2948 |
| 4.2271186 | 75.4230 | 24.811 | 1107.6 | 9.7537 | 1117.3 | 0.00 | 0.2933 |
| 4.2482542 | 75.4545 | 24.617 | 1093.4 | 9.7302 | 1103.2 | 0.00 | 0.2918 |
| 4.2694955 | 75.4430 | 24.425 | 1079.5 | 9.7066 | 1089.2 | 0.00 | 0.2904 |
| 4.2908430 | 75.3525 | 24.235 | 1065.8 | 9.6829 | 1075.5 | 0.00 | 0.2890 |
| 4.3122972 | 75.0426 | 24.047 | 1052.3 | 9.6592 | 1061.9 | 0.00 | 0.2875 |
| 4.3208125 | 74.6680 | 23.973 | 1047.0 | 9.6498 | 1056.6 | 0.00 | 0.2869 |
| 4.3331878 | 74.7152 | 25.411 | 1106.6 | 9.6361 | 1116.2 | 0.00 | 0.2861 |
| 4.3338587 | 74.7698 | 25.405 | 1106.2 | 9.6353 | 1115.8 | 0.00 | 0.2861 |
| 4.3555280 | 75.5931 | 25.219 | 1092.6 | 9.6114 | 1102.2 | 0.00 | 0.2847 |
| 4.3773056 | 75.9883 | 25.035 | 1079.2 | 9.5874 | 1088.8 | 0.00 | 0.2832 |
| 4.3991921 | 76.2762 | 24.852 | 1066.0 | 9.5634 | 1075.6 | 0.00 | 0.2818 |
| 4.4211881 | 76.5112 | 24.671 | 1053.0 | 9.5392 | 1062.5 | 0.00 | 0.2804 |
| 4.4432940 | 76.7127 | 24.491 | 1040.1 | 9.5150 | 1049.6 | 0.00 | 0.2790 |
| 4.4655105 | 76.8894 | 24.314 | 1027.4 | 9.4907 | 1036.9 | 0.00 | 0.2776 |
| 4.4878381 | 77.0459 | 24.138 | 1014.9 | 9.4664 | 1024.4 | 0.00 | 0.2763 |
| 4.5102772 | 77.1840 | 23.962 | 1002.5 | 9.4419 | 1012.0 | 0.00 | 0.2749 |
| 4.5328286 | 77.3038 | 23.789 | 990.32 | 9.4174 | 999.74 | 0.00 | 0.2735 |
| 4.5554928 | 77.4031 | 23.617 | 978.26 | 9.3928 | 987.65 | 0.00 | 0.2722 |
| 4.5782702 | 77.4765 | 23.446 | 966.36 | 9.3682 | 975.73 | 0.00 | 0.2708 |
| 4.6011616 | 77.5107 | 23.277 | 954.62 | 9.3435 | 963.96 | 0.00 | 0.2695 |
| 4.6241674 | 77.4652 | 23.109 | 943.02 | 9.3187 | 952.34 | 0.00 | 0.2681 |
| 4.6423238 | 77.2379 | 22.978 | 934.01 | 9.2992 | 943.31 | 0.00 | 0.2671 |
| 4.6472882 | 77.0364 | 22.942 | 931.56 | 9.2938 | 940.86 | 0.00 | 0.2668 |
| 4.6616761 | 77.3474 | 23.853 | 965.53 | 9.2784 | 974.81 | 0.00 | 0.2660 |
| 4.6705247 | 77.6095 | 23.789 | 961.15 | 9.2689 | 970.42 | 0.00 | 0.2655 |
| 4.6938773 | 78.0081 | 23.624 | 949.73 | 9.2439 | 958.97 | 0.00 | 0.2641 |
| 4.7173467 | 78.2833 | 23.460 | 938.45 | 9.2189 | 947.67 | 0.00 | 0.2628 |
| 4.7409334 | 78.5112 | 23.298 | 927.31 | 9.1938 | 936.50 | 0.00 | 0.2615 |
| 4.7646381 | 78.7131 | 23.136 | 916.28 | 9.1686 | 925.45 | 0.00 | 0.2602 |
| 4.7884613 | 78.8967 | 22.970 | 905.18 | 9.1434 | 914.33 | 0.00 | 0.2589 |
| 4.8124036 | 79.0663 | 22.805 | 894.22 | 9.1181 | 903.34 | 0.00 | 0.2576 |
| 4.8364656 | 79.2252 | 22.642 | 883.39 | 9.0928 | 892.48 | 0.00 | 0.2564 |
| 4.8606479 | 79.3752 | 22.479 | 872.69 | 9.0674 | 881.76 | 0.00 | 0.2551 |
| 4.8849512 | 79.5178 | 22.318 | 862.13 | 9.0419 | 871.17 | 0.00 | 0.2538 |
| 4.9093759 | 79.6539 | 22.158 | 851.68 | 9.0164 | 860.70 | 0.00 | 0.2525 |
| 4.9339228 | 79.7842 | 21.999 | 841.36 | 8.9909 | 850.35 | 0.00 | 0.2513 |
| 4.9585924 | 79.9094 | 21.841 | 831.17 | 8.9652 | 840.14 | 0.00 | 0.2500 |
| 4.9833854 | 80.0298 | 21.684 | 821.10 | 8.9396 | 830.04 | 0.00 | 0.2488 |
| 5.0083023 | 80.1459 | 21.529 | 811.15 | 8.9138 | 820.07 | 0.00 | 0.2476 |
| 5.0333438 | 80.2581 | 21.374 | 801.32 | 8.8881 | 810.20 | 0.00 | 0.2463 |
| 5.0585105 | 80.3665 | 21.220 | 791.60 | 8.8623 | 800.46 | 0.00 | 0.2451 |
| 5.0838031 | 80.4715 | 21.068 | 782.01 | 8.8364 | 790.84 | 0.00 | 0.2439 |
| 5.1092221 | 80.5732 | 20.917 | 772.53 | 8.8105 | 781.34 | 0.00 | 0.2427 |
| 5.1347682 | 80.6718 | 20.767 | 763.17 | 8.7845 | 771.95 | 0.00 | 0.2415 |
| 5.1604421 | 80.7675 | 20.618 | 753.92 | 8.7585 | 762.68 | 0.00 | 0.2403 |
| 5.1862443 | 80.8605 | 20.470 | 744.78 | 8.7324 | 753.52 | 0.00 | 0.2391 |
| 5.2121755 | 80.9508 | 20.323 | 735.76 | 8.7063 | 744.47 | 0.00 | 0.2379 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Fr ($Z=87$) | | | | | | | |
| 5.2382364 | 81.0386 | 20.177 | 726.85 | 8.6802 | 735.53 | 0.00 | 0.2367 |
| 5.2644276 | 81.1240 | 20.032 | 718.05 | 8.6540 | 726.70 | 0.00 | 0.2355 |
| 5.2907497 | 81.2071 | 19.889 | 709.35 | 8.6278 | 717.98 | 0.00 | 0.2343 |
| 5.3172034 | 81.2880 | 19.746 | 700.76 | 8.6016 | 709.36 | 0.00 | 0.2332 |
| 5.3437895 | 81.3668 | 19.605 | 692.28 | 8.5753 | 700.86 | 0.00 | 0.2320 |
| 5.3705084 | 81.4436 | 19.464 | 683.90 | 8.5489 | 692.45 | 0.00 | 0.2309 |
| 5.3973609 | 81.5184 | 19.325 | 675.63 | 8.5225 | 684.15 | 0.00 | 0.2297 |
| 5.4243477 | 81.5914 | 19.186 | 667.45 | 8.4961 | 675.95 | 0.00 | 0.2286 |
| 5.4514695 | 81.6625 | 19.049 | 659.38 | 8.4697 | 667.85 | 0.00 | 0.2274 |
| 5.4787268 | 81.7320 | 18.913 | 651.41 | 8.4432 | 659.85 | 0.00 | 0.2263 |
| 5.5061205 | 81.7998 | 18.778 | 643.53 | 8.4167 | 651.95 | 0.00 | 0.2252 |
| 5.5336511 | 81.8660 | 18.643 | 635.75 | 8.3902 | 644.14 | 0.00 | 0.2241 |
| 5.5613193 | 81.9308 | 18.510 | 628.07 | 8.3636 | 636.44 | 0.00 | 0.2229 |
| 5.5891259 | 81.9942 | 18.378 | 620.49 | 8.3370 | 628.82 | 0.00 | 0.2218 |
| 5.6170716 | 82.0563 | 18.247 | 612.99 | 8.3104 | 621.30 | 0.00 | 0.2207 |
| 5.6451569 | 82.1170 | 18.116 | 605.55 | 8.2837 | 613.83 | 0.00 | 0.2196 |
| 5.6733827 | 82.1760 | 17.985 | 598.18 | 8.2570 | 606.44 | 0.00 | 0.2185 |
| 5.7017496 | 82.2334 | 17.855 | 590.90 | 8.2303 | 599.13 | 0.00 | 0.2174 |
| 5.7302584 | 82.2892 | 17.726 | 583.72 | 8.2036 | 591.92 | 0.00 | 0.2164 |
| 5.7589096 | 82.3437 | 17.598 | 576.62 | 8.1768 | 584.79 | 0.00 | 0.2153 |
| 5.7877042 | 82.3967 | 17.471 | 569.61 | 8.1500 | 577.76 | 0.00 | 0.2142 |
| 5.8166427 | 82.4484 | 17.345 | 562.68 | 8.1232 | 570.81 | 0.00 | 0.2132 |
| 5.8457259 | 82.4988 | 17.219 | 555.85 | 8.0964 | 563.94 | 0.00 | 0.2121 |
| 5.8749546 | 82.5480 | 17.095 | 549.09 | 8.0695 | 557.16 | 0.00 | 0.2110 |
| 5.9043293 | 82.5960 | 16.972 | 542.42 | 8.0426 | 550.47 | 0.00 | 0.2100 |
| 5.9338510 | 82.6429 | 16.850 | 535.84 | 8.0157 | 543.85 | 0.00 | 0.2089 |
| 5.9635202 | 82.6887 | 16.729 | 529.33 | 7.9888 | 537.32 | 0.00 | 0.2079 |
| 5.9933378 | 82.7336 | 16.608 | 522.91 | 7.9619 | 530.87 | 0.00 | 0.2069 |
| 6.0233045 | 82.9336 | 16.486 | 516.48 | 7.9350 | 524.41 | 0.00 | 0.2058 |
| 6.0534210 | 82.9761 | 16.364 | 510.10 | 7.9080 | 518.01 | 0.00 | 0.2048 |
| 6.0836882 | 83.0172 | 16.242 | 503.79 | 7.8810 | 511.67 | 0.00 | 0.2038 |
| 6.1141066 | 83.0569 | 16.121 | 497.56 | 7.8540 | 505.41 | 0.00 | 0.2028 |
| 6.1446771 | 83.0953 | 16.002 | 491.41 | 7.8270 | 499.23 | 0.00 | 0.2018 |
| 6.1754005 | 83.1324 | 15.883 | 485.33 | 7.8000 | 493.13 | 0.00 | 0.2008 |
| 6.2062775 | 83.1684 | 15.765 | 479.34 | 7.7730 | 487.11 | 0.00 | 0.1998 |
| 6.2373089 | 83.2032 | 15.648 | 473.42 | 7.7460 | 481.17 | 0.00 | 0.1988 |
| 6.2684954 | 83.2370 | 15.533 | 467.58 | 7.7189 | 475.30 | 0.00 | 0.1978 |
| 6.2998379 | 83.3781 | 15.416 | 461.75 | 7.6919 | 469.44 | 0.00 | 0.1968 |
| 6.3313371 | 83.4095 | 15.299 | 455.99 | 7.6648 | 463.65 | 0.00 | 0.1958 |
| 6.3629938 | 83.4397 | 15.184 | 450.30 | 7.6377 | 457.94 | 0.00 | 0.1949 |
| 6.3948088 | 83.4687 | 15.070 | 444.69 | 7.6107 | 452.30 | 0.00 | 0.1939 |
| 6.4267828 | 83.4966 | 14.957 | 439.15 | 7.5836 | 446.74 | 0.00 | 0.1929 |
| 6.4589167 | 83.5234 | 14.844 | 433.68 | 7.5565 | 441.24 | 0.00 | 0.1920 |
| 6.4912113 | 83.5492 | 14.733 | 428.29 | 7.5294 | 435.81 | 0.00 | 0.1910 |
| 6.5236674 | 83.5740 | 14.622 | 422.96 | 7.5023 | 430.46 | 0.00 | 0.1901 |
| 6.5562857 | 83.5978 | 14.513 | 417.70 | 7.4752 | 425.17 | 0.00 | 0.1891 |
| 6.5890671 | 83.6208 | 14.404 | 412.51 | 7.4481 | 419.96 | 0.00 | 0.1882 |
| 6.6220125 | 83.6428 | 14.296 | 407.38 | 7.4210 | 414.80 | 0.00 | 0.1872 |
| 6.6551225 | 83.6639 | 14.189 | 402.33 | 7.3939 | 409.72 | 0.00 | 0.1863 |
| 6.6883981 | 83.6842 | 14.083 | 397.34 | 7.3669 | 404.70 | 0.00 | 0.1854 |
| 6.7218401 | 83.7036 | 13.978 | 392.41 | 7.3398 | 399.75 | 0.00 | 0.1844 |
| 6.7554493 | 83.7223 | 13.874 | 387.55 | 7.3127 | 394.86 | 0.00 | 0.1835 |
| 6.7892266 | 83.7402 | 13.771 | 382.75 | 7.2856 | 390.03 | 0.00 | 0.1826 |
| 6.8231727 | 83.7573 | 13.668 | 378.01 | 7.2585 | 385.27 | 0.00 | 0.1817 |
| 6.8572886 | 83.7737 | 13.567 | 373.33 | 7.2314 | 380.56 | 0.00 | 0.1808 |
| 6.8915750 | 83.7895 | 13.466 | 368.72 | 7.2044 | 375.92 | 0.00 | 0.1799 |
| 6.9260329 | 83.8045 | 13.366 | 364.16 | 7.1773 | 371.34 | 0.00 | 0.1790 |
| 6.9606631 | 83.8189 | 13.267 | 359.67 | 7.1503 | 366.82 | 0.00 | 0.1781 |
| 6.9954664 | 83.8326 | 13.169 | 355.23 | 7.1232 | 362.35 | 0.00 | 0.1772 |
| 7.0304437 | 83.8457 | 13.072 | 350.85 | 7.0962 | 357.95 | 0.00 | 0.1764 |
| 7.0655959 | 83.8582 | 12.975 | 346.53 | 7.0692 | 353.60 | 0.00 | 0.1755 |
| 7.1009239 | 83.8701 | 12.879 | 342.26 | 7.0421 | 349.30 | 0.00 | 0.1746 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Fr ($Z=87$) | | | | | | | |
| 7.1364285 | 83.8814 | 12.785 | 338.05 | 7.0151 | 345.06 | 0.00 | 0.1737 |
| 7.1721107 | 83.8922 | 12.691 | 333.89 | 6.9882 | 340.88 | 0.00 | 0.1729 |
| 7.2079712 | 83.9025 | 12.597 | 329.79 | 6.9612 | 336.75 | 0.00 | 0.1720 |
| 7.2440111 | 83.9123 | 12.505 | 325.74 | 6.9342 | 332.68 | 0.00 | 0.1712 |
| 7.2802311 | 83.9216 | 12.413 | 321.75 | 6.9073 | 328.65 | 0.00 | 0.1703 |
| 7.3166323 | 83.9304 | 12.322 | 317.80 | 6.8803 | 324.68 | 0.00 | 0.1695 |
| 7.3532155 | 84.0293 | 12.231 | 313.88 | 6.8534 | 320.73 | 0.00 | 0.1686 |
| 7.3899815 | 84.0375 | 12.140 | 309.99 | 6.8265 | 316.82 | 0.00 | 0.1678 |
| 7.4269314 | 84.0449 | 12.050 | 306.15 | 6.7996 | 312.95 | 0.00 | 0.1669 |
| 7.4640661 | 84.0518 | 11.960 | 302.37 | 6.7728 | 309.14 | 0.00 | 0.1661 |
| 7.5013864 | 84.0582 | 11.871 | 298.63 | 6.7459 | 305.38 | 0.00 | 0.1653 |
| 7.5388934 | 84.0639 | 11.783 | 294.94 | 6.7191 | 301.66 | 0.00 | 0.1645 |
| 7.5765878 | 84.0692 | 11.696 | 291.30 | 6.6923 | 297.99 | 0.00 | 0.1636 |
| 7.6144708 | 84.0739 | 11.610 | 287.71 | 6.6655 | 294.38 | 0.00 | 0.1628 |
| 7.6525431 | 84.0782 | 11.524 | 284.16 | 6.6387 | 290.80 | 0.00 | 0.1620 |
| 7.6908058 | 84.0820 | 11.439 | 280.66 | 6.6120 | 287.28 | 0.00 | 0.1612 |
| 7.7292599 | 84.0853 | 11.355 | 277.21 | 6.5853 | 283.79 | 0.00 | 0.1604 |
| 7.7679062 | 84.0882 | 11.271 | 273.80 | 6.5586 | 280.36 | 0.00 | 0.1596 |
| 7.8067457 | 84.0906 | 11.188 | 270.43 | 6.5319 | 276.96 | 0.00 | 0.1588 |
| 7.8457794 | 84.0927 | 11.106 | 267.11 | 6.5053 | 273.62 | 0.00 | 0.1580 |
| 7.8850083 | 84.0943 | 11.024 | 263.83 | 6.4786 | 270.31 | 0.00 | 0.1572 |
| 7.9244334 | 84.0955 | 10.944 | 260.60 | 6.4520 | 267.05 | 0.00 | 0.1565 |
| 7.9640555 | 84.0964 | 10.864 | 257.40 | 6.4255 | 263.83 | 0.00 | 0.1557 |
| 8.0038758 | 84.0969 | 10.784 | 254.25 | 6.3989 | 260.65 | 0.00 | 0.1549 |
| 8.0438952 | 84.0971 | 10.705 | 251.14 | 6.3724 | 257.51 | 0.00 | 0.1541 |
| 8.0841147 | 84.0969 | 10.627 | 248.07 | 6.3459 | 254.41 | 0.00 | 0.1534 |
| 8.1245352 | 84.0964 | 10.550 | 245.03 | 6.3195 | 251.35 | 0.00 | 0.1526 |
| 8.1651579 | 84.0956 | 10.473 | 242.04 | 6.2931 | 248.33 | 0.00 | 0.1518 |
| 8.2059837 | 84.0945 | 10.397 | 239.09 | 6.2667 | 245.35 | 0.00 | 0.1511 |
| 8.2470136 | 84.0931 | 10.322 | 236.17 | 6.2403 | 242.41 | 0.00 | 0.1503 |
| 8.2882487 | 84.0914 | 10.247 | 233.29 | 6.2140 | 239.51 | 0.00 | 0.1496 |
| 8.3296899 | 84.0895 | 10.173 | 230.45 | 6.1877 | 236.64 | 0.00 | 0.1488 |
| 8.3713384 | 84.0873 | 10.099 | 227.65 | 6.1614 | 233.81 | 0.00 | 0.1481 |
| 8.4131951 | 84.0849 | 10.026 | 224.88 | 6.1352 | 231.02 | 0.00 | 0.1474 |
| 8.4552610 | 84.0823 | 9.9540 | 222.15 | 6.1090 | 228.26 | 0.00 | 0.1466 |
| 8.4975373 | 84.0795 | 9.8824 | 219.45 | 6.0828 | 225.54 | 0.00 | 0.1459 |
| 8.5400250 | 84.0766 | 9.8113 | 216.79 | 6.0567 | 222.85 | 0.00 | 0.1452 |
| Ra ($Z=88$) | | | | | | | |
| Atomic weight: $A_r = 226.0253 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3}) = 5.000$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1}) = [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 375.324 E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1}) = f_2 (e \text{ atom}^{-1}) \times 1.86175 \times 10^5$ | | | | | | | |
| 24 edges, Edge energies (keV) | | | | | | | |
| K | 103.922 | LI | 19.2367 | LII | 18.4843 | LIII | 15.4444 |
| MI | 4.82200 | MII | 4.48950 | MIII | 3.79189 | MIV | 3.24840 |
| MV | 3.10490 | NI | 1.20840 | NII | 1.05760 | NIII | 0.879100 |
| NIV | 0.635900 | NV | 0.602700 | NVI | 0.298900 | NVII | 0.298900 |
| OI | 0.254400 | OII | 0.200400 | OIII | 0.152800 | OIV | 0.0672000 |
| OV | 0.0672000 | PI | 0.043500 | PII | 0.0188999 | PIII | 0.0188000 |
| Relativistic correction estimate: $f_{\text{rel}}(\text{H82,3/5CL}) = (-2.2901, -1.3326) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}} = -0.018795 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 19.9917 | 31.830 | 11852 | 6.1297 | 11858 | 0.00 | 2.480 |
| 0.50250000 | 20.3224 | 32.085 | 11887 | 6.1603 | 11893 | 0.00 | 2.467 |
| 0.50501250 | 20.6558 | 32.331 | 11919 | 6.1909 | 11925 | 0.00 | 2.455 |
| 0.50753756 | 20.9916 | 32.568 | 11947 | 6.2216 | 11953 | 0.00 | 2.443 |
| 0.51007525 | 21.3295 | 32.798 | 11971 | 6.2523 | 11977 | 0.00 | 2.431 |
| 0.51262563 | 21.6690 | 33.018 | 11991 | 6.2830 | 11998 | 0.00 | 2.419 |
| 0.51518875 | 22.0100 | 33.230 | 12008 | 6.3138 | 12015 | 0.00 | 2.407 |
| 0.51776470 | 22.3520 | 33.433 | 12022 | 6.3445 | 12028 | 0.00 | 2.395 |
| 0.52035352 | 22.6946 | 33.628 | 12032 | 6.3753 | 12038 | 0.00 | 2.383 |
| 0.52295529 | 23.0376 | 33.815 | 12038 | 6.4061 | 12045 | 0.00 | 2.371 |
| 0.52557007 | 23.3805 | 33.993 | 12041 | 6.4370 | 12048 | 0.00 | 2.359 |
| 0.52819792 | 23.7231 | 34.163 | 12041 | 6.4678 | 12048 | 0.00 | 2.347 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ra ($Z=88$) | | | | | | | |
| 0.53083891 | 24.0650 | 34.324 | 12038 | 6.4987 | 12045 | 0.00 | 2.336 |
| 0.53349310 | 24.4057 | 34.477 | 12032 | 6.5296 | 12038 | 0.00 | 2.324 |
| 0.53616057 | 24.7449 | 34.622 | 12022 | 6.5605 | 12029 | 0.00 | 2.312 |
| 0.53884137 | 25.0822 | 34.758 | 12009 | 6.5914 | 12016 | 0.00 | 2.301 |
| 0.54153558 | 25.4172 | 34.887 | 11994 | 6.6223 | 12000 | 0.00 | 2.289 |
| 0.54424325 | 25.7495 | 35.008 | 11975 | 6.6533 | 11982 | 0.00 | 2.278 |
| 0.54696447 | 26.0786 | 35.121 | 11954 | 6.6842 | 11961 | 0.00 | 2.267 |
| 0.54969929 | 26.4041 | 35.226 | 11930 | 6.7152 | 11937 | 0.00 | 2.255 |
| 0.55244779 | 26.7253 | 35.323 | 11904 | 6.7462 | 11911 | 0.00 | 2.244 |
| 0.55521003 | 27.0418 | 35.413 | 11875 | 6.7772 | 11882 | 0.00 | 2.233 |
| 0.55798608 | 27.3529 | 35.495 | 11843 | 6.8082 | 11850 | 0.00 | 2.222 |
| 0.56077601 | 27.6579 | 35.570 | 11809 | 6.8392 | 11816 | 0.00 | 2.211 |
| 0.56357989 | 27.9561 | 35.638 | 11773 | 6.8702 | 11780 | 0.00 | 2.200 |
| 0.56639779 | 28.2464 | 35.699 | 11734 | 6.9012 | 11741 | 0.00 | 2.189 |
| 0.56922978 | 28.5278 | 35.752 | 11693 | 6.9322 | 11700 | 0.00 | 2.178 |
| 0.57207593 | 28.7989 | 35.799 | 11650 | 6.9632 | 11657 | 0.00 | 2.167 |
| 0.57493630 | 29.0581 | 35.839 | 11605 | 6.9943 | 11612 | 0.00 | 2.156 |
| 0.57781099 | 29.3031 | 35.873 | 11558 | 7.0253 | 11565 | 0.00 | 2.146 |
| 0.58070004 | 29.5311 | 35.900 | 11510 | 7.0563 | 11517 | 0.00 | 2.135 |
| 0.58360354 | 29.7381 | 35.920 | 11459 | 7.0873 | 11466 | 0.00 | 2.124 |
| 0.58652156 | 29.9182 | 35.935 | 11406 | 7.1183 | 11414 | 0.00 | 2.114 |
| 0.58945417 | 30.0619 | 35.943 | 11352 | 7.1494 | 11360 | 0.00 | 2.103 |
| 0.59240144 | 30.1531 | 35.945 | 11297 | 7.1804 | 11304 | 0.00 | 2.093 |
| 0.59536345 | 30.1592 | 35.942 | 11239 | 7.2114 | 11247 | 0.00 | 2.082 |
| 0.59834026 | 29.9953 | 35.933 | 11181 | 7.2424 | 11188 | 0.00 | 2.072 |
| 0.60133196 | 29.2551 | 35.918 | 11120 | 7.2733 | 11128 | 0.00 | 2.062 |
| 0.60233476 | 28.1756 | 35.912 | 11100 | 7.2837 | 11107 | 0.00 | 2.058 |
| 0.60306523 | 28.2393 | 38.694 | 11945 | 7.2912 | 11953 | 0.00 | 2.056 |
| 0.60433862 | 29.6827 | 38.694 | 11920 | 7.3043 | 11928 | 0.00 | 2.052 |
| 0.60736032 | 30.8787 | 38.691 | 11860 | 7.3353 | 11867 | 0.00 | 2.041 |
| 0.61039712 | 31.5882 | 38.683 | 11799 | 7.3662 | 11806 | 0.00 | 2.031 |
| 0.61344910 | 32.1403 | 38.670 | 11736 | 7.3972 | 11743 | 0.00 | 2.021 |
| 0.61651635 | 32.6067 | 38.653 | 11672 | 7.4281 | 11680 | 0.00 | 2.011 |
| 0.61959893 | 33.0128 | 38.631 | 11608 | 7.4590 | 11615 | 0.00 | 2.001 |
| 0.62269693 | 33.3668 | 38.605 | 11542 | 7.4899 | 11550 | 0.00 | 1.991 |
| 0.62581041 | 33.6656 | 38.574 | 11475 | 7.5208 | 11483 | 0.00 | 1.981 |
| 0.62893946 | 33.8905 | 38.539 | 11408 | 7.5516 | 11416 | 0.00 | 1.971 |
| 0.63208416 | 33.9760 | 38.500 | 11340 | 7.5824 | 11347 | 0.00 | 1.962 |
| 0.63524458 | 33.4274 | 38.457 | 11271 | 7.6132 | 11278 | 0.00 | 1.952 |
| 0.63551339 | 33.1788 | 38.453 | 11265 | 7.6159 | 11273 | 0.00 | 1.951 |
| 0.63628665 | 33.2693 | 40.113 | 11737 | 7.6234 | 11745 | 0.00 | 1.949 |
| 0.63842080 | 34.5166 | 40.092 | 11691 | 7.6440 | 1.1699 | 0.00 | 1.942 |
| 0.64161291 | 35.3225 | 40.056 | 11623 | 7.6748 | 1.1631 | 0.00 | 1.932 |
| 0.64482097 | 35.9249 | 40.018 | 11554 | 7.7055 | 1.1562 | 0.00 | 1.923 |
| 0.64804508 | 36.4485 | 39.976 | 11485 | 7.7362 | 1.1492 | 0.00 | 1.913 |
| 0.65128530 | 36.9281 | 39.931 | 11415 | 7.7669 | 1.1422 | 0.00 | 1.904 |
| 0.65454173 | 37.3785 | 39.883 | 11344 | 7.7976 | 1.1352 | 0.00 | 1.894 |
| 0.65781444 | 37.8076 | 39.832 | 11273 | 7.8282 | 1.1281 | 0.00 | 1.885 |
| 0.66110351 | 38.2202 | 39.778 | 11202 | 7.8588 | 1.1210 | 0.00 | 1.875 |
| 0.66440903 | 38.6194 | 39.721 | 11130 | 7.8893 | 1.1138 | 0.00 | 1.866 |
| 0.66773107 | 39.0072 | 39.661 | 11058 | 7.9199 | 1.1066 | 0.00 | 1.857 |
| 0.67106973 | 39.3852 | 39.599 | 10986 | 7.9504 | 1.0994 | 0.00 | 1.848 |
| 0.67442508 | 39.7542 | 39.533 | 10913 | 7.9808 | 1.0921 | 0.00 | 1.838 |
| 0.67779720 | 40.1151 | 39.465 | 10840 | 8.0112 | 1.0848 | 0.00 | 1.829 |
| 0.68118619 | 40.4686 | 39.394 | 10767 | 8.0416 | 1.0775 | 0.00 | 1.820 |
| 0.68459212 | 40.8152 | 39.320 | 10693 | 8.0719 | 1.0701 | 0.00 | 1.811 |
| 0.68801508 | 41.1552 | 39.243 | 10619 | 8.1022 | 1.0627 | 0.00 | 1.802 |
| 0.69145515 | 41.4891 | 39.165 | 10545 | 8.1325 | 1.0553 | 0.00 | 1.793 |
| 0.69491243 | 41.8173 | 39.084 | 10471 | 8.1627 | 1.0479 | 0.00 | 1.784 |
| 0.69838699 | 42.1399 | 39.000 | 10397 | 8.1929 | 1.0405 | 0.00 | 1.775 |
| 0.70187893 | 42.4572 | 38.915 | 10322 | 8.2230 | 1.0331 | 0.00 | 1.766 |
| 0.70538832 | 42.7696 | 38.827 | 10248 | 8.2531 | 1.0256 | 0.00 | 1.758 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ra ($Z=88$) | | | | | | | |
| 0.70891526 | 43.0769 | 38.737 | 10173 | 8.2831 | 1.0181 | 0.00 | 1.749 |
| 0.71245984 | 43.3794 | 38.645 | 10098 | 8.3131 | 1.0107 | 0.00 | 1.740 |
| 0.71602214 | 43.6772 | 38.551 | 10024 | 8.3430 | 1.0032 | 0.00 | 1.732 |
| 0.71960225 | 43.9702 | 38.454 | 9948.9 | 8.3729 | 9957.3 | 0.00 | 1.723 |
| 0.72320026 | 44.2586 | 38.356 | 9874.1 | 8.4027 | 9882.5 | 0.00 | 1.714 |
| 0.72681626 | 44.5425 | 38.256 | 9799.4 | 8.4325 | 9807.8 | 0.00 | 1.706 |
| 0.73045034 | 44.8219 | 38.154 | 9724.6 | 8.4622 | 9733.1 | 0.00 | 1.697 |
| 0.73410260 | 45.0973 | 38.050 | 9649.9 | 8.4918 | 9658.4 | 0.00 | 1.689 |
| 0.73777311 | 45.3681 | 37.945 | 9575.3 | 8.5214 | 9583.8 | 0.00 | 1.681 |
| 0.74146197 | 45.6343 | 37.838 | 9500.7 | 8.5509 | 9509.3 | 0.00 | 1.672 |
| 0.74516928 | 45.8962 | 37.729 | 9426.3 | 8.5804 | 9434.9 | 0.00 | 1.664 |
| 0.74889513 | 46.1537 | 37.619 | 9352.0 | 8.6098 | 9360.6 | 0.00 | 1.656 |
| 0.75263961 | 46.4069 | 37.507 | 9277.9 | 8.6392 | 9286.5 | 0.00 | 1.647 |
| 0.75640280 | 46.6557 | 37.394 | 9204.0 | 8.6685 | 9212.6 | 0.00 | 1.639 |
| 0.76018482 | 46.9002 | 37.280 | 9130.2 | 8.6977 | 9138.9 | 0.00 | 1.631 |
| 0.76398574 | 47.1418 | 37.165 | 9056.7 | 8.7268 | 9065.5 | 0.00 | 1.623 |
| 0.76780567 | 47.3777 | 37.049 | 8983.5 | 8.7559 | 8992.2 | 0.00 | 1.615 |
| 0.77164470 | 47.6093 | 36.931 | 8910.4 | 8.7849 | 8919.2 | 0.00 | 1.607 |
| 0.77550292 | 47.8366 | 36.813 | 8837.7 | 8.8139 | 8846.5 | 0.00 | 1.599 |
| 0.77938044 | 48.0595 | 36.694 | 8765.2 | 8.8428 | 8774.1 | 0.00 | 1.591 |
| 0.78327734 | 48.2780 | 36.573 | 8693.1 | 8.8716 | 8701.9 | 0.00 | 1.583 |
| 0.78719373 | 48.4920 | 36.453 | 8621.2 | 8.9003 | 8630.1 | 0.00 | 1.575 |
| 0.79112969 | 48.7015 | 36.331 | 8549.7 | 8.9290 | 8558.6 | 0.00 | 1.567 |
| 0.79508534 | 48.9063 | 36.208 | 8478.5 | 8.9575 | 8487.4 | 0.00 | 1.559 |
| 0.79906077 | 49.1065 | 36.085 | 8407.6 | 8.9860 | 8416.6 | 0.00 | 1.552 |
| 0.80305607 | 49.3018 | 35.962 | 8337.1 | 9.0145 | 8346.1 | 0.00 | 1.544 |
| 0.80707135 | 49.4921 | 35.838 | 8267.0 | 9.0428 | 8276.0 | 0.00 | 1.536 |
| 0.81110671 | 49.6771 | 35.713 | 8197.3 | 9.0711 | 8206.3 | 0.00 | 1.529 |
| 0.81516224 | 49.8568 | 35.588 | 8127.9 | 9.0992 | 8137.0 | 0.00 | 1.521 |
| 0.81923806 | 50.0306 | 35.462 | 8059.0 | 9.1273 | 8068.1 | 0.00 | 1.513 |
| 0.82333425 | 50.1983 | 35.336 | 7990.4 | 9.1553 | 7999.6 | 0.00 | 1.506 |
| 0.82745092 | 50.3593 | 35.210 | 7922.3 | 9.1833 | 7931.4 | 0.00 | 1.498 |
| 0.83158817 | 50.5131 | 35.084 | 7854.6 | 9.2111 | 7863.8 | 0.00 | 1.491 |
| 0.83574611 | 50.6587 | 34.957 | 7787.3 | 9.2388 | 7796.5 | 0.00 | 1.484 |
| 0.83992484 | 50.7952 | 34.831 | 7720.4 | 9.2665 | 7729.7 | 0.00 | 1.476 |
| 0.84412447 | 50.9210 | 34.704 | 7654.0 | 9.2941 | 7663.3 | 0.00 | 1.469 |
| 0.84834509 | 51.0341 | 34.577 | 7588.1 | 9.3215 | 7597.4 | 0.00 | 1.461 |
| 0.85258682 | 51.1313 | 34.450 | 7522.6 | 9.3489 | 7531.9 | 0.00 | 1.454 |
| 0.85684975 | 51.2079 | 34.322 | 7457.5 | 9.3762 | 7466.9 | 0.00 | 1.447 |
| 0.86113400 | 51.2561 | 34.195 | 7393.0 | 9.4034 | 7402.4 | 0.00 | 1.440 |
| 0.86543967 | 51.2614 | 34.068 | 7328.9 | 9.4305 | 7338.3 | 0.00 | 1.433 |
| 0.86976687 | 51.1919 | 33.941 | 7265.2 | 9.4575 | 7274.7 | 0.00 | 1.425 |
| 0.87411570 | 50.9533 | 33.815 | 7202.1 | 9.4844 | 7211.6 | 0.00 | 1.418 |
| 0.87813301 | 50.0116 | 33.698 | 7144.4 | 9.5091 | 7154.0 | 0.00 | 1.412 |
| 0.87848628 | 49.7184 | 33.688 | 7139.4 | 9.5112 | 7148.9 | 0.00 | 1.411 |
| 0.88006703 | 50.0925 | 35.771 | 7567.2 | 9.5208 | 7576.7 | 0.00 | 1.409 |
| 0.88287871 | 51.1320 | 35.691 | 7526.2 | 9.5379 | 7535.7 | 0.00 | 1.404 |
| 0.88729310 | 51.8370 | 35.565 | 7462.3 | 9.5645 | 7471.8 | 0.00 | 1.397 |
| 0.89172957 | 52.3086 | 35.437 | 7398.6 | 9.5910 | 7408.1 | 0.00 | 1.390 |
| 0.89618822 | 52.6899 | 35.310 | 7335.3 | 9.6174 | 7344.9 | 0.00 | 1.383 |
| 0.90066916 | 53.0796 | 35.183 | 7272.5 | 9.6437 | 7282.2 | 0.00 | 1.377 |
| 0.90517250 | 53.3810 | 35.056 | 7210.2 | 9.6699 | 7219.9 | 0.00 | 1.370 |
| 0.90969837 | 53.6606 | 34.929 | 7148.4 | 9.6959 | 7158.1 | 0.00 | 1.363 |
| 0.91424686 | 53.9237 | 34.802 | 7087.1 | 9.7219 | 7096.8 | 0.00 | 1.356 |
| 0.91881809 | 54.1740 | 34.676 | 7026.3 | 9.7477 | 7036.0 | 0.00 | 1.349 |
| 0.92341218 | 54.4138 | 34.550 | 6965.9 | 9.7735 | 6975.7 | 0.00 | 1.343 |
| 0.92802924 | 54.6448 | 34.425 | 6906.0 | 9.7991 | 6915.8 | 0.00 | 1.336 |
| 0.93266939 | 54.8684 | 34.299 | 6846.6 | 9.8246 | 6856.5 | 0.00 | 1.329 |
| 0.93733274 | 55.0855 | 34.174 | 6787.7 | 9.8500 | 6797.6 | 0.00 | 1.323 |
| 0.94201940 | 55.2969 | 34.049 | 6729.3 | 9.8753 | 6739.2 | 0.00 | 1.316 |
| 0.94672950 | 55.5032 | 33.925 | 6671.4 | 9.9004 | 6681.3 | 0.00 | 1.310 |
| 0.95146315 | 55.7050 | 33.801 | 6613.9 | 9.9255 | 6623.9 | 0.00 | 1.303 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ra ($Z=88$) | | | | | | | |
| 0.95622046 | 55.9026 | 33.678 | 6557.0 | 9.9504 | 6566.9 | 0.00 | 1.297 |
| 0.96100156 | 56.0964 | 33.554 | 6500.5 | 9.9752 | 6510.5 | 0.00 | 1.290 |
| 0.96580657 | 56.2868 | 33.432 | 6444.5 | 9.9999 | 6454.5 | 0.00 | 1.284 |
| 0.97063560 | 56.4740 | 33.310 | 6389.0 | 10.024 | 6399.1 | 0.00 | 1.277 |
| 0.97548878 | 56.6583 | 33.188 | 6334.0 | 10.049 | 6344.1 | 0.00 | 1.271 |
| 0.98036623 | 56.8399 | 33.067 | 6279.5 | 10.073 | 6289.5 | 0.00 | 1.265 |
| 0.98526806 | 57.0189 | 32.946 | 6225.4 | 10.097 | 6235.5 | 0.00 | 1.258 |
| 0.99019440 | 57.1956 | 32.825 | 6171.8 | 10.121 | 6181.9 | 0.00 | 1.252 |
| 0.99514537 | 57.3702 | 32.705 | 6118.6 | 10.145 | 6128.8 | 0.00 | 1.246 |
| 1.0001211 | 57.5463 | 32.586 | 6065.9 | 10.169 | 6076.1 | 0.00 | 1.240 |
| 1.0051217 | 57.7446 | 32.450 | 6010.7 | 10.193 | 6020.9 | 0.00 | 1.234 |
| 1.0101473 | 57.9277 | 32.315 | 5955.9 | 10.216 | 5966.1 | 0.00 | 1.227 |
| 1.0151980 | 58.1027 | 32.180 | 5901.5 | 10.240 | 5911.7 | 0.00 | 1.221 |
| 1.0202740 | 58.2709 | 32.042 | 5846.8 | 10.263 | 5857.1 | 0.00 | 1.215 |
| 1.0253754 | 58.4309 | 31.896 | 5791.3 | 10.286 | 5801.6 | 0.00 | 1.209 |
| 1.0305023 | 58.5829 | 31.750 | 5736.2 | 10.309 | 5746.5 | 0.00 | 1.203 |
| 1.0356548 | 58.7255 | 31.605 | 5681.5 | 10.332 | 5691.9 | 0.00 | 1.197 |
| 1.0408331 | 58.8563 | 31.460 | 5627.4 | 10.355 | 5637.7 | 0.00 | 1.191 |
| 1.0460372 | 58.9694 | 31.316 | 5573.6 | 10.378 | 5584.0 | 0.00 | 1.185 |
| 1.0512674 | 59.0469 | 31.172 | 5520.3 | 10.400 | 5530.7 | 0.00 | 1.179 |
| 1.0563415 | 58.9730 | 31.033 | 5469.3 | 10.422 | 5479.8 | 0.00 | 1.174 |
| 1.0565238 | 58.9564 | 31.028 | 5467.5 | 10.422 | 5477.9 | 0.00 | 1.174 |
| 1.0588586 | 59.0552 | 31.408 | 5522.3 | 10.432 | 5532.7 | 0.00 | 1.171 |
| 1.0618064 | 59.3130 | 31.327 | 5492.9 | 10.445 | 5503.3 | 0.00 | 1.168 |
| 1.0671154 | 59.5829 | 31.184 | 5440.5 | 10.467 | 5450.9 | 0.00 | 1.162 |
| 1.0724510 | 59.7980 | 31.040 | 5388.5 | 10.488 | 5399.0 | 0.00 | 1.156 |
| 1.0778132 | 59.9910 | 30.893 | 5336.2 | 10.510 | 5346.8 | 0.00 | 1.150 |
| 1.0832023 | 60.1701 | 30.743 | 5283.9 | 10.532 | 5294.4 | 0.00 | 1.145 |
| 1.0886183 | 60.3396 | 30.593 | 5231.9 | 10.553 | 5242.5 | 0.00 | 1.139 |
| 1.0940614 | 60.5016 | 30.443 | 5180.5 | 10.575 | 5191.1 | 0.00 | 1.133 |
| 1.0995317 | 60.6574 | 30.294 | 5129.5 | 10.596 | 5140.1 | 0.00 | 1.128 |
| 1.1050294 | 60.8076 | 30.146 | 5078.9 | 10.617 | 5089.6 | 0.00 | 1.122 |
| 1.1105545 | 60.9527 | 29.998 | 5028.9 | 10.638 | 5039.5 | 0.00 | 1.116 |
| 1.1161073 | 61.0936 | 29.852 | 4979.5 | 10.658 | 4990.1 | 0.00 | 1.111 |
| 1.1216878 | 61.2307 | 29.706 | 4930.5 | 10.679 | 4941.2 | 0.00 | 1.105 |
| 1.1272963 | 61.3642 | 29.561 | 4882.0 | 10.699 | 4892.7 | 0.00 | 1.100 |
| 1.1329328 | 61.4942 | 29.416 | 4834.0 | 10.720 | 4844.7 | 0.00 | 1.094 |
| 1.1385974 | 61.6206 | 29.273 | 4786.4 | 10.740 | 4797.2 | 0.00 | 1.089 |
| 1.1442904 | 61.7436 | 29.129 | 4739.3 | 10.760 | 4750.1 | 0.00 | 1.084 |
| 1.1500119 | 61.8630 | 28.987 | 4692.7 | 10.780 | 4703.4 | 0.00 | 1.078 |
| 1.1557619 | 61.9786 | 28.845 | 4646.4 | 10.799 | 4657.2 | 0.00 | 1.073 |
| 1.1615407 | 62.0901 | 28.703 | 4600.7 | 10.819 | 4611.5 | 0.00 | 1.067 |
| 1.1673484 | 62.1972 | 28.563 | 4555.4 | 10.838 | 4566.2 | 0.00 | 1.062 |
| 1.1731852 | 62.2989 | 28.423 | 4510.5 | 10.857 | 4521.3 | 0.00 | 1.057 |
| 1.1790511 | 62.3941 | 28.284 | 4466.0 | 10.876 | 4476.9 | 0.00 | 1.052 |
| 1.1849464 | 62.4806 | 28.145 | 4422.0 | 10.895 | 4432.9 | 0.00 | 1.046 |
| 1.1908711 | 62.5541 | 28.007 | 4378.5 | 10.914 | 4389.4 | 0.00 | 1.041 |
| 1.1968254 | 62.6045 | 27.862 | 4334.1 | 10.932 | 4345.0 | 0.00 | 1.036 |
| 1.2028096 | 62.5965 | 27.686 | 4285.4 | 10.951 | 4296.3 | 0.00 | 1.031 |
| 1.2069862 | 62.4346 | 27.566 | 4251.9 | 10.963 | 4262.9 | 0.00 | 1.027 |
| 1.2088236 | 62.2684 | 28.070 | 4323.1 | 10.969 | 4334.1 | 0.00 | 1.026 |
| 1.2098138 | 62.5012 | 28.041 | 4315.2 | 10.972 | 4326.2 | 0.00 | 1.025 |
| 1.2148677 | 62.8656 | 27.897 | 4275.1 | 10.987 | 4286.1 | 0.00 | 1.021 |
| 1.2209421 | 63.0927 | 27.725 | 4227.6 | 11.005 | 4238.6 | 0.00 | 1.015 |
| 1.2270468 | 63.2691 | 27.555 | 4180.8 | 11.022 | 4191.8 | 0.00 | 1.010 |
| 1.2331820 | 63.4222 | 27.386 | 4134.5 | 11.040 | 4145.5 | 0.00 | 1.005 |
| 1.2393479 | 63.5611 | 27.219 | 4088.8 | 11.057 | 4099.8 | 0.00 | 1.000 |
| 1.2455447 | 63.6899 | 27.053 | 4043.7 | 11.075 | 4054.7 | 0.00 | 0.9954 |
| 1.2517724 | 63.8109 | 26.888 | 3999.1 | 11.092 | 4010.2 | 0.00 | 0.9905 |
| 1.2580312 | 63.9254 | 26.725 | 3955.1 | 11.108 | 3966.2 | 0.00 | 0.9855 |
| 1.2643214 | 64.0345 | 26.562 | 3911.4 | 11.125 | 3922.5 | 0.00 | 0.9806 |
| 1.2706430 | 64.1386 | 26.399 | 3868.0 | 11.142 | 3879.2 | 0.00 | 0.9758 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ra ($Z=88$) | | | | | | | |
| 1.2769962 | 64.2386 | 26.238 | 3825.3 | 11.158 | 3836.4 | 0.00 | 0.9709 |
| 1.2833812 | 64.3348 | 26.078 | 3783.1 | 11.174 | 3794.2 | 0.00 | 0.9661 |
| 1.2897981 | 64.4275 | 25.920 | 3741.4 | 11.190 | 3752.6 | 0.00 | 0.9613 |
| 1.2962471 | 64.5170 | 25.763 | 3700.2 | 11.206 | 3711.4 | 0.00 | 0.9565 |
| 1.3027283 | 64.6035 | 25.607 | 3659.5 | 11.222 | 3670.8 | 0.00 | 0.9517 |
| 1.3092420 | 64.6871 | 25.453 | 3619.4 | 11.237 | 3630.6 | 0.00 | 0.9470 |
| 1.3157882 | 64.7681 | 25.300 | 3579.7 | 11.253 | 3591.0 | 0.00 | 0.9423 |
| 1.3223671 | 64.8465 | 25.148 | 3540.6 | 11.268 | 3551.8 | 0.00 | 0.9376 |
| 1.3289790 | 64.9226 | 24.998 | 3501.9 | 11.283 | 3513.2 | 0.00 | 0.9329 |
| 1.3356239 | 64.9964 | 24.849 | 3463.7 | 11.297 | 3475.0 | 0.00 | 0.9283 |
| 1.3423020 | 65.0681 | 24.701 | 3426.0 | 11.312 | 3437.3 | 0.00 | 0.9237 |
| 1.3490135 | 65.1377 | 24.554 | 3388.7 | 11.326 | 3400.0 | 0.00 | 0.9191 |
| 1.3557586 | 65.2054 | 24.409 | 3351.9 | 11.341 | 3363.2 | 0.00 | 0.9145 |
| 1.3625374 | 65.2713 | 24.265 | 3315.6 | 11.355 | 3326.9 | 0.00 | 0.9100 |
| 1.3693500 | 65.3355 | 24.122 | 3279.7 | 11.369 | 3291.0 | 0.00 | 0.9054 |
| 1.3761968 | 65.3980 | 23.981 | 3244.2 | 11.382 | 3255.5 | 0.00 | 0.9009 |
| 1.3830778 | 65.4587 | 23.839 | 3209.0 | 11.396 | 3220.4 | 0.00 | 0.8964 |
| 1.3899932 | 65.5176 | 23.699 | 3174.2 | 11.409 | 3185.7 | 0.00 | 0.8920 |
| 1.3969431 | 65.5748 | 23.560 | 3139.9 | 11.422 | 3151.3 | 0.00 | 0.8875 |
| 1.4039278 | 65.6303 | 23.422 | 3106.0 | 11.435 | 3117.4 | 0.00 | 0.8831 |
| 1.4109475 | 65.6843 | 23.285 | 3072.5 | 11.448 | 3084.0 | 0.00 | 0.8787 |
| 1.4180022 | 65.7367 | 23.150 | 3039.4 | 11.461 | 3050.9 | 0.00 | 0.8744 |
| 1.4250922 | 65.7877 | 23.015 | 3006.7 | 11.473 | 3018.2 | 0.00 | 0.8700 |
| 1.4322177 | 65.8373 | 22.882 | 2974.4 | 11.485 | 2985.9 | 0.00 | 0.8657 |
| 1.4393788 | 65.8856 | 22.750 | 2942.5 | 11.497 | 2954.0 | 0.00 | 0.8614 |
| 1.4465757 | 65.9325 | 22.618 | 2911.0 | 11.509 | 2922.5 | 0.00 | 0.8571 |
| 1.4538086 | 65.9782 | 22.488 | 2879.9 | 11.521 | 2891.4 | 0.00 | 0.8528 |
| 1.4610776 | 66.0228 | 22.359 | 2849.1 | 11.532 | 2860.6 | 0.00 | 0.8486 |
| 1.4683830 | 66.0662 | 22.231 | 2818.7 | 11.544 | 2830.2 | 0.00 | 0.8444 |
| 1.4757249 | 66.1085 | 22.104 | 2788.6 | 11.555 | 2800.2 | 0.00 | 0.8402 |
| 1.4831035 | 66.1498 | 21.978 | 2759.0 | 11.566 | 2770.5 | 0.00 | 0.8360 |
| 1.4905190 | 66.1899 | 21.852 | 2729.4 | 11.577 | 2741.0 | 0.00 | 0.8318 |
| 1.4979716 | 66.2285 | 21.725 | 2700.1 | 11.587 | 2711.7 | 0.00 | 0.8277 |
| 1.5054615 | 66.2658 | 21.600 | 2671.2 | 11.597 | 2682.8 | 0.00 | 0.8236 |
| 1.5129888 | 66.3019 | 21.476 | 2642.6 | 11.608 | 2654.2 | 0.00 | 0.8195 |
| 1.5205537 | 66.3367 | 21.352 | 2614.3 | 11.618 | 2626.0 | 0.00 | 0.8154 |
| 1.5281565 | 66.3703 | 21.230 | 2586.4 | 11.627 | 2598.0 | 0.00 | 0.8113 |
| 1.5357973 | 66.4027 | 21.108 | 2558.8 | 11.637 | 2570.5 | 0.00 | 0.8073 |
| 1.5434763 | 66.4340 | 20.988 | 2531.6 | 11.646 | 2543.2 | 0.00 | 0.8033 |
| 1.5511937 | 66.4643 | 20.868 | 2504.6 | 11.656 | 2516.3 | 0.00 | 0.7993 |
| 1.5589496 | 66.4934 | 20.749 | 2478.0 | 11.665 | 2489.6 | 0.00 | 0.7953 |
| 1.5667444 | 66.5216 | 20.632 | 2451.7 | 11.674 | 2463.3 | 0.00 | 0.7913 |
| 1.5745781 | 66.5488 | 20.515 | 2425.6 | 11.682 | 2437.3 | 0.00 | 0.7874 |
| 1.5824510 | 66.5749 | 20.398 | 2399.8 | 11.691 | 2411.5 | 0.00 | 0.7835 |
| 1.5903633 | 66.5998 | 20.282 | 2374.3 | 11.699 | 2386.0 | 0.00 | 0.7796 |
| 1.5983151 | 66.6236 | 20.167 | 2349.1 | 11.707 | 2360.9 | 0.00 | 0.7757 |
| 1.6063066 | 66.6464 | 20.054 | 2324.3 | 11.715 | 2336.0 | 0.00 | 0.7719 |
| 1.6143382 | 66.6681 | 19.940 | 2299.7 | 11.722 | 2311.4 | 0.00 | 0.7680 |
| 1.6224099 | 66.6889 | 19.828 | 2275.3 | 11.730 | 2287.1 | 0.00 | 0.7642 |
| 1.6305219 | 66.7086 | 19.717 | 2251.3 | 11.737 | 2263.0 | 0.00 | 0.7604 |
| 1.6386745 | 66.7274 | 19.606 | 2227.5 | 11.744 | 2239.3 | 0.00 | 0.7566 |
| 1.6468679 | 66.7452 | 19.497 | 2204.1 | 11.751 | 2215.8 | 0.00 | 0.7528 |
| 1.6551022 | 66.7620 | 19.388 | 2180.9 | 11.758 | 2192.6 | 0.00 | 0.7491 |
| 1.6633777 | 66.7779 | 19.280 | 2157.9 | 11.764 | 2169.7 | 0.00 | 0.7454 |
| 1.6716946 | 66.7929 | 19.173 | 2135.3 | 11.771 | 2147.0 | 0.00 | 0.7417 |
| 1.6800531 | 66.8070 | 19.066 | 2112.8 | 11.777 | 2124.6 | 0.00 | 0.7380 |
| 1.6884534 | 66.8202 | 18.961 | 2090.7 | 11.783 | 2102.5 | 0.00 | 0.7343 |
| 1.6968956 | 66.8325 | 18.856 | 2068.8 | 11.788 | 2080.6 | 0.00 | 0.7307 |
| 1.7053801 | 66.8439 | 18.752 | 2047.2 | 11.794 | 2058.9 | 0.00 | 0.7270 |
| 1.7139070 | 66.8544 | 18.649 | 2025.8 | 11.799 | 2037.6 | 0.00 | 0.7234 |
| 1.7224766 | 66.8641 | 18.547 | 2004.6 | 11.804 | 2016.4 | 0.00 | 0.7198 |
| 1.7310889 | 66.8728 | 18.445 | 1983.7 | 11.809 | 1995.5 | 0.00 | 0.7162 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ra ($Z=88$) | | | | | | | |
| 1.7397444 | 66.8808 | 18.344 | 1963.1 | 11.814 | 1974.9 | 0.00 | 0.7127 |
| 1.7484431 | 66.8879 | 18.244 | 1942.6 | 11.819 | 1954.4 | 0.00 | 0.7091 |
| 1.7571853 | 66.8941 | 18.145 | 1922.4 | 11.823 | 1934.3 | 0.00 | 0.7056 |
| 1.7659712 | 66.8995 | 18.046 | 1902.5 | 11.827 | 1914.3 | 0.00 | 0.7021 |
| 1.7748011 | 66.9040 | 17.948 | 1882.7 | 11.831 | 1894.6 | 0.00 | 0.6986 |
| 1.7836751 | 66.9078 | 17.851 | 1863.2 | 11.835 | 1875.1 | 0.00 | 0.6951 |
| 1.7925935 | 66.9107 | 17.755 | 1844.0 | 11.839 | 1855.8 | 0.00 | 0.6916 |
| 1.8015565 | 66.9127 | 17.659 | 1824.9 | 11.842 | 1836.7 | 0.00 | 0.6882 |
| 1.8105642 | 66.9182 | 17.564 | 1806.1 | 11.845 | 1817.9 | 0.00 | 0.6848 |
| 1.8196171 | 66.9187 | 17.470 | 1787.4 | 11.848 | 1799.3 | 0.00 | 0.6814 |
| 1.8287151 | 66.9183 | 17.376 | 1769.0 | 11.851 | 1780.9 | 0.00 | 0.6780 |
| 1.8378587 | 66.9172 | 17.283 | 1750.8 | 11.853 | 1762.7 | 0.00 | 0.6746 |
| 1.8470480 | 66.9152 | 17.191 | 1732.8 | 11.856 | 1744.7 | 0.00 | 0.6713 |
| 1.8562833 | 66.9124 | 17.100 | 1715.0 | 11.858 | 1726.9 | 0.00 | 0.6679 |
| 1.8655647 | 66.9088 | 17.009 | 1697.4 | 11.860 | 1709.3 | 0.00 | 0.6646 |
| 1.8748925 | 66.9044 | 16.919 | 1680.1 | 11.862 | 1691.9 | 0.00 | 0.6613 |
| 1.8842670 | 66.8992 | 16.830 | 1662.9 | 11.863 | 1674.7 | 0.00 | 0.6580 |
| 1.8936883 | 66.8931 | 16.741 | 1645.9 | 11.865 | 1657.7 | 0.00 | 0.6547 |
| 1.9031567 | 66.8862 | 16.653 | 1629.1 | 11.866 | 1640.9 | 0.00 | 0.6515 |
| 1.9126725 | 66.8771 | 16.566 | 1612.4 | 11.867 | 1624.3 | 0.00 | 0.6482 |
| 1.9222359 | 66.8686 | 16.479 | 1596.0 | 11.868 | 1607.9 | 0.00 | 0.6450 |
| 1.9318471 | 66.8593 | 16.393 | 1579.8 | 11.868 | 1591.7 | 0.00 | 0.6418 |
| 1.9415063 | 66.8491 | 16.307 | 1563.7 | 11.869 | 1575.6 | 0.00 | 0.6386 |
| 1.9512138 | 66.8381 | 16.222 | 1547.9 | 11.869 | 1559.7 | 0.00 | 0.6354 |
| 1.9609699 | 66.8263 | 16.138 | 1532.2 | 11.869 | 1544.0 | 0.00 | 0.6323 |
| 1.9707747 | 66.8136 | 16.055 | 1516.6 | 11.869 | 1528.5 | 0.00 | 0.6291 |
| 1.9806286 | 66.8000 | 15.972 | 1501.3 | 11.869 | 1513.2 | 0.00 | 0.6260 |
| 1.9905318 | 66.7856 | 15.889 | 1486.1 | 11.868 | 1498.0 | 0.00 | 0.6229 |
| 2.0004844 | 66.7703 | 15.808 | 1471.1 | 11.867 | 1483.0 | 0.00 | 0.6198 |
| 2.0104868 | 66.7542 | 15.727 | 1456.3 | 11.866 | 1468.2 | 0.00 | 0.6167 |
| 2.0205393 | 66.7371 | 15.646 | 1441.7 | 11.865 | 1453.5 | 0.00 | 0.6136 |
| 2.0306420 | 66.7191 | 15.566 | 1427.2 | 11.864 | 1439.0 | 0.00 | 0.6106 |
| 2.0407952 | 66.7003 | 15.487 | 1412.8 | 11.862 | 1424.7 | 0.00 | 0.6075 |
| 2.0509992 | 66.6805 | 15.408 | 1398.6 | 11.861 | 1410.5 | 0.00 | 0.6045 |
| 2.0612542 | 66.6598 | 15.330 | 1384.6 | 11.859 | 1396.5 | 0.00 | 0.6015 |
| 2.0715604 | 66.6382 | 15.253 | 1370.8 | 11.857 | 1382.6 | 0.00 | 0.5985 |
| 2.0819182 | 66.6156 | 15.176 | 1357.1 | 11.854 | 1368.9 | 0.00 | 0.5955 |
| 2.0923278 | 66.5921 | 15.099 | 1343.5 | 11.852 | 1355.4 | 0.00 | 0.5926 |
| 2.1027895 | 66.5676 | 15.023 | 1330.1 | 11.849 | 1342.0 | 0.00 | 0.5896 |
| 2.1133034 | 66.5422 | 14.948 | 1316.9 | 11.846 | 1328.7 | 0.00 | 0.5867 |
| 2.1238699 | 66.5246 | 14.873 | 1303.7 | 11.843 | 1315.5 | 0.00 | 0.5838 |
| 2.1344893 | 66.4974 | 14.797 | 1290.7 | 11.840 | 1302.5 | 0.00 | 0.5809 |
| 2.1451617 | 66.4690 | 14.723 | 1277.8 | 11.837 | 1289.6 | 0.00 | 0.5780 |
| 2.1558875 | 66.4394 | 14.649 | 1265.0 | 11.833 | 1276.8 | 0.00 | 0.5751 |
| 2.1666670 | 66.4087 | 14.575 | 1252.4 | 11.829 | 1264.2 | 0.00 | 0.5722 |
| 2.1775003 | 66.3767 | 14.502 | 1239.9 | 11.825 | 1251.7 | 0.00 | 0.5694 |
| 2.1883878 | 66.3436 | 14.429 | 1227.6 | 11.821 | 1239.4 | 0.00 | 0.5666 |
| 2.1993297 | 66.3092 | 14.357 | 1215.4 | 11.816 | 1227.2 | 0.00 | 0.5637 |
| 2.2103264 | 66.2736 | 14.286 | 1203.3 | 11.812 | 1215.1 | 0.00 | 0.5609 |
| 2.2213780 | 66.2367 | 14.215 | 1191.4 | 11.807 | 1203.2 | 0.00 | 0.5581 |
| 2.2324849 | 66.1985 | 14.145 | 1179.6 | 11.802 | 1191.4 | 0.00 | 0.5554 |
| 2.2436473 | 66.1590 | 14.075 | 1167.9 | 11.797 | 1179.7 | 0.00 | 0.5526 |
| 2.2548656 | 66.1181 | 14.005 | 1156.3 | 11.792 | 1168.1 | 0.00 | 0.5499 |
| 2.2661399 | 66.0759 | 13.936 | 1144.9 | 11.786 | 1156.7 | 0.00 | 0.5471 |
| 2.2774706 | 66.0322 | 13.868 | 1133.6 | 11.780 | 1145.4 | 0.00 | 0.5444 |
| 2.2888579 | 65.9870 | 13.800 | 1122.5 | 11.774 | 1134.3 | 0.00 | 0.5417 |
| 2.3003022 | 65.9404 | 13.732 | 1111.4 | 11.768 | 1123.2 | 0.00 | 0.5390 |
| 2.3118037 | 65.8922 | 13.665 | 1100.5 | 11.762 | 1112.3 | 0.00 | 0.5363 |
| 2.3233628 | 65.8425 | 13.599 | 1089.7 | 11.756 | 1101.5 | 0.00 | 0.5336 |
| 2.3349796 | 65.7911 | 13.533 | 1079.0 | 11.749 | 1090.8 | 0.00 | 0.5310 |
| 2.3466545 | 65.7381 | 13.467 | 1068.5 | 11.742 | 1080.2 | 0.00 | 0.5283 |
| 2.3583878 | 65.6834 | 13.402 | 1058.0 | 11.735 | 1069.7 | 0.00 | 0.5257 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ra ($Z=88$) | | | | | | | |
| 2.3701797 | 65.6269 | 13.338 | 1047.7 | 11.728 | 1059.4 | 0.00 | 0.5231 |
| 2.3820306 | 65.5686 | 13.274 | 1037.4 | 11.720 | 1049.2 | 0.00 | 0.5205 |
| 2.3939407 | 65.5084 | 13.210 | 1027.3 | 11.713 | 1039.0 | 0.00 | 0.5179 |
| 2.4059104 | 65.4463 | 13.147 | 1017.3 | 11.705 | 1029.0 | 0.00 | 0.5153 |
| 2.4179400 | 65.3789 | 13.079 | 1007.1 | 11.697 | 1018.8 | 0.00 | 0.5128 |
| 2.4300297 | 65.3122 | 13.009 | 996.65 | 11.689 | 1008.3 | 0.00 | 0.5102 |
| 2.4421798 | 65.2426 | 12.939 | 986.36 | 11.681 | 998.04 | 0.00 | 0.5077 |
| 2.4543907 | 65.1702 | 12.869 | 976.18 | 11.672 | 987.85 | 0.00 | 0.5052 |
| 2.4666627 | 65.0948 | 12.800 | 966.11 | 11.664 | 977.77 | 0.00 | 0.5026 |
| 2.4789960 | 65.0164 | 12.732 | 956.16 | 11.655 | 967.81 | 0.00 | 0.5001 |
| 2.4913910 | 64.9349 | 12.664 | 946.32 | 11.646 | 957.96 | 0.00 | 0.4977 |
| 2.5038479 | 64.8501 | 12.596 | 936.59 | 11.637 | 948.22 | 0.00 | 0.4952 |
| 2.5163672 | 64.7619 | 12.529 | 926.97 | 11.627 | 938.59 | 0.00 | 0.4927 |
| 2.5289490 | 64.6703 | 12.462 | 917.45 | 11.618 | 929.07 | 0.00 | 0.4903 |
| 2.5415938 | 64.5750 | 12.396 | 908.05 | 11.608 | 919.66 | 0.00 | 0.4878 |
| 2.5543017 | 64.4758 | 12.326 | 898.44 | 11.598 | 910.04 | 0.00 | 0.4854 |
| 2.5670732 | 64.3723 | 12.256 | 888.88 | 11.588 | 900.47 | 0.00 | 0.4830 |
| 2.5799086 | 64.2642 | 12.187 | 879.43 | 11.578 | 891.01 | 0.00 | 0.4806 |
| 2.5928082 | 64.1514 | 12.117 | 870.09 | 11.568 | 881.66 | 0.00 | 0.4782 |
| 2.6057722 | 64.0336 | 12.049 | 860.86 | 11.557 | 872.41 | 0.00 | 0.4758 |
| 2.6188011 | 63.9107 | 11.981 | 851.73 | 11.546 | 863.28 | 0.00 | 0.4734 |
| 2.6318951 | 63.7824 | 11.913 | 842.71 | 11.535 | 854.24 | 0.00 | 0.4711 |
| 2.6450545 | 63.6437 | 11.846 | 833.79 | 11.524 | 845.31 | 0.00 | 0.4687 |
| 2.6582798 | 63.5034 | 11.779 | 824.97 | 11.513 | 836.48 | 0.00 | 0.4664 |
| 2.6715712 | 63.3567 | 11.713 | 816.25 | 11.502 | 827.75 | 0.00 | 0.4641 |
| 2.6849291 | 63.2033 | 11.647 | 807.63 | 11.490 | 819.12 | 0.00 | 0.4618 |
| 2.6983537 | 63.0426 | 11.582 | 799.11 | 11.478 | 810.59 | 0.00 | 0.4595 |
| 2.7118455 | 62.8742 | 11.517 | 790.69 | 11.466 | 802.15 | 0.00 | 0.4572 |
| 2.7254047 | 62.6976 | 11.453 | 782.36 | 11.454 | 793.81 | 0.00 | 0.4549 |
| 2.7390317 | 62.5122 | 11.389 | 774.13 | 11.442 | 785.57 | 0.00 | 0.4527 |
| 2.7527269 | 62.3173 | 11.326 | 765.99 | 11.429 | 777.42 | 0.00 | 0.4504 |
| 2.7664905 | 62.1121 | 11.263 | 757.94 | 11.417 | 769.36 | 0.00 | 0.4482 |
| 2.7803230 | 61.8959 | 11.200 | 749.98 | 11.404 | 761.39 | 0.00 | 0.4459 |
| 2.7942246 | 61.6677 | 11.138 | 742.12 | 11.391 | 753.51 | 0.00 | 0.4437 |
| 2.8081957 | 61.4262 | 11.077 | 734.34 | 11.378 | 745.72 | 0.00 | 0.4415 |
| 2.8222367 | 61.1704 | 11.015 | 726.65 | 11.365 | 738.02 | 0.00 | 0.4393 |
| 2.8363479 | 60.8988 | 10.955 | 719.05 | 11.351 | 730.40 | 0.00 | 0.4371 |
| 2.8505296 | 60.6095 | 10.894 | 711.54 | 11.338 | 722.88 | 0.00 | 0.4350 |
| 2.8647823 | 60.3008 | 10.834 | 704.11 | 11.324 | 715.43 | 0.00 | 0.4328 |
| 2.8791062 | 59.9701 | 10.775 | 696.75 | 11.310 | 708.06 | 0.00 | 0.4306 |
| 2.8935017 | 59.6148 | 10.715 | 689.46 | 11.296 | 700.76 | 0.00 | 0.4285 |
| 2.9079692 | 59.2313 | 10.657 | 682.26 | 11.282 | 693.54 | 0.00 | 0.4264 |
| 2.9225091 | 58.8155 | 10.598 | 675.14 | 11.268 | 686.40 | 0.00 | 0.4242 |
| 2.9371216 | 58.3622 | 10.540 | 668.09 | 11.253 | 679.35 | 0.00 | 0.4221 |
| 2.9518072 | 57.8647 | 10.482 | 661.13 | 11.239 | 672.37 | 0.00 | 0.4200 |
| 2.9665662 | 57.3146 | 10.425 | 654.25 | 11.224 | 665.47 | 0.00 | 0.4179 |
| 2.9813991 | 56.7005 | 10.368 | 647.44 | 11.209 | 658.65 | 0.00 | 0.4159 |
| 2.9963061 | 56.0066 | 10.312 | 640.71 | 11.194 | 651.90 | 0.00 | 0.4138 |
| 3.0112876 | 55.2321 | 10.238 | 632.95 | 11.178 | 644.13 | 0.00 | 0.4117 |
| 3.0263440 | 54.3068 | 10.158 | 624.93 | 11.163 | 636.09 | 0.00 | 0.4097 |
| 3.0414758 | 53.1680 | 10.080 | 617.01 | 11.147 | 628.16 | 0.00 | 0.4076 |
| 3.0566831 | 51.7110 | 10.002 | 609.21 | 11.132 | 620.34 | 0.00 | 0.4056 |
| 3.0719666 | 49.7023 | 9.9252 | 601.51 | 11.116 | 612.63 | 0.00 | 0.4036 |
| 3.0873264 | 46.4433 | 9.8489 | 593.92 | 11.100 | 605.02 | 0.00 | 0.4016 |
| 3.1027630 | 35.7559 | 9.7733 | 586.43 | 11.084 | 597.51 | 0.00 | 0.3996 |
| 3.1040119 | 31.3348 | 9.7672 | 585.83 | 11.082 | 596.91 | 0.00 | 0.3994 |
| 3.1057879 | 31.0702 | 25.557 | 1532.0 | 11.080 | 1543.1 | 0.00 | 0.3992 |
| 3.1182768 | 44.6231 | 25.384 | 1515.6 | 11.067 | 1526.6 | 0.00 | 0.3976 |
| 3.1338682 | 48.2915 | 25.171 | 1495.4 | 11.051 | 1506.4 | 0.00 | 0.3956 |
| 3.1495376 | 50.1566 | 24.960 | 1475.5 | 11.034 | 1486.5 | 0.00 | 0.3937 |
| 3.1652853 | 51.2628 | 24.751 | 1455.8 | 11.017 | 1466.8 | 0.00 | 0.3917 |
| 3.1811117 | 51.8834 | 24.544 | 1436.4 | 11.001 | 1447.4 | 0.00 | 0.3898 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ra ($Z=88$) | | | | | | | |
| 3.1970172 | 52.0846 | 24.339 | 1417.3 | 10.984 | 1428.3 | 0.00 | 0.3878 |
| 3.2130023 | 51.7901 | 24.135 | 1398.5 | 10.966 | 1409.5 | 0.00 | 0.3859 |
| 3.2290673 | 50.6134 | 23.933 | 1379.9 | 10.949 | 1390.9 | 0.00 | 0.3840 |
| 3.2452127 | 45.3623 | 23.734 | 1361.6 | 10.932 | 1372.5 | 0.00 | 0.3821 |
| 3.2473832 | 41.6409 | 23.707 | 1359.1 | 10.929 | 1370.1 | 0.00 | 0.3818 |
| 3.2494167 | 41.5668 | 34.198 | 1959.4 | 10.927 | 1970.3 | 0.00 | 0.3816 |
| 3.2614387 | 50.6437 | 33.985 | 1940.0 | 10.914 | 1950.9 | 0.00 | 0.3802 |
| 3.2777459 | 53.9920 | 33.700 | 1914.2 | 10.896 | 1925.0 | 0.00 | 0.3783 |
| 3.2941347 | 56.0420 | 33.417 | 1888.7 | 10.878 | 1899.5 | 0.00 | 0.3764 |
| 3.3106053 | 57.5824 | 33.137 | 1863.5 | 10.860 | 1874.4 | 0.00 | 0.3745 |
| 3.3271584 | 58.8377 | 32.860 | 1838.7 | 10.842 | 1849.5 | 0.00 | 0.3726 |
| 3.3437941 | 59.9055 | 32.584 | 1814.2 | 10.824 | 1825.1 | 0.00 | 0.3708 |
| 3.3605131 | 60.8379 | 32.312 | 1790.1 | 10.806 | 1800.9 | 0.00 | 0.3689 |
| 3.3773157 | 61.6663 | 32.041 | 1766.3 | 10.787 | 1777.1 | 0.00 | 0.3671 |
| 3.3942023 | 62.4113 | 31.773 | 1742.8 | 10.769 | 1753.6 | 0.00 | 0.3653 |
| 3.4111733 | 63.0873 | 31.508 | 1719.6 | 10.750 | 1730.4 | 0.00 | 0.3635 |
| 3.4282291 | 63.7045 | 31.244 | 1696.8 | 10.731 | 1707.5 | 0.00 | 0.3617 |
| 3.4453703 | 64.2708 | 30.983 | 1674.2 | 10.712 | 1684.9 | 0.00 | 0.3599 |
| 3.4625971 | 64.7920 | 30.725 | 1652.0 | 10.693 | 1662.7 | 0.00 | 0.3581 |
| 3.4799101 | 65.2728 | 30.468 | 1630.1 | 10.673 | 1640.7 | 0.00 | 0.3563 |
| 3.4973097 | 65.7166 | 30.214 | 1608.4 | 10.654 | 1619.1 | 0.00 | 0.3545 |
| 3.5147962 | 66.1264 | 29.962 | 1587.1 | 10.634 | 1597.7 | 0.00 | 0.3527 |
| 3.5323702 | 66.5041 | 29.711 | 1565.9 | 10.615 | 1576.5 | 0.00 | 0.3510 |
| 3.5500321 | 66.8511 | 29.462 | 1545.1 | 10.595 | 1555.7 | 0.00 | 0.3492 |
| 3.5677822 | 67.1685 | 29.215 | 1524.5 | 10.575 | 1535.1 | 0.00 | 0.3475 |
| 3.5856211 | 67.4565 | 28.970 | 1504.2 | 10.555 | 1514.8 | 0.00 | 0.3458 |
| 3.6035492 | 67.7151 | 28.727 | 1484.2 | 10.535 | 1494.7 | 0.00 | 0.3441 |
| 3.6215670 | 67.9432 | 28.487 | 1464.4 | 10.515 | 1474.9 | 0.00 | 0.3423 |
| 3.6396748 | 68.1389 | 28.248 | 1444.9 | 10.494 | 1455.4 | 0.00 | 0.3406 |
| 3.6578732 | 68.2989 | 28.012 | 1425.7 | 10.474 | 1436.2 | 0.00 | 0.3390 |
| 3.6761626 | 68.4179 | 27.778 | 1406.8 | 10.453 | 1417.2 | 0.00 | 0.3373 |
| 3.6945434 | 68.4869 | 27.546 | 1388.1 | 10.433 | 1398.5 | 0.00 | 0.3356 |
| 3.7130161 | 68.4910 | 27.315 | 1369.6 | 10.412 | 1380.0 | 0.00 | 0.3339 |
| 3.7315812 | 68.4015 | 27.087 | 1351.4 | 10.391 | 1361.8 | 0.00 | 0.3323 |
| 3.7502391 | 68.1565 | 26.861 | 1333.5 | 10.370 | 1343.8 | 0.00 | 0.3306 |
| 3.7689903 | 67.5759 | 26.637 | 1315.8 | 10.349 | 1326.1 | 0.00 | 0.3290 |
| 3.7870982 | 65.5798 | 26.423 | 1299.0 | 10.328 | 1309.3 | 0.00 | 0.3274 |
| 3.7878352 | 65.3467 | 26.414 | 1298.3 | 10.327 | 1308.6 | 0.00 | 0.3273 |
| 3.7965019 | 65.6382 | 30.799 | 1510.3 | 10.317 | 1520.6 | 0.00 | 0.3266 |
| 3.8067744 | 67.4348 | 30.672 | 1500.0 | 10.306 | 1510.3 | 0.00 | 0.3257 |
| 3.8258083 | 68.8565 | 30.438 | 1481.2 | 10.284 | 1491.5 | 0.00 | 0.3241 |
| 3.8449373 | 69.7323 | 30.207 | 1462.6 | 10.263 | 1472.9 | 0.00 | 0.3225 |
| 3.8641620 | 70.4017 | 29.977 | 1444.3 | 10.241 | 1454.6 | 0.00 | 0.3209 |
| 3.8834828 | 70.9589 | 29.750 | 1426.2 | 10.219 | 1436.4 | 0.00 | 0.3193 |
| 3.9029002 | 71.4439 | 29.524 | 1408.4 | 10.197 | 1418.6 | 0.00 | 0.3177 |
| 3.9224147 | 71.8775 | 29.301 | 1390.7 | 10.175 | 1400.9 | 0.00 | 0.3161 |
| 3.9420268 | 72.2722 | 29.079 | 1373.4 | 10.153 | 1383.5 | 0.00 | 0.3145 |
| 3.9617369 | 72.6359 | 28.859 | 1356.2 | 10.131 | 1366.3 | 0.00 | 0.3130 |
| 3.9815456 | 72.9742 | 28.641 | 1339.2 | 10.109 | 1349.3 | 0.00 | 0.3114 |
| 4.0014533 | 73.2908 | 28.424 | 1322.5 | 10.086 | 1332.6 | 0.00 | 0.3098 |
| 4.0214606 | 73.5886 | 28.209 | 1305.9 | 10.064 | 1316.0 | 0.00 | 0.3083 |
| 4.0415679 | 73.8699 | 27.995 | 1289.6 | 10.041 | 1299.6 | 0.00 | 0.3068 |
| 4.0617757 | 74.1352 | 27.778 | 1273.2 | 10.018 | 1283.3 | 0.00 | 0.3052 |
| 4.0820846 | 74.3857 | 27.564 | 1257.1 | 9.9956 | 1267.1 | 0.00 | 0.3037 |
| 4.1024950 | 74.6227 | 27.351 | 1241.2 | 9.9728 | 1251.2 | 0.00 | 0.3022 |
| 4.1230075 | 74.8470 | 27.139 | 1225.5 | 9.9498 | 1235.4 | 0.00 | 0.3007 |
| 4.1436226 | 75.0595 | 26.930 | 1210.0 | 9.9267 | 1219.9 | 0.00 | 0.2992 |
| 4.1643407 | 75.2607 | 26.722 | 1194.7 | 9.9035 | 1204.6 | 0.00 | 0.2977 |
| 4.1851624 | 75.4511 | 26.516 | 1179.5 | 9.8803 | 1189.4 | 0.00 | 0.2962 |
| 4.2060882 | 75.6310 | 26.311 | 1164.6 | 9.8569 | 1174.5 | 0.00 | 0.2948 |
| 4.2271186 | 75.8005 | 26.108 | 1149.9 | 9.8335 | 1159.7 | 0.00 | 0.2933 |
| 4.2482542 | 75.9588 | 25.903 | 1135.2 | 9.8100 | 1145.0 | 0.00 | 0.2918 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ra ($Z=88$) | | | | | | | |
| 4.2694955 | 76.1056 | 25.700 | 1120.7 | 9.7864 | 1130.5 | 0.00 | 0.2904 |
| 4.2908430 | 76.2404 | 25.499 | 1106.4 | 9.7627 | 1116.1 | 0.00 | 0.2890 |
| 4.3122972 | 76.3624 | 25.300 | 1092.3 | 9.7390 | 1102.0 | 0.00 | 0.2875 |
| 4.3338587 | 76.4705 | 25.102 | 1078.3 | 9.7151 | 1088.0 | 0.00 | 0.2861 |
| 4.3555280 | 76.5624 | 24.905 | 1064.6 | 9.6912 | 1074.3 | 0.00 | 0.2847 |
| 4.3773056 | 76.6349 | 24.710 | 1051.0 | 9.6672 | 1060.6 | 0.00 | 0.2832 |
| 4.3991921 | 76.6822 | 24.517 | 1037.6 | 9.6431 | 1047.2 | 0.00 | 0.2818 |
| 4.4211881 | 76.6935 | 24.325 | 1024.3 | 9.6189 | 1033.9 | 0.00 | 0.2804 |
| 4.4432940 | 76.6446 | 24.135 | 1011.2 | 9.5947 | 1020.8 | 0.00 | 0.2790 |
| 4.4655105 | 76.4608 | 23.946 | 998.34 | 9.5703 | 1007.9 | 0.00 | 0.2776 |
| 4.4829005 | 75.9322 | 23.800 | 988.40 | 9.5513 | 997.96 | 0.00 | 0.2766 |
| 4.4878381 | 75.2855 | 23.758 | 985.61 | 9.5459 | 995.15 | 0.00 | 0.2763 |
| 4.4960996 | 75.9831 | 25.229 | 1044.7 | 9.5369 | 1054.2 | 0.00 | 0.2758 |
| 4.5102772 | 76.6248 | 25.110 | 1036.5 | 9.5215 | 1046.0 | 0.00 | 0.2749 |
| 4.5328286 | 77.1055 | 24.922 | 1023.6 | 9.4969 | 1033.1 | 0.00 | 0.2735 |
| 4.5554928 | 77.4258 | 24.736 | 1010.9 | 9.4723 | 1020.4 | 0.00 | 0.2722 |
| 4.5782702 | 77.6788 | 24.552 | 998.40 | 9.4476 | 1007.8 | 0.00 | 0.2708 |
| 4.6011616 | 77.8922 | 24.368 | 986.01 | 9.4229 | 995.43 | 0.00 | 0.2695 |
| 4.6241674 | 78.0777 | 24.186 | 973.76 | 9.3981 | 983.16 | 0.00 | 0.2681 |
| 4.6472882 | 78.2410 | 24.005 | 961.67 | 9.3732 | 971.04 | 0.00 | 0.2668 |
| 4.6705247 | 78.3847 | 23.826 | 949.73 | 9.3482 | 959.08 | 0.00 | 0.2655 |
| 4.6938773 | 78.5094 | 23.648 | 937.95 | 9.3232 | 947.27 | 0.00 | 0.2641 |
| 4.7173467 | 78.6136 | 23.471 | 926.32 | 9.2981 | 935.61 | 0.00 | 0.2628 |
| 4.7409334 | 78.6930 | 23.297 | 914.85 | 9.2729 | 924.13 | 0.00 | 0.2615 |
| 4.7646381 | 78.7369 | 23.124 | 903.54 | 9.2477 | 912.78 | 0.00 | 0.2602 |
| 4.7884613 | 78.7140 | 22.952 | 892.36 | 9.2224 | 901.59 | 0.00 | 0.2589 |
| 4.8116809 | 78.4773 | 22.787 | 881.66 | 9.1979 | 890.86 | 0.00 | 0.2577 |
| 4.8124036 | 78.4584 | 22.781 | 881.33 | 9.1971 | 890.53 | 0.00 | 0.2576 |
| 4.8323191 | 78.5884 | 23.641 | 910.80 | 9.1761 | 919.98 | 0.00 | 0.2566 |
| 4.8364656 | 78.7192 | 23.612 | 908.90 | 9.1717 | 918.07 | 0.00 | 0.2564 |
| 4.8606479 | 79.1649 | 23.443 | 897.94 | 9.1462 | 907.08 | 0.00 | 0.2551 |
| 4.8849512 | 79.4489 | 23.276 | 887.11 | 9.1207 | 896.23 | 0.00 | 0.2538 |
| 4.9093759 | 79.6782 | 23.111 | 876.42 | 9.0951 | 885.51 | 0.00 | 0.2525 |
| 4.9339228 | 79.8784 | 22.946 | 865.84 | 9.0695 | 874.91 | 0.00 | 0.2513 |
| 4.9585924 | 80.0593 | 22.780 | 855.31 | 9.0438 | 864.36 | 0.00 | 0.2500 |
| 4.9833854 | 80.2261 | 22.616 | 844.92 | 9.0181 | 853.93 | 0.00 | 0.2488 |
| 5.0083023 | 80.3819 | 22.453 | 834.65 | 8.9923 | 843.64 | 0.00 | 0.2476 |
| 5.0333438 | 80.5290 | 22.291 | 824.52 | 8.9664 | 833.48 | 0.00 | 0.2463 |
| 5.0585105 | 80.6687 | 22.131 | 814.51 | 8.9405 | 823.45 | 0.00 | 0.2451 |
| 5.0838031 | 80.8020 | 21.971 | 804.60 | 8.9146 | 813.52 | 0.00 | 0.2439 |
| 5.1092221 | 80.9294 | 21.812 | 794.82 | 8.8886 | 803.71 | 0.00 | 0.2427 |
| 5.1347682 | 81.0516 | 21.655 | 785.17 | 8.8626 | 794.03 | 0.00 | 0.2415 |
| 5.1604421 | 81.1691 | 21.499 | 775.63 | 8.8365 | 784.46 | 0.00 | 0.2403 |
| 5.1862443 | 81.2823 | 21.344 | 766.21 | 8.8103 | 775.02 | 0.00 | 0.2391 |
| 5.2121755 | 81.3916 | 21.190 | 756.91 | 8.7842 | 765.69 | 0.00 | 0.2379 |
| 5.2382364 | 81.4972 | 21.038 | 747.72 | 8.7579 | 756.48 | 0.00 | 0.2367 |
| 5.2644276 | 81.5993 | 20.886 | 738.64 | 8.7317 | 747.37 | 0.00 | 0.2355 |
| 5.2907497 | 81.6983 | 20.736 | 729.67 | 8.7053 | 738.38 | 0.00 | 0.2343 |
| 5.3172034 | 81.7942 | 20.587 | 720.82 | 8.6790 | 729.50 | 0.00 | 0.2332 |
| 5.3437895 | 81.8872 | 20.439 | 712.07 | 8.6526 | 720.72 | 0.00 | 0.2320 |
| 5.3705084 | 81.9775 | 20.292 | 703.44 | 8.6262 | 712.06 | 0.00 | 0.2309 |
| 5.3973609 | 82.0651 | 20.146 | 694.91 | 8.5997 | 703.51 | 0.00 | 0.2297 |
| 5.4243477 | 82.1503 | 20.001 | 686.49 | 8.5732 | 695.06 | 0.00 | 0.2286 |
| 5.4514695 | 82.2332 | 19.858 | 678.17 | 8.5466 | 686.72 | 0.00 | 0.2274 |
| 5.4787268 | 82.3138 | 19.715 | 669.96 | 8.5201 | 678.48 | 0.00 | 0.2263 |
| 5.5061205 | 82.3922 | 19.574 | 661.85 | 8.4935 | 670.34 | 0.00 | 0.2252 |
| 5.5336511 | 82.4686 | 19.434 | 653.84 | 8.4668 | 662.31 | 0.00 | 0.2241 |
| 5.5613193 | 82.5430 | 19.295 | 645.94 | 8.4401 | 654.38 | 0.00 | 0.2229 |
| 5.5891259 | 82.6155 | 19.157 | 638.13 | 8.4134 | 646.54 | 0.00 | 0.2218 |
| 5.6170716 | 82.6862 | 19.020 | 630.41 | 8.3867 | 638.80 | 0.00 | 0.2207 |
| 5.6451569 | 82.7552 | 18.884 | 622.77 | 8.3599 | 631.13 | 0.00 | 0.2196 |
| 5.6733827 | 82.8224 | 18.748 | 615.23 | 8.3331 | 623.56 | 0.00 | 0.2185 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ra ($Z=88$) | | | | | | | |
| 5.7017496 | 82.8881 | 18.614 | 607.78 | 8.3063 | 616.09 | 0.00 | 0.2174 |
| 5.7302584 | 82.9522 | 18.481 | 600.43 | 8.2794 | 608.71 | 0.00 | 0.2164 |
| 5.7589096 | 83.0148 | 18.348 | 593.17 | 8.2525 | 601.42 | 0.00 | 0.2153 |
| 5.7877042 | 83.0761 | 18.217 | 586.00 | 8.2256 | 594.22 | 0.00 | 0.2142 |
| 5.8166427 | 83.1362 | 18.087 | 578.92 | 8.1987 | 587.12 | 0.00 | 0.2132 |
| 5.8457259 | 83.1950 | 17.957 | 571.91 | 8.1717 | 580.08 | 0.00 | 0.2121 |
| 5.8749546 | 83.2522 | 17.828 | 564.95 | 8.1448 | 573.09 | 0.00 | 0.2110 |
| 5.9043293 | 83.3077 | 17.699 | 558.07 | 8.1178 | 566.19 | 0.00 | 0.2100 |
| 5.9338510 | 83.3618 | 17.571 | 551.28 | 8.0908 | 559.37 | 0.00 | 0.2089 |
| 5.9635202 | 83.4144 | 17.444 | 544.58 | 8.0637 | 552.64 | 0.00 | 0.2079 |
| 5.9933378 | 83.4657 | 17.318 | 537.96 | 8.0367 | 546.00 | 0.00 | 0.2069 |
| 6.0233045 | 83.5156 | 17.193 | 531.42 | 8.0096 | 539.43 | 0.00 | 0.2058 |
| 6.0534210 | 83.5643 | 17.069 | 524.97 | 7.9825 | 532.95 | 0.00 | 0.2048 |
| 6.0836882 | 83.6118 | 16.946 | 518.60 | 7.9554 | 526.55 | 0.00 | 0.2038 |
| 6.1141066 | 83.6581 | 16.824 | 512.30 | 7.9283 | 520.23 | 0.00 | 0.2028 |
| 6.1446771 | 83.7034 | 16.703 | 506.09 | 7.9011 | 513.99 | 0.00 | 0.2018 |
| 6.1754005 | 83.7476 | 16.583 | 499.96 | 7.8740 | 507.83 | 0.00 | 0.2008 |
| 6.2062775 | 83.7908 | 16.464 | 493.90 | 7.8468 | 501.74 | 0.00 | 0.1998 |
| 6.2373089 | 83.9861 | 16.343 | 487.83 | 7.8196 | 495.65 | 0.00 | 0.1988 |
| 6.2684954 | 84.0270 | 16.223 | 481.82 | 7.7924 | 489.61 | 0.00 | 0.1978 |
| 6.2998379 | 84.0666 | 16.103 | 475.88 | 7.7653 | 483.64 | 0.00 | 0.1968 |
| 6.3313371 | 84.1048 | 15.984 | 470.01 | 7.7380 | 477.75 | 0.00 | 0.1958 |
| 6.3629938 | 84.1418 | 15.866 | 464.22 | 7.7108 | 471.93 | 0.00 | 0.1949 |
| 6.3948088 | 84.1776 | 15.749 | 458.50 | 7.6836 | 466.19 | 0.00 | 0.1939 |
| 6.4267828 | 84.2124 | 15.633 | 452.86 | 7.6564 | 460.52 | 0.00 | 0.1929 |
| 6.4589167 | 84.2460 | 15.518 | 447.29 | 7.6292 | 454.92 | 0.00 | 0.1920 |
| 6.4912113 | 84.2786 | 15.403 | 441.79 | 7.6019 | 449.39 | 0.00 | 0.1910 |
| 6.5236674 | 84.4154 | 15.288 | 436.31 | 7.5747 | 443.88 | 0.00 | 0.1901 |
| 6.5562857 | 84.4457 | 15.174 | 430.89 | 7.5474 | 438.44 | 0.00 | 0.1891 |
| 6.5890671 | 84.4749 | 15.061 | 425.54 | 7.5202 | 433.06 | 0.00 | 0.1882 |
| 6.6220125 | 84.5030 | 14.948 | 420.26 | 7.4929 | 427.75 | 0.00 | 0.1872 |
| 6.6551225 | 84.5300 | 14.837 | 415.05 | 7.4657 | 422.51 | 0.00 | 0.1863 |
| 6.6883981 | 84.5561 | 14.726 | 409.90 | 7.4384 | 417.34 | 0.00 | 0.1854 |
| 6.7218401 | 84.5811 | 14.616 | 404.83 | 7.4112 | 412.24 | 0.00 | 0.1844 |
| 6.7554493 | 84.6052 | 14.507 | 399.81 | 7.3840 | 407.20 | 0.00 | 0.1835 |
| 6.7892266 | 84.6284 | 14.399 | 394.86 | 7.3567 | 402.22 | 0.00 | 0.1826 |
| 6.8231727 | 84.6507 | 14.292 | 389.98 | 7.3295 | 397.31 | 0.00 | 0.1817 |
| 6.8572886 | 84.6721 | 14.186 | 385.16 | 7.3022 | 392.46 | 0.00 | 0.1808 |
| 6.8915750 | 84.6927 | 14.081 | 380.40 | 7.2750 | 387.67 | 0.00 | 0.1799 |
| 6.9260329 | 84.7125 | 13.977 | 375.70 | 7.2478 | 382.95 | 0.00 | 0.1790 |
| 6.9606631 | 84.7316 | 13.873 | 371.06 | 7.2206 | 378.28 | 0.00 | 0.1781 |
| 6.9954664 | 84.7498 | 13.771 | 366.49 | 7.1934 | 373.68 | 0.00 | 0.1772 |
| 7.0304437 | 84.7674 | 13.669 | 361.97 | 7.1662 | 369.13 | 0.00 | 0.1764 |
| 7.0655959 | 84.7842 | 13.568 | 357.51 | 7.1390 | 364.65 | 0.00 | 0.1755 |
| 7.1009239 | 84.8003 | 13.468 | 353.10 | 7.1118 | 360.22 | 0.00 | 0.1746 |
| 7.1364285 | 84.8158 | 13.369 | 348.76 | 7.0846 | 355.84 | 0.00 | 0.1737 |
| 7.1721107 | 84.8306 | 13.270 | 344.47 | 7.0575 | 351.53 | 0.00 | 0.1729 |
| 7.2079712 | 84.8447 | 13.173 | 340.23 | 7.0303 | 347.26 | 0.00 | 0.1720 |
| 7.2440111 | 84.8583 | 13.076 | 336.05 | 7.0032 | 343.06 | 0.00 | 0.1712 |
| 7.2802311 | 84.8713 | 12.980 | 331.93 | 6.9760 | 338.90 | 0.00 | 0.1703 |
| 7.3166323 | 84.8837 | 12.885 | 327.86 | 6.9489 | 334.80 | 0.00 | 0.1695 |
| 7.3532155 | 84.8955 | 12.790 | 323.84 | 6.9218 | 330.76 | 0.00 | 0.1686 |
| 7.3899815 | 84.9068 | 12.697 | 319.87 | 6.8948 | 326.76 | 0.00 | 0.1678 |
| 7.4269314 | 84.9176 | 12.604 | 315.95 | 6.8677 | 322.82 | 0.00 | 0.1669 |
| 7.4640661 | 84.9279 | 12.512 | 312.08 | 6.8407 | 318.93 | 0.00 | 0.1661 |
| 7.5013864 | 84.9377 | 12.421 | 308.27 | 6.8136 | 315.08 | 0.00 | 0.1653 |
| 7.5388934 | 84.9470 | 12.330 | 304.50 | 6.7866 | 311.29 | 0.00 | 0.1645 |
| 7.5765878 | 84.9559 | 12.241 | 300.78 | 6.7596 | 307.54 | 0.00 | 0.1636 |
| 7.6144708 | 85.0561 | 12.150 | 297.07 | 6.7327 | 303.81 | 0.00 | 0.1628 |
| 7.6525431 | 85.0643 | 12.060 | 293.40 | 6.7057 | 300.11 | 0.00 | 0.1620 |
| 7.6908058 | 85.0718 | 11.971 | 289.78 | 6.6788 | 296.46 | 0.00 | 0.1612 |
| 7.7292599 | 85.0788 | 11.882 | 286.21 | 6.6519 | 292.86 | 0.00 | 0.1604 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|--|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ra ($Z=88$) | | | | | | | |
| 7.7679062 | 85.0853 | 11.794 | 282.68 | 6.6250 | 289.31 | 0.00 | 0.1596 |
| 7.8067457 | 85.0912 | 11.707 | 279.20 | 6.5982 | 285.80 | 0.00 | 0.1588 |
| 7.8457794 | 85.0965 | 11.621 | 275.76 | 6.5713 | 282.33 | 0.00 | 0.1580 |
| 7.8850083 | 85.1014 | 11.536 | 272.37 | 6.5445 | 278.92 | 0.00 | 0.1572 |
| 7.9244334 | 85.1058 | 11.451 | 269.02 | 6.5178 | 275.54 | 0.00 | 0.1565 |
| 7.9640555 | 85.1098 | 11.367 | 265.72 | 6.4910 | 272.21 | 0.00 | 0.1557 |
| 8.0038758 | 85.1133 | 11.283 | 262.46 | 6.4643 | 268.92 | 0.00 | 0.1549 |
| 8.0438952 | 85.1164 | 11.201 | 259.24 | 6.4376 | 265.67 | 0.00 | 0.1541 |
| 8.0841147 | 85.1191 | 11.119 | 256.06 | 6.4109 | 262.47 | 0.00 | 0.1534 |
| 8.1245352 | 85.1214 | 11.037 | 252.92 | 6.3843 | 259.31 | 0.00 | 0.1526 |
| 8.1651579 | 85.1233 | 10.957 | 249.83 | 6.3576 | 256.19 | 0.00 | 0.1518 |
| 8.2059837 | 85.1249 | 10.877 | 246.77 | 6.3311 | 253.10 | 0.00 | 0.1511 |
| 8.2470136 | 85.1262 | 10.798 | 243.76 | 6.3045 | 250.06 | 0.00 | 0.1503 |
| 8.2882487 | 85.1271 | 10.719 | 240.78 | 6.2780 | 247.06 | 0.00 | 0.1496 |
| 8.3296899 | 85.1277 | 10.641 | 237.84 | 6.2515 | 244.09 | 0.00 | 0.1488 |
| 8.3713384 | 85.1280 | 10.564 | 234.94 | 6.2250 | 241.17 | 0.00 | 0.1481 |
| 8.4131951 | 85.1281 | 10.488 | 232.08 | 6.1986 | 238.28 | 0.00 | 0.1474 |
| 8.4552610 | 85.1280 | 10.412 | 229.25 | 6.1722 | 235.43 | 0.00 | 0.1466 |
| 8.4975373 | 85.1276 | 10.336 | 226.46 | 6.1459 | 232.61 | 0.00 | 0.1459 |
| 8.5400250 | 85.1271 | 10.262 | 223.71 | 6.1195 | 229.83 | 0.00 | 0.1452 |
| Ac ($Z=89$) | | | | | | | |
| Atomic weight: $A_r=227.0278 \text{ g mol}^{-1}$ Nominal density: $\rho (\text{g cm}^{-3})=10.050$ | | | | | | | |
| $\sigma_a (\text{barns atom}^{-1})=[\mu/\rho](\text{cm}^2 \text{ g}^{-1}) \times 376.989 E(\text{eV}) [\mu/\rho](\text{cm}^2 \text{ g}^{-1})=f_2 (e \text{ atom}^{-1}) \times 1.85353 \times 10^5$ | | | | | | | |
| 24 edges. Edge energies (keV) | | | | | | | |
| K | 106.755 | LI | 19.8400 | LII | 19.9832 | LIII | 15.8710 |
| MI | 5.00200 | MII | 4.65600 | MIII | 3.90900 | MIV | 3.37020 |
| MV | 3.21900 | NI | 1.26900 | NII | 1.08000 | NIII | 0.890000 |
| NIV | 0.674900 | NV | 0.637000 | NVI | 0.303944 | NVII | 0.295067 |
| OI | 0.261255 | OII | 0.206171 | OIII | 0.163235 | OIV | 0.0831361 |
| OV | 0.0769389 | PI | 0.0404636 | PII | 0.0251851 | PIII | 0.0184021 |
| Relativistic correction estimate: $f_{\text{rel}} (\text{H82,3/5CL})=(-2.3597, -1.3722) e \text{ atom}^{-1}$ | | | | | | | |
| Nuclear Thomson correction: $f_{\text{NT}}=-0.016572 e \text{ atom}^{-1}$ | | | | | | | |
| 0.50000000 | 20.5578 | 33.072 | 12260 | 6.1657 | 12266 | 0.00 | 2.480 |
| 0.50250000 | 20.9129 | 33.319 | 12290 | 6.1967 | 12296 | 0.00 | 2.467 |
| 0.50501250 | 21.2708 | 33.556 | 12316 | 6.2278 | 12322 | 0.00 | 2.455 |
| 0.50753756 | 21.6309 | 33.785 | 12338 | 6.2589 | 12345 | 0.00 | 2.443 |
| 0.51007525 | 21.9932 | 34.006 | 12357 | 6.2900 | 12363 | 0.00 | 2.431 |
| 0.51262563 | 22.3573 | 34.217 | 12372 | 6.3211 | 12378 | 0.00 | 2.419 |
| 0.51518875 | 22.7228 | 34.420 | 12384 | 6.3523 | 12390 | 0.00 | 2.407 |
| 0.51776470 | 23.0894 | 34.614 | 12391 | 6.3835 | 12398 | 0.00 | 2.395 |
| 0.52035352 | 23.4570 | 34.799 | 12396 | 6.4147 | 12402 | 0.00 | 2.383 |
| 0.52295529 | 23.8251 | 34.976 | 12397 | 6.4460 | 12403 | 0.00 | 2.371 |
| 0.52557007 | 24.1934 | 35.145 | 12394 | 6.4773 | 12401 | 0.00 | 2.359 |
| 0.52819792 | 24.5618 | 35.304 | 12389 | 6.5085 | 12395 | 0.00 | 2.347 |
| 0.53083891 | 24.9299 | 35.456 | 12380 | 6.5399 | 12387 | 0.00 | 2.336 |
| 0.53349310 | 25.2973 | 35.599 | 12368 | 6.5712 | 12375 | 0.00 | 2.324 |
| 0.53616057 | 25.6639 | 35.734 | 12353 | 6.6025 | 12360 | 0.00 | 2.312 |
| 0.53884137 | 26.0293 | 35.860 | 12335 | 6.6339 | 12342 | 0.00 | 2.301 |
| 0.54153558 | 26.3933 | 35.979 | 12315 | 6.6653 | 12321 | 0.00 | 2.289 |
| 0.54424325 | 26.7556 | 36.090 | 12291 | 6.6967 | 12298 | 0.00 | 2.278 |
| 0.54696447 | 27.1159 | 36.192 | 12265 | 6.7281 | 12271 | 0.00 | 2.267 |
| 0.54969929 | 27.4739 | 36.287 | 12236 | 6.7595 | 12242 | 0.00 | 2.255 |
| 0.55244779 | 27.8293 | 36.375 | 12204 | 6.7910 | 12211 | 0.00 | 2.244 |
| 0.55521003 | 28.1819 | 36.454 | 12170 | 6.8224 | 12177 | 0.00 | 2.233 |
| 0.55798608 | 28.5313 | 36.527 | 12134 | 6.8539 | 12140 | 0.00 | 2.222 |
| 0.56077601 | 28.8773 | 36.592 | 12095 | 6.8854 | 12102 | 0.00 | 2.211 |
| 0.56357989 | 29.2195 | 36.650 | 12054 | 6.9168 | 12060 | 0.00 | 2.200 |
| 0.56639779 | 29.5577 | 36.701 | 12010 | 6.9483 | 12017 | 0.00 | 2.189 |
| 0.56922978 | 29.8916 | 36.745 | 11965 | 6.9798 | 11972 | 0.00 | 2.178 |
| 0.57207593 | 30.2207 | 36.782 | 11917 | 7.0113 | 11924 | 0.00 | 2.167 |
| 0.57493630 | 30.5447 | 36.812 | 11868 | 7.0428 | 11875 | 0.00 | 2.156 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ac ($Z=89$) | | | | | | | |
| 0.57781099 | 30.8632 | 36.836 | 11817 | 7.0743 | 11824 | 0.00 | 2.146 |
| 0.58070004 | 31.1758 | 36.854 | 11763 | 7.1058 | 11770 | 0.00 | 2.135 |
| 0.58360354 | 31.4821 | 36.865 | 11708 | 7.1373 | 11716 | 0.00 | 2.124 |
| 0.58652156 | 31.7815 | 36.871 | 11652 | 7.1688 | 11659 | 0.00 | 2.114 |
| 0.58945417 | 32.0734 | 36.870 | 11594 | 7.2003 | 11601 | 0.00 | 2.103 |
| 0.59240144 | 32.3573 | 36.863 | 11534 | 7.2318 | 11541 | 0.00 | 2.093 |
| 0.59536345 | 32.6322 | 36.851 | 11473 | 7.2633 | 11480 | 0.00 | 2.082 |
| 0.59834026 | 32.8975 | 36.834 | 11410 | 7.2948 | 11418 | 0.00 | 2.072 |
| 0.60133196 | 33.1518 | 36.810 | 11346 | 7.3262 | 11354 | 0.00 | 2.062 |
| 0.60433862 | 33.3940 | 36.782 | 11281 | 7.3577 | 11289 | 0.00 | 2.052 |
| 0.60736032 | 33.6223 | 36.749 | 11215 | 7.3892 | 11222 | 0.00 | 2.041 |
| 0.61039712 | 33.8345 | 36.710 | 11147 | 7.4206 | 11155 | 0.00 | 2.031 |
| 0.61344910 | 34.0278 | 36.667 | 11079 | 7.4521 | 11086 | 0.00 | 2.021 |
| 0.61651635 | 34.1978 | 36.619 | 11009 | 7.4835 | 11017 | 0.00 | 2.011 |
| 0.61959893 | 34.3407 | 36.566 | 10939 | 7.5149 | 10946 | 0.00 | 2.001 |
| 0.62269693 | 34.4428 | 36.509 | 10867 | 7.5463 | 10875 | 0.00 | 1.991 |
| 0.62581041 | 34.4897 | 36.447 | 10795 | 7.5776 | 10803 | 0.00 | 1.981 |
| 0.62893946 | 34.4485 | 36.381 | 10722 | 7.6090 | 10729 | 0.00 | 1.971 |
| 0.63208416 | 34.2369 | 36.312 | 10648 | 7.6403 | 10656 | 0.00 | 1.962 |
| 0.63524458 | 33.4960 | 36.238 | 10574 | 7.6717 | 10581 | 0.00 | 1.952 |
| 0.63664076 | 32.0703 | 36.204 | 10541 | 7.6854 | 10548 | 0.00 | 1.947 |
| 0.63735929 | 32.1221 | 39.221 | 11406 | 7.6925 | 11414 | 0.00 | 1.945 |
| 0.63842080 | 33.5266 | 39.202 | 11381 | 7.7030 | 11389 | 0.00 | 1.942 |
| 0.64161291 | 34.8988 | 39.142 | 11308 | 7.7342 | 11315 | 0.00 | 1.932 |
| 0.64482097 | 35.6393 | 39.080 | 11233 | 7.7655 | 11241 | 0.00 | 1.923 |
| 0.64804508 | 36.1952 | 39.013 | 11159 | 7.7967 | 11166 | 0.00 | 1.913 |
| 0.65128530 | 36.6550 | 38.944 | 11083 | 7.8279 | 11091 | 0.00 | 1.904 |
| 0.65454173 | 37.0503 | 38.872 | 11008 | 7.8591 | 11016 | 0.00 | 1.894 |
| 0.65781444 | 37.3935 | 38.797 | 10932 | 7.8902 | 10940 | 0.00 | 1.885 |
| 0.66110351 | 37.6871 | 38.718 | 10855 | 7.9213 | 10863 | 0.00 | 1.875 |
| 0.66440903 | 37.9238 | 38.638 | 10779 | 7.9524 | 10787 | 0.00 | 1.866 |
| 0.66773107 | 38.0795 | 38.554 | 10702 | 7.9835 | 10710 | 0.00 | 1.857 |
| 0.67106973 | 38.0741 | 38.468 | 10625 | 8.0145 | 10633 | 0.00 | 1.848 |
| 0.67442508 | 37.1905 | 38.380 | 10548 | 8.0455 | 10556 | 0.00 | 1.838 |
| 0.67451800 | 37.0715 | 38.377 | 10546 | 8.0463 | 10554 | 0.00 | 1.838 |
| 0.67528199 | 37.1469 | 40.210 | 11037 | 8.0534 | 11045 | 0.00 | 1.836 |
| 0.67779720 | 38.5905 | 40.153 | 10980 | 8.0764 | 10989 | 0.00 | 1.829 |
| 0.68118619 | 39.3788 | 40.075 | 10905 | 8.1073 | 10913 | 0.00 | 1.820 |
| 0.68459212 | 39.9600 | 39.995 | 10829 | 8.1382 | 10837 | 0.00 | 1.811 |
| 0.68801508 | 40.4583 | 39.913 | 10753 | 8.1690 | 10761 | 0.00 | 1.802 |
| 0.69145515 | 40.9098 | 39.829 | 10677 | 8.1998 | 10685 | 0.00 | 1.793 |
| 0.69491243 | 41.3303 | 39.743 | 10601 | 8.2306 | 10609 | 0.00 | 1.784 |
| 0.69838699 | 41.7282 | 39.656 | 10525 | 8.2613 | 10533 | 0.00 | 1.775 |
| 0.70187893 | 42.1086 | 39.567 | 10449 | 8.2919 | 10457 | 0.00 | 1.766 |
| 0.70538832 | 42.4747 | 39.476 | 10373 | 8.3226 | 10381 | 0.00 | 1.758 |
| 0.70891526 | 42.8287 | 39.383 | 10297 | 8.3531 | 10306 | 0.00 | 1.749 |
| 0.71245984 | 43.1722 | 39.289 | 10221 | 8.3836 | 10230 | 0.00 | 1.740 |
| 0.71602214 | 43.5062 | 39.193 | 10146 | 8.4141 | 10154 | 0.00 | 1.732 |
| 0.71960225 | 43.8317 | 39.095 | 10070 | 8.4445 | 10078 | 0.00 | 1.723 |
| 0.72320026 | 44.1494 | 38.995 | 9994.3 | 8.4749 | 10003 | 0.00 | 1.714 |
| 0.72681626 | 44.4598 | 38.894 | 9918.8 | 8.5052 | 9927.3 | 0.00 | 1.706 |
| 0.73045034 | 44.7635 | 38.792 | 9843.5 | 8.5355 | 9852.0 | 0.00 | 1.697 |
| 0.73410260 | 45.0609 | 38.688 | 9768.3 | 8.5657 | 9776.9 | 0.00 | 1.689 |
| 0.73777311 | 45.3523 | 38.583 | 9693.3 | 8.5958 | 9701.9 | 0.00 | 1.681 |
| 0.74146197 | 45.6380 | 38.477 | 9618.5 | 8.6259 | 9627.2 | 0.00 | 1.672 |
| 0.74516928 | 45.9184 | 38.369 | 9544.0 | 8.6559 | 9552.6 | 0.00 | 1.664 |
| 0.74889513 | 46.1936 | 38.260 | 9469.5 | 8.6859 | 9478.2 | 0.00 | 1.656 |
| 0.75263961 | 46.4639 | 38.150 | 9395.3 | 8.7158 | 9404.0 | 0.00 | 1.647 |
| 0.75640280 | 46.7291 | 38.039 | 9321.3 | 8.7456 | 9330.0 | 0.00 | 1.639 |
| 0.76018482 | 46.9895 | 37.926 | 9247.4 | 8.7754 | 9256.2 | 0.00 | 1.631 |
| 0.76398574 | 47.2451 | 37.812 | 9173.7 | 8.8051 | 9182.5 | 0.00 | 1.623 |
| 0.76780567 | 47.4959 | 37.697 | 9100.3 | 8.8348 | 9109.2 | 0.00 | 1.615 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ac ($Z=89$) | | | | | | | |
| 0.77164470 | 47.7419 | 37.581 | 9027.1 | 8.8644 | 9036.0 | 0.00 | 1.607 |
| 0.77550292 | 47.9833 | 37.464 | 8954.2 | 8.8939 | 8963.1 | 0.00 | 1.599 |
| 0.77938044 | 48.2201 | 37.346 | 8881.6 | 8.9233 | 8890.5 | 0.00 | 1.591 |
| 0.78327734 | 48.4522 | 37.227 | 8809.3 | 8.9527 | 8818.2 | 0.00 | 1.583 |
| 0.78719373 | 48.6809 | 37.107 | 8737.2 | 8.9820 | 8746.2 | 0.00 | 1.575 |
| 0.79112969 | 48.9038 | 36.987 | 8665.5 | 9.0112 | 8674.6 | 0.00 | 1.567 |
| 0.79508534 | 49.1221 | 36.865 | 8594.2 | 9.0403 | 8603.2 | 0.00 | 1.559 |
| 0.79906077 | 49.3356 | 36.743 | 8523.1 | 9.0694 | 8532.2 | 0.00 | 1.552 |
| 0.80305607 | 49.5445 | 36.621 | 8452.5 | 9.0984 | 8461.6 | 0.00 | 1.544 |
| 0.80707135 | 49.7485 | 36.498 | 8382.1 | 9.1273 | 8391.3 | 0.00 | 1.536 |
| 0.81110671 | 49.9475 | 36.374 | 8312.2 | 9.1561 | 8321.4 | 0.00 | 1.529 |
| 0.81516224 | 50.1415 | 36.250 | 8242.7 | 9.1848 | 8251.8 | 0.00 | 1.521 |
| 0.81923806 | 50.3303 | 36.126 | 8173.5 | 9.2135 | 8182.7 | 0.00 | 1.513 |
| 0.82333425 | 50.5137 | 36.001 | 8104.7 | 9.2421 | 8114.0 | 0.00 | 1.506 |
| 0.82745092 | 50.6914 | 35.876 | 8036.4 | 9.2706 | 8045.7 | 0.00 | 1.498 |
| 0.83158817 | 50.8630 | 35.751 | 7968.5 | 9.2990 | 7977.8 | 0.00 | 1.491 |
| 0.83574611 | 51.0282 | 35.625 | 7901.0 | 9.3273 | 7910.3 | 0.00 | 1.484 |
| 0.83992484 | 51.1864 | 35.499 | 7833.9 | 9.3555 | 7843.3 | 0.00 | 1.476 |
| 0.84412447 | 51.3369 | 35.373 | 7767.3 | 9.3837 | 7776.7 | 0.00 | 1.469 |
| 0.84834509 | 51.4788 | 35.247 | 7701.1 | 9.4117 | 7710.5 | 0.00 | 1.461 |
| 0.85258682 | 51.6109 | 35.121 | 7635.4 | 9.4397 | 7644.9 | 0.00 | 1.454 |
| 0.85684975 | 51.7315 | 34.995 | 7570.1 | 9.4675 | 7579.6 | 0.00 | 1.447 |
| 0.86113400 | 51.8383 | 34.869 | 7505.3 | 9.4953 | 7514.8 | 0.00 | 1.440 |
| 0.86543967 | 51.9286 | 34.743 | 7441.0 | 9.5230 | 7450.5 | 0.00 | 1.433 |
| 0.86976687 | 51.9947 | 34.616 | 7377.0 | 9.5506 | 7386.5 | 0.00 | 1.425 |
| 0.87411570 | 52.0225 | 34.489 | 7313.2 | 9.5780 | 7322.8 | 0.00 | 1.418 |
| 0.87848628 | 51.9931 | 34.361 | 7249.9 | 9.6054 | 7259.5 | 0.00 | 1.411 |
| 0.88287871 | 51.8525 | 34.233 | 7187.0 | 9.6327 | 7196.6 | 0.00 | 1.404 |
| 0.88729310 | 51.4100 | 34.106 | 7124.6 | 9.6599 | 7134.3 | 0.00 | 1.397 |
| 0.88919009 | 50.6616 | 34.051 | 7098.0 | 9.6715 | 7107.7 | 0.00 | 1.394 |
| 0.89080989 | 50.7289 | 36.159 | 7523.7 | 9.6813 | 7533.4 | 0.00 | 1.392 |
| 0.89172957 | 51.2871 | 36.133 | 7510.5 | 9.6869 | 7520.2 | 0.00 | 1.390 |
| 0.89618822 | 52.3436 | 36.007 | 7447.1 | 9.7139 | 7456.8 | 0.00 | 1.383 |
| 0.90066916 | 52.8979 | 35.881 | 7384.2 | 9.7407 | 7393.9 | 0.00 | 1.377 |
| 0.90517250 | 53.3184 | 35.756 | 7321.7 | 9.7675 | 7331.5 | 0.00 | 1.370 |
| 0.90969837 | 53.6747 | 35.630 | 7259.7 | 9.7941 | 7269.5 | 0.00 | 1.363 |
| 0.91424686 | 54.0175 | 35.505 | 7198.2 | 9.8207 | 7208.0 | 0.00 | 1.356 |
| 0.91881809 | 54.3100 | 35.380 | 7137.2 | 9.8471 | 7147.0 | 0.00 | 1.349 |
| 0.92341218 | 54.5838 | 35.255 | 7076.6 | 9.8734 | 7086.5 | 0.00 | 1.343 |
| 0.92802924 | 54.8434 | 35.131 | 7016.6 | 9.8996 | 7026.5 | 0.00 | 1.336 |
| 0.93266939 | 55.0916 | 35.007 | 6957.0 | 9.9257 | 6966.9 | 0.00 | 1.329 |
| 0.93733274 | 55.3305 | 34.883 | 6897.9 | 9.9517 | 6907.8 | 0.00 | 1.323 |
| 0.94201940 | 55.5617 | 34.759 | 6839.3 | 9.9775 | 6849.2 | 0.00 | 1.316 |
| 0.94672950 | 55.7862 | 34.636 | 6781.1 | 10.003 | 6791.1 | 0.00 | 1.310 |
| 0.95146315 | 56.0050 | 34.513 | 6723.5 | 10.029 | 6733.5 | 0.00 | 1.303 |
| 0.95622046 | 56.2188 | 34.391 | 6666.3 | 10.054 | 6676.4 | 0.00 | 1.297 |
| 0.96100156 | 56.4283 | 34.269 | 6609.6 | 10.080 | 6619.7 | 0.00 | 1.290 |
| 0.96580657 | 56.6341 | 34.148 | 6553.4 | 10.105 | 6563.5 | 0.00 | 1.284 |
| 0.97063560 | 56.8366 | 34.027 | 6497.7 | 10.130 | 6507.9 | 0.00 | 1.277 |
| 0.97548878 | 57.0363 | 33.906 | 6442.5 | 10.155 | 6452.6 | 0.00 | 1.271 |
| 0.98036623 | 57.2337 | 33.786 | 6387.7 | 10.180 | 6397.9 | 0.00 | 1.265 |
| 0.98526806 | 57.4294 | 33.666 | 6333.5 | 10.205 | 6343.7 | 0.00 | 1.258 |
| 0.99019440 | 57.6240 | 33.547 | 6279.6 | 10.229 | 6289.9 | 0.00 | 1.252 |
| 0.99514537 | 57.8185 | 33.428 | 6226.3 | 10.254 | 6236.5 | 0.00 | 1.246 |
| 1.0001211 | 58.0156 | 33.310 | 6173.3 | 10.278 | 6183.6 | 0.00 | 1.240 |
| 1.0051217 | 58.2161 | 33.175 | 6117.8 | 10.303 | 6128.1 | 0.00 | 1.234 |
| 1.0101473 | 58.3998 | 33.040 | 6062.6 | 10.327 | 6072.9 | 0.00 | 1.227 |
| 1.0151980 | 58.5760 | 32.906 | 6007.9 | 10.351 | 6018.2 | 0.00 | 1.221 |
| 1.0202740 | 58.7470 | 32.771 | 5953.5 | 10.375 | 5963.9 | 0.00 | 1.215 |
| 1.0253754 | 58.9135 | 32.636 | 5899.6 | 10.398 | 5910.0 | 0.00 | 1.209 |
| 1.0305023 | 59.0759 | 32.502 | 5846.0 | 10.422 | 5856.5 | 0.00 | 1.203 |
| 1.0356548 | 59.2341 | 32.368 | 5792.9 | 10.445 | 5803.4 | 0.00 | 1.197 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ac ($Z=89$) | | | | | | | |
| 1.0408331 | 59.3879 | 32.234 | 5740.2 | 10.469 | 5750.7 | 0.00 | 1.191 |
| 1.0460372 | 59.5369 | 32.100 | 5688.0 | 10.492 | 5698.5 | 0.00 | 1.185 |
| 1.0512674 | 59.6805 | 31.966 | 5636.1 | 10.515 | 5646.6 | 0.00 | 1.179 |
| 1.0565238 | 59.8173 | 31.833 | 5584.6 | 10.538 | 5595.2 | 0.00 | 1.174 |
| 1.0618064 | 59.9448 | 31.700 | 5533.6 | 10.560 | 5544.2 | 0.00 | 1.168 |
| 1.0671154 | 60.0580 | 31.567 | 5483.0 | 10.583 | 5493.6 | 0.00 | 1.162 |
| 1.0724510 | 60.1425 | 31.435 | 5432.9 | 10.606 | 5443.5 | 0.00 | 1.156 |
| 1.0778132 | 60.1234 | 31.300 | 5382.7 | 10.628 | 5393.4 | 0.00 | 1.150 |
| 1.0789287 | 60.0524 | 31.270 | 5372.1 | 10.632 | 5382.7 | 0.00 | 1.149 |
| 1.0810714 | 60.1242 | 31.672 | 5430.3 | 10.641 | 5440.9 | 0.00 | 1.147 |
| 1.0832023 | 60.3467 | 31.615 | 5409.8 | 10.650 | 5420.5 | 0.00 | 1.145 |
| 1.0886183 | 60.6471 | 31.470 | 5358.2 | 10.672 | 5368.9 | 0.00 | 1.139 |
| 1.0940614 | 60.8712 | 31.326 | 5307.1 | 10.694 | 5317.8 | 0.00 | 1.133 |
| 1.0995317 | 61.0691 | 31.182 | 5256.5 | 10.716 | 5267.2 | 0.00 | 1.128 |
| 1.1050294 | 61.2526 | 31.039 | 5206.3 | 10.737 | 5217.0 | 0.00 | 1.122 |
| 1.1105545 | 61.4267 | 30.896 | 5156.5 | 10.759 | 5167.3 | 0.00 | 1.116 |
| 1.1161073 | 61.5938 | 30.753 | 5107.2 | 10.780 | 5118.0 | 0.00 | 1.111 |
| 1.1216878 | 61.7553 | 30.611 | 5058.4 | 10.801 | 5069.2 | 0.00 | 1.105 |
| 1.1272963 | 61.9122 | 30.470 | 5010.0 | 10.822 | 5020.8 | 0.00 | 1.100 |
| 1.1329328 | 62.0650 | 30.329 | 4962.0 | 10.843 | 4972.9 | 0.00 | 1.094 |
| 1.1385974 | 62.2145 | 30.191 | 4914.8 | 10.864 | 4925.7 | 0.00 | 1.089 |
| 1.1442904 | 62.3612 | 30.048 | 4867.2 | 10.884 | 4878.1 | 0.00 | 1.084 |
| 1.1500119 | 62.5043 | 29.903 | 4819.6 | 10.904 | 4830.5 | 0.00 | 1.078 |
| 1.1557619 | 62.6440 | 29.758 | 4772.4 | 10.925 | 4783.3 | 0.00 | 1.073 |
| 1.1615407 | 62.7808 | 29.614 | 4725.7 | 10.945 | 4736.6 | 0.00 | 1.067 |
| 1.1673484 | 62.9146 | 29.471 | 4679.4 | 10.965 | 4690.4 | 0.00 | 1.062 |
| 1.1731852 | 63.0457 | 29.328 | 4633.6 | 10.984 | 4644.6 | 0.00 | 1.057 |
| 1.1790511 | 63.1742 | 29.186 | 4588.2 | 11.004 | 4599.3 | 0.00 | 1.052 |
| 1.1849464 | 63.2995 | 29.027 | 4540.5 | 11.023 | 4551.5 | 0.00 | 1.046 |
| 1.1908711 | 63.4205 | 28.864 | 4492.5 | 11.042 | 4503.5 | 0.00 | 1.041 |
| 1.1968254 | 63.5372 | 28.702 | 4445.1 | 11.062 | 4456.1 | 0.00 | 1.036 |
| 1.2028096 | 63.6497 | 28.541 | 4398.2 | 11.080 | 4409.2 | 0.00 | 1.031 |
| 1.2088236 | 63.7578 | 28.381 | 4351.8 | 11.099 | 4362.9 | 0.00 | 1.026 |
| 1.2148677 | 63.8615 | 28.223 | 4306.0 | 11.118 | 4317.1 | 0.00 | 1.021 |
| 1.2209421 | 63.9598 | 28.051 | 4258.5 | 11.136 | 4269.6 | 0.00 | 1.015 |
| 1.2270468 | 64.0516 | 27.878 | 4211.2 | 11.154 | 4222.3 | 0.00 | 1.010 |
| 1.2331820 | 64.1359 | 27.707 | 4164.5 | 11.173 | 4175.6 | 0.00 | 1.005 |
| 1.2393479 | 64.2116 | 27.537 | 4118.3 | 11.190 | 4129.5 | 0.00 | 1.000 |
| 1.2455447 | 64.2763 | 27.369 | 4072.8 | 11.208 | 4084.0 | 0.00 | 0.9954 |
| 1.2517724 | 64.3250 | 27.201 | 4027.8 | 11.226 | 4039.0 | 0.00 | 0.9905 |
| 1.2580312 | 64.3461 | 27.036 | 3983.4 | 11.243 | 3994.6 | 0.00 | 0.9855 |
| 1.2643214 | 64.2950 | 26.872 | 3939.5 | 11.260 | 3950.7 | 0.00 | 0.9806 |
| 1.2675407 | 64.1421 | 26.789 | 3917.3 | 11.269 | 3928.6 | 0.00 | 0.9781 |
| 1.2704594 | 64.1962 | 27.255 | 3976.4 | 11.277 | 3987.7 | 0.00 | 0.9759 |
| 1.2706430 | 64.2193 | 27.251 | 3975.2 | 11.277 | 3986.4 | 0.00 | 0.9758 |
| 1.2769962 | 64.5829 | 27.090 | 3932.0 | 11.294 | 3943.3 | 0.00 | 0.9709 |
| 1.2833812 | 64.7727 | 26.930 | 3889.4 | 11.311 | 3900.7 | 0.00 | 0.9661 |
| 1.2897981 | 64.9226 | 26.772 | 3847.3 | 11.327 | 3858.7 | 0.00 | 0.9613 |
| 1.2962471 | 65.0532 | 26.615 | 3805.8 | 11.344 | 3817.1 | 0.00 | 0.9565 |
| 1.3027283 | 65.1720 | 26.460 | 3764.7 | 11.360 | 3776.0 | 0.00 | 0.9517 |
| 1.3092420 | 65.2823 | 26.305 | 3724.1 | 11.376 | 3735.5 | 0.00 | 0.9470 |
| 1.3157882 | 65.3862 | 26.152 | 3684.0 | 11.392 | 3695.4 | 0.00 | 0.9423 |
| 1.3223671 | 65.4849 | 26.000 | 3644.4 | 11.407 | 3655.8 | 0.00 | 0.9376 |
| 1.3289790 | 65.5792 | 25.850 | 3605.3 | 11.423 | 3616.7 | 0.00 | 0.9329 |
| 1.3356239 | 65.6698 | 25.700 | 3566.6 | 11.438 | 3578.1 | 0.00 | 0.9283 |
| 1.3423020 | 65.7569 | 25.552 | 3528.4 | 11.453 | 3539.9 | 0.00 | 0.9237 |
| 1.3490135 | 65.8410 | 25.405 | 3490.6 | 11.468 | 3502.1 | 0.00 | 0.9191 |
| 1.3557586 | 65.9222 | 25.259 | 3453.3 | 11.483 | 3464.8 | 0.00 | 0.9145 |
| 1.3625374 | 66.0009 | 25.115 | 3416.5 | 11.498 | 3428.0 | 0.00 | 0.9100 |
| 1.3693500 | 66.0772 | 24.971 | 3380.1 | 11.512 | 3391.6 | 0.00 | 0.9054 |
| 1.3761968 | 66.1514 | 24.829 | 3344.1 | 11.526 | 3355.6 | 0.00 | 0.9009 |
| 1.3830778 | 66.2234 | 24.688 | 3308.5 | 11.540 | 3320.1 | 0.00 | 0.8964 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ac ($Z=89$) | | | | | | | |
| 1.3899932 | 66.2936 | 24.548 | 3273.4 | 11.554 | 3284.9 | 0.00 | 0.8920 |
| 1.3969431 | 66.3620 | 24.409 | 3238.7 | 11.568 | 3250.2 | 0.00 | 0.8875 |
| 1.4039278 | 66.4287 | 24.271 | 3204.4 | 11.581 | 3215.9 | 0.00 | 0.8831 |
| 1.4109475 | 66.4937 | 24.133 | 3170.3 | 11.594 | 3181.9 | 0.00 | 0.8787 |
| 1.4180022 | 66.5568 | 23.996 | 3136.7 | 11.607 | 3148.3 | 0.00 | 0.8744 |
| 1.4250922 | 66.6182 | 23.861 | 3103.4 | 11.620 | 3115.0 | 0.00 | 0.8700 |
| 1.4322177 | 66.6780 | 23.726 | 3070.5 | 11.633 | 3082.2 | 0.00 | 0.8657 |
| 1.4393788 | 66.7363 | 23.592 | 3038.1 | 11.646 | 3049.7 | 0.00 | 0.8614 |
| 1.4465757 | 66.7930 | 23.459 | 3005.9 | 11.658 | 3017.6 | 0.00 | 0.8571 |
| 1.4538086 | 66.8484 | 23.326 | 2973.9 | 11.670 | 2985.6 | 0.00 | 0.8528 |
| 1.4610776 | 66.9023 | 23.194 | 2942.4 | 11.682 | 2954.0 | 0.00 | 0.8486 |
| 1.4683830 | 66.9549 | 23.062 | 2911.1 | 11.694 | 2922.8 | 0.00 | 0.8444 |
| 1.4757249 | 67.0061 | 22.932 | 2880.3 | 11.705 | 2892.0 | 0.00 | 0.8402 |
| 1.4831035 | 67.0561 | 22.803 | 2849.8 | 11.717 | 2861.5 | 0.00 | 0.8360 |
| 1.4905190 | 67.1049 | 22.674 | 2819.7 | 11.728 | 2831.4 | 0.00 | 0.8318 |
| 1.4979716 | 67.1526 | 22.547 | 2789.9 | 11.739 | 2801.6 | 0.00 | 0.8277 |
| 1.5054615 | 67.1992 | 22.420 | 2760.4 | 11.750 | 2772.1 | 0.00 | 0.8236 |
| 1.5129888 | 67.2442 | 22.293 | 2731.0 | 11.760 | 2742.8 | 0.00 | 0.8195 |
| 1.5205537 | 67.2878 | 22.166 | 2702.0 | 11.771 | 2713.8 | 0.00 | 0.8154 |
| 1.5281565 | 67.3301 | 22.040 | 2673.3 | 11.781 | 2685.1 | 0.00 | 0.8113 |
| 1.5357973 | 67.3711 | 21.915 | 2644.9 | 11.791 | 2656.7 | 0.00 | 0.8073 |
| 1.5434763 | 67.4108 | 21.791 | 2616.9 | 11.801 | 2628.7 | 0.00 | 0.8033 |
| 1.5511937 | 67.4493 | 21.668 | 2589.2 | 11.811 | 2601.0 | 0.00 | 0.7993 |
| 1.5589496 | 67.4865 | 21.546 | 2561.8 | 11.820 | 2573.6 | 0.00 | 0.7953 |
| 1.5667444 | 67.5227 | 21.424 | 2534.6 | 11.829 | 2546.4 | 0.00 | 0.7913 |
| 1.5745781 | 67.5576 | 21.303 | 2507.7 | 11.838 | 2519.5 | 0.00 | 0.7874 |
| 1.5824510 | 67.5914 | 21.182 | 2481.1 | 11.847 | 2492.9 | 0.00 | 0.7835 |
| 1.5903633 | 67.6241 | 21.062 | 2454.8 | 11.856 | 2466.6 | 0.00 | 0.7796 |
| 1.5983151 | 67.6556 | 20.944 | 2428.8 | 11.864 | 2440.7 | 0.00 | 0.7757 |
| 1.6063066 | 67.6860 | 20.826 | 2403.1 | 11.873 | 2415.0 | 0.00 | 0.7719 |
| 1.6143382 | 67.7154 | 20.709 | 2377.7 | 11.881 | 2389.6 | 0.00 | 0.7680 |
| 1.6224099 | 67.7438 | 20.593 | 2352.6 | 11.889 | 2364.5 | 0.00 | 0.7642 |
| 1.6305219 | 67.7712 | 20.477 | 2327.8 | 11.896 | 2339.7 | 0.00 | 0.7604 |
| 1.6386745 | 67.7975 | 20.363 | 2303.3 | 11.904 | 2315.2 | 0.00 | 0.7566 |
| 1.6468679 | 67.8230 | 20.249 | 2279.0 | 11.911 | 2290.9 | 0.00 | 0.7528 |
| 1.6551022 | 67.8474 | 20.136 | 2255.0 | 11.918 | 2267.0 | 0.00 | 0.7491 |
| 1.6633777 | 67.8709 | 20.024 | 2231.3 | 11.925 | 2243.2 | 0.00 | 0.7454 |
| 1.6716946 | 67.8932 | 19.912 | 2207.8 | 11.932 | 2219.8 | 0.00 | 0.7417 |
| 1.6800531 | 67.9146 | 19.802 | 2184.6 | 11.938 | 2196.6 | 0.00 | 0.7380 |
| 1.6884534 | 67.9351 | 19.692 | 2161.7 | 11.945 | 2173.6 | 0.00 | 0.7343 |
| 1.6968956 | 67.9545 | 19.583 | 2139.0 | 11.951 | 2151.0 | 0.00 | 0.7307 |
| 1.7053801 | 67.9730 | 19.474 | 2116.6 | 11.957 | 2128.6 | 0.00 | 0.7270 |
| 1.7139070 | 67.9906 | 19.367 | 2094.4 | 11.963 | 2106.4 | 0.00 | 0.7234 |
| 1.7224766 | 68.0073 | 19.260 | 2072.5 | 11.968 | 2084.5 | 0.00 | 0.7198 |
| 1.7310889 | 68.0230 | 19.154 | 2050.9 | 11.973 | 2062.9 | 0.00 | 0.7162 |
| 1.7397444 | 68.0379 | 19.049 | 2029.5 | 11.978 | 2041.5 | 0.00 | 0.7127 |
| 1.7484431 | 68.0518 | 18.945 | 2008.3 | 11.983 | 2020.3 | 0.00 | 0.7091 |
| 1.7571853 | 68.0649 | 18.841 | 1987.4 | 11.988 | 1999.4 | 0.00 | 0.7056 |
| 1.7659712 | 68.0772 | 18.738 | 1966.7 | 11.993 | 1978.7 | 0.00 | 0.7021 |
| 1.7748011 | 68.0885 | 18.636 | 1946.3 | 11.997 | 1958.3 | 0.00 | 0.6986 |
| 1.7836751 | 68.0990 | 18.535 | 1926.0 | 12.001 | 1938.0 | 0.00 | 0.6951 |
| 1.7925935 | 68.1086 | 18.434 | 1906.1 | 12.005 | 1918.1 | 0.00 | 0.6916 |
| 1.8015565 | 68.1174 | 18.334 | 1886.3 | 12.009 | 1898.3 | 0.00 | 0.6882 |
| 1.8105642 | 68.1254 | 18.235 | 1866.8 | 12.012 | 1878.8 | 0.00 | 0.6848 |
| 1.8196171 | 68.1325 | 18.136 | 1847.4 | 12.016 | 1859.5 | 0.00 | 0.6814 |
| 1.8287151 | 68.1388 | 18.039 | 1828.3 | 12.019 | 1840.4 | 0.00 | 0.6780 |
| 1.8378587 | 68.1443 | 17.942 | 1809.5 | 12.022 | 1821.5 | 0.00 | 0.6746 |
| 1.8470480 | 68.1489 | 17.845 | 1790.8 | 12.024 | 1802.8 | 0.00 | 0.6713 |
| 1.8562833 | 68.1528 | 17.750 | 1772.3 | 12.027 | 1784.4 | 0.00 | 0.6679 |
| 1.8655647 | 68.1558 | 17.655 | 1754.1 | 12.029 | 1766.1 | 0.00 | 0.6646 |
| 1.8748925 | 68.1580 | 17.561 | 1736.0 | 12.031 | 1748.1 | 0.00 | 0.6613 |
| 1.8842670 | 68.1594 | 17.467 | 1718.2 | 12.033 | 1730.2 | 0.00 | 0.6580 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ac ($Z=89$) | | | | | | | |
| 1.8936883 | 68.1599 | 17.374 | 1700.6 | 12.035 | 1712.6 | 0.00 | 0.6547 |
| 1.9031567 | 68.1597 | 17.282 | 1683.1 | 12.036 | 1695.2 | 0.00 | 0.6515 |
| 1.9126725 | 68.1562 | 17.190 | 1665.9 | 12.038 | 1677.9 | 0.00 | 0.6482 |
| 1.9222359 | 68.1544 | 17.100 | 1648.8 | 12.039 | 1660.9 | 0.00 | 0.6450 |
| 1.9318471 | 68.1518 | 17.009 | 1632.0 | 12.040 | 1644.0 | 0.00 | 0.6418 |
| 1.9415063 | 68.1484 | 16.920 | 1615.3 | 12.041 | 1627.4 | 0.00 | 0.6386 |
| 1.9512138 | 68.1441 | 16.831 | 1598.8 | 12.041 | 1610.9 | 0.00 | 0.6354 |
| 1.9609699 | 68.1391 | 16.743 | 1582.5 | 12.041 | 1594.6 | 0.00 | 0.6323 |
| 1.9707747 | 68.1333 | 16.655 | 1566.4 | 12.042 | 1578.5 | 0.00 | 0.6291 |
| 1.9806286 | 68.1266 | 16.568 | 1550.5 | 12.042 | 1562.5 | 0.00 | 0.6260 |
| 1.9905318 | 68.1191 | 16.482 | 1534.7 | 12.041 | 1546.8 | 0.00 | 0.6229 |
| 2.0004844 | 68.1108 | 16.396 | 1519.2 | 12.041 | 1531.2 | 0.00 | 0.6198 |
| 2.0104868 | 68.1016 | 16.311 | 1503.8 | 12.040 | 1515.8 | 0.00 | 0.6167 |
| 2.0205393 | 68.0916 | 16.226 | 1488.5 | 12.039 | 1500.6 | 0.00 | 0.6136 |
| 2.0306420 | 68.0843 | 16.143 | 1473.5 | 12.038 | 1485.5 | 0.00 | 0.6106 |
| 2.0407952 | 68.0728 | 16.059 | 1458.6 | 12.037 | 1470.6 | 0.00 | 0.6075 |
| 2.0509992 | 68.0603 | 15.977 | 1443.8 | 12.036 | 1455.9 | 0.00 | 0.6045 |
| 2.0612542 | 68.0470 | 15.895 | 1429.3 | 12.034 | 1441.3 | 0.00 | 0.6015 |
| 2.0715604 | 68.0329 | 15.813 | 1414.9 | 12.032 | 1426.9 | 0.00 | 0.5985 |
| 2.0819182 | 68.0179 | 15.732 | 1400.6 | 12.030 | 1412.7 | 0.00 | 0.5955 |
| 2.0923278 | 68.0020 | 15.652 | 1386.6 | 12.028 | 1398.6 | 0.00 | 0.5926 |
| 2.1027895 | 67.9852 | 15.572 | 1372.6 | 12.025 | 1384.7 | 0.00 | 0.5896 |
| 2.1133034 | 67.9676 | 15.493 | 1358.9 | 12.023 | 1370.9 | 0.00 | 0.5867 |
| 2.1238699 | 67.9490 | 15.414 | 1345.2 | 12.020 | 1357.3 | 0.00 | 0.5838 |
| 2.1344893 | 67.9296 | 15.336 | 1331.8 | 12.017 | 1343.8 | 0.00 | 0.5809 |
| 2.1451617 | 67.9092 | 15.259 | 1318.5 | 12.014 | 1330.5 | 0.00 | 0.5780 |
| 2.1558875 | 67.8879 | 15.182 | 1305.3 | 12.010 | 1317.3 | 0.00 | 0.5751 |
| 2.1666670 | 67.8721 | 15.105 | 1292.2 | 12.007 | 1304.2 | 0.00 | 0.5722 |
| 2.1775003 | 67.8491 | 15.028 | 1279.3 | 12.003 | 1291.3 | 0.00 | 0.5694 |
| 2.1883878 | 67.8251 | 14.952 | 1266.4 | 11.999 | 1278.4 | 0.00 | 0.5666 |
| 2.1993297 | 67.7999 | 14.877 | 1253.8 | 11.995 | 1265.8 | 0.00 | 0.5637 |
| 2.2103264 | 67.7736 | 14.801 | 1241.2 | 11.990 | 1253.2 | 0.00 | 0.5609 |
| 2.2213780 | 67.7463 | 14.727 | 1228.8 | 11.986 | 1240.8 | 0.00 | 0.5581 |
| 2.2324849 | 67.7178 | 14.653 | 1216.6 | 11.981 | 1228.5 | 0.00 | 0.5554 |
| 2.2436473 | 67.6881 | 14.579 | 1204.4 | 11.976 | 1216.4 | 0.00 | 0.5526 |
| 2.2548656 | 67.6573 | 14.506 | 1192.4 | 11.971 | 1204.4 | 0.00 | 0.5499 |
| 2.2661399 | 67.6253 | 14.434 | 1180.6 | 11.966 | 1192.5 | 0.00 | 0.5471 |
| 2.2774706 | 67.5921 | 14.362 | 1168.8 | 11.960 | 1180.8 | 0.00 | 0.5444 |
| 2.2888579 | 67.5576 | 14.290 | 1157.2 | 11.954 | 1169.2 | 0.00 | 0.5417 |
| 2.3003022 | 67.5219 | 14.219 | 1145.7 | 11.948 | 1157.7 | 0.00 | 0.5390 |
| 2.3118037 | 67.4849 | 14.149 | 1134.4 | 11.942 | 1146.3 | 0.00 | 0.5363 |
| 2.3233628 | 67.4466 | 14.079 | 1123.2 | 11.936 | 1135.1 | 0.00 | 0.5336 |
| 2.3349796 | 67.4070 | 14.009 | 1112.1 | 11.930 | 1124.0 | 0.00 | 0.5310 |
| 2.3466545 | 67.3660 | 13.940 | 1101.1 | 11.923 | 1113.0 | 0.00 | 0.5283 |
| 2.3583878 | 67.3235 | 13.871 | 1090.2 | 11.916 | 1102.1 | 0.00 | 0.5257 |
| 2.3701797 | 67.2797 | 13.803 | 1079.5 | 11.909 | 1091.4 | 0.00 | 0.5231 |
| 2.3820306 | 67.2343 | 13.736 | 1068.8 | 11.902 | 1080.7 | 0.00 | 0.5205 |
| 2.3939407 | 67.1874 | 13.669 | 1058.3 | 11.894 | 1070.2 | 0.00 | 0.5179 |
| 2.4059104 | 67.1390 | 13.602 | 1047.9 | 11.887 | 1059.8 | 0.00 | 0.5153 |
| 2.4179400 | 67.0889 | 13.536 | 1037.6 | 11.879 | 1049.5 | 0.00 | 0.5128 |
| 2.4300297 | 67.0372 | 13.470 | 1027.4 | 11.871 | 1039.3 | 0.00 | 0.5102 |
| 2.4421798 | 66.9838 | 13.405 | 1017.4 | 11.863 | 1029.2 | 0.00 | 0.5077 |
| 2.4543907 | 66.9287 | 13.340 | 1007.4 | 11.855 | 1019.3 | 0.00 | 0.5052 |
| 2.4666627 | 66.8717 | 13.275 | 997.55 | 11.846 | 1009.4 | 0.00 | 0.5026 |
| 2.4789960 | 66.8128 | 13.211 | 987.81 | 11.837 | 999.65 | 0.00 | 0.5001 |
| 2.4913910 | 66.7521 | 13.148 | 978.17 | 11.828 | 990.00 | 0.00 | 0.4977 |
| 2.5038479 | 66.6893 | 13.085 | 968.63 | 11.819 | 980.45 | 0.00 | 0.4952 |
| 2.5163672 | 66.6245 | 13.022 | 959.20 | 11.810 | 971.01 | 0.00 | 0.4927 |
| 2.5289490 | 66.5575 | 12.960 | 949.87 | 11.801 | 961.67 | 0.00 | 0.4903 |
| 2.5415938 | 66.4858 | 12.898 | 940.63 | 11.791 | 952.42 | 0.00 | 0.4878 |
| 2.5543017 | 66.4144 | 12.833 | 931.21 | 11.781 | 943.00 | 0.00 | 0.4854 |
| 2.5670732 | 66.3400 | 12.764 | 921.64 | 11.771 | 933.41 | 0.00 | 0.4830 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ac ($Z=89$) | | | | | | | |
| 2.5799086 | 66.2626 | 12.696 | 912.18 | 11.761 | 923.94 | 0.00 | 0.4806 |
| 2.5928082 | 66.1819 | 12.629 | 902.82 | 11.751 | 914.57 | 0.00 | 0.4782 |
| 2.6057722 | 66.0980 | 12.562 | 893.57 | 11.741 | 905.31 | 0.00 | 0.4758 |
| 2.6188011 | 66.0107 | 12.496 | 884.41 | 11.730 | 896.14 | 0.00 | 0.4734 |
| 2.6318951 | 65.9198 | 12.430 | 875.37 | 11.719 | 887.08 | 0.00 | 0.4711 |
| 2.6450545 | 65.8253 | 12.364 | 866.42 | 11.708 | 878.13 | 0.00 | 0.4687 |
| 2.6582798 | 65.7269 | 12.299 | 857.57 | 11.697 | 869.27 | 0.00 | 0.4664 |
| 2.6715712 | 65.6183 | 12.234 | 848.82 | 11.685 | 860.50 | 0.00 | 0.4641 |
| 2.6849291 | 65.5116 | 12.170 | 840.17 | 11.674 | 851.84 | 0.00 | 0.4618 |
| 2.6983537 | 65.4006 | 12.106 | 831.61 | 11.662 | 843.27 | 0.00 | 0.4595 |
| 2.7118455 | 65.2848 | 12.039 | 822.87 | 11.650 | 834.52 | 0.00 | 0.4572 |
| 2.7254047 | 65.1638 | 11.972 | 814.19 | 11.638 | 825.83 | 0.00 | 0.4549 |
| 2.7390317 | 65.0374 | 11.905 | 805.62 | 11.626 | 817.25 | 0.00 | 0.4527 |
| 2.7527269 | 64.9053 | 11.839 | 797.14 | 11.614 | 808.76 | 0.00 | 0.4504 |
| 2.7664905 | 64.7671 | 11.773 | 788.76 | 11.601 | 800.36 | 0.00 | 0.4482 |
| 2.7803230 | 64.6226 | 11.707 | 780.47 | 11.589 | 792.06 | 0.00 | 0.4459 |
| 2.7942246 | 64.4713 | 11.642 | 772.28 | 11.576 | 783.86 | 0.00 | 0.4437 |
| 2.8081957 | 64.3129 | 11.578 | 764.18 | 11.563 | 775.74 | 0.00 | 0.4415 |
| 2.8222367 | 64.1468 | 11.514 | 756.17 | 11.549 | 767.72 | 0.00 | 0.4393 |
| 2.8363479 | 63.9726 | 11.450 | 748.26 | 11.536 | 759.79 | 0.00 | 0.4371 |
| 2.8505296 | 63.7897 | 11.387 | 740.43 | 11.522 | 751.95 | 0.00 | 0.4350 |
| 2.8647823 | 63.5974 | 11.324 | 732.69 | 11.509 | 744.19 | 0.00 | 0.4328 |
| 2.8791062 | 63.3951 | 11.262 | 725.03 | 11.495 | 736.53 | 0.00 | 0.4306 |
| 2.8935017 | 63.1820 | 11.200 | 717.46 | 11.481 | 728.94 | 0.00 | 0.4285 |
| 2.9079692 | 62.9571 | 11.139 | 709.98 | 11.467 | 721.45 | 0.00 | 0.4264 |
| 2.9225091 | 62.7195 | 11.078 | 702.58 | 11.452 | 714.04 | 0.00 | 0.4242 |
| 2.9371216 | 62.4682 | 11.017 | 695.27 | 11.438 | 706.70 | 0.00 | 0.4221 |
| 2.9518072 | 62.2019 | 10.957 | 688.03 | 11.423 | 699.46 | 0.00 | 0.4200 |
| 2.9665662 | 61.9195 | 10.897 | 680.88 | 11.408 | 692.29 | 0.00 | 0.4179 |
| 2.9813991 | 61.6199 | 10.838 | 673.81 | 11.393 | 685.20 | 0.00 | 0.4159 |
| 2.9963061 | 61.3048 | 10.779 | 666.81 | 11.378 | 678.19 | 0.00 | 0.4138 |
| 3.0112876 | 60.9550 | 10.703 | 658.78 | 11.363 | 670.14 | 0.00 | 0.4117 |
| 3.0263440 | 60.5592 | 10.621 | 650.47 | 11.348 | 661.82 | 0.00 | 0.4097 |
| 3.0414758 | 60.1236 | 10.539 | 642.28 | 11.332 | 653.61 | 0.00 | 0.4076 |
| 3.0566831 | 59.6434 | 10.459 | 634.20 | 11.316 | 645.52 | 0.00 | 0.4056 |
| 3.0719666 | 59.1109 | 10.379 | 626.23 | 11.300 | 637.53 | 0.00 | 0.4036 |
| 3.0873264 | 58.5155 | 10.299 | 618.34 | 11.284 | 629.63 | 0.00 | 0.4016 |
| 3.1027630 | 57.8426 | 10.221 | 610.57 | 11.268 | 621.84 | 0.00 | 0.3996 |
| 3.1182768 | 57.0708 | 10.143 | 602.90 | 11.252 | 614.15 | 0.00 | 0.3976 |
| 3.1338682 | 56.1683 | 10.066 | 595.34 | 11.235 | 606.57 | 0.00 | 0.3956 |
| 3.1495376 | 55.0837 | 9.9892 | 587.87 | 11.219 | 599.09 | 0.00 | 0.3937 |
| 3.1652853 | 53.7253 | 9.9134 | 580.51 | 11.202 | 591.71 | 0.00 | 0.3917 |
| 3.1811117 | 51.9045 | 9.8384 | 573.25 | 11.185 | 584.43 | 0.00 | 0.3898 |
| 3.1970172 | 49.1126 | 9.7640 | 566.09 | 11.168 | 577.25 | 0.00 | 0.3878 |
| 3.2130023 | 42.5973 | 9.6903 | 559.02 | 11.151 | 570.17 | 0.00 | 0.3859 |
| 3.2180698 | 33.3650 | 9.6672 | 556.81 | 11.145 | 567.95 | 0.00 | 0.3853 |
| 3.2199304 | 33.1070 | 25.185 | 1449.7 | 1.1143 | 1460.9 | 0.00 | 0.3851 |
| 3.2290673 | 44.8301 | 25.065 | 1438.8 | 1.1133 | 1449.9 | 0.00 | 0.3840 |
| 3.2452127 | 49.3765 | 24.857 | 1419.7 | 1.1116 | 1430.8 | 0.00 | 0.3821 |
| 3.2614387 | 51.4897 | 24.650 | 1400.9 | 1.1098 | 1412.0 | 0.00 | 0.3802 |
| 3.2777459 | 52.7388 | 24.445 | 1382.3 | 1.1080 | 1393.4 | 0.00 | 0.3783 |
| 3.2941347 | 53.4846 | 24.242 | 1364.0 | 1.1062 | 1375.1 | 0.00 | 0.3764 |
| 3.3106053 | 53.8354 | 24.041 | 1346.0 | 1.1044 | 1357.0 | 0.00 | 0.3745 |
| 3.3271584 | 53.7733 | 23.841 | 1328.2 | 1.1026 | 1339.2 | 0.00 | 0.3726 |
| 3.3437941 | 53.0984 | 23.644 | 1310.6 | 1.1008 | 1321.6 | 0.00 | 0.3708 |
| 3.3605131 | 50.7847 | 23.448 | 1293.3 | 1.0989 | 1304.3 | 0.00 | 0.3689 |
| 3.3691316 | 44.4946 | 23.348 | 1284.5 | 1.0980 | 1295.5 | 0.00 | 0.3680 |
| 3.3712683 | 44.4122 | 32.752 | 1800.7 | 1.0977 | 1811.7 | 0.00 | 0.3678 |
| 3.3773157 | 50.3172 | 32.686 | 1793.9 | 1.0971 | 1804.9 | 0.00 | 0.3671 |
| 3.3942023 | 54.5300 | 32.506 | 1775.1 | 1.0952 | 1786.0 | 0.00 | 0.3653 |
| 3.4111733 | 56.6534 | 32.327 | 1756.5 | 1.0933 | 1767.5 | 0.00 | 0.3635 |
| 3.4282291 | 58.1776 | 32.149 | 1738.2 | 1.0914 | 1749.1 | 0.00 | 0.3617 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ac ($Z=89$) | | | | | | | |
| 3.4453703 | 59.4012 | 31.974 | 1720.1 | 10.895 | 1731.0 | 0.00 | 0.3599 |
| 3.4625971 | 60.4392 | 31.800 | 1702.2 | 10.876 | 1713.1 | 0.00 | 0.3581 |
| 3.4799101 | 61.3498 | 31.627 | 1684.6 | 10.856 | 1695.4 | 0.00 | 0.3563 |
| 3.4973097 | 62.1674 | 31.457 | 1667.2 | 10.837 | 1678.0 | 0.00 | 0.3545 |
| 3.5147962 | 62.9154 | 31.288 | 1650.0 | 10.817 | 1660.8 | 0.00 | 0.3527 |
| 3.5323702 | 63.6126 | 31.120 | 1633.0 | 10.797 | 1643.8 | 0.00 | 0.3510 |
| 3.5500321 | 64.2670 | 30.914 | 1614.1 | 10.777 | 1624.8 | 0.00 | 0.3492 |
| 3.5677822 | 64.8624 | 30.695 | 1594.6 | 10.757 | 1605.4 | 0.00 | 0.3475 |
| 3.5856211 | 65.4084 | 30.473 | 1575.3 | 10.737 | 1586.0 | 0.00 | 0.3458 |
| 3.6035492 | 65.9117 | 30.250 | 1556.0 | 10.717 | 1566.7 | 0.00 | 0.3441 |
| 3.6215670 | 66.3767 | 30.026 | 1536.8 | 10.697 | 1547.4 | 0.00 | 0.3423 |
| 3.6396748 | 66.8065 | 29.801 | 1517.6 | 10.676 | 1528.3 | 0.00 | 0.3406 |
| 3.6578732 | 67.2032 | 29.575 | 1498.7 | 10.655 | 1509.3 | 0.00 | 0.3390 |
| 3.6761626 | 67.5681 | 29.349 | 1479.8 | 10.635 | 1490.4 | 0.00 | 0.3373 |
| 3.6945434 | 67.9020 | 29.122 | 1461.0 | 10.614 | 1471.6 | 0.00 | 0.3356 |
| 3.7130161 | 68.2049 | 28.894 | 1442.4 | 10.593 | 1453.0 | 0.00 | 0.3339 |
| 3.7315812 | 68.4759 | 28.666 | 1423.9 | 10.572 | 1434.5 | 0.00 | 0.3323 |
| 3.7502391 | 68.7134 | 28.438 | 1405.5 | 10.551 | 1416.1 | 0.00 | 0.3306 |
| 3.7689903 | 68.9142 | 28.210 | 1387.3 | 10.529 | 1397.9 | 0.00 | 0.3290 |
| 3.7878352 | 69.0734 | 27.982 | 1369.3 | 10.508 | 1379.8 | 0.00 | 0.3273 |
| 3.8067744 | 69.1825 | 27.754 | 1351.4 | 10.486 | 1361.9 | 0.00 | 0.3257 |
| 3.8258083 | 69.2273 | 27.527 | 1333.6 | 10.465 | 1344.1 | 0.00 | 0.3241 |
| 3.8449373 | 69.1815 | 27.299 | 1316.0 | 10.443 | 1326.5 | 0.00 | 0.3225 |
| 3.8641620 | 68.9886 | 27.073 | 1298.6 | 10.421 | 1309.0 | 0.00 | 0.3209 |
| 3.8834828 | 68.4912 | 26.846 | 1281.3 | 10.399 | 1291.7 | 0.00 | 0.3193 |
| 3.9029002 | 66.7518 | 26.621 | 1264.2 | 10.377 | 1274.6 | 0.00 | 0.3177 |
| 3.9040746 | 66.4653 | 26.607 | 1263.2 | 10.375 | 1273.6 | 0.00 | 0.3176 |
| 3.9139253 | 66.5373 | 30.960 | 1466.2 | 10.364 | 1476.6 | 0.00 | 0.3168 |
| 3.9224147 | 68.0869 | 30.857 | 1458.1 | 10.355 | 1468.5 | 0.00 | 0.3161 |
| 3.9420268 | 69.6429 | 30.620 | 1439.7 | 10.332 | 1450.1 | 0.00 | 0.3145 |
| 3.9617369 | 70.5704 | 30.384 | 1421.5 | 10.310 | 1431.9 | 0.00 | 0.3130 |
| 3.9815456 | 71.2747 | 30.149 | 1403.5 | 10.287 | 1413.8 | 0.00 | 0.3114 |
| 4.0014533 | 71.8600 | 29.915 | 1385.7 | 10.265 | 1396.0 | 0.00 | 0.3098 |
| 4.0214606 | 72.3694 | 29.683 | 1368.1 | 10.242 | 1378.4 | 0.00 | 0.3083 |
| 4.0415679 | 72.8250 | 29.452 | 1350.7 | 10.219 | 1360.9 | 0.00 | 0.3068 |
| 4.0617757 | 73.2399 | 29.222 | 1333.5 | 10.196 | 1343.7 | 0.00 | 0.3052 |
| 4.0820846 | 73.6222 | 28.993 | 1316.5 | 10.173 | 1326.6 | 0.00 | 0.3037 |
| 4.1024950 | 73.9779 | 28.766 | 1299.7 | 10.150 | 1309.8 | 0.00 | 0.3022 |
| 4.1230075 | 74.3107 | 28.538 | 1283.0 | 10.127 | 1293.1 | 0.00 | 0.3007 |
| 4.1436226 | 74.6230 | 28.313 | 1266.5 | 10.104 | 1276.6 | 0.00 | 0.2992 |
| 4.1643407 | 74.9174 | 28.088 | 1250.2 | 10.080 | 1260.3 | 0.00 | 0.2977 |
| 4.1851624 | 75.1960 | 27.865 | 1234.1 | 10.057 | 1244.2 | 0.00 | 0.2962 |
| 4.2060882 | 75.4589 | 27.639 | 1218.0 | 10.033 | 1228.0 | 0.00 | 0.2948 |
| 4.2271186 | 75.7070 | 27.414 | 1202.0 | 10.010 | 1212.1 | 0.00 | 0.2933 |
| 4.2482542 | 75.9412 | 27.190 | 1186.3 | 9.9859 | 1196.3 | 0.00 | 0.2918 |
| 4.2694955 | 76.1625 | 26.969 | 1170.8 | 9.9621 | 1180.8 | 0.00 | 0.2904 |
| 4.2908430 | 76.3714 | 26.749 | 1155.5 | 9.9382 | 1165.4 | 0.00 | 0.2890 |
| 4.3122972 | 76.5684 | 26.530 | 1140.3 | 9.9142 | 1150.3 | 0.00 | 0.2875 |
| 4.3338587 | 76.7539 | 26.314 | 1125.4 | 9.8901 | 1135.3 | 0.00 | 0.2861 |
| 4.3555280 | 76.9280 | 26.099 | 1110.7 | 9.8659 | 1120.6 | 0.00 | 0.2847 |
| 4.3773056 | 77.0909 | 25.887 | 1096.1 | 9.8417 | 1106.0 | 0.00 | 0.2832 |
| 4.3991921 | 77.2429 | 25.678 | 1081.9 | 9.8173 | 1091.7 | 0.00 | 0.2818 |
| 4.4211881 | 77.3842 | 25.472 | 1067.9 | 9.7929 | 1077.7 | 0.00 | 0.2804 |
| 4.4432940 | 77.5143 | 25.267 | 1054.0 | 9.7684 | 1063.8 | 0.00 | 0.2790 |
| 4.4655105 | 77.6325 | 25.065 | 1040.4 | 9.7438 | 1050.1 | 0.00 | 0.2776 |
| 4.4878381 | 77.7375 | 24.864 | 1026.9 | 9.7192 | 1036.6 | 0.00 | 0.2763 |
| 4.5102772 | 77.8276 | 24.664 | 1013.6 | 9.6944 | 1023.3 | 0.00 | 0.2749 |
| 4.5328286 | 77.8997 | 24.467 | 1000.5 | 9.6696 | 1010.1 | 0.00 | 0.2735 |
| 4.5554928 | 77.9492 | 24.271 | 987.53 | 9.6447 | 997.18 | 0.00 | 0.2722 |
| 4.5782702 | 77.9671 | 24.077 | 974.76 | 9.6198 | 984.38 | 0.00 | 0.2708 |
| 4.6011616 | 77.9352 | 23.885 | 962.17 | 9.5947 | 971.76 | 0.00 | 0.2695 |
| 4.6241674 | 77.8034 | 23.694 | 949.74 | 9.5696 | 959.31 | 0.00 | 0.2681 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ac ($Z=89$) | | | | | | | |
| 4.6472882 | 77.3019 | 23.505 | 937.48 | 9.5445 | 947.02 | 0.00 | 0.2668 |
| 4.6489696 | 77.2070 | 23.491 | 936.59 | 9.5426 | 946.14 | 0.00 | 0.2667 |
| 4.6630307 | 77.2566 | 24.902 | 989.83 | 9.5274 | 999.35 | 0.00 | 0.2659 |
| 4.6705247 | 77.6476 | 24.841 | 985.82 | 9.5192 | 995.34 | 0.00 | 0.2655 |
| 4.6938773 | 78.2289 | 24.652 | 973.45 | 9.4939 | 982.94 | 0.00 | 0.2641 |
| 4.7173467 | 78.5728 | 24.464 | 961.24 | 9.4685 | 970.70 | 0.00 | 0.2628 |
| 4.7409334 | 78.8341 | 24.278 | 949.18 | 9.4431 | 958.63 | 0.00 | 0.2615 |
| 4.7646381 | 79.0506 | 24.094 | 937.29 | 9.4176 | 946.71 | 0.00 | 0.2602 |
| 4.7884613 | 79.2369 | 23.911 | 925.55 | 9.3920 | 934.95 | 0.00 | 0.2589 |
| 4.8124036 | 79.4000 | 23.730 | 913.98 | 9.3664 | 923.34 | 0.00 | 0.2576 |
| 4.8364656 | 79.5434 | 23.550 | 902.55 | 9.3407 | 911.89 | 0.00 | 0.2564 |
| 4.8606479 | 79.6681 | 23.373 | 891.28 | 9.3149 | 900.59 | 0.00 | 0.2551 |
| 4.8849512 | 79.7736 | 23.196 | 880.15 | 9.2891 | 889.44 | 0.00 | 0.2538 |
| 4.9093759 | 79.8567 | 23.022 | 869.20 | 9.2632 | 878.46 | 0.00 | 0.2525 |
| 4.9339228 | 79.9097 | 22.849 | 858.39 | 9.2373 | 867.62 | 0.00 | 0.2513 |
| 4.9585924 | 79.9121 | 22.678 | 847.72 | 9.2113 | 856.93 | 0.00 | 0.2500 |
| 4.9833854 | 79.7849 | 22.509 | 837.20 | 9.1852 | 846.38 | 0.00 | 0.2488 |
| 4.9909955 | 79.6615 | 22.457 | 834.00 | 9.1773 | 843.18 | 0.00 | 0.2484 |
| 5.0083023 | 79.5717 | 23.324 | 863.20 | 9.1591 | 872.36 | 0.00 | 0.2476 |
| 5.0130043 | 79.7706 | 23.292 | 861.23 | 9.1542 | 870.38 | 0.00 | 0.2473 |
| 5.0333438 | 80.2020 | 23.157 | 852.77 | 9.1330 | 861.90 | 0.00 | 0.2463 |
| 5.0585105 | 80.5108 | 22.992 | 842.48 | 9.1068 | 851.59 | 0.00 | 0.2451 |
| 5.0838031 | 80.7472 | 22.828 | 832.32 | 9.0805 | 841.40 | 0.00 | 0.2439 |
| 5.1092221 | 80.9486 | 22.664 | 822.20 | 9.0542 | 831.25 | 0.00 | 0.2427 |
| 5.1347682 | 81.1283 | 22.501 | 812.22 | 9.0278 | 821.25 | 0.00 | 0.2415 |
| 5.1604421 | 81.2929 | 22.339 | 802.37 | 9.0014 | 811.37 | 0.00 | 0.2403 |
| 5.1862443 | 81.4461 | 22.178 | 792.64 | 8.9749 | 801.62 | 0.00 | 0.2391 |
| 5.2121755 | 81.5903 | 22.019 | 783.04 | 8.9484 | 791.99 | 0.00 | 0.2379 |
| 5.2382364 | 81.7270 | 21.862 | 773.57 | 8.9219 | 782.49 | 0.00 | 0.2367 |
| 5.2644276 | 81.8575 | 21.705 | 764.20 | 8.8953 | 773.10 | 0.00 | 0.2355 |
| 5.2907497 | 81.9820 | 21.549 | 754.94 | 8.8686 | 763.81 | 0.00 | 0.2343 |
| 5.3172034 | 82.1013 | 21.394 | 745.79 | 8.8419 | 754.63 | 0.00 | 0.2332 |
| 5.3437895 | 82.2159 | 21.241 | 736.76 | 8.8152 | 745.58 | 0.00 | 0.2320 |
| 5.3705084 | 82.3263 | 21.089 | 727.85 | 8.7884 | 736.63 | 0.00 | 0.2309 |
| 5.3973609 | 82.4328 | 20.938 | 719.04 | 8.7616 | 727.80 | 0.00 | 0.2297 |
| 5.4243477 | 82.5357 | 20.788 | 710.35 | 8.7347 | 719.09 | 0.00 | 0.2286 |
| 5.4514695 | 82.6352 | 20.640 | 701.77 | 8.7078 | 710.48 | 0.00 | 0.2274 |
| 5.4787268 | 82.7316 | 20.493 | 693.30 | 8.6809 | 701.98 | 0.00 | 0.2263 |
| 5.5061205 | 82.8251 | 20.347 | 684.93 | 8.6540 | 693.58 | 0.00 | 0.2252 |
| 5.5336511 | 82.9158 | 20.201 | 676.66 | 8.6270 | 685.28 | 0.00 | 0.2241 |
| 5.5613193 | 83.0039 | 20.057 | 668.48 | 8.5999 | 677.08 | 0.00 | 0.2229 |
| 5.5891259 | 83.0894 | 19.914 | 660.40 | 8.5729 | 668.97 | 0.00 | 0.2218 |
| 5.6170716 | 83.1726 | 19.771 | 652.42 | 8.5457 | 660.97 | 0.00 | 0.2207 |
| 5.6451569 | 83.2534 | 19.630 | 644.54 | 8.5186 | 653.06 | 0.00 | 0.2196 |
| 5.6733827 | 83.3321 | 19.490 | 636.76 | 8.4915 | 645.26 | 0.00 | 0.2185 |
| 5.7017496 | 83.4087 | 19.352 | 629.08 | 8.4643 | 637.55 | 0.00 | 0.2174 |
| 5.7302584 | 83.4832 | 19.214 | 621.49 | 8.4370 | 629.93 | 0.00 | 0.2164 |
| 5.7589096 | 83.5559 | 19.077 | 613.99 | 8.4098 | 622.40 | 0.00 | 0.2153 |
| 5.7877042 | 83.6267 | 18.941 | 606.59 | 8.3825 | 614.97 | 0.00 | 0.2142 |
| 5.8166427 | 83.6957 | 18.806 | 599.27 | 8.3552 | 607.63 | 0.00 | 0.2132 |
| 5.8457259 | 83.7631 | 18.672 | 592.05 | 8.3279 | 600.38 | 0.00 | 0.2121 |
| 5.8749546 | 83.8288 | 18.540 | 584.93 | 8.3005 | 593.23 | 0.00 | 0.2110 |
| 5.9043293 | 83.8930 | 18.408 | 577.89 | 8.2732 | 586.16 | 0.00 | 0.2100 |
| 5.9338510 | 83.9557 | 18.278 | 570.94 | 8.2458 | 579.18 | 0.00 | 0.2089 |
| 5.9635202 | 84.0170 | 18.148 | 564.07 | 8.2183 | 572.29 | 0.00 | 0.2079 |
| 5.9933378 | 84.0770 | 18.020 | 557.29 | 8.1909 | 565.49 | 0.00 | 0.2069 |
| 6.0233045 | 84.1358 | 17.893 | 550.60 | 8.1635 | 558.77 | 0.00 | 0.2058 |
| 6.0534210 | 84.1935 | 17.766 | 543.99 | 8.1360 | 552.13 | 0.00 | 0.2048 |
| 6.0836882 | 84.2497 | 17.639 | 537.41 | 8.1085 | 545.52 | 0.00 | 0.2038 |
| 6.1141066 | 84.3044 | 17.513 | 530.91 | 8.0810 | 538.99 | 0.00 | 0.2028 |
| 6.1446771 | 84.3576 | 17.388 | 524.50 | 8.0535 | 532.55 | 0.00 | 0.2018 |
| 6.1754005 | 84.4094 | 17.263 | 518.16 | 8.0259 | 526.18 | 0.00 | 0.2008 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E keV | f_1 $e \text{ atom}^{-1}$ | f_2 $e \text{ atom}^{-1}$ | $[\mu/\rho]$ Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | $[\sigma/\rho]$ Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]$ Total $\text{cm}^2 \text{ g}^{-1}$ | $[\mu/\rho]_{\text{K}}$ K-shell $\text{cm}^2 \text{ g}^{-1}$ | λ nm |
|-------------------------------|--------------------------------|--------------------------------|---|--|---|--|-----------------|
| Ac ($Z=89$) | | | | | | | |
| 6.2062775 | 84.4600 | 17.140 | 511.90 | 7.9984 | 519.90 | 0.00 | 0.1998 |
| 6.2373089 | 84.5093 | 17.018 | 505.72 | 7.9708 | 513.69 | 0.00 | 0.1988 |
| 6.2684954 | 84.5574 | 16.897 | 499.62 | 7.9432 | 507.56 | 0.00 | 0.1978 |
| 6.2998379 | 84.6043 | 16.776 | 493.59 | 7.9156 | 501.50 | 0.00 | 0.1968 |
| 6.3313371 | 84.6502 | 16.657 | 487.63 | 7.8880 | 495.52 | 0.00 | 0.1958 |
| 6.3629938 | 84.6950 | 16.538 | 481.76 | 7.8604 | 489.62 | 0.00 | 0.1949 |
| 6.3948088 | 84.7388 | 16.421 | 475.95 | 7.8328 | 483.78 | 0.00 | 0.1939 |
| 6.4267828 | 84.7816 | 16.304 | 470.22 | 7.8052 | 478.02 | 0.00 | 0.1929 |
| 6.4589167 | 84.9702 | 16.186 | 464.50 | 7.7775 | 472.27 | 0.00 | 0.1920 |
| 6.4912113 | 85.0108 | 16.068 | 458.81 | 7.7499 | 466.56 | 0.00 | 0.1910 |
| 6.5236674 | 85.0501 | 15.951 | 453.20 | 7.7223 | 460.92 | 0.00 | 0.1901 |
| 6.5562857 | 85.0883 | 15.834 | 447.65 | 7.6946 | 455.35 | 0.00 | 0.1891 |
| 6.5890671 | 85.1253 | 15.719 | 442.18 | 7.6670 | 449.84 | 0.00 | 0.1882 |
| 6.6220125 | 85.1611 | 15.604 | 436.77 | 7.6393 | 444.41 | 0.00 | 0.1872 |
| 6.6551225 | 85.1959 | 15.490 | 431.43 | 7.6116 | 439.04 | 0.00 | 0.1863 |
| 6.6883981 | 85.2297 | 15.378 | 426.15 | 7.5840 | 433.74 | 0.00 | 0.1854 |
| 6.7218401 | 85.2626 | 15.266 | 420.95 | 7.5563 | 428.50 | 0.00 | 0.1844 |
| 6.7554493 | 85.4012 | 15.153 | 415.77 | 7.5287 | 423.30 | 0.00 | 0.1835 |
| 6.7892266 | 85.4320 | 15.040 | 410.61 | 7.5010 | 418.11 | 0.00 | 0.1826 |
| 6.8231727 | 85.4616 | 14.928 | 405.52 | 7.4734 | 412.99 | 0.00 | 0.1817 |
| 6.8572886 | 85.4901 | 14.816 | 400.49 | 7.4457 | 407.94 | 0.00 | 0.1808 |
| 6.8915750 | 85.5174 | 14.706 | 395.53 | 7.4181 | 402.95 | 0.00 | 0.1799 |
| 6.9260329 | 85.5437 | 14.597 | 390.63 | 7.3904 | 398.03 | 0.00 | 0.1790 |
| 6.9606631 | 85.5689 | 14.488 | 385.80 | 7.3628 | 393.17 | 0.00 | 0.1781 |
| 6.9954664 | 85.5932 | 14.381 | 381.03 | 7.3352 | 388.37 | 0.00 | 0.1772 |
| 7.0304437 | 85.6165 | 14.274 | 376.33 | 7.3076 | 383.63 | 0.00 | 0.1764 |
| 7.0655959 | 85.6390 | 14.168 | 371.68 | 7.2800 | 378.96 | 0.00 | 0.1755 |
| 7.1009239 | 85.6606 | 14.063 | 367.09 | 7.2523 | 374.35 | 0.00 | 0.1746 |
| 7.1364285 | 85.6813 | 13.960 | 362.57 | 7.2248 | 369.79 | 0.00 | 0.1737 |
| 7.1721107 | 85.7012 | 13.856 | 358.10 | 7.1972 | 365.30 | 0.00 | 0.1729 |
| 7.2079712 | 85.7204 | 13.754 | 353.69 | 7.1696 | 360.86 | 0.00 | 0.1720 |
| 7.2440111 | 85.7388 | 13.653 | 349.34 | 7.1420 | 356.48 | 0.00 | 0.1712 |
| 7.2802311 | 85.7565 | 13.552 | 345.04 | 7.1145 | 352.16 | 0.00 | 0.1703 |
| 7.3166323 | 85.7734 | 13.453 | 340.80 | 7.0870 | 347.89 | 0.00 | 0.1695 |
| 7.3532155 | 85.7897 | 13.354 | 336.62 | 7.0594 | 343.68 | 0.00 | 0.1686 |
| 7.3899815 | 85.8054 | 13.256 | 332.49 | 7.0319 | 339.52 | 0.00 | 0.1678 |
| 7.4269314 | 85.8204 | 13.159 | 328.41 | 7.0045 | 335.41 | 0.00 | 0.1669 |
| 7.4640661 | 85.8347 | 13.063 | 324.39 | 6.9770 | 331.36 | 0.00 | 0.1661 |
| 7.5013864 | 85.8485 | 12.967 | 320.41 | 6.9495 | 327.36 | 0.00 | 0.1653 |
| 7.5388934 | 85.8618 | 12.873 | 316.49 | 6.9221 | 323.41 | 0.00 | 0.1645 |
| 7.5765878 | 85.8744 | 12.779 | 312.62 | 6.8947 | 319.52 | 0.00 | 0.1636 |
| 7.6144708 | 85.8866 | 12.686 | 308.80 | 6.8673 | 315.67 | 0.00 | 0.1628 |
| 7.6525431 | 85.8982 | 12.594 | 305.03 | 6.8399 | 311.87 | 0.00 | 0.1620 |
| 7.6908058 | 85.9094 | 12.502 | 301.31 | 6.8125 | 308.12 | 0.00 | 0.1612 |
| 7.7292599 | 85.9200 | 12.412 | 297.64 | 6.7852 | 304.42 | 0.00 | 0.1604 |
| 7.7679062 | 85.9303 | 12.322 | 294.01 | 6.7579 | 300.77 | 0.00 | 0.1596 |
| 7.8067457 | 85.9401 | 12.232 | 290.43 | 6.7306 | 297.16 | 0.00 | 0.1588 |
| 7.8457794 | 86.0405 | 12.143 | 286.87 | 6.7033 | 293.57 | 0.00 | 0.1580 |
| 7.8850083 | 86.0497 | 12.053 | 283.34 | 6.6761 | 290.02 | 0.00 | 0.1572 |
| 7.9244334 | 86.0582 | 11.965 | 279.86 | 6.6489 | 286.51 | 0.00 | 0.1565 |
| 7.9640555 | 86.0662 | 11.877 | 276.42 | 6.6217 | 283.04 | 0.00 | 0.1557 |
| 8.0038758 | 86.0737 | 11.790 | 273.03 | 6.5945 | 279.62 | 0.00 | 0.1549 |
| 8.0438952 | 86.0807 | 11.703 | 269.68 | 6.5674 | 276.25 | 0.00 | 0.1541 |
| 8.0841147 | 86.0873 | 11.618 | 266.37 | 6.5403 | 272.91 | 0.00 | 0.1534 |
| 8.1245352 | 86.0934 | 11.533 | 263.11 | 6.5132 | 269.63 | 0.00 | 0.1526 |
| 8.1651579 | 86.0991 | 11.449 | 259.89 | 6.4861 | 266.38 | 0.00 | 0.1518 |
| 8.2059837 | 86.1044 | 11.365 | 256.72 | 6.4591 | 263.17 | 0.00 | 0.1511 |
| 8.2470136 | 86.1094 | 11.283 | 253.58 | 6.4321 | 260.01 | 0.00 | 0.1503 |
| 8.2882487 | 86.1140 | 11.201 | 250.48 | 6.4052 | 256.89 | 0.00 | 0.1496 |
| 8.3296899 | 86.1183 | 11.119 | 247.43 | 6.3782 | 253.81 | 0.00 | 0.1488 |
| 8.3713384 | 86.1224 | 11.039 | 244.41 | 6.3514 | 250.76 | 0.00 | 0.1481 |
| 8.4131951 | 86.1262 | 10.959 | 241.43 | 6.3245 | 247.76 | 0.00 | 0.1474 |

TABLE 5. Form factors, attenuation, and scattering cross-sections, $Z=75-89$, from $E=0.5$ keV to $E=8.54$ keV—Continued

| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
|-------------------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| Ac ($Z=89$) | | | | | | | |
| 8.4552610 | 86.1299 | 10.879 | 238.50 | 6.2977 | 244.79 | 0.00 | 0.1466 |
| 8.4975373 | 86.1334 | 10.801 | 235.59 | 6.2709 | 241.87 | 0.00 | 0.1459 |
| 8.5400250 | 86.1368 | 10.723 | 232.73 | 6.2441 | 238.98 | 0.00 | 0.1452 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV

| Zn (Z=30) | | | | | | | |
|------------------|-----------------------|------------------------|---|---|---------------------------------------|---|-----------|
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 9.32432 | 10.841 | 69774 | 0.26557 | 69774 | 0.00 | 12.40 |
| 0.15000000 | 13.6745 | 11.501 | 49350 | 0.62563 | 49351 | 0.00 | 8.266 |
| 0.20000000 | 16.8473 | 9.9827 | 32126 | 1.0424 | 32127 | 0.00 | 6.199 |
| 0.30000000 | 19.5114 | 7.7217 | 16566 | 1.8774 | 16568 | 0.00 | 4.133 |
| 0.40000000 | 20.6104 | 6.1313 | 9865.7 | 2.6072 | 9868.3 | 0.00 | 3.100 |
| 0.50000000 | 20.9491 | 4.9420 | 6361.5 | 3.2030 | 6364.7 | 0.00 | 2.480 |
| 0.60000000 | 20.8162 | 4.0674 | 4363.1 | 3.6753 | 4366.8 | 0.00 | 2.066 |
| 0.80000000 | 19.3170 | 2.9321 | 2358.9 | 4.3251 | 2363.3 | 0.00 | 1.550 |
| 1.0000000 | 10.8593 | 2.2609 | 1455.2 | 4.6957 | 1459.9 | 0.00 | 1.240 |
| 1.5000000 | 27.2096 | 10.949 | 4697.9 | 4.9633 | 4702.9 | 0.00 | 0.8266 |
| 2.0000000 | 29.3950 | 7.1631 | 2305.2 | 4.8143 | 2310.0 | 0.00 | 0.6199 |
| 3.0000000 | 30.1358 | 3.7644 | 807.61 | 4.2056 | 811.82 | 0.00 | 0.4133 |
| 4.0000000 | 29.9005 | 2.2903 | 368.52 | 3.5931 | 372.12 | 0.00 | 0.3100 |
| 5.0000000 | 29.6026 | 1.5575 | 200.48 | 3.0767 | 203.56 | 0.00 | 0.2480 |
| 6.0000000 | 29.3037 | 1.1237 | 120.54 | 2.6556 | 123.19 | 0.00 | 0.2066 |
| 8.0000000 | 28.5661 | 0.6784 | 54.580 | 2.0319 | 56.612 | 0.00 | 0.1550 |
| 10.000000 | 27.4778 | 3.6295 | 233.61 | 1.6049 | 235.21 | 204.6 | 0.1240 |
| Ga (Z=31) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 7.47244 | 11.584 | 69915 | 0.26225 | 69915 | 0.00 | 12.40 |
| 0.15000000 | 12.9557 | 12.112 | 48737 | 0.61551 | 48738 | 0.00 | 8.266 |
| 0.20000000 | 16.3338 | 11.577 | 34938 | 1.0238 | 34939 | 0.00 | 6.199 |
| 0.30000000 | 19.9773 | 9.5919 | 19298 | 1.8419 | 19299 | 0.00 | 4.133 |
| 0.40000000 | 21.7811 | 7.5513 | 11394 | 2.5578 | 11397 | 0.00 | 3.100 |
| 0.50000000 | 22.3788 | 5.9817 | 7220.6 | 3.1437 | 7223.8 | 0.00 | 2.480 |
| 0.60000000 | 22.4243 | 4.8635 | 4892.3 | 3.6094 | 4895.9 | 0.00 | 2.066 |
| 0.80000000 | 21.5127 | 3.4448 | 2598.9 | 4.2535 | 2603.2 | 0.00 | 1.550 |
| 1.0000000 | 18.5050 | 2.6222 | 1582.7 | 4.6245 | 1587.3 | 0.00 | 1.240 |
| 1.5000000 | 26.8794 | 12.354 | 4971.1 | 4.9041 | 4976.0 | 0.00 | 0.8266 |
| 2.0000000 | 30.0568 | 8.0703 | 2435.5 | 4.7702 | 2440.2 | 0.00 | 0.6199 |
| 3.0000000 | 31.1938 | 4.2799 | 861.07 | 4.1859 | 865.25 | 0.00 | 0.4133 |
| 4.0000000 | 31.0089 | 2.5988 | 392.14 | 3.5889 | 395.73 | 0.00 | 0.3100 |
| 5.0000000 | 30.7215 | 1.7810 | 214.99 | 3.0819 | 218.07 | 0.00 | 0.2480 |
| 6.0000000 | 30.4470 | 1.2913 | 129.89 | 2.6666 | 132.56 | 0.00 | 0.2066 |
| 8.0000000 | 29.8376 | 0.77799 | 58.695 | 2.0484 | 60.744 | 0.00 | 0.1550 |
| 10.000000 | 28.1941 | 0.51547 | 31.112 | 1.6230 | 32.735 | 0.00 | 0.1240 |
| Ge (Z=32) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| KeV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-11}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 5.56668 | 11.101 | 64355 | 0.27300 | 64355 | 0.00 | 12.40 |
| 0.15000000 | 11.5725 | 13.556 | 52391 | 0.63529 | 52392 | 0.00 | 8.266 |
| 0.20000000 | 15.8968 | 13.338 | 38661 | 1.0516 | 38663 | 0.00 | 6.199 |
| 0.30000000 | 20.6016 | 10.700 | 20676 | 1.8821 | 20678 | 0.00 | 4.133 |
| 0.40000000 | 22.5148 | 8.5497 | 12391 | 2.6067 | 12393 | 0.00 | 3.100 |
| 0.50000000 | 23.3818 | 6.9944 | 8109.3 | 3.1991 | 8112.5 | 0.00 | 2.480 |
| 0.60000000 | 23.7275 | 5.7345 | 5540.5 | 3.6698 | 5544.2 | 0.00 | 2.066 |
| 0.80000000 | 23.2689 | 4.0176 | 2911.2 | 4.3213 | 2915.5 | 0.00 | 1.550 |
| 1.0000000 | 21.5347 | 3.0303 | 1756.6 | 4.6975 | 1761.3 | 0.00 | 1.240 |
| 1.5000000 | 25.6785 | 13.859 | 5355.9 | 4.9848 | 5360.9 | 0.00 | 0.8266 |
| 2.0000000 | 30.5604 | 9.0604 | 2626.1 | 4.8542 | 2631.0 | 0.00 | 0.6199 |
| 3.0000000 | 32.2095 | 4.8458 | 936.36 | 4.2698 | 940.63 | 0.00 | 0.4133 |
| 4.0000000 | 32.0974 | 2.9390 | 425.94 | 3.6687 | 429.61 | 0.00 | 0.3100 |
| 5.0000000 | 31.8217 | 2.0164 | 233.78 | 3.1566 | 236.94 | 0.00 | 0.2480 |
| 6.0000000 | 31.5680 | 1.4758 | 142.59 | 2.7359 | 145.32 | 0.00 | 0.2066 |
| 8.0000000 | 31.0387 | 0.88864 | 64.393 | 2.1077 | 66.501 | 0.00 | 0.1550 |
| 10.000000 | 30.1536 | 0.58830 | 34.103 | 1.6739 | 35.777 | 0.00 | 0.1240 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| As (Z=33) | | | | | | | |
|------------------|-----------------------|------------------------|---|---|---------------------------------------|---|-----------|
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]$ | λ |
| KeV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 4.11589 | 10.136 | 56930 | 0.28948 | 56930 | 0.00 | 12.40 |
| 0.15000000 | 9.72111 | 14.147 | 52972 | 0.66700 | 52973 | 0.00 | 8.266 |
| 0.20000000 | 14.6205 | 14.321 | 40217 | 1.0977 | 40218 | 0.00 | 6.199 |
| 0.30000000 | 20.9989 | 12.312 | 23051 | 1.9519 | 23053 | 0.00 | 4.133 |
| 0.40000000 | 23.4734 | 9.7308 | 13663 | 2.6939 | 13666 | 0.00 | 3.100 |
| 0.50000000 | 24.5138 | 7.8377 | 8804.2 | 3.2989 | 8807.5 | 0.00 | 2.480 |
| 0.60000000 | 24.9264 | 6.4683 | 6055.0 | 3.7789 | 6058.7 | 0.00 | 2.066 |
| 0.80000000 | 24.8430 | 4.6484 | 3263.5 | 4.4426 | 3268.0 | 0.00 | 1.550 |
| 1.00000000 | 23.8824 | 3.4846 | 1957.1 | 4.8255 | 1962.0 | 0.00 | 1.240 |
| 1.50000000 | 23.2350 | 13.566 | 5079.6 | 5.1183 | 5084.8 | 0.00 | 0.8266 |
| 2.00000000 | 30.8680 | 10.134 | 2845.8 | 4.9860 | 2850.8 | 0.00 | 0.6199 |
| 3.00000000 | 33.1061 | 5.4571 | 1021.7 | 4.3916 | 1026.1 | 0.00 | 0.4133 |
| 4.00000000 | 33.1744 | 3.3091 | 464.64 | 3.7790 | 468.42 | 0.00 | 0.3100 |
| 5.00000000 | 32.9186 | 2.2669 | 254.64 | 3.2560 | 257.90 | 0.00 | 0.2480 |
| 6.00000000 | 32.6766 | 1.6709 | 156.41 | 2.8256 | 159.24 | 0.00 | 0.2066 |
| 8.00000000 | 32.2023 | 1.0099 | 70.901 | 2.1817 | 73.083 | 0.00 | 0.1550 |
| 10.000000 | 31.5674 | 0.66829 | 37.535 | 1.7360 | 39.271 | 0.00 | 0.1240 |
| Se (Z=34) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]$ K | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{m-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 2.35804 | 8.2165 | 43789 | 0.29855 | 43789 | 0.00 | 12.40 |
| 0.15000000 | 8.14103 | 13.898 | 49377 | 0.68269 | 49378 | 0.00 | 8.266 |
| 0.20000000 | 13.6957 | 15.565 | 41476 | 1.1186 | 41477 | 0.00 | 6.199 |
| 0.30000000 | 20.9241 | 14.008 | 24885 | 1.9790 | 24887 | 0.00 | 4.133 |
| 0.40000000 | 24.1646 | 11.173 | 14887 | 2.7239 | 14889 | 0.00 | 3.100 |
| 0.50000000 | 25.5647 | 8.9777 | 9569.0 | 3.3301 | 9572.3 | 0.00 | 2.480 |
| 0.60000000 | 26.1582 | 7.3687 | 6545.1 | 3.8104 | 6548.9 | 0.00 | 2.066 |
| 0.80000000 | 26.2879 | 5.2615 | 3505.1 | 4.4739 | 3509.5 | 0.00 | 1.550 |
| 1.00000000 | 25.6507 | 3.9971 | 2130.2 | 4.8565 | 2135.0 | 0.00 | 1.240 |
| 1.50000000 | 18.7628 | 15.242 | 5415.4 | 5.1491 | 5420.6 | 0.00 | 0.8266 |
| 2.00000000 | 30.8719 | 11.299 | 3010.8 | 5.0172 | 3015.8 | 0.00 | 0.6199 |
| 3.00000000 | 34.0206 | 6.1261 | 1088.3 | 4.4234 | 1092.7 | 0.00 | 0.4133 |
| 4.00000000 | 34.2318 | 3.7216 | 495.85 | 3.8105 | 499.66 | 0.00 | 0.3100 |
| 5.00000000 | 34.0098 | 2.5453 | 271.29 | 3.2865 | 274.58 | 0.00 | 0.2480 |
| 6.00000000 | 33.7739 | 1.8791 | 166.91 | 2.8548 | 169.76 | 0.00 | 0.2066 |
| 8.00000000 | 33.3408 | 1.1440 | 76.211 | 2.2079 | 78.419 | 0.00 | 0.1550 |
| 10.000000 | 32.8321 | 0.75675 | 40.330 | 1.7593 | 42.089 | 0.00 | 0.1240 |
| Br (Z=35) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]$ K | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 1.61266 | 5.3358 | 28100 | 0.31668 | 28101 | 0.00 | 12.40 |
| 0.15000000 | 6.03262 | 13.889 | 48761 | 0.72104 | 48762 | 0.00 | 8.266 |
| 0.20000000 | 12.0822 | 16.803 | 44246 | 1.1785 | 44247 | 0.00 | 6.199 |
| 0.30000000 | 20.5827 | 15.628 | 27435 | 2.0795 | 27437 | 0.00 | 4.133 |
| 0.40000000 | 24.6054 | 12.629 | 16627 | 2.8582 | 16630 | 0.00 | 3.100 |
| 0.50000000 | 26.3840 | 10.192 | 10735 | 3.4915 | 10738 | 0.00 | 2.480 |
| 0.60000000 | 27.1989 | 8.3763 | 7352.1 | 3.9931 | 7356.1 | 0.00 | 2.066 |
| 0.80000000 | 27.5793 | 5.9863 | 3940.7 | 4.6859 | 3945.4 | 0.00 | 1.550 |
| 1.00000000 | 27.1767 | 4.5415 | 2391.7 | 5.0857 | 2396.8 | 0.00 | 1.240 |
| 1.50000000 | 19.9380 | 2.4147 | 847.77 | 5.3927 | 853.16 | 0.00 | 0.8266 |
| 2.00000000 | 30.4618 | 12.546 | 3303.6 | 5.2565 | 3308.8 | 0.00 | 0.6199 |
| 3.00000000 | 34.6621 | 6.8348 | 1199.8 | 4.6386 | 1204.4 | 0.00 | 0.4133 |
| 4.00000000 | 35.2769 | 4.1804 | 5503.8 | 3.9993 | 554.38 | 0.00 | 0.3100 |
| 5.00000000 | 35.1007 | 2.8519 | 300.38 | 3.4520 | 303.83 | 0.00 | 0.2480 |
| 6.00000000 | 34.8736 | 2.0996 | 184.29 | 3.0006 | 187.29 | 0.00 | 0.2066 |
| 8.00000000 | 34.4660 | 1.2898 | 84.907 | 2.3234 | 87.230 | 0.00 | 0.1550 |
| 10.000000 | 34.0305 | 0.85296 | 44.920 | 1.8531 | 46.773 | 0.00 | 0.1240 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| Kr (Z=36) | | | | | | | |
|------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 4.00284 | 1.2812 | 6433.4 | 0.32026 | 6433.7 | 0.00 | 12.40 |
| 0.15000000 | 2.97977 | 11.454 | 38344 | 0.72828 | 38345 | 0.00 | 8.266 |
| 0.20000000 | 9.55984 | 16.342 | 41031 | 1.1896 | 41032 | 0.00 | 6.199 |
| 0.30000000 | 19.4763 | 17.425 | 29166 | 2.0980 | 29168 | 0.00 | 4.133 |
| 0.40000000 | 24.7319 | 14.334 | 17995 | 2.8832 | 17998 | 0.00 | 3.100 |
| 0.50000000 | 27.0642 | 11.645 | 11695 | 3.5220 | 11699 | 0.00 | 2.480 |
| 0.60000000 | 28.1729 | 9.5903 | 8026.3 | 4.0283 | 8030.4 | 0.00 | 2.066 |
| 0.80000000 | 28.8741 | 6.8504 | 4299.9 | 4.7284 | 4304.6 | 0.00 | 1.550 |
| 1.00000000 | 28.8169 | 5.1851 | 2603.7 | 5.1332 | 2608.9 | 0.00 | 1.240 |
| 1.50000000 | 25.0054 | 2.7777 | 929.89 | 5.4467 | 935.34 | 0.00 | 0.8266 |
| 2.00000000 | 29.1212 | 13.950 | 3502.6 | 5.3124 | 3507.9 | 0.00 | 0.6199 |
| 3.00000000 | 35.4034 | 7.6196 | 1275.4 | 4.6924 | 1280.1 | 0.00 | 0.4133 |
| 4.00000000 | 36.3023 | 4.7106 | 591.35 | 4.0488 | 595.40 | 0.00 | 0.3100 |
| 5.00000000 | 36.1935 | 3.1995 | 321.33 | 3.4970 | 324.82 | 0.00 | 0.2480 |
| 6.00000000 | 35.9791 | 2.3473 | 196.45 | 3.0413 | 199.49 | 0.00 | 0.2066 |
| 8.00000000 | 35.5814 | 1.4474 | 90.851 | 2.3569 | 93.208 | 0.00 | 0.1550 |
| 10.000000 | 35.1961 | 0.95897 | 48.155 | 1.8811 | 50.036 | 0.00 | 0.1240 |
| Nd (Z=60) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 20.9142 | 4.1569 | 12127 | 0.40755 | 12128 | 0.00 | 12.40 |
| 0.15000000 | 28.3001 | 5.2838 | 10277 | 0.95137 | 10278 | 0.00 | 8.266 |
| 0.20000000 | 26.0813 | 4.0230 | 5868.3 | 1.5851 | 5869.8 | 0.00 | 6.199 |
| 0.30000000 | 25.3555 | 6.4017 | 6225.4 | 2.8784 | 6228.3 | 0.00 | 4.133 |
| 0.40000000 | 26.8865 | 8.4111 | 6134.6 | 4.0418 | 6138.6 | 0.00 | 3.100 |
| 0.50000000 | 28.4079 | 8.9025 | 5194.4 | 5.0221 | 5199.4 | 0.00 | 2.480 |
| 0.60000000 | 29.1353 | 8.6132 | 4188.0 | 5.8257 | 4193.8 | 0.00 | 2.066 |
| 0.80000000 | 26.8382 | 7.4239 | 2707.3 | 6.9935 | 2714.3 | 0.00 | 1.550 |
| 1.00000000 | -3.55726 | 37.876 | 11050 | 7.7267 | 11058 | 0.00 | 1.240 |
| 1.50000000 | 46.1894 | 26.121 | 5080.3 | 8.4645 | 5088.7 | 0.00 | 0.8266 |
| 2.00000000 | 53.4496 | 19.050 | 2778.9 | 8.4433 | 2787.3 | 0.00 | 0.6199 |
| 3.00000000 | 56.2655 | 10.936 | 1063.5 | 7.6939 | 1071.1 | 0.00 | 0.4133 |
| 4.00000000 | 55.8375 | 6.9551 | 507.27 | 6.7831 | 514.05 | 0.00 | 0.3100 |
| 5.00000000 | 54.3689 | 4.8727 | 284.31 | 5.9546 | 290.27 | 0.00 | 0.2480 |
| 6.00000000 | 50.2293 | 3.6754 | 178.71 | 5.2463 | 183.96 | 0.00 | 0.2066 |
| 8.00000000 | 57.1035 | 10.987 | 400.68 | 4.1468 | 404.83 | 0.00 | 0.1550 |
| 10.000000 | 59.6459 | 7.6481 | 223.12 | 3.3584 | 226.48 | 0.00 | 0.1240 |
| Pm (Z=61) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 21.0426 | 5.6661 | 16444 | 0.42706 | 16444 | 0.00 | 12.40 |
| 0.15000000 | 28.5314 | 6.9390 | 13425 | 0.99300 | 13426 | 0.00 | 8.266 |
| 0.20000000 | 26.8080 | 5.2201 | 7574.7 | 1.6506 | 7576.3 | 0.00 | 6.199 |
| 0.30000000 | 26.2430 | 7.1186 | 6886.2 | 2.9893 | 6889.2 | 0.00 | 4.133 |
| 0.40000000 | 27.7123 | 8.9354 | 6482.9 | 4.1913 | 6487.1 | 0.00 | 3.100 |
| 0.50000000 | 29.3489 | 9.3903 | 5450.3 | 5.2031 | 5455.5 | 0.00 | 2.480 |
| 0.60000000 | 30.2823 | 9.0946 | 4398.9 | 6.0319 | 4404.9 | 0.00 | 2.066 |
| 0.80000000 | 28.9796 | 7.8640 | 2852.7 | 7.2357 | 2860.0 | 0.00 | 1.550 |
| 1.00000000 | 14.5672 | 6.7565 | 1960.8 | 7.9911 | 1968.8 | 0.00 | 1.240 |
| 1.50000000 | 44.9164 | 27.823 | 5382.9 | 8.7513 | 5391.7 | 0.00 | 0.8266 |
| 2.00000000 | 53.3444 | 20.366 | 2955.1 | 8.7297 | 2963.9 | 0.00 | 0.6199 |
| 3.00000000 | 57.2515 | 11.678 | 1129.7 | 7.9582 | 1137.6 | 0.00 | 0.4133 |
| 4.00000000 | 57.0107 | 7.4101 | 537.62 | 7.0196 | 544.64 | 0.00 | 0.3100 |
| 5.00000000 | 55.7889 | 5.2345 | 303.82 | 6.1653 | 309.98 | 0.00 | 0.2480 |
| 6.00000000 | 53.0526 | 3.9485 | 190.98 | 5.4345 | 196.42 | 0.00 | 0.2066 |
| 8.00000000 | 57.1763 | 11.655 | 422.79 | 4.2993 | 427.09 | 0.00 | 0.1550 |
| 10.000000 | 60.4227 | 8.1407 | 236.25 | 3.4845 | 239.74 | 0.00 | 0.1240 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| Sm (Z=62) | | | | | | | |
|------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 20.5652 | 7.2460 | 20279 | 0.43263 | 20279 | 0.00 | 12.40 |
| 0.15000000 | 29.2917 | 10.125 | 18891 | 1.0024 | 18892 | 0.00 | 8.266 |
| 0.20000000 | 27.7375 | 6.8056 | 9523.2 | 1.6629 | 9524.9 | 0.00 | 6.199 |
| 0.30000000 | 27.3215 | 7.9384 | 7405.5 | 3.0046 | 7408.5 | 0.00 | 4.133 |
| 0.40000000 | 28.6563 | 9.4707 | 6626.3 | 4.2074 | 6630.5 | 0.00 | 3.100 |
| 0.50000000 | 30.3551 | 9.9061 | 5544.7 | 5.2191 | 5549.9 | 0.00 | 2.480 |
| 0.60000000 | 31.4883 | 9.6462 | 4499.4 | 6.0473 | 4505.4 | 0.00 | 2.066 |
| 0.80000000 | 31.0439 | 8.3718 | 2928.7 | 7.2500 | 2936.0 | 0.00 | 1.550 |
| 1.00000000 | 23.7236 | 7.1936 | 2013.2 | 8.0047 | 2021.2 | 0.00 | 1.240 |
| 1.50000000 | 44.1229 | 27.946 | 5214.0 | 8.7649 | 5222.7 | 0.00 | 0.8266 |
| 2.00000000 | 53.5948 | 21.576 | 3019.2 | 8.7446 | 3027.9 | 0.00 | 0.6199 |
| 3.00000000 | 58.2819 | 12.465 | 1162.8 | 7.9759 | 1170.8 | 0.00 | 0.4133 |
| 4.00000000 | 58.1896 | 7.9011 | 552.81 | 7.0393 | 559.85 | 0.00 | 0.3100 |
| 5.00000000 | 57.1361 | 5.6015 | 313.53 | 6.1860 | 319.72 | 0.00 | 0.2480 |
| 6.00000000 | 55.0626 | 4.2215 | 196.91 | 5.4555 | 202.36 | 0.00 | 0.2066 |
| 8.00000000 | 56.8218 | 12.341 | 431.71 | 4.3197 | 436.03 | 0.00 | 0.1550 |
| 10.00000000 | 61.1400 | 8.6579 | 242.30 | 3.5037 | 245.81 | 0.00 | 0.1240 |
| Eu (Z=63) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 23.5129 | 5.5787 | 15448 | 0.44771 | 15449 | 0.00 | 12.40 |
| 0.15000000 | 30.5789 | 9.6744 | 17860 | 1.0346 | 17861 | 0.00 | 8.266 |
| 0.20000000 | 28.5787 | 5.7177 | 7916.6 | 1.7137 | 7918.3 | 0.00 | 6.199 |
| 0.30000000 | 27.6940 | 7.2976 | 6736.1 | 3.0912 | 6739.2 | 0.00 | 4.133 |
| 0.40000000 | 28.9860 | 9.1487 | 6333.6 | 4.3249 | 6337.9 | 0.00 | 3.100 |
| 0.50000000 | 30.8150 | 9.8505 | 5455.5 | 5.3621 | 5460.9 | 0.00 | 2.480 |
| 0.60000000 | 32.1535 | 9.7831 | 4515.2 | 6.2111 | 4521.4 | 0.00 | 2.066 |
| 0.80000000 | 32.4050 | 8.6704 | 3001.2 | 7.4440 | 3008.7 | 0.00 | 1.550 |
| 1.00000000 | 28.0502 | 7.5312 | 2085.5 | 8.2181 | 2093.7 | 0.00 | 1.240 |
| 1.50000000 | 41.9962 | 30.068 | 5550.9 | 8.9996 | 5559.9 | 0.00 | 0.8266 |
| 2.00000000 | 53.6547 | 22.785 | 3154.7 | 8.9814 | 3163.7 | 0.00 | 0.6199 |
| 3.00000000 | 59.1865 | 13.265 | 1224.4 | 8.1974 | 1232.6 | 0.00 | 0.4133 |
| 4.00000000 | 59.3212 | 8.4091 | 582.15 | 7.2394 | 589.39 | 0.00 | 0.3100 |
| 5.00000000 | 58.4092 | 5.9802 | 331.20 | 6.3655 | 337.57 | 0.00 | 0.2480 |
| 6.00000000 | 56.7484 | 4.4994 | 207.66 | 5.6167 | 213.28 | 0.00 | 0.2066 |
| 8.00000000 | 55.6318 | 11.312 | 391.55 | 4.4513 | 396.00 | 0.00 | 0.1550 |
| 10.00000000 | 61.7863 | 9.1917 | 254.53 | 3.6132 | 258.15 | 0.00 | 0.1240 |
| Gd (Z=64) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 20.0918 | 7.6231 | 20400 | 0.46011 | 20400 | 0.00 | 12.40 |
| 0.15000000 | 24.8640 | 14.583 | 26016 | 1.0544 | 26017 | 0.00 | 8.266 |
| 0.20000000 | 27.6514 | 10.415 | 13936 | 1.7376 | 13937 | 0.00 | 6.199 |
| 0.30000000 | 28.6497 | 10.380 | 9259.4 | 3.1161 | 9262.5 | 0.00 | 4.133 |
| 0.40000000 | 30.4903 | 11.163 | 7467.8 | 4.3453 | 7472.2 | 0.00 | 3.100 |
| 0.50000000 | 32.5006 | 11.270 | 6031.8 | 5.3758 | 6037.2 | 0.00 | 2.480 |
| 0.60000000 | 33.9233 | 10.887 | 4855.8 | 6.2177 | 4862.0 | 0.00 | 2.066 |
| 0.80000000 | 34.5904 | 9.4424 | 3158.5 | 7.4379 | 3165.9 | 0.00 | 1.550 |
| 1.00000000 | 31.7764 | 8.1146 | 2171.5 | 8.2023 | 2179.7 | 0.00 | 1.240 |
| 1.50000000 | 42.1682 | 27.396 | 4887.4 | 8.9713 | 4896.4 | 0.00 | 0.8266 |
| 2.00000000 | 53.5843 | 24.017 | 3213.4 | 8.9502 | 3222.4 | 0.00 | 0.6199 |
| 3.00000000 | 59.9289 | 14.082 | 1256.1 | 8.1706 | 1264.3 | 0.00 | 0.4133 |
| 4.00000000 | 60.4442 | 8.9432 | 598.30 | 7.2197 | 605.52 | 0.00 | 0.3100 |
| 5.00000000 | 59.6524 | 6.3601 | 340.39 | 6.3523 | 346.75 | 0.00 | 0.2480 |
| 6.00000000 | 58.2826 | 4.7919 | 213.72 | 5.6087 | 219.33 | 0.00 | 0.2066 |
| 8.00000000 | 54.9306 | 12.047 | 402.98 | 4.4504 | 407.43 | 0.00 | 0.1550 |
| 10.00000000 | 62.3533 | 9.7474 | 260.84 | 3.6163 | 264.46 | 0.00 | 0.1240 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| Tb (Z=65) | | | | | | | |
|------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 19.0901 | 8.3031 | 21985 | 0.46374 | 21986 | 0.00 | 12.40 |
| 0.15000000 | 20.6116 | 23.444 | 41384 | 1.0677 | 41385 | 0.00 | 8.266 |
| 0.20000000 | 28.5249 | 11.852 | 15691 | 1.7650 | 15693 | 0.00 | 6.199 |
| 0.30000000 | 29.3110 | 10.764 | 9500.0 | 3.1773 | 9503.2 | 0.00 | 4.133 |
| 0.40000000 | 30.7329 | 11.619 | 7691.3 | 4.4412 | 7695.8 | 0.00 | 3.100 |
| 0.40585798 | 31.0557 | 11.636 | 7591.4 | 4.5091 | 7595.9 | 0.00 | 3.055 |
| 0.50000000 | 33.1050 | 11.762 | 6228.8 | 5.5039 | 6234.3 | 0.00 | 2.480 |
| 0.60000000 | 34.6595 | 11.447 | 5051.6 | 6.3740 | 5057.9 | 0.00 | 2.066 |
| 0.80000000 | 35.8000 | 10.008 | 3312.6 | 7.6391 | 3320.2 | 0.00 | 1.550 |
| 1.00000000 | 33.9653 | 8.6142 | 2280.9 | 8.4353 | 2289.3 | 0.00 | 1.240 |
| 1.50000000 | 42.0930 | 29.662 | 5236.0 | 9.2454 | 5245.3 | 0.00 | 0.8266 |
| 2.00000000 | 53.0893 | 25.464 | 3371.2 | 9.2355 | 3380.4 | 0.00 | 0.6199 |
| 3.00000000 | 60.7930 | 15.016 | 1325.3 | 8.4441 | 1333.7 | 0.00 | 0.4133 |
| 4.00000000 | 61.5661 | 9.5463 | 631.92 | 7.4684 | 639.39 | 0.00 | 0.3100 |
| 5.00000000 | 60.8788 | 6.7692 | 358.47 | 6.5754 | 365.04 | 0.00 | 0.2480 |
| 6.00000000 | 59.7097 | 5.1138 | 225.67 | 5.8085 | 231.48 | 0.00 | 0.2066 |
| 8.00000000 | 56.3334 | 9.2797 | 307.14 | 4.6121 | 311.75 | 0.00 | 0.1550 |
| 10.00000000 | 62.8194 | 10.395 | 275.24 | 3.7496 | 278.99 | 0.00 | 0.1240 |
| Dy (Z=66) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 21.4950 | 9.2747 | 24017 | 0.46914 | 24018 | 0.00 | 12.40 |
| 0.15000000 | 19.9026 | 9.5619 | 16507 | 1.0795 | 16509 | 0.00 | 8.266 |
| 0.20000000 | 29.7793 | 10.385 | 13446 | 1.7839 | 13448 | 0.00 | 6.199 |
| 0.30000000 | 29.3401 | 9.9703 | 8606.3 | 3.2109 | 8609.5 | 0.00 | 4.133 |
| 0.40000000 | 31.0137 | 10.770 | 6972.3 | 4.4886 | 6976.8 | 0.00 | 3.100 |
| 0.50000000 | 33.0786 | 11.794 | 6108.1 | 5.5633 | 6113.7 | 0.00 | 2.480 |
| 0.60000000 | 34.8227 | 11.737 | 5065.5 | 6.4440 | 5072.0 | 0.00 | 2.066 |
| 0.80000000 | 36.5133 | 10.549 | 3414.7 | 7.7259 | 3422.5 | 0.00 | 1.550 |
| 1.00000000 | 35.5133 | 9.1966 | 2381.5 | 8.5342 | 2390.0 | 0.00 | 1.240 |
| 1.50000000 | 40.5315 | 31.737 | 5479.0 | 9.3614 | 5488.3 | 0.00 | 0.8266 |
| 2.00000000 | 53.0596 | 25.702 | 3327.8 | 9.3576 | 3337.1 | 0.00 | 0.6199 |
| 3.00000000 | 61.6038 | 15.910 | 1373.4 | 8.5651 | 1381.9 | 0.00 | 0.4133 |
| 4.00000000 | 62.6315 | 10.129 | 655.77 | 7.5819 | 663.35 | 0.00 | 0.3100 |
| 5.00000000 | 62.0760 | 7.1723 | 371.46 | 6.6800 | 378.14 | 0.00 | 0.2480 |
| 6.00000000 | 61.0619 | 5.4333 | 234.50 | 5.9043 | 240.40 | 0.00 | 0.2066 |
| 8.00000000 | 56.2709 | 9.9731 | 322.82 | 4.6927 | 327.52 | 0.00 | 0.1550 |
| 10.00000000 | 63.1184 | 11.024 | 285.47 | 3.8180 | 289.29 | 0.00 | 0.1240 |
| Ho (Z=67) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 21.6923 | 9.2556 | 23615 | 0.47577 | 23615 | 0.00 | 12.40 |
| 0.15000000 | 22.5989 | 9.8354 | 16729 | 1.0951 | 16730 | 0.00 | 8.266 |
| 0.20000000 | 30.1909 | 11.171 | 14251 | 1.8103 | 14253 | 0.00 | 6.199 |
| 0.30000000 | 29.8606 | 9.3276 | 7932.8 | 3.2605 | 7936.1 | 0.00 | 4.133 |
| 0.40000000 | 31.6181 | 11.198 | 7142.7 | 4.5602 | 7147.3 | 0.00 | 3.100 |
| 0.50000000 | 33.5887 | 12.248 | 6249.9 | 5.6548 | 6255.6 | 0.00 | 2.480 |
| 0.60000000 | 35.4734 | 12.266 | 5215.7 | 6.5526 | 5222.3 | 0.00 | 2.066 |
| 0.80000000 | 37.5668 | 11.161 | 3559.6 | 7.8614 | 3567.4 | 0.00 | 1.550 |
| 1.00000000 | 37.2009 | 9.7854 | 2496.6 | 8.6888 | 2505.3 | 0.00 | 1.240 |
| 1.50000000 | 37.3200 | 33.943 | 5773.4 | 9.5415 | 5783.0 | 0.00 | 0.8266 |
| 2.00000000 | 52.8861 | 27.240 | 3475.0 | 9.5457 | 3484.6 | 0.00 | 0.6199 |
| 3.00000000 | 62.3832 | 16.852 | 1433.2 | 8.7480 | 1442.0 | 0.00 | 0.4133 |
| 4.00000000 | 63.6962 | 10.748 | 685.57 | 7.7508 | 693.32 | 0.00 | 0.3100 |
| 5.00000000 | 63.2584 | 7.6023 | 387.93 | 6.8337 | 394.77 | 0.00 | 0.2480 |
| 6.00000000 | 62.3687 | 5.7761 | 245.62 | 6.0439 | 251.66 | 0.00 | 0.2066 |
| 8.00000000 | 54.9692 | 3.7104 | 118.33 | 4.8082 | 123.14 | 0.00 | 0.1550 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| | | | | | | | |
|------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| 10.000000 | 63.2308 | 11.517 | 293.84 | 3.9148 | 297.75 | 0.00 | 0.1240 |
| Er (Z=68) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 20.7708 | 10.169 | 25585 | 0.48040 | 25585 | 0.00 | 12.40 |
| 0.15000000 | 23.1545 | 11.106 | 18627 | 1.1073 | 18628 | 0.00 | 8.266 |
| 0.20000000 | 30.3285 | 13.535 | 17027 | 1.8322 | 17028 | 0.00 | 6.199 |
| 0.30000000 | 30.7866 | 10.531 | 8831.4 | 3.3046 | 8834.7 | 0.00 | 4.133 |
| 0.40000000 | 32.1615 | 12.040 | 7572.7 | 4.6266 | 7577.3 | 0.00 | 3.100 |
| 0.50000000 | 34.1055 | 12.965 | 6523.8 | 5.7416 | 6529.5 | 0.00 | 2.480 |
| 0.60000000 | 36.1194 | 12.978 | 5441.6 | 6.6574 | 5448.3 | 0.00 | 2.066 |
| 0.80000000 | 38.5345 | 11.882 | 3736.8 | 7.9953 | 3744.8 | 0.00 | 1.550 |
| 1.00000000 | 38.6444 | 10.433 | 2624.8 | 8.8437 | 2633.6 | 0.00 | 1.240 |
| 1.50000000 | 31.0734 | 36.305 | 6089.2 | 9.7254 | 6099.0 | 0.00 | 0.8266 |
| 2.00000000 | 51.0240 | 27.135 | 3413.5 | 9.7394 | 3423.2 | 0.00 | 0.6199 |
| 3.00000000 | 63.1506 | 17.839 | 1496.0 | 8.9380 | 1504.9 | 0.00 | 0.4133 |
| 4.00000000 | 64.6823 | 11.409 | 717.58 | 7.9269 | 725.51 | 0.00 | 0.3100 |
| 5.00000000 | 64.4195 | 8.0586 | 405.48 | 6.9942 | 412.48 | 0.00 | 0.2480 |
| 6.00000000 | 63.6231 | 6.1239 | 256.78 | 6.1895 | 262.97 | 0.00 | 0.2066 |
| 8.00000000 | 59.4441 | 3.9418 | 123.96 | 4.9287 | 128.89 | 0.00 | 0.1550 |
| 10.000000 | 62.8897 | 12.214 | 307.28 | 4.0158 | 311.29 | 0.00 | 0.1240 |
| Tm (Z=69) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 19.0910 | 11.363 | 28304 | 0.48482 | 28305 | 0.00 | 12.40 |
| 0.15000000 | 22.8223 | 12.790 | 21239 | 1.1200 | 21240 | 0.00 | 8.266 |
| 0.20000000 | 30.2398 | 16.612 | 20690 | 1.8562 | 20692 | 0.00 | 6.199 |
| 0.30000000 | 31.7240 | 12.134 | 10075 | 3.3549 | 10078 | 0.00 | 4.133 |
| 0.40000000 | 33.0177 | 13.197 | 8218.2 | 4.7038 | 8222.9 | 0.00 | 3.100 |
| 0.50000000 | 35.0262 | 13.897 | 6923.4 | 5.8436 | 6929.2 | 0.00 | 2.480 |
| 0.60000000 | 37.2476 | 13.835 | 5743.6 | 6.7815 | 5750.4 | 0.00 | 2.066 |
| 0.80000000 | 40.1237 | 12.673 | 3946.0 | 8.1549 | 3954.2 | 0.00 | 1.550 |
| 1.00000000 | 41.2552 | 11.125 | 2771.1 | 9.0291 | 2780.2 | 0.00 | 1.240 |
| 1.50000000 | 19.4361 | 25.735 | 4273.6 | 9.9462 | 4283.5 | 0.00 | 0.8266 |
| 2.00000000 | 51.7990 | 28.874 | 3596.2 | 9.9720 | 3606.2 | 0.00 | 0.6199 |
| 3.00000000 | 63.5836 | 18.856 | 1565.6 | 9.1656 | 1574.8 | 0.00 | 0.4133 |
| 4.00000000 | 65.6733 | 12.078 | 752.13 | 8.1372 | 760.27 | 0.00 | 0.3100 |
| 5.00000000 | 65.5432 | 8.5366 | 425.28 | 7.1854 | 432.47 | 0.00 | 0.2480 |
| 6.00000000 | 64.8333 | 6.4771 | 268.90 | 6.3626 | 275.26 | 0.00 | 0.2066 |
| 8.00000000 | 61.7080 | 4.1810 | 130.18 | 5.0713 | 135.25 | 0.00 | 0.1550 |
| 10.000000 | 62.1537 | 11.367 | 283.15 | 4.1350 | 287.28 | 0.00 | 0.1240 |
| Yb (Z=70) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 17.1539 | 11.101 | 26997 | 0.47950 | 26997 | 0.00 | 12.40 |
| 0.15000000 | 21.7973 | 14.364 | 23288 | 1.1117 | 23289 | 0.00 | 8.266 |
| 0.20000000 | 26.1087 | 21.883 | 26608 | 1.8467 | 26609 | 0.00 | 6.199 |
| 0.30000000 | 32.2555 | 13.858 | 11234 | 3.3480 | 11237 | 0.00 | 4.133 |
| 0.40000000 | 33.6771 | 14.474 | 8799.5 | 4.7035 | 8804.2 | 0.00 | 3.100 |
| 0.50000000 | 35.7986 | 14.906 | 7249.5 | 5.8518 | 7255.4 | 0.00 | 2.480 |
| 0.60000000 | 38.1945 | 14.740 | 5974.1 | 6.7988 | 5980.9 | 0.00 | 2.066 |
| 0.80000000 | 41.3008 | 13.507 | 4105.8 | 8.1896 | 4114.0 | 0.00 | 1.550 |
| 1.00000000 | 42.5248 | 11.865 | 2885.5 | 9.0787 | 2894.6 | 0.00 | 1.240 |
| 2.00000000 | 50.5268 | 30.816 | 3746.9 | 10.061 | 3757.0 | 0.00 | 0.6199 |
| 3.00000000 | 63.9390 | 19.896 | 1612.8 | 9.2634 | 1622.0 | 0.00 | 0.4133 |
| 4.00000000 | 66.6874 | 12.789 | 7775.3 | 8.2332 | 785.76 | 0.00 | 0.3100 |
| 5.00000000 | 66.6956 | 9.0385 | 439.60 | 7.2759 | 446.88 | 0.00 | 0.2480 |
| 6.00000000 | 66.0718 | 6.8469 | 277.51 | 6.4468 | 283.95 | 0.00 | 0.2066 |
| 8.00000000 | 63.5653 | 4.4269 | 134.57 | 5.1430 | 139.71 | 0.00 | 0.1550 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| | | | | | | | |
|------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| 10.000000 | 60.0647 | 11.786 | 286.62 | 4.1962 | 290.81 | 0.00 | 0.1240 |
| Lu (Z=71) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.1000000 | 16.2066 | 10.906 | 26230 | 0.48403 | 26230 | 0.00 | 12.40 |
| 0.1500000 | 21.1341 | 15.478 | 24817 | 1.1225 | 24818 | 0.00 | 8.266 |
| 0.2000000 | 24.1625 | 19.260 | 23160 | 1.8653 | 23162 | 0.00 | 6.199 |
| 0.3000000 | 32.3488 | 15.387 | 12335 | 3.3839 | 12339 | 0.00 | 4.133 |
| 0.4000000 | 34.2191 | 15.459 | 9295.1 | 4.7567 | 9299.9 | 0.00 | 3.100 |
| 0.5000000 | 36.4127 | 15.471 | 7441.8 | 5.9211 | 7447.8 | 0.00 | 2.480 |
| 0.6000000 | 39.0391 | 15.670 | 6281.0 | 6.8826 | 6287.9 | 0.00 | 2.066 |
| 0.8000000 | 42.3664 | 14.298 | 4298.3 | 8.2972 | 4306.6 | 0.00 | 1.550 |
| 1.000000 | 44.0107 | 12.583 | 3026.3 | 9.2042 | 3035.5 | 0.00 | 1.240 |
| 1.500000 | 33.5702 | 7.7118 | 1236.5 | 10.173 | 1246.7 | 0.00 | 0.8266 |
| 2.000000 | 48.4950 | 27.794 | 3342.3 | 10.224 | 3352.5 | 0.00 | 0.6199 |
| 3.000000 | 64.3805 | 20.911 | 1676.4 | 9.4268 | 1685.8 | 0.00 | 0.4133 |
| 4.000000 | 67.5103 | 13.511 | 812.38 | 8.3874 | 820.76 | 0.00 | 0.3100 |
| 5.000000 | 67.7868 | 9.5556 | 459.63 | 7.4184 | 467.05 | 0.00 | 0.2480 |
| 6.000000 | 67.2496 | 7.2270 | 289.69 | 6.5775 | 296.27 | 0.00 | 0.2066 |
| 8.000000 | 65.1503 | 4.6826 | 140.77 | 5.2530 | 146.02 | 0.00 | 0.1550 |
| 10.00000 | 63.3912 | 8.8841 | 213.67 | 4.2894 | 217.95 | 0.00 | 0.1240 |
| Hf (Z=72) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.1000000 | 14.0652 | 9.9402 | 23435 | 0.48906 | 23435 | 0.00 | 12.40 |
| 0.1500000 | 17.3472 | 14.560 | 22884 | 1.1322 | 22885 | 0.00 | 8.266 |
| 0.2000000 | 20.3269 | 17.036 | 20082 | 1.8799 | 20084 | 0.00 | 6.199 |
| 0.3000000 | 29.0751 | 21.091 | 16575 | 3.4074 | 16578 | 0.00 | 4.133 |
| 0.4000000 | 34.2793 | 20.319 | 11976 | 4.7881 | 11981 | 0.00 | 3.100 |
| 0.5000000 | 37.9535 | 18.894 | 8908.8 | 5.9594 | 8914.8 | 0.00 | 2.480 |
| 0.6000000 | 40.6003 | 18.121 | 7120.1 | 6.9268 | 7127.0 | 0.00 | 2.066 |
| 0.8000000 | 44.1672 | 15.705 | 4628.3 | 8.3512 | 4636.7 | 0.00 | 1.550 |
| 1.000000 | 46.3723 | 13.483 | 3178.6 | 9.2657 | 3187.9 | 0.00 | 1.240 |
| 1.500000 | 39.1653 | 8.2342 | 1294.2 | 10.247 | 1304.4 | 0.00 | 0.8266 |
| 2.000000 | 49.3274 | 29.531 | 3481.1 | 10.303 | 3491.4 | 0.00 | 0.6199 |
| 3.000000 | 64.8182 | 22.078 | 1735.0 | 9.5089 | 1744.5 | 0.00 | 0.4133 |
| 4.000000 | 68.4859 | 14.317 | 843.84 | 8.4669 | 852.30 | 0.00 | 0.3100 |
| 5.000000 | 68.8903 | 10.138 | 478.04 | 7.4936 | 485.53 | 0.00 | 0.2480 |
| 6.000000 | 68.4493 | 7.6543 | 300.76 | 6.6479 | 307.41 | 0.00 | 0.2066 |
| 8.000000 | 66.6373 | 4.9677 | 146.40 | 5.3141 | 151.71 | 0.00 | 0.1550 |
| 10.00000 | 63.9974 | 9.4782 | 223.46 | 4.3425 | 227.80 | 0.00 | 0.1240 |
| Ta (Z=73) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.1000000 | 12.8748 | 8.5641 | 19916 | 0.49863 | 19917 | 0.00 | 12.40 |
| 0.1500000 | 15.6594 | 15.059 | 23347 | 1.1520 | 23348 | 0.00 | 8.266 |
| 0.2000000 | 20.0541 | 18.329 | 21312 | 1.9104 | 21314 | 0.00 | 6.199 |
| 0.3000000 | 28.8283 | 21.259 | 16480 | 3.4584 | 16483 | 0.00 | 4.133 |
| 0.4000000 | 32.6510 | 20.471 | 11901 | 4.8568 | 11906 | 0.00 | 3.100 |
| 0.5000000 | 38.0109 | 21.322 | 9916.9 | 6.0429 | 9923.0 | 0.00 | 2.480 |
| 0.6000000 | 41.2968 | 20.011 | 7756.3 | 7.0226 | 7763.3 | 0.00 | 2.066 |
| 0.8000000 | 45.4126 | 16.942 | 4925.0 | 8.4657 | 4933.5 | 0.00 | 1.550 |
| 1.000000 | 47.3230 | 14.387 | 3345.7 | 9.3928 | 3355.1 | 0.00 | 1.240 |
| 1.500000 | 42.6753 | 8.7525 | 1357.0 | 10.390 | 1367.3 | 0.00 | 0.8266 |
| 2.000000 | 47.9476 | 31.238 | 3632.2 | 10.451 | 3642.7 | 0.00 | 0.6199 |
| 3.000000 | 65.1148 | 23.263 | 1803.3 | 9.6519 | 1813.0 | 0.00 | 0.4133 |
| 4.000000 | 69.3434 | 15.129 | 879.58 | 8.5996 | 888.18 | 0.00 | 0.3100 |
| 5.000000 | 69.9359 | 10.741 | 499.59 | 7.6150 | 507.21 | 0.00 | 0.2480 |
| 6.000000 | 69.5963 | 8.0976 | 313.86 | 6.7587 | 320.62 | 0.00 | 0.2066 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| | | | | | | | |
|------------------|----------------------|----------------------|--|--|--|--|-----------|
| 8.0000000 | 68.0247 | 5.2642 | 153.03 | 5.4069 | 158.43 | 0.00 | 0.1550 |
| 10.000000 | 62.4253 | 10.185 | 236.86 | 4.4212 | 241.29 | 0.00 | 0.1240 |
| W (Z=74) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | e atom ⁻¹ | e atom ⁻¹ | Photoelectric cm ² g ⁻¹ | Coh+inc cm ² g ⁻¹ | Total cm ² g ⁻¹ | K-shell cm ² g ⁻¹ | nm |
| 0.10000000 | 13.0562 | 6.3475 | 14528 | 0.50656 | 14529 | 0.00 | 12.40 |
| 0.15000000 | 13.2354 | 14.198 | 21664 | 1.1684 | 21665 | 0.00 | 8.266 |
| 0.20000000 | 18.1957 | 19.449 | 22257 | 1.9358 | 22259 | 0.00 | 6.199 |
| 0.30000000 | 28.3582 | 22.893 | 17466 | 3.5012 | 17470 | 0.00 | 4.133 |
| 0.40000000 | 33.7196 | 21.337 | 12209 | 4.9147 | 12214 | 0.00 | 3.100 |
| 0.50000000 | 37.6004 | 21.856 | 10005 | 6.1135 | 10011 | 0.00 | 2.480 |
| 0.60000000 | 40.7829 | 21.374 | 8153.6 | 7.1038 | 8160.7 | 0.00 | 2.066 |
| 0.80000000 | 46.1506 | 18.240 | 5218.7 | 8.5631 | 5227.3 | 0.00 | 1.550 |
| 1.0000000 | 48.2942 | 15.353 | 3514.0 | 9.5014 | 3523.5 | 0.00 | 1.240 |
| 1.5000000 | 45.5620 | 9.3157 | 1421.5 | 10.513 | 1432.0 | 0.00 | 0.8266 |
| 2.0000000 | 45.1230 | 32.992 | 3775.7 | 10.578 | 3786.3 | 0.00 | 0.6199 |
| 3.0000000 | 65.1447 | 24.476 | 1867.4 | 9.7756 | 1877.2 | 0.00 | 0.4133 |
| 4.0000000 | 70.1765 | 15.983 | 914.57 | 8.7145 | 923.28 | 0.00 | 0.3100 |
| 5.0000000 | 70.9202 | 11.361 | 520.07 | 7.7204 | 527.79 | 0.00 | 0.2480 |
| 6.0000000 | 70.7329 | 8.5632 | 326.66 | 6.8550 | 333.52 | 0.00 | 0.2066 |
| 8.0000000 | 69.3499 | 5.5724 | 159.43 | 5.4876 | 164.92 | 0.00 | 0.1550 |
| 10.000000 | 64.4797 | 3.8842 | 88.902 | 4.4896 | 93.392 | 0.00 | 0.1240 |
| Re (Z=75) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | e atom ⁻¹ | e atom ⁻¹ | Photoelectric cm ² g ⁻¹ | Coh+inc cm ² g ⁻¹ | Total cm ² g ⁻¹ | K-shell cm ² g ⁻¹ | nm |
| 0.10000000 | 13.7722 | 5.2653 | 11899 | 0.51402 | 11899 | 0.00 | 12.40 |
| 0.15000000 | 12.3601 | 12.867 | 19385 | 1.1848 | 19386 | 0.00 | 8.266 |
| 0.20000000 | 16.7375 | 19.543 | 22082 | 1.9624 | 22084 | 0.00 | 6.199 |
| 0.30000000 | 27.4324 | 24.227 | 18250 | 3.5485 | 18253 | 0.00 | 4.133 |
| 0.40000000 | 34.1240 | 22.774 | 12866 | 4.9811 | 12871 | 0.00 | 3.100 |
| 0.50000000 | 38.1737 | 22.620 | 10223 | 6.1964 | 10230 | 0.00 | 2.480 |
| 0.60000000 | 41.6308 | 21.617 | 8141.8 | 7.2008 | 8149.0 | 0.00 | 2.066 |
| 0.80000000 | 47.0085 | 19.430 | 5488.7 | 8.6816 | 5497.4 | 0.00 | 1.550 |
| 1.0000000 | 50.0209 | 16.300 | 3683.5 | 9.6350 | 3693.2 | 0.00 | 1.240 |
| 1.5000000 | 47.8524 | 9.9535 | 1499.6 | 10.666 | 1510.2 | 0.00 | 0.8266 |
| 2.0000000 | 39.3392 | 34.772 | 3929.0 | 10.737 | 3939.8 | 0.00 | 0.6199 |
| 3.0000000 | 64.8207 | 25.693 | 1935.4 | 9.9288 | 1945.4 | 0.00 | 0.4133 |
| 4.0000000 | 70.9588 | 16.870 | 953.09 | 8.8556 | 961.94 | 0.00 | 0.3100 |
| 5.0000000 | 71.9237 | 11.991 | 541.98 | 7.8487 | 549.83 | 0.00 | 0.2480 |
| 6.0000000 | 71.8427 | 9.0435 | 340.62 | 6.9715 | 347.59 | 0.00 | 0.2066 |
| 8.0000000 | 70.6205 | 5.8779 | 166.04 | 5.5840 | 171.63 | 0.00 | 0.1550 |
| 10.000000 | 67.4622 | 4.1083 | 92.842 | 4.5706 | 97.412 | 0.00 | 0.1240 |
| Os (Z=76) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | e atom ⁻¹ | e atom ⁻¹ | Photoelectric cm ² g ⁻¹ | Coh+inc cm ² g ⁻¹ | Total cm ² g ⁻¹ | K-shell cm ² g ⁻¹ | nm |
| 0.10000000 | 14.9444 | 4.7107 | 10422 | 0.51497 | 10423 | 0.00 | 12.40 |
| 0.15000000 | 12.1338 | 11.322 | 16700 | 1.1875 | 16701 | 0.00 | 8.266 |
| 0.20000000 | 15.2347 | 18.980 | 20996 | 1.9676 | 20998 | 0.00 | 6.199 |
| 0.30000000 | 26.1507 | 25.330 | 18680 | 3.5598 | 18684 | 0.00 | 4.133 |
| 0.40000000 | 34.1826 | 24.308 | 13445 | 4.9990 | 13450 | 0.00 | 3.100 |
| 0.50000000 | 38.4805 | 23.970 | 10606 | 6.2208 | 10612 | 0.00 | 2.480 |
| 0.60000000 | 42.3305 | 22.668 | 8358.6 | 7.2313 | 8365.9 | 0.00 | 2.066 |
| 0.80000000 | 47.5941 | 20.298 | 5613.5 | 8.7225 | 5622.2 | 0.00 | 1.550 |
| 1.0000000 | 50.8274 | 17.278 | 3822.5 | 9.6841 | 3832.2 | 0.00 | 1.240 |
| 1.5000000 | 49.8684 | 10.629 | 1567.7 | 10.728 | 1578.4 | 0.00 | 0.8266 |
| 2.0000000 | 31.3367 | 24.810 | 2744.5 | 10.804 | 2755.3 | 0.00 | 0.6199 |
| 3.0000000 | 64.6821 | 25.855 | 1906.8 | 9.9987 | 1916.8 | 0.00 | 0.4133 |
| 4.0000000 | 71.5194 | 17.803 | 984.71 | 8.9225 | 993.63 | 0.00 | 0.3100 |
| 5.0000000 | 72.9037 | 12.654 | 559.90 | 7.9110 | 567.81 | 0.00 | 0.2480 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| | | | | | | | |
|------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| 6.0000000 | 72.9201 | 9.5463 | 352.01 | 7.0290 | 359.04 | 0.00 | 0.2066 |
| 8.0000000 | 71.8663 | 6.1916 | 171.23 | 5.6328 | 176.86 | 0.00 | 0.1550 |
| 10.0000000 | 69.4616 | 4.3380 | 95.976 | 4.6121 | 100.59 | 0.00 | 0.1240 |
| Ir (Z=77) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 17.3205 | 3.6177 | 7919.8 | 0.51851 | 7920.3 | 0.00 | 12.40 |
| 0.15000000 | 12.7916 | 77369 | 11292 | 1.1978 | 11293 | 0.00 | 8.266 |
| 0.20000000 | 12.9050 | 15.722 | 17209 | 1.9871 | 17211 | 0.00 | 6.199 |
| 0.30000000 | 22.6565 | 25.802 | 18828 | 3.6007 | 18832 | 0.00 | 4.133 |
| 0.40000000 | 32.8297 | 26.699 | 14612 | 5.0616 | 14617 | 0.00 | 3.100 |
| 0.50000000 | 37.4872 | 26.241 | 11489 | 6.3034 | 11495 | 0.00 | 2.480 |
| 0.60000000 | 42.6205 | 24.471 | 8928.7 | 7.3315 | 8936.0 | 0.00 | 2.066 |
| 0.80000000 | 48.1335 | 21.370 | 5847.8 | 8.8510 | 5856.6 | 0.00 | 1.550 |
| 1.0000000 | 51.2116 | 18.437 | 4036.3 | 9.8327 | 4046.1 | 0.00 | 1.240 |
| 1.5000000 | 51.8576 | 11.599 | 1692.8 | 10.904 | 1703.7 | 0.00 | 0.8266 |
| 2.0000000 | 36.1081 | 8.3499 | 913.97 | 10.989 | 924.96 | 0.00 | 0.6199 |
| 3.0000000 | 64.5917 | 27.213 | 1985.8 | 10.177 | 1996.0 | 0.00 | 0.4133 |
| 4.0000000 | 71.9306 | 18.727 | 1024.9 | 9.0866 | 1034.0 | 0.00 | 0.3100 |
| 5.0000000 | 73.7433 | 13.334 | 583.81 | 8.0595 | 591.87 | 0.00 | 0.2480 |
| 6.0000000 | 73.9895 | 10.086 | 367.98 | 7.1628 | 375.15 | 0.00 | 0.2066 |
| 8.0000000 | 73.0850 | 6.5289 | 178.66 | 5.7422 | 184.40 | 0.00 | 0.1550 |
| 10.000000 | 71.1448 | 4.5834 | 100.34 | 4.7029 | 105.04 | 0.00 | 0.1240 |
| Pt (Z=78) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 18.9599 | 3.7223 | 8029.2 | 0.51970 | 8029.7 | 0.00 | 12.40 |
| 0.15000000 | 14.2424 | 5.8462 | 8407.2 | 1.2044 | 8408.4 | 0.00 | 8.266 |
| 0.20000000 | 12.2222 | 12.949 | 13966 | 2.0018 | 13968 | 0.00 | 6.199 |
| 0.30000000 | 20.0046 | 25.162 | 18092 | 3.6361 | 18096 | 0.00 | 4.133 |
| 0.40000000 | 30.9131 | 28.484 | 15360 | 5.1187 | 15366 | 0.00 | 3.100 |
| 0.50000000 | 37.3774 | 26.748 | 11539 | 6.3808 | 11546 | 0.00 | 2.480 |
| 0.60000000 | 42.3892 | 26.037 | 9360.8 | 7.4267 | 9368.2 | 0.00 | 2.066 |
| 0.80000000 | 48.5789 | 22.830 | 6155.8 | 8.9748 | 6164.7 | 0.00 | 1.550 |
| 1.0000000 | 52.2480 | 19.620 | 4232.1 | 9.9767 | 4242.1 | 0.00 | 1.240 |
| 1.5000000 | 53.6485 | 12.642 | 1818.0 | 11.074 | 1829.0 | 0.00 | 0.8266 |
| 2.0000000 | 44.3193 | 8.9804 | 968.57 | 11.165 | 979.73 | 0.00 | 0.6199 |
| 3.0000000 | 63.7784 | 26.961 | 1938.6 | 10.345 | 1948.9 | 0.00 | 0.4133 |
| 4.0000000 | 72.4585 | 19.665 | 1060.5 | 9.2381 | 1069.7 | 0.00 | 0.3100 |
| 5.0000000 | 74.6686 | 14.066 | 606.81 | 8.1942 | 615.01 | 0.00 | 0.2480 |
| 6.0000000 | 74.9971 | 10.652 | 382.97 | 7.2825 | 390.25 | 0.00 | 0.2066 |
| 8.0000000 | 74.2800 | 6.8907 | 185.80 | 5.8377 | 191.63 | 0.00 | 0.1550 |
| 10.000000 | 72.6656 | 4.8476 | 104.57 | 4.7806 | 109.35 | 0.00 | 0.1240 |
| Au (Z=79) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 20.7172 | 3.9569 | 8453.7 | 0.51746 | 8454.2 | 0.00 | 12.40 |
| 0.15000000 | 16.3054 | 4.4737 | 6371.8 | 1.2048 | 6373.0 | 0.00 | 8.266 |
| 0.20000000 | 12.9488 | 10.192 | 10887 | 2.0084 | 10889 | 0.00 | 6.199 |
| 0.30000000 | 17.9221 | 23.826 | 16967 | 3.6614 | 16971 | 0.00 | 4.133 |
| 0.40000000 | 28.7472 | 29.456 | 15732 | 5.1661 | 15738 | 0.00 | 3.100 |
| 0.50000000 | 36.8596 | 28.559 | 12203 | 6.4500 | 12209 | 0.00 | 2.480 |
| 0.60000000 | 42.2772 | 27.890 | 9930.9 | 7.5162 | 9938.4 | 0.00 | 2.066 |
| 0.80000000 | 49.1387 | 24.281 | 6484.3 | 9.0981 | 6493.4 | 0.00 | 1.550 |
| 1.0000000 | 53.2840 | 20.802 | 4444.1 | 10.125 | 4454.2 | 0.00 | 1.240 |
| 1.5000000 | 55.0306 | 13.630 | 1941.3 | 11.258 | 1952.5 | 0.00 | 0.8266 |
| 2.0000000 | 48.7006 | 9.6338 | 1029.1 | 11.362 | 1040.5 | 0.00 | 0.6199 |
| 3.0000000 | 64.2150 | 28.411 | 2023.2 | 10.539 | 2033.8 | 0.00 | 0.4133 |
| 4.0000000 | 72.9278 | 20.605 | 1100.5 | 9.4166 | 1109.9 | 0.00 | 0.3100 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| | | | | | | | |
|------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| 5.0000000 | 75.5211 | 14.805 | 632.60 | 8.3553 | 640.95 | 0.00 | 0.2480 |
| 6.0000000 | 75.9889 | 1.1221 | 399.56 | 7.4273 | 406.99 | 0.00 | 0.2066 |
| 8.0000000 | 75.4267 | 7.2668 | 194.06 | 5.9550 | 200.02 | 0.00 | 0.1550 |
| 10.0000000 | 74.0585 | 5.1224 | 109.44 | 4.8770 | 114.31 | 0.00 | 0.1240 |
| Hg (Z=80) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 21.0456 | 4.4135 | 9258.8 | 0.50922 | 9259.3 | 0.00 | 12.40 |
| 0.15000000 | 18.2544 | 4.1507 | 5804.9 | 1.1905 | 5806.1 | 0.00 | 8.266 |
| 0.20000000 | 14.5688 | 8.2600 | 8664.0 | 1.9898 | 8666.0 | 0.00 | 6.199 |
| 0.30000000 | 16.6378 | 21.781 | 15231 | 3.6399 | 15234 | 0.00 | 4.133 |
| 0.40000000 | 26.2682 | 29.434 | 15437 | 5.1468 | 15442 | 0.00 | 3.100 |
| 0.50000000 | 35.5563 | 30.041 | 12604 | 6.4360 | 12611 | 0.00 | 2.480 |
| 0.60000000 | 41.4530 | 29.738 | 10398 | 7.5088 | 10405 | 0.00 | 2.066 |
| 0.80000000 | 48.6794 | 25.299 | 6634.1 | 9.1048 | 6643.2 | 0.00 | 1.550 |
| 1.0000000 | 53.8982 | 22.034 | 4622.4 | 10.145 | 4632.6 | 0.00 | 1.240 |
| 1.5000000 | 56.3416 | 14.461 | 2022.5 | 11.303 | 2033.8 | 0.00 | 0.8266 |
| 2.0000000 | 51.9152 | 10.364 | 1087.1 | 11.421 | 1098.5 | 0.00 | 0.6199 |
| 3.0000000 | 63.5560 | 29.904 | 2091.1 | 10.610 | 2101.7 | 0.00 | 0.4133 |
| 4.0000000 | 73.3596 | 21.560 | 1130.7 | 9.4877 | 1140.2 | 0.00 | 0.3100 |
| 5.0000000 | 76.3629 | 15.587 | 653.98 | 8.4234 | 662.40 | 0.00 | 0.2480 |
| 6.0000000 | 76.9958 | 11.815 | 413.08 | 7.4910 | 420.57 | 0.00 | 0.2066 |
| 8.0000000 | 76.5845 | 7.6612 | 200.90 | 6.0096 | 206.91 | 0.00 | 0.1550 |
| 10.000000 | 75.4042 | 5.4049 | 113.39 | 4.9236 | 118.31 | 0.00 | 0.1240 |
| Tl (Z=81) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 24.3528 | 4.8723 | 10031 | 0.50781 | 10032 | 0.00 | 12.40 |
| 0.15000000 | 21.4117 | 3.4521 | 4738.4 | 1.1869 | 4739.5 | 0.00 | 8.266 |
| 0.20000000 | 17.1870 | 6.2219 | 6405.1 | 1.9840 | 6407.1 | 0.00 | 6.199 |
| 0.30000000 | 16.3923 | 18.881 | 12958 | 3.6304 | 12962 | 0.00 | 4.133 |
| 0.40000000 | 24.0856 | 27.647 | 14230 | 5.1354 | 14236 | 0.00 | 3.100 |
| 0.50000000 | 33.7172 | 30.527 | 12570 | 6.4243 | 12577 | 0.00 | 2.480 |
| 0.60000000 | 39.6485 | 29.301 | 10054 | 7.4981 | 10062 | 0.00 | 2.066 |
| 0.80000000 | 49.3408 | 26.799 | 6896.9 | 9.0981 | 6906.0 | 0.00 | 1.550 |
| 1.0000000 | 54.2171 | 23.336 | 4804.7 | 10.144 | 4814.9 | 0.00 | 1.240 |
| 1.5000000 | 57.6868 | 15.195 | 2085.7 | 11.315 | 2097.0 | 0.00 | 0.8266 |
| 2.0000000 | 54.5114 | 10.977 | 1130.0 | 11.444 | 1141.5 | 0.00 | 0.6199 |
| 3.0000000 | 61.6045 | 31.660 | 2172.8 | 10.647 | 2183.5 | 0.00 | 0.4133 |
| 4.0000000 | 73.6968 | 22.587 | 1162.6 | 9.5312 | 1172.1 | 0.00 | 0.3100 |
| 5.0000000 | 77.1551 | 16.411 | 675.79 | 8.4693 | 684.26 | 0.00 | 0.2480 |
| 6.0000000 | 77.9851 | 12.442 | 426.95 | 7.5371 | 434.49 | 0.00 | 0.2066 |
| 8.0000000 | 77.7339 | 8.0723 | 207.75 | 6.0533 | 213.80 | 0.00 | 0.1550 |
| 10.000000 | 76.7042 | 5.6875 | 117.10 | 4.9637 | 122.06 | 0.00 | 0.1240 |
| Pb (Z=82) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 27.2378 | 6.0605 | 12308 | 0.49046 | 12309 | 0.00 | 12.40 |
| 0.15000000 | 23.1741 | 3.8605 | 5226.9 | 1.1568 | 5228.1 | 0.00 | 8.266 |
| 0.20000000 | 18.8598 | 5.6965 | 5784.5 | 1.9447 | 5786.4 | 0.00 | 6.199 |
| 0.30000000 | 16.6606 | 17.698 | 11981 | 3.5838 | 11985 | 0.00 | 4.133 |
| 0.40000000 | 23.7225 | 26.565 | 13488 | 5.0919 | 13493 | 0.00 | 3.100 |
| 0.50000000 | 32.9286 | 31.090 | 12628 | 6.3895 | 12634 | 0.00 | 2.480 |
| 0.60000000 | 40.1534 | 30.505 | 10325 | 7.4745 | 10333 | 0.00 | 2.066 |
| 0.80000000 | 49.9789 | 28.239 | 7169.0 | 9.0990 | 7178.0 | 0.00 | 1.550 |
| 1.0000000 | 55.8923 | 24.648 | 5005.7 | 10.167 | 5015.8 | 0.00 | 1.240 |
| 1.5000000 | 59.0150 | 15.800 | 2139.2 | 11.380 | 2150.6 | 0.00 | 0.8266 |
| 2.0000000 | 56.8007 | 11.550 | 1172.9 | 11.532 | 1184.4 | 0.00 | 0.6199 |
| 3.0000000 | 61.4993 | 28.554 | 1933.0 | 10.751 | 1943.7 | 0.00 | 0.4133 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| | | | | | | | |
|------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| 4.0000000 | 73.6532 | 23.666 | 1201.6 | 9.6354 | 1211.2 | 0.00 | 0.3100 |
| 5.0000000 | 77.7175 | 17.256 | 700.90 | 8.5675 | 709.47 | 0.00 | 0.2480 |
| 6.0000000 | 78.8304 | 13.062 | 442.11 | 7.6276 | 449.74 | 0.00 | 0.2066 |
| 8.0000000 | 78.8383 | 8.4922 | 215.59 | 6.1288 | 221.71 | 0.00 | 0.1550 |
| 10.000000 | 77.9571 | 5.9789 | 121.43 | 5.0265 | 126.45 | 0.00 | 0.1240 |
| Bi (Z=83) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 29.1036 | 6.8342 | 13761 | 0.47438 | 13762 | 0.00 | 12.40 |
| 0.15000000 | 24.7062 | 3.3450 | 4490.3 | 1.1298 | 4491.4 | 0.00 | 8.266 |
| 0.20000000 | 19.7010 | 4.8312 | 4864.1 | 1.9110 | 4866.0 | 0.00 | 6.199 |
| 0.30000000 | 16.1549 | 16.989 | 11403 | 3.5486 | 11407 | 0.00 | 4.133 |
| 0.40000000 | 23.3014 | 26.808 | 13495 | 5.0657 | 13500 | 0.00 | 3.100 |
| 0.50000000 | 32.1000 | 31.903 | 12848 | 6.3774 | 12854 | 0.00 | 2.480 |
| 0.60000000 | 40.0449 | 31.728 | 10648 | 7.4786 | 10656 | 0.00 | 2.066 |
| 0.80000000 | 50.0149 | 29.390 | 7397.5 | 9.1355 | 7406.7 | 0.00 | 1.550 |
| 1.0000000 | 56.3091 | 25.937 | 5222.7 | 10.232 | 5233.0 | 0.00 | 1.240 |
| 1.5000000 | 60.2847 | 16.455 | 2208.9 | 11.493 | 2220.4 | 0.00 | 0.8266 |
| 2.0000000 | 58.7593 | 12.141 | 1222.4 | 11.671 | 1234.0 | 0.00 | 0.6199 |
| 3.0000000 | 61.4699 | 30.104 | 2020.6 | 10.904 | 2031.5 | 0.00 | 0.4133 |
| 4.0000000 | 72.0754 | 24.724 | 1244.6 | 9.7840 | 1254.4 | 0.00 | 0.3100 |
| 5.0000000 | 78.1670 | 18.035 | 726.32 | 8.7054 | 735.02 | 0.00 | 0.2480 |
| 6.0000000 | 79.7366 | 13.700 | 459.77 | 7.7536 | 467.53 | 0.00 | 0.2066 |
| 8.0000000 | 79.9227 | 8.9140 | 224.37 | 6.2327 | 230.60 | 0.00 | 0.1550 |
| 10.000000 | 79.1746 | 6.2772 | 126.40 | 5.1125 | 131.51 | 0.00 | 0.1240 |
| Po (Z=84) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 30.6090 | 7.4801 | 15060 | 0.46970 | 15061 | 0.00 | 12.40 |
| 0.15000000 | 25.7627 | 3.4012 | 4565.3 | 1.1267 | 4566.5 | 0.00 | 8.266 |
| 0.20000000 | 20.3170 | 4.0554 | 4082.6 | 1.9144 | 4084.5 | 0.00 | 6.199 |
| 0.30000000 | 15.3597 | 16.638 | 11166 | 3.5746 | 11170 | 0.00 | 4.133 |
| 0.40000000 | 22.8423 | 27.491 | 13838 | 5.1200 | 13843 | 0.00 | 3.100 |
| 0.50000000 | 29.8543 | 31.936 | 12860 | 6.4607 | 12866 | 0.00 | 2.480 |
| 0.60000000 | 39.9121 | 32.844 | 11021 | 7.5891 | 11029 | 0.00 | 2.066 |
| 0.80000000 | 50.3693 | 30.666 | 7717.9 | 9.2924 | 7727.2 | 0.00 | 1.550 |
| 1.0000000 | 56.3510 | 27.132 | 5462.8 | 10.424 | 5473.3 | 0.00 | 1.240 |
| 1.5000000 | 61.4687 | 17.179 | 2305.9 | 11.736 | 2317.6 | 0.00 | 0.8266 |
| 2.0000000 | 60.5186 | 12.867 | 1295.3 | 11.933 | 1307.3 | 0.00 | 0.6199 |
| 3.0000000 | 59.7266 | 31.767 | 2132.0 | 11.164 | 2143.1 | 0.00 | 0.4133 |
| 4.0000000 | 73.5975 | 24.925 | 1254.6 | 10.023 | 1264.6 | 0.00 | 0.3100 |
| 5.0000000 | 78.7399 | 18.873 | 759.98 | 8.9208 | 768.90 | 0.00 | 0.2480 |
| 6.0000000 | 80.6122 | 14.392 | 482.95 | 7.9467 | 490.90 | 0.00 | 0.2066 |
| 8.0000000 | 80.9835 | 9.3588 | 235.54 | 6.3885 | 241.93 | 0.00 | 0.1550 |
| 10.000000 | 80.3715 | 6.5951 | 132.79 | 5.2401 | 138.03 | 0.00 | 0.1240 |
| At (Z=85) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 32.7766 | 6.6272 | 13280 | 0.45708 | 13280 | 0.00 | 12.40 |
| 0.15000000 | 26.4961 | 3.4478 | 4605.9 | 1.1063 | 4607.0 | 0.00 | 8.266 |
| 0.20000000 | 21.6991 | 2.8754 | 2880.9 | 1.8904 | 2882.8 | 0.00 | 6.199 |
| 0.30000000 | 13.6860 | 14.513 | 9693.7 | 3.5545 | 9697.3 | 0.00 | 4.133 |
| 0.40000000 | 20.6305 | 27.797 | 13925 | 5.1133 | 13930 | 0.00 | 3.100 |
| 0.50000000 | 30.0410 | 33.537 | 13441 | 6.4716 | 13447 | 0.00 | 2.480 |
| 0.60000000 | 39.2972 | 34.554 | 11540 | 7.6189 | 11548 | 0.00 | 2.066 |
| 0.80000000 | 50.2796 | 32.279 | 8085.2 | 9.3579 | 8094.5 | 0.00 | 1.550 |
| 1.0000000 | 57.2041 | 27.944 | 5599.5 | 10.520 | 5610.0 | 0.00 | 1.240 |
| 1.5000000 | 62.7559 | 18.025 | 2408.0 | 11.881 | 2419.9 | 0.00 | 0.826 |
| 2.0000000 | 62.1823 | 13.476 | 1350.2 | 12.101 | 1362.3 | 0.00 | 0.6199 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| | | | | | | | |
|------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| 3.0000000 | 55.7886 | 33.674 | 2249.2 | 11.341 | 2260.6 | 0.00 | 0.4133 |
| 4.0000000 | 72.1835 | 24.539 | 1229.3 | 10.190 | 1239.5 | 0.00 | 0.3100 |
| 5.0000000 | 792.883 | 19.729 | 790.66 | 9.0732 | 799.74 | 0.00 | 0.2480 |
| 6.0000000 | 81.4620 | 15.108 | 504.57 | 8.0839 | 512.66 | 0.00 | 0.2066 |
| 8.0000000 | 82.0129 | 9.8227 | 246.04 | 6.4990 | 252.54 | 0.00 | 0.1550 |
| 10.000000 | 81.5619 | 6.9199 | 138.66 | 5.3297 | 143.99 | 0.00 | 0.1240 |
| Rn (Z=86) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 34.7678 | 7.9161 | 15005 | 0.42616 | 15005 | 0.00 | 12.40 |
| 0.15000000 | 27.1629 | 2.5654 | 3241.8 | 1.0397 | 3242.9 | 0.00 | 8.266 |
| 0.20000000 | 23.8790 | 2.2237 | 2107.5 | 1.7855 | 2109.3 | 0.00 | 6.199 |
| 0.30000000 | 13.4063 | 11.102 | 7014.7 | 3.3782 | 7018.0 | 0.00 | 4.133 |
| 0.40000000 | 18.5818 | 27.525 | 1304.3 | 4.8784 | 13048 | 0.00 | 3.100 |
| 0.50000000 | 29.5309 | 32.803 | 1243.6 | 6.1908 | 12442 | 0.00 | 2.480 |
| 0.60000000 | 38.1704 | 35.902 | 1134.2 | 7.3030 | 11349 | 0.00 | 2.066 |
| 0.80000000 | 49.9602 | 33.595 | 7959.9 | 8.9954 | 7968.9 | 0.00 | 1.550 |
| 1.0000000 | 58.6063 | 29.331 | 5559.7 | 10.132 | 5569.9 | 0.00 | 1.240 |
| 1.5000000 | 63.7817 | 18.854 | 2382.5 | 11.477 | 2394.0 | 0.00 | 0.8266 |
| 2.0000000 | 63.5374 | 14.130 | 1339.2 | 11.709 | 1350.9 | 0.00 | 0.6199 |
| 3.0000000 | 47.6386 | 24.645 | 1557.1 | 10.995 | 1568.1 | 0.00 | 0.4133 |
| 4.0000000 | 73.7998 | 25.843 | 1224.7 | 9.8894 | 1234.6 | 0.00 | 0.3100 |
| 5.0000000 | 79.7933 | 20.635 | 782.29 | 8.8109 | 791.10 | 0.00 | 0.2480 |
| 6.0000000 | 82.1650 | 15.851 | 500.76 | 7.8534 | 508.62 | 0.00 | 0.2066 |
| 8.0000000 | 83.0784 | 10.300 | 244.04 | 6.3167 | 250.36 | 0.000 | 0.1550 |
| 10.000000 | 82.7321 | 7.2613 | 137.64 | 5.1815 | 142.82 | 0.00 | 0.1240 |
| Fr (Z=87) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 40.7166 | 11.162 | 21063 | 0.41300 | 21063 | 0.00 | 12.40 |
| 0.15000000 | 30.4047 | 2.7681 | 3482.3 | 1.0160 | 3483.3 | 0.00 | 8.266 |
| 0.20000000 | 26.5548 | 2.2854 | 2156.3 | 1.7541 | 2158.0 | 0.00 | 6.199 |
| 0.30000000 | 15.2769 | 6.5407 | 4114.1 | 3.3410 | 4117.5 | 0.00 | 4.133 |
| 0.40000000 | 15.2781 | 25.743 | 12144 | 4.8448 | 12149 | 0.00 | 3.100 |
| 0.50000000 | 27.9322 | 34.274 | 12935 | 6.1662 | 12941 | 0.00 | 2.480 |
| 0.60000000 | 35.7328 | 36.291 | 11414 | 7.2900 | 11421 | 0.00 | 2.066 |
| 0.80000000 | 49.4424 | 33.078 | 7802.2 | 9.0076 | 7811.2 | 0.00 | 1.550 |
| 1.0000000 | 58.5256 | 30.753 | 5803.2 | 10.167 | 5813.4 | 0.00 | 1.240 |
| 1.5000000 | 64.8647 | 19.755 | 2485.1 | 11.556 | 2496.7 | 0.00 | 0.8266 |
| 2.0000000 | 65.0089 | 14.751 | 1391.8 | 11.812 | 1403.6 | 0.00 | 0.6199 |
| 3.0000000 | 23.4456 | 25.813 | 1623.6 | 11.115 | 1634.7 | 0.00 | 0.4133 |
| 4.0000000 | 73.9239 | 27.091 | 1278.0 | 10.008 | 1288.1 | 0.00 | 0.3100 |
| 5.0000000 | 80.1077 | 21.580 | 814.45 | 8.9224 | 823.37 | 0.00 | 0.2480 |
| 6.0000000 | 82.8997 | 16.581 | 521.49 | 7.9559 | 529.45 | 0.00 | 0.2066 |
| 8.0000000 | 84.0969 | 10.792 | 254.55 | 6.4015 | 260.95 | 0.00 | 0.1550 |
| 10.000000 | 83.8775 | 7.6042 | 143.49 | 5.2516 | 148.74 | 0.00 | 0.1240 |
| Ra (Z=88) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]K$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 51.7375 | 18.011 | 33532 | 0.40193 | 33533 | 0.00 | 12.40 |
| 0.15000000 | 34.9445 | 2.2124 | 2745.9 | 0.99514 | 2746.9 | 0.00 | 8.266 |
| 0.20000000 | 29.8276 | 1.9837 | 1846.6 | 1.7251 | 1848.3 | 0.00 | 6.199 |
| 0.30000000 | 23.3487 | 2.5290 | 1569.4 | 3.3027 | 1572.7 | 0.00 | 4.133 |
| 0.40000000 | 12.6184 | 14.374 | 6690.3 | 4.8049 | 6695.1 | 0.00 | 3.100 |
| 0.50000000 | 19.9917 | 31.830 | 11852 | 6.1297 | 11858 | 0.00 | 2.480 |
| 0.60000000 | 29.7308 | 35.925 | 11147 | 7.2596 | 11155 | 0.00 | 2.066 |
| 0.80000000 | 49.1529 | 36.056 | 8391.0 | 8.9927 | 8400.0 | 0.00 | 1.550 |
| 1.0000000 | 57.5412 | 32.589 | 6067.3 | 1.0169 | 6077.4 | 0.00 | 1.240 |
| 1.5000000 | 66.2388 | 21.691 | 2692.2 | 1.1590 | 2703.8 | 0.00 | 0.8266 |

TABLE 6. Form factors, attenuation, and scattering cross-sections on the Grodstein grid energies for $Z=30-36$, $60-89$, from $E=0.1$ keV to $E=10$ keV—Continued

| | | | | | | | |
|------------------|-----------------------|-----------------------|---|---|---------------------------------------|---|-----------|
| 2.0000000 | 66.7711 | 15.812 | 1471.9 | 1.1867 | 1483.7 | 0.00 | 0.6199 |
| 3.0000000 | 55.8205 | 10.298 | 639.06 | 1.1190 | 650.25 | 0.00 | 0.4133 |
| 4.0000000 | 73.2684 | 28.440 | 1323.7 | 1.0088 | 1333.8 | 0.00 | 0.3100 |
| 5.0000000 | 80.3312 | 22.507 | 838.05 | 9.0009 | 847.05 | 0.00 | 0.2480 |
| 6.0000000 | 83.4769 | 17.290 | 536.50 | 8.0306 | 544.53 | 0.00 | 0.2066 |
| 8.0000000 | 85.1130 | 11.291 | 262.77 | 6.4669 | 269.24 | 0.00 | 0.1550 |
| 10.000000 | 85.0213 | 7.9553 | 148.11 | 5.3080 | 153.42 | 0.00 | 0.1240 |
| Ac (Z=89) | | | | | | | |
| E | f_1 | f_2 | $[\mu/\rho]$ | $[\sigma/\rho]$ | $[\mu/\rho]$ | $[\mu/\rho]_{\text{K}}$ | λ |
| keV | $e \text{ atom}^{-1}$ | $e \text{ atom}^{-1}$ | Photoelectric $\text{cm}^2 \text{ g}^{-1}$ | Coh+inc $\text{cm}^2 \text{ g}^{-1}$ | Total $\text{cm}^2 \text{ g}^{-1}$ | K-shell $\text{cm}^2 \text{ g}^{-1}$ | nm |
| 0.10000000 | 31.9265 | 18.493 | 34278 | 0.39789 | 34279 | 0.00 | 12.40 |
| 0.15000000 | 32.7514 | 3.5356 | 4369.0 | 0.98982 | 4369.9 | 0.00 | 8.266 |
| 0.20000000 | 29.1558 | 2.4707 | 2289.8 | 1.7211 | 2291.5 | 0.00 | 6.199 |
| 0.30000000 | 22.6362 | 2.6924 | 1663.5 | 3.3079 | 1666.8 | 0.00 | 4.133 |
| 0.40000000 | 12.0488 | 15.496 | 7180.6 | 4.8245 | 7185.4 | 0.00 | 3.100 |
| 0.50000000 | 20.5578 | 33.072 | 12260 | 6.1657 | 12266 | 0.00 | 2.480 |
| 0.60000000 | 33.0402 | 36.821 | 11375 | 7.3122 | 11382 | 0.00 | 2.066 |
| 0.80000000 | 49.3853 | 36.715 | 8506.5 | 9.0762 | 8515.5 | 0.00 | 1.550 |
| 1.0000000 | 58.0103 | 33.313 | 6174.7 | 10.278 | 6185.0 | 0.00 | 1.240 |
| 1.5000000 | 67.1653 | 22.513 | 2781.9 | 11.742 | 2793.6 | 0.00 | 0.8266 |
| 2.0000000 | 68.1112 | 16.400 | 1519.9 | 12.041 | 1532.0 | 0.00 | 0.6199 |
| 3.0000000 | 61.2276 | 10.765 | 665.10 | 11.375 | 676.47 | 0.00 | 0.4133 |
| 4.0000000 | 71.8203 | 29.932 | 1387.0 | 10.266 | 1397.3 | 0.00 | 0.3100 |
| 5.0000000 | 79.1759 | 22.396 | 830.25 | 9.1678 | 839.42 | 0.00 | 0.2480 |
| 6.0000000 | 84.0902 | 17.991 | 555.80 | 8.1848 | 563.98 | 0.00 | 0.2066 |
| 8.0000000 | 86.0730 | 11.798 | 273.36 | 6.5972 | 279.95 | 0.00 | 0.1550 |
| 10.000000 | 86.1117 | 8.3217 | 154.25 | 5.4186 | 159.66 | 0.00 | 0.1240 |

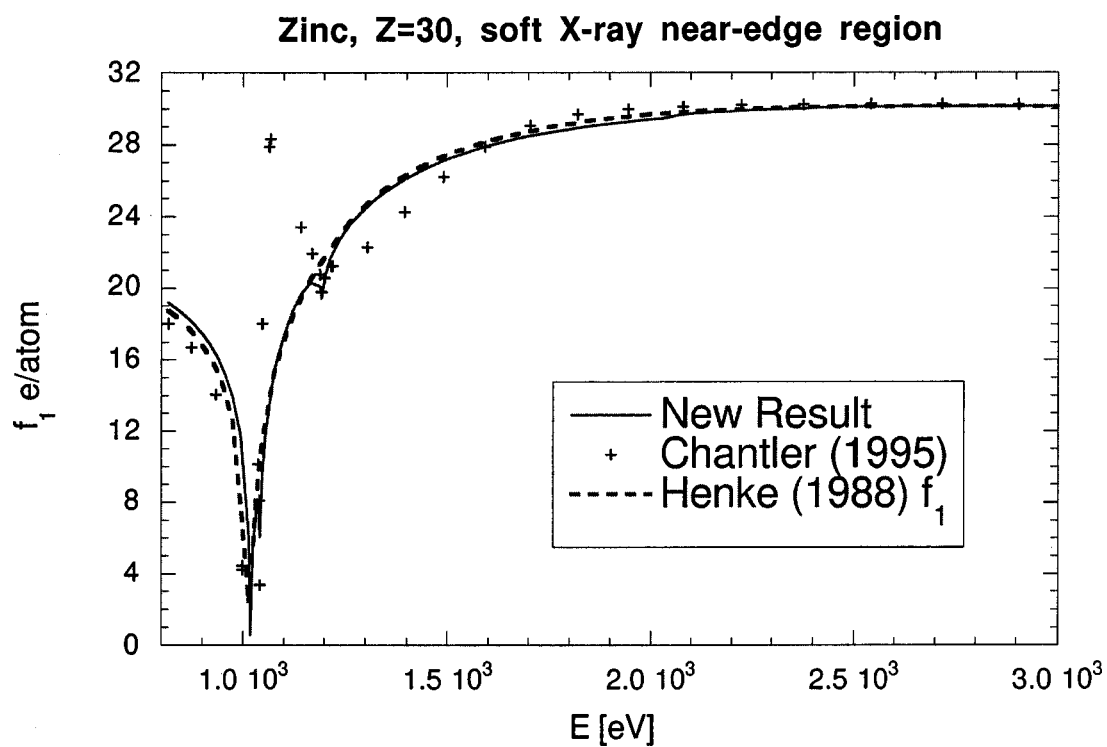


FIG. 15.

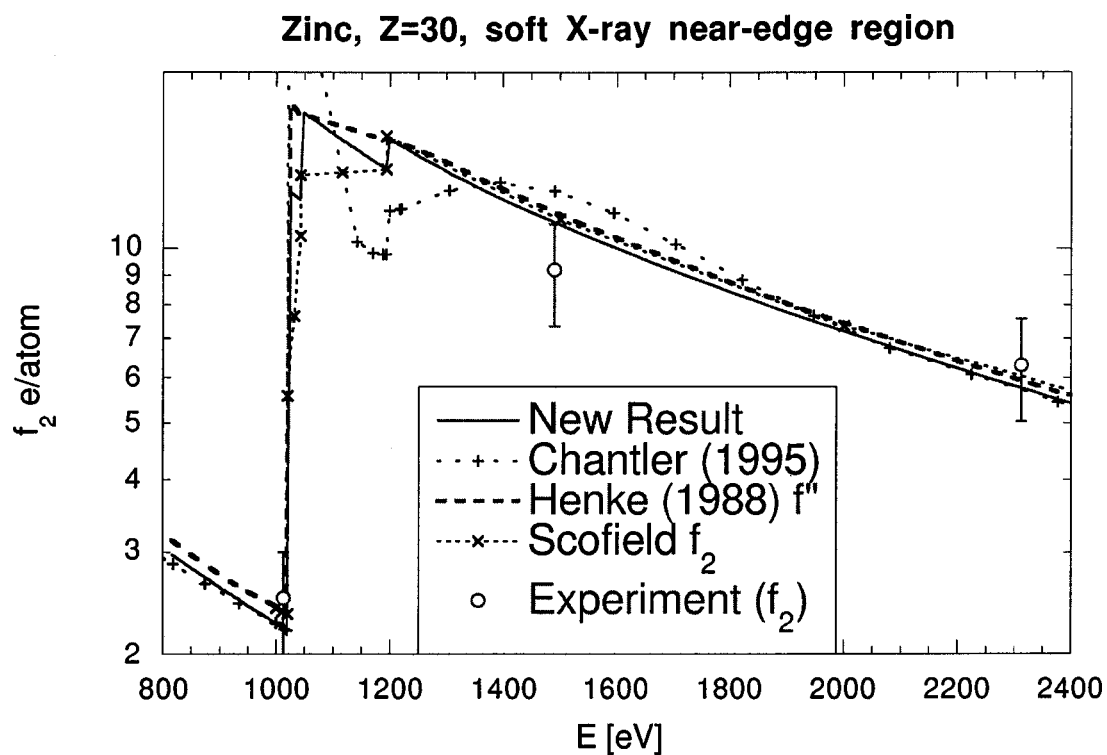


FIG. 16.

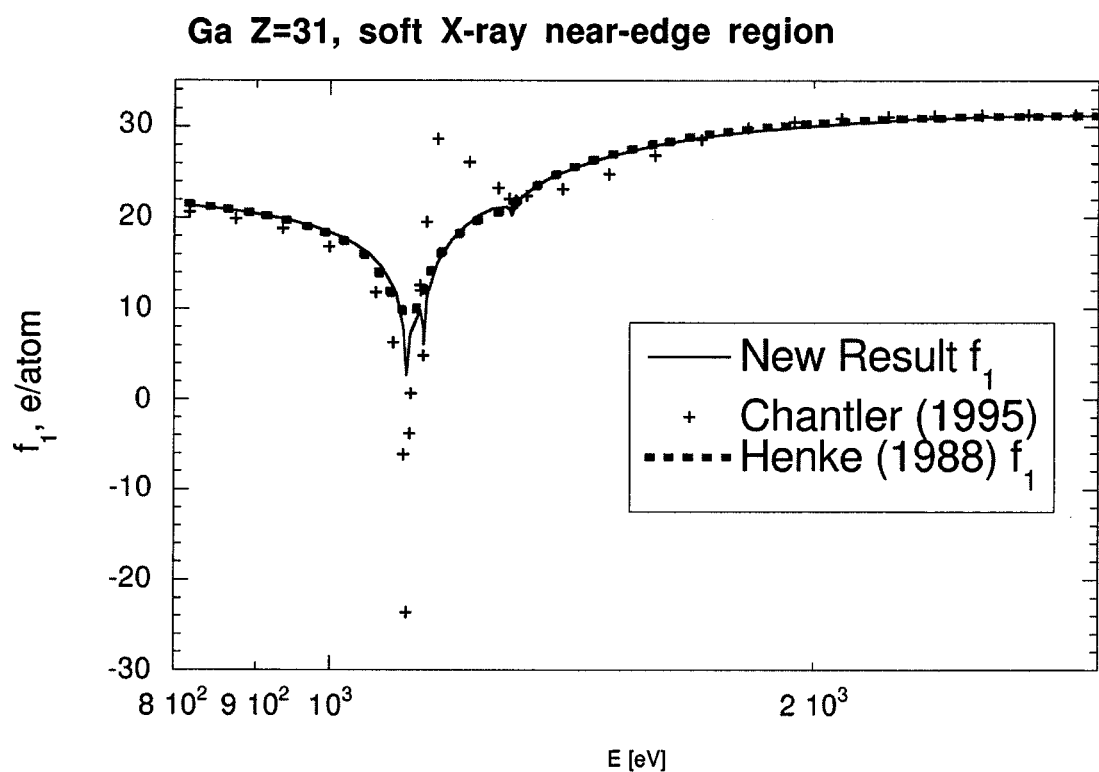


FIG. 17.

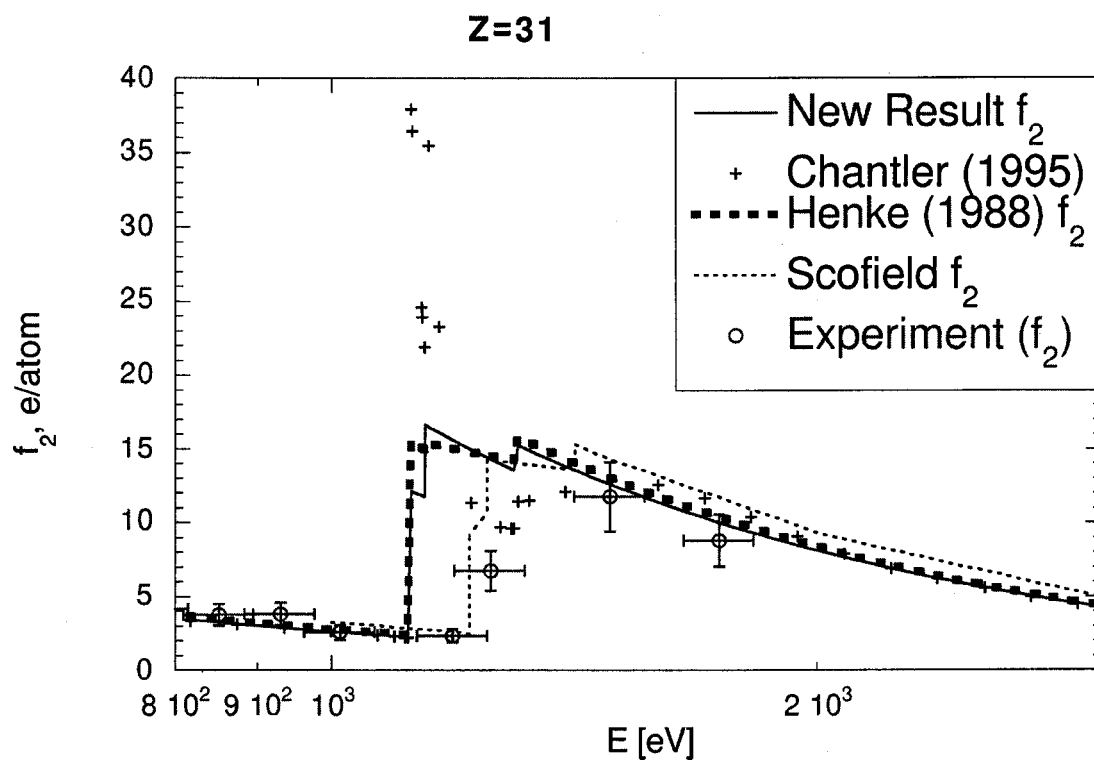


FIG. 18.

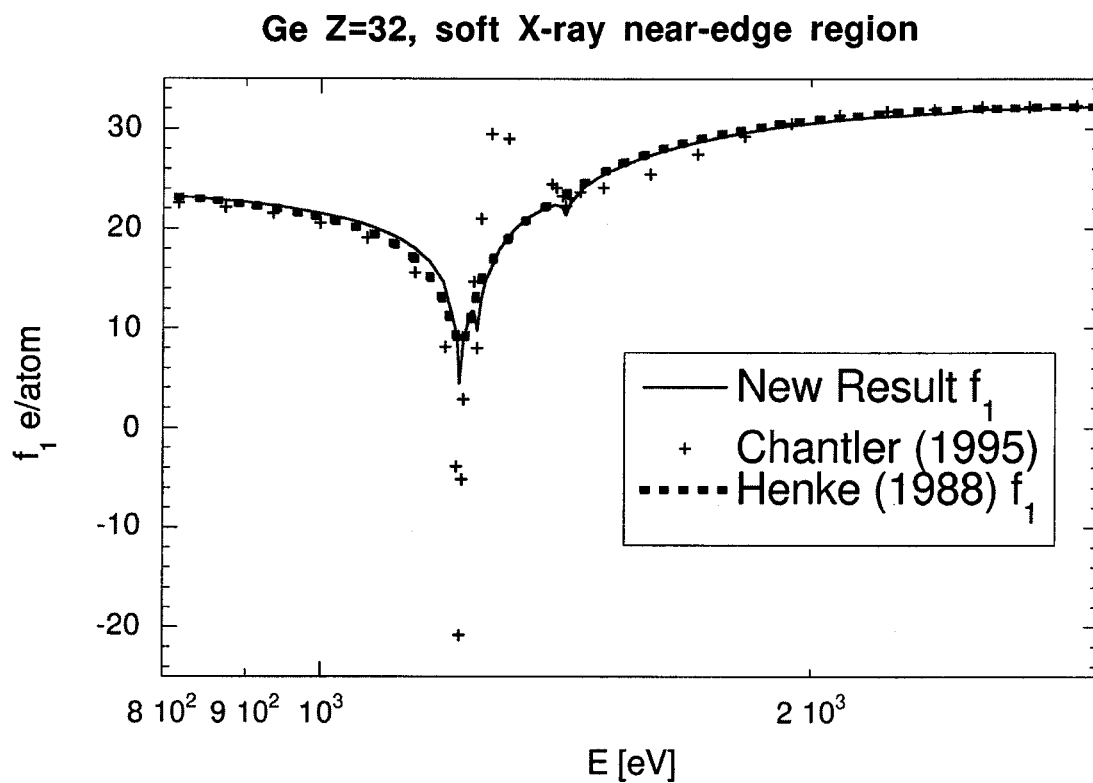


FIG. 19.

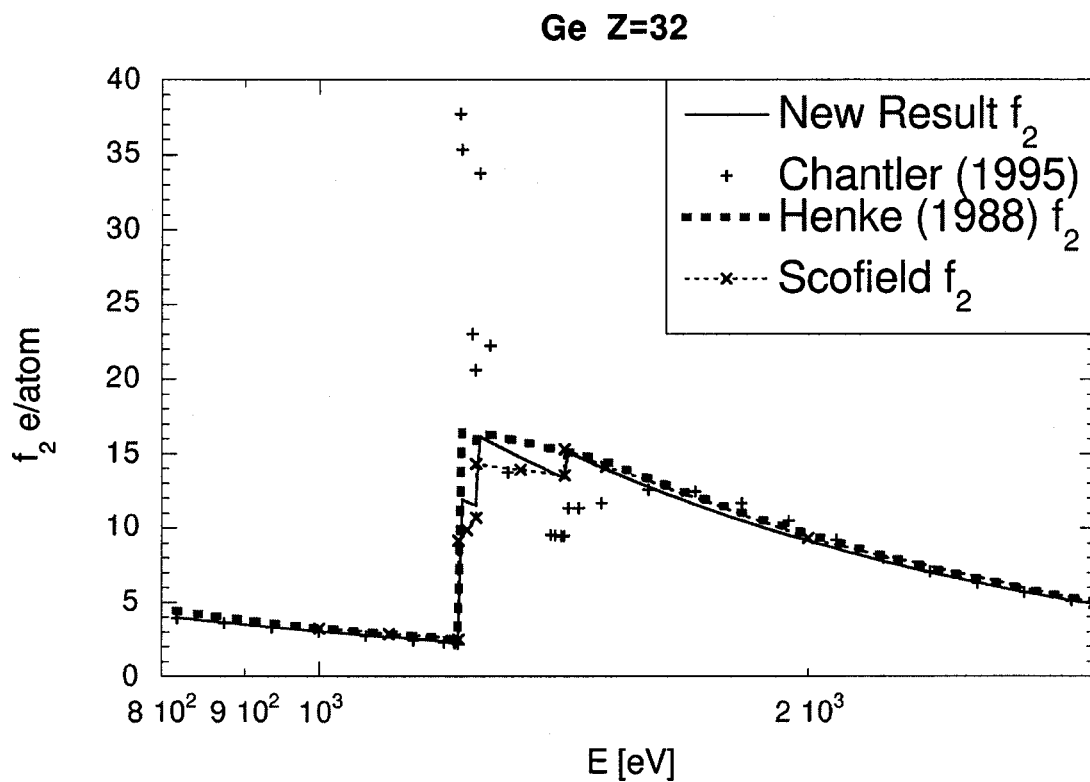


FIG. 20.

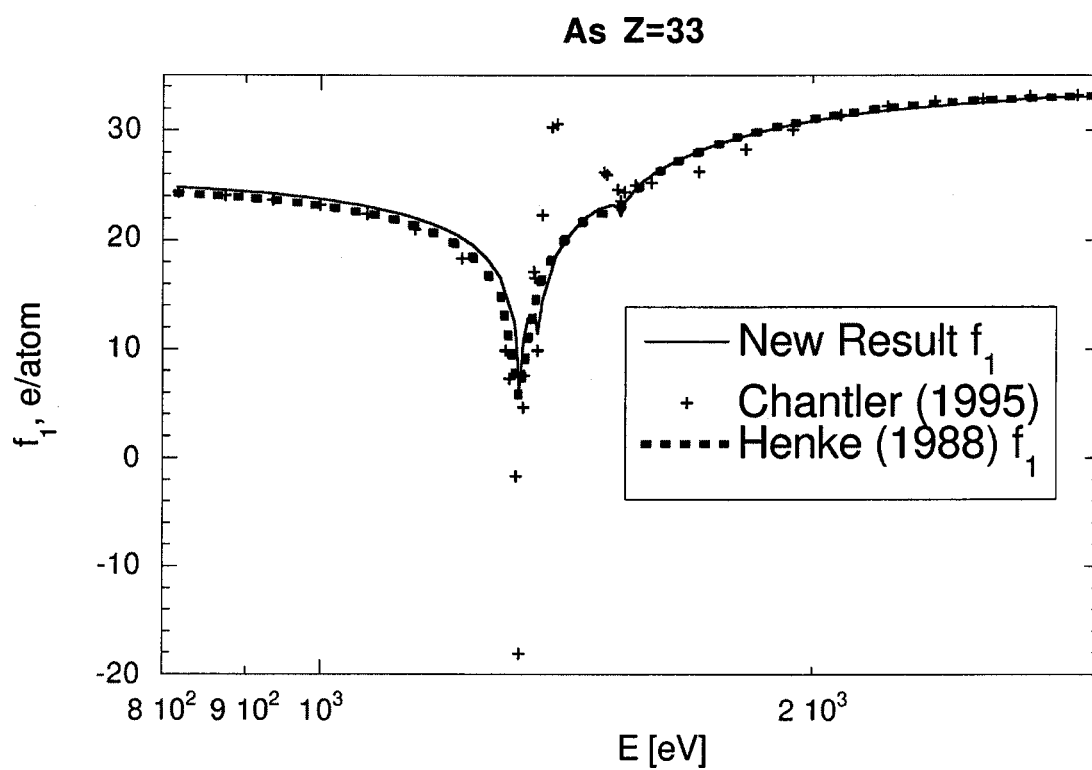


FIG. 21.

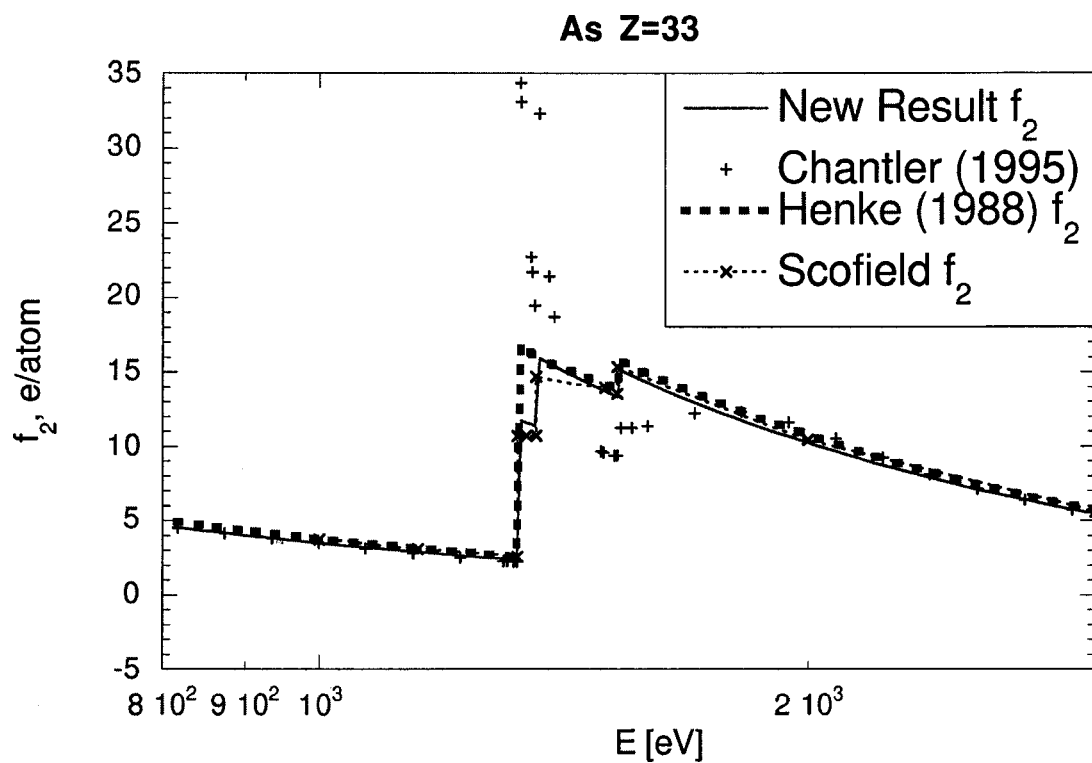


FIG. 22.

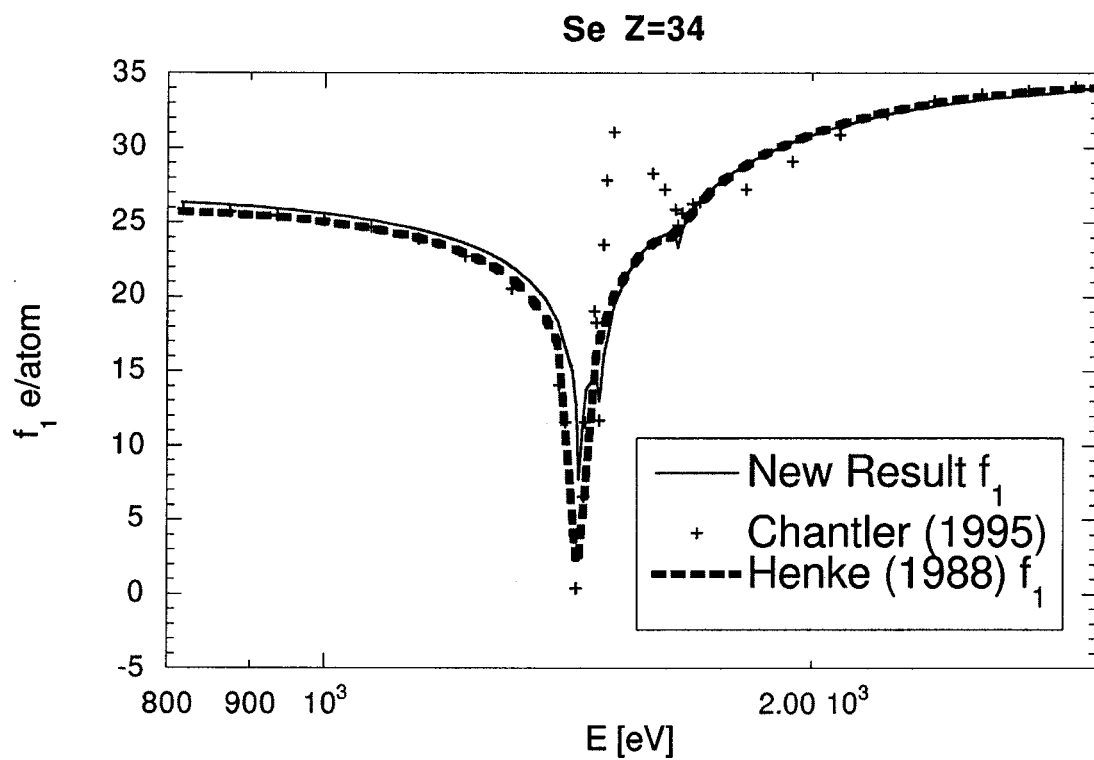


FIG. 23.

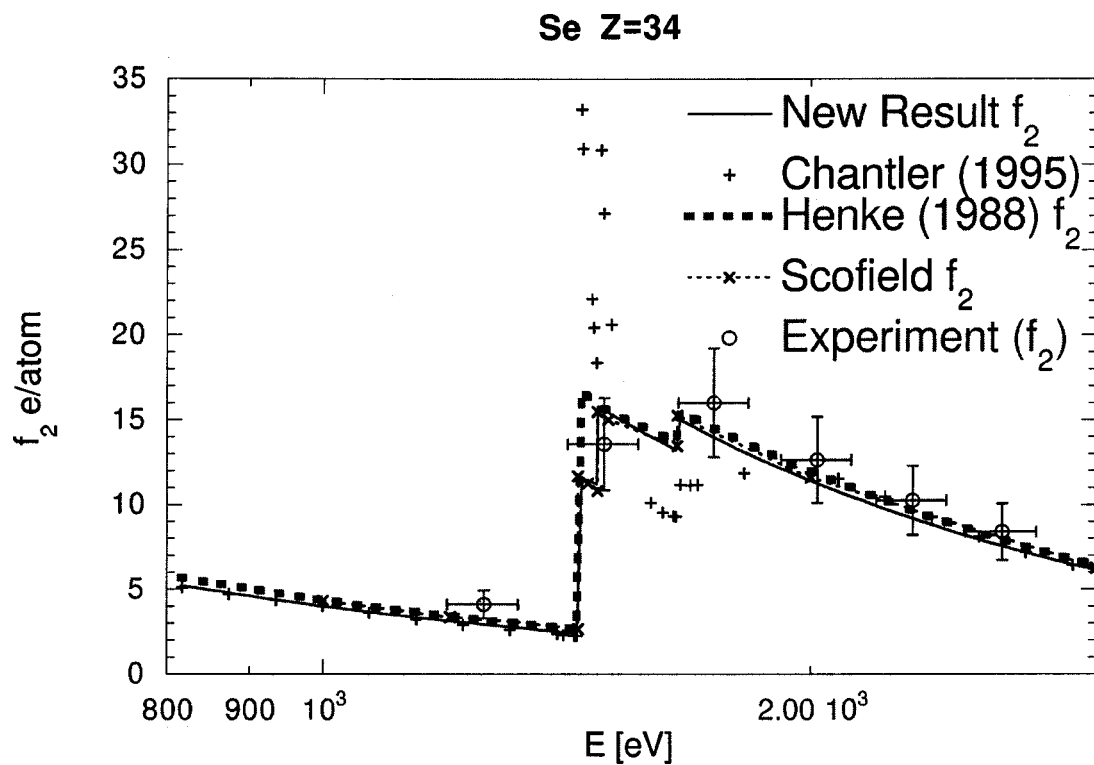


FIG. 24.

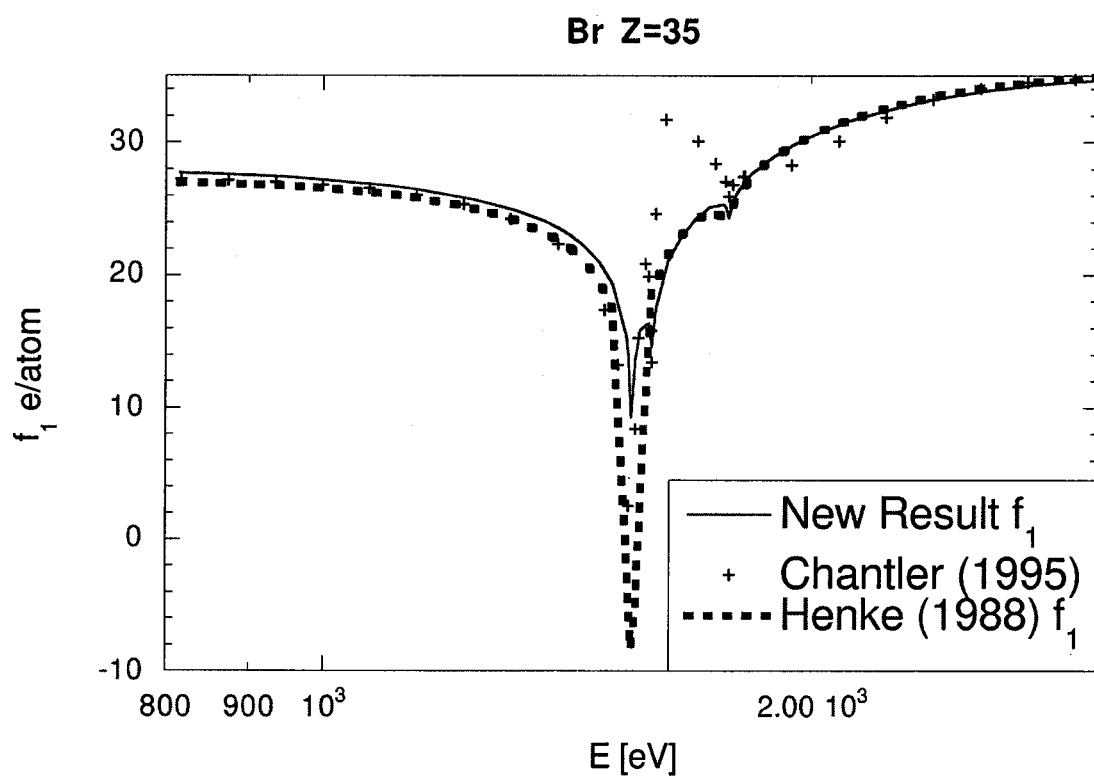


FIG. 25.

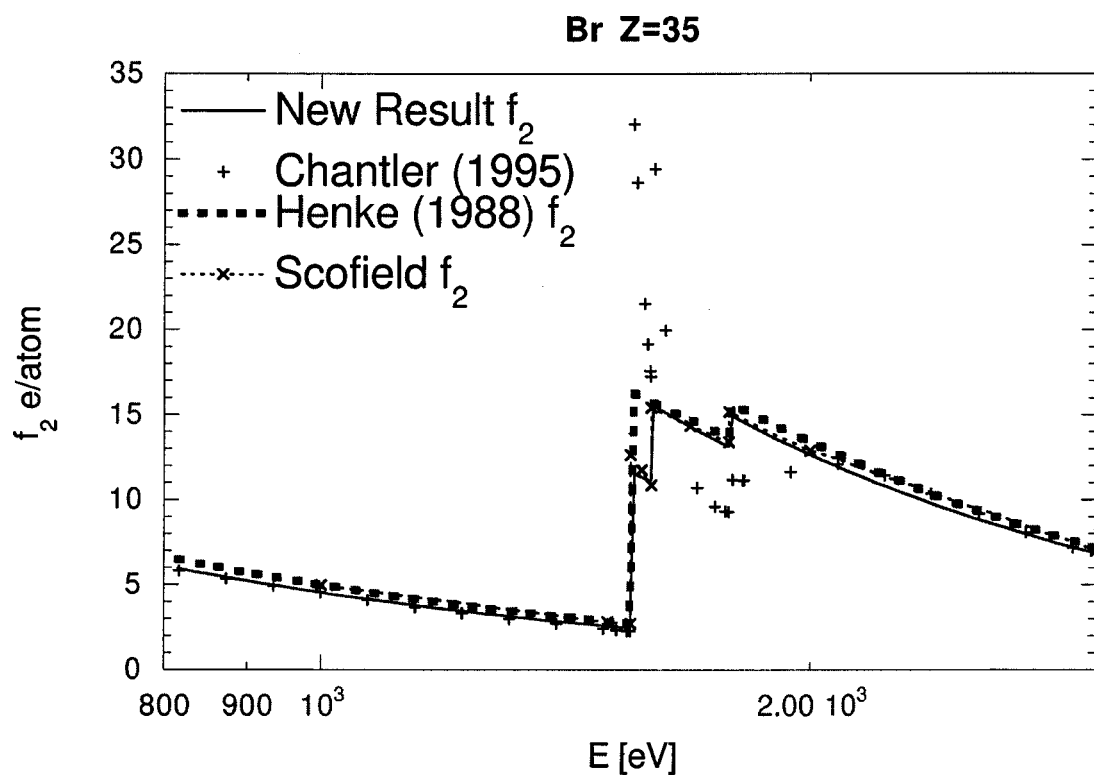


FIG. 26.

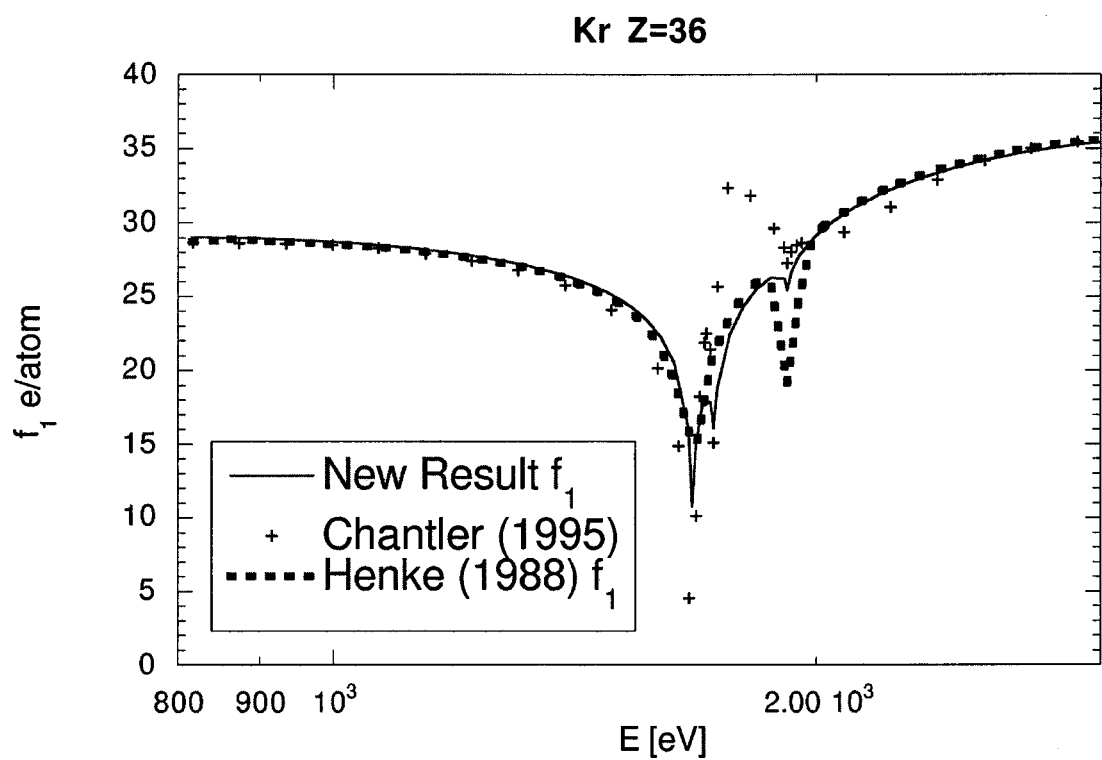


FIG. 27.

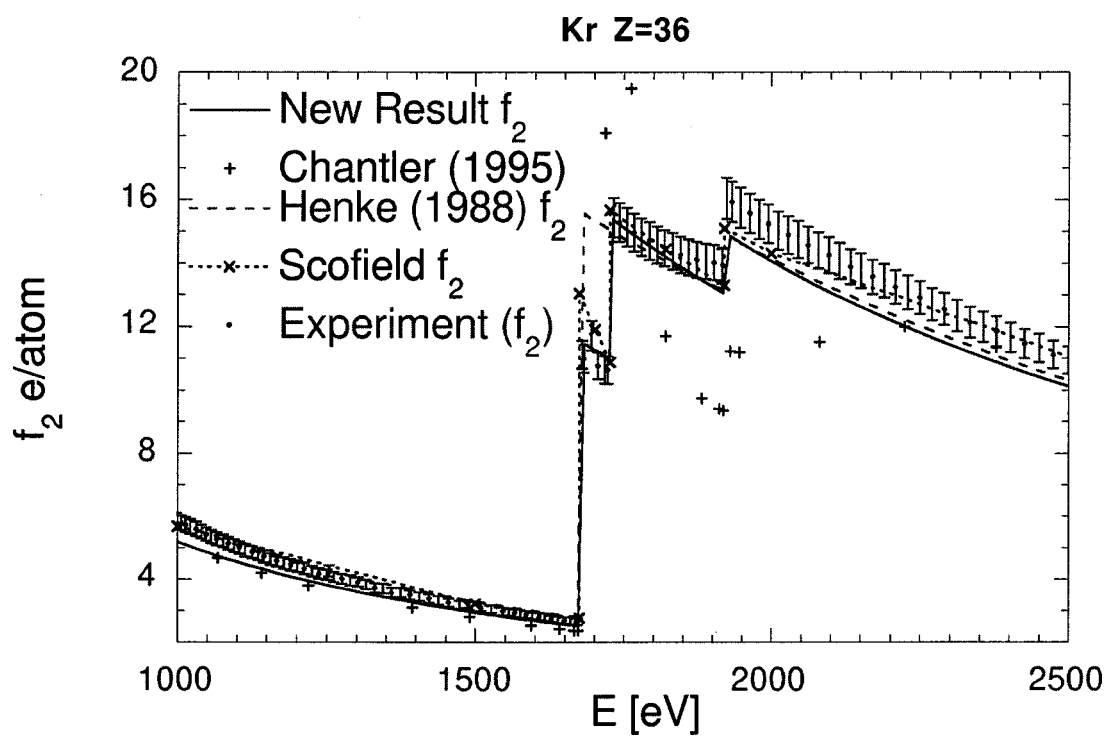


FIG. 28.

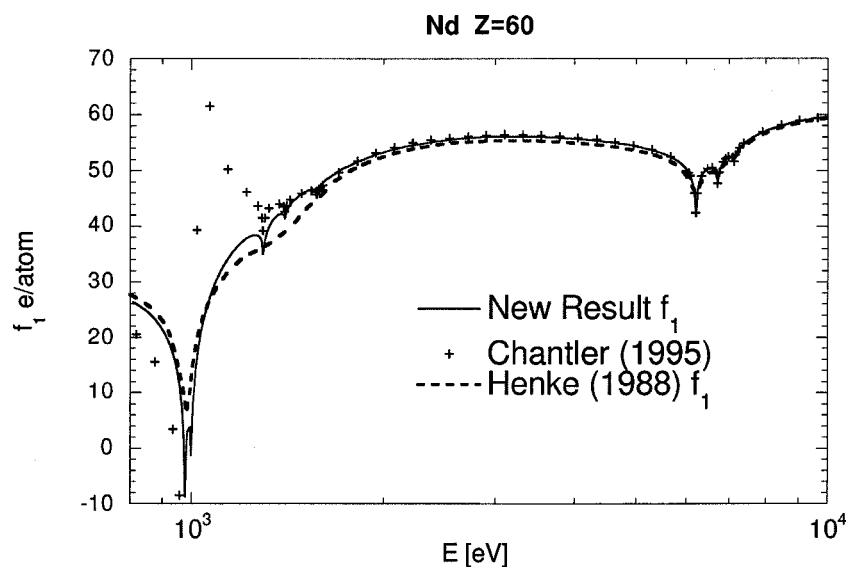


FIG. 29.

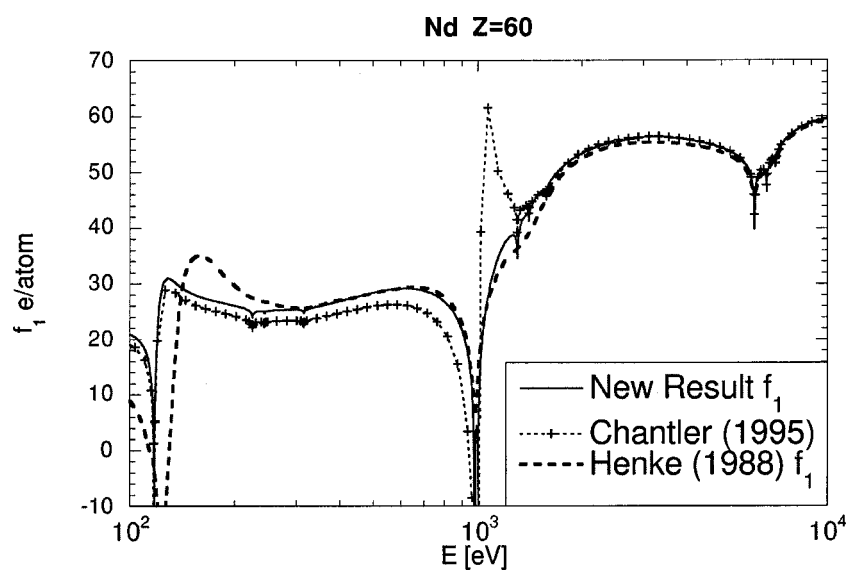


FIG. 30.

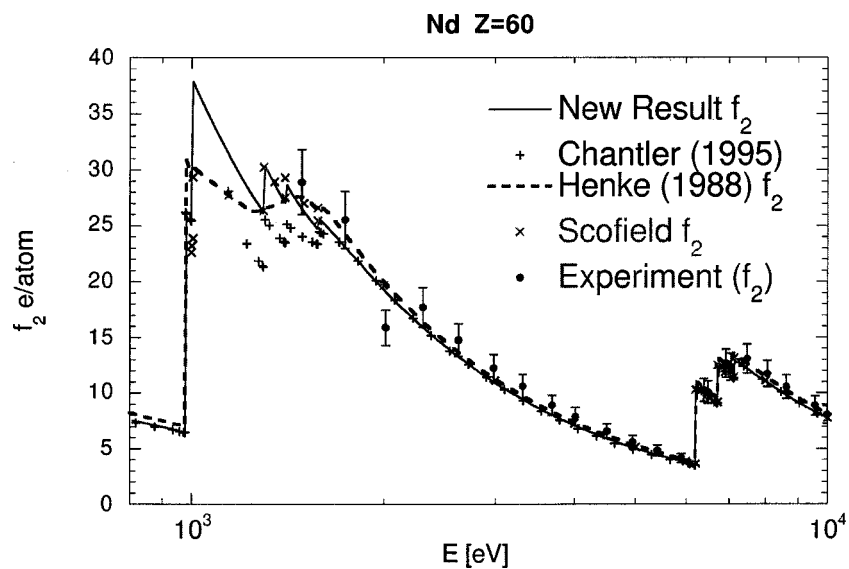


FIG. 31.

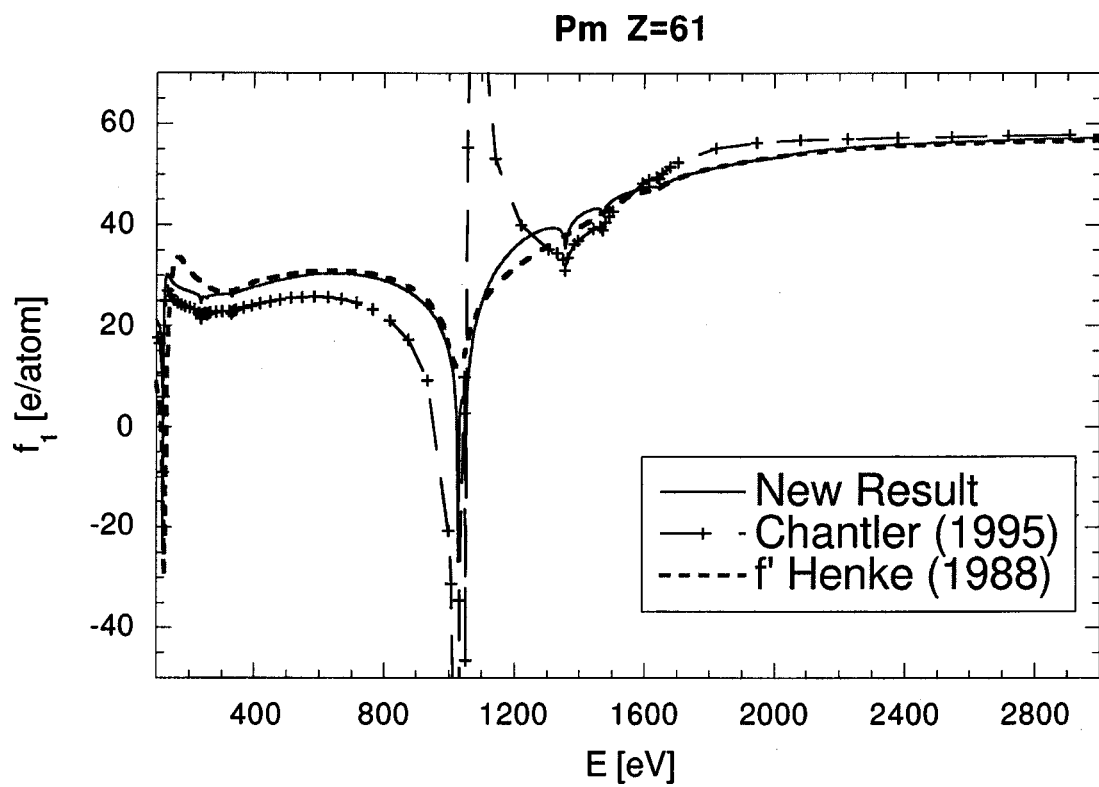


FIG. 32.

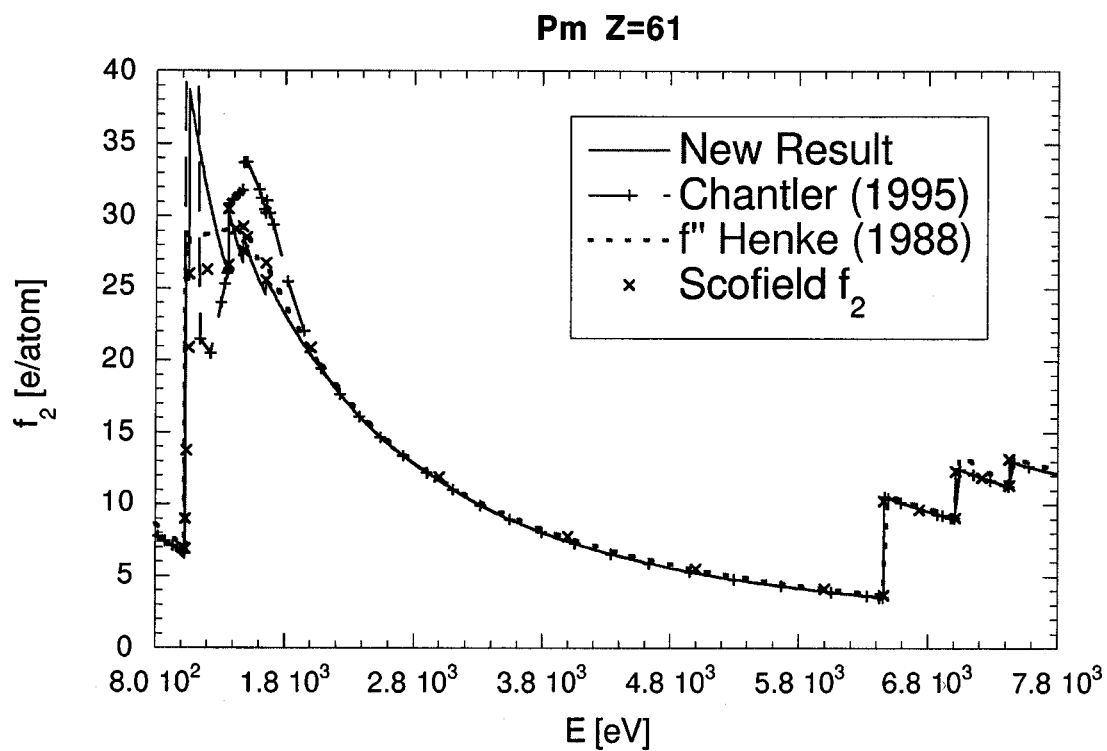


FIG. 33.

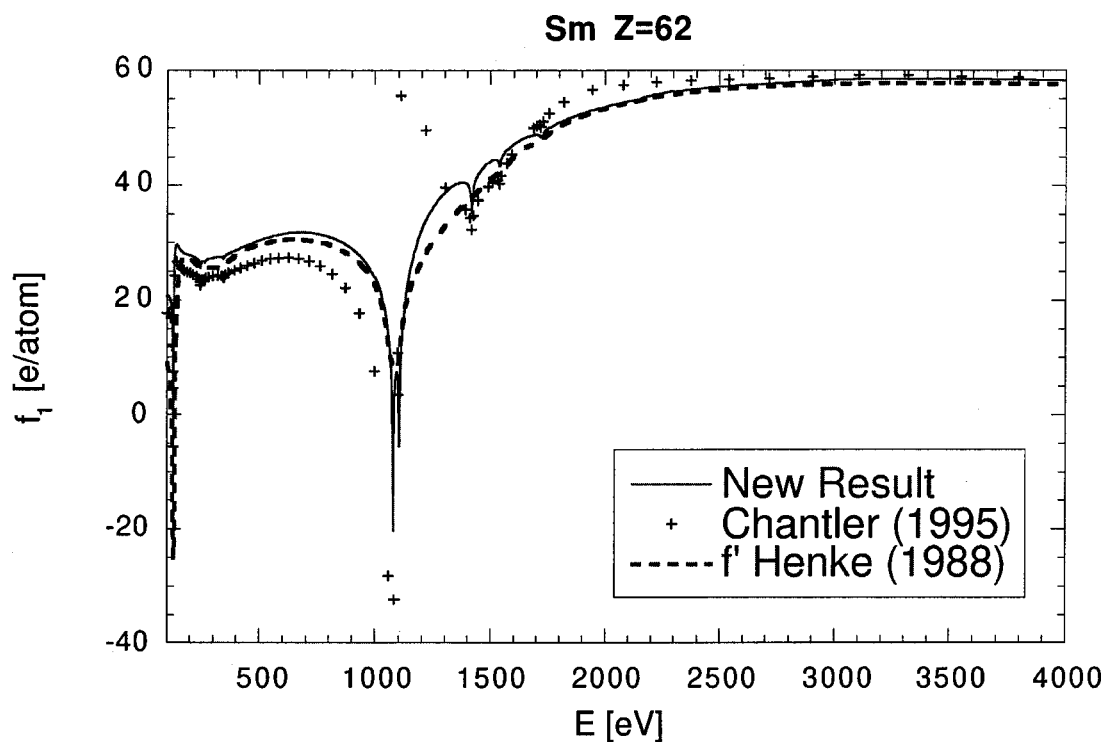


FIG. 34.

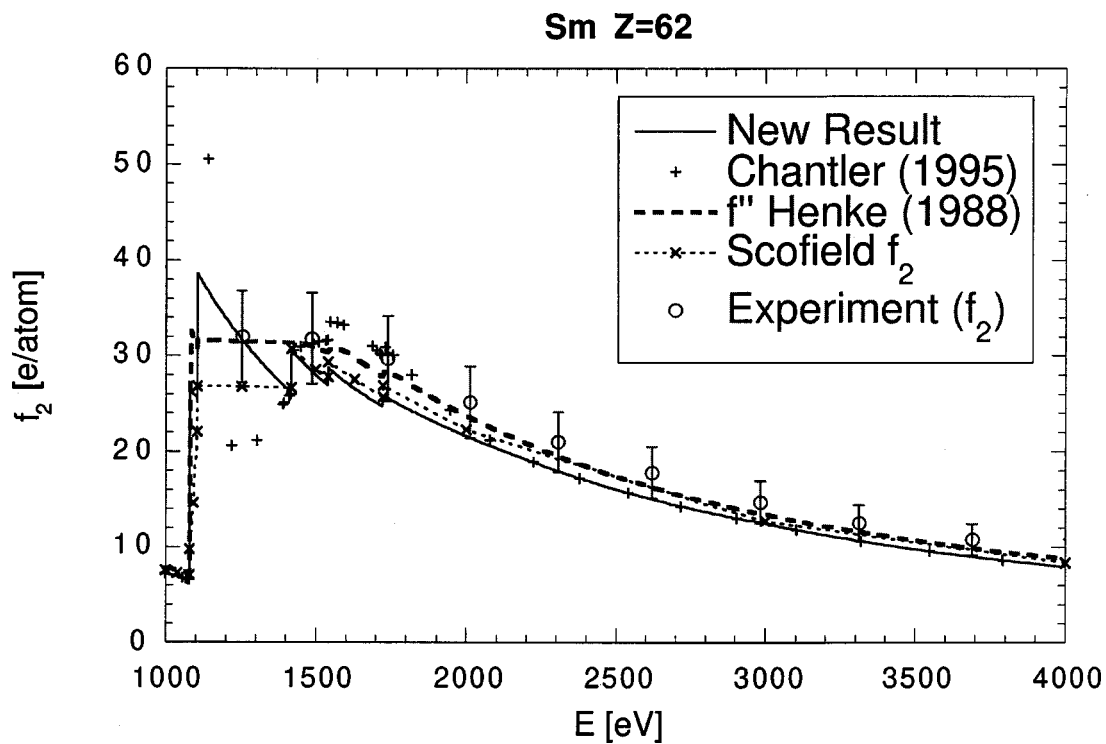


FIG. 35.

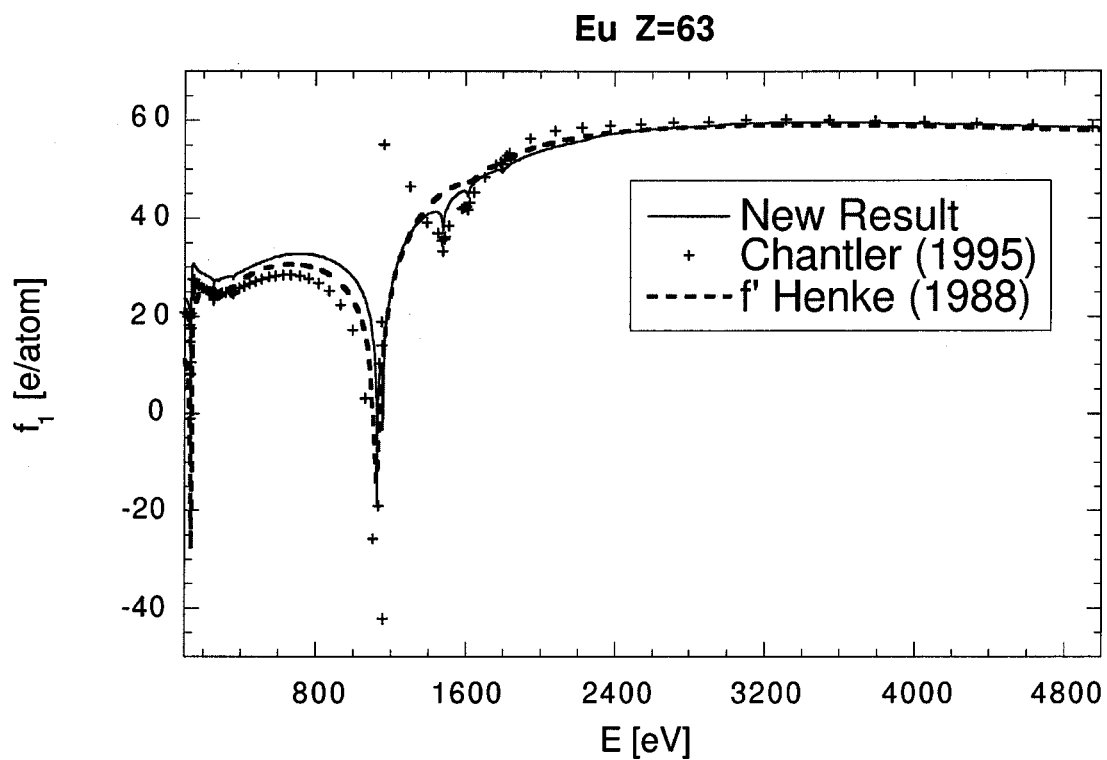


FIG. 36.

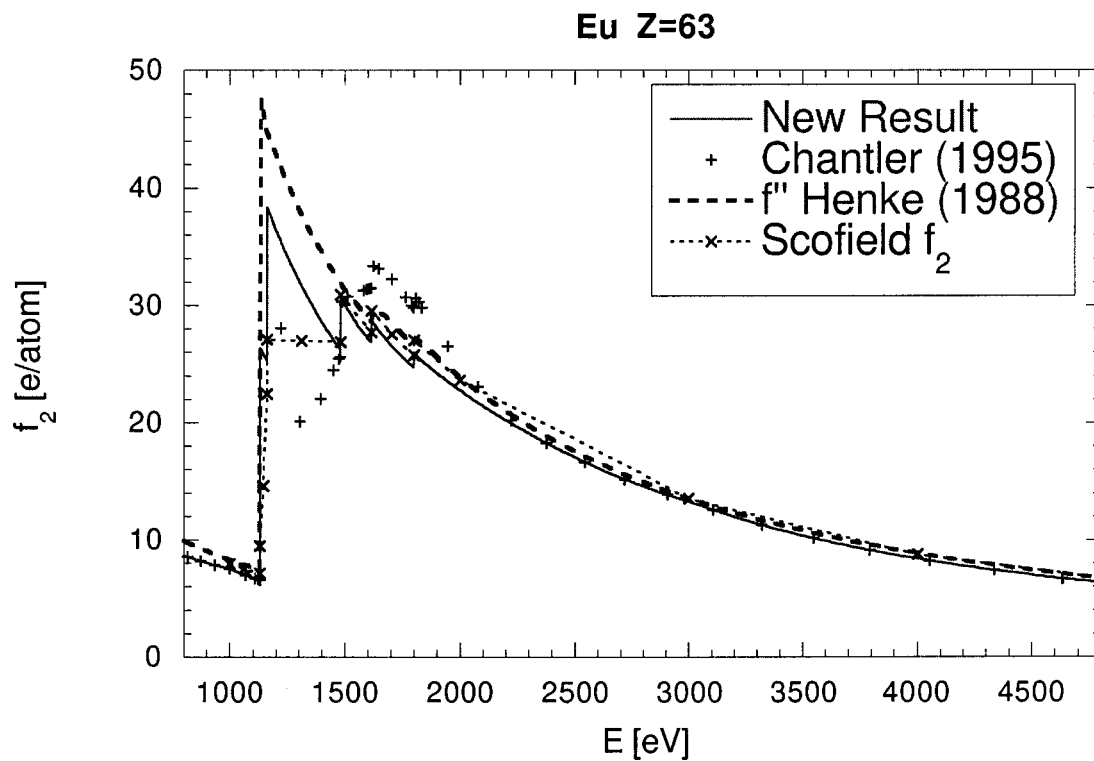


FIG. 37.

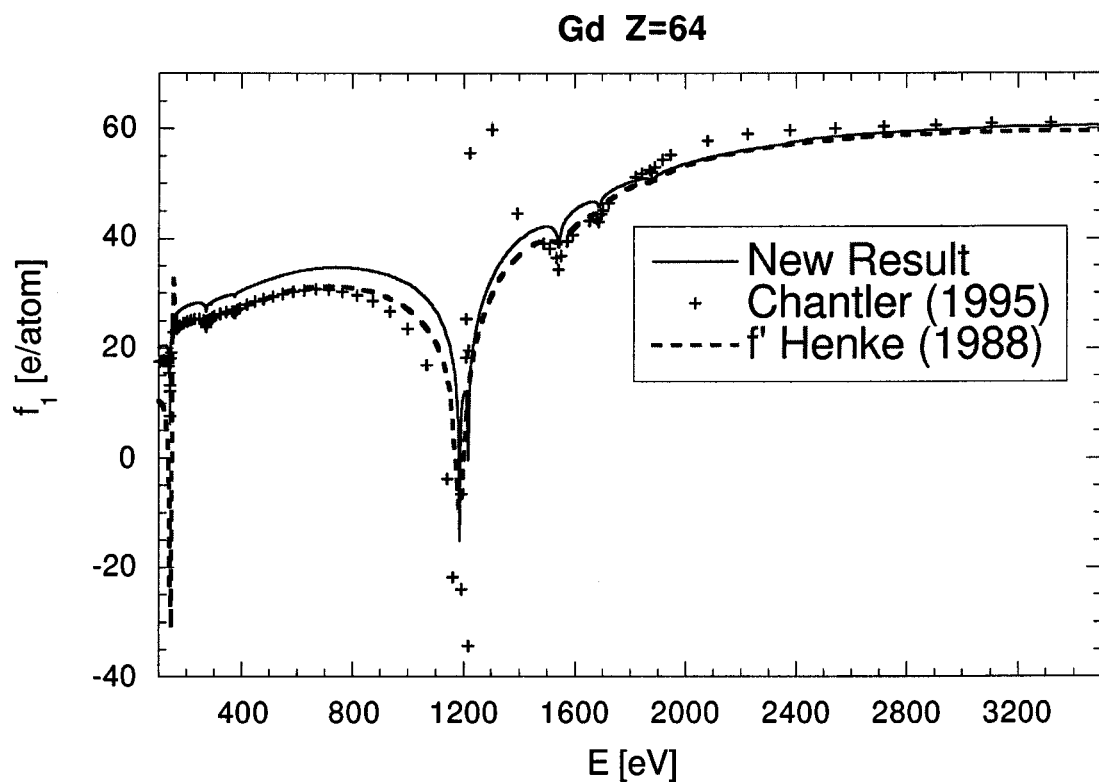


FIG. 38.

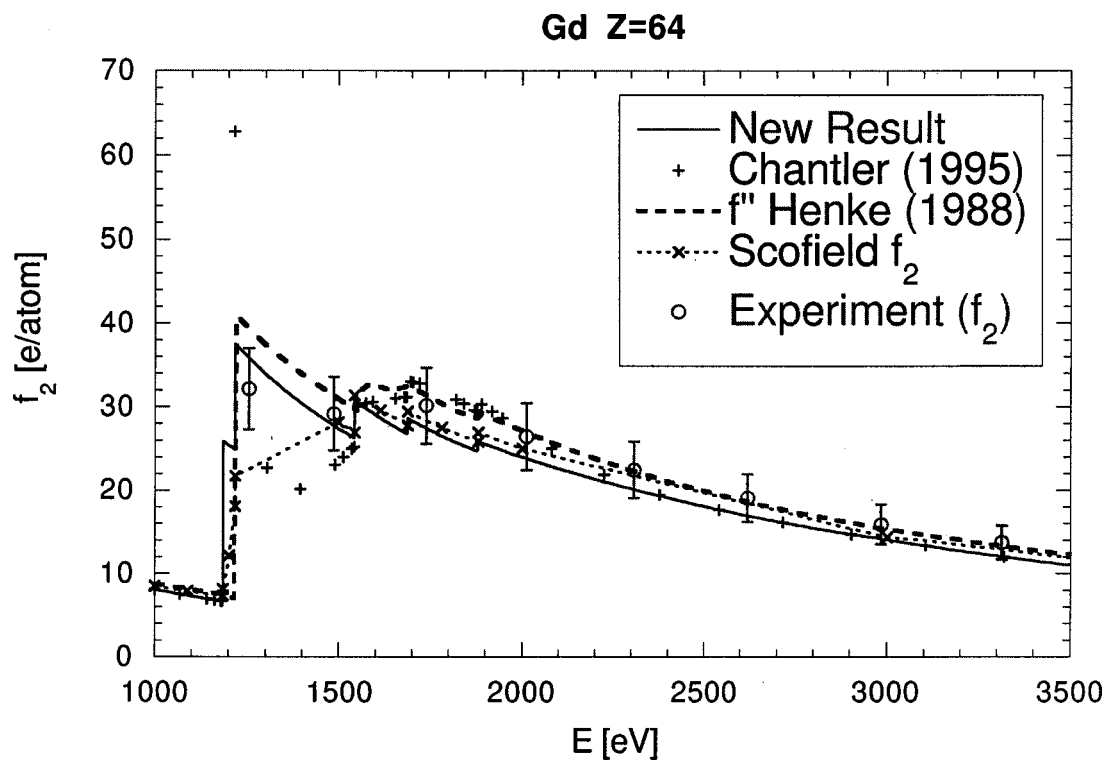


FIG. 39.

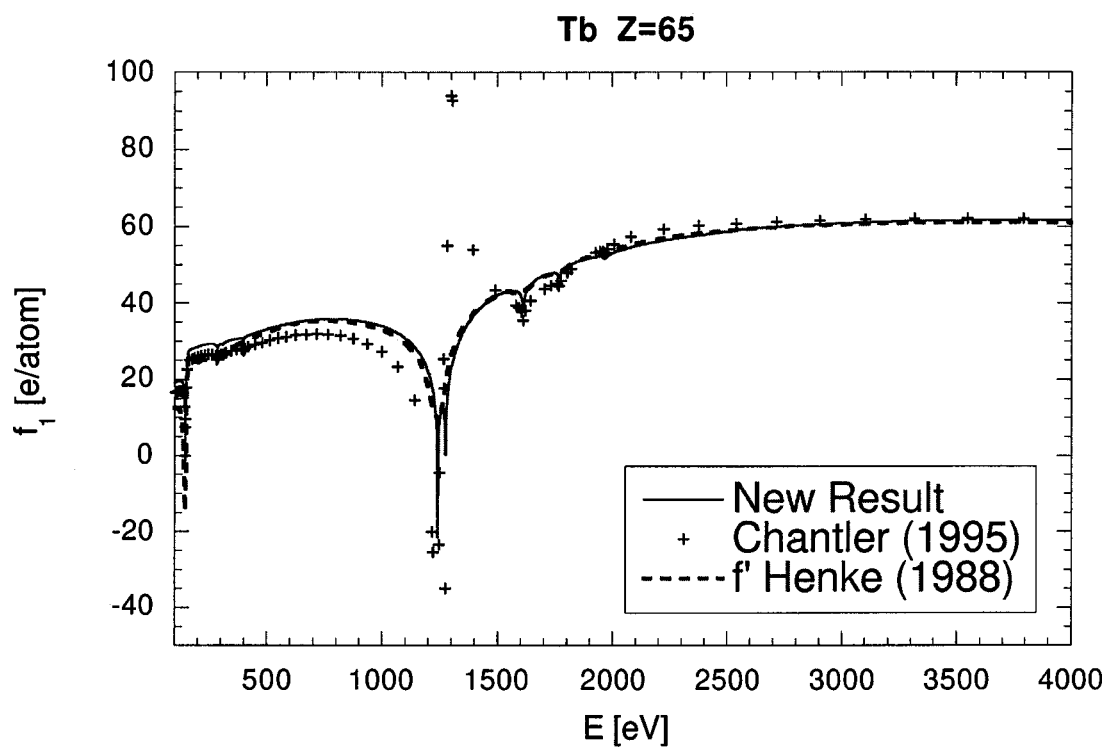


FIG. 40.

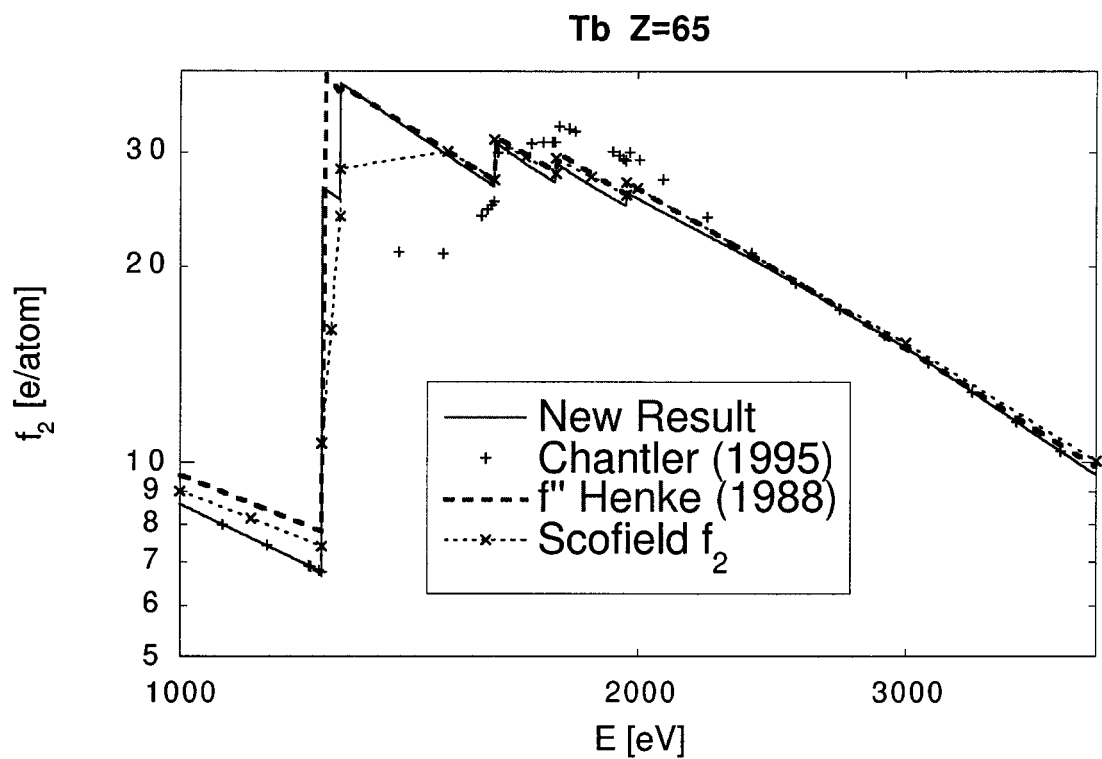


FIG. 41.

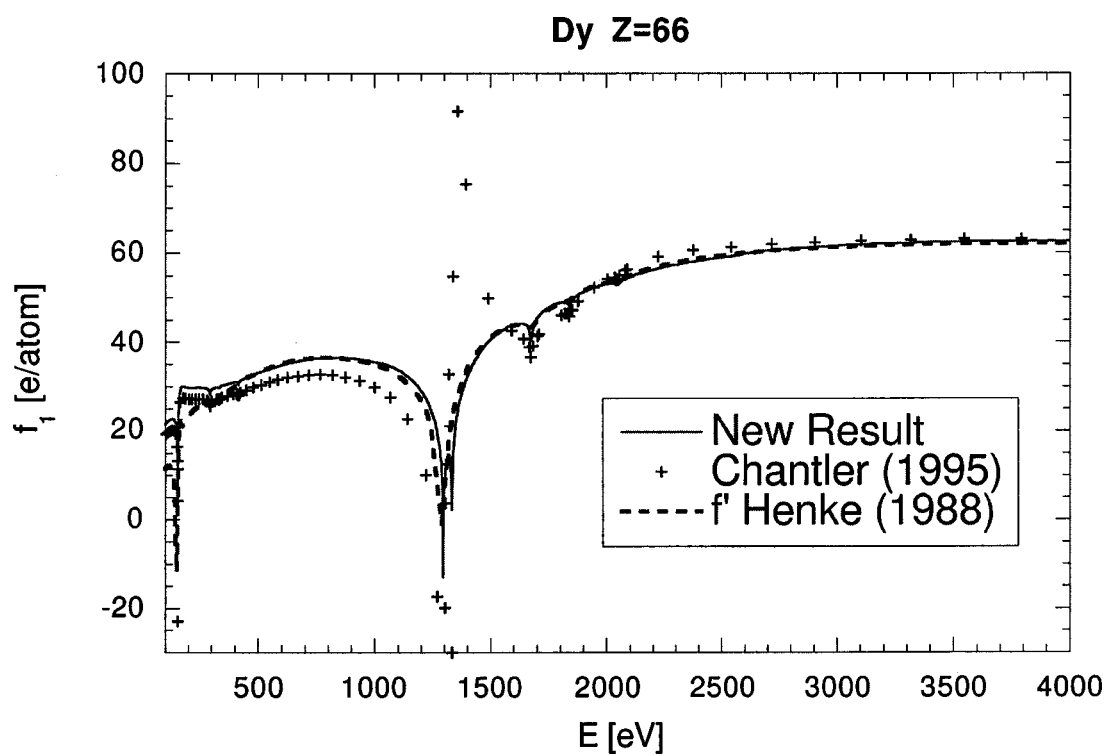


FIG. 42.

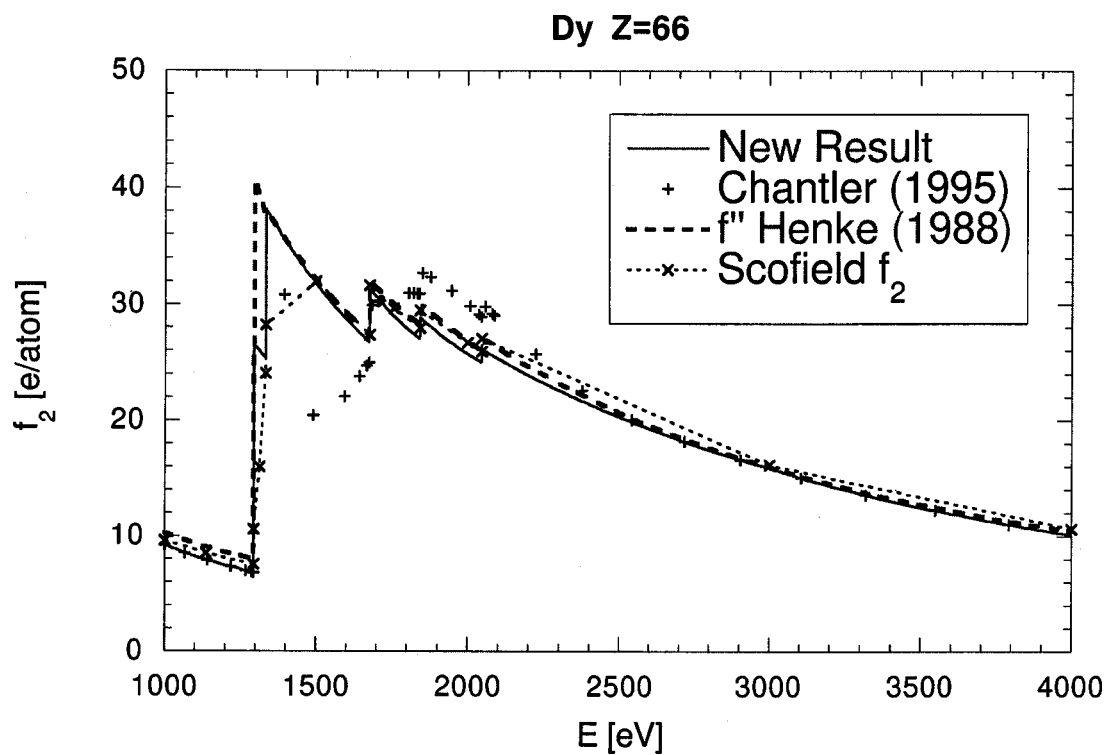


FIG. 43.

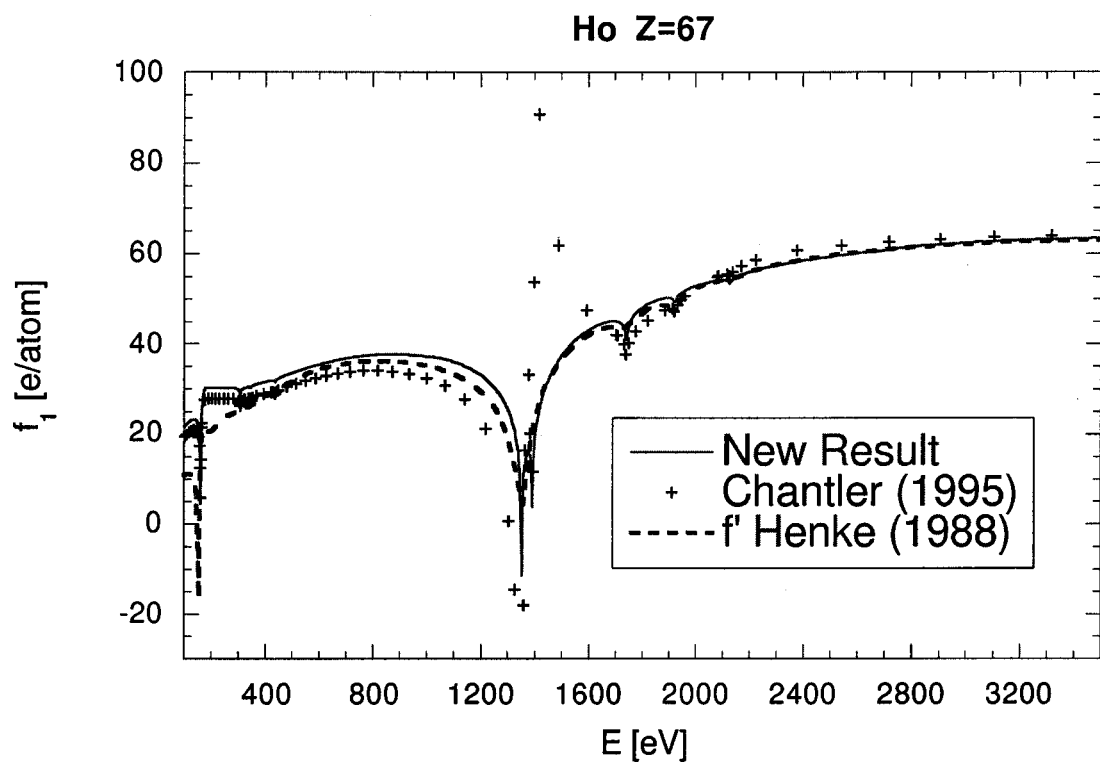


FIG. 44.

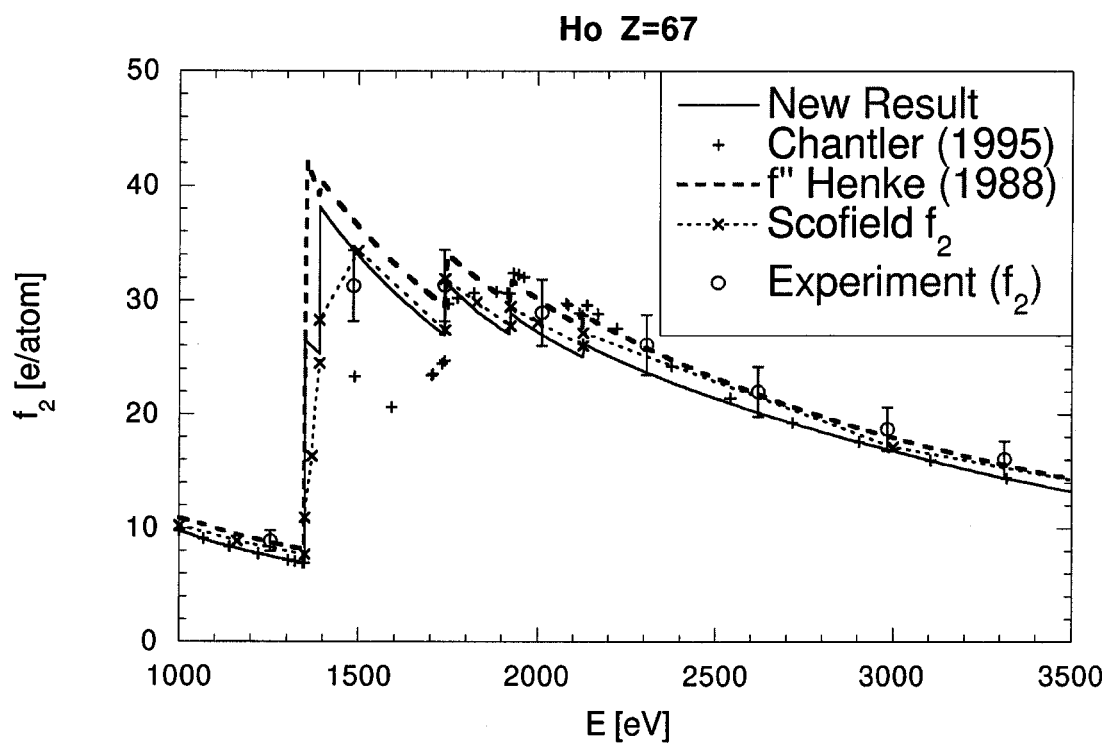


FIG. 45.

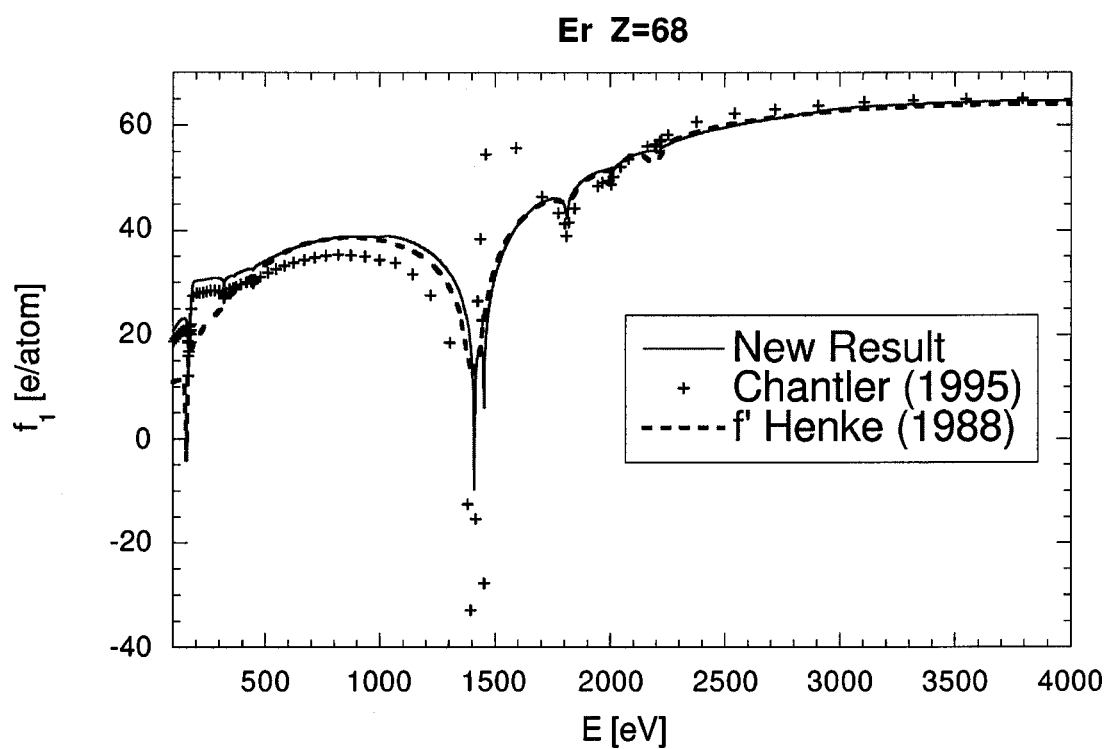


FIG. 46.

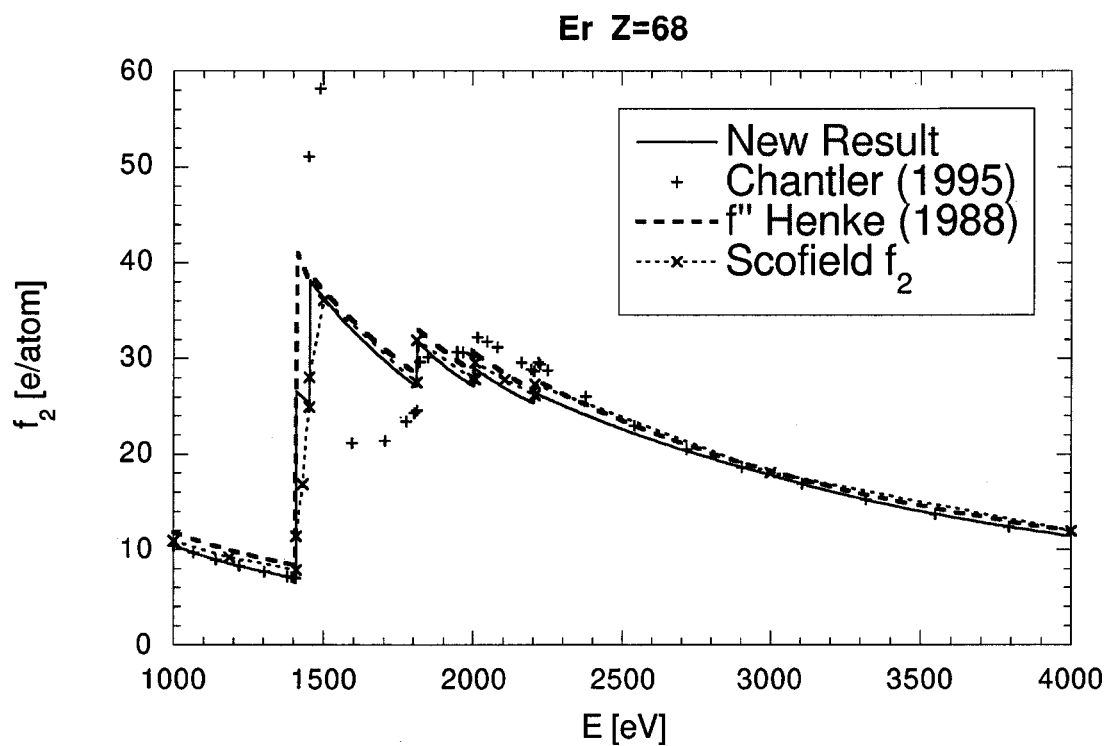


FIG. 47.

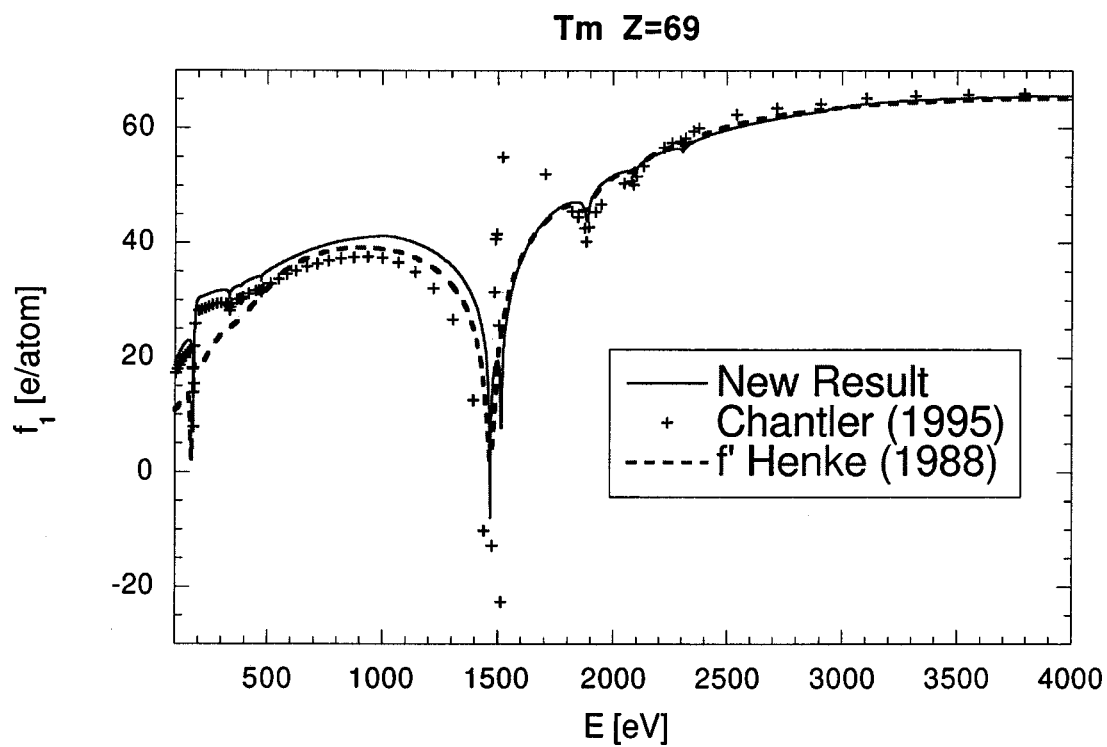


FIG. 48.

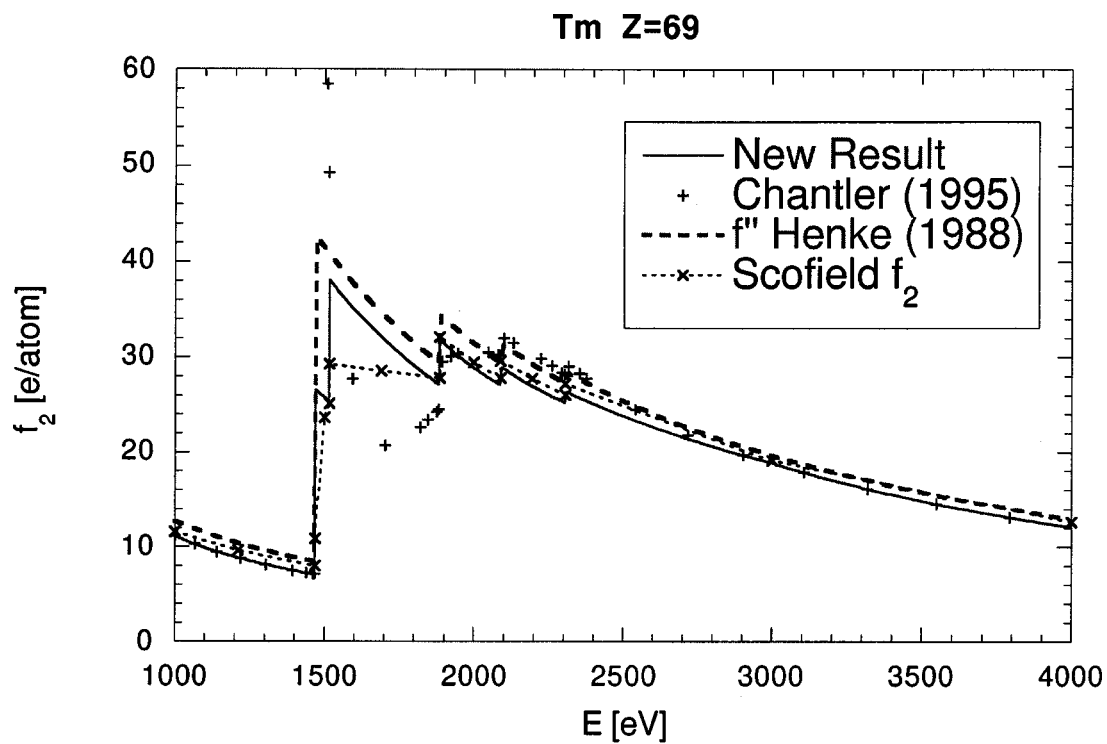


FIG. 49.

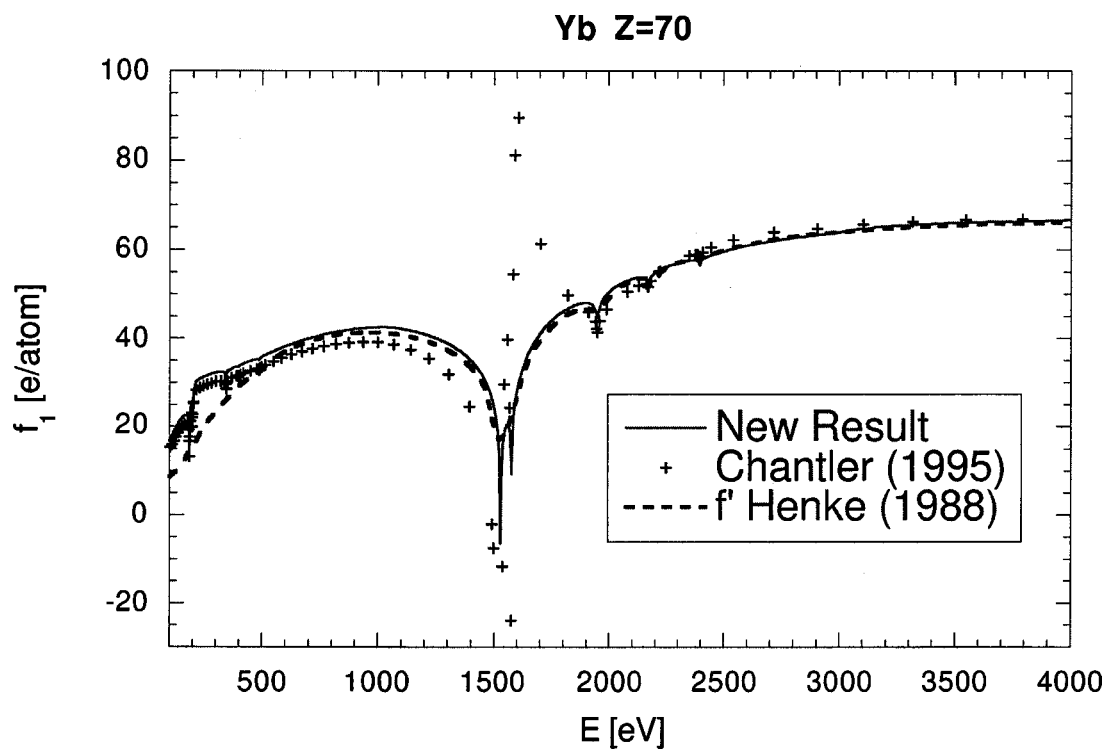


FIG. 50.

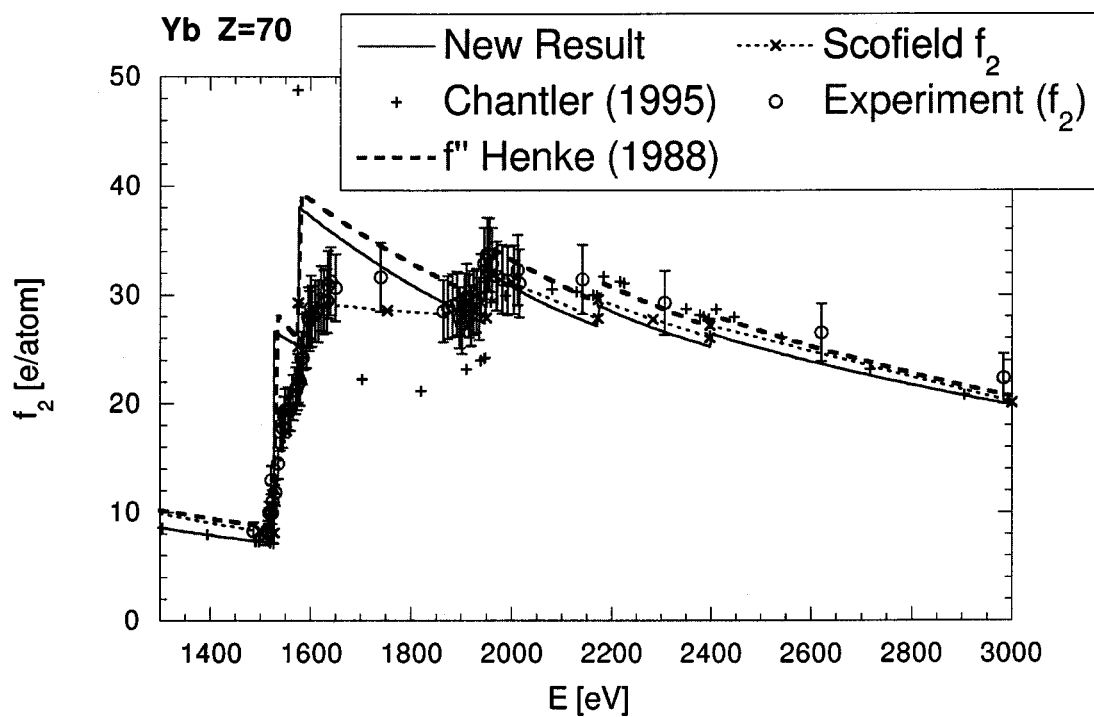


FIG. 51.

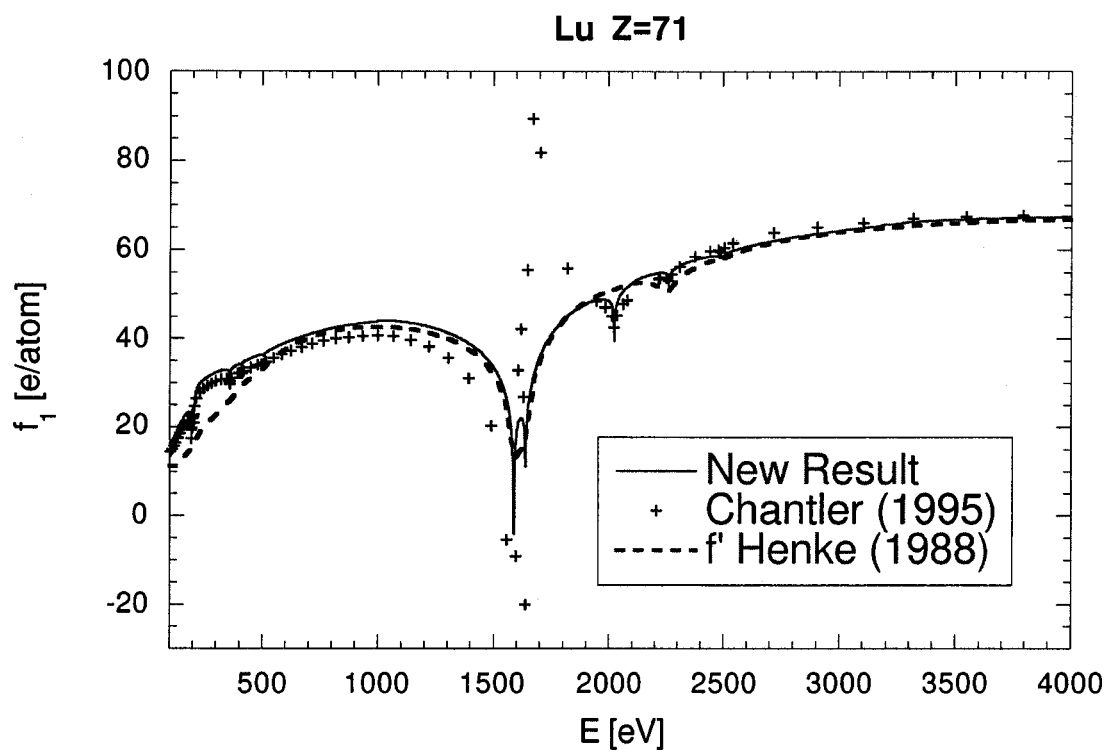


FIG. 52.

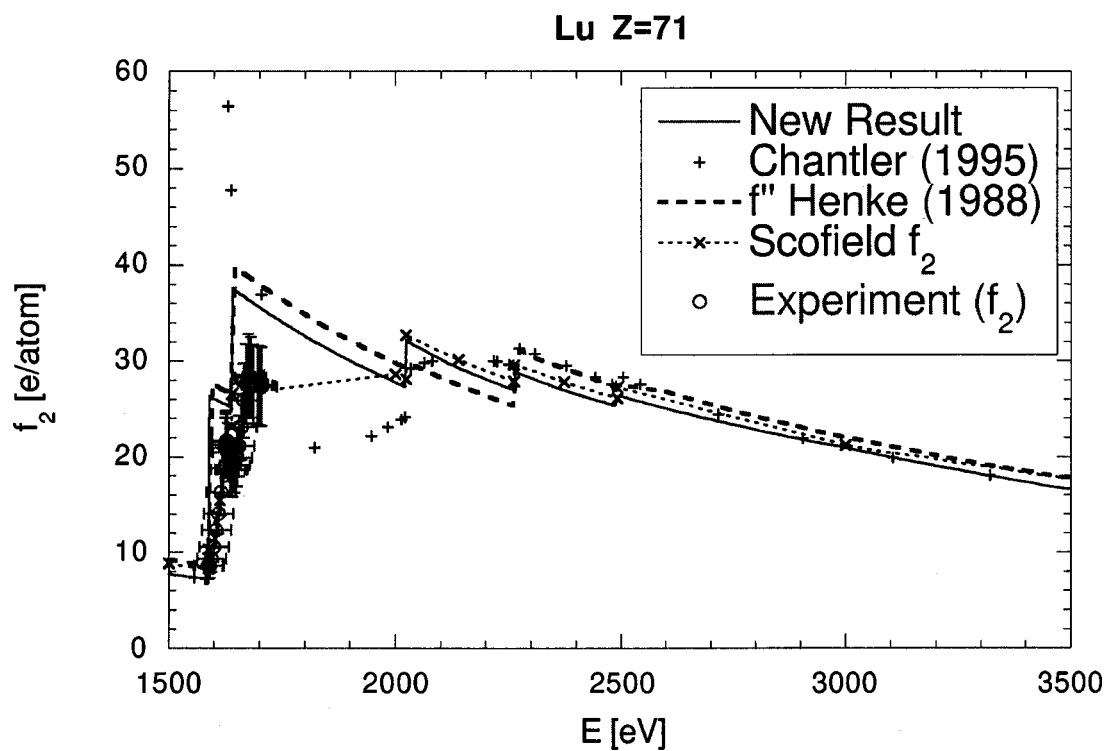


FIG. 53.

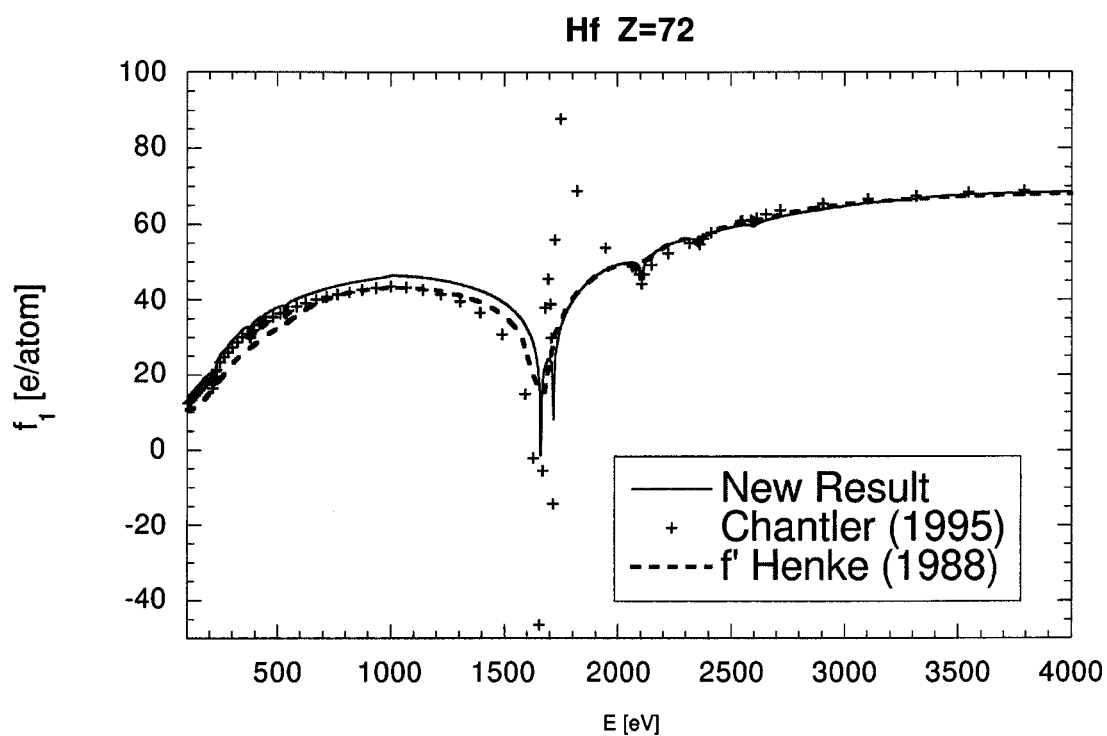


FIG. 54.

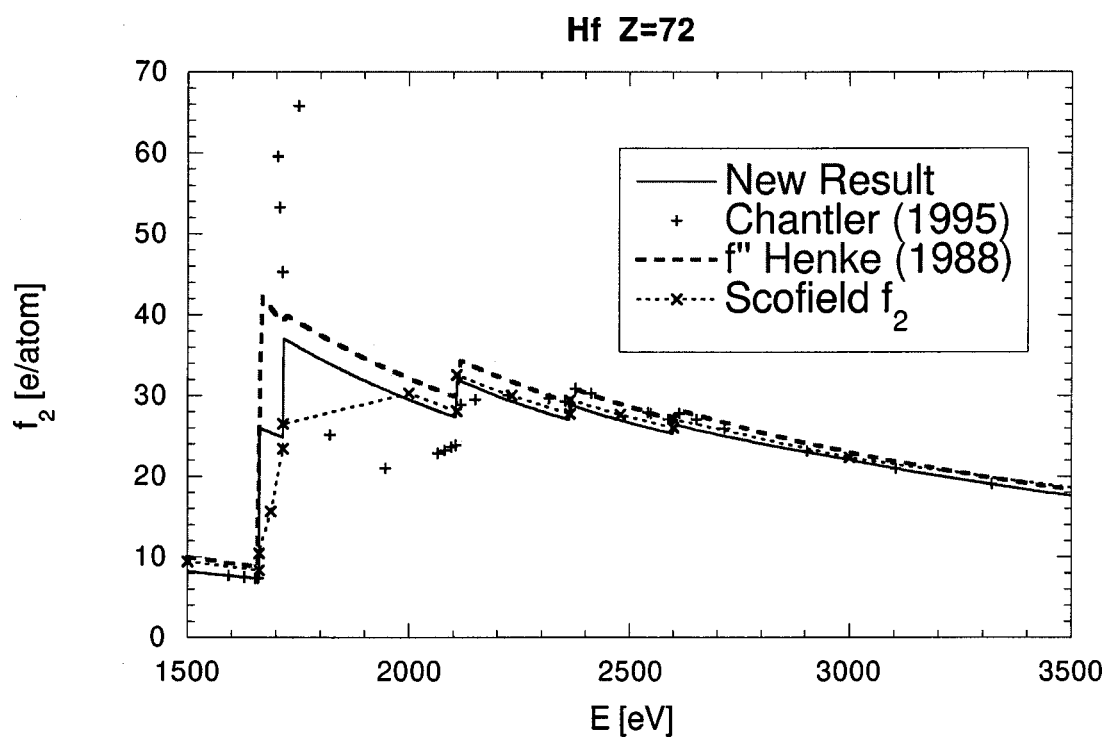


FIG. 55.

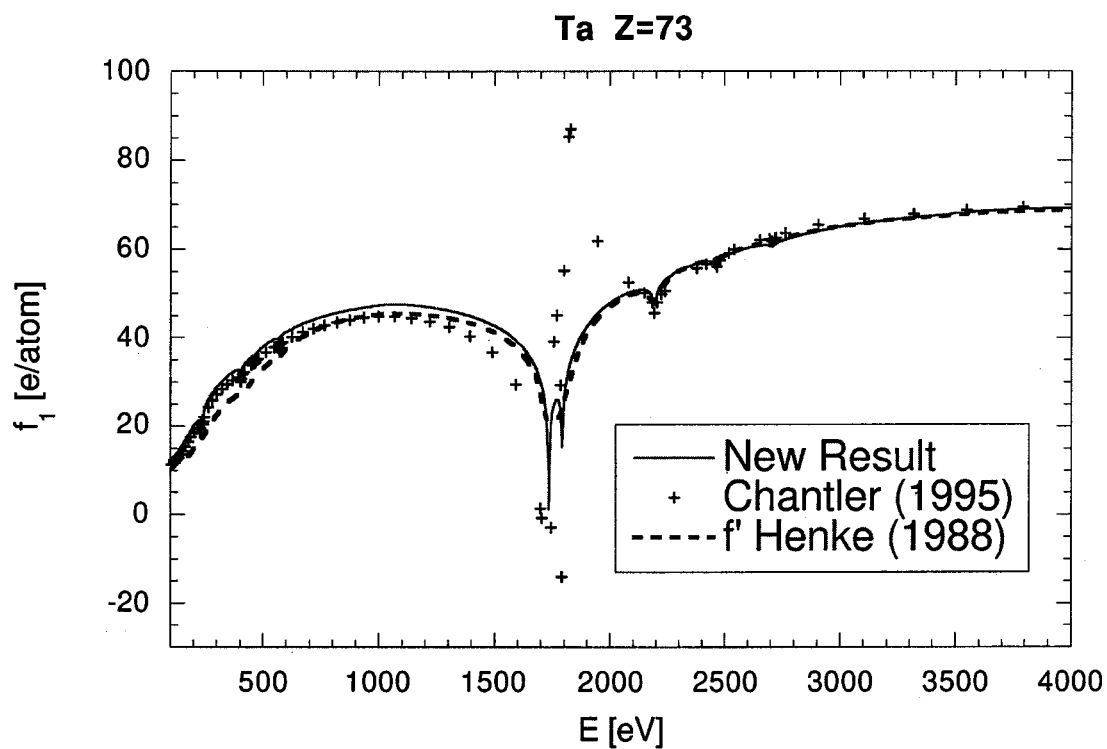


FIG. 56.

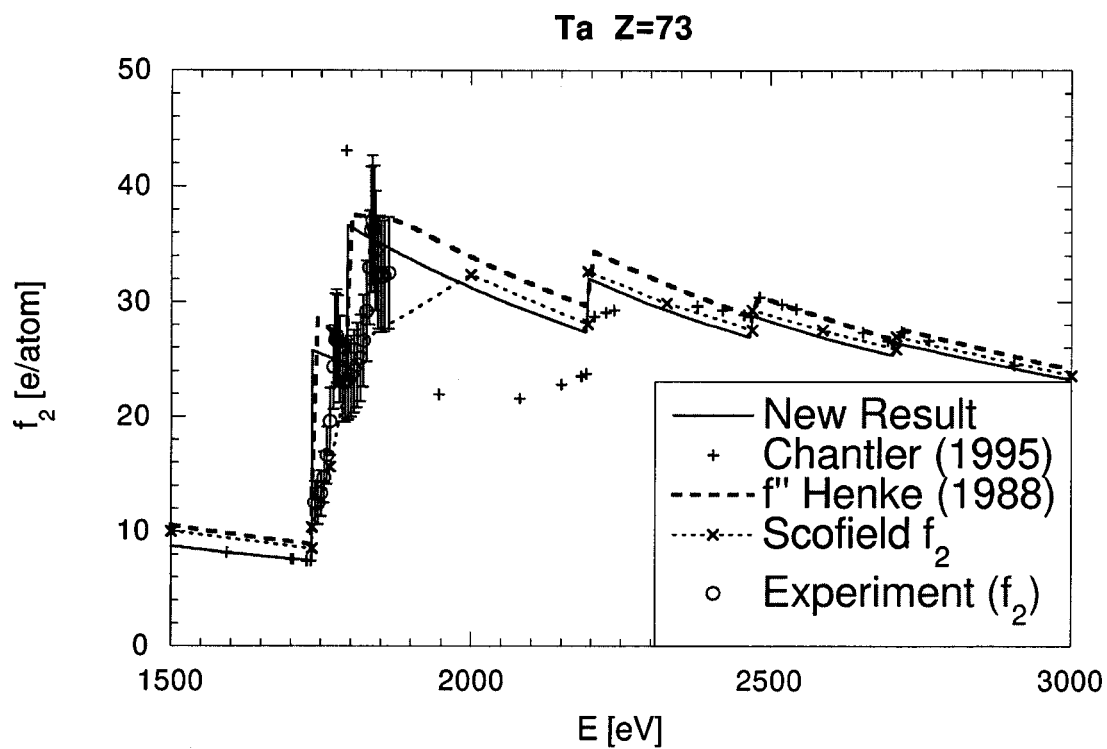


FIG. 57.

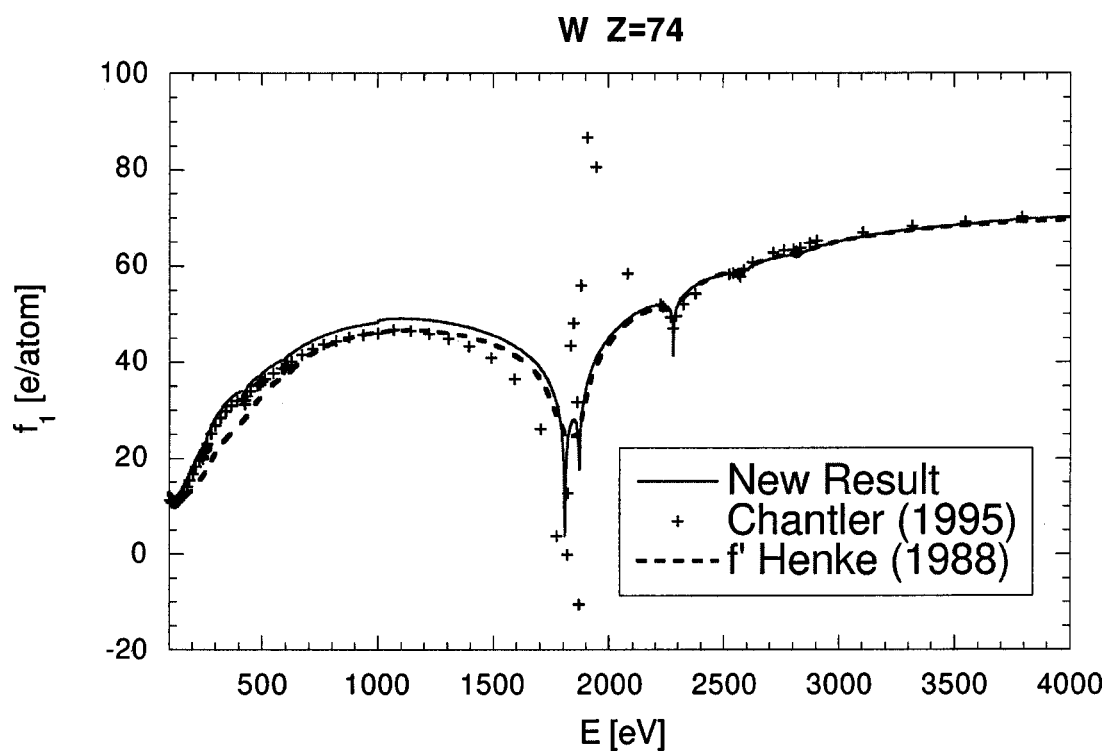


FIG. 58.

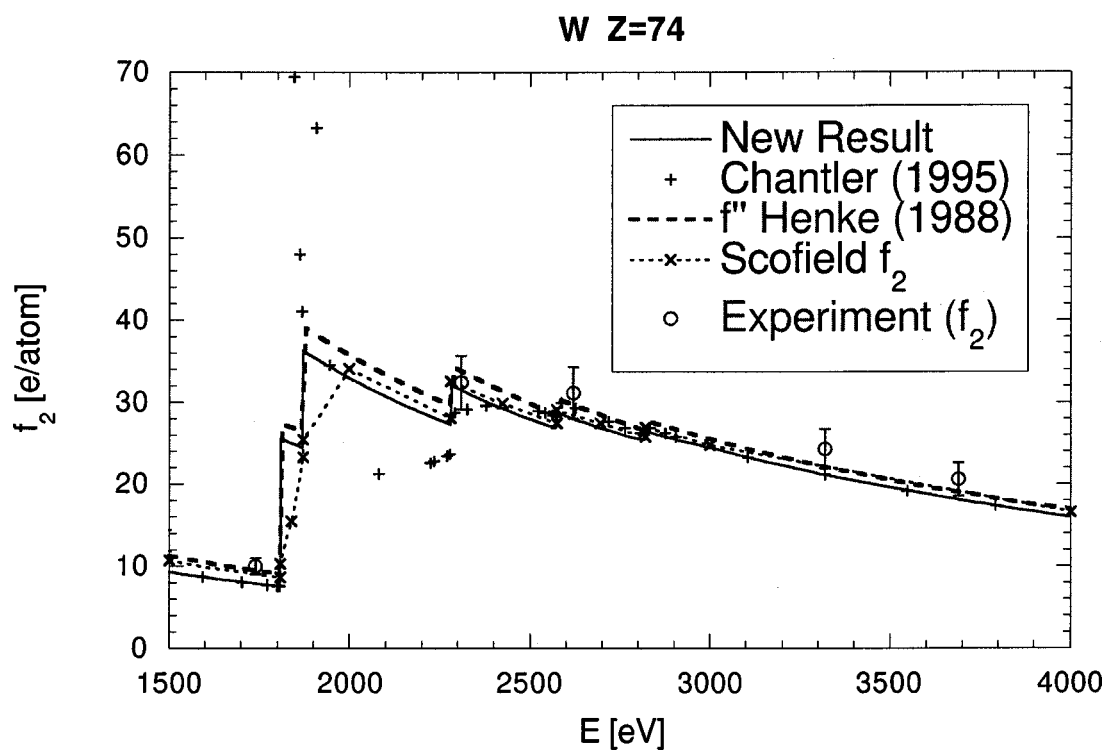


FIG. 59.

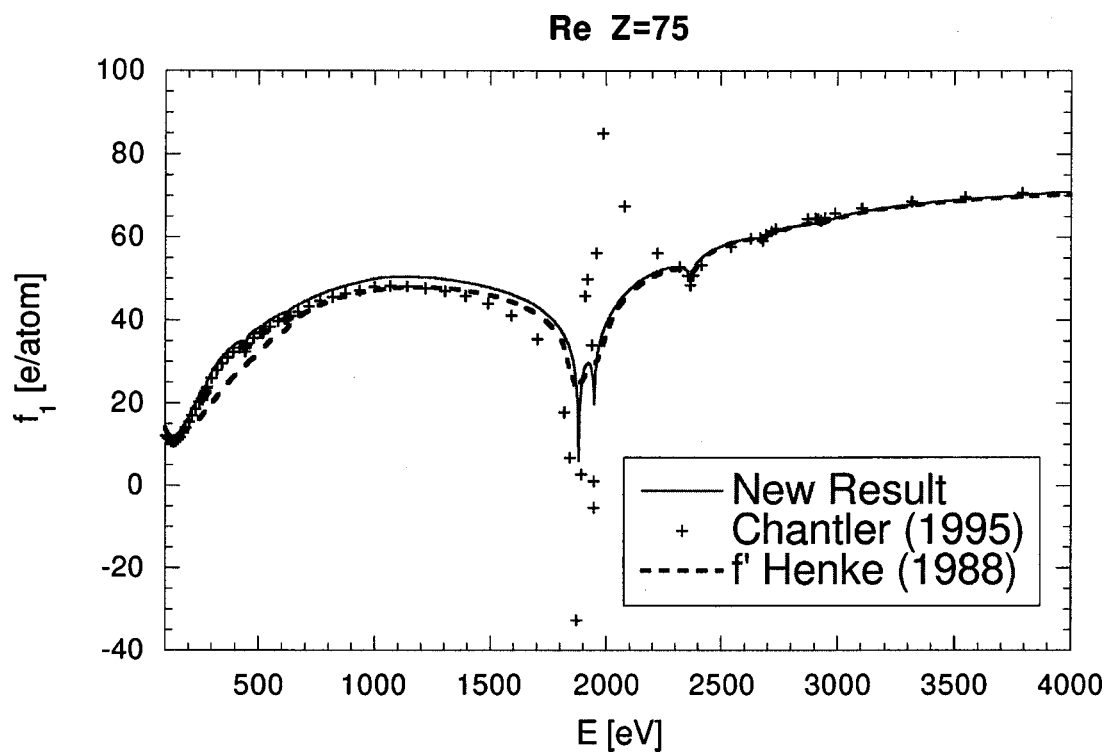


FIG. 60.

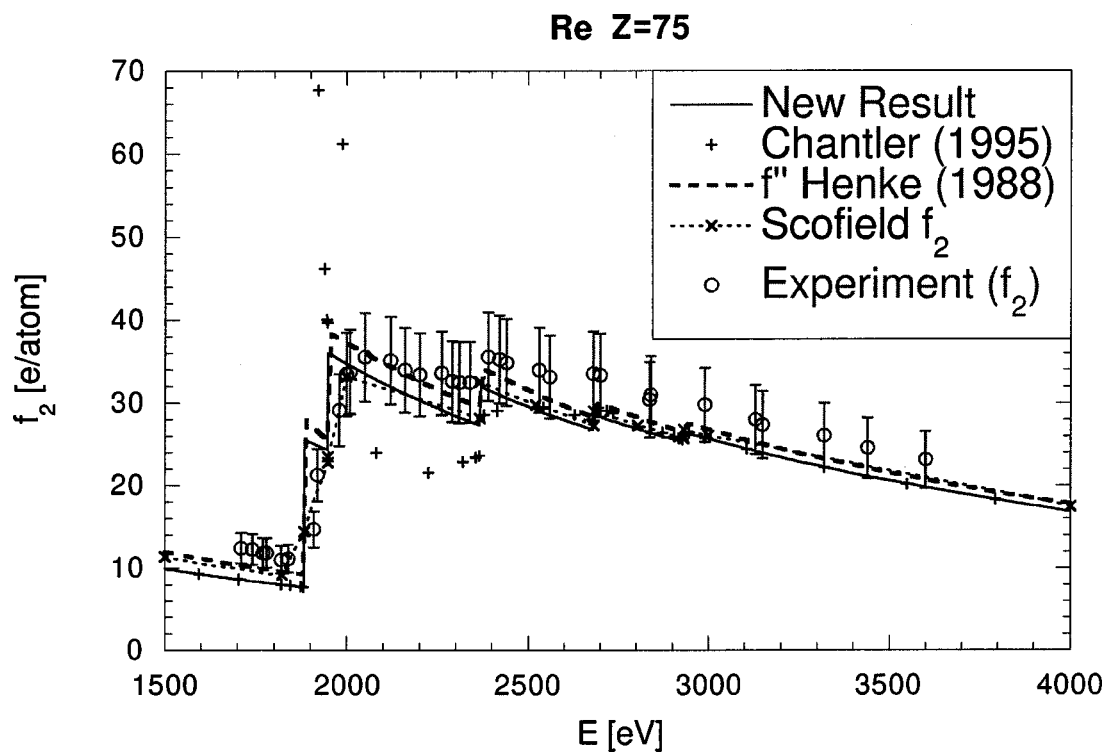


FIG. 61.

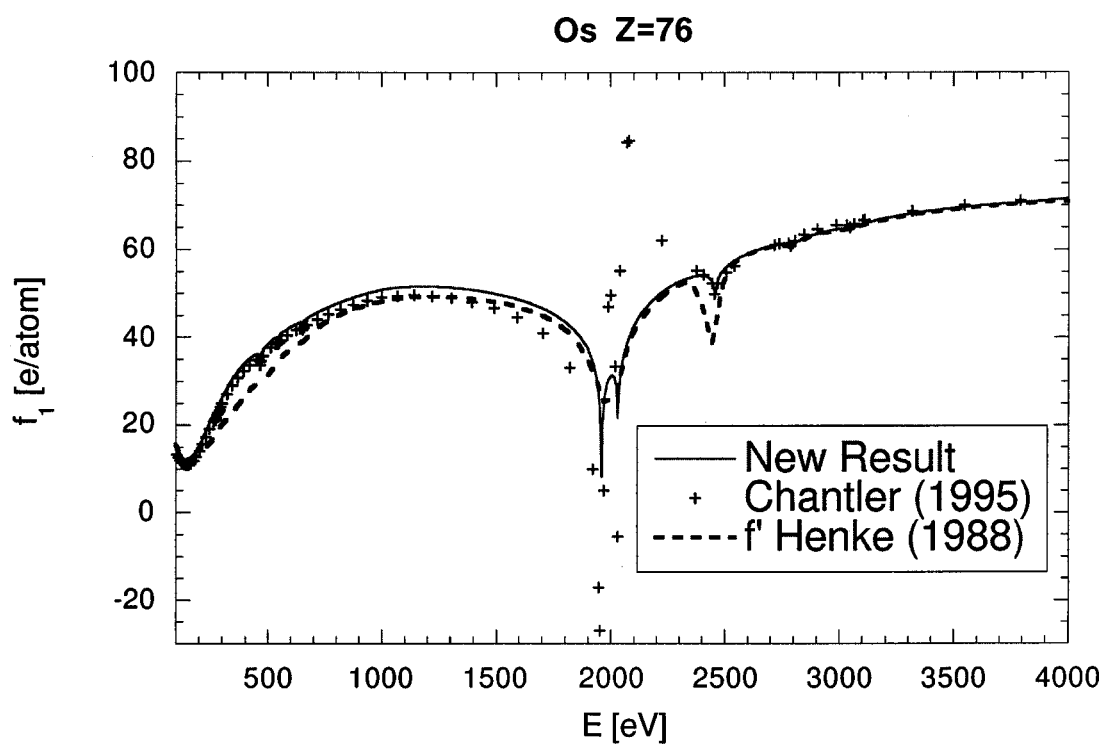


FIG. 62.

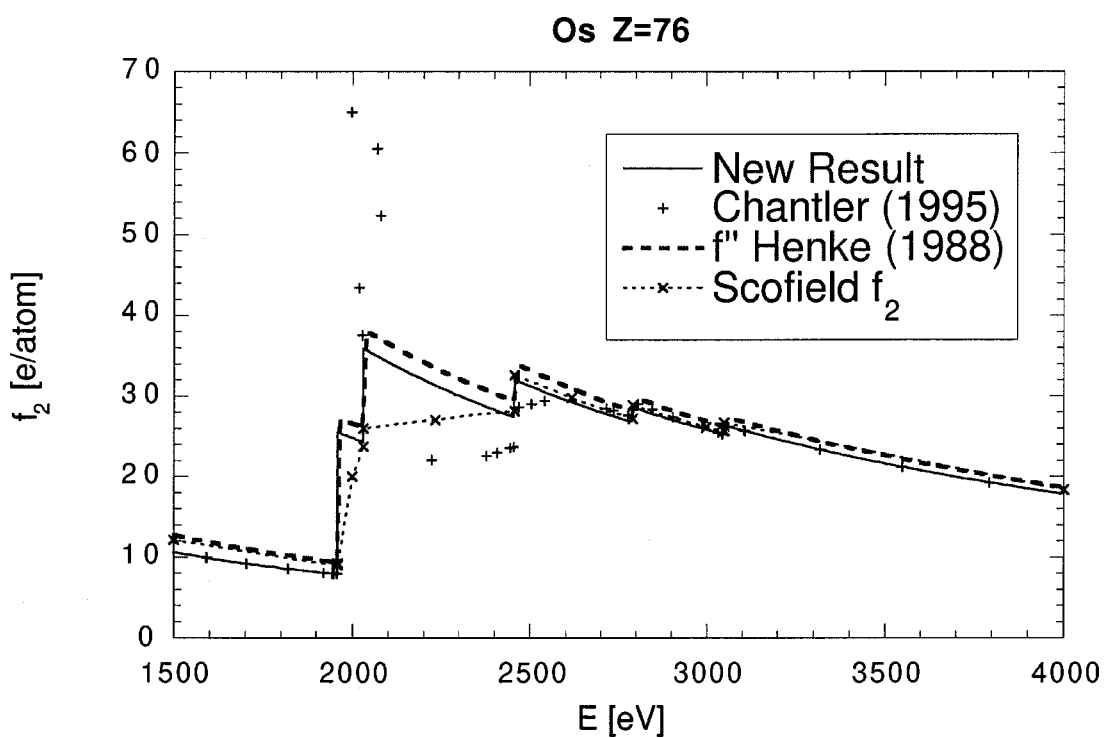


FIG. 63.

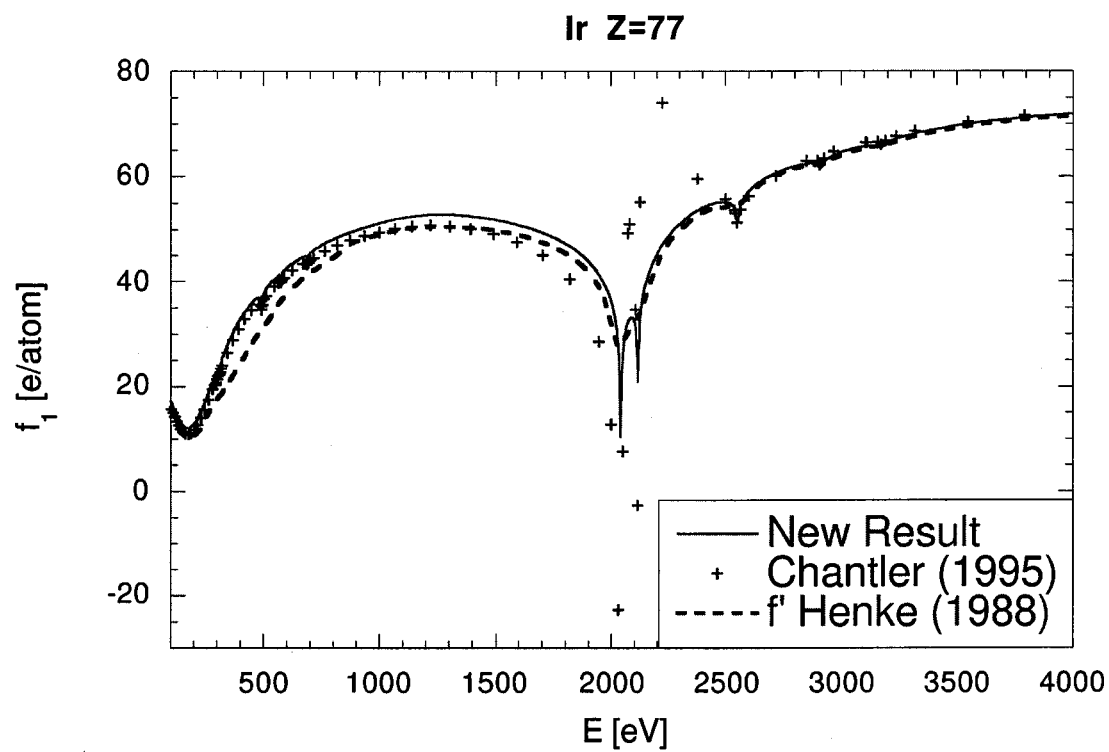


FIG. 64.

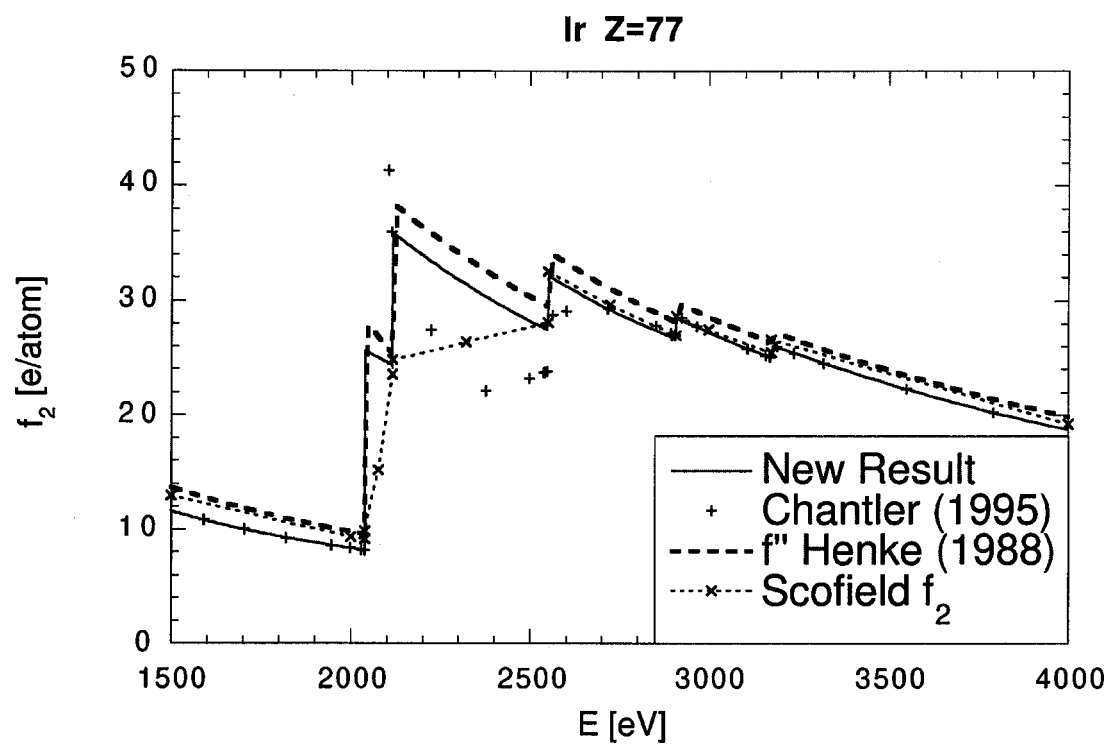


FIG. 65.

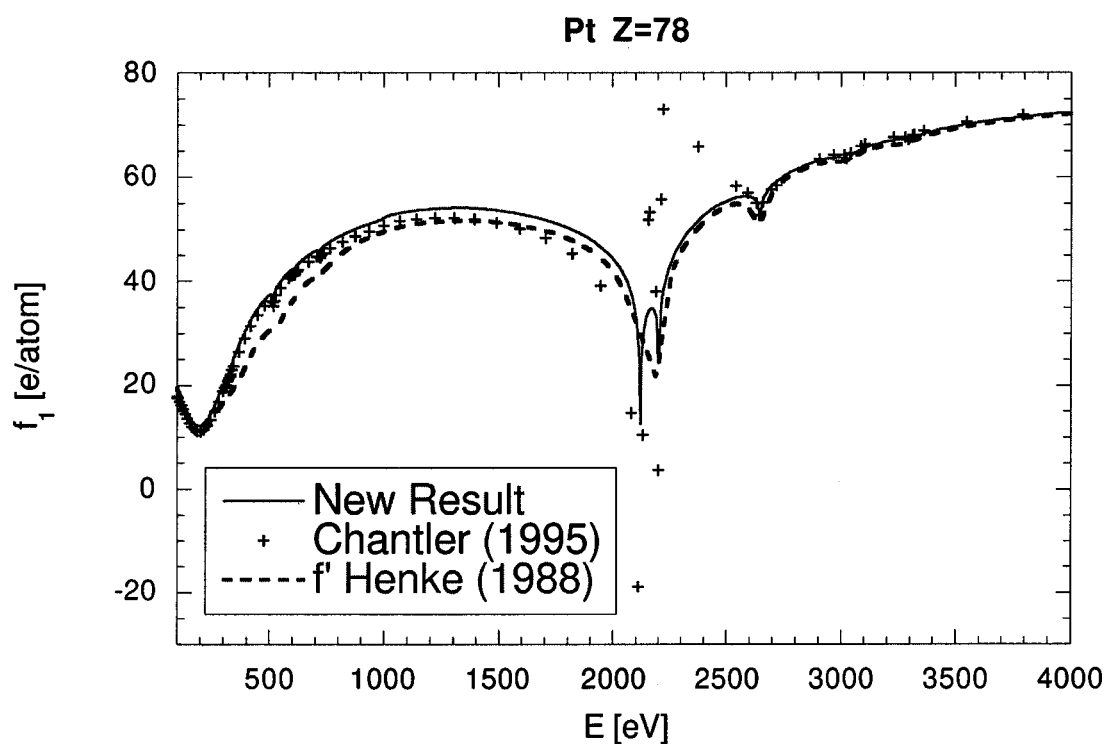


FIG. 66.

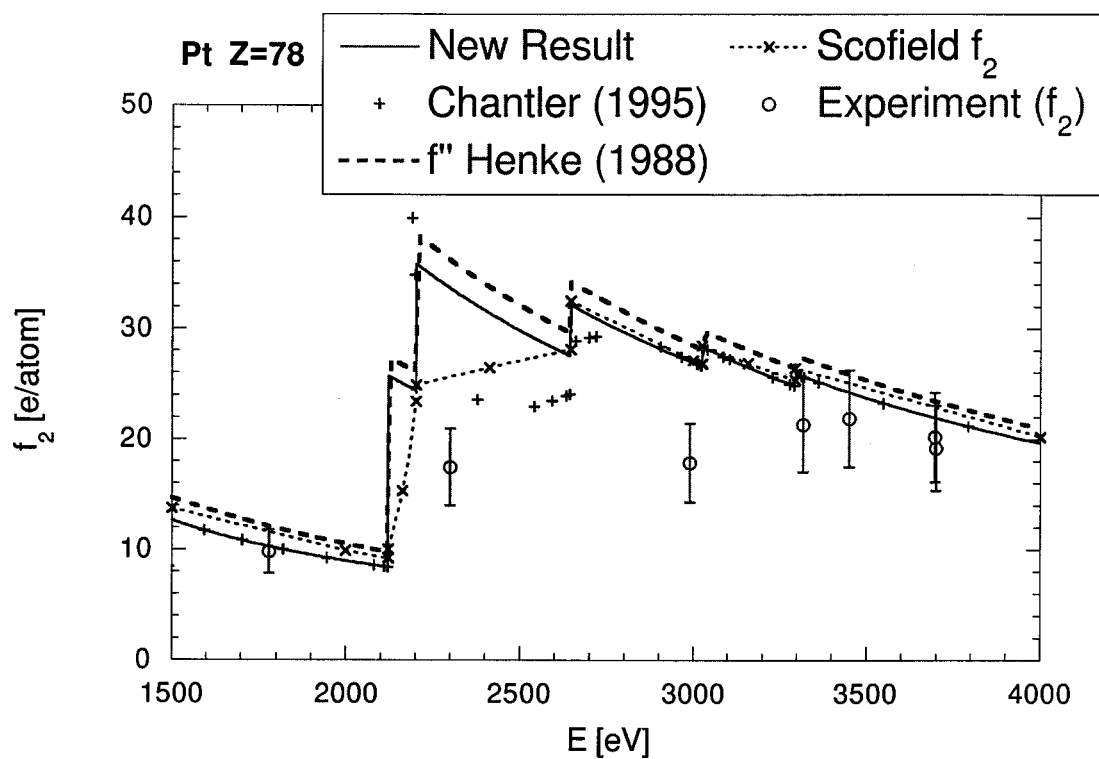


FIG. 67.

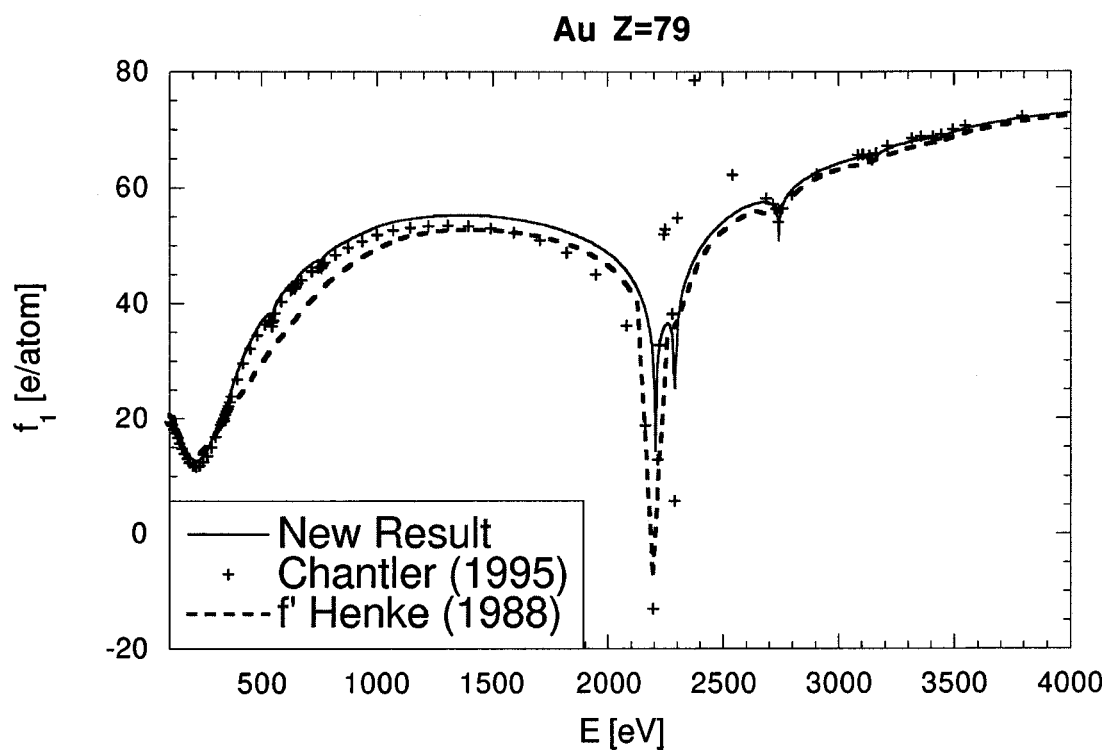


FIG. 68.

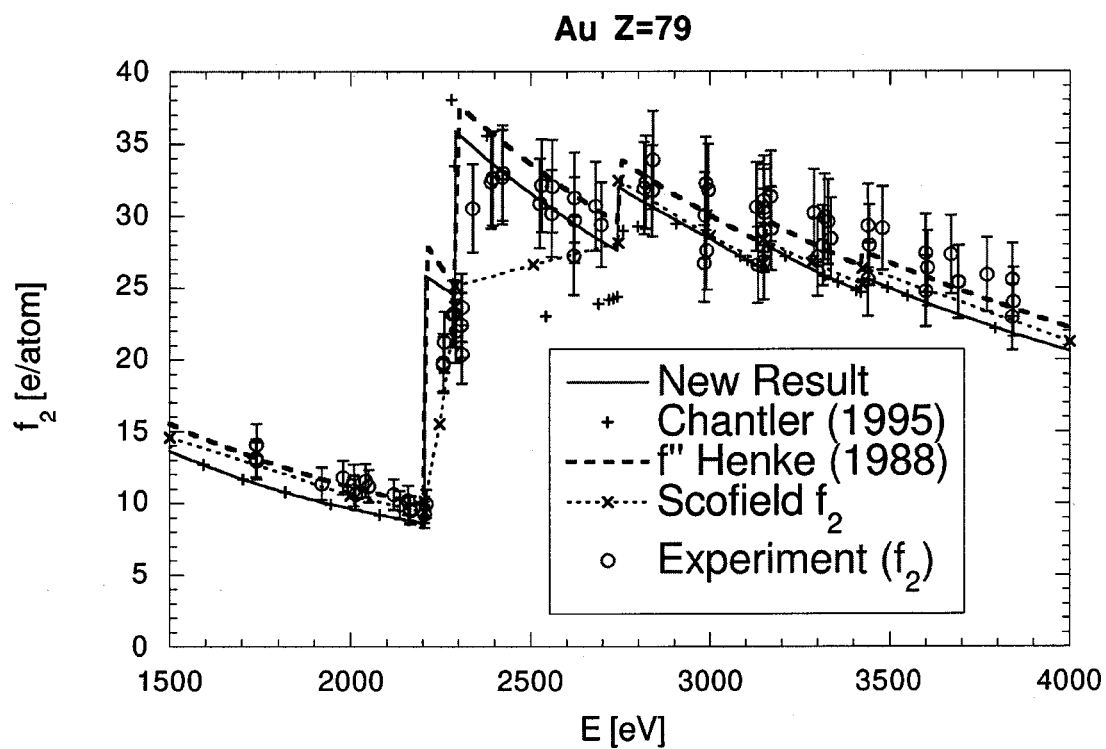


FIG. 69.

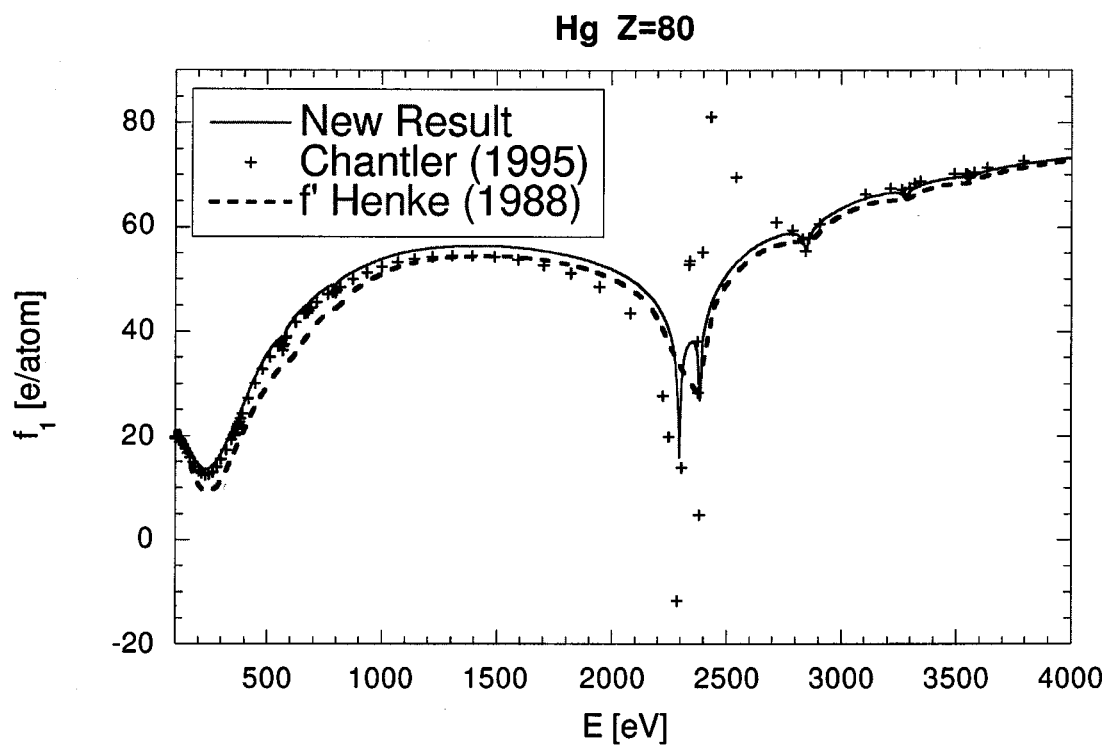


FIG. 70.

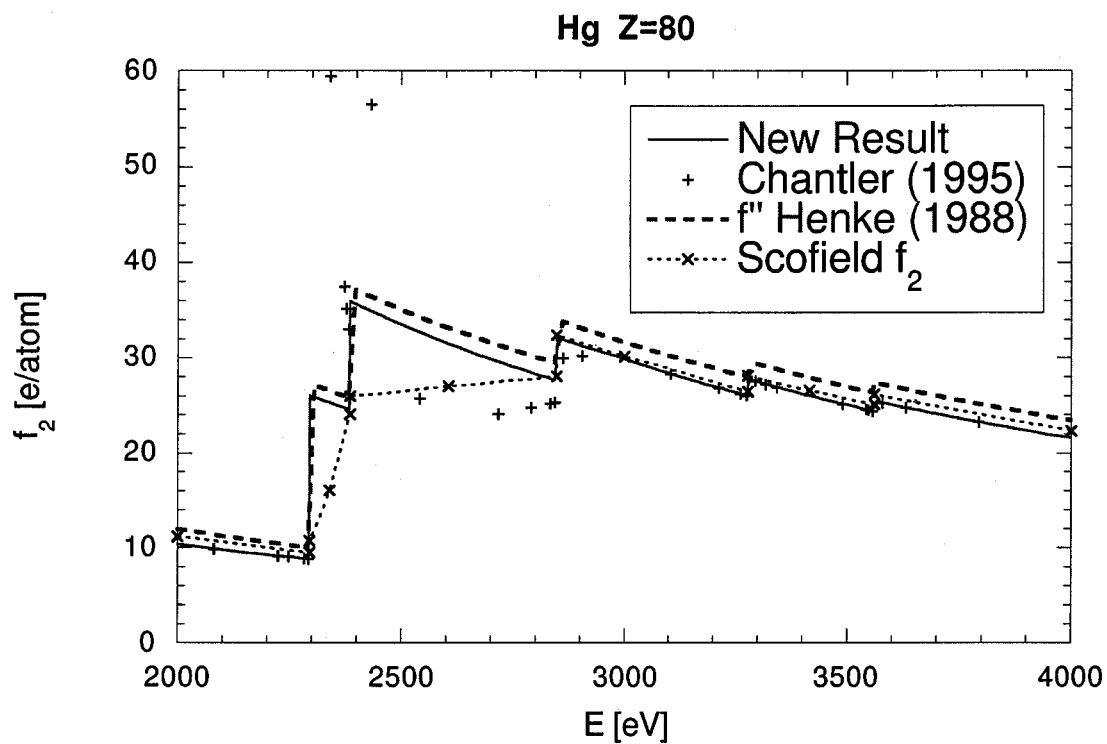


FIG. 71.

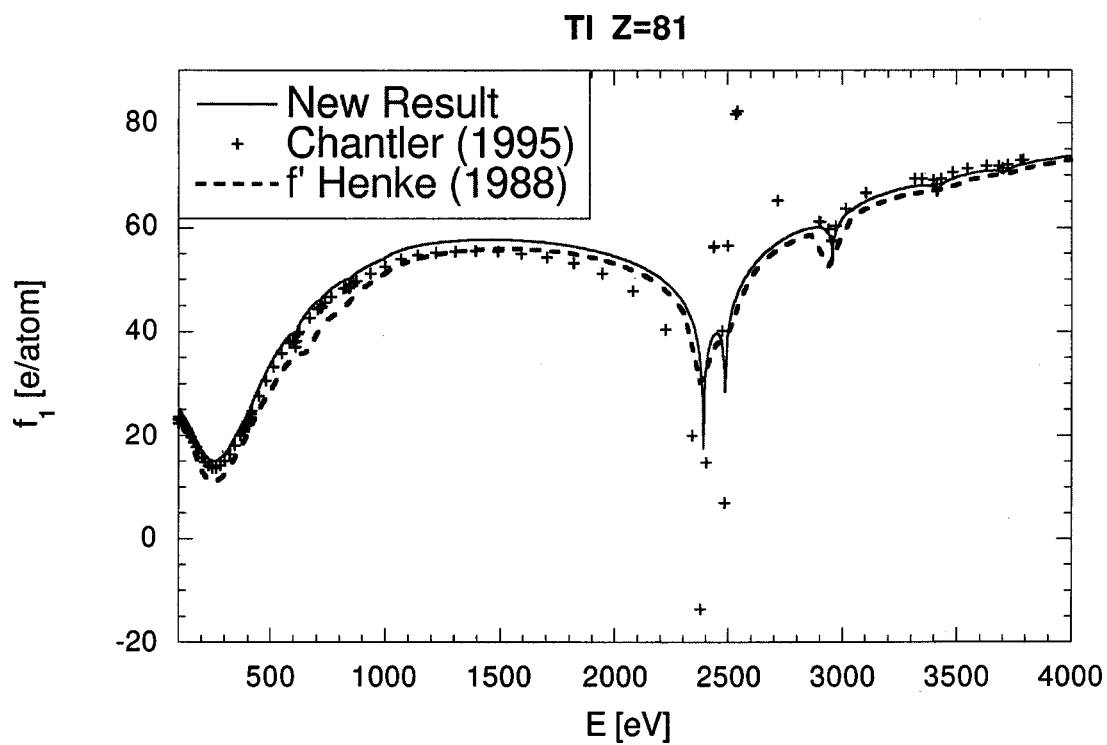


FIG. 72.

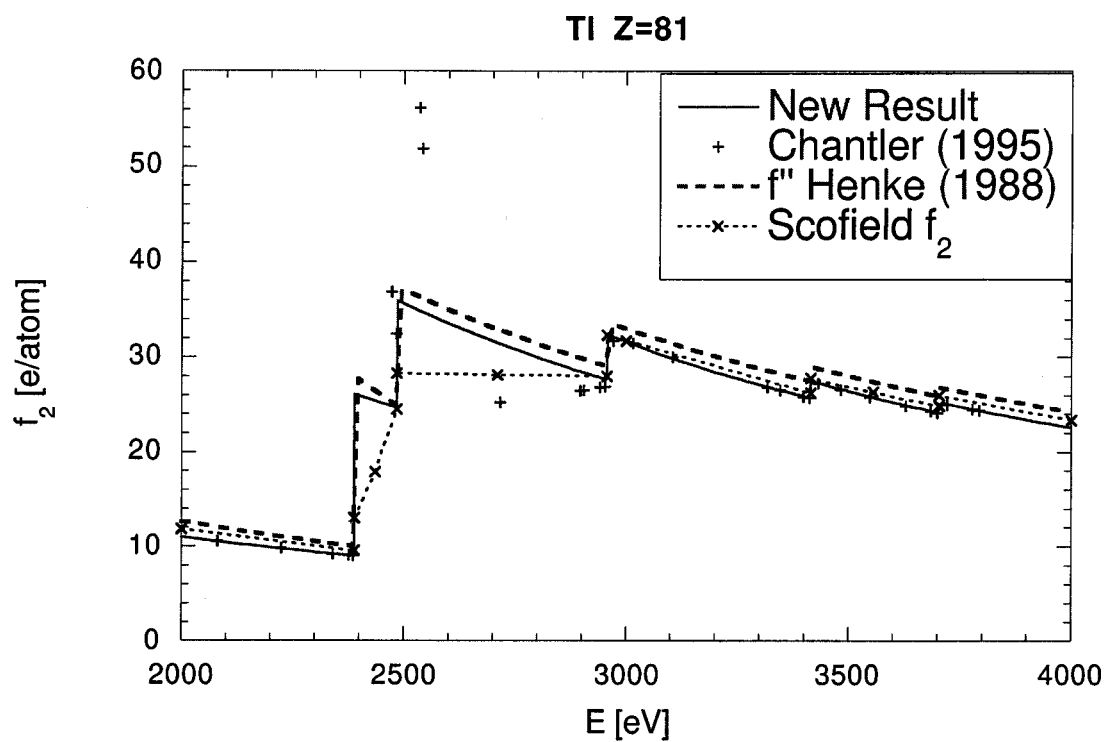


FIG. 73.

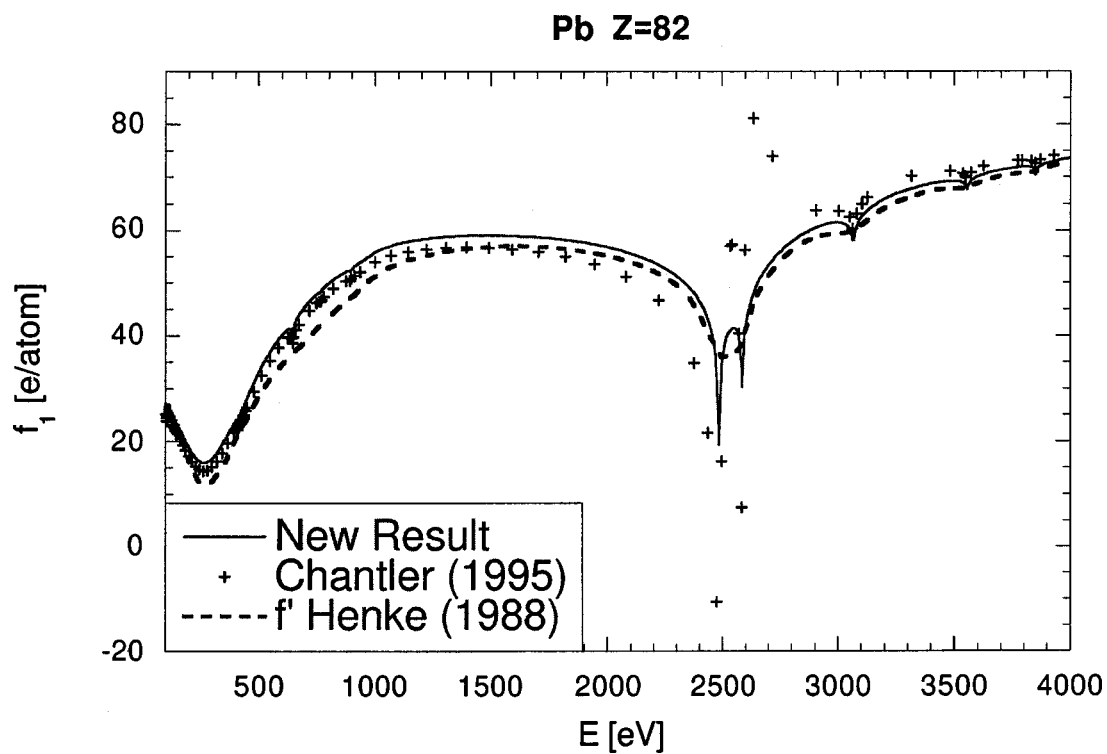


FIG. 74.

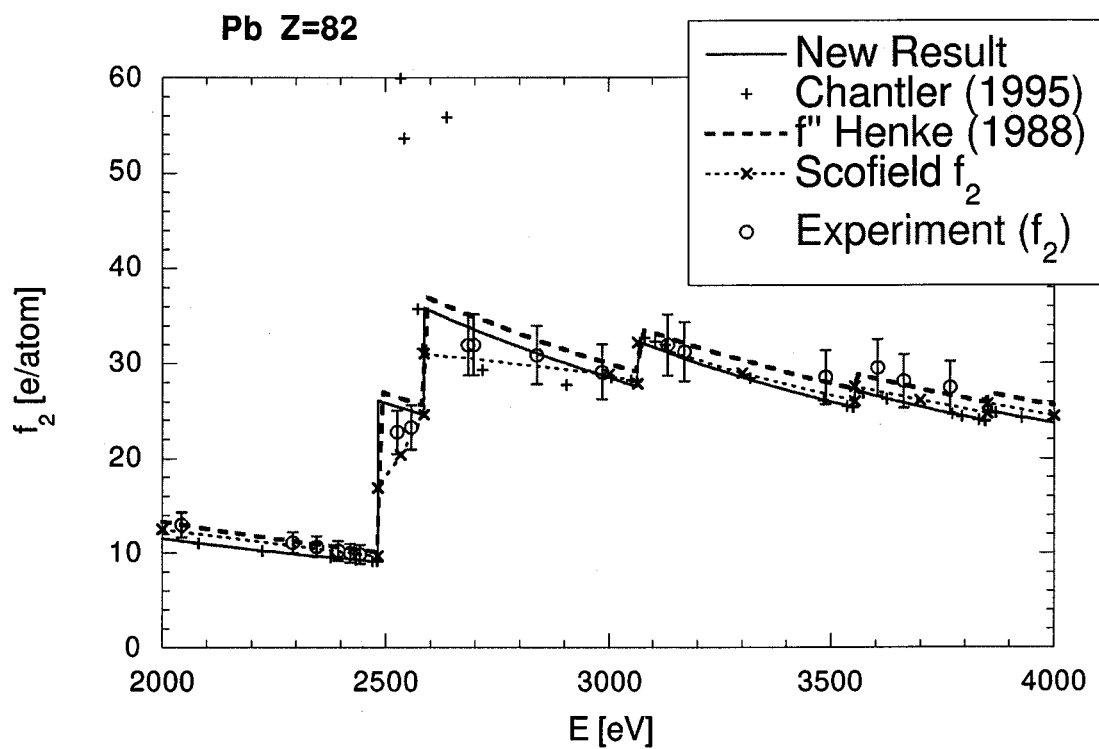


FIG. 75.

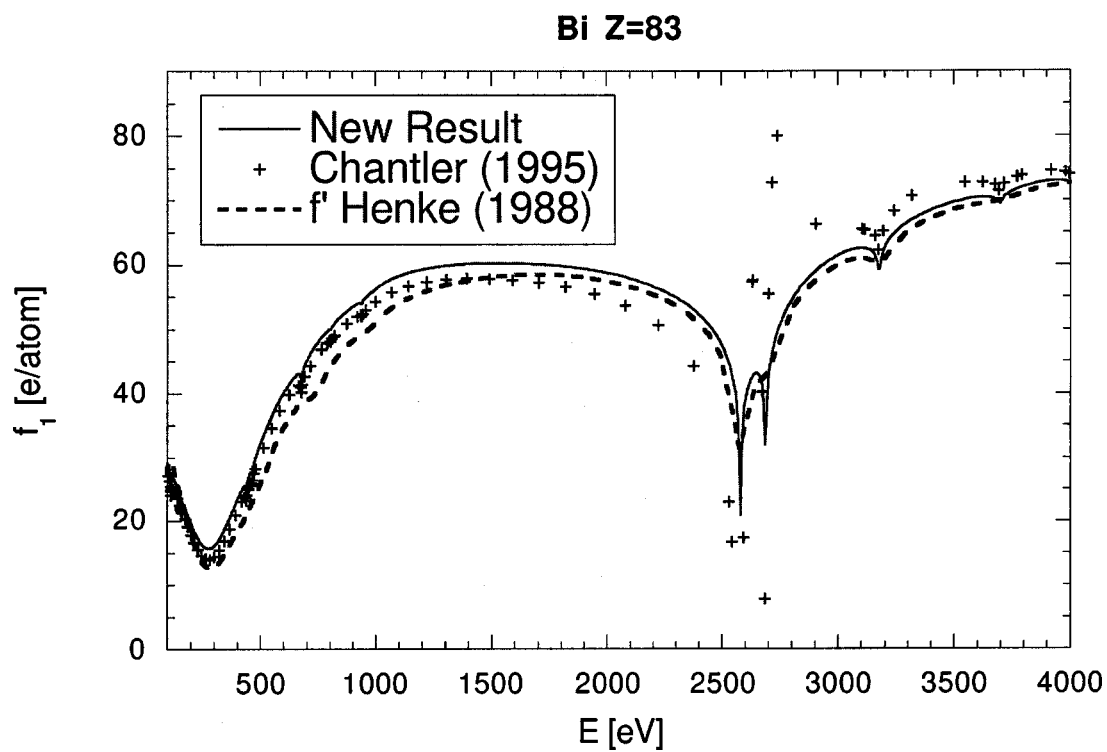


FIG. 76.

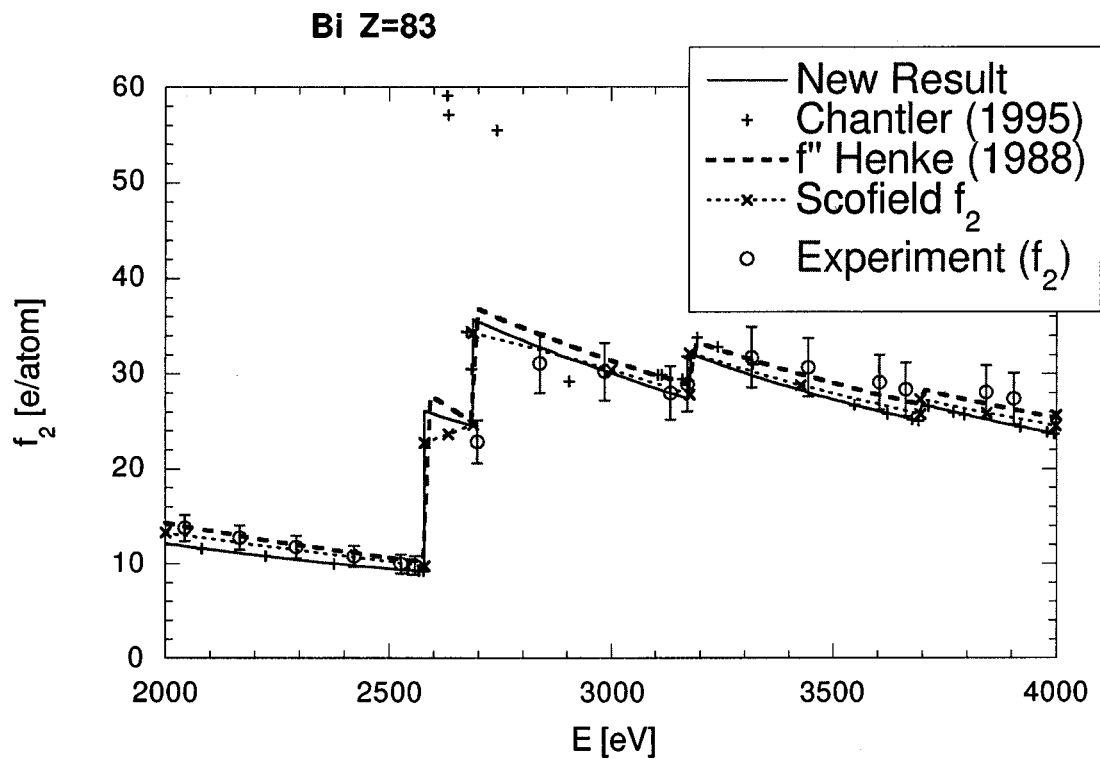


FIG. 77.

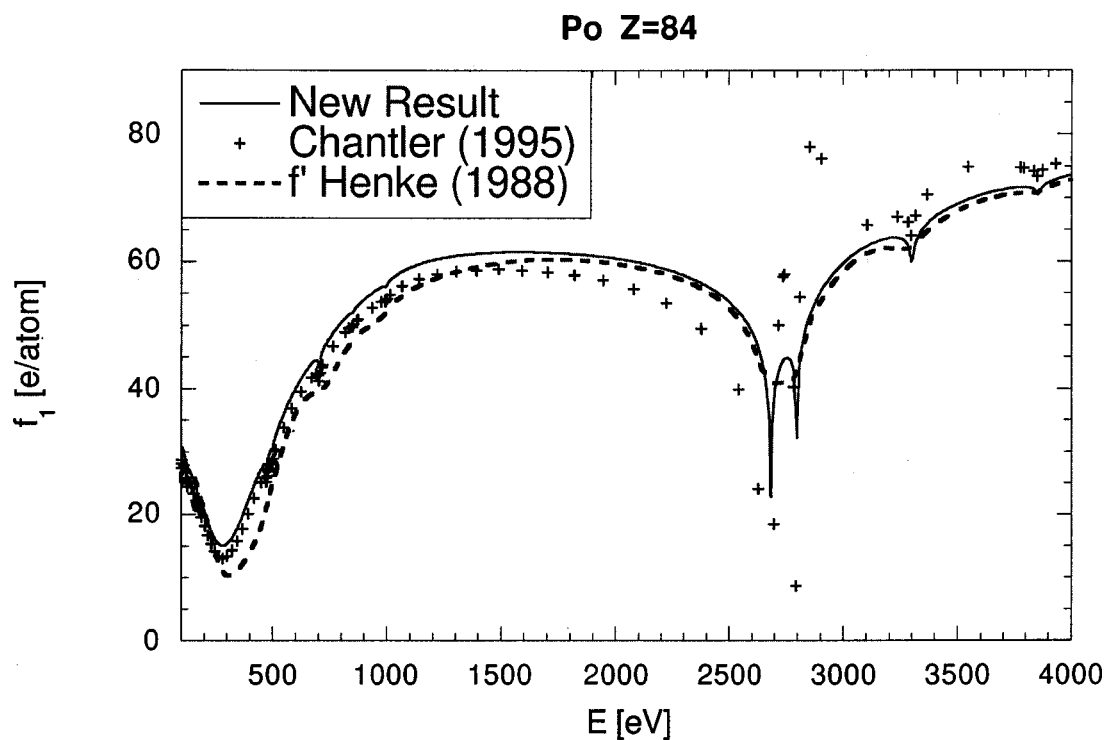


FIG. 78.

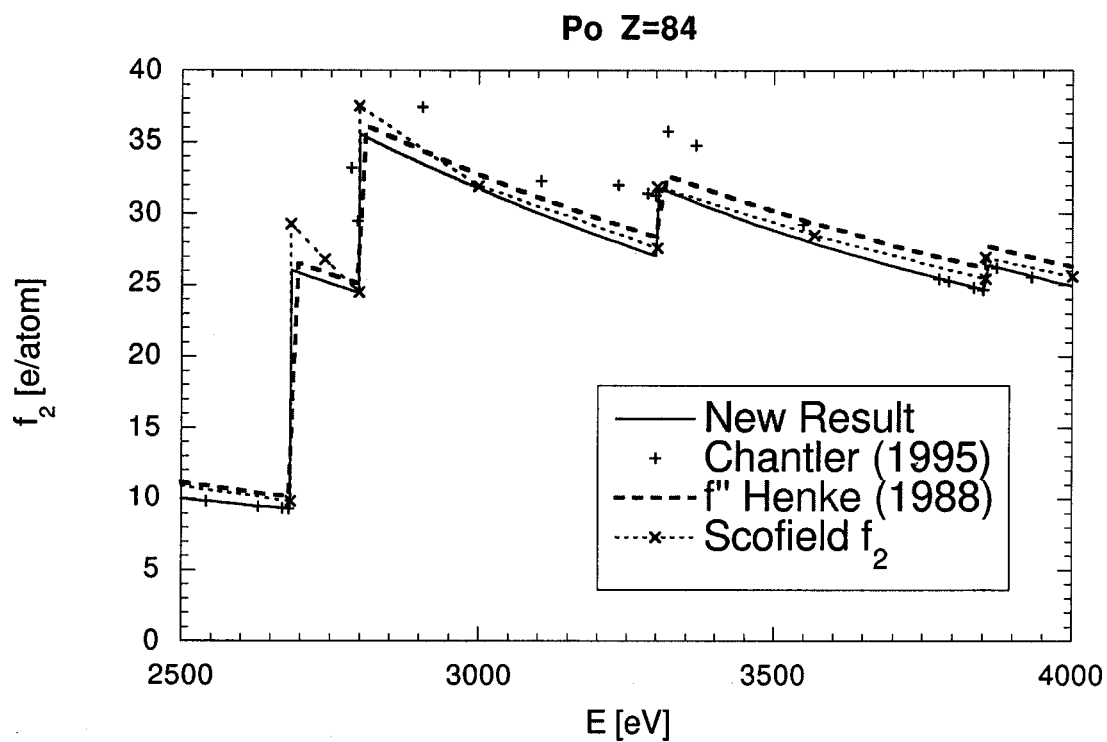


FIG. 79.

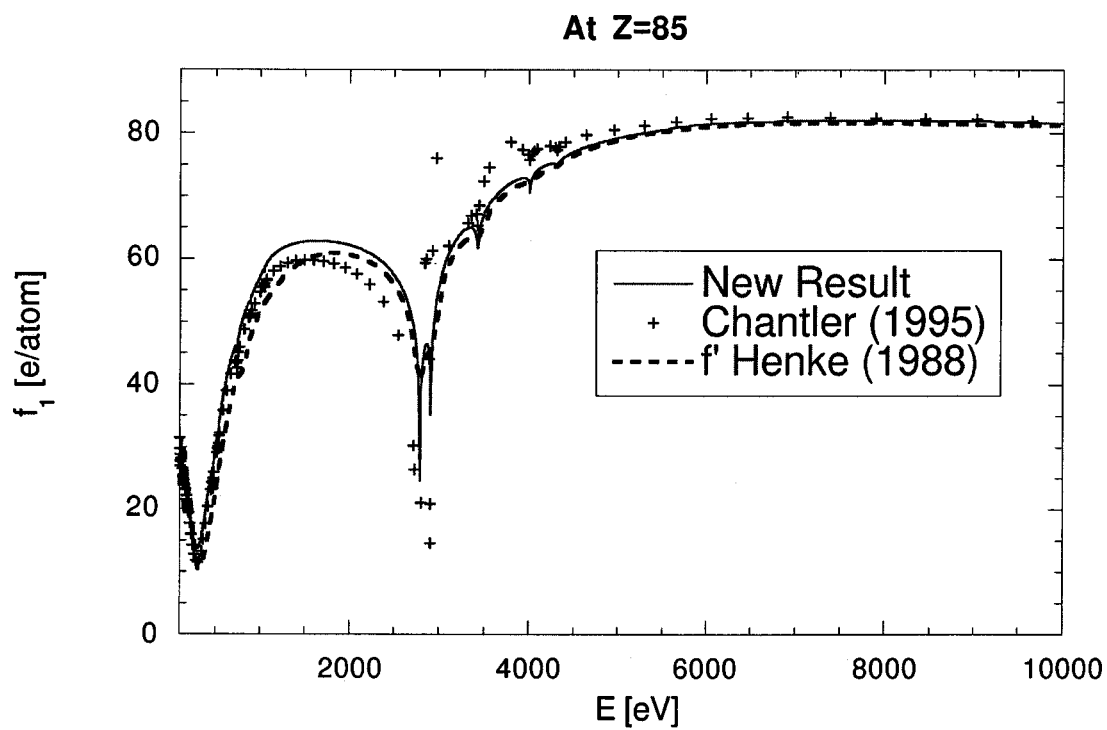


FIG. 80.

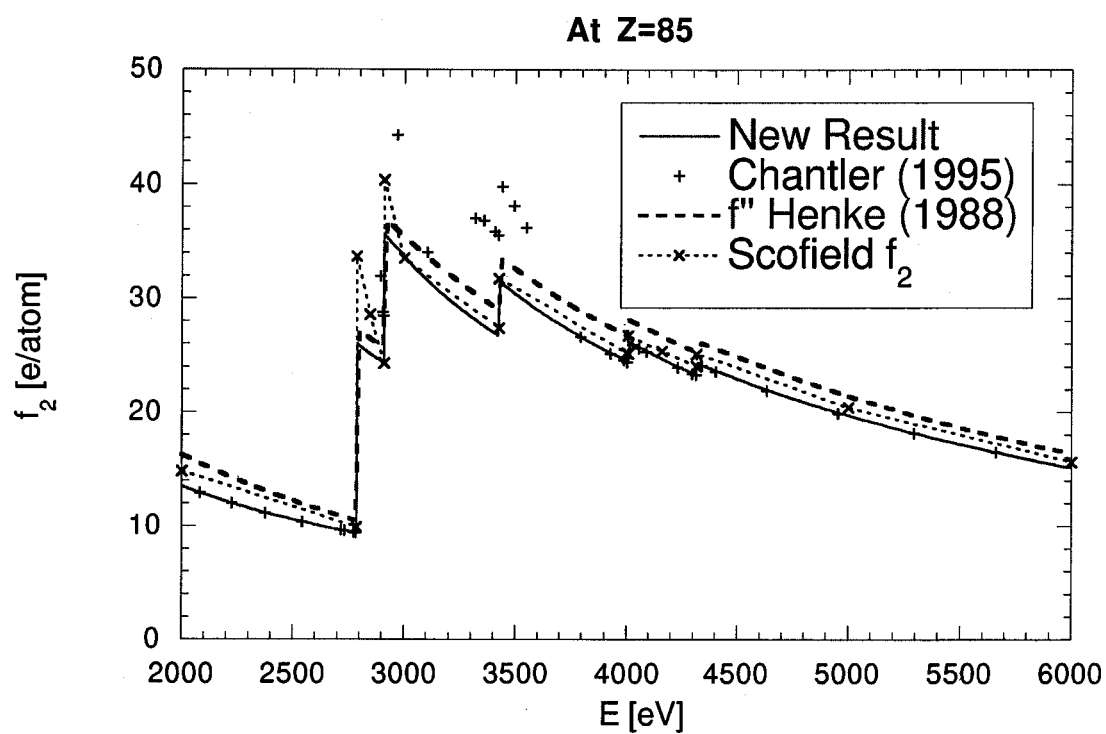


FIG. 81.

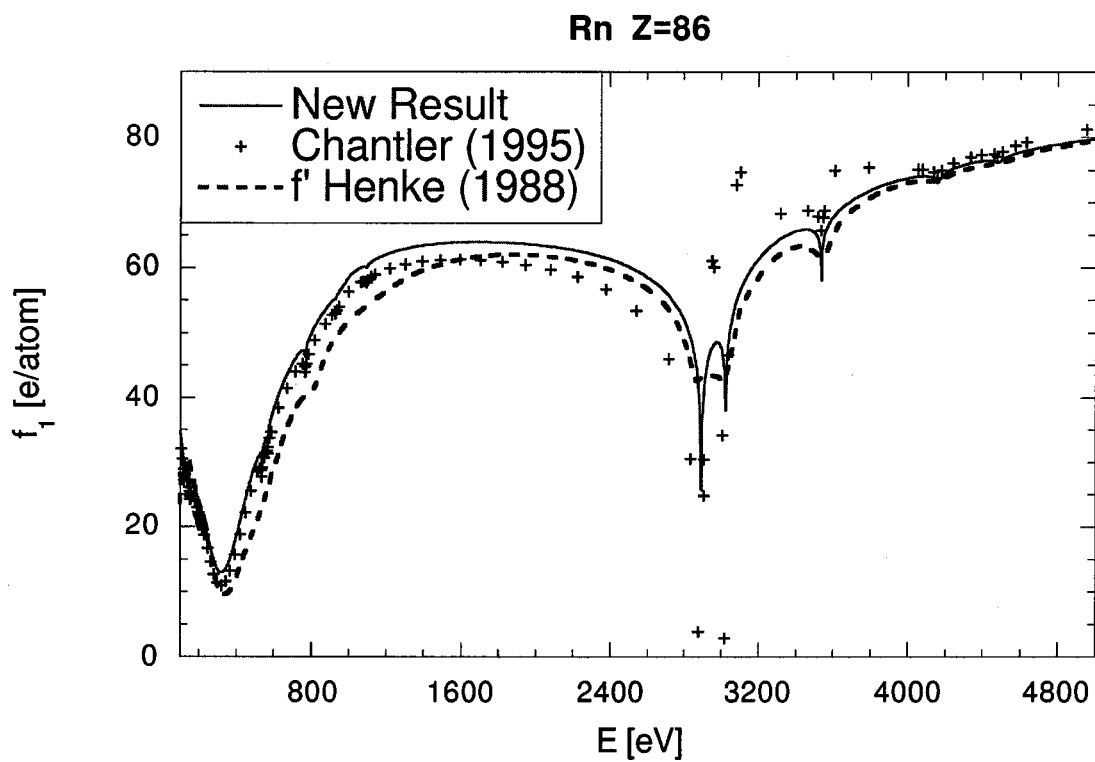


FIG. 82.

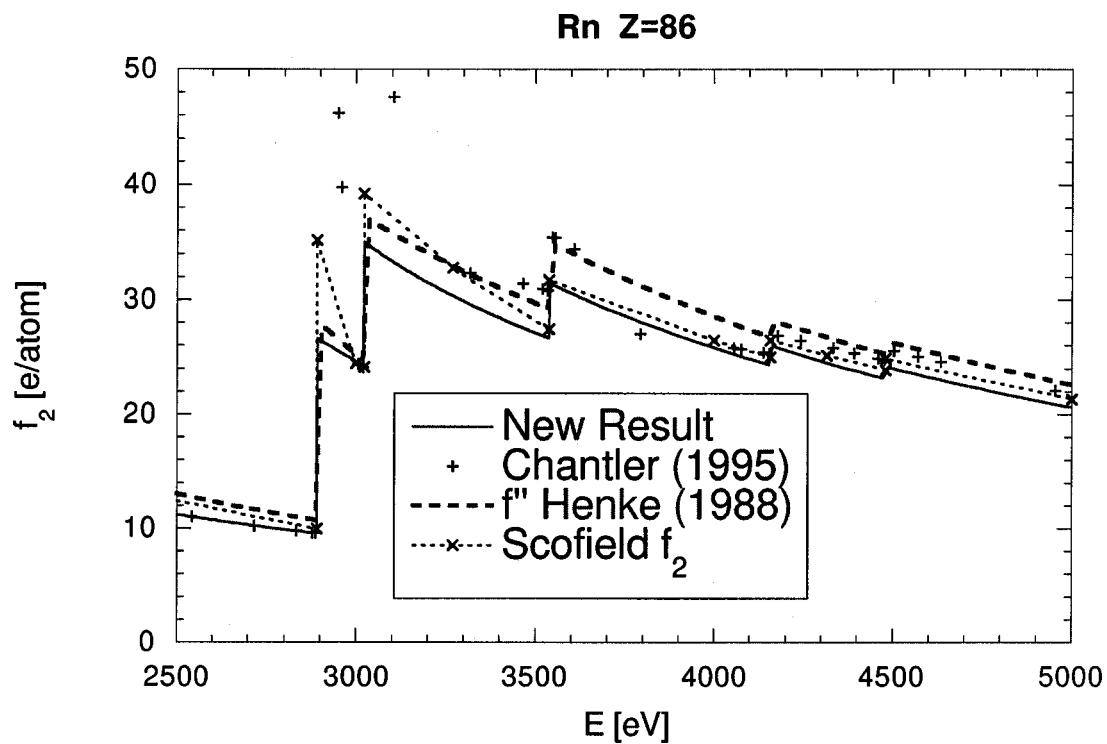


FIG. 83.

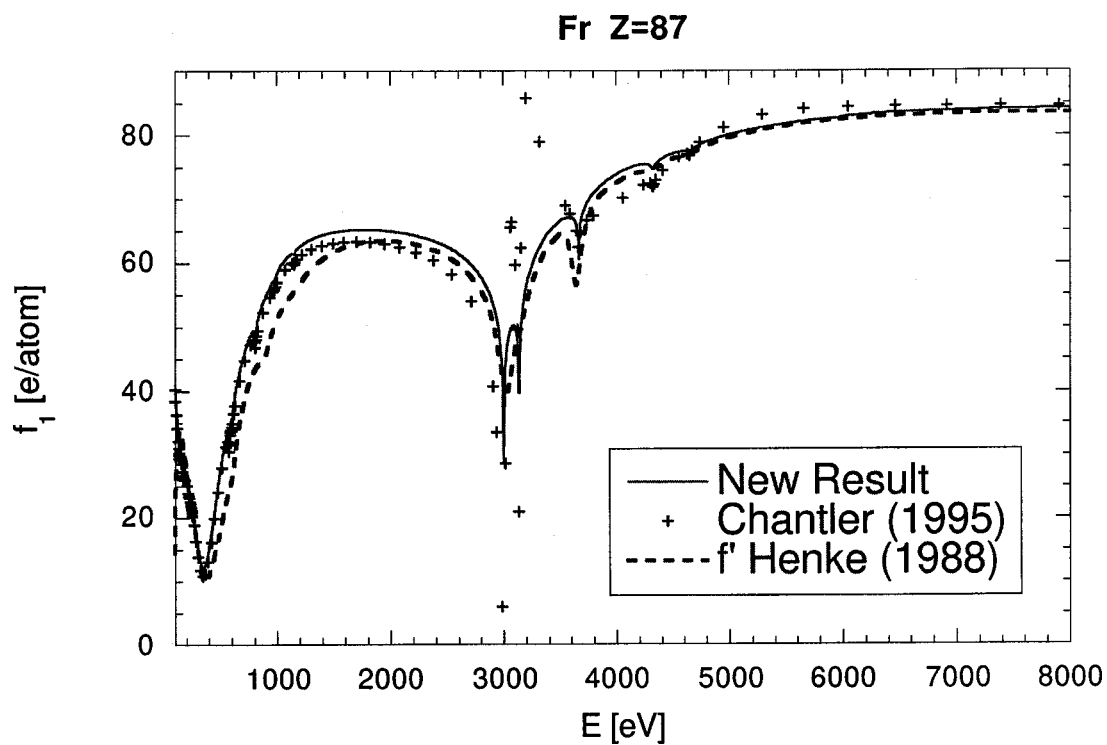


FIG. 84.

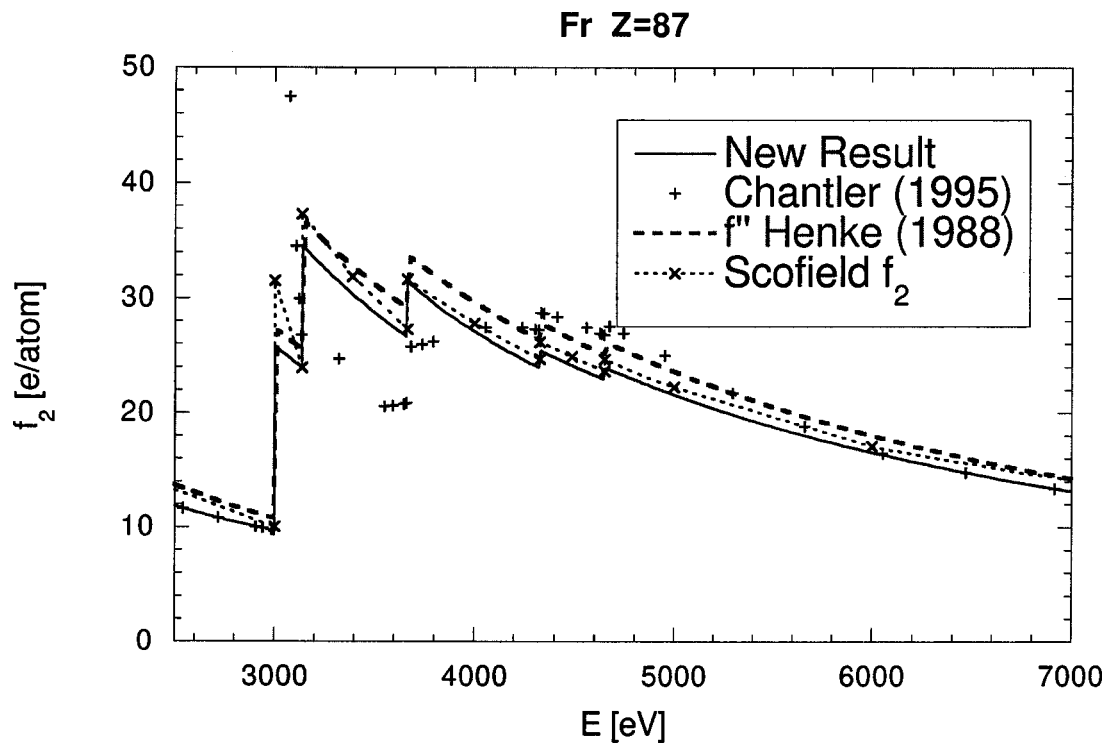


FIG. 85.

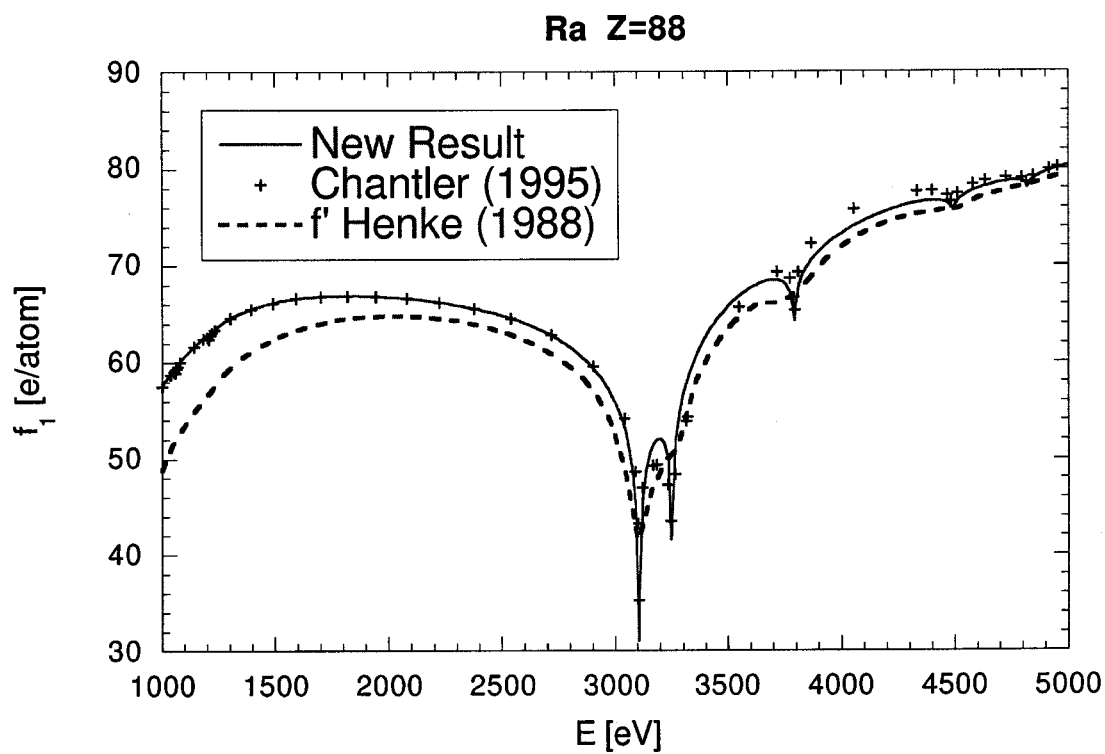


FIG. 86.

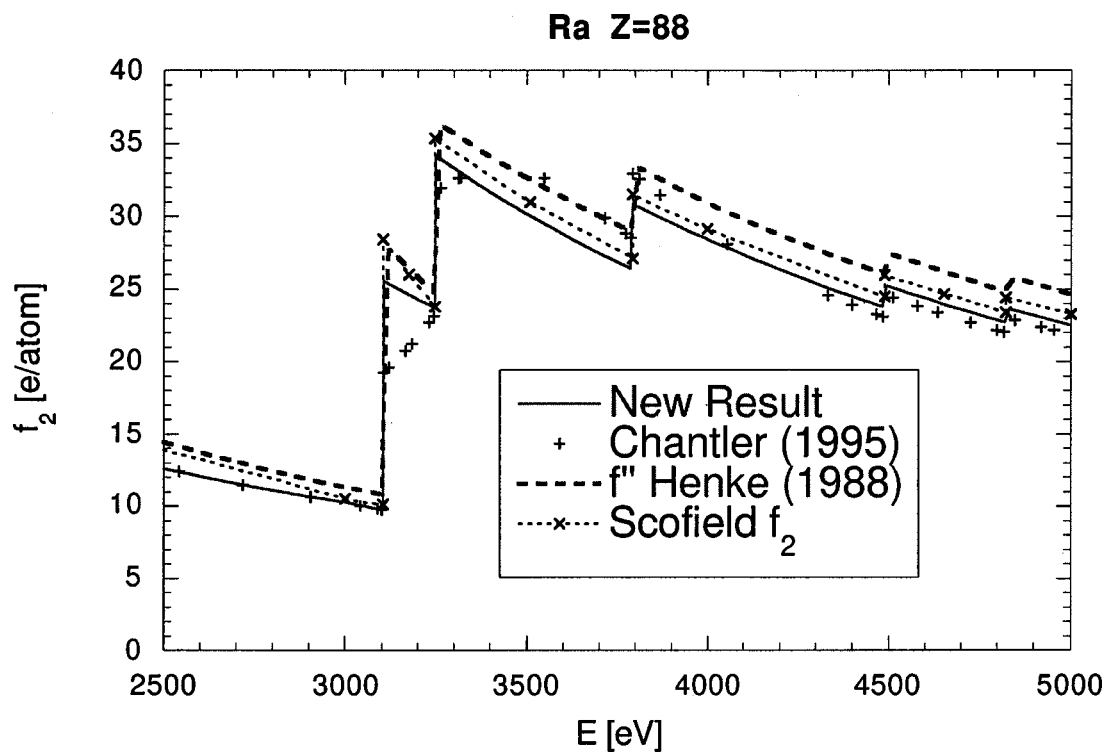


FIG. 87.

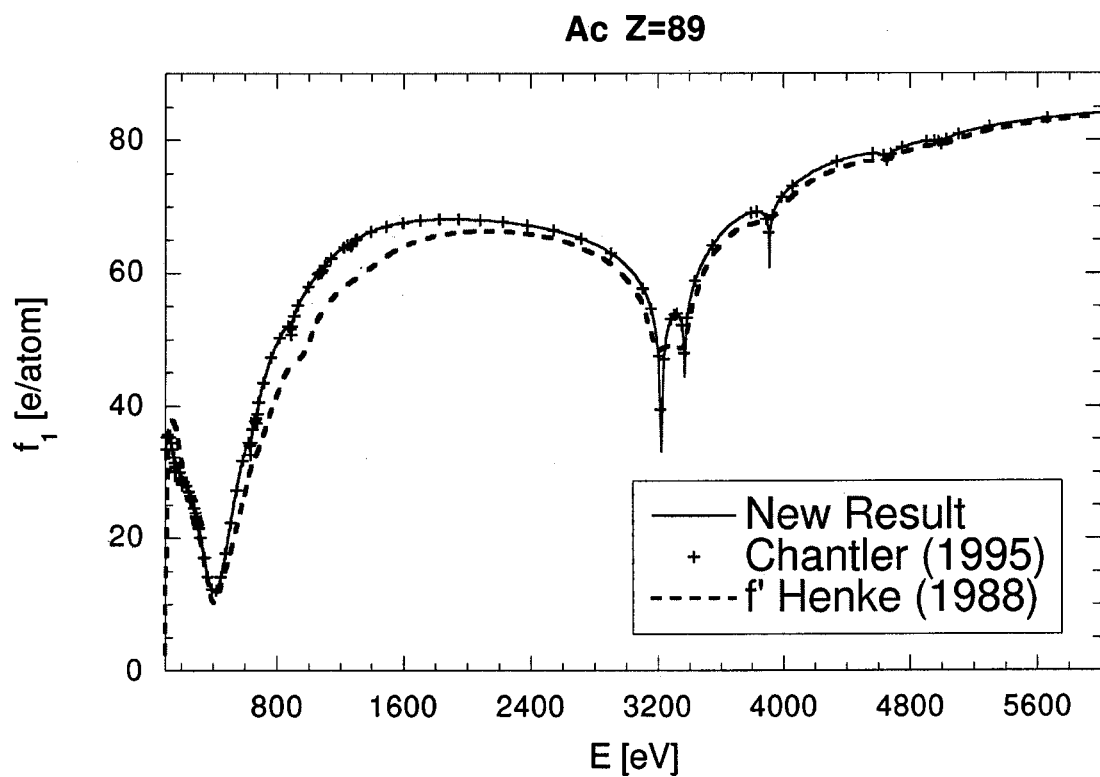


FIG. 88.

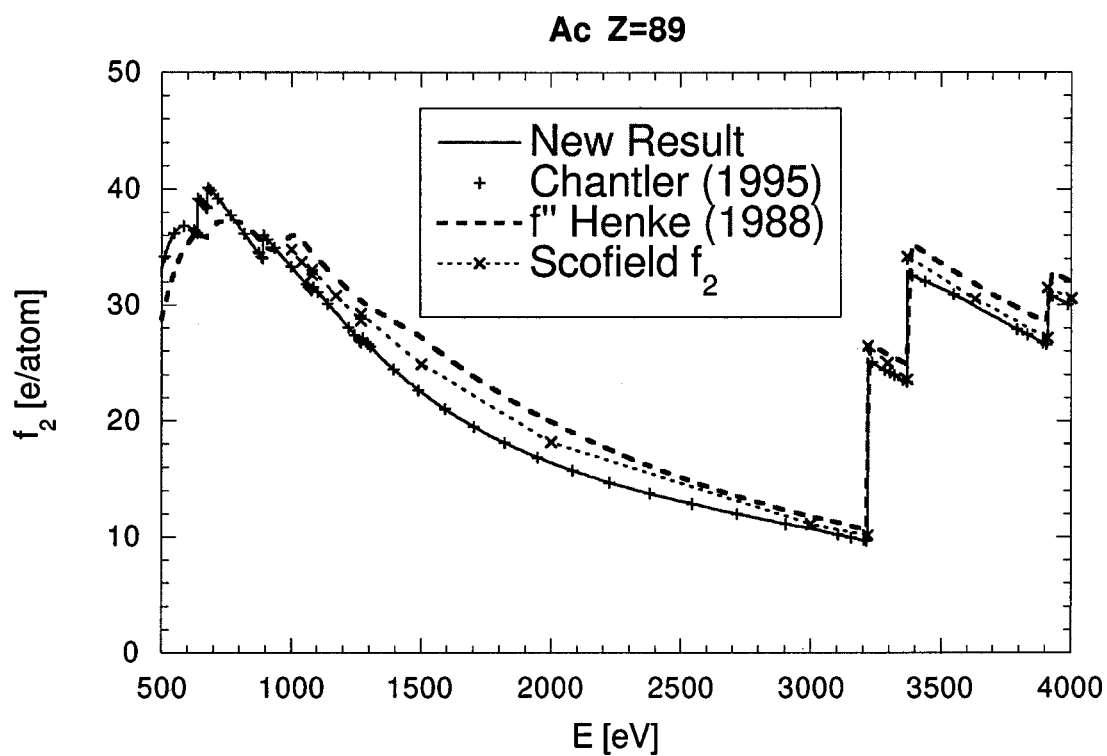


FIG. 89.