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**INTERNATIONAL NUCLEAR DATA COMMITTEE**

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Compilations and Evaluations  
of Data on the Interaction of  
Electromagnetic Radiation with Matter

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International Atomic Energy Agency  
Vienna, Austria

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Forward

This report is issued as a complement to the "Compilations and Evaluations of Nuclear Structure and Decay Data" report series. These reports are designed to keep the nuclear scientific community informed of the availability of tabulations and compilations of nuclear data, and contain references to laboratory reports, journal articles and books containing nuclear data compilations and evaluations.

The material contained in this report deals with data on the interaction of electromagnetic radiation with matter, listing major compilations of x-ray, photon and gamma-ray cross sections and attenuation coefficients, as well as selected reports featuring data on compton scattering, photoelectric absorption and pair production.

The readers of this report are encouraged to send in corrections and additions to this compilation, which may then be included in the future publication of this information.

Title	Author(s)	Pub. Date	Reference and Comments
<b><u>CROSS SECTION AND COEFFICIENT COMPILATIONS</u></b>			
X-Ray Attenuation Coefficients from 10 KeV to 100 MeV	G.R. White Grodstein	1952	NBS Report 1003 (republished) (US National Bureau of Standards)
X-Ray Attenuation Coefficients from 10 KeV to 100 MeV	G. White Grodstein	1957	NBS Circular 583 (US National Bureau of Standards)
X-Ray Attenuation Coefficients from 10 keV to 100 MeV	R.T. McGinnies	1959	NBS Circular 583, Supplement (US National Bureau of Standards)
The X- or Gamma-ray Energy Absorption or Transfer Coefficients: Tabulation and Discussion	R.T. Berger	1961	Published in Radiation Research <u>15</u> , 1.
Analytical Approximations for X-Ray Cross Sections	F. Biggs, R. Lighthill	1967	Published in SC-RR-66-452 (Sandia Corporation, Albuquerque, N.M.)
Compilation of X-ray Cross Sections	W.H. McMaster	1967	Published as UCRL-70525 (preprint) in the Proceedings of the DASA Effects Conference.
Compilation of X-ray Cross Sections Sect. 1	W.H. McMaster, N.Kerr Del Grande J.H. Mallett, J.H. Hubbell	1970	Published in UCRL-50174(Sect.1) (Lawrence Livermore Laboratory)
Compilation of X-ray Cross Sections Sect. 2, Rev. 1	W.H. McMaster, N.Kerr Del Grande J.H. Mallett, J.H. Hubbell	1969	Published in UCRL-50174 (Sect. 2, Rev.1) (Lawrence Livermore Laboratory)
Compilation of X-ray Cross Sections Sect. 3	W.H. McMaster, N.Kerr Del Grande J.H. Hubbell	1969	Published in UCRL-50174 (Sect. 3) (Lawrence Livermore Laboratory)
Compilation of X-ray Cross Sections Sect. 4	W.H. McMaster, N.Kerr Del Grande J.H. Mallett, J.H. Hubbell	1969	Published in UCRL-50174 (Sect. 4) (Lawrence Livermore Laboratory)
Photon Cross Sections, Attenuation Coefficients, and Energy Absorption Coefficients from 10 keV to 100 GeV	J.H. Hubbell	1969	Published in NSRDS-NBS-29 (US National Bureau of Standards)

Title	Author(s)	Pub. Date	Reference and Comments
Photon Cross Sections from 1 KeV to 100 MeV for Elements $Z=1$ to $Z=100$	E. Storm, H.I. Israel	1970	Published in Nucl. Data Tables <u>A7</u> , 565-681
Measurement of Intermediate Energy Gamma-Ray Cross Sections	L.C. Henry, T.J. Kennett	1971	Can. J. Phys., <u>49</u> , 1167
Tables of X-ray Mass Attenuation Coefficients for 87 Elements at Selected Wavelengths	E.L. Grove, A.J. Perkin	1971	Published in Developments in Applied Spectroscopy, <u>9</u> , 357-400, Plenum Press
X-ray Cross Section Compilation from 0.1 keV to 1 MeV. Vol. 1	W.G. Veigele, E. Briggs, L. Bates, E.M. Henry, B. Bracewell	1971	Published in KN-71-431, <u>1</u> , Rev. 1 (Kaman Science Corp., USA)
X-ray Cross Section Compilation from 0.1 keV to 1 MeV. Vol. 2	W.J. Veigele, E. Briggs, L. Bates, E.M. Henry, B. Bracewell	1971	Published in KN-71-431, <u>2</u> , Rev. 1. (Kaman Science Corp., USA)
Survey of Photon-Attenuation-Coefficient Measurements 10 eV to 100 GeV	J.H. Hubbell	1971	Published in Atomic Data, <u>3</u> (3), 241-297
Supplementary Report to X-ray Cross Section Compilation from 0.1 keV to MeV	E.A. Briggs, W.J. Veigele	1972	Published in K-72-431 (Suppl.) (Kaman Science Corp., USA)
Photon Cross Sections from 0.1 keV to MeV for Elements $Z=1$ to $Z=94$	W.M.J. Veigele	1973	Published in At. Data <u>5</u> (1), 51-111
Measurement of Total Attenuation Coefficients for 6- to 10-MeV Photons	K.U. Ahmed, R.G. Cochran	1973	Nucl. Technol., <u>17</u> , 66
Photon Cross Sections 1 keV to 100 MeV	E.F. Plechaty, J.R. Terrall	1968	Published in UCRL-50400, <u>6</u> , (Lawrence Livermore Laboratory)
Tables and Graphs of Photon Interaction Cross Sections from 1.0 keV to 100 MeV Derived from the LLL Evaluated Nuclear Data Library	E.F. Plechaty, D.E. Cullen, R.J. Howerton	1975	Published in UCRL-50400, <u>6</u> , Rev. 1, (Lawrence Livermore Laboratory)
Photon Mass Attenuation and Mass Energy Absorption Coefficients for H, C, N, O, Ar and seven mixtures from 0.1 KeV to 20 MeV	J.H. Hubbell	1977	Published in Radiation Research <u>70</u> , 58-81 (Academic Press)

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Title	Author(s)	Pub. Date	Reference and Comments
<u>SCATTERING</u>			
Graphs of the Compton Energy-Angle Relationship and the Klein-Nishina Formula from 10 KeV to 500 MeV	A.T. Nelms	1953	NBS Circular 542 (US National Bureau of Standards)
Compton Scattering Factors for Symmetric Free Atoms	D.T. Cromer, J.B. Mann	1967	J. Chem. Phys., <u>47</u> , 1892
X-Ray Scattering Factors Computed from Numerical Hartree-Fock Wave Functions	D.T. Cromer, J.B. Mann	1968	Acta Cryst., <u>A24</u> , 321
Compton Scattering Factors for Aspherical Free Atoms	D.T. Cromer	1969	J. Chem. Phys., <u>50</u> , 4857
Coherent and Incoherent X-Ray Scattering by Bound Electrons	R.T. Brown		
I. Helium Isoelectronic Sequence	R.T. Brown	1970	Phys. Rev., <u>A1</u> , 1342
II. Three- and Four-Electron Atoms	R.T. Brown	1970	Phys. Rev., <u>A2</u> , 614
Atomic Form Factor for Neutral Carbon	R.T. Brown	1971	Phys., <u>55</u> , 353
Incoherent Scattering Factor for Atomic Carbon	R.T. Brown	1972	Phys. Rev., <u>A5</u> , 2141
Rayleigh and Raman Cross Sections for the Hydrogen Molecule	J.C. Browne	1973	Published in At. Data <u>2</u> (3), 305-313
Atomic Form Factors, Incoherent Scattering Functions, and Photon Scattering Cross Sections	J.H. Hubbell, Wm.J. Veigele E.A. Briggs, R.T. Brown, D.T. Cromer, R.J. Howerton	1975	Published in J. Phys. Chem. Ref. Data, <u>4</u> (3), 471-538.
Differential Cross Sections for Coherent Photon Scattering by Elements Z=2 through Z=26	R.T. Brown	1975	Published in At. Data Nucl. Data Tables <u>15</u> (2), 111-139

Title	Author(s)	Pub. Date	Reference and Comments
<u>PHOTOELECTRIC ABSORPTION</u>			
The Magnitude and Extended Energy Range of X-Ray K-Absorption Fine Structure for Ti, Fe, Co, Ni, Cu and Zn,	N.K. Del Grande, A.J. Oliver	1972	Proc. Intern. Symp. X-Ray Spectra and Electronic Structure of Matter, Munich
Photoelectric Atomic Absorption Cross Sections for Elements Z=6 to 54 in the Medium Energy X-ray Range (5 to 25 keV) Pt. 1	G. Hildebrandt, JAD. Stephenson H. Wagenfeld	1975	Published in Z. Naturforsch A, <u>30a</u> (6/7), 697-707
Photoelectric Atomic Absorption Cross Sections for Elements Z=6 to 54 in the Medium Energy X-ray Range 5 to 25 keV. Pt. 2	J.D. Stephenson	1975	Published in Z. Naturforsch A, <u>30a</u> (9), 1133-1142
<u>PAIR PRODUCTION</u>			
The Influence of Electronic Screening on High-Energy Bremsstrahlung and Pair Production	A. Sorensen	1965	Published in Nuovo Cim. (10), 38, 745
Theoretical Total Cross Sections for High-Energy Nuclear-Field Pair Production in Light Elements	A. Sorensen	1966	Published in Nuovo Cim. (10), 41, 543
Pair Production by Photons on Electrons	K.J. Mork	1967	Phys. Rev., <u>160</u> , 1055
Exact Calculation of Pair Production	I. Overbo, K.J. Mork, H.A. Olsen	1968	Phys. Rev., <u>175</u> , 1978
Exact Calculation of Pair Production by Photons of Low and Intermediate Energies	I. Overbo	1970	Published in Arkiv Det Fysiske Seminar i Trondheim, No.9
Total Pair Production Cross Sections from 1.120 to 2.754 MeV	L.C. Henry, T.J. Kennett	1972	Can. J. Phys., <u>50</u> , 2756
Screening Effects in Atomic Pair Production below 5 MeV	H.K. Tseng, R.H. Pratt	1972	Phys. Rev., <u>A6</u> , 2049