

The Mass Attenuation Coefficients, Effective Atomic Cross Sections, Effective Atomic Numbers and Electron Densities of Some Halides

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Abstract : The total mass attenuation coefficients μ/r , of some halides such as, NaCl, KCl, CuCl, NaBr, KBr, RbCl, AgCl, NaI, KI, AgBr, CsI, HgCl_2 , CdI_2 and HgI_2 were determined at photon energies 279.2, 320.07, 514.0, 661.6, 1115.5, 1173.2 and 1332.5 keV in a well-collimated narrow beam good geometry set-up using a high resolution, hyper pure germanium detector. The mass attenuation coefficients and the effective atomic cross sections are found to be in good agreement with the XCOM values. From these mass attenuation coefficients, the effective atomic cross sections s_a of the compounds were determined. These effective atomic cross section s_a data so obtained are then used to compute the effective atomic numbers Z_{eff} . For this, the interpolation of total attenuation cross-sections of photons of energy E in elements of atomic number Z was performed by using the logarithmic regression analysis of the data measured by the authors and reported earlier for the above said energies along with XCOM data for standard energies. The best-fit coefficients in the photon energy range of 250 to 350 keV, 350 to 500 keV, 500 to 700 keV, 700 to 1000 keV and 1000 to 1500 keV by a piecewise interpolation method were then used to find the Z_{eff} of the compounds with respect to the effective atomic cross section s_a from the relation obtained by piece wise interpolation method. Using these Z_{eff} values, the electron densities N_{el} of halides were also determined. The present Z_{eff} and N_{el} values of halides are found to be in good agreement with the values calculated from XCOM data and other available published values.

Keywords : mass attenuation coefficient, atomic cross-section, effective atomic number, electron density

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