

ABSTRACT

Gamma ray mass attenuation coefficients (μ/ρ) were determined for several types of industrial material with densities ranging from 0.62g/cm^3 to 2.28g/cm^3 . At the energy of 356keV , coefficient values were obtained for distilled water, toluene and ethanol with different distance separations of detector to sample and sample to source. The best value of μ/ρ for water, toluene and ethanol were found to be $0.112\text{ cm}^2/\text{g}$, $0.107\text{cm}^2/\text{g}$ and $0.118\text{cm}^2/\text{g}$ respectively. By comparing the experimental value to that of theory, it is found that the μ/ρ measurements for water, toluene and ethanol are closer to the expected value when the sample is in close proximity to the source. Gamma ray mass attenuation coefficients have also been measured at 356keV and 662keV for n-pentane, ethanol, toluene, olein, oil sludge, polyethylene, distilled water, cement, brick and concrete respectively. At the energy of 356keV , the μ/ρ values obtained from the experiment are $0.127\text{cm}^2/\text{g}$, $0.135\text{cm}^2/\text{g}$, $0.112\text{cm}^2/\text{g}$, $0.100\text{cm}^2/\text{g}$, $0.102\text{cm}^2/\text{g}$, $0.091\text{cm}^2/\text{g}$, $0.097\text{cm}^2/\text{g}$, $0.084\text{cm}^2/\text{g}$, $0.090\text{cm}^2/\text{g}$ and $0.083\text{cm}^2/\text{g}$ respectively. At the energy of 662keV , the μ/ρ values obtained from the experiment are $0.124\text{cm}^2/\text{g}$, $0.105\text{cm}^2/\text{g}$, $0.100\text{cm}^2/\text{g}$, $0.074\text{cm}^2/\text{g}$, $0.074\text{cm}^2/\text{g}$, $0.069\text{cm}^2/\text{g}$, $0.072\text{cm}^2/\text{g}$, $0.065\text{cm}^2/\text{g}$, $0.061\text{cm}^2/\text{g}$ and $0.066\text{cm}^2/\text{g}$ respectively. The mass attenuation coefficients of the various samples show a decreasing trend with an increase in gamma energy.