

Investigation of lead silicate glass prepared from silica gel for used as gamma-ray shielding materials: A comparison between CaO and SrO

Gamma-ray mass attenuation coefficients have been calculated theoretically for $10\text{CaO-xPbO-(90-x)silica}$ gel waste and $10\text{SrO-xPbO-(90-x)silica}$ gel waste glass systems (where $x = 20, 25, 30, 35, 40$ and 45 mol%) by using WinXCOM program developed by National Institute of Standards and Technology. Then, the results were obtained further used to calculate half value layer and mean free path values. It was found that the $10\text{CaO-xPbO-(90-x)silica}$ gel waste glass system have higher values of mass attenuation coefficients and lower values of half value layer than $10\text{SrO-xPbO-(90-x)silica}$ gel waste glass system for most of gamma ray energy at 662, 1173, 1332 keV. Moreover, the density, molar volume, elastic moduli, Debye and softening temperature were applied to study the structural properties of both glass systems.

Keywords: Glasses; Silica gel waste; Elastic properties; Gamma-ray shielding

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Track Classification: Material Physics, Nanoscale Physics and Nanotechnology