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Radiation shielding studies of Phosphate based heavy metal oxide glasses for Radiation shielding applications.

The development of efficient glass materials for radiation shielding is crucial for the safe handling and long-term storage of nuclear materials and their waste. In the present study, phosphate-based heavy metal oxide glasses were synthesized by the conventional melt-quench technique using a muffle furnace. The density and molar volume of the glasses were found to vary systematically with composition. FTIR analysis confirmed the incorporation of different phosphate structural units in the glass network, as indicated by distinct vibrational modes. Radiation shielding parameters, including the mass absorption coefficient, linear attenuation coefficient, half-value layer, and effective atomic number, were established in the energy range ranging from 667 KeV to 1.3MeV using PHY-X software. The results were further correlated with the effective field distribution within the glass matrix, highlighting the influence of varying heavy metal ion concentrations on the shielding performance.

Keywords: Phosphate glasses, Heavy metal oxides, Radiation shielding, FTIR spectroscopy

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