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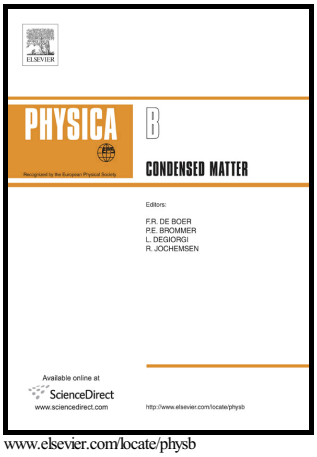

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Comparative Shielding Properties of Some Tellurite Glasses: Part 1

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Abstract:

This article focuses on the shielding properties among 21 tellurite glass samples in the form of TeO_2-A_nO_m, TeO_2-WO_3-B_nO_m andTeO_2-WO_3-Er_2O_3-PbO where A_nO_m= La_2O_3, CeO_2, Sm_2O_3, MnO_2, CoO_3, Nb_2O_5,B_nO_m= Er_2O_3, La_2O_3, Sm_2O_3, CeO_2 mol%. The mass attenuation coefficient, μ/ρ have been computed within the energy range 0.01MeV– 20 MeV using WinXCom software. The obtained mass attenuation coefficients are then utilized to calculate effective atomic numbers, Z_{eff}, half value layers, HVL and mean free path, MFP. In addition, the macroscopic effective removal cross-section for fast neutron (Σ_R) values was also evaluated. Also, variation of the shielding parameters is compared with other tellurite, borate and silicate glasses to explore the superior shielding properties of tellurite glasses from gamma rays than other glasses.

Key Words: Tellurite Glasses; Shielding Properties; WinXCom; Gamma Ray; Neutron.

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Highlights:

Shielding properties of 21 tellurite glass systems revealed that:

- TeO_2-A_nO_m, TeO_2-WO_3-B_nO_m and TeO_2-WO_3-Er_2O_3-PbO glasses can replace conventional concretes as gamma-ray shielding materials and $49TeO_2$ –$29WO_3$-$2Er_2O_3$-20PbO&$60TeO_2$ –$30WO_3$-$10Er_2O_3$are the best,
- Neutrons shielding properties of $49TeO_2$ –$29WO_3$-$2Er_2O_3$-20PbO is the best,