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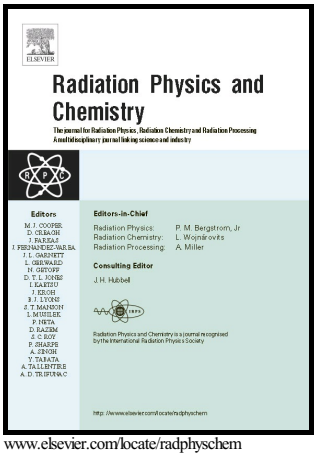

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Determination of nuclear radiation shielding properties of some tellurite glasses using MCNP5 code

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Abstract

In the present work, the new tellurite glasses such as $78.5TeO_2$-$20Na_2O$-$1.5Sm_2O_3$, $90TeO_2$-$9BaO$-$1Nd_2O_3$, $75TeO_2$-$20Sb_2O_3$-$5WO_3$, $55TeO_2$-$25B_2O_3$-$20Bi_2O_3$, $52.5TeO_2$-$22.5PbO$-$25ZnO$ have been investigated in terms of radiation shielding parameters. For this aim, we used the MCNP5 code to simulate the attenuation of photon in glasses. The simulation results were compared with the XCOM program results for four different photon energies in the range of 0.356-1.33 MeV. It was found that the simulation results using the MCNP5 code were in good agreement with the XCOM data. Also the shielding parameters for the present glass samples such as effective atomic number (Z_{eff}), half value layer (HVL), mean free path (MFP) and buildup factors have been calculated for photons. In addition, the present samples were studied for fast neutron and charged particle interaction using fast neutron removal cross sections (Σ_R), effective atomic numbers (Z_{eff}), electron densities (N_e) and mass stopping powers (MSP). The shielding properties of the present glasses were compared to steel-scrap concrete SSC. The