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Research note

Evaluation of the radiation protection capabilities of some metal oxide glasses against radioisotopic gamma sources

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Abstract

In this research, the protection properties of tellurites metal oxide glasses such as TPZ, TNS, TBN, TSW, TBB glass and concrete (SSC) against 10 radiation gamma radioisotopic sources were investigated. For this purpose, the MCNPX code was used to simulate the photon transport in the samples and the XCOM cross section database was applied to calculate the mass attenuation coefficient. The effective atomic number, the linear attenuation coefficient, and the flux buildup factor against the radiation of gamma radioisotopic sources were determined for the mentioned shields. The results show that considering the average energy in the radiation protection calculations for a multienergy gamma source cannot be a suitable criterion; therefore, the whole energy spectrum of the source should be considered. The TBB glass was the best photon attenuator as compared to other tellurites metal oxide glasses, because it had the highest effective atomic number, linear attenuation coefficient, and minimum flux buildup factor for all gamma-radioisotopic sources.

Keywords: metal oxide glasses, effective atomic number, linear attenuation coefficient, flux buildup factor, monte carlo simulation

For full article, refer to the Persian section