

An investigation on shielding properties of BaO, MoO₃ and P₂O₅ based glasses using MCNPX code

ABSTRACT

In the present work, some radiation shielding quantities (mass attenuation coefficients, effective atomic number, effective electron density, half value layer and mean free path) for various BaO–MoO₃–P₂O₅ ternary glass systems have been determined within the 0.015–15 MeV energy range, using WinXCom program. Additionally, the mass attenuation coefficients of all the investigated glasses have been calculated using MCNPX simulation code (version 2.6.0) and compared to those of WinXCom results. Among the studied glasses, BaMoP8 glass sample with MoO₃ content of 70% mol is found to have superior gamma-ray shielding characteristics. Moreover, the glasses studied in this paper possess better radiation shielding properties by providing shorter half value layer (HVL) than RS-253 G18 commercial glass and some concrete samples namely ordinary, hematite-serpentine and ilmanite-limonite.

Keyword: MoO₃-based glass; Radiation shielding; Attenuation coefficients; WinXCom; MCNPX