A comprehensive study of the energy absorption and exposure buildup factors of different bricks for gamma-rays shielding

ABSTRACT

The present investigation has been performed on different bricks for the purpose of gamma-ray shielding. The values of the mass attenuation coefficient (μ/ρ), energy absorption buildup factor (EABF) and exposure buildup factor (EBF) were determined and utilized to assess the shielding effectiveness of the bricks under investigation. The mass attenuation coefficients of the selected bricks were calculated theoretically using WinXcom program and compared with MCNPX code. Good agreement between WinXcom and MCNPX results was observed. Furthermore, the EABF and EBF have been discussed as functions of the incident photon energy and penetration depth. It has been found that the EABF and EBF values are very large in the intermediate energy region. The steel slag showed good shielding properties, consequently, this brick is eco-friendly and feasible compared with other types of bricks used for construction. The results in this work should be useful in the construction of effectual shielding against hazardous gamma-rays.

Keyword: Brick; Mass attenuation coefficient; Buildup factor; G-P fitting; Radiation shielding