GAMMA RADIATION SHIELDING GLASSES LENSES DESIGN IN GLASS MATERIAL SYSTEMS TeO_2-TiO_2-ZnO; WO_3-MoO_3-TeO_2, AND Bi_2O_3-B_2O_3-TeO_2

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Abstract
The utilization of various radiation sources must be carried out carefully and in compliance with safety criteria for workplace safety. The design of safety goggles lenses for gamma radiation is an efforts to minimize the risk of stochastic and deterministic effect on the eyes of radiation workers. In this research, an investigation to candidate material systems potentially used as safety goggles lenses has been studied. This experiment was conducted using the Monte Carlo simulation method using the PHITS software. The experiment were carried out by exposing 50 mCi ^{60}Co and ^{137}Cs source to candidate materials TeO_2-TiO_2-ZnO; WO_3-MoO_3-TeO_2, and Bi_2O_3-B_2O_3-TeO_2 with thickness variation of $2{,}5\times10^{-2}$; $7{,}5\times10^{-2}$; $8{,}5\times10^{-2}$; 2×10^{-1}; 3×10^{-1}; 4×10^{-1}; 5×10^{-1}cm. This research employed a numerical simulation method using PHITS software based on Monte Carlo. The aim was to determine the attenuation of gamma radiation particles when passing through the lens material of the goggles. The program output is a particle flux value, was used to determine the gamma radiation attenuation values, next from these results half value layer (HVL), mean free path (MFP) and build up factor were calculated, leading to the study's conclusions.The simulation results indicated that the Bi_2O_3-B_2O_3-TeO_2 material system with a thickness of 5×10^{-1}cm was the most effective in reducing radiation particles compared to other candidate material system. The design of safety goggle lenses for gamma radiation using the glass material TeO_2-TiO_2-ZnO; WO_3-MoO_3-TeO_2, dan Bi_2O_3-B_2O_3-TeO_2 is remommended only for use when radiation workers handle radiation source of ^{137}Cs or orther source with energy equal to or less than that of ^{137}Cs.