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Study of Effective atomic numbers of Bioactive Glasses for Photon Interaction

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Abstract content
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Bioactive glasses are a group of synthetic silica-based bioactive materials with unique bone bonding properties. Bioactive glasses are widely used in joint replacements, bone plates, etc. As a consequence, various human organs and bioactive material are exposed to X-rays and gamma rays. Once some parts of the human body is replaced by bioactive material, it is very important to know that how these material can be affected by exposing with X-or gamma radiation. This work was carried out to study the nature of mass attenuation and effective atomic numbers of bioactive glasses for gamma or X-rays. In the present study, we have calculated the effective atomic number, electron density for photon interaction in the energy range 1 keV to 100 MeV of selected of bioactive glasses SiO₂-Na₂O-CaO-P₂O₅, SiO₂-CaO-P₂O₅ and SiO₂-CaO. We have also computed the single valued effective atomic number by using XMuDat programme. It is observed that variation in effective atomic number (ZPI, eff) depends also upon the weight fractions of selected bioactive glasses and range of atomic numbers of the elements. The XMuDat calculates Zeff, XMuDat by assuming photoelectric absorption as the main interaction process where as Nel, XMuDat assuming Compton scattering as the main interaction process.

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