

The Promising Use of Volcanic Silica as an Environmental Source for Diagnostic X-ray Shielding Applications

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Ionizing radiation shielding is required to prevent or mitigate the radiological risks resulting therefrom. Low Z materials such as polyethylene are preferable for neutron shielding, while high Z materials such as lead are preferable for photons (gamma and x-rays). Concrete is a conventional shielding material that is used to shield against either photons or neutrons. Although concrete is cheap and can be easily formed, it is responsible for 8% of carbon dioxide emissions. If volcanic silica rocks take the role of concrete in radiation shielding, this will help reduce the level of carbon dioxide emission. Monte Carlo code Fluka was used to simulate the experiment setup and calculate the exposure rate on the other side of the shielding samples. The obtained results showed that the linear, mass attenuation, and absorption coefficients of volcanic silica are almost like those of concrete. These results reveal that volcanic silica rocks could be used similarly to concrete for the shield against X-rays diagnostic range up to 250 keV.

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