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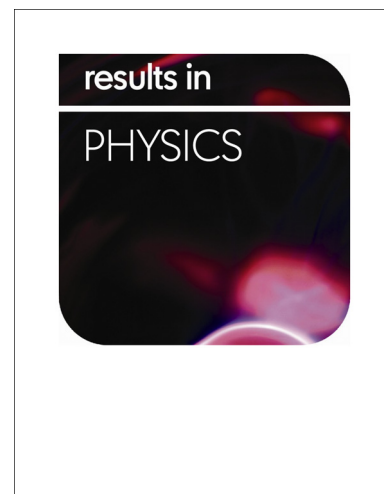
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Shielding features of concrete types containing sepiolite mineral: Comprehensive study on experimental, XCOM and MCNPX results

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Abstract

Natural sepiolite mineral is a naturally occurring clay form belonging to a part of layered silicate. Because of its advantages such as low production cost, light-weight and convenient, it may be selected as an alternative shielding material to others. Radiation shielding performances of some concretes to sepiolite and B₄C additive have been researched reported in a wide energy region of 0.08–1.333 MeV using experimental data, MCNP and XCOM. The simulated data obtained by MCNPX are discussed and compared with the experimental results as well as with the XCOM results. The simulations match the experiments very well except for S3 sample. From the measurement, the maximum gamma-ray attenuation was detected in the concrete specimen with 10% sepiolite (S1) while the minimum attenuation of gamma-ray was noted in the concrete specimen with 30% sepiolite (S3). The addition of sepiolite mineral to concretes may be an alternative option that can be used in several radiation protection applications.

Keywords: Sepiolite; radiation shielding; attenuation coefficients; MCNPX; XCOM

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1. Introduction

As well-known, one of the traditional shielding materials is lead (Pb) material with the purpose of the protection of both public and equipments from harmful effect of ionizing radiation. However, the use of Pb should be avoided due to some disadvantages such as toxic, heaviness for transportation and storage, high production cost and harmful effects on human body. Therewithal, building and construction materials are commonly used as an alternative

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