

STUDY OF SORPTION PROPERTIES OF MODIFIED STRUCTURAL MATERIALS FOR NUCLEAR POWER ON GAMMA-QUANTUM BEAMS OF LINEAR ACCELERATOR

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The energy crisis is currently one of the pressing global problems. And one of the solutions to this problem is the use of a highly efficient resource - nuclear energy. The use and development of this resource is constrained by the safety factor in the operation of nuclear reactors. Today, concrete is widely used as a material for radiation protection: it is cheap, it is easy to form structures of various shapes, and it is a good absorber [1]. Radiation shielding concrete is a composite with special fillers. It is widely used for shielding against gamma rays and neutrons due to its good shielding properties and is the biological barrier of choice in nuclear reactors and other nuclear installations. However, despite this, the process of radiation damage to cement, which is part of concrete, and the effect of different concentrations of chemical elements on its radiation resistance are still insufficiently studied. Therefore, the study of materials used to provide radiation protection is an actual direction.

In this work, studies were carried out on three samples of cement with different contents of B_4C , Fe_3O_4 and $BaSO_4$. To study the coefficients of linear absorption of gamma quanta in the samples under study, an Elekta Axes electron accelerator with gamma quanta energies of 10 and 15 MeV was used as a source of gamma quanta. The samples were made at Cairo University (Egypt). To obtain the linear attenuation coefficients of the samples, the technique developed earlier by the authors was used [2].

As a result, experimental linear attenuation coefficients for samples with various impurities were obtained, and it was shown that cement with a high $BaSO_4$ content is a good absorber of 10 and 15 MeV gamma quanta. However, such samples must be studied for radiation resistance from neutron radiation.

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1. A. Makarious, I. Bashter, E. Abdo, M. Azim, and W. Kansouh, Ann. Nucl. Energy 23(3), 195 (1996).
2. Y. Zaripova, T. Gladkikh, M. Bigeldiyeva, V. Dyachkov, and A. Yushkov, Reports of NAS RK 5, 126 (2021).

The speaker is a student or young scientist

Yes

Section

1. Applications of nuclear methods in science and technology

Primary authors: ZARIPOVA, Yuliya (al-Farabi Kazakh National University); DYACHKOV, Vyacheslav (al-Farabi Kazakh National University); GLADKIKH, Tatyana (Sunkar); BIGELDIYEVA, Mirgul (al-Farabi Kazakh National University); NASR AHMED NASR DIAB (Cairo University)

Presenter: ZARIPOVA, Yuliya (al-Farabi Kazakh National University)

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