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PROPERTIES AND COMPOSITION OF NATURAL QUARTZITES AFTER THE IRRADIATION BY GAMMA RADIATION

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The most reliable and long-term isolation of radioactive waste can be ensured by their burial in stable deep geological formations. The main factors which provide the stability of the geological formation during deep immobilization are absorbed by the protective container.
The natural quartzite was from the Ovruch deposit from the Ukrainian crystal shield. These natural quartzites were irradiated with converted gamma quanta for 12 years on an LUE with E = 12 MeV, I = 450 μA, the maximum absorbed dose D = 35 million Gy. The element's content of the samples irradiated by bremsstrahlung from the linear accelerator electron with an energy of 23 MeV and the current 500 μA was determined. Activation of samples carried out on air. The determination of an element's content in samples was performed by gamma spectrometer method on Ge(Li)-detector with the volume of 50 cubic cm and a resolution of 3.2 eV at 1332 keV line. To reduce the influence of the background, the detector is equipped with three-layer Pb-Cu-Al protection. The element's content in the samples was constant Si (33%), Al, Fe, Mn, Ca, Ti, Mg, and Na (from 0.7 to 0.05%).
The IR-spectroscopy and crystal-optical investigation were used for obtained information about the composition of the natural quartzite and identify not only the molecular species present in its but also the crystalline form. After irradiation, the grains of quartz, which consist of quartzite, have a smoky color and sometimes lose their transparency due to the formation of accumulation of impurities and inclusions, which are formed as a result of radiation-stimulated diffusion.
After irradiation, the grains of quartz, which makeup quartzite, acquire a smoky color and sometimes lose their transparency due to the formation of accumulation of impurities and inclusions, which are formed as a result of radiation stimulated diffusion. There is not visible cracking or amorphization of the quartz.
It is noted that irradiation with quartzite quanta for such a long period contributes to the formation of a more perfect crystal structure of this mineral.
The investigated quartzites are highly resistant to radiation exposure and can be used as a natural geological environment for the long-term storage of radioactive waste.

Primary author: Dr DYKYI, Mikola (Head of department)

Co-authors: Mr MEDVEDEV, Dmytriy; Ms BEREZNYAK, Elena; Ms MEDVEDEVA, Elena; LYASHKO, Yuriy

Presenter: Dr DYKYI, Mikola (Head of department)

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