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The study of the solidification of cement by neutron radiography and diffraction

Nowadays, the special sorts of cement, for exampleportland cement, are increasingly being used for the storage of radioactive waste. Various mechanisms of radionuclide retention, corrosion resistance under various storage conditions, durability of cured compounds, and micro and porous structural properties of cement, as a matrix material in radiation shields, are studied. The main properties of cement materials depend on the characteristics of the pore structure, the formation of which begins at the early stage of cement hardening.
In this work, the presentedstudies of neutron radiography and diffraction methods, the kinetics of solidification and solidification of CEM V cement used for the construction of storage for radioactive aluminum and other radioactive waste facilities.The main factors influencing the distribution of internal heterogeneities in the microstructure, the formation of pores and cracks are studied.
Using the neutron radiography method we found that during the solidification process two phases are observed: the beginning phase is up to 1 hour, the second phase is the active gas (CO2) yielding from 1 hour to 4 hours.
The method of neutron diffraction reveals the processes of decreasing the water content in cement matrixes during drying.
Experiments on neutron radiography been used on a NRT facility, by neutron diffraction on a DN-12 diffractometer of the IBR-2 high-flux pulse reactor.

Primary author: Mr KENESSARIN, Murat (JINR)

Co-author: Dr KICHANOV, Sergey (Joint Institute for Nuclear Research)

Presenter: Mr KENESSARIN, Murat (JINR)

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