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Uptake of 85Sr onto cementious materials and synthetic geopolymer

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The decommissioning of nuclear facilities will produce all levels of radioactive waste, including intermediate- and high-level waste that is not allowed to be disposed of in low- and intermediate-level radioactive waste repositories. Therefore, it is necessary to find infill materials used in a deep geological repository that will make it safe for the environment for a long period of time. The aim of the ALMARA project is to study those materials and test them.

The subject of this work is strontium sorption on cementious materials, finding the equilibrium time needed for ^{85}Sr sorption. Batch type experiment was performed with solution of $^{85}SrCl_2$ in synthetic granitic water on hardened cement paste (CEM), cement mixed with 20 wt% of bentonite (AFM), cement mixed with 1 wt% of nano iron particles (NNM) and synthetic geopolymer (GP). These materials were used in two different grain sizes (mesh fraction less than 0.5 mm and mesh fraction between 1 –2 mm) and two different liquid-solid ratios (5 and 10 ml/g). To compare those materials, distribution coefficients (R_d) were calculated.

The best result was obtained for GP, with the equilibrium time being one week and the Rd value being in the thousands of ml/g. For other materials, the equilibrium time was about two months and the Rd values were significantly smaller as follows: AFM > NNM > CEM.

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