Influence of irradiation on sorbing properties of potential materials, considered for NPP severe accident waste treatment

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Potential VVER 440 and VVER 1000 NPP severe accident, forming large volumes for highly radioactive liquid waste has been evaluated within Fukushima Daichi safety measures in UJV since 2013.

The coolant solution is supposed to be composed namely of H_3BO_3 (15 g/l), KOH (3,3 g/l), N_2H_4 (0,8 g/l). The most important contaminants would be Cs and Sr radioisotopes, altogether with actinides. The assumed volume of treated water was set to 3 000 m^3.

A set of 53 potential sorbent, including commercial, laboratory sorbents and nanomaterials, were firstly evaluated, concerning sorption of Cs, Sr and Eu. Batch sorption experiment method was used, using synthetic coolant solution (see above) as a solvent.

Following that, the sorbents were exposed to irradiation (666 kGy), simulating the effect of radionuclide presence in the solution that would influence the surrounding environment. The resulting changes in sorbent properties (e.g. CEC) and sorption efficiency were afterwards studied.

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