Environmental fate of fission products: a comprenhensive study

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Assuring a safe long-term nuclear waste management implies extensive knowledge on the fundamental behaviour of fission products in the surroundings of the feasible repository. This includes the radionuclide speciation, their migration, and their possible interaction with compartments of the technical and geological barriers, and biota.

Fission products, although generated in low yield, posse radiotoxicity and their half-life can be high (10^5 years). Among them, Se and Tc are especially relevant because some of their species are assumed highly mobile in water, since their interaction with the barrier materials (like clay) is considered negligible, as they are mainly found as anionic species [1].

We carry out a comprehensive study to fill the existing gaps of knowledge about the thermodynamic parameters and the molecular level information related to Tc and Se interaction with minerals. Our approach consist on having a global view of the interaction by combining experiments and theoretical tools [2]. On one hand the experiments consists on batch sorption experiments (to obtain the trend of sorption with pH, ionic strength or time) and on spectroscopic experiments (to get the information of the interaction at a molecular level). On the other hand, the theoretical tool consists on developing complexation models that allow the prediction of fission product-mineral interaction under given conditions and that can be adapted to other environments.

In this talk we focus on the Tc(VII) interaction with alumina. Alumina has been selected not only for its model character for complex minerals, but also because of its high affinity for anions, as Se(IV) [2].

This work has been developed in the frame of VESPA II project (02E11607B), supported by the German Ministry of Economy and Energy (BMWi).

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