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Long-term behavior of thorium-plutonium phosphate-diphosphate solid solutions

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Considering several properties of interest, Thorium Phosphate-Diphosphate $\text{Th}_4\text{P}_6\text{O}_{23}$ (namely beta-TPD) was considered as a promising matrix for the specific immobilization of actinides. Among its interesting properties, one can note its capability to form solid solutions with high actinides mole loadings, its good sintering capability and its high resistance to aqueous corrosion or to radiation damages. Since water is the main vector for radionuclide migration from a deep disposal repository, the long-term behavior of beta-TPD and associated solid solutions with tetravalent plutonium was examined. The evolution of raw and leached $\text{Th}_4\text{-xPuxP}_6\text{O}_{23}$ samples were examined for several years in order to show the effects of internal irradiation on the beta-TPD crystal structure and on the physico-chemical properties of interest such as the chemical durability of the samples.

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