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Sorption of Pd, one long lived fission product, onto synthetic hydroxyapatite

The chemistry of several B-metals in the +II oxidation state is of concern for nuclear waste management. Isotopes of ruthenium (Ru), rhodium (Rh) and palladium (Pd) fission products formed in nuclear spent fuels can have an important contribution to the long-term radiotoxicity of high level wastes. The sorption of one long lived fission products, Pd on hydroxyapatite (Ca10(PO4)6(OH)2) has been studied at 25℃ as a function of pH, from 0.025 M Ca(ClO4)2 and 0.025 M NaH2PO4 aqueous background electrolytes, trying to minimize some types of reactions, such as dissolution of solid and precipitation of metal. The radiotracer palladium, 109Pd, obtained by the neutron irradiation of Pd(NO3)2 salt in Triga Mark III research reactor of the ININ (Mexico), has been used to measure their partition coefficients between aqueous phase and hydroxyapatite. In the interpretation of the sorption measurement, we take into account the existence of active sites at the hydroxyapatite surface and the aqueous solution chemistry of palladium as well as the effect of phosphate anions from solid dissolution. The results can be interpreted as evidence of sorption of the species PdOH+, and of a mixed hydroxo complex of Pd2+ fixed onto Ca-OH surface sites of the hydroxyapatite.

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