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Authors

Rao, Linfeng
Garnov, Alexander Yu.
Rai, Dhanpat
et al.

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Complexation of Isosaccharinic Acid with Actinides: Development of Biodegradable Foams for Decontamination

L. Rao,¹ A. Yu. Garnov,¹ D. Rai², R. C. Moore,³

¹Lawrence Berkeley National Laboratory, Berkeley, CA

²Pacific Northwest National Laboratory, Richland, WA

³Sandia National Laboratories, Albuquerque, NM

Isosaccharinic acid (ISA), a degradation product of cellulosic materials, has been a subject of study due to its presence in cellulose co-disposed low-level nuclear wastes and its ability to complex actinides. Because ISA itself is biodegradable, it has been proposed to incorporate ISA into foams for the purpose of cleaning contaminated surface, replacing complexants that are harsh to the natural environment. In this work, the complexation of isosaccharinic acid with Th(IV), U(VI) and Np(V) has been studied at 25 °C. Formation constants of the complexes and the enthalpy of complexation were determined by potentiometry and calorimetry, respectively. To help evaluate the effectiveness of ISA for decontamination in the presence of common competing ions, the complexation of ISA with Fe(III) and Ca(II) was also investigated.