The Effect of Alcohol Solvent Modifier Structure on Cesium Extraction Performance by Calix[4]arene Crown Ethers

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Abstract

The strength of cesium extraction afforded by a lipophilic calix[4]arene-crown-6 ether extractant can be enhanced by the addition of alcohol solvating components or "modifiers" to the solvent. For a given set of conditions (modifier and extractant concentrations), the degree of enhancement is highly dependent on the structural features of the modifier. To probe this dependence, a small library of alcohol modifiers bearing a common alkylphenoxy core, but differing in the type and placement of substituents, has been evaluated with respect to the effect on the cesium distribution ratio, D(Cs). It was found that the cesium distribution ratio can vary by over two orders of magnitude by appropriate substituent selection within the common core element. The identification of key alcohol modifier structural parameters has been essential to the development of a process for cesium removal from high-level waste. The relationship between the structure of the modifier and its ability to enhance cesium extractability will be discussed.

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