

Thallium extraction from hydrochloric acid media into a deep eutectic using bis(2-ethylhexyl) phosphate

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The chemical properties of superheavy elements are relatively unknown due to their short half-lives and difficulty of production. In preparation for a future experiment to study the chemical properties of element 113, separation techniques have been used to study the behavior of its homologs, In and Tl. Previous work studied the liquid-liquid extraction of radioactive ²⁰¹Tl ($t_{1/2} = 3.04$ d) from various concentrations of HCl into a mixture of menthol and lauric acid that formed a so-called deep eutectic solvent (DES). This work focuses on the effects of adding an extraction agent, bis(2-ethylhexyl) phosphate (HDEHP), to the DES on the efficiency of thallium extraction. The extraction of Tl(I) was generally poor, both with and without HDEHP added. In contrast, ¹¹¹In ($t_{1/2} = 2.80$ d) showed significant extraction using HDEHP added to the same DES. This difference in behavior could potentially be exploited in a future experiment on the chemistry of element 113.