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## Organic Solvent Extraction of Uranium from Alkaline Nuclear Waste

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During the dissolution process of the irradiated uranium target plates, the uranium and some fission products are precipitated as mixed hydrated oxides to form the residue. The same residue is commercially valuable, as a feed stock for recovering and purifying uranium from the other fission products and trans-uranium elements. PUREX (Plutonium Uranium Redox Extraction) is a worldwide known technique for the extraction of uranium using the conventional acid route. However, during the PUREX extraction of uranium, plutonium and thorium are also extracted in this process. In addition, there are proliferation issues, which make the PUREX process not favorable. The aim of this research was to evaluate organic extraction ligands that can operate in alkaline media to remove uranium from the nuclear waste and the objective was to characterize the most effective organic solvent for extracting uranium only, from alkaline media. Uranium oxide was dissolved in sodium carbonate solution to form the uranium tri-carbonate aqueous feed solution. 5% (v/v) Aliquat 336 in either xylene or toluene was used as the organic extractant. The samples were analyzed using the VARIAN CARY 100 UV-VIS Spectrometer set at 450 nm, at an optimum solution pH of 12. The results from this work indicate that Aliquat 336 in Xylene has a less effective extraction percentage of 72% for uranium within the time of 60 minutes, if extraction is performed immediately after the preparation of the uranium feed solution. Toluene extracted 82% of the uranium from the feed solution after 30 minutes. However Toluene showed a decrease in extraction capability to 76% after 60 minutes. Plutonium and thorium were not detected in the final uranium product, indicating that the organic solvent alkaline extraction method could be a valuable technique in uranium processing.

### Country or International Organization

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