

Removal of Uranium from Thorium-Uranium SIMFUEL by Fluoride Volatility

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Abstract

One of the most significant impediments to the implementation of a sustainable thorium-oxide based fuel cycle is the lack of an industrially viable discharged fuel recycling process. The major difficulty lies in the aggressive nature of the reagents required for the initial fuel dissolution step. The concentrated nitric acid containing a small amount of hydrofluoric acid necessary to dissolve the solid fuel presents material challenges from the corrosion perspective, and process problems from the chemistry perspective. In this work a simple and effective separation of uranium from a solid solution of uranium and thorium oxide will be presented. Separations of >99 % have been achieved on thorium-uranium SIMFUEL (SIMulated-irradiated FUEL). The paper will describe the starting material, experimental apparatus, experimental conditions and results. This work is preliminary in nature but the promising results have significant implications and warrant further study and development.