

燃料デブリ分析のための超微量分析技術の開発

(14) TBP 樹脂を用いた模擬デブリ溶解液からのウラン回収

Development of ultramicro analysis technology for fuel debris analysis

(14) Uranium recovery from simulated debris solution by using TBP resin

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Recovery of uranium from simulated debris solution by column separation was performed in the present study. The extraction of uranium was conducted by using TBP resin as impregnated resin in two different condition, hydrochloride acid and nitric acid solutions. Uranium recovery from simulated debris solutions by TBP resin was confirmed in both conditions.

Keywords: fuel debris, actinide analysis, uranium recovery, TBP Resin, column separation

1. Introduction

We have been developing the nuclide separation methods as pretreatment for precious fuel debris analyses. Especially for actinide analyses, the mutual separation of actinides is required in order to remove the isobar interference. TBP is one of the most powerful extractants of actinides, i.e., the extractant used in PUREX process¹. Recently, TBP-impregnated resin (TBP resin) was commercially supplied by TrisKem Int.². In the present study, uranium extraction experiments were conducted by using TBP resin in HNO₃ and HCl solutions.

2. Experimental

7.75 mL of TBP resin was prepared in the Muromac mini column L. The resin height is 9 cm. We prepared the simulant debris solutions with U in 6 mol/L (M) of HNO₃ or HCl solution. 0.5 mL of the simulant debris solution was feed in the above column. 20mL of 6 M HNO₃ or HCl solution was added in this column for the adsorption of U. After this, U was eluted by 0.1 M HNO₃ or HCl solution. U and the stable isotopes of other elements were detected by ICP-MS/MS, Agilent 8900. The radioisotopes such as ²⁴¹Am were detected by Gamma-ray spectrometer.

3. Result

The result of column experiment in HNO₃ solution is shown in Fig. 1. We confirmed that extraction of U from the simulant debris solution. In addition, we also confirmed that extraction of U in HCl solution system.

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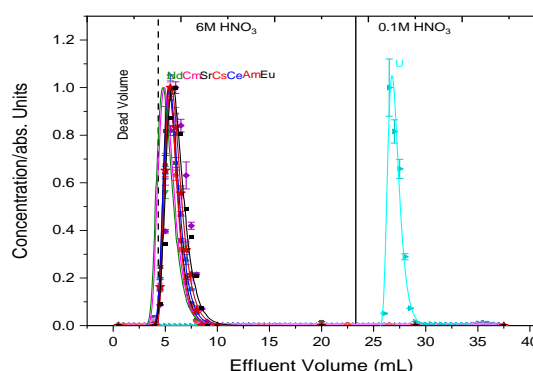


Figure 1. Extraction of uranium by using TBP resin in HNO₃ solution

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