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Electrolytic Deposition of Metal Ions Using A Liquid Cadmium Cathode

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Abstract

As one of researches for the P & T purposes, a basic experiment on the recovery of actinide elements from the mixture with rare earth elements by means of electrorefining using a liquid cadmium cathode in the LiCl-KCl eutectic melt was carried out. In order to examine the behaviors of electrodeposition of metal ions on a liquid electrode, recovery experiments of rare earth metals resulting from forming electrodeposits were performed by a galvanostatic electrolysis method at various current densities. A cyclic voltammetric technique was applied to determine reduction-oxidation potential of each metal element in the melt and to detect the changes of the multi component melt composition for on-line monitoring. Also, a collaboration study with RIAR was completed to test the preliminary feasibility on a recovery of actinide elements from the mixture with rare earth elements using a liquid cadmium cathode and actinide metals. Experimental results showed that the ratio of actinides to rare earths, 9: 0.5~1 led to the rare earth content of about 5~10 wt% in the deposit.

Key Words : liquid cadmium cathode, electrodeposition, eutectic salt, galvanostatic electrolysis, cyclic voltammetry