

Assessment of the Thermochemical Properties of Actinides in Molten Chlorides

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Z. Naturforsch. **63a**, 107 – 113 (2008); received April 3, 2007

Presented at the EUCHEM Conference on Molten Salts and Ionic Liquids, Hammamet, Tunisia, September 16 – 22, 2006.

The electrochemical properties of the chlorides of the actinides U, Pu, Np and Am (AnCl_3) were investigated by transient electrochemical techniques in the LiCl-KCl eutectic at 400–550 °C. The diffusion coefficients of the cations and the apparent standard potentials of the redox systems on an inert W electrode were measured. The Gibbs energy of dilute solutions of AnCl_3 as well as the activity coefficients were derived from electrochemical measurements. In addition, the electrochemical behaviour of the actinides on an Al electrode was investigated. They formed AnAl_4 alloys, the formation potentials of which allowed a quantitative recovery of the actinides and their separation from fission products and especially from lanthanides. In addition, the thermochemical properties of the AnAl_4 alloys were determined by electrochemical measurements.

Key words: Actinides; Thermochemical Properties; Molten Salts; Al Electrode; Pyrochemistry.