

LOADING AND FLOW-RATE DEPENDENCE OF THE TRANSFER RATES IN A CENTRIFUGAL CONTACTOR USING ORGANIC LIGAND CYME₄-BTBP

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Abstract

Centrifugal contactors are efficient and compact devices for running hydrometallurgical separation processes. Due to the short residence time in the centrifugal contactors the equilibrium distribution ratios are usually not reached. This can result in huge errors in the flow-sheet calculations which lead to badly designed processes. An estimation of the apparent distribution ratios can however be done by using stage efficiencies. The stage efficiencies depend on many different parameters and among those are the loading and the flow-rates.

CyMe₄-BTBP is the current European reference extracting agent for the development of trivalent actinide separation processes such as r-SANEX [1],[2] and 1c-SANEX [3]. The CyMe₄-BTBP ligand is known to have slow transfer kinetics and therefore has this system's kinetics been investigated further. Experiments were run in a single stage centrifugal contactor to see the influence of different metal loadings of the ligand, different flow-rates and different flow-rate ratios. The results indicate that the stage efficiency is strongly dependent on flow-rates and is also decreased with higher metal loading.

References

- [1] G. Modolo, M. Sypula, A. Geist, C. Hill, C. Sorel, R. Malmbeck, D. Magnusson, M.R.S. Foreman, *Development and demonstration of a new SANEX process for actinide(III)/lanthanide(III) separation using a mixture of CyMe₄-BTBP and TODGA as a selective extractant*. In: *Actinide and Fission Product Partitioning and Transmutation, 10th Information Exchange Meeting*, Mito, Japan, 6–10 October 2009. NEA No. 6420, OECD-NEA (2010), 235–241.
- [2] D. Magnusson, B. Christiansen, M.R.S. Foreman, A. Geist, J.-P. Glatz, R. Malmbeck, G. Modolo, D. Serrano-Purroy, C. Sorel, *Demonstration of a SANEX process in centrifugal contactors using the CyMe₄-BTBP molecule on a genuine fuel solution*. *Solvent Extr. Ion Exch.* **2009**, 27 (2), 97–106.
- [3] A. Wilden, M. Sypula, G. Modolo, A. Geist, *Direct actinide(III) separation from PUREX raffinate using a BTBP/TODGA solvent*. *Proc. 19th Internat. Solvent Extraction Conf. (ISEC 2011)*, Santiago, Chile, 3–7 October 2011.