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Study of the DTPA and Malonic Acid solution for the selective Am stripping in the CEA EXAm process

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In the frame of the development of the French CEA EXAm process (Am selective separation from a PUREX raffinate by solvent extraction), the selective stripping of americium from lanthanides was studied using a solution of DTPA and malonic acid. This step is similar to a reverse-TALSPEAK system developed for Am/Ln separation.

Organic phase containing 0.3 M HDEHP and 0.6 M DMDOHEMA in TPH was first loaded with the aqueous phase containing Am/lanthanides/fission and/or corrosive products. The loaded organic phase was then contacted with the aqueous solution of DTPA and malonic acid at pH around 2.5. The impact of DTPA and malonic acid concentrations, pH dependence, kinetic and thermodynamic studies were studied on americium and lanthanides extraction. In addition, the impact of the nature of the base used to pH adjustment and the stability constants of DTPA with Am(III), Eu(III) and Ce(III) were determined in process conditions.

These results showed that DTPA and malonic acid extraction system can selectively strip Am(III) over lanthanides (Ce(III) and Eu(III)) and other fission products potentially present in organic phase (Fe(III), Y(III)). The results are important for a better understanding of the process chemistry and are used for the modelling and the simulation of this step of the EXAm process.

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