Status of Advanced Reprocessing and Minor Actinide Partitioning Research in the UK

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Abstract

The UK has a long track record in research and development (R&D) related to nuclear fuel reprocessing and in particular the PUREX process. Over the last two decades R&D has been focused towards supporting the continued operations of the two reprocessing plants at the Sellafield site, reprocessing uranium metal Magnox and uranium oxide fuels, and the development of advanced PUREX processes for future fuel cycles. Specifically, the development of single cycle reprocessing flowsheets aimed at co-processing uranium, neptunium and plutonium has been a major target. More recently, mainly through participation in European framework projects, there has been significant growth in industrial (national laboratory) and academic (university) research in minor actinide partitioning and pyrochemical processing. Some significant highlights from these European collaborations include the synthesis of a range of soft donor ligands which show extraordinary selectivity for trivalent actinides over the trivalent lanthanides and the development of a new grouped actinide extraction (GANEX) process using a combination of TODGA and DMDOHEMA ligands in the organic phase. Additional recent highlights are the UK-based MBASE and REFINE projects, focusing respectively on probing the molecular basis of aqueous separations and networking groups interested in pyrochemical actinide separations.