

Use of Thermodynamic Simulation for Preliminary Study on Electrolyte Recycle Process by Phosphate Conversion Technique

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Abstract

Fission product elements (FP) such as alkali metals, alkaline earth metals and rare-earth elements (REE) are apt to remain in the eutectic medium used in pyroprocessing even after treatment at the pyrocontactor step. It is desirable to have the spent electrolyte purified for recycling which in turn, could lead to the reduction of high-level radioactive waste (HLW). This study is carried out to evaluate the feasibility of the electrolyte recycle process by the phosphate conversion technique. First of all, a reference block flow diagram, which consists of three steps, i.e., "Spent Electrolyte Regeneration Step", "Phosphates Conversion Step", and "Phosphates Immobilization Step", was designed based on known developmental results from literature. Subsequently, evaluation was undertaken by comparison with conventional relevant experimental and theoretical analysis results after gathering the essential basic data for thermodynamic calculation. The obtained computational value was then reflected to establish the preliminary conceptual flow diagram which would facilitate the next discussion and experiment for the realization of this process.