

Third phase formation in the extraction of nitric acid and metal ions by octyl(phenyl)-*N,N*-diisobutyl carbamoyl methyl phosphine oxide (O Φ CMPO) based solvents

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ABSTRACT

Formation of a third phase in the extraction of nitric acid and metal ions such as Th(IV), U(VI), La(III), Ce(III), and Gd(III) by O Φ CMPO based solvents has been investigated under various conditions. The limiting organic concentrations (LOC) and critical aqueous concentrations (CAC) for third phase formation in the extraction of nitric acid by 0.2 M O Φ CMPO + 1.2 M TBP in *n*-tetradecane and 0.2 M O Φ CMPO + 1.2 M TBP in *n*-hexadecane were measured as a function of temperature. Extraction of nitric acid by these solvents as a function of equilibrium aqueous phase acidity at 303 K has been studied. Distribution of nitric acid between diluent-rich phase (DP) and third phase (TP) in the extraction of nitric acid by these solvents has also been studied as a function of equilibrium aqueous phase acidity at 303 K. Densities of diluent-rich phase, third phase, and aqueous phase have been measured as a function of equilibrium aqueous phase acidity at 303 K. Third phase formation in the extraction of Th(IV), U(VI), La(III), Ce(III), and Gd(III) by O Φ CMPO modified with tri-*n*-butyl phosphate (TBP) or tri-*n*-amyl phosphate (TAP) in various hydrocarbon diluents has also been studied as a function of temperature. Metal loading capacity of some of these solvents has also been studied as a function of equilibrium aqueous phase acidity at 303 K. Results obtained from these studies are presented in this paper.

Keywords: Third phase formation; O Φ CMPO; Nitric acid; Lanthanides; Uranium

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