ABSTRACT

Title of the thesis “STUDIES ON LIQUID-LIQUID EXTRACTION OF Ce (III) USING SOME COMMERCIAL EXTRACTANTS AND THEIR BINARY MIXTURE”

The present investigation depicts detailed studies on the extraction of Ce (III) from acidic nitrate / HNO₃ medium employing various commercial extractants like Cyanex 921, Cyanex 923, PC 88A, Aliquat 336, and their binary mixtures in kerosene. The impact of various operating variables like equilibration time, concentrations of nitric acid, nitrate ion, extractant, Ce (III), nature of diluents, temperature and O/A phase volume ratio on the extraction of cerium (III) has been examined. The separation possibilities of Ce (III) and La (III)/ Pr (III)/ Nd (III) from acidic nitrate medium has been studied using binary mixture of Cyanex 921 and Cyanex 923/ Aliquat 336 in kerosene under conditions of maximum extraction of Ce (III). The distribution ratios have been determined from the Ce (III) concentration in the aqueous and organic phase at equilibrium using UV-VIS spectrophotometer. The separation studies concerning Ce, La, Pr and Nd have been performed using ICP-OES. The experimental conditions for optimum extraction have been identified and the composition of the extracted complex was proposed on the basis of slope analysis. The equilibrium constants have been calculated from the extraction data. The thermodynamic parameters like standard enthalpy change (ΔH°) and standard entropy change (ΔS°) have been determined using Van’t Hoff equation. The extent of synergism has been determined in terms of S.C. (synergistic coefficient) and ΔD. Stripping has been carried out with various stripping agents like HCl and H₂SO₄. Data analysis has been performed to calculate uncertainties in experimental data.