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Project Title: Oxalohydroxamic Acid as a partitioning agent in PUREX process of nuclear fuel reprocessing

Preparation of Benzohydroxamic acid and oxalohydroxamic acid, their characterization and spectrophotometric determination of Uranium (VI) at pH 6.2 using oxalohydroxamic acid is completed. A new process has been developed for the separation of cerium from uranium by using oxalohydroxamic acid (OHA) as a partioning agent due to its novel behaviour as reductant and complexant. Various experiments have been performed to check the effect of diluents, ratio of TBP and paraffin, effect of concentration of OHA, effect of pH, effect of organic& aqueous layer ratio, effect of temperature and effect of time on extraction efficiency.

Various aromatic and aliphatic solvents had been tested and aliphatic paraffin was selected as diluents. Paraffin & TBP in 1:0.4 ratio shows maximum complexation with U (VI) and Ce (IV).Time required for the maximum quantitative extraction of cerium was 14-15 minutes in a single extraction. The value of Distribution ratio for Cerium increases at 2 M HNO_3. Distribution ratio for Ce at low concentration of nitric acid i.e. less than 1M are strongly dependent on process that take place in the aqueous phase, such as hydrolysis and disproportionation reactions. Significant change in distribution ratio can be obtained when aqueous solution is spike with Ce before or after addition of tributylphosphate (TBP). At low concentration of HNO_3, highly charged cation of Ce^{4+} is strongly hydrolysable and formation of extractable hydroxo-nitrate complex of cerium into the tributylphasphate (TBP) must be considered. Increase of HNO_3 concentration suppresses the hydrolysis and disproportionation reactions. Concentration of OHA plays an important role on the extraction of Cerium from TBP. Cerium from TPB, which consist Ce and U, can be extracted quantitatively using OHA with 2.04×10^{-2} g/ml concentration in 2 M nitric acid in ratio 1:1 at temperature 20°C to 25°C.

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