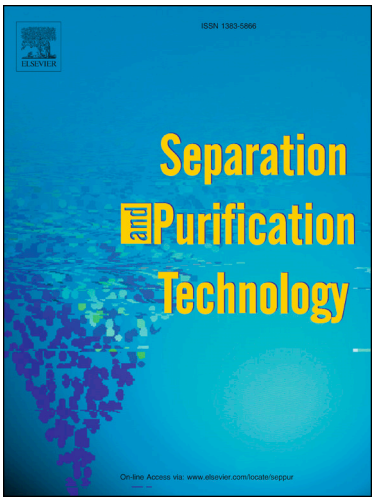


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# Extraction of Scandium (III) from acidic solutions using organo-phosphoric acid reagents: A comparative study

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## Abstract

Comparative and synergistic solvent extraction of Sc(III) using two phosphoric acidic reagents such as di-(2-ethyhexyl) phosphoric acid and 2,4,4,tri-methyl,pentyl-phosphinic acid was investigated. Slope analysis method suggests a cation exchange reaction of Sc(III) with both extractants at a molar ratio of extractant: Sc(III) = 2.5:1 at equilibrium pH< 1.5. The plot of log D vs. log [Extractant] yield the slope (n) value as low as 1.2-1.3 and as high as n=7 at low and high extrcatant concentration level, respectively. Extraction isotherm study predicted the need of 2 stages at A: O=1:4 and A: O=1:3 using 0.1 M $D_2EHPA$ and 0.1 M Cyanex 272, respectively. Stripping of Sc (III) was carried out at varied NaOH concentration to ascertain the optimum stripping condition for effective enrichment of metal. The predicted stripping condition (2-stages with A: O=1:3 and 1:4 for $D_2EHPA$ and Cyanex 272, respectively) obtained from Mc-Cabe Thiele plot was further validated by 6-cycles CCS study. An actual leach solution of Mg-Sc alloy bearing 1.0 g/L of Sc (III), 2.5 g/L of Mg and 0.2 M HCl was subjected for selective separation of Sc at the optimum condition. The counter current simulation (CCS) study for both extraction and stripping of actual solution resulted quantitative separation of Sc with ~12 fold enrichment. The organic phase before and after loading of Sc (III) along with the diluents was characterized by FTIR to ascertain the phase transportation of Sc (III).