STUDIES ON THE EXTRACTIVE SEPARATION OF TUNGSTEN(VI) USING A COCONUT OIL BASED LIGAND

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by

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ABSTRACT

A phenylhydroxamic acid type ligand was prepared using coconut oil as the starting material.

By comparison of the UV absorption spectra of the ligand and the visible spectra of the iron(III) ligand complex, with previous results the authenticity of the ligand was confirmed. A detailed study was carried out on the liquid-liquid extraction of the iron(III) complex of the ligand into hexane. A theoretically expected sigmoidal curve was observed, which further confirmed the authenticity of the ligand. The extraction behaviour of tungsten(VI) and molybdenum(VI) was also studied. tungsten(VI) and molybdenum(VI) form colourless complexes with the ligand which are extractable into a solvent mixture containing 5% CH_2Cl_2 and 95% hexane.

The mixed solvent system was selected to overcome the problem of frothing encountered in the extraction of tungsten(VI) from 0.1-1.0M hydrochloric acid medium. The mixed solvent system was found to exhibit a slight increase in the percentage extraction of tungsten(VI), apart from its function of preventing frothing.

The extraction curves of tungsten(VI) and molybdenum(VI) show a remarkable deviation from the expected sigmoidal curve. Both exhibit two humps, at 3M and 10^{-3}M hydrogen ion concentration for tungsten(VI) and at 6M and 10^{-1}M hydrogen ion concentration for Mo(VI), indicating the possible formation of different complexes of the metal ions with the ligand. The maximum extraction of tungsten(VI) (70%), could be observed in the higher acidic region and the maximum extraction of molybdenum(VI) (98%) in the lower acidic region. At all hydrogen ion concentrations the percentage extraction of molybdenum(VI) was higher than tungsten(VI), indicating the incapability of selectively extracting tungsten(VI) in the presence of molybdenum(VI) by pH control.

EDTA which was used as a masking agent, has the ability of masking molybdenum(VI) in the presence of tungsten(VI) at pH 3.5. 50% of tungsten(VI) could be selectively extracted by using a 5% EDTA solution as masking agent, in the presence of a 35-fold molar excess of iron(II), 35-fold molar excess of iron(III), 70-fold molar excess of aluminium(III), 35-fold molar excess of chromium(III), 35-fold molar excess of vanadium(V) and 20-fold molar excess of molybdenum(VI).

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