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SYNERGISTIC EFFECT IN THE EXTRACTION OF METALS WITH A CASTOR OIL BASED HYDROXAMIC ACID TYPE LIGAND

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Castor oil based hydroxamic acid type ligand has been used for selective extraction of titanium (IV).[1] Based on the theoretical deductions made by Marcus,[2] it was always a practice to state that the mixture of hydroxamic acid and N-phenylphydroxamic acid type ligands prepared using a local oil, as the starting material, is superior in the extraction of metals. The suitability of the mixtures of ligands for direct industrial application and the futility of the separation of the mixture into pure components would have contributed for the above statement.

Although several studies[3-8] were carried out on the extraction of metals with ligands prepared using local oils, no attempt has hitherto been made to investigate the effect of the mixed ligand system. In this study, castor oil was separated into components containing hydroxy fatty acids and non-hydroxyfatty acids. Each of the components was converted into hydroxamic acid type ligand. The ligand prepared from the non-hydroxy component was further separated using column chromatography.

The liquid-liquid extraction curves iron (III) show theoretically expected sigmoidal curves. However, with hydroxy ligand the maximum extraction is 80% at pH 8.0, whereas with the separated ligand the value reaches 53% in the pH range of 9-10. An enhancement of the extraction of iron (III)(90%) in the pH range 7-8 was observed with mixed ligand system. This provides an experimental evidence for our previous statement on the superiority of the mixed ligand systems. The results also could be related to the phenomenon of synergism in liquid-liquid extraction of metals. Similar observations have also been made with vanadium (V).

References:

1. Gunawardhana, H.D. and Wickramanyake, D. Nedra (1962), Indian J. Chem., 21A:88
2. Marcus, Y., (1976), Talanta, 23: 203
3. Gunawardhana, H.D. and Perera, A.C.S., (1977), Proc. Sri Lanka Asso. Advt. Sci, 33, (1)
4. Gunawardhana, H.D., Perera, A.C.S. & Fernando, M.S.B. (1979) Trans. Indian Inst, Metals: 119.
5. Gunawardhana, H.D. & Asirwatham, Dushyanthi, (1982), Indian J. Chem, 21A:338.
6. Gunawardhana, H.D. & Wijesoma, W.S.Sulochana, (1984). Proc. Inst. Chem., Ceylon, 10: 26
7. Weerasekera, C.Mahika and Gunawardhana, H. Dasaratha, (1987) Prof. Sri Lanka Assoc. Advt. Sci 43: 209
8. Fernando, L.Nilmini & Gunawardhara H.Dasaratha, (1988) Proc, Sri Lanka Assoc.Advt.Sci., 44: 185