E2-57 An electrochemical study on plumbagin-metal ion systems

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Plumbagin, a naturally occuring napthaquinone extracted from the dried root of *Aristea ecklonii* forms stable chelate complexes with transition metals. Out of the metals involved, thorium, cerium and lanthanum are given priority, as they are the major components of monazite, the most important source of rare earths found in Sri Lanka. The treatment of plumbagin with a mixture of Th^{4+}, Ce^{3+}

and La^{3+} ions in aqueous solution followed by the slow addition of in aqueous sodium hydroxide allows the complete separation of Th^{4+} ion.

Plumbagin, being a water soluble substance shows significant oxidation and reduction peaks between -1.0 and + 1.0 V at glassy carbon electrodes, and between -0.8 and + 1.0 V at platinum electrode in aqueous medium. Electrodes modified with plumbagin using the continuous scanning method produced more stable electrochemistry than those prepared by the droplet evaporation method. Out of the metal salts used for the complexation, $Th(NO_3)_4$, $Ce(NO_3)_3$ and $CuCl_2$ show significant electroactivity within this potential range. Most of the electroactive metal salts showed positive electroactivity when they are complexed with plumbagin. These complexes are formed in aqueous medium at optimized pH. The complexations are confirmed with the aid of UV (VIS) spectral data.

Electrochemical characterization of solid plumbagin-metal complexes is attempted (metal salt in methanol and plumbagin in dichloromethane) Electrode modification of plumbagin-metal complexes is by dipping plumbagin modified glassy carbon electrodes in solutions of metal salts. Characterization of such electrodes confirms the formation of metal-plumbagin complexes.

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