

Chapter II

Aim and Scope

Capacious and aimless emancipation of toxic ions contaminated industrial effluents into the environ has become an issue of major concern. Upcoming growth of industries based on electroplating, laundry, fertilizers etc. located in and around Coimbatore city are tagged up under red category by Tamil Nadu Water Association Department (TWAD) board. Since, effluents loaded with toxic ions like Pb, Ni, Cr, nitrates, phosphates, fluorides etc. generated by these industries are discharged intentionally into aquatic streams, without adequate treatments. Their effective removal has become critical as several physiological disorders are being reported. Innovative treatment technology like biosorption has gained much importance and favoured due to its simplicity, high success rate, time factor and replicability.

The present investigation aims at identifying suitable naturally occurring sorbent materials capable of meeting the above criteria. According to their concerned properties, two valuable materials of agricultural and aquatic origin viz., *Pistachio vera* shells and *Bivalve* shells are employed in the chelation of specific divalent metal ions [Pb(II), Ni(II)] and trivalent anion (Phosphate). Modifications of the chosen materials are carried out to intensify their sorptive ability. Physico-chemical studies and nature of the modified materials are done using appropriate methods and sophisticated instrumental techniques viz., microscopic analyses, BET, BJH, SEM, EDAX and FT-IR.

Pilot experiments through Batch mode are performed under varied operating factors to ensure the metal removal nature of the employed eco materials. Desorption and regeneration studies performed in order to examine the reproducibility of the modified materials. Isothermal and thermodynamic equilibrium of the chosen metal-sorbent systems are established on the basis of the laboratory results. Quantification of the adsorption process is carried out through column experiments. Extension of the column results to field trials in testing of electroplating/ battery wastewaters forms the scope of the present work.