CHAPTER 2

SCOPE OF THE PRESENT INVESTIGATION
2. SCOPE OF THE PRESENT INVESTIGATION

Cost-effective removal of toxic metal ions from water and wastewater is an important and widely studied research area. A number of technologies have been developed over the years to remove toxic metal ions from water. The treatment methods described in section 1.4, though may appear technically sound, are not without drawbacks. Among the treatment methods, adsorption using activated carbon appears to have the least adverse effects. It is attractive as it can treat wastewater to quality suitable for reuse. Apart from its ability to remove several toxic inorganic substances, it is capable of producing effluent which is clean of suspended solids and relatively free of organic materials including dyes of all types. The process is sensitive to temperature and intermittent discharge.

Though activated carbon treatment has proven history of performance for waste treatment, the technique does not find widespread application, particularly in developing countries like India, due to the expensive nature of commercial activated carbons. In view of this and as a consequence of increased interest for the removal of toxic inorganics from water and wastewater, it was felt that direction of efforts to prepare an activated carbon, which possesses properties comparable to those of commercially available varieties of carbon, from readily available agricultural waste material is justified. Many reports have appeared on the development of activated carbon from cheaper and readily available materials [207]. The materials examined in the literature include bituminous coal, bones, coconut shells, petroleum base residues, pulp and paper black, wood, peanut hulls and rice husk. Among these, peanut hulls, an agricultural waste byproduct is available in abundance in India.

The work reported in the following chapters pertains to the preparation of a low temperature peanut hull carbon (PHC) by sulphuric acid treatment, evaluate its suitability for the adsorption of heavy metal ions such as Hg(II), Pb(II), Cd(II), Ni(II) and Cu(II) in aqueous solutions, apply to the treatment of metal-bearing wastewaters and compare its efficiency with that of a commercially available granular activated carbon (GAC). The investigation includes batch mode and fixed-bed adsorption kinetic studies. The details of these investigations, the experiments performed, the results obtained and the conclusion drawn are described in the following pages.