SCOPE OF THE PRESENT INVESTIGATION

The problems and hazards of heavy metals, such as cadmium, chromium, copper, lead and mercury, in the environment are of primary concern. The US Environmental Protection Agency estimated\textsuperscript{70} that around eight billion gallons of wastewaters containing heavy metals were generated in the US and this agency classified cadmium, lead and mercury as primary pollutants.

For the last five decades there was a major growth of large scale industries manufacturing essential commodities in India and this kind of rapid industrialization affords comforts to humans, at the same time, leaves them open to heavy metal pollution problems and hazards\textsuperscript{160}. In addition, these problems have come under scrutiny due to the increasing emphasis on the legislative laws by the government\textsuperscript{161}. Hence, it becomes absolutely necessary to take immediate protective measures to safeguard the industrial workers and for this purpose, it industrialists have to block the entry of toxic heavy metals into the nation's pure aquatic environment, even at the loss of the growth of the industries.

Among heavy metals, the investigator has chosen lead, in the present study, due to its entry into the environment through multifarious sources and its high toxicity. The potential sources of lead are many such as lead smelters, lead battery manufacturing industries, paper and pulp industries, ship fuels, paint and pigment industries, automobile exhausts, zinc mines and ammunitions\textsuperscript{32,38,51}. 
It has reports suggest\textsuperscript{38,51} that the permissible limit of lead in drinking water is 0.05 mg/L and the lead content above this limit, causes damage to several parts of the human body, viz., kidney, liver, brain, gastrointestinal track, reproductive and nervous systems. In addition, lead poisoning leads to mental retardation in children and subsequently, in their latter lives, this may even lead to convulsions\textsuperscript{38}. Anaemia, headache, sore muscles and irritation are also reported to be some of the effects due to mild plumbism.

Hence, with a view to curtailing the pollution hazards, concerning heavy metals in general, and lead in particular, many techniques, such as hydroxide precipitation, sulphide precipitation, coagulation, electrode-deposition, cementation, ultra-filtration, solvent extraction, ion-exchange, activated carbon adsorption\textsuperscript{162-164} and biological process\textsuperscript{165} have been developed for the removal of heavy metals from waters, wastewaters and effluents containing heavy metals. Numerous researchers have established the suitability of activated carbon as the adsorbent. However, this process has not been followed much in the actual treatment setting for the removal of inorganic adsorbates. The merits of the adsorption process are adsorbent's low-cost and the minimum problems encountered in the disposal. The use of several low-cost adsorbents, such as, clay\textsuperscript{166}, manganese oxide\textsuperscript{197}, hydrous oxide gel\textsuperscript{168} and goethite\textsuperscript{169} has also been reported.

Detailed literature scanning has revealed the availability of only a little work on record, concerning the use of Activated Carbon prepared from Black Gram Husk (hereafter BGHC) as the adsorbent for the removal of lead. Since Black Gram Husk is available abundantly in Tamilnadu and costwise it is very cheap, the investigator has
chosen BGHC as the adsorbent for the present investigation, with a view to making qualitative and quantitative determination of its adsorption capacity as well as to demonstrating the viability of the selected adsorbent for the treatment process. In addition, the investigator has an additional reason to select BGHC as the adsorbent. BGHC exhibits a considerable amount of inherent ion-exchange capacity due to the presence of various functional groups, such as carboxyl and hydroxyl groups, on the peripheral surface of the adsorbent.

Hence the investigator has planned to conduct laboratory studies with a view to evaluating and to optimizing the various variables of the adsorption process, viz., the initial concentration of the adsorbate solution, the dose of the adsorbent, the pH of the solution, the equilibrium time and the temperature of the experimental solution.

Literature survey has also revealed that the data on the kinetics of the removal of lead by BGHC are a few on record and no mechanism has so far been reported. Hence, the investigator aims at to determining how well the Lagergren, Bhattacharya-Venkobachar, Freundlich, Langmuir and Weber-Morris and McKay and other such models, relating to the kinetics of adsorption and the equilibrium studies, can describe lead-BGHC adsorption systems as well as at investigating the effect of the temperature of the solution on the rate process, followed by evaluation of activation parameters, with a view to probing a possible mechanism for the adsorption of lead(II) onto the surface of BGHC.