ABSTRACT

This thesis embodies the results of laboratory studies on Cr(VI), Ni(II), Cu(II) and Pb(II) removal from water with a few selected polymeric sorbents. Based on these results, the mechanism of metal sorption by these sorbents is established. The suitability of the sorbents for the development of metal removal technology is also discussed in detail. The thesis is divided into four main chapters. In the first chapter, a general introduction on metal toxicity and a review of various adsorbents studied for heavy metal removal so far are given in detail. The second chapter deals with the experimental methods to analyze the water samples for various quality parameters and characterize the sorbents with standard reference and the procedure adopted to carry out the adsorption and kinetic studies that have been carried out. The third chapter presents the details of the results and discussion of the heavy metal removal studies with different sorbents and the results are presented under the following sub-divisions.

111.1. Sorption studies of Cr(VI), Ni(II), Cu(II) and Pb(II) using commercial ion exchange resins
111.2. Sorption studies of metal ions using modified chitosan beads
111.3. Sorption studies of metal ions using bio-inorganic polymeric composites
111.4. Sorption studies of metal ions using synthetic polymeric resins and
111.5. Selectivity of metal ions and regeneration studies

Suitable mechanism, isotherm and kinetic models for metal ions sorption onto the sorbents are established.

The fourth chapter presents the summary and conclusion of the thesis which gives the details of the merits and demerits of the various sorbents studied based on their sorption capacity at various equilibrating conditions like time, dosage, pH, effect of co-ions, temperature, etc. A consolidated list of references consulted is given at the end of the thesis to facilitate easy reference followed by list of publications.