



STUDIES OF RETENSION AND REUSABLE CAPACITIES OF SEMICARBAZIDE FORMALDEHYDE BASED COPOLYMER AGAINST SOME TOXIC METAL IONS BY BATCH EQUILIBRIUM TECHNIQUE

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ABSTRACT

Copolymer has been synthesized by the condensation of 2-hydroxy 4-methoxy benzophenone and adipamide with formaldehyde(1:1:2) in the presence of acid catalyst at 122 °C was proved to be a selective chelating ion-exchange copolymer for certain metal ions. A copolymer composition has been determined on the basis of their elemental analysis and the number average molecular weight of this copolymer was determined by conductometric titration in non-aqueous medium. The viscosity measurements in dimethylsulphoxide (DMSO) has been carried out with a view to ascertain the characteristic functions and constants. The newly synthesized copolymer resin was characterized by electronic spectra, FTIR spectra ^1H NMR and ^{13}C NMR spectra. The copolymer has been further characterized by absorption spectra in non-aqueous medium and XRD to elucidate the structure. The resin was analyzed by TGA to assess the thermal stability, in which the resin could be used in high temperature aqueous solutions for the elimination of harmful metal ions. Ion-exchange properties of this resin was studied by batch equilibrium method for Cu^{2+} , Ni^{2+} , Co^{2+} , Zn^{2+} and Pb^{2+} ions over the pH range, 1.5 to 6.5 and in media of various ionic strengths. The resin shows a higher selectivity for Fe^{3+} ion over any other ions. Study of distribution ratio as a function of pH indicates that the amount of metal ion taken by resin is increases with the

increasing pH of medium. The surface morphology of the copolymer resin was examined by scanning electron microscopy and it establishes the transition state between crystalline and amorphous nature.

Keywords: Ion exchanger, Polycondensation, Resin, Toxic metal ions, batch equilibrium, metal ion uptake.

Introduction :

Copolymer is found very useful application as adhesive, high temperature flame resistant, fibers, coating materials, semiconductors, catalysis and ion exchange resins. Ion-exchange resins have attracted much interest in the recent years due to their application in waste water treatment, metal recovery and for the identification of specific metal ions.[1-2] The purpose of present study, is to explore the adsorption behaviour of five metal ions Cu (II), Fe (III), Zn (II), Cd(II), Mg(II) and Ni(II), and Ag (I) on the newly synthesized copolymer resin 4-HBPHF at different pH values, different concentrations of different electrolytes and at different shaking time intervals. The adsorption behaviour of these metal ions are based on the affinity differences towards the chelating resins as functions of pH, electrolyte concentrations and shaking time. The copolymer resin under investigations are found to be cation exchanger having both ion-exchange group and chelating group in the same polymer matrix and the resin can be used selectively for the purpose of purification of waste water. One of the important applications of chelating and functional polymers is their capability to