



Studies of chelation ion-exchange properties of copolymer resin derived from 1,5-diaminonaphthalene, 2,4-dihydroxy-propiophenone and formaldehyde

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ABSTRACT

The copolymer 2,4-DHP-1,5-DANF-I has been synthesized by the condensation of 2,4-dihydroxypropiophenone, 1,5-diaminonaphthalene and formaldehyde in the presence of 2 molar HCl as a catalyst with 1:1:2 molar proportion of reactants. The resin has been characterized by various spectral techniques such as elemental analysis, FT-IR, ¹H NMR. The ion-exchange properties of the copolymer resin for specific metal ions viz. Ni²⁺, Cu²⁺, Co²⁺, Zn²⁺ and Pb²⁺ ions was evaluated by a batch equilibrium method. The study was extended to three variations: evaluation of metal ion uptake in the presence of different electrolytes at different concentrations; evaluation of metal ion uptake at different pH; and evaluation of metal ion uptake at different times. From the results it was observed that the copolymer resin acts as an effective chelating ion-exchanger. Copolymer shows a higher selectivity for Cu²⁺ and Ni²⁺ ion than for Co²⁺, Zn²⁺ and Pb²⁺ ions.

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1. Introduction

The toxicity of heavy metal ions has increased rapidly and strongly because of many industries catalyst contains metal ions. Techniques have been developed for the removal of metal ions such as solid liquid extraction, electro-deposition and co-precipitation. To remove the undesired metal ions from aqueous solution chelating resins have been widely used for this purpose. Toxic heavy metal ions are well known for their harmful effect to human health. The energy and material require of the waste water treatment process can be simple if the toxic metal ion can be recovered. The use of chelating resins for the removal of metal ions is the method used due to its high efficiency separation, high loading capacity, high degree of selectivity [1].

An ion exchange resin have been prepared from 4-hydroxybenzophenone and melamine with formaldehyde which was characterized by elemental analysis other spectral methods

and chelating nature of resin was studied with Ni²⁺, Cu²⁺, Cd²⁺, Zn²⁺, and Pb²⁺ metal ions [2]. Copolymeric chelating ion-exchange resin was synthesized from phallic acid - melamine - formaldehyde copolymer and characterized by FT-IR, ¹H NMR spectra and elemental analysis [3]. Metal ion uptake capacity of synthesized copolymer has been carried out by Batch equilibration method for different metal ions at different concentrations. Comparative study of strong anion exchange poly (Styrene-co-EGDMA-co-VBC) and strong anion exchange hypercrosslinked poly (HEMA-co-EGDMA-co-VBC) was carried out [4]. Synthesis, antimicrobial and ion-exchange studies of copolymer resin derived from substituted resorcinol, biuret and formaldehyde have been studied [5]. Copolymer resin have been synthesized from salicylic acid and diaminobenzoic acid with formaldehyde and the batch equilibrium method was used to study the chelating ion-exchange properties. The resin was found to be, selectivity for Fe³⁺, Cu²⁺ and Ni²⁺ ion than for Zn²⁺, Co²⁺ and Pb²⁺ ions [6]. Copolymer resin by condensation of salicylic acid, semicarbazide and formaldehyde in presence of acid catalyst and studied its ion-exchange properties for Co²⁺, Zn²⁺, Cu²⁺, Ni²⁺, and Pb²⁺ ions. The study was carried out at different shak-

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