ANALYTICAL APPLICATIONS OF NEWLY SYNTHESIZED COPOLYMER RESIN

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ABSTRACT

A copolymer resin (p-APDF) has been synthesized using the monomers p-aminophenol, dithiooxamide, formaldehyde in 1:1:2 molar proportions in the presence of 2M HCl as catalyst. The structure of p-APDF copolymer has been elucidated on the basis of elemental analysis and various physico-chemical techniques i.e. UV-visible, FTIR and 1H NMR spectroscopy. The number average molecular weight of copolymer resin was determined by non-aqueous conductometric titration in DMF. Viscosity measurement were carried out in DMF indicate normal behaviour. The prepared resin proved to be a selective ion exchange resin for some metal ions. The chelating ion exchange properties of this resin was studied for Fe(III) and Cu(II), Ni(II), Co(II), Zn(II), Cd(II). Pb(II) ions. A batch equilibrium method was employed to study selectivity of metal ion uptake over a wide pH range and in media of various ionic strength. The resin showed a higher selectivity for Fe(III), Ni(II) Cu(II) ions than for Co(II), Pb(II), Zn(II) and Cd(II) ions.

Keywords: Structure, resin, degree of polymerization, Synthesis, ion-exchanger.

INTRODUCTION

Many polymers with reactive functional groups are now being synthesized, tested and used not only for the macromolecular properties but also for the properties of functional groups. These functional groups provide an approach to a subsequent modification of the polymers for specific end group application.[1] In recent years, some comprehensive work has been published on functional monomers and their polymers. [2,3]

Ion-exchangers have been used commercially on a worldwide basis for almost a century due to diverse applications in many fields such as water softening and deionization [4], extraction of uranium[5], isolation and purification of antibiotics[6], in hydrometallurgy for separation and purification of waste water treatment[7] and pollution control [8]. The presence of heavy metal in environment is a cause of concern due to their acute and long term toxicity. Lead and mercury are the major hazardous metals present in the environmental waste water. Thus, removal of trace heavy metal from the environmental area have become an interesting field increasing interest and there is strong need for a reliable analytical procedure that can be applied for the removal and determination of these metals at a very low concentration[9]. Since long, considerable interest has been developed in the synthesis of ion-exchange resin having selective properties and containing selective functional groups. Various hydroxyl benzoic acid-formaldehyde and 4-hydroxyacetophenone-biure-formaldehyde copolymers have been reported and found to be useful as ion-exchangers[10-12].

Copolymers of 8-hydroxyquinoline-formaldehyde-resorcinol/catechol were reported by Shah et al [13,14] and chromatographic column separation for various metal ions such as Cu^{2+}, Ni^{2+}, Zn^{2+}, Pb^{2+} and Cd^{2+} have carried out using the quinoline base resins. Mubarak et al.[15] have studied the chelation behaviour of the phenolic-formaldehyde polymers, poly (2,4 – dihydroxybenzoic acid – 3,5 – dimethylene), poly (2 – hydroxybenzoic acid – 3,5 – dimethylene) and Poly (3 – hydroxybenzoic acid – 4,6 – dimethylene) towards the trivalent lanthanide metal ions such as La^{3+}, Nd^{3+}, Sm^{3+}, Gd^{3+} and Tb^{3+} by a static batch equilibrium