

An Eco-Friendly Terpolymer Resin: Synthesis, Characterization and Ion - Exchange Properties

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Abstract: 2, 2'- Biphenol-Hexamethylenediamine-formaldehyde Terpolymers (BPHDF) were synthesized by the condensation of 2, 2'- Biphenol, Hexamethylenediamine, and formaldehyde in the presence of acid catalyst with varying molar ratios of reacting monomers. Terpolymer composition has been determined on the basis of their elemental analysis and the number-average molecular weight of these resins was determined by conductometric titration in nonaqueous medium. The viscosity measurements were carried out in N, N-dimethyl formamide which indicate normal behaviour. IR spectra were studied to elucidate the structure. The terpolymer resin has been further characterized by UV-visible and ¹H-NMR spectra. The surface morphology of the terpolymer resin was examined by scanning electron microscopy. One of the important applications of these terpolymers is their capability to act as chelating ion-exchangers. The newly synthesized terpolymers proved to be selective for chelating ion-exchange properties and showed a powerful adsorption towards specific metal ions like Co²⁺, Hg²⁺, Cd²⁺, Pb²⁺. A batch equilibration method was adopted to study the selectivity of the metal ion uptake involving the measurement of the distribution of the given metal ion between the polymer sample and a solution containing the metal ion over a wide range of concentrations and pHs of different electrolytes. The terpolymers showed a higher selectivity for Co²⁺ > Hg²⁺ > Cd²⁺ > Pb²⁺. It is also observed that the amount of metal ions absorption by the BPHDF terpolymer resins increases in the order: BPHDF-3 > BPHDF-2 > BPHDF-1 due to introduction of more and more phenolic groups in terpolymer resins from BPHDF-1 to BPHDF-3.

Keywords: 2,2'-Biphenol-Hexamethylenediamine-formaldehyde Terpolymersresins, BPHDF, Chelating properties, Batch equilibrium, Distribution ratio, Metal ion uptake

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