Preparation and characterization of polyamidoxime chelating resin from rubberwood fibre-g-polyacrylonitrile

ABSTRACT

Grafted rubberwood fibre was converted to polyamidoxime ion-exchange resin in order to remove heavy metal ions from aqueous solution. The cation-exchange resin existed predominantly in the syn-hydroxyamino form. The water uptake by the resin was ca. 31 g/g dry resin while its hydrogen ion capacity was 3.6 mmol/g. The adsorption capacity of the resin towards different metal ions from wastewater was determined at different pH values within the range 1–6. The prepared chelating ion-exchanger exhibited the highest adsorption capacity towards Cu^{2+} ions (3.83 mmol/g), followed by Cd^{2+}, Fe^{3+}, Pb^{2+}, Ni^{2+} and Co^{3+} ions, respectively. The results showed that the adsorption capacity depended on the solution pH. Polyamidoxime ion-exchange resin was also used to separate Co^{3+} and Ni^{2+} ions from Cu^{2+} ions using a column technique. On passing Cu^{2+}/Ni^{2+} and Cu^{2+}/Co^{3+} ion mixtures through the resin at pH 3, Cu^{2+} ions were adsorbed by the resin but no sorption of Ni^{2+} or Co^{3+} ions was detected. Approximately 98% of the Cu^{2+} ions could be desorbed from the resin. FT-IR spectroscopy was used to confirm the conversion of polyacrylonitrile-g-rubberwood fibre to polyamidoxime.

Keyword: Rubberwood fibre; Polyacrylonitrile; Chelating resin