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 Cu2+ ions (3.83 mmol/g), followed by Cd2+,Fe3+, Pb2+, Ni2+ and Co3+ ions, respectively. The results showed that the adsorption capacity depended on the solution pH. Polyamidoxime ion-exchange resin was also used to separate Co3+ and Ni2+ ions from Cu2+ ions using a column technique. On passing Cu2+/Ni2+ and Cu2+/Co3+ ion mixtures through the resin at pH 3, Cu2+ ions were adsorbed by the resin but no sorption of Ni2+ or Co3+ ions was detected. Approximately 98% of the Cu2+ ions could be desorbed from the resin. FT-IR spectroscopy was used to confirm the conversion of polyacrylonitrile-grubberwood fibre to polyamidoxime.

Keyword: Rubberwood fibre; Polyacrylonitrile; Chelating resin