

**PREPARATION AND CHARACTERIZATION
OF POLY(HYDROXAMIC ACID-
AMIDOXIME) CHELATING RESIN**

YEONG CHOY KWAN

**INDUSTRIAL CHEMISTRY PROGRAMME
SCHOOL OF SCIENCE AND TECHNOLOGY
UNIVERSITY MALAYSIA SABAH**

PERPUSTAKAAN
UNIVERSITI MALAYSIA SABAH

2007



UMS
UNIVERSITI MALAYSIA SABAH

ABSTRACT

The preparation of a chelating ion-exchange resin containing hydroxamic acid-amidoxime functional group was carried out by the poly(methyl acrylate-co-acrylonitrile) (PMA-co-PAN) grafted sago starch. The poly(methyl acrylate-co-acrylonitrile) (PMA-PAN) grafted sago starch was prepared by the free radical initiating process in which ceric ammonium nitrate was chosen as initiator. Conversion of the ester and nitrile groups of the grafted copolymer into the hydroxamic acid and amidoxime groups were carried out by the treatment of ester and nitrile with hydroxylamine in alkaline solution. The characterization of the poly(hydroxamic acid-amidoxime) chelating resin was performed by FTIR spectroscopy. The chelating behavior of the prepared resin toward some metal ions was investigated using a batch technique. The binding capacities of copper, iron, zinc, chromium and cadmium were excellent and the copper was maximum at pH 6 which is 2.54 mmol / g. The rate of exchange of the copper ion was very fast that $t_{1/2}$ is 9 minutes. It was also observed that the metal ion-sorption capacities of the resin were pH dependent and its selectivity toward the metal ions used is in the following order: $\text{Cu(II)} > \text{Fe(III)} > \text{Zn(II)} > \text{Cr(III)} > \text{Cd(II)}$.



**PENYEDIAAN DAN PENCIRIAN CHELATING RESIN DENGAN
POLY(HYDROXAMIC ACID-AMIDOXIME)**

ABSTRAK

Penyediaan resin pengkelat dengan pertukaran ion resin pengkelat penukar ion yang mengandungi kumpulan berfungsi asid hidrosamik-amidoksim telah dilakukan dengan mencantumkan kanji sagu dengan poly(methyl acrylate-co-acrylonitrile) (PMA-co-PAN). Penyediaan ini dilakukan melalui proses permulaan radikal bebas di mana serik ammonium nitrat digunakan sebagai bahan pemula. Penukaran hasil campuran kumpulan berfungsi ester dan nitril yang digabungkan dengan kopolimer kepada asid hidrosamik dan amidoksim dapat dijalankan dengan tindakbalas antara ester dan nitril dengan hidroksilamina di dalam larutan yang beralkali. Ciri-ciri resin poly(hydroxamic acid-amidoxime) dikaji melalui kaedah spektroskopi FTIR. Sifat-sifat chelating resin yang telah disediakan terhadap beberapa ion-ion logam telah dikaji dengan menggunakan teknik kumpulan. Keupayaan berjilid ion-ion logam seperti kuprum, besi, zink, kromium and kadmium adalah bagus dan ion kuprum menunjukkan jerapan maksimum pada pH 6 di mana nilainya ialah 2.54 mmol / g. Kadar pertukaran ion logam kuprum adalah terpantas, iaitu $t_{1/2} = 9$ minit. Jumlah ion yang dijerap oleh resin mengalami peningkatan dengan pertambahan pH dapat diperhatikan dan pemilihan resin terhadap ion-ion logam ini adalah dalam susunan berikut: $\text{Cu(II)} > \text{Fe(III)} > \text{Zn(II)} > \text{Cr(III)} > \text{Cd(II)}$.

