Document Type : Thesis

Document Title : تحضير بعض توليفات بوليمرية واستخدامها كمبادلات أيونية

تحضير بعض توليفات بوليمرية واستخدامها كمبادلات أيونية

Document Language : Arabic

Abstract : The current work is aiming to prepare polymeric blends between polyvinyl chloride (P1) and polyvinylpyrrolidone (P2). The latter was used as a source for functional groups which can be modified into positively charged groups. This modification helped us to get a modified P2 which can be used as an ion-exchanger characterized by low exchange capacity , highly soluble in aqueous solutions, has adsorption ability for the organic matters and various metal ions, hydrophilic in nature and forms hydrogel. To minimize the solubility problems, P1 was used as a hydrophobic substance to reduce the solubility of P2 in aqueous solutions through the formation of a new polymer with it. The previous modifications assist to prepare an ion-exchanger blend between P1 and P2 or after chemical modification of P2 into a polymer supported with ammonium salts and mixed with P1. The probability of using these blends as a stationary phase in chromatographic applications and ion-exchange was studied by determination of the exchange capacity, spectral determination of some heavy metal ions, and determination of the properties of these blends by suitable techniques. The chemical modification of P2 was carried out by insertion of some functional groups such as free carboxylic groups to prepare poly(N-vinylpyrrolidone-co-N-vinyl-4-aminobutyric acid), (P3), and hydroxyl groups to prepare poly(N-vinylpyrrolidone-co-N-vinyl-3-aminopropanal), (P4). These chemical modifications of P2 increase its ability to uptake meal ions. The various blends of P1, P2, P3, and P4 were prepared by dissolution in suitable solvents, followed by casting and thermal treatment of samples to attain a specific degree of cross-linking. The separation efficiency of various blend samples was tested for several metal ions like cadmium (Cd), copper (Cu), iron (Fe), lead (Pb), and zinc (Zn) in aqueous solutions either individually or in a form of binary salt solutions. Different parameters like saturation degree of polymers, distribution coefficient of ions between aqueous and polymer phases, and the polymer preference toward specific metal ions in the binary salt solution, were determined. The chemically modified polymers P3 and P4, in addition to P2 and P1, were analyzed by FT-IR spectrophotometry and elemental analysis (EA). The results indicated that chemical modifications could be achieved. The reaction yield % of the chemical modification of P2 into P3 and P4 were calculated based on the mole fraction concept. The capacity of the different polymers was determined indirectly through the determination of the amount of the unabsorbed ions using Atomic Absorption Spectrophotometry (AAS). The determinations were carried out in three replicates and the average was calculated.

Supervisor : د. صالح عمر سعيد باحفي .د. مجدي يوسف عبدالعال

Publishing Year : 2007