

Synthesis and Properties of Chitosan-Graft-Polyacrylamide/Gelatin Superabsorbent Composites for Wastewater Purification

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Abstract : Super absorbents polymers received much attention and are used in many fields because of their superior characters to traditional absorbents, e.g., sponge and cotton. So, it is very important but challenging to prepare highly and fast-swelling super absorbents. A reliable, efficient and low-cost technique for removing heavy metal ions from waste water is the adsorption using bio-adsorbents obtained from biological materials, such as polysaccharides-based hydrogels super absorbents. In this study, novel multi-functional super absorbent composites type semi-interpenetrating polymer networks (Semi-IPNs) were prepared via graft polymerization of acrylamide onto chitosan backbone in presence of gelatin, CTS-g-PAAm/Ge, using potassium persulfate and N,N'-methylenebisacrylamide as initiator and cross linker, respectively. These hydrogels were also partially hydrolyzed to achieve superabsorbents with ampholytic properties and uppermost swelling capacity. The formation of the grafted network was evidenced by Fourier Transform Infrared Spectroscopy (ATR-FTIR) and thermo gravimetric Analysis (TGA). The porous structures were observed by Scanning Electron Microscope (SEM). From TGA analysis, it was concluded that the incorporation of the Ge in the CTS-g-PAAm network has marginally affected its thermal stability. The effect of gelatin content on the swelling capacities of these super absorbent composites was examined in various media (distilled water, saline and pH-solutions). The water absorbency was enhanced by adding Ge in the network, where the optimum value was reached at 2 wt. % of Ge. Their hydrolysis has not only greatly optimized their absorption capacity but also improved the swelling kinetic. These materials have also showed reswelling ability. We believe that these super-absorbing materials would be very effective for the adsorption of harmful metal ions from waste water.

Keywords : chitosan, gelatin, superabsorbent, water absorbency

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