Poster Presentation

New Routes for Synthesis of Environmentally Friendly Superabsorbent Polymers

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Abstract

New Sucrose – based monomers were prepared. The prepared monomers are Allyl Sucrose (AS) and Epoxy Ally Sucrose (EAS). Allyl sucrose was prepared by reacting sugar with allyl chloride in an alkaline medium. Allyl sucrose was then converted into epoxy allyl sucrose by epoxidation with m-chloroperoxybenzoic acid (m-CPBA). The prepared sucrose-based monomers were characterized by ^{1}H and ^{13}C NMR spectroscopy. Both sucrose-based monomers were then used as cross-linking agents to prepare an entirely new class of special biodegradable superabsorbent polymers. In addition, other cross-linking agents were also used including 1,4-butanediol diglycidyl ether (1,4-BDGE), and ethylene glycol diacrylate (EGDA). Ethylene glycol diacrylate was chosen because it is a well-known cross-linking agent that is reported in the literature as a cross-linking agent for superabsorbent polymers. 1,4-Butanediol diglycidyl ether was used for the first time as cross-linking agent for superabsorbent polymer. The absorbency for the prepared SAP's were evaluated. Free swell for the prepared polymers was measured using the tea bag test, and the absorbency under load was measured using the hanging cell test method. Results showed that the free swells and absorbency under load decrease by increasing percentage of cross-linking agent, lowest absorbency observed at cross-linking about 4%. SAP cross-linked with EAS has the highest absorbent capacity and absorbency under load. This could be because it has the highest polarity and highest number of hydroxyl groups. The advantages of the prepared polymers over the commercial one are that: first; they are biodegradable as shown by the biodegradability test; second, they are prepared in one step process. Since the commercial SAP is prepared in a two-step process, in the first step the acrylic acid is polymerized with the cross-linking agent then the produced SAP is surface cross-linked to enhance it absorbency under load.