

Preparation and Characterization of Starch – Cellulose Biodegradable Polymer Composites for Property Enhancement

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Recently, the production of natural biodegradable polymer composites using renewable sources has become an important research area. These biopolymer composites possess enhanced properties than biopolymers. In this study, a biopolymer composite was prepared using Cassava starch and cellulose that was extracted from *Panicum maximum*. During the study, polymers were prepared using the solution casting technique with a glycerol plasticizer. Starch polymers were prepared by mixing starch and glycerol in 1:1, 2:1, 3:1, 4:1, and 5:1 ratio respectively. Starch-cellulose bio composites were prepared by mixing cellulose and starch in different ratios. During the preparation of biopolymer composites, glycerol and acetic acid amounts were kept constant. The biodegradability, water solubility, water absorption capacity, and mechanical properties of those polymer films were determined. Furthermore, the polymer films were characterized using a scanning electron microscope and infrared spectroscopy in order to investigate the surface morphology and the chemical modifications of polymer films respectively. The tensile strength of the starch polymers increases when increasing the starch content. The water solubility and biodegradability of films were decreased when increasing the starch content. The addition of cellulose increases the tensile strength due to the strong interaction between the starch and cellulose. In starch-cellulose composites, biodegradability has been decreased when increasing the cellulose content. Hence, in starch polymers, better properties can be obtained when increasing the starch content. Whereas in starch-cellulose composites better properties have been obtained with higher cellulose content. Furthermore, properties can be improved by the modification of starch using citric acid.

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