

Preparation, and Characterization of Cellulose Acetate and Carboxymethyl Cellulose from Rice Husk

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ABSTRACT

Native cellulose (NC) was extracted from agricultural waste (Rice Husk) using 10 % nitric acid and 0.8 % sodium sulphite followed by mercerization with 4 % sodium hydroxide and 0.8 % sodium sulphite and bleached with sodium hypochlorite. Esterification and etherification were used to produce Cellulose acetate (CA) and Carboxymethyl cellulose (CMC) respectively. The percentage yield of the cellulose is 32.02 %. Proximate analysis of NC, CA, and CMC such as moisture content, ash content, crude fat, and swelling power, were determined these revealed a reduction in the crude fat content of the modified cellulose. Lignin and Hemicellulose content of the raw sample was also determined. The degree of substitution of the modified cellulose indicated that it increases with an increase in temperature, concentration, and time. Fourier transform infrared (FT-IR) spectroscopy reveals new bands around 1125 - 1162 cm⁻¹, 1725 - 1730 cm⁻¹ and a reduction in the broadness of the peaks around 3200 - 3600 cm⁻¹ for the modified cellulose. Scanning electron microscope (SEM) shows irregular Surface morphology with perforations while the modified cellulose is rough spongy like mass. Thermal analysis showed better heat stability of the modified cellulose than the native cellulose. X-ray diffractometry reveals a higher crystallinity index for the native cellulose compared to the modified cellulose. The results showed a good modification of the cellulose which can serve a wide range of applications in industries.

Keywords: Agricultural waste, Native Cellulose, Nitric acid, Sodium hydroxide, Sodium hypochlorite

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