

# Deep Eutectic Solvent Pretreatment of Rubber Seed Shells for Cellulose and Hemicellulose Production

## Abstract

Ethanol is a clean biofuel that can be produced from biomass, namely, rubber seed shells. Rubber seed shells (RSS) tend to be less worthy and are rapidly becoming an agricultural waste. The environment is getting incredibly degraded as the industrial world constantly expands and has become more technologically developed in industrial operations. Generally, the most common chemical method used in pretreatment is acid and alkaline based. However, this method is unsuitable since it causes a lot of problems such as inhibitors generation and high energy consumption during the pretreatment process. Therefore, in this study, deep eutectic solvent (DESs) was used as the green solvent to pretreat the RSS for more environmentally friendly production of cellulose and hemicellulose. Seven combinations of hydrogen bond acceptor (HBA) and hydrogen bond donor (HBD) were used to synthesize DESs based on their molar ratio and physicochemical properties (pH, viscosity, density, hydrogen bond) were examined. Later, the best synthesized DES to pretreat RSS based on the cellulose and hemicellulose content was evaluated. The chemical composition (cellulose, hemicellulose and lignin) for untreated and pretreated RSS were determined by using the ASTM and TAPPI methods. The experimental results showed that the higher cellulose production were obtained by using acidic based DESs; ChCl:Oxalic acid, ChCl:Lactic acid and ChCl:Formic acid (24.43, 20.42, and 20.31%, respectively). Meanwhile, higher hemicellulose was obtained when using ChCl:Ethylene glycol and ChCl:Urea, with 46.86% and 41.14%, respectively. Hence, the study showed that acidic and slightly acidic based DESs were able to produce high cellulose and hemicellulose from RSS.

## Keywords

Cellulose; Deep eutectic solvent; Hemicellulose; Pretreatment; Rubber seed shells