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## Improvement of the enzymatic hydrolysis of furfural residues by pretreatment with combined green liquor and ethanol organosolv

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### Abstract

Furfural residues (FRs) were pretreated with ethanol and a green liquor (GL) catalyst to produce fermentable sugar. Anthraquinone (AQ) was used as an auxiliary reagent to improve delignification and reduce cellulose decomposition. The results showed that 42.7% of lignin was removed and 96.5% of cellulose was recovered from substrates pretreated with 1.0 mL GL/g of dry substrate and 0.4% (w/w) AQ at 140°C for 1 h. Compared with raw material, ethanol-GL pretreatment of FRs increased the glucose yield from 69.0% to 85.9% after 96 h hydrolysis with 18 FPU/g-cellulose for cellulase, 27 CBU/g-cellulose for  $\beta$ -glucosidase. The Brauner-Emmett-Teller surface area was reduced during pretreatment, which did not inhibit the enzymatic hydrolysis. Owing to the reduced surface area, the unproductive binding of cellulase to lignin was decreased, thus improving the enzymatic hydrolysis. The degree of polymerization of cellulose from FRs was too low to be a key factor for improving enzymatic hydrolysis.

**Keywords:** Furfural residues, Enzymatic hydrolysis, Green liquor, Brauner-Emmett-Teller surface area, Degree of polymerization of cellulose, Cellulase adsorption.

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