

Development of a green liquor dregs pretreatment for enhanced glucose recovery from corn cobs and kinetic assessment on various bioethanol fermentation types
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Abstract:

This study optimized a novel pretreatment of corn cob wastes (CCW) using green liquor dregs (GLD), a waste product from the chemical kraft pulping industry. Subsequently, the microbial growth and ethanol production kinetics of different bioprocess types were comparatively evaluated using the logistic and modified Gompertz models respectively. The optimized GLD pretreatment conditions released a maximum glucose yield of 0.42 g/g. Separate hydrolysis and fermentation (SHF), simultaneous saccharification and fermentation (SSF) and SSF with pre hydrolysis (PSSF) processes were assessed and gave comparable kinetic data. The SHF and PSSF processes displayed slightly higher microbial and bioethanol kinetic coefficients compared to the SSF system. Implications from this study provide major insights for reducing energy, time and costs incurred with lignocellulosic substrate pretreatment, bioethanol process design and scale up. Additionally, the study demonstrates a possible route for beneficiation of waste material such as GLD.