

Optimization of an ionic liquid pretreatment process for the fermentable sugar production

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Pretreatment of mixed softwood with an ionic liquid, 1-butyl-3-methylimidazolium acetate, was optimized to maximize the efficiency of enzymatic hydrolysis. The effects of temperature (70 – 130 oC) and reaction time (6 – 24 h) during pretreatment were examined by applying the central composite design (CCD). As pretreatment temperature and time increased, cellulose and xylan digestibility increased but the carbohydrate recovery decreased. The quadratic models were identified with good predictive accuracies, where operating variables gave the significant effects on enzymatic saccharification performance. The maximum biomass digestibility and fermentable sugar yield were measured to 96 and 92% at 100 oC for 15 h. It was shown in the study that the optimization of the pretreatment improved the fermentable sugar production efficiency with the cost-effectiveness.