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Lignocentric analysis of a carbohydrate-producing lignocellulosic biorefinery process

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Abstract

A biologically-based lignocellulosic biorefinery process for obtaining carbohydrates from raw biomass was investigated across six diverse biomasses (three hardwoods & three nonwoods) for the purpose of decoding lignin's influence on sugar production. Acknowledging that lignin could positively alter the economics of an entire process if valorized appropriately, we sought to correlate the chemical properties of lignin within the process to the traditional metrics associated with carbohydrate production- cellulolytic digestibility and total sugar recovery. Based on raw carbohydrate, enzymatic recovery ranged from 40-64% w/w and total recovery ranged from 70-87% w/w. Using nitrobenzene oxidation to quantify non-condensed lignin structures, it was found that raw hardwoods bearing increasing non-condensed S/V ratios (2.5-5.1) render increasing total carbohydrate recovery from hardwood biomasses. This finding indicates that the chemical structure of hardwood lignin influences the investigated biorefinery process' ability to generate carbohydrates from a given raw hardwood feedstock.

Key Words: Autohydrolysis, autohydrolyzate, sugar recovery, enzymatic digestibility, non-condensed lignin

1. Introduction

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