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**National Renewable Energy Laboratory (NREL)**

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Bibliogov, United States, 2012. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book \*\*\*\*\* Print on Demand \*\*\*\*\*.Following up on previous work, subcontractor investigated three aspects of using NREL pretreatment technology for total hydrolysis (cellulose as well as hemicellulose) of biomass. Whereas historic hydrolysis of biomass used either dilute acid or concentrated acid technology for hydrolysis of both hemicellulose and cellulose, NREL has been pursuing very dilute acid hydrolysis of hemicellulose followed by enzymatic hydrolysis of cellulose. NREL's countercurrent shrinking-bed reactor design for hemicellulose hydrolysis (pretreatment) has, however, shown promise for total hydrolysis. For the first task, subcontractor developed a mathematical model of the countercurrent shrinking bed reactor operation and, using yellow poplar sawdust as a feedstock, analyzed the effect of: initial solid feeding rate, temperature, acid concentration, acid flow rate, Peclet number (a measure of backmixing in liquid flow), and bed shrinking. For the second task, subcontractor used laboratory trials, with yellow poplar sawdust and 0.07 wt sulfuric acid at various temperatures, to verify the hydrolysis of cellulose to glucose (desired) and decomposition of glucose (undesired) and determine appropriate parameters for use in kinetic models. Unlike cellulose and hemicellulose, lignins, the third major component of biomass, are not carbohydrates that can be broken down into component sugars. They are, however, aromatic complex amorphous phenolic polymers that can likely be converted into low-molecular weight compounds suitable for production of fuels and chemicals. Oxidative degradation is one pathway for such conversion and hydrogen peroxide would be an attractive reagent for this, as it would leave no residuals. For the third task, subcontractor reacted lignin with hydrogen peroxide under various conditions and analyzed the resulting product mix.



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