

Applicability of Sub- and Supercritical Water Hydrolysis of Woody Biomass to Produce Monomeric Sugars for Cellulosic Bioethanol Fermentation¹

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ABSTRACT

In this study two woody biomasses, poplar and pitch pine wood, were treated with sub- and supercritical water (SCW) at temperature of 325-425.8 celsius degree, at pressure of 220±10 atm and residence time of 60 s, respectively, to develop a time saving and efficient conversion process for the production of fermentable sugars from woody biomasses using supercritical water system. Cellulose / hemicellulose was easily hydrolyzed during SCW treatment into monomeric sugars with the total yield of 7.3% and 8.2% based on the oven dried weight of poplar and pitch pine, respectively. Total yield of the monomeric sugars was increased about threefolds to 23.0% and 25.1% in the presence of 0.05% of hydrochloric acid. Model experiment confirmed that glucose and xylose were readily converted into low molecular weight compounds during SCW hydrolysis. According to GC/MS analysis main compounds converted from glucose and xylose by SCW were identified to 5 - hydroxymethyl furfural and 4 - oxo - 5 -methoxy -2 - penten - 5- olide, respectively.

Keywords : *Pine wood, Biomass, Supercritical water, Monomeric sugar, GC/MS*

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