

**METHODS FOR THE IDENTIFICATION OF LEVOGLUCOSAN ISOMERS IN BIO OIL OBTAINED BY
FAST PYROLYSIS OF CELLULOSE**

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Fast pyrolysis is widely perceived as a promising approach to convert biomass into fuels. Previous research results demonstrated that the primary products formed in fast pyrolysis of cellulose are small molecules, mostly one dehydrated glucose building block monomer. Levoglucosan has been proposed to be the major product yet definitive evidence has yet to be obtained. Identification of the monomer structure(s) is of great importance in identification of the best conditions for pyrolytic conversion of biomass into useful chemicals or hydrocarbon fuels. By performing LC/MS on a Thermo Fisher Scientific LTQ affixed with a C-18 4 X 250 mm analytical column, we developed LC methods that were successfully applied to preparatory HPLC for the isolation of a pure component of pyrolysis oil. NMR characterization of this component and cross comparison with commercially available levoglucosan (synthesized and isolated from pyrolysis of starch) showed a good match. However peak splitting was not adequate for obtaining coupling constants and thus stereochemistry has not yet been determined. Computational results have shown other isomers to be lower in energy than levoglucosan. Therefore, further characterization is imperative. XRD crystallography is a potential method for obtaining the actual structure of the primary isomer. The other approach that we used in the identification of the monomer structure(s) is to synthesize levoglucosan from glucose to keep the stereochemistry of levoglucosan. This product will be compared to the structure(s) of bio oil monomer using high resolution NMR to determine if they match.