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Ionic Liquid Cation Influence on the Dissolution of Isolated Lignins and Biomass for Ethanol Production

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For economically viable fermentation-based lignocellulosic biofuel production, pretreatment of the biomass is required. Ionic liquids are proving a promising pretreatment medium. However, debate exists as to the extent of biomass dissolution by ionic liquids and the mechanisms by which this solubility occurs. In this study the degree of biomass dissolution as a function of ionic liquid cation was investigated. Four chloride anion based ionic liquids were studied for their ability to dissolve either organsolv, klason, indulin AT, and milled-wood lignins along with eucalyptus and pine biomass. Imidazolium, phosphonium, ammonium and pyridinium anions were screened. Size exclusion chromatography and MALDI-TOF methods were developed to study the degree of dissolution and polydispersity as a function of solvent cation. The comparison between isolated lignins and biomasses deduced not only the degree of dissolution, but mechanistic information on the component of biomass dissolved by ionic liquids.

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