

## Characterization of by-products from organosolv pretreatments of yellow poplar wood (*Liriodendron tulipifera*) in the presence of acid and alkali catalysts

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**Abstract** : Organic by-products derived from cellulose and lignin during organosolv pretreatments of yellow poplar wood (*Liriodendron tulipifera*) in the presence of H<sub>2</sub>SO<sub>4</sub> and NaOH as catalysts, respectively, were subjected to various analyses to elucidate their effects on further performance of biological ethanol fermentation and provide preliminary data for the structure and utilization of organosolv lignin.

Monomeric sugars amounted to ca. 2.2-7.7% in the organosoluble fraction of the organosolv pretreatment with H<sub>2</sub>SO<sub>4</sub>, while significantly low amount of sugars (0.2-0.3%) were determined in that of the organosolv pretreatment with NaOH. In case of addition of H<sub>2</sub>SO<sub>4</sub> during organosolv pretreatment of biomass, a fermentation of the organosoluble fraction could be considered as an essential process to increase an efficiency of biomass utilization as well as yield of bioethanol. Precipitates, insoluble by-products in the solvent mixture, were also analyzed by diverse analytical methods and revealed that these were typically composed of a lignin moiety regardless of catalyst. According to the results of nuclear magnetic resonance (NMR), Fourier Transform Infrared Spectroscopy (FT-IR) and Gel permeation chromatography (GPC), the main components of precipitates seem to be lignin polymers. However, their structures could be slightly modified during pretreatment and mixed with some carbohydrates by chemical bonds and/or physical associations.

**Key words** : Organosolv pretreatment, yellow poplar wood (*Liriodendron tulipifera*), monomeric sugar, inhibitory compounds, organosolv lignin