CATALYTIC REDUCTIVE FRACTIONATION OF WOODY BIOMASS

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There is a growing consensus that lignin valorization is essential to the sustainability and economics of a lignocellulosic biorefinery. Many initiatives have been presented to remove lignin from lignocellulose biomass, while producing a pure hemicellulose and cellulose product, but the fate of the lignin fraction and its use for the production of chemicals were not a primary concern until recently. However, because of the importance of lignin valorization, it is currently one of the foremost challenges of new biorefinery strategies.

In this context, catalytic reductive fractionation of lignocellulose is gaining importance as it constitutes an efficient method to valorize both lignin and the carbohydrate fractions. In this process, woody or herbaceous biomass is processed at elevated temperatures in an (aqueous) organic solvent in the presence of a heterogeneous redox catalyst under a hydrogen atmosphere. During the process, lignin as present in the lignocellulose matrix is extracted through solvolysis and is simultaneously disassembled via hydrogenolysis. This results in a solid carbohydrate pulp and a lignin oil containing a select number of phenolic monomers, dimers, and short oligomers. In this contribution, the influence of several process parameters such catalyst and solvent on the catalytic reductive fractionation of woody substrates such as birch and poplar will be discussed. This will include a quantitative and qualitative analysis of the various product streams.