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Thermal conversion of lignin residues for production of bio-fuels and chemicals in a lignocellulosic biorefinerey

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Lignocellulosic biomass is a widely available resource that can be used as feedstock for production of renewable motor fuels, solid fuels and bulk and fine chemicals. If waste biomass streams and fractions are used, a high level of sustainability can be achieved. The lignin fraction of such biomass comprises a waste stream both from pulping and bio-ethanol applications, and is thus a good feedstock for further use for bio-energy. Here, we present results from solvolytic thermal conversion of lignin and lignin-rich residues that provide a bio-oil that can be used as a motor fuel with some further upgrading. Alternatively, chemicals from the bio-oil can be extracted and used as e.g. renewable plastic monomers, providing value-added streams in a biorefinery concept. The lignin-to-liquid (LtL) conversion is done with water or ethanol as the reaction medium and formic acid (FA) as depolymerisation aid for converting lignin to phenolic monomers. FA also acts as a hydrogen source. The conversion is done in batch reactors at 300-380°C with corresponding pressures of 200-300 bar, and provides recoveries of more than 90% by weight and 80% as carbon in the oil phase at optimal conditions. Tuning the time, temperature and loading parameters enable production of different oil qualities. Heterogeneous catalysts can be used to increase oil yields relative to solid products, tune oil composition and reduce the reaction severity required. In this presentation, results from conversion of a wide range of lignin qualities will be given, both for laboratory and pilot scale conversion.

Biography

T Barth is a Professor at the Department of Chemistry, University of Bergen, Norway. Her research addresses thermochemical biomass conversion for biofuel and chemicals production in an organic chemistry perspective, in parallel with and studies on petroleum composition and alteration.

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