

Supercritical ethanol assisted depolymerization of lignin into high yield of monomeric phenols

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A non-catalytic route for efficient lignin depolymerization into high yields of monomeric phenols was explored in the presence of supercritical ethanol and formic acid. Supercritical ethanol is known as a good liquefaction solvent but not efficient enough to depolymerize lignin completely. The presence of formic acid completely depolymerize lignin at 350 C for short reaction time of 30 min. The yield of aromatic monomers increased from 95.8 mg/g of lignin when the reaction was conducted in the absence of formic acid to 194.4 g/g of lignin in the presence of formic acid. Reaction at 350 C for 60 min duration increased the monomers yield to 367.3 g/g of lignin. Further increasing reaction time led to secondary reaction to produce highly alkylated species in the product mixture and decreasing monomeric yields. Supercritical ethanol at our reaction conditions showed reactivity with itself and lignin as well to produce self-derived and lignin-derived products. Longer reaction times also increases ethanol consumption by increasing its reactivity.