

Depolymerization of kraft lignin at water-phenol mixture solvent in near critical region

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Plant biomass has been proposed as an alternative source of petroleum-based chemical compounds. Especially, aromatic chemical compounds can be obtained from lignin by chemical depolymerization processes due to the complex aromatic polymer component of lignin. In this study, kraft lignin was used as a starting material and was characterized by solid-state ^{13}C -NMR, FT-IR and elemental analysis. The depolymerization of kraft lignin was studied at water-phenol mixture solvent in near critical region. Experiments were conducted at 300~400°C, using a batch type reactor with an atmosphere of hydrogen gas at 150 bar. The effects of water: phenol ratio, reaction temperature, and reaction time were varied to determine the optimum operating conditions for high yields of valuable chemicals. The chemical species and quantities in the liquid products were analyzed using GC-MS, and solid residues (char) were analyzed using FT-IR. GC-MS analysis confirmed that the aromatic chemicals such as anisole, o-cresol, p-cresol, 2-ethylphenol, 4-ethylphenol, dibenzofuran, 3-methyl cabazole and xanthene were produced when phenol was added as a solvent.