바이오매스 유래 페놀 화합물의 액상 알킬레이션 반응을 통한 고탄소 방향족 항공 유분 생산

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The research into the bio-jet fuel production technology using a biomass pyrolysis oil is rapidly expanding. For upgrading the pyrolysis oil to jet-fuel grade alkanes and naphthene, a key catalytic step is to increase the carbon numbers of pyrolysis oil compounds, mostly less than C6, to high carbon number jet fuel precursors. The alkylation of phenolic derivatives in the pyrolysis oils with alcohols is the promising catalytic strategy to meet this goal. In this study, the liquid-phase alkylation of guaiacol with IPA over zeolite catalysts was studied as a model reaction for the alkylation of biomass pyrolysis oils. The zeolites from medium (MFI, MWW) to large pore (FAU, BEA) with various Si/Al ratios as well as Lewis acidic alumina were studied to develop the structure-activity relation for pyrolysis oil alkylation. The alkylation activity was also studied under the diverse reaction condition to estimate the kinetics of the zeolite catalysts. During the alkylation, three types of reactions, C-alkylation, Trans-alkylation and O-alkylation reaction occurred competitively. The effects of pore size and acid sites on the production of the targeted alkylation products will be discussed.