

Condensation of furanic platform molecules to diesel precursors over silica supported sulfonic acid functionalized catalysts

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In this work, self-condensation reaction of 2-methylfuran (2-MF) and its cross-condensation reactions with furfural (FUR), 2-pentanone, and n-butanal have been implemented to produce C₁₄-C₁₅ fuel precursors. Sulfonic acid catalysts with and without alkyl chain linkers supported on fibrous nano-silica (KCC-1), MCM-41, SBA-15, and silica nanoparticles were synthesized and investigated for these reactions. Among the synthesized catalyst, sulfonic acid-functionalized KCC-1 (KCC-1SO₃H) and 3-((3-(Trimethoxysilyl) propyl) thio) propane-1-oxy-sulfonic acid-functionalized (KCC-1APSO₃H) showed higher conversion and selectivity for the self-condensation and cross-condensation reactions respectively. The effects of various parameters on the activity and selectivity, such as reaction time and temperature were studied. The catalysts retain their acidity over multiple reaction cycles. This work was supported by the Energy Efficiency & Resources (No. 20163010092210) of the Korea Institute of Energy Technology Evaluation and Planning (KETEP) grant funded by the Korea government Ministry of Trade, Industry & Energy.