

Production of high-carbon number diesel from lignocellulose

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Solid acid catalyst has been used in many chemical processes replacing highly corrosive and environmental unfriendly liquid acids. A number of solid acids including zeolites, ion-exchange resins, and metal oxides has already been utilized in the Sylvan process to produce petroleum-like diesel. Although there have been several studies on the Sylvan process, none has been reported regarding the correlation between the type of acidity and the catalytic activity. We studied the Sylvan process depending on the acid strength and the type of acidity. A series of silica-alumina aerogel with different ratio of Bronsted and Lewis acid sites were prepared and their catalytic activities toward Sylvan process were investigated. In order to study the effects of the acid strength on the Sylvan process, a series of sulfated zirconia, SO₃H-SBA-15 and SO₃H-SiO₂ with different acidity were prepared. In addition, the commercially available catalysts, including Amberlyst-15, Nafion SAC-113, H₂SO₄, and pTosoH, were also studied. Subsequent hydrogenation and hydroxydeoxygenation of the Sylvan process products were performed to produce the deoxygenated petroleum-like diesel fuels.