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Selective Synthesis of Gas Oil via Oligomerization of Light Olefins Catalyzed by Methanesulphonic Acid

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The oligomerization of light olefins, such as ethylene, propylene, 1-butene and isobutene, catalyzed by methane?sulphonic acid (MSA) was evaluated to synthesize liquid hydrocarbons in a high pressure continuous flow reactor for 250 min at 20 to 40°C. The liquid hydrocarbons separated from the MSA catalyst were analyzed by combined gas chromatography with mass spectrometry. The hydrocarbons were classified by molecular weight as gasoline, kerosene and light oil. Although ethylene and propylene were slightly dissolved into the MSA, no further liquid product was obtained after the reaction period. The yield of liquid product from isobutene was larger than that from 1-butene. The selectivity for gasoline was lower than that for kerosene or light oil. The recovered MSA was replaced 10 times into the reactor to elucidate the effect of recycling on catalyst deactivation. The activity of recycled MSA was the same as the fresh catalyst. On the other hand, the reaction mixture catalyzed by sulfuric acid was not separated into the hydrocarbon layer and catalyst layer after recycling 3 times. Oligomerization of 1-butene with a small amount of water to clarify the effect of impurity showed that the catalytic activity of MSA sharply decreased with water content. Methanesulphonic acid is an effective catalyst for the selective synthesis of gas oil from butenes.

Keywords: Methanesulphonic acid, Light olefin, Butene, Selective synthesis, Gas oil

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