Synthesis of renewable diesel from palm oil and jatropha curcas oil through hydrodeoxygenation using nimo/zal

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Abstrak

Hydrodeoxygenation of palm oil and Jatropha curcas oil over NiMo/ZAL (nickel molybdenum/zeolit alam Lampung) catalyst was investigated under temperatures of 375°C and 400°C and H2 pressure of 15 bar in a semibatch stirred autoclave reactor. NiMo/ZAL catalyst was prepared using a rapid cooling method. NiMo/ZAL characterization revealed a crystal size of 70.07 nm, surface area of 12.25 m2/g, and pore size and pore volume of 9.83 Å and 0.0062 cm3/g, respectively. The hydrodeoxygenation removal pathway of palm oil and Jatropha curcas oil over NiMo/ZAL catalyst was primarily achieved through decarboxylation. Under hydrogen pressure of 15 bar and temperature of 375°C, palm oil and Jatropha curcas oil can be converted into paraffin chains (from n-C15 up to n-C18) by a decarboxylation reaction that produces water, methane, and COx gases as byproducts and contains some undesirable reactions. These byproducts can produce alkene bonds that form chains different from those in conventional diesel fuel. The conversion was 80.87%, selectivity was 52.78%, and yield was 45.66%. The hydrodeoxygenation reaction catalyzed by NiMo/ZAL catalyst was found to be suitable for removing oxygen and producing paraffin chains; this increased the heating value and stability of renewable diesel fuel.