



Synthesis and characterization of nickel catalysts for production of green diesel from palm fatty acid distillate

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Green diesel or bio-hydrogenated diesel (BHD) is a transportation biofuels produced by renewable raw materials such as vegetable oils, animal fats, and their derivatives via a catalytic reaction involving hydroprocessing and deoxygenation. Palm fatty acid distillate (PFAD) is a by-product from refining crude palm which is a derivative of triglyceride molecules. The main composition is palmitic acid (41.6%) and oleic acid (37.4%). The production process generally carried out at high pressure. Therefore, the production is high cost and consumes high energy. In this work, 10wt.% and 20wt.% of Ni loading on different supports at low pressure of less than 10 bars were studied. The support materials were zirconia (ZrO₂), activated carbon (AC), and zeolite Socony Mobil-5 (H-ZSM5). All catalysts were prepared via incipient wetness impregnation method. The catalysts was stirred for an hour and dried at 110°C for 12 h. Ni/ZrO₂ was calcined at 400°C for 4 h, Ni/AC was calcined at 350°C for 3 h with nitrogen gas (N₂), and Ni/H-ZSM5 was calcined at 550°C for 5 h. Catalysts were characterized by XRD, SEM-EDX, FTIR, and N₂ physisorption measurement. Before reaction, the catalysts were reduced by Hydrogen gas in reactor and the reaction was carried out in batch reactor for 6 hours. The composition of the products was analyzed for carbon atom by gas Chromatography. PFAD can used to produce diesel-like hydrocarbon by eliminating of oxygen to form of n-alkane like a molecules of diesel fossil fuel.

Keywords: Green diesel; PFAD; Deoxygenation; Nickel catalyst