PRODUCTION OF BIODIESEL FROM PALM OIL BY TRANSESTERIFICATION PROCESS BY USING POTASSIUM IODIDE (KI) CATALYST WITH NICKEL (Ni) DOPANT AND ALUMINA (Al_2O_3) SUPPORT

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ABSTRACT

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In this research, biodiesel was produced by transesterification of palm oil by utilizing potassium iodide (KI) supported on alumina beads catalyst with nickel as a dopant. The objectives of this research are study the effects of nickel as dopant towards the reactions as well as to determine the most effective methanol to oil molar ratio. The reactions were refluxed at 65 °C with 4 wt.% of catalyst loading for 5 h reaction time while varying the methanol to oil molar ratio at 1:15, 1:25, 1:35, 1:45 and 1:55. The most optimum methanol to oil ratio was at 1:35 gave the yield 53.34%. The catalyst produced were characterized by using Thermogravimetric analysis (TGA). Hence the results proved that the catalyst have undergone two stages of decomposition and the calcination temperature was also can be determined using TGA which at 700 °C. The biodiesel produced then were analyzed qualitatively using Gas Chromatography Mass Spectrometry (GC-MS) using methyl heptadecanoate as the internal standard. In total there were six peaks of methyl esters appeared in the chromatogram and the details of the peaks were confirm by using MS-NIST program. The methyl esters identified was dodecanoic acid methyl ester, methyl tetradecanoate, hexadecenoic acid methyl ester, methyl stearate, octadecenoic acid methyl ester and octadecadienal acid methyl ester. In conclusion, the study has showed that among these five ratios, the most productive was 1:35 of methanol to oil molar ratio. Furthermore, nickel that act as dopant has greatly affects the catalytic reactivity of the catalyst.