EFFECT OF METHANOL TO OIL MOLAR RATIO FOR BIODIESEL PRODUCTION FROM RUBBER SEED OIL USING ALUMINA SUPPORTED CALCIUM OXIDE

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ABSTRACT

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Biodiesel is an alternative source of energy that is sustainable, renewable, biodegradable and has potential to replace petro-diesel fuel. The rubber seed oil contains free fatty acid (FFA) and also has potential to be used as biodiesel feedstock. The objective of this study is to determine the effect of methanol to oil molar ratio on the percent yield of biodiesel. The conversion of rubber seed oil to biodiesel by the process of transesterification reaction was studied. The catalyst that was used in this study was a heterogeneous base catalyst which was alumina supported calcium oxide, Al_2O_3-CaO. The characterization of the catalyst was conducted by using Field Emission Scanning Electron Microscope (FESEM) and Fourier Transform Infrared Spectroscopy (FTIR). The analysis of FTIR shows that the catalyst was produced successfully as there are presences of bands indicating the necessary functional group. FESEM analysis shows that the mixture of Al_2O_3-CaO was successfully done as the CaO supported the Al_2O_3 well. The transesterification reaction was carried out in the fixed condition where the loading amount of catalyst was 1 g, the reaction temperature was 60 °C, three hour reaction time and 600 rpm for the agitation rate. The different molar ratio of methanol to oil studied were 3:1, 6:1, 9:1 and 12:1. The result shows some difference on the percentage yield of biodiesel. The optimum molar ratio is 9:1 that produced the highest percentage yield which was 77.1%. The types of fatty acids that present in the rubber seed oil was determined by using Gas Chromatography-Mass Spectrometry (GC-MS). The analysis of the GC-MS shows the present of stearic, oleic, palmitic, linolenic and linoleic acid in the rubber seed oil. As the conclusion, the catalyst Al_2O_3-CaO has a good potential for producing biodiesel.

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