

ABSTRACT

PREPARATION OF CaO/SiO_2 CATALYSTS FROM CaCO_3 AND RICE HUSK SILICA USING SOL GEL METHOD FOR TRANSESTERIFICATION OF VEGETABLE OIL INTO BIODIESEL

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In this research, a series of CaO/SiO_2 catalysts was synthesized from CaCO_3 and rice husk silica using sol gel method, to obtain the catalysts with CaO contents of 5, 10, 15, 20, and 25% relative to silica. The catalysts were subjected to calcination treatment at 600 °C for 6 hours, and then used for transesterification of coconut oil with metanol. Transesterification results showed that all of the catalysts were able to work, and the best performance was exhibited by the catalyst with CaO content of 25%, with a yield of 93,1%. Further investigation demonstrated that the optimum conditions were reaction time of 60 minutes, the ratio of metanol/oil 4, and the amount of catalyst 5% of the mass of the oil. GC-MS analysis of biodiesel produced revealed the presence of nine methyl esters correspond with fatty acids in coconut oil, suggesting that the catalysts were able to convert coconut oil into biodiesel. Catalyst with the best performance was further characterized to obtain the physical characteristics of the catalyst. Characterization with XRD showed that the catalyst composed of amorphous phase, which is silica, and crystalline phases which are CaSiO_3 and Na_2SiO_3 . Characterization with SEM showed the sample is porous material, with a surface area of 6,098 m^2/g based on the results obtained using BET. As shown by the results of SEM, the surface of the sample is marked by the presence of clusters with varied sizes and shapes, and in agreement with the results of characterization using PSA. The elemental composition as seen by EDX show the presence of Na, Si, Ca, and O, which is in accordance with the raw materials used.

Key words : *CaO/SiO₂ catalyst, sol gel method, coconut oil, transesterification.*