ABSTRACT

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DEVELOPMENT OF SYNTHETIC ZEOLITES FROM RICE HUSK SILICA USING ELECTROCHEMICAL METHOD AND APPLICATION AS CATALYST FOR PYROLYTIC CRACKING OF VEGETABLE OILS

In this research, a series of synthetic zeolites was prepared from rice husk silica using electrochemical method. The zeolites were subsequently tested as catalysts for pyrolytic cracking of vegetable oils. To produce zeolites with varied compositions, preparation was carreid out by applying different pHs and potentials. Before use, then catalysts were subjected to calcination treatments at different temperatures of 300 and 500 °C, and the liquid fuels produced were analyzed by GC-MS to identify the components of the liquid fuels. The results showed that the zeolites having the best performance for the pyrolysis of the coconut oil was the zeolite synthesized at pH = 4 and potential of 8 volt ($Zeo_{4:8}$) which was calcinated at 300 °C and producing the liquid fuel with hydrocarbon content of 42.06%, while for castor oil, the best catalyst was $Zeo_{4:10}$ calcinated at 300 °C producing liquid fuel with hydrocarbon content of 63.06%. The $Zeo_{4:4}$ calcinated at 500 °C was found to produce liquid fuel with hydrocarbon content of 78.28%. The characterization by XRD showed that complete conversion of the samples into zeolite has not been achieved, and therefore they are considered as zeolite precursors. It is also found that according to SEM, the surface of the samples is characterized by relatively homogeneous morphology, while the EDS results confirmed the elemental composition of the samples is in accordance with that of zeolite.

Keywords: rice husk silica, synthetic zeolite, electrochemical method, pyrolysis, liquid fuel