

## Modification of Clay Through and Without Fusion Treatment for Catalyst of Biodiesel Synthesis From Used Cooking Oil

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**Abstract :** Transesterification of used cooking oil into biodiesel has been done using modification of clay to zeolite with Si/Al ratio of 5,5 catalyst through and without fusion treatments. The modified clay catalyst without fusion was synthesized by destructing or dealumination of clay with 8M HCl solution, then followed by treating with NaOH, AlCl<sub>3</sub>.6H<sub>2</sub>O, CTAB and distilled water. Meanwhile, modified clay catalyst through fusion was synthesized by dealumination also carried out like the treatment above, then NaOH pellet (NaOH/zeolite ratio = 0.8), followed by treating with AlCl<sub>3</sub>.6H<sub>2</sub>O, CTAB and distilled water. Each of the mixture was regulated to pH of 11.5. Next, and each of the mixture was then poured into a reactor for hydrothermal process at 140 °C for 72 h. The results of the dealumination of clay was characterized by X-ray Fluorescence and the synthesized zeolite was characterized using X-Ray Diffraction. The transesterification of used cooking oil into biodiesel process was carried out in the variation of reaction time process of 1.5, 3, 4.5 and 6 h.

The temperature of reaction of 65°C, and ratio of catalyst : used cooking oil : methanol was 1.0 : 20.0 : 13.3. The main liquid product of transesterification was methyl ester and it was analyzed using Gas Chromatography Mass Spectrometer. The result showed that the dealumination of clay had Si content of 34.77% and Al content of 5.67%. The results of measurements with XRD produced a different form of chromatogram and type of zeolite. The results of transesterification used cooking oil into biodiesel without fusion treatment was 10 wt %, meanwhile the zeolite through fusion treatment was 85 wt %.

**Keywords :** clay, modification, zeolite, transesterification, used cooking oil, biodiesel.

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