

**WASTE COOKING OIL TRANSESTERIFICATION IN BIODIESEL
PRODUCTION UTILIZING Ca/Al₂O₃ HETEROGENEOUS
CATALYST**

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ABSTRACT

WASTE COOKING OIL TRANSESTERIFICATION IN BIODIESEL PRODUCTION UTILIZING $\text{Ca}/\text{Al}_2\text{O}_3$ HETEROGENEOUS CATALYST

The increasing demand for fossil fuel (petroleum and diesel) in the market brings a great concern to the global economy as it is natural and non-renewable sources. Several studies on alternative diesel (biodiesel) has been performed in which the non-renewable sources was substituted with renewable sources such as waste cooking oil. It was an initiative to reduce the usage of the natural sources. The process of transforming waste cooking oil into biodiesel is called transesterification. The process has been carried out in the round bottom flask fitted with reflux condenser. Generally, waste cooking oil consists of FFA and biodiesel consist of FAME. This study involved two transesterification methods which were one step reaction (transesterification) and two-step reaction (esterification-transesterification) and the $\text{CaO}/\text{Al}_2\text{O}_3$ as heterogeneous catalysts. The concern parameters studied were reaction time and catalyst loading. The results showed, the combination of esterification and transesterification gave high biodiesel yield (30.91%) compared to one step reaction (28.49%) with optimum reaction condition of 3 wt.% of $\text{CaO}/\text{Al}_2\text{O}_3$ catalyst, 12:1 methanol to oil ratio at temperature of 65°C for 3 hours. The biodiesel obtained was analyzed using FTIR and GC-MS to prove the FFA content in the waste cooking oil sample had been converted to FAME. The catalyst proved could be used in the biodiesel production. FTIR results of catalyst analysis proved that all the impurities were eliminated after calcined at 1000°C.

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