

**TRANSESTERIFICATION OF WASTE COOKING OIL  
UTILIZING K/EFBA HETEROGENEOUS CATALYST**

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## ABSTRACT

### TRANSESTERIFICATION OF WASTE COOKING OIL UTILIZING K/EFBA HETEROGENEOUS CATALYST

The growth of human population has led to an increase in the amount of waste and by-products produced by several sectors such as the food and industrial sector. The disposal of waste cooking oil (WCO) and empty fruit bunch (EFB) cause a serious environmental and economical issues as well as the negative environmental impact of fossil fuels which lead to the rising demand in sustainable energy sources. Besides, the application of heterogeneous catalyst has become a trend in the production of biodiesel due to some drawbacks in using homogeneous catalyst during transesterification process. Therefore, in this study, the effectiveness of K/EFBA heterogeneous catalyst in the transesterification of waste cooking oil was investigated. This study also aims to characterize the physiochemical properties of K/EFBA heterogeneous catalysts. Furthermore, this research scope focused on the catalyst characterization and transesterification of waste cooking oil. This catalyst has been characterized by using TGA-DTG, FTIR, SEM-EDX, XRD, XRF, TPD-CO<sub>2</sub> AND BET while the biodiesel analysis was done by using GC-MS. The optimum condition for transesterification of WCO were 7 wt% of catalyst loading, 45 minutes of reaction time and 12:1 of methanol to oil ratio which produced 70.51% of biodiesel yield. The biodiesel was successfully produced by observing six peaks of methyl ester groups in the GC-MS which consist of lauric acid methyl ester, myristic acid methyl ester, palmitic acid methyl ester, oleic acid methyl ester and linoleic acid methyl ester. Hence, the catalysts demonstrated promising results in the conversion of triglycerides in waste cooking oil into fatty acid methyl esters (FAME).