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TITLE:
PRODUCTION OF FATTY ACID METHYL ESTER FROM WASTE COOKING OIL BY USING K METAL CATALYST SUPPORTED BY OIL PALM FROND (OPF) ACTIVATED CARBON

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ABSTRACT

Biodiesel or FAMEis a renewable, non-toxic and biodegradable fuel that can be formed from range of renewable and organic raw material including waste or fresh vegetable oils, oilseed plants, and animal fats. It is chosen above other diesels due to its numerous advantages such as it reduces greenhouse gases, has a higher combustion efficiency, and increases the number of rural manufacturing jobs. The most frequent and straightforward technique of producing biodiesel is transesterification, which uses waste cooking oil (WCO) reacted with alcohol in the presence of a heterogeneous base catalyst which is potassium, K metal with oil palm frond (OPF) as a catalytic support. The goal of this study is to see how the weight percent of K metal catalyst affects the percentage yield of Fatty Acid Methyl Ester. (FAME) (5wt%, 10wt% and 20wt%). In order to make the heterogeneous catalyst the KOH solution was dopped with oil palm frond (OPF) and calcined at 500 °C for 4 hours before being cooled to room temperature. To remove the water content of waste cooking oil (WCO), it must be heated at a higher temperature, and the ratio of methanol to oil and catalyst to oil is critical for the trans-esterification process. The Gas Chromatography-Mass Spectrometry (GCMS) was utilised for FAME analysis to determine the yield percentage of FAME. The 20wt% of K metal catalyst used in these reactions give the highest amount of biodiesel (FAME) production which is about 56.11%. Meanwhile, the 5wt% of the K metal catalyst gives the second lowest percentage of biodiesel (FAME) production which is about 15.68% and the result was higher than the result from 10wt%. The 10wt% of K metal catalyst give the lowest percentage of biodiesel production (FAME) which is about 12.85%

TABLE OF CONTENT

TABLE OF CONTENT

CHAPTER ONE
BACKGROUND

1.1 Introduction

One of the non-renewable energy sources that we can obtain from decomposing plants and animals is fossil fuels (Zhang et al., 2018). To meet the needs of environmental and resource issues, a lot of institutional and industrial research is looking for clean and high efficiency energy sources. Some of the examples of the high efficiency sources are like solar, biomass and wind (Zhang et al., 2018). It is a growing trend in the energy industry to replace fossil fuels with biodiesel fuels. According to Zhang et al., (2018) and He et al., (2017) biodiesel is a biodegradable energy derived from the transesterification of animal fat or vegetable oil. Furthermore, it is a carbon neutral, degradation, and non-toxic, which means that biodiesel can be defined as an environmentally friendly fuel.

Generally, Salaheldeen et al., (2021) stated that transesterification, also known as alcoholysis, in the other words it's means the displacement of alcohol from an ester by another alcohol in a process similar to hydrolysis, except that an alcohol is used instead of water. According to Sudarsanam et al., (2018) Because the active sites are in the same phase as the reactants, they can interact with the reaction substrates. easily, but they are frequently associated with inefficient reusability. In comparison to heterogeneous catalysts, it is recyclable and has a long lifetime, allowing it to be efficiently recovered from reaction mixtures and utilised in several catalytic cycles at once, making the process more cost-effective and sustainable (Sudarsanam et al., 2018).