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EFFECT OF REFLUX TIME IN THE ESTERIFICATION OF KAPOK FIBRE FOR USED COOKING OIL (UCO) TREATMENT

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ABSTRACT

In the process of food preparation, used cooking oil (UCO) is produced as a waste. The color of UCO is dark when use repeatedly in cooking and contains both animal and vegetable matter. The UCO is widely used as a raw material to get biodiesel. Nonetheless, it has drawbacks towards environment if being discharged down into kitchen sinks. This is because UCO may lead to blockages of sewer pipes when the oil solidifies to such a degree where it may lead to water channel problems. To date, none of treatments could reduce the environmental impacts and give better solution in solving UCO. Hence, the aim of this research is to find the alternative method to reduce the oil content in UCO before discharging into the river by using kapok fibre as adsorbent in the esterification method. The esterification reaction is used to modify kapok fibre with the presence of stearic acid and calcium oxide (CaO) as catalyst. The effect of reflux time was studied on the esterification of kapok fibre. Both of modified and unmodified kapok fibres were prepared to compare the oil adsorption towards UCO. In the esterification reaction, 1 g of kapok fibre was mixed with 1 g of stearic acid in the ratio of 1:1. Then, the catalyst added was 10 wt% of kapok fibre mass. The reaction time was ranged from 1, 2 and 4 hours. The experiment was repeated in duplicates in order to take the average result. From the result, the average oil removal efficiency produced at 1 and 2 hours were 31.25% and 32.85%, respectively. Meanwhile, the highest oil removal efficiency was obtained at 34.21% by using refluxing time at 4 hours. The unmodified kapok fibre gave the lowest oil removal efficiency compared to modified kapok fibre (MKF) which is at 25.85%.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

In the process of food preparation, used cooking oil (UCO) is produced as a waste. It is an edible oil that classified into vegetable oil which has been used in food making process. UCO production has increased over the years. It is originate from different sources such as domestic, commercial and also industrial. The huge amount of UCO generated is varies depending to the amount of edible oil consumed from every country. It has been said that the generation of UCO is approximately more than 15 million tons from selected countries around the world (Gui, et. al., 2008). César, et. al., (2017), reported that UCO is used in manufacturing industries such as in the soap production, oil paints and vastly used in the production of biodiesel.

Despite the advantages, UCO is confronting huge difficulties to meet the environmental regulations that are increasingly stringent. UCO is an oily wastewater which comprises of different suspended components. A large amount of UCO are produce and being released into adjacent kitchen sinks and also rivers as this method is the lowest cost for disposal. However, this activity endangered aquatic life because of UCO leads to formation of oil films on the surface of water. This situation worsen the quality of the water since it is prevent the passage of oxygen. Over the previous decades, a few cost-effective treatment have been expanded for the treatment of the UCO such