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**THE SORPTION OF WASTE COOKING OIL (WCO) USING SARAWAK
PINEAPPLE CROWN LEAF (PCL)**

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ABSTRACT

THE SORPTION OF WASTE COOKING OIL (WCO) USING FROM SARAWAK PINEAPPLE CROWN LEAF (PCL)

The unregulated discharge of pollutants into water bodies had become an issue which led to pollution. The utilization of fiber derived from various forms of agrowaste as sorbent are widely used as it has a high sorption capacity and efficiency. The high content of cellulose in certain plants including the crown of pineapple (PCL) would be the best solution for sorption of oil pollutant released into the water bodies which usually caused by mismanagement of those pollutant especially waste cooking oil (WCO) which are widely used in food and beverages industry. In this study, the fiber obtained would be characterized by using Thermogravimetric Analysis (TGA) and Fourier-Transform Infrared Spectroscopy (FTIR) and its effect towards sorbent dosage and time on the adsorption capacity. In FTIR, the significant result were found in C-O stretching of chemical treated PCL which do not shows any peaks in range of 1419 cm^{-1} to 1422 cm^{-1} , 1244 cm^{-1} and 1245 cm^{-1} which indicated the imperfection of hemicellulose and lignin. TGA results agreed with FTIR results where hemicellulose degraded first followed by cellulose and lignin at temperatures 206°C , 396°C , and 480°C respectively for raw PCL. The degradation of hemicellulose, cellulose, and lignin is found at higher temperatures for chemically and thermally treated as compared with raw PCL. In agreement with results from FTIR and TGA analysis, the highest sorption efficiency in pure oil were shown by thermal PCL at 33% and chemical PCL in slick oil at 16.33%. For sorption capacity, the highest value recorded was in between 6-9 g/g for pure oil and 2.5-3.5 g/g for slick oil at duration of 10 minutes. This shown that PCL have a potential to be a sorbent for WCO especially the one which undergo modification as it shows a higher capacity then the raw samples.

CHAPTER 1

RESEARCH BACKGROUND

1.1 Introduction

As the world are competing among each other in development, environmental pollution has become an issue which had affect the quality of life as it reduces the quality of a few things that can be classified as human's basic needs such as water and air. It can be defined as the introduction of substances into the environment that are hazardous to human and other living things. It occurs with presence of dangerous substances that are produced more than the normal concentration and lower the quality of our environment which are known as pollutants which may come either in the form of solids, liquids, or gases (Manisalidis *et al.*, 2020). These pollutants usually come from human activities itself which includes agriculture, municipal activities and industries (Dwivedi *et al.*, 2018). Approximately 80% of all wastewater, both domestic and industrial, is discharged into water resources worldwide without any prior treatment. Global biodiversity has decreased by a factor of roughly one-third because of various forms of pollution causing degradation of freshwater ecosystems (Du Plessis, 2022). It is estimated that 663 million people are consuming untreated water from various sources, such assurface and groundwater (Adelodun *et al.*, 2021). This would lead to a lot of health issue especially some viruses or some toxic microorganism