# ALKALI TREATMENT ON RICE HUSK IN POME TREATMENT

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# ABSTRACT

Palm oil industry is one of the world's most expanding and significant contributing towards the economic growth among the South East Asian countries such as Malaysia and Indonesia. However, along with the increasing production of palm oil, it also has high contaminant in the wastes production which is in palm oil mill effluent (POME). There are several treatment technologies were introduced to reduce the pollution concentration in wastewater but they are very expensive for cost installation. Adsorption treatment by using activated carbon can be more effective method to treat POME but activated carbon is an expensive materials. Therefore, recent study is more focused on using low cost adsorbent by using natural fibre, rice husk. However, the past studies found that by using unmodified of natural fibre exhibited poor efficiency for oil removal due to lower hydrophobicity and low oil adsorption capacity. The modification of rice husk was by using alkali treatment of sodium hydroxide (NaOH) with different concentrations (0.5 M, 1.0 M, 1.5 M, 2.0 M) and different volumes (60 mL, 80 mL, 100 mL). The oil adsorption capacity will be obtained by using n-hexane solvent extraction method. Based on results, it showed that the usage of 2.0 M and 100 mL of NaOH used to modify the rice husk was found to be the optimum condition for the modification where it gave the highest reading of oil adsorption capacity. The oil adsorption capacity of modified rice husk was higher compared to the unmodified rice husk which was at 0.4737 g/g and 0.0579 g/g, respectively. Therefore, the modified rice husk was proven to be used as adsorbent in POME treatment compared to the unmodified rice husk.

# LIST OF CONTENTS

# CHAPTER 1

# INTRODUCTION

## 1.1 Background of Study

Palm oil industry is one of the world's most expanding and significant contributing towards the economic growth among the South East Asian countries. Malaysia and Indonesia are the two countries of largest producing palm oil (Tabassum, et. al., 2015). However, along with the increasing production of palm oil, it also has contaminant in the wastes production which is in palm oil mill effluent (POME). Normally, from the palm oil industry, there were two types of waste discharged which are liquid and solid wastes. POME is a liquid wastes were produced from palm oil industry. It released from the sterilization process, crude oil clarification process and cracked mixture separation process in the production of crude oil. POME has contributed environmental pollution when discharged into water bodies without treatment so it can contaminate drinking water for human and animal communities. It can also be harmful to aquatic life by creating highly acidic to environments (Alhaji, et. al., 2016).

Treatment of POME is necessary conducted in order to prevent the environment pollution. There are several treatment technologies were introduced to reduce the pollution concentration in wastewater such as membrane separation, liquid extraction, coagulation, crystallization, electron-precipitation, ion exchange, chemical oxidation and reduction, ultrafiltration and adsorption. These treatments have their own advantages and disadvantages. Among of these technologies, it had been found that membrane separation is the most efficient method of high removal efficiency of COD but it is very expensive for cost installation (Mohammed and Chong, 2013). However, adsorption treatment by using activated carbon also can be more effective method to