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OIL AND WATER REMOVAL FROM OILY SLUDGE USING CATIONIC PLANT BASED-SURFACTANT VIA SURFACTANT ENHANCED OIL RECOVERY

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ABSTRACT

Oil refinery is a significant industry that we have in Malaysia. Many wastes can be produced in this industry for example is oily sludge. One of the source of oily sludge produced from wastewater treatment plant. This oily sludge can be considered as a hazardous material to the environment and human health. Oily sludge contains many types of heavy metal, petroleum hydrocarbons, water and solid particles. Since the oily sludge contains heavy metal and oil and it can be classified as scheduled waste. Many types of method and technologies has been applied for treatment of oily sludge. This treatment purpose is to reduce the poisonous of the oily sludge, so these oily sludges can go through the landfilling process. One of the method is surfactant enhanced oil recovery. This type of treatment use surfactant to remove the oil and water from the oily sludge. It is a more cheap and efficient process and this method can treat more pollutants. However, usage of chemical surfactant can produce problems to our environment and human health. Therefore, usage of plant-based surfactant is preferable because it is an environment friendly substance. In this study, parameter that has been used is the concentration of the surfactant. The surfactant was mixed with the oily sludge for 20 minutes and then was heated for 1 hour to obtain the moisture lost. The concentration that can remove higher percentage of moisture and oil is at 100 ppm concentration of surfactant. From the study, the plant-based surfactants can remove 70% to 80% of the water and oil in the oily sludge. Based on this study, it shows that this plant-based surfactant can be used in industrial oily sludge treatment.

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CHAPTER ONE
INTRODUCTION

1.1 Research Background

In the world nowadays, there rapid expansion of petroleum and allied industries that can produce the waste. In Malaysia only, there are a lot oil refinery plant that produce waste. All the waste must be treated in wastewater treatment plant. After the process, there will be oily sludge produce and it is the residue produced during wastewater treatment. Oily sludge is a very common solid waste produced in the oil refinery industry.

Oily sludge can be considered as a hazardous to human health and environments as a result of the presence of a lot amount of petroleum hydrocarbons (Hu, Li, & Zeng, 2013). Moreover, oily sludge is a mixture that contained 15–50 wt% oil, 5–46 wt% solids and 30–85 wt% water. Furthermore, this oily sludge has very low removal of oil and water during the compression of the sludge. There are many factors that can effect oil recovery for example sludge-to-solvent mass ratio or sludge concentration, pH, temperature and ionic strength. (Hu et al. 2013).

1.2 Problem Statement

Oily sludge always been produced by the oil refinery plant in this world. Oily sludge is a substance that contain long hydrocarbon chain and it has hydrophobic component in it. Therefore, it is hard to remove oil and water from oily sludge. These oily sludges cannot go through the dumping process because it is a hazardous to human health and environments. Thus, all the oily sludge must be send to Kualiti Alam Sdn Bhd. Besides, the oily sludge contains too much water and oil that can make conventional sludge treatment process to be slow, unproductive and consume too much cost. The example for sludge treatment process is incineration, landfilling and landfarming. The solution that I going to introduce is using plant-based surfactant to