THE STUDY OF ADSORPTION CAPACITY OF COBALT NITRTAE HEXAHYDRATE ONTO SHREDDED PALM OIL EMPTY FRUIT BUNCHES

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ABSTRACT

Three different concentration of cobalt nitrate hexahydrate were prepared to be impregnated onto Shredded Palm Oil Empty Fruit Bunches (SPOEFB); 1%, 3% and 5%. This process was performed in order to study the adsorption capacity of cobalt nitrate hexahydrate. The adsorption capacity increased as the cobalt nitrate hexahydrate solution increased however, a little slow down when at highest concentration (5%). The SPOEFB were treated by two ways; washed by water taps and unwashed to examine their effect on the adsorption capacity. Between that two ways, the washed SPOEFB shows the better adsorption capacity which are 0.252, 2.807 and 3.169 for 1%, 3% and 5% respectively compared to the adsorption capacity of unwashed SPOEFB which are 0.168, 2.781 and 3.144 for 1%, 3% and 5% respectively. The washed SPOEFB shows a bit higher presence of the cobalt nitrate on it compared to the unwashed SPOEFB since the washed SPOEFB had more surface area for the cobalt to be attached as the impurities on them before were more likely had been removed during the washing process.

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Keywords: *Cobalt nitrate, empty fruit bunches, adsorption capacity, impregnation, washed*

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

Due to the depletion of natural resources like fossil fuels and the environmental issues nowadays lead to the invention of renewable energy which is more clean and environmental-friendly. The rapid growth of human population and urbanization also contributes to the invention of renewable energy resources in order to support the increasing demand of energy needs. Since the sources of the pollution comes from the gas emission resulted from combustion of fossil fuels, it is recommended to substitute the fossil fuels with the clean renewable energy resources. Most of the renewable energy resources come from the natural sources which are constantly replenished never run out. For example, biomass energy, solar energy, wind power and geothermal energy.

Among the natural energy resources, biomass energy is the most promising technology as the clean renewable energy resources because of the easily and readily availability of the biomass. Moreover, biomass is abundant waste that largely generated every day which approximately 220 billion tons per year (H. Hassan, 2016). In addition, the use of biomass as the replacement for fossil fuels contributes to low environmental impacts where the biomass emits low carbon dioxide (CO_2) which helps in reducing the global warming where the growing biomass traps the released CO_2 from combustion of biomass through photosynthesis (H. Hassan, 2016).

This non-edible biomass can be converted into valuable products like fuels and useful chemicals through the thermal conversion process. The thermal conversion is a process that using the heat and with or without the presence of oxygen in order to convert the biomass into the product which in energy forms (Agricultural Ecosystems Research Group) .For example, gasification, combustion and pyrolysis. Among all the thermal conversion processes, the pyrolysis had been