

CHAPTER I

INTRODUCTION

At the present, products of farming are transformed to biofuels, which palm fatty acid distillate (PFAD) is one of products from palm oil, which was obtained from refinery process of crude palm oil. It is light brown solid in room temperature, can be melted into liquid phase by heating, which include with high free fatty acids (FFA). Mostly it is generally used in soap and food industry. Otherwise it is used in oleochemical industry as feedstocks and can be extracted vitamin E. However, PFAD is cheap because the product is less when compare with other products from palm oil. Therefore it should be added value by synthesis as lubricant base oil.

Lubricant is an important component for mechanical device. It is used to drive every machines, such as bearing, gears, screws, sliding surface, pistons and cams, which it can help the machines to reduce and overcome the friction. Moreover, it also gets rid of power loss and treats a long life of the machines. In generally, lubricant consists of two main components, additive and base oil. The additive is used for adjustment the base oil's properties (increase viscosity index, decrease pour point, etc) in order to have higher performance. Another important component is base oil that can be divided into three types. The first type is vegetable and animal oil which are not popular because of its low stability and easy to get worse in quality. The second one is petroleum base stock (mineral oil) which has high quality, good stability and low price. Even though there many great properties, it is still not favor for using because of it has disadvantages, such as, high pollution from the production process and not enough to use as raw material. The last type is the synthetic base stock

(synthetic base oil) which is the combination of low molecular compound to produce high molecular compound via chemical reaction. This kind of lubricant is synthesized under controlled conditions (pressure, temperature and percentage of material compounds) to get the purified substance and suitable properties better than other. Although, the synthetic base oil has relatively high price, but it is always advised to use because of it has a positive effect on machine capability, oil life, energy consumption, safety and environmental friendly.

There are many kinds of synthetic base oil that produced from different compounds such as polyalphaolefins, alkylated aromatics, polybutenes, aliphatic diester, ester, polyolester, polyalkylenelycols, phosphate esters which esters are widely used as the main base oil because of its high viscosity index, low pour point, low volatility and good thermal stability. Moreover, it also mixed with other base oil easily. When it is blended with others base oil, it can increase viscosity index of base oil. To be friendly environment, the chemistry of esters is modified to produce compound which it is high biodegradability, low toxicity and clean engine emission.

Owing to the higher requirement of lubricating base oil quality is still needed to develop its specific properties such as higher viscosity index, low pour point and lower volatility. So, it is interesting to find the way to improve lubricating base oil properties. As this reason, this research has been set up to investigate the production of alkyl esters which are used as lubricating base oil from PFAD via esterification reaction with various alcohol by using sulfuric acid as a catalyst. Because the various types of alcohol will occur different physical and chemical properties of alkyl esters. Therefore, this study concerns about the properties of alkyl esters with any alcohols.