CHAPTER I

INTRODUCTION

General

Historically, it has been found from the earliest times that animal and vegetable oils were used as lubricants in general transportation or machinery to reduces friction and wear. These lubricants, while still useful, are not adequate for our industrialized society, either in volume or in desirable properties. They are subjected to oxidation and are thus somewhat unstable. This plus higher led to the replacement by petroleum mineral oils for lubricants base stocks.

Since the beginning of World War II, military equipment of all kinds had to be operated through rapid changes of climate in the air and on the ground. This led to new maintenance problems of storage, transportation, and lubrication under every imaginable condition of temperature, humidity, rain and snow, including exposure to all kinds of tropical deterioration. For this reason, there was an increased interest in research on the basic principles of lubrication and in synthetic lubricants.

Synthetic lubricants are products consisted of stocks manufactured by chemical synthesis. While the use of synthetic lubricants as motor oils in the retail market is fairly new, synthetic lubricants have been used for many years in special aviation and industrial applications where the oil are subjected to

extremely high temperatures or a flammable environment. Mineral oils would not be suitable for these applications. However, synthetic lubricants still represent a small volume proportion of the base oils used today.

Many compounds have been investigated as possible base stocks for synthetic lubricants, of which major importance types are polyalphaolefins, alkylated aromatics, polybutenes, aliphatic diesters, polyolesters, phosphate esters, and polyalkylene glycols

Of the synthetic lubricants used today, the large volume are prepared from aliphatic diesters. The earliest lubricants were animal and vegetable oils. The ester lubricants in use today differ markedly from the early glycerol esters in that they are synthetically for the application and have been greatly improved.

For classification, ester lubricants are characterized by lower pour point, higher viscosity index (VI), lower volatilities, better thermal stabilities, and excellent response to many types of additives such as antioxidants, rust inhibitors, VI improvers, and anti-wear agents which have been developed for petroleum oils. Ester are now used in many applications including automotive and marine engine oils, compressor oils, hydraulic fluids, gear oils and grease formulations. The inherent biodegradability of ester molecules offers additional benefits to their performance.

Raw materials that received significant attention for providing synthetic esters are vegetable oils such as palm oil. Chemically, palm oil has been

defined as the ester of fatty acids with the trihydric alcohol glycerol. The main components of fatty acid are saturated palmitic and mono-unsaturated oleic acids. Each component accounts for about 40 percent of the fatty acids present.

Palm oil is now used in many applications including soap-making, candles, tin-plating, greases, fuel, and edible purposes.

Objective and Scope of the Research

The objective of this study is to synthesize ester used as lubricating oil from palm oil by transesterification and followed by hydrogenation of alkenes using platinum catalyst or followed by hydroxylation of alkenes and to determine the physical and chemical properties of the prepared ester.

The Advantages of this Research

- Guide for synthetic ester lubricants in industry
- Decrease quantity of lubricating oil imported from abroad
- Decrease environmental problem because of the inherent biodegradability of synthetic ester lubricants
- Increase value and application of fat from vegetables