CHAPTER I
INTRODUCTION

Modern engines are frequently under extreme conditions, thus creating lubrication problems which cannot be solved by the use of hydrocarbon components alone. The shortage of mineral oils with low pour points plus increasing demands with respect to oil quality, for instance for aircraft engines, have both contributed to the development of synthetic lubricating fluids. Combined requirements, such as low viscosity variations and good lubricating properties over a wide temperature range, chemical stability, aging and oxidation resistance, as well as resistance to radioactive radiation, can be satisfied in most cases only by special synthetic products. Synthetic lubricants frequently satisfy special requirements such as non flammability, thermal stability, resistance to oxidation and radiation much better then mineral oil products. They can be modified with respect to viscosity grade, viscosity-temperature characteristics, high-pressure stability, low temperature behavior, corrosion and forming characteristics, thus making possible the production of specialized lubricants.

Nowadays, many compounds are being investigated as possible base stock for synthetic lubricants, of which major importance type are polyalphaolefins, alkylated aromatics, polybutenes, aliphatic diesters, polyesters, polyalkyleneglycols, and phosphate esters.

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. Esters are now used in many applications including automotive and marine engine oils, compressor oils, refrigeration oils, hydraulic fluids,

gear oils and grease formulations. The inherent biodegradability of ester molecules offers additional benefits to their performance. Therefore, it is still very interesting to find new synthetic base oils for these kinds of applications.

Objective and Scope of the Research

The objective of this study is to synthesize polyolester to be used as lubricating base oil from monobasic acid and polyhydric alcohols. Physical and chemical properties of these polyol esters will be studied by ^{13}C-NMR, FTIR, TGA, pour point, viscosity and flash point determination.

Literature reviews

Short [1] investigated a method of making a lubricant composition comprising polyol esters including neopentyl alcohol, trimethylolethane, di-pentaerythritol esters, made with branched carboxylic acids. The polyol esters were prepared by esterification. The esters have better lubricity than polyglycols, good chemical stability over wide ranges of temperature, better wearability, and a good combination of viscosity and miscibility characteristics.

Pierik [2] studied a method for synthesizing lubricant by direct esterification from polyol and carboxylic acid. These esters include pentaerythritol partial ester of straight chain C_5 or branched chain C_7 carboxylic acid. The lubricant is miscible with the non-chlorine containing working fluids and exhibit a low level of corrosion.

Sabahi [3] prepared lubricant from neopolyol derivatives in which at least one of the hydroxyl groups is replaced with a substituent that corresponds to the formula -O-R-C(O)-OR′ wherein R is an alkylene group containing 2-5 carbons and R′ is a hydrocarbyl or predominantly hydrocarbyl group containing 1-30 carbons. They are oils which have utility as lubricants. Those in which R′ is a hydrocarbyl group of 1-10 carbons are completely miscible with 1,1,1,2-tetrafluoroethane (R134a), a refrigerant. The compounds of the invention are ether-esters which are derived from neopolyols, i.e., polyhydric alcohols containing at least one quaternary carbon, and they may be prepared by reacting the neopolyol with an α, β - unsaturated nitrile and then hydrolyzing and esterifying the intermediate nitrile to from an ester.