CHAPTER 5

CONCLUSION

The objective of this research is to synthesize monoester from soybean oil in order to modify to use as synthetic ester lubricants . The synthesize monoesters were performed by transesterification and hydrogenation processes. The percentage of the products which obtained from both processes are shown in Table 5-1. Both steps of transesterification and hydrogenation processes, five alcohols such as 2-ethyl-1-hexanol, 1-butanol, 1-hexanol, 4-methyl-2-pentanol and isopropanol were used as varied reactants to compare the lubricant properties of each monoester product. These synthetic hydrogenated monoester products have high values of oxidation point and low oxidation compound. These indicated that synthetic hydrogenatd products hardly occur oxidation reaction. Hydralic lubricant is one kind of lubricants which demands good oxidation stability. Thus, the physical and chemical properties of hydrogenated 2-ethyl-1-hexyl ester was the most suitable to use as hydraulic lubicant. In addition to oxidation stability, other properties of the hydrogenated 2-ethyl-1-hexyl ester are also acceptable in the standard range of hydraulic lubricant. The comparative properties between hydrogenated 2-ethyl-1-hexyl ester and the standard hydraulic lubricant are shown in Table 5-2.

Table 5-1: The Percentage of the products obtaining from both transesterification and hydrogenation process

Monoester	% yield	
	Tranesterification process	Hydrogenation process
Isopropyl ester	90.85	95.58
2-ethyl-1-hexyl ester	95.80	92.56
1-butyl ester	92.41	95.35
1-hexyl ester	93.60	93.75
4-methyl-2-pentyl ester	90.55	93.33

Table 5-2 : The comparative properties between hydrogenated 2-ethyl-1-hexyl ester and the standard hydraulic lubricant.[21]

Properties	Standard Hydraulic lubricant at ISO VG 10	Hydrogenated 2-ethyl -1-Hexyl ester
Color	-	L2.5
Viscosity at 40°C,cSt	9.0-11.0	10.17
Viscosity at 100°C,cSt	-	3.05
Viscosity Index (VI)	upper 75	173.034
Pour Point (°C)	lower -12	4
Flash point (°C)	upper 125	234
Oxidation point (°C)	-	390
Oxidation compound,%wt.	-	1.08
Total Acid Number (TAN) , mg KOH/g	lower 0.7	0.72
Copper Stripe Corrosion at 3 hours,100 °C	not more than copper plate No.1	1b

From Table 5-2 , eventhough the pour point value of hydrogenated 2-ethyl-1-hexyl ester is not in standard range, any pour point depressant additives can be added to this ester in order to adjust the pour point value in acceptable of standard range . Therefore, the hydrogenated 2-ethyl-1-hexyl ester can be use as hydralic lubricant in industry.

Moreover, the good point of these synthetic hydrogenated monoester products is that they can blend together with petroleum base oil homogeneously without using any emulsifiers. Compared with the viscosity index of petroleum base oil (150 SN), the viscosity indices of these synthetic hydrogenated monoester are much higher. When the small amount of synthetic hydrogenated monoester was added into petroleum base oil, the viscosity indices of blended oils are higher than petroleum base oil. Thus, the synthetic monoester products can be used as viscosity index improver additives in lubricanting industry.