CHAPTER 5

CONCLUSIONS

From this study, the lubricating base oils were improved by using catalytic hydrogenation process, The hydrogenation catalyst comprised of nickel on alumina supports. The alumina supports was CS-303 type from United Catalysts Inc.,. The pore volume measured by using water absorption method was 0.27 cc/g. The alumina supports were impregnated with nickel nitrate solution, then dried and calcined.

The nickel contents of the catalysts were analyzed by atomic absorption. The catalysts activity were tested by hydrogenation of cyclohexene. The product of cyclohexene after hydrogenation were characterized by Infrared Spectrophotometer which did not show the absorption band at 1640 cm^{-1}.

The nickel catalysts were used to determine the optimum operating conditions for lubricating base oils (150 BS). The optimum operating conditions were 10% nickel on alumina supports, and catalyst concentration at 2% by weight based on an oil. The reaction time and temperature were 2 hours and 250 $^{\circ}C$ respectively. The reaction pressure and agitation speed were constant at 250 psig and 300 rpm.

The product of hydrogenation of lubricating base oils had physical and chemical properties as the following: pour point = -1, viscosity index = 140, %S = 1.039, $\%C_A$ = 13.02, $\%C_P$ = 53.02, $\%C_N$ = 33.96 and oxidative compound = 33.5

As mentioned above, this hydrogenation catalysts and optimum conditions were useful in improving the quality of lubricating base oils by increasing viscosity index and reducing aromatic compounds. The sulpher content was also reduced.

In this reaction, the pressure was limited at 200 psig. If the pressure could be increased more than 200 psig, the experimental results of hydrogenation lubricating base oils might give better result than in this study.

Moreover, this catalyst comprised only one metal on alumina supports. The advantageous catalysts might also comprise of combinations of one or more group VIII metal. This area of study should be continued in the future.