

CHAPTER V

CONCLUSION

This research was intended to improve the quality of used marine lubricating oil, obtained from Royal Thai Navy, by means of the catalytic hydrogenation method. The physical and chemical treatment gave high waste byproduct and disposal problem. Therefore, this research was aimed to solve this undesirable problem and to reduce the step of treatment by treating the used lubricating oil directly with the catalytic hydrogenation method.

The goal of this research was to study the optimum condition in hydrogenation of used lubricating oil by using three types of hydrotreating catalyst below:

1. Nickel oxide / tungsten oxide / alumina ($\text{NiO}/\text{WO}_3/\text{Al}_2\text{O}_3$)
2. Nickel oxide / molybdenum oxide / alumina ($\text{NiO}/\text{WO}_3/\text{Al}_2\text{O}_3$)
3. Raney nickel

The studying in each type of catalyst was tried to find the suitable condition which used least reaction time and concentration of catalyst that gave hydrogenated oil having desirable properties in order to make it possible use in industrial way and to save cost.

1. Suitable condition of $\text{NiO}/\text{WO}_3/\text{Al}_2\text{O}_3$ catalyst was the reaction time of 2 minutes and the concentration of 30 % catalyst. The hydrogenated oil obtained from this condition having desirable properties, especially in terms of viscosity index, color and sulfur content and more desirable properties than petroleum base oil in terms of viscosity at 100 °C, viscosity index and color.

2. Suitable condition of NiO/MoO₃/Al₂O₃ catalyst was the reaction time of 10 minutes and the concentration of 35 % catalyst. The hydrogenated oil obtained from this condition having desirable properties, especially in terms of viscosity index, color and sulfur content and more desirable properties than petroleum base oil in terms of viscosity at 100 °C, viscosity index and color.

3. Suitable condition of Raney nickel catalyst was the reaction time of 10 minutes and the concentration of 35 % catalyst. The hydrogenated oil obtained from this condition having desirable properties, especially in terms of viscosity index, color, sulfur content and flash point and more desirable properties than petroleum base oil in terms of viscosity at 100 °C, viscosity index, color and flash point.

Recommend Further Study

From this study, there was several limitations of the experimental condition. First of all, the pressure reactor used in this experiment was batch type reactor. Therefore, the catalyst might have been poisoned by sulfur which obtained from desulfurization. Secondly, a continuous reactor should be implemented in order to understand more of the reaction under continuous condition.