CHAPTER I
INTRODUCTION

Crude oil is used as an important feedstock to produce powers, clothings, chemicals and many synthetic materials over the past several decades, since the world population and total energy consumption have been steadily increasing. There are many problems arising from using petroleum as an energy resource such as the depletion of crude oil reserves, the increase in crude oil price and accumulation of pollutant and green house gases in the atmosphere. Due to the disadvantages of petroleum-based fuels and awareness of energy sustainable development,there have been many attempts to displace non-renewable petroleum-based resources with renewable biomass-based resources.

In order to accomplish sustainable growth in energy aspect and also environmental awareness, energy from biomass provides the advantages over petroleum–based such as a relative clean-burning, theoretically inexhaustible fuel source, and zero net greenhouse gases emission. Moreover, it can be converted to several forms of energy. Biodiesel is one of the most promising alternative energies among the others, because the raw materials e.g. jartropha and palm fruit can be grown locally.

Transesterification process is the major process for biodiesel production in industrial scale. But the product obtained from this process is oxygenated product so called fatty acid methyl esters or FAMEs that might cause problems to the engine since it has relatively high viscosity especially at low temperature due to dipole-dipole interaction between carbonyl groups of each FAME molecule. In order to eliminate that problems, The catalytic deoxygenation of triglyceride seems to be the interesting process since the structure of deoxygenated product obtained is similar to that of the conventional diesel fuels. However, the reaction is complex consisting of several consecutive and parallel reactions. The understanding of the reaction mechanism is essential to improve the efficiency of the process.

The aim of the present study is to understand mechanism pathways of hydrogenation of oxygenated hydrocarbon over two different commercial catalysts; Pd/C and $NiMo/Al_2O_3$ catalysts. For the sake of simplicity, oxygen-containing

compounds consisting of 4 carbon atoms i.e. butyric acid, methyl butyrate, butanal and n-butanol were used as model compounds for this study. The experiments were done in order to propose the mechanism pathways and roles of each catalyst in the hydrogenation process. In addition, the effects of reaction temperature and pressure were also studied.