# CHAPTER I
# INTRODUCTION

Nowadays, each country has concerned about environmental problem, especially the energy derived from petroleum resource that is a main source of toxic emission such as greenhouse gases (GHG), nitrogen oxides, sulfur, metal, etc. Due to the stringent regulation of toxic emissions, the demand for using renewable feedstocks such as vegetable oils and animal fats to produce hydrocarbon fuels has increased.

The use of biojet fuel in commercial aviation instead of conventional jet fuel has received considerable attention in recent years. As in 2017 the International Air Transport Association (IATA) has stated that it requires 10% of jet fuel to come from biofuels, jet aircraft operators including all airlines must reduce their emissions. There are several methods for obtaining biojet fuel. One of those methods is subjecting biodiesel to hydrocracking and hydroisomerization in the presence of a catalyst to convert the diesel into the jet fuel product. Platinum supported on Y zeolite is normally chosen as a catalyst because of its molecular structure and properties that allow the large hydrocarbon molecules to be cracked into smaller molecules.

Small crystallite size of HY zeolite has received much attention recently, because of its great potential applications not only in petroleum field but also in variety of new applications. The decrease of crystal size of zeolite results in higher external surface areas, lower coke formation, lower diffusion path of the reactant, product molecules inside the pore, and more dispersed active sites. These results have a good impact on the catalytic performance compared to the conventional zeolite.

The purpose of this work is to produce hydrotreated renewable jet (HRJ) fuel from hydrotreated biodiesel (HBD) derived from jatropha oil using Pt/HY zeolite as the catalyst and to study the effect of crystallite size of the HY zeolite on the activity and selectivity for hydrocracking by preparing HY zeolite with varying crystallite sizes using microwave digestion with different crystallization times, crystallization

temperatures, aging times, and $Na_2O$ contents in the synthesis. The optimization of prepared crystal size can be applied for the commercial process in the future.