CHAPTER I
INTRODUCTION

Recently, fuels from crude oil are more expensive and in demand due to continuously growing up of industry and transportation in the world. The high cost of fuel influences the cost of living, consequently impact on economy in several sectors. Therefore, energy is mainly determined for the fluctuation of costing and necessary factors of live. In terms of environment, the use of fossil fuel is corresponding to high carbon dioxide emission affecting the global climate change. Nowadays many industries are looking for sustainable energy that can reduce the toxic emission and be friendly to environment. For this reason, alternative renewable fuels become more extensively attractive. Especially, the renewable fuel source from bio mass product such as corn, sugarcane, palm, jatropha, etc. can be used for biofuel to solve the problem of rising oil prices and need for energy security.

Jet fuel is a special type of petroleum-based fuel used to power aircraft. It is higher quality than fuels used in less critical applications, such as heating or road transport, and often contains additives to reduce the risk of icing or explosion due to high temperature, among other properties. The most common fuels for commercial aviation are Jet A and Jet A-1 which are produced from petroleum sources. For reducible consumption of fuel from petroleum sources, the alternative energy, such as bio-derived jet fuel seems to be more interesting. The bio-derived jet fuel were synthesized from plant oil, soybean oil, palm oil, algae oil, and vegetable oil containing of fatty acid and triglycerides which are reacted with hydrogen to form hydrogenated biodiesel.

Frequently, the basic process to convert biodiesel to biojet fuel is hydrocracking and hydroisomerization which are efficiently carried out over bifunctional catalysts with both of metallic and acidic function. The platinum over supported on HY zeolite has been widely used as catalyst in the hydrocracking and hydroisomerization to obtain high selectivity biojet fuel because there is a high concentration of active acid sites, thermal stability, and pore structure selectivity.

Most zeolite catalyst manufactures produced zeolite in powder form and then shaped into spheres, granules, extrudates, etc. in order to avoid pressure drop and attrition loss. This formulation can improve mechanical strength including performance of catalyst. In addition, formulation can be provided the high quantity of catalysts in packed bed reactor. In general, zeolite catalysts are formulated by extrusion with the addition of binder and binder solution such as alumina, aluminums phosphates, silica, bentonite, kaolin. However, the composition of zeolite catalyst and binder strongly affect the catalyst activities, selectivity, and stability of zeolite.

In this work, we aim to study the formulation of Pt/HY catalyst which improves mechanical strength, decreases attrition loss, and avoid pressure drop in reactor for producing biojet from hydrogenated biodiesel derived from jatropha oil. The experimental will be done by varying the amounts of binder for optimizing the quantity of binder mixed with HY zeolite catalyst lead to appropriate mechanical strength. The catalysts are formulated into extrudate shapes by extrusion. After shaping, the 0.1 wt% of platinum are loaded onto extruded HY zeolite by ion-exchange method. The formulated catalysts will be tested for their physical and chemical properties by using BET, TPR, TPD, XRD, radial crushing strength, bulk density, attrition loss, as well as catalytic performance.