CHAPTER I
INTRODUCTION

Aromatics, one of the base feedstock, are widely used as a raw material in both petroleum and petrochemical industries. Not only are several polymers derived from aromatics such as PET and nylon, but aromatics are also used as a solvent in many commercial processes. The demand for aromatics is growing dramatically throughout the world. Therefore, strong market pushes the production to be developed, and as a result, new processes and sophisticated catalysts are required. The alkane aromatization (naphtha reforming) is a desirable possibility. The conversion from naphtha (cheap raw material) to aromatics (expensive products) is very attractive to achieve important benefits for the chemical industries.

Platinum supported on potassium form of zeolite L (Pt/KL) catalyst has shown excellent activity and selectivity for n-hexane aromatization (Zheng *et al.*, 1996). Many researchers tried to explain why Pt/KL exhibited the great performance, most of them believed that the unique structure of Pt/KL was the key feature. Although Pt/KL catalyst has been accepted for n-hexane aromatization, it exhibited lower catalytic activity when applying with n-octane (Sackamduang, 2001). Several explanations were discussed such as, one possible propose was unsuitable pore size. Zeolite L's pore size is about 0.71 nm, it is too small to generate aromatics. Pt supported on wider pore size zeolites were studied in this research. Pt/Beta, Pt/Y, Pt/Omega and Pt/SiO_2 were the attractive ones.

In addition, the amount of platinum loading also plays an important role on n-octane aromatization (Davis *et al.*, 1976). At higher loadings, the aromatics distribution predicted for an equal contribution of all the cyclization pathways that lead directly to a six-carbon ring. While at lower loadings, the aromatics distribution appeared to be determined by the relative strength of the carbon-hydrogen bonds. Interestingly, low platinum loading catalyst displayed very high aromatics selectivity, so another goal of this research was to find the appropriate amount of platinum loading.

This research was focussed on studying the effects of supports and the percentage of platinum loading on n-octane aromatization. This research was divided into two parts. The first part was to prepare catalyst by a vapor-phase impregnation (VPI) method and to test the influence of support on performance of catalyst by using n-octane as a feed. The obtained products were analyzed by Gas Chromatograph. The catalysts were characterized by means of Fourier transform infrared spectroscopy (FT-IR) with DRIFT of adsorbed CO to provide the location of Pt particles. Temperature Programmed Oxidation (TPO) was also applied to measure amount of coke formation. The appropriate amount of platinum loading was investigated by vary percent platinum loading at 0.5, 1 and 1.5 for Pt/KL, and Pt/SiO_2. The same reaction testing and catalyst characterization techniques were performed.