



CHAPTER I INTRODUCTION

Tires are one of the polymer derived products, which are essential to transportation systems; therefore, the large quantities of waste tire are rapidly generated and become a more and more serious problem. One way to solve this problem is dumping in landfill, which is considered as an expensive way to dispose them, because they have to be cut in pieces before their disposal, and they also require a large amount of space. Eliminating waste tires by burning results in significant environment and health hazards because of toxic gas emission. Likewise, tire burning is very hot and hard to be extinguished.

Pyrolysis has been considered for solving waste plastic and tire problems, since it can produce high valuable products such as oil and petrochemicals. Pyrolysis is an oxygen-free thermal degradation process. This process requires high energy consumption because it operates at high temperature. A catalyst is designed for decreasing operation temperatures in the pyrolysis process; moreover it can increase product selectivity and product yields. KL zeolite is a basic zeolite and has one dimension of 12 member rings. The composition of KL zeolite is $K_9Al_9Si_{27}O_{72}$ (Satterfield, 1999). In 1999, Bécue *et al.* studied the aromatization on different catalysts. The results revealed that Pt/KL had the highest aromatization ability and improved the octane number of gasoline. Similar, Choosuton (2007) found that KL zeolite was a good catalyst for gasoline production because it gave high aromatic content in gasoline fraction. In addition, Phopaisarn (2010) showed that KL zeolite exhibited high dehydrocyclization activity in producing the total aromatics.

In 1983, Burch and Mitchell studied the effect of 0.3 wt% Re/Al_2O_3 catalysts on the activity and selectivity for the conversion of cyclopentadiene. The results showed that Re had the high activity for the hydrogenolysis and then ring-opening. It gave the high selectivity for C1-C5 paraffins at 79.9%. Similarly, Carter *et al.* (1982) indicated that 0.3wt% Re/Al_2O_3 catalysts had the high hydrogenolysis activity for methylcyclopentane. The selectivity to C1-C6 alkanes was 84 wt%.

Molybdenum (Mo) supported on a zeolite had been studied by Wang *et al.* (1997). They studied the catalytic activity of Mo supported on ZSM-5 zeolite in me-

thane dehydrogenation and aromatization. They found that Mo_2C was produced, and it enhanced the conversion of CH_4 to benzene. Anuziata *et al.* (1999) studied molybdenum supported on ZSM-11 in the transformation of ethane into aromatic hydrocarbons. They found that after molybdenum loading, the amount of Bronsted site also decreased and created new stronger Lewis-acidic sites. It allowed the dehydrogenation of ethane to benzene, toluene, and xylenes. Xu *et al.* (1995) investigated the dehydrogenation and aromatization of methane in the different percentages of molybdenum loading over HZSM-5 zeolite. They found that 2%Mo/HZSM-5 exhibited the maximum methane conversion and the highest selectivity to benzene. In addition, the higher Mo loading resulted in the blocking of catalyst channel, which decreased catalyst activity.

The purposes of this research were to study the influences of Re and MoO_3 over KL zeolite in the catalytic pyrolysis of waste tire. Moreover, the addition of MoO_3 on Re supported on KL zeolite was investigated in order to expectedly improve the quality and quantity of pyrolysis products.