CHAPTER I
INTRODUCTION

Nowadays, there is an enormous amount of waste tire produced all over the world because the automotive and transportation industries, which are the biggest consumers of new rubber, are growing up all the time. The complex nature of tires makes difficulty to recycle them. On one hand the main component of tire rubber is a chemically cross-linked polymer and, therefore, is neither fusible nor soluble, and consequently cannot be remolded into other shapes without serious degradation. On the other hand, tires are a complex mixture of very different materials that include several rubbers, carbon blacks, steel cord, and other organic and inorganic minor components.

The disposal of waste tires creates environmental problems for modern society, especially in developing countries. This is because the majority of scrap tires is disposed in open or landfill sites. However, land filling of tires is declining as a disposal option, since tires do not degrade easily in landfills. They are bulky, taking up valuable landfill space and preventing waste compaction. Open dumping may result in accidental fire with high pollution emissions. Tires also can be breeding ground the insects and home for vermin. Alternative waste management options to landfilling and open dumping include tires retarding, and crumbing to produce rubber for applications such as carpets, sports surfaces, and children's playgrounds.

In general, pyrolysis process or thermal cracking process can be defined as the composition of organic matter in the absence of oxygen or air. It has been used to convert organic matter to other products of fuels. Pyrolysis is energy and resource technology that has the primary objective of conserving energy, due to it can extract fuel or useful chemical material for solid waste. The main products of the pyrolysis process can be roughly categorized into three phases at atmospheric temperature and pressure as gas, liquid and solid residue or char.

Pyrolytic oils (a mixture of paraffins, olefins and aromatic compounds) have a higher heating value (HHV), and can be combusted directly or added to petroleum refinery feedstock. They can also be used as s source of chemicals in the chemical industry since they contain high concentrations of benzene, toluene, xylene

and limonene. The gas fraction contains high concentrations of methane, ethane, butadiene and other hydrocarbon gases, sufficient to provide the energy required by the pyrolysis process and the last things, pyrolytic char consists of carbon black and mixture of products from the degradation of rubber compound such as carbonized rubber polymer and non volatile hydrocarbons.

In the catalytic pyrolysis of waste tire process, the catalysts are expected to reduce pyrolysis temperature and improve the yield of product. There are many series of catalyst in the catalytic pyrolysis process depend on the properties of catalysts such as pore size and silica/alumina ratio. The lower pore size of ZSM- yielded lower production of aromatic compounds than Y-zeolite, and the lower silica/alumina ratio gives higher aromatic hydrocarbon content.

The ITQ series are acidic zolite catalysts. They have large pore size and high selectivity. An FCC catalyst mixed with ITQ-7 was discovered to produce higher gasoline yield with lower aromatics. Also ITQ-7 increased isoparaffins and iso-olefins in the FCC unit (Corma *et al.*, 2001). This work was the studies on the influences of heating rates, metal oxides, and two ITQ zeolites (ITQ-21 and ITQ-24) used as additives in H-mordenite on waste tire pyrolysis products.