CHAPTER I
INTRODUCTION

In a past decade, a number of problems have arisen all over the world, including the collapse of the world economy, the drastic rising of the crude oil price, and the severe environmental problem. It has been confirmed that the causes of all those problems was originated from many different factors, which may possibly have involved either in direct or indirect ways. Waste tire disposal is one of the factors that are believed to take part in all those problems.

Nowadays, an increasing amount of automotive tires production and consumption is considerably noticeable all around the world. In general, tires are produced to be tough and durable. Apart from natural or synthetic rubber, automotive tires also contain steel cords and many kind of chemicals and additives to ensure their best performance and safety. On the other hand, these kinds of properties also make tire disposal become more difficult. Around 65-70% of the waste tires were usually land-filled or left in opened air as reported elsewhere (Dũng *et al.*, 2009), although a part of them was utilized as playgrounds, artificial reefs, and athletic equipments. Disposal by land filling can cause serious problems; for instance, the disposed tire can be a suitable breeding ground for insects and mosquitoes, and if caught in fire, it can emit several hazardous gases, and it is also difficult to be extinguished.

Up until now, numerous researchers have investigated the method and/or process in an attempt to recycle or make use of the waste tire. Such processes are pyrolysis, incineration, hydrolysis, gasification and etc. Recently, pyrolysis is the one that received a great interest since it has an advantage of low emission to the environment, and the products obtained from the process contain valuable chemicals which can be used as a petrochemical feed stock as well as a supplement of fossil fuel. Additionally, the part of the products that still remain as a residual can also be recycled in a worthwhile application (e.g. the production of carbon black). However, due to technical problems as well as economic and legal factors, it has been reported that pyrolysis alone is not cost effective or economically feasible. Therefore, in an attempt to enhance the economic viability of the tire pyrolysis process, a wide range of studies has been done. Boxiong *et al.* (2007) studied the pyrolysis of waste tire with an aid of catalysts, USY, and ZSM-5, to obtain a higher concentration of single ring aromatic such as benzene, toluene, and xylenes. Wang *et al.* (2006) proposed a scrap tire catalytic co-pyrolysis with lubricant base oil (LBO). They found that co-pyrolysis under the aid of catalyst can remarkably increase the pyrolysis rate and also produce higher value oil products.

Recently, using a bi-functional catalyst is one alternative that has received a great attention since it can noticeably reduce a poly-aromatic content in the pyrolytic products up to 50-70 wt% (Choosuton *et al.*, 2007). Moreover, they found that bi-functional catalysts can distinguishably enhance the quality of both gasoline and kerosene in the pyrolytic product. The authors also concluded that Pd/Beta catalyst was the best catalyst for the production of naphtha and kerosene.

The objective of this work was to develop the Pd/Beta catalyst for using in tire pyrolysis at the industrial scale. The scope covered the analysis of different matrix types and the percentage of binder on the product yield and composition from the catalytic pyrolysis of waste tire.