CHAPTER I
INTRODUCTION

During combustion in automotive engine, sulfur compounds present in transportation fuels are converted to sulfur oxide. Sulfur oxide can potentially poison the catalyst in catalytic converter and reduce its efficiency to remove carbon monoxide, unburned hydrocarbons and nitrogen oxide from automotive exhaust. These species and sulfur oxide are poison gases to human body. In recent years, law and regulations concerning the sulfur content in transportation fuels have become more stringent. For instance, the new U.S. EPA sulfur standards for the sulfur content in gasoline and diesel fuels for on board transportation are 30 and 15 ppm, respectively. This is due to the urgent need for preservation of the atmospheric to protect the human. Therefore the efficient removal of sulfur compounds is crucial for refineries. Nowadays, hydrodesulfurization (HDS) is considered the most important unit to reduce sulfur containing in the refineries.

Conventional hydrodesulfurization process is capable of depressing the majority of sulfides and thiols efficiently, but it is not sufficient for a removal of thiophenes and thiophene derivatives. To meet the new legislation, ultra deep desulfurization, which operates at high temperature, high pressure and larger reactor volume, is needed to remove refractory sulfur compounds. This conveys several serious problems to the refineries that include high investment, high operating cost, reduction of catalysts cycle and more hydrogen consumption.

As a result, recent studies have focused on adsorption as a promising and economical desulfurization process because it can be operated at ambient temperature and pressure. However the obvious limitation of currently available adsorbent is low adsorption capacity and selectivity of adsorbent. Thus, the objective of this research was set to study the adsorptive desulfurization to selectively remove unruly sulfur compounds from transportation fuels by using various types of zeolite adsorbents. Effects of several factors such as type and concentration of sulfur compounds in the feed, fuel to adsorbent weight ratio, and temperature on the sulfur adsorption were examined.