CHAPTER I
INTRODUCTION

2,6-Dimethylnaphthalene is an important precursor for the production of high performance engineering plastic called polyethylene naphthalene (PEN) with enhanced properties compared to other thermoplastic polyesters, e.g. polyethylene terephthalete (PET) (Chem Systems, 2000; Lillwitz, 2001). Large scale production of 2,6-DMN is currently one of the limitations obstructing the widespread utilization of the polymer. Until now, only the commercial process licensed by BP Amoco can economically afford an industrial scale production of the chemical (Chem Systems, 2000). The process employs a complex synthesis route with four reaction-in-series, starting from alkylation, cyclization, dehydrogenation and complete with isomerization. By processing the feed stock (toluene and butadiene) through the first three reactions, 1,5-DMN is claimed to be produced with the high 90s conversion and selectivity. However, its subsequent isomerization into 2,6-DMN is thermodynamically controlled to which only 48% of the chemical can be produced and freeze crystallization for the purification is needed. As a result, the low availability as well as the high cost of 2,6-DMN limit the large scale production and commercialization of PEN.

To improve the widespread utilization of PEN, the development in the production of 2,6-DMN is absolutely crucial. Reducing the production cost of the chemical by either reducing the process complexity or increasing the product yield could reduce the production cost of PEN and increase the demand of the polymer. Moreover, the decrease in the 2,6-DMN price could draw attention to industries who own the PET production process to retrofit their existings for the PEN manufacturing (Chem Systems, 2000; Lillwitz, 2001).

The main purpose of this thesis was to develop an alternative to produce high purity 2,6-DMN based on the combination of the catalytic isomerization and adsorptive separation techniques, particularly as the reactive adsorption system. Firstly, the isomerization from 1,5- to 2,6-DMN and adsorption of DMN isomers were individually studied to understand their nature. Subsequently, combination of those two systems as an alternative to produce high purity 2,6-DMN was conducted.