CHAPTER I
INTRODUCTION

Paraffins are saturated hydrocarbons (alkanes) of which the chains can be straight (normal paraffins), branched (isoparaffins) or cyclic (naphthenes). Most of the paraffins in natural crude oils are normal paraffins, while isoparaffins are frequently produced in refinery processes. The normal paraffins are uniquely poor as gasoline and give poor low temperature properties in kerosene and diesel oil. Anyway, there are several applications of normal paraffins today.

The normal paraffins with high carbon numbers have high pour point which means they will easily become solid at low temperature. If the plane flies at high altitude or in the winter time, the normal paraffins portion in jet fuel or diesel oil will precipitate and plug up the fuel line. These problems are also found in Thailand although the average climate is high but crude oil produced in Thailand has high amount of normal paraffins. There are many solutions to solve this problem such as adding additives which will give better low temperature properties of oil or extraction of normal paraffins. However, this research focuses on separation technique only.

The extracted normal paraffins from kerosene and diesel oil have a carbon atom range between 10 to 20 per molecule but not all of these are valuable. Only C10-C14 are valuable as a basic material for linear alkyl benzene (LAB) production which will be used in the biodegradable detergent manufacture. The two common approaches for isolating normal paraffins from other hydrocarbons are solvent extraction or solvent dewaxing and adsorption with molecular sieves. There are many solvents used in solvent dewaxing such as MEK, urea, etc. However, these solvents are considered not friendly to the environment, so most of the commercial processes today use molecular sieves for separation of paraffins. Examples of some commercial processes are Molex by UOP, Isosiv by Union Carbide, Ensorp by Exxon, TSF from Texaco plus BP, Shell and VEB Leuna werke process. These processes usually use zeolite 5A (zeolite CaA) as a molecular sieve adsorbent.

In this research, the adsorption of paraffin by using molecular sieve was investigated. Normal decane was used as a representative of normal paraffins with carbon atom range of C10-C14. The study emphasized on the effect of type of exchanged divalent cations on molecular sieve zeolite A.