CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

5.1.1 Molecular Sieve Preparation (ion exchange)

It has been found that exchanging magnesium into zeolite 4A has lower extent comparing to calcium and strontium which is due to its low selectivity. The selectivity of zeolite A for divalent cations is in the order of:

$$Zn > Sr > Ba > Ca > Co > Ni > Cd > Hg > Mg$$

5.1.2 Paraffin Adsorption

From thermogravimetric study, it was found that as the size of the cation exchanged into the zeolite NaA increases from Mg to Ca and Sr, it is more difficult for the desorption of normal decane. This is most probably due to the confinement effect. The bigger the size of the cation, the smaller the cavity in the zeolite structure, leading to the stronger the van der Waal force between the nonpolar adsorbate and the cation. This effect results in the highest temperature of the peak position observed in the temperature program desorption of normal decane of strontium form of zeolite A.

From column study, the adsorption abilities of Ca-Na-A and Sr-Na-A were found to be nearly the same while Mg-Na-A showed the lowest adsorption ability as indicated by the lowest area above the breakthrough profile (average time) observed. This may be due to possible disruption of the Mg-Na-A crystal structure during dehydration at 400°C to activate the solid before adsorption. This is probably due to the low selectivity of the zeolite A for magnesium ion.

5.2 Recommendations

Since the disruption of the crystal structure in Mg-Na-A was observed, the following recommendations can be offerred:

(1) Since the disruption of the crystal structure of Mg-Na-A was found at around 400°C, the activation of the solid for sorption should be done at lower temperature (300°C-350°C) in order to avoid this problem.

(2) Co-ion exchange of magnesium with calcium (Mg-Ca-Na-A) into zeolite 4A is worth further investigation as this may help strengthen the structure of Mg-Na-A.