



CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Acid-Base interaction between the C_8 aromatics and the X and Y zeolites was investigated. The acidity of the zeolites was varied with mono-valence cations. With increasing the exchanged cation size, the acidity was increased. The results showed that acid-base interaction cannot be solely used to explain the adsorption mechanism for the whole range of the studied cations. Effects of cation size and zeolite type must be included.

For both X and Y zeolites, the cation size plays an important role on the selectivity of Cs , Rb and K exchanged zeolites. The p -xylene selectivity increased continuously as the exchanged cation size decreased. The penetration of p -xylene was sterically hindered by the bigger cation than the smaller one. However, K with Na and Li , the acid-base interaction can be used to explain the adsorption mechanism. The p -xylene selectivity always dropped with the increasing zeolite acidity. Additionally, effect of zeolite framework must be taken into consideration. It was found that with the same exchanged cation, Y zeolites provided higher p -xylene selectivity than X zeolites. But, the p -xylene selectivity with respect to m -xylene of NaX and LiX zeolites was higher than that of NaY and LiY zeolites. The acid-base interaction is solely responsible for this phenomenon. As NaY and LiY have very high acidity, so p -xylene can be adsorbed less in these zeolites while m -xylene can be adsorbed more.

According to the high p -xylene selectivity of KY , further study focusing on KY was performed by using dynamic adsorption and equilibrium adsorption experiments. Results obtained from both techniques were similar. Thus, it was concluded that both techniques were exchangeable. Besides, it was found that the components' concentrations did not affect the p -xylene selectivity.

Moreover, the trend of ΔH of each component on KY was consistent to the selectivity. p -xylene, the most adsorbed species had the highest ΔH followed by ethylbenzene, o -xylene and m -xylene, respectively.

Since the experiment was carried out only on the mono-valence series exchanged cation. Further study on the di-valence series exchanged cation is of interest. Because of the complexity of the adsorption mechanism, the results on the di-valence are unpredictable. Hopefully, further study will lead to more understanding on the C₈ aromatics adsorption.