CHAPTER 8

CONCLUSIONS

The following conclusions may be drawn from the present work.

1. The chromatographic method offers a practicable techniques of studying the gas adsorption in zeolites. The moment method was used to determine equilibrium adsorption constant, overall rate of adsorption and various rate parameters, including axial dispersion, macropore diffusivity and crystal diffusivity for the sorption in zeolites.

2. Under the experimental conditions, the particle size and the flow rate of the carrier have no effect on the adsorption equilibrium constant.

3. The Offretite/Erionite zeolite has the higher adsorption ability than the NaY zeolite at the same temperature.

4. The adsorption equilibrium constant increases with increasing column temperature.

5. The heat of adsorption for Offretite/Erionite zeolite is higher than NaY zeolite.

6. Under the experimental conditions, the axial dispersion is independent of the flow rate and the particle size and therefore is assumed to be occurred by molecular diffusion.

7. The macropore diffusivity for both zeolites of order 10^{-3} cm^2/s is assumed to occur by Knudsen diffusion and perhaps includes surface diffusion.

8. The approximated order of the crystal diffusivity for both zeolites is found to be 10^{-10} cm^2/s which characterizes the crystal diffusion as the activated process.

9. At constant temperature, the overall rate coefficient increases with increasing particle size, which results from the increasing of the axial dispersion and the crystal diffusion contributions and the decreasing of the film plus macropore diffusion contribution.

10. Under experimental condition, the overall rate is controlled by axial dispersion.

11. The effect of flow rate in increasing k' is due to incresing turbulent mixing in the dispersion term.

12. The overall rate increases with increasing column temperature which is caused by the increase of the overall mass transfer of the adsorbent particle.

13. At the same temperature, the overall mass transfer rate for NaY zeolite is higher than Offretite/Erionite zeolite.

14. It is common practice to run a preparative column under overload conditions (i.e., outside the design region). However, the design data provide useful approximate guidance concerning the optimal choice of operating parameters for LPG separation.

Future work

The next step of study should be carried on the adsorption of binary gaseous mixture, i.e. the propane and butane gas. The method may be extended to study equilibrium adsorption and diffusion in binary system. These parameter should be related to the single-component parameters. From the data of both gases, the more accurate design of the adsorption unit can then be found and tested.