CHAPTER VI

CONCLUSION AND RECOMMENDATION

6.1 CONCLUSION

The following conclusions can be derived from the experimental results.

1. Water hyacinth, rice husk, and sugar-cane bagasses could be employed as starting materials for carbon adsorbents. According to American Water Works Association, the carbon adsorbents could be claimed as activated carbons. The yields of carbon adsorbents were reduced as increasing the activating temperature. While the specific surface area was improved greatly with the presence of zinc chloride, even at low temperature as 400°C. The average pore size, especially micropores, as well as the specific surface area became large as activating at high temperatures. Since the iodine number varied slightly with temperature and period.

2. The specific surface area and iodine number do not necessarily mirror the utility of carbon adsorbent. Frequently for a give situation, a type of carbon adsorbent having relatively small area of surface will be more effective than another carbon adsorbent with much greater specific surface area and iodine number.

3. All carbon adsorbents provide a large fraction of polar surface, thus they prefer adsorbing polar molecules, such as o-xylene, to adsorbing non-polar ones, such as toluene and benzene, respectively.

4. The rate of adsorption is controlled by the pore diffusion and also depends on the shape of adsorbate molecules, i.e. benzene tends to be adsorbed more rapidly than toluene and o-xylene, respectively.

5. Heats of adsorption, in the range of 53–110 kJ/mole, is higher than heats of condensation two or three times.

6. The adsorption equilibrium constant decreases as an increase in temperature according to van't Hoff equation.

The adsorption rate constant depends on temperatures of adsorption quite strongly, which obeys Arrhenius' law.

7. In order to generate the adsorbents, heat of adsorption is one of key parameters of consideration. For instance, the heat of adsorption of benzene, toluene, and o-xylene are low, thus it require low energy for regeneration.

8. The chromatographic method is suitable for measurement of adsorption equilibrium constant and mass-transfer coefficient. An advantage of this method is fast measurement, but small errors might occur from the moment analysis of the chromatograms.

9. With the presence of carbonyl groups on surface of carbon adsorbents, it could be accounted for the adsorption capacity of each carbon adsorbent.

6.2 RECOMMENDATION

Further studies of adsorption on carbon adsorbents may be carried on

1. Activating water hyacinth with another method, such as physical activation.

2. Adsorbing other polar molecules, such as alcohol and ketones.

3. Studying the adsorption as a multi-component mixture.