

# Chapter 6

## Conclusion and Recommendation

### 6.1 Conclusion

The experimental results can be concluded in the following.

1. LP814 is made from a raw material which is not coconut shell which is a raw material for production YAOs providing a large portion of flat surfaces.
2. The surface of YAO12/30, which is designed for water treatment, does not contain any hydroxyl groups and consists of pores with large pore diameter, in comparison with YAO4/8 which is designed for air purification, for penetration of water
3. All selected activated carbons can adsorb both acetone and toluene vapors, and can adsorb a large amount of the latter than that of the former from a dilute gaseous mixture.
4. With the present of hydroxyl groups on surfaces of YAOs, it enhances the adsorption of acetone. Whereas, it reduces the toluene adsorption capacity.

In addition, it also reduces the dependence of the toluene adsorption vapor temperature.

5. All adsorption phenomena of acetone and toluene vapors on selected activated carbons are exothermic. The heats of adsorption of both vapor on most activated carbons are about 3 times of heat of condensation (15.60 kJ/mole for acetone and 33.5 kJ/mole for toluene), except the heat of adsorption of acetone on CMS-3A (33.75 kJ/mole) and of toluene on YAO4/8 (36.62 kJ/mole) which are less than heat of condensation.
6. All rates of adsorption of acetone and toluene vapors on selected activated carbon are controlled by the pore diffusion. The dependence of the adsorption rates upon temperature corresponds with Arrhenius's equation.
7. For a short bed of a selected activated carbon, the axial dispersion does not exhibit significantly influence on the variation of chromatograms.
8. For long bed of a selected activated carbon, the effective of the finite rate of adsorption tends to interfere in the determination of the coefficient of the axial dispersion.
9. Although the chromatographic method is simple and fast, it may not provide reasonable results for some adsorption systems, such as the adsorption of toluene vapor on CMS-5A.

## 6.2 Recommendation

1. The length of the column is chosen from the shape of chromatographic elution curve in order to measure the area precisely.
2. The flowrate of the carrier gas in which the flame of gas chromatography with FID detector is available, is restricted by a length of a packed bed. The shorter column, the narrower flow rate range, such as the column length of 0.2 cm, the flowrate is within the range of 0.33-1.67 cm<sup>3</sup>/sec. However, the short column length is advantage for the negligible of the pressure drop.
3. To study the equilibrium adsorption, the researchers should focus on the effect of the surface chemistry of the activated carbon.
4. To find the controlling step of mass transfer, the particle size of the activated carbon must be varied.
5. To study the adsorption of acetone and toluene as a binary mixture, the molecular interaction should be considered.