CHAPTER V
CONCLUSIONS AND RECOMMENDATION

5.1 Conclusions

1) The simple mathematical method proposed by Okazaki et al. for unknown multi-solute adsorption has been shown to be applicable to known single-solute adsorption systems and to a large degree to known binary and tertiary systems.

2) With respect to the unknown natural humic substance and unknown industrial wastewater, the above prediction results are rather unsatisfactory because the method does not take into account the problems associated with adsorbate molecules too bulky to enter the micropores of ACF, thus hindering instantaneous adsorption.

3) According to the experimental results on tapwater and natural humic substance, the type or nature of the solute component can also affect the adsorptivity and the observed breakthrough curve. More specifically, the more bulky the molecular structure and the less lypophilic the adsorbate, the lower the adsorptivity on ACF.

4) The Okazaki's method is a simple and quite reliable tool to predict the breakthrouh time and to size a packed adsorber for the systems in which the assumption of instantaneous adsorption is valid.

5.2 Recommendation for future work

1) To improve the adsorption of unknown solutes consisting of bulky molecules a different adsorbent containing both mesopores and micropores, and even some macropores, should be used.

2) To improve the prediction results, a second term in eqn. (2-15), i.e. n=2, should be added to determine the characteristic distribution curve in order to take account of the slight inflexion observed in the integral adsorption equilibrium curve (IAEC).

3) To enhance the capability of Okazaki's method, improved and/or modified versions proposed by other researchers should be investigated. For example, J. Reunanen , S. Palosaari et. al. (1993) have proposed to improve Okazaki's method by describing the characteristic distribution curve as a skewed Gaussian distribution. Their CDC also has a fewer number of parameters and hence the model is simpler and faster to solve.

Alternatively, Hee Moon, Heung Chul Park and Chi Tien (1991) have studied the adsorption of unknown substances from aqueous solutions. By assuming that the pseudospecies may be characterized using a discrete distribution function, specifically a binomial function of a vector that represents the set of parameters, they modified the procedure proposed by Jayaraj and Tien (1985) for characterizing the adsorption affinity of a solution with unknown composition.