

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In this study, two types of surfactant-modified adsorbents (SMADs) were prepared by two-step surface modification of natural zeolite (SMZ) and clay mineral (SMB) using cationic and anionic surfactant (CTAB and DOWFAX8390). The SMADs were further investigated for their sorption characteristics of various organic compounds (benzene, benzoic acid, phenol, chlorobenzene and naphthalene) and heavy metal (cadmium) in both single-solute and mixed-solute systems.

In single-solute system, the result obtained from the heavy metal adsorption study using SMZ demonstrated that the amount of cadmium adsorbed was fairly comparable with that of homoionic clinoptilolite. In SMB part, cadmium adsorption is greatly decreased from bentonite clay since less amount of DOWFAX 8390 on SMB which played important role on ion exchange process. The adsorption isotherms of cadmium on both SMZ and SMB are Langmuir isotherm. For the organic adsorption study, both SMZ and SMB could enhance significantly than that of ordinary mineral. The organic adsorption isotherms could be described by Linear and Freundlich model. Linear isotherm indicates the adsorption is caused by partition mechanism whereas Freundlich isotherm concludes the adsorption is primarily controlled by adsorption and partition mechanism. In mixed-solute systems, where cadmium and benzene were both present, their uptake showed little decrease from single-solute system in SMADs. Their adsorption in mixed-solute system was considered no significant change from single-solute system. SMADs were able to boost effectively the organic sorption of ordinary minerals as well. Sorption of organic compounds on SMADs was compared by normalized partition coefficient which point out that SMB proved to have more organics adsorption capacity than SMZ. Contrast to cadmium removal that SMZ greatly adsorb better than SMB. It is possible to conclude that the SMADs have good potentialities for cost-effective treatments of organics and metal-contaminated wastewaters.

5.2 Recommendations

This research has focused very much on the preparation of different surfactant-modified adsorbents and the adsorption of heavy metal and different organic contaminants. Bentonite which is successful in sorption of organic contaminant but poorly subtraction heavy metal because of a lesser amount of DOWFAX 8390 coverage. In order to get better adsorption, further study should examine the other feasible method for DOWFAX 8390 adsorption such as polymerizations the organic phase during DOWFAX 8390 adsorption. Besides, it would be motivating that pilot test is set up on further study in order to make used of real condition.