CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The adsorption of diphenylmercury in a substitute condensate of n-heptane both in a batch system and in a continuous system was studied. For the batch system, the experiments were carried out on 3A, 4A, 5A, NaX and NaY zeolites and an activated carbon. It was found that all adsorbents could be used to remove diphenylmercury while NaX and NaY zeolites show better performance in removal. This behavior can be attributed to the relevant properties of diphenylmercury adsorbate molecules and zeolite adsorbents. For the adsorbates, the size of the diphymercury molecule plays an important role in the adsorption process on the adsorbents. The width of the diphenylmercury molecule is 4.64 Å while the length is 12.70 Å. For the adsorbents, the opening pore size is a significant factor in order to accommodate the adsorbates. The adsorption of the adsorbates occurred mostly inside supercages of the NaX and NaY zeolites (7.4 Å) while a few molecules of the adsorbates can penetrate inside the supercage of 5A zeolite (4.4 Å) and the adsorbates adsorbed only the exterior surface of the 3A (2.9 Å) and 4A (3.8 Å) zeolites. Although the diphenylmercury could be trapped inside the supercage of NaX and NaY zeolites, the amount of diphenylmercury adsorption was still very low. The kinetic study revealed that intracrystalline diffusivity constants are very low for the NaX and NaY zeolites and these can be considered as a main problem in diphenylmercury adsorption.

In the continuous system, the experiment was carried out only on NaX and NaY zeolites. It was revealed that the adsorption mechanism of diphenylmercury is possibly chemisorption rather that physisorption as predicted by the equation proposed by Cussler (1997).

5.2 Recommendations

Upon the completion of this study, the adsorption of diphenylmercury on 3A, 4A, 5A, NaX and NaY zeolites and an activated carbon was established. It is interesting to further study towards the effect of temperature on the diphenylmercury adsorption on NaX and NaY zeolites because the improvement of an intracrystalline diffusivity constant can be expected and consequently the improvement of removal efficiency can also be expected. Understanding the interaction of adsorbate-adsorbent by modification of Na-base faujasite zeolite by loading various metal ions on zeolites should be investigated in details. Metals such as S and Ag are potential candidates for the modification of the faujasite zeolites. Subsequently, comparison between Na-based faujasite zeolite and zeolite loaded with other metal ions for their surface adsorption capability can be done.