CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The adsorption of diphenylmercury in n-heptane, heavy naphtha and condensate was studied in both batch and continuous systems. In the batch system, the experiments were carried out using NaX and NaY and the effects of temperature, hydrocarbon matrices, aromatic content and water content were established. The adsorption isotherms were classified as Langmuir Type I in both n-heptane and heavy naphtha. It was found that the adsorption capacity of NaX and NaY decreased while temperature increased in the range of 30-50°C which is the characteristic of physisorption. At the same temperature, adsorption capacity of NaX and NaY in n-heptane system was higher than in heavy naphtha system. This behavior can be attributed to the influence of hydrocarbon matrice in heavy naphtha cuts. It is well known that faujasite zeolite is normally used in aromatic separation processes. Therefore, there is a potential that aromatic species adsorb in the matrice during adsorption of diphenylmercury.

In the attempt to study influence of aromatic species which are dominantly present in real hydrocarbon cuts, cyclohexane, toluene, ethylbezene and *o*-xylene were employed in n-heptane system, the result indicates that the adsorption capacity decreased in the range of 17-25%. Therefore, some interactions e.g. (1) interaction between aromatic and adsorbate and (2) interaction between diphenylmercury and aromatic species could play important role.

The effect of water content in zeolite adsorbents was also studied in n-heptane system. It was found that water content decreased adsorption capacity of both NaX and NaY. As the water content was increased, diphenylmercury molecule became more selective to NaX than NaY and the highest selectivity was obtained at 5% water. Water molecules can adsorb in both α-cages and β-cages of NaX and NaY competitively with diphenylmercury molecules resulting in the reduction of

capacity. However, for industrial application it is preferred to use NaY due to its physical strength properties.

In the continuous system, the experiments were carried out with heavy naphtha spiked with 2000 ppb of DPM and condensate. It was found that in heavy naphtha system diphenylmercury could be removed by NaX and NaY, although not complete, but with higher capacity than CMG273. In the condensate system, it was found that, small amount of adsorption by NaX and NaY could be affected by aromatic fraction and microparticles suspending in condensate resulting in reduction of its performance.

5.2 Recommendations

From the results, it is seen that NaX and NaY have the ability to remove organomercury. Thus, it is interesting to impregnate with active metals such as Ag, Cu or mixed metals the adsorbent to chemically remove also metallic mercury.