



## CHAPTER V

### CONCLUSION AND SUGGESTION FOR FUTURE WORK

#### Conclusion

The research work described in this thesis can be summarized below.

#### 1. The preparation of crosslinked resins

The preparation of crosslinked resins between epoxy resin (2) and diamine (3) to yield crosslinked resins (4) was attempted with several methods. The successful method was the direct heating of the mixture of 2 and 3 at the temperature of 185°C for 2 hours. The best yield was obtained at the equivalent weight ratio of diamine to epoxy resin of 4:1.

#### 2. The chelation with metal ions

Chelating ability of crosslinked resins for some metal ions such as Cu(II), Co(II), Ni(II), Zn(II) and Pb(II) were investigated in various solvents with the methods of batch and column. It was found that the crosslinked resins (4) had selective chelating ability only for Pb(II) and the best capacity was obtained using 80% dioxane solution in water as solvent. The maximum capacity of Pb(II) chelation was 1.5 meqv/g in the batch process, whereas using the column a capacity of 0.27 meqv/g was obtained.



### **3. The application of the crosslinked resins**

The Pb(II) chelation of crosslinked resins (4) in waste water from battery factory was investigated. The method is necessary to use large amount of dioxane for mixing with waste water to swell the crosslinked resin. Using of large amount of dioxane caused dilution of solution which was difficult to analyze Pb(II) content using AAS and result in higher cost. Therefore, it was an unpractical method.

#### **Suggestion for Future Work**

In this work, the novel diamine crosslinking agent (3) was used to prepare crosslinked resins. The preparation was done by heating at 185°C for 2 hours and the post-cure was not examined. So that the further study might investigate the post-cure to determine the optimum curing reaction. The other study should determine the degree of crosslinking of each equivalent weight ratio, which are possible to investigate using solid NMR.

The Pb(II) chelating capacities were only done by varying Pb(II) concentrations. To determine the absolute capacity, the other investigation should perform by varying the amounts of crosslinked resins.

The application of these resins with organic reactions might be possible. The resin might be able to chelate with the counterions at nucleophiles, therefore the nucleophiles should have higher reactivity towards electrophiles. If the results are satisfied, this method will have advantages because 4 could be readily prepared and it can be easily removed from the reaction.