

## CHAPTER V

### CONCLUSION

Novel Schiff base diazadithiol *p*-*tert*-butylcalix[4]arenes, 25,27-((2,2'-diethoxy)benzyl)-3,7-dithianonane-1,9-diimine-*p*-*tert*-butylcalix[4]arene, **3**, 25,27-((4,4'-diethoxy)benzyl)-3,7-dithianonane-1,9-diimine-*p*-*tert*-butylcalix[4]arene, **4**, 25,27-((2,2'-diethoxy)benzyl)-3,6-dithianonane-1,8-diimine-*p*-*tert*-butylcalix[4]arene, **5**, and 25,27-((4,4'-diethoxy)benzyl)-3,6-dithianonane-1,8-diimine-*p*-*tert*-butylcalix[4]arene, **6**, were prepared from high dilution condensation reaction. The ammonium derivatives of compounds **3** and **4**, 25,27-((2,2'-diethoxy)benzyl)-3,7-dithianonane-1,9-diamine-*p*-*tert*-butylcalix[4]arene, **7**, and 25,27-((4,4'-diethoxy)benzyl)-3,7-dithianonane-1,9-diamine-*p*-*tert*-butylcalix[4]arene, **8**, containing N<sub>2</sub>S<sub>2</sub> donor sets were obtained by reactions of **3** and **4** with NaBH<sub>4</sub> and protonation with HCl/CH<sub>3</sub>OH. Protonation constants of the ligands **7** and **8** in 10% CH<sub>2</sub>Cl<sub>2</sub>/CH<sub>3</sub>OH using 1.0x10<sup>-2</sup> M NMe<sub>4</sub>Cl and 5.0x10<sup>-2</sup> M NBu<sub>4</sub>CF<sub>3</sub>SO<sub>3</sub> as supporting electrolytes were determined by potentiometric titrations. Two protonation constants expressed in terms of logarithm in each electrolyte solution were found. Magnitude of the first and second protonation constants of these ligands in both electrolytes are comparable. Distribution of LH<sub>2</sub><sup>2+</sup>, LH<sup>+</sup> and L in both electrolytes depends on the pH of the inert background solution. When pH was increased, the amount of species in the solution varied as follows: LH<sub>2</sub><sup>2+</sup> < LH<sup>+</sup> < L. The LH<sup>+</sup> species of both ligands occur in the neutral pH, and the maximum amount of these species are found at pH 8.3.

Among metal ions in group IIB, both ligands 9 and 10 were found to selectively form complexes with only  $\text{Hg}^{2+}$  ion. The ligand 9 shows better properties for metal ion complexation than 10 does. The two ligands were expected to form stable metal complexes with metal ions that have square planar, linear or octahedral geometry. Species distribution plots of potentiometric titration studies can be used to predict the nature of the complexes in solution. The best conditions for ligands 9 and 10 to form complexes with  $\text{Hg}^{2+}$  ion are at pH 8.7 and 9.1, respectively.

### **Suggestion for Future Works**

Future works should be focused on ;

1. Complexation studies of our ligands with the other divalent metal ions such as  $\text{Ni}^{2+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Pt}^{2+}$  and  $\text{Pd}^{2+}$  and with multivalent metal ions such as  $\text{Pt}^{4+}$ ,  $\text{Rh}^{3+}$  and  $\text{Bi}^{3+}$ .
2. Complexation studies of mixed ligands with target metal ions by potentiometric titrations.
3. Complexation studies of our ligands with mixed metal ions by potentiometric titrations.
4. Complexation studies of our ligands with target metal ions by other methods such as UV-Vis spectroscopy and NMR spectroscopy.