

## CHAPTER V

### CONCLUSION

Basicity study 25,27-{2,2'-[2,2'-((2,5,8-triaza)nonyl)diphenoxy]diethyl}-*p-tert*-butylcalix[4]arene (**L**) and stability of its complexes with transition metal ions ( $M^{2+}$ ) ( $Co^{2+}$ ,  $Ni^{2+}$ ,  $Cu^{2+}$  and  $Zn^{2+}$ ) were investigated by potentiometric titration method at  $25^{\circ}C$ . Protonation constants of the ligand **L** were determined in the methanolic solution of  $5.0 \times 10^{-2} M$   $Et_4NClO_4$  and  $5.0 \times 10^{-2} M$   $Bu_4NCF_3SO_3$ . Three protonation constants expressed in terms of logarithm of its values were found in each electrolyte solution. Order of magnitude of the first, second and third protonation constants of the ligand **L** in both two electrolytes are in the same sequence. The magnitude of three protonation constants of the ligand **L** in the methanolic solution of  $5.0 \times 10^{-2} M$   $Et_4NClO_4$  were bigger than those in the methanolic solution of  $5.0 \times 10^{-2} M$   $Bu_4NCF_3SO_3$ . However the  $Bu_4NCF_3SO_3$  can be used as a new inert background electrolyte in the methanolic solution in order to avoid the use of explosive substance such as perchlorate salts.

Stability constants of the 25,27-{2,2'-[2,2'-((2,5,8-triaza)nonyl)diphenoxy]diethyl}-*p-tert*-butylcalix[4]arene complexes with divalent transition metal ions ( $Co^{2+}$ ,  $Ni^{2+}$ ,  $Cu^{2+}$  and  $Zn^{2+}$ ) were determined in the methanolic solution of  $5.0 \times 10^{-2} M$   $Bu_4NCF_3SO_3$ . The ligand **L** was found to form  $ML^{2+}$  complex species in which the selectivity for metal ions varied as  $Cu^{2+} > Ni^{2+} > Co^{2+} > Zn^{2+}$ . Order magnitude of these stability constants correspond the expected Irving-Williams order. Furthermore  $Cu^{2+}$  and  $Zn^{2+}$  could form  $CuL(OCH_3)^+$  and  $Zn_2L^{2+}$  complex species with this ligand **L** respectively.

### **Suggestion For Further Work**

Further work can be focused on;

1. Complexation study of this ligand **L** with  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$  and  $\text{Zn}^{2+}$  by means of ultraviolet visible spectroscopic titrations.
2. Evaluation of the thermodynamic functions ( $\Delta G$ ,  $\Delta H$  and  $\Delta S$ ) corresponding to complex formation of this ligand **L** with  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$  and  $\text{Zn}^{2+}$ .
3. Complexation study of this ligand **L** with the other divalent transition metal ions such as  $\text{Mn}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Pb}^{2+}$  and with trivalent lanthanide metal ions such as  $\text{Eu}^{3+}$ ,  $\text{Yb}^{3+}$ ,  $\text{Pr}^{3+}$  in order to obtain information for selectivity property and their further applications.