



References

1. Pedersen, C.J., "Cyclic Polyethers and their Complexes with Metal Salts," J.Am.Chem.Soc., 89, 2495, 1967.
2. Christensen, J.J., J.D. Hill, and R.M. Izatt, "Ion Binding by Synthetic Macrocyclic Compounds," Science, 174, 459, 1971.
3. Christensen, J.J., D.J. Eatough and R.M. Izatt, "The Synthesis and Ion Binding of Synthetic Multidentate Macrocyclic Compounds," Chem.Rev., 74, 351, 1974.
4. Watkins, W.D., D.P. Riely, J.A. Stone and D.H. Busch, "Iron(II) Complexes with Unsubstituted Saturated Tetraaza Macrocyclic Ligands of Varying Ring Size," Inorg.Chem., 15, 387, 1976.
5. Cheney, J. and J.M. Lehn, "Proton Cryptates," J.C.S.Chem.Comm. 487, 1972.
6. Dye, J.L., M.T. Lok, F.J. Tehan, J.M. Ceraso and K.J. Voorhees, "Flow Synthesis. A Substitute for the High-Dilution Steps in Cryptate Synthesis," J.Org.Chem., 38, 1773, 1973.
7. Dario, L., M. Fernando and R. Franco, "Phase - Transfer Catalysis: Synthesis and Catalytic Activity of Tricyclohexyl[2,2,2]cryptand(Perhydrotribenzohexadiaza[8,8,8]eicosane)," Synthesis., 3, 233, 1978.
8. Buttafava, A., L. Fabbrizzi, A. Perotti, A. Poggi and B. Segh, "Ring Size Effects on the Formation of Dicopper(II) and Dicopper(III) Complexes with Bimacrocycles Containing 13- and 14-Membered Tetraaza Subunits," Inorg.Chem., 23, 3917, 1984.

9. Deithrich, B., J.M. Lehn and J.P. Sauvage, "Cryptates: Control Over Bivalent/Monovalent Cation Selectivity," J.S.C. Chem. Comm., 15, 1973.
10. Karlin, K.D. and J. Zubieta, "Copper Coordination Chemistry : Biochemical and Inorganic Perspectives," Adenine Press, New York, 1983.
11. Fenton, D.E., "Adv. Inorg. Bioinorg. Mech.," vol 2, Academic Press, London, 1983.
12. Katovic, V., L.T. Taylor and D.H. Bush, "Nickel(II) and Copper (II) Complexes Containing New Monocyclic and Polycyclic Ligands Derived From the Cyclotetrameric Schiff Base of o-Aminobenzaldehyde" Inorg. Chem., 10, 458, 1971.
13. Cummings, S.C. and D.H. Busch, "Cobalt(III) Complexes Containing the Macrocyclic Tetradentate Schiff Base Ligand Tetrabenzob[b,f,j,n][1,5,9,13]tetraazacyclohexadecane," Inorg. Chem., 10, 1220, 1971.
14. Melson, G.A. and D.H. Busch, "Reaction of Coordinated Ligands. The Formation and Properties of a Tetradentate Macrocyclic Ligand by the Self - Condensation of o-amino-benzaldehyde in the Presence of Metal Ions," J. Am. Chem. Soc., 86, 4830, 1964.
15. Hay, R. and D.M.S. Clack, "The Preparation of 1,4,8,11-Tetrakis (2-hydroxyethyl) -1,4,8,11- tetracyclotetradecane and Its Complexes with Na(I), Cu(II) and Ni(II)," Inorg. Chim. Acta., 83, L23, 1984.
16. Bosinich, B., C.K. Poon and M.L. Tobe, "Complexes of Cobalt(III) with a Cyclic Tetradentate Secondary Amine," Inorg. Chem.,

- 4, 1102, 1965.
17. Smith, W.L., J.D. Ekstrand and K.N. Raymond, "High - Yield Synthesis and Crystal Structure of 1,5,9,13-tetraazacyclohexadecane ([16]aneN₄)," J. Am. Chem. Soc., 100, 3539, 1978.
 18. Kyba, E.P., M.G. Siegel, L.R. Sousa, G.D.Y. Sogah and D.J. Cram, "Chiral, Hinged and Functionalized Multiheteromacrocycles," J. Am. Chem. Soc., 95, 2691, 1973.
 19. Matsushima, K., Y. Nakatsuji, N. Kawamura and M. Okahara, "Synthesis of Sulfer and Nitrogen Analogues of Monoxo Crown Ethers," J. Heterocyclic Chem., 23, 255, 1986.
 20. King, A.P. and C.G. Krespan, "Secondary Amines From Trifluoroacetamides," J. Org. Chem., 39, 1315, 1974.
 21. Barefield, E.K., F. Wagner and K.D. Hodges, "Synthesis of Macrocyclic Tetraamine by Metal Ion Assisted Cyclization," Inorg. Chem., 15, 1370, 1976.
 22. Chaudhuri, P. and K. Weighardt, "Progress in Inorganic Chemistry," vol. 35, Wiley, New York, 1987.
 23. Lehn, J.M., "Cryptate : Macropolycyclic Inclusion Complexes," Pure Appl. Chem., 49, 857, 1977.
 24. Ikeda, I., S. Yamamura, Y. Nakatsuji and M. Okaha, "Synthesis of Substituted Crown Ethers from Oligoethylene Glycols," J. Am. Chem. Soc., 45, 5355, 1980.
 25. Lehn, J.M., "Dinuclear Cryptates : Dimetalic Macrocyclic Inclusion Complexes," Pure Appl. Chem., 52, 2441, 1980.
 26. Hope, H., M. Viggiano, B. Moezzi, and P.P. Power, "Synthesis and X-ray Crystal Structures of Two New Classes of Macrocyclic Ligands Having Both Phosphorus and Nitrogen Donor Atoms," Inorg. Chem., 23, 2550, 1984.

27. Pedersen, C.J., "Crystalline Complexes of Macrocyclic Polyethers With Thiourea and Related Compounds," J.Org.Chem., 36, 1690, 1971.
28. Ogawa, S., N. Kishii and S. Shirashi, "Non-template Synthesis and Monoalkylation of an Azamacrocycle Containing 2,2'-Bipyridine," J.C.S.Perkin.Trans.I., 9, 2023, 1984.
29. Bembli, R., V.K. Bhardwaji, R. Singh, K. Taneja and S. Aftab, "Synthesis and Characterization of Copper(II), Nickel(II) and Cobalt(III) Complexes With 1,4,8,11-tetraazacyclohexadecane and 1,4,8,11-tetracycloheptadecane," Inorg.Chem., 23, 4153, 1984.
30. Katovic, V., L.T. Taylor, F.L.Urbach, W.H.White and D.H. Busch, "Chemically Reduced Derivatives of the Nickel(II) and Copper(II) Complexes of the Cyclotetrameric Schiff Base of o-Aminobenzaldehyde," Inorg.Chem., 11, 479, 1972.
31. Richman, J.E. and T.J. Atkins, "Nitrogen Analogs of Crown Ethers," J.Am.Chem.Soc., 96, 2268, 1974.
32. Lindoy, L.F., "Transition Metal Complexes of Synthetic Macrocyclic Ligands," Chem.Soc.Rev., 4, 421, 1975.
33. Richman, J.E. and T.J. Atkins, "The Relationship between Donor Distance and Ring Size in Macrocyclic Complexes," J.Am.Chem.Soc., 96, 2268, 1974.
34. Tabushi, I., Y. Taniguchi and H. Kato, "Preparation of c-Alkylate Macrocyclic Polyamines," Tetrahedron Letters, 1049, 1977.
35. Meadow, J.A. and E.E. Reid, "Macrocyclic Polyether Sulfides," J.Am.Chem.Soc., 56, 2177, 1934.
36. Tabushi, I., H. Okino and Y.K. Uroda, "Convenient Synthesis of Macrocyclic Compound Containing Two Nitrogen Oxygen or

- Sulfur Atoms," Tetrahedron Letters, 4339, 1976.
37. Gokel, G.W. and B.J. Garcia, "Crown Cation Complex Effect(III) Chemistry and Complexes of Monoaxa 18-Crown-6," Tetrahedron Letters, 4, 317, 1977.
 38. Dietrich, B., J.M. Lehn and J.P. Savage, "Diaza-Polyozamacrocycles et Macrobicycles," Tetrahedron Letters, 2885, 1969.
 39. Dietrich, B., J.M. Lehn and J.P. Sauvage, "Oxathia - Macrobicyclic Diamines and Their Cryptates," J.C.S.Chem.Comm., 1055, 1970.
 40. Kimurs, E., R. Machida and M. Kadama, "Macrocyclic Dioxopentaamines : Novel Ligands for 1:1 Ni(II) - O₂ Adduct Formation," J.Am.Chem.Soc., 106, 5497, 1984.
 41. Pedersen, C.J., "Crystalline Salt Complexes of Macrocyclic Polyethers," J.Am.Chem.Soc., 92, 386, 1970.
 42. Sadakane, A., T. Iwachido and K. Toe, "Extraction of Alkali Metal Picrates with Dibenzo-18-crown-6," Bull.Chem.Soc.Jpn., 48, 60, 1975.
 43. Eliasson, B., K.M. Larsson and J. Kowalewski, "Multinuclear NMR Relaxation Studies of Crown Ethers and Alkali Cation Crown Ether Complexes," J.Phy.Chem., 89, 258, 1985.
 44. Danesi, P.R., E. Meider-Gorican, R. Chiarizia and G. Scibona, "Complexes of Macrocyclic Polyethers and Ion Pairs" J.Inorg.Nucl.Chem., 37, 1479, 1975.
 45. Pedersen, C.J., "New Macrocyclic Polyethers," J.Am.Chem.Soc., 92, 391, 1970.
 46. Mitchell, J.W. and D.L. Sanks, "Substoichiometric Neutron Activation Determination of Sodium : Extraction of Sodium Dicyclohexyl-18-crown-6 Tetraphenylborate," Anal.Chem., 47, 642, 1975.

47. Kyba, E.P., R.C. Helgeson, K. Madam, G.W. Gokel, T.L. Tarnowski, S.S. Moove and D.J. Cram, "Host - Guest Complexation I : Concept and Illustration," J.Am.Chem.Soc., 99, 2564, 1977.
48. Wong, K.H., G. Konizer and J. Smid, "Binding of Cyclic Polyethers to Ion Pairs of Cation Alkali Salts," J.Am.Chem.Soc., 92, 666, 1970.
49. Chen, C.S., S.J. Wang and S.C. Wu, "Solvent Effects in the Complexation of Dibenzo-14-crown-4 and Its Analogues with Lithium Ion," Inorg.Chem., 23, 3901, 1984.
50. Takeda, Y., "The Solvent Extraction of Alkali Metal Picrates by 12-Crown-4," Bull.Chem.Soc.Jpn., 53, 2393, 1980.
51. Bourgoin, M., K.H. Wong, J.Y. Hui and J. Smid, "Interactions of Macrobicyclic Polyethers with Ions Pairs of Picrate salts," J.Am.Chem.Soc., 97, 3462, 1975.
52. Baker, A.D., G.H. Armen and S. Funaro, "Orbital Levels of Crown Ethers and Related macrocycles Studied by Ultraviolet Photoelectron Spectroscopy ; Relationship to Complexation Studies," J.C.S.Dalton.Trans., 11, 2519, 1983.
53. Izatt, R.M., D.P. Neison, J.H. Rytting, B.L. Haymore and J.J. Christensen, "A Calorimetric Study of Interaction in Aqueous Solution of Several Uni- and Bivalent Metal Ions with the Cyclic Polyether Dicyclohexyl-18-crown-6 at 10, 25 and 40°C," J.Am.Chem.Soc., 93, 1619, 1971.
54. Frensdorff, H.K., "Salt Complexes of Cyclic Polyethers Distribution Equilibria," J.Am.Chem.Soc." 93, 4684, 1971.
55. Izatt, R.M., R.E. terry, D.P. Nelson, Y. Chan, D.J. Eatough, J.S. Bradshaw, L.D. Hansen and J.J. Christensen, "Calorimetric Titration Study of The Interaction of Some Uni- and

- Bivalent cations with Benzo-15-crown-5, 18-crown-6, Dibenzo-24-crown-8 and Dibenzo-27-crown-9 in Methanol - Water Solvent at 25°C and $\mu = 0.1$," J. Am. Chem. Soc., 98, 7626, 1976.
56. Izatt, R.M., R.E. Terry, B.L. Haymore, L.D. Hansen, N.K. Dalley, A.G. Avondet and J.J. Christensen, "Calorimetric Titration Study of The Interaction of Several Uni- and Bivalent cations with 15-crown-5, 18-crown-6 and Two Isomers of Dicyclohexo-18-crown-6 in Aqueous Solution at 25°C and $\mu = 0.1$," J. Am. Chem. Soc., 98, 7620, 1976.
57. Tasker, P.A. and E.B. Fleischer, "Iron(II), Cobalt(II), Nickel(II) and Zinc(II) Complexes of a Series of New Macrocyclic Sexadentate Ligands," J. Am. Chem. Soc., 92, 1072, 1970.
58. Fabbrizzi, L., F. Forlini, A. Rerotti and B. Seghi, "Stepwise Incorporation of Copper(II) into a Double - Ring Octaaza Macrocyclic and Consecutive Oxidation to the Trivalent State," Inorg. Chem., 23, 807, 1984.
59. Leigh, S.J. and I.O. Sutherland, "Complexes of Primary Ammonium Cations with Diazametacyclophanes," J.S.C. Chem. Comm., 414, 1975.
60. Collman, J.P. and P.W. Schneider, "Complexes of Cobalt(III) and Rhodium(III) with a Cyclic Tetradentate Secondary Amine," Inorg. Chem., 5, 1966, 1966.
61. Castellani, C.B., L. fabbrizzi, M. Lichelli, A. Perotti and A. Poggi, "Stabilization by a Strongly Acidic Medium of Trivalent Copper Tetraaza Macrocyclic Complexes," J.C.S. Chem. Comm., 12, 806, 1984.
62. Alcock, N.W., F.H. Curzon and P. Moore, "Heavy - Metal Macrocyclic

- Complexes of 1,5,9,13-tetraazacyclohexadecane with $\text{Cd}(\text{NO}_3)_2$, HgCl_2 , PbCl_2 and $\text{Pb}(\text{NO}_3)_2$, J.C.S.Dalton.Trans., 12, 2813, 1984.
63. Alcock, N.W., E.H. Corson, P. Moore and C. Pierpont, "Metal Complexes of The New Tetraaza Macrocyclic Ligand 1,5,9,13-tetramethyl-1,5,9,13-tetraazacyclohexadecane; Carbon - 13 Nuclear Magnetic Resonance Study of The Complexes of Cd^{2+} , Hg^{2+} and Pb^{2+} and X-ray crystal Structure of The Cadmium Complexes," J.C.S.Dalton.Trans., 605, 1984.
64. Freeman, G.M., E.K. Barefield and D.G. Van Derveer, "Studied on Nickel(II) Complexes of Cyclam Ligands Containing Functionalized Nitrogen Substituents : Synthesis, Isomerisation and Dealkylation," Inorg.Chem., 3092, 3, 1984.
65. Riley, D.P. and D.H. Busch, "Novel Five - Coordinate Iron(III) Complexes Produced by Oxidation of Square Planar (S=6) Iron(II) Complexes," Inorg.Chem., 3235, 23, 1984.
66. Watkins, D.D., D.P. Riley, T.A. Stone and D.H. Busch, "Structural and Dynamic behavior of Complexes of Lead(II) with Two Tetraaza macrocyclic Ligands and Studied by X-ray Crystallography and Natural - Abundance Carbon - 13 and Nitrogen - 15 - Nuclear Magnetic Resonance," Inorg.Chem., 15, 387, 1976.
67. Lovecchio, F.V., E.S. Gore and D.H. Busch, "The Oxidation and Reduction Behavior of Macrocyclic Complexes of Nickel Electrochemical and Electron Resonance Studies," J. Am. Chem.Soc., 96, 3109, 1974.
68. Fabbrizzi, L., "Coplanar Coordination of The Smallest Tetraaza Macrocycle : Low - Spin 1,4,7,10-tetraazacyclododecane

- Nickel(II)," Inorg.Chem., 16, 2667, 1977.
69. Poor, C.K. and M.L. Tobe, "Mechanism and Steric Course of Octahedron Aquation Part (IX). The Stereoretentive Aquation, Anation and Base Hydrolysis of The Trans - Dichloro (1,4,8,11 - tetraazacyclotetradecane) Cobalt(III) Cation and Its Solvento - Derivatives, "J.Chem.Soc.(A), 2069, 1967.
 70. Sabatini, L. and L. Fabbrizzi, "Fitting of Nickel(II) Ion into the Two 14 - Membered Tetraaz Macrocyces. Blue - to - Yellow Conversion and The Oxidation and Reduction Behavior," Inorg.Chem., 18, 438, 1979.
 71. Fabbrizzi, L., "Selectivity of Tetraaza Macrocyces towards Metal Spin States, The High-Spin-Low-Spin Equilibrium for Nickel (II) Complexes with 13 - and 14 - Membered Ligands," J.C.S.Dalton.Trans., 1857,1979.
 72. Billo, E.J., "Equilibria and Kinetics of Complexation of Bidentate Ligands with The Macrocylic Complex $Ni([14]aneN_4)^{2+}$," Inorg.Chem., 23, 2223, 1984.
 73. Wu, Y. and T.A. Kaden, "Metal complexes with Macrocylic Ligands: A Nonlinear Relationship between the stability of Cu^{2+} Complexes and their Complexation Rate with 1,4,8,11-tetraazacyclotetradecane," Helv.Chim.Acta., 86, 1611, 1985.
 74. bencini, A., L. Fabbrizzi and A. Poggi, "Formation of Nickel(III) Complexes with n-Dentate Amine Macrocyces (n = 4, 5, 6) ESR and Electrochemical Studies," Inorg.Chem., 20, 2544, 1981.
 75. Buttafava, A., L. Fabbrizzi, A. Perotti, A. Poggi, G. Poli and B. Seghi, "Trivalent nickel bis(triazamacrocylic) Complexes,

- Ligand Ring Size and medium effects on the Nickel(III) / Nickel(II) Redox Couple Potential," Inorg.Chem., 25, 1456, 1986.
76. Fabbrizzi, L., A. Poggi and P. Zanello, "Oxidation and Reduction of Copper(II) complexes with Saturated Polyaza Macrocycles of Varying and Denticity," J.C.S.Dalton.Trans., 2191, 1983.
77. Bailey, C.L., R.D. Bereman, D.P. Rillems and R. Nowak, "Redox and Spectral Properties of Nickel(II) Macrocycles Containing Dianionic Tetraazaanulene Ligands." Inorg.Chem., 23, 3956, 1984.
78. Fairbank, M.G., P.R. Norman and A. Mc.Auley, "Steric Effects on the Rates of Redox Reactions Involving Nickel(II/III) macrocycles," Inorg.Chem., 24, 2639, 1985.
79. Olson, D.C. and J. vasilevskis, "Cyclic Amine Complexes of Copper (I), -(II) and -(III). Electrochemistry Preparation and Properties," Inorg.Chem., 10, 463, 1971.
80. Tokel, N.E., V. Katovic, K. Farmery, L.B. Andersen and D.H. Busch, "Mutual Ligand - Metal Ion Oxidation State Stabilization in a System Containing a Quadridentate Macrocycle Analogous to The Porphyrin Ring," J.Am.Chem.Soc., 92, 401, 1970.
81. Murase, I., M. Mikuriya, H. Sonoda and S. Kida, "Synthesis and Characterization of N,N',N'',N'''-tetrakis(2-Aminoethy)-1,4,8,11-tetraazacyclotetradecane and Its Copper(II) Complexes," J.C.S.Chem.Comm., 11, 692, 1984.
82. Bartolini, M., A. Bianchi, M. Micheloni and P. Paoletti, "Solution Chemistry of Macrocycles Part III. Synthesis and Thermodynamics of Protonation of Some Tetraazamacrocycles,

J.C.S.Perkin.Trans.II, 11, 1345, 1982.

83. Alcock, N.W., E.H. Cuson, N. Heron and P. Moore, "Structure and Dinamic Behavior of Cadmium(II) and Mercury(II) Complexes of 1,4,8,11-tetraazacyclotetradecane and 1,4,8,11-tetramethyl-1,4,8,11-tetraazacyclotetradecane," J.C.S. Dalton.Trans., 1987,1979.
84. Oue, M., A. Ishigaki, Y. Matsui, T. Maeda, K. Kimura and T.Shono, "New Poly- and Bis(thiacrown Ether)s as Extraction Reagents," Chem.Lett., 275, 1982.
85. Bradshaw, J.S., B.L. Haymore, R.M. Izatt and J.J. Christensen, "Preparation of Oxathiapentadecanes," J.Org.Chem., 40, 1510, 1975.
86. Rosen, W. and D.H. Busch, "Octahedral Nickel(II) Complexes of Some Cyclic Polyfunctiona Thioethers," Inorg.Chem., 9, 262, 1970.
87. Travis, D. and D.H. Busch, "Cobalt(III) and Rhodium(III) Complexes of Cyclic Tetradentate Thioethers," Inorg.Chem., 13, 2591, 1974.
88. Rosen, W. and D.H. Busch, "Nickel(II) Complexes of Cyclic tetradentate Thioethers," J.Am.Chem.Soc., 91, 4694, 1969.
89. Sevdic, D. and H. Meider, "Macrocyclic Polythiaethers as Solvent Extraction Reagent - I : Silver(I) Extraction and Complex Formation," J.Inor.Nucl.Chem., 39, 1430, 1977.
90. Sevdic, D. and H. Meider, "Macrocyclic Polythiaethers as Solvent Extraction Reagent-II : Mercury(II) Extraction and Complex Formation," J.Inor.Nucl.Chem., 39, 1409, 1977.
91. Sevdic, D. and H. Meider, "Macrocyclic Polythiaethers as Solvent Extraction Reagent-III : Extraction and Complex Formation

- of Silver(I) and Mercury(II) Picrates," J.Inor.Nucl.Chem., 42, 885, 1980.
92. Dockal, E.R., L.L. Diaddario, M.D. Glick and D.B. Rorabacher, "Structure of 1,4,8,11-tetrathiacyclotetradecane Copper(I) Perchlorate : Comparative Geometries of Analogous copper (I) and Copper(II) complexes," J.Am.Chem.Soc., 93, 4530, 1977.
93. Saito, K., Y. Mesuda and E. Sekido, "Liquid - Liquid Extraction of Metal Ion by The Thiacrown compound 1,4,8,11-tetrathiacyclotetradecane," Anal.Chim.Acta., 151, 447, 1983.
94. Frensdorff, H.K., "Stability Constants of Cyclic Polyether Complexes with Univalent Cations," J.Amer.Chem.Soc., 93, 600, 1971.
95. Takeda, Y. and H. Kato, "The Solvent Extraction of Bivalent Metal Picrates by 15-crown-5, 18-crown-6 and Dibenzo-18-crown-6," Bull.Chem.Soc.Jpn., 52, 1027, 1979.
96. Oue, M. and A. Ishigaki, "Synthesis and Cation Binding properties of Poly- and Bis(thiacrown ether)s, "J.Polym.Sci., Polym. chem.Ed., 23, 2033, 1985.
97. Maeda, T., M. Ouchi, K. Kimura and T. Shono, "New Poly- and Bis-(12-crown-4)s Possesing High Sodium - Selectivity," Chem.Lett., 1573, 1981.
98. Kimura, T., K. Iwashima, T. Ishimori and H. Hamaguchi, "Separation of Strontium Ion from a Large Amount of Calcium Ion by the Use of a Macrocyclic Ether," Chem.Lett., 563, 1977.
99. Maeda, T., K. kimura and T. Shono, "Solvent Extracton of Alkali Metal with Poly- and Bis(benzo-12-crown-4)s," Bull.Chem. Soc.Jpn., 55, 3506, 1982.
100. Kimura, K., M. Tanaka, S. Kitazawa and T. Shono, "Highly Lithium-

- Selective Crown Ether Dyes for Extraction Photometry," Chem.Lett., 1239, 1985.
101. Coplan, M.A. and R.M. Fuoss, "Single Ion Conductance in nonaqueous Solvents," J.Phy.Chem., 68, 1177, 1964.
102. Rechnitz, G.A., and E. Eyal, "Selectivity of Cyclic Polyether Type Ligand Membrane - Electrodes," Anal.Chem., 44, 370, 1972.
103. Hodge, P., E. Khoshde and J. Waterhouse, "Preparation of Some Polymer - Supported crown Ethers and Their Use as Phase - Transfer Catalysts," J.C.S.perkin.Trans.I, 2451, 1984.
104. Tamura, H., K. Kimura and T. Shono, "coat Wire Sodium- and Potassium - Selective Electrodes Base on Bis(crown ethers) Compound," Anal.Chem., 54, 1224, 1982.
105. Kimura, K., M. Yashinaga, S. Kitazawa and T. Shono, "Synthesis of Poly(vinyl alcohol)-Based Poly(crown ether)s and Permability of Their polymeric membranes," J.Polym.Sci., Polym. Chem.Ed., 21, 1777, 1983.
106. Jyo, A., A. Nagamoto, T. Khono and A. Ohyosh, "Response of a Copper(II) Ion - Selective Electrode in Cupic Buffers Based on Macrocyclic polyamines," Bull.Chem.Soc.Jpn., 56, 3062, 1983.
107. Bailey, C.L., R.D. Bereman, D.P. Rillema and R. Nowak, "Surface - Modified Electrodes : Oxidative Electropolymerization and Diposition of $Ni[Me_4(RBzO)_2]_{14}$ tetraenen₄] Complexes," Inorg.Chem., 25, 933, 1986.
108. Nakajima, M., K. Kimura and T. Shono, "Ion Chromatographic Behavior of Siligagels modified by Poly and Bis(crown ether)s of Benzo-18-crown-6," Bull.Chem.Soc.Jpn., 56, 3053, 1983.
109. Kimura. K., E. Hayata and T. Shono, "Convenient, Efficient Crown

- Ether - Containing Stationary Phase for Chromatographic Separation of Alkali Metal ions : Dynamic Coating of Highly lipophilic crown Ethers on Octadecylsilanized Silica," Anal.Chem., 55, 463, 1983.
110. Nakajima, M., K. Kimura and T. Shono, "Liquid Chromatography of Alkali and Alkaline Earth Metal Salts on Poly(benzo-15-crown-5)- and Bis(benzo-15-crown-5)-modified Silicas," Anal.Chem., 55, 463, 1983.
111. Kimura, K., M. Nakajima and T. Shono, "Characterization of Poly-(crown ether)-modified Silicas," J.Polym.Sci., Polym.Chem. Ed., 23, 2327, 1985.
112. Kimura, K., M. Yashinaga, S. Kitazawa and T. Shono, "Synthesis of Poly(vinyl alcohol)-based Poly(crown ether)s and Permeability of their Polymeric Membranes," J.Polym.Sci., Polym. Chem.Ed., 21, 2777, 1983.
113. Huheey, J.E., "Inorganic Chemistry : Principles of Structure and Reactivity," 2nd ed., Harper International Edition, New York, 1978.
114. Bassett, J., R.C. Denny, G.H. Jeffery and J. Mendham, "Vogel's Textbook of Quantitative Inorganic Analysis," 4th ed., Longman Group Ltd., 1978.
115. Wulfsberg, G., "Principles of Descriptive Inorganic Chemistry," Brooks / Cole Publishing Company, 1987.
116. Weissberger, A., "Separation and Purification," vol 3 art 1 2nd ed., International Science Publisher, New York, 1954.
117. Dilts, R.V., "Analytical Chemistry," D. van Nostrand Company, New York, 1974.
118. Dean, J.A., "Chemical Separation Methods," D. Van Nostrand Company,

New York, 1969.

119. Saito, K., Y. Masuda and E. Sekedo, "Liquid - Liquid Extraction of Metal Ion by the Thiocrown Compound 1,4,8,11-Tetrathia-cyclotetradecane," Anal.Chim.Acta., 151, 447, 1983.
120. Yoe, J.H. and A.L., Jones, "Colorimetric Determination of Fe with Disodium-1,2-dihydroxybenzene-3,5-disulfonate," Ind.Eng. Chem.,Anal.Ed., 16, 111, 1944.
121. Bradshaw, J.S., K.E. Krakowiak, R.L. Bruening, B.J. Tarbet, P.B. Savage and R.M. Izatt, "Synthesis of (Allyloxy)methyl-substituted Diaza-18-crown-6-compounds for Attachment to Silica Gel," J.Org.Chem., 1988, 53, 3190.



114

VITA

Miss Warin Samarntarn was born on December 24, 1964 in Bangkok. She received her Bachelor Degree of Science (Chemistry) from Ramkhamhang University in 1984. Since 1986, she has been a graduate student studying Inorganic Chemistry at Chulalongkorn University and received a financial support from the University Development Commission.