

REFERENCES

1. Hartley, F. R.; Burgess, C.; Alcock, R. *Solution Equilibria*. Chichester: Ellis Horwood, **1980**.
2. Berdini, V.; Bassetti, M.; Mancini, G.; Mandolini, L.; Monti, D. "Metal ion complexation in organometallic crown ethers; structural and rate effect on the migratory insertion of carbon monoxide in indenyl and cyclopentadienyl iron (II) complexes" *J. Organomet. Chem.* **1998**, *551*, 331-338.
3. Steed, J. W.; Atwood, J. L. *Supramolecular Chemistry*. West Sussex: John Wiley & Sons, **2000**.
4. Pedersen, C. J. "Cyclic polyethers and their complexes with metal salts" *J. Am. Chem. Soc.* **1967**, *89*, 7017-7036.
5. Constable, E. C. *Metals and ligand reactivity*. Chichester: Ellis Horwood, **1990**.
6. Su, N.; Bradshaw, J. S.; Zhang, X. X.; Savage, P. B.; Krakowiak, K. E.; Izatt, R. M. "Diaza-18-crown-6 ligands containing two aminophenol side arms: new heterobinuclear metal ion receptors" *J. Org. Chem.* **1999**, *64*, 3825-3829.
7. Xue, G.; Bradshaw, J. S.; Kent Dalley, N.; Savage, P. B.; Krakowiak, K. E.; Izatt, R. M.; Prodi, L.; Montalti, M.; Zaccheroni, N. "Conventional syntheses and preliminary photophysical properties of novel 8-aminoquinoline appended diaza-18-crown-6 ligands" *Tetrahedron* **2001**, *57*, 7623-7628.
8. Bordunov, A. V.; Hellier, P. C.; Bradshaw, J. S.; Dalley, N. K.; Kou, X.; Zhang, X. X.; Izatt, R. M. "Synthesis of new pyridinozinc crown ethers containing aromatic and heteroaromatic proton ionizable substituents" *J. Org. Chem.* **1995**, *60*, 6097-6102.
9. Bronson, R. T.; Bradshaw, J. S.; Savage, P. B.; Fuangswasdi, S.; Lee, S. C.; Krakowiak, K. E.; Izatt, R. M. "Bis-8-hydroxyquinoline-armed diazatrithia-15-crown-5 and diazatrithia-16-crown-5 ligands: possible fluorophoric metal ion sensors" *J. Org. Chem.* **2001**, *66*, 4752-4758.
10. Meadows, E. S.; De Wall, S. L.; Barbour, L. J.; Gokel, G. W. "Alkali metal cation- π interactions observed by using a lariat ether model system" *J. Am. Chem. Soc.* **2001**, *123*, 3092-3107.
11. Li, L. -D.; Wei, Y.; Tong, A. -J. "Study on cation recognition properties of 4-

- methene-6, 7-dimethoxycoumarin-monoaza-18-crown-6" *Anal. Chim. Acta* **2001**, 427, 29-37.
12. Quici, S.; Manfredi, A.; Pozzi, G.; Cavazzini, M.; Rozzoni, A. "Ditopic receptors capable of hydrogen bonding: synthesis and complexation behaviour of diaza crown-ethers having melamine sidearms" *Tetrahedron* **1999**, 55, 10487-10496.
13. Hamamci, C.; Hosgoren, H.; Erdogan, S. "The solvent extraction of alkali metal picrates with 4, 13-*N,N'*-dibenzyl-4,13-diaza-18-crown-6" *Talanta* **1998**, 47, 229-236.
14. Cooper, S. R. *Crown compounds: toward future applications*. New York: VCH Publishers, **1992**.
15. Liu, Y.; Zhang, H. Y.; Bai, X. P.; Wada, T.; Inoue, Y. "Molecular design of crown ethers. 21. synthesis of novel double-armed benzo-15-crown-5 lariats and their complexation thermodynamics with light lanthanoid nitrates in acetonitrile" *J. Org. Chem.* **2000**, 65, 7105-7109.
16. Bordunov, A. V.; Bradshaw, J. S.; Zhang, X. X.; Dalley, N. K.; Kou, X.; Izatt, R. M. "Synthesis and properties of 5-chloro-8-hydroxyquinoline-substituted azacrown ethers: a new family of highly metal ion-selective lariat ethers" *Inorg. Chem.* **1996**, 35, 7229-7240.
17. Greenwood, N. N.; Earnshaw, A. *Chemistry of the Elements*. Oxford: Butterworth Heinemann, **2001**.
18. Su, N.; Bradshaw, J. S.; Zhang, X. X.; Song, H.; Savage, P. B.; Xue, G.; Krakowiak, K. E.; Izatt, R. M. "Syntheses and metal ion complexation of novel 8-hydroxyquinoline-containing diaza-18-crown-6 ligands and analogues" *J. Org. Chem.* **1999**, 64, 8855-8861.
19. Ijeri, V. S.; Srivastava, A. K. "Complexation of macrocyclic compounds with mono-, di- and tri- valent transition and heavy metal ions in 90% (v/v) DMSO+water medium" *Polyhedron* **2003**, 22, 569-574.
20. Ijeri, V. S.; Srivastava, A. K. "Complexation of macrocyclic compounds with metal ions: 1. Cd(II), Pb(II), Co(II), Mn(II), and Ag(II) ions in 40 vol % ethanol+water medium" *J. Chem. Eng. Data.* **2002**, 47, 346-350.
21. Bargossi, C.; Fiorini, M. C.; Montalti, M.; Prodi, L.; Zaccheroni, N. "Recent developments in transition metal ion detection by luminescent chemosensors"

- Coord. Chem. Rev.* **2000**, *208*, 17-32.
22. Vetrogon, V. I.; Lukyanenko, N. G.; Schwing-Weill, M. J.; Arnaud-Neu, F. "A PC compatible computer program for the calculation of equilibrium constants by the simultaneous processing of different sets of experimental results" *Talanta* **1994**, *41*, 2105-2112.
23. Kellner, R.; Mermet, J. -M.; Otto, M.; Widmer, H. M. *Analytical Chemistry*. Weinheim: Wiley-VCH, **1998**.
24. Christian, G. D.; O'Reilly, J. E. *Instrumental Analysis*, 2nd ed. Massachusetts: Allyn and Bacon, **1986**.
25. Skoog, D. A.; West, D. M.; Holler, F. J.; Crouch, S. R. *Analytical Chemistry: an introduction*, 7th ed. Florida: Harcourt, **2000**.
26. Christian, G. D. *Analytical Chemistry*, 5th ed. New York: John Wiley & Sons, **1994**.
27. Vogel, A. I. *A Text-Book of Quantitative Inorganic Analysis*, 3rd ed. Norfolk: Longman, **1975**.
28. Harris, D. C. *Quantitative Chemical Analysis*, 6th ed. New York: W. H. Freeman and Company, **2003**.
29. Ingri, N.; Kakolowicz, W.; Sillen, L. G.; Warnqvist, B. "High-speed computer as a supplement to graphical methods – V. Håltafall, a general program for calculating the composition of equilibrium mixtures" *Talanta* **1967**, *14*, 1261-1286.
30. Gans, P., Vacca, A.; Sabatini, A. "SUPERQUAD: an improved general program for computation of formation constants from potentiometric data" *J. Chem. Soc., Dalton Trans.* **1985**, 1195-1199.
31. Legett, D. J.; McBryde, W. A. E. "General computer program for the computation of stability constants from absorbance data" *Anal. Chem.* **1975**, *47*, 1065-1070.
32. Casnati, A.; Pochini, A.; Ungaro, R.; Ugozzoli, F.; Arnaud, F.; Fanni, S.; Schwing, M. -J.; Egberink, R. J. M.; De Jong, F.; Reinhoudt, D. "Synthesis, complexation, and membrane transport studies of 1,3-alternate calix[4]arene-crown-6 conformers: a new class of cesium selective ionophores" *J. Am. Chem. Soc.* **1995**, *117*, 2767-2777.
33. Ludyanenko, N. G.; Pastushok, V. N.; Bordunov, A. V.; Vetrogon, V. I.;

- Vetrogon, N. I.; Bradshaw, J. S. "New phenol-containing bis(azacrown-ether)s : synthesis and complexing properties" *J. Chem. Soc., Perkin Trans. 1* **1994**, 1489-1493.
34. Arnaud-Neu, F.; Barret, G.; Fanni, S.; Marrs, D.; McGregor, W.; McKervey, M. A.; Schwing-Weill, M. -J.; Vetrogon, V.; Wechsler, S. "Extraction and solution thermodynamics of complexation of alkali and alkaline-earth cation by calix[4]amides" *J. Chem. Soc., Perkin Trans. 2* **1995**, 453-461.
35. Arnaud-Neu, F.; Fuangwasdi, S.; Maubert, B.; Nelson, J.; McKee, V. "Binding Properties of Octaaminocryptands" *Inorg. Chem.* **2000**, *39*, 573-579.
36. Zhang, X. X.; Bordunov, A. V.; Bradshaw, J. S.; Dalley, N. K.; Kou, X.; Izatt, R. M. "A new highly selective macrocycle for K^+ and Ba^{2+} : effect of formation of a pseudo second macroring through complexation" *J. Am. Chem. Soc.* **1995**, *117*, 11507-11511.
37. Izatt, R. M.; Pawlak, K.; Bradshaw, J. S. "Thermodynamic and kinetic data for macrocycle interaction with cations, anions, and neutral molecules" *Chem. Rev.* **1995**, *95*, 2529-2586.
38. Rulíšek, L.; Havlas, Z. "Theoretical studies of metal ion selectivity. 1. DFT calculations of interaction energies of amino acid site chains with selected transition metal ions (Co, Ni, Cu, Zn, Cd, and Hg)" *J. Am. Chem. Soc.* **2000**, *122*, 10428-10439.
39. Rodriguez-Infante, C.; Esteban, D.; Avecilla, F.; de Blas, A.; Rodriguez-Blas, T.; Mahia, J.; Macedo, A. L.; Geraldés, C. F. G. C. "Copper complexes with bibracchial lariat ethers: from mono- to binuclear structure" *Inorg. Chim. Acta* **2001**, *317*, 190-198.
40. Izatt, R. M.; Bradshaw, J. S.; Nielsen, S. A.; Lamb, J. D.; Chirstensen, J. J. "Thermodynamic and kinetic data for cation-macrocycle interaction" *Chem. Rev.* **1985**, *85*, 271-339.
41. Caiazza, D.; Lincoln, S. F.; Ward, A. D. "A preparative study of some coronands and their complexation of silver(I), zinc(II), cadmium(II) and lead(II)" *Inorg. Chim. Acta* **2004**, *357*, 716-722.
42. Mousavi, M. F.; Sahari, S.; Alizadeh, N.; Shamsipur, M. "Lead ion-selective membrane electrode based on 1,10-dibenzyl-1,10-diaza-18-crown-6" *Anal. Chim. Acta* **2000**, *414*, 189-194.
43. Estaban, D.; Avecilla, F.; Plasas-Iglesias, C.; Mahia, J.; de Blas, A.; Rodriguez-

- Blas, T. "Lead(II) complexes with macrocyclic receptors derived from 4,13-diaza-18-crown-6" *Inorg. Chem.* **2002**, *41*, 4337-4347.
44. Lehn, J. -M.; Montavon, F. "4. Cryptates. XXV¹). Stability and selectivity of cation inclusion complexes of polyaza-macrobicyclic ligands. selective complexation of toxic heavy metal cations" *Helv. Chim. Acta* **1978**, *61*, 67-82.
45. Shriver, D. F.; Atkin, P. W. *Inorganic Chemistry*, 3rd ed. Oxford: Oxford University Press, **1999**.
46. Ma, S. -L.; Zhu, W. X. "Synthesis and crystal structure of copper complex of 7,16-bis(2-hydroxy-5-methyl-3-nitrobenzyl)-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane" *J. Mol. Struct.* **2002**, *643*, 141-146.
47. Chiu, Y. H.; Canary, J. W. "Stability and acidity constants for ternary ligand-zinc-hydroxo complexes of tetradentate tripodal ligands" *Inorg. Chem.* **2003**, *42*, 5107-5116.
48. Prodi, L.; Montalti, M.; Zaccheroni, N.; Bradshaw, J. S.; Izatt, R. M.; Savage, P. B. "Characterization of 5-chloro-8-methoxyquinoline appended diaza-18-crown-6 as a chemosensor for cadmium" *Tetrahedron Lett.* **2001**, *42*, 2941-2944.
49. Persson, E.; Henriksson, J.; Tjalve, H. "Uptake of cobalt from the nasal mucosa into the brain via olfactory pathways in rats" *Toxicol. Lett.* **2003**, *145*, 19-27.
50. Clark, S. J.; Donaldson, J. D.; Khan, Z. I. "Heavy metals in the environment. Part VI: Recovery of cobalt values from spent cobalt/manganese bromide oxidation catalyst" *Hydrometallurgy* **1996**, *40*, 381-392.
51. Ott, I.; Schmidt, K.; Kircher, B.; Schumacher, P.; Wiglenda, T.; Gust, R. "Antitumor-active cobalt-alkyne complexes derived from acetylsalicylic acid: studies on the mode of drug action" *J. Med. Chem.* **2005**, *48*, 622-629.
52. Danil de Namor, A. F.; Cardenas, J. D.; Bullock, J. I.; Garcia, A. A.; Brianso, J. L.; Rius, J.; Whitaker, C. R. "Thermodynamic, crystallographic and solvent extraction properties of cobalt(II), nickel(II) and copper(II) complexes of ethylenediamine-N,N,N',N'-tetraacetanilide" *Polyhedron* **1997**, *16*, 4323-4330.
53. Cai, L.; Xie, W.; Mahmoud, H.; Han, Y.; Wink, D. J.; Li, S.; O'Connor, C. J. "Synthesis and characterization of a constricted and rigid ligand system for five-coordinate binuclear complexes" *Inorg. Chim. Acta* **1997**, *263*, 231-245.

54. Yordanov, A. T.; Roundhill, D. M. "Solution extraction of transition and post-transition heavy and precious metals by chelate and macrocyclic ligands" *Coord. Chem. Rev.* **1998**, *170*, 93-124.
55. Zhang, X. X.; Krakowiak, K. E.; Xue, G.; Bradshaw, J. S.; Izatt, R. M. "A highly selective compound for lead: complexation studies of decamethylcucubit[5]uril with metal ions" *Ind. Eng. Chem. Res.* **2000**, *39*, 3516-3520.
56. Yang, X.; Hibbert, D. B.; Alexander, P. W. "Continuous flow analysis of lead (II) and mercury(II) with substituted diazacrown ionophore membrane electrodes" *Talanta* **1997**, *45*, 155-165.
57. Su, N.; Bradshaw, J. S.; Savage, P. B.; Krakowiak, K. E.; Izatt, R. M.; De Wall, S. L.; Gokel, G. W. "Syntheses and aggregate study of bisphenol-containing diaza-18-crown-6 ligands" *Tetrahedron* **1999**, *55*, 9737-9742.



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