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Referências Bibliográficas

[1] Young, J. A.; Chemistry, A Human Concern; Macmillan Publishing Co., Inc., New York, 439 (1978).

[2] Freeman, B. A., and Crapo, J. D.; Biology of Disease: Free Radicals and Tissue Injury; Lab. Investigation, vol. 47, nº 5, 412-26 (1982).

[3] Harman, D.; Prolongation of life: role of Free Radical Reaction in Aging, The Journal of the American Geriatrics Society, vol. 17, nº 8 (1969).

[4] Miranda, J. L.; Estudo da Complexação do ácido Guanidoacético com os íons Mn(II), Co(II), Ni(II), Cu(II), Cd(II) e Pb(II); Mestrado – PUC-Rio (1994).

[5] Vogel, A. I.; Química Analítica Qualitativa; Editora Mestre Jou, SP – quinta edição (1981).

[6] The Merck Index; twelfth edition (1996).

[7] Burger, K.; Biocoordination Chemistry: Coordination Equilibria in Biologically Active Systems; Elis Horwood Ltd, New York, 59-68 (1990).

[8] Stryer, L. Bioquímica; Guanabara Koogan, Rio de Janeiro (1996).

[9] Biochemical and Biophysical Research Communications; 343, 401-406 (2006).

[10] Takeda, Micho; Japan J. Nephrol; 32(2), 117-26 (1990).

[11] Zubay, G.; Biochemistry; Addison Wesley Publishing Company, U.S.A., 883-885 (1986).

[12] Cohen, S.; Biol. Chem.; 93, 851 (1951).

[13] Costa, E. C.; Estudo da Influência das Estruturas dos Aminoácidos na Complexação com Íons de Importância Biológica; Doutorado – PUC-Rio (1999).

[14] Frieden, E.; Biochemistry of the Essential Ultratrace Elements; Plenun Press, New York and London, 426 (1984).

[15] N. N. Greenwood & A. Earnshaw; Chemistry of the Elements; segunda edição (1997).

[16] Baran, E. J.; Química Bioinorgânica; McGraw-Hill / Interamericana de España, S.A., Madrid, 321 (1994).

[17] Otto Alcides Ohlweiler; Química Inorgânica; Editora Edgard Blucher Ltda – vol II, primeira edição (1973).

[18] Sharpe, A. G.; Inorganic Chemistry; Longman, U.S.A., 2nd Ed. (1986).

[19] Wilcox; Chemical Reviews; 96(7) 2436 (1996).

[20] Fenton, D. E.; Biocoordination Chemistry; Oxford University Press, New York, U.S.A. (1995).

[21] Jabri, E., Carr, M. B., Hausinger, R. P., Carpus, P. A.; Science; 216, 998 (1995).

[22] Sóvágó, I., Kiss, T. and Gergely A.; Critical Survey of the Stability Constants of Complexes of Aliphatic Amino Acids; Pere & Appl. Chem., vol. 65, nº 5, 1029-80 (1993).

[23] Burger, K.; Biocoordination Chemistry: Coordination Equilibria in Biologically Active Systems; Ellis Horwood, London, 349 (1990).

[24] Paniago, E. B. e Carvalho, S.; Determinação de Constantes de Formação de Complexos Metálicos em Soluções Aquosas Através de Medidas de Concentração Hidrogeniônica; Química Nova, 11(4), 406-411 (1988).

[25] Pastushenko, V. A.; A Correlation between the Genetic Code and the Structure and Electrical Properties of Bio Amino Acids; Bioelectrochemistry and Bioenergetics, 44, 23-9 (1997).

[26] Brookes, G. & Pettit, L. D.; J. Chem. Soc. Dalton Trans.; 42 (1976).

[27] Ennor, A. H. & Monisou, J. F.; Physiol. Rev.; 38, 631-674 (1954).

[28] Sugiyama, K., Ohishi, A., Siyo, H. & Takenchi, H.; J. Nutr. Sci. Vitaminol.; 35(6), 623-26 (1989).

[29] Kussis, A. & Mookerje, S.; Nutr. Rev.; 36, 201-207 (1978).

[30] Desantiago S., Torres, N. and Tovar, A., R.; Leucine Catabolism in Mammary Tissues, Liver and Skeketal Muscle of Rat During Lactation and Weaning; Archives of Medical Research, vol. 29, nº 1, 25-32 (1998).

[31] Perkampus, H. H.; UV-VIS Spectroscopy and Its Applications; Springer laboratory (1992).

[32] Sabatini, A., and Vacca A.; Superquad: an Improved General Program for Computation of Formation Constants from Potentiometric Data; J. Chem. Soc. Dalton Trans., 1195-200 (1985).

[33] Harris, D. C.; Análise Química Quantitativa; Editora LTC, RJ – quinta edição (2001).

[34] Cowan, J. A. Inorganic Biochemistry – Na Introduction; New York, VCH Publishers (1993).

[35] Atkins, P. W. Físico-Química; Rio de Janeiro, LTC (1999).

[36] J. Bolzan, A. Arvia; Eletrochimica Acta; 7 / 589 (1962).

[37] S. Musso, G. Anderegg, H. Ruegger; Inorg. Chem.; 34, 3329 (1995).

[38] A. Gergely, I. Sovago, I. nagypal, R. Kiraly; Inorg. Chim. Acta; 6, 435 (1972).

[39] A. Wojciechowska, L. Lornozik et al; Monatsh. Chem.; 118, 1317 (1987).

[40] R. Mittal, CM Chandra, A. Dey; Monatsh. Chem.; 109, 953 (1978).

[41] Baes, C. F., Mesmer, R. E.; The Hydrolysis of Cátions; Wiley, New York (1976).

[42] Z. Anwar, H. Azab; J. Chem. Eng. Data; 44, 1151 (1999).

[43] D. Williams; J. Chem. Soc. Dalton Trans; 1064 (1973).

[44] Miranda, J. L.; Estudo de Complexos Mistos do ácido Guanidoacético com os ácidos Glutâmico, Aspartico e a Glicina, envolvendo os íons Co(II), Ni(II) e Zn(II); Doutorado – PUC-Rio (1999).

[45] N. Milic, Z. Bugarcic, M. Vasic; Bull. Soc. Chim. Beograd.; 44, 209 (1981)

[46] M. Hhalil, A. Attia; J. Chem. Eng. Data; 45, 1108 (2000).

[47] A. Sychev; Zh. Neorg. Khim.; 9, 1270 (1964).

[48] L. Lomozik, A. Gasowska, L. Bolewski; J. Inorg. Biochem.; 63, 191 (1996).

[49] L.Lomozik, L., Jastrzab, R. e Gasowska, A.,; Polyhedron.;19, 1145-1154 (2000).

[50] L.Lomozik, L. e Gasowska, A.,; J. Inorg. Biochem; 72, 37-47 (1998).

[51] L.Lomozik, L., Gasowska, A. e Bolewsky, L.; J. Inorg. Biochem.; 63, 191-206 (1996).

[52] L.Lomozik, L. e Gasowska, A.; J. Inorg. Biochem.; 62, 103-115 (1996).

[53] Figgis, B. N.; Introduction to Ligand Fields; Interscience, New York, 161, 223-225 (1986).

[54] Lever, A. B. P.; Inorganic Eletronic Spectroscopy; Elsevier Publishing Company, Amsterdan, London & New York (1968).

11
Anexos

11.1.
Dados potenciométricos

Tabela 17 Titulação potenciométrica dos ligantes puros (Gly, Ser, Asp e Gaa).

V (KOH) mL	pH (Gly)	pH (Ser)	pH (Asp)	pH (Gaa)
0,00	2,885	2,854	3,350	2,984
0,05	2,906	2,876	3,391	3,007
0,10	2,932	2,900	3,437	3,036
0,15	2,958	2,926	3,486	3,065
0,20	2,989	2,954	3,534	3,096
0,25	3,018	2,983	3,588	3,127
0,30	3,053	3,015	3,642	3,164
0,35	3,088	3,047	3,698	3,200
0,40	3,126	3,084	3,756	3,240
0,45	3,169	3,124	3,819	3,285
0,50	3,213	3,169	3,885	3,332
0,55	3,266	3,219	3,960	3,384
0,60	3,325	3,273	4,033	3,442
0,65	3,388	3,334	4,120	3,507
0,70	3,463	3,407	4,213	3,579
0,75	3,557	3,493	4,324	3,670
0,80	3,673	3,594	4,455	3,771
0,85	3,829	3,736	4,626	3,901
0,90	4,081	3,939	4,886	4,094
0,95	4,630	4,337	5,444	4,389
1,00	6,469	6,309	7,640	5,444
1,05	8,116	7,729	8,519	9,193
1,10	8,558	8,120	8,811	9,770
1,15	8,793	8,337	9,000	10,042
1,20	8,962	8,492	9,137	10,217
1,25	9,091	8,618	9,262	10,355
1,30	9,201	8,732	9,368	10,459
1,35	9,302	8,830	9,456	10,547
1,40	9,389	8,921	9,537	10,617
1,45	9,471	9,012	9,617	10,678
1,50	9,548	9,094	9,688	10,732

Tabela 18 Titulação potenciométrica dos sistemas binários de Co(II).

V (KOH) mL	pH (Co-Gly)	pH (Co-Ser)	pH (Co-Asp)	pH (Co-Gaa)
0,0	6,710	6,309	3,433	7,366
0,1	6,674	6,295	3,530	7,369
0,2	6,718	6,355	3,625	7,395
0,3	6,809	6,511	3,727	7,432
0,4	7,108	6,881	3,840	7,475
0,5	7,369	7,171	3,962	7,521
0,6	7,585	7,376	4,068	7,570
0,7	7,791	7,597	4,212	7,619
0,8	7,976	7,804	4,406	7,672
0,9	8,125	7,982	4,651	7,725
1,0	8,248	8,152	5,030	7,780
1,1	8,364	8,280	5,445	7,838
1,2	8,470	8,401	5,796	7,899
1,3	8,567	8,511	6,072	7,962
1,4	8,658	8,607	6,324	8,028
1,5	8,750	8,701	6,564	8,099
1,6	8,840	8,791	6,791	8,176
1,7	8,937	8,880	7,057	8,262
1,8	9,040	8,974	7,361	8,361
1,9	9,149	9,071	7,724	8,511
2,0	9,275	9,170	8,275	8,955
2,1	9,415	9,275	8,850	9,653
2,2	9,557	9,384	8,981	10,086
2,3	9,701	9,499	9,101	10,350
2,4	9,846	9,618	9,193	10,523
2,5	9,971	9,732	9,307	10,663
2,6	10,095	9,854	9,403	10,779
2,7	10,209	9,972	9,532	10,872
2,8	10,316	10,090	9,671	10,949
2,9	10,441	10,199	9,813	11,014

Tabela 19 Titulação potenciométrica dos sistemas ternários de Co(II).

V (KOH) mL	pH (Co-Gly-Ser)	pH (Co-Gly-Asp)	pH (Co-Gly-Gaa)	pH (Co-Ser-Gaa)
0,0	5,590	3,467	7,040	7,102
0,1	6,416	3,540	6,990	7,026
0,2	6,733	3,623	7,024	7,036
0,3	6,954	3,712	7,102	7,084
0,4	7,128	3,806	7,252	7,168
0,5	7,287	3,914	7,497	7,278
0,6	7,432	4,031	7,700	7,478
0,7	7,556	4,174	7,877	7,663
0,8	7,685	4,341	8,056	7,842
0,9	7,813	4,583	8,200	8,020
1,0	7,934	4,911	8,322	8,181
1,1	8,060	5,392	8,436	8,303
1,2	8,184	5,807	8,537	8,422
1,3	8,307	6,105	8,628	8,528
1,4	8,442	6,341	8,714	8,625
1,5	8,580	6,552	8,799	8,715
1,6	8,717	6,746	8,885	8,805
1,7	8,866	6,933	8,976	8,895
1,8	9,015	7,124	9,071	8,985
1,9	9,158	7,313	9,174	9,080
2,0	9,285	7,508	9,285	9,177
2,1	9,373	7,685	9,409	9,281
2,2	9,470	7,872	9,549	9,393
2,3	9,550	8,056	9,692	9,503
2,4	9,600	8,230	9,820	9,617
2,5	9,653	8,401	9,948	9,734
2,6	9,732	8,568	10,074	9,852
2,7	9,820	8,726	10,190	9,971
2,8	9,851	8,890	10,294	10,087
2,9	9,923	9,054	10,390	10,197

Tabela 20 Titulação potenciométrica do nitrato de níquel(II).

V (KOH) mL	pH (Ni)
0,0	5,861
0,1	7,706
0,2	8,009
0,3	8,133
0,4	8,213
0,5	8,253
0,6	8,280
0,7	8,306
0,8	8,329
0,9	8,351
1,0	8,373
1,1	8,392
1,2	8,406
1,3	8,423
1,4	8,440
1,5	8,457
1,6	8,472
1,7	8,490
1,8	8,506
1,9	8,523
2,0	8,542
2,1	8,561
2,2	8,581
2,3	8,602
2,4	8,623
2,5	8,644
2,6	8,673
2,7	8,705
2,8	8,735
2,9	8,771
3,0	8,805

Tabela 21 Titulação potenciométrica dos sistemas binários de Ni(II).

V (KOH) mL	pH (Ni-Gly)	pH (Ni-Ser)	pH (Ni-Asp)	pH (Ni-Gaa)
0,0	5,421	4,740	3,334	7,472
0,1	5,767	5,236	3,374	8,035
0,2	5,970	5,540	3,419	8,141
0,3	6,140	5,750	3,464	8,182
0,4	6,283	5,920	3,512	8,217
0,5	6,412	6,044	3,560	8,239
0,6	6,533	6,190	3,611	8,265
0,7	6,654	6,304	3,660	8,288
0,8	6,761	6,417	3,720	8,315
0,9	6,876	6,532	3,776	8,330
1,0	6,983	6,640	3,835	8,358
1,1	7,098	6,753	3,900	8,378
1,2	7,217	6,867	3,962	8,393
1,3	7,342	6,979	4,028	8,413
1,4	7,479	7,105	4,104	8,432
1,5	7,626	7,230	4,177	8,447
1,6	7,800	7,374	4,253	8,466
1,7	8,019	7,537	4,338	8,480
1,8	8,289	7,742	4,424	8,495
1,9	8,562	8,021	4,515	8,511
2,0	8,626	8,394	4,614	8,525
2,1	8,644	8,750	4,711	8,545
2,2	8,665	8,866	4,812	8,564
2,3	8,693	8,943	4,910	8,580
2,4	8,716	8,989	5,013	8,604
2,5	8,741	9,005	5,120	8,615
2,6	8,773	9,042	5,223	8,638
2,7	8,800	9,073	5,332	8,667
2,8	8,833	9,116	5,436	8,693
2,9	8,877	9,133	5,553	8,728
3,0	8,943	9,174	5,670	8,752
3,1	-	9,215	5,845	-
3,2	-	9,276	5,986	-
3,3	-	-	6,137	-
3,4	-	-	6,325	-
3,5	-	-	6,510	-
3,6	-	-	6,721	-
3,7	-	-	6,981	-
3,8	-	-	7,296	-
3,9	-	-	7,925	-
4,0	-	-	8,380	-

Tabela 22 Titulação potenciométrica dos sistemas ternários de Ni(II).

V (KOH) mL	pH (Ni-Gly-Ser)	pH (Ni-Gly-Asp)	pH (Ni-Gly-Gaa)	pH (Ni-Ser-Gaa)
0,0	5,088	3,419	5,382	4,894
0,1	5,335	3,458	5,623	5,317
0,2	5,523	3,500	5,867	5,588
0,3	5,658	3,544	6,032	5,801
0,4	5,780	3,588	6,186	5,957
0,5	5,899	3,637	6,301	6,094
0,6	6,004	3,686	6,440	6,223
0,7	6,098	3,734	6,556	6,340
0,8	6,182	3,791	6,670	6,457
0,9	6,263	3,844	6,780	6,571
1,0	6,345	3,904	6,891	6,680
1,1	6,427	3,961	7,011	6,787
1,2	6,503	4,025	7,129	6,898
1,3	6,580	4,092	7,258	7,012
1,4	6,653	4,161	7,393	7,140
1,5	6,725	4,240	7,544	7,277
1,6	6,798	4,318	7,706	7,424
1,7	6,872	4,402	7,914	7,589
1,8	6,945	4,493	8,142	7,803
1,9	7,020	4,586	8,385	8,073
2,0	7,096	4,676	8,663	8,445
2,1	7,171	4,772	8,639	8,734
2,2	7,244	4,867	8,622	8,889
2,3	7,327	4,964	8,631	8,981
2,4	7,413	5,059	8,640	9,015
2,5	7,496	5,157	8,663	9,066
2,6	7,582	5,264	8,701	9,082
2,7	7,674	5,362	8,733	9,138
2,8	7,767	5,463	8,752	9,149
2,9	7,868	5,558	8,790	9,182
3,0	7,976	5,668	8,840	9,208
3,1	8,083	5,807	-	-
3,2	8,196	5,926	-	-
3,3	8,324	6,055	-	-
3,4	-	6,177	-	-
3,5	-	6,315	-	-
3,6	-	6,448	-	-
3,7	-	6,578	-	-
3,8	-	6,706	-	-
3,9	-	6,830	-	-
4,0	-	6,957	-	-