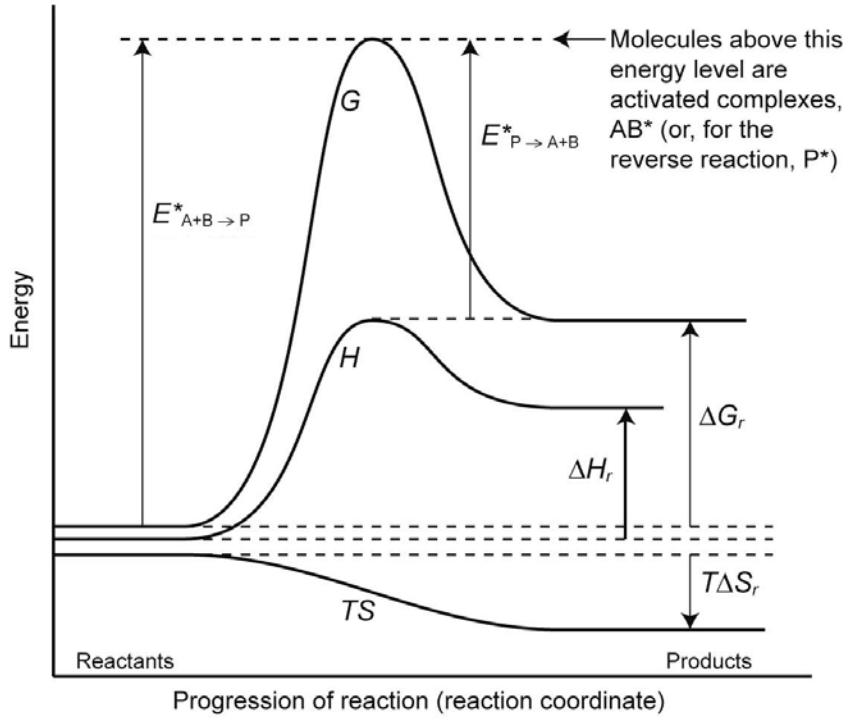
<table>
<tr><td>Chapter 1</td><td></td></tr>
<tr><td>p.27</td><td>In the last line of the paragraph after Equation (1.18b), the last phrase should be: one ohm^{-1} is defined as one Siemen (S).</td></tr>
<tr><td>pp.31–34</td><td>Complete updated problems are provided in a separate file.</td></tr>
<tr><td>Chapter 2</td><td></td></tr>
<tr><td>p.55</td><td>In the table at the bottom of the page, the values of log γ, γ, and Activity for Ca^{2+} should be –0.089, 0.814, and 8.14×10^{-5}, respectively. The corrected table appears below:
<table>
<tr><th>Ion</th><th>Size Parameter a</th><th>log γ</th><th>γ</th><th>Activity</th></tr>
<tr><td>Na^+</td><td>4</td><td>–0.0230</td><td>0.948</td><td>1.90×10^{-3}</td></tr>
<tr><td>Cl^-</td><td>3</td><td>–0.0230</td><td>0.948</td><td>1.14×10^{-3}</td></tr>
<tr><td>Ca^{2+}</td><td>6</td><td>–0.089</td><td>0.814</td><td>8.14×10^{-5}</td></tr>
<tr><td>HCO_3^-</td><td>4</td><td>–0.0230</td><td>0.948</td><td>9.48×10^{-4}</td></tr>
</table></td></tr>
<tr><td>pp.73–75</td><td>Complete updated problems are provided in a separate file.</td></tr>
<tr><td>Chapter 3</td><td></td></tr>
<tr><td>p.81</td><td>In the second line of the paragraph above Equation (3.1), delete the word “negative.” Sentence should read:

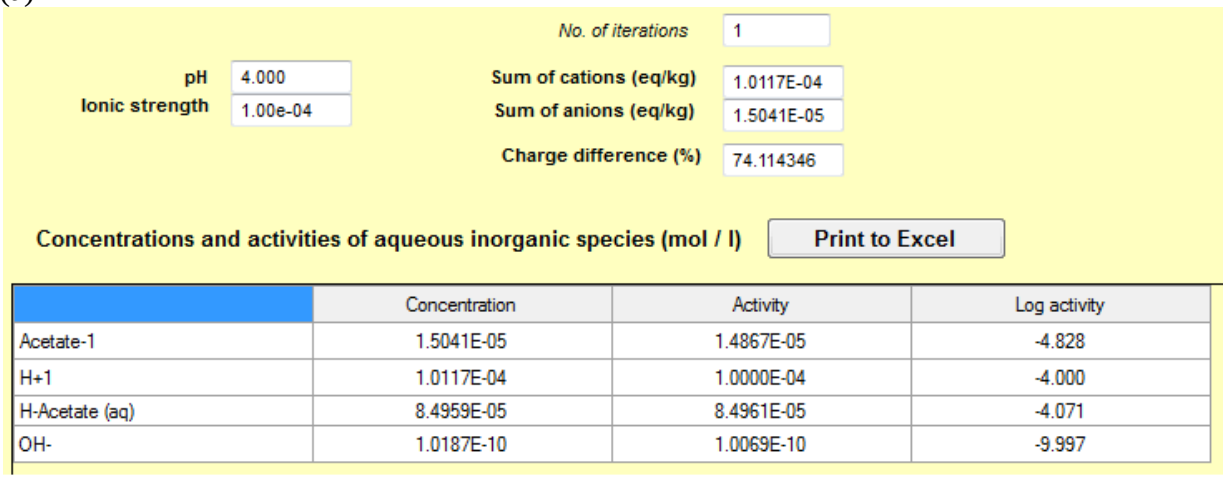
Figure 3.1 includes three curves — one for the enthalpy (H) of the molecules, one for the product of the system temperature and the entropy (S) of the molecules, and one for their Gibbs energy (G).</td></tr>
<tr><td>p.82</td><td>In Figure 3.1, the two E* terms are reversed. The term on the far left should be $E^*_{A+B \rightarrow P}$ and the term on the right should be $E^*_{P \rightarrow A+E}$
The corrected figure appears below:
 
</td></tr>
<tr><td>pp.122–130</td><td>Complete updated problems are provided in a separate file.

The revised Problem 19 is available on the book’s webpage at waveland.com.</td></tr>
</table>

Chapter 3	**(continued)**
p.126 Problems	In Problem 12, the rate constant in line 8 has incorrect units. The expression should be $k = 10^{-3.2}\ \text{atm}^{-1} \cdot \text{s}^{-1}$, not $k = 10^{-3.2}\ \text{atm}^{-1} \cdot \text{d}^{-1}$.
p.128 Problems	In Problem 19, in the drawing of the reaction scheme, the formula for *DMA* (the chemical that initiates the reaction) should be $(CH_3)_2NH$, not $(CH_3)NH$. Also, a revised version of this question using an updated version of the reaction scheme is available on the book's webpage at waveland.com.
Chapter 4	
p.187	At the end of Example 4.9, the terms on the right side should be reversed, and all the minus signs should be plus signs. The equations should be: $\overline{G}^{\circ}_{O_2(aq)} = \Delta\overline{G}^{\circ}_r + \overline{G}^{\circ}_{O_2(g)}$ $= (16.32 + 0)\frac{\text{kJ}}{\text{mol}} = +16.32\frac{\text{kJ}}{\text{mol}}$
p.205	In Equations (4.130) and (4.131), the minus signs on the right sides of the equations should be deleted. In Equation (4.143) at bottom of page, the first term in parentheses should be $1/T_1$, not $1/T_2$.
pp.206–214	**Complete updated problems are provided in a separate file.**
Chapter 5	
p.225	In Table 5.1, pK_{a3} for Arsenic acid should be 11.80.
p.233	Figure 5.11 caption, line 5: formed by reaction of the molecule "in part (a)"… should be … "in part (b)"…
p.244	In the legend, top curves should be labeled 2e–3, not 3e–3.
p.272	Mass balance on *TOT*Na should be: *TOT*Na = $10^{-3.0}$ = (Na^+)
p.274	pH value for the solution of 10^{-3} *M* NaPr should be 7.93 and not 7.60; in following paragraph, change 7.95 to 7.93.
pp.284–290	**Complete updated problems are provided in a separate file.**
Chapter 6	
p.331	In the last column of the table (Ex. 6.10), the third numerical entry should be 1.0×10^{-2} and the last two entries should be zero.
pp.345–352	**Complete updated problems are provided in separate file.**
Chapter 7	
p.366	The equations at the top of p.366 are incorrect. Replace that material with the following content: $[\text{HAc}]_{\text{added}} = [\textbf{Acetate} - \textbf{1}]_{\text{eq}} - [\textbf{Acetate} - \textbf{1}]_{\text{in,init}} = 1.1934\times10^{-3} - 1.0\times10^{-4}$ $= 1.0934\times10^{-3}$ $[\text{HAc}]_{\text{added}} = [\textbf{H}^+]_{\text{eq}} - [\textbf{H}^+]_{\text{in,init}} = 1.0934\times10^{-3} - 0 = 1.0934\times10^{-3}$

Chapter 7	**(continued)**
p.367	In Figure 7.6 the table values and the caption are incorrect, as well as the equations and numerical values in the paragraph below the figure. Corrected material appears below:

(a)



No. of iterations	1
pH	4.000
Ionic strength	1.00e-04
Sum of cations (eq/kg)	1.0117E-04
Sum of anions (eq/kg)	1.5041E-05
Charge difference (%)	74.114346

Concentrations and activities of aqueous inorganic species (mol / l) Print to Excel

	Concentration	Activity	Log activity
Acetate-1	1.5041E-05	1.4867E-05	-4.828
H+1	1.0117E-04	1.0000E-04	-4.000
H-Acetate (aq)	8.4959E-05	8.4961E-05	-4.071
OH-	1.0187E-10	1.0069E-10	-9.997

(b)

Distribution of components between dissolved, sorbed and precipitated phases
(Concentrations in molal)

Component	Total dissolved	% dissolved	Total sorbed	% sorbed	Total precipitated	% precipitated
Acetate-1	1.0000E-04	100.000	0	0.000	0	0.000
H+1	1.8613E-04	100.000	0	0.000	0	0.000

Figure 7.6. Output screens for a system containing 10^{-4} *M* HAc which is then adjusted to pH 4.0 by addition of strong acid. (a) Overall summary of solution composition; (b) Equilibrated mass distribution.

Once again, we can compute the amount of reagent added by writing the mass balance, this time on $\mathbf{H}^+$:

$$[\mathrm{HCl}]_{\mathrm{added}} = [\mathbf{H}^+]_{\mathrm{eq}} - [\mathbf{H}^+]_{\mathrm{in,init}} = 1.861\times10^{-4} - 1.00\times10^{-4} = 8.61\times10^{-5}$$

Of the 1.861×10^{-4} *M TOT***H** in the equilibrium solution, 1.012×10^{-4} *M* is present as free H^+ (i.e., H_3O^+), generating an H^+ activity of $10^{-4.0}$. The rest of the *TOT***H** (8.496×10^{-5} *M*) is bound with acetate in HAc molecules. As expected, since the pH of 4.0 is lower than pK_a for HAc (4.74), the protonated species is present at a larger activity (8.496×10^{-5}) than deprotonated Ac^- (1.487×10^{-5}).

Chapter 8	
p.389	In Figure 8.4(b), the labels for HAc and Ac^- should be switched with those for NH_4^+ and NH_3, respectively.
p.392	In the fourth line of the first paragraph of the Solution, 3.1 should be 3.16; in the ninth line, 3.00 should be 3.16; and in the last line, 2.08 should be 2.10. In the summary at the end of the solution, the value in the first row should be 0.32×10^{-3} and the value at the bottom should be 5.58×10^{-3}.
p.403	In third paragraph, line 5, delete “wide”
p.407	Broken line in graph should be at pH 6.8 and pass through intersection of two titration curves.

Chapter 8	**(continued)**
p.410	The units in the denominator of Equation (8.6) should be mol/L, not equiv/L, and the half-sentence following the equation ("where the number . . . fully protonated.") should be deleted.
p.422	In the last sentence on the page, $10^{-4.7}$ should be $10^{-4.5}$.
p.425	In Table 8.6, row (h), the value in the ALK column should be 3.01, not 2.51.
p. 427	In Equation (8.21b), insert a coefficient "2" before α_2.
p.432	In the equation at the bottom of the page, the signs on the (H^+) and (OH^-) terms are reversed. The equation should read: $$TOTH = 2H_2CO) + (HCO_3^-) - (OH^-) + (H^+)$$
p.452-453	Throughout the example, 9.25 should be 9.24. In the table, the values of 0.01 and 0.99 in the NH_3 column should be reversed.
pp.457–468	**Complete updated problems are provided in a separate file.**
Chapter 9	
p.480	In the equation shown for part (b), the $c_{L,\,i}$ in the first fraction should be $c_{L,\,i'}$ and the $c_{L,\,i'}$ in the second fraction should be $c_{L,\,i}$.
p.490	Denominator in final equation in Ex 9.3b should be 730, not 769, and result should be 12.0, not 14.9.
p.506	In the first full paragraph, after "can be input", add ", and the species name must end with '(g)'".
pp.519–525	**Complete updated problems are provided in separate file.**
Chapter 10	
p.534	The log *K* values for Reactions (10.4) through (10.11) have been updated to be consistent with the Visual Minteq database. These values should be, respectively: 3.90, 3.81, 0.99, 0.01, 7.71, 8.71, –10.19, and –33.30.
p.535–536 and 542–544	The values in Tables 10.2 and 10.3 have been updated to be consistent with the Visual Minteq database. These tables also appear in the appendices as A.4 and A.5. Complete revised versions of these tables are provided at the end of this document.
p.536	The log *K* values for the four reactions near the bottom of the page have been updated to be consistent with the Visual Minteq. The updated values are –10.10, –10.19, –13.01, and –13.99, respectively.
p.539	Eq. 10-21 to 10-27: The log *K* values for the seven reactions at the top of the page have been updated to be consistent with the Visual Minteq. The updated values are 2.214, 2.284, 2.364, 2.204, 4.498, 6.862, and –7.030, respectively.
p.542	See end of file for corrected copy of Table 10.3
p.546	At end of penultimate paragraph, change "10.08" to "10.10" and "10.27" to "10.19".
p.561	Table 10.6: In the expressions for *K* for reactions 9 and 10, delete the '/'.
pp.567–573	**Complete updated problems are provided in separate file.**

Chapter 11	
p.581	Table 11.1: log K_{s0} for $Al(OH)_3(am)$ is –31.20, not –31.10.
pp.649–660	**Complete updated problems are provided in a separate file.**
p.652 Problems	In Problem 22, line 5, change $Zn(OH)_2(s)$ to $Zn(OH)_2(am)$.
Chapter 12	
all pages	Change 0.059 to 0.0592 throughout chapter
p.665	In Solution, the coefficient of 6 should precede $\bar{G}^{o}_{O_2(aq)}$, not $\bar{G}^{o}_{C_6H_{12}O_6}$.
p.677	Table 12.3: Data for $Pb^{4+} \rightarrow Pb^{2+}$ should be $\log K = 57.28$, $pe^o = 28.64$, and $E_H^o = 1690$. On p.678, $\log K$ for $Ag^+ \rightarrow Ag(s)$ should be 13.507.
p.678	Final reaction in middle of page should have 10 H^+ (not 9 H^+) as a reactant and $H_2S(aq)$ (not HS^-) as a product.
p.682	In the expression for $\{Cu^+\}/\{Cu^{2+}\}$ near the bottom of the page, $10^{2.72}$ should be $10^{2.69}$, and $10^{-25.92}$ should be $10^{-25.95}$. Two lines lower, in the expression for $\{Co^{2+}\}/\{Co^{3+}\}$, $10^{33.1}$ should be $10^{32.4}$, and $10^{2.46}$ should be $10^{3.76}$.
p.684	In table near top of page, pK_{a3} for H_3AsO_4 should be 11.80. In middle reaction near the bottom of the page, $10^{-7.6}$ should be $10^{-6.7}$. In subsequent two equations, 3.71×10^{43} should be 1.18×10^{39}. Then, in equation at bottom of page and in paragraph at top of p.685, –0.80 should be +1.45.
p.686	The following sentence should be added to the answer to part (a) at the bottom of the page: The half-reaction for oxidation of NH_3 can be obtained by adding the "K_a" reaction for NH_4^+/NH_3 to the half-reaction shown in Table 12.3 for the NO_3^-/NH_4^+ couple.
p.687	In part (ii) Cl_2/CH^- : In the first reaction shown, the product should be Cl^-, not $½Cl^-$ (see below) $½Cl_2\ (aq) + e^- \leftrightarrow Cl^-$ In the third reaction shown, insert a + sign between Cl^- and $½\ OCN^-$ on the product side (see below) $½Cl_2\ (g) + ½CN^- + OH^- \leftrightarrow Cl^- + ½OCN^- + ½H_2O$ In the last sentence before equation (12.22), omit the word "log" before variable *K*. The sentence should read By definition, $e°$ equals *K* for the oxidation reaction, so we can write:
p.698–99	In line 4 of Example 12.10, $10^{45.61}$ should be $10^{35.4}$, $10^{52.63}$ should be $10^{43.6}$, and $Fe(CN)_6^{3-}$ should be $Fe(CN)_6^{4-}$. (Note that the species $Fe(CN)_6^{3-}$ on the subsequent line is correct.) Correspondingly, the log *K* values for the reactions at the top of p.699 should be 35.4 for the second reaction, –43.6 for the third reaction, and 4.83 (instead of 6.01) for the overall reaction. Also, in the second reaction, the reactant Fe^{3+} should be Fe^{2+}. And, in the final paragraph of the solution, $10^{-6.01}$ should be $10^{-4.83}$, and >6.01 should be >4.83.

Chapter 12	**(continued)**
p.717	Revise final paragraph as follows: To account for the redox reactions and conditions, we "Add" the Cu+/Cu^{2+} couple from the "Redox" menu and use the "Parameters/Specify pe and Eh" menu to indicate that the program should calculate the equilibrium pe. Lacking insight into what we expect the pe to be, we can leave the guess at the default value of 0. Finally, because the problem statement specifies that the solution reaches equilibrium with both nantokite and metallic copper, we specify that both of these solids are present as "infinite solid phases" via the "Solid phases and excluded species" menu.
p.731	In Equation (12.78b), change mV to V.
p.736	In Row 1, move "= –2.303" to second line. Add new footnote: (b) "Note that {Red} and {Ox} refer to the products of all terms on the reduced and oxidized sides of the reaction, other than e^-." Change footnote (b) to (c), and change "of the oxidation and reduction half-reactions" to "of the half-reactions for the oxidant and reductant."
pp.757–768	**Complete updated problems are provided in a separate file.**
p.759 Problems	In Problem 9, line 1, change S(*s*) to SO_3^{2-}.
Chapter 13	
pp.841–845	**Complete updated problems are provided in a separate file.**
Appendices	
p.858–859	Appendix A.4: See following pages for corrected table 10.2.
p.860-862	Appendix A.5: See end of file for corrected table 10.3.
Index	For index entries referring to pages shown in the range 664–770 (Chapter 12), subtract 2 from the page numbers shown. For entries referring to pages shown in the range 763–838 (Chapter 13), add 7 to the page numbers shown.

Table 10.2 – p 535 and Appendix A.4, p.858

Table 10.2 Stability constants for complexation of metals by OH^-.

	i	$\log K_i$	$\log^* K_i$	$\log \beta_i$	$\log^* \beta_i$
Ag^+	1	2.00	−12.00	2.00	−12.00
	2	2.00	−12.00	4.00	−24.00
Al^{3+}	1	9.00	−5.00	9.00	−5.00
	2	8.71	−5.29	17.71	−10.29
	3	7.60	−6.40	25.31	−16.69
	4	7.69	−6.31	33.00	−23.00
Ca^{2+}	1	1.30	−12.70	1.30	−12.70
Cd^{2+}	1	3.90	−10.10	3.90	−10.10
	2	3.81	−10.19	7.71	−20.29
	3	0.99	−13.01	8.70	−33.30
	4	0.01	−13.99	8.71	−47.29
Co^{2+}	1	4.30	−9.70	4.30	−9.70
	2	4.91	−9.09	9.21	−18.79
	3	1.30	−12.70	10.51	−31.49
Cr^{3+}	1	10.43	−3.57	10.43	−3.57
	2	7.73	−6.27	18.16	−9.84
	3	7.65	−6.35	25.81	−16.19
	4	2.54	−11.46	28.35	−27.65
Cu^{2+}	1	6.50	−7.50	6.50	−7.50
	2	5.27	−8.73	11.77	−16.23
	3	3.59	−10.41	15.36	−26.64
	4	0.91	−13.09	16.27	−39.73
Fe^{2+}	1	4.60	−9.40	4.60	−9.40
	2	2.91	−11.19	7.51	−20.49
	3	3.50	−10.50	11.01	−30.99
Fe^{3+}	1	11.98	−2.02	11.98	−2.02
	2	10.27	−3.73	22.25	−5.75
	3	4.75	−9.25	27.00	−15.00
	4	6.30	−7.70	33.30	−22.70

Table 10.2, continued – p 536 and Appendix A.4, p.859

Table 10.2 – *Continued from previous page*

	i	$\log K_i$	$\log^* K_i$	$\log \beta_i$	$\log^* \beta_i$
Hg^{2+}	1	10.60	−3.40	10.60	−3.40
	2	11.24	−2.76	21.84	−6.16
Mg^{2+}	1	2.58	−11.42	2.58	−11.42
Ni^{2+}	1	4.11	−9.89	4.11	−9.89
	2	4.90	−9.10	9.01	−18.99
	3	3.00	−11.00	12.01	−29.99
Pb^{2+}	1	6.40	−7.60	6.40	−7.60
	2	4.51	−9.49	10.91	−17.09
	3	3.00	−11.00	13.91	−28.09
H_4SiO_4	1	4.16	−9.84	4.16	−9.84
	2	1.80	−12.20	5.96	−22.04
Zn^{2+}	1	5.00	−9.00	5.00	−9.00
	2	6.11	−7.89	11.11	−16.89
	3	2.50	−11.50	13.61	−28.39
	4	1.20	−12.80	14.81	−41.19

Table 10.3 – p. 542 and Appendix A.5, p. 860

Table 10.3 Stability constants for some metal–ligand complexes. Values correspond to $\log \beta$ for formation of the complex from the free metal, the ligand, H^+, and H_2O.

	CO_3^{2-}	SO_4^{2-}	Cl^-	F^-	NH_3	PO_4^{3-}	EDTA	CN^-	HS^-
Ag^+		AgL 1.30	AgL 3.31	AgL 0.40	AgL 3.31		AgL 8.05	$AgH_{-1}L$ −0.78	AgL 13.82
		AgL_2 5.25		AgL_2	7.21		AgHL 14.74	AgL_2 20.48	AgL_2 17.91
		AgL_3 5.20						AgL_3 21.70	$AgH_{-1}L$ 5.30
									$AgH_{-1}L_2$ 8.59
Al^{3+}		AlL 3.84	AlL −0.39	AlL 7.01		AlHL 20.01	AlL 18.96		
		AlL_2 5.58		AlL_2 12.63		Al_2L 18.98	AlHL 21.78		
				AlL_3 16.70					
				AlL_4 19.40					
Ca^{2+}	CaL 3.22	CaL 2.36	CaL 0.40	CaL 1.14	CaL 0.20	CaL 6.46	CaL 12.44		
	CaHL 11.43				CaL_2 −0.11	CaHL 15.04	CaHL 15.97		
						CaH_2L 20.92			
Cd^{2+}	CdL 4.37	CdL 2.37	CdL 1.98	CdL 1.20	CdL 2.55	CdHL 16.08	CdL 18.10	CdL 6.01	CdL 8.01
	CdL_2 7.23	CdL_2 3.50	CdL_2 2.60		CdL_2 4.55		CdHL 21.43	CdL_2 11.12	CdL_2 15.31
	CdHL 11.83				CdL_3 5.89		CdH_2L 23.23	CdL_3 15.65	CdL_3 17.11
					CdL_4 6.80			CdL_4 17.92	CdL_4 19.31
Co^{2+}	CoL 4.28	CoL 2.30	CoL −0.35	CoL 1.40	CoL 2.03	CoHL 15.43	CoL 18.16		CoL 5.20
	CoHL 12.22				CoL_2 3.49		CoHL 21.59		

Table 10.3, continued (p.2) – p. 543 and Appendix A.5, p. 861

Table 10.3 – continued from previous page

	CO_3^{2-}	SO_4^{2-}	Cl^-	F^-	NH_3	PO_4^{3-}	EDTA	CN^-	HS^-
					CoL_3 4.42		CoH_2L 23.49	CoL_3 14.31	
					CoL_4 5.05				
					CoL_5 5.11			CoL_5 23.00	
Cr^{3+}		CrL 3.10	CrL −0.54	CrL 5.20	CrL 4.40	CrHL 16.16			
				CrL_2 9.04	CrL_2 4.10	CrH_2L 22.07			
				CrL_3 11.71					
Cu^{2+}	CuL 6.77	CuL 2.36	CuL 0.30	CuL 1.70	CuL 4.02	CuHL 16.50	CuL 20.49		
	CuL_2 10.20	CuHL 2.34	CuL_2 −0.26		CuL_2 7.41		CuHL 24.02		
	CuHL 12.13		CuL_3 −2.29		CuL_3 10.19		CuH_2L 26.23		
			CuL_4 −4.59		CuL_4 12.28				
Fe^{2+}	FeHL 11.43	FeL 2.39	FeL −0.20	FeL 1.21	FeL 1.40	FeHL 15.98	FeL 16.01	FeL_6 35.40	FeL 5.62
					FeL_2 2.24	FeH_2L 22.27	FeHL 19.05	$FeHL_6$ 39.71	
					FeL_3 2.67			FeH_2L_6 42.11	
					FeL_4 2.73				
Fe^{3+}		FeL 4.25	FeL 1.48	FeL 6.04		FeHL 22.28	FeL 27.66	FeL_6 43.60	
		FeL_2 5.38		FeL_2 10.66		FeH_2L 23.85	FeHL 29.17	Fe_2L_6 47.64	
				FeL_3 13.70					

Table 10.3, continued (p.3) – p. 544 and Appendix A.5, p. 862

Table 10.3 – continued from previous page

	CO_3^{2-}		SO_4^{2-}		Cl^-		F^-		NH_3		PO_4^{3-}		EDTA		CN^-		HS^-	
Hg^{2+}	HgL	12.13	HgL	2.47	HgL	7.33	HgL	1.60					HgL	23.24	HgL	17.00		
	HgL_2	15.58	HgL_2	3.48	HgL_2	14.03			HgL_2	17.79			HgHL	26.87	HgL_2	32.75	HgL_2	38.42
	HgHL	16.35			HgL_3	15.03							HgH_2L	29.17	HgL_3	36.31	$HgH_{-1}L_2$	31.93
					HgL_4	15.63			HgL_4	19.28					HgL_4	38.97	$HgH_{-2}L_2$	23.22
Ni^{2+}	NiL	4.57	NiL	2.30	NiL	−0.43	NiL	1.30	NiL	2.72	NiHL	15.33	NiL	20.11	NiL_4	30.20	NiL	5.49
	NiHL	12.42	NiL_2	0.82	NiL_2	−1.89			NiL_2	4.87	NiH_2L	20.50	NiHL	23.64	$NiHL_4$	36.03		
									NiL_3	6.53			NiH_2L	24.74	NiH_2L_4	40.74		
									NiL_4	7.65					NiH_3L_4	43.34		
									NiL_5	8.31								
									NiL_6	8.27								
Pb^{2+}	PbL	6.53	PbL	2.69	PbL	1.56	PbL	2.15			PbHL	15.48	PbL	19.71				
	PbL_2	9.94	PbL_2	3.47	PbL_2	1.90	PbL_2	3.24			PbH_2L	21.07	PbHL	22.54			PbL_2	15.27
	PbHL	13.23			PbL_3	1.80							PbH_2L	24.44			PbL_3	16.57
					PbL_4	1.38							PbH_3L	25.64				
Zn^{2+}	ZnL	4.76	ZnL	2.34	ZnL	0.46	ZnL	1.30	ZnL	2.21	ZnHL	15.69	ZnL	18.00			$ZnH_{-2}L_2$	−1.43
	ZnL_2	7.30	ZnL_2	3.28	ZnL_2	0.45			ZnL_2	4.49			ZnHL	21.43	ZnL_2	11.07		
	ZnHL	11.83			ZnL_3	0.50			ZnL_3	6.85			ZnH_2L_2	22.83	ZnL_3	16.05		
					ZnL_4	0.20			ZnL_4	8.87					ZnL_4	19.62		