# Chemistry Atoms First Release Notes 2017

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**Page Count Difference:**

In the latest edition of *Chemistry: Atoms First*, there are 1355 pages compared to the 1361 pages in the last edition. This page count variation is due to errata revisions.

**Errata:**

Below is a table containing submitted errata, and the resolutions that OpenStax has provided for this latest text.

| Issue | Resolution | Severity |
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| Chapter 1: Essential Ideas; End of Chapter Exercises In Chapter 1, question 90, there is a typo. 0.97 g/cm should be 0.97 g/cm^3. | Revise question 90 part (a) from "g/cm" to "g/cm^3" as follows: (a) What is the mass of 4.00 cm^3 of sodium, density = 0.97 g/cm^3? | Typo |
| Chapter 1.4: Essential Ideas, Section: Measurements Figure 1, showing the rulers is not representative of an actual ft/cm comparison. I'm not sure how the illusion was created, but the image clearly suggests that 1 ft is 30 cm. True, it's close, but the error is compounded by the point of 90 cm such that the 3-ft mark should match up with about 91.5 cm, not 90, which should be clearly visible. The problem is due to the fact that the 100 mark lines up with 40 cm, not 39.36. That may not seem like much, but it is enough. Measurements are important in chemistry, and so why not do it right? | Revise the ruler in Figure 1.23 to correctly show the alignment of centimeters and feet. | Minor |
| Chapter 1.4: Essential Ideas, Section: Measurements, End of Chapter Exercises In | Revise the answer to exercise 43 as follows: 43. Visit this PhET density simulation and select Mystery Blocks. ... (c) Order the Mystery Blocks | Typo |

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| section 1.4 Measurements, there is an error in part c of the solution for the last exercise on the page. The solution given is "(c) B/blue/apple (0.64 kg/L) < C/green/gasoline (0.700 kg/L) < C/green/ice (0.920 kg/L) < D/red/diamond (3.53 kg/L) < A/yellow/gold (19.3 kg/L)" This makes no sense, because C/green cannot be both 0.700 kg/L and 0.920 kg/L. I believe the 3rd and 4th blocks are both identified incorrectly, and that the correct solution should be "(c) B/blue/apple (0.64 kg/L) < C/green/gasoline (0.700 kg/L) < D/red/ice (0.920 kg/L) < E/purple/diamond (3.53 kg/L) < A/yellow/gold (19.3 kg/L)". | from least dense to most dense. Explain. Answer: (c) B/blue/apple (0.64 kg/L) < C/green/gasoline (0.700 kg/L) < D/red/ice (0.920 kg/L) < E/purple/diamond (3.53 kg/L) < A/yellow/gold (19.3 kg/L) | |
| Chapter 1.5: Essential Ideas; Section 1.5: Measurement Uncertainty, Accuracy, and Precision; Subsection: Significant Figures in Calculations. Appears in text and Example 1.3 "lesser than 5" should be "less than 5" | Revise the paragraph before Example 1.3 Rounding Numbers to say "less than" instead of "lesser than". | Typo |
| Chapter 1.6: Essential Ideas, Section: Mathematical Treatment of Measurement Results, End of Chapter Exercises Question 77c and 77f: there is a "t" where I believe you mean x (times): (c) the area of an 8.5 t 11-inch sheet of paper in cm2 (e) the estimated mass of the atmosphere, 5.6 t 1015 tons, to kilograms | In parts (c) and (d) of exercise 77, revise "t" to a multiplication symbol as follows: 77. Make the conversion indicated in each of the following: (c) the area of an 8.5 c 11-inch sheet of paper in cm2 (e) the estimated mass of the atmosphere, 5.6 x 1015 tons, to kilograms | Typo |
| Chapter 3: Electronic Structure and Periodic Properties of Elements; End | Revise "Question 5" to "the previous question" as follows: 36. Which of the subshells described in the previous question contain degenerate | Typo |

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| of Chapter Exercises The phrase, ". . .described in Question 5," should be, ". . .described in Question 35." | orbitals? How many degenerate orbitals are in each? | |
| Chapter 3.4: Electronic Structure and Periodic Properties of Elements; Section 3.4: Electronic Structure of Atoms (Electron Configurations); Subsection: Electron Configurations and the Periodic Table The phrase, ". . . are most easily lost or shared than the core electrons," should be, ". . . are more easily lost or shared than the core electrons." | Revise the phrase "...are most easily lost or shared than the core electrons," to "...are more easily lost or shared than the core electrons" in the first paragraph of Section Orbital Energies and Atomic Structure. | Typo |
| Chapter 3.5: Electronic Structure and Periodic Properties of Elements, Section: Periodic Variations in Element Properties, End of Chapter Exercises In the solutions guide for Chapter 3 problem 49 b; the answer given incorrectly lists the carbonate and ought to be the sulfate. See attached pic. | In the Solution Manual, revise the solution given for exercise 49 part (b) as follows: (b) (NH4)2SO4 | Typo |
| Chapter 4.1: Chemical Bonding and Molecular Geometry, Section: Ionic Bonding, Figure 4.3 figure 4.3, the labeling is wrong, larger spheres are labeled Na+, smaller spheres Cl- | Revise exercise 71 as follows: 71. Outline the steps needed to determine the limiting reactant when 0.50 mol of Cr and 0.75 mol of H3PO4 react according to the following chemical equation. | Typo |
| Chapter 4.6: Chemical Bonding and Molecular Geometry, Section: Molecular Structure and Polarity. The diagram for Chloromethane, as well as the corresponding wording in the text, are incorrect. The dipole moment arrows for the bonds are all pointing | Revise exercise 81 as follows: 81. ... What is the Cl- concentration in a 0.25-mL sample of normal serum that requires 1.46 mL of 8.25 × 10^-4 M Hg(NO3)2(aq) to reach the end point? | Minor |

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| in the wrong direction. They should be pointing from the more positive element to the more negative element. The wording should state "All of the dipoles have an 'UPWARD' component..." | | |
| Chapter 4.6: Chemical Bonding and Molecular Geometry, Section: Molecular Structure and Polarity, Example 4.16 Example 4.16, revise The Lewis structure in the solution has a minor error. One of the oxygens is missing a couple of lone pairs of electrons. | Insert a "+" between Cl^-(aq) and Ag^+(aq) in question 12 part ii, as follows: ii. Na+(aq) + Cl-(aq) + Ag+(aq) + NO3-(aq) --> AgCl(s) + Na+(aq) + NO3-(aq) | Typo |
| Chapter 4.6: Chemical Bonding and Molecular Geometry; Section 4.6: Molecular Structure and Polarity; Subsection: Molecular Polarity and Dipole Moment. There is no C-S dipole. Change the diagram which shows a dipole. | Replace the phrase "from ores as" with "from ores such as" in question 4, as follows: 4. Silver is often extracted from ores such as K[Ag(CN)2] and... | Typo |
| Chapter 4.6: Chemical Bonding and Molecular Geometry; Section 4.6: Molecular Structure and Polarity; Subsection: Molecular Polarity and Dipole Moment The phrase, "Thus, the two bonds do not have of the same bond dipole moment and . . .," should be, "Thus, the two bonds do not have the same bond dipole moment and . . ." | Revise the instructions for exercises 12-15 as follows: "Use the following equations to answer the next four questions:" | Minor |

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| Chapter 5.2: Advanced Theories of Bonding, Section: Hybrid Atomic Orbitals The description of the orbitals (see Figure legend, in terms of color, in Fig. 5.8 is confusing/wrong. The p-orbital is not 'red', nor are the hybrid orbitals 'purple'. I know that we went through various iterations of these colorings, but the figure legends must of course match the figures. The same discrepancy occurs in other figures in this chapter, e.g. Figs. 5.10 and 5.15. | In Figures 5.8, 5.10, and 5.15, revise the captions to say "yellow" instead of "purple". | Major |
| Chapter 5.2: Advanced Theories of Bonding, Section: Hybrid Atomic Orbitals, Figure 5.10 Figure 5.10 showing the hybridization of orbitals to form sp2 orbitals. The figure shows the sp2 orbitals arranged 90 degrees from each other, rather than 120 degrees in a plane. This is very confusing for students! | Add a label to Figure 5.10 to mark the 120 degrees between the sp2 orbitals. | Major |
| Chapter 7: Stoichiometry of Chemical Reactions; Answer Key, Question 71 In the answer for question 71 in chapter 7, the formula H_2PO_4 should be H_3PO_4. | Revise the formula "H2PO4" to "H3PO4" in the answer to question 71, as follows: 71. The conversion needed is mol Cr --> mol H3PO4... | Typo |
| Chapter 7: Stoichiometry of Chemical Reactions; End of Chapter Exercises In question 78 of chapter 7, replace the phrase, "is be required to titrate," with "is required to titrate." | Replace the phrase, "is be required to titrate," with "is required to titrate" in question 78 as follows: 78. What volume of 0.0105-M HBr solution is required to titrate 125 mL of a 0.0100-M Ca(OH)2 solution? | Typo |
| Chapter 7: Stoichiometry of Chemical Reactions; End of | Revise the phrase "in hot water of 60 °C is 164 g L" to "in hot water of 60 °C is 164 g/L" in question | Typo |

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| Chapter Exercises In question 86 of chapter 7, the phrase, "in hot water of 60 °C is 164 g L" should be, "in hot water of 60 °C is 164 g/L." | 86, as follows: 86. ...The solubility of NaHCO3 in hot water of 60 degrees C is 164 g/L... | |
| Chapter 7: Stoichiometry of Chemical Reactions; End of Chapter Exercises The question, "What are the empirical and molecular formulas of the compound." should have a question mark instead of a period. | Add a question mark at the end of question 85. | Typo |
| Chapter 7.1: Stoichiometry of Chemical Reactions, Section: Writing and Balancing Chemical Equations, End of Chapter Exercises Chapter 7 Problem 7c page 1262: The answer given in the back of the book is: Al2O3(GAS) it should be a (SOLID). | Revise the answer given for part (d) of exercise 7 as follows: 7. Colorful fireworks often involve the decomposition of barium nitrate and potassium chlorate and the reaction of the metals magnesium, aluminum, and iron with oxygen.... Answer: (d) ...4Al(s) + 3O2(g) --> 2Al2O3(s) | Typo |
| Chapter 7.1: Stoichiometry of Chemical Reactions, Section: Writing and Balancing Chemical Equations, End of Chapter Exercises End of chapter exercises - Chapter 7 # 11 part a product listed as BaC2O2 (s); should be BaC2O4 (s) | Revise the formula given in part (a) of exercise 11 as follows: 11. From the balanced molecular equations, write the complete ionic and net ionic equations for the following: (a) K2C2O4(aq) + Ba(OH)2(aq) --> 2KOH(aq) + BaC2O4(s) | Typo |
| Chapter 7.1: Stoichiometry of Chemical Reactions, Section: Writing and Balancing Chemical Equations, End of Chapter Exercises Chapter 7 Problem 3 f The (NH4)2Cr52O7 ought to read (NH4)2Cr2O7. I think that the extra 5 is a simple typo | Revise "(NH4)2Cr52O7" to "(NH4)2Cr2O7" in the soltuion to exercise 3 part (f). | Typo |
| Chapter 7.1: Stoichiometry of Chemical Reactions; | In the table that appears just before Example 7.1 Balancing Chemical Equations, revise "2 x 2 = 2" | Typo |

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| Section 7.1: Writing and Balancing Chemical Equations; Subsection: Balancing Equations. In the table that appears just before Example 7.1, 2 times 2 should equal 4 not 2. | to "2 x 2 = 4". | |
| Chapter 7.1: Stoichiometry of Chemical Reactions; Section: Writing and Balancing Chemical Equations, first figure In the caption for Figure 7.2, change "carbon dioxide in water" to "carbon dioxide and water." | Revise "carbon dioxide in water" to "carbon dioxide and water" in the caption for the first figure in section 7.1 Writing and Balancing Chemical Equations as follows: The reaction between methane and oxygen to yield carbon dioxide and water (shown at bottom) may be represented by a chemical equation using formulas (top). | Typo |
| Chapter 7.2: Stoichiometry of Chemical Reactions Section: Classifying Chemical Reactions In Table 7.1, the ion ‘chromate’ is given the formula CrO32-, rather than CrO42-. | Fixed. | Minor |
| Chapter 7.2: Stoichiometry of Chemical Reactions; Section 7.2: Classifying Chemical Reactions; Subsection: Balancing Redox Reactions via the Half-Reaction Method; Example 7.7 In Step 4 for the Solution to Example 7.7, the last equation should read, "Cr_2O_7^2- + 14H^+ yields 2Cr^3+ + 7H_2O." | Add "14H+" to the last equation in the solution to Example 4.7 Balancing Redox Reactions in Acidic Solution as follows: Cr2O72- + 14H+ --> 2Cr3+ + 7H2O | Typo |
| Chapter 7.2: Stoichiometry of Chemical Reactions; Section 7.2: Classifying Chemical Reactions; Subsection: Oxidation-Reduction Reactions; Example 7.5 In the solution to Example 7.5, The equation, "charge on SO_3^2- = -2 = (3 times -1) + (1 times x)" should read, | Revise "(3 x -1)" to "(3 x -2)" in the solution to Example 4.5 Assigning Oxidation Numbers part (b) as follows: (b)... charge on SO32- = -2 = (3 x -2) + (1 x X) | Typo |

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| "charge on SO_3^2- = -2 = (3 times -2) + (1 times x)." | | |
| Chapter 7.2: Stoichiometry of Chemical Reactions; Section 7.2: Classifying Chemical Reactions; Subsection: Precipitation Reactions and Solubility Rules; Table 7.1 In Table 7.1, the charge for the sulfate ion should 2- not just -. | Revise the charge for the sulfate ion in Table 7.1 Solubilities of Common Ionic Compounds in Water from " - " to "2-" | Typo |
| Chapter 7.4: Stoichiometry of Chemical Reactions, Section: Reaction Yields, End of Chapter Exercises Chapter 7 problem 69: In the product side, ether is missing its Oxygen. Reads - 2C2H5OH + H2SO4 --> (C2H5)2 + H2SO4*H2O (C2H2)2 should be (C2H5)2 | Revise the equation given in exercise 69 as follows: 69. Outline the steps needed to solve the following problem, then do the calculations... 2C2H5OH + H2SO4 --> (C2H5)2O + H2SO4 x H2O | Minor |
| Chapter 7.4: Stoichiometry of Chemical Reactions, Section: Reaction Yields, Example 7.16 Combustion Analysis Avogadro's number on flowcart should be "stoichiometric factor" | Revise the flowchart in Example 7.16 Combustion Analysis to read "stoichiometric factor" instead of "Avogadro's number". | Typo |
| Chapter 7.4: Stoichiometry of Chemical Reactions, Section: Reaction Yields, Example 7.16 Combustion Analysis misleading to have y as the subscript in the formula CxHy(s) and also as the coefficient for H2O | In the solution to Example 7.16 Combustion Analysis, change "y" to "y/2" in front of H2O, as follows: CxHy(s) + excess O2(g) --> xCO2 + (y/2)H2O(g) | Typo |
| Chapter 7.4: Stoichiometry of Chemical Reactions; Section 7.4: Reaction Yields; Subsection: Limiting Reactant; Example 7.12 In the solution to Example 7.12, for the equation for mol N_2, the denominator of the fraction should read "28.02 g N_2." | Revise "28.09 g N2" to "28.02 g N2" in the second equation in the solution to Example 4.12 Identifying the Limiting Reactant as follows: mol N2 = 1.50 g N2 x (1 mol N2/28.02 g N2) = 0.0535 mol N2 | Typo |

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| Chapter 7.4: Stoichiometry of Chemical Reactions; Section 7.4: Reaction Yields; Subsection: Limiting Reactant; Example 7.13 In the Check Your Learning for Example 7.13 change the phrase, "of the Freon" to "of the Freon gas." | Revise "the Freon" to "the gas Freon" in the Check Your Learning question for Example 7.13 Calculation of Percent Yield as follows: What is the percent yield of a reaction that produces 12.5 g of the gas Freon $CF_2Cl_2$ from 32.9 g of $CCl_4$ and excess HF? | Typo |
| Chapter 7.5: Stoichiometry of Chemical Reactions, Section: Quantitative Chemical Analysis, End of Chapter Exercises Ironically - the newer edition of the Chemistry book (orange) contains an error; whereas, the older edition does not. On p.221 of the latest edition, chapter 7 problem 81: The concentration given "(...) 5.25 × 10?4 M $Hg(NO_3)_2(aq)$ to reach the end point?" Ought to read "(...) 8.25 (...)" in order to yield the computed value found in the back of the book. In the earlier edition, this was correct. Furthermore, in the solutions guide - the problem interchanges between these two numerical values (photo attached.) | In exercise 81, revise "5.25" to "8.25". | Minor |
| Chapter 7.5: Stoichiometry of Chemical Reactions, Section: Quantitative Chemical Analysis, End of Chapter Exercises p. 222 Chapter 7 Problem 83. The question talks about $GaBr_2$ - however, it ought to read $GaBr_3$. | In exercise 83, revise "$GaBr_2$" to "$GaBr_3$" throughout. | Typo |
| Chapter 7.5: Stoichiometry of Chemical Reactions, Section: Quantitative | Revise the Check Your Learning for Example 7.14 Titration Analysis as follows: "A 20.00-mL sample of aqueous oxalic acid, $H_2C_2O_4$, was titrated with | Minor |

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| Chemical Analysis, Example 7.14 Perhaps the formula for Potassium permanganate should read KMnO4 instead of MnO4 | a 0.09113-M solution of potassium permanganate, KMnO4." | |
| Chapter 7.5: Stoichiometry of Chemical Reactions; Section 7.5: Quantitative Chemical Analysis; Subsection: Titration; Example 7.14 In the Solution to Example 7.14, replace the phrase, "since the amounts of reactants are provided and requested are" with "since the amounts of reactants provided and requested are." | Revise "since the amounts of reactants are provided and requested are" to "since the amounts of reactants provided and requested are" in the Solution to Example 7.14 Titration Analysis as follows: As for all reaction stoichiometry calculations... since the amounts of reactants provided and requested are expressed as solution concentrations. | Typo |
| Chapter 8: Gases, End of Chapter Exercises, 11 p. 502 Chapter 8 Problem 11. The question stem reads: "(...) pressure at sea level 29.97 in., (...)" Ought to read: "(...) pressure at sea level 29.97 in. Hg, (...)" Basically missing the "Hg" | In exercise 11, revise "29.97 in." to "29.97 in. Hg". | Typo |
| Chapter 8: Gases, End of Chapter Exercises, 25 Chapter 8 Problem 25 (2016 ed). Using the figure mentioned in the problem, one cannot (at the given temperature) get the answer that is showing in the back of the book. Either change the temperature to 191K or adjust the volume of the answer. | Revise the solution to exercise 25 as follows: 25. Determine the volume of 1 mol of CH4 gas at 150 K and 1 atm... Solution About 12.2 L | Typo |
| Chapter 8: Gases, End of Chapter Exercises, 69 | Revise part a of exercise 69 to give temperature "875 K". | Minor |

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| Missing a "K" (2016 ed) Chapter 8 Problem 69 A. Reads "875 degree" should read "875 K" (without the degree and Kelvin added.) | | |
| Chapter 8: Gases; Answer Key The answer to question 105 part (b) in chapter 8 currently reads, "the ideal gas approximation breaks down and is significantly different from the pressure calculated by the van der Waals equation," but it should read, "the ideal gas approximation breaks down and is significantly different from the pressure calculated by the ideal gas equation ..." | Revise the answer to part (b) of question 105 to use "ideal gas equation" instead of "van der Waals equation" as follows: (b) When real gases are at low pressures and high temperatures... the ideal gas approximation breaks down and is significantly different from the pressure calculated by the ideal gas equation. | Typo |
| Chapter 8.1: Gases, Section: Gas Pressure Chemistry text: 1) P464 fig 8.5 - diagram on right has incorrect depiction of "h" submitted via ZenDesk | In Figure 8.5 on manometers, revise the label of h on the rightmost manometer to appear above the black line. | Minor |
| Chapter 8.2: Gases, Section: Relating Pressure, Volume, Amount, and Temperature: The Ideal Gas Law Chapter 8 Figure 5 has the wrong units on the vertical axis. They should be psi^-1, not psi | Revise the graph in Figure 8.13 to have units of psi^-1. | Minor |
| Chapter 8.2: Gases, Section: Relating Pressure, Volume, Amount, and Temperature: The Ideal Gas Law Chapter 8 Figure 6, graph on right, axes are incorrectly labeled. This is a graph of 1/P vs. V, not Volume vs. Pressure. But there is probably a simpler solution. The graphs in this figure are a duplication of those in Figure 5, and the Figure 5 graphs are much nicer. The text can simply | Revise part (b) of Figure 8.14 showing the relationship between pressure and volume to show the graph of 1/P vs. V. | Major |

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| refer to Figure 5. | | |
| Chapter 8.2: Gases; Section 8.2: Relating Pressure, Volume, Amount, and Temperature: The Ideal Gas Law; Subsection: Volume and Pressure: Boyle's Law In Example 8.8, the phrase, "Using P_1 and V_1 as the known values 0.933 atm and 2.40 mL, P_2 as the volume at which the pressure is unknown and V_2 as the unknown volume," should read, "Using P_1 and V_1 as the known values 13.0 psi and 15.0 mL, V_2 as the volume at which the pressure is unknown and P_2 as the unknown pressure..." | Revise the phrase "Using P1 and V1 as the known values 0.933 atm and 2.40 mL" to "Using P1 and V1 as the known values 13.0 psi and 15.0 mL" in the solution to Example 9.8 Volume of a Gas Sample, as follows: (c) From Boyle's law... Using P1 and V1 as the known values 13.0 psi and 15.0 mL, P2 as the pressure at which the volume is unknown, and V2 as the unknown volume, we have... | Typo |
| Chapter 8.2: Gases; Section 8.2: Relating Pressure, Volume, Amount, and Temperature: The Ideal Gas Law; Subsection: Volume and Pressure: Boyle's Law In Figure 8.14, the graph of P vs. V is a parabola, but the graph of P vs. V should be a hyperbola. | Revise "parabola" to "hyperbola" in the figure caption for Figure 8.14 on the relationship between pressure and volume. | Typo |
| Chapter 8.2: Gases; Section 8.2: Relating Pressure, Volume, Amount, and Temperature: The Ideal Gas Law; Subsection: Volume and Temperature: Charles's Law The phrase, "and as seen with the V-T relationship, this leads to another form of Charles's law," should be, "and as seen with the P-T relationship, this leads to another form of Charles's law." | Revise "V-T relationship" to "P-T relationship" in the paragraph before Example 8.6 Predicting Change in Volume with Temperature as follows: For a confined, constant pressure gas sample, V/T is constant (i.e., the ratio = k), and as seen with the P-T relationship, this leads to another form of Charles's law: V1/T1 = V2/T2. | Typo |

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| Chapter 8.4: Gases Section: Effusion and Diffusion of Gases In the first equation, for the rate of diffusion, revise “rate of diffusio = “ to “rate of diffusion = “ | Fixed | Typo |
| Chapter 8.4: Gases Section: Effusion and Diffusion of Gases In the second equation, for the rate of effusion, revise “rate of effusio “ to “rate of effusion “ | | Typo |
| Chapter 8.4: Gases; Section 8.4: Effusion and Diffusion of Gases The equation in Example 8.22 should read, "rate of effusion of unknown" over "rate of effusion of CO_2." | Revise "O2" to "CO2" in the equation in Example 8.22 as follows: rate of effusion of unknown/rate of effusion of CO2 | Typo |
| Chapter 8.4: Gases; Section 8.4: Effusion and Diffusion of Gases The equation that appears before Figure 8.29 should read "rate of effusion of B" over "rate of effusion of A." | Revise the equation before Figure 8.29 so that "A" and "B" aren't cut off, as follows: rate of effusion of B/rate of effusion of A | Typo |
| Chapter 8.5: Gases, Section: The Kinetic-Molecular Theory, Subsection: Molecular Velocities and Kinetic Energy the appropriate form of the gas constant is 8.314 J/K (8.314 kg m2s–2K–1) is missing a "per mole" in the definition of R and should be instead: the appropriate form of the gas constant is 8.314 J/mol-K (8.314 kg m2s–2mol-1K–1) | Revise the last paragraph of subsection Molecular Velocities and Kinetic Energy as follows: "...When used in this equation, the appropriate form of the gas constant is 8.314 J/mol x K (8.314 kg m^2s^-2mol^-1K^-1)." | Typo |
| Chapter 8.5: Gases; Section 8.5: The Kinetic-Molecular Theory; Subsection: The Kinetic-Molecular Theory Explains the Behavior of Gases, Part 1 Part of the | Revise "reduced" to "increased" in part (b) of the caption of the figure before subsection Molecular Velocities and Kinetic Energy, Figure 9.31, as follows: (b) When volume decreases, gas pressure increases due to increased frequency of molecular collisions. | Typo |

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| caption for Figure 8.31 currently reads, "(b) When volume decreases, gas pressure increases due to reduced frequency of molecular collisions." However, it should read, "(b) When volume decreases, gas pressure increases due to increased frequency of molecular collisions." | | |
| Chapter 8.5: Gases; Section 8.5: The Kinetic-Molecular Theory; Subsection: The Kinetic-Molecular Theory Explains the Behavior of Gases, Part 1 Part of the caption for Figure 8.31 currently reads, "(c) When the amount of gas increases at a constant pressure, volume increases to yield a constant number of collisions per unit wall area." However, it should read, "(c) When the amount of gas increases at a constant pressure, volume increases to yield a constant number of collisions per unit wall area per unit time." | Add the phrase "per unit time" to part (c) of the caption of the figure before subsection Molecular Velocities and Kinetic Energy, Figure 9.31, as follows: (c) When the amount of gas increases at a constant pressure, volume increases to yield a constant number of collisions per unit wall area per unit time. | Typo |
| Chapter 8.5: Gases; Section 8.5: The Kinetic-Molecular Theory; Subsection: The Kinetic-Molecular Theory Explains the Behavior of Gases, Part 1 The explanation of Charles's law says, "If the temperature of a gas is increased, a constant pressure can be maintained only if the volume occupied by the gas increases. This will result in greater average distances traveled by the molecules to reach the container walls, as well as | Revise the description of Charles's law as follows: Charles's law. If the temperature of a gas is increased... These conditions will decrease the both the frequency of molecule-wall collisions and the number of collisions per unit area, the combined effects of which balance the effect of increased collision forces due to the greater kinetic energy at the higher temperature. (Previous: Charles's law. If the temperature of a gas is increased... These conditions will decrease the both the frequency of molecule-wall collisions and the number of collisions per unit area, the combined effects of which outweigh those of increased collision forces due to the greater kinetic energy at the higher temperature. The net result is a decrease in gas pressure.) | Typo |

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| increased wall surface area. These conditions will decrease both the frequency of molecule-wall collisions and the number of collisions per unit area, the combined effects of which outweigh those of increased collision forces due to the greater kinetic energy at the higher temperature. The net result is a decrease in gas pressure." This is a confused explanation with “constant pressure” and “decrease in gas pressure." Suggest something like: "If the temperature of a gas is increased, a constant pressure can be maintained only if the volume occupied by the gas increases. This will result in greater average distances traveled by the molecules to reach the container walls, as well as increased wall surface area. These conditions will decrease both the frequency of molecule-wall collisions and the number of collisions per unit area, the combined effects of which will balance those of increased collision forces due to the greater kinetic energy at the higher temperature. The net result is a constant gas pressure." | | |
| Chapter 8.5: Gases; Section 8.5: The Kinetic-Molecular Theory; Subsection: The Kinetic-Molecular Theory Explains the Behavior of Gases, Part 1 The phrase, "will decrease the both the frequency," should read, "will decrease both the | Fixed. | Typo |

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| frequency." | | |
| Chapter 8.6: Gases; Section 8.6: Non-Ideal Gas Behavior; Summary In the summary for Section 8.6: Non-Ideal Gas Behavior, the phrase, "non-ideal behavior of gases under conditions," should read, "non-ideal behavior of gases under these conditions." | Add the missing word "these" in the last sentence of the summary for Section 8.6 Non-Ideal Gas Behavior as follows: The van der Waals equation is a modified version of the ideal gas law that can be used to account for the non-ideal behavior of gases under these conditions. | Typo |
| Chapter 9.3: Thermochemistry, Section: Enthalpy, Example 9.15 p. 261 e.g. 5.15 in the Alt Solution using the data from Appendix G. The oxygen in the third chemical reaction is not balanced. A 3 is needed as it's coeffienent (sp). | Revise the third equation given in the solution to Example 9.15 Using Hess's Law as follows: Solution: Supporting Why the General Equation Is Valid ... H2(g) + N2(g) + 3O2(g) --> 2HNO3(aq) | Typo |
| Chapter 9.3: Thermochemistry, Section: Enthalpy, Example 9.15 Using Hess's Law Example 9.14 and 9.15 in OpenStax-see attached files | Revise the third equation in Example 9.15 Using Hess's Law, Solution: Supporting Why the General Equation is Valid, as follows: H2(g) + N2(g) + 3O2(g) --> 2HNO3 (aq) | Typo |
| Chapter 10: Liquids and Solids, End of Chapter Exercises, 29 The last exercise question in chapter 10.2 asks "Water rises in a glass capillary tube to a height of 17 cm. What is the diameter of the capillary tube?". The solution is 9.5 x 10^-5 m. If my calculations are correct, that is the radius not the diameter length. | Revise the solution to exercise 29 as follows: 29. Water rises in a glass capillary tube to a height of 17 cm... Solution 1.9 x 10^-4 m | |
| Chapter 10: Liquids and Solids; Answer Key; Question 19 Part of the answer to question 19 in chapter 10 reads, "H-bonding is the principle intermolecular force holding the DNA | Revise "DNA strands" to "protein strand" in the answer to question 19. | Minor |

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| strands together," but it should read, "H-bonding is the principle intermolecular force holding the protein strand in this shape." | | |
| Chapter 10: Liquids and Solids; Answer Key; Question 63 The solution to question 63 parts (a) and (d) in chapter 10 reference water, but it should be carbon. | Revise "water" to "carbon" in the phase diagram solutions to question 63. | Typo |
| Chapter 10: Liquids and Solids; End of Chapter Exercises; Question 63 Question 63 of chapter 10 states that carbon has, "three different solid phases," but the diagram only shows 2. | Revise "three" to "two" in question 63 as follows: 63. Elemental carbon has one gas phase, one liquid phase, and two different solid phases... | Typo |
| Chapter 10.1: Liquids and Solids; Section 10.1: Answer Key; Question 7 Part of the answer to question 7 part (c) of chapter 10 reads, "Hydrogen bonds form whenever a hydrogen atom is bonded to one of the more electronegative atoms, such as a fluorine, oxygen, nitrogen, or chlorine atom," but it should read, "Hydrogen bonds form whenever a hydrogen atom is bonded to one of the more electronegative atoms, such as a fluorine, oxygen or nitrogen atom." | Remove "chlorine" from the answer to part (c) of question 7. | Typo |
| Chapter 10.3: Liquids and Solids; Section 10.3: Phase Transitions; Subsection: Melting and Freezing The phrase, "the reciprocal process of melting and freezing occur at equal rates," should read, "the reciprocal processes of | Revise "process" to "processes" in the second paragraph of subsection Melting and Freezing as follows: In a mixture of solid and liquid at equilibrium, the reciprocal processes of melting and freezing occur at equal rates, ... | Typo |

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| melting and freezing occur at equal rates." | | |
| Chapter 10.3: Liquids and Solids; Section 10.3: Phase Transitions; Subsection: Vaporization and Condensation; Example 10.5 In the Check Your Learning to Example 10.5, the question uses a vapor pressure of 20 degrees, but the table says 25 degrees. | Revise the table in the Check Your Learning of Example 10.5 Explaining Vapor Pressure in Terms of IMFs to read "Vapor Pressure at 20 degrees C" instead of "25 degrees C". | Typo |
| Chapter 10.5: Liquids and Solids; Section 10.5: The Solid State of Matter The learning objective, "Define and describe the bonding and properties of ionic and molecular, metallic and covalent network crystalline solids" should read, "Define and describe the bonding and properties of ionic, molecular, metallic and covalent network crystalline solids." | Add commas to the first learning objective for section The Solid State of Matter as follows: Define and describe the bonding and properties of ionic, molecular, metallic, and covalent network crystalline solids. | Typo |
| Chapter 10.6: Liquids and Solids, Section: Lattice Structures in Crystalline Solids, Figure 10.59 Figure 10.59 shows an ionic crystal and the text explains that a CsCl crystal can be described as a simple unit cell….but there is a label in the figure that says 'Body-centered simple cubic structure'. This is VERY confusing. | Revise the label for Figure 10.59 to "Simple cubic structure". | Typo |
| Chapter 10.6: Liquids and Solids; Section 10.6: Lattice Structures in Crystalline Solids; Subsection: Unit Cells of Ionic Compounds In Figures 10.59 and 10.60, are the diagrams for the structures of CsCl and NaCl | Revise Figure 10.60 to show Face-Centered Cubic structure, not Body-Centered Cubic structure. | Typo |

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| correct? The labels appear to be wrong. | | |
| Chapter 11.1: Solutions and Colloids, Section: The Dissolution Process Instead of “As for the mixture of sugar and water…” I think it would be better to say “As with the mixture of sugar and water…” | Revise the first sentence of the third paragraph as follows: "As with the mixture of sugar and water, this mixture is also an aqueous solution." | Minor |
| Chapter 11.1: Solutions and Colloids; Section 11.1: The Dissolution Process In the second chemical equation in section 11.1, the Cr_2O_7 should have a charge of 2-. | Revise the second chemical equation in section 11.1 The Dissolution Process to have a charge of 2- for Cr2O7, as follows: K2Cr2O7(s) --> 2K+(aq) plus Cr2O7 2-(aq) | Typo |
| Chapter 11.1: Solutions and Colloids; Section 11.1: The Dissolution Process The phrase, "When a small amount of solid potassium chromate is added to water, the compound dissolves and dissociates to yield potassium ions and dichromate ions," should read, "When a small amount of solid potassium dichromate is added to water, the compound dissolves and dissociates to yield potassium ions and dichromate ions..." | Revise "potassium chromate" to "potassium dichromate" in the third paragraph of Section 11.1 The Dissolution Process as follows: When a small amount of solid potassium dichromate is added to water, ... | Typo |
| Chapter 11.4: Solutions and Colloids, Section: Colligative Properties, Example 11.2 Example 11.2. The text takes 2000g of H2O, divides by the molar mass of H2O (18.02g) and arrives at 11.1 moles, when it should be 111 moles. This error propagates to the calculation of the mole fraction of H2O in the solution. By the way... I love you guys for fighting the | Revise part (a) of the solution for Example 11.2 Calculating Mole Fraction and Molality as follows: Solution (a) The mole fraction... mol H2O = 2000 g × (1 mol H2O/18.02 g H2O) = 111 mol H2O Xethylene glycol =[35.8 mol C2H4(OH)2]/[(35.8 + 111) mol total] = 0.245 | Minor |

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| shameless textbook cartel. Thank you thank you thank you! | | |
| Chapter 11.4: Solutions and Colloids, Section: Colligative Properties, Subsection: Colligative Properties of Electrolytes Page 640, First sentence. Should say "…solution of NaCl contains 2.0 moles of ions…" | Revise the first sentence after Example 11.11 as follows: "Assuming complete dissociation, a 1.0 m aqueous solution of NaCl contains 2.0 mole of ions (1.0 mol Na+ and 1.0 mol Cl-) per each kilogram of water..." | Critical |
| Chapter 11.4: Solutions and Colloids, Section: Colligative Properties, Subsection: Phase Diagram for an Aqueous Solution of a Nonelectrolyte Page 633, line 5: ?Tb should be replaced with ?Tf. | In the last paragraph, revise "DeltaT_b" to "DeltaT_f". | Major |
| Chapter 11.5: Solutions and Colloids; Section 11.5: Colloids; Subsection: Preparation of Colloidal Systems In the chemical equation that follows table 11.4, the state of 3Cl^- should be (s). | Revise the first chemical equation in subsection Preparation of Colloidal Systems as follows: Fe3+(aq) + 3Cl-(aq) + 6H2 O(l) --> Fe(OH)3(s) + H3 O+(aq) + 3Cl-(aq) Previous: Fe3+(s) + 3Cl-(g) + 6H2 O(l) --> Fe(OH)3(aq) + H3 O+(aq) + 3Cl-(aq) | Typo |
| Chapter 14: Acid-Base Equilibria, Appendix H Appendix H – some Ka values do not match values used within Chapter 14. Ka for HCO3- should be 4.7 x 10^-11 instead of 5.6 x 10^-11 | Revise the Ka value given in Appendix H for HCO3- to 4.7 x 10 ^-11. Update examples in Ch. 14 to match. | |
| Chapter 14: Acid-Base Equilibria; Answer Key; Question 81 The answer to question 81 in chapter 14 does not make sense. | Revise the answer to question 81 as follows: 81. [H3O+] and [HCO3?] are practically equal | Minor |
| Chapter 14: Acid-Base Equilibria; End of Chapter Exercises; Question 33 The chemical equation that is the solution to question 33 in chapter 14 is not balanced. | Add a "2" in front of HCl in the equation for question 33 as follows: 33. Mg(OH)2(s) + 2HCl(aq) --> Mg2+(aq) + 2Cl-(aq) + 2H2 O(l) | Typo |

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| Chapter 14: Acid-Base Equilibria; End of Chapter Exercises; Question 37 In Chapter 14, question 37, "strongest acid" should be "stronger acid." | Revise "strongest" to "stronger" in question 37. | Critical |
| Chapter 14.1: Acid-Base Equilibria, Section: Brønsted-Lowry Acids and Bases In your passage about the development of acid-base theories Carl Axel Arrhenius is named as the person behind the Arrhenius model in 1884. Actually it was Svante Arrhenius. As online research shows, Carl Axel Arrhenius was an army officer, who died in 1824. Your sincerely, Gerd Berger | In the first paragraph, revise "Carl Axel Arrhenius" to "Svante Arrhenius". | Typo |
| Chapter 14.1: Acid-Base Equilibria; Section 14.1: Bronsted-Lowry Acids and Bases The phrase, "adding ammonia to water yields hydroxide ions and ammonium ions" should be "adding a base to water yields hydroxide ions and a corresponding cation." Note that the example given does not match the text description. | Revise the text as follows: "Adding pyridine to water yields hydroxide ions and pyridinium ions." (Previous: Adding ammonia to water yields hydroxide ions and ammonium ions.) | Critical |
| Chapter 14.1: Acid-Base Equilibria; Section 14.1: Bronsted-Lowry Acids and Bases; Example 14.1 In Example 14.1, remove the + sign after the superscript 2. (There are two instances of this.) | Remove the + sign after the superscript 2 in the first equation in Example 14.1 Ion Concentrations in Pure Water as follows: Kw = [H3O+][OH-] = [H3O+]2 = [OH-]2 = 1.0 x 10-14 | Major |
| Chapter 14.1: Acid-Base Equilibria; Section 14.1: Bronsted-Lowry Acids and Bases; Summary The last equation in the summary of | Revise the last equation n the summary of section 14.1 from "H2O" to "H3O" as follows: Kw = [H3O+][OH?] = 1.0 × 10^-14 at 25 degrees C | Typo |

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| section 14.1 has a typo. H_2O should be H_3O. | | |
| Chapter 14.3: Acid-Base Equilibria, Section: Relative Strengths of Acids and Bases p802 - Reaction missing a species and ICE table has the columns placed incorrectly | Revise Example 14.11 Determination of Ka or Kb from pH as follows: Delete the first ICE table in the Solution. Revise Example 14.12 Equilibrium Concentrations in a Solution of a Weak Acid as follows: Correct the alignment of the columns in the first ICE table in the Solution. | Major |
| Chapter 14.3: Acid-Base Equilibria, Section: Relative Strengths of Acids and Bases, Subsection: Effect of Molecular Structure on Acid-Base Strength Figure 14.13 – The group numbers in the figure do not match the group numbers in the preceding text. One method of numbering groups in the periodic table should be used throughout the entire textbook. | In the first paragraph, revise "group 7A" to "group 17" and "group 6A" to "group 16". | Typo |
| Chapter 14.3: Acid-Base Equilibria; Section 14.3: Relative Strengths of Acids and Bases In the phrase, "by measuring their equlibrium constants," equilibrium is misspelled. | Correct the spelling of "equlibrium" to "equilibrium". | Typo |
| Chapter 14.3: Acid-Base Equilibria; Section 14.3: Relative Strengths of Acids and Bases; Subsection: The Ionization of Weak Acids and Weak Bases In the caption to Figure 14.9, the phrase, "is has a pH of 3," should be, "has a pH of 3." | Delete the word "is" in the caption for Figure 14.9 pH paper as follows: ...solution of CH3CO2H (beaker on right) has a pH of 3... | Typo |
| Chapter 14.4: Acid-Base Equilibria, Section: Hydrolysis of Salt Solutions, Section: Salts of Weak Acids and Strong Bases The second sentence of the second paragraph states “The sodium ion, as the conjugate | Revise the second paragraph as follows: "A solution of this salt contains sodium ions and acetate ions. The sodium ion has no effect on the acidity of the solution. However, the acetate ion, the conjugate base of acetic acid, reacts with water and increases the concentration of hydroxide ion:" | Typo |

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| acid of a strong base, has not effect on the acidity of the solution." Na+ is not the conjugate acid of NaOH. Water is the conjugate acid of NaOH, and Na+ is simply a spectator ion that does not form an acidic hydrated species like other metal cations. | | |
| Chapter 14.4: Acid-Base Equilibria, Section: Hydrolysis of Salt Solutions, Subsection: Equilibrium in a Solution of a Salt of a Weak Acid and a Weak Base Revise the answer to letter (c) of Check Your Learning in Example 14.17 to "acidic." | Revise the answer to part(c) of Example 14.17 "Determining the Acidic or Basic Nature of Salts" Check Your Learning to "acidic." | Typo |
| Chapter 14.4: Acid-Base Equilibria, Section: Hydrolysis of Salt Solutions, Subsection: Equilibrium in a Solution of a Salt of a Weak Acid and a Weak Base There is an error in the reasoning and calculation used to determine an answer to Example 14.17 (d) on p. 814. (d) The Na+ ion is a spectator, while the HPO42- ion is amphiprotic, with a Ka of 4.2 x 10^-13. The Kb of HPO42- can be determined from the Ka of its conjugate acid, H2PO4-: Kb = (1.0 x 10^-14) / (6.2 x 10^-8) = 1.6 x 10^-7. Since Kb > Ka, the aqueous solution will be basic. | Revise the solution to Example 14.17 "Determining the Acidic or Basic Nature of Salts" as follows: (d) The Na+ cation is a spectator, and will not affect the pH of the solution, while the HPO4^2- anion is amphiprotic. The Ka of HPO4^2- is 4.2 × 10^-13, and its Kb is (1.0 × 10^-14)/(6.2 × 10^-8) = 1.6 × 10^-7. | Major |
| Chapter 14.4: Acid-Base Equilibria, Section: Hydrolysis of Salt Solutions, Subsection: Equilibrium in a Solution of a Salt of a Weak Acid and a Weak Base There is an error in the reasoning | Revise the solution to Example 14.17 "Determining the Acidic or Basic Nature of Salts" as follows: (b) The Na+ cation is a spectator, and will not affect the pH of the solution; while the HCO3- anion is amphiprotic. The Ka of HCO3- is 4.7 × 10^-11, and its Kb is (1.0 × 10^-14)/(4.3 × 10^-7) = 2.3 × 10^-8. | Typo |

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| and calculation used to determine the answer to Example 14.17 (b) on p. 814. (b) The Na+ cation is a spectator; and will not affect the pH of the solution; while the HCO3– anion is amphiprotic, it could either behave as an acid or a base. The Ka of HCO3– is 4.7 x 10^-11; the Kb of HCO3– can be determined from the Ka of its conjugate acid, H2CO3: Kb = (1.0 x 10^-14) / (4.3 x 10^-7) = 2.3 x 10^-8. Since Kb > Ka, the aqueous solution will be basic. | | |
| Chapter 14.4: Acid-Base Equilibria; Section 14.4: Hydrolysis of Salt Solutions; Subsection: The Ionization of Hydrated Metal Ions The sentence, "Note that some of these aluminum species are exhibiting amphiprotic behavior, since they are acting as acids when they appear on the right side of the equilibrium expressions and as bases when they appear on the left side," should read, "Note that some of these aluminum species are exhibiting amphiprotic behavior, since they are acting as acids when they appear on the left side of the equilibrium expressions and as bases when they appear on the right side." | Switch "right" and "left" in the fourth paragraph of Subsection The Ionization of Hydrated Metal Ions as follows: Note that some of these aluminum species are exhibiting amphiprotic behavior, since they are acting as acids when they appear on the left side of the equilibrium expressions and as bases when they appear on the right side. | Typo |
| Chapter 14.5: Acid-Base Equilibria, Section: Polyprotic Acids p823 - ICE table columns not aligned. submitted via ZenDesk | In Example 14.19 Ionization of a Diprotic Acid, revise the alignment of the columns in the first ICE table. | Typo |
| Chapter 14.6: Acid-Base | Revise the answer to exercise 107 as follows: | Minor |

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| Equilibria, Section: Buffers, End of Chapter Exercises The answer for Chapter 14 problem 107 in the back of the book is incomplete. It does not give an answer for the [saccharin] ([HA]). Assuming the question is considering that the 'buffered' solution does not change pH, then the Henderson-Hasselbach equation gives an answer: [HA] = 6.1x10^-9 | 107. Saccharin, C7H4NSO3H, is a weak acid (Ka = 2.1 x 10^-2)... Answer: The molar mass of sodium saccharide is 205.169 g/mol. Using the abbreviations HA for saccharin and NaA for sodium saccharide the number of moles of NaA in the solution is: 9.75 x 10^-6 mol The pKa for [HA] is 1.68, so [HA] = 6.2 x 19^-9 M. Thus, [A-] (saccharin ions) is 3.90 x 10^-5 M. | |
| Chapter 14.7: Acid-Base Equilibria, Section: Acid-Base Titrations, End of Chapter Exercises Problem #112 of Chapter 14 (pg.828) does not state a proper question. Should it read something like: "WHY can we ignore...?" | Revise exercise 112 as follows: "Why can we ignore the contribution of water to the concentration of OH- in a solution of the following bases..." | Major |
| Chapter 14.7: Acid-Base Equilibria; Section 14.7: Acid-Base Titrations; Subsection: Titration Curve The caption for Figure 14.21 reads, "(a) The titration curve for the titration of 25.00 mL of 0.100 M CH_3COOH (weak acid) with 0.100 M NaOH (strong base) has an equivalence point of 7.00 pH. (b) The titration curve for the titration of 25.00 mL of 0.100 M HCl (strong acid) with 0.100 M NaOH (strong base) has an equivalence point of 8.72 pH." However, it should read, "(a) The titration curve for the titration of 25.00 mL of 0.100 M HCl (strong acid) with 0.100 M NaOH (strong base) has an equivalence point of 7.00 pH. (b) The | Reivse "CH3COOH (weak acid)" to "HCl (strong acid)" in part (a) of the caption for Figure 12.21 titration curves. | Typo |

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| titration curve for the titration of 25.00 mL of 0.100 M CH_3COOH (weak acid) with 0.100 M NaOH (strong base) has an equivalence point of 8.72 pH." | | |
| Chapter 14.3: Acid-Base Equilibria; Section 14.3: Relative Strengths of Acids and Bases; Subsection: The Ionization of Weak Acids and Weak Bases In the caption to Figure 14.9, the phrase, "is has a pH of 3," should be, "has a pH of 3." | Delete the word "is" in the caption for Figure 14.9 pH paper as follows: ...solution of CH3CO2H (beaker on right) has a pH of 3... | Typo |
| Chapter 14.4: Acid-Base Equilibria, Section: Hydrolysis of Salt Solutions, Section: Salts of Weak Acids and Strong Bases The second sentence of the second paragraph states "The sodium ion, as the conjugate acid of a strong base, has not effect on the acidity of the solution." Na+ is not the conjugate acid of NaOH. Water is the conjugate acid of NaOH, and Na+ is simply a spectator ion that does not form an acidic hydrated species like other metal cations. | Revise the second paragraph as follows: "A solution of this salt contains sodium ions and acetate ions. The sodium ion has no effect on the acidity of the solution. However, the acetate ion, the conjugate base of acetic acid, reacts with water and increases the concentration of hydroxide ion:" | Critical |
| Chapter 14.4: Acid-Base Equilibria, Section: Hydrolysis of Salt Solutions, Subsection: Equilibrium in a Solution of a Salt of a Weak Acid and a Weak Base Revise the answer to letter (c) of Check Your Learning in Example 14.17 to "acidic." | Revise the answer to part(c) of Example 14.17 "Determining the Acidic or Basic Nature of Salts" Check Your Learning to "acidic." | Major |
| Chapter 14.4: Acid-Base Equilibria, Section: Hydrolysis of Salt Solutions, | Revise the solution to Example 14.17 "Determining the Acidic or Basic Nature of Salts" as follows: (d) The Na+ cation is a spectator, and | Major |

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| Subsection: Equilibrium in a Solution of a Salt of a Weak Acid and a Weak Base There is an error in the reasoning and calculation used to determine an answer to Example 14.17 (d) on p. 814. (d) The Na+ ion is a spectator, while the HPO42- ion is amphiprotic, with a Ka of 4.2 x 10^-13. The Kb of HPO42- can be determined from the Ka of its conjugate acid, H2PO4-: Kb = (1.0 x 10^-14) / (6.2 x 10^-8) = 1.6 x 10^-7. Since Kb > Ka, the aqueous solution will be basic. | will not affect the pH of the solution, while the HPO4^2- anion is amphiprotic. The Ka of HPO4^2- is 4.2 × 10^-13, and its Kb is (1.0 × 10^-14)/(6.2 × 10^-8) = 1.6 × 10^-7. | |
| Chapter 14.4: Acid-Base Equilibria, Section: Hydrolysis of Salt Solutions, Subsection: Equilibrium in a Solution of a Salt of a Weak Acid and a Weak Base There is an error in the reasoning and calculation used to determine the answer to Example 14.17 (b) on p. 814. (b) The Na+ cation is a spectator; and will not affect the pH of the solution; while the HCO3– anion is amphiprotic, it could either behave as an acid or a base. The Ka of HCO3– is 4.7 x 10^-11; the Kb of HCO3– can be determined from the Ka of its conjugate acid, H2CO3: Kb = (1.0 x 10^-14) / (4.3 x 10^-7) = 2.3 x 10^-8. Since Kb > Ka, the aqueous solution will be basic. | Revise the solution to Example 14.17 "Determining the Acidic or Basic Nature of Salts" as follows: (b) The Na+ cation is a spectator, and will not affect the pH of the solution; while the HCO3- anion is amphiprotic. The Ka of HCO3- is 4.7 × 10^-11, and its Kb is (1.0 × 10^-14)/(4.3 × 10^-7) = 2.3 × 10^-8. | Major |
| Chapter 14.4: Acid-Base Equilibria; Section 14.4: Hydrolysis of Salt Solutions; Subsection: The Ionization of Hydrated Metal Ions The | Switch "right" and "left" in the fourth paragraph of Subsection The Ionization of Hydrated Metal Ions as follows: Note that some of these aluminum species are exhibiting amphiprotic behavior, since they are acting as acids when | Typo |

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| sentence, "Note that some of these aluminum species are exhibiting amphiprotic behavior, since they are acting as acids when they appear on the right side of the equilibrium expressions and as bases when they appear on the left side," should read, "Note that some of these aluminum species are exhibiting amphiprotic behavior, since they are acting as acids when they appear on the left side of the equilibrium expressions and as bases when they appear on the right side." | they appear on the left side of the equilibrium expressions and as bases when they appear on the right side. | |
| Chapter 14.5: Acid-Base Equilibria, Section: Polyprotic Acids p823 - ICE table columns not aligned. submitted via ZenDesk | In Example 14.19 Ionization of a Diprotic Acid, revise the alignment of the columns in the first ICE table. | Minor |
| Chapter 14.6: Acid-Base Equilibria, Section: Buffers, End of Chapter Exercises The answer for Chapter 14 problem 107 in the back of the book is incomplete. It does not give an answer for the [saccharin] ([HA]). Assuming the question is considering that the 'buffered' solution does not change pH, then the Henderson-Hasselbach equation gives an answer: [HA] = 6.1x10^-9 | Revise the answer to exercise 107 as follows: 107. Saccharin, C7H4NSO3H, is a weak acid (Ka = 2.1 x 10^-2)... Answer: The molar mass of sodium saccharide is 205.169 g/mol. Using the abbreviations HA for saccharin and NaA for sodium saccharide the number of moles of NaA in the solution is: 9.75 x 10^-6 mol The pKa for [HA] is 1.68, so [HA] = 6.2 x 19^-9 M. Thus, [A-] (saccharin ions) is 3.90 x 10^-5 M. | Minor |
| Chapter 14.7: Acid-Base Equilibria, Section: Acid-Base Titrations, End of Chapter Exercises Problem #112 of Chapter 14 (pg.828) does not state a proper question. Should it read something like: "WHY can we | Revise exercise 112 as follows: "Why can we ignore the contribution of water to the concentration of OH- in a solution of the following bases..." | Minor |

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| ignore...?" | | |
| Chapter 14.7: Acid-Base Equilibria; Section 14.7: Acid-Base Titrations; Subsection: Titration Curve The caption for Figure 14.21 reads, "(a) The titration curve for the titration of 25.00 mL of 0.100 M CH_3COOH (weak acid) with 0.100 M NaOH (strong base) has an equivalence point of 7.00 pH. (b) The titration curve for the titration of 25.00 mL of 0.100 M HCl (strong acid) with 0.100 M NaOH (strong base) has an equivalence point of 8.72 pH." However, it should read, "(a) The titration curve for the titration of 25.00 mL of 0.100 M HCl (strong acid) with 0.100 M NaOH (strong base) has an equivalence point of 7.00 pH. (b) The titration curve for the titration of 25.00 mL of 0.100 M CH_3COOH (weak acid) with 0.100 M NaOH (strong base) has an equivalence point of 8.72 pH." | Reivse "CH3COOH (weak acid)" to "HCl (strong acid)" in part (a) of the caption for Figure 12.21 titration curves. | Typo |
| Chapter 15: Equilibria of Other Reaction Classes, Section: Precipitation and Dissolution In solving for the formation of a solid, two Ksp values are given and two Molar concentrations. In the first calculation to find the concentration of Silver, the wrong Ksp values and concentration are plugged in for AgI, but the correct answer is still given as if the right numbers had been plugged in. | Revise the solution to Example 15.11 "Precipitation of Silver Halides" as follows: Solution ... For AgI: AgI precipitates when Q equals Ksp for AgI (1.5 × 10^-16). When [I-] = 0.0010 M: Q = [Ag+][I-] = [Ag+](0.0010) = 1.5 × 10^-16 [Ag+] = (1.5 × 10^-16)/(0.0010) = 1.5 × 10^-15 M | Major |

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| Chapter 15.1: Equilibria of Other Reaction Classes, Section: Precipitation and Dissolution, Example 15.10 Example Problem 15.10 (pg 841 PDF) has a typo in the Ksp value for Mn(OH)2. The value should be 2x10^-13 (per Appendix J). | Revise the Ksp value in the soultion of Example 15.10 Concentrations Following Precipitation as follows: "Ksp = 2 x 10^-13" | Minor |
| Chapter 15.1: Equilibria of Other Reaction Classes, Section: Precipitation and Dissolution, Example 15.12 The answer to the check your learning question in example 15.12 should be 4 x 10^-11. | Revise the answer to Check Your Learning in Example 15.12 Common Ion Effect as follows: Check Your Learning Calculate the molar solubility of aluminum hydroxide... Answer: 4 x 10^-11 | Major |
| Chapter 15.1: Equilibria of Other Reaction Classes, Section: Precipitation and Dissolution, Example 15.5 Revise answer for Check Your Learning exercsise 15.5 to be: 2.08 x 10^-4. Location: Chapter 15: Equilibria of Other Reaction Classes; Section 15.1: Precipitation and Dissolution; subsection: Ksp and Solubility Both the numerical answer and the number of significant figures are incorrect. For the equilibrium: TlCl (s) --> Tl^+ (aq) + Cl^- (aq) we have Ksp = [Tl^+][Cl^-] Given 3.46 g TlCl dissolves in 1 L, it follows that: 3.46g/(239.93 g/mol) = 0.01442 mol TlCl dissolves in 1 L, so there will be the following concentrations: [Tl^+] = [Cl^-] = 0.01442 M so: Ksp = (0.01442 M)(0.01442 M) = 2.08 x 10 ^-4 | Revise the solution to the Check Your Learning question in Example 15.5 Determination of Ksp from Gram Solubility as follows: Answer 2.08 × 10^-4 | Major |
| Chapter 15.2: Equilibria of Other Reaction Classes, Section: Lewis Acids and | Revise the title of Table 15.2 to "Common Complex Ions by Decreasing Formation Constants". | Typo |

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| Bases, Table 15.2 Table 15.2. The title of the table should be "… Formation Constant" NOT "…Formulation Constants" | | |
| Chapter 15.3: Equilibria of Other Reaction Classes, Section: Multiple Equilibria, End of Chapter Exercises Problem #103 of the Chapter 15.3 Problem set has an incorrect answer in the back of the book. Using the values from the appendix of: Ksp CdCO3 = 5.2x10^-12 H2CO3 Ka1 = 4.3x10^-7, Ka2 = 5.6x10^-11 The value for the concentration of Cd2+ would be 2.3x10^-6 M. The book lists the answer as 3.1x10^-3 M | Revise exercise 103 as follows: 103. Calculate the concentration of Cd2+ resulting from the dissolution of CdCO3 in a solution that is 0.250 M in CH3CO2H, 0.375 M in NaCH3CO2, and 0.010 M in H2CO3. | Minor |
| Chapter 15.3: Equilibria of Other Reaction Classes, Section: Multiple Equilibria, End of Chapter Exercises Problem #107 of the Chapter 15.3 problem set has an incorrect answer in the back of the book. Using values from the Appendices of: Mg(OH)2 Ksp = 8.9x10^-12 HCN Ka = 4.9x10^-10 The answer should be 0.047g NaCN. The book lists the answer as 5.4x10^-3 g. | Revise the answer to exercise 107 to 0.0036 g. | Minor |
| Chapter 16: Electrochemistry, Answer Key, Question 7 Q7 and answers do not correspond | Remove parts (a) of the answer to question 7, and re-letter the remaining answers to (a), (b), and (c). | Typo |
| Chapter 16: Electrochemistry, End of Chapter Exercises, 24 Ch. 16 #24(b): The reaction is not balanced. Should be 3Cu2+(aq) + 2Al(s) ? 2Al3+(aq) + 3Cu(s) | Revise part b of exercise 24 as follows: (b) 3Cu2+(aq) + 2Al(s) --> 2Al3+(aq) + 3Cu(s) | Minor |

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| Chapter 16: Electrochemistry, End of Chapter Exercises, 28 Ch. 16 problem#28. Br- and Br2 are in the same phase, so they should be separated by a comma, not a single vertical line. | In exercise 28, replace the line between Br2 (aq) and br-(aq) with a comma. | Major |
| Chapter 16: Electrochemistry, End of Chapter Exercises, 31 Ch. 16 #31(c) I believe should say "bromide is oxidized to bromine" | Revise part c of exercise 31 as follows: 31. Determine the standard cell potential and the cell potential under the stated conditions... (c) The cell made of a half-cell in which 1.0 M aqueous bromide is oxidized to 0.11 M bromine ion and a half-cell in which aluminum ion at 0.023 M is reduced to aluminum metal. | Major |
| Chapter 16: Electrochemistry; Answer Key; Question 13 In the solution to question 13 in Chapter 16, the charge on Ni should be 2+. | Revise "Ni+" to Ni2+" in the solution to question 13 part (a). | Typo |
| Chapter 16.3: Electrochemistry, Section: Standard Reduction Potentials, Table 16.2 Standard reduction potential values in Appendix L, disagree with some of the values in Table 16.2. | Revise the following values in Table 17.2: Cu2+(aq) + 2e- --> Cu(s) +0.34 AgCl(s) + e- --> Ag(s) + Cl-(aq) +0.22233 Pb2+(aq) + 2e- --> Pb(s) -0.1262 Sn2+(aq) + 2e- --> Sn(s) -0.1375 | Typo |
| Chapter 16.4: Electrochemistry, Section: The Nernst Equation When defining the Faraday constant on this page “F = ….” The constant goes from 9.648 x 10^4 to 9.684 x 10^4. I believe the number should remain the same. | In the equation for Faraday’s constant, revise "9.684" to "9.648". | Minor |
| Chapter 16.4: Electrochemistry, Section: The Nernst Equation, Example 16.5 In Example 16.5. The sentence “The two equilibrium constants differ slightly due to rounding in the constants 0.0257 V and | In Example 16.5 Equilibrium Constants, Standard Cell Potentials, and Standard Free Energy Changes, delete the following sentence: "The two equilibrium constants differ slightly due to rounding in the constants 0.0257 V and 0.0592 V." | Minor |

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| 0.0592 V." I find to be confusing, since in this example the equilibrium constant was only calculated with the 0.0592 V constant. I think it would be best to remove this sentence or modify it. | | |
| Chapter 16.5: Electrochemistry, Section: Batteries and Fuel Cells, Subsection: Secondary Batteries The chemical reaction equations for lithium ion batteries in chapter 16 are not balanced correctly (one Li on the left, and 2x-1 on the right). The x-1 subscript should be 1-x. | In the discussion of Lithium ion batteries, revise the subscript "x - 1" to "1 - x" in the reactions given. | Typo |
| Chapter 16.5: Electrochemistry; Section 16.5: Batteries and Fuel Cells; Subsection: Primary Batteries In Figure 16.10, the top of the dry cell should be positive. | Revise the charge given at the top of the dry cell in Figure 16.10 to be positive. | Typo |
| Chapter 16.6: Electrochemistry, Section: Corrosion, Figure 16.18 Reporting several errors in the last figure in the "Corrosion" section of chapter 16. Details provided below, and a sample image illustrating the recommended revisions is attached. 1. The figure has arrows suggesting current flow through a "lead wire" connecting the protected item to the sacrificial anode. Readers will / should assume those arrows indicate flow of electrons, in which case they're pointing in the wrong direction (should be from sacrificial anode to | Replace Figure 16.18 with an updated version that shows the electrons flowing from the sacrificial anode to the object to be protected. | Major |

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| protected item). Best remedy would be swap the locations of the protected item and the anode, that way the conventional depiction of an electrochemical cell, with anode on left and cathode on right, electrons flowing left-to-right, is honored. 2. The arrows in the soil give the incorrect impression that electrons are flowing through the soil -- these arrows should be removed, and perhaps replaced with more accurate depictions of the ion flow occuring within the soil. 3. Would be helpful to include typical half-reactions at each of the two objects, e.g., reduction of oxygen at the protected item and oxidation of anode material at the anode. 4. It's not clear if the wire connecting the two objects is labeled to indicate its function ("lead" as pronounced "leed") or its composition (the element Pb). If the former, better to replace "lead" with "connecting", or just omit the label altogether. If the latter, should replace "lead" with "Pb", though I'd argue against this non-useful detail being included at all. 5. Finally, the label "no power source is needed" should be removed. This is a true statement for "passive" cathodic protection, but not for "active" cathodic protection. Unless details are added to the text | | |

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| narrative to clarify these two different approaches, it's best not to give the false impression that cathodic protection never requires an external power source. | | |
| Chapter 16.6: Electrochemistry; Section 16.6: Corrosion. In the equation, "cathode: O_2(s) + 2H^+(aq) + 4e^- yields 2H_2O(l)," the 2H^+ should be 4H^+. | Revise "2H+ (aq)" to "4H+ (aq)" in the equation after "The electrons reduce oxygen in the air in acidic solutions." | Typo |
| Chapter 18: Representative Metals, Metalloids, and Nonmetals; End of Chapter Exercises; Question 3 In the answer to question 3 in chapter 18, change SeSe to SrSe. | Change "SeSe" to "SrSe" in the answer to question 3. | Typo |
| Chapter 18: Representative Metals, Metalloids, and Nonmetals; Key Terms In the key terms list of chapter 18, change, "metal atoms of the metallic elements of groups 1, 2, 12, 13, 14, 15 and 16, which form ionic compounds by losing electrons from their outer s or p orbitals," to, "metal (representative) metallic elements of groups 1, 2, 12, 13, 14, 15 and 16, which form ionic compounds by losing electrons from their outer s or p orbitals." | Revise the key term metal from "metal" to "metal (representative)". | Typo |
| Chapter 18.1: Representative Metals, Metalloids, and Nonmetals; Section 18.1: Periodicity; Subsection: Group 12 In the caption to Figure 18.7, the phrase, "Zinc is an active transition metal," should say, "Zinc is an active metal..." | Revise "Zinc is an active transition metal" to "Zinc is an active metal" in the caption to Figure 18.7. | Typo |

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| Chapter 18.2: Representative Metals, Metalloids, and Nonmetals; Section 18.2: Occurrence and Preparation of the Representative Metals; Subsection: The Preparation of Zinc Under the subsection, "The Preparation of Zinc," Co_2 should be CO_2. | Revise "Co2" to "CO2" in subsection The Preparation of Zinc. | Typo |
| Chapter 18.4: Representative Metals, Metalloids, and Nonmetals, Section: Structure and General Properties of the Nonmetals oxidation states missing from some equations | Properly align oxidation numbers below equations. | Typo |
| Chapter 18.4: Representative Metals, Metalloids, and Nonmetals; Section 18.4: Structure and General Properties of the Nonmetals The phrase, "There are four general aspects of the oxidation-reduction chemistry," should read, "There are five general aspects of the oxidation-reduction chemistry..." | Revise "four" to "five" in the phrase "There are five general aspects of the oxidation-reduction chemistry..." | Typo |
| Chapter 18.4: Representative Metals, Metalloids, and Nonmetals; Section 18.4: Structure and General Properties of the Nonmetals; Subsection: Phosphorus The phrase, "shown in Figure 18.24 and Figure 18.24," should read, "shown in Figure 18.24." | Revise the phrase "shown in Figure 18.24 and Figure 18.24," to "shown in Figure 18.24." | Typo |
| Chapter 18.4: Representative Metals, Metalloids, and Nonmetals; Section 18.4: Structure and General Properties of the | Revise the phrase "members of group 15 have five valence elements," to "members of group 15 have five valence electrons" in subsection Sulfur. | Typo |

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| Nonmetals; Subsection: Sulfur The phrase, "For example, members of group 15 have five valence elements," should read, "For example, members of group 15 have five valence electrons..." | | |
| Chapter 18.4: Representative Metals, Metalloids, and Nonmetals; Section 18.4: Structure and General Properties of the Nonmetals; Subsection: Sulfur The phrase, "so named because of the shape or its crystals," should read, "so named because of the shape of its crystals..." | Revise "or its crystals" to "of its crystals" in subsection Sulfur. | Typo |
| Chapter 19: Transition Metals and Coordination Chemistry; Answer Key; Question 19 In the answer to question 19 part (c) in chapter 19, HrCO should be HCrO. | Revise "HrCO" to "HCrO" in the answer to question 19 part (c). | Typo |
| Chapter 19.1: Transition Metals and Coordination Chemistry; Section 19.1: Occurrence, Preparation, and Properties of Transition Metals and Their Compounds The answer to question 17 part (b) in chapter 19 is missing a reaction arrow. | Add the missing reaction arrow to question 17 part (b). | Typo |
| Chapter 19.1: Transition Metals and Coordination Chemistry; Section 19.1: Occurrence, Preparation, and Properties of Transition Metals and Their Compounds; Question 21 The answer to question 21 part (c) in chapter 19 does not correspond with the | Revise the answer to question 21 part (c) as follows: (c) MnO4- + 5Fe2+ + 8H+ --> Mn2+ + 5Fe3+ + 4H2O | Typo |

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| question. | | |
| Chapter 19.2: Transition Metals and Coordination Chemistry, Section: Coordination Chemistry of Transition Metals Hi, I came across this in chapter 19 section 2 of the OpenStax Chemistry title: http://cnx.org/contents/havxkyvS@9.311:V5zcdoUo@6/Coordination-Chemistry-of-Tran Students are told "The four common exceptions are aqua (H2O), amine (NH3)," but at least since 1971 under the IUPAC Red Book recommendations NH3 has been referred to as "ammine" so as to not confuse it with the functional group "amine" used in organic chemistry. I suspect this to be a typographical error. Please correct this so that students keep these concepts correctly in mind as they transfer between classes or schools. | Update the spelling of NH3 "amine" to "ammine" throughout. | Typo |
| Chapter 20.4: Nuclear Chemistry, Section: Transmutation and Nuclear Energy, Table 20.3 In Table 20.3. Californium row has an error. The reaction shown is for the preparation of Bk not Cf. | In Table 20.3 Preparation of Some of the Transuranium Elements, revise the row for californium as follows: californium -- Cf -- 98 -- 242/96 Cm + 4/2 He --> 245/98 Cf + 1/0 n | Major |
| Chapter 20.6: Nuclear Chemistry, Section: Biological Effects of Radiation, Subsection: Ionizing and Nonionizing Radiation The discussion of how radiation can damage biomolecules (chapter 20.6) shows ionized water (H2O | Revise OH- to OH(dot) in figure 21.32 and the figure above it. | Typo |

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| cation) reacting with H2O to form hydronium cation plus hydroxyl ANION. This is obviously wrong. The text is correct in describing hydroxyl RADICAL as the bad actor, but the equation on p1219 and figure 20.32 have the typo. I.e. OH- should be OH• It's a typo, but it's totally egregious (chemically) and really needs to be fixed. | | |
| Chapter 21: Organic Chemistry; key terms Add "addition reaction" to the list of key terms for chapter 21. I suggest the definition, "reaction in which a double carbon-carbon bond forms a single carbon-carbon bond by the addition of a reactant. Typical reaction for an alkene." | Add the key term addition reaction to Chapter 21. | Typo |
| Chapter 21.1: Organic Chemistry; Section 21.1: Hydrocarbons; Subsection: The Basics of Organic Nomenclature: Naming Alkanes; Example 21.5 The answer to the Check Your Learning for Example 20.5 reads, "reactant: trans-3-hexene, product: 3,4-dichlorohexane" should be, "reactant: 3-hexene (could be cis or trans) product: 3,4-dichlorohexane." | Revise the answer to the Check Your Learning in Example 21.5 Alkene Reactivity and Naming to "reactant: cis-3-hexene product: 3,4-dichlorohexane". | Typo |
| Chapter 21.3: Organic Chemistry; Section 21.3: Aldehydes, Ketones, Carboxylic Acids, and Esters; Subsection: Aldehydes and Ketones The third image under the subsection, "Aldehydes and Ketones," has an extraneous image at | Delete the misplaced structural formula in subsection Aldehydes and Ketones. | Typo |

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| the top. | | |
| Chapter 21.3: Organic Chemistry; Section 21.3: Aldehydes, Ketones, Carboxylic Acids, and Esters; Subsection: Aldehydes and Ketones; Example 21.10 In the Check Your Learning to Example 21.10, the phrase, "reduced relative to the marked carbon atom in ethanol," should be, "reduced relative to the carbon atom in CH_2 in ethanol." | Revise the first figure in the Check Your Learning in Example 21.10 Oxidation and Reduction in Organic Chemistry so that the "C" is marked red. | Typo |
| Chapter 21.3: Organic Chemistry; Section 21.3: Aldehydes, Ketones, Carboxylic Acids, and Esters; Subsection: Aldehydes and Ketones; Question 47 The answer to question 47 part (b) in chapter 21c does not make sense. | Revise the answer to question 47 part (b) as follows: (b) CH3COCH3 | Typo |
| Chapter 21.4: Organic Chemistry; Section 21.1: Hydrocarbons; Subsection: The Basics of Organic Nomenclature: Naming Alkanes; Example 21.4 The phrase, "(as shown by the red numbers) so the branch is connected to carbon 3," should read, "(as shown by the blue numbers) so the branch is connected to carbon 3..." | Reverse the use of "red" and "blue" in the solution to Example Example 21.4 Naming Substituted Alkanes. | Typo |
| Appendix B: Essential Mathematics; Section: Exponential Arithmetic In Appendix B, the sentence, "For example, 1,230,000,000 = 1.23 × 10^9 and 0.00000000036 × 10^?10." should read, "For example, 1,230,000,000 = 1.23 × 10^9 | In Appendix B, revise the sentence, "For example, 1,230,000,000 = 1.23 × 10^9 and 0.00000000036 × 10^?10." to "For example, 1,230,000,000 = 1.23 × 10^9 and 0.00000000036 = 3.6 × 10^?10." | Typo |

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| and 0.00000000036 = 3.6 × 10^?10." | | |
| Appendix B: Essential Mathematics; Section: Exponential Arithmetic; Subsection: Addition of Exponentials; Example B1 The solution to Example B1 should be, "3.00 × 10^?3 = 300 × 10^?5." | Revise the solution to Example B1 Adding Exponentials from 3.00 x 100^-3 to 3.00 x 10^-3. | Typo |
| Appendix H: Ionization Constants Of Weak Acids The Lewis structure for formic acid in Appendix H is missing a double bond between the C and the terminal O. | Revise the Lewis structure for formic acid to have a double bond between Carbon and Oxygen. | Minor |