



Chemistry

Concepts and Applications

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STANDARDS	PAGE REFERENCES
<p>I. HISTORY AND NATURE OF SCIENCE</p>	
<p>A. Scientific World View</p>	
<p>The student will understand the nature of scientific ways of thinking and that scientific knowledge changes and accumulates over time.</p>	
<p>1. The student will be able to distinguish among hypothesis, theory and law as scientific terms and how they are used to answer a specific question.</p>	<p>Student Edition: <i>Figure 2.5 57</i> <i>Hypotheses, Theories, and Laws 57</i></p> <p>Teacher Wraparound Edition: CD 9; IM 15, 57; MI 228</p>

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<p>2. The student will be able to explain how scientific and technological innovations as well as new evidence can challenge portions of or entire accepted theories and models including but not limited to cell theory, atomic theory, theory of evolution, plate tectonic theory, germ theory of disease and big bang theory.</p>	<p>Student Edition: <i>Chemistry and Technology</i> 236-237 <i>Early Ideas About Matter</i> 50-51 <i>Expanding the Model of the Atom</i> 228-229, 231 <i>Figure 2.8</i> 61 <i>Figure 2.9</i> 62 <i>Figure 7.1</i> 228 <i>Physics Connection</i> 230 <i>The Discovery of Atomic Structure</i> 59-63</p> <p>Teacher Wraparound Edition: AC 63, 233; CB 62; CD 62; MI 228; TS 230, 236; VL 8, 59; UA 9</p>
<p>3. The student will recognize that in order to be valid, scientific knowledge must meet certain criteria including that it: be consistent with experimental, observational and inferential evidence about nature; follow rules of logic and reporting both methods and procedures; and be falsifiable and open to criticism.</p>	<p>Student Edition: <i>Figure 2.5</i> 57 <i>Hypothesis, Theories, and Laws</i> 57</p> <p>Teacher Wraparound Edition: CD 9, 62; IM 57</p>
<p>4. The student will explain how traditions of ethics, peer review, conflict and general consensus influence the conduct of science.</p>	<p>Student Edition: <i>History Connection</i> 56, 305 <i>Physics Connection</i> 230</p> <p>Teacher Wraparound Edition: E 56, 305; TS 230, 236</p>
<p>5. The student will recognize that some scientific ideas are incomplete, and opportunity exists in these areas for new advances.</p>	<p>Student Edition: 728, 762, 772-773 <i>Chemistry and Society</i> 144 <i>Chemistry and Technology</i> 724-725 <i>Writing in Chemistry</i> 776 #44</p> <p>Teacher Wraparound Edition: CD 62; CJ 772; DI 70; E 762; IS 74; TS 724; UP 48</p>

STANDARDS	PAGE REFERENCES
<p>B. Scientific Inquiry The student will design and conduct a scientific investigation.</p>	
<p>1. The student will design and complete a scientific experiment using scientific methods by determining a testable question, making a hypothesis, designing a scientific investigation with appropriate controls, analyzing data, making conclusions based on evidence and comparing conclusions to the original hypothesis and prior knowledge.</p>	<p>Student Edition: <i>Inquiry Extension</i> 327 <i>Launch Lab</i> 255 Teacher Wraparound Edition: CJ 459; E 728</p>
<p>2. The student will distinguish between qualitative and quantitative data.</p>	<p>Student Edition: <i>Classifying Matter</i> 14 <i>Understand Concepts</i> 44 #23 Teacher Wraparound Edition: A 69; TPK 15</p>
<p>3. The student will apply mathematics and models to analyze data and support conclusions.</p>	<p>Student Edition: <i>CHEMLAB</i> 36-37, 54-55, 360-361, 386-387, 422-423, 457, 544-545, 721, 748-749 <i>Mini Lab</i> 61, 244, 323, 418 Teacher Wraparound Edition: A 37, 55, 387, 545; D 64-65, 382-383</p>
<p>4. The student will identify possible sources of error and their effects on results.</p>	<p>Student Edition: <i>CHEMLAB</i> 55, 205, 361, 423, 721 <i>Inquiry Extension</i> 37, 205 Teacher Wraparound Edition: A 55</p>
<p>5. The student will know that professional scientists and engineers have ethical codes.</p>	<p>Student Edition: <i>History Connection</i> 305 <i>Physics Connection</i> 230 Teacher Wraparound Edition: CC 677; TS 230</p>
<p>6. The student will give examples of how different domains of science use different bodies of scientific knowledge and employ different methods to investigate questions.</p>	<p>Student Edition: <i>Earth Science Connection</i> 383, 723 <i>In the Field</i> 12-13, 490-491, 634-635, 676-677 Teacher Wraparound Edition: AC 613; B 12; IS 595; TS 383, 448, 676, 723</p>

STANDARDS	PAGE REFERENCES
<p>C. Scientific Enterprise The student will understand the relationship between science and technology and how both are used.</p>	
<p>1. The student will compare and contrast the purposes and career opportunities of engineering, technology and science.</p>	<p>Student Edition: <i>In the Field</i> 12-13, 448-449, 490-491, 612-613, 634-635, 676-677</p> <p>Teacher Wraparound Edition: CC 13, 449, 491, 613, 677; TS 448, 612</p>
<p>2. The student will provide an example of a need or problem identified by science and solved by engineering or technology.</p>	<p>Student Edition: <i>Chemistry and Society</i> 29, 58, 537 <i>Chemistry and Technology</i> 106-107, 214-215, 574, 724-725 <i>How It Works</i> 569, 595, 744</p> <p>Teacher Wraparound Edition: B 595; TS 106, 215, 537, 574, 569, 724</p>
<p>3. The student will provide an example of how technology facilitates new discoveries and the development of scientific knowledge.</p>	<p>Student Edition: <i>Chemistry and Society</i> 29, 144 <i>Chemistry and Technology</i> 106-107, 236-237, 388, 750-751</p> <p>Teacher Wraparound Edition: B 29, 106; TS 144, 236, 388; VL 237</p>
<p>4. The student will know that technological changes and scientific advances are often accompanied by social, political, environmental and economic changes.</p>	<p>Student Edition: <i>Chemistry and Society</i> 29, 495, 657 <i>Chemistry and Technology</i> 106-107, 214-215, 424-425, 574, 724-725 <i>Think Critically</i> 595</p> <p>Teacher Wraparound Edition: B 447; CD 425; Di 726; E 607; TS 424, 495, 657, 724</p>
<p>5. The student will recognize that science and technology are influenced by cultural backgrounds and beliefs and by social needs, attitudes, values and limitations.</p>	<p>Student Edition: <i>Chemistry and Society</i> 29, 144, 537 <i>Chemistry and Technology</i> 214-215, 724-725 <i>How It Works</i> 569, 595, 744</p> <p>Teacher Wraparound Edition: AC 485; CD 214, 425, 447, 574, 724; TS 606-607, 657; VL 569</p>

STANDARDS	PAGE REFERENCES
<p>D. Historic Perspectives</p> <p>The student will recognize the historical and cultural context of scientific endeavors and how they influence each other.</p>	
<p>1. The student will be able to trace the development of a scientific advancement, invention or theory and its impact on society.</p>	<p>Student Edition:</p> <p><i>Chemistry and Society</i> 495</p> <p><i>Expanding the Model of the Atom</i> 228-229</p> <p><i>History Connection</i> 56</p> <p><i>Physics Connection</i> 230</p> <p><i>The Discovery of the Atomic Structure</i> 59-63</p> <p><i>The Kinetic Theory of Matter</i> 339-341</p> <p><i>The Search for a Periodic Table</i> 84-89</p> <p>Teacher Wraparound Edition:</p> <p>AC 405; CD 15; D 50, 339; E 56; IS 421; MI 50, 228</p>
<p>2. The student will provide examples of scientific advancements contributed by other civilizations and cultures.</p>	<p>Student Edition:</p> <p><i>Early Ideas About Matter</i> 50-51</p> <p><i>Modern Atomic Theory</i> 51-53</p> <p>Teacher Wraparound Edition:</p> <p>AC 24, 59, 63; CB 101; CD 60, 109, 270-271, 329; CoD 51; E 51; MI 50</p>
<p>3. The student will compare and contrast the differences between scientific theories and theories from other bodies of knowledge, and the importance of each in a science discussion.</p>	<p>Student Edition:</p> <p><i>Hypothesis, Theories, and Laws</i> 57</p> <p><i>Figure 7.2</i> 228</p> <p>Teacher Wraparound Edition:</p> <p>CD 329; IM 57; IS 244, 362; MI 228</p>

STANDARDS	PAGE REFERENCES
II. PHYSICAL SCIENCE	
A. Structure of Matter	
The student will understand the nature of matter including its forms, properties and interactions.	
<p>1. The student will identify protons, neutrons and electrons as the major components of the atom, their mass relative to one another, their arrangement and their charge.</p>	<p>Student Edition: 60, 63, 229 <i>Figure 2.10</i> 63 <i>Figure 7.2 & Figure 7.3</i> 229 <i>Section 2.1 Assessment</i> 66 #1 <i>The Discovery of Atomic Structure</i> 59-63</p> <p>Teacher Wraparound Edition: A 65; D 64-65; DI 62; IM 24, 63, 229; VL 59</p>
<p>2. The student will be able to explain the relationship of an element's position on the periodic table to its atomic number and atomic mass.</p>	<p>Student Edition: <i>Atomic Mass</i> 65-66 <i>Atomic Numbers</i> 64 <i>Figure 2.12</i> 65 <i>Section 2.1 Assessment</i> 66 #5</p> <p>Teacher Wraparound Edition: CB 65; D 64-65; T 64</p>
<p>3. The student will compare and contrast the properties of an element and its isotopes, and describe how isotopes can be used in research, medicine and industry.</p>	<p>Student Edition: 752-753 <i>Biology Connection</i> 766 <i>Chemistry and Technology</i> 750-751 <i>Figure 2.11</i> 64 <i>Figure 21.21</i> 764 <i>How It Works</i> 744 <i>Medical Uses of Radioisotopes</i> 763 <i>Nonmedical Uses of Radioisotopes</i> 765, 767 <i>Nuclear Notation</i> 742</p> <p>Teacher Wraparound Edition: A 752, 765; B 744; CD 764; D 764, 767; E 766; IM 64, 764; TS 750</p>

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<p>4. The student will use the periodic table to identify regions, families, groups and periods.</p>	<p>Student Edition: 96, 101-103, 256-257 <i>Figure 3.14</i> 102 <i>Periods and Groups</i> 94 <i>Section 3.2 Assessment</i> 111 #6 <i>The Main Group Metals and Non-metals</i> 261, 264, 268-269, 271, 274, 276, 279</p> <p>Teacher Wraparound Edition: A 94; CLA 94; DI 94; R 94</p>
<p>5. The student will explain how neutral atoms become ions.</p>	<p>Student Edition: 154-155 <i>Figure 4.17</i> 131 <i>Figure 5.4</i> 155 <i>Table 5.1</i> 155 <i>Ways to Achieve Stability</i> 130-132</p> <p>Teacher Wraparound Edition: A 154; CJ 131; VL 132</p>
<p>6. The student will be able to explain how atoms form compounds through bonding.</p>	<p>Student Edition: 670 <i>A Model of Bonding</i> 300-301 <i>Bonding in Metals</i> 311-312 <i>Covalent Character</i> 306-307 <i>Electronegativity: An Attraction for Electrons</i> 301-303 <i>Figure 9.1</i> 301 <i>Ionic Character</i> 303-304 <i>Polar Covalent Bonds</i> 307-309</p> <p>Teacher Wraparound Edition: CB 129; CD 137; CU 143; DI 130, 133; E 312; IM 131; MI 128; R 312</p>

STANDARDS	PAGE REFERENCES
7. The student will compare and contrast the states of matter in terms of interactions between particles.	<p>Student Edition: <i>CHEMLAB</i> 360-361 <i>Figure 4.25</i> 142 <i>Figure 11.14</i> 390 <i>Section 10.1 Assessment</i> 345 #1-#2 <i>The Kinetic Theory of Matter</i> 339-343</p> <p>Teacher Wraparound Edition: BI 336; CD 142; CU 345; DI 340; E 345; MI 338</p>
8. The student will differentiate between an atom and a molecule.	<p>Student Edition: 40, 51, 136-138 <i>Figure 1.25</i> 40 <i>Figure 4.20</i> 137 <i>Mini Lab</i> 133</p> <p>Teacher Wraparound Edition: A 133; BI 128; CB 129; CD 119, 124; D 56-57; TPK 116; UP 48</p>
9. The student will differentiate between an element and a compound.	<p>Student Edition: 24-25, 28, 124-125 <i>Figure 1.18</i> 28 <i>Section 4.1 Assessment</i> 127 #5 <i>Table 1.3</i> 30</p> <p>Teacher Wraparound Edition: CB 142; D 30, 119, 127, 136; FT 118; IM 24; R 31; TPK 48, 116</p>

STANDARDS	PAGE REFERENCES
<p>B. Chemical Reactions The student will describe chemical reactions and the factors that influence them.</p>	
<p>1. The student will describe chemical reactions using words and symbolic equations.</p>	<p>Student Edition: 193-194 <i>Balanced Chemical Equations</i> 196-197 <i>Chemical Equations</i> 190-191 <i>CHEMLAB</i> 204-205 <i>Example Problem</i> 198-199 <i>Mini Lab</i> 203 <i>Practice Problems</i> 199 <i>Section 6.1 Assessment</i> 199 #6, #9 <i>Supplemental Practice</i> 815 #5 <i>Table 6.1</i> 207</p> <p>Teacher Wraparound Edition: D 196-197, 202-203; E 198, 207; IM 197; MI 188; R 198; Tr 191; VL 190</p>
<p>2. The student will explain the influence of temperature, surface area, agitation and catalysts on the rate of a reaction.</p>	<p>Student Edition: 220-221 <i>Cumulative Review</i> 776 #42 <i>Mini Lab</i> 218 <i>Rate of Reaction</i> 216-217 <i>Section 6.3 Assessment</i> 221 #15 <i>Think Critically</i> 224 #34</p> <p>Teacher Wraparound Edition: A 217; CD 217; D 216-217; E 221; QD 217, 220; T 217</p>
<p>3. The student will distinguish between a chemical reaction and a nuclear reaction.</p>	<p>Student Edition: <i>Concepts in Motion</i> 742 <i>Nuclear Notation</i> 742 <i>Supplemental Practice</i> 843 #7 <i>Table 21.1</i> 742</p> <p>Teacher Wraparound Edition: A 35; CD 745; TPK 738</p>

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<p>4. The student will explain how the rearrangement of atoms and molecules in a chemical reaction illustrates conservation of mass.</p>	<p>Student Edition: <i>Balanced Chemical Equations</i> 196-197 <i>CHEMLAB</i> 54-55 <i>Inquiry Extension</i> 55 <i>Section 6.1 Assessment</i> 199 #5, #8</p> <p>Teacher Wraparound Edition: MI 188; QD 196; Re 53; Tr 197, 747</p>
<p>5. The student will describe how combining acids and bases produce a neutral solution.</p>	<p>Student Edition: <i>Types of Acid-Base Reactions</i> 516-517 <i>Understand Concepts</i> 548 #25, #28</p> <p>Teacher Wraparound Edition: BI 514; CD 520; D 518-519; IM 522; MI 516; TPK 517; VL 516</p>
<p>C. Energy Transformations The student will understand energy forms, transformations and transfers.</p>	
<p>1. The student will know that potential energy is stored energy and is associated with gravitational or electrical force, mechanical position or chemical composition.</p>	<p>Student Edition: 722 <i>CHEMLAB</i> 720-721 <i>Figure 20.12</i> 722 <i>Figure 20.19</i> 732 <i>Figure 21.15</i> 759 <i>Nuclear Fission</i> 757 <i>Think Critically</i> 598</p> <p>Teacher Wraparound Edition: D 722</p>
<p>2. The student will differentiate between kinetic and potential energy and identify situations where kinetic energy is converted into potential energy and vice versa.</p>	<p>Student Edition: 722 <i>Chemistry and Technology</i> 724-725 <i>Concepts in Motion</i> 759 <i>Figure 20.12</i> 722 <i>Figure 20.19</i> 732 <i>Mass and Speed of Particles</i> 348-349</p> <p>Teacher Wraparound Edition: D 349</p>

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3. The student will differentiate between AC and DC current.	This objective could be introduced through classroom discussion using Chapter 20 (702).
4. The student will describe the production, storage and transmission of electricity.	<p>Student Edition: 722 <i>Figure 20.12</i> 722 <i>Figure 21.15</i> 759 <i>Figure 21.30</i> 773 <i>How It Works</i> 598</p> <p>Teacher Wraparound Edition: CU 614</p>
5. The student will be able to describe physical and chemical changes in terms of the law of conservation of energy.	<p>Student Edition: <i>Figure 20.3</i> 707 <i>Figure 20.5</i> 710 <i>Heat and Chemical Reactions</i> 707-709</p> <p>Teacher Wraparound Edition: CJ 711; DI 707; IM 707</p>
6. The student will compare and contrast the amount of energy released through chemical reactions and nuclear fission and fusion.	<p>Student Edition: <i>Concepts in Motion</i> 742 <i>Supplemental Practice</i> 843 #7 <i>Table 21.1</i> 742</p> <p>Teacher Wraparound Edition: A 35; D 760</p>
7. The student will describe the risks and benefits of fossil fuels, renewable sources and nuclear power as sources of usable energy.	<p>Student Edition: 760 <i>Chemistry and Society</i> 495 <i>Chemistry and Technology</i> 724-725 <i>Everyday Chemistry</i> 711 <i>Figure 21.17</i> 760 <i>Section 21.1 Assessment</i> 762 #13</p> <p>Teacher Wraparound Edition: CJ 725; CU 761; D 760; E 707; TS 711, 724; VL 725, 760</p>

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<p>8. The student will describe applications of the different wavelengths of the electromagnetic spectrum.</p>	<p>Student Edition: <i>Concepts in Motion</i> 73 <i>Electrons and Light</i> 72 <i>Everyday Chemistry</i> 74, 318 <i>Figure 2.18</i> 70 <i>Figure 2.19</i> 72 <i>Figure 2.21</i> 73 <i>Mini Lab</i> 75 <i>Physics Connection</i> 71 <i>The Electromagnetic Spectrum</i> 68-69</p> <p>Teacher Wraparound Edition: A 70; D 68-69; E 71, 74; IS 16; TS 74, 318</p>
<p>9. The student will describe energy, work and power both conceptually and quantitatively.</p>	<p>Student Edition: 40, 708, 722 <i>CHEMLAB</i> 720-721 <i>Chemistry and Technology</i> 724-725 <i>Everyday Chemistry</i> 318 <i>Figure 20.12</i> 722 <i>Figure 20.3</i> 707 <i>Section 20.2 Assessment</i> 728 #14</p> <p>Teacher Wraparound Edition: CJ 711; D 40-41; DD 702-703; E 318, 719; TS 318; VL 707</p>
<p>D. Motion The student will understand the nature of force and motion.</p>	
<p>1. The student will use Newton's three laws of motion to qualitatively and quantitatively describe the interaction of objects.</p>	<p>Student Edition: 301, 304 <i>Figure 2.15</i> 68 <i>How It Works</i> 375 <i>Physics Connection</i> 566</p> <p>Teacher Wraparound Edition: B 375; IM 301; IS 374; R 68; TS 566; UA 212</p>

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2. The student will describe the effect of friction and gravity on the motion of an object.	Student Edition: 67 <i>Figure 2.15 68</i> Teacher Wraparound Edition: UA 303
E. Forces of Nature The student will understand the forces of nature and their application.	
1. The student will recognize the factors that affect the presence and magnitude of gravitational, electromagnetic, weak and strong nuclear forces.	Student Edition: 67-68, 303-304, 442-443 <i>Everyday Chemistry 318</i> <i>Figure 2.15 68</i> <i>Figure 9.25 330</i> <i>Interparticle Forces in Water 437-439</i> <i>Polar and Non-polar Molecules 328-330</i> Teacher Wraparound Edition: CJ 442; TS 318; UA 442
2. The student will identify the dominant force or forces in a variety of interactions.	Student Edition: 303-304, 453-454 <i>Figure 13.3 438</i> Teacher Wraparound Edition: CD 453; UA 303