



# CHEMISTRY

## MATTER AND CHANGE

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STANDARDS	PAGE REFERENCES
GRADES 9–12	
<p><b>Standard 1:</b> Students apply the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.</p>	
<p>1. ask questions and state hypotheses using prior scientific knowledge to help design and guide development and implementation of a scientific investigation</p>	<p><b>Student Edition:</b> <i>CHEMLAB</i> 506, 584, 850 <i>Inquiry Extension</i> 92, 164, 230, 432, 466, 584, 698, 850 <i>Launch Lab</i> 31, 281, 401, 633, 679, 707 <i>Mini Lab</i> 648</p>
<p>2. select and use appropriate technologies to gather, process, and analyze data and to report information related to an investigation</p>	<p><b>Student Edition:</b> <i>CHEMLAB</i> 60, 126 #6, 550, 584, 776, 816 #4, 850 <i>Data Analysis Lab</i> 478 <i>Launch Lab</i> 3, 205 <b>Teacher Wraparound Edition:</b> DAL 478; LL 205</p>

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3. identify major sources of error or uncertainty within an investigation ( <i>for example: particular measuring devices and experimental procedures</i> )	<b>Student Edition:</b> CHEMLAB 24 #5, 60 #6, 126 #7, 164 #4, 230 #7, 310 #5, 356 #4, 390 #4, 432 #8, 466 #7, 506 #5, 550 #6, 584 #4, 698 #7, 776 #4, 816 #5, 850 #6 <i>Inquiry Extension</i> 60, 310 <i>Mini Lab</i> 378 #3-4, 526 #4 <i>Problem Solving Lab</i> 50 #3
4. recognize and analyze alternative explanations and models	<b>Student Edition:</b> CHEMLAB 698, 850 #5 <i>Launch Lab</i> 707 <i>Mini Lab</i> 193 <i>Problem-Solving Lab</i> 180
5. construct and revise scientific explanations and models, using evidence, logic, and experiments that include identifying and controlling variables	<b>Student Edition:</b> CHEMLAB 506 <i>Data Analysis Lab</i> 478 <i>Inquiry Extension</i> 230, 310, 446, 550, 584, 698, 776, 816 <i>Launch Lab</i> 69, 515, 559, 707 <b>Teacher Wraparound Edition:</b> DAL 478; LL 515
6. communicate and evaluate scientific thinking that leads to particular conclusions	<b>Student Edition:</b> CHEMLAB 126, 196, 432, 624, 698, 850 <i>Inquiry Extension</i> 390, 506, 624 <i>Launch Lab</i> 3, 135, 205, 401, 859 <i>Mini Lab</i> 648 <i>Problem-Solving Lab</i> 326 <b>Teacher Wraparound Edition:</b> LL 3, 205, 859

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<p><b>Standard 2:</b>            Physical Science: Students know and understand common properties, forms, and changes in matter and energy. (<i>Focus: Physics and Chemistry</i>)</p>	
<p>1. elements can be organized by their physical and chemical properties (Periodic Table)</p>	<p><b>Student Edition:</b>            84-85, 174-181, 182-185, 187-191, 194  <i>Chapter 6 Assessment 200 #78</i>  <i>CHEMLAB 196</i>  <i>Launch Lab 173</i>  <i>Mini Lab 193</i>  <i>Problem Solving Lab 180</i>  <i>Section 6.2 Assessment 186 #13-14</i></p> <p><b>Teacher Wraparound Edition:</b>            As 177, 179, 183; CD 182, 187; CJ 184; D 190-191;            DI 175; E 181; MC 191; MI 174; R 181</p>
<p>2. the spatial configuration of atoms and the structure of the atoms in a molecule determine the chemical properties of the substance</p>	<p><b>Student Edition:</b>            117, 161, 182, 241  <i>Section 6.2 Assessment 186 #14</i></p> <p><b>Teacher Wraparound Edition:</b>            As 183; BI 134; CD 182; CJ 117; E 75</p>
<p>3. there are observable and measurable physical and chemical properties that allow one to compare, contrast, and separate substances (<i>for example: pH, melting point, conductivity, magnetic attraction</i>)</p>	<p><b>Student Edition:</b>            73-75, 634-635  <i>CHEMLAB 432, 816</i>  <i>Launch Lab 401, 825</i>  <i>Mini Lab 82, 144, 648</i></p> <p><b>Teacher Wraparound Edition:</b>            CJ 81; CP 636; CU 83; E 75; IM 73; QD 74</p>
<p>4. word and chemical equations are used to relate observed changes in matter to its composition and structure (<i>for example: conservation of matter</i>)</p>	<p><b>Student Edition:</b>            105, 368-369, 373-374  <i>Example and Practice Problems 78, 370-371</i>  <i>Figure 4.3 105</i>  <i>Launch Lab 679</i>  <i>Mini Lab 301, 378</i>  <i>Practice Problems 635</i>  <i>Problem Solving Strategy 374</i>  <i>Section 11.1 Assessment 372 #7</i>  <i>Table 11.1 369</i></p> <p><b>Teacher Wraparound Edition:</b>            As 374; CJ 78, 369; D 518-519; DI 368; ICE 370;            QD 635</p>

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5. quantitative relationships involved with thermal energy can be identified, measured, calculated and analyzed ( <i>for example: heat transfer in a system involving mass, specific heat, and change in temperature of matter</i> )	<b>Student Edition:</b> 520, 527-531, 534-537 CHEMLAB 550 <i>Example and Practice Problems</i> 521, 525, 532, 536-537 <i>Figure 15.6</i> 524 <i>Figure 15.8</i> 527 <i>Figure 15.9</i> 528 <i>Figure 15.10</i> 530 Mini Lab 526 Section 15.1 Assessment 522 #10 Section 15.2 Assessment 528 #21 Section 15.3 Assessment 533 #26, #29 <b>Teacher Wraparound Edition:</b> As 524; CD 521, 527; CP 526; DI 525, 531; E 519; MC 527; MI 529, 534; R 533
6. energy can be transferred through a variety of mechanisms and in any change some energy is lost as heat ( <i>for example: conduction, convection, radiation, motion, electricity, chemical bonding changes</i> )	<b>Student Edition:</b> 122, 518 <b>Teacher Wraparound Edition:</b> BI 514; CD 516; D 518-519; E 519; UP 514
7. light and sound waves have distinct properties; frequency, wavelengths and amplitude	<b>Student Edition:</b> 137-145 <i>Careers in Chemistry</i> 139 <i>Figure 5.5</i> 139 <i>Figure 5.8</i> 144 <i>Figure 5.9</i> 145 Mini Lab 144 <b>Teacher Wraparound Edition:</b> R 145
8. quantities that demonstrate conservation of mass and conservation of energy in physical interactions can be measured and calculated	<b>Student Edition:</b> 535-537 <i>Chapter 15 Assessment</i> 553 #94 <i>Example and Practice Problems</i> 536-537 <i>Figure 15.13</i> 535 Section 15.4 Assessment 541 #42 <b>Teacher Wraparound Edition:</b> CJ 539; DI 537; ICE 536

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<p>9. Newton's Three Laws of Motion explain the relationship between the forces acting on an object, the object's mass, and changes in its motion</p>	<p>The Laws of Motion could be introduced through class discussion with the picture on page 514 as well as the <i>Use the Photo Rocket Reaction</i> in TWE page 514.</p> <p><b>Student Edition:</b> 514</p> <p><b>Teacher Wraparound Edition:</b> UPRR 514</p>
<p><b>Standard 5</b> Students understand that the nature of science involves a particular way of building knowledge and making meaning of the natural world.</p>	
<p>1. print and visual media can be evaluated for scientific evidence, bias, or opinion</p>	<p><b>Student Edition:</b> 17</p> <p><b>Teacher Wraparound Edition:</b> E 16, 881</p>
<p>2. the scientific way of knowing uses a critique and consensus process (<i>for example: peer review, openness to criticism, logical arguments, skepticism</i>)</p>	<p><b>Student Edition:</b> 12, 15</p>
<p>3. graphs, equations or other models are used to analyze systems involving change and constancy (<i>for example: comparing the geologic time scale to shorter time frame, exponential growth, a mathematical expression for gas behavior; constructing a closed ecosystem such as an aquarium</i>)</p>	<p><b>Student Edition:</b> 403-405, 445, 456, 562 <i>Data Analysis Lab</i> 21, 216 <i>Figure 1.6</i> 8 <i>Figure 1.17</i> 20 <i>Figure 2.17</i> 58 <i>Figure 11.5</i> 380 <i>Figure 12.2</i> 403 <i>Figure 12.3</i> 404 <i>Figure 13.2</i> 445 <i>Figure 18.22</i> 661 <i>Table 13.1</i> 451</p> <p><b>Teacher Wraparound Edition:</b> CB 407; DAL 216; DI 402, 404</p>

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<p>4. there are cause-effect relationships within systems (for example: the effect of temperature on gas volume, effect of carbon dioxide level on the greenhouse effect, effects of changing nutrients at the base of a food pyramid)</p>	<p><b>Student Edition:</b>            7-8, 403, 570-572  <i>Everyday Chemistry</i> 669            Figure 1.6 8            Figure 12.3 404            Figure 12.6 407            Figure 13.2 445            Figure 16.11 570  <i>Problem-Solving Lab</i> 622  <b>Teacher Wraparound Edition:</b>            B 669; CB 721; DI 402; TS 622, 669; UP 514</p>
<p>5. scientific knowledge changes and accumulates over time; usually the changes that take place are small modifications of prior knowledge but major shifts in the scientific view of how the world works do occur</p>	<p><b>Student Edition:</b>  <i>In the Field</i> 505            Figure 4.10 110-111            Figure 6.9 184-185            Figure 9.9 290-291            Figure 12.4 416            Figure 24.22 882-883  <b>Teacher Wraparound Edition:</b>            CJ 89, 290, 882, 888; CP 879; E 883; IF 505</p>
<p>6. interrelationships among science, technology and human activity lead to further discoveries that impact the world in positive and negative ways</p>	<p><b>Student Edition:</b>            887-888  <i>Chemistry and Health</i> 163, 389, 623            Figure 7.6 212-213            Figure 24.22 882-883  <i>How It Works</i> 125, 549  <i>Problem-Solving Lab</i> 622  <i>Real World Chemistry</i> 601  <i>Writing in Chemistry</i> 271  <b>Teacher Wraparound Edition:</b>            AC 416; B 125, 623; CB 111; CD 452-453, 888;            CJ 290; CP 427, 879; E 887; TS 389, 549, 622</p>
<p>7. there is a difference between a scientific theory and a scientific hypothesis</p>	<p><b>Student Edition:</b>            13, 16  <b>Teacher Wraparound Edition:</b>            R 16</p>