



# CHEMISTRY

## MATTER AND CHANGE

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### STANDARDS

### PAGE REFERENCES

#### Scientific Inquiry (Nature of Science Unifying Concept A)

Scientific inquiry is the process by which humans systematically examine the natural world. Scientific inquiry is a human endeavor and involves observation, reasoning, insight, energy, skill, and creativity. Scientific inquiry is used to formulate and test explanations of nature through observation, experiments, and theoretical or mathematical models. Scientific explanations and evidence are constantly reviewed and examined by others. Questioning, response to criticism and open communication are integral to the process of science.

By the end of grade band, students know and are able to do everything required in earlier grades and:

#### **N.12.A Students understand that a variety of communication methods can be used to share scientific information.**

N.12.A.1 Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations. E/S

#### **Student Edition:**

7-8, 20-21, 55-58

*Chemistry & Health* 59

*Chemlab* 24, 60, 734

*Data Analysis Lab* 21, 113, 408, 724

*How It Works* 125

*Math Handbook* 959-963

*Problem-Solving Lab* 50, 531, 890

*Problem-Solving Strategy* 160

#### **Teacher Wraparound Edition:**

CD 55; E 56; VL 7

STANDARDS	PAGE REFERENCES
<p>N.12.A.2 Students know scientists maintain a permanent record of procedures, data, analyses, decisions, and understandings of scientific investigations. I/S</p>	<p><b>Student Edition:</b>  <i>Chemistry &amp; Health</i> 59  <i>Chemlab</i> 92, 356, 584, 734  <i>Data Analysis Lab</i> 21, 216, 387, 768  <i>Writing in Chemistry</i> 125, 163, 309, 431, 465, 583, 733, 775  <b>Teacher Wraparound Edition:</b>  DI 14; E 16</p>
<p>N.12.A.3 Students know repeated experimentation allows for statistical analysis and unbiased conclusions. E/S</p>	<p><b>Student Edition:</b>  47-49  <i>Chemlab</i> 60, 670  <b>Teacher Wraparound Edition:</b>  CU 53; DI 52; ICE 49; IM 34; ML 39</p>
<p>N.12.A.4 Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L</p>	<p><b>Student Edition:</b>  18-19  <i>Chemlab</i> 164, 196, 230, 310, 356, 432, 550, 698, 734, 892  <i>MiniLab</i> 144, 571, 763  <b>Teacher Wraparound Edition:</b>  CP 19; E 720; QD 86, 268</p>
<p>N.12.A.5 Students know models and modeling can be used to identify and predict cause-effect relationships. I/S</p>	<p><b>Student Edition:</b>  10, 15, 146-152  <i>Chemlab</i> 126, 272  <i>MiniLab</i> 120, 423, 457, 873  <i>Problem-Solving Lab</i> 326, 842  <i>Problem-Solving Strategy</i> 254  <b>Teacher Wraparound Edition:</b>  CP 153</p>
<p>N.12.A.6 Students know organizational schema can be used to represent and describe relationships of sets. E/S</p>	<p><b>Student Edition:</b>  71-72, 86-87, 146-152, 177-178, 182-185, 298, 476-479, 802-808  <i>Problem-Solving Strategy</i> 160, 224, 458  <b>Teacher Wraparound Edition:</b>  CD 148; CP 153; MI 182</p>

STANDARDS	PAGE REFERENCES
<p><b>Science, Technology, and Society (Nature of Science Unifying Concept B)</b></p> <p>Technology defines a society or era. It can shape the environment in which people live, and it has increasingly become a larger part of people's lives. While many of technology's effects on society are regarded as desirable, other effects are seen as less desirable. These concepts are shared across subject areas such as science, math, technology, social studies and language arts. The development and use of technology affects society and the environment in which we live, and at the same time, society influences the development of technology and its impact on culture.</p>	
<p>By the end of grade band, students know and are able to do everything required in earlier grades and:</p>	
<p><b>N.12.B Students understand the impacts of science and technology in terms of costs and benefits to society.</b></p>	
<p>N.12.B.1 Students know that science, technology, and society influenced one another in both positive and negative ways. E/S</p>	<p><b>Student Edition:</b>  7-8, 17, 718-727, 747-749, 809-812  <i>Chemistry &amp; Health</i> 59, 389, 465  <i>Connection to Biology</i> 18  <i>Data Analysis Lab</i> 216, 387, 691  <i>Everyday Chemistry</i> 229, 431  <i>How It Works</i> 549, 733  <i>Problem-Solving Lab</i> 622  <i>Real-World Chemistry</i> 5  <b>Teacher Wraparound Edition:</b>  AC 790; CD 4; CP 720, 810; E 22; MI 17</p>
<p>N.12.B.2 Students know consumption patterns, conservation efforts, and cultural or social practices in countries have varying environmental impacts. E/S</p>	<p><b>Student Edition:</b>  5-8, 20-21, 772, 814, 880-882  <i>Connection to Earth Science</i> 788  <i>Connection to Physics</i> 722  <i>Everyday Chemistry</i> 229  <i>How It Works</i> 549, 775  <i>In the Field</i> 505  <i>Real-World Chemistry</i> 722  <b>Teacher Wraparound Edition:</b>  A 871; CP 5, 729, 879; DI 724; E 20, 720, 881, 883</p>
<p>N.12.B.3 Students know the influence of ethics on scientific enterprise. E/S</p>	<p><b>Student Edition:</b>  14-15, 20-21, 50, 57  <i>In the Field</i> 849  <i>Writing in Chemistry</i> 505, 849  <b>Teacher Wraparound Edition:</b>  CB 213; CD 7, 486-487; CJ 501, 841; E 880, 883; MI 17; TS 849</p>

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N.12.B.4 Students know scientific knowledge builds on previous information. E/S	<b>Student Edition:</b> 32, 106-114, 146-152, 184-185, 212-213, 416-417, 744-749, 810-814, 882-883 <i>Everyday Chemistry</i> 229 <i>How It Works</i> 549, 733 <b>Teacher Wraparound Edition:</b> CB 36; CD 184; DI 745; E 116, 883
<b>Matter (Physical Science Unifying Concept A)</b> Matter has various states with unique properties that can be used as a basis for organization. The relationship between the properties of matter and its structure is an essential component of study in the physical sciences. The understanding of matter and its properties leads to practical applications, such as, the capability to liberate elements from ore, create new drugs, manipulate the structure of genes and synthesize polymers.	
By the end of grade band, students know and are able to do everything required in earlier grades and:	
<b>P.12.A Students understand that atomic structure explains the properties and behavior of matter.</b>	
P.12.A.1 Students know that different molecular arrangements and motions account for the different physical properties of solids, liquids, and gases. E/S	<b>Student Edition:</b> 71-72, 402-410, 411-414, 415-424, 442-451, 457-459, 530-531 <i>Problem-Solving Lab</i> 531 <b>Teacher Wraparound Edition:</b> AC 413; DI 402; VL 459
P.12.A.2 Students know elements in the periodic table are arranged into groups and periods by repeating patterns and relationships. E/S	<b>Student Edition:</b> 177-181, 182-185, 187-194 <i>Elements Handbook</i> 904-945 <i>Problem-Solving Lab</i> 180 <b>Teacher Wraparound Edition:</b> MIC 191; R 186
P.12.A.3 Students know identifiable properties can be used to separate mixtures. E/S	<b>Student Edition:</b> 82-83, 300, 747-748 <i>Connection to Biology</i> 504 <i>Data Analysis Lab</i> 269 <i>MiniLab</i> 82, 301 <b>Teacher Wraparound Edition:</b> CP 267; E 303; QD 429, 747

STANDARDS	PAGE REFERENCES
<p>P.12.A.4 Students know atoms bond with one another by transferring or sharing electrons. E/S</p>	<p><b>Student Edition:</b>            206-209, 210-217, 218-224, 225-228, 240-247,            253-260, 265-270  <i>Chemlab</i> 230  <i>Problem-Solving Strategy</i> 224, 254  <b>Teacher Wraparound Edition:</b>            CB 258; CD 208; CJ 267; CU 217; DE 248-249;            MI 240; MIC 214; QD 221</p>
<p>P.12.A.5 Students know that chemical reactions can take place at different rates, depending on a variety of factors (i.e., temperature, concentration, surface area, and agitation). E/S</p>	<p><b>Student Edition:</b>            560-567, 568-573, 574-577, 578-582  <i>Chemistry &amp; Health</i> 583  <i>Chemlab</i> 584  <i>Launch Lab</i> 559  <i>MiniLab</i> 571  <i>Problem-Solving Lab</i> 566  <b>Teacher Wraparound Edition:</b>            CB 564; CJ 576; DE 568-569; MI 560, 574</p>
<p>P.12.A.6 Students know chemical reactions either release or absorb energy. E/S</p>	<p><b>Student Edition:</b>            216-217, 246-247, 525-527, 529, 533, 534-541,            564-565, 718-723, 728-732, 844-848  <i>Chemistry &amp; Health</i> 583  <i>Chemlab</i> 550  <i>Elements Handbook</i> 904-905  <i>Writing in Chemistry</i> 549  <b>Teacher Wraparound Edition:</b>            AC 580; E 246; QD 536, 537; R 533</p>
<p>P.12.A.7 Students know that, in chemical reactions, elements combine in predictable ratios, and the numbers of atoms of each element do not change. I/S</p>	<p><b>Student Edition:</b>            87-90, 105, 285-288, 368-372, 860  <i>Chemlab</i> 390  <b>Teacher Wraparound Edition:</b>            CB 89; IM 861; QD 86</p>
<p>P.12.A.8 Students know most elements have two or more isotopes, some of which have practical applications. I/S</p>	<p><b>Student Edition:</b>            117-121, 860-864, 865-867, 880-884, 887-888  <i>Chemlab</i> 126  <i>Connection to Biology</i> 873-874  <i>Elements Handbook</i> 925  <i>In the Field</i> 891  <b>Teacher Wraparound Edition:</b>            CB 880; CD 888; CJ 117, 120; CP 881, 886; E 119,            871; R 874</p>

STANDARDS	PAGE REFERENCES
P.12.A.9 Students know the number of electrons in an atom determines whether the atom is electrically neutral or an ion. I/S	<b>Student Edition:</b> 187-193, 206-209 <b>Teacher Wraparound Edition:</b> MI 210; VL 192
<b>Forces and Motion (Physical Science Unifying Concept B)</b> The laws of motion are used to describe the effects of forces on the movement of objects. By the end of grade band, students know and are able to do everything required in earlier grades and:	
<b>P.12.B Students understand the interactions between force and motion.</b>	
P.12.B.1 Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S	<b>Student Edition:</b> 16 <i>Connection to Physics</i> 597 <i>How It Works</i> 125 <b>Teacher Wraparound Edition:</b> DI 147; QD 107
P.12.B.2 Students know magnetic forces and electric forces can be thought of as different aspects of electromagnetic force. I/S	<b>Student Edition:</b> 108-109, 865
P.12.B.3 Students know the strength of the electric force between two objects increases with charge and decreases with distance. I/S	<b>Student Edition:</b> 108-109, 865 <b>Teacher Wraparound Edition:</b> QD 107
P.12.B.4 Students know the strength of the gravitational force between two objects increases with mass and decreases rapidly with distance. I/S	<b>Student Edition:</b> 16

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<p><b>Energy (Physical Science Unifying Concept C)</b></p>	
<p>The total energy of the universe is constant. All events involve the transfer of energy in one form or another. In all energy transfers, the overall effect is that the energy is spread out uniformly.</p>	
<p>By the end of grade band, students know and are able to do everything required in earlier grades and:</p>	
<p><b>P.12.C Students understand that there are interactions between matter and energy.</b></p>	
<p>P.12.C.1 Students know waves (i.e., sound, seismic, electromagnetic) have energy that can be transferred when the waves interact with matter. E/S</p>	<p><b>Student Edition:</b> 137, 846 <i>Chemistry &amp; Health</i> 163 <i>Chemlab</i> 165 <i>Connection to Astronomy</i> 145 <i>Elements Handbook</i> 938 <i>How It Works</i> 125 <b>Teacher Wraparound Edition:</b> QD 137</p>
<p>P.12.C.2 Students know that energy forms can be converted. E/S</p>	<p><b>Student Edition:</b> 516-518, 522, 526-528, 530-533, 708-716, 718-723, 728-732, 846-848 <i>Chemlab</i> 550 <i>How It Works</i> 549 <i>In the Field</i> 697 <b>Teacher Wraparound Edition:</b> E 519; MI 516; QD 771</p>
<p>P.12.C.3 Students know nuclear reactions convert a relatively small amount of material into a large amount of energy. I/S</p>	<p><b>Student Edition:</b> 877-884 <i>Problem-Solving Strategy</i> 878 <b>Teacher Wraparound Edition:</b> MIC 877</p>
<p>P.12.C.4 Students know characteristics, applications and impact of radioactivity. E/S</p>	<p><b>Student Edition:</b> 122-124, 860-864, 865-874, 875-884, 886-890 <i>Connection to Biology</i> 888 <i>In the Field</i> 891 <b>Teacher Wraparound Edition:</b> AC 872; CB 882; CD 888; CP 886; E 881, 883, 889; QD 885</p>

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P.12.C.5 Students know the relationship between heat and temperature. I/S	<b>Student Edition:</b> 34-35, 402-403, 444-448, 518-524, 609-610 <i>MiniLab</i> 526 <b>Teacher Wraparound Edition:</b> CD 523; E 519; IM 520; R 522
P.12.C.6 Students know electricity is transferred from generating sources for consumption and practical uses. I/S	<b>Student Edition:</b> 290, 517, 881 <b>Teacher Wraparound Edition:</b> DI 878; E 528