



CHEMISTRY

MATTER AND CHANGE

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STANDARDS	PAGE REFERENCES
<p>Standard A: Science Connections</p>	
<p>By the end of grade twelve, students will:</p>	
<p>A.12.1 Apply the underlying themes of science to develop defensible visions of the future</p>	<p>Student Edition: 722-723, 880-882 <i>Chemistry & Health</i> 163 <i>Data Analysis Lab</i> 21, 216, 387 <i>How It Works</i> 549, 775 Teacher Wraparound Edition: BM 882; CB 810; CP 720, 729; QD 878</p>
<p>A.12.2 Show how conflicting assumptions about science themes lead to different opinions and decisions about evolution, health, population, longevity, education, and use of resources, and show how these opinions and decisions have diverse effects on an individual, a community, and a country, both now and in the future</p>	<p>Student Edition: 5-8, 20-21, 58, 537-540, 770-771 <i>Chemistry & Health</i> 389 <i>Connection to Earth Science</i> 643, 788 <i>Data Analysis Lab</i> 21 <i>Everyday Chemistry</i> 229 <i>In the Field</i> 505 Teacher Wraparound Edition: CJ 530; CP 20, 748, 788; CU 8; MI 770</p>

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A.12.3 Give examples that show how partial systems, models, and explanations are used to give quick and reasonable solutions that are accurate enough for basic needs	Student Edition: 52 <i>Chemlab</i> 126, 196 <i>Everyday Chemistry</i> 355, 815 <i>Launch Lab</i> 633 <i>Problem-Solving Strategy</i> 52 Teacher Wraparound Edition: CJ 52; R 155; TS 389
A.12.4 Construct arguments that show how conflicting models and explanations of events can start with similar evidence	Student Edition: 136-143, 174-176 Teacher Wraparound Edition: CB 149; CP 174
A.12.5 Show how the ideas and themes of science can be used to make real-life decisions about careers, work places, life-styles, and use of resources	Student Edition: <i>Careers in Chemistry</i> 81, 185, 342, 447, 580, 723 <i>Chemistry & Health</i> 59, 389 <i>How It Works</i> 549 <i>In the Field</i> 505, 697, 891 Teacher Wraparound Edition: CD 184
A.12.6 Identify and, using evidence learned or discovered, replace inaccurate personal models and explanations of science-related events	Student Edition: 102-105, 136-143, 174-181, 638-643, 771 <i>How It Works</i> 309 Teacher Wraparound Edition: CD 86; E 104, 108, 774; IM 73, 286, 334, 499
A.12.7 Re-examine the evidence and reasoning that led to conclusions drawn from investigations, using the science themes	Student Edition: 86, 106-114, 117-120, 136-143, 146-152, 158-162, 320-321 <i>Chemlab</i> 92, 164 Teacher Wraparound Edition: DE 112-113; QD 86
Standard B: Nature of Science	
By the end of grade twelve, students will:	
B.12.1 Show how cultures and individuals have contributed to the development of major ideas in the earth and space, life and environmental, and physical sciences	Student Edition: 102-105, 106-114, 146-154, 184-185, 194, 212-213, 290-291, 416-417, 490-491, 636-637, 810-811, 882-883 <i>Everyday Chemistry</i> 431 Teacher Wraparound Edition: CB 213; CD 110, 661; CJ 290, 491; E 77

STANDARDS	PAGE REFERENCES
<p>B.12.2 Identify the cultural conditions that are usually present during great periods of discovery, scientific development, and invention</p>	<p>Student Edition: 7-8, 20-21, 102-105, 402-403, 606-611, 718-723, 877-882 <i>Connection to Biology</i> 18 <i>Real-World Chemistry</i> 722</p> <p>Teacher Wraparound Edition: CB 184, 876, 880; CD 269, 387; CJ 290; CP 610; E 8, 16, 77, 104, 711, 883</p>
<p>B.12.3 Relate the major themes of science to human progress in understanding science and the world</p>	<p>Student Edition: 4, 12-15, 76-77, 102-105, 206-207, 225-228, 240-247, 320-321, 516-518, 594-598 <i>Everyday Chemistry</i> 229, 355 <i>How It Works</i> 271, 309</p> <p>Teacher Wraparound Edition: CB 213; MI 4, 9, 12, 696</p>
<p>B.12.4 Show how basic research and applied research contribute to new discoveries, inventions, and applications</p>	<p>Student Edition: 4-8, 17-18, 22, 111-114 <i>Chemistry & Health</i> 163, 389 <i>How It Works</i> 549, 733</p> <p>Teacher Wraparound Edition: CJ 17, 290; CP 139, 656; CU 8; R 22</p>
<p>B.12.5 Explain how science is based on assumptions about the natural world and themes that describe the natural world</p>	<p>Student Edition: 9-11, 16, 70-75, 76-79, 136-143, 149-152, 161, 212-213, 240-241, 516-518, 594-598 <i>Problem-Solving Strategy</i> 621</p> <p>Teacher Wraparound Edition: CD 4, 136, 516; CJ 78; R 16</p>
<p>Standard C: Science Inquiry</p>	
<p>By the end of grade twelve, students will:</p>	
<p>C.12.1 When studying science content, ask questions suggested by current social issues, scientific literature, and observations* of phenomena, build hypotheses that might answer some of these questions, design possible investigations*, and describe results that might emerge from such investigations</p>	<p>Student Edition: 4-8, 12-16, 17-21 <i>Chemistry & Health</i> 59, 389 <i>Chemlab</i> 24, 698, 892 <i>Data Analysis Lab</i> 21 <i>Everyday Chemistry</i> 229 <i>How It Works</i> 549, 775 <i>In the Field</i> 505, 697</p> <p>Teacher Wraparound Edition: CP 20; CU 8</p>

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<p>C.12.2 Identify* issues from an area of science study, write questions that could be investigated*, review previous research on these questions, and design and conduct responsible and safe investigations to help answer the questions</p>	<p>Student Edition: 12-16, 47-53, 55-58, 84-90 <i>Chemlab</i> 24, 92, 310, 390, 432, 506, 584, 850 <i>MiniLab</i> 227, 526, 571 Teacher Wraparound Edition: E 56; IM 15, 48; QD 14</p>
<p>C.12.3 Evaluate* the data collected during an investigation*, critique the data-collection procedures and results, and suggest ways to make any needed improvements</p>	<p>Student Edition: 47-53, 58 <i>Chemlab</i> 24, 432, 466, 506, 670, 698, 776, 850 <i>Data Analysis Lab</i> 21, 216, 805 <i>Problem-Solving Lab</i> 531, 566, 890 Teacher Wraparound Edition: CJ 47, 52</p>
<p>C.12.4 During investigations*, choose the best data-collection procedures and materials available, use them competently, and calculate the degree of precision of the resulting data</p>	<p>Student Edition: 47-54 <i>Chemistry & Health</i> 59, 583 <i>Chemlab</i> 24, 60, 310, 432, 550, 624, 670, 776, 850 <i>In the Field</i> 505 Teacher Wraparound Edition: E 48; QD 47</p>
<p>C.12.5 Use the explanations* and models* found in the earth and space, life and environmental, and physical sciences to develop likely explanations* for the results of their investigations*</p>	<p>Student Edition: 9-10, 15 <i>Chemlab</i> 310, 584, 850 <i>Launch Lab</i> 281, 441, 559, 825 <i>Problem-Solving Lab</i> 50, 326, 842 <i>Problem-Solving Strategy</i> 51, 621 Teacher Wraparound Edition: IM 51; QD 9</p>
<p>C.12.6 Present the results of investigations* to groups concerned with the issues, explaining* the meaning and implications of the results, and answering questions in terms the audience can understand</p>	<p>Student Edition: 20-21 <i>Chemistry & Health</i> 59, 389, 583 <i>In the Field</i> 505, 891 <i>Writing in Chemistry</i> 23, 697, 849 Teacher Wraparound Edition: CD 7; CP 9</p>

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C.12.7 Evaluate* articles and reports in the popular press, in scientific journals, on television, and on the Internet, using criteria related to accuracy, degree of error, sampling, treatment of data, and other standards of experimental design	Student Edition: 17 <i>Chemistry & Health</i> 59 <i>Chemlab</i> 432, 466, 550, 816 <i>Data Analysis Lab</i> 21, 113, 216 <i>In the Field</i> 505 Teacher Wraparound Edition: AC 42; CJ 17, 122; DI 14; E 16, 22, 75; R 160
Standard D: Physical Science	
By the end of grade twelve, students will:	
STRUCTURE OF ATOMS AND MATTER	
D.12.1 Describe* atomic structure and the properties of atoms, molecules, and matter during physical and chemical interactions*	Student Edition: 70-75, 76-79, 146-152, 282-283, 289-297, 402-410, 411-414, 425-430, 498-504, 563-565 <i>Chemlab</i> 164 <i>Launch Lab</i> 281, 367 Teacher Wraparound Edition: CJ 282; CP 403; CU 79; IM 73; QD 74, 411
D12.2 Explain* the forces that hold the atom together and illustrate* how nuclear interactions* change the atom	Student Edition: 114, 122-124, 146-152, 865-870, 875-876, 878-880, 883-884 Teacher Wraparound Edition: CP 872; DI 147
D.12.3 Explain* exchanges of energy* in chemical interactions* and exchange of mass and energy in atomic/nuclear reactions	Student Edition: 516-522, 523-528, 533-541, 563-565, 710-717, 718-723, 728-733, 860-864, 877-884 <i>Chemlab</i> 550, 734 <i>Problem-Solving Strategy</i> 878 Teacher Wraparound Edition: CD 516; QD 536

STANDARDS	PAGE REFERENCES
CHEMICAL REACTIONS	
D.12.4 Explain* how substances, both simple and complex, interact* with one another to produce new substances	Student Edition: 77, 282, 289-296, 533, 728-732 <i>Chemlab</i> 92, 230, 550 <i>Connection to Biology</i> 308 <i>In the Field</i> 697 <i>Launch Lab</i> 281 <i>Real-World Chemistry</i> 685 Teacher Wraparound Edition: AC 731; CB 682; CJ 282; CU 79; R 533
D.12.5 Identify* patterns in chemical and physical properties and use them to predict* likely chemical and physical changes and interactions	Student Edition: 73-75, 76-77, 177-181, 187-194 <i>Chemlab</i> 310, 734 <i>MiniLab</i> 193 <i>Problem-Solving Lab</i> 180, 294 Teacher Wraparound Edition: CD 187; MC 191
D.12.6 Through investigations*, identify* the types of chemical interactions*, including endothermic, exothermic, oxidation, photosynthesis, and acid/base reactions	Student Edition: 247, 526-528, 564-565, 659-663, 680-683 <i>Chemlab</i> 230, 550, 670, 776 <i>Data Analysis Lab</i> 691, 768 <i>Everyday Chemistry</i> 669 <i>MiniLab</i> 683 <i>Problem-Solving Lab</i> 566, 668 Teacher Wraparound Edition: CB 692; CD 662; CJ 695; DE 680-681; MI 659; QD 536
MOTIONS AND FORCES	
D.12.7 Qualitatively and quantitatively analyze* changes in the motion of objects and the forces that act on them and represent analytical data both algebraically and graphically	Student Edition: 402-405, 516-518 Teacher Wraparound Edition: MI 402, 516
D.12.8 Understand* the forces of gravitation, the electromagnetic force, intermolecular force, and explain* their impact on the universal system	Student Edition: 16, 269-270, 411-414, 865 Teacher Wraparound Edition: CP 37, 412; CU 414; QD 411

STANDARDS	PAGE REFERENCES
D.12.9 Describe* models* of light, heat, and sound and through investigations* describe* similarities and differences in the way these energy* forms behave	Student Edition: 137-143, 402-403, 518-522, 523-528 Teacher Wraparound Edition: A 152; CB 139; E 528; R 522
CONSERVATION OF ENERGY AND THE INCREASE IN DISORDER	
D.12.10 Using the science themes*, illustrate* the law of conservation of energy* during chemical and nuclear reactions	Student Edition: 516-517, 877 Teacher Wraparound Edition: CJ 78; MI 516; MIC 877
INTERACTIONS OF MATTER AND ENERGY	
D.12.11 Using the science themes*, explain* common occurrences in the physical world	Student Edition: 5-8, 290-291 <i>Chemistry & Health</i> 195, 583 <i>Connection to Earth Science</i> 76 <i>How It Works</i> 309 <i>In the Field</i> 91 <i>Problem-Solving Lab</i> 622 <i>Real-World Chemistry</i> 142, 250, 685 Teacher Wraparound Edition: R 6
D.12.12 Using the science themes* and knowledge of chemical, physical, atomic, and nuclear interactions*, explain* changes in materials, living things, earth's features, and stars	Student Edition: 5-8, 718-723, 844-848 <i>Chemistry & Health</i> 533 <i>Connection to Earth Science</i> 545 <i>How It Works</i> 309, 733 <i>In the Field</i> 23, 505, 849, 891 <i>Launch Lab</i> 515 <i>Problem-Solving Lab</i> 842 <i>Real-World Chemistry</i> 685, 807 Teacher Wraparound Edition: CP 517

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Standard G: Science Applications	
By the end of grade twelve, students will:	
<p>G.12.1 Identify personal interests in science and technology, implications that these interests might have for future education, and decisions to be considered</p>	<p>Student Edition: 4, 11 <i>Careers in Chemistry</i> 81, 185, 308, 381, 580, 723 <i>In the Field</i> 23, 91, 505, 697, 849, 891 Teacher Wraparound Edition: CJ 4; E 11</p>
<p>G.12.2 Design, build, evaluate, and revise models and explanations related to the earth and space, life and environmental, and physical sciences</p>	<p>Student Edition: 10, 15, 110-114, 146-152 <i>Chemlab</i> 126, 272 <i>Problem-Solving Lab</i> 294, 326, 444, 622, 668, 842 Teacher Wraparound Edition: CB 149; CJ 110; CP 153</p>
<p>G.12.3 Analyze the costs, benefits, or problems resulting from a scientific or technological innovation, including implications for the individual and the community</p>	<p>Student Edition: 573, 718-723, 880-882, 886-888 <i>Connection to Earth Science</i> 643 <i>Data Analysis Lab</i> 216, 387, 691 <i>Everyday Chemistry</i> 229 <i>How It Works</i> 125, 549, 733 <i>Problem-Solving Lab</i> 622 <i>Real-World Chemistry</i> 257, 375, 767 Teacher Wraparound Edition: CB 18; CD 116; CP 9; E 22</p>
<p>G.12.4 Show how a major scientific or technological change has had an impact on work, leisure, or the home</p>	<p>Student Edition: 527-528, 718-723, 747-749, 809-814, 841-842, 877-882, 886-888 <i>Data Analysis Lab</i> 21, 691 <i>How It Works</i> 125, 549, 733 <i>MiniLab</i> 227, 763 <i>Problem-Solving Lab</i> 622 Teacher Wraparound Edition: CB 692; CD 516, 661, 708, 806; CJ 841; CP 811; IM 794</p>

STANDARDS	PAGE REFERENCES
G.12.5 Choose a specific problem in our society, identify alternative scientific or technological solutions to that problem and argue its merits	Student Edition: <i>Careers in Chemistry</i> 723 <i>Chemistry & Health</i> 59, 389 <i>Everyday Chemistry</i> 229, 815 <i>How It Works</i> 549, 775 <i>In the Field</i> 505 Teacher Wraparound Edition: CD 456, 486-487; CJ 280; E 8, 883
Standard H: Science in Personal and Social Perspectives	
By the end of grade twelve, students will:	
H.12.1 Using the science themes and knowledge of the earth and space, life and environmental, and physical sciences, analyze the costs, risks, benefits, and consequences of a proposal concerning resource management in the community and determine the potential impact of the proposal on life in the community and the region	Student Edition: 573, 718-723, 880-882 <i>Connection to Earth Science</i> 643 <i>Data Analysis Lab</i> 387, 691 <i>Everyday Chemistry</i> 431 <i>How It Works</i> 549 <i>Real-World Chemistry</i> 257, 375, 767 Teacher Wraparound Edition: CP 9; E 22
H.12.2 Evaluate proposed policy recommendations (local, state, and/or national) in science and technology for validity, evidence, reasoning, and implications, both short and long-term	Student Edition: 814, 880-882 <i>How It Works</i> 549 <i>Problem-Solving Lab</i> 622 Teacher Wraparound Edition: CB 880; CJ 882; CP 788, 879; E 881, 883
H.12.3 Show how policy decisions in science depend on social values, ethics, beliefs, and time-frames as well as considerations of science and technology	Student Edition: 814, 880-882 <i>How It Works</i> 21, 549 <i>Problem-Solving Lab</i> 622 Teacher Wraparound Edition: CP 788, 879; DI 880, 882; E 881, 883
H.12.4 Advocate a solution or combination of solutions to a problem in science or technology	Student Edition: <i>Chemistry & Health</i> 163, 623 <i>Data Analysis Lab</i> 216, 387, 408, 724, 768 <i>In the Field</i> 81, 505, 849 <i>Problem-Solving Lab</i> 50, 150, 294, 326, 566, 668 <i>Problem-Solving Strategy</i> 254, 374, 663, 696, 878

STANDARDS	PAGE REFERENCES
<p>H.12.5 Investigate how current plans or proposals concerning resource management, scientific knowledge, or technological development will have an impact on the environment, ecology, and quality of life in a community or region</p>	<p>Student Edition: 5-8, 573, 718-723, 880-882 <i>Connection to Earth Science</i> 643 <i>Data Analysis Lab</i> 387, 691 <i>How It Works</i> 21, 549 <i>In the Field</i> 91, 505 <i>Real-World Chemistry</i> 257, 375, 767 Teacher Wraparound Edition: CP 9; E 22, 720, 883</p>
<p>H.12.6 Evaluate data and sources of information when using scientific information to make decisions</p>	<p>Student Edition: 47-53, 58 <i>Chemistry & Health</i> 59 <i>Chemlab</i> 60 <i>In the Field</i> 505 <i>Math Handbook</i> 949-953 <i>Problem-Solving Lab</i> 50, 566, 890 <i>Problem-Solving Strategy</i> 51 <i>Reference Tables</i> 968-975 Teacher Wraparound Edition: CJ 47; CP 51, 70; IM 48; MIC 52</p>
<p>H.12.7 When making decisions, construct a plan that includes the use of current scientific knowledge and scientific reasoning</p>	<p>Student Edition: 7-8, 16-17, 20-21 <i>Chemlab</i> 24, 356, 698, 776 <i>Data Analysis Lab</i> 21, 216, 387, 805 <i>Problem-Solving Lab</i> 50, 180, 622, 668 Teacher Wraparound Edition: E 8; QD 16; R 6</p>