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Correlated to:

**Arizona Science Content Standards
(Grades 9-12)**

ARIZONA SCIENCE CONTENT STANDARDS (Adopted 6/23/97 Amended 8/24/98)	PAGE(S) WHERE TAUGHT (If submission is not a book, cite appropriate location(s))
STANDARD 1: SCIENCE AS INQUIRY Students understand and use the processes of scientific investigation and scientific ways of knowing. They are able to design, conduct, describe and evaluate these investigations. They are able to understand and apply concepts that unify scientific disciplines.	
PROFICIENCY (Grades 9-12)	
<i>Students know and are able to do all of the above and the following:</i>	
1SC-P1. Propose solutions to practical and theoretical problems by synthesizing and evaluating information gained from scientific investigations	
<ul style="list-style-type: none"> PO 1. Evaluate scientific information for relevance to a given problem 	SE/TE: Chemistry Serving Society: 23, 127, 230, 260, 384, 468, 526, 671; Chemistry Serving The Consumer: 76, 101, 164, 430, 570, 766, 802, 835; Chemistry Serving The Environment: 196, 287, 320, 494, 607, 699, 865; Chemistry Serving Community: 45, 354, 407, 638, 736
<ul style="list-style-type: none"> PO 2. Propose solutions to a problem, based on information gained from scientific investigations 	SE/TE: Chemistry Serving Society: 127, 230, 260, 384, 468, 526, 671; Chemistry Serving The Consumer: 101, 430, 570, 766, 802, 835; Chemistry Serving The Environment: 196, 287, 320, 494, 607, 699, 865; Chemistry Serving Community: 45, 354, 407, 638, 736
1SC-P2. Compare observations of the real world to observations of a constructed model (e.g., an aquarium, a terrarium, a volcano)	
<ul style="list-style-type: none"> PO 1. Assess the capability of a model to represent a "real world" scenario 	SE/TE: 107-108, 109-111, 361-362, 280-283, 344-345, 402, 420, 464; CHEMath: 420; Mini Lab: 112 TR: Guided Reading and Study Workbook: 5.1, 5.2, 10.3, 12.4, 13.1
1SC-P3. Analyze and evaluate reports of scientific studies	
<ul style="list-style-type: none"> PO 1. Analyze reports of scientific studies for elements of experimental design 	SE/TE: 15-16; Portfolio project: 17, 425, 851
<ul style="list-style-type: none"> PO 2. Compare conclusions to original hypotheses 	SE/TE: 15-16 TR: Laboratory Manual: Develop a Hypothesis activity is located in the Going Further section of some labs.

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<ul style="list-style-type: none"> PO 3. Evaluate validity of conclusions 	SE/TE: Small-Scale Lab: 44, 73, 96, 122, 157, 187, 229, 251, 273, 319, 329, 371, 397, 426, 467, 489, 516, 557, 606, 625, 670, 698, 711, 758, 801, 820, 852 TR: Labs in each of the following: Laboratory Manual, Small-Scale Lab Manual, Probeware Lab Manual
1SC-P4. Create and defend a written plan of action for a scientific investigation	
<ul style="list-style-type: none"> PO 1. Design an appropriate protocol (written plan of action) for the investigation of a scientific problem 	SE/TE: Small-Scale Lab: 44, 73, 96, 122, 187, 229, 251, 273, 319, 329, 371, 397, 426, 467, 489, 516, 557, 606, 670, 698, 801, 820, 852 TR: Laboratory Manual: Design and Experiment following each laboratory activity; Small-Scale Chemistry Laboratory Manual: Now It's Your Turn following each laboratory activity
<ul style="list-style-type: none"> PO 2. Justify the protocol in terms of the elements of experimental design 	SE/TE: Small-Scale Lab: 44, 73, 96, 122, 187, 229, 251, 273, 319, 329, 371, 397, 426, 467, 489, 516, 557, 606, 670, 698, 801, 820, 852 TR: Laboratory Manual: Design and Experiment following each laboratory activity; Small-Scale Chemistry Laboratory Manual: Now It's Your Turn following each laboratory activity
1SC-P5. Apply the concepts of equilibrium, form and function to a variety of phenomena	
<ul style="list-style-type: none"> PO 1. Predict the effects of various factors on the equilibrium of a system 	SE/TE: 540-544 TR: Guided Reading and Study Workbook: 19.2; Review Module: 19.2; Laboratory Manual: 243-248; Small-Scale Laboratory Manual: 179-188; TECH: Chem ASAP! CD-ROM: 19.2; CHEMedia Videodiscs: <i>Le Chatelier's Principle</i> ; Small-Scale Video: <i>Equilibrium and Kinetics</i>
<ul style="list-style-type: none"> PO 2. Explain how the relationships between form and function are evident in natural and designed systems 	SE/TE: Chemistry Serving Society: 526; Chemistry Serving the Environment: 287, 320; Chemistry Serving Industry: 45, 407, 736
<ul style="list-style-type: none"> PO 3. Describe how present form and function of an object, organism or system could have evolved from prior form and function 	SE/TE: Chemistry Serving Society: 526; Chemistry Serving Industry: 45, 407, 736 (This concept would be better covered in a biology course.)

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1SC-P6. Identify and refine a researchable question, conduct the experiment, collect and analyze data, share and discuss findings	
<ul style="list-style-type: none"> PO 1. Construct a researchable question 	SE/TE: 15-16; Discover It: 2, 28, 50, 82, 106, 132, 170, 202, 236, 266, 292, 326, 360, 390, 412, 436, 474, 500, 532, 576, 612, 644, 676, 704, 742, 772, 808, 840 TR: Laboratory Manual: Develop a Hypothesis located in the Going Further section following each lab
<ul style="list-style-type: none"> PO 2. Employ a research design that incorporates a scientific method to carry out an experiment 	SE/TE: 15-16; Small-Scale Lab: 44, 73, 96, 122, 187, 229, 251, 273, 319, 329, 371, 397, 426, 467, 489, 516, 557, 606, 670, 698, 801, 820, 852 TR: Laboratory Manual: Design and Experiment following each laboratory activity; Small-Scale Chemistry Laboratory Manual: Now It's Your Turn following each laboratory activity
<ul style="list-style-type: none"> PO 3. Analyze experimental data 	SE/TE: Discover It: 2, 28, 50, 82, 106, 132, 170, 202, 236, 266, 292, 326, 360, 390, 412, 436, 474, 500, 532, 576, 612, 644, 676, 704, 742, 772, 808, 840; Mini Lab: 17, 35, 62, 100, 112, 163, 195, 224, 259, 286, 308, 346, 383, 399, 425, 448, 493, 508, 556, 593, 615, 669, 697, 735, 757, 794, 826, 858; Small-Scale Lab: 44, 73, 96, 122, 157, 187, 229, 251, 273, 319, 329, 371, 397, 426, 467, 489, 516, 557, 606, 625, 670, 698, 711, 758, 801, 820, 852 TR: Laboratory Manual: Analyses and Conclusions section following each laboratory activity; Small-Scale Chemistry Laboratory Manual: Questions for Analysis section following the laboratory activities
<ul style="list-style-type: none"> PO 4. Communicate experimental findings to others 	SE/TE: Portfolio Project: 17, 40, 148, 181, 406, 425, 451, 488, 515, 569, 599, 624, 653, 710, 761, 784, 851 TR: Laboratory Manual: Sample Laboratory Report: 335-337

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STANDARD 2: HISTORY AND NATURE OF SCIENCE	
Students understand the nature of scientific ways of thinking. Students understand that scientific investigation grows from the contributions of many people.	
PROFICIENCY (Grades 9-12)	
<i>Students know and are able to do all of the above and the following:</i>	
2SC-P1. Identify and describe key factors (e.g., technology, competitiveness, world events, personalities, societal views) that affect the development and acceptance of scientific thought	
<ul style="list-style-type: none"> PO 1. Define key factors that affect the development of scientific thought 	SE/TE: 15-17
<ul style="list-style-type: none"> PO 2. Describe how different key factors affect the development and acceptance of scientific thought 	TE: Chemistry and Science History: 59, 376
2SC-P2. Explain how scientific innovations can challenge accepted ideas	
<ul style="list-style-type: none"> PO 1. Describe how an accepted idea could be challenged by scientific innovation 	SE/TE: 109-112, 361-363 TR: Guided Reading and Study Workbook: 5.2, 13.1; Review Module: 5.2, 13.1 TE: Chemistry and Science History: 59, 373, 376
2SC-P3. Explain the impact on society of major scientific developments (e.g., germ theory, molecular biology, relativity)	
<ul style="list-style-type: none"> PO 1. Describe the benefits, limitations, and consequences of major scientific developments in pure and applied science 	SE/TE: 109-112, 361-363; Chemistry Serving Society: 23, 127, 230, 260, 384, 468, 526, 671; Chemistry Serving The Consumer: 76, 101, 164, 430, 570, 766, 802, 835; Chemistry Serving The Environment: 196, 287, 320, 494, 607, 699, 862; Chemistry Serving Industry: 45, 354, 407, 638, 736 TR: Guided Reading and Study Workbook: 5.2, 13.1; Review Module: 5.2, 13.1
<ul style="list-style-type: none"> PO 2. Explain how major scientific developments in pure and applied science have affected, or could affect, society 	SE/TE: Chemistry Serving Society: 23, 127, 230, 260, 384, 468, 526, 671

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2SC-P4. Trace the development and consequences of an invention, theory or discovery to demonstrate the dynamic nature of science	
<ul style="list-style-type: none"> PO 1. Trace the development of a selected invention, theory or discovery from its inception to modern day 	SE/TE: 107-108, 109-112, 360-366, 376-382 TE: Demo: 110, 362; Chemistry and Science History: 363 TR: Guided Reading and Study Workbook: 5.1, 5.2, 13.1, 13.3; Review Module: 5.1, 5.2, 13.1, 13.3; Laboratory Manual: 45-48 TECH: Chem ASAP! CD-ROM: 5.1, 5.2, 13.1, 13.3; ActivChemistry CD-ROM: 9 <i>Electron Configurations</i> ; CHEMedia Videodiscs: 20 <i>Rutherford's Experiment</i> , 30 <i>Electric Charges</i>
<ul style="list-style-type: none"> PO 2. Explain the progression of changes in the invention, theory or discovery 	SE/TE: 107-108, 109-112, 360-366, 376-382 TE: Demo: 110, 362; Chemistry and Science History: 59, 363, 373 TR: Guided Reading and Study Workbook: 5.1, 5.2, 13.1, 13.3; Review Module: 5.1, 5.2, 13.1, 13.3; Laboratory Manual: 45-48 TECH: Chem ASAP! CD-ROM: 5.1, 5.2, 13.1, 13.3; ActivChemistry CD-ROM: 9 <i>Electron Configurations</i> ; CHEMedia Videodiscs: 20 <i>Rutherford's Experiment</i> , 30 <i>Electric Charges</i>
<ul style="list-style-type: none"> PO 3. Describe the impact of the invention, theory or discovery on further scientific thought 	SE/TE: 107-108, 109-112, 360-366, 376-382 TE: Demo: 110, 362; Chemistry and Science History: 59, 363, 373 TR: Guided Reading and Study Workbook: 5.1, 5.2, 13.1, 13.3; Review Module: 5.1, 5.2, 13.1, 13.3; Laboratory Manual: 45-48 TECH: Chem ASAP! CD-ROM: 5.1, 5.2, 13.1, 13.3; ActivChemistry CD-ROM: 9 <i>Electron Configurations</i> ; CHEMedia Videodiscs: 20 <i>Rutherford's Experiment</i> , 30 <i>Electric Charges</i>
2SC-P5. Explain how theory, law and fact are developed in science to answer a specific question	
<ul style="list-style-type: none"> PO 1. Define theory, law and fact 	SE/TE: 16-17 TR: Guided Reading and Study Workbook: 1.3; Review Module: 1.3 TECH: Chem ASAP! CD-ROM: 1.3; Chemistry Alive Videodisc: <i>Ira Remsen Story</i>
<ul style="list-style-type: none"> PO 2. Describe the relationships among theories, laws and facts 	SE/TE: 16-17 TR: Guided Reading and Study Workbook: 1.3; Review Module: 1.3 TECH: Chem ASAP! CD-ROM: 1.3; Chemistry Alive Videodisc: <i>Ira Remsen Story</i>

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<ul style="list-style-type: none"> PO 3. Explain how theories, laws and facts are used to answer specific questions 	SE/TE: 16-17 TR: Guided Reading and Study Workbook: 1.3; Review Module: 1.3 TECH: Chem ASAP! CD-ROM: 1.3; Chemistry Alive Videodisc: <i>Ira Remsen Story</i>
2SC-P6. Analyze evidence that supports past and current scientific theories about a specific topic	
<ul style="list-style-type: none"> PO 1. Distinguish between evidence which supports a given scientific theory (e.g., model of the atom, plate tectonics, natural selection) and evidence which does not support the theory 	SE/TE: 107-108, 109-112, 360-366, 376-382 TE: Demo: 110, 362; Chemistry and Science History: 59, 363 TR: Guided Reading and Study Workbook: 5.1, 5.2, 13.1, 13.3; Review Module: 5.1, 5.2, 13.1, 13.3; Laboratory Manual: 45-48 TECH: Chem ASAP! CD-ROM: 5.1, 5.2, 13.1, 13.3; ActivChemistry CD-ROM: 9 <i>Electron Configurations</i> ; CHEMedia Videodiscs: 20 <i>Rutherford's Experiment</i> , 30 <i>Electric Charges</i>
STANDARD 3: PERSONAL AND SOCIAL PERSPECTIVES IN SCIENCE AND TECHNOLOGY	
Students understand the impact of science on human activity and the environment and are proficient in the uses of technology as they relate to science.	
PROFICIENCY (Grades 9-12)	
<i>Students know and are able to do all of the above and the following:</i>	
3SC-P1. Apply scientific thought processes and procedures to personal and social issues	
<ul style="list-style-type: none"> PO 1. Apply scientific thought processes of skepticism, empiricism, objectivity and logic to seek a solution to personal and social issues 	SE/TE: Chemistry Serving Society: 23, 127, 230, 260, 384, 468, 526, 671; Chemistry Serving the Environment: 196, 287, 320, 494, 607, 699, 862
<ul style="list-style-type: none"> PO 2. Apply a scientific method to the solution of personal and social issues 	SE/TE: Chemistry Serving Society: 23, 127, 230, 260, 384, 468, 526, 671; Chemistry Serving the Environment: 196, 287, 320, 494, 607, 699, 862
3SC-P2. Propose and test, using computer software or common materials, a solution to an existing problem; or design a product to meet a need, using a model or simulation	
<ul style="list-style-type: none"> PO 1. Describe a problem or need 	SE/TE: 83-88; Discover It: 82; Small-Scale Lab: 96 TR: Laboratory Manual: Develop a Hypothesis and Design an Experiment following lab activities; Small-Scale Chemistry Laboratory Manual: Now It's Your Turn following lab activities

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<ul style="list-style-type: none"> PO 2. Propose a solution to the problem or design a product to meet the need 	SE/TE: 83-88 TR: Laboratory Manual: Develop a Hypothesis and Design an Experiment following lab activities; Small-Scale Chemistry Laboratory Manual: Now It's Your Turn following lab activities
<ul style="list-style-type: none"> PO 3. Design a method of testing the solution or design a model or simulation to test the product 	SE/TE: 83-88 TR: Laboratory Manual: Design an Experiment following lab activities; Small-Scale Chemistry Laboratory Manual: Now It's Your Turn following lab activities
<ul style="list-style-type: none"> PO 4. Carry out the test of the solution or product 	SE/TE: 83-88 TR: Laboratory Manual: Design an Experiment following lab activities; Small-Scale Chemistry Laboratory Manual: Now It's Your Turn following lab activities
<ul style="list-style-type: none"> PO 5. Evaluate the test results 	SE/TE: 83-88 TR: Laboratory Manual: Design an Experiment following lab activities; Small-Scale Chemistry Laboratory Manual: Now It's Your Turn following lab activities
3SC-P3. Compare and contrast the goals of science and technology	
<ul style="list-style-type: none"> PO 1. Define the goals of science and the goals of technology 	SE/TE: 3-6, 7-14; Chemistry Serving Society: 23
<ul style="list-style-type: none"> PO 2. Compare the goals of science and the goals of technology 	SE/TE: 3-6, 7-14; Chemistry Serving Society: 23
<ul style="list-style-type: none"> PO 3. Describe the impact of technology on the life, physical, earth and space sciences 	SE/TE: 3-6, 7-14; Chemistry Serving Society: 23
3SC-P4. Identify and describe the basic processes of the natural ecosystems and how these processes affect, and are affected by, humans	
<ul style="list-style-type: none"> PO 1. Describe the basic processes of the natural ecosystems (e.g., water cycle, nutrient cycles) 	SE/TE: Chemistry Serving the Environment: 287, 494, 607
<ul style="list-style-type: none"> PO 2. Explain how these processes affect, and are affected by, humans 	SE/TE: Chemistry Serving the Environment: 287, 494, 607

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3SC-P5. Describe and explain factors that affect population size and growth (e.g., birth and death rates, quality of environment, disease, education)	
<ul style="list-style-type: none"> PO 1. Describe biotic and abiotic factors that affect populations 	This concept would be covered in a Biology course.
<ul style="list-style-type: none"> PO 2. Predict the effect of a change in a specific factor on a population 	This concept would be covered in a Biology course.
STANDARD 4: LIFE SCIENCE Students understand the characteristics of living things, the diversity of life and how organisms change over time in terms of biological adaptation and genetics. Students understand the interrelationships of matter and energy in living organisms and the interactions of living organisms with their environment.	N/A
STANDARD 5: PHYSICAL SCIENCE Students understand the nature of matter and energy including their forms, the changes they undergo and their interactions.	
PROFICIENCY (Grades 9-12)	
<i>Students know and are able to do all of the above and the following:</i>	
5SC-P1. Predict chemical and physical properties of substances (e.g., color, solubility, chemical reactivity, melting point, boiling point)	
<ul style="list-style-type: none"> PO 1. Describe physical and chemical properties that are used to characterize substances 	SE/TE: 29-31, 41-42, 125-126, 422-423, 427-428, 705-706, 708-710, 712-723, 724-731; Discover It: 28, 704; Small-Scale Lab: 44, 397; Link to Physics: 31; chemistry Serving Industry: 736 TE: Demo: 29, 30, 42, 708 TR: Guided Reading and Study Workbook: 2.1, 2.4, 5.4, 15.2, 15.3, 24.1, 24.2, 24.3; Review Module: 2.1, 2.4, 5.4, 15.2, 15.3, 24.1, 24.2, 24.3; Laboratory Manual: 25-32, 33-36, 107-113, 297-300, 301-306; Small-Scale Chemistry Laboratory Manual: 17-24, 253-258; Laboratory Practicals: 2.1 TECH: Chem ASAP! CD-ROM: 2.1, 2.2, 5.4, 15.2, 15.3, 24.1, 24.2, 24.3; ActivChemistry CD-ROM: 2 <i>Matter and Change</i> , 11 <i>Ions and Ionic Bonds</i> ; CHEMedia Videodiscs: 13 <i>Plastics Recycling</i> , 20 <i>Bonding</i> , 30 <i>Ionic Bonding</i>

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<ul style="list-style-type: none"> PO 2. Determine physical and chemical properties of a substance through observation, measurement and experimentation 	SE/TE: 29-31, 41-42, 125-126, 422-423, 427-428; Discover It: 28; Small-Scale Lab: 44, 397, 426 TE: Demo: 29, 30, 42 TR: Guided Reading and Study Workbook: 2.1, 2.4, 5.4, 15.2, 15.3, 24.1, 24.2, 24.3; Review Module: 2.1, 2.4, 5.4, 15.2, 15.3, 24.1, 24.2, 24.3; Laboratory Manual: 25-32, 33-36, 107-113, 297-300, 301-306; Small-Scale Chemistry Laboratory Manual: 17-24, 131-136, 137-144, 145-150, 223-230, 253-258; Probeware Lab Manual: Solutions Containing Ions; Laboratory Practicals: 2.1 TECH: Chem ASAP! CD-ROM: 2.1, 2.2, 5.4, 24.1, 24.2, 24.3; ActivChemistry CD-ROM: 2 <i>Matter and Change</i> ; Chemistry Alive Videodiscs: <i>Making Sodium Chloride</i>
<ul style="list-style-type: none"> PO 3. Separate mixtures of substances based on their physical and chemical properties 	SE/TE: 33-35, 763-764; Mini Lab: 35 TE: Chemistry and Science History: 34 TR: Guided Reading and Study Workbook: 2.2; Review Module: 2.2; Laboratory Manual: 189-194; Small-Scale Chemistry Laboratory Manual: 151-156 TECH: Chem ASAP! CD-ROM: 2.2; CHEMedia Videodiscs: 10 <i>Petroleum</i>
5SC-P2. Describe and explain properties and composition of samples of matter, using models (including atomic and molecular structure and the periodic table)	
<ul style="list-style-type: none"> PO 1. Use models of atomic and molecular structure to explain properties of matter 	SE/TE: 280-283, 361-366, 372-383, 422-424, 427-428, 460-466; Discover It: 360; Mini Lab: 383; Link to Computer Science: 464 TE: Demo: 281, 283, 428, 429 TR: Guided Reading and Study Workbook: 10.3, 13.1, 13.3, 15.2, 15.3, 16.3; Review Module: 10.3, 13.1, 13.3, 15.2, 15.3, 16.3; Laboratory Manual: 151-154, 155-160, 161-164; Small-Scale Chemistry Laboratory Manual: 111-116, 117-122, 171-176, 177-182 TECH: Chem ASAP! CD-ROM: 10.3, 13.1, 13.3, 15.2, 15.3, 16.3; ActivChemistry CD-ROM: 5 <i>States of Matter</i> ; CHEMedia Videodiscs: 10 <i>Synthetic Gems</i> , 20 <i>Bonding</i> , 22 <i>Why a Solid Is a Solid</i> , 30 <i>Ionic Bonding</i> , 32 <i>Metallic Bonding</i>

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<ul style="list-style-type: none"> PO 2. Use the periodic table to predict properties of elements and compounds 	<p>SE/TE: 391-396, 398-406, 705-706, 708-710, 712-723, 724-731, 732-734; Discover It: 390; Small-Scale Lab: 397, 711; Mini Lab: 399</p> <p>TE: Demo: 392, 394, 400, 402, 403, 708-710, 716, 726, 728</p> <p>TR: Guided Reading and Study Workbook: 14.1, 14.2, 24.1, 24.2, 24.3, 24.4; Review Module: 14.1, 14.2, 24.1, 24.2, 24.3, 24.4; Laboratory Manual: 165-170, 301-306; Small-Scale Chemistry Laboratory Manual: 123-130, 247-252, 253-258</p> <p>TECH: Chem ASAP! CD-ROM: 14.1, 14.2, 24.1, 24.2, 24.3; ActivChemistry CD-ROM: 10 <i>Periodic Trends</i>; CHEMedia Videodiscs: 36 <i>Periodic Trends: Reactivity</i></p>
<ul style="list-style-type: none"> PO 3. Predict the properties of substances based upon ionic, covalent, or hydrogen bonding 	<p>SE/TE: 419-425, 437-451, 452-453, 464-465, 475-477; Mini Lab: 425, 448; Small-Scale Lab: 426, 467</p> <p>TR: Guided Reading and Study Workbook: 15.2, 16.1, 16.2, 16.3, 17.1; Review Module: 15.2, 16.1, 16.2, 16.3, 17.1; Laboratory Manual: 171-176, 177-182; Small-Scale Chemistry Laboratory Manual: 131-136, 137-144, 145-150, 151-156; Probeware Laboratory Manual: Solutions Containing Ions, Strengths of Covalent Bonds</p> <p>TECH: Chem ASAP! CD-ROM: 15.2, 16.1, 16.2, 16.3, 17.1; ActivChemistry CD-ROM: 11 <i>Ions and Ionic Bonds</i>, 12 <i>Covalent Bonds</i>; CHEMedia Videodiscs: 10 <i>Synthetic Gems</i>, 20 <i>Bonding</i>, 22 <i>Why a Solid Is Solid</i>, 30 <i>Ionic Bonding</i>, 34 <i>Valence Electrons</i>, 36 <i>Paramagnetism</i>, 38 <i>Decomposition of Nitrogen Triiodide</i>; Small-Scale Video: 12 <i>Paper Chromatography</i></p>

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5SC-P3. Identify, measure, calculate, and analyze qualitative and quantitative relationships associated with energy forms and energy transfer or transformation (e.g., changes in temperature, velocity, potential energy, kinetic energy, conduction, convection, radiation)	
<ul style="list-style-type: none"> PO 1. Identify qualitative and quantitative relationships associated with energy (e.g., heat, mechanical, electrical) 	<p>SE/TE: 8-10, 42, 292-299, 300-306, 307-313, 314-319, 376-379, 551-556, 853-856; Discover It: 292; Mini Lab: 308, 383</p> <p>TE: Demo: 294, 305, 310, 316, 552; Chemistry and Science History: 376</p> <p>TR: Guided Reading and Study Workbook: 11.1, 11.2, 11.3, 11.4, 13.3, 19.2, 28.3; Review Module: 11.1, 11.2, 11.3, 11.4, 13.3, 19.2, 28.3; Laboratory Manual: 115-122, 123-130, 151-154, 155-160, 161-164; Small-Scale Chemistry Laboratory Manual: 97-102, 111-116, 117-122; Probeware Laboratory Manual: Heat of Fusion of Ice, Heat of Combustion of a Candle</p> <p>TECH: Chem ASAP! CD-ROM: 11.1, 11.2, 11.3, 11.4, 13.3, 19.2, 28.3; ActivChemistry CD-ROM: 6 <i>Thermochemistry</i>; CHEMedia Videodiscs: 10 <i>Measuring Energy Expenditure</i>, 27 <i>Evaporative Cooling</i>, 34 <i>Enthalpy Changes</i>, 36 <i>Heat Capacity</i>; Chemistry Alive Videodisc: <i>Burning Magnesium, Exploding Balloons, Superheated Steam, Thermite Reaction, Fountain of Light, Crushing Cans, Phase Change</i></p>
<ul style="list-style-type: none"> PO 2. Measure quantitative (e.g., heat, mechanical, electrical) relationships associated with energy 	<p>SE/TE: 301-306, 307-313; Discover It: 292; Small-Scale Lab: 319, 557; Mini Lab: 308</p> <p>TR: Guided Reading and Study Workbook: 11.2, 11.3, 13.3; Review Module: 11.2, 11.3, 13.3; Laboratory Manual: 115-122, 123-130, 151-154, 155-160, 161-164; Small-Scale Chemistry Laboratory Manual: 111-116; Probeware Laboratory Manual: Heat of Fusion of Ice, Heat of Combustion of a Candle</p> <p>TECH: Chem ASAP! CD-ROM: 11.2, 11.3, 13.3, 19.2; ActivChemistry CD-ROM: 6 <i>Thermochemistry</i>; CHEMedia Videodiscs: 10 <i>Measuring Energy Expenditure</i></p>

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Arizona Science Content Standards, (Grades 9-12)

ARIZONA SCIENCE CONTENT STANDARDS (Adopted 6/23/97 Amended 8/24/98)	PAGE(S) WHERE TAUGHT (If submission is not a book, cite appropriate location(s))
<ul style="list-style-type: none"> PO 3. Calculate quantitative relationships associated with energy (e.g., heat, mechanical, electrical) 	SE/TE: 301-306, 307-313, 375-379; Small-Scale Lab: 319; Mini Lab: 308 TR: Guided Reading and Study Workbook: 11.2, 11.3, 13.3; Review Module: 11.2, 11.3, 13.3; Laboratory Manual: 115-122, 123-130, 155-160, 161-164; Probeware Laboratory Manual: Heat of Fusion of Ice, Heat of Combustion of a Candle TECH: Chem ASAP! CD-ROM: 11.2, 11.3, 13.3; ActivChemistry CD-ROM: 6 <i>Thermochemistry</i> ; CHEMedia Videodiscs: 10 <i>Measuring Energy Expenditure</i>
5SC-P4. Observe, measure and calculate quantities to demonstrate conservation of matter and energy in chemical changes (e.g., acid base, precipitation, heat)	
<ul style="list-style-type: none"> PO 1. Use the law of conservation of matter to explain the quantitative relationships between reactants and products in chemical reactions 	SE/TE: 43, 207-211 TR: Guided Reading and Study Workbook: 8.1; Review Module: 8.1; Small-Scale Chemistry Laboratory Manual: 63-70, 93-100 TECH: Chem ASAP! CD-ROM: 8.1; CHEMedia Videodiscs: 2 <i>The Writing on the Wall</i> ; Small-Scale Video: 3 <i>Chemical Equations</i>
<ul style="list-style-type: none"> PO 2. Quantify the mass relationships between reactants and products in chemical reactions 	SE/TE: 242-250; Small-Scale Lab: 251 TE: Demo: 245 TR: Guided Reading and Study Workbook: 9.2; Review Module: 9.2; Laboratory Manual: 93-100; Small-Scale Laboratory Manual: 79-86, 87-92; Probeware Laboratory Manual: Analysis of Baking Soda TECH: Chem ASAP! CD-ROM: 9.2; ActivChemistry CD-ROM: 4 <i>Stoichiometry</i> ; CHEMedia Videodiscs: 13 <i>Space Shuttle Air Systems</i>
<ul style="list-style-type: none"> PO 3. Use the law of conservation of energy to explain the energy changes in chemical reactions 	SE/TE: 293-295, 303-306 TE: Demo: 294, 305 TR: Guided Reading and Study Workbook: 11.1, 11.2; Review Module: 11.1, 11.2; Laboratory Manual: 115-122; TECH: Chem ASAP! CD-ROM: 11.1, 11.2; ActivChemistry CD-ROM: 6 <i>Thermochemistry</i> ; CHEMedia Videodiscs: 2 <i>Balancing Diet and Exercise</i> , 10 <i>Measuring Energy Expenditure</i> , 34 <i>Enthalpy Changes</i> , 36 <i>Heat Capacity</i> ; Chemistry Alive Videodisc: <i>Burning Magnesium, Exploding Balloons, Superheated Steam, Thermite Reaction, Fountain of Light, Crushing Cans, Phase Change</i>

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<ul style="list-style-type: none"> PO 4. Quantify the energy changes in chemical reactions 	SE/TE: 300-306, 307-313, 314-319; Mini Lab: 308 TE: Demo: 305, 310, 316 TR: Guided Reading and Study Workbook: 11.2, 11.3, 11.4; Review Module: 11.2, 11.3, 11.4; Laboratory Manual: 115-122, 123-130; Small-Scale Chemistry Laboratory Manual: 97-102; Probeware Laboratory Manual: Heat of Fusion of Ice, Heat of Combustion of a Candle TECH: Chem ASAP! CD-ROM: 11.2, 11.3, 11.4; ActivChemistry CD-ROM: 6 <i>Thermochemistry</i> ; CHEMedia Videodiscs: 10 <i>Measuring Energy Expenditure</i> , 27 <i>Evaporative Cooling</i> , 34 <i>Enthalpy Changes</i> , 36 <i>Heat Capacity</i> ; Chemistry Alive Videodisc: <i>Superheated Steam, Phase Change</i>
5SC-P5. Describe and predict chemical reactions (including combustion and simple chemical reactions) and physical interaction of matter (including velocity, force, work and power), using words or symbolic equations	
<ul style="list-style-type: none"> PO 1. Express a chemical reaction by using a balanced equation 	SE/TE: 207-211, 225-229; Discover It: 202; Small-Scale Lab: 229 TE: Demo: 208 TR: Guided Reading and Study Workbook: 8.1, 8.3; Review Module: 8.1, 8.3; Laboratory Manual: 93-100; Small-Scale Chemistry Laboratory Manual: 63-70, 71-78 TECH: Chem ASAP! CD-ROM: 8.1, 8.3; CHEMedia Videodiscs: 2 <i>The Writing on the Wall</i> ; Small-Scale Video: 3 <i>Chemical Equations</i>
<ul style="list-style-type: none"> PO 2. Predict the products of a chemical reaction using types of reactions (e.g., synthesis, decomposition, replacement, combustion) 	SE/TE: 212-224; Mini Lab: 224 TE: Demo: 213, 216, 217, 218, 219 TR: Guided Reading and Study Workbook: 8.2; Review Module: 8.2; Laboratory Manual: 81-84, 85-92; Small-Scale Chemistry Laboratory Manual: 71-78 TECH: Chem ASAP! CD-ROM: 8.2; CHEMedia Videodiscs: 38 <i>reactivity of Magnesium</i> ; Chemistry Alive Videodisc: <i>Making Sodium Chlorid, Elephant Toothpaste, Watermelon Surprise, Superheated Steam, Thermite Reaction, Carbide Cannon, Burning Magnesium, Big Burner, Methane Bubbles, Ira Remsen Story</i>
<ul style="list-style-type: none"> PO 3. Describe physical interactions through use of word equations or formulae 	This concept would be covered in a Physical Science course.

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<ul style="list-style-type: none"> PO 4. Predict the results of a physical interaction by using an algebraic formula 	This concept would be covered in a Physical Science course.
5SSC-P6. Describe and explain physical interactions of matter and energy, using conceptual models (e.g., particle model for gaseous behavior)	
<ul style="list-style-type: none"> PO 1. Demonstrate the use of conceptual models in science (e.g., formulae, diagrams, graphs) 	SE/TE: 107-112, 326-328, 361-363; Discover It: 326; Small-Scale Lab: 329 TE: Demo: 362 TR: Guided Reading and Study Workbook: 5.2, 12.1, 13.1; Review Module: 5.2, 12.1, 13.1; Laboratory Manual: 45-48; Small-Scale Chemistry Laboratory Manual: 103-110 TECH: Chem ASAP! CD-ROM: 5.2, 12.1, 13.1; ActivChemistry CD-ROM: ; CHEMedia Videodiscs: 2 <i>Racing Hot Air Balloons</i> , 20 <i>ruterford's Experiment</i> ; Chemistry Alive Videodisc: <i>Methane Bubbles</i> ; Small-Scale Video: 7 <i>Chemistry of Gases</i>
<ul style="list-style-type: none"> PO 2. Describe physical interactions of matter and energy (e.g., phasechange, gas laws, momentum conservation)\ 	SE/TE: 274-279, 284-286, 307-313, 333-340; Mini Lab: 286 TE: Demo: 310, 333, 338 TR: Guided Reading and Study Workbook: 10.2, 10.4, 11.3, 12.3; Review Module: 10.2, 10.4, 11.3, 12.3; Laboratory Manual: 107-114, 131-138, 139-146; Small-Scale Laboratory Manual: 97-102; Probeware Laboratory Manual: Heat of Fusion of Ice TECH: Chem ASAP! CD-ROM: 10.2, 10.4, 11.3, 12.3; ActivChemistry CD-ROM: 5 <i>States of Matter</i> , 6 <i>Thermochemistry</i> , 7, 8 <i>Behavior of Gases</i> ; CHEMedia Videodiscs: 9 <i>Scuba Diving</i> , 12 <i>Lighter-than-Air Craft</i> , 20 <i>Liquefaction of Carbon Dioxide</i> , 27 <i>Evaporative Cooling</i> ; Chemistry Alive Videodisc: <i>Phase Change, Superheated Steam, Crushing Cans, Easter bunnies, Wok and Balloons</i>

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<ul style="list-style-type: none"> PO 3. Justify the validity of known conceptual models applied to physical phenomena 	SE/TE: 107-112, 326-328, 333-340, 361-363; Discover It: 326; Small-Scale Lab: 329 TE: Demo: 333, 338, 362 TR: Guided Reading and Study Workbook: 5.2, 12.1, 12.3, 13.1; Review Module: 5.2, 12.1, 12.3, 13.1; Laboratory Manual: 45-48, 131-138, 139-146; Small-Scale Chemistry Laboratory Manual: 103-110 TECH: Chem ASAP! CD-ROM: 5.2, 12.1, 12.3, 13.1; ActivChemistry CD-ROM: ; CHEMedia Videodiscs: 2 <i>Racing Hot Air Balloons</i> , 9 <i>Scuba Diving</i> , 12 <i>Lighter-than-Air Craft</i> , 20 <i>Rutherford's Experiment</i> ; Chemistry Alive Videodisc: <i>Methane Bubbles</i> , <i>Crushing Cans</i> , <i>Easter Bunnies</i> , <i>Wok and Balloons</i> ; Small-Scale Video: 7 <i>Chemistry of Gases</i>
5SC-P7. Demonstrate the understanding of gravitation as a universal force that each mass exerts on any other mass	
<ul style="list-style-type: none"> PO 1. Use the universal law of gravitation to predict how the gravity force changes with a change of distance and/or mass 	This concept would be covered in a Physical Science course.
5SC-P8. Demonstrate qualitative understanding of the 1st Law of Thermodynamics (conservation of matter and energy) and the 2nd Law of Thermodynamics (entropy)	
<ul style="list-style-type: none"> P O 1. Use the 1st Law of Thermodynamics to explain the energy changes in a physical system 	SE/TE: 293-295, 300-303 TR: Guided Reading and Study Workbook: 11.1, 11.2; Review Module: 11.1, 11.2; Laboratory Manual: 115-122; TECH: Chem ASAP! CD-ROM: 11.1, 11.2; ActivChemistry CD-ROM: 6 <i>Thermochemistry</i> ; CHEMedia Videodiscs: 34 <i>Enthalpy Changes</i> , 36 <i>Heat Capacity</i> ; Chemistry Alive Videodisc: <i>Burning Magnesium</i> , <i>Exploding Balloons</i> , <i>Superheated Steam</i> , <i>Thermite Reaction</i> , <i>Fountain of Light</i> , <i>Crushing Cans</i>
<ul style="list-style-type: none"> PO 2. Describe a sequence of events that illustrates the 2nd Law of Thermodynamics 	This concept would be covered in a Physical Science course.
Standard 6: Earth And Space Science Students understand the composition, formative processes, and history of the earth, the solar system and the universe.	N/A

Reference: <http://www.ade.state.az.us/standards/science/>