



Glencoe

ARIZONA
Science Standards – High School
***Chemistry: Concepts and Applications* © 2005**

OBJECTIVES	PAGE REFERENCES
Strand 1: Inquiry Process	
Concept 1: Observations, Questions, and Hypotheses Formulate predictions, questions, or hypotheses based on observations. Evaluate appropriate resources.	
PO 1. Evaluate scientific information for relevance to a given problem. (See R09-S3C1, R10-S3C1, R11-S3C1, R12-S3C1)	SE: <i>Biology Connection</i> 280, 772 <i>Chemistry and Society</i> 32, 146, 495 <i>ChemLab</i> 8-9, 56-57, 384-385, 674-675 <i>History Connection</i> 271
PO 2. Develop questions from observations that transition into testable hypotheses.	SE: 52-54, 59 <i>Chemistry and Society</i> 60, 146, 537 <i>Launch Lab</i> 515 TWE: CD 11, 54 DE 60-61 VL 10
PO 3. Formulate a testable hypothesis.	SE: 54-55, 59, 63-64 <i>ChemLab</i> 172-173, 328-329 <i>Mini LAB</i> 262, 532, 712 TWE: CD 11, 54
PO 4. Predict the outcome of an investigation based on prior evidence, probability, and/or modeling (not guessing or inferring).	SE: 10-11, 59, 88-91 <i>ChemLab</i> 56-57, 752-753 TWE: DE 58-59 TPK 179, 233 UA 211, 238
Concept 2: Scientific Testing (Investigating and Modeling) Design and conduct controlled investigations.	
PO 1. Demonstrate safe and ethical procedures (e.g., use and care of technology, materials, organisms) and behavior in all science inquiry.	SE: <i>Appendix C</i> 839-840 <i>Art Connection</i> 759 <i>ChemLab</i> 136-137, 362-363, 650-652, 722-723 <i>History Connection</i> 307 <i>How It Works</i> 569, 748 <i>Physics Connection</i> 232
PO 2. Identify the resources needed to conduct an investigation.	SE: <i>ChemLab</i> 56-57, 100-101, 136-137, 206-207, 362-363, 422-423, 504-505, 560-561, 650-652, 722-723

OBJECTIVES	PAGE REFERENCES
PO 3. Design an appropriate protocol (written plan of action) for testing a hypothesis: <ul style="list-style-type: none"> • Identify dependent and independent variables in a controlled investigation. • Determine an appropriate method for data collection (e.g., using balances, thermometers, microscopes, spectrophotometer, using qualitative changes). • Determine an appropriate method for recording data (e.g., notes, sketches, photographs, videos, journals (logs), charts, computers/calculators). 	SE: 36-37 <i>Appendix A 785-795</i> <i>ChemLab 16-17, 38-39, 56-57, 100-101, 328-329, 542-543, 674-675, 722-723</i>
PO 4. Conduct a scientific investigation that is based on a research design.	SE: <i>ChemLab 16-17, 38-39, 56-57, 100-101, 542-543, 674-675, 722-723</i> <i>Mini LAB 63, 262, 726</i>
PO 5. Record observations, notes, sketches, questions, and ideas using tools such as journals, charts, graphs, and computers.	SE: <i>Appendix A 804-808</i> <i>ChemLab 56-57, 266-267, 362-363, 422-423, 722-723</i> TWE: CJ 233, 442, 460, 729
Concept 3: Analysis, Conclusions, and Refinements Evaluate experimental design, analyze data to explain results and to propose further investigations. Design models.	
PO 1. Interpret data that show a variety of possible relationships between variables, including: <ul style="list-style-type: none"> • positive relationship • negative relationship • no relationship 	SE: 348-349, 382-383, 391-392, 440, 756 <i>Appendix A 805-808</i> <i>ChemLab 362-363, 384-385</i> TWE: CJ 459 DE 386-387
PO 2. Evaluate whether investigational data support or do not support the proposed hypothesis.	SE: 59, 63-65, 230-235 <i>ChemLab 16-17, 38-39, 56-57, 100-101, 542-543, 674-675, 722-723</i>
PO 3. Critique reports of scientific studies (e.g., published papers, student reports).	SE: <i>Biology Connection 772</i> <i>Chemistry and Society 146, 495</i> <i>Chemistry and Technology 728</i> <i>History Connection 271, 307</i> <i>Literature Connection 96</i> <i>Physics Connection 232</i> TWE: CB 91 WAC 33
PO 4. Evaluate the design of an investigation to identify possible sources of procedural error, including: <ul style="list-style-type: none"> • sample size • trials • controls • analyses 	SE: <i>Appendix A 788-794</i> <i>ChemLab 38-39, 56-57, 136-137, 236-237, 328-329, 362-363, 422-423, 504-505, 722-723</i>

OBJECTIVES	PAGE REFERENCES
PO 5. Design models (conceptual or physical) of the following to represent "real world" scenarios: <ul style="list-style-type: none"> • carbon cycle • water cycle • phase change • collisions 	SE: 34-35, 342-344, 348-361 <i>ChemLab</i> 362-363 TWE: CB 372 CJ 348 CU 364
PO 6. Use descriptive statistics to analyze data, including: <ul style="list-style-type: none"> • mean • frequency • range • (See MHS-S2C1-10) 	SE: <i>ChemLab</i> 38-39 <i>Mini LAB</i> 63
PO 7. Propose further investigations based on the findings of a conducted investigation.	SE: <i>ChemLab</i> 38-39, 56-57, 236-237, 266-267, 328-329, 422-423, 456-457, 504-505, 542-543, 560-561
Concept 4: Communication Communicate results of investigations.	
PO 1. For a specific investigation, choose an appropriate method for communicating the results. (See W09-S3C2-01 and W10-S3C2-01)	SE: <i>Appendix A</i> 804-808 <i>ChemLab</i> 8-9, 362-363, 384-385, 542-543 TWE: AS 17, 101, 423, 607, 723
PO 2. Produce graphs that communicate data. (See MHS-S2C1-02)	SE: 540-541, 756 <i>Appendix A</i> 805-808 <i>ChemLab</i> 362-363, 752-753 TWE: AS 363, 385
PO 3. Communicate results clearly and logically.	SE: <i>ChemLab</i> 8-9, 16-17, 38-40, 136-137, 172-173, 266-267, 328-329, 456-457, 542-543, 650-652
PO 4. Support conclusions with logical scientific arguments.	SE: <i>ChemLab</i> 8-9, 16-17, 38-40, 100-101, 206-207, 236-237, 362-363, 384-385, 422-423, 504-505
Strand 2: History and Nature of Science	
Concept 1: History of Science as a Human Endeavor Identify individual, cultural, and technological contributions to scientific knowledge.	
PO 1. Describe how human curiosity and needs have influenced science, impacting the quality of life worldwide.	SE: 52-55, 86-91 <i>Chemistry and Society</i> 146, 537 <i>Chemistry and Technology</i> 424-425 <i>Everyday Chemistry</i> 76, 248-249, 657, 715 <i>Physics Connection</i> 566
PO 2. Describe how diverse people and/or cultures, past and present, have made important contributions to scientific innovations.	SE: <i>Art Connection</i> 411 <i>Chemistry and Society</i> 146 <i>Chemistry and Technology</i> 216-217 <i>ChemLab</i> 8-9 <i>History Connection</i> 58, 307 <i>Physics Connection</i> 232 TWE: CUL 14, 15, 425
PO 3. Analyze how specific changes in science have affected society.	SE: 567, 605-613, 648-661 <i>Chemistry and Society</i> 146, 447, 495 <i>Chemistry and Technology</i> 216-217, 288-291, 354-355, 590-592

OBJECTIVES	PAGE REFERENCES
PO 4. Analyze how specific cultural and/or societal issues promote or hinder scientific advancements.	SE: <i>Biology Connection</i> 203 <i>Everyday Chemistry</i> 221, 417, 594, 685 <i>History Connection</i> 58 <i>How It Works</i> 569, 614, 748 <i>Physics Connection</i> 566
Concept 2: Nature of Scientific Knowledge Understand how science is a process for generating knowledge.	
PO 1. Specify the requirements of a valid, scientific explanation (theory), including that it be: <ul style="list-style-type: none"> • logical • subject to peer review • public • respectful of rules of evidence 	SE: 59, 65-66, 86-91, 243-251, 342-345 <i>Chemistry and Society</i> 146, 495 <i>Everyday Chemistry</i> 571, 777 TWE: DE 106-107
PO 2. Explain the process by which accepted ideas are challenged or extended by scientific innovation.	SE: 59 <i>Biology Connection</i> 280, 632 <i>Chemistry and Technology</i> 728-729 <i>Earth Science Connection</i> 727 <i>History Connection</i> 58, 307 TWE: AC 92 CM 59
PO 3. Distinguish between pure and applied science.	SE: 106-107, 111-113, 764-767 <i>Chemistry and Technology</i> 108-109, 176-178, 288-291, 354-355, 424-425, 484, 590-592
PO 4. Describe how scientists continue to investigate and critically analyze aspects of theories.	SE: 59, 77-79, 243-251, 342-345, 768-774 <i>Chemistry and Society</i> 146, 495 <i>Everyday Chemistry</i> 571, 777 TWE: DE 106-107
Strand 3: Science in Personal and Social Perspectives	
Concept 1: Changes in Environments Describe the interactions between human populations, natural hazards, and the environment.	
PO 1. Evaluate how the processes of natural ecosystems affect, and are affected by, humans.	SE: 535, 736-737, 771, 778-779 <i>Chemistry and Society</i> 495 <i>Everyday Chemistry</i> 571, 715, 777 <i>Mini LAB</i> 775
PO 2. Describe the environmental effects of the following natural and/or human-caused hazards: <ul style="list-style-type: none"> • flooding • drought • earthquakes • fires • pollution • extreme weather 	SE: 535, 764-765, 771, 774-779 <i>Chemistry and Society</i> 495 <i>Everyday Chemistry</i> 715, 777 TWE: IS 536
PO 3. Assess how human activities (e.g., clear cutting, water management, tree thinning) can affect the potential for hazards.	SE: 764-765, 771, 778-779 <i>Chemistry and Society</i> 447, 495 <i>Everyday Chemistry</i> 715

OBJECTIVES	PAGE REFERENCES
PO 4. Evaluate the following factors that affect the quality of the environment: <ul style="list-style-type: none"> • urban development • smoke • volcanic dust 	SE: <i>Chemistry and Society</i> 495
PO 5. Evaluate the effectiveness of conservation practices and preservation techniques on environmental quality and biodiversity.	SE: 732, 771 <i>Chemistry and Technology</i> 424-425, 728-729 <i>Everyday Chemistry</i> 715
Concept 2: Science and Technology in Society Develop viable solutions to a need or problem.	
PO 1. Analyze the costs, benefits, and risks of various ways of dealing with the following needs or problems: <ul style="list-style-type: none"> • various forms of alternative energy • storage of nuclear waste • abandoned mines • greenhouse gases • hazardous wastes 	SE: 493-494, 764-765, 771, 778-779 <i>Chemistry and Society</i> 495 <i>Chemistry and Technology</i> 728-729 TWE: AC 65 D 730, 765
PO 2. Recognize the importance of basing arguments on a thorough understanding of the core concepts and principles of science and technology.	SE: <i>Art Connection</i> 759 <i>Biology Connection</i> 280, 772 <i>Chemistry and Society</i> 32, 146, 447, 495 <i>Chemistry and Technology</i> 216-217 <i>History Connection</i> 141, 271
PO 3. Support a position on a science or technology issue.	SE: <i>Biology Connection</i> 280, 772 <i>Chemistry and Society</i> 32, 146, 447, 495 <i>Chemistry and Technology</i> 216-217, 728-729 <i>History Connection</i> 141, 271
PO 4. Analyze the use of renewable and nonrenewable resources in Arizona: <ul style="list-style-type: none"> • water • land • soil • minerals • air 	SE: 778-779 <i>Chemistry and Society</i> 60, 495, 659 <i>Chemistry and Technology</i> 590-592, 728-729 TWE: AC 65 D 765
PO 5. Evaluate methods used to manage natural resources (e.g., reintroduction of wildlife, fire ecology).	SE: 764-765, 778-779 <i>Chemistry and Society</i> 447, 495 <i>Everyday Chemistry</i> 715 TWE: D 765
Concept 3: Human Population Characteristics Analyze factors that affect human populations.	
PO 1. Analyze social factors that limit the growth of a human population, including: <ul style="list-style-type: none"> • affluence • education • access to health care • cultural influences 	See Glencoe's <i>Biology: The Dynamics of Life</i> © 2004 SE: 100-103

OBJECTIVES	PAGE REFERENCES
PO 2. Describe biotic (living) and abiotic (nonliving) factors that affect human populations.	See Glencoe's <i>Biology: The Dynamics of Life</i> © 2004 Point out to students that humans are affected by abiotic factors. SE: 37-38, 52-55, 56-57, 65-66, 91-93, 96-99, 100-103
PO 3. Predict the effect of a change in a specific factor on a human population.	See Glencoe's <i>Biology: The Dynamics of Life</i> © 2004 SE: Section Assessment 103 #5
Strand 5: Physical Science	
Concept 1: Structure and Properties of Matter Understand physical, chemical, and atomic properties of matter.	
PO 1. Describe substances based on their physical properties.	SE: 24-31, 34-37, 86-88 <i>ChemLab</i> 16-17, 38-39 <i>Mini LAB</i> 77, 63, 89, 97 TWE: DE 70-71
PO 2. Describe substances based on their chemical properties.	SE: 28-29, 40-44, 88-94, 154-157, 170-175, 261-281, 294-295 <i>ChemLab</i> 16-17, 100-101 <i>Mini LAB</i> 97
PO 3. Predict properties of elements and compounds using trends of the periodic table (e.g., metals, non-metals, bonding – ionic/covalent).	SE: 27-29, 88-94, 102-107, 243-251, 258-261, 285 <i>Mini LAB</i> 97, 262 TWE: CB 91 RE 27
PO 4. Separate mixtures of substances based on their physical properties.	SE: 20, 170-171, 637-638 <i>Chemistry and Technology</i> 326-327, 354-355 <i>ChemLab</i> 328-329 <i>How It Works</i> 468 <i>Mini LAB</i> 22, 30, 312 TWE: QD 18
PO 5. Describe the properties of electric charge and the conservation of electric charge.	SE: 134-135, 156-157, 584-589, 593-605, 608-615 <i>ChemLab</i> 606-607 TWE: CB 599 DE 322-323, 590-591, 604-605
PO 6. Describe the following features and components of the atom: <ul style="list-style-type: none"> • protons • neutrons • electrons • mass • number and type of particles • structure • organization 	SE: 61-68, 74-79, 98-99, 238-242, 244-251 <i>Mini LAB</i> 245 <i>Physics Connection</i> 73 TWE: CE 65 DIN 72 VL 61

OBJECTIVES	PAGE REFERENCES
PO 7. Describe the historical development of models of the atom.	SE: 52-55, 61-65, 77-78, 230-235, 238-242, 250-251 TWE: AC 65 CB 64 CUL 62 VL 61
PO 8. Explain the details of atomic structure (e.g., electron configuration, energy levels, isotopes).	SE: 65-68, 74-79, 230-235, 238-242, 244-245, 250-251 <i>Mini LAB 63</i> TWE: CD 259 CM 70, 75
Concept 2: Motions and Forces Analyze relationships between forces and motion.	
PO 1. Determine the rate of change of a quantity (e.g., rate of erosion, rate of reaction, rate of growth, velocity).	SE: 210-220, 756-758 <i>Chemistry and Technology 754-755</i> <i>Mini LAB 220</i> TWE: DE 730-731
PO 2. Analyze the relationships among position, velocity, acceleration, and time: <ul style="list-style-type: none"> • graphically • mathematically 	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 38-40, 43-47, 59-63, 65-68 <i>Physics Lab 20-21, 48-49, 76-77</i> TWE: BA 38 CU 42 IM 39
PO 3. Explain how Newton's 1 st Law applies to objects at rest or moving at constant velocity.	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 94-95, 100-101, 126-127, 131-135 TWE: AML 132 CB 92 CU 101 IM 127 QD 94, 100 RLP 134
PO 4. Using Newton's 2 nd Law of Motion, analyze the relationships among the net force acting on a body, the mass of the body, and the resulting acceleration: <ul style="list-style-type: none"> • graphically • mathematically 	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 93, 96-99, 154-155, 176, 182, 754-755 <i>Physics Lab 108-109</i> TWE: HSS 98 ICE 155 PP 99
PO 5. Use Newton's 3 rd Law to explain forces as interactions between bodies (e.g., a table pushing up on a vase that is pushing down on it; an athlete pushing on a basketball as the ball pushes back on her).	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 102-107 <i>How It Works 110</i> <i>Physics Lab 108-109</i> TWE: BA 102 CD 105 HSS 104 IM 103 RE 107

OBJECTIVES	PAGE REFERENCES
PO 6. Analyze the two-dimensional motion of objects by using vectors and their components.	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 120-125, 131-135, 147-152, 153-156 <i>Launch Lab</i> 119 <i>Physics Lab</i> 136-137, 160-161 TWE: HSS 148 ICE 121 IM 122
PO 7. Give an example that shows the independence of the horizontal and vertical components of projectile motion.	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 148-152 <i>Physics Lab</i> 160-161 TWE: CD 148 CT 151 RT 152
PO 8. Analyze the general relationships among force, acceleration, and motion for an object undergoing uniform circular motion.	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 153-155 <i>Future Technology</i> 162 TWE: BA 153 CD 154 D 155 EX 156
PO 9. Represent the force conditions required to maintain static equilibrium.	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 94-95, 131-135, 211-215 <i>Physics Lab</i> 218-219 <i>Technology and Society</i> 220 TWE: AML 132 CB 92, 212 CD 211 CT 214 RLP 134
PO 10. Describe the nature and magnitude of frictional forces.	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 94, 126-130 <i>Physics Lab</i> 136-137 TWE: QD 128 RE 129 RT 130 UA 127
PO 11. Using the Law of Universal Gravitation, predict how the gravitational force will change when the distance between two masses changes or the mass of one of them changes.	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 175-176, 179-180, 182-185 TWE: CB 177 CD 176 CU 185

OBJECTIVES	PAGE REFERENCES
PO 12. Using Coulomb's Law, predict how the electrical force will change when the distance between two point charges changes or the charge of one of them changes.	TWE: DIN 263 Also see Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 549-553, 564 TWE: ICE 551, 565, 566 RE 550 RT 553
PO 13. Analyze the impulse required to produce a change in momentum.	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 230-232, 234-235, 236-237 TWE: A 233 CB 231 CD 230 ICE 232
PO 14. Quantify interactions between objects to show that the total momentum is conserved in both collision and recoil situations.	See Glencoe's <i>Physics: Principles and Problems</i> © 2005. SE: 236-237, 243-245 TWE: CD 243 CU 245 RE 244
Concept 3: Conservation of Energy and Increase in Disorder Understand ways that energy is conserved, stored, and transferred.	
PO 1. Describe the following ways in which energy is stored in a system: <ul style="list-style-type: none"> • mechanical • electrical • chemical • nuclear 	SE: 599-605, 608-615, 696, 721, 734-737, 761-767 <i>Chemistry and Technology</i> 728-729 <i>ChemLab</i> 606-607, 722-723 TWE: D 724
PO 2. Describe various ways in which energy is transferred from one system to another (e.g., mechanical contact, thermal conduction, electromagnetic radiation).	SE: 70-72, 599-615, 696-697, 708-714, 719-720, 726, 733-737 <i>ChemLab</i> 722-723 TWE: CM 697 QD 720
PO 3. Recognize that energy is conserved in a closed system.	SE: 711-712, 720 TWE: CB 708 CD 54 CM 720
PO 4. Calculate quantitative relationships associated with the conservation of energy.	SE: 711-712, 719-720
PO 5. Analyze the relationship between energy transfer and disorder in the universe (2 nd Law of Thermodynamics).	SE: 716-718, 730-732, 736-737 <i>Try at Home Lab</i> 872 TWE: CD 717 QD 716
PO 6. Distinguish between heat and temperature.	SE: 348-350, 352-361, 364-365, 789 <i>ChemLab</i> 362-363 TWE: CM 711 KC 348
PO 7. Explain how molecular motion is related to temperature and phase changes.	SE: 348-351, 352-358, 360-361, 364-365 <i>ChemLab</i> 362-363 TWE: KC 348

OBJECTIVES	PAGE REFERENCES
Concept 4: Chemical Reactions Investigate relationships between reactants and products in chemical reactions.	
PO 1. Apply the law of conservation of matter to changes in a system.	SE: 41-42, 53-55, 198-199 <i>ChemLab</i> 56-57 TWE: CD 54 CM 59 D 44 DE 198-199 KC 190 QD 53
PO 2. Identify the indicators of chemical change, including formation of a precipitate, evolution of a gas, color change, absorption or release of heat energy.	SE: 190-191 <i>ChemLab</i> 206-207 TWE: CJ 191 QD 208
PO 3. Represent a chemical reaction by using a balanced equation.	SE: 198-199, 555-558, 567 TWE: D 44, 563 DE 194-195, 198-199, 558-559 VL 555
PO 4. Distinguish among the types of bonds (i.e., ionic, covalent, metallic, hydrogen bonding).	SE: 134, 140-147, 170-171, 305-314, 332-333, 438-439, 451-454 <i>ChemLab</i> 172-173 TWE: CM 308 DD 434-435 DE 140-141 VL 309
PO 5. Describe the mole concept and its relationship to Avogadro's number.	SE: 396-398, 404-409, 414-416, 419, 426-429 TWE: CB 396 CD 416 CU 412 DE 415, 426-427
PO 6. Solve problems involving such quantities as moles, mass, molecules, volume of a gas, and molarity using the mole concept and Avogadro's number.	SE: 396-398, 404-413, 414-419, 426-429 <i>Launch Lab</i> 403 <i>Mini LAB</i> 420 TWE: CB 396 CD 416 DD 402-403 DE 415, 426-427
PO 7. Predict the properties (e.g., melting point, boiling point, conductivity) of substances based upon bond type.	SE: 134, 143-147, 170-171, 313-314, 332-333 <i>ChemLab</i> 172-173 TWE: CU 332 DD 434-435 DE 140-141 VL 309
PO 8. Quantify the relationships between reactants and products in chemical reactions (e.g., stoichiometry, equilibrium, energy transfers).	SE: 195-196, 404-409, 414-419, 421, 426-429, 711-712 <i>Chemistry and Technology</i> 424-425 <i>ChemLab</i> 422-423 <i>Mini LAB</i> 420 TWE: DD 434-435

OBJECTIVES	PAGE REFERENCES
PO 9. Predict the products of a chemical reaction using types of reactions (e.g., synthesis, decomposition, replacement, combustion).	SE: 202-205, 208-209, 655-661, 713 <i>ChemLab</i> 8-9, 206-207 TWE: CD 204 CJ 202 QD 208
PO 10. Explain the energy transfers within chemical reactions using the law of conservation of energy.	SE: 708-709, 711-714, 719-720, 726, 734-737 <i>ChemLab</i> 722-723 TWE: CB 708 CD 724 CM 720 DE 734-735
PO 11. Predict the effect of various factors (e.g., temperature, concentration, pressure, catalyst) on the equilibrium state and on the rates of chemical reaction.	SE: 211-215, 218-223, 356-360, 676-677 <i>Chemistry & Technology</i> 216-217, 424-425 <i>ChemLab</i> 674-675 TWE: DE 218-219 EX 223 QD 222
PO 12. Compare the nature, behavior, concentration, and strengths of acids and bases.	SE: 480-492, 497-500, 502-507, 516-523, 526-530 <i>ChemLab</i> 542-543 TWE: CD 486, 517 DE 518-519, 526-527
PO 13. Determine the transfer of electrons in oxidation/reduction reactions.	SE: 556-558, 585, 602-605, 608-609 <i>ChemLab</i> 606-607 <i>Health Connection</i> 610 <i>How it Works</i> 612, 614 <i>MiniLAB</i> 587 TWE: AC 595 DIN 556, 601
Concept 5: Interactions of Energy and Matter Understand the interactions of energy and matter.	
PO 1. Describe various ways in which matter and energy interact (e.g., photosynthesis, phase change).	SE: 348-361, 364-365, 719-721, 733-737 <i>ChemLab</i> 362-363, 722-723 <i>Everyday Chemistry</i> 248-249 TWE: CD 724, 733 QD 720
PO 2. Describe the following characteristics of waves: <ul style="list-style-type: none"> • wavelength • frequency • period • amplitude 	SE: 70-72, 233-235 <i>Everyday Chemistry</i> 76 TWE: EX 76 QD 74, 235 UA 233
PO 3. Quantify the relationships among the frequency, wavelength, and the speed of light.	TWE: AS 72
PO 4. Describe the basic assumptions of kinetic molecular theory.	SE: 342-347, 348-352, 386, 392 TWE: CB 349, 372 DE 378-379 KC 348 VL 391

OBJECTIVES	PAGE REFERENCES
PO 5. Apply kinetic molecular theory to the behavior of matter (e.g., gas laws).	SE: 342-344, 348-352, 373-375, 382-383, 386, 391-392 <i>ChemLab</i> 384-385 TWE: CB 372 DE 378-379, 386-387
PO 6. Analyze calorimetric measurements in simple systems and the energy involved in changes of state.	SE: 352-361, 364-365, 719-721 <i>ChemLab</i> 362-363, 722-723 <i>MiniLAB</i> 712, 726 TWE: CD 724 EX 732 QD 720
PO 7. Explain the relationship between the wavelength of light absorbed or released by an atom or molecule and the transfer of a discrete amount of energy.	SE: 74-75, 233-235 <i>Everyday Chemistry</i> 76 <i>Fact of the Matter</i> 242 <i>Mini LAB</i> 77 TWE: EX 76 QD 74, 235 UA 233
PO 8. Describe the relationship among electric potential, current, and resistance in an ohmic system.	SE: 601-604 <i>Mini LAB</i> 600 TWE: CB 599 CE 601
PO 9. Quantify the relationships among electric potential, current, and resistance in an ohmic system.	SE: 601-604 <i>Mini LAB</i> 600 TWE: CB 599 CE 601

Codes Used for TWE Pages

AC	Across the Curriculum
AS	Assessment
CB	Content Background
CD	Concept Development
CE	Correcting Errors
CJ	Chemistry Journal
CM	Correcting Misconceptions
CU	Check for Understanding
CUL	Cultural Diversity
D	Discussion
DD	Discovery Demo
DE	Demonstration
DIN	Differentiated Instruction
EX	Extension
IS	Integrating the Sciences
KC	Key Concept
QD	Quick Demo
RE	Reinforcement
TPK	Tying to Previous Knowledge
UA	Using an Analogy
VL	Visual Learning
WAC	Writing About Chemistry