



Glencoe

IDAHO
Science Standards – Grades 9-12
***Chemistry: Matter and Change* © 2005**

STANDARDS	PAGE REFERENCES
648. UNIFYING CONCEPTS OF SCIENCE.	
01. Understand systems, order, and organization.	
a. Know the scientific meaning and application of the concepts of system, order, and organization.	SE: 127-134, 154-158, 163-169, 259-261, 263-267, 737-738, 850-851, 858-861
02. Understand concepts and processes of evidence, models, and explanation.	
a. Know that observations and data are evidence on which to base scientific explanations.	SE: 10-13, 36-45 <i>Chemistry and Society</i> 20 <i>Chemlab</i> 46-47, 550-551, 688-689 <i>Mini Lab</i> 15 <i>Problem-Solving Lab</i> 130, 860
b. Use models to explain how things work.	SE: 13, 699 <i>Chemlab</i> 108-109, 862-863 <i>Discovery Lab</i> 241, 737 <i>Problem-Solving Lab</i> 8, 130
c. Develop scientific explanations based on scientific knowledge, logic, and analysis.	SE: 10-13, 36-45, 127-134, 151-154, 419-426 <i>Chemlab</i> 46-47 <i>Mini Lab</i> 15 <i>Problem-Solving Lab</i> 155
03. Understand constancy, change, and measurement.	
a. Identify constancy in some concepts in science that do not change with time such as the speed of light.	SE: 25-29, 72-73, 118-120, 122-123, 819-820 <i>Chemlab</i> 142-143 <i>History Connection</i> 311
b. Recognize that change occurs in and among systems and change can be measured.	SE: 61-63, 105-107, 277-283, 404-409, 421-426, 471-474, 498-500 <i>Mini Lab</i> 786
c. Measure in both the metric and customary system.	SE: 25-30 <i>Chemlab</i> 46-47 <i>Discovery Lab</i> 309, 489 <i>Math Handbook</i> 900-902 TWE: AC 33 AS 35 P 34
04. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.	
a. Know that the present arises from materials and forms of the past.	SE: 819-820 <i>Earth Science Connection</i> 600, 726 <i>Everyday Chemistry</i> 730 <i>Problem-Solving Lab</i> 860 TWE: EN 841

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b. Understand evolution as a series of changes, some gradual and some sporadic, that account for present form and function of objects, organisms, and natural or mechanical systems.	SE: <i>Biology Connection</i> 637
c. Know that equilibrium is a physical state in which forces and changes occur in opposite and offsetting directions.	SE: 559-562, 575, 585 <i>Chemistry and Technology</i> 588 <i>Physics Connection</i> 563 TWE: CU 567, 574
05. Understand concepts of form and function.	
a. Know that form refers to function and function refers to form.	SE: 778-779, 784-787 <i>Biology Connection</i> 637 <i>How It Works</i> 204, 376, 656, 864 <i>Problem-Solving Lab</i> 790
649. CONCEPTS OF SCIENTIFIC INQUIRY.	
01. Understand scientific inquiry and develop critical thinking skills.	
a. Identify questions and concepts that guide scientific investigations.	SE: 10-13, 36-41, 63-64, 75-76, 490 <i>Problem-Solving Lab</i> 503, 583, 790
b. Design and conduct scientific investigations.	SE: <i>Chemlab</i> 78-79, 170-171, 268-269, 300-301, 444-445, 520-521, 688-689, 832-833
c. Use technology and mathematics to improve investigations and communication.	SE: <i>Chemlab</i> 480-481, 688-689, 796-797, 832-833, 862-863 <i>Problem-Solving Lab</i> 96, 860
d. Formulate and revise scientific explanations and models using logic and evidence.	SE: 3-6, 10-13, 94-97, 152-154 <i>Chemlab</i> 18-19 <i>Problem-Solving Lab</i> 60, 130, 155
e. Recognize and analyze alternative explanations and models.	SE: 87-91, 152-154, 263-266 <i>Everyday Chemistry</i> 730 <i>History Connection</i> 311 <i>Physics Connection</i> 563 <i>Problem-Solving Lab</i> 267, 860
f. Communicate and defend a scientific argument.	SE: 129-132, 388-392 <i>How It Works</i> 204 <i>Mini Lab</i> 505 <i>Problem-Solving Lab</i> 44, 155, 219, 679
g. Know the differences among observations, hypotheses, and theories.	SE: 10-13, 94-97, 118-124, 129-132, 385-386 <i>History Connection</i> 75, 311 <i>Mini Lab</i> 15
650. CONCEPTS OF PHYSICAL SCIENCE.	
01. Understand the structure of atoms.	
a. Know the function and location of protons, neutrons, and electrons.	SE: 94-97, 127-132, 159-162, 211-216, 228-229, 242-246, 810-820, 822-826
b. Understand the processes of fission and fusion.	SE: 821-823, 826 <i>Discovery Lab</i> 805
c. Know the characteristics of isotopes.	SE: 98, 100-104, 810-814, 817-820 TWE: AS 314 CU 107 EN 99

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d. Know the basic electrical properties of matter.	SE: 92-94, 168-169, 263-264, 663-669, 673-678, 683-687 <i>Chemlab</i> 688-689 <i>How It Works</i> 204
02. Understand the structure and function of matter and molecules and their interactions.	
a. Know how atoms interact with one another by transferring or sharing electrons.	SE: 211-220, 228-229, 241-246, 256-257, 259-261, 263-266 <i>Chemlab</i> 232-233
b. Know how bonds between atoms are created when electrons are shared or transferred to form molecules or ionic substances.	SE: 211-220, 228-229, 241-246, 256-257, 259-261, 263-266 <i>Chemlab</i> 232-233
c. Know how the physical properties of compounds reflect the nature of the interactions among its molecules.	SE: 264-266, 393-403, 435-436, 743-746 <i>Chemlab</i> 268-269, 410-411, 766-767 <i>Problem-Solving Lab</i> 267
d. Know how solids, liquids, and gases differ in the energy that bonds them together.	SE: 396-400, 404-409, 471-474, 492-494, 502-503 <i>Mini Lab</i> 505 <i>Problem-Solving Lab</i> 267 TWE: AS 495
03. Understand chemical reactions.	
a. Know that chemical reactions may release or consume energy.	SE: 496-500, 506-512, 532-534 <i>Chemlab</i> 520-521 <i>Discovery Lab</i> 489 TWE: CU 505 DE 492-493
b. Know that chemical reactions can occur in time periods that vary from very fast to very slow and that catalysts can affect the rate of a chemical reaction.	SE: 529-530, 536-541, 546-547, 778-779 <i>Physics Connection</i> 544 <i>Problem-Solving Lab</i> 533 TWE: CUL 532
c. Identify chemical reactions that are occurring all around us.	SE: <i>How It Works</i> 376, 552, 628, 656, 864 <i>Mini Lab</i> 681 <i>Problem-Solving Lab</i> 424, 583, 647
04. Understand concepts of motion and forces.	
a. Know that gravitational force and electrical force are universal forces.	SE: 94-95 TWE: DIN 128 QD 92, 118
b. Know that objects change their motion only when a net force is applied.	SE: 92-95 <i>Physics Connection</i> 563 <i>Problem-Solving Lab</i> 44
c. Understand that moving electrical charges produce magnetic forces, and moving magnets produce electrical forces.	SE: 106-107 TWE: EN 103
05. Understand that the total energy in the universe is constant.	
a. Understand that energy can be transferred but it can neither be destroyed nor created.	SE: 490, 821-823 TWE: CJ 64
b. Know that energy can be classified as either potential energy, kinetic energy, or energy contained by a field.	SE: 385-386, 489-490 TWE: R 494

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c. Know that heat is evidenced by random motion and the vibrations of atoms, molecules, and ions.	SE: 491, 496-497 TWE: R 500 RE 406
d. Know that energy is transferred by various types of waves and by electrons flowing through matter.	SE: 118-121, 131-132, 228-229 <i>Chemlab</i> 142-143 <i>How It Works</i> 48, 144, 270
653. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.	
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	
a. Know that all matter tends toward more disorganized states.	SE: 514-516 TWE: E 519
b. Know that living systems require a continuous input of energy to maintain their chemical and physical organization.	SE: 792-794, 858-861 TWE: AS 795
c. Know that the energy for life is primarily derived from the sun through photosynthesis.	SE: 793-795, 858-859 <i>Everyday Chemistry</i> 730
d. Understand cellular respiration and the synthesis of macromolecules.	SE: 775-778, 794 TWE: AS 793 E 795
e. Know that chemical bonds of food molecules contain energy, which is released when the bonds are broken.	SE: 792-794 <i>Chemlab</i> 796-797 TWE: R 795
f. Know that cells usually store energy as Adenosine Triphosphate (ATP).	SE: 792-793 TWE: R 795
g. Know that the distribution and abundance of organisms and populations in ecosystems are limited by the availability of matter and energy.	SE: 850-853, 858-861 <i>Earth Science Connection</i> 457
h. Trace how matter cycles and energy flows through different levels of organization of living systems' cells, organs, organisms, communities, and between living systems and the physical environment.	SE: 850-853, 858-861 <i>Earth Science Connection</i> 281 <i>Everyday Chemistry</i> 730
02. Understand the individual behavior of organisms and their interactions in populations and communities as influenced by physiological and environmental factors.	
a. Know that multi-cellular animals have nervous systems that generate behavior.	SE: <i>Biology Connection</i> 637 <i>Everyday Chemistry</i> 798
b. Know that the nerve cells communicate with each other by secreting specific excitatory and inhibitory molecules.	SE: <i>Biology Connection</i> 637, 785 <i>Everyday Chemistry</i> 798
c. Know that organisms have behavioral responses to internal changes and to external stimuli, and that broad patterns of behavior have evolved to ensure reproductive success.	SE: <i>Biology Connection</i> 637 <i>Everyday Chemistry</i> 798
d. Know that behaviors often have an adaptive logic when viewed in terms of natural selection.	SE: <i>Biology Connection</i> 637, 785 <i>Everyday Chemistry</i> 798

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655. TECHNOLOGY.	
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	
a. Know the ways that science advances technology and technology advances science.	SE: 7, 673-681, 725-727, 761-765, 824-825, 828-831 <i>Chemistry and Technology</i> 344, 446, 588
b. Recognize that science and technology are pursued for different purposes and that scientific inquiry is driven by the desire to understand the natural world and technological design is driven by the need to meet human needs and solve human problems.	SE: 7, 118-124, 673-681, 684-687 <i>Chemistry and Society</i> 80, 110 <i>Chemistry and Technology</i> 344, 588
c. Know that critical thinking, creativity, imagination, and a good knowledge base are all required in the work of science and engineering.	SE: <i>Careers Using Chemistry</i> 136, 250, 403, 499, 677, 828 <i>History Connection</i> 75, 190, 311
d. Know the elements of technological design, which include the following: - Identify a problem or design an opportunity; - Propose designs and choose between alternative solutions; - Implement a proposed solution; - Evaluate the solution and its consequences; - Communicate the problem, process, and solution.	SE: <i>Chemistry and Technology</i> 344, 588, 768 <i>Chemlab</i> 46-47, 728-729 <i>Everyday Chemistry</i> 730 <i>Problem-Solving Lab</i> 424, 679
e. Use available technology to assist in solving problems.	SE: <i>Chemistry and Society</i> 80 <i>Chemistry and Technology</i> 344, 446, 588 <i>Physics Connection</i> 544, 808 <i>Problem-Solving Lab</i> 424, 679
656. PERSONAL AND SOCIAL PERSPECTIVES.	
01. Understand common environmental quality issues, both natural and human induced.	
a. Identify issues, including but not limited to: - Water quality; - Air quality; - Hazardous waste; - Forest health.	SE: 3-6, 824-825, 843-849, 852-853, 858-860 <i>Chemistry and Society</i> 80, 834 <i>Earth Science Connection</i> 457, 847
02. Understand the causes and effects of population change.	
a. Understand the impact of technological development and the growth of human population on the living and nonliving environment.	SE: 3-6, 844-849, 853, 858-860 <i>Earth Science Connection</i> 457, 847 TWE: CJ 824 R 831
b. Understand the impact of population change on natural resources and community infrastructure.	SE: 846-848, 853, 859-860
03. Understand the importance of natural resources and the need to manage and conserve them.	
a. Understand the differences between renewable and nonrenewable resources.	SE: 725-727, 842-846, 850-853, 855-861 <i>Chemistry and Society</i> 80 <i>Chemlab</i> 862-863 <i>Everyday Chemistry</i> 730

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b. Understand the differences between preservation and conservation.	SE: 852-853 <i>Chemistry and Society</i> 80 <i>Earth Science Connection</i> 457, 726, 847 <i>Problem-Solving Lab</i> 860 TWE: CJ 856 P 859
c. Understand the role and effect of management of natural resources.	SE: 844-849, 853-854, 859-860 <i>Earth Science Connection</i> 457, 517, 726 TWE: CJ 825 DIN 823
01. Understand different uses of technology in science and how they affect our standard of living.	
a. Identify examples of technologies used in scientific fields, including but not limited to: - Weather forecasting; - Food production; - Environmental cleanup; - Advances in medicine; - Communications; - The space program.	SE: 827-829 <i>Chemistry and Society</i> 110, 482 <i>Chemistry and Technology</i> 344, 690 <i>Physics Connection</i> 544, 808 <i>Problem-Solving Lab</i> 424, 647
657. HISTORY OF SCIENCE.	
01. Understand the significance of major scientific milestones.	
a. Understand the social and economic impact of historical scientific events.	SE: <i>Chemistry and Society</i> 20, 110 <i>Chemistry and Technology</i> 344, 588 <i>History Connection</i> 75, 311 <i>Problem-Solving Lab</i> 130, 860
b. Understand the contributions of notable scientists.	SE: 87-90, 92-96, 122-124, 129-132 <i>Biology Connection</i> 14 <i>History Connection</i> 75, 190, 311, 423
658. INTERDISCIPLINARY CONCEPTS.	
01. Understand that interpersonal relationships are important in scientific endeavors.	
a. Know the importance of working in interdisciplinary teams to solve scientific problems.	SE: 94-97, 789 <i>Chemistry and Society</i> 20, 80, 110 <i>Chemistry and Technology</i> 690 TWE: CUL 99 QD 10
02. Understand technical communication.	
a. Read for information.	TWE: CJ 5, 14, 76 E 13, 59 DIN 12, 94 P 57
b. Write and articulate technical information.	TWE: CJ 5, 8, 14, 26, 36, 43 DIN 12, 94

Codes Used for TWE Pages

AC	Applying Chemistry
AS	Assessment
CJ	Chemistry Journal
CU	Check for Understanding
CUL	Cultural Diversity
DE	Demonstration
DIN	Differentiated Instruction
E	Extension
EN	Enrichment
P	Portfolio
QD	Quick Demo
R	Reteach
RE	Reinforcement