Active Chemistry Correlation to the Nevada Academic Content Standards for Principles of Science, Grades 9-12

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.

Indicator	**Location/Page where Standard is found**
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	7-10, 15-18, 35-37, 101-103, 113-113, 120-121, 126-127, 134-137, 144-146, 152-153, 157-158, 162-164, 182-184, 193-195, 201-203, 210-214, 224-227, 233-236, 241-242, 255-258, 287-291, 300-301, 308-311, 318-320, 329-332, 353-356, 369-371, 379-382, 390-392, 401-404, 408-410, 416-418, 433-435, 441-444, 448-451, 456-460, 468-469, 477-479, 485-488, 496-497, 511-513, 522-524, 532-535, 544-545, 551-554, 560-562, 568-569, 575-577, 599-602, 608-610, 618-520, 632-634, 641-643, 659-661, 677-679, 685-686, 693-697, 703-704, 712-713, 727-728, 743-745, 766-768, 779-783, 790-792, 799—803, 812-816, 843-848, 857-858, 867-869, 877-882, 892-896, 902-904, 910-912, 919-921

N.12.A.2 Students know scientists maintain a permanent record of procedures, data, analyses, decisions, and understandings of scientific investigations. I/S	7-10, 15-18, 35-38, 58-62, 101-103, 110-113, 120-121, 126-127, 134-137, 144-146, 152,-153, 157-159, 162-164, 182-184, 193-195, 201-203, 210-214, 224-230, 233-235, 241-242, 255-258, 287-291, 300-301, 308-311, 318-320, 318-320, 329-332, 353-356, 369-371, 379-382, 390-392, 401-404, 408-410, 416-418, 433-435, 441-444, 448-451, 456-460, 468-469, 477-479, 485-488, 496-497, 511-513, 522-524, 532-535, 544-545, 551-554, 560-562, 568-569, 575-577, 677-679, 685-686, 693-697, 703-704, 712-713, 727-729, 743-744, 766-768, 779-783, 790-792, 799-804, 812-816, 826-827, 843-848, 857-859, 867-869, 877-882, 892-896, 902-904, 910-912, 919-921,
N.12.A.3 Students know repeated experimentation allows for statistical analysis and unbiased conclusions. E/S	7-10, 26-28, 46-50, 58-62, 101-103, 113-113, 120-121, 134-137, 144-146, 182-184, 193-195, 201-203, 210-214, 224-227, 233-236, 241-242, 255-258, 287-291, 300-301, 308-311, 329-332, 353-356, 361-364, 369-371, 379-382, 390-392, 401-404, 416-418, 433-435, 441-444, 448-451, 456-460, 468-469, 477-479, 485-488, 496-497, 511-513, 522-524, 532-535, 544-545, 560-562, 575-577, 599-602, 608-610, 618-520, 632-634, 641-643, 659-661, 677-679, 685-686, 693-697, 703-704, 712-713, 727-728, 743-745, 779-783, 790-792, 799-803, 812-816, 843-848, 857-858, 867-869, 877-882, 892-896, 902-904, 910-912, 919-921
N.12.A.4 Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L	102, 111, 121, 135, 145, 158, 163, 194-5, 202, 211, 225, 234, 242, 256, 288, 309, 311, 330, 354, 370, 391, 402, 434,442, 450, 459, 468, 477, 486, 512, 523,533, 545, 553, 576, 600,

	609, 618, 633, 642, 651, 660, 679, 686, 694, 703, 712, 727, 766, 802, 845, 858, 868, 878, 893, 903, 910, 920
N.12.A.5 Students know models and modeling can be used to identify and predict cause-effect relationships. I/S	15-18, 35-37, 19-20, 24, 29-30, 33, 34, 39-41, 43, 46-50, 54, 58-62, 82, 101-103, 182-184, 703-704, 712-713
N.12.A.6 Students know organizational schema can be used to represent and describe relationships of sets. E/S.	5,15-18,26-28, 35-38, 46-50, 58-62, 68-70, 77-79, 101-103, 157-159, 162-165, 179-181, 224-230, 233-235, 241-242, 265-269, 274-278, 287-291, 308-311, 318-320, 353-356, 361-364, 369-371, 390-392, 401-404, 408-410, 433-435, 441-444, 448-451, 456-460, 468-469, 477-479, 485-488, 496-497, 511-513, 522-524, 532-535, 544-545, 560-562, 575-577, 593-594, 599-602, 618-622, 632-634, 641-643, 677-679, 685-686, 712-713, 743-744, 779-783, 790-792, 812-816, 843-848, 867-869, 877-882, 892-896, 902-904, 910-912, 919-921

Science, Technology, and Society (Nature of Science Unifying Concept B)

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.

Indicator	**Location/Page where Standard is found**
N.12.B: Students understand the impacts of science and technology in terms of costs and benefits to society.	
N.12.B.1 Students know science, technology, and society influenced one another in both positive and negative ways. E/S	162-164, 179-181, 193-195, 201-203, 233-235, 353-356, 416-418, 532-535, 560-562, 575-577, 607, 685-686, 743-744, 766-768, 812-816, 826-

	827, 902-904
N.12.B.2 Students know consumption patterns, conservation efforts, and cultural or social practices in countries have varying environmental impacts. E/S	
N.12.B.3 Students know the influence of ethics on scientific enterprise. E/S	
N.12.B.4 Students know scientific knowledge builds on previous information. E/S	15-18, 19-22, 29-32, 34, 35-37, 39-40, 54, 63-64, 82, 101-103, 152-153, 182-184, 416-418, 568-569, 608-610, 618-620, 703-704, 712-713, 919-921

Structure and Transformation of Matter

A basic understanding of matter is essential to the conceptual development of other big ideas in science. In the elementary years of conceptual development, students will be studying properties of matter and physical changes of matter at the macro level through direct observations, forming the foundation for subsequent learning. During the middle years, physical and chemical changes in matter are observed and students begin to relate these changes to the smaller constituents of matter—namely, atoms and molecules. By high school, students will be dealing with evidence from both direct and indirect observations (microscopic level and smaller) to consider theories related to change and conservation of matter. The use of models (and an understanding of their scales and limitations) is an effective means of learning about the structure of matter. Looking for patterns in properties is also critical to comparing and explaining differences in matter.

Physical Science

Indicator	**Location/Page where Standard is found**
SC-HS-1.1.1 Students will classify or make generalizations about elements from data of observed patterns in atomic structure and/or position on the periodic table.	2, 3, 6, 7, 10, 13, 19-23, 24, 26-28, 29-33, 32-34, 39, 42-44, 48-52, 54, 56, 66, 77-78, 89-91, 93, 96, 159, 196-197, 199, 250, 292, 297, 304, 356, 366, 448, 499, 595, 611, 641, 643-647, 763, 772-774, 851

SC-HS-1.1.2 Students will understand that the atom's nucleus is composed of protons and neutrons that are much more massive than electrons. When an element has atoms that differ in the number of neutrons, these atoms are called different isotopes of the element.	7-10, 15-18, 26-31, 35-39, 78, 79-85
SC-HS-1.1.3 Students will understand that solids, liquids and gases differ in the distances between molecules or atoms and therefore the energy that binds them together. In solids, the structure is nearly rigid; in liquids, molecules or atoms move around each other but do not move apart; and in gases, molecules or atoms move almost independently of each other and are relatively far apart. The behavior of gases and the relationship of the variables influencing them can be described and predicted.	410-411, 712-715, 738
SC-HS-1.1.4 Students will understand that in conducting materials, electrons flow easily; whereas, in insulating materials, they can hardly flow at all. Semiconducting materials have intermediate behavior. At low temperatures, some materials become superconductors and offer no resistance to the flow of electrons.	144-150, 204-207, 655-656
SC-HS-1.1.5 Students will explain the role of intermolecular or intramolecular interactions on the physical properties (solubility, density, polarity, conductivity, boiling/melting points) of compounds.	71-72, 147, 204-207, 210, 215, 228, 270, 310, 362-366, 428, 452-453, 555, 623, 637, 725, 71-753,759, 772-773, 808, 810, 838, 850, 851,
SC-HS-1.1.6 Students will: • identify variables that affect reaction rates; • predict effects of changes in variables (concentration, temperature, properties of reactants, surface area and catalysts) based on evidence/data from chemical reactions.	166, 266, 272, 321, 335, 341, 348, 393, 457-462, 480-481, 506, 525, 677-679, 706, 712-713, 860, 892-896
SC-HS-1.1.7 Students will: • construct diagrams to illustrate ionic or covalent bonding; • predict compound formation and bond type as either ionic or covalent (polar, nonpolar) and represent the products formed with simple chemical formulas.	68-73, 101-103, 110-113, 255-258, 361-364, 441-444, 843-848
SC-HS-1.1.8 Students will: • explain the importance of chemical reactions in a real-world context; • justify conclusions using evidence/data from chemical reactions.	101-103, 110-113, 144-146, 152-153, 157-159, 162-164, 182-184, 193-195, 201-203, 210-214, 224-230, 233-235, 241-242, 255-258, 265-269, 274-278, 287-291, 308-311, 318-320, 353-356, 369-371, 390-392, 408-410, 416-418, 433-435, 441-444, 456-460, 468-469, 477-479, 485-488, 496-497, 532-535, 568-569, 608-610, 618-622, 632-634, 641-643, 650-653, 677-679,

	685-686, 693-697, 703-704, 727-729, 766-768, 779-783, 790-792, 799-804, 812-816, 826-827, 843-848, 867-869, 877-882, 892-896, 902-904, 910-912, 919-921

Motion and Forces

Whether observing airplanes, baseballs, planets or people, the motion of all bodies is governed by the same basic rules. In the elementary years of conceptual development, students need multiple opportunities to experience, observe and describe (in words and pictures) motion, including factors (pushing and pulling) that affect motion. At the middle level, qualitative descriptions of the relationship between forces and motion will provide the foundation for quantitative applications of Newton's Laws. These ideas are more fully developed at the high school level along with the use of models to support evidence of motion in abstract or invisible phenomena such as electromagnetism..

Indicator	**Location/Page where Standard is found**
SC-HS-1.2.1 Students will: • select or construct accurate and appropriate representations for motion (visual, graphical and mathematical); • defend conclusions/explanations about the motion of objects and real-life phenomena from evidence/data.	
SC-HS-1.2.2 Students will: • explain the relationship between electricity and magnetism; • propose solutions to real life problems involving electromagnetism.	
SC-HS-1.2.3 Students will understand that the electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel.	

Energy Transformations

Energy transformations are inherent in almost every system in the universe—from tangible examples at the elementary level, such as heat production in simple earth and physical systems to more abstract ideas beginning at middle school, such as those transformations involved in the growth, dying and decay of living systems. The use of models to illustrate the often invisible and abstract notions of energy transfer will aid in conceptualization, especially as students move from the macroscopic level of observation and evidence (primarily elementary school) to the microscopic interactions at the atomic level (middle and high school levels). Students in high school expand their understanding of constancy through the study of a variety of phenomena. Conceptual understanding and application of the laws of thermodynamics connect ideas about matter with energy transformations within all living, physical and earth systems.

Unifying Concepts

Indicator	**Location/Page where Standard is found**

SC-HS-4.6.1 Students will: • explain the relationships and connections between matter, energy, living systems and the physical environment; • give examples of conservation of matter and energy.	166, 300-306, 333, 468-474, 522-529, 623, 877-889
SC-HS-4.6.2 Students will: • predict wave behavior and energy transfer; • apply knowledge of waves to real life phenomena/investigations.	35, 39-40, 43, 77, 157-161, 196, 300-306
SC-HS-4.6.3 Students will understand that electromagnetic waves, including radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, x-rays and gamma rays result when a charged object is accelerated.	35-43, 157-161, 300-306
SC-HS-4.6.4 Students will: • describe the components and reservoirs involved in biogeochemical cycles (water, nitrogen, carbon dioxide and oxygen); • explain the movement of matter and energy in biogeochemical cycles and related phenomena.	166, 471, 522-529, 532-540
SC-HS-4.6.5 Students will describe and explain the role of carbon-containing molecules and chemical reactions in energy transfer in living systems.	152-154, 162-164, 568-572, 588, 677-679, 681, 703-704, 706, 727-729, 738, 751-756, 790-795, 799-804
SC-HS-4.6.6 Students will understand that heat is the manifestation of the random motion and vibrations of atoms.	110-113,114-119, 174, 260, 274-278, 361-364, 369-371, 379-382, 401-406, 410-413, 544-550, 551-558, 712-719
SC-HS-4.6.7 Students will: • explain real world applications of energy using information/data; • evaluate explanations of mechanical systems using current scientific knowledge about energy.	159, 330-307, 318-328, 468-476, 511-531, 563, 588,
SC-HS-4.6.8 Students will: • describe the connections between the functioning of the Earth system and its sources of energy (internal and external); • predict the consequences of changes to any component of the Earth system.	
SC-HS-4.6.9 Students will: • explain the cause and effect relationship between global climate and weather patterns and energy transfer (cloud cover, location of mountain ranges, oceans); • predict the consequences of changes to the global climate and weather patterns.	
SC-HS-4.6.10 Students will: • identify the components and mechanisms of energy stored and released from food molecules (photosynthesis and respiration); • apply information to real-world situations.	568-574, 677-683, 703-708, 727-732,

SC-HS-4.6.11 Students will: • explain the difference between alpha and beta decay, fission and fusion; • identify the relationship between nuclear reactions and energy.	77-91
SC-HS-4.6.12 Students will understand that the forces that hold the nucleus together, at nuclear distances, are usually stronger than the forces that would make it fly apart	81-88