LAB-AIDS CORRELATIONS

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)
CHEMISTRY

A Natural Approach to Chemistry (NAC) is written by Hsu, Chaniotakis, Carlisle, and Damelin, and is published by, and available exclusively from, LAB-AIDS, Ronkonkoma NY. This correlation is intended to show selected locations in NAC programs that support the TEKS 2010-2011 for chemistry. It is not an exhaustive list; other locations may exist that are not listed here.

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The Natural Approach to Chemistry		
THEMES		
Energy is a unifying theme that explains why chemistry occurs		
The atomic model of matter is consistently woven through every chapter		
Understanding of 'why' chemistry occurs is emphasized		
Principles are illustrated with examples from the human body and the environment		
ORGANIZATION OF CONTENT		
Fundamentals	Chapters 1 -4	Present comprehensive overview of all main ideas in chemistry such as the atomic nature of matter, systems, temperature, and energy. *"Big Picture"*
Core Concepts	Chapters 5 -14	Present in-depth coverage of all major topic areas. They developed usable understanding of the big ideas laid out in the first four chapters. The treatment includes strong conceptual development as well as algebra-based quantitative problem solving. *All academic content and instruction standards for chemistry have been met by the end of Chapter 14.*
Applications	Chapter 15 - 21	Provide deeper exploration of significant areas of interest in chemistry. *Examples include rechargeable batteries, materials science, planetary atmospheres, etc.*
COMPLETE LEARNING SYSTEM		
Coordinated student textbook		
Integrated laboratory investigations manual containing 58 labs to choose from		
New laboratory control, data collection and probe system		
Evaluation elements throughout the curriculum (student book and lab investigation manual) through which student knowledge or skills are assessed or applied		

Correlation Citation Reference Key:

Locations are given in the student book (SB) and/or laboratory manual (LM).

SB 1.2 pp. 19-25

Means Student Book Chapter 1 Section 1.2 pages 19 – 25

LM 1A, 3D

Means Lab Investigations Manual Chapter 1 Investigation 1A;

Chapter 3 Investigation 3D

	Location in NAC	
TEKS Chemistry Descriptor	Student Book	Lab Manual
(1) Scientific processes. The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:		
(A) demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles, and fire extinguishers;		pp. xiii-xvi
(B) know specific hazards of chemical substances such as flammability, corrosiveness, and radioactivity as summarized on the Material Safety Data Sheets (MSDS); and		pp. xiii-xvi
(C) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	1.3, pp 30-31; 10.4, pp. 318-319; 18.4, pp. 598-599; 19.3, pp. 628-629	pp. xiii-xvi
(2) Scientific processes. The student uses scientific methods to solve investigative questions. The student is expected to:		
(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;	1.2, pp. 19-26	
(B) know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;	1.2, pp. 19-26	
(C) know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but may be subject to change as new areas of science and new technologies are developed;	1.2, pp. 19-26	
(D) distinguish between scientific hypotheses and scientific theories;	1.2, pp. 19-26	1A
(E) plan and implement investigative procedures, including asking questions, formulating testable hypotheses, and selecting equipment and technology, including graphing calculators, computers and probes, sufficient scientific glassware such as beakers, Erlenmeyer flasks, pipettes, graduated cylinders, volumetric flasks, safety goggles, and burettes, electronic balances, and an adequate supply of consumable		Throughout, e.g., 1C, 2A, 2C, 3A-D, 4A, 5B, 8A, 9A-C, 10B-C, 11A, 12A, 13A, 15A-D, 17B…

	Location in NAC	
TEKS Chemistry Descriptor	Student Book	Lab Manual
chemicals;		
(F) collect data and make measurements with accuracy and precision;	1.2, pp. 19-26	Throughout, e.g, 3C: 1; 4A: 2-3; 5B: 4; 5C: 3; 7A-C; 9A: 2; 9B; 12B: 5; 13A: 8; 14B: 3
(G) express and manipulate chemical quantities using scientific conventions and mathematical procedures, including dimensional analysis, scientific notation, and significant figures;	Throughout, e.g., 1.1, pp 15-18; 3.2, pp 85086; 5.4, p. 157; 9.2, p. 270-272; 9.2, p. 277; 11.1, pp. 332-338; 11.2, pp. 342-344, 13.2, pp. 418-420…	1D, 3A, 3B, 3D, 8A, 9A, 11A, 11B, 13D, Appendix C, pp. 168-172
(H) organize, analyze, evaluate, make inferences, and predict trends from data; and		2C, 3C, 4A, 5B, 9A, 9B, 13A, 14B
(I) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals, summaries, oral reports, and technology-based reports.		Throughout, e.g., 3C: 1; 4A: 2-3; 5B: 4; 5C: 3; 7A-C; 9A: 2; 9B; 12B: 5; 13A: 8; 14B: 3
(3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:		
(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;	1.2, pp. 19-26	3B: 6; 8A:3; 9B: 6; 11B: 6; 12B: 6; 13B: 4; 14A: 3…
(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;		
(C) draw inferences based on data related to promotional materials for products and services;		
(D) evaluate the impact of research on scientific thought, society, and the environment;	1.2, pp. 19-26; 1.3, pp 30-31; 10.4, pp. 318-319; 15.4, pp. 504-505; 18.4, pp. 598-599; 19.3, pp. 628-629	
(E) describe the connection between chemistry and future careers; and	1.3, pp 30-31; 8.4, pp. 254-255; 10.4, pp. 318-319; 15.4, pp.	

	Location in NAC	
TEKS Chemistry Descriptor	Student Book	Lab Manual
	504-505; 18.4, pp. 598-599; 20.5, pp. 658-659	
(F) research and describe the history of chemistry and contributions of scientists.	5.1, p. 135-136; 5.2, p. 144; 13.1, pp. 412-413; 14.2, p. 454; 15.4, p. 494	
(4) Science concepts. The student knows the characteristics of matter and can analyze the relationships between chemical and physical changes and properties. The student is expected to:		
(A) differentiate between physical and chemical changes and properties;	2.1 pp. 39-40; p. 4.1, p. 104	
(B) identify extensive and intensive properties;	2.1 pp. 39-40	
(C) compare solids, liquids, and gases in terms of compressibility, structure, shape, and volume; and	14.1, p. 442; 16.1, p. 512; 16.4, p. 525	4A, 14A, 14B, 16A, 16B
(D) classify matter as pure substances or mixtures through investigation of their properties.	2.1, p. 38; 2.3, p. 56	2A
(5) Science concepts. The student understands the historical development of the Periodic Table and can apply its predictive power. The student is expected to:		
(A) explain the use of chemical and physical properties in the historical development of the Periodic Table;	6.1, pp. 171-172	6A, 6B
(B) use the Periodic Table to identify and explain the properties of chemical families, including alkali metals, alkaline earth metals, halogens, noble gases, and transition metals; and	6.2, pp. 177-182	6A, 6B, 6C
(C) use the Periodic Table to identify and explain periodic trends, including atomic and ionic radii, electronegativity, and ionization energy.	6.1, pp. 173-174	6A, 6B, 6C
(6) Science concepts. The student knows and understands the historical development of atomic theory. The student is expected to:		
(A) understand the experimental design and conclusions used in the development of modern atomic theory, including Dalton's Postulates, Thomson's discovery of electron properties, Rutherford's nuclear atom, and Bohr's nuclear atom;	5.1, p. 135-136; 5.2, p. 144	5A
(B) understand the electromagnetic spectrum and the mathematical relationships between energy, frequency, and wavelength of light;	5.4, pp. 155-156	5B, 5C
(C) calculate the wavelength, frequency, and energy of	5.2, p. 146; 5.4, p. 157	

	Location in NAC	
TEKS Chemistry Descriptor	Student Book	Lab Manual
light using Planck's constant and the speed of light;		
(D) use isotopic composition to calculate average atomic mass of an element; and	5.1, pp. 138-139	5A
(E) express the arrangement of electrons in atoms through electron configurations and Lewis valence electron dot structures.	6.3, pp. 184-188 7.2, pp. 207-212; 7.3, pp. 214-221	7A
(7) Science concepts. The student knows how atoms form ionic, metallic, and covalent bonds. The student is expected to:		
(A) name ionic compounds containing main group or transition metals, covalent compounds, acids, and bases, using International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules;	8.1, pp. 235-236; 8.2, pp. 243-244	8B
(B) write the chemical formulas of common polyatomic ions, ionic compounds containing main group or transition metals, covalent compounds, acids, and bases;	8.1, pp. 230-234, 237-244; 13.1, p. 415	8B
(C) construct electron dot formulas to illustrate ionic and covalent bonds;	6.3, pp. 187-188; 7.2, pp. 209-215	7A
(D) describe the nature of metallic bonding and apply the theory to explain metallic properties such as thermal and electrical conductivity, malleability, and ductility; and	7.1, p. 203; 16.3, pp. 521-522	
(E) predict molecular structure for molecules with linear, trigonal planar, or tetrahedral electron pair geometries using Valence Shell Electron Pair Repulsion (VSEPR) theory.	7.3, pp. 217-221	7A, 7B
(8) Science concepts. The student can quantify the changes that occur during chemical reactions. The student is expected to:		
(A) define and use the concept of a mole;	2.1, pp. 45-46	
(B) use the mole concept to calculate the number of atoms, ions, or molecules in a sample of material;	2.2, pp 53-55	
(C) calculate percent composition and empirical and molecular formulas;	8.2, p 243; 8.4, pp. 252-253; 9.2, pp. 271-272	8A
(D) use the law of conservation of mass to write and balance chemical equations; and	4.2, pp. 114-117	
(E) perform stoichiometric calculations, including determination of mass relationships between reactants and products, calculation of limiting reagents, and percent yield.	11.2, pp. 340-342; 11.4, pp. 353-357	11A, 11B

	Location in NAC	
TEKS Chemistry Descriptor	Student Book	Lab Manual
(9) Science concepts. The student understands the principles of ideal gas behavior, kinetic molecular theory, and the conditions that influence the behavior of gases. The student is expected to:		
(A) describe and calculate the relations between volume, pressure, number of moles, and temperature for an ideal gas as described by Boyle's law, Charles' law, Avogadro's law, Dalton's law of partial pressure, and the ideal gas law;	14.2, pp. 450-456	14A
(B) perform stoichiometric calculations, including determination of mass and volume relationships between reactants and products for reactions involving gases; and	14.2, pp. 460-465	14A
(C) describe the postulates of kinetic molecular theory.	14.1, p. 442, p. 447	
(10) Science concepts. The student understands and can apply the factors that influence the behavior of solutions. The student is expected to:		
(A) describe the unique role of water in chemical and biological systems;	9.1, p. 260-265	
(B) develop and use general rules regarding solubility through investigations with aqueous solutions;	9.2, p. 270; 10.3, p. 308	10A
(C) calculate the concentration of solutions in units of molarity;	9.2, p. 272, 277	9B
(D) use molarity to calculate the dilutions of solutions;	9.2, p. 272, 277	9B
(E) distinguish between types of solutions such as electrolytes and nonelectrolytes and unsaturated, saturated, and supersaturated solutions;	9.1, p. 262, 269; 9.2, p. 273, 276	
(F) investigate factors that influence solubilities and rates of dissolution such as temperature, agitation, and surface area;	9.2, pp. 270-276	9A
(G) define acids and bases and distinguish between Arrhenius and Bronsted-Lowry definitions and predict products in acid base reactions that form water;	10.3, pp. 305-308; 13.1, pp. 412-413	13A
(H) understand and differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions;	13.4, pp. 427-428	10A, 13B
(I) define pH and use the hydrogen or hydroxide ion concentrations to calculate the pH of a solution; and	13.2, pp. 416-419	13A, 13B, 13C
(J) distinguish between degrees of dissociation for strong and weak acids and bases.	13.3, pp. 422-423	
(11) Science concepts. The student understands the energy		

	Location in NAC	
TEKS Chemistry Descriptor	Student Book	Lab Manual
changes that occur in chemical reactions. The student is expected to:		
(A) understand energy and its forms, including kinetic, potential, chemical, and thermal energies;	1.2, pp. 28-29; 3.1, p. 79	
(B) understand the law of conservation of energy and the processes of heat transfer;	3.2, pp. 80-81	3A, 3C
(C) use thermochemical equations to calculate energy changes that occur in chemical reactions and classify reactions as exothermic or endothermic;	4.2, pp. 118-119	4B
(D) perform calculations involving heat, mass, temperature change, and specific heat; and	3.2, pp. 83-86	3A, 3B, 3C, 3D
(E) use calorimetry to calculate the heat of a chemical process.	9.3, pp 280-283	9C
(12) Science concepts. The student understands the basic processes of nuclear chemistry. The student is expected to:		
(A) describe the characteristics of alpha, beta, and gamma radiation;	20.2, pp 639-641	20B
(B) describe radioactive decay process in terms of balanced nuclear equations; and	20.3, pp 642-644	
(C) compare fission and fusion reactions.	20.4, pp 652-655	