Lab-Aids Correlations for

Tennessee Academic Standards for Science:

Chemistry I

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This document is intended to show how *A Natural Approach to Chemistry, 3rd edition* materials align with the Tennessee Academic Standards for Science: Chemistry I.

ABOUT OUR PROGRAMS

Lab-Aids has based its home offices and operations in Ronkonkoma, NY, since 1963. We publish over 200 kits and core curriculum programs to support science teaching and learning, grades 6-12. All core curricula support an inquiry-driven pedagogy, with support for literacy skill development and with assessment programs that clearly show what students know and are able to do as a result of program use. All programs have extensive support for technology and feature comprehensive teacher support. For more information, please visitwww.lab-aids.com and navigate to the program of interest.

ABOUT *A NATURAL APPROACH TO CHEMISTRY*

A Natural Approach to Chemistry (NAC), written by Manos Chaniotakis, PhD, is published by, and available exclusively from, Lab-Aids, Inc., Ronkonkoma NY. Fully integrated instructional materials include a Student Book (SB), Lab Investigations Manual (LIM), Teacher Edition (TE), and a variety of materials packages.

Chapters 1-4 present a comprehensive overview of the "big picture," main ideas in chemistry, such as the atomic nature of matter, systems, temperature, and energy. Chapters 5-14 provide in-depth coverage 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. Chapters 15-21 dive deeper into significant areas of interest in chemistry related to the natural world and applications of chemistry to our daily lives.

ABOUT THE LAB-AIDS CITATIONS

Citations included in the correlation document are as follows:

Student Book: Chapter, Section. e.g. 5.1, 19.GS*, 20.CC*
Lab Investigations Manual: Investigation # e.g. 5A, E4*

*GS = Getting Started; CC = Chemistry Connections; E = Engineering investigation

This correlation is intended to show selected locations in *A Natural Approach to Chemistry, 3rd edition* student materials that support the Tennessee Academic Standards for Chemistry I. It is not an exhaustive list; other locations may exist that are not listed here.

Chemistry I: Academic Standard	*A Natural Approach to Chemistry* Student Book Chapter and Section	*A Natural Approach to Chemistry* Lab Investigations Manual Investigation #
CHEM1.PS1: Matter and Its Interactions		
1) Obtain, evaluate, and communicate information to compare historical models of the atom (from Democritus to quantum model) and construct explanations to show how scientific knowledge evolves over time based on scientific evidence.	5.1, 5.2	5A
2) Use the Periodic Table as a model to predict chemical and physical properties of main group elements (e.g. reactivity, number of subatomic particles, valence electrons, electronegativity, ion charge, ionization energy, and atomic radius) based on locations on the periodic table.	2.1, 5.1, 6.1, 6.2, 7.1, 7.2, 7.3	6A, 6B, 6C, 7A
3) Model different representations of atoms (e.g. Lewis Dot Structures, Bohr Models, electron configurations).	5.1, 5.2, 5.3, 6.2, 6.3, 7.3	5A, 7A
4) Use the periodic table and properties of elements to develop an explanation to predict the types of bonds that are formed between atoms.	4.1, 7.1, 7.2	6C, 7A
5) Evaluate the components of a substance to write the chemical name and formula using IUPAC criteria, including covalent compounds, ionic compounds, polyatomic ions, and common acids.	8.1, 8.2	2B, 8A, 8B
6) Construct and use a model to show that atoms, and therefore mass, are conserved during a chemical reaction. Symbolically represent this by balancing chemical equations.	4.2, 10.1, 10.2, 15.3,	2B, 4C
7) Perform stoichiometric calculations involving the following relationships: mole-mole; mass-mass; mole-mass; mole-particle; and mass-particle.	11.1, 11.2, 11.3, 11.4	11A, 11B
8) Use models to show a qualitative understanding of the concept of percent yield, limiting reactants, and excess reactants in a chemical reaction.	11.2, 11.3, 11.4	11A, 11B
9) Develop an explanation using the reactants in a chemical reaction to identify reaction type (i.e., synthesis, decomposition, combustion, single replacement, double replacement) and predict products.	10.3, 11.GS	4B, 4C
10) Conduct investigations and develop models to characterize the behavior of gases (e.g., pressure, volume, temperature).	14.1, 14.2,	14A, 14B
11) Develop an explanation for the behavior of gases using the Kinetic Molecular Theory and the Combined Gas Law.	14.1, 14.2	14B
12) Use the Ideal Gas Law (PV=nRT) to quantitatively evaluate the relationship among the number of moles, volume, pressure, and temperature for ideal gases.	14.2	14A

Chemistry I: Academic Standard	*A Natural Approach to Chemistry* Student Book Chapter and Section	*A Natural Approach to Chemistry* Lab Investigations Manual Investigation #
CHEM1.PS1: Matter and Its Interactions		
13) Create models of solutions to describe solutes and solvents, concentration of solutions, and the process of solvation.	2.3, 9.1	9A, 9B
14) Quantitatively analyze solutions to describe concentration using molarity, percent composition, and ppm.	9.1, 9.2	9A, 9B
15) Demonstrate separation methods such as evaporation, distillation, electrophoresis, and/or chromatography. Construct an argument to justify the use of certain separation methods under different conditions.	2.1, 3.3, 17.3, 19.GS, 19.2	17B
16) Obtain, evaluate, and communicate information to identify acids and bases as a special class of compounds due to their unique properties.	4.3, 13.1, 13.2, 13.3, 13.4	13A, 13B, 13C, 13D
17) Use models to describe radioactive stability, radioactive decay, fusion, and fission.	20.1, 20.2, 20.3, 20.4	20A, 20B
18) Develop and use models to compare alpha, beta, and gamma radiation in terms of mass, charge, and penetrating power. Identify examples of applications of different radiation types in everyday life.	20.2, 20.3, 20.4, 20.CC	20B

Chemistry I: Academic Standard	*A Natural Approach to Chemistry* Student Book Chapter and Section	*A Natural Approach to Chemistry* Lab Investigations Manual Investigation #
CHEM1.PS3: Energy		
1) Construct an explanation of thermal energy as a form of energy, and temperature as a measure of average kinetic energy of a group of particles.	1.2, 3.1, 3.2,	3A, 3B, 3C, 3D, 4A
2) Analyze and interpret data using heating/cooling curves and phase diagrams.	3.2, 3.3	3A, 3C, 3D, 4A
3) Analyze the energy changes involved in calorimetry by using the law of conservation of energy quantitatively (use of $q=mc\Delta T$) and qualitatively.	3.2, 3.3, 9.3	3A, 3B, 3C, 3D, 4A, 9C
4) Distinguish between endothermic and exothermic reactions by constructing potential energy diagrams and explaining the differences between the two using chemical terms (e.g. activation energy).	4.2, 10.4	10B, E4
5) Analyze data to explain how energy is absorbed or given off depending on the bonds formed and broken.	4.1, 4.2, 10.4	3D, 4A, 4B, E4, 9C