Lab-Aids Correlations for

NEXT GENERATION SCIENCE STANDARDS
HIGH SCHOOL LEVEL, CHEMISTRY

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This document is intended to show how *A Natural Approach to Chemistry, 3rd edition* materials align with the chemistry specific standards in the [Next Generation Science Standards].

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 visit www.lab-aids.com and navigate to the program of interest.

ABOUT *A NATURAL APPROACH TO CHEMISTRY*
A Natural Approach to Chemistry, Third Edition (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. This 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
This correlation is intended to show selected locations in *A Natural Approach to Chemistry, Third Edition* student materials that support the chemistry-specific standards found in the NGSS. It is not an exhaustive list; other locations may exist that are not listed here.

Citations included in the correlation document are as follows:

Student Book	Chapter, Section	2.1
Lab Investigations	Chapter, Investigation	6B

NGSS Performance Expectation	**Student Book** Chapter and Section	**Lab Investigations Manual** Chapter and Investigation
HS-PS1 Matter and its Interactions		
HS-PS1-1 Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	2.1, 5.2, 5.3, 6.1, 6.2, 6.3, 7.1, 7.2	6A, 6B, 6C, 7A
HS-PS1-2 Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	4.1, 6.1, 6.2, 7.2, 7.3	4C, 7A
HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.	2.2, 8.1, 8.2, 8.3, 9.1, 16.4	3B
HS-PS1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.	4.1, 12.1, 12.3	4C, 10C
HS-PS1-5 Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	12.2	12A, 12B, 12C
HS-PS1-6 Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.*	12.2, 12.3, 12.4	12A, 12B, 12C
HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	4.2, 10.1, 10.2, 10.3, 11.1, 11.2, 11.3, 11.4, 12.2	4A, 10A
HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.	20.1, 20.2, 20.3, 20.4	20B
HS-PS2 Motion and Stability: Forces and Interactions		
HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.*	8.1, 8.2, 8.3, 16.1, 16.2, 16.3, 16.4, 17.1, 17.2, 17.3	E7, E9, 16A, 16B, 17B
HS-PS3 Energy		
HS-PS3-1 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.	3.2, 10.4	3A, 3B, 9C, 10C

NGSS Performance Expectation	**Student Book** Chapter and Section	**Lab Investigations Manual** Chapter and Investigation
HS-PS3-2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects).	1.3, 3.1, 9.3	3A, 3B, 3D, 4A, 9C, 10C, 15A, 15B
HS-PS3-3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.*	9.3, 15.1, 15.4	15A, 15B, 15C
HS-PS3-4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	3.2, 3.3, 3.4, 19.1	3A, 3B
HS-PS4 Waves and their Applications in Technologies for Information Transfer		
HS-PS4-3 Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.	5.2, 5.4	
HS-ETS1 Engineering Design		
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	Supported in Lab Investigation Manual	E7, E15, E19
HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	Supported in Lab Investigation Manual	E7, E15, E19
HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.	Supported in Lab Investigation Manual	E7, E19
HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.	Supported in Lab Investigation Manual	E7