



## Active Chemistry Correlation to the Maryland Core Learning Goals

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	CH. 1	CH. 2	CH. 3	CH. 4	CH. 5	CH. 6	CH. 7	CH. 8	CH. 9	CH. 10	CH. 11

**Goal 1: Skills And Processes**  
 The student will demonstrate ways of thinking and acting inherent in the practice of science. The student will use the language and instruments of science to collect, organize, interpret, calculate, and communicate information.

**Expectation 1.1 The student will explain why curiosity, honesty, openness, and skepticism are highly regarded in science.**

solution and decisions to accept one solution over another are made on the basis of many issues.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.1.2 The student will modify or affirm scientific ideas according to accumulated evidence.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.1.3 The student will critique arguments that are based on faulty, misleading data or on the incomplete use of numbers.	X	X	X	X	X	X	X	X	X	X	X
1.1.4 The student will recognize data that are biased.	X	X	X	X	X	X	X	X	X	X	X
1.1.5 The student will explain factors that produce biased data.	X	X	X	X	X	X	X	X	X	X	X

**Expectation 1.2 The student will pose scientific questions and suggest investigative approaches to provide answers to questions.**

1.2.1 The student will identify meaningful, answerable scientific questions.	XX	X	XX	XX	XX	X	X	XX	XX	X	XX
1.2.2 The student will pose meaningful, answerable scientific questions.	XX	X	X	XX	XX	X	X	XX	X	X	XX
1.2.3 The student will formulate a working hypothesis.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.2.4 The student will test a working hypothesis.	X	X	X	X	X	X	X	XX	X	X	XX
1.2.5 The student will select appropriate instruments and materials to conduct an investigation	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.2.6 The student will identify appropriate methods for conducting an investigation, including independent and dependent variables, and affirm the need for proper controls in an experiment.	X	X	X	X	X	X	X	XX	XX	X	XX
1.2.7 The student will use relationships discovered in the lab to explain phenomena observed outside the laboratory.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.2.8 The student will defend the need for verifiable data.											

**Expectation 1.3 The student will carry out scientific investigations effectively and employ the instruments, systems of measurement, and materials of science appropriately.**



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1.3.1 The student will develop and demonstrate skills in using lab and field equipment to perform investigative techniques.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.3.2 The student will recognize safe laboratory procedures.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.3.3 The student will demonstrate safe handling of the chemicals and materials of science.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.3.4 The student will learn the use of new instruments and equipment by following instructions in a manual or from oral direction.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
<b>Expectation 1.4 The student will demonstrate that data analysis is a vital aspect of the process of scientific inquiry and communication.</b>											
1.4.1 The student will organize data appropriately using techniques such as tables, graphs, and webs (for graphs: axes labeled with appropriate quantities, appropriate units on axes, axes labeled with appropriate intervals, independent and dependent variables on correct axes, appropriate title).	XX	XX	X	X	XX	X	XX	X	X	X	X
1.4.2 The student will analyze data to make predictions, decisions, or draw conclusions.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.4.3 The student will use experimental data from various investigators to validate results.											
1.4.4 The student will determine the relationships between quantities and develop the mathematical model that describes these relationships.	XX	XX	XX	XX	XX	XX	XX	XX	X	X	XX
1.4.5 The student will check graphs to determine that they do not misrepresent results.	XX	XX			XX		XX				
1.4.6 The student will describe trends revealed by data.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.4.7 The student will determine the sources of error that limit the accuracy or precision of experimental results.					XX						XX
1.4.8 The student will use models and computer simulations to extend his/her understanding of scientific concepts.		X						X		X	
1.4.9 The student will use analyzed data to confirm, modify, or reject an hypothesis.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
<b>Expectation 1.5 The student will use appropriate methods for communicating in writing and orally the processes and results of scientific investigation.</b>											
1.5.1 The student will demonstrate the ability to summarize data (measurements/observations).	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX



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1.5.2 The student will explain scientific concepts and processes through drawing, writing, and/or oral communication.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.5.3 The student will use computers and/or graphing calculators to produce the visual materials (tables, graphs, and spreadsheets) that will be used for communicating results.				X	X		X				
1.5.4 The student will use tables, graphs, and displays to support arguments and claims in both written and oral communication.	XX	XX	XX	XX	XX	XX	XX	XX	X	X	XX
1.5.5 The student will create and/or interpret graphics. (scale drawings, photographs, digital images, etc.)	XX	XX	X	XX	XX	X	XX	XX	X	X	XX
1.5.6 The student will read a technical selection and interpret it appropriately.	XX	XX	XX	XX	XX	XX	XX	XX	XX	X	XX
1.5.7 The student will use, explain, and/or construct various classification systems.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
1.5.8 The student will describe similarities and differences when explaining concepts and/or principles.	XX	X	X	X	X	X	X	X	X	X	X
1.5.9 The student will communicate conclusions derived through a synthesis of ideas.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
<b>Expectation 1.6 The student will use mathematical processes.</b>											
1.6.1 The student will use ratio and proportion in appropriate situations to solve problems.				XX	XX						XX
1.6.2 The student will use computers and/or graphing calculators to perform calculations for tables, graphs, or spreadsheets.			XX	XX	XX		XX	X			XX
1.6.3 The student will express and/or compare small and large quantities using scientific notation and relative order of magnitude.	XX	XX	XX	XX	XX	X	X	XX	XX		XX
1.6.4 The student will manipulate quantities and/or numerical values in algebraic equations.		X	XX	XX	XX	X	XX	XX	X	X	XX
1.6.5 The student will judge the reasonableness of an answer.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
<b>Expectation 1.7 The student will show that connections exist both within the various fields of science and among science and other disciplines including mathematics, social studies, language arts, fine arts, and technology.</b>											
1.7.1 The student will apply the skills, processes, and concepts of biology, chemistry, physics, and earth science to societal issues.	X		X					X	X	X	XX
1.7.2 The student will identify and evaluate the impact of scientific ideas and/or advancements in technology on society.	X							XX			XX



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1.7.3 The student will describe the role of science in the development of literature, art, and music.			XX					X			
1.7.4 The student will recognize mathematics as an integral part of the scientific process.	X	X	X	XX	XX		X	X	X		XX
1.7.5 The student will investigate career possibilities in the various areas of science.	XX	XX	XX	X	X	X	XX	XX	X	XX	XX
1.7.6 The student will explain how development of scientific knowledge leads to the creation of new technology and how technological advances allow for additional scientific accomplishments.		X						XX	X		X
<b>Goal 2: Concepts Of Chemistry</b>											
<b>The student will demonstrate the ability to use scientific skills and processes (Core Learning Goal 1) to explain composition and interactions of matter in the world in which we live.</b>											
<b>Expectation 4.1 The student will explain how the observation of the properties of matter forms the basis for understanding its structure and changes in its structure.</b>											
4.1.1 The student will select and use appropriate devices to measure directly or indirectly the length, mass, volume, or temperature of a substance. AT LEAST: centigram balances, graduated cylinders & pipettes, metric rulers, thermometers & temperature probes	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
4.1.2 The student will gather and interpret data related to physical and chemical properties of matter such as density and percent composition. AT LEAST: constructing data tables, graphing linear relationship, appropriate technology to analyze data		X	X	XX	X		X	X			
4.1.3 The student will demonstrate how matter may be identified and classified in various ways based upon common properties. AT LEAST: states of matter, elements, compounds, mixtures, solutions, metals/nonmetals	XX	XX	X	X	XX	XX	X	XX	X	X	X
<b>Expectation 4.2 The student will explain that all matter has structure and the structure serves as the basis for the properties of and the changes in matter.</b>											
4.2.1 The student will illustrate the structure of the atom and describe the characteristics of the particles found there. AT LEAST: protons, neutrons, & electrons, nucleus	XX	X	X	X	X	XX		XX		X	



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4.2.2 The student will demonstrate that the arrangement and number of electrons determine the properties of an element and that these properties repeat in a periodic manner illustrated by their arrangement in the periodic table. AT LEAST: atomic number, mass number, valence electrons, chemical properties/families	xx	X	X	xx	X	xx		xx		xx	X
4.2.3 The student will explain how atoms interact with other atoms through the transfer and sharing of electrons in the formation of chemical bonds. AT LEAST: characteristics of a neutral atom, formation of ions, ionic bonding, covalent bonding	xx	x	X	xx	x	xx	xx	x		xx	xx
4.2.4 The student will distinguish among metallic, ionic, and covalent solids in terms of observable properties. AT LEAST: solubility, melting point, boiling point, conductivity	xx	x	xx	xx		x	x	xx		X	xx
4.2.5 The student will summarize that the properties of a molecule are determined by the number and types of atoms it contains and how they are arranged. AT LEAST: determine the types and numbers of atoms represented by a given formula, polar and nonpolar molecules	xx	xx	xx	xx	X	xx	X	X	x	xx	X
4.2.6 The student will explain why organic compounds have such diverse properties and give examples of how they have had an impact on society. AT LEAST: unique characteristics of carbon (tetrahedral structure), fuels and plastics		X	X		X	X	X	X	X	X	X
<b>Expectation 4.3 The student will analyze how the basic laws of thermodynamics apply to phase and chemical changes, and why accounting for all the energy associated with change is difficult.</b>											
4.3.1 The student will illustrate that heat energy in a material consists of the ordered and disordered motions of its colliding particles. AT LEAST: phase changes		x		xx			x				xx
4.3.2 The student will explain why the interactions among particles involve a change in the energy system. AT LEAST: exothermic change, endothermic change, specific heat		xx	x	xx		xx	xx				
4.3.3 The student will conclude that the conservation of mass and energy holds true for all systems, and that the total amount of energy in any closed system remains constant. AT LEAST: total amount of energy in any closed system remains constant			x	xx	x	xx	x	x			x



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4.3.4 The student will describe the observed changes in pressure, volume, or temperature of a sample of gas in terms of the behavior of particles. AT LEAST: matter is made of small particles, particles are in constant motion, the collisions among particles are elastic collisions		x			xx		x		xx		
<b>Expectation 4.4 The student will explain and demonstrate that matter undergoes transformations in such a way that the products have properties that are very different from those of the starting materials.</b>											
4.4.1 The student will illustrate that substances can be represented by formulas. AT LEAST: know that symbols are used to represent elements, identify the atomic mass of the element, write formulas for compounds given the name of the compound, name binary compounds given the formula, calculate the molecular weight of a compound given the periodic table	xx	xx	xx	xx	xx	xx	x	xx	xx	x	xx
4.4.2 The student will show that chemical reactions can be represented by symbolic or word equations that specify all reactants and products involved	x	x	xx	xx	xx	xx	xx	xx	xx	xx	xx
4.4.3 The student will use the law of conservation of mass and energy to balance simple equations. AT LEAST: use appropriate coefficients to balance a given symbolic equation.	x	x	xx	xx	xx	xx	x	x			xx
4.4.4 The student will classify chemical reactions into general types based on the nature of the observed changes. AT LEAST: synthesis and decomposition, combustion, single and double displacement	x	x	xx	xx	xx	xx	x	xx	x		xx
4.4.5 The student will demonstrate that adjusting quantities of reactants will affect the amounts of products formed. AT LEAST: use the coefficients of a balanced equation to predict amounts of reactants and products				x	xx	xx					xx
4.4.6 The student will describe a neutralization reaction. AT LEAST: properties of acids and bases, characteristics of weak and strong acids and bases, characteristics of salts, indicators, pH scale	x		xx			xx		x	xx	xx	xx
<b>Expectation 4.5 The student will investigate the impact of Chemistry on society.</b>											
4.5.1 The student will investigate an issue such as hazardous waste disposal, the role of food additives, and the substitution of synthetic products for natural products.	xx	x			x						xx



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4.5.2 The student will conclude that the starting materials of the chemical industry such as petroleum, are limited resources and decisions must be made about their wise consumption.											
4.5.3 The student will recognize data that are biased.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
4.5.4 The student will recognize that real problems have more than one solution and decisions to accept one solution over another are made on the basis of many issues.	X	X	XX	X	X	X	X	XX	XX	XX	XX
4.5.5 The student will use tables, graphs, and charts to display data in making arguments and claims in both written and oral communication.	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
<b>Expectation 4.6 The student will show that connections exist both within the various fields of science and among science and other disciplines including mathematics, social studies, language arts, fine arts, and technology.</b>											
4.6.1 The student will apply chemistry to the concepts of biology, physics, earth science, and environmental science.	<u>X</u>	<u>X</u>	<u>XX</u>	<u>X</u>	<u>XX</u>	<u>X</u>	<u>XX</u>	<u>XX</u>	<u>XX</u>	<u>XX</u>	<u>XX</u>
4.6.2 The student will recognize mathematics as part of the scientific endeavor, comprehend the nature of mathematical thinking, and become familiar with key mathematical ideas and skills.	<u>XX</u>	<u>XX</u>	<u>XX</u>	<u>XX</u>	<u>XX</u>	<u>X</u>	<u>XX</u>	<u>X</u>	<u>X</u>		<u>XX</u>
4.6.3 The student will investigate the role of chemistry in all areas of human endeavor and achievement.	XX	XX	XX	XX	XX	XX	XX	XX	XX	X	XX