



Alignment Document
State of Nebraska and Aventa Learning Chemistry

Chemistry
2005-2007 Benchmark Blueprint

Goals	Standards	Benchmarks	Unit Name	Course Topic Description
12.1 Unifying concepts and processes help students think about and integrate a range of basic ideas which builds an understanding of the natural world.	12.1.1 develop an understanding of systems, order, and organization.	12.1.1.A Predict and evaluate how change within a system affects that system.	Thermodynamics	Thermodynamics
		12.1.1.B Design solutions to problems identified within a system	Thermodynamics	Thermodynamics
	12.1.2 develop an understanding of evidence, models, and explanation.	12.1.2.A Create a physical, mental, or mathematical model to show how objects and processes are connected.	Solids, Liquids, and Gases Thermodynamics	Understanding Gas Laws Thermodynamics
		12.1.2.B Test the usefulness of a model by comparing its predictions to actual observations.	Covered in labs throughout the Course	
		12.1.2.C Understand that the way data are displayed affects interpretation.	Covered in labs throughout the Course	
		12.1.2.D Evaluate the reasonableness of answers to problems.	Covered in labs throughout the Course	
		12.1.2.E Understand that larger well-chosen samples produce more accurate estimates of the characteristics of the total population.		

		12.1.2.F Understand that a correlation between two variables doesn't mean that either one causes the other.		
	12.1.3 develop an understanding of change, constancy, and measurement.	12.1.3.A Use powers of ten to represent large and small numbers.	The Scientific Method	Qualitative Vs. Quantitative
		12.1.3.B Compare data for two groups by using averages and ranges of values.	Covered in labs throughout the Course	
		12.1.3.C Understand that measurement errors may affect results of calculations.	Covered in labs throughout the Course	
			The Scientific Method	Accuracy and Precision
		12.1.3.D Describe rate of change by comparing one measured quantity to another measured quantity.	Reaction Rates	Reaction Rates and Collision Theory
			Reaction Rates	Kinetics
	12.1.3.E Investigate and describe how different characteristics, properties, or relationships within a system change as their dimensions increase or decrease.		The Scientific Method	Qualitative Vs. Quantitative
			Solids, Liquids, and Gases	Understanding the Gas Laws
	12.1.4 develop an understanding of form and function.	12.1.4.A Explain function by referring to form and explain form by referring to function.		
	12.1.5 develop an understanding of change over a period of time.	12.1.5.A Identify the series of changes that occur in objects, organisms, and natural and human designed systems.	Nuclear Chemistry	Fission and Fusion
		12.1.5.B Explain how a system at equilibrium is affected by change.		
12.2 Science as inquiry requires students to combine processes and scientific knowledge with scientific reasoning and critical thinking to develop their understanding	12.2.1 develop the abilities needed to do scientific inquiry.	12.2.1.A Formulate questions and identify concepts that guide scientific investigations.	The Scientific Method	The Scientific Method
		12.2.1.B Design and conduct scientific investigations.	Covered in labs throughout the Course	

of science.		12.2.1.C Use technology and mathematics to improve investigations and communications.	Covered in labs throughout the Course	
		12.2.1.D Formulate and revise scientific explanations and models using logic and evidence.		
		12.2.1.E Recognize and analyze alternative explanations and models.		
		12.2.1.F Communicate and defend a scientific argument.	Covered in labs throughout the Course	
12.3 Physical science focuses on science facts, concepts, principles, theories, and models that are important for all students to know, understand, and use.	12.3.1 develop an understanding of the structure of the atom.	2.3.1.A Investigate and describe the structure of atoms, focusing on properties of subatomic particles.	Atoms/PeriodTable	Atom
		12.3.1.B Investigate and explain the types of nuclear reactions.	Nuclear Chemistry	Nuclear Reactions
		12.3.1.C Investigate and describe the effect of electrical and nuclear forces which hold atoms together.	Nuclear Chemistry	Nuclear Chemistry
	12.3.2 develop an understanding of the structure and properties of matter.	12.3.2.A Investigate and understand that atoms interact with one another by transferring or sharing electrons.	Ionic Compounds	Ionic and Covalent Compounds
		12.3.2.B Investigate and explain the periodic table of elements in terms of repeating patterns of physical and chemical properties.	Atoms/PeriodTable	Trends in the Periodic Table
		12.3.2.C Investigate and describe how the structure of an atom determines the chemical properties of an element.	Atoms/ PeriodTable	Atom
			Atoms/PeriodTable	Trends in the Periodic Table
		12.3.2.D Investigate and explain how the interactions among the molecules of a compound determine its physical and chemical properties.	Chemistry Fundamentals	Physical Change
	Chemistry Fundamentals	Chemical Change		
	Chemistry Fundamentals	Chemical Versus Physical Properties		

		12.3.2.D Investigate and use changes in energy to explain the differences among the states of matter.	Solids, Liquids, and Gases Solids, Liquids, and Gases Solids, Liquids, and Gases	Introduction Properties of Gases Changes of State
		12.3.2.F Investigate and describe the bonding of carbon atoms in chains and rings to produce compounds essential to life.		
12.3.3 develop an understanding of chemical reactions.		12.3.3.A Investigate and describe common chemical reactions.	Chemical Reactions	What is a Chemical Reaction?
		12.3.3.B Investigate and describe the change of energy as a result of chemical reactions.	Thermodynamics	Thermodynamics
		12.3.3.C Investigate and describe how electrons are involved in bond formation during chemical reactions.	Ionic Compounds	Ionic and Covalent Compounds
		12.3.3.D Investigate and describe the factors influencing the rates of chemical reactions, including catalysts.	Reaction Rates	Kinetics
12.3.4 develop an understanding of motions and forces.		12.3.4.A Investigate and understand the effect of forces on the motion of objects.		
		12.3.4.B Investigate and understand gravity as an attractive force that each mass exerts on any other mass.		
		12.3.4.C Investigate and understand electrical force as a force that exists between any two charged objects.		
		12.3.4.D Investigate and describe an electric field, a magnetic field, and the interaction between them.		

	12.3.5 develop an understanding of the conservation of energy and increase in disorder.	12.3.5.A Understand that the total energy in the universe is constant and can never be destroyed.	Thermodynamics	Conservation of Energy - Calorimetry
		12.3.5.B Investigate and distinguish between kinetic energy and potential energy.		
		12.3.5.C Investigate and describe heat transfer in terms of conduction, convection, and radiation.		
		12.3.5.D Investigate and give examples of how systems tend to become more disorderly over time.	Thermodynamics	Conservation of Energy - Calorimetry
	12.3.6 develop an understanding of the interactions of energy and matter.	12.3.6.A Investigate and understand that all waves possess and transfer energy.		
		12.3.6.B Understand that electromagnetic waves result when a charged object accelerates.		
		12.3.6.C Investigate and illustrate how wavelength and frequency of waves are inversely related.		
		12.3.6.D Investigate and understand that the energy of waves can be changed into other forms of energy, just as other forms of energy can be transformed into wave energy.		
	12.3.6.E Investigate and understand that atoms or molecules can be identified by spectral analysis.			
	12.3.6.F Investigate and describe how the composition and temperature of a material affect electron flow.			

<p>12.6 An understanding of science and technology establishes connections between the natural and designed world, linking science and technology.</p>	<p>12.6.1 develop an understanding of technological design.</p>	<p>12.6.1.A Propose designs and choose between alternative solutions of a problem.</p>		
		<p>12.6.1.B Implement the selected solution.</p>		
		<p>12.6.1.C Evaluate the solution and its consequences.</p>		
		<p>12.6.1.D Communicate the problem, process, and solution.</p>		
	<p>12.6.2 develop an understanding about science and technology.</p>	<p>12.6.2.A Explain how science advances with the introduction of new technology.</p>	The Scientific Method	Atom
		<p>12.6.2.B Understand creativity, imagination, and a good knowledge base are all needed to advance the work of science and engineering.</p>	The Scientific Method	Atom
		<p>12.6.2.C Contrast the reasons for the pursuit of science and the pursuit of technology.</p>		
		<p>12.6.2.D Contrast the reporting of scientific knowledge and the reporting of technical knowledge.</p>		
<p>12.7 A personal and social perspective of science helps a student to understand and act on personal and social issues. This perspective builds a foundation for future decision making.</p>	<p>12.7.1 develop an understanding of personal and community health.</p>	<p>12.7.1.A Investigate and describe the effect of nutritional balance on growth, development, and personal well-being.</p>		
		<p>12.7.1.B Investigate and explain how diseases are prevented, controlled, and cured.</p>		
		<p>12.7.1.C Investigate and explain how genetic traits affect a person's health.</p>		
		<p>12.7.1.D Investigate and analyze risks and benefits in making decisions about personal and community health.</p>		

	12.7.2 develop an understanding of the effects of population change.	12.7.2.A Investigate and identify causes of population growth or decline.		
		12.7.2.B Investigate and explain how various factors influence birth rates and death rates.		
		12.7.2.C Investigate and predict how population change may impact resource use and environments.		
	12.7.3 develop an understanding of natural resources.	12.7.3.A Investigate and explain how human populations use environmental resources to maintain and improve their existence.	Nuclear Chemistry	Fission and Fusion
		12.7.3.B Investigate and understand that the earth has renewable and finite resources.		
		12.7.3.C Investigate and understand the limitations of natural systems to renew and recycle resources.		
	12.7.4 develop an understanding of environmental quality.	12.7.4.A Investigate and describe how the positive and negative consequences of human intervention or nonintervention impact the ecosystem.	Nuclear Chemistry	Fission and Fusion
		12.7.4.B Investigate and explain factors which may influence environmental quality.	Nuclear Chemistry	Fission and Fusion
	12.7.5 develop an understanding of natural and human-induced hazards.	12.7.5.A Investigate and describe how human activities increase or reduce the potential for hazards.	Nuclear Chemistry	Fission and Fusion
		12.7.5.B Investigate and distinguish between slowly and rapidly occurring natural hazards and their impact on the environment.		

	<p>12.7.6 develop an understanding of the role of science and technology in local, national, and global challenges.</p>	<p>12.7.6.A Understand that knowledge of basic concepts about scientific and technological challenges should precede active debate.</p>		
		<p>12.7.6.B Investigate and understand that social issues and challenges may affect advancements in science and technology.</p>		
		<p>12.7.6.C Understand that science and technology are essential social enterprises that indicate what could happen, but not what should happen.</p>		
<p>12.8 The history and nature of science illustrates different aspects of scientific inquiry, the human aspects of science, and the role that science has played in the development of various cultures.</p>	<p>12.8.1 develop an understanding of science as a human endeavor.</p>	<p>12.8.1.A Demonstrate ethical scientific practices (e.g., informing research subjects about risks and benefits, humane treatment of animals, truthful reporting, public disclosure of work, and peer review).</p>		
		<p>12.8.1.B Examine and understand the societal, cultural, and personal beliefs that influence scientists</p>		
		<p>12.8.1.C Recognize science as one way of answering questions and explaining the natural world.</p>	The Scientific Method	The Scientific Method
	<p>12.8.2 develop an understanding of the nature of scientific knowledge.</p>	<p>12.8.2.A Demonstrate the use of empirical standards, logical arguments, and skepticism in science</p>		

		12.8.2.B Create scientific explanations consistent with experimental and observational evidence; make accurate predictions; strive to be logical; respect the rules of evidence; accept criticism; report methods and procedures; and make knowledge public.	Covered in labs throughout the Course	
		12.8.2.C Understand that all scientific knowledge is, in principle, subject to change as new evidence becomes available.	The Scientific Method	The Scientific Method
12.8.3 develop an understanding of the history of science.		12.8.3.A Investigate and describe the contributions of diverse cultures to scientific knowledge and technological inventions.		
		12.8.3.B Understand that changes in scientific knowledge evolve over time and almost always build on earlier knowledge.	The Scientific Method	Atom
		12.8.3.C Understand that some advancements in science and technology have long-lasting effects on society.		