

Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Science
Course ID	CASC80360	Grade Level	9, 10, 11, 12
Course Name	Honors Chemistry A	# of Credits	0.5
SCED Code	03101H0.5012	Curriculum Type	Connections Academy

COURSE DESCRIPTION

Honors Chemistry A is the first of two courses that comprise Honors Chemistry. This course consists of rigorous curriculum that provides students the opportunity to deeply explore concepts, engage in independent research, perform hands-on and virtual lab experiments, and complete interdisciplinary problem-solving activities. In addition, the course includes assessments that are differentiated from those in the standard courses. Throughout the course, the student will build on prior knowledge to learn how to model the structure of an atom, analyze the periodic table of elements, represent and interpret reactions between atoms and molecules, and perform calculations to solve problems in chemistry. The course provides many opportunities for the student to apply these concepts to real-world situations.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK
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.
HS-PS1-2.	Construct 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, and revise, as needed.
HS-PS1-3.	Plan and conduct an investigation to gather evidence to compare the structure of substances at the macroscopic scale to infer the strength of electrical forces between particles.
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.
HS-PS1-5.	Apply scientific principles and use 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.
HS-PS1-6.	Evaluate the design of a chemical system by changing conditions to produce increased amounts of products at equilibrium, and refine the design, as needed.
HS-PS1-7.	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
HS-PSI-6	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
HS-PS2-6.	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of materials.
HS-PS3-1.	Create or apply 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.
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 position of particles (objects).
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.

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES
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<p>Unit 1: Introduction to Chemistry Chemistry can help explain much of what is happening in the world around you. This branch of science is vast because it deals with the study of matter, which is present just about everywhere. In this introductory unit, you will study the different areas of chemistry, identify how chemistry affects various industries, review the steps of the scientific method, and examine the measurement system that all scientists use. You will also learn how to measure, convert, and calculate accurately to solve chemistry problems. You will repeatedly apply these math concepts throughout the course.</p>		<ul style="list-style-type: none"> •Identify the traditional areas of study in chemistry •Describe how chemistry research affects industries •Describe the scientific method •Perform accurate metric conversions •Calculate the density of a material from experimental data
<p>Unit 2: An Overview of Matter and Change Chemistry is the study of matter and the changes it undergoes. In this unit you will begin to examine the basic types of matter and the factors that may alter it. You will learn how to classify matter, review the chemical naming system of elements, describe the physical and chemical properties of different substances, and analyze chemical and physical changes of matter. You will further explore some of these concepts later in the course.</p>	HS-PS1-1, HS-PS1-2, HS-PS1-7	<ul style="list-style-type: none"> •Describe physical and chemical properties and changes •Define element, compound, and mixture •Compare different types of substances •Identify signs that indicate a chemical change has occurred
<p>Unit 3: Atoms and Elements In order to understand the composition of matter, you need to understand the structure of an atom, the smallest particle of an element that has all the characteristics of that element. In this unit you will study the composition of atoms and elements. You will examine various historic models of the atom, learn how to write an electron configuration for an atom, compare atoms of different elements, and learn how an atom becomes an ion. In addition, you will review how elements are organized in the periodic table and analyze trends in the table.</p>	HS-PS1-1, HS-PS1-2	<ul style="list-style-type: none"> •Compare historic models of the atom •Describe the structure of an atom •Define isotope •Explain how elements are organized in a periodic table •Identify information provided in the periodic table
<p>Unit 4: Chemical Bonding Atoms and molecules constantly combine to form new substances. In this unit you will learn how different types of chemical bonding occur. You will examine how atoms become charged ions; compare ionic, metallic, and covalent bonds; model how atoms combine; describe the properties of different types of compounds; and evaluate the strength of bonds. It is important that you to understand how chemical bonding occurs before you study chemical reactions.</p>	HS-PS1-1, HS-PS1-2, HS-PS1-3	<ul style="list-style-type: none"> •Describe how cations and anions form •Explain the octet rule •Compare the properties of ionic and molecular compounds •Demonstrate how electron dot structures represent ionic and molecular compounds •Evaluate the strength of ionic and covalent bonds

<p>Unit 5: Chemical Formulas and Reactions In order to understand many core chemistry concepts, you must be able represent and analyze chemical reactions. In this unit you will practice doing so as you apply rules for naming and writing chemical formulas, balance equations, compare and interpret empirical and molecular formulas, and predict the products of different types of reactions. In addition, you will learn how to convert one quantity of a substance, such as mass or volume, to another, such as moles or number of particles, and calculate percent composition of a compound.</p>	HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS1-7	<ul style="list-style-type: none"> •Describe and apply the rules for naming different types of compounds and formulas •Define and apply the laws of definite proportions and multiple proportions •Describe how to convert the mass or volume of a substance to number of particles and vice versa •Calculate the percent compositions, empirical formulas, and molecular formulas of compounds •Describe and analyze the major types of chemical reactions
<p>Unit 6: Stoichiometry In order to thoroughly understand chemical equations, you need to be able to mathematically interpret them. In this unit you will apply math concepts in order to analyze chemical equations in terms of moles, particles, mass, and volume. You will also learn how to calculate the maximum amount of product that reaction can produce.</p>	HS-PS1-1, HS-PS1-2, HS-PS1-7	<ul style="list-style-type: none"> •Describe how balanced equations apply to both chemistry and everyday life •Explain balanced chemical equations in terms of moles, representative particles, mass, and gas volume at standard temperature and pressure •Calculate stoichiometric quantities from balanced chemical equations •Identify and use the limiting reagent in a reaction to calculate the maximum amount of product(s) produced and the excess reagent that remains unreacted
<p>Unit 7: Final Review and Exam In this unit, you will have the opportunity to prepare for and take the final exam. The final exam may include any material that has been presented throughout the semester. Since this is a comprehensive exam, it may be helpful to organize your notes and answers to questions in your Science journal before you begin to review.</p>		<ul style="list-style-type: none"> •Identify strategies that you will use to prepare for your exam •Organize your time and study materials •Review your notes, answers to lesson questions and assessments, and key vocabulary terms