

# Wyoming Department of Education Required Virtual Education Course Syllabus

## BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Science
Course ID	CASC80374	Grade Level	9, 10, 11, 12
Course Name	Honors Chemistry B	# of Credits	0.5
SCED Code	03101H0.5022	Curriculum Type	Connections Academy

### COURSE DESCRIPTION

*Honors Chemistry B is the second 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 courses include assessments that are differentiated from those in the standard courses. Throughout the course the student will analyze the nature of solids, liquids, and gases, investigate the properties of solutions, describe and calculate the energies of different types of reactions, begin to explore electrochemistry, and continue to examine the fundamental concepts of nuclear and organic 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-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><b>Unit 1: Solids, Liquids, and Gases</b></p> <p>In this unit you will analyze the states of matter in terms of particles and use the kinetic theory of matter to describe the behavior of matter in each state. You will predict how temperature, volume, and the number of particles affect gas pressure, and how to quantify these effects using Boyle's, Charles's, and the combined gas laws. You will have the opportunity to perform a virtual lab to investigate the relationship between the pressure and volume of a gas. Finally, you will learn how solutions form and compare different types of solutions.</p>	<p>HS-PS1-1, HS-PS1-2, HS-PS1-3, HS-PS3-1, HS-PS3-2</p>	<ul style="list-style-type: none"> <li>• Describe the different states of matter</li> <li>• Describe phase changes in terms of energy</li> <li>• Apply the gas laws</li> <li>• Compare homogeneous and heterogeneous aqueous solutions</li> </ul>
<p><b>Unit 2: Solutions, Acids, and Bases</b></p> <p>In this unit you will continue to learn about different types of solutions as you examine some special properties of solutions and solve problems involving solubility and concentration. You will explore acids and bases as you compare acid-base theories, calculate acid and base concentrations, and describe what happens during neutralization reactions. You will have the opportunity to perform a virtual and a hands-on titration lab at the end of the unit.</p>	<p>HS-PS1-1, HS-PS1-2, HS-PS1-3</p>	<ul style="list-style-type: none"> <li>• Identify the factors that determine the rate at which a solute dissolves</li> <li>• Solve problems involving concentrations of solutions</li> <li>• Define the properties of acids and bases</li> <li>• Classify a solution as neutral, acidic, or basic</li> <li>• Use the process of titration to determine the concentration of an acid or a base</li> </ul>
<p><b>Unit 3: Heat, Energy, and Reactions</b></p> <p>In this unit you will continue to explore chemical reactions in terms of heat and energy as you learn how scientists measure the heat of a reaction and solve problems involving heat transfers in chemical reactions. You will identify factors that affect the rate of a reaction and design an experiment to test these factors. Finally, you will learn how amounts of reactants and products change in a chemical system at equilibrium and identify stresses that can change the equilibrium of a chemical reaction.</p>	<p>HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS3-2, HS-PS3-4, HS-PS1-5</p>	<ul style="list-style-type: none"> <li>• Explain how energy, heat, and work are related</li> <li>• Solve for enthalpy changes in chemical reactions</li> <li>• Design an experiment to test the factors that affect the rate of a reaction</li> <li>• Describe how the amounts of reactants and products change in a chemical system at equilibrium</li> <li>• Identify stresses that may compromise the equilibrium of a chemical reaction</li> </ul>
<p><b>Unit 4: Electrochemistry</b></p> <p>In this unit you will study electrochemistry, the branch of chemistry that deals with the relationship between electricity and chemical changes. You will examine how reactants and products gain and lose electrons, learn how to determine the oxidation number of an atom, and compare different types of electrochemical cells, which convert electrical energy into chemical energy or vice versa. In addition, you will have the opportunity to perform a virtual redox titration.</p>	<p>HS-PS1-2, HS-PS2-6</p>	<ul style="list-style-type: none"> <li>• Identify whether substances are being reduced or oxidized during a chemical reaction</li> <li>• Determine the oxidation number of an atom</li> <li>• Interpret an activity series</li> <li>• Distinguish between electrolytic and voltaic cells</li> </ul>
<p><b>Unit 5: Organic Chemistry</b></p> <p>Many everyday items, such as clothes, food, and containers, are carbon-based, or organic compounds. Throughout this unit you will classify organic compounds, model their structures, examine how they form, and identify the organic compounds that certain common products contain. In addition, you will learn about the roles that carbon plays in biochemical processes.</p>	<p>HS-PS1-1, HS-PS1-2</p>	<ul style="list-style-type: none"> <li>• Classify organic compounds</li> <li>• Construct general formulas and structures of organic compounds</li> <li>• Describe how enzymes affect biochemical reactions</li> <li>• Identify some common plastics and their uses</li> </ul>

<p><b>Unit 6: Nuclear Chemistry</b></p> <p>Although nuclear materials are fairly common, most people do not know exactly what they are or what makes them both beneficial and dangerous. In this unit, you will explore different types and uses of radioactivity and analyze the various changes that nuclear particles may undergo. Also, you will learn how nuclear waste is stored and how scientists detect radiation.</p>	<p>HS-PSI-6</p>	<ul style="list-style-type: none"> <li>• Describe the three types of nuclear radiation</li> <li>• Solve problems involving nuclear decay</li> <li>• Compare fission and fusion reactions</li> <li>• Identify devices that are used to detect radiation</li> <li>• Identify different uses of radiation</li> </ul>
<p><b>Unit 7: Final Review and Exam</b></p> <p>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"> <li>• Identify strategies that you will use to prepare for your exam</li> <li>• Organize your time and study materials</li> <li>• Review your notes, answers to lesson questions and assessments, and key vocabulary terms</li> </ul>