

Honors Chemistry

Instructor:

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Prerequisite: Successful completion Honors Biology and enrollment in Algebra 2 or higher
2 semesters, 1 credit

This college preparatory course introduces the students to the basic concepts of chemistry. This course prepares students for science courses at the university level and is aimed at students wishing to major in the sciences or engineering. Topics covered include atomic structure, nuclear chemistry, formula writing, stoichiometry, gas laws, solution chemistry, thermochemistry, equilibrium and oxidation-reduction reactions. Labs will include practicing proper techniques and analyzing data by providing students with the opportunity to actively investigate scientific problems. Participants will also learn how to write lab reports, conduct basic research, and explore the scientific process.

Graduation Standards (the number of the standard is referenced in the performance indicators listed in each unit):

1-PHYSICAL SCIENCES: STRUCTURE, PROPERTIES AND INTERACTIONS OF MATTER: Understand and analyze matter, reactions, and physical systems.

8- Engineering, Technology, and Application of Science Demonstrate engineering concepts across multiple disciplines and novel situations. (HS-ETS1)

- 8A. Ask questions/ define problems.
- 8B. Develop and use models.
- 8C. Plan and carry out investigations.
- 8D. Analyze and interpret data.
- 8E. Use mathematical and computational reasoning.
- 8F. Construct explanations/ design solutions.
- 8G. Engage in Argument from evidence.
- 8H. Obtain, evaluate, and communicate information

Unit 1	Matter and Change
Summary	The main ideas covered in this chapter include: chemistry is the study of matter and its processes, atoms are the building blocks of matter, all substances have characteristic properties and how matter is classified. The periodic table organizes elements by their chemical properties and elements can be classified as metals, nonmetals or metalloids.
Performance Indicators Assessed in Unit	1-A. Understand various patterns of the periodic table and use knowledge of these patterns to predict chemical and physical properties. 8- (A-H) Engineering, Technology, and Application of Science Practices
Unit 2	Measurements and Calculations

Summary	In the chapter the following skills are reviewed and learned: using scientific notation, counting, rounding and using significant figures and applying accuracy and precision to measurements.
Performance Indicators Assessed in Unit	8- (A-H) Engineering, Technology, and Application of Science Practices
Unit 3	The Atom
Summary	This chapter covers the history of the atom, structure of the atom, the mol and how we count atoms.
Performance Indicators Assessed in Unit	1-A. Understand various patterns of the periodic table and use knowledge of these patterns to predict chemical and physical properties. 8- (A-H) Engineering, Technology, and Application of Science Practices
Unit 4	Nuclear Chemistry
Summary	This chapter focuses on the nucleus of the atom and the changes it undergoes. Concepts of half-life, nuclear decay, various forms of radioactivity, fission and fusion are covered.
Performance Indicators Assessed in Unit	1-F. Model nuclear processes in which an atomic nucleus changes including radioactive decay, fission, and fusion. 8- (A-H) Engineering, Technology, and Application of Science Practices
Unit 5	The Arrangement of Electrons in Atoms and Patterns of the Periodic Table
Summary	This unit explores the arrangement of electrons in the atom and how this affects the properties of substances. Electron configurations and how it relates to the organization of the periodic table and periodic properties are also explored.
Performance Indicators Assessed in Unit	1-A. Understand various patterns of the periodic table and use knowledge of these patterns to predict chemical and physical properties. 8- (A-H) Engineering, Technology, and Application of Science Practices
Unit 6	Introduction to Chemical Bonding
Summary	This unit explores concepts of ionic covalent and metallic bonding. Lewis structures and VSEPR theory are also covered.
Performance Indicators Assessed in Unit	1-A. Understand various patterns of the periodic table and use knowledge of these patterns to predict chemical and physical properties. 1-B. Understand that chemical and physical properties of matter result from the atoms and their interactions. 8- (A-H) Engineering, Technology, and Application of Science Practices
Unit 7	Chemical Compounds and Formulas
Summary	This unit covers formula writing, nomenclature and language of chemistry. Calculations from formulas are also covered.

Performance Indicators Assessed in Unit	<p>1-A. Understand various patterns of the periodic table and use knowledge of these patterns to predict chemical and physical properties.</p> <p>1-B. Understand that chemical and physical properties of matter result from the atoms and their interactions.</p> <p>8- (A-H) Engineering, Technology, and Application of Science Practices</p>
Unit 8	Types of Chemical Reactions
Summary	This unit covers balancing equations and the classification of chemical reactions.
Performance Indicators Assessed in Unit	<p>1-B. Understand that chemical and physical properties of matter result from the atoms and their interactions.</p> <p>1-C. Understand and apply the Law of Conservation of Mass.</p> <p>8- (A-H) Engineering, Technology, and Application of Science Practices</p>
Unit 9	Stoichiometry
Summary	This unit covers the mass relationships between reactants and products in chemical reactions
Performance Indicators Assessed in Unit	<p>1-C. Understand and apply the Law of Conservation of Mass.</p> <p>8- (A-H) Engineering, Technology, and Application of Science Practices</p>
Unit 10	The Gas Laws and States of Matter
Summary	This unit covers kinetic molecular theory and the Gas Laws
Performance Indicators Assessed in Unit	<p>D. Demonstrate that the kinetic molecular theory describes the motion of atoms and molecules, explains the properties of gases, and determines reaction rate.</p> <p>8- (A-H) Engineering, Technology, and Application of Science Practices</p>
Unit 11	Solution Chemistry and pH
Summary	This unit covers the basics of solution chemistry and principle of PH
Performance Indicators Assessed in Unit	<p>1-B. Understand that chemical and physical properties of matter result from the atoms and their interactions.</p> <p>8- (A-H) Engineering, Technology, and Application of Science Practices</p>

Unit 12	Thermochemistry
Summary	This unit covers the basics of thermochemistry including manipulation of thermochemical equations and Hess's Law
Performance Indicators Assessed in Unit	1-B. Understand that chemical and physical properties of matter result from the atoms and their interactions. 8- (A-H) Engineering, Technology, and Application of Science Practices
Unit 13	Equilibrium
Summary	This unit covers the basics of equilibrium including application of Lechatilier's Principle and writing equilibrium expressions
Performance Indicators Assessed in Unit	1-J. Model chemical equilibrium as a dynamic process at the molecular level. 8- (A-H) Engineering, Technology, and Application of Science Practices