Chemistry

Course Overview
Students will study matter and the changes it undergoes, learning about atomic theory, chemical bonding, chemical reactions, intermolecular forces, and reaction thermodynamics.

Adopted Materials
Chemistry Scales

First Semester	Second Semester
Unit 1: Matter/Measurement	Unit 5: Stoichiometry
Unit 2: Atoms and the Periodic Table	Unit 6: Solution Chemistry
Unit 3: Forces of Attraction	Unit 7: Conceptual Equilibrium and Reaction Rates
Unit 4: Chemical Reactions	Unit 8: Energy
	Unit 9: Gas Laws

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Unit 1.1 Matter/Measurement (Particle Arrangement)
Unit Learning Intentions 1.1
● I am learning how particles move and are arranged in solids, liquids, and gases.
Unit Priority Standards: No State Standards

Unit 1.2 Matter/Measurement (Classification of Matter)
Unit Learning Intentions 1.2
● I am learning how to classify different types of matter (elements, compounds, and mixtures) based on the types of particles they contain and how they are arranged.
Unit Priority Standards: No State Standards

Unit 1.3 Matter/Measurement (Chemistry Math)
Unit Learning Intentions 1.3
● I am learning how to apply ratios and proportions to calculate relationships between chemical quantities and use unit conversions and dimensional analysis to solve chemistry problems accurately.
Unit Priority Standards: No State Standards

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Unit 2.1 Atoms and the Periodic Table (Atomic Theory and Atoms)
Unit Learning Intentions
● I am learning how atomic theory explains the structure of atoms and how to represent atoms and isotopes using models, numbers, and diagrams.
Unit Priority Standards: ● **HS-PSC-1.2** Use the periodic table as a model to predict the relative properties of elements based on patterns of electrons in the outermost energy level of atoms. ● **HS-PSC-1.4** 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 the various modes of radioactive decay.

Unit 2.2 Atoms and the Periodic Table (Nuclear Reactions)
Unit Learning Intentions
● I am learning how nuclear reactions, like radioactive decay, release or absorb energy.
Unit Priority Standards: ● **HS-PSC-1.2** Use the periodic table as a model to predict the relative properties of elements based on patterns of electrons in the outermost energy level of atoms. ● **HS-PSC-1.4** 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 the various modes of radioactive decay.

Unit 2.3 Atoms and the Periodic Table (Periodic Table Trends)
Unit Learning Intentions
● I am learning how the attractive and repulsive forces of subatomic particles influence periodic trends.
Unit Priority Standards: ● **HS-PSC-1.2** Use the periodic table as a model to predict the relative properties of elements based on patterns of electrons in the outermost energy level of atoms. ● **HS-PSC-1.4** 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 the various modes of radioactive decay.

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Unit 3.1 Forces of Attraction (Bonding)
Unit Learning Intentions
● I am learning how atoms bond to form different types of compounds and how these bonds affect the properties of substances.
Unit Priority Standards: ● **HS-PSC-1.1** Develop models to describe the atomic composition of simple molecules and extended structures. ● **HS-PSC-1.3** Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

Unit 3.2 Forces of Attraction (Modeling of Molecules and IMF's)
Unit Learning Intentions
● I am learning to create models of molecules to show how molecules interact in 3D space and how attractive forces hold them together.
Unit Priority Standards: ● **HS-PSC-1.1** Develop models to describe the atomic composition of simple molecules and extended structures. ● **HS-PSC-1.3** Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

Unit 4.1 Chemical Reactions (Writing and Balancing Chemical Reactions)
Unit Learning Intentions 4.1
● I am learning how to write and balance chemical equations to show what happens in a reaction.
Unit Priority Standards:

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- **HS-PSC-2.1:** Construct and revise 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.

Unit 4.2
Chemical Reactions
(Types of Chemical Reactions)

Unit Learning Intentions

- I am learning to identify different types of chemical reactions and use patterns to predict the products of chemical reactions.

Unit Priority Standards:

- **HS-PSC-2.1:** Construct and revise 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.

Unit 5.1
Stoichiometry
(Moles)

Unit Learning Intentions

- I am learning about moles and how to use them to measure and convert between mass, moles, and particles.

Unit Priority Standards:

- **HS-PSC-2.4:** Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

Unit 5.2
Stoichiometry
(Stoichiometry)

Unit Learning Intentions

- I am learning how to use stoichiometry to calculate the amounts of reactants and products in a chemical reaction.

Unit Priority Standards:

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● **HS-PSC-2.4:** Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

Unit 6.1 **Solution Chemistry** **(Solutions/Concentration)**
Unit Learning Intentions
● I am learning how solutions form, what affects how substances dissolve, and how to calculate and change their concentration
Unit Priority Standards: Use knowledge of solutions and/or acid and base chemistry to determine the concentration of an unknown solution.

Unit 6.2 **Solution Chemistry** **(Acids/Bases/pH)**
Unit Learning Intentions
● I am learning about the properties of acids and bases and how pH is connected to hydrogen ion concentration.
Unit Priority Standards: Use knowledge of solutions and/or acid and base chemistry to determine the concentration of an unknown solution.

Unit 7.1 **Chemical Equilibrium and Reaction Rates** **(Speed of Chemical Reactions)**
Unit Learning Intentions
● I am learning what affects the speed of chemical reactions.
Unit Priority Standards:

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- **HS-PSC-2.3:** Apply scientific principles and 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.

Unit 7.2
Conceptual Equilibrium and Reaction Rates
(Reverse Reactions with Equilibrium)

Unit Learning Intentions

- I am learning how equilibrium works in reversible reactions.

Unit Priority Standards:
HS-PSC-2.3: Apply scientific principles and 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.

Unit 8.1
Energy
(Energy Input/Output)

Unit Learning Intentions

- I am learning how energy is absorbed or released in reactions.

Unit Priority Standards:
- **HS-PSC-2.2**: 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-PSC-3.2**: Create 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.

Unit Supporting Standards:
- **HS-PSC-3.5**: Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics)

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Unit 8.2 Energy (Heat Curves and Calorimetry)
Unit Learning Intentions
● I am learning how to calculate energy changes using heat capacity and calorimetry.
Unit Priority Standards: ● **HS-PSC-2.2**: 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-PSC-3.2**: Create 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. **Unit Supporting Standards:** ● **HS-PSC-3.5**: Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics)

Unit 9.1 Gas Laws (Gas Laws)
Unit Learning Intentions
● I am learning how gases behave and how gas laws explain the relationships between pressure, volume, temperature, and the amount of gas.
Unit Priority Standards: ● **HS-PSC-3.3:** 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).

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Unit 9.2 Gas Laws (Calculating Gas Relationships and Ideal Gas Law)
Unit Learning Intentions
● I am learning how to use gas laws to calculate the relationships between pressure, volume, temperature, and the amount of gas, including how the ideal gas law applies to real-world situations.
Unit Priority Standards: ● **HS-PSC-3.3:** 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).

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