

CURRICULUM

GUIDE

Chemistry

Providence
Schools

QUARTER I

Content students have to learn

Processes students will learn and use

Unit 1.1 – Chemical and Physical Properties (14 days)

- Understand that chemical and physical properties can be used to identify and classify substances.
- Collect appropriate data that can be used to distinguish two or more substances.
- Understand that intermolecular forces are unique to a substance and are responsible for the substance's chemical and physical properties.
- Understand that energy is involved in chemical and physical changes.

- » Plan and implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and make measurements with precision.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
- » Organize, analyze, evaluate, make inferences, and predict trends from any data source.
- » Communicate valid conclusions supported by data.

Unit 1.2 – Atomic Structure and Theory (10 days)

- Understand how advancements in technology allow scientists to discover and explain the structure of an atom.
- Identify elements based on their atomic structure.
- Understand how the mass of an atom can change.
- Understand the significance of each discovery that led to modern atomic theory.

- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
- » Organize, analyze, evaluate, make inferences, and predict trends from any data source.
- » Communicate valid conclusions supported by data.

Unit 1.3 – Nuclear Chemistry (10 days)

- Understand how alpha and beta decay can change an element.
- Explain the half-life of isotopes and how they are used to date materials.
- Express alpha, beta, and gamma decay in a nuclear equation.
- Distinguish between fission and fusion in nuclear reactions.

- » Implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
- » Organize, analyze, evaluate, make inferences, and predict trends from any data source.
- » Communicate valid conclusions supported by data.

QUARTER 2

Content students have to learn

Processes students will learn and use

Unit 2.1 – The Periodic Table (10 days)

- Understand the general arrangement of the periodic table.
- Relate chemical groups to properties and valence electrons.
- Use the periodic table to find information about a given element and make predictions about that element's properties.

- » Plan and implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and make measurements with precision.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
- » Organize, analyze, evaluate, make inferences, and predict trends from any data source.
- » Communicate valid conclusions supported by data.

Unit 2.2 – Periodic Trends (6 days)

- Understand general periodic trends both horizontally and vertically within the periodic table.
- Predict reactivity of an element based on its placement within the periodic table.
- Explain the arrangement of the modern periodic table.

- » Implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and make measurements with precision.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
- » Communicate valid conclusions supported by data.

Unit 2.3 – Electron Configuration (12 days)

- Understand how electrons are arranged in the energy levels around the nucleus.
- Understand how an atom's electron configuration represents the energy of the electrons.
- Use ionization energy data to confirm electron configurations.

- » Plan and implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and make measurements with precision.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
- » Communicate valid conclusions supported by data.

Unit 2.4 – Chemical Bonding (16 days)

- Understand how electron configurations of atoms can be used to determine the oxidation state of the element.
- Understand how electron (Lewis) dot structures can be used to determine the correct chemical formulas for basic compounds.
- Understand the scientific conventions for writing chemical formulas and naming compounds.
- Understand how the chemical bonds within a compound cause chemical forces to occur between individual particles.
- Use electron configuration to predict the type of bond that would exist between two or more atoms.

- » Plan and implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and make measurements with precision.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
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QUARTER 3

Content students have to learn

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Unit 3.1 – Writing Simple Chemical Equations (10 days)

- Understand that matter and energy are conserved in a chemical change.
- Determine that patterns exist in chemical equations and use these patterns to predict products from the reaction.
- Understand that, for a chemical reaction to occur, reactants must be present in specific proportions.

- » Implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and make measurements with precision.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
- » Organize, analyze, evaluate, make inferences, and predict trends from any data source.
- » Communicate valid conclusions supported by data.

Unit 3.2 – Stoichiometry of Chemical Reactions (11 days)

- Understand and apply the mole theory to basic stoichiometric calculations.
- Determine the molar quantities of reactants and products for simple reactions, including acid–base reactions.

- » Implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and make measurements with precision.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
- » Organize, analyze, evaluate, make inferences, and predict trends from any data source.
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Unit 3.3 – Chemical Reactions (9 days)

- Understand that patterns exist and enable us to predict the products from chemical reactions.
- Understand how the solubility rules and reactivity series can be used to predict the nature of the products in chemical reactions.
- Understand there is a driving force that determines if chemical reactions will take place.
- Understand that chemical reactions are reversible.

- » Implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and make measurements with precision.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
- » Organize, analyze, evaluate, make inferences, and predict trends from any data source.
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QUARTER 4

Content students have to learn

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Unit 4.1 – Gas Laws (13 days)

- Understand that the physical properties of a gaseous substance can be altered by external conditions.
- Understand the mathematical relationships in the gas laws (Boyle's, Charles's, Avogadro's, combined gas law, and ideal gas law).
- Understand Graham's law of effusion, Dalton's law of partial pressure, and the kinetic theory of gases.
- Apply gas laws and stoichiometry to chemical equations that use or produce gas.

- » Implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and make measurements with precision.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
- » Organize, analyze, evaluate, make inferences, and predict trends from any data source.
- » Communicate valid conclusions supported by data.

Unit 4.2 – Energy and Chemical Reactions (19 days)

- Collect data with a calorimeter to describe heat lost or gained.
- Describe the relationship between the energy in the bonds of reactants and products of a chemical reaction.
- Use Hess's Law to determine if a reaction is exothermic or endothermic.
- Understand that the energy of a reaction is determined by the reactants and products.

- » Implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and make measurements with precision.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
- » Organize, analyze, evaluate, make inferences, and predict trends from any data source.
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Unit 4.3 – Chemistry and the Changing Earth (12 days)

- Understand how heat energy drives the rock cycle and the formation of different types of rocks.
- Describe how the crustal plates move and the results of these movements.
- Understand the processes that change the earth's crust and describe them in terms of physical or chemical changes.
- Explain conservation of mass in terms of earth processes.

- » Implement investigative procedures.
- » Apply appropriate safety measures in the classroom and laboratory.
- » Collect data and make measurements with precision.
- » Express and manipulate chemical quantities using scientific conventions and mathematical procedures.
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