2023-2024
Jackson County Schools
9-12 Chemistry Pacing Guide

1st Quarter

Measurement, Conversions, and Lab Safety

***Focus Standard 4** - Proficiency Scale (APlus)
Plan and conduct an investigation to classify properties of matter as intensive (e.g., density, viscosity, specific heat, melting point, boiling point) or extensive (e.g., mass, volume, heat) and demonstrate how intensive properties can be used to identify a compound.

ASIM:
- ➔ Density of a Liquid
- ➔ Thickness of Aluminum Foil
- ➔ Intensive and Extensive Properties
- ➔ Extraction and Identification of Dyes (Kool-Aid)
- ➔ Flame Test
- ➔ Specific Heat
- ➔ Melting Points

Atomic Structure and the Periodic Table

***Focus Standard 1**
Obtain and communicate information from historical experiments (e.g., work by Mendeleev and Moseley, Rutherford's gold foil experiment, Thomson's cathode ray experiment, Millikan's oil drop experiment, Bohr's interpretation of bright line spectra) to determine the structure and function of an atom and to analyze the patterns represented in the periodic table.

***Focus Standard 2**
Develop and use models of atomic nuclei to explain why the abundance-weighted average of isotopes of an element yields the published atomic mass.

***Focus Standard 3a** - Proficiency Scale(AMSTI) Proficiency Scale (APlus) (1,2,3a)
Analyze data such as physical properties to explain periodic trends of the elements, including metal/nonmetal/metalloid behavior, electrical/heat conductivity, electronegativity and electron affinity, ionization energy, and atomic-covalent/ionic radii, and how they relate to position in the periodic table.

ASIM:
- ➔ History of the Atomic Theory
- ➔ Excited Electrons
- ➔ Coinium Isotopes of Atoms
- ➔ Flame Tests
- ➔ Calculating Average Atomic Mass
- ➔ Periodic Trends

Bonding, IMFs, and Molecular Geometry

***Focus Standard 3b** - Proficiency Scale (AMSTI)
Develop and use models (e.g., Lewis dot, 3-D ball-and-stick, space-filling, valence-shell electron-pair repulsion [VSEPR]) to predict the type of bonding and shape of simple compounds.

***Focus Standard 9** - Proficiency Scale (AMSTI) Proficiency Scale (APlus)
Analyze and interpret data (e.g., melting point, boiling point, solubility, phase-change diagrams) to compare the strength of intermolecular forces and how these forces affect physical properties and changes.

ASIM:
- ➔ Bond Types and Physical Properties
- ➔ Covalent Bonding and Lewis Structures
- ➔ Molecular Shape and Polarity

Writing Component - Narrative
Topic of your choice

Additional Resources:
AMSTI Learning Resources
ACT Sample Questions
3a Assessment Sets (AMSTI)
9 Assessment Sets (AMSTI)

2nd Quarter

Nomenclature and the Mole

***Focus Standard 3c** - **Proficiency Scale (AMSTI)**
Use the periodic table as a model to derive formulas and names of ionic and covalent compounds.

***Focus Standard 5**
Plan and conduct investigations to demonstrate different types of simple chemical reactions based on valence electron arrangements of the reactants and determine the quantity of products and reactants.

Standard 5a - Use mathematics and computational thinking to represent the ratio of reactants and products in terms of masses, molecules, and moles.

Standard 5b - Use mathematics and computational thinking to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. **Proficiency Scale (AMSTI)** **Proficiency Scale (APlus)**

ASIM:
- ➔ Chemicool People
- ➔ It's In The Cards
- ➔ Chemical Nomenclature
- ➔ Tortoise Island
- ➔ Mole Concept
- ➔ Chemical Changes
- ➔ Chemical Reactions
- ➔ Empirical Formulas
- ➔ Color of Chemistry
- ➔ Aluminum Leftovers
- ➔ Aspirin Synthesis
- ➔ Mass and Mole Relationships in Reactions
- ➔ Using Stoichiometry to Identify the Products of a Reaction
- ➔ Acid Titrations
- ➔ Ideal Gas Law and Molar Volume

Writing Component - Descriptive
Topic of your choice

Additional Resources:
AMSTI Learning Resources
ACT Sample Questions
3c Assessment Sets (AMSTI)
5 Assessment Set (AMSTI)
5a Assessment Set (AMSTI)
5b Assessment Set (AMSTI)

3rd Quarter

Chemical Reactions and Stoichiometry

***Focus Standard 5**
Plan and conduct investigations to demonstrate different types of simple chemical reactions based on valence electron arrangements of the reactants and determine the quantity of products and reactants.

Standard 5a - Use mathematics and computational thinking to represent the ratio of reactants and products in terms of masses, molecules, and moles.

Standard 5b - Use mathematics and computational thinking to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. **Proficiency Scale (AMSTI)** **Proficiency Scale (APlus)**

ASIM:

- ➔ Mole Concept
- ➔ Chemical Changes
- ➔ Chemical Reactions
- ➔ Empirical Formulas
- ➔ Color of Chemistry
- ➔ Aluminum Leftovers
- ➔ Aspirin Synthesis
- ➔ Mass and Mole Relationships in Reactions
- ➔ Using Stoichiometry to Identify the Products of a Reaction
- ➔ Acid Titrations
- ➔ Ideal Gas Law and Molar Volume

States of Matter and Gas Laws

***Focus Standard 7**
Plan and carry out investigations to explain the behavior of ideal gases in terms of pressure, volume, temperature, and number of particles.

Standard 7a - Use mathematics to describe the relationships among pressure, temperature, and volume of an enclosed gas when only the amount of gas is constant.

Standard 7b - Use mathematical and computational thinking based on the ideal gas law to determine molar quantities.

***Focus Standard 10**
Plan and conduct experiments that demonstrate how changes in a system validate the kinetic molecular theory.

Standard 10a - Develop a model to explain the relationship between the average kinetic energy of the particles in a substance and the temperature of the substance (e.g., no kinetic energy equaling absolute zero [0K or -273.15oC]).
Proficiency Scale (AMSTI) **Proficiency Scale (APlus) (7,10)**

ASIM:

- ➔ Calcium Carbonate Decomposition AP
- ➔ Boyle's Law
- ➔ Ideal Gas Law and Molar Volume
- ➔ Temperature - Pressure Relationship of Gases
- ➔ Kinetic Molecular Theory
- ➔ Energy Changes in Simple Distillation
- ➔ Evaporation and Intermolecular Forces

Writing Component - Expository
Topic of your choice

Additional Resources:
AMSTI Learning Resources
ACT Sample Questions
5 Assessment Set (AMSTI)
5a Assessment Set (AMSTI)
5b Assessment Set (AMSTI)

4th Quarter

Solutions

***Focus Standard 6** - **Proficiency Scale (APlus)**
Use mathematics and computational thinking to express the concentrations of solutions quantitatively using molarity.

Standard 6a - Develop and use models to explain how solutes are dissolved in solvents.
Standard 6b - Analyze and interpret data to explain effects of temperature on the solubility of solid, liquid, and gaseous solutes in a solvent and the effects of pressure on the solubility of gaseous solutes.
Standard 6c - Design and conduct experiments to test the conductivity of common ionic and covalent substances in a solution.

ASIM:
- ➔ Temperature and Solubility
- ➔ Conducting Solutions
- ➔ Determining the Concentration of a Solution
- ➔ Spectroscopy

Acids, Bases, and Buffers

***Focus Standard 6d** - Use the concept of pH as a model to predict the relative properties of strong, weak, concentrated, and dilute acids and bases (e.g., Arrhenius and Brønsted-Lowry acids and bases). **Proficiency Scale (APlus)**

ASIM:
- ➔ Acid Ionization
- ➔ Acid Titrations

Factors Affecting Chemical Systems

***Focus Standard 8 - Proficiency Scale (AMSTI)**
Refine the design of a given chemical system to illustrate how LeChâtelier's principle affects a dynamic chemical equilibrium when subjected to an outside stress (e.g., heating and cooling a saturated sugar- water solution).

***Focus Standard 11 - Proficiency Scale (AMSTI)**
Construct an explanation that describes how the release or absorption of energy from a system depends upon changes in the components of the system.

Standard 11a - Develop a model to illustrate how the changes in total bond energy determine whether a chemical reaction is endothermic or exothermic.
Standard 11b - Plan and conduct an investigation that demonstrates the transfer of thermal energy in a closed system (e.g., using heat capacities of two components of differing temperatures). **Proficiency Scale (APlus) (8,11)**

ASIM:
- ➔ Chemical Equilibrium
- ➔ Modeling Reversible Reactions and Determining "K"
- ➔ Endothermic and Exothermic Reactions
- ➔ Energy Content of Food
- ➔ Hess's Law
- ➔ Particle Collisions and Activation Energy
- ➔ Excited electrons
- ➔ Energy Changes in Simple Distillation
- ➔ Elephant Toothpaste
- ➔ Specific Heat

Writing Component - Persuasive
Topic of your choice

Additional Resources:
AMSTI Learning Resources
ACT Sample Questions
8 Assessment Set (AMSTI)