

Helena-West Helena School District
Physical Science
Unit 1: Matter and Interaction

Enduring Understanding:

- How do science concepts apply to your/our world?
- How can one explain the structure, properties and interaction of matter?
- How do particles combine to form the variety of matter to observe?
- Energy can not be created or destroyed.
- What types of interactions will create matter?

Essential Questions(s):

- Why are elements and compounds classified as pure substances?
- How do mixtures differ from pure substances?
- What is the main difference among solutions, suspension and colloids?
- What are some examples of physical properties?
- How can knowing the physical properties of matter be used?
- What processes are used to separate mixtures?
- When can chemical properties be observed?
- What observations might indicate that a chemical change has occurred?
- What is the difference between chemical and physical changes?
- What causes gas pressure in a closed container?
- What factors affect gas pressure?
- How are the temperature, volume and pressure?
- What contributions did Thomson and Rutherford make to the development of atomic theory?
- What are three subatomic particles?
- What properties can be used to compare protons, electrons, and neutrons?
- How are atoms of one element different from the atoms of other elements?
- What is the difference between two isotopes of the same element?
- What can happen to electrons when atoms gain or lose energy?
- What model do scientists use to describe how electrons behave in atoms?
- What is the most stable configuration of electrons in an atom?

Time Frame/Concepts & Content: 9-WEEKS

Chapter 2: Properties of Matter

Lesson 2.1: Classifying Matter

Lesson 2.2: Physical Properties

Lesson 2.3: Chemical Properties

Chapter 3: States of Matter

Lesson 3.1: Solids, Liquids, and Gases

Lesson 3.2: The Gas Laws

Lesson 3.3: Phases Changes

Chapter 4: Atomic Structure

Lesson 4.1: Studying Atoms

Lesson 4.2: The Structure of an Atom

Lesson 4.3: Modern Atomic Theory

Student Learning Expectations: Students will and be able to :

- Classify pure substances as elements or compounds.
- Describe the characteristics of an element and the symbols used to identify elements.
- Describe the characteristics of a compound.
- Distinguish pure substances from mixtures.
- Classify mixture as heterogeneous or homogeneous.
- Classify mixture as solution, suspensions, or colloids.
- Describe physical properties of matter.
- Identify substances based on their physical properties.
- Describe how properties are used to choose materials.
- Describe methods used to separate mixtures
- Describe evidence that indicates a physical change is taking place.
- Describe chemical properties of matter.
- Describe clues that indicate that a chemical change is taking place.
- Distinguish chemical changes from physical changes.
- Explain the behavior of gases, liquids, and solids, using kinetic theory.
- Define pressure and gas pressure.
- Identify factors that affect gas pressure.
- Predict changes in gas pressure due to change in temperature, volume, and number of particles.
- Explain Charles's law, Boyle's law and the combined gas law.
- Apply gas laws to solve problems involving gases.
- Describe phase changes.
- Explain how temperature can be used to recognize a phase change.
- Describe each of the six phase changes.
- Identify phase change as endothermic or exothermic.
- Describe ancient Greek models of matter.
- List the main points of Dalton's atomic theory and describe his evidence for the existence of atoms.
- Explain how Thomson and Rutherford used data from experiments to produce their atomic models.
- Identify three subatomic particles and compare their properties.

- Distinguish the atomic number of elements from the mass of an isotope, and use the numbers to describe the structure of atoms.
- Describe Bohr's model of the atom and the evidence for energy levels.
- Explain how the electrons cloud model represents the behavior and location of electrons in atoms.
- Distinguish the ground state from excited states of an atom based on electron configurations.

Standards:

Major:

PSI-PS2-6: Communicate scientific and technical information about why the molecular- level structure is important in the functioning of designed materials.

PSI-PS1-3: 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.

PSI-PS1-4: Develop a model to illustrate that the release of absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

PSI-PS1-7: Use mathematical representation to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

PSI-PS1-1: Use 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.

PSI-PS1-2: 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 patterns of chemical properties.

Supporting: Recurring

HS-ETS1-1: Analyze major global challenges to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2: Evaluate competing design solutions using a systemic process to determine how well they meet the criteria and constraints of the problems.

HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade- offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

HS-ETS1-4: Use a computer simulation to model the impact of proposed solutions to complex real-world problems with numerous criteria and constraints of interactions within and between systems relevant to the problem.

Key Terminology:

Chapter 2: Properties of Matter

Lesson 2.1: pure substance, element, atom, compound, heterogenous mixture, homogenous mixture, solution, suspension, colloid

Lesson 2.2: physical properties, viscosity, conductivity, malleability, melting point, boiling point, filtration, distillation, physical change

Lesson 2.3: chemical properties, flammability, reactivity, chemical change, precipitate

Chapter 3: States of Matter

Lesson 3.1: solid, liquid, gas, kinetic energy

Lesson 3.2: pressure, absolute zero, Charles's law, Boyle's law

Lesson 3.3. phase change, endothermic, heat of fusion, exothermic, vaporization, heat of vaporization, evaporation, vapor pressure, condensation, sublimation, deposition

Chapter 4: Atomic Structure

Lesson 4.1: nucleus

Lesson 4.2: protons, electron, neutron, atomic number, mass number, isotopes

Lesson 4.3: energy levels, electron cloud, orbital, electron configuration, ground state.

Activities & Assessments:

Quick writes, Exit tickets, Lab analysis, Graphs, Data Presentations, Card Sort(Vocabulary), Digital Lab notebook, Quizlet, QRC Codes, Lesson Quiz, Scientific Investigations, Teacher/Student Models, Student Response Questions, Concept Map(Vocabulary)

See attachment in physical science folder

Materials and Resources:

Lesson plan, Textbook, Videos, Chart paper, Paper, pencils, pens, coloring pencils, Science-Consortium, [Discovery Channel](#) Interactive Science Journal for students, Science News, [Kahoots](#), [QRC Codes](#) Edpuzzle.com, [On-line Virtual Labs](#), [PHet](#), [The Physics classroom.com](#), Labster, [chemcollective.org](#), [openstax.org](#), [Periodic Table](#), [Khan Academy](#), Apex,