

Grade & Course: 9-12 Chemistry	Topic: Matter	Duration: 4 weeks
<p>Georgia Standards and Content:</p> <p>SC1. Obtain, evaluate, and communicate information about the use of the modern atomic theory and periodic law to explain the characteristics of atoms and elements.</p> <p>a. Evaluate merits and limitations of different models of the atom in relation to relative size, charge, and position of protons, neutrons, and electrons in the atom.</p> <p>c. Construct an explanation based on scientific evidence of the production of elements heavier than hydrogen by nuclear fusion.</p> <p>SC2. Obtain, evaluate, and communicate information about the chemical and physical properties of matter resulting from the ability of atoms to form bonds.</p> <p>a. Plan and carry out an investigation to gather evidence to compare the physical and chemical properties at the macroscopic scale to infer the strength of intermolecular and intramolecular forces.</p> <p>b. Construct an argument by applying principles of inter- and intra-molecular forces to identify substances based on chemical and physical properties.</p>		
<p>Narrative / Background Information</p>		
<p>Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)</p> <p>S8P1. Obtain, evaluate, and communicate information about the structure and properties of matter.</p> <p>a. Develop and use a model to compare and contrast pure substances (elements and compounds) and mixtures.</p> <p>b. Develop and use models to describe the movement of particles in solids, liquids, gases, and plasma states when thermal energy is added or removed.</p> <p>c. Plan and carry out investigations to compare and contrast chemical (i.e., reactivity, combustibility) and physical (i.e., density, melting point, boiling point) properties of matter.</p> <p>d. Construct an argument based on observational evidence to support the claim that when a change in a substance occurs, it can be classified as either chemical or physical.</p>		
<p>Year-Long Anchoring Phenomena: (LEARNING PROCESS)</p> <p>Changes to the measurement of chemicals added to Flint Michigan’s water supply created dangerous levels of lead contamination in the drinking water.</p>		
<p>Unit Phenomena (LEARNING PROCESS)</p> <p>The atomic theory led to amazing scientific breakthroughs in areas of modern chemistry to nuclear energy. It has influenced daily life, culture, science and societal change.</p>		
<p>MYP Inquiry Statement:</p> <p>Chemistry is the study of the composition, structure, and properties of matter.</p>		
<p>MYP Global Context:</p> <p>Scientific and Technical Innovation (Systems, models, methods, products, processes and solutions)</p>		
<p>Approaches to Learning Skills:</p> <p>Ask Questions and Define Problems Developing and Using Models Engaging in Argument from evidence Research Skills Thinking Skills Collaboration Skills Communication Skills Research Skills</p>	<p>Disciplinary Core Ideas: (KNOWLEDGE & SKILLS)</p> <p>Atomic Structure Relative Atomic Mass Composition Stoichiometry Types of Matter Intensive & Extensive Properties Chemical & Physical Properties/Changes</p>	<p>Crosscutting Concepts: (KNOWLEDGE & SKILLS)</p> <p>Energy and Matter Structure and Function Scale, Proportion, and Quantity</p> <p>MYP Key and Related Concepts:</p> <p>Key Concept: Change Related Change: Form & Models</p>

Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)

Simple physical transformations (such as dissolution) are not grasped as reversible.

Matter has no permanent aspect. When matter disappears from sight (e.g. when sugar dissolves in water) it ceases to exist.

Materials can only exhibit properties of one state of matter.

Particles possess the same properties as the materials they compose. For example, atoms of copper are “orange and shiny,” gas molecules are transparent, and solid molecules are hard.

Weight is not an intrinsic property of matter. The existence of weightless matter can be accepted.

Density is not an intrinsic property of matter.

Key Vocabulary: (KNOWLEDGE & SKILLS)

Law of Conservation of Matter

Chemical & Physical Property

Chemical & Physical Change

Element/Atom

Pure Substance vs Mixtures

Homogeneous Mixture

Heterogeneous Mixture

Compound

Solution

Colloid

Mole

Molecules

Mass

Density

Extensive & Intensive Property

Chemical & Physical Separation

Proton, Electron, Neutron

Isotope

Ion

Inquiry Questions:

Factual - What subatomic particles are in the molecular composition of all matter?

What is the difference between an ion and isotope?

What does a mole measurement represent in chemistry?

Conceptual - How do the structure and properties of matter affect density?

How did elements originate?

MYP Objectives	Summative assessment	
Sciences Sciences Design Design	Assessment Task: Criterion D Scientific Essay - Students will answer 1 of the following writing prompts: How does the Law of Conservation of Matter assist current scientists in technological advancements? What implications does the Law of Conservation of Matter have for humans?	Relationship between summative assessment task(s) and statement of inquiry: All matter has a specific chemical composition that when altered will change the identity of the substance. The chemical composition of the substance determines the physical and chemical properties of the substance.
Unit Objectives:		

Learning Activities and Experiences	Inquiry & Obtain: (LEARNING PROCESS)	Evaluate: (LEARNING PROCESS)	Communicate: (LEARNING PROCESS)
Week 1:	<p>Phenomenon Substances with similar physical appearances behave differently under chemical reactions.</p> <p>Gathering Types of Matter POGIL Physical and Chemical Changes POGIL Activity Extensive vs. Intensive Simulation Properties of Matter Physical and Chemical Properties Virtual Lab Separation Activity</p>	Formative Assessment #1 - Socratic Quiz	Group Presentations on "How chemists determine if a chemical change occurred - Chemical Indicators" CER - Density
Week 2:	<p>Phenomenon The atomic number which is equal to the number of protons is unique to a specific element on the Periodic Table. No other substance on Earth can have the same number of protons.</p> <p>Gathering Atomic Structure/Model POGIL Calculating subatomic particles with ions and isotopes Activity Nuclear Fusion Activity</p>	Formative Assessment # 2 - Schoology AMP	Atomic model Presentations Nuclear Fusion Multimedia Presentations

	Calculating with the Mole Introduction Activity Review Formative Assessment #1 with Instructor		
Week 3:	<p>Phenomenon One atomic mass unit is defined to be 1/12 of the mass of a carbon-12 atom.</p>	Summative Assessment - Schoology AMP	Criterion D - Essay Highlights

Gathering

Calculating with the Mole
Activity II
Relative Atomic Mass
Simulation
Review Formative
Assessment # 2 with
Instructor

Resources (hyperlink to model lessons and/or resources):

Discovery Education Science Techbook
Physical and Chemical Changes POGIL Extensive vs. Intensive Properties Online Activity
Physical and Chemical Properties Virtual Simulation
Atomic Structure POGIL
Relative Atomic Mass Simulation
Molar Mass Activity
Mole Carnival
Carbon dioxide triple point video Sugar and sulfur video
Ivory soap video

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit