<u>Unit Plan</u>

Title: Matter and Chemistry

Unit Summary:

Students will be studying different physical properties of matter, comparing and contrasting mass, volume, density, and learning about the atomic structure of elements and atoms. They will also learn about the similarities and differences between physical and chemical changes.

Critical Questions:

- 1. What are the physical properties we use to measure things? (notes)
- 2. What is matter?
- 3. What is mass? Give an example of how you measure for mass.
- 4. What is the volume of an object? Give an example of how you can measure volume.
- 5. What unit of measurement do we use for weight?
- 6. Calculate your weight on the moon.
- 7. What is density? What is the formula for calculating density of an object. (notes)
- 8. What is the density of water? Explain whether or not an object will sink or float.
- 9. How dense are solids, liquids, and gases?
- 10.Looking at the chart on p.297, list the common substances' densities of the six substances.
- 11. What determines if an object sinks or floats?
- 12.Explain what bouyancy is.
- 13. What does it mean when materials conduct? Give two examples.
- 14. What does it mean when materials insulate? Give two examples.

Topic 2, What Matter is Made Of

- 1. What are elements?
- 2. Know how to read the periodic table of elements. (notes)
- 3. What is a compound? Give an example.
- 4. What are chemical formulas? Give three examples of compounds and their chemical formula.

- 5. What are atoms?
- 6. What are the protons?
- 7. What are the neutrons?
- 8. What are the electrons?
- 9. What is the nucleus?
- 10. What determines what element it is?
- 11.Be able to draw an atom of an element.
- 12. What does it mean when we say something is reactive?
- 13. What is the melting and boiling temperatures of elements?
- 14. What is the difference between metals and nonmetals?
- 15. What are molecules?

Topic 3, Solids, Liquids, and Gases

- 1. What are the states of matter?
- 2. How can you change a substance from one state to another state of matter?
- 3. What happens to the molecules when heat is added?
- 4. What happens to the molecules when heat is taken away?
- 5. What is the melting point?
- 6. What is the boiling point?
- 7. What is the freezing point?
- 8. How could the melting point and freezing point be the same temperature?
- 9. What is it called when a liquid changes to a gas?
- 10. How do evaporation and boiling differ?
- 11. Why does a liquid remain at the same temperature when it boils?
- 12.Based on the pictures on p.330, what form are solids, liquids, and gases.
- 13.Explain when a substance expands. Give three examples.
- 14. Explain when a substance contracts. Give three examples.

Ohio Standards Connections:

Matter: Chemical Reactions

1. Explain how equal volumes of matter usually have different masses.

- 2. Describe during a chemical change, a new substance is formed with different chemical and physical properties than the original substance (rusting, burning, etc.).
- 3. Describe during a physical change, no new substance is formed. The chemical properties stay the same, only the physical properties change (size, shape, state of matter, etc.).
- 4. Describe and identify all of the different physical changes and chemical changes in our lives.
- 5. Describe the effects of different forces on objects of different masses.
- 6. Identify information about the periodic table of elements
- 7. Diagram an atom of an element using the periodic table of elements
- 8. Describe various atomic models throughout history (electron cloud, Bohr's model, etc.)
- 9. compare and contrast elements, mixtures, and compounds
- 10. Describe states of matter and model their molecular structure
- 11. Measure the pH of acids and bases
- 12. Compare and contrast acids, bases, and salts
- 13. compare and contrast solutions, saturated solutions, and suspensions

Assessment/Ongoing, post, summative

Pre-unit assessment, post unit assessment, group project (authentic assessment), quarterly assessment

Differentiated Instruction Support for all learners:

Students will have many different exposures to the material. There will be group discussions, videos, class discussions, chapter reading and answering of questions, group activities, etc.

Key Vocabulary:

SCIENTIFIC CONTENT

- acidic/acids and basic/bases (salts and neutrals are optional)
 - o pH scale
 - indicators (e.g., bromothymol blue/BTB, red and blue litmus paper, phenolthalien, etc.)
 - o neutralization
- activation energy (enrichment)
- atoms and molecules
 - \circ electrons
 - o neutrons
 - o nucleus
 - \circ protons
- atom diagrams
- atomic models throughout history
 - Bohr model
 - \circ electron cloud model
 - o etc.
- characteristics
- chemical
- chemical bonds (enrichment, taught at ninth grade)
 - \circ covalent
 - \circ double
 - ionic bonds/ions
 - hydrogen ions
 - hydroxide ions
 - polyatomic ion
- chemical change
- chemical equations/formulas (enrichment, taught at ninth grade)
 - \circ coefficients
 - \circ products
 - o reactants
 - o subscripts
- chemical processes
- conservation of energy, mass and matter
- elements and molecular compounds
- energy, potential and kinetic

- \circ chemical
- o nuclear
- \circ thermal
- energy flow/transformation for a physical or chemical change
- gravity (related to weight)
- mass versus weight
- matter
- measuring matter
 - o mass versus weight
 - \circ density
 - \circ volume
 - o length
- nonpolar and polar (enrichment, taught at ninth grade)
- particle/particles
- Periodic Table of Elements
 - \circ atomic mass
 - o atomic number
 - chemical symbols for elements (at least, common elements)
 - metal or nonmetal
 - \circ name of the element
 - o number of protons and neutrons
 - o etc.
- physical and chemical properties
 - boiling point
 - \circ color
 - o density
 - \circ conduction/insulation
 - o crystal shape
 - freezing point
 - o malleability
 - melting point
 - o shape
 - o size
 - o texture
 - viscosity
 - \circ etc.
- physical and chemical change, characteristics of
 - o physical
 - observable change in size
 - observable change in shape
 - change in state of matter
 - does not produce or become a new substance
 - do not involve permanent changes in properties of a material
 - \circ chemical
 - difficult to reverse
 - often give off heat on their own

- result in permanent changes in the properties of a material
- physical and chemical changes
 - o physical
 - evaporation
 - condensation
 - freezing
 - melting
 - solidification (e.g., molten steel solidifying, etc.)
 - sublimation
 - etc.
 - o chemical
 - rusting
 - burning
 - combustion
 - corrosive/corrosion
 - fermentation
 - oxidation
 - tarnishing
 - etc.
- physical and chemical changes, everyday examples of
 - \circ body chemistry
 - \circ cooking
 - \circ industrial change
 - o etc.
- reactions, rates of
 - \circ catalysts
 - enzymes (enrichment)
 - inhibitors (enrichment)
 - o etc.
- reactions, types of chemical (enrichment, taught at ninth grade)
 - endothermic
 - \circ exothermic
 - o synthesis
 - o decomposition
 - replacement reaction
 - o etc.
- safety
- \circ fire safety
- o gloves
- o goggles
- o identifying unknown powders, chemicals, etc.
- wafting for smelling
- o etc.
- senses for observations
- solutions and mixtures
 - concentrated solution (optional)

- \circ concentration (optional)
- dilute solution (optional)
- \circ dissolve
- \circ saturated solution
- solute (optional)
- solvent (optional)
- unsaturated solution
- o solubility
- \circ etc.
- states of matter
 - o gas
 - o liquid
 - o plasma
 - o solid
- substance
- suspensions (optional)