Unit 1: Building Blocks of Matter

Chemistry Learning Objectives

1. Provide experimental evidence that air is not an element.
   - I can define "element."
   - I can provide experimental evidence for air being a mixture primarily of oxygen (~20%) and nitrogen (~80%).
   - I can sketch and describe Lavoisier's mercury experiment.

2. Differentiate between chemical changes and physical changes.
   - Given a description of how properties change, I can identify the change as chemical or physical.
   - I can describe a mixture as formed by a physical change and a compound as formed by a chemical change.

3. Provide experimental evidence that water is not an element.
   - I can sketch a setup of Lavoisier's water and rifle barrel experiment.
   - I can describe how water can be broken down into simpler parts.
   - I can explain how water is formed from "inflammable air" (we call it hydrogen) and oxygen.

4. Differentiate between elements, compounds, mixtures, and pure substances
   - Given a description of a substance, I can categorize it as an element, compound, mixture, and/or pure substance.
   - I can label a substance as either homogeneous or heterogeneous.

5. Understand how scientific notation and significant figures affect math operations.
   - I can multiply, divide, and round numbers using scientific notation and the correct number of significant figures.
   - Note: you will be exposed to adding and subtracting numbers in significant figures, but you will not need to know adding and subtracting for the test.

6. Convert between units of measure.
   - I can use the prefixes nano, micro, milli, centi, and kilo along with standard metric base units to perform metric conversions.
   - I can use dimensional analysis to perform unit conversions.

7. Use differences in density of materials as evidence for differences in the structure of matter.
   - I can define mass as the amount of "stuff" or particles and contrast it with volume.
   - I can recognize that density is a characteristic property of matter (i.e., it can be used to help identify an unknown substance).
   - On a graph of mass vs. volume, I can relate the slope of the line to the density of the substance.
   - I can measure the mass and volume of an object and then use the equation $D = m/V$ to find the density. I can rearrange the density equation to solve for mass or volume.