

**Chemistry** Day 010

**Major Topic:** Classification of Matter

**Reading:** Ch. 3.1 through 3.4

**Focus:** Students will be able to: **12PS#1, 12SWK#1,3**

- define, correctly use, and differentiate among the terms and concepts of mass, elements, compounds, mixtures (heterogeneous & homogeneous), substances
- differentiate between & give examples of physical & chemical properties, intensive & extensive properties
- differentiate between & give examples of physical & chemical changes

**Materials:**

- Webquest to illustrate the different types of matter.
- Molecular models to demonstrate the difference between atoms, molecules, mixtures
- elements: Fe, Al, Si, Au, S
- compounds: sucrose,  $\text{NaHCO}_3$ , water, sulfuric acid
- homogeneous mixtures: sucrose in water, brass weight, vinegar
- physical changes: candle wax, paper
- chemical changes: Lycopodium powder & Bunsen burner, Mg ribbon, Zn &  $\text{I}_2$ , electrolysis setup
- $\frac{1}{2}$  page in-class WS (Matter: Properties & Changes)
- Classification of Matter handout
- HW WS: Matter
- 2 Lab Procedures: % of Sn in Solder, Separation of a Mixture

**Procedure**

1. Central questions: What is matter & how is it classified? Best done with a **concept map**.
2. Define matter - anything w/ mass & volume.
  - a. Mass - how much stuff is in an object or sample. Already decided that mass is constant for a given object. Doesn't change w/ gravity, temperature, etc.
3. Varieties of matter - What pigeonholes or classifications can we put different kinds of matter in?
  - a. Elements - All the particles (atoms) in it are of the same type (**use molecular models**).
    - i. All of the atoms behave the same way in the same situations (called physical and chemical properties).
    - ii. All **elements** are on the periodic table - surefire method of knowing!
    - iii. **Pass around samples if S. want to see them.**
  - b. Compounds - The particles here are molecules, made up of 2 or more atoms, of different or same types. Use molecular models.
    - i. All the molecules have the same set of physical & chemical properties, but they can be broken down into their elements by chemical or physical means. **Demo electrolysis of water and/or dehydration of sugar by  $\text{H}_2\text{SO}_4$** .
    - ii. Further, the properties of a compound are different than the properties of the elements that make it up. e.g. sugar is C, H, O.
    - iii. Have S. name some common compounds: NaCl,  $\text{H}_2\text{O}$ ,  $\text{CO}_2$ , sugar, etc.
    - iv. Elements & compounds are called **substances**.
    - v. **Law of Definite Proportions or Constant Composition** - The elements in a compound are combined in fixed ratios. Different ratio = different compound! We can express these ratios as masses (100 g NaCl has 39.3 g of Na and 60.7 g of Cl), or in moles (the ratio of Na to Cl is 1:1).
  - c. Mixtures - The particles here are of different types (**Mix models together.**) More than 1 type of element or compound in a mixture. **Sugar water, brass, air!**
    - i. The different particles (both elements & compounds) have different properties (they keep their own original properties.)
    - ii. Because they have different properties, the components of a mixture can be separated by physical and chemical means. Let's take two mixtures: Kool-Aid, and sand mixed in with salt. Who can think of a way of separating the different components of these two mixtures? **Demo: sugar water.**
    - iii. Because a mixture just has different stuff mixed together, it's composition isn't fixed. You can mix Jell-O with different amounts of water: less and you get Jigglers, more = regular Jell-O