

# Bell Work, May 7 – May 10, 2018

## Unit 4: (Describing Substances)

Mixtures, Pure Substances, Elements, Compounds, Atoms, Separation of the Components of a Mixture, Filtration, Distillation, Avogadro's Hypothesis, Law of Definite Proportions, Law of Multiple Proportions.



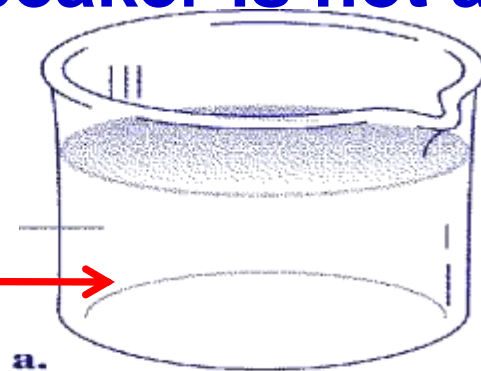
## Draw the beakers.

1. Identify the homogeneous mixture(s)
2. Identify the heterogeneous mixture(s)
3. Identify which beaker is not a mixture?

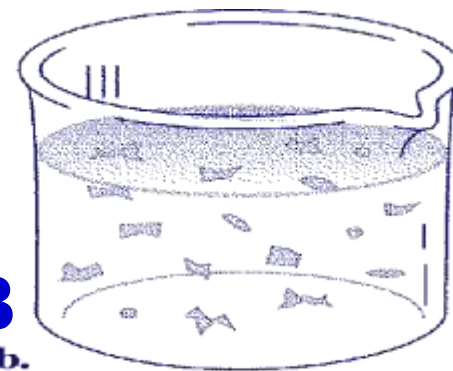
Objectives: Sketch particle diagrams that distinguish compounds, elements and mixtures, and types of mixtures.

**Salt  
water  
solution**

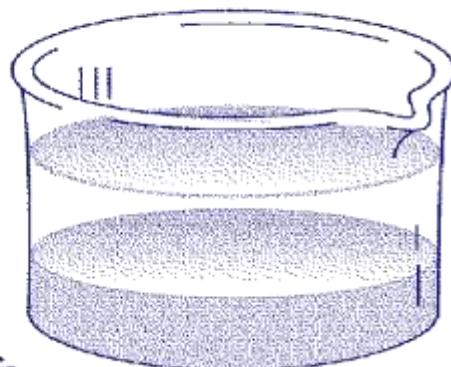
**A**



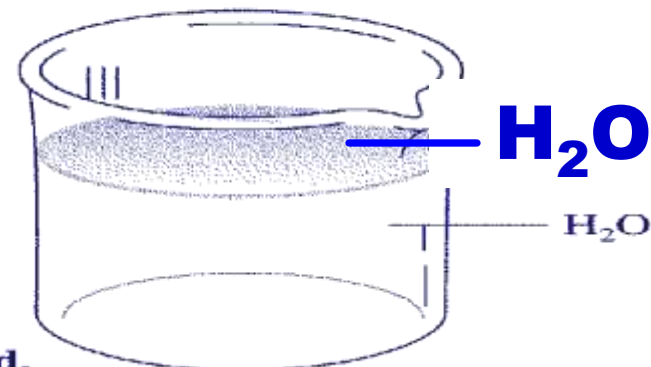
**B**



**C**



**D**



**1. A is Homogeneous mixture**

**3. D: Not a mixture (it is a pure substance, just water)**

Salt  
Water

**A**  
a.

**B**  
b.

**2. B & C are heterogeneous**

**C**  
c.

**D**  
d.

H<sub>2</sub>O

4. Homogeneous matter can be classified as a mixture or a pure substances.

5. A pure substance can be classified as an element or a compound.

6. Elements are composed of only one kind of atom.

Elements can not be broken in to simpler substances by chemical or physical changes.

7. An atom is the smallest unit of an element that maintains its chemical properties and physical properties.

8. Compounds are composed of two or more different types of elements and can be broken down to elements.

9. Explain why a magnet can separate iron atoms from the sulfur mixture but not from the compound iron sulfide.

- Pure substances such as the iron retain their properties in a mixture.
- When the iron reacts with another substance the resulting compound has different properties than the reactants (iron & sulfur).

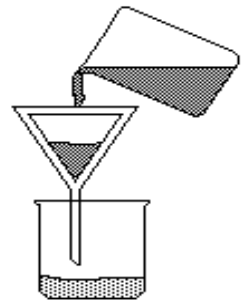


# Bell Work, Tuesday, May 8, 2018 (4 ques.)

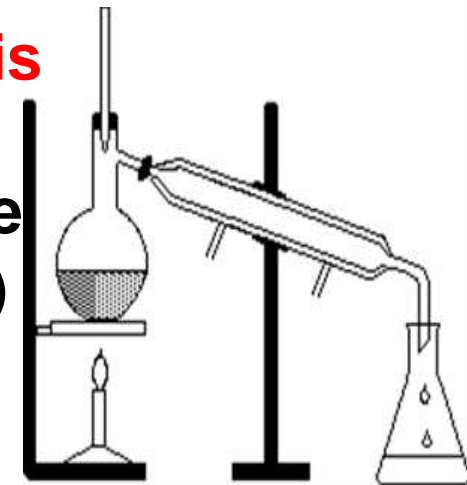


**Objective: Describe how one could use differences in characteristic properties to separate the components of a mixture.**

**1. See Unit 4 worksheet 1 problem 1. What is the name of these two processes? What is each used for? What property makes the separation process possible? Give an example of each.**



- a. The process on the right is distillation. It is used to separate mixtures of miscible liquids such as water & alcohol. (Miscible means the liquids mix & do not separate.)**
- Differences in boiling point property allows the mixture to be separated.**



**b. The process on the left is called filtration.**

- It is used to separate a solid from a liquid (sand & water), or a dissolved solid such as salt, from sand.**
- Differences in solubility property allows the mixture to be separated.**

# Bell Work, Tuesday, May 8, 2018



**Objective:** Describe how one could use differences in characteristic properties to separate the components of a mixture.

**2. When sample X is passed through a filter paper, a tan solid, Y, remains on the paper and a clear liquid, Z, passes through. When liquid Z is vaporized (all liquid is boiled off) a white powder remains. Sample X is best classified as**

- a. a mixture
- b. a gas
- c. a compound
- d. an element

**3. In problem 1 Sand and salt are mixed together , then water is added. What is the identity of X, Y & Z ? What is the white powder?**

**X is a mixture of sand, salt and water.**

**Y is sand. Because Y is insoluble (does not dissolve) it does not pass through the filter.**

**Z is salt water and the white powder is salt.**

**4. Explain soluble and solubility.**

**Solubility and soluble are properties referring to the ability for a given solute to dissolve in a solvent. Insoluble means cannot dissolve.**

1. The composition of this substance is variable; its physical properties depend on the composition.
  - a. pure substance
  - b. element
  - c. compound
  - d. mixture
2. A material that has a definite ratio and can be represented by a chemical formula is
  - a. an element.
  - b. a mixture.
  - c. a homogeneous solution.
  - d. a pure substance.
3. Name the two types of pure substances.

**Elements and compounds.**

4. A substance made from only one type of atom is

**An element**

5. A substance that is made of at least two different types of atoms or elements and is chemically combined is a

**Compound.**



**Objective: State features of Dalton's model of the atom.**

**6. Describe the four main concepts of Dalton's Atomic Theory**

- a. All matter is composed of indivisible, indestructible particles called atoms.**
- b. All atoms of a given element are identical; atoms of different elements have different properties.**
- c. Chemical reactions involve the combination of atoms (forming compounds), not the destruction of atoms.**

This was an extremely advanced concept for its time; while Dalton's theory implied that atoms bonded together, it would be more than 100 years before scientists began to explain the concept of chemical bonding.

- d. When elements react to form compounds, they react in defined, whole-number ratios.**





## 1. State the Law of Multiple Proportions.

Whenever the same two elements form more than one compound, the different masses of one element that combine with the same mass of the other element are in the ratio of small whole numbers.

This means that chemical formulas always have small whole number ratios. Example: Water is  $\text{H}_2\text{O}$  and never  $\text{H}_{2.5}\text{O}$  or  $\text{H}_{1/4}\text{O}$

2. The elements hydrogen and oxygen can form the compounds water ( $\text{H}_2\text{O}$ ) and hydrogen peroxide ( $\text{H}_2\text{O}_2$ ). What law does this illustrate? **Law of Multiple Proportions**

## 3. State the Law of Definite Proportions.

Compounds are made up of elements in fixed ratios.

Example: Water is  $\text{H}_2\text{O}$ : 2 hydrogens for every 1 oxygen

Chemical formulas always have small whole number ratios.

Example: Water is  $\text{H}_2\text{O}$  and never  $\text{H}_{2.5}\text{O}$  or  $\text{H}_{1/4}\text{O}$

4. A compound consists of two or more elements in a fixed mass ratio (100 g water is always 11g hydrogen & 89g oxygen or 11% H & 89% Oxygen). **Law of Definite Proportions**

What law does this illustrate?

5. The elements hydrogen and oxygen can form the compounds water ( $\text{H}_2\text{O}$ ) and hydrogen peroxide ( $\text{H}_2\text{O}_2$ ). What law does this illustrate? **Law of Multiple Proportions**

6. State Avogadro's hypothesis.

- Equal volumes of gases contain the same number of particles at the same pressure and temperature.
- Some pure elemental gases are clustered into pairs to form diatomic molecules
- A diatomic element is made up of two of same atom. Example:  $\text{H}_2$ ,  $\text{O}_2$