

### Chapter 3 Topics

- Identify the characteristics of a pure substance.
- Distinguish between physical and chemical properties.
- Distinguish between intensive and extensive properties.
- Differentiate between the physical states of matter.
- Define physical change and recognize several common changes.
- Define chemical change and recognize indications that a chemical change has occurred.
- Recognize & state some common indications of chemical change.
- Explain the difference between physical and chemical changes.
- Explain the law of conservation of mass and apply it to a chemical reaction.
- Describe the differences between mixtures and pure substances.
- Classify mixtures as homogeneous or heterogeneous.
- Recognize two other names applied to homogeneous mixtures.
- Describe several techniques used to separate mixtures.
- Explain the general basis for all techniques used to separate mixtures.
- Describe the similarities and differences in elements and compounds.
- State and recognize the smallest unit of matter for an element and for a compound.
- Describe the organization of elements in the periodic table.
- Explain the law of definite proportions (% by mass) and multiple proportions.

Work the following problems/questions on a separate sheet:

- Mastering Concepts pg. 82-83 #33, 34, 37, 39, 40, 45, 46, 50, 49; Mastering Problems pg. 83 #61, 62, 63, 64

1. What is the definition of a pure substance? What are the two kinds of pure substances? Draw two particle diagrams, using any symbols you want, to illustrate these.
2. Classify each of the following substances as; an element (E), a compound (C), a homogeneous mixture (hom), or a heterogeneous mixture (het).

a. Silver	b. Magnesium carbonate
c. Oatmeal	d. Bromine
e. Rust ( $\text{Fe}_2\text{O}_3$ )	f. Chicken soup
g. Brass (an alloy)	h. Clear apple juice
i. Acetic acid	j. Vanadium

3. Draw a particle diagram showing the electrolysis of  $\text{H}_2\text{O}$  liquid into  $\text{H}_2$  and  $\text{O}_2$  gases, as demonstrated in class. Start with 4  $\text{H}_2\text{O}$  molecules and be sure to draw the correct number of H and O atoms in the products.
4. A 102.81-g sample of lithium sulfate,  $\text{LiSO}_4$ , always contains 6.74 g of lithium, 32.07 g of sulfur, and 64.00 g of oxygen. Find the mass percentage of each element in this compound.
5. A 148.33-g sample of magnesium nitrate,  $\text{Mg}(\text{NO}_3)_2$ , always contains 24.31 g of magnesium, 28.02 g of nitrogen, and the rest of oxygen.
  - a. Find the mass percentage of each element in this compound.
  - b. From your answer to (a), determine the mass of N present in 68.2 g  $\text{Mg}(\text{NO}_3)_2$ .

6. Two samples containing only carbon and hydrogen are analyzed and the following masses of carbon are obtained. Are these two samples the same compound or different compounds? Show your work to justify your answer.

Analysis Data of Two Carbon Compounds					
Compound	Total Mass (g)	Mass C (g)	Mass H (g)	Mass % C	Mass % H
I	83.04	66.33			
II	27.03	21.59			

7. Which of the following pairs of molecules are examples of the law of multiple proportions?  
 a. CO and CO<sub>2</sub>    c. CH<sub>4</sub> and C<sub>2</sub>H<sub>6</sub>  
 b. H<sub>2</sub>O and H<sub>2</sub>S    d. NO<sub>2</sub> and HNO<sub>3</sub>
8. What is the property by which the periodic table is ordered?
9. What are the columns in the periodic table called? What are the rows called?
10. What kinds of elements are along the staircase? Above and right? Below and left?
11. Name two elements that have properties similar to those of the element potassium (K). To those of krypton (Kr).