

**Chapter 10 Packet – PreIB**

Name: \_\_\_\_\_

Chemistry, Mrs. Cook

*Portions of this packet will be due throughout the chapter. Please listen in class for due dates. If you feel comfortable with the material, you may move on to another portion of the booklet. You MUST use a pencil! If you lose this booklet, you will be required to print off a copy from my website.*

**Assignment 1 – The Mole****Due Date:** \_\_\_\_\_

- 1) Answer in your own words, using an example: “What is a mole?”
  
- 2) How many atoms are in a mole of anything? \_\_\_\_\_
  - a. What is the title of this number? \_\_\_\_\_
  
- 3) What is the molar mass of  $\text{NH}_3$ ?
  
- 4) What is the mass of one mole of  $\text{C}_6\text{H}_{12}\text{O}_6$  (glucose)
  
- 5) Find the molar mass of  $\text{Al}_2(\text{SO}_4)_3$
  
- 6) Determine the formula mass of  $(\text{NH}_4)_2\text{S}$
  
- 7) How many liters of any gas are in one mole? \_\_\_\_\_
  
- 8) Draw the chart that shows how to convert between grams, moles, and liters:

**Assignment 2 – Single Step Molar Conversions**

**Due Date:** \_\_\_\_\_

*Refer to the chart you drew at the end of Assignment 1 to solve these problems.*

- 9) Convert 0.89 mol of  $\text{CaCl}_2$  to grams.
- 10) How many moles are in 158.1 grams of  $\text{PbSO}_4$ ?
- 11) Find the mass of 1.112 mol of HF. ***Hint:*** What unit is “mass” measured in? grams!
- 12) What are the three types of “particles” in chemistry?  
\_\_\_\_\_
- 13) Determine the number of atoms that are in 0.58 mol of Se.
- 14) How many moles of barium nitride ( $\text{Ba}_3\text{N}_2$ ) are there in  $4.7 \times 10^{24}$  formula units?
- 15) Determine the number of molecules that are in 1.25 mol of  $\text{O}_2$ .
- 16) What does “STP” stand for? \_\_\_\_\_
- 17) What volume will 0.37 mol of  $\text{N}_2$  gas occupy at STP?

18) A canister with a volume of 69.4 L contains how many moles of oxygen at STP?

19) A chemical reaction produces 13.8 mol of carbon monoxide. What volume will the gas occupy at STP?

**Assignment 3 – Multi-Step Molar Conversions**

**Due Date:** \_\_\_\_\_

*Refer to the chart you drew at the end of Assignment 1 to solve these problems.*

20) What mass of  $\text{C}_2\text{H}_6$  is in  $6.45 \times 10^{24}$  molecules?

21) How many formula units are in 5.1 g of  $\text{TiO}_2$ ?

22) What mass of helium will occupy 5.6 L at STP?

23) What volume would 46.8 grams of  $\text{Cl}_2$  occupy at STP?

24) What volume would  $3.33 \times 10^{25}$  atoms of krypton occupy at STP?

25) How many molecules are there in 12 L of carbon dioxide at STP?

26) What would the volume be of  $2.3 \times 10^{23}$  molecules of CO at STP?

27) What is the mass of  $3.62 \times 10^{24}$  molecules of methanol (CH<sub>3</sub>OH)?

Review Questions for Assignment 3

28) How many particles are in a mole? \_\_\_\_\_

29) How many liters are in one mole of a gas? \_\_\_\_\_

30) What are the three types of "particles" in chemistry?  
\_\_\_\_\_

31) What are the units for molar mass?

#### **Assignment 4 – Percent Composition**

- 32) What is the percent composition of each element in  $\text{GaBr}_3$ ?
- 33) What is the percent composition of each element in  $\text{Al}_2(\text{CO}_3)_3$ ?
- 34) What is the percent composition of phosphorus in  $\text{Mg}_3(\text{PO}_4)_2$ ?

#### ***Relationships between Empirical and Molecular Formulas***

- 35) What is the molecular formula of a compound that has a molar mass of 132.24 g/mol and an empirical formula of  $\text{C}_3\text{H}_8$ ?
- 36) A molecular compound has a molar mass of 128.14 g/mol and the empirical formula  $\text{SO}_2$ . What is the molecular formula?
- 37) A compound has a molar mass of 283.6 g/mol and its empirical formula is  $\text{P}_2\text{O}_5$ . What is its molecular formula?
- 38) What is the molecular formula of a substance that has an empirical formula of  $\text{NO}_2$  and a molecular mass of 138 g/mol?

**Assignment 5 – Calculating Empirical Formulas**

**Due Date:** \_\_\_\_\_

39) What is the empirical formula of:

a)  $C_6H_{12}O_6$  \_\_\_\_\_

b)  $N_2O_4$  \_\_\_\_\_

c)  $C_3H_6$  \_\_\_\_\_

d)  $C_6H_6$  \_\_\_\_\_

40) A compound is 75% carbon and 25% hydrogen. What is its empirical formula?

41) A compound is 3.061g of hydrogen, 31.633g of phosphorus, and 65.306g of oxygen. What is the empirical formula?

42) A compound is 38.8% chlorine and 61.2% oxygen. What is its empirical formula?

43) A compound is 35.93% aluminum and 64.07% sulfur. What is its empirical formula?

44) A compound is 50% sulfur and 50% oxygen. What is its empirical formula?

45) An 87g sample contains 6.89g carbon and 80.22g chlorine. What is the empirical formula?

Review Questions for Assignment 5

46) Find the percent composition of each element in  $\text{Fe}_2(\text{SO}_4)_3$

47) A compound has molar mass of 51g and an empirical formula of  $\text{NH}_3$ . What is the molecular formula?

48) What is the mass of  $4.30 \times 10^{21}$  molecules of octane ( $\text{C}_8\text{H}_{18}$ )?

**Assignment 6 – Calculating Molecular Formulas**

**Due Date:** \_\_\_\_\_

49) A compound is 82.76% carbon and 17.24% hydrogen. It has a molecular mass of 58g. What is the molecular formula?

- 50) Find the molecular formula of a compound that contains 42.56g palladium and 0.80 g of hydrogen. The molar mass of the compound is 216.8 g/mol.
- 51) A compound is 30.435% nitrogen and 69.565% oxygen. It has a molecular mass of 92g. What is the molecular formula?
- 52) Find the molecular formula of a compound given that a 212.1g sample contains 169.7g of carbon and 42.4g of hydrogen and the molar mass is 30 g/mol.

Review Questions for Assignment 6

- 53) What volume will be occupied by a gas containing  $6.02 \times 10^{23}$  atoms at STP? \_\_\_\_\_
- 54) What is the mass of one mole of  $\text{Ca}(\text{OH})_2$ ?
- 55) What is the mass of 2 moles of  $\text{HgO}$ ?