CHM 111   Chapter 3   Worksheet and Study Guide

Purpose: This is a guide for your as you work through the chapter. The major topics are provided so that you can write notes on each topic and work the corresponding problems.

This should serve a s a study guide as you go on to do the problems in Sapling and take the quizzes and exams.

The Problems are embedded in the Topics and Space for Notes

N_A = 6.022 x 10^{23}

By the end of the Chapter 3 you should be able to:

- Calculate formula masses for covalent and ionic compounds
- Define the amount unit mole and the related quantity Avogadro's number Explain the relation between mass, moles, and numbers of atoms or molecules, and perform calculations deriving these quantities from one another
- Compute the percent composition of a compound
- Determine the empirical formula of a compound
- Determine the molecular formula of a compound
- Describe the fundamental properties of solutions
- Calculate solution concentrations using molarity
- Perform dilution calculations using the dilution equation

Topic 1   Calculate Molar Mass:

Calculate the Molar Mass of:
1. H_2O

2. Cl_2

3. $C_6H_{12}O_6$

4. Silver sulfate

Topic 2:   Convert grams to moles and moles to atoms:

1. How many moles of Ar are in 65.5 g of Ar?

2. How many atoms of Ar are there in 65.5 g of Ar?

3. Caffeine has the formula $C_8H_{10}N_4O_2$. Calculate the molar mass of caffeine.

4. How many moles of caffeine are in 38.9 grams of the compound?

5.How many moles of nitrogen are in 2.5 moles of caffeine?

6. How many atoms of N are in 2.5 moles of caffeine?

Topic 3: **Calculate percent by mass and empirical formula. Convert between Empirical and Molecular formula.**

Notes:

1. Calculate the mass percent of lithium in Li_3PO_4.

2. What is the empirical formula for a compound that is 58.80 % by mass C, 9.87 % by mass H and 31.33 % by mass O?

3. (A) A compound of mercury, nitrogen and oxygen contains 4.35 g of Hg, 0.2966 g of N and 1.02 g of oxygen. What is the empirical formula of the compound?

   (B) If the Molar Mass of the compound above is 525 g/mol, what is the molecular formula of the compound?

Topic 4:   **Molarity. Notes:**

(1)   What is the Molarity of a solution made by dissolving 1.45 moles of NaCl in enough water to make 500.0 mL of solution?

(2) What is the Molarity of a solution made by dissolving 3.45 grams of potassium permanganate in enough water to make 2.00 L of solution?

(3) How many grams of KNO_3 are contained in 25.0 mL of 1.25 M $KNO_3(aq)$?

Topic 5:   **Dilution: Notes:**

(1) 15.0 mL of 5.50 M KNO_3(aq) is diluted to a volume of 200. mL. What is the final concentration of KNO_3 (aq)?

(2) What volume of a 100.0 µg/L solution does a student need to make 200. mL of 5.0 µg/L solution?

(3) 25.0 mL of a .456 M solution of HCl(aq) is diluted to 100.0 mL. Then 35.0 mL of this solution is mixed with 75.0 mL of water. What is the final concentration?