

Key

3/4/21

Chapters 6 & 7: SI Session for Chem 1407

Chapter 6:

1. Define and provide an example for the following terminology:

Term	Definition	example
Mole	The unit used to count atoms • Avogadro's number • 6.022×10^{23} moles	Mol
Molar Mass	The mass of 1 mol of atoms of an element • Numerically equal to the element's atomic mass in atomic mass units	Atom C-12 = 12.01 amu = 12.01g.
Mass Percent Composition	The mass percent composition of an element is the element's percentage of the total mass of the compound.	$\frac{\text{mass in comp}}{\text{mass of comp}} \times 100\%$
Empirical Formulas	The simplest whole # ratio of each type of atom in a compound.	H ₂ O
Molecular Formulas:	Shows the exact # of atoms of each element in a compound.	H ₆ O ₃

2. Determine the percent mass composition of Hydrogen in the compound H₃PO₄.

$$\begin{aligned}
 H &= 1.01 \times 3 = 3.03 \\
 P &= 30.97 = 30.97 \\
 O &= 16 \times 4 = 64.00
 \end{aligned}$$

98

$$\frac{3.03}{98.00} \times 100\% = \boxed{3.091\% \text{ H}}$$

3/14/21

3. How many grams of S are in 3 moles of SO_4 ?

$$\frac{3 \text{ moles } \text{SO}_4}{1 \text{ mole } \text{SO}_4} \times \frac{1 \text{ mole S}}{1 \text{ mole S}} \times 32.07 \text{ g S} = 96.21 \text{ g S}$$

4. What are the rules used to calculate Empirical formulas?

a. You will be given either the masses of each compound or the percentage of each element in the compound.

b. Convert the masses of each element into moles of each element.

c. Divide each of the moles by the smallest of the number of moles.

d. If you have a decimal value, multiply all the values by the smallest possible integer that will give the smallest set of whole numbers.

5. Determine the empirical formula for a compound with 40% C, 20% H, and 20% N.

$$\frac{40\text{g C}}{12.01\text{g C}} = \frac{1\text{mol C}}{3.33} = 1.16$$

$$\frac{20\text{g H}}{1.01\text{g}} = \frac{1\text{mol H}}{19.801} = 2.855$$

$$\frac{20\text{g N}}{14.01\text{g}} = \frac{1\text{mol N}}{2.855} = 1$$

6. Determine the molecular formula for H₃O₂.
With a molar mass of 105.09.

$$\text{H} = 1.01 \times 3 = 3.03$$

$$\text{O} = 16 \times 2 = \frac{32}{35.03\text{g/mol}} = 1$$

$$\frac{105.09}{35.03\text{g/mol}} = 3$$

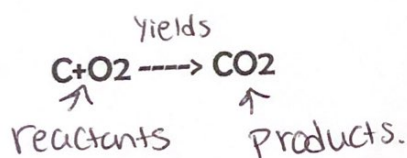
6.935

C₁H₇N₁

H₉O₆

Chapter 7:

1. What are the five indicators of a chemical reaction?
 - a. A Change in Color by the solution
 - b. Formation of a precipitate (solid)
 - c. Formation of a gas
 - d. emission of light
 - e. emission / absorption of heat
2. Label the reactant and products in the following chemical equation.



3. What is a catalyst?
Speeds up the reaction, but is not changed by the reaction.

4. In an electrolyte solution, what do ionic compounds separate into?

a. Cations + Anions -
dissociates into ions.