Topic 6 – Mole Interpretation : Mathematics of Formulas and Equations

Lesson 1 – Mole Interpretation in Formulas

Terms to Know

Mole –

Moles of atoms in formulas –

Molar Mass –

Gram-atomic Mass –

Gram-formula Mass –

Percent Composition –

Hydrates –

Anhydrous –

Formula Mass of a Hydrate –

Percent Composition of a Hydrate –

**Formula mass** = mass of 1 mole of a formula = sum of all atomic masses in a formula

To find the formula mass of a compound

Example H2O

Step 1 Determine number of each atom 2 H

 1 O

Step 2 Multiply by atomic mass 2 (1) = 2

 1 (16) = 16

Step 3 Find formula mass by adding up all masses

 2 + 16 = 18 g

The mass of one mole of a substance is the formula mass of that substance. One mole (6.02 x 1023 particles) of a given substance will always weigh a mass equal to its formula mass.

To calculate the mass of any given number of moles of a substance

 DETERMINE the formula mass of the substance

 MULTIPLY the number of moles in question by formula mass

Moles given = mass\_\_\_\_\_\_\_ OR Mass = moles given x formula mass

 formula mass



**Percent Composition by Mass**

% = $\frac{total mass of atom}{formula mass}$ x 100

**Percent Composition by Volume**

% = $\frac{part volume}{whole volume}$ x 100

**Percent of Water in a Hydrate**

% H2O = $\frac{total mass of water}{formula mass of hydrate}$ x 100

**Percent of Water from Hydrate Lab data**

Mass of water = mass of hydrate – mass of anhydrous salt

% water = $\frac{mass of water}{mass of hydrate}$ x 100

**Molecular Formula from Mass and Empirical Formula**

* Determine mass of the empirical formula
* Determine how many units of the empirical formula
* Determine the molecular formula by multiplying each subscript of the empirical formula by the unit

**Number of Particles Calculation**

1 mole = 6.02 x 1023

**Volume of a Gas Calculation**

1 mole of a gas = 22.4 L