CONCEPT: EMPIRICAL FORMULA

Empirical Formula vs. Molecular Formula

- **Empirical Formula**: related to the mass percentage of its constituent elements using the *mole concept*.
  - □ The **Molecular Formula** gives the _____ number of atoms in a compound.
  - □ The **Empirical Formula** gives the _____ number of atoms and represents the most *simplified* form.
  - □ By convention, any formula must contain whole numbers of each atom called the _____ ratio.

Molecular Formula	Empirical Formula
$C_3H_6O_3$	
$C_{10}H_{14}N_2$	
$C_{12}H_{22}O_{11}$	

Calculating the Empirical Formula

- Empirical Formula: can be calculated from the _____ or _____ of elements within a compound.

EXAMPLE: Determine the empirical formula of a compound that is 68.40% chromium and 31.60% oxygen.

STEP 1: Write down the _____ for each element in the question.

STEP 2: Write down the _____ (in grams) of each element given.

- □ Convert all _____ into grams by assuming there are 100 grams of the compound.

STEP 3: Convert all the masses into _____.

- □ To avoid rounding errors, make sure the values have at least 4 decimal places

STEP 4: Divide each mole answer by the smallest mole value in order to obtain whole numbers for each element.

STEP 5: If you get a value of _____ or _____ then you can round to the nearest whole number.

- □ If you can't round we multiply by a factor to create whole numbers.

CONCEPT: EMPIRICAL FORMULA

PRACTICE: A compound that contains only carbon, hydrogen, and oxygen is composed of 48.64% C and 43.2% O by mass. What is the empirical formula of this compound?

PRACTICE: Elemental analysis of a sample of an ionic compound showed 2.82 g of Na, 4.35 g of Cl, and 7.83 g of O. What is the empirical formula of the compound?

PRACTICE: A compound composed of carbon, hydrogen, and chlorine contains 4.19×10^{23} hydrogen atoms. If 9.00 g of the compound also contains 55.0% chlorine by mass, what is the empirical formula?