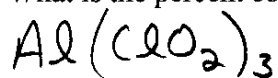


Percent Composition and Empirical & Molecular Formulas 1

1. What is the percent composition of aluminum chlorite?



$$\text{Al} = 26.98 \times 1 = 26.98$$

$$\text{Cl} = 35.45 \times 3 = 106.35$$

$$\text{O} = 16.00 \times 6 = 96.00$$

$$\underline{229.33 \text{ g/mol}}$$

$$\% \text{Al} = \frac{26.98}{229.33} \times 100 = 11.76\% \text{Al}$$

$$\% \text{Cl} = \frac{106.35}{229.33} \times 100 = 46.37\% \text{Cl}$$

$$\% \text{O} = \frac{96.00}{229.33} \times 100 = 41.86\% \text{O}$$

2. A white powder is found to contain 43.64% phosphorous and 56.56% oxygen. The molar mass of the compound is 283.88 g/mol. What are the empirical and molecular formulas of this compound? Name this compound.

Assume 100 g

$$\frac{43.64 \text{ g P}}{30.97 \text{ g}} \left| \frac{1 \text{ mol}}{30.97 \text{ g}} \right. = 1.409 \text{ mol P} \quad \frac{1.409}{1.409} = 1 \times 2 = 2$$

$$\frac{56.56 \text{ g O}}{16.00 \text{ g}} \left| \frac{1 \text{ mol}}{16.00 \text{ g}} \right. = 3.535 \text{ mol O} \quad \frac{3.535}{1.409} = 2.5 \times 2 = 5$$

empirical formula = P_2O_5

emp. formula mass = 141.94 g/mol

$$\frac{283.88}{141.94} \approx 2$$

molecular formula = P_4O_{10}

tetraphosphorous decaoxide

3. A 10.000-g sample of a compound contains 7.165g chlorine, 2.427g carbon, and 0.407g hydrogen, and the compound has a molecular mass of *approximately* 100 g/mol. What is the molecular formula of the compound?

$$\frac{7.165 \text{ g Cl}}{35.45 \text{ g}} \left| \frac{1 \text{ mol}}{35.45 \text{ g}} \right. = 0.2021 \text{ mol Cl} \quad \frac{0.2021}{0.2021} = 1$$

$$\frac{2.427 \text{ g C}}{12.01 \text{ g}} \left| \frac{1 \text{ mol}}{12.01 \text{ g}} \right. = 0.2021 \text{ mol C} \quad \frac{0.2021}{0.2021} = 1$$

$$\frac{0.407 \text{ g H}}{1.01 \text{ g}} \left| \frac{1 \text{ mol}}{1.01 \text{ g}} \right. = 0.403 \text{ mol H} \quad \frac{0.403}{0.2021} = 1.99 \approx 2$$

emp. form: CH_2Cl

emp. form. mass = 49.48 g/mol

$$\frac{100}{49.48} = 2.02 \approx 2$$

Molec formula: $\text{C}_2\text{H}_4\text{Cl}_2$