Chemistry 112

Learning Opportunities

April 27 – May 1

Percent Composition

Percent composition is used to express the relative amounts of the elements in a compound. The percent by mass of an element in a compound is the number of grams of the element divided by the mass in grams of the compound, multiplied by 100%.

%mass of element = $\frac{mass\ of\ element}{mass\ of\ compound}$ X 100%

See Percent Composition Sample Problem

Practice Problems

1. Calculate the percent of nitrogen in NH_3
2. Calculate the percent of nitrogen in NH_4NO_3
3. Calculate the percent of oxygen in $KMnO_4$
4. Calculate the percent composition of C_2H_6

Empirical Formulas and Molecular Formulas

The empirical formula of a compound shows the smallest whole number ratio of atoms in the compound.

The molecular formula tells the actual number of each kind of atom in a compound. It can be the same as the empirical formula or it is a whole-number multiple of the empirical formula.

Examples:

Empirical Formulas		Molecular formulas
HO	X2	H_2O_2
CH	X2	C_2H_2
CH	X8	C_8H_8
CH_2O	X6	$C_6H_{12}O_6$
CH_2O	X2	$C_2H_4O_2$
HCl	X1	HCl

See Empirical Formula Sample Problems

Practice Problems

1. Calculate the empirical formula for a compound that is 62.1% C, 13.8% H and 24.1%N.
2. Calculate the empirical formula for a compound that is 25.9% N and 74.1% O.
3. Calculate the empirical formula for a compound that is 40.0% C, 6.7% H and 53.3%O

See Molecular Formula Sample Problems

Practice Problems

1. Find the molecular formula for a substance with a molar mass of 112.16g/mol and the empirical formula CH_2N.
2. Find the molecular formula for a substance with a molar mass of 62g/mol and the empirical formula CH_3O.

3. Find the molecular formula for a substance with a molar mass of 58g/mol that is 82.5% C and 17.5% hydrogen.
4. Find the molecular formula for a substance with a molar mass of 92.0g/mol that is 30.4% N and 69.6% O.