Mole, Quantum Theory Catalysts

Chemistry

Catalyst 10/28

1. What is the molar mass?

2. What is Avogadro's number? What does it represent?

3. Calculate the molar mass of the following compounds:

   a. NH_3

   b. C_3H_8

   c. $C_6H_{12}O_6$

Catalyst 11/3

Determine the mass percent of each element in sulfuric acid (H_2SO_4)

11/3 Cont.

Rubbing alcohol is an aqueous solution of isopropyl alcohol. Isopropyl alcohol has the formula C_3H_7OH. Determine the mass percent of each element in isopropyl alcohol.

Catalyst 11/8

1. Calculate the mass in grams of 0.251 mol of ethyl alcohol, C_2H_6O.
2. Calculate the mass in grams of 9.31×10^{-4} mol of $MgCl_2$
3. Calculate the molecules present in 1.25×10^{-2} mol of Lead (II) acetate, $Pb(CH_3CO_2)_2$

Catalyst 11-9

1. Calculate the percent by mass of each element in $NaHSO_3$.

2. What is the empirical formula if the compound consists of 21.2%N, 6.1%H, 24.2%S and 48.5% O?

3. A compound used as an additive for gasoline to help prevent engine know shows the following percent composition: 71.65%Cl, 24.27%C and 4.07%H. The molar mass is known to be 98.96g. Determine the empirical formula and molecular formula for this compound.

$N_2H_8SP_4$
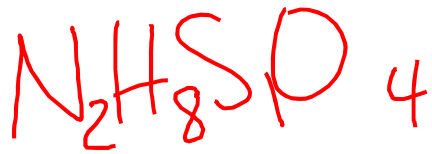
smallest whole # ratio

- What is the empirical formula if the compound consists of 21.2%N, 6.1%H, 24.2%S and 48.5% O?

$$\frac{21.2\,g\,N}{} \left|\frac{1\,mol}{14.01g\,N}\right. = \frac{1.513}{0.75499314} = 2.005309 \quad = 2$$

$$\frac{48.5\,g}{}\left|\frac{1\,mol\,O}{16.00\,g}\right. = \frac{3.03125}{0.75499314} = 4.020 \quad 4$$

$$\frac{6.1\,g\,H}{}\left|\frac{1\,mol}{1.01g\,H}\right. = \frac{6.0396039}{0.754599314} = 8.0372 \quad 8$$

$$\frac{24.2\,g\,S}{}\left|\frac{1\,mol}{32.01g}\right. = \frac{0.75459931}{0.754599314} = 1$$

A compound used as an additive for gasoline to help prevent engine know shows the following percent composition: 71.65%Cl, 24.27%C and 4.07%H. The molar mass is known to be 98.96g. Determine the empirical formula and molecular formula for this compound.

$$\frac{71.65 \text{ g Cl}}{} \left| \frac{1 \text{ mol Cl}}{35.45 \text{ g Cl}} \right. = 2.021115655$$

$$\frac{2.021115655}{2.020815987} = 1.001 = 1$$

$$\frac{24.27 \text{ g C}}{} \left| \frac{1 \text{ mol}}{12.01 \text{ g C}} \right. = 2.020815987$$

$$\frac{2.020815987}{2.020815987} = 1$$

MF $C_2H_4Cl_2$

$$\frac{4.07 \text{ g H}}{} \left| \frac{1 \text{ mol H}}{1.01 \text{ g H}} \right. = 4.029702297$$

$$\frac{4.029702297}{2.020815987} = 1.9919 = 2$$

EFC HCl_2

$$\frac{12.01}{2.02} = \frac{2.02}{35.45} = 49.48 \text{ g}$$

$$\frac{(CH_2Cl)}{} = ME \qquad \times (EM) = MM$$

$$\times 49.48 = 98.96 \text{ g}$$