Mole

1.) If 1.0 L of unknown gas X contains 3.0×10^{22} molecules at a certain temperature and pressure, how many molecules are present in 5.0 L of oxygen gas at the same temperature and pressure?

2.) Calculate the molar mass of each of the following.
 a.) NO
 b.) H_2O
 c.) NH_3
 d.) CO_2
 e.) CH_4
 f.) $AgNO_3$
 g.) $Ca(OH)_2$
 h.) $Al(NO_3)_3$
 i.) $FeCl_3$
 j.) SnC_2O_4
 k.) $Sn(C_2O_4)_2$
 l.) $(NH_4)_3PO_4$
 m.) CH_3COOH
 n.) $CH_3CH_2CH_2CH_3$
 o.) $Ni(H_2O)_2(NH_3)_4Cl_2$
 p.) $Al_2(SO_4)_3$

3.) Calculate the molar mass of each of the following.
 a.) $Co_3(AsO_4)_2 \cdot 8H_2O$

b.) $Pb(C2H3O2)2 \cdot 3H2O$ c.) $MgSO4 \cdot 7H2O$ d.) $KAl(SO4)2 \cdot 12H2O$

More mole

1.) Calculate the number of moles contained in the following.
 a.) 10.6 g of SO_2 (g) at STP
 b.) 7.51×10^{24} molecules of HNO_3
 c.) 425 g of $Ca(OH)_2$
 d.) 4.25×10^{23} molecules of Fe_2O_3
 e.) 0.950 kg of NaOH
 f.) 25.0 L of N_2 (g) at STP

g.) 5.50×10^{22} molecules of CCl_4

h.) 0.120 g of NO_2 (g) at STP

2.) Calculate the volume of the following gases at STP.

a.) 0.235 mol of B_2H_6 (g)

b.) 9.36 mol of SiH_4 (g)

c.) 2.5×10^{23} molecules of C_2H_6 (g)

3.) Calculate the mass of each of the following.

a.) 0.125 mol of CO_2 (g) at STP

b.) 5.48 mol of $FeCl_3$ (s)

c.) 6.54×10^{23} molecules of HCN (g) at STP

d.) 15.4 mol of $Ni(OH)_2$ (g)

4.) Calculate the mass of 1 mol of each of the following.

a.) $Na_2B_4O_7 \cdot 10H_2O$

b.) My grandmother has a mass of 52 kg

c.) A bismuth atom having a mass of 3.52×10^{-22} g

d.) An electron having a mass of 9.1×10^{-31} g

e.) $Cu_3(OH)_2(CO_3)_2$

f.) A book having a mass of 1.34 kg

5.) An unknown gas sample contains only one of the compounds SO_3, CH_4, NF_3, or C_2H_2. If 1 molecule of the gas has a mass of 1.18×10^{-22} g, which type of molecule is contained in the sample?

6a.) General Saunders "Kelowna Fried Chicken" features the Super Barrel, containing 2 mol of chickens (deep fried). How many drumsticks are contained in the Super Barrel?

6b.) How many drumsticks, wings, and thighs are in the Super Barrel altogether?

Percent Composition

1.) Calculate the percentage composition of the following:

a.) C_2H_6
 b.) $FeCl_2$
 c.) $FeCl_3$
 d.) $C_2H_4O_2$
 e.) $CaCO_3$
 f.) NaOH
 g.) $CaCl_2 \cdot 2H_2O$
 h.) $(NH_4)_3PO_4$
 i.) $Ag(NH_3)_2Cl$
 j.) $C_{17}H_{15}N_3O_2Cl$

Empirical Formula

1.) Find the empirical formula for the following compounds:

a.) 15.9% B and 84.1% F
 b.) 87.5% Si and 12.5% H
 c.) 43.7% P and 56.5% O
 d.) 77.9% I and 22.1% O
 e.) 77.7% Fe and 22.3% O
 f.) 70.0% Fe and 30.0% O
 g.) 72.4% Fe and 27.6% O

Molecular Formula

1.A gas has the empirical formula CH_2. If **0.850 L** of the gas at STP has a mass of **1.59 g**, what is the molecular formula?

2.A gas has the percentage composition: **30.4% N** and **69.6% O**. If the **density** of the gas is **4.11 g/L** at STP, what is the molecular formula?

3.A compound has an empirical formula C_5H_{11}. If **0.0275 mol** of the compound has a mass of **3.91 g**, what is the molecular formula?

4.When a sample of nickel carbonyl is heated, **0.0600 mol** of a gas containing carbon and oxygen is formed. The gas has a mass of **1.68 g** and is **42.9% C** by mass. What is the molecular formula of the gas?

5.A gas sample is analyzed and found to contain **33.0% Si** and **67.0% F**. If the gas **density** is **7.60 g/L** at STP, what is the molecular formula?

6.A gas has the percentage composition: **78.3% B** and **21.7% H**. A sample bulb is filled with the unknown gas and weighed. The mass of the unknown gas is found to be **0.986 times** the mass of a sample of nitrogen gas in the same bulb under the same conditions. What is the molecular formula of the unknown gas?

7.A gas has an empirical formula CH_2. If **0.500 L** of the gas at STP has a mass of **0.938 g**, what is the molecular formula of the compound?

8.A sample of gas has an empirical formula of **O** and a molar mass which is **3 times that of CH$_4$**. What is the molecular formula of the gas?