TH-GC General Chemistry Week 16 1/19

$$2H_2 + O_2 \longrightarrow 2H_2O$$

$$Pb(OH)_2 + 2HCl \longrightarrow 2H_2O + PbCl_2$$

$$2AlBr_3 + 3K_2SO_4 \longrightarrow 6KBr + Al_2(SO_4)_3$$

General Chemistry Chapter 3 Pre-Test

1.) (10 pts) What is the molar mass of tryptophan, $C_{11}H_{12}N_2O_2$?

C 11 * 12.011 g/mol = 132.121 g/mol
H 12 * 1.008 g/mol = 12.096 g/mol
N 2 * 14.007 g/mol = 28.014 g/mol
O 2 * 15.999 g/mol = 31.998 g/mol
+
204.229 g/mol

2.) (10 pts) How many moles are in 320 g of $(NH_4)_2SO_4$?

Find molar mass of $(NH_4)_2SO_4$

N 2 * 14.007 g/mol = 28.014 g/mol
H 8 * 1.008 g/mol = 8.064 g/mol
S 1 * 32.06 g/mol = 32.06 g/mol
O 4 * 15.999 g/mol = 63.996 g/mol
+
132.134 g/mol

$320\text{g} * \frac{1\text{ mol}}{132.134\text{ g}}$

2.42 mol

3.) (10 pts) How many water molecules are in 4.76 moles of H_2O?

$4.76\text{ mol} * \frac{6.022 * 10^{23}\text{ molecules}}{1\text{ mol}}$

6.022
x4.76
28.6647 * 10^{23}
24

$2.87 * 10^{24}$ molecules

4.) (10 pts) How many molecules of CO_2 are there in 68 g of carbon dioxide?

C: 1 * 12.011 g/mol = 12.011 g/mol

O: 2 * 15.999 g/mol = 31.998 g/mol

44.009 g/mol

molar mass

$$68\text{g } CO_2 * \frac{1 \text{ mol}}{44.009\text{g}} * \frac{6.022*10^{23} \text{ molecules}}{1 \text{ mol}}$$

$9.3*10^{23}$ molecules

5.) (18 pts) Find the percent composition of each atom in $NaHCO_3$.

Na → 22.99/84.006 * 100 = 27.3%

H → 1.008/84.006 * 100 = 1.12%

C → 12.011/84.006 * 100 = 14.3%

O → 3 * 15.999 = 47.997/84.006 * 100 = 57.1%

22.99 + 1.008 + 12.011 + 47.997 = 84.006

6.) (20 pts) The compound glutamine has the following percent composition. What is the empirical formula?

C = 44.9 % H= 6.4 % O = 30.8 % N= 17.9 %

C $\frac{44.9}{12.011} = \frac{3.74}{1.28} = 3*2 = 6$

H $\frac{6.4}{1.008} = \frac{6.35}{1.28} = 5*2 = 10$

O $\frac{30.8}{15.999} = \frac{1.93}{1.28} = 1.5*2 = 3$

N $\frac{17.9}{14.007} = \frac{1.28}{1.28} = 1*2 = 2$

$C_6H_{10}O_3N_2$

7.) (10 pts) The empirical formula for a substance is CH_2O. What is its molecular formula if its molar mass is 210 g/mol?

1 C = 12.011

2 H = 2.016

1 O = 15.999

30.026

$\frac{210}{30.026} \approx 7$

$7(CH_2O)$ $C_7H_{14}O_7$

8.) (12 pts total, 4 pts each) Complete each of the following stoichiometry reactions.

a) $Al_2O_3 \rightarrow Al + O_2$

b) $C_2H_6 + O_2 \rightarrow CO_2 + H_2O$

c) $HNO_3 + NaHCO_3 \rightarrow NaNO_3 + H_2O + CO_2$