W-GC General Chemistry Week 16 1/10

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

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

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

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

$\frac{320\text{ g}}{132.134\text{ g/mol}}$

2.42 mol

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

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

$2.87 * 10^{24}$ molecules

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

Molar Mass: CO_2

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

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

$44.009\ g/mol$

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

$9.3 * 10^{23}$ molecules

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

Na → $22.99 / 84.006 * 100\% = 27.36$

H → $1.008 / 84.006 * 100\% = 1.20$

C → $12.011 / 84.006 * 100\% = 14.3\%$

O → $3 * 15.999 = 47.997 / 84.006 * 100\% = 57.14\%$

$22.99 + 1.008 + 12.011 + 47.997 = 84.006\ g/mol$

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 %

Assume: 100g

C — $\frac{44.9}{12.011} = \frac{3.73}{1.28} = 3*2 = 6$

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?

Find empirical molar mass CH_2O

C: $1*12.011\ g/mol$ $12.011\ g/mol$

H: $2*1.008\ g/mol$ $2.016\ g/mol$

O: $1*15.999\ g/mol$ $15.999\ g/mol$

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) $2Al_2O_3 \rightarrow 4Al + 3O_2$

Combustion

b) $C_2H_6 + \frac{7}{2}O_2 \rightarrow 2CO_2 + 3H_2O$ (last; ④ ③)

or ×2

$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

H:2 N:1 Na:1 H:2 N:1 ✓

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

O:6 C:1 O:6 C:1 Na:1

Already balanced