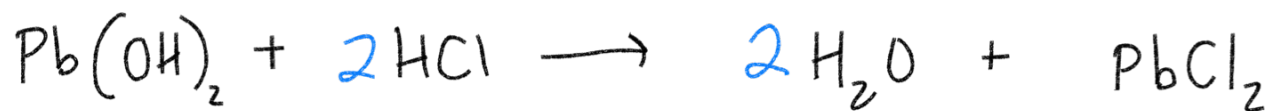
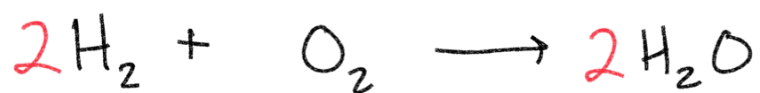


TH-6C General Chemistry Week 16 1/19



General Chemistry Chapter 3 Pre-Test

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

$$\begin{array}{r}
 C \ 11 * 12.011 \text{ g/mol} = 132.121 \text{ g/mol} \\
 H \ 12 * 1.008 \text{ g/mol} = 12.096 \text{ g/mol} \\
 N \ 2 * 14.007 \text{ g/mol} = 28.014 \text{ g/mol} \\
 O \ 2 * 15.999 \text{ g/mol} = 31.998 \text{ g/mol} \\
 \hline
 \end{array}$$

204.229 g/mol

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

Find molar mass of $(NH_4)_2SO_4$

$$\begin{array}{r}
 N \ 2 * 14.007 \text{ g/mol} = 28.014 \text{ g/mol} \\
 H \ 8 * 1.008 \text{ g/mol} = 8.064 \text{ g/mol} \\
 S \ 1 * 32.06 \text{ g/mol} = 32.06 \text{ g/mol} \\
 O \ 4 * 15.999 \text{ g/mol} = 63.996 \text{ g/mol} \\
 \hline
 \end{array}$$

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 ?

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

$$\begin{array}{r}
 6.022 \\
 \times 4.76 \\
 \hline
 28.6647 * 10^{23}
 \end{array}$$

2.87 * 10²⁴ molecules

4.) (10 pts) How many molecules of CO₂ are there in 68 g of carbon dioxide?

$$C: 1 * 12.011 \text{ g/mol} = 12.011 \text{ g/mol}$$

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

$$44.009 \text{ g/mol}$$

molar
mass

$$68 \text{ g CO}_2 * \frac{1 \text{ mol}}{44.009 \text{ g}} * \frac{6.022 * 10^{23} \text{ molecules}}{1 \text{ mol}} = 9.3 * 10^{23} \text{ molecules}$$

5.) (18 pts) Find the percent composition of each atom in NaHCO₃.

$$Na \rightarrow 22.99 / 84.006 * 100 = 27.3\%$$

$$H \rightarrow 1.008 / 84.006 * 100 = 1.12\%$$

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

$$O \rightarrow 3 * 15.999 = 47.997 / 84.006 * 100 = 57.1\%$$

$$22.99 + 1.008 + 12.011 + 47.997 = 84.006$$

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 %

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

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

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

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

$C_6H_{10}O_3N_2$

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?

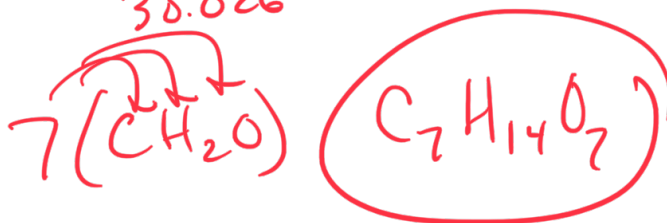
$$1 C = 12.011$$

$$2 H = 2.016$$

$$1 O = 15.999$$

$$\frac{30.026}{30.026}$$

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



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

