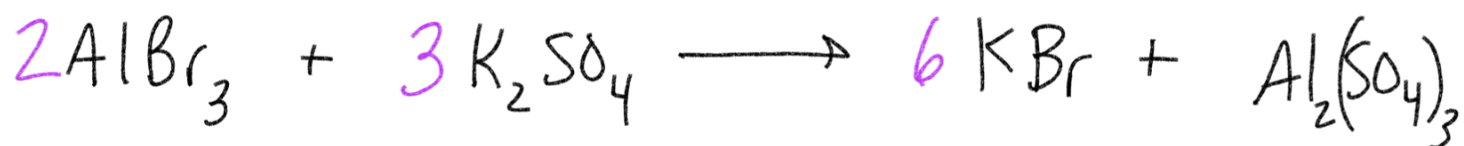
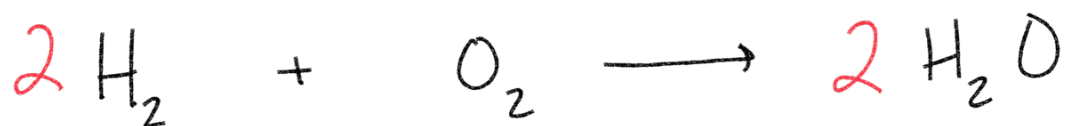


W-6C General Chemistry Week 16 1/10



General Chemistry Chapter 3 Pre-Test

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

$$C \ 11 * 12.011 \text{ g/mol} = 132.121 \text{ g/mol}$$

$$H \ 12 * 1.008 \text{ g/mol} = 12.096 \text{ g/mol}$$

$$N \ 2 * 14.007 \text{ g/mol} = 28.014 \text{ g/mol}$$

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

$$204.229 \text{ g/mol}$$

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

Find molar mass of  $(NH_4)_2SO_4$

$$N: 2 * 14.007 \text{ g/mol} = 28.014 \text{ g/mol}$$

$$H: 8 * 1.008 \text{ g/mol} = 8.064 \text{ g/mol}$$

$$S: 1 * 32.06 \text{ g/mol} = 32.06 \text{ g/mol}$$

$$O: 4 * 15.999 \text{ g/mol} = 63.996 \text{ g/mol}$$

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

$$320 \text{ g}$$

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

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

$$2.42 \text{ mol}$$

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

$$2.87 * 10^{24} \text{ molecules}$$

4.) (10 pts) How many molecules of  $\text{CO}_2$  are there in 68 g of carbon dioxide?

Molar Mass:  $\text{CO}_2$

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

$$\text{O}_2 : 2 * 15.999 \text{ g/mol} = 31.998 \text{ g/mol}$$
$$\hline 44.009 \text{ g/mol}$$

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

5.) (18 pts) Find the percent composition of each atom in  $\text{NaHCO}_3$ .

$$\text{Na} \rightarrow 22.99 / 84.006 * 100\% = 27.36$$

$$\text{H} \rightarrow 1.008 / 84.006 * 100\% = 1.20$$

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

$$\text{O} \rightarrow 3 * 15.999 = 47.997 / 84.006 * 100\% = 57.14\%$$

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

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 %

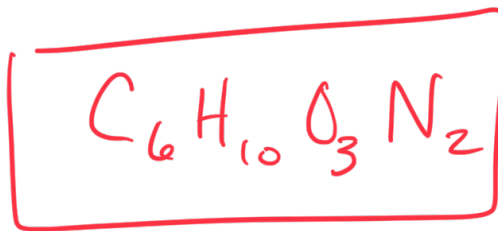
Assume: 100g

$$C - \frac{44.9}{12.011} = 3.73 \xrightarrow{1.28} 3 \times 2 = 6$$

$$H - \frac{6.4}{1.008} = 6.35 \xrightarrow{1.28} 5 \times 2 = 10$$

$$O - \frac{30.8}{15.999} = 1.93 \xrightarrow{1.28} 1.5 \times 2 = 3$$

$$N - \frac{17.9}{14.007} = 1.28 \xrightarrow{1.28} 1 \times 2 = 2$$

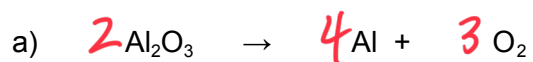


7.) (10 pts) The empirical formula for a substance is  $CH_2O$ . What is its molecular formula if its molar mass is 210 g/mol?

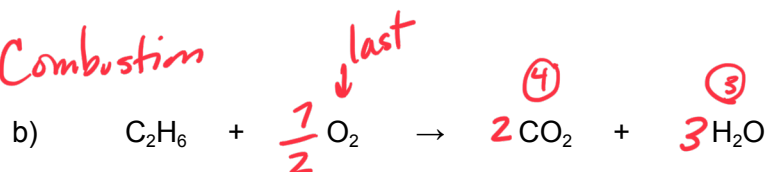
Find empirical molar mass  $CH_2O$

C: $1 \times 12.011 \text{ g/mol}$	12.011 g/mol	$\frac{210}{30.026} \approx 7$ $\downarrow \downarrow \downarrow$ $7(CH_2O)$
H: $2 \times 1.008 \text{ g/mol}$	2.016 g/mol	
O: $1 \times 15.999 \text{ g/mol}$	15.999 g/mol	
30.026		$\boxed{C_7H_{14}O_7}$

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



Combustion



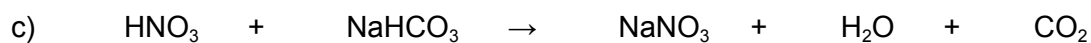
or  $\times 2$



H:2 N:1

Na:1

H:2 N:1



O:6

C:1

O:6

C:1

Na:1

Already balanced