



What is the theoretical yield in grams of P_2O_5 starting with 26.4 g KClO_3 and excess P_4S_6 ? September 16th

* means you don't have to worry about it winning out!

$$\text{TY}_{\text{P}_2\text{O}_5} = \frac{26.4 \text{ g } \text{KClO}_3}{122.55 \text{ g } \text{KClO}_3} \times \frac{1 \text{ mol}}{22 \text{ mol } \text{KClO}_3} \times \frac{6 \text{ mol } \text{P}_2\text{O}_5}{1 \text{ mol } \text{P}_2\text{O}_5} \times 141.94 \text{ g} = 8.34 \text{ g}$$

limiting reagent "LR"

During one specific reaction 7.22g P_2O_5 were obtained, what is the percent yield?

$$\% \text{ yield} = 100\% \times \frac{\text{actual}}{\text{TY}}$$

$$= 100\% \times \frac{7.22 \text{ g}}{8.34 \text{ g}} = 86.6\%$$

suppose, 107g P_4S_6 & 211g KClO_3 are reacted, (a) which is the LR?

$$3\text{P}_4\text{S}_6 + 22\text{KClO}_3 \rightarrow 6\text{P}_2\text{O}_5 + 18\text{SO}_2 + 22\text{KCl}$$

GO MOLES! $\frac{107 \text{ g}}{316.24 \text{ g}} \times 1 \text{ mol} = 0.3384 \text{ mol}$ $\frac{211 \text{ g}}{122.55 \text{ g}} \times 1 \text{ mol} = 1.722 \text{ mol}$ ← LR

$\frac{0.3384 \text{ mol}}{3} = 0.1128$ $\frac{1.722 \text{ mol}}{22} = 0.0783$

* Determine LR by ÷ by coefficient * SMALLEST is LR!

What is the TY of SO_2 ?

$$\text{TY} = \frac{1.722 \text{ mol } \text{KClO}_3}{22 \text{ mol } \text{KClO}_3} \times \frac{18 \text{ mol } \text{SO}_2}{1} = 1.41 \text{ mol } \text{SO}_2$$

L.R. STOICH

Today: sections 3.4-3.6

September 16th

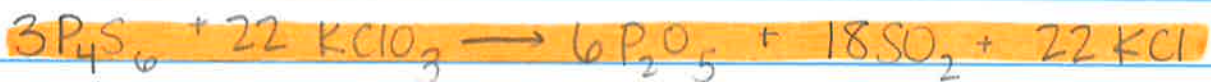
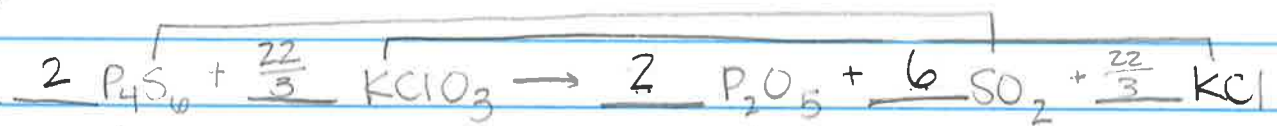
Tuesday: 9-17, Experiment 1

wednesday: 9-18, Finish ch. 3

Balance These reactions:



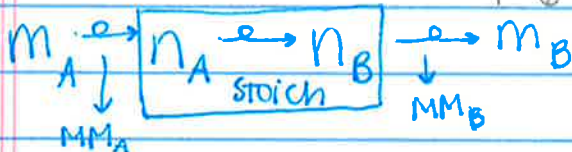
4 K 4
4 Cl 4
12 O 12
4 P 4



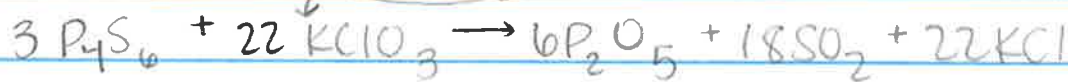
12 P 12
18 S 18
22 K 22
22 Cl 22
60 O 60

1. How many moles of KClO_3 are needed to react with 0.712 moles of P_4S_6 ?

$$\hookrightarrow 0.712 \text{ mol} \left| \frac{22 \text{ mol KClO}_3}{3 \text{ mol P}_4\text{S}_6} \right. = \boxed{5.22 \text{ mol KClO}_3}$$



2. How many grams are required for stoichiometric reaction with 4.93g of KClO_3 ?



60 moles!

$$\text{P} = 30.97 \times 4 = 123.88$$

$$\text{S} = 32.00 \times 6 = 192.36$$

$$316.24$$

$$\text{K} = 39.10 \times 1 = 39.10$$

$$\text{Cl} = 35.45 \times 1 = 35.45$$

$$\text{O} = 16.00 \times 3 = 48$$

$$122.55$$

$$n_{\text{KClO}_3} = \frac{4.93 \text{ g KClO}_3}{122.55 \text{ g KClO}_3} \times 1 \text{ mol} = 0.0402 \text{ mol KClO}_3$$

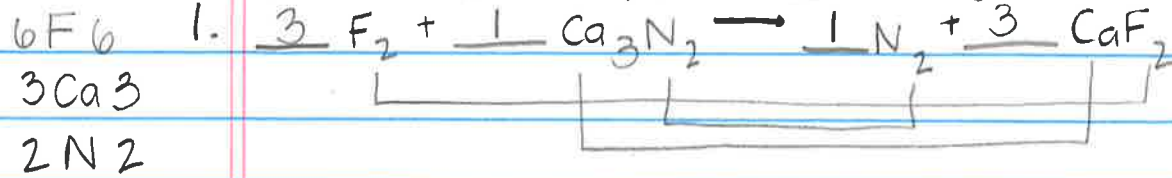
$$n_{\text{P}_4\text{S}_6} = 0.0402 \text{ mol KClO}_3 \left| \frac{3 \text{ mol P}_4\text{S}_6}{22 \text{ mol KClO}_3} \right. \times 316.24 \text{ g P}_4\text{S}_6 = 1.73 \text{ g of P}_4\text{S}_6$$

1. Balance Equation 4. What mass of the reagent in excess is left over?

2. Suppose 48.9 g of F_2 & 97.4 g Ca_3N_2 are reacted.

What is the LR?

3. What is the TY in moles of CaF_2 ?



September 16th

2. Go moles!

$\rightarrow 48.9 g F_2 \left| \frac{1 mol}{38.00 g} = 1.29 mol \right. \xrightarrow{\cdot \frac{1}{3} F_2} \left[0.43 \right] \leftarrow \text{SMALLER!} \rightarrow LR = F_2$

$\rightarrow 97.4 g Ca_3N_2 \left| \frac{1 mol}{148.234 g} = 0.66 \right. \xrightarrow{\cdot \frac{1}{1} Ca_3N_2} 0.66$

3. TY = $\frac{1.29 mol F_2}{3 mol F_2} \cdot 3 mol CaF_2 = \left[1.29 mol CaF_2 \right]$

4. $\frac{1.29 mol F_2}{3 mol F_2} \cdot \frac{1 mol Ca_3N_2}{1 mol Ca_3N_2} = 0.43 mol Ca_3N_2$
 $0.43 mol Ca_3N_2 \cdot 148.27 g Ca_3N_2 = 63.76 g Ca_3N_2$ USED

Total = 97.4 g \rightarrow 97.4 g - 63.76 g = $\left[33.84 g Ca_3N_2 \text{ left over} \right]$