$3P_4S_6 + 22KClO_3 \longrightarrow 6P_2O_5 + 18SO_2 + 22KCl$

September 16th

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

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

$$TY_{P_2O_5} = \frac{26.4\text{ g } KClO_3}{122.55\text{ g } KClO_3} \left| \frac{1\text{ mol}}{22\text{ mol } KClO_3} \right| \frac{6\text{ mol } P_2O_5}{1\text{ mol } P_2O_5} \left| \frac{141.94\text{ g}}{} \right. = \boxed{8.34\text{ g } P_2O_5}$$

limiting reagent "LR"

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

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

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

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

$$3P_4S_6 + 22KClO_3 \longrightarrow 6P_2O_5 + 18SO_2 + 22KCl$$

GO MOLES! $\frac{107\text{ g}}{316.24\text{ g}} \left| \frac{1\text{ mol}}{} \right.$ $\frac{211\text{ g}}{122.55\text{ g}} \left| \frac{1\text{ mol}}{} \right.$

$0.3384\text{ mol} \div 3 = 0.1128$ | $1.722\text{ mol} \div 22 = 0.0783$ ← LR

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

What is the TY of SO_2?

$$TY = \frac{1.722\text{ mol } KClO_3}{22\text{ mol } KClO_3} \left| \frac{18\text{ mol } SO_2}{} \right. = \boxed{1.41\text{ mol } SO_2}$$

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:

$1\ KClO_3 + \_\_\ P_4 \rightarrow 2\ P_2O_6 + 4\ KCl$

1 K 1
4 Cl 4
12 O 12
4 P 4

$2\ P_4S_6 + \frac{22}{3}\ KClO_3 \rightarrow 2\ P_2O_5 + 6\ SO_2 + \frac{22}{3}\ KCl$

$3P_4S_6 + 22\ KClO_3 \rightarrow 6P_2O_5 + 18SO_2 + 22KCl$

12 P 12
18 S 18
22 K 22
22 Cl 22
66 O 66

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

↳ $0.712\ mol\ P_4S_6 \left| \frac{22\ mol\ KClO_3}{3\ mol\ P_4S_6} \right. = \boxed{5.22\ mol\ KClO_3}$

$m_A \xrightarrow{\text{÷}} n_A \xrightarrow[\text{STOICH}]{} n_B \xrightarrow{\times} m_B$

MM_A MM_B

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

$3\ P_4S_6 + 22\ KClO_3 \rightarrow 6P_2O_5 + 18SO_2 + 22KCl$

GO MOLES!

$P = 30.97 \times 4 = 123.88$

$S = 32.00 \times 6 = +192.36$

316.24

$K = 39.10 \times 1 = 39.10$

$Cl = 35.45 \times 1 = 35.45$

$O = 16.00 \times 3 = +48$

122.55

$n_{KClO_4} = 4.93g\ KClO_4 \left| \frac{1\ mol}{122.55g\ KClO_4} \right. = 0.0402\ mol\ KClO_3$

$n_{P_4S_6} = 0.0402\ mol\ KClO_3 \left| \frac{3\ mol\ P_4S_6}{22\ mol\ KClO_3} \right. \left| \frac{316.24g\ P_4S_6}{1\ mol\ P_4S_6} \right. = \boxed{1.73\ g\ of\ P_4S_6}$

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

2. Suppose 48.9g of F_2 & 97.4g Ca_3N_2 are reacted. what is the LR?

3. what is the TY in moles of CaF_2?

6F6
3Ca3
2N2

1. $\underline{3}\ F_2 + \underline{1}\ Ca_3N_2 \rightarrow \underline{1}\ N_2 + \underline{3}\ CaF_2$

September 16th

2. Go moles!

$48.9\text{g}\ F_2 \left| \frac{1\text{mol}}{38.00\text{g}} \right. = 1.29\text{mol} \div 3\ F_2 = 0.43$ ← SMALLER!

↳ LR = F_2

$97.4\text{g}\ Ca_3N_2 \left| \frac{1\text{mol}}{148.234\text{g}} \right. = 0.66\ \text{mol}\ Ca_3N_2 \div 1 = 0.66$

3. $TY = 1.29\text{mol}\ F_2 \left| \frac{3\ \text{mol}\ CaF_2}{3\ \text{mol}\ F_2} \right. = \boxed{1.29\ \text{mol}\ CaF_2}$

4. $1.29\ \text{mol}\ F_2 \left| \frac{1\ \text{mol}\ Ca_3N_2}{3\ \text{mol}\ F_2} \right| \frac{148.27\text{g}\ Ca_3N_2}{1\ \text{mol}\ Ca_3N_2} = 63.76\text{g}\ Ca_3N_2$ USED

↳ Total = 97.4g → 97.4g - 63.76g = $\boxed{33.84\text{g}\ Ca_3N_2\ \text{left over}}$