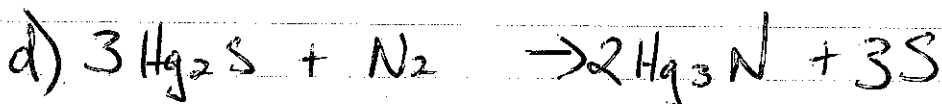
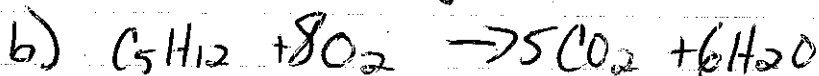
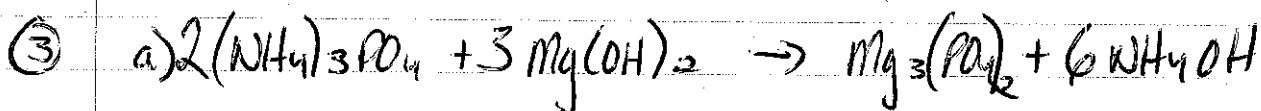
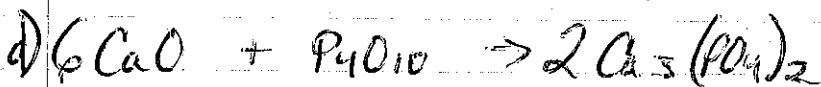
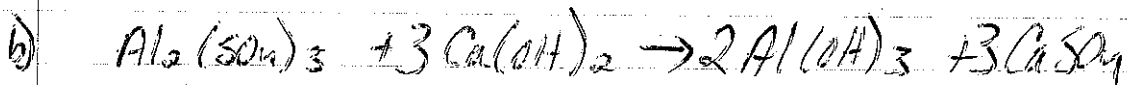
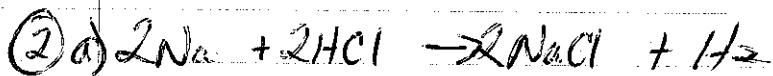


CH30

Rxns Part 2

Key

- ① a) Synth b) S.R. c) decomp d) D.R. e) Comb f) Synth



④ $0.15 \text{ mol S} \times \frac{32.1 \text{ g}}{1 \text{ mol}} = \boxed{4.815 \text{ g S}}$

⑤ $16.1 \text{ g NO}_2 \times \frac{1 \text{ mol}}{46 \text{ g}} = \boxed{0.35 \text{ mol NO}_2}$

⑥ $2.17 \times 10^{23} \text{ atoms} \times \frac{1 \text{ mol}}{\text{Na atoms}} = \boxed{0.36 \text{ mol Mg}}$

⑦ $32.1 \text{ g Ca} \times \frac{1 \text{ mol}}{40.1 \text{ g}} = \boxed{0.8 \text{ mol Ca}}$

②

$$\textcircled{8} \quad 2.25 \text{ g} \times \frac{1 \text{ mol}}{18.02 \text{ g}} = \boxed{0.13 \text{ mol H}_2\text{O}}$$

$$\textcircled{9} \quad 1.5 \text{ mol H}_3\text{PO}_4 \times \frac{98.03 \text{ g}}{1 \text{ mol}} = \boxed{147.05 \text{ g}}$$

$$\textcircled{10} \quad 2.46 \text{ g Ca(NO}_3)_2 \times \frac{1 \text{ mol}}{164.1 \text{ g}} = \boxed{0.015 \text{ mol}}$$

$$\textcircled{11} \quad 7.6 \text{ g F}_2 \times \frac{1 \text{ mol}}{38 \text{ g}} = \boxed{0.2 \text{ mol}}$$

$$\textcircled{12} \quad 0.6 \text{ mol Na}_2\text{SO}_4 \times \frac{\text{Na molecules}}{1 \text{ mol}} = 3.6 \times 10^{23} \text{ molecules} \times \frac{7 \text{ atoms}}{1 \text{ molecule}} = \boxed{2.53 \times 10^{24} \text{ atoms}}$$

$$\textcircled{13} \quad 58.5 \text{ g (NH}_4)_2\text{SO}_4 \times \frac{1 \text{ mol}}{132.8 \text{ g}} = \boxed{0.44 \text{ mol}}$$

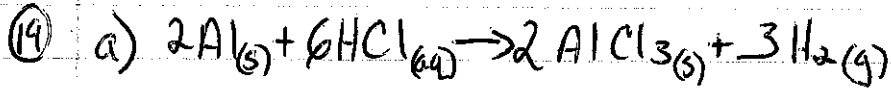
$$\textcircled{14} \quad 179.1 \text{ g Fe(HCO}_3)_3 \times \frac{1 \text{ mol}}{238.5 \text{ g}} = 0.75 \text{ mol} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} = \boxed{4.51 \times 10^{23} \text{ molecules}}$$

$$\textcircled{15} \quad 1.25 \text{ mol He} \times \frac{22.4 \text{ L}}{1 \text{ mol}} = \boxed{28 \text{ L}}$$

$$\textcircled{16} \quad \begin{array}{l} 1 \text{ mol H}_2 = 2.02 \text{ g} \\ 1 \text{ mol H}_2 = 22.4 \text{ L} \end{array} \quad \therefore \text{density} = \frac{2.02 \text{ g}}{22.4 \text{ L}} = \boxed{0.090 \text{ g/L}}$$

$$\textcircled{17} \quad 8.96 \text{ L SO}_2 \times \frac{1 \text{ mol}}{22.4 \text{ L}} = 0.4 \text{ mol} \times \frac{64.1 \text{ g}}{1 \text{ mol}} = \boxed{25.64 \text{ g}}$$

$$\textcircled{18} \quad 6.4 \text{ g CH}_4 \times \frac{1 \text{ mol}}{16.04 \text{ g}} = 0.4 \text{ mol} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} = \boxed{2.4 \times 10^{23} \text{ molecules}}$$

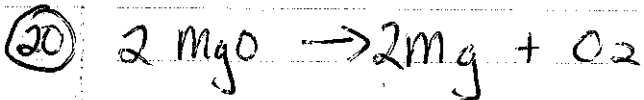


b) $8.25g Al \times \frac{1mol}{27g} = \boxed{0.31mol Al}$

c) $0.31mol Al \times \frac{3mol H_2}{2mol Al} = 0.465mol H_2 \times \frac{2.02g}{1mol} = \boxed{0.94g H_2}$

d) $0.31mol Al \times \frac{2mol AlCl_3}{2mol Al} = 0.31mol AlCl_3 \times \frac{133.5g}{1mol} = \boxed{41.39g AlCl_3}$

e) $\frac{38.15g}{41.39g} \times 100 = \boxed{92\%}$



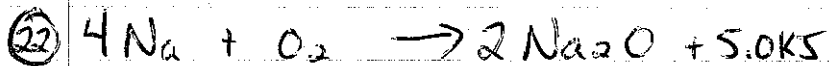
$0.5mol MgO \times \frac{2mol Mg}{2mol MgO} = \boxed{0.5mol Mg}$

$\times \frac{1mol O_2}{2mol MgO} = \boxed{0.25mol O_2}$

21) $0.75mol C_3H_8 \times \frac{6mol H_2O}{1mol C_3H_8} = \boxed{4.5mol H_2O}$

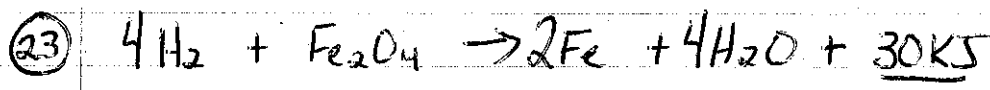
" $\times \frac{3mol CO_2}{1mol C_3H_8} = 2.25mol CO_2 \times \frac{44g}{1mol} = \boxed{99g CO_2}$

" $\times \frac{10mol H_2}{1mol C_3H_8} = 7.5mol H_2 \times \frac{2.02g}{1mol} = \boxed{15.15g H_2}$



$$8.05\text{g Na} \times \frac{1\text{mol}}{23\text{g}} = 0.35\text{mol Na} \times \frac{2\text{mol Na}_2\text{O}}{4\text{mol Na}} = 0.175\text{mol Na}_2\text{O} \times \frac{62\text{g}}{1\text{mol}} = \boxed{10.85\text{g}}$$

$$0.35\text{mol Na} \times \frac{5.0\text{KJ}}{4\text{mol Na}} = \boxed{10.438\text{KJ}}$$



$$50.9\text{g Fe}_2\text{O}_3 \times \frac{1\text{mol}}{175.6\text{g}} = 0.29\text{mol Fe}_2\text{O}_3 \times \frac{30\text{KJ}}{1\text{mol Fe}_2\text{O}_3} = \boxed{8.7\text{KJ}}$$



$$19.2\text{g Fe}_2\text{O}_3 \times \frac{1\text{mol}}{159.6\text{g}} = 0.12\text{mol Fe}_2\text{O}_3 \times \frac{3\text{mol SO}_2}{2\text{mol Fe}_2\text{O}_3} = 0.18\text{mol SO}_2 \times \frac{22.4\text{L}}{1\text{mol}} = \boxed{4.03\text{L}}$$



$$9.5\text{L H}_2 \times \frac{1\text{mol}}{22.4\text{L}} = 0.424\text{mol H}_2 \times \frac{2\text{mol NH}_3}{3\text{mol H}_2} = 0.28\text{mol NH}_3 \times \frac{22.4\text{L}}{1\text{mol}} = \boxed{6.3\text{L}}$$

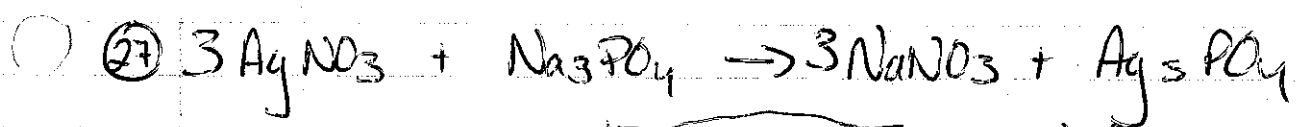


$$160.5\text{g S} \times \frac{1\text{mol}}{32.1\text{g}} = \boxed{5\text{mol S}} \times \frac{3\text{mol O}_2}{2\text{mol S}} = 7.5\text{mol O}_2 \text{ needed}$$

$$\boxed{8.4\text{mol O}_2} \leftarrow \text{HAVE}$$

∴ O₂ is Excess, S is L.R.

$$5\text{mol S} \times \frac{2\text{mol SO}_3}{2\text{mol S}} = 5\text{mol SO}_3 \times \frac{80.1\text{g}}{1\text{mol}} = \boxed{400.5\text{g SO}_3}$$



$$200 \text{g AgNO}_3 \times \frac{1 \text{ mol}}{169.9 \text{ g}} = 1.18 \text{ mol AgNO}_3 \times \frac{1 \text{ mol Na}_3\text{PO}_4}{3 \text{ mol AgNO}_3} = 0.39 \text{ mol Na}_3\text{PO}_4 \text{ needed}$$

$$200 \text{g Na}_3\text{PO}_4 \times \frac{1 \text{ mol}}{164 \text{ g}} = 1.22 \text{ mol Na}_3\text{PO}_4 \text{ HAVE}$$

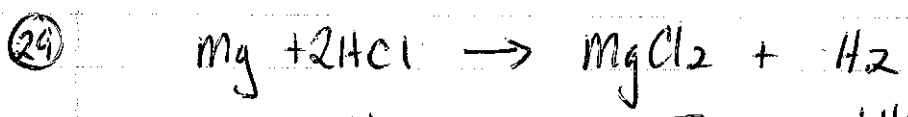
$\therefore \text{Na}_3\text{PO}_4$ is excess & AgNO_3 is L.R.

$$1.18 \text{ mol AgNO}_3 \times \frac{1 \text{ mol Ag}_3\text{PO}_4}{3 \text{ mol AgNO}_3} = 0.39 \text{ mol Ag}_3\text{PO}_4 \times \frac{418.7 \text{ g}}{1 \text{ mol}} = 163.3 \text{ g}$$

28 will use 0.39 mol Na_3PO_4 , Have 1.22 mol.

$$\therefore 1.22 \text{ mol} - 0.39 \text{ mol} = 0.83 \text{ mol left over}$$

$$0.83 \text{ mol} \times \frac{164 \text{ g}}{1 \text{ mol}} = 136.12 \text{ g left}$$



$$50 \text{g Mg} \times \frac{1 \text{ mol}}{24.3 \text{ g}} = 2.06 \text{ mol Mg} \times \frac{2 \text{ mol HCl}}{1 \text{ mol Mg}} = 4.12 \text{ mol HCl needed}$$

$$75 \text{g HCl} \times \frac{1 \text{ mol}}{36.5 \text{ g}} = 2.05 \text{ mol HCl HAVE}$$

$\therefore \text{HCl}$ is L.R.

$$2.05 \text{ mol HCl} \times \frac{1 \text{ mol H}_2}{2 \text{ mol HCl}} = 1.025 \text{ mol H}_2 \times \frac{22.4 \text{ L}}{1 \text{ mol}} = 23 \text{ L H}_2$$

$$30 \quad 2.05 \text{ mol HCl} \times \frac{1 \text{ mol Mg}}{2 \text{ mol HCl}} = 1.025 \text{ mol Mg used}$$

$$\text{Have } 2.06 \text{ mol, so } 2.06 \text{ mol} - 1.025 \text{ mol} = 1.035 \text{ mol left over}$$

$$1.035 \text{ mol} \times \frac{24.3 \text{ g}}{1 \text{ mol}} = 25.15 \text{ g left}$$

31 Assume 100g sample

∴ 19.8g C x $\frac{1\text{mol}}{12\text{g}}$ = 1.65mol C ÷ 0.83 = 2 ∴ empirical = C₂H₃NO₅

2.5g H x $\frac{1\text{mol}}{1.01\text{g}}$ = 2.48mol H ÷ 0.83 = 3

11.6g N x $\frac{1\text{mol}}{14\text{g}}$ = 0.83mol N ÷ 0.83 = 1

66.1g O x $\frac{1\text{mol}}{16\text{g}}$ = 4.13mol O ÷ 0.83 = 5

32 empirical = C₂H₃NO₅ = 121.03g/mol
molecular = 242g/mol $\frac{242}{121.03} = 2 \times$ biggers

∴ molecular = C₄H₆N₂O₁₀

33 Assume 100g sample.

∴ 82.66g C x $\frac{1\text{mol}}{12\text{g}}$ = 6.89mol C ÷ 6.89 = 1 x 2 = 2

17.34g H x $\frac{1\text{mol}}{1.01\text{g}}$ = 17.17mol H ÷ 6.89 = 2.5 x 2 = 5

∴ empirical = C₂H₅