Pg. 194 #11

$$\frac{1.05\ mol\ MnO_2}{} \times \frac{4\ HCl}{1\ MnO_2} = 4.20\ mol\ HCl$$

$$\frac{1.25\ mol\ H_2O}{} \times \frac{1\ MnCl_2}{2\ H_2O} = 0.625\ mol\ MnCl_2$$

Pg. 194 #12

$$\frac{100.\ g\ Al_4C_3}{} \times \frac{1\ mol\ Al_4C_3}{144.22\ g} \times \frac{12\ H_2O}{1\ Al_4C_3} =$$

$$8.32\ mol\ H_2O$$

$$\frac{0.600\ mol\ CH_4}{} \times \frac{4\ Al(OH)_3}{3\ CH_4} = 0.800\ mol\ Al(OH)_3$$

Pg. 194 #13

$$\frac{500.\ \text{g Ca(OH)}_2}{} \times \frac{1\ \text{mol Ca(OH)}_2}{74.10\ \text{g}} \times \frac{2\ \text{NaOH}}{1\ \text{Ca(OH)}_2} \times \frac{40.01\ \text{g}}{1\ \text{mol NaOH}} =$$

540. g NaOH

Pg. 194 #14

$$\frac{10.0\ g\ Zn}{} \times \frac{1\ mol\ Zn}{65.39\ g} \times \frac{1\ Zn_3(PO_4)_2}{3\ \ Zn} \times \frac{386.11\ g}{1\ mol\ Zn_3(PO_4)_2} =$$

$$19.7\ g\ Zn_3(PO_4)_2$$

Pg. 194 #15

$$125\ kg\ Fe_2O_3 = 125000\ g\ Fe_2O_3$$

$$\frac{125000\ g\ Fe_2O_3}{} \times \frac{1\ mol\ Fe_2O_3}{159.70\ g} \times \frac{2\ Fe}{1\ Fe_2O_3} \times \frac{55.85\ g}{1\ mol\ Fe} =$$

$$87430\ g\ Fe = 87.4\ kg\ Fe$$

Pg. 194 #16

$$\frac{375\ g\ Fe_3O_4}{} \times \frac{1\ mol\ Fe_3O_4}{231.55\ g} \times \frac{4\ H_2O}{1\ Fe_3O_4} \times \frac{18.02\ g}{1\ mol\ H_2O} =$$

$$117\ g\ H_2O$$

$$\frac{375\ g\ Fe_3O_4}{} \times \frac{1\ mol\ Fe_3O_4}{231.55\ g} \times \frac{3\ Fe}{1\ Fe_3O_4} \times \frac{55.85\ g}{1\ mol\ Fe} =$$

$$271\ g\ Fe$$

Pg. 194 #17ab

$$\frac{15.0 \text{ mol } C_2H_6}{} \frac{7 \text{ } O_2}{2 \text{ } C_2H_6} = 52.5 \text{ mol } O_2$$

$$\frac{8.00 \text{ g } H_2O}{} \frac{1 \text{ mol } H_2O}{18.02 \text{ g}} \frac{4 \text{ } CO_2}{6 \text{ } H_2O} \frac{44.01 \text{ g}}{1 \text{ mol } CO_2}$$

$$= 13.03 \text{ g } CO_2$$

Pg. 194 #17cd

$$\frac{75.0\ \text{g } C_2H_6}{} \frac{1\ \text{mol } C_2H_6}{30.06\ \text{g}} \frac{4\ CO_2}{2\ C_2H_6} \frac{44.01\ \text{g}}{1\ \text{mol } CO_2}$$

$$= 219.6\ \text{g } CO_2$$

$$\frac{2.75\ \text{mol } H_2O}{} \frac{4\ \text{mol } CO_2}{6\ \text{mol } H_2O} \frac{44.01\ \text{g}}{1\ \text{mol } CO_2}$$

$$= 80.7\ \text{g } CO_2$$

Pg. 194 #17ef

$$\frac{25.0 \text{ mol } C_2H_6}{} \frac{7 \text{ } O_2}{2 \text{ } C_2H_6} \frac{32.00 \text{ g}}{1 \text{ mol } O_2}$$

$$= 28\bar{0}0 \text{ g } O_2$$

$$\frac{125 \text{ g } H_2O}{} \frac{1 \text{ mol } H_2O}{18.02 \text{ g}} \frac{2 \text{ } C_2H_6}{6 \text{ } H_2O} \frac{30.06 \text{ g}}{1 \text{ mol } C_2H_6}$$

$$= 69.5 \text{ g } C_2H_6$$

Pg. 197 #27

$$X_8 + 12O_2 \longrightarrow 8XO_3$$

$$120.0\ g\ O_2 \times \frac{1\ mol\ O_2}{32.0\ g} \times \frac{1\ mol\ X_8}{12\ mol\ O_2} = 0.313\ mol\ X_8$$

$$\frac{0.313\ mol\ X_8}{80.0\ g\ X_8} = \frac{1\ mol\ X_8}{?}$$

$$? = 256\ g \div 8 = 32.0\ g\ or\ sulfur$$

Pg. 197 #29

$$0.927\ mol\ AlBr_3\ from\ Al$$

$$0.417\ mol\ AlBr_3\ from\ Br_2$$

$$\frac{64.2\ g}{111\ g} = 57.8\%$$

Pg. 196 #37a

$$\frac{750.\ g\ C_6H_{12}O_6}{} \times \frac{1\ mol\ C_6H_{12}O_6}{180.0\ g} \times \frac{2\ C_2H_5OH}{1\ C_6H_{12}O_6} \times \frac{46.0\ g}{1\ mol\ C_2H_5OH}$$

$$= 383\ g\ C_2H_5OH$$

$$\frac{750.\ g\ C_6H_{12}O_6}{} \times \frac{1\ mol\ C_6H_{12}O_6}{180.0\ g} \times \frac{2\ CO_2}{1\ C_6H_{12}O_6} \times \frac{44.0\ g}{1\ mol\ CO_2}$$

$$= 367\ g\ CO_2$$

$$or\ 750.\ g\ -\ 383\ g\ =\ 367\ g$$

Pg. 196 #37b

$$\frac{750.\ g\ C_6H_{12}O_6}{} \times \frac{1\ mol\ C_6H_{12}O_6}{180.0\ g} \times \frac{2\ C_2H_5OH}{1\ C_6H_{12}O_6} \times \frac{46.0\ g}{1\ mol\ C_2H_5OH}$$

$$= \ 383\ g\ C_2H_5OH$$

$$d = \frac{m}{V} \qquad 0.79 = \frac{383}{V} \qquad V = 480\ mL$$

Pg. 196 #38

$$2CH_3OH\ (\ell) + 3O_2\ (g) \xrightarrow{\Delta} 2CO_2\ (g) + 4H_2O\ (g)$$

$$d = \frac{m}{V} \qquad 0.72 = \frac{m}{60.0} \qquad m = 43\ g$$

$$\frac{43\ g\ CH_3OH}{} \times \frac{1\ mol\ CH_3OH}{32.0\ g} \times \frac{3\ O_2}{2\ CH_3OH} \times \frac{32.0\ g}{1\ mol\ O_2}$$

$$= 65\ g\ O_2$$

Pg. 196 #39abcd

a. $295312.5 = 3.0 \times 10^5\ g$

b. $213277 = 2.1 \times 10^5\ g$

c. $97.47 = 97.5\ g$

d. $\frac{750\ g\ N_2H_4}{} \times \frac{1\ mol\ N_2H_4}{32.0\ g} \times \frac{8\ H_2O}{1\ N_2H_4} = 187.5\ mol\ H_2O$

$\frac{125\ g\ H_2O_2}{} \times \frac{1\ mol\ H_2O_2}{34.0\ g} \times \frac{8\ H_2O}{7\ H_2O_2} = 4.20\ mol\ H_2O = 75.6\ g\ H_2O$

Pg. 196 #39e

$$\frac{125\ g\ H_2O_2}{} \times \frac{1\ mol\ H_2O_2}{34.0\ g} \times \frac{1\ N_2H_4}{7\ H_2O_2} \times \frac{32.0\ g}{1\ mol\ N_2H_4}$$

$$= 16.8\ g\ \textit{used}$$

$$750. - 16.8 = 733\ g\ \textit{remaining}$$

Pg. 197 #43

$a)\ lead(II)\ iodide - PbI_2$

$b)\ double\ displacement$

$$Pb(NO_3)_2 + 2KI \longrightarrow PbI_2 + 2KNO_3$$

$$\frac{15\ g\ Pb(NO_3)_2}{} \times \frac{1\ mol\ Pb(NO_3)_2}{331.2\ g} \times \frac{1\ PbI_2}{1\ Pb(NO_3)_2} = 0.0453\ mol\ PbI_2$$

$$\frac{15\ g\ KI}{} \times \frac{1\ mol\ KI}{166.0\ g} \times \frac{1\ PbI_2}{2\ KI} = 0.0452\ mol\ PbI_2$$

$$0.0452\ mol\ PbI_2 = 20.8\ g \qquad \frac{6.68}{20.8} = 32.1\%$$

Pg. 197 #45

$$180.0\ g\ Zn - 35\ g\ Zn = 145\ g\ Zn\ used$$

$$\frac{145\ g\ Zn}{} \times \frac{1\ mol\ Zn}{65.4\ g} \times \frac{1\ H_2}{1\ Zn} \times \frac{2.02\ g}{1\ mol\ H_2} = 4.48\ g\ H_2$$

$$\frac{145\ g\ Zn}{} \times \frac{1\ mol\ Zn}{65.4\ g} \times \frac{2\ HCl}{1\ Zn} \times \frac{36.5\ g}{1\ mol\ HCl} = 162\ g\ HCl$$

$$\frac{35\ g\ Zn}{} \times \frac{1\ mol\ Zn}{65.4\ g} \times \frac{2\ HCl}{1\ Zn} \times \frac{36.5\ g}{1\ mol\ HCl} = 39.1\ g\ HCl$$

Pg. 197 #47

$$CO\ (g) + 2\ H_2\ (g) \longrightarrow CH_3OH\ (\ell)$$

$$\frac{40.0\ g\ CO}{} \times \frac{1\ mol\ CO}{28.0\ g\ CO} \times \frac{1\ CH_3OH}{1\ CO} \times \frac{32.0\ g}{1\ mol\ CH_3OH} = 45.7\ g\ CH_3OH$$

$$\frac{10.0\ g\ H_2}{} \times \frac{1\ mol\ H_2}{2.02\ g\ H_2} \times \frac{1\ CH_3OH}{2\ H_2} \times \frac{32.0\ g}{1\ mol\ CH_3OH} = 79.2\ g\ CH_3OH$$

H_2 is the excess reactant, 5.7 g (45.7 - 40.0) were used.

Therefore, 10.0g - 5.7g = 4.3g remain.