

# Pg. 194 #11



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

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

# Pg. 194 #12



$$\frac{100. \text{ g } Al_4C_3}{144.22 \text{ g}} \times \frac{1 \text{ mol } Al_4C_3}{144.22 \text{ g}} \times \frac{12 \text{ H}_2\text{O}}{1 \text{ Al}_4\text{C}_3} =$$

$$8.32 \text{ mol H}_2\text{O}$$

$$\frac{0.600 \text{ mol } CH_4}{3 \text{ CH}_4} \times \frac{4 \text{ Al(OH)}_3}{3 \text{ CH}_4} = 0.800 \text{ mol Al(OH)}_3$$

# Pg. 194 #13



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

540. g NaOH

# Pg. 194 #14



$$\frac{10.0 \text{ g Zn}}{1} \times \frac{1 \text{ mol Zn}}{65.39 \text{ g}} \times \frac{1 \text{ Zn}_3(\text{PO}_4)_2}{3 \text{ Zn}} \times \frac{386.11 \text{ g}}{1 \text{ mol Zn}_3(\text{PO}_4)_2} =$$

$$19.7 \text{ g Zn}_3(\text{PO}_4)_2$$

# Pg. 194 #15



$$125 \text{ kg } Fe_2O_3 = 125000 \text{ g } Fe_2O_3$$

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

$$87430 \text{ g } Fe = 87.4 \text{ kg } Fe$$

# Pg. 194 #16



$$\frac{375 \text{ g } Fe_3O_4}{1} \times \frac{1 \text{ mol } Fe_3O_4}{231.55 \text{ g}} \times \frac{4 \text{ H}_2\text{O}}{1 \text{ Fe}_3\text{O}_4} \times \frac{18.02 \text{ g}}{1 \text{ mol H}_2\text{O}} =$$

117 g  $H_2O$

$$\frac{375 \text{ g } Fe_3O_4}{1} \times \frac{1 \text{ mol } Fe_3O_4}{231.55 \text{ g}} \times \frac{3 \text{ Fe}}{1 \text{ Fe}_3\text{O}_4} \times \frac{55.85 \text{ g}}{1 \text{ mol Fe}} =$$

271 g  $Fe$

## Pg. 194 #17ab



$$\frac{15.0 \text{ mol C}_2\text{H}_6}{2 \text{ C}_2\text{H}_6} \frac{7 \text{ O}_2}{2 \text{ C}_2\text{H}_6} = 52.5 \text{ mol O}_2$$

$$\frac{8.00 \text{ g H}_2\text{O}}{18.02 \text{ g}} \frac{1 \text{ mol H}_2\text{O}}{6 \text{ H}_2\text{O}} \frac{4 \text{ CO}_2}{1 \text{ mol CO}_2} \frac{44.01 \text{ g}}{1 \text{ mol CO}_2} = 13.03 \text{ g CO}_2$$

## Pg. 194 #17cd



$$\frac{75.0 \text{ g C}_2\text{H}_6}{30.06 \text{ g}} \frac{1 \text{ mol C}_2\text{H}_6}{2 \text{ C}_2\text{H}_6} \frac{4 \text{ CO}_2}{1 \text{ mol CO}_2} \frac{44.01 \text{ g}}{1 \text{ mol CO}_2}$$
$$= 219.6 \text{ g CO}_2$$

$$\frac{2.75 \text{ mol H}_2\text{O}}{6 \text{ mol H}_2\text{O}} \frac{4 \text{ mol CO}_2}{1 \text{ mol CO}_2} \frac{44.01 \text{ g}}{1 \text{ mol CO}_2}$$
$$= 80.7 \text{ g CO}_2$$





## Pg. 194 #17ef

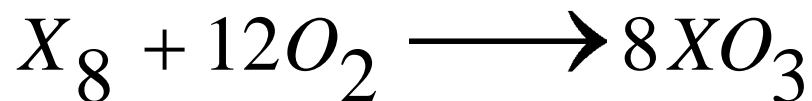
$$\frac{25.0 \text{ mol C}_2\text{H}_6}{2 \text{ C}_2\text{H}_6} \frac{7 \text{ O}_2}{1 \text{ mol O}_2} \frac{32.00 \text{ g}}{1 \text{ mol O}_2}$$

$$= 2800 \text{ g O}_2$$

$$\frac{125 \text{ g H}_2\text{O}}{18.02 \text{ g}} \frac{1 \text{ mol H}_2\text{O}}{6 \text{ H}_2\text{O}} \frac{2 \text{ C}_2\text{H}_6}{1 \text{ mol C}_2\text{H}_6} \frac{30.06 \text{ g}}{1 \text{ mol C}_2\text{H}_6}$$

$$= 69.5 \text{ g C}_2\text{H}_6$$

# Pg. 197 #27



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

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

$$? = 256 \text{ g} \div 8 = 32.0 \text{ g or sulfur}$$

**Pg. 197 #29**



*0.927 mol AlBr<sub>3</sub> from Al*

*0.417 mol AlBr<sub>3</sub> from Br<sub>2</sub>*

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

# Pg. 196 #37a



$$\frac{750. \text{ g } C_6H_{12}O_6}{1} \times \frac{1 \text{ mol } C_6H_{12}O_6}{180.0 \text{ g}} \times \frac{2 \text{ } C_2H_5OH}{1 \text{ } C_6H_{12}O_6} \times \frac{46.0 \text{ g}}{1 \text{ mol } C_2H_5OH}$$
$$= 383 \text{ g } C_2H_5OH$$

$$\frac{750. \text{ g } C_6H_{12}O_6}{1} \times \frac{1 \text{ mol } C_6H_{12}O_6}{180.0 \text{ g}} \times \frac{2 \text{ } CO_2}{1 \text{ } C_6H_{12}O_6} \times \frac{44.0 \text{ g}}{1 \text{ mol } CO_2}$$
$$= 367 \text{ g } CO_2$$

$$\text{or } 750. \text{ g } - 383 \text{ g } = 367 \text{ g}$$

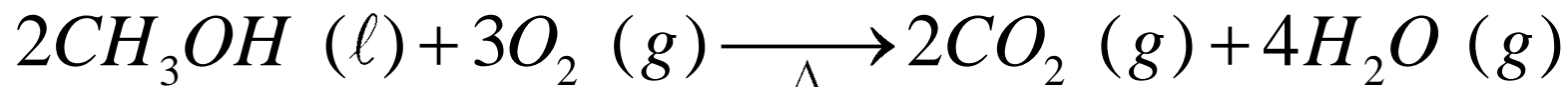
# Pg. 196 #37b



$$\frac{750. \text{ g } C_6H_{12}O_6}{1} \times \frac{1 \text{ mol } C_6H_{12}O_6}{180.0 \text{ g}} \times \frac{2 \text{ } C_2H_5OH}{1 \text{ } C_6H_{12}O_6} \times \frac{46.0 \text{ g}}{1 \text{ mol } C_2H_5OH}$$
$$= 383 \text{ g } C_2H_5OH$$

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

# Pg. 196 #38



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

$$\begin{aligned} & \frac{43 \text{ g } CH_3OH}{1} \times \frac{1 \text{ mol } CH_3OH}{32.0 \text{ g}} \times \frac{3 O_2}{2 CH_3OH} \times \frac{32.0 \text{ g}}{1 \text{ mol } O_2} \\ & = 65 \text{ g } O_2 \end{aligned}$$

# Pg. 196 #39abcd



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

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

$$c. 97.47 = 97.5 \text{ g}$$

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

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

## Pg. 196 #39e



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

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

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

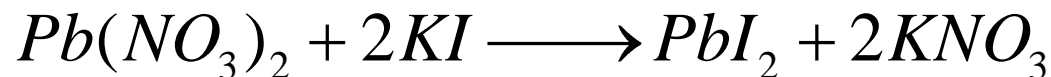


# Pg. 197 #43



a) *lead(II) iodide – PbI<sub>2</sub>*

b) *double displacement*



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

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

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



## Pg. 197 #45

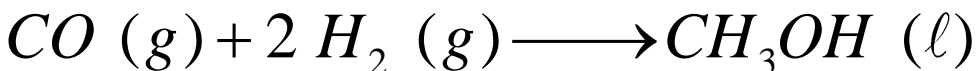
$$180.0 \text{ g Zn} - 35 \text{ g Zn} = 145 \text{ g Zn used}$$

$$\frac{145 \text{ g Zn}}{1} \times \frac{1 \text{ mol Zn}}{65.4 \text{ g}} \times \frac{1 \text{ H}_2}{1 \text{ Zn}} \times \frac{2.02 \text{ g}}{1 \text{ mol H}_2} = 4.48 \text{ g H}_2$$

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

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

# Pg. 197 #47



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

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

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

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