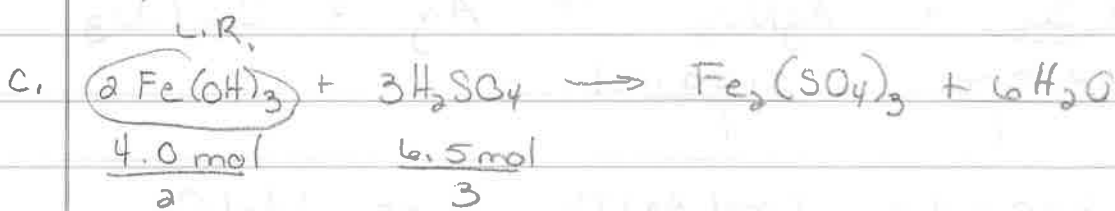
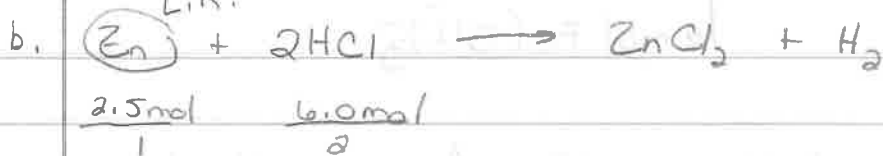
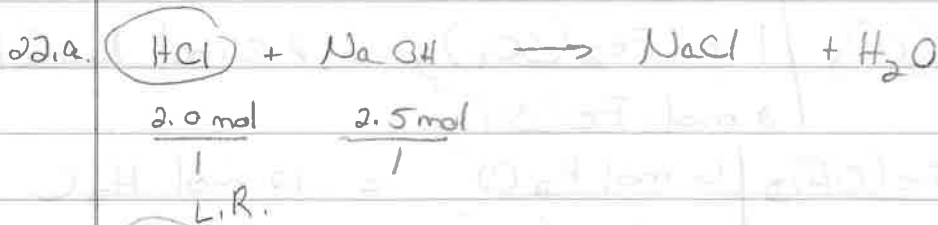


HW #4 22, 23, 24, 25, 26, 27, 28, 29, 30

L.R.



23.a. $\frac{2.0 \text{ mol HCl}}{1 \text{ mol HCl}} \Big| \frac{1 \text{ mol NaOH}}{1 \text{ mol HCl}} = 2 \text{ mol NaOH} \quad 2.5 - 2.0 = 0.5 \text{ mol NaOH}$

b. $\frac{2.5 \text{ mol Zn}}{1 \text{ mol Zn}} \Big| \frac{2 \text{ mol HCl}}{1 \text{ mol Zn}} = 5.0 \text{ mol HCl} \quad 6.0 - 5.0 = 1.0 \text{ mol HCl}$

c. $\frac{4.0 \text{ mol Fe}(\text{OH})_3}{2 \text{ mol Fe}(\text{OH})_3} \Big| \frac{3 \text{ mol H}_2\text{SO}_4}{2 \text{ mol Fe}(\text{OH})_3} = 6 \text{ mol H}_2\text{SO}_4 \quad 6.5 - 6 = 0.5 \text{ mol H}_2\text{SO}_4$

24-b. $\frac{2.5 \text{ mol Zn}}{1 \text{ mol Zn}} \Big| \frac{1 \text{ mol ZnCl}_2}{1 \text{ mol Zn}} = 2.5 \text{ mol ZnCl}_2$

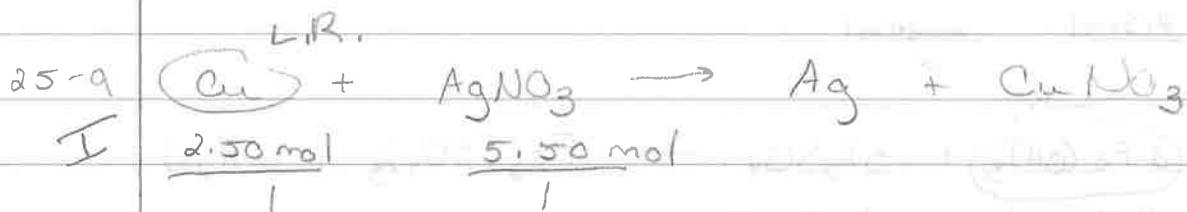
$\frac{2.5 \text{ mol Zn}}{1 \text{ mol Zn}} \Big| \frac{1 \text{ mol H}_2}{1 \text{ mol Zn}} = 2.5 \text{ mol H}_2$

a. $\frac{2.0 \text{ mol HCl}}{1 \text{ mol HCl}} \Big| \frac{1 \text{ mol NaCl}}{1 \text{ mol HCl}} = 2.0 \text{ mol NaCl}$

$\frac{2.0 \text{ mol HCl}}{1 \text{ mol HCl}} \Big| \frac{1 \text{ mol H}_2\text{O}}{1 \text{ mol HCl}} = 2.0 \text{ mol H}_2\text{O}$

$$c. \frac{4.0 \text{ mol Fe(OH)}_3}{2 \text{ mol Fe(OH)}_3} \bigg| \frac{1 \text{ mol Fe}_2(\text{SO}_4)_3}{2 \text{ mol Fe(OH)}_3} = 2.0 \text{ mol NaCl}$$

$$\frac{4.0 \text{ mol Fe(OH)}_3}{2 \text{ mol Fe(OH)}_3} \bigg| \frac{6 \text{ mol H}_2\text{O}}{2 \text{ mol Fe(OH)}_3} = 12 \text{ mol H}_2\text{O}$$



$$b. \frac{2.50 \text{ mol Cu}}{1 \text{ mol Cu}} \bigg| \frac{1 \text{ mol AgNO}_3}{1 \text{ mol Cu}} = 2.50 \text{ mol AgNO}_3$$

$$5.5 - 2.50 = 3.0 \text{ mol AgNO}_3$$

$$c. \frac{2.50 \text{ mol Cu}}{1 \text{ mol Cu}} \bigg| \frac{1 \text{ mol Ag}}{1 \text{ mol Cu}} \bigg| \frac{107.87 \text{ g Ag}}{1 \text{ mol Ag}} = 269.68 \text{ g Ag}$$

$$\frac{2.50 \text{ mol Cu}}{1 \text{ mol Cu}} \bigg| \frac{1 \text{ mol Cu(NO}_3)_2}{1 \text{ mol Cu}} \bigg| \frac{125.56 \text{ g Cu(NO}_3)_2}{1 \text{ mol Cu(NO}_3)_2} = 313.9 \text{ g Cu(NO}_3)_2$$



$$\frac{2.5 \text{ mol}}{1} \quad \frac{5.5 \text{ mol}}{2}$$

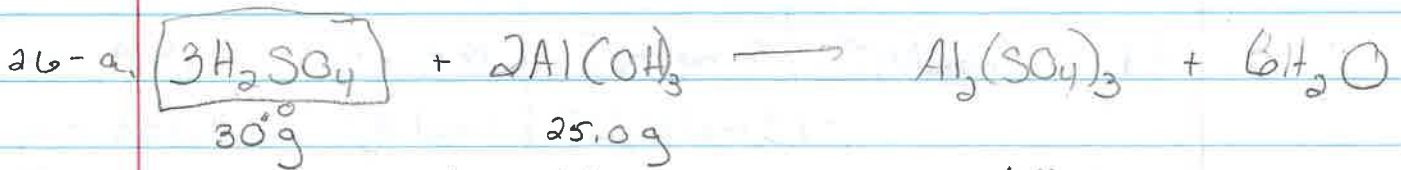
$$b. \frac{2.50 \text{ mol Cu}}{1 \text{ mol Cu}} \bigg| \frac{2 \text{ mol AgNO}_3}{1 \text{ mol Cu}} = 5.0 \text{ mol AgNO}_3$$

$$5.5 - 5.0 = 0.5 \text{ mol AgNO}_3$$

$$c. \frac{2.5 \text{ mol Cu}}{1 \text{ mol Cu}} \bigg| \frac{2 \text{ mol Ag}}{1 \text{ mol Cu}} \bigg| \frac{107.87 \text{ g Ag}}{1 \text{ mol Ag}} = 539.35 \text{ g Ag}$$

$$\frac{2.5 \text{ mol Cu}}{1 \text{ mol Cu}} \bigg| \frac{1 \text{ mol Cu(NO}_3)_2}{1 \text{ mol Cu}} \bigg| \frac{187.57 \text{ g Cu(NO}_3)_2}{1 \text{ mol Cu(NO}_3)_2} = 468.93 \text{ g Cu(NO}_3)_2$$

L.R.



$$\frac{30.0\text{g H}_2\text{SO}_4}{98.09\text{g H}_2\text{SO}_4} \Big| \frac{1\text{ mol H}_2\text{SO}_4}{3} = \frac{0.31\text{ mol H}_2\text{SO}_4}{3} = 0.10$$

$$\frac{25.0\text{g Al}(\text{OH})_3}{78.01\text{g Al}(\text{OH})_3} \Big| \frac{1\text{ mol Al}(\text{OH})_3}{2} = \frac{0.32\text{ mol Al}(\text{OH})_3}{2} = 0.16$$

b. $\frac{0.31\text{ mol H}_2\text{SO}_4}{3\text{ mol H}_2\text{SO}_4} \Big| \frac{2\text{ mol Al}(\text{OH})_3}{3\text{ mol H}_2\text{SO}_4} = 0.21\text{ mol Al}(\text{OH})_3$

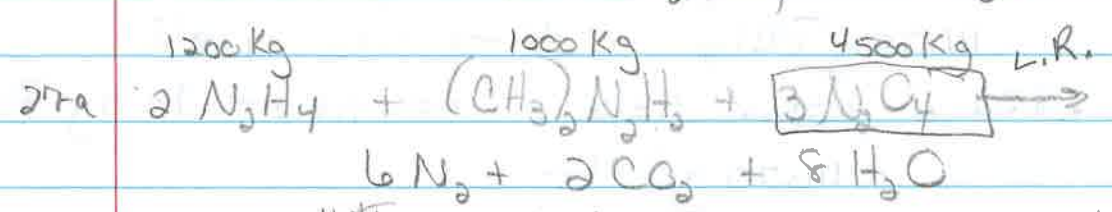
$0.32 - 0.21 = 0.11\text{ mol Al}(\text{OH})_3$

$$\frac{0.11\text{ mol Al}(\text{OH})_3}{1\text{ mol Al}(\text{OH})_3} \Big| \frac{78.01\text{g Al}(\text{OH})_3}{1\text{ mol Al}(\text{OH})_3} = 8.58\text{g Al}(\text{OH})_3$$

c. $\frac{0.31\text{ mol H}_2\text{SO}_4}{3\text{ mol H}_2\text{SO}_4} \Big| \frac{1\text{ mol Al}_2(\text{SO}_4)_3}{3\text{ mol H}_2\text{SO}_4} \Big| \frac{342.17\text{g Al}_2(\text{SO}_4)_3}{1\text{ mol Al}_2(\text{SO}_4)_3}$

$$= 35.3\text{g Al}_2(\text{SO}_4)_3$$

$$\frac{0.31\text{ mol H}_2\text{SO}_4}{3\text{ mol H}_2\text{SO}_4} \Big| \frac{6\text{ mol H}_2\text{O}}{3\text{ mol H}_2\text{SO}_4} \Big| \frac{18.02\text{g H}_2\text{O}}{1\text{ mol H}_2\text{O}} = 11.2\text{g H}_2\text{O}$$



$$\frac{1,200,000\text{g N}_2\text{H}_4}{32.06\text{g N}_2\text{H}_4} \Big| \frac{1\text{ mol N}_2\text{H}_4}{2} = \frac{37430\text{ mol N}_2\text{H}_4}{2} = 18,715$$

$$\frac{1,000,000\text{g } (\text{CH}_3)_2\text{N}_2\text{H}_2}{60.12\text{g } (\text{CH}_3)_2\text{N}_2\text{H}_2} \Big| \frac{1\text{ mol } (\text{CH}_3)_2\text{N}_2\text{H}_2}{1} = \frac{16,633\text{ mol } (\text{CH}_3)_2\text{N}_2\text{H}_2}{1} = 16,633$$

$$\frac{4,500,000\text{g N}_2\text{O}_4}{92.02\text{g N}_2\text{O}_4} \Big| \frac{1\text{ mol N}_2\text{O}_4}{3} = \frac{48,902\text{ mol N}_2\text{O}_4}{3} = 16,301$$

$$b. \frac{48,902 \text{ mol } N_2O_4}{3 \text{ mol } N_2O_4} \left| \frac{8 \text{ mol } H_2O}{1 \text{ mol } H_2O} \right| \frac{18.02 \text{ g } H_2O}{2,350 \text{ Kg } H_2O} = 2,349,904 \text{ g } H_2O$$

$$28. a. \% \text{ yield} = \frac{15.0 \text{ g}}{20.0 \text{ g}} \cdot 100\% = 75.0\%$$

$$b. .900 = \frac{\text{act. yield}}{1.0 \text{ g}} \quad \text{act. yield} = 0.90 \text{ g}$$

$$c. \% \text{ yield} = \frac{4.75 \text{ g}}{5.00 \text{ g}} \cdot 100\% = 95.0\%$$

$$d. 48.0\% = \frac{\text{act. yield}}{3.45 \text{ g}} \quad \text{act. yield} = 1.66 \text{ g}$$



$$\frac{13.7 \text{ g } PCl_3}{137.32 \text{ g } PCl_3} \left| \frac{1 \text{ mol } PCl_3}{1 \text{ mol } PCl_3} \right| \frac{1 \text{ mol } PCl_5}{1 \text{ mol } PCl_3} \left| \frac{208.22 \text{ g } PCl_5}{1 \text{ mol } PCl_5} \right| =$$

111.75 g PCl_5 — theoretical yield

$$.832 = \frac{\text{actual yield}}{111.75 \text{ g } PCl_5} \quad \text{act. yield} = 93.0 \text{ g } PCl_5$$

HW #5



$$\frac{5,000 \text{ g } \text{NH}_3}{17.04 \text{ g } \text{NH}_3} \left| \frac{1 \text{ mol } \text{NH}_3}{4 \text{ mol } \text{NH}_3} \right| \frac{4 \text{ mol } \text{NO}}{4 \text{ mol } \text{NH}_3} \left| \frac{30.01 \text{ g } \text{NO}}{1 \text{ mol } \text{NO}} \right| = 8,806 \text{ g } \text{NO}$$

$$.94 = \frac{\text{act. yield}}{8,806 \text{ g } \text{NO}} \quad \text{act. yield} = 8,278 \text{ g } \text{NO}$$

$$\frac{8278 \text{ g NO}}{30.01 \text{ g NO}} \times \frac{1 \text{ mol NO}}{1 \text{ mol NO}} \times \frac{2 \text{ mol NO}_2}{2 \text{ mol NO}} \times \frac{46.01 \text{ g NO}_2}{1 \text{ mol NO}_2} = 12,691 \text{ g NO}_2$$

$$0.94 = \frac{\text{act. yield}}{12,691 \text{ g NO}_2} = 11,930 \text{ g NO}_2$$

$$\frac{11,930 \text{ g NO}_2}{46.01 \text{ g NO}_2} \times \frac{1 \text{ mol NO}_2}{1 \text{ mol NO}_2} \times \frac{2 \text{ mol HNO}_3}{3 \text{ mol NO}_2} \times \frac{63.02 \text{ g HNO}_3}{1 \text{ mol HNO}_3} = 10,894 \text{ g HNO}_3$$

$$0.94 = \frac{\text{act. yield}}{10,894 \text{ g}} = 10,240 \text{ g HNO}_3$$



1250g

% yield 85.0%

$$\frac{1250 \text{ g C}}{12.01 \text{ g C}} \times \frac{1 \text{ mol C}}{1 \text{ mol C}} \times \frac{1 \text{ mol CH}_4}{2 \text{ mol C}} \times \frac{16.05 \text{ g CH}_4}{1 \text{ mol CH}_4} = 835 \text{ g CH}_4$$

$$0.85 = \frac{\text{act. yield}}{835 \text{ g CH}_4} \quad \text{act. yield} = 710 \text{ g CH}_4$$

11-15-10	11-15-10	11-15-10	11-15-10
11-15-10	11-15-10	11-15-10	11-15-10
11-15-10	11-15-10	11-15-10	11-15-10

11-15-10	11-15-10	11-15-10	11-15-10
11-15-10	11-15-10	11-15-10	11-15-10
11-15-10	11-15-10	11-15-10	11-15-10

11-15-10 11-15-10 11-15-10 11-15-10

11-15-10	11-15-10	11-15-10	11-15-10
11-15-10	11-15-10	11-15-10	11-15-10
11-15-10	11-15-10	11-15-10	11-15-10

11-15-10 11-15-10 11-15-10 11-15-10