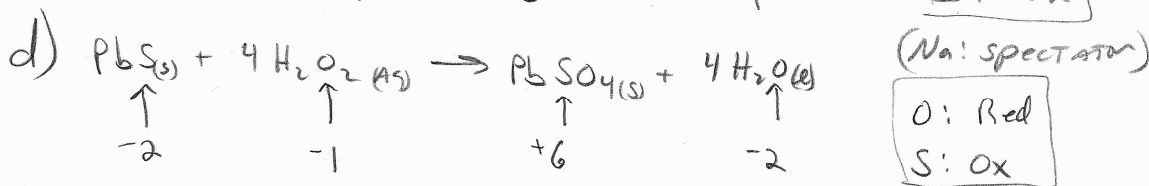
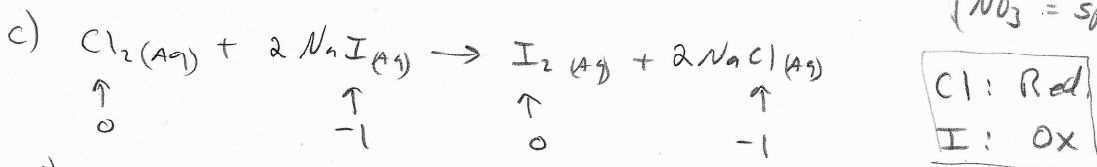
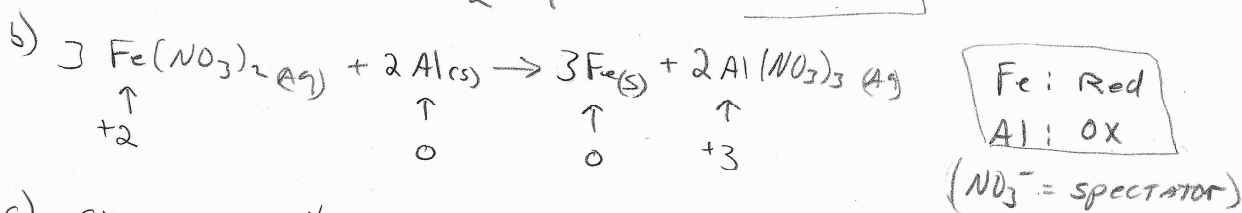
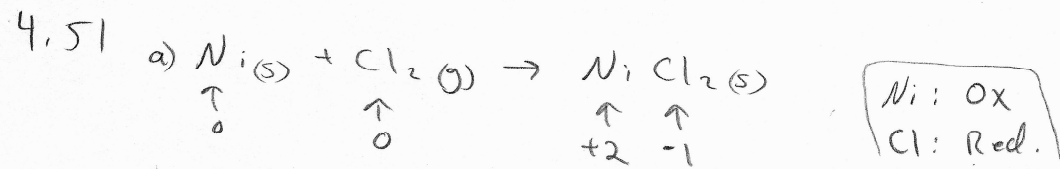
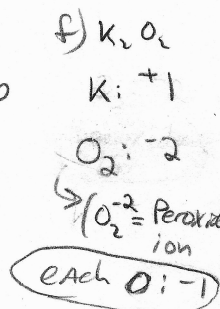
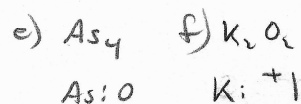
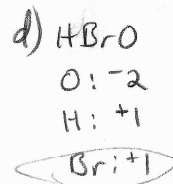
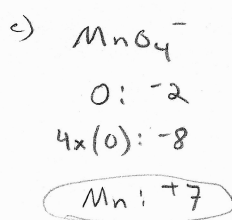
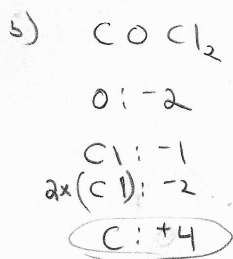
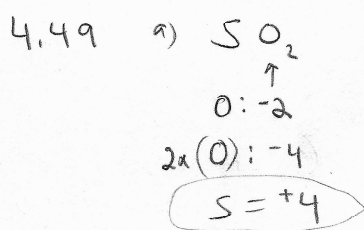


Chapter 4



4.61 a) $\frac{0.0345 \text{ mol NH}_4\text{Cl}}{400 \text{ mL}} \left(\frac{1 \text{ mL}}{10^{-3} \text{ L}} \right) = 0.0863 \text{ M NH}_4\text{Cl}$

b) $2.20 \text{ M HNO}_3 = 2.20 \frac{\text{mol HNO}_3}{\text{L}}$
 $2.20 \frac{\text{mol HNO}_3}{\text{L}} (35.0 \text{ mL}) \left(\frac{10^{-3} \text{ L}}{1 \text{ mL}} \right) = 0.0770 \text{ mol HNO}_3$

c) $1.50 \text{ M KOH} = 1.50 \frac{\text{mol KOH}}{\text{L}}$, or $1.50 \text{ mol KOH} = 1 \text{ L KOH}$ (conversion factor)
 $0.125 \text{ mol KOH} \left(\frac{1 \text{ L}}{1.50 \text{ mol KOH}} \right) \left(\frac{1 \text{ mL}}{10^{-3} \text{ L}} \right) = 83.3 \text{ mL}$

4.63 5.0 L blood
 0.135 M Na^+ in blood
 $\text{Na} = 23.3 \text{ g/mol}$
 $0.135 \frac{\text{mol}}{\text{L}} \text{Na}^+ (5.0 \text{ L}) \left(\frac{23.3 \text{ g}}{1 \text{ mol}} \right) = 16 \text{ g Na}^+$

4.65 a) $0.15 M \text{KBr} \left(\frac{0.25 \text{ L}}{1 \text{ mol}} \right) \left(\frac{119 \text{ g}}{1 \text{ mol}} \right) = 4.46 \text{ g KBr}$

b) 4.75 g $\text{Ca}(\text{NO}_3)_2$ in 0.200 L

MW $\text{Ca}(\text{NO}_3)_2 = 164.08 \text{ g/mol}$

$4.75 \text{ g Ca}(\text{NO}_3)_2 \left(\frac{1 \text{ mol Ca}(\text{NO}_3)_2}{164.08 \text{ g}} \right) \left(\frac{1}{0.200 \text{ L}} \right) = 0.145 M \text{Ca}(\text{NO}_3)_2$

c) 5.00 g Na_3PO_4 , 1.50 M Na_3PO_4

MW $\text{Na}_3\text{PO}_4 = 164 \text{ g/mol}$

$5.00 \text{ g Na}_3\text{PO}_4 \left(\frac{1 \text{ mol Na}_3\text{PO}_4}{164 \text{ g}} \right) \left(\frac{1 \text{ L}}{1.5 \text{ mol}} \right) = 20.3 \text{ mL Na}_3\text{PO}_4$

4.67 a) $0.20 \frac{\text{mol}}{\text{L}} \text{KCl} \left(\frac{1 \text{ mol K}^+}{1 \text{ mol KCl}} \right) = 0.20 \text{ mol K}^+$

$0.15 \frac{\text{mol}}{\text{L}} \text{K}_2\text{CrO}_4 \left(\frac{2 \text{ mol K}^+}{1 \text{ mol K}_2\text{CrO}_4} \right) = 0.30 \text{ mol K}^+, 0.15 M \text{K}_2\text{CrO}_4$

$0.080 \frac{\text{mol}}{\text{L}} \text{K}_3\text{PO}_4 \left(\frac{3 \text{ mol K}^+}{1 \text{ mol K}_3\text{PO}_4} \right) = 0.24 \text{ mol K}^+$

b) $0.15 \frac{\text{mol}}{\text{L}} \text{K}_2\text{CrO}_4 \left(\frac{10^{-3} \text{ L}}{1 \text{ mL}} \right) (30.0 \text{ mL}) \left(\frac{2 \text{ mol K}^+}{1 \text{ mol K}_2\text{CrO}_4} \right) = 0.009 \text{ mol K}^+$ 30.0 mL of 0.15 M K_2CrO_4

$0.080 \frac{\text{mol}}{\text{L}} \text{K}_3\text{PO}_4 \left(\frac{10^{-3} \text{ L}}{1 \text{ mL}} \right) (25.0 \text{ mL}) \left(\frac{3 \text{ mol K}^+}{1 \text{ mol K}_3\text{PO}_4} \right) = 0.006 \text{ mol K}^+$

4.69 d) 40 mL, 0.15 M KClO_3
35 mL, 0.22 M Na_2SO_4 TOTAL Volume = 75 mL

$40 \text{ mL KClO}_3 \left(\frac{0.15 \text{ mol KClO}_3}{1 \text{ L}} \right) \left(\frac{1}{75 \text{ mL}} \right) = 0.08 M \text{KClO}_3 = 0.08 M \text{K}^+, 0.08 M \text{ClO}_3^-$

$35 \text{ mL Na}_2\text{SO}_4 \left(\frac{0.22 \text{ mol Na}_2\text{SO}_4}{1 \text{ L}} \right) \left(\frac{1}{75 \text{ mL}} \right) = 0.10 M \text{Na}_2\text{SO}_4 \left(\frac{2 \text{ mol Na}^+}{1 \text{ mol Na}_2\text{SO}_4} \right) = 0.20 M \text{Na}^+$

$0.10 M \text{Na}_2\text{SO}_4 \left(\frac{1 \text{ mol SO}_4^{2-}}{1 \text{ mol Na}_2\text{SO}_4} \right) = 0.10 M \text{SO}_4^{2-}$

4.71 a) $C_i V_i = C_f V_f$

$V_i = \frac{C_f V_f}{C_i} = \frac{(0.250 M \text{NH}_3)(100.0 \text{ mL NH}_3)}{(14.8 M \text{NH}_3)} = 1.69 \text{ mL NH}_3$

b) $C_i V_i = C_f V_f$

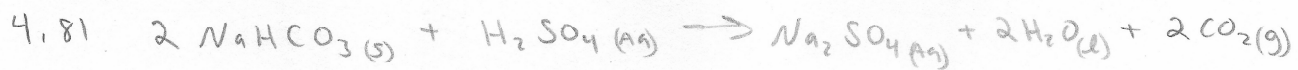
$C_f = \frac{C_i V_i}{V_f} = \frac{(14.8 M \text{NH}_3)(10.0 \text{ mL})}{(250 \text{ L}) \left(\frac{1 \text{ mL}}{10^{-3} \text{ L}} \right)} = 0.592 M \text{NH}_3$

4.73 a) MW $\text{C}_{12}\text{H}_{22}\text{O}_{11} = 342 \text{ g/mol}$

$0.150 \frac{\text{mol}}{\text{L}} (125 \text{ mL}) \left(\frac{10^{-3} \text{ L}}{1 \text{ mL}} \right) \left(\frac{342 \text{ g}}{1 \text{ mol}} \right) = 6.41 \text{ g C}_{12}\text{H}_{22}\text{O}_{11}$

b) 400 mL of 0.100 M $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ contains $400 \text{ mL} \left(\frac{10^{-3} \text{ L}}{1 \text{ mL}} \right) \left(\frac{0.100 \text{ mol}}{1 \text{ L}} \right) = 0.04 \text{ mol C}_{12}\text{H}_{22}\text{O}_{11}$

Stock: 1.50 M $\text{C}_{12}\text{H}_{22}\text{O}_{11}$, $0.04 \text{ mol C}_{12}\text{H}_{22}\text{O}_{11} \left(\frac{1 \text{ L}}{1.50 \text{ mol}} \right) = 0.0267 \text{ L Stock}$



if 27 mL of 6.0M H_2SO_4 spilled, that is:

$$27 \text{ mL} \left(\frac{10^{-3} \text{ L}}{1 \text{ mL}} \right) \left(\frac{6.0 \text{ mol}}{1 \text{ L}} \right) = 0.162 \text{ mol } \text{H}_2\text{SO}_4$$

$$0.162 \text{ mol } \text{H}_2\text{SO}_4 \left(\frac{2 \text{ NaHCO}_3}{1 \text{ mol } \text{H}_2\text{SO}_4} \right) = 0.324 \text{ mol } \text{NaHCO}_3$$

$$\text{MW } \text{NaHCO}_3 = 84 \text{ g/mol}$$

$$0.324 \text{ mol } \text{NaHCO}_3 \left(\frac{84 \text{ g}}{1 \text{ mol}} \right) = \boxed{27 \text{ g } \text{NaHCO}_3}$$