Chem 1314 Section 3
InClass Exercise #2
Fall 2000

Name_____

TA Name _____

Lab Section #_____

ALL work must be shown to receive full credit. **Due at the end of laboratory.**

ICE3.1. What volume of 0.778 M sodium carbonate solution must be diluted to 150.0 mLs with water to reduce its concentration to 0.0234 M Na_2CO_3?

ICE3.2. A 0.0945 g sample of $CuSO_4 \cdot 5H_2O$ is dissolved and diluted to the mark in a 500.0 mL volumetric flask. A 2.00 mL sample of this solution is transferred to a second 500.0 mL volumetric flask and diluted.

a) What is the molarity of the $CuSO_4$ in the final solution?

b) To prepare the solution directly what mass of $CuSO_4 \cdot 5H_2O$ must be weighed out?

ICE3.3. Describe how you would prepare 250.0 mLs of a 0.0100 M solution of $KMnO_4$.

ICE3.4. Given the reaction

$$PbO_{2(s)} + HNO_{3(aq)} \rightarrow Pb(NO_3)_{2(aq)} + H_2O_{(l)} + 2O_{2(g)}$$

a) Balance the chemical equation.

b) What volume of 1.23 M nitric acid is required to react with 15.0 g of lead(IV) oxide according tot he equation?

ICE3.5. Phosphoric aciid can be produced according to the reaction

$$Ca_5(PO_4)_3F_{(s)} + 5H_2SO_{4(aq)} + 10H_2O_{(l)} \rightarrow 3H_3PO_{4(aq)} + 5(CaSO_4 \cdot 2H_2O)_{(s)} + HF_{(aq)}$$

a) What volume of 2.50 M phosphoric acid is generated by the reaction of 500. g of $Ca_5(PO_4)_3F$ with excess sulfuric acid?

b) What volume of 3.00 M sulfuric acid is required to react with amount of $Ca_5(PO_4)_3F$ in part a?

ICE3.6. Given the reaction

$$K_2Cr_2O_{7(aq)} + 6Fe(NO_3)_{2(aq)} + 14H^+_{(aq)} \rightarrow 2Cr^{3+}_{(aq)} + 6Fe^{3+}_{(aq)} + 7H_2O_{(l)} + 2KNO_{3(aq)}$$

a) A solution of $Cr_2O_7^{2-}$ is prepared by dissolving 9.34 g of $K_2Cr_2O_7$ in 400.0 mL of water. (Assume no significant change in volume when the solution is prepared.) A total 14.75 mL of this solution is required to reach the end-point in a titration of a 250.0 mL sample containing Fe(II). Determine the concentration of Fe(II) in the solution.

b) Calculate the mols of H^+ required to react with the amount of $K_2Cr_2O_{7(aq)}$ and $6Fe(NO_3)_{2(aq)}$ used in part a.

c) If this number of mols of H^+ are dissolved in 300. MLs, calcualte the concentration of H^+.

ICE3.7. Write the chemical formula(s) of the product(s) and balance the following reactions. Identify all products phases as either (g)as, (l)iquid, (s)olid or (aq)ueous. If no reaction occurs write NR.

a) $Al_{(s)} + Fe_2O_{3(s)} \rightarrow$

b) $Na_2SO_{4\,(aq)} + NH_4Cl_{(aq)} \rightarrow$

c) $Mg_{(s)} + Cu^{2+}{}_{(aq)} \rightarrow$

d) $Na_2CO_{3(aq)} + Fe(NO_3)_{3\,(aq)} \rightarrow$

ICE3.8. Write the ionic and net ionic chemical equations for 1b) and 1d).

1b)

Ionic equation:

Net Ionic equation:

1d)

Ionic equation:

Net Ionic equation:

ICE3.9. Calculate the mass of manganese(II) sulfate that forms with 0.680 mLs of 2.44×10^{-3} M $KMnO_4$ react with 1.25 g of potassium permanganate in excess sulfuric acid. The equation which describes the reaction between oxalic acid, potassium permanganate and sulfuric acid is,

$$2KMnO_{4(aq)} + 5H_2C_2O_{4(aq)} + 3H_2SO_{4(aq)} \rightarrow K_2SO_{4\,(aq)} + 2MnSO_{4(aq)} + 10CO_{2(g)} + 8H_2O_{(l)}$$