WS 6 - Redox Stoichiometry

1. A 2.75 g piece of aluminum is placed in 250 mL of iron(III) nitrate solution. Assuming that the reaction reaches endpoint, calculate the concentration of the $Fe^{3+}(aq)$ ions.

2. If 6.00 mol/L nitric acid is poured into a beaker containing 50.0 mL of 1.50 mol/L hydrogen peroxide, what volume of acid is needed to reach endpoint?

3. If 30.0 mL of acidic dichromate ion solution is poured into a beaker containing 50.0 mL of 0.400 mol/L tin(II) nitrate, calculate the dichromate ion concentration and the $Sn^{4+}(aq)$ concentration.

4. Bromine can be obtained by bubbling chlorine gas through sea water. The concentration of bromide ions in sea water is 0.00020 mol/L. What mass of chlorine gas is needed to oxidize all the bromide ions in 1000 L of water?

5. ~~Copper (II) nitrate can be produced by reacting copper metal with concentrated nitric acid. What volume of 15 mol/L nitric acid is needed to react with 12.7 g of copper?~~

6. The copper (II) ions in a solution can be converted to copper metal by trickling the solution over iron. The reaction produces iron (II) ions from the scrap iron. If the process produces 25 L of solution containing 0.0020 mol/L of $Fe^{2+}(aq)$ ions, what mass of copper is produced?

7. In an experiment to analyze the iron in an iron ore sample, 0.05000 mol/L $K_2Cr_2O_7(aq)$ was used in an acidic solution to oxidize $Fe^{2+}(aq)$ ions to $Fe^{3+}(aq)$ ions. Use the following data to calculate the concentration of $Fe^{2+}(aq)$ in the solution:

   volume of $Fe^{2+}(aq)$ solution…….25.0 mL
   final buret reading ($K_2Cr_2O_7(aq)$)……48.7 mL
   initial buret reading…….3.7 mL

8. Another experiment was used to analyze the tin in a tin ore sample. The $Sn^{2+}(aq)$ ions in an acidic solution were oxidized to $Sn^{4+}(aq)$ by a 0.200 mol/L $KMnO_4(aq)$ solution. Use the following information to calculate the concentration of $Sn^{2+}(aq)$ in the solution.

   volume of $Sn^{2+}(aq)$ solution…….10.0 mL
   final buret reading ($KMnO_4(aq)$)…….39.3 mL
   initial buret reading…….1.8 mL