Unit 4 – Chapter 4 Pre-Lab Questions: **Name _____**

Permanganate Determination of the Iron Sample **Period _____**

Redox prelab problems:

1) A solution of permanganate was standardized by titration with oxalic acid ($H_2C_2O_4$). It required 28.97 mL of the permanganate solution to react completely with 0.1058 grams of oxalic acid. The unbalanced equation for the reaction is:

$$MnO_4^-{}_{(aq)} + H_2C_2O_{4(aq)} \rightarrow Mn^{2+}{}_{(aq)} + CO_{2(aq)}$$

Calculate the molarity of the permanganate solution.

2) A 50.00 mL sample of solution containing Fe^{2+} ions is titrated with a 0.0216 *M* $KMnO_4$ solution. It required 20.62 mL of the $KMnO_4$ solution to oxidize all the Fe^{2+} ions to Fe^{3+} ions by the reaction:

$$MnO_4^-{}_{(aq)} + Fe^{2+}{}_{(aq)} \rightarrow Mn^{2+}{}_{(aq)} + Fe^{3+}{}_{(aq)} \quad \text{(unbalanced)}$$

a. What was the concentration of the Fe^{2+} ions in the sample solution?

b. What volume of 0.0150 *M* $K_2Cr_2O_7$ solution would it take to do the same titration? The reaction is:

$$Cr_2O_7^{2-}{}_{(aq)} + Fe^{2+}{}_{(aq)} \rightarrow \quad Cr^{3+}{}_{(aq)} + Fe^{3+}{}_{(aq)}$$

3) The iron content of iron ore can be determined by titration with standard $KMnO_4$ solution. The iron ore is dissolved in HCl and all the iron is reduced to Fe^{2+} ions. This solution is then titrated with $KMnO_4$ solution, producing Fe^{3+} and Mn^{2+} ions in acidic solution. If it required 41.95 mL of 0.0205 *M* $KMnO_4$ to titrate a solution made from 0.6128 grams of iron ore, what is the mass percent of iron in the iron ore?