CHEM 201 Self Quiz – 2 (Gravimetric analysis/Volumetric analysis)

1. Calculate the solubility product constant for SrF_2 given the molar concentration of the saturated solution is 8.6×10^{-4} M.

2. Calcium fluoride, CaF_2, is a sparingly soluble salt with a $K_{sp} = 3.9 \times 10^{-11}$.

(a) Calculate its molar solubility in a saturated solution.

(b) Calculate its molar solubility in a saturated aqueous solution that is also 0.050 M in fluoride ion, F^-.

3. A solution containing 250 mL of 2.00×10^{-4} M $Ni(NO_3)_2$ is mixed with 250 mL of a solution containing 4.00×10^{-8} M Na_2S. The solubility product constant (K_{sp}) for NiS is 3.00×10^{-21}. Show all your work.

(a) Write the net ionic reaction that occurs.

(b) What are the initial concentrations of the predominant species participating in the net ionic reaction (prior to the reaction)?

(c) Does a precipitate form? Justify your answer with the calculation that demonstrates whether or not a precipitate forms.

4. Distinguish between end point and equivalence point.

5. Consider the following reaction

$$5\ H_2C_2O_4 + 2\ KMnO_4^- + 6\ H^+ \longrightarrow 10\ CO_2 + 2\ Mn^{2+} + 8\ H_2O$$

How many milliliters of 0.165 M $KMnO_4$ are needed to react with 108.0 mL of 0.165 M oxalic acid? How many milliliters of 0.165M oxalic acid are required to react with 108 mL of 0.165 M $KMnO_4$?

6. Why solubility of an ionic compound increases as the ionic strength of the solution increases?

7. Find the activity coefficient of each ion at the indicated ionic strength:

(a) SO_4^{2-} (= 0.01 M)
(b) Sc^{3+} (= 0.005 M)

8. Calculate the concentration of Hg_2^{2+} in saturated solutions of Hg_2Br_2 in:
(a) 0.001 M KNO_3
(b) 0.01 M KNO_3
(c) 0.1 M KNO_3