Chapters 16 Questions

Section 16.1(a)

1) Why is the concentration of undissolved solid not explicitly included in the expression of solubility product constant?

2) What is in equilibrium when a solid partially dissolves?

3) Write the expression for the solubility product constant for each of the following semi-soluble strong electrolytes:
a) AgI
b) $SrSO_4$
c) $Fe(OH)_3$
d) $Ca_3(PO_4)_2$
e) CoS
f) Ag_2CO_3

4a) If the molar solubility of CaF_2 at 35 ^oC is 1.24×10^{-3} M, what is the K_{sp} at this temperature?
b) It is found that 0.011 g of SrF_2 dissolves per 100 mL of aqueous solution at 25 ^oC. Calculate the solubility product for SrF_2.
c) The molar solubility of silver bromate in water is very small, 7.42×10^{-7} M. What is the solubility product for silverbromate?
d) 0.0279 g of barium carbonate will dissolve in 2.00 L of water. What is the solubility product for barium carbonate?
e) In 250 mL of water, 0.00241 g of magnesium hydroxide will dissolve. What is the solubility product constant for magnesium hydroxide?
f) Lanthanum iodate has a molar solubility of 2.29×10^{-4} M. What is the Ksp for $La(IO_3)_3$?

Section 16.1(b)

5a) The K_{sp} for $Ba(IO_3)_2$ at 25 ^oC is 6.0×10^{-10}. What is the molar solubility of $Ba(IO_3)_2$?
b) The $K_{sp} = 1.6 \times 10^{-30}$ for chromium (III) hydroxide. What are the concentrations of the ions in solution?
c) Cadmium (II) sulfide has a $Ksp = 8 \times 10^{-28}$. How many grams of cadmium sulfide will dissolve in 10.0 L of water?
d) Lead (II) chloride has a solubility product of 1.7×10^{-5}. What is the maximum amount of lead (II) chloride that will dissolve in 500 mL of water?
e) Silver sulfate will dissolve in water with a Ksp of 1.5×10^{-5}. What would be the molar solubility of each ion when dissolved?
f)) A 1.00 L solution saturated at 25 ^oC with calcium oxalate is evaporated to dryness, giving a 0.0061 g residue of calcium oxalate. Calculate the solubility product constant for this salt.

6a) How does the addition of solid NaF to a CaF_2 solution affect the solubility of the CaF_2. Explain in terms of equilibrium.
b) What would you see happen in the beaker when this is done?

7) Using Appendix 5.4, calculate the molar solubility of AgBr in
a) pure water
b) 0.030 M $AgNO_3$ solution
c) 0.10 M NaBr solution

8) Calculate the molar solubility of $Fe(OH)_2$ when buffered at
a) pH = 7.0
b) pH = 11.0

Section 16.1(c)

9) Ion product is the multiplication of ion concentrations in a similar fashion to solubility product.
a) How can ion product be used to determine whether a solid will form?
b) What values of ion product will indicate the formation of a solid?

10a) Will calcium hydroxide precipitate from solution if the pH of a 0.050 M solution of calcium chloride is adjusted to 8.0?

b) Two solutions are mixed such that the final concentrations of $[Ca^{+2}] = 0.00525$ M and $[SO_4^{-2}] = 0.0125$ M. Will a precipitate form?
c) Will silver (I) sulfate precipitate when 10 mL of 0.050 M silver (I) nitrate is mixed with 10 mL of 5.0×10^{-2} M sodium sulfate?
d) Will $AgIO_3$ precipitate when 100 mL of 0.050 M $AgNO_3$ is mixed with 100 mL of 0.015 M $NaIO_3$ ($K_{sp} = 3.1 \times 10^{-8}$ for $AgIO_3$)?
e) If 0.003 grams of tin (II) nitrate and 0.0045 grams of sodium sulfide are dissolved in 1.0 L of water. Would a precipitate form?