Ksp Practice Problems

Name: Key Per: __

Use your notes or read the portion of "Using solubility product constants" (pg.614-617). Pay attention to any and all examples!

1. What is the solubility product constant and when is it used?
The equilibrium constant expression for the dissolving of a sparingly soluble compound

2. How can you use the solubility product constant to calculate the solubility of a sparingly soluble ionic compound?
write the dissociation equation
write the Ksp expression
substitute "x"
plug in Ksp value
solve for x

3. How can you calculate ion concentration using the solubility product constant?
State the equation for the solubility equilibrium
write the Ksp expression
Substitute "x"
Combine terms
Calculate & solve for x

3 Write the Ksp expression for the following compounds:

a. PbF_2 $K_{sp} = [Pb^{2+}][F^-]^2$

b. $Zn(OH)_2$ $K_{sp} = [Zn^{2+}][OH^-]^2$

c. $MgCO_3$ $K_{sp} = [Mg^{2+}][CO_3^{2-}]$

4 Use the Ksp values from the table to calculate the following: (Show all of your work)

a. The solubility in mol/L of $PbCrO_4$

$K_{sp} = [Pb^{2+}][CrO_4^{2-}]$

$2.3 \times 10^{-13} = x^2$

$\sqrt{2.3 \times 10^{-13}} = x = 4.80 \times 10^{-7}\ M$

b. The solubility in mol/L of Ag_2SO_4

$K_{sp} = [Ag^+]^2[SO_4^{2-}]$

$K_{sp} = (2x)^2 x$

$K_{sp} = 4x^3$

$1.2 \times 10^{-5} = 4x^3$

$x^3 = 3 \times 10^{-6}$

$x = \sqrt[3]{3 \times 10^{-6}}$

$x = .0144$

$[X] = .0144\ M$

c. $[F^-]$ in a saturated solution of CaF_2 at equilibrium.

$K_{sp} = [Ca^{2+}][F^-]^2$

$K_{sp} = x \cdot (2x)^2$

$K_{sp} = 4x^3$

$3.5 \times 10^{-11} = 4x^3$

$x^3 = 8.75 \times 10^{-12}$

$x = \sqrt[3]{8.75 \times 10^{-12}} = 2.06 \times 10^{-4}$

$[F^-] = 2x$, so $2(2.06 \times 10^{-4}) = 4.12 \times 10^{-4}\ M$

Compound	Ksp at 298 K
$PbCrO_4$	2.3×10^{-13}
Ag_2SO_4	1.2×10^{-5}
CaF_2	3.5×10^{-11}