Solubility Product Worksheet

1) What is the concentration of a saturated silver (I) acetate solution? $K_{sp}(AgC_2H_3O_2) = 1.94 \times 10^{-3}$.

2) What is the concentration of a saturated lead chloride solution? $K_{sp}(PbCl_2) = 1.17 \times 10^{-5}$.

3) I have discovered a new chemical compound with the formula A_2B. If a saturated solution of A_2B has a concentration of 4.35×10^{-4} M, what is the solubility product constant for A_2B?

4) Solubility product constants are usually specified for 25^0 C. Why does the K_{sp} value for a chemical compound depend on the temperature?

5) The K_{sp} for nickel (II) hydroxide is 5.47×10^{-16}. What is the base dissociation constant for nickel (II) hydroxide?

Solubility Product Worksheet - Answers

1) What is the concentration of a saturated silver (I) acetate solution? $K_{sp}(AgC_2H_3O_2) = 1.94 \times 10^{-3}$.

Since $K_{sp} = [Ag^+][C_2H_3O_2^-]$, and the concentration of silver ions is the same as the concentration of acetate ions, we can set up the following equation:

$$1.94 \times 10^{-3} = x^2$$
$$x = 0.0440\ M$$

2) What is the concentration of a saturated lead chloride solution? $K_{sp}(PbCl_2) = 1.17 \times 10^{-5}$.

$K_{sp} = [Pb^{+2}][Cl^-]^2$. Since the concentration of chloride ions is twice that of lead (II) ions, this boils down to the following equation:

$$1.17 \times 10^{-5} = (x)(2x)^2$$
$$1.17 \times 10^{-5} = 4x^3$$
$$x = 0.0143\ M$$

3) I have discovered a new chemical compound with the formula A_2B. If a saturated solution of A_2B has a concentration of 4.35×10^{-4} M, what is the solubility product constant for A_2B?

$K_{sp} = [A^+]^2[B^{2-}]$. Since the concentration of A is twice that of B, and the concentration of B is 4.35×10^{-4} M, we can set up the following equation:

$$K_{sp} = [2(4.35 \times 10^{-4}\ M)]^2\ [4.35 \times 10^{-4}\ M]$$
$$K_{sp} = 3.29 \times 10^{-10}$$

4) Solubility product constants are usually specified for 25^0 C. Why does the K_{sp} value for a chemical compound depend on the temperature?

K_{sp} depends on temperature because solubility depends on temperature. Generally, solids become more soluble as the temperature of the solution increases. As a result, K_{sp} values of solids tend to increase as the temperature increases.

5) The K_{sp} for nickel (II) hydroxide is 5.47×10^{-16}. What is the base dissociation constant for nickel (II) hydroxide?

5.47×10^{-16}. Because nickel (II) hydroxide dissociates to become a base, the K_{sp} and K_b values are identical.