

Chapter Summary: Solubility Equilibrium

Solubility Product (K_{sp}): Is a value that indicates how much of the salt is present in the solution at a particular temperature.

For example: $A_mB_n \rightleftharpoons mA^+ + nB^{2-}$

$$K_{sp} = [A^+]^m[B^{2-}]^n$$

Common ion effect: Shift of equilibrium when a salt is added.

Solubility Quotient (Q_{ip}): determines if precipitation will occur (similar to Q_c in equilibrium chapter)

$Q_{ip} > K_{sp}$ = precipitation occurs

$Q_{ip} = K_{sp}$ = saturation of solution

$Q_{ip} < K_{sp}$ = precipitation will not occur

(In general very small value of K_{sp} indicates complete precipitation)

Factors affecting solubility: common ion effect and pH, complex ion formation

Effect of pH on solubility: pH of a solution will affect solubility if the conjugate ion (acid or base) is acidic or basic. E.g. Cl^- is very weak conjugate base (CB) and is not considered basic, whereas HCO_3^- is weak CB whose solubility is affected by the pH.

Complex Ions: A complex ion is polyatomic anion or cation consisting of central metal ion and is associated with other groups called ligands. Common ligands are anions Cl^- and OH^- and molecules NH_3 and H_2O .

Selective/Fractional Precipitation: Can be done by calculating the amount of ion needed for precipitation.

Qualitative Inorganic Analysis: Separation of a mixture of cations on the basis of their solubility in different conditions (acidic, basic, complex ion formation).

Key Words

Solubility equilibrium constant	Solubility quotient	Common ion effect
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