

Solubility Key concepts

equations

$CA \rightleftharpoons C^{+} + A^{-}$ $C_{2}A \rightleftharpoons 2C^{+} + A^{-}$ $CA_{2} \rightleftharpoons C^{+} + 2A^{-}$

Solubility expressions

$$K_s(CA) = [C] [A]$$
 $K_s(C_2A) = [C]^2 [A]$
 $K_s(CA_2) = [C] [A]^2$

Ks/s calculations

$$K_s(CA) = s^2$$
 $s(CA) = \sqrt{k_s}$
 $K_s(C_2A) = 4s^3$ $s(C_2A) = \sqrt[3]{k_s}/4$

$$C = cation A = anion$$

Equilibrium effects

Acids increase solubility if the salt contains a carbonate

Bases increase solubility if the salt contains a cation that forms a complex ion When pH is above 10

Bases decrease solubility if the salt contains a hydroxide ion

This occurs when pH is above 4 but below 10

Common ion effect

Ks is the maximum concentration of ions the solution can hold (at a given temperature)

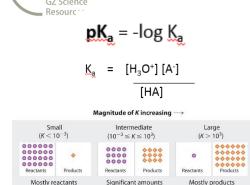
If IP > Ks then precipitate

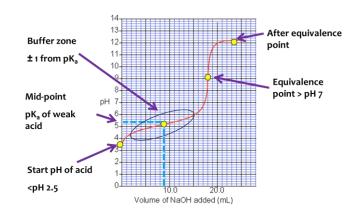
If IP < Ks then no precipitate

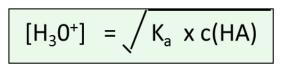
IP = ionic product

Ks = solubility product

Acid/Base Key concepts







$$[OH^{-}] = \int K_b \times c(B)$$

K_a and pK_a

of reactants and products

Composition of equilibrium mixture

titration curves

pH calculations

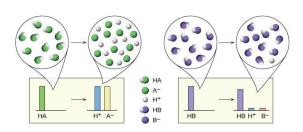
buffers

 $[H_3O^+] = \underbrace{Ka}_{a} \times \underbrace{[\text{weak acid}]}_{[\text{conjugate base}]} \qquad OR \quad pH = \underbrace{pKa}_{a} + log \quad [A-]_{[HA]}$ $[\text{Weak acid or conjugate base}] = \underbrace{\text{original concentration x original volume}}_{final \ volume}$

conjugate acid/base

Weak acid base conjugate base conjugate acid HA + H₂O A⁻ + H₃O⁺ transfer of H⁺ paired base acid conjugate acid conjugate base B + H₂O BH⁺ + OH⁻

species in solution



conductivity

