DPP–13 (Common Ion Effect)

Chapter: Ionic Equilibrium

"Stop saying 'I'll do it tomorrow.' One day, there won't be a tomorrow left."

Q1. Solubility of AgBr will be minimum in :-

Solubility decreases maximum when **common ion concentration is highest**.

$AgBr(s) \rightleftharpoons Ag^+ + Br^-$. $CaBr_2$ gives **2 Br^- per formula unit**, hence strongest common ion effect.

Correct option: (2) 0.1 M $CaBr_2$

Q2. In which of the following, the solubility of AgCl will be maximum :-

Maximum solubility occurs when **no common ion is present**.

Correct option: (2) Water

Q3. The correct order of increasing solubility of AgCl in (A) Water (B) 0.1 M NaCl (C) 0.1 M $BaCl_2$ (D) 0.1 M NH_3 is

NH_3 forms complex with Ag^+ $\Rightarrow$ increases solubility. $BaCl_2$ gives **2 Cl^-** $\Rightarrow$ strongest suppression.

Order (lowest to highest): $BaCl_2 < NaCl < Water < NH_3$

Correct option: (4) C < B < A < D

Q4. Solubility of Ag_2CO_3 will be maximum in :-

NH_3 removes Ag^+ by complex formation $\Rightarrow$ shifts equilibrium forward.

Correct option: (4) 0.05 M NH_3

Q5. If K_{sp} of CaF_2 is 1.7×10^{-10}, solubility in 0.1 M NaF is :-

Common ion F^- present, assume $[F^-] \approx 0.1$ M.

$K_{sp} = [\mathrm{Ca}^{2+}][F^-]^2 \ 1.7 \times 10^{-10} = s(0.1)^2 \ s = 1.7 \times 10^{-8}$

Correct option: (3)

Q6. Solubility of AgCl ($K_{sp} = 1.6 \times 10^{-10}$) in 0.1 M NaCl is :-

$[Cl^-] \approx 0.1$ M (dominant common ion).

$K_{sp} = s(0.1) \ s = 1.6 \times 10^{-9}$ M

Correct option: (4)

Q7. If solubility of $\mathrm{PbCl_2}$ in water is 0.01 M, its solubility in 0.1 M NaCl is :-

$\mathrm{PbCl_2}$: $K_{sp} = 4s^3$. First calculate K_{sp}.

$K_{sp} = 4(0.01)^3 = 4 \times 10^{-6}$ In 0.1 M NaCl: $K_{sp} = s(0.1)^2 \ s = 4 \times 10^{-4}$

Correct option: (2)

Q8. Solubility of $\mathrm{XB_2}$ is X in water. Solubility in 10^{-3} M YB is :-

$\mathrm{XB_2}$: $K_{sp} = 4X^3$. Common ion $\mathrm{B^-}$ present.

$4X^3 = s(10^{-3})^2 \ s = 4X^3 \times 10^{-6}$

Correct option: (1)

Q9. Ratio of solubility of AgCl in 0.1 M $\mathrm{AgNO_3}$ and pure water :-

$s_{\text{water}} = \sqrt{K_{sp}}$; $s_{\mathrm{AgNO_3}} = \dfrac{K_{sp}}{0.1}$.

$s_{\text{water}} = 1.34 \times 10^{-5} \ s_{\mathrm{AgNO_3}} = 1.8 \times 10^{-9}$ Ratio $= 1.34 \times 10^{-4}$

Correct option: (2)

Q10. K_{sp} of $\mathrm{Mg(OH)_2}$ is 4×10^{-12}. Moles of $\mathrm{Mg^{2+}}$ in 0.1 M NaOH :-

$[OH^-] \approx 0.1$ due to common ion.

$K_{sp} = s(0.1)^2 \ s = 4 \times 10^{-10}$ mol

Correct option: (1)

Q11. 200 mL 0.005 M $AgNO_3$ + 300 mL 0.01 M KCl, find max $[Ag^+]$.

Find limiting reagent, then use K_{sp} equilibrium.

Moles $Ag^+ = 0.001$, $Cl^- = 0.003 \Rightarrow$ excess Cl^-. $K_{sp} = s(0.004)$ $s = \dfrac{1.8 \times 10^{-10}}{0.004} = 4.5 \times 10^{-8}$

Correct option: (2)

Weird Chemist Tip: Common ion ka matlab simple hai — jo already hai, wahi sabse zyada roke ga.