

Daily Tutorial Sheet - 13

Level-3

147.(BCD) $h = \sqrt{\frac{K_h}{C}} = \sqrt{\frac{K_w}{K_b \cdot C}}$

'C' decreases with dilution $\Rightarrow$ h increases

If K_b decreases, h increases

If temperature decreases, K_w decreases $\Rightarrow$ h decreases

148.(ABD) For AgCl precipitation

$$[\text{Ag}^+]_{\text{needed}} = \frac{K_{\text{sp}}(\text{AgCl})}{[\text{Cl}^-]} = \frac{10^{-10}}{0.05} = 2 \times 10^{-9} \text{M}$$

For AgI precipitation

$$[\text{Ag}^+]_{\text{needed}} = \frac{K_{\text{sp}}(\text{AgI})}{[\text{I}^-]} = \frac{4 \times 10^{-16}}{0.05} = 8 \times 10^{-15} \text{M}$$

$\therefore$ AgI precipitates out first

149.(A) Salt having lower K_{sp} precipitates first

150.(C) $[\text{S}^{2-}] = \frac{K_{\text{sp}}(\text{NiS})}{(\text{Ni}^{2+})} = \frac{3 \times 10^{-21}}{0.1} = 3 \times 10^{-20} \text{M}$

For precipitation of NiS

$$[\text{S}^{2-}] = \frac{K_{a_1} \cdot K_{a_2} [\text{H}_2\text{S}]}{[\text{H}^+]^2}$$

$$\Rightarrow [\text{H}^+]^2 = \frac{10^{-7} \times 10^{-14} \times 0.1}{3 \times 10^{-20}} = \frac{1}{300}$$

$$[\text{H}^+] = \frac{1}{10\sqrt{3}}$$

$$\text{pH} = -\log \frac{1}{10\sqrt{3}} = \log 10\sqrt{3} = 1 + \frac{1}{2} \log 3 = 1 + 0.24 = 1.24$$

151.(B) All the salts NiS, CdS, SnS are of the type AB and one ion S^{2-} is common

$\therefore$ Lower is the K_{sp} earlier is the precipitation.

152.(A) $\text{S}^{2-} = \frac{[K_{a_1} \cdot K_{a_2}][\text{H}_2\text{S}]_{\text{satd.}}}{[\text{H}^+]^2}$

$$= \frac{10^{-7} \times 10^{-14} \times 0.1}{0.1 \times 0.1} = 10^{-20} \text{M}$$

$$\text{Cd}^{2+} = \frac{K_{\text{sp}}(\text{CdS})}{[\text{S}^{2-}]} = \frac{10^{-28}}{10^{-20}} = 10^{-8} \text{M}$$