

1. (b) Solubility of $Al_2(SO_4)_3$



$$K_{sp} = [Al^{3+}]^2 [SO_4^{2-}]^3$$

2. (c) Due to common ion effect.

3. (b) $MX_2 \rightleftharpoons M_S^{2+} + 2X_{2S}^{-}$

$$K_{sp} = (2S)^2 (S) = 4S^3$$

$$\Rightarrow S = 2\sqrt[3]{\frac{K_{sp}}{4}} = \sqrt[3]{\frac{4 \times 10^{-12}}{4}} = 1.0 \times 10^{-4} M.$$

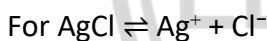
4. (b) Solubility product

EXPLANATION (easy to remember):

For sparingly soluble salts, in a *saturated solution*, the concentration of ions reaches equilibrium.

The product of concentrations of the ions in this state is constant → this is called the Solubility Product (K_{sp}).

Example:



$$K_{sp} = [Ag^+] \times [Cl^-]$$

5. (b) $MX_2 \rightleftharpoons M_{(S)}^+ + 2X_{(2S)}^-; K_{sp} = 4S^3$

$$S = \sqrt[3]{\frac{K_{sp}}{4}} = \sqrt[3]{\frac{1 \times 10^{-11}}{4}} = 1.35 \times 10^{-4}$$

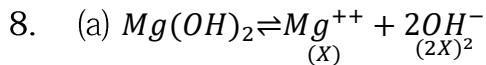
6. (d) $\text{mol}^2 \text{ L}^{-2}$

$$\text{Unit} = (\text{mol} \cdot \text{L}^{-1}) \times (\text{mol} \cdot \text{L}^{-1}) = \text{mol}^2 \cdot \text{L}^{-2}$$

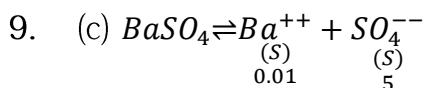
7. (c) HgS



Lowest K_{sp} → Precipitates first

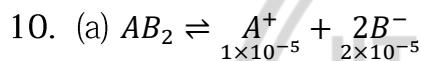


$$K_{sp} = 4X^3$$

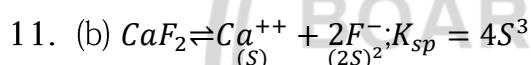


$$K_{sp} = S^2 = S \times S = 0.01 \times S$$

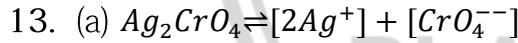
$$S_{(SO_4^{--})} = \frac{K_{sp}}{S_{(Ba^{++})}} = \frac{1 \times 10^{-9}}{0.01} = 10^{-7} \text{ mole/litre}$$



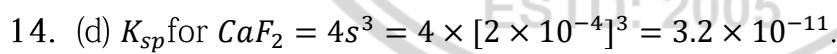
$$K_{sp} = [1 \times 10^{-5}][2 \times 10^{-5}]^2 = 4 \times 10^{-15}$$



12. (b) Due to common ion effect.



$$\text{Hence } K_{sp} = [Ag^{+}]^2[CrO_4^{--}]$$

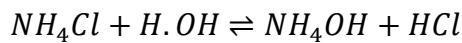


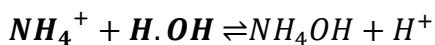
15. (d) The concentration of S^{2-} -ions in group II is lowered by maintaining acidic medium

in the presence of NH_4Cl . The ionization of H_2S is suppressed due to common ion

effect. So the ionic product is less than solubility product.

16. (b) NH_4Cl is hydrolysed and give $[H^{+}]$





17. (c) FeCl_3 is a salt of weak base (Fe(OH)_3) and strong acid (HCl).
18. (c) For the precipitation of an electrolyte, it is necessary that the ionic product must exceed its solubility product.
19. (d) $K_{sp} = [\text{Ag}^+]^2[\text{CrO}_4^{2-}] = [2S]^2[0.01]$
 $= 4S^2[0.01] = 4[2 \times 10^{-8}]^2 \times 0.01 = 16 \times 10^{-18}$.

20. (c) Complex salts contain two different metallic elements but give test for only one of them. e.g. $\text{K}_4\text{Fe(CN)}_6$ does not give test for Fe^{3+} ions.

