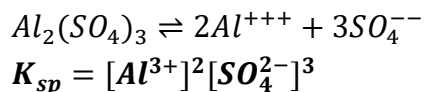


1. (b) Solubility of  $Al_2(SO_4)_3$



2. (c) Due to common ion effect.

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

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

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

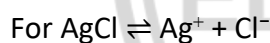
4. (b) Solubility product

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  $\rightarrow$  this is called the Solubility Product ( $K_{sp}$ ).

Example:



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

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

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

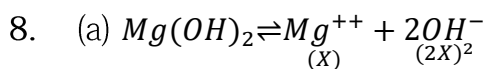
6. (d)  $\text{mol}^2 \text{L}^{-2}$

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

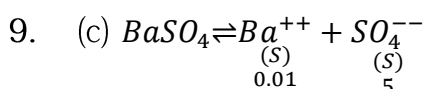
7. (c) HgS



Lowest  $K_{sp} \rightarrow$  Precipitates first

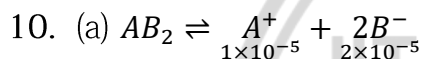


$$K_{sp} = 4X^3$$

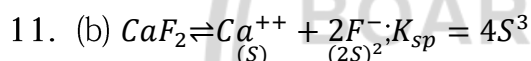


$$K_{sp} = S^2 = S \times S = 0.01 \times S$$

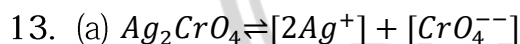
$$S_{(SO_4^{2-})} = \frac{K_{sp}}{S_{(Ba^{++})}} = \frac{1 \times 10^{-9}}{0.01} = 10^{-7} \text{ mole/litre}$$



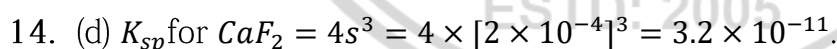
$$K_{sp} = [1 \times 10^{-5}][2 \times 10^{-5}]^2 = 4 \times 10^{-15}$$



12. (b) Due to common ion effect.



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

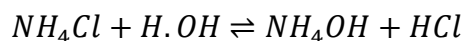


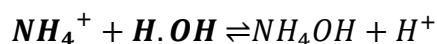
15. (d) The concentration of  $S^{2-}$  ions in group II is lowered by maintaining acidic medium

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)  $K_{sp} = [Ag^+]^2[CrO_4^{2-}] = [2S]^2[0.01]$   
 $= 4S^2[0.01] = 4[2 \times 10^{-8}]^2 \times 0.01 = 16 \times 10^{-18}$ .
20. (c) Complex salts contain two different metallic elements but give test for only one of them. e.g.  $K_4Fe(CN)_6$  does not give test for  $Fe^{3+}$  ions.

