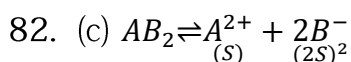


$$K_{sp} = S^2 \Rightarrow S = \sqrt{K_{sp}}; K_{sp} = [Ba^{2+}] \times [SO_4^{2-}]$$

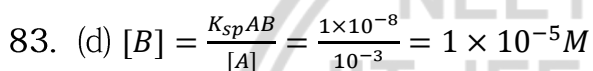
$$4 \times 10^{-10} = [1 \times 10^{-4}] \times [SO_4^{2-}]$$

$$[SO_4^{2-}] = \frac{4 \times 10^{-10}}{1 \times 10^{-4}} = 4 \times 10^{-6}.$$



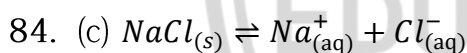
$$K_{sp} = 4S^3$$

$$S = \sqrt[3]{\frac{K_{sp}}{4}} = \sqrt[3]{\frac{4 \times 10^{-12}}{4}} = 1 \times 10^{-4} \text{ gm.mol/litre}$$



Where ionic product  $> K_{sp}$ , ppt formed

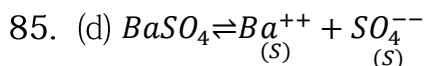
$\therefore$  8 should be more than  $10^{-5} M$ .



$HCl \rightleftharpoons H^{+} + Cl^{-}$ . The increase in  $[Cl^{-}]$  brings in an increase in  $[Na^{+}][Cl^{-}]$  which will lead for backward reaction because

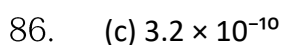
$$K_{sp}(NaCl) = [Na^{+}][Cl^{-}]$$

means Ionic product  $\geq K_{sp}$



$$K_{sp} = S^2; S = \sqrt{K_{sp}} = \sqrt{1.3 \times 10^{-9}}$$

$$= 3.6 \times 10^{-5} \text{ mol/litre}$$



Explanation (Simple & Clear):

AgCl is sparingly soluble (only dissolves a little in water).

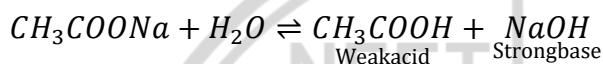
Therefore, its K<sub>sp</sub> value is very small.

Standard value of K<sub>sp</sub> of AgCl at 25°C is:

$$K_{sp} = [Ag^+] \times [Cl^-] = 3.2 \times 10^{-10}$$

This value is experimentally determined and generally memorized for exams.

87. (b) Alkaline,



88. (c) Because it is a strong base.

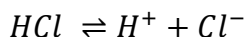
89. (b) For pure water  $[H^+] = [OH^-]$ ,  $\therefore K_w = 10^{-12}$

$$90. (a) MX_2 \rightleftharpoons \underset{(s)}{M^{2+}} + \underset{(2s)^2}{2X^-}; 4S^3 = 4 \times (0.5 \times 10^{-4})^3 \\ = 5 \times 10^{-13}$$

91. (a) Solubility coefficient =  $[Pb^{2+}][Cl^-]^2$

92. (a) Solubility of  $Al(OH)_3$  is lesser than  $Zn(OH)_2$ .

93. (c)  $NaCl_{(s)} \rightleftharpoons Na^+_{(aq)} + Cl^-_{(aq)}$



The increase in  $[Cl^-]$  brings in an increase in  $[Na^+][Cl^-]$  which will lead for

backward reaction because  $K_{sp}NaCl = [Na^+][Cl^-]$ .

94. (c) Common ion effect.

95. (a)  $CaF_2 \rightleftharpoons \underset{s}{Ca^{++}} + \underset{(2s)^2}{2F^-}$



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

$$S = \sqrt[3]{\frac{K_{sp}}{4}} = \sqrt[3]{\frac{3.2 \times 10^{-11}}{4}} = 2 \times 10^{-4} \text{ mol/l.}$$

96. (d) In aqueous solution following equilibrium exists.  $H_2S \rightleftharpoons H^+ + HS^-$

While adding the dilute  $HCl$  solution

( $HCl \rightleftharpoons H^+ + Cl^-$ ) equilibrium is shifted to the left side in  $H_2S \rightleftharpoons H^+ + HS^-$

97. (d)  $M_2X_3 \rightleftharpoons 2M^{+++} + 3X^{--}$   
 $K_{sp} \quad (2y)^2 \quad (3y)^3$

Solubility product  $K_{sp} = 108y^5 \text{ mol } \frac{d}{m^3}$

98. (b) Solubility is directly proportional to the  $K_{sp}$ .

99. (b)  $PbCl_2 \rightleftharpoons Pb^{++} + 2Cl^-$   
 $S \quad (2S)^2$

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

$$S = \sqrt[3]{\frac{K_{sp}}{4}} = \sqrt[3]{\frac{1.5 \times 10^{-4}}{4}} = 3.34 \times 10^{-2}$$

100. (b)  $BCl_3$

Explanation

A Lewis acid is a species that can accept an electron pair.

Why  $BCl_3$  is a Lewis acid

Boron has only 3 valence electrons and forms three covalent bonds with chlorine, giving only 6 electrons around boron.

Therefore,  $BCl_3$  is electron-deficient and readily accepts an electron pair  $\rightarrow$  acts as a Lewis acid.

