SOLUBILITY AND SOLUBILITY PRODUCT

In this section, we'll study about sparingly soluble salts.

eg $AgCl(s) \rightleftharpoons Ag^+(aq) + Cl^-(aq.)$

$\rightarrow$ s $\frac{mol}{lit}$ s   s
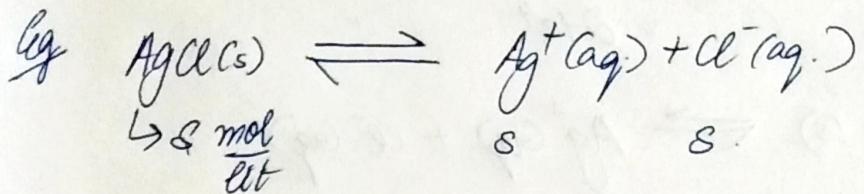
$K_{sp} = [Ag^+][Cl^-] = s \cdot s = s^2$

$$s = \sqrt{K_{sp}}$$

K_{sp} = solubility product.

K_{sp} only depends on temperature.

On addition of solid at a particular temp., it will have no effect on solubility.

ex $PbCl_2(s) \rightleftharpoons Pb^{2+}(aq) + 2Cl^-(aq.)$

          s   2s
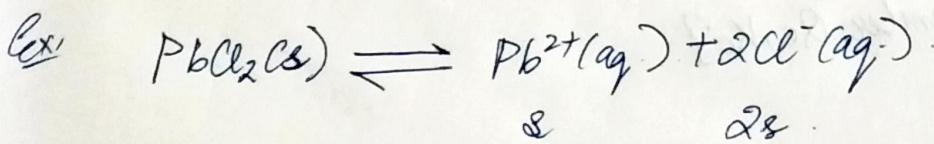
$K_{sp} = [Pb^{2+}][Cl^-]^2 = s \cdot (2s)^2 = 4s^3$

$\Rightarrow$ $s^3 = \dfrac{K_{sp}}{4}$

$\Rightarrow$ $s = \left(\dfrac{K_{sp}}{4}\right)^{1/3}$

s is solubility of $PbCl_2$.

Generalize

$A_xB_y \rightleftharpoons xA^{y+} + yB^{x-}$
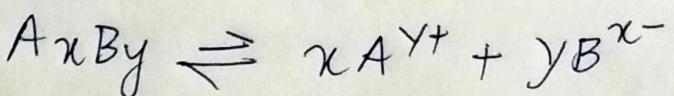
          xs   ys.

$K_{sp} = (xs)^x (ys)^y = x^x y^y s^{x+y}$.

$$Na_3AlF_6 \rightleftharpoons 3Na^+ + AlF_6^{3-}$$
$$3s \qquad\qquad s$$

$$Ksp = (3s)^3(s)$$
$$= 27s^4$$

\# $\quad AgCl_{(s)} \rightleftharpoons Ag^+_{(aq)} + Cl^-_{(aq)}$
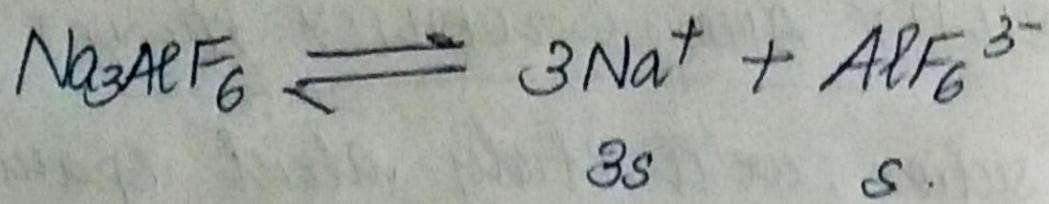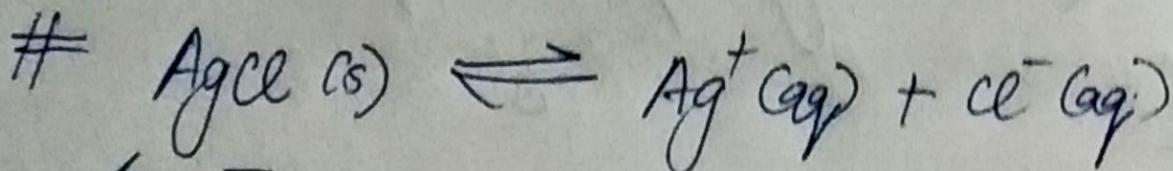
Ionic Product I.P. $= [Ag^+][Cl^-]$

if . I.P. $= Ksp \longrightarrow$ satureated solution
(a ppt will not formed)

I.P $< Ksp \longrightarrow$ unsaturated solution
(a ppt. will not formed)

I.P $> Ksp \longrightarrow$ supersatureated.
solution
(ppt. occure)

[Remember Qc, Kc]