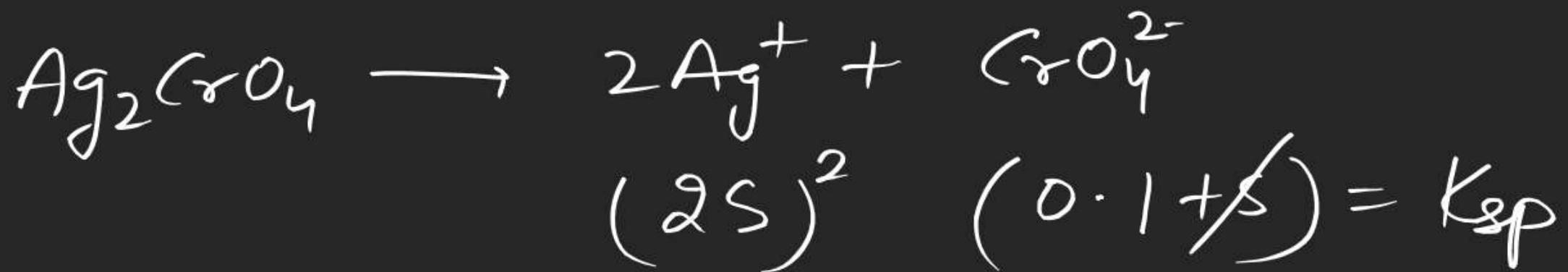


O-I 94-95-

S-I 71-72

$$\textcircled{66} \quad K_{sp} = 4s^3 = 4 \times (10^{-3})^3 = 4 \times 10^{-9}$$



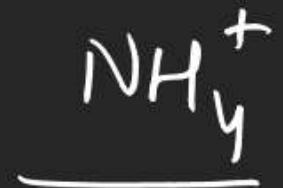
$$\textcircled{67} \quad 4(s_1 + s_2)^3 = 13.5 \times 10^{-9}$$

$$(s_1 + s_2)^3 = 3.375 \times 10^{-9}$$

$$s_1 + s_2 = 1.5 \times 10^{-3}$$

$$\underline{[F^-] = 3 \times 10^{-3}}$$

2 (D)



③



④ \textcircled{R} 70°C



④



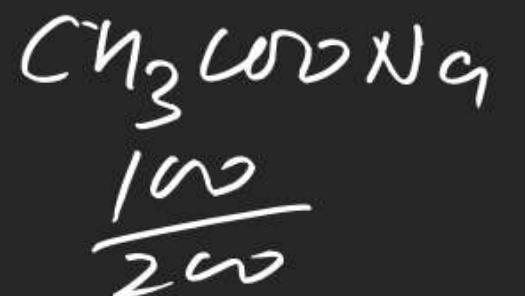
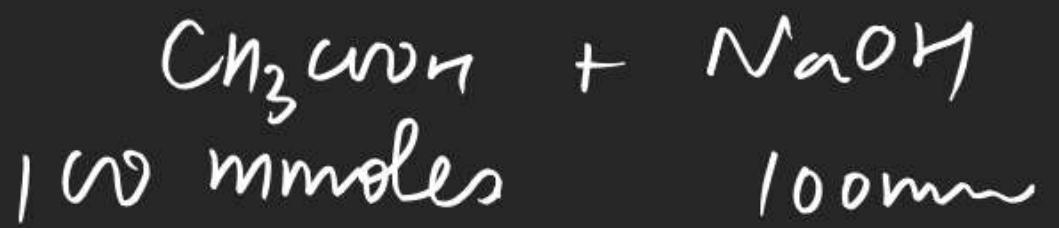
$$\text{let } K_w = 10^{-12}$$

$$\text{pH} = 6$$

$$\underline{\text{pH} = \text{pK}_a}$$

$$\text{pH} + \text{pOH} = 12$$

(21)



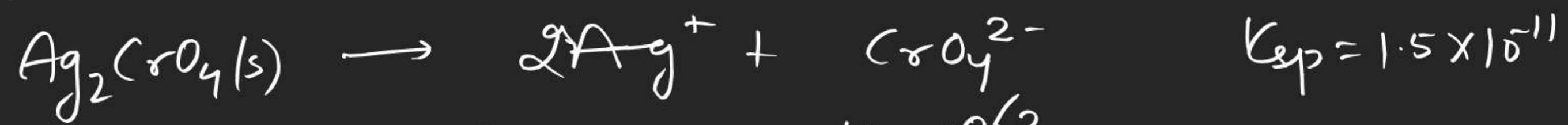
$$= 0.5 \text{ M} = \frac{1}{2} \text{ M}$$

$$\frac{K_w}{K_a} = \frac{x^2}{\frac{1}{2} - x}$$

$$[\text{OH}^-] = \sqrt{\frac{1}{2} \frac{K_w}{K_a}}$$

$$\begin{aligned} \text{pOH} &= \frac{1}{2} \left(\text{p}K_w - \log \frac{1}{K_a} - \log \frac{1}{2} \right) \\ &= \frac{1}{2} \left(\text{p}K_w - \text{p}K_a + \log 2 \right) \end{aligned}$$





$$\frac{100 \times 0.1}{500} \quad \frac{400 \times 10^{12}}{500 \times 10}$$

$$2 \times 10^{-2} \quad 16 \times 10^{-2}$$

$$10^2 \quad 15 \times 10^{-2}$$

$$(2S)^2 \left(15 \times 10^{-2} + \phi \right) = 1.5 \times 10^{-11}$$

$$[+\text{Ag}^+]^2 = \frac{10^{-10}}{100}$$

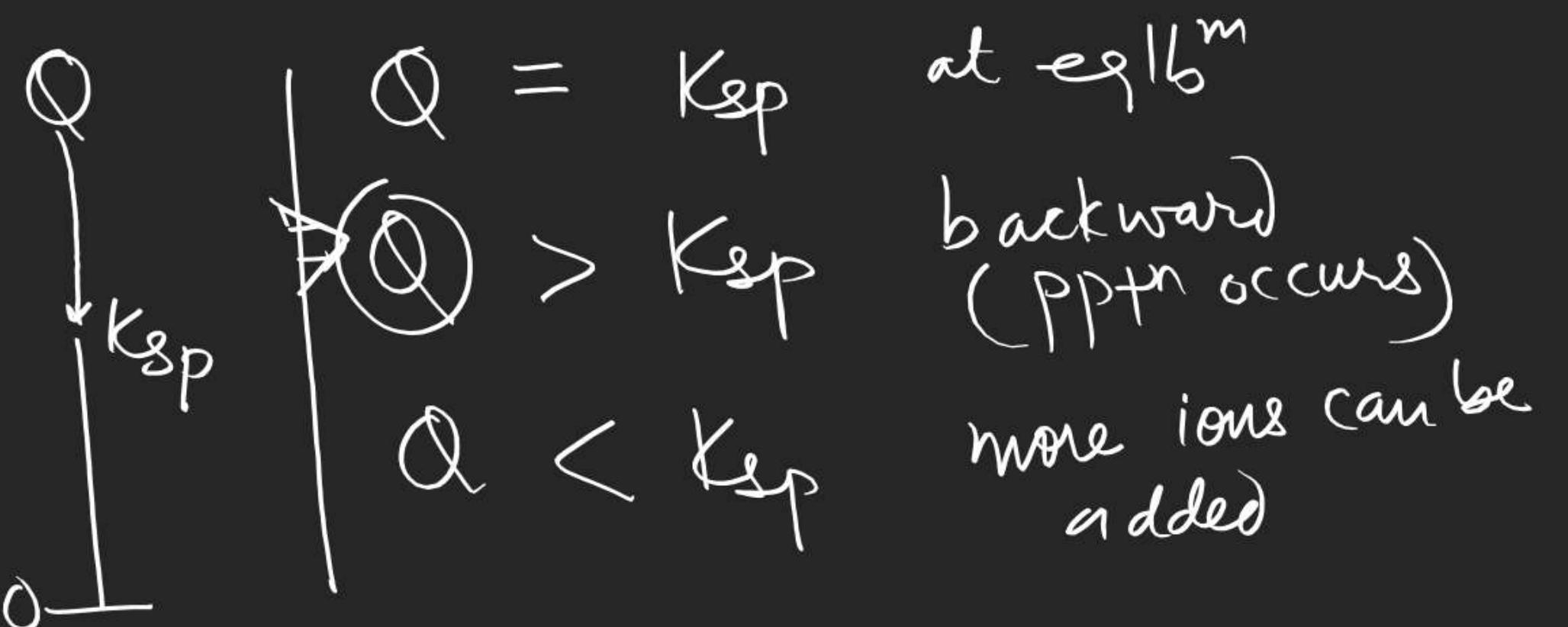
(92) $\frac{10^{-5}}{100} = 10^{-7}$

Application of K_{sp} (Precipitation)

~~Notation~~



$$[\text{Ag}^+][\text{Cl}^-] = Q$$



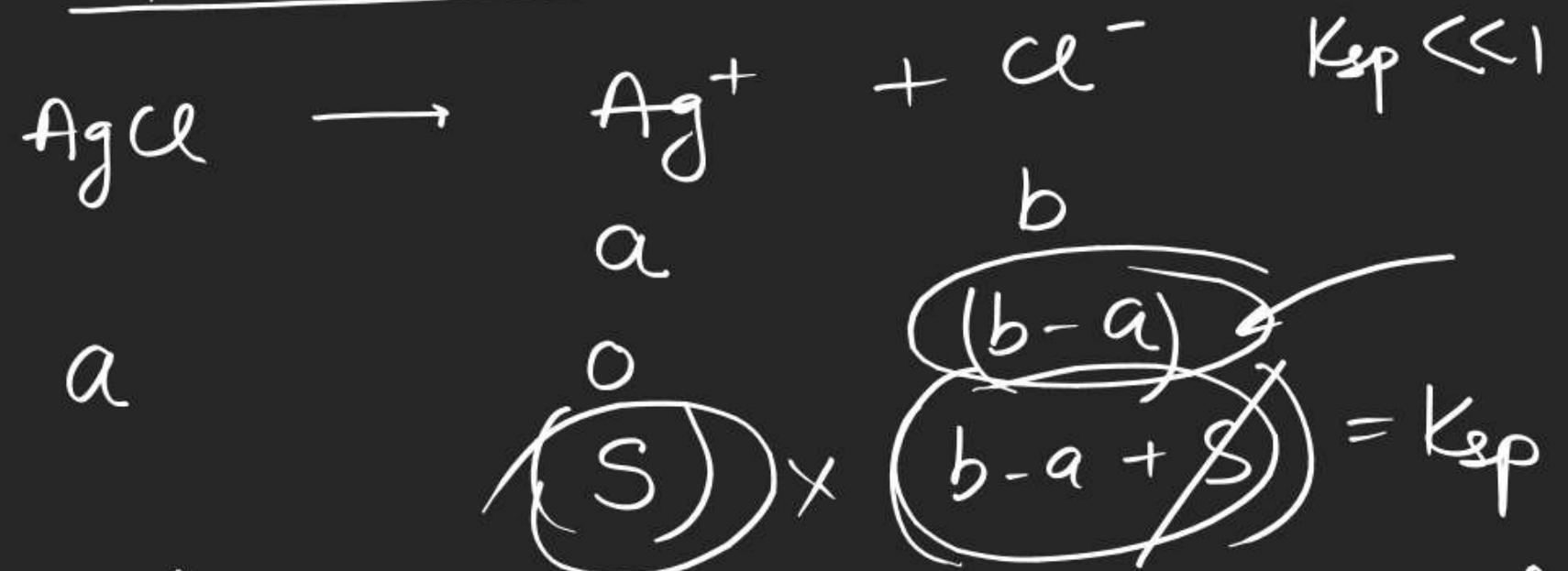
at eq/b^m

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

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

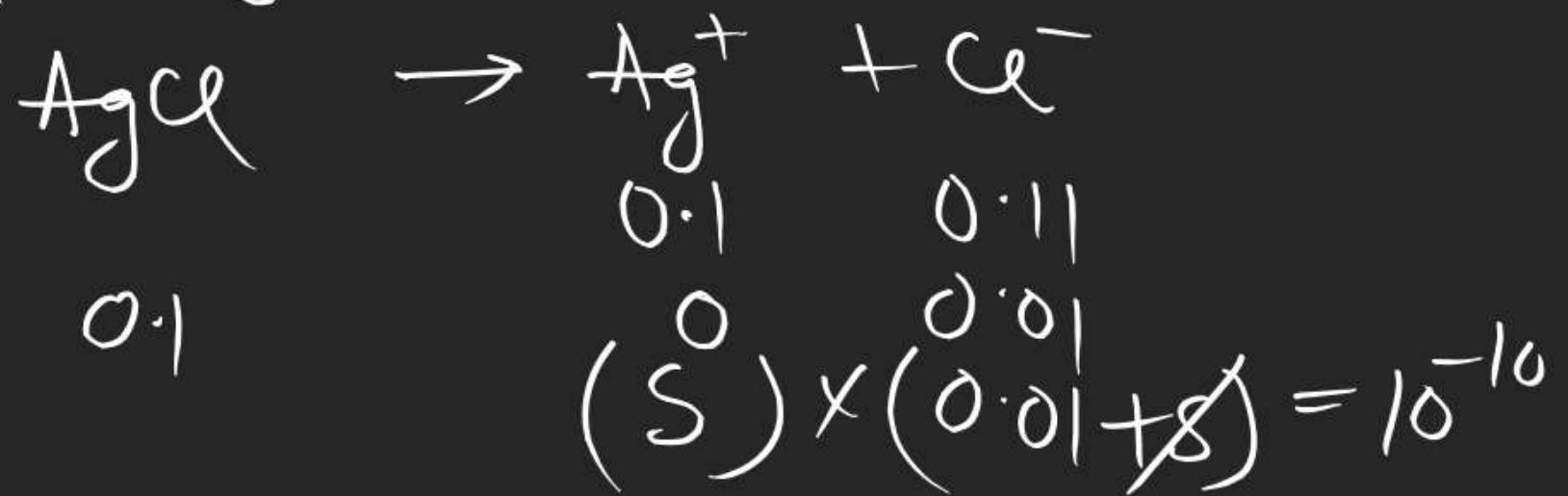
Calculation of conc. of ions after pptn :-

Case-I If amount added is given



$$[\text{Ag}^+] = 10^{-8}$$

Q. find final conc. of each ion if 0.11 mol Cl⁻ are added to 1 lit 0.1 M Ag⁺ soln $K_{\text{sp}}(\text{AgCl}) = 10^{-10}$



Q. 200 ml 0.3M AgNO_3 + 300ml 0.5M $\underline{\text{NaCl}}$

$$K_{\text{sp}} = 10^{-10}$$



$$\frac{200 \times 0.3}{500} = 1.2 \times 10^{-1}$$

$$3 \times 10^{-1}$$

O

$$\frac{300 \times 0.5}{500}$$

$$1.8 \times 10^{-1}$$

$$[\text{Ag}^+]$$

$$= \frac{1}{18} \times 10^{-8}$$

$$= 5.6 \times 10^{-9}$$

$$10^{-10} = (\textcircled{s}) \times (\underbrace{1.8 \times 10^1}_{\cancel{\times 10^{-1}}})$$

$$\frac{1}{1.8} \times 10^{-9} = s$$

Case-II If final conc of one ion is given

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

Q. find final conc of each ion if Cl^- are added to 2 lit
 0.1 M Ag^+ soln such that Cl^- conc. become 0.2 M.

$$K_{\text{sp}}(\text{AgCl}) = 10^{-10}$$

$$[\text{Ag}^+] [0.2] = 10^{-10}$$

$$K_{sp} = 10^{-10}$$

$$[Cl^-]$$

$$K_{sp} = 10^{-13}$$

$$[CrO_4^{2-}] = 0.1 M$$

Ag^+ are added which will ppt first

$$= 0.1 M$$

$$\underline{[Ag^+] (0.1) = 10^{-10}}$$

$$[Ag^+]^2 [CrO_4^{2-}] = 10^{-13}$$

$$[Ag^+] = 10^{-6}$$

Q. find conc of Cl^- ion when CrO_4^{2-} starts ppting.