

(25)



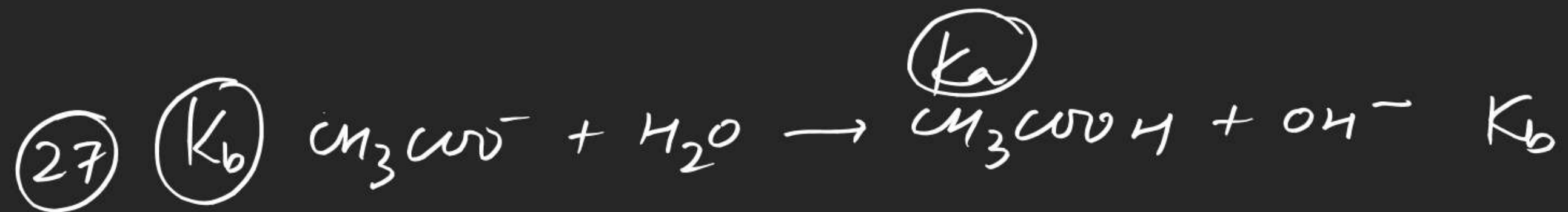
$$K_a \times K_b = K_w$$

$$\text{p}K_a + \text{p}K_b = 14$$

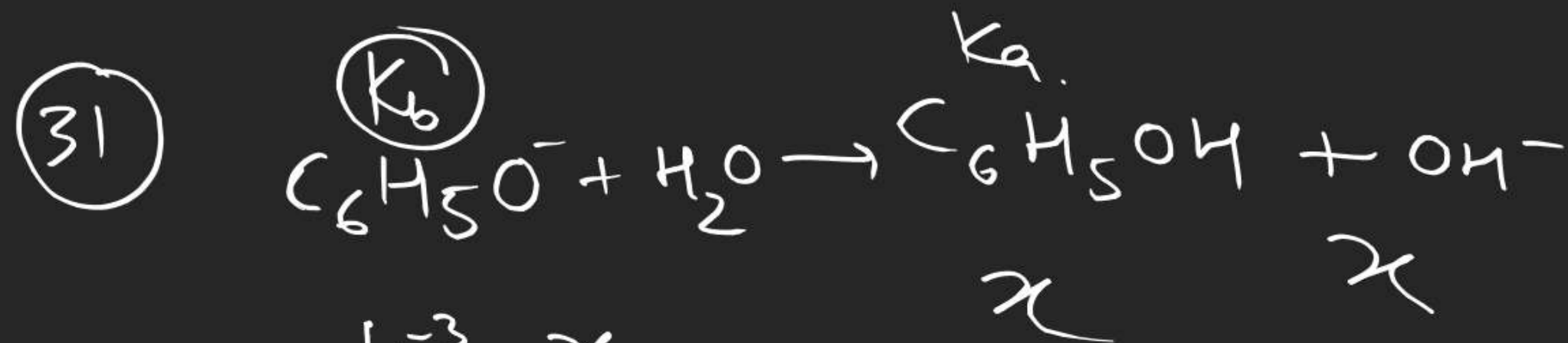
S-I

25, 27, 28, 31

59-63



$$\frac{K_w}{K_a} = K_b = \frac{x^2}{0.08 - x}$$



$$\frac{10^{-3}}{1.05 \times 10^{-4}} = \frac{K_w}{K_a} = K_b = \frac{x^2}{10^{-3} - x}$$

$$\textcircled{60} \quad S = \frac{38 \times 10^{-3}}{304} \text{ mol/lit}$$

$$= \left(\frac{380}{304} \right) \times 10^{-4}$$

$$S = 1.25 \times 10^{-4}$$

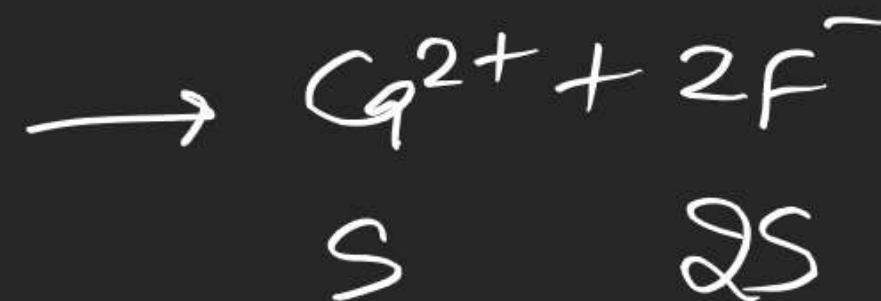
$$K_{sp} = (1.25 \times 10^{-4})^2$$

$$= 1.56 \times 10^{-8}$$

$$\textcircled{62} \quad \frac{2.4 \times 10^{-5} \times 10}{60}$$

$$S = 4 \times 10^{-6}$$

$\textcircled{61}$



$$\boxed{2S = 4.1 \times 10^{-4}}$$



Volume ↑

moles ↓

↑

↑

↓

↓

↓

Conc.



moles ↓

↑

↑

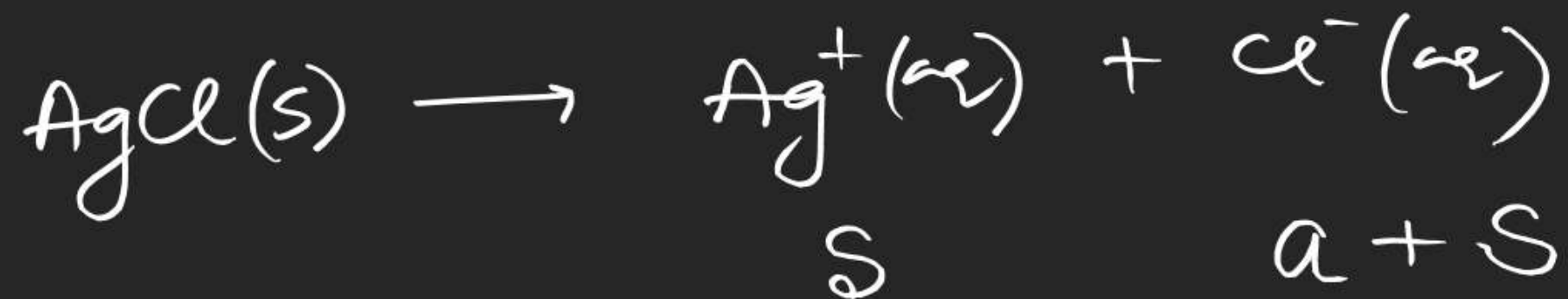
Addⁿ of
 $\text{H}_2\text{O(l)}$

Conc ↓

↓

↓

Solubility in presence of common ion



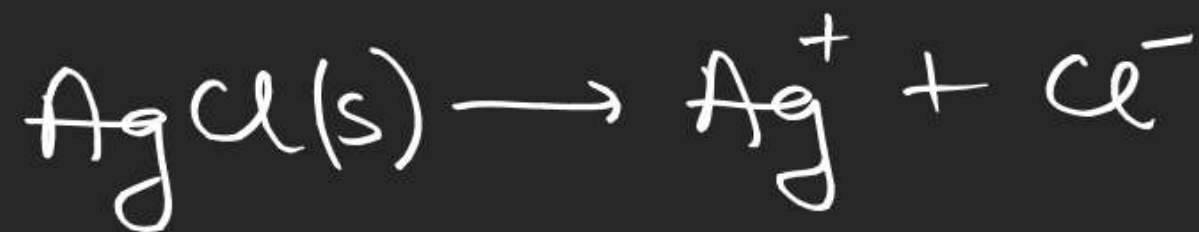
$$K_{sp} = \underline{s}(a + \cancel{s})$$

Q. find solubility of AgCl in

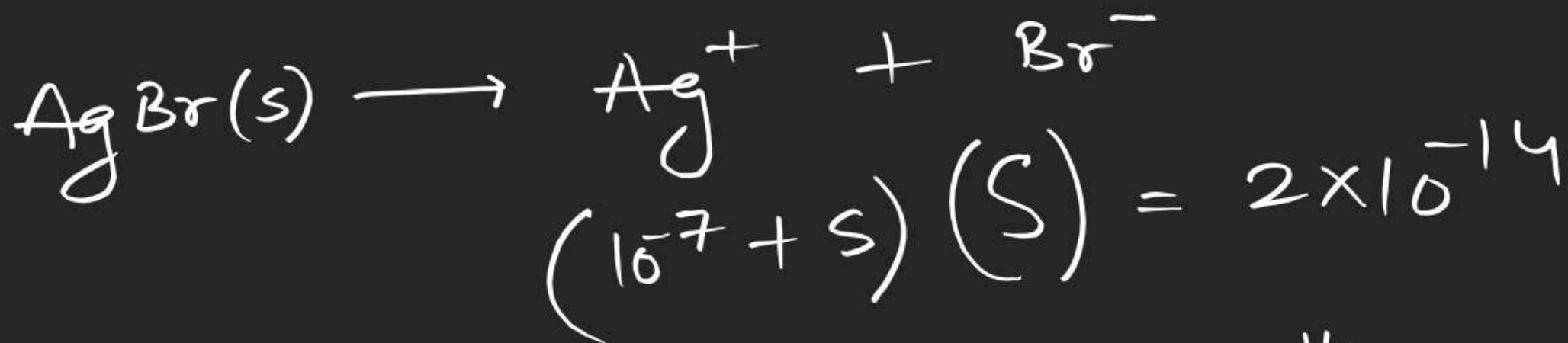
$$10^{-10} = s(10^{-2} + \cancel{s})$$

$$\underline{10^{-8} = s}$$

0.01 M NaCl solⁿ. ($K_{sp} = 10^{-10} \text{ M}$)



Find

Solubility of AgBr in 10^{-7}M AgNO_3 solⁿ
 $K_{sp}(\text{AgBr}) = 2 \times 10^{-14}$ 

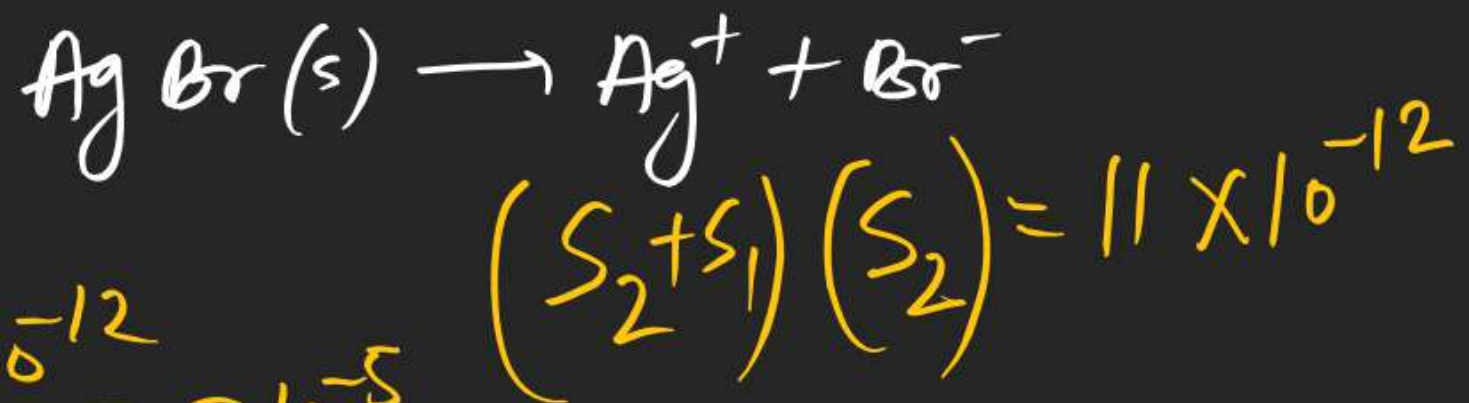
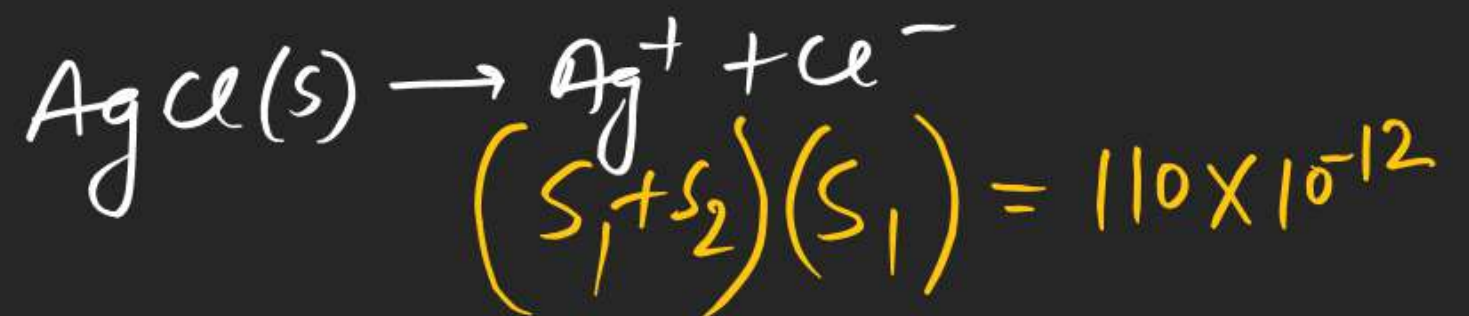
$$S^2 + 10^{-7}S - 2 \times 10^{-14} = 0$$

$$\underline{S = 10^{-7}}$$

Simultaneous solubility: →

find Ag^+ conc if $\text{AgBr}(s)$ & $\text{AgCl}(s)$ both are dissolved simultaneously in $\text{H}_2\text{O}(l)$.

Given $K_{sp}(\text{AgCl}) = 110 \times 10^{-12}$
 $K_{sp}(\text{AgBr}) = 11 \times 10^{-12}$



$$(S_1 + S_2)^2 = 121 \times 10^{-12}$$

$$S_1 + S_2 = 11 \times 10^{-6}$$

$$S_1 = \frac{110 \times 10^{-12}}{11 \times 10^{-6}} = 10^{-5}$$

$$S_2 = 10^{-6}$$

Applⁿ of K_{sp} i.e. condⁿ of precipitation

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

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

$$Q < K_{sp}$$

pptⁿ occursat eq^l_b^m
(or saturated)more Cl^-
can be added

Q. find minimum Cl^-
required to ppt AgCl
from 0.01M AgNO_3 solⁿ

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

$$Q > K_{sp}$$

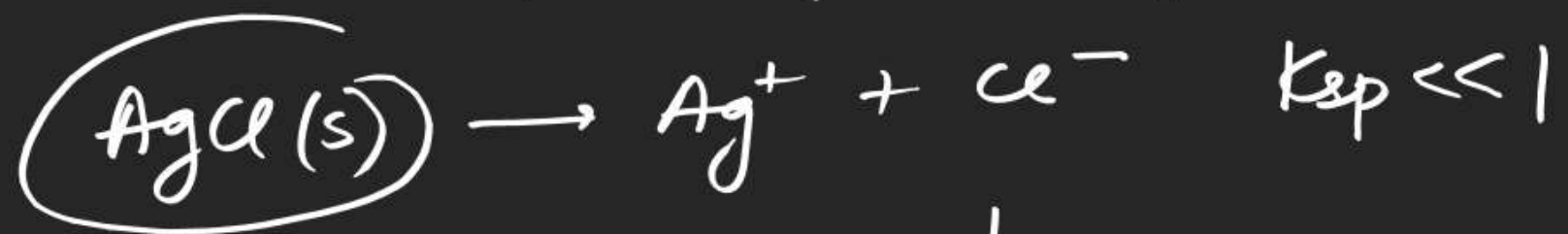
$$\underline{Q = K_{sp}}$$

$$[\text{Cl}^-](10^{-2}) = 10^{-10}$$

$$\underline{[\text{Cl}^-] = 10^{-8}}$$

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

Calculation of conc. of ions after pptn



	a	b
a	0	b-a
a-s	s	b-a+s

$$K_{sp} = s(b-a+s)$$

	0.1	0.11
0.1	0	0.01
0.1-s	(s)	(0.01+s)

$$s = 10^{-8}$$

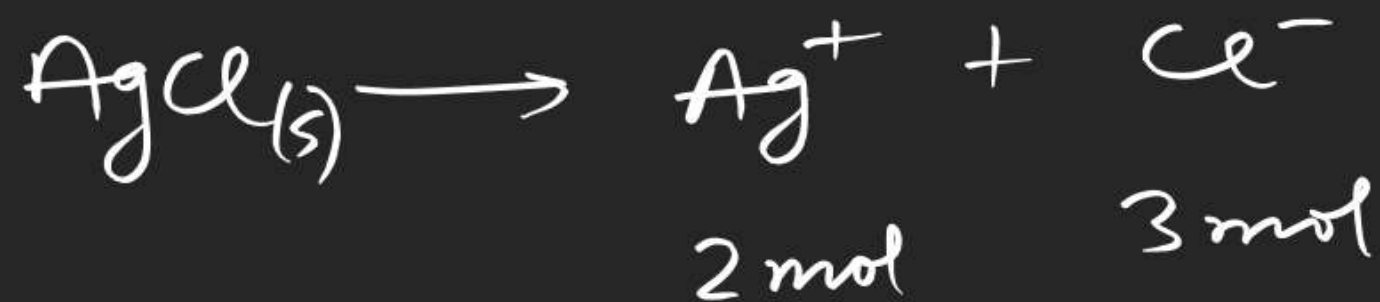
find final conc of each ion if 0.11 mol Cl^- are added to 1 lit 0.1M Ag^+ (or) - Given $K_{sp}(\text{AgCl}) = 10^{-10}$

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

$$[\text{Cl}^-] = 10^{-2}$$

find Ag^+ conc if 3 moles of Cl^- are added to
10 lit 0.2 M AgNO_3 solⁿ.

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



2 moles

2 mol 3 mol

0 1
0 0.1

$$(S) (0.1 + \cancel{S}) = 10^{-10}$$

$$S = 10^{-9}$$



0.2 $\frac{3}{10}$

0.2 0.3

0 0.1

5 $0.1 + \cancel{S}$

$$(5)(0.1) = 10^{-10}$$

0-12 89-94

5-12 68-71

Ionic

Atomic str
Chemical eq

Lecture	O-I	S-I	J-Mains	J-Adv	O-II	S-II
✓	✓	✗		✓		
✓	✗	✗		✓		