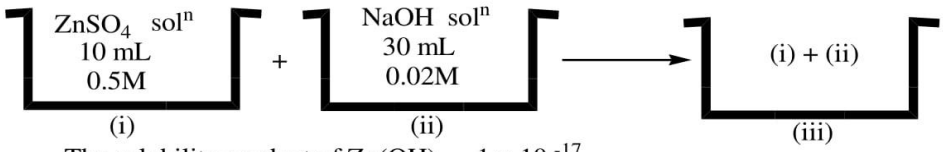
1. Observe the following stem and answer the questions.



The solubility product of $Zn(OH)_2 = 1 \times 10^{-17}$

Q: Justify the possibility of precipitation when two solution of (i) & (ii) are mixed together.

Ans:

Related reaction is-

$$ZnSO_4 + 2\,NaOH \rightleftharpoons Zn(OH)_2 + Na_2SO_4$$

$Zn(OH)_2$ Ionized in the solution as follows-

$$Zn(OH)_2 = Zn^{2+} + 2\,OH^-$$

$\therefore K_{IP} = [Zn^{2+}] \times [OH^-]^2$.....(i)

The new concentration of $ZnSO_4$ in pot-(iii) is-

$V_1S_1 = V_2S_2$

Or. $S_2 = \frac{V1S1}{V_2}$

Or, $S_2 = \frac{10 \times 0.5}{40}$

Or, $S_2 = 0.125M$

V1= 10mL
S1 = 0.5M
V2 = 40mL
S2 = ?

As the concentration of $ZnSO_4$ is 0.125M

$\therefore [Zn^{2+}] = 0.125M$

Again,

The new concentration of NaOH in pot-(iii) is-

$V_1S_1 = V_2S_2$

Or. $S_2 = \frac{V1S1}{V_2}$

Or, $S_2 = \frac{30 \times 0.02}{40}$

Or, $S_2 = 0.015M$

V1= 30mL
S1 = 0.02M
V2 = 40mL
S2 = ?

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As the concentration of NaOH is 0.015M

$\therefore [OH^-] = 0.015M$

From no (i) equation-

$K_{IP} = [Zn^{2+}] \times [OH^-]^2$

Or, $K_{IP} = 0.125 \times (0.015)^2$

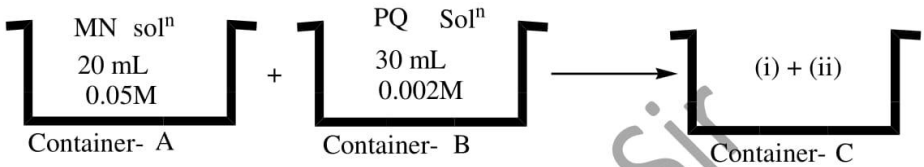
Or, $K_{IP} = 2.8 \times 10^{-5}$

As the $K_{IP} > KSP$

So Precipitation will be form in the pot-(iii).

Home Work

1.

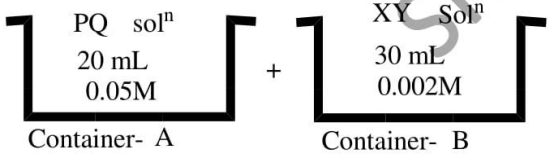


Ksp of MQ = 3.5×10^{-4}

Ksp of PN = 2.5×10^{-2}

Q: Justify the possibility of precipitation when two solution of A & B are mixed together in Container-`C'.

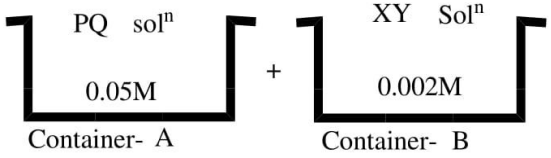
2.



Ksp of PY_2= 1.85×10^{-8}

Q: Justify the possibility of precipitation when two solution of A & B are mixed together in another vacuum Container.

3.



Ksp of PY_2= 1.85×10^{-8}

Q: Justify the possibility of precipitation when equal valume of two solution are mixed together in another third vacuum Container.

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