

**Q1 2021 (01 Sep Shift 2)**

The molar solubility of  $\text{Zn}(\text{OH})_2$  in 0.1 M NaOH solution is  $x \times 10^{-18}$  M. The value of  $x$  is \_\_\_\_\_. (Nearest integer)

(Given : The solubility product of  $\text{Zn}(\text{OH})_2$  is  $2 \times 10^{-20}$ )

**Q2 2021 (31 Aug Shift 2)**

The pH of a solution obtained by mixing 50 mL of 1 M HCl and 30 mL of 1 M NaOH is  $x \times 10^{-4}$ . The value of  $x$  is \_\_\_\_\_. (Nearest integer)

$[\log 2.5 = 0.3979]$

**Q3 2021 (31 Aug Shift 1)**

$\text{A}_3\text{B}_2$  is a sparingly soluble salt of molar mass  $M$  ( $\text{g mol}^{-1}$ ) and solubility  $x \text{ g L}^{-1}$ . The solubility product satisfies  $K_{\text{sp}} = a \left(\frac{x}{M}\right)^5$ . The value of  $a$  is \_\_\_\_\_. (Integer answer)

**Q4 2021 (26 Aug Shift 1)**

Given below are two statements.

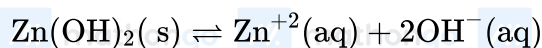
*Statement I:* In the titration between strong acid and weak base methyl orange is suitable as an indicator.

*Statement II:* For titration of acetic acid with NaOH phenolphthalein is not a suitable indicator. In the light of the above statements, choose the *most appropriate* answer from the options given below:

- (1) *Statement I* is false but *Statement II* is true
- (2) *Statement I* is true but *Statement II* is false
- (3) Both *Statement I* and *Statement II* are true
- (4) Both *Statement I* and *Statement II* are false



Q1 (2)



$$S(0.1 + 2s) \simeq 0.1$$

$$K_{sp} = S(0.1)^2$$

$$2 \times 10^{-20} = s \times 10^{-2} \Rightarrow s = 2 \times 10^{-18}$$

$$= x \times 10^{-18}$$

$$x = 2$$

Q2 (6021)



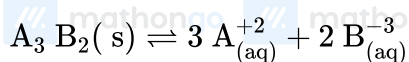
|              |                    |                   |   |   |
|--------------|--------------------|-------------------|---|---|
| $t = 0$      | 50 ml, 1M<br>50 mm | 30ml, 1M<br>30 mm | - | - |
| $t = \infty$ | 20 mm              | -                 |   |   |

$$[\text{HCl}] = \frac{20}{80} = \frac{1}{4} \text{M} = 2.5 \times 10^{-1} \text{M}$$

$$\text{pH} = -\log 2.5 \times 10^{-1} = 1 - 0.3979 = 0.6021$$

$$\text{pH} = 6021 \times 10^{-4}$$

Q3 (108)



$$3s \quad 2s$$

$$K_{sp} = (3s)^3(2s)^2$$

$$K_{sp} = 108s^5 \& s = (X/M)$$

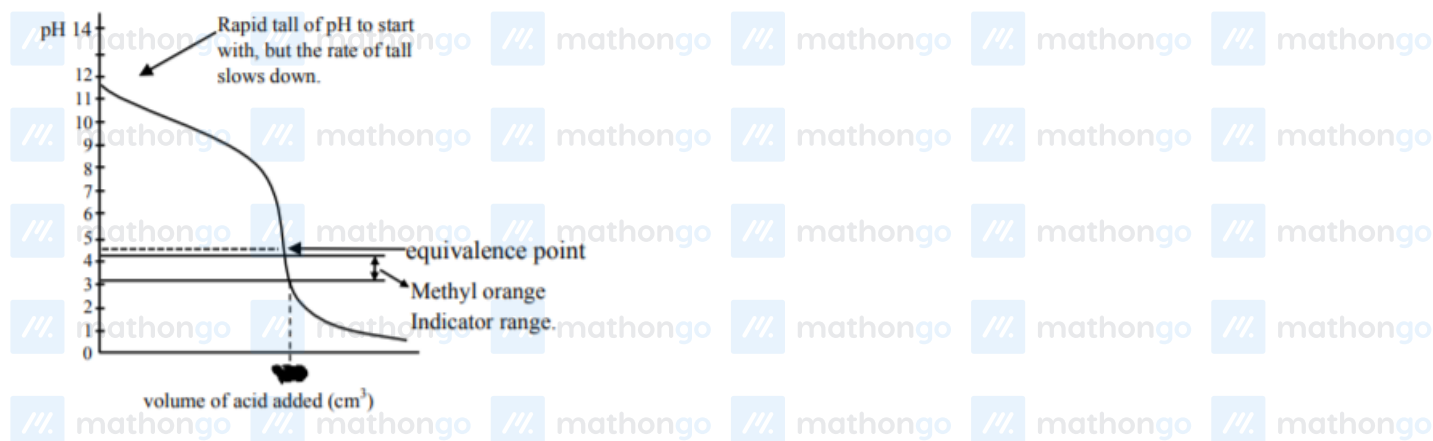
$$K_{sp} = 108\left(\frac{x}{m}\right)^5$$

$$\text{given } K_{sp} = a\left(\frac{x}{m}\right)^5$$

$$\text{comparing } a = 108$$

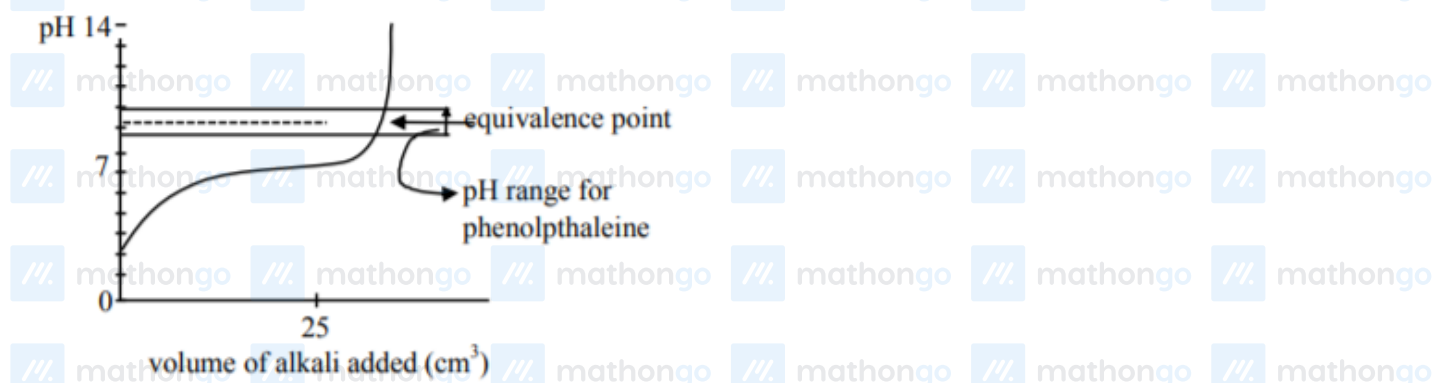
Q4 (2)

Titration curve for strong acid and weak base initially a buffer of weak base and conjugate acid is:



Formed, thus pH falls slowly and after equivalence point, so the pH falls sharply so methyl orange, having

pH range of 3.2 to 4.4 will work as indicator. So *Statement – I* is correct.



Titration curve for weak acid and strong base (NaOH)

Initially weak acid will form a buffer so pH increases slowly but after equivalence point. it rises sharply

covering range of phenolphthalein so it will be suitable indicator so *Statement – II* is false.