

## Questions with Answer Keys

MathonGo

## Q1 (20 July 2021 Shift 2)

A solution is 0.1M in  $\text{Cl}^-$  and 0.001M in  $\text{CrO}_4^{2-}$ . Solid  $\text{AgNO}_3$  is gradually added to it. Assuming that the addition does not change in volume and  $K_{\text{sp}}(\text{AgCl}) = 1.7 \times 10^{-10} \text{M}^2$  and  $K_{\text{sp}}(\text{Ag}_2\text{CrO}_4) = 1.9 \times 10^{-12} \text{M}^3$ . Select correct statement from the following :

- (1)  $\text{AgCl}$  precipitates first because its  $K_{\text{sp}}$  is high.
- (2)  $\text{Ag}_2\text{CrO}_4$  precipitates first as its  $K_{\text{sp}}$  is low.
- (3)  $\text{Ag}_2\text{CrO}_4$  precipitates first because the amount of  $\text{Ag}^+$  needed is low.
- (4)  $\text{AgCl}$  will precipitate first as the amount of  $\text{Ag}^+$  needed to precipitate is low.

## Q2 (25 July 2021 Shift 2)

Assuming that  $\text{Ba}(\text{OH})_2$  is completely ionised

in aqueous solution under the given conditions the concentration of  $\text{H}_3\text{O}^+$  ions in 0.005M aqueous solution of  $\text{Ba}(\text{OH})_2$  at 298 K is  $\times 10^{-12} \text{mol L}^{-1}$ . (Nearest integer)

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# Answer Key

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Q1 (4)

Q2 (1)

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#MathBoleTohMathonGo

## Hints and Solutions

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Q1

(i)  $[\text{Ag}^+]$  required to ppt  $\text{AgCl}(s)$   $K_{sp} = IP = [\text{Ag}^+][\text{Cl}^-] = 1.7 \times 10^{-10}$ 

$$[\text{Ag}^+] = 1.7 \times 10^{-9}$$

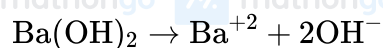
(ii)  $[\text{Ag}^+]$  required to ppt  $\text{Ag}_2\text{CrO}_4(s)$ 

$$K_{sp} = IP = [\text{Ag}^+]^2 [\text{CrO}_4^{2-}] = 1.9 \times 10^{-12}$$

$$[\text{Ag}^+] = 4.3 \times 10^{-5}$$

 $[\text{Ag}^+]$  required to ppt  $\text{AgCl}$  is low so  $\text{AgCl}$  will ppt 1<sup>st</sup>

Q2



$$2 \times 0.005 = 0.01 = 10^{-2}$$

At 298 K : in aq. solution  $[\text{H}_3\text{O}^+][\text{OH}^-] = 10^{-14}$ 

$$[\text{H}_3\text{O}^+] = \frac{10^{-14}}{10^{-2}} = 10^{-12}$$