

**TOPIC – PRACTICE QUESTION**

- Q.1** The rate constant of the reaction  $A \rightarrow 2B$  is  $1.0 \times 10^{-3} \text{ mol lit}^{-1} \text{ min}^{-1}$ , if the initial concentration of A is  $1.0 \text{ mole lit}^{-1}$  what would be the concentration of B after 100 minutes.
- (A)  $0.1 \text{ mol lit}^{-1}$   
(B)  $0.2 \text{ mol lit}^{-1}$   
(C)  $0.9 \text{ mol lit}^{-1}$   
(D)  $1.8 \text{ mol lit}^{-1}$
- Q.2** A drop of solution (volume  $0.05 \text{ mL}$ ) contains  $3.0 \times 10^{-6}$  moles of  $\text{H}^+$ . If the rate constant of disappearance of  $\text{H}^+$  is  $1.0 \times 10^7 \text{ mole litre}^{-1} \text{ sec}^{-1}$ . How long would it take for  $\text{H}^+$  in drop to disappear :
- (A)  $6 \times 10^{-8} \text{ sec}$   
(B)  $6 \times 10^{-9} \text{ sec}$   
(C)  $6 \times 10^{-7} \text{ sec}$   
(D)  $6 \times 10^{-10} \text{ sec}$
- Q.3** For a reaction  $2A + B \rightarrow \text{product}$ , rate law is  $-\text{d}[A]/\text{dt} = k[A]$ . At a time when  $t = 1/k$ , concentration of the reactant is : ( $C_0$  = initial concentration)
- (A)  $C_0/e$   
(B)  $C_0e$   
(C)  $C_0/e^2$   
(D)  $1/C_0$
- Q.4** Two substances A ( $t_{1/2} = 5 \text{ min}$ ) and B ( $t_{1/2} = 15 \text{ min}$ ) are taken in such a way that initially  $[A] = 4[B]$ . The time after which both the concentration will be equal is: Assume that reaction is first order
- (A) 5 min  
(B) 15 min  
(C) 20 min  
(D) concentration can never be equal

# SOLUTION

(CHEMISTRY)

## CHEMICAL KINETICS

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DPP – 03

CLASS – 12<sup>th</sup>

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**Sol.1** Correct option is C)

$$k = 1 \times 10^{-3} \text{ mol lit}^{-1}\text{min}^{-1}$$

So it is Zero Order Reaction.

$$k = \frac{A_0 - A}{t}$$

$$t = 100 \text{ min}, [A_0] = 1 \text{ mole lit}^{-1}$$

On substituting,

$$[A] = 1 - 0.1 = 0.9 \text{ mol lit}^{-1}$$

**Sol.2** Correct option is B)

$$k = 10^7 \text{ mol L}^{-1} \text{ sec}^{-1}$$

$$[H^+] = k = \frac{3 \times 10^{-6}}{0.05 \times 10^{-3}} \text{ mol L}^{-1} = \frac{3}{5} \times 10^{-1} \text{ mol L}^{-1}$$

$$t_{99\%} = \frac{\ln\left(\frac{A_0}{A}\right)}{k}$$

$$= \frac{\ln\left(\frac{3/5 \times 10^{-1}}{3/5 \times 10^{-3}}\right)}{10^7}$$

$$= 9.212 \times 10^{-3} \text{ sec}$$

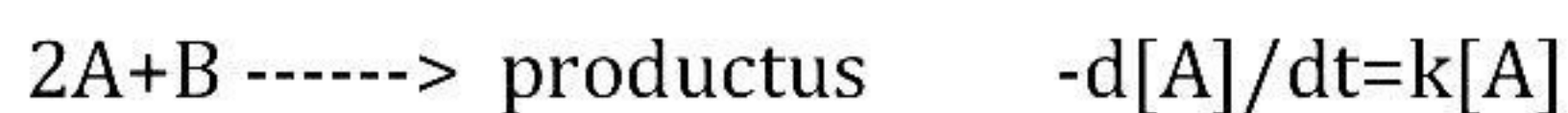
so,

$$V = k[H^+] = 0.6 \times 10^{-1} \times 10^7$$

$$= 0.6 \times 10^6$$

$$= 0.6 \times 10^5 \text{ mol}^2 \text{ L}^{-1} \text{ s}^{-1}$$

$$t = 6 \times 10^{-9} \text{ sec for } \frac{3}{5} \times 10^{-1} \text{ mol L}^{-1}$$

**Sol.3** Correct operation is )

$$A = A_0 e^{kt} \quad \text{when } t_2 = 1/k$$

$$A = A_0 e^1 \quad A = A_0/e$$

**Sol.4** Correct option is B)

$$C_1 = C_0 e^{-kt}$$

According to the question,  $C_A = C_B$ 

$$C_A e^{-k_A t} = C_B e^{-k_B t}$$

$$\frac{C_A}{C_B} \frac{e^{-k_A t}}{e^{-k_B t}} \Rightarrow \frac{C_A}{C_B} e^{(K_A - K_B) t}$$

$$4 = e^{\left[ \frac{\ln 2}{5} - \frac{\ln 2}{15} \right] \times t}$$

$$\ln 4 = e^{\left[ \frac{\ln 2}{5} - \frac{\ln 2}{15} \right] t}$$

$$\ln 2^2 = e^{\left[ \frac{\ln 2}{5} - \frac{\ln 2}{15} \right] t}$$

$$2 \ln 2 = e^{\left[ \frac{\ln 2}{5} - \frac{\ln 2}{15} \right] t}$$

$$2 = \left[ \frac{1}{5} - \frac{1}{15} \right] t$$

$$2 = \frac{2}{15} \times t$$

$$t = 15 \text{ minutes}$$

Hence, option B is correct.