CHEMICAL KINETICS

DPP – 03

CLASS – 12th

TOPIC – PRACTICE QUESTION

Q.1 The rate constant of the reaction A gives 2B is 1.0×10^{-3} mol lit^{-1} min^{-1}, if the initial concentration of A is 1.0 mole lit^{-1} what would be the concentration of B after 100 minutes.

(A) 0.1 mol lit^{-1}

(B) 0.2 mol lit^{-1}

(C) 0.9 mol lit^{-1}

(D) 1.8 mol lit^{-1}

Q.2 A drop of solution (volume 0.05 mL) contains 3.0×10^{-6} moles of H^+. If the rate constant of disappearance of H^+ is 1.0×10^{7} mole $litre^{-1}$ sec^{-1}. How long would it take for H^+ in drop to disappear :

(A) 6×10^{-8} sec

(B) 6×10^{-9} sec

(C) 6×10^{-7} sec

(D) 6×10^{-10} sec

Q.3 For a reaction 2A + B product, rate law is $-d[A]/dt = k[A]$. At a time when $t = 1/k$, concentration of the reactant is : (C0 = initial concentration)

(A) C0/e

(B) C0e

(C) $C0/e^2$

(D) 1/C0

Q.4 Two substances A (t1/2 = 5 min) and B (t1/2 = 15 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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Sol.1 Correct option is C)

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

So it is Zero Order Reaction.

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

$t = 100$ min, $[A_o] = 1$mole lit^{-1}

On substituting,

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

Sol.2 Correct option is B)

$k = 10^7$ molL^{-1} sec^{-1}

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

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

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

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

so,

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

$= 0.6 \times 10^6$

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

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

Sol.3 Correct operation is)

2A+B ------> productus   -d[A]/dt=k[A]

$A=A_0e^{kt}$ when $t_2 l/k$

$A= A_0e^{1}$ $A=A_0/e$

Sol.4 Correct opetion is B)

$C_1 = C_0e^{-kt}$

According to the question, $C_A = C_B$

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

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

$$4 = e\left[\frac{In2}{5} - \frac{In2}{15}\right] \times t$$

$$In4 = e\left[\frac{In2}{5} - \frac{In2}{15}\right]t$$

$$In\ \ 2\ ^{2} = e\left[\frac{In2}{5} - \frac{In2}{15}\right]t$$

$$2\,In\,2 = e\left[\frac{In2}{5} - \frac{In2}{15}\right]t$$

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

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

t = 15 minutes

Hence, option B is correct.