(CHEMISTRY) **CHEMICAL KINETICS**

DPP – 05

CLASS –12th

TOPIC –PRACTICE QUESTION

Q.1 A reaction, which is second order, has a rate constant of 0.002 L mol-1 s-1. If the initial conc. of the reactant is 0.2 M. How long will it take for the concentration to become 0.0400 M?

(A) 1000 sec

(B) 400 sec

(C) 200 sec

(D) 10,000 sec

Q.2 Which is not true for a second order reaction?

(A) It can have rate constant 1 x 10-2 L mol-1 s-1

(B) Its half-life is inversely proportional to its initial concentration

(C) Time to complete 75% reaction is twice of half-life

(D) Half-Life = 1/k x Initial conc.

Q.3 The rate constant for a certain second order reaction is 8 x 10^-5 M^-1 min^-1. How long will it take a 1 M solution to be reduced to 0.5 M in reactant?

Q.4 The reaction CH3CH2NO2 + OH- gives CH3CH- NO2 + H2O obeys the rate law for pseudo first order kinetics in the presence of a large excess of hydroxide ion. If 1% of nitro ethane undergoes reaction in half a minute when the reactant concentration is 0.002 M. What is the pseudo first order rate constant ?

(log 99 = 1.996)

SOLUTION

(CHEMISTRY) CHEMICAL KINETICS

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TOPIC –PRACTICE SOLUTION

Sol.1 Correct option is D

$$\frac{1}{a} = \frac{1}{a_0} + kt$$

$$\frac{1}{0.04} = \frac{1}{0.2} + 0.002t$$

t = 10000 sec

Sol.2 Correct option is C

Unit of Rate Constant for a second order reaction is $mol^{-1} Ls^{-1}$.

$t_{1/2} \alpha a^{1-n}$. Here n = 2

$t_{1/2} \alpha a^{-1}$. So Its Inversely Proportional to Half Life.

$t_{1/2} = \frac{1}{ak}$ where a is initial concentration

Time to complete 75% reaction is twice to half life is false. Its is true for 1st Order Reaction

Sol.3 The time required to reduce the concentration of 1 M solution to 0.5 M (i.e one-half) is the half life period.

For second order reaction

$$t_{1/2} = \frac{1}{k[A_0]} = \frac{1}{8\times10^{-5} M^{-1} min^{-1} \times 1M}$$

$= 1.25 \times 10^4 min$

Sol.4 1 per cent of nitroethane undergoes reaction in half a minute when the reactant concentration is 0.002M.

Amount of nitroethane reacted = $\frac{0.002}{0.01} = 0.00002$

The expression for the rate constant is $k = \frac{2.303}{T} \log \frac{a}{(a-x)}$

$$= \frac{2.303}{0.5} \log \frac{0.002}{(0.002 - 0.00002)} = 2\times10^{-2} min^{-1}$$