CLASS XII

CHAPTER- CHEMICAL KINETICS

ONE MARK QUESTIONS

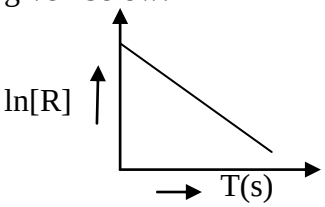
1. Why does the rate of a reaction not remain constant throughout the reaction process? (2010)
2. The rate of a reaction is 1.2 x 10^{-3} L/mol/s. What is the order of the reaction?

TWO MARK QUESTIONS

1. Define the following terms :
   a) Half-life of a reaction (t½)
   b) Rate constant (k) (2015)
2. A first order decomposition reaction takes 40 minutes for 30% decomposition. Calculate its $t_{1/2}$ value. (2008)
3. Show that for a first order reaction, the time required for half the change is independent of initial concentration. (2010)

THREE MARK QUESTIONS

1. A reaction is first order in A and second order in B.
   a) Write differential rate equation.
   b) How is the rate affected when the concentration of A is tripled?
   c) How is the rate affected when the concentration of both A and B are doubled?
2. For a certain chemical reaction, variation in the concentration, ln[R] Vs time(s) plot is given below:



   For the reaction
   a) What is the order of the reaction?
   b) Give the relationship between k and $t_{1/2}$
   c) What does the slope of the above line indicate? (2014)
3. An artifact containing wood has only 80% of the C^{14} activity found in a living tree. Estimate the age of the artifact if $t_{1/2}$ of C^{14} is 5730 years.
4. The reaction, N_2 (g) + O_2 (g) ⇌ 2NO(g) contributes to air pollution whenever a fuel is burnt inhigh temperature. At 1500 K, equilibrium constant K for it is 1.0 x 10^{-5}. Suppose in case $[N_2]$ = 0.80 mol L^{-1} and $[O_2]$ = 0.20 mol L^{-1} before any reaction occurs, calculate the equilibrium concentrations of the reactants and the product after the mixture has been heated to 1500 K. (2012)

5. For the decomposition of azoisopropane into hexane and nitrogen at 543K , the following data were obtained. Calculate the rate constant.

T(sec	P (mm of Hg)
0	35
360	54
720	63

6. The time required for 10% completion of a first order reaction at 298 K is equal to that required for its 25% completion at 308K.if the value of A is 4×10^{10}/s, calculate k at 318K and E_a

FIVE MARK QUESTIONS

1. (a) For a reaction A + B → P, the rate is given by
   Rate = k $[A]^2[B]$
   (i) How is the rate of reaction affected if the concentration of A is doubled?
   (ii) What is the overall order of reaction if B is present in large excess?
   (b) A first order reaction takes 23.1 minutes for 50% completion. Calculate the time required for 75% completion of this reaction.
   (Given : log 2 = 0.301, log 3 = 0.4771, log 4 = 0.6021) (2015)
2. a) Explain the following terms:
   i) Order of reaction
   ii) Molecularity of a reaction
   b) The rate of a reaction increases four times when the temperature changes from 300 K to 320K. Calculate the energy of activation of the reaction assuming that it does not change with temperature. (R = 8.314 J K^{-1} mol^{-1}) (2010)
3. The following results have been obtained during the kinetic studies of the reaction:
   2A + B → C + D

Experiment	[A]/M	[B]/M	Initial rate of formation of D/mol L^{-1} min^{-1}
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.2×10^{-3}
III	0.3	0.4	2.88×10^{-3}
IV	0.4	0.1	2.40×10^{-3}

Determine the rate law and rate constant for the reaction.

VALUE BASED QUESTION

1. A catalyst is substance which increases the rate of reaction without its self-undergoing any permanent chemical change. It is believed that the catalyst provides an alternate pathway or reaction mechanism by reducing the activation energy between the reactant and product
   After reading the above passage, answer the following questions-
   a) $2KClO_3 \xrightarrow{?} 2KCl + 3O_2$
   Which catalyst is used in the above reaction?
   b) Name the equation, which is used to calculate the activation energy.
   c) Mention the biological functions of catalyst in our daily life.
   d) Good values help us in prospering in our life like the catalyst which enhances the rate of reaction. Do you agree with this statement?