PRACTICE PAPER CHEMISTRY
UNIT- IV (CHEMICAL KINETICS)
Subject: Chemistry
Class: XII

Time: 1 Hour
Max. Marks: 20

Note: There are **09** questions in this question paper with internal choice. Q. No. 1-2 consist of multiple-choice questions carrying 1 mark each. Q. No. 3-4 consist of Assertion and Reason questions carrying 1 mark each. Q. No. 5-6 consist of very short answer questions carrying 2 marks each. Q. No. 7 consists of short answer questions carrying 3 marks. Q. No. 8 consists of case- based questions carrying 4 (1+1+1+1) marks. Q. No. 9 consists of long answer questions carrying 5 marks.

S.No.	Questions	Marks
1.	The rate of reaction for the reaction $2A + B \rightarrow C$ is found to be: rate = k[A][B], The correct statement in relation to this reaction is that the (a) Rate of formation of C is twice the rate of disappearance of A (b) $t_{1/2}$ is a constant (c) unit of k must be s^{-1} (d) value of k is independent on the initial concentration of A and B	1
2.	Consider the following reactant samples: I. 1 mol of A and 1 mol of B in a 1 L vessel II. 2 mol of A and 2 mol of B in a 2 L vessel III. 0.2 mol of A and 0.2 mol of B in a 0.1 L vessel Which of the reactant sample reacts at the highest rate? (a) I (b) II (c) III (d) All react at equal rate	1
	In the following questions one mark each (Q. No. 3-4) a statement of **Assertion (A)** followed by a statement of **Reason (R)** is given. Choose the correct answer out of the following choices. (i) A and R both are correct statements and R is the correct explanation for A. (ii) A and R both are correct statements and R is not correct explanation for A. (iii) A is correct statement but R is wrong statement. (iv) A is wrong statement but R is correct statement.	
3.	**Assertion (A):** Order of reaction can be zero or fractional. **Reason (R):** We cannot determine order from balanced chemical equation.	1
4.	**Assertion (A):** Formation of activated complex by reactant molecules is called as transition state. **Reason (R):** Transition sate is the configuration of atoms in the activated complex, which if attained leads to the formation of the products.	1
5.	Write the expression for $3/4^{th}$ life of a first order reaction.	2
6.	For the reaction, $C_{12}H_{22}O_{11} + H_2O \rightarrow C_6H_{12}O_6 + C_6H_{12}O_6$ Write: (i) Rate of reaction expression (ii) Rate law equation (iii)Molecularity (iv) Order of reaction OR How does a change in temperature affect the rate of a reaction? How can this effect on the rate constant of reaction be represented quantitatively?	2

7.	For a decomposition reaction, the value of k at two different temperatures are given below: $k_1 = 2.15 \times 10^{-8}$ (L/mol.s), at 650 K, $k_2 = 2.39 \times 10^{-8}$ (L/mol.s), at 700 K Calculate the value of activation energy for the reaction. (R = 8.314 J/K/mol) OR The velocity constant of the decomposition of hydrogen iodide at 283^0C and 508^0C are 3.517×10^{-7} and 3.954×10^{-2} respectively. Calculate the frequency factor at 283^0C and energy of activation of reaction.	3
8.	**Case study-based questions** Few facts about rate constant are given below: • Rate of reaction is proportional to rate constant. Greater the value of rate constant, faster is the reaction. • Value of rate constant is definite for a reaction at a particular temperature. With the change of temperature, rate constant also changes. • The value of rate constant is independent of concentration of reactants. • Units of rate constant depend upon the order of reaction. • Presence of catalyst changes the rate of reaction. • Presence of catalyst changes the rate of reaction and thus rate constant as well, by lowering the activation energy. Units of Rate constant for a reaction of n^{th} order can be determine as, Rate = $dx/dt = k[\text{concentration}]^n$, $k = (dx/dt) \times 1/[\text{concentration}]^n$ $= (\text{concentration/time}) \times 1/[\text{concentration}]^n$ $k = (\text{concentration})^{1-n}\ \text{time}^{-1}$ The following questions are multiple choice questions. Choose the most appropriate answer. (i) Rate constant in case of first order reaction is (a) Inversely proportional to the concentration units (b) Independent of concentration units (c) directly proportional to concentration units (d) Inversely proportional to the square of concentration units. (ii) If the concentrations are expressed in mol L^{-1} and time in s, then the units of the rate constant of the first order reaction are, (a) Mol $L^{-1}\ s^{-1}$ (b) $Mol^{-1}\ L\ s^{-1}$ (c) s^{-1} (d) $Mol^2\ L^{-2}\ s^{-1}$ (iii) The units for the rate constant for the second order reaction are (a) $Mol^{-1}\ L\ s^{-1}$ (b) Mol $L^{-2}\ s^{-1}$ (c) s^{-1} (d) Mol $L^{-1}\ s^{-1}$ (iv) The rate of reaction, $Cl_3CCHO + NO \rightarrow CHCl_3 + NO + CO$ is given by equation, Rate = $k[Cl_3CCHO]\ [NO]$. If concentration is expressed in mol/litre, the units of k are (a) $L^2\ mol^{-2}\ s^{-1}$ (b) L^{-1} mol s^{-1} (c) L $mol^{-1}\ s^{-1}$ (d) s^{-1}	4
9.	(i) The rate law for a reaction is Rate = $k[A]B]^{3/2}$, Can the reaction be an elementary process? Expalin. (ii) In a reaction between A and B, the initial rate of reaction (r_0) was measured for different initial concentrations of A and B as given below: A/mol L^{-1} | 0.20 | 0.20 | 0.40 B/mol L^{-1} | 0.30 | 0.10 | 0.05 r_0/mol $L^{-1}\ s^{-1}$ | 5.07×10^{-5} | 5.07×10^{-5} | 1.43×10^{-4} What is the order of the reaction with repect to A and B? OR (i) Will the rate constant of the reaction depend upon T if the activation energy of the reaction zero?	5

	(ii)	In a first order reaction, the concentration of the reactant is reduced from 0.6 mol L^{-1} to 0.2 mol L^{-1} in 5 minutes. Calculate the rate constant of the reaction.	
	(iii)	For a reaction: $2NH_3$ (g) → N_2 (g) + $3H_2$ (g), Rate = k (a) Write the order and molecularity of this reaction. (b) Write the unit of k.	