Chapter 4

Chemical Kinetics

(Assertion and Reason Questions)

In the following questions, two statements are given—one labeled Assertion (A) and the other labeled. Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:
(a) Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).
(b) Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)
(c) Assertion (A) is correct, but Reason (R) is incorrect statement.
(d) Assertion (A) is incorrect, but Reason (R) is correct statement.

Q.1. Assertion (A) : Instantaneous rate is used to predict the rate of a reaction at a particular moment of time.

Reason (R) : Average rate is constant for the time interval for which it is calculated

Q.2. Assertion (A) : For the reaction, $CHCl_3 + Cl_2 \; CCl_4 + HCl$, rate = $k[CHCl_3]\,[Cl_2]^{1/2}$

Reason (R) : Rate law for any reaction can be predicted with the help of a balanced chemical equation.

Q.3. Assertion (A) : The rate of the reaction is the rate of change of concentration of a reaction or a product.

Reason (R) : Rate of reaction remains constant during the course of reaction.

Q.4. Assertion (A) : Order of the reaction can be zero or fractional.

Reason (R) : We cannot determine order from balanced chemical equation.

Q.5. Assertion (A) : Order and molecularity are same.

Reason (R) : Order is determined experimentally and molecularity is the sum of the stoichiometric coefficient of rate determining elementary step.

Q.6. Assertion (A) : For the reaction

$$2N_2O_5 \longrightarrow 4NO_2 + O_2;$$
$$\text{Rate} = k[N_2O_5].$$

Reason (R) : Rate of decomposition of N2O5 is determined by slow step.

Q.7. Assertion (A) : The inversion of cane sugar,

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{H^+} C_6H_{12}O_6 + C_6H_{12}O_6$$

is a pseudo first order reaction.

Reason (R) : H2O in this reaction is present in very less amount as compared to $C_{12}H_{22}O_{11}$.

Q.8. Assertion (A) : For each ten degree rise of temperature the specific rate constant is nearly doubled.

Reason (R) : Energy-wise distribution of molecules in a gas is an experimental function of temperature.

Q.9. Assertion (A) : If the activation energy of a reaction is zero, temperature will have no effect on the rate constant.

Reason (R) : Lower the activation energy, faster is the reaction.

Q.10. Assertion (A) : Rate constants determined from Arrhenius equation are fairly accurate for simple as well as complex molecules.

Reason (R) : Reactant molecules undergo chemical change irrespective of their orientation during collision.

Q.11. Assertion (A) : The enthalpy of reaction remains constant in the presence of a catalyst.

Reason (R) : A catalyst participating in the reaction, forms different activated complex and lowers down the activation energy but the difference in energy of reactant and product remains the same.

Q.12. Assertion (A) : All collision of reactant molecules lead to product formation.

Reason (R) : Only those collisions in which molecules have correct orientation and sufficient kinetic energy lead to compound formation.

-x-x-x-

ANSWER KEY

Q.1 : (b)	**Q.2 :** (c)	**Q.3 :** (c)	**Q.4 :** (b)
Q.5 : (d)	**Q.6 :** (b)	**Q.7 :** (c)	**Q.8 :** (b)
Q.9 : (c)	**Q.10 :** (c)	**Q.11 :** (a)	**Q.12 :** (d)