

CHEMICAL KINETICS

CHAPTER-4

TEST-A

SOLVED

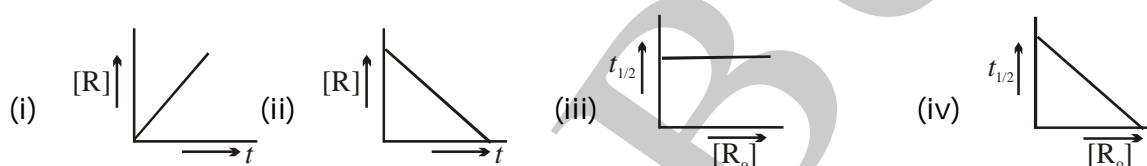
Time: 1 hr.

Max. Marks: 30

SECTION-A

Tick the correct option:

1. Which of the following graph represents the zero order reaction? [1]



2. For the reaction $A \rightarrow B$, the rate constant and the temperature are related by equation,
 $\log k(\text{s}^{-1}) = 10.00 - \frac{100K}{T}$ [R = 8.314 J mol⁻¹ K⁻¹]

The value of the Arrhenius factor (A) and the energy of activation respectively, is [1]

- (i) $A = 10.0 \times 10^{10} \text{ s}^{-1}$, $E_a = 19.15 \text{ J mol}^{-1}$
 (ii) $A = 1.0 \times 10^{10} \text{ s}^{-1}$, $E_a = 19.15 \text{ J mol}^{-1}$
 (iii) $A = 1.00 \times 10^{10} \text{ s}^{-1}$, $E_a = 19.15 \text{ kJ mol}^{-1}$
 (iv) $A = 1.0 \times 10^{10} \text{ s}^{-1}$, $E_a = 1.915 \text{ kJ mol}^{-1}$
3. The incorrect statement about the use of catalyst is [1]
- (i) Catalyst increases the rate constant
 (ii) In a reversible reaction, the catalyst does not affect the equilibrium constant.
 (iii) Catalyst lowers the energy of activation
 (iv) Catalyst makes the $\Delta_r H^\circ$ more negative

Assertion-Reason type Questions:

- (i) If assertion and reason both are correct and reason is the correct explanation of assertion.
 (ii) If assertion and reason both are correct and reason is not the correct explanation of assertion.
 (iii) If assertion is correct and reason is wrong.
 (iv) If assertion is wrong and reason is correct.

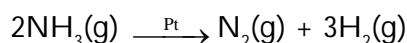
4. Assertion: For simple reactions, order and molecularity is same. [1]
Reason: Both order and molecularity are theoretical concepts.
5. Assertion: All nuclear disintegration reactions follows first order kinetics.
Reason: The concentration of the radioactive elements decreases exponentially with time.

One word /One Sentence type Questions.

6. Give two points to distinguish between the rate and the rate constant. [1]
7. The rate of reaction becomes 27 times when we reduced the volume of the container containing reactant R to one-third. What is the order of the reaction? [1]

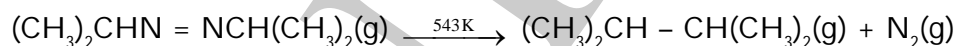
SECTION-B

8. A first order reaction is half-complete in 40 min. Calculate the time for the reaction to be 80% complete. [2]
9. A plot of $\log k$ versus $1/T$ is a straight line with slope equals to -3.0×10^3 K. Calculate the energy of activation ($R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$) [2]
10. The decomposition of NH_3 on platinum surface follows zero order kinetics with $k = 1.25 \times 10^{-3} \text{ mol L}^{-1} \text{ min}^{-1}$. [2]



Find the rate of formation of N_2 and rate of formation of H_2 .

11. For the decomposition of azoisopropane to hexane and nitrogen at 543 K, calculate the rate constant from the following data: [3]



Time (Sec)	Pressure (mm Hg)
0	35
360	54
720	63

12. (i) Why don't we have a molecularity more than three? [3]
(ii) Suggest a mechanism for the reaction
$$2\text{NO}_2 + \text{Cl}_2 \rightarrow 2\text{NO}_2\text{Cl}$$
which has a rate equation $r = k[\text{NO}_2][\text{Cl}_2]$
13. (i) Prove that half-life of a first order reaction is independent of the initial concentration of the reactants. [3]
(ii) For the reaction $\text{A} \rightarrow \text{P}$, $k = 1.38 \times 10^{-2} \text{ L mol}^{-1} \text{ s}^{-1}$. What of the reaction.
14. The reaction $\text{A} + 2\text{B} \rightarrow \text{D}$ is first order w.r.t A and second order w.r.t B. [3]
(i) write differential rate law.
(ii) How is the rate get affected when we double the concentration of both A and B?
(iii) How is the rate get affected when we double the concentration of B and reduce the concentration of A to half of its initial value?
15. (a) Give four points to distinguish between order and the molecularity of reaction. [2+3]
(b) In a given organic reaction, the concentration of the reactants is reduced to 0.12 M from 0.24 M in 20 s and to 0.06 M in 40 s. What is the order of the reaction? Also, calculate the value of the rate constant.

