

[MCQ'S – 2

2M – 1

3M – 3 (1 T, 2 NP)]

1. The unit of rate constant of a reaction is $L \text{ mol}^{-1} \text{ s}^{-1}$. What is the order of the reaction?
2. Unit of rate constant of a reaction is same as the unit of rate of reaction. What is the order of the reaction?
3. What is collision frequency?
4. By how many times does the $t_{1/2}$ of zero order reaction increase if the initial concentration of the reactant is doubled?
5. What happens to the half life period of a first order reaction, if the initial concentration of the reactants is increased?
6. In a zero order reaction, the time taken to reduce the concentration of the reactant from 50% to 25% is 30 minutes. What is the time required to reduce the concentration from 25% to 12.5%?
7. Define instantaneous rate of reaction.
8. Define average rate of reaction.
9. Define half life period of a reaction.
10. Define effective collision.
11. Define activation energy.
12. Mention the criteria for effective collision.
13. Define rate of reaction.
14. Define chemical kinetics.
15. What is the unit for rate of reaction?
16. Define order of a reaction.
17. Give the rate expression for the reaction $3A \longrightarrow \text{products}$ which follows zero order reaction.
18. What is the effect of temperature on the rate of reaction?
19. What is the rate determining step in a multiple step reaction?
20. What is the effect of concentration on the rate of reaction?
21. E_{af} & E_{ab} are activation energy of forward and backward reaction. If $E_{af} > E_{ab}$ predict the nature of the reaction.
22. Negative catalyst decreases the activation energy of particular reaction rate say true/false.
23. Calculate half life period if rate constant is $6 \times 10^{-4} \text{ s}^{-1}$ at 300K.
24. In a first order reaction, it took 50 min for completion of 50% reaction. What is the time required for 75% change.
25. Write the rate constant unit for n^{th} order reaction.
26. Give the SI unit of rate constant of a second order reaction.
27. What happens to the energy of activation when the positive catalyst is added?
28. For a reaction $2\text{HI} \longrightarrow \text{H}_2 + \text{I}_2$ write its molarity.

II. Two mark questions:

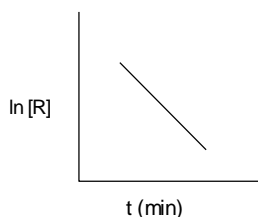
1. Write Arrhenius equation. What is E_a in the equation called? **OR** Write Arrhenius equation and explain each term in it.
2. Show that half life period for a zero order reaction is directly proportional to initial concentration. **OR** Derive the half life period expression for zero order reaction.

3. Show that half life period of a first order reaction is independent of initial concentration of reactants. **OR** Derive the half life period expression for first order reaction.
4. Draw a graph of potential energy versus reaction coordinate to show the effect of catalyst on activation energy.
5. A reaction is 50% complete in 2 hours and 75% complete in 4 hours. What is the order of reaction? Give reason.
6. Write any two differences between order and molecularity of a reaction.
7. Draw a graph of concentration of R versus time for a zero order reaction: $R \longrightarrow$ products. What is the intercept of the line?
8. Why is rate of reaction represented as $\pm \frac{dx}{dt}$?
9. Define molecularity of a reaction with one example.
10. Define and explain temperature coefficient of a reaction graphically.
11. Define pseudo unimolecular reaction with one example.
12. Define unimolecular reaction with one example.
13. Define bimolecular reaction with one example.
14. Define first order reaction with an example.
15. Define zero order reaction with an example.
16. Define second order reaction with an example.
17. Define third order reaction with an example.
18. Give any two differences between rate constant and velocity of a reaction.
19. Show that the ratio of first order reaction doubles when the concentration of the reactant doubles.
20. Give reason, in a chemical reaction, even through reaction molecules posses, more than threshold energy but the rate of reaction is slow.
21. Velocity of reaction decreases with time give reason.
22. Identify the order of reaction by following units. (i) $\text{mol L}^{-1}\text{s}^{-1}$ (ii) $\text{L mol}^{-1}\text{s}^{-1}$.
23. Identify the order of reaction by following units. (i) s^{-1} (ii) $\text{L mol}^{-1}\text{s}^{-1}$.
24. Mention the factors effecting rate of reaction.
25. Define (i) Temperature coefficient of a reaction (ii) Half life period of a reaction.
26. According to collision theory, what are the two factors that lead to effective collisions? **OR** What are two criteria for effective collision according to collision theory?
27. Show that the rate of a first order reaction is doubled when the initial concentration of the reactants are doubled.

III. Three mark questions:

1. Explain the effect of catalyst on activation energy of a reaction.
2. The velocity constant of a first order reaction is 0.0231 min^{-1} . Calculate the time required for 50% change.
3. In a first order reaction $3/4^{\text{th}}$ change occurred in 300sec. What is the time required for $7/8^{\text{th}}$ change.
4. Derive an integrated rate equation for the velocity constant for a first order reaction. **OR** Derive an integrated rate expression for rate constant of a first order reaction.
5. Rate constant of a first order reaction is $5.5 \times 10^{-14} \text{ s}^{-1}$. Calculate the half life period of the reaction.
6. Derive an integrated rate equation for the velocity constant of a zero order reaction.

7. Rate constant of a first order reaction is 0.0693 min^{-1} . Calculate the percentage of the reactant remaining at the end of 60 minutes.
8. Given $2\text{NO}_{(g)} + \text{O}_{2(g)} \longrightarrow 2\text{NO}_{2(g)}$; rate = $k[\text{NO}]^2 [\text{O}_2]^1$. By how many times does the rate of the reaction change when the volume of the reaction vessel is reduced to 1/3rd of its original volume? Will there be any change in the order of the reaction?
9. The rate of a reaction increases by 4 times when the temperature of the reaction is raised from 340 K to 360 K. Calculate the energy of activation of the reaction. Given $R = 8.314 \text{ J/K/mol}$.
10. Calculate the energy of activation if the rate of the reaction doubles when the temperature doubles when the temperature increases from 27°C to 37°C .
11. A reaction is first order w.r.t reactant 'A' and second order reaction w.r.t reactant 'B'. (i) Write differential rate equation. (ii) How is the rate of the reaction affected when concentration of 'B' alone is increased to three times?
12. A first order reaction is half completed in 46 minutes. Calculate the rate constant and also time taken for 75% completion of the reaction.
13. For a certain chemical reaction, variation in concentration $\ln [R]$ v/s t (min) plot is given below (i) what is the order of the reaction (ii) What does the slope of the line indicates? (iii) If initial concentration for this reaction becomes half, how will $t_{1/2}$ vary?



14. Show that in case of first order reaction, the time taken for completion of 99.9% of the reaction is 10 times the time required for half change of the reaction. **OR** Prove that $t_{99.9\%} = 10 t_{50\%}$ for a first order reaction.
15. The rate of a first order reaction doubles when the temperature changes from 300K to 310K. Calculate the energy of activation of the reaction.
