Chemical kinetics - Theory questions

1. Define the average rate of reaction. Write its unit.
2. Define the instantaneous rate of reaction.
3. Define the rate law of a chemical reaction.
4. Define the rate constant.
5. Define the order of a reaction. Write its features.
6. Define molecularity. Write its features.
7. Define elementary and complex reactions.
8. What is a pseudo first-order reaction? Give two examples.
9. Write two examples of zero-order reactions. Explain why these reactions are zero order.
10. Write the integrated rate equation for a zero-order reaction.
11. Write the expression for the half-life of a zero-order reaction.
12. Write the integrated rate equation for a first-order reaction.
13. Write the expression for the half-life of a first-order reaction.
14. Draw the graphs for zero-order and first-order reactions.
15. What is the relationship between temperature and the rate constant?
16. State the Arrhenius equation.
17. Define activation energy.
18. Define a catalyst. How does a catalyst increase the rate of a reaction?
19. Define most probable kinetic energy.
20. Why does the rate of reaction increase with increase in temperature?
21. Define collision frequency.
22. Define effective collision.
23. State the collision theory of chemical reactions

CHEMICAL KINETICS – EXTRA QUESTIONS (Theory Only)

1. Why is the rate of reaction maximum at the beginning of a reaction?
2. Why is the order of a reaction determined experimentally and not from the balanced chemical equation?
3. Can the order of a reaction be zero or fractional? Explain.
4. Why is molecularity always a whole number?
5. Why can molecularity never be zero?
6. Distinguish between order and molecularity of a reaction.
7. Why is the rate constant independent of the concentration of reactants?
8. How does temperature affect the rate constant of a reaction?
9. Why does the half-life of a first-order reaction not depend on initial concentration?
10. Why is the rate of a zero-order reaction constant?

11. Why do photochemical reactions generally follow zero-order kinetics?
12. Why does a catalyst not change the equilibrium constant of a reaction?
13. How does a catalyst increase the rate of a reaction?
14. Why is activation energy different for forward and reverse reactions?
15. What is the physical significance of activation energy?
16. Why does the rate of reaction increase with increase in temperature?
17. Why is collision frequency alone not sufficient for a reaction to occur?
18. Why is proper orientation of molecules necessary for an effective collision?
19. Why do reactions proceed faster in solution than in the solid state?
20. What is the effect of pressure on the rate of gaseous reactions?
21. Why does the rate of reaction decrease with time?
22. Why is instantaneous rate more meaningful than average rate?
23. Why does finely divided solid react faster than a lump of the same substance?
24. What is the significance of the Arrhenius factor (A)?
25. State two limitations of collision theory