Chemical Kinetics Viva Questions With Answers

Question.1. What is chemical kinetics ?
Answer. Chemical kinetics is that branch of chemistry which deals with the study of the rates of reactions and their mechanisms.

Question.2. What do you understand by the rate of reaction ?
Answer. The rate of a reaction is defined as the change in the molar concentration of any one of the reactant or the product per unit time.

Question.3. What are the units of the rate of reaction ?
Answer. Mol L^{-1} s^{-1} (Moles per litre per second).

Question.4. What are the factors on which the rate of reaction depends ?
Answer. The rate of reaction depends upon : (i) Nature of the reactants ; (ii) Concentration of the reactants ; (iii) Temperature ; (iv) Presence of catalyst; and (v) Presence of radiations.

Question.5. What is the law of mass action ?
Answer. Law of mass action states that the rate of a reaction is directly proportioned to the product of molar concentrations of the reactants.

Question.6. What is temperature coefficient of a reaction ?
Answer. Temperature coefficient of a reaction is the ratio of rate constants at two temperatures differing by 10°. Its value is generally equal to 2.

Question.7. What are the units of rate constant for zero order reactions ?
Answer. Same as rate of the reaction, i.e. moles/litre/sec.

Question.8. What are the units of rate constant for first order reactions ?
Answer. Sec^{-1}.

Question.9. What is the effect of temperature on rate constant of a reaction ?
Answer. It increases with increase in temperature.

Question.10. Why certain reactions are very fast ?
Answer. Because they have very low activation energy.

Question.11. What is threshold energy ?
Answer. It is the minimum energy which the colliding molecules must possess so as to have effective collision.

Question.12. Why reactions with molecularity more than three are rare ?
Answer. Because simultaneous collision between more than three particles is rare on the basis of probability considerations.

Question.13. "For an exothermic reaction activation energy for the forward reaction is less than that for the backward reaction." Is this statement true or false ?
Answer. True.

Question.14. What is rate determining step ?
Answer. In complex reactions, the slowest step determines the overall rate of the reaction. This step is known as rate determining step.

Question.15. What is the effect of catalyst on the activation energy and heat of the reaction ?
Answer. A catalyst decreases the activation energy of the reaction. It has no effect on the heat of the reaction.

Question.16. On increasing the concentration of reactants the rate of the reaction does not change. What can you say about the order of the reaction ?
Answer. It is a zero order reaction.

Question.17. Can order of a reaction be fractional ?
Answer. Yes. For example, for the reaction
$CH_3CHO \longrightarrow CH_4 + CO$
the order is equal to 3/2.

Question.18. What is a complex reaction ?
Answer. A reaction involving more than one step is called a complex reaction.

Question.19. What do you understand by '4 volume' H_2O_2 solution ?
Answer. It is a way of expressing the cone, of H202 solution. 1 litre of '4 volume' H_2O_2 solution gives 4 litres of oxygen at N.T.P. on decomposition.

Question.20. Express the cone, of 1 M H_2O_2 solution in terms of volume strength.
Answer. $2H_2O_2 \longrightarrow 2H_20 + O_2$
2 mol 22.4 L
1 litre of 1 M H_2O_2 contains 1 mole of H_2O_2 and hence would give 11.2 L on complete decomposition. Hence, 1 M H_2O_2 solution is '11.2 volume'.

Question.21. What is the equivalent mass of H_2O_2 ?
Answer. 17.

Question.22. What is the normality of 1 M H_2O_2 solution ?
Answer. 2 N.

Question.23. What is the oxidation number of oxygen in H_2O_2 ?
Answer. -1.

Question.24. What is the colour of starch-iodine complex ?
Answer. Blue.

Question.25. What is the effect of increase in cone, of iodide ions on the following reaction : $2H_30+ + 2I^- + H_2O_2 \longrightarrow 4H_20 + I_2$
Answer. Rate of the reaction increases.

Question.26. The reaction under examination is as Follows:
$S_2O_3^{2-}(aq) + 2H^+(aq) \longrightarrow H_2O(l) + SO_2(g) + S(g)$
Write the conditions under which the rate law expression for this reaction can be written in the following manner.
Rate of precipitation of sulphur = $k [S_2O_3^{2-}] [H^+]^2$.
Answer. None of the reactants should be used in excess and the reaction should be elementary.

Question.27. Suppose the above rate law expression for the precipitation of sulphur holds good, then on doubling the concentration of $S_2O_3^{2-}$ ion and H+ ion, by how many times will the rate of the reaction increase?
Answer. By eight times.

Question.28. How does the rate constant of a reaction vary with temperature?
Answer. The rate constant of a reaction increases with increase in temperature.