QB365 Question Bank Software Study Materials

Chemical Kinetics 50 Important 1 Marks Questions With Answers (Book Back and Creative)
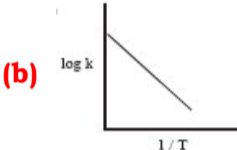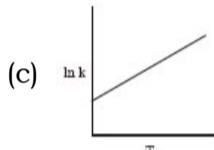
12th Standard

Chemistry

Total Marks : 50

Multiple Choice Question

50 x 1 = 50

1) For a first order reaction A → B the rate constant is x min^{-1}. If the initial concentration of A is 0.01M, the concentration of A after one hour is given by the expression.

(a) 001. e^{-x} (b) 1 x 10^{-2}(1-e^{-60x})   **(c) (1 x 10^{-2})e^{-60x}**   (d) none of these

2) A zero order reaction X → Product, with an initial concentration 0.02M has a half life of 10 min. if one starts with concentration 0.04M, then the half life is

(a) 10 s   (b) 5 min   **(c) 20 min**   (d) cannot be predicted using the given information

3) Among the following graphs showing variation of rate constant with temperature (T) for a reaction, the one that exhibits Arrhenius behavior over the entire temperature range is _____.

(a)   **(b)**   (c)   (d) both (b) and (c)

4) For a first order reaction A → product with initial concentration x mol L^{-1}, has a half life period of 2.5 hours. For the same reaction with initial concentration $\left(\frac{x}{2}\right)$ mol L^{-1} the half life is

(a) (2.5 x 2) hours   (b) $\left(\frac{2.5}{2}\right)$ hours   **(c) 2.5 hours**

(d) Without knowing the rate constant, $t_{1/2}$ cannot be determined from the given data

5) For the reaction, $2NH_3 \rightarrow N_2 + 3H_2$, if $\frac{-d[NH_3]}{dt}$ = k$_1$[NH$_3$], $\frac{d[N_2]}{dt} = k_2[NH_3]$, $\frac{d[H_2]}{dt}$ = k$_3$[NH$_3$] then the relation between k$_1$, k$_2$ and k$_3$ is _____.

(a) k$_1$ = k$_2$ = k$_3$ (b) k$_1$ = 3k$_2$ = 2k$_3$ **(c) 1.5k$_1$ = 3k$_2$ = k$_3$**   (d) 2k$_1$ = k$_2$ = 3k$_3$

6) The decomposition of phosphine (PH$_3$) on tungsten at low pressure is a first order reaction. It is because the _____.

(a) rate is proportional to the surface coverage   (b) rate is inversely proportional to the surface coverage

(c) rate is independent of the surface coverage   (d) rate of decomposition is slow

7) For a reaction Rate = k[acetone]$^{3/2}$ then unit of rate constant and rate of reaction respectively is _____.

(a) (mol L^{-1} S^{-1}),(mol$^{1/2}$ L$^{1/2}$ S^{-1})   **(b) (mol$^{-1/2}$ L$^{1/2}$ s^{-1}),(mol L^{-1} s^{-1})**   (c) (mol$^{1/2}$ L$^{1/2}$ s^{-1}),(mol L^{-1} s^{-1})

(d) (mol L s^{-1}),(mol$^{1/2}$ L$^{1/2}$ s)

8) The addition of a catalyst during a chemical reaction alters which of the following quantities?

(a) Enthalpy   **(b) Activation energy**   (c) Entropy   (d) Internal energy

9) Consider the following statements:
(i) increase in concentration of the reactant increases the rate of a zero order reaction.
(ii) rate constant k is equal to collision frequency A if E$_a$ = 0
(iii) rate constant k is equal to collision frequency A if E$_a$ = ∞
(iv) a plot of ln (k) vs T is a straight line.
(v) a plot of ln (k) vs $\left(\frac{1}{T}\right)$ is a straight line with a positive slope.
Correct statements are

(a) (ii) only   (b) (ii) and (iv)   (c) (ii) and (v)   (d) (i), (ii) and (v)

10) In a reversible reaction, the enthalpy change and the activation energy in the forward direction are respectively −x kJ mol^{-1} and y kJ mol^{-1}. Therefore, the energy of activation in the backward direction is _____.

(a) (y-x) kJ mol^{-1} (b) (x+y) J mol^{-1} (c) (x-y) KJ mol^{-1} **(d) (x+y) x 10^{3}J mol^{-1}**

11) What is the activation energy for a reaction if its rate doubles when the temperature is raised from 200K to 400K? (R = 8.314 JK^{-1} mol^{-1})

(a) 234.65 kJ mol^{-1} (b) 434.65 kJ mol^{-1} **(c) 2.305 kJ mol^{-1}**   (d) 334.65 J mol^{-1}

12) For a first order reaction, the rate constant is 6.909 min^{-1} the time taken for 75% conversion in minutes is _____.

(a) $\left(\frac{3}{2}\right)\log 2$ **(b) $\left(\frac{2}{3}\right)\log 2$**   (c) $\left(\frac{3}{2}\right)\log\left(\frac{3}{4}\right)$ (d) $\left(\frac{2}{3}\right)\log\left(\frac{4}{3}\right)$

13) In a first order reaction x ⟶ y; if k is the rate constant and the initial concentration of the reactant x is 0.1M, then, the half life is_____.

(a) $\left(\frac{\log 2}{k}\right)$ (b) $\left(\frac{0.693}{(0.1)k}\right)$ **(c) $\left(\frac{In2}{k}\right)$**   (d) none of these

14) Predict the rate law of the following reaction based on the data given below

2A+B⟶C+3D
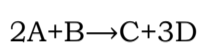
Reaction number	[A] (min)	[B] (min)	Initial rate (M s^{-1})
1	0.1	0.1	x
2	0.2	0.1	2x
3	0.1	0.2	4x
4	0.2	0.2	8x

(a) rate = k[A]^2 [B]   **(b) rate = k[A] [B]^2**   (c) rate = k[A] [B]   (d) rate = k[A]$^{1/2}$ [B]$^{3/2}$

15) The rate constant of a reaction is 5.8 x 10^{-2} S^{-1} The order of the reaction is _____.

(a) First order   (b) zero order   (c) Second order   (d) Third order

16) For the reaction $N_2O_5\,(g) \longrightarrow 2NO_2\,(g) + \frac{1}{2}O_2\,(g)$ value of rate of disappearance of N_2O_5 is given as 6.5 x 10^{-2} mol L^{-1}s^{-1}. The rate of formation of NO_2 and O_2 is given respectively as_____.

(a) (3.25 x 10^{-2} mol L^{-1}s^{-1}) and (1.3 x 10^{-2} mol L^{-1}s^{-1})   (b) (1.3 x 10^{-2} mol L^{-1}s^{-1}) and (3.25 x 10^{-2} mol L^{-1}s^{-1})

(c) (1.3 x 10^{-1} mol L^{-1}s^{-1}) and (3.25 x 10^{-2} mol L^{-1}s^{-1})   (d) None of these

17) During the decomposition of H_2O_2 to give dioxygen, 48 g O_2 is formed per minute at certain point of time. The rate of formation of water at this point is

(a) 0.75 mol min^{-1} (b) 1.5 mol min^{-1} (c) 2.25 mol min^{-1} **(d) 3.0 mol min^{-1}**

18) If the initial concentration of the reactant is doubled, the time for half reaction is also doubled. Then the order of the reaction is_____.

(a) Zero   (b) one   (c) Fraction   (d) none

19) In a homogeneous reaction A⟶B+C+D, the initial pressure was P$_0$ and after time t it was P expression for rate constant in terms of P$_0$, P and t will be _____.

(a) $k=\left(\frac{2.303}{t}\right)\log\left(\frac{2P_0}{3P_0-P}\right)$ (b) $k=\left(\frac{2.303}{t}\right)\log\left(\frac{2P_0}{P_0-P}\right)$ (c) $k=\left(\frac{2.303}{t}\right)\log\left(\frac{3P_0-P}{2P_0}\right)$ (d) $k=\left(\frac{2.303}{t}\right)\log\left(\frac{2P_0}{3P_0-2P}\right)$

20) If 75% of a first order reaction was completed in 60 minutes, 50% of the same reaction under the same conditions would be completed in_____.

(a) 20 minutes   **(b) 30 minutes**   (c) 35 minutes   (d) 75 minutes

21) The half life period of a radioactive element is 140 days. After 560 days, 1 g of element will be reduced to

(a) $\left(\frac{1}{2}\right)g$ (b) $\left(\frac{1}{4}\right)g$ (c) $\left(\frac{1}{8}\right)g$ **(d) $\left(\frac{1}{16}\right)g$**

22) The correct difference between first and second order reactions is that_____.

(a) A first order reaction can be catalysed; a second order reaction cannot be catalysed.

(b) The half life of a first order reaction does not depend on [A$_0$]; the half life of a second order reaction does depend on [A$_0$].

(c) The rate of a first order reaction does not depend on reactant concentrations; the rate of a second order reaction does depend on reactant concentrations.

(d) The rate of a first order reaction does depend on reactant concentrations; the rate of a second order reaction does not depend on reactant concentrations.

23) After 2 hours, a radioactive substance becomes $\left(\frac{1}{16}\right)^{th}$ of original amount Then the half life (in min) is _____.

(a) 60 minutes   (b) 120 minutes   **(c) 30 minutes**   (d) 15 minutes

24) $\triangle \longrightarrow \wedge$; This reaction follows first order kinetics. The rate constant at particular temperature is 2.303 x 10^{-2} hour^{-1}. The initial concentration of cyclopropane is 0.25 M. What will be the concentration of cyclopropane after 1806 minutes? (log 2 = 0.3010)

(a) 0.125 M   (b) 0.215 M   (c) 0.25 x 2.303 M   (d) 0.05 M

25) For the reaction, $2N_2O_5 \rightarrow 4 NO_2+O_2$, select the correct statement.

(a) Rate of formation of O_2 is same as rate of formation of NO_2

(b) Rate of disappearance of N_2O_5 is two times the rate of formation of NO_2.

(c) Rate of formation of O_2 is 0.5 times rate of disappearance of N_2O_5

(d) Rate of formation of NO_2 is equal to rate of disappearance of N_2O_5

26)
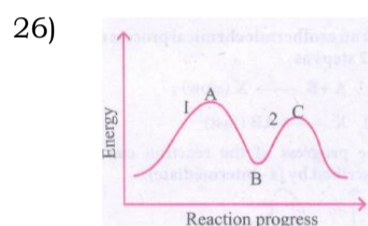
(a) It is a 2 steps reaction, step 1 is slower than step 2   (b) It is a 2 steps reaction, step 2 is slower than step 1.

(c) Single step reaction where B is a activated complex   (d) Single step reaction in which B is a reaction intermediate.

27) The graph between the log K versus $\frac{1}{T}$ is a straight line. The slope of the line is_____.

(a) $\frac{-2.303R}{Ea}$ **(b) $\frac{Ea}{2.303R}$**   (c) $\frac{2.303R}{Ea}$ (d) $\frac{Ea}{2.303R}$

28) The addition of a catalyst during a chemical reaction alters which of the following quantities?

(a) Activation energy   (b) Entropy   (c) Internal energy   (d) Enthalpy

29) Compound A reacts by first order kineties. At 25°C, the rate constant of the reaction is 0.60 sec. What is the half life of A?

(a) 1.15 sec   (b) 0.4158 sec   (c) 0.093 sec   (d) 1.29 sec

30) Pick out the effect of catalyst on activation energy?

(a) Catalyst lowers the activation energy   (b) Catalyst provides alternate path to the reaction   **(c) Both (a) and (b)**

(d) None of these

31) In the graph showing Maxwell, Boltzmann distribution of energy _____.

(a) area under the curve must not change with increase in temperature.

(b) area under the curve increases in temperature.   (c) area under the curve decreases with increase in temperature.

(d) None of these above

32) $CH_3COOCH_3 + H_2O \xrightarrow{H^+} CH_3COOH + CH_3OH$ is an example of _____ order reaction.

(a) first   (b) zero   (c) third   **(d) pseudo**

33) The half-life period of a first order reaction is 69.3 seconds. Its rate constant is _____.

(a) **10^{-2} s^{-1}**   (b) 10^{-4} s^{-1} (c) 10 s^{-1} (d) 10^2 s^{-1}

34) Activation energy of a reactant is reduced by _____.

(a) **increased temperature**   (b) reduced temperature   (c) increased pressure   (d) reduced pressure

35) The rate constant of a reaction at temperature 200K is 10 times less than the rate constant at 400K. What is the activation energy of the reaction? (R = gas constant)

(a) 1842.4R   **(b) 921.2R**   (c) 460.6R   (d) 230.3R

36) Time required for the reactant concentration to reach one half of its initial value is called _____.

(a) **half life period**   (b) first order   (c) zero order   (d) second order

37) For a reaction R → P the concentration of the reactant changes from 0.05 M to 0.04 M in 30 minutes. What will be the average rate of reaction in minutes?

(a) 4×10^{-4} M min^{-1} (b) 8×10^{-4} M min^{-1} **(c) 3.3×10^{-4} M min^{-1}**   (d) 2.2×10^{-4} M min^{-1}

38) When a chemical reaction takes place, during the course of reaction the rate of reaction.

(a) keeps in increasing with time   (b) remains constant with time   **(c) keeps in decreasing with time**
(d) show irregular trend with time

39) The rate constant of the reaction depends upon _____.

(a) **temperature of the reaction**   (b) extent of the reaction   (c) initial concentration of the reactants
(d) the time of complete of reaction

40) The rate law for the reaction A + B → C + D is given by the expression K[A], the rate of the reactions will be _____.

(a) double on doubling the concentration of B   **(b) halved on redncing the concentration of A to half**
(c) decreased on increasing the temperature of the reaction   (d) un affected by any change in concentration or temperature

41) Rate constant in case of first order reaction is _____.

(a) **inversely proportional to the concentration units**   (b) independent of concentration units
(c) directly proportional to concentration units   (d) inversely proportional to the square of concentration units

42) The time of half change of a first order reaction is _____ initial concentration.

(a) proportional to   (b) inversely proportional to   **(c) independent of**   (d) equal to

43) The rate constant for a first order reaction in 2×10^{-2} s^{-1}. The half life period of reaction is _____.

(a) 69.3 min   **(b) 34.65 min**   (c) 17.37 min   (d) 3.46 min

44) The value of rate constant of a Pseudo first order reaction _____.

(a) depends on the concentration of reactants present in small amount

(b) depends on the concentration of reactants present in excess   (c) is independent of the concentration of reactants

(d) depends only on temperature

45) If we plot log k Vs 1/T, by Arrhenius equation, the slope is _____.

(a) $\frac{-E_a}{R}$ (b) $\frac{+E_a}{R}$ **(c) $\frac{-E_a}{2.303R}$**   (d) $\frac{+E_a}{2.303R}$

46) Arrhenius equation is _____.

(a) $k = Ae^{E_a/RT}$ **(b) $k = Ae^{-E_a/RT}$**   (c) $k = Ae \times {}^{E_a/RT}$ (d) $k = A\, e^{RT/-E_a}$

47) The role of a catalyst is to change the _____.

(a) Gibbs energy of reaction   (b) enthalpy of reaction   **(c) activation energy of reaction**   (d) equilibrium constant

48) The increases in concentration of the reactants lead to the increases in the rate . This is explained by _____.

(a) Arrhenius theory **(b) collision theory** (c) activation energy (d) equilibrium constant

49) For the first order reaction velocity constant k = 10-3 s-1. Two third life for it would be _____.

(a) 1100 s (b) 2200 s (c) 3300 s (d) 4400 s

50) Match the following

Column - I	Column - II
a) Pre decomposition of N_2O hot Pt surface at high pressure	i) Zero order reaction
b) Decomposition of sulphuryl chloride in the gas phase	ii) Pseudo first order reaction
c) The acid catalysed by hydrolysis of an ester	iii) First order reaction

(a) a-i, b-ii, c-iii (b) a-ii, b-i, c-iii (c) a-iii, b-ii, c-i **(d) a-i, b-iii, c-ii**