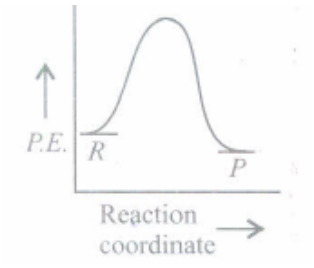
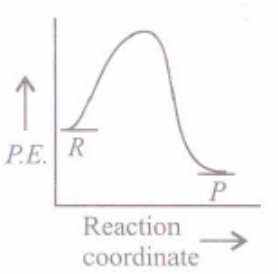
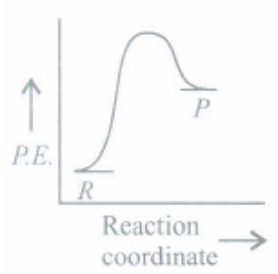
RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308

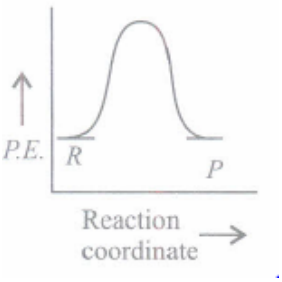
Time : 1 Mins **CHEMICAL KINETICS 1** **Marks : 850**

1. 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
2. 3A ⟶ 2B, rate of reaction + $\frac{d[B]}{dt}$ is equal to :
   a) $-\frac{3}{2}\frac{d[A]}{dt}$ b) $-\frac{2}{3}\frac{d[A]}{dt}$ c) $-\frac{1}{3}\frac{d[A]}{dt}$ d) $+2\frac{d[A]}{dt}$
3. An endothermic reaction with high activation energy for the forward reaction can be shown by th figure

a) 

b) 

c) 

d) 

4. Mechanism of a hypothetical reaction
   $\mathrm{X_2 + Y_2 \rightarrow 2XYi}$ is given below:
   $(i)\ \mathrm{X_2 \rightarrow X + X}(fast)$
   $(ii)\ \mathrm{X + Y_2 \rightleftharpoons XY + Y}(s0)$
   $(iii)\ \mathrm{X + Y \rightarrow XY}(fast)$
   The overall order of the reaction will be:
   a) 2 b) 0 c) 1.5 d) 1
5. In acidic medium, the rate of reaction between [BrO_3^-] and [Br^-] ions is given by the expression $-\frac{d[BrO_3^-]}{dt}$ = k[BrO_3^-][Br^-][H^+]^2 It means
   (i) rate constant of the reaction depends upon the concentration of H^+ ions

(ii) rate of reaction is independent of the concentration of acid added
(iii) the change in pH of the solution will affect the rate of reaction
(iv) doubling the concentration of H^+ ions will increase the reactions rate by 4 times.
a) Only (ii) b) Only (iii) c) Only (i) and (ii) d) Only (iii) and (iv)

6. The temperature dependence of the rate of a chemical reaction can be explained by Arrhenius equation which is
a) $k=Ae^{E_a/RT}$ b) $k=Ae^{-E_a/RT}$ c) $k=Ae \times \frac{E_a}{RT}$ d) $k=Ae \times \frac{RT}{E_a}$

7. For the reaction $N_2 + 3H_2 \longrightarrow 2NH_3$, if $\frac{d[NH_3]}{dt}$=2 x 10^{-4} mol L^{-1} s^{-1}, the value of $\frac{-d[H_2]}{dt}$ would be:
a) 3 x 10^{-4} mol $L^{-1}s^{-l}$ b) 4 X 10^{-4} mol $L^{-1}s^{-l}$ c) 6 X 10^{-4} mol L^{-1} s^{-l} d) 1 x 10^{-4} mol $L^{-1}s^{-l}$

8. For a first order reaction $A \longrightarrow B$, the reaction rate at reactant concentration of 0.01 M is found to be 2.0 x 10^{-5} mol L^{-1} s^{-1}. The half-life period of the reaction is :
a) 220 s b) 30 s c) 300 s d) 347 s

9. What will be the half-life of the first order reaction for which the value of rate constant is 200 s^{-1}?
a) 3.46 x 10^{-2} s b) 3.46 x 10^{-3} s c) 4.26 X 10^{-2} s d) 4.26 x 10^{-3} s

10. Activation energy (E_a) and rate constants (k_1 and k_2) of a chemical reaction at two different temperatures (T_1 and T_2) are related by:
a) $\ln \frac{k_2}{k_1} = -\frac{E_a}{\mathrm{R}}\left(\frac{1}{\mathrm{T}_1} - \frac{1}{\mathrm{T}_2}\right)$ b) $\ln \frac{k_2}{k_1} = -\frac{E_a}{\mathrm{R}}\left(\frac{1}{\mathrm{T}_2} - \frac{1}{\mathrm{T}_1}\right)$
c) $\ln \frac{k_2}{k_1} = -\frac{E_a}{\mathrm{R}}\left(\frac{1}{\mathrm{T}_2} + \frac{1}{\mathrm{T}_1}\right)$ d) $\ln \frac{k_2}{k_1} = \frac{E_a}{\mathrm{R}}\left(\frac{1}{\mathrm{T}_1} - \frac{1}{\mathrm{T}_2}\right)$

11. The increase in concentration of the reactants lead to change:
a) ΔH b) collision frequency c) activation energy d) equilibrium constant

12. Assertion: Rate of reaction increases with increase in temperature.
Reason: Number of effective collisions increases with increase in temperature.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

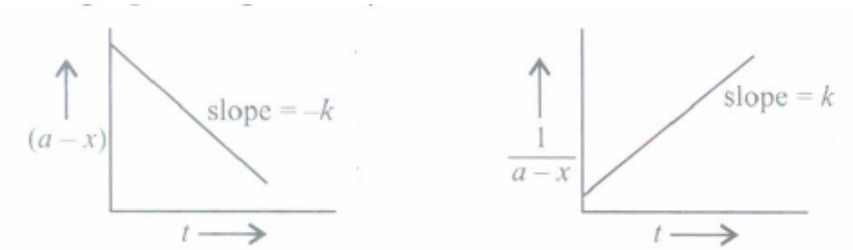
13. Which one of the following is wrongly matched?
a) Saponification of $CH_3COOC_2H_5$ - Second order reaction
b) Hydrolysis of CH_3COOCH_3 - Pseudounimolecular reaction
c) Decomposition of H_2O_2 - First order reaction
d) Combination of H_2 and Br_2 to give HBr - Zero order reaction

14. Assertion: The rate of a reaction sometimes does not depend on concentrations.
Reason: Lower the activation energy, faster is the reaction.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

15. The value of rate of a pseudo first order reaction depends upon:
    a) the concentration of both the reactants present in the reaction
    b) the concentration of the reactant present in small amount
    c) the concentration of the reactant present in excess
    d) the value of ΔH of the reaction

16. Two plots are shown below between concentration and time t. Which of the given orders are shown by the graphs respectively



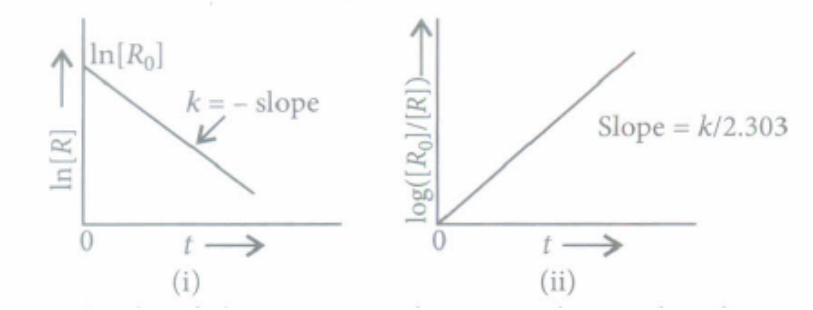
    a) Zero order and first order b) First order and second order
    c) Zero order and second order d) First order and first order

17. Find the values of A, B and C in the following table for the reaction X + Y ⟶ Z. The reaction is of first order w.r.t X and zero order w.r.t. Y.

Exp.	**[X](mol L^{-1})**	**[Y](mol L^{-1})**	**Initial rate (mol $L^{-1}s^{-1}$)**
1.	0.1	0.1	2 x 10^{-2}
2.	A	0.2	4 x 10-2
3.	0.4	0.4	B
4.	C	0.2	2 x 10^{-2}

    a) A = 0.2 mol L^{-1}, B = 8 x 10^{-2} mol L^{-1} s^{-1}, C = 0.1 mol L^{-1}
    b) A = 0.4 mol L^{-1}, B = 4 x 10^{-2} mol L^{-1} s^{-1}, C = 0.2 mol L^{-1}
    c) A = 0.2 mol L^{-1}, B = 2 x 10^{-2} mol L^{-1} s^{-1}, C = 0.4 mol L^{-1}
    d) A = 0.4 mol L^{-1}, B = 2 x 10^{-2} mol L^{-1} s^{-1}, C=0.4 mol L^{-1}

18. Observe the given graphs carefully.



    Which of the given orders are shown by the graphs respectively?

a)

(i)	(ii)
First order	First order

b)

(i)	(ii)
Second order	Zero order

c)

(i)	(ii)
Zero order	First order

d)

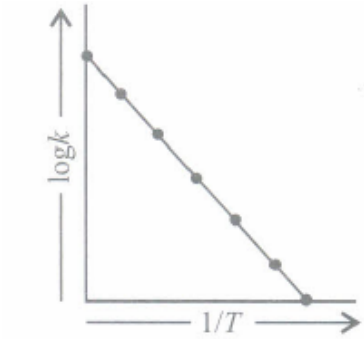
(i)	(ii)
First order	Zero order

19. For a chemical reaction, X ⟶ Y, the rate of reaction increases by a factor of 1.837 when the concentration of X is increased by 1.5 times, the order of the reaction with respect to X is
    a) 1 b) 1.5 c) 2 d) 2.5
20. For a first reaction A - B the reaction rate at reactant concentration of 0.01 M is found to be 2.0 x 10^{-5} mol L^{-1} s^{-l}. The half-life period of the reaction is:
    a) 30 s b) 220 s c) 300 s d) 347 s
21. The rate of a first order reaction is 0.04 mol l^{-1} s^{-1} at 10 seconds and 0.03 mol $l^{-1}s^{-l}$ at 20 seconds after initiation of the reaction. The half-life period of the reaction is:
    a) 24.1 s b) 34.1 s c) 44.1 s d) 54.1 s
22. For the reaction N_2 + $3H_2$ ⟶ $2NH_3$ how are the rate of reaction expressions inter-related $\frac{d[H_2]}{dt}$ and $\frac{d[NH_3]}{dt}$?
    a) $-\frac{1}{3}\frac{d[H_2]}{dt} = +\frac{1}{2}\frac{d[NH_3]}{dt}$ b) $-\frac{1}{2}\frac{d[H_2]}{dt} = +\frac{1}{3}\frac{d[NH_3]}{dt}$ c) $+\frac{1}{2}\frac{d[H_2]}{dt} = -\frac{1}{3}\frac{d[NH_3]}{dt}$
    d) $+\frac{1}{3}\frac{d[H_2]}{dt} = -\frac{1}{2}\frac{d[NH_3]}{dt}$
23. For the reaction 2A $+\mathrm{B} \rightarrow 3\mathrm{C} + \mathrm{D}$
    which of the following does not express the reaction rate?
    a) $-\frac{d[\mathrm{B}]}{dt}$ b) $\frac{d[\mathrm{D}]}{dt}$ c) $-\frac{1}{2}\frac{d[\mathrm{A}]}{dt}$ d) $-\frac{1}{3}\frac{d[\mathrm{C}]}{dt}$
24. For the reaction, 2A + B ⟶ 3C + D which of the following does not express the reaction rate?
    a) $-\frac{d[C]}{3\,dt}$ b) $-\frac{d[B]}{dt}$ c) $\frac{d[D]}{dt}$ d) $-\frac{d[A]}{2\,dt}$
25. Assertion: Complex reaction takes place in different steps and the slowest step determines the rate of reaction.
    Reason: Order and molecularity of a reaction are always equal.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false

26. A hypothetical reaction, A2 + B2 ⟶ 2AB follows the mechanism as given below:
    A2 ⇌ A + A ....(fast)
    A + B2 ⟶ AB + B .....(slow)
    A + B ⟶ AB ..... (fast)
    The order of the overall reaction is
    a) 2 b) 1 c) 3/2 d) zero

27. Rate constant of two reactions are given below Identifying their order of reaction.
    (i) k = 5.3 x 10^{-2} L mol^{-1} s^{-1}
    (ii) k = 3.8 x 10^{-4} s^{-1}
    a) (i) second order, (ii) first order b) (i) first order, (ii) second order
    c) (i) zero order, (ii) first order d) (i) second order, (ii) zero order

28. The temperature dependence of the rate constant k I.S expresse d as k = Ae^{-E} a./RT
    When a plot between log k and l/T is plotted we get the graph as shown.



    What is the value of slope in the graph?
    a) $\frac{E^a}{RT}$ b) $-\frac{E_a}{2.303R}$ c) $-\frac{E_a}{2.303RT}\log A$ d) $-\frac{E_a}{2.303}\frac{R}{T}$

29. Which of the following statements is correct?
    a)
    The rate of a reaction decreases with passage of time as the concentration of reactants decreases
    b) The rate of a reaction is same at any time during the reaction
    c) The rate of a reaction is independent of temperature change
    d) The rate of a reaction decreases with increase in concentration of reactant(s)

30. Assertion: Molecularity greater than three is not observed.
    Reason: The overall molecularity of a complex reaction is equal to molecularity of the slowest step.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false

31. When a chemical reaction takes place, during the course of the reaction the rate of reaction:

a) keeps on increasing with time b) remains constant with time
c) keeps on decreasing with time d) shows irregular trend with time

32. In the reaction
$\mathrm{BrO_{3(aq)}^{-}} + 5\mathrm{Br_{(aq)}^{-}} + 6\mathrm{H^{+}} \rightarrow 3\mathrm{Br_{2(l)}} + 3\mathrm{H_2O}(l)$ The rate of appearance of bromine (Br_2) is related to rate of disappearance of bromide ions as following:
a) $\frac{d[\mathrm{Br_2}]}{dt} = -\frac{5}{3}\frac{d[\mathrm{Br^-}]}{dt}$ b) $\frac{d[\mathrm{Br_2}]}{dt} = \frac{5}{3}\frac{d[\mathrm{Br^-}]}{dt}$ c) $\frac{d[\mathrm{Br_2}]}{dt} = \frac{3}{5}\frac{d[\mathrm{Br^-}]}{dt}$
d) $\frac{d[\mathrm{Br_2}]}{dt} = -\frac{3}{5}\frac{d[\mathrm{Br^-}]}{dt}$

33. Half-life period of a first order reaction is 10 min. What percentage of the reaction will be completed in 100 min?
a) 25% b) 50% c) 99.9% d) 75%

34. If 60% of a first order reaction was completed in 60% minutes, 50% of the same reaction would be completed in approximately
$(\log 4 = 0.60, \log 5 = 0.69)$
a) 45 minutes b) 60 minutes c) 40 minutes d) 50 minutes

35. In pseudo unimolecular reactions,
a) both the reactants are present in low concentration
b) both the reactants are present in same concentration
c) one of the reactant is present in excess d) one of the reactant is non-reactive

36. The chemical reaction, $2O_3 \rightarrow 3O_2$ proceeds as
$O_3 \rightleftharpoons O_2 + [O]$ (fast)
$[O] + O_3 \xrightarrow{k_2} 2O_2$ (slow)
The rate law expression will be
a) Rate = k[O][O_3] b) Rate = k[O_3]^2 [O_2]$^{-1}$ c) Rate = k[O_3]^2 d) Rate = k[O_2] [O]

37. In a first order reaction, A $\longrightarrow$ B, if k is rate constant and initial concentration of the reaction A is 0.5 M, then the half-life is :
a) $\frac{0.693}{0.5k}$ b) $\frac{log\,2}{k}$ c) $\frac{log\,2}{k\sqrt{0.5}}$ d) $\frac{ln\,2}{k}$

38. Assertion: All molecular collisions lead to the formation of products.
Reason: Reactant molecules undergo chemical change irrespective of their collision
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

39. Assertion: The decomposition of gaseous ammonia on a hot platinum surface is a zero order reaction at high pressure.
Reason: For a zero order reaction, the rate of reaction is independent of initial concentration.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

40. Which of the following statements is not correct for the catalyst?
a) It catalyses the forward and backward reaction to the same extent
b) It alters ΔG of the reaction
c) It is a substance that does not change the equilibrium constant of a reaction
d)
It provides an alternate mechanism by reducing activation energy between reactants and products

41. Which of the following statements is not correct?
a) For a zero order reaction, $t_{1/2}$ is proportional to initial concentration
b)
The relationship of variation of rate constant with temperature is given by $\frac{k_2}{k_1} = \frac{E_a}{2.303R}\left[\frac{T_2 - T_1}{T_1 T_2}\right]$.
c) The unit of rate constant for a reaction is $mol^{1-n}L^{n-1}s^{-1}$ where n is order of the reaction
d) The unit of rate of reaction changes with order of reaction

42. The rate of the reaction $2NO + Cl_2 \rightarrow 2NOCl$ is given by the rate equation rate = $k[NO]_2\,[Cl_2]$
The value of the rate constant can be increased by:
a) increasing the concentration of NO b) increasing the temperature
c) increasing the concentration of the Cl_2 d) doing all of these

43. A first order reaction has a rate constant 1.15 x 10^{-3} s^{-1} How long will 5 g of this reactant take to reduce to 3 g?
a) 444 s b) 400 s c) 528 s d) 669 s

44. For the reaction $2NH_3 \rightarrow N_2 + 3H_2$
$-\frac{d[NH_3]}{dt} = k_1[NH_3]$, $\frac{d[N_2]}{dt} = K_2[NH_3]$, $\frac{d[H_2]}{dt} = k_3[NH_3]$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) $2k_1=k_2=3k_3$

45. Which of the following factors are responsible for the increase in the rate of a surface catalysed reaction?
(i) A catalyst provides proper orientation for the reactant molecules to react.
(ii) Heat of adsorption of reactants on a catalyst helps reactant molecules to overcome activation energy.
(iii) The catalyst increases the activation energy of the reaction.
a) (i) and (iii) b) (i) and (ii) c) (ii) and (iii) d) (i), (ii) and (iii)

46. The reaction $2NO + Br_2 \rightarrow 2NOBr$, obeys the following mechanism:
$NO + Br_2 \overset{Fast}{\rightleftharpoons} NOBr_2$; $NOBr_2 + NO \overset{Slow}{\longrightarrow} 2NOBr$
The rate expression of the above reaction can be written as
a) $r=k[NO]^2[Br_2]$ b) $r=k[NO][Br_2]$ c) $r=k[NO][Br_2]$ d) $r=k[NOBr_2]$

47. The rate of reaction between two reactants A and B decreases by a factor of 4 if the concentration of reactant B is doubled. The order of this reaction with respect to reactant B is
a) 2 b) -2 c) 1 d) -1

48. The number of molecules of the reactants taking part in a single step of the reaction is indicative of
a) order of a reaction b) molecularity of a reaction
c) fast step of the mechanism of a reaction d) half-life of the reaction

49. For exothermic reaction, the energy of activation of the reactants is :
a) equal to the energy of activation of products
b) less than the energy of activation of products
c) greater than the energy of activation of products
d) sometimes greater and sometimes less than that of the products

50. The half-life of the reaction $X \rightarrow Y$, following first order kinetics, when the initial concentration of X is 0.01 mol L^{-1} and initial rate is 0.00352 mol L^{-1} min^{-1} will be
a) 19.69 min. b) 1.969 min c) 7.75 min d) 77.5 min.

51. For a unimolecular reaction,
a) the order and molecularity of the slowest step are equal to one
b) molecularity of the reaction can be zero, one or two
c) more than one reacting species are involved in one step
d) molecularity of the reaction can be determined only experimentally

52. The decomposition of a hydrocarbon follows the equation $k = (4.5 \times 10^{11}\ s^{-1})e^{-28000K/T}$. What will be the value of activation energy?
a) 669 kJ mol^{-1} b) 669 kJ mol^{-1} c) 4.5×10^{11} kJ mol^{-1} d) 28000 kJ mol^{-1}

53. For a reaction $X \rightarrow Y$, the rate of reaction becomes twenty seven times when the concentration of X is increased three times. What is the order of the reaction?
a) 2 b) 1 c) 3 d) 0

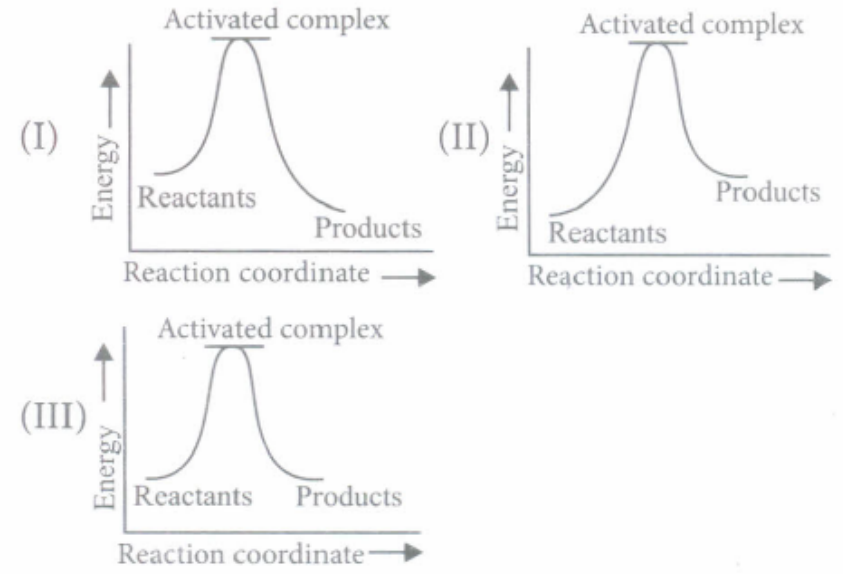
54. The decomposition of dimethyl ether is a fractional order reaction. The rate of reaction is given by rate = $k_{(PCH3OCH3)}^{3/2}$. If the pressure is measured in bar and time in minutes, then what are the units of rate and rate constant?
a) bar min^{-1}, bar^2 min^{-1} b) bar min^{-1}, $bar^{1/2}$ min^{-1} c) $bar^{-1/2}$ min^{-1}, bar^2 min^{-1}
d) bar min^{-1}, $bar^{1/2}$ min^{-1}

55. Which of the following is an example of a fractional order reaction?
a) $NH_4NO_2 \rightarrow N_2 + 2H_2O$ b) $NO + O_3 \rightarrow NO_2 + O_2$ c) $2NO + Br_2 \rightarrow 2NOBr$
d) $CH_3CHO \rightarrow CH_4 + CO$

56. Assertion: A catalyst increases the rate of reaction without itself undergoing any permanent chemical change.
Reason: A catalyst changes the Gibbs energy (ΔG) of the reaction and equilibrium constant of the reaction.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If assertion is true but reason is false

57. The rate constant of a reaction depends upon
a) temperature of the reaction b) extent of the reaction
c) initial concentration of the reactants d) the time of completion of reaction

58. Which of the following graphs represents exothermic reaction?



a) (I) only b) (II) only c) (III) only d) (I) and (II)

59. For the reaction A + B products, it is observed that:
1. on doubling the initial concentration of A only, the rate ofreaction is also doubled and
2. on doubling the initial concentrations of both A and B, there is a change by a factor of 8 in the rate of the reaction.
The rate of this reaction is given by:
a) rate = k[A] $[B]^2$ b) rate = $k[A]^2$ $[B]^2$ c) rate = k[A][B] d) rate = $k[A]^2$ [B]

60. For a reaction P + Q ⟶ 2R + S. Which of the following statements is incorrect?
a) Rate of disappearance of P = Rate of appearance of S
b) Rate of disappearance of Q = 2 x Rate of appearance of R
c) Rate of disappearance of P = Rate of disappearance of Q
d) Rate of disappearance of Q = $\frac{1}{2}$ x Rate of appearance of R

61. Which of the following statements is not correct about order of a reaction?
a) The order of a reaction can be a fractional number
b) Order of a reaction is experimentally determined quantity

c)

The order of a reaction is always equal to the sum of the stoichiometric coefficients of reactants in the balanced chemical equation for a reaction

d)

The order of a reaction is the sum of the powers of molar concentration of the reactants in the rate law expression

62. The decomposition of a substance follows first order kinetics. If its concentration is reduced to 1/8 of its initial value in 12 minutes, the rate constant of the decomposition system is

a) $\left(\frac{2.303}{12}\log\frac{1}{8}\right) min^{-1}$. b) $\left(\frac{2.303}{12}\log 8\right) min^{-1}$. c) $\left(\frac{0.693}{12}\right) min^{-1}$.

d) $\left(\frac{1}{12}\log 8\right) min^{-1}$.

63. The rate of the reaction:

$CH_3COOC_2H_5$ + NaOH ⟶ CH_3COONa + C_2H5OH is given by the equation,

rate = k[$CH_3COOC_2H_5$] [NaOH]

If concentration is expressed in mol/L, the units of k are

a) $mol^{-2}\ L^2\ s^{-1}$ b) $mol\ L^{-1}\ s^{-1}$ c) $L\ mol^{-1}\ s^{-1}$ d) s^{-1}

64. 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 very slow.

65. Fill up the following with suitable terms.

(i) Activation energy = Threshold energy __

(ii) Half-life period of zero order reaction = __

(iii) Average rate of reaction = _____

(iv) Instantaneous rate of reaction = _____

a)

(i)	(ii)	(iii)	(iv)
Potential energy	$\frac{0.693}{k}$	$\frac{dx}{dt}$	$\frac{\triangle[A]}{\triangle t}$

b)

(i)	(ii)	(iii)	(iv)
Energy of reactants	$\frac{1}{k}$	$\frac{\triangle[A]}{\triangle t}$	$\frac{dx}{dt}$

c)

(i)	(ii)	(iii)	(iv)
Energy of reaction	$\frac{logk}{t}$	$\frac{\triangle[A]}{\triangle t}$	$\frac{dx}{dt}$

d)

(i)	(ii)	(iii)	(iv)
Average kinetic energy of reactants	$\frac{a}{2k}$	$\frac{\triangle[A]}{\triangle t}$	$\frac{dx}{dt}$

66. The plot of concentration of the reactant versus time for a reaction is a straight line with a negative slope. This reaction follows :

a) zero order rate equation b) first order rate equation c) second order rate equation

d) third order rate equation

67. The rate constants k_1 and k_2 for two different reactions are $10^{16}.e^{-2000/T}$ and $10^{15}.e^{-1000/T}$, respectively. The temperature at which $k_1 = k_2$ is :

a) 1000 K b) $\frac{2000}{2.303}K$ c) 2000 K d) $\frac{1000}{2.303}K$

68. The rate constant for the reaction, $2N_2O_5 \longrightarrow 4NO_2 + O_2$ is 2×10^{-5} s^{-1}. If rate of reaction is 1.4×10^{-5} mol L^{-1} s^{-1}, what will be the concentration of N_2O_5 in mol L^{-1}?
a) 0.8 b) 0.7 c) 1.2 d) 1

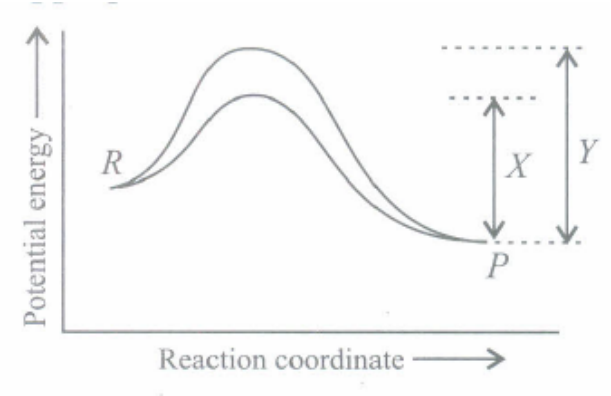
69. Rate law for the reaction, A + 2B ⟶ C is found to be Rate =k[A][B]
Concentration of reactant 'B' is doubled, keeping the concentration of 'A' constant, the value of rate constant will be _____
a) the same b) doubled c) quadrupled d) halved

70. Nitrogen dioxide (NO_2) dissociates into nitric oxide (NO) and oxygen (O_2) as follows:
$2NO_2 \longrightarrow 2NO + O_2$
If the rate of decrease of concentration of NO_2 is 6.0×10^{-12} mol L^{-1} s^{-1}. What will be the rate of increase of concentration of O_2?
a) 3×10^{-12} mol L^{-1} s^{-1} b) 6×10^{-12} mol $L^{-1}s^{-1}$ c) 1×10^{-12} mol L^{-1} s^{-1}
d) 1.5×10^{-12} mol L^{-1} s^{-1}

71. The order of reaction is decided by
a) temperature b) mechanism of reaction as well as relative concentration of reactants
c) molecularity d) pressure

72. For the reaction $4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$, if the rate of disappearance of NH_3 is 3.6×10^{-3} mol L^{-1} s^{-1}, what is the rate of formation of H_2O?
a) 5.4×10^{-3} mol L^{-1} s^{-1} b) 3.6×10^{-3} mol L^{-1} s^{-1} c) 4×10^{-4} mol L^{-1} s^{-1}
d) 0.6×10^{-4} mol L^{-1} s^{-1}

73. The graph of the effect of catalyst on activation energy is given below. Fill up the blanks X and Y with appropriate statements.



a) X = energy of activation without catalyst, Y = energy of activation with catalyst
b) X = path of reaction with catalyst, Y = path ofm reaction without catalyst
c) X = energy of activation with catalyst, Y = energy of activation without catalyst
d) X = energy of endothermic reaction, Y= energy of exothermic reaction

74. For the reaction, $N_2O_{5(g)} \longrightarrow 2NO_{2(g)} + \frac{1}{2}O_{2(g)}$. The value of rate of disappearance of N_2O_5 is given as 6.25×10^{-3} mol $L^{-1}s^{-1}$. The rate of formation of NO_2 and O_2 is given respectively as :
a) 6.25×10^{-3} mol L^{-1} s^{-1} and 6.25×10^{-3} mol L^{-1} s^{-1}
b) 1.25×10^{-2} mol $L^{-1}s^{-1}$ and 3.125×10^{-3} mol $L^{-1}s^{-1}$
c) 6.25×10^{-3} mol $L^{-1}s^{-l}$ and 3.125×10^{-3} mol L^{-1} s^{-1}
d) 1.25×10^{-2} mol $L^{-1}s^{-1}$ and 6.25×10^{-3} mol $L^{-1}s^{-1}$

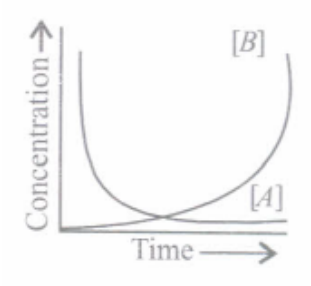
75. A first order reaction takes 40 min for 30% decomposition. What will be $t_{1/2}$?
    a) 77.7 min. b) 52.5 min c) 46.2 min. d) 22.7 min

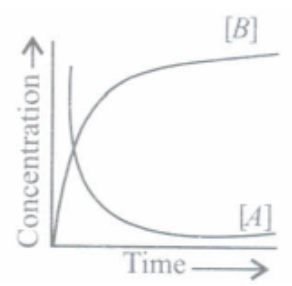
76. Consider a first order gas phase decomposition reaction given below:
    $A_{(g)} \rightarrow B_{(g)} + C_{(g)}$
    The initial pressure of the system before decomposition of A was P_i. After lapse of time 't' total pressure of the system increased by x units and became P_t: The rate constant k for the reaction is given as _____.
    a) $k = \frac{2.303}{t} \log \frac{P_i}{P_i - x}$ b) $k = \frac{2.303}{t} \log \frac{P_i}{2P_i - P_t}$ c) $k = \frac{2.303}{t} \log \frac{P_i}{2P_i + P_t}$
    d) $k = \frac{2.303}{t} \log \frac{P_i}{2P_i + x}$

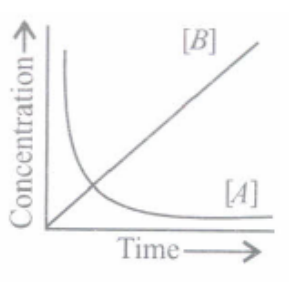
77. The rate of formation of a dimer in a second order dirnerisation reaction is 9.1 x 10^{-6} mol L^{-1} s^{-1} at 0.01 mol L^{-1} monomer concentration. What will be the rate constant for the reaction?
    a) 9.1 x 10^{-2} L mol^{-1} s^{-1} b) 9.1 x 10^{-6} L mol^{-1} s^{-1} c) 3 x 10^{-4} L mol^{-1} s^{-1}
    d) 27.3 x 10^{-2} L mol^{-1} s^{-1}

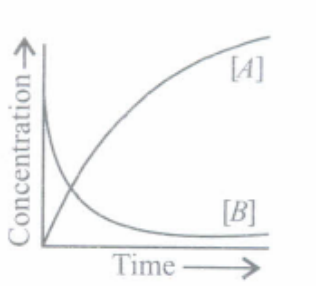
78. Consider the Arrhenius equation given below and mark the correct option.
    $k=Ae^{-Ea/RT}$
    a)
    Rate constant increases exponentially with increasing activation energy and decreasing temperature
    b)
    Rate constant decreases exponentially with increasing activation energy and decreasing temperature
    c)
    Rate constant increases exponentially with decreasing activation energy and decreasing temperature
    d)
    Rate constant increases exponentially with decreasing activation energy and increasing temperature

79. Consider the reaction A $\rightarrow$ B. The concentration of both the reactants and the products varies exponentially with time. Which of the following figures correctly describes the change in concentration of reactants and products with time?

a) 

b) 

c) 

d) 

80. A plot of log (a - x) against time t is a straight line. This indicates that the reaction is of:
a) zero order b) first order c) second order d) third order.

81. For a certain reaction a large fraction of molecules has energy more than the threshold energy, still the rate of reaction is very slow. The possible reason for this could be that
a) the colliding molecules could be large in size
b) the colliding molecules must not be properly oriented for effective collisions
c) the rate of reaction could be independent of the energy
d) one of the reactants could be in excess

82. The experimental data for the reaction 2A + B_2 + 2AB is

Exp.	[A]	$[B_2]$	Rate (Ms^{-1})
1.	0.50	0.50	1.6×10^{-4}
2.	0.50	1.00	3.2×10^{-4}
3.	1.00	1.00	3.2×10^{-4}

the rate equation for the above data is
a) $\text{rate} = k[B_2]$ b) $\text{rate} = k[B_2]^2$ c) $\text{rate} = k[A]^2[B]^2$ d) $\text{rate} = k[A]^2[B]$

83. Rate of a general reaction A + B ⟶ products can be expressed as follows on the basis of collision theory Rate = $ZAB^{e-E_a/RT}$.
Which of the following statements is not correct for the above expression?
a)
Z is collision frequency and is equal to number of collisions per second per unit volume of the reaction mixture
b) $e^{-E_a/RT}$ is the fraction of molecules with kinetic energy equal to or greater than E_a
c) E_a is activation energy of the reaction
d) All the molecules which collide with one other are effective collisions

84. The correct difference between first and second order reactions is that :
a) A first-order reaction can catalyzed; a second-order reaction cannot be catalyzed.
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 $[A]_0$.

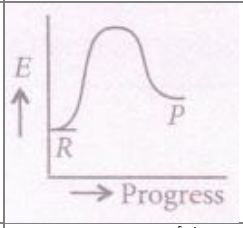
c)

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 secondorder reaction does not depend on reactant concentrations.

85. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Zero-order	(i)	$\log \frac{k_2}{k_1} = \frac{E_a}{2.303R}\left[\frac{T_2-T_1}{T_1T_2}\right]$
(B)	First-order	(ii)	
(C)	Endothermic reaction	(iii)	$k = \frac{2.303}{t} log \frac{[A]_0}{[A]}$
(D)	Activation energy	(iv)	$k = \frac{1}{t}$ ($[A]_0$-[A]

a) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)

b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv)

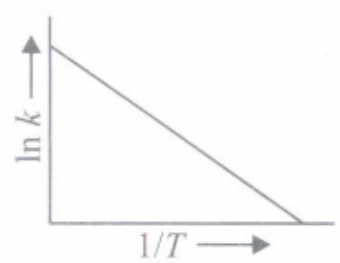
c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i)

d) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii)

86. For an endothermic reaction, H represents the enthalpy of the reaction in kJ mol I. The minimum amount of activation energy will be:

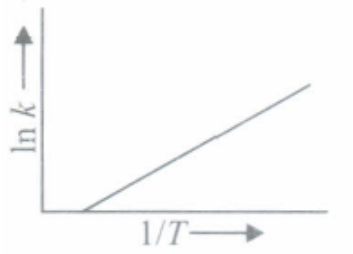
a) less than zero b) equal to △H c) less than △H d) more than △H.

87. According to Arrhenius equation rate constant k is equal to Ae-EaIRT. Which of the following options represents the graph of In k vs 1/T?

a) 

b) 

c) 

d) 

88. In the reaction $BrO^-_{3(aq)} + 5Br^-_{(aq)} + 6H^+ \longrightarrow 3Br_2 + 3H_2O_{(l)}$ the rate of appearance of bromine (Br_2)is related to rate of disappearance of bromide ions as following:

a) $\frac{d[Br_2]}{dt} = -\frac{3}{5}\frac{d[Br^-]}{dt}$ b) $\frac{d[Br_2]}{dt} = -\frac{5}{3}\frac{d[Br^-]}{dt}$ c) $\frac{d[Br_2]}{dt} = \frac{5}{3}\frac{d[Br^-]}{dt}$ d) $\frac{d[Br_2]}{dt} = \frac{3}{5}\frac{d[Br^-]}{dt}$

89. Consider the reaction, $2N_2O_5 \longrightarrow 4NO_2 + O_2$ In the reaction NO_2 is being formed at the rate of 0.0125 mol L^{-1} s^{-1}. What is the rate of reaction at this time?

a) 0.0018 mol L^{-1} s^{-1} b) 0.0031 mol L^{-1} s^{-1} c) 0.0041 mol L^{-1} s^{-1} d) 0.050 mol L^{-1} s^{-1}

90. In a reaction, 2X ⟶ Y, the concentration of X decreases from 0.50 M to 0.38 M in 10 min. What is the rate of reaction in M s^{-1} during this interval?
a) 2 x 10^{-4} b) 4 x 10^{-2} c) 2 x 10^{-2} d) 1 x 10^{-2}

91. A first order reaction is 50% complete in 30 minutes at 27°C and in 10 minutes at 47°C. The reaction rate constant at 27°C and the energy of activation of the reaction are respectively:
a) k = 0.0231 min^{-1}, Ea = 43.848 k] mol^{-1} b) k = 0.017 min^{-1}, Ea = 52.54 kJ $morl^{-1}$
c) k = 0.0693 min^{-1}, Ea = 43.848 k] $morl^{-1}$ d) k = 0.0231 min^{-1}, Ea = 28.92 k] mol^{-1}

92. The rate constant for a first order reaction is 4.606 x $10^{-3}s^{-1}$. The time required to reduce 2.0 g of the reactant to 0.2 g is:
a) 1000 s b) 100 s c) 200 s d) 500 s

93. The experimental data for the reaction 2A + B_2 ⟶ 2AB is :

Exp.	[A]	[B]	Rate (Ms^{-1})
1.	0.50	0.50	1.6 x 10^{-4}
2.	0.50	1.00	3.2 x 10^{-4}
3.	1.00	1.00	3.2 x 10^{-4}

The rate equation for the above data is :
a) rate = k[B_2] b) rate = k[B_2]^2 c) rate = k[A]^2[B]^2 d) rate = k[A]^2[B]

94. The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at a constant volume.
$SO_2Cl_2(g) \longrightarrow SO_2(g) + Cl_2(g)$

Experiment	**Time/s-1**	**Total pressure/atm**
1	0	0.5
2	100	0.6

What is the rate of reaction when total pressure is 0.65 atm?
a) 0.35 atm s^{-1} b) 2.235 x 10^{-3} atm s^{-1} c) 7.8 x 10^{-4} atm s^{-1} d) 1.55 x 10^{-4} atm s^{-1}

95. The activation energy for a simple chemical reaction A + B is E_a in forward direction. The activation energy for reverse reaction
a) Is always double of E_a b) Is negative of E_a c) Is always less than E_a
d) Canbe less than or more than E_a

96. Consider the reaction
$\mathrm{N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)}$
The equality relationship between $\frac{d[\mathrm{NH_3}]}{dt}$ and $-\frac{d[\mathrm{H_2}]}{dt}$ is
a) $+\frac{d[\mathrm{NH_3}]}{dt} = -\frac{2}{3}\frac{d[\mathrm{H_2}]}{dt}$ b) $+\frac{d[\mathrm{NH_3}]}{dt} = -\frac{3}{2}\frac{d[\mathrm{H_2}]}{dt}$ c) $\frac{d[\mathrm{NH_3}]}{dt} = -\frac{d[\mathrm{H_2}]}{dt}$
d) $\frac{d[\mathrm{NH_3}]}{dt} = -\frac{1}{3}\frac{d[\mathrm{H_2}]}{dt}$

97. Assertion: For a first order reaction, $t_{1/2}$ is independent of rate constant.
Reason: For a first order reaction, $t_{1/2} \propto [R]_0$.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

98. Half-life of a first order reaction is 4 s and the initial concentration of the reactants is 0.12 M. The concentration of the reactant left after 16 s is:
a) 0.0075 M b) 0.06 M c) 0.03 M d) 0.015 M

99. Which one of the following statements for the order of a reaction is incorrect?
a) Order can be determined only experimentally.
b) Order is not influenced by stoichiometric coefficient of the reactants.
c)
Order of reaction is sum of power to the concentration terms of reactants to express the rate of reaction.
d) Order of reaction is always whole number.

100. For a reaction, $I^- + OCl^- \longrightarrow IO^- + Cl^-$ in an aqueous medium, the rate of reaction is given by $\frac{d[IO^-]}{dt} = k\frac{[I^-][OCI^-]}{[OH^-]}$. The overall order of reaction is:
a) -1 b) 0 c) 1 d) 2

101. The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation, $k = Ae^{-Ea^*/RT}$. Activation energy (E*) of the reaction can be calculated by plotting :
a) log k vs $\frac{1}{T}$ b) log k vs $\frac{1}{log\,T}$ c) k vs T d) k vs $\frac{1}{log\,T}$

102. Consider the reaction: $2N_2O_4 \rightleftharpoons 4NO_2$ if $-\frac{d[N_2O_4]}{dt}$=k and $\frac{d[NO_2]}{dt}$=k' then
a) 2k'=k b) k'=2k c) k'=k d) k=$\frac{1}{4}$k'

103. The half-life for radioactive decay of C-14 is 5730 years. An archaeological artifact containing wood had only 80% of the C-14 found in a living tree. The age of the sample is
a) 1485 years b) 1845 years c) 530 years d) 4767 years

104. The decomposition of dinitrogen pentoxide (N_2O_5) follows first order rate law. What will be the rate constant from the given data?
At t = 800 s, $[N_2O_5] = 1.45$ mol L^{-1}
At t = 1600 s, $[N_2O_5] = 0.88$ mol L^{-1}
a) 3.12×10^{-4} s^{-1} b) 6.24×10^{-4} s^{-1} c) 2.84×10^{-4} s^{-1} d) 8.14×10^{-4} s^{-1}

105. When initial concentration of the reactant is doubled, the half-life period of a zero-order reaction :
a) Is tripled b) Is doubled c) Is halved d) Remains unchanged

106. The overall rate of a reaction is governed by
a) the rate of fastest intermediate step b) the sum of the rates of all intermediate steps
c) the average of the rates of all the intermediate steps

d) the rate of slowest intermediate step

107. A reaction having equal energies of activation for forward and reverse reaction has:
a) $\Delta G = 0$ b) $\Delta H = 0$ c) $\Delta H = \Delta G = \Delta S = 0$ d) $\Delta S = 0$

108. For a reaction A_2 + B_2 ~ 2AB the figure shows the path of the reaction in absence and presence of acatalyst. What will be the energy of activation for forward (E_f) and backward (E_b) reaction in presence of a catalyst and i1H for the reaction? The dotted curve is the path of reaction in presence of a catalyst.
a) E_f= 60 kJ/mol, E_b = 70 kJ/mol, △H = 20 kJ/rnol
b) E_f= 20 kJ/mol, E_b = 20 kJ/mol,△H = 50 kJ/mol
c) E_f= 70 kJ/rnol, E_b = 20 kJ/mol, △H = 10 kJ/mol
d) E_f= 10 kJ/rnol, E_b = 20 kJ/mol, △H = -10 kJ/mol

109. Consider the reaction, $N_{2(g)}$+ $3H_{2(g)} \longrightarrow 2NH_{3(g)}$ The equality relationship between $\frac{d[NH_3]}{dt}$ and $-\frac{d[NH_2]}{dt}$ is :
a) $\frac{d[NH_3]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt}$ b) $+\frac{d[NH_3]}{dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$ c) $+\frac{d[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$ d) $\frac{d[NH_3]}{dt} = -\frac{d[H_2]}{dt}$

110. For a reaction, 2NO + $2H_2 \longrightarrow N_2 + 2H_2O$, the possible mechanism is
$2NO \rightleftharpoons N_2O_2$
$N_2O_2 + H_2 \xrightarrow{slow} N_2O + H_2O$
$N_2O + H_2O \xrightarrow{fast} N_2 + H_2O$
What is the rate law and order of the reaction?
a) Rate = $[N_2O_2]$, order = 1 b) Rate = $[N_2O_2][H_2]$, order = 2
c) Rate = $[N_2O_2]^2$, order = 2 d) Rate = $[N_2O_2]^2$ $[H_2]$, order = 3

111. If hydrogen and oxygen are mixed and kept in the same vessel at room temperature, the reaction does not take place to form water because
a) activation energy for the reaction is very high at room temperature
b) molecules have no proper orientation to react to form water
c) the frequency of collisions is not high enough for the reaction to take place
d) no catalyst is present in the reaction mixture

112. Activation energy of a chemical reaction can be determined by_____.
a) determining the rate constant at standard temperature
b) determining the rate constants at two temperatures
c) determining probability of collision d) using catalyst

113. Assertion: Order of a reaction with respect to any reactant can be zero, positive, negative or fractional.
Reason: Rate of a reaction cannot decrease with increase in concentration of a reactant or a product.
a) If assertion is true but reason is false b) If both assertion and reason are false
c)
If both assertion and reason are true and reason is the correct explanation of assertion

d)

If both assertion and reason are true but reason is not the correct explanation of assertion

114. The activation energy in a chemical reaction is defined as

a) the difference in energies of reactants and products

b) the sum of energies of reactants and products

c)

the difference in energy of intermediate complex with the average energy of reactants and products

d) the difference in energy of intermediate complex and the average energy of reactants

115. The rate of the reaction $2\ \mathrm{N_2O_5} \rightarrow 4\mathrm{NO_2} + \mathrm{O_2}$ can be written in three ways:

$\frac{-d[\ \mathrm{N_2O_5}]}{dt} = k\,[\ \mathrm{N_2O_5}]$

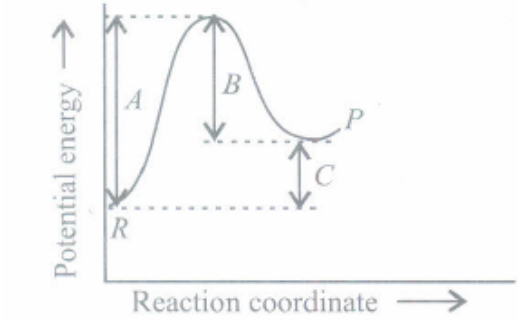
$\frac{d[\mathrm{NO_2}]}{dt} = k'\,[\mathrm{N_2O_5}]$

$\frac{d[\mathrm{O_5}]}{dt} = k''\,[\mathrm{N_2O_5}]$

The relationship between k and k' and between k and k" are:

a) $k' = 2k; k'' = k$ b) $k' = 2k; k'' = k/2$ c) $k' = 2k; k'' = 2k$ d) $k' = k; k'' = k$

116. The potential energy diagram for a reaction X ~ Y is given. A and C in the graph corresponding to



a) A → activation energy, C → $\triangle$H^o

b) A → energy of reactants, C→ energy of products

c) A → $\triangle$H^o, C →activation energy d) A → activation energy, C→threshold energy

117. The rate law for a reaction, A + B ⟶ C + D is given by the expression k[A]. The rate of reaction will be

a) doubled on doubling the concentration of B

b) halved on reducing the concentration of A to half

c) decreased on increasing the temperature of the reaction

d) unaffected by any change in concentration or temperature

118. Consider the graph given in Q. 9. Which of the following options does not show instantaneous rate of reaction at 40th second?

a) $\frac{V_5-V_2}{50-30}$ b) $\frac{V_4-V_2}{50-30}$ c) $\frac{V_3-V_2}{40-30}$ d) $\frac{V_3-V_1}{40-20}$

119. In a pseudo first order hydrolysis of ester in water, the following results were obtained.

t/s	0	30	60	90
Ester/mol L^{-1}	0.55	0.31	0.17	0.085

What will be the average rate of reaction between the time interval 30 to 60 seconds?
a) 1.91 x 10^{-2} s^{-1} b) 4.67 x 10^{-3} mol L^{-1} s^{-1} c) 1.98 x 10^{-3} s^{-1} d) 2.07 x 10^{-2} s^{-1}

120. The temperature dependence of the rate of a chemical reaction is given by Arrhenius equation, $k = Ae^{-E_a/RT}$. Which of the following graphs will be a straight line?
a) ln A vs 1/T b) ln A vs E_a c) ln k vs 1/T d) ln k vs $-E_a/R$

121. The reaction of hydrogen and iodine monochloride is given as: $H_{2(g)} + 2ICl_{(g)} \longrightarrow 2HCl_{(g)} + I_{2(g)}$ This reaction is of first order with respect to $H_{2(g)}$ and $ICl_{(g)}$, following mechanisms were proposed.
Mechanism A
$H_{2(g)} + 2ICl_{(g)} \longrightarrow 2HCl_{(g)} + I_{2(g)}$
Mechanism B
$H_{2(g)} + ICl_{(g)} \longrightarrow HCl_{(g)} + HI_{(g)}$, slow
$HI_{(g)} + ICl_{(g)} \longrightarrow HCl_{(g)} + I_{2(g)}$, fast
When of the above mechanism(s) can be consistent with the given information about the reaction?
a) Only B b) Both A and B c) Neither A nor B d) Only A

122. In a first-order reaction A + B, if k is rate constant and initial concentration of the reactant A is 0.5M, then the half-life is
a) $\frac{\log 2}{k}$ b) $\frac{\log 2}{k\sqrt{0.5}}$ c) $\frac{\ln 2}{k}$ d) $\frac{0.693}{0.5k}$

123. Assertion: The rate of reaction is the rate of change of concentration of a reactant or a product.
Reason: Rate of reaction remains constant during the complete reaction.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

124. Radioactive disintegration is an example of
a) zero order reaction b) first order reaction c) second order reaction
d) third order reaction

125. In a reversible reaction, the energy of activation of the forward reaction is 50 kcal. The energy of activation for the reverse reaction will be :
a) < 50 kcal b) 50 kcal c) either greater than or less than 50 kcal d) > 50 kcal

126. The rate of disappearance of SO_2 in the reaction, $2SO_2 + O_2 \longrightarrow 2SO_3$ is 1.28 X 10^{-5} M s^{-1}. The rate of appearance of SO_3 is
a) 0.64 x 10^{-5} M s^{-1} b) 0.32 x 10^{-5} M s^{-1} c) 2.56 x 10^{-5} M s^{-1} d) 1.28 x 10^{-5} M s^{-1}

127. For the reaction, $H_{2(g)} + Br_{2(g)} \longrightarrow 2HBr_{(g)}$, the reaction rate $=k[H_2][Br_2]^{1/2}$. Which statement is true about this reaction?

a) The reaction is of second order b) Molecularity of the reaction is 3/2.
c) The unit of k is sec^{-1} d) Molecularity of the reaction is 2

128. The hydrolysis of ethyl acetate,
$CH_3COOC_2H_5 + H_2O \xrightarrow{H^+} CH_3COOH + C_2H_5OH$ is a reaction of
a) zero order b) pseudo first order c) second order d) third order

129. The unit of rate and rate constant are same for a
a) zero order reaction b) first order reaction c) second order reaction
d) third order reaction

130. Fill in the blanks by choosing the correct option. Order of the reaction is the X of the powers to which concentration terms are raised in experimentally determined rate equation. The unit of first order rate constant is Y The unit of first order rate constant when concentration is measured in terms of pressure and time in minutes is Z.
a) X ⟶ product, Y ⟶ mol L^{-1} $time^{-1}$, Z ⟶ atm min^{-1}
b) X ⟶ sum, Y ⟶ L mol^{-1} time $^{-1}$, Z ⟶ atm min^{-1}
c) X ⟶ product, Y ⟶ L mol^{-1}, Z ⟶ atm min^{-1} d) X ⟶ sum, Y ⟶ $time^{-1}$, Z ⟶ min^{-1}

131. For the reaction $2\ N_2O_5 \rightarrow 4NO_2 + O_2$ rate and rate constant are $1.02 \times 10^{-4}\ \text{mol lit}^{-1}\text{sec}^{-1}$ and $3.4 \times 10^{-5}\text{sec}^{-1}$ respectively, then concentration of N_2O_5 at that time will be:
a) 1.732 M b) 3 M c) 3.4 x 10^5 M d) 1.02 x 10^{-4} M

132. The expression to calculate time required for: completion of zero order reaction is
a) t=$\frac{[R_0]}{k}$ b) t=[R]-[R_0] c) t=$\frac{k}{[R_0]}$ d) t=$\frac{[R_0]-[R]}{[R_0]}$

133. A first order reaction has a specific reaction rate of 10^{-2} sec^{-l}. How much time will it take for 20 g of the reactant to reduce to 59?
a) 138.6 sec b) 346.5 sec c) 693.0 sec d) 238.6 sec

134. For a reaction R ⟶ P, the concentration of a 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 x 10^{-4} M min^{-1} b) 8 x 10^{-4} M min^{-1} c) 3.3 x 10^{-4} M min^{-1} d) 2.2 x 10^{-4} M min^{-1}

135. When a catalyst is used in an equilibrium process,
a) it increases the rate of forward reaction
b) it decreases the rate of backward reaction
c)
it decreases activation energy of forward process and decreases activation energy of backward process
d) it fastens the attainment of equilibrium by lowering activation energy

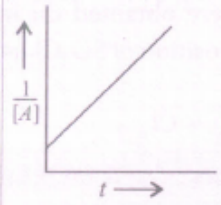
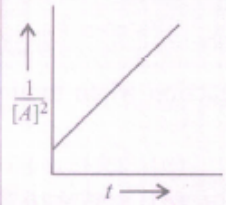
136. Assertion: Precipitation of silver chloride occurs instantaneously by mixing of aqueous solutions of silver nitrate and sodium chloride.
Reason: Ionic reactions occur very fast.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

137. A substance I decomposes by a first order reaction starting initially with [A] = 2.00 m and after 200 min, [A] becomes 0.15 m. For this reaction t1/2 is:
a) 53.49 min b) 50.49 min c) 48.45 min d) 46.45 min

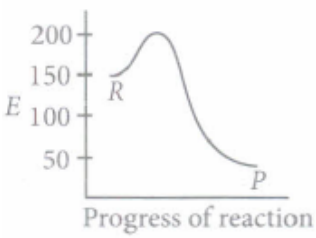
138. What will be the rate equation for the reaction 2X + Y ⟶ Z, if the order of the reaction is zero?
a) Rate=k[X][Y] b) Rate=k c) Rate = k[X]°[Y] d) Rate = k[X][Y]°

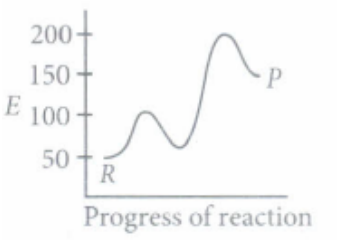
139. Match the graphs given in column Iwith the order given in column IIand mark the appropriate choice.

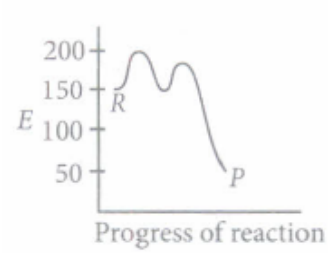
Column I		Column II	
(A)		(i)	Third order
(B)		(ii)	First order
(C)		(iii)	Zero order
(D)		(iv)	Second order

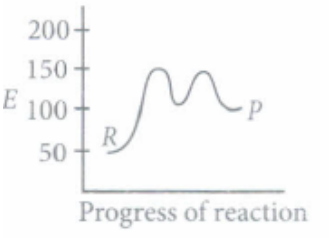
a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
b) (A) → (iii), (B) → (ii), (C) → (iv), (D) → (i)
c) (A) → (ii), (B) → (i), (C) → (iii), (D) → (iv)
d) (A) → (iv), (B) → (iii), (C) → (i), (D) → (ii)

140. An exothermic chemical reaction proceeds by two stages. Reactants stage Intermediate stage Products The activation energy of state 1 is 50 kJ mol^{-1}. Theoverall enthalpy change for the reaction is-100 kJ mol. Which diagram could represent the energy level diagram for the reaction?

a) 

b) 

c) 

d) 

141. A reaction is 50% completed in 2 hours and 75% completed in 4 hours. The order of reaction is
a) 0 b) 1 c) 2 d) 3

142. The addition of a catalyst during chemical reaction alters which of the following quantities?
a) Enthalpy b) Activation energy c) Entropy d) Internal energy

143. The rate constant for a first order reaction is 2×10^{-2} min^{-1}. The half-life period of reaction is
a) 69.3 min. b) 34.65 min. c) 17.37 min. d) 3.46 min.

144. Which of the following statements is incorrect about the collison theory of chemical reaction?
a)
It considers reacting molecules or atoms to be hard spheres and ignores their structural features
b) Number of effective collisions determines the rate of reaction
c)
Collision of atoms or molecules possessing sufficient threshold energy results into the product formation
d)
Molecules should collide with sufficient threshold energy and proper orientation for the collision to be effective

145. When a biochemical reaction is carried out in laboratory in the absence of enzyme then rate of reaction obtained is 10^{-6} times, then activation energy of reaction in the presence of enzyme is:
a) $\frac{6}{RT}$ b) Different from E_a obtained in laboratory c) P is required
d) Can't say anything

146. The rate constant for a first order reaction at 300°C for which E_a is 35 kcal mol^{-1} and frequency constant is 1.45×10^{11} s^{-1} is
a) 10×10^{-2} s^{-1} b) 5.37×10^{10} s^{-1} c) 5×10^{-4} s^{-1} d) 7.94×10^{-3} s^{-1}

147. During the kinetic study of the reaction , $2\ \mathrm{A} + \mathrm{B} \rightarrow \mathrm{C} + \mathrm{D}$ following results were obtained

$\mathrm{I}\ 0.10.16.0 \times 10^{-1}$

$\mathrm{II}\ 0.30.27.2 \times 10^{-1}$

$\mathrm{III}\ 0.30.42.88 \times 10^{-1}$

$\mathrm{IV}\ 0.40.12.40 \times 10^{-1}$

Based on the above data which one of the following is correct?

a) rate = k[A]^2 [B] b) rate = k[A][B] c) rate = k[A]^2 [B]^2 d) rate = k[A] [B]^2

148. For an endothermic reaction, energy of activation is E_a and enthalpy of reaction is ΔH (both of these in kJ/mol). Minimum value of E_a will be :

a) less than ΔH b) equal to ΔH c) more than ΔH d) equal to zero

149. 3A $\longrightarrow$ B + C. It would be a zero order reaction, when :

a) the rate of reaction is proportional to square of concentration of A

b) the rate of reaction remains same at any concentration of A

c) the rate remains unchanged at any concentration of B and C

d) the rate of reaction doubles if concentration of B is increased to double

150. What is the activation energy for a reaction if its rate doubles when the temperature is raised from 20^0C to 35^0C?

(H = 8.314 J mol^{-1} K^{-1})

a) 342 kJ mol^{-1} b) 269 kJ mol^{-1} c) 34.7 kJ mol^{-1} d) 15.1 kJ mol^{-1}

151. Assertion: E_a of the forward reaction is higher than that of backward reaction in a reversible endothermic reaction.

Reason: Increasing the temperature of the substance increases the fraction of molecules which collide with energies greater than E_a.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

152. When initial concentration of a reaction is doubled in a reaction, its half-life period is not affected. The order of the reaction is :

a) zero b) second c) first d) more than zero but less than first

153. The unit of rate constant for the reaction,

$2H_2 + 2NO \longrightarrow 2H_2O + N_2$

which has rate = k[H_2][NO]^2, is

a) mol L^{-1} s^{-1} b) s^{-1} c) mol^{-2} L^2 s^{-1} d) mol L^{-1}

154. A reaction in which reactants (R) are converted into products (P) follows second order kinetics. If concentration of R is increased by four times, what will be the increase in the rate of formation of P?

a) 9 times b) 4 times c) 16 times d) 8 times

155. The rate of a first order reaction is 1.5 x 10^{-2} mol L^{-1} min^{-1} at 0.5 M concentration of the reactant. The half-life of the reaction is:
a) 0.383 min b) 23.1 min c) 8.73 min d) 7.53 min

156. For the reaction, $2N_2O_5 \longrightarrow 4NO_2 + O_2$ rate and rate constant are 1.02 x 10^{-4} mol L^{-1} s^{-1} and 3.4 x 10^{-5} s^{-1} respectively. The concentration of N_2O_5 in mol L^{-1} will be:
a) 3.4 x 10^{-4} b) 3.0 c) 5.2 d) 3.2 x 10^{-5}

157. During the kinetic study of the reaction, 2A + B ⟶ C + D, following results were obtained :

Run	A/mol L^{-1}	B/mol L^{-1}	Initial rate of formation of d/mol $L^{-1}min^{-1}$
I	0.1	0.1	6.0 x 10^{-3}
II	0.3	0.2	7.2 x 10^{-2}
III	0.3	0.4	2.88 x 10^{-1}
IV	0.4	0.1	2.40 x 10^{-2}

Based on the above data which one of the followmg is correct?
a) Rate = k $[A]^2[B]$ b) Rate = k [A][B] c) Rate = k $[A]^2[B]^2$ d) Rate = k $[A][B]^2$

158. The rate constant is given by the equation $k = P \cdot Ze^{-E_a/RT}$. Which factor should register a decrease for the reaction to proceed more rapidly?
a) T b) Z c) E d) P

159. Assertion: For a chemical reaction with rise in temperature by 10° the rate constant is nearly doubled.
Reason: At t + 10, the fraction of molecules having energy equal to or greater than activation energy gets doubled.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

160. The rate of the reaction, A+B+C ⟶ P is given by: $r = -\frac{d[A]}{dt}$ $= k[A]^{1/2}[B]^{1/2}[C]^{1/4}$. The order of the reaction is
a) 1 b) 2 c) 1/2 d) 5/4

161. For a first order reaction, the ratio of the time taken for $7/8^{th}$ of the reaction to complete to that of half of the reaction to complete is
a) 3:1 b) 1:3 c) 2:3 d) 3:2

162. In a reaction, A + B ⟶ Product, rate is doubled when the concentration of B is doubled and rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled. Rate law for the reaction can be written as :
a) rate = k $[A][B]^2$ b) rate = k $[A]^2$ $[B]^2$ c) rate = k [A][B] d) rate = k $[A]^2$ [B]

163. The unit of rate constant for a zero order reaction is:
a) $\mathrm{mol\ L^{-1}\ s^{-1}}$ b) $\mathrm{L\ mol^{-1}\ s^{-1}}$ c) $\mathrm{L^2\ mol^{-2}\ s^{-1}}$ d) $\mathrm{s^{-1}}$

164. The minus sign in rate =-$\frac{d[A]}{dtt}$ indicates the in concentration of the _____ with time. The rate of a reaction is always _____ quantity. The rate of reaction increases with _____ in concentration of reactants. The blanks in the question corresponds to
a) decrease, products, positive, increase b) increase, reactants, negative, decrease
c) decrease, reactants, positive, increase d) increase, products, positive, increase

165. If 60% of a first order reaction was completed in 60 min, 50% of the same reaction would be completed in approximately: (log 4 = 0.60, log 5 = 0.69)
a) 50 min b) 45 min c) 60 min d) 40 min

166. For the reaction, $2N_2O_5 \longrightarrow 4NO_2 + O_2$, the rate of reaction can be expressed in terms of time and concentration by the expression:
a) Rate = $-\frac{d[N_2O_5]}{dt} = -\frac{1}{4}\frac{d[NO_2]}{dt} = \frac{1}{2}\frac{d[O_2]}{dt}$ b) Rate =$-\frac{1}{2}\frac{d[N_2O_5]}{dt} = \frac{1}{4}\frac{d[NO_2]}{dt} = \frac{d[O_2]}{dt}$
c) Rate = $-\frac{1}{4}\frac{d[N_2O_5]}{dt} = \frac{1}{2}\frac{d[NO_2]}{dt} = \frac{d[O_2]}{dt}$ d) Rate =$-\frac{1}{2}\frac{d[N_2O_5]}{dt} = \frac{1}{2}\frac{d[NO_2]}{dt} = \frac{1}{2}\frac{d[O_2]}{dt}$

167. The rate constant of the reaction A $\longrightarrow$ B is 0.6 x 10^{-3} mole per second. If the concentration of A is 5M then concentration of B after 20 min is :
a) 1.08 M b) 3.60 M c) 0.36 M d) 0.72 M

168. The rate of first order reaction is 1.5 X 10^{-2} mol L^{-1} min^{-1} at 0.5 M concentration of the reactant. The half-life of the reaction is :
a) 0.383 min b) 23.1 min c) 8.73 min d) 7.53 min

169. If the rate constant for a first order reaction is k, the time (l) required for the cornpletion of 99% of the reaction is given by
a) t = 6.909/k b) t = 4.606/k c) t = 2.303/k d) t = 0.693/k

170. The reaction A $\longrightarrow$ B follows first order kinetics. The time taken for 0.8 mole of A to produce 0.6 mole of B is 1 h. What is the time taken for the conversion of 0.9 mole of A to 0.675 mole of B?
a) 0.25 h b) 2 h c) 1 h d) 0.5 h

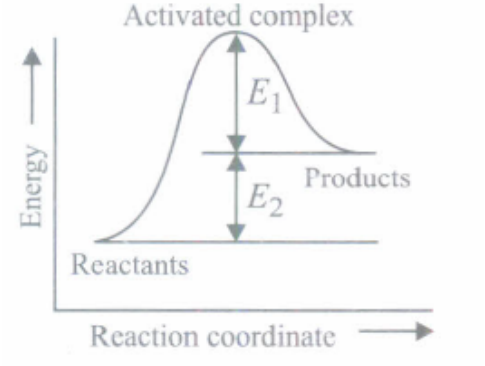
171. Half-life period of a first order reaction is 1386 s. The specific rate constant of the reaction is :
a) 5.0 x 10^3 s^{-1} b) 0.5 x 10^3 s^{-1} c) 0.5 x 10^{-3} s^{-1} d) 5.0 x 10^{-3} s^{-1}

172. A first order reaction is 50% completed in 1.26 x 10^{14} S. How much time would it take for 100% completion
a) 1.26 x 10^{15} s b) 2.52 x 10^{14} s c) 2.52 X 10^{28} s d) Infinite

173. A chemical reaction is catalysed by a catalyst X. Hence, X :
a) reduces enthalpy of the reaction b) decreases rate constant of the reaction
c) increases activation energy of the reaction
d) does not affect equilibrium constant of the reaction

174. A first order reaction is 20% complete in 10 minutes. What is the specific rate constant for the reaction?
a) 0.0970 min^{-1} b) 0.009 min^{-1} c) 0.0223 min^{-1} d) 2.223 min^{-1}

175. Consider figure and mark the correct option.



a)
Activation energy of forward reaction is $E_1 + E_2$ and product is less stable than reactant
b)
Activation energy of forward reaction is $E_1 + E_2$ and product is more stable than reactant
c)
Activation energy of both forward and backward reaction is $E_1 + E_2$ and reactant is more stable than product
d)
Activation energy of backward reaction is E_1 and product is more stable than reactant

176. The role of a catalyst is to change _____
a) Gibbs energy of reaction b) enthalpy of reaction c) activation energy of reaction d) equilibrium constant

177. In a reaction 2X ⟶ Y, the concentration of X decreases from 3.0 moles/litre to 2.0 moles/litre in 5 minutes. The rate of reaction is
a) 0.1 mol L^{-1} min^{-1} b) 5 mol L^{-1} min^{-1} c) 1 mol L^{-1} min^{-1} d) 0.5 mol L^{-1} min^{-1}

178. An increase in the concentration of the reactants of a reaction leads to change in:
a) collision frequency b) activation energy c) heat of reaction d) threshold energy

179. For the reaction $\mathrm{N_2 + 3H_2 \rightarrow 2NH_3}$
$\frac{d[\mathrm{NH_3}]}{dt} = 2 \times 10^{-4}\ \mathrm{mol\ L^{-}s^{-1}}$, the value of $\frac{-d[\mathrm{H_2}]}{dt}$ would be
a) $4 \times 10^{-4}\ \mathrm{mol\ L^{-1}\ s^{-1}}$ b) $6 \times 10^{-4}\ \mathrm{mol\ L^{-1}\ s^{-1}}$ c) $1 \times 10^{-4}\ \mathrm{mol\ L^{-1}\ s^{-1}}$
d) $3 \times 10^{-4}\ \mathrm{mol\ L^{-1}\ s^{-1}}$

180. Assertion: For the reaction
$CHCl_3 + Cl_2 \longrightarrow CCl_4 + HCl$
Rate $= k[CHCl_3][Cl_2]^{1/2}$
Reason: Rate of reaction is always equal to the sum of the stoichiometric coefficients of the reacting species in a balanced chemical equation.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

181. F or the reaction $\left[\mathrm{N_2O_5(\,g)} \rightarrow \mathrm{2NO_{2(\,g)} + 1/2O_{2(\,g)}}\right]$ the value of rate of disappearance of N_2O_5 is given 6.25 x 10^{-3} mol $L^{-1}s^{-1}$. The rate of formation of NO_2 and O_2 is given respectively as:
a) $6.25 \times 10^{-3}\ \mathrm{mol\ L^{-1}\ s^{-1}}$ *and* $6.25 \times 10^{-3}\ \mathrm{mol\ L^{-1}\ s^{-1}}$
b) $1.25 \times 10^{-2}\ \mathrm{mol\ L^{-1}\ s^{-1}}$ *and* $3.125 \times 10^{-3}\ \mathrm{mol\ L^{-1}\ s^{-1}}$
c) $6.25 \times 10^{-3}\ \mathrm{mol\ L^{-1}\ s^{-1}}$ *and* $3.125 \times 10^{-3}\ \mathrm{mol\ L^{-1}\ s^{-1}}$
d) $1.25 \times 10^{-2}\ \mathrm{mol\ L^{-1}\ s^{-1}}$ *and* $6.25 \times 10^{-3}\ \mathrm{mol\ L^{-1}\ s^{-1}}$

182. 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

183. The reaction 2X ⟶ Y + Z would be zero order reaction when
a) rate remains unchanged at any concentration of Y and Z
b) rate of reaction doubles if concentration of Y is doubled
c) rate of reaction remains same at any concentration of X
d) rate of reaction is directly proportional to square of concentration of X

184. In a reaction 2HI ⟶ H_2 + I_2, the concentration of HI decreases from 0.5 mol L^{-1} to 0.4 mol L^{-1} in 10 minutes. What is the rate of reaction during this interval?
a) 5 x 10^{-3} M min^{-1} b) 2.5 x 10^{-3} M min^{-1} c) 5 x 10^{-2} M min^{-1} d) 2.5 x 10^{-2} M min^{-1}

185. Which of the following statements for order of reaction is not correct?
a) Order can be determined experimentally
b)
Order of reaction is equal to the sum of powers of concentration terms in rate law expression
c) Order cannot be fractional
d) Order is not affected by stoichiometric coefficient of the reactants

186. The bromination of acetone that occurs in acid solution is represented by this equation
$\mathrm{CH_3COOH_3(aq) + Br_2(aq) \rightarrow CH_3COCH_2Br(aq) + H^+(aq) + Br^-(aq)}$
These kinetic data were obtained for given reaction concentrations.
Initial concentrations, M

$[CH_3COOH_3]$	$[Br_2]$	$[H^+]$
0.30	0.05	0.05
0.30	0.10	0.05
0.30	0.10	0.10
0.40	0.05	0.20

initial rate, disappearance of Br_2, Ms^{-1}
5.7×10^{-5} 5.7×10^{-5}
1.2×10^{-4} 3.1×10^{-4}
Base on these data, the rate equations is:
a) $\mathrm{Rate\ = k\left[CH_3COCH_3\right]\left[H^+\right]}$ b) $\mathrm{Rate\ = k\left[CH = COCH_3\right]\left[Br_2\right]}$
c) $\mathrm{Rate\ = k\left[CH_3COCH_3\right]\left[Br_2\right]\left[H^+\right]^2}$ d) $\mathrm{Rate\ = k\left[CH_3COCH_3\right]\left[Br_2\right]\left[H^+\right]}$

187. Match the rate law given in column I with the dimensions of rate constants given in column II and mark the appropriate choice.

Column I		Column II	
(A)	RAte=k$[NH_3]^0$	(i)	mol $L^{-1}s^{-1}$
(B)	Rate=k$[H_2O_2][I^-]$	(ii)	L $mol^{-1}s^{-1}$
(C)	Rate=k$[CH_3CHO]^{3/2}$	(iii)	s^{-1}
(D)	Rate=k$[C_2H_5Cl]$	(iv)	$L^{1/2}mol^{-1/2}s^{-1}$

a) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)
b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv)
c) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (iii)
d) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (iii)

188. Which of the following expressions is correct for the rate of reaction given below?

$$5Br^-_{(aq)} + BrO^-_{3(aq)} + 6H^+_{(aq)} \longrightarrow 3Br_{2(aq)} + 3H_2O_{(l)}$$

a) $\frac{\triangle[Br^-]}{\triangle t} = 5\frac{\triangle[H^+]}{\triangle t}$ b) $\frac{\triangle[Br^-]}{\triangle t} = \frac{6}{5}\frac{\triangle[H^+]}{\triangle t}$ c) $\frac{\triangle[Br^-]}{\triangle t} = \frac{5}{6}\frac{\triangle[H^+]}{\triangle t}$ d) $\frac{\triangle[Br^-]}{\triangle t} = 6\frac{\triangle[H^+]}{\triangle t}$

189. For a reaction X + Y ⟶ Z, rate ∝. [X]. What is (i) molecularity and (ii) order of reaction?
a) (i) 2, (ii) 1 b) (i) 2, (ii) 2 c) (i) 1, (ii) 1 d) (i) 1, (ii) 2

190. For a first-order reaction, the half-life period is independent of :
a) initial concentration b) cube root of initial concentration
c) first power of final concentration d) square root of final concentration

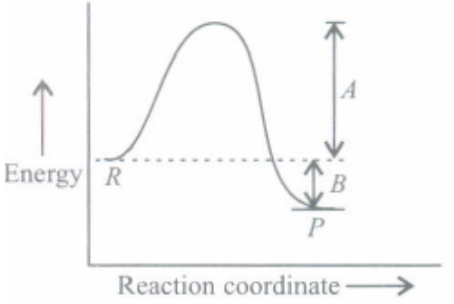
191. For the reaction A + B ⟶ products, what will be the order of reaction with respect to A and B?

Exp,	[A](mol L^{-1})	[A](mol L^{-1})	initial rate (mol L^{-1} s^{-1})
1.	2.5 x 10^{-4}	3 x 10^{-5}	5 x 10^{-4}
2.	5 x 10^{-4}	6 x 10^{-5}	4 x 10^{-3}
3.	1 x 10^{-3}	6 x 10^{-5}	1.6 x 10^{-2}

a) 1 with respect to A and 2 with respect to B
b) 2 with respect to A and 1 with respect to B
c) 1 with respect to A and 1 with respect to B
d) 2 with respect to A and 2 with respect to B

192. What is the activation energy for a reaction if its rate doubles when the temperature is raised frorn 20°C to 35°C? (R:8.314J $mol^{-1}k^{-1}$)
a) 269 kJ mol^{-1} b) 34.7 kJ mol^{-1} c) 15.1 kJ mol^{-1} d) 342 kJ mol^{-1}

193. The energy diagram of a reaction P + Q ⟶ R + S is given. What are A and B in the graph?



a) A $\rightarrow$ activation energy, B $\rightarrow$ heat of reaction
b) A $\rightarrow$ threshold energy, B $\rightarrow$heat of reaction
c) A $\rightarrow$ threshold energy, B $\rightarrow$ heat of reaction
d) A $\rightarrow$ potential energy, B $\rightarrow$ energy of reaction

194. The rate of a gaseous reaction is given by the expression $k[A]^2[B]^3$. The volume of the reaction vessel is reduced to one half of the initial volume. What will be the reaction rate as compared to the original rate a?
a) $\frac{1}{8}$a b) $\frac{1}{2}$a c) 2a d) 32a

195. Assertion: The reaction

$\underset{Cane}{C_{12}H_{22}O_{11}} + H_2O \xrightarrow{H^+} \underset{Glucose}{C_6H_{12}O_5} + \underset{Fructose}{C_6H_{12}O_6}$ is a first order reaction.

Reason: Change in concentration of H_2O is negligible.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

196. The rate of first-order reaction is 0.04 mol L^{-1} s^{-1} at 10 seconds and 0.03 mol L^{-1} s^{-1} at 20 seconds after initiation of the reaction. The half-life period of the reaction is :
a) 44.1 s b) 54.1 s c) 24.1 s d) 34.1 s

197. In a first order reaction, the concentration of reactant decreases from 400 mol L^{-1} to 25 mol L^{-1} in 200 seconds. The rate constant for the reaction is
a) 1.01386 s^{-1} b) 2 x 10^{-4} s^{-1} c) 1.386 x 10^{-2} s^{-1} d) 3.4 x 10^{-4} s^{-1}

198. The rate constant of a first order reaction is 15 x 10^{-3} s^{-1}. How long will 5.0 g of this reactant take to reduce to 3.0 g?
a) 10.10 s b) 15 s c) 34.07 s d) 7.57 s

199. If the rate of the reaction is equal to the rate constant, the order of the reaction is
a) 3 b) 0 c) 1 d) 2

200. In a zero-order reaction for every 10^o rise of temperature, the rate is doubled. If the temperature is increased from 10^oC to 100^oC, the rate of the reaction will become:
a) 256 times b) 512 times c) 64 times d) 128 times

201. Consider a first order gas phase decomposition reaction given below:
$A_{(g)} \longrightarrow . B_{(g)} + C_{(g)}$
The initial pressure of the system before decomposition of A was P_i. After lapse of time 't' total pressure of the system increased by x units and became 'p_t'.
The rate constant k for the reaction is given as _____.
a) k= $\frac{2.303}{t} log \frac{p_i}{p_i - x}$ b) k= $\frac{2.303}{t} log \frac{p_i}{2p_i - p_t}$ c) k= $\frac{2.303}{t} log \frac{p_i}{2p_i + p_t}$ d) k= $\frac{2.303}{t} log \frac{p_i}{p_i + x}$

202. Threshold energy is equal to

a) activation energy b) activation energy - energy of molecules
c) activation energy + energy of molecules d) None of these

203. The activation energy of a reaction can be determined from the slope of which of the following graphs?
a) ln k vs T b) ln k vs $\frac{1}{T}$ c) $\frac{ln\,k}{T}$ vs T d) $\frac{T}{ln\,k} vs \frac{1}{T}$

204. Compounds 'A' and 'B' react according to the following chemical equation.
$A_{(g)} + 2B_{(g)} \longrightarrow 2C_{(g)}$
Concentration of either 'A' or 'B' were changed keeping the concentrations of one of the reactants constant and rates were measured as a function of initial concentration. Following results were obtained. Choose the correct option for the rate equations for this reaction.

Experiment	Initial concentration of [A]mol L^{-1}	Initial concentration of [B] /mol L^{-1}	Initial rate of formation of [C]/mol $L^{-1}s^{-1}$
1.	0.30	0.30	0.10
2.	0.30	0.60	0.40
3.	0.60	0.30	0.20

a) Rate = k $[A]^2$ [B] b) Rate = k [A] $[B]^2$ c) Rate = k [A] [B] d) Rate = k [A] $[B]^0$

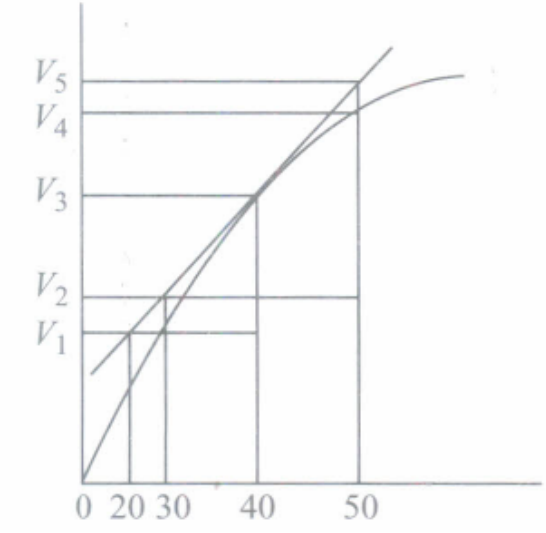
205. In a hypothetical reaction X ~ Y, the activation energy for the forward and backward reactions are 15 and 9 kJ mol^{-1} respectively. The potential energy of X is 10 kJ mol^{-1}. Which of the following statements is/are correct?
(i) The threshold energy of the reaction is 25 kJ mol^{-1}
(ii) The potential energy of Y is 16 kJ mol^{-1}
(iii) Heat of reaction is 6 kJ mol^{-1}
(iv) The reaction is endothermic.

a) Only (i) b) Only (i) and (ii) c) Only (ii) and (iii) d) All are correct.

206. In the presence of a catalyst, the heat evolved or absorbed during the reaction _____
a) increases b) decreases c) remains unchanged d) may increase or decrease

207. In a first order reaction, the concentration of reactant is reduced to 1/8 of the initial concentration in 75 minutes at 298 K. What is the half-life period of the reaction in minutes?
a) 50 min. b) 15 min. c) 30 min. d) 25 min.

208. A graph of volume of hydrogen released vs time for the reaction between zinc and dil. HCl is given in figure. On the basis of this mark the correct option.



a) Average rate upto 40 seconds is $\frac{V_3-V_2}{40}$ b) Average rate upto 40 seconds is $\frac{V_3-V_2}{40-30}$

c) Average rate upto 40 seconds is $\frac{V_3}{40}$ d) Average rate upto 40 seconds is $\frac{V_3-V_1}{40-20}$

209. Under what conditions a bimolecular reaction may be of first order?

a) When both reactants have same concentration

b) When one of the reacting species is in large excess

c) When the reaction is at equilibrium d) When the activation energy of reaction is less

210. For a reaction between A and B the order with respect to A is 2 and the order with respect to B is 3. The concentrations of both A and B are doubled, the rate will increase by a factor of :

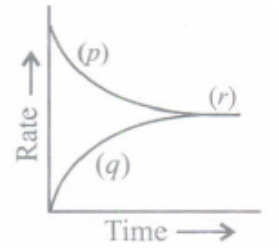
a) 10 b) 12 c) 16 d) 32

211. For the reaction,

$2N_2O_5 \longrightarrow 4NO_2 + O_2$, rate and rate constant are 1.02×10^{-4} and 3.4×10^{-5} s^{-1} respectively, then concentration of N205 at that time will be :

a) 1.732 b) 3 c) 1.02×10^{-4} d) 3.4×10^{5}

212. For a reversible reaction, $A + B \rightleftharpoons C + D$, the graph for rate of reaction with time is given below. Mark the terms (P), (q) and (r).



a) (p)-rate of backward reaction, (q)-rate of forward reaction, (r)-equilibrium

b) (p)-rate of forward reaction, (q)-rate of backward reaction, (r)-equilibrium

c) (p)-concentration of products, (q)- concentration of reactants, (r)-rate of reaction

d) (p)-instantaneous rate of reaction, (q)-variation of rate, (r)-average rate of reaction

213. Which of the following statements about the catalyst is true?

a) A catalyst makes the reaction feasible by making ΔG more negative

b) A catalyst makes equilibrium constant more favourable for forward reaction

c) A catalyst accelerate rate of reaction by bringing down the activation energy

d) A catalyst always increases the rate of reaction

214. The bromination of acetone that occurs in acid solution is represented by this equation

$CH_3COCH_{3(aq)} + Br_{2(aq)} \longrightarrow CH_3COCH_2Br_{(aq)} + H^+_{(aq)} + Br^-_{(aq)}$

These kinetic data were obtained for given reaction concentrations.

Initial concentrations, M

$[CH_3COCH_3]$	$[Br_2]$	$[H^+]$
0.30	0.05	0.05
0.30	0.10	0.05
0.30	0.10	0.10
0.40	0.05	0.20

Initial rate, disappearance of Br_2,Ms^{-1}

5.7×10^{-5}

5.7×10^{-5}

1.2×10^{-4}

3.1×10^{-4} Based on these data, the rate equation is :

a) rate = $k[CH_3COCH_3][H^+]$ b) rate = $k[CH_3COCH_3]\,[Br_2]$

c) rate = $k[CH_3COCH_3][Br_2][H^+]^2$ d) rate = $k[CH_3COCH_3][Br_2][H^+]$