CFE-KOTA
IIT-JEE | NEET | CA | CS | Foundation
A Unit of PP SAVANI
Beginning For Successful Career

CLASS: RENEET **SUB: CHEMISTRY** **DPP: CHEMICAL KINETICS**

Section A

- **Choose correct answer from the given options.** [Each carries 1 Mark] **[94]**

1. The rate of a chemical reaction....
(A) increases as the reaction proceeds. (B) decreases as the reaction proceeds.
(C) may increase or decrease during the reaction. (D) remains constant as the reaction proceeds.

2. A large increase in the rate of a reaction for a rise in temperature is due to....
(A) the decrease in the number of collisions.
(B) the increase in the number of activated molecules.
(C) the shortening of the mean free path.
(D) the lowering of the activation energy.

3. A zero order reaction is one whose rate is independent of...
(A) temperature of the reaction.
(B) the concentrations of the reactants.
(C) the concentration of the products.
(D) the material of the vessel in which the reaction is carried out.

4. The dimension of rate constant of a second order reaction involves....
(A) neither time nor concentration. (B) only time.
(C) time and concentration. (D) time and square of concentration.

5. The rate at which a substance reacts depends on its...
(A) atomic weight. (B) equivalent weight. (C) molecular weight. (D) active mass.

6. The rate of a reaction that not involve gases is not dependent on...
(A) pressure (B) temperature (C) concentration (D) catalyst

7. The rate constant of a reaction depends on...
(A) temperature (B) mass (C) weight (D) time

8. A reaction involving two different reactants....
(A) can never be a second order reaction. (B) can never be a unimolecular reaction.
(C) can never be a bimolecular reaction. (D) can never be a first order reaction.

9. Inversion of sucrose is....
(A) zero order reaction. (B) 1^{st} order reaction. (C) 2^{nd} order reaction. (D) 3^{rd} order reaction.

10. A catalyst increases the rate of reaction because it...
(A) increases the activation energy. (B) decreases the energy barrier for reaction.
(C) decreases the collision diameter. (D) increases the temperature coefficient.

11. The reaction rate at a given temperature becomes slower, then....
(A) the free energy of activation is higher.
(B) the free energy of activation is lower.
(C) the entropy changes.
(D) the initial concentration of the reactants remains constant.

12. Half life period of second order reaction is
(A) proportional to the initial concentration of reactants.

(B) independent of the initial concentration of reactants.

(C) inversely proportional to initial concentration of reactants.

(D) inversely proportional to square of initial concentration of reactants.

13. The thermal decomposition of a compound is of first order. If a sample of the compound decomposes 50% in 120 minutes, in what time will it undergo 90% decomposition....

(A) nearly 240 minutes. (B) nearly 480 minutes.

(C) nearly 450 minutes. (D) nearly 400 minutes.

14. On increasing the temperature, the rate of the reaction increases because of...

(A) decrease in the number of collisions.

(B) decrease in the energy of activation.

(C) decrease in the number of activated molecules.

(D) increase in the number of effective collisions.

15. If initial concentration is reduced to its $1/4^{th}$ in a zero order reaction, the time taken for half of the reaction to complete....

(A) remains same. (B) becomes 4 times. (C) becomes one-fourth. (D) doubles.

16. A first order reaction which is 30% complete in 30 minutes has a half-life period of....

(A) 24.2 minutes (B) 58.2 minutes (C) 102.2 minutes (D) 120.2 minutes

17. 75% of a first order reaction was completed in 32 minutes when was 50% of the reaction completed...

(A) 16 min. (B) 24 min. (C) 8 min. (D) 4 min.

18. A first order reaction is half completed in 45 minutes. How long does it need 99.9% of the reaction to be completed....

(A) 5 Hr. (B) 7.5 Hr. (C) 10 Hr. (D) 20 Hr.

19. The rate of a chemical reaction depends upon

(A) time (B) pressure (C) concentration (D) All of these

20. The minimum energy a molecule should possess in order to enter into a fruitful collision is known as....

(A) reaction energy. (B) collision energy. (C) activation energy. (D) threshold energy.

21. Half life of a reaction is found to be inversely proportional to the cube of its initial concentration. The order of reaction is

(A) 2 (B) 5 (C) 3 (D) 4

22. Collision theory is applicable to....

(A) first order reactions. (B) zero order reactions.

(C) bimolecular reactions. (D) intra molecular reactions.

23. Which of the following statements is false in relation to enzyme....

(A) pH affects their functioning. (B) temperature affects their functioning.

(C) they always increase activation energy. (D) their reactions are specific.

24. A reaction is catalysed by ‘X’. Here ‘X’

(A) Decreases the rate constant of reaction.

(B) Does not affect the equilibrium constant of reaction.

(C) Decreases the enthalpy of reaction.

(D) Decreases the activation energy.

25. Which reaction characteristics are changing by the addition of a catalyst to a reaction at constant temperature.....

(i) Activation energy (ii) Equilibrium constant
(iii) Reaction entropy (iv) Reaction enthalpy
(A) (i) Only (B) (iii) only (C) (i) and (ii) only (D) All of these

26. Rate of reaction....
(A) decreases with increase in temperature.
(B) increases with increase in temperature.
(C) may increase or decrease with increase in temperature.
(D) does not depend on temperature.

27. In the first order reaction, the concentration of the reactant is reduced to 25% in one hour. The half life period of the reaction is...
(A) 2 hr. (B) 4 hr. (C) 1/2 hr. (D) 1/4 hr.

28. If a substance with half life 3 days is taken at other place in 12 days. What amount of substance is left now....
(A) 1/4 (B) 1/8 (C) 1/16 (D) 1/32

29. Which of the following statements regarding the molecularity of a reaction is wrong....
(A) it is the number of molecules of the reactants taking part in a single step chemical reaction.
(B) it is calculated from the reaction mechanism.
(C) it may be either a whole number or fractional.
(D) it depends on the rate determining step in the reaction.

30. 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.

31. For the reaction 3A → 2B. What will be the reaction rate with reference to B ?
(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) $\frac{2d[A]}{dt}$

32. Which statement is correct with reference to Arrhenius equation $K = Ae^{-Ea/RT}$ A ?
(A) A is adsorbent coefficient (B) E_a is a activation energy
(C) R is Rydberg constant (D) K is equilibrium constant

33. If the activation of forward reaction in a simple chemical reaction A → B is E_a, then what will be activation energy for reverse reaction ?
(A) $-E_a$ (B) Always less than E_a
(C) Always twice of E_a (D) More or less than E_a

34. The values of the rate constants of the reaction $C_2H_5I + OH^- \rightarrow C_2H_5OH + I^-$ at 30° and 60°C temperatures are 0.325 and 6.735 litre mole^{-1} second^{-1} than what will be the value of activation energy ?
(A) 20260 cal (B) 20260 K cal (C) 361.44 cal (D) 84773 cal

35. In a first order reaction, the concentration of the reactant, decreases from 0.8M to 0.4M in 15 minutes. The time taken for the concentration to change from 0.1M to 0.025M is....
(A) 7.5 minutes (B) 15 minutes (C) 30 minutes (D) 60 minutes

36. Which is correct about zero order reaction....
(A) rate of reaction depends on decay constant.
(B) rate of reaction is independent of concentration.
(C) unit of rate constant is concentration^{-1}.
(D) unit of rate constant is concentration^{-1} time^{-1}.

37. 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) –1 (B) –2 (C) 1 (D) 2

38. The rate of a reaction doubles when its temperature changes from 300 K to 310 K. Activation energy of such a reaction will be : (R = 8.314 JK^{-1} mol^{-1} and log 2 = 0.301)

(A) 53.6 kJ mol^{-1} (B) 48.6 kJ mol^{-1} (C) 58.5 kJ mol^{-1} (D) 60.5 kJ mol^{-1}

39. For the non - stoichiometre reaction 2A + B → C + D, the following kinetic data were obtained in three separate experiments, all at 298 K.

Initial Concentration (A)	Initial Concentration (B)	Initial rate of formation of C (mol $L^{-}S^{-}$)
0.1 M	0.1 M	1.2×10^{-3}
0.1 M	0.2 M	1.2×10^{-3}
0.2 M	0.1 M	2.4×10^{-3}

The rate law for the formation of C is :

(A) $\frac{dc}{dt} = k[A]\,[B]^2$ (B) $\frac{dc}{dt} = k[A]$ (C) $\frac{dc}{dt} = k[A]\,[B]$ (D) $\frac{dc}{dt} = k[A]^2\,[B]$

40. The rate constant of the reaction A → B is 0.6×10^{-3} mole per second. If the concentration of A is 5 M, then concentration of B after 20 minutes is :

(A) 0.36 M (B) 0.72 M (C) 1.08 M (D) 3.60 M

41. Decomposition of H_2O_2 follows a first order reaction. In fifty minutes the concentration of H_2O_2 decreases from 0.5 to 0.125 M in one such decomposition. When the concentration of H_2O_2 reaches 0.05 M, the rate of formation of O_2 will be :

(A) 1.34×10^{-2} mol L^{-1} min^{-1} (B) 6.93×10^{-2} mol L^{-1} min^{-1}

(C) 6.93×10^{-4} mol L^{-1} min^{-1} (D) 2.66 L min^{-1} at STP

42. 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^{-1} at 20 seconds after initation of the reaction. The half life period of the reaction is....

(A) 34.1 s (B) 44.1 s (C) 54.1 s (D) 24.1 s

43. Two reactions R_1 and R_2 have identical pre-exponential factors. Activation energy of R_1 exceeds that of R_2 by 10 kJ mol^{-1}. If k_1 and k_2 are rate constants for reactions R_1 and R_2 respectively at 300 K, then $ln(k_2/k_1)$ is equal to ...... (R = 8.314 J mol^{-1} K^{-1})

(A) 8 (B) 12 (C) 6 (D) 4

44. For the reaction, XA + YB → ZC, if

$\frac{-d[A]}{dt} = \frac{-d[B]}{dt} = \frac{1.5d[C]}{dt}$, then the correct statement among the following is ......

(A) the value of X = Y = Z = 3 (B) the value of X = Y = 3

(C) the value of X = 2 (D) the value of Y = 2

45. The correct difference between first and second order reactions is that...

(A) 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

(B) 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

(C) a first-order reaction can be catalyzed; a second-order reaction cannot be catalyzed

(D) 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 $[A]_0$.

46. Initial chemicial reaction $A_2 \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} 2A$, then $\frac{d[A]}{dt}$ = ...

(A) $k_1[A_2] - k_{-1}[A]^2$
(B) $2k_1[A_2] - k_{-1}[A]^2$
(C) $2k_1[A_2] - 2k_{-1}[A]^2$
(D) $k_1[A_2] + k_{-1}[A]^2$

47. For the chemical reaction, $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ what is the correct option ?

(A) $3\frac{d[H_2]}{dt} = 2\frac{d[NH_3]}{dt}$
(B) $-\frac{1}{3}\frac{d[H_2]}{dt} = -\frac{1}{2}\frac{d[NH_3]}{dt}$
(C) $-\frac{d[N_2]}{dt} = 2\frac{d[NH_3]}{dt}$
(D) $-\frac{d[N_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$

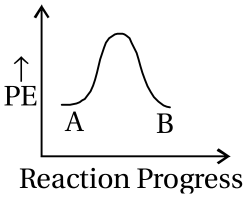
48. If the rate constant for a first order reactions K, the time (t) required for the completion of 99% of the reaction is given by :

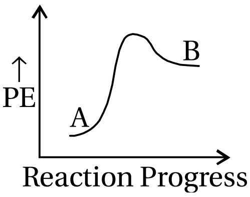
(A) $t = 2.303/k$
(B) $t = 0.693/k$
(C) $t = 6.909/k$
(D) $t = 4.606/k$

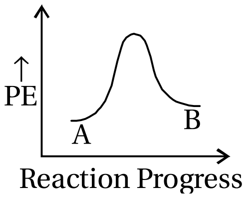
49. An increase in the concentration of the reactants of a reaction leads to change in :

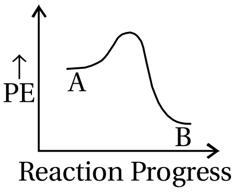
(A) threshold energy
(B) collision frequency
(C) activation energy
(D) heat of reaction

50. For a reaction A → B, enthalpy of reaction is –4.2 kJ mol^{-1} and enthalpy of activation is 9.6 kJ mol^{-1}. The correct potential energy profile for the reaction is shown in option.

(A) 

(B) 

(C) 

(D) 

51. The slope of Arrhenius plot $\left(\ln k \text{ v/s } \frac{1}{T}\right)$ of first order reaction is -5×10^3 K. The value of Ea of the reaction is : Choose the correct option for your answer. [Given R = 8.314 J K^{-1} mol^{-1}]

(A) 166 kJ mol^{-1}
(B) –83 kJ mol^{-1}
(C) 41.5 kJ mol^{-1}
(D) 83.0 kJ mol^{-1}

52. For a first order reaction A → Products, initial concentration of A is 0.1 M, which becomes 0.001 M after 5 minutes. Rate constant for the reaction in min^{-1} is

(A) 0.4606
(B) 0.2303
(C) 1.3818
(D) 0.9212

53. Total order of reaction X + Y → XY is 3. The order of reaction with respect to X is 2. State the differential rate equation for the reaction.

(A) $-\frac{d[X]}{dt} = K[X]^3[Y]^0$
(B) $-\frac{d[X]}{dt} = K[X]^0[Y]^3$
(C) $-\frac{d[X]}{dt} = K[X]^2[Y]$
(D) $-\frac{d[X]}{dt} = K[X][Y]^2$

54. $X \xrightarrow{\text{Step-I}} Y \xrightarrow{\text{Step-II}} Z$ is a complex reaction. Total order of reaction is 2 and step-II is slow step. What is molecularity of Step-II ?

(A) 1
(B) 2
(C) 3
(D) 4

55. Reaction $3ClO^- \rightarrow ClO^-_3 + 2Cl^-$ occurs in following two steps.

(i) $ClO^- + ClO^- \xrightarrow{K_1} ClO_2^- + Cl^-$ (Slow step)

(ii) $ClO_2^- + ClO^- \xrightarrow{K_2} ClO_3^- + Cl^-$ (Fast step)

then the rate of given reaction = ...

(A) $K_1[ClO^-]^2$
(B) $K_1[ClO^-]$
(C) $K_2[ClO^-_2]$ $[ClO^-]$
(D) $K_2[ClO^-]^3$

56. How much time is required for completion of a zero order reaction ?

(A) $\frac{2[R_o]}{K}$
(B) $\frac{[R_o]}{2K}$
(C) $\frac{[R_o]}{K}$
(D) $\frac{K}{[R_o]}$

57. Time taken for consumption of half of the initial concentration is 20 seconds for a first order reaction. What will be the time taken by the same reaction to get the concentration of reactant from 0.125 M to 0.0625 M.

(A) 5 sec. (B) 20 sec. (C) 10 sec. (D) 40 sec.

58. At 298 K temperature the activation energy for the reaction $X_2 + Y_2 \rightarrow 2XY + 20$ KJ is 15 KJ. What will be the activation energy for the reaction $2XY \rightarrow X_2 + Y_2$?

(A) +35 KJ (B) –35 KJ (C) –5 KJ (D) –15 KJ

59. The rate constant value for a reaction is 1.75×10^2 L^2 mol^{-2} sec^{-1}. The half life period $t_{1/2}$ α ....

(A) $[R_o]^{-2}$ (B) $[R_o]$ (C) $[R_o]^2$ (D) $[R_o]^{-1}$

60. The half life period for a radioactive substance is 15 minutes. How many gms of this radioactive substance is decayed from 50 gm of substance after one hour ?

(A) 25 (B) 46.875 (C) 43.75 (D) 37.5

61. The values of slope and intercept in the graph of Freundlich adsorption isotherm at 25°C temperature are 0.5 and 0.4771 respectively. What will be the propertion of adsorption at 4 bar pressure ?

(A) 6 (B) 3 (C) 24 (D) 12

62. Instantaneous rate of reaction for the reaction 3A + 2B → 5C is ....

(A) $+\frac{1}{3}\frac{d[A]}{dt} = -\frac{1}{2}\frac{d[B]}{dt} = +\frac{1}{5}\frac{d[C]}{dt}$ (B) $-\frac{1}{3}\frac{d[A]}{dt} = -\frac{1}{2}\frac{d[B]}{dt} = +\frac{1}{5}\frac{d[C]}{dt}$

(C) $+\frac{1}{3}\frac{d[A]}{dt} = +\frac{1}{2}\frac{d[B]}{dt} = -\frac{1}{5}\frac{d[C]}{dt}$ (D) $+\frac{1}{3}\frac{d[A]}{dt} = -\frac{1}{2}\frac{d[B]}{dt} = -\frac{1}{5}\frac{d[C]}{dt}$

63. Time required to decompose SO_2Cl_2 to half of its initial amount is 40 minutes. If the decomposition is a first order reaction, what will be the rate constant of the reaction ?

(A) 1.73×10^{-2} s^{-1} (B) 2.88×10^{-2} s^{-1} (C) 2.88×10^{-4} s^{-1} (D) 1.73×10^{-4} s^{-1}

64. For a reaction, $K = 4.5 \times 10^{-4}$ L mol^{-1} s^{-1}. What is order of reaction ?

(A) Zero (B) First (C) Second (D) Third

65. For first order reaction, the value of slope for graph of $\log\frac{[R]_0}{[R]} \rightarrow t$ is ......

(A) $\frac{K}{2.303}$ (B) –K (C) $\frac{2.303}{K}$ (D) $-\frac{K}{2.303}$

66. For the first order reaction, what is slope of the plot $\log\frac{[R]_0}{[R]}$ vs time ?

(A) – K (B) $\frac{K}{2.303}$ (C) $-\frac{K}{2.303}$ (D) $\frac{2.303}{K}$

67. What is the correct formula for R → P reaction rate ?

(A) $\frac{-\Delta[R]}{t} = \frac{-\Delta[P]}{t}$ (B) $\frac{-\Delta[R]}{\Delta t} = \frac{\Delta[P]}{\Delta t}$ (C) $\frac{-[R]}{t} = \frac{\Delta[P]}{\Delta t}$ (D) $\frac{-\Delta[R]}{\Delta t} = \frac{\Delta t}{\Delta[P]}$

68. If graph $\log K \rightarrow \frac{1}{T}$ is plotted, a straight line is obtained then what will be value of slope ?

(A) $\frac{E_a}{2.303R}$ (B) $\frac{-E_a}{3.203R}$ (C) $\frac{-2.303R}{E_a}$ (D) $\frac{-E_a}{2.303R}$

69. The half reaction time required to decrease initial concentration from 40% to 20% is 20 minute. What time will be taken to decrease initial concentration from 10% to 5% ?

(A) 20 minute (B) 5 minute (C) 10 minute (D) 60 minute

70. What will be the theoretical rate of elementary reaction if pressure of O_2 is increased by three times ? $2SO_{2(g)} + O_{2(g)} \rightarrow 2SO_{3(g)}$

(A) 27 times increase (B) 9 times increase (C) 18 times increase (D) 3 times increase

71. If energy of activation of a reaction is 2303 Joule, then what is the value of slope of graph log K →

$\frac{1}{T}$?

(A) –12195.12 Joule (B) –503.27 Joule (C) –120.28 Joule (D) –239.0 Joule

72. For any chemical reaction, value of slope of $\ln K \rightarrow \frac{1}{T}$ graph will be.....

(A) $-\frac{E_a}{2.303}$ (B) $-\frac{E_a}{R}$ (C) $-\frac{E_a}{2.303\,R}$ (D) $-E_a$

73. In elementary reaction : $2SO_{2(g)} + O_{2(g)} \rightarrow$ product. If pressure of SO_2 gas is doubled and pressure of O_2 gas is halved, then what will be the increase in rate of reaction ?

(A) Sixteen times (B) Two times (C) Four times (D) Eight times

74. Which of the following statement is not appropriate ?

(A) Activated complex is short lived molecule.

(B) Activated complex breaks due to its oscillation motion.

(C) Activated complex possesses very weak bonds.

(D) Activated complex possesses minimum potential energy.

75. For the first order reaction, the time required for completion of 50% reaction is 100 seconds. Then the rate constant will be...

(A) 6.93×10^{-3} mol^2 lit^{-2} s^{-1} (B) 6.93×10^{-3} s^{-1}

(C) 6.93×10^{-3} mol lit^{-1} s^{-1} (D) 6.93×10^{-2} s^{-1}

76. For which of the following reactions, Oswald's isolation method is useful for determination of order of the reaction ?

(A) $N_2O_{5(g)} \rightarrow 2NO_{2(g)} + \frac{1}{2}O_{2(g)}$ (B) $H_2O_{2(l)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_{2(g)}$

(C) $-\frac{K}{2.303} + BrO^-_{3(aq)} + 6H^+_{(aq)} \rightarrow 3Br_{2(aq)} + 3H_2O_{(l)}$ (D) All the three given options.

77. With the help of which graph the value of Arrhenius constant can be obtained from Arrhenius equation : $K = A \cdot e^{-E_a/RT}$

(A) $\log K$ versus $\frac{1}{\log T}$ (B) K versus $\frac{1}{\log T}$ (C) $\log K$ versus $\frac{1}{T}$ (D) K versus T

78. Which is correct relation for half life period (t½) and Initial concentration of reactant $[R]_0$ for fourth order reaction.

(A) $t_{1/2} \propto \frac{1}{[R]_0^{-3}}$ (B) $t_{1/2} \propto \frac{1}{[R]_0}$ (C) $t_{1/2} \propto \frac{1}{[R]_0^3}$ (D) $t_{1/2} \propto [R]_0$

79. The order of following reaction is ....

$H_{2(g)} + Cl_{2(g)} \xrightarrow{hv} 2HCl_{(g)}$

(A) 2 (B) 1 (C) 1.5 (D) 0

80. $3ClO^- \rightarrow ClO^-_3 + 2Cl$ The rate of reaction of above reaction is given by ....

(A) $K_1[ClO^-]$ (B) $K_1[Cl^-]^2$ (C) $K_1[ClO_2^-]$ (D) $K_1[ClO^-]^2$

81. Which of the following relation is correct for zero order reaction ?

(A) $t_{\frac{1}{2}} \propto \frac{1}{[R]_0}$ (B) $t_{\frac{1}{2}} \propto [R]_0$

(C) $t_{\frac{1}{2}} \propto \frac{1}{[R]_0^2}$ (D) $t_{\frac{1}{2}}$ is independent of $[R]_0$

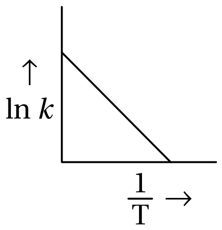
82. For the reaction $2A + B \rightarrow$ product, $-\frac{d[A]}{dt} = K\,[A]^2[B]$. What will be the rate equation for $-\frac{d[B]}{dt}$?

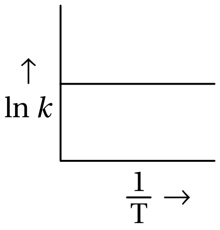
(A) $K[2A]^2[B]$ (B) $\frac{1}{2}K[A]^2[B]$ (C) $K[A][B]^2$ (D) $K[A][B]^{\frac{1}{2}}$

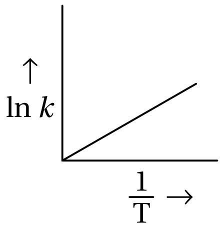
83. What is the value of slope of graph $\log_{10} K \rightarrow \frac{1}{T}$?

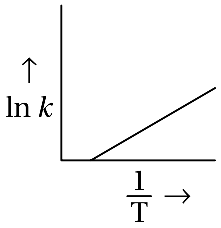
(A) $-\frac{k}{2.303}$ (B) $-\frac{E_a}{2.303R}$ (C) $-\frac{E_a}{R}$ (D) $-k$

84. Which of the following graph for $\ln k \rightarrow \frac{1}{T}$ is correct ?

(A) 

(B) 

(C) 

(D) 

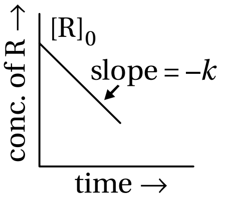
85. The decomposition of NH_3 on platinum surface is zero order reaction. What is the rate of production of N_2 if $K = 2.5 \times 10^{-4}$ mol L^{-1} S^{-1} ?

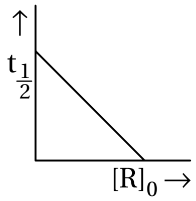
(A) 2.5×10^{-4} mol L^{-1} s^{-1} (B) 8.3×10^{-5} mol L^{-1} s^{-1}
(C) 7.5×10^{-4} mol L^{-1} s^{-1} (D) 5×10^{-4} mol L^{-1} s^{-1}

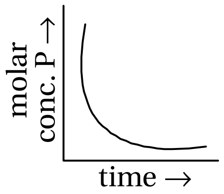
86. The role of catalyst is to change ....

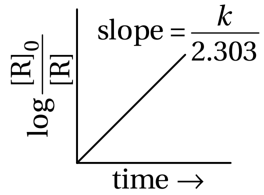
(A) Gibbs energy of reaction. (B) Enthalpy of reaction.
(C) Equilibrium constant of the reaction. (D) Activation energy of the reaction.

87. Which of the following graph is correct for a first order reaction ?

(A) 

(B) 

(C) 

(D) 

88. A first order reaction is found to have a rate constant, $K = 5.5 \times 10^{-14}$ s^{-1}. The half life of reaction is ....

(A) 1.26×10^{14} s (B) 6.93×10^{14} s (C) 1.26×10^{13} s (D) 12.6×10^{15} s

89. What is the wrong equation of rate constant for zero order reaction ?

(A) $[R] = -Kt + [R]_0$ (B) $-K = \frac{[R]-[R]_0}{t}$ (C) $K = \frac{[R]_0-[R]}{t}$ (D) $[R]_0 + [R] = -Kt$

90. What is the unit of rate constant of the second order reaction ?

(A) mol $L^{-1}s^{-1}$ (B) mol^{-1} Ls^{-1} (C) s^{-1} (D) mol^{-2} $L^{+2}s^{-1}$

91. What is the slope of graph of $\ln k \rightarrow \frac{1}{r}$?

(A) $-\frac{E_a}{R}$ (B) $\frac{-2.303\,E_a}{R}$ (C) $-\frac{R}{E_a}$ (D) $\frac{-2.303R}{E_a}$

92. Which of the following is bimolecular reaction ?

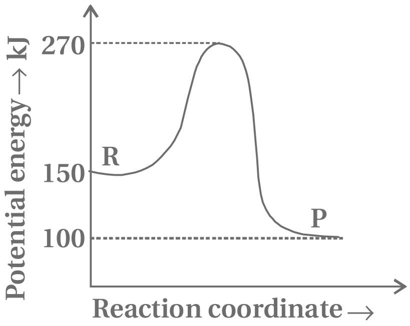
(A) $N_2 + 3H_2 \rightarrow 2NH_3$ (B) $2NH_3 \rightarrow N_2 + 3H_2$
(C) $NH_4NO_2 \rightarrow N_2 + 2H_2O$ (D) $2NO + O_2 \rightarrow 2NO_2$

93. What will be the unit of rate constant for following reaction ?

$C_2H_{4(g)} + H_{2(g)} \rightarrow C_2H_{6(g)}$

(A) $mol^{-1}\ L\,S^{-1}$ (B) S^{-1} (C) $mol\ L^{-1}\,S^{-1}$ (D) $mol^{-2}\ L^2\,S^{-1}$

94. For R → P reaction, following graph is given.



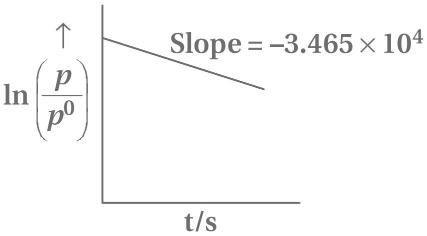
What will be enthalpy change for the given reaction ?

(A) –50 kJ (B) 50 kJ (C) 120 kJ (D) 170 kJ

●

[1]

95. For the decomposition of azomethane. $CH_3N_2CH_{3(g)} \rightarrow CH_3CH_{3(g)} + N_{2(g)}$ a first order reaction, the variation in partial pressur K is given as



The half life of the reaction is ……… × 10^{-5} s. [Nearest integer]

TOPIC :- Chemical Kinetics (DPP)

DPP-01: Rate of reaction

1. xA + yB → zC. If $= -\frac{d[A]}{dt} = -\frac{d[B]}{dt} 1.5 = \frac{d[C]}{dt}$ then x,y and z can be :

(1) 1,1,1 (2) 3,2,3 (3) 3,3,2 (4) 2,2,3

2. The rate of a reaction is expressed in different ways as follows ;

+ 1/2(d[C]/dt) = – 1/3 (d[D]/dt) = + 1/4 (d[A]/dt) = – (d[B]/dt) The reaction can be :

(1) $4A + B \longrightarrow 2C + 3D$ (2) $B + 3D \longrightarrow 4A + 2C$

(3) $4A + 2B \longrightarrow 2C + 3D$ (4) $B + (1/2) D \longrightarrow 4A + 3C$

3. Consider the chemical reaction :

$$N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$$

The rate of this reaction can be expressed ;in terms of time and of concentration of $N_2(g)$, $H_2(g)$ or $NH_3(g)$. Identify the correct relationship amongest the rate expressions.

(1) Rate $= -\frac{d[N_2]}{dt} = \frac{1}{3}\frac{d[H_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$ (2) Rate $= -\frac{d[N_2]}{dt} = -\frac{3d[H_2]}{dt} = \frac{2d[NH_3]}{dt}$

(3) Rate $= -\frac{d[N_2]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt} = \frac{d[NH_3]}{dt}$ (4) Rate $= -\frac{d[N_2]}{dt} = \frac{d[H_2]}{dt} = \frac{d[NH_3]}{dt}$

4. In a reaction $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$ the rate of appearance of NH_3 is 2.5×10^{-4} mol L^{-1} sec^{-1}. The rate of reaction & rate of disappearance of H_2 will be (in mol L^{-1} sec^{-1})

(1) 3.75×10^{-4} , 1.25×10^{-4} (2) 1.25×10^{-4}, 2.5×10^{-4}

(3) 1.25×10^{-4}, 3.75×10^{-4} (4) 5.0×10^{-4}, 3.75×10^{-4}

5. $3A \rightarrow 2B$, rate of reaction $\frac{+d[B]}{dt}$ is equal to :

(1) $-\frac{3}{2}\frac{d[A]}{dt}$ (2) $-\frac{2}{3}\frac{d[A]}{dt}$ (3) $-\frac{1}{3}\frac{d[A]}{dt}$ (4) $+2\frac{d[A]}{dt}$

6. In the reaction; $A + 2B \longrightarrow 3C + D$, which of the following expression does not describe changes in the concentration of various species as a function of time :

(1) {d [C] / dt} = – {3d [A] / dt} (2) {3d [D] / dt} = {d [C] / dt}

(3) {3d [B] / dt} = – {2d [C] / dt} (4) {2d [B] / dt} = – {d [A] / dt}

7. In the following reaction : $xA \longrightarrow yB$

$$\log\left[-\frac{d[A]}{dt}\right] = \log\left[\frac{d[B]}{dt}\right] + \log 2$$

where –ve sign indicates rate of disappearance of the reactant. Thus, x : y is :

(1) 1 : 2 (2) 2 : 1 (3) 3 : 1 (4) 3 : 10

8. Which of the following statements is correct?

(1) The rate of a reaction decreases or remain constant with passage of time as the concentration of reactants dereases.

(2) The rate of a reaction is same at any time during the reaction.

(3) The rate of a reaction is independent of temperature change.

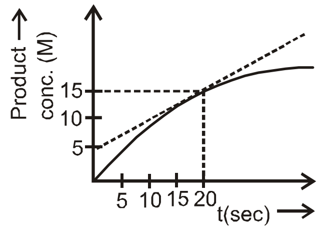
(4) The rate of a reaction decreases with increase in concentration of reactant(s).

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

$5Br^{-}(aq) + BrO_3^{-}(aq) + 6H^{+}(aq) \longrightarrow 3Br_2(aq) + 3H_2O(l)$

(1) $\frac{\Delta[Br^-]}{\Delta t} = 5\ \frac{\Delta[H^+]}{\Delta t}$ (2) $\frac{\Delta[Br^-]}{\Delta t} = \frac{6}{5}\frac{\Delta[H^+]}{\Delta t}$

(3) $\frac{\Delta[Br^-]}{\Delta t} = \frac{5}{6}\frac{\Delta[H^+]}{\Delta t}$ (4) $\frac{\Delta[Br^-]}{\Delta t} = 6\ \frac{\Delta[H^+]}{\Delta t}$

10. 

Rate of formation of product at t = 20 seconds is

(1) 0.5 MS^{-1} (2) 1 M S^{-1} (3) 1.5 M S^{-1} (4) $2MS^{-1}$

11. Rate of formation of SO_3 in the following reaction $2SO_2 + O_2 \rightarrow 2SO_3$ is 100 g min^{-1}. Hence rate of disappearance of O_2 is :

(1) 50 g min^{-1} (2) 40 g min^{-1} (3) 200 g min^{-1} (4) 20 g min^{-1}

12. If rate constant is numerically the same for the three reactions of first, second and third order respectively. Assume all the reactions of the kind A → products. Which of the following is correct :

(1) if [A] = 1 then $r_1 = r_2 = r_3$ (2) if [A] < 1 then $r_1 > r_2 > r_3$

(3) if [A] > 1 then $r_3 > r_2 > r_1$ (4) All

DPP-02 : Rate law

1. $aA + bB \longrightarrow$ Product, $dx/dt = k\,[A]^a\,[B]^b$. If conc of A is doubled, rate is four times. If conc. of B is made four times, rate is doubled. What is relation between rate of disappearance of A and that of B ?

(1) {– d [A] / dt} = {– d [B] / dtK (2) – {d [A] / dt} = – 4 {d [B] / dt}

(3) – 4 {d [A] / dt) = {– d [B]/ dt} (4) None of these

2. For a reaction pA + qB → products, the rate law expression is $r = k[A]^1\,[B]^m$, then :

(1) (p+1) < (1+ m) (2) (p + q) > (1 + m)

(3) (p + q) may or may not be equal to (1+ m) (4) (p + q) = (1 + m)

3. For the reaction $H_2 + Br_2 \rightarrow 2\ HBr$ overall order is found to be 3/2. The rate of reaction can be expressed as:

(1) $[H_2][Br_2]^{1/2}$ (2) $[H_2]^{1/2}\,[Br_2]$ (3) $[H_2]^{3/2}\,[Br_2]^0$ (4) All of these

4. The rate of certain hypothetical reaction A + B + C → products is given by $r = \frac{-d[A]}{dt} = K\,[A]^{1/2}[B]^{1/3}[C]^{1/4}$ The order of the reaction :

(1) 1 (2) $\frac{1}{2}$ (3) 2 (4) $\frac{13}{12}$

5. 2A → B + C it would be a zero order reaction when :

(1) The rate of reaction is proportional to square of conc. of A
(2) The rate of reaction remains same at any conc. of A
(3) The rate remains unchanged at any conc. of B and C
(4) The rate of reaction doubles if conc. of B is increased to double

6. The rate equation for the reaction 2A + B → C is found to be : rate k[A][B]. The correct statement in relation to this reaction is that the

(1) Rate of formation of C is twice the rate of disappearance of A.
(2) Half life is a constant
(3) Unit of k must be s^{-1}
(4) Value of k is independent of the initial concentration of A and B

7. For the reaction, $2NO(g) + 2H_2(g) \longrightarrow N_2(g) + 2H_2O(g)$ the rate expression can be written in the following ways:

$\{dt [N_2] / dt\} = k_1 [NO][H_2]$; $\{d[H_2O] / dt) = k[NO][H_2]$; $\{- d[NO] / dt\} = k'_1 [NO] [H_2]$; $\{-d[H_2] / dt\} = k''_1 [NO][H_2]$

The relationship between k, k_1 , k'_1 and k''_1. is :

(1) $k = k_1 = k'_1 = k''_1$ (2) $k = 2k_1 = k'_1 = k''_1$ (3) $k = 2k'_1 = k_1 = k''_1$ (4) $k = k_1 = k'_1 = 2 k''_1$

8. If a reaction gets completed in finite time then its order can be :

(1) 3 (2) 2 (3) 1 (4) Zero

9. For the reaction A + B → Products, it is found that the order of A is 2 and of B is 3 in the rate expression. When concentration of both is doubled the rate will increase by a factor of :

(1) 10 (2) 6 (3) 32 (4) 16

10. For a reaction A + B → products, the rate of the reaction was doubled when the concentration of. A was doubled, the rate was again doubled when the conc. of A & B were doubled the order of the reaction with respect to A & B are :

(1) 1,1 (2) 2,0 (3) 1,0 (4) 0,1

DPP-03 : The integrated rate laws

1. The rate constant of reaction $2 A + B \longrightarrow C$ is 2.57×10^{-5} lt mole^{-1} sec^{-1} after 10 sec. 2.65×10^{-5} lt. mole^{-1} sec^{-1} after 20 sec. and 2.55×10^{-5} lt. mole^{-1} sec^{-1} after 30 sec. The order of the reaction is:

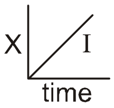
(1) 0 (2) 1 (3) 2 (4) 3

2. For a first order reaction, the plot of 't' against log C gives a straight line with slope equal to :

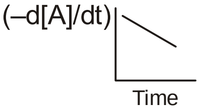
(1) (k / 2.303) (2) (– k / 2.303) (3) (ln k / 2.303) (4) – k.

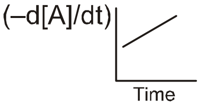
3. In a first order reaction the amount of reactant decayed in three half lives (let a be is initial amount) would be:

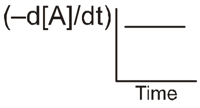
(1) 7a / 8 (2) a / 8 (3) a / 6 (4) 5a / 6

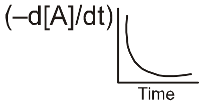
4. Graph between concentration of the product and time of the reaction A → B is of the type 

Hence graph between – d[A]/dt and time will be of the type :

(1) 

(2) 

(3) 

(4) 

5. The reaction N_2O_5 (in CCl_4) $\rightarrow$ $2NO_2 + 1/2O_2(g)$ is first order in N_2O_5 with rate constant 6.2×10^{-4} S^{-1}. What is the value of rate of reaction when $[N_2O_5] = 1.25$ mole L^{-1}

(1) 7.75×10^{-4} mol L^{-1} S^{-1} (2) 6.35×10^{-3} mol L^{-1} S^{-1}
(3) 5.15×10^{-5} mol L^{-1} S^{-1} (4) $3,85 \times 10^{-4}$ mol L^{-1} S^{-1}

6. K for a zero order reaction is 2×10^{-2} mol L^{-1} sec^{-1} . If the concentration of the reactant after 25 sec is 0.5 M, the initial concentration must have been.

(1) 0.5 M (2) 1.25 M (3) 12.5 M (4) 1.0 M

7. Plot of log(a–x) vs time t is straight line. This indicates that the reaction is of

(1) Second order (2) First order (3) Zero order (4) Third order

8. In a certain reaction, 10% of the reactant decomposes in one hour, 20 % in two hours, 30% in three hours and so on the dimensions of the rate constant is :

(1) $hour^{-1}$ (2) mole $litre^{-1}$ sec^{-1} (3) litre $mole^{-1}$ sec^{-1} (4) mole sec^{-1}

9. If a first order reaction is completed to the extent of 75% and 50% in time intervals, t_1 and t_2, what is the ratio, $t_1 : t_2$?

(1) ln 2 (2) $\frac{\ln(3/4)}{\ln 2}$ (3) 2 (4) 1/2

10. The rate constant for a reaction is $\frac{\ln 2}{10}$ min^{-1}. What will be the order of reaction and time taken to change concentration from 1 M to 0.25 M.

(1) one, 10 min (2) zero, 10 min (3) one, 20 min (4) two, 20 min

11. In the case of zero order reaction, the ratio of time required for 75% completion to 50% completion is :

(1) ln 2 (2) 2 (3) 1.5 (4) None

12. For the irreversible process, A + B $\longrightarrow$ products, the rate is first–order w.r.t. A and second–order w.r.t. B. If 1.0 mol each of A and B introduced into a 1.0 L vessel, and the initial rate was 1.0×10^{-2} mol L^{-1} s^{-1} , rate when half reactants have been turned into products is :

(1) 1.25×10^{-3} mol L^{-1} s^{-1} (2) 1.0×10^{-2} mol L^{-1} s^{-1}
(3) 2.50×10^{-3} mol L^{-1} s^{-1} (4) 2.0×10^{-2} mol L^{-1} s^{-1}

13. The rate constant of the reaction A $\rightarrow$ 2B is 1.0×10^{-3} mol lit^{-1} min^{-1}, if the initial concentration of A is 1.0 mole lit^{-1} what would be the concentration of B after 100 minutes.

(1) 0.1 mol lit^{-1} (2) 0.2 mol lit^{-1} (3) 0.9 mol lit^{-1} (4) 1.8 mol lit^{-1}

14. Two substances A ($t_{1/2}$ = 5 min) and B ($t_{1/2}$ = 15 min) are taken in such a way that initially [A] = 4[B]. The time after which both the concentration will be equal is : (Assume that reaction is first order)

(1) 5 min (2) 15 min
(3) 20 min (4) concentration can never be equal

15. In a first order reaction the reacting substance has half-life period of ten minutes. What fraction of the substance will be left after an hour the reaction has occurred ? :

(1) 1/6 of initial concentration (2) 1/64 of initial concentration
(3) 1/12 of initial concentration (4) 1/32 of initial concentration

16. A reaction, which is second order, has a rate constant of 0.002 L mol^{-1} s^{-1}. If the initial conc. of the reactant is 0.2 M. how long will it take for the concentration to become 0.0400 M ?

(1) 1000 sec (2) 400 sec (3) 200 sec (4) 10, 000 sec

17. Which is not true for a second order reaction ?

(1) It can have rate constant 1×10^{-2} L mol^{-1} s^{-1}

(2) Its half-life is inversely proportional to its initial concentration

(3) Time to complete 75% reaction is twice of half-life

(4) $T_{50} = \dfrac{1}{K \times \text{Initial conc.}}$

DPP-04: Methods to determine the rate law

1. The data for the reaction A + B → C is

Exp.	$[A]_0$	$[B]_0$	initial rate
1	0.012	0.035	0.10
2	0.024	0.035	0.80
3	0.012	0.070	0.10
4	0.024	0.070	0.80

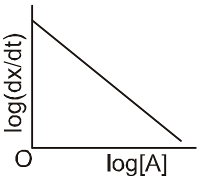
(1) $r = k[B]^3$ (2) $r = k[A]^3$ (3) $r = k[A][B]^4$ (4) $r = k[A]^2[B]^2$.

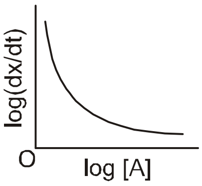
2. $A + B \longrightarrow$ Product, $\dfrac{dx}{dt} = k[A]^a[B]^b$

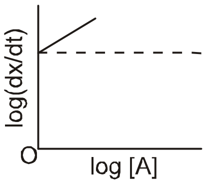
If $\left(\dfrac{dx}{dt}\right) = k$, then order is :

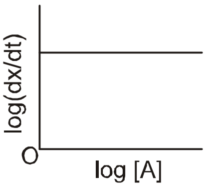
(1) 4 (2) 2 (3) 1 (4) 0

3. A → Product and $\left(\dfrac{dx}{dt}\right) = k[A]^2$. If log $\left(\dfrac{dx}{dt}\right)$ is plotted against log [A],then graph is of the type :

(1)


(2)


(3)


(4)


4. For the reaction $A \longrightarrow$ Products, $-\dfrac{d[A]}{dt} = k$ and at different time interval, [A] values are :

Time	0	5 min	10 min	15 min
[A]	20 mol	18 mol	16 mol	14 mol

At 20 minute, rate will be :

(1) 12 mol /min (2) 10 mol/min (3) 8 mol/min (4) 0.4 mol/min

5. The rate law for a reaction A + B → product is rate = $K[A]^1[B]^2$. Then which one of the following statement is false :

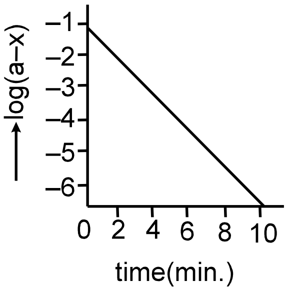
(1) If [B] is held constant while [A] is doubled, the reaction will proceed twice as fast

(2) If [A] is held constant while [B] is reduced to one quater, the rate will be halved

(3) If [A] and [B] are both doubled, the reaction will proceed 8 times as fast

(4) This is a third order reaction

6. The conversion of vinyl allyl ether to pent-4-enol follows a certain kinetics. The following plot is obtained for such a reaction. The order for the reaction is



(1) zero (2) –1 (3) 1 (4) 2

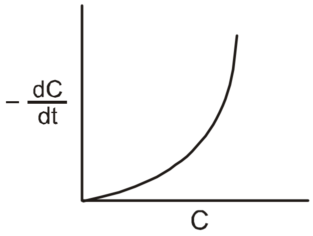
7. The reaction A(s) → 2 B(g) + C(g) is first order. The pressure after 20 min. and after very long time are 150 mm Hg and 225 mm Hg. The value of rate constant and pressure after 40 min. are :

(1) 0.05 In 1.5 min^{-1}, 200 mm (2) 0.5 ln 2 min^{-1} ,300 mm

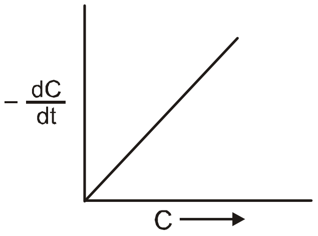
(3) 0.05 In 3 min^{-1}, 300 mm (4) 0.05 In 3 min^{-1}, 200 mm

8. In three different reactions, involving a single reactant in each case, a plot of rate of the reaction on the y–axis, versus concentration of the reactant on the x–axis, yields three different curves shown below.

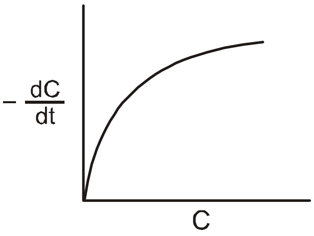
(i)



(ii)



(iii)



What are the possible orders of the reactions (i), (ii), (iii).

(1) 1, 2, 3 (2) 2, 1, 1/2 (3) 0, 1, 2 (4) 0, 1, 1/2

DPP-05 : Methods to monitor the progress of the reaction

1. Consider the reaction 2A(g) $\longrightarrow$ 3B(g) + C(g). Starting with pure A initially, the total pressure doubled in 3 hrs. The order of the reaction might possibly be

(1) zero (2) first

(3) second (4) unpredictable from this data

2. At 373 K, a gaseous reaction A → 2B + C is found to be of first order. Starting with pure A, the total pressure at the end of 10 min. was 176 mm and after a long time when A was completely dissociated, it was 270 mm. The pressure of A at the end of 10 minutes was :

(1) 94 mm (2) 47 mm (3) 43 mm (4) 90 mm

3. Let there be as first-order reaction of the type, A $\longrightarrow$ B + C. Let us assume that only A is geseous. We are required to calculate the value of rate constant based on the following data.

Time	0	T	∞
Partial pressure of A	P_0	P_t	–

Calculate the expression of rate constant.

(1) $k = \frac{1}{t} \ln\left(\frac{P_0}{P_t}\right)$ (2) $k = \frac{1}{t} \ln\left(\frac{P_t}{P_0}\right)$ (3) $k = \frac{1}{t} \ln\left(\frac{2P_0}{P_t}\right)$ (4) $k = \frac{1}{t} \ln\left(\frac{P_t}{2P_0}\right)$

4. The decompostion NH_3 gas on a heated tungsten surface gave the following results :

Initial pressure (mm)	65	105	y	185
Half-life (sec)	290	x	670	820

Calculate approximately the values of x

(1) x = 410 sec
(2) x = 467 sec
(3) x = 490 sec
(4) x = 430 sec

5. In the reaction NH_4NO_2 (aq.) → N_2 (g) + 2 H_2O (*l*) the volume of N_2 after 20 min and after a long time is 40 ml and 70 ml respectively. The value of rate constant is :

(1) (1/20) In (7/4) min^{-1}
(2) (2.303 /1200) log (7/3) sec^{-1}
(3) (1/20) log (7/3) min^{-1}
(4) (2.303 / 20) log (11/7) min^{-1}

DPP-06 : Effect of Temperature

1. Rate of which reactions increases with temperature :

(1) of any
(2) of exothermic reactions
(3) of endothermic
(4) of none.

2. For a zero order reaction. Which of the following statement is false :

(1) the rate is independent of the temperature of the reaction.
(2) the rate is independent of the concentration of the reactants.
(3) the half life depends as the concentration of the reactants.
(4) the rate constant has the unit mole lt^{-1} sec^{-1}.

3. A large increase in the rate of a reaction for a rise in temperature is due to

(1) increase in the number of collisions
(2) the increase in the number of activated molecules
(3) The shortening of mean free path
(4) the lowering of activation energy

4. The rate constant, the activation energy and the frequency factor of a chemical reaction at 25°C are 3.0×10^{-4} s^{-1}, 104.4 KJ mol^{-1} and 6.0×10^{14} s^{-1} respectively. The value of the rate constant as $T \to \infty$ is :

(1) 2.0×10^{18} s^{-1}
(2) 6.0×10^{14} s^{-1}
(3) ∞
(4) 3.6×10^{30} s^{-1}

5. According to collision theory of reaction rates –

(1) Every collision between reactant leads to chemical reaction
(2) Rate of reaction is proportional to velocity of molecules
(3) All reactions which occur in gaseous phase are zero order reaction
(4) Rate of reaction is directly proportional to collision frequency.

6. The minimum energy for molecules to enter into chemical reaction is called.

(1) Kinetic energy
(2) Potential energy
(3) Threshold energy
(4) Activation energy

7. The activation energy for the forward reaction $X \to Y$ is 60 KJ mol^{-1} and ΔH is –20 KJ mol^{-1}. The activation energy for the backard reaction $Y \to X$ is :

(1) 80 KJ mol^{-1}
(2) 40 KJ mol^{-1}
(3) 60 KJ mol^{-1}
(4) 20 KJ mol^{-1}

8. For producing the effective collisions, the colloiding molecules must posses :

(1) A certain minimum amount of energy
(2) Energy equal to or greater than threshold energy
(3) Proper orientation
(4) Threshold energy as well as proper orientation of collision.

9. For the first order reaction, $X_{(s)} \longrightarrow X_{(g)}$

the monitoring is done by observing the volume :

time	t	∞
volume	V_t	V_∞

The rate constant is given by :

(1) $\frac{1}{t}\ln\left(\frac{V_\infty}{V_t}\right)$ (2) $\frac{1}{t}\ln\left(\frac{V_\infty}{V_\infty - V_t}\right)$ (3) $\frac{1}{t}\ln\left(\frac{V_\infty + V_t}{V_\infty}\right)$ (4) $\frac{1}{t}\ln\left(\frac{V_\infty + V_t}{V_\infty - V_t}\right)$

10. The first order rate constant k is related to temp. as log k = 15.0 – (10^6 /T) Which of the following pair of value is correct ?

(1) A = 10^{15} and E = 1.9 × 10^4 KJ (2) A = 10^{-15} and E = 40 KJ

(3) A = 10^{15} and E = 40 KJ (4) A = 10^{-15} and E = 1.9 × 10^4 KJ.

11. For a given reaction, energy of activation for forward reaction (E_{af}) is 80kJ.mol^{-1}. $\Delta H = -40$kJ.mol^{-1} for the reaction. A catalyst lowers E_{af} to 20 kJ.mol^{-1}. The ratio of energy of activation for reverse reaction before and after addition of catalyst is :

(1) 1.0 (2) 0.5 (3) 1.2 (4) 2.0

12. The E_a of a reaction in presence of a catalyst is 4.15 kJ mol^{-1} and in absence of a catalyst is 8.3 kJ mol^{-1}. What is slope of the plot of ln k vs $\frac{1}{T}$ in the absence of catalyst

(1) + 1 (2) –1 (3) + 1000 (4) –1000

DPP-07 : Mechanism of reactions

1. For the reaction $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$ the experiment data suggested that $r = k[H_2][Br_2]^{1/2}$

The molecularity and order of the reaction are respectively :

(1) 2, 3/ 2 (2) 3/2 , 3/2 (3) Not defined, 3/2 (4) 1,1/2

2. The reaction of hydrogen, and iodine monochloride is represented by the equation :

$$H_2(g) + 2ICl(g) \longrightarrow 2HCl(g) + I_2(g)$$

This reaction is first–order in H_2(g) and also first–order in ICl(g). Which of these proposed mechanism can be consistent with the given information about this reaction ?

Mechanism I : $H_2(g) + 2ICl(g) \longrightarrow 2HCl(g) + I_2(g)$

Mechanism II : $H_2(g) + ICl(g) \xrightarrow{\text{Slow}} HCl(g) + HI(g)$

$HI(g) + ICl(g) \xrightarrow{\text{fast}} HCl(g) + I_2(g)$

(1) I only (2) II only (3) both I and II (4) neither I nor II

3. Following mechanism has been proposed for a reaction.

$2A + B \rightarrow D + E$

Step -1 $A + B \rightarrow C + D$ (slow)

Step -2 $A + C \rightarrow E$ (fast)

The rate law expression for the reaction is :

(1) r = K[A]^2 [B] (2) r = K [A] [B] (3) r = K [A]^2 (4) r = K[A][C]

4. A following mechanism has been proposed for a reaction :

$2A + B \longrightarrow D + E$ K = 2 × 10^{-1} lt^2 mol^{-2} sec^{-1}

$A + B \longrightarrow C + D$ K = 1.5 × 10^{-6} lt/mol sec

$A + C \longrightarrow E$ K = 2 × 10^{-3} lt/mol sec

The rate law expression for the reaction is :

(1) r = k[A]^2 [B] (2) r = k[A][B] (3) r = k[A]^2 (4) r = k[A][C]

5. A hypothetical reaction $A_2 + B_2 \rightarrow 2AB$ follows the mechanism as given below :

$A_2 \rightleftharpoons A + A$ fast

$A + B_2 \rightarrow AB + B$ slow

$A + B \rightarrow AB$ fast

The order of the overall reaction is :

(1) 2 (2) 1 (3) 1.5 (4) 0

6. For an elementary process $2X + Y \rightarrow Z + W$, the molecularity is :

(1) 2 (2) 1 (3) 3 (4) Unpredictable

7. The reaction of NO_2 (g) and O_3 (g) is first-order in NO_2 (g) and O_3 (g)

$$2\,NO_2\,(g) + O_3\,(g) \longrightarrow N_2O_5\,(g) + O_2\,(g)$$

The reaction can take place by mechanism :

I : $NO_2 + O_3 \xrightarrow{\text{slow}} NO_3 + O_2$

$NO_3 + NO_2 \xrightarrow{\text{fast}} N_2O_5$

II : $O_3 \underset{k_b}{\overset{k_a\ \text{fast}}{\rightleftharpoons}} O_2 + [O]$

$NO_2 + O \xrightarrow{\text{slow}} NO_3$

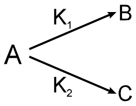
$NO_3 + NO_2 \xrightarrow{\text{fast}} N_2O_5$

Select correct mechanism.

(1) I only (2) II only (3) both I and II (4) None of I and II

DPP-08: Complications in first order reactions

1. The substance undergoes first order decomposition. The decomposition follows two parallel first order reactions as :



$K_1 = 1.26 \times 10^{-4}\ \text{sec}^{-1}$ and $K_2 = 3.8 \times 10^{-5}\ \text{sec}^{-1}$

The percentage distribution of B and C

(1) 80% B and 20% C (2) 76.83% B and 23.17%C

(3) 90% B and 10% C (4) 60% B and 40% C

Answers

EXERCISE - 1

DPP-01

1.	(3)	**2.**	(2)	**3.**	(1)	**4.**	(3)	**5.**	(2)	**6.**	(4)	**7.**	(2)
8.	(1)	**9.**	(3)	**10.**	(1)	**11.**	(4)	**12.**	(4)				

DPP-02

1.	(2)	**2.**	(3)	**3.**	(4)	**4.**	(4)	**5.**	(2)	**6.**	(4)	**7.**	(2)
8.	(4)	**9.**	(3)	**10.**	(3)								

DPP-03

1.	(3)	**2.**	(2)	**3.**	(1)	**4.**	(3)	**5.**	(1)	**6.**	(4)	**7.**	(2)
8.	(2)	**9.**	(3)	**10.**	(3)	**11.**	(3)	**12.**	(1)	**13.**	(2)	**14.**	(2)
15.	(2)	**16.**	(4)	**17.**	(3)								

DPP-04

1.	(2)	**2.**	(4)	**3.**	(3)	**4.**	(4)	**5.**	(2)	**6.**	(3)	**7.**	(4)
8.	(2)												

DPP-05

1.	(1)	**2.**	(2)	**3.**	(1)	**4.**	(2)	**5.**	(2)

DPP-06

1.	(1)	**2.**	(1)	**3.**	(2)	**4.**	(2)	**5.**	(4)	**6.**	(3)	**7.**	(1)
8.	(4)	**9.**	(2)	**10.**	(1)	**11.**	(4)	**12.**	(4)				

DPP-07

1.	(3)	**2.**	(2)	**3.**	(2)	**4.**	(2)	**5.**	(3)	**6.**	(3)	**7.**	(3)

DPP-08

1. (2)