CHEMISTRY

BOOKS - MODERN PUBLICATION

CHEMICAL KINETICS

EXAMPLE

1. Express the rate of the following reaction : $4PH_3 \rightarrow P_4 + 6H_2$

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2. Express the rate of the following reaction : $2NO_2 \rightarrow 2NO + O_2$

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3. The concentrations of a reactant R at different times are given below:

t(s)	[R] (mol L^{-1})	t(s)	[R] (mol L^{-1})
0	160×10^{-3}	5	80×10^{-3}
10	40×10^{-3}	20	10×10^{-3}
30	2.5×10^{-3}		

Calculate the average rate of reaction, $R \rightarrow P$ during different intervals of time.

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4. From the concentration of C_4H_9Cl (butyl chloride) at different times given below, calculate the average rate of reaction: $C_4H_9Cl + H_2O \rightarrow C_4H_9OH + HCl$ during different intervals of time.

t(s)	C_4H_9Cl (mol L^{-1})	t(s)	C_4H_9Cl (mol L^{-1})
0	0.100	300	0.0549
50	0.0905	400	0.0439
100	0.0820	500	0.0335
150	0.0741	700	0.0210
200	0.0671	800	0.017

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5. Ammonia and oxygen react at high temperature as : $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$ In an experiment, rate of formation of NO is $3.6 \times 10^{-3} mol L^{-1} s^{-1}$. Calculate (i) rate of disapperance of ammonia, (ii) rate of formation of water .

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6. The decomposition of N_2O_5 in $\mathbb{C}1_4$ at 318K has been studied by monitoring the concentration of N_2O_5 in the solution. Initially the concentration of N_2O_5 is $2.33 mol L^{-1}$ and after 184 minutes, it is reduced to 2.08 mol L^{-1}. The reaction takes place according to the equation

$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g) Calc\underline{a}tetheavera \geq rateofthisreaction \in$

NO_2` during this period?

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7. Dinitrogen pentoxide decomposes at 475K as: $N_2O_5(g) \rightarrow N_2O_4(g) + \frac{1}{2}O_2(g)$ If the initial pressure is 125 mm and after 30 minutes of the reaction, total pressure of the gaseous mixture is 148 mm, calculate the average rate of reaction in atm min^{-1}

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8. Dinitrogen pentoxide decomposes at 475K as: $N_2O_5(g) \rightarrow N_2O_4(g) + \frac{1}{2}O_2(g)$ If the initial pressure is 125 mm and after 30 minutes of the reaction, total pressure of the gaseous mixture is 148 mm, calculate the average rate of reaction in $molL^{-1}s^{-1}$.

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9. Calculate the overall order of a reaction which has the rate expression:

Rate = k [A]^(1/2) [B]^(3/2)`

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10. Calculate the overall order of a reaction which has the rate expression:

Rate = k [A]^(3/2) [B]^(-1)

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11. The reaction $A+B \rightarrow C$ has zero order. What is its rate equation

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12. What is meant by the rate constant, 'k' of a reaction. If the concentration be expressed in mol L^{-1} units and time in seconds, what would be the units for k for a first order reaction ?

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13. What are the units of rate constant for a zero order reaction ? (concentrations are expressed in mol L^{-1} and time in seconds).

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14. Write the units of the rate constant for a nth order reaction. Deduce from this the units of rate constant for a (i) half order reaction (ii) 3/2th order reaction (iii) third order reaction.

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15. Identify the reaction order of the following rate constants.

$k = 2.3 \times 10^{-5} Lmol^{-1}s^{-1}$.

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16. Identify the reaction order from each of the following rate constants.

$k = 3 \times 10^{-4}s^{-1}$

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17. The rate law for a reaction of A, B and C has been found to be rate = $k[A][B][C]^2$. How would the rate of reaction change when concentration of C is doubled ?

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18. The rate law for a reaction of A, B and C has been found to be rate = $k[A][B][C]^2$. How would the rate of reaction change when concentration of A is halved ?

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19. The rate law for a reaction of A, B and C has been found to be rate = $k[A][B][C]^2$. How would the rate of reaction change when concentration of both B and C are doubled ?

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20. The rate law for a reaction of A, B and C has been found to be rate = $k[A][B][C]^2$. How would the rate of reaction change when concentration of each of A, B and C are tripled ?

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21. The rate of a gaseous reaction becomes half when volume of the vessel is doubled. What is the order of the reaction ?

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22. A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is: doubled

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23. A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is: reduced to half ?

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24. The decomposition of hydrogen peroxide in the presence of iodide ion has been found to be first order in H_2O_2:

$$2H_2O_2(aq) \xrightarrow{1^-(aq)} 2H_2O(l) + O_2(g).$$

The rate constant has been found to be $1.01 \times 10^{-2} \text{ min}^{-1}$:

(a) Calculate the rate of reaction when $[H_2O_2] = 0.4 \text{ mol lit}^{-1}$.

(b) What concentration of $[H_2O_2]$ would give a rate of $1.12 \times 10^{-2} \text{ mol lit}^{-1} \text{ min}^{-1}$?

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25. The decomposition of hydrogen peroxide in the presence of iodide ion has been found to be first order with respect to H_2O_2 with rate constant k is $1.01 \times 10^{-2} \overset{-1}{\text{min}}$. Calculate the rate of reaction when $[H_2O_2] = 0.15 mol L^{-1}$

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26. The decomposition of hydrogen peroxide in the presence of iodide ion has been found to be first order in H_2O_2:

$2H_2O_2(aq) \xrightarrow{1^-(aq)} 2H_2O(l) + O_2(g)$.

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(b) What concentration of $[H_2O_2]$ would give a rate of $1.12 \times 10^{-2} \text{ mol lit}^{-1} \text{ min}^{-1}$?

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27. For the reaction $2A + B + C \rightarrow A_2B + C$ The rate law has been found to be Rate = $k[A][B]^2$ with $k = 2.0 \times 10^{-6} mol^{-2} L^2 s^{-1}$ For this reaction, determine the initial rate of reaction with $[A] = 0.1 mol L^{-1}, [B] = 0.2 mol L^{-1}, [C] = 0.8 mol L^{-1}$. Determine the rate after 0.04 mol L^{-1} of A has been reacted.

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28. How will rate of reaction change when $[A]_0$ is doubled for a zero order reaction

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29. Is there any reaction for which reation rate does not decrease with time ?

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30. How will rate of reaction change when $[A]_0$ doubled and tripled for zero order reaction?

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31. How will rate of reaction change when $[A]_0$ doubled and tripled for second order reaction ?

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32. What is instantaneous rate of reaction?

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33. The rate constant of a reaction has same units as the rate of reaction.

The reaction is of .....

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34. $2NOBr \rightarrow 2NO(g) + Br_2(g)$

Rate=$k[NOBr]_2$

What are the units of rate constant.?

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35. For a zero order reaction will the molecularity be equal to zero ?

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36. The rate of reaction is equal to rate constant of the reaction. What is the order of reaction?

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37. What is activation energy? How is related to rate constant of a reaction?

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38. For a reaction : $2NH_3(g) \xrightarrow{Pt} N_2(g) + 3H_2(g)$ Rate =k . Write the order and molecularity of this reaction.

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39. For a reaction : $2NH_3(g) \xrightarrow{Pt} N_2(g) + 3H_2(g)$ Rate =k . Write the unit of k.

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40. Identify the reaction order of the following rate constants.

$k = 2.3 \times 10^{-5} Lmol^{-1}s^{-1}$.

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41. Identify the reaction order from each of the following rate constants.

$k = 3 \times 10^{-4}s^{-1}$

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42. Identify the order of a reaction of the following rate constants : $k = 9.3 \times 10^{-4} mol L^{-1} s^{-1}$

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43. For the reaction : $Ester + H^{+} \rightarrow$ Acid + Alcohol, rate= k [Ester] $\left[H^{+}\right]^{0}$. Find the order of the reaction .

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44. For the assumed reaction : $X_2 + 2Y_2 \rightarrow 2XY_2$, write the rate equation in terms of the rate of disappearance of Y_2 .

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45. For the reaction : $Cl_2(g) + 2NO(g) \rightarrow 2NOCl(g)$ The rate law is expressed as rate = $k[NO]^{2}[Cl_2]$ What is the overall order of the reaction

?

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46. Express the rate of the following reaction in terms of disappearance of hydrogen in the following reaction : $3H_2(g) + N_2(g) \rightarrow 2NH_3(g)$

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47. The decomposition reaction of ammonia gas on platinum surface has a rate constant, $k = 2.5 \times 10^{-4} molL^{-1}s^{-1}$. What is the order of the reaction ?

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48. What is molecularity of reaction

$CI \rightarrow \frac{1}{2}Cl_2$

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49. Milk, egg, fish, meat, pulses contain mainly_______ in them.

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50. If the concentration be expressed in mol L^{-1} units and time in seconds, what would be units for rate constant, k for a zero order reaction?

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51. If the concentration be expressed in mol L^{-1} units and time in seconds, what would be units for rate constant, k for a first order reaction?

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52. Identify the order of a reaction if the units of its rate constant are :

$L^{-1} mol s^{-1}$

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53. Identify the order of a reaction if the units of its rate constant are :

$L mol^{-1} s^{-1}$.

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54. A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is: reduced to half ?

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55. In the reaction : $aA + bB \rightarrow$ products, if the concentration of A is doubled (keeping B constatnt), the initial rate becomes four times and if B is doubled (keeping A constatnt), the rate become double. What is the rate law equation and order of the reaction ?

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56. The rate constant of a reaction is $3 \times 10^2 min^{-1}$. What is the order of reaction ?

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57. For a reaction, $A + B \rightarrow$ Product, the rate law is given by, r = k [A]^(1/2) [B]^2. What is the order of the reaction?

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58. The rate law for a reaction is

Rate = $k[A]^{1/2}[B]^2$

Can the reaction be an elementry reaction. Explain.

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59. The rate of formation of a dimer in a second order reaction is $9.5 \times 10^{-5} mol L^{-1} s^{-1}$ at 0.01 mol L^{-1} monomer concentration. Calculate the rate constant.

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60. The rate constant for a reaction of zero order in A is 0.0030 $mol L^{-1} s^{-1}$. How long will it take for the initial concentration of A to fall from 0.10 M to 0.075 M.

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61. The decomposition of N_2O_5 at 318 K according to the following equation follows first order reaction: $N_2O_5(g) \rightarrow 2NO_2(g) + \frac{1}{2}O_2(g)$ The initial concentration of N_2O_5 was $1.24 \times 10^{-2} molL^{-1}$ and that after 60 minutes was $0.20 \times 10^{-2} molL^{-1}$. Calculate the rate constant of the reaction at 318 K.

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62. The decomposition of a compound is found to follow first order rate law. If it takes 15 minutes for 20 percent of original material to react, calculate the specific rate constant?

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63. The decomposition of a compound is found to follow first order rate law. If it takes 15 minutes for 20 percent of original material to react, calculate the time at which 10 percent of the original material remains unreacted.

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64. The decomposition of a compound is found to follow first order rate law. If it takes 15 minutes for 20 percent of original material to react, calculate the time it takes for the next 20 per cent of the reactant left to react after first 15 minutes.

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65. The following data were obtained during the first order thermal decomposition of N_2O_5 (g) at constant volume: $2N_2O_5(g) \rightarrow 2N_2O_4(g) + O_2(g)$

S.No.	Time/s	Total Pressure/(atm)
1.	0	0.5
2.	100	0.512

Calculate the rate constant.

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66. The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at constant volume .

$SO_2Cl_2(g) \rightarrow SO_2(g) + Cl_2(g)$

Experiment	Times / s	Total pressure/atm
1	0	0.5
2	100	0.6

Calculate the rate of reaction when total pressure is 0.65 atm.

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67. Calculate the half life period of first order reaction where the specific rate constant is $200s^{-1}$

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68. Calculate the half-life of a first order reaction from their rate constants given below: $2 \min^{-1}$

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69. Calculate the half life period of first order reaction where the specific rate constant is $4 year^{-1}$

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70. Fill in the blanks with appropriate answers- Milk contains ___________which is converted into ____________ in the presence of a bacteria during the formation of curd.

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71. For a first order reaction, calculate the ratio between the time taken to complete three-fourth of the reaction and the time taken to complete half of the reaction.

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72. The rate of decomposition of hydrogen peroxide at a particular temperature was measured by titrating its solution with acidic $KMnO_4$ solution. Following results were obtained:

Time, t (min)	0	10	20
mol ($KMnO_4$)	22.8	13.8	8.3

Show that the reaction is of first order .

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Time, t (min)	0	10	20
mol ($KMnO_4$)	22.8	13.8	8.3

Calculate the rate constant ?

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74. The following results were obtained for the decomposition of nitrogen peroxide in an inert solvent :

t (s)	0	300	600	900	∞
Vol. of O_2 evolved (cm^3)	0	3.42	6.30	8.95	34.75

Show that the reaction is of first order and also calculate the rate constant.

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75. The experimental data for decomposition of N_2O_5 $2N_2O_5 \rightarrow 4NO_2 + O_2$ in gas phase at 318K are given below:

t/s	0	400	800	1200	1600	2000	2400	2800	3200
$10^2 \times [N_2O_5]$/ mol L^{-1}	1.63	1.36	1.14	0.93	0.78	0.64	0.53	0.43	0.35

What is the rate law?

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76. What is glauber salt?

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77. Rice,maize,sugar and potato contain ________ in them.

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78. The experimental data for decomposition of N_2O_5

$2N_2O_5 \rightarrow 4NO_2 + O_2$ in gas phase at 318K are given below:

t/s	0	400	800	1200	1600	2000	2400	2800	3200
$10^2 \times [N_2O_5]/$ $mol\ L^{-1}$	1.63	1.36	1.14	0.93	0.78	0.64	0.53	0.43	0.35

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t/s	0	400	800	1200	1600	2000	2400	2800	3200
$10^2 \times [N_2O_5]$/ mol L^{-1}	1.63	1.36	1.14	0.93	0.78	0.64	0.53	0.43	0.35

Calculate the half-life Period from k and compare it with (b) .

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81. The following data were obtained for the reaction:

$2NO(g) + Br_2(g) \rightarrow 2NOBr(g)$

Experiment	Initial conc. [NO]	Initial conc. $[Br_2]$	Initial rate (mol L^{-1} min^{-1})
I	0.10	0.10	1.3×10^{-6}
II	0.20	0.10	5.2×10^{-6}
III	0.20	0.30	1.56×10^{-5}

Determine: the orders with respect to NO and Br_2

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82. The following data were obtained for the reaction:

$2NO(g) + Br_2(g) \rightarrow 2NOBr(g)$

Experiment	Initial conc. [NO]	Initial conc. $[Br_2]$	Initial rate (mol L^{-1} min^{-1})
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Determine the rate law?

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83. The following data were obtained for the reaction: $2NO(g) + Br_2(g) \rightarrow 2NOBr(g)$

Experiment	Initial conc. [NO]	Initial conc. $[Br_2]$	Initial rate (mol L^{-1} min^{-1})
I	0.10	0.10	1.3×10^{-6}
II	0.20	0.10	5.2×10^{-6}
III	0.20	0.30	1.56×10^{-5}

Determine rate constant.

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84. What is the order of the reaction if the unit of rate constant is s − 1 ?

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85. The following data were obtained for the reaction: $2NO_2(g) + F_2(g) \rightarrow 2NO_2F$

Experiment	Initial conc. $[NO_2]_0$	$[F_2]_0$	Initial rate mol L^{-1} min^{-1}
1	0.20	0.05	6.0×10^{-3}
2	0.40	0.05	1.2×10^{-2}
3	0.80	0.10	4.8×10^{-2}

Determine: order of reaction.

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86. The following data were obtained for the reaction:

$2NO_2(g) + F_2(g) \rightarrow 2NO_2F$

Experiment	Initial conc. $[NO_2]_0$	$[F_2]_0$	Initial rate mol L^{-1} min^{-1}
1	0.20	0.05	6.0×10^{-3}
2	0.40	0.05	1.2×10^{-2}
3	0.80	0.10	4.8×10^{-2}

Determine: rate law.

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87. The following data were obtained for the reaction:

$2NO_2(g) + F_2(g) \rightarrow 2NO_2F$

Experiment	Initial conc. $[NO_2]_0$	Initial conc. $[F_2]_0$	Initial rate mol L^{-1} min^{-1}
1	0.20	0.05	6.0×10^{-3}
2	0.40	0.05	1.2×10^{-2}
3	0.80	0.10	4.8×10^{-2}

Determine: rate of reaction when $[NO_2] = 0.50 mol L^{-1}$ and $[F_2] = 0.60 mol L^{-1}$.

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88. The initial rate of reaction : $A + 5B + 6C \leftrightarrow 3L + 3M$ has been determined by measuring the rate of disappearance of A under the following conditions :

Expt. No.	$[A]_0$ M	$[B]_0$ M	$[C]_0$ M	Initial rate M/min^{-1}
1.	0.02	0.02	0.02	2.08×10^{-3}
2.	0.01	0.02	0.02	1.04×10^{-3}
3.	0.02	0.04	0.02	4.16×10^{-3}
4.	0.02	0.02	0.04	8.32×10^{-3}

Determine the order of reaction with respect to each reactant and overall order of the reaction. What is the rate constant ? Calculate the initial rate of the reaction when the concentration of all the reactants is 0.01 M. Calculate the initial rate of change in concentration of B and L.

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89. Nitrogen pentoxide decomposes according to equation : $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$ This first order reaction was allowed to proceed at $40^\circ C$ and the data below were collected :

$[N_2O_5]$ (M)	Time (min)
0.400	0.00
0.289	20.0
0.209	40.0
0.151	60.0
0.109	80.0

Calculate the rate constant. Include units with your answer.

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90. Nitrogen pentoxide decomposes according to equation : $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$ This first order reaction was allowed to proceed at $40^\circ C$ and the data below were collected :

$[N_2O_5]$ (M)	Time (min)
0.400	0.00
0.289	20.0
0.209	40.0
0.151	60.0
0.109	80.0

What will be the concentration of N_2O_5 after 100 minutes ?

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91. Fill in the blanks- __________ and ________ are irreversible changes.

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92. The reaction : $CH_3COF + H_2O = CH_3COOH + HF$ has been studied under the following initial conditions:

Experiment I

$[H_2O]_0 = 1.00\ M$

$[CH_3COF]_0 = 0.01\ M$

Experiment II

$[H_2O]_0 = 0.02\ M$

$[CH_3COF]_0 = 0.80\ M$

Calculate the order of the reaction and the rate constant for the reaction.

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93. The half life period for the conversion of ammonium cyanate into urea at 303 K. at initial concentration of 0.1 mol/l and 0.2 mol/l are 1152 and 568 min respectively. What is the order of reaction.

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94. A first order reaction has a rate constant of 0.0051 $\min^{-1}$. If we begin with 0.10 M concentration of the reactant, what concentration of reactant will remain in Solution after 3 hours ?

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95. Fill in the blanks- __________ is the plant nutrient which helps to transfer genetic character from one generation to other.

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96. A first order reaction is 20% complete in the 10 minutes. Calculate the time period for 75% completion of the reaction.

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97. A first order reaction takes 23.1 minutes for 50% conmpletion. Calculate the time required for 75% completion of this reaction $(\log 2 = 0.\ 301), (\log 3 = 0.\ 4771)(\log 4 = 0.6021)$

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98. The rate constant for the first order reaction is $60s^{-1}$. How much time will it take to reduce the concentration to reactant to $\frac{1}{10}$ th of initial

value ?

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99. The half-life for radioactive decay of $.^{14}C$ is 5730 years. An archaeological artifact contented wood that has only 80% of the $.^{14}C$ found in living tree. Estimate the age of the sample.

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100. Calculate two third life of a first order reaction having $k = 5.48 \times 10^{-14} s^{-1}$.

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101. The reaction : $SO_2Cl_2 \xrightarrow{k_1} SO_2 + Cl_2$ is a first order reaction with half life $3.15 \times 10^4 s$ at 575 K. What percentage of SO_2Cl_2 would be decomposed on heating at 575 K for 90 minutes?

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102. The rate of decomposition of N_2O_5 in CCl_4 solution has been measured at 318 K and the following results were obtained :

t(min)	0	135	339	689	1680
c (M)	2.08	1.91	1.67	1.35	0.57

Find the order of reaction and calculate its rate constant. What is its half life period ?

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103. A first order reaction is 15% complete in 20 minutes. How long will it take to complete 60%?

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104. Show that in case of a first order reaction, the time taken for completion of 99.9% reaction is ten times the time required for half

change of the reaction.

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105. The decomposition of phosphine, PH_3, proceeds according to the following equation : $4PH_3(g) \rightarrow P_4(g) + 6H_2(g)$ It is found that the reaction follows the following rate equation : Rate = $k[PH_3]$. The half-life of PH_3 is 37.9 s at 120° C. How much time is required for 3/4th of PH_3 to decompose?

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107. Sucrose decomposes in acid solution into glucose and fructose according to the first order rate law, with $t_{\frac{1}{2}}$=3.00 hours. What fraction of sample of sucrose remains after 8 hours?

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108. The thermal decomposition of a compound is first order. If 50 % of the. compound is decomposed in 120 minutes, how long will it take for 90 % of this compound decompose?

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109. Starting from 10g of a radioactive element, 0.25 g was left after 5 years. Calculate Rate constant for the decay of the radioactive element.

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110. Starting from 10g of a radioactive element, 0.25 g was left after 5 years. Calculate The amount left after one year.

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111. Starting from 10g of a radioactive element, 0.25 g was left after 5 years. Calculate The time required for half of the element to decay.

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112. Artificial gold is made up of ________

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113. The half-life of first order decomposition of NH_4NO_3 is 2.10 hr at 288 K temperature

$NH_4NO_3(aq) \rightarrow N_2O(g) + 2H_2O(l)$. If 6.2 of NH_4NO_3 is allowed to decompose, the required for NH_4NO_3 to decompose 90 % is :

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114. The half life time of a first order decomposition of nitramide is 2.1 hour at $15^{\circ}C$.

$NH_2NO_2(aq) \rightarrow N_2O(g) + H_2O(I)$ If 6.2 of NH_2NO_2 is allowed to decompose 99%, calculate volume of dry N_2O produced at this point measured at S.T.P.

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115. The decomposition of Cl_2O_7 at 400 K in the gas phase to Cl_2 and O_2 is a first order reaction. After 55 seconds at 400 K, the pressure of Cl_2O_7 falls from 0.062 to 0.044 atm. Calculate the rate constant.

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116. The decomposition of Cl_2O_7 at 400 K in the gas phase to Cl_2 and O_2 is a first order reaction. After 55 seconds at 400 K, the pressure of Cl_2O_7 falls from 0.062 to 0.044 atm Calculate the pressure of ` after 100 s of decomposition at this temperature.

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117. What is the number of water molecules contained in a drop of water weighing 0.06g?

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118. Calculate the mass of 3.011 (10 *24) molecules of nitrogen gas.

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119. The absolute mass of one molecule of a substance is 5.32 (10*-32) g . What is its molecular mass .

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120. For a decomposition reaction, the values of rate constants, k at two different temperatures are given below :

$k_1 = 2.15 \times 10^{-7} Lmol^{-1}s^{-1}$ at 650K

$k_2 = 2.39 \times 10^{-7} Lmol^{-1}s^{-1}$ at 700K

calculate activation energy for the reaction.

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121. In general it is observed that the rate of a chemical reaction becomes double for every 10° rise in temperature. If this generalisation holds for a reaction in the temperature range 2908 K to 398 K, what would be the value of activation energy for the reaction.

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

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122. The rate of reaction becomes four times when the temperature changes from 293 K to 313 K. Calculate the energy of activation (E_a) of the reacton assuming that it does not change with temperature. $[R = 8.314 JK^{-1} mol^{-1}, \log 4 = 0.6021]$

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123. The rate constant of a reaction at $700K$ and $760K$ are $0.011 M^{-1} s^{-1}$ and $0.105 M^{-1} s^{-1}$ respectively. Calculate the value of Arrhenius parameter.

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124. A first order reaction takes 23.1 minutes for 50% conmpletion. Calculate the time required for 75% completion of this reaction $(\log 2 = 0.301), (\log 3 = 0.4771)(\log 4 = 0.6021)$

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125. The values of rate constant for the decomposition of HI into H_2 and I_2 at different temperatures are given below:

$T(K)$	633	667	710	738
$k(M^{-1}s^{-1})$	0.19	1.00	8.31	25.1

Draw a graph between ln k and 1/T and calculate the values of Arrhenius parameters.

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126. Rate constant 'k' of a reaction varies with temperature 'T' according to the equation: $\log k = \log A - \frac{E_a}{2.303R}\left(\frac{1}{T}\right)$ where E_a is the activation energy. When a graph is plotted for log k vs. $\frac{1}{T}$, a straight line with a slope of - 4250 K is obtained. Calculate E_a for the reaction $(R = 8.314 JK^{-1} mol^{-1})$

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127. The rate constant for a reaction is found to be $1.96 \times 10^{-2} s^{-1}$ at 313K. The activation energy of the reaction is 93.62 kJ mol^{-1}. Calculate the frequency factor ,A.

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128. The rate constants of a reaction at 500K and 700K are $0.02 s^{-1}$ and $0.07 s^{-1}$ respectively. Calculate the values of E_a and A.

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129. Calculate the mass of 1 mole of each one of the following : NaCl

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130. Calculate the mass of 1 mole of each one of the following : CaCO3

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131. Two reactions of the same order have equal pre-exponential factors but their activation energies difter by 24.9 kJ mol^{-1}. Calculate the ratio between the rate constants of these reactions at $27^{\circ} C$. (Gas constant, $R = 8.3 JK^{-1} mol^{-1}$).

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132. A hydrogenation reaction is carried out at $500K$. If the same reaction is carried out in the presence of a catalyst at the same rate, the temperature required is $400K$. Calculate the activation energy of the reaction if the catalyst lowers the activation barrier by $20 kJ mol^{-1}$.

a) 100 kJ/mol

b) 80 kJ/mol

c) 60 kJ/mol

d) none of these

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133. The time required for 10% completion of a first order reaction at 298K is equal to that required for its 25% completion at 308K. If the value of A is $4 \times 10^{10} s^{-1}$. Calculate k at 318K and E_a.

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134. Fill in the blanks- _______ is the essential macronutrient which is one of the component of chlorophyll.

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135. Half life period of a first order reaction is :

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136. After five half life periods for a first order reaction what fraction of reactant remains ?

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137. For a first order reaction, time taken for half of the reaction to complete is t_1 and 3/4 of the reaction to complete is t_2. How are t_1 and t_2 related ?

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138. A reaction is first order in A and second order in B.

Write the differential rate equation.

Watch Video Solution

139. A reaction is first order in A and second order in B

How is the rate affected on increasing the concentration of B three times ?

Watch Video Solution

140. A reaction is first order in A and second order in B. How is the rate affected when the concentrations of both A and B are doubled?

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141. Express the relation between the half life period of a reactant and its initial concentration for a reaction of nth order.

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142. For the reaction :

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{HI} C_6H_{12}O_6 + O_6H_{12}O_6$$

Write : (a) Rate of reaction expression.

(b) Molecularity of reaction

(c) Order of reaction

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143. Complete the reaction : $NH_4NO_3(s) \xrightarrow{Heat}$

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144. Fill in the blanks- _______ is present in the blood and also called as leukocytes.

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145. Fill in the blanks- _________is the component of the blood which contains food, wastes, enzymes and protein.

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146. Fill in the blanks- ___________ is the tissue of the plant that carries water and nutrient from soil to the stems and leaves.

Watch Video Solution

147. Complete the following terms- Sweat contains_________.

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148. Fill in the blanks- __________ transport blood that has low oxygen content from right ventricles to the lungs.

Watch Video Solution

149. Fill in the blanks- _______ is an explosive also called as tenerite.

Watch Video Solution

150. Fill in the blanks- Gun powder is made up of_____________.

Watch Video Solution

151. What value of k is predicted for the rate constant by Arrhenius equation if $T \rightarrow \infty$? Is this value physically reasonable ?

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152. Why $\Delta G$is positive for photochemical reaction ?

Watch Video Solution

153. What is the main difference between a photosensitizer and a Catalyst ?

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154. Give the damaging effect of Photochemistry.

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155. Why does equilibrium constant not change with the Presence of a catalyst ?

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156. What is the fraction of molecules having energy equal to or greater than activation energy, E_a? What is this quantity called ?

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157. What is the effect adding catalyst on the free energy of a reaction?

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158. For a reaction: $A + B \rightarrow P$, the rate law is given as: Rate = $k[A][B]^2$ How is the rate of reaction affected when the concentration of B is doubled?

Watch Video Solution

159. For a reaction: $A + B \rightarrow P$, the rate law is given as: Rate = $k[A][B]^2$

What is the order of reaction if A is present in large excess.

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160. The concentration of a reactant changes from 0.03 M to 0.02 M in 25 minutes. Calculate the average rate of reaction using units of time both in minutes and seconds .

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161. In a reaction, $2A \rightarrow Products$, the concentration of A decreases from 0.5 mol L^(-1) to $0.4 mol L^{-1}$ in 10 minutes. Calculate the rate during this interval?

Watch Video Solution

162. For a reaction, $A + B \rightarrow$ Product, the rate law is given by, r = k [A]^(1/2) [B]^2. What is the order of the reaction?

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163. The conversion of molecules X to Y follows second order kinetics. If concentration of X is increased to three times how will it affect the rate of formation of Y ?

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164. A first order reaction has a rate constant $1.15 \times 10^{-3} s^{-1}$. How long will 5g of this reactant take to reduce to 3 g?

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165. Time required to decompose SO_2Cl_2 to half of its initial amount Is 60 minutes. If the decomposition is a first order reaction, calculate the rate constant of the reaction.

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166. What is the effect of temperature on the rate constant of a reaction? How can this effect of temperature on rate constant be represented quantitatively?

Watch Video Solution

167. The rate of the chemical reaction doubles for an increase of 10 K In absolute temperature from 298 K. Calculate E_a .

Watch Video Solution

168. The activation energy for the reaction $2HI(g) \rightarrow H_2 + I_2(g)$ is 209.5 kJ mol^(-1) at 58IK.Calculate the fraction of molecules of reactants having energy equal to or greater than activation energy?

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169. From the rate expression for the following reactions, determine their order of reaction and the dimensions of the rate constants: $3NO(g) \rightarrow N_2O(g) Rate = k[NO]^2$

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170. From the rate expression for the following reactions, determine their order of reaction and the dimensions of the rate constants: $H_2O_2(aq) + 3I^{-(aq)} + 2H^+ \rightarrow 2H_2O(I) + I^-{}_3 Rate = k[H_2O_2][I^-]$

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171. From the rate expression for the following reactions, determine their order of reaction and the dimensions of the rate constants: $CH_3CHO(g) \rightarrow CH_4(g) + CO(g) Rate = k[CH_3CHO]^{\frac{3}{2}}$

Watch Video Solution

172. From the rate expression for the following reactions, determine their order of reaction and the dimensions of the rate constants: $C_2H_5CI(g) \rightarrow C_2H_4(g) + HCI(g) Rate = k[C_2H_5CI]$

Watch Video Solution

173. For the reaction: $2A + B \rightarrow A2B$ the $rate = k[A][B]^2$ with $k = 2.0 \times 10^{-6} mol^{-2} L^2 s^{-1}$. Calculate the initial rate of the reaction when $[A] = 0.1 mol L^{-1}$, $[B] = 0.2 mol L^{-1}$. Calculate the rate of reaction after [A] is reduced to $0.06 mol L^{-1}$.

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174. The decomposition of NH3 on platinum surface is zero order reaction. What are the rates of production of N_2 and H_2 if $k = 2.5 \times 10^{-4} mol L^{-1} s^{-1}$?

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175. The decomposition of dimethyl ether leads to the formation of CH_4, H_2 and CO and the reaction rate is given by $Rate = k[CH_3OCH_3]^{\frac{3}{2}}$. The rate of reaction is followed by increase in pressure in a closed vessel, so the rate can also be expressed in terms of the partial pressure of dimethyl ether, i.e., $Rate = k\left(P_{CH_3OCH_3}^{\frac{3}{2}}\right.$ If the pressure is measured in bar and time in minutes, then what are the units of rate and rate constants?

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176. Discuss the various factors affecting the rates of chemical reactions.

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177. A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is: doubled

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178. A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is: reduced to half ?

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179. What is the effect of temperature on the rate constant of a reaction? How can this effect of temperature on rate constant be represented quantitatively?

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180. 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

Calculate the average rate of reaction between the time interval 30 to 60 seconds.

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181. 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

Calculate the pseudo first order rate constant for the hydrolysis of ester.

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182. A reaction is first order in A and second order in B.

Write the differential rate equation.

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183. A reaction is first order in A and second order in B

How is the rate affected on increasing the concentration of B three times ?

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184. A reaction is first order in A and second order in B. How is the rate affected when the concentrations of both A and B are doubled?

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185. In a reaction between A and B, the initial rate reaction (r_o) was measured for different initial concentrations of A and B as given below :

A/mol L^{-1}	0.20	0.20	0.40
B/mol L^{-1}	0.30	0.10	0.05
r_0/mol $L^{-1}s^{-1}$	5.07×10^{-5}	5.07×10^{-5}	1.43×10^{-4}

What is the order of the reaction with respect to A and B?

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186. The following results have been obtained during the kinetic studies of the reaction : $2A + B \rightarrow C + D$

Experiment	[A]/mol L^{-1}	[B]/mol L^{-1}	Initial rate of formation of D/mol $L^{-1}min^{-1}$
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.2×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.40×10^{-2}

Determine the 'rate law and the rate constant for the reaction

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187. The reaction between A and B is first order with respect to A and zero order with respect to B. Fill in the blanks in the following table:

Experiment	$[A]/mol\ L^{-1}$	$[B]/mol\ L^{-1}$	Initial rate/ $mol\ L^{-1}\ min^{-1}$
I	0.1	0.1	2.0×10^{-2}
II	-	0.2	4.0×10^{-2}
III	0.4	0.4	
IV	-	0.2	2.0×10^{-2}

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188. Calculate the half-life of a first order reaction from its rate constant which is

200 S^{-1}

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189. Calculate the half-life of a first order reaction from their rate constants given below: $2\ \text{min}^{-1}$

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190. Calculate the half-life of a first order reaction from their rate constants given below: $4years^{-1}$

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191. The half-life for radioactive decay of $.^{14}C$ is 5730 years. An archaeological artifact contented wood that has only 80% of the $.^{14}C$ found in living tree. Estimate the age of the sample.

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192. The experimental data for decomposition of $N_2O_5 2N_2O_5 \rightarrow 4NO_2 + O_2$ in gas phase at 318K are given below:

t/s	0	400	800	1200	1600	2000	2400	2800	3200
$10^2 \times [N_2O_5]$/ mol L^{-1}	1.63	1.36	1.14	0.93	0.78	0.64	0.53	0.43	0.35

Plot $[N_2O_5]$ against t.

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193. The experimental data for decomposition of N_2O_5

$2N_2O_5 \rightarrow 4NO_2 + O_2$ in gas phase at 318K are given below:

t/s	0	400	800	1200	1600	2000	2400	2800	3200
$10^2 \times [N_2O_5]$/ mol L^{-1}	1.63	1.36	1.14	0.93	0.78	0.64	0.53	0.43	0.35

What is the rate law?

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194. The experimental data for decomposition of N_2O_5

$2N_2O_5 \rightarrow 4NO_2 + O_2$ in gas phase at 318K are given below:

t/s	0	400	800	1200	1600	2000	2400	2800	3200
$10^2 \times [N_2O_5]/$ $mol\ L^{-1}$	1.63	1.36	1.14	0.93	0.78	0.64	0.53	0.43	0.35

What is the rate law?

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195. The experimental data for decomposition of N_2O_5

$2N_2O_5 \rightarrow 4NO_2 + O_2$ in gas phase at 318K are given below:

t/s	0	400	800	1200	1600	2000	2400	2800	3200
$10^2 \times [N_2O_5]/$ $mol\ L^{-1}$	1.63	1.36	1.14	0.93	0.78	0.64	0.53	0.43	0.35

What is the rate law?

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196. Fill in the blanks- Mixture of _________ is used as domestic fuel.

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197. __________ process is used in the formation of alloys of iron.

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198. The rate constant for a first order reaction is 60 s^(-1). How much time will it take to reduce the initial concentration of the reactant to its l/16^(th) value?

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199. During nuclear explosion, one of the products is ^{90}Sr with half-life of 28.1 years. If $1\mu g$ of ^{90}Sr was absorbed in the bones of a newly born baby instead of calcium, how much of it will remain after 10 years and 60 years if it is not lost metabolically.

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200. Show that the time required for 99% completion of a first order reaction In twice the time required for the completion of 90%.

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201. A first order reaction takes 40 min for 30% completion. Calculate $t_{\frac{1}{2}}$.

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202. For the decomposition of azoisopropane to hexane and nitrogen at 543 K, the following data is obtained.

t(sec)	P(mm of Hg)
0	35.0
360	54.0
720	63.0

Calculate the rate constant.

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

Experiment	Time/s^{-1}	Total pressure/atm
1	0	0.5
2	100	0.6

Calculate the rate of the reaction when total pressure is 0.65 atm.

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204. The rate constant for the decomposition of N_2O_5 at various temperatures is given below :

T/°C	0	20	40	60	80
$10^5 \times k/s^{-1}$	0.0787	1.70	25.7	178	2140

Draw a graph between In k and 1/T and calculate the values of A and E_a.

Predict the rate constant at 30° and $50^\circ C$.

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205. The rate constant for the decomposition of hydrocarbons is $2.418 \times 10^{-5} s^{-1}$ at 546 K. If the energy of activation is 179.9 kJ/mol, what will be the value of pre-exponential factor.

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206. Consider a certain reaction A $\rightarrow$ Products with k=2.0 xx 10^(-2)S^{-1} Calculate the concentration of A remaining after 100 s if the initial concentration of A is 1.0 mol L^(-1)`.

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207. Sucrose decomposes in acid solution into glucose and fructose according to the first order rate law, with $t_{\frac{1}{2}}$=3.00 hours. What fraction of sample of sucrose remains after 8 hours?

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208. The decomposition of hydrocarbon follows the equation $k = (4.5 \times 10^{11} S^{-1}) e^{-28000 \frac{K}{T}}$ Calculate E_a

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209. The rate constant for the first order decomposition of H_2O_2 is given by the following equation: log $k = 14.34 - 1.25 \times 10^4 \frac{K}{T}$ Calculate E_a for this reaction and at what temperature will its half-period be 256 minutes?

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210. The decomposition of A into product has value of k as $4.5 \times 10^3 s^{-1}$ at 10°C and energy of activation 60 kJ mol^{-1}. At what temperature would k be $1.5 \times 10^4 s^{-1}$?

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211. The time required for 10% completion of a first order reaction at 298K is equal to that required for its 25% completion at 308K. If the value of A is $4 \times 10^{10} s^{-1}$. Calculate k at 318K and E_a.

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212. The rate of a reaction quadruples when the temperature changes from 293 K to 313 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature.

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213. State a condition under which a bimolecular reaction is kinetically first order reaction.

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214. The following rate data were obtained at 303 K for the following reaction : $2A + B \rightarrow C + D$

Experiment	[A]	[B]	Initial rate of formation of D
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.2×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.4×10^{-2}

The order of the reaction is :

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215. For a reaction at 500 K, $NO_2(g) + CO(g) \rightarrow CO_2(g) + NO(g)$ the proposed mechanism is as given below :

$NO_2(g) + NO_2(g) \rightarrow NO(g) + NO_3(g)$ (slow)

$NO_3(g) + CO(g) \rightarrow CO_2(g) + NO_2(g)$ (fast)

What is rate law for the reaction ?

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216. For which type of reactions, order and molecularity have same value ?

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217. In a reaction when the concentration of reactants is tripled, the rate of reaction becomes 27 times. What is order of reaction ?

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218. The time required for 100% completion of a zero order reaction is

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219. For a reaction $A + B \rightarrow$ Products, the rate law is .... Rate $= k[A][B]^{3/2}$ can the reaction be an elementary reaction :

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220. For a certain reaction large fraction of molecules has energy more than the threshold energy, yet the rate of reaction is very slow. Why?

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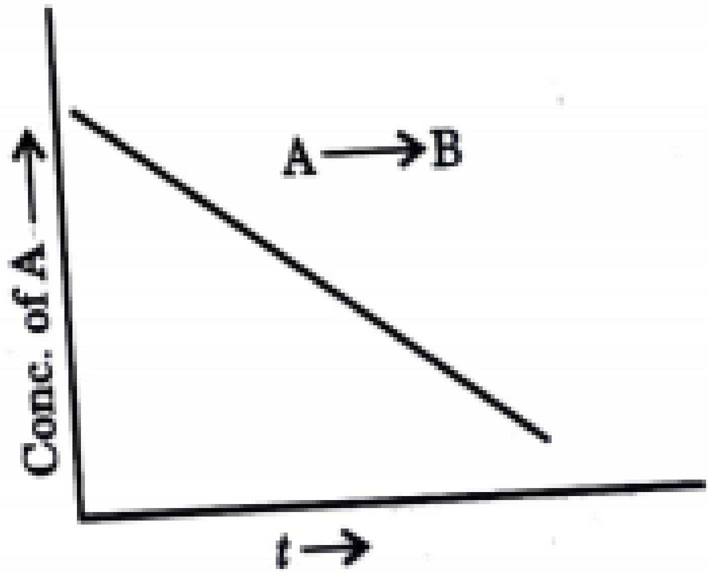
221. For a zero order reaction will the molecularity be equal to zero ?

Watch Video Solution

222. For a general reaction A $\rightarrow$ B, plot of concentration of A vs time is given in figure below. Answer the following question on the basis of this graph.



What is the order of the reaction?

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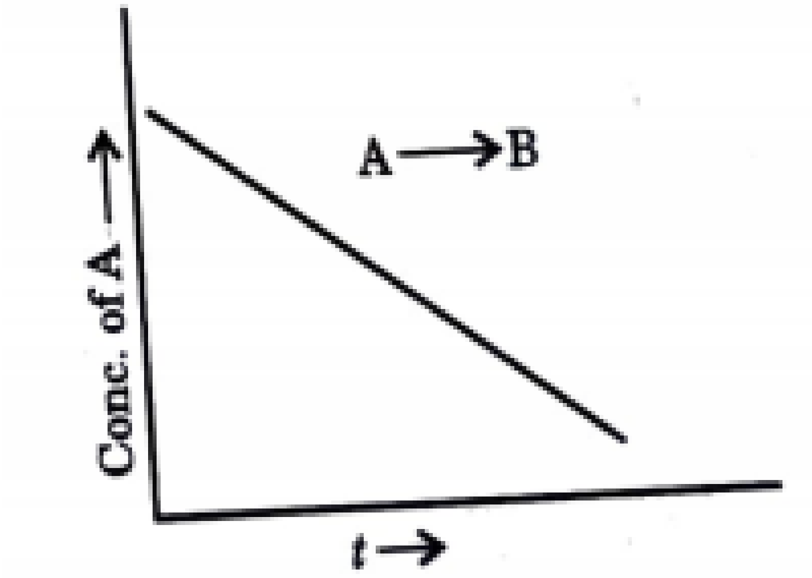
223. For a general reaction A $\rightarrow$ B, plot of concentration of A vs time is given in figure below. Answer the following question on the basis of this graph.



What is the slope of the curve?

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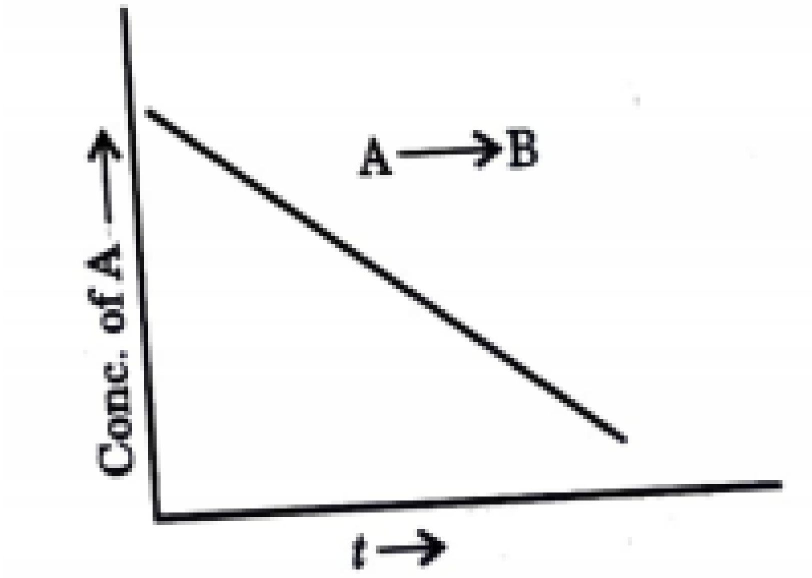
224. For a general reaction A $\rightarrow$ B, plot of concentration of A vs time is given in figure below. Answer the following question on the basis of this graph.



What are the units of rate constant?

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225. The reaction between $H_2(g)$ and $O_2(g)$ is highly feasible yet allowing the gases to stand at room temperature in the same vessel does not lead to the formation of water. Explain.

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226. Why does the rate of a reaction increase with rise in temperature?

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227. Oxygen is available in plenty in air yet fuels do not burn by themselves at room temperature. Explain.

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228. Explain why reactions with molecularity of three or more are rare ?

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229. Define rate of a reaction.

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230. Thermodynamic feasibility of the reaction alone cannot decide the rate of the reaction. Explain with the help of one example .

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231. Why in the redox titration of $KMnO_4$ vs oxalic acid, we heat oxalic acid solution before starting the titration ?

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232. Why can't molecularity of any reaction be equal to zero?

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233. Why molecularity is applicable only for elementary reactions and order is applicable for elementary as well as complex reactions?

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234. Why can we not determine the order of a reaction by taking into consideration the balanced chemical equation?

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235. Derive the rate law expression for the reaction: $2P + Q \rightarrow$ Products if the first step is the reversible dimerization of P, followed reaction of P_2 with Q in a bimolecular rate controlling step. Assume that the equilibrium concentration of P_2 is very small as compared to [P].

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236. The $t_{1/2}$ of a reaction is halved as the initial concentration' the reactant is doubled. What is the order of the reaction?

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237. For a zero order reaction, starting with initial concentration C_0, how long will it take for the reaction to go to completion ?

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238. The probable mechanism for the reaction : $Hg_2^{2+} + TI^{3+} \rightarrow 2Hg^{2+} + TI^{+}$

$Hg_2^{2+} \overset{K}{\longleftrightarrow} Hg^{2+} + Hg$

$Hg + TI^{3+} \overset{k'}{\longrightarrow} Hg^{2+} + TI^{+}$ is Derive the rate law.

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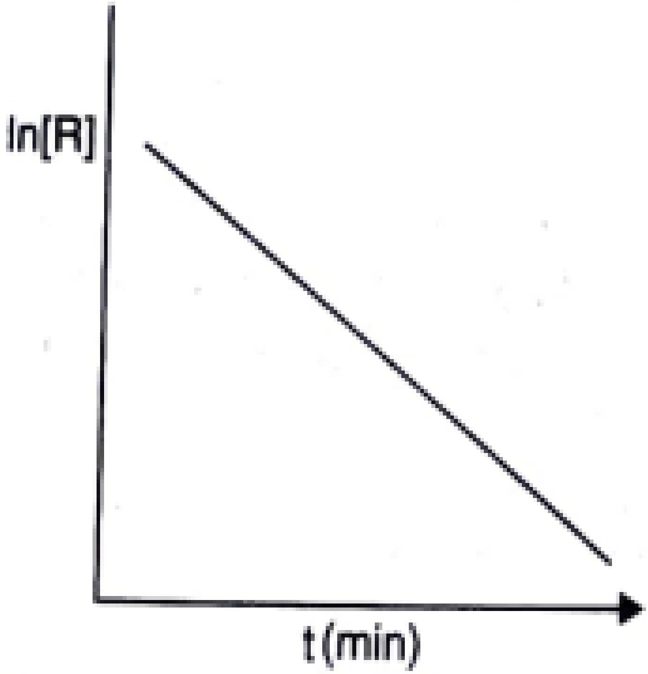
239. For a certain chemical reaction, Variation in the concentration, In[R] vs time (min) plot is shown below:



For this reaction :What is the order of the reaction ?

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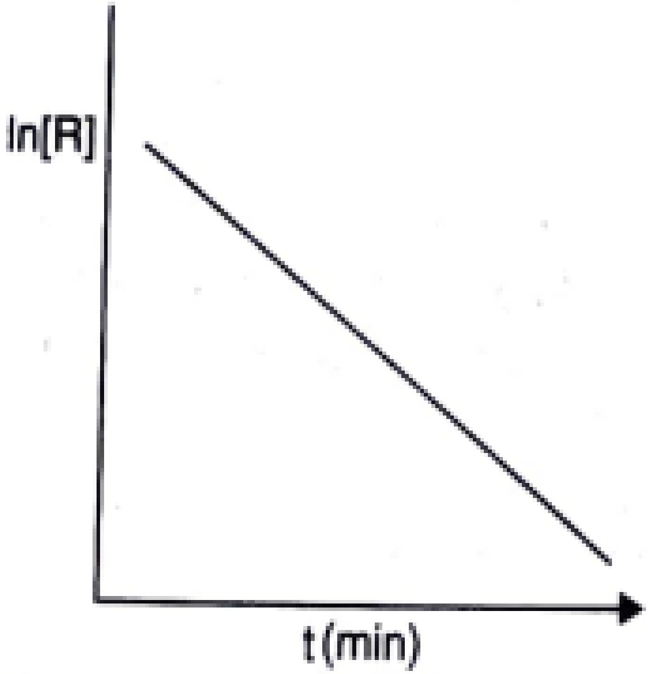
240. For a certain chemical reaction, Variation in the concentration, In[R] vs time (min) plot is shown below:



For this reaction : What are the units of rate constant, k for this reaction ?

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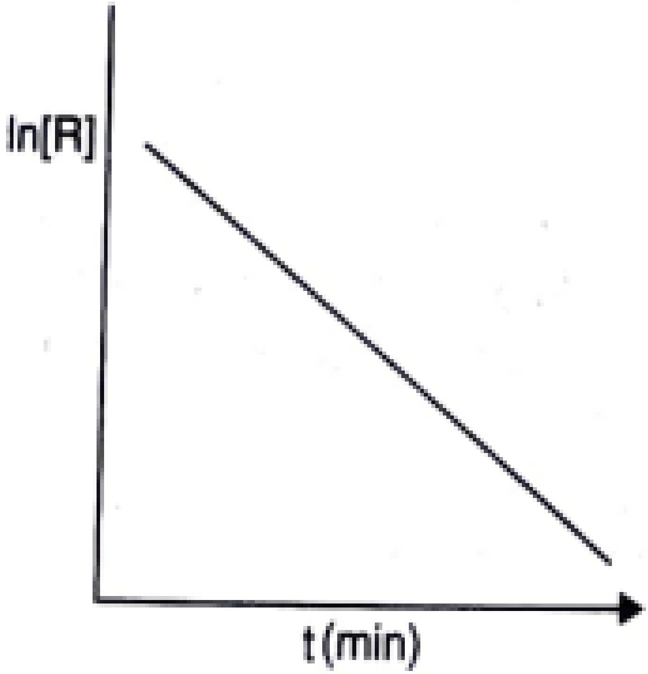
241. For a certain chemical reaction, Variation in the concentration, In[R] vs time (min) plot is shown below:



For this reaction : Give the relationship between k and $t_{1/2}$ of the reaction.

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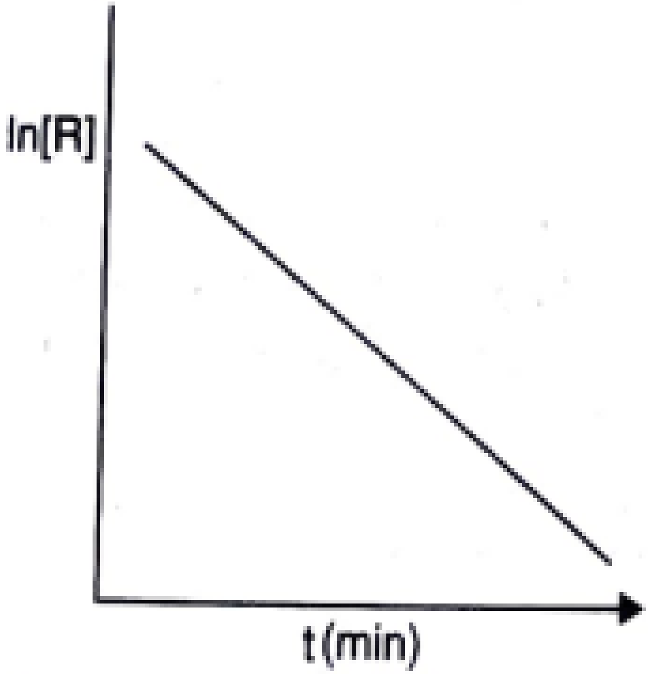
242. For a certain chemical reaction, Variation in the concentration, In[R] vs time (min) plot is shown below:



For this reaction : If initial concentration for this reaction becomes half, how will $t_{1/2}$ vary?

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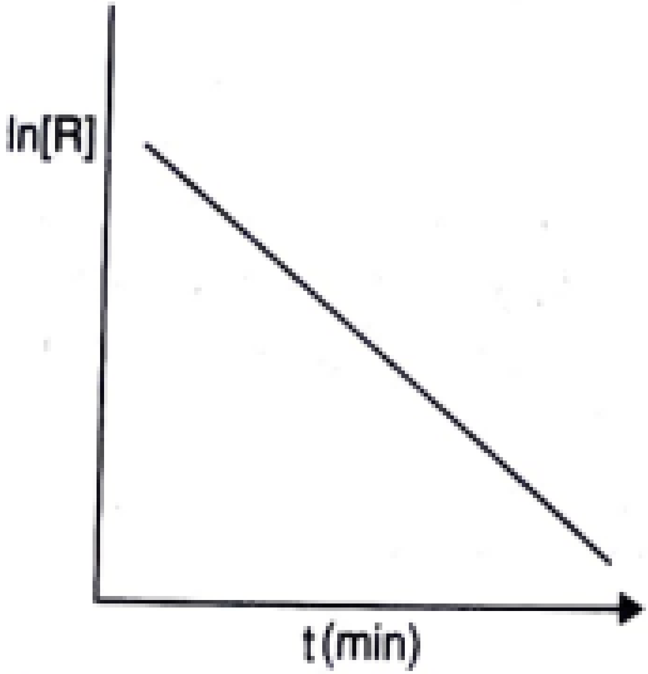
243. For a certain chemical reaction, Variation in the concentration, In[R] vs time (min) plot is shown below:



For this reaction : What does the slope of this line indicate?

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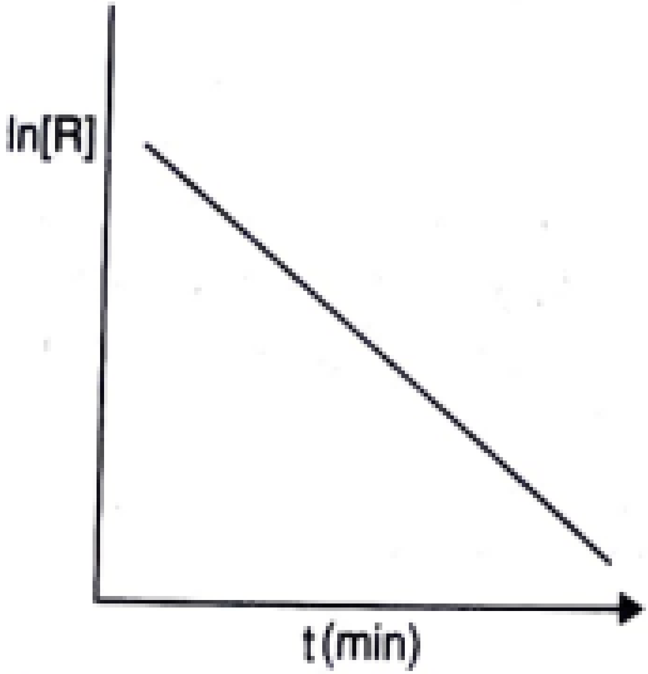
244. For a certain chemical reaction, Variation in the concentration, In[R] vs time (min) plot is shown below:



For this reaction : Draw the plot of log $[R]_0 / [R]$ vs time (s) .

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245. The rate of decomposition of ammonia is found to depend upon the concentration of ammonia as : $-\frac{d[NH_3]}{dt} = \frac{k_1[NH_3]}{1 + k_2[NH_3]}$ what will be the order of reaction when : concentration of NH_3 is very high ?

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246. The rate of decomposition of ammonia is found to depend upon the concentration of ammonia as : $-\frac{d[NH_3]}{dt} = \frac{k_1[NH_3]}{1+k_2[NH_3]}$ what will be the order of reaction when : concentration of ammonia is very low ?

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247. For a reaction $A \xrightarrow{k}$ product, the reaction occurs as : $A \xrightarrow{k_1} A^* \xrightarrow{k_2} B^* \xrightarrow{k_3}$ product

The overall rate constant k is given as: $k = 2k_1\left(\frac{k_2}{k_3}\right)^{2/3}$

If E_{a1}, E_{a2} and E_{a3} are the activation energies of these steps, then what is the relation between overall activation energy E_a and the activation energies of these steps.

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248. For a reversible reaction $H_2(g) + I_2(g) \underset{k_2}{\overset{k_1}{\longleftrightarrow}} 2HI$ derive an expression for the formation of HI.

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249. The decomposition of N_2O_5 according to the equation, $2N_2O_5(g) \leftrightarrow 4NO_2(g) + O_2(g)$ is a first order reaction. After 30 min from the start of the decomposition in a closed vessel, the total pressure developed is found to be 284.5 mm of Hg and on complete decomposition, the total pressure is 584.5 mm of Hg. Calculate the rate constant of the reaction.

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250. The half life for the reaction: $N_2O_5 \rightarrow 2NO_2 + \frac{1}{2}O_2$ is 2.4 hours at $30^\circ C$ Starting with 100 g of N_2O_5 , how many grams wil remain after a period of 9.6 hours ?

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251. The half life for the reaction: $N_2O_5 \rightarrow 2NO_2 + \frac{1}{2}O_2$ is 2.4 hours at $30^\circ C$ What time would be required to reduce 5×10^{10} molecules of

N_2O_5 to 10^8 molecules ?

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252. A piece of wood from an archaeological source has a ^{14}C activity which Is 60% of the activity found in fresh wood today. Calculate the age of the archaeological sample (the half life period of C-14 is 5770 years).

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253. What is the maximum number of electrons an L shell of the atom can accommodate ?

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254. The β- activity of a sample of CO_2 prepared from a contemporary wood gave a count rate 25.5 counts per minute (c.p.m). The same mass of CO_2 from an ancient wooden statue gave a count rate of 20.5 c.p.m. in the same counter conditions. Calculate its age to the nearest 50 years taking $t_{1/2}$ for ^{14}C as 5770 years. What would be the expected count rate of an identical mass of CO_2 from a sample which is 4000 years old ?

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EXERCISE

1. How can we express the rates of following reactions in terms of concentration of reactants and products ?

$2O_3 \leftrightarrow 3O_2$

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2. How can we express the rates of following reactions in terms of concentration of reactants and products ?

$2NO + Br_2 \leftrightarrow 2NOBr$

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3. How can we express the rates of following reactions in terms of concentration of reactants and products ?

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

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4. For the reaction, $N_2 + 3H_2 \rightarrow 2NH_3$ the rate of reaction measured as $\frac{\Delta[NH_3]}{\Delta t}$ was found to be $2.4 \times 10^{-4} mol L^{-1} s^{-1}$. Calculate the rate of reaction expressed in terms of (i) N_2 and (ii) H_2.

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5. For the reaction : $2N_2O_5 \rightarrow 4NO_2 + O_2$ the rate of reaction measured as $\frac{\Delta[NO_2]}{\Delta t}$ was found to be $1 \times 10^{-3} mol L^{-1} s^{-1}$. Calculate rate of reaction expressed in terms of N_2O_5 .

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6. A reaction, $3X \rightarrow 2Y + Z$ proceeds in a closed vessel. The rate of disappearance of X, $-\Delta[X]/\Delta t$ is found to be 0.072 mol $L^{-1}s^{-1}$. Calculate : $\frac{\Delta[Y]}{\Delta t}$ and $\frac{\Delta[Z]}{\Delta t}$

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7. Consider the reaction: $4NO_2(g) + O_2(g) \rightarrow 2N_2O_5(g)$ In an experiment, rate of reaction of O_2 is 0.024 mol $L^{-1}s^{-1}$. Calculate (i) the rate disappearance of NO_2 and (ii) rate of formation of N_2O_5.

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8. Explain with examples the meaning of the terms average rate and instantaneous rate of the reaction.

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9. A reaction $3X \rightarrow 2Y + Z$ procees in a closed vessel. The rate of disappearance of X is found to be 0.072 mol $L^{-1}s^{-1}$. Calculate the rate of appearance of Y.

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10. The rate of formation of a Second order dimerisation reaction is $5.8 \times 10^{-4} molL^{-1}s^{-1}$ at 0.01 mol L^{-1} monomer concentration. Calculate the rate constant.

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11. The gas phase decomposition of $COCl_2$, $COCl_2(g) \rightarrow CO(g) + Cl_2(g)$ follows the rate law : rate = $k[COCl_2]^{3/2}$ What are the units of its rate constant ?

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12. Identify the reaction order for each of the following rate constants -

$k = 7.6 \times 10^{-4} molliter^{-1} s^{-1}$

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13. Identify the reaction order for each of the following rate constants -

$k = 5.6 \times 10^{-3} mol^{-1} liters^{-1}$

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14. Identify the reaction order for each of the following rate constants -

$k = 7.1 \times 10^{-5} s^{-1}$

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15. Identify the reaction order for each of the following rate constants -

$k = 1.25 \times 10^{-2} mol^{-2} liter^2 s^{-1}$

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16. Identify the reaction order for each of the following rate constants -

$k = 5.0 \times 10^{-6} atm^{-1} s^{-1}$

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17. For a reaction: $A + B \rightarrow$ Products, the rate is given as $k[A]^{1/3}[B]^{2}$.

What are the units of its rate Constant ?

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18. The rate law for a reaction is found to be : Rate = $k\left[NO_2^- [I^-][H^+]^2\right.$

How would the rate of reaction change when concentration of I^- is halved ?

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19. The rate law for a reaction is found to be : Rate = $k\left[NO_2^-[I^-][H^+]^2\right.$

How would the rate of reaction change when concentration of H^+ is doubled ?

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20. The rate law for a reaction is found to be : Rate = $k\left[NO_2^-[I^-][H^+]^2\right.$

How would the rate of reaction change when concentration of each of NO_2^-, I^- and H^+ are tripled ?

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21. For the reaction : $2A \rightarrow A_2$, the rate of reaction becomes 27 times When the Concentration of A is increased three times. What is the order of the reaction ?

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22. For a reaction $X \to Y$, the rate of reaction increases by a factor of 1.857 when the concentration of x is increase by 1.5 times. What is the order of reaction with respect of X ?

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23. The decomposition of N_2O_5 in carbon tetrachloride solution has been found to be first order with respect to N_2O_5 with rate constant, $k - 6.2 \times 10^{-4} s6 - 1$

$N_2O_5(G) \to 2NO_2(g) + \frac{1}{2}O_2(g)$

Calculate the rate of reaction when

$[N_2O_5] = 2.50 mol L^{-1}$

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24. The decomposition of N_2O_5 in carbon tetrachloride Solution has been found to be first order With respect toN_2O_5 with rate constant,

$k = 6.2 \times 10^{-4} s^{-1}$ $N_2O_5(solution) \rightarrow 2NO_2(solution) + 1/2O_2(g)$

Calculate the rate of the reaction when $[N_2O_5] = 0.50 mol L^{-1}$

Watch Video Solution

25. The decomposition of N_2O_5 in carbon tetrachloride solution has been found to be first order with respect to N_2O_5 with rate constant, $k = 6.2 \times 10^{-4} s^{-1}$

$N_2O_5(G) \rightarrow 2NO_2(g) + \frac{1}{2}O_2(g)$

What concentration of N_2O_5 would give a rate of $4.2 \times 10^{-3} mol L^{-1} s^{-1}$?

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26. The rate of a reaction : $2A + B \rightarrow A_2B$ has the rate law : rate $=k[A]^2$ with rate constant equal to 0.50 $mol L^{-1} s^{-1}$. Calculate the rate of the reaction When [A] = 0.60 $mol L^{-1}$ [B] = 0.05 $mol L^{-1}$

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27. The rate of a reaction $2A + B \rightarrow A_2B$.

has rate law : rate = k $[A]^2$ with the rate constant equal to 0.50 mol^{-1} L $\sec^{-1}$. Calculate the rate of reaction when

(i) [A] = 0.60 mol L^{-1}, [B] =-0.05 mol L^{-1} and

(ii) When concentration of A and B have been reduced to 1/4 th

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28. During the decomposition of N_2O_5 dissolved in carbon tetrachloride at 303 K, the following results were obtained :

Time (min)	0	40	80	120	160	∞
Vol. of O_2 collected (cc)	0	15.6	28.6	38.6	46.8	84.6

Show that the reaction is of first order. Also calculate the rate constant.

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29. Diazobenzene chloride decomposes as : $C_6H_5N_2Cl \rightarrow C_6H_5Cl + N_2$

The volume of N 2 evolved at different times was measured and following results were obtained :

Time (min)	0	20	70	∞
Vol. of N_2 (ml)	0	10	33	162

Calculate the (i) order of the reaction and (ii) rate constant.

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30. The rate constant for the decomposition of N_2O_5 is $6.0 \times 10^{-4}s^{-1}$. At what time will the initial concentration of 1 M be reduced to 0.2 M if the reaction is of first order ?

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31. What are the benefits of taking vitamin C in the diet?

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32. Fill in the blanks- ________ helps in the absorption of iron in the body and helps to heal wound.

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33. Fill in the blanks- _______is also known as ascorbic acid and is found in citrus fruits.

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34. The following rate data were obtained for the reaction : $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

Experiment	Concentration (mol L^{-1}) [NO]	[O_2]	Rate of reaction mol L^{-1} s^{-1}
I	0.30	0.30	0.096
II	0.60	0.30	0.384
III	0.30	0.60	0.192
IV	0.60	0.60	0.768

Determine the rate law expression and order of the reaction.

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35. For the reaction : $2NO(g) + Cl_2(g) \rightarrow 2NOCl(g)$ the following data were collected. All the measurements were taken at 263 K.

Experiment No	Initial [NO] (M)	Initial $[Cl_2]$(M)	Initial rate of disappearance of Cl_2 (M/min)
1	0.15	0.15	0.60
2	0.15	0.30	1.20
3	0.30	0.15	2.40
4	0.25	0.25	?

Write the expression for rate law.

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36. For the reaction : $2NO(g) + Cl_2(g) \rightarrow 2NOCl(g)$ the following data were collected. All the measurements were taken at 263 K.

Experiment No	Initial [NO] (M)	Initial $[Cl_2]$(M)	Initial rate of disappearance of Cl_2 (M/min)
1	0.15	0.15	0.60
2	0.15	0.30	1.20
3	0.30	0.15	2.40
4	0.25	0.25	?

Calculate the value of rate constant and specify its units .

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37. For the reaction : $2NO(g) + Cl_2(g) \rightarrow 2NOCl(g)$ the following data were collected. All the measurements were taken at 263 K.

Experiment No	Initial [NO] (M)	Initial $[Cl_2]$(M)	Initial rate of disappearance of Cl_2 (M/min)
1	0.15	0.15	0.60
2	0.15	0.30	1.20
3	0.30	0.15	2.40
4	0.25	0.25	?

What is initial rate of disappearance of Cl_2 in exp.4 ?

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38. Fill in the blanks in the following table which treats a reaction of a compound A with a compound B, that is the first order with respect to A and zero order with respect to B.

Experiment	[A] mol L^{-1}	[B] mol L^{-1}	Initial rate
I	0.1	0.1	2.0×10^{-2} mol L^{-1} min^{-1}
II	—	0.2	4.0×10^{-2} mol L^{-1} min^{-1}
III	0.4	0.4	—
IV	—	0.2	2.0×10^{-2} mol L^{-1} min^{-1}

In a reaction between A and B, the initial rate of reaction was measu

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39. In a reaction between A and B, the initial rate of reaction was measured for the ferent initial concentrations of A and B as given below :

A (M)	0.20	0.20	0.40
B (M)	0.30	0.10	0.05
$r_0 (Ms^{-1})$	5.07×10^{-5}	5.07×10^{-5}	1.43×10^{-4}

What is the order of reaction with respect to A and B ?

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40. In a hydrolysis reaction, 5g ethyl acetate is hydr olyzed in presence of dilute HCl in 300 minutes. If the reaction 15 of first order and the initial concentration of ethyl acetate 18 22 g/L, calculate the rate constant of the reaction.

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41. A first order reaction is 20% complete in 10 minutes. Calculate the time taken for the reaction to go to 80% completion.

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42. A first order reaction takes 40 min for 30% completion. Calculate $t_{\frac{1}{2}}$.

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43. 50 % of first order reaction gets completed in 16 minutes. What fraction of the reaction would occur in 32 minutes :

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44. The three fourth of a first order reaction is completed in 32 minutes. What is the half-life period of the reaction ?

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45. The half life period for a reaction of first order is 2.31×10^3 min. How long will it take for $\frac{1}{5^{th}}$ of the reactants to be left behind.

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46. A reaction is first order with vosbect to reactant P having rate constant 6 min^{-1}. If we start with [P] = 0.5 mol L^{-1}, when would [P] reach the value of 0.05 mol L^{-1}? Calculate half life period of the reaction

.

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47. For a first order reaction, half life period $\left(t_{1/2}\right)$ is 100 seconds. How long will it take for the reaction to complete 75%?

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48. The rate constant for a first order reaction is $80s^{-1}$. How much time will it take to reduce the concentration of the reactants to $\frac{1}{18^{th}}$ of Its initial value ?

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49. The pressure of a gas decomoposing at the surface of a solid catalyst has been measured at different times and the results are given below :

$t(s)$	0	100	200	300
$p(Pa)$	4.00×10^3	3.50×10^3	3.00×10^3	2.5×10^3

Determine the order of reaction, its rate constant and half life period.

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50. The half life period of a substance is 60 min at a certain initial concentration. When the concentration is reduced to one half of the initial concentration, the half life period is found to be 30 min. Calculate the order of the reaction.

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51. The thermal decomposition of a compound is first order. If 50 % of the. compound is decomposed in 120 minutes, how long will it take for 90 %

of this compound decompose?

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52. A first order reaction takes 69.3 minutes for 50% completion. Calculate the time required for 80% completion of the reaction.

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53. The rate of a reaction increases four times when the temperature changes from 300 K to 320 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature $\left(R = 8.314 JK^{-1} mol^{-1}\right)$.

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54. The reaction, $2NO_2 \rightarrow 2NO + O_2$ has an activation energy of 110 kJ mol^{-1}. At $400^{\circ} C$, the rate constant is 7.8 $mol^{-1} Ls^{-1}$. What is the value of rate constant at $430^\circ C$?

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55. Calculate the mass of of 1 mole of each one of the following : FeSO4.7H2O

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56. Calculate the mass of of 1 mole of each one of the following : Na2O2

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57. Write the electronic configuration of an element X whose atomic number is 12.

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58. Write the distribution of electrons in a nitrogen atom. (Atomic number of nitrogen = 7)

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59. What would be the electronic configuration of a positively charged sodium ion, Na+ ? What would be its atomic number ?

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60. The rate constant for a first order reaction becomes six times when the temperature is raised from 350 to 400 K. Calculate the activation energy for the reaction. (Gas constant $R = 8.314 JK^{-1} mol^{-1}$)

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61. The rate constant for a reaction is 1.6×10^{-5} and $6.36 \times 10^{-3} s^{-1}$ at 600 K and 700 K respectively. Calculate the activation energy for the reaction.

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62. Fill in the blanks- _________is used in killing moulds and fungi of plants.

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63. The rate constant of a reaction is $1.2 \times 10^{-3} \sec^{-1}$ at $30^{\circ} C$ and $2.1 \times 10^{-3} \sec^{-1}$ at $40^{\circ} C$. Calculate the energy of activation of the reaction.

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64. For the decomposition of ethyl iodide : $C_2H_5I \rightarrow C_2H_4 + HI$ the rate constants are $1.60 \times 10^{-5} s^{-1}$ and 6.36×10^{-3} at 600K and 700K respectively. Calculate the activation energy for the reaction .

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65. The specific rate constant for the combination of H_2 and I_2 to form HI $H_2 + I_2 \rightarrow 2HI$ is $2.34 \times 10^{-3} mol L^{-1} s^{-1}$ at 773K. Calculate the activation energy for the reaction.

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66. Rate constant, k of a reaction varies with temperature as: $\log k = Cons\tan t - \frac{E_a}{2.303RT}$ whereE_a is the activation energy. When a Graph is plotted for log k vs 1/T ,a straight line with a slope of -6670K is obtained. Calculate the energy of activation for this reaction. ($R = 8.314 J K^{-1} mol^{-1}$)

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67. The activation energy of a first order reaction at 300 K is 60 kJ mol^{-1}. In the Presence of a Catalyst, the activation energy gets lowered to 50 kJ mol^{-1} at 300 K. How many times the reaction rate changes in the Presence of a catalyst at the same temperature ?

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68. The decomposition of A into product has value of k as $4.5 \times 10^3 s^{-1}$ at 10°C and energy of activation 60 kJ mol^{-1}. At what temperature would k be $1.5 \times 10^4 s^{-1}$?

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69. True or False : The units of rate constant of a zero order reaction are same as the units of rate of a reaction.

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70. For first order reaction, rate constant

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71. Identify the order of a reaction if the units of its rate constant are : $L^{-1}mols^{-1}$

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72. True or False : The rate of a multistep reaction is determined by the fastest step in the sequence.

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73. True or False : For the second order reaction with respect to a reactant rate becomes 8 times when its concentration is tripled.

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74. True or False : The units of rate constant of a zero order reaction are same as the units of rate of a reaction.

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75. True or False : The half life Period for a first order reaction is independent of its initial Concentration.

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76. True or False : If $[A]_0$ is the initial concentration of a reactant following first order reaction, then after three half lives its concentration becomes $\frac{[A]_0}{3^2}$.

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77. Define molecularity of a reaction.

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78. True or False : Higher the activation energy of a reaction, faster is the reaction.

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79. The molecularity of a reaction can never be a fraction.

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80. True or False : For a first order reaction, plot of $\ln([A]_0/[A])$ versus time has a positive slope whose value is equal to the rate constant of the reaction.

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81. True or False : The time taken for 3/4 th of a first order reaction to complete is 1.5 times the half life period.

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82. For a first order reaction :

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83. Fill in the blanks- ________ is used in the hydrogenation of alkynes to alkenes.

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84. What is the composition of brass and what are its uses?

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85. Fill in the blanks- Bronze is made up of_______ and is used in ________________.

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86. ________ is an alloy used in making guns, pistols etc.

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87. The difference in energy between the energy of activated complex and the average energy of reactants is called ....

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88. The factor $e^{-Ea/RT}$ in Arrhenius equation is called............ factor.

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89. Fill in the blanks- Wool, cotton, silk is known as _________ fibres.

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90. The rate of a reaction when the concentration of each reactant is taken as unity is called.............

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91. Explain the concept of activation energy.

Watch Video Solution

92. Example for first order reaction.

Watch Video Solution

93. If the rate of reaction : $N_2 + 3H_2 \rightarrow 2NH_3$ measured as $\Delta[NH_3]/\Delta t$ was found to be $3.6 \times 10^{-4} mol L^{-1} s^{-1}$, then rate of reaction expressed as $\Delta[H_2]/\Delta t$ is ....

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94. The sum of powers to which concentration terms are raised in the rate law expression is called .... of the reaction.

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95. For a reaction : $A + B \rightarrow$ Products, the rate is given as $k[A]^{1/3}B^2$. The units of its rate constant are ....

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96. When the concentration of a reactant of a second order is tripled, then rate will become .... times.

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97. If half life period of a first order reaction is 32 min, then the time taken for concentration to be reduced to 1/16 th is ....

Watch Video Solution

98. If rate constant for a first order reaction has been found to be $2.31 \times 10^{-3}s^{-1}$, then its half life period is ....

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99. True or False : For a zero order reaction, plot of [A] vs t is a horizontal line.

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100. A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is: reduced to half ?

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101. Average life time is more/less than half life time for a first order reaction.

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102. For fast reactions, activation energy is low/high.

Watch Video Solution

103. The molecularity of hydrolysis of cane sugar is two/one.

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104. Increase in rate of reaction with rise in temperature is mainly due to increase in collision frequency/effective collisions.

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105. For an endothermic reaction, activation energy for the forward reaction is more/less than activation energy for the backward reaction.

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106. For exothermic reaction, E_a (forward) -E_a (backward) is +ve /-ve.

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107. For a second order reaction, when the concentration of the reactant is tripled rate becomes nine/eight times.

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108. The units of zero order reaction are $molL^{-1}s^{-1}$ / mol^-1 Ls^-1\` .

Watch Video Solution

109. Define half life period. Derive expression for half life period for 1st oder reaction.

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110. Can order of a reaction be fractional ? Give an example.

Watch Video Solution

111. The specific rate of a reaction is $6.2 \times 10^{-3} molL^{-1}s^{-1}$. What is the order of the reaction ?

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112. Is it possible for a reaction to have identical values for molecularity and order ?

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113. For a zero order reaction will the molecularity be equal to zero ?

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114. For a first order reaction, $k = 2.5 \times 10^{-4} s^{-1}$, what is the rate of reaction, when the initial concentration of the reactant is 0.1 mol L^{-1}?

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115. How is half life period of a first order reaction related to its rate constant ?

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116. What are the units of rate constant for a zero order and a first order reaction ?

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117. If k_1 and k_2 are rate constants at temperatures T_1 and T_2 respectively, then according to Arrhenius equation,

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118. The rate law for the reaction $CHCl_3(g) + Cl_2(g) \rightarrow CCl_4 + HCI$ is rate = $k[CHCl_3][Cl_2]^{1/2}$. What is the order of reaction ?

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119. What is the order of a reaction whose rate constant has same units as the rate of the reaction ?

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120. Can overall order of a reaction be negative? Explain.

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121. Define rate of a reaction.

Watch Video Solution

122. Give one example of zero order reaction.

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123. Which is the rate determining step of a reaction ?

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124. The temperature coefficient of a reaction is:

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125. In a reaction, $2A \rightarrow Products$, the concentration of A decreases from 0.5 mol L^(-1) to $0.4 mol L^{-1}$ in 10 minutes. Calculate the rate during this interval?

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126. The rate constant of a reaction is $3 \times 10^2 min^{-1}$. What is the order of reaction ?

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127. What is instantaneous rate of reaction?

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128. What is collision frequency?

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129. Is there any reaction for which the rate does not decreases with time?

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130. Express the rate of the following reaction in terms of disappearance of hydrogen in the following reaction : $3H_2(g) + N_2(g) \rightarrow 2NH_3(g)$

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131. The reaction: $A + 2B \rightarrow C$ obeys rate equation. Rate = $k[A]^{1/2}[B]^{3/2}$ What is the order of this reaction?

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132. Define order of a reaction.

Watch Video Solution

133. Define activation energy of a reaction.

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134. A first order reaction has a half life period of 34.65 seconds. Its rate constant is

A. $2 \times 10^{-2} s^{-1}$

B. $4 \times 10^{-4} s^{-1}$

C. $20 s^{-1}$

D. $2 \times 10^{-4} s^{-1}$

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135. If a graph is plotted between log k and 1/T the slope of the straight line so obtained is given by

A. $-\frac{E_a}{R}$

B. $-\frac{E_a}{2.303R}$

C. $-\frac{2.303}{E_a . R}$

D. $-\frac{E_a}{2.303}$

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136. Reactions with very low activation energies are generally

A. very slow

B. very fast

C. exothermic

D. endothermic

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137. Which of the following does not influence the reaction rate?

A. Nature of reactants

B. Conc. of reactants

C. Temperature of the reaction

D. Molecularity of the reaction.

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138. Unit of rate constant for zero order reaction is

A. $molL^{-1}s^{-1}$

B. s^{-1}

C. $Lmol^{-1}s^{-1}$

D. $L^2mol^{-2}s^{-1}$

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139. A catalyst :

A. increasing activation energy

B. decreasing activation energy

C. increasing reactant energy

D. decreasing threshold energy

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

A. $mol^{-1} litres^{-1}$

B. $mollitre^{-2} s^{-1}$

C. s^{-1}

D. $mollitre^{-1} s^{-1}$

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141. The value of k for a reaction is $2.96 \times 10^{30} s^{-1}$, what is the order of the reaction?

A. Zero

B. 3

C. 2

D. 1

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142. A reaction was found to be of second order with respect to concentration of carbon monoxide . If the concentration of carbon monoxide is doubled, the rate of reaction will :

A. triple

B. increase by a factor of 4

C. double

D. remain unchanged

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143. What is the unit of rate of reaction ?

A. $mol^{-1}Ls^{-1}$

B. $molLs^{-1}$

C. mol^2Ls^{-1}

D. $molL^{-1}s^{-1}$

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144. Half life period of a first order reaction is :

A. $t_{1/2} = 693/k$

B. $t_{1/2} = 0.693/k$

C. $t_{1/2} = 6.93/k$

D. None of these

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145. Calculate the half-life of a first order reaction from its rate constant which is

200 S^{-1}

A. $3.465 \times 10^{-2} s$

B. $3.465 \times 10^{-3} s$

C. $1.150 \times 10^{-2} s$

D. $1.150 \times 10^{-3} s$

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146. The change in any one of the reactants or products per unit time is called

A. order of a reaction

B. rate of a reaction

C. rate constant of a reaction

D. molecularity of a reaction

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147. The rate of a reaction is $1.209 \times 10^{-4} L^2 mol^{-2} s^{-1}$. The order of the reaction is :

A. zero

B. first

C. second

D. third

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148. A larger increase in reaction rate with small rise in temperature is due to

A. increase in number of activated molecules

B. increase in number of collisions

C. lowering of activation energy

D. shortening of mean free path

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149. Discuss the various factors affecting the rates of chemical reactions.

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150. What is meant by order of a chemical reaction ? The reaction : $2NO_2 + F_2 \rightarrow 2NO_2F$ has been found to be first order with respect to NO_2 and with respect to F_2. Write the rate law equation for the reaction.

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151. What is meant by order of a chemical reaction ? The reaction : $2NO_2 + F_2 \rightarrow 2NO_2F$ has been found to be first order with respect to NO_2 and with respect to F_2. What is the overall order of the reaction ?

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152. What is meant by order of a chemical reaction ? The reaction : $2NO_2 + F_2 \rightarrow 2NO_2F$ has been found to be first order with respect to NO_2 and with respect to F_2. Suggest a suitable mechanism for the reaction.

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153. Explain with examples the meaning of the terms average rate and instantaneous rate of the reaction.

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154. Consider the rate equation $Rate = k[A]^n$ What is the change of rate that occurs on doubling the concentration of A, when n=0 ?

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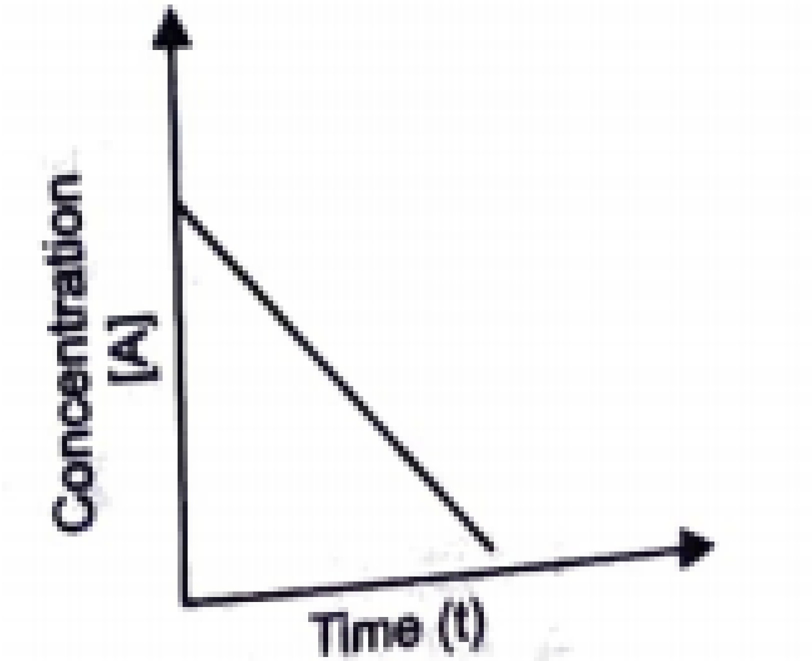
155. Consider the rate equation $Rate = k[A]^n$ What is the change of rate that occurs on doubling the concentration of A, when n=1 ?

Watch Video Solution

156. Consider the rate equation $Rate = k[A]^n$ What is the change of rate that occurs on doubling the concentration of A, when n =2 ?

Watch Video Solution

157. Consider the reaction $A \xrightarrow{k} P$. The change in concentration of A with time is shown in the following plot:



Predict the order of the reaction .

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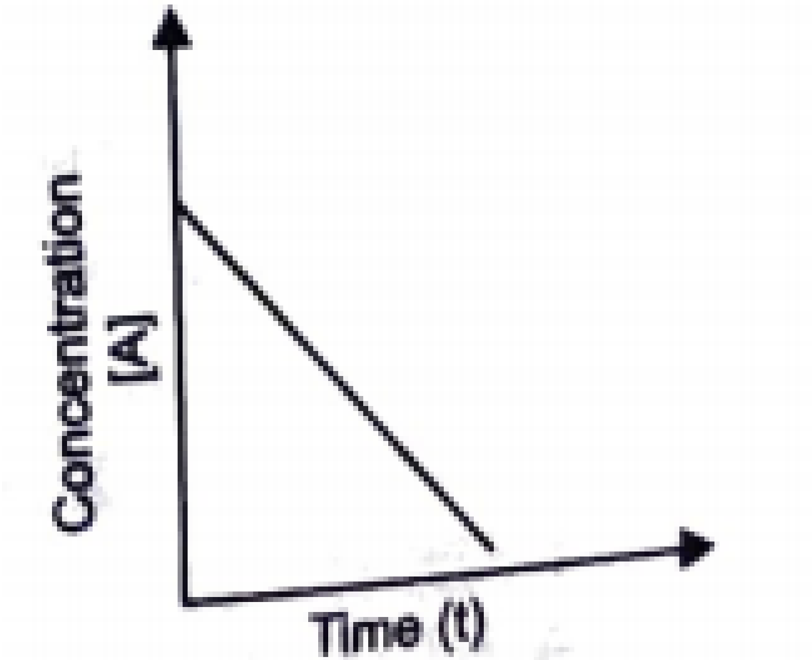
158. Consider the reaction $A \xrightarrow{k} P$. The change in concentration of A with time is shown in the following plot:



Derive the expression for the time required for the completion of the reaction.

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159. What is meant by the rate constant, 'k' of a reaction. If the concentration be expressed in mol L^{-1} units and time in seconds, what would be the units for k for a zero order reaction ?

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160. What is meant by the rate constant, 'k' of a reaction. If the concentration be expressed in mol L^{-1} units and time in seconds, what would be the units for k for a first order reaction ?

Watch Video Solution

161. Derive the following relation : $\log\frac{k_2}{k_1}=\frac{E_a}{2.303R}\left[\frac{T_2-T_1}{T_2T_1}\right]$

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162. Show that half life period for a zero order reaction is directly proportional to initial concentration of reactants.

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163. What is the effect of temperature on rate of a reaction.

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164. An element has 2 electrons in the M shell. What is the atomic number of the element ?

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165. Write the difference between molecularity and order of reaction?

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166. Define the following terms : Pseudo first order reaction.

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167. For Zero order reaction. The integrated rate equation is :

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168. What is the difference between instantaneous rate of a reaction and rate constant?

Watch Video Solution

169. Define activation energy of a reaction.

Watch Video Solution

170. How does the nature of a reactant affect the rate of a chemical reaction?

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171. Calculate two third life of a first order reaction having $k = 5.48 \times 10^{-14} s^{-1}$.

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172. A reaction is first order in A and second order in B.

Write the differential rate equation.

Watch Video Solution

173. A reaction is first order in A and second order in B

How is the rate affected on increasing the concentration of B three times

?

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174. Write the difference between molecularity and order of reaction?

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

Watch Video Solution

176. Example for first order reaction.

Watch Video Solution

177. State the order with respect to each reactant and overall order for the following reaction :

$H_2O_2 + 3I^- + 2H^+ \rightarrow 2H_2O + I_3^-(aq)$

Rate=$K[H_2O_2][I^-]$

What are the units of rate constant?

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178. Define molecularity of a reaction.

Watch Video Solution

179. Define activation energy of a reaction.

Watch Video Solution

180. Show that the time required for 99% completion of a first order reaction In twice the time required for the completion of 90%.

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181. What is difference between order of reaction and molecularity of reaction ?

Watch Video Solution

182. Define the following terms : Pseudo first order reaction.

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183. Define the following terms : Half life period of reaction $\left(t_{1/2}\right)$.

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184. Explain the following terms: Rate constant (k).

Watch Video Solution

185. Define the following terms : Half life period of reaction $\left(t_{1/2}\right)$.

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186. What are pseudochemical or pseudo-order reactions ? Give one example.

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187. The half life period of a zero order reaction is independent of initial concentration

Watch Video Solution

188. The reaction : $2A + B \to C + D$ has the rate equation as: rate = $k[A]^x[B]^y$ What is the molecularity of the reaction?

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189. The reaction : $2A + B \to C + D$ has the rate equation as: rate = $k[A]^x[B]^y$ Order of the reaction when B is present in large excess.

Watch Video Solution

190. Discuss the effect of catalyst on the activation energy.

Watch Video Solution

191. What is the value of integrated Rate reaction in zero order reaction ?

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192. Define order of a reaction

Watch Video Solution

193. For the reaction R $\rightarrow$ P, write the differential rate law.

Watch Video Solution

194. For the reaction R $\rightarrow$ P, rate becomes four times faster when the concentration of the reactant R is doubled at a given temperature. What is the order of reaction?

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195. Fill in the blanks- ________ alloy is formed by the mixing of 90% of copper and 10% of tin metal.

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196. What is activation energy? How is related to rate constant of a reaction?

Watch Video Solution

197. Which is the rate determining step of a reaction ?

Watch Video Solution

198. Give an example of a pseudo first order reaction.

Watch Video Solution

199. A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is: reduced to half ?

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200. Show that the time required for completion of 3/4th of a first order reaction ia twice the time required for the completion of 1/2 of the reaction.

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201. What is meant by zero order reaction? Give an example of such a reaction.

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202. What is half life of a reaction? If the half life of a first order reaction in A is 2 minutes, how long will it take to reach 25% of initial concentration?

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203. Define order of a reaction.

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204. Identify the reaction order of the following units of reaction rate constants.

$molL^{-1}s^{-1}$.

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205. Identify the reaction order of the following units of reaction rate constants.

$Lmol^{-1}s^{-1}$.

Watch Video Solution

206. Give an example of a pseudo first order reaction.

Watch Video Solution

207. A first order reaction takes 40 min for 30% completion. Calculate $t_{\frac{1}{2}}$.

Watch Video Solution

208. The half life period of a zero order reaction is independent of initial concentration

Watch Video Solution

209. For the reaction :

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{HI} C_6H_{12}O_6 + O_6H_{12}O_6$$

Write : (a) Rate of reaction expression.

(b) Molecularity of reaction

(c) Order of reaction

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210. For the reaction :

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{HI} C_6H_{12}O_6 + O_6H_{12}O_6$$

Write : (a) Rate of reaction expression.

(b) Molecularity of reaction

(c) Order of reaction

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211. Unit of rate constant for zero order reaction is

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212. Define half life period. Derive expression for half life period for 1st oder reaction.

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213. Give one example of zero order reaction.

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214. Derive the integrated rate equation for the rate constant for a first order reaction. What would be units of the first order rate constant, if the concentration is expressed in moles per litre and time to seconds ? Also give graphical representation of integrated rate law equation.

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215. Define average rate of a reaction.

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216. The molecularity of the reaction $2NO + O_2 \rightarrow 2NO_2$ is,

A. 5

B. 2

C. 3

D. 0

Watch Video Solution

217. Define rate of a reaction.

Watch Video Solution

218. What is the effect of temperature on rate of a reaction.

Watch Video Solution

219. First order reaction is found to have rate constant, $k = 5.5 \times 10^{-14} s^{-1}$. Find the half life to the reaction.

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220. Fill in the blanks- ________ alloy is made up of 95% of copper, 4% of tin, 1% of phosphorus.

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221. For a reaction at 500 K, $NO_2(g) + CO(g) \rightarrow CO_2(g) + NO(g)$ the proposed mechanism is as given below :

$NO_2(g) + NO_2(g) \rightarrow NO(g) + NO_3(g)$ (slow)

$NO_3(g) + CO(g) \rightarrow CO_2(g) + NO_2(g)$ (fast)

What is rate law for the reaction ?

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222. Find the half life time period for first order reaction.

Watch Video Solution

223. Discuss the various factors affecting the rates of chemical reactions.

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224. Define the following : Elementary reaction.

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225. Define rate of a reaction.

Watch Video Solution

226. Define order of a reaction.

Watch Video Solution

227. Explain the concept of activation energy.

Watch Video Solution

228. A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is: reduced to half ?

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229. Identify the order of a reaction if the units of its rate constant are :

$L^{-1} mol s^{-1}$

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230. Identify the order of a reaction if the units of its rate constant are :

$L mol^{-1} s^{-1}$.

Watch Video Solution

231. A reaction is of second order with respect to a reactant. How is its rate affected if the concentration of the reactant is doubled?

Watch Video Solution

232. For a reaction, $A + B \rightarrow$ Product, the rate law is given by, r = k [A]^(1/2) [B]^2. What is the order of the reaction?

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233. First order reaction is found to have rate constant, $k = 5.5 \times 10^{-14} s^{-1}$. Find the half life to the reaction.

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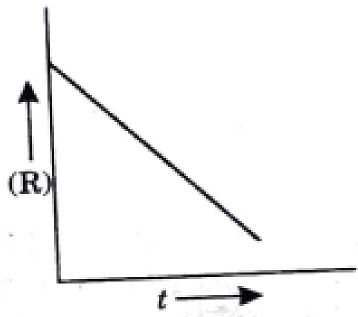
234. For a chemical reaction $R \rightarrow P$ the variation in the concentration (R) vs. time (t) plot is given as



Predict the order of the reaction.

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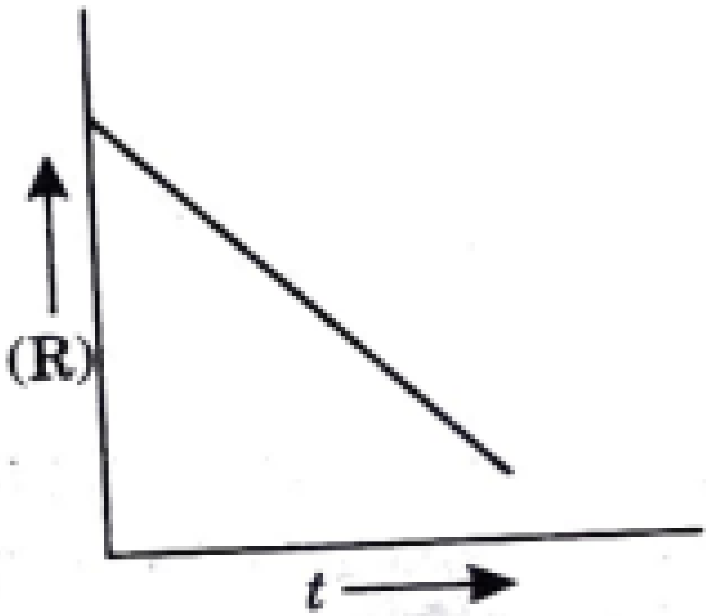
235. For a chemical reaction $R \rightarrow P$ the variation in the concentration (R) vs. time (t) plot is given as



What is the slope of the curve ?

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236. What is difference between order of reaction and molecularity of reaction ?

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237. A first order reaction has a rate constant $1.15 \times 10^{-3} s^{-1}$. How long will 5g of this reactant take to reduce to 3 g?

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238. Zero order reaction means that the rate of a reaction is independent of concentration of reactants. Write an example for a zero order reaction.

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239. Zero order reaction means that the rate of a reaction is independent of concentration of reactants. Write the integral rate expression for the zero order reaction, R $\rightarrow$ P.

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240. The temperature dependence of the rate of a chemical equation can be accurately explained by Arrhenius equation. With the help of Arrhenius equation, calculate the rate constant for the first order reaction: $C_2H_5I(g) \rightarrow C_2H_4(g) + HI(g)$ at 700 K. Energy of activation (E_a) for the reaction is 209 kJ mol^{-1} and rate constant at 600 K is $1.60 \times 10^{-5} s^{-1}$. Universal gas constant, R = 8.314 $JK^{-1}mol^{-1}$).

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241. Write down the unit of rate constant for zero order reaction.

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242. Give relationship between half life period and concentration for different order of reactions.

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243. Write the difference between molecularity and order of reaction?

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244. For a first order reaction, half life period $\left(t_{1/2}\right)$ is 100 seconds. How long will it take for the reaction to complete 75%?

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245. A reaction is first order in A and second order in B.

Write the differential rate equation.

Watch Video Solution

246. A reaction is first order in A and second order in B

How is the rate affected on increasing the concentration of B three times ?

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247. A reaction is second order in A and first order in B. How is the rate affected when the concentrations of both A and B are doubled ?

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248. A first order reaction takes 40 minutes for 30% decomposition. Calculate $t_{1/2}$ for this reaction. (Given log 1.428 = 0.1548)

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249. For a first order reaction, show that time required for 99% completion is twice the time required for the completion of 90% of reaction.

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250. Deduce the rate equation for a zero order reaction.

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251. The half life period for the decomposition of a compound is 20 min. If initial concentration is increased two times, its half life period becomes 10 min. Calculate the order of reaction.

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252. Define activation energy of a reaction.

Watch Video Solution

253. Show that in case of a first order reaction, the time taken for completion of 99.9% reaction is ten times the time required for half change of the reaction.

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254. Consider a general reaction $aA + bB \rightarrow cC + dD$. The rate expression for the reaction is : Rate =$k[A]^x[B]^y$ Establish the significance of '(a + b)â€™ and '(x + y)â€™ in terms of order and molecularity.

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255. Consider a general reaction $aA + bB \rightarrow cC + dD$. The rate expression for the reaction is : Rate =$k[A]^x[B]^y$ Write any two differences between order and molecularity.

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256. “Reactions with zero order is possible, but zero molecularity is not”. Justify the statement.

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257. The term ‘order and molecularity ' are common in chemical kinetics. What do you mean by order and molecularity?

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258. The term ‘order and molecularity ' are common in chemical kinetics. Write two factors influencing rate of a reaction.

Watch Video Solution

259. The term ‘order and molecularity ' are common in chemical kinetics. Write Arrhenius equation.

Watch Video Solution

260. Derive the integrated rate equation for the rate constant for a first order reaction. What would be units of the first order rate constant, if the concentration is expressed in moles per litre and time to seconds ? Also give graphical representation of integrated rate law equation.

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261. Differentiate between order and molecularity of a chemical reaction.

Watch Video Solution

262. For the hydrolysis of methyl acetate in aqueous solution, the following results were obtained:

t/s	0	30	60
$[CH_3COOCH_3]/mol\ L^{-1}$	0.60	0.30	0.15

Show that it follows pseudo first order reaction, as the concentration of water remains constant.

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263. For the hydrolysis of methyl acetate in aqueous solution, the following results were obtained:

t/s	0	30	60
$[CH_3COOCH_3]/\text{mol L}^{-1}$	0.60	0.30	0.15

Calculate the average rate of reaction between the time interval 30 to 60 seconds. (Given log 2 = 0.3010, log 4=0.6021)

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264. For a reaction: $A + B \rightarrow P$, the rate law is given as: Rate = $k[A][B]^2$

How is the rate of reaction affected when the concentration of B is doubled?

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265. For a reaction: $A + B \rightarrow P$, the rate law is given as: Rate = $k[A][B]^2$

What is the order of reaction if A is present in large excess.

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266. A first order reaction takes 30 minutes for 50 % completion. Calculate the time required for 90 % completion of the reaction.

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267. Explain the following terms : Rate of a reaction.

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268. Define activation energy of a reaction.

Watch Video Solution

269. The decomposition of phosphine, PH_3, proceeds according to the following equation : $4PH_3(g) \rightarrow P_4(g) + 6H_2(g)$ It is found that the reaction follows the following rate equation : Rate = $k[PH_3]$. The half-life of PH_3 is 37.9 s at 120° C. How much time is required for 3/4th of PH_3 to decompose?

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270. The decomposition of phosphine, PH_3, proceeds according to the following equation : $4PH_3(g) \rightarrow P_4(g) + 6H_2(g)$ It is found that the reaction follows the following rate equation : Rate = $k[PH_3]$. The half-life of PH_3 is 37.9 s at 120° C. What fraction of the original sample of PH_3 remains behind after 1 minute?

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271. Define order of a reaction

Watch Video Solution

272. Define molecularity of a reaction.

Watch Video Solution

273. The rate of a reaction increases four times when the temperature changes from 300 K to 320 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature $(R = 8.314 JK^{-1} mol^{-1})$.

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274. Explain the factors affecting rate of a reaction.

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275. The rate constant of a first order reaction increases from $4 \times 10^{-2} \rightarrow 8 \times 10^{-2}$ when the temperatur changes from $27^{\circ} C$ to $37^{\circ} C$. Calculate the energy of activation (Ea). $\log 2 = 0.301)$, $\log 3 = 0.4771$, $\log 4 = 0.6021$

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276. For a reaction: $A+B \rightarrow P$, the rate law is given as: Rate = $k[A][B]^2$

How is the rate of reaction affected when the concentration of B is doubled?

Watch Video Solution

277. For a reaction: $A+B \rightarrow P$, the rate law is given as: Rate = $k[A][B]^2$

What is the order of reaction if A is present in large excess.

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278. A first order reaction takes 23.1 minutes for 50% conmpletion. Calculate the time required for 75% completion of this reaction $(\log 2 = 0.301)$, $(\log 3 = 0.4771)(\log 4 = 0.6021)$

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279. The decomposition of sulphuryl chloride to SO_2 and Cl_2 is a first order reaction whose half life is 30 minutes. What percentage of the reactant will be decomposed in 2 hours ?

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280. The activation energy of a first order reaction at 300 K is 60 kJ mol^{-1}. In the Presence of a Catalyst, the activation energy gets lowered to 50 kJ mol^{-1} at 300 K. How many times the reaction rate changes in the Presence of a catalyst at the same temperature ?

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281. The rate constant for a first order reaction is 5.70×10^{-5} and $1.64 \times 10^{-4} s^{-1}$ at $25^{\circ} C$ and $40^{\circ} C$ respectively. Calculate the activation energy and the Arrhenius frequency factor.

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282. A first order reaction has $k = 1.5 \times 10^{-6} s^{-1}$ at $200^{\circ} C$. If the reaction is allowed to run for 10 hours, what percentage of the initial concentration would have changed into the product ? What is the half life period of the reaction ?

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283. A first order reaction is 20% complete in 10 minutes. Calculate the time taken for the reaction to go to 75% complete.

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284. A first order reaction is 20 % complete in 10 minutes. Calculate Specific rate constant of the reaction

Watch Video Solution

285. The rate constants for the decomposition of HI at $283^\circ C$ and $508^\circ C$ are 3.517×10^{-7} and 3.954×10^{-2} respectively. Calculate the frequency factor at $283^\circ C$ and energy of activation of the reaction.

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286. The catalytic decomposition of hydrogen peroxide was studied by liberating it at different intervals with $KMnO_4$ solution. Calculate the rate constant from the following data assuming the reaction to be of the first order :

t (seconds)	0	600	1200
$KMnO_4$ (mL)	22.8	13.8	8.2

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287. What is the maximum number of electrons which can be accommodated in the K shell of an atom ?

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288. A first order reaction is 15% complete in 20 minutes. How long will it take to complete 60% ? (log 1.1766 = 0.0705. log 2.6 = 0.3979).

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289. A first order reaction is 40%. Complete in 50 minute. How long will it take to 80% complete.

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290. In a hydrolysis reaction, 5g ethyl acetate is hydr olyzed in presence of dilute HCl in 300 minutes. If the reaction 15 of first order and the initial concentration of ethyl acetate 18 22 g/L, calculate the rate constant of the reaction.

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291. A first order reaction is 15% complete in 20 minutes. How long will it take to complete 20%.

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292. The half life period for a reaction of first order is 2.31×10^3 min. How long will it take for $\frac{1}{5^{th}}$ of the reactants to be left behind.

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293. The half life period of a first order reaction is 3 minutes. Calculate the time taken to complete 75% of the initial concentration.

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

Experiment	Time/s^{-1}	Total Pressure/atm
1	0	0.4
2	100	0.7

Calculate the rate constant. (Given : log 4 = 0.6021, log 2 = 0.3010)

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295. A first order reaction is 75% complete in 60 min. Find the half-life of the reaction.

Watch Video Solution

296. A first order reaction takes 40 minutes for 20% completion. Calculate its half life period.

Watch Video Solution

297. For a first-order reaction, it takes 5 minutes for the initial concentration of 0.6 mol L^{-1} to become 0.4 mol L^{-1}. How long will it take for the initial concentration to become 0.3 molL^{-1}?

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298. What is the maximum number of electrons which can be accommodated in the innermost shell of an atom ?

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299. Ramanâ€™s mother was trying again and again to burn a big lump of coal. But it was not catching fire easily. Raman suggested her mother to break the big lump of coal into small pieces and then burn it. His mother did so and she was happy to find that the coal pieces started burning rapidly. Now answer the following question : What was the idea behind Ramanâ€™s suggestion ?

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300. What is the maximum number of electrons an M shell of the atom can accommodate ?

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301. If the concentration be expressed in mol L^{-1} units and time in seconds, what would be units for rate constant, k for a first order reaction?

A. $mollitre^{-1}s^{-1}$

B. $mol^{-1}litres^{-1}$

C. s^{-1}

D. $mol^2litre^{-2}s^{-1}$

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302. The half-life period for a first order reaction is 69.3 s. Its rate constant is:

A. $10^{-2}s^{-1}$

B. $10^{-4}s^{-1}$

C. $10s^{-1}$

D. $10^{2}s^{-1}$

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

A. $litremol^{-1}s^{-1}$

B. $mollitre^{-2}s^{-1}$

C. s^{-1}

D. $mollitre^{-1}s^{-1}$

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304. Half life period of a first order reaction is :

A. directly proportional to the initial concentration of the reactant

B. half of the rate constant

C. same for all reactions

D. independent of initial concentration of reactants.

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305. For the reaction, A $\rightarrow$ C , it is found that the rate of the reaction quadruples when the concentration of A is doubled. The rate for the reaction is. Rate = $[A]^n$ where the value of n is :

A. 1

B. 2

C. zero

D. 3

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306. For a chemical reaction $A + B \rightarrow C$, the following data were found :

Initial conc. of A (mol litre^{-1})	Initial Conc. of B (mol litre^{-1})	Rate (mol litre^{-1} sec^{-1})
2.0	3.0	0.10
6.0	3.0	0.90
6.0	6.0	0.90

The correct rate expression from these data is :

A. $r = k[A]^2[B]^2$

B. $r = k[A][B]$

C. $r = k[A]^2$

D. $r = k[A][B]^2$

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307. On increasing temparature of the reacting system by 10 degrees, the rate of reaction almost doubles. The most appropriate reason for this is :

A. Collision frequency increases

B. Activation energy decreases by increase in temperature

C. The fraction of molecules having energy equal to threshold energy or more increases

D. The value of threshold energy decreases.

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308. The rate of a first order reaction is $1.8 \times 10^{-3} mol L^{-1} min^{-1}$ when the initial concentration is 0.3 mol L^{-1}. The rate constant in the units of second is :

A. $1 \times 10^{-2} s^{-1}$

B. $1 \times 10^{-4} s^{-1}$

C. $6 \times 10^{-2} s^{-1}$

D. $6 \times 10^{-2} s$

Watch Video Solution

309. The rate for the first order reaction is $0.69 \times 10^{-2} mol L^{-1} min^{-1}$ and the initial concentration is 0.2 mol L^{-1}. The half life period is :

A. 1205 s

B. 330 s

C. 600 s

D. 1 s .

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310. For the first order reaction, the half life period is (if k is rate constant and a is initial concentration),

A. $\frac{\ln 2}{k}$

B. $\frac{1}{ka}$

C. $\frac{\ln k}{2}$

D. $\frac{\log k}{2}$

Watch Video Solution

311. If k_1 and k_2 are rate constants at temperatures T_1 and T_2 respectively, then according to Arrhenius equation,

A. $\log\frac{k_2}{k_1}=\frac{2.303R}{E_a}\left(\frac{1}{T_1}-\frac{1}{T_2}\right)$

B. $\log\frac{k_2}{k_1}=\frac{E_a}{2.303R}\left(\frac{1}{T_1}-\frac{1}{T_2}\right)$

C. $\log\frac{k_1}{k_2}=\frac{E_a}{2.303R}\left(\frac{1}{T_1}-\frac{1}{T_2}\right)$

D. $\log\frac{k_1}{k_2}=\frac{E_a}{2.303}\left(\frac{1}{T_1}-\frac{1}{T_2}\right)$

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312. The rate constant of a reaction is $1.2\times10^{-5}mol^{-2}\text{litre}^2s^{-1}$. The order of the reaction is:

A. Zero

B. 1

C. 2

D. 3

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313. The following rate data were obtained at 303 K for the following reaction : $2A + B \rightarrow C + D$

Experiment	[A]	[B]	Initial rate of formation of D
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.2×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.4×10^{-2}

The order of the reaction is :

A. 2

B. 3

C. 1

D. 4

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314. For a reaction $X \rightarrow Y$, the rate of reaction increases by a factor of 1.857 when the concentration of x is increase by 1.5 times. What is the order of reaction with respect of X ?

A. 1

B. 1.5

C. 2

D. 2.5

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315. For a reaction $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

Rate= k $[NO]^2[O_2]$, if the volume of the reaction vessel is double. What is the rate of reaction.

A. will diminish to 1/4 of initial value

B. will diminish to 1/8 of initial value

C. will grow 4 times

D. will grow 8 times.

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316. For the first order reaction, time required for 99% completion is :

A. half the time required for completion of 90% of reaction

B. thrice the time required for 90% completion of reaction

C. twice the time required for 90% completion of reaction

D. none of these.

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317. In the reversible reaction $2NO_2 \leftrightarrow N_2O_4$, the rate of disappearance of NO_2 is equal to

A. $\frac{2k_1}{k_2}[NO_2]^2$

B. $2k_1[NO_2] - 2k_2[N_2O_4]$

C. $2k_1[NO_2]^2 - 2k_2[N_2O_4]$

D. $(2k_1 - k_2)[NO_2]$.

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318. For the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$ rate and rate constant are 1.22×10^{-4} and $3.4 \times 10^{-5} s^{-1}$ respectively then the concentration of N_2O_5 at that time will be

A. 1.732

B. 3.6

C. 1.02×10^{-4}

D. 3.4×10^5.

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319. For zero order reaction, the integrated rate equation is :

A. $kt = \frac{A}{[A]_0}$

B. $kt = [A] - [A]_0$

C. $[A] = -kt + [A]_0$

D. $[A] = kt - [A]_0$

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320. For a first order reaction involving decomposition of N_2O_5 the following information is available :

$2N_2O_5(g) \to 4NO_2(g) + O_2(g) Rate = k[N_2O_5]$

$N_2O_5(g) \rightarrow 2NO_2(g) + \frac{1}{2}O_2(g) Rate = k'[N_2O_5]$. Which of the following expressions is true ?

A. k=k'

B. k' =2k

C. k' =1/2k

D. kgt k'.

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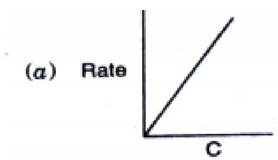
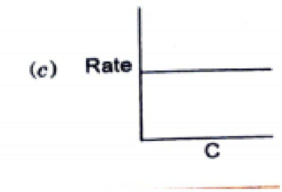
321. Which of the following graphs corresponds to first order reaction:

A.

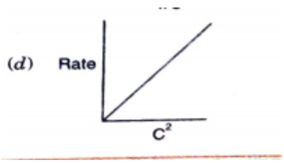


B.

C.



D.



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322. Which of the following is correct for a zero order reaction

A. $t_{3/4} = 2t_{1/2}$

B. $t_{3/4} = 1.5t_{1/2}$

C. $t_{3/4} = \frac{1}{2}t_{1/2}$

D. $t_{3/4} = \frac{1}{3}t_{1/2}$

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323. The half life period for a zero order reaction is equal to

A. $2k/[A]_0$

B. $\frac{[A]_0}{2k}$

C. $\frac{0.693}{k}$

D. $\frac{0.693}{k[A]_0}$

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324. For a second order reaction rate at a particular time x. if the initial concentration is tripled, the rate will become.

A. 3x

B. $9x^2$

C. 9x

D. 27x.

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325. When ln K is plotted against 1/T, the slope was found to be $-10.7 \times 10^3 K$ activation energy for the reaction would be :

A. $-78.9kJmol^{-1}$

B. $2.26kJmol^{-1}$

C. $88.9kJmol^{-1}$

D. $10.7 kJ mol^{-1}$

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326. For a zero order reaction, linear plot was obtained for [A] vs t. The slope of the line is equal to:

A. k_0

B. $-k_0$

C. $\frac{0.693}{k_0}$

D. $-\frac{k_0}{2.303}$

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327. For a reaction having rate law expression Rate=$k[A]^{3/2}[B]^{-1/2}$. If the concentration of both A and B becomes four times, the rate of reaction:

A. becomes four times

B. becomes 16 times

C. decreases four times

D. remains same.

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328. For a chemical reaction $A \rightarrow B$,it is observed that the rate of reaction doubles when the concentration of A is increased four times. The order of reaction in A is :

A. Two

B. One

C. Half

D. Zero

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329. The reaction -$N_2O_5(inCCl_4) \rightarrow 2NO_2 + \frac{1}{2}O_2(g)$ is first order in N_2O_5 with rate constant $6.2 \times 10^{-4}s^{-1}$. What is the value of rate of reaction when $[N_2O_5] = 1.25molL^{-1}$?

A. $7.75 \times 10^{-4}molL^{-1}s^{-1}$

B. $6.35 \times 10^{-3}molL^{-1}s^{-1}$

C. $5.15 \times 10^{-5}molL^{-1}s^{-1}$

D. $3.55 \times 10^{-4}molL^{-1}s^{-1}$

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330. Reaction $A \rightarrow B$ follows second order kinetics. Doubling the concentration of A wil increase the rate of formation of B by a factor of :

A. $\frac{1}{4}$

B. 2

C. $\frac{1}{2}$

D. 4

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331. A reaction is 50% completes in 2 hours and 75 % completes in 4 hours. The order of reaction is

A. 0

B. 1

C. 2

D. 3

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332. For the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$ rate and rate constant are 1.22×10^{-4} and $3.4 \times 10^{-5} s^{-1}$ respectively then the concentration of N_2O_5 at that time will be

A. 1.732

B. 3.0

C. 1.02×10^{-4}

D. 3.4×10^{5}.

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333. The reaction : A $\rightarrow$ B follows first order kinetics. The time taken for 0.8 mol of A to produce 0.6 mol of B is 1 hour. What is the time taken for Conversion of 0.9 mol of A to produce 0.675 mol of B ?

A. 1 hour

B. 0.5 hour

C. 0.25 hour

D. 2 hour

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334. The time taken for 90% of a first order reaction to complete is approximately

A. 1.1 times that of half life

B. 2.2 times that of half life

C. 3.3 times that of half life

D. 4.4 times that of half life

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335. The rate law for a reaction between the Substances A and B is given by Rate = $k[A]^n[B]^m$ On doubling the concentration of A and halving the concentration of B, the ratio of the new rate to the earlier rate of reaction will be

A. $m+n$

B. $n-m$

C. 2^{n-m}

D. $\frac{1}{2^{m+n}}$

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336. In a first order reaction, the concentration of the reactant decreases from 800 mol/dm^3 to 50 mol/dm^3 in 2×10^4 sec. The rate constant of the reaction in $\sec^{-1}$ is

A. 2×10^4

B. 3.45×10^{-5}

C. 1.386×10^{-4}

D. 2×10^{-4}

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337. The rate of a first order reaction is : $1.5 \times 10^{-2} molL^{-1} min^{-1}$ at 0.5 M concentration of the reactant. The half life of the reaction is :

A. 23.1 min

B. 8.73 min

C. 7.53 min

D. 0.383 min.

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338. The rate equation for the reaction $2A + B \rightarrow C$ is found to be rate =k[A][B]. The correct statement in relation to this reaction is that the

A. units of k must be s^{-1}

B. $t_{1/2}$ is constant

C. rate formation of C is twice the rate of disappearance of A.

D. value of k is independent of the initial concentration of A and B.

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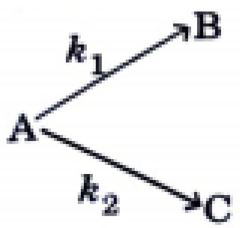
339. A substance undergoes first order decomposition. The decomposition follows we parallel first order reactions as :



$k_1 = 1.26 \times 10^{-4} s^{-1}$ $k_2 = 3.8 \times 10^{-5} s^{-1}$ The percentage distribution of B and C are

A. 75% B and 26% C

B. 80% B and 20% C

C. 60% B and 40% C

D. 76.83% B and 23.17% C

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340. A reactant (A) forms two products : $A \xrightarrow{k_1} B$, Activation energy, E_{a1} $A \xrightarrow{k_2} C$, Activation energy, E_{a2} If $E_{a2} = 2E_{a1}$, then k_1 and k_2 are related as

A. $k_1 = k_2 e^{E_{a1} / RT}$

B. $k_2 = k_1 e^{E_{a2} / RT}$

C. $k_1 = Ak_2 e^{E_{a1} / RT}$

D. $k_1 = 2k_2 e^{E_{a2} / RT}$

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341. Consider the reaction : $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ The equality relationship between $\frac{d[NH_3]}{dt}$ and $\frac{d[H_2]}{dt}$ is

A. $+\frac{dt[NH_3]}{dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$

B. $+\frac{dt[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$

C. $+\frac{dt[NH_3]}{dt} = -\frac{d[H_2]}{dt}$

D. $+\frac{dt[NH_3]}{dt} = -\frac{1}{2}\frac{d[H_2]}{dt}$

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342. The correct electronic configuration of a chloride ion is : (a) 2, 8 (b) 2, 8, 4 (c) 2, 8, 8 (d) 2, 8, 7

A. A and B both

B. Neither A nor B

C. A only

D. C only.

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343. In a first-order reaction $A \rightarrow B$, if k is rate constant and initial concentration of the reactant A is 0.5 M, then the half-life is :

A. $\frac{\log 2}{k}$

B. $\frac{\log 2}{k\sqrt{0.5}}$

C. $\frac{\ln 2}{k}$

D. $\frac{0.693}{0.5k}$

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344. 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. 40minutes

D. 50 minutes

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345. The bromination of acetone that occurs in acid solution is represented by the equation $CH_3COCH_3(aq) + Br_3(aq) \rightarrow CH_3COCH_2Br(aq) + H^+(aq) + Br^-(aq)$ These kinetic data were obtained for given reaction concentrations.

Initial concentrations, M

$[CH_3COCH_3]$	$[Br_2]$	$[H^+]$	Initial Rate, disappearance of Br_2, Ms^{-1}
0.30	0.05	0.05	5.7×10^{-5}
0.30	0.10	0.05	5.7×10^{-5}
0.30	0.10	0.10	1.2×10^{-4}
0.40	0.05	0.20	3.1×10^{-4}

Based on these data, the rate of reaction is :

A. $rate = k[CH_3COCH_3][Br_2]$

B. $rate = k[CH_3COCH_3][Br_2]\left[H^+\right]^2$

C. $rate = k[CH_3COCH_3][Br_2]\left[H^+\right]$

D. $rate = k[CH_3COCH_3]\left[H^+\right]$

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346. For a reaction : $A + B \rightarrow$ product, it is observed that (i) on doubling the concentration of A only, the rate of reaction is also doubled.

(ii) on doubling the initial concentration of both A and B, there is change by a factor of 8 in the rate of reaction. The rate of reaction is given by

A. $Rate = k[A][B]^2$

B. $Rate = k[A]^2[B]^2$

C. $Rate = k[A][B]$

D. $Rate = k[A]^2[B]$

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347. Half life period of a first order reaction is 1386 seconds. The specific rate constant of the reaction is :

A. $0.5 \times 10^{-2} s^{-1}$

B. $0.5 \times 10^{-3} s^{-1}$

C. $5.0 \times 10^{-2} s^{-1}$

D. $5.0 \times 10^{-3} s^{-1}$

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348. For the reaction, $N_2 + 3H_2 \rightarrow 2NH_3$ if $\frac{d[NH_3]}{dt} = 2 \times 10^{-4} mol/L/s$, the value of $-\frac{d[H_2]}{dt}$ would be

A. $4 \times 10^{-4} mol/L/s$

B. $6 \times 10^{-4} mol/L/s$

C. $1 \times 10^{-4} mol/L/s$

D. $3 \times 10^{-4} mol/L/s$

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349. In the reaction $BrO_3^-(aq) + 5Br^- + 6H^+ \rightarrow 3Br_2 + 3H_2O$ the rate of appearance of bromine is relate to the rate of disappearance of bromide ions as

A. $\frac{d[Br_2]}{dt} = -\frac{5}{3}\frac{d[Br^-]}{dt}$

B. $\frac{d[Br_2]}{dt} = \frac{5}{3}\frac{d[Br^-]}{dt}$

C. $\frac{d[Br_2]}{dt} = \frac{3}{5}\frac{d[Br^-]}{dt}$

D. $\frac{d[Br_2]}{dt} = -\frac{3}{5}\frac{d[Br^-]}{dt}$

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350. During the kinetic study of the reaction. $2A + B \rightarrow C + D$, following results were obtained: Based on the above data which one of the following is correct?

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	6.01×10^{-3}
II	0.3	0.2	7.2×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.40×10^{-2}

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

A. $Rate = k[A]^2[B]^2$

B. $Rate = k[A][B]^2$

C. $Rate = k[A]^2[B]$

D. $Rate = k[A][B]$

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351. For the reaction $N_2O_5(g) \rightarrow 2NO_2(g) + \frac{1}{2}O_2(g)$ the value of rate of disappearance of N_2O_5 is given as $6.25 \times 10^{-3} mol L^{-1} s^{-1}$. The rate of formation of NO_2 and O_2 is given respectively as :

A. $6.25 \times 10^{-3} mol L^{-1} s^{-1}$ and $3.125 \times 10^{-3} mol L^{-1} s^{-1}$

B. $6.25 \times 10^{-3} mol L^{-1} s^{-1}$ and $6.25 \times 10^{-3} mol L^{-1} s^{-1}$

C. $6.25 \times 10^{-3} mol L^{-1} s^{-1}$ and $6.25 \times 10^{-3} mol L^{-1} s^{-1}$

D. $1.25 \times 10^{-2} mol L^{-1} s^{-1}$ and $3.125 \times 10^{-3} mol L^{-1} s^{-1}$

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352. In a reaction, $A + B \rightarrow$ Product, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentration 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. $Rate = k[A]^2[B]$

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353. In a zero-order reaction for every 10° rise of temperature, the rate is doubled. If the temperature is increased from $10^\circ C$ to $100^\circ C$, the rate of the reaction will become

A. 256 times

B. 512 times

C. 64 times

D. 128 times

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354. What is the activation energy for a reaction if its rate double when the temperature raised from $20^{\circ} C$ to $35^{\circ} C$? $(R = 8.314 J / mol / K)$

A. $34.7 kJ mol^{-1}$

B. $15.1 kJ mol^{-1}$

C. $342 kJ mol^{-1}$

D. $269 kJ mol^{-1}$

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355. The rate constant of the reaction A $\rightarrow$ 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. 0.72M

C. 1.08M

D. 3.60M

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356. The activation energy of a reaction can be determined by

A. ln k vs. $\frac{1}{T}$

B. $\frac{T}{\ln k}$ vs. $\frac{1}{T}$

C. In k vs. T

D. $\frac{\ln k}{T}$ vs. T

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

A. second

B. more than zero but less than first

C. zero

D. first

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358. The addition of a catalyst during a chemical reaction alters which of the following quantities?

A. Enthalpy

B. Activation energy

C. Entropy

D. Internal energy

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359. 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

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360. The decomposition of phosphine (PH_3) on tungsten at low pressure is a first order reaction. It is because

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

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361. What is the time required for a first order reaction to be 99 % complete, compared to the time taken for the reaction to be 90 % complete ?

A. There is no change

B. Time taken is double .

C. Time taken is triple

D. The time required is half of the initial value.

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362. The experimental rate law for a reaction : $2A + B \rightarrow$ Product is rate $\propto C_A C_B^{1/2}$. If the concentrations of both A and B are doubled the rate increases by a factor of

A. $\sqrt{2}$

B. 2

C. $2\sqrt{2}$

D. 4

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

A. Zero

B. fraction

C. three

D. one

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364. For a reaction taking place in three steps, the rate constants are k_1, k_2 and k_3. The overall rate constant $k = \frac{k_1 k_2}{k_3}$. If the energy of activation values for the first, second and third stages are respectively 40, 50 and 60 kJ mol^{-1}, then the overall energy of activation in kJ mol^{-1} is

A. 30

B. 40

C. 60

D. 50

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365. For a zero order reaction, the plot of concentration of reactant vs time is (intercept refers to concentration axis).

A. linear with +ve slope and zero intercept

B. linear with -ve slope and zero intercept

C. linear with -ve slope and non-zero intercept

D. linear with +ve slope and non-zero intercept

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366. Consider the following statements : (i) increase in concentration of reactant increases the rate of a zero order reaction (ii) rate constant k is equal to collision frequency A if $E_a = 0$. (iii) rate constant k is equal to collision frequency A if $E_a = \propto$. (iv) In k vs T is a straight line. (v) Ink vs IT is a straight line. Correct statements are

A. (i) and (iv)

B. (ii) and (v)

C. (iii) and (iv)

D. (ii) and (iii)

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367. The initial rates of reaction E $3A + 2B + C \rightarrow$ Products, at different initial concentrations are given below

Initial rate, Ms^{-1}	$[A]_0$,M	$[B]_0$,M	$[C]_0$,M
5.0×10^{-3}	0.010	0.005	0.010
5.0×10^{-3}	0.010	0.005	0.015
1.0×10^{-2}	0.010	0.010	0.010
1.25×10^{-3}	0.005	0.005	0.010

The order with respect to the reactants, A, B and C are respectively

A. 3,2,0

B. 3,2,1

C. 2,1,0

D. 2,2,1

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368. For a reaction $A + B \rightarrow C + 2D$, experimental results were collected for three trials and the data obtained are given below :

Trial	[A], M	[B], M	Initial Rate, Ms^{-1}
1	0.40	0.20	5.5×10^{-4}
2	0.80	0.20	5.5×10^{-4}
3	0.40	0.40	2.2×10^{-3}

The correct rate law of the reaction is

A. $rate = k[A]^0[B]^2$

B. $Rate = k[A][B]^2$

C. $Rate = k[A][B]$

D. $r = k[A][B]^0$

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369. In a first order reaction, the concentration of the 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

B. 15

C. 45

D. 25

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370. The activation energy for the reaction if $k = A$ is

A. 83

B. 166

C. 249

D. 332

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371. The decomposition of ammonia on tungsten surface at 500 K follows zero order kinetics. The half-life period of this reaction is 45 minutes when the initial pressure is 4 bar. The half life period (minutes) of the reaction when the initial pressure is 16 bar at the same temperature is

A. 120

B. 60

C. 240

D. 180

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372. The rate constant of a first order reaction is doubled when the temperature is increased from $20^\circ C$ to $25^\circ C$. How many times the rate constant will increase if the temperature is raised from $20^\circ C$ to $40^\circ C$?

A. 4

B. 8

C. 16

D. 32

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373. The rate of a reaction is given by rate, $r = k[H^+]^n$ If the rate becomes 100 times when the pH changes from 3 to 1, the order of the reaction is

A. 0

B. 1

C. 2

D. 3

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374. In a first order reaction, 80 % of the reactant at an instant was reduced to 8 % in 4606 seconds. The rate constant of the reaction is

A. $2.303 \times 10^{-4} s^{-1}$

B. $4.606 \times 10^{-3} s^{-1}$

C. $5.000 \times 10^{-3} s^{-1}$

D. $5.000 \times 10^{-4} s^{-1}$

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375. The decomposition of N_2O_5 in $\mathbb{C}l_4$ solution at 318 K is studied by monitoring the concentration of N_2O_5 in the solution. Initially the concentration of N_2O_5 is 2.4 mol L^{-1} and after 200 minutes, it is reduced to 2.00 mol L^{-1}.What is the rate of production of NO_2 during this period in mol $L^{-1}min^1$?

A. 4×10^{-3}

B. 2×10^{-3}

C. 1×10^{-3}

D. 2×10^{-4}

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376. In a first order reaction, the concentration of the reactant decreases from 0.6 M to 0.3 M in 30 minutes. The time taken for the concentration to change from 0.1 M to 0.025 M is

A. 60 min

B. 30 min

C. 15 min

D. 50 min

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377. The following mechanism has been proposed for the reaction of NO and Br_2 to form NOBr

$NO(g) + Br_2(g) \leftrightarrow NOBr_2(g)$ (fast)

$NOBr_2(g) + NO \leftrightarrow 2NOBr(g)$ (slow)

If the second step is rate determining step, the order of the reaction with respect to NO(g) is

A. 0

B. 3

C. 2

D. 1

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378. Rate of a reaction can be expressed by Arrhenius equation as: $k = Ae^{-E/RT}$ In this equation, E represents

A. energy below which colliding molecules will not react.

B. the total energy of the reacting molecules at a temperature T.

C. the fraction of molecules with energy greater than the activation energy

D. the energy above which all the colliding molecules will react.

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379. Consider the reaction, $2A + B \rightarrow$ Products When concentration of B alone was doubled, the half-life did not change. When the concentration of A alone was doubled, the rate increased by two times. The units of rate constant for this reaction are -

A. no unit

B. $molL^{-1}s^{-1}$

C. s^{-1}

D. $Lmol^{-1}s^{-1}$

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380. The half life period of a first order reaction is 6.93 minutes. The time required for the completion of 99% of the chemical reaction will be $(\log 2 = 0.301)$

A. 230.3 minutes

B. 23.03 minutes

C. 46.06 minutes

D. 460.6 minutes

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381. The time for half life period of a certain reaction A $\rightarrow$ Products is 1 hour. When the initial concentration of the reactant 'A' is 2.0 mol L^{-1}, how much time does it take for its concentration to come from 0.50 to 0.25 mol L^{-1}? if it is a zero order reaction?

A. 0.25 h

B. 1 h

C. 4h

D. 0.5 h.

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382. The rate of chemical reaction double for every 10° C rise of temperature if the temperature is raised by $50^{\circ}C$, the rate of the reaction increases by

A. 10 times

B. 24 times

C. 32 times

D. 64 times

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383. For a first order reaction, (A) $\rightarrow$ Products, the concentration of A changes from 0.1 M to 0.025 M in 40 minutes The rate of reaction when the concentration of A is 0.01 M is

A. $3.47 \times 10^{-4} M / \min$

B. $3.47 \times 10^{-5} M / \min$

C. $1.73 \times 10^{-4} M / \min$

D. $1.73 \times 10^{-5} M / \min$

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384. 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. 60.5 kJ mol-1

B. 53.6 kJ mol-1

C. 48.6 kJ mol-1

D. 58.5 kJ mol-1

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385. For the non-stoichiometric reaction: $2A + B \rightarrow C + D$, 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 $L^{-1}s^{-1}$)
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. $\frac{dC}{dt} = k[A][B]$

C. $\frac{dC}{dt} = k[A]^2[B]$

D. $\frac{dC}{dt} = k[A][B]^2$

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386. Higher-order (n > 3) reactions are rare due to:

A. shifting of equilibrium towards reactants due to elastic collisions

B. loss of active species on collision

C. low probability of simultaneous collision of all the reacting species

D. increase in entropy and activation energy as more molecules are involved.

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387. 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. $6.93 \times 10^{-2} mol min^{-1}$

B. $6.93 \times 10^{-4} mol L^{-1} min^{-1}$

C. $2.66 L min^{-1}$ at STP

D. $1.34 \times 10^{-2} mol min^{-1}$

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388. At 500 K, the half life period of a gaseous reaction at an initial pressure of 80 kPa is 350 sec. When the pressure is 40 kPa, the half life period is 175 sec. The order of the reaction is

A. Zero

B. One

C. three

D. two

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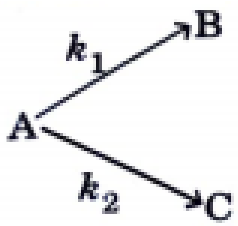
389. A substance undergoes first order decomposition. The decomposition follows we parallel first order reactions as :



$k_1 = 1.26 \times 10^{-4} s^{-1}$ $k_2 = 3.8 \times 10^{-5} s^{-1}$ The percentage distribution of B and C are

A. 400K

B. 1000 K

C. 800K

D. 1500 K

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390. The rate for the first order reaction is $0.69 \times 10^{-2} mol L^{-1} min^{-1}$ and the initial concentration is 0.2 mol L^{-1}. The half life period is :

A. 0

B. 3

C. 1

D. 2

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391. The activation energies of two reactions are E_1 and $E_2 (E_1 > E_2)$. If the temperature of the system is increased from T_1 to T_2 the rate constant of the reaction changes from k_1 to k_1' in the first reaction and k_2 to k_2' in second reaction, predict which of the following expression is correct ?

A. $\frac{k_1'}{k_1} = \frac{k_2'}{k_2}$

B. $\frac{k_1'}{k_1} > \frac{k_2'}{k_2}$

C. $\frac{k_1'}{k_1} < \frac{k_2'}{k_2}$

D. $\frac{k_1'}{k_1} = \frac{k_2'}{k_2} = 0$

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392. The activation energy for a reaction at the temperature T K was found to be 2.303 RT J mol-1 .The ratio of the rate constant to Arrhenius factor is

A. 10^{-2}

B. 2×10^{-3}

C. 2×10^{-3}

D. 2×10^{-2}

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393. Half lives of a first order and a zero order reactions are same. Then the ratio of the initial rates of first order reaction to that of the zero order reaction is

A. $\frac{1}{0.693}$

B. 2×0.693

C. 0.693

D. $\frac{2}{0.693}$

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394. If the activation energy for the forward reaction 150 kJ mol^{-1} and that of the reverse reaction is 260 kJ mol^{-1}, what is the enthalpy change for the reaction?

A. $410kJ$mol^-1`

B. $-110kJ$mol^-1`

C. $110kJ$mol^-1`

D. $-410kJ$mol^-1`

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395. Fill in the blanks- __________ is an alloy made up of 90% of copper and 10% of aluminium metal and is used in making artificial jewellery.

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396. The following data were obtained during the first order decomposition of $2A(g) \rightarrow B(g) + C(s)$ at a constant volume and at a particular temperature.

S.No.	Time	Total pressure in Pascal
1	At the end of 10 min	300
2	After completion	200

The rate constant in min^{-1} is

A. 0.0693

B. 69.3

C. 6.93

D. 6.93×10^{-4}

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397. The time required for 100% completion of a zero order reaction is

A. ak

B. $\frac{a}{2k}$

C. $\frac{a}{k}$

D. $\frac{2k}{a}$

398. The rate of reaction $A \rightarrow$ Products, at the initial concentration of $3.24 \times 10^{-2} M$ is nine times its rate at another initial concentration of $1.2 \times 10^{-3} M$. The order of the reaction is

A. $\frac{1}{2}$

B. $\frac{3}{4}$

C. $\frac{3}{2}$

D. $\frac{2}{3}$

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399. For first order reaction, rate constant

A. indirectly proportional to concentration of the reactant

B. is proportional to square of concentration of reactant

C. is dependent of temperature

D. is independent of temperature

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400. Fill in the blanks- ________ is an alloy which is used for making coins and costly idols.

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401. Fill in the blanks- _________ is an alloy made up of 88% of Cu, 10% of Sn and 2% of Zn.

Watch Video Solution

402. The half-life for decay of 14C by β-emission is 5730 years. The fraction of 14C decays, in a sample that is 22,920 years old, would be

A. $1/8$

B. $1/16$

C. $7/8$

D. $15/16$

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403. For a chemical reaction at $27^{\circ}C$, the activation energy is 600 R. The ratio of the rate constants at $327^{\circ}C$ to that of at $27^{\circ}C$ will be

A. 2

B. 40

C. e

D. e^2

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404. Fill in the blanks- ________ alloy is made up of 5% of aluminium and 95% of magnesium.

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405. Temperature coefficient of a reaction is ‘2. When temperature is increased from $30^\circ C$ to $90^\circ C$, the rate of reaction is increased by

A. 60 times

B. 64 times

C. 150times

D. 400 times

Watch Video Solution

406. State the number of electrons present in the outermost shell of the atoms of the following elements : (i) Neon

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407. For the following reaction : $NO_2(g) + CO(g) \rightarrow NO(g) + CO_2(g)$, the rate law is : Rate = $k[NO_2]^2$. If 0.1 mole of gaseous carbon monoxide is added at constant temperature to the reaction mixture, which of the following statements is true ?

A. Both k and the reaction rate remain the same

B. Both k and the reaction rate increases

C. Both k and the reaction rate decreases

D. Only k increases, the reaction rate remains the same

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408. The rate of a reaction is given by rate, $r = k\left[H^+\right]^n$ If the rate becomes 100 times when the pH changes from 3 to 1, the order of the reaction is

A. 2

B. 0

C. 1

D. 1.5

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409. A piece of wood from an archaeological sample has 5.0 counts min^{-1} per gram of C-14, while a fresh sample of wood has a count of 15.0 $min^{-1}gram^{-1}$. If half-life of C-14 is 5770 years, the age of the archaeological sample is

A. 8,500 years

B. 9,200 years

C. 10,000 years

D. 11,000 years

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410. For the reaction $A + 2B \rightarrow C$, the reaction rate is doubled if the concentration of A is doubled. The rate is increased by four times when concentrations of both A and B are increased by four times. The order of the reaction is

A. 3

B. 0

C. 1

D. 2

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411. Fill in the blanks- ________ is an alloy made up of 95% of aluminium, 1% of magnesium, 4% of copper.

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412. The relationship between rate constant and half life period of zero order reaction is given by

A. $t_{\frac{1}{2}} = [A]_0 2k$

B. $t_{\frac{1}{2}} = \frac{0.693}{k}$

C. $t_{\frac{1}{2}} = \frac{[A]_0}{2k}$

D. $t_{\frac{1}{2}} = \frac{2[A]_0}{k}$

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413. For the reaction $O_{3(g)} + O_{(g)} \rightarrow 2O_{2(g)}$, if the rate law expression is, $rate = K[O_3][O]$, the molecularity and order of the reaction are respectively

A. 2 and 2

B. 2 and 1.33

C. 2 and 1

D. 1 and 2

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414. Fill in the blanks- _______ is an alloy which is used for making wires, parts of the machine and utensils.

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415. Average rate of reaction: $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$ is written as:

A. $\dfrac{\Delta[SO_2]}{\Delta t}$

B. $\dfrac{1}{2}\dfrac{\Delta[SO_2]}{\Delta t}$

C. $-\dfrac{\Delta[O_2]}{\Delta t}$

D. $\dfrac{\Delta[SO_3]}{\Delta t}$

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416. The reaction takes place in two steps as: (i) $NO_2Cl(g) \xrightarrow{k_1} NO_2(g) + Cl_2(g)$ (ii) NO_2Cl(g) + Cl(g) overset (k_2)rarr NO_2(g) + Cl_2(g)` Identify the reaction intermediate

A. $NO_2Cl(g)$

B. $NO_2(g)$

C. $Cl_2(g)$

D. $Cl(g)$

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417. The rate constant and half life of a first order reaction are related to each other as:

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418. Fill in the blanks- _______ is an alloy used for making bells which are used in schools and temples.

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419. In the reaction A $\rightarrow$ Products, when the concentration of A was reduced from $2.4 \times 10^{-2} M$ to $1.2 \times 10^{-2} M$, the rate decreased 8 times at the same temperature. The order of the reaction is

A. 0

B. 1

C. 2

D. 3

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420. For a chemical reaction, $mA \rightarrow xB$, the rate lay is $R = k[A]^2$. If the concentration of A is doubled, the reaction rate will be

A. doubled

B. quadrupled

C. increased by 8 times

D. unchanged

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421. Give an example of the given statement- Metals are sonorous.

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422. The activation energy of a reaction can be determined by

A. evaluating rate constants at two different temperatures

B. changing the concentration of reactants

C. evaluating the concentration of reactants at two different temperatures

D. evaluating rate constant at standard temperature

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423. What is the composition of chromium steel?

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424. For a first order reaction, (A) $\rightarrow$ Products, the concentration of A changes from 0.1 M to 0.025 M in 40 minutes The rate of reaction when the concentration of A is 0.01 M is

A. $1.73 \times 10^{-4} M min^{-1}$

B. $3.47 \times 10^{-5} M min^{-1}$

C. $3.47 \times 10^{-4} M min^{-1}$

D. $1.73 \times 10^{-5} M min^{-1}$

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425. Consider a reaction $aG + bH \rightarrow$ Products. When concentration of both the reactants G and H is doubled, the rate increases by eight times, However, when the concentration of G is doubled keeping the concentration of H fixed, the rate is doubled. The overall order of the reaction is

A. 0

B. 1

C. 2

D. 3

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426. Under the same conditions, initial concentration of 1.386 mol dm^{-3} of a substance becomes half in 40 seconds and 20 seconds through first order and zero order kinetics respectively. Ratio $\left(\frac{k_1}{k_0}\right)$ of the rate constants for first order (k_1) and zero order (k_0) of the reaction is

A. $0.5 mol^{-1} dm^3$

B. $1.0 mol^{-1} dm^3$

C. $1.5 mol dm^3$

D. $2.0 mol^{-1} dm^3$

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427. State the number of electrons present in the outermost shell of the atoms of the following elements : (ii) chlorine

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428. Fill in the blanks- ________is an alloy used foe making aircrafts and aeroplane.

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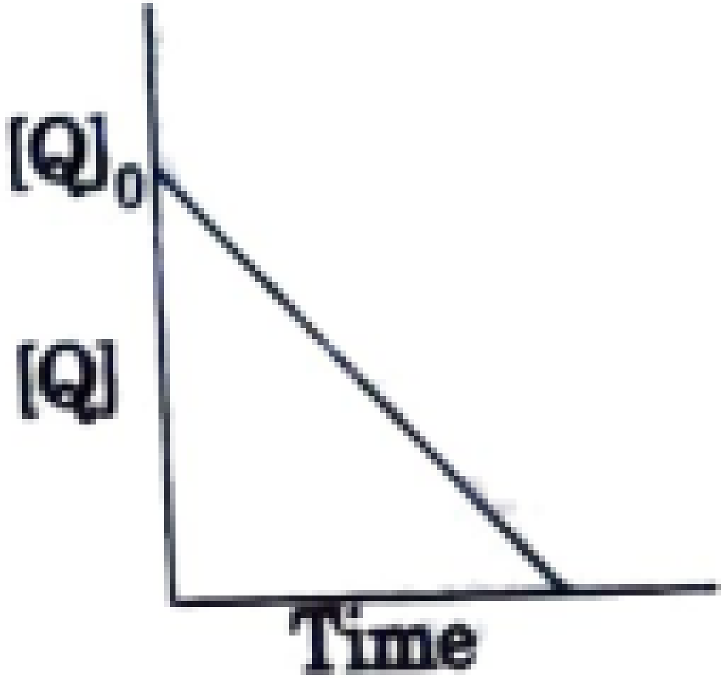
429. In the reaction, $P + Q \rightarrow R + S$+the time taken for 75% reaction of P is twice the time taken for 50% reaction of P. The concentration of Q varies with reaction time as shown in the figure. The overall order of the reaction is



A. 2

B. 3

C. 0

D. 1

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430. The initial rate of hydrolysis of methyl acetate (1M) by a weak acid (HA, 1M) is 1/100 th of that of a strong acid (HX, 1M), at $25^{\circ} C$. The K_a of HA is

A. 1×10^{-4}

B. 1×10^{-5}

C. 1×10^{-6}

D. 1×10^{-3}

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431. For the elementary reaction M $\rightarrow$ N, the rate of disappearance of M increases by a factor of 8 upon doubling the concentration of M. The order of the reaction with respect to M is

A. 4

B. 3

C. 2

D. 1

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432. If rate of reaction in terms of disappearance of NH_3 is $-\frac{d[NH_3]}{dt}$, for the reaction : $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$ then which of the following expressions are correct for rate of the reaction :

A. $Rate = -\frac{4}{5}\frac{d[O_2]}{dt}$

B. $Rate = \frac{3}{2}\frac{d[H_2O]}{dt}$

C. $Rate = \frac{d[NO]}{dt}$

D. $Rate = \frac{4}{5}\frac{d[O_2]}{dt}$

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433. Consider the rate law expression for a reaction :

$rate = k[NO_2^-][I^-][H^+]^2$

Which of the following is/are not correct ?

A. When concentration of both NO_2^- and I^- are doubled rate becomes 4 times.

B. When concentration of H^+ is tripled, rate becomes nine times.

C. When concentration of each of H^+, NO_2^- and I^- are tripled, rate becomes nine times.

D. When concentration of NO_2^- is doubled, of I^- is halved and of H^+ is doubled rate becomes 16 times.

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434. For a first order reaction :

A. The degree of dissociation is equal to $1 - e^{-kt}$

B. A plot of reciprocal of concentration of reactant vs time gives a straight line.

C. The time taken the completion of 75% of reaction is thrice the $t_{1/2}$ of the reaction.

D. The pre-exponential factor in the Arrhenius equation has the dimensions of $time^{-1}$.

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435. In acidic medium, the rate of reaction between BrO_3^- and Br^- is given by the expression - $-\frac{d[BrO_3]}{dt} = k[BrO_3^-][Br^-][H^+]^2$ which of the following statements are correct ?

A. Rate of reaction is independent of the concentration of acid added .

B. Rate of reaction is affected by change in pH of the solution .

C. Doubling the concentration of H^+ ions increases the reaction rate by 4 times.

D. This is an example of pseudo second order reaction.

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436. The rate law for the reaction : $RCl + NaOH \rightarrow ROH + NaCl$ is given as : rate = k[RCl). The rate of this reaction :

A. is doubled by doubling the concentration of NaOH

B. is halved by reducing the concentration of RCl by one half.

C. is increased by increasing the temperature of the reaction.

D. is unaffected by change in temperature.

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437. Which of the following statements is not correct. Some antisecptics can be added to soaps, Dilute solutions of some disinfectants can be used as antiseptic, Disinfectants are antimicrobial drugs, Antiseptic medicines can be ingested.

A. changes the Δ H of the reaction

B. decreases the activation energy for the forward and backward reaction equally.

C. provides a new path of higher activation energy.

D. increases the average kinetic energy of reacting molecules

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438. Fill in the blanks- ________is an mixture which is used as domestic fuel.

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439. For the first order reaction $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$ which is incorrect:-

A. the concentration of the reactant decreases exponentially with time.

B. the half-life of the reaction decreases with increasing temperature.

C. the half-life of the reaction depends on the initial concentration of the reactant.

D. the reaction proceeds to 99.6% completion in eight half-life duration.

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440. Consider the following reaction for $2NO_2(g) + F_2(g) \rightarrow 2NO_2F(g)$. The expression for the rate of reaction in terms of the rate of change of Partial pressures of reactant and product is/are

A. $rate = -1/2[dp(NO_2)/dt]$

B. $rate = 1/2[dp(NO_2)/dt]$

C. $rate = -1/2[dp(NO_2F)/dt]$

D. $rate = 1/2[dp(NO_2F)/dt]$

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441. Arrhenius equation is

A. a high activation energy usually implies a fast reaction.

B. ate constant increases with increase in temperature. This is due to a greater number of collisions whose energy exceeds the activation energy.

C. higher the magnitude of activation energy, stronger is the temperature dependence of the rate constant.

D. the pre-exponential factor is a measure of the rate at which collisions occur, irrespective of their energy.

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442. The integrated rate equations can be fitted with kinetic data to determine the order of a reaction. The integrated rate equations for zero, first and second order reactions are : Zero order : $\left[Al = -kt + [A]_0\right.$ First order : $\log[A] = -\frac{kt}{2.303} + \log[A]_0$ Second order : $\frac{1}{[A]} = kt + \frac{1}{[A]_0}$ These equations can also be used to calculate the halt life periods of different reactions, which give the time during which the concentration of a reactant is reduced to half of its initial concentration, i.e, at time $t_{1/2}, [A] = [A]_0/2$ Answer the following (1 to 5) question : The decomposition of nitrogen pentoxide :

$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$ is a first order reaction. The plot of log $[N_2O_5]$ vs time (min) has slope = - 0.01389. The rate constant k is

A. $1.389 \times 10^{-2} min^{-1}$

B. $3.2 \times 10^{-2} min^{-1}$

C. $6.03 \times 10^{-3} min^{-1}$

D. $71.99 min^{-1}$

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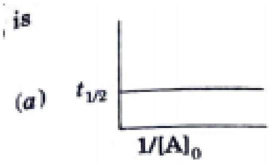
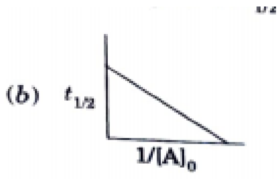
For a second order reaction, the correct plot of $t_{1/2}$ vs. $1/[A]_0$ is

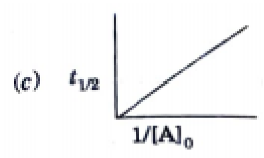
A.



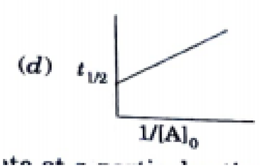
B.



C.



D.



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444. The integrated rate equations can be fitted with kinetic data to determine the order of a reaction. The integrated rate equations for zero, first and second order reactions are : Zero order : $[Al = -kt + [A]_0$ First order : $\log[A] = -\frac{kt}{2.303} + \log[A]_0$ Second order : $\frac{1}{[A]} = kt + \frac{1}{[A]_0}$ These equations can also be used to calculate the halt life periods of different reactions, which give the time during which the concentration of a reactant is reduced to half of its initial concentration, i.e, at time $t_{1/2}, [A] = [A]_0/2$ Answer the following (1 to 5) question : For a second order reaction, rate at a particular time is x. if the initial concentration is tripled, the rate will become

A. $9x^2$

B. 27x

C. 9x

D. 3x

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445. The integrated rate equations can be fitted with kinetic data to determine the order of a reaction. The integrated rate equations for zero, first and second order reactions are : Zero order : $[Al = -kt + [A]_0$ First order : $\log[A] = -\frac{kt}{2.303} + \log[A]_0$ Second order : $\frac{1}{[A]} = kt + \frac{1}{[A]_0}$ These equations can also be used to calculate the halt life periods of different reactions, which give the time during which the concentration of a reactant is reduced to half of its initial concentration, i.e, at time $t_{1/2}, [A] = [A]_0/2$ Answer the following (1 to 5) question : The rate for the first order reaction is 0.0069 mol $L^{-1}min^{-1}$ and the initial concentration is 0.2 mol L^{-1}. The half life period is

A. 636 s

B. 0.635 s

C. 690s

D. 1205s

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446. For a zero order reaction, linear plot was obtained for [A] vs t. The slope of the line is equal to:

A. $-\frac{k}{2.303}$

B. $\frac{k}{2.303}$

C. 2.303 k

D. $-k$

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447. According to collision theory of chemical reactions, rate of a reaction depends upon collision frequency and fraction of effective collisions. The rate of a reaction generally increases with rise in temperature mainly because of increase in number of effective collisions. Arrhenius proposed a quantitative relation between rate constant and temperature as

$k = Ae^{-E_a/Rt}$ where E_a is activation energy. It is equal to the difference between threshold energy and average kinetic energy of reacting molecules. Which of the following plot will be linear ?

A. In k versus T with -ve slope

B. in k versus 1/T with -ve slope

C. Ink versus 1/T with +ve slope

D. k versus 1/T with -ve slope.

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448. For a first order reaction, the plot of log K versus 1/T gives straight line. The slope of the line has been found to be a-8.95×10^{-3} K. The activation energy for the reaction is

A. $74.4 kJmol^{-1}$

B. $-171.4 kJmol^{-1}$

C. $171.4 kJ mol^{-1}$

D. $20.61 kJ mol^{-1}$

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449. The pre-expotential factor in Arrhenius equation of a second order reaction has the units

A. $mol L^{-1} s^{-1}$

B. s^{-1}

C. $L mol^{-1} s^{-1}$

D. dimensionless

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450. At $27^\circ C$ in the presence of a catalyst, the activation energy of a reaction is lowered by 10 kJ mol^{-1}. The ratio of log k (catalyst)/k (uncatalysed) is

A. 1.741

B. 191.47

C. 0.034

D. 0.0145

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451. The rate of a chemical reaction becomes double for every $10^\circ C$ rise in temperature. If this generalisation holds for a reaction in the temperature range 290 K to 300 K, what would be the approximate value of E_a for the reaction ?

A. $50 kJ mol^{-1}$

B. $25kJmol^{-1}$

C. $60kJmol^{-1}$

D. $40kJmol^{-1}$

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452. Fill in the blanks- __________ is a mixture of__________ and is used as an explosive.

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453. What is the fraction of molecules having energy equal to or greater than activation energy, E_a? What is this quantity called ?

A. $x = -\dfrac{E_a}{RT}$

B. $x = e^{E_a/RT}$

C. $\log x = -\dfrac{E_a}{2.303RT}$

D. $x = 10^{-E_a/RT}$

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454. The questions given below consist of an Assertion and a Reason. Use the following key to choose the appropriate answer.

If both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

If both assertion and reason and CORRECT, but reason is NOT THE CORRECT explanation of the assertion.

If assertion is CORRECT but reason is INCORRECT.

If assertion is INCORRECT but reason is CORRECT.

If both assertion and reason are INCORRECT.

Assertion: E° for $Mn^{3+} \mid Mn^{2+}$ is more positive than $Cr^{3+} \mid Cr^{2+}$.

Reason: The third ionistation energy of Mn is larger that than of Cr.

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455. Higher-order (n > 3) reactions are rare due to:

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456. True or False : The half life Period for a first order reaction is independent of its initial Concentration.

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457. Fill in the blanks- ________ is an alloy which is used in the manufacture of lockers, fish plates of railways tracks, part of cutting machines.

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458. Assertion : For a second order reaction, graph of [A] vs. t is a straight line. Reason : For second order reaction, $[A] = kt + \frac{1}{[A]_0}$

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459. Molecularity of a reaction cannot be zero.

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460. A catalyst increases the rate of a reaction by:

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461. Assertion : The molecularity of the reaction $H_2 + Br_2 \rightarrow 2HBr$ is 2.

Reason : Order of the reaction 3/2.

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462. $Assertion$: For the reaction : $RCl + NaOH(aq) \rightarrow ROH + NaCl$, the rate of reaction is reduced, half when the concentration of RCl is reduced to to half cell.

$Reason$: The rate of reactions is represented by k[RCl] i.e., it is a first order reaction.

A. (a) Both assertion and reason are correct and reason is the correct explanation of the assertion.

B. (b) Both assertion and reason are correct and reason is not the correct explanation of the assertion.

C. (c) Assertion is correct but reason is incorrect.

D. (d) Assertion is incorrect but reason is correct.

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463. Which subatomic particle was discovered by : (i) Chadwick (ii) Thomson (iii) Goldstein

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464. Match the units in Column I with the type of reaction in Column II

Column I	Column II
(A) s^{-1}	(p) First order reaction
(B) $L^2 \, mol^{-2} \, s^{-1}$	(q) Second order reaction
(C) $L \, mol^{-1} \, s^{-1}$	(r) Third order reaction
(D) $mol \, L^{-1} \, s^{-1}$	(s) Zero order reaction

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465. Name the subatomic particle whose relative charge is : (a) +1

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466. The answer to each of the following question is a single- digit-integer ranging from 0 to 9. Darken the correct digit. The concentration of R in the reaction R $\rightarrow$ P was measured as a function of time and the following data is obtained :

[R] (molar)	1.0	0.75	0.40	0.10
t (min)	0.0	0.05	0.12	0.18

The order of the reaction is

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467. For a reaction : 2A $\rightarrow A_2$ the rate of reaction becomes 27 times when the concentration of A changes from x to 3x. The order of reaction is

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468. The rate of a reaction is expressed as : $3.65 \times 10^{-3} atm^{-1} s^{-1}$. The order of reaction

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469. The rate of a reaction of Br^- ions with BrO_3^- ions in the acidic medium is $rate = k[Br^-][BrO_3^-][H^+]^2$

The order of reaction

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470. The order of reaction is

$C_{12}H_{22}O_{11} + H_2O \rightarrow C_6H_{12}O_6 + C_6H_{12}O_6$

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471. An organic compound undergoes first-order decomposition. The time taken for decomposition to 1/8 and 1/10 of its initial concentration are $t_{1/8}$ and $t_{1/10}$ respectively. What is the value of $\frac{[t_{1/8}]}{[t_{1/10}]} \times 10$? (take $\log_{10} 2 = 0.3$)

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472. In dilute aqueous H_2SO_4, the complex diaquodioxalato ferrate (II) is oxidized by MnO_4^-. For this reaction, the ratio of the rate of change of $[H^+]$ to the rate of change of $[MnO_4^-]$ is

0	1	2	3	4	5	6	7	8	9

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473. The role of a catalyst in a chemical reaction is to change:

A. gibbs energy of reaction.

B. enthalpy of reaction.

C. activation energy of reaction.

D. equilibrium constant.

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474. 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.

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475. The activation energy of a 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.

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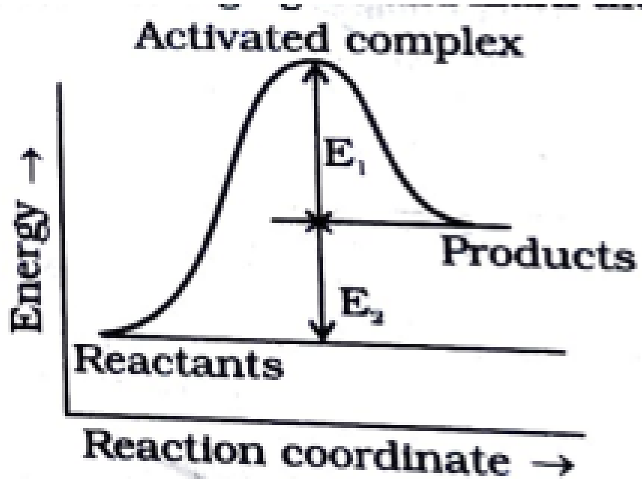
476. Consider the following figure and mark the correct option.



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.

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477. 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 â€˜tâ€™, total pressure of the System increased by x units and became â€˜p_t',. The rate constant & for the reaction is given as ___.

A. $\frac{2.303}{t} \log \frac{p_i}{p_i - x}$

B. $\frac{2.303}{t} \log \frac{p_i}{2p_i - p_t}$

C. $\frac{2.303}{t} \log \frac{p_i}{p_i - p_t}$

D. $\frac{2.303}{t} \log \frac{p_i}{p_i x}$

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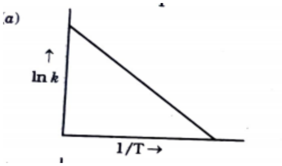
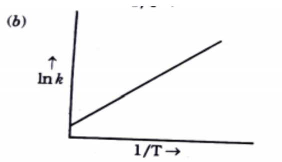
478. According to Arrhenius equation rate constant k is equal to $Ae^{-Ea/RT}$. Which of the following options represents the graph of In k vs $\frac{1}{T}$?

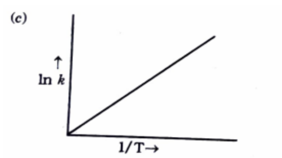
A.



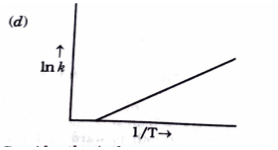
B.



C.



D.



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479. 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 temperatures .

C. Rate constant increases exponentially with decreasing activation energy and decreasing temperature.

D. Rate constant increases exponentially with decreasing activation energy and increasing temperature.

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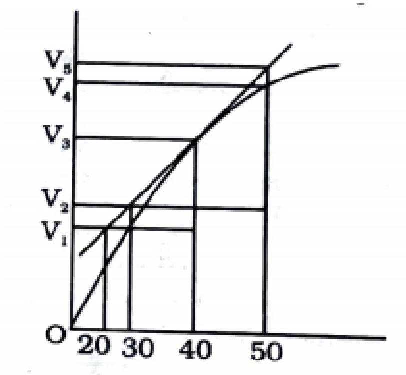
480. A graph of volume of hydrogen released Vs time for the reaction between zinc and dil.HCl is given in figure On the basis of this mark the correct option.



A. Average rate upto 40 seconds $\frac{V_3 - V_2}{40}$

B. Average rate upto 40 seconds is $\frac{V_3 - V}{40 - 30}$

C. Average rate upto 40 seconds is $\frac{V_3}{40}$

D. Average rate upto 40 seconds is $\frac{V_3 - V_1}{40 - 20}$

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481. 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.

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482. Consider the graph given in previous question. 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. $\frac{V_3 - V_1}{40 - 20}$

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483. Which of the following statements is correct?

A. The rate of a reaction decreases with passage of time as the concentration of reactants dereases.

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).

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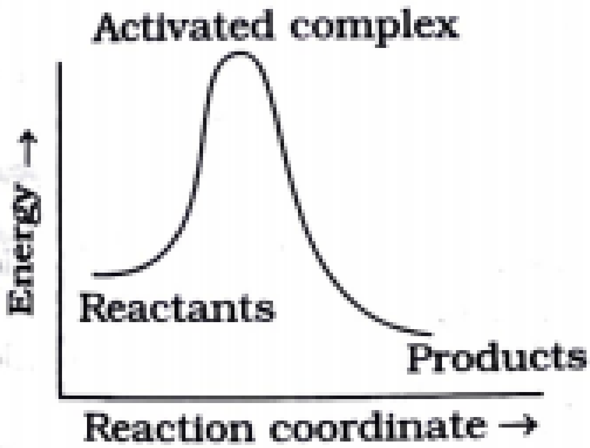
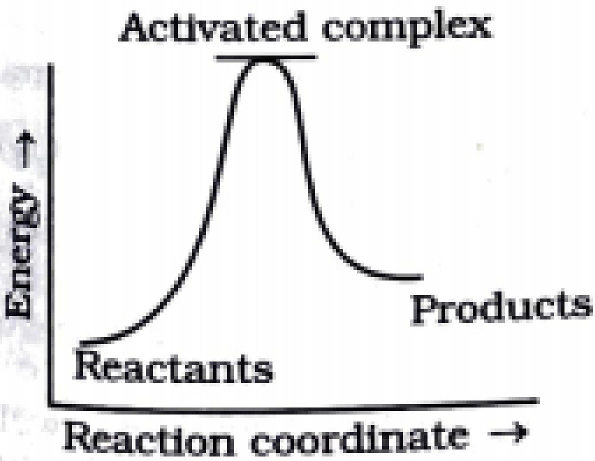
484. Which of the following graphs represents exothermic reaction?

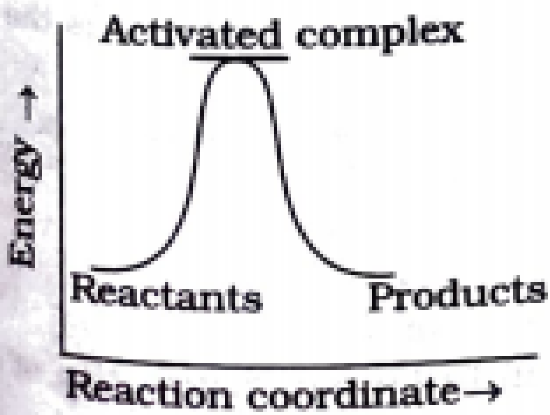
(i)



(ii)



(iii)



A. (i) only

B. (ii) only

C. (iii) only

D. (i) and (ii) only

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485. Rate law for the reaction $A+2B \rightarrow C$ is found to be rate = $k[A][B]$ concentration of reactant B is doubled, keeping the concentration of A constant the value of rate will be

A. the same

B. doubled

C. quadrupled

D. halved

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486. Which of the following statements is incorrect about the collision 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.

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487. A first order reaction taken 16 minutes for 50% completion. How much time will it take for 75% completion ?

A. $1.26 \times 10^{15} s$

B. $2.52 \times 10^{14} s$

C. $2.52 \times 10^{28} s$

D. infinite

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488. Compounds 'A' and 'B' react according to the following chemical equation. $A(g) + 2B(g) \rightarrow 2C(g)$ 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. $r = k[A]^2[B]^0$

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489. Which of the following statements are not correct regarding rate of catalyst in a chemical reaction

A. It catalyses the forward and backward reaction to the same extent.

B. It alters G 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.

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490. Define the following terms : 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.

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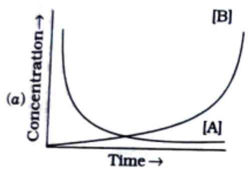
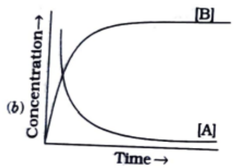
491. Consider the reaction A $\leftrightarrow$ B. The concentration of both the reactants and the products varies exponentially with time. Which of the following figures correctly describes the change in concentration of reactants and products with time?

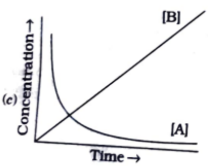
A.



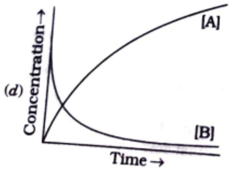
B.



C.



D.



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492. In the following questions two or more options may be correct. Rate law cannot be determined from balanced chemical equation if ______ .

A. reverse reaction is involved.

B. it is an elementary reaction.

C. it is a sequence of elementary reactions.

D. any of the reactants is in excess.

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493. Which of the following statements are applicable to a balanced chemical equation of an elementary reaction?

A. Order is same as molecularity.

B. Order is less than the molecularity.

C. Order is greater than the molecularity.

D. Molecularity can never be zero.

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494. What is the maximum number of electrons that can go into the N shell of an atom ?

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495. What is the electronic configuration of a hydrogen atom ?

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496. At high pressure the following reaction is zero order. $2NH_3(g) \xrightarrow[Platinum catalyst]{1130K} N_2(g) + 3H_2(g)$ Which of the following options are correct for this reaction?

A. Rate of reaction = Rate constant

B. Rate of the reaction depends on concentration of ammonia.

C. Rate of decomposition of ammonia will remain constant until ammonia disappears completely.

D. Further increase in pressure will change the rate of reaction.

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497. During decomposition of an activated complex

A. energy is always released

B. energy is always absorbed

C. energy does not change

D. reactants may be formed

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498. According to Maxwell Boltzmann distribution of energy, ______ ,

A. the fraction of molecules with most probable kinetic energy decreases at higher temperatures.

B. most probable kinetic energy increases at higher temperatures.

C. the fraction of molecules with most probable kinetic energy increases at higher temperatures.

D. most probable kinetic energy decreases at higher temperatures.

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499. Name the subatomic particle whose relative charge is : (b) –1

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500. Which of the following statements are in accordance with the Arrhenius equation?

A. Rate of a reaction increases with increase in temperature.

B. Rate of a reaction increases with decrease in activation energy.

C. Rate constant decreases exponentially with increase in temperature.

D. Rate of reaction decreases with decrease in activation energy.

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501. Fill in the blanks- _____,______,_____ are the things that are made of wood.

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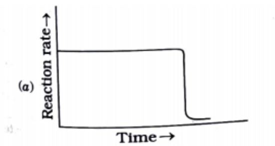
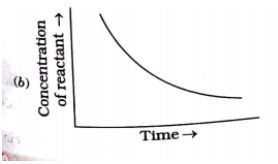
502. Which of the following graphs is correct for a zero order reaction?

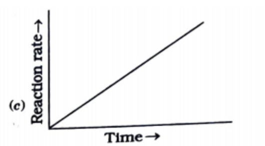
A.



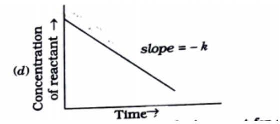
B.



C.



D.



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503. Name the subatomic particle whose relative charge is : (c) 0

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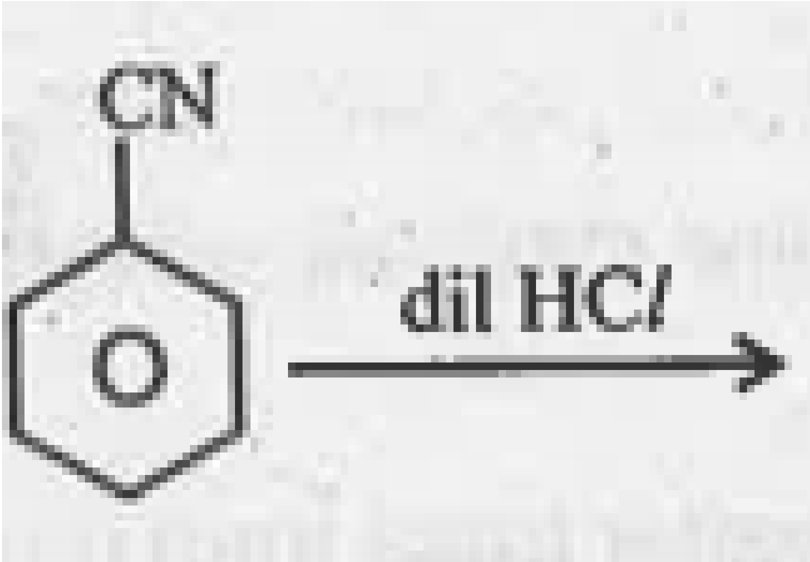
504. Complete the reaction



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505. Which shell of an atom can accommodate a maximum of : (a) 8 electrons ?

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506. Match the items of Column I and Column II.

Column I	Column II
(a) Diamond	(i) short interval of time
(b) Instantaneous rate	(ii) ordinarily rate of conversion is imperceptible
(c) Average rate	(iii) long duration of time

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507. Which shell of an atom can accommodate a maximum of : (b) 32 electrons

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508. Name the shell of an atom which can accommodate a maximum of : (a) 2 electrons

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509. Name the shell of an atom which can accommodate a maximum of : (b) 18 electrons

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510. Assertion : The enthalpy of reaction remains constant in the presence of a catalyst. Reason : A catalyst participating in the reaction, forms different activated complex and lowers down the activation energy but the difference in energy of reactant and product remains the same.

A. Both assertion and reason are true and reason is thhe correct explanation of assertion.

B. Both assertion and reason are true but reason is not the correct explanation of assertion.

C. Assertion is true but reason is false.

D. Assertion is false but reason is true.

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511. An element has an atomic number 12. How many electrons will be present in the K, L and M energy shells of its atom ?

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512. An element has atomic number 13 and an atomic mass of 27. (a) How many electrons are there in atom of the element ?

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513. Define activation energy of a reaction.

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514. Write the distribution of electrons in an atom of element whose atomic number is 18. What is special about the outermost electron shell (or valence shell) of the atom of this element ?

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515. For a chemical reaction $X \to Y$, the rate. increases by a factor 2.25 when the concentration of X is increased by 1.5. What is the order of reaction ?

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516. Can order of a reaction be fractional ? Give an example.

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517. Manganese steel is made up of mixture of__________.

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518. The decomposition of NH3 on platinum surface is zero order reaction. What are the rates of production of N_2 and H_2 if $k = 2.5 \times 10^{-4} mol L^{-1} s^{-1}$?

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519. Show that half life period of a first order reaction does not depend upon the initial concentration of reactants.

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520. A first order reaction is 15% complete in 20 minutes. How long will it take to complete 60%?

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521. What is the difference between instantaneous rate of a reaction and rate constant?

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522. A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is: reduced to half ?

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523. An element has atomic number 10 and an atomic mass of 22. Write the symbol of element. Find the number of neutron in it.

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524. A first order reaction has a rate constant of 0.0051 $\min^{-1}$. If we begin with 0.10 M concentration of the reactant, what concentration of reactant will remain in Solution after 3 hours ?

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525. Define the following terms : Pseudo first order reaction.

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526. what are the uses of chromium steel?

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527. What is the effect of temperature on the rate constant of a reaction? How can this effect of temperature on rate constant be represented quantitatively?

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528. During nuclear explosion, one of the products is ^{90}Sr with half-life of 28.1 years. If $1\mu g$ of ^{90}Sr was absorbed in the bones of a newly born baby instead of calcium, how much of it will remain after 10 years and 60 years if it is not lost metabolically.

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529. What is meant by order and molecularity of a reaction? How do these differ?

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530. An element has atomic number 10 and an atomic mass of 22. Write the symbol of element. Find the number of electron and proton in it.

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531. A reaction rate 18 first order in A and second order in B. How is its rate affected on increasing concentrations of A and B two and three times respectively?

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