



CHEMISTRY

BOOKS - ACCURATE PUBLICATION

CHEMICAL KINETICS

Multiple Choice Questions

1. The rate of a chemical reaction tells us about :

- A. the reactants taking part in the reaction
- B. the products formed in the reaction
- C. how slow or fast the reaction is taking place
- D. none of the above

Answer: C

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2. In the rate equation, when the concentration of reactants is unity then the rate is equal to :

- A. specific rate constant
- B. average rate constant
- C. instantaneous rate constant
- D. None of the above

Answer: A

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3. For a reaction $2A + B \rightarrow 2C$, rate equation is given as $\text{Rate} = k[A^2]B$, which of the following statement is correct :

- A. the order with respect to A is 1 and the order overall is 1.

B. the order with respect to A is 2 and the order overall is 2.

C. the order with respect to A is 2 and the order overall is 3.

D. the order with respect to B is 2 and the order overall is 2

Answer: C

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4. Suppose the reaction : $A + 2B \rightarrow AB_2$, occurs by the following mechanism:

Step 1: $A + B \rightarrow AB$ slow

Step 2: $AB + B \rightarrow AB_2$ fast

Overall : $A + 2B \rightarrow AB_2$

The rate law expression must be, Rate =

A. $k[A]$

B. $k[B]$

C. $k[A][B]$

D. $k_i[B]^2$

Answer: C

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5. State whether the statement is true or false- Rusting of iron is faster in costal areas than the desert areas.

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6. Why rate of reaction increases when the concentration of reactant molecules is increased ?

A. the average kinetic energy of molecules increases.

B. the frequency of molecular collisions increases.

C. the rate constant increases.

D. the activation energy increases.

Answer: B

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7. Fill in the blanks- Forming of curd is a _____ and an _____ change.

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8. If a reaction requires two moles of a single reactant to produce one mole of product, what is the ratio of the rate of product formation to the rate of reactant consumption ?

A. 2 : 1

B. 1 : 2

C. 1 : 1

D. Cannot be determined

Answer: B

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9. The value of average rate approaches the value of instantaneous rate for a reaction :

- A. at the start of the reaction
- B. at the end of the reaction
- C. in the middle of the reaction
- D. when the length of time interval approaches zero

Answer: D

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10. The rate law for the reaction $A + B \rightarrow \text{Product}$, is given by the expression $k[A][B]$. If the concentration of B is increased from 0.1 to 0.3 mol/L, keeping the value of A at 0.1 mol/L, the rate constant will be:

- A. K
- B. K/3
- C. 3K
- D. 9K

Answer: A

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11. In the given elementary reaction $2A + B \rightarrow A_2B$, if the concentration of A is doubled and that of B is halved, then the rate of the reaction will:

- A. increase 2 times

B. increase 4 times

C. decrease 2 times

D. remain the same

Answer: A

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12. Higher-order ($n > 3$) reactions are rare due to:

A.

B.

C.

D.

Answer: C

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13. Give one example where both chemical and physical changes occur together?

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14. The rate-determining step is :

- A. The slowest step in a mechanism
- B. The fastest step in a mechanism
- C. A fictional reaction added to every mechanism
- D. None of the above

Answer: A

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15. A catalyst:

- A. actually participates in the reaction
- B. always increases the activation energy for reaction
- C. does not affect a reaction energy path
- D. always decreases the rate for are action

Answer: A

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16. A catalyst alters, which of the following in a chemical reaction?

- A. Entropy
- B. Enthalpy
- C. Internal energy
- D. Activation energy

Answer: D

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17. In the presence of a catalyst, the heat evolved or absorbed during the reaction :

- A. Increases
- B. Decreases
- C. Remain sun changed
- D. May increase or decrease

Answer: C

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18. In the formation of SO_2 by contact process : $2SO_2 + O_2 \rightarrow 2SO_3$, the rate of disappearance of O_2 is $2.5 \times 10^{-4} molL^{-1} s^{-1}$. The rate of formation of SO_3 will be:

A. $-5.0 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$

B. $-1.25 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$

C. $3.75 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$

D. $5.00 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$

Answer: D



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19. The formation of gas at the surface of tungsten due to adsorption is the reaction of order :

A. 0

B. 1

C. 2

D. in sufficient data

Answer: A



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

A. $\text{rate}=3$

B. $\text{rate}=k[A]$

C. $\text{rate} = k[A]^2$

D. $\text{rate} = k[A][B][C]$

Answer: D



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21. Molecularity of a reaction is equal to the total number of

A. Products formed in the elementary step

B. Reactants taking part in elementary step

C. Reactants and products in the elementary step

D. Reactants and products in the final step

Answer: B

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22. The elementary processes with molecularity greater than are not known.

A. 1

B. 2

C. 3

D. 0

Answer: C

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23. Which of the following statement is incorrect about the molecularity of are action ?

- A. It is a theoretical concept
- B. Each step of a multi-step reaction has a unique molecularity
- C. It is equal to the total number of reactants taking part in elementary step
- D. It can be zero, fractional or integer

Answer: D



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24. The effective collisions between the reactant molecules at higher temperatures _____.

- A. Increase
- B. Decrease
- C. Remains same
- D. First increase then decrease

Answer: A

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25. Molecularity of are action

- A. is always equal to the overall order of reaction
- B. May not be equal to the order of reaction
- C. Can be equal to the overall order of reaction
- D. Both (b) and (c)

Answer: D

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26. 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 be zero

Answer: A



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27. State whether the statement is true or false- Burning of wood is a chemical change.



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28. State whether the statement is true or false- To prevent an iron gate from rusting, it should be painted with a paint.

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

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30. For a reaction: $H_2 + Cl_2 \rightarrow 2HCl$. Write molecularity of this reaction

- A. Two
- B. Three
- C. Four
- D. One

Answer: A



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31. What are the units of k for the rate law : $\text{Rate} = k[A][B]^2$, when the concentration unit is mol/L ?

A. s^{-1}

B. s

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

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

Answer: D



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32. The rate of reaction, $A + B \rightarrow \text{Products}$, is given by the equation, $r = k[A][B]$. If B is taken in excess, what would be the order of reaction ?

A. 2

B. 1

C. zero

D. unpredictable

Answer: B



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33. 50 % of first order reaction gets completed in 16 minutes. What fraction of the reaction would occur in 32 minutes :

A. 66 %

B. 75 %

C. 25 %

D. 90 %

Answer: B



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

A. Yes

B. No

C. Cannot be determined

D. Data Inadequate

Answer: B



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

- A. Bimolecular reaction becomes kinetically first order when one of the reactants is in excess.
- B. Bimolecular reaction becomes kinetically first order when one of the reactants is in lesser amount.
- C. Cannot be determined
- D. When both reactants are in excess.

Answer: A



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36. For which type of reactions, molecularity have value = 2 ?

- A. Elementary
- B. Bimolecular
- C. Trimolecular
- D. Tetramolecular

Answer: B

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

- A. No
- B. Yes
- C. Data Inadequate
- D. Cannot be determined

Answer: A

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38. What are the elements of the weather?

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39. For a reaction $\text{Rate} = k(\text{acetone})^{3/2}$ then unit of rate constant will be

A. $(\text{molL}^{-1}\text{s}^{-1})$

B. $(\text{mol}^{-1/2}\text{L}^{1/2}\text{s}^{-1})$

C. $(\text{mol}^{1/2}\text{L}^{1/2}\text{s}^{-1})$

D. (molLs^{-1})

Answer: B

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40. What is the reason behind that some areas have very dry and hot climate through out the year?

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41. A zero order reaction is one in which the rate of reaction:

- A. is dependent on concentration of only one reactant.
- B. is independent of concentration of reactants.
- C. is dependent on concentration of catalyst
- D. none of the above.

Answer: B

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42. Units of rate constant for zero order reaction in case of gaseous reactions is

A. s^{-1}

B. atms^{-1}

C. $\text{atm}^{-1}\text{s}^{-1}$

D. $\text{atm}^{-2}\text{s}^{-1}$

Answer: B

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

A. it becomes two times

B. it is halved

C. it remain sun changed

D. it becomes four times

Answer: C

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

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45. Give one example of zero order reaction.

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46. Unit of rate constant for zero order reaction is

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

B. S^{-1}

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

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

Answer: A

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

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

B. $t_{1/2} = [A]_0/2K$

C. $t_{1/2} = 1/k[A]_0$

D. none of the above.

Answer: B

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48. In the rate equation, when the concentration of reactants is unity then the rate is equal to :

- A. specific rate constant
- B. average rate constant
- C. instantaneous Rate constant
- D. none of the above

Answer: A

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49. For a reaction, $A \rightarrow$ products to be zero order. If time taken for 50 % completion is 2 mins, find the time required for 75 % completion of reaction.

- A. 2 min

B. 3 min

C. 15 min

D. none of the above

Answer: B

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50. Which are the two regions of the earth with extremely hot and extremely cold climatic conditions?

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51. Which property is used for determination of molar mass of colloids, polymers and proteins

A. when there are two reactants

B. when there is only one reactant

C. when there are more than two reactants

D. all of these

Answer: B

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52. State whether the statement is true or false- The climate of any particular area changes frequently but weather does not.

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53. State whether the statement is true or false- Tropical rainforests there is a large number of population of animals.

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54. If a is the initial concentration of the reactant what is the time required for 100 % completion of a zero order reaction

A. a/k

B. $a \cdot k$

C. $a/2k$

D. none of these.

Answer: A



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55. A photochemical reaction which is example of zero order is

A. decomposition of N_2O_5

B. formation of HCl

C. inversion of sucrose

D. hydrogenation of ethane

Answer: B

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56. Explain the following statement- Animals adapt themselves according to the climatic conditions they are living in.

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57. The plot of $[R]$ (concentration) versus t (time) for a zero order reaction is

A. straight line

B. hyperbola

C. parabola

D. none of these

Answer: A



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

A. rate = $k[A]^0[B]^0$

B. rate = $k[A]^{1/2}[B]^0$

C. rate = $k[A]^2[B]^0$

D. none of the above

Answer: A



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59. 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. same
- B. doubled
- C. quadrupled
- D. halved

Answer: A



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60. How elephant is adapted to live in tropical rainforests?



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61. A first order reaction has specific reaction rate 10^{-2} s^{-1} . How much time it will take for 20 g of reactant to reduce to 5 g?

A. $138.6s$

B. $346.5s$

C. $693.0s$

D. $238.6s$

Answer: A



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62. If conc, of reactant 'A' is increased 10 times and rate of reaction becomes 100 times, What is order with respect to 'A'?

A. 1

B. 2

C. 3

D. 4

Answer: B

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63. Fill in the blanks- Wind is _____

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64. 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. $2 \times 10^{-4} s^{-1}$

Answer: A

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

A. zero

B. 3

C. 2

D. 1

Answer: D

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66. Half life period of a first order reaction depends upon :

A. 1. Concentration of reactants

B. 2. Concentration of products

C. 3. Rate constant of reaction

D. 4. None of these

Answer: C

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

A. directly proportional to the initial concentration of reactant

B. half of the rate constant

C. same for all reactions

D. independent of the initial concentration of the reactants

Answer: D

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68. 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

Answer: B



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69. What is the difference between air and wind?



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70. Near the earth surface, _____ air rises up and _____ air comes down.

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71. 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. $2.303 \times 10^{-4} \text{ sec}^{-1}$

B. $4.606 \times 10^{-14} \text{ sec}^{-1}$

C. $5.000 \times 10^{-3} \text{ sec}^{-1}$

D. $5.000 \times 10^{-4} \text{ sec}^{-1}$

Answer: D

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72. Would you like to buy a house having windows but no ventilators?

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73. What is the composition of soil?

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74. which type of soil has the highest capacity to hold maximum water?

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75. Explain the term- Weathering?

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76. Which soil is useful for wheat and paddy crops?

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77. If the rate constant for a first order reaction is k , the time (t) required for completion of 99 % of the reaction is given by

A. $t = 2.303/k$

B. $t = 180.693/k$

C. $t = 6.909/k$

D. $t = 4.606/k$

Answer: D

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78. Which type of crops can be grown on sandy soil?



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79. If the half life period of a first order reaction is 100 seconds, then rate constant will be

A. $6.93 \times 10^{-3} s$

B. $6.93 \times 10^{-2} s$

C. $0.693s$

D. $6.93s$

Answer: A



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80. Fill in the blanks- The process in which the upper fertile layer of soil is removed by strong wind and flowing water is called_____.



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81. The activation energy for the reaction if $k = A$ is

A. 0

B. ?

C. 1

D. none of these

Answer: A



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82. The activation for the reverse reaction XY, if YX is an exothermic reaction and E_a for Y is 39.5 kJ per mole and the heat of the reaction is 71.7 kJ

A. 111.2

B. 32.2

C. 91.2

D. 47.2

Answer: A

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83. The activation energy for the forward reaction in case of exothermic reaction :

- A. less than backward reaction
- B. more than backward reaction
- C. same for both
- D. uncountable

Answer: A

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84. State whether the statement is true or false- We eat leaves of paddy crop.

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85. By determining the rate constants at two temperatures, we will be able to

- A. determine the rate constant at standard temperature
- B. determine Activation energy of a chemical reaction
- C. determine probability of collision.
- D. all of above.

Answer: B

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86. By plotting the graph between $\log k$ vs $\frac{1}{T}$ for first order reaction gives straight line having slope - 4670 K. The activation energy for this reaction is :

A. 89.417 J mol

B. $89417.1 \text{ J mol}^{-1}$

C. $89.417 \text{ K J mol}^{-1}$

D. $89417.1 \text{ K J mol}^{-1}$

Answer: C



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87. Fill in the blanks- We eat _____ and _____ of the mustard plant.



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88. Rate of a reaction can be expressed by Arrhenius equation as

$k = Ae^{-\frac{E_a}{RT}}$. In this equation, E_a represents:

- A. the energy below which colliding molecules will not react.
- B. the total energy of the reacting molecules at a temperature
- C. the fraction of molecules with energy greater than the activation energy.
- D. the energy above which all the colliding molecules will react.

Answer: A



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89. In respect of the equation $K = Ae^{-E_a/RT}$ in chemical kinetics, which one of the following statements is correct?

- A. k is equilibrium constant

B. A is adsorption factor.

C. E_a is energy of activation

D. R is Rydberg's constant

Answer: C

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90. The rate of chemical reaction becomes double for every 10° rise in temperature because of

A. increase in activation energy

B. decrease in activation energy

C. increase in number of molecular collisions

D. increase in number of activated molecules

Answer: D

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91. The increase in concentration of the reactant leads to change in :

- A. dH
- B. collision frequency
- C. activation energy
- D. none of these.

Answer: B



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92. In Arrhenius equation graph of $\log k$ vs $(1/T)$ has slope equals to

- A. $-E_a / 2.303R$
- B. E_a / R
- C. $E_a / 2.303R$

D. $-E_a/R$

Answer: A

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93. The activation energy of a reaction is 56.2 kJ/mol. The ratio of the rate constant at 300 K and 305 K is $(R = 8J\text{mole}^{-1}K^{-1})$ about :

A. 1.25

B. 1.5

C. 1.10

D. 1.60

Answer: B

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94. The chemical reactions in which the reactants require high amount of activation energy are generally

- A. fast
- B. slow
- C. instantaneous
- D. none of these.

Answer: B

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95. Effective collisions are when

- A. molecules have attained the threshold energy
- B. the molecules are in proper orientation
- C. products are formed

D. all the above.

Answer: D



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96. What type of reactions are represented by following equation : $2\text{Ca} + \text{O}_2 \rightarrow 2\text{CaO}$



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97. What type of reactions are represented by following equation : $2\text{Na} + \text{O}_2 \rightarrow \text{Na}_2\text{O}$



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98. Although combustion of fuels is exothermic reaction, yet these can be stored in contact of air and oxygen. This is mainly due to :

- A. fuels have high activation energy
- B. fuels have poor energy absorbing power
- C. fuels have low activation energy
- D. combustion of fuels have no relation with activation energy.

Answer: A

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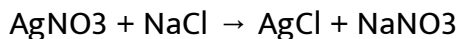
99. Which of the following reactants in presence of $AlCl_3$ gives acetophenone ?

- A. both 1 and 4
- B. both 2 and 3
- C. 1, 2 and 3
- D. 1,2,3 and 4

Answer: B

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100. What type of reactions are represented by following equation :



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

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

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

C. 20s^{-1}

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

Answer: A



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

A. $-Ea / R$

B. $-Ea / 2.303R$

C. $-20303 / Ea \cdot R$

D. $-Ea / 2.303$

Answer: A



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103. The units of rate constant for a zero order reaction is

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

B. s^{-1}

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

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

Answer: A

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104. 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}

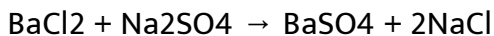
C. 10s^{-1}

D. 10^2s^{-1}

Answer: A

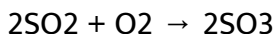
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105. What type of reactions are represented by following equation :



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106. What type of reactions are represented by following equation :



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

A. $\ln 2 / k$

B. $1/ka$

C. $\ln k/2$

D. $\log k/2$

Answer: A

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

A. $\log k_2/k_1 = 2.303/EaR[1/T_1 - 1/T_2]$

B. $\log k_2/k_1 = Ea/2.303R[1/T_1 - 1/T_2]$

C. $\log k_1/k_2 = Ea/2.303R[1/T_1 - 1/T_2]$

D. $\log k_1/k_2 = Ea/2.303[1/T_1 - 1/T_2]$

Answer: B

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109. The rate constant of a reaction is $1.2 \times 10^{-5} \text{ mol}^{-2} \text{ litre}^2 \text{ s}^{-1}$. The order of the reaction is:

A. Zero

B. 1

C. 2

D. 3

Answer: D



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

A. $kt = [A] / [A]_0$

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

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

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

Answer: C

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111. Fill in the blanks- Example of flowers with joint sepals are _____ and _____

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

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

Answer: B

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

A. $2k / [A]_0$

B. $[A]_0 / 2k$

C. $0.693 / k$

D. $0.693 / k[A]_0$

Answer: B

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114. 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. $27x$

Answer: C



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115. 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

Answer: B

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116. For a reaction having rate law expression $\text{Rate} = k[A]^{3/2}[B]^{-1/2}$. 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

Answer: A



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117. 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

Answer: B



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118. 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

Answer: C



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119. The rate of chemical reaction double for every 10°C rise of temperature if the temperature is raised by 50°C , the rate of the reaction increases by

A. 10 times

B. 24 times

C. 32 times

D. 64 times

Answer: C



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120. What is the activation energy for a reaction if its rate double when the temperature raised from $20^{\circ}C$ to $35^{\circ}C$? ($R = 8.314J/mol/K$)

A. $34.7kJ/mol$

B. $15.1kJ/mol$

C. $342kJ/mol$

D. $269kJ/mol$

Answer: A



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121. 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 reaction is instantaneous

Answer: B

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122. 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

Answer: B

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

A. $2k_1 / k_2 [NO_2]$

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

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

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

Answer: C

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1 Mark Questions

1. What are the units of rate constant for a third order reaction ?

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2. Unit of rate constant for zero order reaction is

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3. Give one example of zero order reaction.

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4. What is Pseudo first order reaction and gives its example.

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5. Which factor Rate of reaction depends upon ?

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

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7. Draw the diagram for reactant change its concentration with time?

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8. What is order of reaction ? Explain.

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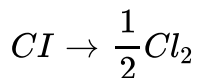
9. Example for first order reaction.

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10. Molecularity of are action

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11. What is molecularity of reaction



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

?

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13. Derive the integrated rate law equation for 1^{st} order reaction and write its one use.

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14. Define half life period of a reaction.

 [Watch Video Solution](#)

15. What is activation energy ?

 [Watch Video Solution](#)

16. Define catalyst.

 [Watch Video Solution](#)

17. Why ΔG is positive for photochemical reaction ?

 [Watch Video Solution](#)

18. A catalyst :

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19. What are Enzymes ? Give important characteristics of enzyme catalysis.

 [Watch Video Solution](#)

20. Name the enzyme which converts starch into maltose.

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21. Name the enzyme which converts starch into maltose.

 [Watch Video Solution](#)

22. Name the enzyme which converts glucose into alcohol.

 [Watch Video Solution](#)

23. Name the enzyme which converts sucrose into glucose and fructose.

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24. what is enzyme catalysis?

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

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

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3. Define zero order reaction. Derive integrated rate equation for rate constant of a zero order reaction.

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

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

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

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7. Discuss key concept of evolution theory of Darwin.

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8. What are two main points of collision theory?

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9. what is Arrhenius equation .

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Numerical Of Half Life Time Period

1. 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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2. A first order reaction takes 23.1 minutes for 50% completion. 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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3. The rate constant for a first order reaction is 60S^{-1} . How much time will it take to reduce the concentration of the reactant to $\frac{1}{20^{\text{th}}}$ of its initial value ?

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

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

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

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Arrhenius Equations

1. 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.

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

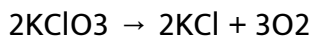
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2. The rate constant of a reaction at 700K and 760K are $0.011\text{M}^{-1}\text{s}^{-1}$ and $0.105\text{M}^{-1}\text{s}^{-1}$ respectively. Calculate the value of

Arrhenius parameter.

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3. What type of reactions are represented by following equation :



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4. Bicyclohexane was found to undergo two parallel first order rearrangements. At 730 K, the first order rate constant for the formation of cyclohexene was measured as $1.26 \times 10^{-4} \text{sec}^{-1}$, and for the formation of methyl cyclopentane the rate constant was $3.8 \times 10^{-5} \text{sec}^{-1}$. What is the percentage distribution of therearrangement products?

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5. A first order reaction has a rate constant value 10^{-3} s^{-1} . How much time will it take for 10 g of the reactant to reduce to 2.5 g.

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6. For the following data for the zero order reaction $A \rightarrow \text{products}$.

Calculate the value of k .

Time(min)	[A]
0.0	0.10M
1.0	0.09M
2.0	0.08M

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7. The reaction $2A + B + C \rightarrow D + 2E$ is of first order with respect to A and of second order with respect to B and is of zero order with respect to C

Write down the rate law for the reaction

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8. A substance reacts according to the law of first order reaction the velocity constant of the reaction is 1.0×10^{-2} per sec. If initial conc. of the substance is 0.1 M

Find out the initial rate

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

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10. The reaction $2NO_2O_5 \rightarrow 4NO_2 + O_2$ forms NO_2 at the rate of $0.0072 \text{ mol L}^{-1} \text{ s}^{-1}$ after a certain time.

What is the rate of change of $[O_2]$ at this time?

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11. 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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Topic Chemical Kinetic

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

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3. A first order reaction is 40% complete in 50 minutes. How long will it take to be 80% complete.

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4. The rate constant for the first order reaction becomes three times when the temperature is raised from 20°C to 50°C . Calculate the energy of activation for the reaction.

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5. The rate constant for a first order reaction becomes double when the temperature is raised from 300 K to 400 K . Find the activation energy.

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6. The rate constant for a first order reaction becomes six times when the temperature is raised from 350 K to 400 K. Calculate activation energy for the reaction.

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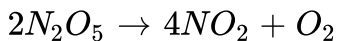
7. For the reaction : $N_2 + 3H_2 \rightarrow 2NH_3$ The rate of reaction measured as $\frac{\Delta[NH_3]}{\Delta t}$ we found to be $2 \times 10^{-4} molL^{-1} sec^{-1}$. Calculate the rate of reaction expressed in terms of N_2 .

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8. 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 $1.01 \times 10^{-2} min^{-1}$. Calculate the rate of reaction when $[H_2O_2] = 0.15 molL^{-1}$

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9. For the reaction :



the rate of reaction measured as $\frac{\Delta[NO_2]}{\Delta t}$ was found to be

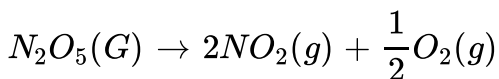
$4 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$. Calculate the rate of reaction, expressed in

terms of N_2O_5

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10. 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,

$$k = 6.2 \times 10^{-4} \text{ s}^{-1}$$



Calculate the rate of reaction when

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

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11. For Reaction : $3H_2 + N_2 + 2NH_3$. Find rate of H_2 If rate of reaction

is $\frac{\Delta[NH_3]}{\Delta t} = 2 \times 10^{-4} \text{ mol L}^{-1} \text{ S}^{-1}$

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12. Give the unit of third order rate constant.

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13. Unit of rate constant for zero order reaction is

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14. The rate of constant of reaction at $300K/320K$ are $5 \times 10^{-4} \text{ s}^{-1}$ and $2.0 \times 10^{-3} \text{ s}^{-1}$ respectively. Calculate the value of activation energy of reaction.

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15. Write the general reaction rate constant for nth order.

$$(\text{molL}^{-1})^{1-n} \text{sec}^{-1}.$$

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

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17. The units of rate constant for first order equation.

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18. The rate constants of a reaction at 300 and 320 K are 0.0231s^{-1} and 0.0693s^{-1} respectively. Calculate the value of activation energy of

the reaction. $[R=8.314] K^{-1} mol^{-1}, \log 3 = 0.4771]$

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19. For a chemical reaction $X \rightarrow Y$, 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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20. 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

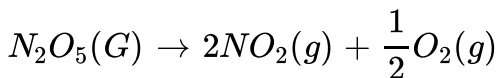
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21. For a chemical reaction $A \rightarrow B$, the rate of reaction doubles when the concentration of A is doubled. What is the order of reaction ?

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22. 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,

$$k = 6.2 \times 10^{-4} \text{ s}^{-1}$$



Calculate the rate of reaction when

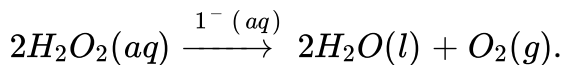
$$[N_2O_5] = 2.50 \text{ mol L}^{-1}$$

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23. For a chemical reaction $R \rightarrow P$, the rate of reaction does not change when the concentration of R is changed. What is the order of reaction ?

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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 :



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. A first order reaction taken 16 minutes for 50% completion. How much time will it take for 75% completion?

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26. A first order reaction taken 32 minutes for 50% completion. How much time will it take for 90% completion ?

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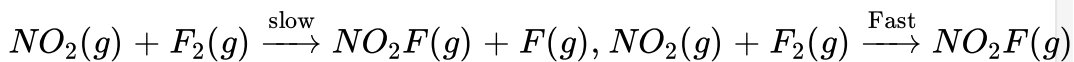
27. A first order reaction taken 45.4 minutes for 50% completion. How much time will it take for 60% completion ?

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28. Rate constant for a first order reaction is $60s^{-1}$. How much time will it take to reduce the concentration of the reaction on $\frac{1}{10}$ th of its initial value.

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29. Reaction between NO_2 and F_2 to give NO_2F takes place by the following mechanism:



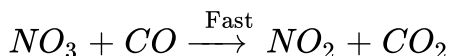
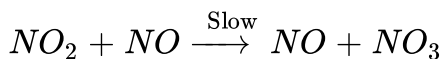
Write the rate expression and order of the reaction.

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

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31. Reaction between NO_2 and CO to give CO_2 takes place by the following mechanism :



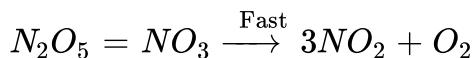
Write the rate expression and order of the reaction.

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32. 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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33. Thermal decomposition of dinitrogen pentoxide takes place by the following mechanism :



Write the rate expression and order of the reaction.

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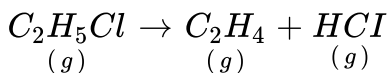
34. A reaction is of first order in reactant A and of second order in reactant B. How is rate of reaction affected when

(a) Concentration of B alone is increased to three times.

(b) The concentration of A as well as B is doubled.

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35. State the order with respect to each reactant and overall order for following reaction. Also give units of rate constant



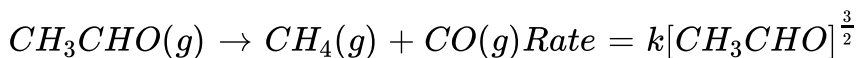
$$\text{Rate} = K[C_2H_5Cl]$$

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36. For a chemical reaction temperature ranges from 650 K to 750 K with rate constant 2.15 to 2.39. Find Activation Energy.

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37. From the rate expression for the following reactions, determine their order of reaction and the dimensions of the rate constants:



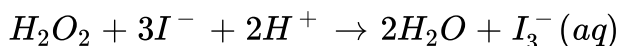
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38. In general it is observed that the rate of a chemical reaction becomes double for every 10° rise in temperature. If this generalisation holds for a reaction in the temperature range 2908 K to 398 K, what would be the value of activation energy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

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

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



$$\text{Rate} = k[H_2O_2][I^-]$$

What are the units of rate constant?

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40. The rate constant for first order reaction becomes six times when the temperature is raised from 50 K to 400 K. Calculate the activation energy for the reaction. ($R = 8.314 \text{ J/K/mol}$)

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41. 60% of a first order reaction was completed in 60 minutes. When was it half completed ?

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42. 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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43. 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.



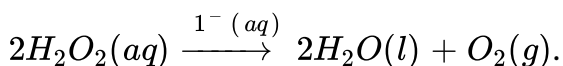
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44. 1^{st} order reaction Find the rate constant for the reaction having initial and final concentration are 11.9 and 4.15 at 20 minutes.



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



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

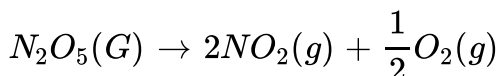
(a) Calculate the rate of reaction when $[H_2O_2] = 0.4 \text{ mol lit}^{-1}$.

(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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46. 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,

$$k = 6.2 \times 10^{-4} \text{ s}^{-1}$$



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

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

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

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

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

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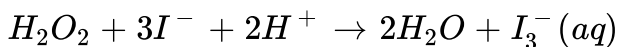
48. A first order of reaction is found to have a rate constant, $k = 5.5 \times 10^{-14} \text{ s}^{-1}$. Find half life of reaction.

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49. The half-life period of a chemical reaction is 1443.6 sec, find out k for this reaction.

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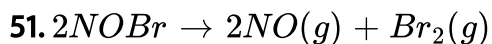
50. State the order with respect to each reactant and overall order for the following reaction :



$$\text{Rate} = K[H_2O_2][I^-]$$

What are the units of rate constant?

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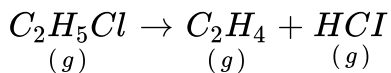


$$\text{Rate} = k[NOBr]_2$$

What are the units of rate constant.?

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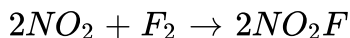
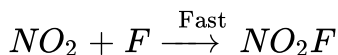
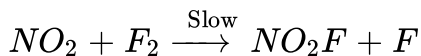
52. State the order with respect to each reactant and overall order for following reaction. Also give units of rate constant



$$\text{Rate} = K[C_2H_5Cl]$$

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53. Reaction between NO_2 and F_2 to give NO_2F takes place by the following mechanism



write order of reaction.

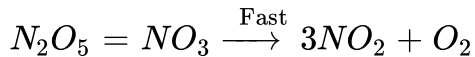
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54. Calculate two third life of first order reaction having $K = 5.48 \times 10^{-14} s^{-1}$.

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55. Thermal decomposition of dinitrogen pentoxide takes place by the following mechanism :





Write the rate expression and order of the reaction.

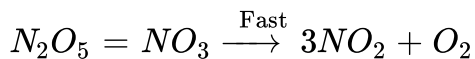
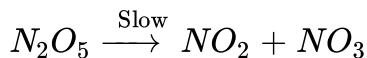
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56. The rate constant for the first order reaction is $3.0 \times 10^{-4} \text{ min}^{-1}$.

How long will it take for 1/5th of reaction to be left behind ?

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57. Thermal decomposition of dinitrogen pentoxide takes place by the following mechanism :



Write the rate expression and order of the reaction.

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58. 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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59. A first order reaction is 20% complete in 20 minuts. Calculate the time it will take the reaction to complete 80%.

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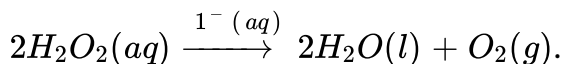
60. A first order reaction is 20% complete in the 10 minutes. Calculate the time period for 75% completion of the reaction.

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61. Calculate the time required for the completion of 90% of a reaction of first order kinetics, $t_{\frac{1}{2}} = 44.1$ minutes.

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



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

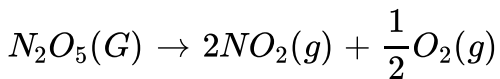
(a) Calculate the rate of reaction when $[H_2O_2] = 0.4 \text{ mol lit}^{-1}$.

(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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63. 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,

$$k = 6.2 \times 10^{-4} \text{ s}^{-1}$$



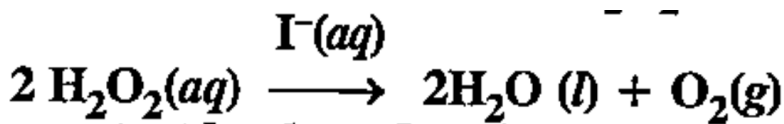
Calculate the rate of reaction when

$$[\text{N}_2\text{O}_5] = 2.50 \text{ mol L}^{-1}$$

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64. The decomposition of H_2O_2 , in the presence of Iodide ion has been found to be first order in H_2O_2 .

The rate constant has been found to be $1.01 \times 10^{-2} \text{ min}^{-1}$. What concentration of H_2O_2 would give rate of $1.12 \times 10^{-2} \text{ mol L}^{-1} \text{ min}^{-1}$?



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65. The rate law for a reaction is

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

Can the reaction be an elementary reaction. Explain.

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66. Calculate the e.m.f. of the following cell at 298 K, $M \text{ g} \mid \mid M \text{ g}^{2+} + (0.130 \text{ M}) \mid \mid \mid A \text{ g} + (1.0 \times 10^{-4} \text{ M}) \mid \mid A \text{ g}$

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

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68. Find the half life period of first order reaction whose rate constant, $k = 4.93 \times 10^{-4} \text{ s}^{-1}$.

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69. The rate constant for a first order reaction is 90 s^{-1} . How much time will it take to reduce the concentration of the reactant to $\frac{1}{20^{\text{th}}}$ of its initial value?

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