CHEMISTRY

BOOKS - MODERN PUBLICATION

CHEMICAL KINETICS

Exercise

1. A catalyst has no effect on

A. rate of forward reaction

B. activation energy

C. threshold energy

D. beat of reaction

Answer: D

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2. For the reaction $A \rightarrow B + C$, $\Delta H = +25kJ$ mole The activation energy for the reaction is

A. 25kJ/mole

B. less than 25 kJ/mole

C. more than25kJ/mole

D. none of these

Answer: C

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3. The rate constant of a reaction is $2.5 \times 10^{-2} mo \leq^{-1} lit \sec^{-1}$. The order of the reaction is

A. zero

B. 1st

C. 2nd

D. 3rd

Answer: C

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4. The reaction

$$CH_3COOC_2H_5 + H_2O \rightarrow \left(H^+\right)CH_3COOH + C_2H_5 - OH$$

is an example of

A. zero order reaction

B. 1st order reaction

C. 2nd order reaction

D. fractional order reaction

Answer: B

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5. The rate of reaction is independent of

A. Temperature

B. Concentration of reactant

C. Catalyst

D. none of these

Answer: D

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6. For every $10^{\circ} C$ rise in temperature the rate of reaction increases nearly

A. 10 times

B. 2 times

C. 5 times

D. 8 times

Answer: B

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7. In the synthesis of NH_3 from N_2 and H_2 the Catalyst used is

A. Mo

B. Ni

C. Fe

D. Mn

Answer: C

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8. The unit of rate constant for 2nd order reaction is

A. $mo \leq lit^{-1} \sec^{-1}$

B. $mo \leq^{-1} lit \sec^{-1}$

C. $mo \leq^{-1} lit^{-1} \sec^{-1}$

D. $mo \leq^{2} lit^{2} \sec^{-1}$

Answer: B

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9. The inverse of sucrose is a reaction of

A. 1st order

B. zero order

C. 2nd order

D. 3rd order

Answer: A

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10. The rate constant of a reaction depends upon

A. Temperature

B. Catalyst

C. conc. of reactant

D. all of these

Answer: C

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11. Temperature dependent equation can be written as

A. $\ln k = \ln A - \frac{E_a}{R}T$

B. ln k = ln A - E_(n)/RT

C. ln k= ln A - RT/E_(a)

D. none of these

Answer: A

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12. A catalyst can

A. Increase the rate of reaction

B. Initiate a chemical reaction

C. decrease the activation energy

D. do all the above

Answer: D

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13. For a 1st order reaction log K is plotted against $\frac{1}{T}$ and, the slope of the line is $-1.5 \times 10^2 K$. The activation energy for the reaction would be

A. 2872 $Jmo \leq^{-1}$

B. 28.72 $Jmo \leq^{-1}$

C. 1914 $Jmo \leq^{-1}$

D. 1200 $Jmo \leq^{-1}$

Answer: A

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14. The half-life period of a first order reaction is 0.0693 seconds. What is rate constant ?

A. 0.01 $\sec^{-1}$

B. 0.1 $\sec^{-1}$

C. 1$\sec^{-1}$

D. 10 $\sec^{-1}$

Answer: A

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15. For the reaction $2A + B \rightarrow A_2B$, the rate law given is

A. k[2A][B]

B. k[A]^(3)[B]

C. k[A][B]^3

D. k[A]^2[B]

Answer: D

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16. What is the order of reaction which has a rate expression rate = $k(A)^{\frac{3}{2}}(B)^{-1}$?

A.

B.

C.

D.

Answer: B

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17. 1/[A] vs time is a straight line . The order of reaction is :

A. 1

B. 2

C. 3

D. 0

Answer: B

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18. The half life of first order reaction is :

A. independent of rate constant

B. independent of initial concentratio

C. dependent on initial concentration

D. dependent on temperature

Answer: B

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19. The rate of a reaction depends upon

A. temperature

B. catalyst

C. concentration

D. all of these

Answer: D

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20. A reaction $P \rightarrow Q$ completed 25% in 25 minutes , 50% is completed in 25 minutes. If P is halved , 25% is completed in 50 minutes. If P is doubled, the order of the reaction is

A. 1

B. 2

C. 0

D. 3

Answer: C

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21. For the reaction, $2A + B \rightarrow 3C + D$, which of the following does not express the reaction rate ?

A. $-d[A]/2dt$

B. $-d[C]/3dt$

C. $-d[B]/dt$

D. $-d[D]/dt$

Answer: B

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22. If a substance with half life 3 days is taken at other place in 12 days. What amount of substance is left now ?

A. 1/4

B. 1/8

C. 1/16

D. 1/32

Answer: C

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23. A reaction involving two different reactants can never be

A. Unimolecular reaction

B. First order reaction

C. Second order reaction

D. Bimolecular reaction

Answer: A

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

A. t_(1/2) prop a

B. t_(1/2) prop 1/a

C. t_(1/2) prop a^o

D. t_(1/2) prop a^(2)

Answer: C

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25. If Ea of a reaction is zero, k is equal to :

A. 1

B. 0

C. A

D. 1/A

Answer: C

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26. The Arrhenius equation is

A. $k = -Ae^{(-E_a/RT)}$

B. $k = Ae^{(-E_a/RT)}$

C. $k = e^{(-E_a/RT)}$

D. $k = Ae^{(E_a/RT)}$

Answer: B

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27. The rate of reaction, A to B, Increases 2.25 time, when concentration of A increases 1.5 times. The order of reaction is :

A. 0

B. 1

C. 2

D. 3

Answer: C

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28. For a second order reaction rate at a particular time is 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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29. The rate constant of a reaction is1.2×10 ^(-5) $mole^{-2}litre^{2}s^{-1}$. The order of the reaction is :

A. zero

B. 1

C. 2

D. 3

Answer: D

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30. For the 1st order reaction, the half life period is :

A. ln2/k

B. 1/ka

C. lnk/2

D. log k/2

Answer: A

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31. A substance with half life period 3 days is taken to another place in 12 days. The amount of substance left now is

A. 44200

B. 44204

C. 44212

D. 1/16

Answer: B

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32. When log K is plotted Vs $\frac{1}{T}$ for a 1st order reaction we get a straight line.The slope of the line is equal to

A. -E_(a)/2.303R

B. E_(a)/R

C. 2.303 R/E_(a)

D. E_(a)/2.303

Answer: A

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33. In a certain reaction it takes 5 min for the initial concentration of 0.5 M to become 0.25 M and another 5 min to become 0.125 M. The rate constant of the reaction is

A. 0.138 $\min^{-1}$

B. 5 $\min^{-1}$

C. 0.2 $\min^{-1}$

D. 0.145 $\min^{-1}$

Answer: A

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34. For a 1st order reaction $\log(a-x)$ is plotted Vs time, a straight line is obtained with slope

A. K/2.303

B. 2.303/K

C. -K/2.303

D. -2.303 K

Answer: C

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35. For a reaction, $A \rightarrow B + C$, activation energy is 15 kJ/mole and enthalpy of reaction is +5kJ/mole. The activation energy for the reaction $B + C \rightarrow$ A is

A. 10kJ/mole

B. 20 kJ/mole

C. 30kJ/mole

D. 15kJ/mole

Answer: A

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36. For a reaction $K = 2 \times 10^{-2}$ mole lit^{-1} $\sec^{-1}$. If the concentration of the reactant is IM, the half life period of

the reaction is

A. 20 sec

B. 25 sec

C. 34.6 se

D. 50 sec

Answer: B

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37. The rate constant of a reaction is 2×10^{-5} $\sec^{-1}$. If the initial concentration is 0.1 M, the initial rate is

A. 2×10^(-4) M $\sec^{-1}$

B. 2×10^(-5) $M \sec^{-1}$

C. 2×10^(-6) $M \sec^{-1}$

D. 2×10^(-7)$M \sec^{-1}$

Answer: C

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38. Which equation gives relationship between rate-constant and tempeature ?

A. Ostwald's and temperature

B. Kirchoff's equation

C. Arrhenius equation

D. Nernst equation

Answer: C

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39. Which of the following statements regarding molecularity is wrong ?

A. it is the number of reactant molecules colliding in a single step of chemical reaction

B. it refers to individual step of the reaction

C. it may be whole number or fractional

D. the rate of reaction is independent of molecularity

Answer: C

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40. For a chemical reaction $A \rightarrow B$, it is found that the rate of reaction doubles when the conc, of 'A' is increased four times. The order of reaction is

A. 0

B. 0.5

C. 1

D. 2

Answer: B

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41. The elementary step of the reaction $2Na + Cl_2 \rightarrow 2NaCl$ is found to follow a third order Kinetics. The molecularity of the reaction is

A. 1

B. 2

C. 3

D. 4

Answer: C

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42. Which of the following statements is not correct ?

A. a catalyst cannot be recovered unchanged

B. a catalyst usually does not initiate a chemical reaction

C. a very small amount of catalyst is sufficient to catalyse the reaction.

D. The action of a catalyst is specific

Answer: A

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43. 75% of a first order reaction was completed in 32 minutes, 50% of the reaction will be completed in

A. 4 minutes

B. 8 minutes

C. 24 minutes

D. 16 minutes

Answer: D

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44. For the hypothetical reaction, 2A to 3C the reaction rate is given by

A. $r = -d[A]/dt$

B. $r = -1/2\ d[A]/dt$

C. $r = -1/3\ d[A]/dt$

D. $r = d[A]/dt$

Answer: B

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45. The rate of reaction, $A + B + C \rightarrow P$ is given by:

$r = -\frac{d[A]}{dt} = K[A]^{1/2}[B]^{1/2}[C]^{1/4}$. The order of the reaction is:

A. 44198

B. 13/12

C. 1

D. 2

Answer: B

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46. Rate expression of a chemical change is

$$\frac{dx}{dt} = K[A]^2[B][C]^0$$

The order of the reaction is

A. 2

B. 3

C. 1

D. 0

Answer: B

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47. The rate law of the reaction, $2A + B \rightarrow 2AC$ is represented as Rate $= K[A]^2[B]$. If A is taken in large excess, the order of the reaction will be,

A. three

B. two

C. one

D. zero

Answer: C

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48. The rate law for the single step reaction $2A + B \rightarrow 2C$ is given by

A. rate=k[A][B]

B. rate=k[A]^2[B]

C. rate=k[A][B]

D. rate=k[A]^2[B]^0

Answer: B

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49. The decomposition of N_2O_5 by $2N_2O_5 \rightarrow 4NO_2 + O_2$ follows first order kinetics. Select the incorrect statement.

A. the reaction is bimolecular

B. the reaction is unimolecular

C. t_(1/2).prop a^0

D. none of the above

Answer: C

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50. The isotope ${}_{19}K^{42}$ has a half life of about 12 hours. What fraction of the initial concentration of ${}_{19}K^{42}$ remains after 48 hours.

A. 44200

B. 44204

C. 44208

D. 44212

Answer: D

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51. What will be the amount of $I^{128}\left(t_{1/2} = 25 \ \ \text{min}\right)$ left after 50 min?

A. one half

B. one forth

C. one third

D. one eighth

Answer: B

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52. In which of the following cases, does the reaction go farthest to completion :

A. k=10^2

B. k=10^(-2)

C. k=10

D. k=1

Answer: A

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53. If a is the initial concentration then time required to decompose half of the substance for nth order is inversely proportional to:

A. a^1/2

B. a^(n-2)

C. a^(n-1)

D. a^(n+1)

Answer: C

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54. The minimum energy level necessary to permit a reaction to occur is :

A. threshold energy

B. activation energy

C. intrinsic energy

D. free energy

Answer: A

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55. A radioactive substance takes 20 min to decay 25%. How much time will be taken to decay 75% ?

A. 96.4 min

B. 68 min

C. 964 min

D. 680 min

Answer: A

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56. In the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$, the initial pressure is 500 atm and the rate constant k is $3.38 \times 10^{-5}\,\text{sec}^{-1}$. After 10 minutes the final pressure of N_2O_5 is

A. 490 atm

B. 250 atm

C. 480 atm

D. 420 atm

Answer: A

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57. $T_{\frac{1}{2}} of C^{14}$ isotope is 5770 years. Time after which 72% of isotope left is

A. 2740 years

B. 274 years

C. 2780 years

D. 278 years

Answer: A

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58. Temperature dependent equation can be written as

A. In k = In A-E_(a)/RT

B. In k=In A+E_(a)/RT

C. log k = log A - RT/E_(a)

D. All of the above

Answer: A

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59. A reaction $P \rightarrow Q$ completed 25% in 25 minutes , 50% is completed in 25 minutes. If P is halved , 25% is completed in 50 minutes. If P is doubled, the order of the reaction is

A. 0

B. 1

C. 2

D. 3

Answer: A

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60. A sample of K_{19}^{40} contains invariably Ar_{18}^{40}. This is because K_{19}^{40} has tendency to undergo

A. alpha-decay

B. beta-decay

C. gamma-decay

D. positronium decay

Answer: D

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61. $t_{\frac{1}{2}}$ of first order reaction is

A. directly proportional to initial concentration

B. independent of initial concentration

C. directly proportional to square of initial concentration

D. inversely proportional to initial concentration.

Answer: B

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62. The rate of a reaction depends upon

A. temperature

B. catalyst

C. concentration

D. all

Answer: D

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63. 1/[A] vs time is a straight line . The order of reaction is :

A. Zero

B. First

C. Second

D. Third

Answer: D

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64. With increase in temperature reaction rate increases due to

A. increase in collision frequency.

B. increase in number of molecules having threshold energy.

C. not occurs in atomic reaction.

D. none

Answer: B

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65. In a chemical reaction catalyst

A. lowers the energy of activation.

B. increases the energy of activation.

C. no change in the energy of activation.

D. none

Answer: A

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66. Molecularity of a reaction is determined by

A. stoichiometric representation of a reaction .

B. reaction of atoms

C. both

D. none

Answer: A

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67. The large increase in the rate of a chemical reaction on rise of temperature is due to the

A. lowering of activation energy.

B. decrease in the mean free path.

C. increase in the number of molecules

having more than the threshold energy.

D. increase in collision frequency.

Answer: C

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68. For the reaction $2A + B \rightarrow A_2B$, the rate law given is

A. rate = k[A][B]

B. rate =k[2A][B]

C. rate= k[A_(2)B]

D. rate = k[A]^2[B]

Answer: D

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69. The equation for rate constant is given by $k = p.\ Z.\ exp\left(\frac{E_a}{RT}\right)$, a chemical reaction will proceed more rapidly if there is a decrease in

A. E_a

B. Z

C. p

D. T

Answer: A

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70. The half life of a first order reaction is 69.3 secs. The rate constant is

A. 100 s^{-1}

B. 0.01 s^{-1}

C. 0.001 s^{-1}

D. 10 s^{-1}

Answer: B

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71. For a radioactive decay the value of $k = 2.7 \times 10^{-3} s^{-1}$ and initial concentration is 160 moles/lit. After 100 second the concentration of radioactive element is

A. 72 moles/lit

B. 122 moles/lit

C. 14 moles/lit

D. 41 moles/lit

Answer: A

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72. For the reaction $CH_3CH_2CH_3 \rightarrow CH_3CH = CH_2$ initial concentration is 0.58 mole/lit.

$Rate = k[CH_3CH_2CH_3]$, $k = 1.86 \times 10^{-3} s^{-1}$. After one hour the rate is

A. 0.582×10^{-6}

B. 0.188×10^{-6}

C. 1.34×10^{-6}

D. none

Answer: A

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73. Which of the following statements is incorrect about the collision theory of chemical reactions?

A. (i) & (ii)

B. (i) & (iii)

C. (ii) & (iii)

D. all are correct

Answer: C

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74. The rate constant of a reaction depends upon

A. temperature

B. volume

C. nature of reactant

D. Both (a) & (c)

Answer: D

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75. The rate of a reaction depends upon

A. concentration of reactant

B. pressure

C. catalyst

D. Both (a) & (c)

Answer: D

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76. Alkaline hydrolysis of ester is an example of

A. 1st order reaction

B. 2nd order reaction

C. zero order reaction

D. pseudo 1st order reaction

Answer: B

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77. The half life period for a 1st order reaction is 6.93 sec., its rate constant is

A. 10 $\sec^{-1}$

B. 100 $\sec^{-1}$

C. 0.1 $\sec^{-1}$

D. 1 $(\sec^{-} 1)$

Answer: C

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78. In which of the following will the reaction take more time for completion ?

A. $K = 10^{-2}$

B. $K = 10$

C. $K = 1$

D. $K = 100$

Answer: A

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79. The unit of rate constant for zero order reaction is

A. $\sec^{-1}$

B. $mollit^{-1}\sec^{-1}$

C. $mollit\sec^{-1}$

D. $mol^{-1}lit^{-1}\sec^{-1}$

Answer: B

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80. The rate of a reaction $A \rightarrow$ product, increases by a factor of 100, when cone, of 'A' is increased 10 fold. The order of the reaction is

A. 3

B. 2

C. 1

D. 0.5

Answer: B

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81. Alkali hydrolysis of ester is a _____ order reaction having molecularity_____.

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82. Rusting of iron is a _____ reaction.

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83. $NaOH(aq) + HCl(aq) \rightarrow Na^+Cl^-(aq) + H_2O(l)$ is a

A. precipitation reaction

B. decomposition reaction

C. neutralisation reaction

D. synthesis reaction

Answer: Very fast

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84. The rate of reaction is the _____ of any one of the reactants or products per unit time.

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85. Unit of the rate of reaction is_____.

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86. The slope of concentration of reactant versus time graph for a zero order reaction gives ___.

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87. Rate of reaction____as tempersture increases.

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88. The rate constant of a reaction depends upon

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89. Rate constant is also known as _____.

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90. The number of reactant molecules taking part in a single step of the reaction is known as _____.

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91. Molecularity is a ____ concept.

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92. Molecularity cannot be _____.

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93. The 1st order reaction having molecularity greater than one is called _____.

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94. Order of a reaction may be _____.

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95. Half life period * decay constant =_____.

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96. Unit of the rate constant for first order reaction is_____.

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97. Rate of reaction is influenced by____.

Watch Video Solution

98. Rate constant for 1st order reaction is_____.

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99. Alkali hydrolysis of ester is a _____ order reaction having molecularity____.

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100. if $t_{0.5} \propto \frac{1}{a^2}$, then order of reaction is _____.

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101. $t_{\frac{1}{2}}$ of first order reaction is

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102. Order of a reaction is an _____.

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103. For a zero-order reaction, the plot of concentration of reactant versus time is: (intercept refers to concentration

axis)

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104. Photochemical reaction between hydrogen and chlorine is _____order reaction.

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105. $H_2O_2 \rightarrow H_2O + \frac{1}{2}O_2$ is _____ order reaction.

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106. SO_2 can be used as:

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107. Conversion of ozone into oxygen at 100° c is ____ order reaction.

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108. $2NO + O_2 \rightarrow NO_2$ is _____ order reaction.

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109. Activation energy= _____ -Normal energy of reactants.

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110. Arrhenius equation is given by____.

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111. Units of rate constant for a reaction of n order is _____.

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112. Unit of rate constant for a gaseous second order reaction is _____.

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113. Unit of rate constant for a second order reaction is _____.

Watch Video Solution

114. Molecularity cannot be greater than _____.

Watch Video Solution

115. If unit of rate constant is $mol^{-2}L^2\sec^{-1}$, the order of reaction is_____.

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116. Correct the statement: Acidic hydrolysis of esters is a 2nd order reaction.

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117. Correct the statement: Unit of rate constant for second order reaction is $litre^{-1} mol \sec^{-1}$.

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118. Correct the statement: In Arrhenius equation, $e^{-Ea/RT}$ is called Joule-Thomson factor.

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119. Correct the statement: Fast reactions have high activation energy.

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120. Correct the statement: If $t_{0.5} \propto \frac{1}{a^2}$, order of reaction is 2.

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121. Correct the statement: The substance which increases the efficiency of catalyst is called sensitizer.

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122. What is order of reaction $2H_2O_2 \rightarrow H_2O + O_2$?

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123. Give an example of zero order reaction.

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124. The half life period for two reactions are 20 and 50 minutes respectively. Which of these is faster ?

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125. How does rate of zero order reaction vary with time ?

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126. For zero order reaction unit of rate constant is mol $lit^{-1} \sec^{-1}$. (True/False)

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127. Give an example of -ve catalyst.

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128. What is the order of reaction for alkaline hydrolysis of ester ?

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129. Suggest a metal that can be used for cathodic protection of iron against rusting.

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130. How does concentration of sulfuric acid change in Lead Storage battery when current is drawn from it ?

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131. Write the rate law for a first order reaction.

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132. Calculate the unit of 3rd order rate constant.

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133. Give one example of unimolecular reaction.

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134. Give one example of bimolecular reaction.

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135. The minimum energy which molecules need to acquire before they can react by collision is known as what ?

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136. Write the rate equation for a zero order reaction.

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137. The slowest step is called the rate determining step of the multistep reaction. (True/False)

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138. Explain zero order reaction with an example.

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139. The rate constant of a reaction is $1.45 \times 10^{-3} mol^{-1} Ls^{-1}$. What is the order of the reaction ?

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

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141. What is order of reaction of following reaction $rate = k[A]^2$

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142. How average K.E. of a gas molecule is related to the temperature ?

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143. Name the reaction when hydrolysis of ester in an alkaline medium takes place.

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144. What is unit of rate of reaction?

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145. A +ve catalyst increases the rate of reaction by decreasing the activation energy of the reactant. (True/False)

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146. What is order of reaction having rate = $K[A]^{\frac{3}{2}}[B]^{\frac{3}{2}}$?

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147. Rate constant of a reaction depends on temperature. (True/False)

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148. Activation energy for a chemical reaction depends on the nature of the reactant. (True/False)

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149. Molecularity of a reaction can never be zero.(True/False)

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150. The unstable intermediate compound formed by reactants after absorption of activation energy is called as

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151. Write the molecularity of the following reaction : $2N_2O_5 \rightarrow 2N_2O_4 + O_2$.

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152. After six half life period for a first order reaction what fraction of reactant remains ?

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153. For the reaction A to B, the rate of reaction becomes twenty seven times when the concentration of A is increased three times what is the order of the reaction ?

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154. What is the order of reaction whose rate constant has the same unit as the rate of the reaction ?

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155. A reaction is 50 % complete in 2 hrs and 75% complete in 4 hrs what is the order of the reaction.

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156. What is the order of decomposition reaction of H_2O_2 ?

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157. Give one example of pseudo first order reaction ?

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158. How photochemical reaction is different from thermochemical reaction ?

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159. Define activation energy of a reaction.

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160. Define photochemical reaction.

Watch Video Solution

Watch Video Solution

161. Define Activated Complex.

Watch Video Solution

162. Write relationship between the rate constant and its activation energy.

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163. Write the integrated rate equation for 1st order reaction and name the notations used.

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164. Give one example of fractional order reaction and predict the order.

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165. Define rate of reaction.

Watch Video Solution

166. Define average rate of reaction.

Watch Video Solution

167. What is half life time and life time of a reaction ?

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168. Define order of reaction.

Watch Video Solution

169. Explain molecularity of a reaction.

Watch Video Solution

170. Write relationship between the rate constant and its activation energy.

Watch Video Solution

171. What does the minus sign in expression $R \propto -dA/dt$ indicate ?

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172. Define order of reaction.

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173. Write two factors which influence the rate of reaction.

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174. What is chemical kinetics ?

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175. How are concentration of reactants and time related in the first order reaction? Show graphically.

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176. How catalyst affects the rate of reaction ?

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177. Define threshold energy.

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178. If activation energy of a reaction is zero, how does rate constant of the reaction change with temperature ?

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179. What is Arrhenius equation?

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180. For photochemical reaction violet light is more useful than red light. Why ?

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181. How is rate constant related to conc. of the reactant ?

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182. Express the rate of the reaction $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$.

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183. What is photochemical reaction ? Write the reaction occurring between hydrogen and chlorine gas.

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184. What is activation energy? How it is affected by the use of catalyst and rise in temperature?

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185. Write the rate law for a first order reaction. Justify the statement that half-life of a 1st order reaction is independent of the initial concentration of the reactant.

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186. The possible mechanism for the reaction $2NO(g) + O_2(g) \rightarrow 2NO_2$ is (i) $NO + O_2 \rightarrow NO_3$(fast)

(ii) $NO_3 + NO \rightarrow K_2NO_2 + NO_2(g)$ (slow) write the rate law and order for the reaction.

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187. Rate of most of reactions increases when temperature of reaction mixture is increased. Why ? In what units is the rate of reaction expressed?

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188. Draw a Schematic graph showing how the rate of reaction changes with change in concentration of reactant for zero order reaction.

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189. Rate of reaction is given by the equation : Rate = $K[A]^2[B]^1$.What are the units of rate and the rate constant for the reaction?

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190. What is activated complex in the reaction? State its relation with activation energy.

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191. What aspect of the reaction is influenced by the presence of catalyst which increases the rate or possibility of the reaction?

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192. Consider the following reaction,

$2NO(g) + CI_2(g) \rightarrow 2NOCI(g)$

The rate of reaction becomes doubled when the concentration of CI_2 is doubled However, when the concentration of both the reactants are doubled, the rate becomes eight times. What is the order with respect to NO and with respect to reaction chlorine? What is the overall order of reaction?

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193. Find the rate of law of the given reaction

$NO_2(g) + CO(g) \rightarrow CO_2(g) + NO(g)$

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194. Find the rate of law of the given reaction $2NO + 2H_2 \rightarrow N_2 + 2H_2O$

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195. The rate law for the reaction $2NO + 2H_2 \rightarrow N_2 + 2H_2O$ is given by $-\text{d[NO]}/dt = K[NO]^2[H_2]$. Explain the mechanism of the reaction.

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196. What is meant by "mechanism of a reaction" ? Write the mechanism for the decomposition of O_3 into O_2.

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197. One gram of pulverised wood burns faster than one gram piece of wood. Explain.

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198. Why the rate of a reaction increases with increase in temperature ?

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199. What are pseudo unimolecular reactions? Give two examples.

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200. Using rate law, how much rate of reaction: $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$ will change if the volume of vessel is reduced to 1/3 rd of its initial value ?

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201. Distinguish between reaction, rate and reaction rate constant.

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202. How is rate constant related to conc. of the reactant ?

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203. What is order of reaction ?

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204. Explain molecularity of a reaction.

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205. Derive an expression for 1st order reaction.

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206. What is the effect of catalyst on activation energy?

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207. Why do reaction rates depend on temperature? Explain.

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208. What is temperature co-efficient ?

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209. What is zero order reaction? Give one example.

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210. Rate of reaction is influenced by which factors ?

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211. What do you understand by zero order reaction?

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212. Write the Arrhenius equation for the rate constants K_1 and K_2 at temperature T_1 and T_2 in terms of activation energy E_a.

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213. Define order of a reaction.

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

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

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216. A reaction is of first 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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217. Does half life period of a first order reaction depend upon the initial concentration of the reactants ?

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218. What are pseudo first order reactions ? Give one example .

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219. What do you mean by molecularity and order of reaction? Give one example each of the first and second order reaction.

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220. Derive an expression for the rate constant of the given first order reaction:

$A \rightarrow$ products

Also draw the graph showing the variation of $[A]$ with time.

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221. Give two examples of first order reaction.

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222. Write short note on activation energy.

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223. What is rate of chemical reaction and its unit ?

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224. What are the various factors affecting the rate of reaction.

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225. What is the difference between order and molecularity of a reaction ?

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226. Derive the integrated form of rate equation for the first order reaction.

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227. (a)What is equation to describe the effect of temperature on rate of a reaction ? How can it be used to calculate the activation energy of a reaction ?

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228. Describe briefly the dependence of reaction rate of a chemical reaction on temperature.

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Problem

1. Calculate the rate constant of a reaction (first order) which is 90% complete in 10 min.

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2. What is half time period ? A first order reaction takes 69.3 minutes for 50 % completion. How much time will be needed for 80% completion.

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3. The rate constant of first order reaction is 0.346 $\min^{-1}$. What is the half life ?

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4. The rate constant of 1st order is $0.0005\ \min^{-1}$. Find its half life period.

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5. The half life period of a 1st order reaction is 300 seconds. Calculate its rate constant.

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6. A first order reaction takes 69.3 minutes for 50 % completion. How much time will be needed for 80% completion ?

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7. The rate of reaction is doubled when the temperature changes from $27^{\circ}C$ to $37^{\circ}C$. Calculate the energy of activation.

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8. Find the value of activation energy of a reaction whose rate of reaction becomes 3 time by 10°C rise in temperature in the vacinity of 300 K.

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9. A chemical reaction 2A to 4B + C in gas phase occurs in a closed vessel. The concentration of B is found to increase by $5 \times 10^{-3} mol L^{-1}$ in 10 seconds.Calculate (i) Rate of appearance of B, (ii) Rate of disappearance of A.

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10. Name of the metal which present in chlorophyll.

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11. The half-life period of a reaction is 60 s. Calculate its rate constant.

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12. The rate constant of a first order reaction is $k = 7.39 \times 10^{-5}\ \mathrm{s}^{-1}$. Find the half-life of the reaction.

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13. Rate constant of a 1st order reaction is 0.5 s^{-1}. What is the half-life period ?

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14. The order of a reaction having the rate expression, rate $= k[A]^{1/2}[B]^{1/2}$ is..... .

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15. The rate of decomposition of NH_3 on platinum surface is zero order. What are rate of production of N_2 and H_2 if K $= 3 \times 10^{-4} molL^{-1}s^{-1}$.

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16. The rate of most reactions become double when their temperature is raised from 298 K to 308 K. Calculate their activation energy.

(Given, $R = 8.314 \ \ \mathrm{J\ mol^{-1}}$)

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17. The half-life for radioactive decay of ^{14}C is 5730 yr. An archaeological artifact containing wood had only 80% of the ^{14}C found in a living tree. Calculate the age of the sample.

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18. Calculate the half life of the first order reaction from their rate constant given as : (a) 2 $\min^{-1}$ (b) 200 $\sec^{-1}$

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19. The rate constant of the decomposition of N_2O_5 is $6.0X10^{-4}\ s^{-1}$.At what time will the initial concentration of 1M be reduced to 0.2 M is the reaction of the first order ?

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20. A first order reaction is 25% completing 30 minutes. How long will it take for its 75% completion ?

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21. The rate constant of a reaction is $1.5 \times 10^{7} s^{-1}$ at $50^{\circ} C$ and $4.5 \times 10^{7} s^{-} 1$ at $100^{\circ} C$. Calculate the Arrhenius parameter for the reaction.

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22. What will be the initial rate of a reaction if its rate constant is $10^{-3} \ \mathrm{min}^{-1}$ and the concentration of reactant is 0.2 mol dm^{-3}? How much of the reactant will be converted into products in 200 min?

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

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24. A 1st order reaction is $20\,\%$ complete in 20 minutes. Calculate the time it will take the reaction to complete $80\,\%$.

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25. Calculate the rate of reaction from rate law $-d[A]/dt = K[A][B]^2$ when the concentration of A and B are 0.01M and 0.02M respectively and K = $5.1 \times 10^{-3} lit^2 mol^{-2} s^{-1}$.

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26. For a reaction the energy of activation is zero. What is the value of rate constant at 600 K if K= $9.2X10^6 S^{-1}$ at 480 K.

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27. The rate constant for 1st order reaction is 0.0005 $\min^{-1}$.

Calculate its half life.

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28. A first order reaction is 25% complete in 30 minutes. Calculate the

specific reaction rate.

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29. The decomposition of hydrocarbon follows the equation,

$k = \left(4.5 \times 10^{11} \ \mathrm{s}^{-1}\right) \mathrm{e}^{-28000K/T}$. Calculate E_a.

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30. What is the half life period of a 1st order reaction having rate constant $10^{-4}\,\mathrm{sec}^{-1}$?

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31. The half-life period of a first order reaction is 60 seconds. Calculate the rate constant.

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32. The reaction is a first order reaction. The half life period of this reaction is 60 minutes. Calculate the rate constant of this reactions.

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33. For a reaction, A + B to Products, the rate is given by R = $k[A]^{\frac{1}{2}}[B]^{2}$. What is the order of the reaction ?

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34. In a reaction $A \rightarrow Products$, the concentration of A decreases from 0.6 $molL^{-1}$ to 0.3 $molL^{-1}$ in 10 minutes. Calculate the rate during this time interval.

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35. The half-life period of a first order reaction is 100 sec. Calculate the rate constant.

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36. Write the expressions for half life period of zero and first order reactions. Which is independent of initial concentration of the reactant?

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37. Derive an expression for a half life period for the first order reaction and show that it is independent of the initial concentration of the reactant.

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38. Prove that for a 1st order reaction, the time taken for 99% completion of the reaction is twice the time required for the completion of 90% of the reaction.

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39. 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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40. A certain reaction is 50% complete in 20 min at 300 K and the remaining of the reaction is again 50% complete in

5 min at 350 K. Calculate the activation energy if it is a first order reaction.

$\left(R = 8.314 \mathrm{JK}^{-1} \ \mathrm{mol}^{-1}, \log 4 = 0.602\right)$

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