CHEMISTRY

BOOKS - MTG GUIDE

CHEMICAL KINETICS

Illustration

1. For the hypothetical reaction 2 A $\rightarrow$ 3 C, give the reaction rate 'r' in terms of the rate of change of concentration of C.

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2. The complexation of Fe^{2+} and chelating agent dipyridyl has been studied kinetically in both forward and reverse directions.

$Fe^{2+} + 3(\text{dipy}) \rightarrow \left[Fe(dipy)_3\right]^{2+}$

Rate of forward reaction = $\left(1.45 \times 10^{13}\right)\left[Fe^{2+}\right][\text{dipy}]^{3}$ and rate of reverse reaction = $\left(1.22 \times 10^{-4}\right)\left[\text{Fe}\left(\text{dipy}\right)_{3}\right]^{2+}$ Find the rate constant for the complex.

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3. The rate law for the reaction $x + y \rightarrow z$ is $r = k[x]^{3/2}[y]^{-1/2}$

Find the order and molecularity of reaction.

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4. The decomposition of Cl_2O_7 at 400 K in the gas phase to Cl_2 is a first order reaction

(i) After 55 seconds at 400 K the pressure of Cl_2O_7 falls from 0.062 to 0.044 atm. Calculate the rate constant.

(ii) Calculate the pressure of Cl_2O_7 after 100 seconds of decomposition at this temperature.

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5. The half life for the reaction, $N_2O_{5(g)} \rightarrow 2NO_{2(g)} + O_{2(g)}$ is 2.4 hr at 30° C. (a) Starting with 10 g, what is the mass of N_2O_5 left after 9.6 hr? (b) How much time is required to reduce 5.0×10^{10} molecules of N_2O_5 to 1.0×10^8 molecules?

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

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7. Suppose 50 bacteria are placed in a flask containing nutrients for the bacteria, so that they can multiply.

A study at 35° C gave the following results:

Time (minutes)	0	15	30	45	60
Number of bacteria	50	100	200	400	800

Show that the rate of production of bacteria is first order. How many bacteria will be there after 3 hours?

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8. For a reaction, specific rate constant at 283 K is 2.25×10^{-6} L mol^{-1} $\sec^{-1}$ and at 293 K is 2.5×10^{-5} L mol^{-1} s^{-1}. Compute the energy of activation of the reaction.

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9. The activation energy of a non-catalysed reaction at 37°C is 20.0 kcal mol^{-1} and activation energy of the same reaction catalysed by a transition metal is 6.0 kcal mol^{-1}. Compute the ratio of rate constants of the catalysed and non-catalysed reactions.

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

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Topicwise Practice Questions

1. Which factor has no influence on the rate of reaction?

A. Molecularity

B. Temperature

C. Concentration of reactant

D. Nature of reactant

Answer: A

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2. For the first order decomposition reaction of N_2O_5,it is observed that

$$N_2O_{5(g)} \rightarrow 2NO_{2(g)} + 1/2O_{2(g)}, \; -\frac{d[N_2O_5]}{dt} = k[N_2O_5]$$

$$2N_2O_{5(g)} \rightarrow 4NO_{2(g)} + O_{2(g)}, \; -\frac{d[N_2O_5]}{dt} = k[N_2O_5]$$

which of the following is true?

A. k=k

B. k= 2K

C. k=k/2

D. $k = K^2$

Answer: B

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3. Nitrogen tetraoxide (N_{20}_4) decomposes as :

$$N_2O_{4(g)} \rightarrow 2NO_{2(g)}$$

If the pressure of N_2O_4 falls from 0.50 atm to 0.32 atm in 30 minutes, the rate of appearance of `NO_(2(g)) is

A. 0.006 atm $\min^{-1}$

B. 0.003 atm $\min^{-1}$

C. 0.012 atm $\min^{-1}$

D. 0.024 atm $\min^{-1}$

Answer: C

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4. A hypothetical reaction, $A_2 + B_2 \rightarrow 2AB$ follows the following mechanism:

$A_2 \Leftrightarrow A + A$ .....fast

$A + B_2 \rightarrow AB + B$ .....slow

$A + B$rarr` AB .....fast

The order of the overall reaction is

A. 2

B. $3/2$

C. 1

D. 0

Answer: B

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5. The rate law for reaction hetween the substances A and B is given by Rate = $k[A]^n[B]^m$.

On doubling the concentration of A and halving the concentration of B, the ratio of the new rate to the earlier rate of reaction will be

A. m+n

B. n-m

C. 2^{n-m}

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

Answer: C

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6. The rate law for the reaction ,

$RCl + NaOH_{(aq)} \rightarrow ROH + NaCl$is given by, Rate = k[RCI]. The rate of the reaction will be ,

A. doubled on doubling the concentration of sodium hydroxide

B. halved on reducing the concentration of alkyl halide to one half

C. decreased on increasing the temperature of the reaction

D. unaffected by increasing the temperature of the reaction.

Answer: B

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7. The rate of the reaction, $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$, was measured as

$$\frac{d}{dt}[NH_3] = 2 \times 10^{-4} \text{ mol } L^{-1}s^{-1}$$

The rate of the reaction expresses in terms of N_2 and H_2 are

	Rates in terms of N_2	Rate in terms of H_2
A.	mol $L^{-1}s^{-1}$	mol $L^{-1}s^{-1}$
	1×10^{-4}	3×10^{-4}
	Rates in terms of N_2	Rate in terms of H_2
B.	mol $L^{-1}s^{-1}$	mol $L^{-1}s^{-1}$
	3×10^{-4}	1×10^{-4}
	Rates in terms of N_2	Rate in terms of H_2
C.	mol $L^{-1}s^{-1}$	mol $L^{-1}s^{-1}$
	1×10^{-4}	1×10^{-4}
	Rates in terms of N_2	Rate in terms of H_2
D.	mol $L^{-1}s^{-1}$	mol $L^{-1}s^{-1}$
	2×10^{-4}	2×10^{-4}

Answer: A

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8. Which of the following statements is incorrect?

A. The rate law for any reaction cannot be determined experimentally.

B. Complex reactions inay or may not have fractional order.

C. Bimolecular reactions involve simultaneous collision between two species.

D. Molecularity is only applicable for elementary reactions

Answer: A

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9. The rate expression for the reaction, $A_{(g)} + B_{(g)} \rightarrow C_{(g)}$, is rate = $k[A]^2[B]^{1/2}$.

What changes in the initial concentrations of A and B will cause the rate of reaction to increase by a factor of eight?

A. $[A] \times 2, [B] \times 2$

B. $[A] \times 2, [B] \times 4$

C. $[A] \times 1, [B] \times 4$

D. $[A] \times 4, [B] \times 1$

Answer: B

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10. For the reaction : $H_{2(g)} + Br_{2(g)} \rightarrow 2HBr_{(g)}$, the experimental data suggests, rate $=k[H_2][Br_2]^{1/2}$. The molecularity and order of the reaction is

A. 2 and 2 respectively

B. 2 and $1\frac{1}{2}$ respectively

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

D. $1\frac{1}{2}$ and $1\frac{1}{2}$ respectively

Answer: B

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11. For a reaction, $pA + qB \rightarrow$ products, the rate law expression is $r = k[A]^m[B]^n$, then

A. (p + q) $\neq$ (m + n)

B. (p+q) = (m + n)

C. (p+q) may or may not be equal to (m + 1)

D. (p+q) $>$ (m + n)

Answer: C

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12. For the reaction, $4KClO_3 \rightarrow 3KClO_4 + KCl$ if $\frac{-d[KClO_3]}{dt} = k_1[KClO_3]^4$, $\frac{d[KClO_4]}{dt} = k_2[KClO_3]^4$, $\frac{d[KCl]}{dt} = k_2[KC$

,

the correct relation between ki, ky and kz is

A. $k_1 = k_2 = k_3$

B. $4k_1 = 3k_2 = k_1$

C. $3k_1 = 4k_2 = 12k_3$

D. none of these

Answer: C

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13. The following data pertains to reaction between A and B.

S.No.	$[A]$ mol L^{-1}	$[B]$ mol L^{-1}	Rate (mol L^{-1} $time^{-1}$)
1.	1.0×10^{-2}	2.0×10^{-2}	2.0×10^{-4}
2.	2.0×10^{-2}	2.0×10^{-2}	4.0×10^{-4}
3.	2.0×10^{-2}	4.0×10^{-2}	8.0×10^{-4}

Which of the following inference(s) can be drawn from the above data?

1.Rate constant of the reaction is 1.0×10^{-4}

2.Rate law of the reaction is, rate = k[A] [B].

3.Rate of reaction increases four times on doubling the concentration of both the reactants.

A. 1, 2 and 3

B. 1 and 2

C. 2 and 3

D. 3 only

Answer: C

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14. A reaction was found to be second order with respect to the concentration of carbon monoxide. If the concentration of carbon monoxide is doubled, with everything else kept the same, the rate of reaction will be

A. unchanged

B. tripled

C. increased by a factor of 4

D. doubled

Answer: C

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15. The following mechanism has been proposed for the reaction of NO with Brą to form NOBr.

$NO_{(g)} + Br_{2(g)} \Leftrightarrow NOBr_{2(g)}$

$NOBr_{2(g)} + NO_{(g)} \rightarrow 2NOBr_{(g)}$

If the second step is the rate determining step, the order of the reaction with respect to $NO_{(g)}$ is

A. 1

B. 0

C. 3

D. 2

Answer: D

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16. Consider the reaction, 2A + B $\rightarrow$ products. When concentration of D alone was doublcd, thc half-lifc did not change. When the concentration of A alone was doubled, the rate increased by two times. The unit of rate constant for this reaction is

A. s^{-1}

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

C. no unit

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

Answer: B

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17. For a reaction, $\frac{1}{2}A \rightarrow 2B$ rate of disappearance of A is related to the rate of appearance of B by the expression

A. $-\frac{d[A]}{dt} = 4\frac{d[B]}{dt}$

B. $= \frac{d[A]}{dt} = \frac{1}{2}\frac{d[B]}{dt}$

C. $-\frac{d[A]}{dt} = \frac{1}{4}\frac{d[B]}{dt}$

D. $-\frac{d[A]}{dt} = \frac{d[B]}{dt}$

Answer: C

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18. For a pseudo first order reaction,

$CH_3COOC_2H_5 + H_2O \overset{H^+}{\Longleftrightarrow} CH_3COOH + C_2H_5OH$ the net rate is given by

$$\frac{dx}{dt} = 4 \times 10^{-4} \text{ L } mol^{-1}s^{-1}[CH_3COOC_2H_5]$$

$$\frac{dx}{dt} = -3 \times 10^{4} \text{ L } mol^{-1}s^{-1}[CH_3COOH][C_2H_5OH]$$

The equilibrium constant of the reaction would be

A. 1.3×10^{-7} mol $L^{-1}s^{-1}$

B. 1.3×10^{-6} mol $L^{-1}s^{-1}$

C. 1.33×10^{-9} mol L^{-1}

D. 1.33×10^{-8} mol L^{-1}

Answer: D

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19. In the reaction,

$$BrO_{3(aq)}^{-} + 5Br_{(aq)}^{-} + 6H^{+} \rightarrow 3Br_{2(l)} + 3H_2O$$

The rate of appearance of bromine (Bry) is related to rate of disappearance of bromide ions as

A. $\frac{d[Br_2]}{dt}$=-5/3(d[Br^(-)])/(dt)`

B. $\frac{d[Br_2]}{dt}$=5/3(d[Br^(-)])/(dt)`

C. $\frac{d[Br_2]}{dt}$=3/5(d[Br^(-)])/(dt)`

D. $\frac{d[Br_2]}{dt}$=-3/5(d[Br^(-)])/(dt)`

Answer: D

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20. For gaseous reactions, the rate is often expressed in terins of dP / dt instead of dC / dt or dn / dt (where Cis concentration and n is the number of mole). What is the relation among these three expressions?

A. $\frac{dC}{dt} = \frac{1}{V}\left(\frac{dn}{dt}\right) = \frac{1}{RT}\left(\frac{dp}{dt}\right)$

B. $\frac{dC}{dt} = \left(\frac{dn}{dt}\right) = \left(\frac{dP}{dt}\right)$

C. $\frac{dC}{dt} = \left(\frac{dn}{dt}\right) = \frac{1}{RT}\left(\frac{dP}{dt}\right)$

D. $\frac{dC}{dt} = \frac{V}{RT}\left(\frac{dn}{dt}\right)$

Answer: A

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21. For a reaction A + B $\rightarrow$ Products, it is observed that doubling the concentration of B causes the reaction rate to increase four times, but doubling the concentration of A has no effect on the rate of reaction. The rate equation is therefore

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

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

C. rate = k[A][B]

D. rate = k[A]

Answer: B

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22. For a reaction A $\rightarrow$ Products, the concentration of reactant A are $C_0, aC_0, a^2C_0, a^3C_0$... after time interval 0, t, 2t, 3t... where 'a' is constant (0 $<$ a $<$ 1). What is the order of the reaction?

A. Zero order

B. Second order

C. First order

D. Third order

Answer: C

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23. In a reaction between A and B, the initial rate of reaction r_0 was measured for different initial concentrations of A and B as given below :

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

The order of the reaction with respect to A is

A. 1.5

B. 0.5

C. 1

D. 2

Answer: A

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

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

These kinetic data were obtained for given reaction concentrations.

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

Based on these data, the rate equation is

A. Rate=$k[CH_3COCH_3][Br_2]\left[H^+\right]^2$

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

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

D. Rate=$k[CH_3COCH_3][Br_2]$

Answer: C

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25. The chemical reaction $2CO_3 \rightarrow 3O_2$ proceeds as follows

(i) $O_3 \Leftrightarrow rO_2 + O$ .....(fast)

(ii) $O + O_3 \Leftrightarrow 2O_2$ .....(slow)

The rate law expression should be

A. $r = k'[O_3]^2$

B. $r = k'[O_3]^2[O_2]^{-1}$

C. $r = k'[O_3][O_2]$

D. unpredictable

Answer: B

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26. The reaction, $N_2O_5 \ \ (\text{in } \text{CCl}_4) \rightarrow 2NO_2 + l/2O_{2(g)}$ is first order with respect to N_2O_5, with rate constant $6.25 \times 10^{-4}s(-1)$. What is the value of rate of reaction when $\left[N_2O_5 = 1.25 \ \ \text{mol} \ \ L^{-1}\right]$?

A. 7.81×10^{-4} mol $L^{-1}s^{-1}$

B. 6.35×10^{-3} mol $L^{-1}s^{-1}$

C. 5.15×10^{-5} mol $L^{-1}s^{-1}$

D. 3.85×10^{-4} mol $L^{-1}s^{-1}$

Answer: A

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27. Consider the reaction,

$Cl_{2(aq)} + H_2S \rightarrow S_{(s)} + 2H^+_{(aq)} + 2Cl^-_{(aq)}$

the rate law for this reaction is rate = k[C12][H2S]. Which law mechanism is/are consistent with this rate equation?

$A.$ $Cl_2 + H_2S \rightarrow H^+ + Cl^- + Cl^+ + HS^- (slow)$

$Cl^+ + HS^- \rightarrow H^+Cl^- + S$ (fast)

$B.$ $H_2S \Leftrightarrow rH^+ + HS^-$ (fast equilibrium)

$Cl_2 + HS^- \rightarrow 2Cl^- + H^+ + S$ (slow)

A. A only

B. B only

C. Both A and B

D. Neither A nor B

Answer: A

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28. In acidic inedium the rate of reaction between BrO_3^- and Br^- ions is given by the expression,

$$-\frac{d\left[BrO_{\cdot}(3)^-\right]}{dt} = k\left[BrO_3^-\right]\left[Br^-\right]\left[H^+\right]^2$$

It means

A. rate constant of overall reaction is 4 $\sec^{-1}$

B. rate of reaction is independent of the conc. of acid

C. the change in pH of the solution will not affect the rate

D. doubling the conc. of H^+ ions willincrease the reaction rate by 4 times.

Answer: D

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29. The rate constant(k) for the reaction: 2A+B $\rightarrow$ Product, was found to be $2.5x10^{-5}$ litre $mol^{-1}s^{-1}$ after 15 s. $2.60 \times 10^{-5}\mathrm{L}\ \ mol^{-1}s^{-1}$ after 30 s and 2.55 $\times 10^{-5}Lmol^{-1}s^{-1}$ after 50 s. The order of reaction is

A. 2

B. 3

C. zero

D. 1

Answer: A

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30. In the reaction of $aA + B + C \rightarrow$ Products,

i. If concentration of A is doubled, keeping conc. of B and C constant, the rate of reaction becomes double.

ii. If concentration of B is halved keeping conc. of A and C constant, the rate of reaction remains unaffected.

iii. If concentration of C is made 1.5 times, the rate of reaction becomes 2.25 times.

The order of reaction is

A. 1

B. 2.5

C. 3

D. 3.5

Answer: C

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31. When ethyl acetate was hydrolysed in presence of 0.1 N HCl, the rate constant was found to be $5.40 \times 10^{-5} s^{-1}$, But when 0.1 NH_2SO_4 was used for the hydrolysis, the rate constant was found to be $6.20 \times 10^{-5} s^{-1}$. From these values we can say that

A. H_2SO_4 is stronger than HCl

B. H_2SO_4 is weaker than HCI

C. both the acids have equal strength

D. the data is insufficient to compare the strengths of HCl and H_2SO_4

Answer: A

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32. In the synthesis of aminonia from nitrogen and hydrogen gases, if 6×10^{-2} mole of hydrogen disappears in 10 minutes, the number of moles of ammonia formed in 0.3 minutes is

A. 1.8×10^{-2}

B. 1.2×10^{-3}

C. 4×10^{-2}

D. 3.6×10^{-2}

Answer: B

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33. Which one of the following statements is incorrect about the molecularity of a reaction?

A. Molecularity of an elementary reaction is the number of molecules of the reactants present in the balanced equation.

B. Molecularity of a reaction is the number of molecules in the slowest step.

C. Molecularity is always a whole number.

D. There is no difference between order and molecularity of a reaction.

Answer: D

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34. In the reaction, $2NO + Cl_2 \rightarrow 2NOCl$, it has been found that doubling the concentration of both the reactants increases the rate by a factor of eight but doubling the chlorine concentration alone only doubles the rate. Which of the following statements is incorrect?

A. The reaction is first order in Cl_2.

B. The reaction is second order in NO

C. The overall order of reaction is 2.

D. The overall order of reaction is 3

Answer: C

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35. Rate constant in case of first order reaction is

A. inversely proportional to the concentration units

B. independent of concentration units

C. directly proportional to concentration units

D. inversely proportional to the square of concentration units.

Answer: B

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36. If I is the intensity of absorbed light and C is the concentration of AB for the photochemical process $AB + hv \rightarrow AB \cdot$ the rate of forination of AB* is directly proportional to

A. C

B. I

C. I^2

D. Cl

Answer: B

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37. For the decomposition of a compound AB at 600 K, the following data were obtained

$[AB]$ mol dm^{-3}	Rate of decomposition of AB in mol dm^{-3} s^{-1}
0.20	2.75×10^{-8}
0.40	11.0×10^{-8}
0.60	24.75×10^{-8}

The order for the decomposition of AB is

A. 0

B. 1

C. 2

D. 1.5

Answer: C

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38. The rate constant of a reaction is $2.3 \times 10^{-2}\ \ \mathrm{mol}^{-2}L^{2}\ \ \mathrm{min}^{-1}$. The order of reaction is

A. zero

B. 1

C. 2

D. 3

Answer: D

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39. Which one of the following equation is correct for the reaction, $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$?

A. $\frac{3d[H_2]}{dt} = \frac{2d[N_2]}{dt}$

B. $\frac{2d[N_2]}{dt} = \frac{1}{3}\frac{d[H_2]}{dt}$

C. $\frac{2d[NH_2]}{dt} = \frac{-3d[H_2]}{dt}$

D. $\frac{3d[NH_2]}{dt} = \frac{-2[H_2]}{dt}$

Answer: D

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40. For a chemical reaction, X $\rightarrow$ Y , the rate of reaction increases by a factor of 1.837 when the concentration of X is increased by 1.5 times, the order of the reaction with respect to X is

A. 1

B. 1.5

C. 2

D. 2.5

Answer: B

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41. Which of the following rate laws has an overall order of 0.5 for reaction involving substances x, y and z ?

A. Rate = $k[C_x][C_y][C_z]$

B. Rate = $k[C_x]^{0.5}[C_y]^{0.5}]C_z]^{0.5}$

C. Rate = $k[C_x]^{1.5}[C_y]^{-1}]C_z]^{0}$

D. Rate=$k[C_x][C_z]^2/[C_y]^2$

Answer: C

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42. The hydrolysis of an ester was carried out separately with 0.1 M HCl and 0.1 M H_2SO_4. Which of the following will be true?

A. $k_{HCl} > k_{H_2SO_4}$

B. $k_{HCl} < k_{H_2SO_4}$

C. $k_{HCl} = k_{H_2SO_4}$

D. unpredictable

Answer: B

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43. The rate of a reaction is expressed in different ways as follows:

$$+\frac{1}{2}\frac{d[C]}{dt} = -\frac{1}{3}\frac{d[D]}{dt} = +\frac{1}{4}\frac{d[A]}{dt} = -\frac{d[B]}{dt}.$$

The reaction is

A. 4A+B $\rightarrow$ 2C+3D

B. B+3D $\rightarrow$ 4A+2C

C. A+B $\rightarrow$ C+D

D. B+D $\rightarrow$ A+C

Answer: B

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44. The rate of reaction, A+B $\rightarrow$ Products, is given by the equation r = k[A] [B]. If B is taken in large excess, the order of the reaction would be

A. 2

B. 1

C. 0

D. unpredictable

Answer: B

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45. How will the rate of reaction, $2NO_{(g)} + O_{2(g)} + 2NO_{2(g)}$ get affected if the volume of the reacting system is doubled? (Given that the

reaction is second order with respect to NO and first order with respect to O_2).

A. Diminishes to one-fourth of its initial value

B. Diminishes to one-eighth of its initial value

C. Increases four times

D. Increases eight times

Answer: B

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46. Units of specific reaction rate for 2^{nd} order reaction is

A. s^{-1}

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

C. $L^2 \quad mol^{-2}s^{-1}$

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

Answer: D

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47. A reaction A $\rightarrow$ B follows second order kinetics, doubling the concentration of A will increase the rate of formation of B by a factor of

A. 2

B. $1/2$

C. 4

D. $1/4$

Answer: C

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48. The units of rate constant and rate of reaction are identical for

A. zero order reaction

B. first order reaction

C. second order reaction

D. reversible reaction.

Answer: A

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49. For a reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$, rate and rate constant are 1.02×10^{-4} mol $L^{-1}s^{-1}$ and $3.4 \times 10^{-5}s^{-1}$ The concentration of N_2O_5 at that time will be

A. 1.732 mol L^{-1}

B. 3 mol L^{-1}

C. 1.02×10^{-4} mol L^{-1}

D. 3.2×10^5 mol L^{-1}

Answer: B

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50. The rate constant for a first order reaction is equal to the initial rate of reaction when the initial concentration of the reactant is

A. 100M

B. 1×10^{-2} M

C. 1.0 M

D. 0.1 M

Answer: C

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51. Which one of the following statements about the order of a reaction is true?

A. The order of a reaction can only be determined by experiment.

B. The order of a reaction increases with increase in temperature.

C. The order of a reaction can be determined from the balanced equation

D. A second order reaction is also bimolecular

Answer: A

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52. The rate law for the reaction,

$2H_{2(g)} + 2NO_{(g)} \rightarrow N_{2(g)} + 2H_2O_{(g)}$ is $\frac{d[N_2]}{dt} = k[H_2][NO]^2$

Which of the following mechanisms is consistent with the rate law?

A. $H_{2(g)} + 2NO_{(g)} \xrightarrow{k_1} N_2O_{(g)} + H_2O_{(g)}$

B. $H_{2(g)} + N_2O_{(g)} \xrightarrow{k_2} N_{2(g)} + H_2O_{(g)}$

C. $H_{2(g)} + NO_{(g)} \xrightarrow{k_3} H_{2(g)} + NO_{2(g)}$

D. $H_{2(g)} + 2NO_{(g)} \xrightarrow{k_4} N_{2(g)} + H_2O_{(g)} + \frac{1}{2}O_{2(g)}$

Answer: A

View Text Solution

53. The hydrolysis of ethyl acetate is a reaction of

A. pseudo-first order

B. second order

C. third order

D. zero order.

Answer: A

View Text Solution

54. The reaction, $2SO_{2(g)} + O_{2(g)} \rightarrow 2SO_{3(g)}$ is carried out in a 1 dm^3 vessel and 2 dm^3 vessel separately. The ratio of reaction rates will be

A. $1:8$

B. $1:4$

C. $4:1$

D. $8:1$

Answer: D

View Text Solution

55. Which of the following statements regarding the molecularity of a reaction is wrong?

A. It is the number of molecules of the reactants taking part in a single step chemical reaction.

B. It is calculated from the reaction mechanism.

C. It may be either a whole number or fractional.

D. It depends on the rate determining step in the reaction.

Answer: C

View Text Solution

56. The rate of reaction between A and B increases by a factor of 100 when the concentration with respect to A is increased 10 folds, the order of reaction with respect to A is

A. 10

B. 1

C. 4

D. 2

Answer: D

View Text Solution

57. A zero order reaction is one whose rate is independent of

A. temperature of the reaction

B. concentration of reactant

C. the concentration of products

D. material of vessel in which reaction is carried out.

Answer: B

View Text Solution

58. For a chemical reaction, $A \rightarrow B$, it is found that the rate of reaction doubles when the concentration of A is increased four times. The order in terms of A for this reaction is

A. two

B. one

C. half

D. zero

Answer: C

View Text Solution

59. The order of reaction is decided by

A. temperature

B. mechanism of reaction as well as relative concentration of reactants

C. molecularity

D. pressure

Answer: B

View Text Solution

60. In the reversible reaction,

$$2NO_2 \underset{k_2}{\overset{k_1}{\rightleftharpoons}} N_2O_4,$$

the rate of disappearance of NO, is equal to

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

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

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

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

Answer: B

View Text Solution

61. What is the order of a reaction which has a rate law $r = k[A]^{3/2}[B]^{-1}$?

A. Zero

B. $3/2$

C. $1/2$

D. None of these

Answer: C

View Text Solution

62. Consider the reaction $2N_2O_4 \Leftrightarrow 4NO_2$ and given that $\frac{-d[N_2O_4]}{dt} = k$ and $(d[NO_2])(dt) = k'$. then

A. $2k' = k$

B. k'=2k

C. k'=k

D. None of these

Answer: B

View Text Solution

63. $2N_2O_{5(g)} \rightarrow 4NO_{2(g)} + O_{2(g)}$

What is the ratio of the rate of decomposition of N_2O_5 to rate of formation of NO_2?

A. $4:1$

B. $1:4$

C. $2:1$

D. $1:2$

Answer: D

View Text Solution

64. For a chemical reaction ..... can never be a fraction.

A. order

B. half-life

C. molecularity

D. rate constant

Answer: C

View Text Solution

65. For the reaction, $aA \rightarrow xP$, when [A] = 2.2 mM the rate was found to be 2.4 mM 5. On reducing concentration of A to half, the rate changes to $0.6mMs^{-1}$. The order of reaction with respect to A is

A. 1.5

B. 2.0

C. 2.5

D. 3.0

Answer: B

View Text Solution

66. According to law of mass action, rate of chemical reaction is proportional to

A. concentration of reactants

B. molar concentration of reactants

C. concentration of products

D. molar concentration of products.

Answer: B

View Text Solution

67. During the decomposition of H_2O_2 48 g O_2 is formed per minute at a certain point of time. The rate of formation of water at this point is

A. 0.75 mol $\min^{-1}$

B. 1.5 mol $\min^{-1}$

C. 2.25 mol $\min^{-1}$

D. 3.0 mol $\min^{-1}$

Answer: D

View Text Solution

68. For the reaction, $2PH_3 \rightarrow 2P + 3H_2$ The decomposition of phosphine on the surface of tungsten at high pressure is

A. zero order

B. first order

C. second order

D. third order.

Answer: A

View Text Solution

69. Calculate the order of reaction, A $\rightarrow$ Product, from the following data:

$[A]$	$d[Product]/dt$
(moles/L)	(moles/L/s)
0.003	10.0×10^{-5}
0.006	5.0×10^{-5}
0.012	2.5×10^{-5}

A. 1

B. -2

C. -1

D. 2

Answer: C

View Text Solution

70. Rate at which a substance reacts depends upon its

A. atomic weight

B. equivalent weight

C. molecular weight

D. active mass.

Answer: D

View Text Solution

71. 1 dm^3 of 2 M CH_3COOH is mixed with 1 dm^3 of 3 M ethanol to form ester. The decrease in the initial rate if each solution is diluted with an equal volume of water would be

A. 2 times

B. 4 times

C. 0.25 times

D. 0.5 times

Answer: C

View Text Solution

72. For a reaction A + B $\rightarrow$ C + D, if concentration of A is doubled without altering that of B, rate doubles. If concentration of B is increased nine times without altering that of A, rate triples. Order of the reaction is

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

B. $1\frac{1}{3}$

C. 2

D. 1

Answer: A

View Text Solution

73. If 60% of a first order reaction was completed in 60 minutes, 50% of the same reaction would be completed in approximately (log 4 = 0.60, log 5 = 0.69)

A. 45 minutes

B. 60 minutes

C. 40 minutes

D. 50 minutes

Answer: A

View Text Solution

74. Half-life period of a zero order reaction is

A. proportional to initial concentration of reactants

B. independent of initial concentration of reactants

C. inversely proportional to initial concentrations of reactants

D. inversely proportional to the square of initial concentration of reactants.

Answer: A

View Text Solution

75. The decomposition of a substance R takes place according to first order kinetics. Its initial concentration is reduced to $1/8^{th}$ in 24 s. The rate constant of the reaction is

A. $\frac{1}{24}s^{-1}$

B. $\frac{0.69}{16}s^{-1}$

C. $\frac{In\ \ 2}{8}s^{-1}$

D. $\frac{1}{8}s^{-1}$

Answer: C

View Text Solution

76. For a first order reaction, A $\rightarrow$ products, the rate of reaction at [A] = 0.2 M is 1.0×10^{-2} mol $litre^{-1}$ $\min^{-1}$. The half-life period for the reaction is

A. 832 s

B. 440 s

C. 416 s

D. 14 s

Answer: A

View Text Solution

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

A. 1.1 times that of half-life

B. 2.2 times that of half-life

C. 3.3 times that of half-life

D. 4.4 times that of half-life.

Answer: C

View Text Solution

78. Which of the following represents the expression for $3/4^{th}$ life of a first order reaction?

A. $\frac{k}{2.303}\log 4/3$

B. $\frac{2.303}{k}\log 3/4$

C. $\frac{2.303}{k}\log 4$

D. $\frac{2.303}{k}\log 3$

Answer: C

View Text Solution

79. In a first order reaction the a/(a – x) was found to be 8 after 10 ininute. The rate constant is

A. $(2.303 \times 3 \ \log \ 2)/10$

B. $(2.303 \times 2 \ \log \ 3)/10$

C. $10 \times 2.303 \times 2 \ \log \ 3$

D. $10 \times 2.303 \times 3 \ \log \ 2$

Answer: A

View Text Solution

80. In the reaction, $CH_3COCH_{3(g)} \rightarrow C_2H_{4(g)} + H_{2(g)} + CO_{(g)}$ the initial pressure is found to be 0.40 atm and after 10 min, it was 0.50 atm. The rate constant for first order reaction is [log 4 = 0.6021, log 3.5 = 0.5441]

A. 0.0133 $\min^{-1}$

B. 0.4 s^{-1}

C. 10 s^{-1}

D. 0.6 $\min^{-1}$

Answer: A

View Text Solution

81. For a reaction, X $\rightarrow$ Y, the graph of the product concentration (x) versus (t) came out to be a straight line passing through the origin. Hence the graph of $\frac{-d[X]}{dt}$ and time would be

A. straight line with a negative slope and an intercept on p-axis

B. straight line with a positive slope and an intercept on y-axis

C. a straight line parallel to x-axis

D. a hyperbola.

Answer: C

View Text Solution

82. The half-life period for a first order reaction is 15 min. The time required for the concentration of the reactant to change from 0.12 M to 0.08 M is

A. 18 min

B. 8.77 min

C. 5.67 min

D. 11 min

Answer: B

View Text Solution

83. For a reaction following first-order kinetics, which of the following statement is correct?

A. The time taken for the completion of 50% of the reaction is $t_{1/2}$

B. A plot of the reciprocal of the concentration of the reactants against time gives a straight line.

C. The degree of dissociation is equal to $1 - e^{-kt}$.

D. A plot of $[A]_0 / [A]$ versus time gives a straight line.

Answer: A

View Text Solution

84. The half-life period of a first order reaction is 35 minutes. What fraction of the reactant remains after 75 minutes?

A. 4.415

B. 0.226

C. 5.263

D. 0.155

Answer: B

View Text Solution

85. The half-life of a certain first order reaction is 60 minutes. How long will it take for 80% reaction to occur?

A. 139.37 minutes

B. 19.9 minutes

C. 199.39 hours

D. 40 minutes

Answer: A

View Text Solution

86. If initial concentration of reactants in certain reaction is doubled, the half-life period of the reaction doubles, the order of a reaction i

A. zero

B. first

C. second

D. third

Answer: A

View Text Solution

87. A first order reaction is 20% complete in 10 minutes. The rate constant of the reaction is

A. 0.223 $\min^{-1}$

B. 0.0223 $\min^{-1}$

C. 2.23 $\min^{-1}$

D. 22.3 $\min^{-1}$

Answer: B

View Text Solution

88. A substance A decomposes in solution following the first order kinetics, Flask Icontains 1 litre of 1 M solution of A and flask II contains 100 inL of 0.6 M solution of A. After 8 hours the concentration of A in flask I becomes 0.25 M. What will be the time for concentration of A in flask II to become 0.3 M?

A. 0.4 hours

B. 2.4 hours

C. 4.0 hours

D. Unpredictable as rate constant is not given.

Answer: C

View Text Solution

89. Half-life period of 2^{nd} order reaction is

A. proportional to initial concentration of reactants

B. independent of initial concentration of reactants

C. inversely proportional to initial concentration of reactants

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

Answer: C

View Text Solution

90. The radioactive decay follows

A. zero order kinetics

B. first order kinetics

C. second order kinetics

D. fractional order kinetics.

Answer: B

View Text Solution

91. For a zero order reaction $A \rightarrow P$, $t_{1/2}$ is (k is rate constant)

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

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

C. $\frac{1}{k[A]}0$

D. $\frac{\text{In } 2}{[A]_0 k}$

Answer: A

View Text Solution

92. A reaction is 50% complete in 2 hours and 75% complete in 4 hours, the order of reaction is

A. 0

B. 1

C. 2

D. 3

Answer: B

View Text Solution

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

A. remains same

B. becomes 4 times

C. becomes one-fourth

D. doubles

Answer: C

View Text Solution

94. Given $t_{1/2}$ = 3 hours, then how many gram of a substance will remain after 18 hours from 300 gram of a substance?

A. 4.6 g

B. 5.6 g

C. 9.2 g

D. 6.4 g

Answer: A

View Text Solution

95. The decomposition of a substance follows first order kinetics. If its concentration is reduced to $1/8^{th}$ of its initial value, in 24 minutes, the rate constant of decomposition process is

A. $1/24\ \text{min}^{-1}$

B. $0.692/24\ \text{min}^{-1}$

C. $\frac{2.303}{24}\log\left(\frac{1}{8}\right)\ \min^{-1}$

D. $\frac{2.303}{24}\log\left(\frac{8}{1}\right)\ \min^{-1}$

Answer: D

View Text Solution

96. The half-life of a first order reaction is 10 minutes. If initial amount is 0.08 mol / L and concentration at some instant is 0.01 mol / L, then t is

A. 10 minutes

B. 30 minutes

C. 20 minutes

D. 40 minutes.

Answer: B

View Text Solution

97. A first order reaction is 20% complete in 15 minutes, How much time it will take for 80% completion?

A. 108.2 minutes

B. 138.6 minutes

C. 207.9 minutes

D. 60 minutes

Answer: A

View Text Solution

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

A. 4

B. 3

C. 5

D. 2

Answer: A

View Text Solution

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

A. 0.5 hour

B. 0.25 hour

C. 2 hours

D. 1 hour

Answer: D

View Text Solution

100. In a first order reaction, 75% of the reactants disappeared in 1.386 hours. What is the rate constant?

A. $3.6 \times x10^{-3}s^{-1}$

B. $2.7 \times 10^{-4}s^{-1}$

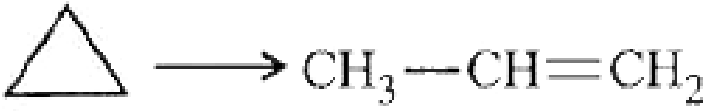
C. $72 \times 10^{-3}s^{-1}$

D. $1.8 \times 10^{-3}s^{-1}$

Answer: B

View Text Solution

101. Cyclopropane rearranges to form propene



This follows first order kinetics. The rate constant is $2.714 \times 10^{-3}\ \text{sec}^{-1}$. The initial concentration of cyclopropane is 0.29 M. What will be the concentration of cyclopropane after 100 sec?

A. 0.035 M

B. 0.22 M

C. 0.145 M

D. 0.0018 M

Answer: B

View Text Solution

102. The first order rate constant for the decomposition of N_2O_5 is $6.2 \times 10^{-4} s^{-1}$. The $t_{1/2}$ of decomposition is

A. 1117.7

B. 111.77

C. 223.4

D. 160.9

Answer: A

View Text Solution

103. For the first order reaction, half-life is 14 s. The time required for the initial concentration to reduce to $1/8^{th}$ of its value is

A. 28 s

B. 42 s

C. $(14)^3 s$

D. $(14)^2 s$

Answer: B

View Text Solution

104. Decomposition of H_2O_2 was studied by titration against $KMnO_4$ solution. It was found that 0.4 mole of H_2O_2 was reduced to 0.2 mole in 20 minutes and to 0.1 mole in 40 minutes and to 0.05 mole after one hour. The order of reaction must be

A. 0

B. 1

C. 2

D. 3

Answer: B

View Text Solution

105. Which of the following expressions is correct for first order reaction?

(a_0 refers to initial concentration of reactant)

A. $t_{1/2} \propto a_0^0$

B. $t_{1/2} \propto a_0^{-2}$

C. $t_{1/2} \propto a_0^{-1}$

D. $t_{1/2} \propto a_0$

Answer: A

View Text Solution

106. Which of the following statements about first order is not true?

A. The rate of the reaction increases with the decrease in concentration of reactants.

B. The graph between log (a -- x) vs time is straight line with intercept log a_0 and slope equal to - k/2.303.

C. Half-life is independent of initial concentration of reactant.

D. Unit of rate constant is s^{-1}

Answer: A

View Text Solution

107. The rate constant, k of the reaction,

$N_2O_{2(g)} \rightarrow 2NO_{2(g)} + \frac{1}{2}O_{2(g)}$ is $2.3 \times 10^{-2}s^{-1}$

Which equation given below describes the change of $[N_2O_5]$ with time? $[N_2O_5]_0$ and $[N_2O_5]$, correspond to concentration of N_2O_5 initially and at time t.

A. $[N_2O_5]_t = [N_2O_5]_0 + kt$

B. $\log[N_2O_5]_t = \log[N_2O_5]_0 - kt$

C. $[N_2O_5]_0 = [N_2O_5]_t e^{kt}$

D. $\ln \left(\frac{[N_2O_5]_0}{(N_2O_5]_t} \right) = kt$

Answer: D

View Text Solution

108. The first order reaction was started with a decimolar solution of the reactant. After 8 minutes and 20 seconds, its concentration was found to be M/100. So the rate constant of the reaction is

A. $2.303 \times 10^{-5} s^{-1}$

B. $2.303 \times 10^{-4} s^{-1}$

C. $4.606 \times 10^{-3} s^{-1}$

D. $2.606 \times 10^{-4} s^{-1}$

Answer: C

View Text Solution

109. For a first order reaction A $\rightarrow$ B, the reaction rate at reactant concentration of 0.01 M is found to be $2.0 \times 10^{-5} \text{mol } L^{-1} s^{-1}$The half-life period of the reaction is

A. 220 seconds

B. 30 seconds

C. 300 seconds

D. 347 seconds

Answer: D

View Text Solution

110. The rate of a first order reaction is 0.4 mol $L^{-1}s^{-1}$ at 10 minutes and 0.04 mol $L^{-1}s^{-1}$ at 20 minutes after initiation. The half life of the reaction is

A. 2 minutes

B. 6.9 minutes

C. 3 minutes

D. 3.3 minutes.

Answer: C

View Text Solution

111. The activation energies of two reactions are E_1 and $E_2(E_1 > E_2)$. If the temperature of the system is increased from $T_1 \rightarrow T_2$ the rate constant of the reactions changes from $k_1 \rightarrow k_1$ in the first reaction and

$k_2 \rightarrow k_2$ in the second reaction. Predict which of the following expression is correct?

A. $\frac{k_1'}{k_1} = \frac{k_2'}{k_2}$

B. $\frac{k_1'}{k_1} > \frac{k_2'}{k_2}$

C. $\frac{k_1'}{k_1} < \frac{k_2'}{k_2}$

D. $\frac{k_1'}{k_1} = \frac{k_2'}{k_2} = 1$

Answer: B

View Text Solution

112. The rate constant of a reaction at 500 K and 700 K are 0.02 s^{-1} and 0.07 s^{-1} respectively. The value of E_a is

A. 20.24 kJ mol^{-1}

B. 19.6 kJ mol^{-1}

C. 18.23 kJ mol^{-1}

D. 17.42 kJ mol^{-1}

Answer: C

View Text Solution

113. The rate constant, the activation energy and the Arrhenius parameter of a chemical reaction at 25°C are $3.0 \times 10^{-4} s^{-1}$, 104.4 kJ mol^{-1} and $6.0x10^{14} s^{-1}$ respectively. The value of rate constant at T $\rightarrow \infty$ is

A. $2.0 \times 10^{18} s^{-1}$

B. $6.0 \times 10^{14} s^{-1}$

C. infinity

D. $3.6 \times 10^{30} s^{-1}$

Answer: B

View Text Solution

114. The rate of reaction is doubled for every 10°C rise in temperature. The increase in reaction rate as a result of temperature rise from 10°C to 80°C is

A. 112

B. 512

C. 256

D. 128

Answer: D

View Text Solution

115. Two reactions proceed at 25°C at the same rate. The temperature coefficient of the rate of first reaction is 2 and that of second reaction is 2.5. The ratio of rates of these reactions at 95°C is

A. 5.6

B. 9.85

C. 4.768

D. 70

Answer: C

View Text Solution

116. The rate constant (k') of one of the reaction is found to be double that of the rate constant (k'') of another reaction. Then the relationship between the corresponding activation energies of the two reactions (E_a' and E_a'') can be represented as

A. $E_a' > E_a$

B. $E_a' < E_a$

C. $E_a' = E_a$

D. $E_a' = 4E_a$

Answer: B

View Text Solution

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

A. 2000 K

B. $\frac{1000}{2.303}K$

C. 1000 K

D. $\frac{2000}{2.303}K$

Answer: B

View Text Solution

118. Which of the following expression gives the effect of temperature on the rate constant?

A. In k= In A - E_a / RT

B. In k=In A +E_a / RT

C. In k =A -E_a / RT

D. k= In A + In E_a / RT

Answer: A

View Text Solution

119. The plot of log k vs 1/T helps to calculate

A. energy of activation

B. rate constant of the reaction

C. order of the reaction

D. energy of activation as well as the frequency factor.

Answer: D

View Text Solution

120. For a given reaction, 0.02 =1.61 exp $\left(\frac{-18230.8}{8.314 \times T}\right)$

The temperature at which the reaction occurs is

A. 301 K

B. 401 K

C. 501 K

D. 601 K

Answer: C

View Text Solution

121. By increasing the temperature by 10° C, the rate of forward reaction at equilibrium is increased by a factor of 2. The rate of backward reaction by this increase in temperature

A. remains unaffected

B. increases by a factor greater than two

C. decreases by a factor lesser than two

D. is also increased by a factor of two.

Answer: D

View Text Solution

122. Which of the following statements is incorrect?

A. The catalyst does not affect the equilibrium of a reaction,

B. Reaction with higher activation energy has higher rate constant.

C. In an exothermic reaction, the activation energy of the reverse reaction is higher than that of the forward reaction.

D. Half-life period of a first order reaction is independent of initial concentration.

Answer: B

View Text Solution

123. If a reaction A + B $\rightarrow$ C, is exothermic to the extent of 30 kJ/mol and the forward reaction has an activation energy of 249 kJ/mol, the activation energy for reverse reaction in kJ/mol is

A. 324

B. 279

C. 40

D. 100

Answer: B

View Text Solution

124. In a hypothetical reaction, A $\rightarrow$ Y, the activation energies for the forward and backward reactions are 15 and 9 kJ mol^{-1} respectively. The potential energy of A is 10 kJ mol^{-1}. Which of the following is wrong?

A. Threshold energy of the reaction is 25 kJ.

B. The potential energy of Y is 16 kJ.

C. Heat of reaction is 6 kl.

D. The reaction is exothermic.

Answer: D

View Text Solution

125. The activation energies for forward and backward reactions in a chemical reaction are 30.5 and 45.4 kJ mol^{-1} respectively. The reaction is

A. exotherinic

B. endotherinic

C. neither exothermic nor endothermic

D. independent of temperature.

Answer: A

View Text Solution

126. For the reaction : $H_2 + I_2 \rightarrow 2HI$, log k values at temperature 769 K and 667 K are 2.9 and 1.1 respectively. Estimate the activation energy for the reaction.

$\left(\frac{1}{769} = 1.3 \times 10^{-3} K^{-1}, \frac{1}{667} = 1.5 \times 10^{-3} K^{-1}\right)$

A. 41.4 cal mol^{-1}

B. 41.4 kcal mol^{-1}

C. 18 cal mol^{-1}

D. 18 kcal mol^{-1}

Answer: B

View Text Solution

127. Rate of a reaction can be expressed by Arrhenius equation as : k = $Ae^{-E_a/RT}$. In this equation, E_a represents

A. the energy above which all the colliding molecules will react

B. the energy below which colliding molecules will not react

C. the total energy of the reacting molecules at a temperature, T

D. the fraction of molecules with energy greater than the activation energy of the reaction.

Answer: B

View Text Solution

128. The energies of activation for forward and reverse reactions for $A_2 + B_2 \Leftrightarrow 2AB$ are 180 kJ mol^{-1} and 200 kJ mol^{-1} respectively. The presence of a catalyst lowers the activation energy of both (forward and reverse) reactions by 100 kJ mol^{-1}. The enthalpy change of the reaction ($A_2 + B_2 \rightarrow 2AB$) in the presence of a catalyst will be (in kJ mol^{-1})

A. -20

B. 300

C. 120

D. 280

Answer: A

View Text Solution

129. The activation energy of a reaction is 58.3 kJ mol^{-1}. The ratio of rate constants at 305 K and 300 K is about (R= 8.3 J $K^{-1}mol^{-1}$)

A. 1.25

B. 1.5

C. 1.75

D. 2

Answer: B

View Text Solution

130. Which one of the following is not true?

A. For first order reaction, straight-line graph of log C versus t is obtained, slope = $-k/2.303$

B. A plot of log k vs $1/T$ gives a straight-line graph for which slope = $-E_a/2.303R$.

C. For third order reaction, the product of $t_{1/2}$ and initial concentration (a) is constant.

D. Units of k for the first order reaction are independent of concentration units.

Answer: C

View Text Solution

131. The activation energy of a reaction is 5 kcal/mol. The increase in the rate constant when its temperature is raised from 300 to 305 K is

approximately

A. 0.146

B. 0.5

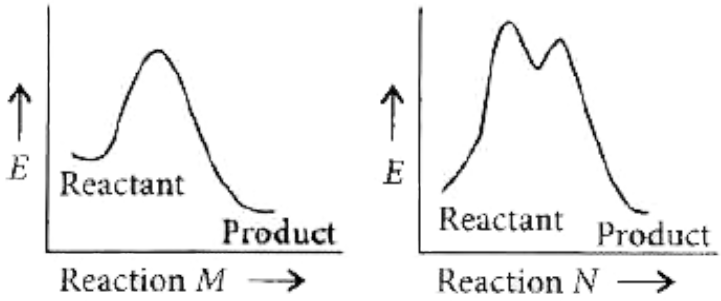
C. 1

D. 25.7%.

Answer: A

View Text Solution

132. The correct statement regarding the following energy diagrams is



A. reaction M is faster and less exothermic than reaction N

B. reaction M is slower and less exothermic than reaction N

C. reaction M is faster and more exothermic than reaction N

D. reaction M is slower and more exothermic than reaction N.

Answer: C

View Text Solution

133. Milk turns sour at 40° C three times as faster as at 0° C. The energy of activation for souring of milk is

A. 4.694 kcal

B. 2.6 kcal

C. 6.6 kcal

D. none of these.

Answer: A

View Text Solution

134. The rate of decomposition for methylnitrite and ethylnitrite can be given in terms of rate constant $(\text{in} s^{-1})$ k_1 and k_2 . The energy of activations for the two reactions are 152.30 kJ/mol and 157.7 kJ/ mol as well as frequency factors are 10^{13} and 10^{14} for the decomposition of methyl and ethyl nitrite. The temperature at which rate constant will be same for the two reactions is

A. 298 K

B. 287 K

C. 282 K

D. 273 K

Answer: C

View Text Solution

135. The activation energy of a reaction at a given temperature is found to be 2.303 RT J mol^{-1}. The ratio of rate constant to the Arrhenius factor is

A. 0.01

B. 0.1

C. 0.02

D. 0.001

Answer: B

View Text Solution

136. Reactant (A) forms two products :

$A \xrightarrow{k_1} B$ Activation energy,E_{a_1}

$A \xrightarrow{k_2} C$ Activation energy,E_{a_2}

If $E_{a_2} = 2E_{a_1}$, then ky and ky are related as

A. $k_2 = k_1 e^{E_{a_1}/RT}$

B. $k_2 = k_1 e^{E_{a_2}/RT}$

C. $k_1 = Ak_2 e^{E_{a_1}/RT}$

D. $k_1 = 2k_2 e^{E_{a_2}/RT}$

Answer: C

View Text Solution

137. For a reaction, the rate of reaction was found to increase about 1.8 times when the temperature was increased by 10°C. The increase in rate is not due to

A. increase in number of active molecules

B. increase in activation energy of reactants

C. decrease in activation energy of reactants

D. increase in the number of collisions between reacting molecules.

Answer: B

View Text Solution

138. The enzyme-catalyzed reaction is faster than a metal catalyzed reaction because in enzyme catalysed reaction

A. activation energy is greater

B. activation energy is lower

C. enzymes are present in larger amounts

D. none of the above.

Answer: B

View Text Solution

139. If for a first order reaction, the values of A and E_a are 4 $\times 10^{13}$ $\sec^{-1}$ and 98.6 kJ/mol respectively, then at what temperature

will its half-life period be 10 minutes?

A. 330 K

B. 300 K

C. 330.95 K

D. 311.15 K

Answer: B

View Text Solution

140. Rate constant k of a reaction varies with temperature according to the equation, log k = constant -$\frac{E_a}{2.303RT}$ When a graph is plotted for logk versus 1/T a straight line with a slope -5632 is obtained. The energy of activation for this reaction is

A. 127.67 kJ mol^{-1}

B. 107.84 kJ mol^{-1}

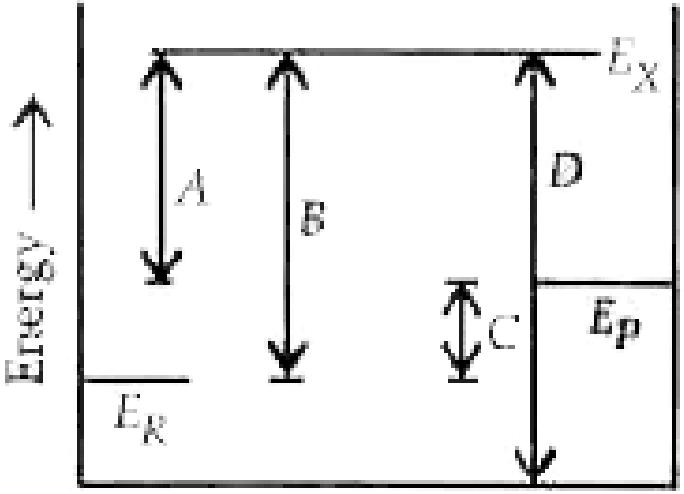
C. 86 kJ mol^{-1}

D. 246.8 kJ mol^{-1}

Answer: B

View Text Solution

141. In the accompanied diagram, E_R, E_p and E_x represent the energy of the reactants, products and activated complex respectively. Which of the following is the activation energy for the backward reaction?



A. A

B. B

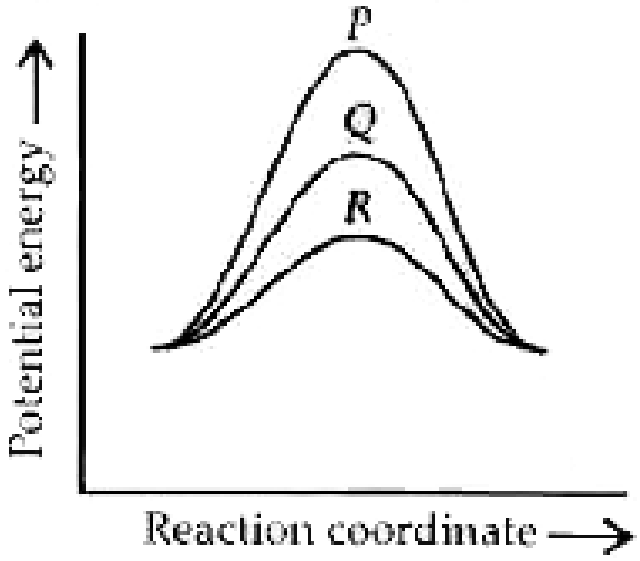
C. C

D. D

Answer: A

View Text Solution

142. If a homogeneous catalytic reaction can take place through three alternative paths as depicted below, the catalytic efficiency of P, Q, R representing the relative case would be



A. $P > Q > R$

B. $Q > P > R$

C. $P > R > Q$

D. $R > Q > P$

Answer: D

View Text Solution

143. An endothermic reaction A $\Leftrightarrow$ B has an activation energy as x kJ mol^{-1} of A. If energy change of the reaction is y kJ, the activation energy of the reverse reaction is

A. $-x$

B. x-y

C. x+y

D. y-x

Answer: B

View Text Solution

144. Which one of the following statements is incorrect?

A. The temperature coefficient of a reaction is the ratio of the rate constants at any two temperatures.

B. The temperature coefficient of a reaction is the ratio of the rate constants at 298 K and 308 K.

C. The temperature coefficient of most of the reactions lies between 2 and 3.

D. In an endothermic reaction, activation energy of reactants is more than that of the products.

Answer: A

View Text Solution

145. The activation energy of a reaction is zero. The rate constant of the reaction

A. increases with increase of temperature

B. decreases with increase of temperature

C. decreases with decrease of temperature

D. is nearly independent of temperature.

Answer: D

View Text Solution

146. A catalyst lowers the activation energy of the forward reaction by 10 kJ mol^{-1}. What effect does it have on the activation energy of the backward reaction?

A. Increases by 10 kJ mol^{-1}

B. Decreases by 10 kJ mol^{-1}

C. Remains unaffected

D. Can not be predicted

Answer: B

View Text Solution

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

A. the difference in energies of reactants and products

B. the sum of energies of reactants and products

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

D. the difference in energy of intermediate complex and the average energy of reactants.

Answer: D

View Text Solution

148. The minimum energy necessary to permit a reaction is

A. internal energy

B. threshold energy

C. activation energy

D. free energy.

Answer: B

View Text Solution

149. The activation energy necessary for a reaction, may be lowered by

A. decreasing the temperature

B. increasing the temperature

C. adding a catalyst

D. reducing the potential energy.

Answer: C

View Text Solution

150. What happens when the temperature of a solution is increased from 25° C to 65° C?

A. The rate of the reaction remains unchanged and the rate constant k decreases.

B. The rate of the reaction increases and rate constant k decreases.

C. The rate of the reaction decreases and so does the rate constant k.

D. The rate of the reaction increases and so does the rate constant k.

Answer: D

View Text Solution

151. The rate of reaction can be increased in general by all the factors except by

A. using a catalyst

B. increasing temperature

C. increasing the activation energy

D. increasing the concentration of reactants.

Answer: C

View Text Solution

152. Effect of temperature on reaction rate is given by

A. Claisen-Clapeyron equation

B. Arrhenius equation

C. Gibb's-Helmholtz equation

D. Kirchhoff's equation.

Answer: B

View Text Solution

153. For an endothermic reaction, where AH represents the enthalpy of the reaction in kJ/mol, the minimum value for the energy of activation will be

A. less than ΔH

B. zero

C. more than ΔH

D. equal to ΔH

Answer: C

View Text Solution

154. On increasing the temperature by 10 K the rate of reaction becomes double. Which of the following is the most appropriate reason?

A. With increase of temperature, velocities increase and hence the number of collisions is appreciably increased.

B. The activation energy decreases with increase of temperature.

C. The bonds between the atoms of the reacting molecules become weak at higher temperature.

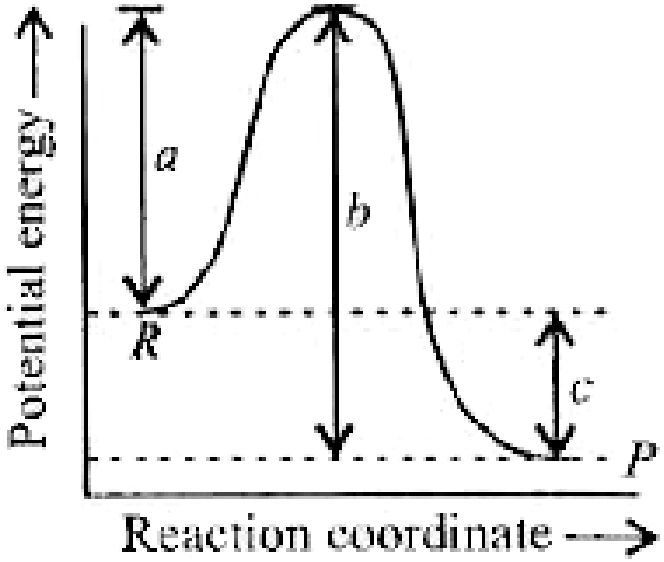
D. The higher the temperature, larger is the fraction of colliding particles which can cross the energy barrier.

Answer: D

View Text Solution

155. The potential energy diagram for the reaction

$R \rightarrow P$ is given below:



ΔH° of the reaction corresponds to the energy

A. a

B. b

C. c

D. a+b

Answer: C

View Text Solution

156. What is the energy of activation of a reaction if its rate doubles when the temperature is raised from 290 K to 300 K?

A. 12 kcal

B. 41 kcal

C. 13.8 kcal

D. 52 kcal

Answer: A

View Text Solution

157. The activation energy of a reaction can be determined by

A. changing the concentration of reactants

B. evaluating rate constant at standard temperature

C. evaluating rate constant at two different temperatures

D. by doubling concentration of reactants.

Answer: C

View Text Solution

158. Consider an endothermic reaction x $\rightarrow$ y with the activation energy E_b and E_f for the backward and forward reaction respectively. In general

A. $E_b < E_f$

B. $E_b > E_f$

C. $E_b = E_f$

D. no definite relation between E_b and E_f

Answer: A

View Text Solution

159. Which reaction characteristics are changing by the addition of a catalyst to a reaction at constant teinperature?

(i) Activation energy

(ii) Equilibrium constant

(iii) Reaction entropy

(iv) Reaction enthalpy

A. Only (i)

B. Only (iii)

C. Only (i) and (ii)

D. All of these

Answer: A

View Text Solution

160. At a given temperature, the energy of activation of two reactions is same if

A. the specific rate constant for the two reactions is the same

B. the temperature coefficient for the two reactions is the same

C. ΔH for the two reactions is same but not zero

D. ΔH for the two reactions is zero.

Answer: A

View Text Solution

161. The rate constant is given by the equation, $k = P.\ Ze^{-E_a/RT}$ Which factor should register a decrease for the reaction to proceed more rapidly?

A. T

B. Z

C. E_a

D. P

Answer: C

View Text Solution

162. Number of molecules must overcome an energy barrier is given by the expression

A. A

B. k

C. $e^{-E_a/RT}$

D. E_a

Answer: C

View Text Solution

163. According to collision theory of reaction rates

A. every collision between reactants leads to chemical reaction

B. rate of reaction is proportional to velocity of molecules

C. all reactions which occur in gaseous phase are zero order reactions

D. rate of reaction is directly proportional to collision frequency

Answer: D

View Text Solution

164. Collision theory is applicable to

A. first order reactions

B. zero order reactions

C. bimolecular reactions

D. intramolecular reactions.

Answer: C

View Text Solution

165. For effective collisions, colliding molecules must have

A. minimum potential energy

B. sufficient kinetic energy

C. sufficient potential energy

D. maximum energy of activation.

Answer: B

View Text Solution

Check Your Neet Vitals

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

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

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

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

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

Answer: B

View Text Solution

2. Which of the following is not correct?

A. Rate of zero order reaction depends upon initial concentration of reactant.

B. Rate of zero order reaction does not depend upon initial concentration of reactant.

C. $t_{1/2}$ of first order reaction is independent of initial concentration of reactant.

D. $t_{1/2}$ of zero order reaction is dependent of initial concentration of reactant.

Answer: A

View Text Solution

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

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

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

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

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

Answer: B

View Text Solution

4. Reactant (A) forms two products :

$A \xrightarrow{k_1} B$ Activation energy, E_{a_1}

$A \xrightarrow{k_2} C$ Activation energy, E_{a_2}

If $E_{a_2} = 2E_{a_2}$, and k_1 and k_2 are related as

A. $k_2 = k_1 e^{E_{a_1}/RT}$

B. $k_2 = k_1 e^{E_{a_2}/RT}$

C. $k_1 = Ak_2 e^{E_{a_1}/RT}$

D. $k_1 = 2k_2 e^{E_{a_2}/RT}$

Answer: C

View Text Solution

5. Consider the reaction, $2A + B \rightarrow$ products. When concentration of B alone was doubled, the half-life did not change. When the concentration of A alone was doubled, the rate increased by two times. The unit of rate constant for this reaction is

A. s^{-1}

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

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

D. none of these

Answer: B

View Text Solution

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

A. 0.5 M

B. 1.25 M

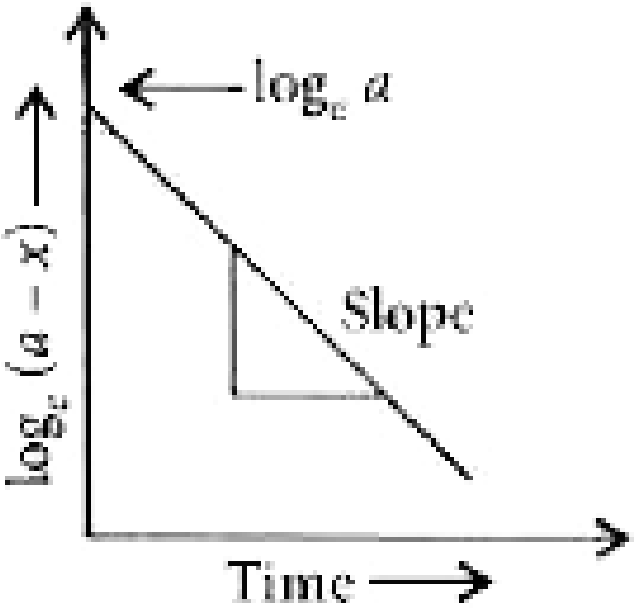
C. 12.5 M

D. 1.0 M

Answer: D

View Text Solution

7. In the following plot, for a first order reaction, slope is equal to



A. $-k$

B. $-\dfrac{k}{2.303}$

C. $-\dfrac{2.303}{k}$

D. $-k \times 2.303$

Answer: B

View Text Solution

8. In a second order reaction, when the concentration of both the reactants are equal, the reaction is completed 20% in 500 s. How long would it take for the reaction to go to 60% completion?

A. 3000 s

B. 5000 s

C. 1000 s

D. 2000 s

Answer: A

View Text Solution

9. For a reaction $A_2 + B_2 \rightarrow 2AB$, evaluate the energy of activation from the following data :

T (in K)	$1/T$ (K^{-1})	$\log_{10} k$
500	2×10^{-3}	3.0
200	5×10^{-3}	2.0

A. 15.4 kcal

B. 1.54 kcal

C. 154 kcal

D. 1.54×10^3 kcal

Answer: A

View Text Solution

10. The time required for 10% completion of a first order reaction at 298 K is equal to that required for its 25% completion at 308 K. If the pre-exponential factor for the reaction is $3.56 \times 10^9 s^{-1}$, calculate its rate constant at 318 K.

A. $0.92 \times 10^{-4} s^{-1}$

B. $9.22 \times 10^{-4} s^{-1}$

C. $92.2 \times 10^{-4} s^{-1}$

D. $92 \times 10^{-4} s^{-1}$

Answer: B

View Text Solution

11. For a reaction A $\rightarrow$ Products, starting with initial concentrations of 5×10^{-3} M and 25×10^{-4} M, half- lives are found to be 1.0 and 8.0 hour respectively. If we start with an initial concentration of 1.25×10^{-3} M, the half life of the reaction will be

A. 16 h

B. 32 h

C. 64 h

D. 256 h

Answer: C

View Text Solution

12. Which of the following statements are correct ?

1. Order of a reaction can be known from experimental result and not from the stoichiometry of reaction.

2. Overall molecularity of a reaction may be determined in a manner similar to overall order of reaction.

3. Overall order of reaction, $A^m + B^n \rightarrow AB_x$ is (m+n) 4. Molecularity of a reaction refers to

(i) molecularity of each of the elementary steps (slow steps) in a multistep reaction.

(ii) molecularity of that particular step in a single step reaction.

A. 1, 3 and 4

B. 1, 2 and 3

C. 2, 3 and 4

D. 1, 2 and 4

Answer: D

View Text Solution

13. In the Arrhenius equation for a certain reaction, the values of A and E_a (energy of activation) are $4 \times 10^{13} \ \ \sec^{-1}$ and 98.6 kJ mol^{-1} respectively. If the reaction is of first order, at what temperature will its half life period be 10 minute?

A. 31.35 K

B. 311.35 K

C. 3.11 K

D. 31.34 K

Answer: B

View Text Solution

14. The lowering of activation energy by catalyst is due to

A. formation of adsorbed activated complex and to provide new pathway to reaction

B. adsorption is always exothermic

C. the adsorbed activated complex possesses lower energy level than simple activated complex

D. all of the above,

Answer: D

View Text Solution

15. Which of the following statements is correct?

A. The rate of a reaction decreases with passage of time as the concentration of reactants decreases.

B. The rate of a reaction is same at any time during the reaction.

C. The rate of a reaction is independent of temperature change.

D. The rate of a reaction decreases with increase in concentration of reactants.

Answer: A

View Text Solution

16. Select the correct statements out of I, II and III for a zero order reaction.

I. Quantity of the product formed is directly proportional to time.

II. Larger the initial concentration of the reactant, greater is the half-life period.

III. If 50% reaction takes place in 100 minutes, 75% reaction will take place in 150 minutes.

A. I only

B. I and II only

C. II and III only

D. I, II and III

Answer: D

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17. Specific conductance of 0.1 M CH2COOH at 25°C is 3.9×10^{-4} $ohm^{-2}cm^{-1}$. If $\lambda^\infty\left(H^+\right)$ and $\lambda^\infty\left(CH_3COO^-\right)$ at 25°C are 349.0 and 41.0 ohm^{-1} $\mathrm{cm}\hat{}(2)mol^{-1}$ respectively, degree of ionisation of CH_3COOH at the given concentration is

A. 0.02

B. 0.01

C. 0.04

D. 0.05

Answer: B

View Text Solution

18. What is the two-third life of a reaction having $k = 5.48 \times 10^{-14} s^{-1}$?

A. 2.01×10^{13} s

B. 2.01×10^{12} s

C. 4.02×10^{13}s

D. 4.02×10^{26} s

Answer: A

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19. If half-lives of a first order and zero order reactions are same, then the ratio of the initial rates of the first order reaction to that of zero order reaction is

A. $1/0.693$

B. 2×0.693

C. $2/0.693$

D. 6.93

Answer: B

View Text Solution

20. Two reactions with different activation energies have the same rate at rooin temperature. Which statement correctly describes the rates of these two reactions at the same higher temperature?

A. The reaction with the greater activation energy will be faster.

B. The reaction with the smaller activation energy will be faster.

C. The two reactions will have the same rate.

D. Temperature range is also required.

Answer: A

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21. In the reaction, A + 2B $\rightarrow$ 3C + D, which of the following expressions does not describe changes in the concentration of various species as a function of time?

A. $\frac{d[C]}{dt} = \frac{-3d[A]}{dt}$

B. $\frac{3d[D]}{dt} = \frac{d[C]}{dt}$

C. $\frac{3d[B]}{dt} = \frac{-2d[C]}{dt}$

D. $\frac{2d[B]}{dt} = \frac{d[A]}{dt}$

Answer: D

View Text Solution

22. How much faster would a reaction proceed at 25°C than at 0°C if the activation energy is 65 kJ?

A. 2 times

B. 16 times

C. 11 times

D. 6 times

Answer: C

View Text Solution

23. In an exothermic reaction A $\rightarrow$ B, the activation energy of reverse reaction is twice that of forward reaction. If enthalpy of the reaction is -80 kJ mol^{-1}, the activation energy of the reverse reaction is

A. 80.0kJ mol^{-1}

B. 60.0 kJ mol^{-1}

C. 40.0 kJ mol^{-1}

D. 160.0 kJ mol^{-1}

Answer: D

View Text Solution

24. If the volume of the vessel in which the reaction, $2NO + O_2 \rightarrow 2NO_2$, is occurring is diminished to $1/3^{rd}$ of its initial volume, then the rate of reaction will be increased by

A. 3 times

B. 9 times

C. 27 times

D. 36 times

Answer: C

View Text Solution

25. According to collision theory of reaction rates, rise in temperature of a reaction will increase the rate of the reaction because of

A. increase in the velocity of the reacting molecules

B. increase in the number of collisions

C. increase in the number of molecules having the activation energy (threshold energy)

D. none of these.

Answer: C

View Text Solution

Aipmt Neet Mcqs

1. For the reaction $N_2O_{5(g)} \rightarrow 2NO_{2_g} = 1/2O_{2(g)}$ the value of rate of disappearance of N_2O_5 is given as $6.25 \times 10^{-3}\text{mol}\ \ L^{-1}s^{-1}$. The rate of formation of NO_2 and O_2 is given respectively as

A. 6.25×10^{-3} mol $L^{-1}s^{-1}$ and 6.25×10^{-3} mol $L^{-1}s^{-1}$

B. 1.25×10^{-2} mol $L^{-1}s^{-1}$ and 3.125×10^{-3} mol $L^{-1}s^{-1}$

C. 6.25×10^{-3} mol $L^{-1}s^{-1}$ and 3.125×10^{-3} mol $L^{-1}s^{-1}$

D. 1.25×10^{-2} mol $L^{-1}s^{-1}$ and 6.25×10^{-3} mol $L^{-1}s^{-1}$

Answer: B

View Text Solution

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

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

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

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

B. Rate = k[A][B]

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

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

Answer: D

View Text Solution

3. The rate of the reaction,

$2NO + Cl_2 \rightarrow 2NOCI$ is given by the rate equation rate = $k[NO]^2[Cl_2]$.

The value of the rate constant can be increased by

A. increasing the temperature

B. increasing the concentration of NO

C. increasing the concentration of the Cl_2

D. doing all of these.

Answer: A

View Text Solution

4. Which one of the following statements for the order of a reaction is incorrect?

A. Order can be determined only experimentally.

B. Order is not influenced by stoichiometric coefficient of the reactants.

C. Order of a reaction is sum of power to the concentration terms of reactants to express the rate of reaction.

D. Order of reaction is always whole number.

Answer: D

View Text Solution

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

$$\frac{-d[N_2O]}{dt} = k[N_2O_5]$$

$\frac{d[NO_2]}{dt} = k'[N_2O_5], \frac{d[O_2]}{dt} = k''[N_2O_5]$

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

A. k'=2k , k'' = k

B. k'=2k , k'' = $k/2$

C. k'=2k , k''=2k

D. k'=k , k''=k

Answer: B

View Text Solution

6. The unit of rate constant for a zero order reaction is

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

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

C. $L^2 \quad mol^{-2}s^{-1}$

D. s^{-1}

Answer: A

View Text Solution

7. In a reaction, A + B $\rightarrow$ product, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentration of both the reactants (A and B) are doubled, rate law for the reaction can be written as

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

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

C. rate = k[A][B]

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

Answer: D

View Text Solution

8. In a zero-order reaction for every 10° C rise of temperature, the rate is doubled. If the temperature is increased from 10° C to 100° C, the rate of the reaction will become

A. 256 times

B. 512 times

C. 64 times

D. 128 times.

Answer: B

View Text Solution

9. Activation energy (E_a) and rate constants (k_1 and k_2) of a chemical reaction at two different temperatures (T_1 and T_2) are related by

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

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

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

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

Answer: B::D

View Text Solution

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

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

A. 34.7 kJ mol^{-1}

B. 15.1 kJ mol^{-1}

C. 342 kJ mol^{-1}

D. 269 kJ mol^{-1}

Answer: A

View Text Solution

11. The activation energy of a reaction can be determined from the slope of which of the following graphs?

A. In k vs. $\frac{1}{T}$

B. $\frac{T}{In \quad k} vs \frac{.1}{T}$

C. In k vs. T

D. $\frac{In \quad k}{T} vs. T$

Answer: A

View Text Solution

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

A. second

B. more than zero but less than first

C. zero

D. first

Answer: D

View Text Solution

13. The rate constant of the reaction A $\rightarrow$ B is 0.6×10^{-3} mol $L^{-1}s^{-1}$. If the concentration of A is 5 M, then concentration of B after 20 minutes is

A. 3.60 M

B. 0.36 M

C. 0.72 M

D. 1.08 M

Answer: C

View Text Solution

14. The rate of first-order reaction is 0.04 mol $L^{-1}s^{-1}$ at 10 seconds and 0.03 mol $L^{-1}s^{-1}$ at 20 seconds after initiation of the reaction. The half period of the reaction is

A. 44.1 s

B. 54.1 s

C. 24.1 s

D. 34.1 s

Answer: C

View Text Solution

15. The addition of a catalyst during a chemical reaction alters which of the following quantities?

A. Enthalpy

B. Activation energy

C. Entropy

D. Internal energy

Answer: B

View Text Solution

16. The decomposition of phosphine (PH_3) on tungsten at low pressure is a first-order reaction. It is because the

A. rate is proportional to the surface coverage

B. rate is inversely proportional to the surface coverage

C. rate is independent of the surface coverage

D. rate of decomposition is very slow.

Answer: A

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17. Mechanism of a hypothetical reaction

$X_2 + Y_2 \rightarrow 2XY$, is given below :

(i) $X_2 \rightarrow X + X(f*)$

(ii) $X + Y_2 = XY + Y$(slow)

(iii) X+Y $\rightarrow$ XY(fast)

The overall order of the reaction will be

A. 2

B. 0

C. 1.5

D. 1

Answer: C

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18. A first order reaction has a specific reaction rate of $10^{-2}\,\mathrm{sec}^{-1}$. How much time will it take for 20 g of the reactant to reduce to 5 g?

A. 138.6 sec

B. 346.5 sec

C. 693.0 sec

D. 238.6 sec

Answer: A

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

A. the rate of a first-order reaction does not depend on reactant concentrations, the rate of a second-order reaction does depend on reactant concentrations

B. the half-life of a first-order reaction does not depend on $[A]_0$, the half-life of a second-order reaction does depend on $[A]_0$

C. a first-order reaction can be catalysed, a second order reaction cannot be catalysed

D. the rate of a first-order reaction does depend on reactant concentrations, the rate of a second-order reaction does not depend on reactant concentrations.

Answer: B

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20. When initial concentration of the reactant is doubled, the half-life period of a zero order reaction

A. is halved

B. is doubled

C. is tripled

D. remains unchanged.

Answer: B

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

A. $t=2.303/k$

B. $t= 0.693/k$

C. $t=6909/k$

D. $t=4.606/k$

Answer: D

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22. For the chemical reaction, $N_{2(g)} + 3H_{2(g)} \Leftrightarrow 2NH_{3(g)}$ the correct option is

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

B. $-\frac{1}{3}\frac{d[H_2]}{dt} = -\frac{1}{2}\frac{d[NH_3]}{dt}$

C. $-\frac{d[N_2]}{dt} = 2\frac{d[NH_3]}{dt}$

D. $-\frac{d[N_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$

Answer: D

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