CHEMISTRY

BOOKS - MODERN PUBLICATION CHEMISTRY (KANNADA ENGLISH)

CHEMICAL KINETICS

Multiple Choice Questions Rate Of A Reaction

1. The concentration of a reactant changes from 0.03 M to 0.02 M in 25 minutes . The average rate of reaction using time in seconds is :

A. $0.4 \times 10^{-3} \text{mol L}^{-1} s^{-1}$

B. $0.024 \text{mol} L^{-1} s^{-1}$

C. $0.24 \text{mol} \quad L^{-1} s^{-1}$

D. $0.66 \times 10^{-4} \text{mol} L^{-1} s^{-1}$.

Answer: D

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2. For the reaction ,

$2NO_2 \rightarrow 2NO + O_2$

rate is expressed as :

A. $-\frac{1}{2}\frac{d[NO_2]}{dt} = -\frac{1}{2}\frac{d[NO]}{dt} = \frac{d[O_2]}{dt}$

B. $-\frac{2d[NO_2]}{dt} = \frac{2d[NO]}{dt} = \frac{d[O_2]}{dt}$

C. $-\frac{1}{2}\frac{d[NO_2]}{dt} = \frac{1}{2}\frac{d[NO]}{dt} = \frac{d[O_2]}{dt}$

D. $-\frac{d[NO_2]}{dt} = d\frac{[NO]}{dt} = \frac{2d[O_2]}{dt}$

Answer: C

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3. The rate of a reaction may be expressed by the following different ways :

$$\frac{1}{2}\frac{d[X]}{dt} = -\frac{1}{3}\frac{d[Y]}{dt} = -\frac{d[Z]}{dt}$$

The reaction is :

A. $3Y + Z \rightarrow 2X$

B. $2X + Y \rightarrow Z$

C. $3X + 2Y \rightarrow 6Z$

D. $2Y + 6Z \rightarrow 3X$

Answer: A

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4. For the reaction :

$2O_3 \rightarrow 3O_2$

the rate of reaction is correctly given by the expression

A. $-\frac{2}{3}\frac{d[O_3]}{dt}$

B. $-\frac{1}{3}\frac{d[O_3]}{dt}$

C. $-\frac{1}{2}\frac{d[O_3]}{dt}$

D. $\frac{1}{2}\frac{d[O_3]}{dt}$

Answer: C

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5. The rate of a reaction depends on all factors except :

A. reaction temperature

B. concentration of reactants

C. magnitude of equilibrium constant

D. specific rate constant.

Answer: C

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6. For the reaction

$2A + B + C \rightarrow A_2B + C$

the rate law has been found to be

Rate = k[A] $[B]^2$ with $k = 2.0 \times 10^{-6} mol^{-2} L^2 s^{-1}$.

The initial rate of reaction with

[A] =0.1 mol L^{-1}

[B] = 0.2 mol L^{-1} and

[C] = 0.8 mol $L^{-1} s^{-1}$

A. $6.4 \times 10^{-8} \text{mol L}^{-1} s^{-1}$

B. $4 \times 10^{-3} \text{mol L}^{-1} s^{-1}$

C. $8.0 \times 10^{-9} \text{mol L}^{-1} s^{-1}$

D. $4.0 \times 10^{-7} \text{mol L}^{-1} s^{-1}$

Answer: C

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7. The rate of the reaction

$2SO_2 + O_2 \rightarrow 2SO_3$

may be expressed as :

$$-\frac{d[O_2]}{dt} = 2.5 \times 10^{-4} \text{mol L}^{-1}\text{sec}^{-1}$$

The rate of reaction when expressed in terms of SO_3 will be :

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

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

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

D. $5.0 \times 10^{-4} \text{mol L}^{4}\text{sec}^{-1}$

Answer: D

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8. For the reaction

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

Which of the following does not express reaction rate ?

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

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

C. $-\frac{d[A]}{2dt}$

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

Answer: D

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9. Consider the reaction :

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

The equality relationship between $\frac{d[NH_3]}{dt}$ and $-\frac{d[H_2]}{dt}$ is

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

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

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

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

Answer: A

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10. Consider the chemical reaction $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$. The rate of this reaction can be expressed in terms of time derivative of concentration of $N_2(g)$, $H_2(g)$ or $NH_3(g)$. Indentify the correct relationship amongst the rate expressions :

A. Rate

$$= -d[N_2]/dt = -1/3d[H_2]/dt = 1/2d[NH_3]/dt$$

B. Rate

$$= -d[N_2]/dt = -3d[H_2]/dt = 2d[NH_3]/dt$$

C. Rate

$$= d[N_2]/dt = 1/3d[H_2]/dt = 1/2d[NH_3]/dt$$

D. Rate = -$d[N_2]/dt = -d[H_2]/dt = d[NH_3]/dt$

Answer: A

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11. Which of the following statements is not correct for the reaction :

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

A. the rate of disappearance of B is one - fourth the rate of disappearance of A.

B. the rate of appearance of C is one - half the rate of disappearance of B .

C. the rate of formation of D is one -half the rate of consumption of A .

D. the rate of formation of C and D are equal .

Answer: B

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12. Nitrogen tetraoxide (N_2O_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 is 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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Multiple Choice Questions Order And Molecularity Of Reactions

1. For the reaction :

$3CIO^- \rightarrow CIO_3^- + 2CI^-$ **various steps are :**

$CIO^- + CIO^- \rightarrow CIO_2^- + CI^-$ **(slow)**

$CIO_2^- + CIO^- \rightarrow CIO_3^- + CI^-$ **(fast)**

the order of the reaction is :

A. 1

B. 2

C. 0

D. 3

Answer: B

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2. A reaction A+B $\rightarrow$ C is second order with respect to A and independent of B .The rate expression for the reaction is :

A. rate = k[A] [B]

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

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

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

Answer: D

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3. The specific rate constant for a fist order reaction depends on the :

A. concentration of the reactant

B. concentration of the product

C. time

D. temperature .

Answer: D

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4. The possible mechanism for the reaction :

$2NO_2CI \rightarrow 2NO_2 + CI_2$ **is**

$NO_2CI \xrightarrow{\text{slow}} NO_2 + CI$

$NO_2CI + CI \xrightarrow{\text{Fast}} NO_2 + CI_2$

The order of the reaction is :

A. 1.5

B. 1

C. 2

D. 3

Answer: B

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5. For a chemical reaction A+B $\rightarrow C$ it has been found that :

(i) rate becomes double when the concentrations of A is doubled

(ii) rate becomes 16 times when the concentrations of both A and B are doubled . The rate expression is :

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

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

C. rate = $k[A][B]^3$

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

Answer: B

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6. For the reaction $2NO_2 + F_2 \rightarrow 2NO_2$ F which is proposed to occur as :

$NO_2 + F_2 \rightarrow NO_2F + F$ (slow)

$NO_2 + F \rightarrow NO_2F$ (fast)

the rate law can be written as :

A. rate $= k[NO_2][F]^2$

B. rate $= k[NO_2][F_2]$

C. rate $= k[NO_2][F_2]$

D. rate=$k[NO_2F]$

Answer: B

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7. A zero order reaction is one :

A. whose rate is not affected by concentration

B. in which the reactants do not react

C. in which one of the reactants is in large excess

D. in which concentration of reactants changes with time .

Answer: A

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8. The rate law for a reaction is :

Rate = $k[A]^n$

The rate of reaction remains same on doubling the concentration of A. The value of n is :

A. 0

B. 1

C. 2

D. 3

Answer: A

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9. A lump of coal burns slowly in air while coal dust burns explosively . This is because of :

A. less mass of powdered coal

B. large surface area of coal dust

C. lower ignition temperature of coal dust

D. nature of coal dust.

Answer: B

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10. The rate constant is numerically same for three reactions of first second and third order respections of

first second and third order respectively .Which of the following is true for the rate of these three reactions if concentration of the reactant is same and larger than 1 M ?

A. $r_1 = r_2 = r_3$

B. $r_1 < r_2 < r_3$

C. $r_1 > r_2 > r_3$

D. no definte relation

Answer: B

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11. The hydrolysis of ethyle acetate in dilute aqueous solution in the presence of a mineral acid is represented by the equation :

$$CH_3COOC_2H_5 + H_2O \xrightarrow{H^+} CH_3COOH + C_2H_5OH$$

The reaction is :

A. trimolecular

B. second order

C. pseudo first order

D. zero order

Answer: C

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12. 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. pseudo -first order reaction

Answer: A

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13. The rate law experession for four reactions are give below . In which case the percentage increase in the rate

of reaction would be maximum when the concentration of A is doubled ?

A. rate = k[A]

B. rate $= k[A]^{3/2}$

C. rate $k[A]^{\circ}$

D. rate $=k[A]^{2}$

Answer: D

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

A. zero

B. 1

C. 2

D. 3

Answer: D

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15. For the chemical reaction A $\rightarrow$ B it is found that the rate of the 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. Zero

D. Half

Answer: D

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16. The rate constant for the reaction :

$2N_2O_5 \rightarrow 4NO_2 + O_2$

is $3.0 \times 10^{-5} \text{sec}^{-1}$ **. If the rate is** 2.40×10^{-5} **mol** $\text{litre}^{-1} \text{sec}^{-1}$ **then the concentration of** N_2O_5 **(in mol** litre^{-1} **) is :**

A. 1.4

B. 1.2

C. 0.02

D. 0.8

Answer: D

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17. Which of the following statements for order of reaction is not correct ?

A. Order can be determined experimentally

B. Order of a reaction is equal to the sum of the powers of concentration terms in differential rate

law

C. It is not effected with the stoichiometric coefficient of the reactants

D. Order cannot be fractional .

Answer: D

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18. The rate of the reaction A $\rightarrow$ Products at the initial concentration of 3.24×10^{-2} M is nine times its rate at another initial concentration of 1.2×10^{-3} M. The order of the reaction is

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

B. $\frac{3}{4}$

C. $\frac{2}{3}$

D. $\frac{3}{2}$

Answer: D

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19. If the concentrations are expressed in mole $litre^{-1}$ and time in sec then the units of the rate constant for the first order reaction are :

A. mol $litre^{-1}\sec^{-1}$

B. $mol^{-1}\text{litre}\sec^{-1}$

C. $\sec^{-1}$

D. $\text{mol}^2\text{litre}^{-2}\text{sec}^{-1}$

Answer: C

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20. The units for the rate constant for the second order reaction (concentration : mol $litre^{-1}$ time sec) are:

A. $mol^{-1}\text{litre}\,\text{sec}^{-1}$

B. mol $\text{litre}^{-2}\text{sec}^{-1}$

C. $\sec^{-1}$

D. $\text{mol litre}^{-1}\text{sec}^{-1}$

Answer: A

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21. For a reaction $X \rightarrow Y$ the rate of the reaction has been found to be third order with respect to X . What happens when the concentration of X is doubled :

A. rate becomes double

B. rate becomes three times

C. rate becomes six times

D. rate becomes eight times

Answer: D

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Multiple Choice Questions Measuring Order Of A Reaction Integrated Rate Equation Half Life Period

1. For a zero order reaction :

$A \rightarrow B$

a graph of rate vs . Time has slope equal to :

A. k

B. $-k/2.303$

C. -2.303**k**

D. zero

Answer: D

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2. For a first order reaction :

$R \rightarrow P$

$t_{1/2}$ **is proportional to :**

A. $[A]^{1/2}$

B. $[A]^{0}$

C. [A]

D. $1/[A]$

Answer: B

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

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

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

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

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

Answer: A

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4. If $[A_0]$ is the initial concentration and [A] is the concentration at time t then :

A. $[A] = [A]_0 e^{k/t}$

B. $[A] = [A]_0 e^{-kt}$

C. $[A]_0 = [A] e^{-k/t}$

D. $[A] = [A]_0 e^{-k/t}$

Answer: B

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5. If a is the initial concentration of a isubstance which reacts according to zero order kinetics and k is rate constant the time for the reaction to go to completion is :

A. k/a

B. ak

C. a/2k

D. a/k

Answer: D

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6. The ration of the time required for 3/4 of the reaction and half of the reaction is :

A. $4:3$

B. $3:2$

C. $2:1$

D. $1:2$

Answer: C

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7. For the half life period of a first order reaction which one of the following statements is generally false ?

A. It is independent of initial concentration .

B. It decreases with the introduction of a catalyst .

C. It increases with increase of temperature .

D. It is inversely proportional to rate constant.

Answer: C

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8. The rate constant for a fist order reaction is $k = 7 \times 10^{-4} s^{-1}$ .The time taken for the reactant to be reduced to 1/2 of the initial concentration is :

A. 990 s

B. 1980 s

C. 445 s

D. 2970 s

Answer: B

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9. The following rate date were obtained at 313 K for the reaction :

$$2A + 2B \rightarrow C + D$$

Expt.	[A]	[B]	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	2.4×10^{-2}

The rate law for the reaction is :

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

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

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

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

Answer: A

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10. The half life period of a reaction is 100 min . In 400 min the intitial concentration of 2.0 g will become :

A. $0.25g$

B. $0.75g$

C. $0.125g$

D. $0.1g$

Answer: C

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11. A radioactive substance is reduced to 1/8 of its original concentration in 24 s. The rate constant of the reaction is :

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

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

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

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

Answer: D

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12. The rate for the first order reaction is 0.0069 mol $L^{-1}\ \overset{-1}{\min}$ and the initial concentration is 0.2 mol L^{-1} .

The half life period is

A. 638 s

B. 1205 s

C. 690 s

D. 0.635s

Answer: B

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13. The half life period of the reaction :

$$N_2O_5 \rightarrow 2NO_2 + \frac{1}{2}O_2$$

is 24 hrs at $30^\circ C$. Starting with 10 g of N_2O_5 how many grams of N_2O_5 will remain after a period of 96 hours ?

A. $1.25g$

B. $0.63g$

C. $1.75g$

D. $0.5g$

Answer: D

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14. If the initial concentration of reactants in a certain reaction is doubled the half life period of the reaction doubles . The order of the reaction is :

A. zero

B. First

C. Second

D. Third

Answer: A

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15. The conversion of A to B follows second order kinetics. Doubling the concentration of A will increases the rate of formation of B by a factor of

A. a factor of 2

B. a factor of 4

C. a factor of $\frac{1}{2}$

D. a factor of $\frac{1}{4}$

Answer: B

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16. For an nth order reaction the half life period $t_{1/2}$ is proportional to (initial conc = C_0) :

A. $\frac{1}{C_0^n}$

B. C_0^{n-1}

C. $\frac{1}{C_0^{n-1}}$

D. $\frac{0.693}{C_0^n}$

Answer: C

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17. The rate of a first order reaction is 1.5×10^{-2} mol $L^{-1}\min^{-1}$ at 0.5 M concentration of the reactant . The

half life of the reaction is :

A. $23.1\ \text{min}$

B. 8.73 min

C. 7.53 min

D. 0.383min

Answer: A

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

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

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

C. $\frac{In2}{k}$

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

Answer: C

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19. The half life of a reaction is inversely proportionaly to the square of the initial concentration of the reactant . Then the order of the reaction is :

A. 0

B. 1

C. 2

D. 3

Answer: D

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20. Half the period of a first order reaction is 1386 seconds . The specific rate constant of the reaction is :

A. $0.5 \times 10^{-2} s^{-1}$

B. $0.5 \times 10^{-3} s^{-1}$

C. $5.0 \times 10^{-2} s^{-1}$

D. $5.0 \times 10^{-3} s^{-1}$

Answer: B

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21. The rate law for reaction between the substances A and B is given by : Rate = k$[A]^n[B]^m$ on doubling the concentration of A and halving the cocentration 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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22. 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 :

A. triple

B. increase by a factor of 4

C. double

D. reamain unchanged

Answer: B

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23. The rate law for the chemical reaction :

$2NO_2Cl \rightarrow 2NO_2 + Cl_2$

is : The rate determining step is :

A. $2NO_2Cl \rightarrow 2NO_2 + 2Cl$

B. $NO_2 + Cl_2 \rightarrow NO_2Cl + Cl$

C. $NO_2Cl + Cl \rightarrow NO_2 + Cl_2$

D. $NO_2Cl \rightarrow NO_2 + Cl$

Answer: D

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

A. k_0

B. $-k_0$

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

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

Answer: B

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25. The reaction :

$X \rightarrow$ Product

follows first order kinetics . In 40 minutes the concentration of X changes from 0.1 to 0.025 M. Then the rate of reaction when concentration of X is 0.01 M is

A. $1.73 \times 10^{-4} \mathrm{M\ min^{-1}}$

B. $3.47 \times 10^{-5} \mathrm{M\ min^{-1}}$

C. $3.47 \times 10^{-4} \mathrm{M\ min^{-1}}$

D. $1.73 \times 10^{-5}\ \mathrm{M\ min^{-1}}$

Answer: C

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26. The rate constant for a first order reaction is $60s^{-1}$. The time required to reduce the concentration of the reactant to 1/ 10th of its initial value is

A. 380 s

B. 7.6×10^{-2} s

C. 3.8×10^{-2} s

D. 760

Answer: C

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27. If the initial concentration of reactants in a certain reaction is doubled the half life period of the reaction doubles . The order of the reaction is :

A. zero

B. fraction

C. three

D. one

Answer: A

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Multiple Choice Questions Effect Of Temperature Catalyst And Radiation On Rate Of Reaction

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

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

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

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

D. $\log \frac{k_2}{k_1} = \frac{E_a}{2.303R}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]$

Answer: B

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2. The influence of temperature on the rate of reaction is given by :

A. Gibbs Helmholtz equation

B. Clausius Clapeyron equation

C. Arrhenius equation

D. van der Waals equation.

Answer: C

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3. The effect of catalyst in a chemical reaction is to change the :

A. heat of reaction

B. equilibrium concentration

C. activation energy

D. final products

Answer: D

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4. The temperature coefficient for most of the reactions lies between :

A. 2 and 3

B. 1 and 2

C. 3 and 4

D. 10 .

Answer: A

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5. An exothermic reaction $A \rightarrow B$ has an activation energy of 17 kJ per mole of A . The heat of reaction is 40 kJ . The activation energy for the reverse reaction $B \rightarrow A$ is

A. 23 kJ

B. 97 kJ

C. 57 kJ

D. 17 kJ

Answer: C

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6. Which of the followig statements is true ?

A. The reaction is fast if the activation energy is low

B. The activation energy of forward reaction can never be greater than that of the backward reaction .

C. A catalyst increases the rate of a reaction by decreasing the rate of backward reaction

D. Reaction rates increase with temperature because the activation energy decreases at high temperature .

Answer: A

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7. Which one of the following statements is not true regarding catalyst ?

A. A catalyst remains unchanged at the end of the reaction .

B. A catalyst can initiat a rection .

C. A catalyst does not alter the equilibrium in a reversible reaction

D. Catalysts are sometimes very specific in terms of reactions

Answer: B

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

A. a) increases with increase in temperature

B. b) decreases with increase in temperature

C. c) decreases with decrease in temperature

D. d) is nearly independent of temperature

Answer: D

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9. The activation energy of a reaction is 56 .2 kJ mole . The ratio of rate constants at 305 K and 300 K is (R=8 J $mol^{-1}K^{-1}$) about :

A. 1.25

B. 1.47

C. 1.10

D. 1.60

Answer: B

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10. Reaction $A + B \rightarrow C + D + 38$ kcal has activation energy 20 kcal . Activation energy for reaction $C + D \rightarrow A + B$ is :

A. 20 kcal

B. -20 kcal

C. 58 kcal

D. 18 kcal

Answer: C

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11. The reaction

$A + B \rightarrow C + D \Delta H = 30 kJ mol^{-1}$

should have activation energy

A. a) 30 kJ mol^{-1}

B. b) -30kJ mole^{-1}

C. c) $> 30 \text{kJ mole}^{-1}$

D. d) $\leq 30 \text{kJ mol}^{-1}$

Answer: C

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12. Two reactions A $\rightarrow$ Products and $B \rightarrow$ products have rate constants k_A and k_B respectively at temperature T and activation energies E_A and E_B respectively . If $k_A > K_B$ and $E_A < E_B$ and assuming that A for both the reactions is same then :

A. at higher temperature k_A will be greater than k_B

B. at lower temperature k_A and k_B will be close to each other in magnitude

C. as temperature increases k_A and k_B will become close to each other in magnitude .

D. at lower temperature $k_b > k_A$

Answer: B

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13. Rate of reaction can be expressed by Arrhenius equation as k= $Ae^{-E/RT}$. In this reaction E represents

A. The energy below which colliding molecules will not react

B. The total enegy of the reacting molecules at a temperature T .

C. The fraction of molecules with energy greater than activation energy of the reaction

D. The energy above which the colloiding molecules will react.

Answer: A

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Multiple Choice Questions Level Ii

1. A first order reaction is carried out starting with 10 mol L^{-1} of the reactant . It is 40% complete in 50 min . If the same reaction is carried out with an initial concentration of 5 mol L^{-1} the percentage of reaction that is completed in 50 min is

A. 40%

B. 80%

C. 20%

D. 36.8%

Answer: A

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2. A substance decomposes according to zero order kinetics . If the rate constant is k and initial concentration is a then half life period is :

A. 1/ak

B. 0.693 /k

C. k/2a

D. a/2k

Answer: D

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3. In the reaction $P \to Q$ if the concentration of P is increased by four times the rate of reaction is increased by two times . The order of reaction is :

A. 1

B. 0.5

C. Zero

D. 2

Answer: B

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4. The rate law of a reaction is :

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

On doubling the concentration of both A and B the rate x will become :

A. $4x^2$

B. 8x

C. x^3

D. 9x

Answer: B

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5. The ezyme catalysed reaction is faster than a metal catalysed reaction because its activation energy is :

A. greater than that of metal catalysed reaction

B. same as that of metal catalysed reaction

C. less than thart of metal catalysed reaction

D. none of the above

Answer: C

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6. In 1.2 year half of 160 mg of a radioactive isotope decays . The amount present after 6 years is :

A. a) 0 mg

B. b) 4 mg

C. c) 5 mg

D. d) 16 mg

Answer: C

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7. Starting with one mole of a compound X it is found that the reaction is 3/4 complete in 1 min . What is the rate

constant if the reaction follows first order ?

A. $0.213\,\sec^{-1}$

B. $2.31\,\sec^{-1}$

C. $0.0231\,\sec^{-1}$

D. $2.31 \times 10^{-3}\,\sec^{-1}$

Answer: C

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8. The rate of a first order reaction is $0.69 \times 10^{-2}\ \min^{-1}$ and the initial concentration is 0.5 mol L^{-1} . The half life period is

A. 3000 s

B. 0.33 s

C. 50 s

D. 100 s

Answer: A

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

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

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

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

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

Answer: B

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10. The rate of a first order reaction has been found to be $2.45 \times 10^{-6} \mathrm{mol\ L^{-1} s^{-1}}$ at concentration C_1 . The value of C_1 is (rate constant = 3.5×10^{-5}) :

A. 7.0 mol L^{-1}

B. 0.7 mol L^{-1}

C. 0.07 mol L^{-1}

D. 2.1 mol L^{-1}

Answer: C

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11. The half life period for the first order reaction $XY_2 \rightarrow X + Y_2$ is 10 minutes . In what period would the concentration of XY_2 be reduced to 10% of the original concentration ?

A. 33.2 min

B. 90 min

C. 120 min

D. 26.3 min

Answer: A

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12. If the half life period for a reaction in A is 100 min . How long will it take [A] to reach 25 % of its initial concentration ?

A. 50 min

B. 250 min

C. 200 min

D. 500 min

Answer: C

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13. The experimental data for the reaction :

$2NO(g) + CI_2(g) \rightarrow 2NOCI(g)$ **are given below :**

Expt	$[CI_2]$	$[NO]$	Initial rate
1	0.020	0.010	2.40×10^{-4}
2	0.020	0.030	2.16×10^{-3}
3	0.040	0.030	4.32×10^{-3}

What is the order the reaction ?

A. 1

B. 2

C. 3

D. 0

Answer: C

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14. The rate of a first order reaction :

$R \to P$

is 7.5×10^{-4} **mol** $L^{-1}\mathrm{s}^{-1}$ **. The rate concentration of R is 0.5 mol** L^{-1} **. The rate constant is :**

A. $2.5 \times 10^{-5} s^{-1}$

B. $1.5 \times 10^{-3} s^{-1}$

C. $4.16 \times 10^{-7} s^{-1}$

D. $1.50 \times 10^{5} s^{-1}$

Answer: A

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15. The decomposition of ozone proceeds as :

$O_3 \rightarrow O_2 + O$ (fast)

$O + O_3 \rightarrow 2O_2$ (slow)

The rate expression should be :

A. Rate = $k[O_3]^2$

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

C. Rate $= k[O_3][O_2]$

D. Rate $= k[O_3][O_2]^{-1}$

Answer: B

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16. In a gaseous reaction $2P + Q \rightarrow$ Products :

Rate $= k[P]^2[Q]$

The volume of the reaction vessel is suddenly reduced to half of its initial volume . The rate of eaction as compared to original rate becomes :

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

B. $\frac{1}{8}$ times

C. 4 times

D. 8 times

Answer: D

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17. A first order reaction is 25% complete in one hour . At the end of two hours the extent of reaction is :

A. 0.5

B. 0.3125

C. 0.4375

D. 0.75

Answer: C

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18. For a reaction : A $\rightarrow$ Products it is found that the rate of reaction increases by a factor of 6.25 when the

concentration of A is increased by a factor of 2.5 . The order of the reaction with respect to A is :

A. 2.5

B. 3

C. 2

D. 0.5

Answer: C

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19. Two reactions proceed at $25^{\circ} C$ at the same rate . The temperature coefficient of the rate of first reaction is 2

and the 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

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20. A gaseous reaction A(g) $\rightarrow 2B(g) + C(g)$ is found to be of first order . If the reaction is started with p_A =90 mm

Hg the total pressure after 10 min is found to be 180 min Hg. The rate constant of the reaction is :

A. $4.60 \times 10^{-3} s^{-1}$

B. $6.9 \times 10^{-3} s^{-1}$

C. $1.15 \times 10^{-3} s^{-1}$

D. $4.90 \times 10^{-3} s^{-1}$

Answer: C

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21. The ratio of the time taken for $99.9\,\%$ reaction and half life of the reaction is :

A. 100

B. 49.95

C. 10

D. 1000

Answer: C

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22. One litre of 2 M acetic acid is mixed with one litre of 2 M ethyl alcohol to form ester as :

$$CH_3COOH + C_2H_5Oh \rightarrow CH_3COOC_2H_5 + H_2O$$

The decrease in initial reaction rate if each solution is diluted by an equal volume of water would be :

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

B. $\frac{1}{4}$ times

C. 2 times

D. 4 times

Answer: B

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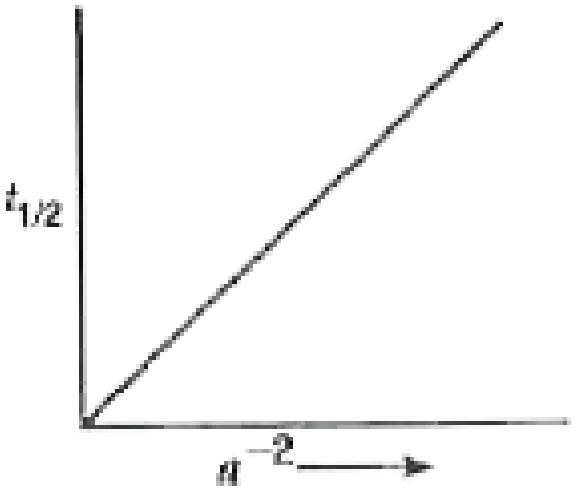
23. The following plot of $t_{1/2}$ vs. concentration corresponds to :



A. second order

B. Third order

C. First order

D. zero order

Answer: B

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24. For a reaction :

$A \rightarrow B$

If k_1 and k_{-1} are the rate constants for the forward and the backard reactions respectively then equilibrium constant of the reaction is given as :

A. $k = \frac{k_1}{k_{-1}}$

B. $K = k_{-1} / k_1$

C. $K_{k_1} \times k_{-1}$

D. $K = k_1 + k_{-1}$

Answer: A

Watch Video Solution

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

A. 1 hour

B. 0.5 hour

C. 0.25 hour

D. 2 hours

Answer: A

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26. If 60% of a first order reaction was completed in 60 minutes 50% of the same reaction would be completed in approximately :

A. 45 minutes

B. 60 minutes

C. 40 minutes

D. 50 minutes .

Answer: B

Watch Video Solution

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

A. 76 mol /L

B. 122 mol /L

C. 50 mol /L

D. 80 mol /L

Answer: A

Watch Video Solution

28. The time taken for 10% completion of a first order reaction is 20 min . Then for 19% completion the reaction will take :

A. 40 mins

B. 60 mins

C. 30 mins

D. 50 mins

Answer: B

Watch Video Solution

29. For a chemical raction $A \rightarrow B$ the rate of the reaction is 2×10^{-3} mol $dm^{-3}s^{-1}$, when the initial concentration is 0.05 mol dm^{-3}. The rate of the same reaction is 1.6×10^{-2} mol $dm^{-3}s^{-1}$ when the initial concentration is 0.1 mol dm^{-3}. The order of the reaction is

A. 0

B. 3

C. 1

D. 2

Answer: C

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30. 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 $mol/dm^3/s$
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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31. For a fist order reaction the rate constant is 6.909 $\min^{-1}$. The time taken for 75% conversion in minutes is :

A. $\frac{3}{2}\log 2$

B. $\frac{2}{3}$ log 3

C. $\frac{2}{3}$ log 2

D. $\frac{3}{2}$ log $\frac{3}{4}$

Answer: B

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32. The activation energies of two reactions are E_1 and $E_2(E_1 > E_2)$. If the temperature of the system is increased from T_1 to T_2 , the rate constant of the reaction changes from k_1 to k_1 in the first reaction and k_2 to k_2 in second reaction predict which of the following expression is correct ?

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

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

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

D. $\frac{k_1}{k_1} = \frac{k_2}{k_2}$=0

Answer: D

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33. In the reaction

$$BrO_3^-(aq) + 5Br^- + 6H^+ \rightarrow 3Br_2 + 3H_2O$$

the rate of appearance of bromine is related to the rate of disappearance of bromide ions as :

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

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

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

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

Answer: A

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34. Consider the chemical reaction :

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

The rate of this reaction can be expressed in terms of time derivative of concentration of $N_2(g), H_2(g) \text{or} NH_3(g)$ **. Identify the correct relationship amongst the rate expressions :**

A. Rate $= -\frac{d[N_2]}{dt} = -1/3d[H_2]/dt = \frac{1}{2}d\frac{NH_3}{dt}$

B. Rate

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

C. Rate $= d[N_2]/dt = 1/3d[H_2]/dt = \frac{1}{2d[NH_3]dt}$

D. Rate

$$= -d[N_2]/dt = -d[H_2]/dt = d[NH_3]/dt$$

Answer: C

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

A. 2×10^4

B. 3.45×10^{-5}

C. 1.386×10^{-4}

D. 2×10^{-4}

Answer: C

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36. The reaction :

$X \rightarrow$ Product

follows first order kinetics . In 40 minutes the concentration of X changes from 0.1 to 0.025 M. Then the rate of reaction when concentrartion of X is 0.01 M is :

A. $1.73 \times 10^{-4} \mathrm{M\ min}^{-1}$

B. $3.47 \times 10^{-5} \mathrm{M\ min}^{-1}$

C. $3.47 \times 10^{-4} \mathrm{M\ min}^{-1}$

D. $1.73 \times 10^{-5} \mathrm{M\ min}^{-1}$

Answer: C

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37. In a first order reaction the concentration of the reactant decreases from 0.8 to 0.4 M in 15 minutes . The time taken for the concentration to change from 0.1 M to 0.025 M is :

A. a) 7.5 mins

B. b) 15 mins

C. c) 30 mins

D. d) 60 mins

Answer: C

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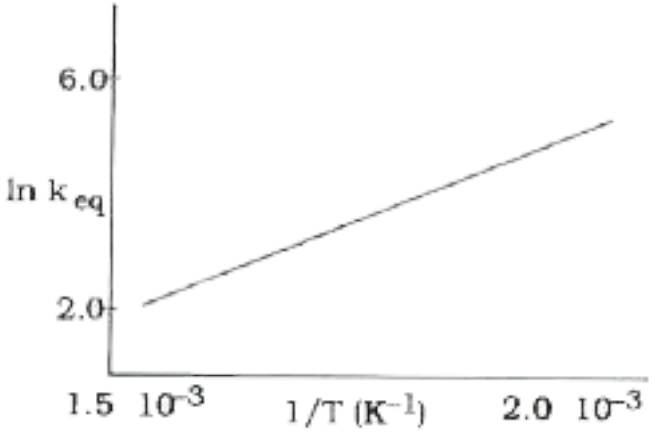
38. A schematic plot of In k_{eq} versus inverse of temperature for a reaction is shown below : The reaction must be :



A. exothermic

B. endothermic

C. one with negligible enthalpy change highly spontaneous at ordinary temperature .

D. high spontaneous at ordinary temperature .

Answer: A

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39. Consider an endothermic reaction :

$X \rightarrow Y$

with activation energies E_b and E_f for the backward and forward reactions respectively . In general

A. $E_b < E_f$

B. $E_b > E_f$

C. $E_b = E_f$

D. there is no definite relation between E_b and E_f

Answer: A

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40. Consider a reaction a G + bH $\rightarrow$ Products . When concentration of both the reactants G and H is doubled the rate increases by eight times . However when the concentration of G is doubled keeping the concentration of H fixed the rate is doubled . The overall order of the reaction is :

A. 0

B. 1

C. 2

D. 3

Answer: D

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

A. 120

B. 280

C. 20

D. 300

Answer: C

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42. For reaction $A \rightarrow B$ the rate of reaction incrases by a factor of 1.857 when the concentration of A is increased by 1.5 times . The order of reaction with respect to A is

A. 1

B. 1.5

C. 2

D. 2.5

Answer: B

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43. For a reaction $NO_g + O_2(g) \rightarrow 2NO_2(g)$

Rate $= k[NO^2][O_2]$ if the volume of the reaction vessel is doubled the rate of the reaction :

A. will diminish to 1/4 of initial value

B. will diminish to 1/8 of initial value will grow 4 times

C. will grow 4times

D. will grow 8 times

Answer: B

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

$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$

Rate =k $[N_2O_5]$

$N_2O_5(g) \rightarrow 2NO_2(g) + 1/2O_2(g)$

Rate =k $[N_2O_5)$

Which of the following expressions is true ?

A. k=k

B. k=2k

C. k=1/2k

D. k $> k$

Answer: B

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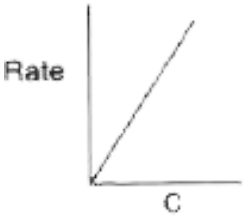
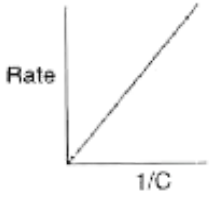
45. Which of the following graphs correspond to first order reaction ?

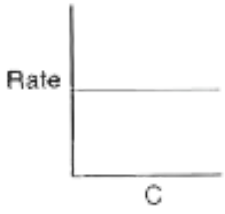
A.

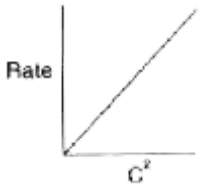


B.



C.



D. 

Answer: A

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46. 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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47. For a reaction having rate law expression :

Rate $= k[A]^{3/2}[B]^{-1/2}$

If the concentration of both A and B become four times the rate of reaction

A. become four times

B. becomes 16 times

C. decreases four times

D. reamains same .

Answer: A

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48. A chemical reaction was carried out at 300 K and 280 K. The rate constants were found to be k_1 and k_2 respectively . Then

A. $k_2 = 4k_1$

B. $k_2 = 2k_1$

C. $k_2 = 0.25k_1$

D. $k_2 = 0.5k_1$

Answer: C

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49. 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

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50. The rate law for reaction between the substances A and B is given by : Rate = k$[A]^n[B]^m$ on doubling the concentration of A and halving the cocentration of B the ratio of the new rate to the earlier rate of reaction will be :

A. m+n

B. n-m

C. 2^{n-m}

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

Answer: C

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Multiple Choice Questions Level Iii

1. The half life period of a first order chemical reaction is 6.93 minutes . The time required for the completion of $99\ \%$ of the chemical reaction will be (log 2 = 0.301) :

A. 230.3 minutes

B. 23.03 minutes

C. 46.06 minutes

D. 460.6 minutes

Answer: C

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2. Consider the reaction

$$CI_2(aq) + H_2S(aq) \rightarrow S(s) + 2H^+(aq) + 2CI^{-1}(aq)$$

The rate equation for this reaction is rate = $k[CI_2][H_2S]$

Which of these mechanisms is /are consistent with this rate equation ?

$CI_2 + H_2S \rightarrow H^+ + CI^- + CI^+HS^-$ **(slow)**

$CI^+ + HS^- + CI^- + S$ **(fas)**

$H_2S \rightarrow H^+ + HS^-$ **(fast equilibrium)**

$CI_2 + HS^- \rightarrow 2CI^- + H^+ + S$ **(slow)**

A. Neither (i) nor (ii)

B. (i) only

C. (ii) only

D. Both (i) and (ii)

Answer: B

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3. The time for half life period of a certain reaction A $\rightarrow$ Products is 1 hour . When the initial concentration of the reactant A is 2.0 mol L^{-1} how much time does it take for its concentration to come from 0.50 to 0.25 mol L^{-1} if it is a zero order reaction ?

A. 0.25 h

B. 1 h

C. 4 h

D. 0.5 h

Answer: A

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4. The rate of a chemical reaction doubles for every 10° C rise of temperature . If the temperature is raised by 50° C the rate of the reaction increases by about :

A. 32 times

B. 64 times

C. 10 times

D. 24 times

Answer: A

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5. A 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_1} then k_1 and k_2 are related as :

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

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

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

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

Answer: C

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6. For a first order reaction $(A) \rightarrow$ products the concentration of A changes from 0.1 M to 0.025 M in 40 minutes . The rate of reaction when the concentration of A is 0.01 M is :

A. $1.73 \times 10^{-4} M / \min$

B. 1.73×10^{-5} M/min

C. 3.47×10^{-4} M/min

D. 3.47×10^{-5} M/min

Answer: C

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7. a) The rate of a particular reaction doubles when the temperature changes from 300 K to 310 K. Calculate the energy of activation of the reaction. [Given : $R = 8.314\,\mathrm{JK}^{-1}\ \mathrm{mol}^{-1}$].

A. $53.6\mathrm{kJ\ mol}^{-1}$

B. $48.6\mathrm{kJ\ mol}^{-1}$

C. $58.5kJmol^{-1}$

D. $60.5\mathrm{kJ\ mol}^{-1}$

Answer: A

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8. For the non -stoichiometric reaction :

$2A + B \rightarrow C + D$

the following data were obtained in three separate experiments experiments all at 298 K

Initial conc. [A]	Initial conc. [B]	Initial rate of formation of C (mol Ls^{-1})
0.1 M	0.1 M	1.2×10^{-3}
0.1 M	0.2 M	1.2×10^{-3}
0.2 M	0.1 M	2.4×10^{-3}

The rate law for the formation of C is

A. $\frac{dC}{dt} = k[A][B]$

B. $\frac{dC}{dt} = k[A]^2[B]$

C. $\frac{dC}{dt} = k[A][B]^2$

D. $\frac{dC}{dt} = k[A]$

Answer: D

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9. Higher order (> 3) reactions are rare due to :

A. low probability of simultaneous collision of all the reacting species .

B. increase in entropy and activation energy as more molecules are involed

C. shifting of equilibrium towards reactants due to elastic collisions

D. loss of active species on collision .

Answer: A

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Recent Examination Questions

1. 2 g of a radioactive sample having half life of 15 days was synthesised on 1st Jan 2009. The amount of the smaple left behind on 1st March, 2009 (including btoh the days)

A. 0.124 g

B. 1 g

C. 0.5 g

D. 0 g

Answer: A

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2. For a chemical raction $A \rightarrow B$ the rate of the reaction is 2×10^{-3} mol $dm^{-3}s^{-1}$, when the initial concentration is 0.05 mol dm^{-3}. The rate of the same reaction is 1.6×10^{-2} mol $dm^{-3}s^{-1}$ when the initial concentration is 0.1 mol dm^{-3}. The order of the reaction is

A. 0

B. 3

C. 1

D. 2

Answer: B

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3. Match the Column

Column A	Column B
(1) Carl Correns	(a) Theory of Natural selection
(2) Mendel	(b) Use and Disuse of Organ
(3) Darwin	(c) Four O' Clock plant
(4) Lamarck.	(d) Laws of Inheritance

A. 0

B. 1

C. 2

D. 1.5

Answer: C

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4. The rate equation for a reaction $A \rightarrow B$ is $r = k[A]^0$. If the initial concentration of the reactant is a mol dm^{-3}, the half life period of the reaction is

A. k/a

B. a/k

C. 2a/k

D. a/2k

Answer: D

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5. The activation energy for a reaction at the temperature T K was found to be 2.303 RT J mol^{-1} . The ratio of the rate constant to Arrhenius factor is :

A. 10^{-1}

B. 10^{-2}

C. 2×10^{-3}

D. $2x10^{-2}$

Answer: A

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

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

B. $\frac{a}{2k}$

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

D. ak.

Answer: B

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7. The following data is obtained during the first order thermal decomposition of $2A_{(g)} \rightarrow B_{(g)} + C_{(s)}$ at

constant volume and temperature .

S.No.	Time	Total pressure in Pascal
1.	At the end of 10 minutes	300
2.	After completion	200

The rate constant in $\min^{-1}$ is :

A. 0.0693

B. 6.93

C. 0.00693

D. 69.3

Answer: A

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8. A first order reaction is 60% complete in 20 minutes .How long will the reaction take to be 84% complete ?

A. 54 mins

B. 68 mins

C. 40 mins

D. 76 mins

Answer: C

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9. A given sample of milk turns sour at room temperature $(27^\circ C)$ in 5 hours . In a refrigerator at $-3^\circ C$, it can be

stored 10 times longer . The energy of activation for the souring of milk is

A. $2.303 \times 10 \ \ \mathrm{R\,kJ\ mol^{-1}}$

B. $2.303 \times 5 \ \ \mathrm{R\,kJ\ mol^{-1}}$

C. $2.303 \times 3 \ \ \mathrm{R\,kJ\ mol^{-1}}$

D. $2.303 \times 2.7 \ \ \mathrm{R\,kJ\ mol^{-1}}$

Answer: D

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10. At 300 K a gaseous reaction $A \rightarrow B + C$ was found to follow first order kinetics . Starting with pure A the total pressure at the end of 20 minutes was 100 mm of Hg

. The total pressure after the completion of the reactionn is 180 mm of Hg . The partial pressure of A (in mm of Hg) is :

A. 100

B. 90

C. 180

D. 80

Answer: B

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11. For a reaction : $A + B \rightarrow$ Products the rate of the reaction of various concentrations are given below :

Expt No.	$[A]$	$[B]$	Rate $(\text{mol dm}^{-3}s^{-1}$
1	0.2	0.2	2
2	0.2	0.4	4
3	0.6	0.4	36

The rate law for the above reaction is :

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

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

C. $r = k[A]^3[B]$

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

Answer: A

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12. If 50 % of the reactant is converted into a product in first order reaction in 25 minutes how much of it would

react in 100 minutes ?

A. 93. 75 %

B. $87.5\ \%$

C. $75\ \%$

D. $100\ \%$

Answer: A

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13. The rate of reaction increases with rise in temperature because of

A. increases in number of activated molecules

B. increase in energy of activation

C. decrease in energy of activation

D. increase in the number of effective collisions .

Answer: D

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14. The temperature coefficient of a reaction is 2. When the temperature is increased from 30° C to 90° C, the rate of reaction is increased by

A. 60 times

B. 64 times

C. 150 times

D. 400 times

Answer: B

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15. A plot of $\frac{1}{T}$ Vsk for a reaction gives the slope $-1 \times 10^4 K$. The energy of activation for the reaction is (Given $R = 8.314 JK^{-1}\ \ \text{mol}^{-1}$)

A. 8314 J mol^{-1}

B. $1.202 kJmol^{-1}$

C. $12.02 Jmol^{-1}$

D. $83.14kJmol^{-1}$

Answer: A

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16. $A_{(g)} \xrightarrow{\Delta} P_{(g)} + Q_{(g)} + R_{(g)}$, follows first order kinetics with a half life of 69.3 s at 500° C. Starting from the gas 'A' enclosed in a container at $500^\circ C$ and at a pressure of 0.4 atm, the total pressure of the system after 230 s will be

A. 1.15 atm

B. 1.32 atm

C. 1.22 atm

D. 1.12 atm

Answer: D

17. In the first order reaction, the concentration of the reactant is reduced to 12.5% in one hour. The half-life period of the reaction is:

A. 30 min

B. 3 hr

C. 15 min

D. 20 min

Answer: D

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18. Half life period of a first order reaction is 10min. Starting with initial concentration 12 M. The rate after 20 min is

A. $0.0693 \times 3 \text{ min}^{-1}$

B. $0.0693M \text{ min}^{-1}$

C. $0.0693 \times 4\text{M min}^{-1}$

D. $0.693 \times 3\text{M min}^{-1}$

Answer: A

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19. $100cm^3$ of 1 M CH_3COOH was mixed with $100cm^3$ of 2 M CH_3OH to form an ester. The change in the initial rate if eachsolution is diliuted with equal volume of water would be

A. 0.5 times

B. 2 times

C. 0.25 times

D. 4 times

Answer: C

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20. For the reaction $A+B \rightarrow$ products. The rate becomes doubled when concentration of only A is increased by two times, the rate is increased by four times, when the concentration of B alone is doubled what is the order of the reaction?

A. 1

B. 2

C. 3

D. 4

Answer: B

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