CHEMISTRY

BOOKS - NCERT FINGERTIPS CHEMISTRY (HINGLISH)

CHEMICAL KINETICS

Rate Of A Chemical Reaction

1. The rate of chemical reaction

A. keeps on increasing with time

B. remains constant with time

C. keeps on decreasing with time

D. shows irregular trend with time.

Answer: C

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2. The minus sign in rate $= -\frac{d[A]}{dt}$ indicates the _____ in concentration of the _____ with time. The rate of a reaction is always _____quantity. The rate of reaction increases with _____in concentration of reactants. The blanks in the question corresponds to

A. decrease, products, positive, increase

B. increase, reactants, negative, decrase

C. decrease, reactants, positive, increase

D. increase, porducts, positive, increase

Answer: C

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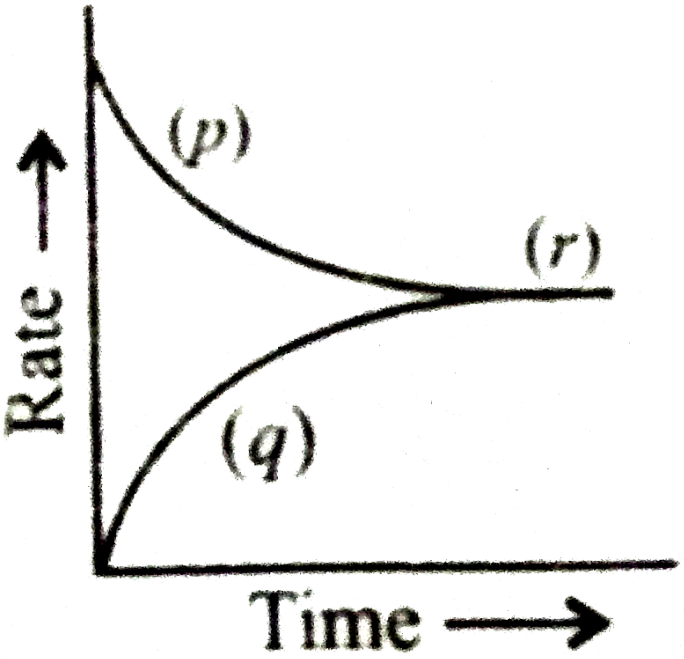
3. For reversible reaction, $A + B \Leftrightarrow C + D$, the graph for rate of reaction with time is given below.

Mark the terms (p),(q) and (r)



A. (p)-rate of backward reaction ,(q)-rate of forward reaction, (r)-equilibrium,

B. (p)-rate of forward reaction, (q)-rate of backward reaction, (r)-equilibrium

C. (p)-concentration of products (q)-concentration of reactants (r)-rate of reaction

D. (p)-instantaneous rate of reaction, (q)-variation of rate, (r)-average rate of reaction

Answer: B

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4. For a reaction $P + Q \rightarrow 2R + S$. Which of the following statements is incorrect?

A. Rate of disappearance of P = Rate of appearance of S

B. Rate of disappearance of Q = $2 \times$ Rate of appearance of R

C. Rate of disappearance of P = Rate of disappearance of Q

D. Rate of disappearance of Q = $\frac{1}{2} \times$ Rate of appearance of R

Answer: B

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5. For this reaction

$N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$

The relation between $\frac{d(NH_3)}{dt}$ and $-\frac{d(H_2)}{dt}$ is :-

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

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

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

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

Answer: A

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6. For a reaction, $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$ rate of reaction is:

A. Rate $= -\frac{d[N_2O_5]}{dt} = -\frac{1}{4}\frac{d[NO_2]}{dt} = \frac{1}{2}\frac{d[O_2]}{dt}$

B. Rate $= -\frac{1}{2}\frac{d[n_2O_5]}{dt} = \frac{1}{4}\frac{d[NO_2]}{dt} = \frac{d[O_2]}{2}$

C. Rate $= -\frac{1}{4}\frac{d[N_2O_5]}{dt} = \frac{1}{2}\frac{d[NO_2]}{dt} = \frac{d[O_2]}{dt}$

D. Rate $= -\frac{1}{2}\frac{d[N_2O_5]}{dt} = \frac{1}{2}\frac{d[NO_2]}{dt} = \frac{1}{2}\frac{d[O_2]}{dt}$

Answer: B

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7. For the reaction $2N_2O_4 \Leftrightarrow 4NO_2$, given that $\frac{-d[N_2O_4]}{dt} = K$ and $\frac{d[NO_2]}{dt} = K$, then

A. $2k' = k$

B. $k' = 2k$

C. $k' = k$

D. $k = \frac{1}{4}k'$

Answer: B

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8. For a reaction $2NH_3 \rightarrow N_2 + 3H_2$, it is observed that $\frac{-d(NH_3)}{dt} = k_1(NH_3), \frac{d(N_2)}{dt} = k_2(NH_3), \frac{d(H_2)}{dt} = k_3(NH_3)$

What is the relation between k_1, k_2 and k_3?

A. $k_1 = k_2 = k_3$

B. $3k_1 = 6k_2 = 2k_3$

C. $2k_1 = 3k_2 = 6k_3$

D. $6k_1 = 3k_2 = 2k_3$

Answer: B

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9. Consider the reaction, $2N_2O_5 \rightarrow 4NO_2 + O_2$ In the reaction NO_2 is being formed at the rate of 0.0125 mol $L^{-1}s^{-1}$. What is the rate of reaction at this time?

A. 0.0018 mol $L^{-1}s^{-1}$

B. 0.0031 mol $L^{-1}s^{-1}$

C. 0.0041 mol $L^{-1}s^{-1}$

D. 0.050 mol $L^{-1}s^{-1}$

Answer: B

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10. For a reaction $R \rightarrow P$, the concentration of a reactant changes from 0.05 M to 0.04 M in 30 minutes. What will be average rate of reaction in minutes?

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

B. $8 \times 10^{-4} \min^{-1}$

C. $3.3 \times 10^{-4} M \min^{-1}$

D. $2.2 \times 10^{-4} M \min^{-1}$

Answer: C

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11. In a reaction $2HI \rightarrow H_2 + I_2$ the concentration of HI decreases from 0.5 mol L^{-1} to 0.4 mol L^{-1} in 10 minutes. What is the rate of reaction during this interval?

A. $5 \times 10^{-3} M \min^{-1}$

B. $2.5 \times 1 -^{-3} M \min^{-1}$

C. $5 \times 10^{-1} M \min^{-1}$

D. $2.5 \times 10^{-2} M \min^{-1}$

Answer: A

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12. For the reaction $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$, if the rate of disappearance of NH_3 is 3.6×10^{-3} mol $L^{-1} s^{-1}$, what is the rate of formation of H_2O

A. $5.4 \times 10^{-3} molL^{-1}s^{-1}$

B. $3.6 \times 10^{-3} molL^{-1}s^{-1}$

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

D. $0.6 \times 10^{-4} molL^{-1}s^{-1}$

Answer: A

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13. Nitrogen dioxide (NO_2) dissociates into nitric oxide (NO) and oxygen (O_2) as follows

$NO_2 \rightarrow 2NO + O_2$

If the rate of decrease of concentration of NO_2 is 6.0×1^{-12} mol $L^{-1}s^{-1}$. What will be the rate of increase of concentration of O_2?

A. $3 \times 10^{-12} molL^{-1}s^{1}$

B. $6 \times 10^{-12} molL^{-1}s^{-1}$

C. $1 \times 10^{-12 molL^{-1}s^{1}}$

D. $1.5 \times 10^{-12} molL^{-1}s^{1}$

Answer: A

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14. The rate of disappearance of SO_2 in the reaction $2SO_2 + O_2 \rightarrow 2SO_3$ is $1.28 \times 10^{-3} g/\sec$ then the rate of formation of SO_3 is

A. $0.64 \times 10^{-5} Ms^{-1}$

B. $0.32 \times 10^{-5} Ms^{-1}$

C. $2.56 \times 10^{-5} Ms^{-1}$

D. $1.28 \times 10^{-5} Ms^{-1}$

Answer: D

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15. In a reaction $2X \rightarrow Y$, the concentration of X decreases from 3.0 mole/litre to 2.0 moles/litre in 5 minutes. The rate of reaction is

A. 0.1 mol $L^{-1}\text{min}^{-1}$

B. 5 mol $L^{-1}\text{min}^{-1}$

C. 1 mol $L^{-1}\text{min}^{-1}$

D. 0.5 mol $L^{-1}\text{min}^{-1}$

Answer: A

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16. In a reaction, $2X \rightarrow Y$, the concentration of X decreases from 0.50M to 0.38 M in 10 min. What is the rate of reaction in M s^{-1} during this interval?

A. 2×10^{-4}

B. 4×10^{-2}

C. 2×10^{-2}

D. 1×10^{-2}

Answer: A

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17. For the reaction, $2N_2O_5 \rightarrow 4NO_2 + O_2$ rate and rate constant are $1.02 \times 10^{-4} M \sec^{-1}$ and $3.4 \times 10^{-5} \sec^{-1}$ respectively, the concentration of N_2O_5, at that time will be

A. 3.4×10^{-4}

B. 3

C. 5.2

D. 3.2×10^{-5}

Answer: B

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Factors Influencing Rate Of Reaction

1. The rate constant of a reaction depends on

A. temperature or the reaction

B. extent of the reaction

C. initial concentration of the reactants

D. the time of completion of reaction.

Answer: A

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2. The chemical reaction $2O_3 \rightarrow 3O_2$ proceeds as follows :

$O_3 \rightarrow O_2O$ (fast)

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

The rate law expression should be :

A. Rate $= k[O][O_3]$

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

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

D. Rate $= [O_2][O]$

Answer: B

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3. 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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4. The rate law for a reaction $A + B \rightarrow C + D$ is given by the expression k[A]. The rate of reaction will be

A. doubled on doubling the concentration of B

B. halved on reducing the concentration of A to half

C. Decreased on increasing the temperature of the reaction

D. unaffected by any change in concentration or temperature.

Answer: B

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5. A reaction in which reactants (R) are converted into products (P) follows second order kinetics. If concentration of R is increased by four times, what will be the increase in the rate formation of p?

A. 9 times

B. 4 times

C. 16 times

D. 8 times

Answer: C

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6. The rate of a gaseous reaction is given by the expresison $k[A]^2[B]^3$. The volume of the reaction vessel is suddenly reduced to one-half of the initial volume. The reaction rate relative to the original rate will be

A. $\frac{1}{8}a$

B. $\frac{1}{2}a$

C. 2a

D. 32a

Answer: D

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7. The rate of formation of a dimer in a second order dimerisation reaction is $9.1 \times 10^{-6} molL^{-1}s^{1}$ at 0.01 mol L^{-1} monomer concentration. Calculate the rate consant for the reaction.

A. $9.1 \times 10^{-2} Lmol^{-1}s^{-1}$

B. $9.1 \times 10^{-6} mol^{-1}s^{-1}$

C. $3 \times 10^{-4} Lmol^{-1}s^{-1}$

D. $27.3 \times 10^{-2} Lmol^{-1}s^{-1}$

Answer: A

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8. The rate constant for the reaction, $2N_2O_5 \rightarrow 4NO_2 + O_2$ is $3.0 \times 10^{-5} s^{-1}$. If the rate is $2.40 \times 10^{-5} molL^{-1}s^{-1}$, then the initial concentration of N_2O_5 (in $molL^{-1}$) is

A. 0.8

B. 0.7

C. 1.2

D. 1

Answer: B

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9. 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

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

A. Order can be determined experimentally.

B. order of reaction is equal to the sum of powers of concentration terms in rate law expression

C. order cannot be fractional.

D. order is not affected by stoichiometric coefficient of the reactants.

Answer: C

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11. Which of the following is an example of a fractional order reaction?

A. $NH_4NO_2 \rightarrow N_2 + 2H_2O$

B. $NO + O_3 \rightarrow NO_2 + O_2$

C. $2NO + Br_2 \rightarrow 2NOBr$

D. $CH_3CHO \rightarrow CH_4 + CO$

Answer: D

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12. What will be the rate equation for the reaction $2X + Y \rightarrow Z$, if the order of the reaction is zero?

A. Rate =k[X][Y]

B. Rate = k

C. Rate $= k[X]^0[Y]$

D. Rate = $k[X][Y]^0$

Answer: B

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13. For a reaction, $I^- + OCl^- \rightarrow IO^- + Cl^-$ in an aqueous medium, the rate of reaction is given by $\frac{d[IO^-]}{dt} = k\left(\frac{I^-[OCl^-]}{[OH^-]}\right)$. The overall order of reaction is

A. -1

B. 0

C. 1

D. 2

Answer: C

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14. For a reaction, $2NO + 2H_2 \rightarrow N_2 + 2H_2O$, the possible mechanism is

$NO \Leftrightarrow N_2O_2$

$N_2O_2 + H_2 \xrightarrow{\text{Slow}} N_2O + H_2O$

$N_2O + H_2O \xrightarrow{\text{fast}} N_2 + H_2O$

What is the rate law and order of the reaction?

A. Rate = $[N_2O_2]$, order = 1

B. Rate = $[N_2O_2][H_2]$, order = 2

C. Rate = $[N_2O_2]^2$ order = 2

D. Rate = $[N_2O_2]^2[H_2]$, order = 3

Answer: B

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15. Rate constant of two reactions are given below. Identifying their order of reaction

$k = 5.3 \times 10^{-2} L mol^{-1} s^{-1}$

$k = 3.8 \times 10^{-4} s^{-1}$

A. (i) second order, (ii) first order

B. (i) first order, second order

C. (i) zero order, (ii) first order

D. (i) second order, (ii) zero order

Answer: A

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16. Find the values of A,B and C in the following table for the reaction $X + Y \rightarrow Z$. The reaction is of first order w.r.t X and zero order w.r.t. Y.

Exp	$[X](molL^{-1})$	$[Y](molL^{-1})$	$Initialrate(molL^{-1}s^{-1})$
1	0.1	0.1	2×10^{-2}
2	A	0.2	4×10^{-2}
3	0.4	0.4	B
4	C	0.2	2×10^{-2}

A. $A = 0.2molL^{-1}, B = 8 \times 10^{-2}molL^{-1}s^{-1}, C = 0.1molL^{-1}$

B. $A = 0.4molL^{-1}, B = 4 \times 10^{-2}molL^{-1}s^{-1}, C = 0.02molL^{-1}$

C. $A = 0.2molL^{-1}, B = 2 \times 10^{-2}molL^{-1}s^{-1}, C = 0.4molL^{-1}$

D. $A = 0.4molL^{-1}, B = 2 \times 10^{2}molL^{-1}s^{-1}, C = 0.4molL^{-1}$

Answer: A

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17. For a chemical reaction $A \rightarrow B$, the rate of reaction increases by a factor of 1.837 when the concentration of A is increased by 1.5 time. 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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18. For a reaction A $\rightarrow$ B, the rate of reaction becomes twenty seven times when the concentration of A is increased three times. What is the order of the reaction?

A. 2

B. 1

C. 3

D. 0

Answer: C

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19. For the reaction $A + B \rightarrow$ products, what will be the order of reaction with respect to A and B?

Exp	$[A](molL^{-1})$	$[B](molL^{-1})$	$Initialrate(molL^{-1}s^{-1})$
1	2.5×10^{-4}	3×10^{-5}	5×10^{-4}
2	5×10^{-4}	6×10^{-5}	4×10^{-3}
3	1×10^{-3}	6×10^{-5}	1.6×10^{-2}

A. 1 with respect to A and 2 with respect to B

B. 2 with respect to A and 1 with respect to B

C. 1 with respect to A and 1 with respect to B

D. 2 with respect to A and 2 with respect to B

Answer: B

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20. The unit of rate constant for the reaction,

$2H_2 + 2NO \rightarrow 2H_2O + N_2$

Which has rate $= k[H_2)[NO]^2$, is

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

B. S^{-1}

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

D. mol L^{-1}

Answer: C

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21. Match the rate law given in column I with the dimensions of rate constants given in column II and mark the appropriate choice.

Column I	Column II
$(A)\text{Rate} = k[NH_3]^0$	$(i) molL^{-1}s^{-1}$
$(B)\text{Rate} = k[H_2O_2][I^-]$	$(ii) Lmol^{-1}s^{-1}$
$(C)\text{Rate} = k[CH_3CHO]^{3/2}$	$(iii) S^{-1}$
$(D)\text{Rate} = k[C_5H_5CI]$	$(iv) L^{1/2}mol^{-1/2}s^{-1}$

A. (A) $\rightarrow$ (iv), (B) $\rightarrow$ (iii), (C) $\rightarrow$ (ii), (D) $\rightarrow$ (i)

B. (A) $\rightarrow$ (i), (B) $\rightarrow$ (ii) (C) $\rightarrow$ (iii) ,(D) $\rightarrow$ (iv)

C. (A) $\rightarrow$ (iii), (B) $\rightarrow$ (ii) (C) $\rightarrow$ (i) ,(D) $\rightarrow$ (iv)

D. (A) $\rightarrow$ (ii), (B) $\rightarrow$ (i), (C) $\rightarrow$ (vi), (D) $\rightarrow$ (iii)

Answer: D

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22. The decomposition of dimethyl ether is a fractional order reaction. The rate of reaction is givenby rate $= k(p_{CH_3OCH_3})^{3/2}$. If the pressure is measured in bar and time in minutes, then what are the units of rate and constant?

A. bar $\min^{-1}$, $\text{bar}^2\text{min}^{-1}$

B. bar $\min^{-1}$, bar^2, $\min^{-1}$

C. $\text{bar}^{-1/2}\text{min}^{-1}$, bar^2, $\min^{-1}$

D. bar $\min^{-1}$, $\text{bar}^{1/2}\text{min}^{-1}$

Answer: B

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23. The unit of rate of reaction and rate of rate constant are same for a :

A. zero order reaction

B. first order reaction

C. second order reaction

D. third order reaction

Answer: A

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24. The rate of the reaction:

$CH_3COOC_2H_5 + NaOH \rightarrow Ch_3COONa + C_2H_5OH$ is given by the equation,

rate $= k[CH_3COOC_2H_5][NaOH]$

If concenration is expressed in mol/L the units of k are

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

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

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

D. S^{-1}

Answer: C

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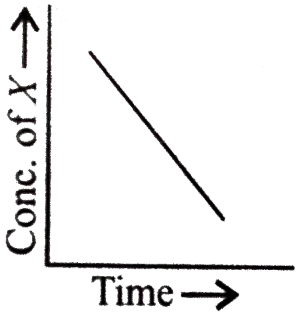
25. For a general reaction $X \rightarrow Y$, the plot of conc. Of X vs Time is given in the figure. What is the order of the reaction and what are the units of rate constant?



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

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

C. First, s^{-1}

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

Answer: A

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26. Fill in the blanks by choosing the correct option. Order of the reaction is the $\underline{X}$ of the powers to which concentration terms are raised in experimentally determined rate equation. The unit of first order rate constant is $\underline{Y}$. The unit of first order rate constant when concentration measured in terms of pressure and time in minutes is $\underline{Z}$

A. $X \rightarrow$ product, $Y \rightarrow molL^{-1}\text{time}^{-1}$, $Z \rightarrow \text{atmmin}^{-1}$

B. $X \rightarrow$ sum $Y \rightarrow Lmol^{-1}\text{time}^{-1}$, $Z \rightarrow \text{atmmin}^{-1}$

C. $X \rightarrow$ product, $Y \rightarrow Lmol^{-1}$, $Z \rightarrow \text{atmmin}^{-1}$

D. $X \rightarrow$ sum, $Y \rightarrow \text{tim}^{-1}$, $Z \rightarrow \text{min}^{-1}$

Answer: D

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27. The number of molecules of the reactants taking part in a single step of the reaction tells about. :

A. order of a reaction

B. molecularity of a reaction

C. fast step of the mechanism of a reaction

D. half-life of the reaction

Answer: B

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28. In any unimolecular reaction

A. the order and molecularity of the slowest step are equal to one

B. molecularity of the reaction can be zero, one or one step

C. more then one reacting species are involved in one step

D. molecularity of the reaction can be determined only experimentally.

Answer: A

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29. The overall rate of a reaction is governed by :

A. the rate of fastest intermediate step

B. the sum of the rates of all intermediate steps

C. the average of the rates of all the intermediate steps

D. the rate of slowest intermediate step.

Answer: D

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30. For a reaction $X + Y \rightarrow Z$, rate $\propto [X]$. What is (i) molecularity and (ii) order of reaction ?

A. (i) 2, (ii) 1

B. (i) 2, (ii) 2

C. (i) 1, (ii) 1

D. (i) 1, (ii) 2

Answer: A

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Integrated Rate Equation

1. The reaction $2X \rightarrow Y + Z$ would be zero order reaction when

A. rate remains unchanged at any concentration of Y and Z

B. rate of reaction doubles if concentration of Y is doubled

C. rate of reaction remains same at any concentration of X

D. rate of reaction is directly proportional to square of concentration of X

Answer: C

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2. Derive an expression to calculate time required for completion of zero order reaction.

A. $t = \frac{[R_0]}{k}$

B. $t = [R] - [R_0]$

C. $t = \frac{k}{[R_0]}$

D. $t = \frac{[R_0] - [R]}{[R_0]}$

Answer: A

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3. A plot of log (a-x) against time 't' is a straight line. This indicates that the reaction is of :

A. zero order

B. first order

C. second order

D. third order

Answer: B

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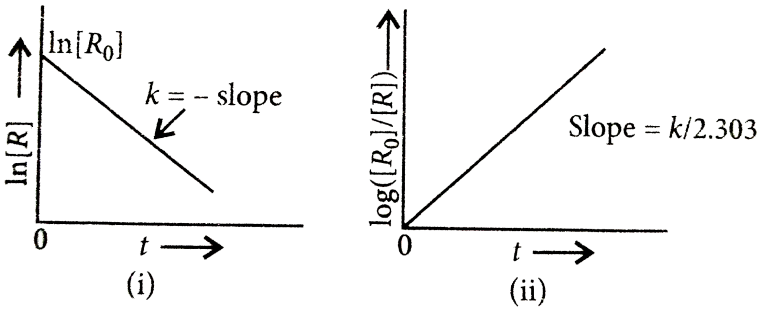
4. Observe the given graphs carefully.



Which of the given orders are shown by the graphs respectively?

A. zero order, First order

B. First order, Zero order

C. First order, first order

D. Second order, Zero order

Answer: C

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5. Radioactive distintegration is an example of

A. zero order reaction

B. first order reaction

C. second order reaction

D. third order reaction

Answer: B

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6. A first order reaction has a rate constant of $5 \times 10^{-3} s^{-1}$. How long will $5.0g$ of this reaction take to reduce to $3.0g$?

A. 34.07 s

B. 7.57 s

C. 10.10 s

D. 15 g

Answer: A

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7. In a first order reaction, the concentration of reactant decrease from 400 mol L^{-1} to 25 mol L^{-1} in 200 seconds. The rate constant for the reaction is

A. $1.01386 s^{-1}$

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

C. $1.386 \times 10^{-2} s^{-1}$

D. $3.4 \times 10^{-4} s^{-1}$

Answer: C

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8. A first order reaction is 20% complete in 10 minutes. What is the specific rate constant for the reaction?

A. $0.0970\ \min^{-1}$

B. $0.009\ \min^{-1}$

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

D. $2.223 \min^{-1}$

Answer: C

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9. The decomposition of a substance follows first order kinetics. If its concentration is reduced to 1/8 th of its initial value in 12 minutes, the

rate constant of the decomposition system is

A. $\left(\frac{2.303}{12}\frac{\log(1)}{8}\right)\min^{-1}$

B. $\left(\frac{2.303}{12}\log 8\right)\min^{-1}$

C. $\left(\frac{0.693}{12}\right)\min^{-1}$

D. $\left(\frac{1}{12}\log 8\right)\min^{-1}$

Answer: B

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10. A first order reaction takes 40 min for $30\,\%$ decomposition. Calculate $t_{1/2}$. (Given $\log 7 = 0.845$)

A. 77.7 min

B. 52.5 min

C. 46.2min

D. 22.7 min

Answer: A

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11. The following data were obtained during the first order thermal decomposition of SO_2CI_2 at a constant volume.

$$SO_2CI_{2(g)} \rightarrow SO_{2(g)} + CI_{2(g)}$$

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

What is the rate of reaction when total pressure is 0.65 atm?

A. $0.35 atm s^{-1}$

B. $2.235 \times 10^{-3} atm s^{-1}$

C. $7.8 \times 10^{-4} atm s^{-1}$

D. $1.55 \times 10^{-4} atm s^{-1}$

Answer: C

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

A. 444s

B. 400s

C. 528s

D. 669s

Answer: A

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13. The decomposition of dinitrogen pentoxide (N_2O_5) follows first order rate law. Calculate the rate constant from the given data:

$t = 800\,\text{sec}[N_2O_5] = 1.45\text{mol}L^{-1} = [A]$

$t = 600\,\text{sec}[N_2O_5] = 0.88\text{mol}L^{-1} = [A_2]$

A. $3.12 \times 10^{-4} s^{-1}$

B. $6.24 \times 10^{-4} s^{-1}$

C. $2.84 \times 10^{-4} s^{-1}$

D. $8.14 \times 10^{-4} s^{-1}$

Answer: B

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14. Half life of a first order reaction in 10 min. What $\%$ of reaction will be completed in 100 min ? `

A. 0.25

B. 0.5

C. 0.999

D. 0.75

Answer: C

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15. The half life for radioactive decay of $.^{14}C$ is 5730 years. An archaeological artifact containing wood had only $80\ \%$ of the $.^{14}C$ found in a living tree. Estimat the age of the sample.

A. 1485 years

B. 1845 years

C. 530 years

D. 4767 years

Answer: B

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16. What will be the half-life of the first order reaction for which the value of rate constant is $200s^{-1}$?

A. $3.46 \times 10^{-2}s$

B. $3.46 \times 10^{-3} s$

C. $4.26 \times 10^{-2} s$

D. $4.26 \times 10^{-3} s$

Answer: B

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17. The rate constant of first order reaction is $10^{-2} \min^{-1}$. The half-life period of reaction is

A. 69.3 min

B. 34.65 min

C. 17.37 min

D. 3.46 min

Answer: B

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18. In a first order reaction, The concentration of reactant is reduced to 1/8th of the initial concentration in 75 minutea at 298 K. What is the half period of the reaction in minutes?

A. 50 min

B. 15 min

C. 30 min

D. 25 min

Answer: D

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19. Calculate the half life of the reaction $A \rightarrow B$, when the initial concentration of A is $0.01 \text{mol} L^{-1}$ and initial rate is $0.00352 \text{mol} L^{-1} \text{min}^{-1}$. The reaction is of the first order

A. 19.69 min

B. 1.969 min

C. 7.75 min

D. 77.5 min

Answer: B

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20. In pseudo-unimolecular reactions :

A. both the reactants are present in low concentraion

B. both the reactants are present in same concentration

C. one of the reactant is present in excess

D. one of the reactant is non-reactive.

Answer: C

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21. The value of rate of a pseudo first order reaction depends upon

A. the concentration of both the reactants present in the reaction

B. the concentration of the reactant present small amount

C. the concentration of the reactant present in excess

D. the value of ΔH of the reaction.

Answer: B

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22. State one condition under which a bimolecular reaction may be kinetically of first order reactions.

A. When both reactants have same concentration

B. when one of the reacting species is in large excess

C. when the reaction is at equilibrium

D. when the activation energy of reaction is less

Answer: B

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23. The hydrolysis of ethyl acetate is a reaction of :

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

A. zero order

B. pseudo first order

C. second order

D. third order

Answer: B

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24. Which one of the following is wrongly matched?

A. Saponification of $CH_{3COOC_2H_5}$ - second order reaction

B. Hydrolysis of CH_3COOCH_3 - Pseudounimolecular reaction

C. Decomposition of H_2O_2 - First order reaction

D. Combination of H_2 and Br_2 to give HBr - Zero order reaction

Answer: D

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25. In a pseudo first order hydrolysis of ester in water the following result6s were obtained:

t/s	0	30	60	90
[Ester]	0.55	0.31	0.17	0.085

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

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

A. $1.91 \times 10^{-2} s^{-1}$

B. $4.67 \times 10^{-3} molL^{-1} s^{-1}$

C. $1.98 \times 10^{-3} s^{-1}$

D. $2.07 \times 10^{-2} s^{1}$

Answer: B

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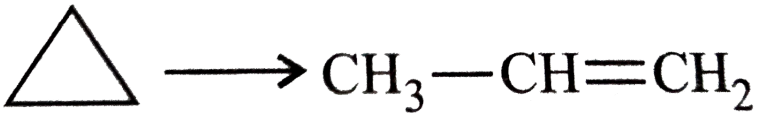
Mcqs

1. Cyclopropane rearranges to form propene



$\rightarrow CH_3 - CH = CH_2$

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

A. 0.035 M

B. 0.22 M

C. 0.145 M

D. 0.0018 M

Answer: B

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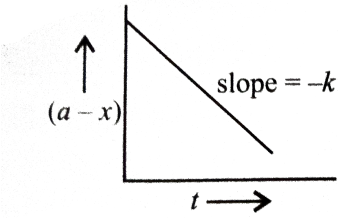
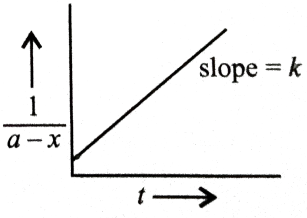
2. Two plots are shown below between concentration and time t. Which of the given orders are shown by the graphs respectively?





A. Zero order and first order

B. first order and second order

C. zero order and second order

D. frist order and first order

Answer: C

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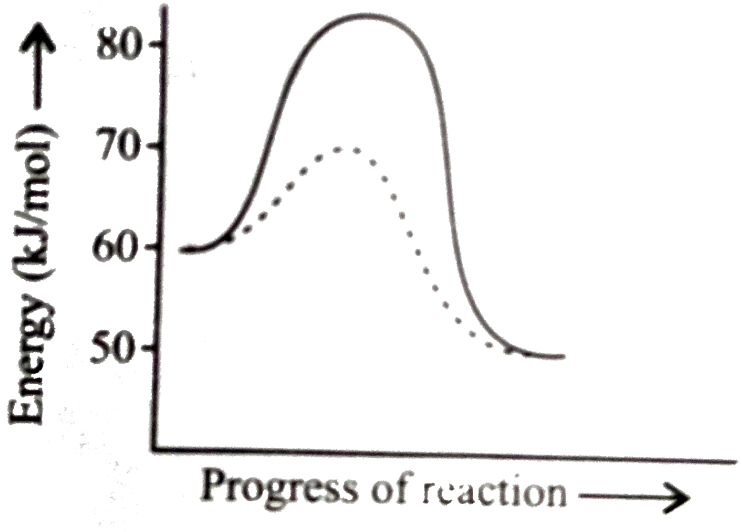
3. For a reaction $A_2 + B_2 \Leftrightarrow 2AB$ the figure shows the path of the reaction in absence and presence of a catalyst. What will be energy of activation for forward $\left(E_f\right)$ and backward $\left(E_b\right)$ reaction in presence of a catalyst and ΔH for the reaction? The dotted curve is path of reaction in

presence of a catalyst.



A. $E_f = 60kJ/mol, E_b = 70kJ/mol, \Delta H = 20kJ/mol$

B. $E_f = 20kJmol, E_b = 2 - kJ/mol, \Delta H = 50kJ/mol$

C. $E_f = 70kJ/mol, E_b = 20kJ/mol, \Delta H = 10kJ/mol$

D. $E_f = 10kJ/mol, E_b = 20kJ/mol, \Delta H = -10kJmol$

Answer: D

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Temperature Dependendence Of The Rate Of A Reaction

1. The Activation energy for a chemical reaction mainly depends upon

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 reactantsand products

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

Answer: D

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2. The temperature dependence of the rate of a chemical reaction can be explained by Arrhenius equaiton which is

A. $k = Ae^{Ea/RT}$

B. $k = Ae^{-Ea/RT}$

C. $k = Ae \times \frac{E_a}{RT}$

D. $k = Ae \times \frac{RT}{E_a}$

Answer: B

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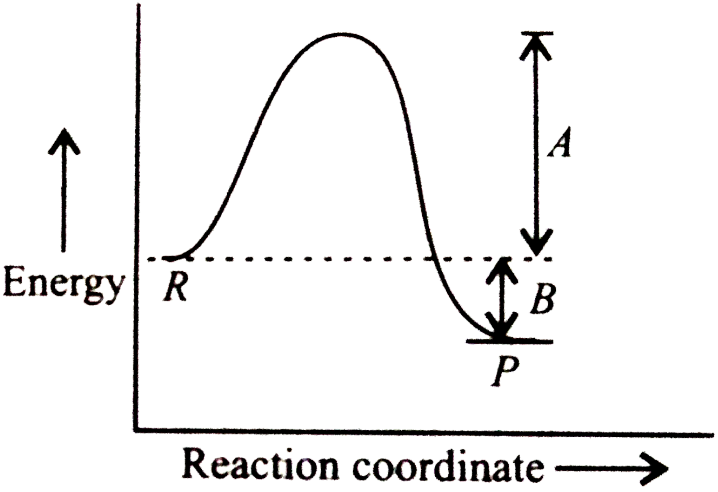
3. The energy diagram of a reaction $P + Q \rightarrow R + S$

is given. What are A and B in the graphs?



A. A $\rightarrow$ activation energy, B $\rightarrow$ heat of reaction

B. A $\rightarrow$ threshold energy, B $\rightarrow$ heat of reaction

C. A $\rightarrow$ heat of reaction, B $\rightarrow$ activation energy

D. A $\rightarrow$ potential energy, B $\rightarrow$ energy of reaction

Answer: A

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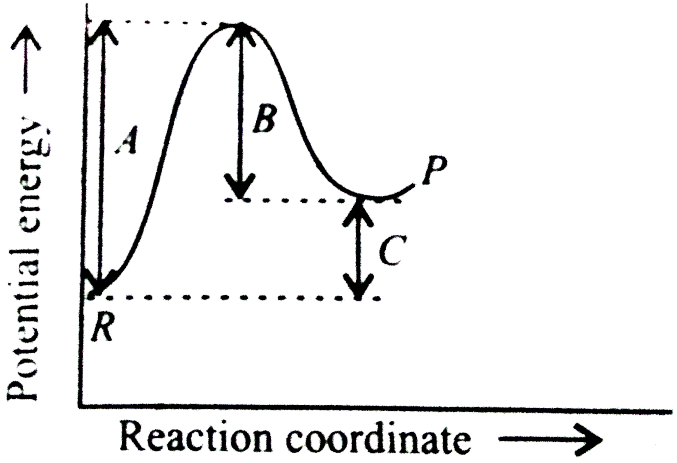
4. The potential energy diagram for a reaction $X \rightarrow Y$ is given. A and C in the graph corresponding to



A. A $\rightarrow$ activation energy, C $\rightarrow \Delta H^{\circ}$

B. A $\rightarrow$ energy of reactants, C $\rightarrow$ energy of products

C. A $\rightarrow \Delta H^{\circ}, C \rightarrow$ activation energy

D. A $\rightarrow$ activation energy, C $\rightarrow$ threshold energy

Answer: A

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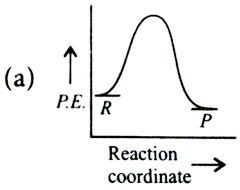
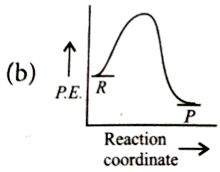
5. An endothermic reaction with high activation energy for the forward reaction is given by the diagram

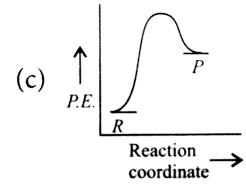
A.



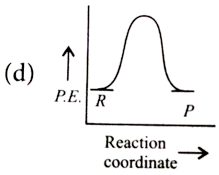
B.



C.



D.



Answer: C

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6. For an endothermic reaction, where ΔH represents the enthalpy of reaction in $kJmol^{-1}$, the minimum value for the energy of activation will be

A. Less the zero

B. equal to ΔH

C. less than ΔH

D. more than ΔH

Answer: D

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7. If hydrogen and oxygen are mixed and kept in the same vessel at room temperature, the reaction does not take place to form water because

A. activation energy for the reaction is very high at room temperature

B. molecules have no proper orientation to react to form water

C. the frequency of collisions is not high enough for the reaction to take place

D. no catalyst s present in the reaction mixture.

Answer: A

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8. The temperature dependence of the rate of a chemical reaction is given by arrhenius equation, $k = Ae^{-Ea/RT}$. Which of the following graphs will be a straight line?

A. In A vs 1/T

B. In A vs E_a

C. In K vs 1/T

D. In k vs $-E_a/R$

Answer: C

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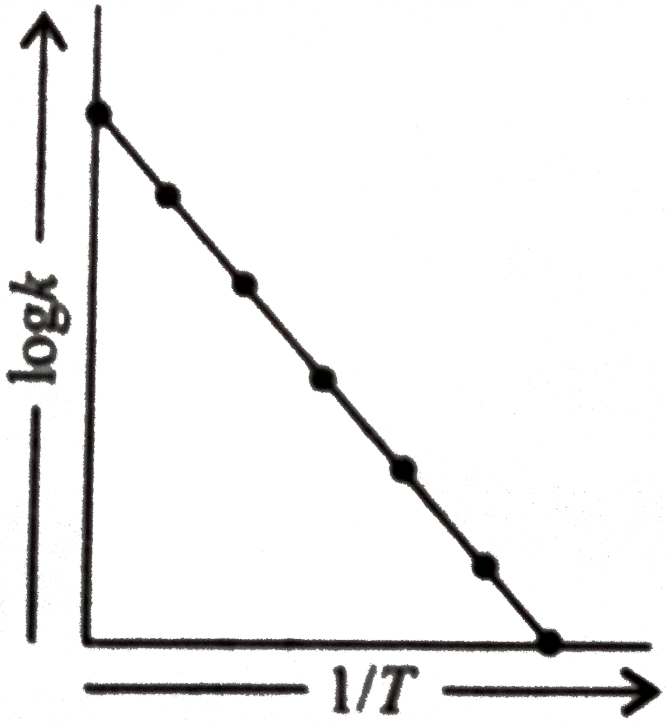
9. The temperature dependence of the rate constant k is expressed as $k = Ae^{-Ea/RT}$

When a plot between logk and 1/T is plotted we get the graph as shown.



What is the value of slopw in the graph?

A. $\frac{E_a}{RT}$

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

C. $-\frac{E_a}{2.303RT}\log A$

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

Answer: B

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10. Which of the following statements is not correct?

A. For a zero order reaction $t_{1/2}$ is proportional to initial concentraion.

B. The relationship of variation of rate constant with temperature is given by

$$\frac{\log(k_2)}{k_1} = \frac{E_a}{2.303R}\left[\frac{T_2 - T_1}{T_1 T_2}\right]$$

C. The unit of rate constant for a reaction is $mol^{1-n}L^{n-1}s^{-1}$ where n is order of the reaction.

D. The unit of rate of reaction changes with order of reaction.

Answer: D

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11. The decomposition of hydrocarbon follows the equation $k = \left(4.5 \times 10^{11} s^{-1}\right) e^{-28000K/T}$

Calculate E_a.

A. 669 kJ mol^{-1}

B. 232. 79 kJ mol^{-1}

C. $4.5 \times 10^{11} kJmol^{-1}$

D. 28000 kJ mol^{-1}

Answer: B

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12. The rate constant for a first order reaction at $300^{\circ} C$ for which E_a is 35 kcal mol^{-1} and frequency constant is $1.45 \times 10^{11} s^{-1}$ is

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

B. $5.37 \times 10^{10} s^{-1}$

C. $5 \times 10^{-4} s^{-1}$

D. $7.94 \times 10^{-3} s^{-1}$

Answer: D

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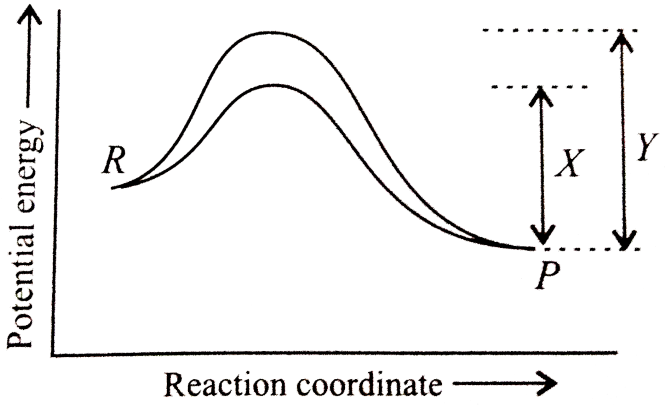
13. The graph of the effect of catalyst on activation energy is given below.

Fill up the blanks X and Y with appropriate statements



A. X = energy of activation without catalyst,

Y = energy of activation with catalyst

B. X = path of reaction with catalyst, Y = path of reaction without catalyst

C. X = energy of activation with catalyst,

Y = energy of activation without catalyst

D. X = energy of endothermic reaction, Y = energy of exothermic reaction

Answer: C

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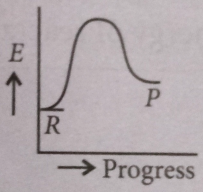
14. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Zero order	(i)	$\log\frac{k_2}{k_1}=\frac{E_a}{2.303R}\left[\frac{T_2-T_1}{T_1T_2}\right]$
(B)	First order	(ii)	
(C)	Endothermic reaction	(iii)	$k=\frac{2.303}{t}\log\frac{[A]_0}{[A]}$
(D)	Activation energy	(iv)	$k=\frac{1}{t}([A]_0-[A])$

A. (A) $\rightarrow$ (iv), (B) $\rightarrow$ (iii), (C) $\rightarrow$ (ii), (D) $\rightarrow$ (i)

B. (A) $\rightarrow$ (i), (B) $\rightarrow$ (ii) (C) $\rightarrow$ (iii), (D) $\rightarrow$ (iv)

C. (A) $\rightarrow$ (ii), (B) $\rightarrow$ (iii), (C) $\rightarrow$ (iv), (D) $\rightarrow$ (i)

D. (A) $\rightarrow$ (iii), (B) $\rightarrow$ (iv) (C) $\rightarrow$ (i), (D) $\rightarrow$ (ii)

Answer: A

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15. Which of the following statement about the catalyst is/are true?

A. A catalyst accelerate rate of reaction by bringing down the activation energy

B. A catalyst makes equilibrium constant more favourable for forward reaction

C. A catalyst makes the reaction feasible by making ΔG more negative.

D. A catalyst always increases the rate of reaction.

Answer: A

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16. When a catalyst is used an equilibrium process,

A. it increases the rate of forward reaction

B. it decreases the rate of backward reaction

C. it decreases activation energy of forward process and decreases activation energy of backward process

D. it fastens the attainment of equilibrium by lowering activation energy.

Answer: D

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17. Which of the following factors are responsible for the increase in the rate of a surface catalysed reaction?

(i) A catalyst provides proper orientation for the reactant molecules to react.

(ii) heat of adsorption of reactants on a catalyst helps reactant molecules to overcome activation energy.

(iii) The catalyst increases the activation energy of the reactio.

A. (i) and (iii)

B. (i) and (ii)

C. (ii) and (iii)

D. (i),(ii) and (iii)

Answer: B

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Collision Theory Of Chemical Reactions

1. The increase in concentration of the reactants lead changes in

A. ΔH

B. collision frequency

C. activation energy

D. equilibrium constant.

Answer: B

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2. 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

D. pressure.

Answer: C

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3. Rate of a general reaction A + B $\rightarrow$ products can be expressed as follows on the basis of collision theory.

Rate $= Z_{AB}e^{-E_a/RT}$

Which of the following statements is not correct for the above expression?

A. Z is collision frequency andis equal to number of collisions per second per unit volume of the reaction mixture

B. $e^{E_a/RT}$ is the fraction of molecules with kinetic energy equal to or greater than E_a

C. E_a is activation energy of the reaction.

D. All the molecules which collide with one other are effective collisions.

Answer: D

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4. Threshold energy is equal to

A. activation energy

B. activation energy - energy of molecules

C. activation energy + energy of molecules

D. None of these

Answer: C

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5. For a certain reaction a large fraction of molecules has energy more than the threshold energy, still the rate of reaction is very slow. The possible reason for this could be that

A. the colliding molecules could be large in size

B. the colliding molecules must not be properly oriented for effective collisions

C. the rate of reaction could be independent of the energy

D. one of the reactant cound be in excess.

Answer: B

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6. fill up the following with suitable terms

(i) Activation energy = Threshold energy - _____

(ii) Half-life period of zero order reaction =____

(iii) Average rate of reaction = ___

(iv) Instantaneous rate of reaction

A. Potential energy $\frac{0.693}{k}, \frac{dx}{dt}, \frac{\Delta[A]}{\Delta t}$

B. Energy of reactants $\frac{1}{k}, \frac{\Delta[A]}{\Delta t}, \frac{dx}{dt}$

C. Energy of reaction $\frac{\log x}{t}, \frac{\Delta[A]}{\Delta t}, \frac{dx}{dt}$

D. Average kinetic energy of reactants $\frac{a}{2k}, \frac{\Delta[A]}{\Delta t}, \frac{dx}{dt}$

Answer: D

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Higher Order Thinking Skills

1. The reaction $2NO + Br_2 \rightarrow 2NOBr$, obeys the following mechanism: $NO + Br_2 \overset{\text{fast}}{\Longleftrightarrow} NOBr_2, NOBr_2 + NO \overset{\text{Slow}}{\longrightarrow} 2NOBr$ The rate expression of the above reaction can be written as

A. $r = k[NO]^2[Br_2]_2$

B. $r = k[NO][Br_2]$

C. $r = k[NO][Br_2]$

D. $r = k[NOBr_2]$

Answer: A

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2. A hypothetical reaction $A_2 + B_2 \rightarrow 2AB$ follows the mechanism as given below:

$A_2 \Leftrightarrow A + A(\text{fast})$

$A + B_2 \rightarrow AB + B$ (slow)

$A + B \rightarrow AB$ (fast)

The order of the overall reaction is

A. 2

B. 1

C. 43892

D. zero

Answer: C

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3. In acidic medium the rate of reaction between $\left[BrO_3^-\right]$ and $\left[Br^-\right]$ ions given by the expression

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

It means

(i) rate of constant of the reaction depends upon the concentration of H^+ ions

(ii) rate of reaction is independent of the concentration of acid added

(iii) the change in pH of the solution will affect the rate of reaction

(iv) doubling the concentration of H^+ ions will increase the reactions rate by 4 items.

A. only (ii)

B. only (iii)

C. only (i) and (ii)

D. only (iii) and (iv)

Answer: D

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4. The rate of certain hypothetical reaction

$A + B + C \rightarrow$ Products, is given by

$$r = -\frac{dA}{dt} = k[A]^{1/2}[B]^{1/3}[C]^{1/4}$$

The order of a reaction is given by

A. 1

B. 1/2

C. 2

D. 13/12

Answer: D

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5. For the reaction, $H_{2(g)} + Br_{2(g)} \rightarrow 2HBr_{(g)}$, the reaction rate $= k[H_2][Br_2]^{1/2}$. Which statement is true about this reaction?

A. The reaction is of second order

B. Molecularity of the reaction is 3/2

C. The unit of k is $\sec^{-1}$

D. Molecularity of the reaction is 2.

Answer: D

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6. For a first order reaction, the ratio of the time taken for $7/8^{th}$ of the reaction to complete to that of half of the reaction to complete is

A. $3:1$

B. $1:3$

C. $2:3$

D. $3:2$

Answer: A

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7. A first order reaction is $50\,\%$ completed in $30\ \text{min}$ at $27^\circ C$ and in $10\ \text{min}$ at $47^\circ C$. Calculate the reaction rate constants at $27^\circ C$ and the energy of activation of the reaction in $kJmol^{-1}$.

A. $k = 0.0231\text{min}^{-1}, E_a = 43.848kJmol^{-1}$

B. $k = 0.017\text{min}^{-1}, E_a = 52.54kJmol^{-1}$

C. $k = 0.0693\text{min}^{-1}, E_a = 43.848kJmol^{-1}$

D. $k = 0.0231\text{min}^{-1}, E_a = 28.92kJmol^{-1}$

Answer: A

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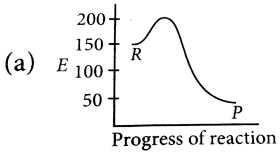
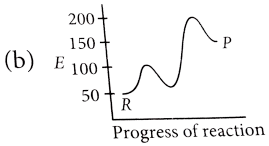
8. An exothermic chemical reaction proceeds by two stages reactants $\xrightarrow{\text{Stage I}}$ intermdediate $\xrightarrow{\text{Stage II}}$ products, The activation energy of stage I is $50kJmol^{-1}$. The overall enthalpy change of the reaction is

-100kJ mol^{-1}. Which diagram could represent the energy level diagram for the reaction ?

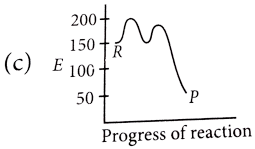
A.



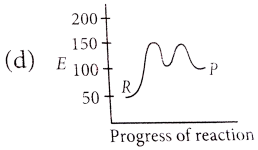
B.



C.



D.



Answer: C

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

(i) The threshold energy of the reaction is 25 kJ mol^{-1}

(ii) The potential energy of Y is 16 kJ mol^{-1}

(iii) Heat of reaction is 6 kJ mol^{-1}

The reaction is endothermic.

A. Only (i)

B. Only (i) and (ii)

C. Only (ii) and (iii)

D. All are correct

Answer: D

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Ncert Exemplar

1. The role of a catalyst is to change

A. Gibbs energy of reaction

B. enthalpy of reaction

C. activation energy of reaction

D. equilibrium constant.

Answer: C

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

A. increases

B. decreases

C. remains unchanged

D. may increase or decrease

Answer: C

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3. Activation energy of a chemical reaction can be determined by

A. determining the rate constant at standard temperature

B. determining the rate constants at two temperatures

C. determining probaiility of collision

D. using catalyst

Answer: B

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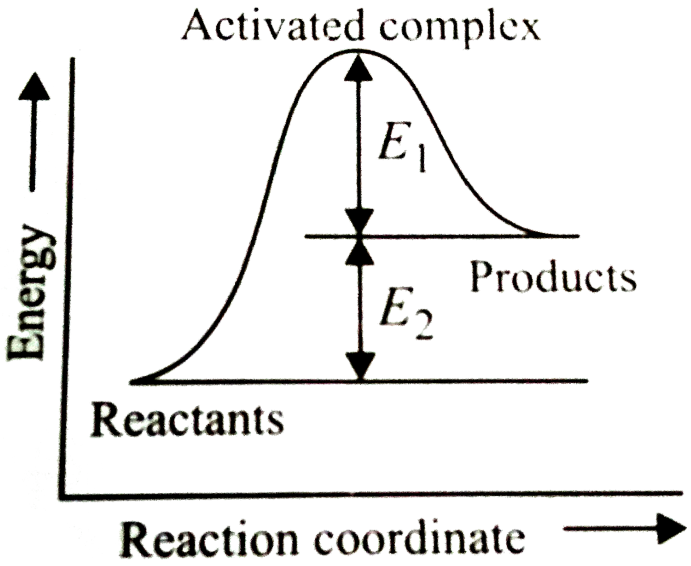
4. Consider figure and mark the correct option.



A. Activation energy of forward reaction is $E_1 + E_2$ and product is less stable than reactant.

B. Activation energy of forward reaction is $E_1 + E_2$ and product is more stable than reactant.

C. Activation energy of both forward and backward reaction is $E_1 + E_2$ and reactant is more stable than product.

D. Activation energy of backward reaction is E_1 and product is more stable than reactant.

Answer: A

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5. Consider a first order gas phase decomposition reaction given below:

$A(g) \rightarrow B_g + C_g$

The initial pressure of the system before decomposition of A was p_i. After lapse of time t'. Total pressure of the system increased by x units and became P_t. the rate constant k for the reaction is given as

A. $k = \frac{2.303}{t} \frac{\log(p_i)}{p_i - x}$

B. $k = \frac{2.303}{t} \frac{\log(p_i)}{2p_i - p_t}$

C. $k = \frac{2.303}{t} \frac{\log(p_i)}{2p_i + p_i}$

D. $k = \frac{2.303}{t} \frac{\log(p_i)}{p_i + x}$

Answer: B

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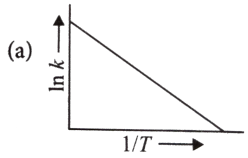
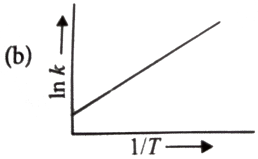
6. According to Arrhenius equation rate constant k is equal to $Ae^{-E_a/RT}$. Which of the following option. Represents the graph of ln k us $\frac{1}{T}$?

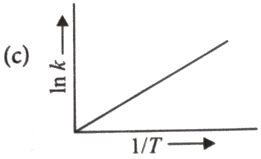
A.



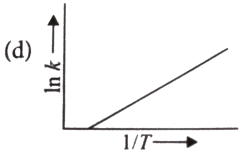
B.



C.



D.



Answer: A

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7. Consider the Arrhenius equation given below and mark the correct option.

$k = Ae^{-\frac{Ea}{RT}}$

A. Rate constant increases exponentially with increasing activation energy and decreasing temperature

B. Rate constant decreases exponentially with increasing activation energy and decreasing temperature.

C. Rate constant increases exponentially with decreasing activation energy and decreasing temperature.

D. Rate Constant increases exponentially with decreasing activation energy and increasing temperature.

Answer: D

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8. Which of the following statement is not correct about order of a reaction ?

A. The order of a reaction can be a fractional number.

B. Order of a reaction is experimaentally determined quantity

C. The order or a reaction is always equal to the sum of the stoichiometic coefficients of reactants in the balanced chemical equaiton for a reaction.

D. The order of a reaction is the sum of the powers of molar concentration of the reactants in the rate law expression.

Answer: C

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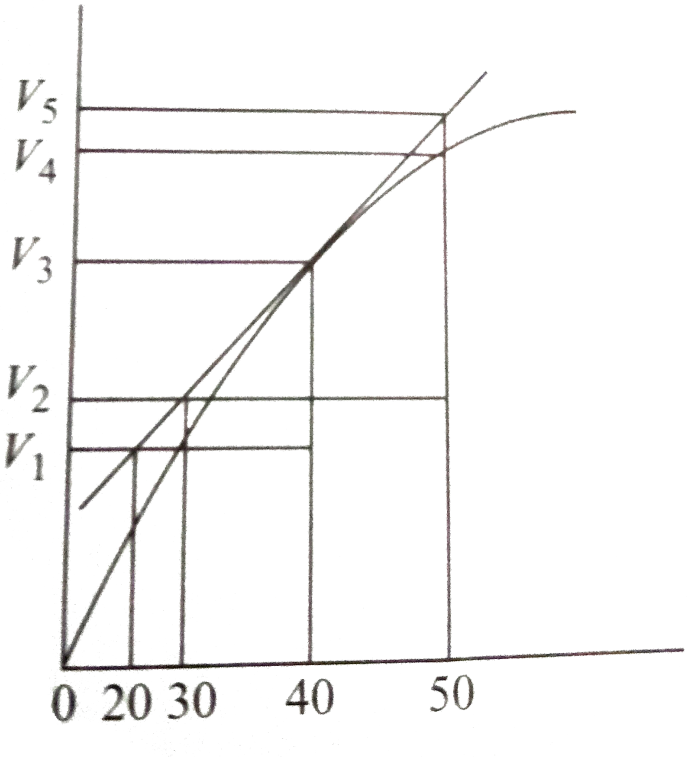
9. A graph of volume of hydrogen released vs time for the reaction between zinc and dil. HCI is given in figure. On the basic of this mark the

correct option.



A. Average rate upto 40 seconds is $\frac{V_3 - V_2}{40}$

B. Average rate upto 40 seconds is $\frac{V_3 - V_2}{40 - 30}$

C. Average rate upto 40 seconds is $\frac{v_3}{40}$

D. Average rate upto 40 seconds is $\frac{V_3 - V_1}{40 - 20}$

Answer: C

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10. Consider the graph given in Q.9 Which of the following options does not show instantaneous rate of reaction at 40^{th} second?

A. $\frac{V_5 - V_2}{50 - 30}$

B. $\frac{V_4 - V_2}{50 - 30}$

C. $\frac{V_3 - V_2}{40 - 30}$

D. $\frac{V_3 - V_1}{40 - 20}$

Answer: B

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11. Which of the following statements is correct?

A. The rate of fa 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 increases in concentration of reactant(s)

Answer: A

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12. Which of the following expression is correct for the rate of reaction given below ?

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

A. $\frac{\Delta[Br^-]}{\Delta t} = 5\frac{\Delta[H^+]}{\Delta}$

B. $\frac{\Delta[Br^-]}{\Delta t} = \frac{6}{5}\frac{\Delta[H^+]}{\Delta t}$

C. $\frac{\Delta[Br^-]}{\Delta t} = \frac{5}{6}\frac{\Delta[H^+]}{\Delta t}$

D. $\frac{\Delta[Br^-]}{\Delta t} = 6\frac{\Delta[H^+]}{\Delta t}$

Answer: C

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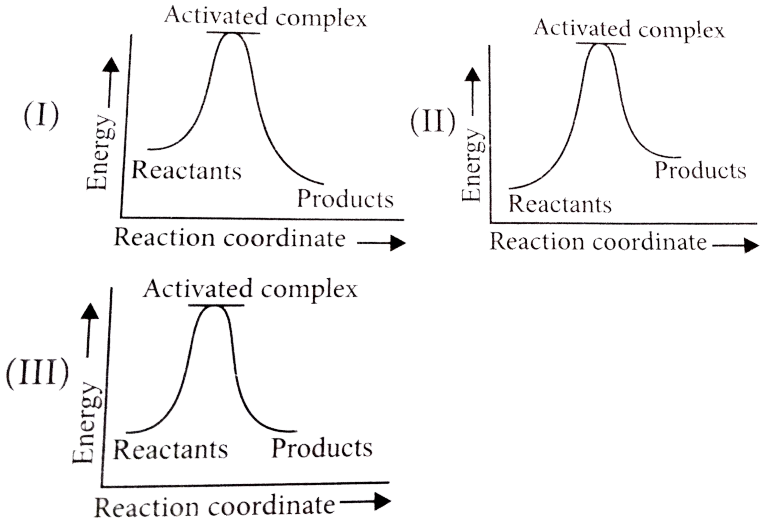
13. Which of the following graphs represents exothoermic reaction?



A. (i) Only

B. (ii) Only

C. (iii) only

D. (i) and (ii)

Answer: A

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14. Rate law for the reaction, $A + 2B \rightarrow C$ is found to be

Rate $= k[A][B]$

Concentration of reactant 'B' is doubled keeping the concentration of 'A' constant, the value of rate constant will be _____

A. the same

B. doubled

C. quadrupled

D. halved

Answer: A

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15. Which of the following statements is incorrect about the collision theory of chemical reaction?

A. It considers reacting molecules or atoms to be hard spheres and ignores their structural features.

B. Number of effective collisions determines the rate of reaction.

C. Collision of atoms or molecules possessing suffieient threshold energy results into the product formation.

D. Molecules should collide with sufficient threshold energy and proper orientation for the collsision to be effective.

Answer: C

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16. A first order reaction is $50\,\%$ completed in 1.26×10^{14}s. How much time would it take for $100\,\%$ completion?

A. $1.26 \times 10^{15} s$

B. $2.52 \times 10^{14} s$

C. $2.52 \times 10^{28} s$

D. Infinite

Answer: D

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17. Compound 'A' and B react according to the following chemical equation.

$A_{(g)} + 2B_{(g)} \rightarrow 2C_{(g)}$

Concentration of either A or B were changed keeping the concentrations of one of the reactants constant and rates were mesured as a function of initial concentration. Following results were obtained. Choose the correct option for the rate equations for this reaction.

Experiment	Initial concentration of $[A]/molL^{-1}$	Initial concentration o
1	0.30	0.30
2	0.30	0.60
3	0.60	0.30

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

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

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

D. Rate = $k[A]^2[B]^0$

Answer: B

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18. Which of the following statements is not correct for the catalyst?

A. It catalyst the forward and backward reaction to the same extent.

B. It alters ΔG of the reaction.

C. It is a substance that does not change the equilibrium constant of a reaction.

D. It provides an alternate mechanism by reducing activation energy between reactants and products.

Answer: B

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19. The value of rate constant of a pseudo first order reaction

A. depends on the concentration of reactants present in small amount

B. depends on the concentrations of reactants present in excess

C. is independent of the concentration of reactants

D. depends only on temperature

Answer: B

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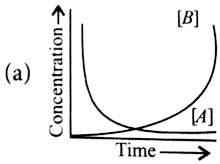
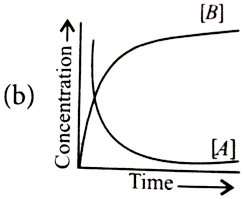
20. Consider the reaction $A \rightarrow B$. The concentration of both the reactants and the products varies exponentially with time. Which of the following figure correctly describes the change in concentration of reactants and products with time ?

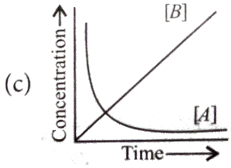
A.



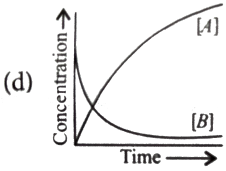
B.



C.



D.



Answer: B

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Assertion And Reason

1. Assertion : Precipitation of silver chloride occurs instantaneously by mixing of aqueous solutions of silver nitrate and sodium chloride.

Reason : Ionic reactions occur very fast.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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2. Assertion : The rate of reaction is the rate of change of concentration of a reactant or a product.

Reason : Rate of reaction remians constant during the complete reaction.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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3. Assertion : For the reaction

$CHCI_3 + CI_2 \rightarrow \mathbb{C}I_4HCI$

Rate = $k[CHCI_3][CI_2]^{1/2}$

Reason : Rate of reaction is always equals to the sum of the stoichiometic coefficients of the reacting species in a balanced chemical equation.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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4. Assertion : Order of a reaction with respect to any reactant can be zero, positive negative of fractional.

Reason : Rate of a reaction cannot decrease with increase in concentration of a reactant or a product.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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5. Assertion : Molecularity greater than three is not observed.

Reason : The overall molecularity of complex reaction is equal to molecularity of the slowest step.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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6. Assertion : Complex reaction takes place in different steps and the slowest step determines the rate of reaction.

Reason : Order and molecularity of a reaction are always equal.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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7. Assertion : The decomposition of gaseous ammonia on a hot platinum surface is a zero order reaction at high pressure.

For a zero order reaction the rate of reaction is independent of initial concentration.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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8. Assertion : For a first order reaction, $t_{1/2}$ is indepent of rate constant.

Reason : For a first reaction $t_{1/2} \propto [R]_0$.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D

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9. Assertion : The reaction

$\underset{\text{Cane sugar}}{C_{12}H_{22}O_{11}} + H_2O \overset{H^+}{t0} \underset{\text{Glucose}}{C_6h_{12}O_6} + \underset{\text{Fructose}}{C_6H_{12}O_6}$ is a first order reaction.

Reason : Change in concentration of H_2O is negligible.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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10. Assertion : The rate of a reaction sometimes does not depend on concentration.

Resaon : Lower the activation energy, faster is the reaction

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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11. Assertion : For a chemical reaction with rise in temperature by 10° the rate constant is nearly doubled.

Reason : At t + 10, the fraction of molecules having energy equal to or greater than activation energy gets doubled.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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12. Assertion : E_a of the forward reaction is higher than that of backward reaction in a reversible endothermic reaction.

Reason : Increasing the tempreature of the substance increases the fraction of molecules which collide with energies greater than E_a.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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13. Assertion : A catalyst increases the rate of reaction without itself undergoing any permanent chemical change.

Reason : A catalyst changes the Gibbs energy (ΔG) of the reaction and equilibrium constant of the reaction.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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14. Assertion : All molecules collisions lead to the formation of products.

Reason : Reactant molecules undergo chemical change irrespective of their collision.

Assertion : Rate of reaction increases with increase in temperature .

Reason : Number of effective collisions increases with increase in temperature.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D

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15. Assertion : Rate of reaction increases with increase in temperature.

Reason : Number of effective increases with increase in temperature.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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