

NEET

JEE

CUET

FOUNDATION VII-XII

Q.1 For a reactions $A + B \rightarrow$ product, it was found that rate of reaction increases four times if concentration of 'A' is doubled, but the rate of reaction remains unaffected, if concentration of 'B' is doubled. Hence, the rate law for the reaction is

- (1) rate = $k [A] [B]$ (2) rate = $k [A]^2$
(3) rate = $k [A]^2 [B]^1$ (4) rate = $k [A]^2 [B]^2$

Q.2 The unit of rate constant for a zero order reaction is

- (1) litre sec^{-1} (2) litre $\text{mole}^{-1} \text{sec}^{-1}$
(3) mole $\text{litre}^{-1} \text{sec}^{-1}$ (4) mole sec^{-1}

Q.3 A first order reaction which is 30% complete in 30 minutes has a half-life period of –

- (1) 24.2 min (2) 58.2 min
(3) 102.2 min (4) 120.2 min

Q.4 The order of a reaction which has the rate

expression $\frac{dc}{dt} = K[E]^{3/2}[D]^{3/2}$ is

- (1) 3/2 (2) 3
(3) 2 (4) 0

Q.5 An example of a pseudo-unimolecular reaction is

- (1) Dissociation of hydrogen iodide
(2) Hydrolysis of methyl acetate in dilute solution
(3) Dissociation of phosphorus pentachloride
(4) Decomposition of hydrogen peroxide

Q.6 Which equation is correct for first order reactions

- (1) $t_{1/2} \propto C^{-1}$ (2) $t_{1/2} \propto C$
(3) $t_{1/2} \propto C^0$ (4) $t_{1/2} \propto C^{1/2}$

Q.7 According to the collision theory of chemical reactions

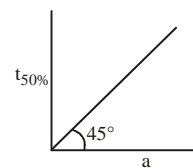
- (1) A chemical reaction occurs with every molecular collision.

- (2) Rate is directly proportional to the number of collisions per second.
(3) Reactions in the gas phase are always of zero order.
(4) Reaction rates are of the order of molecular speeds.

Q.8 The activation energy for a reaction is 9.0 Kcal/mol. The increase in the rate constant when its temperature is increased from 298K to 308K is

- (1) 63% (2) 50%
(3) 100% (4) 10%

Q.9 What will be the respective order of reaction and rate constant for a chemical change having $t_{50\%}$ vs concentration (a) curve as –



- (1) 0, 1/2 (2) 1, 1
(3) 0, 1 (4) 2, 1

Q.10 In a reaction, $X \rightarrow$ Products, when start is made from 8.0×10^{-2} M of X, half life is found to be 120 minute. For the initial concentration 4.0×10^{-2} M, the half life of the reaction becomes 240 minute. The order of the reaction is –

- (1) 0 (2) 1
(3) 2 (4) 0.5

Q.11 For a given reaction the rate of reaction can be represented by

(1) $-\frac{1}{3} \frac{d[A]}{dt} = \frac{-d[B]}{dt} = \frac{+d[C]}{dt} = \frac{+d[D]}{dt}$

(2) $-\frac{1}{3} \frac{d[A]}{dt} = \frac{d[C]}{dt} = K[A]^m[B]^n$

(3) $+\frac{1}{3} \frac{d[A]}{dt} = \frac{-d[C]}{dt} = K[A]^n[B]^m$

- (4) None of these

Q.12 In the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$, initial pressure is 500atm and rate constant K is $3.38 \times 10^{-5} \text{sec}^{-1}$. After 10 minutes the final pressure of N_2O_5 is

- (1) 490 atm (2) 250 atm
(3) 480 atm (4) 420 atm

Q.13 The reaction $2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}_2(\text{g})$ is of first order. If volume of reaction vessel is reduced to $1/3$, the rate of reaction would be –

- (1) $1/3$ times (2) $2/3$ times
(3) 3 times (4) 6 times

Q.14 Decay constant of a reaction is $1.1 \times 10^{-9}/\text{sec}$, then the half life of the reaction is

- (1) 1.2×10^8 (2) 6.3×10^8
(3) 3.3×10^8 (4) 2.1×10^8

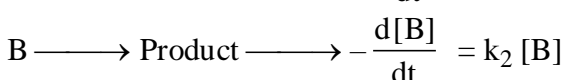
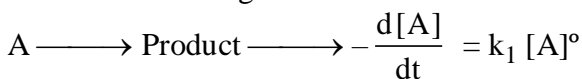
Q.15 For the reaction $\text{H}_2 + \text{Cl}_2 \xrightarrow{\text{Sunlight}} 2\text{HCl}$ taking place on water, the order of reaction is

- (1) 1 (2) 2
(3) 3 (4) 0

Q.16 The unit of rate constant of first & second order reaction is respectively -

- (1) time^{-1} , $\text{mole}^{-1} \cdot \text{litre} \cdot \text{time}^{-1}$
(2) mole ltr^{-1} , time^{-1}
(3) $\text{mole}^{-1} \cdot \text{litre} \cdot \text{time}^{-1}$, time^{-1}
(4) sec^{-1} , litre^{-1}

Q.17 Consider following two reactions



Units of k_1 and k_2 are expressed in terms of molarity (mol L^{-1}) and time (sec^{-1}) as –

- (1) sec^{-1} , M sec^{-1} (2) M sec^{-1} , M sec^{-1}
(3) sec^{-1} , $\text{M}^{-1} \text{sec}^{-1}$ (4) M sec^{-1} , sec^{-1}

Q.18 H_2 gas is adsorbed on the metal surface like tungsten. This follows..... order reaction –

- (1) Third (2) Second
(3) Zero (4) First

Q.19 For the reaction system:

$2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \longrightarrow 2\text{NO}_2(\text{g})$ volume is suddenly reduced to half its value by increasing the pressure on it. If the reaction is of first order with respect to O_2 and second order with respect to NO , the rate of reaction will –

- (1) Increase to eight times of its initial value.
(2) Increase to four times of its initial value.
(3) Decrease to one-fourth of its initial value.
(4) Decrease to one-eighth of its initial value.

Q.20 The rate equation for the reaction $2\text{A} + \text{B} \rightarrow \text{C}$ is found to be : $\text{rate} = k [\text{A}] [\text{B}]$. The correct statement in relation to this reaction is that the

- (1) unit of k must be s^{-1} .
(2) $t_{1/2}$ is a constant.
(3) rate of formation of C is twice the rate of disappearance of A .
(4) value of k is independent of the initial concentrations of A and B .

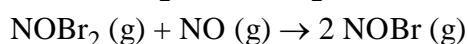
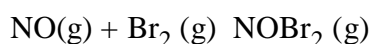
Q.21 Consider an endothermic reaction $\text{X} \rightarrow \text{Y}$ with the activation energies E_b and E_f for the backward and forward reactions, respectively. In general

- (1) $E_b > E_f$
(2) $E_b < E_f$
(3) there is no definite relation b/t E_b & E_f
(4) $E_b = E_f$

Q.22 Rate of reaction can be expressed by Arrhenius equation as $k = Ae^{-E/RT}$, In this equation, E represents –

- (1) the energy below which colliding molecules will not react.
(2) the total energy of the reacting molecule at a temperature, T .
(3) the fraction of molecules with energy greater than the activation energy of the reaction.
(4) the energy above which all the colliding molecules will react.

Q.23 The following mechanism has been proposed for the reaction of NO with Br_2 to form NOBr :



If the second step is the rate determining step, the order of the reaction with respect to $\text{NO}(\text{g})$ is -

- (1) 0 (2) 3
(3) 2 (4) 1

Q.24 The time for half life period of a certain reaction : $\text{A} \rightarrow \text{products}$ is 1 hr. 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 ?

- (1) 4 h (2) 0.5 h
(3) 0.25 h (4) 1 h

- Q.25** Consider the reaction :
 $\text{Cl}_2(\text{aq}) + \text{H}_2\text{S}(\text{aq}) \rightarrow \text{S}(\text{s}) + 2\text{H}^+(\text{aq}) + 2\text{Cl}^-(\text{aq})$
 The rate equation for this reaction is rate
 $= k [\text{Cl}_2] [\text{H}_2\text{S}]$
 Which of these mechanisms is/are consistent with this rate equation ?
 (a) $\text{Cl}_2 + \text{H}_2\text{S} \rightarrow \text{H}^+ + \text{Cl}^- + \text{Cl}^+ + \text{HS}^-$ (slow)
 $\text{Cl}^+ + \text{HS}^- \rightarrow \text{H}^+ + \text{Cl}^- + \text{S}$ (fast)
 (b) $\text{H}_2\text{S} \rightleftharpoons \text{H}^+ + \text{HS}^-$ (fast equilibrium)
 $\text{Cl}_2 + \text{HS}^- \rightarrow 2\text{Cl}^- + \text{H}^+ + \text{S}$ (slow)
 (1) b only (2) Both a and b
 (3) Neither a nor b (4) a only
- Q.26** Under what conditions a bimolecular reaction may be kinetically of first order ?
 (1) When both reactants have same concentration.
 (2) When one of the reacting species is in excess.
 (3) When the reaction is at equilibrium.
 (4) When the activation energy of reaction is less.
- Q.27** If 'I' is the intensity of absorbed light and 'C' is the concentration of AB for the photochemical process $\text{AB} + h\nu \rightarrow \text{AB}^*$, rate of formation of AB^* is directly proportional to
 (1) C (2) I
 (3) I^2 (4) C.I.
- Q.28** In a first order reaction the conc. of reactant decreases from 800 mol/dm^3 to 50 mol/dm^3 in $2 \times 10^4 \text{ sec}$. The rate constant of reaction in sec^{-1} is –
 (1) 2×10^4 (2) 3.45×10^{-5}
 (3) 1.386×10^{-4} (4) 2×10^{-4}
- Q.29** Which one of the following statement for order of reaction is not correct ?
 (1) Order can be determined experimentally.
 (2) Order of reaction is equal to sum of the powers of concentration terms in differential rate law.
 (3) It is not affected with the stoichiometric coefficient of the reactants.
 (4) Order cannot be fractional.
- Q.30** Under the same reaction conditions, initial concentration of $1.386 \text{ mol dm}^{-3}$ of a substance becomes half in 40 seconds and 20 seconds through first order and zero order kinetics, respectively. Ratio (k_1/k_0) of the rate constants for first order (k_1) and zero order (k_0) of the reactions is –
 (1) $0.5 \text{ mol}^{-1} \text{ dm}^3$ (2) 1.0 mol dm^{-3}
 (3) 1.5 mol dm^{-3} (4) $2.0 \text{ mol}^{-1} \text{ dm}^3$
- Q.31** For a first order reaction $\text{A} \rightarrow \text{P}$, the temperature (T) dependent rate constant (k) was found to follow the equation $\log k = - (2000) \frac{1}{T} + 6.0$. The pre-exponential factor A and the activation energy E_a , respectively, are :
 (1) $1.0 \times 10^6 \text{ s}^{-1}$ and 9.2 kJ mol^{-1}
 (2) 6.0 s^{-1} and 16.6 kJ mol^{-1}
 (3) $1.0 \times 10^6 \text{ s}^{-1}$ and 16.6 kJ mol^{-1}
 (4) $1.0 \times 10^6 \text{ s}^{-1}$ and 38.3 kJ mol^{-1}
- Q.32** The concentration of R in the reaction $\text{R} \rightarrow \text{P}$ was measured as a function of time and the following data is obtained :

t (min.)	0.0	0.05	0.12	0.18
[R](molar)	1.0	0.75	0.40	0.10

 The order of the reaction is –
 (1) 0 (2) 3
 (3) 2 (4) 1
- Q.33** For the elementary reaction $\text{M} \rightarrow \text{N}$, the rate of disappearance of M increases by a factor of 8 upon doubling the concentration of M. The order of the reaction with respect to M is –
 (1) 4 (2) 3
 (3) 2 (4) 1
- Q.34** In a reaction $2\text{HI} \rightarrow \text{H}_2 + \text{I}_2$, 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 ?
 (1) $5 \times 10^{-3} \text{ M min}^{-1}$ (2) $2.5 \times 10^{-3} \text{ M min}^{-1}$
 (3) $5 \times 10^{-2} \text{ M min}^{-1}$ (4) $2.5 \times 10^{-2} \text{ M min}^{-1}$
- Q.35** 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
 (1) Colliding molecules could be large in size.
 (2) The colliding molecules must not be properly oriented for effective collisions.
 (3) The rate of reaction could be independent of the energy.
 (4) One of the reactants could be in excess.

Q.36 A plot of $\log(a - x)$ against time t is a straight line. This indicates that the reaction is of

- (1) Zero order (2) First order
(3) Second order (4) Third order

Q.37 Which of the following statements is not correct for the catalyst ?

- (1) It catalyses the forward and backward reaction to the same extent.
(2) It alters ΔG of the reaction.
(3) It is a substance that does not change the equilibrium constant of a reaction.
(4) It provides an alternate mechanism by reducing activation energy between reactants and products.

Q.38 Consider the reaction : $2\text{N}_2\text{O}_4 \rightleftharpoons 4\text{NO}_2$.

If $-\frac{d[\text{N}_2\text{O}_4]}{dt} = k$ and $\frac{d[\text{NO}_2]}{dt} = k'$ then

- (1) $2k' = k$ (2) $k' = 2k$
(3) $k' = k$ (4) $k = \frac{1}{2}k'$

Q.39 In the presence of a catalyst, the heat evolved or absorbed during the reaction –

- (1) Increases
(2) Decreases
(3) Remains unchanged
(4) May increase or decrease

Q.40 Which of the following statements is not correct?

- (1) For a zero order reaction, $t_{1/2}$ is proportional to initial concentration
(2) The relationship of variation of rate constant with temperature is given by

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

- (3) The unit of rate constant for a reaction is $\text{mol}^{1-n} \text{L}^{n-1} \text{s}^{-1}$ where n is order of the reaction.
(4) The unit of rate of reaction changes with order of reaction.

Q.41 Consider a first order gas phase decomposition reaction : $\text{A}_{(g)} \rightarrow \text{B}_{(g)} + \text{C}_{(g)}$

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 become ' p_t '. The rate constant k for the reaction is given as

$$(1) k = \frac{2.303}{t} \log \frac{p_i}{p_i - x}$$

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

$$(3) k = \frac{2.303}{t} \log \frac{p_i}{2p_i + p_t}$$

$$(4) k = \frac{2.303}{t} \log \frac{p_i}{p_i + x}$$

Q.42 For a first order reaction $\text{A} \rightarrow \text{B}$ the reaction rate at reactant concentration of 0.01M is found to be $2.0 \times 10^{-5} \text{ mol L}^{-1}\text{S}^{-1}$. The half life period of the reaction is –

- (1) 30s (2) 220s
(3) 300s (4) 347s

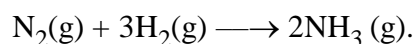
Q.43 The rate of reaction between two reactants A and B decreases by a factor of 4 if the concentration of reactant B is doubled. The order of this reaction with respect to reactant B is –

- (1) 2 (2) – 2
(3) 1 (4) – 1

Q.44 For the reaction $2\text{A} + \text{B} \rightarrow 3\text{C} + \text{D}$, which of the following does not express the reaction rate

- (1) $-\frac{d[\text{B}]}{dt}$ (2) $\frac{d[\text{D}]}{dt}$
(3) $-\frac{1}{2} \frac{d[\text{A}]}{dt}$ (4) $-\frac{1}{3} \frac{d[\text{C}]}{dt}$

Q.45 Consider the reaction :



The equality relationship between

$\frac{d[\text{NH}_3]}{dt}$ and $-\frac{d[\text{H}_2]}{dt}$ is –

$$(1) +\frac{d[\text{NH}_3]}{dt} = -\frac{2}{3} \frac{d[\text{H}_2]}{dt}$$

$$(2) +\frac{d[\text{NH}_3]}{dt} = -\frac{3}{2} \frac{d[\text{H}_2]}{dt}$$

$$(3) \frac{d[\text{NH}_3]}{dt} = -\frac{d[\text{H}_2]}{dt}$$

$$(4) \frac{d[\text{NH}_3]}{dt} = -\frac{1}{3} \frac{d[\text{H}_2]}{dt}$$