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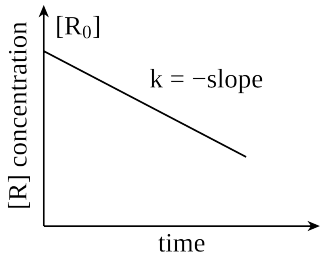
# NEET CHEMICAL KINETICS — PYQS

**Max. Marks:** 300 **Questions:** 75

## Section A (MCQ) — 75 questions

**Q.1** For a certain reaction R →
Product, the plot of concentration [R] vs time has a negative slope as shown. The order of reaction is :

[NEET (UG) 2026]




(1) 1 (2) 2.5 (3) 2 (4) 0

Scan or tap for the full solution

**Q.2** Given below is an expression for the rate constant of a first-order reaction occurring at a certain temperature, T (K).

$$\ln k = 14.34 - \frac{1.25 \times 10^4}{T}$$

The energy of activation in kcal $mol^{-1}$ for the reaction is :
(Given : k in $s^{-1}$, R = 1.987 cal $mol^{-1}$ $K^{-1}$)

[NEET (UG) 2026]

(1) 12.42 (2) 18.63 (3) 14.34 (4) 24.84

Scan or tap for the full solution

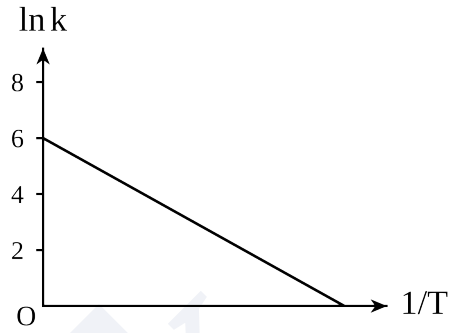
**Q.3** Match **List-I** with **List-II** : [NEET (UG) 2026]

| List-I (Order of reaction) | | List-II (Unit of rate constant) | |
|---|---|---|---|
| A. | Zero order | I. | $mol^{-1}$ L $s^{-1}$ |
| B. | First order | II. | $mol^{-2}$ $L^2$ $s^{-1}$ |
| C. | Second order | III. | $s^{-1}$ |
| D. | Third order | IV. | mol $L^{-1}$ $s^{-1}$ |

(1) A-IV, B-III, C-II, D-I
(2) A-IV, B-III, C-I, D-II
(3) A-I, B-II, C-III, D-IV
(4) A-IV, B-II, C-I, D-III

Solution

**Q.4** For an elementary chemical reaction, the Arrhenius plot is given below.




If the energy of activation is 6.64 kJ $mol^{-1}$ and R = 8.3 J $K^{-1}$ $mol^{-1}$, the temperature at which the rate constant becomes $e^2$ $min^{-1}$, is

[RE-NEET (UG) 2026]

(1) 250 K (2) 125 K (3) 150 K (4) 200 K

Scan or tap for the full solution

**Q.5** $2A \xrightarrow{k} B$ is a zero-order reaction, where k = 1.0 mol $L^{-1}$ $min^{-1}$. If the initial concentration of A is 2 M, then the time taken to complete 75% of the reaction will be [RE-NEET (UG) 2026]

(1) 2.0 min (2) 1.5 min
(3) 0.75 min (4) 1.0 min

Scan or tap for the full solution

**Q.6** If the rate constant of a reaction is 0.03 $s^{-1}$, how much time does it take for 7.2 mol $L^{-1}$ concentration of the reactant to get reduced to 0.9 mol $L^{-1}$ ? (Given: $\log 2 = 0.301$)

[NEET (UG) 2025]

(1) 210 s (2) 21.0 s (3) 69.3 s (4) 23.1 s

Scan or tap for the full solution

**Q.7** If the half-life ($t_{1/2}$) for a first order reaction is 1 minute, then the time required for 99.9% completion of the reaction is closest to :

[NEET (UG) 2025]

(1) 5 minutes (2) 10 minutes
(3) 2 minutes (4) 4 minutes

Scan or tap for the full solution

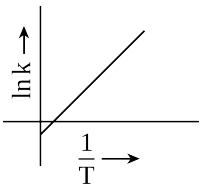
**Q.8** Activation energy of any chemical reaction can be calculated if one knows the value of

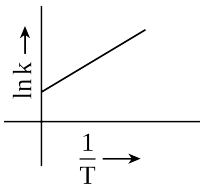
[NEET (UG) 2024]

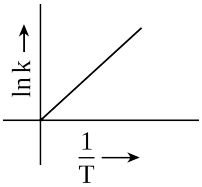
(1) rate constant at standard temperature
(2) probability of collision
(3) orientation of reactant molecules during collision
(4) rate constant at two different temperatures

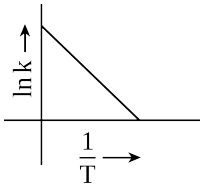
Scan or tap for the full solution

**Q.9** Which plot of $\ln k$ vs $\frac{1}{T}$ is consistent with Arrhenius equation? [NEET (UG) 2024]

(1) 


(2) 


(3) 


(4) 


Scan or tap for the full solution

**Q.10** The rate of a reaction quadruples when temperature changes from 27°C to 57°C. Calculate the energy of activation.
Given R = 8.314 J $K^{-1}$ $mol^{-1}$, $\log 4 = 0.6021$

[NEET (UG) 2024]

(1) 38.04 kJ/mol (2) 380.4 kJ/mol
(3) 3.80 kJ/mol (4) 3804 kJ/mol

Scan or tap for the full solution

**Q.11** Following data is for a reaction between reactants A and B :

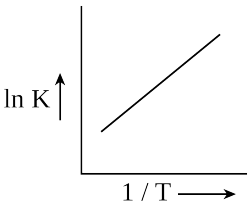
| **Rate** ($mol\,L^{-1}\,s^{-1}$) | [A] | [B] |
|---|---|---|
| $2 \times 10^{-3}$ | 0.1 M | 0.1 M |
| $4 \times 10^{-3}$ | 0.2 M | 0.1 M |
| $1.6 \times 10^{-2}$ | 0.2 M | 0.2 M |

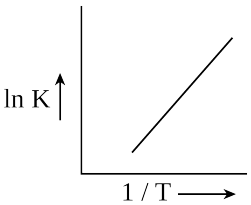
The order of the reaction with respect to A and B, respectively, are [RE-NEET (UG) 2024]

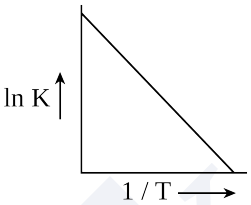
(1) 1, 0 (2) 0, 1 (3) 1, 2 (4) 2, 1

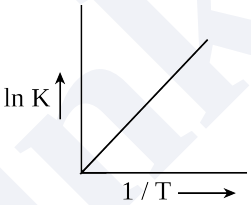
Scan or tap for the full solution

**Q.12** Which of the following plot represents the variation of $\ln k$ versus $\frac{1}{T}$ in accordance with Arrhenius equation? [RE-NEET (UG) 2024]

(1) 


(2) 


(3) 


(4) 


Scan or tap for the full solution

**Q.13** Rate constants of a reaction at 500 K and 700 K are 0.04 $s^{-1}$ and 0.14 $s^{-1}$, respectively; then, activation energy of the reaction is :
(Given: $\log 3.5 = 0.5441$, R = 8.31 J $K^{-1}$ $mol^{-1}$)

[RE-NEET (UG) 2024]

(1) 182310 J (2) 18500 J
(3) 18219 J (4) 18030 J

Scan or tap for the full solution

**Q.14** For a certain reaction, the rate = $k[A]^2[B]$, when the initial concentration of A is tripled keeping concentration of B constant, the initial rate would [NEET (UG) 2023]

(1) increase by a factor of six
(2) increase by a factor of nine
(3) increase by a factor of three
(4) decrease by a factor of nine

Solution

**Q.15** Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
**Assertion (A):** A reaction can have zero activation energy.
**Reason (R):** The minimum extra amount of energy absorbed by reactant molecules so that their energy becomes equal to threshold value, is called activation energy.

In the light of the above statements, choose the correct answer from the options given below:

[NEET (UG) 2023]

(1) Both A and R are true but R is NOT the correct explanation of A.

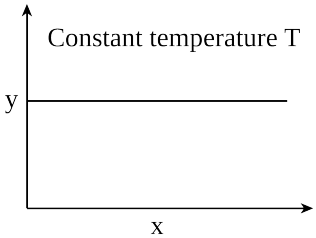
(2) A is true but R is false.

(3) A is false but R is true.

(4) Both A and R are true and R is the correct explanation of A.

Scan or tap for the full solution

**Q.16** The given graph is a representation of kinetics of a reaction




The y and x axes for zero and first order reactions, respectively are [NEET (UG) 2022]

(1) zero order (y = concentration and x = time), first order (y = $t_{1/2}$ and x = concentration)

(2) zero order (y = concentration and x = time), first order (y = rate constant and x = concentration)

(3) zero order (y = rate and x = concentration), first order (y = $t_{1/2}$ and x = concentration)

(4) zero order (y = rate and x = concentration), first order (y = rate and x = $t_{1/2}$)

Scan or tap for the full solution

**Q.17** For a first order reaction $A \longrightarrow \text{Products}$, initial concentration of A is 0.1 M, which becomes 0.001 M after 5 minutes. Rate constant for the reaction in $min^{-1}$ is [NEET (UG) 2022]

(1) 1.3818 (2) 0.9212 (3) 0.4606 (4) 0.2303

Scan or tap for the full solution

**Q.18** The half life of a first order reaction is 2000 years. If the concentration after 8000 years is 0.02 M, then the initial concentration was :

[NEET (UG) 2022 (Phase 2)]

(1) 0.04 M (2) 0.16 M (3) 0.32 M (4) 0.08 M

Scan or tap for the full solution

**Q.19** For a chemical reaction

$4A + 3B \longrightarrow 6C + 9D$

Rate of formation of C is $6 \times 10^{-2}$ mol $L^{-1}$ $s^{-1}$ and rate of disappearance of A is $4 \times 10^{-2}$ mol $L^{-1}$ $s^{-1}$. The rate of reaction and amount of B consumed in interval of 10 seconds, respectively will be :

[NEET (UG) 2022 (Phase 2)]

(1) $10 \times 10^{-2}$ mol $L^{-1}$ $s^{-1}$ and $30 \times 10^{-2}$ mol $L^{-1}$

(2) $1 \times 10^{-2}$ mol $L^{-1}$ $s^{-1}$ and $30 \times 10^{-2}$ mol $L^{-1}$

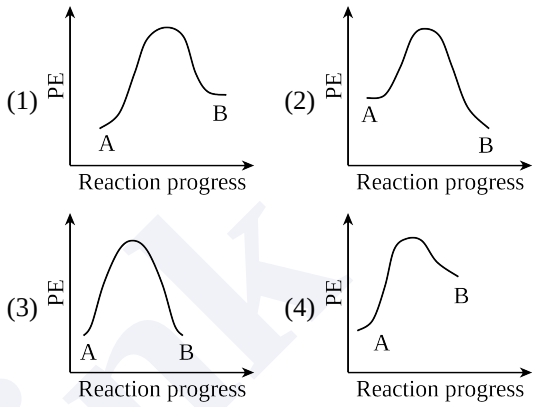
(3) $10 \times 10^{-2}$ mol $L^{-1}$ $s^{-1}$ and $10 \times 10^{-2}$ mol $L^{-1}$

(4) $1 \times 10^{-2}$ mol $L^{-1}$ $s^{-1}$ and $10 \times 10^{-2}$ mol $L^{-1}$

Scan or tap for the full solution

**Q.20** For a reaction, $A \longrightarrow B$, enthalpy of reaction is $-4.2$ kJ $mol^{-1}$ and enthalpy of activation is 9.6 kJ $mol^{-1}$. The correct potential energy profile for the reaction is shown in option.

[NEET (UG) 2021]




Scan or tap for the full solution

**Q.21** The slope of Arrhenius plot $\left(\ln k \text{ v/s } \frac{1}{T}\right)$ of first order reaction is $-5 \times 10^3$ K. The value of $E_a$ of the reaction is. Choose the correct option for your answer.

[Given R = 8.314 J $K^{-1}$ $mol^{-1}$] [NEET (UG) 2021]

(1) $-83$ kJ $mol^{-1}$ (2) 41.5 kJ $mol^{-1}$

(3) 83.0 kJ $mol^{-1}$ (4) 166 kJ $mol^{-1}$

Scan or tap for the full solution

**Q.22** An increase in the concentration of the reactants of a reaction leads to change in : [NEET (UG) 2020]

(1) heat of reaction (2) threshold energy

(3) collision frequency (4) activation energy

Scan or tap for the full solution

**Q.23** The rate constant for a first order reaction is $4.606 \times 10^{-3}$ $s^{-1}$. The time required to reduce 2.0 g of the reactant to 0.2 g is : [NEET (UG) 2020]

(1) 200 s (2) 500 s (3) 1000 s (4) 100 s

Scan or tap for the full solution

**Q.24** If the rate constant for a first order reaction is k, the time (t) required for the completion of 99 % of the reaction is given by : [NEET (UG) 2019]

(1) $t = \frac{4.606}{k}$ (2) $t = \frac{2.303}{k}$

(3) $t = \frac{0.693}{k}$ (4) $t = \frac{6.909}{k}$

Scan or tap for the full solution

**Q.25** For the chemical reaction
$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
the correct option is : [NEET (UG) 2019]

(1) $-\frac{d[N_2]}{dt} = 2\frac{d[NH_3]}{dt}$

(2) $-\frac{d[N_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$

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

(4) $-\frac{1}{3}\frac{d[H_2]}{dt} = -\frac{1}{2}\frac{d[NH_3]}{dt}$

Scan or tap for the full solution

**Q.26** The correct difference between first and second order reactions is that [NEET 2018]

(1) the rate of a first-order reaction does not depend on reactant concentrations; the rate of a second-order reaction does depend on reactant concentrations

(2) the half-life of a first-order reaction does not depend on $[A]_0$; the half-life of a second order reaction does depend on $[A]_0$

(3) a first-order reaction can be catalysed; a second-order reaction cannot be catalysed

(4) the rate of a first-order reaction does depend on reactant concentrations; the rate of a second-order reaction does not depend on reactant concentrations

Scan or tap for the full solution

**Q.27** When initial concentration of the reactant is doubled, the half-life period of a zero order reaction [NEET 2018]

(1) is halved (2) is doubled

(3) is tripled (4) remains unchanged.

Scan or tap for the full solution

**Q.28** Mechanism of a hypothetical reaction
$X_2 + Y_2 \longrightarrow 2XY$, is given below :

(i) $X_2 \rightleftharpoons X + X$ (fast) (ii) $X + Y_2 \longrightarrow XY + Y$ (slow)

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

The overall order of the reaction will be [NEET 2017]

(1) 2 (2) 0 (3) 1.5 (4) 1

Scan or tap for the full solution

**Q.29** A first order reaction has a specific reaction rate of $10^{-2}$ $sec^{-1}$. How much time will it take for 20 g of the reactant to reduce to 5 g? [NEET 2017]

(1) 138.6 sec (2) 346.5 sec

(3) 693.0 sec (4) 238.6 sec

Scan or tap for the full solution

**Q.30** The rate of first-order reaction is 0.04 mol $L^{-1}$ $s^{-1}$ at 10 seconds and 0.03 mol $L^{-1}$ $s^{-1}$ at 20 seconds after initiation of the reaction. The half-life period of the reaction is [NEET 2016 (Phase 1)]

(1) 44.1 s (2) 54.1 s (3) 24.1 s (4) 34.1 s

Scan or tap for the full solution

**Q.31** The addition of a catalyst during a chemical reaction alters which of the following quantities? [NEET 2016 (Phase 1)]

(1) Enthalpy (2) Activation energy

(3) Entropy (4) Internal energy

Scan or tap for the full solution

**Q.32** The decomposition of phosphine ($PH_3$) on tungsten at low pressure is a first-order reaction. It is because the [NEET 2016 (Phase 2)]

(1) rate is proportional to the surface coverage

(2) rate is inversely proportional to the surface coverage

(3) rate is independent of the surface coverage

(4) rate of decomposition is very slow.

Scan or tap for the full solution

**Q.33** The rate constant of the reaction $A \longrightarrow B$ is $0.6 \times 10^{-3}$ mol $L^{-1}$ $s^{-1}$. If the concentration of A is 5 M, then concentration of B after 20 minutes is [AIPMT 2015]

(1) 3.60 M (2) 0.36 M (3) 0.72 M (4) 1.08 M

Scan or tap for the full solution

**Q.34** The activation energy of a reaction can be determined from the slope of which of the following graphs? [AIPMT 2015 (Cancelled)]

(1) $\ln k$ vs. $\frac{1}{T}$ (2) $\frac{T}{\ln k}$ vs. $\frac{1}{T}$

(3) $\ln k$ vs. T (4) $\frac{\ln k}{T}$ vs. T

Scan or tap for the full solution

**Q.35** When initial concentration of a reactant is doubled in a reaction, its half-life period is not affected. The order of the reaction is [AIPMT 2015 (Cancelled)]

(1) second

(2) more than zero but less than first

(3) zero

(4) first.

Solution

**Q.36** A reaction having equal energies of activation for forward and reverse reactions has [NEET 2013]

(1) $\Delta H = 0$ (2) $\Delta H = \Delta G = \Delta S = 0$

(3) $\Delta S = 0$ (4) $\Delta G = 0$

Scan or tap for the full solution

**Q.37** What is the activation energy for a reaction if its rate doubles when the temperature is raised from 20°C to 35°C?

($R = 8.314\ J\ mol^{-1}\ K^{-1}$) [NEET 2013]

(1) 34.7 kJ $mol^{-1}$ (2) 15.1 kJ $mol^{-1}$

(3) 342 kJ $mol^{-1}$ (4) 269 kJ $mol^{-1}$

Scan or tap for the full solution

**Q.38** For a reaction between A and B the order with respect to A is 2 and the order with respect to B is 3. The concentrations of both A and B are doubled, the rate will increase by a factor of

[NEET 2013 (Karnataka)]

(1) 12 (2) 16 (3) 32 (4) 10

Scan or tap for the full solution

**Q.39** A reaction is 50% complete in 2 hours and 75% complete in 4 hours. The order of reaction is

[NEET 2013 (Karnataka)]

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

Scan or tap for the full solution

**Q.40** Activation energy ($E_a$) and rate constants ($k_1$ and $k_2$) of a chemical reaction at two different temperatures ($T_1$ and $T_2$) are related by

[AIPMT 2012 (Mains)]

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

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

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

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

Scan or tap for the full solution

**Q.41** In a reaction, $A + B \longrightarrow \text{product}$, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled, rate law for the reaction can be written as

[AIPMT 2012 (Prelims)]

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

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

Scan or tap for the full solution

**Q.42** In a zero-order reaction, for every 10°C rise of temperature, the rate is doubled. If the temperature is increased from 10°C to 100°C, the rate of the reaction will become [AIPMT 2012 (Prelims)]

(1) 256 times (2) 512 times

(3) 64 times (4) 128 times

Scan or tap for the full solution

**Q.43** The rate of the reaction: $2N_2O_5 \longrightarrow 4NO_2 + O_2$ can be written in three ways.

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

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

The relationship between k and k' and between k and k'' are [AIPMT 2011 (Mains)]

(1) k' = 2k; k'' = k (2) k' = 2k; k'' = k/2

(3) k' = 2k; k'' = 2k (4) k' = k; k'' = k

Scan or tap for the full solution

**Q.44** The unit of rate constant for a zero order reaction is

[AIPMT 2011 (Mains)]

(1) mol $L^{-1}\ s^{-1}$ (2) L $mol^{-1}\ s^{-1}$

(3) $L^2\ mol^{-2}\ s^{-1}$ (4) $s^{-1}$

Scan or tap for the full solution

**Q.45** The half-life of a substance in a certain enzyme-catalysed reaction is 138 s. The time required for the concentration of the substance to fall from 1.28 mg $L^{-1}$ to 0.04 mg $L^{-1}$ is

[AIPMT 2011 (Mains)]

(1) 414 s (2) 552 s (3) 690 s (4) 276 s

Scan or tap for the full solution

**Q.46** Which one of the following statements for the order of a reaction is incorrect? [AIPMT 2011 (Prelims)]

(1) Order can be determined only experimentally.

(2) Order is not influenced by stoichiometric coefficient of the reactants.

(3) Order of a reaction is sum of power to the concentration terms of reactants to express the rate of reaction.

(4) Order of reaction is always whole number.

Scan or tap for the full solution

**Q.47** The rate of the reaction, $2NO + Cl_2 \longrightarrow 2NOCl$ is given by the rate equation rate = $k[NO]^2[Cl_2]$. The value of the rate constant can be increased by [AIPMT 2010 (Mains)]

(1) increasing the temperature

(2) increasing the concentration of NO

(3) increasing the concentration of the $Cl_2$

(4) doing all of these.

Scan or tap for the full solution

**Q.48** For an endothermic reaction, energy of activation is $E_a$ and enthalpy of reaction is $\Delta H$ (both of these in kJ/mol). Minimum value of $E_a$ will be [AIPMT 2010 (Prelims)]

(1) less than $\Delta H$ (2) equal to $\Delta H$

(3) more than $\Delta H$ (4) equal to zero

Scan or tap for the full solution

**Q.49** For the reaction $N_2O_5(g) \longrightarrow 2NO_2(g) + \frac{1}{2}O_2(g)$ the value of rate of disappearance of $N_2O_5$ is given as $6.25 \times 10^{-3}$ mol $L^{-1}$ $s^{-1}$. The rate of formation of $NO_2$ and $O_2$ is given respectively as [AIPMT 2010 (Prelims)]

(1) $6.25 \times 10^{-3}$ mol $L^{-1}$ $s^{-1}$ and $6.25 \times 10^{-3}$ mol $L^{-1}$ $s^{-1}$

(2) $1.25 \times 10^{-2}$ mol $L^{-1}$ $s^{-1}$ and $3.125 \times 10^{-3}$ mol $L^{-1}$ $s^{-1}$

(3) $6.25 \times 10^{-3}$ mol $L^{-1}$ $s^{-1}$ and $3.125 \times 10^{-3}$ mol $L^{-1}$ $s^{-1}$

(4) $1.25 \times 10^{-2}$ mol $L^{-1}$ $s^{-1}$ and $6.25 \times 10^{-3}$ mol $L^{-1}$ $s^{-1}$

Solution

**Q.50** During the kinetic study of the reaction, $2A + B \longrightarrow C + D$, following results were obtained

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

Based on the above data which one of the following is correct? [AIPMT 2010 (Prelims)]

(1) Rate = $k[A]^2[B]$ (2) Rate = $k[A][B]$

(3) Rate = $k[A]^2[B]^2$ (4) Rate = $k[A][B]^2$

Scan or tap for the full solution

**Q.51** For the reaction, $N_2 + 3H_2 \longrightarrow 2NH_3$, if $\frac{d[NH_3]}{dt} = 2 \times 10^{-4}$ mol $L^{-1}$ $s^{-1}$, the value of $\frac{-d[H_2]}{dt}$ would be [AIPMT 2009]

(1) $4 \times 10^{-4}$ mol $L^{-1}$ $s^{-1}$ (2) $6 \times 10^{-4}$ mol $L^{-1}$ $s^{-1}$

(3) $1 \times 10^{-4}$ mol $L^{-1}$ $s^{-1}$ (4) $3 \times 10^{-4}$ mol $L^{-1}$ $s^{-1}$

Scan or tap for the full solution

**Q.52** In the reaction,

$BrO^-_{3(aq)} + 5Br^-_{(aq)} + 6H^+ \longrightarrow 3Br_{2(l)} + 3H_2O_{(l)}$.

The rate of appearance of bromine ($Br_2$) is related to rate of disappearance of bromide ions as [AIPMT 2009]

(1) $\frac{d[Br_2]}{dt} = -\frac{5}{3}\frac{d[Br^-]}{dt}$

(2) $\frac{d[Br_2]}{dt} = \frac{5}{3}\frac{d[Br^-]}{dt}$

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

(4) $\frac{d[Br_2]}{dt} = -\frac{3}{5}\frac{d[Br^-]}{dt}$

Scan or tap for the full solution

**Q.53** Half-life period of a first order reaction is 1386 s. The specific rate constant of the reaction is [AIPMT 2009]

(1) $0.5 \times 10^{-2}$ $s^{-1}$ (2) $0.5 \times 10^{-3}$ $s^{-1}$

(3) $5.0 \times 10^{-2}$ $s^{-1}$ (4) $5.0 \times 10^{-3}$ $s^{-1}$

Scan or tap for the full solution

**Q.54** For the reaction $A + B \longrightarrow$ products, it is observed that

(i) on doubling the initial concentration of A only, the rate of reaction is also doubled and

(ii) on doubling the initial concentration of both A and B, there is a change by a factor of 8 in the rate of the reaction.

The rate of this reaction is given by [AIPMT 2009]

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

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

Scan or tap for the full solution

**Q.55** The rate constants $k_1$ and $k_2$ for two different reactions are $10^{16} \cdot e^{-2000/T}$ and $10^{15} \cdot e^{-1000/T}$, respectively.

The temperature at which $k_1 = k_2$ is [AIPMT 2008]

(1) 2000 K (2) $\frac{1000}{2.303}$ K

(3) 1000 K (4) $\frac{2000}{2.303}$ K

Scan or tap for the full solution

**Q.56** The bromination of acetone that occurs in acid solution is represented by this equation.

$CH_3COCH_3(aq) + Br_2(aq) \longrightarrow CH_3COCH_2Br(aq) + H^+(aq) + Br^-(aq)$

These kinetic data were obtained for given reaction concentrations.

| $[CH_3COCH_3]$, M | $[Br_2]$, M | $[H^+]$, M | Initial rate, disappearance of $Br_2$, $M\,s^{-1}$ |
|---|---|---|---|
| 0.30 | 0.05 | 0.05 | $5.7 \times 10^{-5}$ |
| 0.30 | 0.10 | 0.05 | $5.7 \times 10^{-5}$ |
| 0.30 | 0.10 | 0.10 | $1.2 \times 10^{-4}$ |
| 0.40 | 0.05 | 0.20 | $3.1 \times 10^{-4}$ |

Based on these data, the rate equation is [AIPMT 2008]

(1) Rate = $k[CH_3COCH_3][Br_2][H^+]^2$

(2) Rate = $k[CH_3COCH_3][Br_2][H^+]$

(3) Rate = $k[CH_3COCH_3][H^+]$

(4) Rate = $k[CH_3COCH_3][Br_2]$

Solution

**Q.57** If 60% of a first order reaction was completed in 60 minutes, 50% of the same reaction would be completed in approximately (log 4 = 0.60, log 5 = 0.70) [AIPMT 2007]

(1) 45 minutes (2) 60 minutes

(3) 40 minutes (4) 50 minutes

Scan or tap for the full solution

**Q.58** In a first-order reaction $A \longrightarrow B$, if k is rate constant and initial concentration of the reactant A is 0.5 M, then the half-life is [AIPMT 2007]

(1) $\frac{\log 2}{k}$ (2) $\frac{\log 2}{k\sqrt{0.5}}$

(3) $\frac{\ln 2}{k}$ (4) $\frac{0.693}{0.5k}$

Scan or tap for the full solution

**Q.59** The reaction of hydrogen and iodine monochloride is given as:

$H_{2(g)} + 2ICl_{(g)} \longrightarrow 2HCl_{(g)} + I_{2(g)}$

This reaction is of first order with respect to $H_{2(g)}$ and $ICl_{(g)}$. The following mechanisms were proposed.

Mechanism A:

$H_{2(g)} + 2ICl_{(g)} \longrightarrow 2HCl_{(g)} + I_{2(g)}$

Mechanism B:

$H_{2(g)} + ICl_{(g)} \longrightarrow HCl_{(g)} + HI_{(g)}$ ; slow

$HI_{(g)} + ICl_{(g)} \longrightarrow HCl_{(g)} + I_{2(g)}$ ; fast

Which of the above mechanism(s) can be consistent with the given information about the reaction? [AIPMT 2007]

(1) A and B both (2) Neither A nor B

(3) A only (4) B only

Scan or tap for the full solution

**Q.60** Consider the reaction : $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$

The equality relationship between $\frac{d[NH_3]}{dt}$ and $-\frac{d[H_2]}{dt}$ is [AIPMT 2006]

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

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

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

(4) $+\frac{d[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$

Scan or tap for the full solution

**Q.61** For the reaction, $2A + B \longrightarrow 3C + D$, which of the following does not express the reaction rate? [AIPMT 2006]

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

Scan or tap for the full solution

**Q.62** 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 [AIPMT 2005]

(1) 2 (2) −2 (3) 1 (4) −1

Scan or tap for the full solution

**Q.63** For a first order reaction $A \longrightarrow B$ the reaction rate at reactant concentration of 0.01 M is found to be $2.0 \times 10^{-5}$ mol $L^{-1}$ $s^{-1}$. The half-life period of the reaction is [AIPMT 2005]

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

Scan or tap for the full solution

**Q.64** The rate of a first order reaction is $1.5 \times 10^{-2}$ mol $L^{-1}$ $min^{-1}$ at 0.5 M concentration of the reactant. The half-life of the reaction is [AIPMT 2004]

(1) 0.383 min (2) 23.1 min

(3) 8.73 min (4) 7.53 min

Scan or tap for the full solution

**Q.65** The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation, $k = A \cdot e^{-E^*/RT}$. Activation energy ($E^*$) of the reaction can be calculated by plotting [AIPMT 2003]

(1) k vs T
(2) k vs $\frac{1}{\log T}$
(3) log k vs $\frac{1}{T}$
(4) log k vs $\frac{1}{\log T}$

Scan or tap for the full solution

**Q.66** If the rate of the reaction is equal to the rate constant, the order of the reaction is [AIPMT 2003]

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

Scan or tap for the full solution

**Q.67** The reaction $A \longrightarrow B$ follows first order kinetics. The time taken for 0.8 mole of A to produce 0.6 mole of B is 1 hour. What is the time taken for conversion of 0.9 mole of A to produce 0.675 mole of B? [AIPMT 2003]

(1) 1 hour
(2) 0.5 hour
(3) 0.25 hour
(4) 2 hours

Scan or tap for the full solution

**Q.68** The activation energy for a simple chemical reaction $A \rightleftharpoons B$ is $E_a$ in forward direction. The activation energy for reverse reaction [AIPMT 2003]

(1) is negative of $E_a$
(2) is always less than $E_a$
(3) can be less than or more than $E_a$
(4) is always double of $E_a$

Solution

**Q.69** The radioisotope, tritium ($_1^3H$) has a half-life of 12.3 years. If the initial amount of tritium is 32 mg, how many milligrams of it would remain after 49.2 years? [AIPMT 2003]

(1) 1 mg (2) 2 mg (3) 4 mg (4) 8 mg

Scan or tap for the full solution

**Q.70** $2A \longrightarrow B + C$

It would be a zero order reaction when [AIPMT 2002]

(1) the rate of reaction is proportional to square of concentration of A
(2) the rate of reaction remains same at any concentration of A
(3) the rate remains unchanged at any concentration of B and C
(4) the rate of reaction doubles if concentration of B is increased to double

Scan or tap for the full solution

**Q.71** When a bio-chemical reaction is carried out in laboratory, outside the human body in absence of enzyme, then rate of reaction obtained is $10^{-6}$ times, the activation energy of reaction in the presence of enzyme is [AIPMT 2001]

(1) 6/RT
(2) P is required
(3) different from $E_a$ obtained in laboratory
(4) can't say anything.

Scan or tap for the full solution

**Q.72** For the reaction;

$2N_2O_5 \longrightarrow 4NO_2 + O_2$ rate and rate constant are $1.02 \times 10^{-4}$ and $3.4 \times 10^{-5}$ $s^{-1}$ respectively, then concentration of $N_2O_5$ at that time will be [AIPMT 2001]

(1) 1.732
(2) 3
(3) $1.02 \times 10^{-4}$
(4) $3.4 \times 10^{5}$

Scan or tap for the full solution

**Q.73** A human body required 0.01 m activity of radioactive substance after 24 hours. Half life of radioactive substance is 6 hours. Then injection of maximum activity of radioactive substance that can be injected is [AIPMT 2001]

(1) 0.08 (2) 0.04 (3) 0.16 (4) 0.32

Scan or tap for the full solution

**Q.74** For the reaction

$6H^+ + BrO_3^- + 5Br^- \longrightarrow 3Br_2 + 3H_2O$

which of the following relation correctly represents the consumption and formation of products. [AIPMT 2000]

(1) $\frac{d[Br_2]}{dt} = -\frac{3}{5}\frac{d[Br^-]}{dt}$
(2) $\frac{d[Br_2]}{dt} = \frac{3}{5}\frac{d[Br^-]}{dt}$
(3) $\frac{d[Br_2]}{dt} = -\frac{5}{3}\frac{d[Br^-]}{dt}$
(4) $\frac{d[Br_2]}{dt} = \frac{5}{3}\frac{d[Br^-]}{dt}$

Scan or tap for the full solution

**Q.75** A 300 g radioactive sample has a half-life of 3 hours. After 18 hours, the remaining quantity is [AIPMT 2000]

(1) 4.68 g (2) 2.34 g (3) 3.34 g (4) 9.37 g

Scan or tap for the full solution

## ANSWER KEY

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ques.** | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Ans.** | **4** | **4** | **2** | **4** | **3** | **3** | **2** |
| **Ques.** | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| **Ans.** | **4** | **4** | **1** | **3** | **3** | **3** | **2** |
| **Ques.** | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| **Ans.** | **3** | **3** | **2** | **3** | **2** | **2** | **2** |
| **Ques.** | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| **Ans.** | **3** | **2** | **1** | **2** | **2** | **2** | **3** |
| **Ques.** | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| **Ans.** | **1** | **3** | **2** | **1** | **3** | **1** | **4** |
| **Ques.** | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| **Ans.** | **1** | **1** | **3** | **1** | **2, 4** | **4** | **2** |
| **Ques.** | 43 | 44 | 45 | 46 | 47 | 48 | 49 |
| **Ans.** | **2** | **1** | **3** | **4** | **1** | **3** | **2** |
| **Ques.** | 50 | 51 | 52 | 53 | 54 | 55 | 56 |
| **Ans.** | **4** | **4** | **4** | **2** | **2** | **2** | **3** |
| **Ques.** | 57 | 58 | 59 | 60 | 61 | 62 | 63 |
| **Ans.** | **1** | **3** | **4** | **3** | **2** | **2** | **4** |
| **Ques.** | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| **Ans.** | **2** | **3** | **1** | **1** | **3** | **2** | **2** |
| **Ques.** | 71 | 72 | 73 | 74 | 75 | | |
| **Ans.** | **3** | **2** | **3** | **1** | **1** | | |

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