EdLoop JEE

CHEMISTRY · JEE MAIN

Chemical Kinetics

Previous Year Questions with answers

235 questions · **198** papers · **2002–2026** · newest paper first

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What is in this PDF: every Chemical Kinetics question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

Step-by-step solutions for every question are free in the EdLoop JEE app (Google Play) and on app.edloop.in. More chapters: pyq.edloop.in/free-pdfs/

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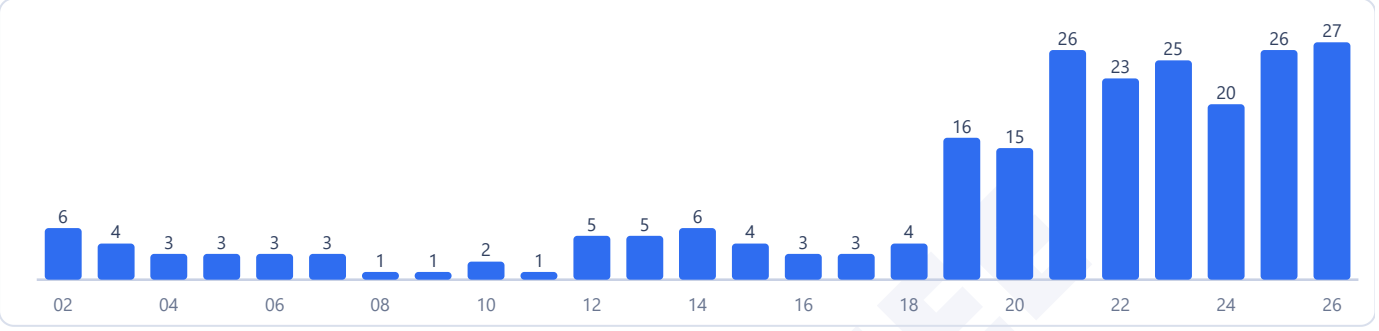
Chapter at a glance

3.9%	235	160 of 162	130 / 105
of Chemistry questions, 2019–2026	questions, 2002–2026	papers asked it, 2019–2026	MCQ / numerical, 2002–2026

Trend. Steady: 1.3 questions per paper in 2024–2026 against 1 in 2019–2023.

Questions per year



Counts are the questions we hold: 235 in 198 papers. No question in this chapter was found repeated across papers.

Most-asked topics in this chapter (2002–2026)

Integrated Rate Laws	**102**
Temperature Dependence & Mechanism	**75**
Rate of Reaction	**58**

How often it comes up

Chemical kinetics deals with reaction speeds and reaction mechanisms under Unit 8: Chemical Kinetics in the Class 12 curriculum, holding rank 10 of 31 chemistry chapters with a 3.9% share of all chemistry questions. In the 2019 to 2026 period, Chemical Kinetics accounted for 178 questions across 162 papers, holding a 3.9% share of all chemistry questions and ranking 10 of 31 chapters. During earlier testing between 2002 and 2018, it represented 57 questions across 38 papers with a 4.2% share. Looking at 2024 to 2026, the volume rose to 73 questions in 58 papers, taking a 4.7% subject share. The chapter's trajectory has trended up across recent shifts.

The topic has appeared every year from 2019 to 2026. Students routinely encounter at least one question per test, averaging 1.1 questions per paper across 2019 to 2026 and 1.3 per paper in the 2024 to 2026 window. Additionally, numerical value problems feature very heavily here: 105 numerical answer questions were presented between 2019 and 2026.

Most-asked topics

The syllabus divides into three core topics:

- Integrated Rate Laws: The single largest area with 102 total questions (82 in 2019 to 2026), examined up through 2026. Focus areas include first-order rate equations, half-life relationships, fractional life calculations, graphical plots of concentration versus time, and gaseous decomposition reactions using partial pressures.
- Temperature Dependence & Mechanism: Accounted for 75 total questions (59 in 2019 to 2026), continuing into 2026. This area centers on the Arrhenius equation, activation energy calculations, temperature coefficients, catalyst influences, and multi-step reaction mechanisms identifying the rate-determining step.
- Rate of Reaction: Comprises 58 total questions (37 in 2019 to 2026), asked up through 2026. Key ideas involve average and instantaneous rates, stoichiometric rate expressions, rate laws, and overall reaction order determination from experimental rate tables.

What the questions look like

Examiners present clear mathematical problems and conceptual graphs. A significant portion tests first-order kinetics, such as finding the time required for a specific percentage completion or linking rate constants to half-lives. Gaseous reactions requiring total pressure data at various times frequently appear in numerical answer sections.

Temperature dependence problems typically involve comparing rate constants at two different temperatures or determining activation energies via Arrhenius plots. Mechanism questions usually give elementary steps and ask students to deduce the composite rate law or the order with respect to individual reactants.

How to practise it

Mastering Chemical Kinetics requires fluency in logarithmic calculations and graph sketching:

1. Memorize integrated rate laws: Be confident writing integrated forms for zero-order, first-order, and general nth-order processes, including their respective half-life expressions and units of rate constants. 2. Practise gas-phase kinetics: Work out problems where partial pressures replace molar concentrations. Track pressure changes carefully using stoichiometric tables. 3. Master Arrhenius calculations: Review logarithmic properties and algebraic steps needed to solve for activation energy or temperature when ratios of rate constants are provided. 4. Interpret graphs quickly: Sketch standard curves such as concentration against time, log concentration against time, and log k against reciprocal temperature so you can extract slopes and intercepts without hesitation. 5. Solve numerical PYQs: With 105 numerical questions in 2019 to 2026, regular calculation practice prevents algebraic and rounding mistakes under time constraints.

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Q1 JEE Main 2026 · 8 Apr · Shift 2 MCQ

Given below are two statements :
$R = 8.314$ J K^{-1} mol^{-1} and 1 cal = 4.2 J

Statement I : When Ea = 12.6 kcal/mol, the room temperature rate constant is doubled by a 10 °C increase in temperature (298 K to 308 K)

Statement II : For a first order reactions A $\rightarrow$ B,

(see the figure above)

Here $[A]_o$ is the initial concentration of A and $t_{1/2}$ is half life of reaction.

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

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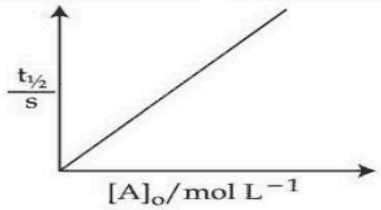


Here $[A]_o$ is the initial concentration of A and $t_{1/2}$ is half life of reaction.
In the light of the above statements, choose the **correct** answer from the options given below :

Options :

6911211980. Both **Statement I** and **Statement II** are true

6911211981. Both **Statement I** and **Statement II** are false

6911211982. **Statement I** is true but **Statement II** is false

6911211983. **Statement I** is false but **Statement II** is true

(A) Both **Statement I** and **Statement II** are true
(B) Both **Statement I** and **Statement II** are false
(C) **Statement I** is true but **Statement II** is false
(D) **Statement I** is false but **Statement II** is true

Answer: (C) Statement I is true but **Statement II** is false · Official NTA final key

Q2 JEE Main 2026 · 6 Apr · Shift 1 Numerical

Sucrose hydrolyses in acidic medium into glucose and fructose by first order rate law with $t_{1/2}$ = 3 hour. The percentage of sucrose remaining after 6 hours is _____. (Nearest integer)
(Given : log 2 = 0.3010 and log 3 = 0.4771)

Numerical value type: the answer is a number.

Answer: 25. · Official NTA final key

Q3 JEE Main 2026 · 6 Apr · Shift 2 Numerical

Decomposition of a hydrocarbon follows the equation $k = (5.5 \times 10^{11}\ s^{-1})\, e^{\frac{-28000\ K}{T}}$. The activation energy of reaction is _____ kJ mol^{-1}. (Nearest Integer)
Given : R = 8.3 J K^{-1} mol^{-1}

Numerical value type: the answer is a number.

Answer: 232. · Official NTA final key

Q4 JEE Main 2026 · 5 Apr · Shift 1 MCQ

First order gas phase reaction

$A \rightarrow B + C$

p_i = initial pressure of gas A, p_t = total pressure of the reaction mixture at time t

Expression of rate constant (k) is

(A) $\frac{1}{t} \ln \frac{p_i}{2p_i - p_t}$
(B) $\frac{1}{t} \ln \frac{2p_i}{p_i - p_t}$
(C) $\frac{1}{t} \ln \frac{p_i}{3p_i - 2p_t}$
(D) $\frac{1}{t} \ln \frac{3p_i}{4p_i - p_t}$

Answer: (A) $\frac{1}{t} \ln \frac{p_i}{2p_i - p_t}$ · Official NTA final key

Q5 JEE Main 2026 · 5 Apr · Shift 1 Numerical

If the half life of a first order reaction is 6.93 minutes then the time required for completion of 99% of the reaction will be _____ minutes .

(Given : $\log 2 = 0.3010$)

Numerical value type: the answer is a number.

Answer: 46. · Official NTA final key

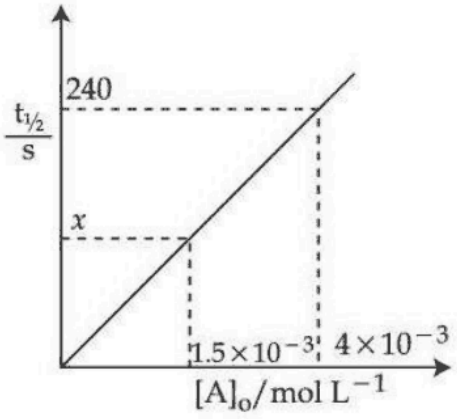
Q6 JEE Main 2026 · 5 Apr · Shift 2 Numerical

For a reaction $A \rightarrow P$ at T K, the half life ($t_{1/2}$) is plotted as a function of initial concentration $[A]_o$ of A as given below.

(see the figure above)

The value of x in the given figure is _____ s (Nearest integer)

For a reaction A → P at T K, the half life ($t_{1/2}$) is plotted as a function of initial concentration $[A]_o$ of A as given below.



The value of x in the given figure is _____s (Nearest integer)

Numerical value type: the answer is a number.

Answer: 90. · Official NTA final key

Q7 JEE Main 2026 · 4 Apr · Shift 1 MCQ

Consider the first order reaction $\mathrm{R} \rightarrow \mathrm{P}$.

The fraction of molecules decomposed in the given first order reaction can be expressed as

(A) $1 - e^{k_1 t}$

(B) $1 + e^{k_1 t}$

(C) $1 + e^{-k_1 t}$

(D) $1 - e^{-k_1 t}$

Answer: (D) $1 - e^{-k_1 t}$ · Official NTA final key

Q8 JEE Main 2026 · 4 Apr · Shift 2 MCQ

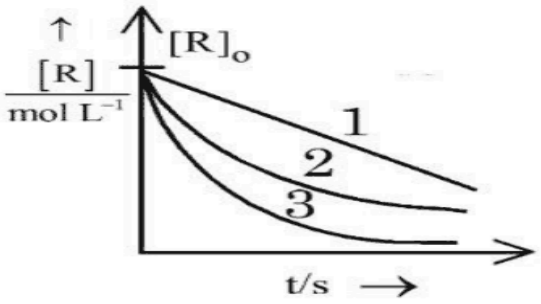
Consider the given graph showing variation of reactant concentration with time.

Three different reactions were started with identical initial concentration of reactants. Which of the following statement is correct?

(see the figure above)

Consider the given graph showing variation of reactant concentration with time.

Three different reactions were started with identical initial concentration of reactants. Which of the following statement is correct?



Options :

6952781494. The order of all the three reactions is same.

6952781495. The rate constant of reaction 3 is larger than the rate constant of reaction 2 if the order of reaction is same for both.

6952781496. The SI unit of rate constant of reaction 1 is s^{-1}.

6952781497. Thermal decomposition of HI on gold surface is an example of reaction 2.

(A) The order of all the three reactions is same.

(B) The rate constant of reaction 3 is larger than the rate constant of reaction 2 if the order of reaction is same for both.

(C) The SI unit of rate constant of reaction 1 is s^{-1}.

(D) Thermal decomposition of HI on gold surface is an example of reaction 2.

Answer: (B) The rate constant of reaction 3 is larger than the rate constant of reaction 2 if the order of reaction is same for both. · Official NTA final key

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Q9 JEE Main 2026 · 4 Apr · Shift 2 Numerical

For a first order reaction $A \rightarrow B$

t/min	[A]/M
0	0.6500
x	0.0650
20	0.00065

$x =$ _____ min. (Nearest integer)

Numerical value type: the answer is a number.

Answer: 7. · Official NTA final key

Q10 JEE Main 2026 · 2 Apr · Shift 1 MCQ

$t_{100\%}$ is the time required for the 100% completion of the reaction while $t_{1/2}$ is the time required for 50% of the reaction to be completed. Which of the following option correctly represents the relation between $t_{100\%}$ and $t_{1/2}$ for zero and first order reactions respectively ?

(A) $t_{100\%} = (t_{1/2})^2$ and $t_{100\%} = (t_{1/2})^{-\infty}$

(B) $t_{100\%} = 2t_{1/2}$ and $t_{100\%} = (t_{1/2})^{\infty}$

(C) $t_{100\%} = 2t_{1/2}$ and $t_{100\%} = (2t_{1/2})^2$

(D) $t_{100\%} = (t_{1/2})^{\infty}$ and $t_{100\%} = 2t_{1/2}$

Answer: (B) $t_{100\%} = 2t_{1/2}$ and $t_{100\%} = (t_{1/2})^{\infty}$ · Official NTA final key

Q11 JEE Main 2026 · 2 Apr · Shift 1 Numerical

For reaction $A \rightarrow P$, rate constant $k = 1.5 \times 10^3$ s^{-1} at 27°C

If activation energy for the above reaction is 60 kJ mol^{-1}, then the temperature (in °C) at which rate constant, $k = 4.5 \times 10^3$ s^{-1} is _____. (Nearest integer)

Given : $\log 2 = 0.30$, $\log 3 = 0.48$, $R = 8.3$ J K^{-1} mol^{-1}, $\ln 10 = 2.3$

Numerical value type: the answer is a number.

Answer: 41. · Official NTA final key

Q12 JEE Main 2026 · 2 Apr · Shift 2 MCQ

Consider the reaction $aX \rightarrow bY$, for which the rate constant at 30°C is 1×10^{-3} mol^{-1} L s^{-1}. Which of the following statements are true ?

A. When concentration of 'X' is increased to four times, the rate of reaction becomes 16 times.

B. The reaction is a second order reaction.

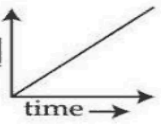
C. The half-life period is independent of the concentration of X.

D. Decomposition of N_2O_5 is an example of the above reaction.

E. $\ln \frac{[R_o]}{[R]}$ *(see the figure above)* is valid for the above reaction.

Choose the **correct** answer from the options given below :

Consider the reaction aX → bY, for which the rate constant at 30°C is 1×10^{-3} mol^{-1} L s^{-1}. Which of the following statements are true ?
A. When concentration of 'X' is increased to four times, the rate of reaction becomes 16 times.
B. The reaction is a second order reaction.
C. The half-life period is independent of the concentration of X.
D. Decomposition of N_2O_5 is an example of the above reaction.
E. $\ln \frac{[R_o]}{[R]}$ is valid for the above reaction.
Choose the **correct** answer from the options given below :



Options :

691121705. A and B Only

691121706. A, B and C Only

691121707. A, B, D and E Only

691121708. C and D Only

(A) A and B Only
(B) A, B and C Only
(C) A, B, D and E Only
(D) C and D Only

Answer: (A) A and B Only · Official NTA final key

Q13 JEE Main 2026 · 2 Apr · Shift 2 Numerical

Consider the following gas phase reaction being carried out in a closed vessel at 25°C.

$2A(g) \longrightarrow 4B(g) + C(g)$

time (min)	total pressure of the system (mm Hg)
30	300
∞	600

The pressure of C(g) at 30 minutes time interval would be _____ mm Hg. (nearest integer)

Numerical value type: the answer is a number.

Answer: 20. · Official NTA final key

Q14 JEE Main 2026 · 28 Jan · Shift 1 MCQ

An organic compound undergoes first order decomposition. The time taken for decomposition to $\left(\frac{1}{8}\right)^{th}$ and $\left(\frac{1}{10}\right)^{th}$ of its initial concentration are $t_{1/8}$ and $t_{1/10}$ respectively.

What is the value of $\frac{t_{1/8}}{t_{1/10}} \times 10$?

(log 2= 0.3)

(A) 3
(B) 30
(C) 9
(D) 0.9

Answer: (C) 9 · Official NTA final key

Q15 JEE Main 2026 · 28 Jan · Shift 2 Numerical

A $\longrightarrow$ B (first reaction)

C $\longrightarrow$ D (second reaction)

Consider the above two first-order reactions. The rate constant for first reaction at 500 K is double of the same at 300 K. At 500 K, 50% of the reaction becomes complete in 2 hour. The activation energy of the second reaction is half of that of first reaction. If the rate constant at 500 K of the second reaction becomes double of the rate constant of first reaction at the same temperature; then rate constant for the second reaction at 300 K is _____ $\times 10^{-1}$ hour^{-1} (nearest integer).

Numerical value type: the answer is a number.

Answer: 5. · Official NTA final key

Q16 JEE Main 2026 · 24 Jan · Shift 1 MCQ

At 27 °C in presence of a catalyst, activation energy of a reaction is lowered by 10 kJ mol^{-1}. The logarithm of ratio of $\frac{k(\text{catalysed})}{k(\text{uncatalysed})}$ is....

(Consider that the frequency factor for both the reactions is same)

(A) 0.1741

(B) 1.741

(C) 3.482

(D) 17.41

Answer: (B) 1.741 · Official NTA final key

Q17 JEE Main 2026 · 24 Jan · Shift 1 MCQ

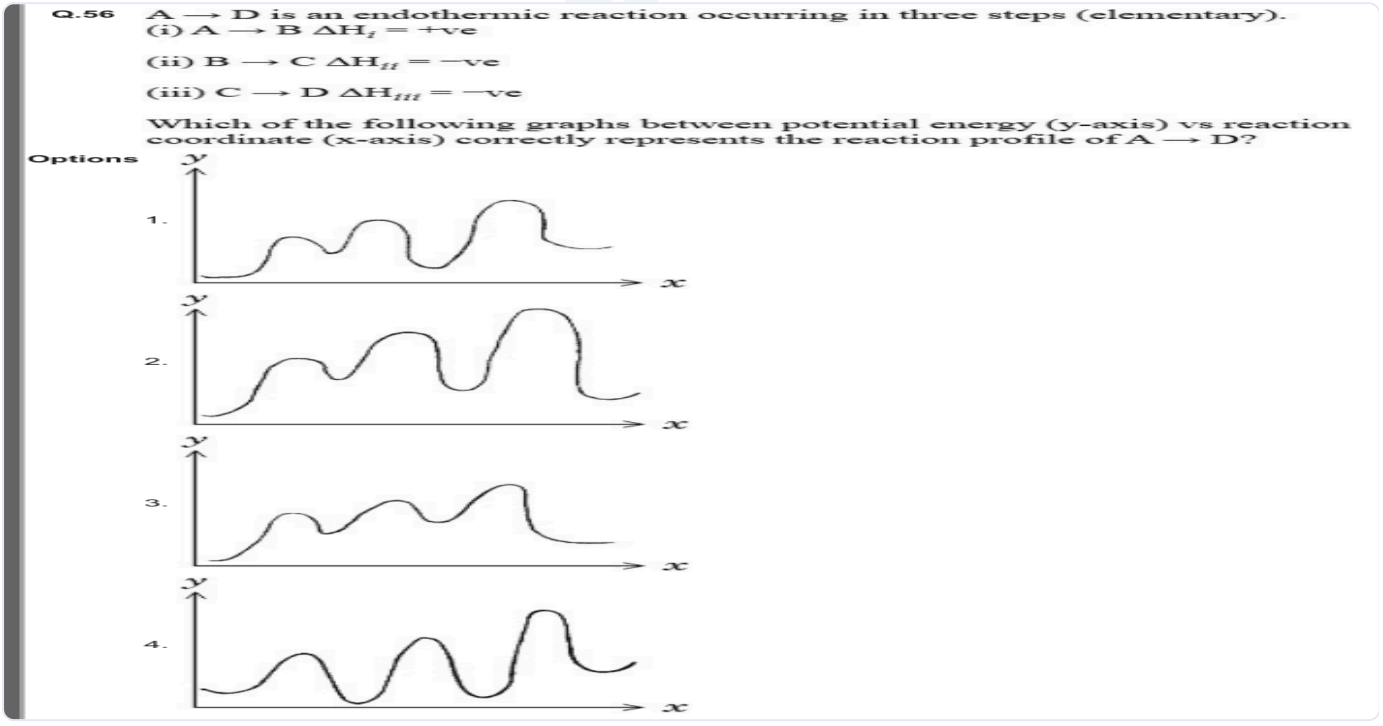
A→D is an endothermic reaction occurring in three steps (elementary).

(i) A→B $\Delta H_i = +ve$

(ii) B→C $\Delta H_{ii} = -ve$

(iii) C→D $\Delta H_{iii} = -ve$

Which of the following graphs between potential energy (y-axis) vs reaction coordinate (x-axis) correctly represents the reaction profile of A→D?



(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

Answer: (B) · Official NTA final key

Q18 JEE Main 2026 · 24 Jan · Shift 2 Numerical

The half-life of ^{65}Zn is 245 days. After x days, 75% of original activity remained. The value of x in days is _____. (Nearest integer)

(Given: log 3 = 0.4771 and log 2 = 0.3010)

Numerical value type: the answer is a number.

Answer: 102. · Official NTA final key

Q19 JEE Main 2026 · 23 Jan · Shift 1 Numerical

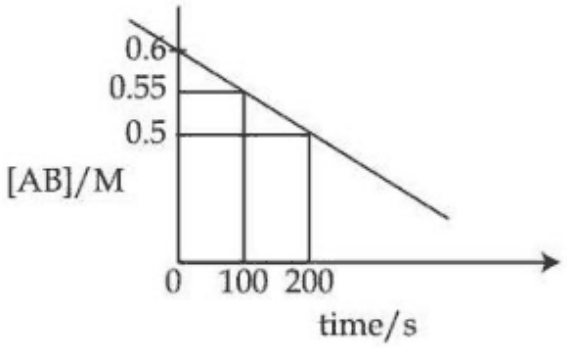
For the thermal decomposition of reactant AB(g), the following plot is constructed.

(see the figure above)

The half life of the reaction is 'x' min.

x = _____ min. (Nearest integer)

Q.72 For the thermal decomposition of reactant AB(g), the following plot is constructed.



The half life of the reaction is 'x' min.

x = _____ min. (Nearest integer)

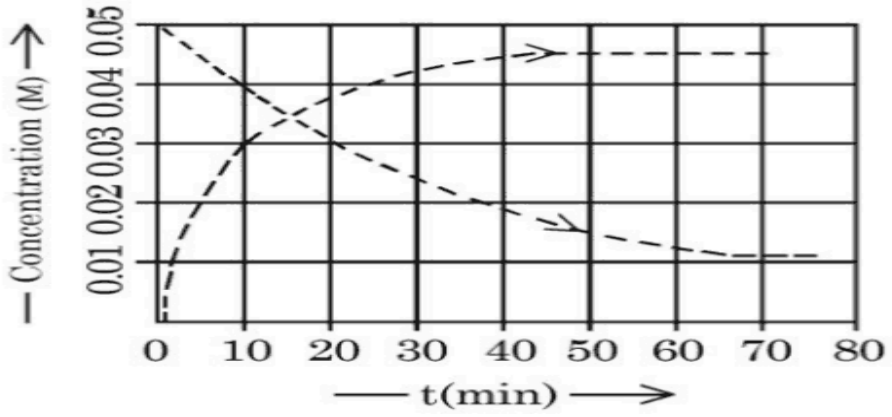
Numerical value type: the answer is a number.

Answer: 10. · Official NTA final key

Q20 JEE Main 2026 · 23 Jan · Shift 2 MCQ

see figure

Q.55



Given above is the concentration vs time plot for a dissociation reaction : $A \rightarrow nB$.

Based on the data of the initial phase of the reaction (initial 10 min), the value of n is _____.

Options
1. 4
2. 5
3. 2
4. 3

(A) 4
(B) 5
(C) 2
(D) 3

Answer: (D) 3 · Official NTA final key

Q21 JEE Main 2026 · 23 Jan · Shift 2 MCQ

Observe the following reactions at T(K).

I. $A \rightarrow$ products.

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

Both the reactions are started at 10.00 am. The rates of these reactions at 10.10 am are same. The value of $-\frac{\Delta[Br^-]}{\Delta t}$ at 10.10 am is 2×10^{-4} mol L^{-1} min^{-1}. The concentration of A at 10.10 am is 10^{-2} mol L^{-1}. What is the first order rate constant (in min^{-1}) of reaction I?

(A) 2×10^{-3}
(B) 4×10^{-3}
(C) 10^{-2}
(D) 10^{-3}

Answer: (B) 4×10^{-3} · Official NTA final key

Q22 JEE Main 2026 · 22 Jan · Shift 1 MCQ

$A \rightarrow$ product (First order reaction).

Three sets of experiment were performed for a reaction under similar experimental conditions:

Run 1 $\Rightarrow$ 100 mL of 10 M solution of reactant A

Run 2 $\Rightarrow$ 200 mL of 10 M solution of reactant A

Run 3 $\Rightarrow$ 100 mL of 10 M solution of reactant A + 100 mL of H_2O added.

The correct variation of rate of reaction is

(A) Run 3 $<$ Run 1 $=$ Run 2

(B) Run 1 $=$ Run 2 $=$ Run 3

(C) Run 1 $<$ Run 2 $<$ Run 3

(D) Run 3 $<$ Run 1 $<$ Run 2

Answer: (A) Run 3 $<$ Run 1 $=$ Run 2 · Official NTA final key

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Q23 JEE Main 2026 · 22 Jan · Shift 1 Numerical

The temperature at which the rate constants of the given below two gaseous reactions become equal is _____ K. (Nearest integer)

$X \longrightarrow Y\ k_1 = 10^6\, e^{\frac{-30000}{T}}$

$P \longrightarrow Q\ k_2 = 10^4\, e^{\frac{-24000}{T}}$

Given: $\ln 10 = 2.303$

Numerical value type: the answer is a number.

Answer: 1303. · Official NTA final key

Q24 JEE Main 2026 · 22 Jan · Shift 2 MCQ

Correct statements regarding Arrhenius equation among the following are :

A. Factor $e^{-Ea/RT}$ corresponds to fraction of molecules having kinetic energy less than Ea.

B. At a given temperature, lower the Ea, faster is the reaction.

C. Increase in temperature by about 10°C doubles the rate of reaction.

D. Plot of log k vs $\frac{1}{T}$ gives a straight line with slope $= -\frac{Ea}{R}$.

Choose the **correct** answer from the options given below :

(A) A and C Only

(B) B and D Only

(C) A and B Only

(D) B and C Only

Answer: (D) B and C Only · Official NTA final key

Q25 JEE Main 2026 · 22 Jan · Shift 2 Numerical

Consider $A \xrightarrow{k_1} B$ and $C \xrightarrow{k_2} D$ are two reactions. If the rate constant (k_1) of the $A \longrightarrow B$ reaction can be expressed by the following equation $\log_{10} k = 14.34 - \frac{1.5 \times 10^4}{T/K}$ and activation energy of $C \longrightarrow D$

reaction (Ea_2) is $\frac{1}{5}$th of the $A \longrightarrow B$ reaction (Ea_1), then the value of (Ea_2) is _____ kJ mol^{-1}. (Nearest Integer)

Numerical value type: the answer is a number.

Answer: 57. · Official NTA final key

Q26 JEE Main 2026 · 21 Jan · Shift 1 Numerical

Pre-exponential factors of two different reactions of same order are identical. Let activation energy of first reaction exceeds the activation energy of second reaction by 20 kJ mol^{-1}. If k_1 and k_2 are the rate constants of first and second reaction respectively at 300 K, then $\ln \frac{k_2}{k_1}$ will be _____. (nearest integer) [R = 8.3 J K^{-1} mol^{-1}]

Numerical value type: the answer is a number.

Answer: 8. · Official NTA final key

Q27 JEE Main 2026 · 21 Jan · Shift 2 MCQ

Decomposition of A is a first order reaction at T(K) and is given by $A(g) \longrightarrow B(g) + C(g)$.

In a closed 1 L vessel, 1 bar A(g) is allowed to decompose at T(K). After 100 minutes, the total pressure was 1.5 bar. What is the rate constant (in min^{-1}) of the reaction ? ($\log 2 = 0.3$)

(A) 6.9×10^{-4}
(B) 6.9×10^{-1}
(C) 6.9×10^{-2}
(D) 6.9×10^{-3}

Answer: (D) 6.9×10^{-3} · Official NTA final key

Q28 JEE Main 2025 · 8 Apr · Shift 2 MCQ

In a first order decomposition reaction, the time taken for the decomposition of reactant to one fourth and one eighth of its initial concentration are t_1 and t_2 (s), respectively. The ratio t_1/t_2 will be:

(A) $\frac{4}{3}$
(B) $\frac{3}{4}$
(C) $\frac{2}{3}$
(D) $\frac{3}{2}$

Answer: (C) $\frac{2}{3}$ · Key from source paper

Q29 JEE Main 2025 · 7 Apr · Shift 1 MCQ

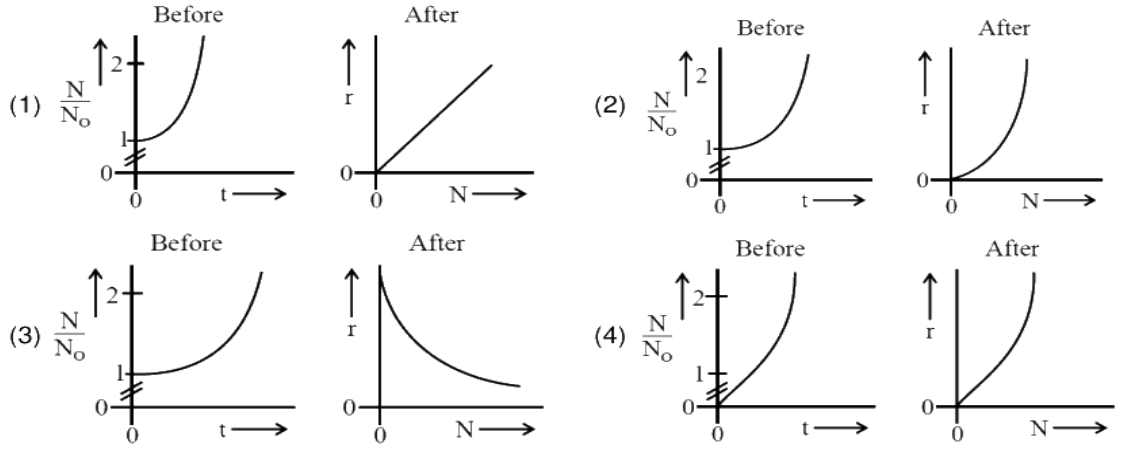
A person's wound was exposed to some bacteria and then bacterial growth started to happen at the same place. The wound was later treated with some antibacterial medicine and the rate of bacterial decay(r) was found to be proportional with the square of the existing number of bacteria at any

instance. Which of the following set of graphs correctly represents the 'before' and 'after' situation of the application of the medicine?

[Given: $N =$ No. of bacteria, $t =$ time, bacterial growth follows 1st order kinetics.]

12. A person's wound was exposed to some bacteria and then bacterial growth started to happen at the same place. The wound was later treated with some antibacterial medicine and the rate of bacterial decay(r) was found to be proportional with the square of the existing number of bacteria at any instance. Which of the following set of graphs correctly represents the 'before' and 'after' situation of the application of the medicine?

[Given: $N =$ No. of bacteria, $t =$ time, bacterial growth follows 1st order kinetics.]



(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

Answer: (B) · Key from source paper

Q30 JEE Main 2025 · 7 Apr · Shift 1 MCQ

Reaction $A(g) \rightarrow 2B(g) + C(g)$ is a first order reaction. It was started with pure A

t/min	Pressure of system at time t/mm Hg
10	160
∞	240

Which of the following option is incorrect?

(A) Rate constant of the reaction is $1.693 min^{-1}$

(B) The reaction never goes to completion

(C) Partial pressure of A after 10 minute is 40 mm Hg

(D) Initial pressure of A is 80 mm Hg

Answer: (A) Rate constant of the reaction is $1.693 min^{-1}$ · Key from source paper

Q31 JEE Main 2025 · 7 Apr · Shift 2 MCQ

$A(g) \rightarrow B(g) + C(g)$ is a first order reaction.

Time T ∞

P_{system} P_t P_∞

The reaction was started with reactant A only. Which of the following expression is correct for rate constant k ?

(A) $k = \frac{1}{t} \ln \frac{P_\infty}{P_t}$

(B) $k = \frac{1}{t} \ln \frac{2(P_\infty - P_t)}{P_t}$

(C) $k = \frac{1}{t} \ln \frac{P_\infty}{(P_\infty - P_t)}$

(D) $k = \frac{1}{t} \ln \frac{P_\infty}{2(P_\infty - P_t)}$

Answer: (D) $k = \frac{1}{t} \ln \frac{P_\infty}{2(P_\infty - P_t)}$ · Key from source paper

Q32 JEE Main 2025 · 4 Apr · Shift 1 MCQ

Rate law for a reaction between A and B is given by

$r = k[A]^n[B]^m$

If concentration of A is doubled and concentration of B is halved from their initial value, the ratio of new rate of reaction to the initial rate of reaction $\left(\frac{r_2}{r_1}\right)$ is

(A) $(n - m)$

(B) $(m + n)$

(C) $\frac{1}{2^{m+n}}$

(D) $2^{(n-m)}$

Answer: (D) $2^{(n-m)}$ · Key from source paper

Q33 JEE Main 2025 · 4 Apr · Shift 1 MCQ

For $A_2 + B_2 \rightleftharpoons 2AB$

E_a for forward and backward reaction are 180 and $200 kJ\, mol^{-1}$ respectively

If catalyst lowers E_a for both reaction by $100 kJ\, mol^{-1}$.

Which of the following statement is correct?

(A) Catalyst can cause non-spontaneous reactions to occur.

(B) Catalyst does not alter the Gibbs energy change of a reaction.

(C) The enthalpy change for the catalysed reaction is different from that of uncatalysed reaction.

(D) The enthalpy change for the reaction is $+20 kJ\, mol^{-1}$.

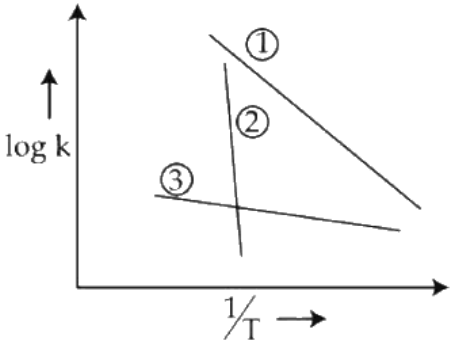
Answer: (B) Catalyst does not alter the Gibbs energy change of a reaction. · Key from source paper

Q34 JEE Main 2025 · 4 Apr · Shift 2 MCQ

Consider the following plots of log of rate constant $k(\log k)$ vs $\frac{1}{T}$ for three different reactions. The correct order of activation energies of these reactions is :

(see the figure above)

11. Consider the following plots of log of rate constant $k(\log k)$ vs $\frac{1}{T}$ for three different reactions. The correct order of activation energies of these reactions is :



(1) $Ea_2 > Ea_1 > Ea_3$

(2) $Ea_3 > Ea_2 > Ea_1$

(3) $Ea_1 > Ea_3 > Ea_2$

(4) $Ea_1 > Ea_2 > Ea_3$

(A) $Ea_2 > Ea_1 > Ea_3$

(B) $Ea_3 > Ea_2 > Ea_1$

(C) $Ea_1 > Ea_3 > Ea_2$

(D) $Ea_1 > Ea_2 > Ea_3$

Answer: (A) $Ea_2 > Ea_1 > Ea_3$ · Key from source paper

Q35 JEE Main 2025 · 4 Apr · Shift 2 MCQ

Half life of zero order reaction $A \rightarrow$ product is 1 hour, when initial concentration of reactant is $2.0 molL^{-1}$. The time required to decrease concentration of A from 0.50 to $0.25 molL^{-1}$ is :

(A) 1.0 .5 hour

(B) 15 min

(C) 4 hour

(D) 60 min

Answer: (B) 15 min · Key from source paper

Q36 JEE Main 2025 · 3 Apr · Shift 1 MCQ

In a reaction $A + B \rightarrow C$, initial concentrations of A and B are related as $[A]_0 = 8[B]_0$. The half lives of A and B are 10 min and 40 min , respectively. If they start to disappear at the same time, both following first order kinetics, after how much time will the concentration of both the reactants be same?

(A) 60 min
(B) 20 min
(C) 40 min
(D) 80 min

Answer: (C) 40 min · Key from source paper

Q37 JEE Main 2025 · 3 Apr · Shift 2 MCQ

Consider the following statements related to temperature dependence of rate constants.

Identify the correct statements.

A. The Arrhenius equation holds true only for an elementary homogenous reaction.

B. The unit of A is same as that of k in Arrhenius equation.

C. At a given temperature, a low activation energy means a fast reaction.

D. A and Ea as used in Arrhenius equation depend on temperature.

E. When $Ea >> RT$, A and Ea become interdependent.

Choose the correct answer from the options given below:

(A) B and C Only
(B) B, D and E Only
(C) A and B Only
(D) A, C and D Only

Answer: (A) B and C Only · Key from source paper

Q38 JEE Main 2025 · 2 Apr · Shift 1 Numerical

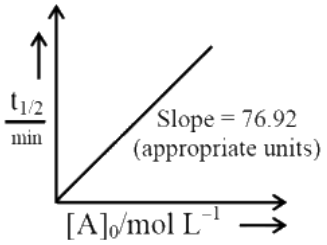
For the reaction A $\rightarrow$ products.

(see the figure above)

The concentration of A at 10 minutes is _____ $\times 10^{-3} molL^{-1}$ (nearest integer). The reaction was started with $2.5 molL^{-1}$ of A .

CHEMISTRY **02-04-2025 (MORNING SESSION)**

24. For the reaction A $\rightarrow$ products.



The concentration of A at 10 minutes is _____ $\times 10^{-3} molL^{-1}$ (nearest integer). The reaction was started with $2.5 molL^{-1}$ of A .

Numerical value type: the answer is a number.

Answer: 2435. · Key from source paper

Q39 JEE Main 2025 · 2 Apr · Shift 2 MCQ

Reactant A converts to product D through the given mechanism (with the net evolution of heat) :

A → B slow; $\Delta H = +ve$

B → C fast; $\Delta H = -ve$

C → D fast; $\Delta H = -ve$

Which of the following represents the above reaction mechanism?

CHEMISTRY **02-04-2025 (EVENING SESSION)**

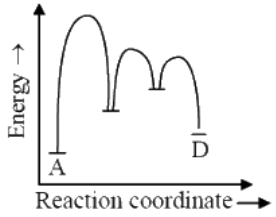
18. Reactant A converts to product D through the given mechanism (with the net evolution of heat) :

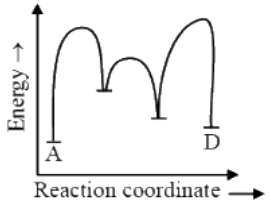
A → B slow; $\Delta H = +$ ve

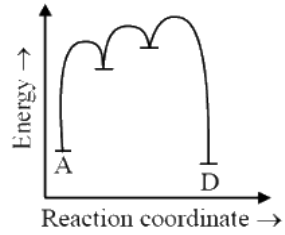
B → C fast; $\Delta H = -ve$

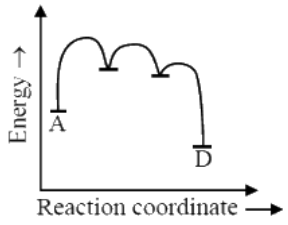
C → D fast; $\Delta H = -ve$

Which of the following represents the above reaction mechanism?

(1) 

(2) 

(3) 

(4) 

(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

Answer: (D) · Key from source paper

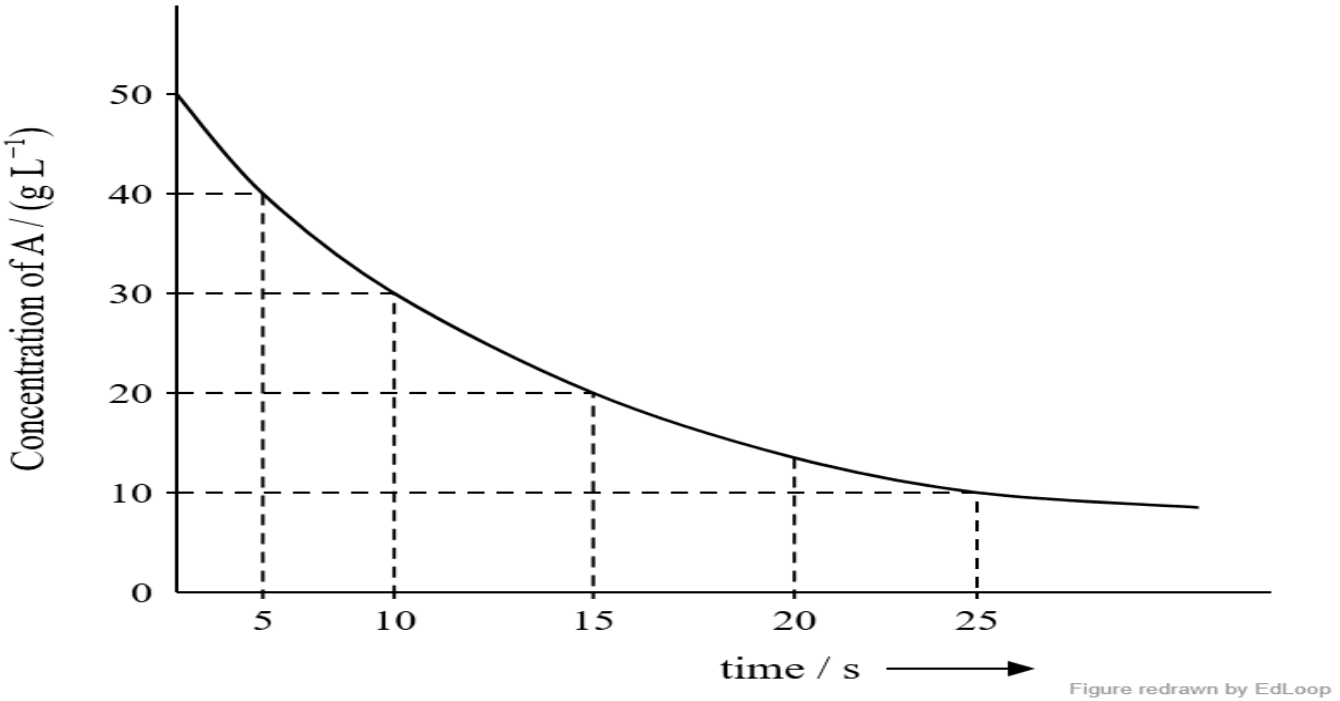
Q40 JEE Main 2025 · 2 Apr · Shift 2 Numerical

For the reaction $A \rightarrow B$ the following graph was obtained.

(see the figure above)

The time required (in seconds) for the concentration of A to reduce to $2.5 gL^{-1}$ (if the initial concentration of A was $50 gL^{-1}$) is _____ . (Nearest integer)

Given : $\log 2 = 0.3010$



Numerical value type: the answer is a number.

Answer: 43. · Key from source paper

Q41 JEE Main 2025 · 29 Jan · Shift 1 MCQ

The reaction $A_2 + B_2 \rightarrow 2AB$ follows the mechanism $A_2 \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} A + A$ (fast) $A + B_2 \xrightarrow{k_2} AB + B$ (slow) $A + B \rightarrow AB$ (fast) The overall order of the reaction is :

(A) 2
(B) 2.5
(C) 3
(D) 1.5

Answer: (D) 1.5 · Key from source paper

Q42 JEE Main 2025 · 29 Jan · Shift 2 MCQ

Drug X becomes ineffective after 50% decomposition. The original concentration of drug in a bottle was 16mg/mL which becomes 4mg/mL in 12 months. The expiry time of the drug in months is _____ Assume that the decomposition of the drug follows first order kinetics.

(A) 2
(B) 6
(C) 12
(D) 3

Answer: (B) 6 · Key from source paper

Q43 JEE Main 2025 · 28 Jan · Shift 1 MCQ

$[A]_0/\text{mol L}^{-1}$	$t_{1/2}/\text{min}$
0.100	200
0.025	100

For a given reaction R $\rightarrow$ P, $t_{1/2}$ is related to $[A]_0$ as given in table. Given: log 2 = 0.30 Which of the following is true? A. The order of the reaction is 1/2. B. If $[A]_0$ is 1 M , then $t_{1/2}$ is $200\sqrt{10}$ min C. The order of the reaction changes to 1 if the concentration of reactant changes from 0.100 M to 0.500 M . D. $t_{1/2}$ is 800 min for $[A]_0 = 1.6$M Choose the correct answer from the options given below: Options

(A) A and C Only
(B) A, B and D Only
(C) C and D Only
(D) A and B Only

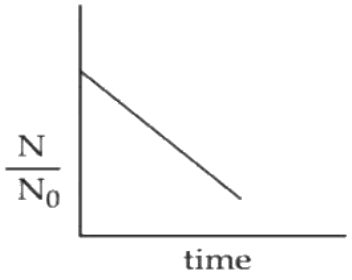
Answer: (B) A, B and D Only · Key from source paper

Q44 JEE Main 2025 · 28 Jan · Shift 2 MCQ

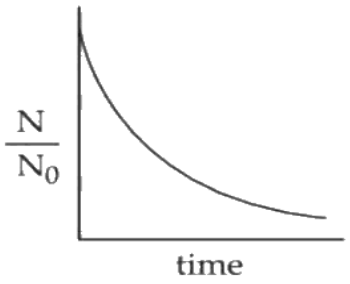
For bacterial growth in a cell culture, growth law is very similar to the law of radioactive decay. Which of the following graphs is most suitable to represent bacterial colony growth ? Where N - Number of Bacteria at any time, N_0 - Initial number of Bacteria.

Q57. For bacterial growth in a cell culture, growth law is very similar to the law of radioactive decay. Which of the following graphs is most suitable to represent bacterial colony growth ? Where N - Number of Bacteria at any time, N_0 - Initial number of Bacteria.

(1)



(2)



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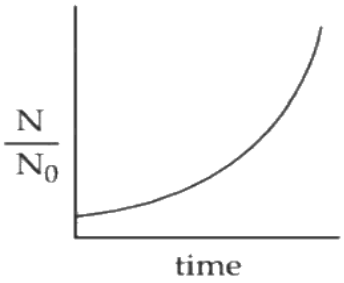
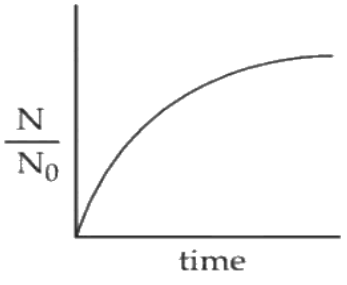


(4)



(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (C) · Key from source paper

Q45 JEE Main 2025 · 28 Jan · Shift 2 MCQ

Consider an elementary reaction $\mathrm{A(g)+B(g) \rightarrow C(g)+D(g)}$ If the volume of reaction mixture is suddenly reduced to $\frac{1}{3}$ of its initial volume, the reaction rate will become ' x ' times of the original reaction rate. The value of x is :

(A) 3
(B) $\frac{1}{9}$
(C) 9
(D) $\frac{1}{3}$

Answer: (C) 9 · Key from source paper

Q46 JEE Main 2025 · 24 Jan · Shift 1 MCQ

For a reaction, $\mathrm{N_2O_{5(g)} \rightarrow 2NO_{2(g)} + \frac{1}{2}O_{2(g)}}$ in a constant volume container, no products were present initially. The final pressure of the system when 50% of reaction gets completed is

(A) 5 times of initial pressure
(B) 5/2 times of initial pressure
(C) 7/2 times of initial pressure
(D) 7/4 times of initial pressure

Answer: (D) 7/4 times of initial pressure · Key from source paper

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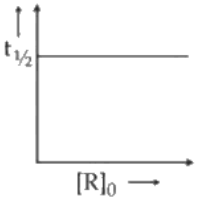
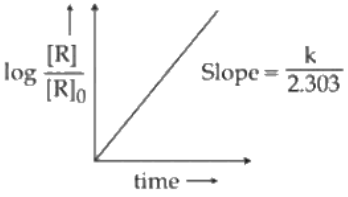
Q47 JEE Main 2025 · 24 Jan · Shift 2 MCQ

see figure

Q63.

Statement (I) : 

is valid for first order reaction.

Statement (II) : 

is valid for first order reaction.

Given below are two statements :

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

(1) Both Statement I and Statement II are true
(2) Statement I is false but Statement II is true
(3) Statement I is true but Statement II is false
(4) Both Statement I and Statement II are false

(A) Both Statement I and Statement II are true
(B) Statement I is false but Statement II is true
(C) Statement I is true but Statement II is false
(D) Both Statement I and Statement II are false

Answer: (C) Statement I is true but Statement II is false · Key from source paper

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Q48 JEE Main 2025 · 24 Jan · Shift 2 Numerical

Consider a complex reaction taking place in three steps with rate constants k_1, k_2 and k_3 respectively. The overall rate constant k is given by the expression $k = \sqrt{\frac{k_1 k_3}{k_2}}$. If the activation energies of the three steps are 60,30 and 10 kJ mol^{-1} respectively, then the overall energy of activation in kJmol^{-1} is _____ (Nearest integer).

Numerical value type: the answer is a number.

Answer: 20. · Key from source paper

Q49 JEE Main 2025 · 23 Jan · Shift 1 Numerical

For the thermal decomposition of $\mathrm{N_2O_5(g)}$ at constant volume, the following table can be formed, for the reaction mentioned below. $2\,\mathrm{N_2O_5(g)} \rightarrow 2\,\mathrm{N_2O_4(g)} + \mathrm{O_2(g)}$

Sr.No	Time/s	Total pressure/(atm)
1	0	0.6
2	100	'x'

$\mathrm{x} = \ldots \times 10^{-3}$ atm [nearest integer] Given : Rate constant of the reaction is $4.606 \times 10^{-2}\ \mathrm{s}^{-1}$.

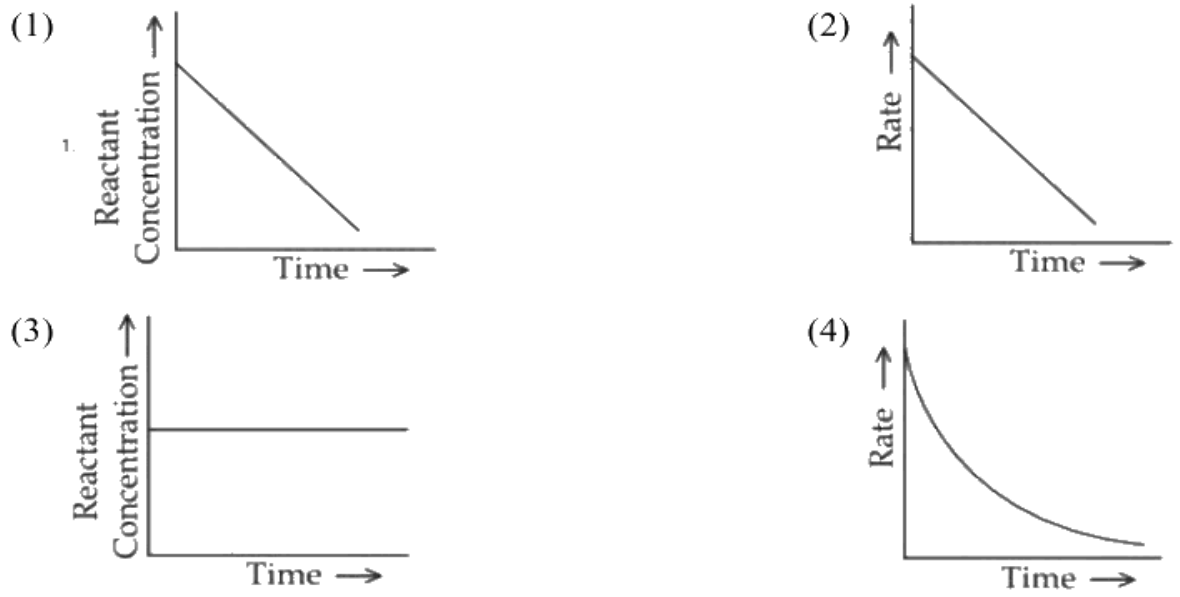
Numerical value type: the answer is a number.

Answer: 897. · Key from source paper

Q50 JEE Main 2025 · 23 Jan · Shift 2 MCQ

Which of the following graphs most appropriately represents a zero order reaction ?

Q54. Which of the following graphs most appropriately represents a zero order reaction ?



(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (A) · Key from source paper

Q51 JEE Main 2025 · 22 Jan · Shift 1 MCQ

Which of the following statement is not true for radioactive decay?

(A) Decay constant increases with increase in temperature.
(B) Amount of radioactive substance remained after three half lives is $\frac{1}{8}$ th of original amount.
(C) Decay constant does not depend upon temperature.
(D) Half life is $\ln 2$ times of $\frac{1}{\text{rate constant}}$.

Answer: (A) Decay constant increases with increase in temperature. · Key from source paper

Q52 JEE Main 2025 · 22 Jan · Shift 1 Numerical

A $\rightarrow$ B The molecule A changes into its isomeric form B by following a first order kinetics at a temperature of 1000 K . If the energy barrier with respect to reactant energy for such isomeric transformation is 191.48 kJ mol^{-1} and the frequency factor is 10^{20}, the time required for 50% molecules of A to become B is _____ picoseconds (nearest integer). $[\text{R} = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}]$

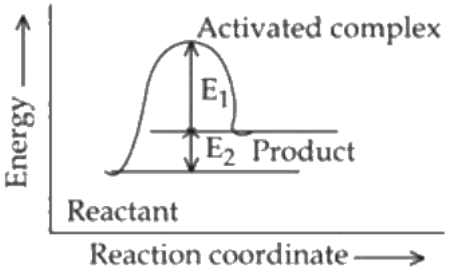
Numerical value type: the answer is a number.

Answer: 69. · Key from source paper

Q53 JEE Main 2025 · 22 Jan · Shift 2 MCQ

see figure

Q55.



Consider the given figure and choose the correct option :

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

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

(3) Activation energy of backward reaction is E_1 and product is more stable than reactant.

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

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

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

(C) Activation energy of backward reaction is E_1 and product is more stable than reactant.

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

Answer: (B) Activation energy of forward reaction is $E_1 + E_2$ and product is less stable than reactant. · Key from source paper

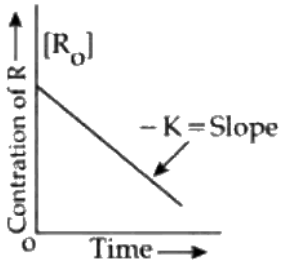
Q54 JEE Main 2024 · 9 Apr · Shift 1 Numerical

Given below are two statements: Statement I: The rate law for the reaction $A + B \rightarrow C$ is rate $(r) = k[A]^2[B]$. When the concentration of both A and B is doubled, the reaction rate is increased " x " times. Statement II :

(see the figure above)

The figure is showing "the variation in concentration against time plot" for a " y " order reaction. The Value of $x + y$ is _____

Q57. Given below are two statements : Statement I: The rate law for the reaction $A + B \rightarrow C$ is rate $(r) = k[A]^2[B]$. When the concentration of both A and B is doubled, the reaction rate is increased " x " times. Statement II :



The figure is showing "the variation in concentration against time plot" for a " y " order reaction. The Value of $x + y$ is _____

Numerical value type: the answer is a number.

Answer: 8. · Key from source paper

Q55 JEE Main 2024 · 9 Apr · Shift 2 Numerical

Consider the following first order gas phase reaction at constant temperature $\mathrm{A(g)} \rightarrow 2\,\mathrm{B(g)} + \mathrm{C(g)}$ If the total pressure of the gases is found to be 200 torr after 23sec. and 300 torr upon the complete decomposition of A after a very long time, then the rate constant of the given reaction is _____ $\times 10^{-2}\ \mathrm{s}^{-1}$ (nearest integer) [Given : $\log_{10}(2) = 0.301$]

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q56 JEE Main 2024 · 8 Apr · Shift 1 Numerical

Consider the following reaction

$\mathrm{A + B \rightarrow C}$

The time taken for A to become $1/4^{th}$ of its initial concentration is twice the time taken to become $1/2$ of the same. Also, when the change of concentration of B is plotted against time, the resulting graph gives a straight line with a negative slope and a positive intercept on the concentration axis. The overall order of the reaction is _____

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q57 JEE Main 2024 · 8 Apr · Shift 2 MCQ

For a reaction $\mathrm{A} \xrightarrow{K_1} \mathrm{B} \xrightarrow{K_2} \mathrm{C}$ If the rate of formation of B is set to be zero then the concentration of B is given by :

(A) $(K_1 + K_2)[A]$
(B) $(K_1/K_2)[A]$
(C) $(K_1 - K_2)[A]$
(D) $K_1\,K_2[\,A]$

Answer: (B) $(K_1/K_2)[A]$ · Key from source paper

Q58 JEE Main 2024 · 6 Apr · Shift 1 Numerical

Time required for 99.9% completion of a first order reaction is _____ times the time required for completion of 90% reaction.(nearest integer)

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q59 JEE Main 2024 · 6 Apr · Shift 2 Numerical

Consider the two different first order reactions given below $A + B \rightarrow C$ (Reaction 1) $P \rightarrow Q$ (Reaction 2) The ratio of the half life of Reaction 1 : Reaction 2 is 5 : 2. If t_1 and t_2 represent the time taken to complete $2/3^{rd}$ and 45th of Reaction 1 and Reaction 2, respectively, then the value of the ratio $t_1 : t_2$ is _____ $\times 10^{-1}$ (nearest integer). [Given : $\log_{10}(3) = 0.477$ and $\log_{10}(5) = 0.699$]

Numerical value type: the answer is a number.

Answer: 17. · Key from source paper

Q60 JEE Main 2024 · 5 Apr · Shift 1 Numerical

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

	A [M]	B [M]	initial rate of formation of D
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.20×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.40×10^{-2}

Based on above data, overall order of the reaction is _____

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q61 JEE Main 2024 · 5 Apr · Shift 2 Numerical

Consider the following single step reaction in gas phase at constant temperature. $2\,\mathrm{A_{(g)}} + \mathrm{B_{(g)}} \rightarrow \mathrm{C_{(g)}}$ The initial rate of the reaction is recorded as $\mathrm{r_1}$ when the reaction starts with 1.5 atm pressure of A and 0.7 atm pressure of B. After some time, the rate $\mathrm{r_2}$ is recorded when the pressure of C becomes 0.5 atm. The ratio $\mathrm{r_1} : \mathrm{r_2}$ is _____ $\times 10^{-1}$. (Nearest integer)

Numerical value type: the answer is a number.

Answer: 315. · Key from source paper

Q62 JEE Main 2024 · 4 Apr · Shift 1 Numerical

Consider the following transformation involving first order elementary reaction in each step at constant temperature as shown below. $A + B$ Step 1$C \longrightarrow P$ Some details of the above reactions are listed below.

Step	Rate constant (sec^{-1})	Activation energy ($\mathrm{kJ\ mol}^{-1}$)
1	k_1	300
2	k_2	200
3	k_3	Ea_3

If the overall rate constant of the above transformation (k) is given as $k = \frac{k_1 k_2}{k_3}$ and the overall activation energy ($\mathrm{E_a}$) is 400 kJ mol^{-1}, then the value of Ea_3 is _____ kJmol^{-1} (nearest integer)

Numerical value type: the answer is a number.

Answer: 100. · Key from source paper

Q63 JEE Main 2024 · 4 Apr · Shift 2 Numerical

Consider the following reaction, the rate expression of which is given below

$\mathrm{A + B \rightarrow C}$

rate = $\mathrm{k[A]^{1/2}[B]^{1/2}}$

The reaction is initiated by taking 1M concentration of A and B each. If the rate constant (k) is $4.6 \times 10^{-2}\ \mathrm{s}^{-1}$, then the time taken for A to become 0.1M is _____ sec. (nearest integer)

Numerical value type: the answer is a number.

Answer: 50. · Key from source paper

Q64 JEE Main 2024 · 1 Feb · Shift 1 Numerical

The ratio of $\frac{^{14}\mathrm{C}}{^{12}\mathrm{C}}$ in a piece of wood is $\frac{1}{8}$ part that of atmosphere. If half life of $^{14}\mathrm{C}$ is 5730 years, the age of wood sample is ..... years.

Numerical value type: the answer is a number.

Answer: 17190. · Key from source paper

Q65 JEE Main 2024 · 1 Feb · Shift 2 Numerical

The following data were obtained during the first order thermal decomposition of a gas A at constant volume:

$\mathrm{A(g) \rightarrow 2B(g) + C(g)}$

S. No Time/s Total pressure/(atm)

1.	0	0.1
2.	115	0.28

The rate constant of the reaction is _____ $\times 10^{-2}\,s^{-1}$ (nearest integer).

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q66 JEE Main 2024 · 31 Jan · Shift 1 MCQ

Integrated rate law equation for a first order gas phase reaction is given by (where P_i is initial pressure and P_t is total pressure at time t)

(A) $k = \frac{2.303}{t} \times \log \frac{P_i}{2P_i - P_t}$

(B) $k = \frac{2.303}{t} \times \log \frac{2P_i}{2P_i - P_t}$

(C) $k = \frac{2.303}{t} \times \log \frac{2P_i - P_t}{P_i}$

(D) $k = \frac{2.303}{t} \times \frac{P_i}{2P_i - P_t}$

Answer: (A) $k = \frac{2.303}{t} \times \log \frac{P_i}{2P_i - P_t}$ · Key from source paper

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Q67 JEE Main 2024 · 31 Jan · Shift 2 Numerical

$r = kA$ for a reaction, 50% of A is decomposed in 120 minutes. The time taken for 90% decomposition of A is _____ minutes.

Numerical value type: the answer is a number.

Answer: 399. · Key from source paper

Q68 JEE Main 2024 · 30 Jan · Shift 1 Numerical

The rate of first order reaction is 0. 04 mol L^{-1} s^{-1} at 10 minutes and 0. 03 mol L^{-1} s^{-1} at 20 minutes after initiation. Half life of the reaction is _____ minutes. (Given log 2 = 0. 3010, log 3 = 0. 4771) Round off your answer to the nearest integer.

Numerical value type: the answer is a number.

Answer: 24. · Key from source paper

Q69 JEE Main 2024 · 30 Jan · Shift 2 Numerical

NO_2 required for a reaction is produced by decomposition of N_2O_5 in CCl_4 as by equation

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

The initial concentration of N_2O_5 is 3 mol L^{-1} and it is 2.75 mol L^{-1} after 30 minutes. The rate of formation of NO_2 is $x \times 10^{-3}$ mol L^{-1} min_{-1}, value of x is _____.

Numerical value type: the answer is a number.

Answer: 17. · Key from source paper

Q70 JEE Main 2024 · 29 Jan · Shift 1 Numerical

For a reaction taking place in three steps at same temperature, overall rate constant K = $\frac{K_1K_2}{K_3}$. If Ea_1, Ea_2 and Ea_3 are 40, 50 and 60 kJ / mol respectively, the overall Ea is _____ kJ / mol.

Numerical value type: the answer is a number.

Answer: 30. · Key from source paper

Q71 JEE Main 2024 · 29 Jan · Shift 2 Numerical

The half-life of radioisotopic bromine - 82 is 36 hours. The fraction which remains after one day is _____ $\times 10^{-2}$.

(Given antilog 0.2006 = 1.587)

Round off to the nearest integer

Numerical value type: the answer is a number.

Answer: 63. · Key from source paper

Q72 JEE Main 2024 · 27 Jan · Shift 1 Numerical

Consider the following data for the given reaction

$2\,\mathrm{HI}_{(g)} \rightarrow \mathrm{H}_{2(g)} + \mathrm{I}_{2(g)}$

$\mathrm{HI}\ (\mathrm{mol\,L^{-1}})$	**0.005**	**0.01**	**0.02**
Rate $(\mathrm{mol\,L^{-1}\,s^{-1}})$	7.5×10^{-4}	3.0×10^{-3}	1.2×10^{-2}

The order of the reaction is _____.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q73 JEE Main 2024 · 27 Jan · Shift 2 Numerical

Time required for completion of 99.9% of first order reaction is _____ times of half life ($t_{1/2}$) of the reaction

Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q74 JEE Main 2023 · 15 Apr · Shift 1 Numerical

For a reversible reaction A $\rightleftharpoons$ B, the ΔH forward reaction = 20 kJ mol^{-1}. The activation energy of the uncatalyzed forward reaction is 300 kJ mol^{-1}. When the reaction is catalysed keeping the reactant concentration same, the rate of the catalysed forward reaction at 27°C is found to be same as that of the uncatalyzed reaction at 327°C. The activation energy of the catalysed backward reaction is _____ kJ mol^{-1}

Numerical value type: the answer is a number.

Answer: 130. · Key from source paper

Q75 JEE Main 2023 · 13 Apr · Shift 1 Numerical

$t_{87.5}$ is the time required for the reaction to undergo 87.5% completion and t_{50} is the time required for the reaction to undergo 50% completion. The relation between $t_{87.5}$ and t_{50} for a first order reaction is $t_{87.5} = x \times t_{50}$

The value of x is _____. (Nearest integer)

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q76 JEE Main 2023 · 13 Apr · Shift 2 Numerical

$A(g) \rightarrow 2B(g) + C(g)$ is a first order reaction. The initial pressure of the system was found to be 800 mm Hg which increased to 1600 mm Hg after 10 min. The total pressure of the system after 30 min will be mm Hg. (Nearest integer)

Numerical value type: the answer is a number.

Answer: 2200. · Key from source paper

Q77 JEE Main 2023 · 12 Apr · Shift 1 Numerical

The reaction $2NO + Br_2 \rightarrow 2\,NOBr$ takes place through the mechanism given below

$NO + Br_2 \rightleftharpoons NOBr_2$ (fast)

$NOBr_2 + NO \rightarrow 2\,NOBr$ (slow)

The overall order of the reaction is _____.

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q78 JEE Main 2023 · 11 Apr · Shift 1 Numerical

$KClO_3 + 6FeSO_4 + 3H_2SO_4 \rightarrow KCl + 3Fe_2(SO_4)_3 + 3H_2O$

The above reaction was studied at 300 K by monitoring the concentration of $FeSO_4$ in which initial concentration was 10 M and after half an hour became 8.8 M. The rate of production of $Fe_2(SO_4)_3$ is _____ $\times 10^{-6}$ mol L^{-1} s^{-1} (Nearest integer)

Numerical value type: the answer is a number.

Answer: 333. · Key from source paper

Q79 JEE Main 2023 · 11 Apr · Shift 2 MCQ

For a chemical reaction $A + B \rightarrow$ Product, the order is 1 with respect to A and B.

Rate (mol L^{-1} S^{-1}) | [A] (mol L^{-1}) | [B] (mol L^{-1})

0.10 | 20 | 0.5

0.40 | x | 0.5
0.80 | 40 | y
What is the value of x and y?

(A) 160 and 4
(B) 80 and 4
(C) 80 and 2
(D) 40 and 4

Answer: (C) 80 and 2 · Key from source paper

Q80 JEE Main 2023 · 10 Apr · Shift 1 Numerical

A molecule undergoes two independent first order reactions whose respective half lives are 12 min and 3 min. If both the reactions are occurring then the time taken for the 50% consumption of the reactant is _____ min. (Nearest integer)

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q81 JEE Main 2023 · 10 Apr · Shift 2 Numerical

$\mathrm{A(g)} \rightleftharpoons 2\,\mathrm{B(g)} + \mathrm{C(g)}$
For the given reaction, if the initial pressure is 450 mmHg and the pressure at time t is 720 mmHg at a constant temperatureT and constant volume V. The fraction of $\mathrm{A(g)}$ decomposed under these conditions is $x \times 10^{-1}$. The value of x is (nearest integer)

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q82 JEE Main 2023 · 10 Apr · Shift 2 Numerical

The number of incorrect statement/s from the following is _____
A. The successive half lives of zero order reactions decreases with time.
B. A substance appearing as reactant in the chemical equation may not affect the rate of reaction
C. Order and molecularity of a chemical reaction can be fractional number
D. The rate constant units of zero and second order reaction are $\mathrm{mol\,L^{-1}\,s^{-1}}$ and $\mathrm{mol^{-1}\,L\,s^{-1}}$ respectively

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q83 JEE Main 2023 · 8 Apr · Shift 1 Numerical

The number of given statement/s which is/are correct is _____
(A) The stronger the temperature dependence of the rate constant, the higher is the activation energy.
(B) If a reaction has zero activation energy, its rate is independent of temperature.

(C) The stronger the temperature dependence of the rate constant, the smaller is the activation energy.
(D) If there is no correlation between the temperature and the rate constant then it means that the reaction has negative activation energy.

Numerical value type: the answer is a number.

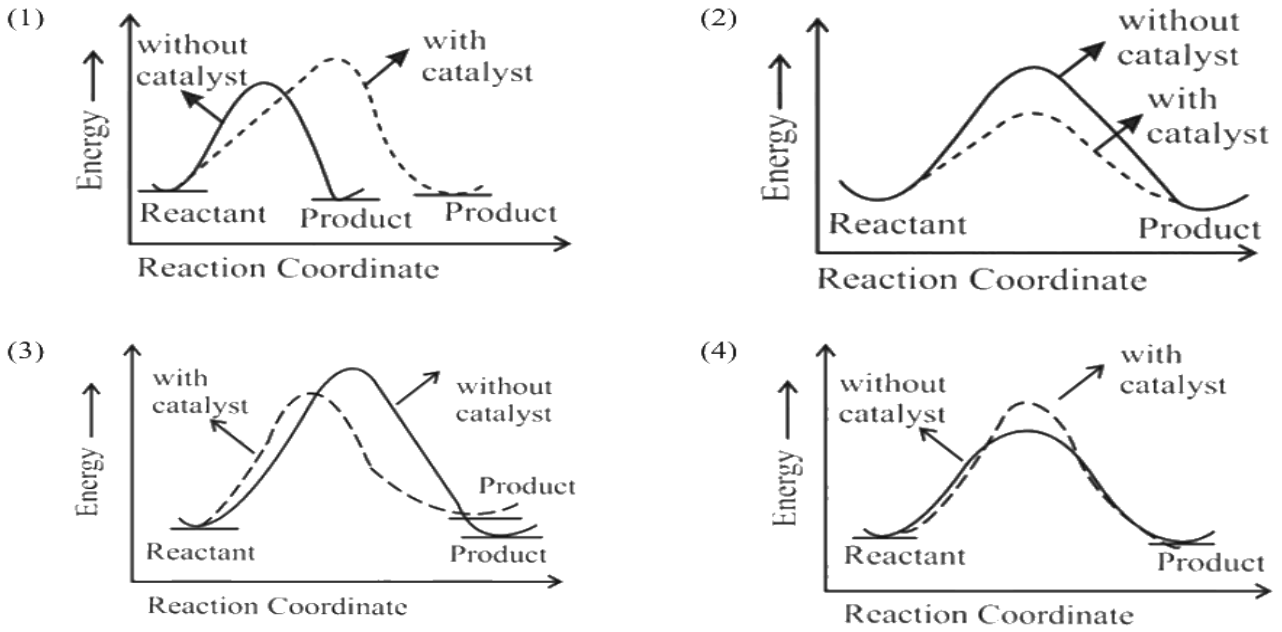
Answer: 2. · Key from source paper

Q84 JEE Main 2023 · 8 Apr · Shift 2 MCQ

The correct reaction profile diagram for a positive catalyst reaction.

(see the figure above)

Q48. The correct reaction profile diagram for a positive catalyst reaction.



(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (B) · Key from source paper

Q85 JEE Main 2023 · 6 Apr · Shift 1 Numerical

For the adsorption of hydrogen on platinum, the activation energy is $30\ \text{kJ mol}^{-1}$ and for the adsorption of hydrogen on nickel, the activation energy is $41.4\ \text{kJ mol}^{-1}$. The logarithm of the ratio of the rates of chemisorption on equal areas of the metals at $300\ \text{K}$ is _____ (Nearest integer)

Given: $\ln 10 = 2.3$

$R = 8.3\ \text{J K}^{-1}\ \text{mol}^{-1}$

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q86 JEE Main 2023 · 6 Apr · Shift 2 MCQ

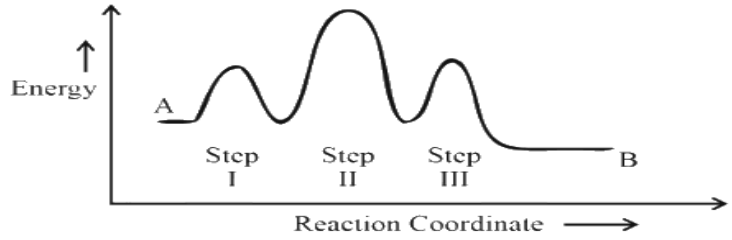
Consider the following reaction that goes from A to B in three steps as shown below:

(see the figure above)

Choose the correct option

	Number of Intermediates	Number of Activated Complexes	Rate determining step
(1)	2	3	I
(2)	2	3	III
(3)	2	3	II
(4)	3	2	II

Q49. Consider the following reaction that goes from A to B in three steps as shown below:



Choose the correct option

	Number of Intermediates	Number of Activated Complexes	Rate determining step
(1)	2	3	I
(2)	2	3	III
(3)	2	3	II
(4)	3	2	II

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

(A) (1)
(B) (2)
(C) (3)
(D) (4)

Answer: (C) (3) · Key from source paper

Q87 JEE Main 2023 · 1 Feb · Shift 1 Numerical

A and B are two substances undergoing radioactive decay in a container. The half life of A is 15 min and that of B is 5 min. If the initial concentration of B is 4 times that of A and they both start decaying at the same time, how much time will it take for the concentration of both of them to be same? _____ min.

Numerical value type: the answer is a number.

Answer: 15. · Key from source paper

Q88 JEE Main 2023 · 1 Feb · Shift 2 Numerical

$A \rightarrow B$

The above reaction is of zero order. Half life of this reaction is 50 min. The time taken for the concentration of A to reduce to one-fourth of its initial value is _____ min . (Nearest integer)

Numerical value type: the answer is a number.

Answer: 75. · Key from source paper

Q89 JEE Main 2023 · 31 Jan · Shift 1 Numerical

$A \rightarrow B$

The rate constants of the above reaction at 200 K and 300 K are 0.03 min^{-1} and 0.05 min^{-1} respectively. The activation energy for the reaction is _____ J (Nearest integer)

(Given : $\ln 10$ = 2.3

R = 8.3 $J\ K^{-1}\ mol^{-1}$

$\log 5$ = 0.70

$\log 3$ = 0.48

$\log 2$ = 0.30

Numerical value type: the answer is a number.

Answer: 2520. · Key from source paper

Q90 JEE Main 2023 · 31 Jan · Shift 2 Numerical

The rate constant for a first order reaction is 20 min^{-1}. The time required for the initial concentration of the reactant to reduce to its $\frac{1}{32}$ level is _____ $\times 10^{-2}$ min. (Nearest integer)

Numerical value type: the answer is a number.

Answer: 17. · Key from source paper

Q91 JEE Main 2023 · 30 Jan · Shift 1 Numerical

If compound A reacts with B following first order kinetics with rate constant 2.011×10^{-3} s^{-1}. The time taken by A (in seconds) to reduce from 7 g to 2 g will be _____ . (Nearest Integer)

log5 = 0.698, log7 = 0.845, log2 = 0.301

Numerical value type: the answer is a number.

Answer: 623. · Key from source paper

Q92 JEE Main 2023 · 30 Jan · Shift 2 Numerical

An organic compound undergoes first order decomposition. If the time taken for the 60% decomposition is 540 s, then the time required for 90% decomposition will be is _____ s. (Nearest

integer).
Given : ln 10 = 2.3; log 2 = 0.3

Numerical value type: the answer is a number.

Answer: 1350. · Key from source paper

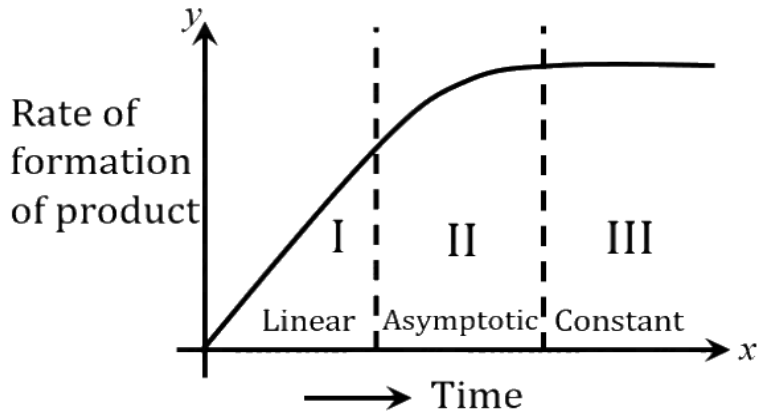
Q93 JEE Main 2023 · 29 Jan · Shift 1 Numerical

For certain chemical reaction $X \rightarrow Y$, the rate of formation of product is plotted against the time as shown in the figure. The number of **Correct** statement/s from the following is _____

(see the figure above)

(A) Over all order of this reaction is one
(B) Order of this reaction can't be determined
(C) In region-I and III, the reaction is of first and zero order respectively
(D) In region-II, the reaction is of first order
(E) In region-II, the order of reaction is in the range of 0.1 to 0.9.

Q49. For certain chemical reaction $X \rightarrow Y$, the rate of formation of product is plotted against the time as shown in the figure. The number of **Correct** statement/s from the following is _____



(A) Over all order of this reaction is one
(B) Order of this reaction can't be determined
(C) In region-I and III, the reaction is of first and zero order respectively
(D) In region-II, the reaction is of first order
(E) In region-II, the order of reaction is in the range of 0.1 to 0.9.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q94 JEE Main 2023 · 29 Jan · Shift 2 Numerical

For conversion of compound A $\rightarrow$ B, the rate constant of the reaction was found to be $4.6 \times 10^{-5}\ \mathrm{L\,mol^{-1}\,s^{-1}}$. The order of the reaction is _____ .

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q95 JEE Main 2023 · 25 Jan · Shift 1 Numerical

For the first order reaction A $\rightarrow$ B the half life is 30 min. The time taken for 75% completion of the reaction is _____ min. (Nearest integer)
Given : $\log 2 = 0.3010$
$\log 3 = 0.4771$
$\log 5 = 0.6989$

Numerical value type: the answer is a number.

Answer: 60. · Key from source paper

Q96 JEE Main 2023 · 25 Jan · Shift 2 Numerical

A first order reaction has the rate constant, k = $4.6 \times 10^{-3}\ s^{-1}$. The number of correct statement/s from the following is/are Given: log 3 = 0.48.

A. Reaction completes in 1000 s.

B. The reaction has a half-life of 500 s.

C. The time required for 10% completion is 25 times the time required for 90% completion.

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

E. The rate and the rate constant have the same unit.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q97 JEE Main 2023 · 24 Jan · Shift 1 Numerical

The number of correct statement/s from the following is _____.

A.Larger the activation energy, smaller is the value of the rate constant.

B. The higher is the activation energy, higher is the value of the temperature coefficient.

C. At lower temperatures, increase in temperature causes more change in the value of k than at higher temperature.

D. A plot of ln k vs $\frac{1}{T}$ is a straight line with slope equal to $-\frac{E_a}{R}$

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q98 JEE Main 2023 · 24 Jan · Shift 2 MCQ

A student has studied the decomposition of a gas AB_3 at $25^{\circ}C$. He obtained the following data

p (mm Hg)	50	100	200	400
Relative $t_{1/2}$ (s)	4	2	1	0.5

The order of the reaction is

(A) 0.5
(B) 2
(C) 1
(D) 0 (zero)

Answer: (B) 2 · Key from source paper

Q99 JEE Main 2022 · 29 Jul · Shift 1 Numerical

The reaction between X and Y is first order with respect to X and zero order with respect to Y.

Experiment	$\frac{[X]}{\text{molL}^{-1}}$	$\frac{[Y]}{\text{molL}^{-1}}$	$\frac{\text{Initial rate}}{\text{molL}^{-1}\text{min}^{-1}}$
I	0.1	0.1	2×10^{-3}
II	L	0.2	4×10^{-3}
III	0.4	0.4	M $\times 10^{-3}$
IV	0.1	0.2	2×10^{-3}

Examine the data of table and calculate ratio of numerical values of M and L.

Numerical value type: the answer is a number.

Answer: 40. · Key from source paper

Q100 JEE Main 2022 · 29 Jul · Shift 2 Numerical

Assuming 1 μg of trace radioactive element X with a half life of 30 years is absorbed by a growing tree. The amount of X remaining in the tree after 100 years is _____ $\times 10^{-1}$ μg. [Given : $\ln 10 = 2.303$; $\log 2 = 0.30$]

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q101 JEE Main 2022 · 28 Jul · Shift 1 MCQ

For kinetic study of the reaction of iodide ion with H_2O_2 at room temperature :
(A) Always use freshly prepared starch solution.
(B) Always keep the concentration of sodium thiosulphate solution less than that of KI solution.
(C) Record the time immediately after the appearance of blue colour.
(D) Record the time immediately before the appearance of blue colour.
(E) Always keep the concentration of sodium thiosulphate solution more than that of KI solution.
Choose the correct answer from the options given below

(A) A, B, C only
(B) A, D, E only
(C) D, E obly
(D) A, B, E only

Answer: (A) A, B, C only · Key from source paper

Q102 JEE Main 2022 · 28 Jul · Shift 1 Numerical

For the given first order reaction $\mathrm{A} \rightarrow \mathrm{B}$ the half life of the reaction is $0.3010\ \mathrm{min}$. The ratio of the initial concentration of reactant to the concentration of reactant at time $2.0\ \mathrm{min}$ will be equal to _____. (Nearest integer)

Numerical value type: the answer is a number.

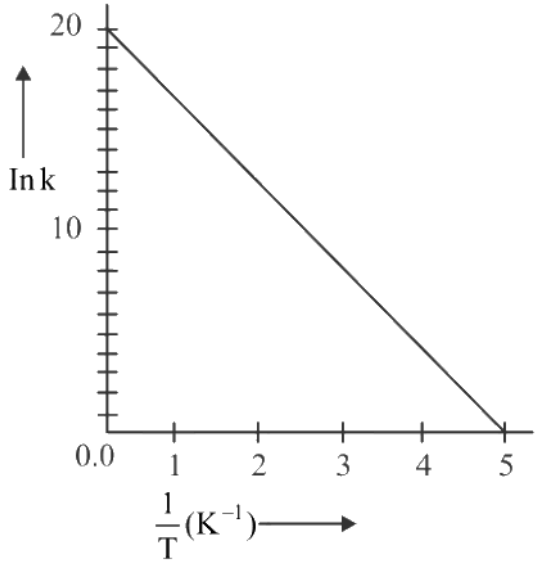
Answer: 100. · Key from source paper

Q103 JEE Main 2022 · 28 Jul · Shift 2 Numerical

For a reaction, given below is the graph of $\ln k$ vs $\frac{1}{T}$. The activation energy for the reaction is equal to _____ $\mathrm{cal\ mol^{-1}}$.(Given : $\mathrm{R} = 2\ \mathrm{calK^{-1}\ mol^{-1}}$)

(see the figure above)

Q59. For a reaction, given below is the graph of $\ln k$ vs $\frac{1}{T}$. The activation energy for the reaction is equal to____ cal $\mathrm{mol^{-1}}$.(Given : $\mathrm{R} = 2\,\mathrm{calK^{-1}\ mol^{-1}}$)



Numerical value type: the answer is a number.

Answer: 8. · Key from source paper

Q104 JEE Main 2022 · 27 Jul · Shift 1 Numerical

$2\mathrm{NO} + 2\mathrm{H_2} \rightarrow \mathrm{N_2} + 2\mathrm{H_2O}$

The above reaction has been studied at 800 °C. The related data are given in the table below

Reaction serial number	Initial pressure of $\mathrm{H_2}$ / kPa	Initial Pressure of NO / kPa	Initial rate $\left(\frac{-dp}{dt}\right)$/(kPa /s)
1	65.6	40.0	0.135
2	65.6	20.1	0.033
3	38.6	65.6	0.214
4	19.2	65.6	0.106

The order of the reaction with respect to NO is _____

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q105 JEE Main 2022 · 27 Jul · Shift 2 Numerical

$[A] \rightarrow [B]$

Reactant Product

If formation of compound [B] follows the first order of kinetics and after 70 minutes the concentration of [A] was found to be half of its initial concentration. Then the rate constant of the reaction is x $\times$ 10^{-6} s^{-1}. The value of x is _____

Numerical value type: the answer is a number.

Answer: 165. · Key from source paper

Q106 JEE Main 2022 · 26 Jul · Shift 1 Numerical

For a reaction $A \rightarrow 2B + C$ the half lives are 100 s and 50 s when the concentration of reactant A is 0.5 and 1.0 mol L = respectively. The order of the reaction is

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q107 JEE Main 2022 · 26 Jul · Shift 2 MCQ

At $30\ ^{\circ}C$, the half life for the decomposition of AB_2 is $200\ s$ and is independent of the initial concentration of AB_2. The time required for 80% of the AB_2 to decompose is (Given: $\log 2 = 0.30$; $\log 3 = 0.48$)

(A) $200s$

(B) $323s$

(C) $467s$

(D) $532s$

Answer: (C) $467s$ · Key from source paper

Q108 JEE Main 2022 · 25 Jul · Shift 1 Numerical

The half life for the decomposition of gaseous compound A is 240 s when the gaseous pressure was 500 Torr initially. When the pressure was 250 Torr, the half life was found to be 4.0 min. The order of the reaction is _____ (Nearest integer)

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

EdLoop JEE

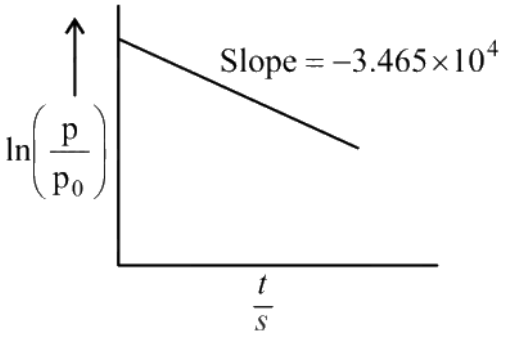
Q109 JEE Main 2022 · 25 Jul · Shift 2 Numerical

For the decomposition of azomethane. $CH_3\ N_2\ CH_3(g) \rightarrow CH_3\ CH_3(g) + N_2$ a first order reaction, the variation in partial pressure with time at 600 K is given as

(see the figure above)

The half life of the reaction is _____ $\times 10^{-5}$ s

Q58. For the decomposition of azomethane. $CH_3\ N_2\ CH_3(g) \rightarrow CH_3\ CH_3(g) + N_2$ a first order reaction, the variation in partial pressure with time at 600 K is given as



The half life of the reaction is____$\times 10^{-5}$ s

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q110 JEE Main 2022 · 29 Jun · Shift 1 Numerical

The activation energy of one of the reactions in a biochemical process is $532611\ J\ mol^{-1}$. When the temperature falls from $310\ K$ to $300\ K$, the change in rate constant observed is $k_{300} = x \times 10^{-3} k_{310^\circ}$. The value of x is

[Given: $\ln 10 = 2.3\ R = 8.3\ J\ K^{-1}\ mol^{-1}$]

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q111 JEE Main 2022 · 29 Jun · Shift 2 Numerical

The equation $k = \left(6.5 \times 10^{12}\ s^{-1}\right) e^{-26000\ K/T}$ is followed for the decomposition of compound A. The activation energy for the reaction is _____ $KJ\ mol^{-1}$. [nearest integer]

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

Numerical value type: the answer is a number.

Answer: 216. · Key from source paper

Q112 JEE Main 2022 · 28 Jun · Shift 1 Numerical

For a first order reaction $A \rightarrow B$, the rate constant, $k = 5.5 \times 10^{-14}\ s^{-1}$. The time required for 67% completion of reaction is x $\times 10^{-1}$ times the half life of reaction. The value of x is Nearest integer)

(Given : $\log 3 = 0.4771$)

Numerical value type: the answer is a number.

Answer: 16. · Key from source paper

Q113 JEE Main 2022 · 28 Jun · Shift 2 Numerical

A radioactive element has a half life of 200 days. The percentage of original activity remaining after 83 days is _____ (Nearest integer)
(Given : antilog 0.125 = 1.333, antilog 0.693 = 4.93)

Numerical value type: the answer is a number.

Answer: 75. · Key from source paper

Q114 JEE Main 2022 · 27 Jun · Shift 1 Numerical

The rate constant for a first order reaction is given by the following equation :
$\ln k = 33.24 - \frac{2.0\times10^4\ \mathrm{K}}{T}$
The Activation energy for the reaction is given by _____ $\mathrm{kJ\,mol^{-1}}$. (In Nearest integer) (Given : $\mathrm{R} = 8.3\ \mathrm{J\ K^{-1}\ mol^{-1}}$)

Numerical value type: the answer is a number.

Answer: 166. · Key from source paper

Q115 JEE Main 2022 · 27 Jun · Shift 2 Numerical

It has been found that for a chemical reaction with rise in temperature by 9 K the rate constant gets doubled. Assuming a reaction to be occurring at 300 K, the value of activation energy is found to be $\mathrm{kJ\,mol^{-1}}$. [nearest integer] (Given $\ln 10 = 2.3, \mathrm{R} = 8.3\ \mathrm{J\ K^{-1}\ mol^{-1}}, \log 2 = 0.30$)

Numerical value type: the answer is a number.

Answer: 59. · Key from source paper

Q116 JEE Main 2022 · 26 Jun · Shift 1 Numerical

A flask is filled with equal moles of A and B. The half lives of A and B are $100\ \mathrm{s}$ and $50\ \mathrm{s}$ respectively and are independent of the initial concentration. The time required for the concentration of A to be four times that of B is _____ s.
(Given : $\ln 2 = 0.693$)

Numerical value type: the answer is a number.

Answer: 200. · Key from source paper

Q117 JEE Main 2022 · 26 Jun · Shift 2 Numerical

Catalyst A reduces the activation energy for a reaction by $10\ \mathrm{kJ\ mol^{-1}}$ at $300\ \mathrm{K}$. The ratio of rate constants, $\frac{k_{T,\text{Catalysed}}}{k_{T,\text{Uncatalysed}}}$ is e^x. The value of x is _____ [nearest integer] [Assume that the pre-exponential factor is same in both the cases. Given $\mathrm{R} = 8.31\ \mathrm{J\ K^{-1}\ mol^{-1}}$]

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q118 JEE Main 2022 · 25 Jun · Shift 1 Numerical

For a given chemical reaction $\gamma_1 A + \gamma_2 B \rightarrow \gamma_3 C + \gamma_4 D$. Concentration of C changes from $10\ \text{mmol dm}^{-3}$ to $20\ \text{mmol dm}^{-3}$ in $10\ \text{s}$. Rate of appearance of D is 1.5 times the rate of disappearance of B which is twice the rate of disappearance A. The rate of appearance of D has been experimentally determined to be $9\ \text{mmol dm}^{-3}\text{s}^{-1}$. Therefore the rate of reaction is _____ $\text{mmol dm}^{-3}\text{s}^{-1}$. (Nearest Integer)

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q119 JEE Main 2022 · 25 Jun · Shift 2 Numerical

At $345\ \text{K}$, the half life for the decomposition of a sample of a gaseous compound initially at $55.5\ \text{kPa}$ was $340\ \text{s}$. When the pressure was $27.8\ \text{kPa}$, the half life was found to be $170\ \text{s}$. The order of the reaction is - [integer answer]

Numerical value type: the answer is a number.

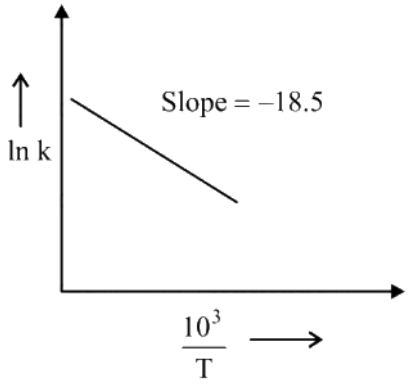
Answer: 0. · Key from source paper

Q120 JEE Main 2022 · 24 Jun · Shift 1 Numerical

The rate constants for decomposition of acetaldehyde have been measured over the temperature range $700 - 1000\ \text{K}$. The data has been analysed by plotting $\ln k$ vs $\frac{10^3}{T}$ graph. The value of activation energy for the reaction is kJmol^{-1}. (Nearest integer) (Given : $R = 8.31\ \text{JK}^{-1}\ \text{mol}^{-1}$)

(see the figure above)

Q58. The rate constants for decomposition of acetaldehyde have been measured over the temperature range $700 - 1000\ \text{K}$. The data has been analysed by plotting $\ln k$ vs $\frac{10^3}{T}$ graph. The value of activation energy for the reaction is kJmol^{-1}. (Nearest integer) (Given : $R = 8.31\ \text{JK}^{-1}\ \text{mol}^{-1}$)



Numerical value type: the answer is a number.

Answer: 154. · Key from source paper

Q121 JEE Main 2022 · 24 Jun · Shift 2 MCQ

For a first order reaction, the time required for completion of 90% reaction is 'x' times the half life of the reaction. The value of 'x' is
(Given: $\ln 10 = 2.303$ and $\log 2 = 0.3010$)

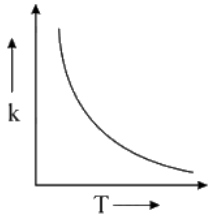
(A) 1.12
(B) 2.43
(C) 3.32
(D) 33.31

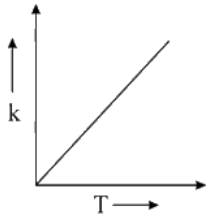
Answer: (C) 3.32 · Key from source paper

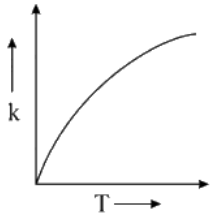
Q122 JEE Main 2021 · 1 Sep · Shift 2 MCQ

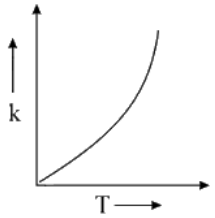
Which one of the following given graphs represents the variation of rate constant (k) with temperature (T) for an endothermic reaction?

Q38. Which one of the following given graphs represents the variation of rate constant (k) with temperature (T) for an endothermic reaction?

(1)


(2)


(3)


(4)


(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (D) · Key from source paper

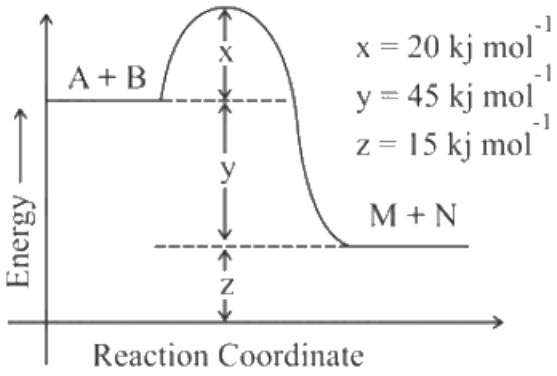
Q123 JEE Main 2021 · 31 Aug · Shift 1 Numerical

According to the following figure, the magnitude of the enthalpy change of the reaction
$A + B \rightarrow M + N$ in kJ mol^{-1}
is equal to _____. (Integer answer)
(see the figure above)

Q52. According to the following figure, the magnitude of the enthalpy change of the reaction

$A + B \rightarrow M + N$ in kJ mol^{-1}

is equal to _____ . (Integer answer)



Numerical value type: the answer is a number.

Answer: 45. · Key from source paper

Q124 JEE Main 2021 · 31 Aug · Shift 1 Numerical

For a first order reaction, the ratio of the time for 75% completion of a reaction to the time for 50% completion is _____. (Integer answer)

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q125 JEE Main 2021 · 31 Aug · Shift 2 Numerical

For the reaction A → B, the rate constant k (in s^{-1}) is given by

$\log_{10} k = 20.35 - \frac{2.47 \times 10^3}{T}$

The energy of activation in kJ mol^{-1} is _____. (Nearest integer)

[Given : R = 8.314 J K^{-1} mol^{-1}]

Numerical value type: the answer is a number.

Answer: 47. · Key from source paper

Q126 JEE Main 2021 · 27 Aug · Shift 1 Numerical

The reaction that occurs in a breath analyser, a device used to determine the alcohol level in a person's blood stream is

$2\,K_2Cr_2O_7 + 8H_2SO_4 + 3C_2H_6O \rightarrow 2\,Cr_2(SO_4)_3 + 3C_2H_4O_2 + 2\,K_2SO_4 + 11H_2O$

If the rate of appearance of $Cr_2(SO_4)_3$ is 2.67 mol min^{-1} at a particular time, the rate of disappearance of C_2H_6O at the same time is mol min^{-1}. (Nearest integer)

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q127 JEE Main 2021 · 27 Aug · Shift 2 Numerical

The first order rate constant for the decomposition of $CaCO_3$ at 700 K is $6.36 \times 10^{-3}\ s^{-1}$ and activation energy is 209 kJ mol^{-1}. Its rate constant (in s^{-1}) at 600 K is $x \times 10^{-6}$. The value of x is (Nearest integer)
[Given $R = 8.31\ J\ K^{-1}\ mol^{-1}$; $\log 6.36 \times 10^{-3} = -2.19$, $10^{-4.79} = 1.62 \times 10^{-5}$]

Numerical value type: the answer is a number.

Answer: 16. · Key from source paper

Q128 JEE Main 2021 · 26 Aug · Shift 1 Numerical

The following data was obtained for chemical reaction given below at 975 K.
$2\,NO_{(g)} + 2H_{2(g)} \rightarrow N_{2(g)} + 2H_2O_{(g)}$
Table of three experiments, columns [NO] in $mol\ L^{-1}$, $[H_2]$ in $mol\ L^{-1}$ and Rate in $molL^{-1}\ s^{-1}$:
(A) 8×10^{-5}, 8×10^{-5}, 7×10^{-9}
(B) 24×10^{-5}, 8×10^{-5}, 2.1×10^{-8}
(C) 24×10^{-5}, 32×10^{-5}, 8.4×10^{-8}
The order of the reaction with respect to NO____ is [Integer answer]

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q129 JEE Main 2021 · 27 Jul · Shift 1 MCQ

For a reaction of order n, the unit of the rate constant is :

(A) $mol^{1-n}\ L^{1-n} s$
(B) $mol^{1-n}\ L^{2n} s^{-1}$
(C) $mol^{1-n}\ L^{n-1}\ s^{-1}$
(D) $mol^{1-n}\ L^{1-n} s^{-1}$

Answer: (C) $mol^{1-n}\ L^{n-1}\ s^{-1}$ · Key from source paper

Q130 JEE Main 2021 · 27 Jul · Shift 2 Numerical

For the first order reaction $A \rightarrow 2B$, 1 mole of reactant A gives 0.2 moles of B after 100 minutes. The half life of the reaction is _____ min. (Round off to the nearest integer).
[Use : $\ln 2 = 0.69$, $\ln 10 = 2.3$
Properties of logarithms : $\ln x^y = y \ln x$
$\ln\left(\frac{x}{y}\right) = \ln x - \ln y$]
(Round off to the nearest integer)

Numerical value type: the answer is a number.

Answer: 655. · Key from source paper

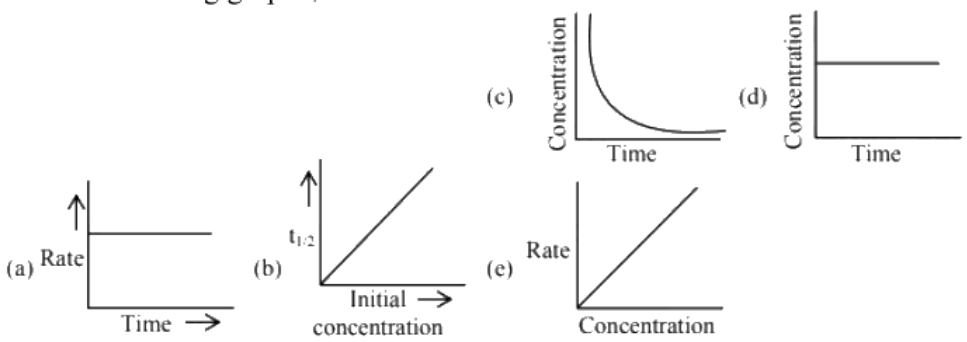
Q131 JEE Main 2021 · 25 Jul · Shift 1 MCQ

For the following graphs,

(see the figure above)

Choose from the options given below, the correct one regarding order of reaction is :

Q38. For the following graphs,



Choose from the options given below, the correct one regarding order of reaction is :

(1) (b) zero order (c) and (e) First order

(2) (a) and (b) Zero order (e) First order

(3) (b) and (d) Zero order (e) First order

(4) (a) and (b) Zero order (c) and (e) First order

(A) (b) zero order (c) and (e) First order

(B) (a) and (b) Zero order (e) First order

(C) (b) and (d) Zero order (e) First order

(D) (a) and (b) Zero order (c) and (e) First order

Answer: (B) (a) and (b) Zero order (e) First order · Key from source paper

Q132 JEE Main 2021 · 25 Jul · Shift 2 Numerical

For a chemical reaction A $\rightarrow$ B, it was found that concentration of B is increased by $0.2\ \text{mol L}^{-1}$ in $30\ \text{min}$. The average rate of the reaction is _____ $\times 10^{-1}\ \text{mol L}^{-1}\ \text{h}^{-1}$. (in nearest integer)

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q133 JEE Main 2021 · 22 Jul · Shift 1 Numerical

$\text{N}_2\text{O}_{5(\text{g})} \rightarrow 2\text{NO}_{2(\text{g})} + \frac{1}{2}\text{O}_{2(\text{g})}$

In the above first order reaction the initial concentration of N_2O_5 is $2.40 \times 10^{-2}\ \text{mol L}^{-1}$ at $318\ \text{K}$. The concentration of N_2O_5 after 1 hour was $1.60 \times 10^{-2}\ \text{mol L}^{-1}$. The rate constant of the reaction at $318\ \text{K}$ is _____ $\times 10^{-3}\ \text{min}^{-1}$ (Nearest integer):

[Given : $\log 3 = 0.477, \log 5 = 0.699$]

Numerical value type: the answer is a number.

Answer: 7. · Key from source paper

Q134 JEE Main 2021 · 20 Jul · Shift 1 Numerical

The inactivation rate of a viral preparation is proportional to the amount of virus. In the first minute after preparation, 10% of the virus is inactivated. The rate constant for viral inactivation is _____ $\times 10^{-3}\ \mathrm{min}^{-1}$. (Nearest integer) [Use : $\ln 10 = 2.303$; $\log_{10} 3 = 0.477$ property of logarithm: $\log x^y = y \log x$]

Numerical value type: the answer is a number.

Answer: 106. · Key from source paper

Q135 JEE Main 2021 · 20 Jul · Shift 2 Numerical

$\mathrm{PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)}$

In the above first order reaction the concentration of $\mathrm{PCl_5}$ reduces from initial concentration $50\ \mathrm{mol\ L^{-1}}$ to $10\ \mathrm{mol\ L^{-1}}$ in 120 minutes at 300 K. The rate constant for the reaction at 300 K is $\mathrm{x} \times 10^{-2}\ \mathrm{min}^{-1}$. The value of x is _____ .

[Given $\log 5 = 0.6989$]

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q136 JEE Main 2021 · 18 Mar · Shift 1 Numerical

$\mathrm{2\,NO(g) + Cl_2(g) \rightleftharpoons 2\,NOCl(s)}$

This reaction was studied at $-10^{\circ}\mathrm{C}$ and the following data was obtained

run	$[\mathrm{NO}]_0$	$[\mathrm{Cl_2}]_0$	$\mathrm{r_0}$
1	0.10	0.10	0.18
2	0.10	0.20	0.35
3	0.20	0.20	1.40

$[\mathrm{NO}]_0$ and $[\mathrm{Cl_2}]_0$ are the initial concentrations and $\mathrm{r_0}$ is the initial reaction rate. The overall order of the reaction is

(Round off to the Nearest Integer).

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q137 JEE Main 2021 · 18 Mar · Shift 2 Numerical

A reaction has a half life of $1\ \mathrm{min}$. The time required for 99.9% completion of the reaction is _____ min.

(Round off to the Nearest integer)

[Use : $\ln 2 = 0.69$, $\ln 10 = 2.3$]

Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q138 JEE Main 2021 · 17 Mar · Shift 1 Numerical

For a certain first order reaction 32% of the reactant is left after 570 s. The rate constant of this reaction is $\times 10^{-3}\ \mathrm{s}^{-1}$. (Round off to the Nearest Integer).
[Given: $\log_{10} 2 = 0.301, \ln 10 = 2.303$]

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q139 JEE Main 2021 · 17 Mar · Shift 2 Numerical

The reaction $2\ \mathrm{A} + \mathrm{B}_2 \rightarrow 2\mathrm{AB}$ is an elementary reaction.
For a certain quantity of reactants, if the volume of the reaction vessel is reduced by a factor of 3, the rate of the reaction increases by a factor of _____. (Round off to the Nearest Integer).

Numerical value type: the answer is a number.

Answer: 27. · Key from source paper

Q140 JEE Main 2021 · 16 Mar · Shift 1 Numerical

The decomposition of formic acid on gold surface follows first order kinetics. If the rate constant at 300 K is $1.0 \times 10^{-3}\ \mathrm{s}^{-1}$ and the activation energy $\mathrm{E_a} = 11.488\ \mathrm{kJ\ mol^{-1}}$, the rate constant at 200 K is _____ $\times 10^{-5}\ \mathrm{s}^{-1}$. (Round of to the Nearest Integer).
(Given $\mathrm{R} = 8.314\ \mathrm{J\ mol^{-1}\ K^{-1}}$)

Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q141 JEE Main 2021 · 16 Mar · Shift 2 Numerical

A and B decompose via first order kinetics with half-lives $54.0\ \mathrm{min}$ and $18.0\ \mathrm{min}$ respectively. Starting from an equimolar non-reactive mixture of A and B, the time taken for the concentration of A to become 16 times that of B is _____ min. (Round off to the Nearest Integer).

Numerical value type: the answer is a number.

Answer: 108. · Key from source paper

Q142 JEE Main 2021 · 26 Feb · Shift 1 Numerical

An exothermic reaction $\mathrm{X} \rightarrow \mathrm{Y}$ has an activation energy $30\ \mathrm{kJ\ mol^{-1}}$. If energy change $\Delta\mathrm{E}$ during the reaction is $-20\ \mathrm{kJ}$, then the activation energy for the reverse reaction in kJ is _____ (Integer answer)

Numerical value type: the answer is a number.

Answer: 50. · Key from source paper

Q143 JEE Main 2021 · 26 Feb · Shift 2 Numerical

If the activation energy of a reaction is $80.9\ \text{kJ mol}^{-1}$, the fraction of molecules at $700\ \text{K}$, having enough energy to react to form products is e^{-x}. The value of x is (Rounded off to the nearest integer) [Use R = $8.31\ \text{J K}^{-1}\ \text{mol}^{-1}$]

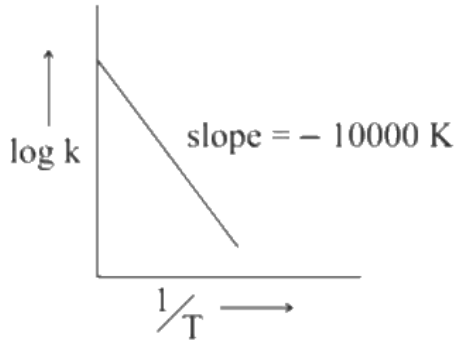
Numerical value type: the answer is a number.

Answer: 14. · Key from source paper

Q144 JEE Main 2021 · 25 Feb · Shift 1 Numerical

For the reaction, $aA + bB \rightarrow cC + dD$, the plot of log k v/s $\frac{1}{T}$ is given below:
(see the figure above)
The temperature at which the rate constant of the reaction is $10^{-4}\ \text{s}^{-1}$ is _____ K. (Rounded-off to the nearest integer) [Given : The rat5e constant of the reaction is $10^{-5}\ \text{s}^{-1}$ at 500 K.]

Q59. For the reaction, $aA + bB \rightarrow cC + dD$, the plot of log k v/s $\frac{1}{T}$ is given below:



The temperature at which the rate constant of the reaction is $10^{-4}\ \text{s}^{-1}$ is _____ K.
(Rounded-off to the nearest integer) [Given : The rat5e constant of the reaction is $10^{-5}\ \text{s}^{-1}$ at 500 K.]

Numerical value type: the answer is a number.

Answer: 526. · Key from source paper

Q145 JEE Main 2021 · 25 Feb · Shift 2 Numerical

The rate constant of a reaction increases by five times on increase in temperature from 27°C to 52°C. The value of activation energy in kJmol^{-1} is _____ .(Rounded-off to the nearest integer) $[R = 8.314\ \text{J K}^{-1}\ \text{mol}^{-1}]$

Numerical value type: the answer is a number.

Answer: 52. · Key from source paper

Q146 JEE Main 2021 · 24 Feb · Shift 1 Numerical

Gaseous cyclobutene isomerizes to butadiene in a first order process which has a 'K' value of $3.3 \times 10^{-4}\ \text{s}^{-1}$ at 153°C. The time in minutes it takes for the isomerization to proceed 40% to completion at this temperature is _____. (Rounded off to the nearest integer)

Numerical value type: the answer is a number.

Answer: 26. · Key from source paper

Q147 JEE Main 2021 · 24 Feb · Shift 2 Numerical

Sucrose hydrolyses in acid solution into glucose and fructose following first order rate law with a half-life of $3.33\ \mathrm{h}$ at $25^{\circ}\mathrm{C}$. After $9\ \mathrm{h}$, the fraction of sucrose remaining is f. The value of $\log_{10}\left(\frac{1}{\mathrm{f}}\right)$ is _____ $\times 10^{-2}$.
(Rounded off to the nearest integer)
[Assume: $\ln 10 = 2.303$, $\ln 2 = 0.693$]

Numerical value type: the answer is a number.

Answer: 81. · Key from source paper

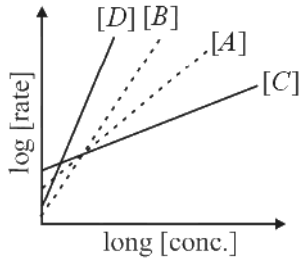
Q148 JEE Main 2020 · 6 Sep · Shift 1 MCQ

Consider the following reactions
$\mathrm{A} \rightarrow \mathrm{P1};\ \mathrm{B} \rightarrow \mathrm{P2};\ \mathrm{C} \rightarrow \mathrm{P3};\ \mathrm{D} \rightarrow \mathrm{P4}$
The order of the above reactions are a, b, c and d,respectively. The following graph is obtained when log[rate] vs.log[conc.] are plotted:
(see the figure above)
Among the following, the correct sequence for the order of the reactions is :

Q36. Consider the following reactions

$\mathrm{A} \rightarrow \mathrm{P1}; \mathrm{B} \rightarrow \mathrm{P2}; \mathrm{C} \rightarrow \mathrm{P3}; \mathrm{D} \rightarrow \mathrm{P4}$

The order of the above reactions are a, b, c and d,respectively. The following graph is obtained when log[rate] vs.log[conc.] are plotted:



Among the following, the correct sequence for the order of the reactions is :

(1) $\mathrm{d} > \mathrm{a} > \mathrm{b} > \mathrm{c}$
(2) $\mathrm{a} > \mathrm{b} > \mathrm{c} > \mathrm{d}$
(3) $\mathrm{c} > \mathrm{a} > \mathrm{b} > \mathrm{d}$
(4) $\mathrm{d} > \mathrm{b} > \mathrm{a} > \mathrm{c}$

(A) d > a > b > c
(B) a > b > c > d
(C) c > a > b > d
(D) d > b > a > c

Answer: (D) d > b > a > c · Key from source paper

Q149 JEE Main 2020 · 6 Sep · Shift 2 · Numerical

The rate of a reaction decreased by 3.555 times when the temperature was changed from $40\ ^\circ\mathrm{C}$ to $30\ ^\circ\mathrm{C}$. the activation energy (in $\mathrm{kJ\ mol^{-1}}$) of the reaction is _____.

Numerical value type: the answer is a number.

Answer: 100. · Key from source paper

Q150 JEE Main 2020 · 5 Sep · Shift 1 · MCQ

A flask contains a mixture of compounds A and B. Both compounds decompose by first-order kinetics. The half-lives for A and B are 300 s and 180 s, respectively. If the concentrations of A and B are equal initially, the time required for the concentration of A to be four times that of B (in s) is : (Use $\ln 2 = 0.693$)

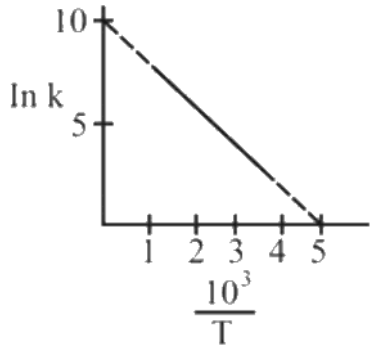
(A) 180
(B) 900
(C) 300
(D) 120

Answer: (B) 900 · Key from source paper

Q151 JEE Main 2020 · 5 Sep · Shift 2 · MCQ

The rate constant (k) of a reaction is measured at different temperature (T), and the data are plotted in the given figure. the activation energy of the reaction in $\mathrm{kJmol^{-1}}$ is : (R is gas constant)
(see the figure above)

Q38. The rate constant (k) of a reaction is measured at different temperature (T), and the data are plotted in the given figure. the activation energy of the reaction in $\mathrm{kJmol^{-1}}$ is : (R is gas constant)



(1) $2/R$
(2) $1/R$
(3) R
(4) $2R$

(A) $2/R$
(B) $1/R$
(C) R
(D) $2R$

Answer: (D) $2R$ · Key from source paper

Q152 JEE Main 2020 · 4 Sep · Shift 1 Numerical

If $75\,\%$ of a first order reaction was completed in 90 minutes, $60\,\%$ of the same reaction would be completed in approximately (in minutes) _____
(Take: $\log 2 = 0.30$; $\log 2.5 = 0.40$)

Numerical value type: the answer is a number.

Answer: 60. · Key from source paper

Q153 JEE Main 2020 · 4 Sep · Shift 2 Numerical

The number of molecules with energy greater than the threshold energy for a reaction increases five fold by a rise of temperature from $27^{\circ}\mathrm{C}$ to $42^{\circ}\mathrm{C}$. Its energy of activation in J/ mol is _____ (Take $\ln\ 5 = 1.6094$; $\mathrm{R} = 8.314\ \mathrm{J\ mol^{-1}}$)

Numerical value type: the answer is a number.

Answer: 84297. · Key from source paper

Q154 JEE Main 2020 · 3 Sep · Shift 1 MCQ

It is true that:

(A) A second order reaction is always a multistep reaction
(B) A zero order reaction is a multi-step reaction
(C) A first order reaction is always a single step reaction
(D) A zero order reaction is a single step reaction

Answer: (B) A zero order reaction is a multi-step reaction · Key from source paper

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Q155 JEE Main 2020 · 3 Sep · Shift 2 MCQ

For the reaction $2A + 3B + \frac{3}{2}C \rightarrow 3P$, which statement is correct?

(A) $\frac{dn_A}{dt} = \frac{3}{2}\frac{dn_B}{dt} = \frac{3}{4}\frac{dn_C}{dt}$
(B) $\frac{dn_A}{dt} = \frac{dn_B}{dt} = \frac{dn_C}{dt}$
(C) $\frac{dn_A}{dt} = \frac{2}{3}\frac{dn_B}{dt} = \frac{4}{3}\frac{dn_C}{dt}$
(D) $\frac{dn_A}{dt} = \frac{2}{3}\frac{dn_B}{dt} = \frac{3}{4}\frac{dn_C}{dt}$

Answer: (C) $\frac{dn_A}{dt} = \frac{2}{3}\frac{dn_B}{dt} = \frac{4}{3}\frac{dn_C}{dt}$ · Key from source paper

Q156 JEE Main 2020 · 2 Sep · Shift 2 MCQ

The results given in the below table were obtained during kinetic studies of the following reaction:

$2A + B \rightarrow C + D$

Experiment	$[A]/molL^{-1}$	$[B]/molL^{-1}$	Initial rate/$molL^{-1}\,min^{-1}$
I	0.1	0.1	6.00×10^{-3}
II	0.1	0.2	2.40×10^{-2}
III	0.2	0.1	1.20×10^{-2}
IV	X	0.2	7.20×10^{-2}
V	0.3	Y	2.88×10^{-1}

X and Y in the given table are respectively :

(A) $0.4,\ 0.4$

(B) $0.4,\ 0.3$

(C) $0.3,\ 0.4$

(D) $0.3,\ 0.3$

Answer: (C) $0.3,\ 0.4$ · Key from source paper

Q157 JEE Main 2020 · 9 Jan · Shift 1 MCQ

For the following reactions

$A \xrightarrow{700K}$ Product

$A \xrightarrow[\text{catalyst}]{500K}$ Product

It was found that the E_a is decreased by 30 KJ/mol in the presence of catalyst. If the rate remains unchanged, the activation energy for catalysed reaction is (Assume pre-exponential factor is same)

(A) 75 KJ/mol

(B) 105 KJ/mol

(C) 135 KJ/mol

(D) 198 KJ/mol

Answer: (A) 75 KJ/mol · Key from source paper

Q158 JEE Main 2020 · 9 Jan · Shift 2 Numerical

A sample of milk splits after 60min . at 300K and after 40min . at 400K when the population of lactobacillus acidophilus in it doubles. The activation energy (in kJ / mol) for this process is closest to _____.

(Given, $R = 8.3 Jmol^{-1}K^{-1}$, $\ln\left(\frac{2}{3}\right) = 0.4$, $e^{-3} = 4.0$)

Numerical value type: the answer is a number.

Answer: 3.98. · Key from source paper

Q159 JEE Main 2020 · 8 Jan · Shift 1 MCQ

The rate of a certain biochemical reaction at physiological temperature (T) occurs 10^6 times faster with enzyme than without. The change in the activation energy upon adding enzyme is:

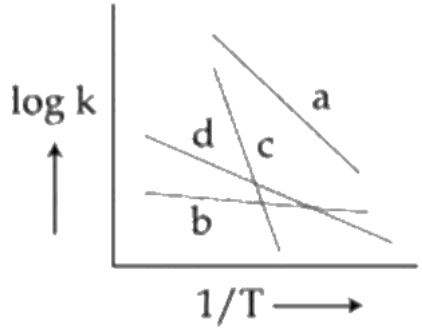
(A) $-6(2.303)\mathrm{RT}$
(B) $-6\mathrm{RT}$
(C) $+6(2.303)\mathrm{RT}$
(D) $+6\mathrm{RT}$

Answer: (A) $-6(2.303)\mathrm{RT}$ · Key from source paper

Q160 JEE Main 2020 · 8 Jan · Shift 2 MCQ

Consider the following plots of rate constant versus $\frac{1}{T}$ for four different reactions. Which of the following orders is correct for the activation energies of these reactions?
(see the figure above)

Q34. Consider the following plots of rate constant versus $\frac{1}{T}$ for four different reactions. Which of the following orders is correct for the activation energies of these reactions?



(1) $E_b > E_a > E_d > E_c$
(2) $E_a > E_c > E_d > E_b$
(3) $E_c > E_a > E_d > E_b$
(4) $E_b > E_d > E_c > E_a$

(A) $E_b > E_a > E_d > E_c$
(B) $E_a > E_c > E_d > E_b$
(C) $E_c > E_a > E_d > E_b$
(D) $E_b > E_d > E_c > E_a$

Answer: (C) $E_c > E_a > E_d > E_b$ · Key from source paper

Q161 JEE Main 2020 · 7 Jan · Shift 1 Numerical

During the nuclear explosion, one of the products is $^{90}\mathrm{Sr}$ with half life of 6.93 years. If $1\mu\mathrm{g}$ of $^{90}\mathrm{Sr}$ was absorbed in the bones of a newly born baby in place of Ca, how much time, in years, is required to reduce it by 90% if it is not lost metabolically _____ .

Numerical value type: the answer is a number.

Answer: 23.03. · Key from source paper

Q162 JEE Main 2020 · 7 Jan · Shift 2 MCQ

For the reaction $2\mathrm{H_2(g)} + 2\mathrm{NO(g)} \rightarrow \mathrm{N_2(g)} + 2\mathrm{H_2O(g)}$ the observed rate expression is, rate $= \mathrm{k_f[NO]^2[H_2]}$. The rate expression for the reverse reaction is:

(A) $k_b[N_2][H_2O]^2$

(B) $k_b[N_2][H_2O]^2/[NO]$

(C) $k_b[N_2][H_2O]$

(D) $k_b[N_2][H_2O]^2/[H_2]$

Answer: (D) $k_b[N_2][H_2O]^2/[H_2]$ · Key from source paper

Q163 JEE Main 2019 · 12 Apr · Shift 1 MCQ

In the following reaction; $xA \rightarrow yB$

$\log_{10} -\frac{dA}{dt} = \log_{10} \frac{dB}{dt} + 0.3010$

'A' and 'B' respectively can be:

(A) C_2H_4 and C_4H_8

(B) C_2H_2 and C_6H_6

(C) n-Butane and Iso-butane

(D) N_2O_4 and NO_2

Answer: (A) C_2H_4 and C_4H_8 · Key from source paper

Q164 JEE Main 2019 · 12 Apr · Shift 2 MCQ

NO_2 required for a reaction is produced by the decomposition of N_2O_5 in CCl_4 as per the equation, $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$. The initial concentration of N_2O_5 is $3.00\ \text{mol L}^{-1}$ and it is $2.75\ \text{mol L}^{-1}$ after 30 minutes. The rate of formation of NO_2 is:

(A) $1.667 \times 10^{-2}\ \text{mol L}^{-1}\ \text{min}^{-1}$

(B) $8.333 \times 10^{-3}\ \text{mol L}^{-1}\text{min}^{-1}$

(C) $4.167 \times 10^{-3}\ \text{mol L}^{-1}\text{min}^{-1}$

(D) $2.083 \times 10^{-3}\ \text{mol L}^{-1}\ \text{min}^{-1}$

Answer: (A) $1.667 \times 10^{-2}\ \text{mol L}^{-1}\ \text{min}^{-1}$ · Key from source paper

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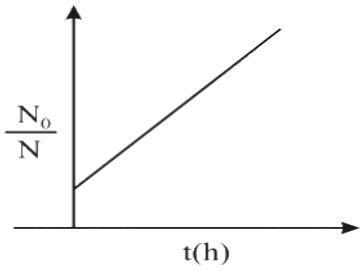
Q165 JEE Main 2019 · 10 Apr · Shift 1 MCQ

A bacterial infection in an internal wound grows as $N'(t) = N_0 \exp(t)$, where the time t is in hours. A dose of antibiotic, taken orally, needs 1 hour to reach the wound. Once it reaches there, the bacterial population goes down as $\frac{dN}{dt} = -5N^2$. What will be the plot of $\frac{N_0}{N}$ vs t after 1 hour?

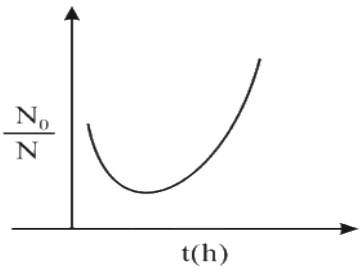
(see the figure above)

Q46. A bacterial infection in an internal wound grows as $N'(t) = N_0 \exp(t)$, where the time t is in hours. A dose of antibiotic, taken orally, needs 1 hour to reach the wound. Once it reaches there, the bacterial population goes down as $\frac{dN}{dt} = -5N^2$. What will be the plot of $\frac{N_0}{N}$ vs t after 1 hour?

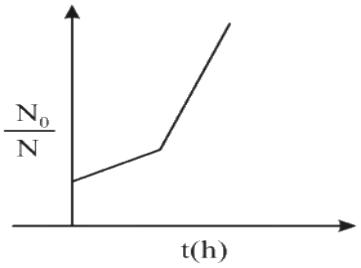
(1)



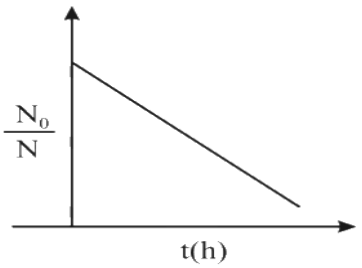
(2)



(3)



(4)



(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (A) · Key from source paper

Q166 JEE Main 2019 · 10 Apr · Shift 2 MCQ

For the reaction of H_2 with I_2, the rate constant is $2.5 \times 10^{-4}\ dm^3 mol^{-1} s^{-1}$ at $327^\circ C$ and $1.0\ dm^3$ mol-1s-1 at $527^\circ C$. The activation energy for the reaction, in kJ mol-1 is:
$R = 8.314\ JK^{-1} mol^{-1}$

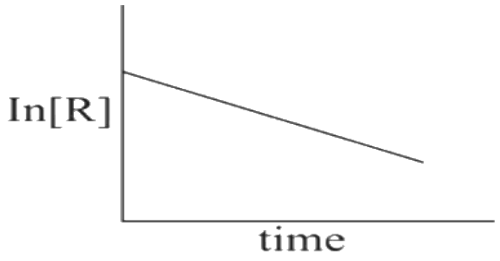
(A) 166
(B) 59
(C) 72
(D) 150

Answer: (A) 166 · Key from source paper

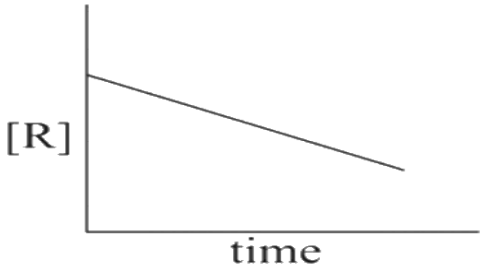
Q167 JEE Main 2019 · 9 Apr · Shift 1 MCQ

The given plots represent the variation of the concentration of a reactant R with time for two different reactions (i) and (ii). The respective orders of the reaction are
(see the figure above)

Q47. The given plots represent the variation of the concentration of a reactant R with time for two different reactions (i) and (ii). The respective orders of the reaction are



(i)



(ii)

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

(A) 1,1
(B) 0,1
(C) 1,0
(D) 0,2

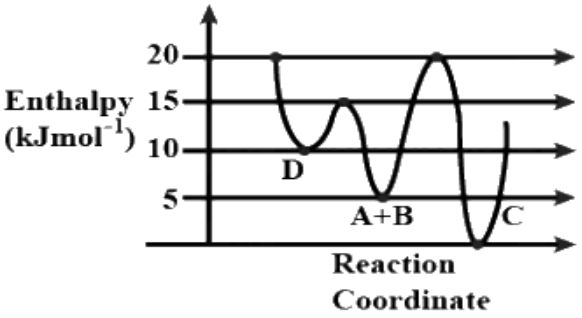
Answer: (C) 1,0 · Key from source paper

Q168 JEE Main 2019 · 9 Apr · Shift 2 MCQ

Consider the given plot of enthalpy of the following reaction between A and B. A + B → C + D. Identify the incorrect statement.

(see the figure above)

Q43. Consider the given plot of enthalpy of the following reaction between A and B. $A + B \rightarrow C + D$. Identify the incorrect statement.



(1) Formation of A and B from C has highest enthalpy of activation.
(2) D is kinetically stable product.
(3) C is the thermodynamically stable product.
(4) Activation enthalpy to form C is 5 kJ mol^{-1} less than that to form D.

(A) Formation of A and B from C has highest enthalpy of activation.
(B) D is kinetically stable product.
(C) C is the thermodynamically stable product.
(D) Activation enthalpy to form C is 5 kJ mol^{-1} less than to form D.

Answer: (D) Activation enthalpy to form C is 5 kJ mol^{-1} less than to form D. · Key from source paper

Q169 JEE Main 2019 · 8 Apr · Shift 1 MCQ

For the reaction $2A + B \rightarrow C$, the values of initial rate at different reactant concentrations are given in the table below. The rate law for the reactions is:
(see the figure above)

Q48. For the reaction $2A + B \rightarrow C$, the values of initial rate at different reactant concentrations are given in the table below. The rate law for the reactions is:

$[A]\left(\text{mol } L^{-1}\right)$	$[B]\left(\text{mol } L^{-1}\right)$	Initial Rate $\left(\text{mol } L^{-1}s^{-1}\right)$
0.05	0.05	0.045
0.10	0.05	0.090
0.20	0.10	0.72

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

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

Answer: (D) Rate = $k[A][B]^2$ · Key from source paper

Q170 JEE Main 2019 · 8 Apr · Shift 2 MCQ

For a reaction scheme A $\xrightarrow{k_1}$ B $\xrightarrow{k_2}$ C, if the net rate of formation of B is set to be zero then the concentration of B is given by:

(A) $k_1 + k_2\,[A]$
(B) $k_1 k_2\,[A]$
(C) $\frac{k_1}{k_2}\,[A]$
(D) $k_1 - k_2\,[A]$

Answer: (C) $\frac{k_1}{k_2}\,[A]$ · Key from source paper

Q171 JEE Main 2019 · 12 Jan · Shift 1 MCQ

Decomposition of X exhibits a rate constant of 0 .05 μg/ year. How many years are required for the decomposition of 5 μg of X into 2 .5 μg?

(A) 20
(B) 40
(C) 25
(D) 50

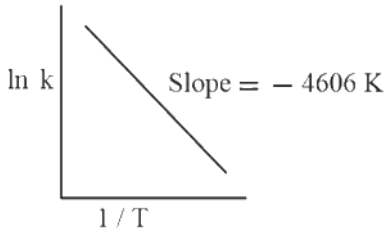
Answer: (D) 50 · Key from source paper

Q172 JEE Main 2019 · 12 Jan · Shift 2 MCQ

For a reaction, consider the plot of $ln\,k$ versus $1/T$ given in the figure. If the rate constant of this reaction at 400 K is $10^{-5}s^{-1}$, then the rate constant at 500 K is:

(see the figure above)

Q47. For a reaction, consider the plot of $ln\,k$ versus $1/T$ given in the figure. If the rate constant of this reaction at 400 K is $10^{-5}s^{-1}$, then the rate constant at 500 K is:



(1) $10^{-4}s^{-1}$ (2) $10^{-6}s^{-1}$
(3) $2\text{ x }10^{-4}s^{-1}$ (4) $4\text{ x }10^{-4}s^{-1}$

(A) $10^{-4}s^{-1}$
(B) $10^{-6}s^{-1}$
(C) $2\text{ x }10^{-4}s^{-1}$
(D) $4\text{ x }10^{-4}s^{-1}$

Answer: (A) $10^{-4}s^{-1}$ · Key from source paper

Q173 JEE Main 2019 · 11 Jan · Shift 1 MCQ

If a reaction follows the Arrhenius equation, the plot ln k vs $\frac{1}{(RT)}$ gives straight line with a gradient $(-y)$ unit. The energy required to activate the reactant is:

(A) y/R unit
(B) y unit
(C) yR unit
(D) $-y$ unit

Answer: (B) y unit · Key from source paper

Q174 JEE Main 2019 · 11 Jan · Shift 2 MCQ

The reaction 2X → B is a zeroth order reaction. If the initial concentration of X is 0.2M, the half-life is 6 h. When the initial concentration of X is 0.5M, the time required to reach its final concentration of 0.2M will be

(A) 9.0 h
(B) 12.0 h
(C) 18.0 h
(D) 7.2 h

Answer: (C) 18.0 h · Key from source paper

Q175 JEE Main 2019 · 10 Jan · Shift 1 MCQ

Consider the given plots for a reaction obeying Arrhenius equation $(0^{\circ}C < T < 300^{\circ}C)$: ($K$and E_a are rate constant and activetion energy, respectively)

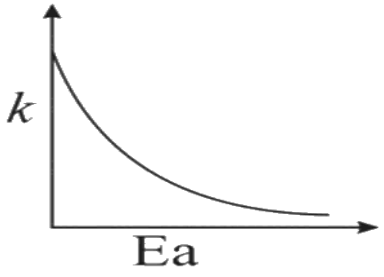
(see the figure above)

(I)

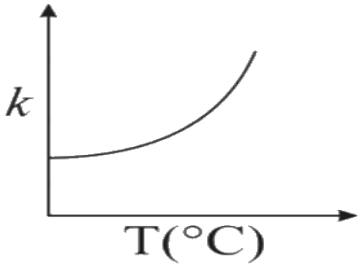
(see the figure above)

(II)

Q49. Consider the given plots for a reaction obeying Arrhenius equation $(0^{\circ}C < T < 300^{\circ}C)$: ($K$and E_a are rate constant and activetion energy, respectively)



(I)



(II)

(1) I is wrong but II is right
(2) Both I and II are wrong
(3) I is right but II is wrong
(4) Both I and II are correct

(A) I is wrong but II is right
(B) Both I and II are wrong
(C) I is right but II is wrong
(D) Both I and II are correct

Answer: (D) Both I and II are correct · Key from source paper

Q176 JEE Main 2019 · 10 Jan · Shift 2 MCQ

For an elementary chemical reaction, $A_2 \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} 2A$, the expression for $\frac{d[A]}{dt}$ is:

(A) $2k_1[A_2] - 2k_{-1}[A]^2$
(B) $2k_1[A_2] - k_{-1}[A]^2$
(C) $k_1[A_2] + k_{-1}[A]^2$
(D) $k_1[A_2] - k_{-1}[A]^2$

Answer: (A) $2k_1[A_2] - 2k_{-1}[A]^2$ · Key from source paper

Q177 JEE Main 2019 · 9 Jan · Shift 1 MCQ

The following results were obtained during kinetic studies of the reaction.
$2A + B \rightarrow$ product
Experiment | A in $mol\ L^{-1}$ | B in $mol\ L^{-1}$ | Initial rate of reaction in $mol\ L^{-1}\ min^{-1}$
I | 0.10 | 0.20 | 6.93×10^{-3}
II | 0.10 | 0.25 | 6.93×10^{-3}
III | 0.20 | 0.30 | 1.386×10^{-2}
The time (in minutes) required to consume half of A is

(A) 100
(B) 10
(C) 5
(D) 1

Options (2) or (3) were accepted. More than one answer was accepted. · Key from source paper

Q178 JEE Main 2019 · 9 Jan · Shift 2 MCQ

For the reaction, $2A + B \rightarrow$ products, when the concentration of A and B both were doubled, the rate of the reaction increased from $0.3\ mol\ L^{-1}s^{-1}$ to $2.4\ mol\ L^{-1}s^{-1}$. When the concentration of A alone is doubled, the rate increased from $0.3\ mol\ L^{-1}s^{-1}$ to $0.6\ mol\ L^{-1}s^{-1}$.
Which one of the following statements is correct?

(A) Order of the reaction with respect to B is 2
(B) Total order of the reaction is 4
(C) Order of the reaction with respect to A is 2
(D) Order of the reaction with respect to B is 1

Answer: (A) Order of the reaction with respect to B is 2 · Key from source paper

Q179 JEE Main 2018 · 16 Apr · Online MCQ

If $50\ \%$ of a reaction occurs in 100 second and $75\ \%$ of the reaction occurs in 200 second, the order of this reaction is:

(A) 2
(B) 3
(C) Zero
(D) 1

Answer: (D) 1 · Key from source paper

Q180 JEE Main 2018 · 15 Apr · Shift 1 MCQ

N_2O_5 decomposes to NO_2 and O_2 and follows first order kinetics. After 50 minutes, the pressure inside the vessel increases from 50 mm Hg to 87.5 mm Hg. The pressure of the gaseous mixture after 100 minutes at constant temperature will be _____.

(A) 136.25 mm Hg
(B) 106.25 mm Hg
(C) 175.0 mm Hg
(D) 116.25 mm Hg

Answer: (B) 106.25 mm Hg · Key from source paper

Q181 JEE Main 2018 · 15 Apr · Shift 2 MCQ

For a first order reaction, $A \rightarrow P$, $t_{1/2}$ (half-life) is 10 days. The time required for $\frac{1}{4}^{th}$ conversion of A (in days) is: ($\ln 2 = 0.693$, $\ln 3 = 1.1$).

(A) 3.2
(B) 2.5
(C) 4.1
(D) 5

Answer: (C) 4.1 · Key from source paper

Q182 JEE Main 2018 · 8 Apr · Offline MCQ

At $518^\circ C$, the rate of decomposition of a sample of gaseous acetaldehyde, initially at a pressure of 363 Torr was 1.00 Torr s^{-1} when 5% had reacted and 0.50 Torr s^{-1} when 33% had reacted. The order of the reaction is:

(A) 0
(B) 2
(C) 3
(D) 1

Answer: (B) 2 · Key from source paper

Q183 JEE Main 2017 · 9 Apr · Online MCQ

The rate of a reaction quadruples when the temperature changes from 300 to 310 K. The activation energy of this reaction is:
(Assume Activation energy and pre-exponential factor are independent of temperature; $\ln(2) = 0.693$; $R = 8.314\ \text{J mol}^{-1}\text{K}^{-1}$)

(A) $53.6\ \text{kJ mol}^{-1}$
(B) $214.4\ \text{kJ mol}^{-1}$
(C) $107.2\ \text{kJ mol}^{-1}$
(D) $53.7\ \text{kJ mol}^{-1}$

Answer: (C) $107.2\ \text{kJ mol}^{-1}$ · Key from source paper

Q184 JEE Main 2017 · 8 Apr · Online MCQ

The rate of a reaction A doubles on increasing the temperature from 300 to 310 K. By how much, the temperature of reaction B should be increased from 300 K so that rate doubles if activation energy of the reaction B is twice to that of reaction A.

(A) 4.92 K
(B) 9.84 K
(C) 19.67 K
(D) 2.45 K

Answer: (A) 4.92 K · Key from source paper

Q185 JEE Main 2017 · 2 Apr · Offline MCQ

Two reactions A_1 and A_2 have identical pre-exponential factors. The activation energy of A_1 is more than A_2 by $10\ \text{kJ mol}^{-1}$. If k_1 and k_2 are the rate constants for reactions A_1 and A_2, respectively at $300\ \text{K}$, then $\ln \frac{k_2}{k_1}$ is equal to
$R = 8.314\ \text{J mol}^{-1}\text{K}^{-1}$

(A) 12
(B) 6
(C) 4
(D) 8

Answer: (C) 4 · Key from source paper

Q186 JEE Main 2016 · 10 Apr · Online MCQ

The rate law for the reaction below is given by the expression $k[A][B]$
$A + B \rightarrow \text{Product}$
If the concentration of B is increased from 0.1 to $0.3\ \text{mol}$, keeping the value of A at $0.1\ \text{mol}$, the rate constant will be:

(A) $3k$

(B) $9k$

(C) $k/3$

(D) k

Answer: (D) k · Key from source paper

Q187 JEE Main 2016 · 9 Apr · Online MCQ

The reaction of ozone with oxygen atoms in the presence of chlorine atoms can occur by a two step process shown below:

$O_3(g) + Cl^{\bullet} \rightarrow O_2(g) + ClO^{\bullet}(g)$ ...(i)

$k_i = 5.2 \times 10^9\ L\ mol^{-1}\ s^{-1}$

$ClO^{\bullet}(g) + O^{\bullet}(g) \rightarrow O_2(g) + Cl^{\bullet}(g)$ ...(ii)

$k_{ii} = 2.6 \times 10^{10}\ L\ mol^{-1}\ s^{-1}$

The closest rate constant for the overall reaction $O_3(g) + O^{\bullet}(g) \rightarrow 2O_2(g)$ is:

(A) $1.4 \times 10^{20}\ L\ mol^{-1}\ s^{-1}$

(B) $3.1 \times 10^{10}\ L\ mol^{-1}\ s^{-1}$

(C) $5.2 \times 10^9\ L\ mol^{-1}\ s^{-1}$

(D) $2.6 \times 10^{10}\ L\ mol^{-1}\ s^{-1}$

Answer: (C) $5.2 \times 10^9\ L\ mol^{-1}\ s^{-1}$ · Checked by our team

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Q188 JEE Main 2016 · 3 Apr · Offline MCQ

Decomposition of H_2O_2 follows a first order reaction. In fifty minutes the concentration of H_2O_2 decreases from 0.5 to 0.125 M in one such decomposition. When the concentration of H_2O_2 reaches 0.05 M , the rate of formation of O_2 will be:

(A) $2.66\ L\ min^{-1}$ at STP

(B) $1.34 \times 10^{-2}\ mol\ min^{-1}$

(C) $6.93 \times 10^{-2}\ mol\ min^{-1}$

(D) $6.93 \times 10^{-4}\ mol\ min^{-1}$

Answer: (D) $6.93 \times 10^{-4}\ mol\ min^{-1}$ · Key from source paper

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Q189 JEE Main 2015 · 11 Apr · Online MCQ

A + 2B $\rightarrow$ C , the rate equation for the reaction is given as

Rate = k [A] [B]

If the concentration of A is kept the same but that of B is doubled what will happen to the rate itself?

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(A) Doubled
(B) Halved
(C) The same
(D) Quadrupled

Answer: (A) Doubled · Key from source paper

Q190 JEE Main 2015 · 11 Apr · Online MCQ

For the equilibrium, A(g) $\rightleftharpoons$ B(g), ΔH is $-$ 40 kJ / mol . If the ratio of the activation energies of the forward (E_f) and reverse (E_b) reactions is $\frac{2}{3}$ then:

(A) E_f = 30 kJ / mol, E_b = 70 kJ / mol
(B) E_f = 70 kJ / mol, E_b = 30 kJ / mol
(C) E_f = 80 kJ / mol, E_b = 120 kJ / mol
(D) E_f = 60 kJ / mol,E_b = 100 kJ / mol

Answer: (C) E_f = 80 kJ / mol, E_b = 120 kJ / mol · Key from source paper

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Q191 JEE Main 2015 · 10 Apr · Online MCQ

The reaction $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$ follows first order kinetics. The pressure of a vessel containing only N_2O_5 was found to increase from 50 mm Hg to 87.5 mm Hg in 30 min. The pressure exerted by the gases after 60 min. Will be (Assume temperature remains constant) :

(A) 106.25 mm Hg
(B) 125 mm Hg
(C) 116.25 mm Hg
(D) 150 mm Hg

Answer: (A) 106.25 mm Hg · Key from source paper

Q192 JEE Main 2015 · 4 Apr · Offline MCQ

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

(A) Loss of active species on collision.
(B) Low probability of simultaneous collision of all the reacting species.
(C) Increase in entropy and activation energy as more molecules are involved.
(D) Shifting of equilibrium towards reactants due to elastic collisions.

Answer: (B) Low probability of simultaneous collision of all the reacting species. · Key from source paper

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Q193 JEE Main 2014 · 19 Apr · Online MCQ

For the reaction, $3A + 2B \rightarrow C + D$, the differential rate law can be written as :

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

Answer: (C) $-\frac{1}{3}\frac{d[A]}{dt} = \frac{d[C]}{dt} = k[A]^n[B]^m$ · Key from source paper

Q194 JEE Main 2014 · 12 Apr · Online MCQ

The rate coefficient (k) for a particular reactions is $1.3 \times 10^{-4}\mathrm{M}^{-1}\ \mathrm{s}^{-1}$ at $100^{\circ}\mathrm{C}$, and $1.3 \times 10^{-3}\ \mathrm{M}^{-1}\ \mathrm{s}^{-1}$ at $150^{\circ}\mathrm{C}$. What is the energy of activation $(\mathrm{E_A})$ (in kJ) for this reaction? (R = molar gas constant $= 8.314\mathrm{JK}^{-1}\ \mathrm{mol}^{-1}$)

(A) 16
(B) 60
(C) 99
(D) 132

Answer: (B) 60 · Key from source paper

Q195 JEE Main 2014 · 11 Apr · Online MCQ

In the reaction of formation of sulphur trioxide by contact process $2\mathrm{SO_2} + \mathrm{O_2} \rightleftharpoons 2\mathrm{SO_3}$ the rate of reaction was measured as $\frac{\mathrm{d[O_2]}}{\mathrm{dt}} = -2.5 \times 10^{-4}\ \mathrm{mol\ L^{-1}\ s^{-1}}$. The rate of reaction is terms of $[\mathrm{SO_2}]$ in $\mathrm{molL^{-1}\ s^{-1}}$ will be:

(A) -1.25×10^{-4}
(B) -2.50×10^{-4}
(C) -3.75×10^{-4}
(D) -5.00×10^{-4}

Answer: (D) -5.00×10^{-4} · Key from source paper

Q196 JEE Main 2014 · 11 Apr · Online MCQ

For the reaction, $2\ \mathrm{N_2O_5} \rightarrow 4\mathrm{NO_2} + \mathrm{O_2}$, the rate equation can be expressed in two ways $-\frac{\mathrm{d[N_2O_5]}}{\mathrm{dt}} = \mathrm{k}\ [\mathrm{N_2O_5}]$ and $+\frac{\mathrm{d[NO_2]}}{\mathrm{dt}} = \mathrm{k'}\ [\mathrm{N_2O_5}]$ k and k' are related as:

(A) $\mathrm{k} = \mathrm{k'}$
(B) $2\mathrm{k} = \mathrm{k'}$
(C) $\mathrm{k} = 2\mathrm{k'}$
(D) $\mathrm{k} = 4\mathrm{k'}$

Answer: (B) $2\mathrm{k} = \mathrm{k'}$ · Key from source paper

Q197 JEE Main 2014 · 9 Apr · Online MCQ

The half-life period of a first-order reaction is 15 minutes. The amount of substance left after one hour will be

(A) $\frac{1}{16}$ of the original amount
(B) $\frac{1}{8}$ of the original amount.
(C) $\frac{1}{32}$ of the original amount.
(D) $\frac{1}{4}$ of the original amount.

Answer: (A) $\frac{1}{16}$ of the original amount · Key from source paper

Q198 JEE Main 2014 · 6 Apr · Offline MCQ

For the non-stoichiometry reaction, 2A + B $\rightarrow$ C + D, the following kinetic data were obtained in three separate experiments, all at 298 K.

Initial Concentration (A) | Initial Concentration (B) | Initial rate of formation of C (mol L^{-} S^{-})
0.1 M | 0.1 M | 1.2×10^{-3}
0.1 M | 0.2 M | 1.2×10^{-3}
0.2 M | 0.1 M | 2.4×10^{-3}

The rate law for the formation of C is

(A) $\frac{dc}{dt} = \mathrm{k[A][B]}$
(B) $\frac{dc}{dt} = \mathrm{k[A]^2[B]}$
(C) $\frac{dc}{dt} = \mathrm{k[A][B]^2}$
(D) $\frac{dc}{dt} = \mathrm{k[A]}$

Answer: (D) $\frac{dc}{dt} = \mathrm{k[A]}$ · Key from source paper

Q199 JEE Main 2013 · 25 Apr · Online MCQ

A radioactive isotope having a half - life period of 3 days was received after 12 days. If 3 g of the isotope is left in the container, what would be the initial mass of the isotope ?

(A) 12 g
(B) 36 g
(C) 48 g
(D) 24 g

Answer: (C) 48 g · Key from source paper

Q200 JEE Main 2013 · 23 Apr · Online MCQ

The rate constant of a zero order reaction is $2.0 \times 10^{-2}\ \mathrm{mol\ L^{-1}\ s^{-1}}$. If the concentration of the reactant after 25 seconds is 0.5M. What is the initial concentration?

(A) 0.5M
(B) 1.25M
(C) 12.5M
(D) 1.0M

Answer: (D) 1.0M · Key from source paper

Q201 JEE Main 2013 · 22 Apr · Online MCQ

The reaction $\mathrm{X} \rightarrow \mathrm{Y}$ is an exothermic reaction. Activation energy of the reaction for X into Y is $150\ \mathrm{kJ\ mol^{-1}}$. Enthalpy of reaction is $135\ \mathrm{kJ\ mol^{-1}}$. The activation energy for the reverse reaction, $\mathrm{Y} \rightarrow \mathrm{X}$ will be :

(A) $280\ \mathrm{kJ\ mol^{-1}}$
(B) $285\ \mathrm{kJ\ mol^{-1}}$
(C) $270\ \mathrm{kJ\ mol^{-1}}$
(D) $15\ \mathrm{kJ\ mol^{-1}}$

Answer: (B) $285\ \mathrm{kJ\ mol^{-1}}$ · Key from source paper

Q202 JEE Main 2013 · 9 Apr · Online MCQ

The instantaneous rate of disappearance of $\mathrm{MnO_4^-}$ ion in the following reaction is $4.56 \times 10^{-3}\ \mathrm{Ms^{-1}}$ $2\mathrm{MnO_4^-} + 10\mathrm{I^-} + 16\mathrm{H^+} \rightarrow 2\mathrm{Mn^{2+}} + 5\mathrm{I_2} + 8\mathrm{H_2O}$ The rate of appearance $\mathrm{I_2}$ is :

(A) $4.56 \times 10^{-4}\ \mathrm{Ms^{-1}}$
(B) $1.14 \times 10^{-2}\ \mathrm{Ms^{-1}}$
(C) $1.14 \times 10^{-3}\ \mathrm{Ms^{-1}}$
(D) $5.7 \times 10^{-3}\ \mathrm{Ms^{-1}}$

Answer: (B) $1.14 \times 10^{-2}\ \mathrm{Ms^{-1}}$ · Key from source paper

Q203 JEE Main 2013 · 7 Apr · Offline MCQ

The rate of a reaction doubles when its temperature changes from 300K to 310K. Activation energy of such a reaction will be:
(R = 8.314 $\mathrm{JK^{-1}\ mol^{-1}}$ and log 2= 0.301)

(A) $58.5\ \mathrm{kJ\ mol^{-1}}$
(B) $60.5\ \mathrm{kJ\ mol^{-1}}$
(C) $53.6\ \mathrm{kJ\ mol^{-1}}$
(D) $48.6\ \mathrm{kJ\ mol^{-1}}$

Answer: (C) $53.6\ \mathrm{kJ\ mol^{-1}}$ · Key from source paper

Q204 AIEEE 2012 · 26 May · Online MCQ

The activation energy for a reaction which doubles the rate when the temperature is raised from 298 K to 308 K is

(A) 59.2 kJ mol^{-1}
(B) 39.2 kJ mol^{-1}
(C) 52.9 kJ mol^{-1}
(D) 29.5 kJ mol^{-1}

Answer: (C) 52.9 kJ mol^{-1} · Key from source paper

Q205 AIEEE 2012 · 19 May · Online MCQ

For a reaction $A \rightarrow$ Products, a plot of $\log t_{1/2}$ versus $\log a_0$ is shown in the figure. If the initial concentration of A is represented by a_0, the order of the reaction is

(A) one
(B) zero
(C) two
(D) three

Answer: (B) zero · Key from source paper

Q206 AIEEE 2012 · 12 May · Online MCQ

In a chemical reaction A is converted into B. The rates of reaction, starting with initial concentrations of A as $2 \times 10^{-3}\mathrm{M}$ and 1×10^{-3} M, are equal to $2.40 \times 10^{-4}\mathrm{Ms}^{-1}$ and $0.60 \times 10^{-4}\mathrm{Ms}^{-1}$ respectively. The order of reaction with respect to reactant A will be

(A) 0
(B) 1.5
(C) 1
(D) 2

Answer: (D) 2 · Key from source paper

Q207 AIEEE 2012 · 7 May · Online MCQ

Reaction rate between two substance A and B is expressed as following: rate = $k[A]^n[B]^m$ If the concentration of A is doubled and concentration of B is made half of initial concentration, the ratio of the new rate to the earlier rate will be:

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(A) $m+n$
(B) $n-m$
(C) $\frac{1}{2^{(m+n)}}$
(D) $2^{(n-m)}$

Answer: (D) $2^{(n-m)}$ · Key from source paper

Q208 AIEEE 2012 · Offline MCQ

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

(A) $1.73 \times 10^{-5} \mathrm{M/min}$
(B) $3.47 \times 10^{-4} \mathrm{M/min}$
(C) $3.47 \times 10^{-5} \mathrm{M/min}$
(D) $1.73 \times 10^{-4} \mathrm{M/min}$

Answer: (B) $3.47 \times 10^{-4} \mathrm{M/min}$ · Key from source paper

Q209 AIEEE 2011 MCQ

The rate of a chemical reaction doubles for every $10^{\circ}\mathrm{C}$ rise of temperature. If the temperature is raised by $50^{\circ}\mathrm{C}$, the rate of the reaction increases by about :

(A) 24 times
(B) 32 times
(C) 64 times
(D) 10 times

Answer: (B) 32 times · Key from source paper

Q210 AIEEE 2010 MCQ

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

(A) 4 h
(B) 0.5 h
(C) 0.25 h
(D) 1 h

Answer: (C) 0.25 h · Key from source paper

Q211 AIEEE 2010 MCQ

Consider the reaction :
$\mathrm{Cl_2(aq) + H_2\,S(aq) \rightarrow S(s) + 2H^+(aq) + 2Cl^-(aq)}$

The rate equation for this reaction is rate = k $[Cl_2]$ $[H_2S]$ Which of these mechanisms is/are consistent with this rate equation? (A) $Cl_2 + H_2 \rightarrow H^+ + Cl^- + Cl^+ + HS^-$ (slow)
$Cl^+ + HS^- \rightarrow H^+ + Cl^- + S$ (fast)
(B) $H_2S \rightleftharpoons H^+ + HS^-$ (fast equilibrium) $Cl_2 + HS^- \rightarrow 2Cl^- + H^+ + S$ (slow)

(A) B only
(B) Both A and B
(C) Neither A nor B
(D) A only

Answer: (D) A only · Key from source paper

Q212 AIEEE 2009 MCQ

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

(A) 230.3 minutes
(B) 23.03 minutes
(C) 46.06 minutes
(D) 460.6 minutes

Answer: (C) 46.06 minutes · Key from source paper

Q213 AIEEE 2008 MCQ

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

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

Answer: (B) $-\frac{d[A]}{dt} = \frac{1}{4}\frac{d[B]}{dt}$ · Key from source paper

Q214 AIEEE 2007 MCQ

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

(A) 300
(B) 120
(C) 280
(D) 20

Answer: (D) 20 · Key from source paper

Q215 AIEEE 2007 MCQ

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

(A) $L\ mol^{-1}\ s^{-1}$
(B) no unit
(C) $mol\ L^{-1}\ s^{-1}$
(D) s^{-1}

Answer: (A) $L\ mol^{-1}\ s^{-1}$ · Key from source paper

Q216 AIEEE 2007 MCQ

A radioactive element gets spilled over the floor of a room. Its half-life period is 30 days. If the initial activity is ten times the permissible value, after how many days will it be safe to enter the room?

(A) 1000 days
(B) 300 days
(C) 10 days
(D) 100 days

Answer: (D) 100 days · Key from source paper

Q217 AIEEE 2006 MCQ

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

(A) remain unchanged
(B) triple
(C) increase by a factor of 4
(D) double

Answer: (C) increase by a factor of 4 · Key from source paper

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Q218 AIEEE 2006 MCQ

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

(A) the energy above which all the colliding molecules will react
(B) the energy below which colliding molecules will not react
(C) the total energy of the reacting molecules at a temperature, T
(D) the fraction of molecules with energy greater than the activation energy of the reaction

Answer: (B) the energy below which colliding molecules will not react · Key from source paper

Q219 AIEEE 2006 MCQ

The following mechanism has been proposed for the reaction of NO with $\mathrm{Br_2}$ to form NOBr :
$\mathrm{NO(g) + Br_2(g) \rightleftharpoons NOBr_2(g)}$
$\mathrm{NOBr_2(g) + NO(g) \longrightarrow 2NOBr(g)}$
If the second step is the rate determining step, the order of the reaction with respect to $NO(g)$ is

(A) 1
(B) 0
(C) 3
(D) 2

Answer: (D) 2 · Key from source paper

Q220 AIEEE 2005 MCQ

Consider an endothermic reaction, $X \longrightarrow Y$ with the activation energies E_b and E_f for the backward and forward reactions, respectively. In general

(A) $\mathrm{E_b < E_f}$
(B) $E_b > E_f$
(C) $E_b = E_f$
(D) There is no definite relation between E_b and E_f

Answer: (A) $\mathrm{E_b < E_f}$ · Key from source paper

Q221 AIEEE 2005 MCQ

A reaction involving two different reactants can never be

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(A) Unimolecular reaction
(B) First order reaction
(C) second order reaction
(D) Bimolecular reaction

Answer: (A) Unimolecular reaction · Key from source paper

Q222 AIEEE 2005 MCQ

$t_{1/4}$ can be taken as the time taken for the concentration of a reactant to drop to $\frac{3}{4}$ of its initial value. If the rate constant for a first order reaction is K, the $t_{1/4}$ can be written as

(A) 0.10/K
(B) 0.29/K
(C) 0.69/K
(D) 0.75/K

Answer: (B) 0.29/K · Key from source paper

Q223 AIEEE 2004 MCQ

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

(A) 30 minutes
(B) 60 minutes
(C) 7.5 minutes
(D) 15 minutes

Answer: (A) 30 minutes · Key from source paper

Q224 AIEEE 2004 MCQ

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

(A) unit of K must be s^{-1}
(B) values of k is independent of the initial concentration of A and B
(C) rate of formation of C is twice the rate of disappearance of A
(D) $t_{1/2}$ is a constant

Answer: (B) values of k is independent of the initial concentration of A and B · Key from source paper

Q225 AIEEE 2004 MCQ

The half - life of a radioisotope is four hours. If the initial mass of the isotope was 200 g, the mass remaining after 24 hours undecayed is

(A) 1.042 g
(B) 4.167 g
(C) 3.125 g
(D) 2.084 g

Answer: (C) 3.125 g · Key from source paper

Q226 AIEEE 2003 MCQ

The half-life of a radioactive isotope is three hours. If the initial mass of the isotope were 256 g, the mass of it remaining undecayed after 18 hours would be

(A) 8.0 g
(B) 12.0 g
(C) 16.0 g
(D) 4.0 g

Answer: (D) 4.0 g · Key from source paper

Q227 AIEEE 2003 MCQ

In respect of the equation $k = Ae^{-E_a/RT}$ in chemical kinetics, which one of the following statements is correct?

(A) A is adsorption factor
(B) $\mathrm{E_a}$ is energy of activation
(C) R is Rydberg's constant
(D) k is equilibrium constant

Answer: (B) $\mathrm{E_a}$ **is energy of activation** · Key from source paper

Q228 AIEEE 2003 MCQ

The rate law for a reaction between the substances A and B is given by Rate $= k[A]^n[B]^m$ On doubling the concentration of A and halving the concentration of B, the ratio of the new rate to the earlier rate of the reaction will be as

(A) $(m+n)$
(B) $(n-m)$
(C) $2^{(n-m)}$
(D) $\frac{1}{2^{(m+n)}}$

Answer: (C) $2^{(n-m)}$ · Key from source paper

Q229 AIEEE 2003 MCQ

For the reaction system: $2\mathrm{NO(g)} + \mathrm{O_2(g)} \rightarrow 2\mathrm{NO_2(g)}$ volume is suddenly reduce to half its value by increasing the pressure on it. If the reaction is of first order with respect to $\mathrm{O_2}$ and second order with

respect to NO, the rate of reaction will

(A) diminish to one-eighth of its initial value
(B) increase to eight times of its initial value
(C) increase to four times of its initial value
(D) diminish to one-fourth of its initial value

Answer: (B) increase to eight times of its initial value · Key from source paper

Q230 AIEEE 2002 MCQ

Units of rate constant of first and zero order reactions in terms of molarity M unit are respectively

(A) $\sec^{-1}, \mathrm{Msec}^{-1}$
(B) $\sec^{-1}$, M
(C) $\mathrm{Msec}^{-1}, \sec^{-1}$
(D) M, $\sec^{-1}$

Answer: (A) $\sec^{-1}, \mathrm{Msec}^{-1}$ · Key from source paper

Q231 AIEEE 2002 MCQ

For the reaction $A + 2B \rightarrow C$, rate is given by $R = [A][B]^2$ then the order of the reaction is

(A) 3
(B) 6
(C) 5
(D) 7

Answer: (A) 3 · Key from source paper

Q232 AIEEE 2002 MCQ

The differential rate law for the reaction $\mathrm{H_2} + \mathrm{I_2} \rightarrow 2\mathrm{HI}$ is

(A) $-\frac{\mathrm{d[H_2]}}{\mathrm{dt}} = -\frac{\mathrm{d[I_2]}}{\mathrm{dt}} = -\frac{\mathrm{d[HI]}}{\mathrm{dt}}$
(B) $\frac{\mathrm{d[H_2]}}{\mathrm{dt}} = \frac{\mathrm{d[I_2]}}{\mathrm{dt}} = \frac{1}{2}\frac{1\,\mathrm{d[HI]}}{\mathrm{dt}}$
(C) $\frac{1}{2}\frac{\mathrm{d[H_2]}}{\mathrm{dt}} = \frac{1}{2}\frac{\mathrm{d[I_2]}}{\mathrm{dt}} = -\frac{\mathrm{d[HI]}}{\mathrm{dt}}$
(D) $-2\frac{\mathrm{d[H_2]}}{\mathrm{dt}} = -2\frac{\mathrm{d[I_2]}}{\mathrm{dt}} = \frac{\mathrm{d[HI]}}{\mathrm{dt}}$

Answer: (D) $-2\frac{\mathrm{d[H_2]}}{\mathrm{dt}} = -2\frac{\mathrm{d[I_2]}}{\mathrm{dt}} = \frac{\mathrm{d[HI]}}{\mathrm{dt}}$ · Key from source paper

Q233 AIEEE 2002 MCQ

If half-life of a substance is 5 yrs, then the total amount of substance left after 15 years, when initial amount is 64 grams is

(A) 16 grams
(B) 2 grams
(C) 32 grams
(D) 8 grams

Answer: (D) 8 grams · Key from source paper

Q234 AIEEE 2002 MCQ

The integrated rate equation is $Rt = \log C_0 - \log C_t$. The straight line graph is obtained by plotting

(A) time vs $\log C_t$
(B) $\frac{1}{\text{time}}$ vs C_t
(C) time vs C_t
(D) $\frac{1}{\text{time}}$ vs $\frac{1}{C_t}$

Answer: (A) time vs $\log C_t$ · Key from source paper

Q235 AIEEE 2002 MCQ

The formation of gas at the surface of tungsten due to adsorption is the reaction of order

(A) 0
(B) 1
(C) 2
(D) insufficient data

Answer: (A) 0 · Key from source paper

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