

Q1 JEE Main 2020 - 2 September (Evening)

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



Experiment	[A]/ molL^{-1}	[B]/ molL^{-1}	Initial rate / $\text{molL}^{-1} \text{min}^{-1}$
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) 0.4,0.3
- (B) 0.3,0.4
- (C) 0.4,0.4
- (D) 0.3,0.3

Q2 JEE Main 2020 - 3 September (Morning)

It is true that

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

Q3 JEE Main 2020 - 3 September (Evening)

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) $\frac{dn_A}{dt} = \frac{2}{3} \frac{dn_B}{dt} = \frac{3}{4} \frac{dn_C}{dt}$

Q4 JEE Main 2020 - 4 September (Morning)

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 : $\log 2 = 0.30$; $\log 2.5 = 0.40$)

Q5 JEE Main 2020 - 4 September (Evening)

If the equilibrium constant for $A \rightleftharpoons B + C$ is $K_{eq}^{(1)}$ and that of $B + C \rightleftharpoons P$ is $K_{eq}^{(2)}$, the equilibrium constant for $A \rightleftharpoons P$ is

- (A) $K_{eq}^{(1)} / K_{eq}^{(2)}$
 (B) $K_{eq}^{(1)} + K_{eq}^{(2)}$
 (C) $K_{eq}^{(2)} - K_{eq}^{(1)}$
 (D) $K_{eq}^{(1)} K_{eq}^{(2)}$

Q6 JEE Main 2020 - 4 September (Evening)

The number of molecules with energy greater than the threshold energy for a reaction increases five fold by a rise of temperature from 27°C to 42°C . Its energy of activation in J/mol is

(Take $\ln 5 = 1.6094$; $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$)

Q7 JEE Main 2020 - 5 September (Morning)

A flask contains a mixture of compounds A and

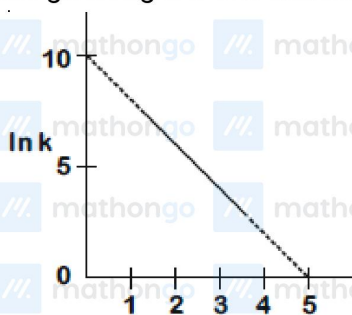
B. Both compounds decompose by first-order kinetics. The half-lives for A and B are 300s and 180s,

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

Q8 JEE Main 2020 - 5 September (Evening)

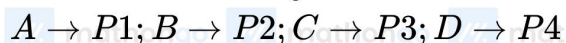
The rate constant (k) of a reaction is measured at different temperatures (T), and the data are plotted in the given figure. The activation energy of the reaction in kJ mol^{-1} is (R is gas constant)



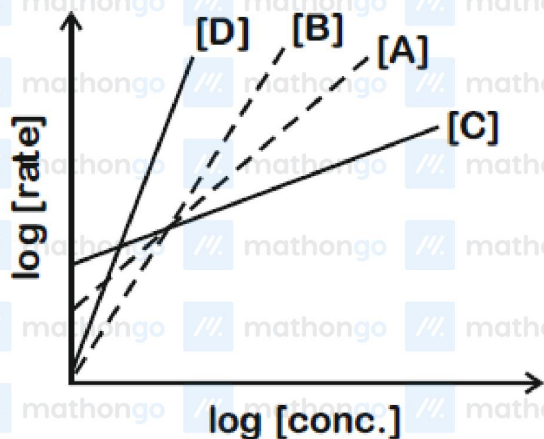
- (A) $1/R$
- (B) $2/R$
- (C) $2R$
- (D) R

Q9 JEE Main 2020 - 6 September (Morning)

Consider the following reactions



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



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

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

Q10 JEE Main 2020 - 6 September (Evening)

The rate of a reaction decreased by 3.555 times when the temperature was changed from 40°C to 30°C . The activation energy (in kJmol^{-1}) of the reaction is \rightarrow take;

$$R = 8.314\text{Jmol}^{-1}\text{K}^{-1} \ln 3.555 = 1.268$$

Q11 JEE Main 2020 - 7 January (Morning)

During the nuclear explosion, one of the products is ^{90}Sr with half life of 6.93 years. If $1\ \mu\text{g}$ of ^{90}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.

Q12 JEE Main 2020 - 7 January (Evening)

For the reaction, $2\text{H}_2(\text{g}) + 2\text{NO}(\text{g}) \rightarrow \text{N}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$; the observed rate expression is, $\text{rate} = k_f[\text{NO}]^2[\text{H}_2]$. The rate expression for the reverse reaction is:

- (A) $k_b = [\text{N}_2][\text{H}_2]^2/[\text{H}_2]$

Chemical Kinetics

JEE Main 2020 Chapterwise

Questions with Answer Keys

Chemistry

$$(B) k_b = [K_2][H_2O]^2/[H_2]$$

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

$$(D) k_b = [N_2][N_2O]^2/[H_2]$$

Q13 JEE Main 2020 - 8 January (Morning)

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 :

$$(A) -6 \times 2.303 RT$$

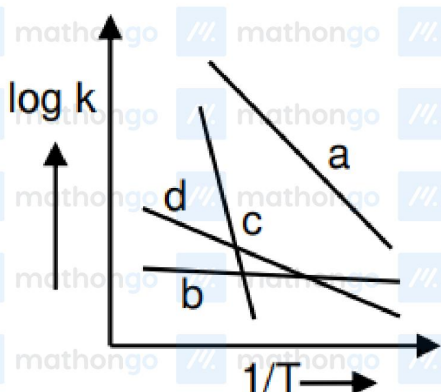
$$(B) +6 \times 2.303 RT$$

$$(C) +6 RT$$

$$(D) -6 RT$$

Q14 JEE Main 2020 - 8 January (Evening)

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?



$$(A) E_c > E_a > E_d > E_b$$

$$(B) E_a > E_d > E_c < E_b$$

$$(C) E_c > E_b > E_a > E_d$$

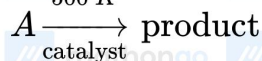
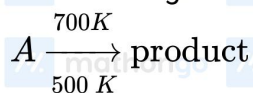
$$(D) E_d > E_a > E_b > E_c$$

Q15 JEE Main 2020 - 9 January (Morning)

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For following reactions



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 (Assumer pre exponential factor is same) :

- (A) 75 kJ
- (B) 135 kJ
- (C) 105 kJ
- (D) 125 kJ

Q16 JEE Main 2020 - 9 January (Evening)

A sample of milk splits after 60 min. at 300 K and after 40 min. at 400 K when the population of lactobacillus acidophilus in it doubles. The activation energy (in kJmol^{-1}) for this process is closest to

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

Chemical Kinetics

Questions with Answer Keys

JEE Main 2020 Chapterwise

Chemistry

Answer Key

Q1 (B)	Q2 (B)	Q3 (C)	Q4 (60)
Q5 (D)	Q6 (84297.48)	Q7 (D)	Q8 (C)
Q9 (A)	Q10 (100)	Q11 (23.03)	Q12 (C)
Q13 (A)	Q14 (A)	Q15 (A)	Q16 (3.98)

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