

AIPMT 2009

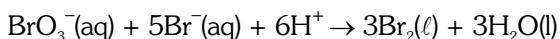
1. For the reaction, $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$, if $\frac{d[\text{NH}_3]}{dt} = 2 \times 10^{-4} \text{ mol L}^{-1}\text{s}^{-1}$, the value of $\frac{-d[\text{H}_2]}{dt}$ would be :-
- (1) $1 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$ (2) $3 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$
 (3) $4 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$ (4) $6 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$

2. For the reaction $\text{A} + \text{B} \rightarrow \text{products}$, it is observed that :-
- (a) on doubling the initial concentration of A only, the rate of reaction is also doubled and
 (b) on doubling the initial concentrations of both A and B, there is a change by a factor of 8 in the rate of the reaction.

The rate of this reaction is given by :-

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

3. In the reaction



The rate of appearance of bromine (Br_2) is related to rate of disappearance of bromide ions as following :-

- (1) $\frac{d[\text{Br}_2]}{dt} = \frac{3}{5} \frac{d[\text{Br}^-]}{dt}$
 (2) $\frac{d[\text{Br}_2]}{dt} = -\frac{3}{5} \frac{d[\text{Br}^-]}{dt}$
 (3) $\frac{d[\text{Br}_2]}{dt} = -\frac{5}{3} \frac{d[\text{Br}^-]}{dt}$
 (4) $\frac{d[\text{Br}_2]}{dt} = \frac{5}{3} \frac{d[\text{Br}^-]}{dt}$

4. Half life period of a first-order reaction is 1386 s. The specific rate constant of the reaction is :-
- (1) $5.0 \times 10^{-2} \text{ s}^{-1}$ (2) $5.0 \times 10^{-3} \text{ s}^{-1}$
 (3) $0.5 \times 10^{-2} \text{ s}^{-1}$ (4) $0.5 \times 10^{-3} \text{ s}^{-1}$

AIPMT 2010

5. The rate of the reaction $2\text{NO} + \text{Cl}_2 \rightarrow 2\text{NOCl}$ is given by the rate equation

$$\text{rate} = k[\text{NO}]^2[\text{Cl}_2]$$

the value of rate constant can be increased by :

- (1) Increasing the concentration of NO
 (2) Increasing the concentration of the Cl_2
 (3) Increasing the temperature
 (4) all of these

6. For the reaction $\text{N}_2\text{O}_5(\text{g}) \rightarrow 2\text{NO}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g})$ the value of rate of disappearance of N_2O_5 is given as $6.25 \times 10^{-3} \text{ mol L}^{-1}\text{s}^{-1}$. The rate of formation of NO_2 and O_2 is given respectively as:-

- (1) $1.25 \times 10^{-2} \text{ mol L}^{-1}\text{s}^{-1}$ and $6.25 \times 10^{-3} \text{ mol L}^{-1}\text{s}^{-1}$
 (2) $6.25 \times 10^{-3} \text{ mol L}^{-1}\text{s}^{-1}$ and $6.25 \times 10^{-3} \text{ mol L}^{-1}\text{s}^{-1}$
 (3) $1.25 \times 10^{-2} \text{ mol L}^{-1}\text{s}^{-1}$ and $3.125 \times 10^{-3} \text{ mol L}^{-1}\text{s}^{-1}$
 (4) $6.25 \times 10^{-3} \text{ mol L}^{-1}\text{s}^{-1}$ and $3.125 \times 10^{-3} \text{ mol L}^{-1}\text{s}^{-1}$

7. During the kinetic study of the reaction, $2\text{A} + \text{B} \rightarrow \text{C} + \text{D}$, following results were obtained:-

Ex. No.	[A](mol L ⁻¹)	[B](mol L ⁻¹)	Initial rate of formation of D(mol L ⁻¹ min ⁻¹)
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.2×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.40×10^{-2}

Based on the above data which one of the following is correct ?

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

8. For an endothermic reaction, energy of activation is E_a and enthalpy of reaction is ΔH (both of these in kJ/mol). Minimum value of E_a will be :-
- (1) Equal to zero (2) Less than ΔH
 (3) Equal to ΔH (4) More than ΔH

AIPMT Pre. 2011

9. Which one of the following statements for the order of a reaction is incorrect ?
- (1) Order can be determined only experimentally
 - (2) Order is not influenced by stoichiometric coefficient of the reactants
 - (3) Order of reaction is sum of power to the concentration terms of reactants to express the rate of reaction
 - (4) Order of reaction is always whole number

AIPMT Mains 2011

10. The unit of rate constant for a zero order reaction is :-
- (1) s^{-1}
 - (2) $\text{mol L}^{-1} s^{-1}$
 - (3) $\text{L mol}^{-1} s^{-1}$
 - (4) $\text{L}^2 \text{mol}^{-2} s^{-1}$
11. The half life of a substance in a certain enzyme-catalysed first order reaction is 138 s. The time required for the concentration of the substance to fall from 1.28 mg L^{-1} to 0.04 mg L^{-1} :-
- (1) 276 s
 - (2) 414 s
 - (3) 552 s
 - (4) 690 s

12. The rate of the reaction $2\text{N}_2\text{O}_5 \rightarrow 4\text{NO}_2 + \text{O}_2$ can be written in three ways

$$\frac{-d[\text{N}_2\text{O}_5]}{dt} = k[\text{N}_2\text{O}_5]$$

$$\frac{d[\text{NO}_2]}{dt} = k' [\text{N}_2\text{O}_5]$$

$$\frac{d[\text{O}_2]}{dt} = k'' [\text{N}_2\text{O}_5]$$

The relationship between k and k' and between k and k'' are :-

- (1) $k' = k$; $k'' = k$
- (2) $k' = 2k$; $k'' = k$
- (3) $k' = 2k$; $k'' = k/2$
- (4) $k' = 2k$; $k'' = 2k$

AIPMT Pre. 2012

13. In a zero-order reaction for every 10° rise of temperature, the rate is doubled. If the temperature is increased from 10°C to 100°C , the rate of the reaction will become:
- (1) 64 times
 - (2) 128 times
 - (3) 256 times
 - (4) 512 times

14. In a reaction $\text{A} + \text{B} \rightarrow \text{Product}$, rate is doubled when the concentration of B is doubled and rate increased by a factor of 8 when the concentrations of both the reactants (A and B) are doubled, rate law for the reaction can be written as:

- (1) $\text{Rate} = k[\text{A}][\text{B}]$
- (2) $\text{Rate} = k[\text{A}]^2[\text{B}]$
- (3) $\text{Rate} = k[\text{A}][\text{B}]^2$
- (4) $\text{Rate} = k[\text{A}]^2[\text{B}]^2$

AIPMT Mains 2012

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

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

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

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

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

NEET-UG 2013

16. A reaction having equal energies of activation for forward and reverse reactions has :-
- (1) $\Delta H = \Delta G = \Delta S = 0$
 - (2) $\Delta S = 0$
 - (3) $\Delta G = 0$
 - (4) $\Delta H = 0$

17. What is the activation energy of a reaction if its rate doubles when the temperature is raised from 20°C to 35°C ? ($R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$)
- (1) 15.1 kJ mol^{-1}
 - (2) 342 kJ mol^{-1}
 - (3) 269 kJ mol^{-1}
 - (4) 34.7 kJ mol^{-1}

AIPMT 2015

18. The activation energy of a reaction can be determined from the slope of which of the following graphs ?

$$(1) \frac{\ln k}{T} \text{ v / s. } T$$

$$(2) \ln k \text{ v/s. } \frac{1}{T}$$

$$(3) \frac{T}{\ln k} \text{ v / s. } \frac{1}{T}$$

$$(4) \ln k \text{ v/s. } T$$

19. When initial concentration of a reactant is doubled in a reaction, its half-life period is not affected. The order of the reaction is :-

- (1) First
- (2) Second
- (3) More than zero but less than first
- (4) Zero

Re-AIPMT 2015

20. The rate constant of the reaction $A \rightarrow B$ is $0.6 \times 10^{-3} \text{ M sec}^{-1}$. If the concentration of A is 5 M, then concentration of B after 20 min is :-
 (1) 0.36 M (2) 0.72 M
 (3) 1.08 M (4) 3.60 M

NEET-I 2016

21. The rate of a first-order reaction is $0.04 \text{ mol L}^{-1}\text{s}^{-1}$ at 10 s and $0.03 \text{ mol L}^{-1}\text{s}^{-1}$ at 20 s after initiation of the reaction. The half-life period of the reaction is :
 (1) 24.1 s (2) 34.1 s
 (3) 44.1 s (4) 54.1 s
22. The addition of a catalyst during a chemical reaction alters which of the following quantities ?
 (1) Entropy (2) Internal energy
 (3) Enthalpy (4) Activation energy

NEET-II 2016

23. The decomposition of phosphine (PH_3) on tungsten at low pressure is a first-order reaction. It is because the
 (1) rate is independent of the surface coverage
 (2) rate of decomposition is very slow
 (3) rate is proportional to the surface coverage
 (4) rate is inversely proportional to the surface coverage

NEET(UG) 2017

24. Mechanism of a hypothetical reaction $X_2 + Y_2 \rightarrow 2XY$ is given below :
 (i) $X_2 \rightleftharpoons X + X$ (fast)
 (ii) $X + Y_2 \rightarrow XY + Y$ (slow)
 (iii) $X + Y \rightarrow XY$ (fast)
 The overall order of the reaction will be :
 (1) 2 (2) 0
 (3) 1.5 (4) 1
25. A first order reaction has a specific reaction rate of 10^{-2} s^{-1} . How much time will it take for 20 g of the reactant to reduce to 5 g ?
 (1) 138.6 s (2) 346.5 s
 (3) 693.0 s (4) 238.6 s

NEET(UG) 2018

26. The correct difference between first- and second-order reaction is that
 (1) the rate of a first-order reaction does not depend on reactant concentration; the rate of a second-order reaction does depend on reactant concentrations.
 (2) the half-life of a first-order reaction does not depend on $[A]_0$; the half-life of a second-order reaction does depend on $[A]_0$

- (3) a first-order reaction can be catalyzed; a second-order reaction cannot be catalyzed.
 (4) the rate of a first-order reaction does depend on reactant concentrations; the rate of a second-order reaction does not depend on reactant concentrations

27. When initial concentration of the reactant is doubled, the half-life period of a zero order reaction
 (1) is halved (2) is doubled
 (3) is tripled (4) remains unchanged

NEET(UG) 2019

28. If the rate constant for a first order reaction is k, then the time (t) required for the completion of 99% of the reaction is given by :-
 (1) $t = 0.693/k$ (2) $t = 6.909/k$
 (3) $t = 4.606/k$ (4) $t = 2.303/k$
29. For the chemical reaction
 $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$
 the **correct** option is :
 (1) $-\frac{1}{3} \frac{d[\text{H}_2]}{dt} = -\frac{1}{2} \frac{d[\text{NH}_3]}{dt}$
 (2) $-\frac{d[\text{N}_2]}{dt} = 2 \frac{d[\text{NH}_3]}{dt}$
 (3) $-\frac{d[\text{N}_2]}{dt} = \frac{1}{2} \frac{d[\text{NH}_3]}{dt}$
 (4) $3 \frac{d[\text{H}_2]}{dt} = 2 \frac{d[\text{NH}_3]}{dt}$

NEET(UG) 2019 (Odisha)

30. A first order reaction has a rate constant of $2.303 \times 10^{-3} \text{ s}^{-1}$. The time required for 40g of this reactant to reduce to 10 g will be-
 [Given that $\log_{10} 2 = 0.3010$]
 (1) 230.3 s (2) 301 s
 (3) 2000 s (4) 602 s
31. For a reaction, activation energy $E_a = 0$ and the rate constant at 200K is $1.6 \times 10^6 \text{ s}^{-1}$. The rate constant at 400K will be-
 [Given : gas constant $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$]
 (1) $3.2 \times 10^4 \text{ s}^{-1}$ (2) $1.6 \times 10^6 \text{ s}^{-1}$
 (3) $1.6 \times 10^3 \text{ s}^{-1}$ (4) $3.2 \times 10^6 \text{ s}^{-1}$

NEET (UG) 2020

32. The rate constant for a first order reaction is $4.606 \times 10^{-3} \text{ s}^{-1}$. The time required to reduce 2.0 g of the reactant to 0.2 g is :
 (1) 1000 s (2) 100 s
 (3) 200 s (4) 500 s

- (1) collision frequency (2) activation energy
(3) heat of reaction (4) threshold energy

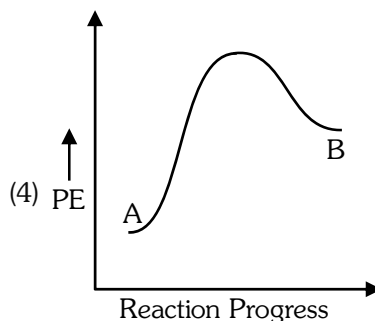
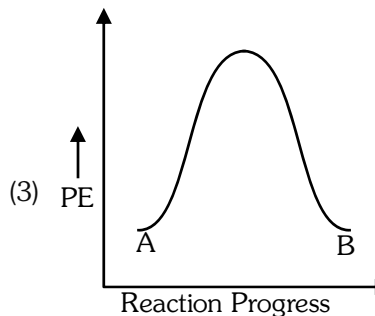
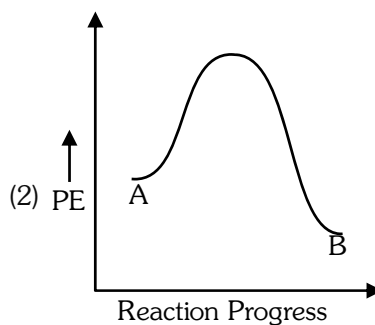
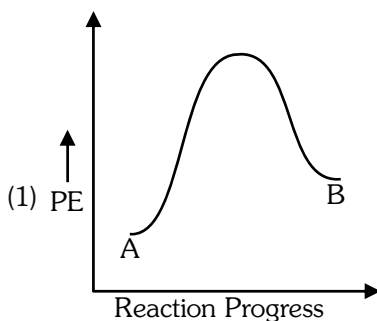
NEET (UG) 2020 (COVID-19)

- (1) 1.0×10^{-4} (2) 2.0×10^{-4}
(3) 2.0×10^{-3} (4) 1.0×10^{-2}

- (1) the fraction of molecules with energies greater than E_a
- (2) the collision frequency of reactants, A and B
- (3) steric factor
- (4) the fraction of molecules with energies equal to E_a

NEET (UG) 2021

- 4.2 kJ mol⁻¹ and enthalpy of activation is 9.6 kJ mol⁻¹. The correct potential energy profile for the reaction is shown in option.



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

[Given $R=8.314 \text{ JK}^{-1} \text{ mol}^{-1}$]

- (1) 41.5 kJ mol^{-1} (2) 83.0 kJ mol^{-1}
(3) 166 kJ mol^{-1} (4) -83 kJ mol^{-1}

[illegible]