

22. 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 :

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

23. $t_{1/4}$ 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) $0.75/k$ (b) $0.69/k$ (c) $0.29/k$ (d) $0.10/k$

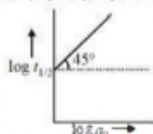
24. The decomposition of ammonia on tungsten surface at 500 K follows zero order kinetics. The half-life period of this reaction is 45 minutes when the initial pressure is 4 bar. The half-life period (minutes) of the reaction when the initial pressure is 16 bar at the same temperature is

(a) 120 (b) 60 (c) 240 (d) 180

25. In a 1st order reaction, reactant concentration C varies with time t as:

(a) $\frac{1}{C}$ increases linearly with t
 (b) $\log C$ decreases linearly with t
 (c) C decreases with $\frac{1}{t}$
 (d) $\log C$ decreases with $\frac{1}{t}$

26. For a reaction $A \rightarrow \text{Product}$, 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

27. The rate of a chemical reaction doubles for every 10°C rise of temperature. If the temperature is raised by 50°C , the rate of the reaction increases by about :

(a) 10 times (b) 24 times (c) 32 times (d) 64 times

28. For a first order reaction $t_{0.75}$ is 1368 seconds, therefore, the specific rate constant in sec^{-1} is

(a) 10^{-3} (b) 10^{-2} (c) 10^{-9} (d) 10^{-5}

29. 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) $\frac{1}{\text{time}} \text{ Vs } C_t$
 (c) time Vs C_t (d) $\frac{1}{\text{time}} \text{ Vs } \frac{1}{C_t}$

30. 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 a catalyst lowers the activation energy of both (forward and reverse) reactions by 100 kJ mol^{-1} . The enthalpy change of the reaction ($A_2 + B_2 \rightarrow 2AB$) in the presence of a catalyst will be (in kJ mol^{-1})

(a) 20 (b) 300 (c) 120 (d) 280

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

(a) $\frac{1}{4}$ of the original amount
 (b) $\frac{1}{8}$ of the original amount
 (c) $\frac{1}{16}$ of the original amount
 (d) $\frac{1}{32}$ of the original amount

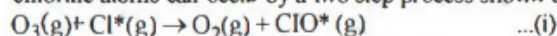
32. Reaction rate between two substance A and B is expressed as following:

$\text{rate} = k[A]^n[B]^m$

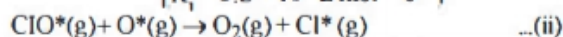
If the concentration of A is doubled and concentration of B is made half of initial concentration, the ratio of the new rate to the earlier rate will be:

(a) $m+n$ (b) $n-m$ (c) $\frac{1}{2^{(m+n)}}$ (d) $2^{(n-m)}$

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

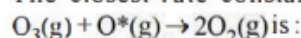


$[K_1 = 5.2 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}]$



$[K_2 = 2.6 \times 10^{10} \text{ L mol}^{-1} \text{ s}^{-1}]$

The closest rate constant for the overall reaction



(a) $1.4 \times 10^{20} \text{ L mol}^{-1} \text{ s}^{-1}$ (b) $3.1 \times 10^{10} \text{ L mol}^{-1} \text{ s}^{-1}$
 (c) $5.2 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$ (d) $2.6 \times 10^{10} \text{ L mol}^{-1} \text{ s}^{-1}$

34. The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation,

$k = A \cdot e^{-E_a}$ Activation energy (E_a) of the reaction can be calculated by plotting

(a) k vs. $\frac{1}{\log T}$ (b) $\log k$ vs. $\frac{1}{T}$
 (c) $\log k$ vs. $\frac{1}{\log T}$ (d) k vs. T