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TARGET : NEET (UG) 2024

Course : SARANSH (Youtube Live CRASH COURSE)

I-CHEMISTRY

DPP

DAILY PRACTICE PROBLEMS

DPP NO. 2

Organic Chemistry : CHEMICAL KINETICS

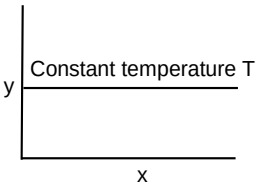
1. The rate constant for a first order reaction 4.606×10^{-3} S^{-1}. The time required to reduced 2.0 g of the reactant to 0.2 g is :

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

2. The half-life for a zero order reaction having 0.02 M initial concentration of reactant is 100 s. The rate constant (in mol L^{-1} s^{-1}) for the reaction is

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

3. The given graph is a representation of kinetics of a reaction.



The y and x axes for zero and first order reactions, respectively are

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

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

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

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

4. For a first order reaction A $\rightarrow$ Product initial concentration A is 0.1 M, which becomes 0.001 M after 5 minutes. Rate constant for the reaction in min^{-1} is

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

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

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

6. 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) $\ln \frac{K_2}{K_1} = -\frac{E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$ (2) $\ln \frac{K_2}{K_1} = -\frac{E_a}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$

(3) $\ln \frac{K_2}{K_1} = -\frac{E_a}{R}\left(\frac{1}{T_2} + \frac{1}{T_1}\right)$ (4) $\log \frac{K_2}{K_1} = \frac{E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$

7. What is the activation energy for a reaction if its rate doubles when the temperature is raised from 20°C to 35°C ? (R = 8.314 J mol^{-1} K^{-1})

(1) 269 kJ mol^{-1} (2) 34.7 kJ mol^{-1}

(3) 15.1 kJ mol^{-1} (4) 342 kJ mol^{-1}

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

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

(3) $\frac{T}{\ln K}$ vs. $\frac{1}{T}$ (4) ln K vs. T

9. For a reaction, activation energy E_a = 0 and the rate constant at 200 K is $1.6 \times 10^6 s^{-1}$.The rate constant at 400 K will be –[Given that gas constant, R = 8.314 J K^{-1} mol^{-1}]

(1) 3.2×10^4 s^{-1} (2) 1.6×10^6 s^{-1}

(3) 1.6×10^3 s^{-1} (4) 3.2×10^6 s^{-1}

10. An increase in the concentration of the reactant of a reaction leads to change in:

(1) heat of reaction (2) threshold energy

(3) collision frequency (4) activation energy

11. In collision theory of chemical reaction, Z_{AB} represents

(1) the fraction of molecules with energies greater than E_a

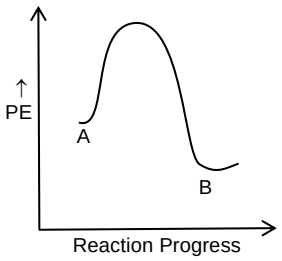
(2) the collision frequency of reactants, A and B

(3) steric, factor

(4) the fraction of molecules with energies equal to E_a

12. For a reaction A → B enthalpy of reaction –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. (PE = Potential energy)

(1)



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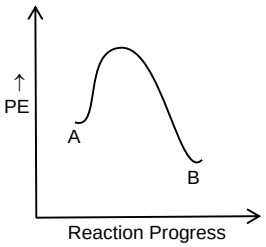

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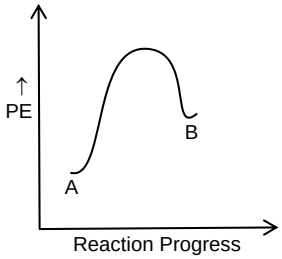

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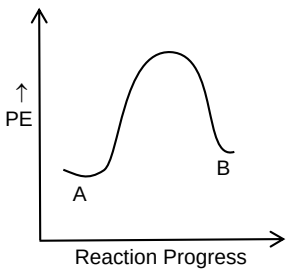

13. The slope of Arrhenius Plot $\left(\ln k \text{ v/s } \frac{1}{T}\right)$ of first order reaction is -5×10^3 K. The value of E_a of the reaction is. Choose the correct option for your answer. [Given R = 8.314 $JK^{-1}\,mol^{-1}$]

(1) 83.0 kJ mol^{-1} (2) 166 kJ mol^{-1}

(3) –83 kJ mol^{-1} (4) 41.5 kJ mol^{-1}

14. The plot of ln k vs $\frac{1}{T}$ for the following reaction

$2N_2O_5\,(g) \rightarrow 4NO_2\,(g) + O_2(g)$

gives a straight line with the slope of line equal to $-1.0 \times 10_4$ K. Activation energy for the reaction in J mol^{-1} is

(1) 4.0×10^{-2} (2) 8.3×10^{-4}

(3) 8.3×10^4 (4) 4.0×10^2

15. Given below are two statements: one is labelled as **Assertion A** and the other is labelled as Reason R :

Assertion A : A reaction can have zero activation energy.

Reasons R : The minimum extra amount of energy absorbed by reactant molecules so that their energy becomes equal to threshold value, is called activation energy.

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

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

(2) **A** is true but **R** is false.

(3) **A** is false but **R** is true.

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

Answer Key

1.	(2)	**2.**	(1)	**3.**	(1)	**4.**	(4)	**5.**	(2)	**6.**	(2)	**7.**	(2)
8.	(2)	**9.**	(2)	**10.**	(3)	**11.**	(2)	**12.**	(1)	**13.**	(4)	**14.**	(3)
15.	(1)												