CHEMISTRY

NCERT - FULL MARKS CHEMISTRY(TAMIL)

CHEMICAL KINETICS-II

Examples

1. The decomposition of phosphine (PH_3) on tungsten at low pressure is a first order reaction. It is because the

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2. In a first-order reaction, it takes the reactant 40.5 minutes to be $25\ \%$ decomposed. Find the rate constant of the reaction.

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3. A certain amount of methyl acetate was hydrolysed in the presence of excess of $0.05\ \mathrm{M}\ \mathrm{HCl}$ at $25^{\circ}C$. 20 mL of reaction mixture were removed and titrated with $NaOH$ solution, the volume V of alkali required for neutralisation after time 't' were as follows :

$\mathrm{t(min)}$	0	20	40	60	∞
$\mathrm{v(mL)}$	20.2	25.6	29.5	32.8	50.5

Show that the reaction is the first order reaction.

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4. Derive the relationship between half-life period and rate constant for a first order reaction.

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Self Evaluation A Choose The Correct Answer

1. In the acid hydrolysis of an ester what is the time taken for complete hydrolysis ?

A. second order reaction

B. zero order reaction

C. pseudo first order reaction

D. first order reaction

Answer:

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2. The unit of zero order rate constant is

A. $\text{litre mol}^{-1}\text{ sec}^{-1}$

B. $\text{mol litre}^{-1}\text{ sec}^{-1}$

C. sec^{-1}

D. $\text{litre}^{2}\text{ sec}^{-1}$

Answer:

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3. The excess energy which a molecule must possess to become active is known as

A. kinetic energy

B. threshold energy

C. potential energy

D. activation energy

Answer:

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4. The term A in Arrhenius equation is called as

A. $k = Ae^{-1/RT}$

B. $k = Ae^{-RT/Ea}$

C. $k = Ae^{-Ea/RT}$

D. $k = Ae^{Ea/RT}$

Answer:

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5. The term A in Arrhenius equation is called as

A. Probability factor

B. Activation of energy

C. Collision factor

D. Frequency factor

Answer:

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6. If [A] is the concentration of A at any time t and $[A_0]$ is the concentration at t = 0, then for the first order reaction, the rate equation can be written as _____.

A. molecularity

B. order

C. rate

D. rate constant

Answer:

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7. The chemical reactions which takes place with the evolution of heat energy are called _____. Reaction

A. consecutive reactions

B. parallel reactions

C. opposing reactions

D. chain reactions

Answer:

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8. The half life period of a first order reaction is 10 minutes. Then its rate constant is

A. $6.93 \times 10^{2} \mathrm{min}^{-1}$

B. $0.693 \times 10^{-2} \mathrm{min}^{-1}$

C. $6.932 \times 10^{-2} \mathrm{min}^{-1}$

D. $69.3 \times 10^{-1} \mathrm{min}^{-1}$

Answer:

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9. For a reaction : $aA \rightarrow bB$, the rate of reaction is doubled when the concentration of A is increased by four times. The rate of reaction is equal to

A. $k[A]^a$

B. $k[A]^{\frac{1}{2}}$

C. $k[A]^{\frac{1}{a}}$

D. $k[A]$

Answer:

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10.

$2N_2O_5 \rightarrow NO_2 + O_2$, $\frac{d[N_2O_5]}{dt} = k_1[N_2O_5]$, $\frac{d[NO_2]}{dt} = k_2[N_2O_5]$ and $\frac{dO_2}{dt} = k_3[N_2O_5]$, the relation between k_1, k_2 and k_3 is

A. $2k_1 = 4k_2 = k_3$

B. $k_1 = k_2 = k_3$

C. $2k_1 = k_2 = 4k_3$

D. $2k_1 = k_2 = k_3$

Answer:

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11. For a reaction, $E_a = 0$ and $k = 4.2 \times 10^5 \, \text{sec}^{-1}$ at 300 K, the value of k at 310 K will be _____

A. $4.2 \times 10^5 \sec^{-1}$

B. $8. .4 \times 10^5 \sec^{-1}$

C. $8.4 \times 10^5 \sec^{-1}$

D. unpredictable

Answer:

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Self Evaluation B Answer In One Or Two Sentences

1. Define zero order reaction. Give the unit for its rate constant (k).

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2. Derive the relationship between half-life period and rate constant for a first order reaction.

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3. What is meant by activation energy?

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4. Define zero order reaction. Give the unit for its rate constant (k).

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5. Write Arrhenius equation and explains the terms involved.

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6. Define half life period.

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7. Give the example for a zero order reaction.

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8. What are simple and complex reactions ?

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9. Write notes on (i) consecutive reactions, (ii) parallel reactions and (iii) opposing reactions.

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Self Evaluation C Answer Not Exceeding Sixty Words

1. Write an account of the Arrhenius theory of electrolytic dissociation.

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2. Write notes on (i) consecutive reactions, (ii) parallel reactions and (iii) opposing reactions.

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3. Write the characteristics of refraction.

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4. Explain the experimental determination of material of the prism using spectrometer. Determination of angle of the prism.

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Self Evaluation D Solve The Problems

1. The specific reaction rates of a chemical reaction are $2.45 \times 10^{-5} \sec^{-1}$ at 273 K and $1.62 \times 10^{-4} \sec^{-1}$ at 303 K. Calculate the activation energy.

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2. Rate constant of a first order reaction is $0.45\,\mathrm{sec}^{-1}$, calculate its half life.

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3. A first order reaction completes 25% of the reaction in 100 mins. What are the rate constant and half life values of the reactions ?

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4. If $30\ \%$ of a first order reaction is completed in 12 mins, what percentage will be completed in 65.33 mins?

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5. Show that for a first order reaction the time required for 99.9% completion is about 10 times its half life period.

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6. The half life period of a first order reactions is 10 mins. What percentage of the reactant will remain after one hour ?

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7. The initial rate of a first order reaction is $5.2 \times 10^{-6} \text{mol lit}^{-1} s^{-1}$ 298 K. When the initial concentration of reactant is $2.6 \times 10^{-3} \text{mol lit}^{-1}$, calculate the first order rate constant of the reaction at the same temperature.

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