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GENESIS TUTORIALS

Test-*Chemical Kinetics*

1. If the rate laws are expressed in concentration unit mol dm^{-3}, the unit of the third order reaction rate constant is:

   (a) $dm^3\ mol^1\ sec^1$ (b) $dm^3\ mol^{-1}\ sec^{-1}$ (c) $dm^6\ mol^{-2}\ sec^{-1}$ (d) $dm^{-3}\ mol^1\ sec^{-1}$

2. The value of the rate of constant for the gas phase reaction $2NO_2 + F_2 \rightarrow 2NO_2F$ is 38 $dm^3\ mol^{-1}\ sec^{-1}$ at 300K. The order of the reaction is:

   (a) 0 (b) 1 (c) 2 (d) 3

3. If the concentration vs time plot is found to be linear with a negative slope, the order of the reaction is:

   (a) 0 (b) 1 (c) 2 (d) cannot be determined.

4. The differential rate law equation for the elementary reaction A + 2 B → 3 C, is:

   (a) $-\frac{d[A]}{dt} = -\frac{d[B]}{dt} = \frac{d[C]}{dt} = k[A]\,[B]^2$ (b) $-\frac{d[A]}{dt} = -\frac{1}{2}\frac{d[B]}{dt} = \frac{1}{3}\frac{d[C]}{dt} = k[A]^2[B]$

   (c) $-\frac{d[A]}{dt} = -\frac{1}{2}\frac{d[B]}{dt} = \frac{1}{3}\frac{d[C]}{dt} = k[A][B]^2$ (d) None of these

5. For the reaction 2 A → B + 3C; if

$$-\frac{d[A]}{dt} = k_1[A]^2;\ \frac{d[B]}{dt} = k_2[A]^2;\ \frac{d[C]}{dt} = k_3[A]^2$$

   The correct relation between k_1, k_2 and k_3 is:

   (a) $k_1 = k_2 = k_3$ (b) $2k_1 = k_2 = 3k_3$ (c) $4k_1 = k_2 = 3k_3$ (d) $\frac{k_1}{2} = k_2 = \frac{k_3}{3}$

6. If $r = k\,[A]_0^2\,[B]_0$ for a reaction, by what factor is the initial rate multiplied if the $[A]_0$ is multiplied by 1.5 and $[B]_0$ is tripled?

   (a) 4.5 (b) 6 (c) 6.75 (d) None of these

7. The half life time for a reaction at initial concentrations of 0.1 and 0.4 mol L^{-1} are 200 s and 50 s respectively. The order of reaction is:

   (a) 0 (b) 1 (c) 2 (d) 3

8. For a certain first-order reaction, the rate constant is 0.92 s^{-1}. After 5 half lives, the percentage of reactant that remains unreacted is-

(a) 50% (b) 25% (c) 6% (d) 3%

9. The half life of a zero order reaction (A→P) is given by (K= rate constant)

(a) $t_{1/2} = \frac{A_o}{2K}$ (b) $t_{1/2} = \frac{2.303}{K}$ (c) $t_{1/2} = \frac{A_o}{K}$ (d) $t_{1/2} = \frac{1}{KA_o}$

10. A first order chemical reaction is 10% complete in 10 minutes. Its half life is (log 3 = 0.48)

(a) 50.50 minutes (b) 7.5 minutes

(c) 75.2 minutes (d) 150.4 minutes

11. Which of the following statements is NOT correct for a catalyst?

(a) It increases the rate of a reaction.

(b) It is not consumed in the course of a reaction.

(c) It provides an alternative pathway for the reaction.

(d) It increases the activation energy of the reaction.

12. Arrhenius equation is given by-

(a) $\ln K = \ln A + \frac{Ea}{RT}$ (b) $\ln K = \ln A - \frac{Ea}{RT}$ (c) $K = A. \frac{Ea}{RT}$ (d) $K = A\, e^{Ea/RT}$

13. Temperature dependence of the rate constant for a reaction obeys the Arrhenius equation- $k = A.e^{-\frac{Ea}{RT}}$. According to this equation, as T approaches infinity, k will approach:

(a) A (b) infinity (c) 1 (d) 0

14. According to Arrhenius equation (k = rate constant and T = temperature)

(a) ln k decreases linearly with 1/T

(c) ln k decreases linearly with T

(c) ln k incrcases linearly with 1/T

(d) In k increases linearly with T

15. A first order gaseous reaction is 25% complete in 30min at 227°C and in 10 min at 237°C. The activation energy of the reaction is closest to (R=2 cal K^{-1} mol^{-1})

(a) 27 K cal mol^{-1} (b) 110 K cal mol^{-1} (c) 56 K cal mol^{-1} (d) 5.5 K cal mol^{-1}