CHEMICAL KINETICS

1.. For a chemical reaction represented by R→ ⍰P the rate of reaction is denoted by –d [R]/dt or +d[P]/dt . State the significance of plus and minus sign.

2. Express the rate of reaction in terms of disappearance of hydrogen and appearance of ammonia in the given reaction.

$N_2(g) + 3\ H_2\ (g) \rightarrow 2NH_3\ (g)$

3. Why rate of reaction does not remain constant throughout?

4. Write the unit of first order rate constant of a gaseous reaction if the partial pressure of gaseous reactant is given in bar.

5. What will be the order of reaction, if the rate of reaction does not depend on the concentration of any of the reactant.

6. For the elementary step of a chemical reaction :

$H_2 + I_2 \rightarrow 2HI$

rate of reaction $\rightarrow [H_2]\ [I_2]$

What is the (i) molecularity and (ii) order of the reaction.

7.For a chemical reaction A→ B. The rate of the reaction is given as Rate = $k\ [A]^n$ the rate of the above reaction quadruples when the concentration of A is doubled. What is the value of n?

8.Mention one example of zero order reaction.

9. What is the value of the order of reaction of radioactive decay?

10. Express the relation between the half life period of a reactant and initial concentration for a reaction of nth order.

11. A reaction is 50% complete in 2 hours and 75% complete in 4 hours. What is the order of reaction?

12. Suggest an appropriate reason for the observation : “On increasing temperature of the reacting system by 10 degrees, the rate of reaction almost doubles or even sometimes becomes five folds.”

13. For a chemical reaction, activation energy is zero and at 300K rate constant is $5.9 \times 10^{-5} s^{-1}$, what will be the rate constant at 400K?

14. Two reactions occuring at the same temperature have identical values of Ea. Does this ensure that also they will have the same rate constant? Explain.

15. The rate constant of a reaction is given by the expression k = Ae–Ea/RT Which factor in this expression should register a decrease so that the reaction proceeds rapidly?

16. For a chemical reaction rate constant $k = 5.3 \times 10^{-4}$mol L–1 s–1, what will be the order of reaction?

17.. Write the rate law and order for the following reaction :

$AB_2 + C_2 \rightarrow AB_2C + C$ (slow)

$AB_2 + C \rightarrow AB_2C$ (Fast)]

18.The conversion of molecules X to Y follows second order kinetics.If concentration of Xis increased to 3 times how will it affect the rate of formation of Y.

19.When rate of reaction becomes equal to specific reaction rate.

20.87.5% of the substance disintegrated in 45 minutes(first order reaction) .What is its Half life.

Answer

1.(–) sign represents decrease in concentration with time while (+) sign represetns increase in concentration.

2.Rate= $-1/3d[H_2]/dt$ rate=$+1/2d[NH_3]/dt$

3.It is because concentration of reactants goes on decreasing with time.

4.s^{-1}

5.. zero order

6. .i)2 ii) 1

7. n=2

8.$2NH_3$ (g)→N_2 (g) +$3H_2$(g) (at1130K and Pt as catalyst)

9. First order

10.$t_{1/2}$ α $1/[R]_0^{n-1}$ where n is order of reaction.

11.First order

12.Increasing the temperature of the substance increases the fraction of molecules which collide with energy greater than E_a.

13..$5.9 \times 10^{-5}\ s^{-1}$

14No,because the Rate depends on the nature and concentrations of reactants and also pre-exponential factor.

15.Ea should. Deacrease. : Rate = k [AB2] [C2]; Order = 1 + 1 = 2]

16.zero order reaction

17.Rate = k [AB2] [C2]; Order = 1 + 1 = 2]

18.The rate will increase 9 times.

19.When the concentration of reactant is Unity.

20.15 Minutes.