

CBSE Class 12 physics
Important Questions
Chapter 4
Chemical Kinetics

1 Marks Questions

1. Is rate of reaction always constant?

Ans. No. rate of a reaction is not always constant. It depends on many factors such as concentration, temperature etc.

2. Can order of reaction be zero? Give example.

Ans. Yes, decomposition of ammonia on a hot platinum surface is a zero order of reaction at high pressure.

3. What do you understand by rate law expression?

Ans. The rate law is the expression in which rate is given in terms of molar concentration of reactants with each term raised to some power, which may or may not be same as the stoichiometric coefficient of the reacting species in a balanced chemical equation.

4. Is it possible to determine or predict the rate law theoretically by merely looking at the equation?

Ans. No, the rate law can not be predicted by merely looking at the balanced chemical equation but must be determined experimentally.

5. Define the term chemical kinetics?

Ans. The branch of chemistry that deals with the study of reaction rates and their mechanisms is called chemical Kinetics.

6. Define – Rate of reaction and the factors affecting the rate of reaction.

Ans. Rate of reaction can be defined as the change in concentration of a reactant or product per unit time. Factors affecting the rate of reaction are temperature, concentration of

reactants and catalyst.

7. What is average rate of a reaction? How is it determined?

Ans. Average rate of a reaction is defined as the change in concentration of a reactant or a product per unit time. It can be determined by dividing the change in concentration of reactant or product by the time interval

$$\text{For the reaction: } A \rightarrow B \quad R_{\text{av}} = \frac{-\Delta[A]}{\Delta t} = \frac{\Delta[B]}{\Delta t}$$

8. What are the units of rate of a reaction?

Ans. The units of rate of a reaction are $\text{Mol L}^{-1}\text{s}^{-1}$. In gaseous reaction the unit of rate of reaction is atom s^{-1} .

9. Identify the reaction order for from each of the following rate constant –

a) $k = 2.3 \times 10^{-5} \text{ L mol}^{-1} \text{ s}^{-1}$

b) $k = 3.1 \times 10^{-4} \text{ s}^{-1}$

Ans. a) Since the units of rate constant are $\text{L mol}^{-1} \text{ s}^{-1}$ The reactions is of second order.

b) Since the units of rate constant are s^{-1} , The reaction is of first order.

10. Consider the equation $2\text{NO}(\text{g}) + 2\text{H}_2(\text{g}) \rightarrow \text{N}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$ The rate law for this equation is first order with respect to H_2 and second order with respect to NO. write the rate law for this reaction.

Ans. The rate law will be $R = K[\text{NO}]^2[\text{H}_2]$

11. Give an example of pseudo – first order reaction ?

Ans. Hydrolysis of ethyl acetate when concentration of water is very large, is an example of pseudo first order reaction. $\text{CH}_3\text{COO C}_2\text{H}_5 + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH}$.

12. Write the expression for half – life period of a first order reaction?

Ans. For a first order reaction, the half life period is $T_{1/2} = \frac{0.693}{k}$

13. A first order reaction is found to have a rate constant $K = 5.5 \times 10^{-14} \text{ sec}^{-1}$. Find half life of reaction?

Ans. $t_{1/2} = \frac{0.693}{k} = \frac{0.693}{5.5 \times 10^{-14} \text{ sec}^{-1}} = 1.26 \times 10^{13} \text{ s}$

14. The time required to decompose SO_2Cl_2 to half of its initial amount is 60 min. If the decomposition is a first order reaction, calculate the rate constant of the reaction?

Ans. 0.01155 min^{-1}

15. What is the effect of catalyst on rate constant?

Ans. A catalyst increases the rate constant value.

16. How is activation energy affected on adding a catalyst?

Ans. A catalyst lowers the activation energy by following a different path for the reaction.

17. What do you mean by the term- collision frequency?

Ans. The no. of collisions per second per unit volume of the reaction mixture is known as collision frequency. It is denoted by Z.

18. What is the drawback of collision theory?

Ans. The drawback of collision theory is that it considers the molecules to be hard spheres and ignores their structural aspect.

19. How does the number of collisions change on increasing the temperature?

Ans. The rate of reaction would increase on increasing the temperature as it will increase the no. of collision as well as no. of effective collisions.

20. There is no bar on the no. of collisions among the reacting species. Why most of the reactions do not take place under normal conditions?

Ans. The reactions either do not have required energy or are not properly oriented, then the reaction will not take place.

21. The rate of a particular reaction quadruples when the temperature changes from 293 K to 313 K. Calculate activation energy for such a reaction.

Ans. 52.86 KJ/mol