Chem Kinetics

15 MCQs on Chemical Kinetics Concepts

Definition of Reaction Rate

1. **Which of the following best defines the rate of a chemical reaction?**
   a) The time taken for a reaction to complete.
   b) The change in concentration of reactants or products per unit time.
   c) The total amount of reactants consumed.
   d) The total amount of products formed.

2. **The rate of a reaction can be expressed as:**
   a) $\frac{time}{concentration}$
   b) $\frac{concentration}{time}$
   c) $\frac{moles}{time}$
   d) $\frac{mass}{volume}$

3. **If the concentration of a reactant decreases by 0.5 M in 2 hours, what is the average rate of the reaction?**
   a) 0.25 M/hr
   b) 0.5 M/hr
   c) 1 M/hr
   d) 2 M/hr

Rate Expressions and Units

4. **What are the units of the rate constant for a first-order reaction?**
   a) s^{-1}
   b) $M^{-1}s^{-1}$
   c) M^2s^{-1}
   d) M

5. **For the reaction rate equation $-\frac{d[A]}{dt} = k[A]$, what is the order of the reaction?**
   a) Zero
   b) First
   c) Second
   d) Third

6. **In the rate equation $\text{Rate} = k[A]^2[B]$, the reaction is:**
   a) Zero-order in B
   b) First-order in B
   c) Second-order in A
   d) Second-order overall

Instantaneous and Average Rates

7. **The instantaneous rate of reaction is determined:**
   a) Over a long period of time.
   b) At a specific point in time.
   c) By averaging rates over different time intervals.
   d) At the start of the reaction.
8. **The average rate of reaction between two time intervals can be calculated by:**
   a) Taking the difference in concentration divided by the total reaction time.
   b) Taking the sum of concentrations divided by the total reaction time.
   c) Taking the product of concentrations divided by the total reaction time.
   d) Taking the difference in concentration divided by the time interval.
9. **Which method would you use to determine the rate of a reaction at a specific moment?**
   a) Initial rate method
   b) Average rate calculation
   c) Instantaneous rate determination
   d) Overall rate method

Initial Rate Method

10. **The initial rate method involves measuring:**
    a) The rate of reaction after it has reached equilibrium.
    b) The rate of reaction at the very beginning.
    c) The average rate over the course of the reaction.
    d) The instantaneous rate at the middle of the reaction.
11. **In the initial rate method, why is the initial concentration used?**
    a) Because it is easier to measure.
    b) Because the rate is highest at the beginning.
    c) Because it simplifies calculations by avoiding changes in concentration.
    d) Because the reaction is slowest at the beginning.
12. **Which of the following is a step in determining the initial rate of a reaction?**
    a) Allowing the reaction to proceed to completion.
    b) Measuring the concentration of reactants or products after a long time.
    c) Measuring the concentration change at the very start of the reaction.
    d) Averaging the rates at different times.
13. **In a reaction, if the concentration of a reactant is doubled and the rate quadruples, the order of the reaction with respect to that reactant is:**
    a) Zero
    b) One
    c) Two
    d) Three
14. **The rate law for a reaction A + B → C was determined to be Rate = k[A][B]^2. If the concentration of A is halved and the concentration of B is doubled, how will the rate change?**
    a) It will remain the same.
    b) It will double.
    c) It will quadruple.
    d) It will halve.

15. **In the rate equation** $\mathrm{Rate} = k[A][B]$**, if the initial concentration of A and B are both 1 M, and k = 0.5 M^{-1}s^{-1}, what is the initial rate?**
    a) 0.25 M/s
    b) 0.5 M/s
    c) 1 M/s
    d) 2 M/s