

Chem Kinetics Overview



Multiple Choice Questions (MCQs) on Zero Order, First Order, and Second Order Reactions

Questions

- Which of the following rate laws corresponds to a zero-order reaction?
 - A. Rate = $k[A]^0$
 - B. Rate = $k[A]$
 - C. Rate = $k[A]^2$
 - D. Rate = $k[A][B]$
- The rate constant for a first-order reaction is 0.693 s^{-1} . What is the half-life of the reaction?
 - A. 1 s
 - B. 0.693 s
 - C. 1.44 s
 - D. 2 s
- For a second-order reaction, the rate law is:
 - A. Rate = $k[A]^0$
 - B. Rate = $k[A]$
 - C. Rate = $k[A]^2$
 - D. Rate = $k[A][B]$
- Which of the following plots is linear for a first-order reaction?
 - A. $[A]$ vs. t
 - B. $\ln[A]$ vs. t
 - C. $\frac{1}{[A]}$ vs. t
 - D. $\frac{1}{[A]^2}$ vs. t
- The half-life of a zero-order reaction is directly proportional to:
 - A. Initial concentration of the reactant
 - B. Rate constant
 - C. Square of the initial concentration
 - D. None of the above
- For a second-order reaction, the half-life is inversely proportional to:
 - A. Rate constant
 - B. Initial concentration of the reactant
 - C. Square of the rate constant
 - D. Square of the initial concentration
- For a first-order reaction with a rate constant of 0.02 min^{-1} , what is the time required for the concentration to decrease to 25% of its initial value?
 - A. 17.32 minutes
 - B. 34.65 minutes
 - C. 69.3 minutes
 - D. 138.6 minutes

8. Which of the following reactions follows zero-order kinetics?
- A. Decomposition of hydrogen peroxide
 - B. Radioactive decay of Carbon-14
 - C. Decomposition of ammonia on a platinum surface
 - D. Saponification of esters
9. If the concentration of a reactant in a second-order reaction is reduced to one-fourth of its initial value in 40 seconds, what is the rate constant k ?
- A. $0.015 \text{ M}^{-1}\text{s}^{-1}$
 - B. $0.025 \text{ M}^{-1}\text{s}^{-1}$
 - C. $0.035 \text{ M}^{-1}\text{s}^{-1}$
 - D. $0.045 \text{ M}^{-1}\text{s}^{-1}$
10. The half-life of a first-order reaction is 50 seconds. How long will it take for the concentration to fall to 12.5% of its original value?
- A. 50 seconds
 - B. 100 seconds
 - C. 150 seconds
 - D. 200 seconds
11. For a zero-order reaction, the units of the rate constant k are:
- A. $\text{M} \cdot \text{s}^{-1}$
 - B. s^{-1}
 - C. $\text{M}^{-1} \cdot \text{s}^{-1}$
 - D. $\text{M}^{-2} \cdot \text{s}^{-1}$
12. In a first-order reaction, the time required for 75% of the reactant to decompose is:
- A. $t_{1/2}$
 - B. $2t_{1/2}$
 - C. $3t_{1/2}$
 - D. $4t_{1/2}$
13. If the rate constant for a second-order reaction is $0.05 \text{ M}^{-1}\text{s}^{-1}$, what is the half-life for an initial concentration of 0.1 M?
- A. 10 seconds
 - B. 20 seconds
 - C. 100 seconds
 - D. 200 seconds
14. For a zero-order reaction, the concentration of the reactant decreases from 1.0 M to 0.5 M in 10 minutes. What is the rate constant k ?
- A. $0.05 \text{ M} \cdot \text{min}^{-1}$
 - B. $0.1 \text{ M} \cdot \text{min}^{-1}$
 - C. $0.15 \text{ M} \cdot \text{min}^{-1}$
 - D. $0.2 \text{ M} \cdot \text{min}^{-1}$
15. Which of the following is true for the half-life of a second-order reaction?
- A. It is independent of the initial concentration.
 - B. It is directly proportional to the initial concentration.
 - C. It is inversely proportional to the initial concentration.
 - D. It is inversely proportional to the square of the initial concentration.
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Answer Key

1. A

- 2. A
- 3. C
- 4. B
- 5. A
- 6. B
- 7. B
- 8. C
- 9. B
- 10. C
- 11. A
- 12. C
- 13. B
- 14. B
- 15. C