

Rate Laws Quiz PDF

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Which of the following is NOT a type of rate law?

- Differential rate law
- Integrated rate law
- Empirical rate law
- Stoichiometric rate law

Explain how the method of initial rates can be used to determine the order of a reaction.

What is the overall order of a reaction with the rate law: $\text{Rate} = k[\text{A}]^2[\text{B}]$?

- First order
- Second order
- Third order
- Fourth order

What does the rate law of a reaction express?

- The relationship between the rate of reaction and the temperature
- The relationship between the rate of reaction and the concentration of reactants
- The relationship between the rate of reaction and the pressure
- The relationship between the rate of reaction and the volume

For a second-order reaction, which of the following are true?

- The rate is proportional to the square of the concentration of one reactant.
- The rate is proportional to the product of the concentrations of two reactants.
- The half-life is independent of the initial concentration.
- A plot of $1/[A]$ vs. time is linear.

Which statements are true about the Arrhenius equation?

- It relates the rate constant to temperature.
- It includes the activation energy of the reaction.
- It can be used to determine the order of a reaction.
- It includes a frequency factor.

Which of the following methods can be used to determine the rate law of a reaction?

- Method of initial rates
- Isolation method
- Method of half-lives
- Method of integration

How can you experimentally determine whether a reaction is zero, first, or second order?

Which plot would yield a straight line for a first-order reaction?

- $[A]$ vs. time
- $\ln[A]$ vs. time
- $1/[A]$ vs. time
- Rate vs. $[A]$

What does the rate-determining step in a reaction mechanism refer to?

- The fastest step in the mechanism
- The step with the highest concentration of reactants
- The slowest step in the mechanism

- The step with the lowest activation energy

Which of the following factors can affect the rate constant (k) of a reaction?

- Temperature
 Concentration of reactants
 Presence of a catalyst
 Pressure

Which of the following statements is true about catalysts?

- They increase the rate of reaction by increasing the concentration of reactants.
 They increase the rate of reaction by providing an alternative pathway with a lower activation energy.
 They are consumed in the reaction.
 They decrease the rate of reaction.

In a zero-order reaction, how does the rate of reaction change with concentration?

- It increases linearly with concentration.
 It decreases with concentration.
 It remains constant regardless of concentration.
 It increases exponentially with concentration.

Which of the following are characteristics of a first-order reaction?

- The rate is independent of the concentration of reactants.
 The half-life is constant.
 A plot of $\ln[A]$ vs. time is linear.
 The rate is directly proportional to the concentration of one reactant.

Describe the effect of temperature on the rate constant and the rate of a chemical reaction.

Which of the following can be determined from the integrated rate law?

- Concentration of reactants at a given time
- Reaction order
- Rate constant
- Activation energy

Describe how the half-life of a first-order reaction can be used to determine the rate constant.

Explain the significance of the rate-determining step in a multi-step reaction mechanism.

Discuss the role of a catalyst in a chemical reaction and how it affects the reaction mechanism.

Which of the following is the correct unit for the rate constant (k) of a first-order reaction?

- mol L⁻¹ s⁻¹
- s⁻¹

- $\text{L mol}^{-1} \text{s}^{-1}$
- $\text{mol}^2 \text{L}^{-2} \text{s}^{-1}$