

22 2 review and reinforcement the reaction process answer chemistry

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Chemical Reactions Involving Two Molecules**

When Two Molecules React

Chemical reactions involving two molecules of reactants are known as **bimolecular reactions**. In these reactions, two molecules collide and interact, resulting in the formation of new products.

Chemical Kinetics and Reaction Rate

Chemical kinetics studies the rates at which chemical reactions occur. The **reaction rate** measures the change in the concentration of reactants or products over time.

Types of Reaction Kinetics

Reaction kinetics can be classified into different types based on the order of the reaction:

- **Zero-order reaction:** The reaction rate is independent of reactant concentration.
- **First-order reaction:** The reaction rate is directly proportional to the concentration of one reactant.
- **Second-order reaction:** The reaction rate is directly proportional to the square of the concentration of one reactant or to the product of the concentrations of two reactants.

Order of Reaction in Chemical Reaction Engineering

The **order of reaction** is a numerical representation of the relationship between the reaction rate and the concentration of reactants. It determines the rate law expression for the reaction.

When Two Reactants Mix

When two reactants mix in a chemical reaction, they form an **activated complex**. This is a high-energy intermediate state that forms before the reactants can react to form products.

Chemical Reaction with Two Elements as Reactants

A chemical reaction involving two elements as reactants is known as a **combination reaction**. In this type of reaction, the elements combine to form a new compound.

Reaction Rate for a Chemical Reaction

The **reaction rate** is a measure of the speed at which a reaction occurs. It can be expressed as the change in concentration of reactants or products per unit time.

Reactants: Positive or Negative?

Reactants in a chemical reaction are typically **negative**, indicating that their concentrations are decreasing over time.

Reaction Rate in Chemistry Simplified

The reaction rate is the speed at which a chemical reaction occurs, measured as the change in concentration of reactants or products over time.

Collision Theory

A collision between molecules is necessary in many reactions because it provides the energy needed to overcome the **activation energy**, which is the minimum energy required for a reaction to occur.

Catalyst Poisoning

A **poison** is a substance that interferes with the action of a catalyst, reducing or eliminating its effectiveness.

Electrochemistry Difficulty

Electrochemistry can be a challenging subject due to its complex concepts, mathematical equations, and experimental techniques.

Activation Energy Symbol

The symbol for activation energy is **E_a**.

Calculating Rate Constant

The rate constant, *k*, can be calculated from experimental data using various methods, such as the integrated rate law or the Arrhenius equation.

Determining Rate Law

The rate law is an expression that describes the relationship between the reaction rate and the concentrations of reactants. It can be determined experimentally by measuring the reaction rate at different reactant concentrations.

Synthesis Reaction General Form

The general form of a **synthesis reaction** is:



where A and B are the reactants and AB is the product.

Factors Not Affecting Reaction Rate

The following factors **do not** affect the reaction rate:

- Temperature
- Concentration of reactants
- Presence of a catalyst

Energy Types for Chemical Changes

Different types of chemical changes require different types of energy, such as:

- **Endothermic reactions:** Energy is absorbed.
- **Exothermic reactions:** Energy is released.

Properties of Products vs. Reactants

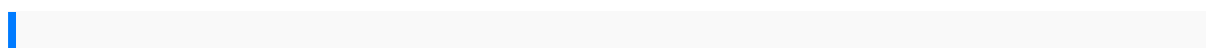
The properties of products are different from those of reactants because a chemical reaction involves the creation of new chemical bonds and the breaking of old ones.

Balancing Chemical Equations

The easiest way to balance a chemical equation is to adjust the stoichiometric coefficients (numbers in front of the chemical formulas) until the number of atoms of each element is the same on both sides of the equation.

Combination Reactions and Energy Release

Not all combination reactions release energy. Some reactions, known as **exothermic reactions**, release energy in the form of heat or light, while others, known as **endothermic reactions**, require an input of energy to occur.



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