# Pericyclic Reactions

Understanding the Dynamics of
Organic Chemistry Reactions

Course name: Heterocyclic, organic synthesis and pericyclic reactions
Course code: BCHE603

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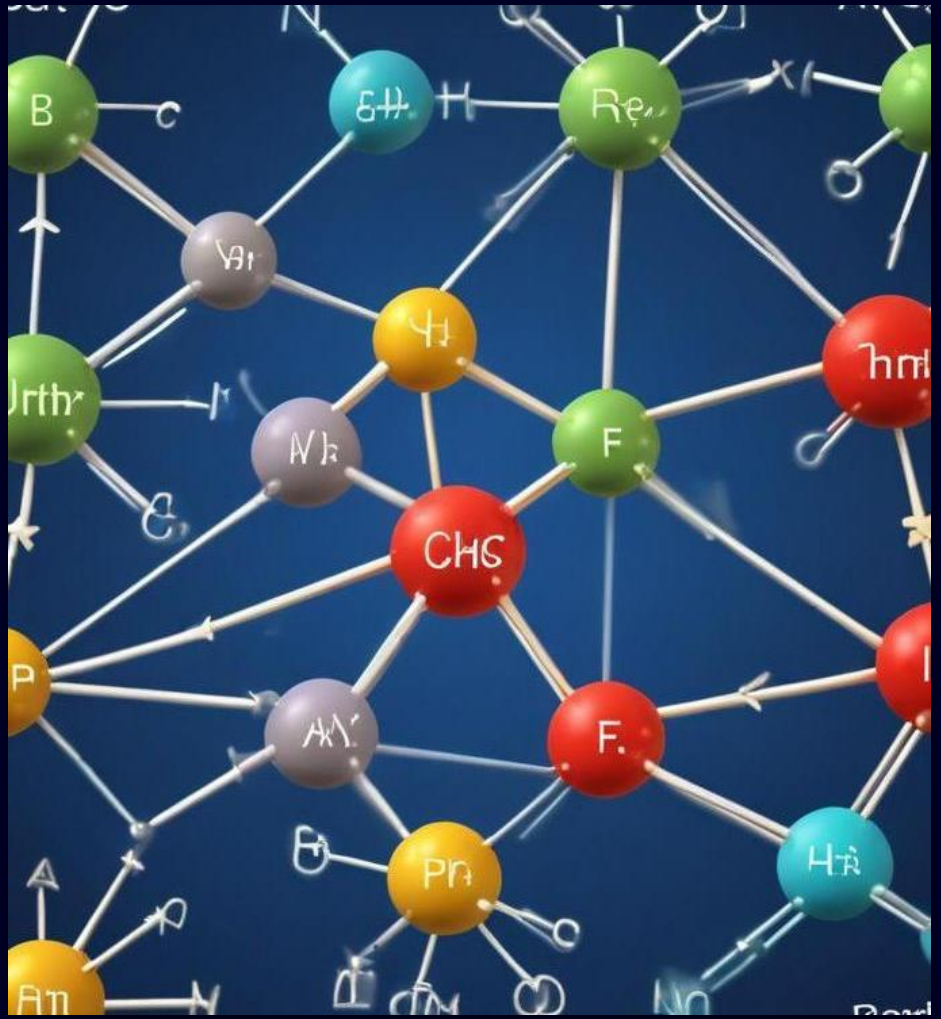
# Introduction

This presentation explores pericyclic reactions, their types, mechanisms, and significance in organic chemistry, focusing on how these reactions occur through concerted processes involving cyclic transition states.

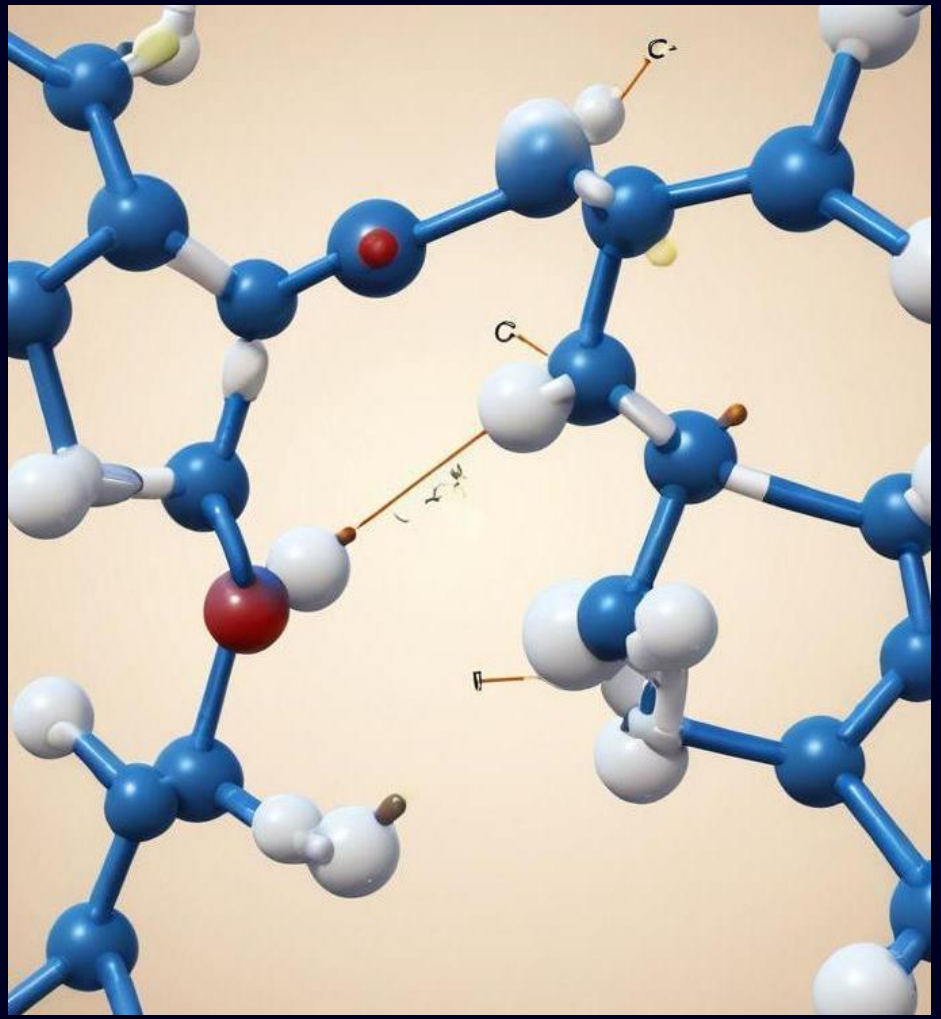


# 01

# Types

# Electrocyclic reactions

Electrocyclic reactions involve the opening or closing of a cyclic system through the rotation of σ-bonds and π-bonds, governed by orbital symmetry. Catalysts can influence the direction of the reaction, which may occur thermally or photochemically.



# Cycloaddition reactions

Cycloaddition reactions combine two reactants to form a cyclic product in a single step, often involving π-systems. The most common examples include Diels-Alder reactions, which showcase the importance of stereochemistry and transition states in reaction pathways.

# Sigmatropic rearrangements

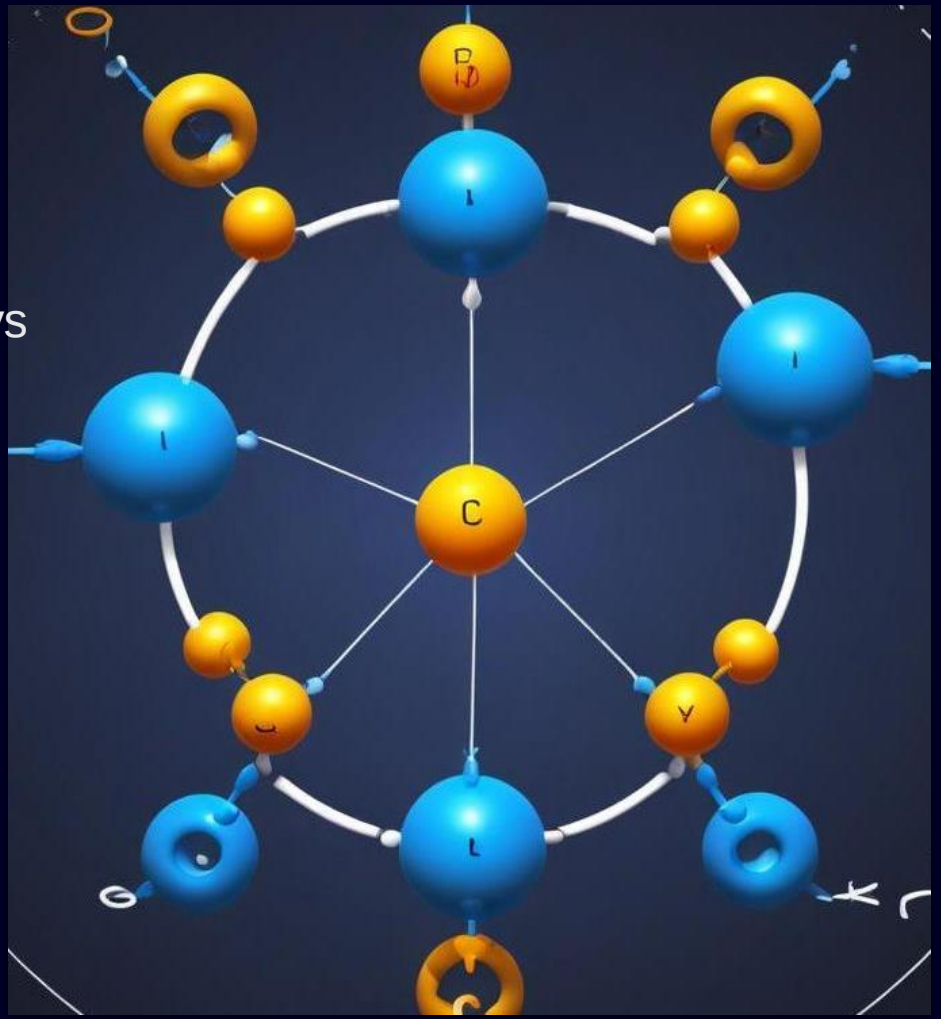
Sigmatropic rearrangements are reactions where a σ-bond and π-bond shift simultaneously to form a new bond while breaking another. These rearrangements can be classified into various categories based on the number of atoms involved and the nature of the migration, playing a crucial role in synthesis and natural product development.

# 02

# Mechanisms

# Orbital symmetry consideration

In pericyclic reactions, orbital symmetry plays a vital role in determining reactivity. The Woodward-Hoffmann rules provide a framework for predicting the stereochemical outcomes of these reactions based on the symmetry of the molecular orbitals involved, making it easier to understand the electron flow during reactions.



# Reaction intermediates

Reaction intermediates are transient species formed during the progression of a chemical reaction. In pericyclic reactions, identifying these intermediates helps chemists understand reaction pathways, barriers, and the influence of external conditions on reaction outcomes, essential for effective synthesis planning.