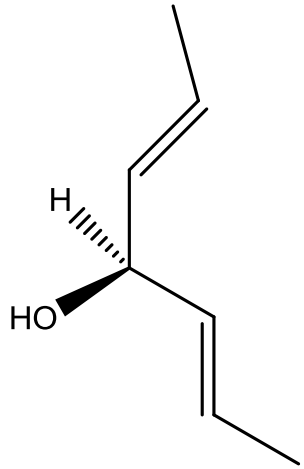
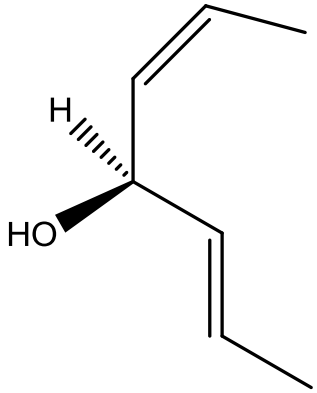
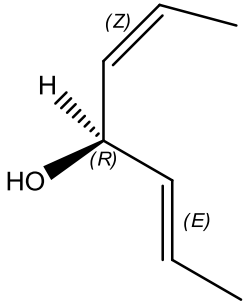
Additional Information on Relative Priority

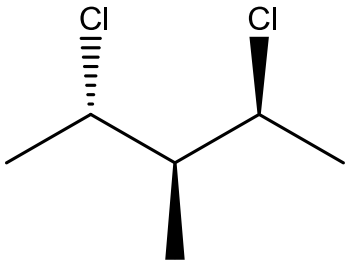
Pericyclic Reaction

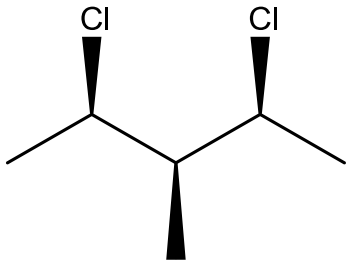
Isomerism of Organic Molecules: Additional information

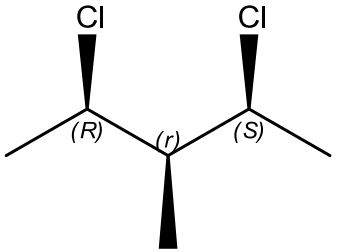












group with descriptor '*R' has priority over its* enantiomorph '*S' and group with Z or Cis dessriptor has priority over E or trans*

pseudo-asymmetric carbon atom

The tetrahedrally coordinated carbon atom bonded to four different entities, two of which have the same constitution but opposite chirality sense

Isomerism of Organic Molecules: Additional information

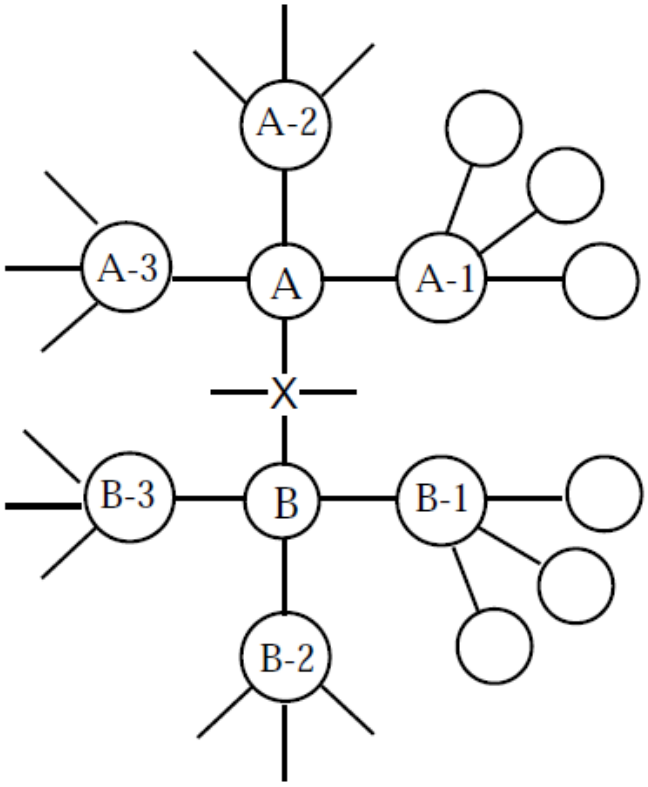
Compare the highest priority atoms, i.e. compare A-1 with B-1.

If A-1 is a higher priority atoms than B-1, then A is higher priority than B

If A-1 and B-1 are the same atom, then compare the second highest priority atoms directly bonded to A and B (A-2 with B-2)

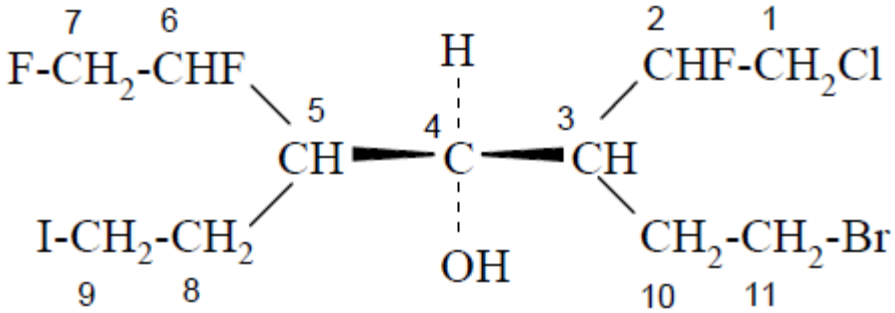
if A-2 is a higher priority atom than B-2, then A is higherpriority than B.

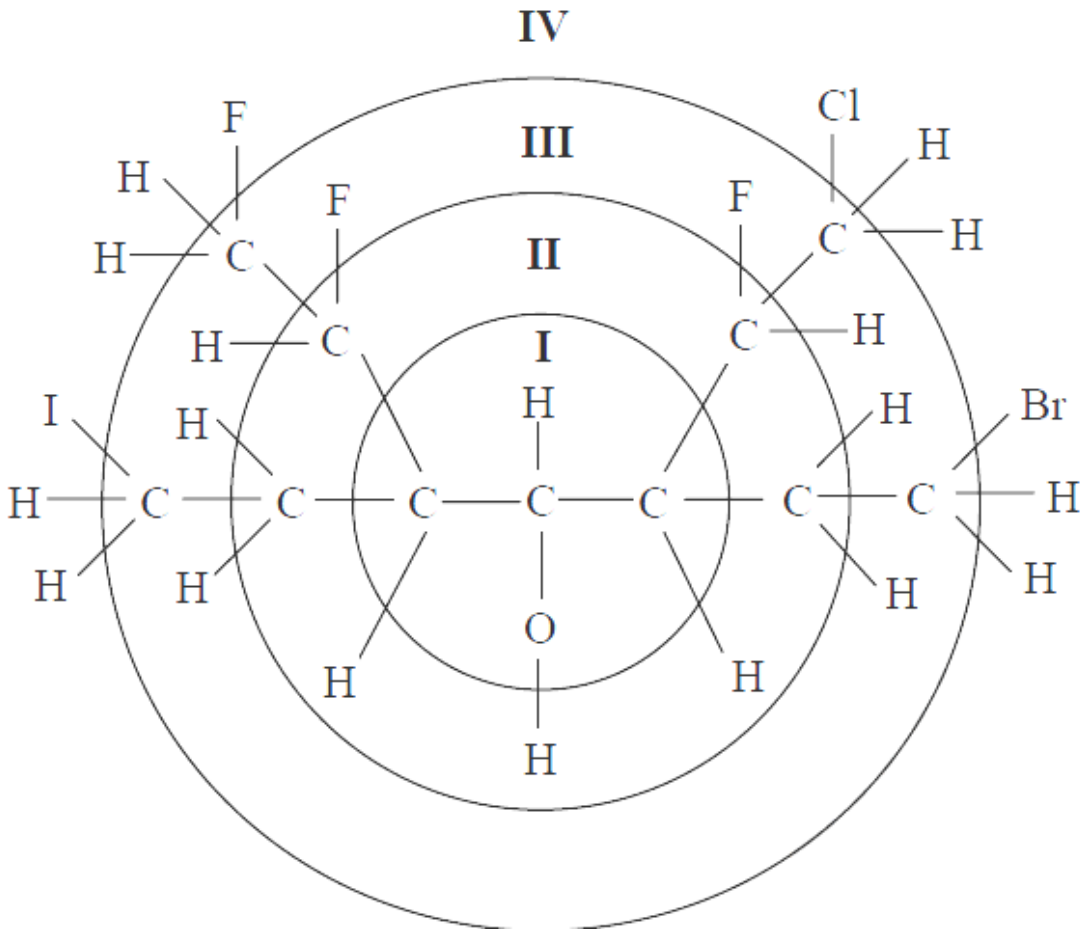
If A-2 and B-2 are identical atoms, compare A-3 with B-3



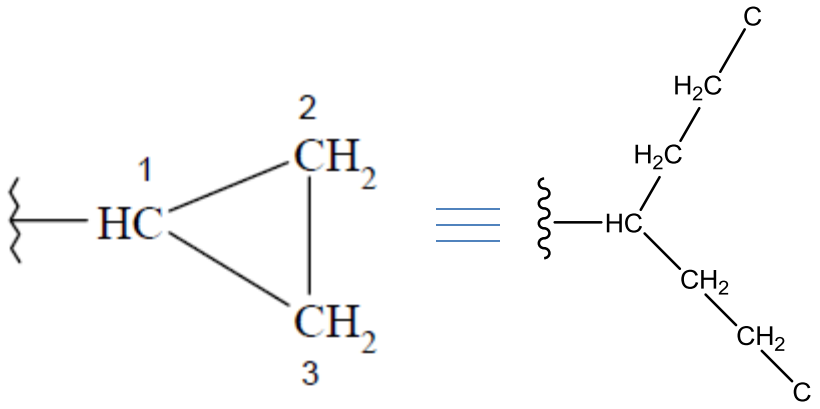
If a difference still can not be found, move out to the next highest priority group (A-1 and B-1 in the diagram) and repeat the process

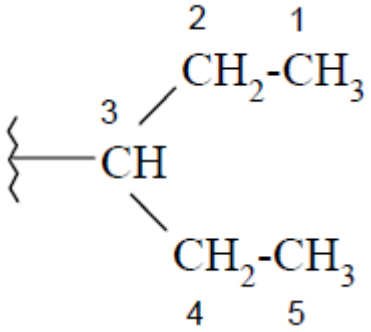
Isomerism of Organic Molecules: Additional information

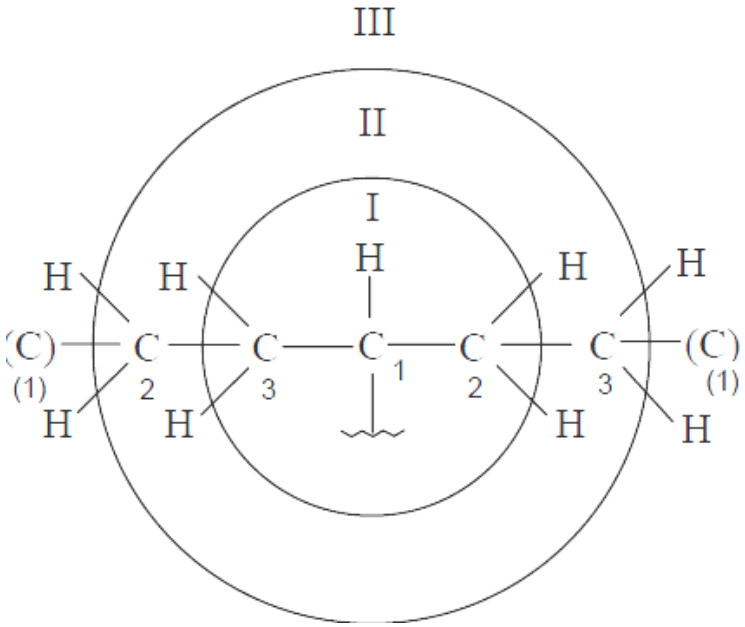


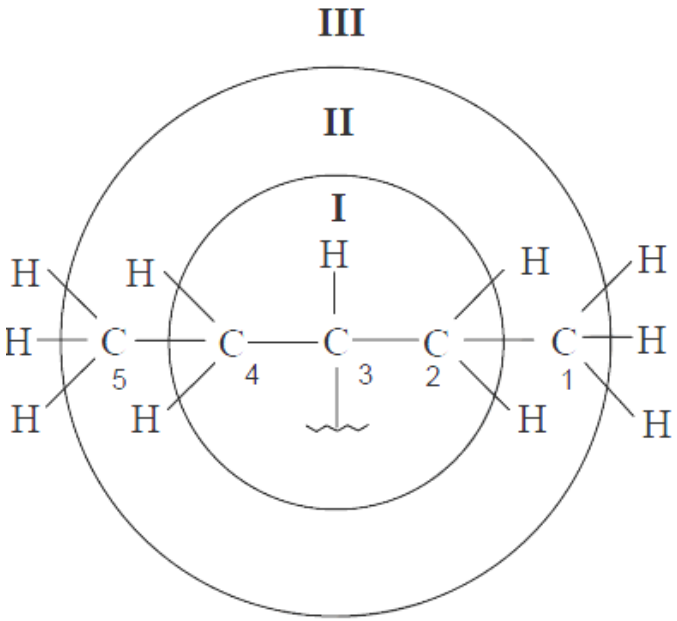


Isomerism of Organic Molecules: Additional information

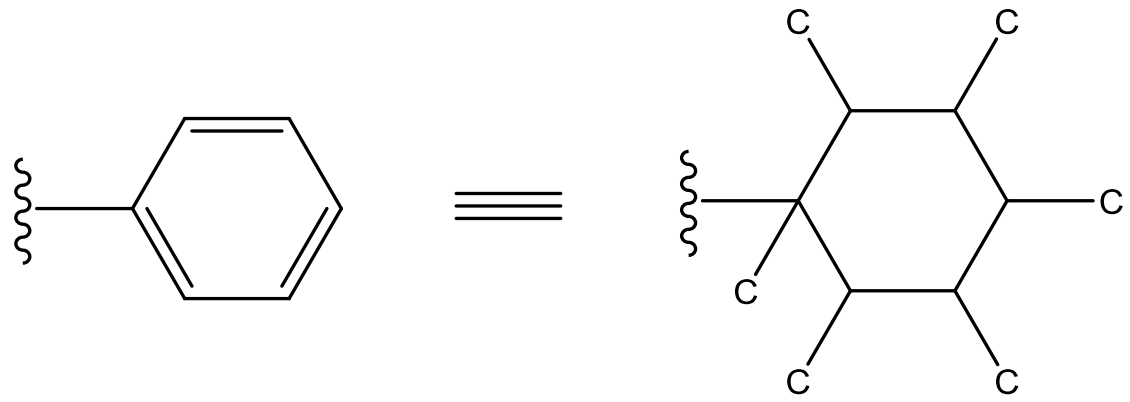




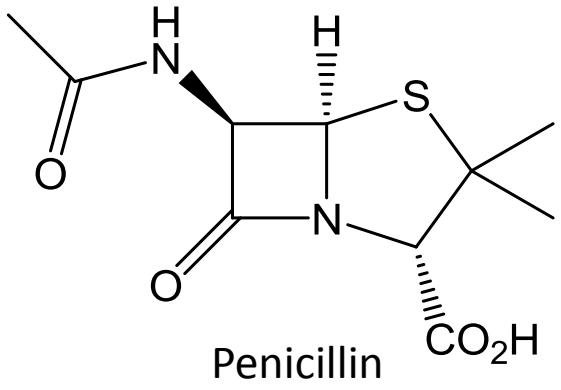




Isomerism of Organic Molecules: Additional information



Provide the stereo-descriptor for the chiral centers of Penicillin



Penicillin

Pericyclic Reactions

Books: Any organic chemistry book

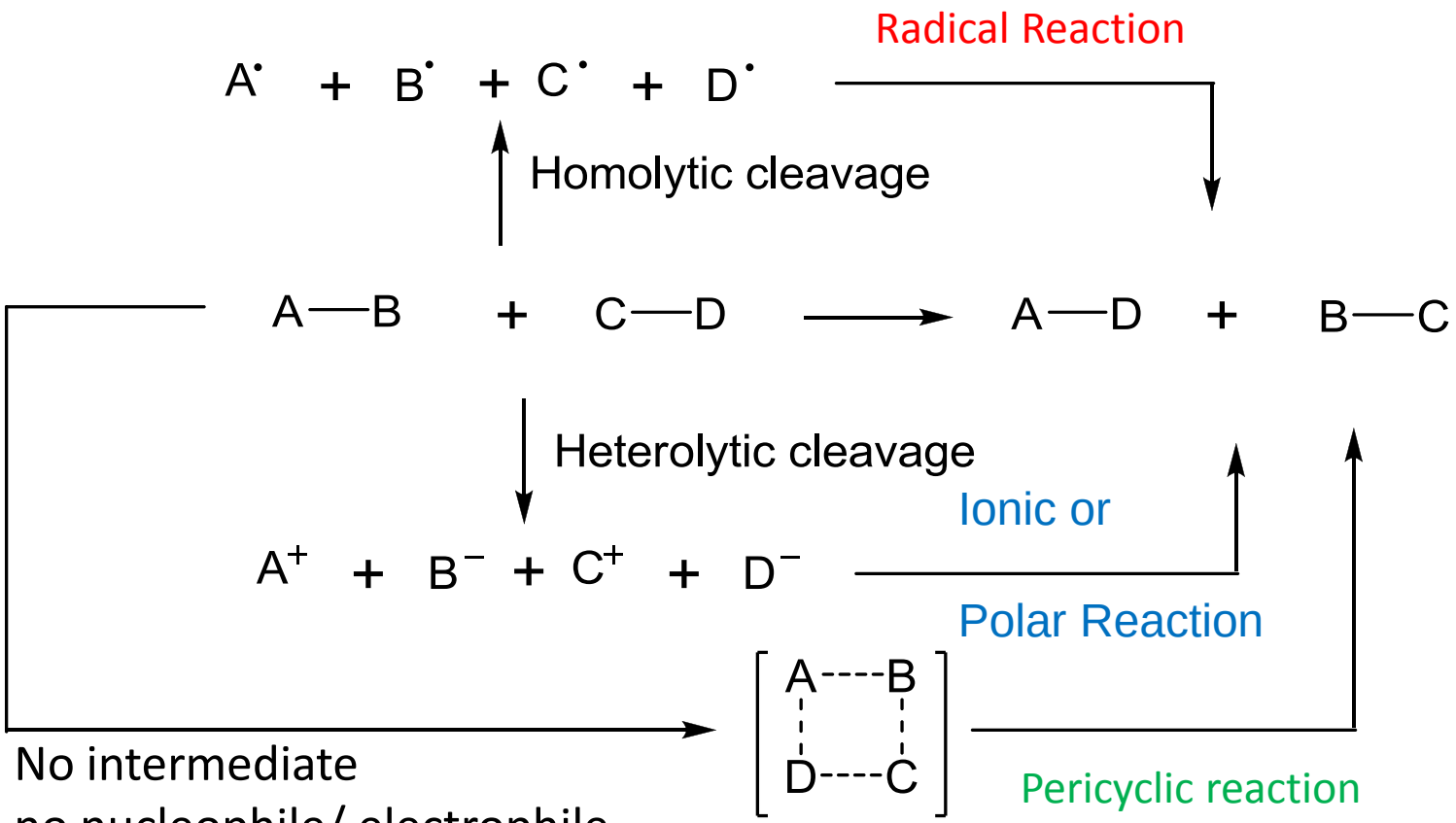
Lectures mainly follow:

Organic Chemistry by P. Y. Bruice

Organic Chemistry by J. Clayden, N. Greeves and S. Warren

Advanced studies: Pericyclic Reactions by Ian Fleming

Organic Reactions



no nucleophile/ electrophile

simultaneous bond breaking and bond making

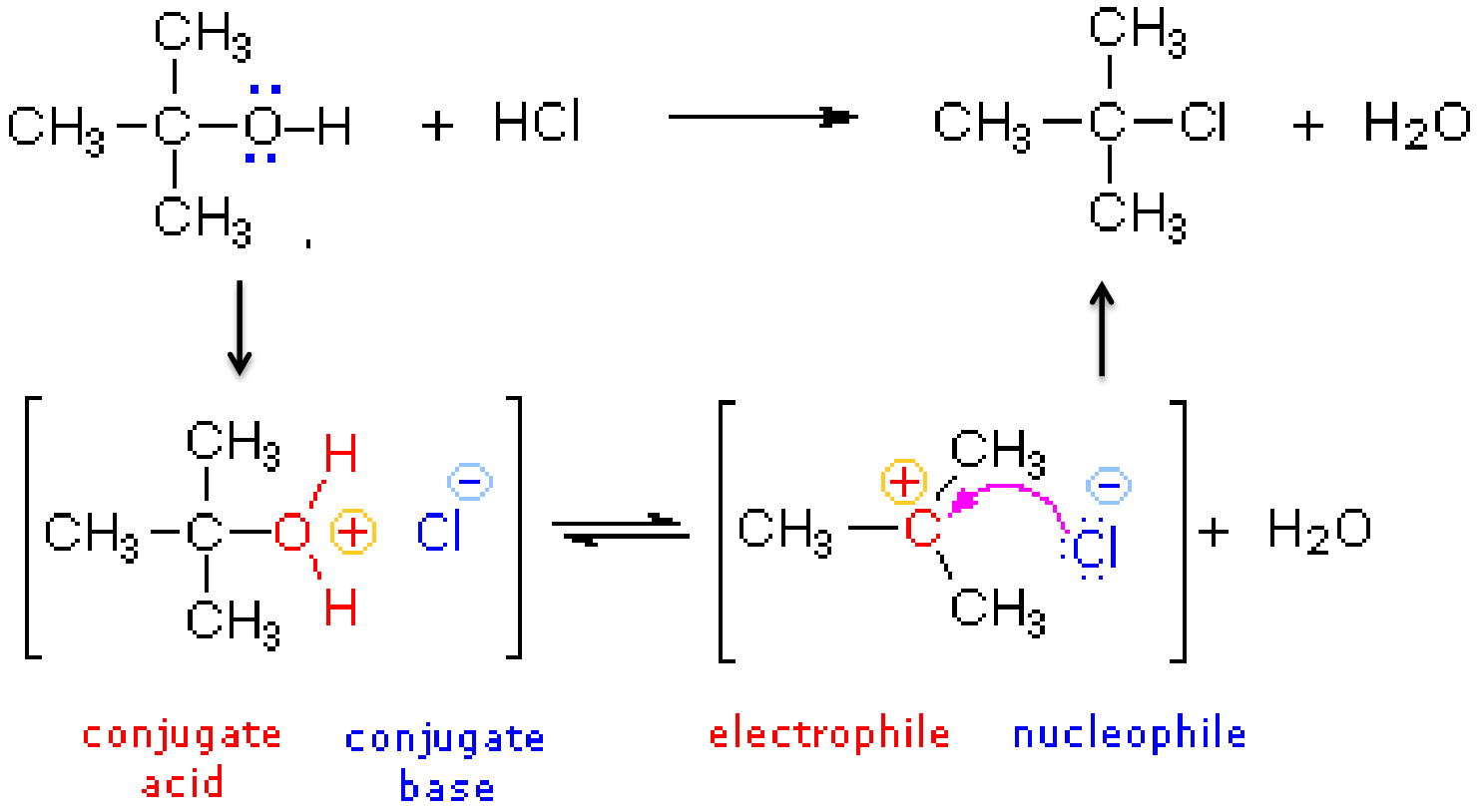
cyclic transition states

Organic reactions are of three kinds

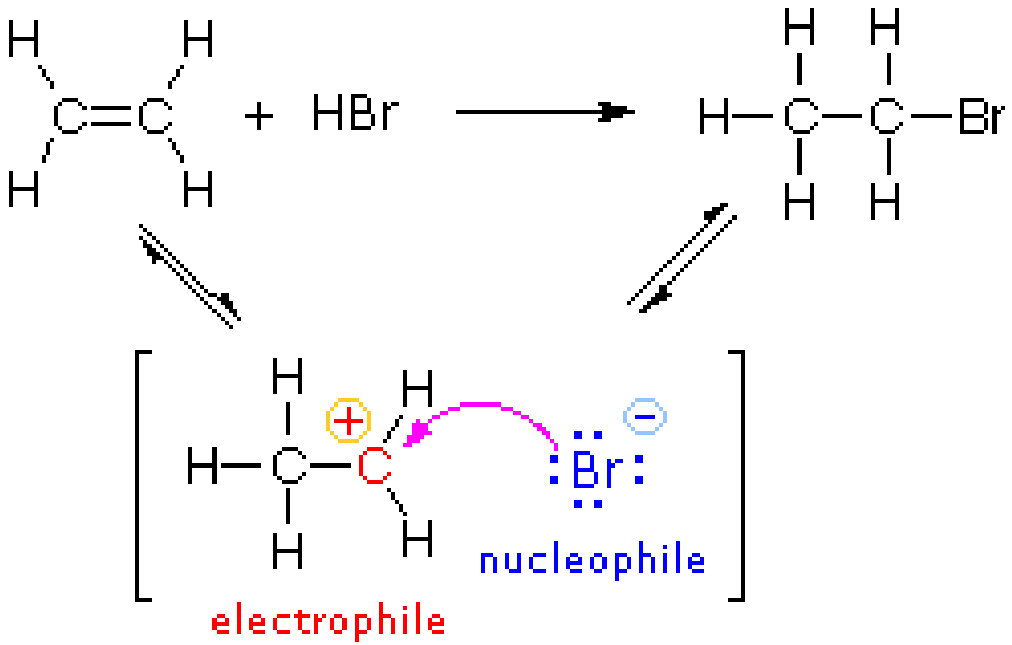
1. Ionic or Polar Reaction
2. Radical Reaction
3. Pericyclic reaction

Ionic or Polar Reaction

Reaction involving charged species; the product is formed combining Electrophiles and nucleophiles



Ionic or Polar Reaction



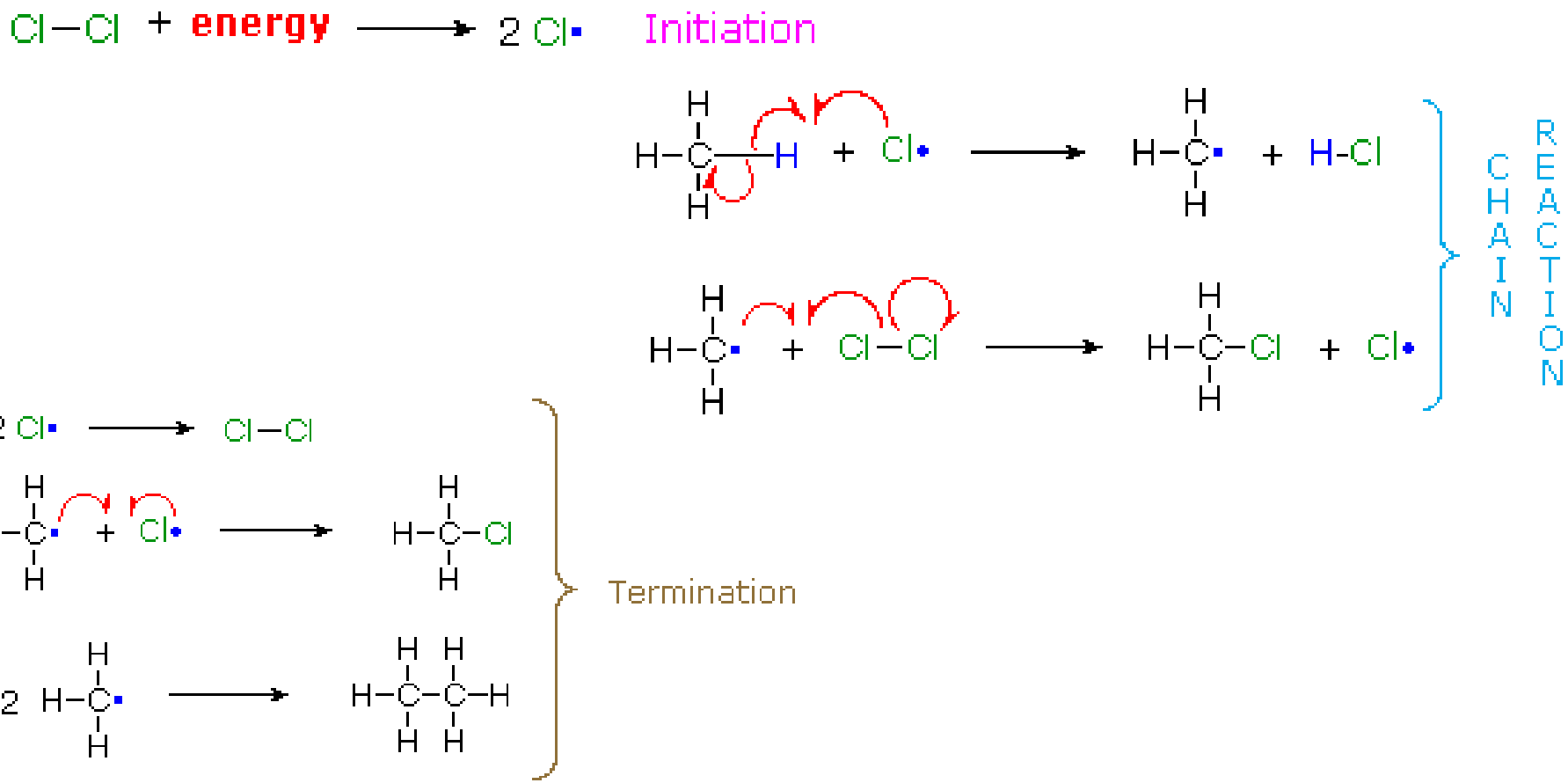
Ionic reaction involves : ions as intermediates

reaction between nucleophile and electrophile

Radical Reaction

Reactions involving neutral radical intermediates are called **radical reaction**

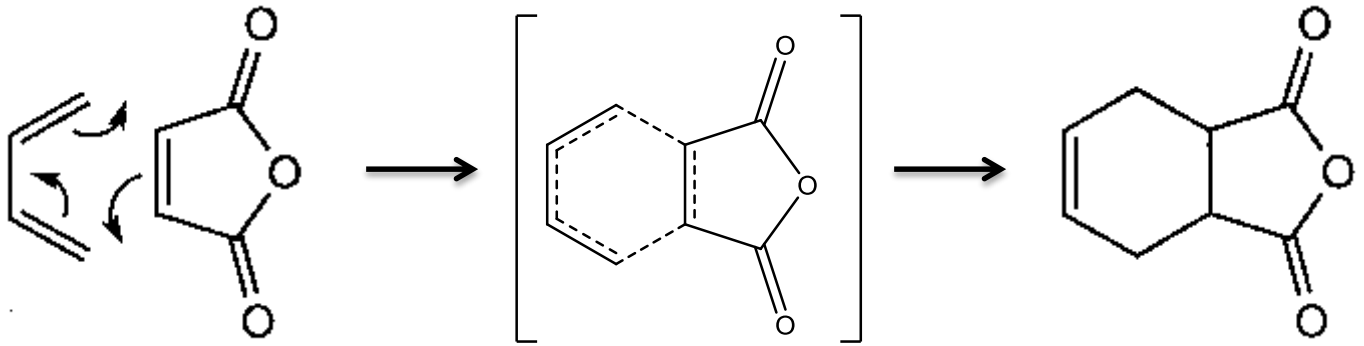
$$CH_4 + Cl_2 + \text{energy} \longrightarrow CH_3Cl + CH_2Cl_2 + CHCl_3 + CCl_4 + HCl$$



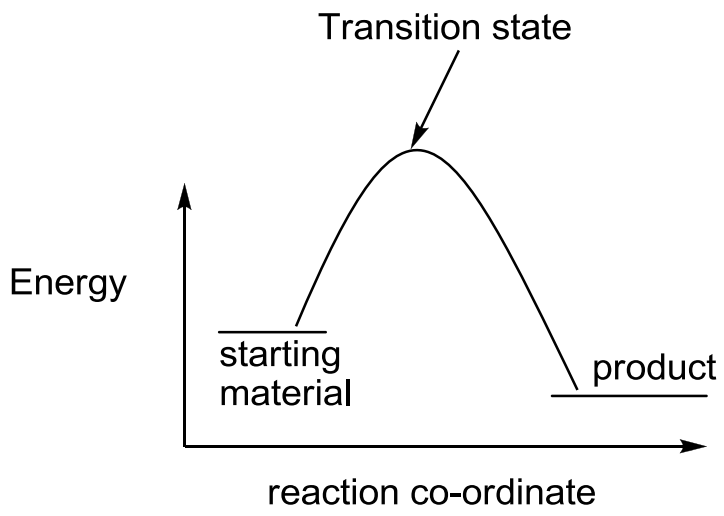
Pericyclic Reactions

Pericyclic reaction are those which are:

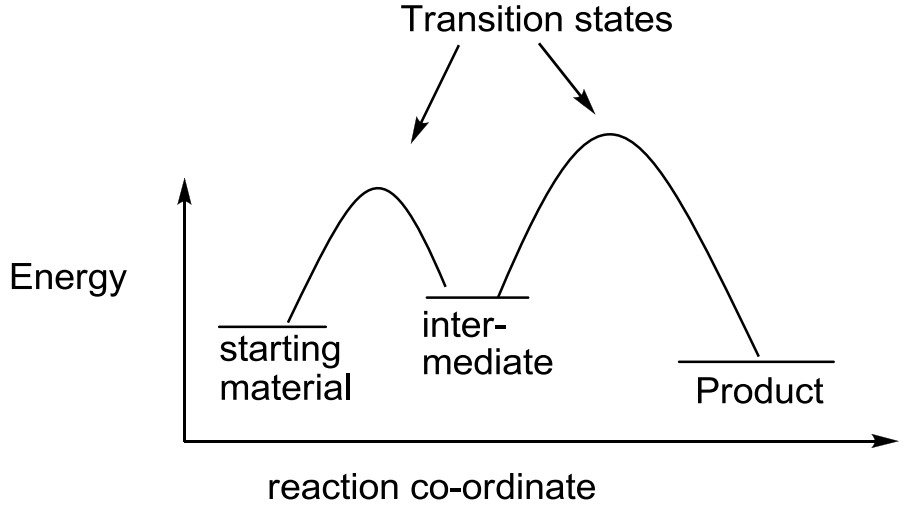
1. **Concerted** reaction with **cyclic transition states**
2. **Without** formation of **intermediate**
3. Having **simultaneous bond-forming and bond breaking** process



Concerted reaction



multistep Ionic or radical reaction



Pericyclic Reactions: Classification

Types of pericyclic reaction:

a) Cycloaddition reaction

b) Electrocyclic Reaction (electrocyclic ring closing and electrocyclic ring openning)

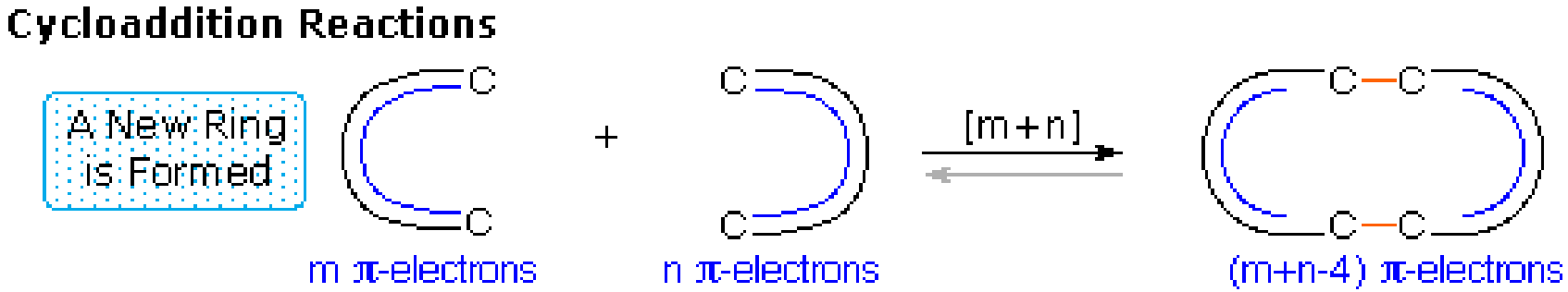
c) Sigmatropic rearrangement

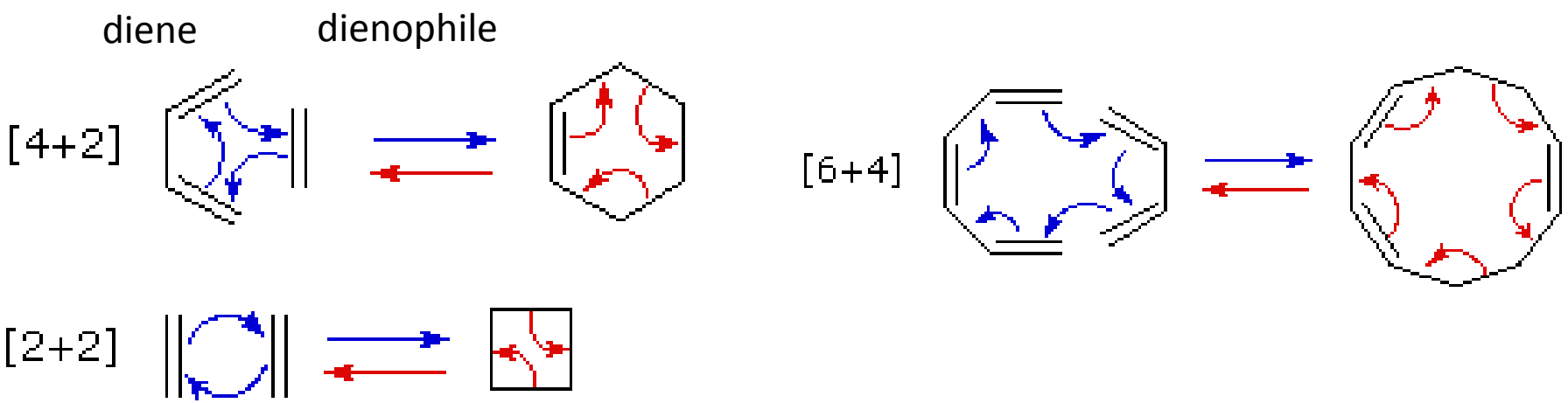
d) Group transfer reaction

Pericyclic Reactions: Cycloaddition Reaction

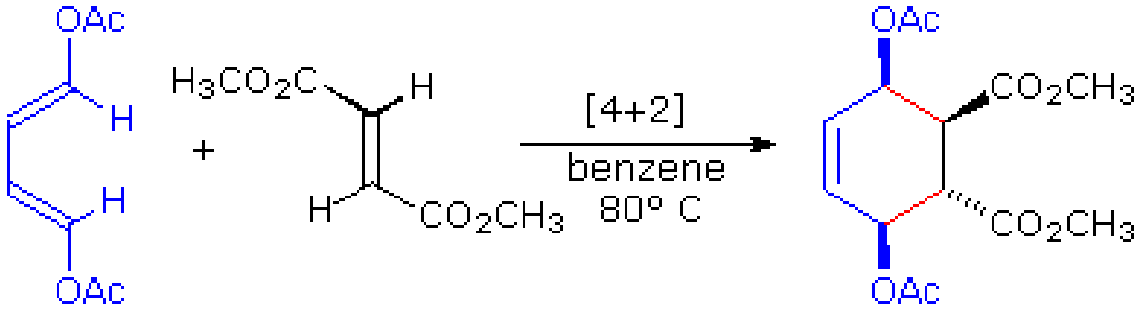
Cycloaddition reaction is characterized by

a. **two (or more) components** reacting together
b. to form **two (or more) new σ-bonds** at the end of both the π-components
c. forming a **ring**
d. with a **reduction in the length of the conjugated system** in each components.





Pericyclic Reactions: Cycloaddition Reaction



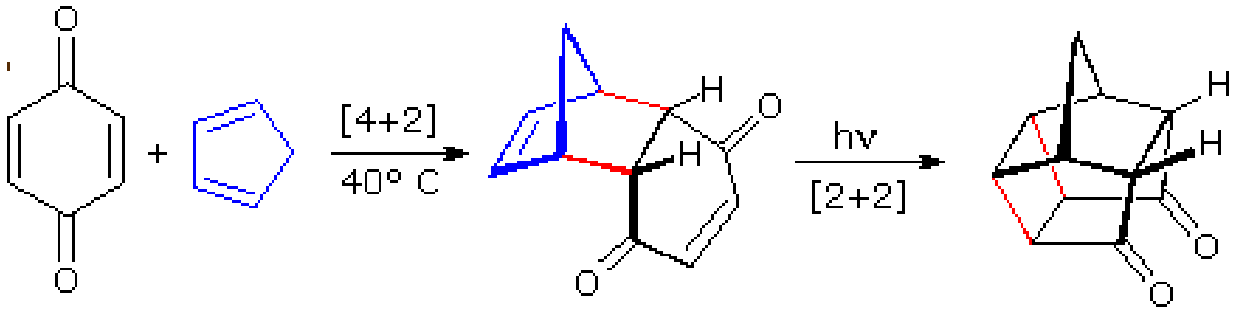
diene

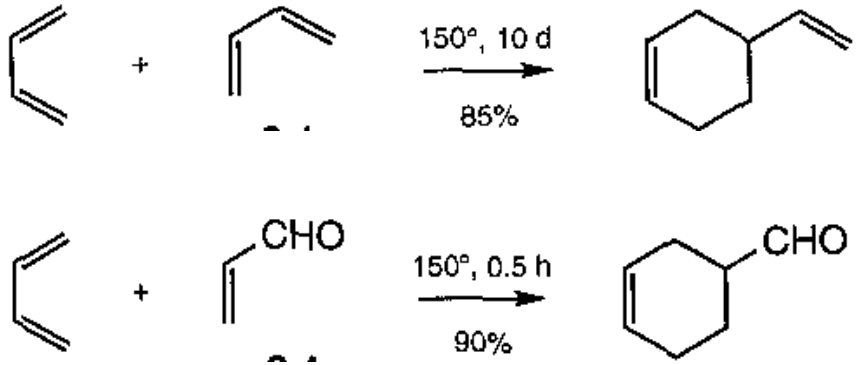
dienophile

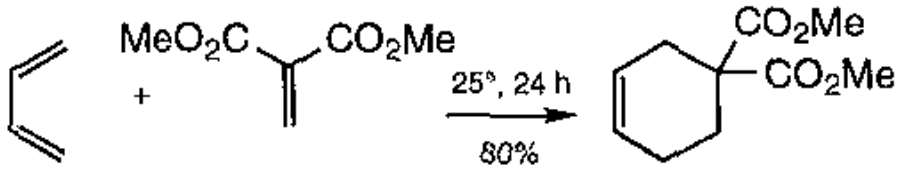
How to assign the relative Stereochemistry ?

[4+2] under thermal condition

[2+2] in presence of light



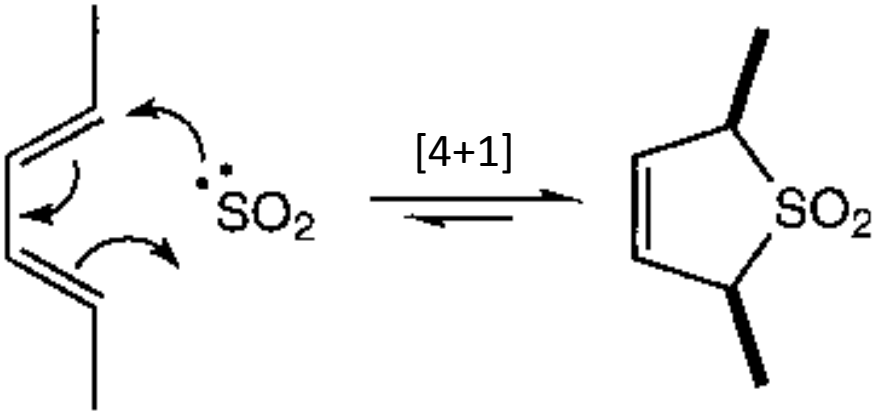


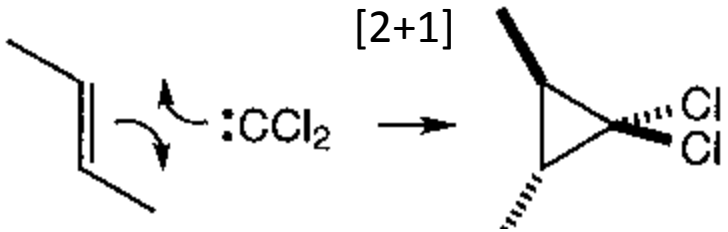


reaction occurs at low temperature and short time

reaction require high temperature and longer time

Pericyclic Reactions: Cheletropic Reactions





a. **two components** reacting together

b. to form **two new σ-bonds** at the end of both the π-components

c. forming a **ring**

d. with a **reduction in the length of the conjugated system** in each components.

Cheletropic reactions are a special type of cycloaddition/cycloreversion reactions

Two bonds are formed or broken at a single atom

The nomenclature for cheletropic reactions is the same as for cycloadditions

Looking forward

Pericyclic Reaction

Quize on 27th Aug: physical, inorganic and organic

Course material will be uploaded **after 17:00** h on **every Thursday** @

http://www.iitg.ac.in/ckjana/ckjana/Teaching.html