

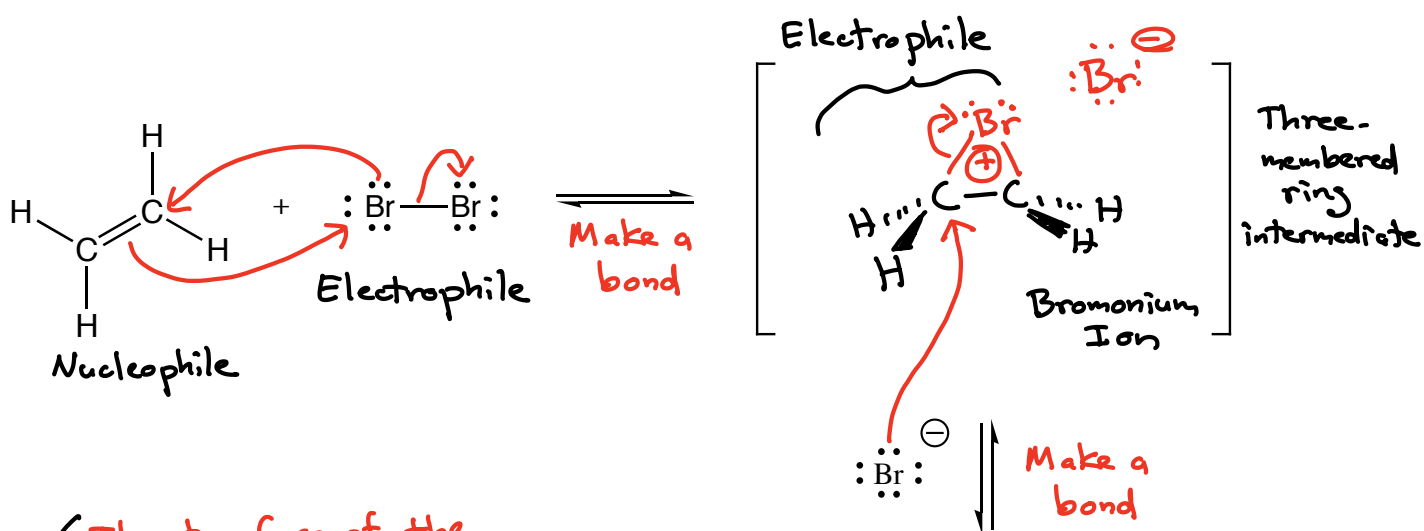
Alkene Reaction Stereochemistry Possibilities

Anti → groups add to opposite faces of the original double bond

Syn → groups add to the same face of the original double bond

Mixed → groups add both anti and syn in the reaction

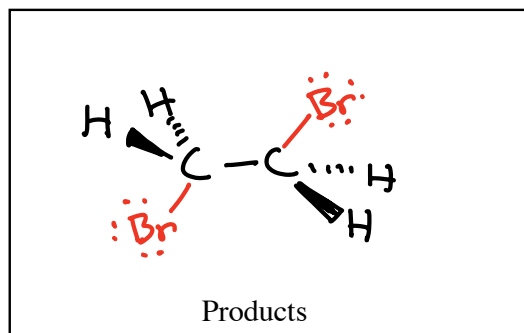
Alkene Halogenation



Called "anti" addition stereochemistry

The top face of the intermediate is "blocked" by the Br atom, so the Br^- nucleophile must react from the opposite face

⇓
Gives only a "trans" product—never "cis"

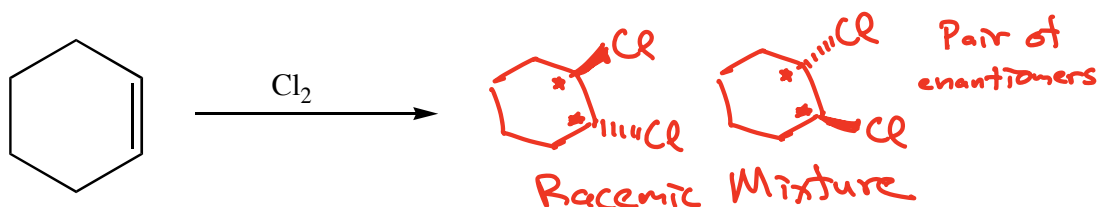


Summary: Alkenes react with X_2 to give a three-membered ring intermediate, then a new bond is made by X^- reacting from behind the C-X bond of the intermediate.

Regiochemistry: Not applicable $\rightarrow$ Br is on both atoms

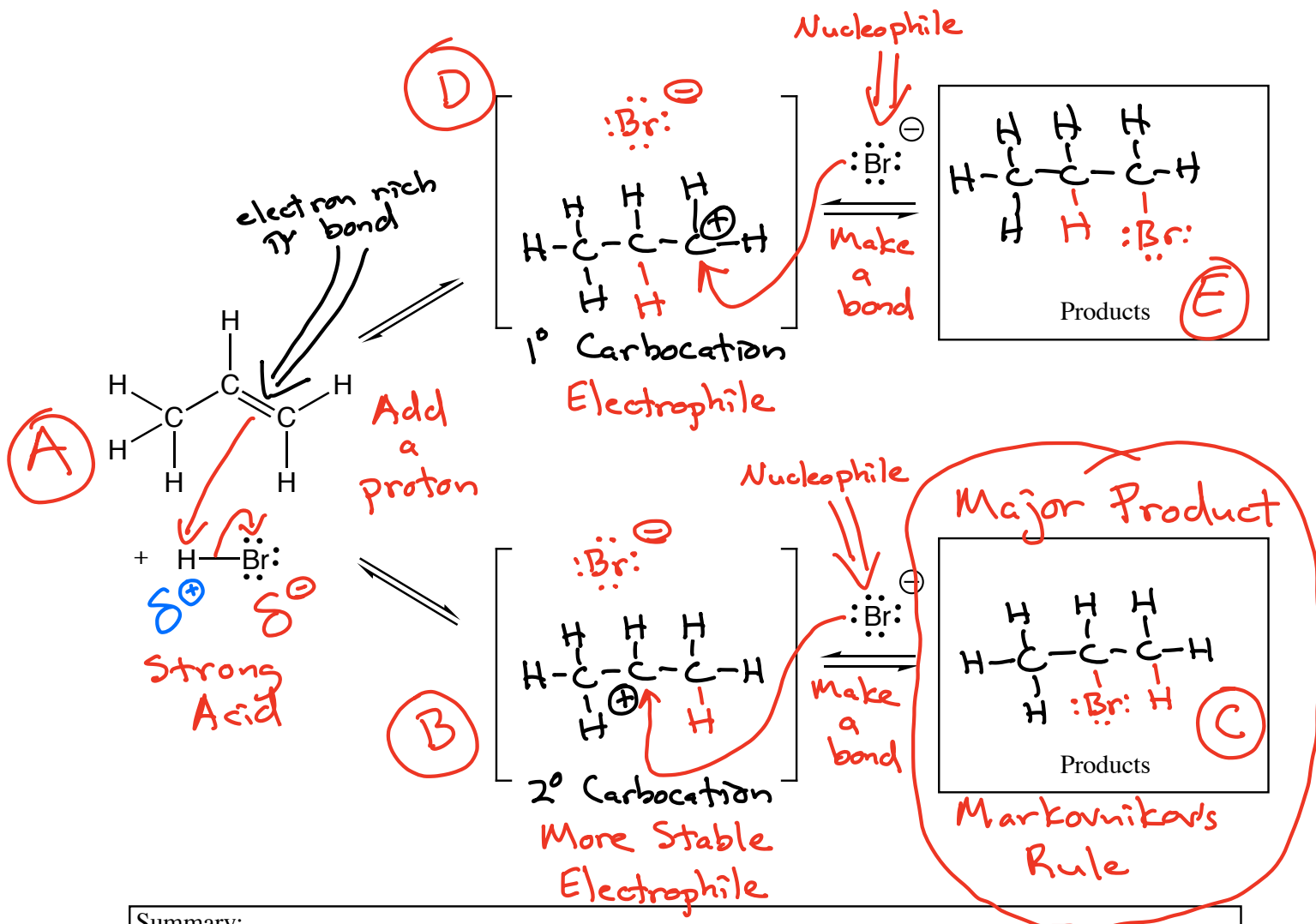
Stereochemistry: Anti addition geometry $\rightarrow$ trans products

Example:



Addition of H-X to an Alkene

X = Cl, Br, I
but not F



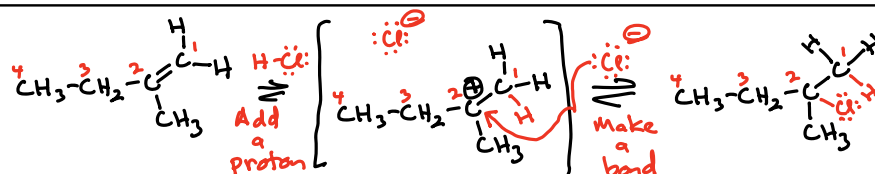
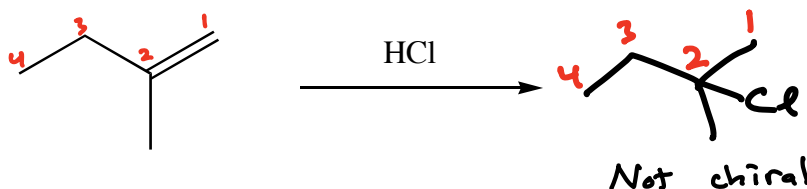
Summary:

The alkene π bond reacts with H-X to add a proton to create a carbocation intermediate that makes a bond with X^- to give the product

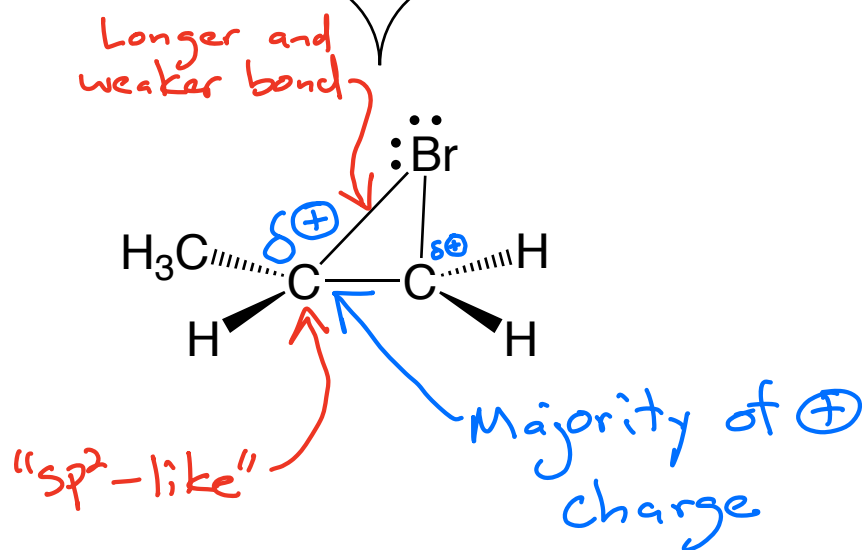
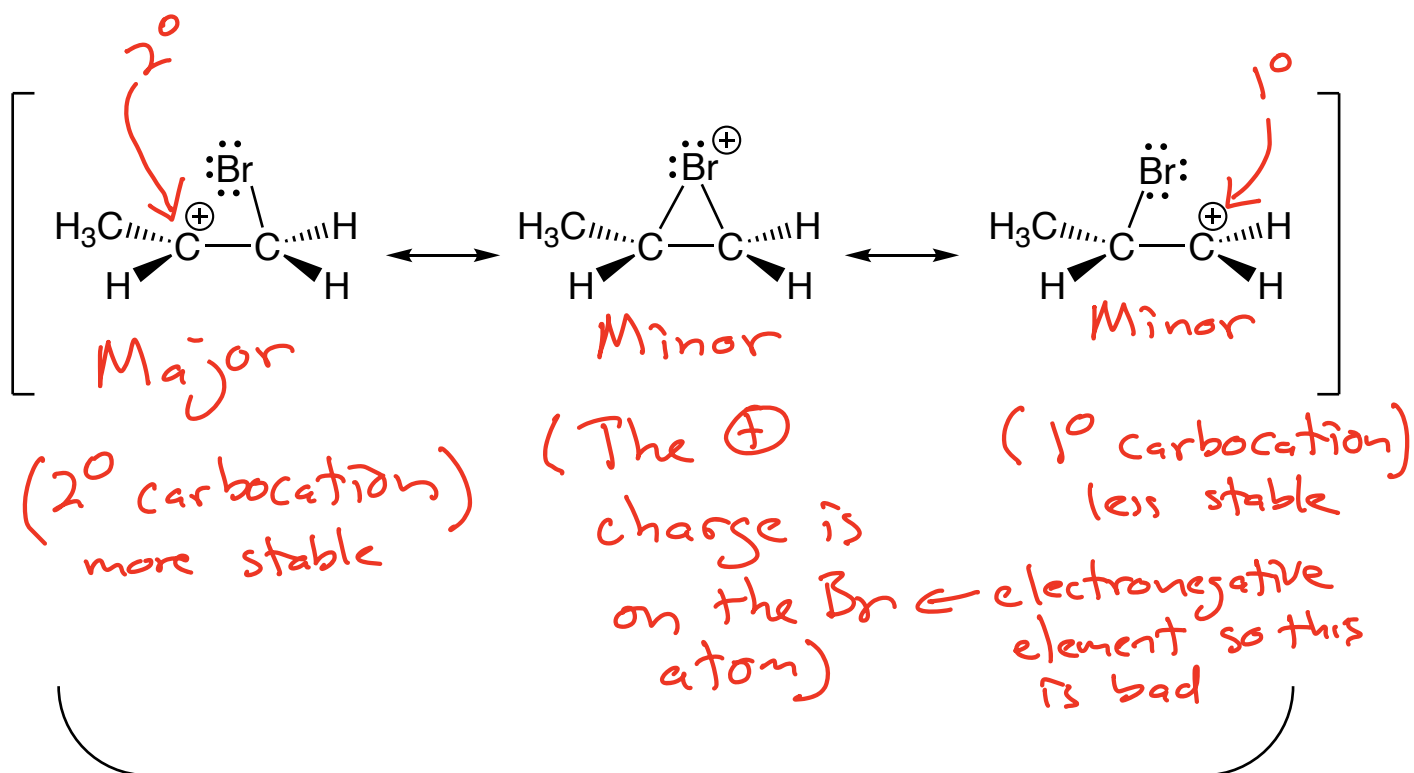
Regiochemistry: **Markovnikov's Rule**

Stereochemistry: **Mixed (time capsule) → Racemic Product**

Example:



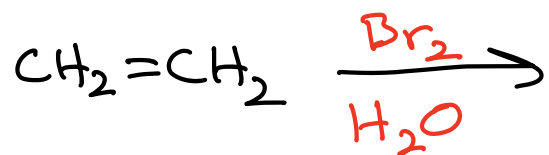
How to think about unsymmetrical halonium ions



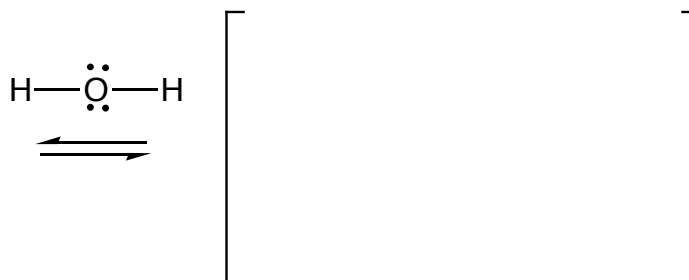
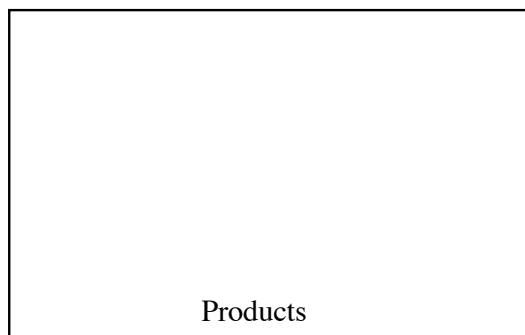
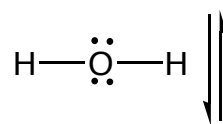
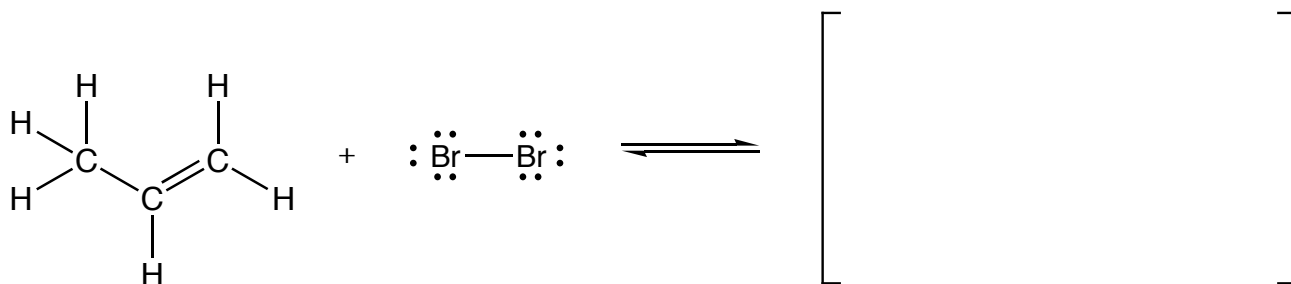
Complication $\rightarrow$ Some intermediates and products are chiral

Solution $\rightarrow$

New overall reaction: Halohydrin Formation



Alkene Hydrohalogenation

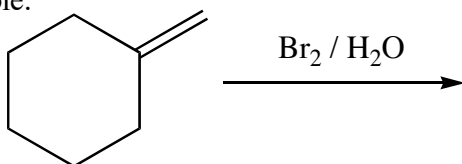


Summary:

Regiochemistry:

Stereochemistry:

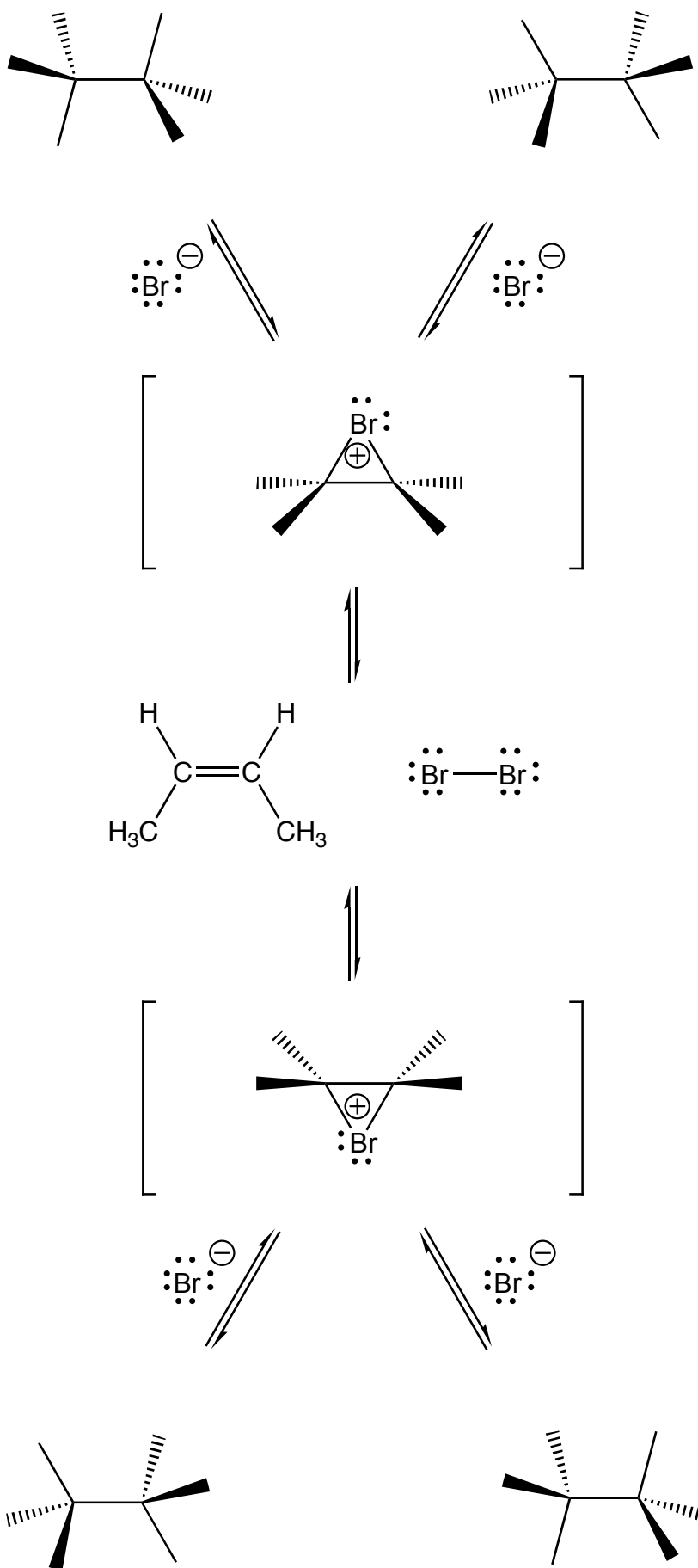
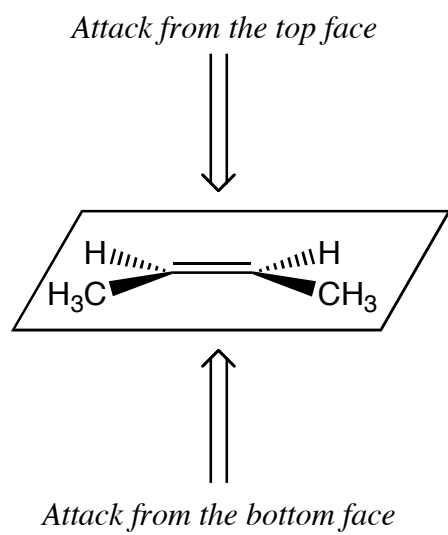
Example:

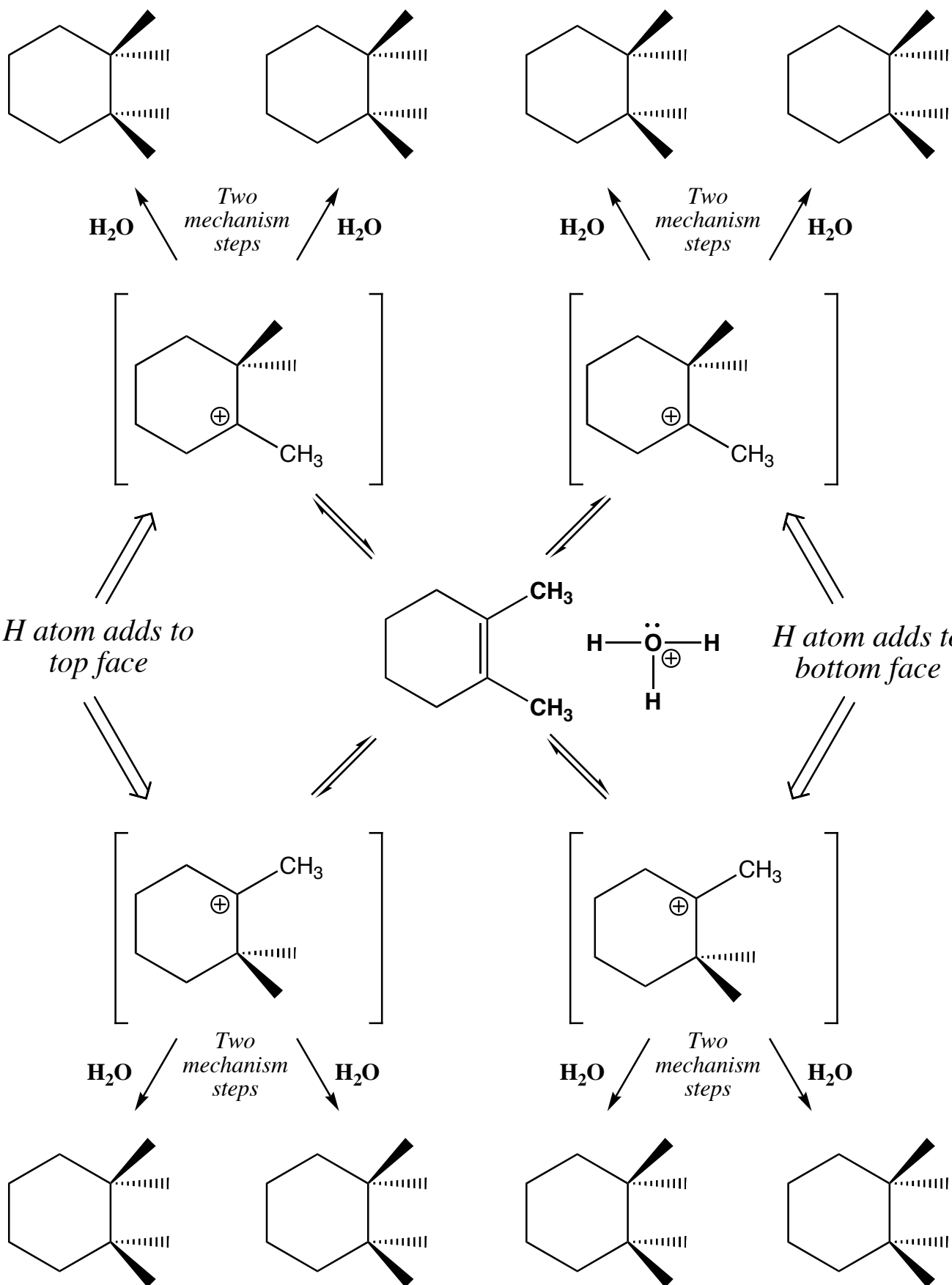


Only carbocations rearrange!

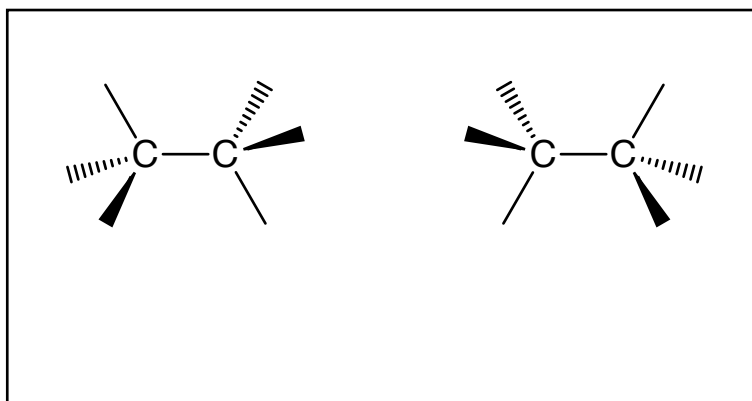
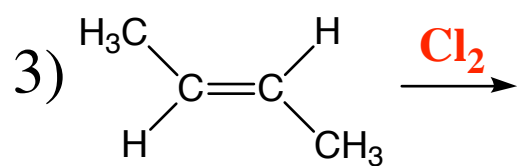
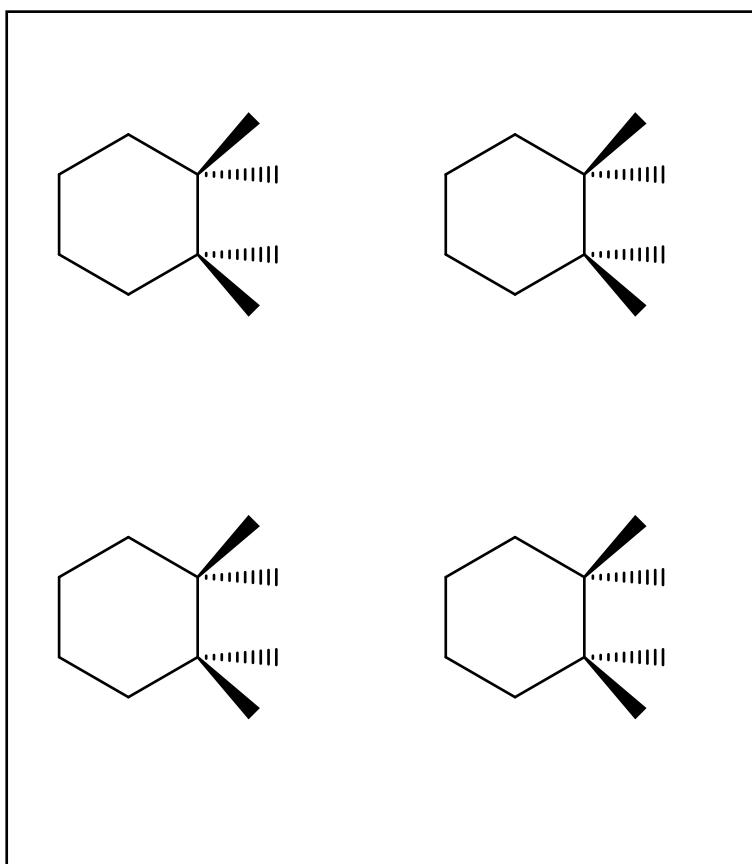
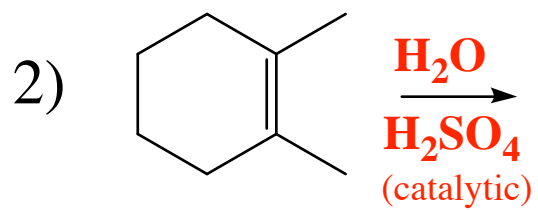
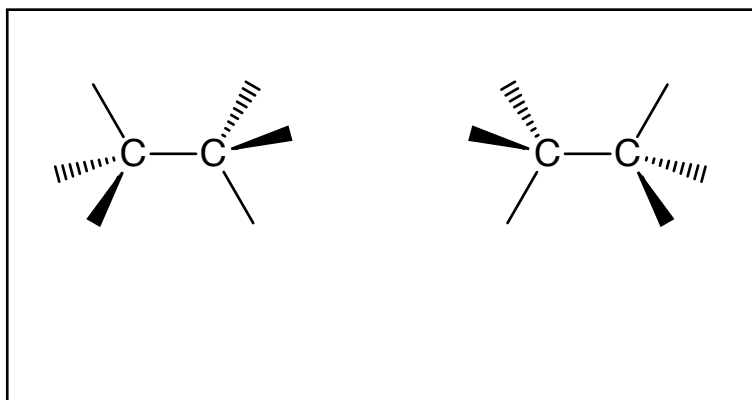
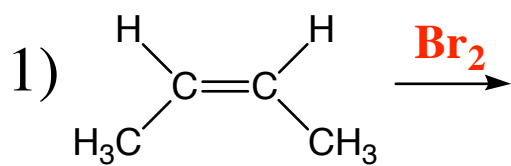


To get stereochemistry
correct when predicting
reaction products,

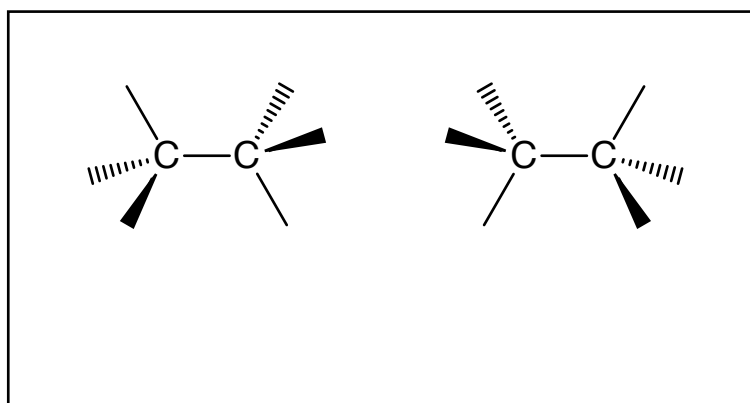
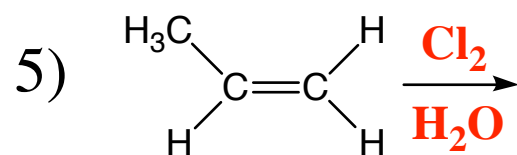
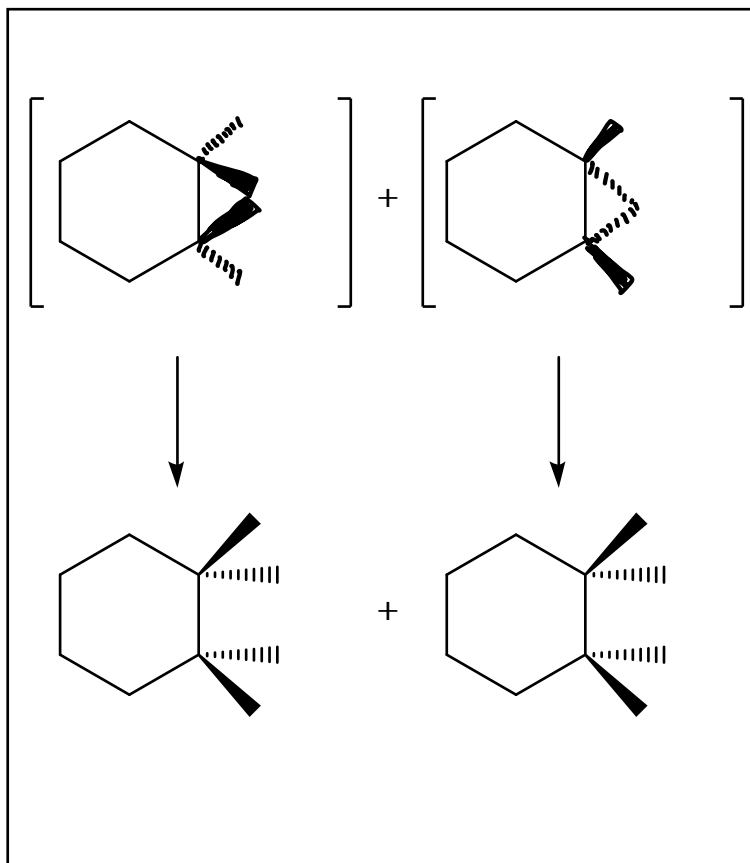
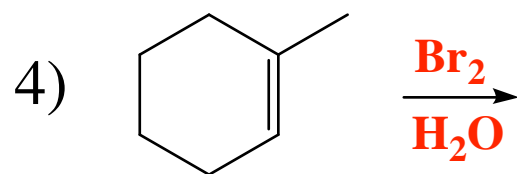




Examples



More Examples



Who do you call when you need help?

Nurse

[nɜrs] noun

lifesaving superhero, patient,
smile bringing, kind, lives to heal.
Kind of a big deal.

nurse

[nɜrs] *noun*

the first person you see after saying, "hold my beer and watch this!"

When studying OChem → Call a NIRRS
Learn each of these things for every
reaction → then you will be able to
predict mechanisms and therefore products

Nature of the reaction; what is the starting material/product? (i.e. alkene converted to an alcohol)

Intermediate (or "Important transition state" if applicable) of the reaction, the key to the mechanism (carbocation, halonium ion, etc.)

Reagents Learn the exact way to designate the reagents for each reaction

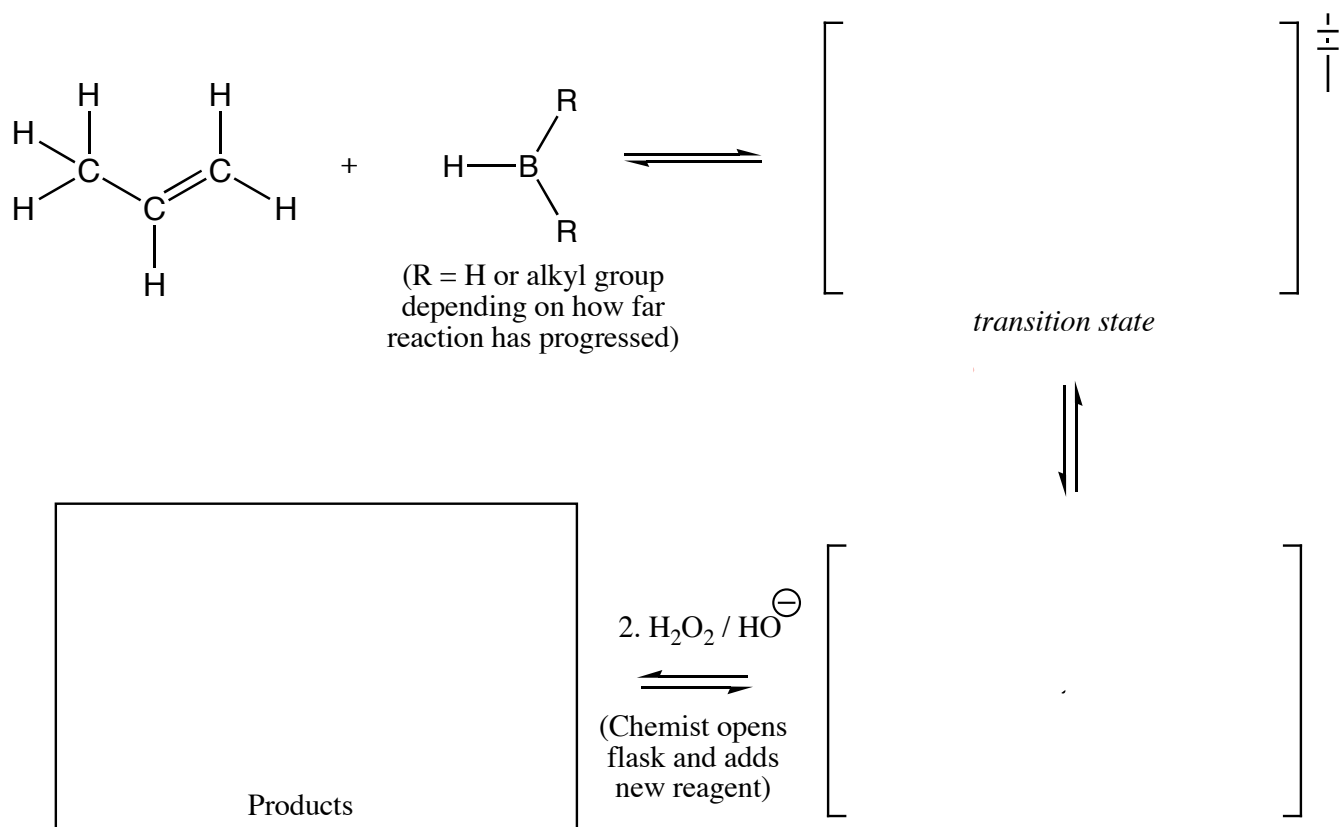
Regiochemistry What is the regiochemistry of addition? (Markovnikov, non-Markovnikov, etc.)

Stereochemistry of addition (anti, syn or mixed)

When you see



Hydroboration-Oxidation

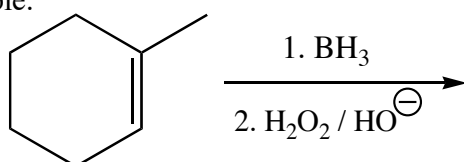


Summary:

Regiochemistry:

Stereochemistry:

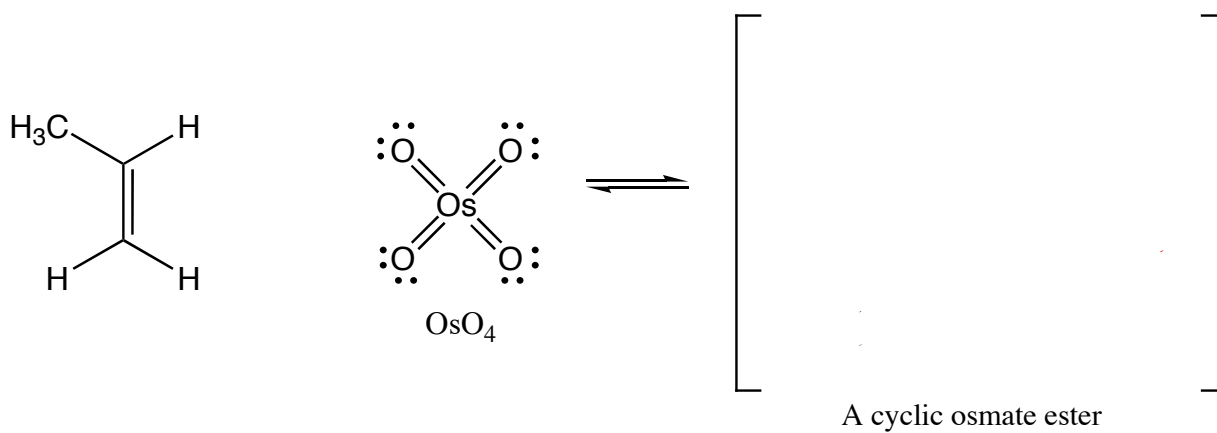
Example:



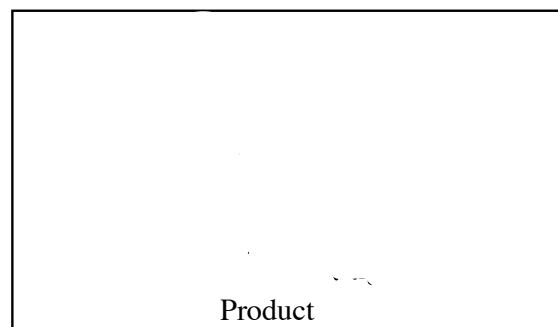
Ozzy Osbourne



OsO₄ Partial Mechanism



2. NaHSO₃ / H₂O
(Chemist opens
up flask)

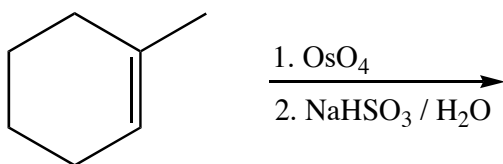


Summary:

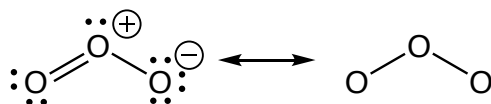
Regiochemistry:

Stereochemistry:

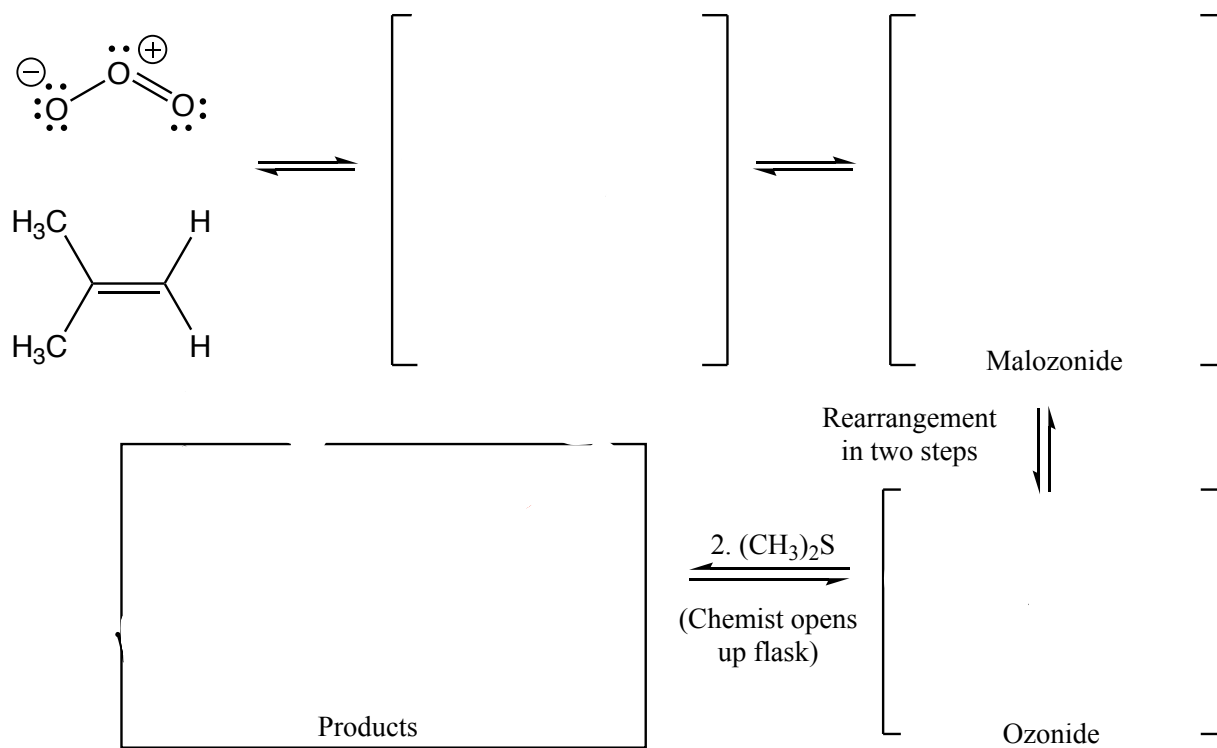
Example:



Ozonolysis Partial Mechanism



Ozone contributing structures

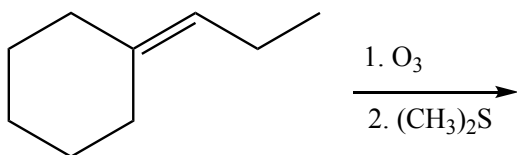


Summary:

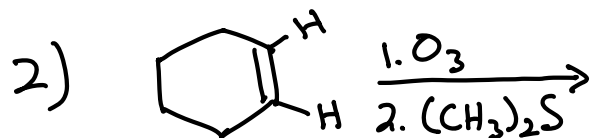
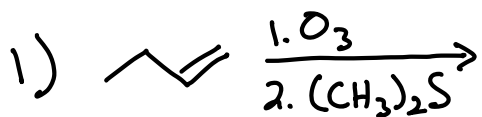
Regiochemistry:

Stereochemistry:

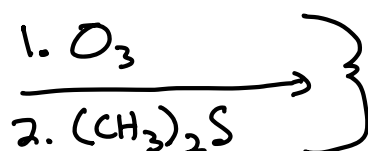
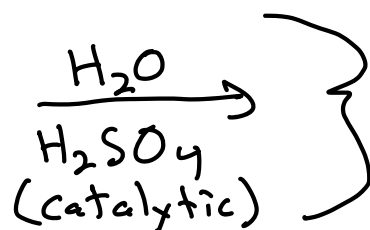
Example:



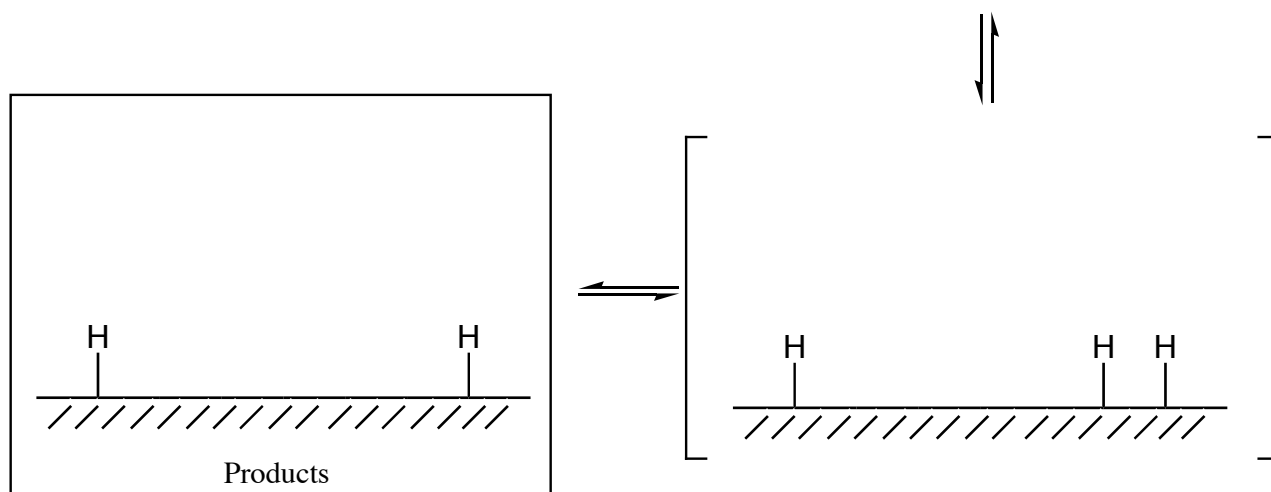
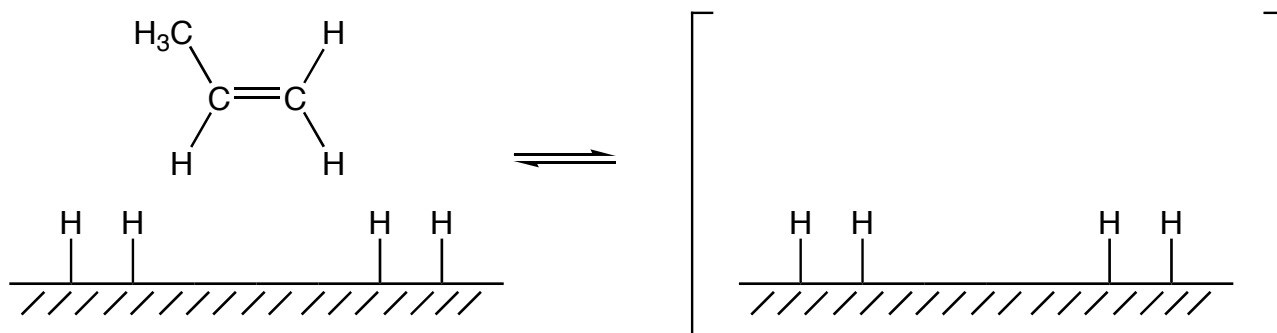
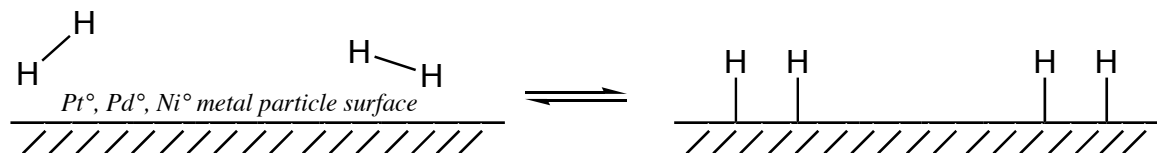
Ozonolysis is the only reaction that breaks C=C bonds!



Notice the numbers!



Hydrogenation: H_2 with Pt° , Pd° , Ni°

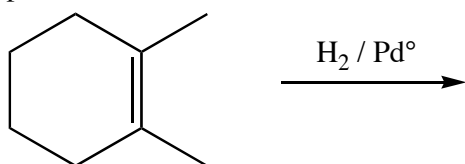


Summary:

Regiochemistry:

Stereochemistry:

Example:



Examples:

