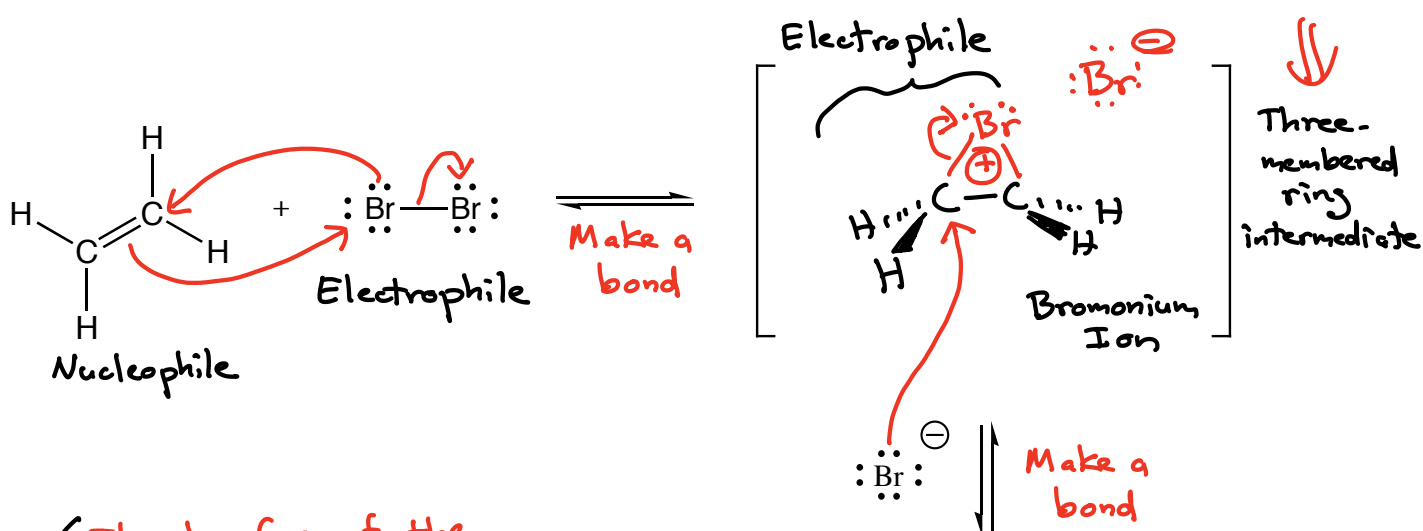


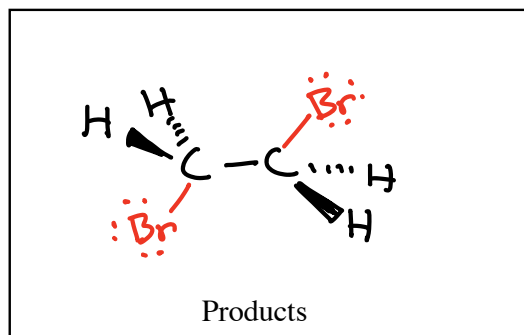
Alkene Halogenation



Called "anti" addition stereochemistry

The top face of the intermediate is "blocked" by the Br atom, so the $:\text{Br}^-$ nucleophile must react from the opposite face

↓ ↓
Gives only a "trans" product - never "cis"

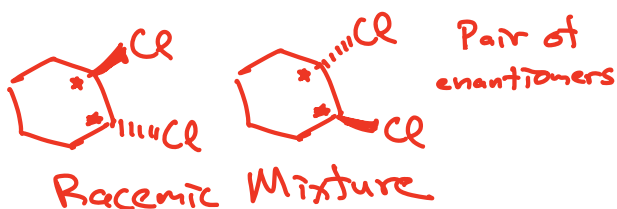
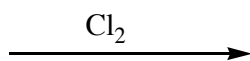
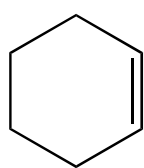


Summary: Alkenes react with X_2 to give a three-membered ring intermediate, then a new bond is made by X^- reacting from behind the C-X bond of the intermediate.

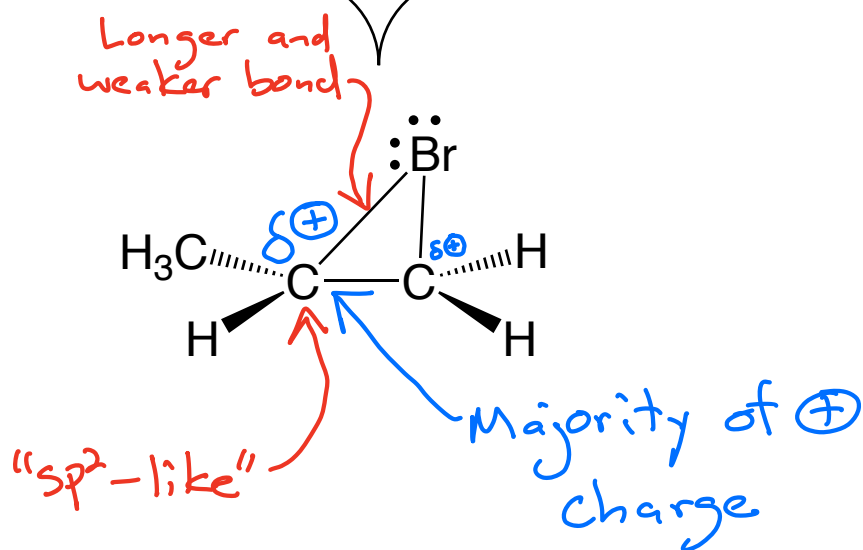
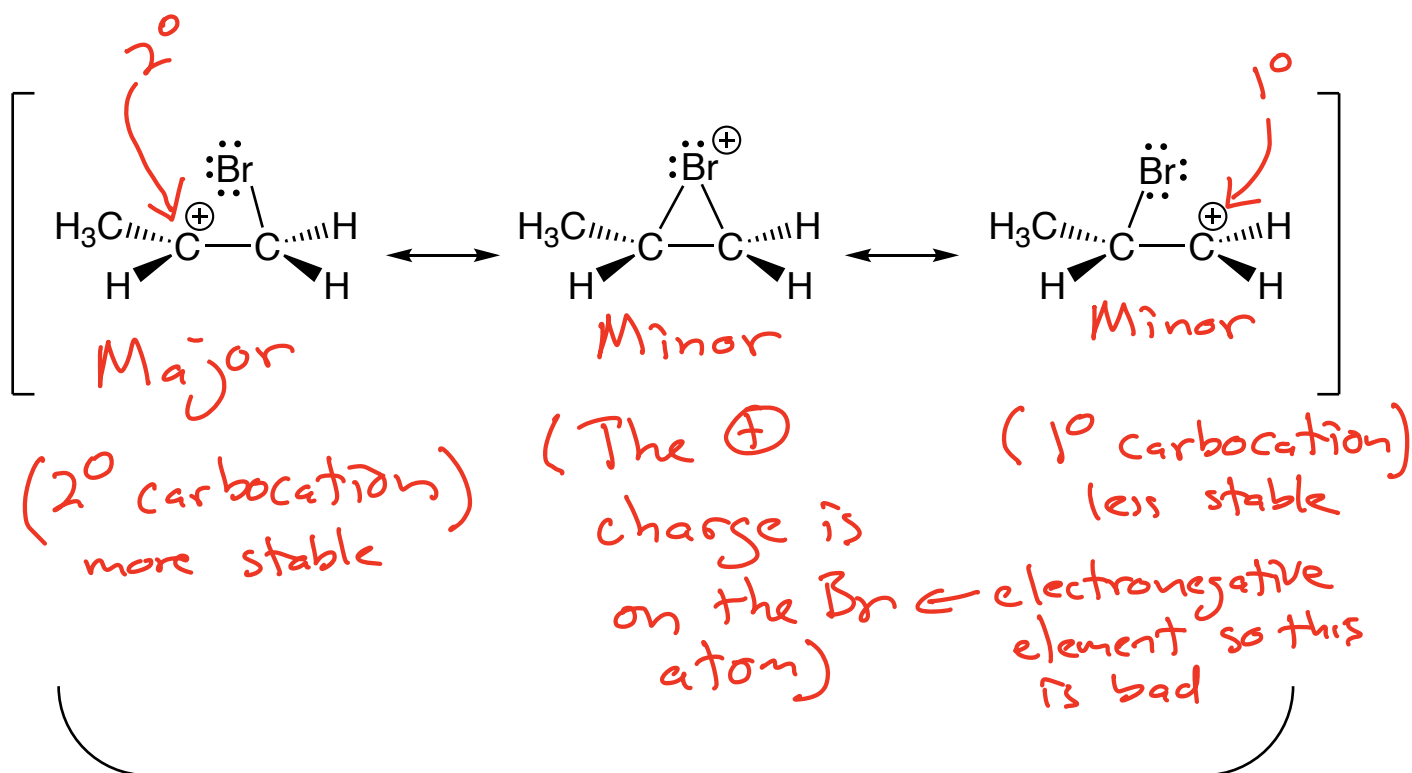
Regiochemistry: Not applicable → Br is on both atoms

Stereochemistry: Anti addition geometry → trans products

Example:



How to think about unsymmetrical halonium ions

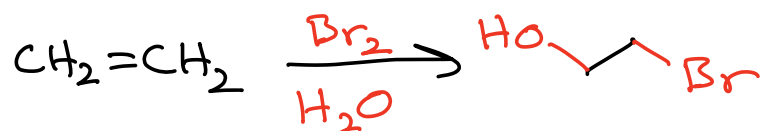


Complication → Some intermediates and products are chiral

Solution → Label all chiral centers in intermediates and products
IN MECHANISM QUESTIONS
with an asterisk (*) and
write "Racemic" if appropriate.
No need to draw all of the
stereoisomers → just one of
them using wedges and dashes.

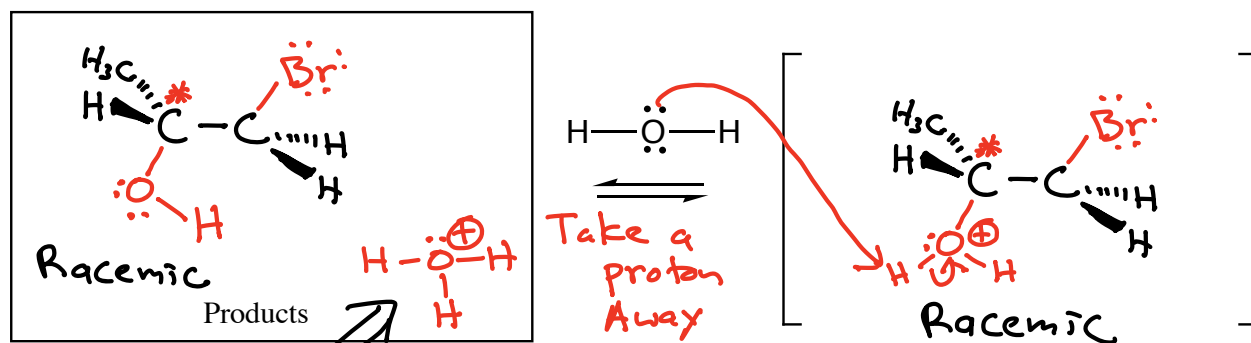
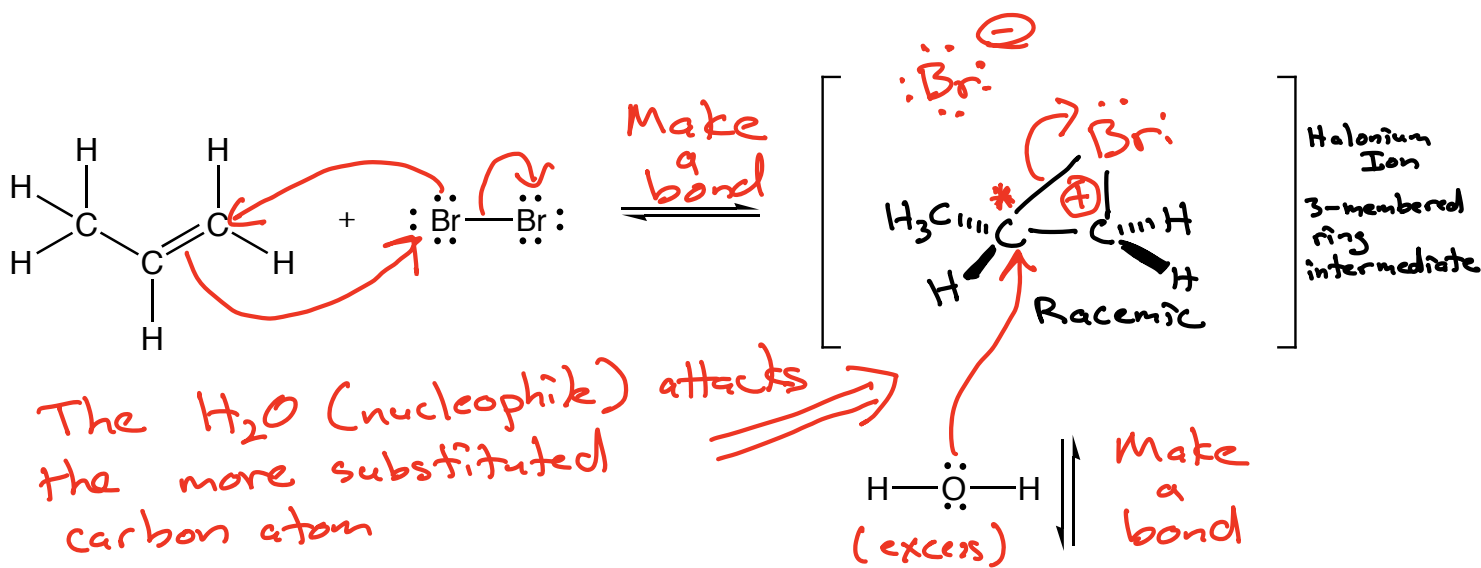
Again
this is
for
mechanism
problems
only

New overall reaction: Halohydrin Formation



Called a
halohydrin

Alkene Hydrohalogenation



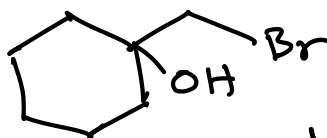
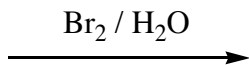
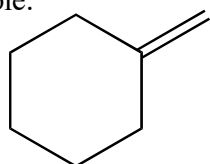
pH drops during the reaction!

Summary: Alkene reacts with X_2 to give a 3-membered ring intermediate (halonium ion) \rightarrow H_2O attacks the more substituted C atom and we take a proton away to give the halohydrin product.

Regiochemistry: Markovnikov (OH on more substituted C atom)

Stereochemistry: Anti

Example:



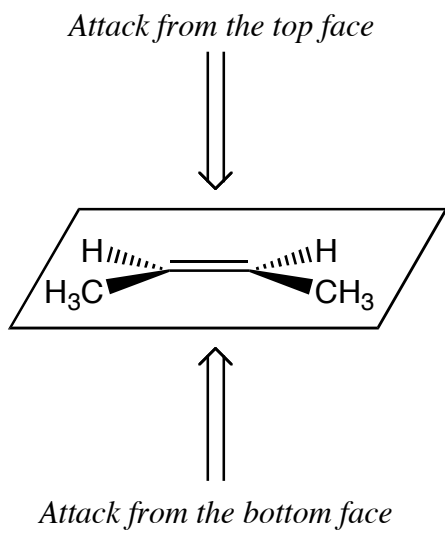
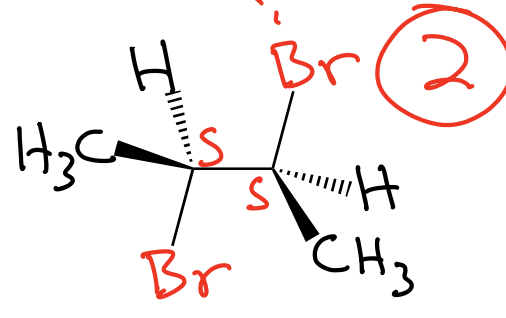
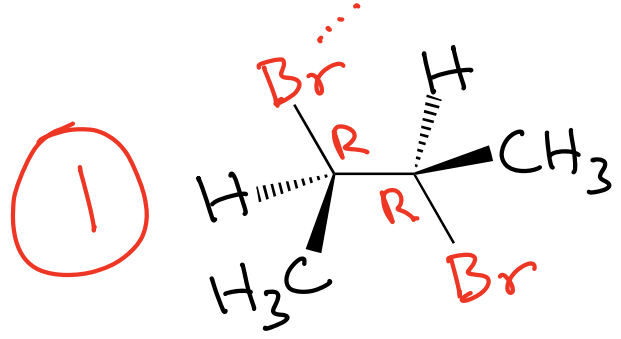
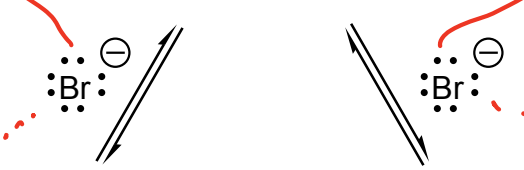
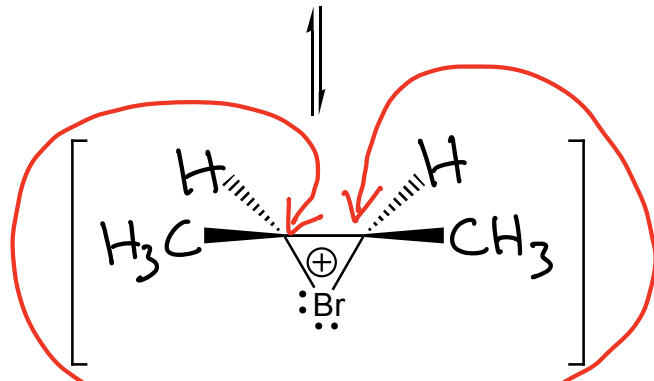
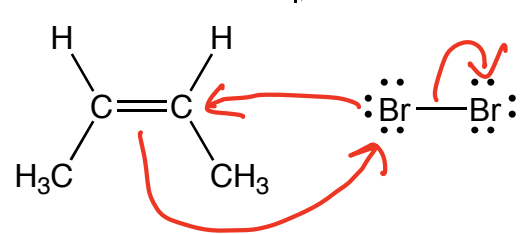
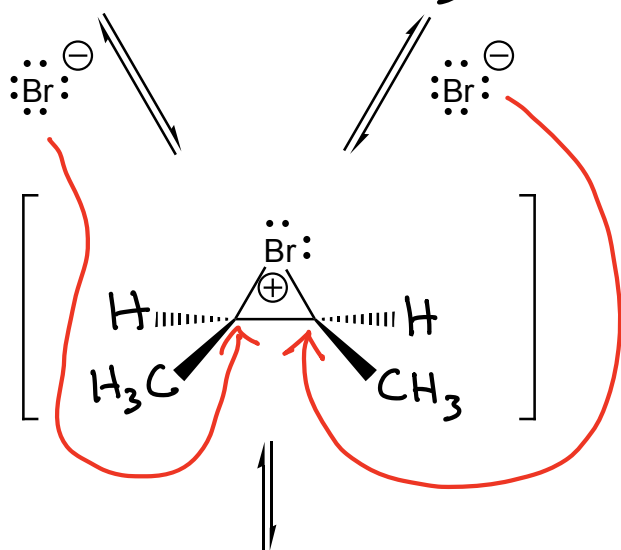
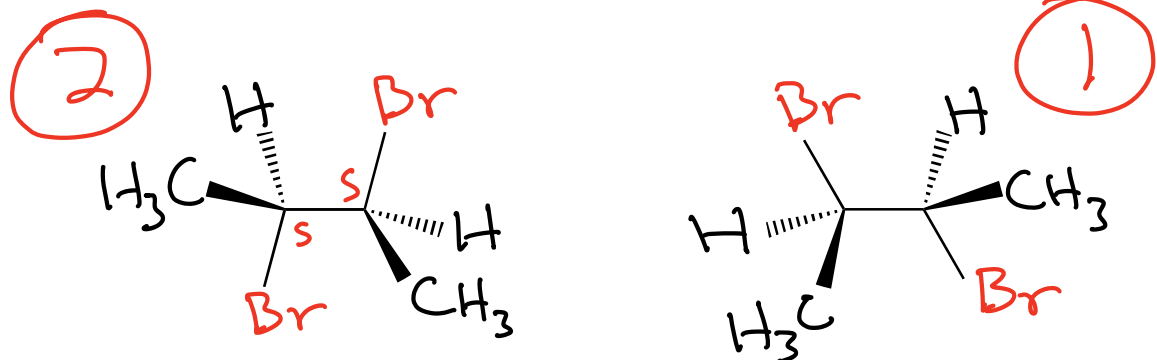
Not Chiral

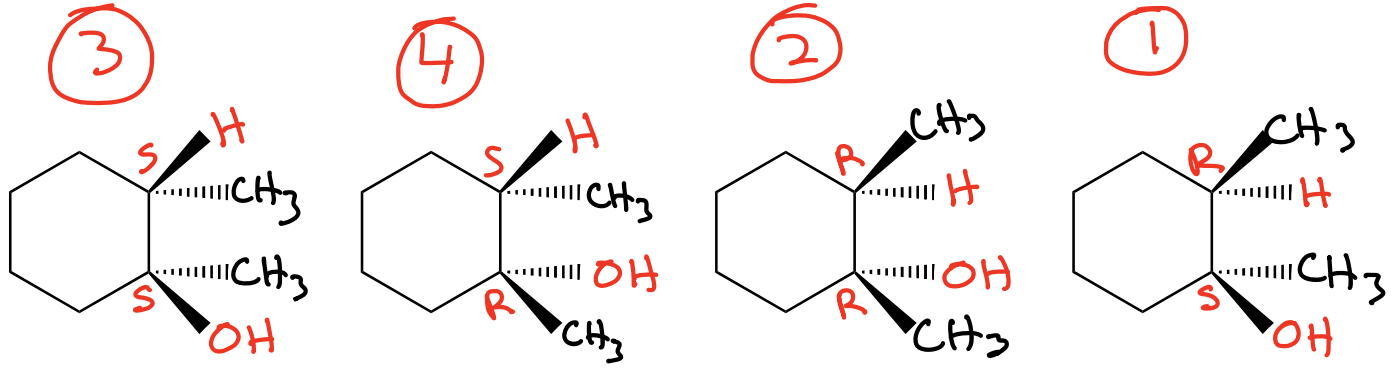
Only carbocations rearrange!

Halonium ions (3-membered rings) DO NOT

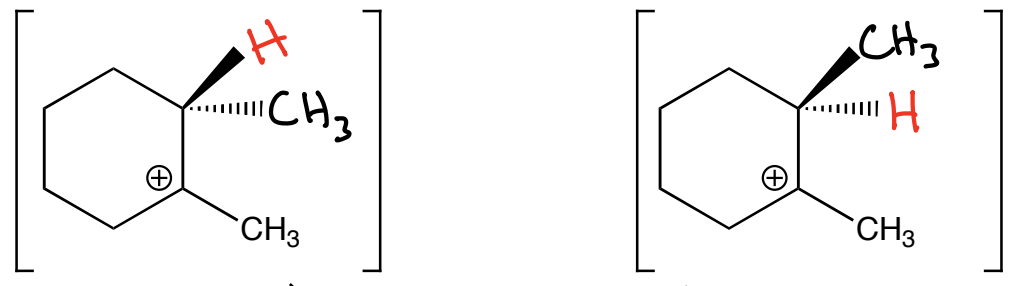


To get stereochemistry correct when predicting reaction products, you need to analyze each reaction on a case by case basis



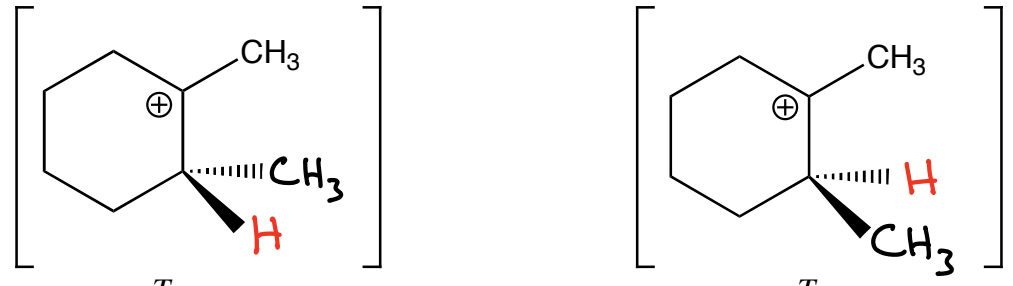
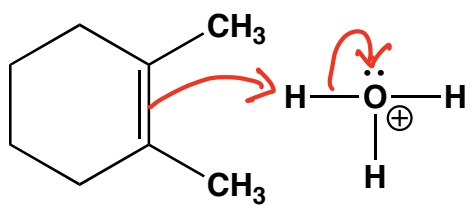


H₂O top Two mechanism steps H₂O bottom H₂O top

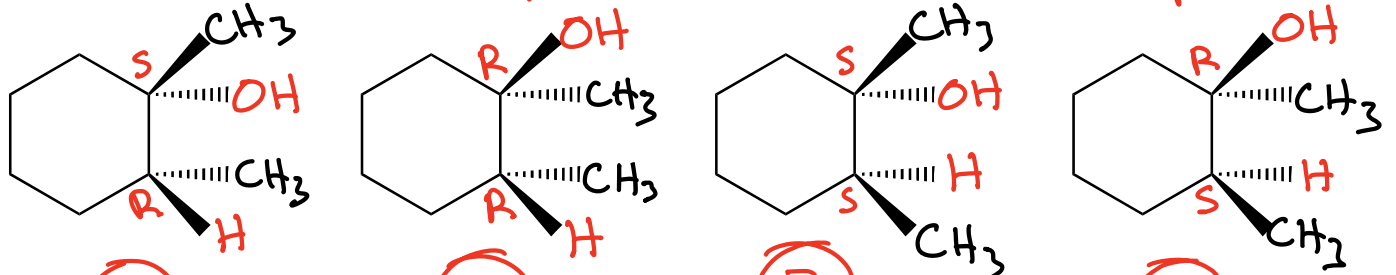


H atom adds to top face

H atom adds to bottom face

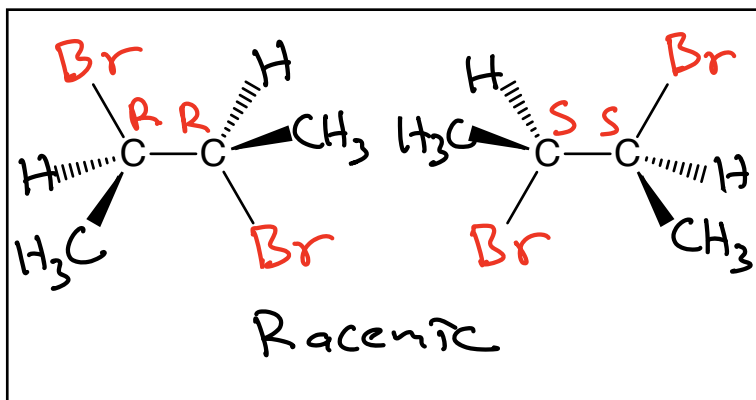
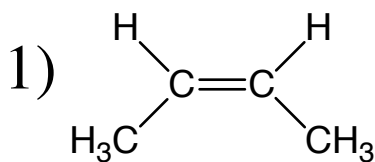


H₂O bottom Two mechanism steps H₂O top H₂O top

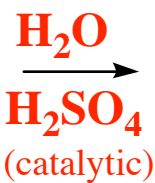
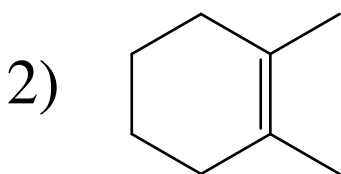


①
②
③
④

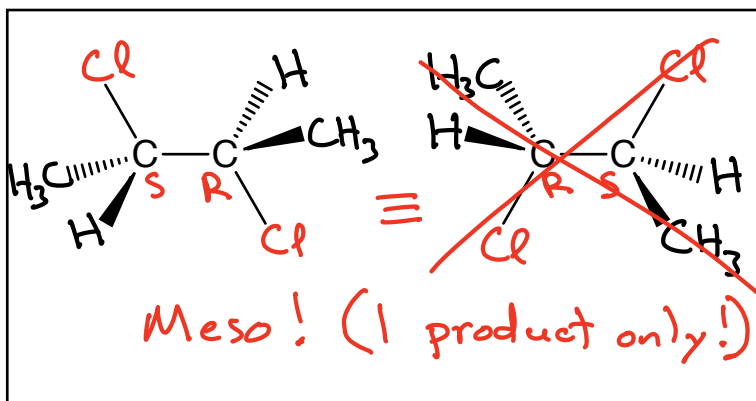
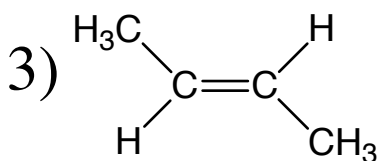
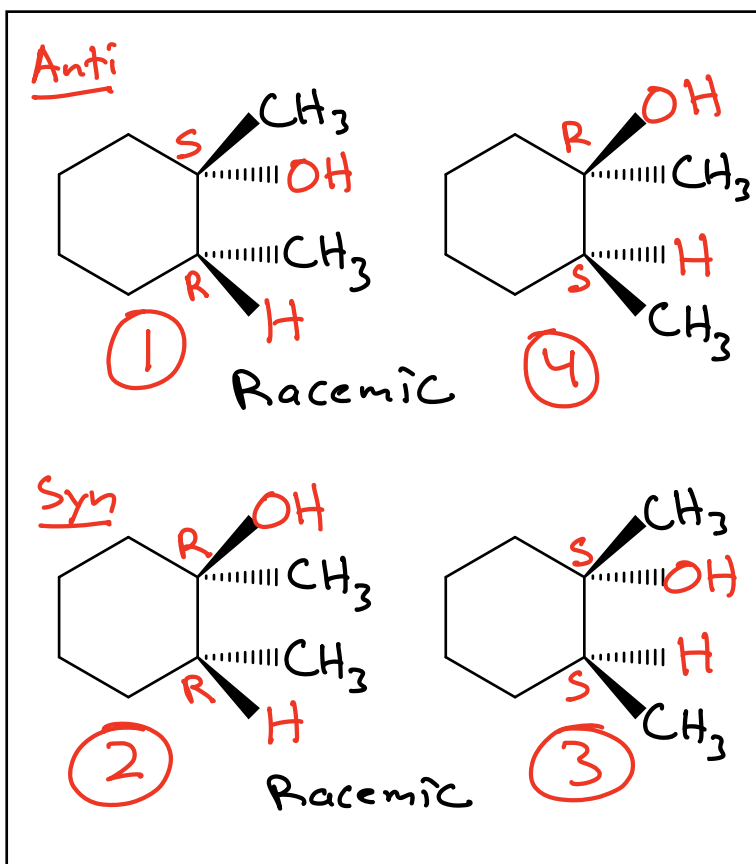
Examples



\Rightarrow Anti

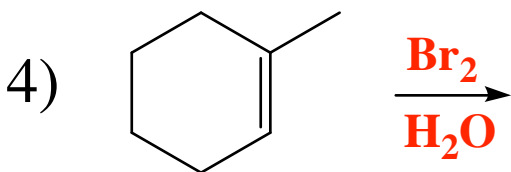


\Rightarrow Mixed \rightarrow Anti and Syn
 \Rightarrow Markovnikov

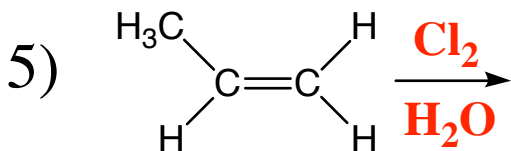
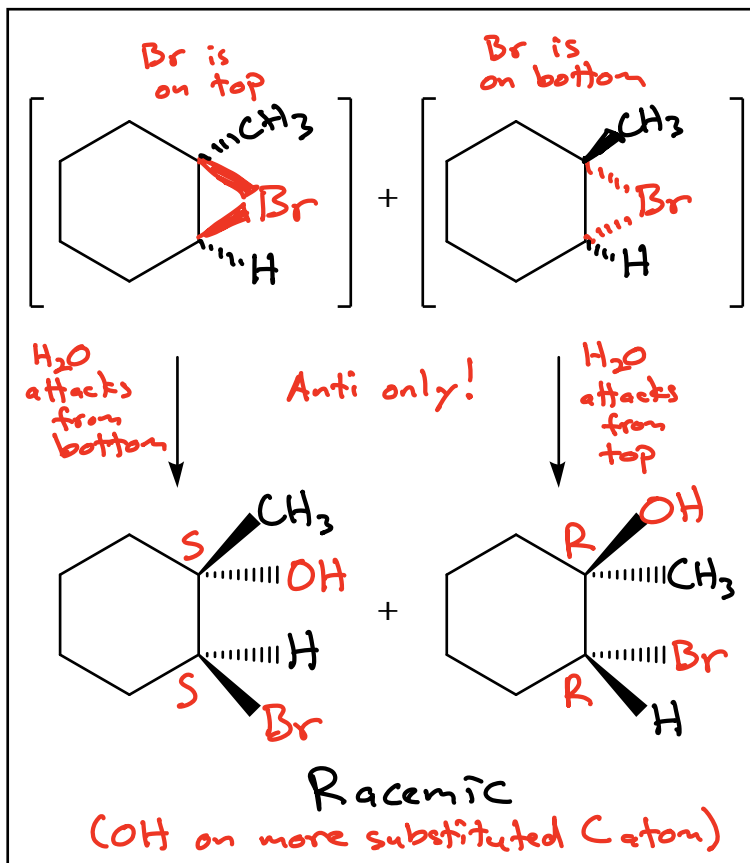


\Rightarrow Anti

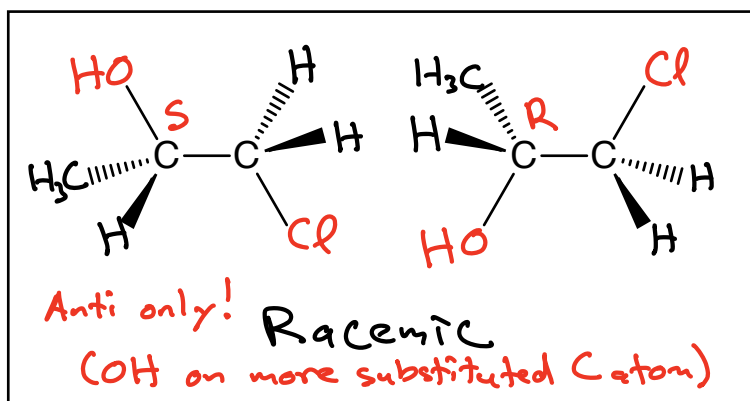
More Examples



⇒ Anti
 ⇒ Markovnikov



⇒ Anti
 ⇒ Markovnikov



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)