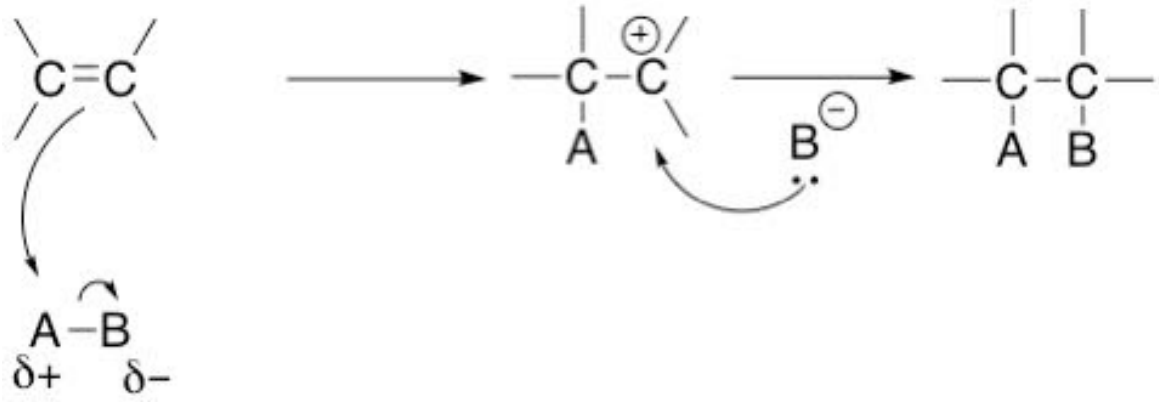
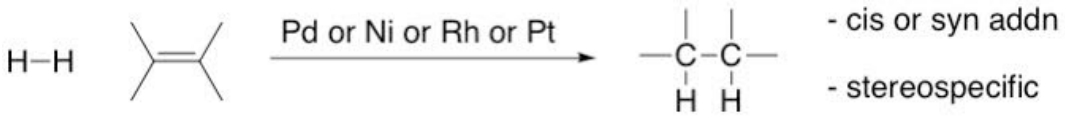
Recall:

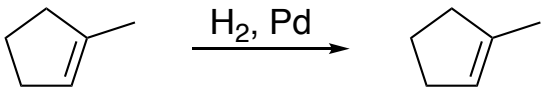
Addition Reactions

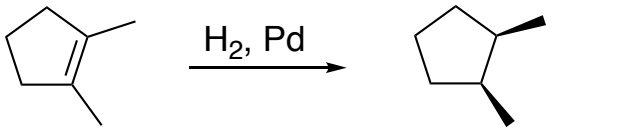
- Occurs on double bonds and triple bonds



Example: Hydrogenation

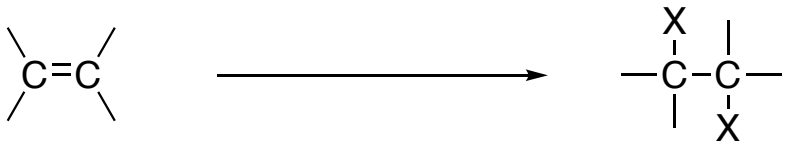






Meso compound

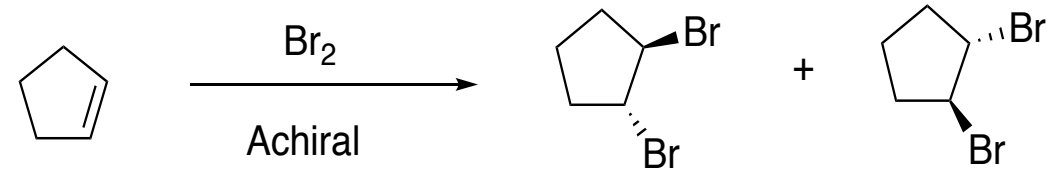
Halogenation: Addition of halogens across a double bond



Anti Addition
Trans Addition

X = F, Cl, Br, (I)

Ex #1) Cyclopentene

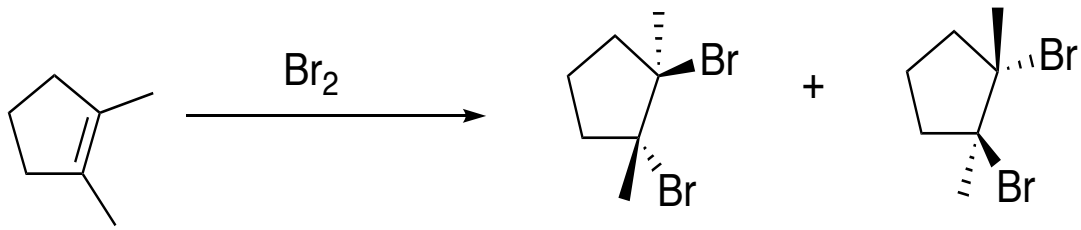


Achiral

trans-1,2-Dibromocyclopentane

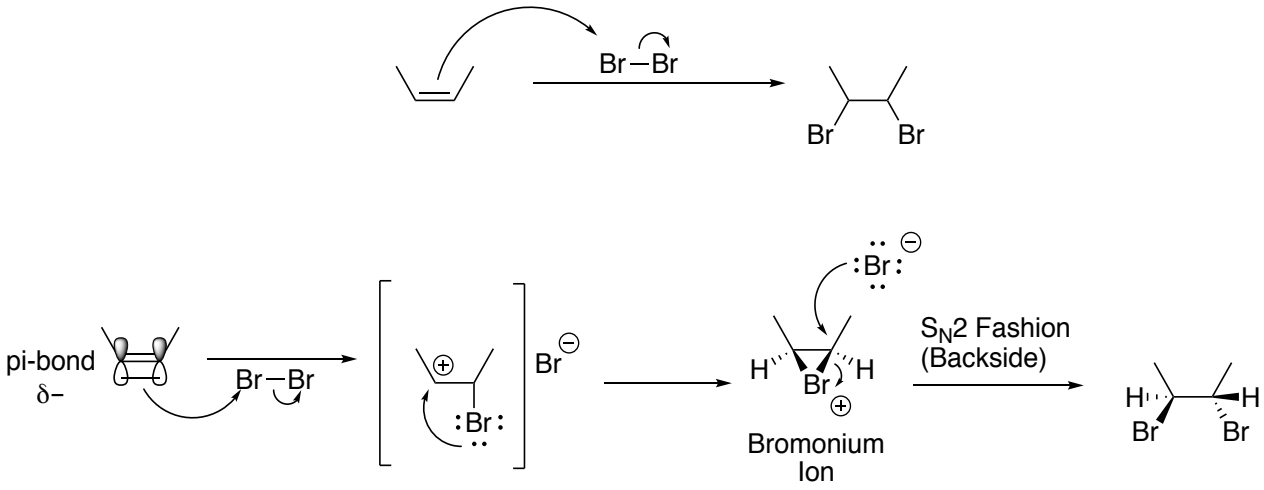
Both enantiomers formed (1:1 racemate)

Ex #2) 1,2-dimethylcyclopentene

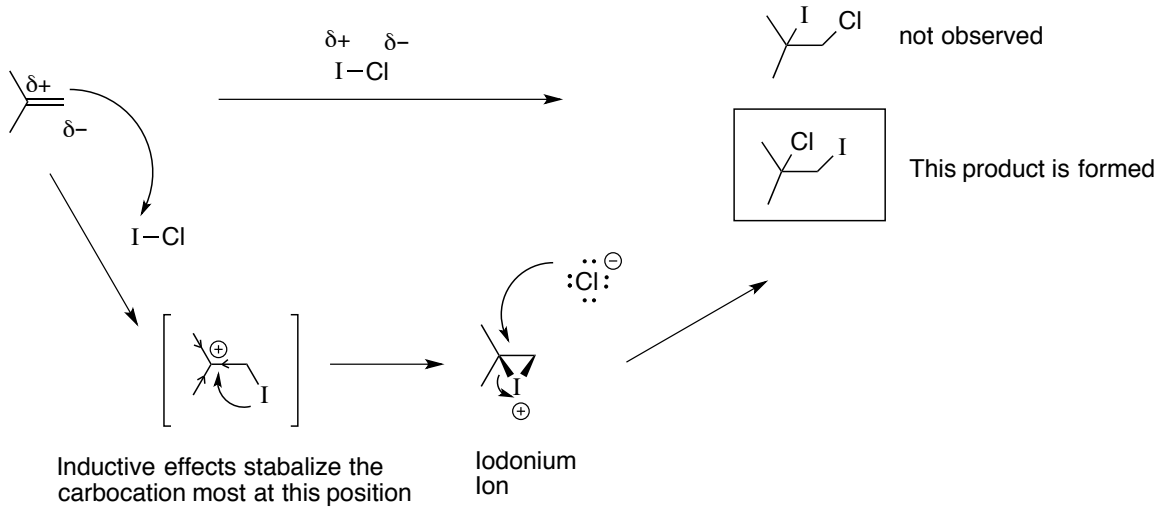


trans-1,2-Dibromo-1,2-dimethylcyclopentane

Mechanism:

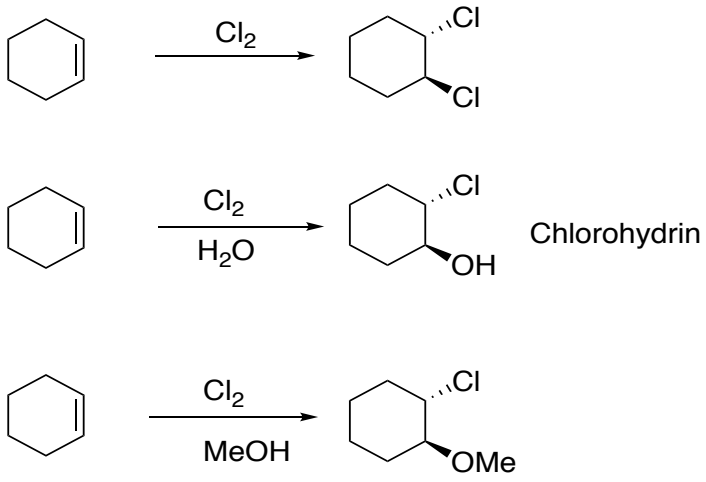


Ex #3) 2-Methylpropene



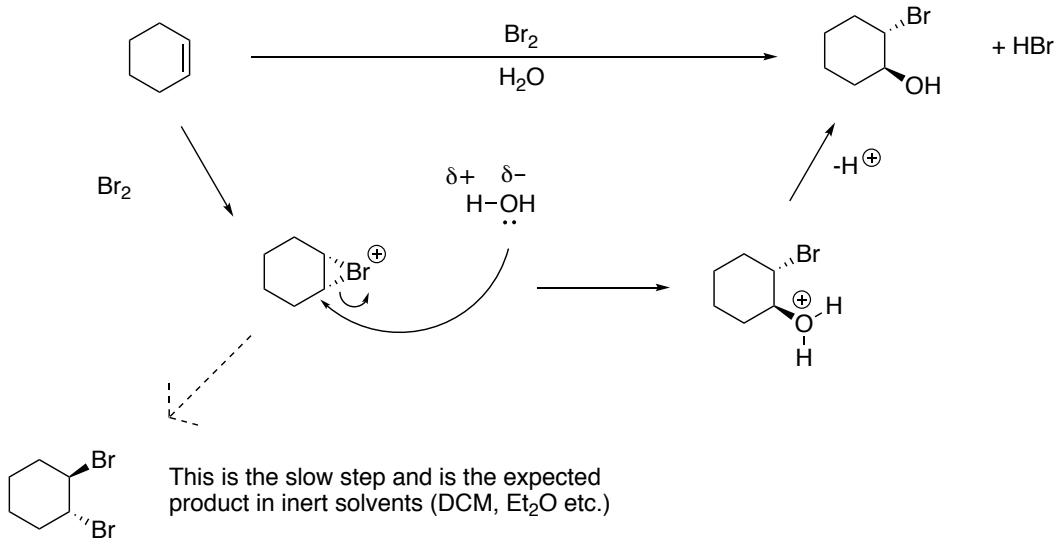
Markovnikov's Rule: In an addition reaction, the positive end of an A–B system (e.g. I–Cl) adds to the least substituted end of the double bond to make the more stable carbocation.

Ex #4) Cyclohexene

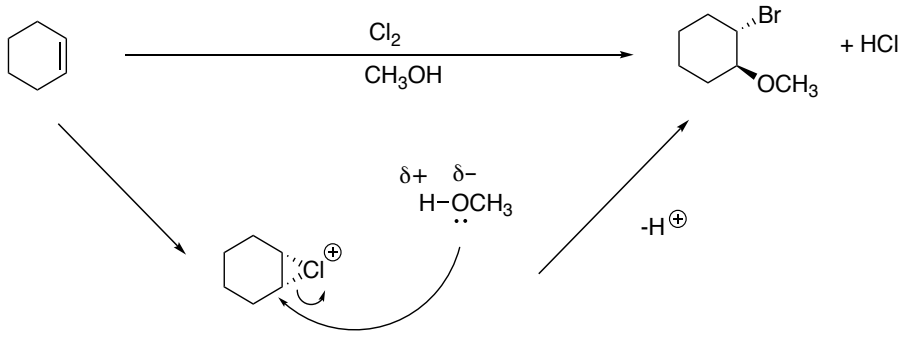


Mechanisms:

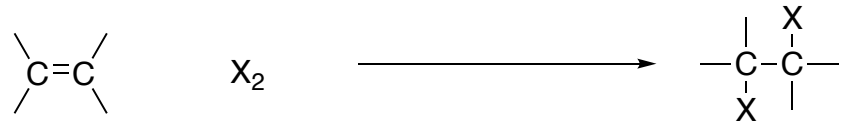
#1) Addition of an alcohol functional group (in H_2O)

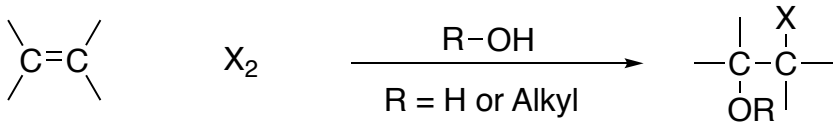


#2) Addition of an ether functional group (in CH_3OH)



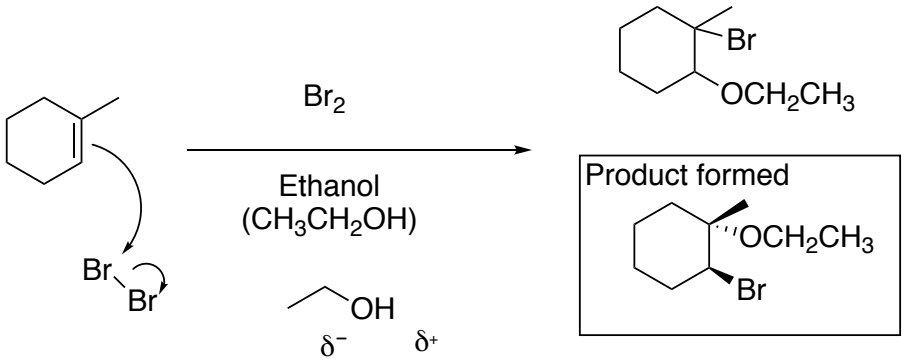
Summary:



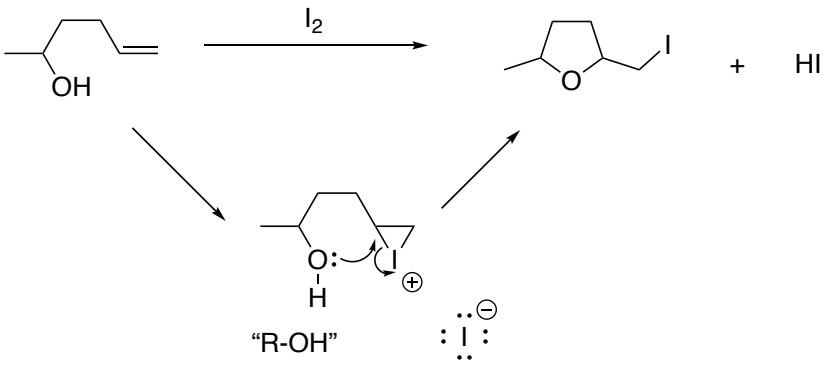


Will add in Markovnikov fashion

Ex #5)



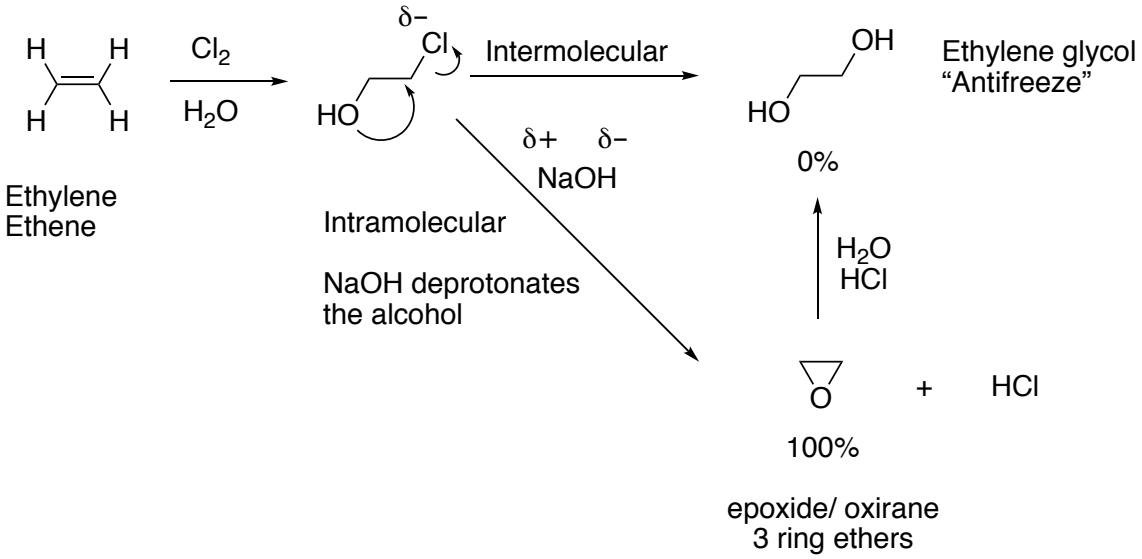
Ex #6)



In the above example, the intramolecular reaction (meaning within the same molecule) occurs much much FASTER than the intermolecular reaction (between two or more molecules). This means that the –OH group will attack the iodonium ion much faster than the I^- group because it is an intramolecular reaction.

Intramolecular reaction almost always beats intermolecular reactions.

Ex #7)


H
H
H
H
Cl2
H2O
δ−
Cl
HO
Intermolecular
OH
HO
Ethylene glycol
“Antifreeze”
0%
δ+ δ−
NaOH
Ethylene
Ethene
Intramolecular
NaOH deprotonates
the alcohol
H2O
HCl
O
+
HCl
100%
epoxide/ oxirane
3 ring ethers