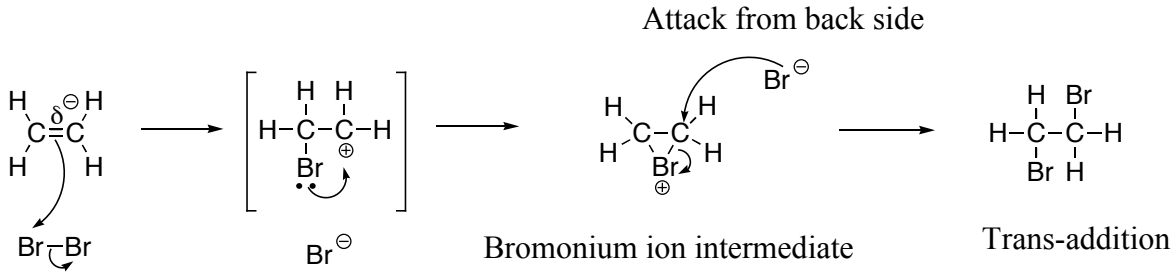
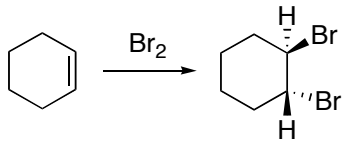
Halogenation Reaction:

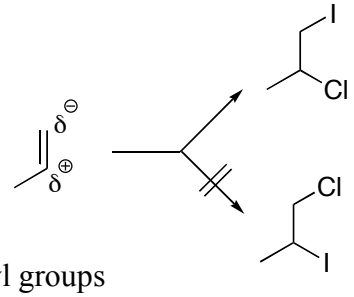


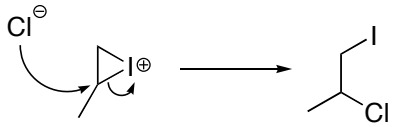
- Iodonium ion can form but does not produce diiodo product
- Overall addition reaction

Ex)



Iodine monochloride - adds to alkenes, but gives only top product shown below





Alkyl groups
donate electrons and stabilize positive charge

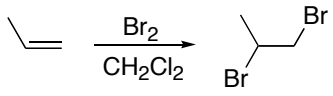
- The more substituents, the more stable the alkene. Alkyl groups donate electrons

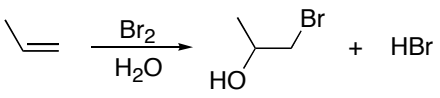
Iodonium ion forms as chloride is more electronegative and leaves as an anion

Chloride then attacks site best able to stabilize positive charge (most substituted carbon)

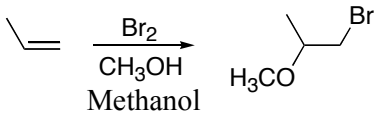
Markovnikov Rule

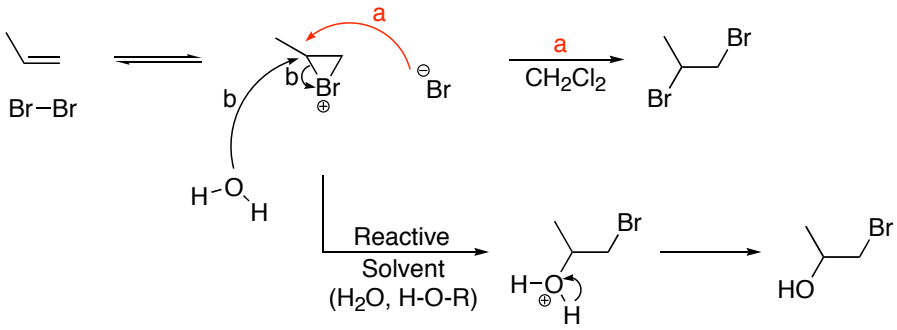
- In addition reactions the positive end of adding species adds to least substituted end of C=C.



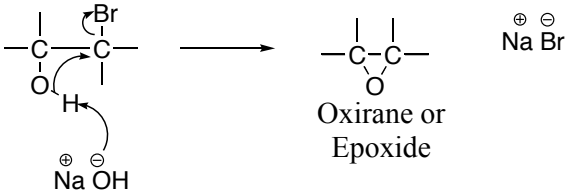


Bromohydrin

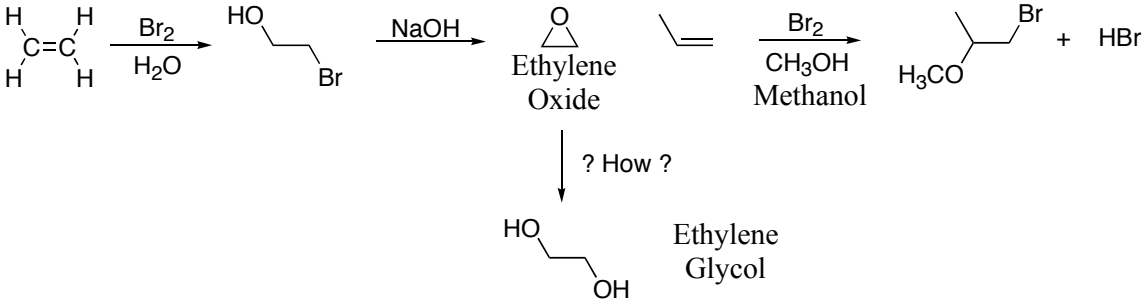




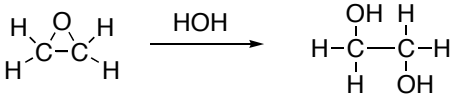
- Oxygen - Hydrogen bond is very easy to break.



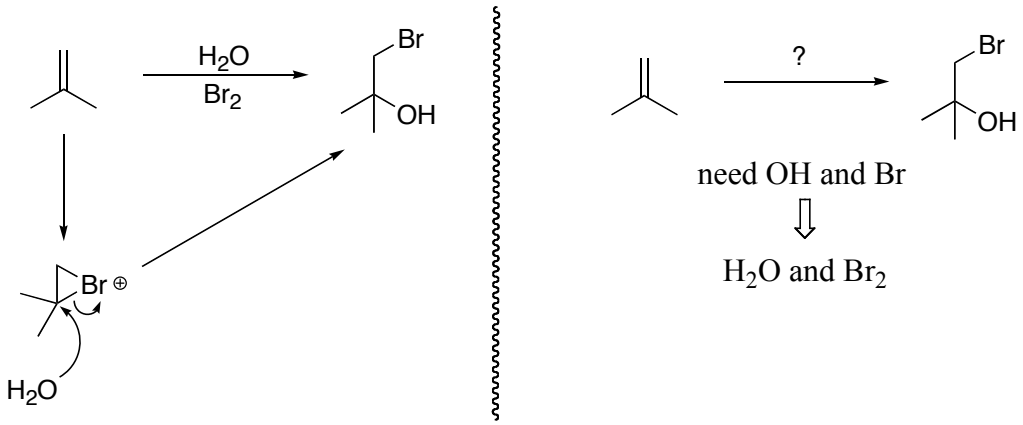
Oxirane or
Epoxide

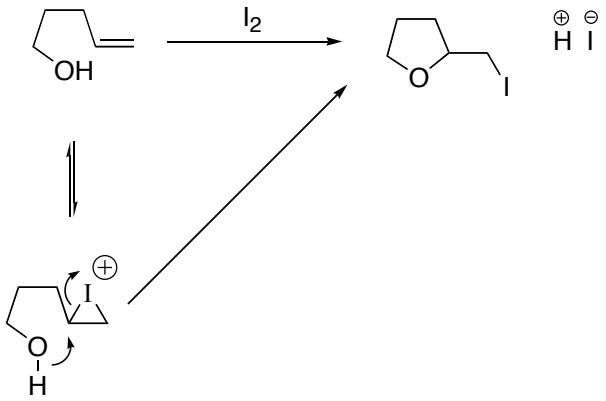


Ethylene
Glycol

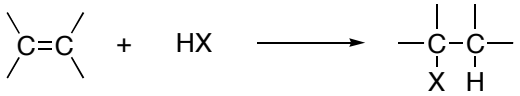


- Need O and 2H's

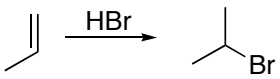




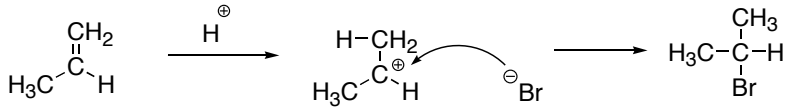
Hydrogen Halide Addition (HX)



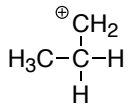
- Usually syn



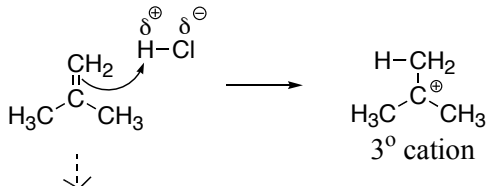
Isopropyl bromide
(2-Bromopropane)



- 2^o cation, more stable since 2 alkyl groups donating electrons

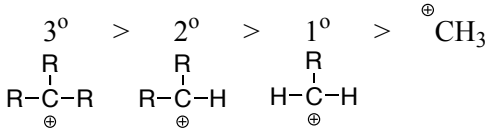


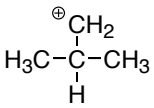
- 1^o cation, less stable and does not readily form



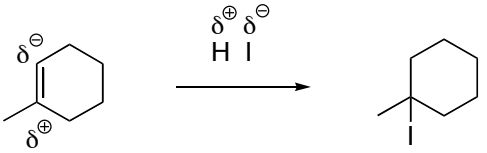
3^o cation

Stability of Cations

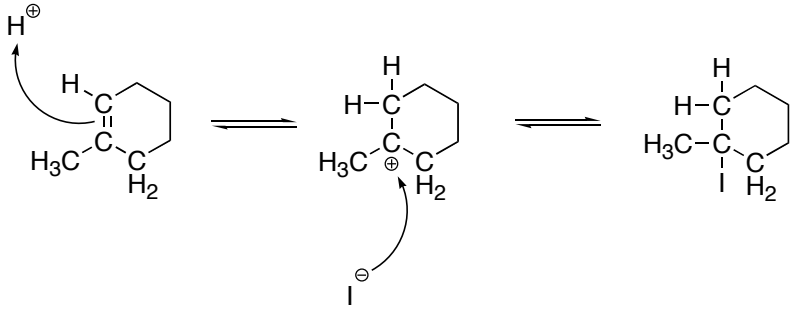




1^o cation



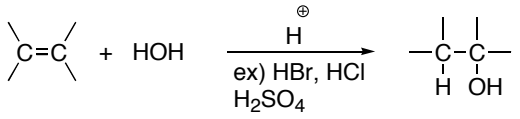
1-methyl cyclohexene 1-iodo-1-methyl cyclohexane



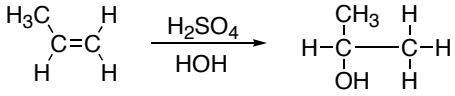
Addition of water (H_2O) to C=C → hydration of alkenes

Also: Addition of Alcohol (H-OR) to C=C (analogous mechanism)

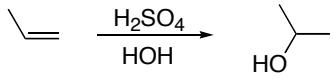
Important: Normally neither water nor alcohols react with alkenes in the absence of acid



- HOH adds because it's in higher concentration and also more nucleophilic than chloride, bisulfate etc.



Isopropyl alcohol (rubbing alcohol)



Same reaction as above in line structures

Mechanism

2^o carbocation