

12/11/2010

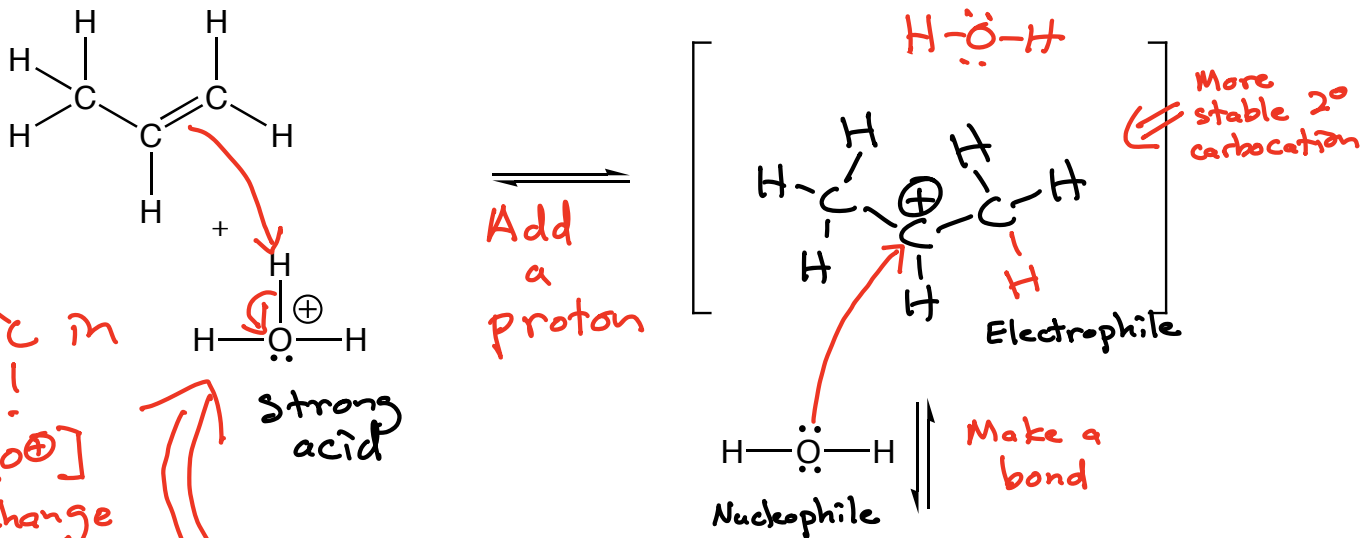
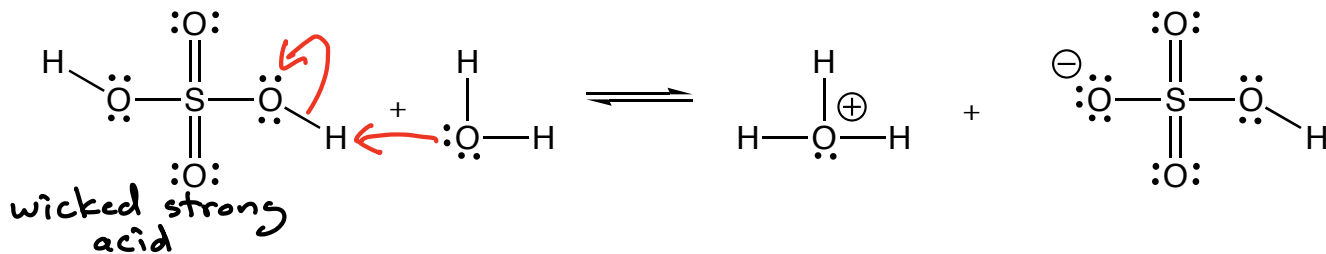
Dear Dr. Iverson,

I have a story you should tell to your class next year when trying to get them to run.

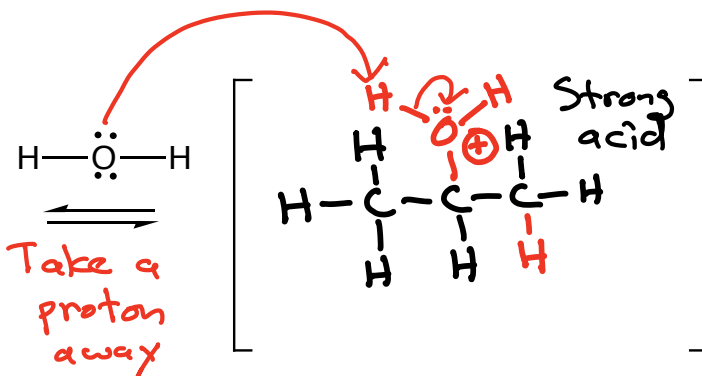
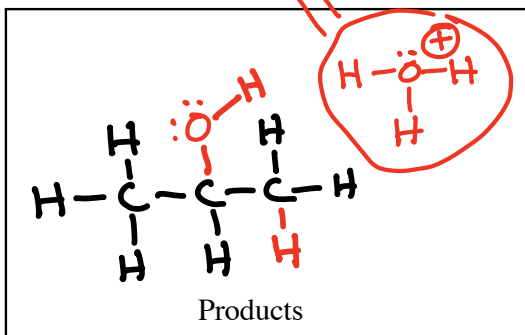
Today I woke up at 9:25. My Genetics final started at 9:00 and the professor ~~there~~ has a no-entry policy after a 30 minutes of the exam. Luckily I sprinted from my apt. over to the room in 3 minutes and got to take my final. Had I not trained for ~~the~~ Run For The Water, I probably would have not made it on time and failed my class. So, thanks a million for inspiring me to run! It's already helped my future!!

P.S. Have you read about the Archae recently discovered that uses Arsenic instead of phosphorus for its DNA backbone? Crazy stuff!

Acid-catalyzed Hydration of an Alkene



Catalytic in Acid!
 ⇒ The $[\text{H}_3\text{O}^+]$ does not change during the reaction

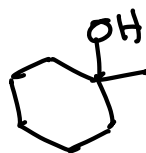
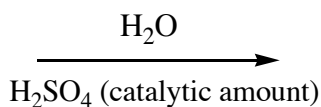
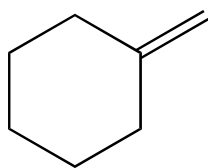


Summary: Proton adds to make a carbocation intermediate, water attacks to make a new bond, take a proton away to make the product alcohol. Catalytic in H_3O^+

Regiochemistry: **Markovnikov's Rule**

Stereochemistry: **Mixed (time capsule)**

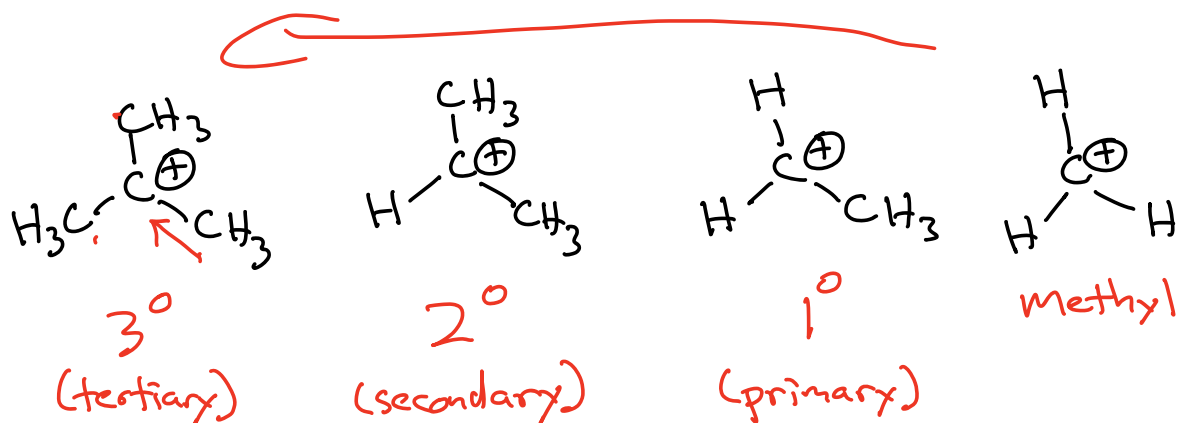
Example:



(Not chiral)

-OH on more substituted C atom ⇒ Markovnikov's Rule

Carbocation stability \rightarrow the more C atoms bonded to the C^+ the more stable



Hyperconjugation stabilization

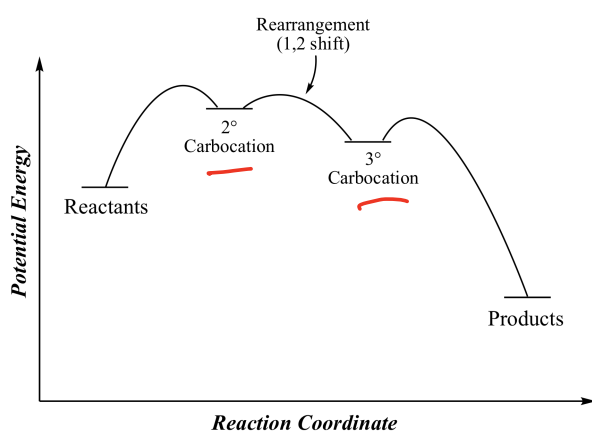
Inductive effect stabilization

Carbocation Stability

Markovnikov's Rule \rightarrow For alkene reactions involving a carbocation intermediate the nucleophile (ex. $:Br^-$) will make a bond to the more substituted C atom \rightarrow derived from the more stable carbocation



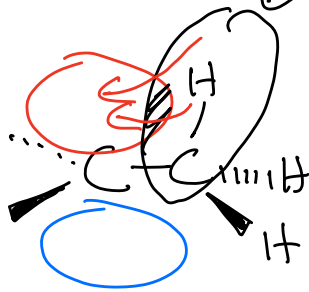
Carbocation intermediates can sometimes rearrange (Called 1,2 Shift) If a carbocation intermediate of equal or greater stability can be produced by shifting an adjacent H atom (or rarely an alkyl group), rearrangement will compete with product formation to give a mixture of products.



Motive → A 3° (tertiary) carbocation is more stable than a 2° (secondary) carbocation

Opportunity → The mechanism is really just hyperconjugation "taken to the extreme"

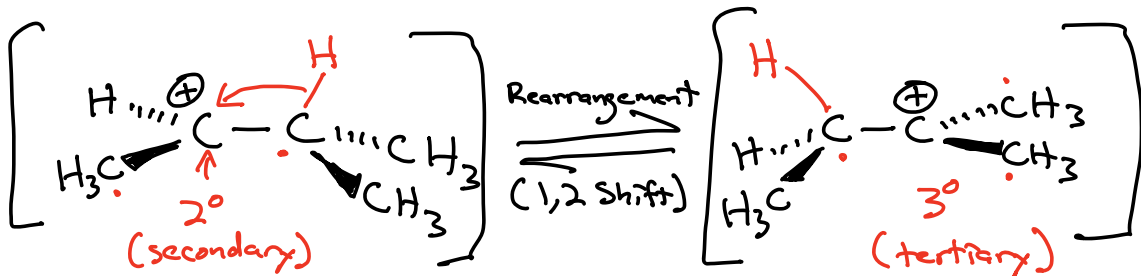
1) Hyperconjugation → overlap of adjacent σ bonding electron density with the empty $2p$ orbital of a carbocation



delocalizes the \oplus charge

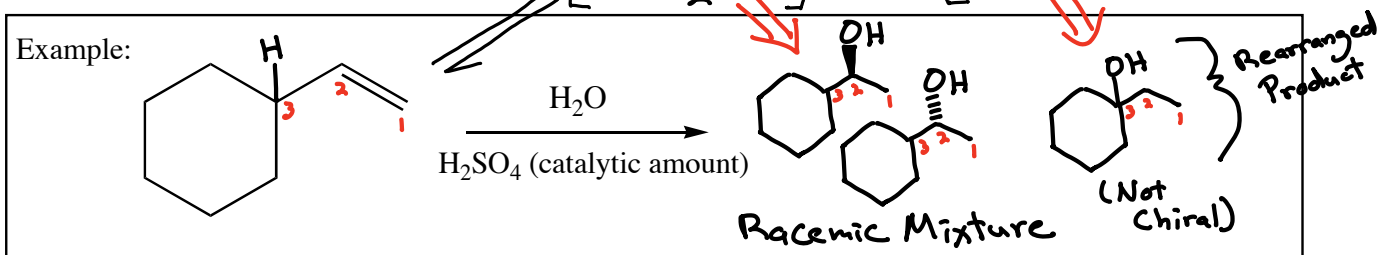
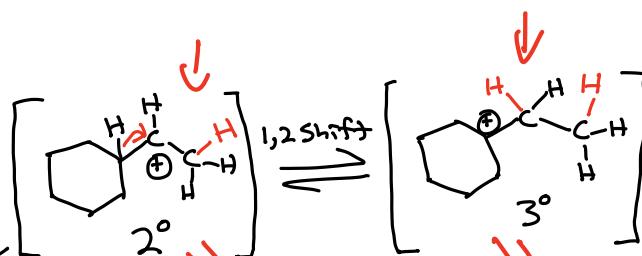
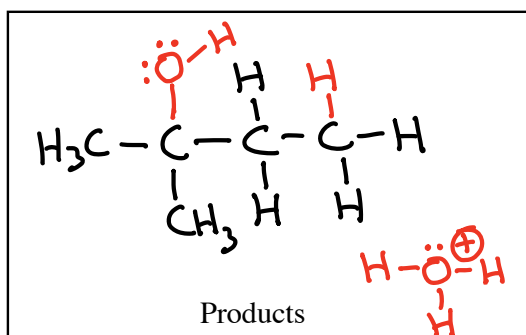
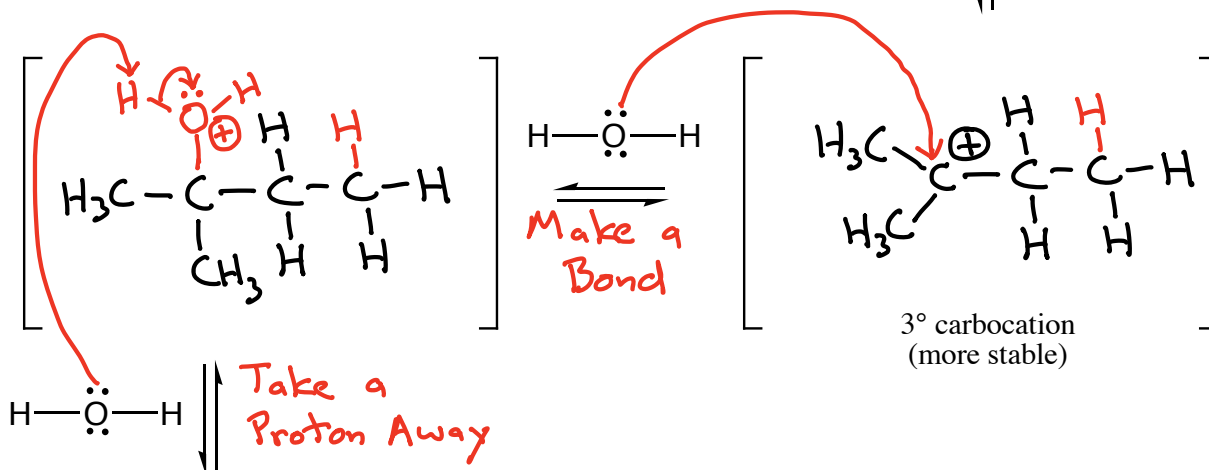
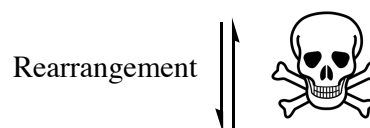
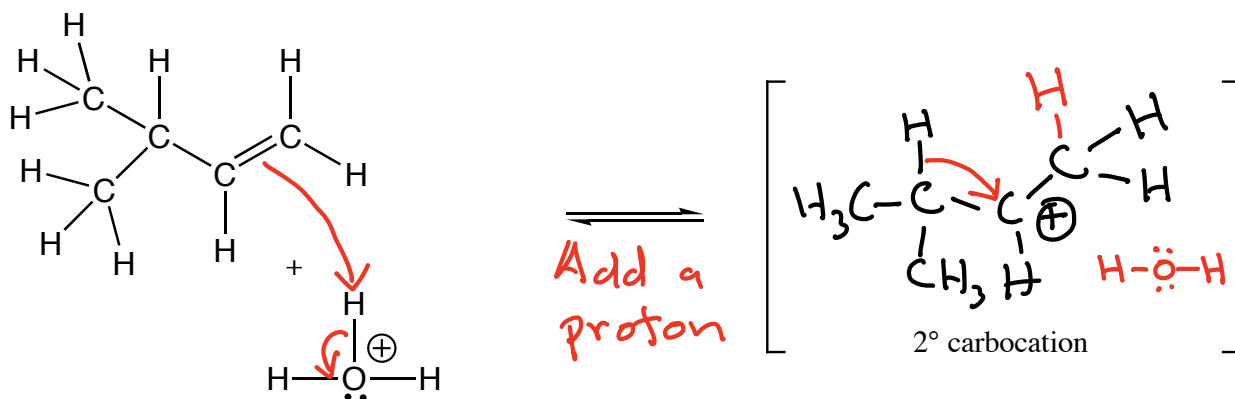
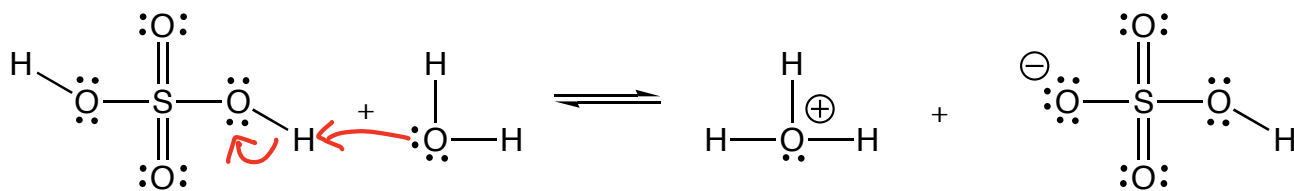
Some electron density of the C-H σ bond is pulled into the empty $2p$ orbital

(red arrows in the figure)



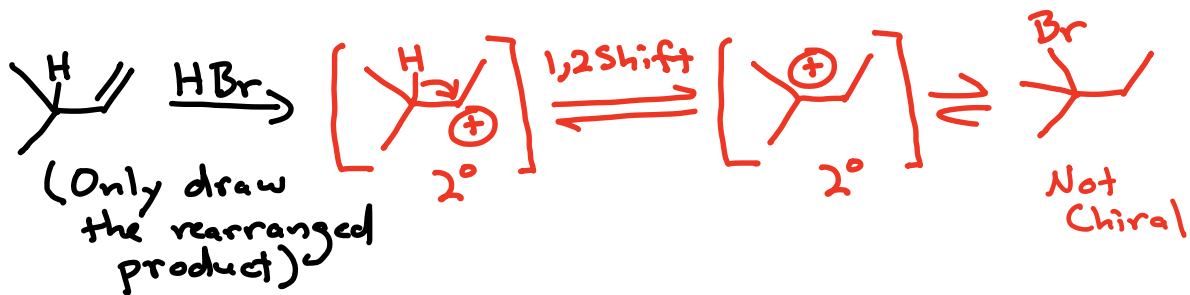
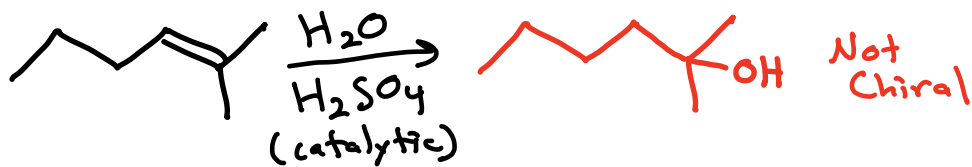
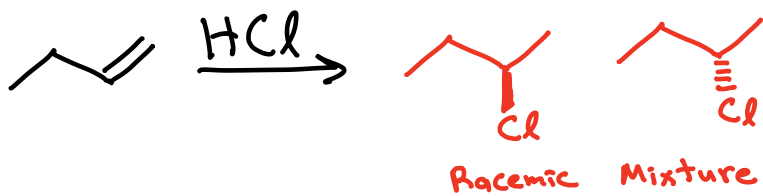
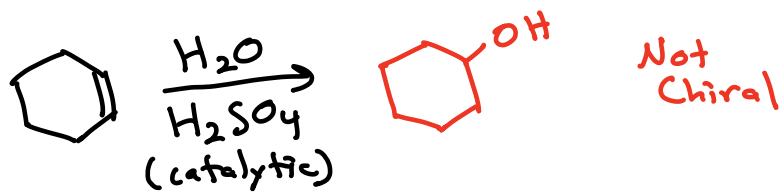
More Stable Carbocation

Cation Rearrangement

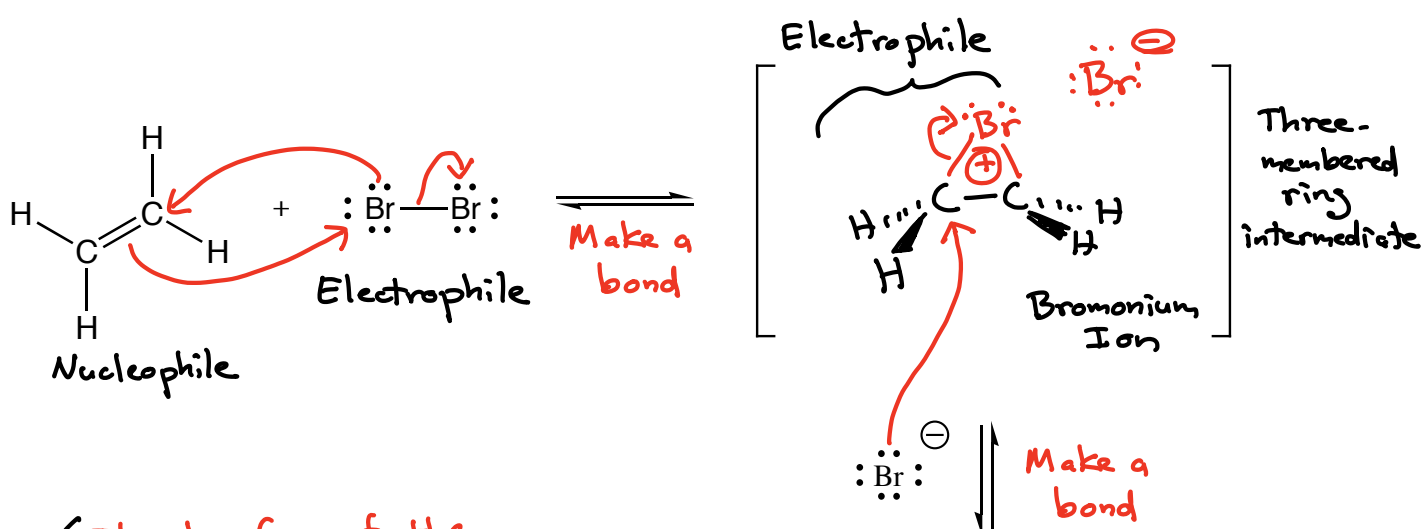




Examples

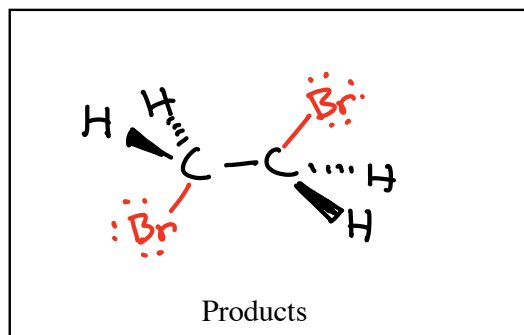


Alkene Halogenation



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.

\Downarrow
 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:

