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Review:



Example 1 (follows Markovnikov Rule)



Mechanism



Product: an alcohol, which is not stereospecific

Example 2:



What about a molecule with a stereogenic center?





Recall that the intermediate is a *planar* carbocation, therefore both isomers are possible!

However, due to the steric hindrance of the 'out' methyl group, the hydroxyl is more likely to attack from the back, resulting in more of the 2^{nd} product being formed.









Eucalyptol is made by the intramolecular formation of a 6-membered ring. You have probably encountered it in Vicks vaporub. The product that would have both alkenes hydrated is not formed.

Example 6



A secondary carbon is better at stabilizing positive charge than a primary carbon. The oxygen from the alcohol (partially negative) ends up attaching to the secondary carbon (partially positive) after protonation of the alkene creates the carbocation.



Hydroboration: B₂H₆ – diborane (behaves like BH₃)



Boron is a Lewis acid. It has an empty p-orbital and can accept 2 electrons to get 8 in its valence shell, but takes on a negative charge in doing so.

Hydroboration delivers H minus not H plus – it ends up attaching to the more substituted end of the alkene.

Oxidation: 2 reagents

NaOH, (base, such as sodium hydroxide) H-O-OH or H₂O₂ (hydrogen peroxide)

General Scheme:



Mechanism of Reaction

1st STEP

The first step is a concerted reaction. The pi electrons from the alkene acts as a nucleophile then attacks the electrophilic B and the Hydride is transferred to the other carbon by syn addition. Other B-H bonds can react similarly



2nd STEP

The Peroxide ion then reacts as a nucleophile with the electrophilic B atom



3rd STEP

The C-B bond then migrates to form C-O bond and then hydroxide is displaced. The stereochemistry of the carbon centre is not changed



4th STEP

The nucleophilic hydroxide then attacks the electrophilic B and an alkoxide group is displaced



5th STEP Addition of a proton to form an alcohol



If more alkene is present, the organoborane intermediate can repeat the process two more times to create the final product.

However, this molecule is sensitive to both acid and base and can break down into the anti-Markovnikov alcohol with hydrogen peroxide and base present (down) or the alkane with acid present (to the right). Stoichiometrically, this yields 3 equivalents of each molecule.

Example 2



Example 3



