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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?

Example 3



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 2nd product being formed.

Example 4



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.



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.

More on Hydration of Alkenes:



 $H_{H} = H_{H} = 2 \times \frac{H_{L} O}{H} = H_{H} = 1 \times \frac{H_{L} O}{H} =$

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:



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 3



as racemate



Hydrogen Halide Addition

- think of it as a mixture of hydrogenation and halogenation
- However, as the added species is polarized (2 different groups with different electronegativity), the addition of the hydrogen and halide is site specific





Ozonolysis: Oxidation of Alkenes

- cleavage of alkenes by ozone (O₃)

Ozone is a resonance stabilized electrophile that adds to alkenes

