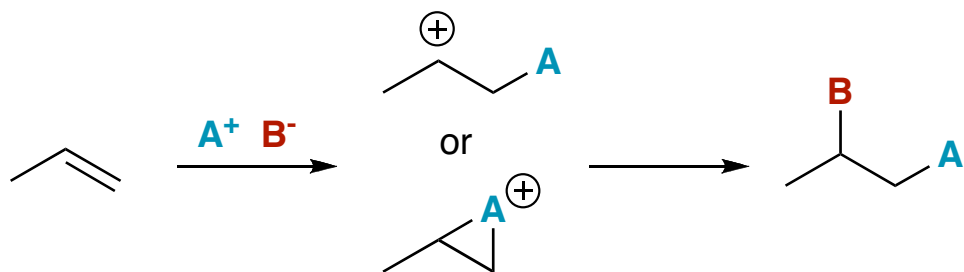


Chem 341 • Organic Chemistry I

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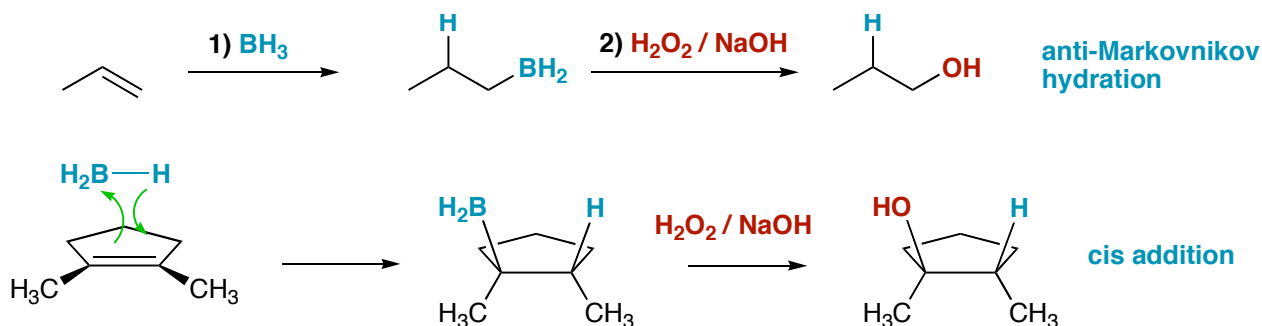
Chapter 7 - Alkenes: Reactions and Synthesis

Electrophilic Addition to Alkenes Overview



reagents	overall equivalent		notes
	A ⁺	B ⁻	
HX	H ⁺	X ⁻	markov.
X ₂	X ⁺	X ⁻	bridged, trans
X ₂ /H ₂ O	X ⁺	HO ⁻	bridged, trans, markov.
NBS/H ₂ O	Br ⁺	HO ⁻	bridged, trans, markov
Hg(OAc) ₂ /H ₂ O then NaBH ₄	H ⁺	HO ⁻	Bridged, trans, markov Hg adds first, then changed to H

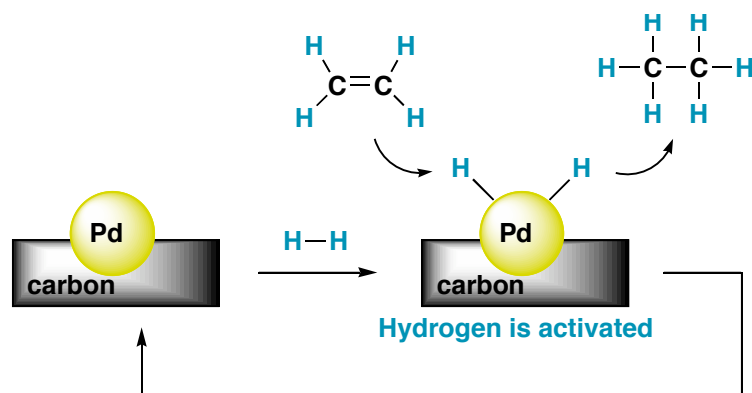
Anti Markovnikov Hydroboration



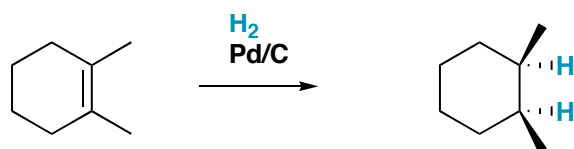
Note that this is a CIS addition and the position of the B and H are dictated by the atom size. So, the B ends up on the less substituted carbon. This is where the OH eventually ends up after the C-B bond is oxidized.

Hydrogenation of Alkenes (Reduction)

Alkenes can be reduced with hydrogen gas with the aid of a transition metal catalyst, usually Pd but sometimes, Pt, Rh, Ru, etc. These catalysts are placed on some type of solid support, often carbon (graphite). Hydrogenation of double bonds occurs stereospecifically to give *cis* addition products.



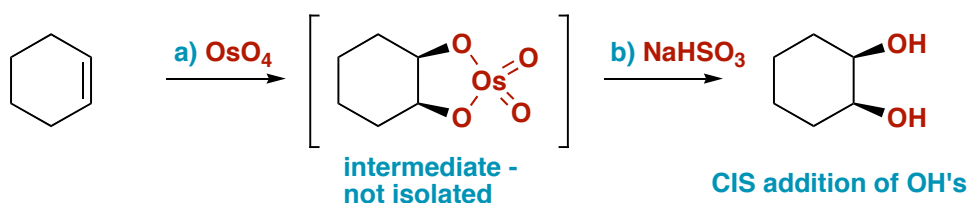
The catalyst activates hydrogen gas by splitting the H-H bond. It then transfers the H's to the alkene and this regenerates the metal catalyst to activate more hydrogen



CIS addition of H₂

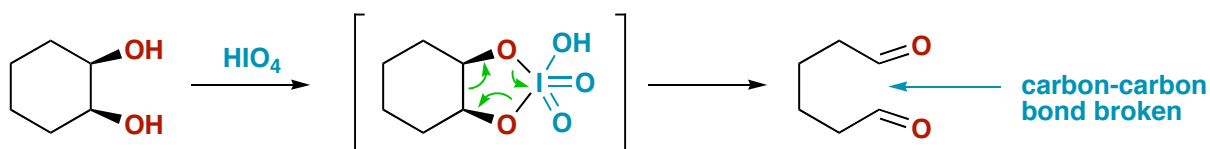
Oxidation of Alkenes

There are several oxidizing agents that will oxidize alkenes to varying levels of oxidation states. The addition of two oxygens to a double bond can be accomplished with osmium tetroxide. The result is the formation of a 1,2-diol. This reaction is stereospecific to give the *cis* product. Note that sodium bisulfite is required to break down the intermediate osmium complex.



CIS addition of OH's

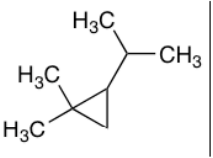
1,2-Diols are useful and can be further oxidized with periodic acid. This results in cleaving the carbon-carbon bond between the two alcohols and forming aldehydes on the end.


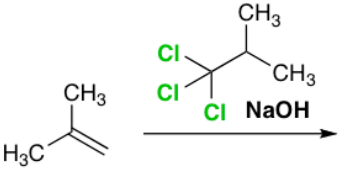
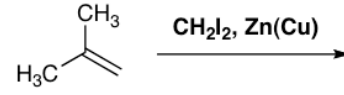


carbon-carbon bond broken

Quiz of the day

Q: Which of the following reactions on the right would produce the product shown below?



<input type="checkbox"/> 1:	
<input type="checkbox"/> 2:	
<input type="checkbox"/> 3:	
<input checked="" type="checkbox"/> 4:	