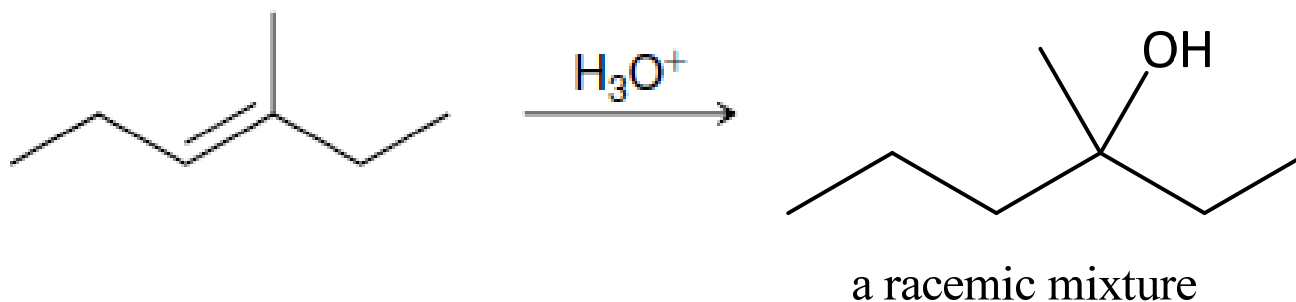
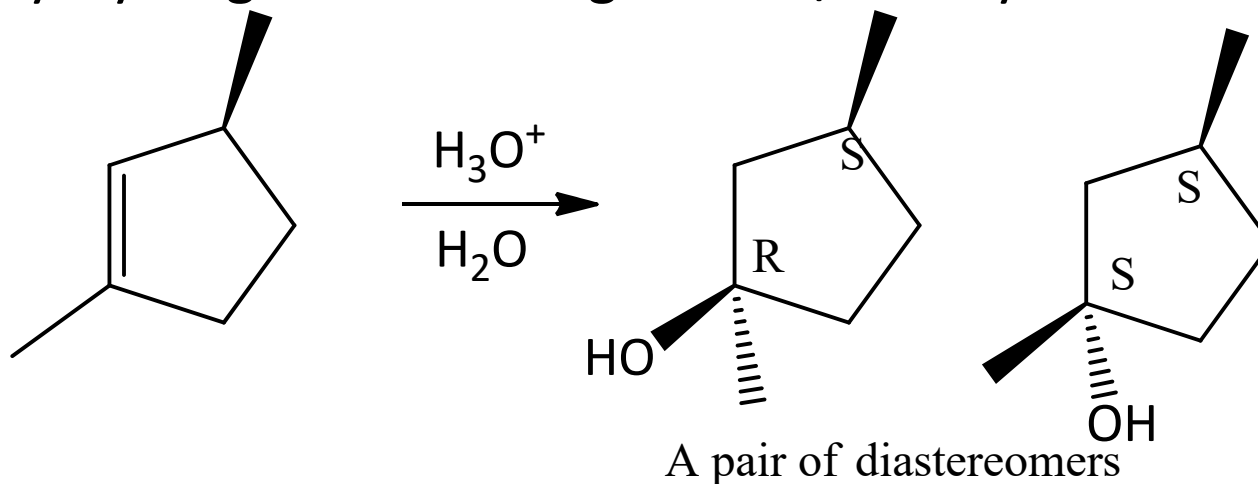


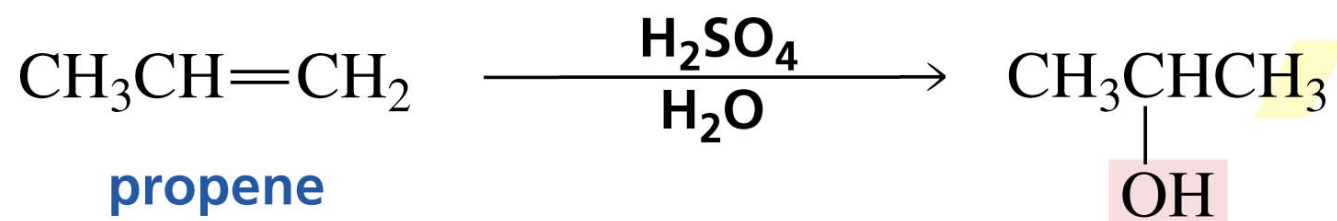
Chapter 8 part 3:

Halogenation/Halohydrins formation

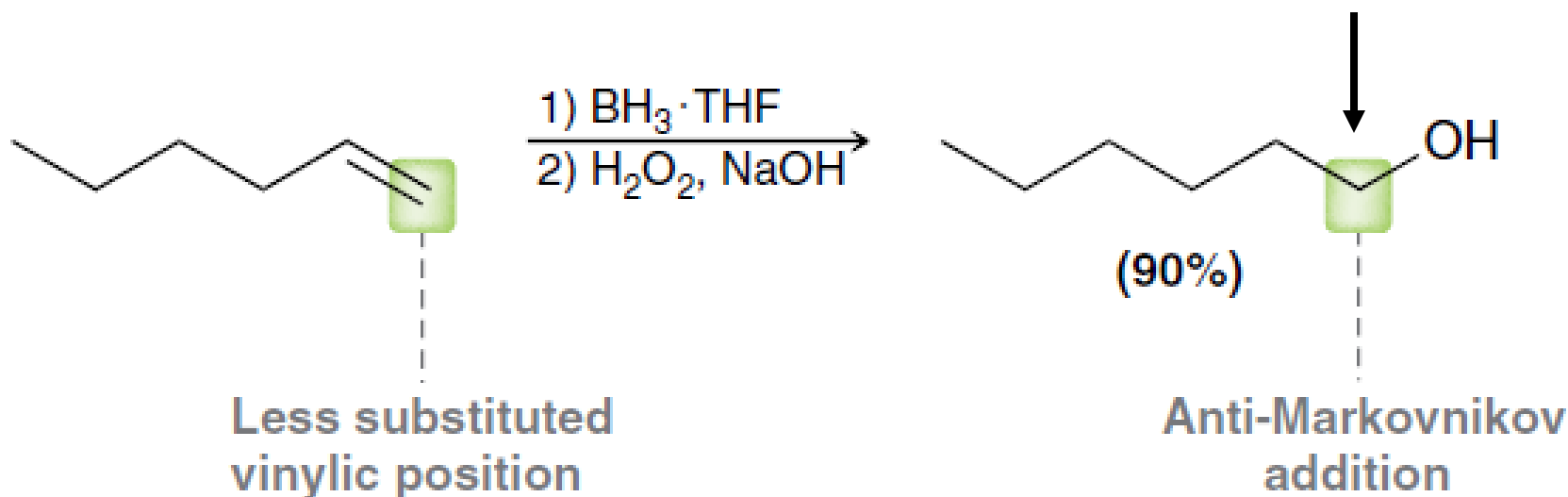
- Today Hydrogenation Halogenation/Halohydrin formation



How do we Synthesize a Primary Alcohol?



Anti-Markovnikov's addition of an OH group

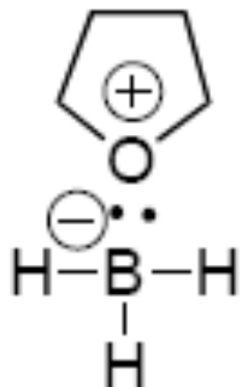


- Note that the process occurs in two steps.

Diborane

Diborane B_2H_6 is example of molecule that can't be treated by simple Lewis Dot or M.O. theory.

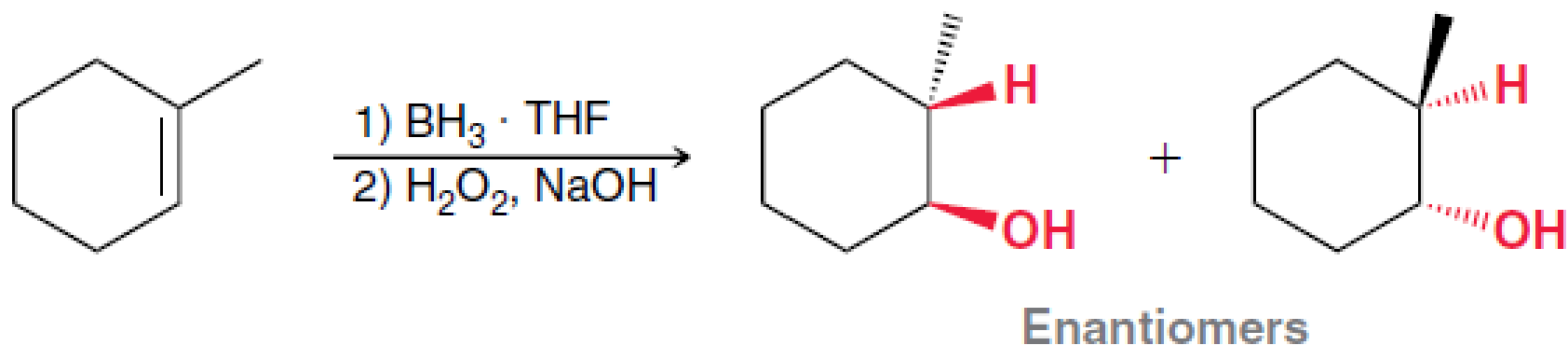
It is very useful (and dangerous!!) reagent. In solvents such as diethyl ether and tetrahydrofuran, forms Lewis Acid-Base adducts:



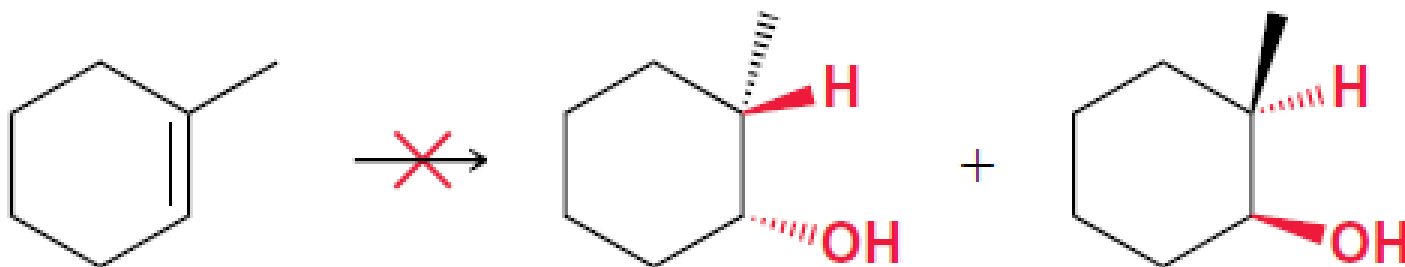
We write BH_3/THF . B_2H_6 is also o.k.

Hydroboration-Oxidation

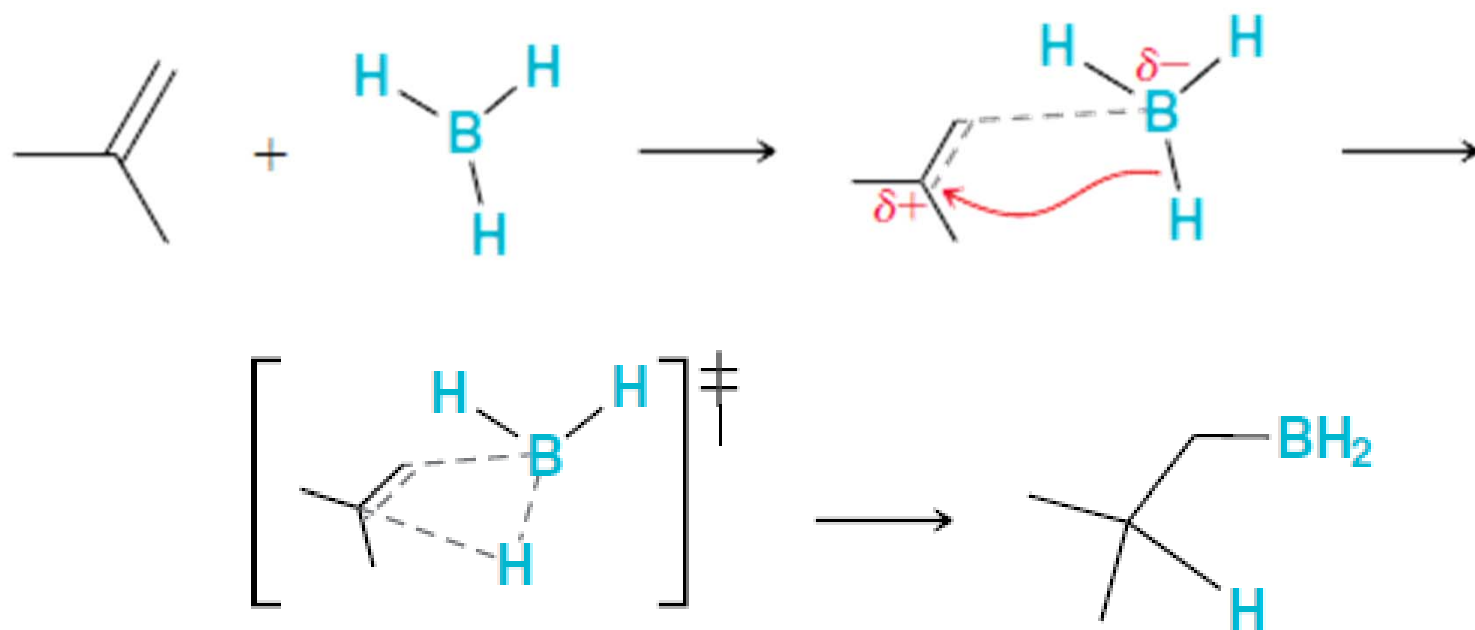
- Hydroboration-oxidation reactions achieve SYN addition.



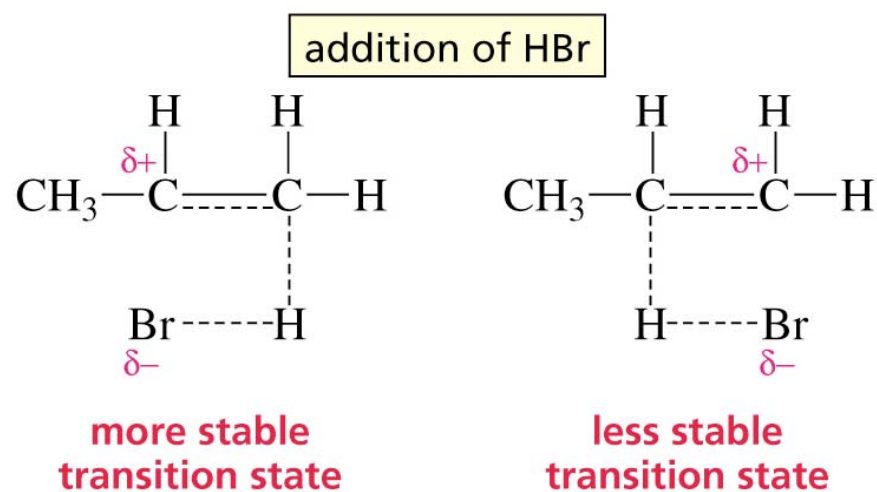
- ANTI addition is NOT observed.



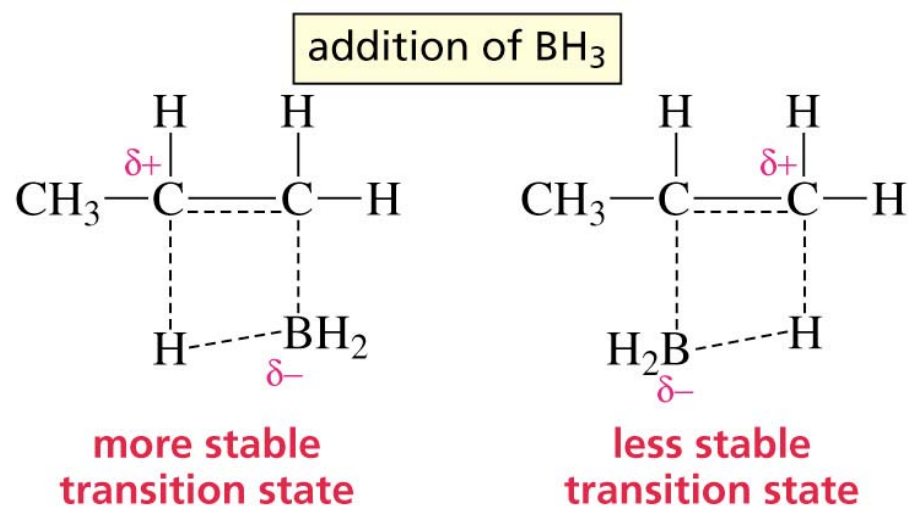
Hydroboration-Oxidation – The Hydroboration Step



Markovnikov addition

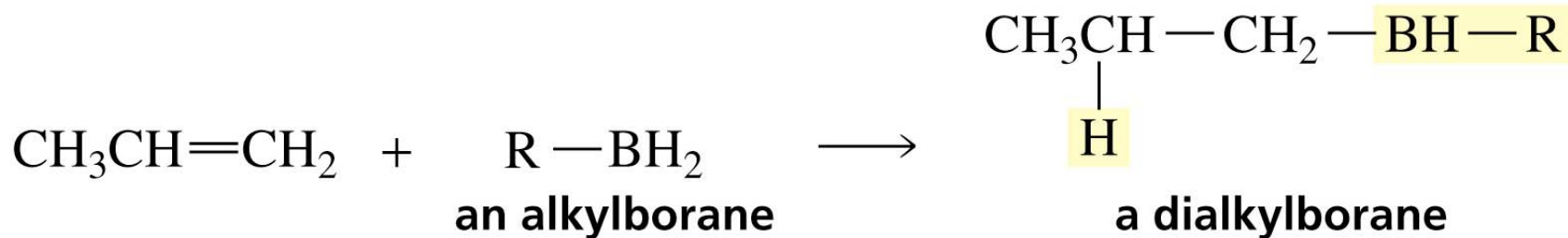


Anti-Markovnikov addition

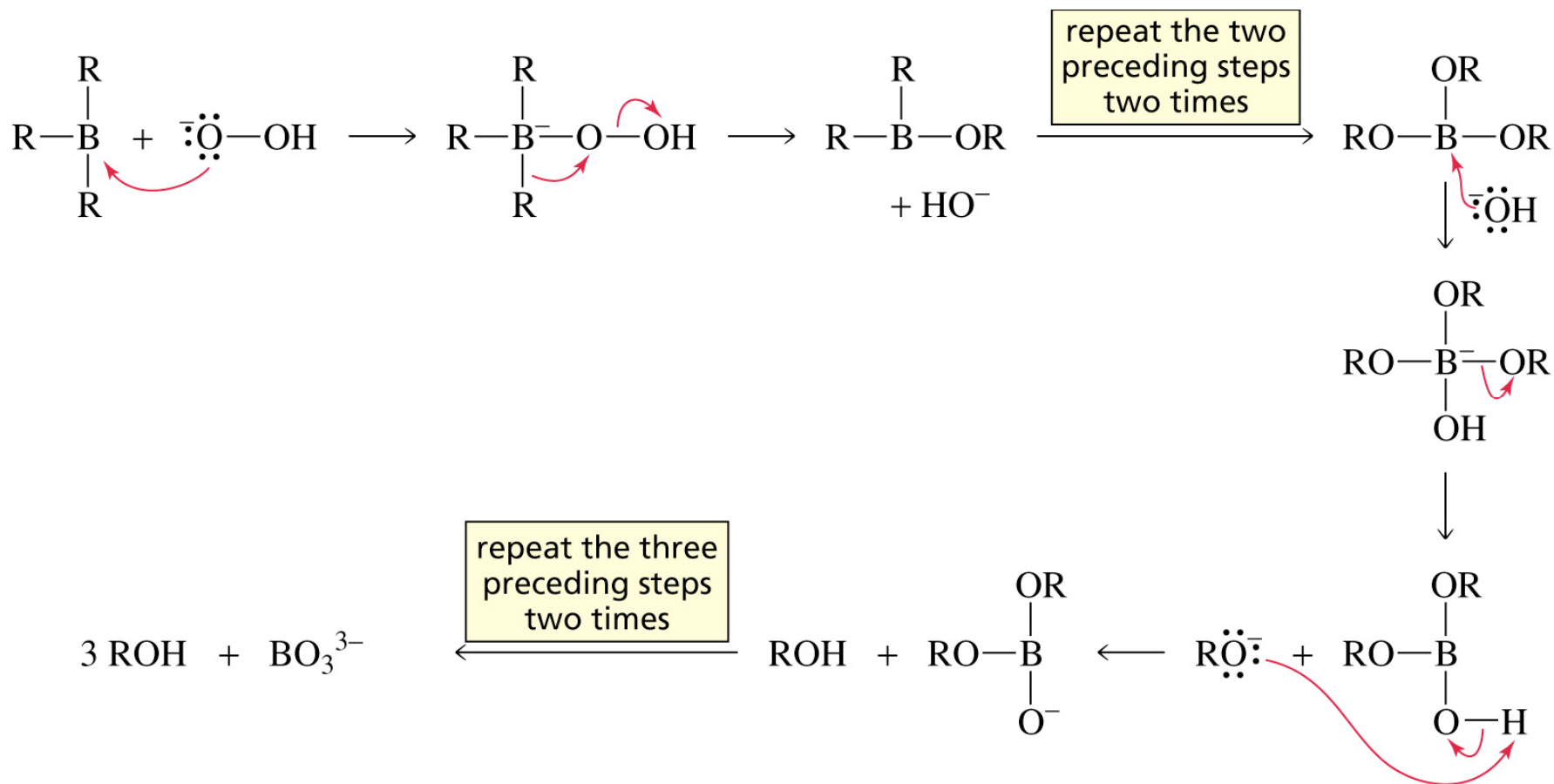


(a pericyclic reaction)

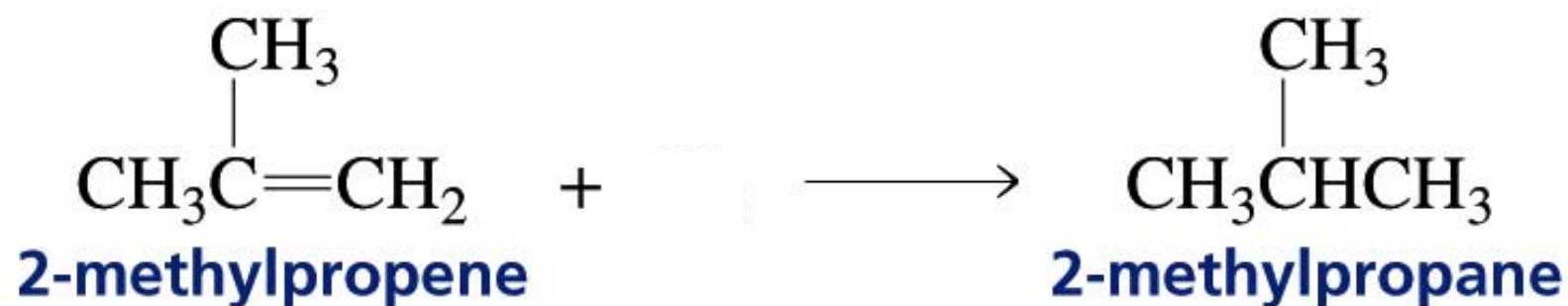
Step 1: Formation of Alkyl Boranes



Step 2: Oxidation Step



How do we make an Alkene back into an alkane?



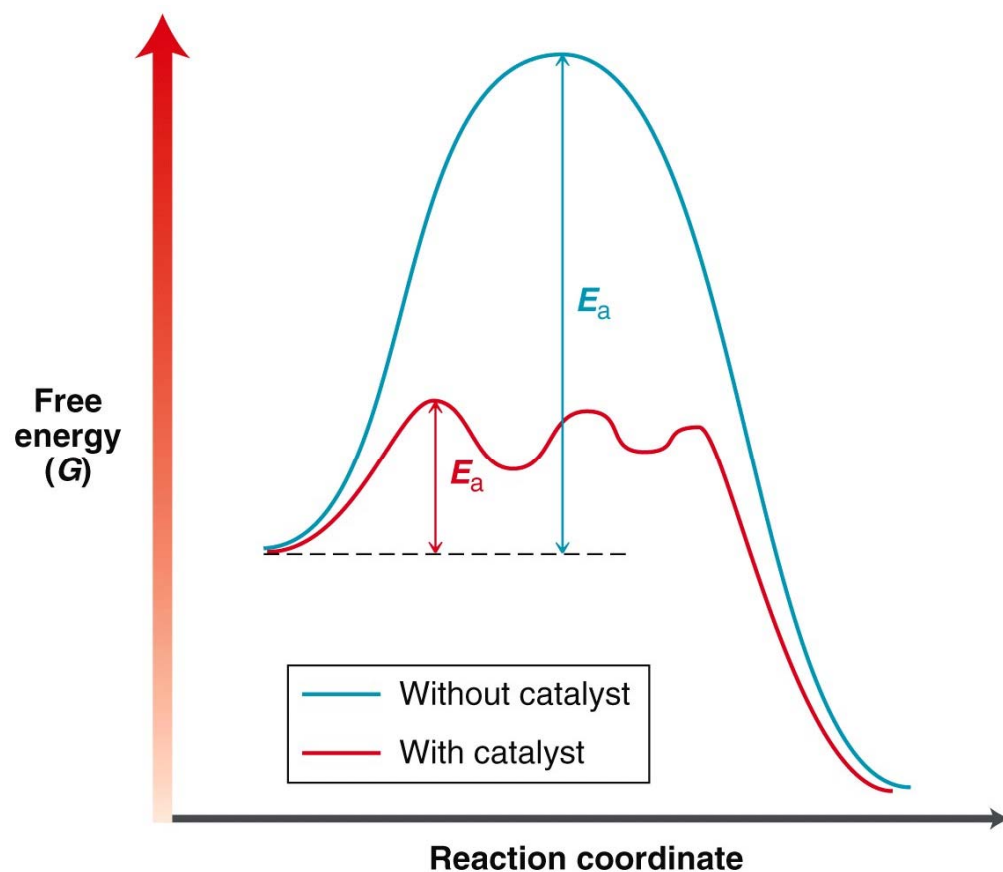
Addition of Hydrogen to Alkenes

How do we make an Alkene back into an alkane?



Typical catalysts include Pt, Pd, and Ni.

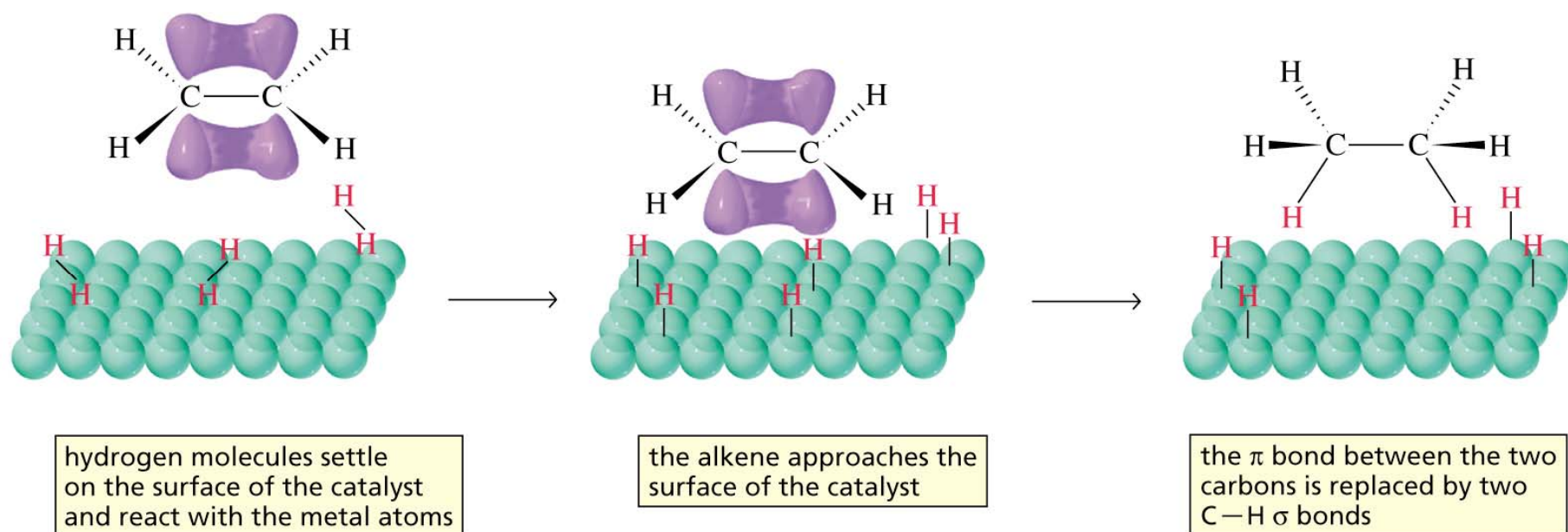
Hydrogenation – Catalytic



- Analyze the energy diagram.
 - Why is a catalyst necessary?
 - Does the catalyst affect the spontaneity of the process?

Catalytic Hydrogenation of an Alkene

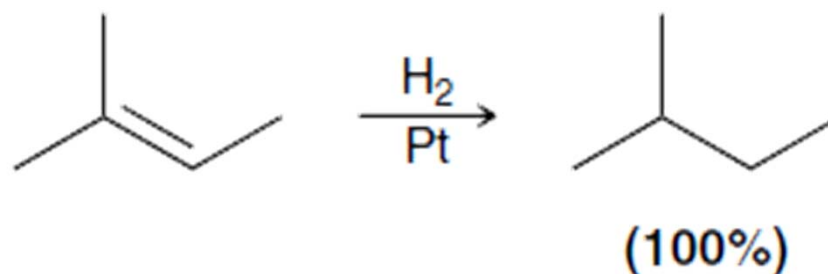
- The metal catalyst is believed to both adsorb the H atoms and coordinate the alkene.



- The H atoms add to the same side of the alkene pi system.

Hydrogenation – Catalytic

- The addition of H_2 across a $\text{C}=\text{C}$ double bond:



- If a chirality center is formed, SYN addition is observed

