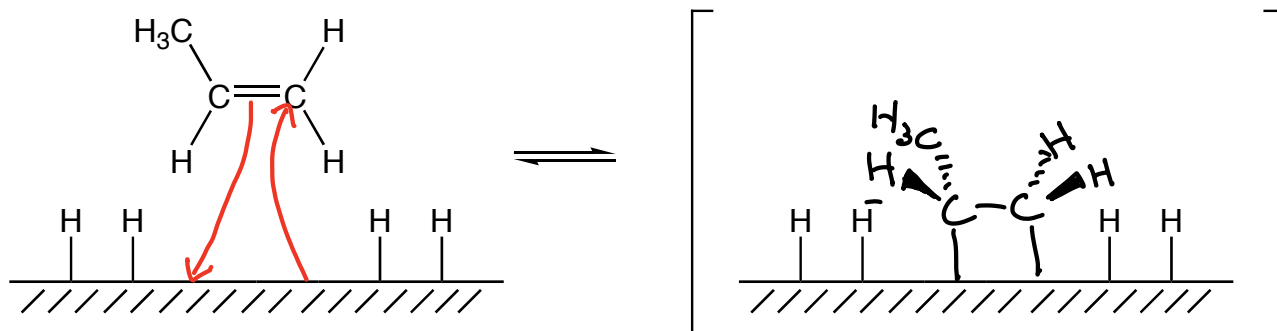
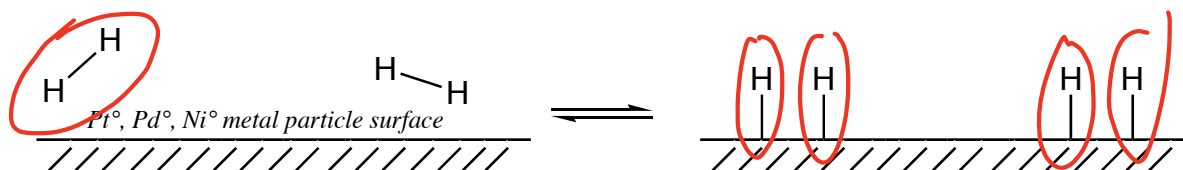
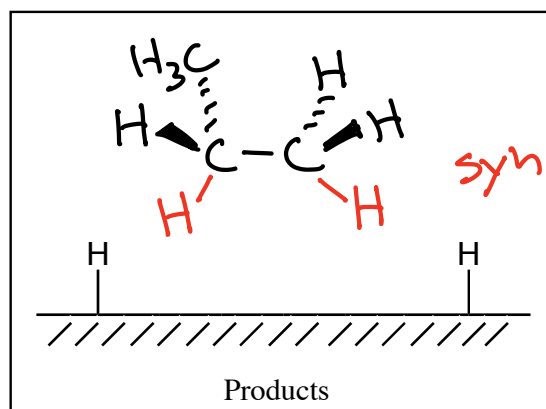


Hydrogenation: H_2 with Pt^0 , Pd^0 , Ni^0

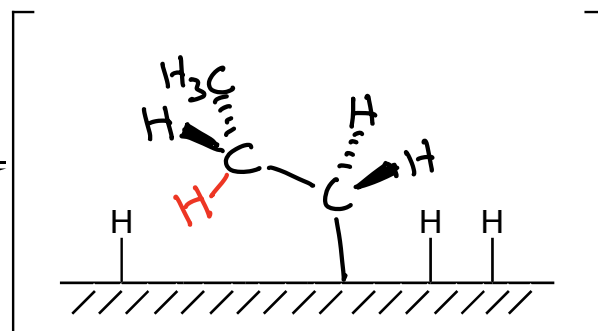
"In the elemental state - a metal"



Very fast



Very fast

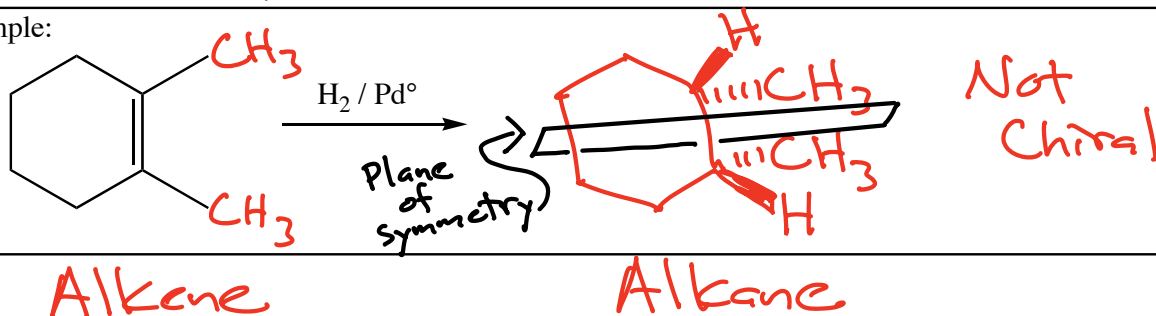


Summary: H_2 adsorbs onto the metal surface.
The alkene adsorbs onto the metal surface.
H atoms transfer to both C atoms $\rightarrow$ on the same face $\rightarrow$ before the C-C bond rotates

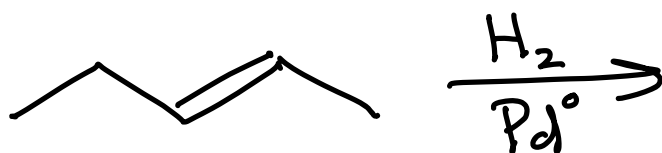
Regiochemistry: N/A

Stereochemistry: Syn

Example:



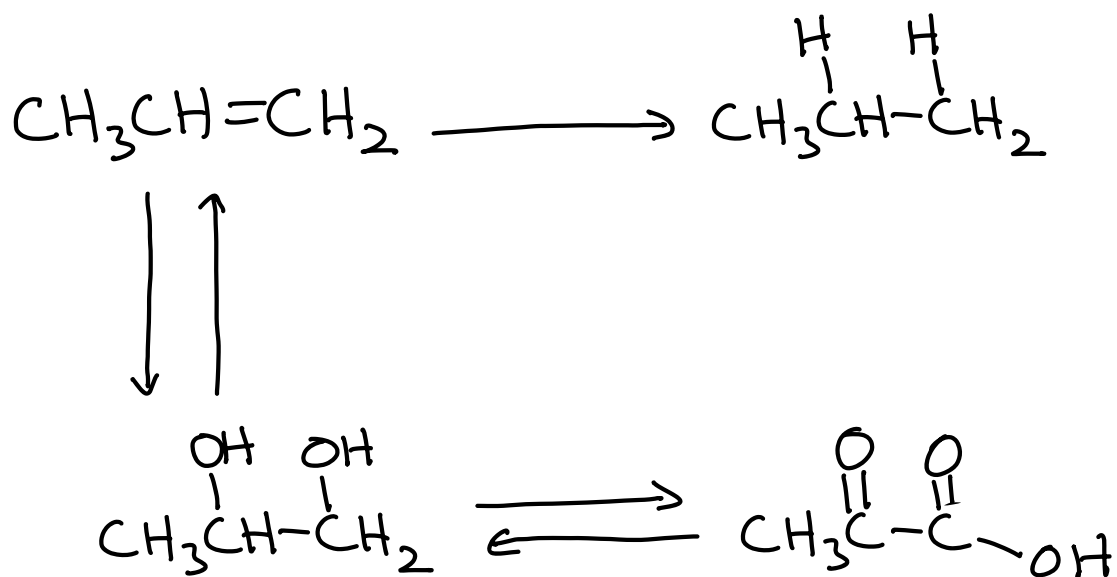
Examples:



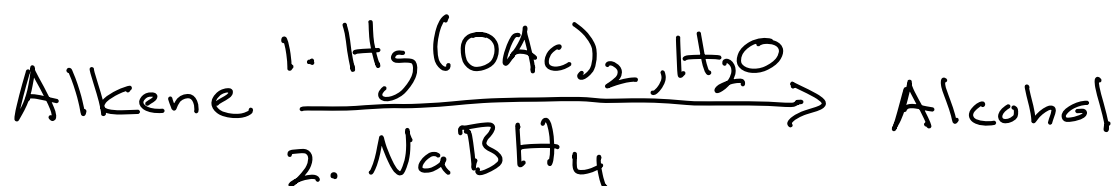
Important definitions for organic chemistry

Oxidation Reaction $\rightarrow$ Net loss of electrons

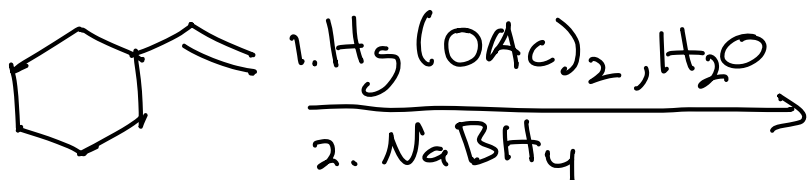
Reduction Reaction $\rightarrow$ Net gain of electrons



You do not need to know this next reaction, but I am going to show it to you for reference

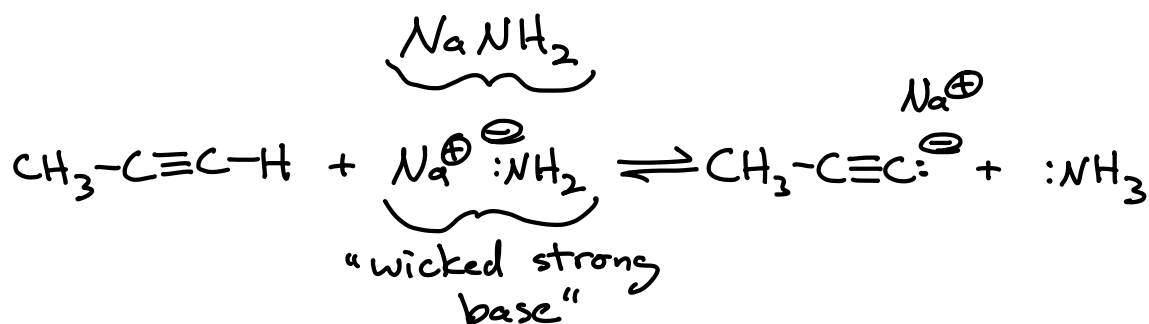


Example:



Alkynes $\rightarrow$ similar to alkenes because of the π bonds.

$\rightarrow$ One big difference
 $\Downarrow$



Epic New Reaction



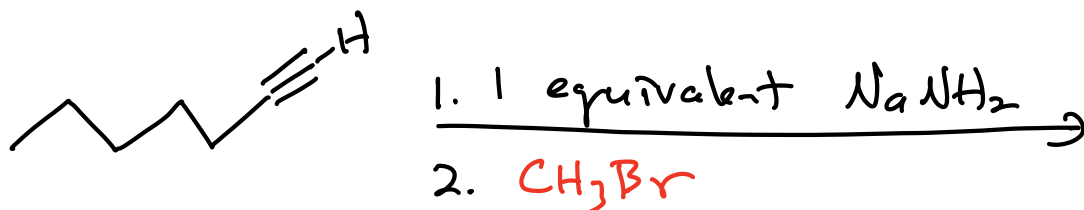
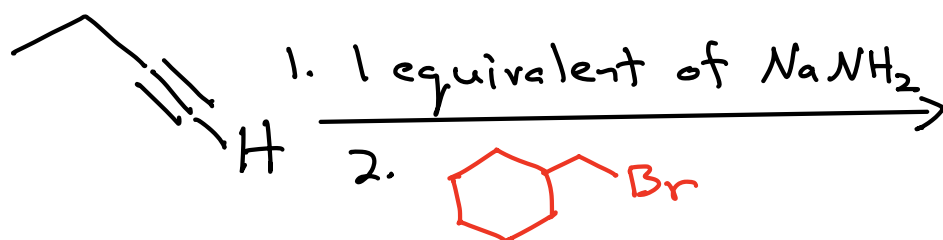
A primary
haloalkane



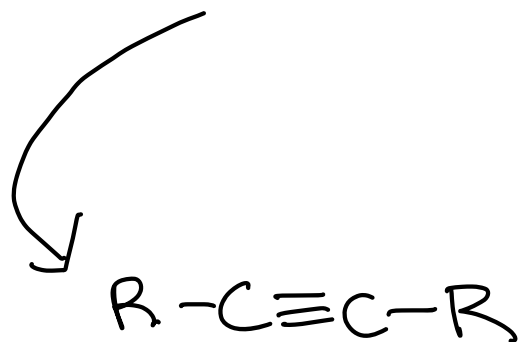
Time capsule: This is an $\text{S}_{\text{N}}2$ reaction. The haloalkane must be primary to avoid an $\text{E}2$ reaction.

Making C-C bonds allows us to construct larger molecules from smaller ones!

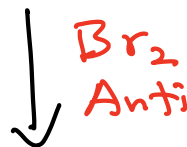
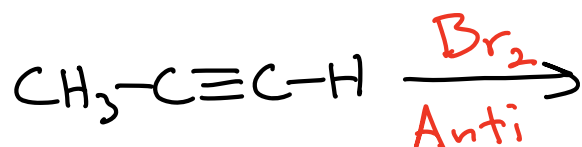
Example:



Alkynes $\Rightarrow$ The two orthogonal pi bonds define alkyne reactions

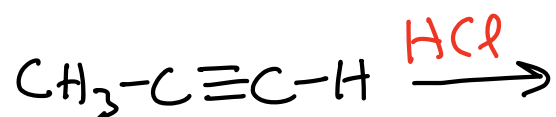


A) Reaction with 2 equivalents of X_2
 $X = Cl, Br$



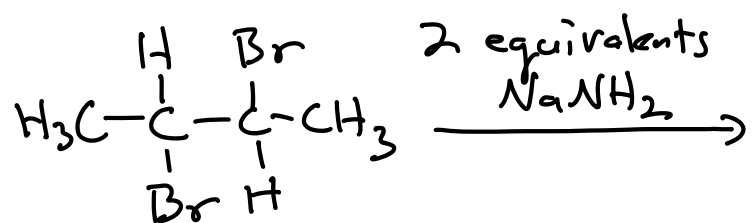
B) Reaction with 2 equivalents of H-X

X = Cl, Br

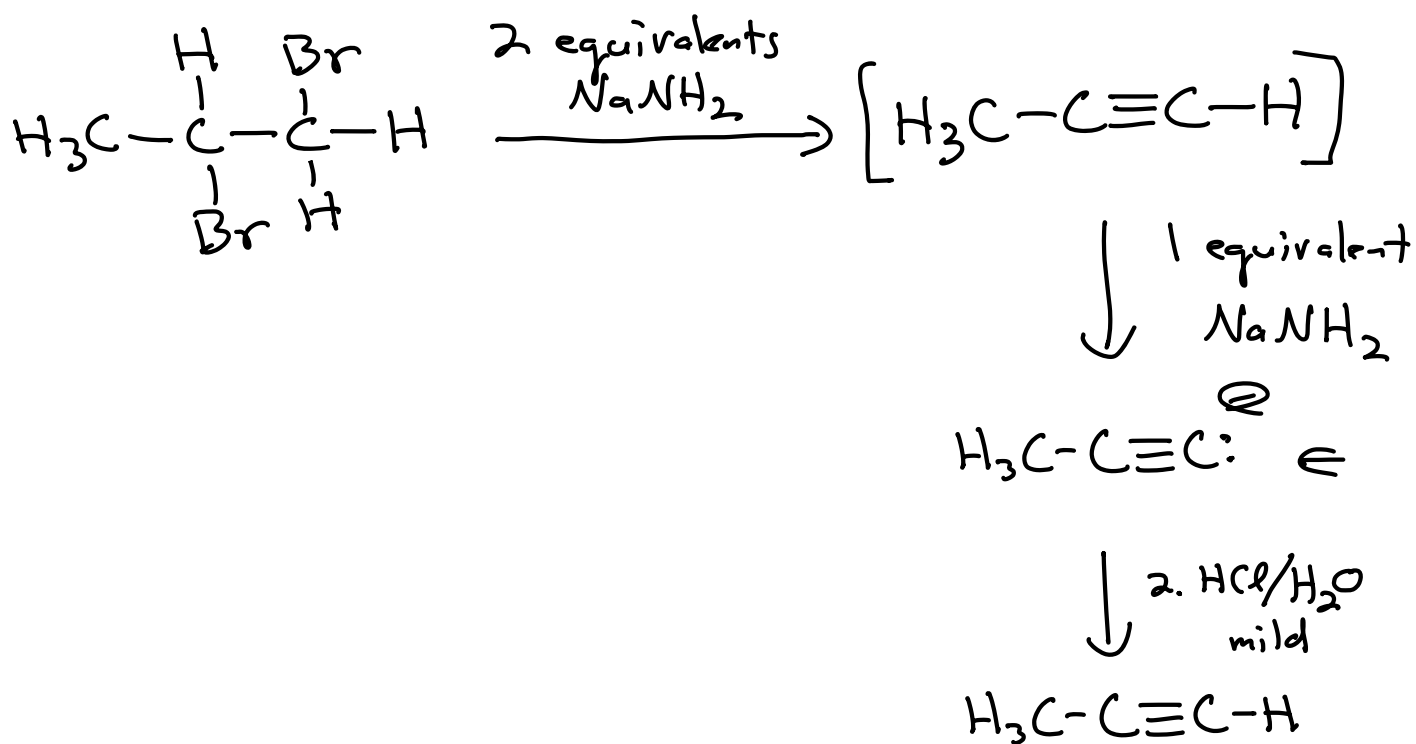




c) Conversion of a vicinal dihalide into an alkyne



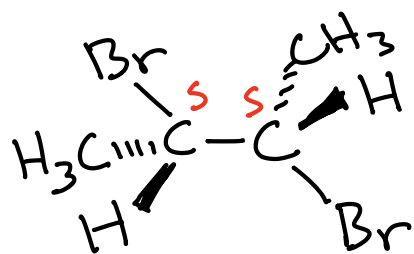
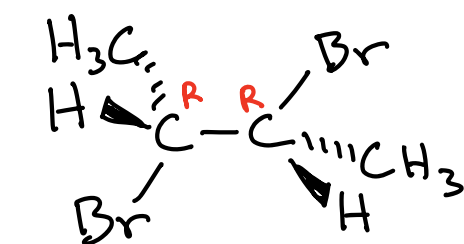
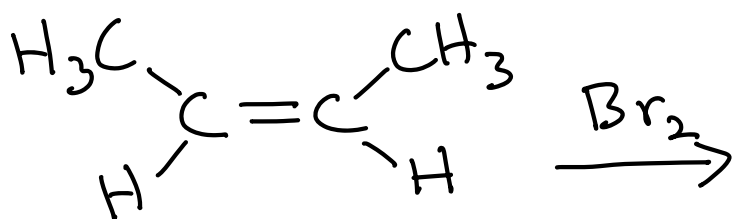
Time capsule → This is a double E2 reaction



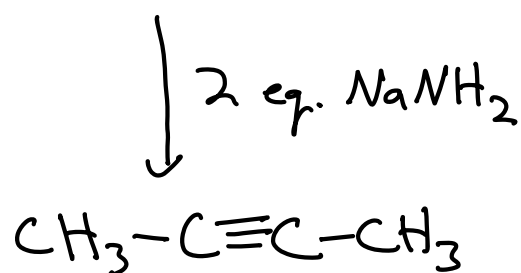
Internal alkyne example:



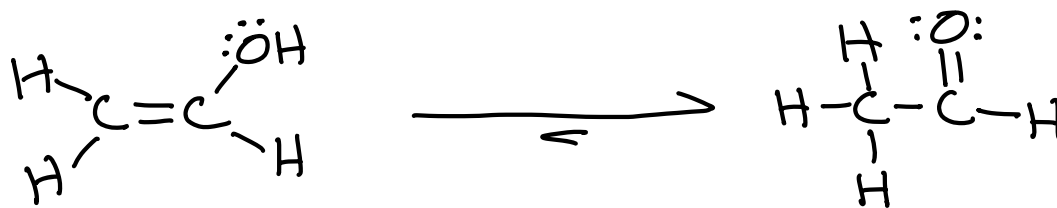
Big Deal $\rightarrow$ allows
conversion of an alkene
to an alkyne



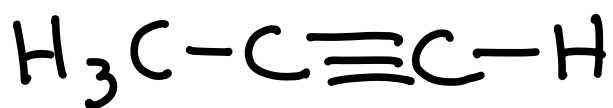
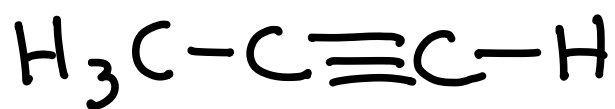
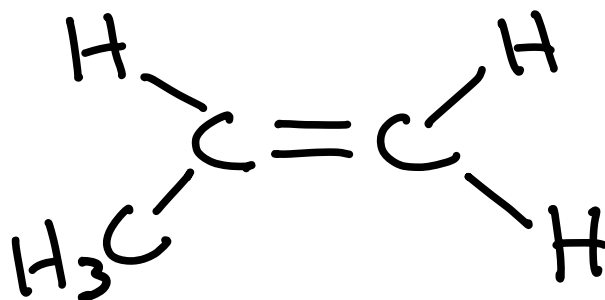
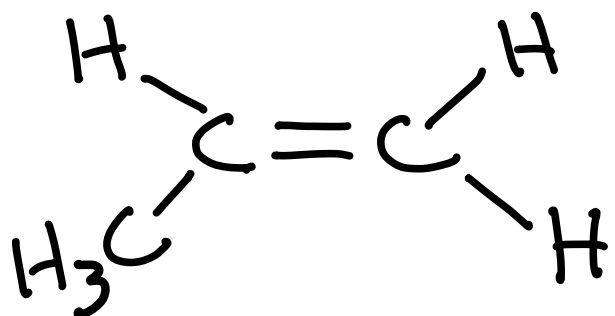
Racemic

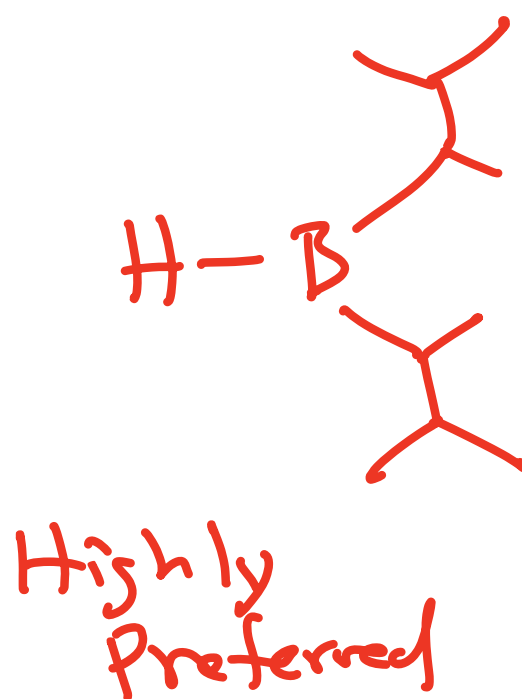
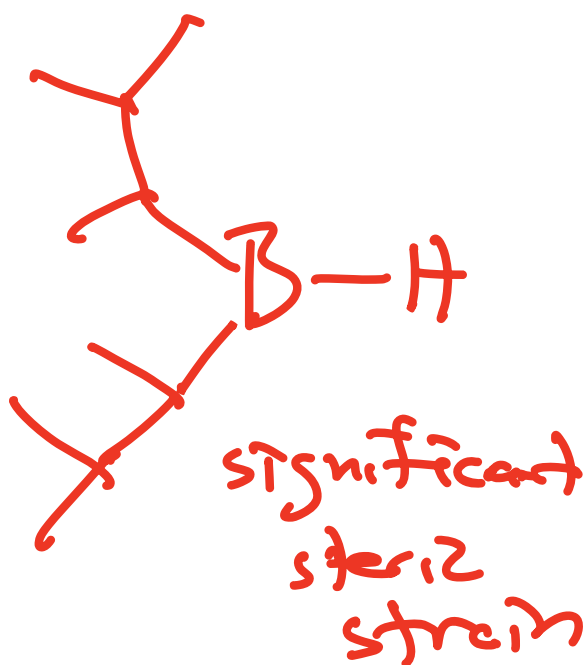
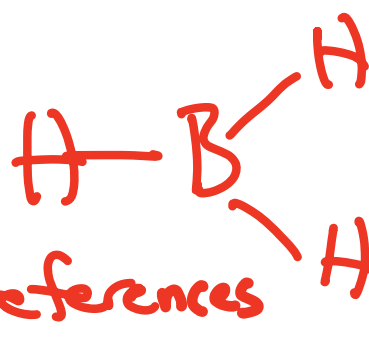
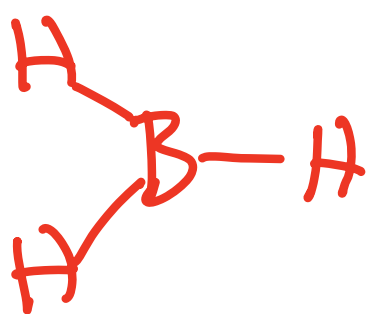
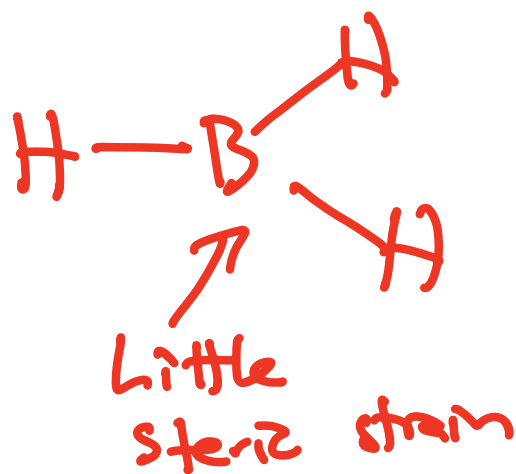
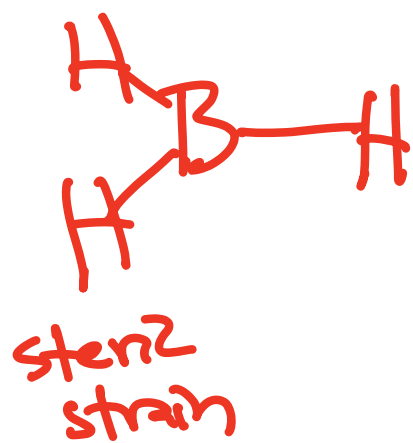


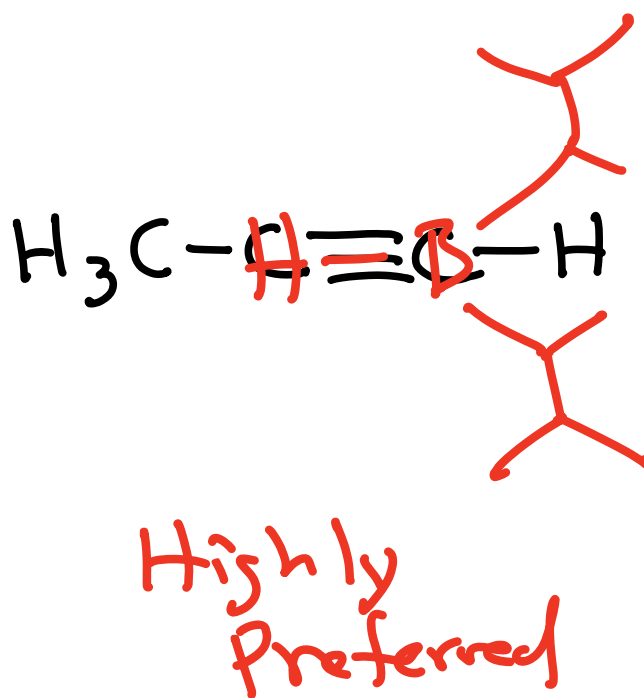
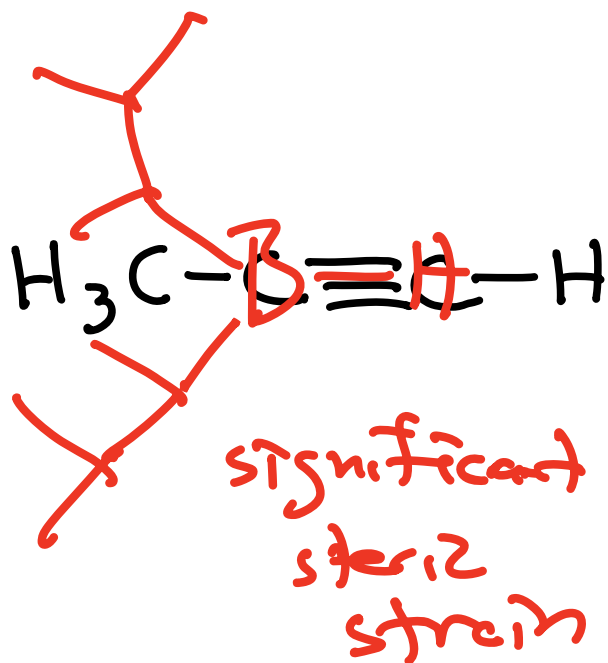
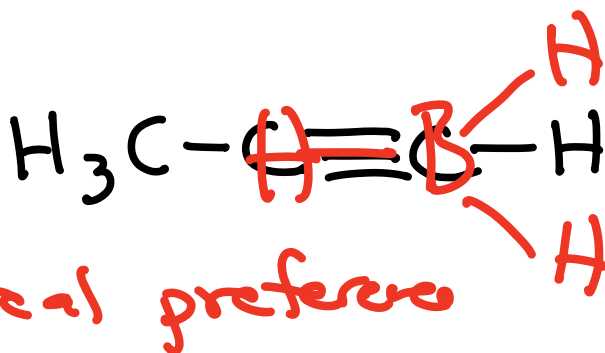
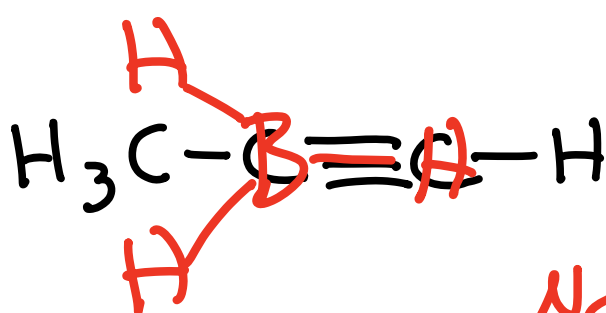
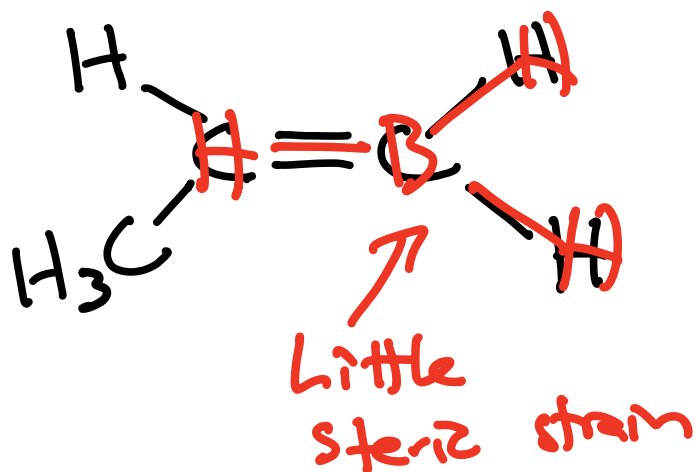
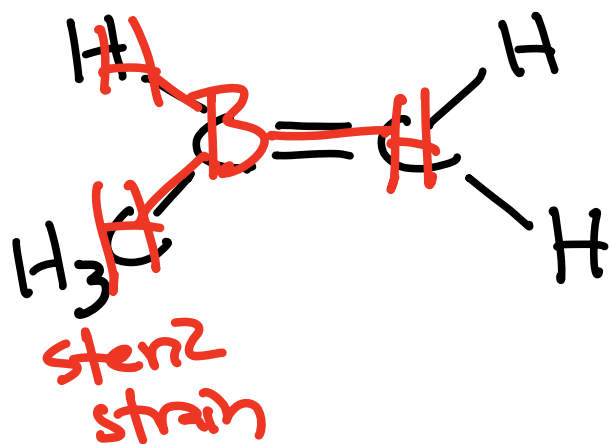
New Concept → The following species are in equilibrium, and the more stable species is the form



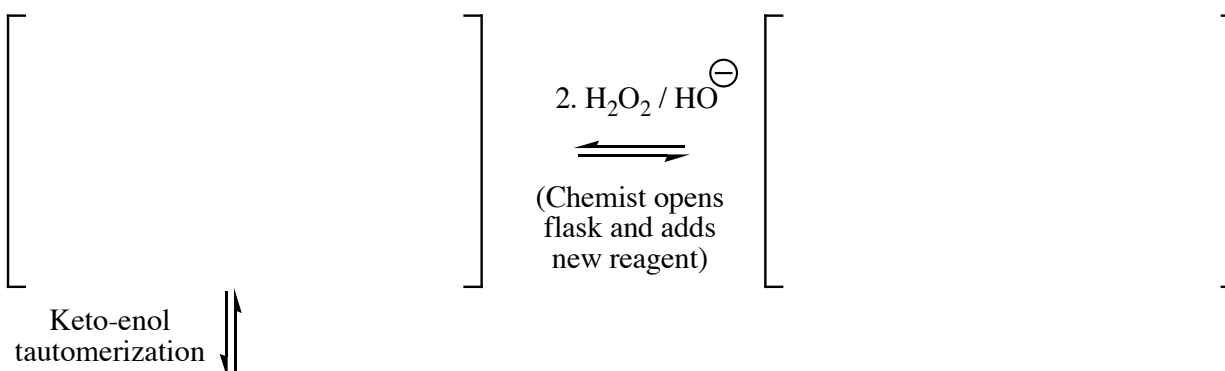
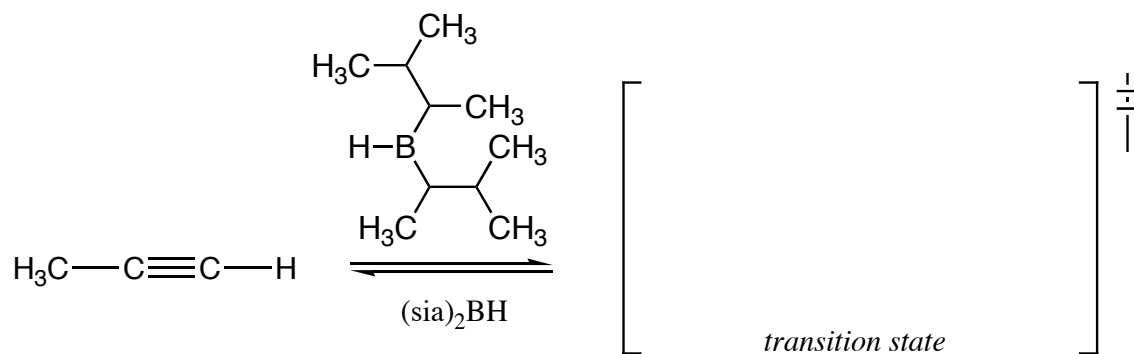








Terminal Alkyne Hydroboration



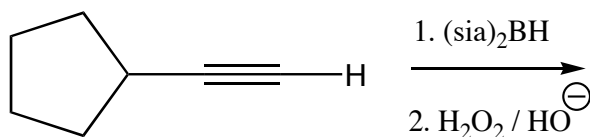
Products

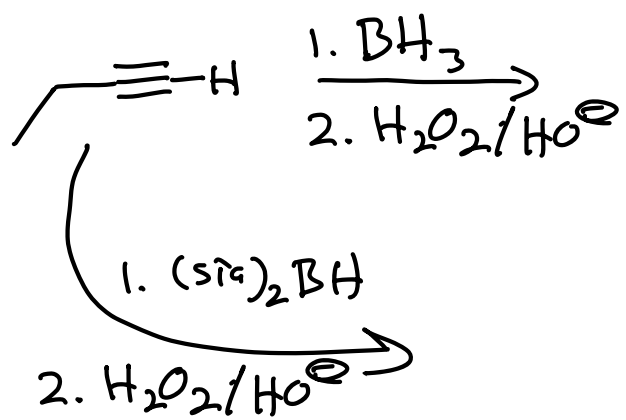
Summary:

Regiochemistry:

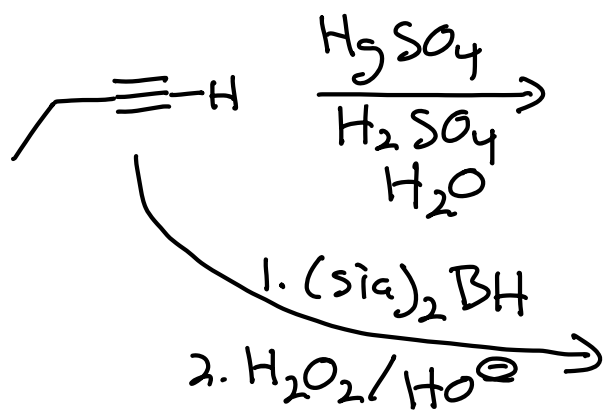
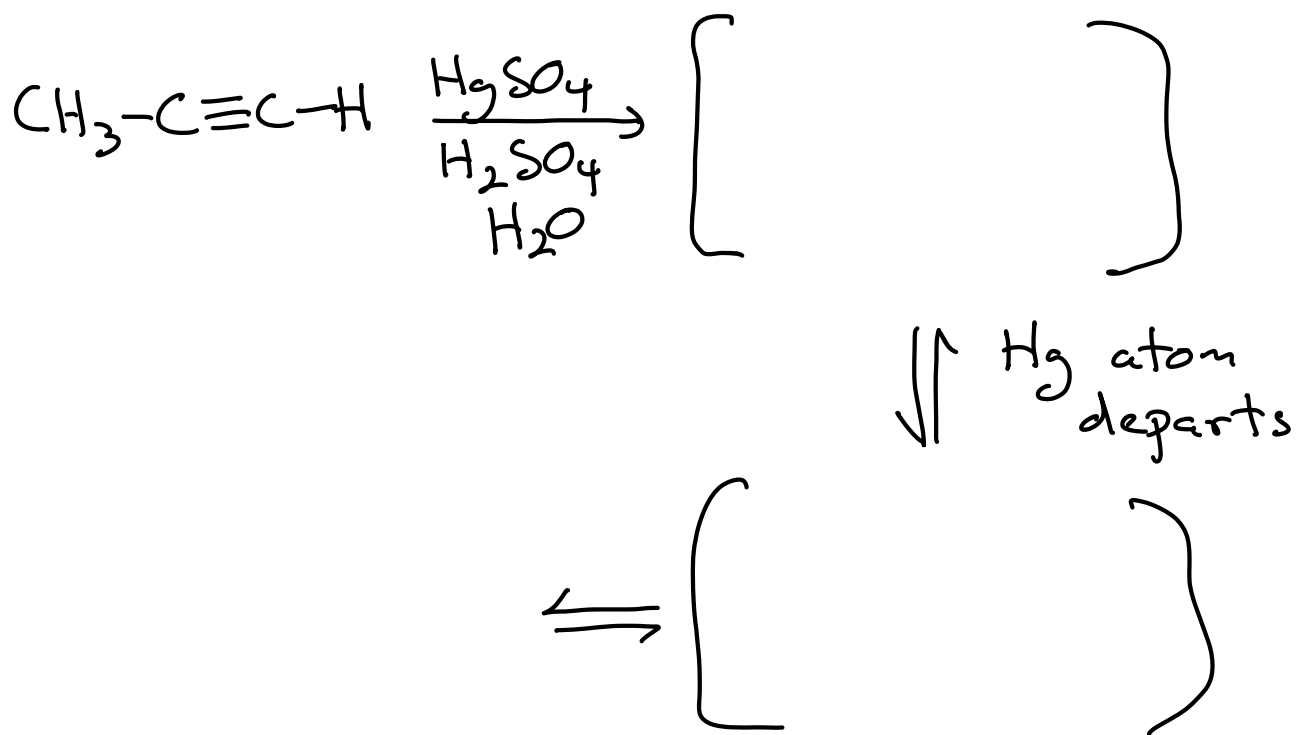
Stereochemistry:

Example:



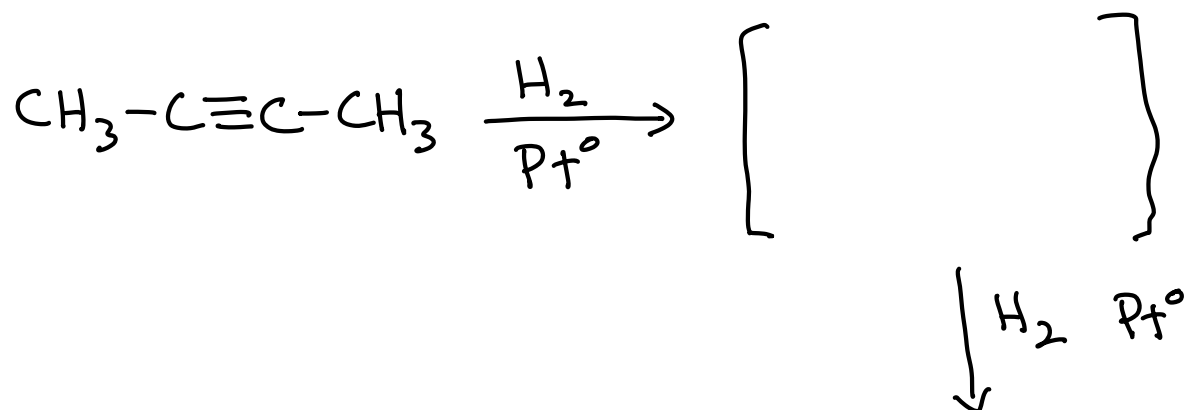


Hydration of an alkyne using
 $\text{HgSO}_4, \text{H}_2\text{SO}_4, \text{H}_2\text{O}$

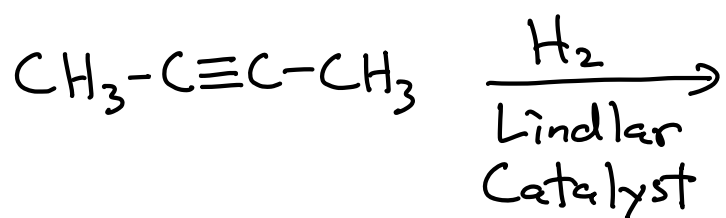


Reduction of Alkynes

1) Hydrogenation H_2 $\text{Pt}^0, \text{Pd}^0, \text{Ni}^0$



Lindlar Catalyst $\rightarrow$ special catalyst that stops the hydrogenation at the syn addition



Time Out:

Regular Arrows



"Fish hook" Arrows



Radical $\rightarrow$ a species with an unpaired electron

Time In:

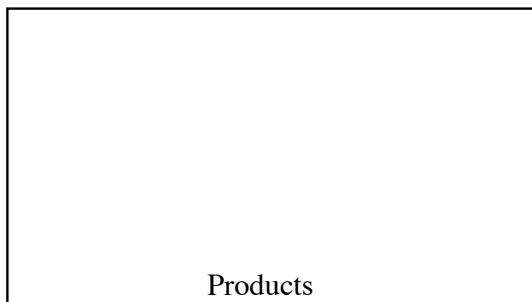
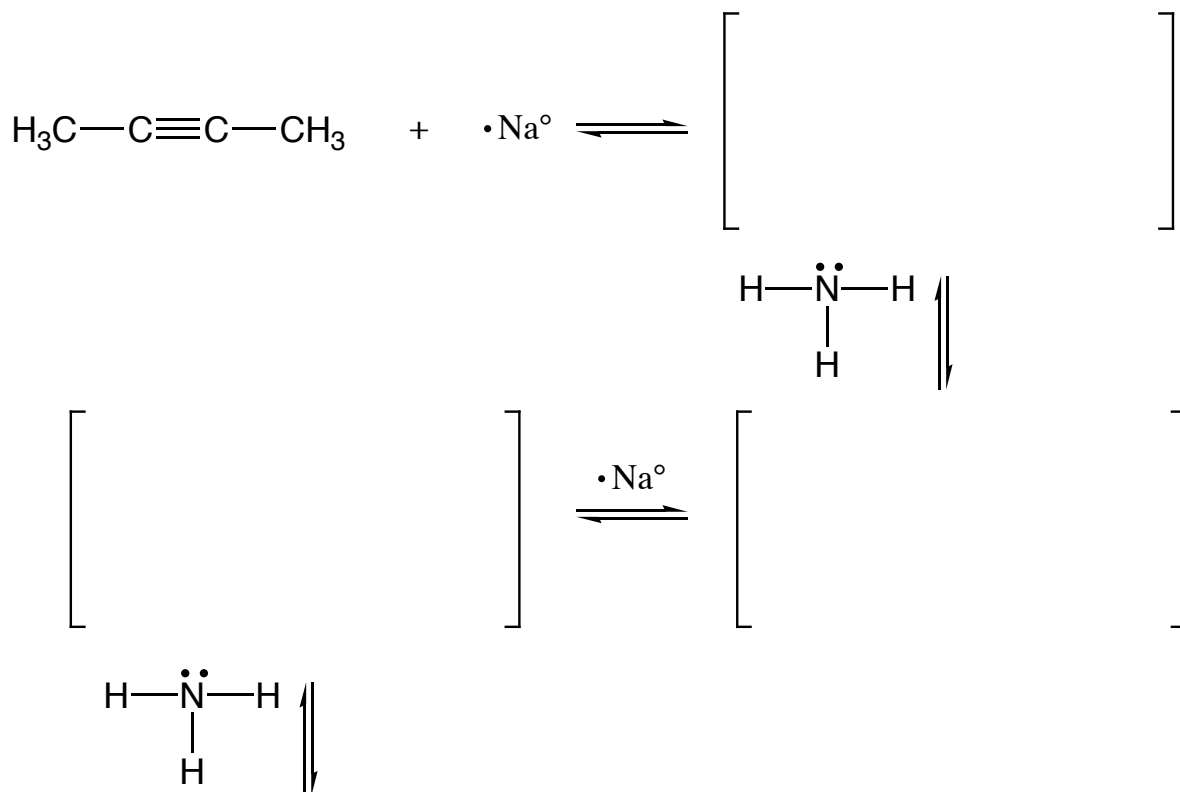
2) Dissolving metal reductions of alkynes
 Na^0 in NH_3

Sodium $\rightarrow (\text{Na}^0)$ is a very strong agent

because Na^+ has a
in its valence shell

NH_3 $\rightarrow$ used as source of and the

Reduction of Alkynes Using Sodium and Ammonia

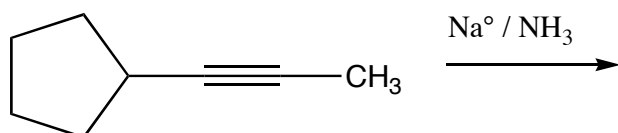


Summary:

Regiochemistry:

Stereochemistry:

Example:



Reductions of alkynes $\rightarrow$ 3 choices

