



## INFO SESSION SCHEDULE

# CAMP KESEM



### Dates

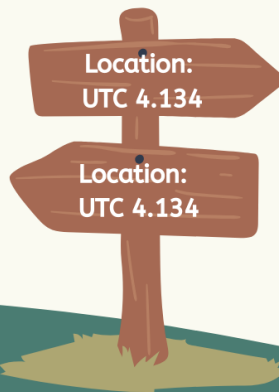
TUESDAY 9/3  
THURSDAY 9/5  
WEDNESDAY 9/11  
TUESDAY 9/17 (Zoom)  
MONDAY 10/7  
TUESDAY 11/5



All Info Sessions are  
from 6-7pm and the  
location is at UTC  
4.134



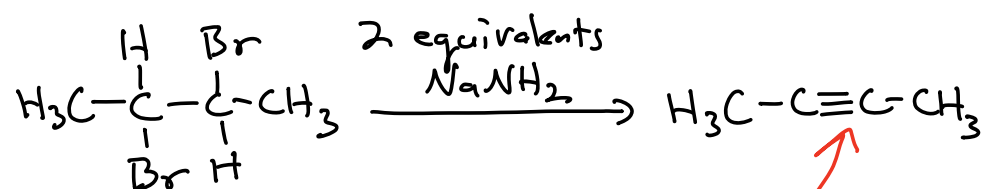
JOIN OUR REMIND!  
use the code above  
or text @utkesem15



SUPPORTING CHILDREN THROUGH AND BEYOND A PARENT'S CANCER  
@kesemutaustin



c) Conversion of a vicinal dihalide into an alkyne



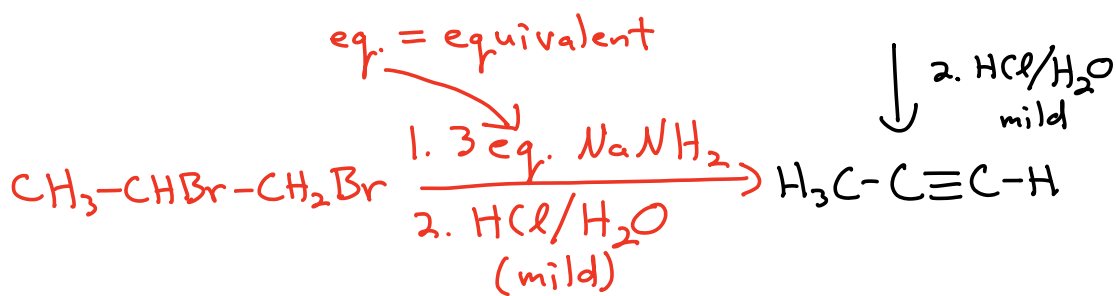
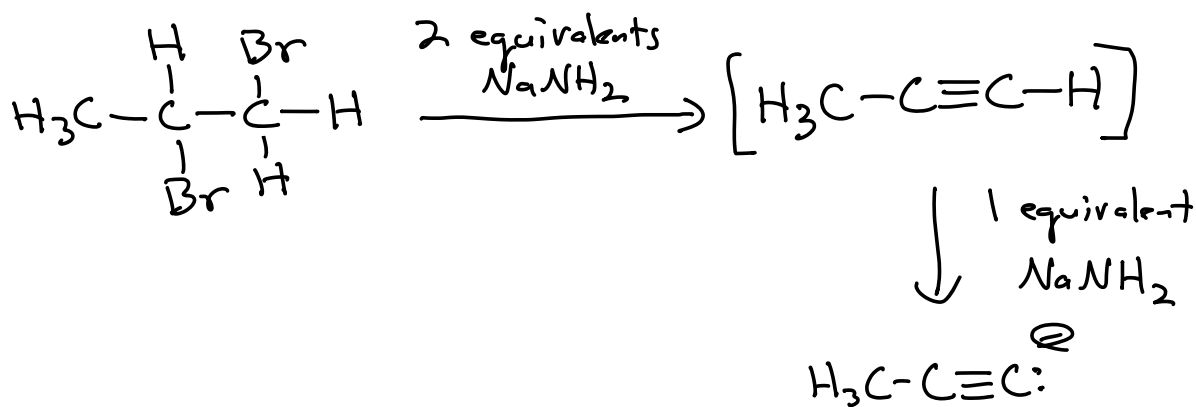
Vicinal dihalide

Note this alkyne is not terminal  
(it is not on the end)

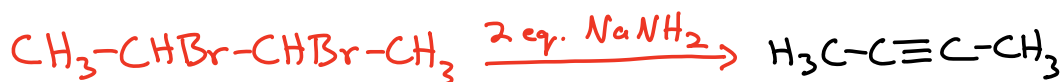


Time capsule → This is a double E2 reaction

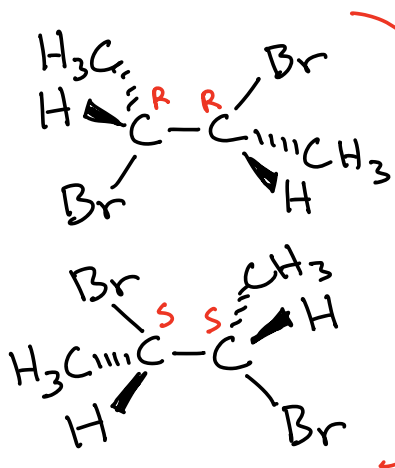
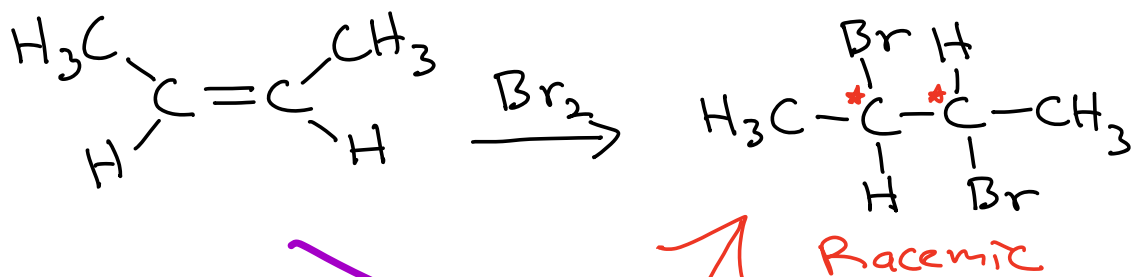
When creating a terminal alkyne you must use 3 equivalents of  $\text{NaNH}_2$  as a first step  $\rightarrow$  AND  $\rightarrow$  you need a second step that is mild acid  $\rightarrow \text{HCl}/\text{H}_2\text{O}$



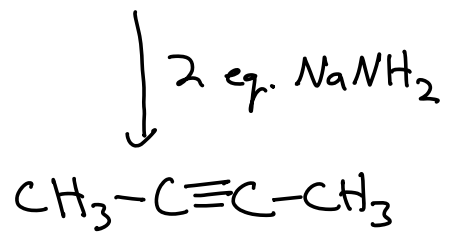
Internal alkyne example:



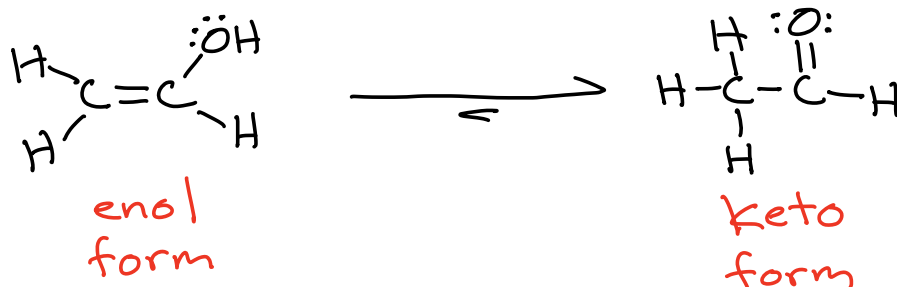
Big Deal  $\rightarrow$  allows  
conversion of an alkene  
to an alkyne



Racemic



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

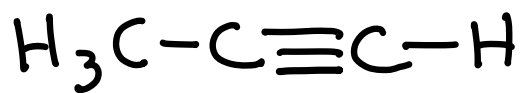
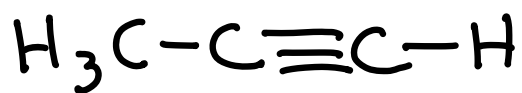
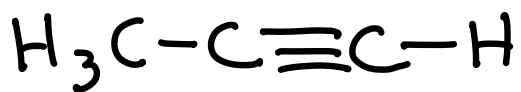
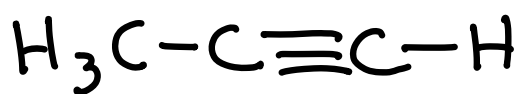
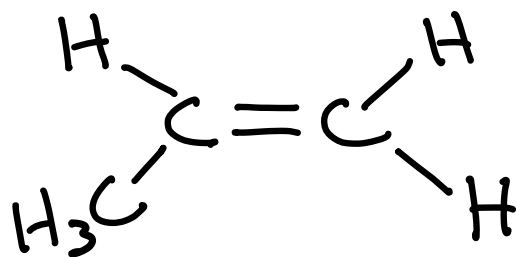
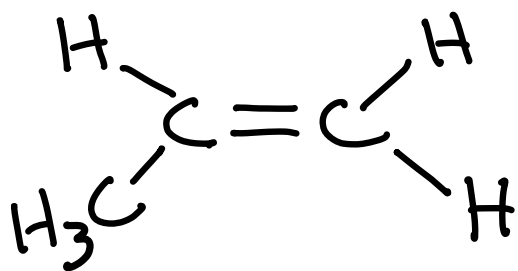


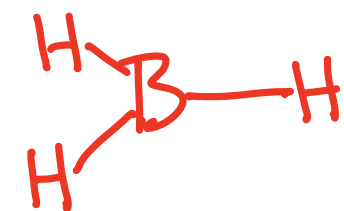
This process is called "tautomerization" as in "keto-enol tautomerization"

Favored  
(a  $\text{C}=\text{O}$  pi bond is stronger than a  $\text{C}=\text{C}$  pi bond)

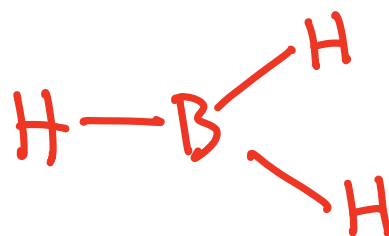


© 2012 Lone Star Outdoor News Photo by David J. Sams, LSON

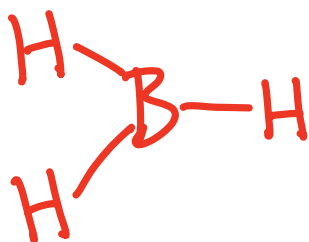




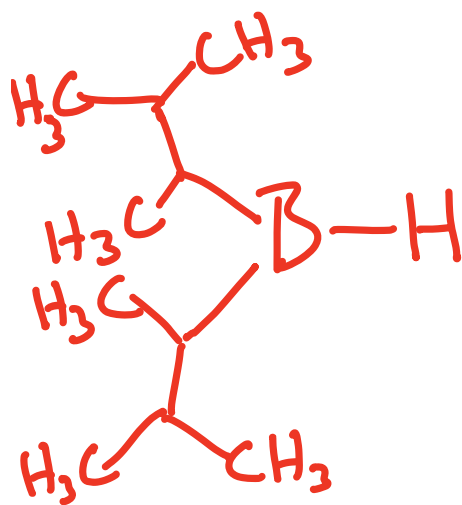
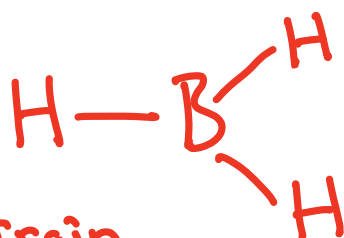
Steric Strain



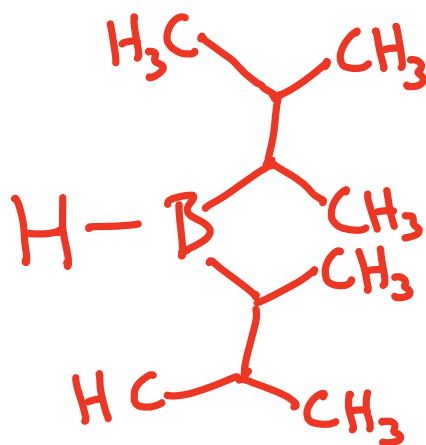
Much less Steric Strain



No steric strain  
No real preference

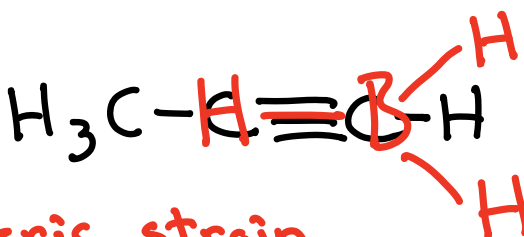
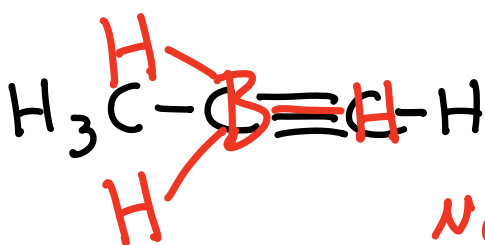
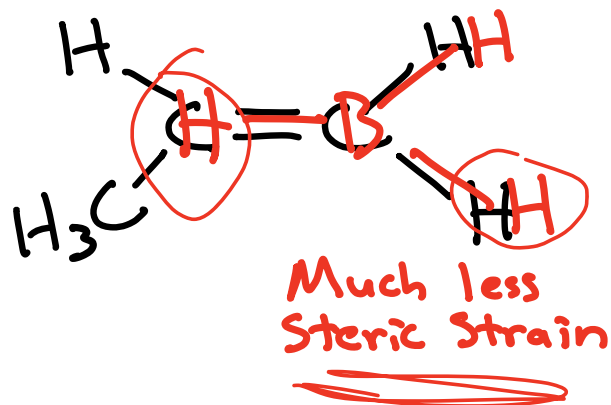
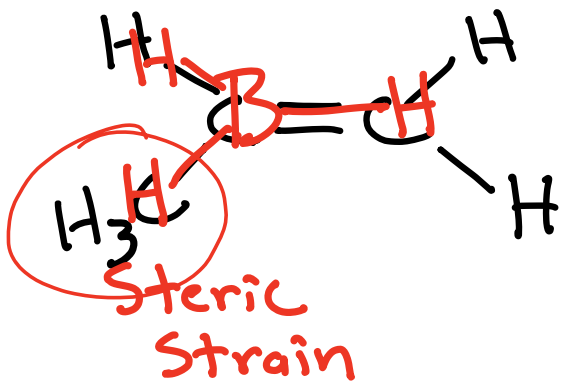


Significant Steric Strain

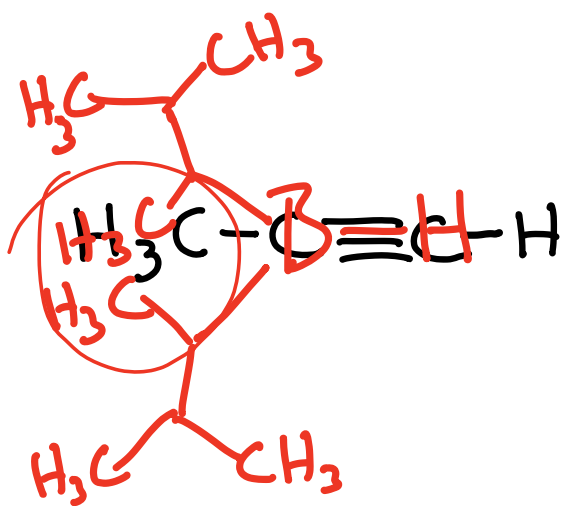


Highly Preferred

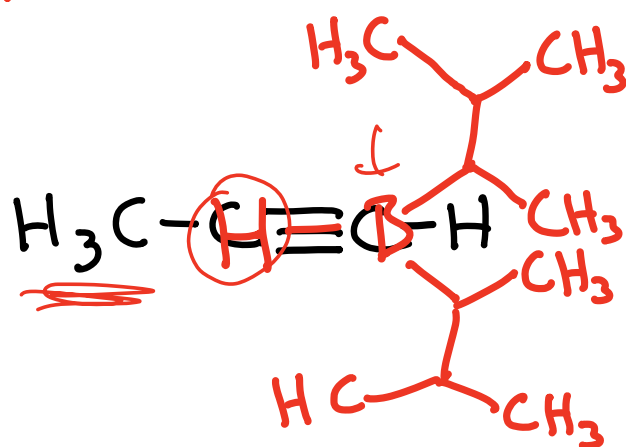




No steric strain  
No real preference

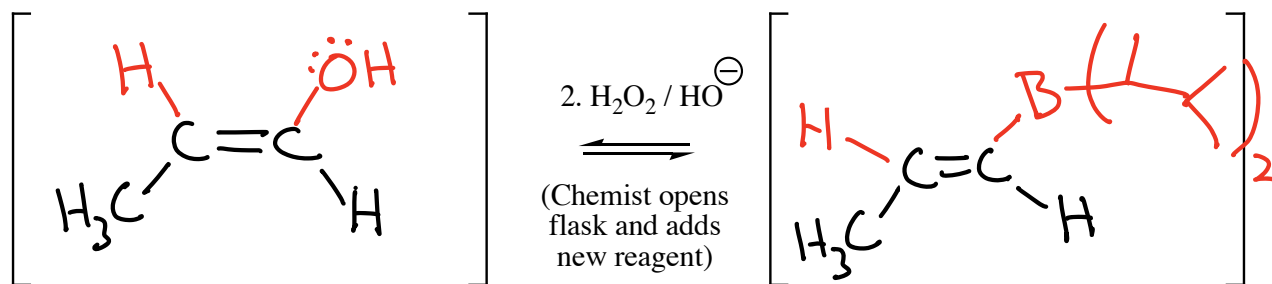
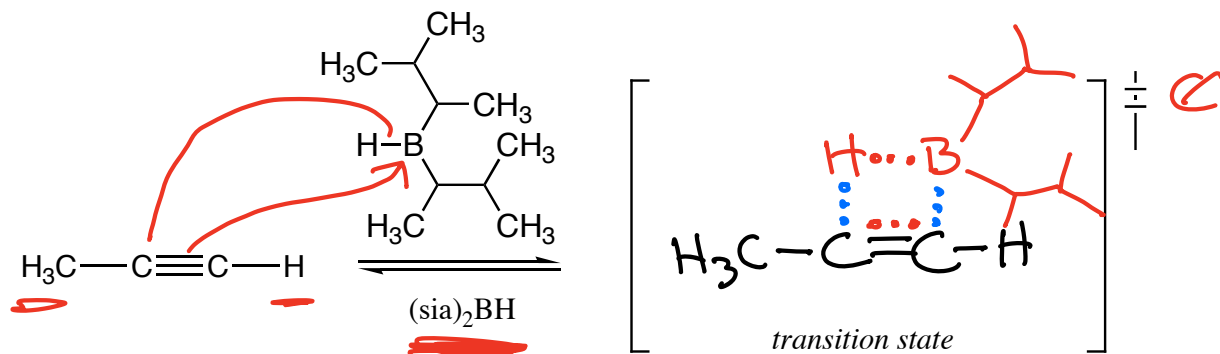


Significant Steric Strain

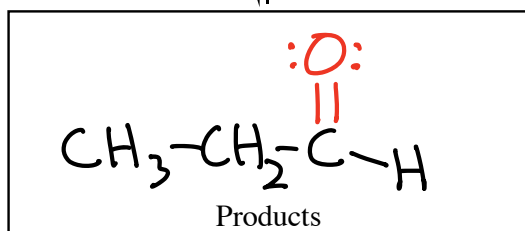


Highly Preferred

## Terminal Alkyne Hydroboration



Keto-enol  
tautomerization



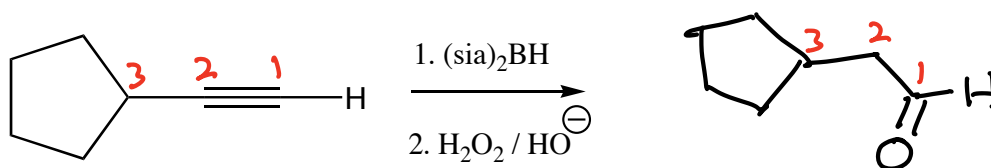
⇐ The C=O is on the C on the end → "non-Markovnikov"

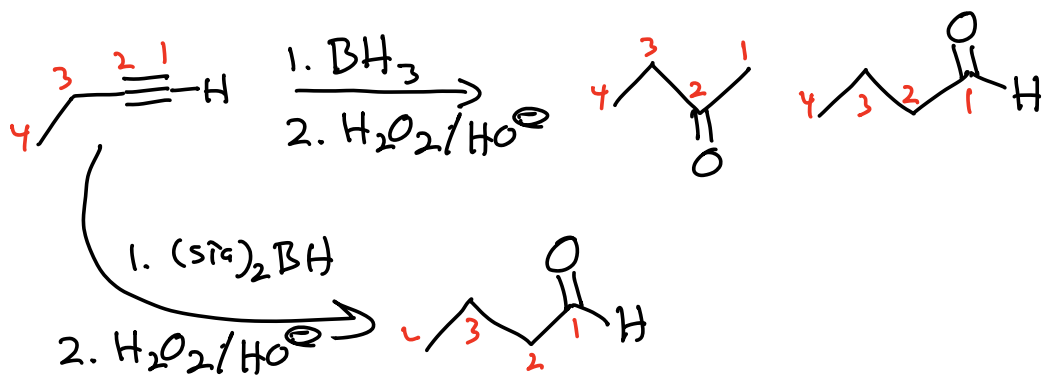
Summary: The  $(\text{sia})_2\text{BH}$  reacts so the B atom attaches to the C atom on the end. The four-membered ring transition states makes both bonds simultaneously.  $2. \text{H}_2\text{O}_2 / \text{HO}^- \rightarrow \text{enol} \rightarrow \text{keto}$

Regiochemistry: non-Markovnikov

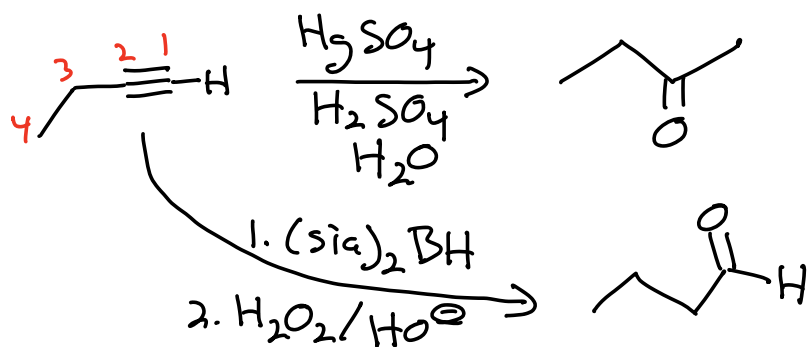
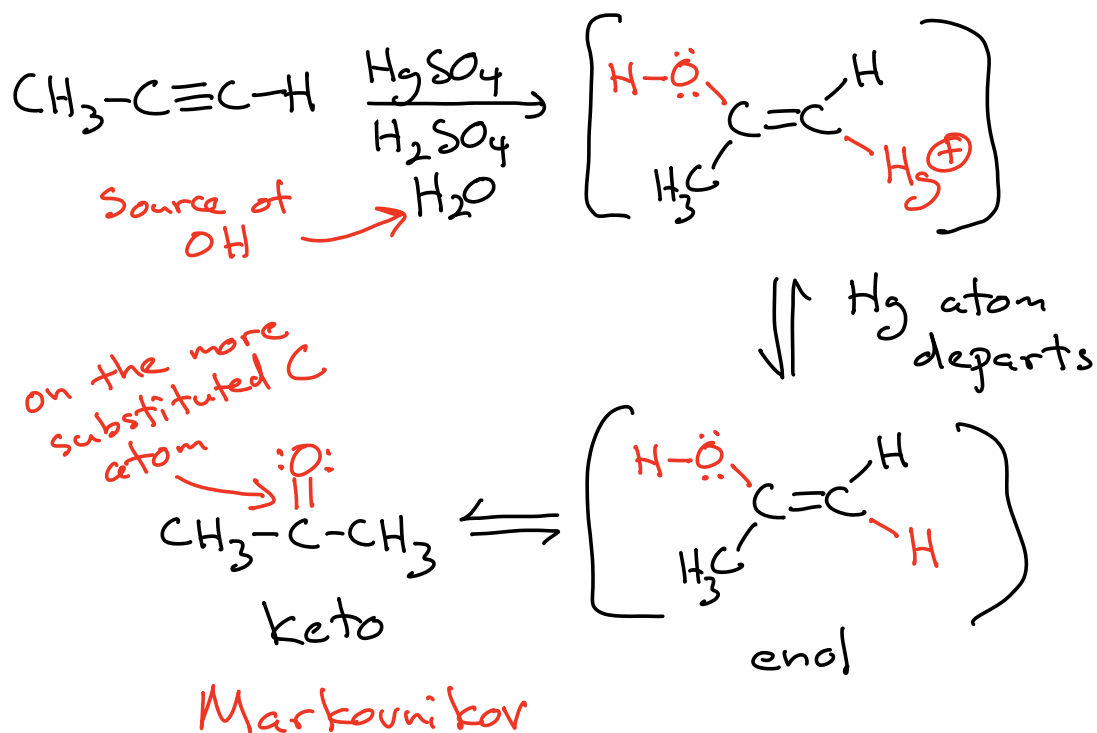
Stereochemistry: N/A

Example:





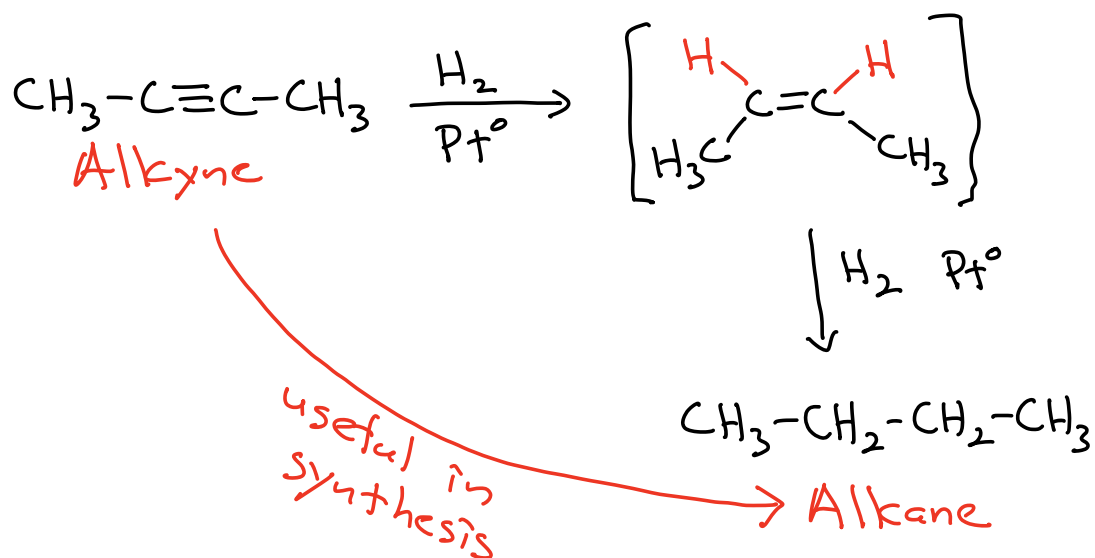
Hydration of an alkyne using  $\text{HgSO}_4, \text{H}_2\text{SO}_4, \text{H}_2\text{O}$



## Reduction of Alkynes

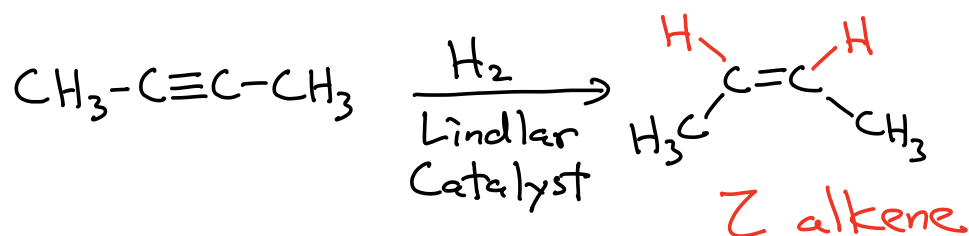
1) Hydrogenation  $H_2$   $Pt^0, Pd^0, Ni^0$

Hydrogenation does not ordinarily stop at the alkene



Lindlar Catalyst  $\rightarrow$  special catalyst that stops the hydrogenation at the cis-alkene  
 $\Downarrow$   
Found by experiment not designed  
syn addition

$Pd^0$  on  $CaCO_3$ , Pb salts  
quinoline



Time Out:

### Regular Arrows



used to show movement  
of a pair of  
electrons

### "Fish hook" Arrows



"fish hook" arrows are used  
to show movement of  
single electrons

Radical → a species with an unpaired  
electron → unstable so  
we encounter radicals  
as reaction intermediates

Time In:

2) Dissolving metal reductions of alkynes  
 $\text{Na}^\circ$  in  $\text{NH}_3$

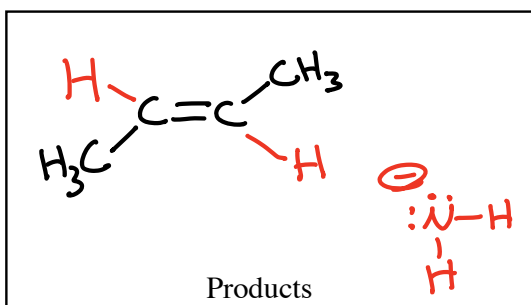
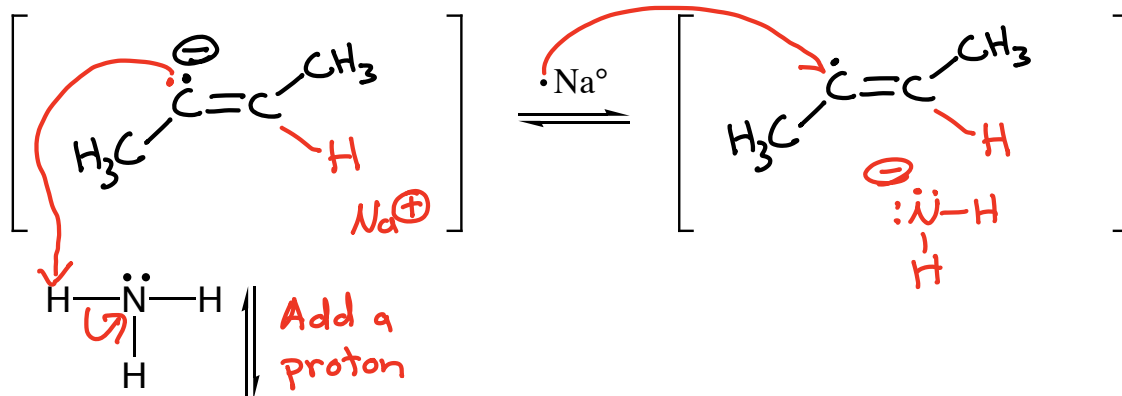
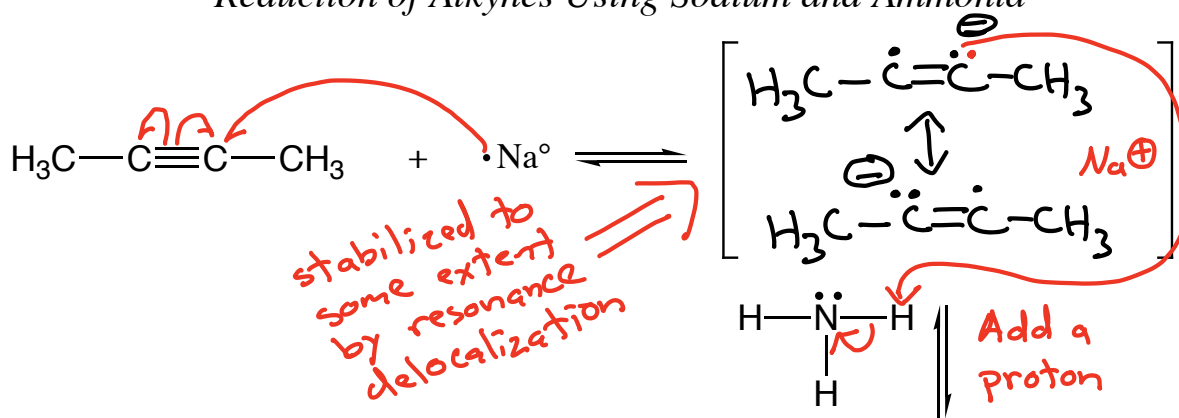
Sodium  $\rightarrow (\text{Na}^\circ)$  is a very strong one electron reducing agent because  $\text{Na}^\oplus$  has a filled octet in its valence shell

Formation of a filled octet for  $\text{Na}^\oplus$  gives a strong motive for  $\text{Na}^\circ$  to transfer its unpaired electron

$\text{NH}_3$   $\rightarrow$  used as solvent and the source of protons

$\rightarrow$  other solvents like  $\text{H}_2\text{O}$  react violently with  $\text{Na}^\circ$

## Reduction of Alkynes Using Sodium and Ammonia



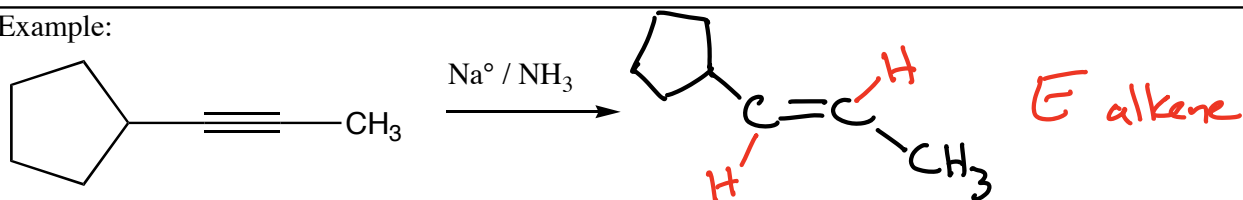
This reaction makes the more stable E alkene

Summary: Alkynes are reduced to E alkenes by  $\text{Na}^\ominus$  in  $\text{NH}_3$  via two one-electron reductions by  $\text{Na}^\ominus$ , each of which is followed by adding a proton from the  $\text{NH}_3$  solvent

Regiochemistry: N/A

Stereochemistry: Anti  $\rightarrow$  E products

Example:





Reductions of alkynes  $\rightarrow$  3 choices

