

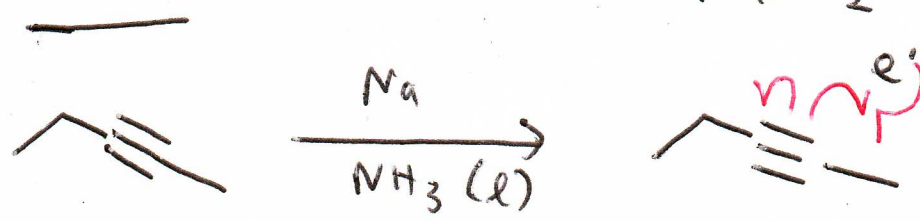
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Lindlar's catalyst

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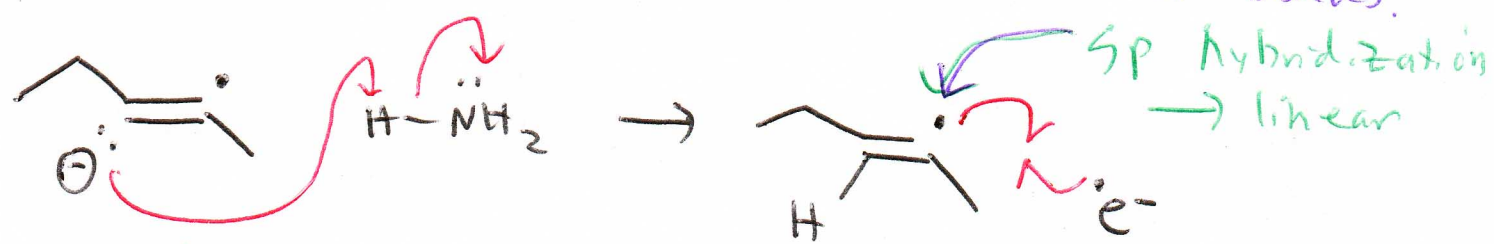


Since hydrogen is added to the same face of the π -bond, partial hydrogenation of an alkyne using a "poisoned" (deactivated) catalyst will produce a cis alkene.



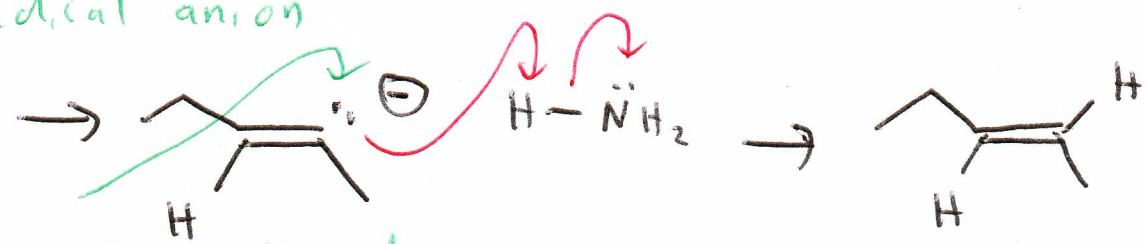
Sodium metal is a reducing agent and acts as a source of electrons.

In the first step of the mechanism, an electron is added to the anti-bond of one of the π -bonds:

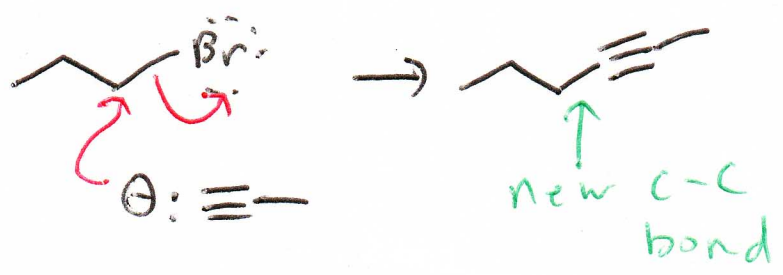


radical anion

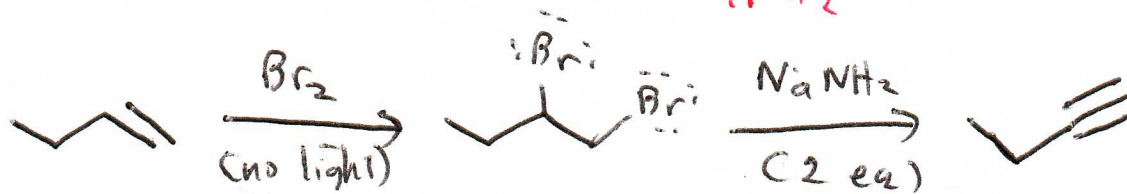
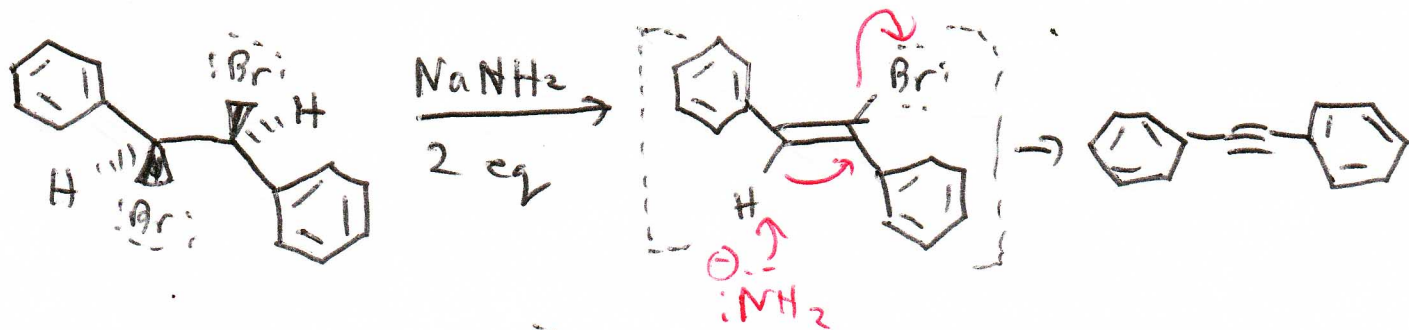
sp hybridization \rightarrow linear



now sp^2 hybridized; trans more favorable



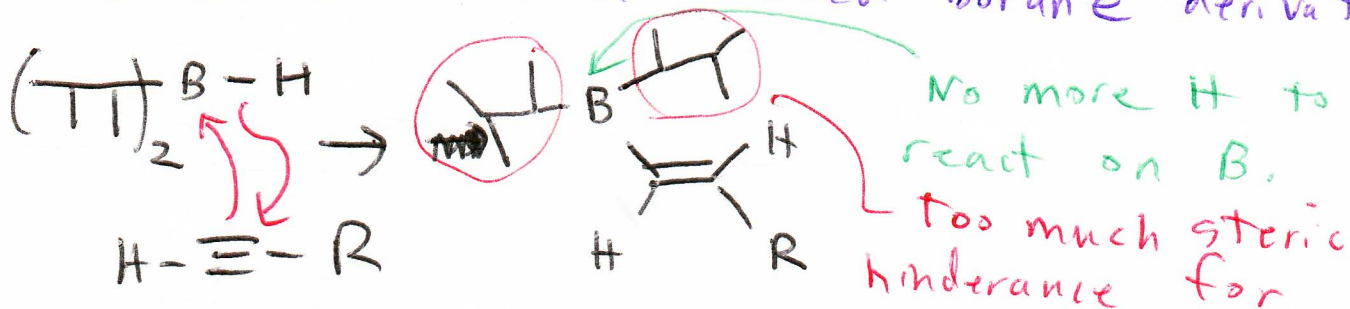
Alkylation (adding an alkyl group) is possible using 1° substrates (2° undergoes E2)



$\text{R}-\text{C}\equiv\text{C}-\text{H} \xrightarrow{\text{BH}_3 \cdot \text{TTHF}} \text{R}-\text{C}(\text{H})=\text{C}(\text{H})-\text{BH}_2$

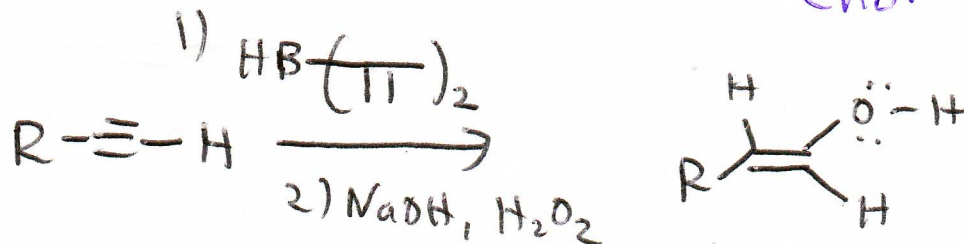
The alkene can react with a separate molecule of borane; additionally, the hydrogen on the boron already added would continue to react with other alkenes + alkynes, the result would be a messy network of carbon + boron bonds.

Solution: Use a hindered borane derivative.



another borane to attack the alkene intermediate.

enol - contains both an alcohol + an alkene.



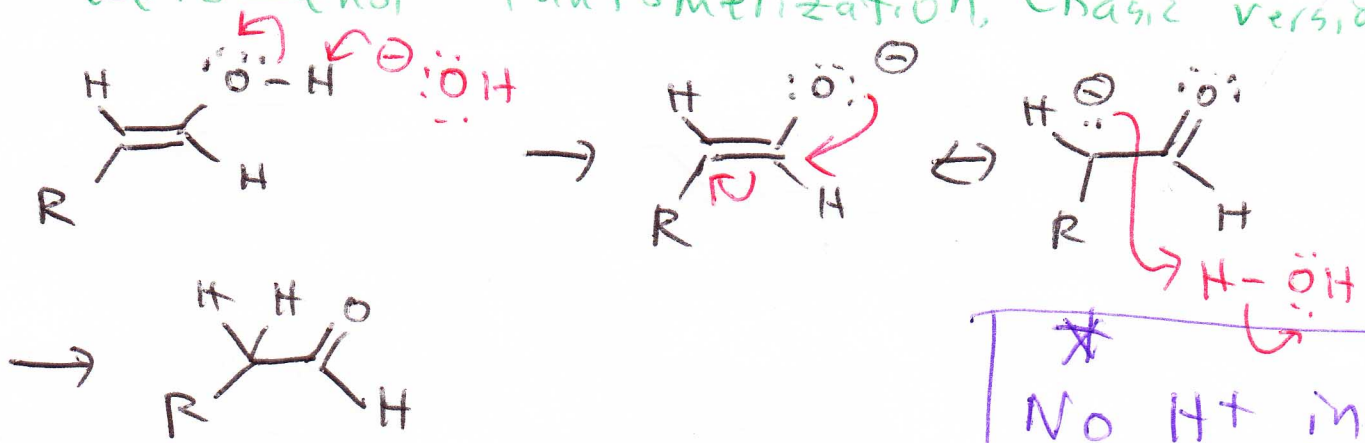
Tautomerization



Tautomerization is not resonance, it involves

the loss of two bonds (C=C, O-H) and the formation of two bonds (C-H, C=O). Overall, the process is exothermic for forming the C=O.

Keto-enol tautomerization, (basic version)



* No H⁺ in Sol'n

