

# Alkynes

A. Structure

B. Nomenclature

C. Reactions

1. Addition of HX (geminal dihalide)
2. Addition of X<sub>2</sub> (tetrahalide)
3. Hg<sup>2+</sup> Catalyzed Hydration
4. Hydroboration/Oxidation
5. Reduction
  - a. alkane
  - b. *cis*-alkene
  - c. *trans*-alkene
6. Oxidative Cleavage
7. Alkylation Reactions

D. Retrosynthetic Analysis

Suggested Reading: Chapter 8 in McMurry

Suggested Problems: 8.1, 8.3-8.14, 8.19-8.47

## ALKYNES!



Capillin  
(fungicidal activity)



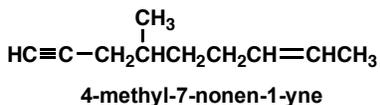
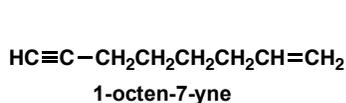
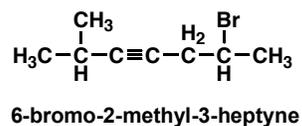
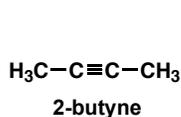
Ichthyothereol  
(convulsant used by Amazon Indians for  
poisoned arrowheads)



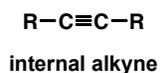
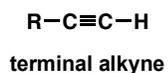
Norquen Ovastol  
(in oral contraceptives)

## Alkyne Nomenclature

1. Follow alkene rules, but use -yne as suffix.
2. If more than one triple bond is present, use -diyne, -triyne, tetrayne . . .
3. If both double and triple bonds are present,
  - use -enyne as suffix
  - Number from side with nearest multiple bond (either double or triple)
  - If a double and triple bond is equidistant, make the double bond the lower number



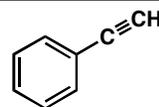
## Alkynes: Common Names and Groups



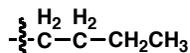
acetylene



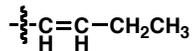
methylacetylene



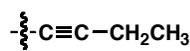
phenylacetylene



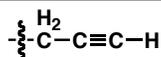
butyl



butenyl



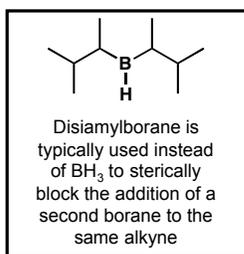
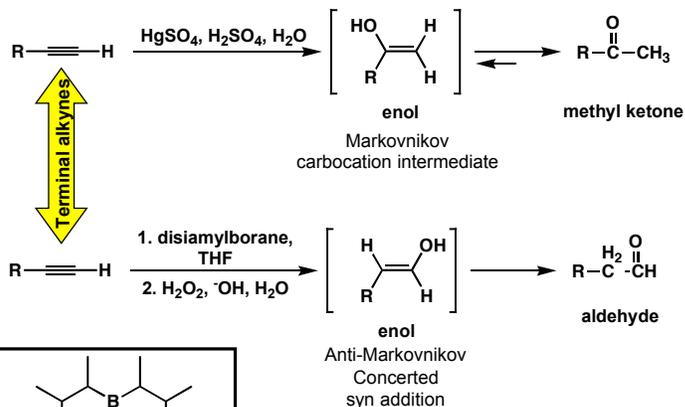
butynyl



propargyl

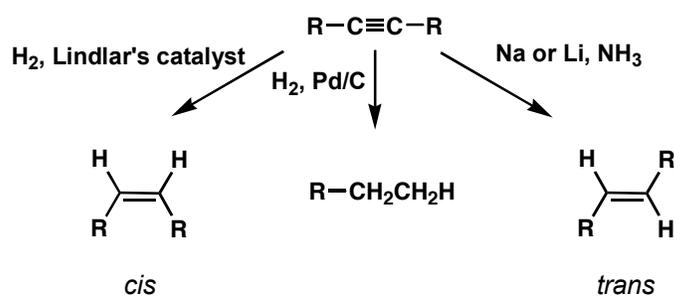


## Hydration of Terminal Alkynes



Hydration of **internal alkynes** leads to a mixture of ketones under both conditions

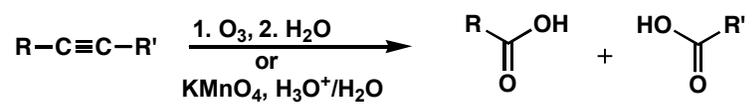
## Reduction of Alkynes



**Lindlar's catalyst**  
 Deactivated (poisoned) catalyst  
 Pd,  $\text{CaCO}_3$ , lead acetate, quinoline

## Oxidation of Alkynes

### Internal Alkyne



### Terminal Alkyne

