Alkynes

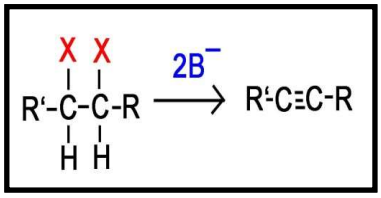
❑The general molecular formula for an acyclic (noncyclic) alkyne is C_nH_n

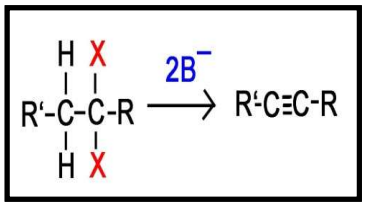
❑Each carbon is *sp* hybridized, so each has two *sp* orbitals and two *p* orbitals

❖ ***Synthesis of Alkynes by Double Elimination (E2 mechanis)***

✓from dihaloalkanes through dehydrohalogenation using alkoxide bases

✓if we apply this concept using 2 halides on vicinal or geminal carbons, the E2 reaction will take place twice resulting in the formation of 2 π bonds and thus an Alkyne





Reactions of Alkynes

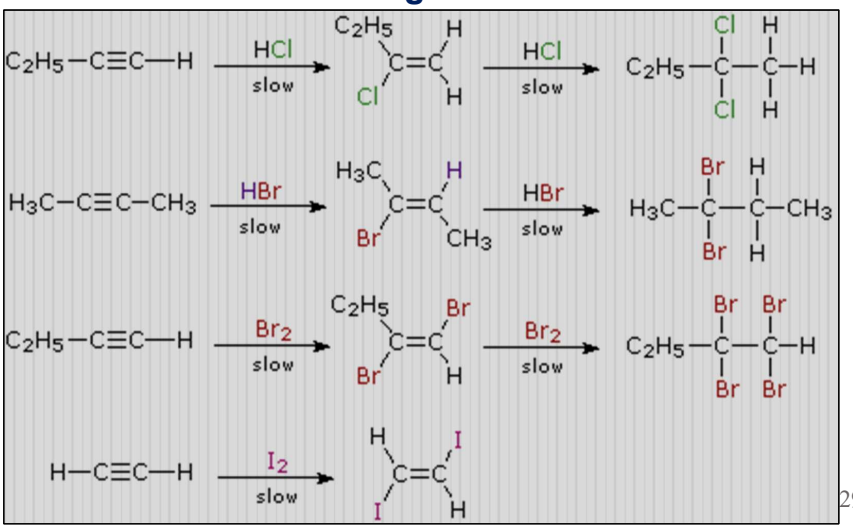
➢An alkyne is an electron rich molecule.

➢In other words, it is a nucleophile and consequently it will react with electrophiles

➢The mechanism of the additions is presumably the same as with the alkenes, the initial step involving reaction between the nucleophilic unsaturated carbon atom and the electrophilic reagent atom

1.Addition by Electrophilic Reagents

- The reactions are even more exothermic than the additions to alkenes
- It takes place and generally display Markovnikov Rule regioselectivity and anti-stereoselectivity.
- The products of these additions are themselves substituted alkenes and can therefore undergo further addition

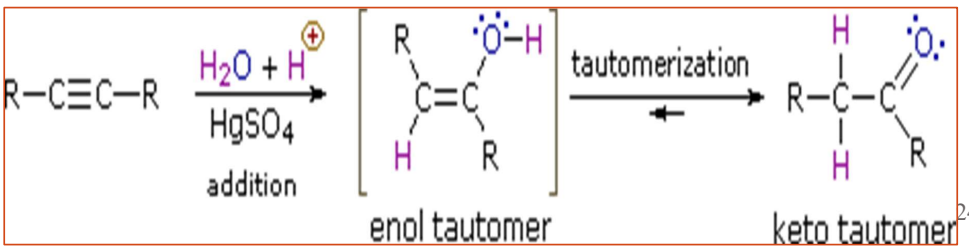


2-Hydration of Alkynes and Tautomerism

❑As with alkenes, the addition of water to alkynes requires a strong acid, usually sulfuric acid, and is facilitated by mercuric sulfate

❑However, unlike the additions to double bonds which give alcohol products, addition of water to alkynes gives ketone products

❑Due to enol-keto tautomerization, The initial product from the addition of water to an alkyne is an enol (a compound having a hydroxyl substituent attached to a double-bond), and this immediately rearranges to the more stable keto tautomer



3-Oxidations

Reactions of alkynes with oxidizing agents such as potassium permanganate and ozone usually result in cleavage of the triple-bond to give carboxylic acid products

$$RC{\equiv}CR' \;+\; [O] \longrightarrow RCO_2H \;+\; R'CO_2H$$