

	$\text{HC}\equiv\text{CH}$	$\text{CH}_3\text{C}\equiv\text{CH}$	$\text{CH}_3\text{CH}_2\text{C}\equiv\text{CH}$	$\text{CH}_3\text{C}\equiv\text{CCH}_3$
IUPAC name:	Ethyne	Propyne	1-Butyne	2-Butyne
Common name:	Acetylene			
	$\begin{array}{c} \text{Cl} \\ \\ \text{CH}_3\text{CHCHC}\equiv\text{CCH}_2\text{CHCH}_2\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$	$\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_2\text{CHCH}_2\text{CH}_3 \end{array}$		
	3-Chloro-2,7-dimethyl-4-nonyne			

Problem 4.7 Write the condensed structural formula for

- (a) 1-Pentyne (b) 3-Hexyne
(c) 3,3-Dimethyl-1-butyne (d) 1-Cyclohexyl-2-butyne

Problem 4.8 The names given for the compounds listed here are incorrect. Draw their structures and give their correct name.

- (a) 4-Pentyne (b) 2-Chloro-2-*n*-propyl-3-butyne
(c) 2,2-Dibromo-5-methyl-3-pentyne (d) 4,4-Dimethyl-2-butyne

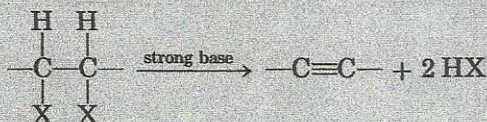
4.10 Physical Properties of Alkynes

Alkynes have physical properties that are essentially the same as those of alkenes and alkanes. They are insoluble in water but quite soluble in the usual organic solvents such as benzene, ether, and carbon tetrachloride. Like alkanes and alkenes, alkynes are less dense than water; their boiling points show the usual increase with increasing molecular weight; and their boiling points are close to those of alkanes or alkenes with the same carbon skeleton. Like alkanes or alkenes the $\text{C}_2\text{--C}_4$ alkynes are gases, the $\text{C}_5\text{--C}_{18}$ alkynes are liquids, and those with more than eighteen carbons are solids.

4.11 Preparation of Alkynes

Basically, alkynes are synthesized by two methods.

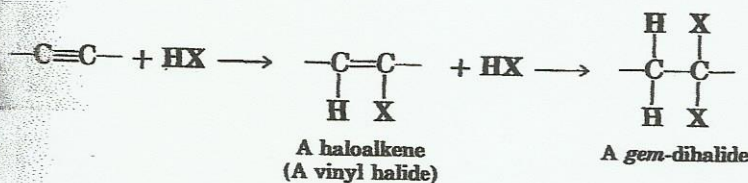
1. Dehydrohalogenation of alkyl dihalides using a strong base



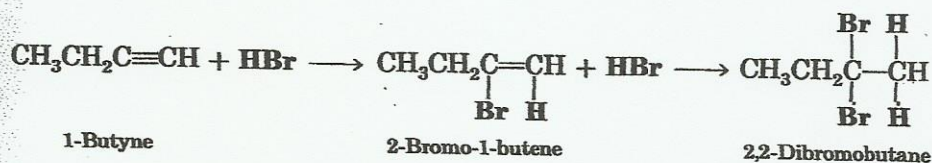
C Addition of Hydrogen Halide

The addition of hydrogen chloride, bromide, or iodide to alkynes follows Markovnikov's rule (Sec. 3.17). The reaction proceeds in two steps and may be stopped at the haloalkene (or vinyl halide) stage or, if allowed to react further with another mole of HX, to the *gem*-dihalide stage. The term *gem*-dihalide (from the Latin *geminus*, twin) signifies that both halogens are on the same carbon atom.

General equation



Specific example



Problem 4.11 Starting with acetylene, show how you would synthesize these compounds.

- (a) 1,1-Dibromoethane
(c) 2,2-Dibromobutane

- (b) 1,2-Dibromoethane
(d) 2,3-Dibromobutane

Problem 4.12 Draw the structures of the product formed from the hydration of the following compounds. Draw the enol and keto forms of each product.

- (a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}\equiv\text{CH}$ (b) $\text{CH}_3\text{C}\equiv\text{CCH}_3$ (c) 