

Alkynes

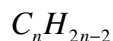
Unsaturated hydrocarbons that contain one or more triple bonds between carbon atoms are called **alkynes**. Because alkynes must have a triple bond between carbon atoms, there is no alkyne with only one carbon.

Straight-chain Alkynes

When an alkyne's carbon-carbon bonds can be connected with a single line, the alkyne is called a **straight-chain alkyne**. Some examples of straight chain alkynes are shown below:

| Name | Molecular Formula | Structural Formula | Condensed Structural Formula |
|----------|-------------------|--|------------------------------|
| Ethyne | C_2H_2 | $H-C\equiv C-H$ | $CH\equiv CH$ |
| Propyne | C_3H_4 | $\begin{array}{c} H \\ \\ H-C\equiv C-C-H \\ \\ H \end{array}$ | $CH\equiv C-CH_3$ |
| 1-Butyne | C_4H_6 | $\begin{array}{c} H & H \\ & \\ H-C\equiv C-C-C-H \\ & \\ H & H \end{array}$ | $CH\equiv C-CH_2-CH_3$ |
| 2-Butyne | C_4H_6 | $H_3C-C\equiv C-CH_3$ | $CH_3-C\equiv C-CH_3$ |

Notice that in each alkyne the number of hydrogen atoms two less than twice the number of carbon atoms. This leads us to the general formula for alkynes:



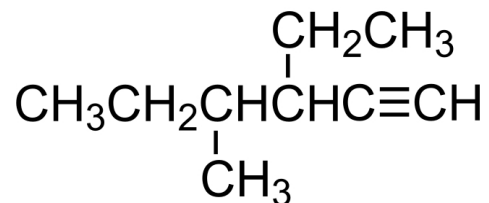
Also notice that alkynes with 4 or more carbons, such as butyne, can have the triple bond in different locations. Thus, they must be named differently in order to tell them apart.

Example 1

Determine the general formula for the alkyne that has 7 carbon atoms.

Branched Alkynes

Alkynes with branched carbon chains are called **branched alkynes**. For example:

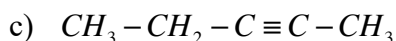
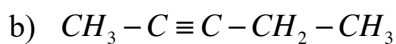


Naming Alkynes

Straight-chain and branched alkynes are named in the same way as alkenes. The only difference is that the name of the parent chain ends in *-yne* instead of *-ene*.

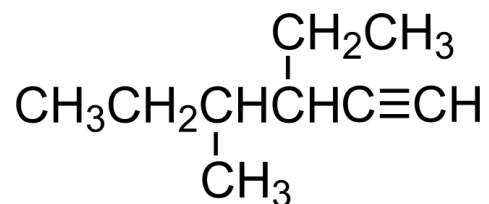
Example 2

Name each of the following alkynes:



Example 3

Name the alkyne pictured below.



Example 4

Name the alkyne pictured below.

