

# What are Alkynes?

## Worksheet

Alkynes have the general formula  $C_nH_{2n-2}$  (for one triple bond) and contain CC triple bonds. Each triple bond consists of one  $\sigma$  bond and two  $\pi$  bonds, making the electron density very high and the molecule highly reactive.

## Questions

1. General formula for alkynes?  
A)  $C_nH_{2n}$   
B)  $C_nH_{2n-2}$   
C)  $C_nH_{2n-4}$   
D)  $C_nH_{2n-6}$
2. What is the structure of the CC bond?  
A) Three single bonds  
B) One  $\sigma$  + two  $\pi$  bonds  
C) Three  $\pi$  bonds  
D) Three  $\sigma$  bonds
3. Acetylene ( $C_2H_2$ ) is most commonly used for  
A) fuel in cars  
B) welding and cutting metals  
C) making plastics  
D) industrial solvents
4.  $C_2H_2$  could be  
A) only an alkene  
B) an alkene or alkyne  
C) only an alkyne  
D) neither
5. What is the molecular formula of acetylene?
6. A hydrocarbon has the formula  $C_4H_6$ . Is it an alkene or alkyne?
7. Acetylene reacts with  $Br_2$ . Write the first addition product.
8. Define: What is the general formula for alkynes?
9. Define: How many  $\sigma$  and  $\pi$  bonds in CC?
10. Define: Why are alkynes very reactive?

## Answer Key

1. C) CH - Alkynes with one triple bond follow CH.
2. B) One + two bonds - Triple bond = 1 (head-on overlap) + 2 bonds (perpendicular overlaps).
3. B) welding and cutting metals - Acetylene burns with a very hot, bright flame (3000 C), ideal for welding and metal cutting.
4. B) an alkene or alkyne - Propene (CH) is an alkene; allene (CH) would be a different structure entirely.
5. Acetylene has 2 carbons (n=2) and one CC triple bond. CH = CH
6. For alkene (one double): CH = CH (no) For alkyne (one triple): CH = CH (yes) It is a butyne (alkyne).
7. CH + Br CHBr (1,2-dibromoethene) The first bond breaks; one bond remains.
8. CH for alkynes with one triple bond.
9. One bond and two bonds, totaling three bonds.
10. The high electron density of the triple bond makes bonds very accessible to nucleophilic attack.

### Bounlu

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