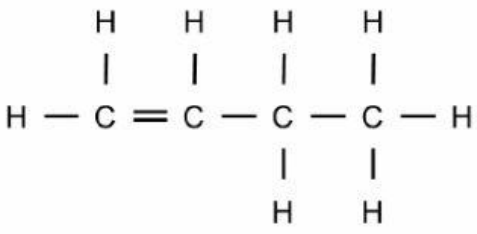
2 ALKENES C_nH_{2n}

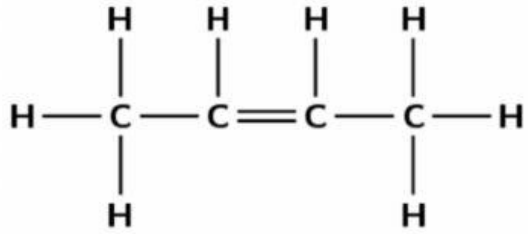
- - ene
- double bond between 2 carbons
- unsaturated
- Non-polar (doesn't dissolve in water)
- London forces
- More reactive than alkanes

The second HOMOLOGOUS SERIES that we will study are the ALKENES. As summarised above, their general formula is C_nH_{2n} and their name ends in –ene. The distinguishing feature of alkenes is that they have at least one **double bond** between carbons in the molecule, meaning that they are UNsaturated.

The prefix of alkenes is the same as for alkanes (one carbon is meth- etc), but the name ends in –ene and it is necessary to show WHICH carbon the double bond is attached to. Start numbering the carbons from the end of the chain that is CLOSEST to the double bond, as shown in the example below:

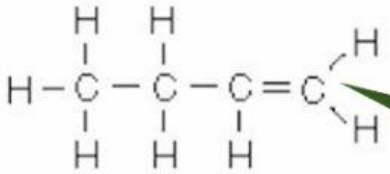


But-1-ene



But-2-ene

Note that you cannot have But-3-ene because then the carbon would be on the first carbon starting from the other end of the chain, so this would again be But-1-ene (see the diagram below). Always start counting carbons from the end closest to the double bond! (For the same reason ethene does not need a number because there is only one position for the double bond….think about that when you do the exercise below.)



but-1-ene

Note that there are still 4 bonds on every C, but not as many H's are attached now!

The molecular formula for the molecule above is C_4H_8, according to the general formula C_nH_{2n}.

Fill in the molecular formulae for the compounds below and draw their structures into your books:

Eg 1) ethene

2) prop-1-ene

3) pent-1-ene

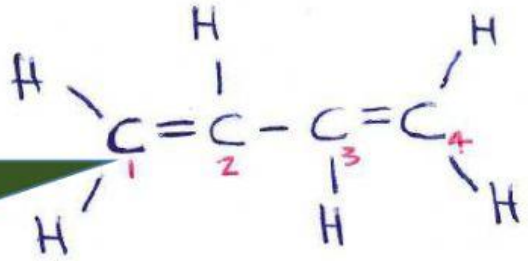
4) pent-2-ene

5) hept-3-ene

6) hex-2-ene

Sometimes an Alkene has TWO or more double bonds! In this case it is necessary to list ALL of the carbons that have a double bond and use the prefix di, tri, tetra, etc before the –ene in the name. See the examples below:

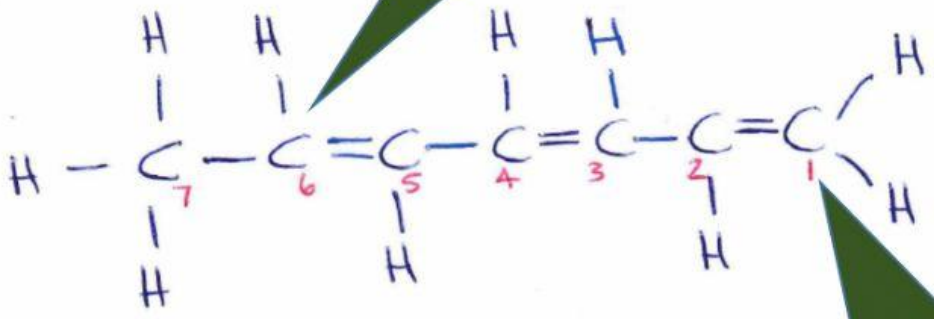
1) Buta-1,3-diene



Note that the numbers you use in the name are the LOWER carbon number that the double bond starts on.
Use - and , as shown in the name to separate letters and numbers.

2) **Hepta-1,3,5-triene**

Make sure every carbon only has FOUR bonds – so change the number of hydrogens attached to each carbon.



Note that you start numbering the carbons from end closest to a double bond. The numbers are shown in red to help you understand, but you don't usually write them in on your structure.

3 ALKYNES C_nH_{2n-2}

- - yne
- Triple bond between 2 carbon
- Unsaturated
- Non-polar
- London forces
- More reactive than –anes and –enes

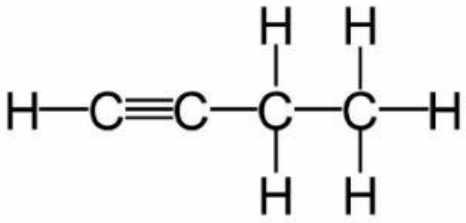
The third homologous series of organic compounds is the alkynes. They are similar to the alkenes but in this case there is at least one **triple bond** between carbons in the molecule, meaning that they are also UNsaturated.

The prefix of alkynes is the same as for alkanes (one carbon is meth- etc), but the name ends in –yne and it is necessary to show WHICH carbon the triple bond is attached to, in the same way we did for alkenes. (Start numbering the carbons from the end of the chain that is CLOSEST to the triple bond.)

e.g. ethyne:

Note that there are still 4 bonds on every C!

but-1-yne:



Use the general formula for alkynes, C_nH_{2n-2}, to help you fill in the molecular formula for each of these molecules above.

Ethyne

But-1-yne

Fill in the molecular formulae for the compounds below and draw their structures into your books:

1) pent-1-yne

2) prop-1-yne

3) but-2-yne

4) hex-2-yne