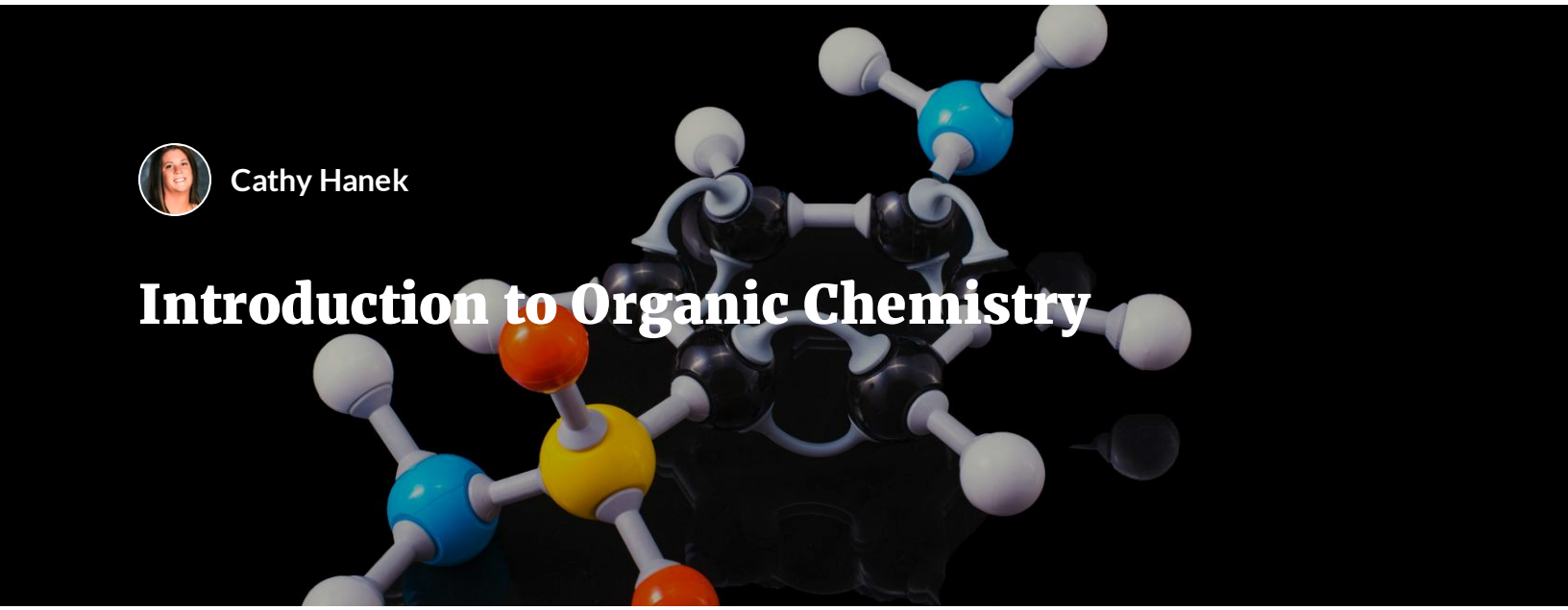

Cathy Hanek

Introduction to Organic Chemistry

Organic Chemistry Introduction- Naming alkanes, alkenes, and alkynes

IUPAC NOMENCLATURE

- Root Words/ Prefixes
- Counting Carbons

NAMING ALKANES, ALKENES AND ALKYNES

- Naming Alkanes
- Naming Alkenes
- Naming Alkynes

Root Words/ Prefixes

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Prefix	Number of Carbon Atoms	Prefix	Number of Carbon Atoms
meth-	1	undec-	11
eth-	2	dodec-	12
prop-	3	tridec-	13
but-	4	tetradec-	14
pent-	5	pentadec-	15
hex-	6	hexadec-	16
hept-	7	heptadec-	17
oct-	8	octadec-	18
non-	9	nonadec-	19
dec-	10	eicos-	20

You will notice that most of these are similar to prefixes when naming covalent compounds.

Count the number of carbons in the **longest** chain of your structure to determine the correct prefix to use.

Lesson 2 of 5

Counting Carbons

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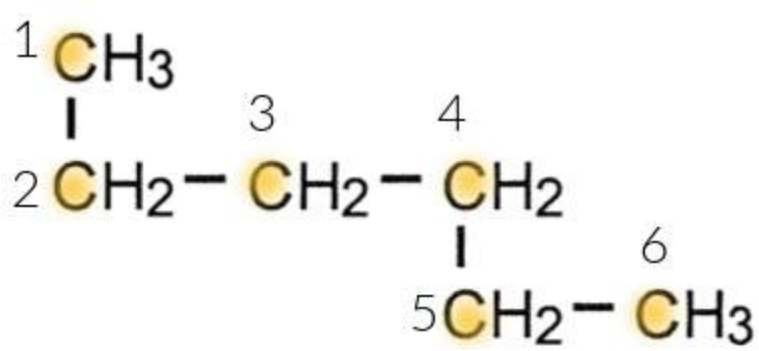
Counting Carbons in the Longest Chain

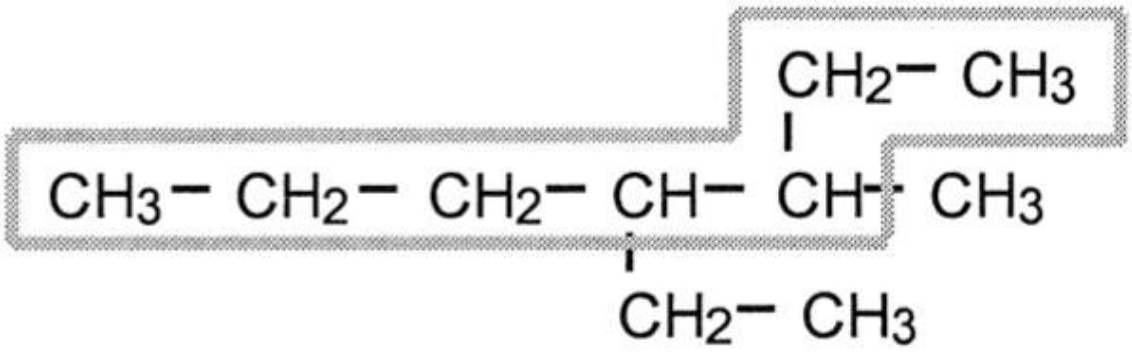
When deciding what prefix you will need to use it is important to count the longest continuous carbon chain in the structure.



6 carbons- prefix is -hex.

Counting Carbons

In the structure to the left, there are 6 carbons in a continuous chain- they are highlighted. The prefix for this compound would be -hex.



This chain is 7 carbons long. The prefix for 7 is -hept

The structure shows the longest Carbon Chain in the highlighted box. Should you choose to go to any of the carbons not highlighted they chain would be shorter. We need the longest chain all the time.

Naming Alkanes

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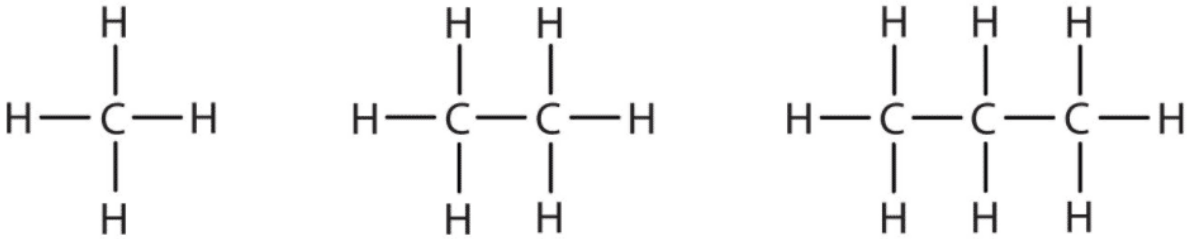
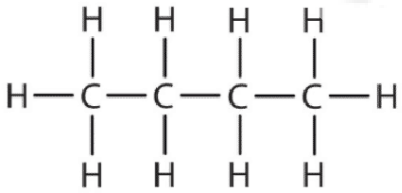


In each structure, there are only single bonds (represented by one single line). A structure containing only single bonds is an alkane.

1



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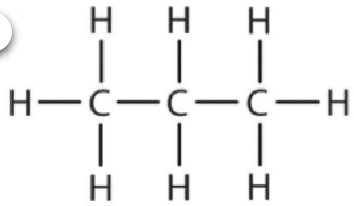

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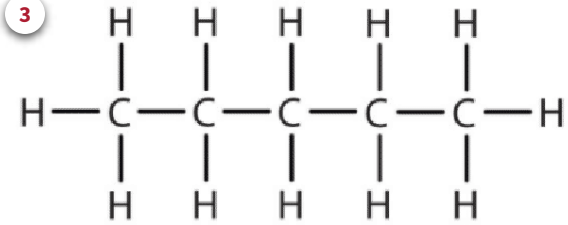
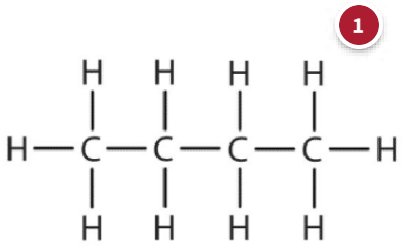
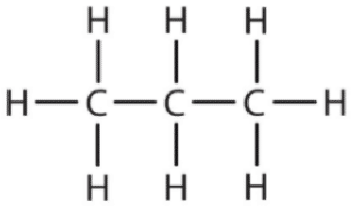
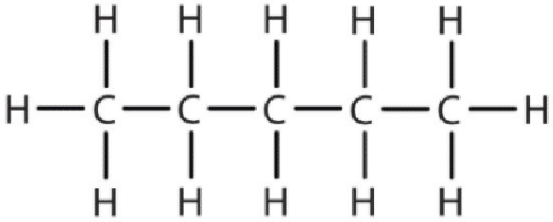


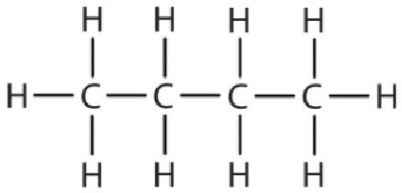


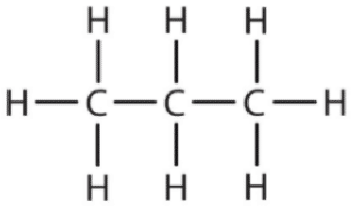


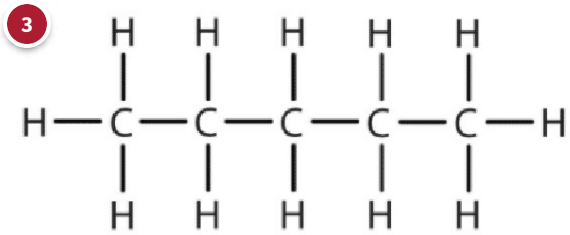


4 Carbon Chain

This structure contains 4 single-bonded carbons. A 4 carbon chain uses the prefix -*but.* The correct name would be butane.

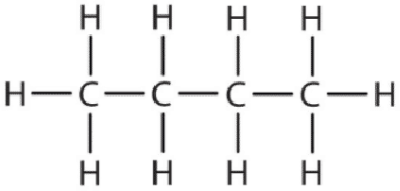


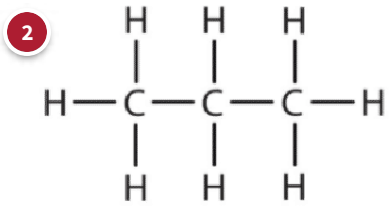


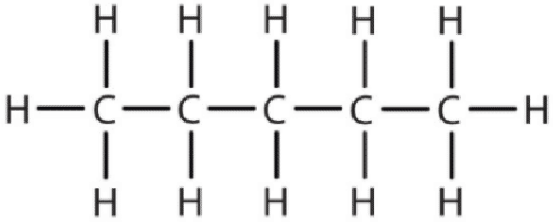


5 Carbon Chain

This structure contains 5 single-bonded carbons. A 5carbon chain uses the prefix *-pent.* The correct name would be pentane.







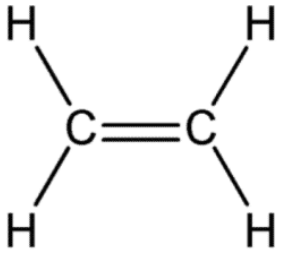
3 Carbon Chain

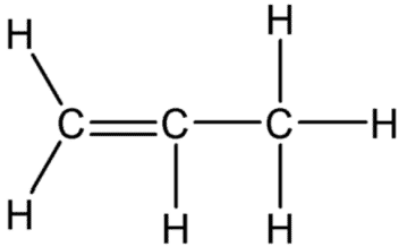
This structure contains 3 single-bonded carbons. A 3 carbon chain uses the prefix *-prop.* The correct name would be propane.

Lesson 4 of 5

Naming Alkenes

Cathy Hanek





An alkene will contain a double bond- represented by a double line somewhere in the structure. As you can see these both have a double bond.

Naming rules

1. The parent chain must contain the double bond.

2. The parent chain must be numbered so that the double bond has the lowest possible carbon.

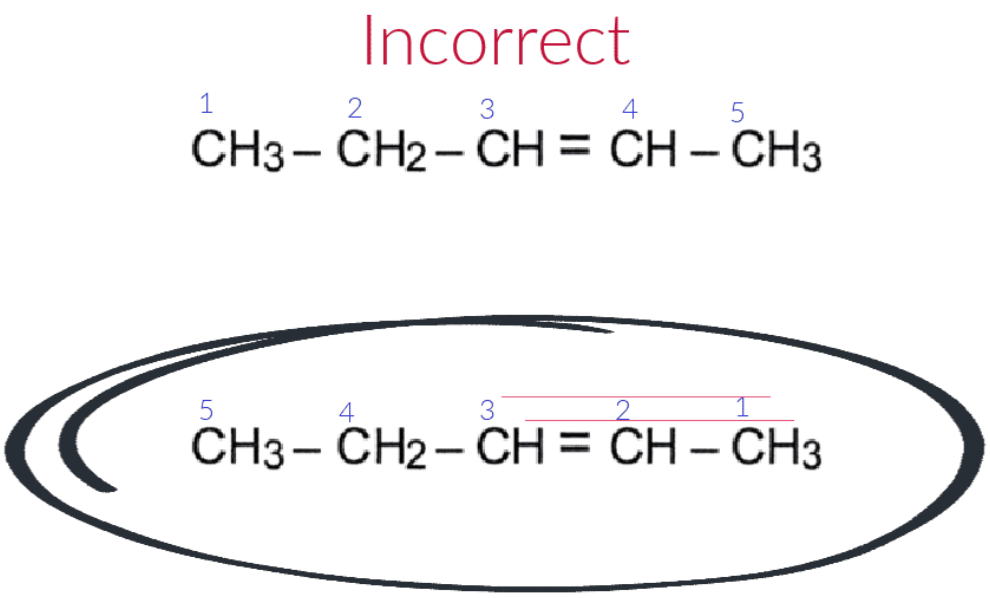
3. The name must contain the number of the carbon where the double bond begins.

Naming an alkene

Using the figure shown we will go through the process of correctly naming this structure.

Step 1

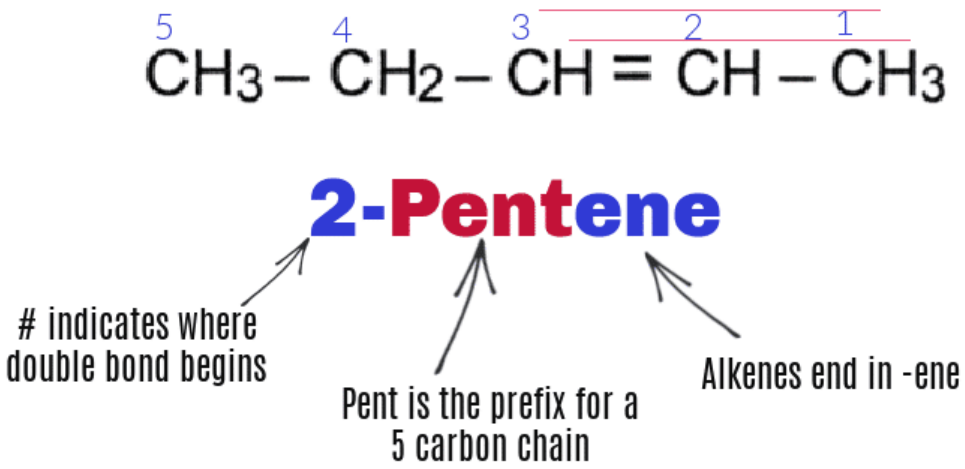
Correct Counting Direction



Step one is to count the longest chain of carbons containing the double bond. You may count from the left to right or from right to left. Choose the counting process where the double bond begins at the lowest numbered carbon. By counting from left to right, the double bond begins at carbon 3 (top figure). By counting from right to left the double bond begins at carbon 2 (bottom figure).

Step 2

Naming the Alkene



When a counting direction has been indicated it is time to name this structure. Proper naming requires indicating where the double bond begins. Also, alkenes have the ending of -ene... not -ane as alkanes did.

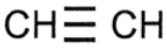
Summary

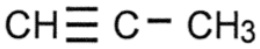
Alkenes must always be numbered so that the double bond is at the lowest possible carbon. Change the ending to -ene.

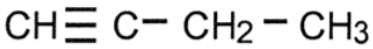
Lesson 5 of 5

Naming Alkynes

Cathy Hanek







Alkynes contain a triple bond in the main carbon chain.

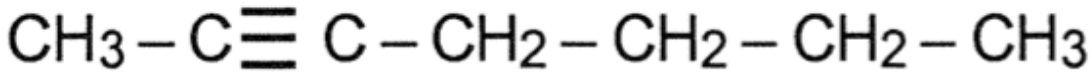
Naming Rules

1. The parent chain must contain the triple bond.

2. The parent chain must be numbered so that the triple bond has the lowest possible carbon.

3. The name must contain the number of the carbon where the triple bond begins.

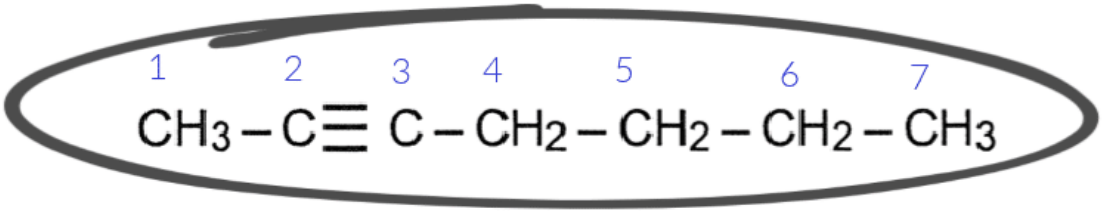
Naming an Alkyne



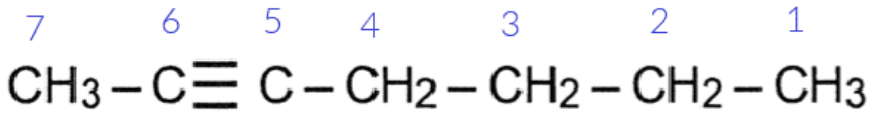
Using the figure shown we will go through the process of correctly naming this structure.

Step 1

Counting Carbons



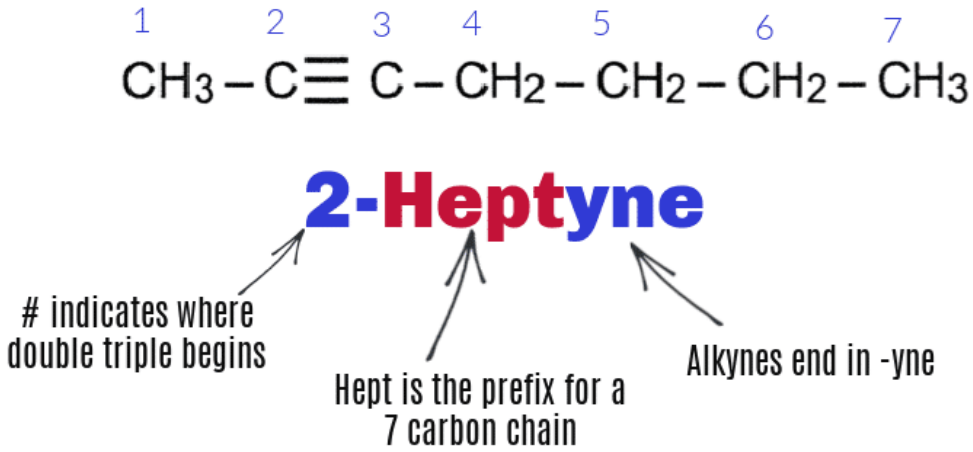
Incorrect



Step one is to count the longest chain of carbons containing the triple bond. You may count from the left or the right to the left. Choose the counting process where the triple bond begins at the lowest numbered carbon. By counting from left to right, the double bond begins at carbon 2 (top figure). By counting from right to left the double bond begins at carbon 5 (bottom figure).

Step 2

Naming the Alkyne



When a counting direction has been indicated it is time to name this structure. Proper naming requires indicating where the triple bond begins, just as you did when naming alkenes. Also, alkynes have the ending of -yne... not -ane as alkanes did, or -ene as in alkenes.

Summary

Alkynes must always be numbered so that the triple bond is at the lowest possible carbon.

Change the ending to -yne.