

Organic Chemistry

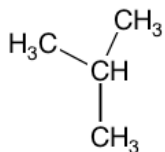
Organic chemistry is the chemistry of carbon.

The simplest carbon molecules are compounds of just carbon and hydrogen, hydrocarbons. We name the compounds based on the length of the longest carbon chain. We then add prefixes and suffixes to describe the types of bonds and any add-ons the molecule has.

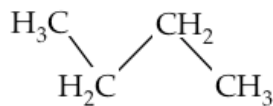
When the molecule has just single bonds we use the -ane suffix.

Name	Formula	Isomers
Methane	CH ₄	1
Ethane	C ₂ H ₆	1
Propane	C ₃ H ₈	1
Butane	C ₄ H ₁₀	2
Pentane	C ₅ H ₁₂	3
Hexane	C ₆ H ₁₄	5
Heptane	C ₇ H ₁₆	9
Octane	C ₈ H ₁₈	18
Nonane	C ₉ H ₂₀	35
Decane	C ₁₀ H ₂₂	75

Isomers are compounds that have the same formula but different bonding.



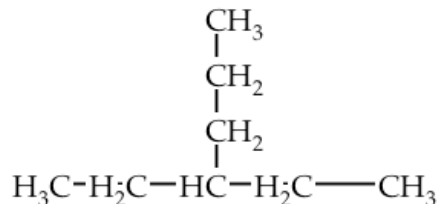
isobutane



n-butane

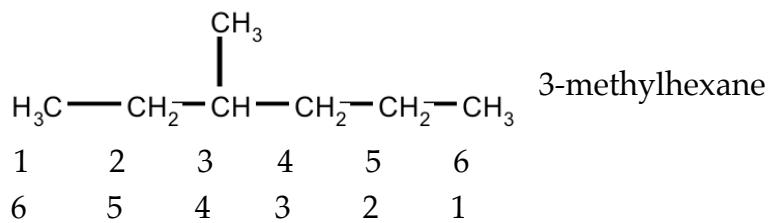
Naming Alkanes

Hydrocarbons are always named based on the longest carbon chain.



When an alkane is a substituent group they are named using the -yl ending instead of the -ane ending. So, -CH₃ would be a methyl group.

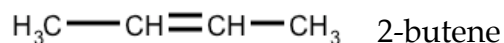
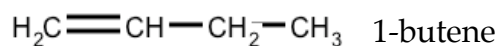
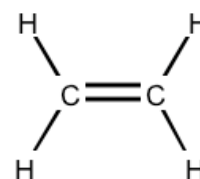
The substituent groups are named by numbering the carbons on the longest chain so that the first branching gets the lowest number possible. The substituents are listed alphabetically without regard to the number prefixes that might be used.



Alkenes and Alkynes

When a hydrocarbon has a double bond we replace the -ane ending with -ene.

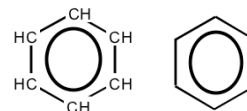
When the hydrocarbon has more than three carbon the position of the double bond must be specified with a number.



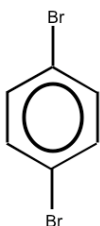
Hydrocarbons with triple bonds are named basically the same, we replace the -ane ending with -yne.

Aromatic Hydrocarbons

Cyclic hydrocarbons with delocalized bonds are called aromatic hydrocarbons the most common of these is benzene.

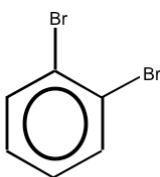


Naming aromatic compounds is very similar to other hydrocarbons.



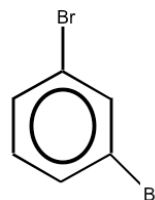
1,2-dibromobenzene

ortho-dibromobenzene



1,3-dibromobenzene

meta-dibromobenzene



1,4-dibromobenzene

para-dibromobenzene

Table 22.5 The Common Functional Groups

<i>Class</i>	<i>Functional Group</i>	<i>General Formula*</i>	<i>Example</i>
Halohydrocarbons	—X (F,Cl,Br,I)	R—X	CH ₃ I Iodomethane (methyl iodide)
Alcohols	—OH	R—OH	CH ₃ OH Methanol (methyl alcohol)
Ethers	—O—	R—O—R'	CH ₃ OCH ₃ Dimethyl ether
Aldehydes			CH ₂ O Methanal (formaldehyde)
Ketones			CH ₃ COCH ₃ Propanone (dimethyl ketone or acetone)
Carboxylic acids			CH ₃ COOH Ethanoic acid (acetic acid)
Esters			CH ₃ COOCH ₂ CH ₃ Ethyl acetate
Amines	—NH ₂	R—NH ₂	CH ₃ NH ₂ Aminomethane (methylamine)

*R and R' represent hydrocarbon fragments.