

Intro to Naming Organic Compounds

Organic compounds are those containing chains or rings of carbon with hydrogen bonded to the chain to complete the octet for carbon.

Hydrocarbons

The most basic type of organic molecule contains only carbon and hydrogen in a straight chain. These molecules are called *hydrocarbons*. Hydrocarbons are named with a two-part naming system: A prefix indicates how many carbons are in the chain, and a suffix indicates what kinds of bonds are formed between the carbons.

Prefixes

meth-	1
eth-	2
prop-	3
but-	4
pent-	5
hex-	6
hept-	7
oct-	8
non-	9
dec-	10

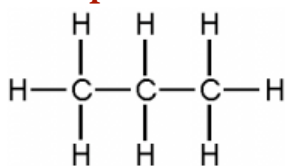
Suffixes

single bonds	-ane
double bonds	-ene
triple bonds	-yne

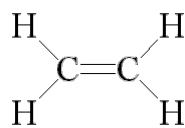
Generic formula/bond type relationship:

single	C_nH_{2n+2}
double	C_nH_{2n}
triple	C_nH_{2n-2}

Examples:



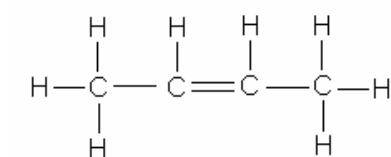
Propane – C_3H_8



Ethene – C_2H_4



Ethyne – C_2H_2



Butene – C_4H_8

- There are 3 carbons so prefix is prop-
- All the carbon-carbon bonds are single so suffix is -ane
- There are 2 carbons so prefix is eth-
- The carbons have a double bond so suffix is -ene
- There are 2 carbons so prefix is eth-
- The carbons have a triple bond so suffix is -yne
- The presence of just one double bond means the suffix is -ene – they do not all have to be double bonded together (in fact, usually they are not)

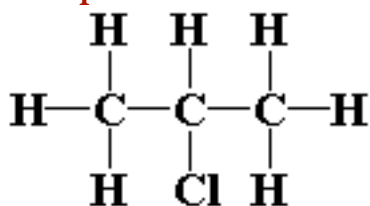
Functional Groups

Hydrogens on the chain can be replaced with different elements or groups of elements. These replacements are called functional groups. When functional groups are present, the basic hydrocarbon name for the chain is modified to indicate the type and location of the substitution.

Halogen Substitution

A halogen replaces a hydrogen on the carbon chain. To name these, first determine the name of the basic hydrocarbon as if the halogen was not present. Then put the root of the halogen name as a prefix to the hydrocarbon name. If there is more than one of the halogen present, use the normal number prefixes to indicate how many. If there are more than 2 carbons in the chain, the carbon chain is numbered, and the number of the carbon the halogen is on precedes the name (*where* it is is as important as *what* it is).

Example:



2-chloropropane

- If the chlorine was not there we would call this propane
- The root of chlorine is chloro-, so that goes in front of the hydrocarbon name: chloropropane
- If we number the carbons from one end to the other, the chlorine is on the second carbon so we put a 2 in front of the name

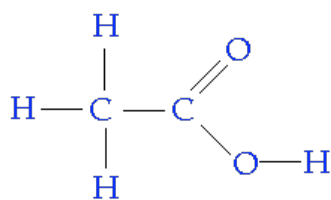
Alcohols (hydroxyl group)

An alcohol is an organic compound where a hydrogen has been replaced by the hydroxyl group -OH . (Note, this is not the hydroxide ion...there is no net charge and it is not a base.) These are named by determining the name of the original hydrocarbon, then removing the final "e" in the name and replacing it with -ol . If there are more than 2 carbons, again the chain can be numbered and the number of the carbon it is on can precede the name. We won't worry about what happens if there's more than one group for now!

Carboxylic acids (carboxyl group)

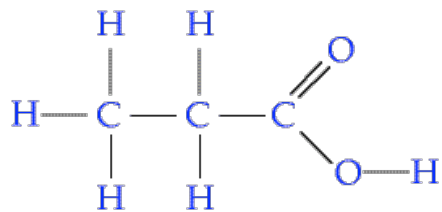
Most acids found in nature are organic or carboxylic acids. All organic acids have a carbon chain which terminates in the carboxyl group, -COOH or $\text{-}\overset{\text{O}}{\parallel}\text{C}-\text{OH}$. These are named by determining the name of the original hydrocarbon, then removing the final "e" and replacing it with -oic acid .

Example:



- If there was only hydrogen on the carbons we would call this ethane
- We remove the "e" at the end of the name and replace it with -oic acid

ethanoic acid – $\text{C}_2\text{H}_5\text{OH}$



○ Original compound was propane

propanoic acid – C₃H₇OH