

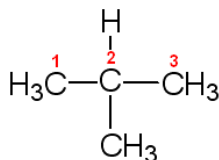
Nomenclature of Organic Compounds

General rules

Nomenclature of Alkanes

Straight-Chain Alkanes			Alkyl Groups		
English name	Czech name		English name	Czech name	
methane	methan	CH ₄	methyl	methyl	CH ₃ -
ethane	ethan	CH ₃ CH ₃	ethyl	ethyl	CH ₃ -CH ₂ -
propane	propan	CH ₃ CH ₂ CH ₃	propyl	propyl	CH ₃ -CH ₂ -CH ₂ -
butane	butan	CH ₃ (CH ₂) ₂ CH ₃	isopropyl	isopropyl	(CH ₃) ₂ CH-
pentane	pentan	CH ₃ (CH ₂) ₃ CH ₃	butyl	butyl	CH ₃ -CH ₂ -CH ₂ -CH ₂ -
hexane	hexan	CH ₃ (CH ₂) ₄ CH ₃			
heptane	heptan	CH ₃ (CH ₂) ₅ CH ₃			
octane	oktan	CH ₃ (CH ₂) ₆ CH ₃			

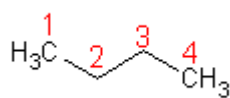
With alkanes containing a *branched chain*, such as



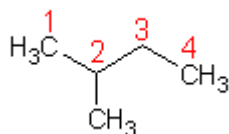
2-methylpropane

the name is more complex. A branched-chain alkane such as 2-methylpropane can be considered to be derived from a *straight-chain* alkane by replacing one or more hydrogen atoms by alkyl groups. The name consists of two parts:

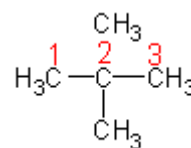
- a suffix that identifies the parent straight-chain alkane. To find the suffix count the number of carbon atoms in the longest continuous chain. For a three-carbon chain, the suffix is propane; for a four-carbon chain it is butane, and so on.
- a prefix that identifies the branching alkyl group and indicates by a number the carbon atom where branching occurs. In 2-methylpropane, referred to above, the methyl group is located at the second carbon from the end of the chain:



pentane



2-methylbutane



2,2-dimethylpropane

Notice that

- if the same alkyl group is at two branches, the prefix **di-** is used (2,2-dimethylpropane). If there were three methyl branches, we would write trimethyl, and so on.
- the number in the name is made as small as possible. Thus, we refer to 2-methylbutane, numbering the chain from the left, rather than from the right.

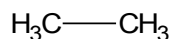
[branched chain](#) – rozvětvený řetězec

[straight chain](#) – přímý (rovný) řetězec

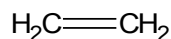
Nomenclature of Alkenes

The systematic names of alkenes are derived from those of the corresponding alkanes with the same number of carbon atoms per molecule. There are two modifications.

- the ending **-ane** is replaced by **-ene**

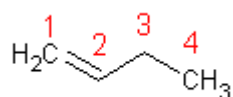


ethane

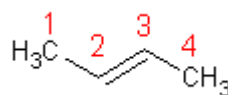


ethene

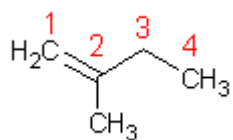
- where necessary, a number is used to designate the *double-bonded carbon*; the number is made as small as possible.



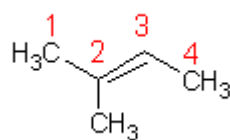
but-1-ene



but-2-ene

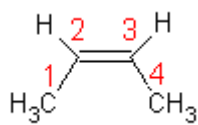


2-methylbut-1-ene

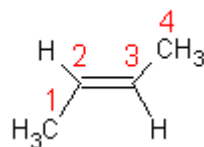


2-methylbut-2-ene

You may be surprised to learn that there are actually two different 2-butenes, differing from each other in molecular geometry.



cis-but-2-ene

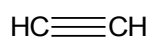


trans-but-2-ene

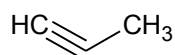
[double-bonded carbon](#) – uhlík se dvěma vazbami

Nomenclature of Alkynes

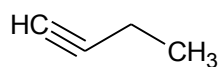
The IUPAC names of alkynes are derived from those of the corresponding alkenes by replacing the suffix **–ene** with **–yne**.



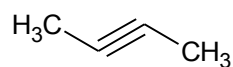
ethyne



propyne



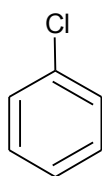
but-1-yne



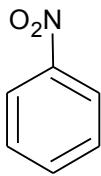
but-2-yne

Derivatives of Benzene

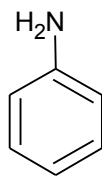
Monosubstituted benzenes are ordinarily named as derivatives of benzene.



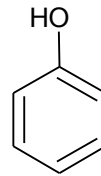
chlorobenzene



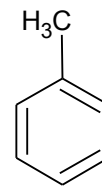
nitrobenzene



aminobenzene
(aniline)



hydroxybenzene
(phenol)



methylbenzene
(toluene)

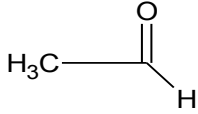
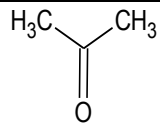
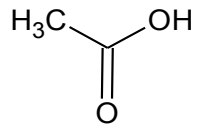
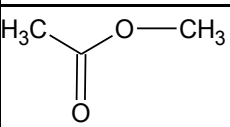
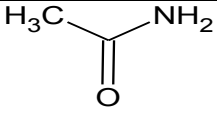
The last three compounds listed are always referred to by their common names, shown in red.

common – běžný (triviální)

referred – uváděný

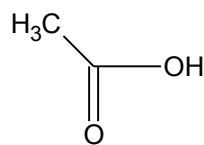
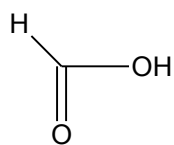
Functional Groups

Many organic molecules can be considered to be derived from hydrocarbons by substituting a functional group for a hydrogen atom. The functional group can be a nonmetal atom or small group of atoms that is bonded to carbon.

Common Functional Groups			
Czech name	Class	Example	Name
halogeny	halides	C_2H_5Cl	chloroethane
alkoholy	alcohols	C_2H_5OH	ethanol
ethery	ethers	CH_3-O-CH_3	dimethyl ether
aldehydy	aldehydes		ethanal
ketony	ketones		propanone
karboxylové kyseliny	carboxylic acids		ethanoic acid
estery	esters		methyl methanoate
aminy	amines	CH_3NH_2	aminomethane
amidy	amides		ethanamide

Carboxylic Acids

The systematic names of these compounds are obtained by adding the suffix –oic to the stem of the name of the corresponding alkanes. In practice, these names are seldom used for the first two members of the series, which are commonly referred to as formic acid and acetic acid.



methanoic acid
(formic acid)

ethanoic acid
(acetic acid)

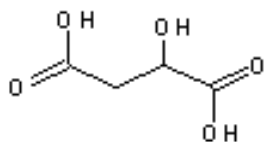
A wide variety of carboxylic acids occur in nature, giving a sour or tart taste to foods.

Some naturally Occurring Organic Acids		
Name		Source
acetic acid	$\begin{array}{c} \text{H}_3\text{C} \\ \\ \text{C} - \text{OH} \\ \\ \text{O} \end{array}$	vinegar
citric acid	$\begin{array}{c} \text{OH} \\ \\ \text{HO} - \text{C} - \text{CH}_2 - \text{C} - \text{CH}_2 - \text{C} - \text{OH} \\ // \quad \quad // \\ \text{O} \quad \text{OH} \quad \text{O} \end{array}$	citrus fruits
malic acid	$\begin{array}{c} \text{OH} \quad \text{OH} \\ \quad \\ \text{O} = \text{C} - \text{CH}_2 - \text{CH} - \text{C} = \text{O} \\ \quad \quad \\ \quad \quad \text{OH} \end{array}$	apples, grape juice
oxalic acid	HOOC-COOH	tomatoes, spinach

Self-tests

Write the name

Write the correct names of these compounds:



malic acid



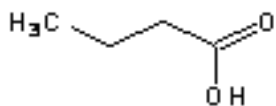
but-2-ene



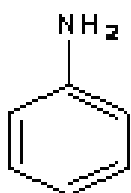
pentane



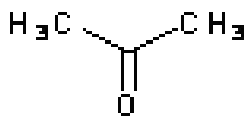
pent-1, 3-diene



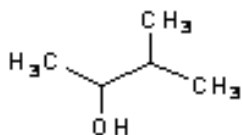
butanoic acid



aminobenzene



propanone

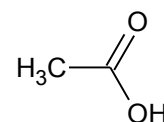


3-methylbutan-2-ol

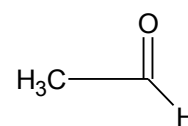
Draw the formula

Draw the right formulas of these compounds

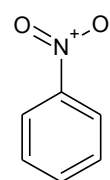
ethanoic acid



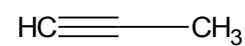
ethanal



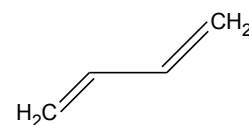
nitrobenzene



propyne



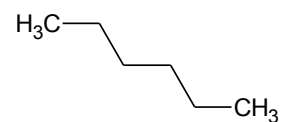
trans-but-2-ene



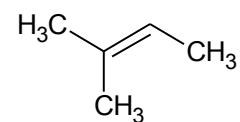
pent-2,3-diene



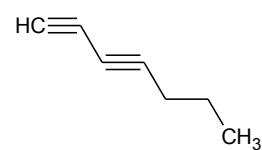
hexane



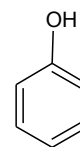
2-methylbut-2-ene



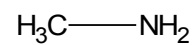
hept-1,3-diyne



phenol



aminomethane



but-2-ene-1-ol

