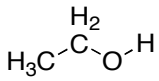
Alcohols

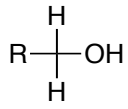
Alcohols are compounds that have a hydroxyl group (-OH) bonded to a carbon atom (but not a carbonyl C=O). Alcohols can be thought of as organic derivatives of water in which one of the hydrogens is replaced by an organic group: H-O-H versus R-O-H. Alcohols occur widely in nature and have many industrial and pharmaceutical applications. Ethanol is one of the simplest alcohols, finding use as a fuel additive, an industrial solvent, and key ingredient in many beverages (beer, wine etc).



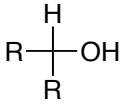
Ethanol

Naming Alcohols

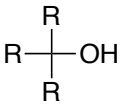
Alcohols are classified as primary (1°), secondary (2°), or tertiary (3°), depending on the number of organic groups bonded to the hydroxyl bearing carbon.



primary alcohol (1°)



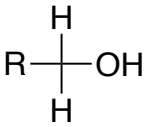
secondary alcohol (2°)



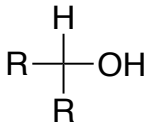
tertiary alcohol (3°)

Alcohol and Ether Nomenclature

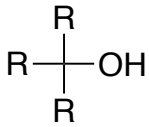
Alcohol	Ether
R-OH	R-O-R



Primary



Secondary



Tertiary

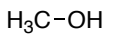
1º 2º 3º

Alcohols are classified as primary (1°), secondary (2°), or tertiary (3°), depending on the number of organic groups bonded to the hydroxyl bearing carbon.

Simple alcohols are named using the IUPAC system as derivatives of the parent alkane, using the suffix *ol*:

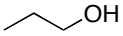
1) Select the longest carbon chain containing the alcohol, and derive the parent name by replacing the -*e* ending of the corresponding alkane with –*ol*.
2) Number the alkane chain, beginning at the end closest to the hydroxyl group.
3) Number the substituents according to their position on the chain.

For example:



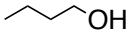
methanol
or methyl alcohol
or wood alcohol

ethanol
or ethyl alcohol
or grain alcohol



n-propanol
or 1-propanol

2-propanol
or isopropanol

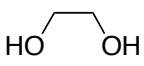


butanol
1-butanol
n-butanol (n means normal or straight chain)

If there is more than 1 OH group:

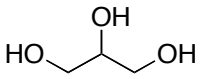
2 OH's	diol (glycol)
3 OH's	triol
4 OH's	tetraol
5 OH's	pentaol

Some simple and widely occurring alcohols have common names that are accepted by IUPAC. For example:



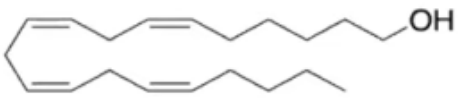
ethylene glycol
or 1,2-ethanediol
(antifreeze)

the freezing point is lower if mixed with water

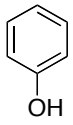


glycerol or glycerine
or 1,2,3-propanetriol
or propane-1,2,3-triol

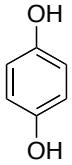
Glycerol is a precursor to fats (fatty acid esters in cell membranes)



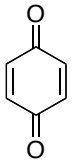
Eicosan-6,9,12,15-tetraen-1-ol



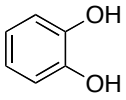
phenol



4-hydroxyphenol
or p-hydroxyphenol
or hydroquinone

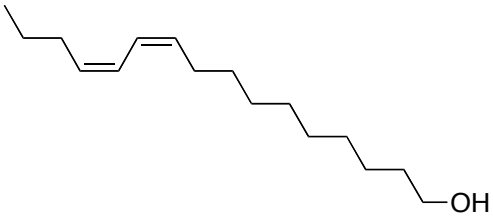


quinone



catechol

A more difficult example is the name of the sex pheromone from the silkworm moth shown below.



hexadeca-10Z,12Z-dien-1-ol

The longest chain is 16 carbons long, which is a hexadecane. The *-e* ending is dropped, and replaced with *–ol* to become hexadecan-1-ol. There are two cis double bonds present at positions 10 and 12. This information allows the compound to be named a 10,12-diene. Putting the overall name together then gives hexadeca-10Z, 12Z-dien-1-ol.

This molecule was discovered by Adolf Butenandt in 1959.
The word pheromone comes from Greek pherein (to carry) and horman (excitement)