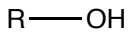
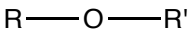
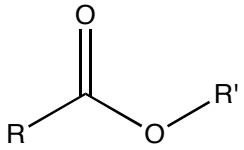
Alcohols and Ethers



alcohol



ether



ester

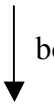
Alcohol Nomenclature

Rules:

Find the longest chain with the OH and
Number from end to give –OH the lowest number.
Drop "e" of alkane, and add "ol"

Examples:

CH_3OH - methanol (wood alcohol, or methyl alcohol)
Toxic

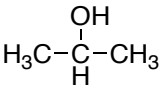


body

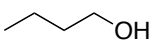
formaldehyde

CH_3CH_2OH - ethanol (grain alcohol or ethyl alcohol)

$CH_3CH_2CH_2OH$ - propanol (propan-1-ol, n-propanol, or n-propyl alcohol)

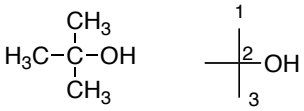


- 2-propanol (iso-propyl alcohol), rubbing alcohol

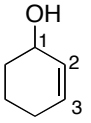


1-butanol
butan-1-ol
n-butanol

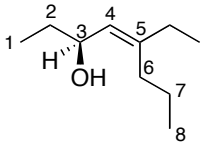
2-butanol



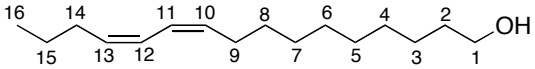
tert-butyl alcohol
2-methyl-2-propanol
2-methyl propan-2-ol



2-cyclohexen-1-ol or
cyclohex-2-en-1-ol

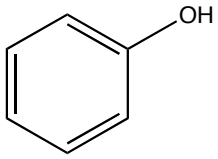


3-(s)-5-ethyl-4(Z)-octen-3-ol

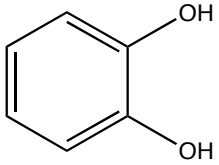


16C = hexadecane
10,12 = Diene
1 = ol

Hexadeca-10(Z)-12(Z)-dien-1-ol



phenol

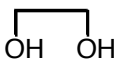


catechol

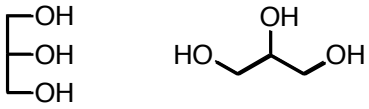
Polyols:

Diol: 2 OH groups
Triol: 3 OH
Tetraol: 4 OH, etc.

Polyols from nature:



Ethylene glycol (antifreezer)
1,2-dihydroxyethane
ethane-1,2-diol



glycerol
glycerine
1,2,3-trihydroxypropane
12,3-propanetriol

Physical Properties of Alcohols

R-O-H - can donate and accept hydrogen bonds
- polar, good solvents

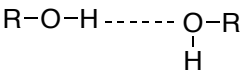
CH_3-OH
CH_3CH_2OH
$CH_3CH_2CH_2OH$

→ Miscible in H_2O + organic solvent

- longer alcohols are generally not miscible with water.

e.g. $CH_3CH_2CH_2CH_2OH$ soluble in H_2O, but not fully miscible in all amounts

- less dense than water $\rho < 1.0$
- good solvents for polar + non-polar compounds



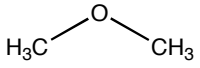
H-bonding results in high B.P and M.P.

	CH_3OH	CH_3CH_3
MW	32	30
BP	+ 65°C	- 88°C

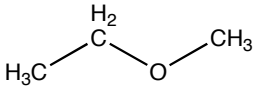
Nomenclature of Ethers

- common name "alkyl" groups on oxygen, then add "ether"

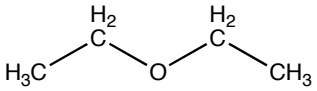
Examples:

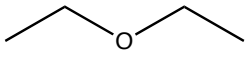


dimethyl ether
methyl ether

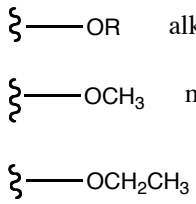


ethyl methyl ether





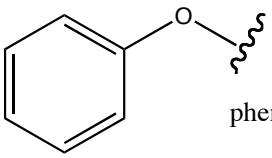
diethyl ether, ethyl ether, ether



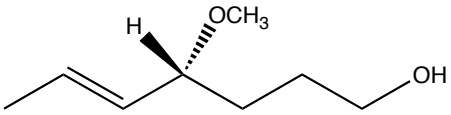
alkoxy group

methoxy group

ethoxy group



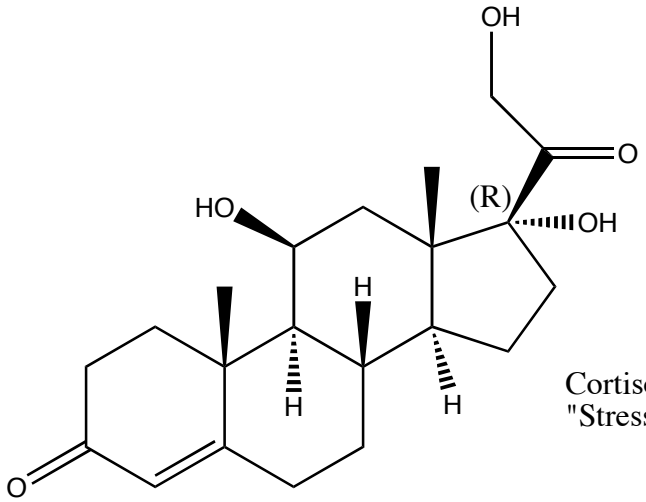
phenoxy group



Note: alcohols have higher naming priority

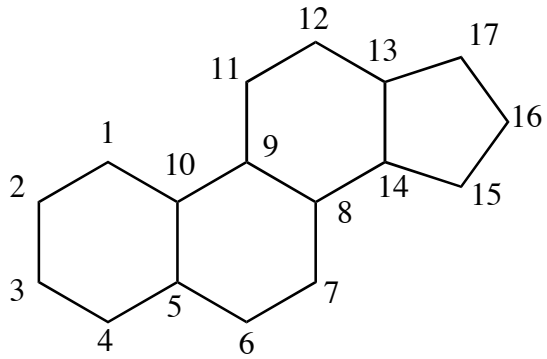
4R-methoxyhept-5E-en-1-ol

4R-methoxy-(E)-hept-5-en-1-ol



Cortisol
"Stress hormone"

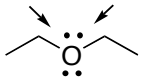
Numbering carbons on steroids:



Properties of Ethers

- non-polar (relatively), generally unreactive, especially to base

    - have dipole-dipole interactions,



ethyl ether

- H-bond acceptors but NOT H-bond donors,

- not miscible with water, good solvents for organic compounds.

- low B.P. and M.P. than alcohols but higher than hydrocarbons.

    eg. $CH_3CH_2OCH_2CH_3$ BP = 35 ^oC