L06 Chemistry Applied Organics II

English with 2 Little Pigs

www.with2littlepigs.com

Marina & The Diamonds - Mowgli’s Road (2010)

Hydrocarbon Prefixes

Name the hydrocarbon prefixes:

1 Carbon	C	Meth
2 Carbons	C-C	Eth
3 Carbons	C-C-C	Prop
4 Carbons	C-C-C-C	But
5 Carbons	C-C-C-C-C	Pent
6 Carbons	C-C-C-C-C-C	Hex
7 Carbons	C-C-C-C-C-C-C	Hept
8 Carbons	C-C-C-C-C-C-C-C	Oct
9 Carbons	C-C-C-C-C-C-C-C-C	Non
10 Carbons	C-C-C-C-C-C-C-C-C-C	Dec

But

Dec

Eth

Hept

Hex

Meth

Non

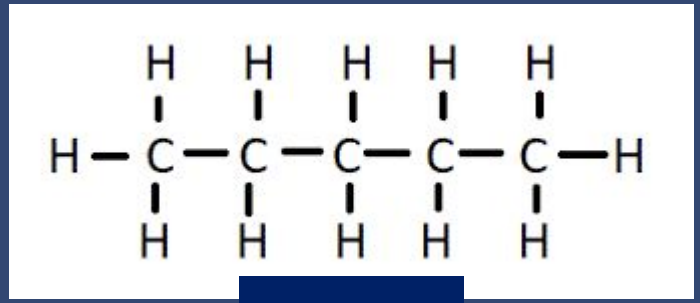
Oct

Pent

Prop

Alkanes

Name the Alkanes:



Pentane

1 Carbon	CH_4	Methane
2 Carbons	C_2H_6	Ethane
3 Carbons	C_3H_8	Propane
4 Carbons	C_4H_{10}	Butane
5 Carbons	C_5H_{12}	Pentane
6 Carbons	C_6H_{14}	Hexane
7 Carbons	C_7H_{16}	Heptane
8 Carbons	C_8H_{18}	Octane
9 Carbons	C_9H_{20}	Nonane
10 Carbons	$C_{10}H_{22}$	Decane

Butane

Decane

Ethane

Heptane

Hexane

Methane

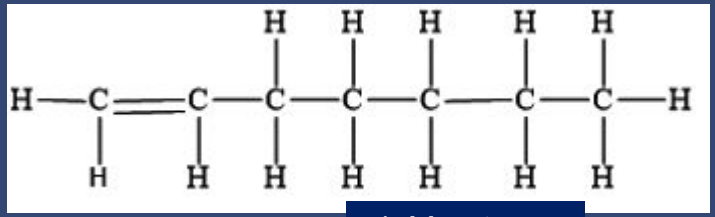
Nonane

Octane

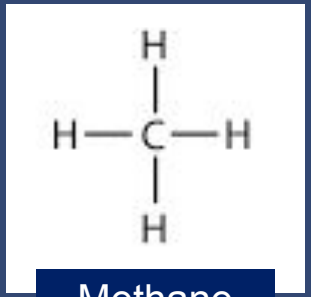
Pentane

Propane

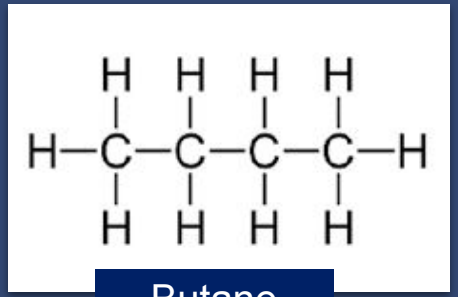
See if you can name these:



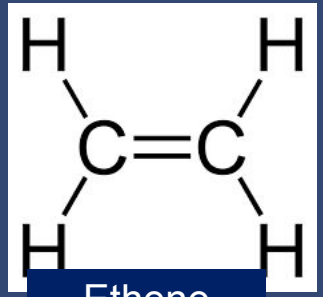
1-Heptene



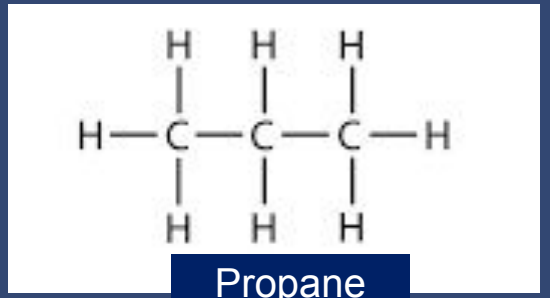
Methane



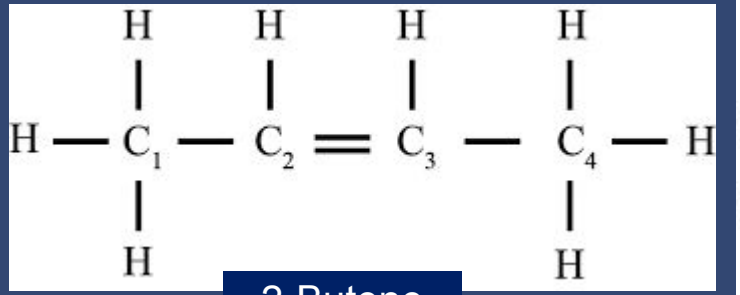
Butane



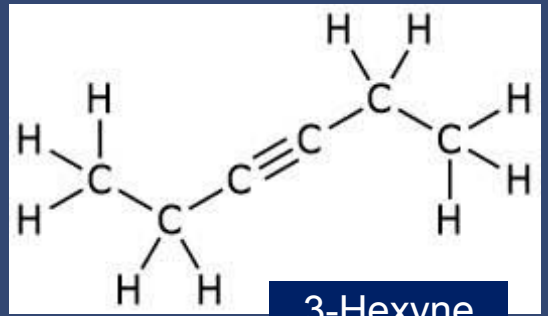
Ethene



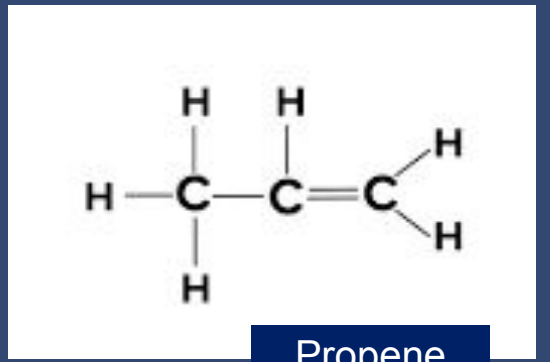
Propane



2-Butene



3-Hexyne

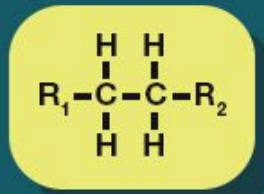


Propene

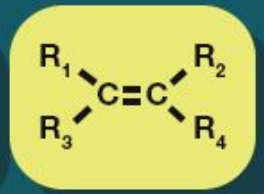
Topics & Concepts

1. Aldehydes
2. Ketones
3. Alcohols
4. Ethers

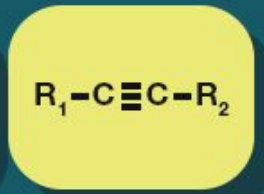
Functional Groups



ALKANE ✔



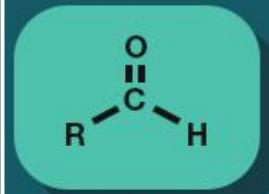
ALKENE ✔



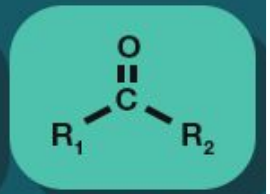
ALKYNE ✔

ARENE

HALOALKANE

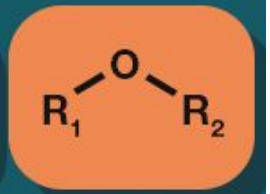


ALDEHYDE



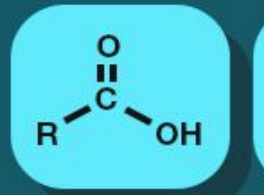
KETONE

ALCOHOL

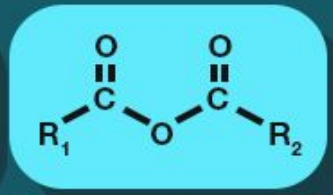


ETHER

AMINE



CARBOXYLIC ACID



ACID ANHYDRIDE

ESTER

AMIDE

ACYL HALIDE

HYDROCARBONS ✔

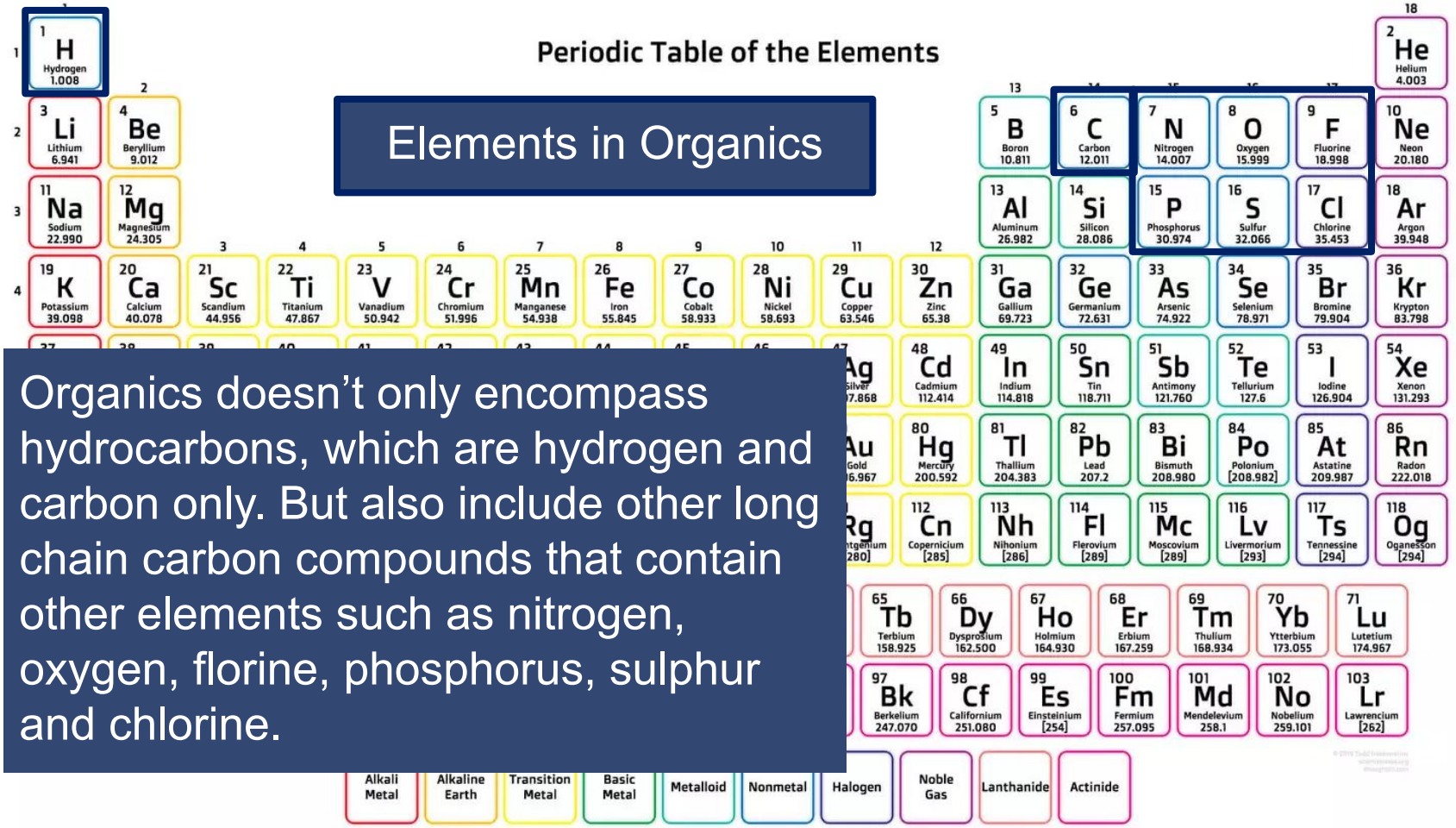
AROMATICS

OTHER HETEROATOMICS

SIMPLE OXYGEN HETEROATOMICS

CARBONYL COMPOUNDS

CARBOXYLIC ACIDS AND DERIVATIVES

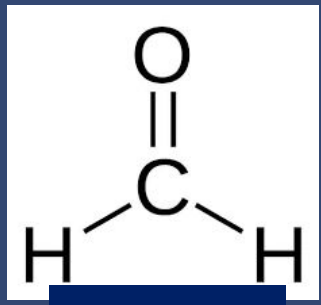

Periodic Table of the Elements
Elements in Organics
Organics doesn't only encompass hydrocarbons, which are hydrogen and carbon only. But also include other long chain carbon compounds that contain other elements such as nitrogen, oxygen, florine, phosphorus, sulphur and chlorine.
Alkali Metal
Alkaline Earth
Transition Metal
Basic Metal
Metalloid
Nonmetal
Halogen
Noble Gas
Lanthanide
Actinide

1. Aldehydes

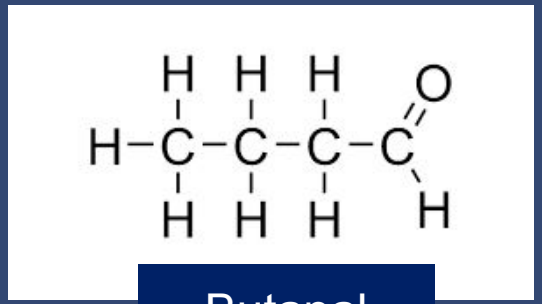
Aldehydes

The first 10 aldehydes are:

1 Methanal	CH_2	O	… (Formaldehy
2 Ethanal	C_2H_4O		
3 Propanal	C_3H_6O		
4 Butanal	C_4H_8O		
5 Pentanal	$C_5H_{10}O$		
6 Hexanal	$C_6H_{12}O$		
7 Heptanal	$C_7H_{14}O$		
8 Octanal	$C_8H_{16}O$		
9 Nonanal	$C_9H_{18}O$		
10 Decanal	$C_{10}H_{20}O$		



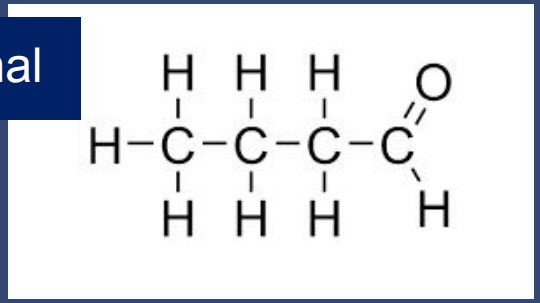
Methanal



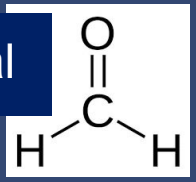
Butanal

Aldehydes

Butanal



Methanal



Name the Aldehydes:

1 Carbon	CH_2O	Methanal … (Formaldehyde)
2 Carbons	C_2H_4O	Ethanal
3 Carbons	C_3H_6O	Propanal
4 Carbons	C_4H_8O	Butanal
5 Carbons	$C_5H_{10}O$	Pentanal
6 Carbons	$C_6H_{12}O$	Hexanal
7 Carbons	$C_7H_{14}O$	Heptanal
8 Carbons	$C_8H_{16}O$	Octanal
9 Carbons	$C_9H_{18}O$	Nonanal
10 Carbons	$C_{10}H_{20}O$	Decanal

Butanal

Decanal

Ethanal

Heptanal

Hexanal

Methanal

Nonanal

Octanal

Pentanal

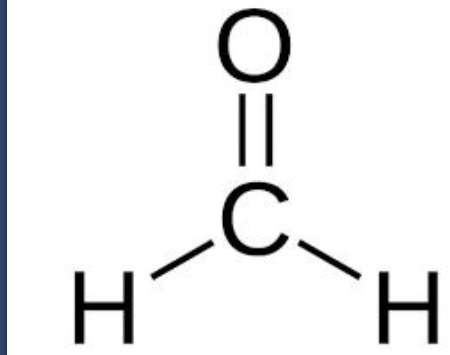
Propanal

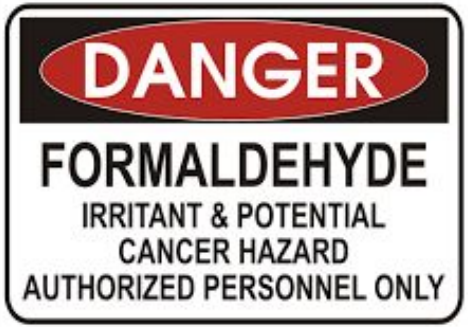
Aldehydes

Aldehydes are found in nature in small amounts in such things as the plants that produce the spices cinnamon and vanilla, these are very small doses.

However in industry we create large amounts, especially methanal, otherwise known as formaldehyde. This chemical is then used to make glues and resins that are in turn used to make furniture for the home and car interiors.

The “new car smell” and the “new home smell” is formaldehyde … and it is very very toxic.

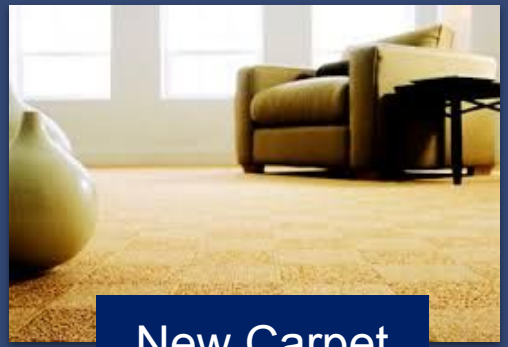




Formaldehyde

Household Products Containing Formaldehyde

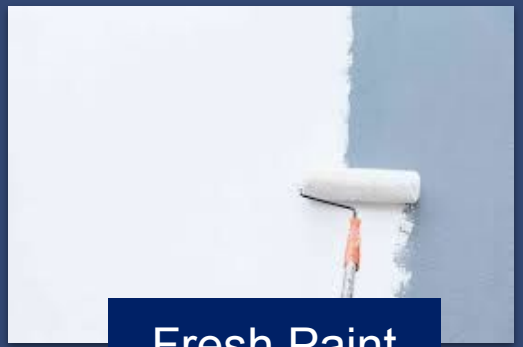
New Homes



New Carpet

New Furniture

New Cars



Fresh Paint

Causes Illness

Formaldehyde is extremely toxic

Short term exposures to high levels of formaldehyde can be fatal at levels as low as 100 parts per million (.01%) in air.

3 to 5 parts per million in air causes eye tearing and is intolerable to some people.

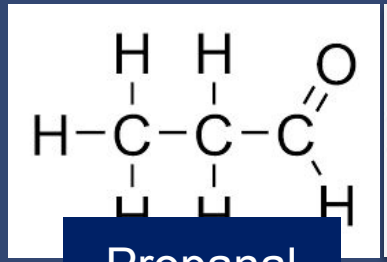
Some people have developed asthma or bronchitis following and single exposure to high levels of formaldehyde in the air from an accidental spill.

Some people are very sensitive to formaldehyde, whereas others have no reaction to the same level of exposure.

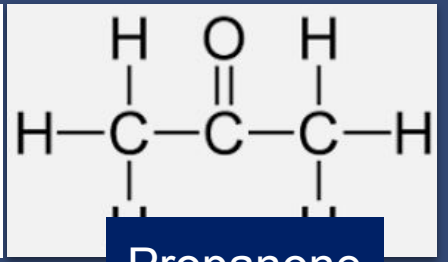
2. Ketones

Ketones

The ketones are:

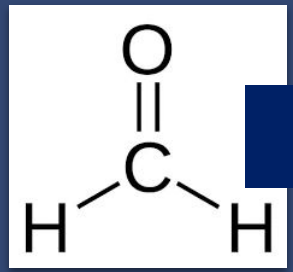


Propanal

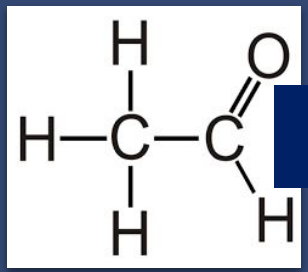


Propanone

1 Methanone doesn't exist, it is methanal
2 Ethanone doesn't exist, it is ethanal



Same as methanal



Same as ethanal

3 Propanone C_3H_6O (Acetone)
4 Butanone C_4H_8O
5 Pentanone $C_5H_{10}O$

Ketones

Name the Ketones:

1 Carbon	CH_2O	Does Not Exist, it is Methanal
2 Carbons	C_2H_4O	Does Not Exist, it is Ethanal
3 Carbons	C_3H_6O	Propanone
4 Carbons	C_4H_8O	Butanone
5 Carbons	$C_5H_{10}O$	Pentanone
6 Carbons	$C_6H_{12}O$	Hexanone
7 Carbons	$C_7H_{14}O$	Heptanone
8 Carbons	$C_8H_{16}O$	Octanone
9 Carbons	$C_9H_{18}O$	Nonanone
10 Carbons	$C_{10}H_{20}O$	Decanone

These all have multiple isomers

Butanone

Decanone

Heptanone

Hexanone

Nonanone

Octanone

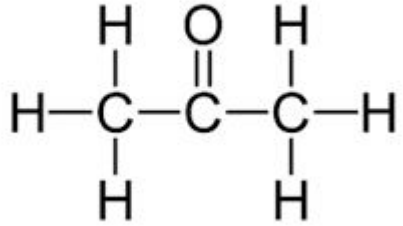
Pentanone

Propanone

Ketones

Ketones are similar to aldehydes, in fact in chemistry we group them together, aldehydes and ketones. Both have an oxygen atom double-bonded to a carbon atom, aldehydes have an oxygen bonded to a carbon bonded to a carbon and a hydrogen whereas a ketone has an oxygen bonded to two carbons.

A common form of ketone is propanone, commonly called acetone. It is used as a solvent in nail polish. It is highly toxic both through the skin, through the air and if swallowed.



Face masks are useless. The girls simply get used to the smell and continue to inhale the fumes.

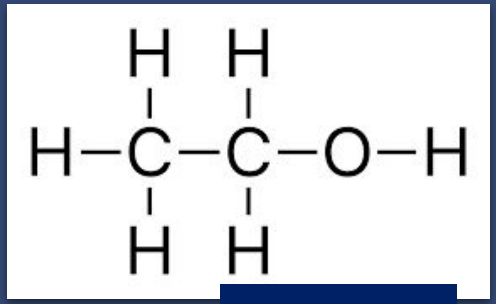
Acetone in Nail Polish & Nail Polish Remover

3. Alcohols

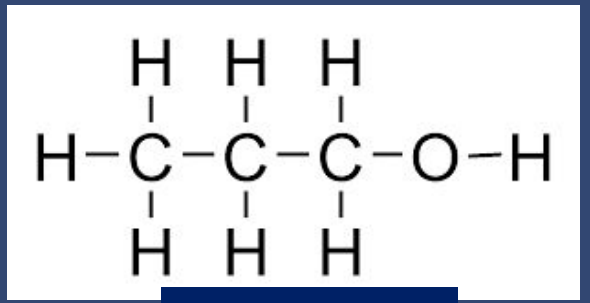
Alcohols

The first 10 alcohols are:

1 Methanol	CH_3OH	…	(Alcohol)
2 Ethanol	C_2H_5OH		
3 Propanol	C_3H_7OH		
4 Butanol	C_4H_9OH		
5 Pentanol	$C_5H_{11}OH$		
6 Hexanol	$C_6H_{13}OH$		
7 Heptanol	$C_7H_{15}OH$		
8 Octanol	$C_8H_{17}OH$		
9 Nonanol	$C_9H_{19}OH$		
10 Decanol	$C_{10}H_{21}OH$		



Ethanol

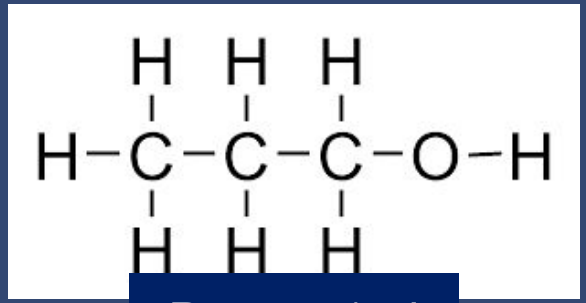


Propan-1-ol

Alcohols

Name the Alcohols:

1 Carbon	CH_3OH	Methanol
2 Carbons	C_2H_5OH	Ethanol
3 Carbons	C_3H_7OH	Propanol
4 Carbons	C_4H_9OH	Butanol
5 Carbons	$C_5H_{11}OH$	Pentanol
6 Carbons	$C_6H_{13}OH$	Hexanol
7 Carbons	$C_7H_{15}OH$	Heptanol
8 Carbons	$C_8H_{17}OH$	Octanol
9 Carbons	$C_9H_{19}OH$	Nonanol
10 Carbons	$C_{10}H_{21}OH$	Decanol



Propan-1-ol

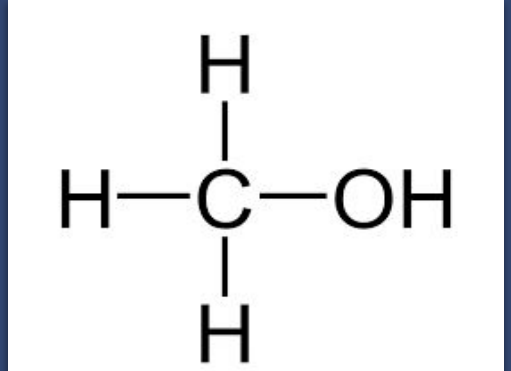
Butanol
Decanol
Ethanol
Heptanol
Hexanol
Methanol
Nonanol
Octanol
Pentanol
Propanol

Methanol

Methanol, also known as methyl alcohol and wood spirit, is the simplest of the alcohols and often abbreviated to MeOH.

It is made from natural gas, methane, and water in a process called steam reformation. It is a base chemical used in industry worldwide and in some instances, such as some motorsports, it is used as fuel because it produces more power.

It is extremely volatile and burns with a pale blue flame that is practically invisible during the day, which makes methanol fires extremely dangerous.



Methanol Fires

Methanol Fires

Methanol Fires

Methanol Plant

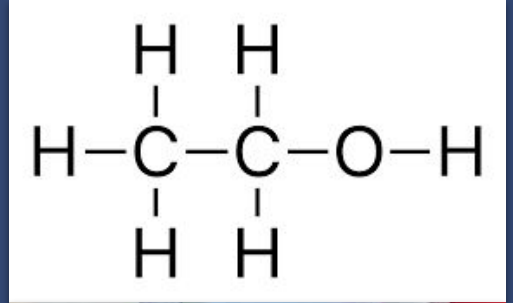
This is a methanol plant in New Zealand. They take natural gas from an offshore rig, pipe it to the plant and produce methanol.

Ethanol

Ethanol, otherwise known as ethyl alcohol, grain alcohol, drinking alcohol or just alcohol is often abbreviated to EtOH.

Ethanol is a volatile, flammable, colourless liquid with a characteristic wine-like odour and pungent taste. It is a psychoactive recreational drug, and the active ingredient in all alcoholic drinks.

For human consumption it is made by bacteria and fungi that feed on sugars such as potatoes in vodka, molasses in rum, grapes in wine. For gasoline additives it comes direct from the refinery.



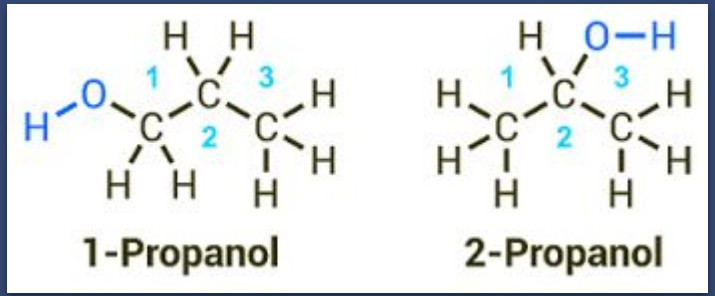
Ethanol

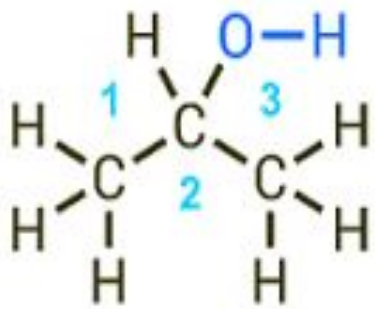
Propanol Isomers

Propanol has two isomers: 1 propanol & 2 propanol

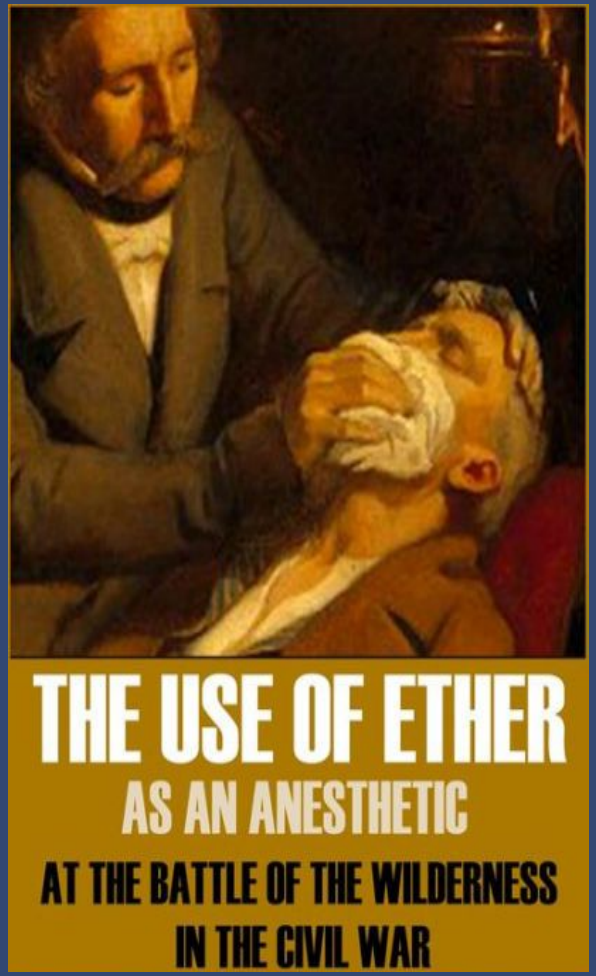
1 propanol, also called propan-1-ol and PrOH.

2 propanol, or propan-2-ol and isopropyl alcohol is is a colourless, flammable organic compound with a pungent alcoholic odour used as a solvent and in many medical applications for sterilization.



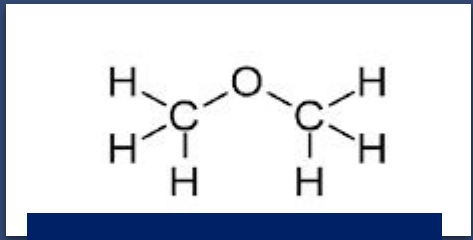


4. Ethers



Ethers

Example of 4 ethers are:



Dimethyl Ether

1 Methoxymethane CH_3 OCH_3 (Dimethyl ether)

2 Methoxyethane $CH_3OC_2H_5$ (Methyl ethyl ether)

3 Methoxypropane $CH_3OC_3H_7$ (Methyl propyl ether)

4 Methoxybutane $C_2H_5OC_2H_5$ (Diethyl ether)

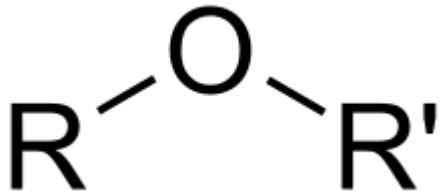
ETC

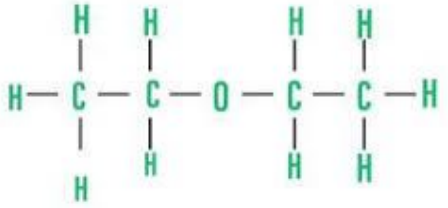
Ethers

In organic chemistry, ethers are a class of compounds that contain an ether group, an oxygen atom connected to two organyl groups.

They have the general formula R−O−R′, where R and R′ represent organyl groups.

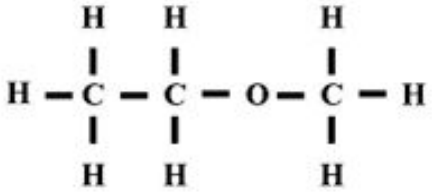
Ethers can again be classified into two varieties: if the organyl groups are the same on both sides of the oxygen atom, then it is a symmetrical ether, whereas if they are different, the ethers are called mixed or unsymmetrical ethers.





Diethyl ether

Symmetrical



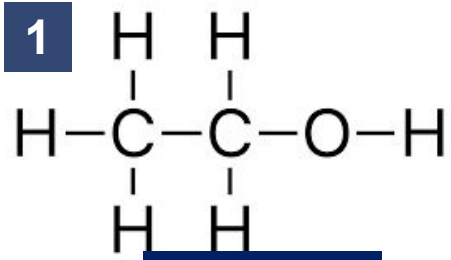
Ethyl Methyl Ether

Unsymmetrical

Ether

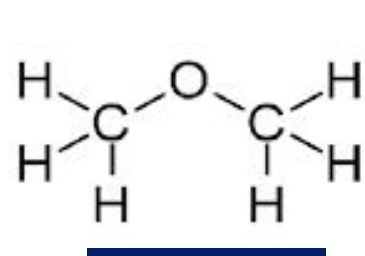
Alkane, Alkene, Alkyne, Aldehyde, Ketone, Alcohol or Ether?

1



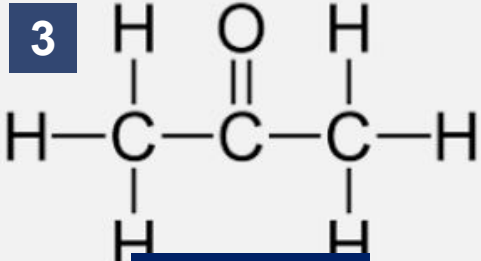
Alcohol

2



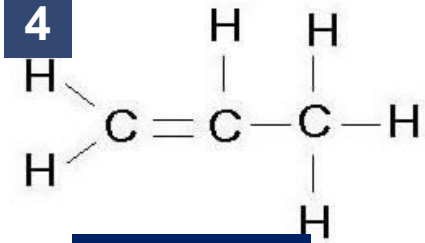
Ether

3



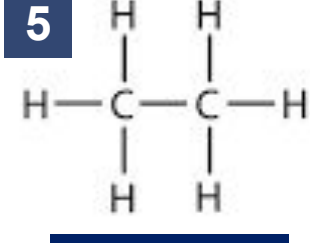
Ketone

4



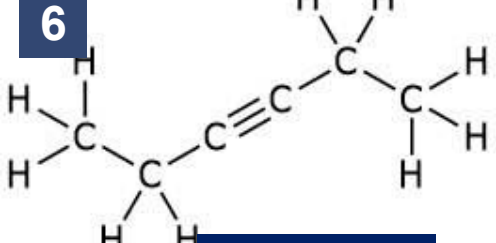
Alkene

5



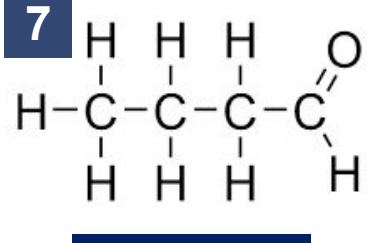
Alkane

6



Alkyne

7



Aldehyde


English with
2 Little Pigs
The End