

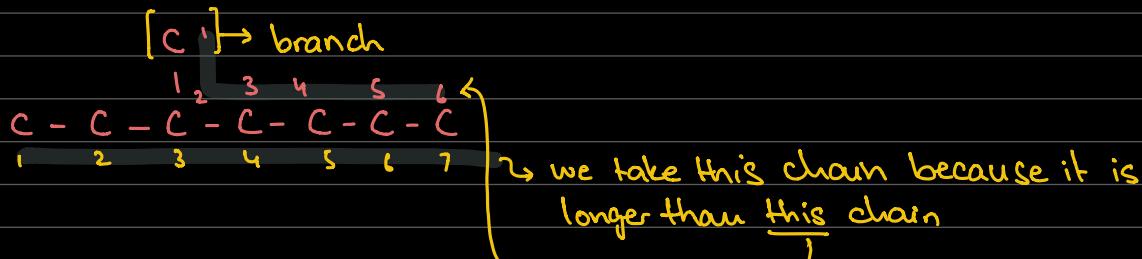
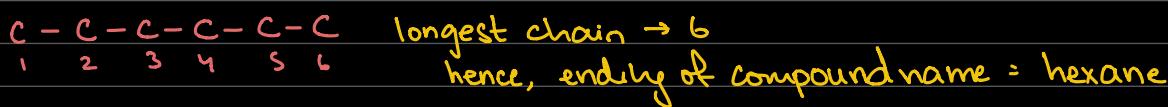
# NOMENCLATURE : Naming organic compounds

- The name for an organic compound can be either the trade name / trivial name or the systematic/IUPAC-assigned name
- Trivial / Trade names rarely follow a naming system, whereas IUPAC names tend to follow a very specific naming system and format

Rules for naming alkanes and substituted alkanes

1. Locate the longest continuous, straight chain of carbon atoms in the molecule.  
The name of the straight chain alkane with the same number of carbon atoms becomes the last part of the compound name
2. Find and name all the alkyl groups that are branches (substituents) on the "backbone" (longest continuous carbon chain) of the molecule.  
↳ Assign each one a position on the chain, numbering the chain so that the substituents have the lowest possible numbers.
3. If there are several substituents of the same kind, indicate how many by using the prefixes di-, tri-, tetra-, penta-, hexa-, and so on.  
(2) (3) (4) (5) (6)  
And use a number to assign a position to each one on the chain.
4. Construct the name of the compound by listing all of the substituents in alphabetical order, ignoring the prefixes when alphabetising.
5. Use commas to separate numbers from each other (i.e. 2,2,3) and use hyphens to separate numbers from letters (i.e. 2,2,3-methyl)
6. Merge the name of the last substituent with the name of the longest continuous chain.

Examples :

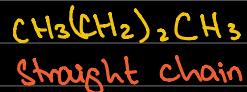


Note: Do not "backtrack" when

## Structural Isomers

locating the largest continuous chain

$$\text{Butane} \rightarrow \text{C}_4\text{H}_{10}$$

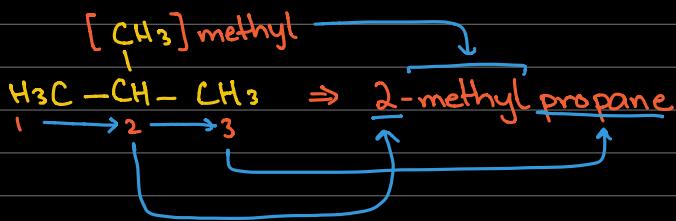


$$\text{Pentane} \rightarrow \text{C}_5\text{H}_{12}$$

↳ Has 3 structural isomers

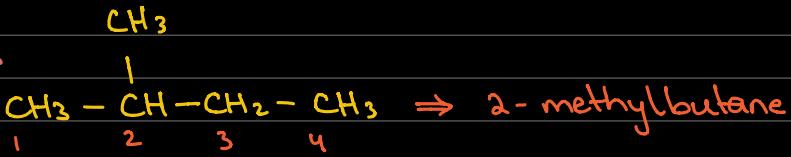


## Straight Chain



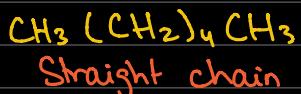
$$\text{Pentane} \rightarrow \text{C}_5\text{H}_{12}$$

↳ Has 3 structural isomers

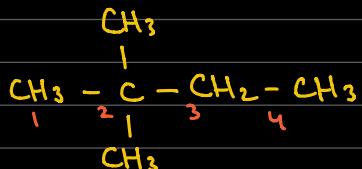


$$\text{Hexane} \rightarrow \text{C}_6\text{H}_{14}$$

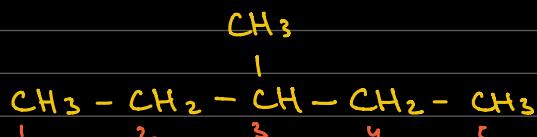
↳ Has 5 structural isomers



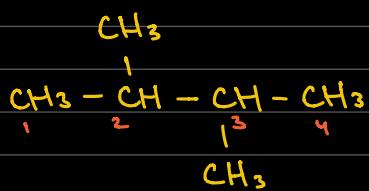
## Straight chain



$\Rightarrow$  2,2-dimethylbutane

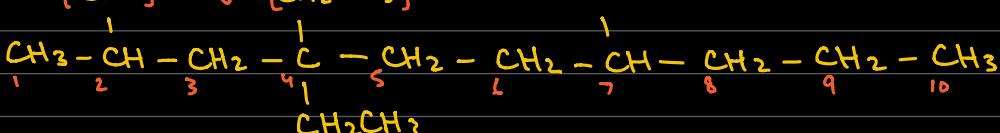


$\Rightarrow$  3 - methylpentane



$\Rightarrow$  2, 3 - dimethylbutane

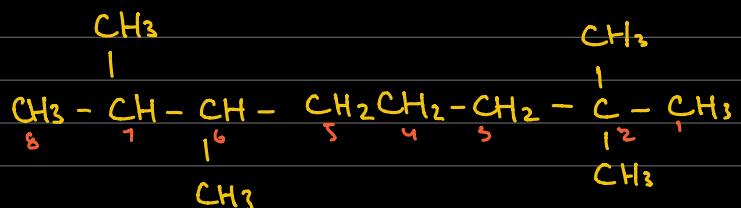
## Other examples:



2-methyl

## 4.4.7 - triethyl

$\Rightarrow$  4,4,7-triethyl-2-methyldecane



2, 2, 6, 7 - tetramethyl octane

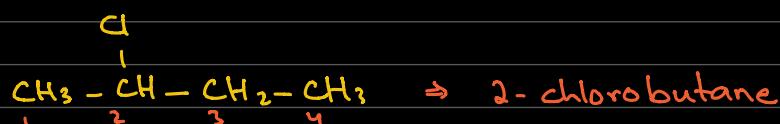
Other examples (alkyl halides) (substitution of halogens on the alkane chain)

F → Fluoro -

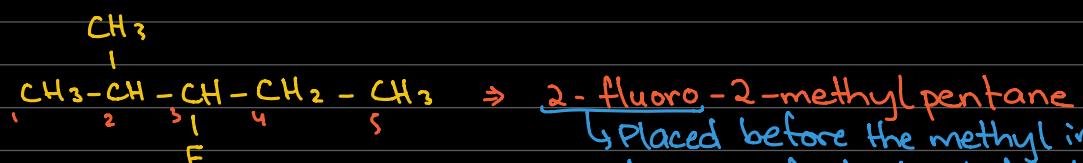
Cl → Chloro -

$\text{Br} \rightarrow \text{Bromop-}$

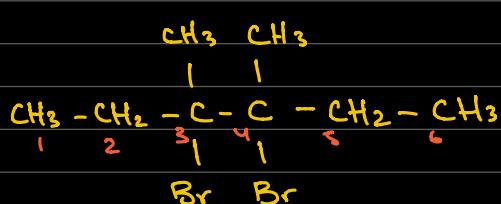
I → logo -



2-methyl

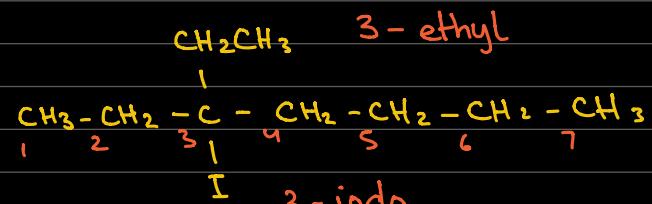


3 - Funciones



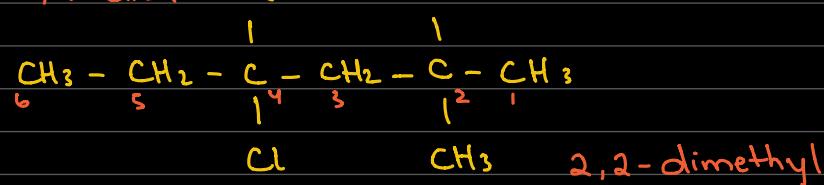
3,4 - Bromo      3,4 - methyl

$\Rightarrow$  3,4-bromo-3,4-methylhexane

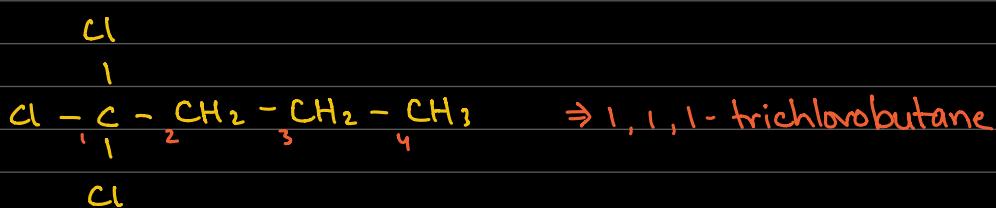


$\rightarrow$  3-ethyl-3-iodoheptane

## 2,2-dichloro Cl

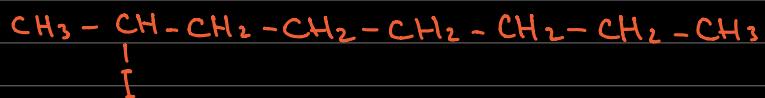


2,2-dichloro-2,2-dimethylhexane

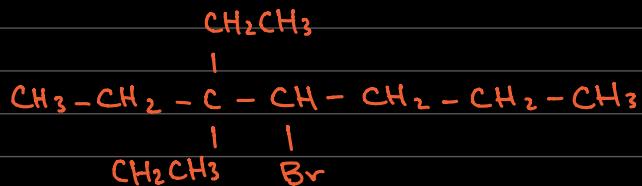


Examples (drawing displayed formulae from names)

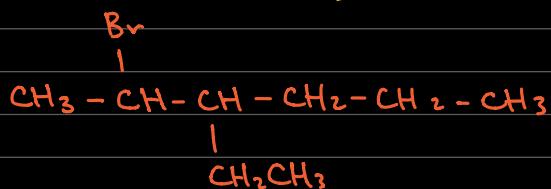
1. 2-iodooctane



2. 4-bromo - 3,3-diethylheptane



3. 2-bromo-3-ethylhexane

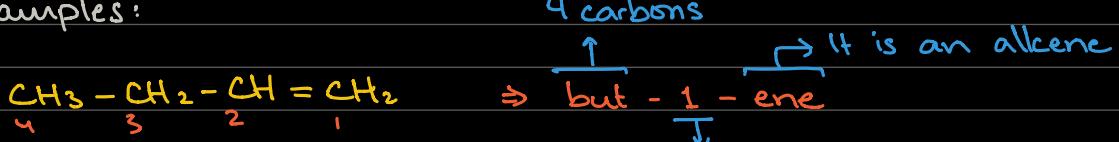


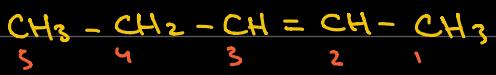
## NAMING ALKENES

Rules for naming:

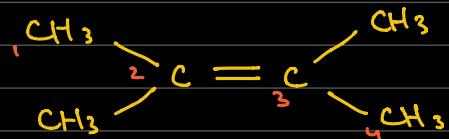
1. Add the suffix -ene to the longest continuous chain of carbon atoms
2. Number the chain so that the C=C bond gets the smallest number  
(The functional group gets the lowest number)
3. The position of the double bond is indicated by the position of the 1<sup>st</sup> carbon atom of the bond
4. All substituents are given a number and are listed alphabetically

Examples:

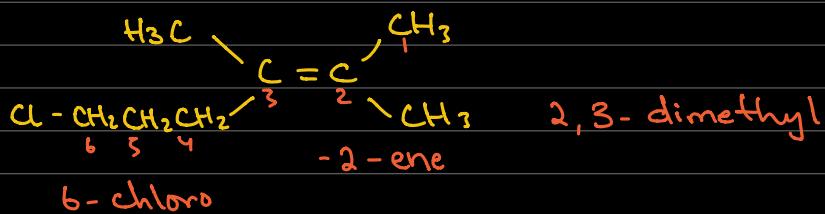




$\Rightarrow$  pent-2-ene

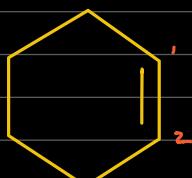


$\Rightarrow$  2,3-dimethylbut-2-ene

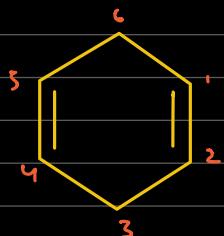


$\Rightarrow$  6-chloro-2,3-dimethylhex-2-ene

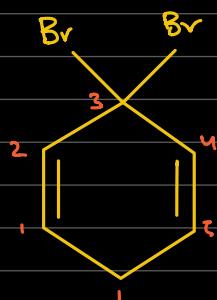
## Cyclic Examples :



$\Rightarrow$  cyclohexene



1,4-cyclohexadiene  
or  
cyclohex-1,4-diene



$\Rightarrow$  3,3-dibromo-1,4-cyclohexadiene

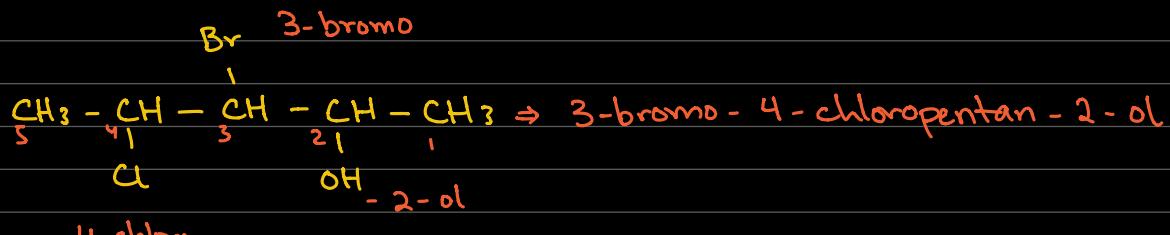
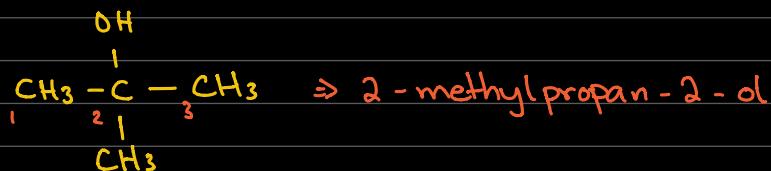
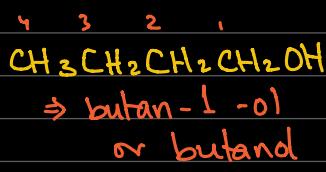
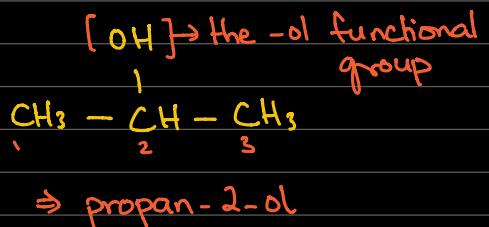
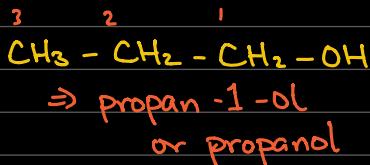
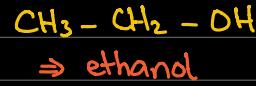
# NAMING ALCOHOLS

## Rules for naming:

- i. The suffix -ol is added to the longest chain of carbon atoms that includes the alcohol functional group

- Number the chain so that the OH gets the lowest possible number
- If numbering can be done from either left or right, number the chain taking other substituent into account

Examples :



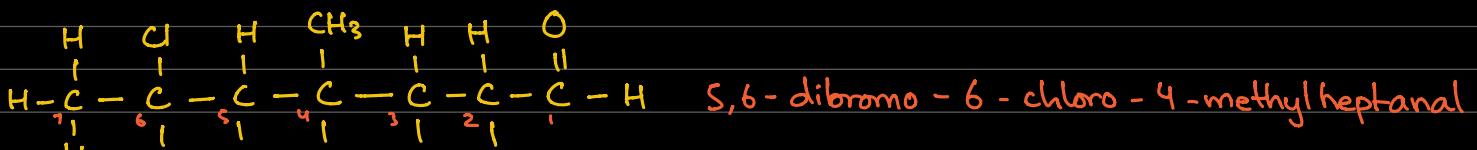
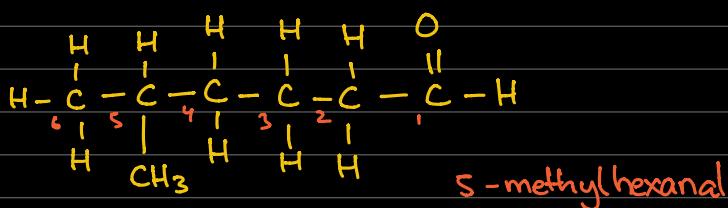
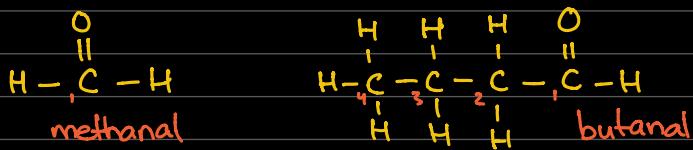
## NAMING ALDEHYDES

- The suffix -al is added to the longest chain of carbon atoms
- The functional group gets the lowest possible number

- General formula :



Examples :





## NAMING KETONES

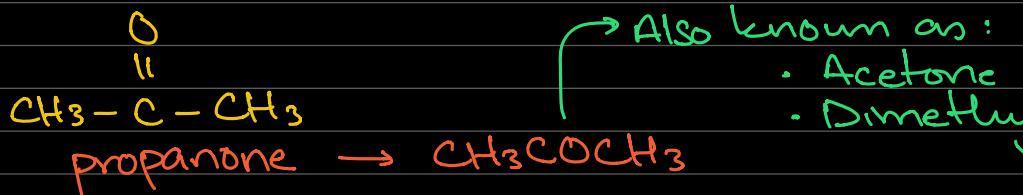
$\begin{array}{c} \text{O} \\ \parallel \\ \text{R}-\text{C}-\text{R}' \end{array}$  where R and R' can be the same or different alkyl groups.

↳ However, they CANNOT be hydrogens  
ie, they have to be carbons

Rules for naming:

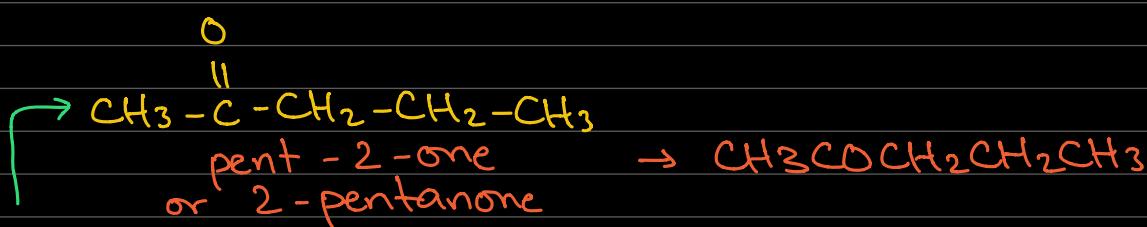
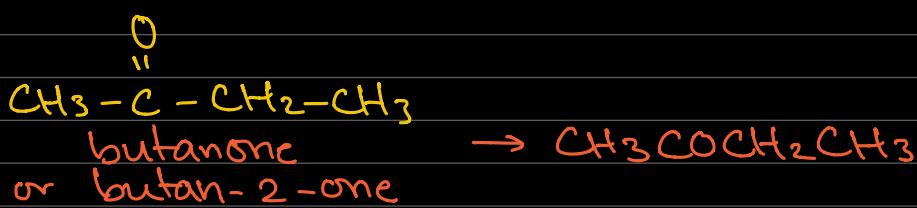
- The suffix "-one" is added to the longest chain of carbon atoms, which includes the  $\text{C}=\text{O}$
- Number the carbon chain such that the functional group gets the lowest number

Examples:

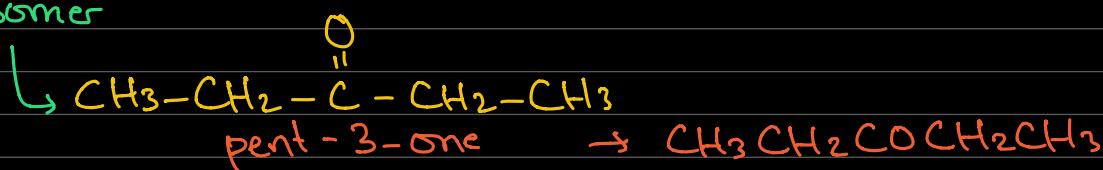


Also known as :

- Acetone
- Dimethylketone



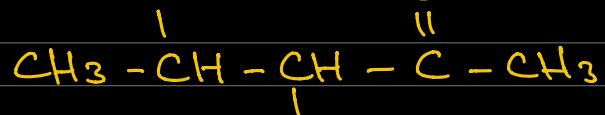
Positional Isomer



cyclohexanone  
(cyclic ketone)

$\text{CH}_3$

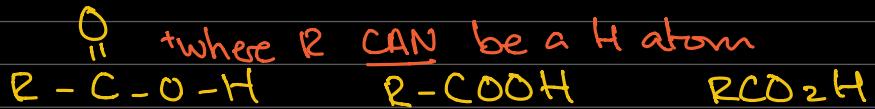
$\text{O}$



Br

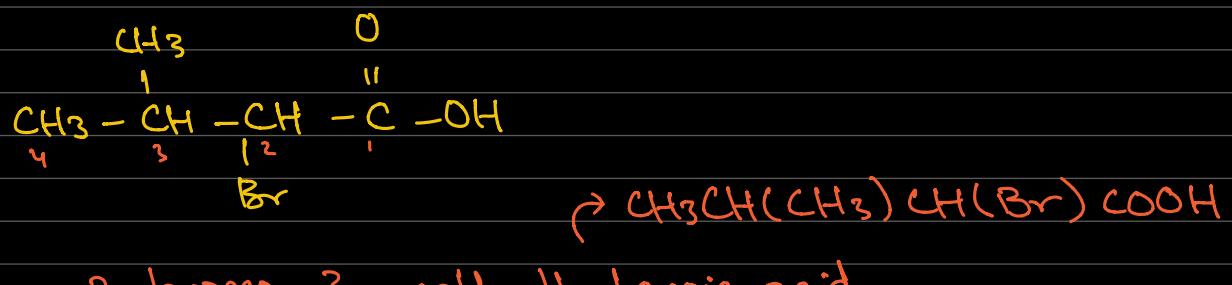
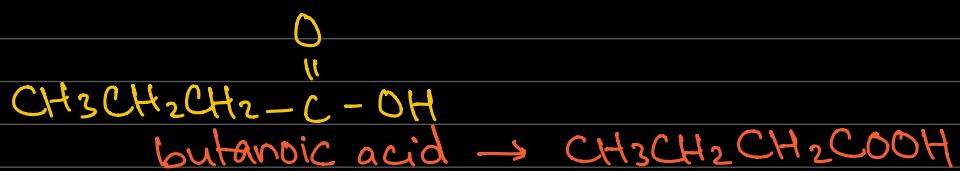
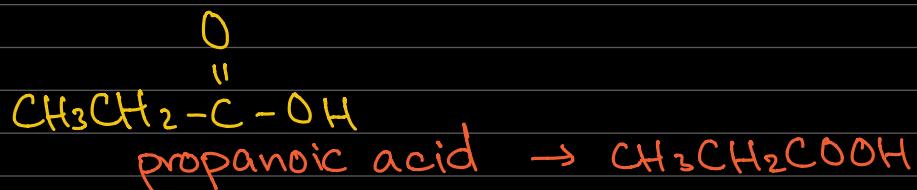
3-bromo-4-methylpent-2-one

## NAMING CARBOXYLC ACIDS



- The suffix "oic acid" is added to the longest chain of C atoms
- The carbon chain numbering always begins with the COOH carbon
- All other constituents are listed in the usual, alphabetical manner

Example:



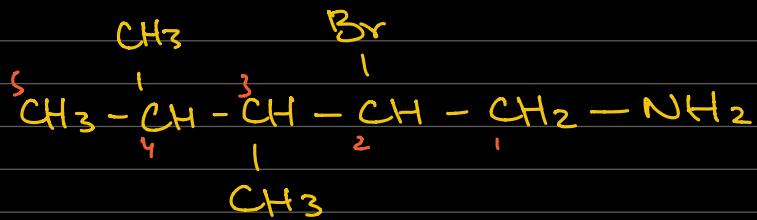
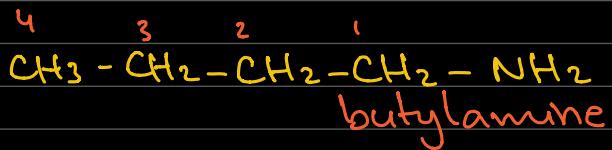
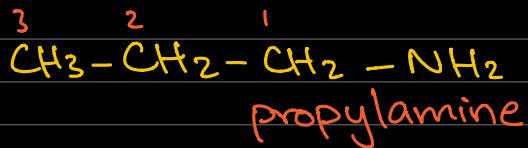
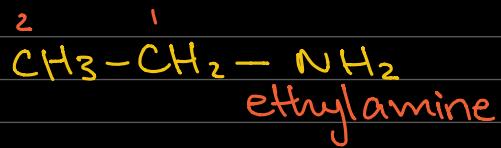
2-bromo-3-methylbutanoic acid

## NAMING AMINES: only primary amines

Replacing one hydrogen of  $\text{NH}_3$  with an alkyl group gives a primary amine  $\text{CH}_3\text{-NH}_2$  ( $1^\circ$  amine) methylamine

- Add the suffix "amine" to the longest chain of carbon atoms that includes the NH<sub>2</sub> group

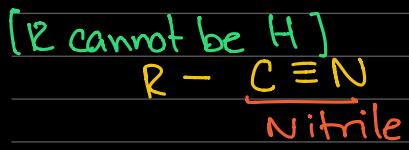
Examples:



2 - bromo - 3 , 4 - dimethylpentylamine

## NAMING NITRILES

$\text{R}' - [\text{CN}] \rightarrow$  named differently in organic and inorganic chemistry



↳ In inorganic chemistry, CN is known as cyanide while in organic chemistry, it's referred to as "nitrile"

- The suffix "-nitrile" is added to the longest chain of carbon atoms
- The CN carbon is carbon # 1 (when numbering the carbon chain)

Examples:





## MULTIPLE FUNCTIONAL GROUPS

↳ only used for naming — isn't relevant to reactivity

ORDER OF PRECEDENCE: of functional groups in organic chem.

- This order is followed when the molecule contains more than one major functional group.
- The last part of the name depends on its precedence, which is based on how oxidised the functional group is.

Decreasing Order of Precedence:

1. Carboxylic Acid  $\text{RCOOH}$  → Highest Precedence

2. Esters  $\text{RCOOR}'$

3. Amides  $\text{R}-\overset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{NH}_2$

4. Nitriles  $\text{R}-\text{CN}$

5. Aldehydes  $\text{RCHO}$

6. Ketones  $\text{RCOR}'$

7. Alcohols  $\text{R}-\text{OH}$

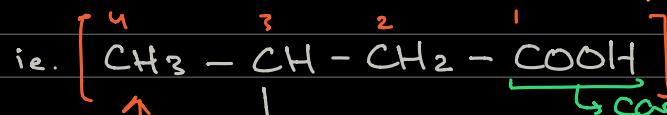
8. Amines  $\text{R}-\text{NH}_2$

9. Alkynes  $-\text{C}\equiv\text{C}-$

10. Alkenes  $-\overset{\text{l}}{\underset{\text{l}}{\text{C}}}=\text{C}-$

11. Alkanes  $-\underset{\text{l}}{\underset{\text{l}}{\text{C}}}-\underset{\text{l}}{\underset{\text{l}}{\text{C}}}-$  → Lowest Precedence

- When alcohols are substituents, they are called "hydroxy"



↳ carboxylic group takes precedence

OH

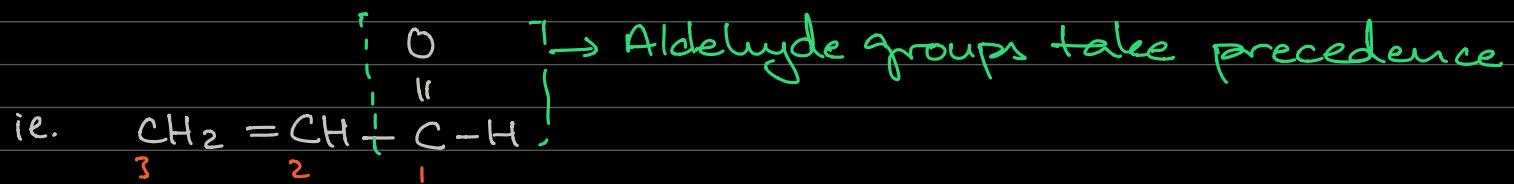
Since this is a branch/substituent  
the name of the compound will be  
3-hydroxybutanoic acid

6-hydroxy

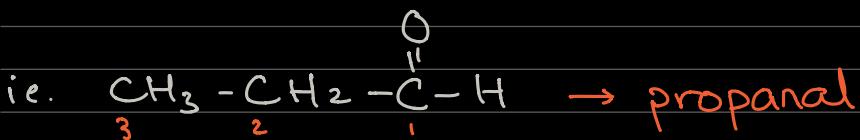


6-hydroxyhexanal

Aldehyde group  
takes precedence

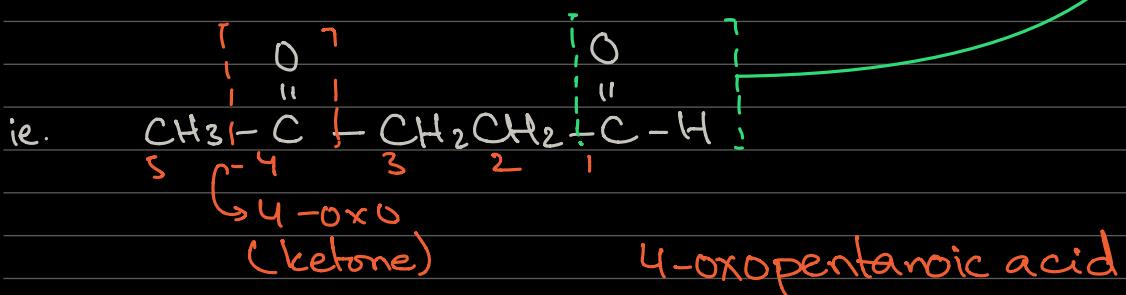
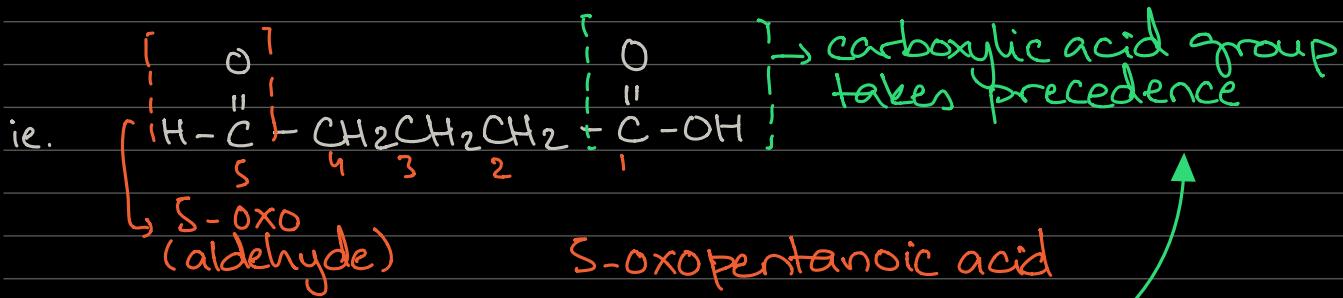


2-propenal

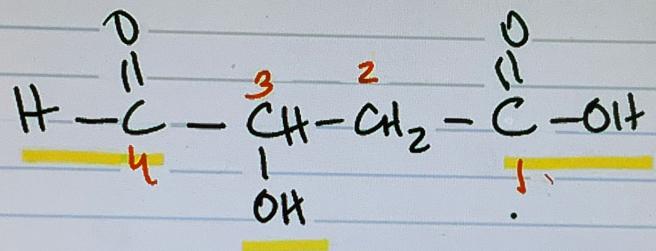
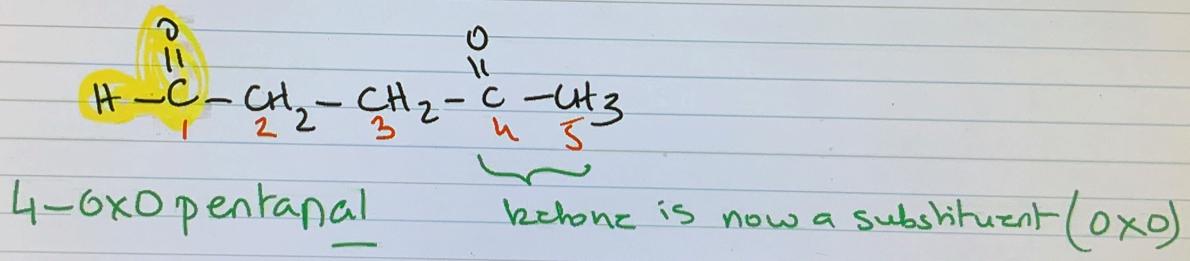


- When aldehydes and ketones are substituents, they are given a number and the prefix "oxo" is used to name them.

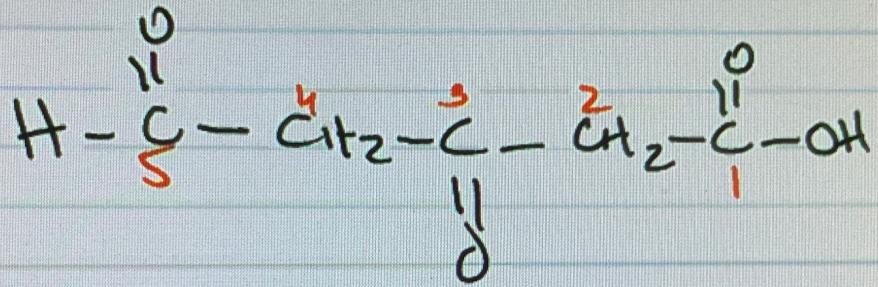
↳ When another functional group of higher precedence is present



A few more examples:



3-hydroxy-4-oxo butanoic acid



3,5-dioxo pentanoic acid