CHAPTER 21

NOMENCLATURE.

Nomenclature of organic chemistry:

First we will order the **functional groups** according to preference when calling:
Carboxylic acids
Esters
Amides
Aldehids
Ketones
Nitrils
Alcohols
Amines
Éters
Halogenated derivatives
Unsaturated hydrocarbons
Saturated hydrocarbons

Let's start below:

Hydrocarbons Alcans, alquens and alkynes

1. Begin counting on the nearest radical.
2. Count from the longest radical.
3. Count the radicals from alphabetical order.
4. Radicals end in termination -il.
5. The position of each radical is named before its prefix name.
6. In alquens, the double links are named just ahead of the main chain.
7. the main chain is the one that contains the double or triple links.
8. First they are called the double links and then the triples.
9. the double links end in -e are the triples in -i.
10. Methane, age, propane, butane, pentane ... are names of the main chains.

11. If they have one or more double links, or even triple, we see how, they are called in the attached examples ("position-name of the main chain finished in -e [depending on whether they have double links: -three, triple ... .] and position of the triple link followed by -i).
12. The chain with more unsaturated links prevails, even if it is not the longest.
13. It has priority, at the time of counting the chain, the closest to the radical with unsaturated links.

Ex:

```
                C ≡ CH
                |
CH 2 = CH- C = C - CH = CH2
           |
     CH 3 - CH-CH 2 -CH 3
```

4-ethynyl, 3- (1 methyl propyl), (1,3,5) hexatrieth.

```
CH 2 = CH- C = C - CH = CH 2
           |    |
     CH ≡C      CH- CH 3
                |
                CH 3
```

3-ethynyl, 4- (1-methylethyl), (1,3,5) -hexatriè.

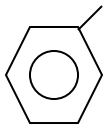
```
                CH = CH 2
                |
CH 2 = CH- C≡ C-CH - CH- CH 3 -CH3
                           |
                          CH-CH 2 - CH 3
                          |
                          CH 3
```

4-etenil, 3- (1.methylpropyl), 1,6- octane, 3-i.

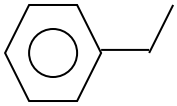
Cyclic and aromatic hydrocarbons:

In aromatic only talk about benzene; According to the order of the radicals we can call them "orto", "meta" or "para" (there are some examples in fig. 66 and 66’).

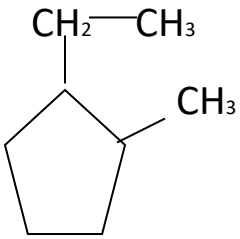
Fig. 66:



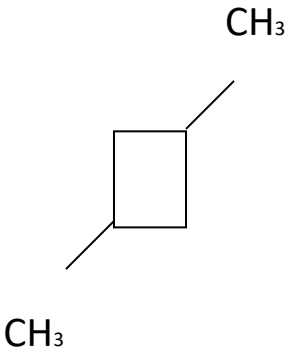
fenil



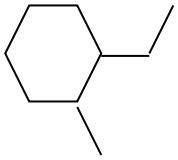
benzil



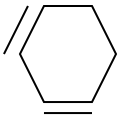
1-etil, 2-metil ciclopentà



(1,3)-dimetil ciclobutà

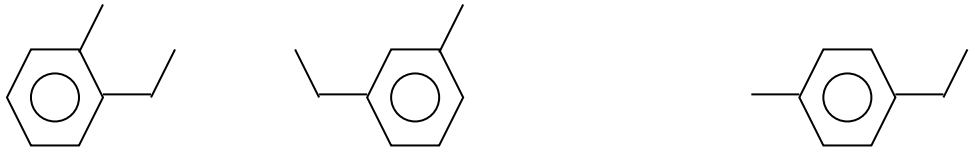


1-etil, 2-metil ciclohexà

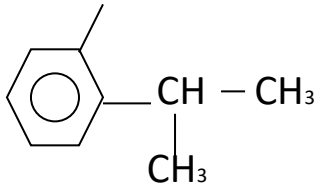


(1,3) ciclohexadiè

Fig. 66 ':



Orto-etilmetilbenzè meta-etilmetilbenzè para-etilmetilbenzè



1-metil, (2-(1-metil etil) benzè

Halogenated derivatives:
In the nomenclature the halogens are placed opposite, but not in the order of preference with respect to the unsaturated HC (hydrocarbur).

$CH_3 - CH = CH - CH(Cl) - CH_3$ 4-chlorine, 2-pentene

Éters:
Ethylmethyl ether: $CH_3 - O - CH_2 - CH_3$

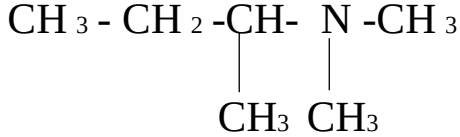
Radicals: methoxy, ethoxy, phenoxy.
Do not exceed alcohols when prior to nomenclature;
Ex:
$CH_3 - CH_2 - O - CH_2 - CH(O - CH_3) - CH_2 - OH$
It is called: 3-ethoxy, 2-methoxy, 1-propanol

$CH_3 - O - CH_2 - O - CH_3$ 1,1-dimethoxy methane

Amines:

Amines 1 arias are counted
Amines 2 aries
Amines 3 aries .

CH_3 -NH- CH_3 dimethylamine



N,N-dimethyl,1-methylpropylamine

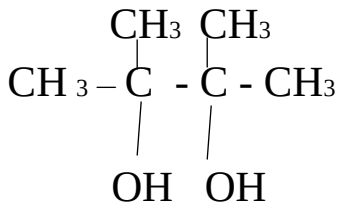
Or they are also counted as radicals (in case they are not priority) and they are called "-aza-".

CH_3- NH- CH_2 -CH_2 - NH- CH_2 -NH- CH_3 2,4,7-triazaoctane.

Alcohols:

Alcohol has priority over unsaturations, that is, they are called at the end. The species that have alcohol as a priority functional group end up in -ol:

CH ≡C- CH = CH- CH_2 - OH 2-penten, 4-i 1-ol.



2,3-dimethyl 2,3-butanediol

CH ≡ C- CH = CH- CH_2 - OH 2-penten, 4-i, 1-ol.

When alcohol is not a priority in a compound it has the "hydroxy" nomenclature.

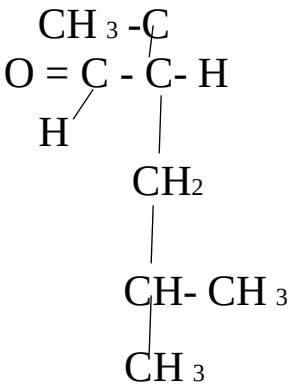
Ketones:

Unlike aldehydes, they can only go in the middle of the chain.

If no other functional group is named C = O -one.

As we already know, it does not have priority over aldehydes but rather on other unsaturations below the initial list

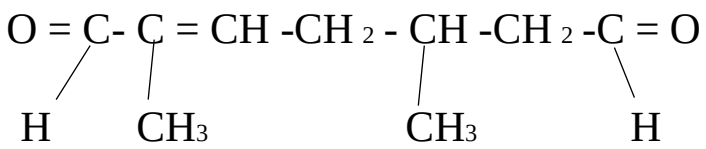
In change, when ∃ aldehyde or other functional groups over when it is important, it is called "-oxo-".



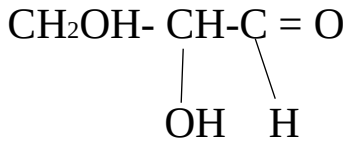
2- (2methylproblem), 3-oxo, butanal

Aldehids:

They have the termination finished in "-al".

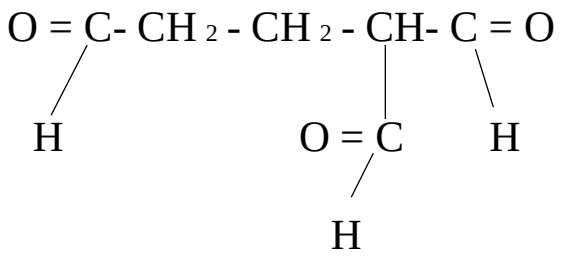


2,5-dimethyl, 2-hepten, dial

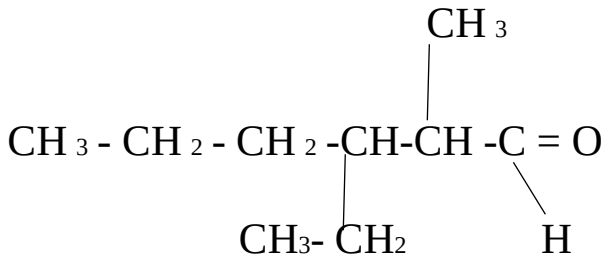


2,3-dihydroxypropanal.

It is called "formil" when describing a aldehyde radical.



2-formylpentanodial



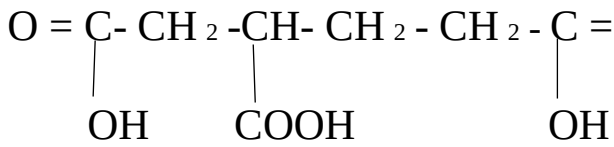
3-ethyl, 2-methyl, hexanal

Carboxylic acids:

They end up in -oic.

When radical carboxylic acids are found, the nomenclature is "carboxy-".

Such a functional group prevails over any other.



3-carboxy hexandioic acid

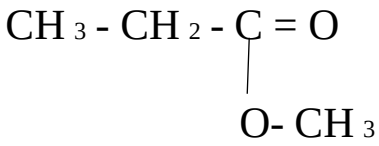
HOOC- CH = CH- CH 2 -CH = CH -CH 2 -COOH

2,5-octadiendioic acid

Salt of acids and acid esters:

They are the seconds in the preferences list.

From the termination -oic they pass to -oat + the name of the radical.



Methyl propaneate

$CH_3-C(=O)-O^-$ Etanoate

$CH_3-C(=O)-ONa$ Etanoate of sodium

$O=C(H)-O-CH=CH_2$ Methaneate of ethenyl

Amides:

There are also 1 arias , 2 arias , and 3 arias .

When the amides are radical, their name becomes "carbamyl".

$CH_3-CH_2-C(=O)-NH_2$ propanamide

$CH_2=CH-CH_2-CO-NH_2$ 3-butenamide.

$CH_3-CH_2-CO-NH-CO-CH_2-CH_3$ propanamide o Propanodiamide

$CH_3-CO-N(CO-CH_2-CH_2-CH_3)-CO-CH_2-CH_3$ Butaneethanopropanotriamide.

In this latter compound we see how the radicals are called alphabetically as I have already commented at the beginning of the chapter.

Nomenclature of inorganic chemistry:

Binary compounds

- Oxygen : a) *metals:* oxides
  i peroxides
  b) *no metals:* anhydrides
- Hydrogen : a) *metal*
  b) *not metal*
- Salts : a) *metal + no metal*
  b) *no metal + no metal*

Ternary compounds

- Acids: *anhydrides + water*
- Peroxides : *oxides + water*

Table of valences of the different elements:

Let's remember that the valances are equivalent to the charges that the different elements can take.

Metals :
Crom (Cr) ..... 2, 3, 6.
Manganès (Mn) ..... 2, 3, 4, 6, 7.
Aluminum (Al) 3
Gold (Au) .... 1, 3.
Iron (Faith) ..... 2, 3.
Cobalt (Co) ..... ".
Nickel (Ni) ..... ".
Copper (Cu) ...., 1, 2.
Mercury (Hg) ..... ".
Estany (Sn) ..... .2, 4.
Lead (Pb) ..... ".
Platinum (Pt) ..... ".
Iridi (Ir) ..... ".
The rest are alkaline, which have valence 1 and alkaline earthquakes which are added Cadmium (Cd) and Zinc (Zn) with valence 2.

No metals:
Hydrogen (H) ....- 1, 1.
Fluoride (F) ....- 1.
Halogens: Chlorine (Cl) ... -1, 1, 3, 5, 7.
Brom (Br) .. ".
Iode (I) ... ... ".
Oxygen (O) .....-2.
Sulfur (S) ....- 2, 2, 4, 6.
Selene (Se) ..... ".
Teluri (Te) ..... ".
Nitrogen (N) .....- 3, 1, 2, 3, 4, 5
Phosphorus (P) .....- 3, 1, 3, 5.
Bor (B) .....- 3, 3
Bismuth (Bi) .....- 3, 3, 5.
Carbon (C) -4, 2, 4.
Silicon (Si) .....- 4, 4.

They made the first atom less electronegative (*en*) or more and then the metal or nonmetal.
In the case of the formulation it goes upside down.
We put the valence of the metal as a subset of non-metal while the sub-index of the non-metal is the valence of the metal.
It's called this way:
We have 3 ways of naming inorganic compounds:

1. Systematic: (IUPAC): the prefixes mono-, di-, tri-, tetra-, front are opposite to each element of the compound.
   N_2O_5 ..... dinitrogen pentoxide

2. Stock Nomenclature:
   Li_2O ..... lithium oxide (I)
   Au_2O_3 ..... gold oxide (III)
   Au_2O ..... gold oxide (I).

3. Traditional Nomenclature:
   Fe_2O_3 .... ferrous oxide (-os) valence greater
   FeO ..... ferric oxide (-ic) minor valence

If we find that there are no metals with more than 2 valences (**applied to anhydrides**):

- With 3 valences:
  SO ..... Hyosulfurid HIDIDIDE
  SO_2 .... sulphurous anhydride
  SO_3 sulphuric anhydride
- With 4 valences:
  Cl_2O ..... Hypochlorous anhydride
  Cl_2O_3 ..... chlorinated anhydride
  Cl_2O_5 ..... clòlic anhydride
  Cl_2O_7 ..... peripheral anhydride
- In the case of non-metals with a single valence, the termination is -ic.

In the case of **compounds with hydrogen** :
1- H + metal ⟶ hydrogen adopts the suffix -ur:
BeH_2 ... hydride Berilli
2- H + no metal ⟶ is now the non-metal the most *en*, for so much it is called first:
H_2S ..... hydrogen sulphide, in other words sulfhydric acid
HCl ..... Hydrogen chloride or hydrochloric acid.

In the complicated case of salts:

a) Neutral salts (not metals + metals) contain the suffix -ur after non-metal:

LiF ..... Lithium flour
CuBr ... copper bromide
$CuBr_2$ cuprós bromide
K_2S ..... potassium sulfide.

b) the nomenclature with respect to salts formed by non-metal + non-metal is simple to understand:

IBr_3 ..... iodine bromide (III)
CCl_4 ... carbon chloride (IV).

In the case of acids:

<u>Formulation:</u> $H_aX_bO_c$, where the total q is neutralized if there is no other reason.

<u>Nomenclature</u> : anhydrides + H_2O.

Ex: $Cl_2O + H_2O \longrightarrow$ HClO hypochlorous acid
$Cl_2O_3 + H_2O \longrightarrow HClO_2$ acid chlorides
$Cl_2O_5 + H_2O \longrightarrow HClO_3$ Cloric acid
$Cl_2O_7 + H_2O \longrightarrow HclO_4$ perchloric acid

It has the same rules as anhydrides but adding "acid" at the beginning.
There is also the "Stock" nomenclature, where the central atom has the termination - followed by the valence that it adopts in parentheses.
Ex: $HClO_2$ dioxochlorate (I) of hydrogen

H_2SO_3 trioxosulfate (IV) of hydrogen

Apart from the traditional one:

H_2SO_4 hydrogen sulphate

H_2CO_3 hydrogen carbonate

HNO_2 hydroxide nitrite

When instead of H a cation is located, it is called:

K_2SO_3 Trioxosulfate (IV) of potassium or potassium sulphite

$CaCO_3$ Trioxocarbonate (IV) calcium

In the acid section, there is also the number of water molecules that bind to anhydride:

Meta....., add 1 H_2O

Orto ... they add 3 H_2O.

For example: $P_2O_3 + H_2O \longrightarrow HPO_2$ metaphosphorous acid

$P_2O_3 + 3H_2O \longrightarrow 2H_3PO_3$ orthophosphorous acid

We add:

Disulfuric acid: $2H_2SO_4 - 1\ H_2O \longrightarrow H_2S_2O_7$

Triphosphoric acid: $3H_3PO_4 - 2\ H_2O \longrightarrow H_5P_3OR_{10}$

Hydroxides:

<u>Formulation</u> : $Fe(OH)_2$, $Al(OH)_3$

<u>Nomenclature:</u>

$Ra(OH)_2$ ..... hydroxide of radius

$Al(OH)_3$.....aluminum hydroxide

Cu (OH).....Cu (I) hydroxide

copper hydroxide