ALCHENI

Formula generale: C_nH_{2n}

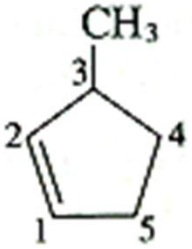
Desinenza : -ene

etilene $CH_2=CH_2$

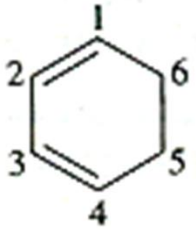
propilene $CH_2=CH-CH_3$

butilene $CH_2=CH-CH_2-CH_3$; $CH_3-CH=CH-CH_3$

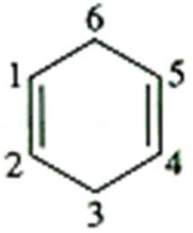
ciclopentene



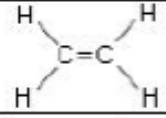
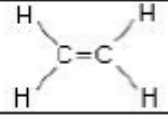
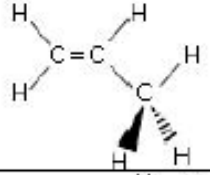
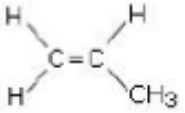
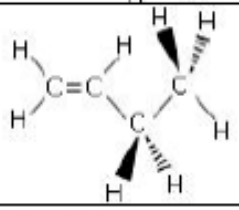
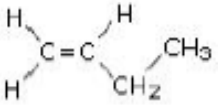
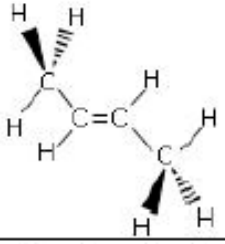
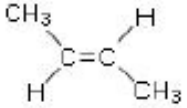
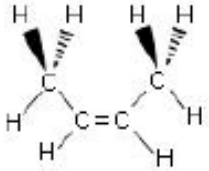
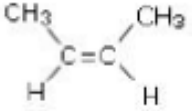
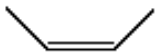
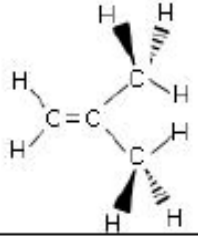
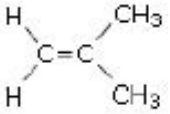
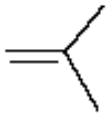
3-metilciclopentene



1,3-cicloesadiene

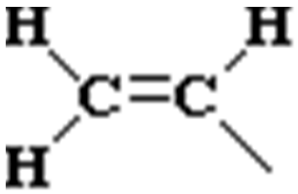


1,4-cicloesadiene

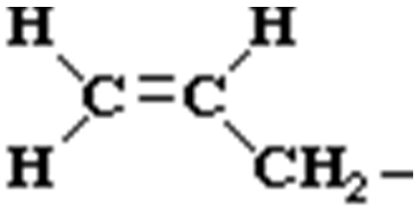
Nome	Formula grezza	Formula spaziale	Formula di struttura	Formula razionale	formula schematica
etene (etilene)	C_2H_4			$CH_2=CH_2$	
propene	C_3H_6			$CH_2=CH-CH_3$	
1-butene	C_4H_8			$CH_2=CH-CH_2-CH_3$	
trans 2-butene	C_4H_8			$CH_3-CH=CH-CH_3$	
cis 2-butene	C_4H_8			$CH_3-CH=CH-CH_3$	
isobutene metilpropene	C_4H_8			$CH_2=C(CH_3)-CH_3$	

I **residui** che si formano togliendo un idrogeno agli alcheni, conservano la stessa radice, ma cambiano la desinenza da –ene in **–enile** e saranno pertanto:

Etenile (o *vinile)* $CH_2=CH-$
1-propenile $CH_3-CH=CH-$
2-propenile (o *allile)* $CH_2=CH-CH_2-$



gruppo vinile

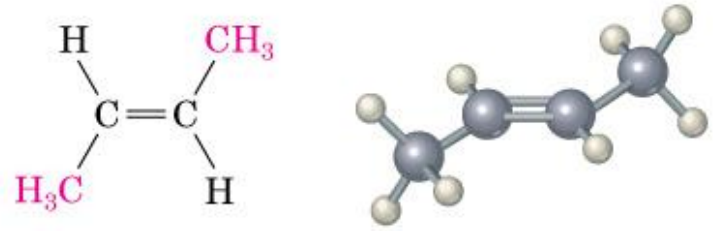


gruppo allile

Isomeria cis/trans

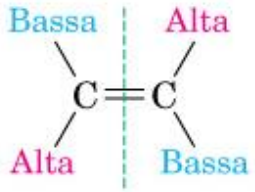
FIGURE 6.3 Isomeri cis e trans del 2-butene. L'isomero cis ha i due gruppi metilici dalla stessa parte del doppio legame, mentre l'isomero trans ha i gruppi metilici da parti opposte.

cis-2-Butene

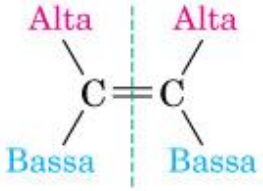


trans-2-Butene

Isomeria E/Z



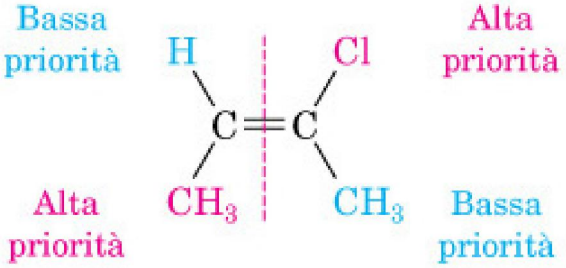
Doppio legame *E*
(I gruppi a priorità più alta
si trovano su lati opposti.)



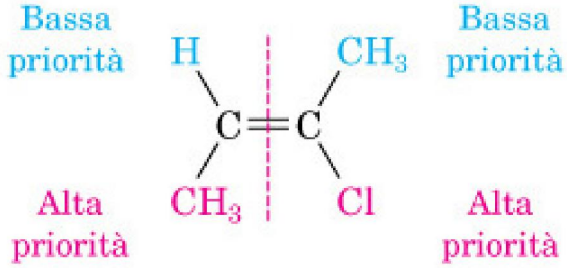
Doppio legame *Z*
(I gruppi a priorità più alta
si trovano sullo stesso lato.)

35 17 8 7 6 1
Br > Cl > O > N > C > H

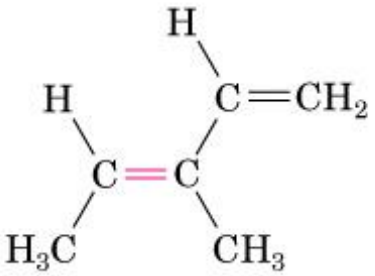
Per esempio:



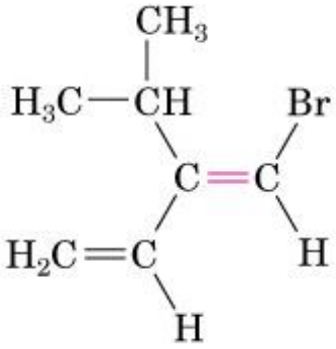
(a) (*E*)-2-Cloro-2-butene



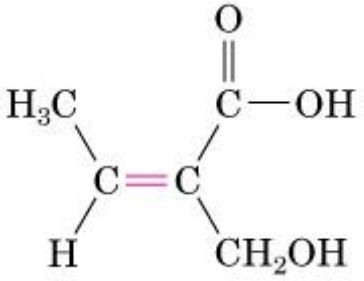
(b) (*Z*)-2-Cloro-2-butene



(*E*)-3-Metil-1,3-pentadiene



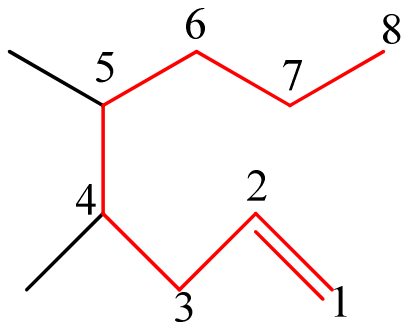
(*E*)-1-Bromo-2-isopropil-1,3-butadiene



Acido (*Z*) 2-idrossimetil-2-butenoico

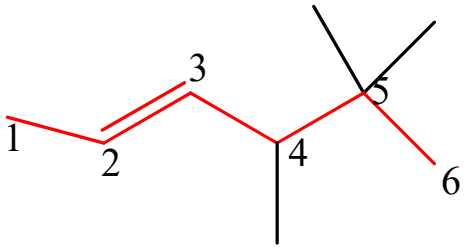
NOMENCLATURA

- SCEGLIERE LA CATENA PIU' LUNGA CONTENENTE IL DOPPIO LEGAME, E METTERE IL SUFFISSO –ENE



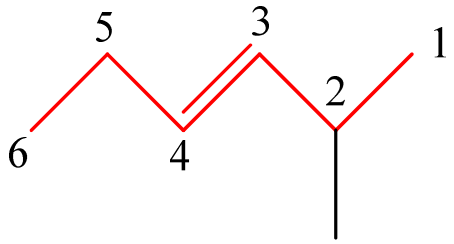
4,5-dimetil-oct-1-ene

- INIZIARE LA NUMERAZIONE DALL'ESTREMITÀ PIÙ VICINA AL LEGAME MULTIPLO



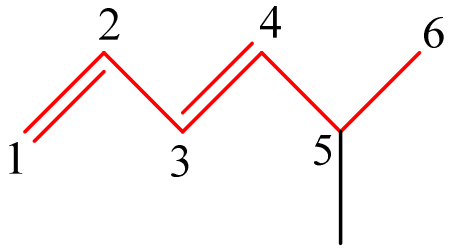
(E)-4,5,5-trimetil-es-2-ene

- SE IL LEGAME MULTIPLO È EQUIDISTANTE DALLE DUE ESTREMITÀ, LA NUMERAZIONE INIZIA DA QUELLA PIÙ VICINA AL PRIMO PUNTO DI RAMIFICAZIONE

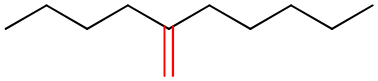


(E)-2-metil-es-3-ene

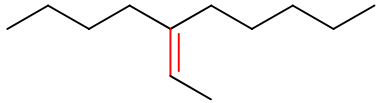
- SE I LEGAMI MULTIPLI SONO PIÙ DI UNO, LA NUMERAZIONE INIZIA DALL'ESTREMITÀ PIÙ VICINA A QUELLO CHE VIENE PER PRIMO



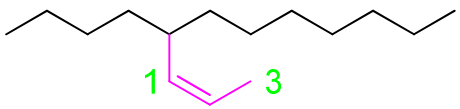
(E)-5-metil-esa-1,3-diene



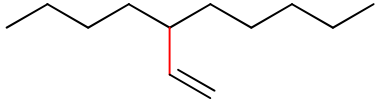
5-metilidenedecano



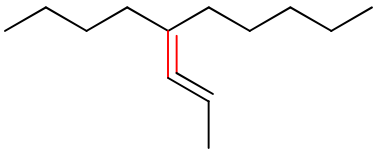
(5Z) 5-etilidenedecano



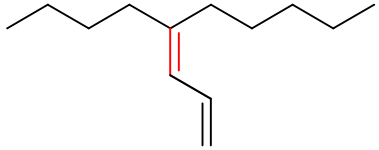
5-[(1Z)-prop-1-en-1-il]dodecano



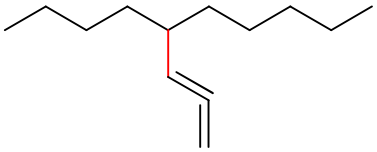
5-etenildecano



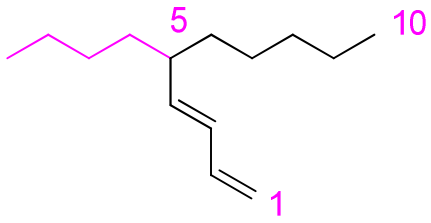
5-(prop-1-en-1-ilidene)decano



(5Z)-5-(prop-2-en-1-ilidene)decano



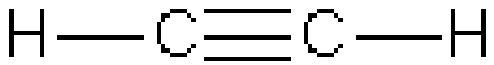
5-propadienildecano



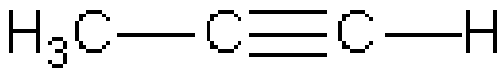
(3E)-5-butildeca-1,3-diene

Alchini

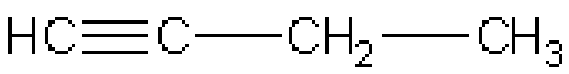
L'**etino** (C_2H_2, nome comune: acetilene) è il più semplice alchino



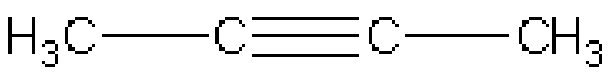
Il successivo è il **propino** (C_2H_4, nome comune: metilacetilene):



Il **butino** si presenta come due isomeri:

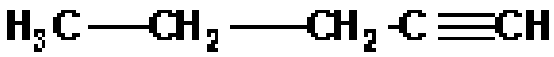


1-Butino



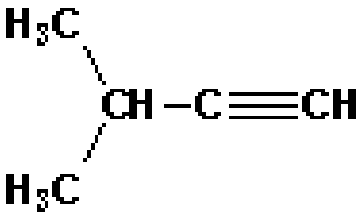
2-Butino

Il **pentino**, invece, come tre isomeri:



1-Pentino

2-Pentino

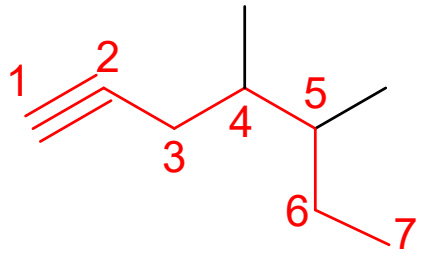


3-metil-1-butino

A causa della geometria linere del triplo legame gli alchini non danno isomeria cis-trans.

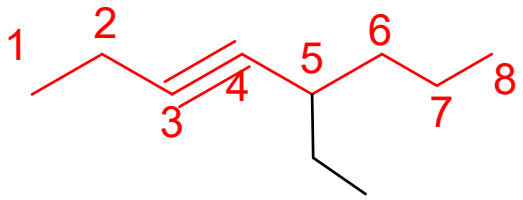
Nomenclatura

- Individuare la catena più lunga contenente il triplo legame e sostituire la desinenza *-ano* dell'alcano corrispondente con la desinenza ***-ino*** dell'alchino.



4,5-dimetilept-1-ino

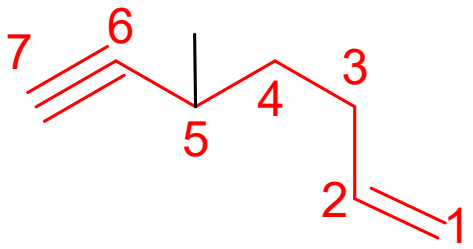
- la catena più lunga deve contenere il triplo legame e la sua numerazione deve iniziare dall'estremità più vicina al triplo legame, in modo da attribuirgli la numerazione più bassa.



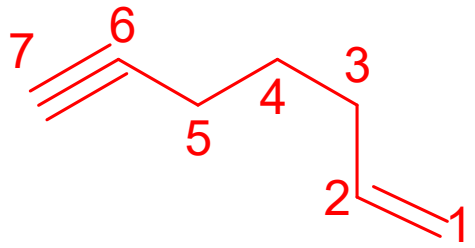
5-etilott-3-ino

N.B. Quando la catena contiene **anche** un doppio legame

- Se, sia il triplo legame che il doppio legame sono all'estremità della catena, si numera in modo che il doppio legame abbia la posizione più bassa (anche in presenza di sostituenti sulla catena)

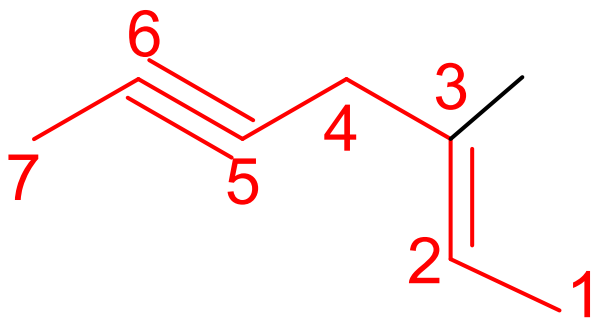


5-metilept-1-en-6-ino



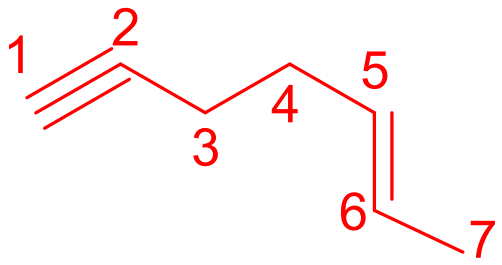
ept-1-en-6-ino

Allo stesso modo, se sia il doppio legame che il triplo sono interni, e si collocano nella stessa posizione partendo da un'estremità o dall'altra, si numera la catena in modo che il doppio legame abbia la posizione più bassa (pur rimanendo il triplo legame il gruppo a priorità maggiore)

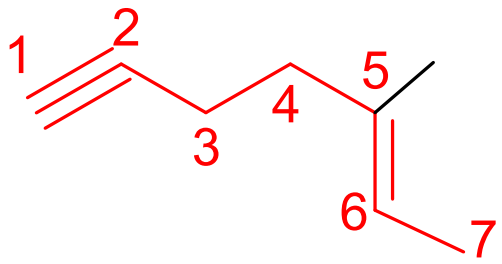


(E)-3-metil**ept-2-en-5-ino**

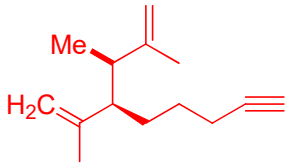
- <u>Se il triplo legame è esterno e il doppio legame è interno</u> alla catena, si numera in modo che il triplo legame abbia la posizione più bassa (anche in presenza di sostituzione)



(E)-ept-5-en-1-ino

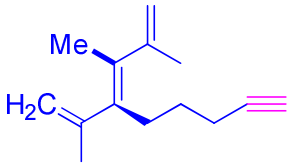


(E)-5-metilept-5-en-1-ino

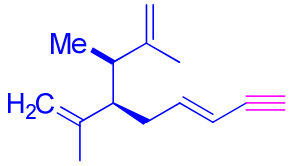


(3*R*,4*R*)-2,3-dimetil-
4-(prop-1-en-2-il)non-1-en-8-ino

Se è presente un'altra insaturazione nella catena principale
si deve numerare la catena cercando di dare a questa insaturazione
il numero più piccolo.

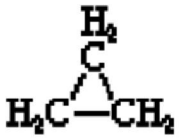
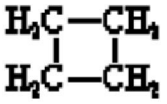
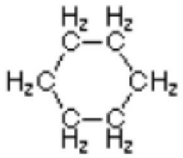
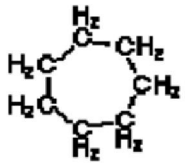
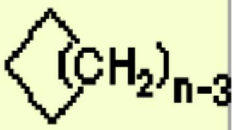


(*E*)-2,3-dimetil-4-(prop-1-en-2-il)
nona-1,3-dien-8-ino

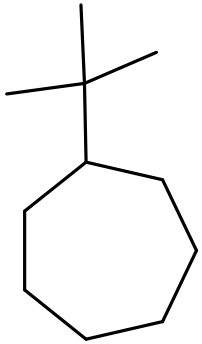


(6*R*,7*R*,*E*)-7,8-dimetil-6-(prop-1-en-2-il)
nona-3,8-dien-1-ino

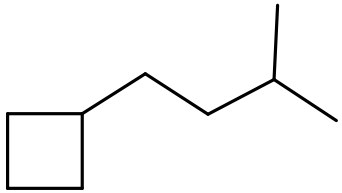
Nomenclatura dei CicloAlcani Semplici

Nome	Ciclopropano	Ciclobutano	Ciclopentano	Cicloesano	Cicloeptano	Cicloalcano
Formula Molecolare	C_3H_6	C_4H_8	C_5H_{10}	C_6H_{12}	C_7H_{14}	C_nH_{2n}
Struttura Condensata						$(CH_2)_n$
Struttura Lineare						

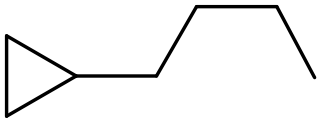
La Nomenclatura dei cicloalcani non sostituiti è molto semplice: basta mettere il prefisso "ciclo"prima del nome dell'alcano con il corrispondente numero di atomi di carbonio



tert-butilcicloeptano

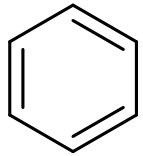


isopentilciclobutano

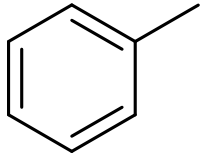


butilciclopropano

BENZENE

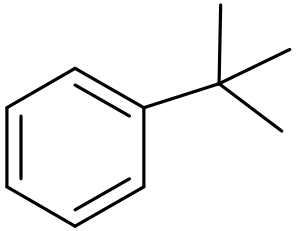


benzene

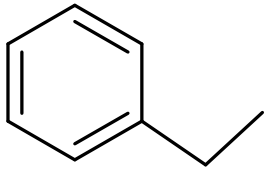


fenile (abbreviato come -C_6H_5 o Ph)

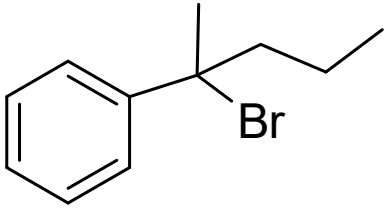
I composti in cui l'anello benzenico porta dei sostituenti con minore priorità, sono considerati come benzeni sostituiti



tert-butilbenzene

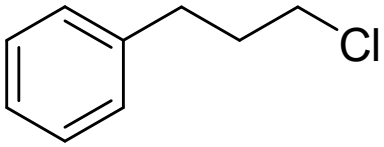


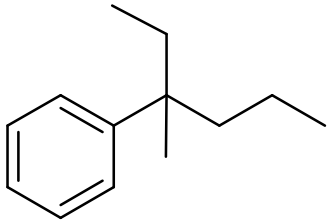
etilbenzene

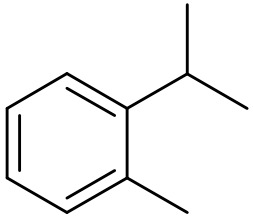


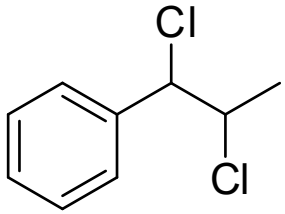
(S)-(2-bromopentan-2-il)benzene

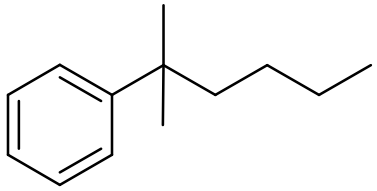
Assegnare il nome IUPAC ai seguenti composti:



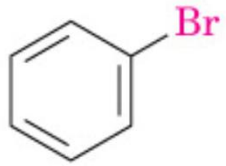




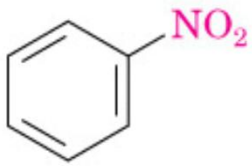




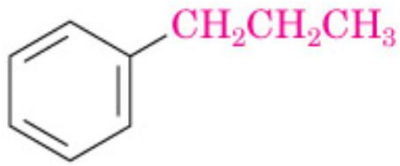
Nomenclatura dei derivati benzene: Derivati monosostituiti



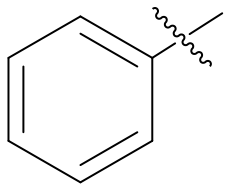
Bromobenzene



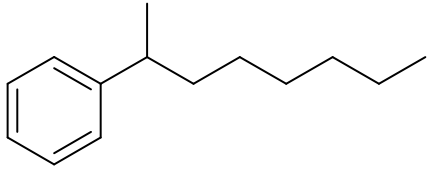
Nitrobenzene



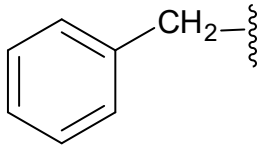
Propilbenzene



Gruppo fenilico

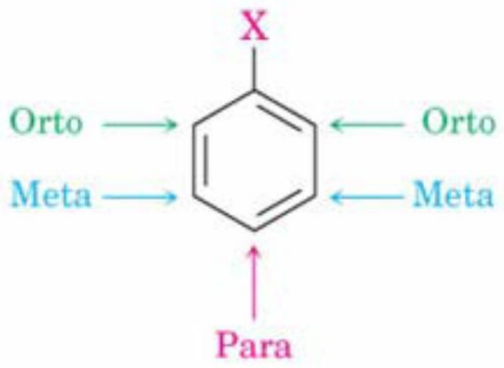


Ottan-2-il-benzene

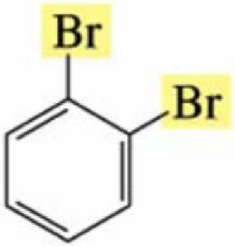


Gruppo Benzilico

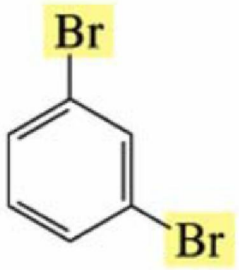
Nomenclatura dei derivati benzene: Derivati polisostituiti



Si numera l'anello in modo che i sostituenti abbiano i numeri più bassi possibili.



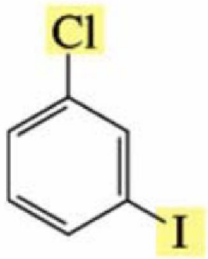
1,2-dibromobenzene
***ortho*-dibromobenzene**
***o*-dibromobenzene**



1,3-dibromobenzene
***meta*-dibromobenzene**
***m*-dibromobenzene**

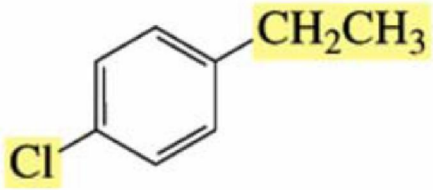
1,4-dibromobenzene
***para*-dibromobenzene**
***p*-dibromobenzene**

Se ci sono due sostituenti diversi, si usa l'ordine alfabetico

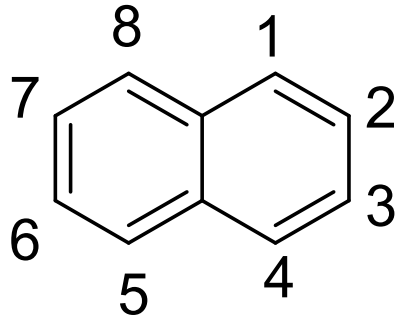


1-chloro-3-iodobenzene
meta-chloroiodobenzene
not
1-iodo-3-chlorobenzene
meta-iodochlorobenzene

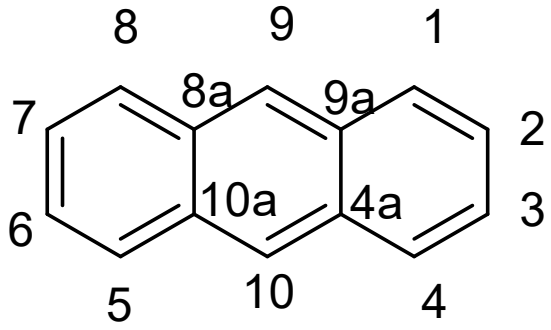
1-bromo-3-nitrobenzene
meta-bromonitrobenzene



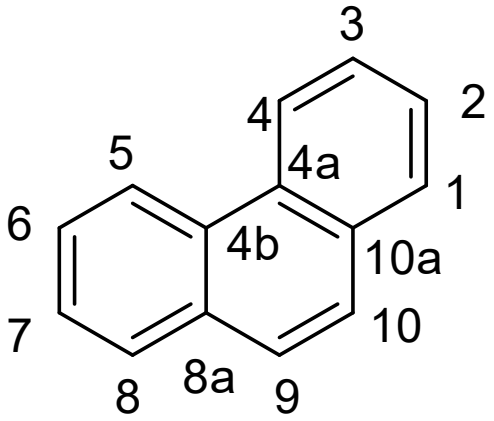
1-chloro-4-ethylbenzene
para-chloroethylbenzene



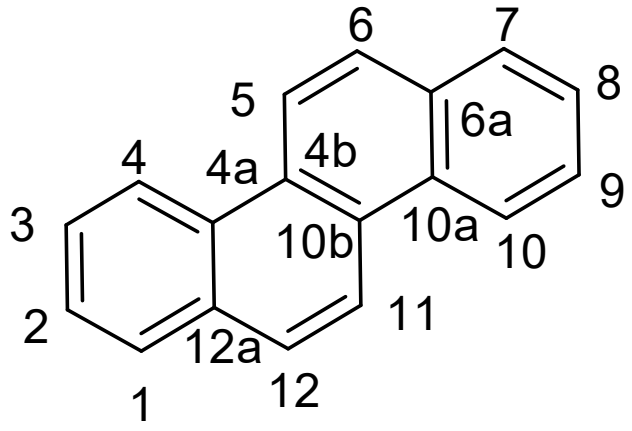
naftalene



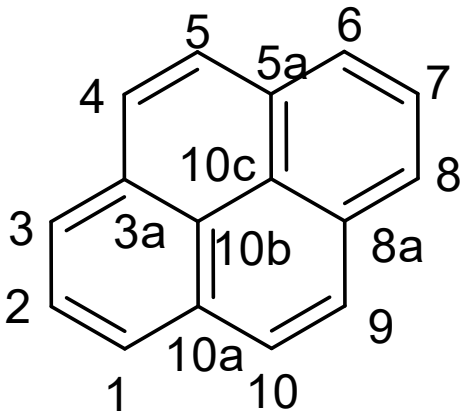
antracene



fenantrene

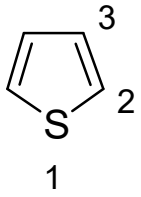


crisene

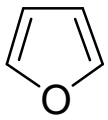


pirene

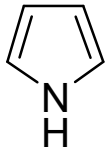
Composti eterociclici semplici



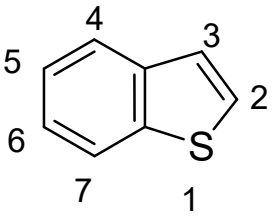
tiofene



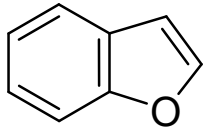
furano



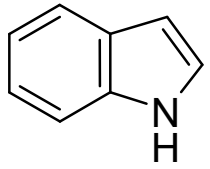
pirrolo



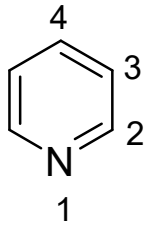
benzotiofene



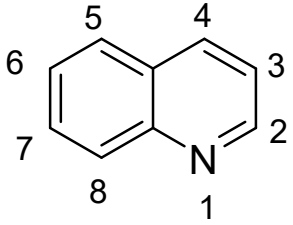
benzofurano



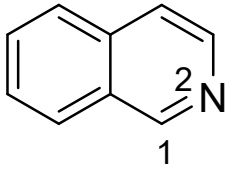
indolo



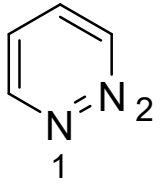
piridina



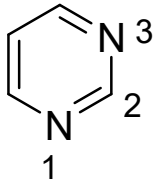
chinolina



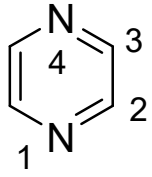
isochinolina



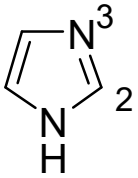
piridazina



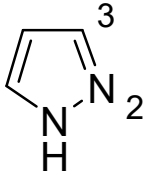
pirimidina



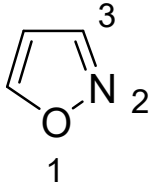
pirazina



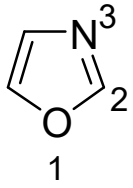
imidazolo



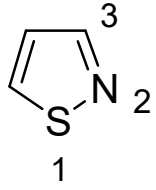
pirazolo



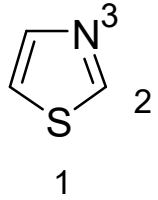
isossazolo



ossazolo



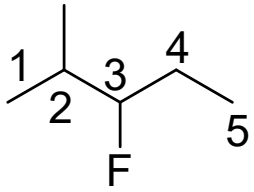
isotiazolo



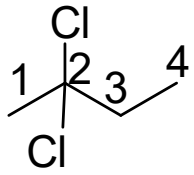
tiazolo

Alogenuri alchilici:

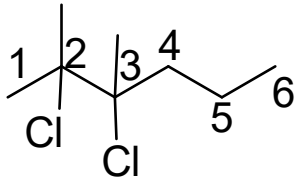
La nomenclatura segue le stesse regole viste per gli idrocarburi ramificati.
Per indicare la presenza degli alogeni si usano i prefissi **fluoro, cloro, bromo e iodio**



3-fluoro-2-metilpentano



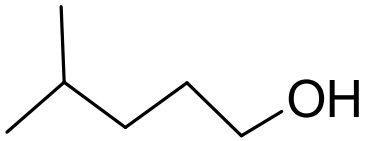
2,2-diclorobutano



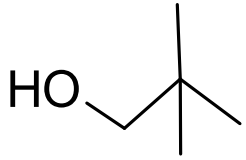
2,3-dicloro-3,4-dimetilesano

Alcoli

Per attribuire il nome ad un **alcol** bisogna individuare la catena idrocarburica più lunga contenente il gruppo ossidrilico **–OH**, e numerarla in modo che l'ossidrile abbia la posizione più bassa.

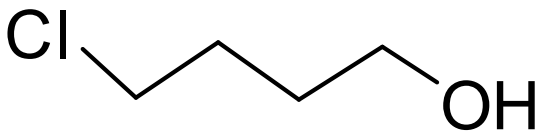


4-metilpentanolo



2,2-dimetilpropan-1-olo

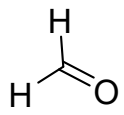
1,3-propandiolo



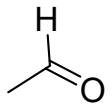
4-clorobutan-1-olo

Aldeidi

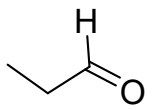
Il nome delle aldeidi semplici si genera cambiando la desinenza “O” dell’alcano con il suffisso “ale”. Gli altri sostitutenti verranno indicati come prefissi preceduti da un numero che identifica la posizione rispetto al gruppo aldeidico



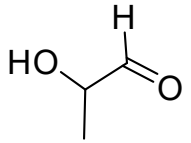
metanale
formaldeide



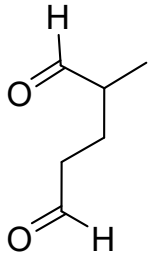
etanale
acetaldeide



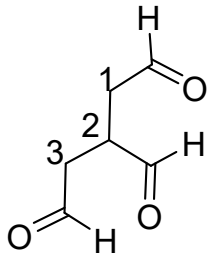
propanale



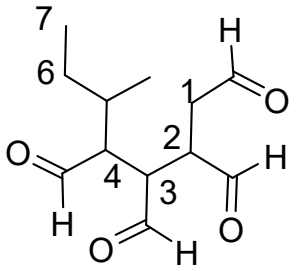
2-idrossipropanale



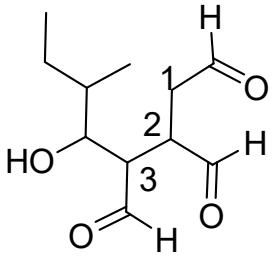
2-metilpentanodiale



propano-1,2,3-tricarbaldeide

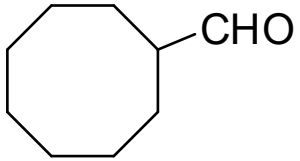


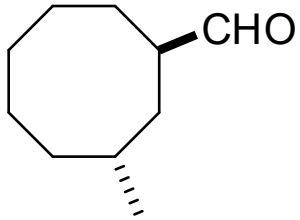
5-metileptano-1,2,3,4-tetracarbaldeide



4-idrossi-5-metileptano-1,2,3-tricarbaldeide

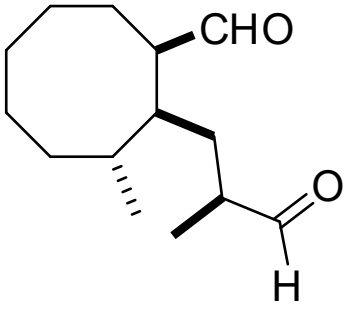
Se il gruppo aldeidico si trova legato ad un ciclo prende il nome di “Carbaldeide”





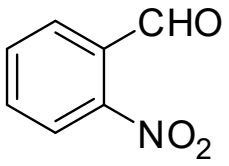
Cicloottancarbaldeide

trans-3-metilcicloottancarbaldeide

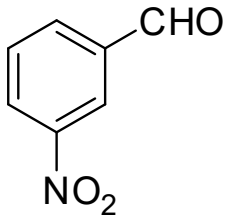


(1*R*,2*S*,3*R*)-3-metill-2-((*S*)-2-metil-3-ossopropil) cicloottancarbaldeide

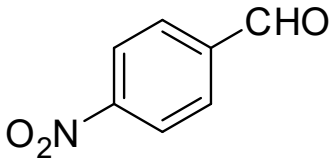
Se il gruppo aldeidico si trova legato ad un anello benzenico la molecola prende il nome di benzaldeide. Sostituenti secondari saranno posizionati nell'anello nelle posizioni *o*-, *m*-, *p*- oppure 2,3,4,5,6 rispetto al gruppo CHO.



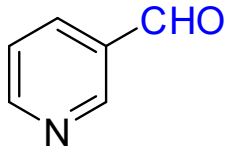
o-nitrobenzaldeide



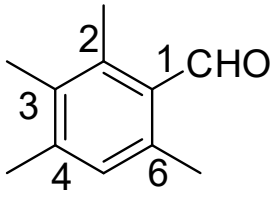
m-nitrobenzaldeide



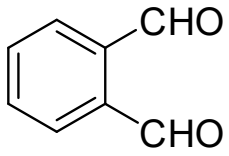
p-nitrobenzaldeide



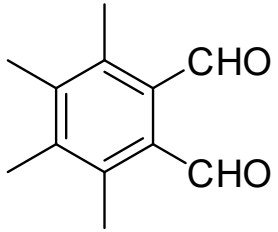
3-Piridincarbossaldeide
or
carbossialdeide



2,3,4,6-tetrametilbenzaldeide

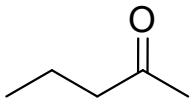


benzene-1,2-dicarbaldeide
ftalaldeide

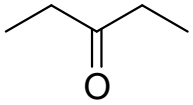


3,4,5,6-tetrametilbenzene-1,2-dicarbaldeide

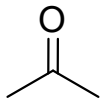
I **chetoni** si considerano derivati dall'idrocarburo corrisponente sostituendo la desinenza "O" con la desinenza **ONE.** ***Al carbonile bisogna dare il numero più piccolo possibile***



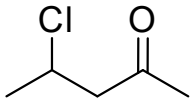
2-pentanone



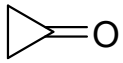
3-pentanone



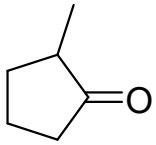
acetone
propanone



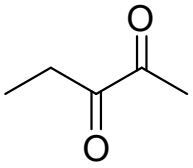
4-cloropentan-2-one



ciclopropanone

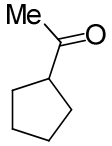


2-metilciclopentanone

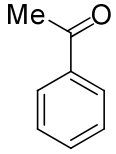


pentano-2,3-dione

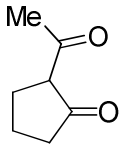
Alcune volte può essere preferibile considerare i gruppi organici come sostituenti del carbonile che viene indicato come chetone



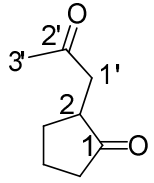
Ciclopentilmetilchetone
1-ciclopentiletanone



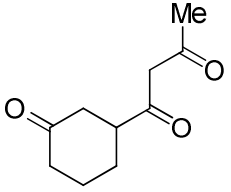
fenilmetilchetone
acetofenone



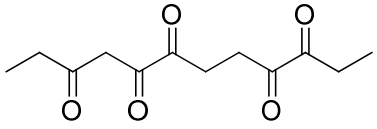
2-acetilciclopentanone



2-(2-ossopropil)ciclopentanone

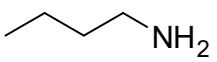


1-(3-ossocicloesil)butan-1,3-dione

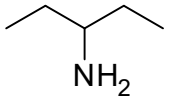


dodecane-3,4,7,8,10-pentaone

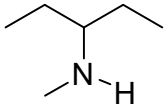
Ammine. Nella nomenclatura IUPAC la “O” finale dell’alcano è sostituita dalla desinenza ammina. La catena si numera dando al gruppo amminico il numero più piccolo possibile. Se l’ammina è sostituita gli altri sostituenti sono indicati da una *N* prima dei ripettivi nomi.



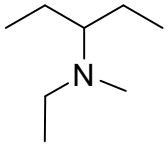
butanammina



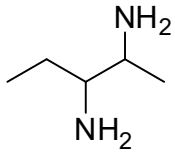
pentan-3-ammina



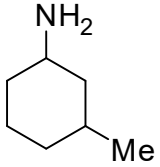
N-metilpentan-3-ammina



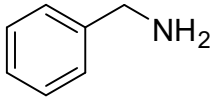
N-*etil*-*N*-metilpentan-3-ammina



pentano-2,3-diammina

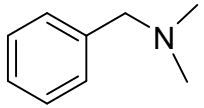


cis-3-metilcicloesanammina



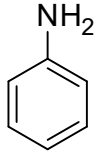
benzilammina

fenilmetanamina

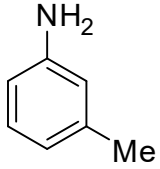


N,*N*-dimetilbenzilammina

N,*N*-dimetil-1-fenilmetanammina

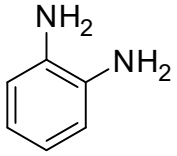


Anilina



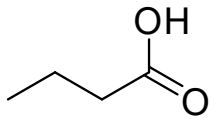
m-toluidina

3-metilanilina

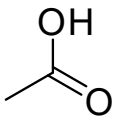


benzene-1,2-diammina

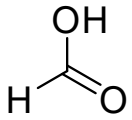
Acidi. La vocale “O” dell’idrocarburo si cambia con la desinenza “OICO” aggiungendo la parola acido al nome così ottenuto. Al carbossile si dà il numero più piccolo.



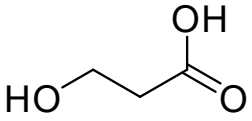
acido butanoico



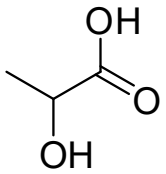
acido acetico



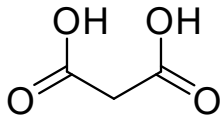
acido formico



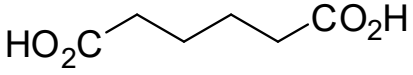
acido 3-idrossipropanoico



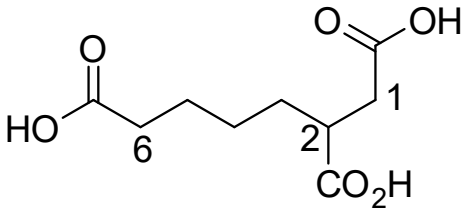
acido 2-idrossipropanoico
acido lattico



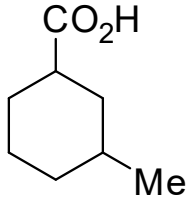
acido malonico



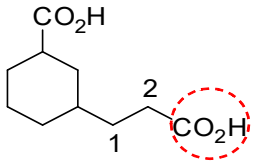
acido adipico
acido esandioico



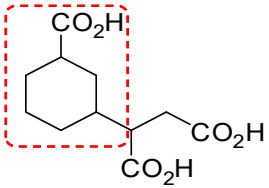
acido esano-1,2,6-tricarbossilico



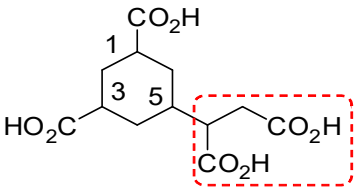
acido cis-3-metilcicloesancarbossilico



acido
3-(2-carbossietil)cicloesancarbossilico

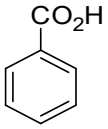


acido
2-(3-carbossicicloesil)succinico

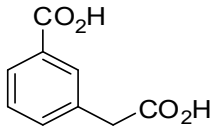


acido 5-(1,2-dicarbossietil)cicloesano-
-1,3-dicarbossilico

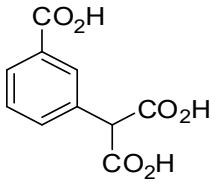
3-(carboxymethyl)benzoic acid



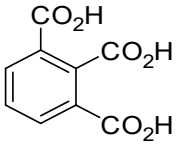
acido benzoico



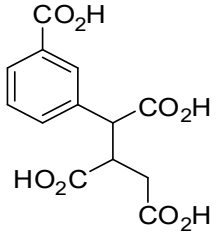
acido 3-(carbossimetil)benzoico



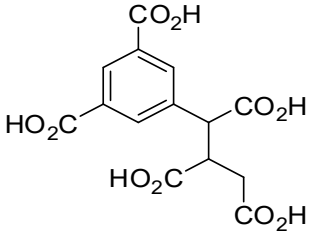
acido 2-(3-carbossifenil)malonico



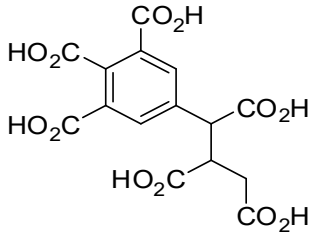
acido benzene-1,2,3-tricarbossilico



acido 1-(3-carbossifenil)propano-
-1,2,3-tricarbossilico



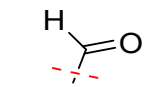
acido 1-(3,5-dicarbossifenil)propano-1,2,3-
tricarbossilico



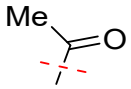
acido 5-(1,2,3-tricarbossipropil)benzene-
-1,2,3-tricarbossilico

Nomenclatura dei gruppi acilici e degli alogenuri acilici

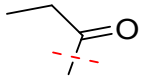
Il gruppo RCO si chiama acile; Il gruppo PhCO benzoile



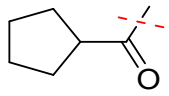
formile



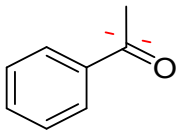
acetile



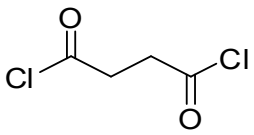
propanoile



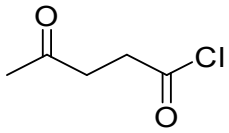
ciclopentancarbonile



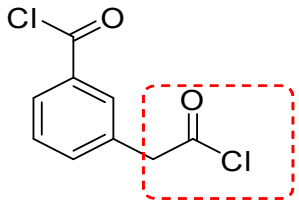
benzoile



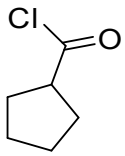
dicloruro di butandioile
dicloruro di succinile



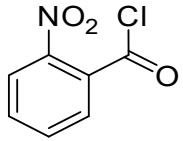
cloruro di 4-ossopentanoile



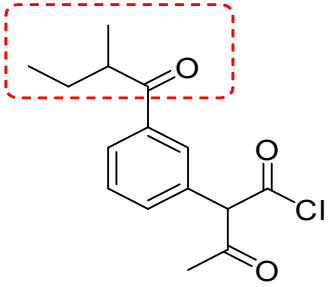
3-(2-cloro-2-ossetil)benzoil cloruro



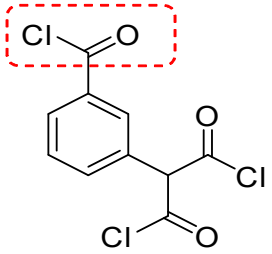
cloruro di
ciclopentancarbonile



cloruro di 2-nitrobenzoile

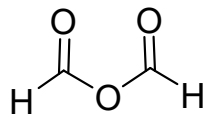


2-(3-(2-metilbutanoil)fenil)-
-3-ossobutanoil chloride

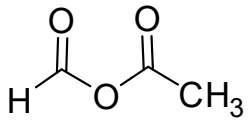


2-(3-(clorocarbonil)fenil)malonil
dicloruro

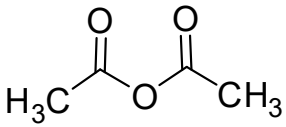
Anidride. Conserva il nome dell'acido, sostituendo la parola acido con anidride e la "O con A"



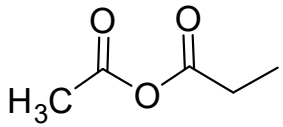
anidride formica



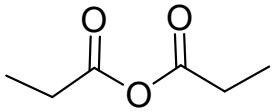
anidride acetoformica



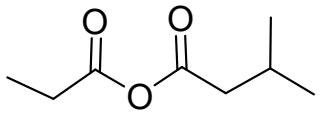
anidride acetica



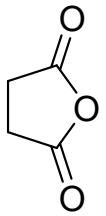
anidride acetopropionica



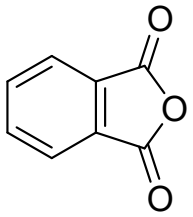
anidride propionica



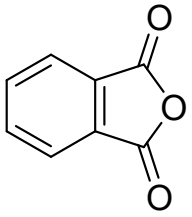
anidride 3-metilbutan**oica** propionica



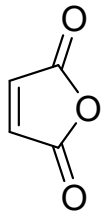
anidride succinica



anidride ftalica

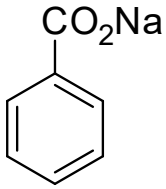


anidride ftalica

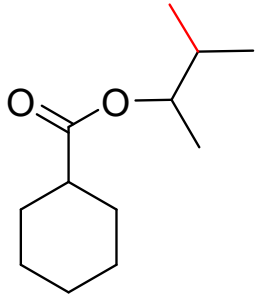


anidride maleica

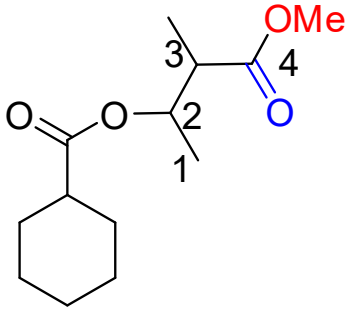
Sali ed Esteri. Il nome dei Sali e degli Esteri si ottiene premettendo il nome del catione per i Sali, e il nome del residuo alchilico legato al gruppo alcossilico per gli Esteri, seguito dal nome dell'acido in cui è stata sostituita la desinenza "**ICO"** con il suffisso "ATO".



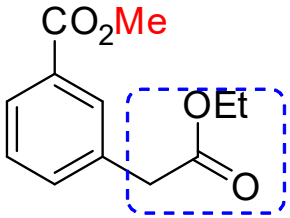
sodio benzoato



3-metilbutan-2-il cicloesancarbossilato



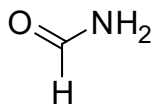
4-metossi-3-metil-4-ossobutan-2-il cycloesancarbossilato



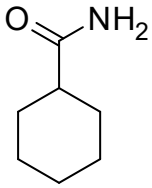
metil 3-(2-etossi-2-ossoetil)benzoato

metil 3-(etossicarbonilmetil)benzoato

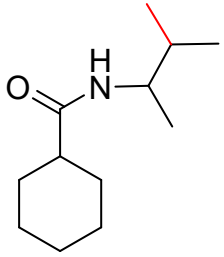
Ammidi. Il nome delle ammidi si ottiene dall'acido togliendo la parola acido e sostituendo la desinenza **oico** con **AMMIDE**



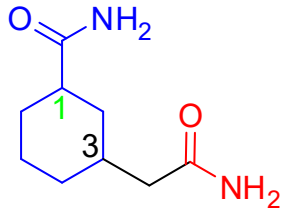
formammide



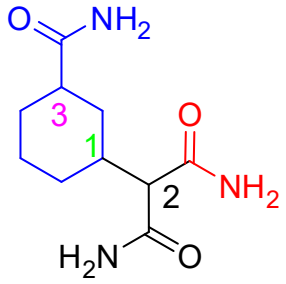
cicloesancarbossiammide



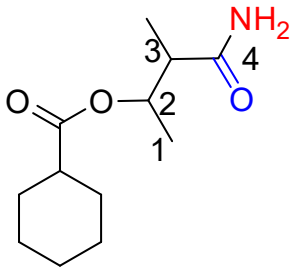
N-(3-metilbutan-2-il)cicloesancarbossiammide



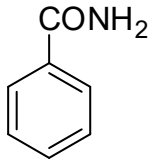
3-(2-ammino-2-ossoetil)cicloesancarbossiammide



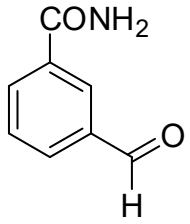
2-(3-carbamoilcicloesil)malonammide



4-ammino-3-metil-4-ossobutan-2-il cycloesancarbossilato

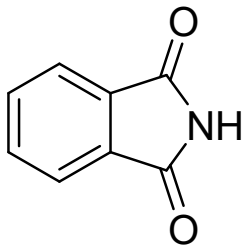


benzamide

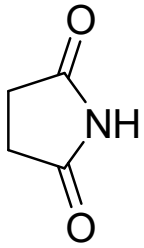


3-formilbenzamide

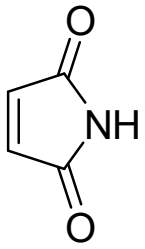
Immidi. Ammidi cicliche in cui due gruppi acilici sono legati allo stesso atomo di azoto.
Questi composti si formano con facilità se è possibile la chiusura di anelli a cinque o sei termini.



ftalimmide

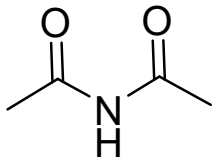


succinimmide

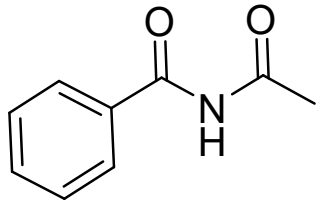


maleimmide

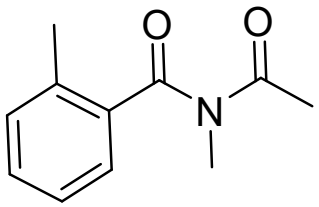
NB.



N-acetilacetammide



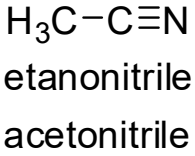
N-acetilbenzammide



N-acetil-*N*,2-dimetilbenzammide

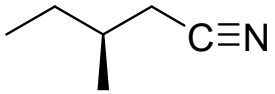
I nitrili sono composti che contengo il gruppo ciano 

Al nome dell'idrocarburo corrispondente si aggiunge il suffisso nitrile

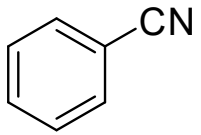


etanonitrile

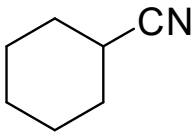
acetonitrile



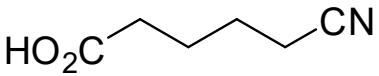
(*S*)-3-metilpentanonitrile



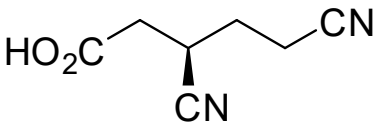
benzonitrile



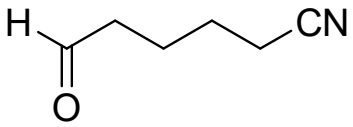
cicloesanocarbonitrile



acido 5-cianopentanoico

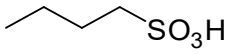


acido (*R*)-3,5-dicianopentanoico

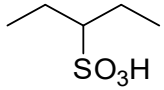


6-ossoesanonitrile

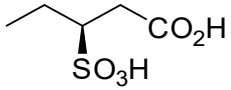
Acidi solfonici, Radicali, Anioni e Cationi



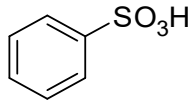
acido butansolfonico



acido pentan-3-solfonico

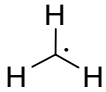


acido (*S*)-3-solfopentanoico



acido benzen sofonico

Priorità 1

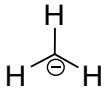


metil

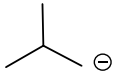
terz-butil

propan-2-il

Priorità 2

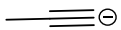


metanide



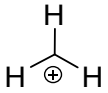
2-metilpropan-1-ide

2-metilpropan-2-ide



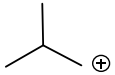
prop-1-in-1-ide

Priorità 3



metilio

2-metilprop-2-ilio



2-metilprop-1-ilio