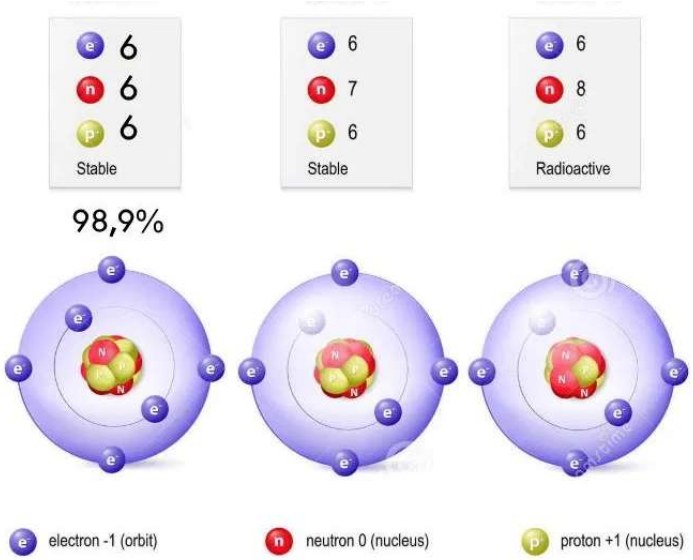
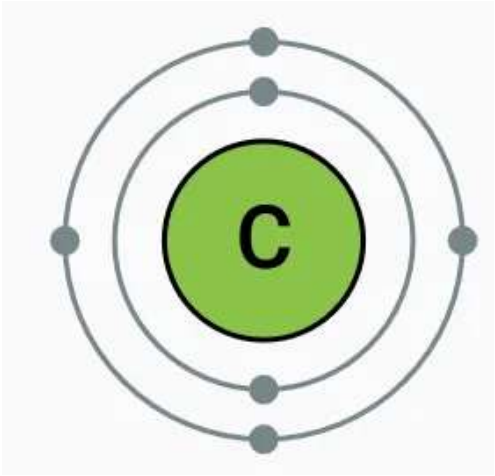
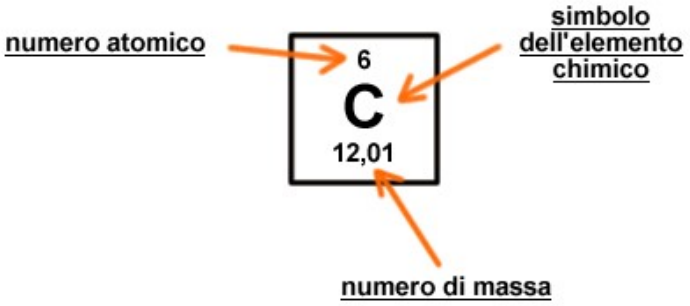
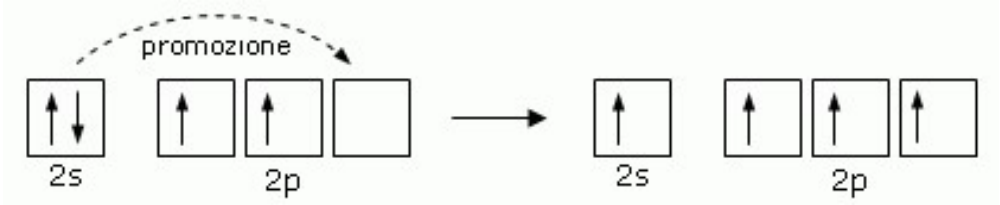
L'ATOMO DI CARBONIO

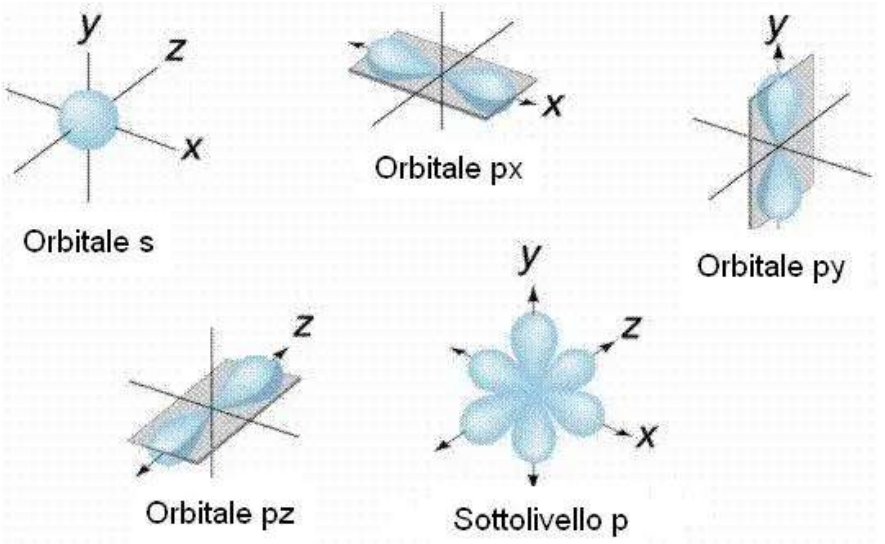








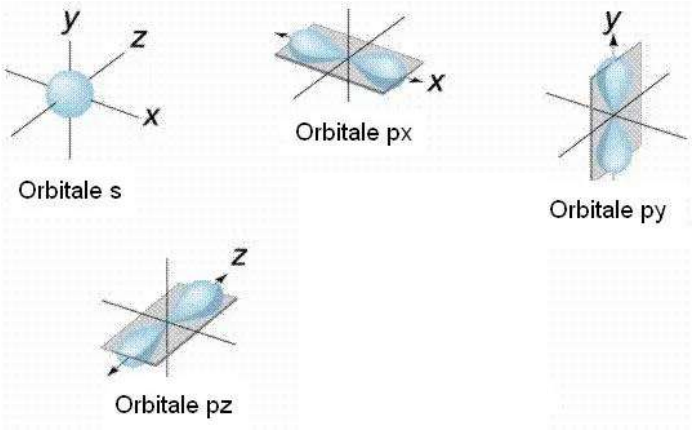
stato fondamentale stato eccitato



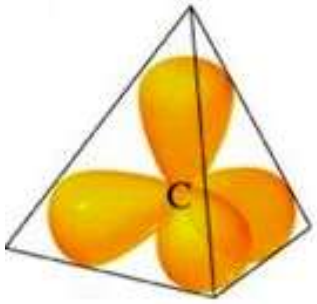
IDROCARBURI

Idrocarburi Alifatici	SATURI	ALCANI (o Paraffine)	solo legami tutti atomi di C sp^3
	INSATURI	ALCHENI (o Olefine)	doppio legame C-C (ibridazione sp^2)
		ALCHINI (o Acetilenici)	triplo legame C-C (ibridazione sp)

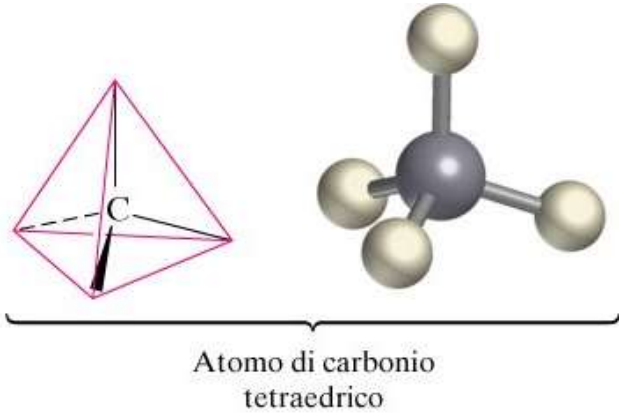
L'ATOMO DI CARBONIO
ibridazione *sp³*
4 domini



Ibridazione sp^3

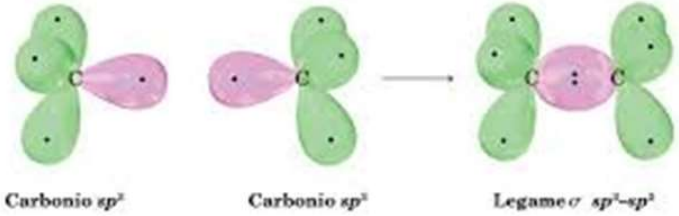


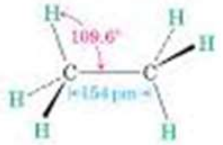
orbitale sp^3



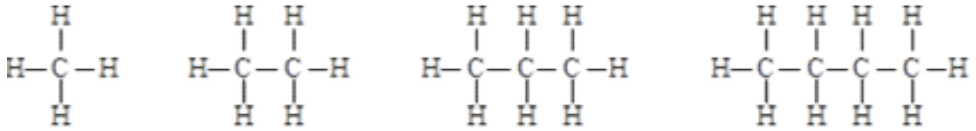
metano

etano

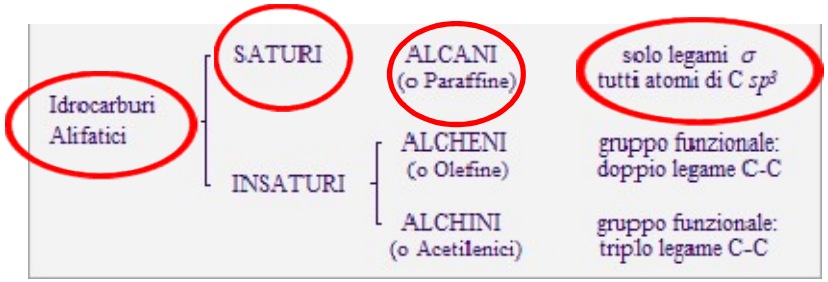




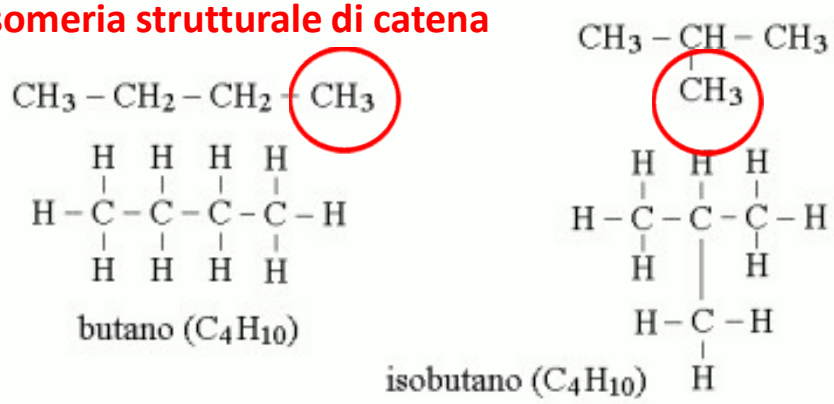
IDROCARBURI
alcani

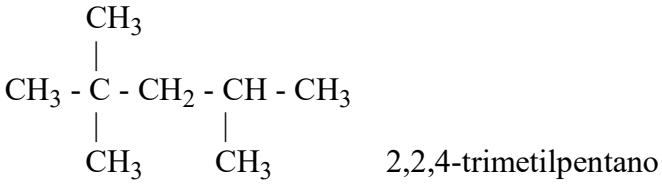


Metano Etano Propano Butano

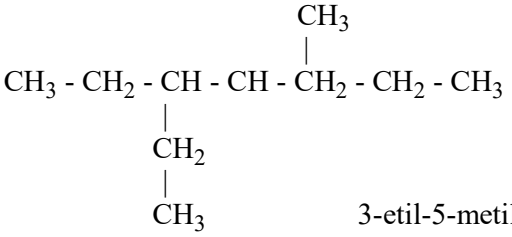


Isomeria strutturale di catena

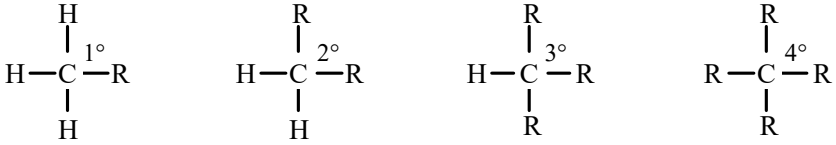




2,2,4-trimetilpentano

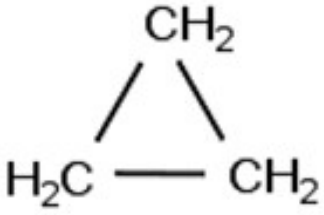


3-etil-5-metileptano

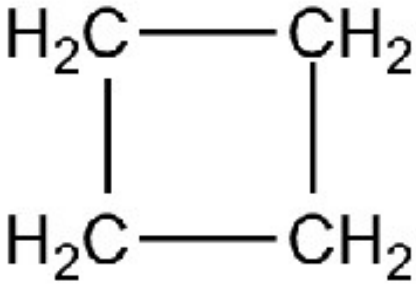


carbonio 1° **carbonio 2°** **carbonio 3°** **carbonio 4°**

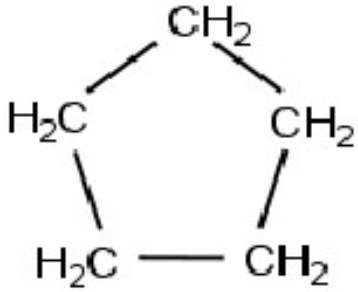
IDROCARBURI
cicloalcani



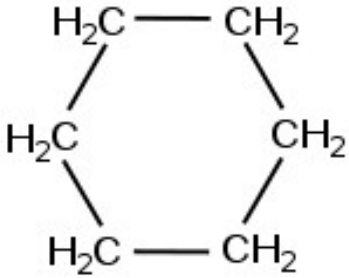
Ciclopropano



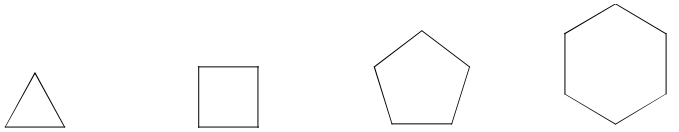
Ciclobutano



Ciclopentano

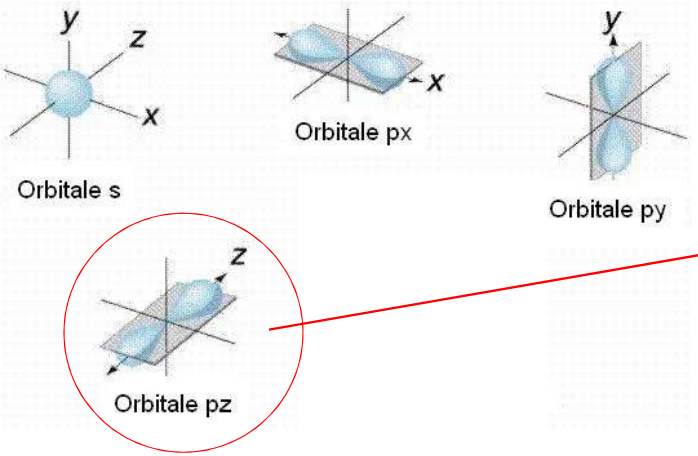


Cicloesano

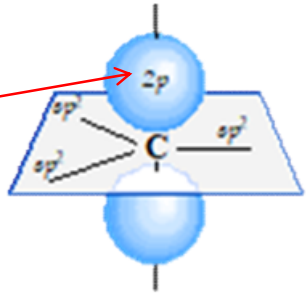


ciclopropan ciclobutanc ciclopentan cicloesan

L'ATOMO DI CARBONIO
ibridazione *sp²*
3 domini

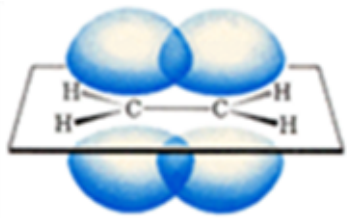


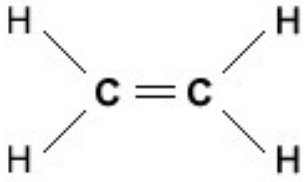
Ibridazione
sp^2

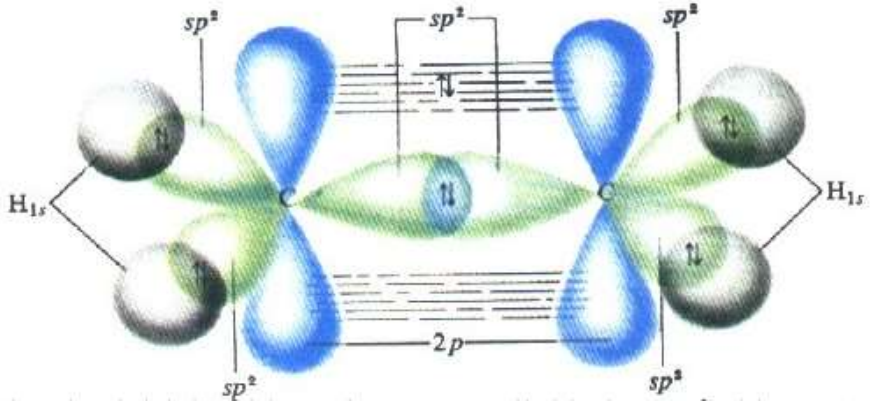


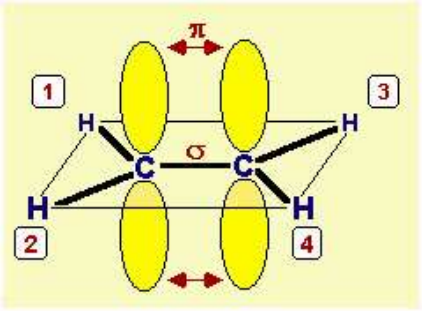
orbitale sp^2

etene

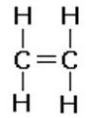




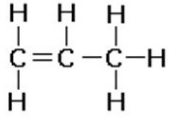




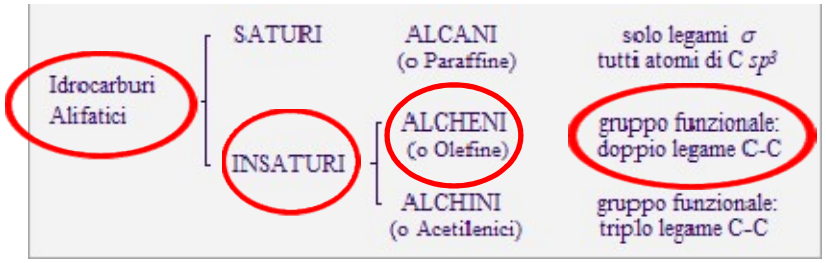
IDROCARBURI
alcheni



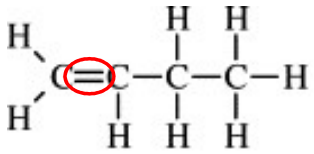
etene



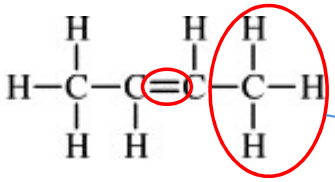
propene



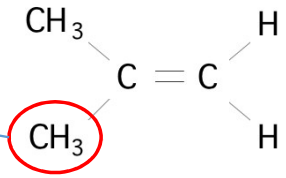
isomeria butene



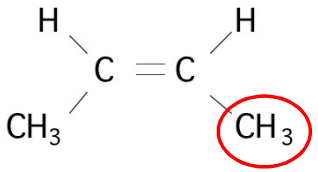
1-butene



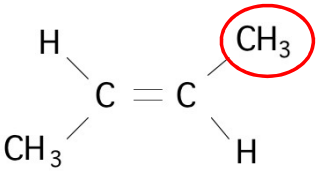
2-butene



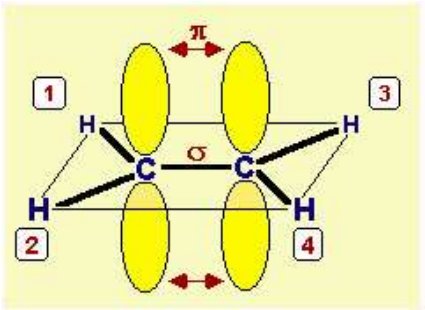
*iso*butene

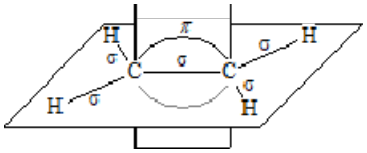


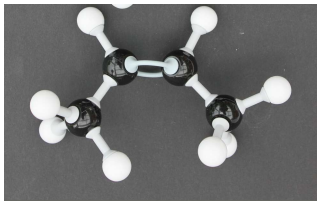
cis-2-butene

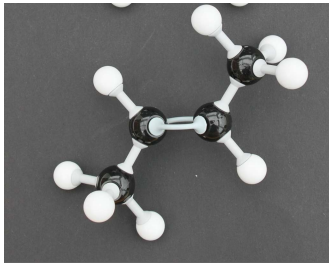


*trans*2-buten

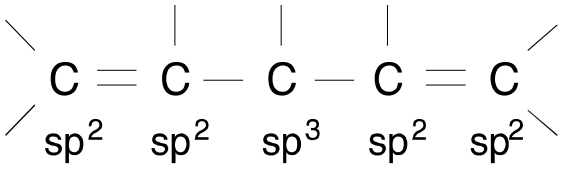




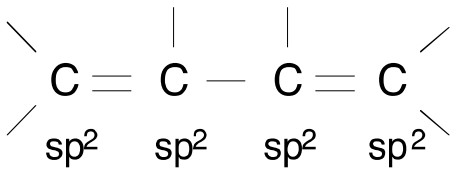




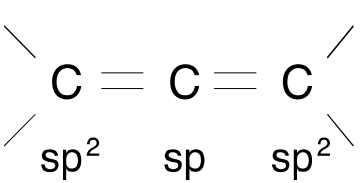
IDROCARBURI
dieni



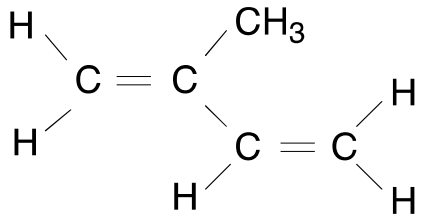
isolati



coniugati

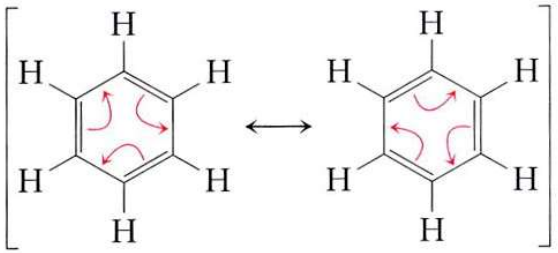


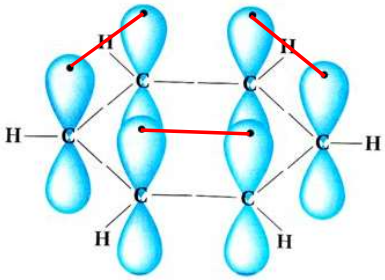
cumulati

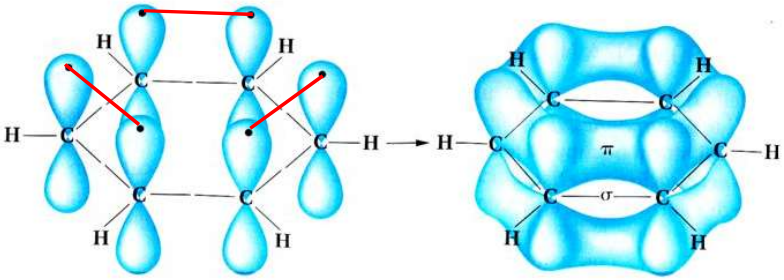


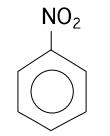
isoprene
2-metil 1,3-butadiene

IDROCARBURI
aromatici
(benzene)

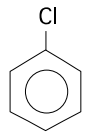




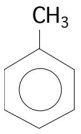




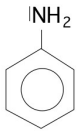
nitrobenzen



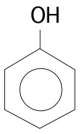
clorobenze



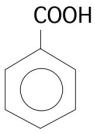
toluene



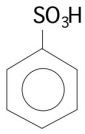
anilina



fenolo

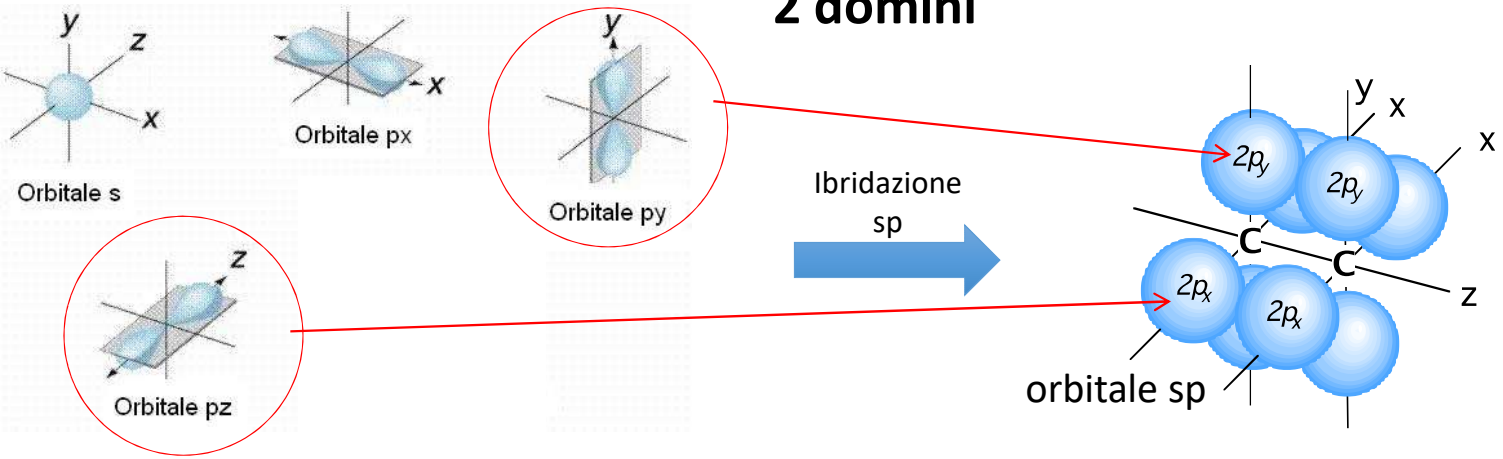


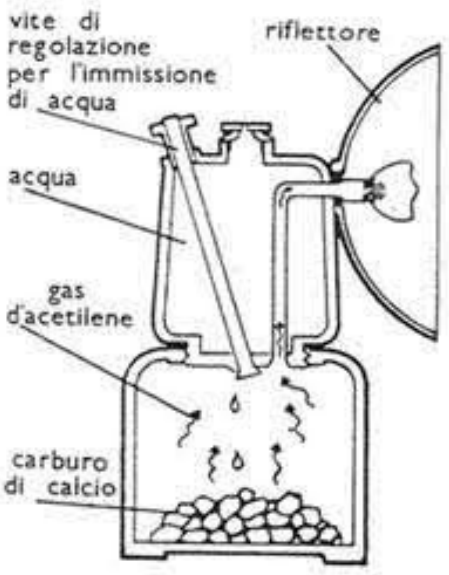
acido benzoic



acido benzensolfonic

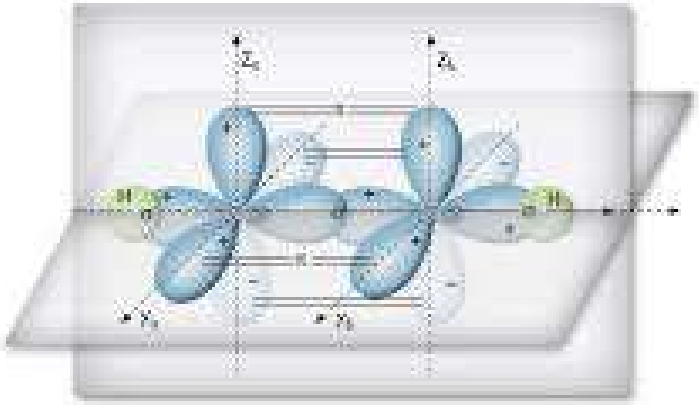
L'ATOMO DI CARBONIO
ibridazione *sp*
2 domini



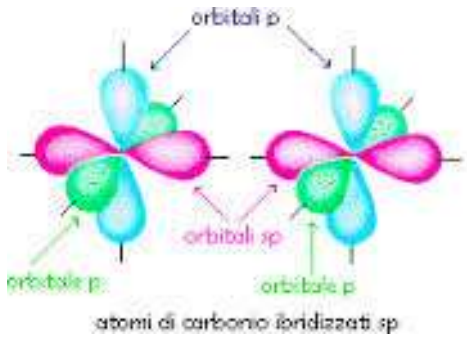


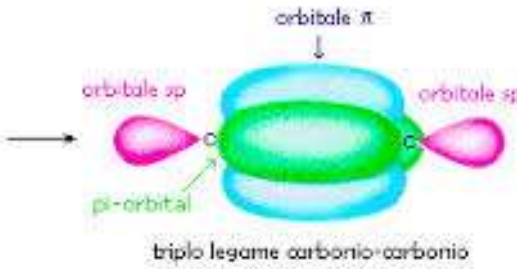
Lampada ad acetilene

etino (acetilene)

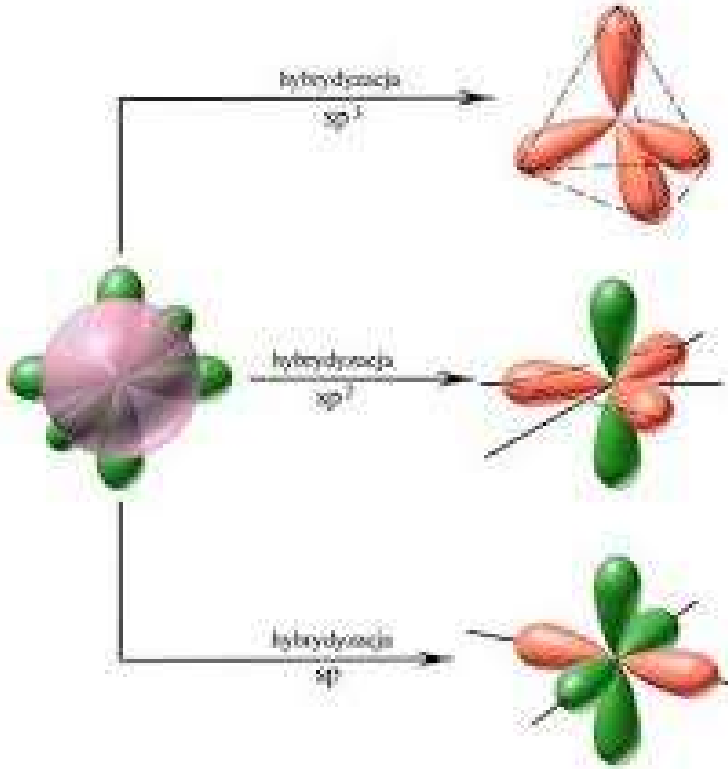


H—C≡C—H





IBRIDAZIONE sp^3, sp^2, sp



sp^3 geometria tetraedrica, angoli legame 109°5'

sp^2 geometria triangolare planare, angoli legame 120°

sp geometria lineare, angoli legame 180°

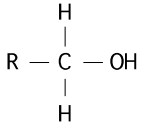
Gruppi funzionali delle principali classi di composti organici

gruppo funzionale		*classe di composti*	*note*
C = C	doppio legame C-C	**alcheni**	
C ≡ C	triplo legame C-C	**alchini**	
-OH	ossidrile	**alcoli**	quando è legato ad un carbonio sp^3
		enoli	quando è legato ad un carbonio sp^2
		fenoli	quando è legato ad un anello aromatico
-SH	solfidrilico	**tioli**	legato a C sp^3
	aldeidico	**aldeidi**	
	carbonilico	**chetoni**	
-C ≡ N	nitrile	**nitrili**	
	carbossilico	**acidi carbossilici**	
$-NH_2$	amminico	**ammine primarie alifatiche**	quando sostituisce un H in un alcano
		ammine primarie aromatiche	quando è legato ad un anello aromatico
		ammidi	quando sostituisce un –OH in un gruppo carbossilico

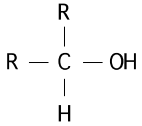
Diversi composti organici possono contenere due o più gruppi funzionali, come ad esempio gli **idrossiacidi** (ossidrile + carbossilico), i **chetoacidi** (chetonico + carbossilico), gli **amminoacidi** (amminico + carbossilico), i **carboidrati** (aldeidico o chetonico + due o più ossidrili).

ALCOLI

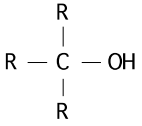
R-OH



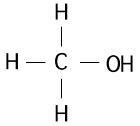
primario



secondario



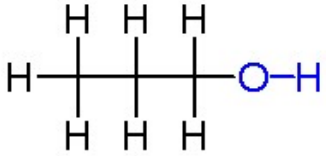
terziario



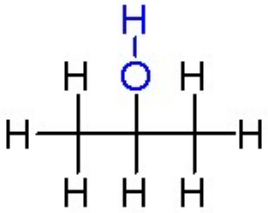
alcool metilicc
"nullario"

CH_3OH
metanolo
(alcol metilico)
alcol primario

$CH_3–CH_2OH$
etanolo
(alcol etilico)
alcol primario



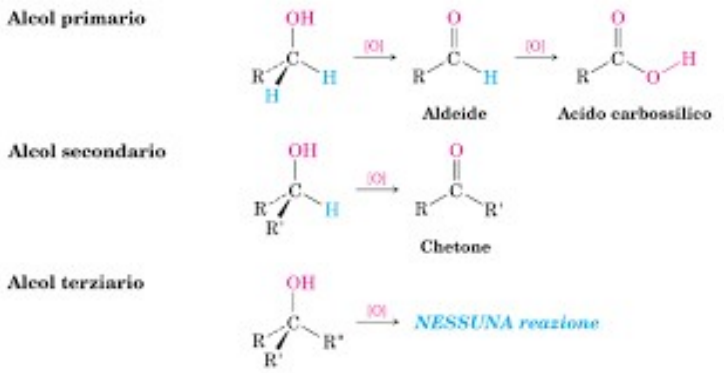
1-propanolo
n-propanolo
alcol primario
secondario



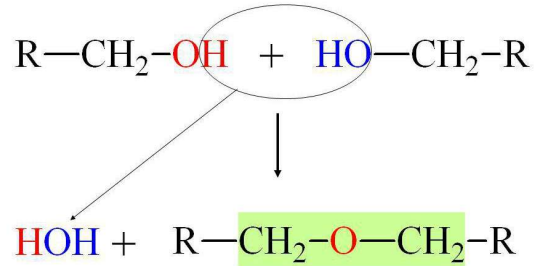
2-propanolo
iso-propanolo
alcol

REAZIONI CARATTERISTICHE ALCOLI

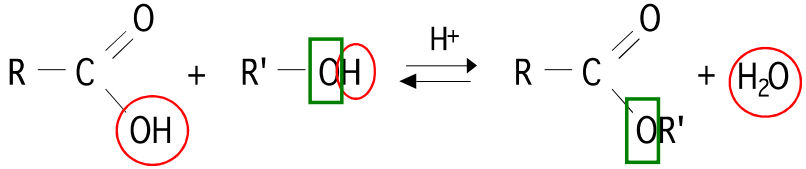
ossidazione alcoli



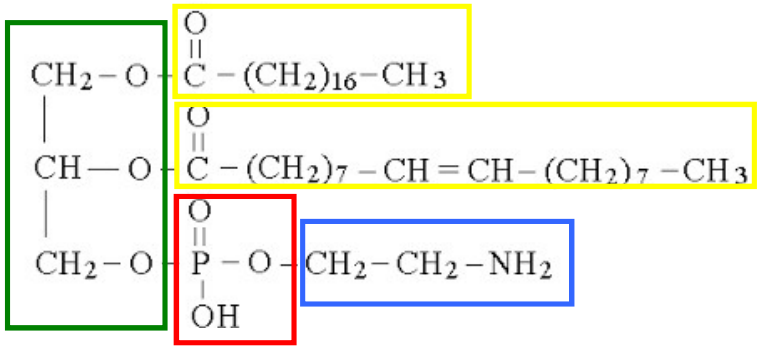
eteri



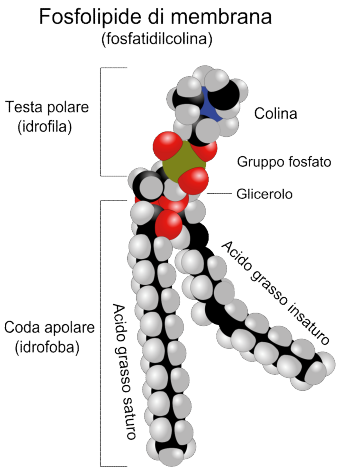
esteri



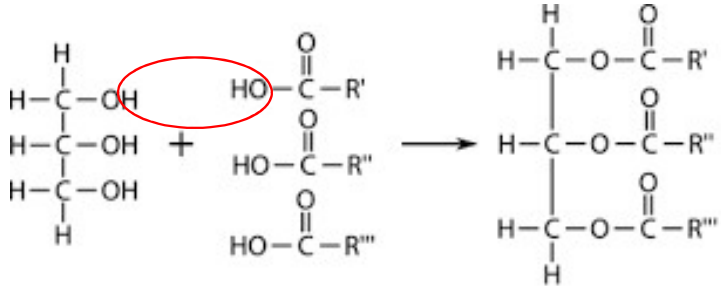
fosfoesteri del glicerolo (fosfolipidi)
fosfatidil etanolammina



- glicerolo
- Acidi grassi
- fosfato
- etanolammina



esteri del glicerolo (trigliceridi)

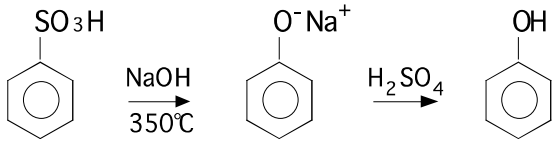


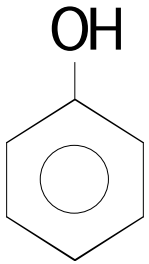
Glicerolo
Triolo

acidi grassi

triacilglicerolo
(trigliceride)

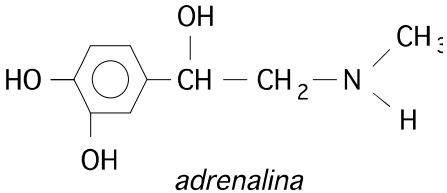
FENOLO



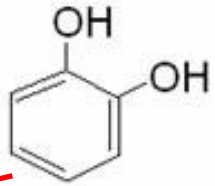


fenolo

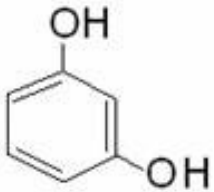
POLIFENOLI



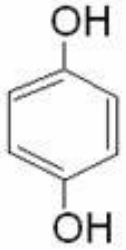
adrenalina



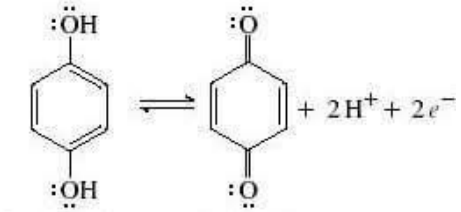
catecolo



resorcinolo



idrochinone



Idrochinone Benzochinone

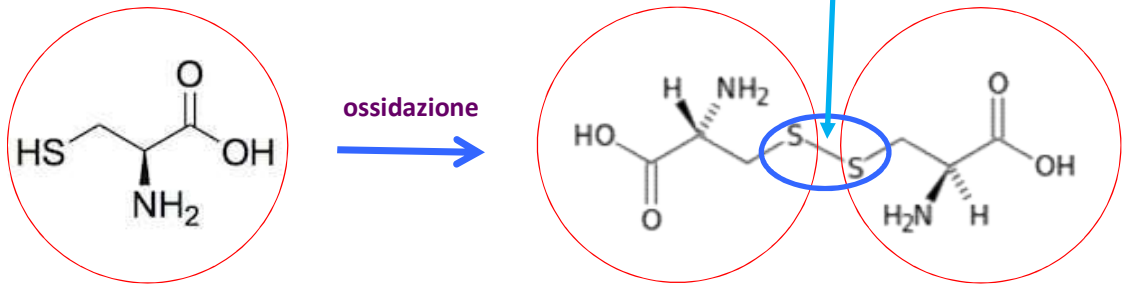
TIOLI (R-SH)

CH3-SH *metilmercaptano* o *metantiolo*
CH3CH2-SH *etilmercaptano* o *etantiolo*
CH2=CHCH2-SH *allilmercaptano* o *propentiolo*

Ponte disolfuro

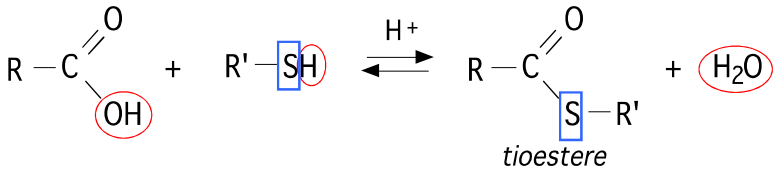
Ossidazione del gruppo - SH

R-SH + HS-R ossidazione **======>** **R-S-S-R**
disolfuro

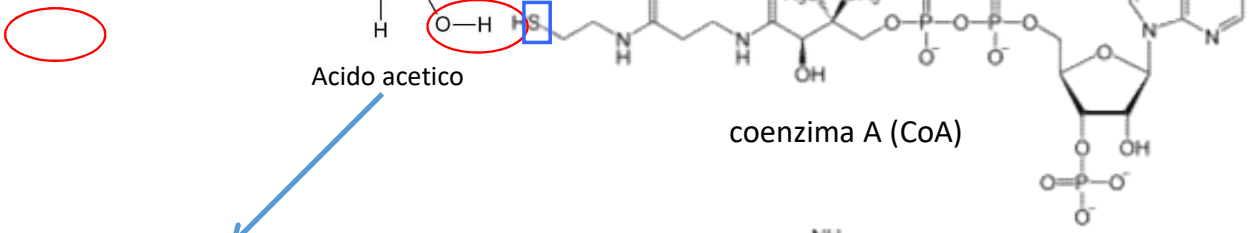


cisteina cistina

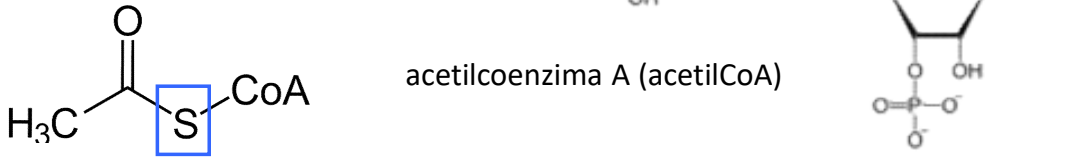
TIOESTERI



tioestere

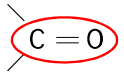


Acido acetico coenzima A (CoA)

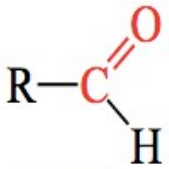


acetilcoenzima A (acetilCoA)

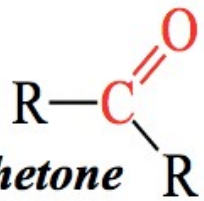
ALDEIDI E CHETONI



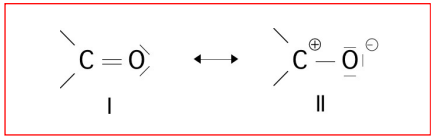
gruppo carbonilico



aldeide

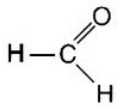


chetone

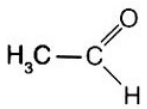


I II

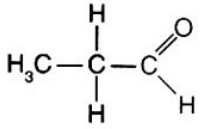
Nomenclatura aldeidi



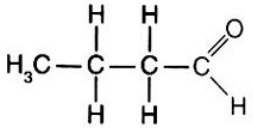
Metanale
(aldeide **formica**)



Etanale
(aldeide **acetica**)

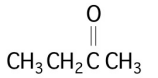


Propanale
(aldeide **propionica**)

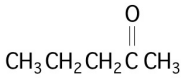


Butanale
(aldeide **butirrica**)

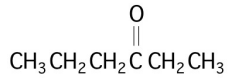
Nomenclatura chetoni



butanone
(metil-etilcheton

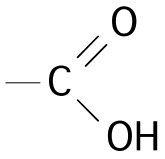


2-pentanone
(metil-propilchetor



3-esanone
(etil-propilcheton

ACIDI CARBOSSILICI



Numerazione atomi di C negli acidi carbossilici

numeri

$\cdots {}_4C - {}_3C - {}_2C - {}_1COOH$

lettere alfabeto greco

$\cdots {}_\delta C - {}_\gamma C - {}_\beta C - {}_\alpha C - COOH$

Acidi grassi

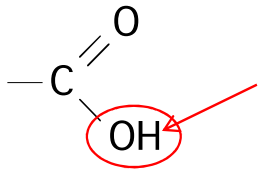
acidi grassi saturi (Cn:0)		acidi grassi insaturi (Cn:m, *cis/trans* x)[1]	
C6	acido capronico		
C8	acido caprilico		
C10	acido caprinico		
C12	acido laurico		
C14	acido miristico		
C16	acido palmitico	C16:1, cis 9	acido palmitoleico
C18	acido stearico	C18:1, cis 9	acido oleico
C20	acido arachidico	C18:2, cis 9,12	acido linoleico[e]
C22	acido benico	C18:3, cis 9,12,15	acido linolenico[e]
C24	acido lignocerico	C20:4, cis 5,8,11,14	acido arachidonico[e]

[1)] n= numero atomi carbonio; m= numero doppi legami, x = posizione del primo dei due atomi di carbonio impegnati nel doppio legame.

[e)] acidi grassi **essenziali**. Gli animali superiori non sono in grado di sintetizzare a.g. poliinsaturi, che devono essere quindi assunti con la dieta.

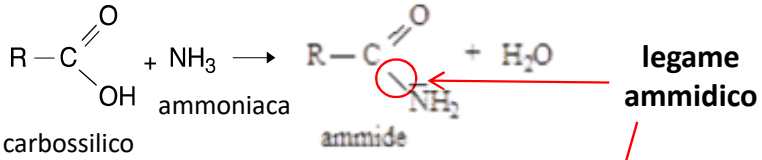
Formula	Fonte	Nome tradizionale	Nome IUPAC
HCOOH	formiche	acido formico	acido metanoico
CH_3COOH	aceto	acido acetico	acido etanoico
CH_3CH_2COOH	latte	acido propionico*	acido propanoico
$CH_3(CH_2)_2COOH$	burro	acido butirrico	acido butanoico
$CH_3(CH_2)_3COOH$	radice della valeriana	acido valerianico	acido pentanoico
$CH_3(CH_2)_4COOH$	capre	acido capronico	acido esanoico
$CH_3(CH_2)_5COOH$	fiore della vite	acido enantico	acido eptanoico
$CH_3(CH_2)_6COOH$	capre	acido caprilico	acido ottanoico
$CH_3(CH_2)_7COOH$	pelargonio	acido pelargonico	acido nonanoico
$CH_3(CH_2)_8COOH$	capre	acido caprinico	acido decanoico

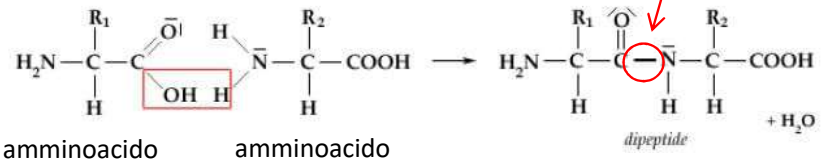
ACIDI CARBOSSILICI
derivati funzionali



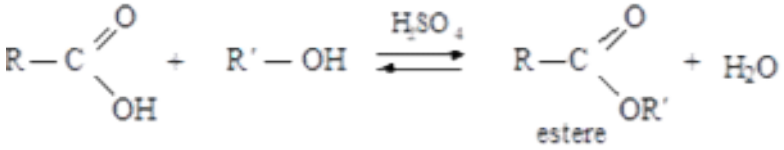
Sostituzione gruppo OH

ammidi

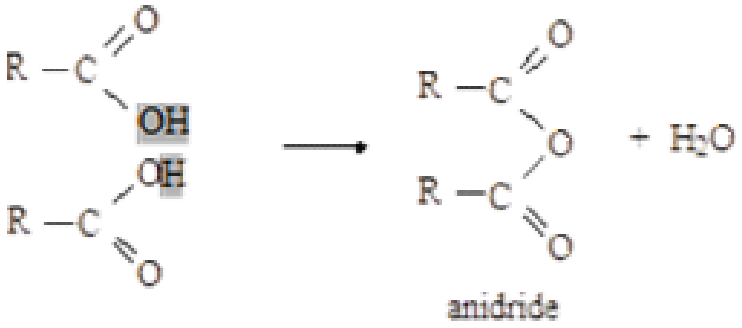




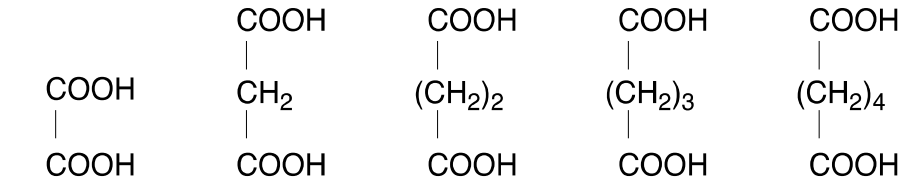
esteri



anidridi



ACIDI BICARBOSSILICI
DUE GRUPPI CARBOSSILICI



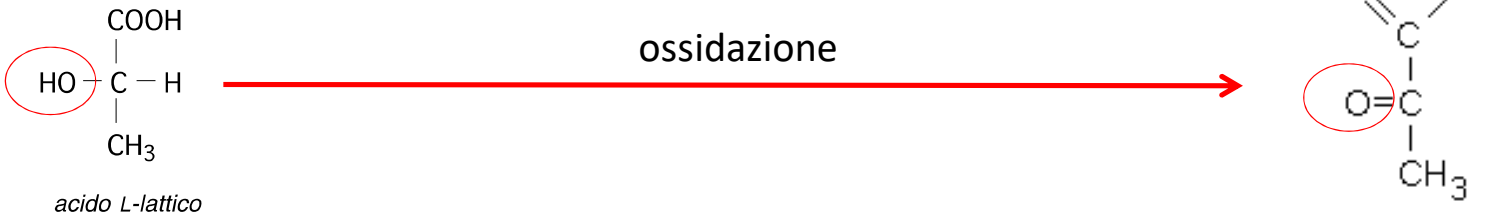
acido ossalico (etandioico) — *acido malonico (propandioico)* — *acido succinico (butandioico)* — *acido glutarico (pentandioico)* — *acido adipico (esandioico)*

IDROSSIACIDI
GRUPPO CARBOSSILICO + OSSIDRILICO

ossidazione →

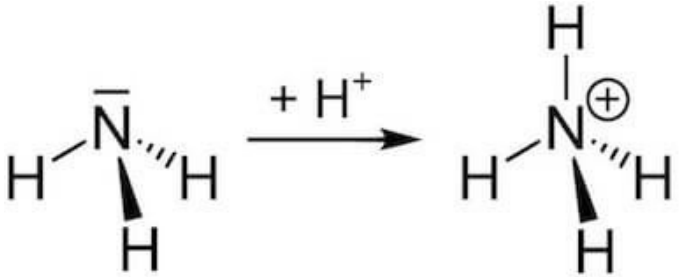
CHETOACIDI
GRUPPO CARBOSSILICO + CHETONICO

α-idrossiacido — β-idrossiacido — γ -idrossiacido — α-chetoacido — β-chetoacido — γ-chetoacido

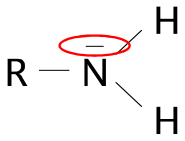


acido L-lattico

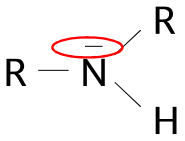
AMMINE



ammoniaca ione ammonio



Ammina 1



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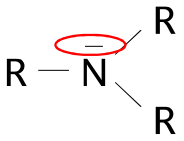
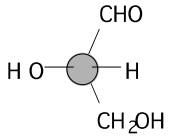
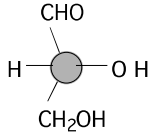


Ammina 3

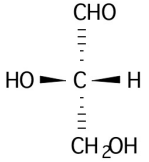
ZUCCHERI
STEREOISOMERIA



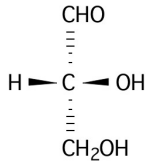
L-aldeide glicerica



D-aldeide glicerica



L-gliceraldeide



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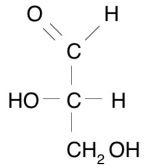
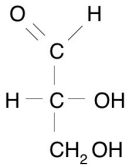


L - gliceraldeid



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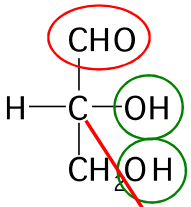
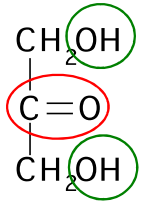


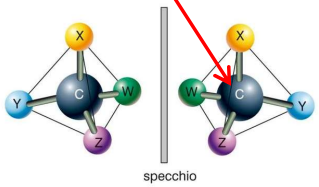
D-gliceraldeide

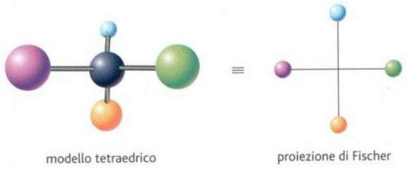


diidrossiacetone

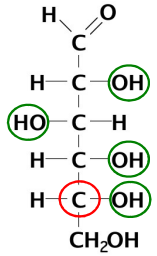
CARBONIO CHIRALE

due immagini speculari non sovrapponibili

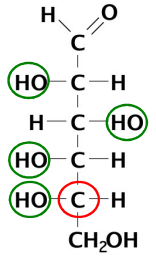




Monosaccaridi Singola unità		**Polisaccaridi** (disaccaridi, oligosaccaridi e polisaccaridi) 2 o più unità legate con legame glicosidico
gruppo funzionale	**Aldosi** **Chetosi**	
lunghezza catena (no. atomi di carbonio)	**Triosi** **Tetrosi** **Pentosi** **Esosi** etc.	



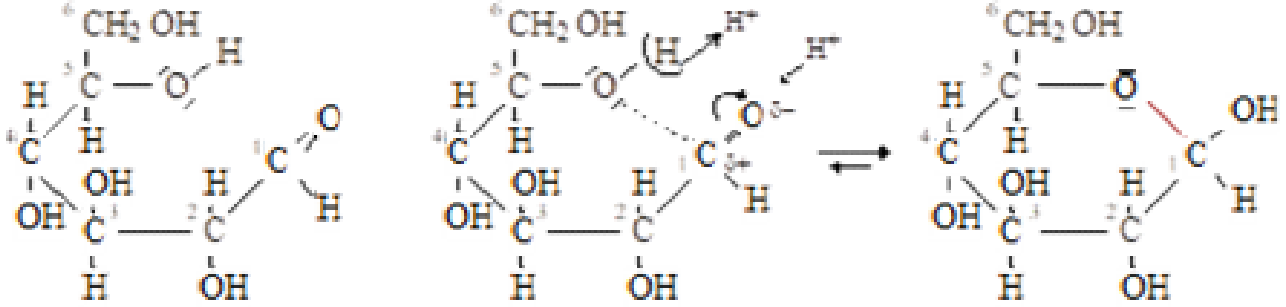
D-glucosio

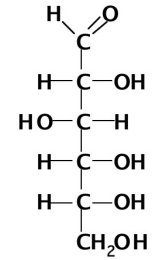


L-glucosio

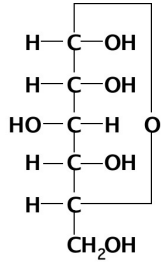
D ed L glucosio sono immagini speculari. Tutti e quattro i centri chirali sono "invertiti"

ZUCCHERI
CICLIZZAZIONE

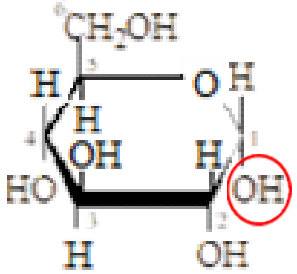




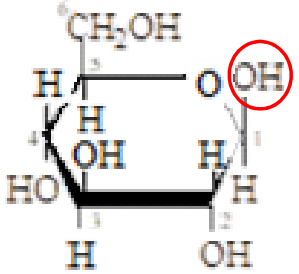
D-glucoso
(struttura aperta)



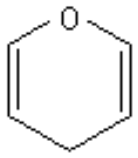
D-glucoso
(struttura ciclica)



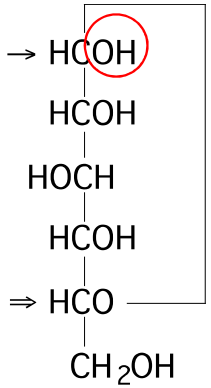
α-D-glucoso



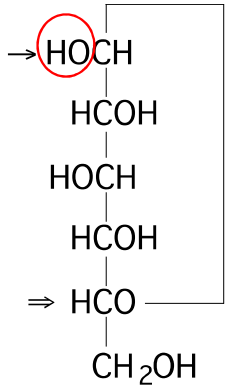
β-D-glucoso



Pirano

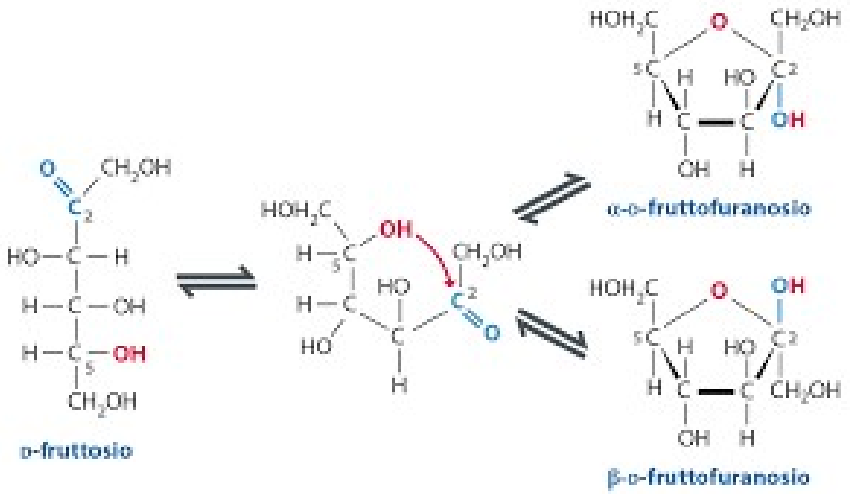


α-D-glucoso



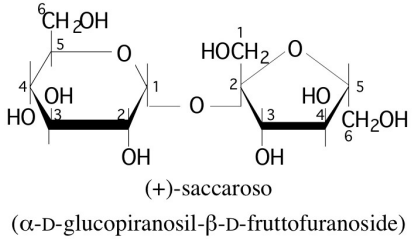
β-D-glucoso

ZUCCHERI
CICLIZZAZIONE

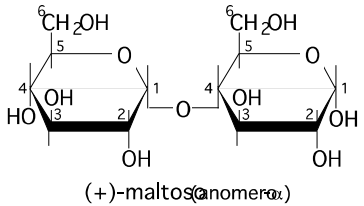


FURANO

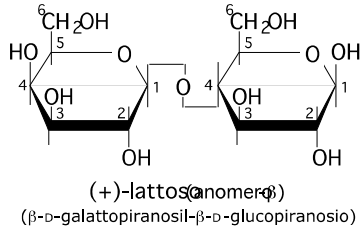
ZUCCHERI
DISACCARIDI



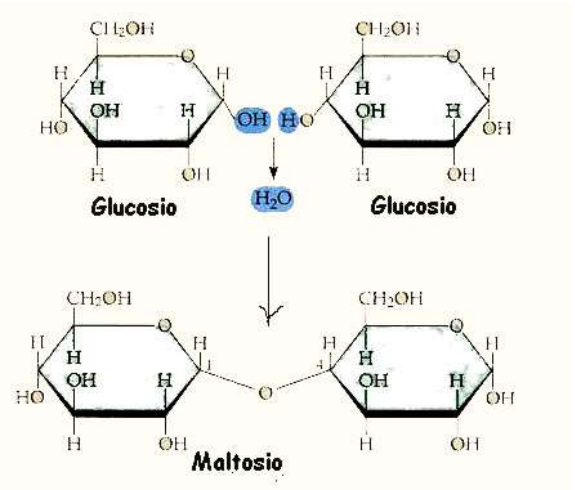
saccarosio: legame glicosidico $\alpha 1\text{–}\beta 2$



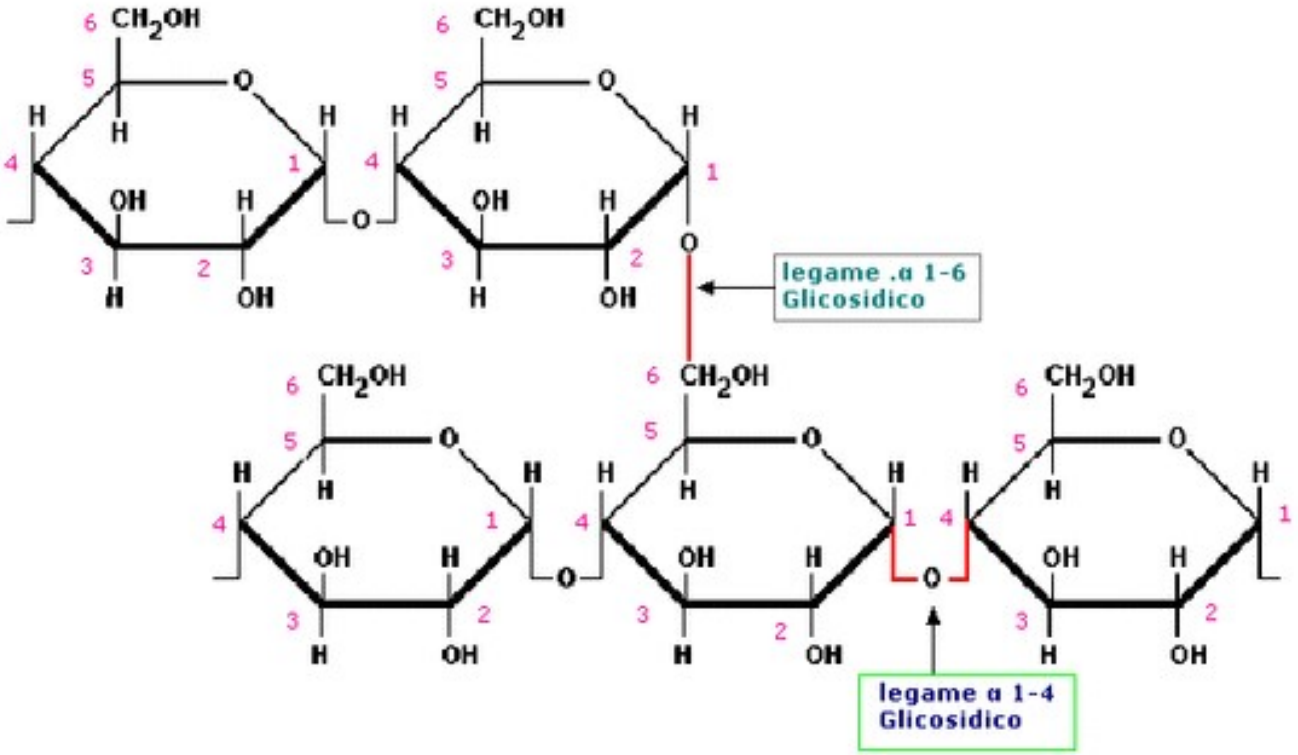
maltosio: legame glicosidico $\alpha 1\text{–}4$



lattosio: legame glicosidico $\beta 1\text{–}4$



ZUCCHERI
POLISACCARIDI
amido e glicogeno



ZUCCHERI
POLISACCARIDI
cellulosa