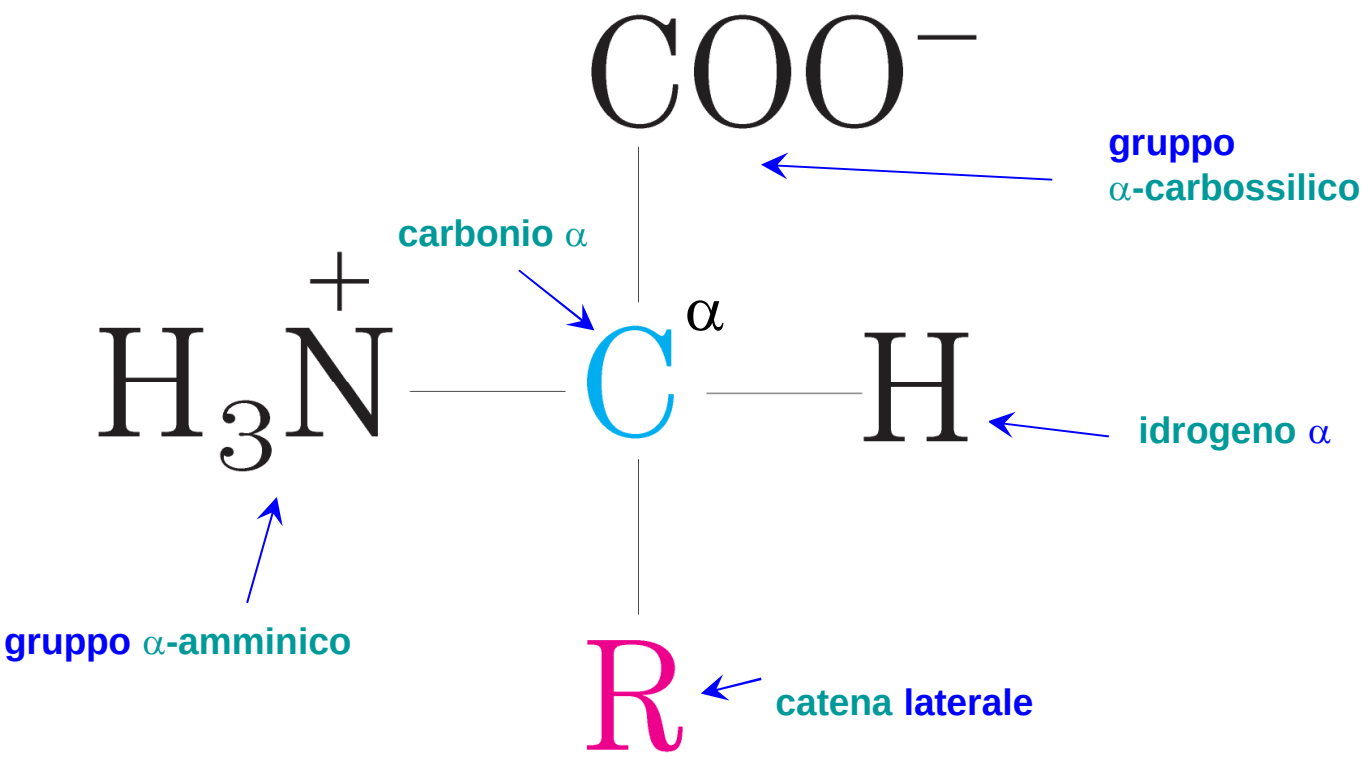
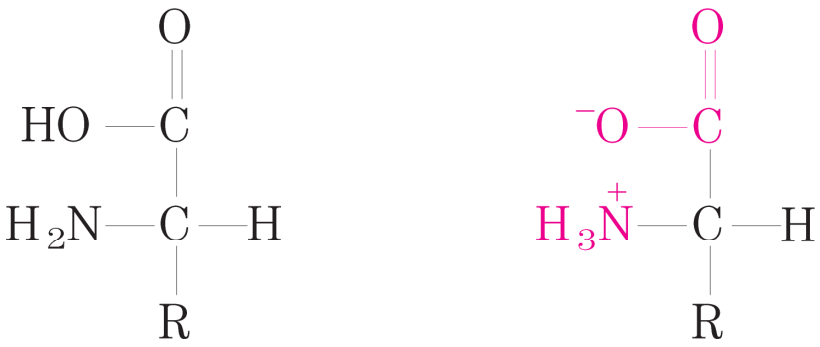
Cap.3

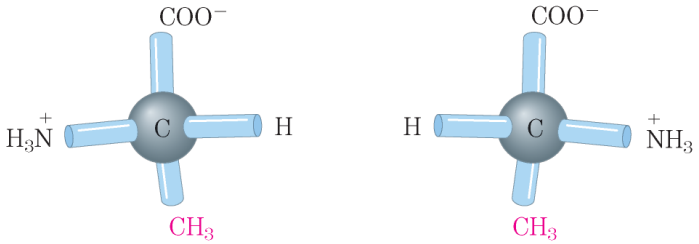
AMMINOACIDI





Forma non ionica

Forma zwitterionica



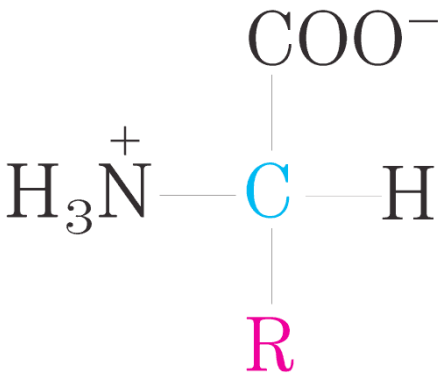
(a) L-Alanina D-Alanina

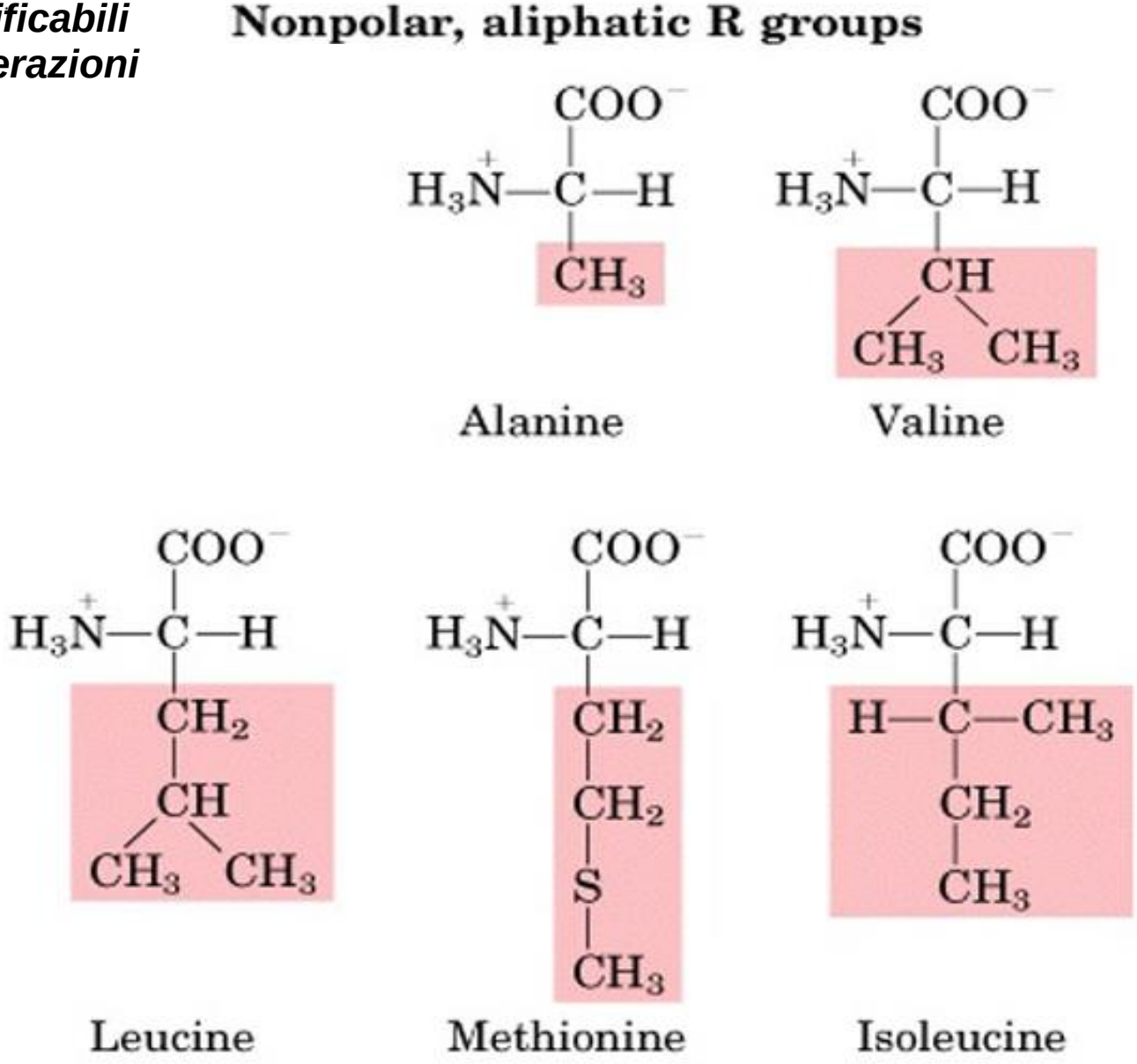
(b) L-Alanina D-Alanina

(c) L-Alanina D-Alanina

amminoacidi con catene laterali alifatiche

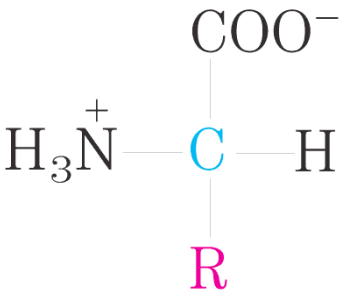
catene laterali chimicamente inerti e quindi non modificabili partecipano solo ad interazioni idrofobiche e vdW

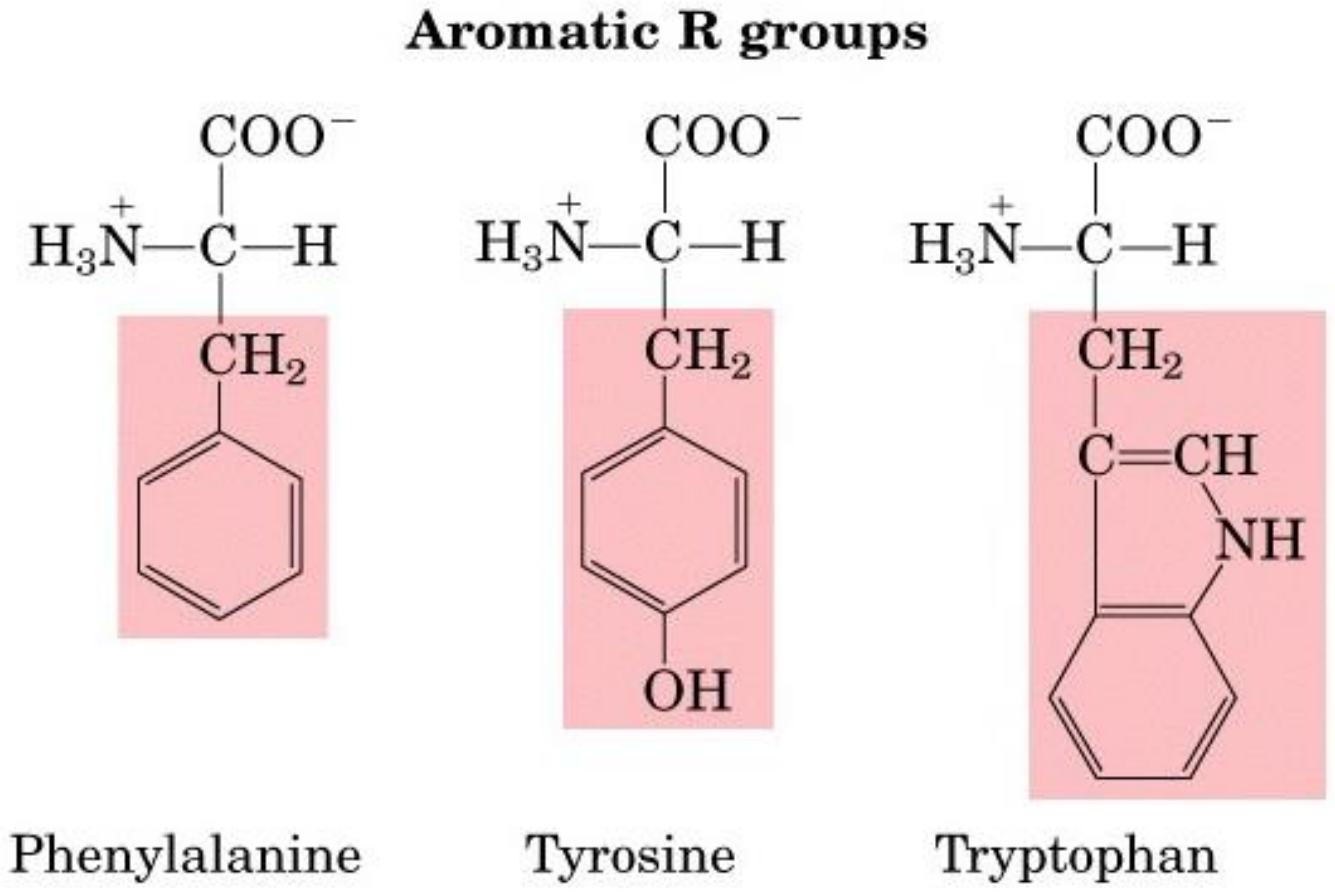


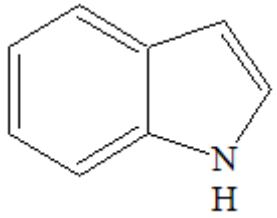


amminoacidi con catene laterali aromatiche

- ***partecipano ad interazioni idrofobiche.***
- ***Tyr e Trp partecipano a legami-H***



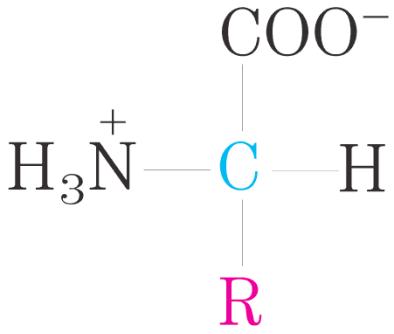


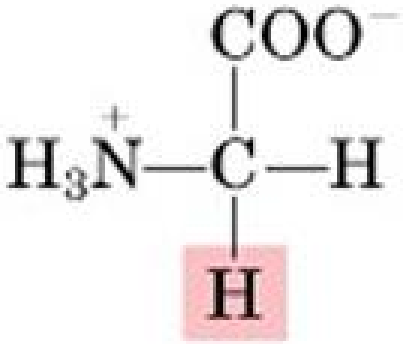


INDOLO

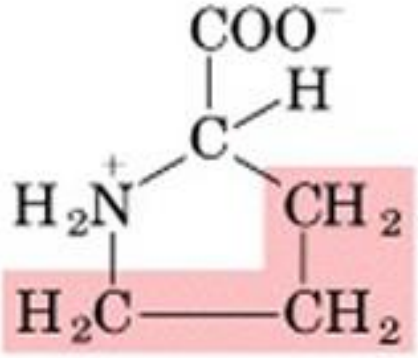
amminoacidi con catene laterali polari neutre

- ***importanti caratteristiche strutturali (flessibilità/rigidità)***
- ***non reattive***



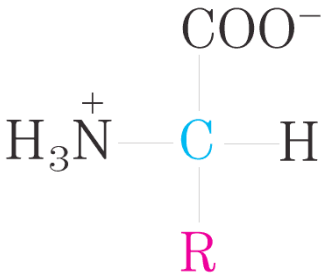


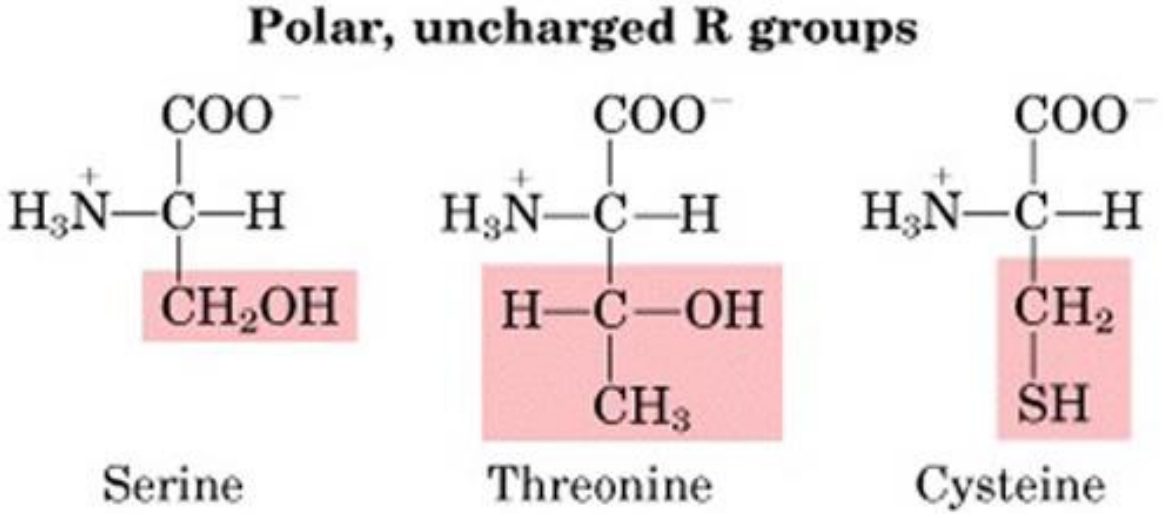
Glycine



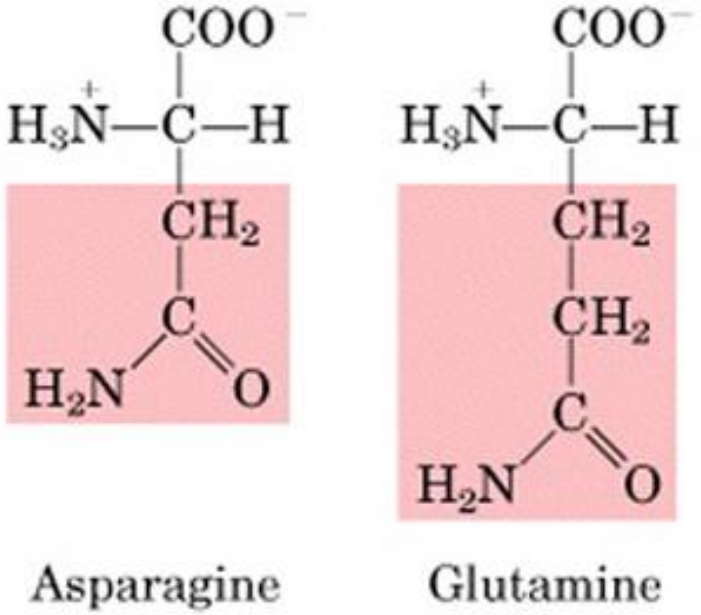
Proline

amminoacidi con catene laterali polari, non cariche (idrofiliche)

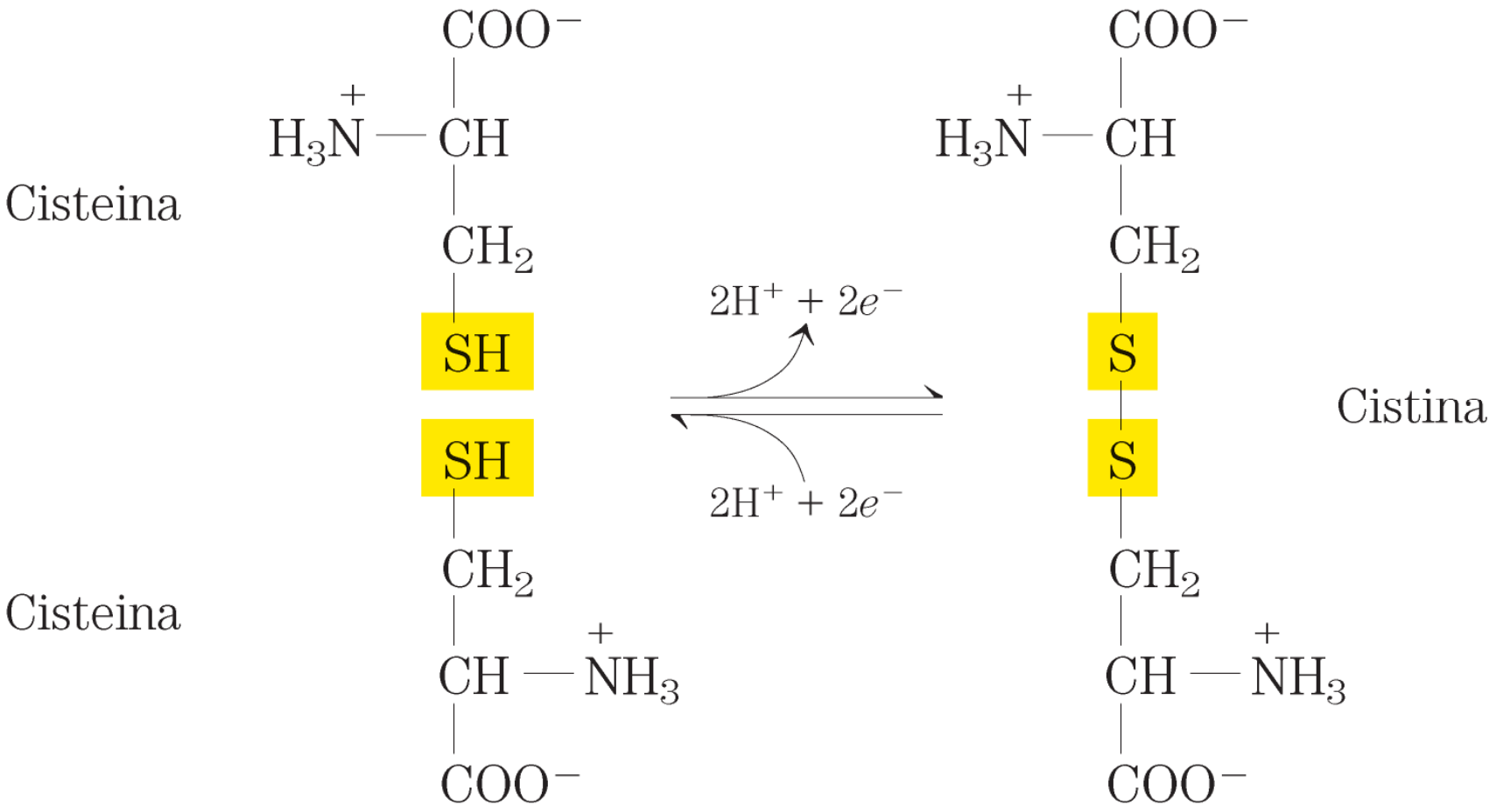




- *le catene laterali sono polari e idrofiliche*
- *partecipano alla formazione di legami-H*

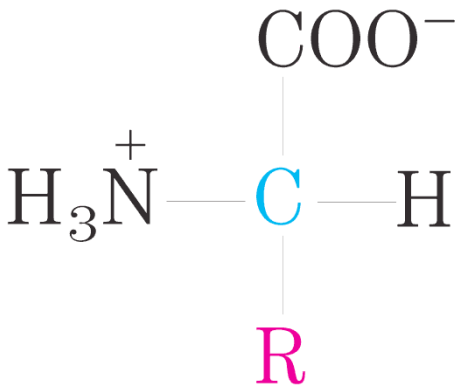


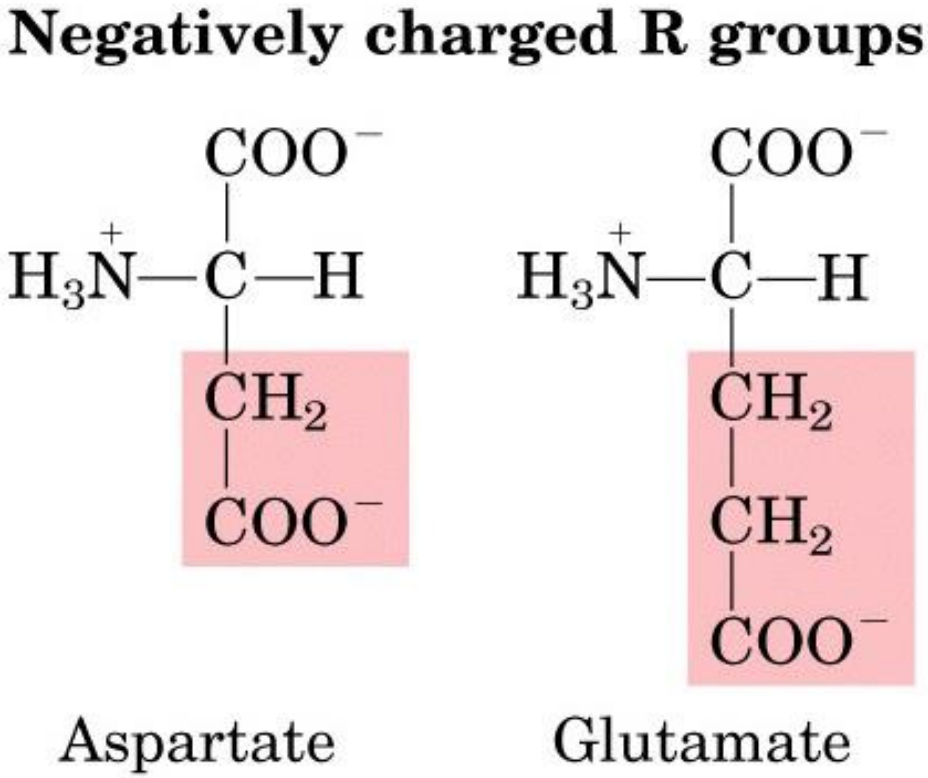
Å ***le catene laterali di Cys sono polari e partecipano alla formazione di legami covalenti (ponti disolfuro) strutturalmente importanti***



amminoacidi con catene laterali acidiche

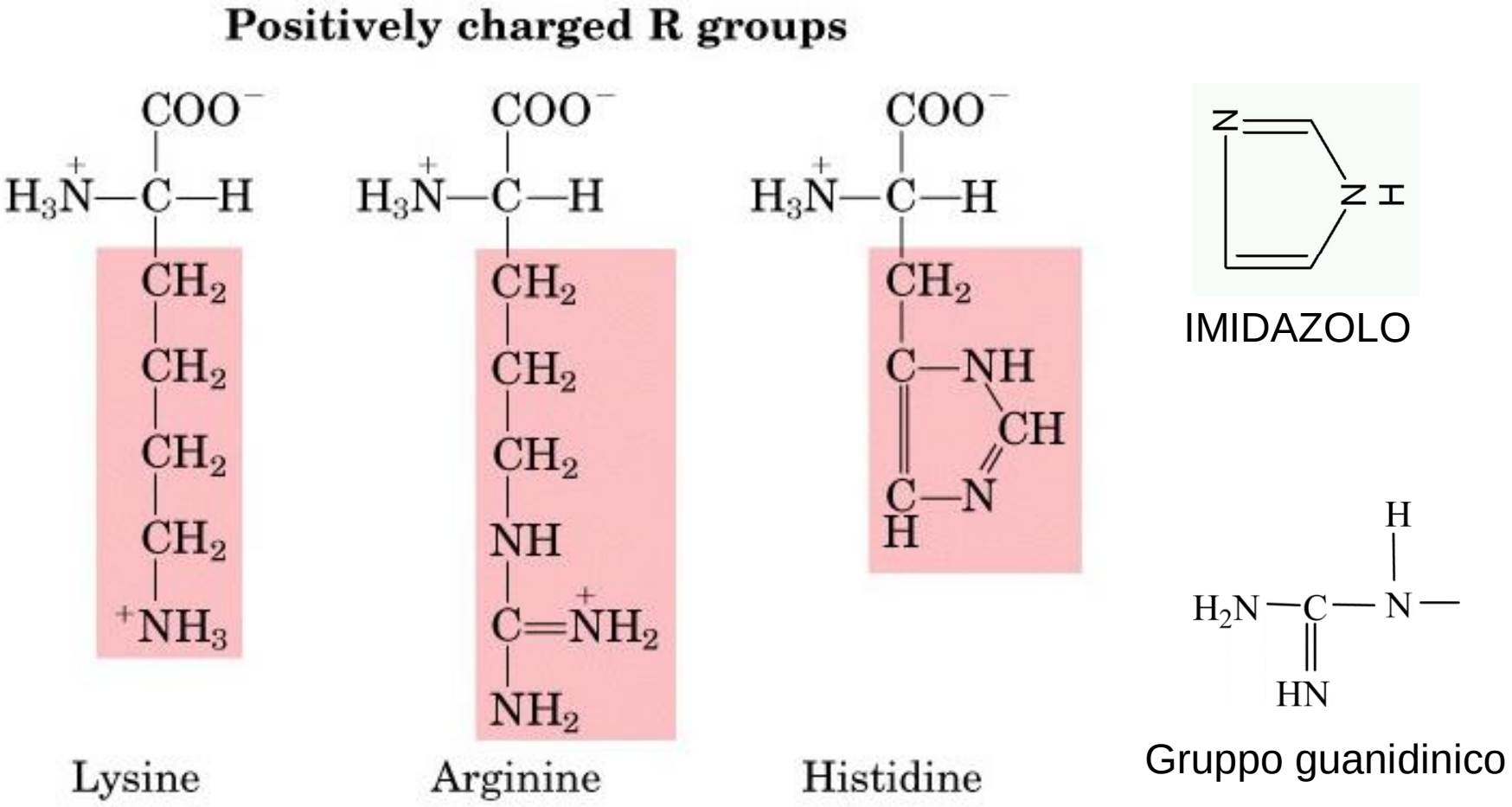
- ***catene laterali polari cariche negativamente (anioniche)***
- ***partecipano ad interazioni elettrostatiche***





amminoacidi con catene laterali basiche

- ***catene laterali polari cariche positivamente (R,K, per H dipende dal pH)***
- ***partecipano ad interazioni elettrostatiche***

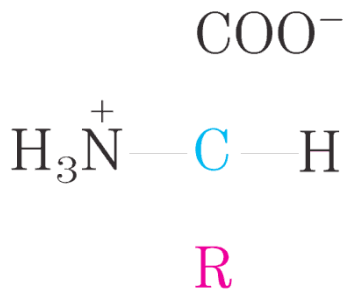


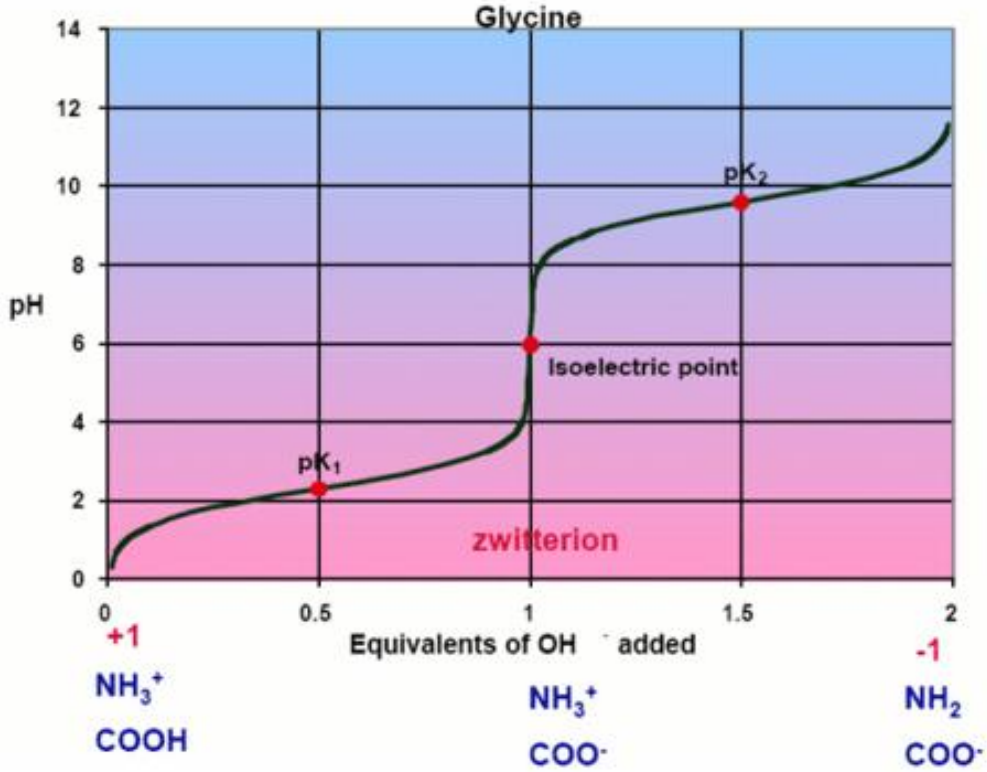
IMIDAZOLO

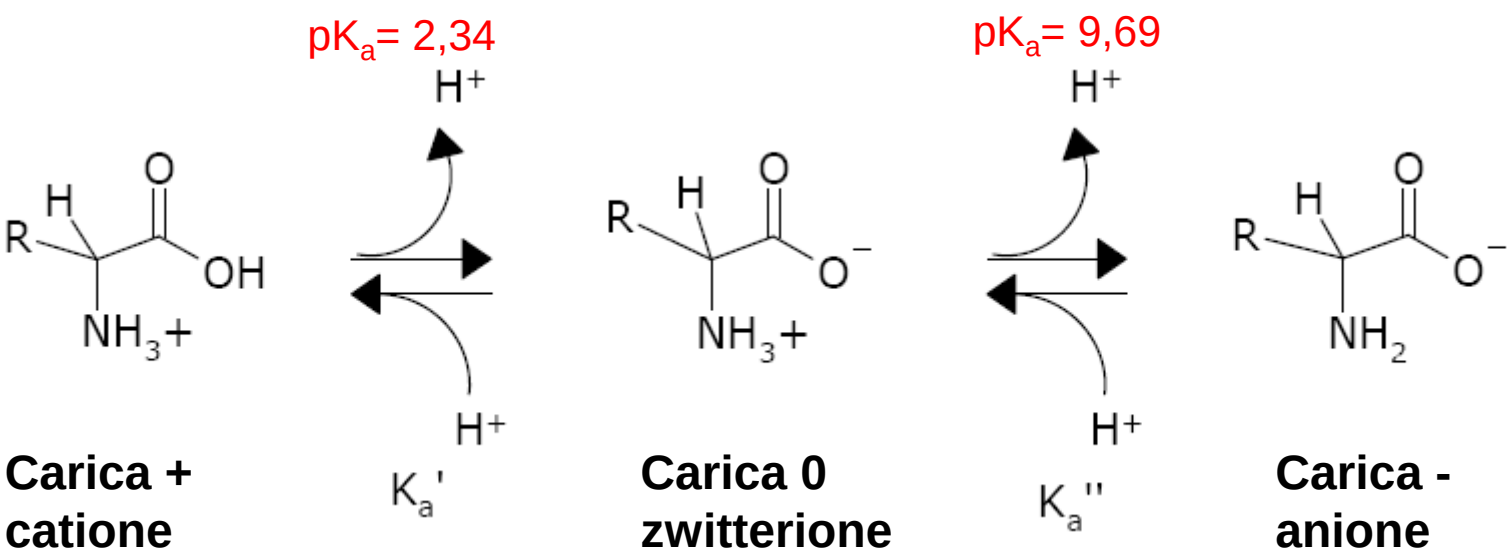
Gruppo guanidinico

Proprietà acido-base degli AA

- La presenza dei due gruppi funzionali –COOH e $-NH_3^+$ rende gli AA simili, nel loro comportamento acido-base, ad acidi biprotici AH_2^+.

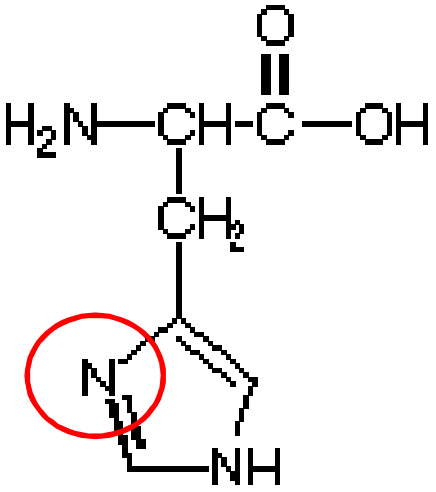


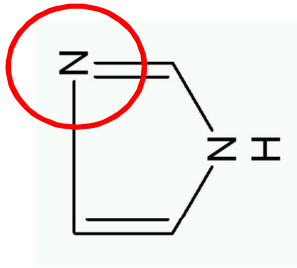




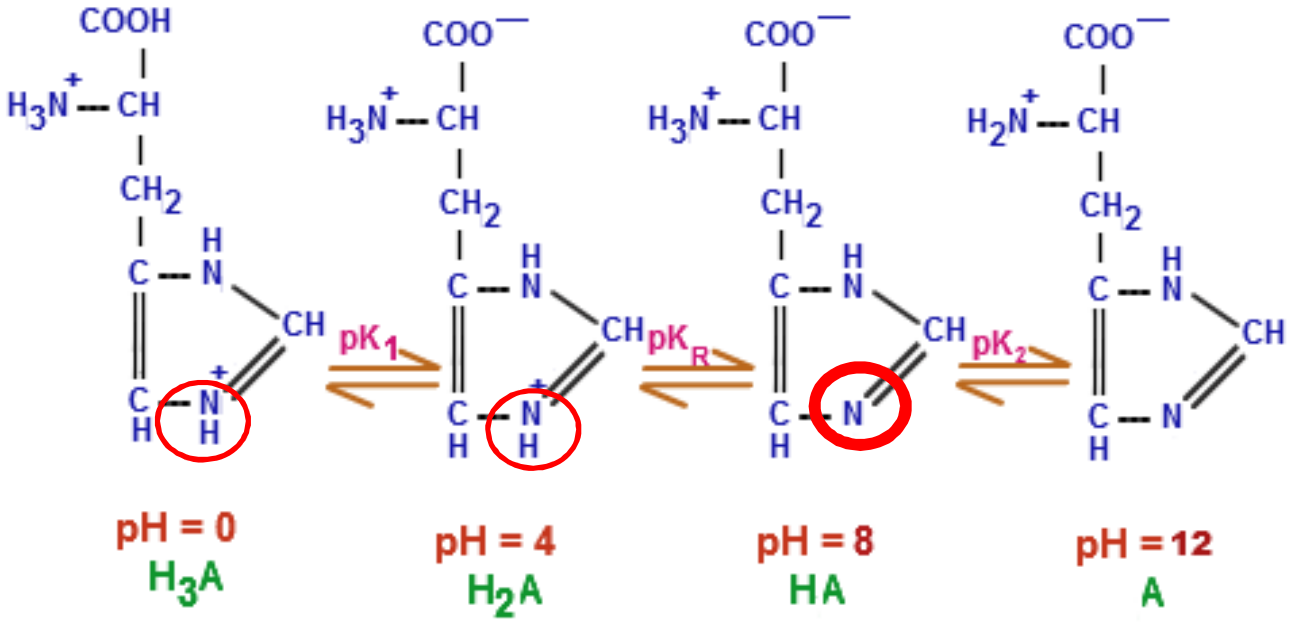
ISTIDINA

pK1= 1.8
pK2= 6
pK3= 9.2



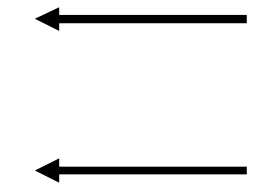


IMIDAZOLO

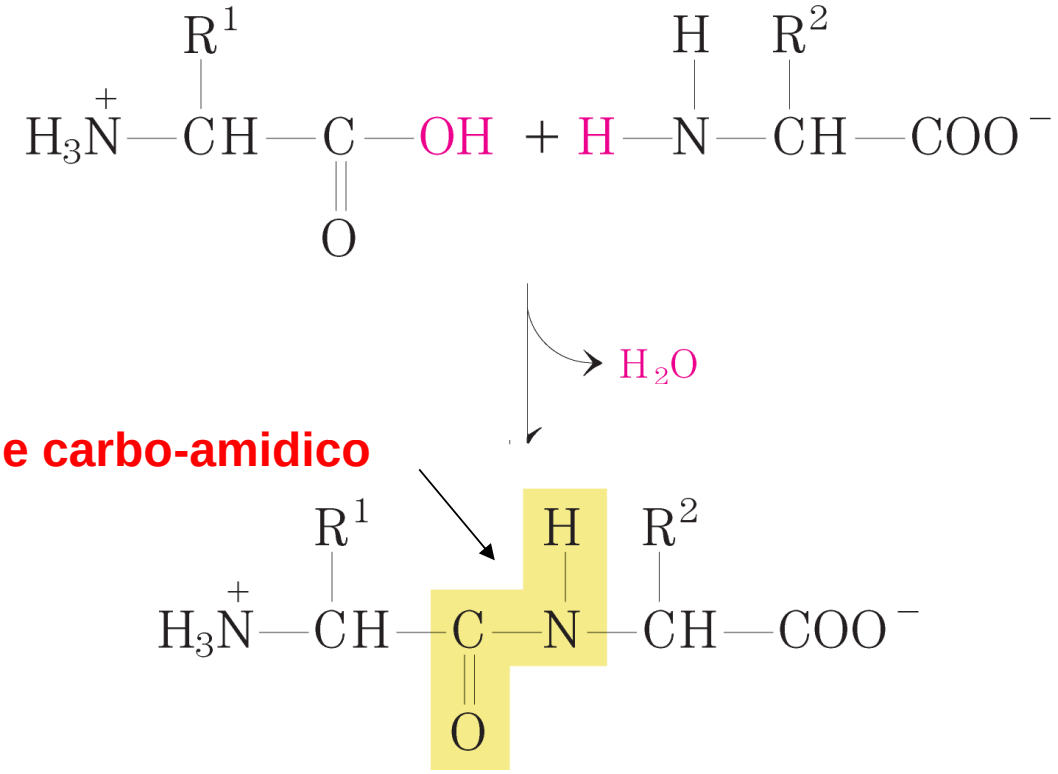


Si definisce *punto isoelettrico* il pH in corrispondenza al quale gli aminoacidi in soluzione hanno lo stesso numero di cariche elettriche positive e negative.

AA	pK_a'	pK_a''	pK_aR	pI
Cys	1.7	10.8	8.3	5.0
Tyr	2.2	9.1	10.1	5.7
Asp	2.1	9.8	3.9	3.0
Asn	2.0	8.8	-	5.4
Glu	2.2	9.7	4.3	3.2
Gln	2.0	9.1	-	5.7
His	1.8	9.2	6.0	7.6
Lys	2.2	9.0	10.5	9.8
Arg	2.2	9.0	12.5	10.8

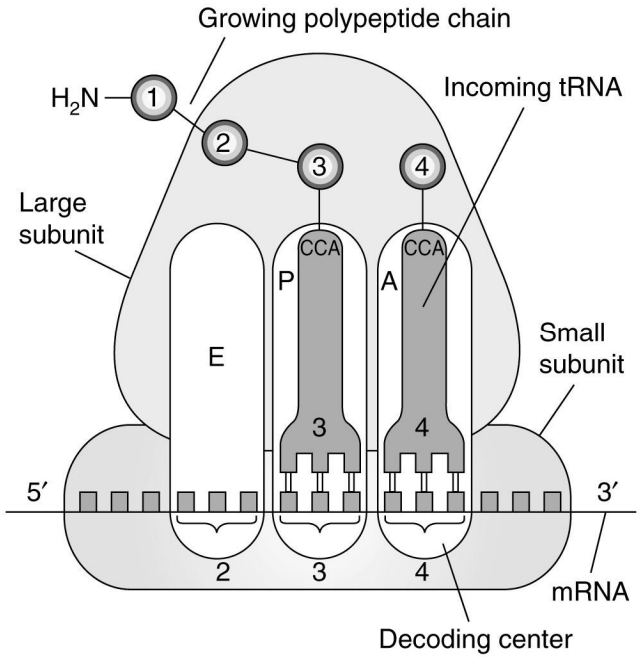


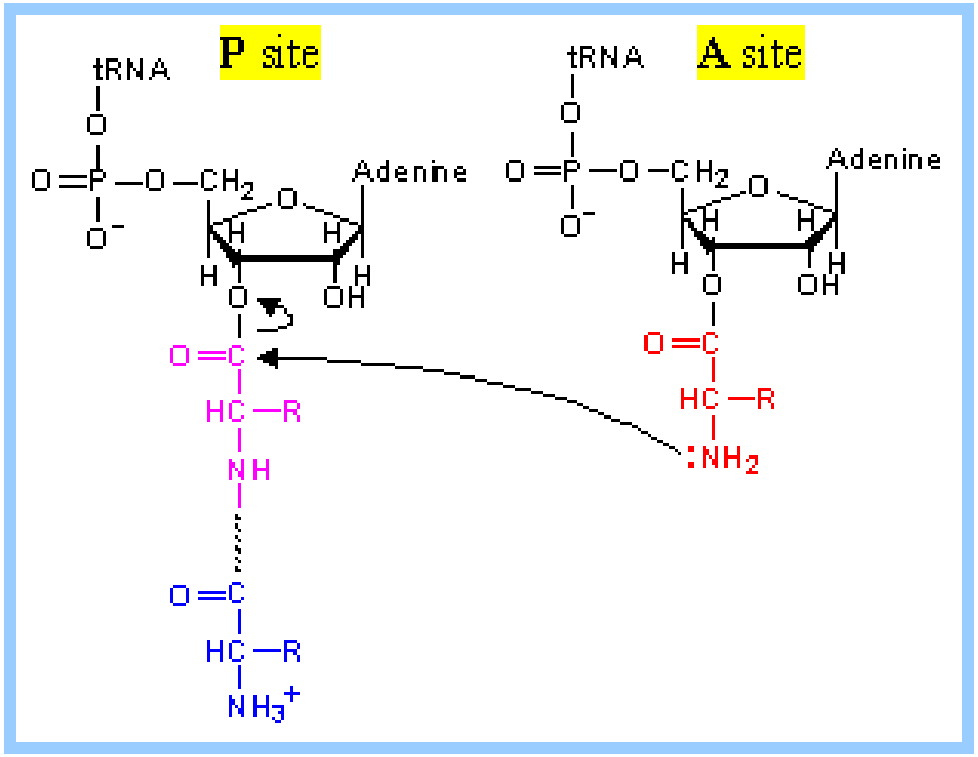
Il LEGAME PEPTIDICO



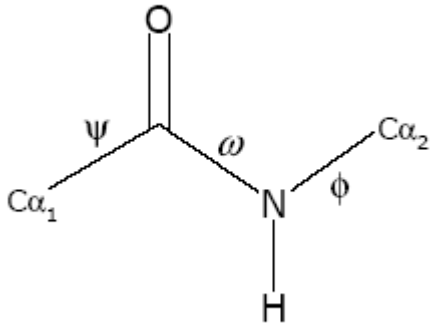
Per convenzione il legame peptidico viene scritto con l'aa che ha il gruppo amminico libero a sinistra e l'aa che ha il gruppo COOH libero a destra.

I due aa vengono definiti rispettivamente *amminoacido N-terminale* e *amminoacido C-terminale*

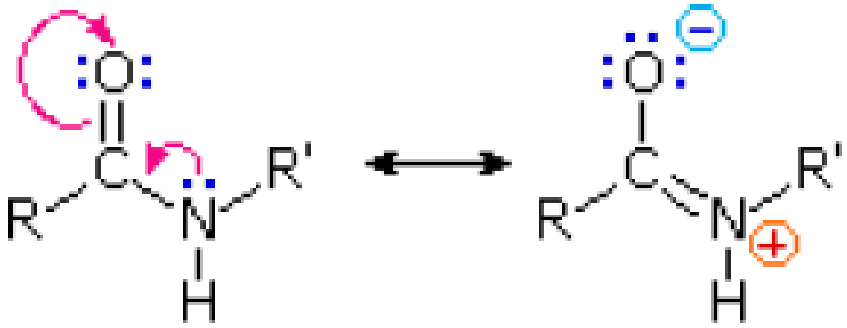

Growing polypeptide chain
H_2N
1
2
3
4
Incoming tRNA
Large subunit
CCA
CCA
P
A
E
Small subunit
3
4
5′
3′
2
3
4
mRNA
Decoding center

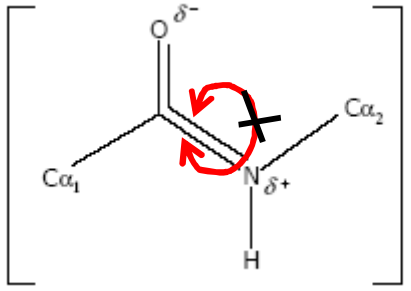

P site
A site
tRNA
tRNA
Adenine
Adenine
O=C
HC—R
NH
O=C
HC—R
NH_3^+
O=C
HC—R
:NH_2

A causa della distribuzione degli elettroni il legame peptidico ha specifiche proprietà geometriche:

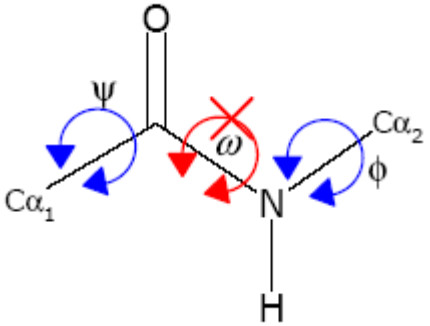


Stabilizzazione per risonanza





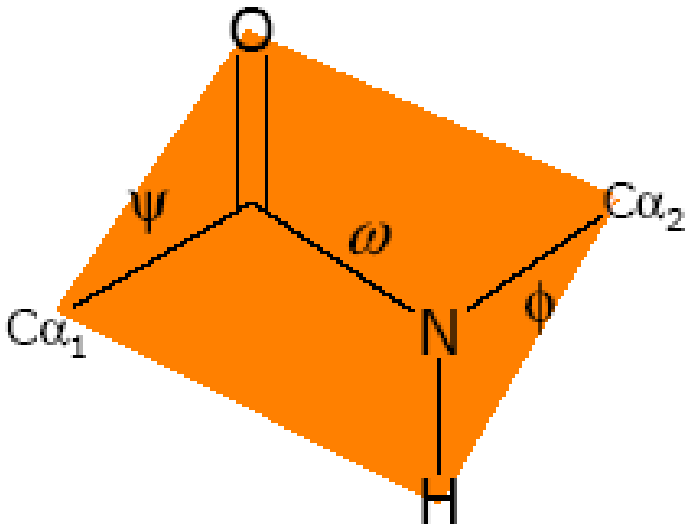
– Non vi è libera rotazione intorno al legame C-N



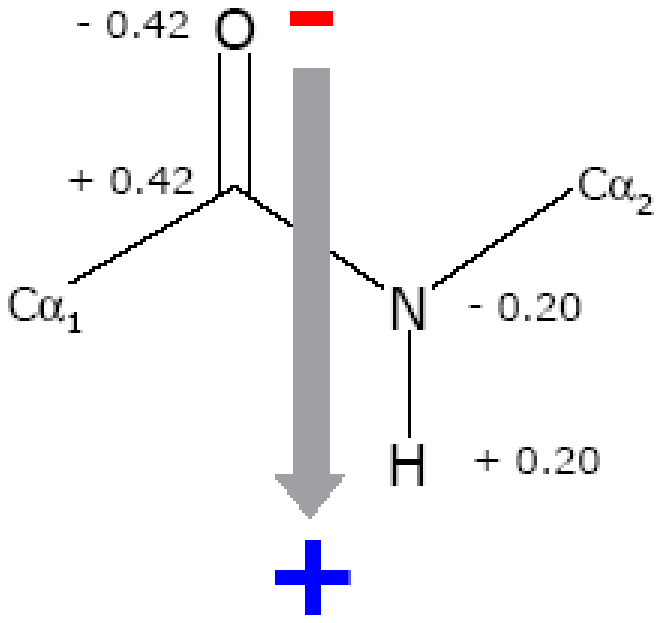
– Vi è libera rotazione solo intorno ai legami ϕ e ψ.

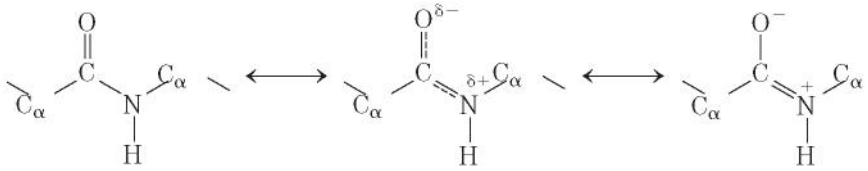
A causa della distribuzione degli elettroni il legame peptidico ha specifiche proprietà geometriche:

- È planare.



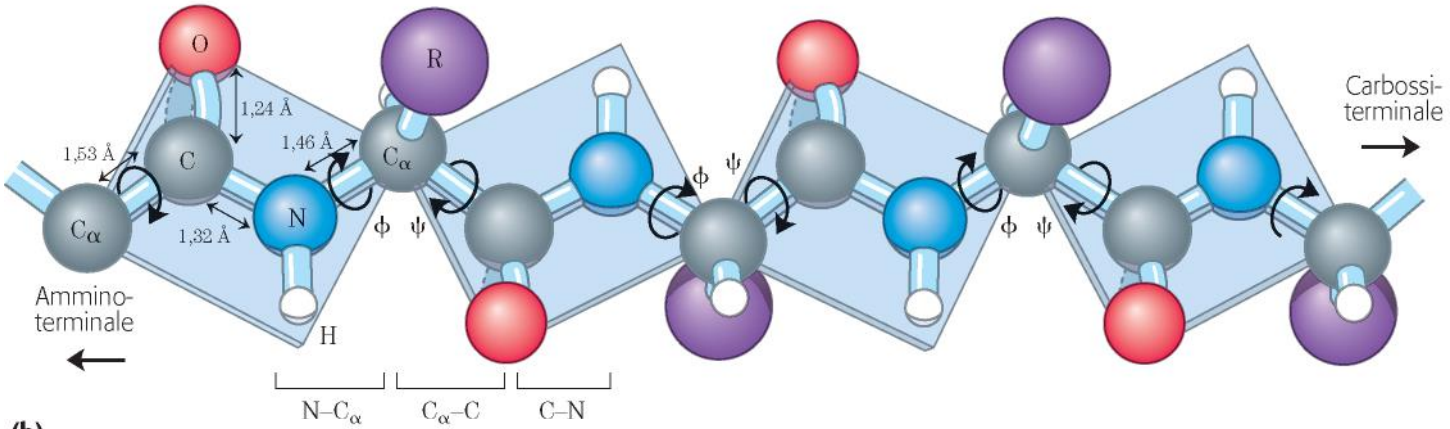
- È dipolare.





L'ossigeno carbossilico ha una parziale carica negativa e l'azoto ammidico una parziale carica positiva, per cui si genera un piccolo dipolo elettrico. Praticamente tutti i legami delle proteine hanno questa configurazione trans; un'eccezione è mostrata nella Figura 4.8b.

(a)



(b)

Dipeptide: peptide formato dall'unione di due aa;
tripeptide: peptide formato dall'unione di tre aa; ...etc

In genere:

Oligopeptide (pochi aa) polipeptide (molti aa…)