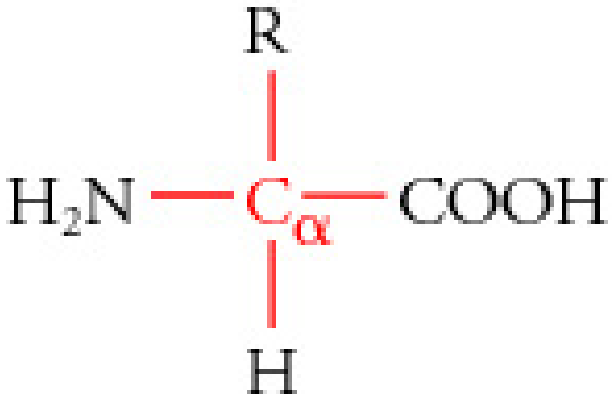
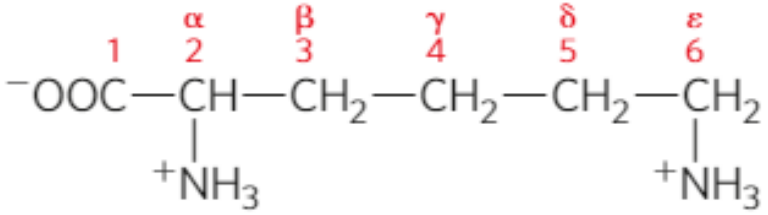
Ammino acidi e legame peptidico

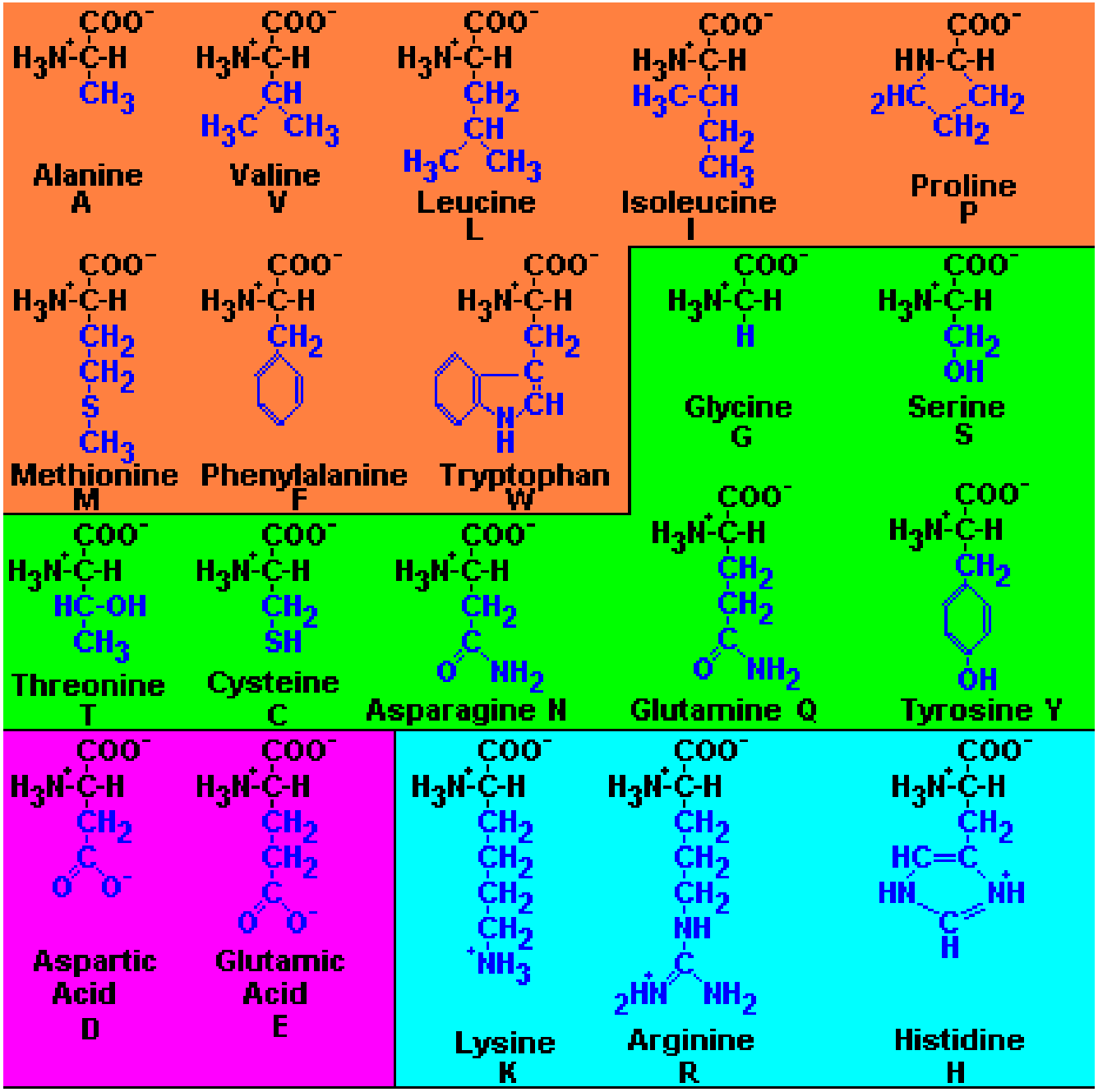
Gli ammino acidi (AA) si differenziano per il gruppo R



Vengono classificati in base alla natura di questo gruppo



Lisina


Alanine
A
Valine
V
Leucine
L
Isoleucine
I
Proline
P
Methionine
M
Phenylalanine
F
Tryptophan
W
Glycine
G
Serine
S
Threonine
T
Cysteine
C
Asparagine N
Glutamine Q
Tyrosine Y
Aspartic
Acid
D
Glutamic
Acid
E
Lysine
K
Arginine
R
Histidine
H

AA idrofobici
AA idrofilici
AA basici
AA acidi

Gli AA proteici hanno tutti stereochimica “L”.
Le caratteristiche più importanti di un AA oltre ai gruppi funzionali in catena laterale sono il peso molecolare ed il punto isoelettrico.

Equazione di Henderson-Hasselbach

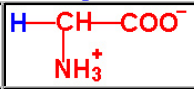
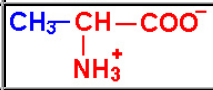
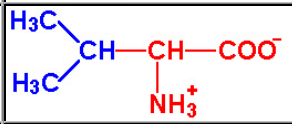
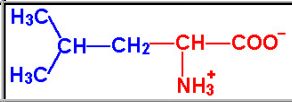
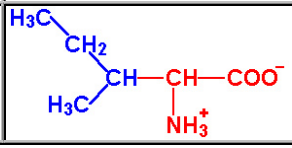
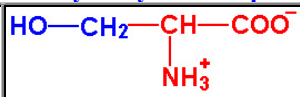
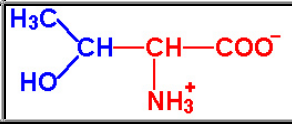
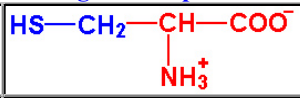
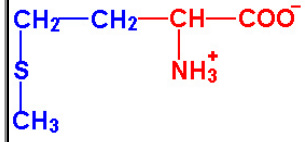
$$\mathrm{pH} = \mathrm{p}K_a + \log_{10}\frac{[\mathrm{A}^-]}{[\mathrm{HA}]}$$

oppure:

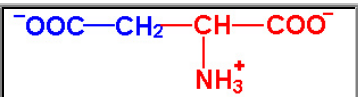
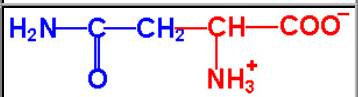
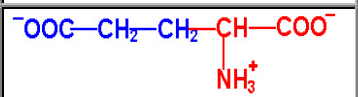
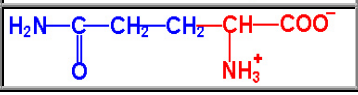
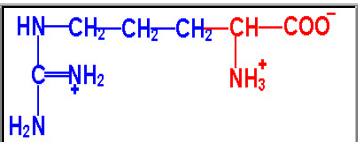
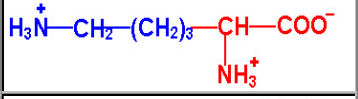
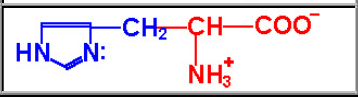
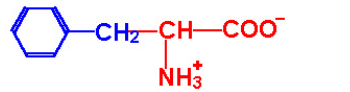
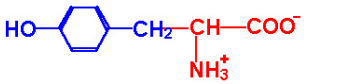
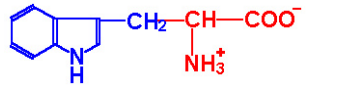
$$pH = pK_a + \log_{10}\left(\frac{[\text{sale}]}{[\text{acido}]}\right)$$

Margaret Oakley Dayhoff, 1925-1983. [Foto della dott.ssa Ruth Dayhoff, per gentile concessione di Vincent Brannigan.]

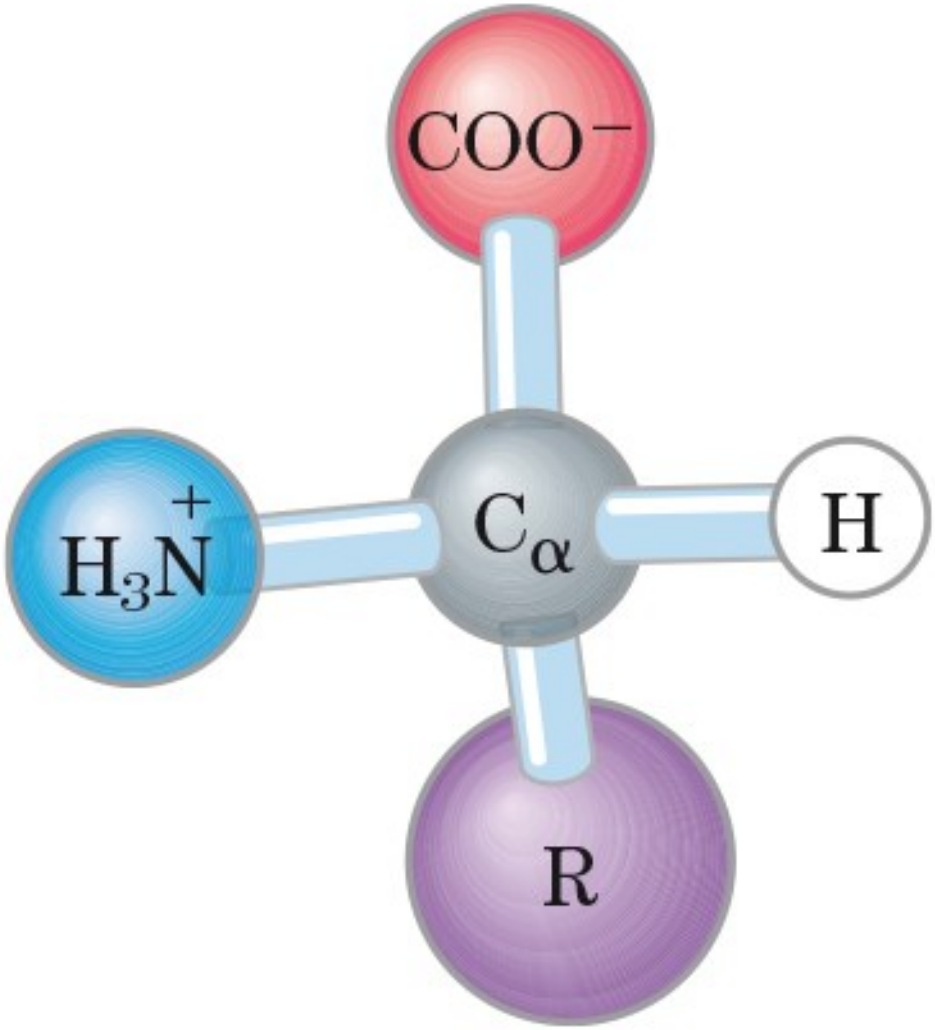
Considerata fondatrice della bioinformatica

Amino Acid	Symbol	Structure*	pK_1	pK_2	pK R Group
Amino Acids with Aliphatic R-Groups					
Glycine	Gly - G		2.4	9.8	
Alanine	Ala - A		2.4	9.9	
Valine	Val - V		2.2	9.7	
Leucine	Leu - L		2.3	9.7	
Isoleucine	Ile - I		2.3	9.8	
Non-Aromatic Amino Acids with Hydroxyl R-Groups					
Serine	Ser - S		2.2	9.2	~13
Threonine	Thr - T		2.1	9.1	~13
Amino Acids with Sulfur-Containing R-Groups					
Cysteine	Cys - C		1.9	10.8	8.3
Methionine	Met-M		2.1	9.3	

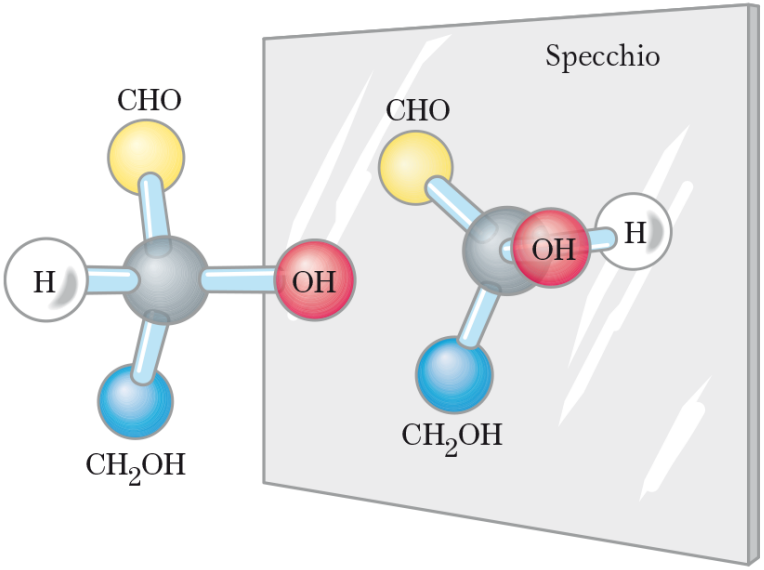
*Backbone of the amino acids is red, R-groups are blue

Acidic Amino Acids and their Amides					
Aspartic Acid	Asp - D		2.0	9.9	3.9
Asparagine	Asn - N		2.1	8.8	
Glutamic Acid	Glu - E		2.1	9.5	4.1
Glutamine	Gln - Q		2.2	9.1	
Basic Amino Acids					
Arginine	Arg - R		1.8	9.0	12.5
Lysine	Lys - K		2.2	9.2	10.8
Histidine	His - H		1.8	9.2	6.0
Amino Acids with Aromatic Rings					
Phenylalanine	Phe - F		2.2	9.2	
Tyrosine	Tyr - Y		2.2	9.1	10.1
Tryptophan	Trp-W		2.4	9.4	
Imino Acids					
Proline	Pro - P		2.0	10.6	

*Backbone of the amino acids is red, R-groups are blue


COO⁻
H₃N⁺
Cα
H
R

I monosaccaridi hanno centri asimmetrici.

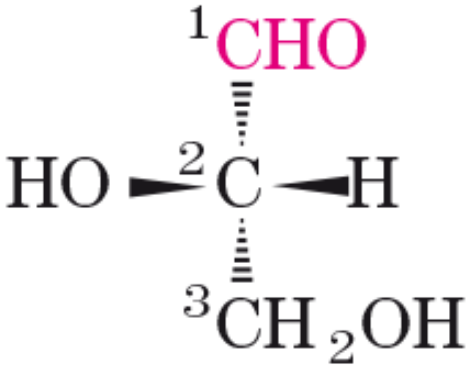


Modelli a palle e bastoncini

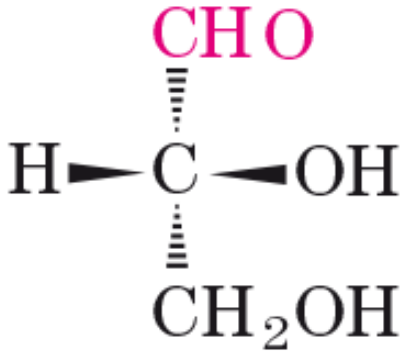
Formule proiettive di Fischer

Formule prospettiche

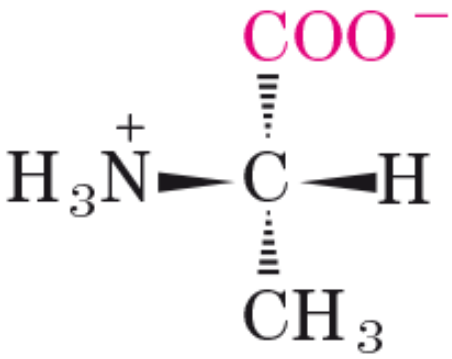
CONFIGURAZIONE ASSOLUTA



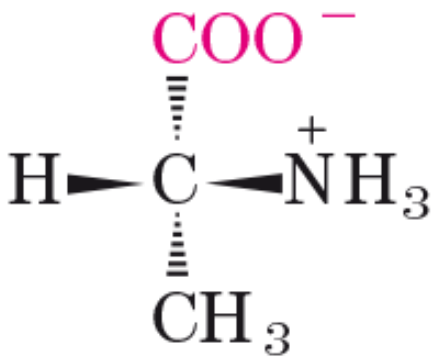
L-Gliceraldeide



D-Gliceraldeide

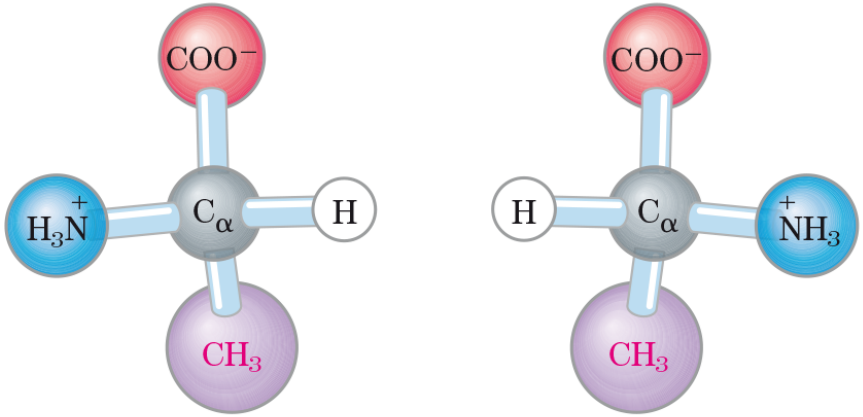


L-Alanina



D-Alanina

CONFIGURAZIONE ASSOLUTA

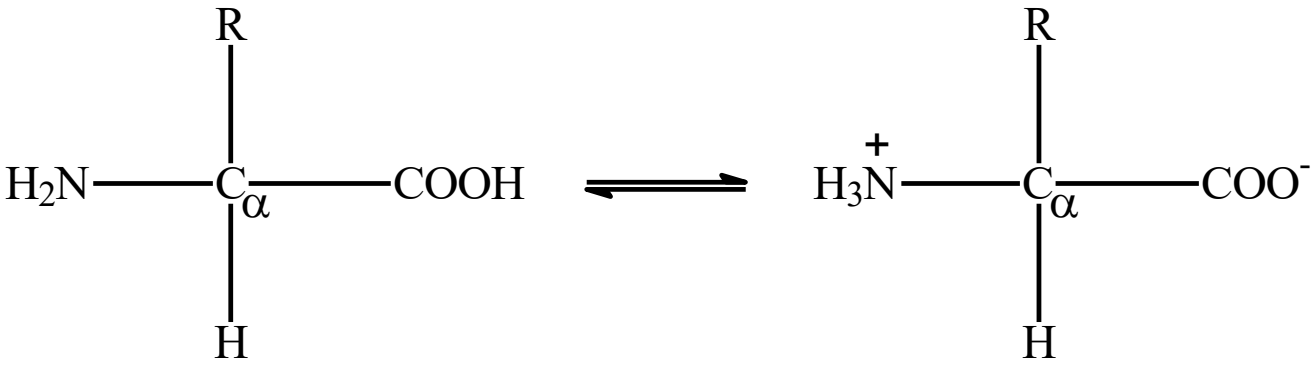


(a) L-Alanina D-Alanina

(b) L-Alanina D-Alanina

(c) L-Alanina D-Alanina

Formule di proiezione di Fisher

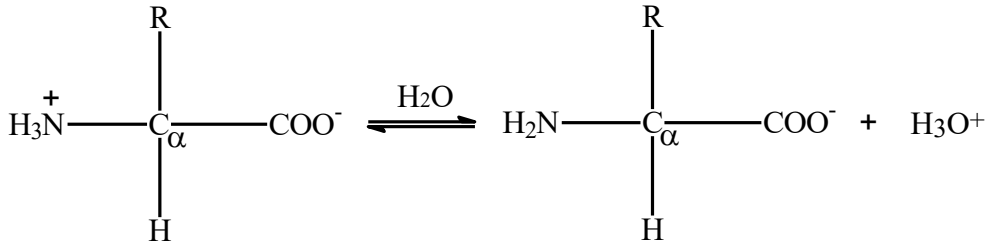


Forma non ionica

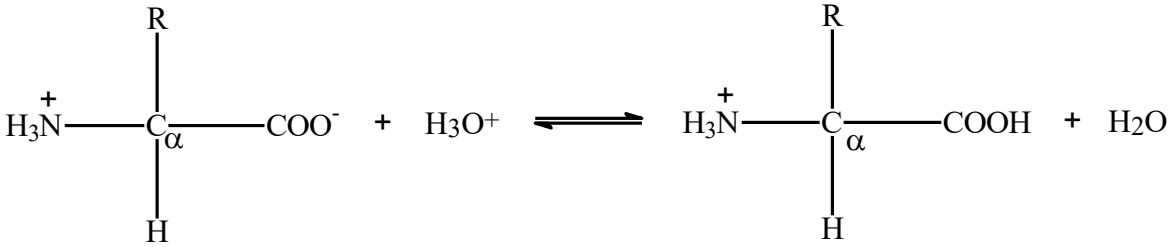
Forma zwitterionica

a pH neutro

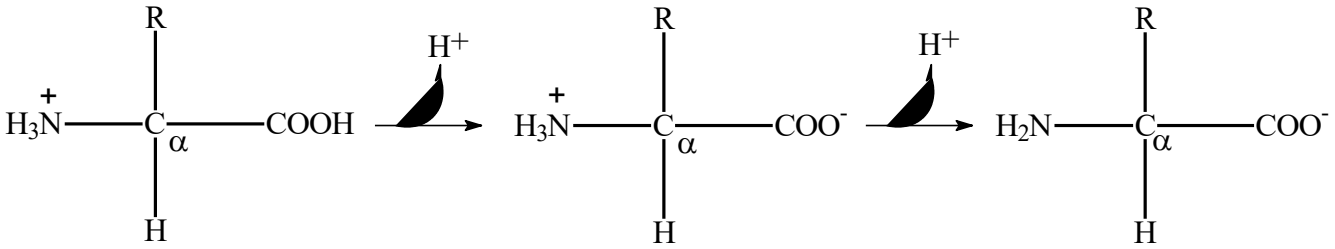
Comportamento acido-base



acido



base



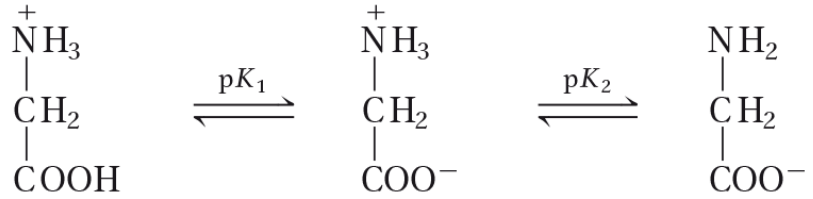
Curva di titolazione della glicina

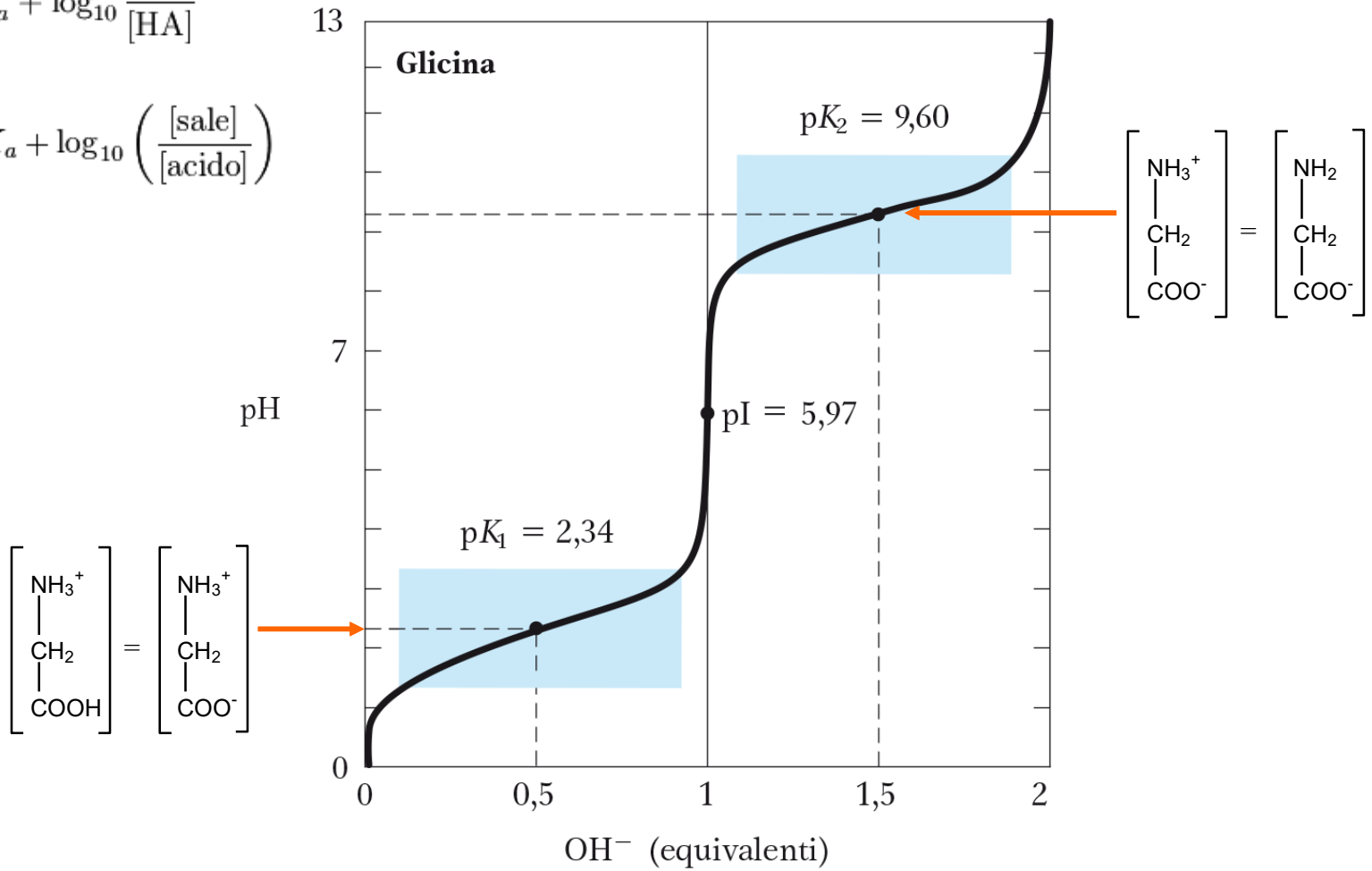
Equazione di Henderson-Hasselbach

$$\mathrm{pH} = \mathrm{pK}_a + \log_{10}\frac{[\mathrm{A}^-]}{[\mathrm{HA}]}$$

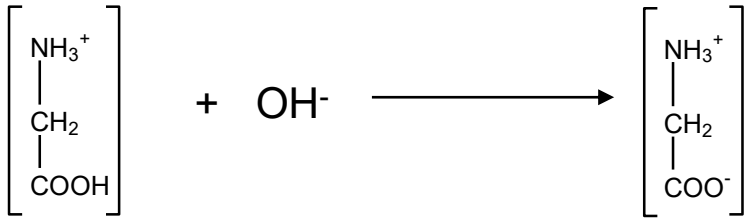
oppure:

$$pH = pK_a + \log_{10}\left(\frac{[\text{sale}]}{[\text{acido}]}\right)$$

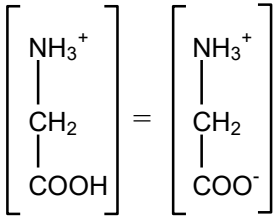




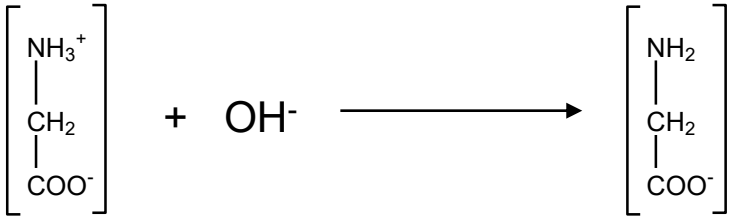
supponiamo di avere 10 moli di glicina (tutta protonata) da titolare



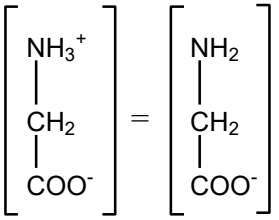
moli	i	10	1	
moli	f	9	0	1
moli	i	10	5	
moli	f	5	0	5
moli	i	10	10	
moli	f	0	0	10



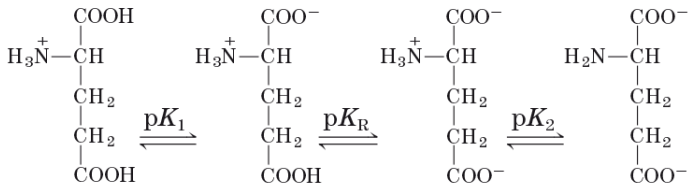
supponiamo di avere 10 moli di glicina (zwitterione) da titolare



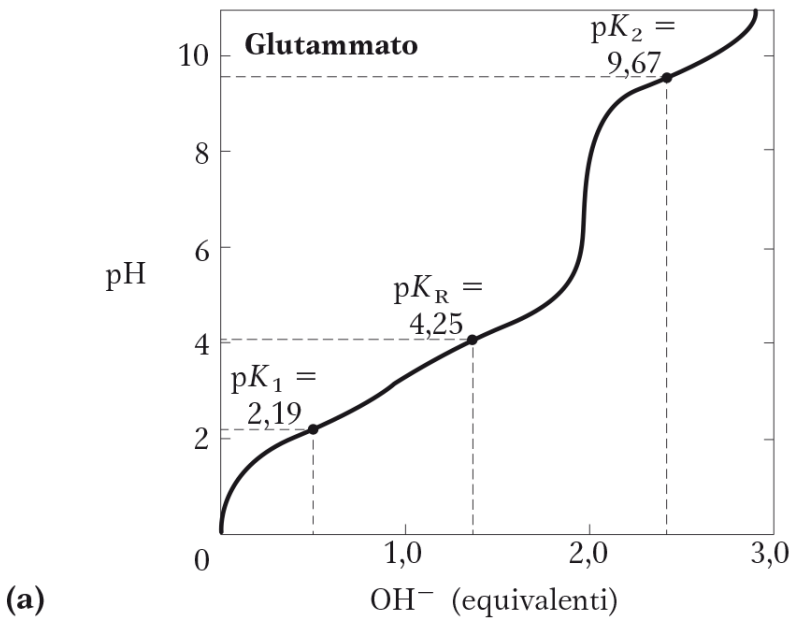
moli	i	10	1	
moli	f	9	0	1
moli	i	10	5	
moli	f	5	0	5
moli	i	10	10	
moli	f	0	0	10

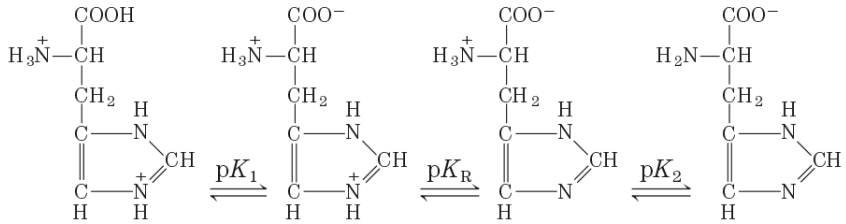


Curve di titolazione del glutammato e dell'istidina



Carica netta: **+1** **0** **−1** **−2**





+2 **+1** **0** **−1**