

Tema 3. Aminoácidos.

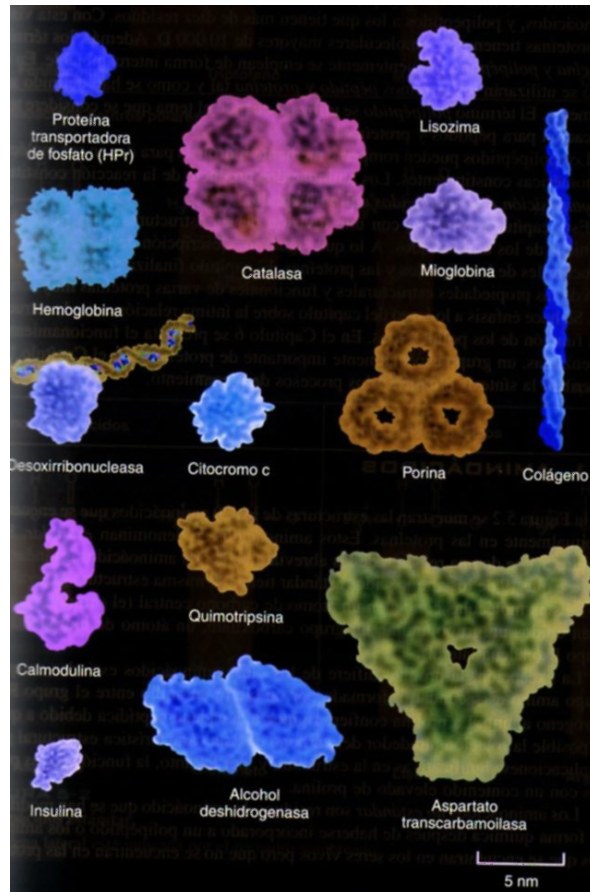
Estructura y propiedades de los aminoácidos. Clasificaciones de aminoácidos según sus cadenas laterales. Estereoisomería de aminoácidos. Aminoácidos no estándar. Modificaciones postraduccionales de aminoácidos. Propiedades ácido-básicas y curvas de valoración.

BIOQUÍMICA-1º de Medicina
Dpto. Biología Molecular
Jesús Navas



Proteínas: principales polímeros estructurales y funcionales de los seres vivos

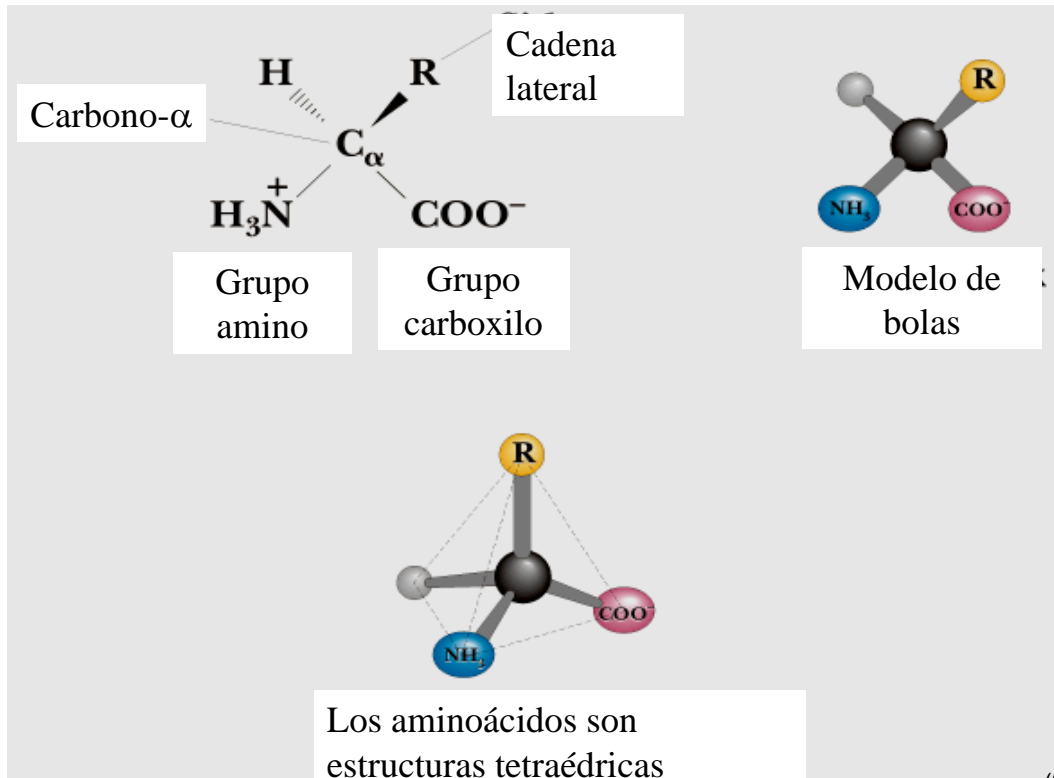
- Catálisis de reacciones enzimáticas, transporte de vitaminas, minerales, oxígeno y combustibles.
- Estructura de tejidos, transmisión nerviosa, contracción muscular y motilidad celular.
- Coagulación sanguínea, defensas inmunológicas, hormonas y moléculas reguladoras.



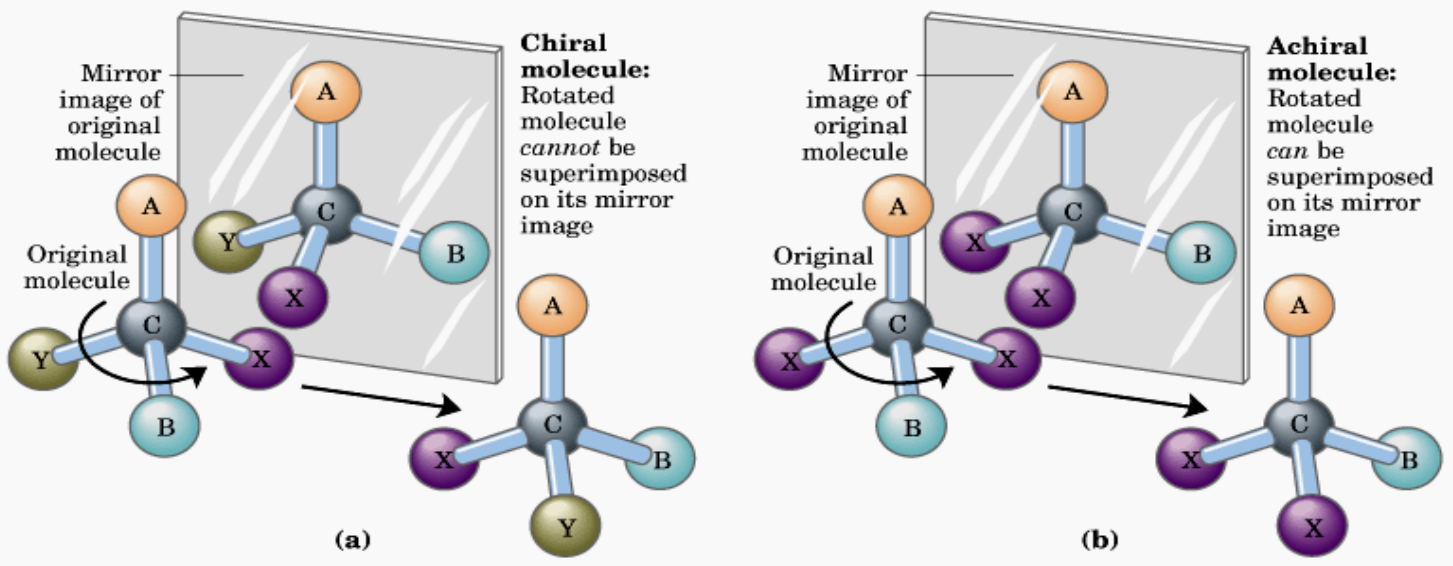
AMINOACIDOS

- En los microorganismos, plantas y animales se encuentran unos 300 aminoácidos.
- Solamente 20 aminoácidos son codificados por el DNA para formar las proteínas.
- Muchas proteínas contienen aminoácidos modificados y partes no proteicas (grupos prostéticos)

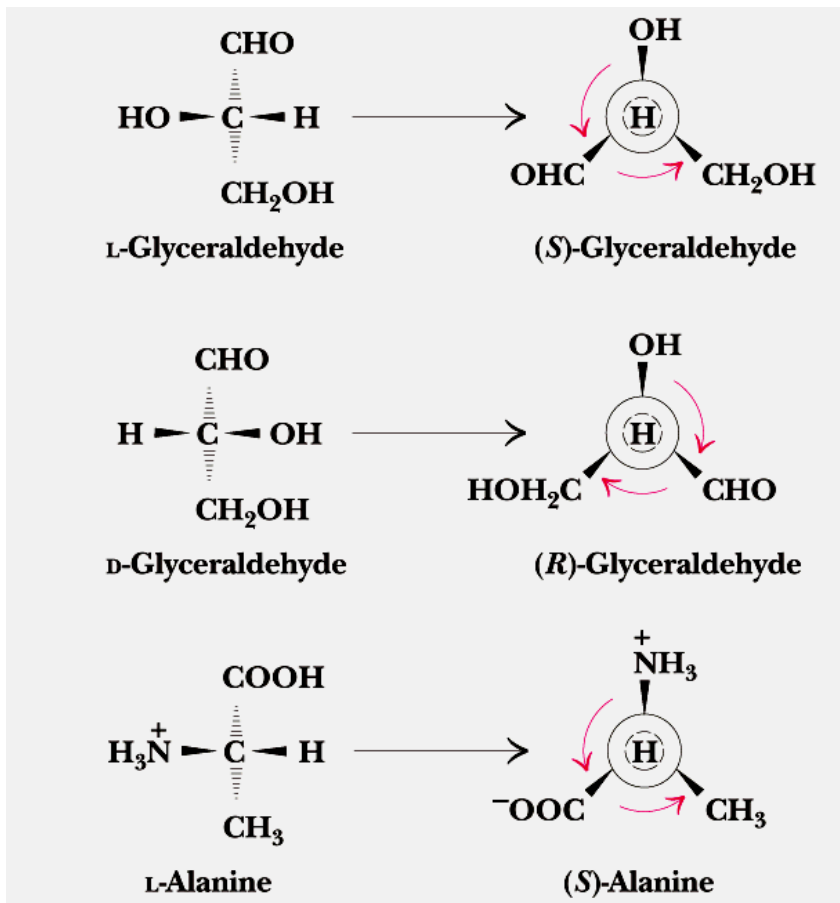
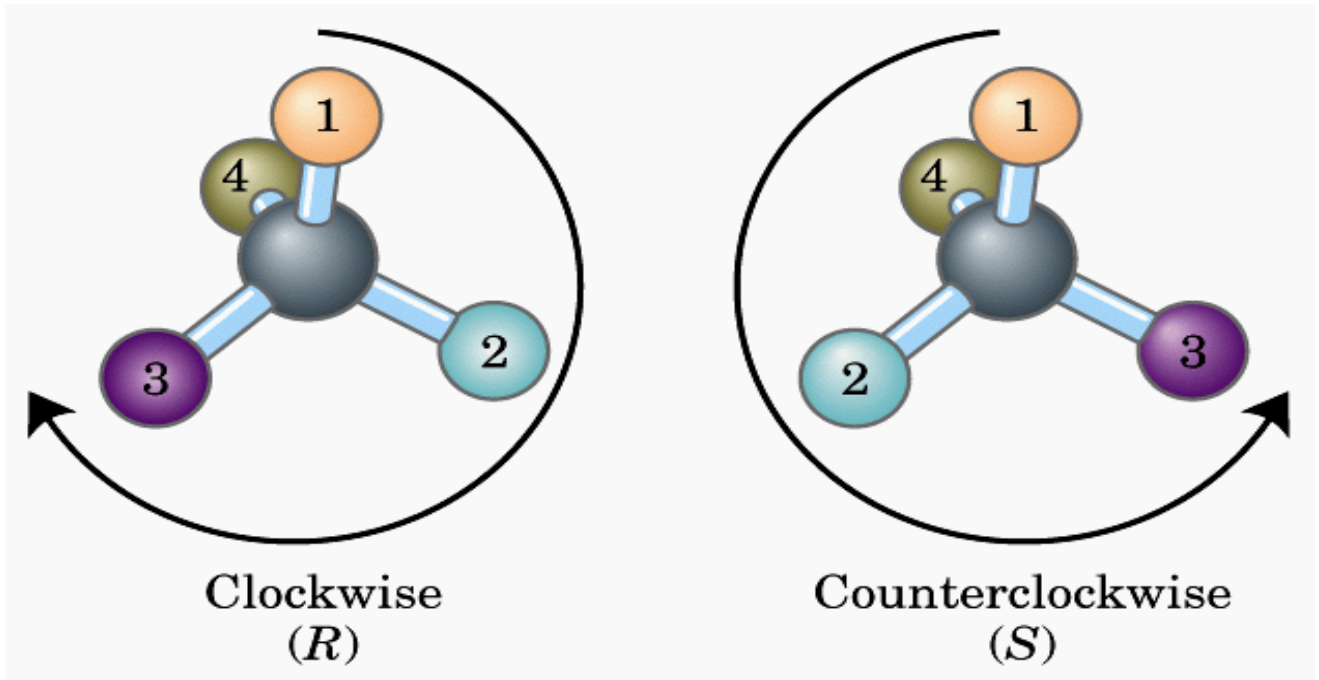
Aminoácidos

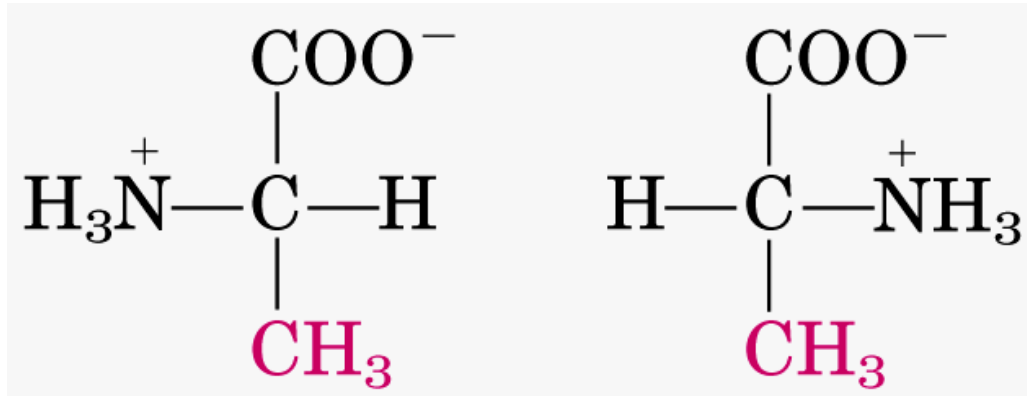
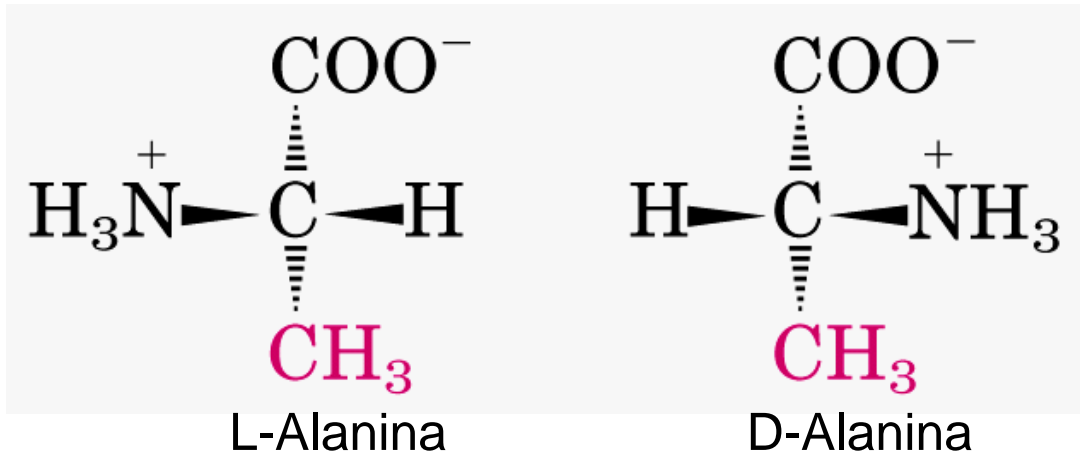


(Garrett and Grisham)

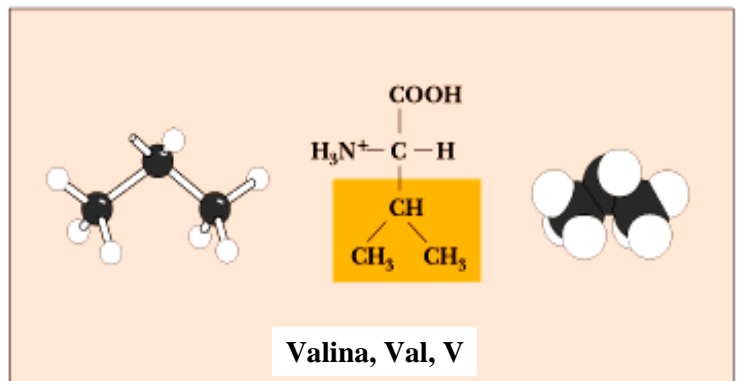
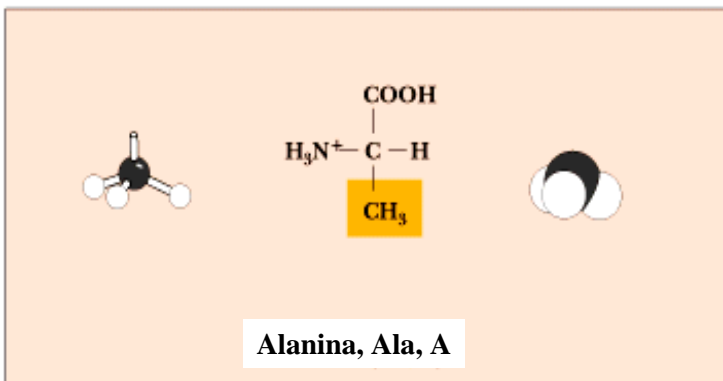
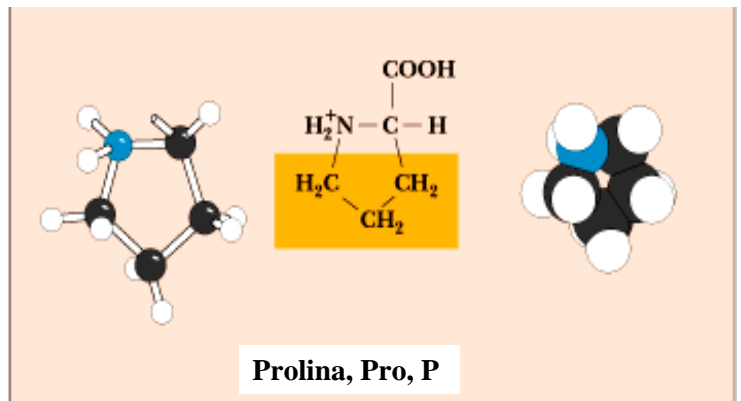
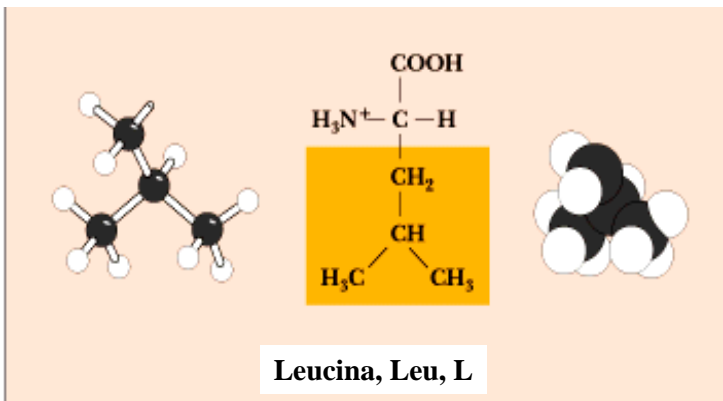


(Lehninger)

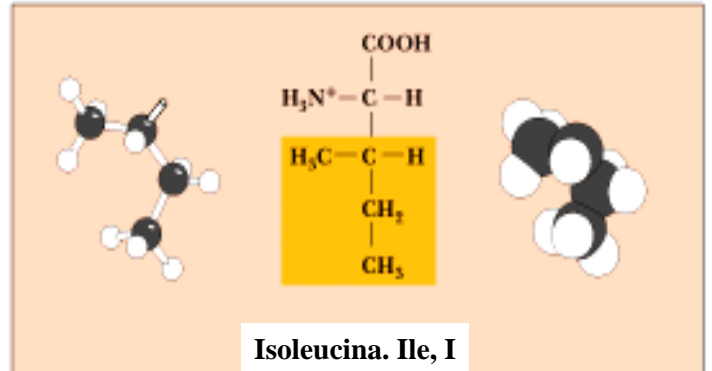
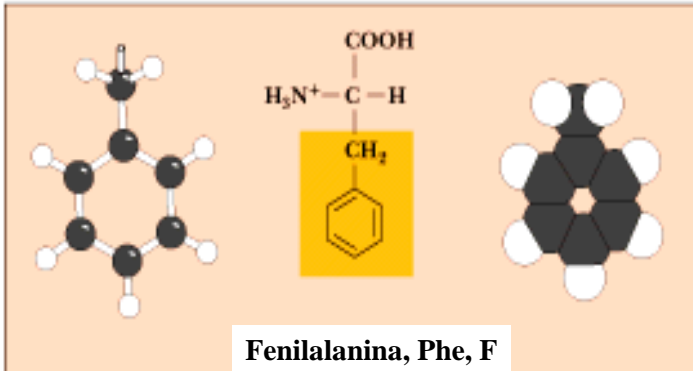
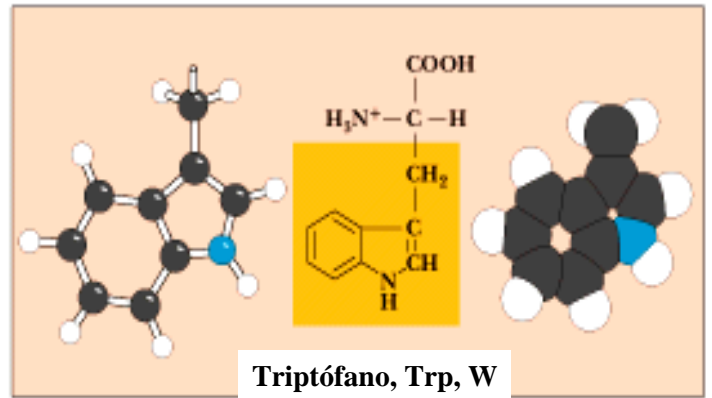
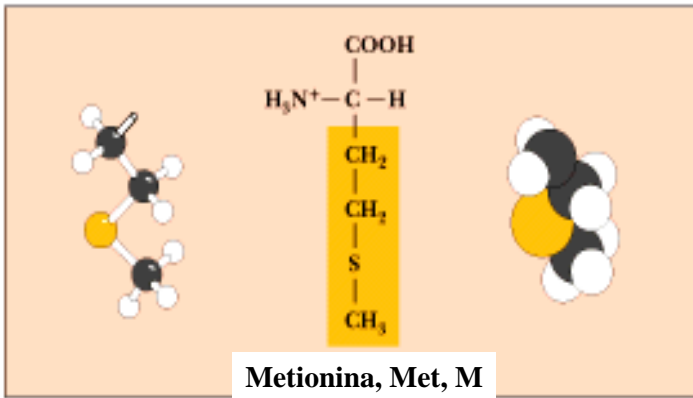




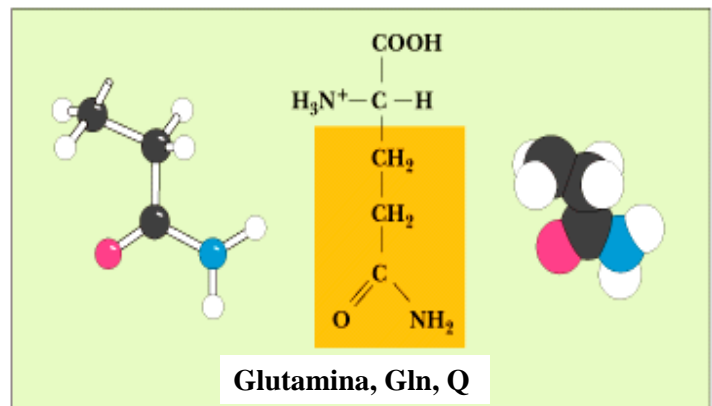
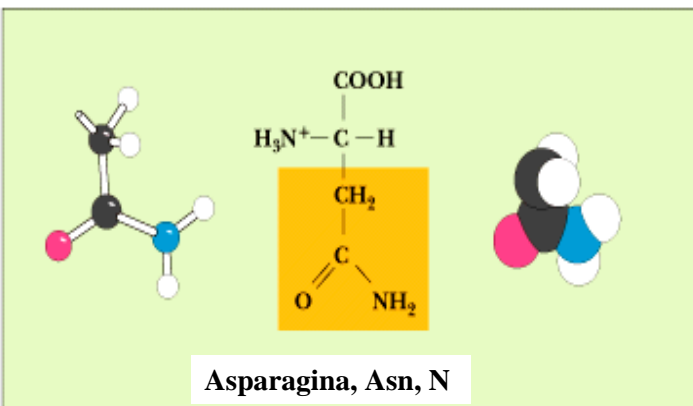
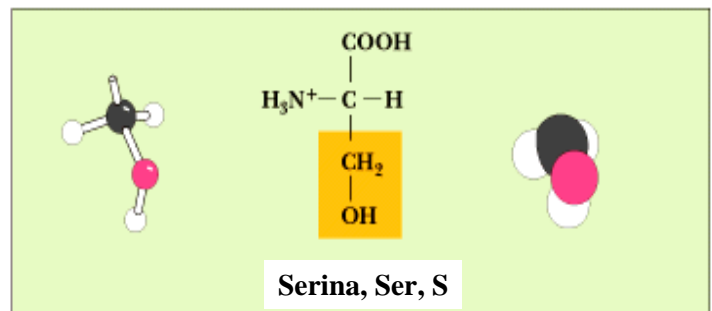
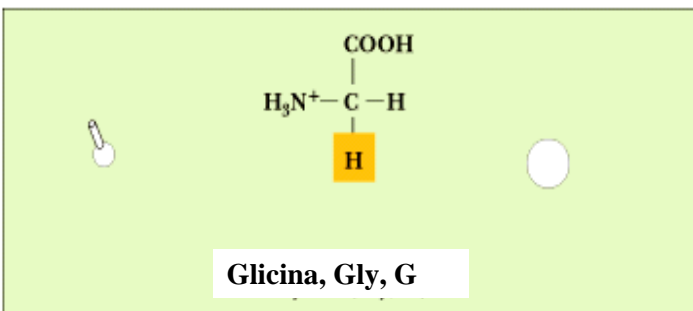
Aminoácidos apolares



Apolares (hidrofóbicos)

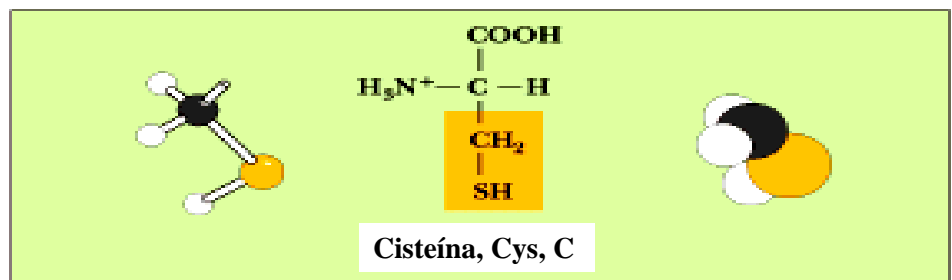
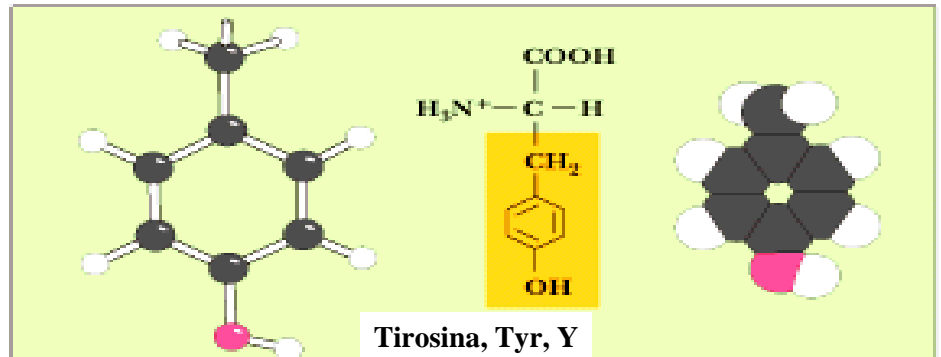
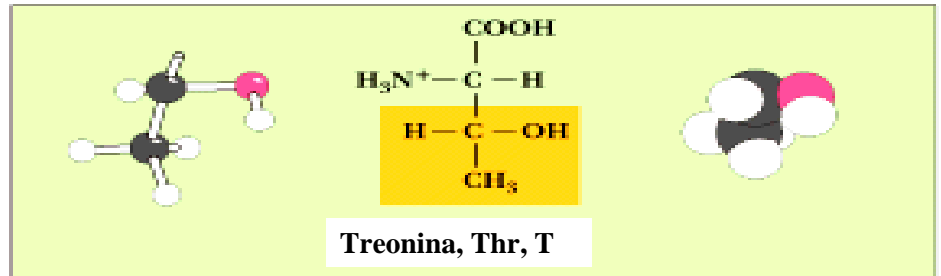


Polares sin carga

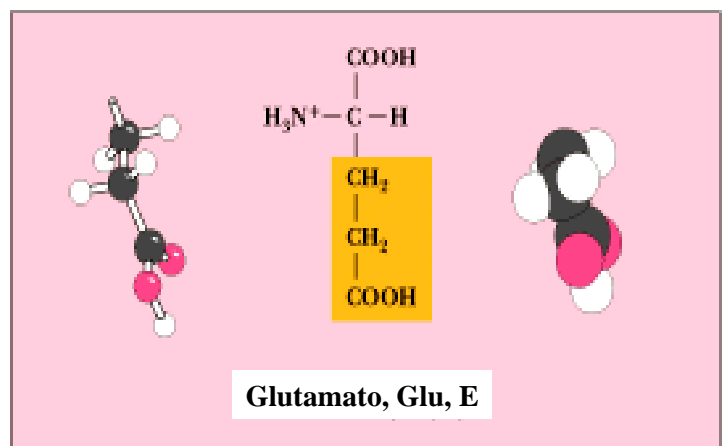
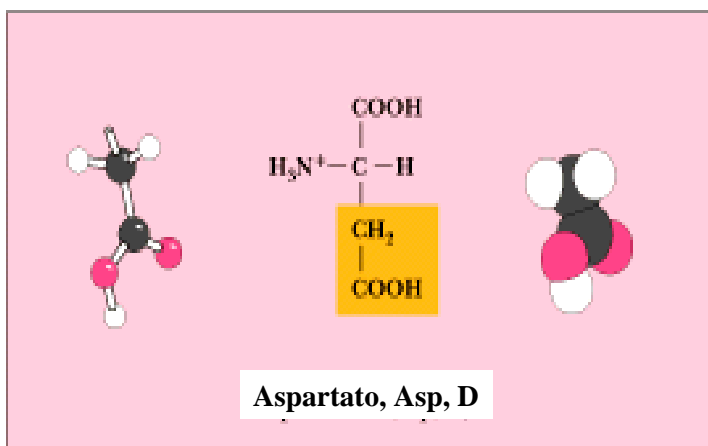


Polares sin carga

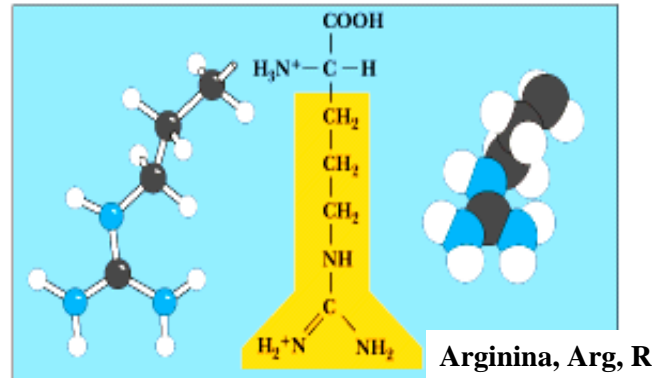
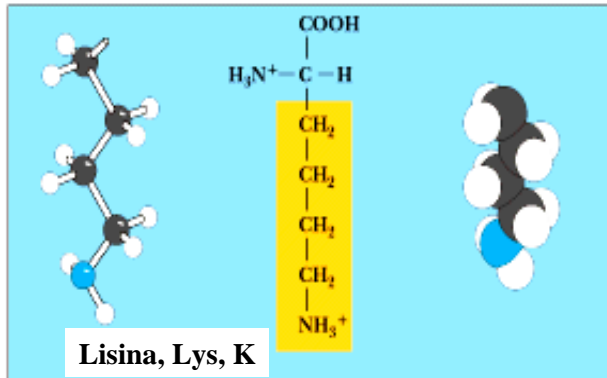
(Ser y Thr en
sitios activos de
enzimas)
(Glucoproteínas:
Ser, Thr, Asn)



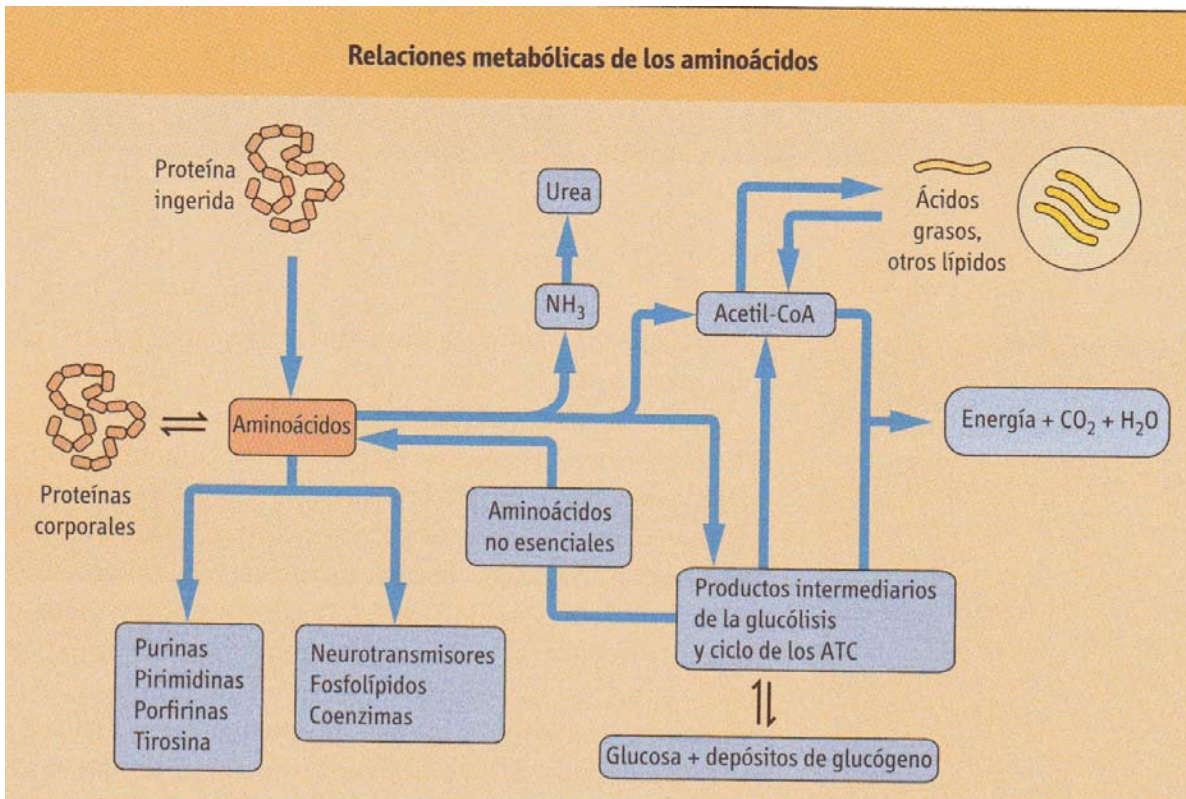
Aminoácidos acídicos



Aminoácidos básicos



Properties and Conventions Associated with the Standard Amino Acids								
Amino acid	Abbreviated names	M_r	pK_a values			pI	Hydropathy index*	Occurrence in proteins (%) [†]
			pK_a (-COOH)	pK_a (-NH ₃ ⁺)	pK_a (R group)			
Nonpolar, aliphatic R groups								
Glycine	Gly G	75	2.34	9.60		5.97	-0.4	7.2
Alanine	Ala A	89	2.34	9.69		6.01	1.8	7.8
Valine	Val V	117	2.32	9.62		5.97	4.2	6.6
Leucine	Leu L	131	2.36	9.60		5.98	3.8	9.1
Isoleucine	Ile I	131	2.36	9.68		6.02	4.5	5.3
Methionine	Met M	149	2.28	9.21		5.74	1.9	2.3
Aromatic R groups								
Phenylalanine	Phe F	165	1.83	9.13		5.48	2.8	3.9
Tyrosine	Tyr Y	181	2.20	9.11	10.07	5.66	-1.3	3.2
Tryptophan	Trp W	204	2.38	9.39		5.89	-0.9	1.4
Polar, uncharged R groups								
Serine	Ser S	105	2.21	9.15		5.68	-0.8	6.8
Proline	Pro P	115	1.99	10.96		6.48	1.6	5.2
Threonine	Thr T	119	2.11	9.62		5.87	-0.7	5.9
Cysteine	Cys C	121	1.96	10.28	8.18	5.07	2.5	1.9
Asparagine	Asn N	132	2.02	8.80		5.41	-3.5	4.3
Glutamine	Gln Q	146	2.17	9.13		5.65	-3.5	4.2
Positively charged R groups								
Lysine	Lys K	146	2.18	8.95	10.53	9.74	-3.9	5.9
Histidine	His H	155	1.82	9.17	6.00	7.59	-3.2	2.3
Arginine	Arg R	174	2.17	9.04	12.48	10.76	-4.5	5.1
Negatively charged R groups								
Aspartate	Asp D	133	1.88	9.60	3.65	2.77	-3.5	5.3
Glutamate	Glu E	147	2.19	9.67	4.25	3.22	-3.5	6.3

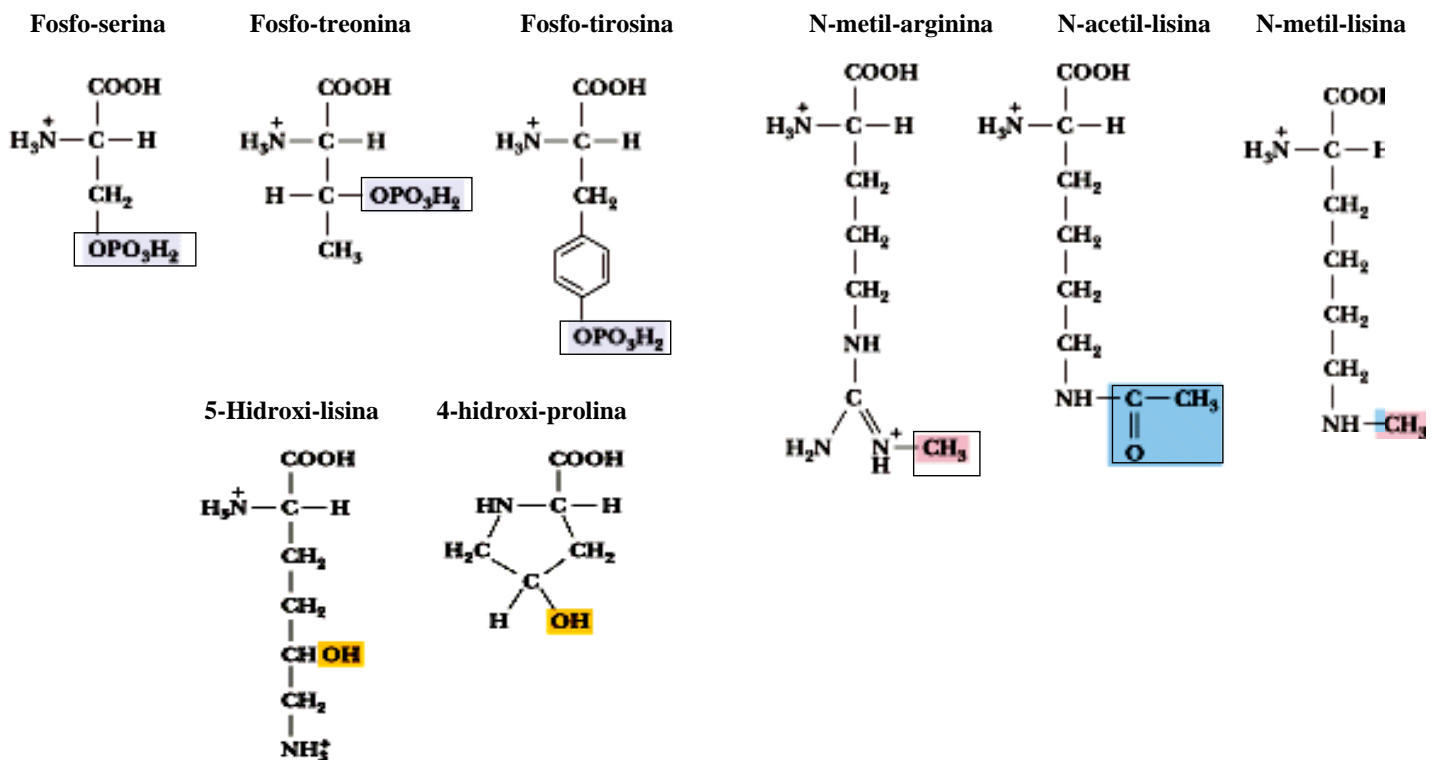


Síndrome del restaurante oriental

- Cefalea, sudoración, náuseas
- Hormigueo en la cara y parte superior del torso
- Se deben a la acción transitoria sobre el SNC del Glu o GABA



Aminoácidos modificados postraduccionalmente en proteínas



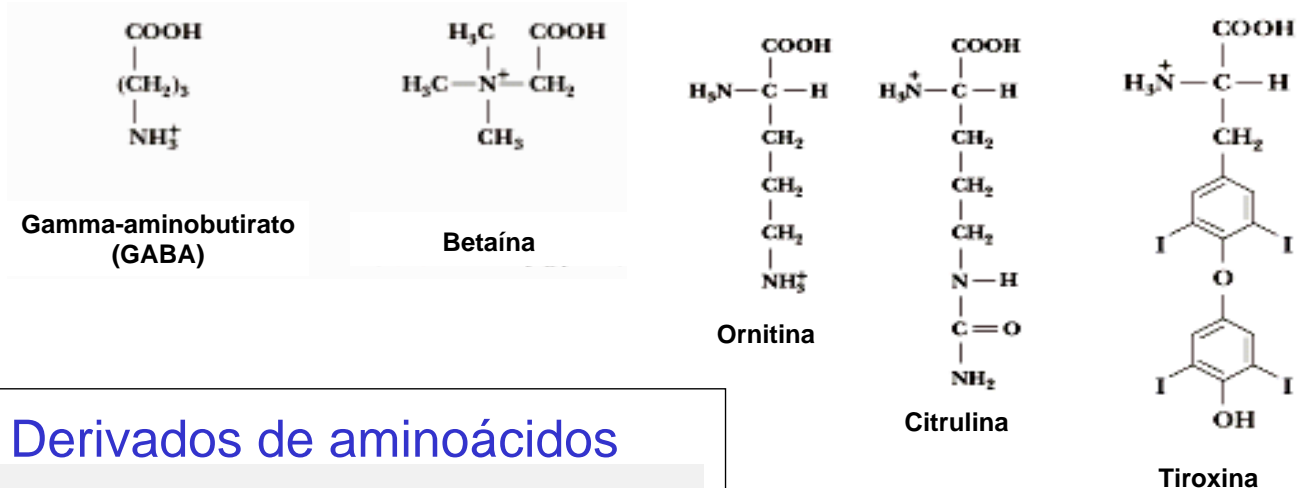
(Garrett and Grisham)

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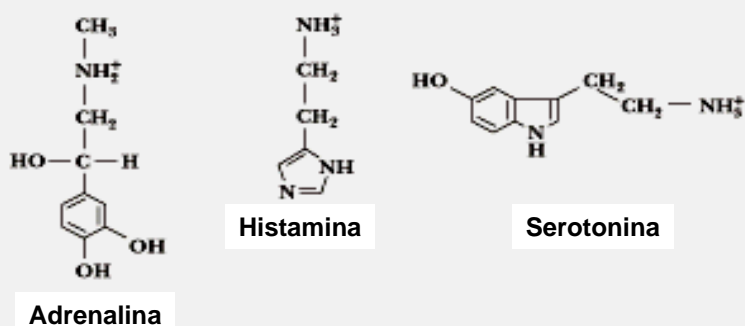


TEMA 3

Aminoácidos que no están en proteínas



Derivados de aminoácidos



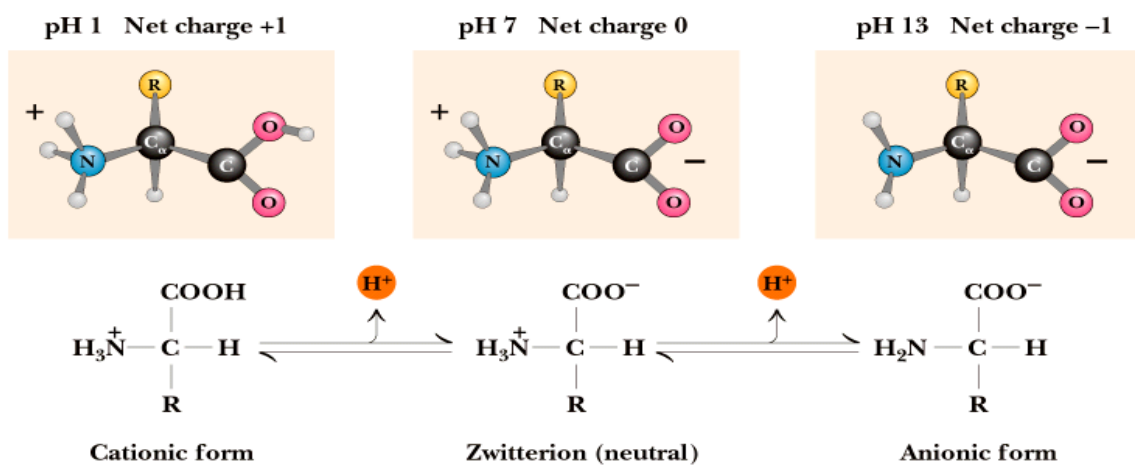
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(Garrett and Grisham)

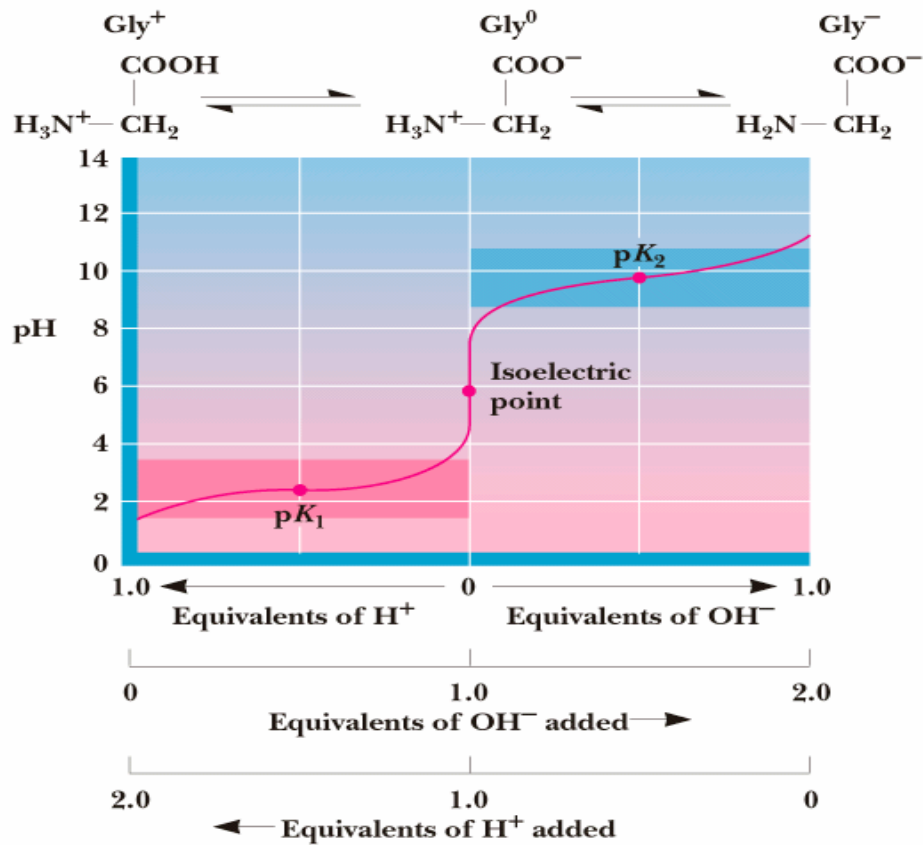
Aminoácidos esenciales

- Phe, Val, Treo, Trp, Ile, Met, His, Arg, Leu, Lys

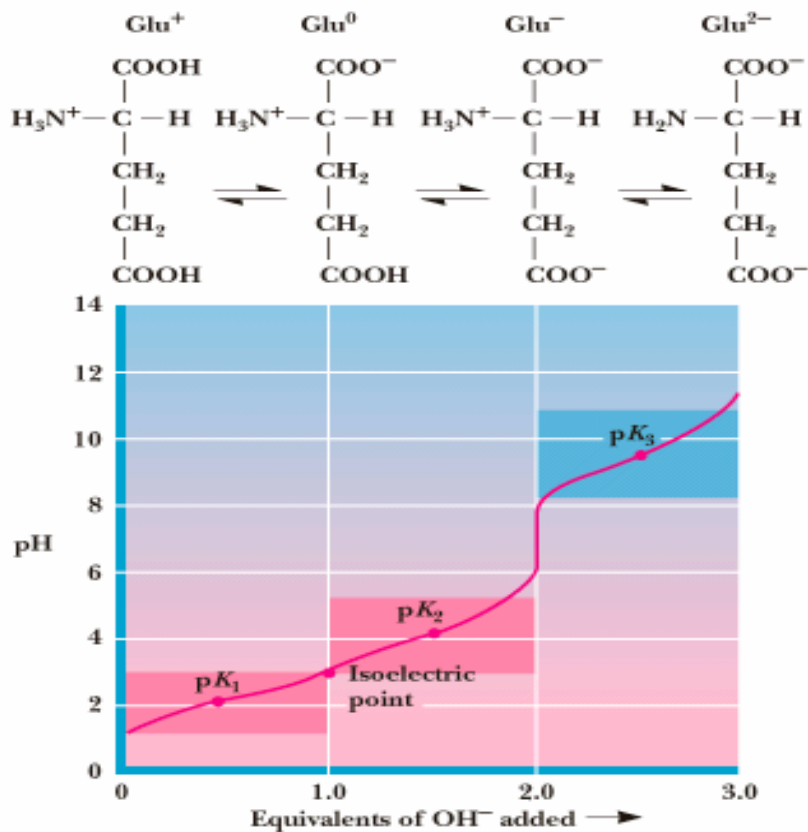
Ionización de los aminoácidos



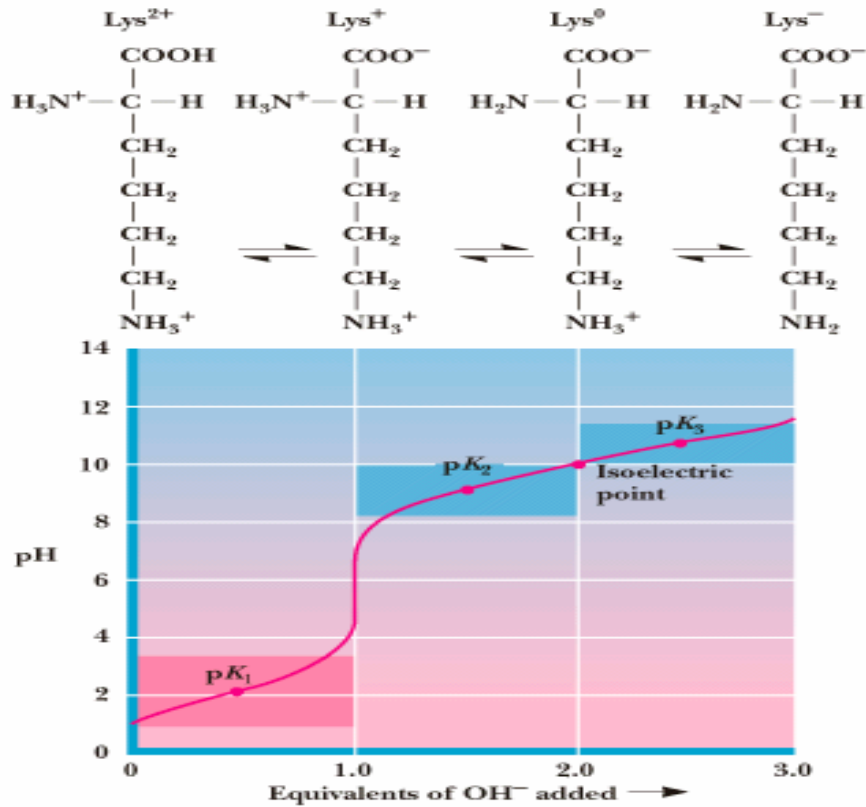
Titulación de la glicina



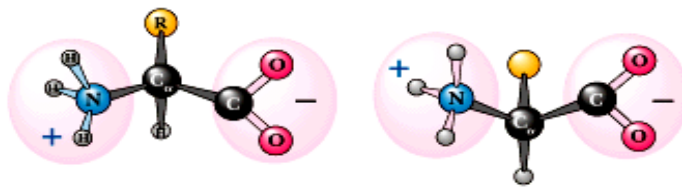
Titulación del ácido glutámico



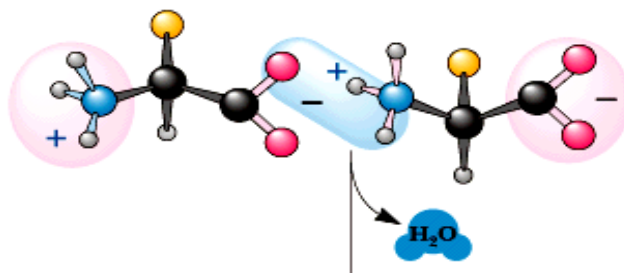
Titulación de la lisina



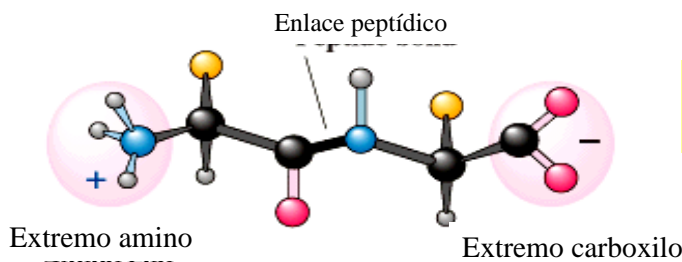
Los aminoácidos se pueden unir por enlaces peptídicos



Dos aminoácidos



Eliminación de una molécula de agua



... Formación del enlace CO-NH