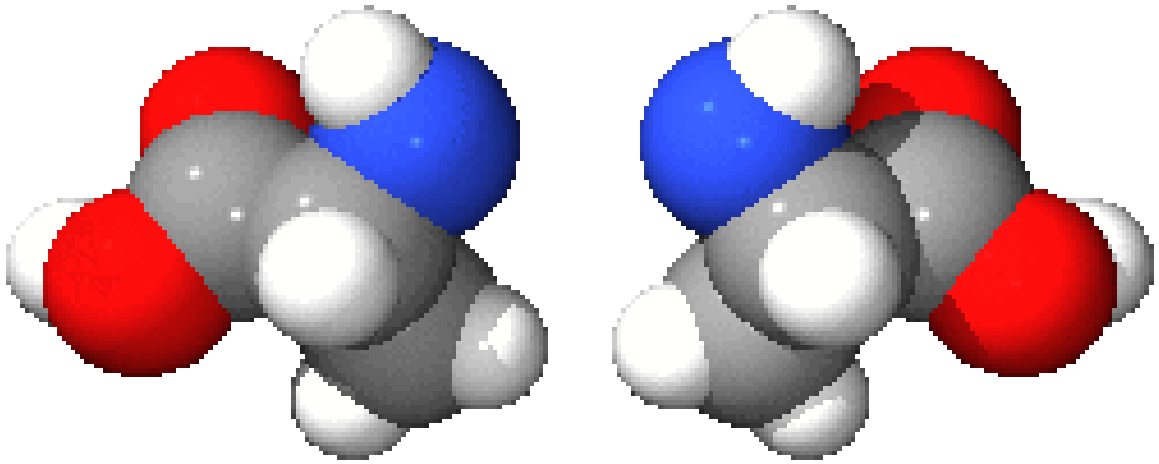
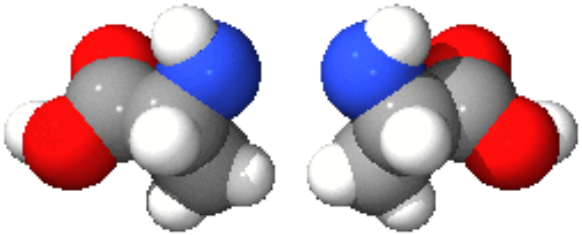
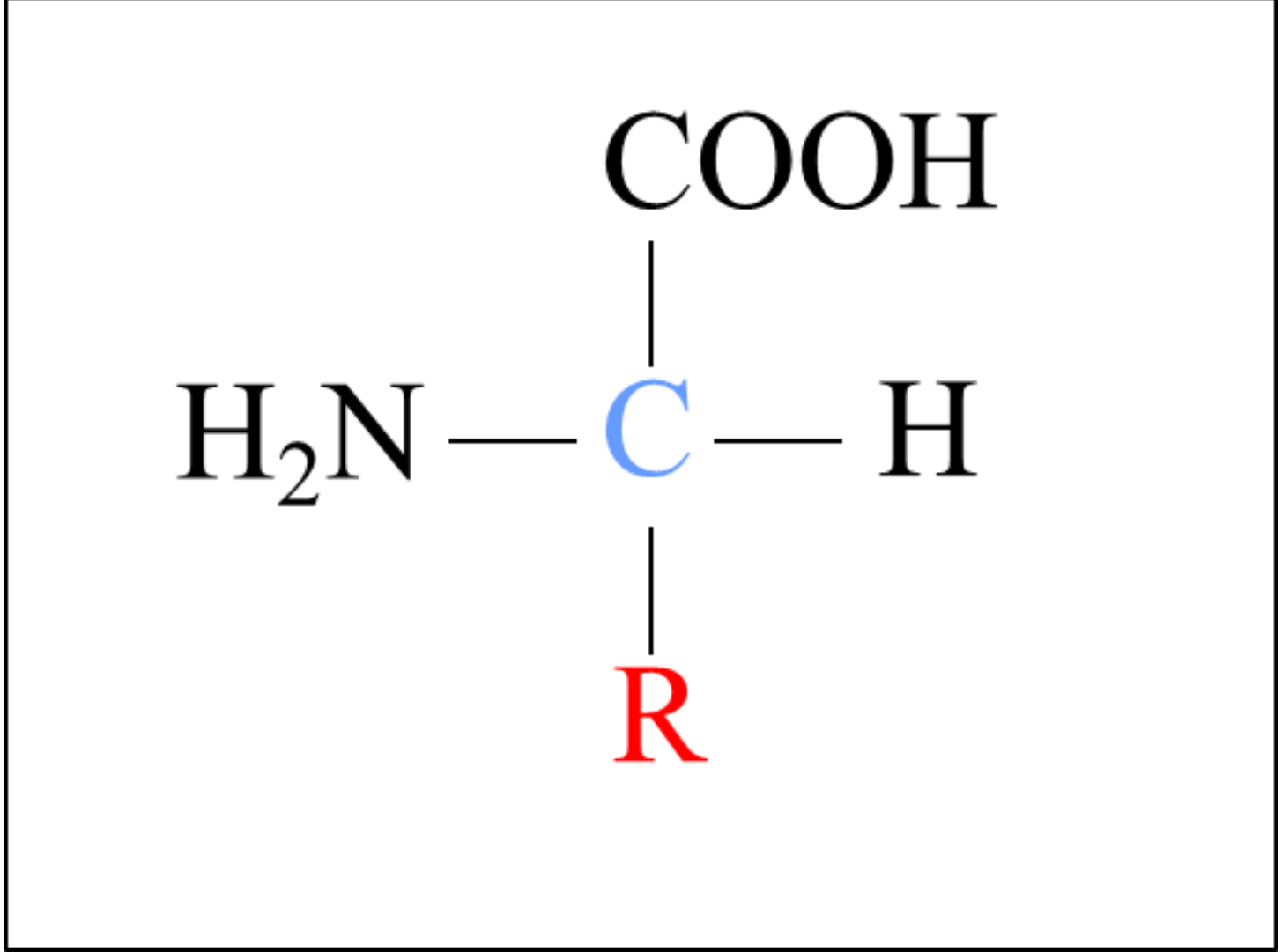


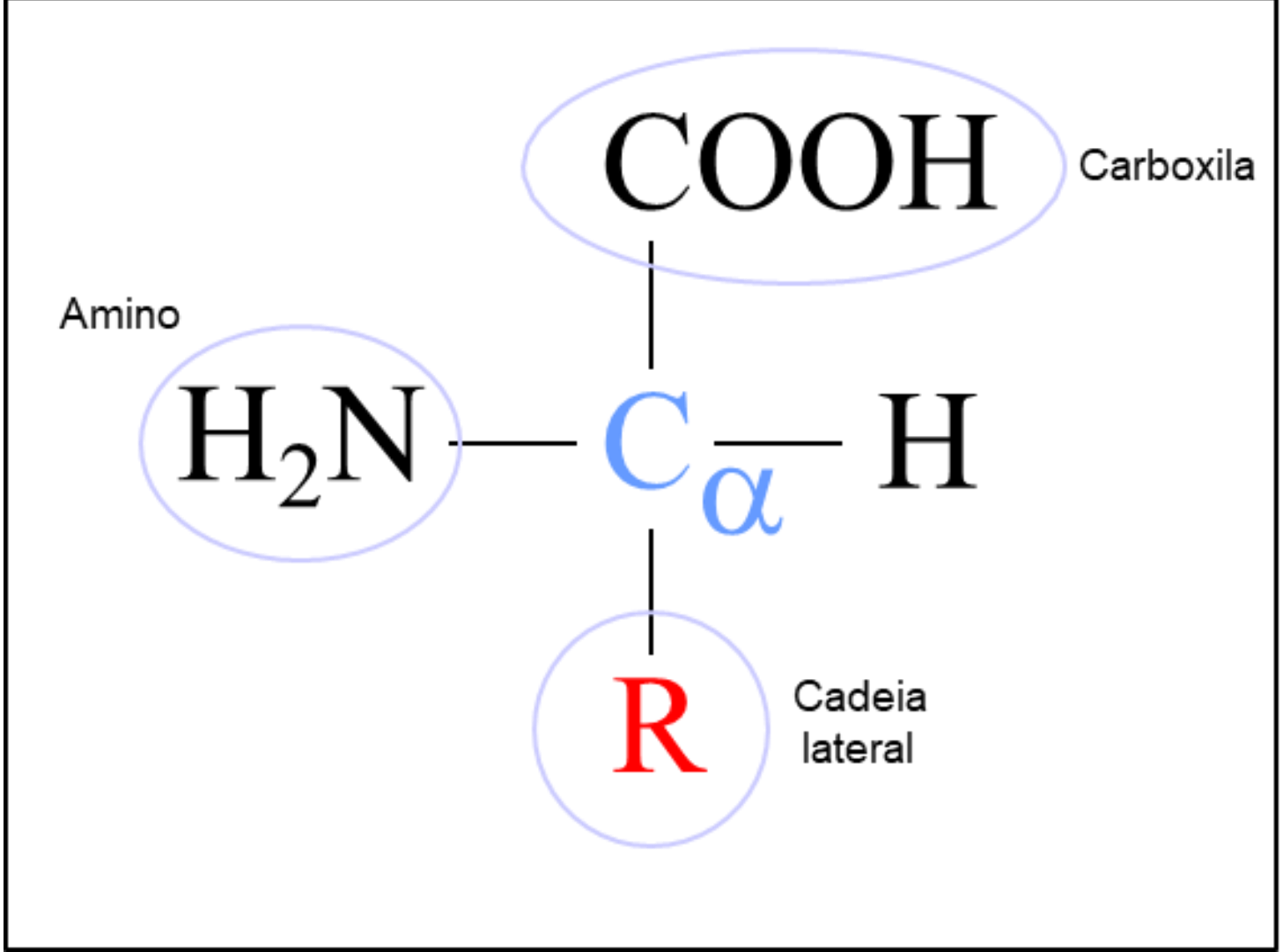
Aminoácidos



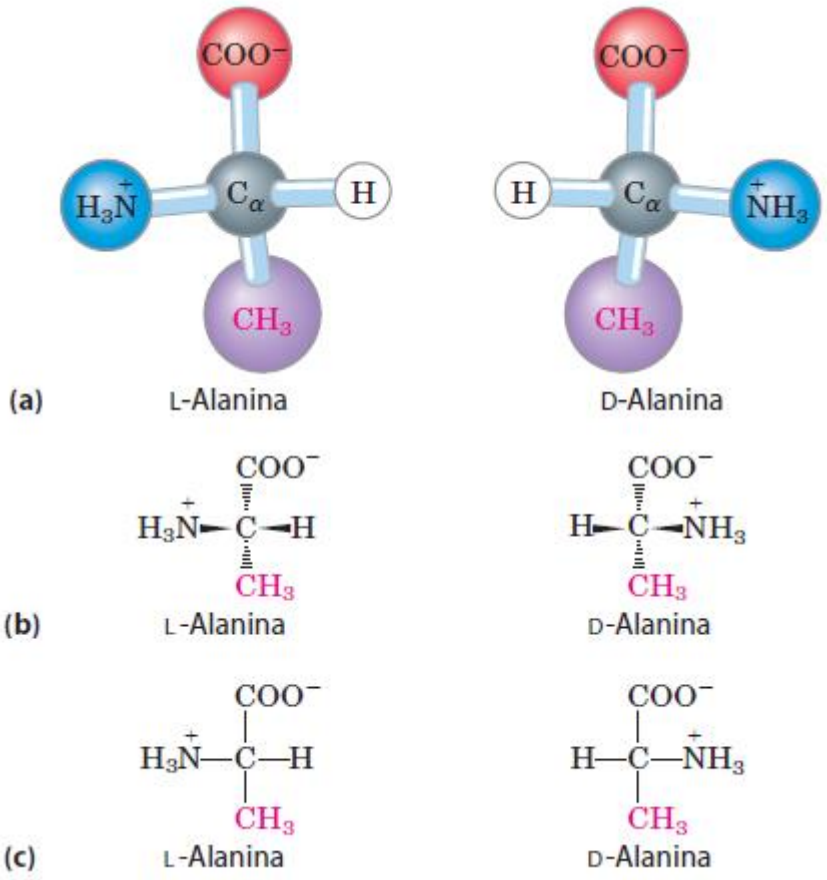
Ronaldo Bento Quaggio

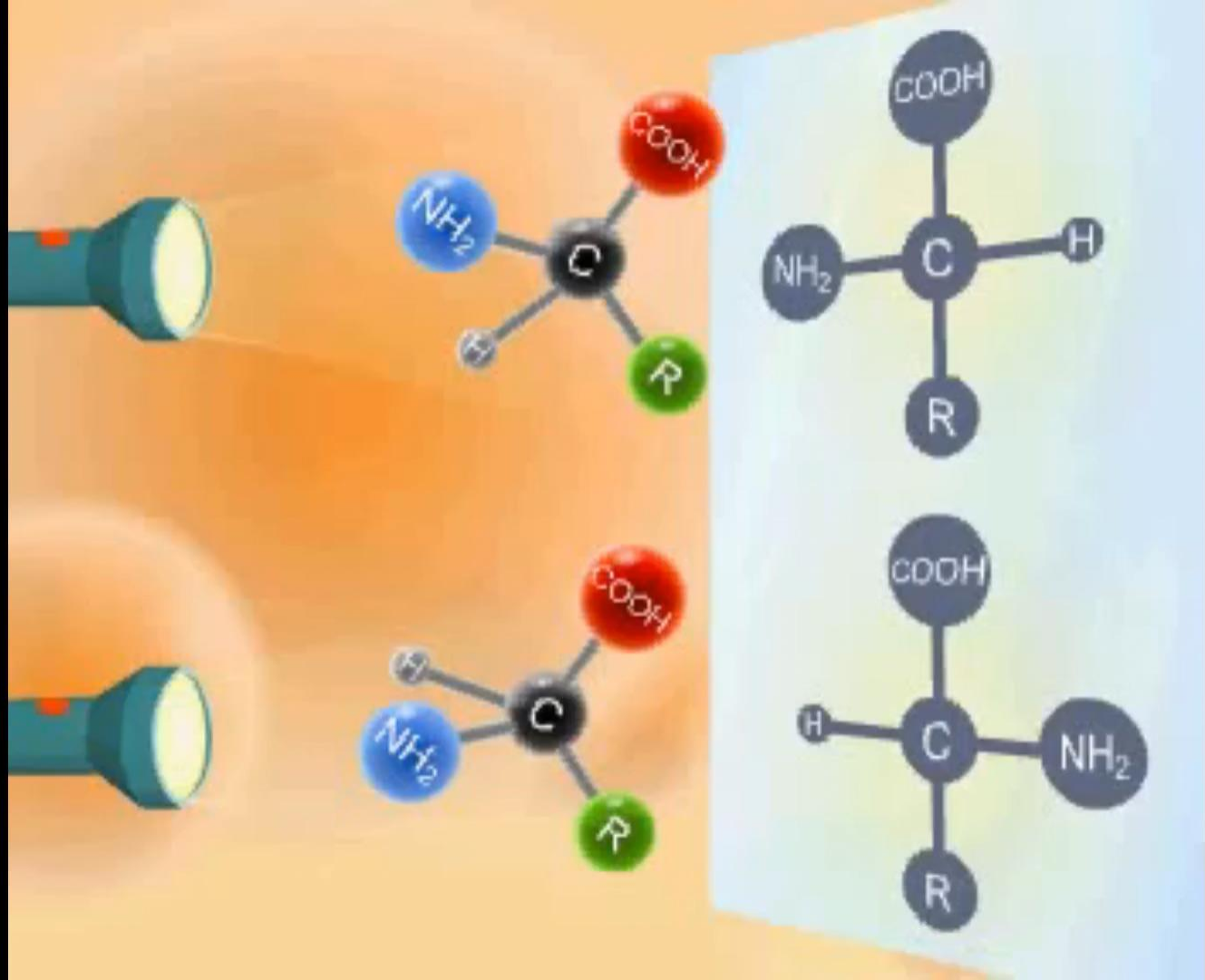
QBQ0204 - Bioquímica
Estrutura de Biomoléculas e Metabolismo


COOH
H2N
C
H
R


COOH
Carboxila
Amino
H_2N
C_α
H
R
Cadeia
lateral

Estereoisomerismo em α-aminoácidos.

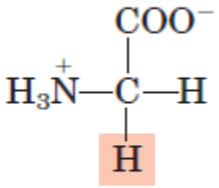



COOH
NH2
C
H
R
COOH
NH2
C
H
R
COOH
H
C
NH2
R
COOH
H
C
NH2
R

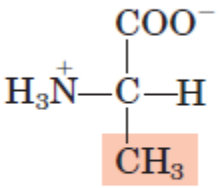
Glicina	Gly	G
Alanina	Ala	A
Valina	Val	V
Leucina	Leu	L
Isoleucina	Ile	I
Prolina	Pro	P
Metionina	Met	M
Fenilalanina	Phe	F
Tirosina	Tyr	Y
Triptofano	Trp	W

Serina	Ser	S
Treonina	Thr	T
Cisteína	Cys	C
Asparagina	Asn	N
Glutamina	Gln	Q
Arginina	Arg	R
Lisina	Lys	K
Histidina	His	H
A. Aspártico	Asp	D
A. Glutâmico	Glu	E

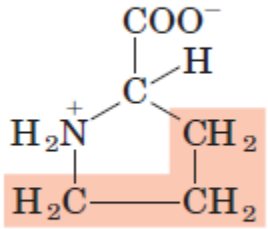
Grupos R apolares, alifáticos



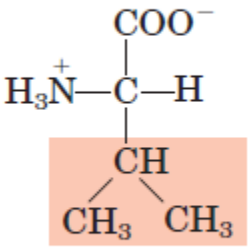
Glicina



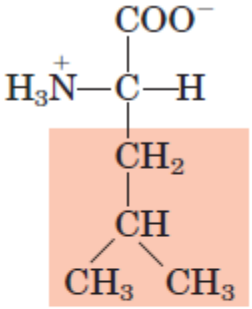
Alanina



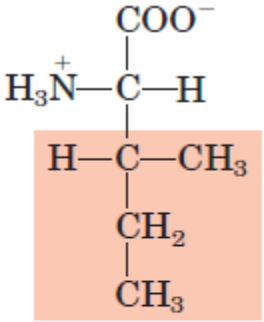
Prolina



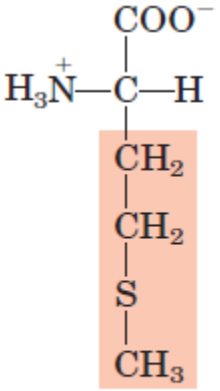
Valina



Leucina

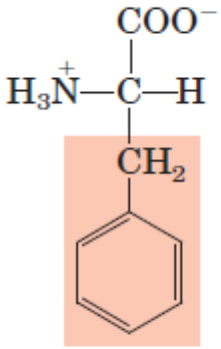


Isoleucina

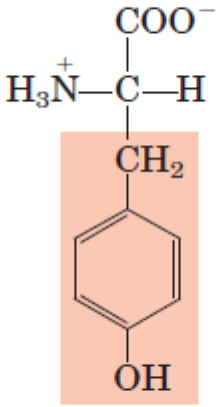


Metionina

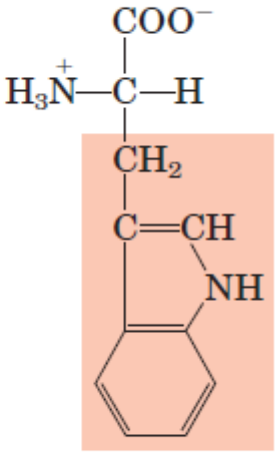
Grupos R aromáticos



Fenilalanina

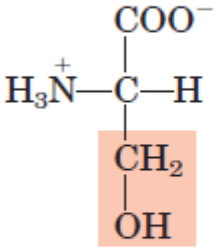


Tirosina

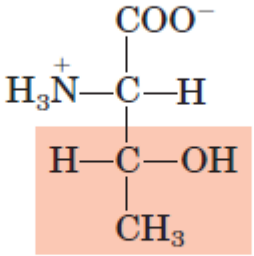


Triptofano

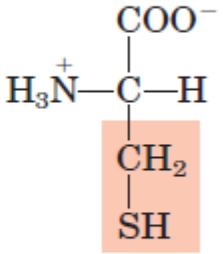
Grupos R polares, não carregados



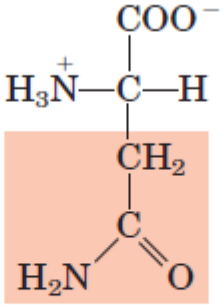
Serina



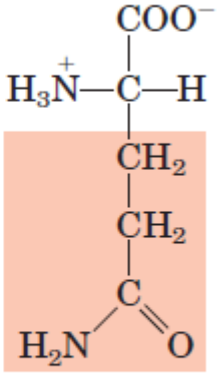
Treonina



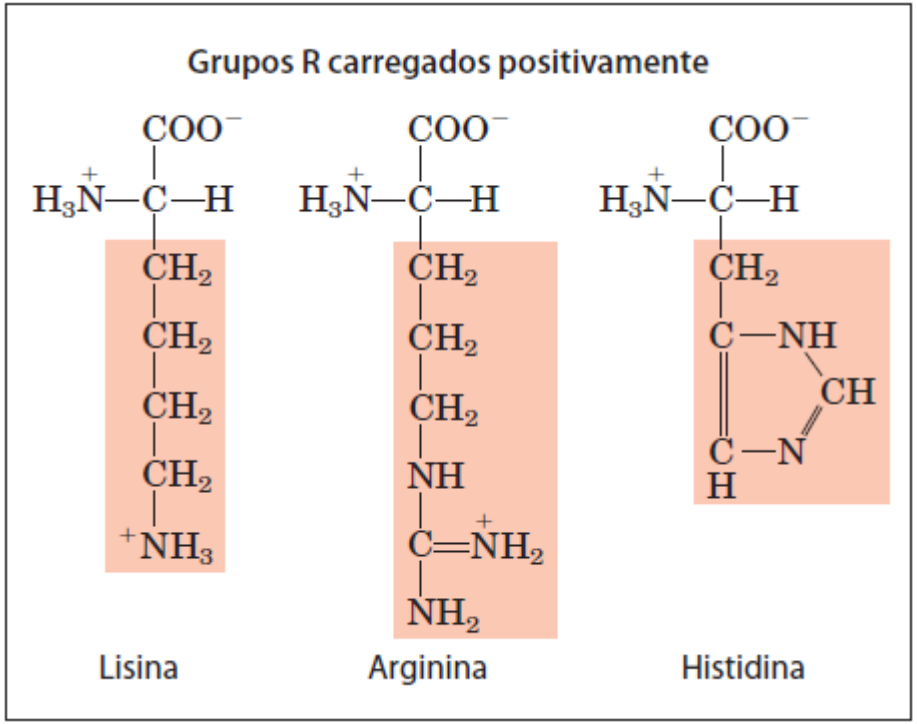
Cisteína



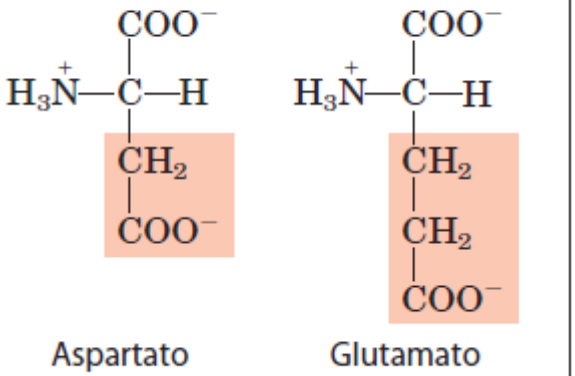
Asparagina



Glutamina


Grupos R carregados positivamente
Lisina
Arginina
Histidina

Grupos R carregados negativamente



Aspartato

Glutamato


AMINOÁCIDOS
Essenciais
Triptofano
Fenilalanina
Lisina
Treonina
Metionina
BCAAs
Leucina
Isoleucina
Valina
Condicionalmente Essenciais
Tirosina
Cisteína
Arginina
Serina
Histidina
Não Essenciais
Prolina
Asparigina
Glicina
Alanina
Glutamina
Ácido Glutâmico
Ácido Aspártico

9 ESSENTIAL AMINO ACIDS

Amino acids are the building blocks of human protein, the body uses 20 amino acids, 9 of which are essential*

*Essential amino acids must be part of your diet

FUNCTIONS OF AMINO ACIDS

ISOLEUCINE	LEUCINE	LYSINE	METHIONINE	PHENYLALANINE	THREONINE	TRYPTOPHAN	VALINE	HISTIDINE
blood sugar regulation growth and repair of muscle tissue hemoglobin development energy regulation	blood sugar regulation growth and repair of muscle tissue hormone production wound healing energy regulation	development and regulation of collagen, antibodies, hormones, and enzymes promotes calcium absorption growth and repair of muscle tissue	may prevent arterial fat buildup may act as an antioxidant promotes collagen synthesis	neurotransmitter function increases blood levels of norepinephrine, epinephrine, dopamine	antibody production	precursor for serotonin (aids sleep and combats anxiety) niacin production	growth and repair of muscle tissue energy regulation niacin production	growth tissue repair histamine development

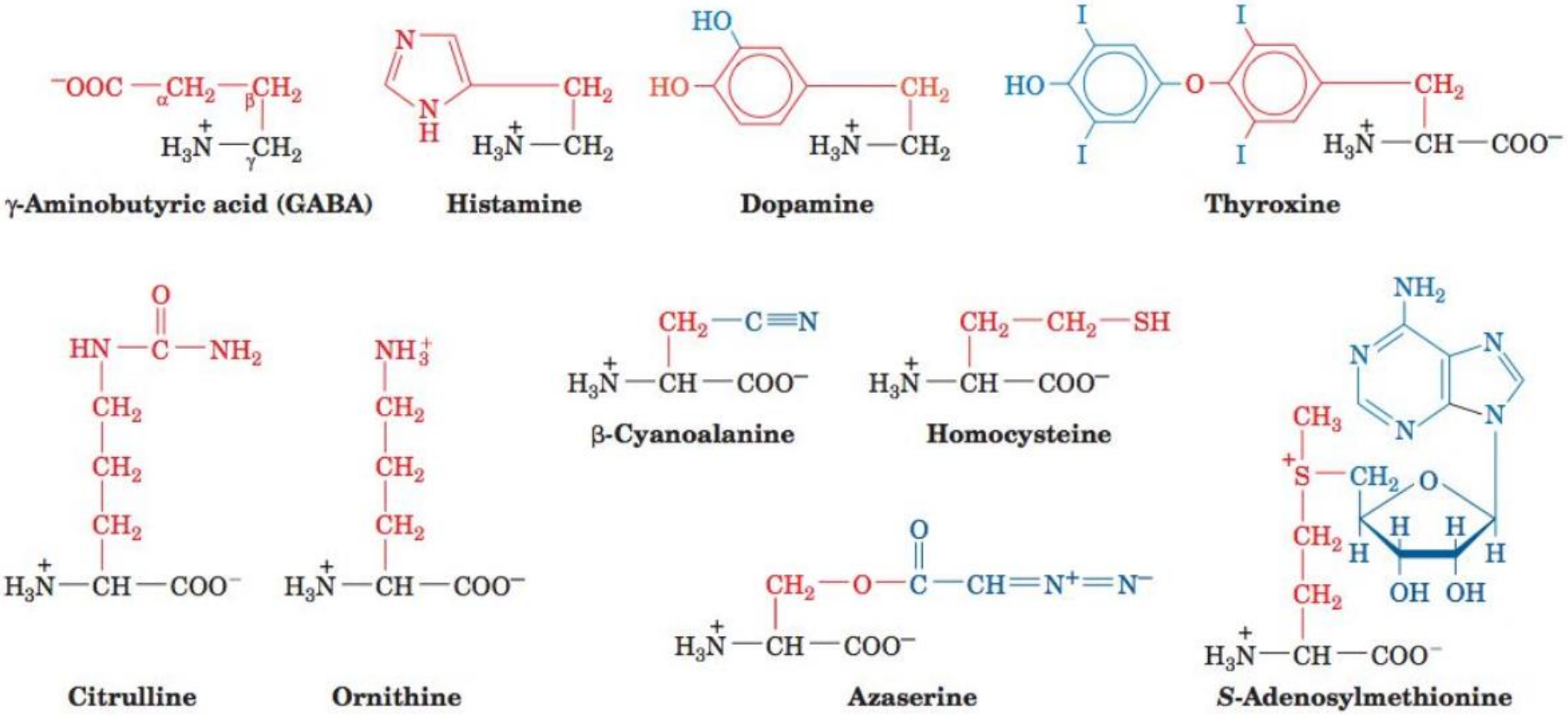
PLANT SOURCES OF EACH AMINO ACID

sacha inchi	sacha inchi	sacha inchi	sacha inchi	sacha inchi	sacha inchi	sacha inchi	sacha inchi	sacha inchi
-	-	beans	beans	-	beans	-	-	-
-	rice	-	-	-	-	rice	-	rice
-	-	-	-	peanuts	peanuts	peanuts	peanuts	-
almonds	almonds	-	-	almonds	almonds	-	almonds	-
soy	soy	soy	-	-	-	-	soy	-
wheat	wheat	-	-	-	-	-	-	wheat

MEAT SOURCES OF EACH AMINO ACID

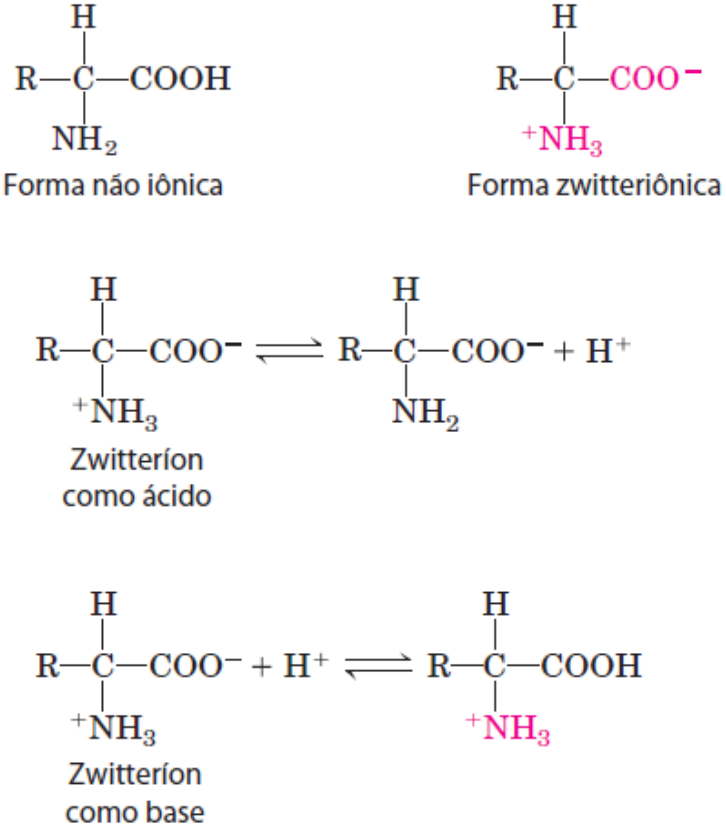
beef	beef	beef	beef	-	beef	beef	beef	-
dairy	dairy	dairy	dairy	dairy	dairy	dairy	dairy	-
eggs	eggs	eggs	eggs	-	eggs	-	eggs	-
fish	fish	fish	fish	-	-	fish	-	-
poultry	poultry	-	-	-	poultry	poultry	poultry	poultry

Information sourced from The Accidental Scientist - The Science of Cooking



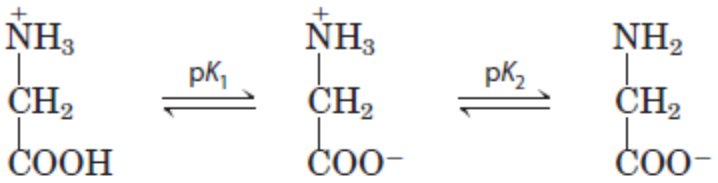
Alguns resíduos incomuns de aminoácidos que são componentes de certas proteínas

Formas não iônicas e zwitteriônicas de aminoácidos

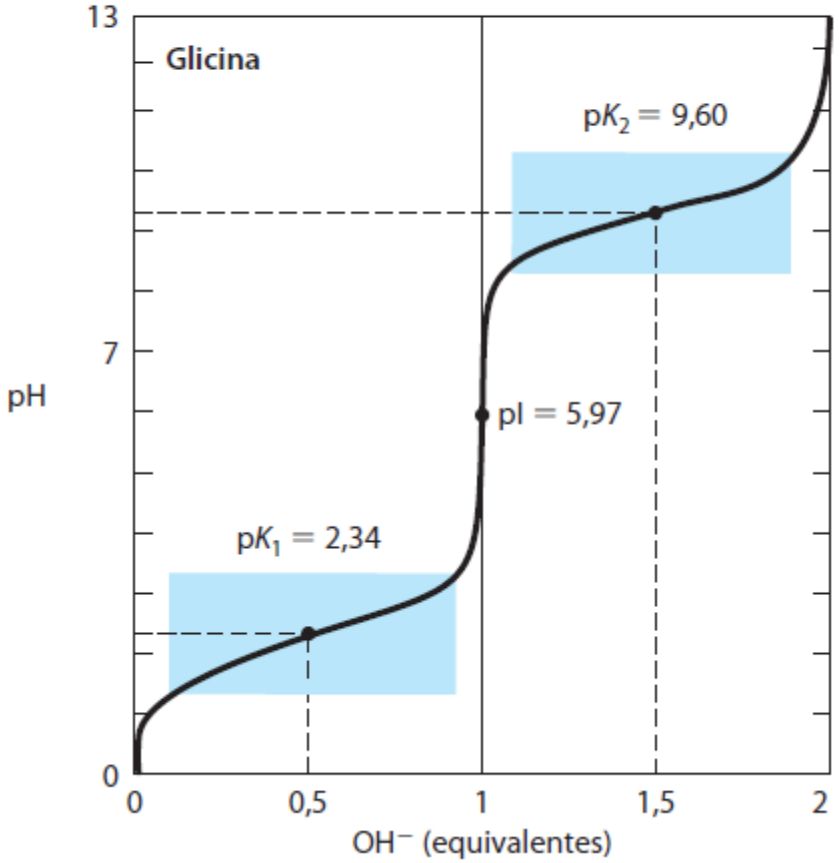


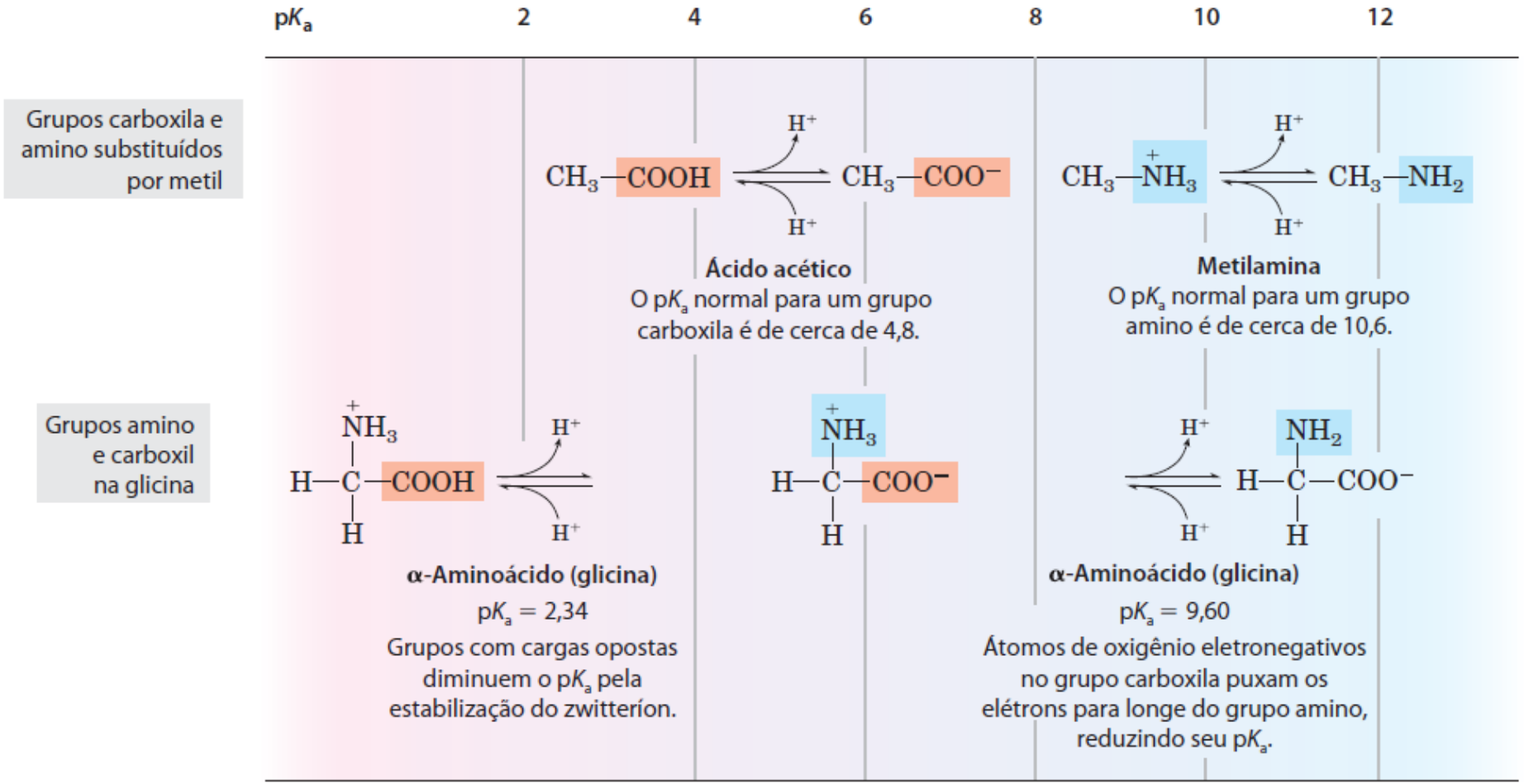
Titulação de um aminoácido

Glicina

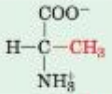
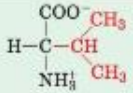
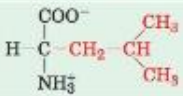
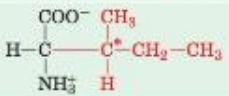
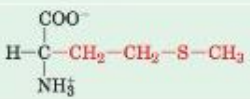
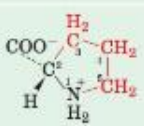
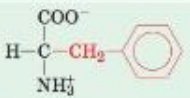
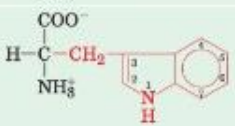


$$pI = \frac{pK_1 + pK_2}{2}$$

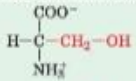
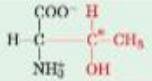
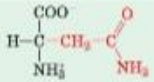
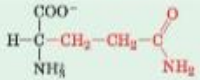
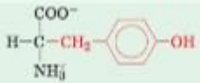
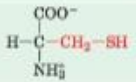
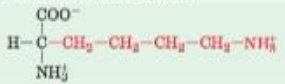
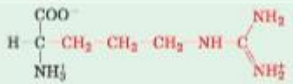
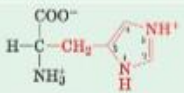
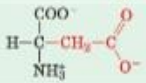
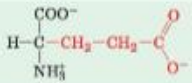


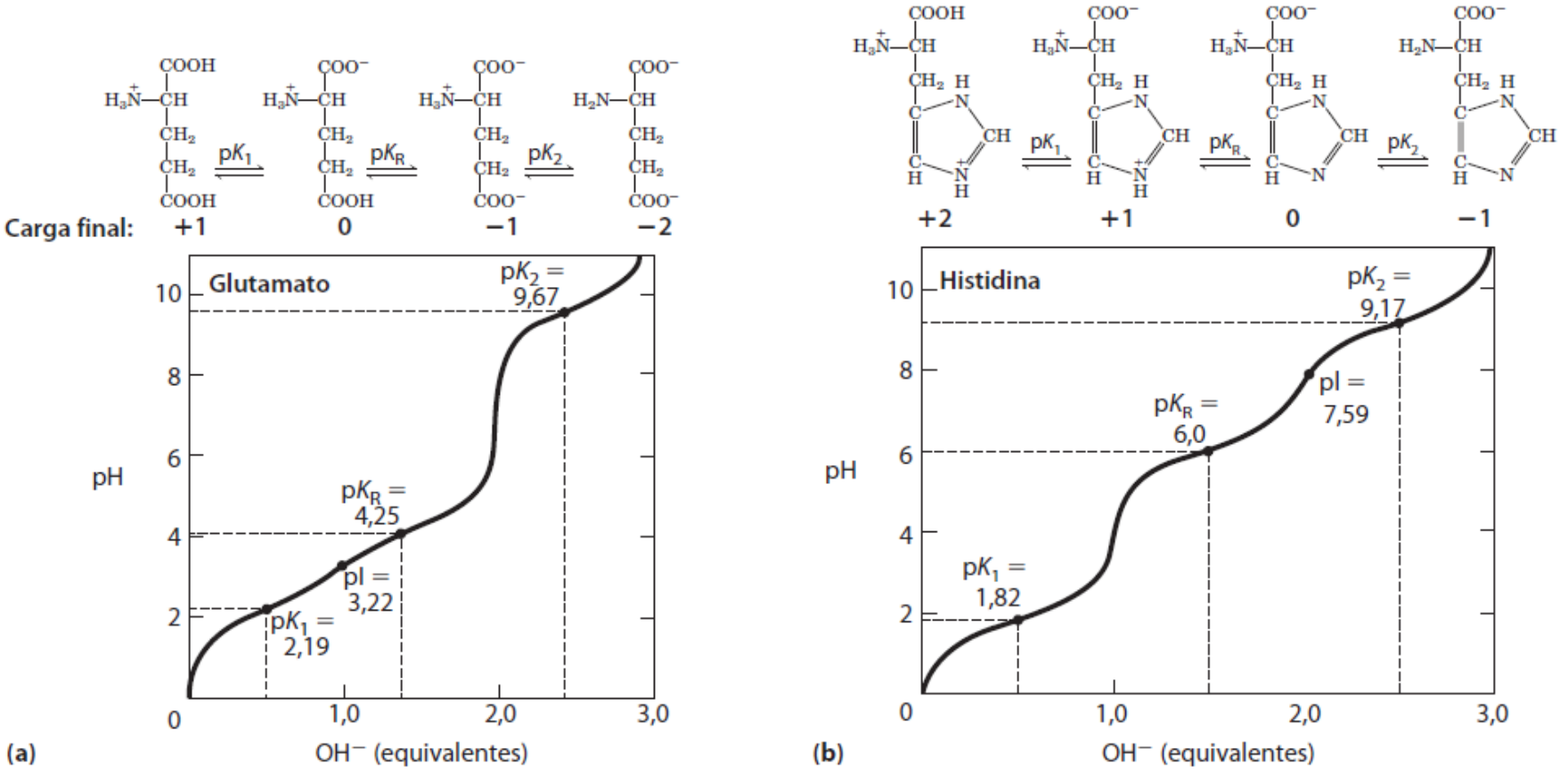


Efeito do ambiente químico no pKa

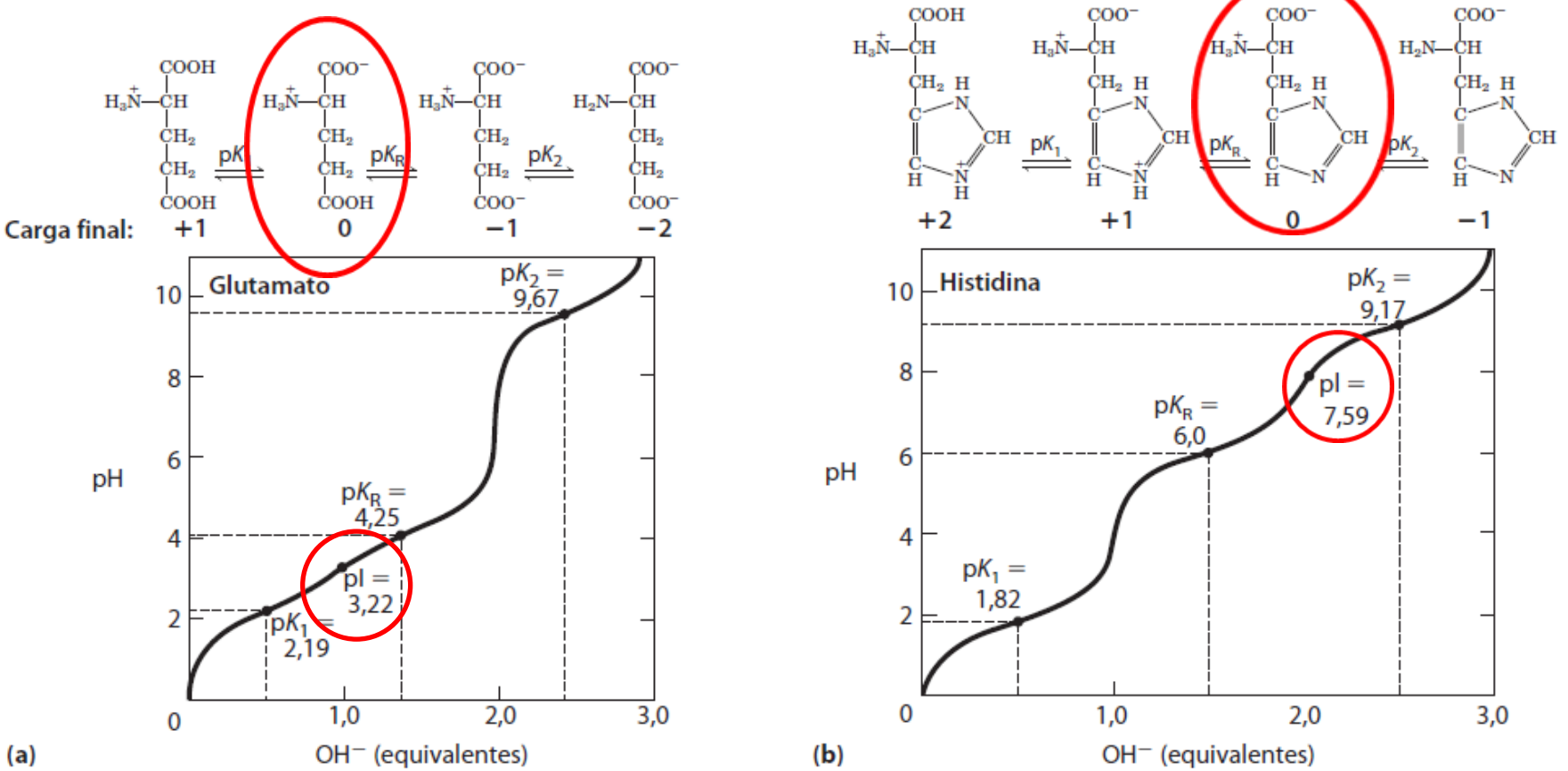
Name, Three-Letter Symbol, and One-Letter Symbol	Structural Formula[a]	Residue Mass (D)[b]	Average Occurrence in Proteins (%)[c]	pK_1 α-COOH[a]	pK_2 α-NH_3^+[d]	pK_R Side Chain[d]
Amino acids with nonpolar side chains						
Glycine Gly G		57.0	7.1	2.35	9.78	
Alanine Ala A		71.1	8.3	2.35	9.87	
Valine Val V		99.1	6.9	2.29	9.74	
Leucine Leu L		113.2	9.7	2.33	9.74	
Isoleucine Ile I		113.2	6.0	2.32	9.76	
Methionine Met M		131.2	2.4	2.13	9.28	
Proline Pro P		97.1	4.7	1.95	10.64	
Phenylalanine Phe F		147.2	3.9	2.20	9.31	
Tryptophan Trp W		186.2	1.1	2.46	9.41	

(*continued*)

Name Three-Letter Symbol, and One-Letter Symbol	Structural Formula[a]	Residue Mass (D)[b]	Average Occurrence in Proteins (%)[c]	pK_1 α-COOH[d]	pK_2 α-$^+NH_3$[d]	pK_R Side Chain[d]
Amino acids with uncharged polar side chains						
Serine Ser S		87.1	6.5	2.19	9.21	
Threonine Thr T		101.1	5.3	2.09	9.10	
Asparagine[f] Asn N		114.1	4.0	2.14	8.72	
Glutamine[f] Gln Q		128.1	3.9	2.17	9.13	
Tyrosine Tyr Y		163.2	2.9	2.20	9.21	10.46 (phenol)
Cysteine Cys C		103.1	1.4	1.92	10.70	8.37 (sulfhydryl)
Amino acids with charged polar side chains						
Lysine Lys K		128.2	5.9	2.16	9.06	10.54 (ε-NH_3^+)
Arginine Arg R		156.2	5.5	1.82	8.99	12.48 (guanidino)
Histidine[e] His H		137.1	2.3	1.80	9.33	6.04 (imidazole)
Aspartic acid[f] Asp D		115.1	5.4	1.99	9.90	3.90 (β-COOH)
Glutamic acid[f] Glu E		129.1	6.8	2.10	9.47	4.07 (γ-COOH)



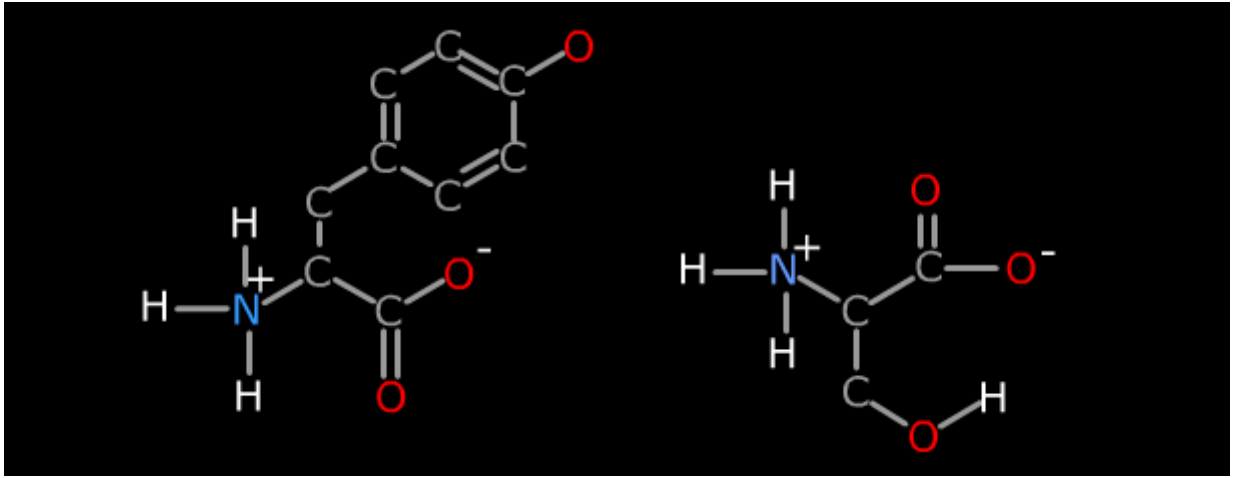
Curvas de titulação para (a) glutamato e (b) histidina. O grupo R do pKa é designado aqui como pK_R.

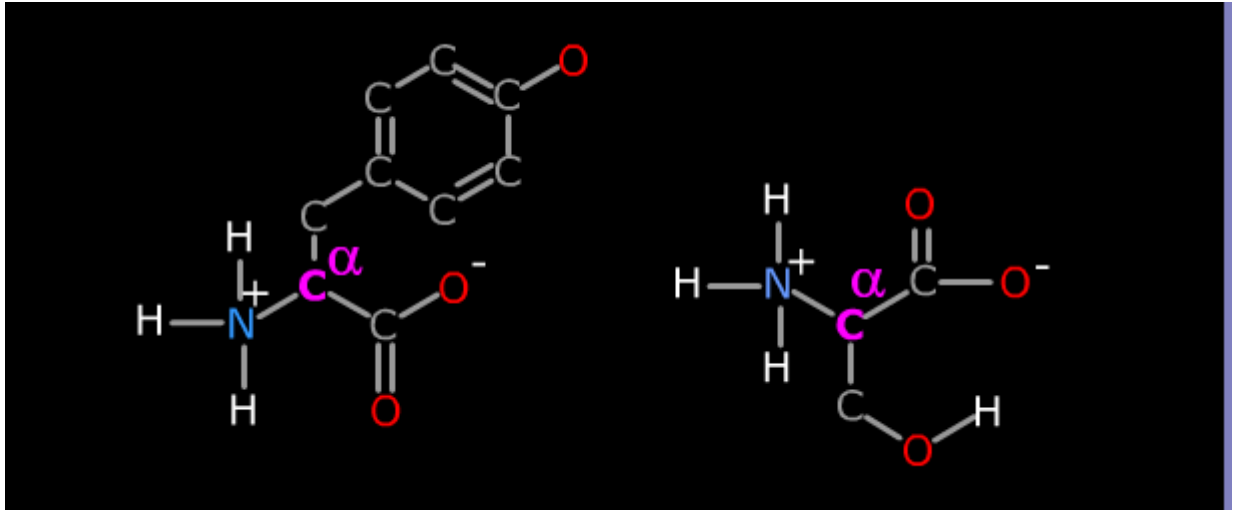


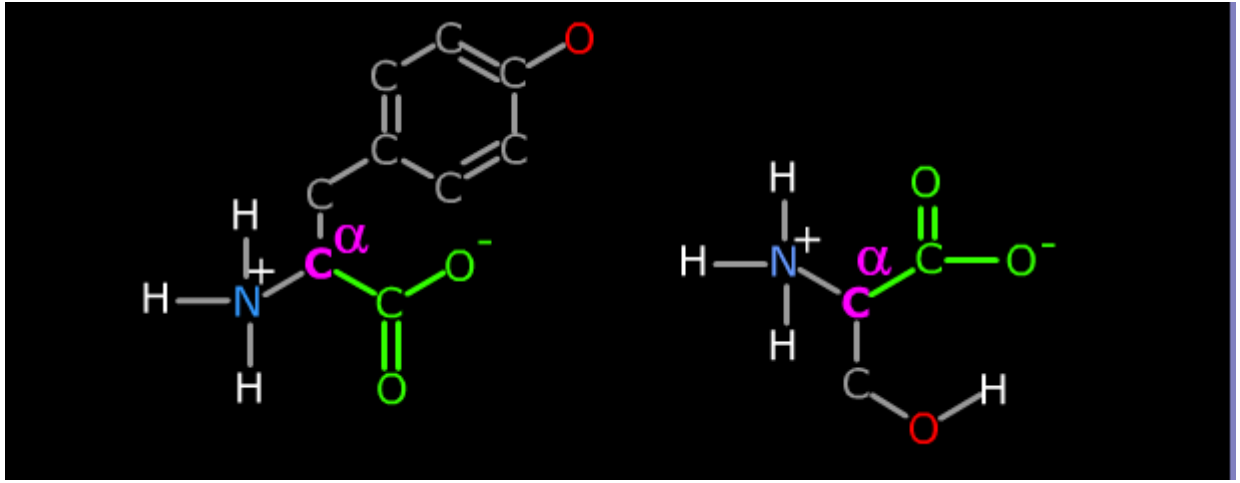
Curvas de titulação para (a) glutamato e (b) histidina. O grupo R do pKa é designado aqui como pK_R.

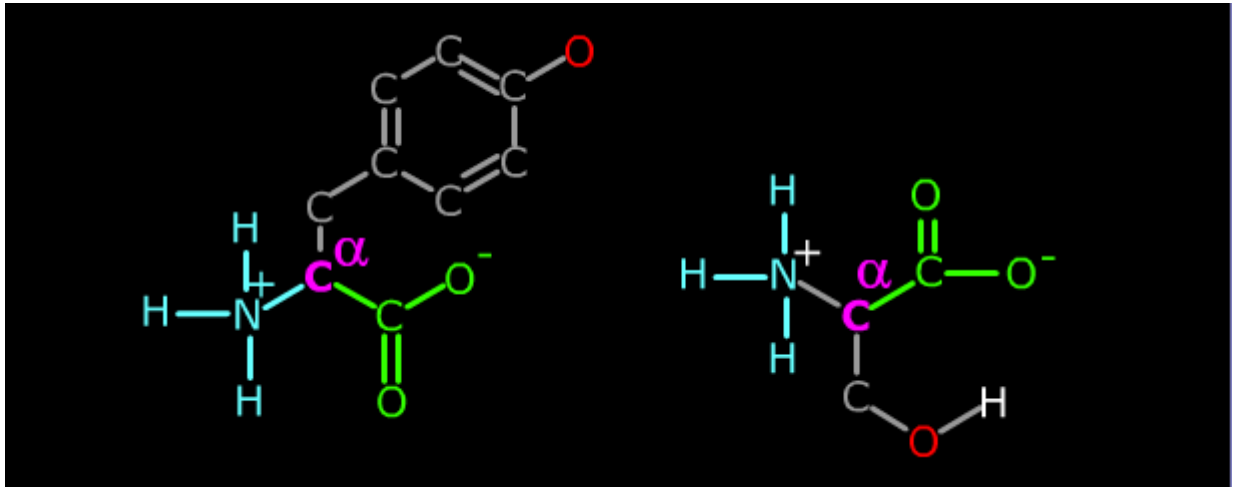
Resumo Aminoácidos

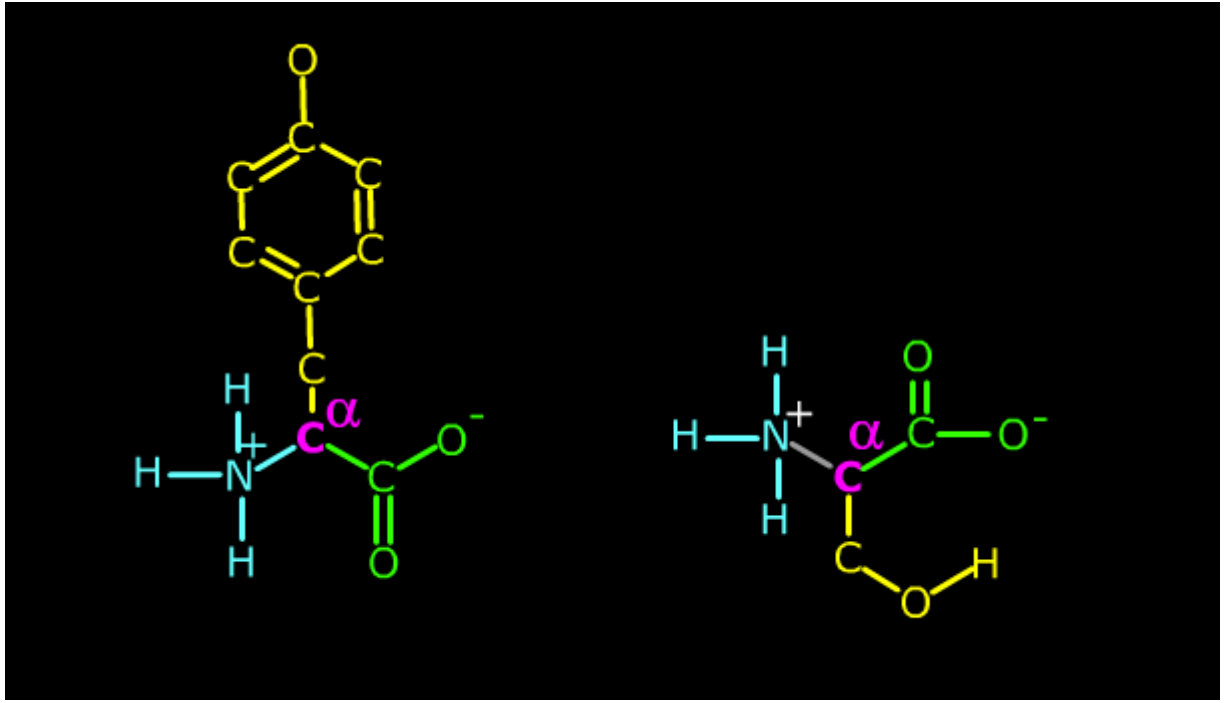
- Os 20 aminoácidos comum como resíduos em proteínas contêm ente encontrados um grupo α-carboxila, um grupo α-amino e um grupo R característico substituído no átomo do carbono α. O átomo de carbono a de todos os aminoácidos, exceto a glicina, é assimétrico e, portanto, os aminoácidos podem existir em pelo menos duas formas estéreoisoméricas. Apenas os estereoisômeros L, com uma configuração relacionada à configuração absoluta da molécula de referência L gliceraldeído, são encontrados em proteínas.
- Outros aminoácidos menos comuns também ocorrem, tanto como constituintes de proteínas (pela modificação de resíduos de aminoácidos comuns após a síntese proteica) quanto como metabólitos livres.
- Os aminoácidos podem ser classificados em cinco tipos com base na polaridade e carga (em pH 7) de seus grupos R.
- Os aminoácidos variam em suas propriedades acidobásicas e têm curvas de titulação características. Aminoácidos monoamino monocarboxílicos (com grupos R não ionizáveis) são ácidos dipróticos (1H3NCH(R)COOH) em pH baixo e existem em várias formas iônicas diferentes à medida que o pH aumenta. Aminoácidos com grupos R ionizáveis têm espécies iônicas adicionais, dependendo do pH do meio e do p*K*a do grupo R.

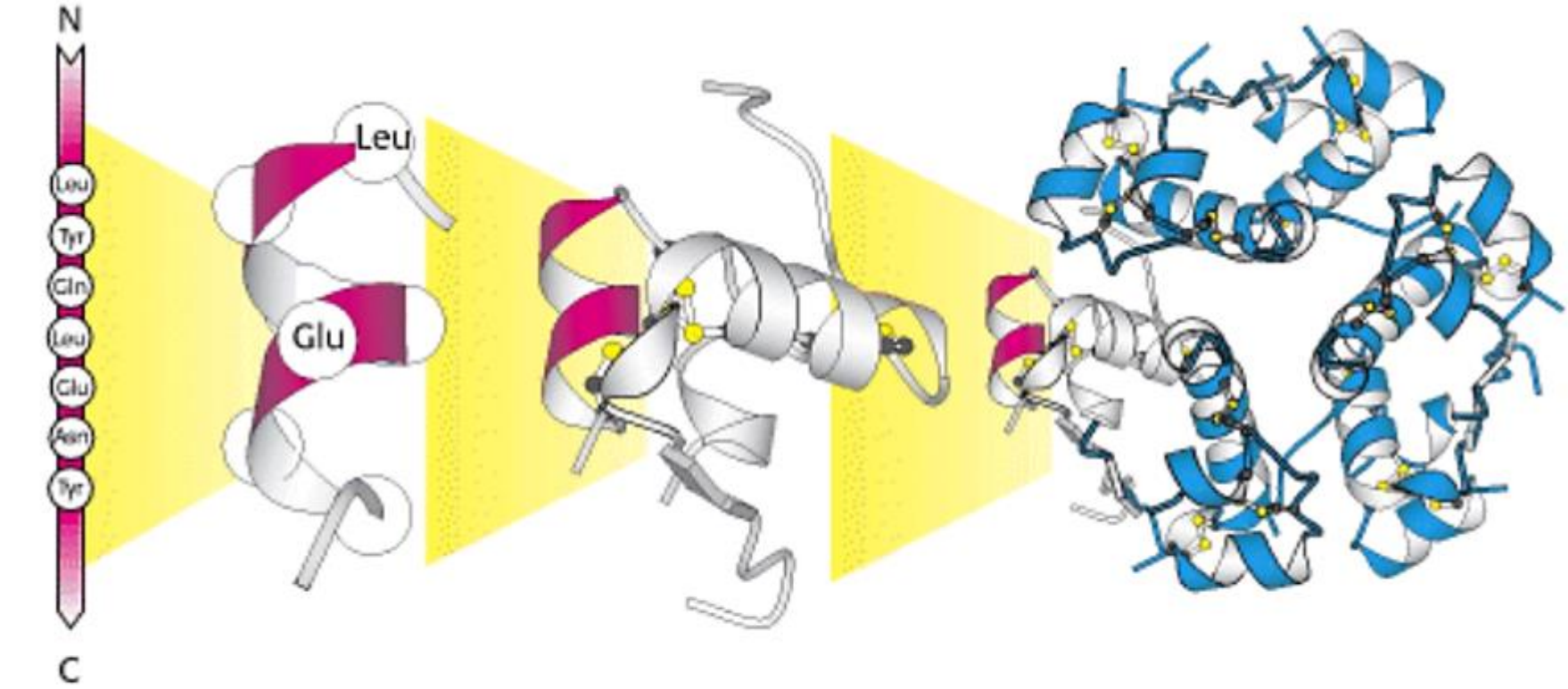

C
C
O
C
C
C
C
H
H
+
C
O
-
H
N
C
O
H
H
O
C
O
-
H
N
+
H
C
C
O
H


O
C
C
C
C
C
C
H
H
N
+
α
C
C
O
-
O
H
H
N
+
α
C
O
C
O
-
C
O
H


O
C
C
C
C
C
C
H
H
N
+
α
C
O
-
C
O
H
H
H
N
+
α
C
O
O
-
C
H
O


O
C
C
C
C
C
C
H
H
N
+
α
C
C
O
-
O
H
H
N
+
α
C
O
O
-
C
H
O


O
C
C
C
C
C
C
C
H
H
N
+
H
α
C
O
-
C
O
H
N
+
H
H
α
C
O
C
O
-
C
O
H


N
Leu
Tyr
Gln
Leu
Glu
Asn
Tyr
C
Leu
Glu
Primary structure
Secondary structure
Tertiary structure
Quarternary structure