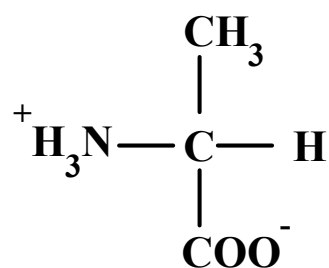
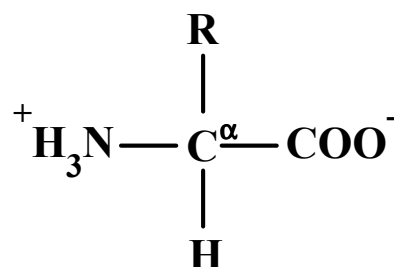
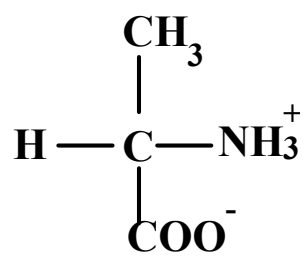


### 3. Aminokyseliny

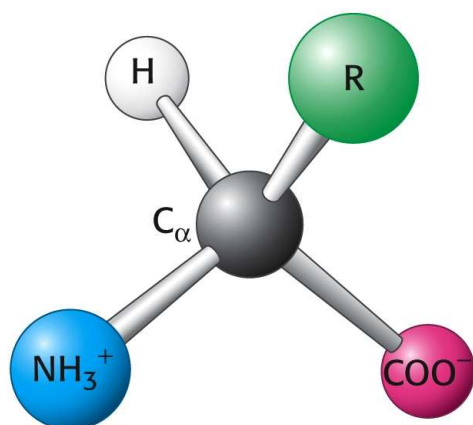
#### Základní struktura aminokyselin



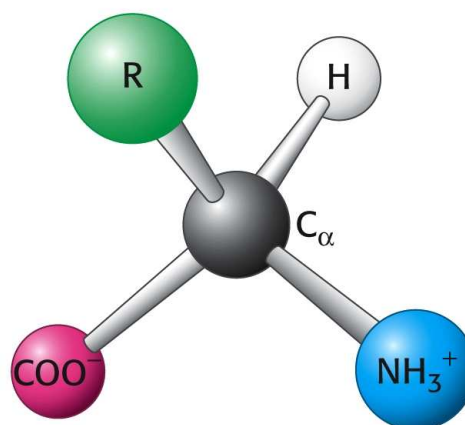
**L -alanin**



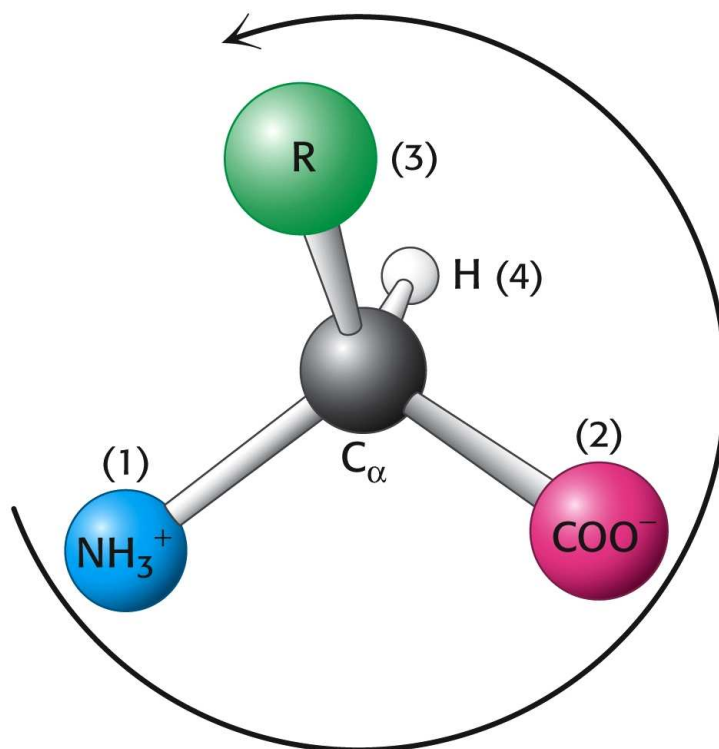
**D-alanin**



**L isomer**



**D isomer**



## Absolutní konfigurace

Gly (G) není chirální

Cys (C) je v absolutní konfiguraci *R*

Ile (I) a Thr (T) mají dvě chirální centra.

L-Ile ( $2S,3S$ ) ..., existují dva enantiomery diastereoizomerní k alloisoleucinu ( $2R,3S$ )

L-Thr ( $2S,3R$ )..., existují dva enantiomery, které jsou diastereoizomerní k allothreoninu ( $2R,3R$ ).

Všechny ostatní L-aminokyseliny jsou *S* !!

# ACIDOBAZICKÉ VLASTNOSTI

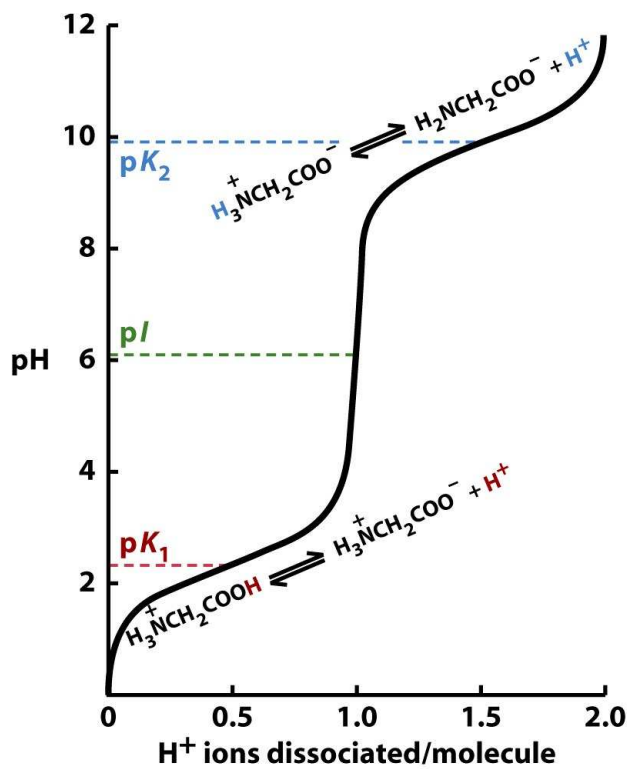
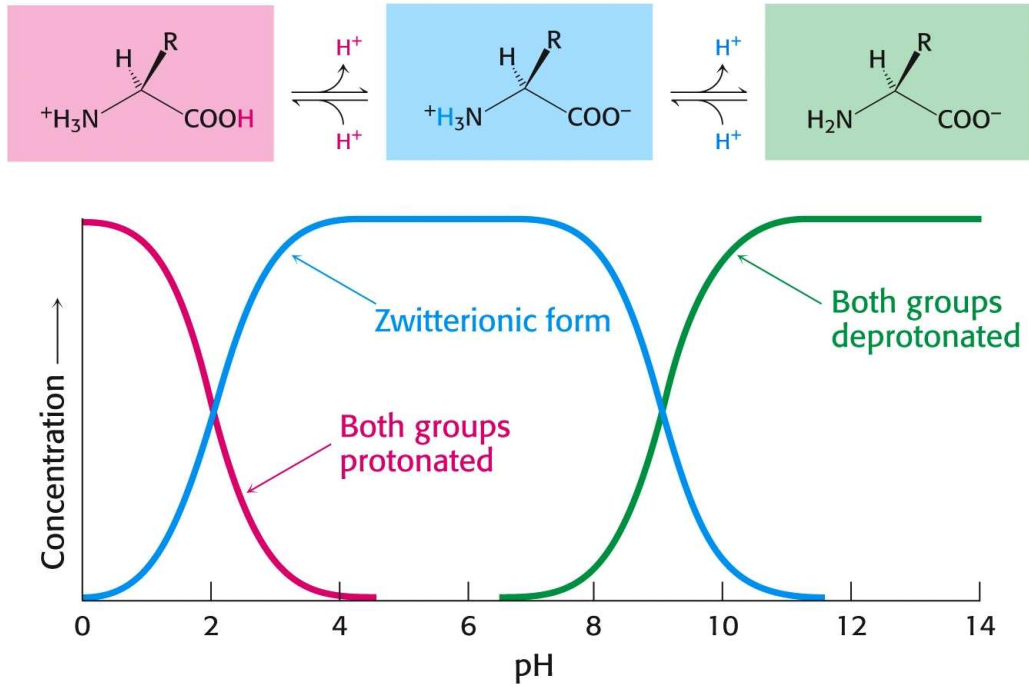


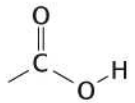
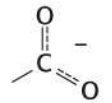
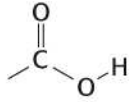
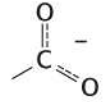
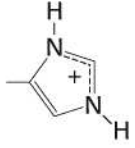
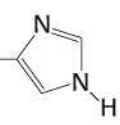
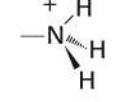
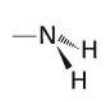
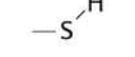
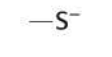
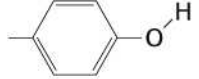
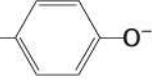
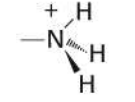
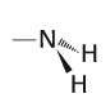
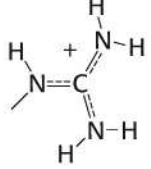
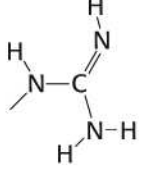
Figure 4-8 Fundamentals of Biochemistry, 2/e  
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Izoelektrický bod  $pI = \frac{pK_{COOH} + pK_{NH_2}}{2}$

Tabulka pK

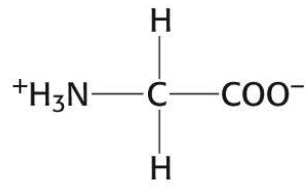
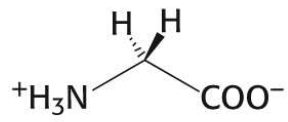
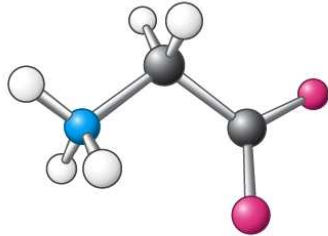
Skupina	pK	Skupina	pK	Skupina	pK
$\alpha$ COOH	1.8 - 2.5	$\beta$ COOH	3.9	$\gamma$ COOH	4.1
$\alpha$ NH <sub>2</sub>	9 - 10	$\epsilon$ NH <sub>2</sub>	10.8	guanidin	12.5
imidazol	6.0	SH	8.3	OH	10.1

**TABLE 3.1** Typical  $pK_a$  values of ionizable groups in proteins

Group	Acid	$\rightleftharpoons$	Base	Typical $pK_a^*$
Terminal $\alpha$ -carboxyl group		$\rightleftharpoons$		3.1
Aspartic acid Glutamic acid		$\rightleftharpoons$		4.1
Histidine		$\rightleftharpoons$		6.0
Terminal $\alpha$ -amino group		$\rightleftharpoons$		8.0
Cysteine		$\rightleftharpoons$		8.3
Tyrosine		$\rightleftharpoons$		10.9
Lysine		$\rightleftharpoons$		10.8
Arginine		$\rightleftharpoons$		12.5

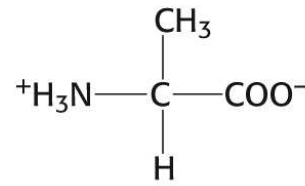
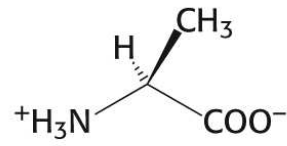
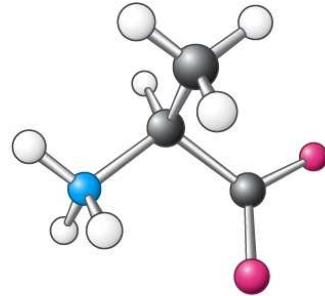
\* $pK_a$  values depend on temperature, ionic strength, and the microenvironment of the ionizable group.

**Glycine**  
**(Gly, G)**



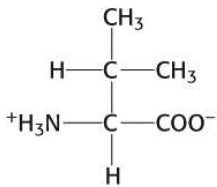
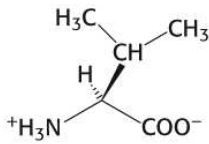
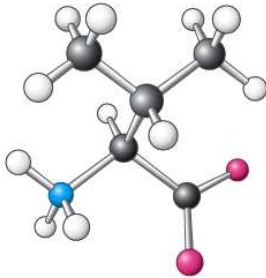
**Glycine**  
**(Gly, G)**

**Alanine**  
**(Ala, A)**



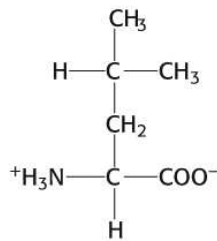
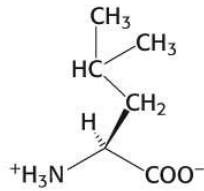
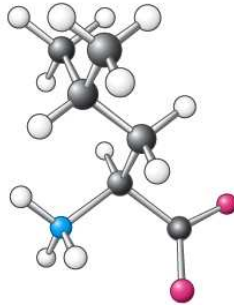
**Alanine**  
**(Ala, A)**

**Valine  
(Val, V)**



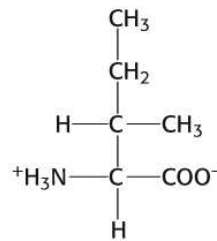
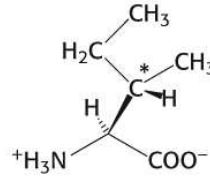
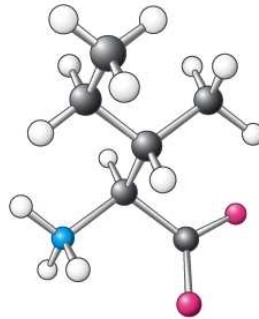
**Valine  
(Val, V)**

**Leucine  
(Leu, L)**



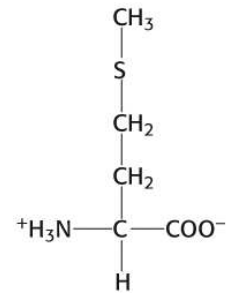
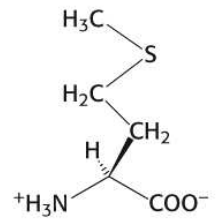
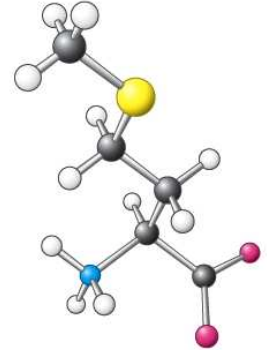
**Leucine  
(Leu, L)**

**Isoleucine  
(Ile, I)**

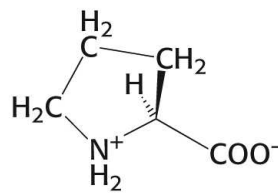
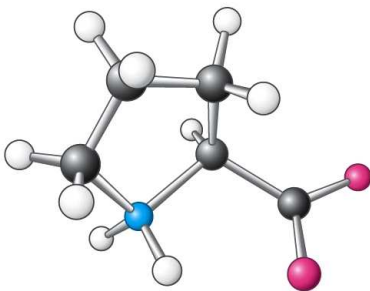


**Isoleucine  
(Ile, I)**

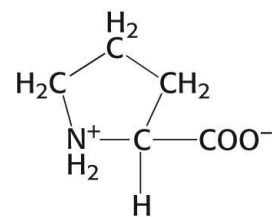
**Methionine  
(Met, M)**



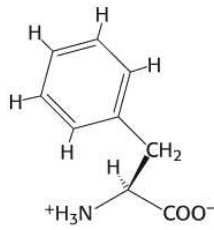
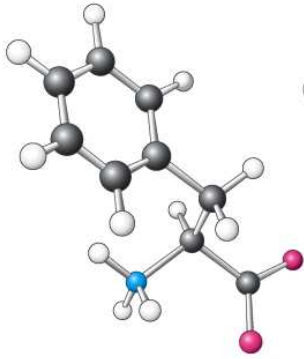
**Methionine  
(Met, M)**



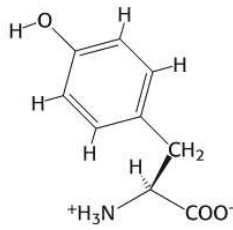
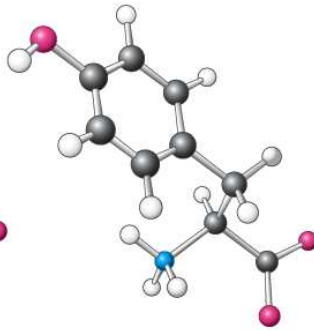
**Proline  
(Pro, P)**



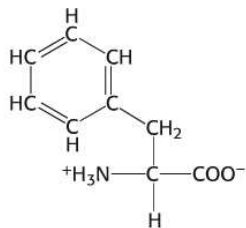
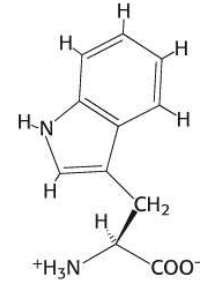
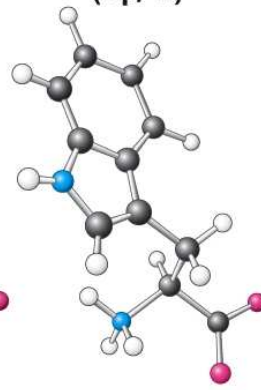
**Phenylalanine  
(Phe, F)**



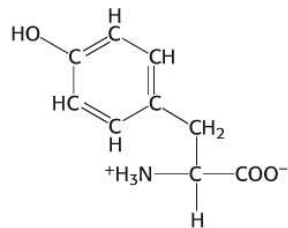
**Tyrosine  
(Tyr, Y)**



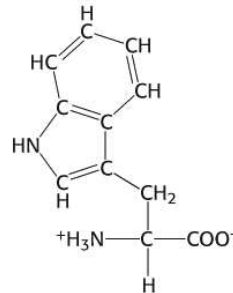
**Tryptophan  
(Trp, W)**



**Phenylalanine  
(Phe, F)**

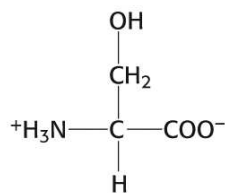
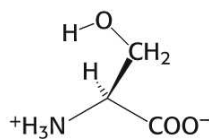
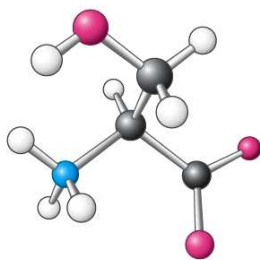


**Tyrosine  
(Tyr, Y)**



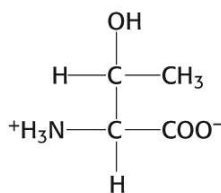
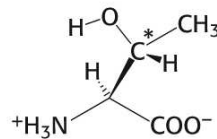
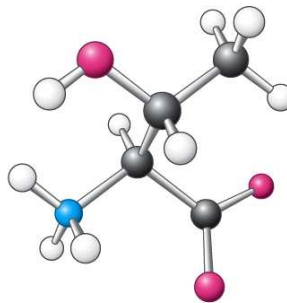
**Tryptophan  
(Trp, W)**

**Serine  
(Ser, S)**

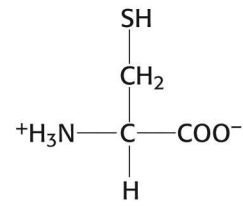
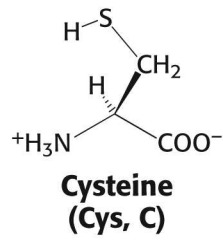
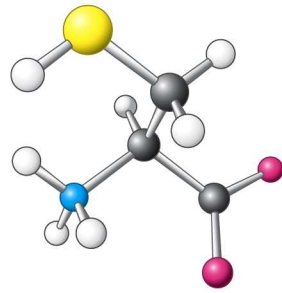


**Serine  
(Ser, S)**

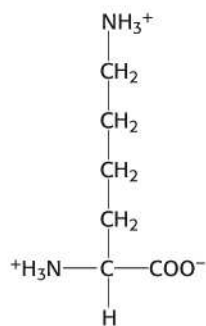
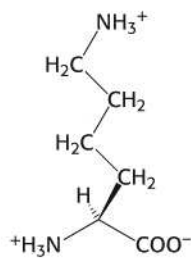
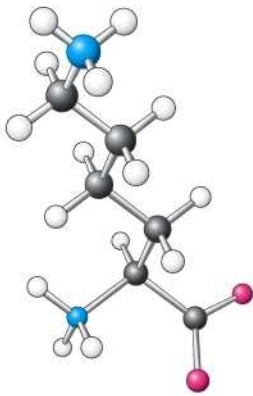
**Threonine  
(Thr, T)**



**Threonine  
(Thr, T)**

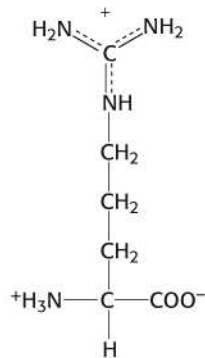
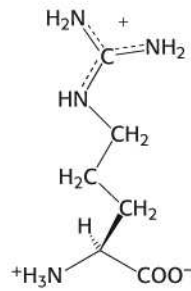
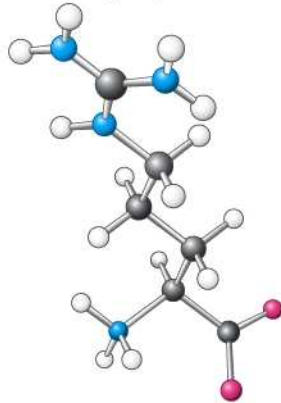


**Lysine**  
(Lys, K)



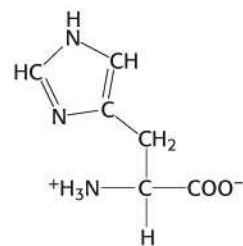
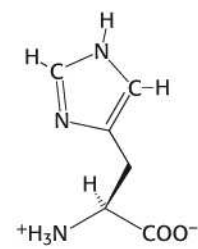
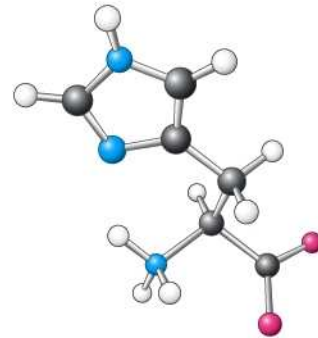
**Lysine**  
(Lys, K)

**Arginine**  
(Arg, R)



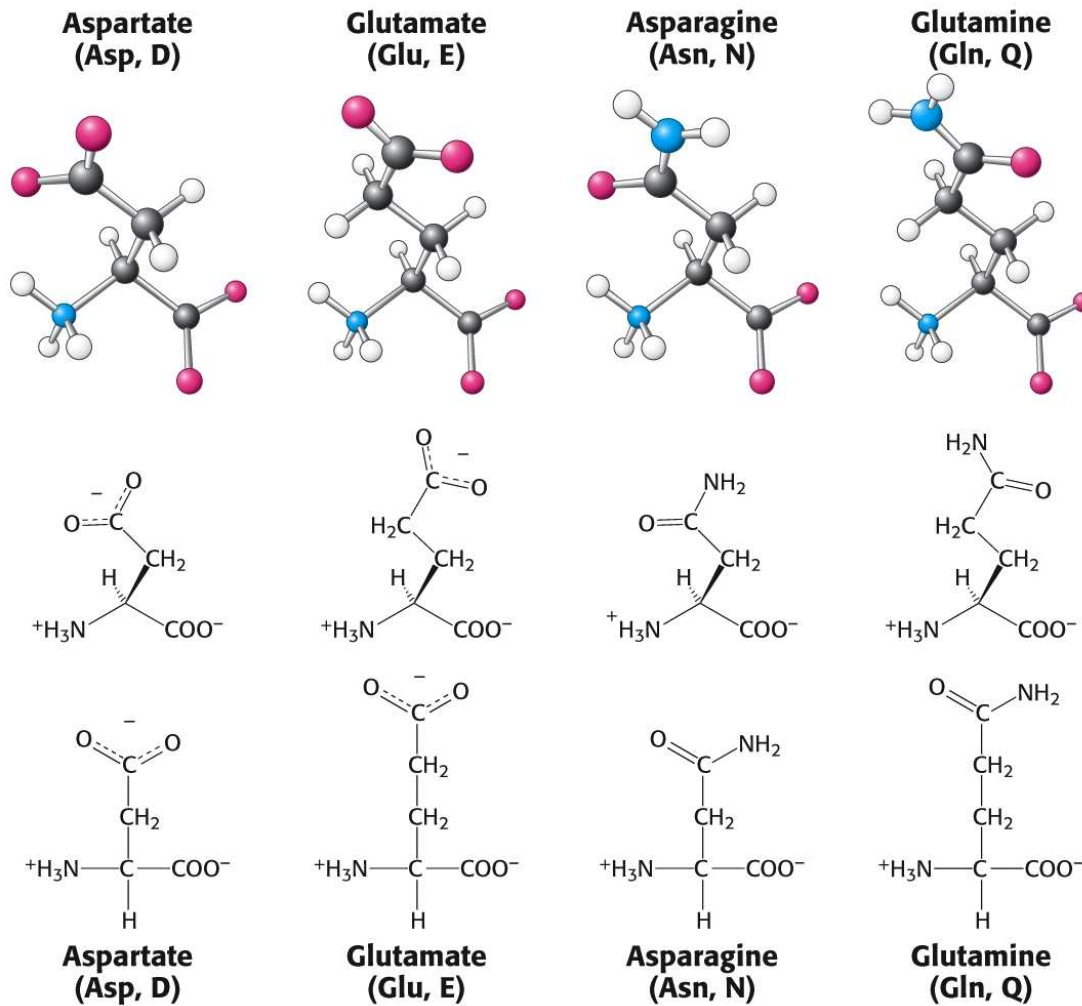
**Arginine**  
(Arg, R)

**Histidine**  
(His, H)



**Histidine**  
(His, H)

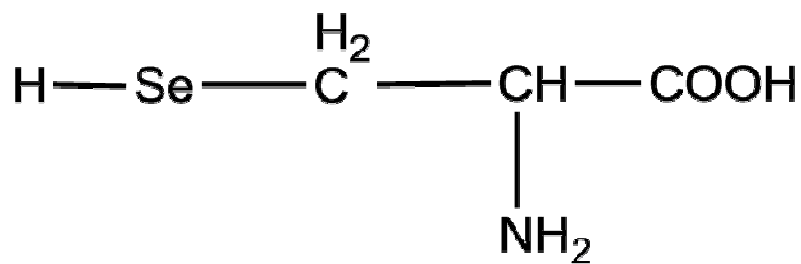




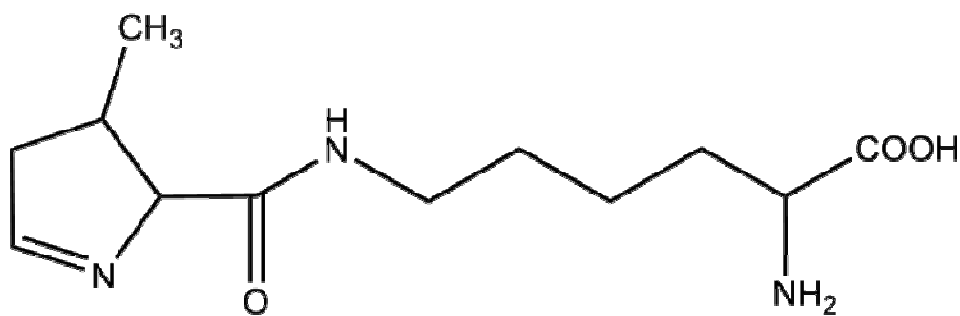
**TABLE 3.2** Abbreviations for amino acids

Amino acid	Three-letter abbreviation	One-letter abbreviation	Amino acid	Three-letter abbreviation	One-letter abbreviation
Alanine	Ala	A	Methionine	Met	M
Arginine	Arg	R	Phenylalanine	Phe	F
Asparagine	Asn	N	Proline	Pro	P
Aspartic Acid	Asp	D	Serine	Ser	S
Cysteine	Cys	C	Threonine	Thr	T
Glutamine	Gln	Q	Tryptophan	Trp	W
Glutamic Acid	Glu	E	Tyrosine	Tyr	Y
Glycine	Gly	G	Valine	Val	V
Histidine	His	H	Asparagine or aspartic acid	Asx	B
Isoleucine	Ile	I	Glutamine or glutamic acid	Glx	Z
Leucine	Leu	L			
Lysine	Lys	K			

AMK	Symboly		AMK	Symboly	
glycin	Gly	G	methionin	Met	M
alanin	Ala	A	glutamová k.	Glu	E
valin	Val	V	asparagin	Asn	N
leucin	Leu	L	glutamin	Gln	Q
izoleucin	Ile	I	lysin	Lys	K
serin	Ser	S	arginin	Arg	R
threonin	Thr	T	tyrosin	Tyr	Y
cystein	Cys	C	fenylalanin	Phe	F
histidin	His	H	tryptofan	Trp	W
prolin	Pro	P	asparagová k.	Asp	D



**Selenocystein**



**Pyrolyzin**

## Hydropatie aminokyselin

**TABLE 3.1** Hydrophathy scale for amino acid residues

<b>Amino acid</b>	<b>Free-energy change for transfer (kJ mol<sup>-1</sup>)</b>
Isoleucine	3.1
Phenylalanine	2.5
Valine	2.3
Leucine	2.2
Methionine	1.1
Tryptophan	1.5 <sup>b</sup>
Alanine	1.0
Glycine	0.67
Cysteine	0.17
Tyrosine	0.08
Proline	-0.29
Threonine	-0.75
Serine	-1.1
Histidine	-1.7
Glutamate	-2.6
Asparagine	-2.7
Glutamine	-2.9
Aspartate	-3.0
Lysine	-4.6
Arginine	-7.5

## Volné aminokyseliny a deriváty

$\beta$  alanin

ornitin a citrulin

$\gamma$  aminomáselná

antibiotika - azaserin, cykloserin, chloramfenikol

nervové mediátory - DOPA, dopamin, adrenalin

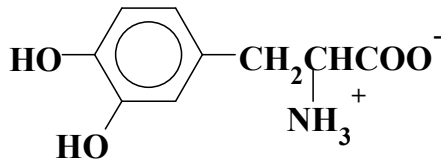
hormony - thyroxin, trijodthyronin



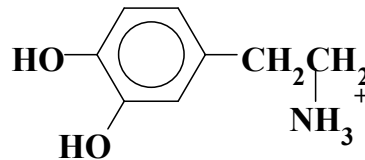
$\beta$  alanin



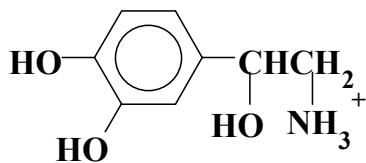
$\gamma$  aminomáselná kyselina



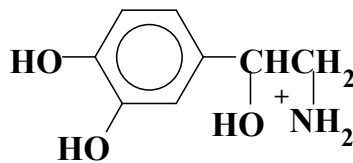
DOPA



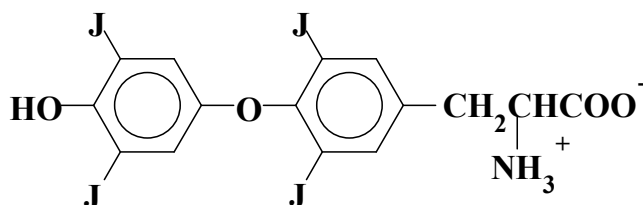
dopamin



noradrenalin



adrenalin



tyroxin

(3,5,3',5'-tetrajodthyronin)

