Amino Acids

Amino Acid Structures.

Neutral–Nonpolar R Groups

Glycine (Gly or G)
L-Alanine (Ala or A)
L-Valine (Val or V)
L-Isoleucine (Ileu or I)
L-Leucine (Leu or L)
L-Phenylalanine (Phe or F)
L-Proline (Pro or P)
L-Methionine (Met or M)

Neutral–Polar R Groups

L-Serine (Ser or S)
L-Threonine (Thr or T)
L-Tyrosine (Tyr or Y)
L-Tryptophan (Trp or W)
L-Asparagine (Asn or N)
L-Glutamine (Gln or Q)
L-Cysteine (Cys or C)

Acidic R Groups

L-Aspartic acid (Asp or D)
L-Glutamic acid (Glu or E)

Basic R Groups

L-Lysine (Lys or K)
L-Arginine (Arg or R)
L-Histidine (His or H)

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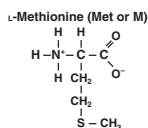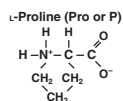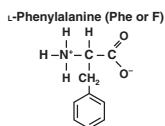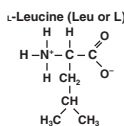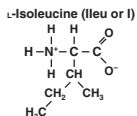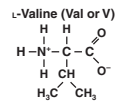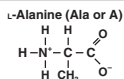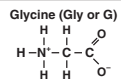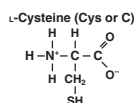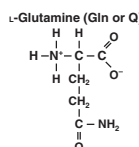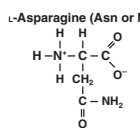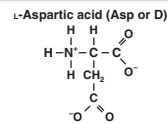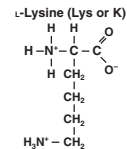
Amino Acid Abbreviations and Molecular Weights.

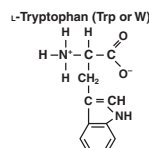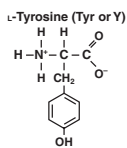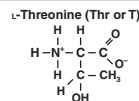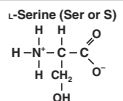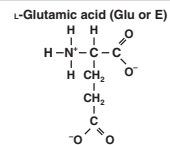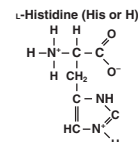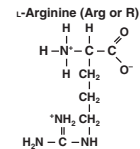| Amino Acid	Three-Letter Abbreviation	One-Letter Symbol	Molecular Weight
Alanine	Ala	A	89Da
Arginine	Arg	R	174Da
Asparagine	Asn	N	132Da
Aspartic acid	Asp	D	133Da
Asparagine or aspartic acid	Asx	B	133Da
Cysteine	Cys	C	121Da
Glutamine	Gln	Q	146Da
Glutamic acid	Glu	E	147Da
Glutamine or glutamic acid	Glx	Z	147Da
Glycine	Gly	G	75Da
Histidine	His	H	155Da
Isoleucine	Ile	I	131Da
Leucine	Leu	L	131Da
Lysine	Lys	K	146Da
Methionine	Met	M	149Da
Phenylalanine	Phe	F	165Da
Proline	Pro	P	115Da
Serine	Ser	S	105Da
Threonine	Thr	T	119Da
Tryptophan	Trp	W	204Da
Tyrosine	Tyr	Y	181Da
Valine	Val	V	117Da

The average molecular weight of an amino acid is 110Da.

Dalton (Da) is an alternate name for the atomic mass unit, and kilodalton (kDa) is 1,000 daltons. Thus a protein with a mass of 64kDa has a molecular weight of 64,000 grams per mole.

Peptide Bond Formation.

amino terminus

carboxy terminus

4737MA
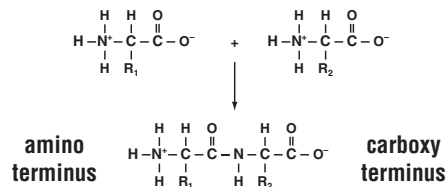
R_1 and R_2 represent the R groups of the two amino acids.

The Genetic Code.

2nd Position					
1st Position	U	C	A	G	3rd Position
U	UUU Phe	UCU Ser	UAU Tyr	UGU Cys	U
U	UUC Phe	UCC Ser	UAC Tyr	UGC Cys	C
U	UUA Leu	UCA Ser	**UAA** Stop	**UGA** Stop	A
U	UUG Leu	UCG Ser	**UAG** Stop	UGG Trp	G
C	CUU Leu	CCU Pro	CAU His	CGU Arg	U
C	CUC Leu	CCC Pro	CAC His	CGC Arg	C
C	CUA Leu	CCA Pro	CAA Gln	CGA Arg	A
C	CUG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	AUU Ile	ACU Thr	AAU Asn	AGU Ser	U
A	AUC Ile	ACC Thr	AAC Asn	AGC Ser	C
A	AUA Ile	ACA Thr	AAA Lys	AGA Arg	A
A	***AUG*** Met	ACG Thr	AAG Lys	AGG Arg	G
G	GUU Val	GCU Ala	GAU Asp	GGU Gly	U
G	GUC Val	GCC Ala	GAC Asp	GGC Gly	C
G	GUA Val	GCA Ala	GAA Glu	GGA Gly	A
G	GUG Val	GCG Ala	GAG Glu	GGG Gly	G

The codons are read in the 5′ → 3′ direction.

Termination codons are in bold.

AUG start codon is in bold italic.