Promega

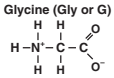
TECHNICAL REFERENCE

Amino Acids

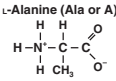
Amino Acid Structures.

Neutral–Nonpolar R Groups

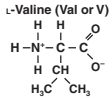
Glycine (Gly or G)



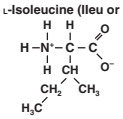
L-Alanine (Ala or A)



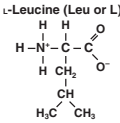
L-Valine (Val or V)



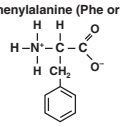
L-Isoleucine (Ileu or I)



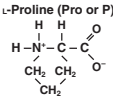
L-Leucine (Leu or L)



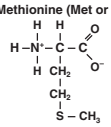
L-Phenylalanine (Phe or F)



L-Proline (Pro or P)

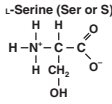


L-Methionine (Met or M)

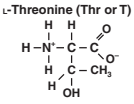


Neutral–Polar R Groups

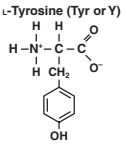
L-Serine (Ser or S)



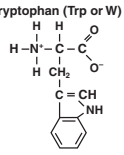
L-Threonine (Thr or T)



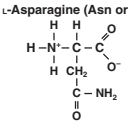
L-Tyrosine (Tyr or Y)



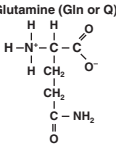
L-Tryptophan (Trp or W)



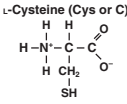
L-Asparagine (Asn or N)



L-Glutamine (Gln or Q)

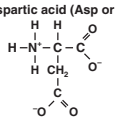


L-Cysteine (Cys or C)

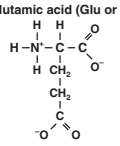


Acidic R Groups

L-Aspartic acid (Asp or D)

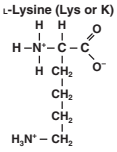


L-Glutamic acid (Glu or E)

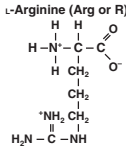


Basic R Groups

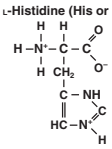
L-Lysine (Lys or K)



L-Arginine (Arg or R)



L-Histidine (His or H)



4092MA04_3A

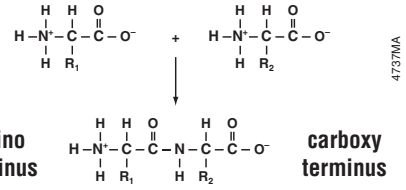
Amino Acid Abbreviations and Molecular Weights.

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.



4737MA

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

The Genetic Code.

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

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PART #GE626