

Amino Acids List

AA Name	Abbrev.		Structure	AA Name	Abbrev.		Structure
Alanine	Ala	A	$\begin{array}{c} \text{CH}_3 \\ \\ \text{-NH-CH-CO-} \end{array}$	Leucine	Leu	L	$\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_2\text{-CH-CH}_2 \\ \\ \text{-NH-CH-CO-} \end{array}$
Arginine	Arg	R	$\begin{array}{c} \text{NH}_2 \\ \\ \text{CH}_2\text{CH}_2\text{CH}_2\text{-NH-C} \\ \\ \text{-NH-CH-CO-} \\ \\ \text{NH} \end{array}$	Lysine	Lys	K	$\begin{array}{c} \text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2 \\ \\ \text{-NH-CH-CO-} \end{array}$
Asparagine	Asn	N	$\begin{array}{c} \text{O} \\ \\ \text{CH}_2\text{-C-NH}_2 \\ \\ \text{-NH-CH-CO-} \end{array}$	Methionine	Met	M	$\begin{array}{c} \text{CH}_2\text{CH}_2\text{S-CH}_3 \\ \\ \text{-NH-CH-CO-} \end{array}$
Aspartic acid	Asp	D	$\begin{array}{c} \text{O} \\ \\ \text{CH}_2\text{-C-OH} \\ \\ \text{-NH-CH-CO-} \end{array}$	Phenylalanine	Phe	F	$\begin{array}{c} \text{CH}_2\text{-} \langle \text{benzene ring} \rangle \\ \\ \text{-NH-CH-CO-} \end{array}$
Cysteine	Cys	C	$\begin{array}{c} \text{H}_2\text{C-SH} \\ \\ \text{-NH-CH-CO-} \end{array}$	Proline	Pro	P	$\begin{array}{c} \text{CH}_2 \\ \\ \text{H}_2\text{C} \text{---} \text{CH}_2 \\ \\ \text{-N-CH-CO-} \end{array}$
Glutamine	Gln	Q	$\begin{array}{c} \text{O} \\ \\ \text{CH}_2\text{CH}_2\text{-C-NH}_2 \\ \\ \text{-NH-CH-CO-} \end{array}$	Serine	Ser	S	$\begin{array}{c} \text{CH}_2\text{-OH} \\ \\ \text{-NH-CH-CO-} \end{array}$
Glutamic acid	Glu	E	$\begin{array}{c} \text{O} \\ \\ \text{CH}_2\text{CH}_2\text{-C-OH} \\ \\ \text{-NH-CH-CO-} \end{array}$	Threonine	Thr	T	$\begin{array}{c} \text{OH} \text{ CH}_3 \\ \quad \\ \text{CH} \\ \\ \text{-NH-CH-CO-} \end{array}$
Glycine	Gly	G	$\text{-NH-CH}_2\text{-CO-}$	Tryptophan	Trp	W	$\begin{array}{c} \text{H} \\ \\ \text{CH} \text{---} \langle \text{benzene ring} \rangle \\ \\ \text{CH}_2 \\ \\ \text{-NH-CH-CO-} \end{array}$
Histidine	His	H	$\begin{array}{c} \text{H} \\ \\ \text{N} \\ \\ \text{CH}_2 \\ \\ \text{-NH-CH-CO-} \end{array}$	Tyrosine	Tyr	Y	$\begin{array}{c} \text{CH}_2\text{-} \langle \text{benzene ring} \rangle \text{-OH} \\ \\ \text{-NH-CH-CO-} \end{array}$
Isoleucine	Ile	I	$\begin{array}{c} \text{CH}_3 \\ \\ \text{HC-CH}_2\text{CH}_2 \\ \\ \text{-NH-CH-CO-} \end{array}$	Valine	Val	V	$\begin{array}{c} \text{CH}_3 \text{ CH}_3 \\ \quad \\ \text{CH} \\ \\ \text{-NH-CH-CO-} \end{array}$

	A L A	A R G	A S N	A S P	C Y S	G L U	G L N	G L Y	H I S	I L E	L E U	L Y S	M E T	P H E	P R O	S E R	T H R	T R P	T Y R	V A L
acidic (negative)				D		E														
basic (positive)		R							H			K								
charged		R		D		E			H			K								
neutral	A		N		C		Q	G	H	I	L		M	F	P	S	T	W	Y	V
hydrophobic	A							G		I	L		M	F	P			W	Y	V
Hydrophilic (polar)		R	N	D	C	E	Q		H			K				S	T			

*Amino acid structures from www.ionsource.com

Codon List
Translation from RNA to Protein

		Second base					
		U	C	A	G		
First base (5' end)	U	UUU	UCU	UAU	UGU	Third base (3' end)	U
		UUC	UCC	UAC	UGC		C
		UUA	UCA	UAA Stop	UGA Stop		A
		UUG	UCG	UAG Stop	UGG Trp		G
	C	CUU	CCU	CAU	CGU	U	
		CUC	CCC	CAC	CGC	C	
		CUA	CCA	CAA	CGA	A	
		CUG	CCG	CAG	CGG	G	
	A	AUU	ACU	AAU	AGU	U	
		AUC	ACC	AAC	AGC	C	
		AUA	ACA	AAA	AGA	A	
		AUG Met or start	ACG	AAG	AGG	G	
	G	GUU	GCU	GAU	GGU	U	
		GUC	GCC	GAC	GGC	C	
		GUA	GCA	GAA	GGA	A	
		GUG	GCG	GAG	GGG	G	

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