



Name	3-Letter Symbol	1-Letter Symbol	Molecular weight	Molecular Formula	Residue Formula	Residue Weight (-H ₂ O)	pK _a ¹	pK _b ²	pK _x ³	pI ⁴
Alanine	Ala	A	89.10	C ₃ H ₇ NO ₂	C ₃ H ₅ NO	71.08	2.34	9.69	—	6.00
Arginine	Arg	R	174.20	C ₆ H ₁₄ N ₄ O ₂	C ₆ H ₁₂ N ₄ O	156.19	2.17	9.04	12.48	10.76
Asparagine	Asn	N	132.12	C ₄ H ₈ N ₂ O ₃	C ₄ H ₆ N ₂ O ₂	114.11	2.02	8.80	—	5.41
Aspartic acid	Asp	D	133.11	C ₄ H ₇ NO ₄	C ₄ H ₅ NO ₃	115.09	1.88	9.60	3.65	2.77
Cysteine	Cys	C	121.16	C ₃ H ₇ NO ₂ S	C ₃ H ₅ NOS	103.15	1.96	10.28	8.18	5.07
Glutamic acid	Glu	E	147.13	C ₅ H ₉ NO ₄	C ₅ H ₇ NO ₃	129.12	2.19	9.67	4.25	3.22
Glutamine	Gln	Q	146.15	C ₅ H ₁₀ N ₂ O ₃	C ₅ H ₈ N ₂ O ₂	128.13	2.17	9.13	—	5.65
Glycine	Gly	G	75.07	C ₂ H ₅ NO ₂	C ₂ H ₃ NO	57.05	2.34	9.60	—	5.97
Histidine	His	H	155.16	C ₆ H ₉ N ₃ O ₂	C ₆ H ₇ N ₃ O	137.14	1.82	9.17	6.00	7.59
Hydroxyproline	Hyp	O	131.13	C ₅ H ₉ NO ₃	C ₅ H ₇ NO ₂	113.11	1.82	9.65	—	—
Isoleucine	Ile	I	131.18	C ₆ H ₁₃ NO ₂	C ₆ H ₁₁ NO	113.16	2.36	9.60	—	6.02
Leucine	Leu	L	131.18	C ₆ H ₁₃ NO ₂	C ₆ H ₁₁ NO	113.16	2.36	9.60	—	5.98
Lysine	Lys	K	146.19	C ₆ H ₁₄ N ₂ O ₂	C ₆ H ₁₂ N ₂ O	128.18	2.18	8.95	10.53	9.74
Methionine	Met	M	149.21	C ₅ H ₁₁ NO ₂ S	C ₅ H ₉ NOS	131.20	2.28	9.21	—	5.74
Phenylalanine	Phe	F	165.19	C ₉ H ₁₁ NO ₂	C ₉ H ₉ NO	147.18	1.83	9.13	—	5.48
Proline	Pro	P	115.13	C ₅ H ₉ NO ₂	C ₅ H ₇ NO	97.12	1.99	10.60	—	6.30
Pyroglutamic	Glp	U	139.11	C ₅ H ₇ NO ₃	C ₅ H ₅ NO ₂	121.09	—	—	—	5.68
Serine	Ser	S	105.09	C ₃ H ₇ NO ₃	C ₃ H ₅ NO ₂	87.08	2.21	9.15	—	5.68
Threonine	Thr	T	119.12	C ₄ H ₉ NO ₃	C ₄ H ₇ NO ₂	101.11	2.09	9.10	—	5.60
Tryptophan	Trp	W	204.23	C ₁₁ H ₁₂ N ₂ O ₂	C ₁₁ H ₁₀ N ₂ O	186.22	2.83	9.39	—	5.89
Tyrosine	Tyr	Y	181.19	C ₉ H ₁₁ NO ₃	C ₉ H ₉ NO ₂	163.18	2.20	9.11	10.07	5.66
Valine	Val	V	117.15	C ₅ H ₁₁ NO ₂	C ₅ H ₉ NO	99.13	2.32	9.62	—	5.96

¹ pK_a is the negative of the logarithm of the dissociation constant for the -COOH group

² pK_b is the negative of the logarithm of the dissociation constant for the -NH₃⁺ group

³ pK_x is the negative of the logarithm of the dissociation constant for any other group in the molecule

⁴ pI is the pH at the isoelectric point

References: D. R. Lide, *Handbook of Chemistry and Physics, 72nd Edition*, CRC Press, Boca Raton, FL, 1991.