Amino Acid and Amino Acid Residue Mass Values

Amino acid name	Abbreviation	Letter	Molecular formula	Molecular weight g/mol	Linear formula	Residue monoisotopic m/z	Residue average m/z	Resdiue formula
Alanine	Ala	A	C3H7NO2	89.1	CH3-CH(NH2)-COOH	71.03711	71.07855	C3H5NO
Arginine	Arg	R	C6H14N4O2	174.2	HN=C(NH2)-NH-(CH2)3-CH(NH2)-COOH	156.10111	156.18707	C6H12N4O
Asparagine	Asn	N	C4H8N2O3	132.1	H2N-CO-CH2-CH(NH2)-COOH	114.04293	114.10354	C4H6N2O2
Aspartic acid (Aspartate)	Asp	D	C4H7NO4	133.1	HOOC-CH2-CH(NH2)-COOH	115.02694	115.08826	C4H5NO3
Cysteine	Cys	C	C3H7NO2S	121.2	HS-CH2-CH(NH2)-COOH	103.14464	103.14464	C3H5NOS
Glutamic acid (Glutamate)	Glu	E	C5H9NO4	147.1	HOOC-(CH2)2-CH(NH2)-COOH	129.04259	129.11504	C5H7NO3
Glutamine	Gln	Q	C5H10N2O3	146.1	H2N-CO-(CH2)2-CH(NH2)-COOH	128.05858	128.13032	C5H8N2O2
Glycine	Gly	G	C2H5NO2	75.1	NH2-CH2-COOH	57.02146	57.05177	C2H3NO
Histidine	His	H	C6H9N3O2	155.2	NH-CH=N-CH=C-CH2-CH(NH2)-COOH	137.05891	137.14062	C6H7N3O
Isoleucine	Ile	I	C6H13NO2	131.2	CH3-CH2-CH(CH3)-CH(NH2)-COOH	113.08406	113.1589	C6H11NO
Leucine	Leu	L	C6H13NO2	131.2	(CH3)2-CH-CH2-CH(NH2)-COOH	113.08406	113.1589	C6H11NO
Leucine or Isoleucine [Generic]	Jli	J	C6H13NO2	131.2	(CH3)2-CH-CH2-CH(NH2)-COOH	113.08406	113.1589	C6H11NO
Lysine	Lys	K	C6H14N2O2	146.2	H2N-(CH2)4-CH(NH2)-COOH	128.09496	128.17358	C6H12N2O
Methionine	Met	M	C5H11NO2S	149.2	CH3-S-(CH2)2-CH(NH2)-COOH	131.04048	131.1982	C5H9NOS
Phenylalanine	Phe	F	C9H11NO2	165.2	Ph-CH2-CH(NH2)-COOH	147.06841	147.17571	C9H9NO
Proline	Pro	P	C5H9NO2	115.1	NH-(CH2)3-CH-COOH	97.05276	97.11623	C5H7NO
Serine	Ser	S	C3H7NO3	105.1	HO-CH2-CH(NH2)-COOH	87.03203	87.07796	C3H5NO2
Threonine	Thr	T	C4H9NO3	119.1	CH3-CH(OH)-CH(NH2)-COOH	101.04768	101.10474	C4H7NO2
Tryptophan	Trp	W	C11H12N2O2	204.2	Ph-NH-CH=C-CH2-CH(NH2)-COOH	186.07931	186.2122	C11H10N2O
Tyrosine	Tyr	Y	C9H11NO3	181.2	HO-Ph-CH2-CH(NH2)-COOH	163.06333	163.17512	C9H9NO2
Valine	Val	V	C5H11NO2	117.1	(CH3)2-CH-CH(NH2)-COOH	99.06841	99.13211	C5H9NO
Aspartic acid or Asparagine [Average]	Bnd	B				114.53494	114.5959	
Glutamine or Glutamic acid [Average]	Zqe	Z				128.55059	128.62326	
Any amino acid	Xaa	X						

Special amino acids	Abbreviation	Letter	Molecular formula	Molecular weight g/mol	Linear formula	Monoisotopic m/z	Average m/z	Fragment formula
Pyrrolysine	Pyl	O				237.14773	237.29874	C12H19N3O2
Seleno Cysteine	Sec	U				150.95364	150.0369	C3H5NOSe

Common Proteases & Chemicals used for Protein Digestions

Enzyme name	Type	Specificity	Cleaves after	Cleaves before	Except
Arg-C	Enzymatic	C-terminal side of arginine residue	R		
Asp-N	Enzymatic	N-terminal side of Aspartate		D	
Chymotrypsin	Enzymatic	C-terminal side of Aryl Amino Acids	F, W, Y, or L		
Glu-C	Enzymatic	C-terminal side of Glutamate and Aspartate	E or D		
Lys-C	Enzymatic	C-terminal side of Lysine	K		
Pepsin	Enzymatic	Non-specific			
Trypsin	Enzymatic	C-terminal side of Basic Amino Acids	K or R		P is after K or R
Trypsin (Immobilized)	Enzymatic	C-terminal side of Basic Amino Acids	K or R		P is after K or R

Reagent name	Type	Specificity	Cleaves after	Cleaves before	Except
2-Iodosobenzoic acid	Chemical	C-terminal side of Tryptophan and Tyrosine	W		
Acid	Chemical	Non-specific			
BNPS-Skatole	Chemical	Non-specific			
Cyanogen Bromide	Chemical	C-terminal side of Methionine	M		
Dithiothreitol (DTT)	Chemical	Reduction of disulfide bonds Cys-SS-Cys			
Iodoacetamide	Chemical	Cysteine protease inhibitor. Binds to thiol group of Cysteine to block disulfide bond formation			
Iodoacetate	Chemical	Cysteine protease inhibitor. Binds to thiol group of Cysteine to block disulfide bond formation			

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Quick Reference Guide

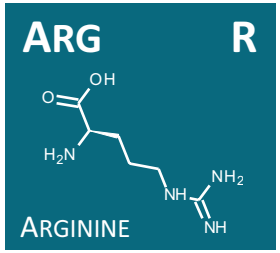
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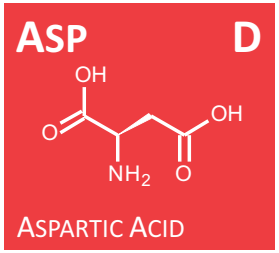


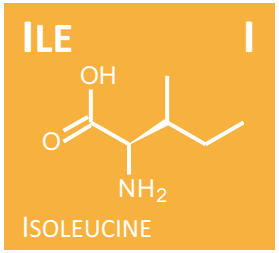
Relative Size of Common Biopharmaceuticals

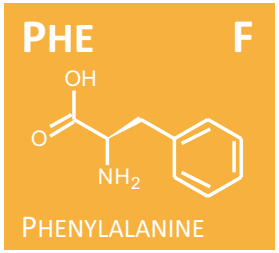
Drug	Innovator name	Biosimilar name	Primary indication	Formula	Mass g/mol	Type	2015 sales (billion $)
Trastuzumab Emtansine	Kadcyla	-	Breast cancer	C6448H9948N1720O2012S44(C47H62ClN4O13S)n	148500	ADC	3.2
Adalimumab	Humira	Exemptia	Rheumatoid arthritis	C6428H9912N1694O1987S46	144190	MAb	8.2
Etanercept	Enbrel	Benepali	Rheumatoid arthritis	C2224H3475N621O698S36	51235	Fusion protein	5.9
Erythropoietin	Eprex	Retacrit	Renal failiure	C815H1317N233O241S5	18396	Recombinant protein	3.3
Insulin glargine	Lantus	Abasaglar	Diabetes	C267H404N72O78S6	6063	Peptide	4.7

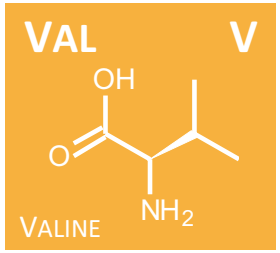
Amino Acids Coloured by Property

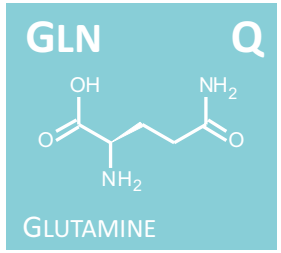


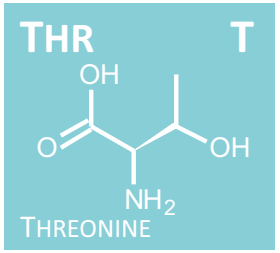


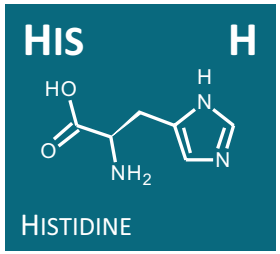


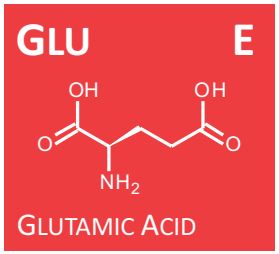


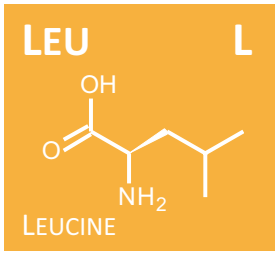


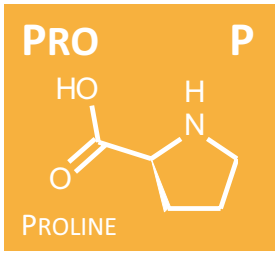


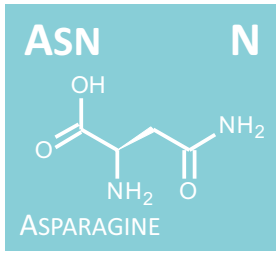


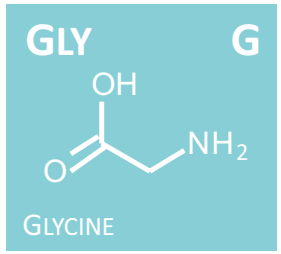


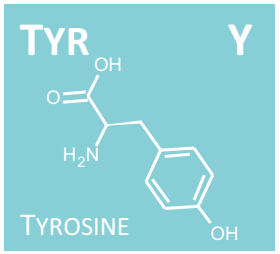


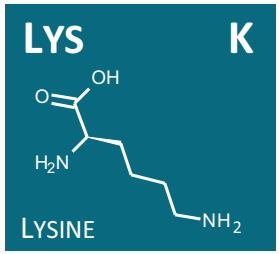


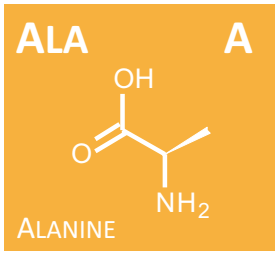


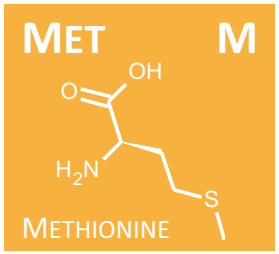


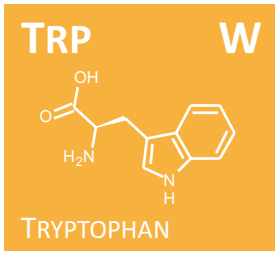


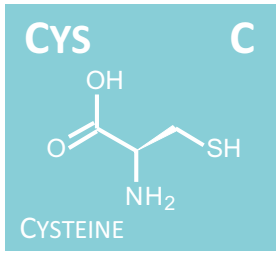


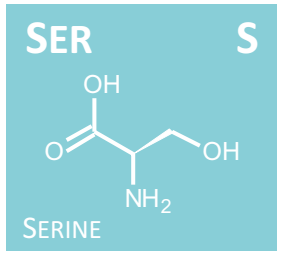












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