

Amino acids are very small biomolecules with an average molecular weight of about 135 daltons. These organic acids exist naturally in a zwitterion state where the carboxylic acid moiety is ionized and the basic amino group is protonated. The entire class of amino acids has a common backbone of an organic carboxylic acid group and an amino group attached to a saturated carbon atom. The simplest member of this group is glycine, where the saturated carbon atom is unsubstituted, rendering it optically inactive.

The rest of the 20 most common amino acids are optically active existing as both D and L stereoisomers. Naturally occurring amino acids that are incorporated into proteins are, for the most part, the levorotary (L) isomer. Substituents on the alpha (or saturated) carbon atom vary from lower alkyl groups to aromatic amines and alcohols. There are also acidic and basic side chains as well as thiol chains that can be oxidized to dithiol linkages between two similar amino acids.

Amino acids are the principal building blocks of proteins and enzymes. They are incorporated into proteins by transfer RNA according to the genetic code while messenger RNA is being decoded by ribosomes. During and after the final assembly of a protein, the amino acid content dictates the spatial and biochemical properties of the protein or enzyme.

The amino acid backbone determines the primary sequence of a protein, but the nature of the side chains determines the protein's properties. Amino acid side chains can be polar, non-polar, or practically neutral. Polar side chains tend to be present on the surface of a protein where they can interact with the aqueous environment found in cells. On the other hand, non-polar amino acids tend to reside within the center of the protein where they can interact with similar non-polar neighbors. This can create a hydrophobic region within an enzyme where chemical reactions can be conducted in a non-polar atmosphere. Likewise, enzymes can also have polar amino acid substituents within the active site that provide a polar region in which to conduct biochemical synthesis.

[Alanine](#) - The second simplest amino acid, but used the most in proteins.

[beta-Alanine](#) - The only naturally occurring **beta** amino acid.

[Arginine](#) - Amino acid often used at the active sites of enzymes.

[Asparagine](#) - Amide derivative of aspartic acid.

[Aspartic Acid](#) - Important intermediate in the citric acid cycle.

[Carnitine](#) - Unusual amino acid that carries fatty acids into mitochondria.

[Citrulline](#) - An amino acid that works to detoxify and eliminate unwanted ammonia.

[Cysteine](#) - Thiol containing amino acid involved in active sites and protein tertiary

structure determination.

[Cystine](#) - Oxidation product of cysteine that holds proteins together.

[gamma-Aminobutyric Acid](#) - Decarboxylated amino acid that helps you chill out.

[Glutamic Acid](#) - Negatively charged amino acid found on the surface of proteins.

[Glutamine](#) - The only amino acid with the ability to easily cross the barrier between blood and brain tissue.

[Glutathione](#) - Small peptide that helps dump free radicals.

[Glycine](#) - Simplest amino acid that also acts as a neurotransmitter antagonist.

[Histidine](#) - Amino acid responsible for histamine biosynthesis.

[Hydroxyproline](#) - Important amino acid used in structural proteins like collagen.

[Isoleucine](#) - Hydrophobic amino acid used almost exclusively in protein and enzyme construction.

[Leucine](#) - Another hydrophobic amino acid used almost exclusively in protein and enzyme construction.

[Lysine](#) - An essential amino acid with a positive charge on the aliphatic side chain.

[Methionine](#) - An essential amino acid that helps initiate protein synthesis.

[Ornithine](#) - Critical member of the amino acids in the urea cycle.

[Phenylalanine](#) - Most common aromatic amino acid found in proteins.

[Proline](#) - Cyclic aliphatic amino acid used in the synthesis of collagen.

[Serine](#) - Amino acid alcohol found in the active site of serine proteases.

[Taurine](#) - Mercaptan-containing amino acid that is involved in bile acid biochemistry.

[Threonine](#) - Amino acid alcohol involved in porphyrin metabolism.

Tryptophan - Aromatic amino acid used the least frequently in proteins.

Tyrosine - Hydroxyphenyl amino acid that is used to build neurotransmitters and hormones.

Valine - Hydrophobic aliphatic amino acid used to hold proteins together.