

Amino Acid Explanation

Amino acids are defined as organic compounds that combine to form proteins. When proteins are digested, amino acids are left. They are classified as either "essential" amino acids (which must be consumed in the diet), or "nonessential" amino acids (which can be made by the body from the essential amino acids).

The basic structure of protein is a chain of amino acids that contain carbon, hydrogen, oxygen, and nitrogen. The presence of nitrogen differentiates protein from carbohydrate and fat.

The body can make only 13 of the amino acids; these are known as the nonessential amino acids. They are called nonessential because the body can make them and does not need to get them from the diet. There are 9 essential amino acids that are obtained only from food, and not made in the body.

Amino acid profiles of food proteins

The following table shows representative amino acid profiles of some common foods and dietary protein supplements. The percentages are averages of several commercial products. Casein and whey are milk proteins. Casein is the protein that precipitates from milk when curdled with rennet; it is the basis for making cheese. Whey is the watery part of milk that remains after the casein is separated.

Percentage (%) by weight of amino acid

Amino Acid	protein						
	egg white	beef	chicken	whey	casein	soy	yeast
alanine	6.6	6.1	5.5	5.2	2.9	4.2	8.3
arginine	5.6	6.5	6.0	2.5	3.7	7.5	6.5
aspartic acid	8.9	9.1	8.9	10.9	6.6	11.5	9.8
cystine	2.5	1.3	1.3	2.2	0.3	1.3	1.4
glutamic acid	13.5	15.0	15.0	16.8	21.5	19.0	13.5
glycine	3.6	6.1	4.9	2.2	2.1	4.1	4.8
histidine *	2.2	3.2	3.1	2.0	3.0	2.6	2.6
isoleucine *	6.0	4.5	5.3	6.0	5.1	4.8	5.0
leucine *	8.5	8.0	7.5	9.5	9.0	8.1	7.1
lysine *	6.2	8.4	8.5	8.8	3.8	6.2	6.9
methionine *	3.6	2.6	2.8	1.9	2.7	1.3	1.5
phenylalanine *	6.0	3.9	4.0	2.3	5.1	5.2	4.7
proline	3.8	4.8	4.1	6.6	10.7	5.1	4.0
serine	7.3	3.9	3.4	5.4	5.6	5.2	5.1
threonine *	4.4	4.0	4.2	6.9	4.3	3.8	5.8
tryptophan *	1.4	0.7	1.2	2.2	1.3	1.3	1.6
tyrosine	2.7	3.2	3.4	2.7	5.6	3.8	5.0
valine *	7.0	5.0	5.0	6.0	6.6	5.0	6.2

* Essential amino acids

Amino acid analysis of food products report **cystine** instead of **cysteine**. Cystine is an amino acid that is formed from the oxidation of two molecules of cysteine.



Egg white protein is considered to have one of the best amino acids profiles for human nutrition. Plant proteins generally have lower content of some essential amino acids such as lysine and methionine. Soy protein is one of the best plant proteins, but nevertheless, the most prominent difference in this chart is the proportion of the essential sulfur-containing amino acid methionine. Egg white protein has approximately three times more methionine than is found in soy protein. The yeast information is for "brewer's yeast" (*Saccharomyces Cervisiae*).