

AMINO-ACIDS

(See also [Proteins](#))

Amino acids are the basic elements of which proteins are made. The order of sequence and the amount of amino acids will produce proteins whose characteristics and functions will be quite different from one another.

Amino acids are composed of an amine function (NH₂) and of an acid function (COOH). Both can be described by the formula: NH₂-CHR-COOH.

There are 20 Amino acids. They are characterized by a chemical nature found in their side chain (R). They may be classified as neutral AA (glycine, alanine, valine, leucine, isoleucine), acids (aspartic acid, glutamic acid, asparagine and glutamine), alcohol (threonine, serine), basics (lysine, arginine, histidine), sulphur (cysteine, methionine), phenolics (tyrosine), aromatics (phenylalanine, tryptophan) as well as an amino acid with an intracyclic nitrogen (proline).

They are classified in 2 groups, in human nutrition:

9 essential amino acids	they cannot be synthesized and thus, must absolutely be acquired by food intake (isoleucine, leucine, valine, threonine, phenylalanine, tryptophan, methionine, lysine as well as histidine for infants).
11 nonessential amino acids	those which may be synthesized by the human organism (alanine, glutamine, aspartic acid, glutamic acid, asparagine, cysteine, proline, glycine, arginine, tyrosine, serine).

It is usual to put together methionine + cysteine and phenylalanine + tyrosine, because a methionine deficit could be corrected by a cysteine contribution and a phenylalanine deficit by a tyrosine contribution.

Dairy proteins have the advantage of containing all the essential amino acids, in satisfactory proportions compared to the reference protein (as defined in 1990 by the FAO/OMS) (see table on next page).

This composition, of essential amino acids, gives dairy proteins a very good nutritional value. These proteins are self sufficient but also allow for improvement of other proteins' nutritional value.

Thus, dairy proteins, which are particularly rich in lysine, are able to correct the deficit found in cereal products especially when they are consumed together (for example: rice or semolina with milk; bread + milk).

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Composition in essential amino acids of various proteins (protein mg/g)

Amino acids	Eggs	Milk	Meat	Soy flour	Wheat	Reference protein*
Histidine	26	28	38	25	25	19
Isoleucine	72	57	57	51	35	28
Leucine	98	101	88	77	72	66
Lysine	69	80	105	69	31	58
Methionine + Cysteine	59	35	53	32	43	25
Phenylalanine + Tyrosine	108	101	89	86	80	63
Threonine	55	47	52	43	31	34
Tryptophane	18	14	14	13	12	11
Valine	87	68	60	53	47	35
Total (+His)	592	531	546	456	376	339
Total (-His)	566	503	508	431	351	320

*Reference Protein as defined for adults by the FAO/OMS (1990)