

Amino acids. Uses and Applications in the food industry

Bachelor's degree Final Project
Food Science and Technology
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Introduction:

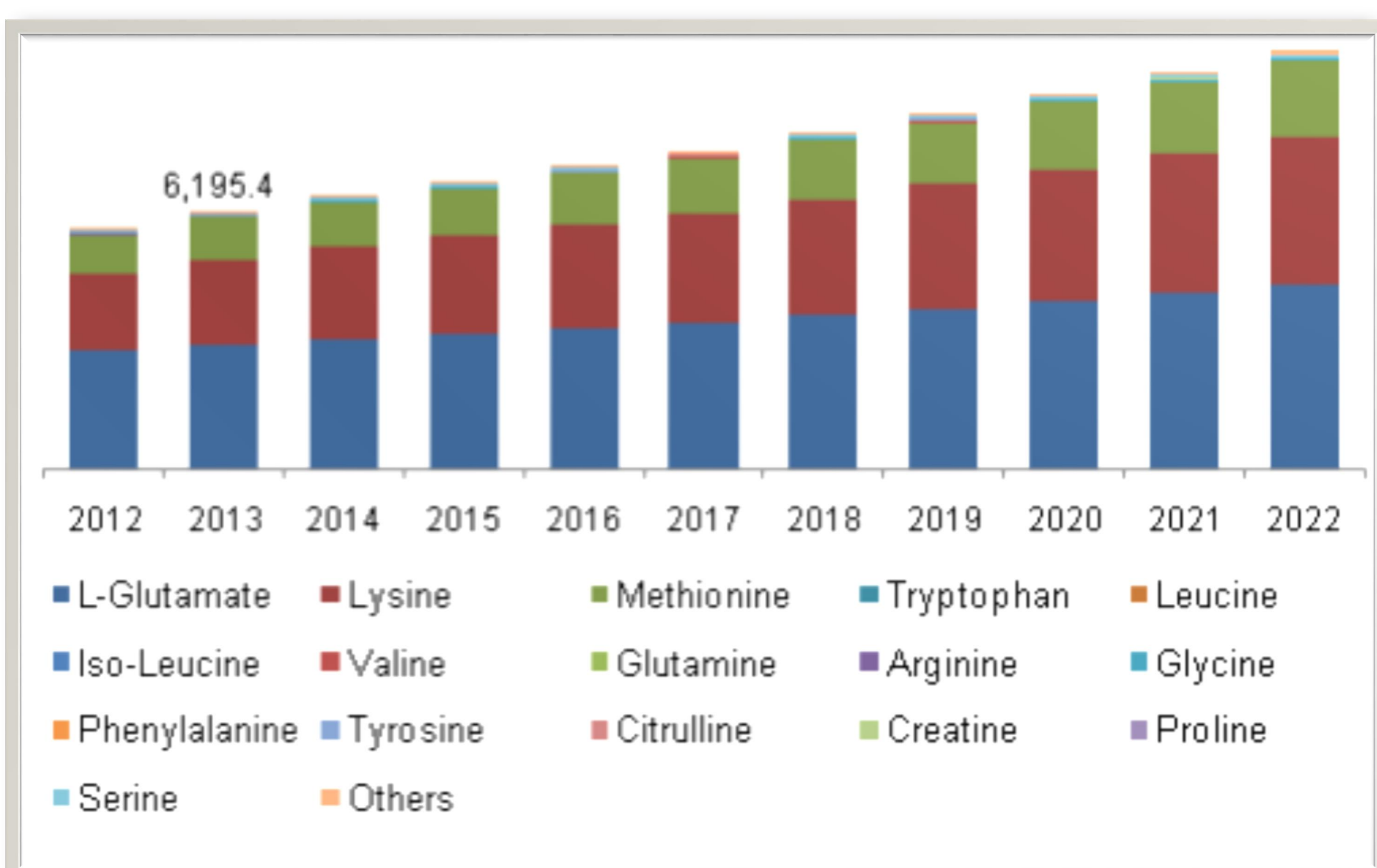
As the precursors of proteins, amino acids are essential compounds for all kinds of living forms, but they have plenty of different functions, both metabolic and sensorial, that make these compounds interesting for the food industry.

Objectives:

Know the relevance of amino acids as biochemical compounds implied in many physiological functions.
Describe the role of amino acids in food industry, both as nutritional suppliers and food additives
Describe the amino acid production processes performed in food industry.

Essential Amino acids	Conditionally essential amino acids	Non-essential amino acids
Histidine	Arginine	Alanine
Isoleucine	Glutamine	Aspartic acid
Leucine	Glicine	Glutamic acid
Lysine	Proline	
Methionine	Serine*	
Phenylalanine	Tyrosine	
Threonine	Asparagine*	
Tryptophan	Cysteine	
Valine		

Amino acid global market volume by product, 2012-2022 (kilo tons)



Uses in food industry

As nutritional supplements:

- For humans (sanitary use)
- For animals (feed enrichment)

As flavour enhancers:

- Aspartic acid
 - Glutamic acid
- Umami taste**

As iron amino acid chelates:

- Better absorption than in non-organic forms
- Iron bis-glycinate

As sweeteners:

- Alanine, proline, glycine (low intensity)
- Aspartame (high intensity)

As flavourings:

- For all flavours
- Each single amino acid has its own taste

Production methods

Extraction method:

- Hydrolization of vegetal protein to obtain single amino acids.
- Extraction with a solvent insoluble with water.
- Separation from the solvent by distillation.

Synthesis method:

- Based on Strecker's amino acid synthesis.
- Source: acrylonitrile.

Fermentation method:

- Amino acid production by optimized microorganism strains.
- Microorganisms are prepared to overproduce and excrete an amino acid.
- They are cultured in fixed stirring, temperature, pH conditions.

Enzyme catalysis method:

- Fixed enzymes synthesize amino acids from specific substrates
- Used to obtain nonbiological amino acid derivatives

Conclusions:

- Amino acids are biochemical compounds of great complexity, with several physiological functions
- Amino acids global market grows year after year and it is expected to keep growing.
- Amino acid uses are diversified, as a wide range of nutritional supplements, and also as food additives, mostly flavour modifiers.
- Amino acid production methods are varied, and the biochemical ones are the most efficient ones. Fermentation is the most used method.