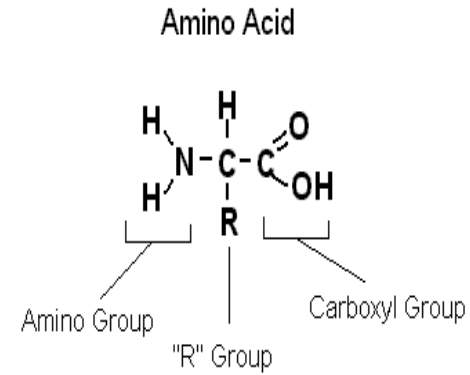


# Abstract for Amino Acids Production



*Ensymm abstract for amino acids production*

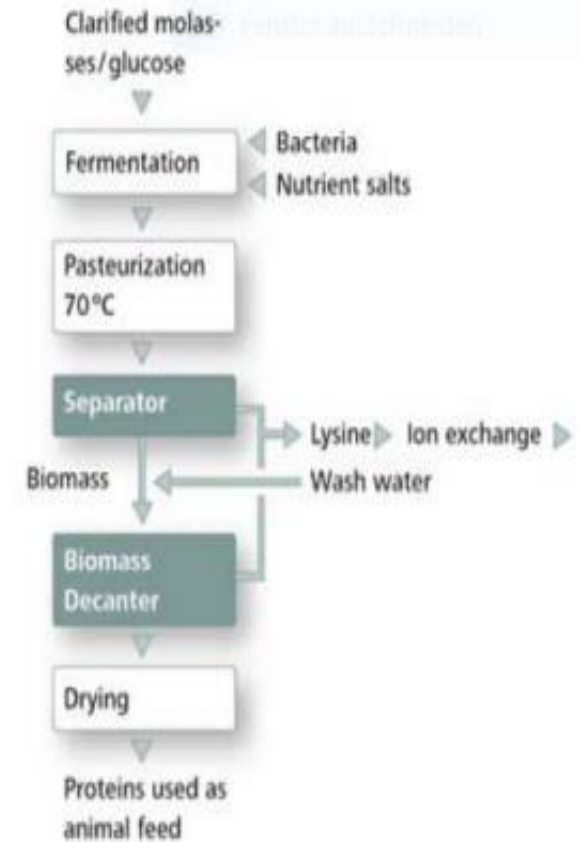


# INTRODUCTION

Demand for amino acids for use in the areas of food and feed additives and drug manufacturing has increased. In the medical sector, amino acids are used for infusions and as therapeutic agents. Amino acid derivatives are used in the chemical industry as well, regarding cosmetics, synthetic leathers, surface-active agents, fungicides, and pesticides. The developed production methods so far may be summarized as followed: (1) protein hydrolysis, (2) chemical synthesis, (3) microbiological production (e.g. carbon sources such as glucose or from chemically synthesized precursors, and (4) enzymatic synthesis. Whereas chemical synthesis produces a racemic mixture, which may require additional resolution, the latter

procedures give rise to optically pure amino acids. Due to its outstanding importance, the microbial production of L-Lysine will be described in this expertise. The commercial production of lysine is important because lysine is an essential additive to corn feed given to dairy cows and chicken farms. Without this additive, the cattle would not have the amino acids required for protein synthesis and subsequent milk production and the poultry need this essential AS for egg laying and metabolism. *Corynebacterium glutamicum* is the primary bacterium used in the commercial production of amino acids, particularly lysine. This expertise will be performed by BASF (GER) and Ajinomoto (JP) as one of

the leaders for Lysine production in different areas.



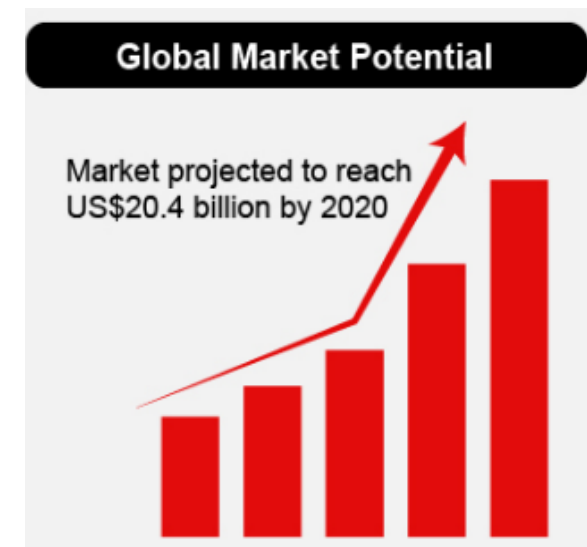
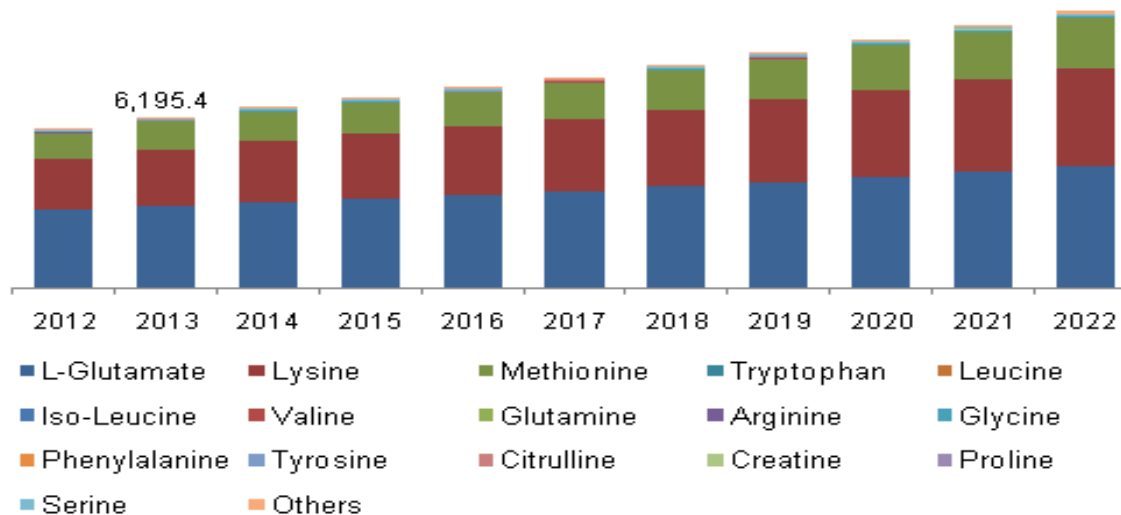
# MARKET OF AMINO ACIDS

According to *Grand View Research Inc.*, the global amino acids market demand was about 6.19 million tons in 2013. Rising meat consumption connected with high livestock production such as swine, broiler and cattle are expected to increase animal feed additive demand.

This trend is expected to remain a key factor to market growth over the next seven years. Threonine, lysine, tryptophan, and methionine are widely used in animal feed additives as they are essential for good health and regulate all metabolic processes.

*Global Industry Analyst Inc.* predicts that amino acids are projected to reach \$ 20.4 billion by 2020 driven by robust demand from the animal feed end-use sector. Asia-pacific represents the largest and fastest growing market with a projected CAGR of 5.1 % over the whole period of analysis.

**Global Amino Acids Market Volume By Product, 2012 - 2022 (Kilo Tons)**



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