



200mM L-Glutamine solution 200mM Stable Glutamine solution

L-Glutamine as cell culture supplement

Product	Cat#	Package size
Stable L-Glutamine, 200 mM (100-times)	C4282.0050	50mL
Stable L-Glutamine, 200 mM (100-times)	C4282.0100	100mL
L-Glutamine, 200 mM (100-times)	C4281.0050	50mL
L-Glutamine, 200 mM (100-times)	C4281.0100	100mL

Synonyms: L-Alanyl-L-Glutamine

Description

L-Glutamine from Genaxxon is a serum-free medium supplement, useful for Biomanufacturing; Tissue Engineering and Specialty Media.

L-glutamine is an unstable essential amino acid required in cell culture media formulations. Most commercially available media are formulated with free L-glutamine which is either included in the basal formula or added to liquid formulations at time of use. L-glutamine is unstable at physiological pH in liquid media. It breaks down to ammonium and pyroglutamate at rates that make it a problem in many biomanufacturing applications.

A drawback of the spontaneous breakdown once in solution is the generation of ammonia as a by-product, which is toxic to the cells and can affect protein glycosylation.

One strategy to minimize generation of ammonia is to replace the L-glutamine in medium with stable glutamine (L-Alanyl-L-Glutamine) from Genaxxon. This supplement shows an improved stability compared to free L-Glutamine and considerable reduction of spontaneous ammonia generation.

An additional benefit using stable Glutamine from Genaxxon in place of L-glutamine in cell culture is the extension of culture time, potentially reducing the number of times the cells must be passaged.

The concentration of L-glutamine used in classical media ranges from 0.5mM in Ames' Medium to 10mM in MCDB Media 131. The more typical concentrations in media used is between 2 and 4mM. DMEM/F12 (50:50) is often used as a starting formulation for media used with Chinese Hamster Ovary, CHO, cells. L-glutamine in DMEM/F12 Nutrient Mixture is 2.5mM. L-glutamine in Serum-Free/Protein Free Hybridoma Medium is 2.7mM. L-glutamine in DMEM, GMEM, IMDM and H-Y medium is 4mM.

IMDM is often used as a starting formulation for proprietary hybridoma cell culture media. Hybridoma cells grow better in concentrations of L-glutamine that are above the average levels found in media.

Glutamine Stability

L-Glutamine is a freely soluble neutral amino acid containing an R-group amide. It can break down non-enzymatically into ammonia and pyroglutamate (pyrrolidonecarboxylic acid) in liquid media. The breakdown of L-glutamine over time is dependent on pH, temperature and the presence of various anions. Glutamine deamination occurs in both acidic and basic conditions and it is significantly more rapid in the presence of phosphate or bicarbonate. The deamination rate at a fixed phosphate concentration increases as the pH increases from 4.3 to 10. The rate of deamination in the presence of phosphate increases almost linearly as the pH increases from 7 to 8.

When glutamine is present as an amino acid residue in proteins or peptides (e.g. L-alanyl-L-glutamine), it is stable at physiological conditions.

Because of its chemical instability and importance for cell growth and function, it is critical that the delivery of L-glutamine be optimized to each unique cell culture process. Hence the effective use of L-glutamine and L-glutamine equivalents in cell culture requires an understanding of its chemistry and multiple delivery forms.



fon:
+49 (0)731 - 3608 123
fax:
+49 (0)731 - 3608 962
eMail:
info@genaxxon.com
internet:
www.genaxxon.com

Primary Functions of Glutamine in Cell Culture Systems:

Glutamine supports the growth of cells that have high energy demands and synthesize large amounts of proteins and nucleic acids. It is an alternative energy source for rapidly dividing cells and cells that use glucose inefficiently. Cells require nitrogen atoms to build molecules such as nucleotides, amino acids, amino-sugars and vitamins. Ammonium is an inorganic source of nitrogen that exists primarily as a positively charged cation, NH_4^+ , at physiological pH. Ammonium nitrogen used by cells is initially incorporated into organic nitrogen as an amine of glutamate or an amide of glutamine. These two amino acids provide the primary reservoirs of nitrogen for the synthesis of proteins, nucleic acids and other nitrogenous compounds.

Roles of glutamine:

- Glutamine contains one atom of nitrogen as an amide and another atom of nitrogen as an amine and it transports and delivers nitrogen to cells in quantities that are toxic as free ammonium.
- Glutamine amide nitrogen is used in the synthesis of the vitamins NAD and NADP, purine nucleotides, CTP from UTP and asparagine. Nitrogen initially stored in glutamine can also be used to produce carbamyl phosphate for the synthesis of pyrimidines.
- Glutamine is a precursor of glutamate, a key amino acid used for the transamination of alpha ketoacids to form other alpha amino acids.
- When glucose levels are low and energy demands are high, cells can metabolize amino acids for energy. Glutamine is one of the most readily available amino acids for use as an energy source and it is a major source of energy for many rapidly dividing cell types in vitro.

Usage of stable Glutamine:

While results may vary depending on the cell line, using stable Glutamine from Genaxxon as a supplement in place of L-glutamine in cell culture can improve cell viability and growth, potentially increasing productivity levels. Increase media stability, minimize toxic ammonia build-up, and maximize cell performance.

The buffered solution of L-alanyl-L-glutamine (200 mM, cat# C4282) can be used in the same concentrations as L-glutamine ([link to L-glutamine](#)).