

DID YOU KNOW

GLUTAMAX SUPPLEMENT CAN KEEP YOUR CELLS HEALTHIER FOR LONGER?



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connection

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L-glutamine is an essential nutrient in cell cultures for energy production as well as protein and nucleic acid synthesis. However, L-glutamine in cell culture media spontaneously degrades (Figure 1) [1], generating ammonia as a by-product, which is toxic to the cells [2]. This can affect protein glycosylation [3,4] and cell viability, lowering protein production and changing glycosylation patterns.

Lower ammonia concentrations can be advantageous in attaining high cell yields, particularly for cells that are sensitive to ammonia toxicity [5]. Cells can be sensitive to ammonia even at nontoxic levels, creating artifacts.

Media stability keeps cells healthier

Media with Gibco™ GlutaMAX™ Supplement are standard cell culture formulations that contain a stabilized form of L-glutamine, the dipeptide L-alanyl-L-glutamine, that prevents degradation and buildup of ammonia even during long-term culture (Figures 2 and 3). The dipeptide, due to its extreme stability in aqueous solution, does not degrade in storage or incubation. This allows:

- Increased media stability
- Minimized toxic ammonia buildup
- Maximized cell performance

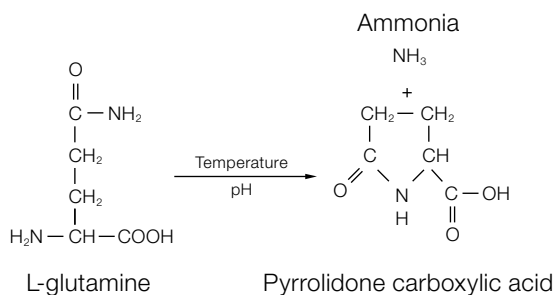


Figure 1. L-glutamine spontaneously decomposes into ammonia and pyrrolidone carboxylic acid at a rate dependent on pH and temperature [1].

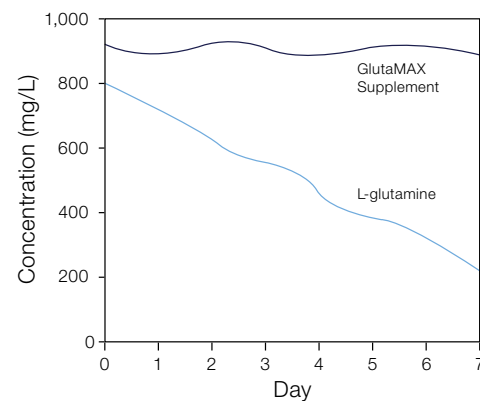


Figure 2. Extended growth of MDBK cells cultured with GlutaMAX Supplement. DMEM was supplemented with GlutaMAX Supplement or L-glutamine, dispensed into vials, and stored at 37°C. Samples were taken daily and frozen at -20°C. Levels of GlutaMAX Supplement and L-glutamine were determined by HPLC.

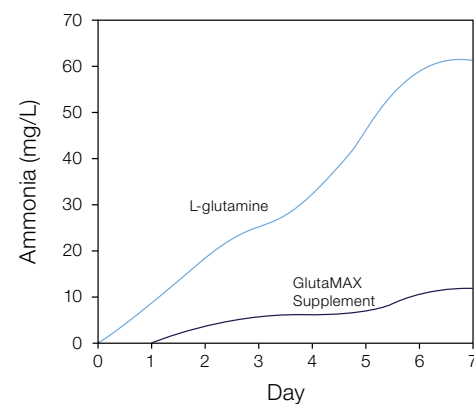


Figure 3. Ammonia levels in supplemented media. DMEM was supplemented with GlutaMAX Supplement or L-glutamine, dispensed into vials, and stored at 37°C. Samples were taken daily and frozen at -20°C. Levels of ammonia were determined by HPLC.

Extend the life of your cells

GlutaMAX Supplement can also extend cell culture life, which may reduce the number of times the cells must be passaged. Figure 4 compares MDBK cells cultured in DMEM with 10% FBS and L-glutamine or GlutaMAX Supplement. Cells cultured in GlutaMAX Supplement reach peak density two days later, and viability declines less rapidly than in cultures with L-glutamine supplementation. The slight increase of the lag phase is attributed to the time needed to release the peptidase and digest the dipeptide. This allows a gradual increase in availability of L-glutamine to the cells [2].

Choose from many formulations

We offer many widely used liquid media formulations in which the GlutaMAX dipeptide substitutes for L-glutamine. They include Gibco™ DMEM, MEM, IMDM, RPMI, Opti-MEM™ media, and others. For details, go to thermofisher.com/glutamax.

Do it yourself with GlutaMAX Supplement

You can purchase the GlutaMAX dipeptide as a stand-alone supplement. Supplied as a 200 mM solution, GlutaMAX Supplement can be used as a direct substitute for L-glutamine at equimolar concentrations in your current cell culture media formulations.

Note: This supplement is suitable for mammalian cell cultures. It is not recommended for insect cell cultures.

Applications for GlutaMAX Supplement

GlutaMAX Supplement and media with GlutaMAX Supplement are suitable for both adherent and suspension cultures of mammalian cells, including:

- Culture systems requiring long periods of incubation without feeding (e.g., cloning assays)
- Long-term studies requiring optimum standardization of media (e.g., cancer cell lines, long-term cultures passaged over time, and toxicity testing)
- Culture systems sensitive to ammonia (e.g., high-density bioreactors)

References

1. Tritsch GL, Moore GE (1962) Spontaneous decomposition of glutamine in cell culture media. *Exp Cell Res* 28:360–364.
2. Hassell T, Gleave S, Butler M (1991) Growth inhibition in cell culture. The effect of lactate and ammonia. *Appl Biochem Biotechnol* 30:29–41.
3. Yang M, Butler M (2002) Effects of ammonia and glucosamine on the heterogeneity of erythropoietin glycoforms. *Biotechnol Prog* 18:129–138.
4. Yang M, Butler M (2000) Effects of ammonia on the glycosylation of human recombinant erythropoietin in culture. *Biotechnol Prog* 16:751–759.
5. Christie A, Butler M (1994) Glutamine-based dipeptides are utilized in mammalian cell culture by extracellular hydrolysis catalyzed by a specific peptidase. *J Biotechnol* 37:277–90.

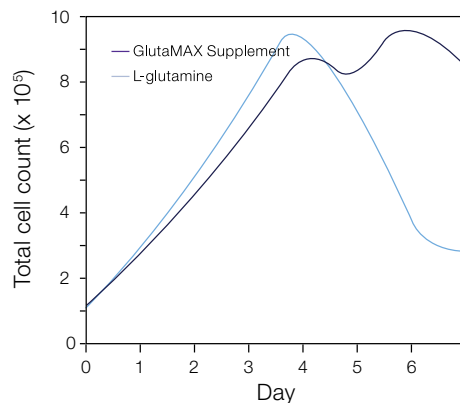


Figure 4. Growth of MDBK cells with L-glutamine versus GlutaMAX Supplement. MDBK cells were seeded at approximately 1×10^5 cells/flask in DMEM with 10% FBS and L-glutamine or GlutaMAX Supplement in 25 cm² T-flasks.

Common cell lines cultured with GlutaMAX Supplement

Cell line	Source
MDBK	Bovine kidney
MDCK	Canine kidney
HeLa	Human ovary
PER.C6	Human embryonic retinoblastoma
HEK293	Human embryonic kidney
AE-1	Mouse hybridoma
3D9	Mouse hybridoma
CHO	Chinese hamster ovary
BHK	Baby hamster kidney

Ordering information

Description	Classical medium with L-glutamine	Classical medium without L-glutamine	Medium with GlutaMAX Supplement	
	Cat. No.	Cat. No.	Quantity	Quantity
Dulbecco's Modified Eagle Medium (DMEM) (1X), liquid Low glucose, contains sodium pyruvate	11885-076		1,000 mL	10567-014 (in EU 21885-025) 500 mL
	11885-084		500 mL	
	11885-092		10 x 500 mL	
Dulbecco's Modified Eagle Medium (DMEM) (1X), liquid High glucose, contains sodium pyruvate	11995-040		1,000 mL	10569-010 (in EU 31966-021) 500 mL
	11995-081		6 x 1,000 mL	
	11995-065	10313-021	500 mL	
	11995-073		10 x 500 mL	
Dulbecco's Modified Eagle Medium (DMEM) (1X), liquid High glucose, contains no sodium pyruvate	11965-084	11960-051	1,000 mL	10566-016 (in EU 61965-026) 500 mL
	11965-126	11960-077	6 x 1,000 mL	
	11965-092	11960-044	500 mL	
	11965-118	11960-069	10 x 500 mL	
Dulbecco's Modified Eagle Medium (DMEM) (1X), liquid High glucose, contains HEPES buffer but no sodium pyruvate	12430-047		1,000 mL	10564-011 (in EU 32430-027) 500 mL
	12430-054		500 mL	
	12430-062		10 x 500 mL	
DMEM/F-12 (1X), liquid, 1:1	11320-033		500 mL	10565-018 (in EU 31331-028) 500 mL
Ham's F-12 Nutrient Mix (1X), liquid	11765-047		1,000 mL	31765-035 (in EU 31765-027) 500 mL
	11765-070		6 x 1,000 mL	
	11765-054		500 mL	
	11765-062		10 x 500 mL	
Iscove's Modified Dulbecco's Medium (IMDM) (1X), liquid	12440-046		1,000 mL	31980-030 (in EU 31980-022) 500 mL
	12440-053		500 mL	
	12440-061		10 x 500 mL	
Minimum Essential Medium (MEM) alpha (1X), liquid Contains no ribonucleosides or deoxyribonucleosides	12561-049		1,000 mL	32561-037 (in EU 32561-029) 500 mL
	12561-056		500 mL	
Minimum Essential Medium (MEM) alpha (1X), liquid Contains ribonucleosides and deoxyribonucleosides	12571-048		1,000 mL	32571-036 (in EU 32571-028) 500 mL
	12571-063		500 mL	
	12571-071		10 x 500 mL	
Minimum Essential Medium (MEM), liquid Contains Earle's salts	11095-072	11090-073	1,000 mL	41090-036 (in EU 41090-028) 500 mL
	11095-080	11090-081	500 mL	
	11095-098	11090-099	10 x 500 mL	
Minimum Essential Medium (MEM), liquid Contains Earle's salts and HEPES buffer		12360-038	500 mL	42360-032 (in EU 42360-024) 500 mL
Opti-MEM I Reduced-Serum Medium (1X), liquid	31985-062		100 mL	51985-034 (in EU 51985-026) 500 mL
	31985-070		500 mL	
	31985-088		1,000 mL	
RPMI 1640 Medium (1X), liquid	11875-085	21870-084	1,000 mL	61870-036 (in EU 61870-010) 500 mL
	11875-135		6 x 1,000 mL	
	11875-093	21870-076	500 mL	
	11875-119	21870-092	10 x 500 mL	
	11875-101		100 mL	
	11875-127		20 x 100 mL	
RPMI 1640 Medium (1X), liquid Contains HEPES buffer	22400-071		1,000 mL	72400-047 (in EU 72400-021) 500 mL
	22400-089		500 mL	
	22400-105		10 x 500 mL	

Reagent	Cat. No.	Quantity	GlutaMAX Supplement*	
			Cat. No.	Quantity
L-Glutamine 200 mM (100X), liquid	25030-149	20 mL	35050-061 (in EU 35050-038)	100 mL
	25030-081	100 mL		

* This product is for research use, and where appropriate, as raw material components in further cell culture manufacturing applications. It is not intended for human or animal diagnostic, therapeutic, or other clinical uses, unless otherwise stated.

Find out how to maximize your cell cultures with GlutaMAX Supplement at thermofisher.com/glutamax

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