

# GlutaMAX media

Keep your cells healthier for longer



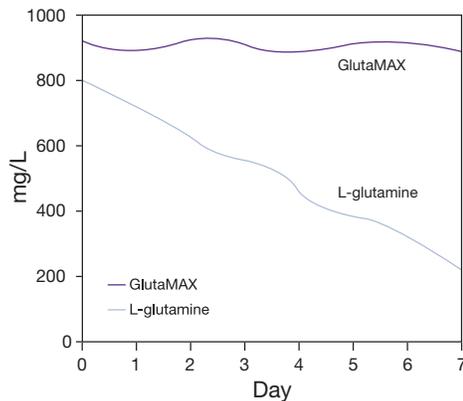
L-glutamine is an essential nutrient in cell cultures for energy production as well as protein and nucleic acid synthesis. However, L-glutamine in cell culture media spontaneously degrades (Figure 1) [1]. This generates ammonia as a by-product, which is toxic to the cells [2] and can affect protein glycosylation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

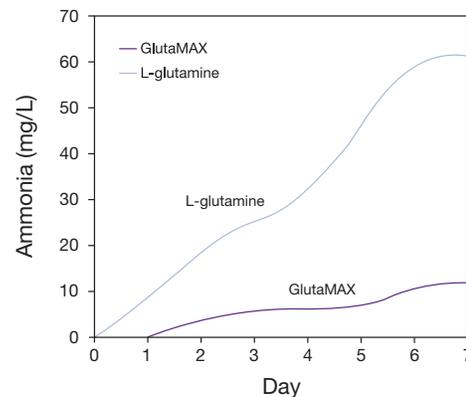
### Media stability keeps cells healthier

Gibco™ GlutaMAX™ media are standard cell culture media that contain a stabilized form of L-glutamine, the dipeptide L-alanyl-L-glutamine, that prevents degradation and ammonia buildup even during long-term culture (Figures 2 and 3). Extremely stable in aqueous solution, the dipeptide does not degrade in storage or incubation, which allows:

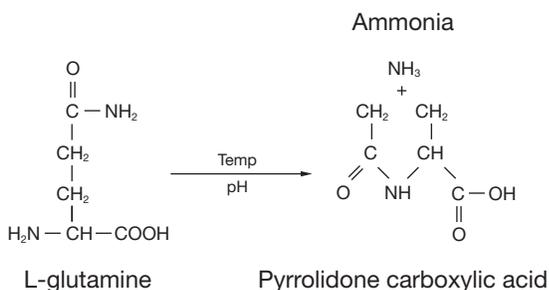
- Increased media stability
- Minimized toxic ammonia buildup
- Maximized cell performance



**Figure 2. Stability of Gibco™ GlutaMAX™ Supplement vs. L-glutamine in DMEM.** DMEM was supplemented with GlutaMAX Supplement or L-glutamine, aliquoted 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, aliquoted into vials, and stored at 37°C. Samples were taken daily and frozen at -20°C. Levels of ammonia were determined by HPLC.



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

# 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 Gibco™ GlutaMAX™ dipeptide substitutes for L-glutamine. They include DMEM, MEM, IMDM, RPMI, Gibco™ Opti-MEM™ media, and others. For details, go to [thermofisher.com/glutamax](http://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 formulation.

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

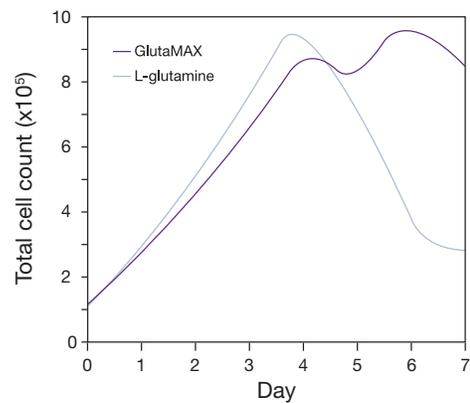
## Applications for GlutaMAX media

GlutaMAX media and GlutaMAX media with GlutaMAX Supplement are suitable for both adherent and suspension mammalian cell cultures, 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, 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. *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) Growth and metabolism of a murine hybridoma in cultures containing glutamine-based dipeptides. *FOCUS™* 16:1, 9.



**Figure 4. Growth of MDBK cells in DMEM supplemented with L-glutamine or GlutaMAX Supplement and 10% FBS.** MDBK cells were seeded at approximately  $1 \times 10^5$  cells/flask in DMEM with 10% FBS and L-glutamine or GlutaMAX Supplement in 25 cm<sup>2</sup> 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
293	Human embryonic kidney
AE-1	Mouse hybridoma
3D9	Mouse hybridoma
CHO	Hamster ovary
BHK	Hamster kidney

**Ordering information**

Description	Classical media with L-glutamine	Classical media without L-glutamine	GlutaMAX media		
	Cat. No.	Cat. No.	Size	Cat. No.	Size
<b>Dulbecco's Modified Eagle Medium (DMEM) (1X), liquid</b> 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		
<b>Dulbecco's Modified Eagle Medium (DMEM) (1X), liquid</b> 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		
<b>Dulbecco's Modified Eagle Medium (DMEM) (1X), liquid</b> 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		
<b>Dulbecco's Modified Eagle Medium (DMEM) (1X), liquid</b> 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		
<b>DMEM/F-12, (1X) liquid, 1:1</b>	11320-033		500 mL	10565-018 (in EU 31331-028)	500 mL
<b>F-12 Nutrient Mixture (Ham), (1X), liquid</b>	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		
<b>Iscove's Modified Dulbecco's Medium (IMDM) (1X), liquid</b>	12440-046		1,000 mL	31980-030 (in EU 31980-022)	500 mL
	12440-053		500 mL		
	12440-061		10 x 500 mL		
<b>Minimum Essential Medium (MEM) alpha (1X), liquid</b> Contains no ribonucleosides or deoxyribonucleosides	12561-049		1,000 mL	32561-037 (in EU 32561-029)	500 mL
	12561-056		500 mL		
<b>Minimum Essential Medium (MEM) alpha (1X), liquid</b> 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		
<b>Minimum Essential Medium (MEM), liquid</b> 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		
<b>Minimum Essential Medium (MEM), liquid</b> Contains Earle's Salts and HEPES buffer		12360-038	500 mL	42360-032 (in EU 42360-024)	500 mL
<b>Opti-MEM I Reduced-Serum Medium (1X), liquid</b>	31985-062		100 mL	51985-034 (in EU 51985-026)	500 mL
	31985-070		500 mL		
	31985-088		1,000 mL		
<b>RPMI 1640 Medium (1X), liquid</b>	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		
<b>RPMI 1640 Medium (1X), liquid</b> 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		

			GlutaMAX Supplement*	
Reagents	Cat. No.	Size	Cat.No.	Size
<b>L-Glutamine 200 mM (100X), liquid</b>	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 media at [thermofisher.com/glutamax](http://thermofisher.com/glutamax)