

Product Data Sheet

Product Name: Ectoine
Cat. No.: GC39290

Chemical Properties

Cas. No. 96702-03-3

SMILES O=C([C@H]1NC(C)=NCC1)O

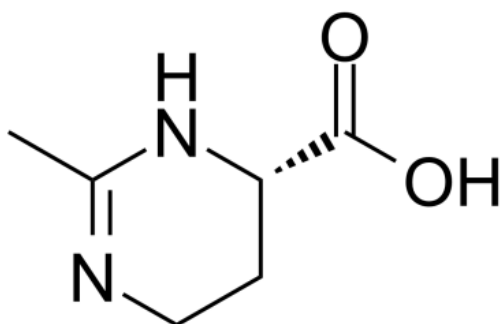
Formula C6H10N2O2 M.Wt 142.16

Solubility Water : 250 mg/mL (1758.58 mM) Storage 4°C, protect from light

General tips For obtaining a higher solubility , please warm the tube at 37 °C and shake it in the ultrasonic bath for a while. Stock solution can be stored below -20°C for several months.

Shipping Condition Evaluation sample solution : ship with blue ice All other available size: ship with RT , or blue ice upon request.

Structure



Protocol

Cell experiment [1]:

Cell lines Human erythrocytes

Caution: Product has not been fully validated for medical applications. For research use only.

Tel: (909) 407-4943 Fax: (626) 353-8530 E-mail: tech@glpbio.com

Address: 10292 Central Ave. #205, Montclair, CA, USA

Product Data Sheet

Preparation Method Human erythrocytes (2×10^8 cells/mL) are treated for 1h with 0%, 0.1%, 0.5%, 1%, and 5% ectoine. Then cells are stressed for 10min with 0% to 0.04% SDS solution, and the number of cells in lysis is determined spectroscopically via the content of free hemoglobin.

Reaction Conditions 0%, 0.1%, 0.5%, 1%, and 5%; 1h

Applications Ectoine protects the cells from damage caused by SDS treatment. The erythrocytes pretreated with ectoine are shown to be more resistant to membrane damage by SDS than those of untreated cells. No stabilizing effect was observed in cells without ectoine, in which maximum erythrocyte damage occurred (0% increase of membrane stability). The higher the ectoine concentration, the greater the protective effect against membrane damage.

Animal experiment [2]:

Animal models Dry eye model (C57BL/6 mice)

Preparation Method An experimental dry eye model was induced via desiccating stress (DS) in female C57BL/6 mice (DS mice). The DS mice were treated with topical administration via instillation of 5 μ L/eye of ectoine in PBS at different concentrations (0.5, 1.0 and 2.0%), 4 times daily during exposure to desiccation for 5 days. On day 5, clinical signs of dry eye and corneal damage were assessed via a stereo microscopy and Oregon Green dextran fluorescein staining.

Caution: Product has not been fully validated for medical applications. For research use only.

Tel: (909) 407-4943 Fax: (626) 353-8530 E-mail: tech@glpbio.com

Address: 10292 Central Ave. #205, Montclair, CA, USA

Product Data Sheet

Dosage form 0.5, 1.0, 2.0%; 5µL/eye; 4 times daily; topical administration via instillation

Applications Topical administration of 0.5, 1.0, and 2.0% of ectoine in DS mice improved corneal smoothness in a concentration-dependent manner, and ectoine at 1.0 and 2.0% significantly restored the corneal smoothness to near or completely normal condition, with a corneal smoothness score of 1.80 ± 0.92 and 1.20 ± 1.03 , respectively.

References:

- [1] GRAF R, ANZALI S, BUENGER J, et al. The multifunctional role of ectoine as a natural cell protectant[J]. Clinics in Dermatology, 2008, 26(4): 326-333.
- [2] CHEN X, LIN N, LI J M, et al. Ectoine, from a natural bacteria protectant to a new treatment of dry eye disease[J]. Pharmaceutics, 2024, 16(2): 236.

Background

Ectoine is a cyclic amino acid derivative produced by bacteria living in extreme environments, which exerts cytoprotective effects through osmoregulation^[1]. By binding to water molecules, ectoine forms a stable protective hydration shell around cellular components, safeguarding cell structures from damage caused by environmental factors and helping maintain the natural folding state of proteins^[2]. Ectoine has been widely used in high-end skincare products, anti-allergic agents, and neuroprotection-related fields due to the compound's favorable safety profile and ability to repair cellular barriers^[3,4].

In vitro, pretreatment of human red blood cells with ectoine (0-5%) for 1h protected the cells from damage induced by SDS treatment, with higher concentrations of ectoine providing stronger membrane protection^[5]. When co-incubated with 25µM amyloid-β peptide (Aβ42) for 72h, ectoine (25µM-100mM) concentration-dependently reduced Thioflavin T (ThT)-induced fluorescence, indicating fewer cross-β-sheet structures. Notably, 100mM ectoine significantly inhibited Aβ42 fibril aggregation^[6]. Pretreatment of human neutrophils with 1mM ectoine for 2h, followed by co-

Caution: Product has not been fully validated for medical applications. For research use only.

Tel: (909) 407-4943 Fax: (626) 353-8530 E-mail: tech@glpbio.com

Address: 10292 Central Ave. #205, Montclair, CA, USA

Product Data Sheet

incubation with inflammatory mediators such as 300nM leukotriene B₄ (LTB₄) and 33µg/mL carbon nanoparticles (CNP) for 16h, significantly restored neutrophil apoptosis rates that were suppressed by these stimuli^[7].

In vivo, topical administration of ectoine (0.5-2.0%; 5µL/eye; 4 times daily) in a dry eye model in C57BL/6 mice for 5 days improved corneal smoothness in a concentration-dependent manner. Both 1.0% and 2.0% ectoine restored corneal smoothness to near or complete normality^[8]. A single co-administration of ectoine (1mM) with CNP (2.5mg/kg) into the lungs of Fisher 344 rats significantly reduced neutrophil counts and cinc-1 levels from 48 to 168h, demonstrating notable and sustained anti-inflammatory effects^[7].

References:

- [1] WANG K, CUI B, WANG Y, et al. Microbial production of ectoine: a review[J]. ACS Synthetic Biology, 2025, 14(2): 332-342.
- [2] NG H S, WAN P K, KONDO A, et al. Production and recovery of ectoine: A review of current state and future prospects[J]. Processes, 2023, 11(2): 339.
- [3] KAUTH M, TRUSOVA O V. Topical ectoine application in children and adults to treat inflammatory diseases associated with an impaired skin barrier: a systematic review[J]. Dermatology and Therapy, 2022, 12(2): 295-313.
- [4] BUJAK T, ZAGÓRSKA-DZIOK M, NIZIOŁ-ŁUKASZEWSKA Z. Complexes of ectoine with the anionic surfactants as active ingredients of cleansing cosmetics with reduced irritating potential[J]. Molecules, 2020, 25(6): 1433.
- [5] GRAF R, ANZALI S, BUENGER J, et al. The multifunctional role of ectoine as a natural cell protectant[J]. Clinics in Dermatology, 2008, 26(4): 326-333.
- [6] KANAPATHIPILLAI M, LENTZEN G, SIERKS M, et al. Ectoine and hydroxyectoine inhibit aggregation and neurotoxicity of Alzheimer's β-amyloid[J]. FEBS Letters, 2005, 579(21): 4775-4780.
- [7] SYDLIK U, PEUSCHEL H, PAUNEL-GÖRGÜLÜ A, et al. Recovery of neutrophil apoptosis by ectoine: a new strategy against lung inflammation[J]. European Respiratory Journal, 2013, 41(2): 433-442.
- [8] CHEN X, LIN N, LI J M, et al. Ectoine, from a natural bacteria protectant to a new treatment of dry eye disease[J]. Pharmaceutics, 2024, 16(2): 236.

Caution: Product has not been fully validated for medical applications. For research use only.

Tel: (909) 407-4943 Fax: (626) 353-8530 E-mail: tech@glpbio.com

Address: 10292 Central Ave. #205, Montclair, CA, USA