Cycloheximide Solution (10% in DMSO, Sterile)
PRODUCT DATA SHEET

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Product Name:	Cycloheximide Solution (10% in DMSO, Sterile)
Product Number:	C084
CAS Number:	66-81-9
Molecular Formula:	$C_{15}H_{23}NO_4$
Molecular Weight:	281.35
Form:	Solution
Appearance:	Clear to light-yellow solution.
Source:	*Streptomyces griseus*
Storage Conditions:	2-8°C
Description:	Cycloheximide Solution (10% in DMSO, Sterile) is equivalent to 100 mg/ml. It is a glutarimide antibiotic and natural fungicide isolated from *Streptomyces griseus* and a protein synthesis inhibitor in eukaryotic cells. It was discovered by Alma Whiffen-Barksdale of Upjohn Company in 1946. It is routinely used as a selection agent in several types of isolation media. It can be used as a tool in molecular biology to determine the half life of proteins, or in in chase experiments to analyze protein degradation. This product is considered a dangerous good. Quantities above 1 g may be subject to additional shipping fees. Please contact us for details. We also offer: • Cycloheximide (C001) • Cycloheximide, CulturePure® (C071) • Cycloheximide A, EvoPure® (C123)
Mechanism of Action:	Cycloheximide binds to the ribosome and inhibits the eEF2-mediated translocation step in protein synthesis, thus blocking translational elongation.
Spectrum:	Cycloheximide is effective against fungi and yeast, including fungi found in brewing test media. It has lower activity against bacteria.

Microbiology Applications

Media Supplements

Cycloheximide is routinely used as a selection agent in several types of isolation media:

Columbia Blood Agar - *Campylobacter* selective supplement (Butzler)

Dermasel agar - Selective supplement for dermatophyte fungi

Campylobacter Agar - *Campylobacter* Selective Supplement (Preston)

Listeria Selective Agar - *Listeria* Selective Supplement

Listeria Enrichemnt Broth - *Listeria* Selective Enrichment Supplement

Listeria Enrichment Broth - Modified *Listeria* Selective Enrichemnt Supplement

STAA Agar - STAA Selective Supplement

Legionella CYE Agar - *Legionella* GVPC Selective Supplement

Campylobacter Agar - *Campylobacter* Selective Supplement (Karmali)

Bolton Broth - Bolton Broth Selective Supplement

Representative susceptibility data includes:

- *Candida albicans:* 12.5 µg/ml
- *Saccharomyces cerevisiae:* 0.2 µg/ml
- *Mycosphaerella graminicola:* 5.62-100 µg/ml

For additional Cycloheximide MIC data, please review our Antimicrobial Index.

Cycloheximide chase followed by western blotting was used to analyze protein degradation in the model unicellular eukaryote, *S. cerevisiae* (buddiing yeast). Yeast cells are incubated in cycloheximide and cell aliquots are collected after specific time points. This allows visualization of the degradation kinetics of the steady state population of a variety of cellular proteins (Buchanan et al, 2016).

Plant Biology Applications

Cycloheximide is a commonly used lab reagent used in i*n vitro* applications to inhibit fungal growth by targeting protein synthesis. In yeast, concentrations of 200 uM have fungicidal effects (Schneider-Poetsch et al, 2009). The compound can be used as a plant growth regulator to stimulate ethylene production in leaves and fruit.

Cancer Applications

Pretreatment with Cycloheximide followed by estrogen stimulation prevented the estrogen-induced changes in glucose metabolism in perfused breast cancer T47D clone 11 cells. This suggested that the estrogen stimulation requires synthesis of mRNA and protein (Neeman and Degani, 1989).

In studying the “immune escape” of cancer cells, in human colorectal cancer cell line COLO 205 is normally resistant to TNF-alpha - a death inducing ligand. However, co-incubation TNF-alpha with Cycloheximide caused time-dependent cell death. In fact, authors found that Cycloheximide sensitizes cells to TNF-alpha-induced apoptosis (Pajak et al, 2005).

References:

Baliga BS, Pronczuk AW and Munro HN (1969) Mechanism of cycloheximide inhibition of protein synthesis in a cell-free system prepared from rat liver. J Biol Chem. 244(16):4480-4489 PMID 5806588

Doyle SM, Diamond M and McCabe PF (2010) Chloroplast and reactive oxygen species involvement in apoptotic-like programmed cell death in *Arabidopsis* suspension cultures. J. Exper. Bot 61 (2):473–482 PMID 19933317

Lee S et al (2012) Global mapping of translation initiation sites in mammalian cells at single-nucleotide resolution. Proc Natl Acad Sci USA. 109(37):E2424-32 PMID 22927429

Neeman M and Degani H (1989) Early estrogen-induced metabolic changes and their inhibition by actinomycin D and cycloheximide in human breast cancer cells: 31P and 13C NMR studies. PNAS 86 (14):5585-5589 PMID 2748604

Pajak B, Gajkowska B, Orzechowski A (2005) Cycloheximide-mediated sensitization to TNF-alpha-induced apoptosis in human colorectal cancer cell line COLO 205; role of FLIP and metabolic inhibitors. J. Physiol. Pharmacol.56 (3)101-118. PMID 16077198

Schneider-Poetsch T et al (2009) Inhibition of eukaryotic translation elongation by cycloheximide and lactimidomycin. Nat. Chem. Biol 6: 209-217 PMID 20118940

References for Cycloheximide Solution from TOKU-E:

Jimenez-Moreno N et al (2019) LIR-dependent LMX1A/LMX1B autophagy crosstalk shapes human midbrain dopaminergic neuronal resilience. bioRxiv 636712 link

Reference for Cycloheximide from TOKU-E:

Buchanan BW, Lloyd ME, Engle SM, and Rubenstein EM (2016) Cycloheximide chase analysis of protein degradation in *Saccharomyces cerevisiae*. *J. Vis. Exp.* (110), e53975