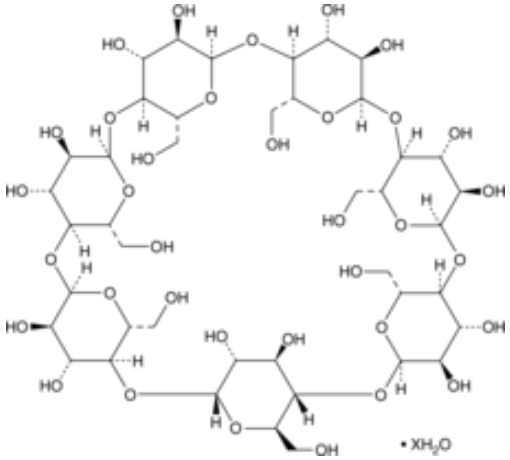
Product Data Sheet

Product Name: β-Cyclodextrin (hydrate)
Cat. No.: GC48297

Chemical Properties

Cas. No.	68168-23-0		
SMILES	OC[C@@H](O[C@@](O[C@]([C@@H]1O)([H])[C@H](O[C@@](O[C@]([C@@H]2O)([H])[C@H](O[C@@](O[C@]([C@@H]3O)([H])[C@H](O[C@@]4([H])[C@@H]3O)CO)([H])[C@@H]2O)CO)([H])[C@@H]1O)CO)([H])[C@@H]5O)[C@](O[C@](O[C@H](CO)[C@](O[C@](O[C@H](CO)[C@](O[C@](O[C@H](CO)[C@](O4)([H])[C@@H]6O)([H])[C@@H]6O)([H])[C@@H]7O)([H])[C@@H]7O)([H])[C@@H]8O)([H])[C@@H]8O)([H])[C@@H]5O		
Formula	C42H70O35.XH2O	M.Wt	1135
Solubility	DMF: 2.5 mg/ml,DMSO: 2.5 mg/ml,DMSO:PBS (pH 7.2) (1:30): 0.03 mg/ml	Storage	Store at -20°C
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

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Cell experiment [1]:

Cell lines	Human glial cell line (CRL 8621)
Preparation Method	Cells were cultured in Eagle's Minimal Essential Medium (EMEM) supplemented with 10% heat-inactivated fetal calf serum (FCS) and 100U of penicillin/streptomycin at 37°C in a humidified 5% CO_2 atmosphere. Cells were treated with β-Cyclodextrin at concentrations ranging from 4.69 to 300μg/ml for 24, 48, and 72 hours.
Reaction Conditions	4.69 to 300μg/ml; 24-72h
Applications	At lower concentrations (≤18.75μg/ml), β-Cyclodextrin significantly increased cell proliferation. At higher concentrations (≥150μg/ml), β-Cyclodextrin significantly reduced cell survival. The in vitro IC_{50} was 115.95μg/ml. A linear dose-dependent cytotoxicity was observed at 24 and 48 hours, while a hermetic-like biphasic dose-response was observed at 72 hours.

Animal experiment [2]:

Animal models	Male Wistar rats (390-480g)
Preparation Method	Rats were permanently cannulated in the jugular vein at least 1 week before the experiments. For intravenous administration, β-Cyclodextrin was dissolved in saline and administered through the cannula. For oral administration, rats were starved for 16 hours prior to the experiment and β-Cyclodextrin dissolved in water was administered through a stomach catheter.

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Dosage form	25-200mg/kg; i.v.; 50-150mg; oral administration; single dose
Applications	After intravenous administration, β-Cyclodextrin showed rapid distribution over extracellular fluids and elimination occurred through glomerular filtration. When a dose of 200mg/kg β-Cyclodextrin was administered, the elimination rate was decreased, probably as a result of nephrotoxicity. Within 24 hours after administration, most of the cyclodextrin dose was recovered unchanged in urine. After oral administration, only insignificant amounts of intact β-Cyclodextrin were absorbed from the gastrointestinal tract.

References:
[1] Sofian ZM, Abdullah JM, Rahim AA, et al. Cytotoxicity evaluation of vancomycin and its complex with beta-cyclodextrin on human glial cell line. Pak J Pharm Sci. 2012 Oct;25(4):831-7.
[2] Frijlink HW, Visser J, Hefting NR, et al. The pharmacokinetics of beta-cyclodextrin and hydroxypropyl-beta-cyclodextrin in the rat. Pharm Res. 1990 Dec;7(12):1248-52.

Background

β-Cyclodextrin (hydrate) is a cyclic oligosaccharide composed of seven glucose units, featuring a hydrophilic outer surface and a hydrophobic inner cavity. β-Cyclodextrin can enhance the solubility and stability of poorly soluble drugs by forming inclusion complexes, while also controlling drug release. β-Cyclodextrin (hydrate) is used in research related to drug delivery systems, the food industry, and cosmetics[1-4].

In vitro, β-Cyclodextrin (1-100μM) in the form of inclusion complexes with Harman was used to treat A2058 melanoma cells for 24 hours. β-Cyclodextrin significantly promoted cytotoxicity, apoptosis, and cell cycle arrest, inhibited cell migration, and enhanced pro-apoptotic effects by increasing caspase-3 activity[5]. β-Cyclodextrin (4.69-300μg/ml) was used to treat human glial cell line (CRL 8621) for 24-72 hours. At lower concentrations (≤18.75μg/ml), β-Cyclodextrin significantly increased cell proliferation; at higher concentrations (≥150μg/ml), β-Cyclodextrin significantly reduced cell survival (IC_{50}=115.95μg/ml)[6].

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In vivo, β-Cyclodextrin (25-675mg/kg/day) was administered through diet to Fischer 344 rats and CD-1 mice (rats for 122-130 weeks, mice for 93-105 weeks). β-Cyclodextrin did not induce treatment-related carcinogenic effects. In mice, β-Cyclodextrin caused large intestine dilation with soft or liquid contents, histologically accompanied by mucosal coverage with mucous secretions containing exfoliated cells, mucosal flattening, and intestinal gland atrophy[7]. β-Cyclodextrin (25-200mg/kg) was administered as a single intravenous injection or (50-150mg) as a single oral dose to male Wistar rats. β-Cyclodextrin rapidly distributed into extracellular fluids and was eliminated through glomerular filtration; when challenged with a high dose (200mg/kg), the elimination rate of β-Cyclodextrin in rats decreased[8].

References:

[1] Aleem O, Kuchekar B, Pore Y, et al. Effect of beta-cyclodextrin and hydroxypropyl beta-cyclodextrin complexation on physicochemical properties and antimicrobial activity of cefdinir. J Pharm Biomed Anal. 2008 Jul 15;47(3):535-40.
[2] Shahi M, Falahati D. DFT Study of Interaction between Teriflunomide and β-cyclodextrin. Curr Mol Med. 2025;25(2):187-201.
[3] Kaboudi N, Asl SG, Nourani N, et al. Solubilization of drugs using beta-cyclodextrin: Experimental data and modeling. Ann Pharm Fr. 2024 Jun;82(4):663-672.
[4] Chodankar D, Vora A, Kanhed A. β-cyclodextrin and its derivatives: application in wastewater treatment. Environ Sci Pollut Res Int. 2022 Jan;29(2):1585-1604.
[5] Ferraz CAA, de Oliveira Júnior RG, et al. Complexation with β-cyclodextrin enhances apoptosis-mediated cytotoxic effect of harman in chemoresistant BRAF-mutated melanoma cells. Eur J Pharm Sci. 2020 Jul 1;150:105353.
[6] Sofian ZM, Abdullah JM, Rahim AA, et al. Cytotoxicity evaluation of vancomycin and its complex with beta-cyclodextrin on human glial cell line. Pak J Pharm Sci. 2012 Oct;25(4):831-7.
[7] Waner T, Borelli G, Cadel S, et al. Investigation of potential oncogenetic effects of beta-cyclodextrin in the rat and mouse. Arch Toxicol. 1995;69(9):631-9.
[8] Frijlink HW, Visser J, Hefting NR, et al. The pharmacokinetics of beta-cyclodextrin and hydroxypropyl-beta-cyclodextrin in the rat. Pharm Res. 1990 Dec;7(12):1248-52.

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