

Product Data Sheet

Product Name: Sulbactam sodium

Cat. No.: GC12665

Chemical Properties

Cas. No. 69388-84-7

Chemical Name sodium;(2S,5R)-3,3-dimethyl-4,4,7-trioxo-4λ6-thia-1-azabicyclo[3.2.0]heptane-2-carboxylate

SMILES CC1(C(N2C(S1(=O)=O)CC2=O)C(=O)[O-])C.[Na+]

Formula $C_8H_{10}NO_5S.Na$

M.Wt 255.22

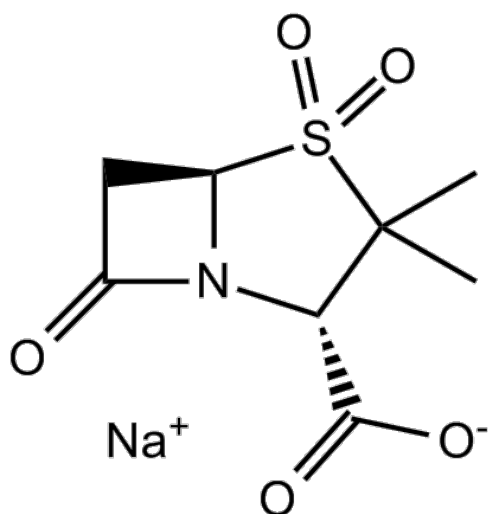
Solubility $\geq 10.75\text{mg/mL}$ in Water

Storage Store at -20°C , protect from light, stored under nitrogen

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]:

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Cell lines	Clinical isolates of carbapenem-resistant <i>Acinetobacter baumannii</i> (CRAB)
Preparation Method	A total of 43 geographically and genetically distinct CRAB clinical strains containing different mechanisms of resistance (OXA-23, OXA-58, IMP-1, NDM-1, ISAb1-OXA-66) were used to test Sulbactam sodium or Sulbactam sodium in combination with zidebactam. Additionally, three reference strains (AB0057, AB5075, and AYE) were included. The strains were tested against Sulbactam sodium (range 0.12–512mg/l) and Sulbactam sodium plus 4mg/l zidebactam using the microdilution method according to CLSI Standards.
Reaction Conditions	Sulbactam sodium (range 0.12–512mg/l) and Sulbactam sodium plus 4mg/l zidebactam
Applications	Sulbactam sodium in combination with zidebactam significantly restored Sulbactam sodium susceptibility against CRAB strains. The combination showed a ≥ 2 dilutions decrease in Sulbactam sodium MICs in 84% of the isolates tested.

Animal experiment [2]:

Animal models	Male Wistar rats
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Preparation Method Global brain ischemia was induced by tightening nylon sutures to block the blood flow of the bilateral common carotid arteries for 8 minutes. The rats were treated with Sulbactam sodium (10.0mg/kg) via lateral ventricle injection once daily for five consecutive days prior to ischemia. After the last administration, global brain ischemia or sham treatment was performed. The sham rats received the same treatments except the bilateral vertebral artery and bilateral common carotid artery were not occluded. The rats were sacrificed at various time points after reperfusion for different assays.

Dosage form 10.0mg/kg; i.c.v.

Applications Sulbactam sodium pretreatment significantly improved the binding characteristics of glutamate transporter-1 (GLT-1) and inhibited the increase in extracellular glutamate concentration in the CA1 region of the hippocampus in ischemic rats. Sulbactam sodium also protected neurons in the CA1 region and alleviated ischemia-induced delayed neuronal death.

References:

- [1] Cedano J, Baez M, Pasteran F, et al. Zidebactam restores Sulbactam sodium susceptibility against carbapenem-resistant *Acinetobacter baumannii* isolates. *Front Cell Infect Microbiol.* 2022 Jul 8;12:918868.
- [2] Gu WW, Cui X, Liu LZ, et al. Sulbactam sodium improves binding property and uptake capacity of glutamate transporter-1 and decreases glutamate concentration in the CA1 region of hippocampus of global brain ischemic rats. *Amino Acids.* 2021 Nov;53(11):1649-1661.

Background

Sulbactam sodium, a β -lactamase inhibitor, is commonly used in combination with β -lactam antibiotics to enhance their efficacy against drug-resistant bacteria^[1]. One of the reasons for the development of bacterial resistance to β -lactam antibiotics is the production of β -lactamases^[2].

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Sulbactam sodium irreversibly binds to bacterial β -lactamases, preventing these enzymes from hydrolyzing β -lactam antibiotics^[3], thereby preserving the ability of β -lactam antibiotics to inhibit bacterial cell wall formation^[4].

In vitro, when Sulbactam sodium (0.5, 1, 2, 4, 8mg/L) is combined with β -lactam antibiotics (ampicillin, cefoperazone, imipenem) at various ratios (2:1, 1:1, 1:1.5, 1:2, 1:2.5, 1:3) to treat *Acinetobacter baumannii*, Sulbactam sodium significantly enhances the bactericidal activity of the antibiotics against *A. baumannii* ^[5]. Zidebactam (4mg/L) combined with Sulbactam sodium (0.12–512mg/L) significantly restores the susceptibility of carbapenem-resistant *Acinetobacter baumannii* (CRAB) clinical isolates to Sulbactam sodium. Among 43 CRAB strains, 84% showed a ≥ 2 -fold decrease in MIC of Sulbactam sodium when tested in combination with Zidebactam ^[6].

In vivo, Sulbactam sodium (10.0mg/kg) was administered via intracerebroventricular injection to prevent ischemic injury in a rat model of cerebral ischemia. The administration began 5 days before the occurrence of ischemia, once daily for a total of 5 consecutive days. Sulbactam sodium pretreatment significantly improved the binding characteristics of glutamate transporter-1 (GLT-1) and inhibited the increase in extracellular glutamate concentration in the CA1 region of the hippocampus in ischemic rats. Sulbactam sodium also protected neurons in the CA1 region and alleviated ischemia-induced delayed neuronal death^[7]. Sulbactam sodium (400, 1000, and 2000mg/kg/d) was administered via intraperitoneal injection to induce epilepsy in a chronic renal failure (CRF) mouse model, starting immediately after the CRF model was established. Sulbactam sodium at all three doses significantly induced epileptic seizures in a dose-dependent manner in CRF mice, leading to death. In particular, the high dose (2000mg/kg/d) of Sulbactam sodium caused seizures in CRF mice as early as 3 days after administration^[8].

References:

- [1] Noguchi JK, Gill MA. Sulbactam sodium: a beta-lactamase inhibitor. Clin Pharm. 1988 Jan;7(1):37-51.
- [2] Tooke CL, Hinchliffe P, Bragginton EC, et al. β -Lactamases and β -Lactamase Inhibitors in the 21st Century. J Mol Biol. 2019 Aug 23;431(18):3472-3500.
- [3] Akova M. Sulbactam sodium-containing beta-lactamase inhibitor combinations. Clin Microbiol Infect. 2008 Jan;14 Suppl 1:185-8.
- [4] Fu Y, Asempa TE, Kuti JL. Unraveling Sulbactam sodium-durlobactam: insights into its role in

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combating infections caused by *Acinetobacter baumannii*. Expert Rev Anti Infect Ther. 2025 Jan;23(1):67-78.

[5] Wang L, Chen Y, Han R, et al. Sulbactam sodium Enhances in vitro Activity of β -Lactam Antibiotics Against *Acinetobacter baumannii*. Infect Drug Resist. 2021 Sep 28;14:3971-3977.

[6] Cedano J, Baez M, Pasteran F, et al. Zidebactam restores Sulbactam sodium susceptibility against carbapenem-resistant *Acinetobacter baumannii* isolates. Front Cell Infect Microbiol. 2022 Jul 8;12:918868.

[7] Gu WW, Cui X, Liu LZ, et al. Sulbactam sodium improves binding property and uptake capacity of glutamate transporter-1 and decreases glutamate concentration in the CA1 region of hippocampus of global brain ischemic rats. Amino Acids. 2021 Nov;53(11):1649-1661.

[8] Wu Y, Gu D, Li J, et al. Role of the gut microbiota in cefoperazone/Sulbactam sodium-induced epilepsy in mice with chronic renal failure. Ren Fail. 2024 Dec;46(2):2371551.

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