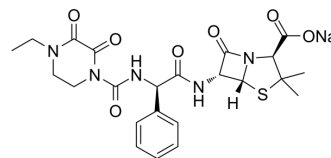


## Piperacillin sodium

Cat. No.:	HY-B1286
CAS No.:	59703-84-3
Molecular Formula:	C <sub>23</sub> H <sub>26</sub> N <sub>5</sub> NaO <sub>7</sub> S
Molecular Weight:	539.54
Target:	Bacterial; Antibiotic; Penicillin-binding protein (PBP)
Pathway:	Anti-infection
Storage:	4°C, sealed storage, away from moisture * In solvent : -80°C, 6 months; -20°C, 1 month (sealed storage, away from moisture)



### SOLVENT & SOLUBILITY

#### In Vitro

DMSO : 100 mg/mL (185.34 mM; Need ultrasonic)  
 H<sub>2</sub>O : ≥ 100 mg/mL (185.34 mM)  
 \* "≥" means soluble, but saturation unknown.

Preparing Stock Solutions	Solvent Concentration	Mass		
		1 mg	5 mg	10 mg
	1 mM	1.8534 mL	9.2672 mL	18.5343 mL
	5 mM	0.3707 mL	1.8534 mL	3.7069 mL
	10 mM	0.1853 mL	0.9267 mL	1.8534 mL

Please refer to the solubility information to select the appropriate solvent.

#### In Vivo

- Add each solvent one by one: PBS  
Solubility: 100 mg/mL (185.34 mM); Clear solution; Need ultrasonic
- Add each solvent one by one: 10% DMSO >> 40% PEG300 >> 5% Tween-80 >> 45% saline  
Solubility: ≥ 2.5 mg/mL (4.63 mM); Clear solution
- Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)  
Solubility: ≥ 2.5 mg/mL (4.63 mM); Clear solution
- Add each solvent one by one: 10% DMSO >> 90% corn oil  
Solubility: ≥ 2.5 mg/mL (4.63 mM); Clear solution

### BIOLOGICAL ACTIVITY

#### Description

Piperacillin sodium is a semisynthetic broad-spectrum β-lactam antibiotic which exhibits potent bactericidal activity against Gram-negative bacteria as well as select Gram-positive strains through penicillin-binding proteins. Piperacillin is most commonly used in combination with the β-lactamase inhibitor Tazobactam<sup>[1][2][3]</sup>.

#### IC<sub>50</sub> & Target

β-lactam

<b>In Vitro</b>	<p>Piperacillin (12.5 µg/mL, 24h) inhibits 92% of isolates of <i>Pseudomonas aeruginosa</i>, 82% of <i>Serratia marcescens</i>, 73% of <i>Escherichia coli</i>, 61% of <i>Klebsiella</i> spp, and 42% of <i>Enterobacter</i> spp, most <i>Proteus</i> spp. were extremely susceptible. Piperacillin fails to inhibit the growth of gram-negative bacilli when large inocula were used (minimum inhibitory concentration &gt; 25 µg/ml) [2].</p> <p>MCE has not independently confirmed the accuracy of these methods. They are for reference only.</p>								
<b>In Vivo</b>	<p>Piperacillin (100 mg/kg, i.v., 4 times a day, 5 d) in combination with Tazobactam (HY-B1418)(12.5 mg/kg, i.v., 4 times a day, 5 d) prolongs survival in mice with low inoculum of <i>K. pneumoniae</i>[3].</p> <p>MCE has not independently confirmed the accuracy of these methods. They are for reference only.</p> <table border="1" data-bbox="347 449 1515 898"> <tr> <td data-bbox="347 449 618 516">Animal Model:</td> <td data-bbox="618 449 1515 516">BALB/c low inoculum model of <i>K. pneumoniae</i>, KEN-11 strain [3]</td> </tr> <tr> <td data-bbox="347 516 618 569">Dosage:</td> <td data-bbox="618 516 1515 569">100 mg/kg</td> </tr> <tr> <td data-bbox="347 569 618 663">Administration:</td> <td data-bbox="618 569 1515 663">Intravenous injection (i.v.), 4 times a day, 5 d, in combination with Tazobactam (12.5 mg/kg, i.v., 4 times a day, 5 d)</td> </tr> <tr> <td data-bbox="347 663 618 898">Result:</td> <td data-bbox="618 663 1515 898"> <p>Enabled all mice survived whereas all control mice died by 5 d, decreased the number of bacteria in lungs compared with control group[.</p> <p>Observed no bacteria in the blood of most mice (except for two mice at the early phase) while bacteria were observed in the blood of control group.</p> <p>Observed few inflammatory cells in the alveoli whereas an influx of numerous inflammatory cells were observed in the control group.</p> </td> </tr> </table>	Animal Model:	BALB/c low inoculum model of <i>K. pneumoniae</i> , KEN-11 strain [3]	Dosage:	100 mg/kg	Administration:	Intravenous injection (i.v.), 4 times a day, 5 d, in combination with Tazobactam (12.5 mg/kg, i.v., 4 times a day, 5 d)	Result:	<p>Enabled all mice survived whereas all control mice died by 5 d, decreased the number of bacteria in lungs compared with control group[.</p> <p>Observed no bacteria in the blood of most mice (except for two mice at the early phase) while bacteria were observed in the blood of control group.</p> <p>Observed few inflammatory cells in the alveoli whereas an influx of numerous inflammatory cells were observed in the control group.</p>
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## CUSTOMER VALIDATION

- Nat Commun. 2022 Mar 2;13(1):1116.
- Antimicrob Agents Chemother. 2023 May 18;e0160322.
- Microbiol Spectr. 2023 Apr 24;e0069223.
- Microbiol Spectr. 2022 Dec 8;e0303822.
- Biomed Res Int. 2018 Jul 2;2018:3579832.

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## REFERENCES

- [1]. Fu KP, et al. Piperacillin, a new penicillin active against many bacteria resistant to other penicillins. *Antimicrob Agents Chemother.* 1978;13(3):358-67.
- [2]. Bodey GP, et al. Piperacillin: In Vitro Evaluation. *Antimicrob Agents Chemother.* 1978;14(1):78-87.
- [3]. Harada Y, et al. In vitro and in vivo activities of piperacillin-tazobactam and meropenem at different inoculum sizes of ESBL-producing *Klebsiella pneumoniae*. *Clin Microbiol Infect.* 2014;20(11):O831-9.
- [4]. Tan JS, et al. Antipseudomonal penicillins. *Med Clin North Am.* 1995 Jul;79(4):679-93.
- [5]. Lau WK, et al. Randomized, open-label, comparative study of piperacillin-tazobactam administered by continuous infusion versus intermittent infusion for treatment of hospitalized patients with complicated intra-abdominal infection. *Antimicrob Agents Chemother.* 2006 Nov;50(11):3556-61.
- [6]. Fu KP, et al. Piperacillin, a new penicillin active against many bacteria resistant to other penicillins. *Antimicrob Agents Chemother.* 1978 Mar;13(3):358-67.

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

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