

Product Data Sheet

Product Name: Phosphocreatine disodium salt

Cat. No.: GC13228

Chemical Properties

Cas. No. 922-32-7

Chemical Name sodium (E)-(amino((carboxymethyl)(methyl)amino)methylene)phosphoramidate

SMILES OC(CN(C)/C(N)=N/P([O-])([O-])=O)=O.[Na+].[Na+]

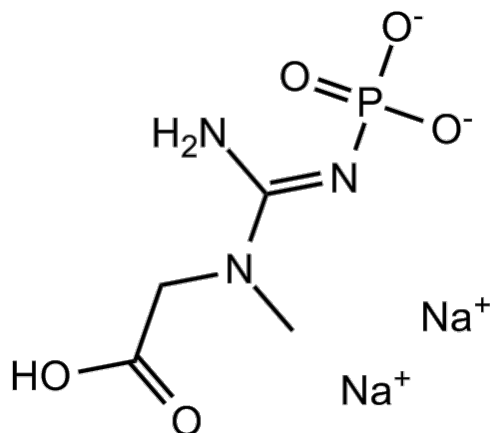
Formula $C_4H_8N_3Na_2O_5P$ M.Wt 255.08

Solubility ≥ 54.6 mg/mL in Water Storage Store at 2-8°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

Cell experiment [1]:

Cell lines PC12 cells

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

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Preparation Method	PC12 cells were cultured in Dulbecco's Modified Eagle's medium (DMEM) supplemented with 10% fetal bovine serum, 100U/mL penicillin, and 100U/mL streptomycin, and cultured in a 5% CO ₂ saturated humidified incubator at 37°C.
	PC-12 cells were seeded in 96-well plates at a density of 5×10 ⁴ cells/ml/well and cultured for 24 hours. Cell viability was analyzed by pretreatment with various concentrations of Phosphocreatine disodium salt (5, 10, and 2mM) for 2h followed by stimulation with methylglyoxal (MGO) (0.8mM) for 24h. To examine cell morphology, cells were seeded in 6-well plates and pretreated with Phosphocreatine disodium salt for 2h, respectively, followed by stimulation with MGO (0.8mM) for 24h. Images were taken using an inverted microscope.
Reaction Conditions	5, 10, and 2mM; 2h
Applications	Phosphocreatine disodium salt treatment significantly increased the cell viability and restored the morphological changes following MGO-induced injury.

Animal experiment [2]:

Animal models	C57Bl/6 mice
Preparation Method	Acute colitis was induced in C57Bl/6 mice using drinking water containing 2.5% DSS for a total of 5 days and then discontinued 2 days before sacrifice. Mice in the Phosphocreatine disodium salt-treated group drank drinking water containing 78mM Phosphocreatine disodium salt from 2 days before DSS initiation until death. If non-DSS control mice were included, mice were given either untreated drinking water or water containing 78mM Phosphocreatine disodium salt for the duration of the experiment. Colon length (from cecum to anus) was measured. The colon was skinned, washed, and colonic tissue fragments were collected and fixed in formalin for histological analysis.

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Dosage form	5mM in drinking water/day for 1 week; p.o.
Applications	Phosphocreatine disodium salt treatment significantly attenuated the severity of DSS-induced colitis in mice.

References:

- [1] Li H, Tang Z, Chu P, et al. Neuroprotective effect of phosphocreatine on oxidative stress and mitochondrial dysfunction induced apoptosis in vitro and in vivo: Involvement of dual PI3K/Akt and Nrf2/HO-1 pathways[J]. Free Radical Biology and Medicine, 2018, 120: 228-238.
- [2] Bhagavatula G, Worledge C S, Schaepe C, et al. Phosphocreatine rescues intestinal epithelial metabolic dysfunction related to creatine kinase loss and is protective in murine colitis[J]. Cellular and Molecular Gastroenterology and Hepatology, 2025: 101557.

Background

Phosphocreatine disodium salt is a crucial energy store in tissues with high, fluctuating energy demands like muscle and brain [1]. Phosphocreatine disodium salt interacts with phospholipids to influence membrane properties and exert membrane protection [2]. Phosphocreatine disodium salt is an effective and safe cardioprotective agent, which has been widely used in different animal models to protect the heart from intraoperative injury and improve cardiac function[3].

In vitro, Phosphocreatine disodium salt pretreatment at 20mM for 2 hours significantly attenuated methylglyoxal (MGO)-induced PC12 cell damage and inhibited MGO-induced apoptosis[4]. Pretreatment of NRK-52E cells with 40mM Phosphocreatine disodium salt for 4 hours significantly restored the viability of MGO-injured NRK-52E cells, resulting in a significant decrease in MDA levels, a significant increase in GSH and SOD levels, and inhibition of intracellular ROS production[5]. Pretreatment of H9C2 cells with 20mM Phosphocreatine disodium salt for 2h attenuated the cytotoxicity of recovered MGO, significantly increased Bcl-2 expression, decreased Bax expression, and improved mitochondrial respiration[6].

In vivo, a single dose of Phosphocreatine disodium salt (400mg/kg) administered intravenously 30min before cerebral ischemia-reperfusion (IR) can protect neurological function, reduce infarct

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volume, and brain cell apoptosis in rats 72 hours after focal cerebral IR^[7]. Daily oral administration of Phosphocreatine disodium salt in drinking water (78mM) for one week reduced the severity of dextran sulfate sodium (DSS)-induced colitis in mice^[8].

References:

- [1] Guimarães-Ferreira L. Role of the phosphocreatine system on energetic homeostasis in skeletal and cardiac muscles[J]. Einstein (Sao Paulo), 2014, 12: 126-131.
- [2] Tokarska-Schlattner M, Epand R F, Meiler F, et al. Phosphocreatine interacts with phospholipids, affects membrane properties and exerts membrane-protective effects[J]. 2012.
- [3] Xi H, Zhang A, Han G, et al. Pharmacokinetics and hemorheology of phosphocreatine and creatine in rabbits: A directly comparative study between parent drug and active metabolite[J]. European Journal of Pharmaceutical Sciences, 2019, 138: 105033.
- [4] Li H, Tang Z, Chu P, et al. Neuroprotective effect of phosphocreatine on oxidative stress and mitochondrial dysfunction induced apoptosis in vitro and in vivo: Involvement of dual PI3K/Akt and Nrf2/HO-1 pathways[J]. Free Radical Biology and Medicine, 2018, 120: 228-238.
- [5] Shopit A, Niu M, Wang H, et al. Protection of diabetes-induced kidney injury by phosphocreatine via the regulation of ERK/Nrf2/HO-1 signaling pathway[J]. Life Sciences, 2020, 242: 117248.
- [6] Qaed E, Wang J, Almoiliqy M, et al. Phosphocreatine improves cardiac dysfunction by normalizing mitochondrial respiratory function through JAK2/STAT3 signaling pathway in vivo and in vitro[J]. Oxidative medicine and cellular longevity, 2019, 2019(1): 6521218.
- [7] Li T, Wang N, Zhao M. Neuroprotective effect of phosphocreatine on focal cerebral ischemia-reperfusion injury[J]. BioMed Research International, 2012, 2012(1): 168756.
- [8] Bhagavatula G, Worledge C S, Schaepe C, et al. Phosphocreatine rescues intestinal epithelial metabolic dysfunction related to creatine kinase loss and is protective in murine colitis[J]. Cellular and Molecular Gastroenterology and Hepatology, 2025: 101557.

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