Urea

Cat. No.: HY-Y0271

CAS No.: 57-13-6

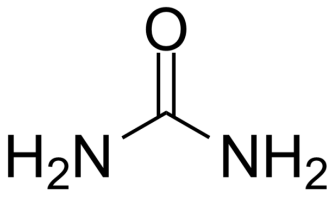
Molecular Formula: CH_4N_2O

Molecular Weight: 60.06

Target: Endogenous Metabolite; Carbonic Anhydrase; ERK; Apoptosis

Pathway: Metabolic Enzyme/Protease; MAPK/ERK Pathway; Stem Cell/Wnt; Apoptosis

Storage: Store at room temperature 3 years
In solvent -80°C 2 years
-20°C 1 year



SOLVENT & SOLUBILITY

In Vitro

H_2O : 100 mg/mL (1665.00 mM; Need ultrasonic)
DMSO : 100 mg/mL (1665.00 mM; Need ultrasonic)

Preparing Stock Solutions	Solvent / Mass / Concentration	1 mg	5 mg	10 mg
	1 mM	16.6500 mL	83.2501 mL	166.5002 mL
	5 mM	3.3300 mL	16.6500 mL	33.3000 mL
	10 mM	1.6650 mL	8.3250 mL	16.6500 mL

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

In Vivo

1. Add each solvent one by one: PBS
   Solubility: 100 mg/mL (1665.00 mM); Clear solution; Need ultrasonic
2. Add each solvent one by one: 10% DMSO >> 40% PEG300 >> 5% Tween-80 >> 45% saline
   Solubility: ≥ 2.5 mg/mL (41.63 mM); Clear solution
3. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 2.5 mg/mL (41.63 mM); Clear solution
4. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 2.5 mg/mL (41.63 mM); Clear solution

BIOLOGICAL ACTIVITY

Description

Urea is a powerful protein denaturant via both direct and indirect mechanisms[1]. A potent emollient and keratolytic agent [2]. Used as a diuretic agent. Blood urea nitrogen (BUN) has been utilized to evaluate renal function[3]. Widely used in fertilizers as a source of nitrogen and is an important raw material for the chemical industry.

IC_{50} & Target	Microbial Metabolite	Human Endogenous Metabolite

In Vitro

Urea (550-1000 mosmol/kg, 24 h) inhibits the proliferation of murine inner medullary collecting duct cell mIMCD3, arrests cell cycle at G2/M phase, induces apoptosis in mIMCD3[4].
Urea (5-300 mM, 1 h) increases protein carbonylation, causes oxidative stress and DNA damage (especially 8-oxoguanine damage) in mIMCD3 cells[5].
Urea (0-100 mM, 18 h) post-transcriptionally reversibly inhibits LPS (HY-D1056)-induced NO synthesis in RAW264.7, causes macrophage dysfunction and affects the host's immune defense mechanism[6].
Urea (200 mM, 5 min) increases phosphorylation of MEK1 and MEK2, causes the activation of ERK in mIMCD3 cells[7].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Cell Cycle Analysis[4]

Cell Line:	mIMCD3
Concentration:	550-1000 mosmol/kg
Incubation Time:	24 h
Result:	Arrested cell cycle at G2/M phase.

Western Blot Analysis[5]

Cell Line:	mIMCD3
Concentration:	300 mM
Incubation Time:	15 min
Result:	Increased the carbonylation of 36 kDa and 70 kDa proteins.

In Vivo

Urea (30 g/kg, continuous iv infusion, 2-14 days) induces osmotic diuresis, and causes diabetic nephropathy in rats models[8].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Model:	Wistar rats[8]
Dosage:	30 g/kg
Administration:	continuous iv infusion, 2-14 days
Result:	Increased kidney weight, renal protein content and glomerular hyperfiltration in rats.

CUSTOMER VALIDATION

- Nature. 2024 Dec 18.
- Autophagy. 2022 Nov 30.
- Biomed Pharmacother. 2024 Aug 23:179:117329.

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REFERENCES

[1]. Michea L, et al., Cell cycle delay and apoptosis are induced by high salt and urea in renal medullary cells. Am J Physiol Renal Physiol. 2000 Feb;278(2):F209-18.

[2]. Zhang Z, et al. High urea and NaCl carbonylate proteins in renal cells in culture and in vivo, and high urea causes 8-oxoguanine lesions in their DNA. Proc Natl Acad Sci U S A. 2004 Jun 22;101(25):9491-6.

[3]. Prabhakar SS, et al., Urea inhibits inducible nitric oxide synthase in macrophage cell line. Am J Physiol. 1997 Dec;273(6):C1882-8.

[4]. Yang XY, et al., ERK activation by urea in the renal inner medullary mIMCD3 cell line. Am J Physiol. 1999 Aug;277(2):F176-85.

[5]. Ogino Y, et al., Effects of chronic, urea-induced osmotic diuresis on kidney weight and function in rats. Diabetologia. 1994 Mar;37(3):225-31.

[6]. Bennion BJ, et al. The molecular basis for the chemical denaturation of proteins by urea. Proc Natl Acad Sci U S A. 2003 Apr 29;100(9):5142-7.

[7]. Pan M, et al. Urea: a comprehensive review of the clinical literature. Dermatol Online J. 2013 Nov 15;19(11):20392.

[8]. Wang H, et al. Urea. Subcell Biochem. 2014;73:7-29.

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

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