

## Product Data Sheet

Product Name: Nocodazole

Cat. No.: GC14075

### Chemical Properties

Cas. No. 31430-18-9

Chemical Name methyl N-[6-(thiophene-2-carbonyl)-1H-benzimidazol-2-yl]carbamate

SMILES COC(=O)NC1=NC2=C(N1)C=C(C=C2)C(=O)C3=CC=CS3

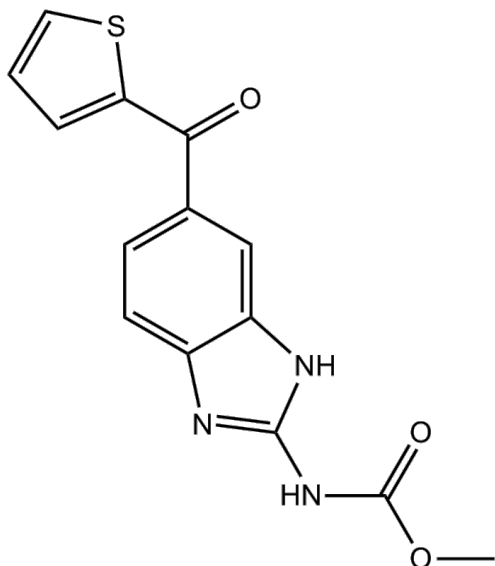
Formula  $C_{14}H_{11}N_3O_3S$  M.Wt 301.32

Solubility  $\geq 15.1\text{mg/mL}$  in DMSO Storage Store at  $-20^{\circ}\text{C}$

General tips For obtaining a higher solubility, please warm the tube at  $37^{\circ}\text{C}$  and shake it in the ultrasonic bath for a while. Stock solution can be stored below  $-20^{\circ}\text{C}$  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                      HuH7 cells

Preparation Method                      HuH7 cells were grown in Dulbecco's modified Eagle's medium supplemented with 10 % fetal bovine serum, 100 U/ml penicillin, and 100 µg/ml streptomycin at 37 °C in 5 % CO<sub>2</sub> incubator. To synchronize the cells at prometaphase, they were treated with 50 ng/ml nocodazole for 16 h.

Reaction  
Conditions                      50 ng/ml; 16h

Applications                      Approximately 50 % of the cells were synchronized in G2/M phases.

### Animal experiment [2]:

Animal models                      nude mouse

Preparation Method                      COLO 205 cells were injected subcutaneously between the scapulae of each nude mouse. Once tumors reached a mean size of 200mm<sup>3</sup>, animals received intraperitoneal injections of DMSO (25µL), ketoconazole(50 mg/kg), nocodazole(5 mg/kg), or ketoconazole+nocodazole three times per week for 6 week.

Dosage form                      5mg/kg; i.p.

Applications                      Nocodazole has antitumor effects in athymic mice bearing COLO 205 tumor xenografts.

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### References:

[1]Makiyama T, Obama T, Watanabe Y, et al. Behavior of intracellular lipid droplets during cell division in HuH7 hepatoma cells[J]. Experimental Cell Research, 2023, 433(2): 113855.

[2]Wang Y J, Jeng J H, Chen R J, et al. Ketoconazole potentiates the antitumor effects of nocodazole: In vivo therapy for human tumor xenografts in nude mice[J]. Molecular Carcinogenesis: Published in cooperation with the University of Texas MD Anderson Cancer Center, 2002, 34(4): 199-210.

### Background

Nocodazole is an anti-mitotic drug and a rapid and reversible microtubule polymerization inhibitor. It inhibits Abl, Abl (E255K), and Abl (T315I) in cell-free assays with IC<sub>50</sub> values of 0.21μM, 0.53μM, and 0.64μM, respectively<sup>[1]</sup>. Nocodazole binds to β-tubulin and disrupts microtubule assembly/disassembly dynamics, thereby arresting mitosis and inducing apoptosis in tumor cells<sup>[2]</sup>. Nocodazole can increase CRISPR-mediated homologous recombination efficiency, enhancing the precision of gene editing efficacy<sup>[3]</sup>.

In vitro, Nocodazole (50 ng/ml) treatment of HuH7 cells for 16 hours synchronizes approximately 50% of the cells at the G2/M phase, with intracellular microtubule fibers mainly distributed in the peripheral region of the cells and without forming a bipolar spindle<sup>[4]</sup>. Nocodazole (20μM) treatment of emsCOS-1 cells for 30 minutes results in the dispersion of Golgi stacks throughout the cytoplasm<sup>[5]</sup>. Nocodazole (1 nM) treatment of CHO cells inhibits microtubule dynamics, slowing migration and increasing the frequency and duration of the resting state while maintaining cell directionality. Nocodazole (70nM) has the opposite effect of low drug concentrations, causing cells to move more randomly<sup>[6]</sup>.

In vivo, Nocodazole (5 mg/kg) administered intraperitoneally for six weeks significantly reduces the tumor volume and weight in mice transplanted with COLO 205 tumors, with enhanced antitumor effects observed when combined with ketoconazole<sup>[7]</sup>.

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- [1] Park H, Hong S. Nocodazole is a high-affinity ligand for the cancer-related kinases ABL, c-KIT, BRAF, and MEK[J]. ChemMedChem, 2011, 7(1): 53-56.
- [2] Jordan M A, Wilson L. Microtubules and actin filaments: dynamic targets for cancer chemotherapy[J]. Current opinion in cell biology, 1998, 10(1): 123-130.
- [3] Chen S, Chen D, Liu B, et al. Modulating CRISPR/Cas9 genome-editing activity by small molecules[J]. Drug Discovery Today, 2022, 27(4): 951-966.
- [4] Makiyama T, Obama T, Watanabe Y, et al. Behavior of intracellular lipid droplets during cell division in HuH7 hepatoma cells[J]. Experimental Cell Research, 2023, 433(2): 113855.
- [5] Mukai, K., Konno, H., Akiba, T. et al. Activation of STING requires palmitoylation at the Golgi[J]. Nat Commun 7, 11932 (2016).
- [6] Ganguly A, Yang H, Sharma R, Patel KD, Cabral F. The role of microtubules and their dynamics in cell migration[J]. J Biol Chem. 2012, 287(52):43359-69.
- [7] Wang Y J, Jeng J H, Chen R J, et al. Ketoconazole potentiates the antitumor effects of nocodazole: In vivo therapy for human tumor xenografts in nude mice[J]. Molecular Carcinogenesis: Published in cooperation with the University of Texas MD Anderson Cancer Center, 2002, 34(4): 199-210.

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