# Product data sheet

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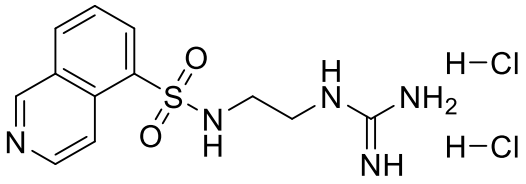
|---|---|
| MedKoo Cat#: 526339<br>Name: HA-1004 HCl<br>CAS: 92564-08-4 (2HCl),<br>Chemical Formula: $C_{12}H_{17}Cl_2N5O2S$<br>Molecular Weight: 366.261 |  |
| Product supplied as: | Powder |
| Purity (by HPLC): | ≥ 98% |
| Shipping conditions | Ambient temperature |
| Storage conditions: | Powder: -20°C 3 years; 4°C 2 years. |
| | In solvent: -80°C 3 months; -20°C 2 weeks. |

**1. Product description:**
HA-1004 is an inhibitor of PKA, cGKI, PKC, MYLK, and calcium channel protein.

**2. CoA, QC data, SDS, and handling instruction**
SDS and handling instruction, CoA with copies of QC data (NMR, HPLC and MS analytical spectra) can be downloaded from the product web page under "QC And Documents" section. Note: copies of analytical spectra may not be available if the product is being supplied by MedKoo partners. Whether the product was made by MedKoo or provided by its partners, the quality is 100% guaranteed.

**3. Solubility data**

| Solvent | Max Conc. mg/mL | Max Conc. mM |
|---|---|---|
| DMF | 2.0 | 5.46 |
| DMSO | 3.0 | 8.19 |
| PBS (pH 7.2) | 5.0 | 13.65 |

**4. Stock solution preparation table:**

| Concentration / Solvent Volume / Mass | 1 mg | 5 mg | 10 mg |
|---|---|---|---|
| 1 mM | 2.73 mL | 13.65 mL | 27.30 mL |
| 5 mM | 0.55 mL | 2.73 mL | 5.46 mL |
| 10 mM | 0.27 mL | 1.37 mL | 2.73 mL |
| 50 mM | 0.06 mL | 0.27 mL | 0.55 mL |

**5. Molarity Calculator, Reconstitution Calculator, Dilution Calculator**
Please refer the product web page under section of "Calculator"

**6. Recommended literature which reported protocols for in vitro and in vivo study**
In vitro study

1. Chapman RW, Tozzi S, Kreutner W. Antibronchoconstrictor activity of the intracellular calcium antagonist HA 1004 in guinea pigs. Pharmacology. 1988;37(3):187-94. doi: 10.1159/000138462. PMID: 2906438.
2. Ishikawa T, Inagaki M, Watanabe M, Hidaka H. Relaxation of vascular smooth muscle by HA-1004, an inhibitor of cyclic nucleotide-dependent protein kinase. J Pharmacol Exp Ther. 1985 Nov;235(2):495-9. PMID: 2997436.

In vivo study

1. Almela P, García-Carmona JA, Martínez-Laorden E, Milanés MV, Laorden ML. Crosstalk between G protein-coupled receptors (GPCRs) and tyrosine kinase receptor (TXR) in the heart after morphine withdrawal. Front Pharmacol. 2013 Dec 27;4:164. doi: 10.3389/fphar.2013.00164. PMID: 24409147; PMCID: PMC3873507.
2. Almela P, Atucha NM, Milanés MV, Laorden ML. Cross-talk between protein kinase A and mitogen-activated protein kinases signalling in the adaptive changes observed during morphine withdrawal in the heart. J Pharmacol Exp Ther. 2009 Sep;330(3):771-82. doi: 10.1124/jpet.109.154583. Epub 2009 Jun 30. PMID: 19567779.

**7. Bioactivity**
Biological target:

An inhibitor of PKG and PKA.

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In vitro activity

In vitro, HA 1004, verapamil, nifedipine and albuterol inhibited Ca2+-induced contractions of the depolarized guinea pig trachea. HA 1004 and albuterol also relaxed the basal tracheal tone, whereas verapamil and nifedipine were inactive.

Reference: Pharmacology. 1988;37(3):187-94. https://pubmed.ncbi.nlm.nih.gov/2906438/

In vivo activity

As shown in Figure 2A, chronic pre-treatment with HA-1004 concomitantly with morphine antagonized the expression of PKA in both controls and morphine-withdrawn animals.

Reference: Front Pharmacol. 2013 Dec 27;4:164. https://pubmed.ncbi.nlm.nih.gov/24409147/

*Note: The information listed here was extracted from literature. MedKoo has not independently retested and confirmed the accuracy of these methods. Customer should use it just for a reference only.*