



Product Information

1-Methyl-4-phenyl-1,2,3,6-tetrahydropyridine

Product Number **M 1021**
Store at Room Temperature

Product Description

Molecular Formula: C₁₂H₁₅N
Molecular Weight: 173.3
CAS Number: 28289-54-5
Melting Point: 40-42 °C¹
Synonym: MPTP

1-Methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) is a piperidine derivative and dopaminergic neurotoxin that has been used in neurological research. MPTP is metabolized to 1-methyl-4-phenylpyridine (MPP⁺), which in turn can cause free radical production *in vivo* and lead to oxidative stress. Thus MPP⁺ is generally acknowledged as the active metabolite derived from MPTP.^{2,3} The synthesis of MPTP has been published.^{4,5}

MPTP is widely utilized in *in vivo* research studies as a model for Parkinsonism.⁶⁻¹¹ A mouse investigation of MPTP treatment has indicated a possible role for cyclooxygenase 2 (COX-2) in Parkinsonian neurodegeneration.¹² A review describes the application of MPTP studies to programmed cell death in neurodegenerative diseases.¹³

A molecular docking study of MPTP with various models of the cytochrome P450 2D6 structure has been described.¹⁴

Precautions and Disclaimer

For Laboratory Use Only. Not for drug, household or other uses.

Preparation Instructions

This product is soluble in methylene chloride (10 mg/ml).

References

1. The Merck Index, 12th ed., Entry# 6376
2. Przedborski, S., et al., The parkinsonian toxin MPTP: action and mechanism. *Restor. Neurol. Neurosci.*, **16(2)**, 135-142 (2000).

3. Adams, J. D., Jr., et al., Parkinson's disease - redox mechanisms. *Curr. Med. Chem.*, **8(7)**, 809-814 (2001).
4. Ziering, A., et al., Piperidine Derivatives. Part III. 4-Arylpiperidines. *J. Org. Chem.*, **12**, 894-903 (1947).
5. Schmidle, C. J., and Mansfield, R. C., The Aminomethylation of Olefins. IV. The Formation of 1-Alkyl-4-aryl-1,2,3,6-tetrahydropyridines. *J. Am. Chem. Soc.*, **78**, 425-428 (1956).
6. Davis, G.C., et al., Chronic Parkinsonism secondary to intravenous injection of meperidine analogues. *Psychiatry Res.*, **1**, 249-254 (1979).
7. Burns, R.S., et al., A primate model of parkinsonism: selective destruction of dopaminergic neurons in the pars compacta of the substantia nigra by N-methyl-4-phenyl-1,2,3,6-tetrahydropyridine. *Proc. Nat. Acad. Sci. USA* **80**, 4546-4550 (1983).
8. Langston, J. W., et al., Chronic Parkinsonism in humans due to a product of meperidine-analog synthesis. *Science*, **219**, 979-980 (1983).
9. Przedborski, S., and Jackson-Lewis, V., Mechanisms of MPTP toxicity. *Mov. Disord.*, **13**, 35-38 (1998).
10. Gainetdinov, R.R., et al., Increased MPTP neurotoxicity in vesicular monoamine transporter 2 heterozygote knockout mice. *J. Neurochem.* **70**, 1973-1978 (1998).
11. Mogi, M., et al., Effects of repeated systematic administration of methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) to mice on interleukin-1band nerve growth factor in the striatum. *Neurosci. Lett.*, **250**, 25-28 (1998).
12. Teismann, P., et al., Cyclooxygenase-2 is instrumental in Parkinson's disease neurodegeneration. *Proc. Natl. Acad. Sci. USA*, **100(9)**, 5473-5478 (2003).

13. Vila, M., and Przedborski, S., Targeting programmed cell death in neurodegenerative diseases. *Nat. Rev. Neurosci.*, **4(5)**, 365-375 (2003).

14. Kirton, S. B., et al., Impact of incorporating the 2C5 crystal structure into comparative models of cytochrome P450 2D6. *Proteins*, **49(2)**, 216-231 (2002).

GCY/RXR 12/03

Sigma brand products are sold through Sigma-Aldrich, Inc.

Sigma-Aldrich, Inc. warrants that its products conform to the information contained in this and other Sigma-Aldrich publications. Purchaser must determine the suitability of the product(s) for their particular use. Additional terms and conditions may apply. Please see reverse side of the invoice or packing slip.