Australian Government
Department of Industry, Science and Resources

National Measurement Institute

NATA
WORLD RECOGNISED ACCREDITATION

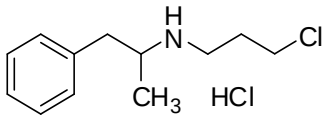
CERTIFIED REFERENCE MATERIAL CERTIFICATE OF ANALYSIS

NMIA D283b: Mefenorex hydrochloride

Report ID: D238b.2023.01

Chemical Formula: $C_{12}H_{18}ClN.HCl$

Molecular Weight: 248.2 g/mol (HCl)



Certified value

Batch No.	CAS No.	Purity (mass fraction)
05-D-12	**5586-87-8**	**99.3 ± 0.7%**

The uncertainty has been calculated according to ISO Guide 35 and is stated at the 95% confidence limit (k = 2).

IUPAC: 3-Chloro-N-(1-phenyl-2-propanyl)-1-propanamine hydrochloride

Expiration of certification: The property values are valid till 21 December 2033, ten years from the date of re-certification provided the **unopened** material is handled and stored in accordance with the recommendations below. The material as issued in the unopened container and stored as recommended below should be suitable for use beyond this date, subject to confirmation of batch stability from the issuing body. The expiry date/shelf life does not apply to sample bottles that have been opened. In such cases it is recommended that the end-user conduct their own in-house stability trials.

Description: White solid prepared by synthesis and certified for identity and purity by NMIA. Packaged in amber glass bottles with a screw top cap.

Intended use: This certified reference material is suitable for use as a primary calibrator.

Instructions for use: Equilibrate the bottled material to room temperature before opening.

Recommended storage: When not in use, this material should be stored at or below 25 ºC in a closed container in a dry, dark area.

Metrological traceability: The certified purity value is traceable to the SI unit for mass (kg) through Australian national standards via balance calibration. In the mass balance approach all impurities are quantified as a mass fraction and subtracted from 100%.

Stability: This material has demonstrated stability over a minimum period of ten years. The measurement uncertainty at the 95% coverage interval includes a stability component which has been estimated from annual stability trials. The long-term stability of the compound in solution has not been examined.

Homogeneity assessment: The homogeneity of the material was assessed using purity assay by GC-FID on five randomly selected 1-2 mg sub samples of the material. The material was judged to be sufficiently homogeneous at this level of sampling as the variation in analysis results between samples was not significantly different at a 95% confidence level from that observed on repeat analysis of the same sample.

Safety: Treat as hazardous substance. Use appropriate work practices when handling to avoid skin or eye contact, ingestion or inhalation of dust. Refer to the provided safety data sheet.

S. R. Davies

Dr Stephen R. Davies,
Team Leader,
Chemical Reference Materials, NMI.
8 January 2024

This report supersedes any issued prior to 08 January 2024.

NATA Accreditation No. 198 / Corporate Site No. 14214

Characterisation Report:

The identity was confirmed by a range of spectroscopic techniques, NMR, IR and MS. The certified purity value was obtained by mass balance from a combination of traditional analytical techniques, including GC-FID and Karl Fischer analysis. The purity value is calculated as per Equation 1.

Purity = (100 % - I_{ORG}) x (100 % - I_{VOL} – I_{NVR}) Equation 1

I_{ORG} = Organic impurities of related structure, I_{VOL} = volatile impurities, I_{NVR} = non-volatile residue

Supporting evidence is provided by qualitative elemental microanalysis.

GC-FID:	Instrument:	Agilent 6890N or 7890
	Column:	HP-1 Capillary, 30 m × 0.32 mm I.D. × 0.25 μm
	Program:	60 °C (1 min), 20 °C/min to 300 °C (3 min)
	Injector:	150 °C
	Detector Temp:	300 °C
	Carrier:	Helium
	Split ratio:	20/1
	Relative mass fraction of the main component:	
	Initial analysis:	Mean = 99.2%, s = 0.06% (3 sub samples in duplicate, September 2005)
	Re-analysis:	Mean = 99.3%, s = 0.03% (5 sub samples in duplicate, October 2008)
	Re-analysis:	Mean = 99.3%, s = 0.03% (5 sub samples in duplicate, October 2011)
GC-FID:	Instrument:	Agilent 6890N, 7890 or Varian CP-3800
	Column:	HP-1 or VF-1MS Capillary, 30 m × 0.32 mm I.D. × 0.25 μm
	Program:	60 °C (1 min), 20 °C/min to 300 °C (3 min)
	Injector:	180 °C
	Detector Temp:	320 °C
	Carrier:	Helium
	Split ratio:	20/1
	Relative mass fraction of the main component:	
	Re-analysis:	Mean = 99.3%, s = 0.01% (5 sub samples in duplicate, August 2014)
	Re-analysis:	Mean = 99.5%, s = 0.01% (5 sub samples in duplicate, July 2019)
GC-FID:	Instrument:	Agilent 6890N, 7890 or Varian CP-3800
	Column:	HP-1, 30 m × 0.32 mm I.D. × 0.25 μm
	Program:	80°C (1 min), 20 °C/min to 170°C (4 min), 30°C/min to 300 °C (3 min)
	Injector:	150 °C
	Detector Temp:	320 °C
	Carrier:	Helium
	Split ratio:	20/1
	Relative mass fraction of the main component:	
	Re-analysis:	Mean = 99.5%, s = 0.03% (5 sub samples of bulk and bottles in duplicate, December 2023)
Thermogravimetric analysis:		Volatile content was not determined due to decomposition of the material between 110-120 ºC
Karl Fischer analysis:		Moisture content < 0.1% mass fraction (August 2006, October 2011, August 2014, July 2019 and December 2023) Moisture content 0.4% mass fraction (September 2007 and October 2008)

Spectroscopic and other characterisation data

GC-MS:	Instrument:	HP5890/5971A
	Column:	ZB-5, 30 m × 0.25 mm I.D. × 0.20 μm
	Program:	100 °C (1 min), 10 °C/min to 250 °C, (5 min)
	Injector:	220 °C
	Transfer line temp:	280 °C
	Carrier:	Helium, 1.0 mL/min
	Split ratio:	20/1
	The retention time of the free base is reported along with the major peaks in the mass spectrum. The latter are reported as mass/change ratios and (in brackets) as a percentage relative to the base peak.	
	9.70 min:	196 (M^+, 1), 120 (100), 91 (22), 84 (4), 76 (4), 65 (6), 56 (5) *m/z*
TLC:	Conditions:	Kieselgel 60F_{254}. Methanol/Conc. aqueous NH_3 (200/3) Single spot observed, R_f = 0.6. Visualisation with ninhydrin dip
IR:	Instrument:	Biorad FTS300MX FT-IR
	Range:	4000-400 cm^{-1}, KBr pellet
	Peaks:	2962, 2806, 2499, 2468, 2422, 1588, 1499, 1454, 1389, 1316, 738, 698 cm^{-1}
^{1}H NMR:	Instrument:	Bruker DPX2-300
	Field strength:	300 MHz
	Solvent:	MeOH-d_4 (3.31 ppm)
	Spectral data:	δ 1.25 (3H, d, *J* = 6.5 Hz), 2.22 (2H, m), 2.75 (1H, dd, *J* = 10.1, 13.2 Hz), 3.22-3.32 (3H, m), 3.54 (1H, m), 3.73 (2H, t, *J* = 6.2 Hz), 7.25-7.40 (5H, m) ppm
^{13}C NMR:	Instrument:	Bruker DPX2-300
	Field strength:	75 MHz
	Solvent:	MeOH-d_4 (49.0 ppm)
	Spectral data:	δ 15.9, 30.4, 40.2, 42.3, 43.9, 57.2, 128.4, 130.0, 130.4, 137.2 ppm
Melting point:		124-128 °C
Microanalysis:	Found:	C = 58.3 %; H = 7.9 %; N = 5.6% (September 2005)
	Calculated:	C = 58.1 %; H = 7.7 %; N = 5.6% (Calculated for $C_{12}H_{18}ClN.HCl$)