



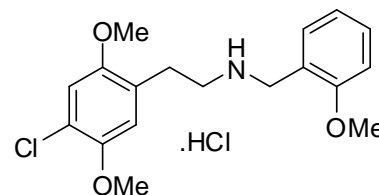
## CERTIFIED REFERENCE MATERIAL CERTIFICATE OF ANALYSIS

### NMIA D1008: 2-(4-Chloro-2,5-dimethoxyphenyl)-N-[(2-methoxyphenyl)methyl]ethylanamine hydrochloride

Report ID: D1008.2024.01

Chemical Formula:  $C_{18}H_{22}ClNO_3 \cdot HCl$

Molecular Weight: 372.3 g/mol (HCl), 335.8 g/mol (base)



### Certified value

Batch No.	CAS No.	Purity (mass fraction)
13-D-28	1227608-02-7 (free base)	91.4 ± 2.0%

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

**IUPAC name:** 2-(4-Chloro-2,5-dimethoxyphenyl)-N-(2-methoxybenzyl)ethanamine hydrochloride (1:1).

**Expiration of certification:** The property values are valid till 23 April 2029, five 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:** Off-white powder prepared by synthesis and certified for identity and purity by NMI Australia. Packaged in amber glass bottles with a septum and crimped aluminium cap or 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 °C 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 five years. 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 HPLC with UV detection on ten 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 a 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.



Dr Stephen R. Davies,  
Team Leader,  
Chemical Reference Materials, NMI.  
25 April 2025

This report supersedes any issued prior to 25 April 2025.

NATA Accreditation No. 198 / Corporate Site No. 14214.

**Legal notice:** Terms and Conditions associated with the provision of this reference material can be found on the NMIA website.

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## Characterisation Report:

The identity was confirmed by a range of spectroscopic techniques, NMR, IR and MS. Impurities of related structure were assessed by HPLC with UV detection. The purity value was obtained by mass balance from a combination of traditional analytical techniques, including HPLC with UV detection. The purity value is calculated as per Equation 1.

$$\text{Purity} = (100\% - I_{\text{ORG}}) \times (100\% - I_{\text{VOL}} - I_{\text{NVR}})$$

Equation 1

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

Supporting evidence is provided by thermogravimetric analysis, Karl Fischer analysis and  $^1\text{H}$  NMR spectroscopy, qualitative headspace GC-MS analysis of occluded solvents and elemental microanalysis.

**Note: This material contains 25H-NBOMe (~0.4%), two impurities identified as isomers of 25C-NBOMe (~ 1.1 and 5.6%), and a further two impurities identified as dichloro analogues of 25C-NBOMe (~0.5 and 0.8%).**

HPLC:	Instrument:	Shimadzu Binary pump LC-20AB, SIL-20 A HT autosampler
	Column:	X-Bridge C-18, 5 $\mu\text{m}$ (4.6 mm $\times$ 150 mm)
	Column oven:	40°C
	Mobile Phase:	Acetonitrile/MilliQ water (50:50 v/v) [2013, 2014] Methanol/MilliQ water (65:35) [2015, 2016] The aqueous phase was buffered at pH 10.8 using 20mM $\text{NH}_4\text{OAc}$ and ammonia
	Flow rate:	1.0 mL/min
	Detector:	Waters 2998 PDA operating at 210 nm
	Relative peak area of the main component:	
	Initial analysis:	Mean = 91.4%, s = 0.2% (10 sub samples in duplicate, September 2013)
	Re-analysis:	Mean = 92.2%, s = 0.05% (5 sub samples in duplicate, July 2014)
	Re-analysis:	Mean = 92.0%, s = 0.04% (5 sub samples in duplicate, July 2015)
Karl Fischer analysis:	Re-analysis:	Mean = 92.3%, s = 0.06% (5 sub samples in duplicate, June 2016)
	Re-analysis:	Mean = 92.1%, s = 0.06% (5 sub samples in duplicate, July 2020)
	Re-analysis:	Mean = 91.5%, s = 0.06% (1 sub sample in triplicate, April 2024)
	Re-analysis:	
Thermogravimetric analysis:	Moisture content 0.6% mass fraction (September 2013)	
	Moisture content 0.3% mass fraction (July 2014, July 2015 and June 2016)	
	Moisture content 0.2% mass fraction (July 2020)	
Thermogravimetric analysis:	Non volatile residue < 0.2% mass fraction (September 2013). The volatile content (e.g. organic solvents and/or water) could not be determined because of the inherent volatility of the material and/or degradation at elevated temperatures.	

## Spectroscopic and other characterisation data

LC-MS:	Instrument:	Waters 2695 (HPLC)/ Micromass Quattro
	Column:	X-Bridge C-18, 150 mm x 4.6 mm I.D. x 5 µm
	Column temp:	40 °C
	Solvent system:	MilliQ water with 1% formic acid [60% v/v], Methanol [40% v/v]
	Flow rate:	0.2 mL/min
	Sample prep:	1000 µg/g in mobile phase
	Injection volume:	10 µL
	Ionisation mode:	Electrospray positive ion
	Capillary voltage:	3.5 kV
	Cone voltage:	15 V
	Source temp:	130 °C
	Desolvation gas temp:	350 °C
	Cone gas flow rate:	23 L/hr
	Desolvation gas flow:	753 L/hr
	The retention time of the parent compound is reported along with the major peak in the mass spectrum. The latter is reported as a mass/charge ratio.	
HS-GC-MS:	17.98 min:	336.2 (M+H <sup>+</sup> <sup>35</sup> Cl), 338.2 (M+H <sup>+</sup> <sup>37</sup> Cl) <i>m/z</i>
	Instrument:	Agilent 6890/5973/G1888
	Column:	DB-624, 30 m x 0.25 mm I.D. x 1.4 µm
	Program:	50 °C (5 min), 7 °C/min to 120 °C, 15 °C/min to 220 °C (8.3 min)
	Injector:	150 °C
	Split ratio:	50/1
	Transfer line temp:	280 °C
	Carrier:	Helium, 1.2 mL/min
	Solvents detected:	Diethyl ether
TLC:	Conditions:	Kieselgel 60F <sub>254</sub> . Hexane/ethyl acetate/Diethyl amine (15/3/0.2)
	Single spot observed, R <sub>f</sub> = 0.2. Visualisation with UV at 254 nm.	
IR:	Instrument:	Biorad FTS3000MX FT-IR
	Range:	4000-400 cm <sup>-1</sup> , KBr powder
	Peaks:	2961, 2920, 2777, 2714, 2673, 2637, 2485, 1601, 1587, 1505, 1495, 1453, 1440, 1256, 1216, 1046, 1031, 864, 812, 732 cm <sup>-1</sup>
<sup>1</sup> H NMR:	Instrument:	Bruker Avance -400
	Field strength:	400 MHz
	Solvent:	DMSO- <i>d</i> <sub>6</sub> (2.50 ppm)
	Spectral data:	δ 2.97 (2H, m), 3.06 (2H, m), 3.75 (3H, s), 3.80 (3H, s), 3.83 (3H, s), 4.12 (2H, s), 7.00 (1H, dt, <i>J</i> = 1.0, 7.5 Hz), 7.04 (1H, s), 7.09 (1H, s), 7.09 (1H, bd, <i>J</i> = 7.6 Hz), 7.41 (1H, ddd, <i>J</i> = 1.7, 7.6, 9.2 Hz), 7.39 (1H, dd, <i>J</i> = 1.6, 7.5 Hz), 9.79 (2H, bs) ppm. Diethyl ether estimated at 0.2% mass fraction was observed in the <sup>1</sup> H NMR.
<sup>13</sup> C NMR:	Instrument:	Bruker Avance-400
	Field strength:	101 MHz
	Solvent:	DMSO- <i>d</i> <sub>6</sub> (39.5 ppm)
	Spectral data:	δ 26.2, 44.8, 45.8, 55.6, 56.2, 56.5, 111.1, 113.1, 115.2, 119.6, 119.7, 120.4, 124.8, 130.8, 131.5, 148.4, 151.2, 157.5 ppm
Melting point:	182-184 °C	
Microanalysis:	Found:	C = 57.1%; H = 6.1%; N = 3.7%; Cl% = 19.4% (September 2013)
	Calculated:	C = 58.1%; H = 6.2%; N = 3.8%; Cl% = 19.1% (Calculated for C <sub>18</sub> H <sub>22</sub> NO <sub>3</sub> .HCl)