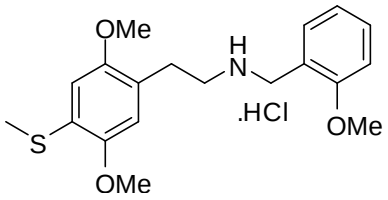
Australian Government
Department of Industry, Science and Resources

National Measurement Institute

CERTIFIED REFERENCE MATERIAL CERTIFICATE OF ANALYSIS

NMIA D1016: (2-(4-Methylthio-2,5-dimethoxyphenyl)-N-[(2-methoxybenzyl)]ethylamine hydrochloride



Report ID: D1016.2020.03

Chemical Formula: $C_{19}H_{25}NO_3S.HCl$

Molecular Weight: 383.9 g/mol (HCl), 347.5 g/mol (base)

Certified value

Batch No.	CAS No.	Purity (mass fraction)
14-D-11	**1539266-47-1 (HCl)**	**99.6 ± 0.5%**

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

IUPAC name: 2-[2,5-Dimethoxy-4-(methylsulfanyl)phenyl]-N-(2-methoxybenzyl)ethanamine hydrochloride.

Expiration of certification: The property values are valid till 23 November 2025, i.e. 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 a 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. The material will be re-tested on an annual basis to ensure that the property values are still valid. In the event a product fails the stability trial, notification will be sent to all impacted customers.

Description: White powder prepared by synthesis, and certified for identity and purity by NMIA. 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 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

Stability: This material has demonstrated stability over a minimum period of five years. The measurement uncertainty at the 95% confidence 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 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.

S. R. Davies

Dr Stephen R. Davies,
Team Leader,
Chemical Reference Materials, NMI.
21 September 2022

This report supersedes any issued prior to 21 September 2022.

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.

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, thermogravimetric analysis, Karl Fischer analysis and ^{1}H NMR spectroscopy. 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 headspace GC-MS analysis of occluded solvents and elemental microanalysis.

GC-FID:	Instrument:	Varian CP-3800 or Agilent 7890		
	Column:	VF-1 or HP-5, 30 m × 0.32 mm I.D. × 0.25 μm		
	Program:	180 °C (1 min), 8°C/min to 260 °C (7 min), 30 °C/min to 300 °C (3 min)		
	Injector:	250 °C	Detector Temp:	320 °C
	Carrier:	Helium	Split ratio:	20/1
	Relative mass fraction of the main componentas the free base:			
	Initial analysis:	Mean = 99.6%, s = 0.03% (10 sub samples in duplicate, October 2014)		
	Re-analysis:	Mean = 99.8%, s = 0.03% (7 sub samples in duplicate, October 2015)		
	Re-analysis:	Mean = 99.4%, s = 0.1% (5 sub samples in duplicate, November 2016)		
	Re-analysis:	Mean = 99.8%, s = 0.03% (5 sub samples in duplicate, October 2017)		
	Re-analysis:	Mean = 99.8%, s = 0.04% (5 sub samples in duplicate, November 2020)		
Karl Fischer analysis:		Moisture content ≤ 0.1% mass fraction (August 2014, August 2015, November 2016, October 2017 and November 2020)		
Thermogravimetric analysis:		Non-volatile residue < 0.2% mass fraction (October 2014)		

Spectroscopic and other characterisation data

GC-MS:	Parent compound:	
	Instrument:	Agilent 6890/5973
	Column:	TG-1MS, 30 m x 0.25 mm I.D. x 0.25 μm
	Program:	130 °C (1 min), 15 °C/min to 280 °C (6 min), 30 °C/min to 300 °C (3 min)
	Injector:	250 °C Transfer line temp: 300 °C
	Carrier:	Helium, 1.0 mL/min Split ratio: 20/1
	The retention time of the free baseisreported with the major peaks in the mass spectra. The latter are reported as mass/charge ratios and (in brackets) as a percentage relative to the base peak.	
	Free base (13.0 min):	281 (4), 207 (10), 198 (37), 150 (34), 121 (100), 91 (24) *m/z*
ESI-MS:	Instrument:	Micromass Quatro LC Micro
	Operation:	Positive ion mode, direct infusion at 10 μL/min
	Ionisation:	ESI spray voltage at 3.5 kV positive ion
	EM voltage:	650 V
	Cone voltage:	10 V
	Peak:	348.3 ($M+H^+$) *m/z*
HS-GC-MS:	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
	Transfer line temp:	280 °C
	Carrier:	Helium, 1.2 mL/min
	Split ratio:	50/1
	Solvents detected:	Ethanol
TLC:	Conditions:	Kieselgel 60F_{254}. Methanol/ammonia (100:1.5) Single spot observed, R_f = 0.6
IR:	Instrument:	Bruker Alpha Platinum ATR
	Range:	4000-400 cm^{-1},neat
	Peaks:	2974, 2944, 2916, 2672, 2601, 2532, 1579, 1490, 1458, 1439, 1253, 1204, 1025, 745, 495, 460 cm^{-1}
^{1}H NMR:	Instrument:	Bruker Avance III-500
	Field strength:	500 MHz
	Solvent:	D_2O (4.79 ppm)
	Spectral data:	δ 2.39 (3H, s), 2.86 (2H, t, *J* = 6.9 Hz), 3.16 (2H, t, *J* = 6.9 Hz), 3.62 (3H, s), 3.66 (3H, s), 3.73 (3H, s), 4.13 (2H, s), 6.71 (1H, s), 6.73 (1H, s), 6.92 (1H, d, *J* = 7.9 Hz), 6.97 (1H, t, *J* = 7.2 Hz), 7.22 (1H, d, *J* = 7.2 Hz), 7.39 (1H, t, *J* = 7.9 Hz) ppm Ethanol estimated at 0.2% mass fraction was observed in the ^{1}H NMR
^{13}C NMR:	Instrument:	Bruker Avance III-500
	Field strength:	126 MHz
	Solvent:	D_2O
	Spectral data:	δ 13.8, 26.5, 46.0, 47.3, 55.1, 56.0, 56.3, 110.2, 110.9, 113.7, 118.0, 120.9, 121.6, 125.8, 131.5, 149.6, 151.8, 157.3 ppm
Melting point:		165-166 °C
Microanalysis:	Found:	C = 59.7%; H = 6.9%; N = 3.7%; Cl% = 9.0%; S% = 8.3% (August, 2014)
	Calculated:	C = 59.4%; H = 6.8%; N = 3.7%; Cl% = 9.2%; S% = 8.4% (Calculated for $C_{19}H_{25}NO_3S.HCl$)