Australian Government
Department of Industry, Science and Resources

National Measurement Institute

NATA
WORLD RECOGNISED ACCREDITATION

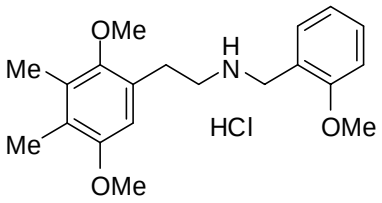
CERTIFIED REFERENCE MATERIAL CERTIFICATE OF ANALYSIS

NMIA D1018: 2-(3,4-Dimethyl-2,5-dimethoxyphenyl)-N-[(2-methoxybenzyl)]ethylamine hydrochloride

Report ID: D1018.2023.01

Chemical Formula: $C_{20}H_{27}NO_3.HCl$

Molecular Weight: 365.9 g/mol (HCl), 329.4 g/mol (base)



Certified value

Batch No.	CAS No.	Purity (mass fraction)
14-D-17	1797132-54-7 (HCl) 1354632-65-7 (base)	97.8 ± 1.2%

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-3,4-dimethylphenyl)-*N*-(2-methoxybenzyl)ethanamine hydrochloride (1:1).

Expiration of certification: The property values are valid till 1 May 2028, 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 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 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 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 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.
8 May 2023

This report supersedes any issued prior 08 May 2023.

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
	Column:	HP-1, 30 m × 0.32 mm I.D. × 0.25 μm
	Program:	120 °C (1 min), 20 °C/min to 250 °C (5 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 = 98.3%, s = 0.03% (10 sub samples in duplicate, July 2014)
GC-FID:	Instrument:	Varian CP-3800, Agilent 7890
	Column:	HP-5, 30 m × 0.32 mm I.D. × 0.25 μm
	Program:	120 °C (1 min), 20 °C/min to 250 °C (5 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 component as the free base:	
	Initial analysis:	Mean = 98.0%, s = 0.02% (7 sub samples in duplicate, July 2014)
	Re-analysis:	Mean = 98.8%, s = 0.11% (5 sub samples in duplicate, July 2015)
	Re-analysis:	Mean = 98.3%, s = 0.03% (5 sub samples in duplicate, May 2016)
	Re-analysis:	Mean = 98.0%, s = 0.08% (5 sub samples in duplicate, April 2017)
	Re-analysis:	Mean = 98.6%, s = 0.04% (7 sub samples in duplicate, May 2023)
Karl Fischer analysis:		Moisture content 0.1% mass fraction (July 2014, July 2015, May 2016, May 2023) Moisture content 0.2% mass fraction (April 2017)
Thermogravimetric analysis:		Volatiles content < 0.1% and non-volatile residue < 0.2% mass fraction (August 2019)

Spectroscopic and other characterisation data

GC-MS:	Instrument:	Agilent 6890/5973
	Column:	TG-1MS, 30 m × 0.25 mm I.D. × 0.25 mm
	Program:	60 °C (1 min), 10 °C/min to 300 °C (3 min)
	Injector:	250 °C
	Split ratio:	20/1
	Transfer line temp:	280 °C
	Carrier:	Helium
	Scan range:	50-550 *m/z*
	The retention times of the free base and *N*-acetyl derivative are reported along 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 (22.3 min):	298 (M^+-OMe, 13), 180 (7), 150 (42), 121 (100), 91 (26) *m/z*
	N-acetyl (24.5 min):	371 (M^+, 11), 192 (93), 177 (13), 150 (8), 121 (100), 91 (30) *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:	Diethyl ether, isopropanol
TLC:	Conditions:	Kieselgel 60F_{254}. Dichloromethane/Methanol/conc NH_3 (11:1:drop) Single spot observed, R_f = 0.5
IR:	Instrument:	Bruker Alpha Platinum ATR
	Range:	4000-400 cm^{-1},neat
	Peaks:	2939, 2837, 2743, 2667, 2622, 2477, 1600, 1585, 1494, 1482, 1466, 1438, 1407, 1253, 1231, 1118, 1090, 1032, 1015, 767, 477 cm^{-1}
^{1}H NMR:	Instrument:	Bruker Avance III-500
	Field strength:	500 MHz
	Solvent:	DMSO-d_6 (2.50 ppm)
	Spectral data:	δ 2.04 (3H, s), 2.12 (3H, s), 2.98 (2H, m), 3.08 (2H, m), 3.58 (3H, s), 3.73 (3H, s), 3.84 (3H, s), 4.14 (2H, s), 6.66 (1H, s), 7.00 (1H, dt, *J* = 1.0, 7.5 Hz), 7.10 (1H, dd, *J* = 0.6, 7.7 Hz), 7.42 (1H, ddd, *J* = 1.7, 7.6, 8.3 Hz), 7.51 (1H, dd, *J* = 1.7, 7.5 Hz), 9.22 (2H, br s) ppm
	Isopropanol (0.1%) and diethyl ether (0.2%) estimated mass fraction was observed in the ^{1}H NMR ppm	
^{13}C NMR:	Instrument:	Bruker Avance III-500
	Field strength:	126 MHz
	Solvent:	DMSO-d_6 (39.52 ppm)
	Spectral data:	δ 11.9, 12.6, 26.3, 44.9, 47.0, 55.6, 60.8, 109.5, 111.1, 119.8, 120.4, 124.2, 127.0, 130.4, 130.8, 131.5, 150.1, 153.2, 157.5 ppm
Melting point:		170 °C
Microanalysis:	Found:	C = 65.5 %; H = 7.9 %; N = 3.8 %; Cl = 9.4% (August 2014)
	Calculated:	C = 65.7 %; H = 7.7 %; N = 3.8 %; Cl = 9.7 % (Calculated for $C_{20}H_{27}NO_3$.HCl)