Australian Government
Department of Industry, Science and Resources

National Measurement Institute

NATA
WORLD RECOGNISED ACCREDITATION

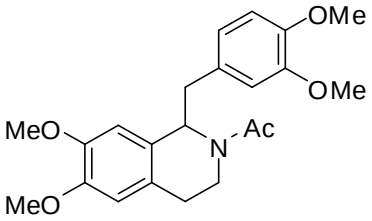
CERTIFIED REFERENCE MATERIAL CERTIFICATE OF ANALYSIS

NMIA D697: *N*-Acetylnorlaudanosine

Report ID: D697.2023.01

Chemical Formula: $C_{22}H_{27}NO_5$

Molecular Weight: 385.5 g/mol



Certified value

Batch No.	CAS No.	Purity (mass fraction)
01-D-005	**860-23-1**	**99.2 ± 1.0%**

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

IUPAC name: 1-[(1S)-1-(3,4-Dimethoxybenzyl)-6,7-dimethoxy-3,4-dihydro-2(1H)-isoquinolinyl]ethanone

Expiration of certification: The property values are valid till 9 January 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 bottle 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 or sourced from an external supplier, 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%. Quantitative NMR provides an independent direct measure of the mass fraction of the analyte of interest, calibrated with an internal standard certified for purity (mass fraction).

Stability: This material has demonstrated stability over a minimum period of five 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 eight randomly selected 1-2 mg 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.
23 January 2023

This report supersedes any issued prior to 23 January 2023.

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, 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 elemental microanalysis.

GC-FID:	Instrument:	Agilent 6890N
	Column:	HP-1 Capillary, 30 m × 0.32 mm I.D. × 0.25 μm
	Program:	200 °C (1 min), 10 °C/min to 270 °C (3.5 min), 20 °C/min to 300 °C (3 min)
	Injector:	250 °C
	Detector Temp:	320 °C
	Carrier:	Helium
	Split ratio:	20/1
	Relative mass fraction response of the main component:	
	Initial analysis:	Mean = 99.6%, s = 0.02% (8 sub samples in duplicate, June 2001)
	Re-analysis:	Mean = 99.6%, s = 0.02% (5 sub samples in duplicate, September 2008)
	Re-analysis:	Mean = 99.6%, s = 0.01% (5 sub samples in duplicate, July 2013)
	Re-analysis:	Mean = 99.5%, s = 0.02% (3 sub samples in duplicate, June 2018)
	Re-analysis:	Mean = 99.6%, s = 0.01% (5 sub samples in duplicate, January 2023)
Thermogravimetric analysis:		Volatiles content < 0.1% and non-volatile content < 0.2% mass fraction (April 2001, November 2005 and September 2008)
Karl Fischer analysis:		Moisture content < 0.1% mass fraction (2 sub samples, September 2008) Moisture content ≤ 0.2% mass fraction (2 sub samples, July 2013) Moisture content ≤ 0.2% mass fraction (2 sub samples, June 2018) Moisture content ≤ 0.3% mass fraction (2 sub samples, January 2023)

Spectroscopic and other characterisation data

GC-MS:	Instrument:	HP6890/5973
	Column:	ZB-5, 30 m × 0.25 mm I.D. × 0.3 μm
	Program:	230 °C (1 min), 10 °C /min to 300 °C (5 min)
	Injector:	250 °C
	Transfer line temp:	280 °C
	Carrier:	Helium, 1.0 mL/min
	Split ratio:	20/1
	The retention time of the parent compound is reported along with the major peaks in the mass spectrum. The latter are reported as mass/charge rations and (in brackets) as a percentage relative to the base peak.	
	Parent (7.1 min):	234 ($M^{+\cdot}$-$CH_2C_6H_3$ $(MeO)_2$, 100), 192 (80), 176 (12) *m/z*
TLC:	Conditions:	Kieselgel 60F254. Chloroform/acetone (80:20) Single spot observed, R_f = 0.4 (3 replicates)
IR:	Instrument:	FT-IR, Biorad WIN FTS40
	Range:	4000-400 cm^{-1}, KBr pellet
	Peaks:	3078, 2940, 2834, 1635, 1516, 1444, 1159, 1022, 821 cm^{-1}
^{1}H NMR:	Instrument:	Bruker DMX-600
	Field strength:	600 MHz
	Solvent:	Pyridine-d_5 (7.445 ppm)
	Spectral data:	δ 1.63 (3H, s), 2.01 (3H, s), 2.47 (1H, ddd, *J* = 4.3, 15.8 Hz), 2.54 (1H, br dd, *J* = 16.1 Hz), 2.61 (1H, ddd, *J* =5.6, 9.9, 15.8 Hz), 2.79 (1H, ddd, *J* = 5.9, 11.8, 16.1 Hz), 3.07-3.18 (5H, m), 3.34 (1H, ddd, *J* = 4.6, 9.9, 13.5 Hz), 3.49-3.53 (1H, m), 3.52 (3H, s), 3.57 (3H, s), 3.58 (3H, s), 3.61 (3H, s), 3.63 (3H, s), 3.64 (3H, s), 3.65 (3H, s), 3.67 (3H, s), 4.95 (1H, dd, *J* = 5.3, 13.2 Hz), 5.04 (1H, dd, *J* = 4.3, 9.9 Hz), 5.98 (1H, dd, *J* = 6.9 Hz), 6.48 (1H, s), 6.62 (1H, s), 6.64 (1H, s), 6.71-6.75 (2H, m), 6.78-6.82 (2H, m), 6.86 (1H, s), 6.91 (1H, s), 6.92 (1H, s) ppm.
		Solvents signals (DCM 0.1% and diethyl ether 0.14%) were observed in the proton NMR.
^{13}C NMR:	Instrument:	Bruker DMX-600
	Field strength:	151 MHz
	Solvent:	Pyridine-d_5 (150.0 ppm)
	Spectral data:	δ 21.4, 22.1, 28.4, 28.8, 35.1, 41.4, 42.2, 42.6, 54.0, 55.9, 55.99, 56.02, 56.04, 56.1, 56.2, 59.4, 111.7, 112.0, 112.4, 112.5, 112.6, 112.9, 114.38, 114.42, 122.47, 122.53, 126.8, 127.2, 129.5, 129.6, 131.7, 132.0, 148.2, 148.5, 148.7, 148.8, 149.0, 149.1, 169.1, 169.3 ppm.
Microanalysis:	Found:	C = 68.4%; H = 7.2%; N = 3.6% (June 2001)
	Calculated:	C = 68.6%; H = 7.1%; N = 3.6% (Calculated for $C_{22}H_{27}NO_5$)
Melting point:		112–114 °C