



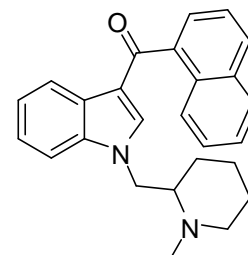
REFERENCE MATERIAL PRODUCT INFORMATION SHEET

NMIA D982: 1-[(1-Methylpiperidin-2-yl) methyl]-3-(1-naphthoyl)-indole (AM1220)

Report ID: D982.2017.02

Chemical Formula: C₂₆H₂₆N₂O

Molecular Weight: 382.5 g/mol



Certified value

| Batch No. | CAS No. | Purity (mass fraction) |
|-----------|-------------|------------------------|
| 12-D-10 | 137642-54-7 | 99.5 ± 0.9% |

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

IUPAC name: [1-[(1-Methyl-2-piperindinyl)methyl]-1H-indol-3-yl]-1-naphthalenyl-methanone

Expiration of certification: The property values are valid till 23 May 2022, 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. This material has been given a shelf life of three years from the date of re-certification.

Description: Off-white powder sourced from an external supplier, 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 °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%. 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% 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.
31 March 2020

This report supersedes any issued prior to 31 March 2020

NATA logo notice: Accredited for compliance with ISO 17034. Accreditation No. 198 / Corporate Site No. 20844. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Legal notice: Neither NMIA as a representative of the Commonwealth of Australia, nor any person acting on NMIA's behalf, assumes any liability with respect to the use of, or for damages resulting from the use of, this reference material or the information contained in this document.

Characterisation Report:

The identity was confirmed by a range of spectroscopic techniques, NMR, IR and MS. The certified purity value by qNMR was obtained using the one-proton doublet of doublets at 4.5 ppm measured against a certified internal standard of 1,4-bis(trimethylsilyl)benzene.

$$\text{Purity} = (100\% - I_{\text{ORG}}) \times (100\% - I_{\text{VOL}} - I_{\text{NVR}}) \quad \text{Equation 1}$$

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

Supporting evidence is provided by a combination of traditional analytical techniques, including GC-FID, thermogravimetric analysis, Karl Fischer analysis, ^1H NMR spectroscopy, and elemental microanalysis.

| | | |
|-----------------------------|--|---|
| GC-FID: | Instrument: | Agilent 6890 |
| | Column: | HP-1, 30 m × 0.32 mm I.D. × 0.25 μm |
| | Program: | 150 °C (2 min), 30 °C/min to 290 °C (16 min), 30 °C/min to 300 °C (5 min) |
| | Injector: | 250 °C |
| | Detector Temp: | 320 °C |
| | Carrier: | Helium |
| | Split ratio: | 20/1 |
| | Relative mass fraction of the main component: | |
| | Initial analysis: | Mean = 99.8%, s = 0.01% (10 sub samples in duplicate, December 2012) |
| | Re-analysis: | Mean = 99.7%, s = 0.04% (5 sub samples in duplicate, July 2014) |
| | Re-analysis: | Mean = 99.8%, s = 0.01% (5 sub samples in duplicate, May, 2017) |
| GC-FID: | Instrument: | Varian CP-3800 |
| | Column: | VF-1MS or HP-5, 30 m × 0.32 mm I.D. × 0.25 μm |
| | Program: | 150 °C (2 min), 30 °C/min to 290 °C (20 min), 30 °C/min to 300 °C (5 min) |
| | Injector: | 250 °C |
| | Detector Temp: | 320 °C |
| | Carrier: | Helium |
| | Split ratio: | 20/1 |
| | Relative mass fraction of the main component: | |
| | Initial analysis: | Mean = 99.8%, s = 0.02% (10 sub samples in duplicate, December 2012) [VF-1] |
| | Initial analysis: | Mean = 99.8%, s = 0.02% (10 sub samples in duplicate, December 2012) [HP-5] |
| Thermogravimetric analysis: | Non volatile residue < 0.2% mass fraction (December 2012). The volatile content (e.g. organic solvents and/or water) could not be determined because of the inherent volatility of the material. | |
| Karl Fischer analysis: | Moisture content < 0.1% mass fraction (December 2012) Moisture content 0.12% mass fraction (May 2017) | |
| qNMR: | Instrument: | Bruker Avance-400 |
| | Field strength: | 400 MHz |
| | Solvent: | DMSO- d_6 (2.50 ppm) |
| | Internal standard: | 1,4-Bis(trimethylsilyl)benzene (100% mass fraction) |
| | Initial analysis: | Mean (4.7 ppm) = 99.5%, s = 0.8% (5 sub samples, March 2013) |

Spectroscopic and other characterisation data

| | | |
|----------------------|---|--|
| GC-MS: | Instrument: | Agilent 6890/5973 |
| | Column: | TG-1MS, 30 m x 0.25 mm I.D. x 0.25 μ m |
| | Program: | 150 °C (1 min), 10 °C/min to 270 °C (25 min), 30 °C/min to 300 °C (5 min) |
| | Injector: | 250 °C |
| | Transfer line temp: | 300 °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 ratios and (in brackets) as a percentage relative to the base peak. | |
| | Parent (34.7 min): | 380 (M ⁺ -2H, 1), 284 (2), 254 (2), 155 (4), 127 (8), 98 (100), 70 (8), 42 (4) <i>m/z</i> |
| LC/ESI -MS: | Instrument: | Waters Acquity UPLC/TQD |
| | Ionisation mode: | Electrospray positive ion |
| | Capillary voltage: | 3.5 kV |
| | Cone voltage: | 60 V |
| | Source temp: | 100 °C |
| | Desolvation gas temperature: | 400 °C |
| | Cone gas flow rate: | 1 L/hr |
| | Desolvation gas flow rate: | 500 L/hr |
| | Peak: | 383.3 (M+H ⁺) <i>m/z</i> |
| HS-GC-MS: | Instrument: | Agilent 6890/5973/G1888 |
| | Column: | DB-624, 30 m x 0.25 mm I.D. x 1.4 μ m |
| | 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: | Methylene chloride and hexane |
| TLC: | Conditions: | Kieselgel 60F ₂₅₄ . Ethyl acetate /methanol (10/1) Single spot observed, R _f = 0.3. Visualisation with UV at 254 nm |
| IR: | Instrument: | Biorad FTS3000MX FT-IR |
| | Range: | 4000-400 cm ⁻¹ , KBr powder |
| | Peaks: | 3054, 2937, 2853, 2790, 2715, 1607, 1522, 1462, 1395, 1338, 1206, 1184, 1079, 886, 781, 745, 642, 574, 518, 426 cm ⁻¹ |
| ¹ H NMR: | Instrument: | Bruker Avance III-400 |
| | Field strength: | 400 MHz |
| | Solvent: | CDCl ₃ (7.26 ppm) |
| | Spectral data: | δ 1.04-1.17 (2H, m), 1.23-1.28 (1H, m), 1.41-1.66 (3H, m), 2.12 (1H, dt, <i>J</i> = 3.0, 11.6 Hz), 2.37 (1H, m), 2.41 (3H, s), 2.85 (1H, dm, <i>J</i> = 11.8 Hz), 3.85 (1H, dd, <i>J</i> = 9.2, 13.8 Hz), 4.53 (1H, dd, <i>J</i> = 4.3, 13.7 Hz), 7.34-7.43 (4H, m), 7.45-7.56 (3H, m), 7.67 (1H, dd, <i>J</i> = 1.1, 6.9 Hz), 7.92 (1H, dd, <i>J</i> = 1.3, 8.2 Hz), 7.98 (1H, d, <i>J</i> = 8.2 Hz), 8.21 (1H, d, <i>J</i> = 8.2 Hz), 8.45-8.50 (1H, m) ppm Dichloromethane estimated at 0.4%, ethyl acetate at 0.1% and hexane at 0.1% mass fraction were observed in the ¹ H NMR. |
| ¹³ C NMR: | Instrument: | Bruker Avance DMX-600 |
| | Field strength: | 151 MHz |
| | Solvent: | CDCl ₃ (77.2 ppm) |
| | Spectral data: | δ 23.5, 25.6, 29.6, 43.7, 50.0, 57.2, 62.8, 110.3, 117.9, 123.0, 123.1, 123.9, 124.7, 126.17, 126.2, 126.4, 126.9, 127.0, 128.3, 130.3, 131.0, 133.9, 137.6, 138.7, 139.1, 192.2 ppm |
| Melting point: | | 134-135 °C |
| Microanalysis: | Found: | C = 81.4%; H = 6.8%; N = 7.3% (December, 2012) |
| | Calculated: | C = 81.6%; H = 6.9%; N = 7.3% (Calculated for C ₂₆ H ₂₆ N ₂ O) |