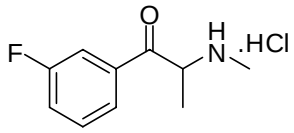
Australian Government

National Measurement Institute

CERTIFIED REFERENCE MATERIAL CERTIFICATE OF ANALYSIS

Report ID: D947b.2013.01

Compound Name: (±)-**3-Fluoromethcathinone hydrochloride**
Collection Number: D947b
Chemical Formula: $C_{10}H_{12}FNO.HCl$
CAS No: N/A
Structure:



Description: Off white solid
Batch Number: 10-D-15
Molecular Weight: 217.7(HCl), 181.2 (base)
Release date: 24th January 2011

Synonyms: 1-(3-Fluorophenyl)-2-methylaminopropan-1-one hydrochloride
3-FMC.HCl

Purity (mass fraction): 99.8± 2.0% (95% coverage interval)

The purity value was obtained from a combination of traditional analytical techniques and quantitative nuclear magnetic resonance (QNMR). The purity estimate by traditional analytical techniques was obtained by subtraction from 100% of total impurities by HPLC with UV detection, thermogravimetric analysis, Karl Fischer analysis and ^{1}H and ^{19}F NMR. The purity estimate by QNMR was obtained using a combination of the three proton doublet at 1.45 ppm and one proton quartet at 5.2 ppm against a certified internal standard of dimethyl terephthalate. Supporting evidence is provided by headspace GC-MS analysis of occluded solvents, elemental microanalysis and GC-FID analysis of *N*-acetyl derivative.

HPLC:	Instrument:	Shimadzu Model LC-20AB, SIL-20A HT autosampler	
	Column:	Ascentis C-18, 2.7 µm (4.6 mm x 150 mm)	
	Mobile Phase:	Acetonitrile/MilliQ water (80:20)	
		0.05% TFA was present in both aqueous and organic phases.	
	Flow rate:	0.4 mL/min	
	Detector:	Waters PDA 996 operating at 242 nm	
	Retention time:	10.6 min	
	Relative peak area response of main component:		
	Initial analysis:	Mean = 99.9%, s = 0.01% (10 sub samples in duplicate, October 2010)	
GC-FID:	Instrument:	Agilent 6890	
	Column:	HP-1, 30 m × 0.32 mm I.D. × 0.25 µm	
	Program:	100 °C (1 min), 20 °C/min to 160 °C (10 min), 30 °C/min to 300 °C (3 min)	
	Injector:	200 °C	Detector Temp: 320 °C
	Carrier:	Helium	Split ratio: 20/1
	Relative peak area response of main component as the *N*-acetyl derivative:		
	Initial analysis:	Mean = 99.9%, s = 0.14% (5 sub samples in duplicate, November 2010)	
	Re-analysis:	Mean = 99.5%, s = 0.04% (5 sub samples in duplicate, March 2013)	
GC-FID:	Instrument:	Varian CP-3800	
	Column:	HP-1, 30 m × 0.32 mm I.D. × 0.25 µm	
	Program:	100 °C (1 min), 20 °C/min to 160 °C (10 min), 20 °C/min to 300 °C (3 min)	
	Injector:	200 °C	Detector Temp: 320 °C
	Carrier:	Helium	Split ratio: 20/1
	Relative peak area response of main component as the *N*-acetyl derivative:		
	Initial analysis:	Mean = 99.5%, s = 0.13% (5 sub samples in duplicate, November 2010)	
	Re-analysis:	Mean = 99.5%, s = 0.14% (5 sub samples in duplicate, September 2011)	

Thermogravimetric analysis:		Non volatile residue < 0.2 % mass fraction (November 2010). The volatile content (e.g. organic solvents and/or water) could not be analysed accurately because of the inherent volatility of the material.
Karl Fischer analysis:		Moisture content < 0.2% mass fraction (September 2010, 2011 and 2013)
QNMR:	Instrument:	Bruker Avance-400
	Field strength:	400 MHz Solvent: d_6-DMSO (2.50 ppm)
	Internal standard:	Dimethylterephthalate (100% m/m)
	Initial analysis:	Mean (1.45 ppm) = 99.8%, s = 0.5% (5 sub samples, September 2010)
	Initial analysis:	Mean (5.20 ppm) = 99.8%, s = 0.5% (5 sub samples, September 2010)

Spectroscopic and other characterisation data

ESI-MS:	Instrument	Micromass Quatro Micro
	Operation:	Negative ion mode, direct infusion at 5 µL/min
	Ionisation:	ESI spray voltage at 3.2 kV positive ion
	EM voltage:	650 V
	Cone voltage	14 V
	Peak:	182.2 ($M+H^+$) 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:	Acetone and diethyl ether
IR:	Instrument:	Biorad FTS300MX FT-IR
	Range:	4000-400 cm^{-1}, KBr powder
	Peaks:	2950, 2739, 2690, 2442, 1700, 1585, 1474, 1436, 1261, 1097, 1017, 897, 797 cm^{-1}
^{1}H NMR:	Instrument:	Bruker Avance-400
	Field strength:	400 MHz Solvent: D_2O (4.79 ppm)
	Spectral data:	δ 1.63 (3H, d, J = 7.3 Hz), 2.84 (3H, s), 5.11 (1H, q, J = 7.3 Hz), 7.50 (1H, dddd, J = 0.9, 2.6, 8.5, 8.5 Hz), 7.62 (1H, ddd, J = 5.6, 8.2, 8.2 Hz), 7.73 (1H, dddd, J = 1.7, 1.7, 1.7, 9.3 Hz), 7.83(1H, dddd, J = 1.0, 1.0, 1.0, 7.8 Hz) ppm Acetone and diethyl ether were both observed at 0.01% mass fraction in the ^{1}H NMR.
^{13}C NMR:	Instrument:	Bruker Avance-400
	Field strength:	101 MHz Solvent: D_2O
	Spectral data:	δ 15.1, 31.0, 59.8, 115.3 (d, $J_{C\text{-}F}$ = 23.1 Hz), 122.2 (d, $J_{C\text{-}F}$ = 21.1 Hz), 125.0 (d, $J_{C\text{-}F}$ = 3.0 Hz), 131.3 (d, $J_{C\text{-}F}$ = 8.0 Hz), 134.2 (d, $J_{C\text{-}F}$ = 7.0 Hz), 162.6 (d, $J_{C\text{-}F}$ = 246.5 Hz), 196.4 (d, $J_{C\text{-}F}$ =3.0 Hz) ppm
^{19}F NMR:	Instrument:	Bruker Avance-400
	Field strength:	376 MHz Solvent: D_2O
	Spectral data:	δ -111.8 (1F, s) ppm A fluorinated impurity was observed at 2.6% mass fraction in the ^{19}F NMR.
Microanalysis:		Found: C = 55.5%; H = 6.1%; N = 6.4% (September, 2010) Calc: C = 55.2%; H = 6.0%; N = 6.4% (Calculated for $C_{10}H_{13}ClFNO$)

Expiration of certification
The property values are valid till 5th March 2016, i.e. three 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.

The long-term stability of the compound in solution has not been examined.

This material has been given a shelf life of three years from the date of re-certification. 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.

In the absence of stability data the measurement uncertainty at the 95% coverage interval has been expanded to accommodate any potential change in the property value. The stability component has been estimated from stability trials conducted on similar materials by NMI Australia over the last 10 years.

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 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.

Metrological Traceability
The certified purity value is traceable to the SI unit for mass (kg) through Australian national standards via balance calibration. The purity was derived by subtraction of the mass of impurities from the mass of the reference material. Organic purity is traceable to the SI-derived coherent unit one through chromatographic separation and response factor determination of individual components. Volatile and non-volatile residue content is directly traceable to mass through use of Karl Fischer and thermogravimetric analysis. 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).

Recommended storage
When not in use, this material should be stored at or below 4 ºC in a closed container in a dry, dark area.

Intended Use
For ***in vitro*** laboratory analysis only.

Caution
Treat as hazardous substance. Use appropriate work practices when handling to avoid skin or eye contact, ingestion or inhalation of dust.

Legal notice
Neither NMI nor any person acting on NMI'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 certificate.

Authorised by:

S. R. Davies

Team Leader,
Chemical Reference Materials, NMI.
Dated: 14 March, 2013.

Characterisation data and property values specified in this report supersede those in all reports issued prior to 14th March 2013.