Australian Government
Department of Industry, Science and Resources

National Measurement Institute

NATA
WORLD RECOGNISED ACCREDITATION

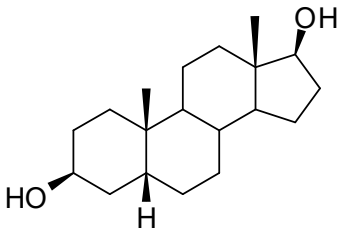
CERTIFIED REFERENCE MATERIAL CERTIFICATE OF ANALYSIS

NMIA D637: 5β-Androstane-3β, 17β-diol

Report ID: D637.2021.04 (Ampouled 100809)

Chemical Formula: $C_{19}H_{32}O_2$

Molecular Weight: 292.5 g/mol



Certified value

Batch No.	CAS No.	Mass per ampoule
98-001018	6038-31-9	927 ± 11 µg

The uncertainty has been calculated according to ISO 33405 and is stated at the 95% confidence limit (k = 2).

IUPAC: (3β,5β,17β)-Androstane-3,17-diol

Expiration of certification: The property values are valid till 18 February 2031, i.e. ten 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 material will be re-tested periodically 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: The compound is supplied as a dried aliquot in a sealed ampoule under an atmosphere of argon. The CRM is intended for a single use to prepare a standard solution containing D637. This material was prepared by synthesis, and certified for identity and purity by NMIA.

Intended use: This certified reference material is suitable for use as a primary calibrator.

Instructions for use: Open the ampoule and carefully rinse the interior at least three times, each time with a minimum of 0.5 mL of a suitable organic solvent (e.g. chloroform). This process will ensure the transfer of the stated mass per ampoule of anhydrous 5β-androstane-3β, 17β-diol. The mass of analyte contained in each ampoule has been determined based on the assigned purity of the bulk material and the concentration of that bulk material in the stock solution used during ampoule preparation.

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.

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 ten years. The measurement uncertainty at the 95% coverage interval includes a stability component which has been estimated from long term 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 seven randomly selected ampoules 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.
15 July 2026

This report supersedes any issued prior to 15 July 2026.

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:

GC-FID:	Instrument:	Varian 3800 or Agilent 7890
	Column:	VF-1, 30 m x 0.32 mm I.D. x 0.25 μm, or
		HP-5, 30 m x 0.32 mm I.D. x 0.25 μm
	Program:	220 °C (12 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 of the main component:	
	Initial analysis:	Mean = 97.6%, s = 0.02% (7 ampoules in duplicate, August 2010)
	Re-analysis:	Mean = 97.4%, s = 0.02% (5 ampoules in duplicate, August 2011)
	Re-analysis:	Mean = 97.8%, s = 0.02% (5 ampoules in duplicate, August 2012)
	Re-analysis:	Mean = 97.7%, s = 0.03% (5 ampoules in duplicate, July 2013)
	Re-analysis:	Mean = 97.8%, s = 0.04% (5 ampoules in duplicate, May 2016)
	Re-analysis:	Mean = 97.8%, s = 0.02% (5 ampoules in duplicate, February 2021)

The following analytical data was obtained on the bulk material subsequently used in the preparation of the ampoules.

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.

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

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, 29.8 m x 0.32 mm x 0.25 μm
	Program:	220 °C (10 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 of the main component:	
	Initial analysis:	Mean = 97.8%, s = 0.13% (5 sub samples in duplicate, February 2007)
GC-FID:	Instrument:	Varian
	Column:	VF-1, 29.8 m x 0.32 mm x 0.25 μm
	Program:	220 °C (10 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 of the main component:	
	Initial analysis:	Mean = 98.1%, s = 0.16% (5 sub samples in duplicate, February 2008)
	Re-analysis:	Mean = 97.8%, s = 0.06% (5 sub samples in duplicate, February 2009)
Thermogravimetric analysis:		Volatiles content 4.9% and non-volatile residue < 0.2% mass fraction (February 2007) Volatiles content 5.3% and non-volatile residue < 0.2% mass fraction (January 2008) Volatiles content 5.9% and non-volatile residue < 0.2% mass fraction (January 2009) Volatiles content 5.2% and non-volatile residue < 0.2% mass fraction (August 2010)
Karl Fischer analysis:		Moisture content 2.6% mass fraction (January 2008) Moisture content 2.8% mass fraction (January 2009)

Spectroscopic and other characterisation data

GC-MS:	Instrument:	Agilent 6890/5973
	Columns:	ZB-5 MS, 30 m x 0.25 mm I.D. x 0.25 μm
	Program:	100 °C, 15 °C/min to 230 °C, 8 °C/min to 310 °C
	Injector:	250 °C
	Transfer line temp:	300 °C
	Split ratio:	30/1
	The retention time of the parent compound is reported with the major peaks in the mass spectrum. The latter are reported as mass/charge ratios (in brackets) as a percentage relative to the base peak.	
	9.3 min:	292 (M^+, 9), 274 (100), 259 (33), 241 (30), 233 (30), 215 (77) *m/z*
TLC:	Conditions:	Kieselgel 60F254. Chloroform/ethyl acetate (80:20) Single spot observed, Rf = 0.13 (3 sub samples)
IR:	Instrument:	FT-IR, Biorad WIN FTS40
	Range:	4000-400 cm^{-1}, KBr powder
	Peaks:	3387, 1445, 1314, 1277, 1105, 1058, 1032, 944 cm^{-1}
^{1}H NMR:	Instrument:	Bruker DMX-500
	Field strength:	500 MHz
	Solvent:	$CDCl_3$/DMSO-d_6 (7.26 ppm/2.5 ppm)
	Key spectral data:	δ 0.55 (3H, s), 0.79 (3H, s), 3.42 (1H, t), 3.89 (1H, br) ppm ^{1}H NMR run in d4-methanol shows the presence of hexane and ethyl acetate in quantities of 3.0% and 0.5% mass fractions respectively.
^{13}C NMR:	Instrument:	Bruker DMX-300
	Field strength:	75 MHz
	Solvent:	$CDCl_3$/DMSO-d_6 (77.16 ppm/39.52 ppm)
	Spectral data:	δ 11.0, 20.4, 23.2, 23.7, 25.7, 26.4, 27.6, 29.8, 30.2, 33.3, 35.0, 35.5, 36.3, 36.9, 39.8, 42.9, 51.0, 66.2, 81.3 ppm
Microanalysis:	Found:	C = 76.5%; H = 11.4% (May 2000)
	Calculated:	C = 78.0%; H = 11.0% (Calculated for $C_{19}H_{32}O_2$)