Australian Government
Department of Industry, Innovation and Science

National Measurement Institute

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

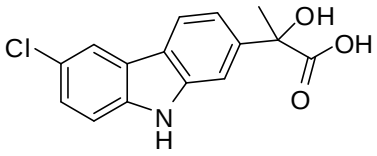
REFERENCE MATERIAL PRODUCT INFORMATION SHEET

NMIA D1072: α-Hydroxycarprofen

Report ID: D1072.2020.01

Chemical Formula: $C_{15}H_{12}ClNO_3$

Molecular Weight: 289.7 g/mol



Property value

Batch No.	CAS No.	Purity estimate
18-D-01	**70359-62-5**	**85%**

Synonyms: 6-Chloro-α-hydroxy-α-methyl-9*H*-carbazole-2-acetic acid

Expiration of certification: The property values are valid till 18 February 2023, 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.

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.

Intended use: The purity value is an estimate only. This reference material should be used for qualitative analysis only.

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.

Stability: 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 HPLC-UV 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.
24 February 2020

This report supersedes any issued prior to 24 February 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 purity value was obtained by mass balance from a combination of traditional analytical techniques, including HPLC with UV detection, 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.

HPLC:	Instrument:	Shimadzu Binary pump LC-20AB, SIL-20 A HT autosampler
	Column:	X-Bridge C-18, 5 μm (4.6 mm x 250 mm)
	Column oven:	40 °C
	Mobile Phase:	A = MilliQ water; B = Acetonitrile 0-20 min 25% B; 20-25 min 25-80% B; 25-30 min 80%B; 30-31 min 80-25%B. The aqueous phase was buffered at pH 9 using 10mM $NH_4CO_2^-$ and NH_3
	Flow rate:	1 mL/min
	Detector:	Shimadzu SPD-M20A PDA operating at 300 nm
	Relative peak area of the main component:	
	Initial analysis:	Mean = 90.0%, s = 0.3% (10 sub samples in duplicate, November 2018)
	Re-analysis:	Mean = 91.7%, s = 0.03% (5 sub samples in duplicate, February 2020)
Thermogravimetric analysis:		Non volatile residue 0.2 % mass fraction (November 2018). The volatile content (e.g. organic solvents and/or water) could not be determined by thermogravimetric analysis.
Karl Fischer analysis:		Moisture content 0.5% mass fraction (November 2018)

Spectroscopic and other characterisation data

LC-MS:	Instrument:	Waters Acquity/Waters TQ Detector	
	Column:	X-Bridge C-18, 250 mm × 4.6 mm I.D. × 5 μm	
	Column temp:	40 °C	
	Solvent system:	A = MilliQ water; B = Acetonitrile 0-20 min 25% B; 20-25 min 25-80% B; 25-30 min 80%B; 30-31 min 80-25%B. The aqueous phase was buffered at pH 9 using 10mM $NH_4CO_2^-$ and NH_3	
	Flow rate:	0.2 mL/min	
	Sample prep:	1000 μg/g in mobile phase	
	Injection volume:	30 μL	
	Ionisation mode:	Electrospray negative ion	
	Capillary voltage:	3 kV	Cone voltage: 20 V
	Source temp:	120 ºC	Desolvation gas temperature: 400 ºC
	Cone gas flow rate:	23 L/hr	Desolvation gas flow rate: 500 L/hr
	The retention time of α-hydroxycarprofen is reported along with the major peak in the mass spectrum. The latter is reported as a mass/charge ratio.		
	14.6 min:	288.2 $[M-H]^-$ *m/z*	
IR:	Instrument:	Bruker Alpha FT-IR	
	Range:	4000-400 cm^{-1}, neat	
	Peaks:	3405, 2978, 2938, 1736, 1628, 1472, 1449, 1270, 1174, 1148, 1061, 824, 806, 700, 583, 463 cm^{-1}	
^{1}H NMR:	Instrument:	Bruker Avance III-500	
	Field strength:	500 MHz	
	Solvent:	MeOH-*d*$_4$ (3.31 ppm)	
	Spectral data:	δ 1.84 (3H, s), 7.32 (1H, dd, *J* = 2.0, 8.5 Hz), 7.39-7.43 (2H, m), 7.71 (1H, d, *J* = 0.9 Hz), 7.99-8.02 (2H, m) ppm	
		Tert-butyl methyl ether estimated at 5.6% and hexane at 0.3% mass fraction was observed in the ^{1}H NMR.	
^{13}C NMR:	Instrument:	Bruker Avance III-500	
	Field strength:	125 MHz	
	Solvent:	MeOH-*d*$_4$ (49.0 ppm)	
	Spectral data:	δ 27.2, 77.2, 108.9, 112.9, 117.8, 120.6, 120.9, 122.7, 125.2, 125.2, 126.5, 140.3, 142.0, 143.5, 178.4 ppm	
Melting point:		176-180 °C	
Microanalysis:	Found:	C = 62.5%; H = 4.7%; N = 4.9%; Cl = 10.6% (November 2018)	
	Calculated:	C = 62.2%; H = 4.2%; N = 4.8%; Cl = 12.2% (Calculated for $C_{15}H_{12}ClNO_3$)	