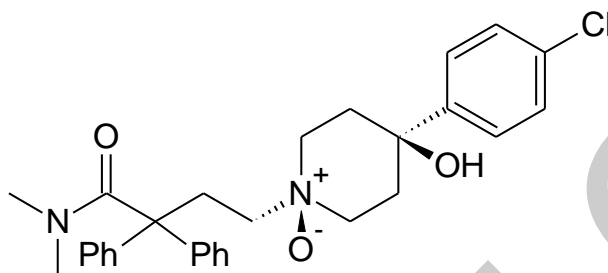


Reference Material Product Information Sheet

Epichem's Quality System conforms to ISO9001:2015 as certified by ECAAS Pty Ltd - Certification number 616061.



Name	<i>cis</i> -loperamide- <i>N</i> -oxide
BP/EP Name	Loperamide Impurity G
USP Name	Not listed.
Synonym(s)	4-(<i>cis</i> -4-(4-chlorophenyl)-4-hydroxy-1-oxidopiperidin-1-yl)- <i>N,N</i> -dimethyl-2,2-diphenylbutanamide
Epichem Item #	EPL-AA160 Batch 5
CAS #	109572-89-6
Molecular Formula	C ₂₉ H ₃₃ ClN ₂ O ₃
Molecular Weight	493.05 g/mol
Appearance	White powder
Melting Point	156.4-172.3°C (decomposition)
Combustion Analysis	Required (%): C:70.6; H:6.8; N:5.7. Found (%): C:68.1; H:7.1; N:5.3.
Purity*	94.6%
Date of Manufacture	3 March 2015
Storage Requirements	Hygroscopic. Protect from heat, light and moisture.
Special Precautions	This compound is for laboratory use only. Its toxicological properties may not have been fully established. It should be handled only by suitably qualified personnel.
Intended Use	This compound is suitable for the identification of impurities and degradants in pharmaceutical materials. The purity assay is considered as relative contribution.
Date of Shipment	TBA This certificate is valid for one year from the date of shipment provided the substance is stored under the recommended conditions.
Retest Date	TBA (Proper Storage and Handling Required)

* NATA accreditation does not cover the performance of this service

EPL-AA160 Batch 5

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I. Identity

The identity of this product was established using the following analyses:

Ia. ¹HNMR Spectrum

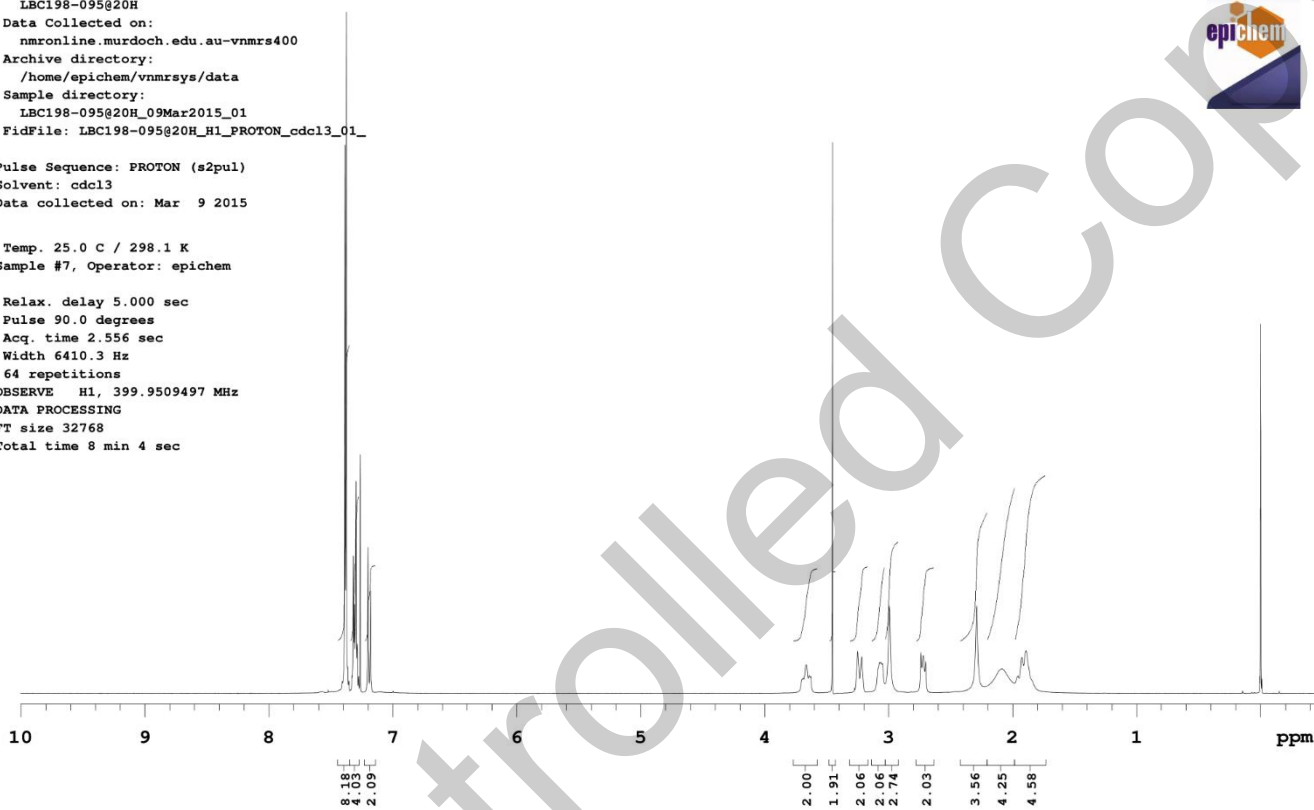
Conditions: 400 MHz, CDCl₃
¹HNMR spectrum consistent with chemical structure.

Sample Name:
LBC198-095@20H
Data Collected on:
nmronline.murdoch.edu.au-vnmrs400
Archive directory:
/home/epichem/vnmrsys/data
Sample directory:
LBC198-095@20H_09Mar2015_01
FidFile: LBC198-095@20H_H1_PROTON_cdc13_01_

Pulse Sequence: PROTON (s2pul)
Solvent: cdcl3
Data collected on: Mar 9 2015

Temp. 25.0 C / 298.1 K
Sample #7, Operator: epichem

Relax. delay 5.000 sec
Pulse 90.0 degrees
Acq. time 2.556 sec
Width 6410.3 Hz
64 repetitions
OBSERVE H1, 399.9509497 MHz
DATA PROCESSING
FT size 32768
Total time 8 min 4 sec



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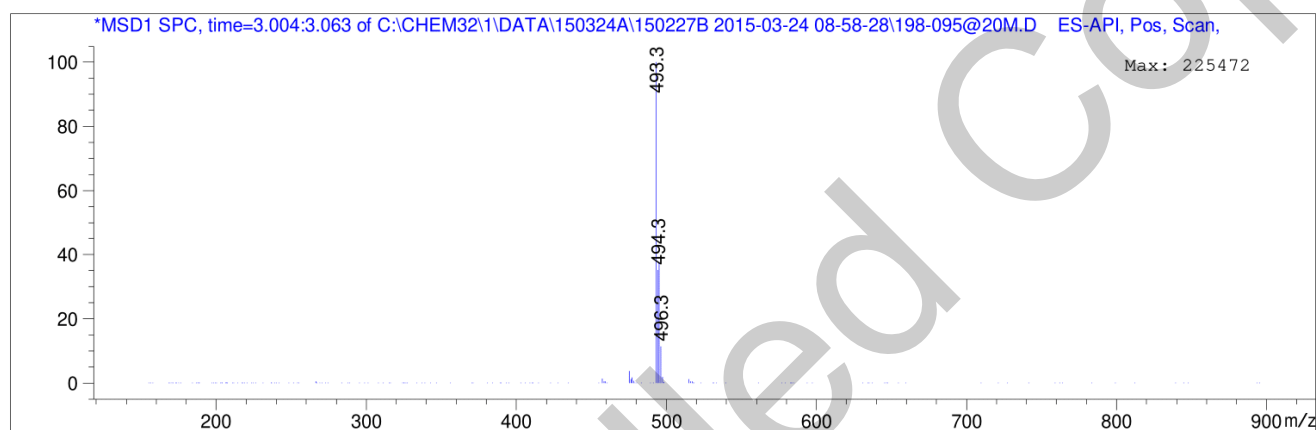
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Ib. Mass Spectrum

The mass spectrum of this material was analysed by Liquid Chromatography Mass Spectroscopy (LCMS) using in-house EM005.WI08.

Method: 5% to 100% ACN in water gradient (+0.1% formic acid)
Poroshell 120 EC-C18, 4.6 x 50 mm, 2.7 micron

Retention Time (MS)	MS Area	Mol. Weight or Ion
3.031	2776153	496.30 495.30 494.30 493.30



Theoretical values: 493.3 [M+H]⁺.

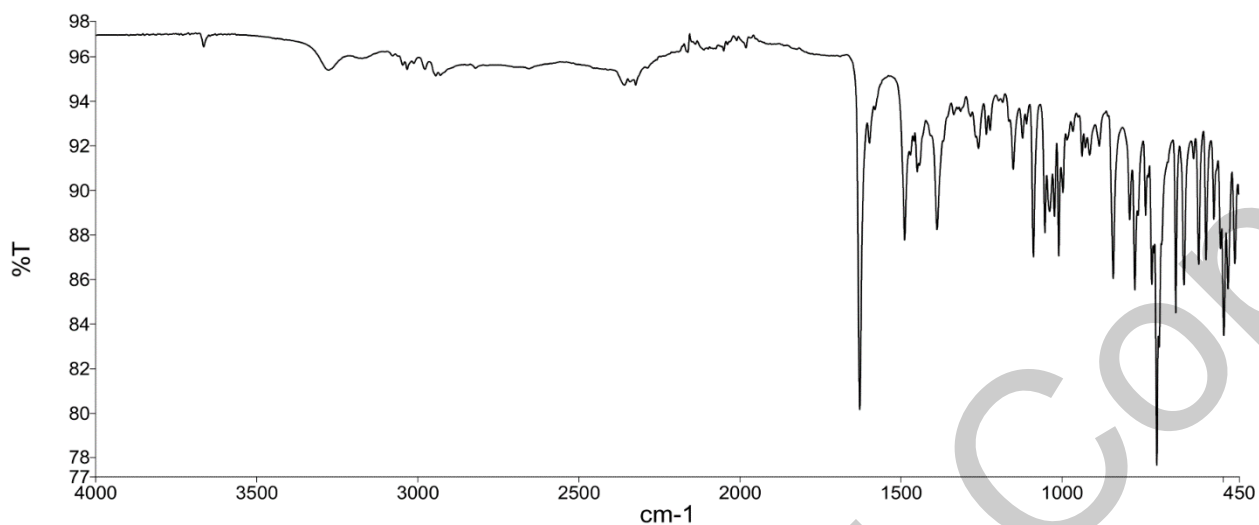
The signal of the Mass Spectrum is consistent with the theoretical value and its interpretation is consistent with the structural formula.

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Ic. IR Spectrum

The infra-red spectrum of this material was analysed by Fourier-Transform Infrared Spectroscopy (FTIR) using in-house EM005.WI09.



The interpretation of the signals of the Fourier-Transform Infrared Spectrum is consistent with the structural formula.

EPL-AA160 Batch 5

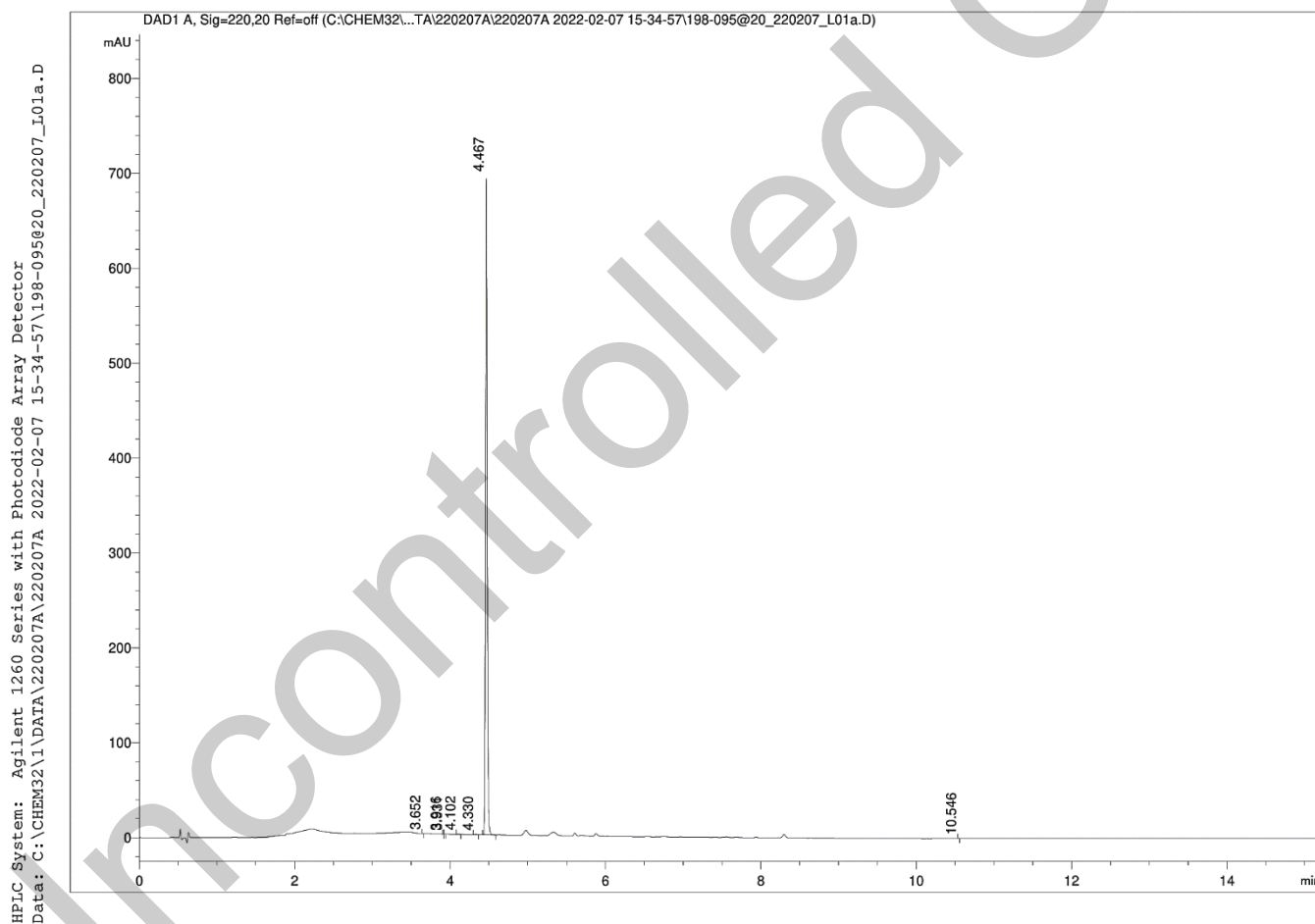
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II. Purity

The purity of this material was analysed by high performance liquid chromatography (HPLC) using in-house EM005.WI07.

HPLC Conditions:

Column	Conditions				Detector	Injector
Agilent Poroshell 120 EC-C18 4.6 x 50mm 2.7 micron	25°C				DAD	Auto
	Time (min)	% Line A (5 mM tetrabutylammonium bisulfate in water)	% Line B (acetonitrile, no modifiers)	Flow rate (mL/min)	220nm	1.0 µL
	0.00	86	14	1.0		0.5 mg/mL in 100% methanol (NO MODIFIERS)
	9.00	5	95	1.0		
	14.00	5	95	1.0		
	15.00	86	14	1.0		
20.00	86	14	1.0			



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Area Percent Report – Sorted by Signal

Peak Number	Retention Time (rounded)	Area	Area % (rounded)
1	3.65	0.08	0.01
2	3.92	0.02	0.00
3	3.93	0.05	0.00
4	4.10	0.56	0.05
5	4.33	0.85	0.08
6	4.47	1050.20	99.84
7	10.55	0.11	0.01
Totals			100 (rounded)

For the calculation the system peaks were ignored. The content of the analyte was determined as a ratio of the peak area of the analyte and the cumulative areas of the purities, added up to 100%.

Results:

Average 99.9% (average of 10 duplicate runs)

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III. Water Content

Method: Karl-Fischer titration using in-house EM005.WI04.

Results:

Average 1.3%

IV. Ash Content

Method: BP 2016 Ash (Appendix XI J) as per WS001/28614

Result:

Contains <0.1% ash.

V. Residual Solvents

Method: ¹H NMR

Result:

4.0% Methanol detected by ¹H NMR analysis.

VI. Final Result

Chromatographic purity (HPLC)	99.9%
Water content	1.3%
Ash content	<0.1%
Residual solvents	4.0%
Purity*	94.6%

This purity is assessed to be 94.6%.

Product Reviewed By:

Jason Chaplin, PhD
Principal Chemist

Product Released By:

Carol Worth, PhD
Quality Manager
Release Date: 16 February 2022

**NATA accreditation does not cover the performance of this service.*

The calculation of the purity follows the formula:

$$\text{Purity(\%)} = \frac{((\text{Chromatographic purity [HPLC]}) \times (100 - (\text{water content} + \text{ash content} + \text{volatile contents})))}{100}$$

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