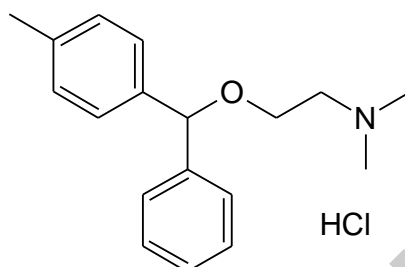


Reference Material Product Information Sheet

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



Name	2-((<i>RS</i>)-(4-methylphenyl)phenylmethoxy)- <i>N,N</i> -dimethylethanamine hydrochloride
BP/EP Name	Orphenadrine Impurity F
USP Name	Orphenadrine Related Compound F
Synonym(s)	(<i>RS</i>)- <i>N,N</i> -dimethyl- <i>N</i> -(2-((4-methylphenyl)(phenyl)methoxy)ethyl)amine hydrochloride; (<i>RS</i>)- <i>N,N</i> -dimethyl-2-(2-((4-methylphenyl)(phenyl)methoxy)ethanamine hydrochloride
Epichem Item #	EPL-AA37 Batch 3
CAS #	4024-34-4
Molecular Formula	C ₁₈ H ₂₃ NO . HCl
Molecular Weight	305.85 g/mol
Appearance	White powder
Melting Point	152.3-154.6°C
Combustion Analysis	Required (%): C:70.7; H:7.9; N:4.6. Found (%): C:70.8; H:8.0; N:4.6.
Purity*	99.1%
Date of Manufacture	8 January 2021
Storage Requirements	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

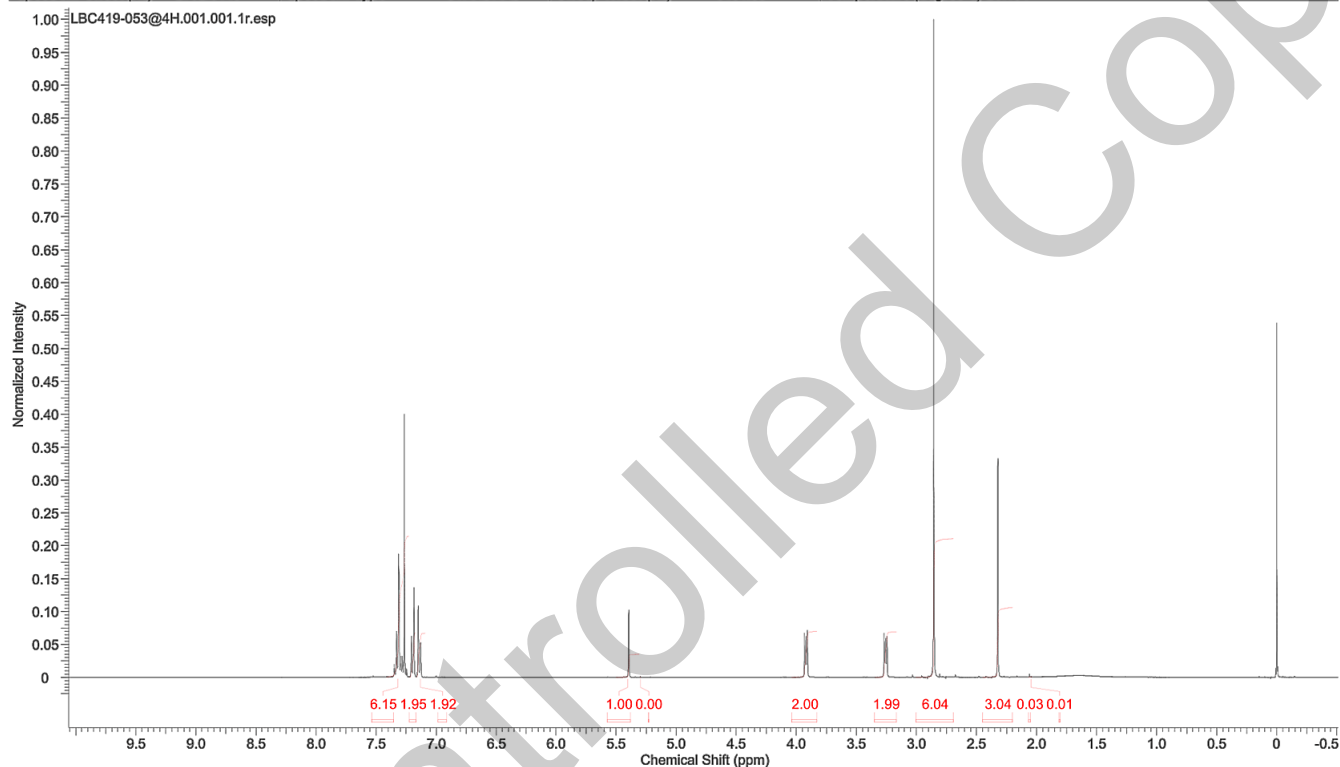
I. Identity

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

Ia. ¹H NMR Spectrum

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

Acquisition Time (sec)	3.7547	Comment	1H CDCl ₃ (E:\data\external\epichem) epichem 16	Date	07 Jan 2021 17:53:04		
Date Stamp	07 Jan 2021 17:53:04	File Name	\\naphthalene\company\NMR files\LBC419-053@4H\1\data\1\1r				
Frequency (MHz)	400.13	Nucleus	1H	Number of Transients	8	Origin	spect
Original Points Count	24038	Owner	nmr	Points Count	32768	Pulse Sequence	zg
Receiver Gain	144.00	SW(cyclical) (Hz)	6402.05	Solvent	CHLOROFORM-d		
Spectrum Offset (Hz)	2792.5149	Spectrum Type	STANDARD	Sweep Width (Hz)	6401.85	Temperature (degree C)	25.104



EPL-AA37 Batch 3

Revision 2

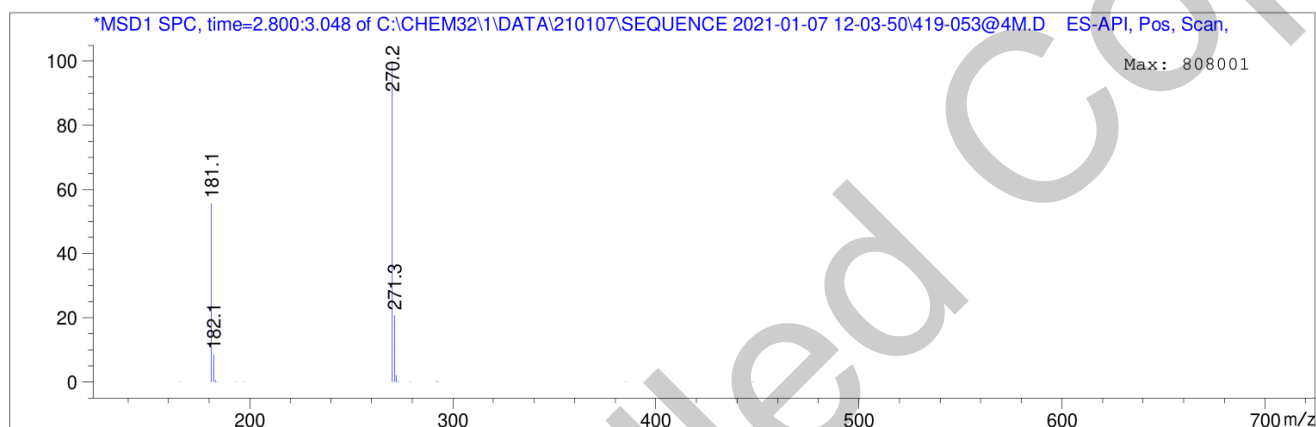
Epichem Pty Ltd, Suite 5, 3 Brodie-Hall Drive, Bentley WA 6102, Australia
Tel + 61 (0)8 6167 5200 Fax + 61 (0)8 6167 5201 www.epichem.com.au ABN 80 106 769 902

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)
Zorbax Eclipse XDB-C8, 3.0 x 100 mm, 3.5 micron

Retention Time (MS)	MS Area	Mol. Weight or Ion
2.901	28797234	271.25 I
		270.20 I
		181.10 I

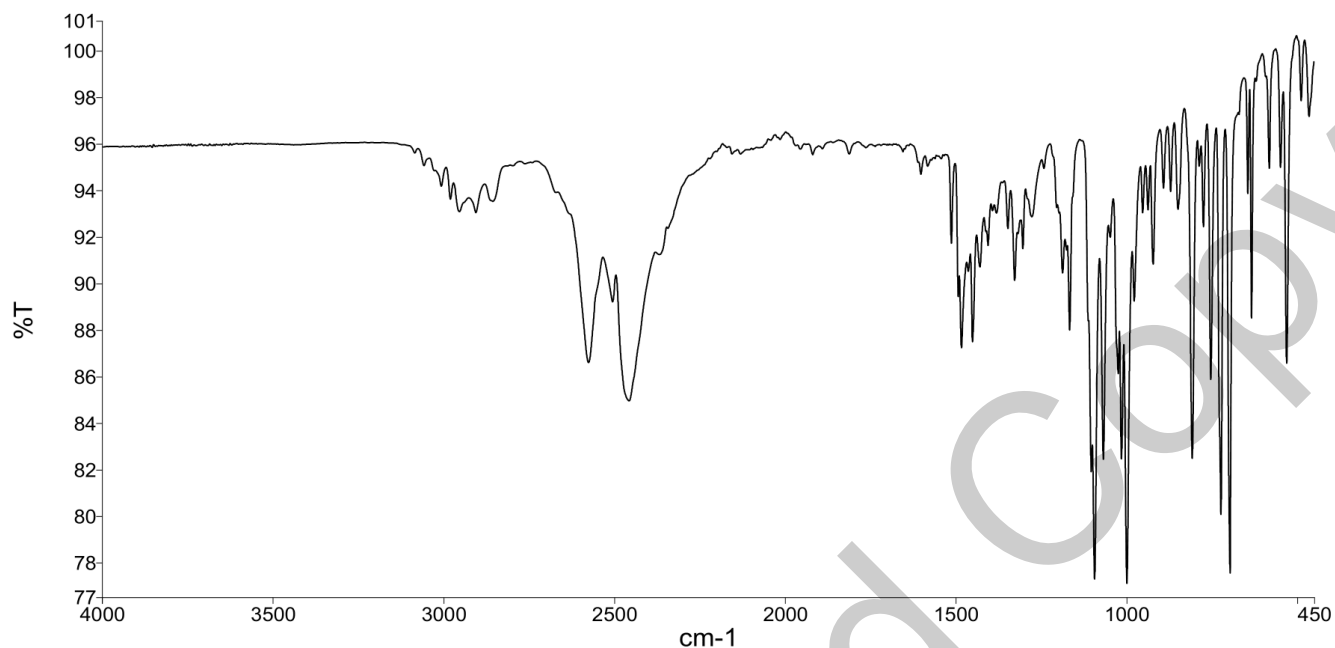


Theoretical values: 271.2 [M+H]⁺.

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

Ic. IR Spectrum

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



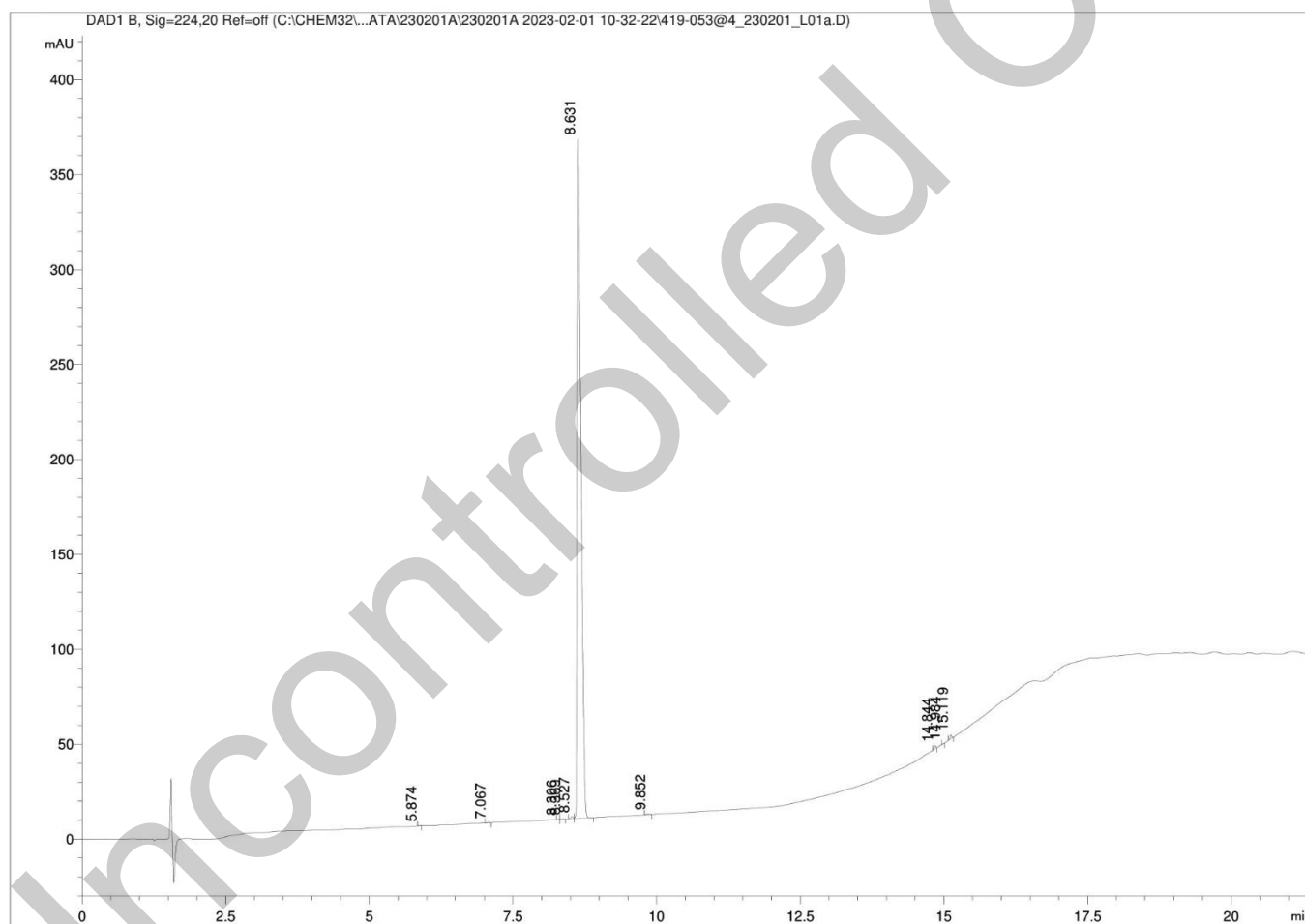
The interpretation of the signals of the Fourier-Transform Infrared Spectrum is consistent with the structural formula.

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 150mm 2.7 micron	45°C				DAD 224nm	Auto
	Time (min)	% Line A (Water + 0.1% (v/v) TFA)	% Line B (Acetonitrile + 0.1% (v/v) TFA)	Flow rate (mL/min)		1.0 µL
	0.00	75	25	1.0		1.0 mg/mL in
	10.00	50	50	1.0		100% acetonitrile
	14.50	5	95	1.0		(NO MODIFIERS)
	19.50	5	95	1.0		
	20.50	75	25	1.0		
	29.50	75	25	1.0		



EPL-AA37 Batch 3

Revision 2

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ABN 80 106 769 902

Area Percent Report – Sorted by Signal

Peak Number	Retention Time (rounded)	Area	Area % (rounded)
1	5.87	0.43	0.03
2	7.07	0.55	0.03
3	8.31	0.15	0.01
4	8.37	0.47	0.03
5	8.53	2.97	0.18
6	8.63	1669.08	99.22
7	9.85	1.26	0.07
8	14.84	3.17	0.19
9	14.98	0.17	0.01
10	15.12	3.93	0.23
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 99.2% (average of 10 duplicate runs)

III. Water Content

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

Results:

Average **0.1%**

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:

No significant impurities detected by ¹H NMR analysis.

VI. Final Result

Chromatographic purity (HPLC)	99.2%
Water content	0.1%
Ash content	0.1%
Residual solvents	<0.1%
Purity*	99.0%

This purity is assessed to be 99.0%

Product Reviewed By:

Product Released By:

James Rixson, PhD
Head of Production

Carol Worth, PhD
Quality Manager
Release Date: 9 February 2023

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

The calculation of the purity follows the formula:

$$\text{Purity(\%)} = \frac{((\text{Chromatographicpurity[HPLC]}) \times (100 - (\text{watercontent} + \text{ashcontent} + \text{volatilecontents})))}{100}$$