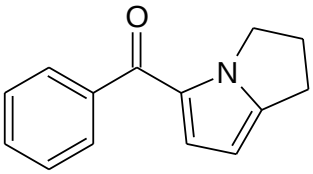
Our Formula. Your Success.

Reference Material Product Information Sheet

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



Name	(2,3-dihydro-1*H*-pyrrolizin-5-yl)phenylmethanone
Other Name	5-benzoyl-2,3-dihydro-1*H*-pyrrolizine; phenyl(2,3-dihydro-1*H*-pyrrolizin-5-yl)methanone; 1-descarboxy ketorolac
BP/EP Name	Ketorolac Impurity I
USP Name	Ketorolac Related Compound D
Epichem Item #	EPL-AA258 Batch 1
CAS #	113502-55-9
Molecular Formula	$C_{14}H_{13}NO$
Molecular Weight	211.27 g/mol
Appearance	Yellow powder
Melting Point	104.5-106.2°C
Combustion Analysis	Required (%): C:79.6, H:6.2, N:6.6. Found (%): C:79.2, H:6.2, N:6.6.
Purity*	99.6%
Date of Manufacture	3 February 2020
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 unopened and stored under the recommended conditions.
Retest Date	TBA (Proper Storage and Handling Required)

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

Epichem Pty Ltd, Suite 5, 3 Brodie-Hall Drive, Bentley WA 6102, Australia
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I. Identity

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

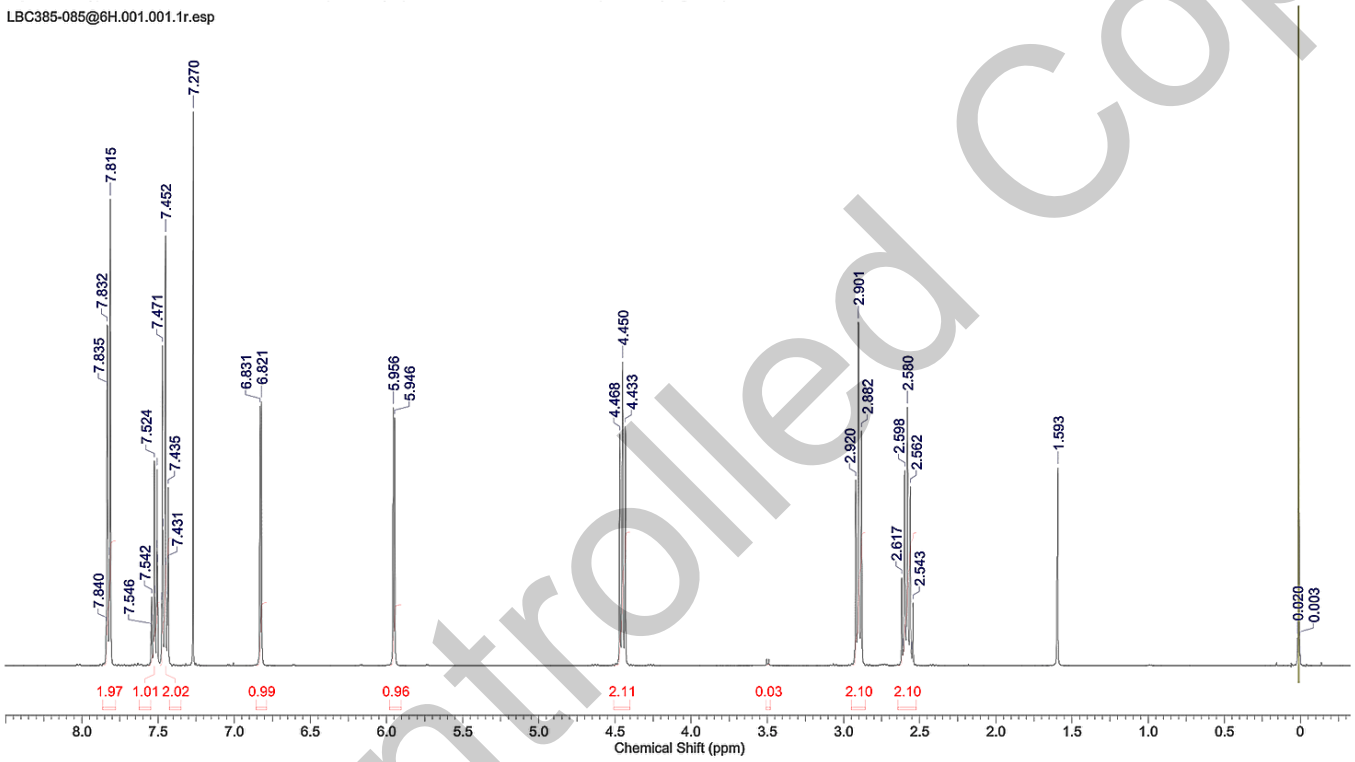
Ia. ^{1}HNMR Spectrum

Conditions: 400 MHz, CHLOFOFORM-d

^{1}HNMR spectrum consistent with chemical structure.

Acquisition Time (sec)	3.7547	*Comment*	LBC385-085@6H 1H CDCl3 {E:\dataexternal\epichem} cygoh 22				
Date	29 Jan 2020 17:31:44			*Date Stamp*	29 Jan 2020 17:31:44		
File Name	\\naphthalene\company\NMR files\LBC385-085@6H\1\pdata\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)*	2794.9438
Spectrum Type	STANDARD	*Sweep Width (Hz)*	6401.85	*Temperature (degree C)*	25.645		

LBC385-085@6H.001.001.1r.esp



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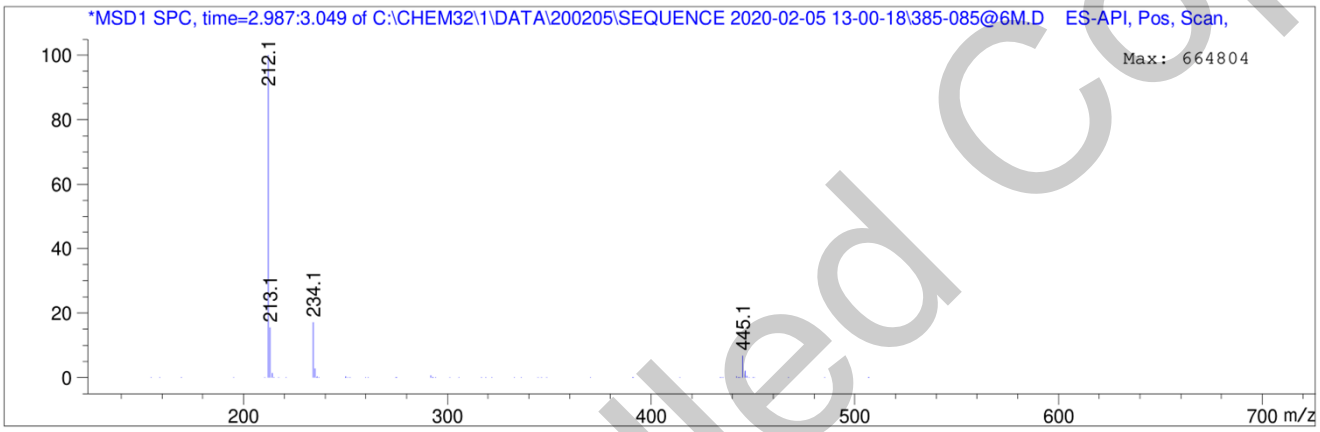
Ib. Mass Spectrum

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

Method: ACN/water gradient (+ 0.1% formic acid).

ZORBAX SB-C8, 4.6 x 30 mm, 3.5 micron.

Retention Time (MS)	MS Area	Mol. Weight or Ion
3.006	9360650	234.15 I
		213.10 I
		212.10 I



Theoretical value: 212.1 $[M+H]^+$.

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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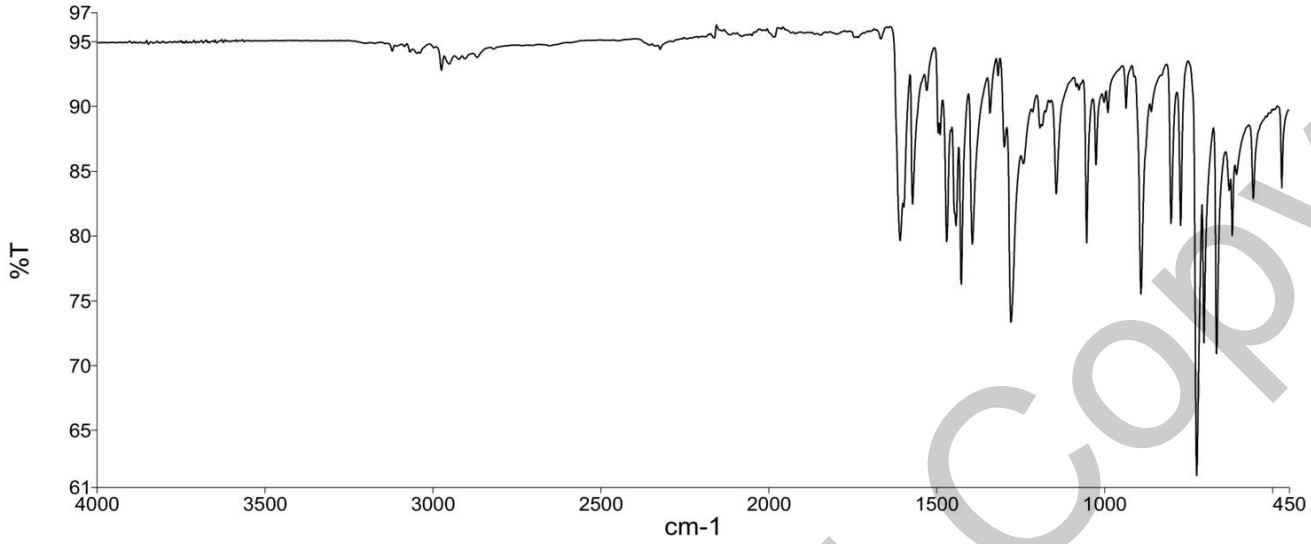
Ic. IR Spectrum

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.

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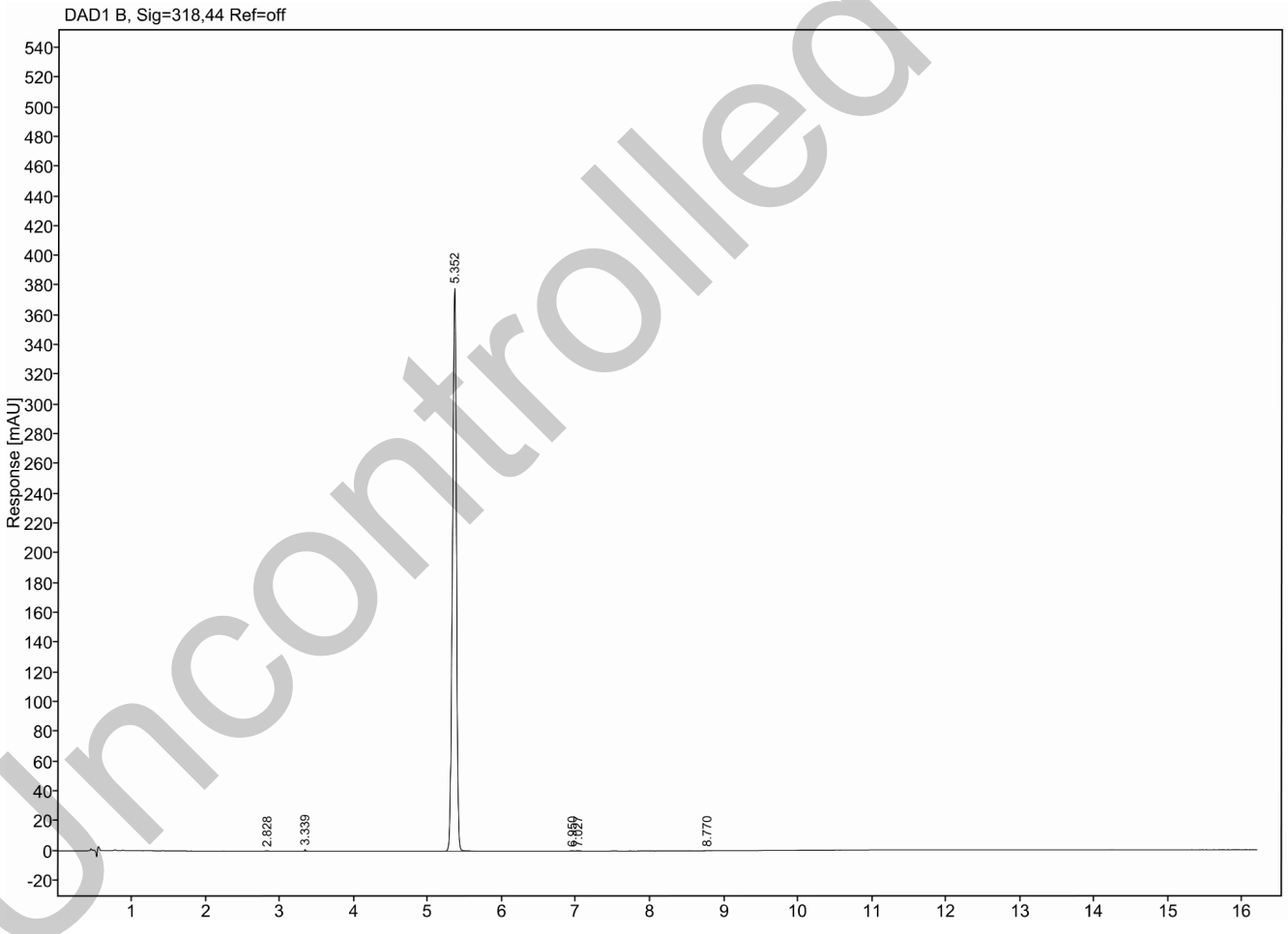
II. Purity

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 50 mm 2.7 micron	25ºC				DAD 318nm	Auto 1.0 µL 0.4mg/mL in 100% acetonitrile (NO MODIFIERS)
	Time (min)	% Line A (Water + 0.1% (v/v) TFA)	% Line B (Acetonitrile + 0.1% (v/v) TFA)	Flow rate (mL/min)		
	0.00	70	30	1.0		
	7.00	35	65	1.0		
	10.00	5	95	1.0		
	15.00	5	95	1.0		
	16.00	70	30	1.0		
	19.00	70	30	1.0		



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Area Percent Report – Sorted by Signal

Peak Number	Retention Time (rounded)	Area	Area % (rounded)
1	2.83	0.19	0.01
2	3.34	1.08	0.08
3	5.35	1410.48	99.84
4	6.95	0.18	0.01
5	7.03	0.55	0.04
6	8.77	0.26	0.02
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 analyses)

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III. Water Content

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

Results:

Average 0.1%

IV. Ash Content

Method: BP 2020 Ash Appendix XIJ Method II

Result:

Contains <0.1% ash.

V. Residual Solvents

Method: ^{1}HNMR

Result:

Contains 0.2% methanol by ^{1}H NMR analysis.

VI. Final Result

Chromatographic purity (HPLC)	99.9%
Water content	0.1%
Ash content	<0.1%
Residual solvents	0.2%
Purity*	99.6%

This purity is assessed to be 99.6%

Product Reviewed By:

James Rixson, PhD
Head of Production

Product Released By:

Jason Chaplin, PhD
Principal Chemist

Release Date: 10 May 2022

**NATA accreditation does not cover the performance of this service.*
The calculation of the purity follows the formula:

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

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