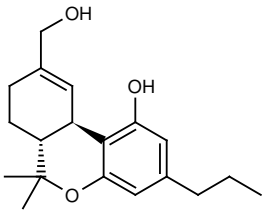
BDG SYNTHESIS

Certificate of Analysis

BDG Synthesis certifies that this reference material meets or exceeds the specifications stated herein.

Neil Beare, PhD, Director
14 March 2015

Name:	**11-Hydroxytetrahydrocannabivarin**
CAS Number:	none
Structure:	
Molecular Weight:	$C_{19}H_{26}O_3$ = 302.41
Lot Number:	BDG 16351.11
Appearance:	Off-white, crystalline solid
Corrected Purity:	99.5 % (HPLC) - 4.5 % (chloroform) = 95.3 %
Re-test Date:	14 March 2016
Storage and Handling:	Temperature: refrigerate for prolonged storage; may be handled and shipped at ambient temperature.
	Humidity: not believed to be hygroscopic; may be handled in normal laboratory atmosphere.
	Light: protect from strong sunlight.
	Caution: only experienced laboratory personnel should handle the material.

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Identity and Purity

Proton NMR Spectrum

Identity: the signals are consistent with the proposed structure and in accord with literature where available.
Residual Solvents: a small amount of chloroform (4.2 % *w/w*) is observed.
Impurities: no significant impurities are evident in the spectrum.

Carbon-13 NMR Spectrum

Identity: the signals are consistent with the proposed structure and in accord with literature where available.

High-resolution Mass Spectrum (ESI+)

Found *m/z* 303.1955. $C_{19}H_{27}O_3$ $[M+H]^+$ requires *m/z* 303.1960. The deviation of 1.6 ppm is within normally accepted limits for the establishment of identity by HRMS.

HPLC

A sharp, symmetrical peak is observed (99.5 %). Note: in the absence of reference materials for preparing calibration curves, it is assumed that all peaks have the same detector response. Where possible, the conditions of analysis follow a pharmacopeial or literature method, or have been adapted from same.

Elemental Analysis

	Found:	C 72.27, H 8.57 %
$C_{19}H_{26}O_3 \cdot 0.12CHCl_3$	Requires:	C 72.50, H 8.31 %, $CHCl_3$ 4.5 %
$C_{19}H_{26}O_3$	Requires:	C 75.46, H 8.67 %

The elemental analyses fall somewhat outside those expected for unsolvated material; the presence of chloroform is reasonably expected from the method of purification and/or the type of material, and the “best-fit” solvated molecular formula is given.

Karl-Fischer Analysis

	Found:	$H_2O < 0.5$ %
$C_{19}H_{26}O_3 \cdot 0.12CHCl_3$	Requires:	H_2O 0.0 %

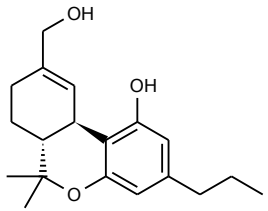
Of necessity, only a small sample could be used and only a single or duplicate analysis performed. We are unable to state what the errors in the reported water content are, but recommend that the result be used, as the best available, when determining corrected purity.

The available quantity of custom-synthesised material is always small, and this limits the extent and type of analytical data which can be obtained. This Certificate is presented in descriptive format for use by analytical chemists who are trained in the use of custom-synthesised materials. Custom materials often contain higher levels of residual solvents and/or water, and we urge you to use the corrected purity where needed rather than the raw HPLC purity. This compound is intended for use as an analytical reference material and it is not for human administration. Structures are shown with relative stereochemistry unless otherwise specified.

The re-test date is assigned from experience gained with the material in the laboratory and/or on storage. It is not possible to perform formal storage studies because of the small amount of material available.

BDG SYNTHESIS

Proton NMR Spectrum of 11-Hydroxytetrahydrocannabivarin in DMSO-d_6



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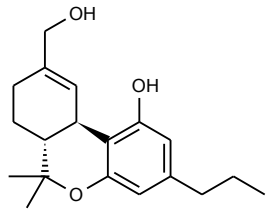
Carbon-13 NMR Spectrum of 11-Hydroxytetrahydrocannabivarin in DMSO-d_6



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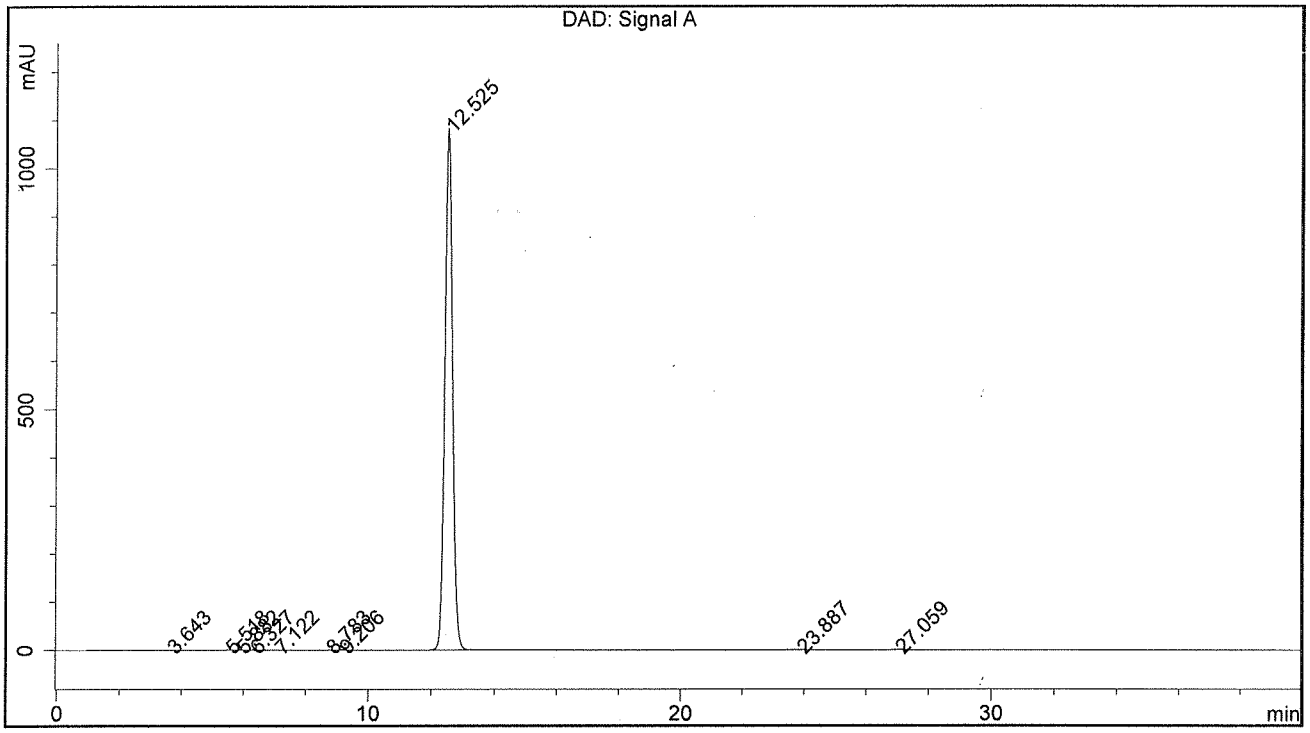
BDG - Analysis of 11-Hydroxytetrahydrocannabivarin

Column : Phenomenex Luna C18(2) 5 um 250 x 4.6 mm
Guard : Phenomenex Security Guard C18 RP 4 x 3 mm. . . . . Injection Volume : 10 uL
Mobile Phase : 45:55 Water : Acetonitrile . . . . . Sample Solvent : 1:1 Water : Acetonitrile
Flow Rate : 1.0 mL/min . . . . . Column Temperature : 20 C . . . . . Detection: UV 230 nm

Sample Name	BDG 16351.11	Instrument	AnalyticalLC01
Acquisition	14/03/2015, 19:32:10	Method (rev.)	LC10655a (8)
Sequence	BDG_14Mar2015d - Reprocessed	Vial Position	42
Operator	solvation010\cerityadmin	Injection	1 of 1



Area Percent Report

Peak#	RT	Peak Height	Peak Area	Width	Area %
1	3.64 min	0.3693	4.3785	0.1583 min	0.024 %
2	5.52 min	0.8577	13.8826	0.2488 min	0.075 %
3	5.88 min	0.6031	7.1008	0.1654 min	0.038 %
4	6.33 min	0.4302	4.9700	0.1908 min	0.027 %
5	7.12 min	0.3435	12.4310	0.4422 min	0.067 %
6	8.78 min	0.3827	5.9854	0.1984 min	0.032 %
7	9.21 min	0.5232	7.7582	0.2250 min	0.042 %
8	12.53 min	1082.0739	18501.2780	0.2675 min	99.459 %
9	23.89 min	0.6689	27.8858	0.5104 min	0.150 %
10	27.06 min	0.4757	16.1731	0.4166 min	0.087 %