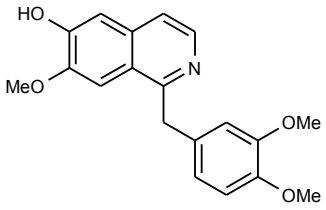
BDG SYNTHESIS

Certificate of Analysis

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

Barry Dent

Barry R. Dent, PhD, Director
29 March 2012

Name:	**6-*O*-Desmethylpapaverine**
CAS Number:	18813-63-3
Structure:	
Molecular Weight:	$C_{19}H_{19}NO_4$ = 325.36
Lot Number:	BDG 6351.1
Appearance:	Off-white, crystalline solid
Corrected Purity:	99.3 % (HPLC) - 0.2 % (diethyl ether) - 2.2 % (water) = 96.9 %
Re-test Date:	29 March 2017

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.

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 diethyl ether (0.2 % *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* 326.1401. $C_{19}H_{20}NO_4$ $[M+H]^+$ requires *m/z* 326.1387. The deviation of 4.2 ppm is within normally accepted limits for the establishment of identity by HRMS.

HPLC

A sharp, symmetrical peak is observed (99.3 %). 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 69.31, H 5.61, N 4.38 %
$C_{19}H_{19}NO_4 \cdot 0.2H_2O$	Requires:	C 69.37, H 5.94, N 4.26 %
$C_{19}H_{19}NO_4$	Requires:	C 70.14, H 5.89, N 4.31 %

The elemental analyses fall within generally accepted limits for establishing the molecular formula given. The results may also be taken to imply the absence of significant quantities of water or inorganic salts (which have not been elsewhere tested for because of sample size limitations).

Karl-Fischer Analysis

	Found:	H_2O 2.2 %
$C_{19}H_{19}NO_4 \cdot 0.2H_2O$	Requires:	H_2O 1.1 %

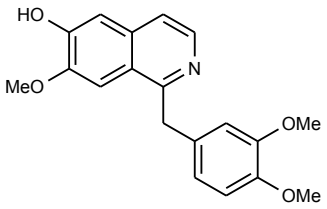
Of necessity, only a small sample could be used and only a single or duplicate analysis performed. We are unable to state what the errors in the reported water content are, but recommend that the result be used, as the best available, when determining corrected purity.

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

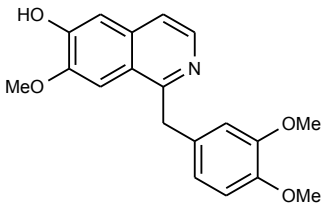
Proton NMR Spectrum of 6-*O*-Desmethylpapaverine in DMSO-d_6



Lot Number: BDG 6351.1

BDG SYNTHESIS

Carbon-13 NMR Spectrum of 6-*O*-Desmethylpapaverine in DMSO-d_6

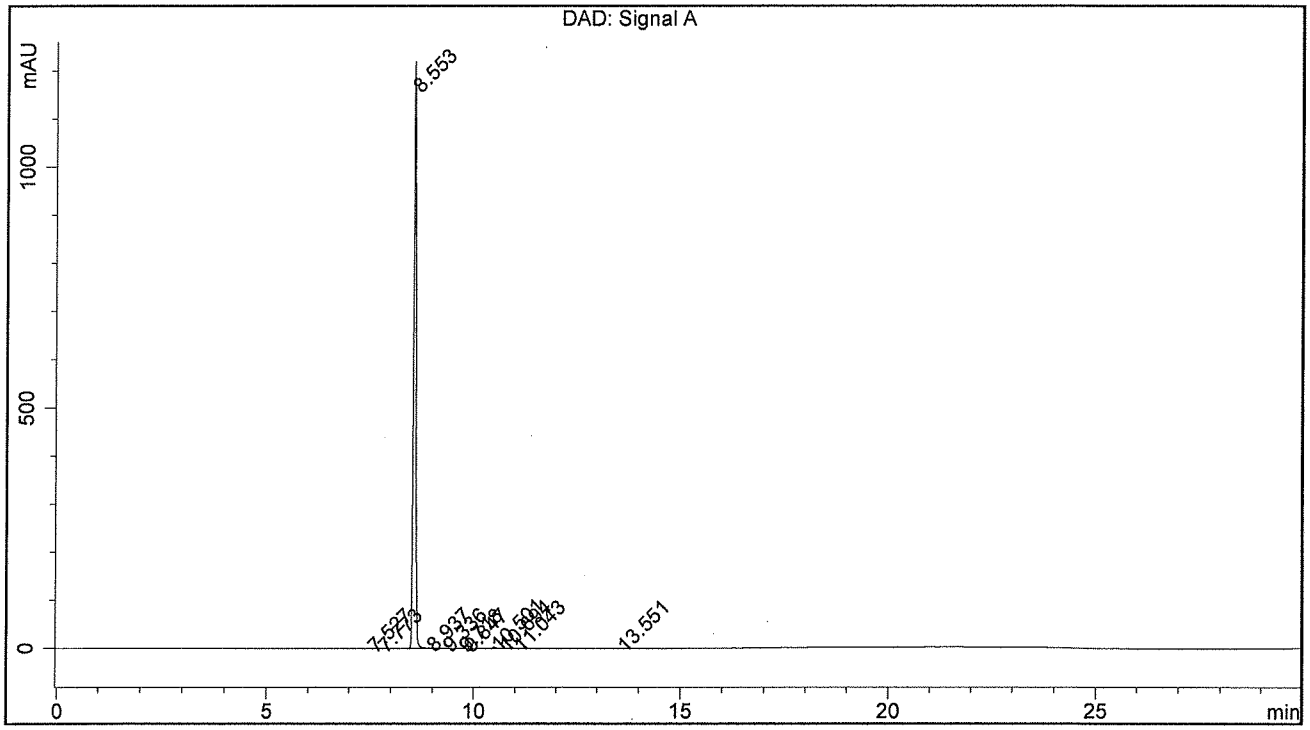


Lot Number: BDG 6351.1

BDG - Analysis of 6-O-Desmethylpapaverine

Column : Phenomenex Luna C18(2) 5um 250 x 4.6 mm
Guard : Phenomenex SecurityGuard C18 4 x 3mm
Mobile Phase A : 90:10 20 mM Potassium diHydrogen Phosphate pH=3.0 : Acetonitrile
Mobile Phase B : 25:75 20 mM Potassium diHydrogen Phosphate pH=3.0 : Acetonitrile
Gradient (A:B) : T0=100:0, T15=0:100, T20=0:100, T25=100:0, T30=100:0
Flow Rate : 1.0 mL/min . . . . . Sample Solvent : Mobile Phase
Column Temperature : 35C . . . . . Injection Volume : 10 uL . . . . . Detection : UV at 238 nm

Sample Name	BDG 6351.1	**Instrument**	AnalyticalLC01
Acquisition	29/03/2012, 17:57:01	**Method (rev.)**	LC10500a (8)
Sequence	BDG_29Mar2012f - Reprocessed	**Vial Position**	1
Operator	solvation010\cerityadmin	**Injection**	1 of 1



Area Percent Report

Peak#	RT	Peak Height	Peak Area	Width	Area %
1	7.53 min	0.4146	2.3955	0.0854 min	0.048 %
2	7.77 min	0.2669	1.3317	0.0742 min	0.026 %
3	8.55 min	1221.4019	4998.7947	0.0657 min	99.293 %
4	8.94 min	0.5274	3.0956	0.0865 min	0.061 %
5	9.34 min	0.6300	2.9770	0.0711 min	0.059 %
6	9.72 min	0.2638	1.3105	0.0740 min	0.026 %
7	9.85 min	0.1916	1.3117	0.0939 min	0.026 %
8	10.50 min	3.0768	12.7081	0.0662 min	0.252 %
9	10.69 min	0.9514	5.6988	0.0879 min	0.113 %
10	11.04 min	0.4339	3.2235	0.1067 min	0.064 %
11	13.55 min	0.2733	1.5394	0.0877 min	0.031 %