



BDG SYNTHESIS

Certificate of Analysis

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

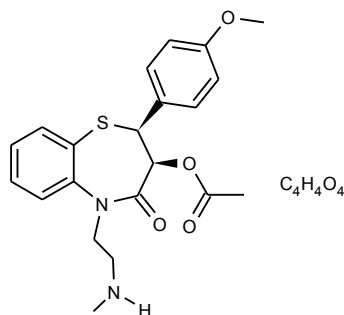
Barry Dent

Barry R. Dent, PhD, Director
3 May 2011

Name: *N*-Desmethyldiltiazem Maleate

CAS Number: 86408-45-9 (free base)

Structure:



Molecular Weight: $C_{21}H_{24}N_2O_4S \cdot C_4H_4O_4 = 516.56$

Lot Number: BDG 4765.2

Appearance: White, crystalline solid

Purity By HPLC: 98.2 %

Re-test Date: 3 May 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.

Identity and Purity

Proton NMR Spectrum

Identity: the signals are consistent with the proposed structure and in accord with literature where available. A second, minor set of signals is visible due to the presence of conformers.

Residual Solvents: no residual solvents are 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 401.1535. $C_{21}H_{25}N_2O_4S$ $[M+H]^+$ (free base) requires m/z 401.1530. The deviation of 1.2 ppm is within normally accepted limits for the establishment of identity by HRMS.

HPLC

A broad, slightly tailing peak is observed (98.2 %). The peak on the solvent front is from maleic acid, confirmed by a spiking experiment. 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

$C_{21}H_{24}N_2O_4S \cdot C_4H_4O_4$	Found:	C 58.29, H 5.47, N 5.54 %
	Requires:	C 58.13, H 5.46, N 5.42 %

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).

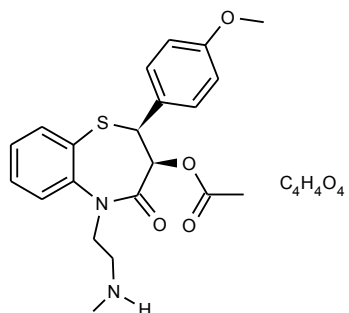
The available quantity of custom-synthesised material is always small, and this limits the extent and type of analytical data which can be obtained. This Certificate is presented in descriptive format for use by analytical chemists who are trained in the use of custom-synthesised materials. Custom materials 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.

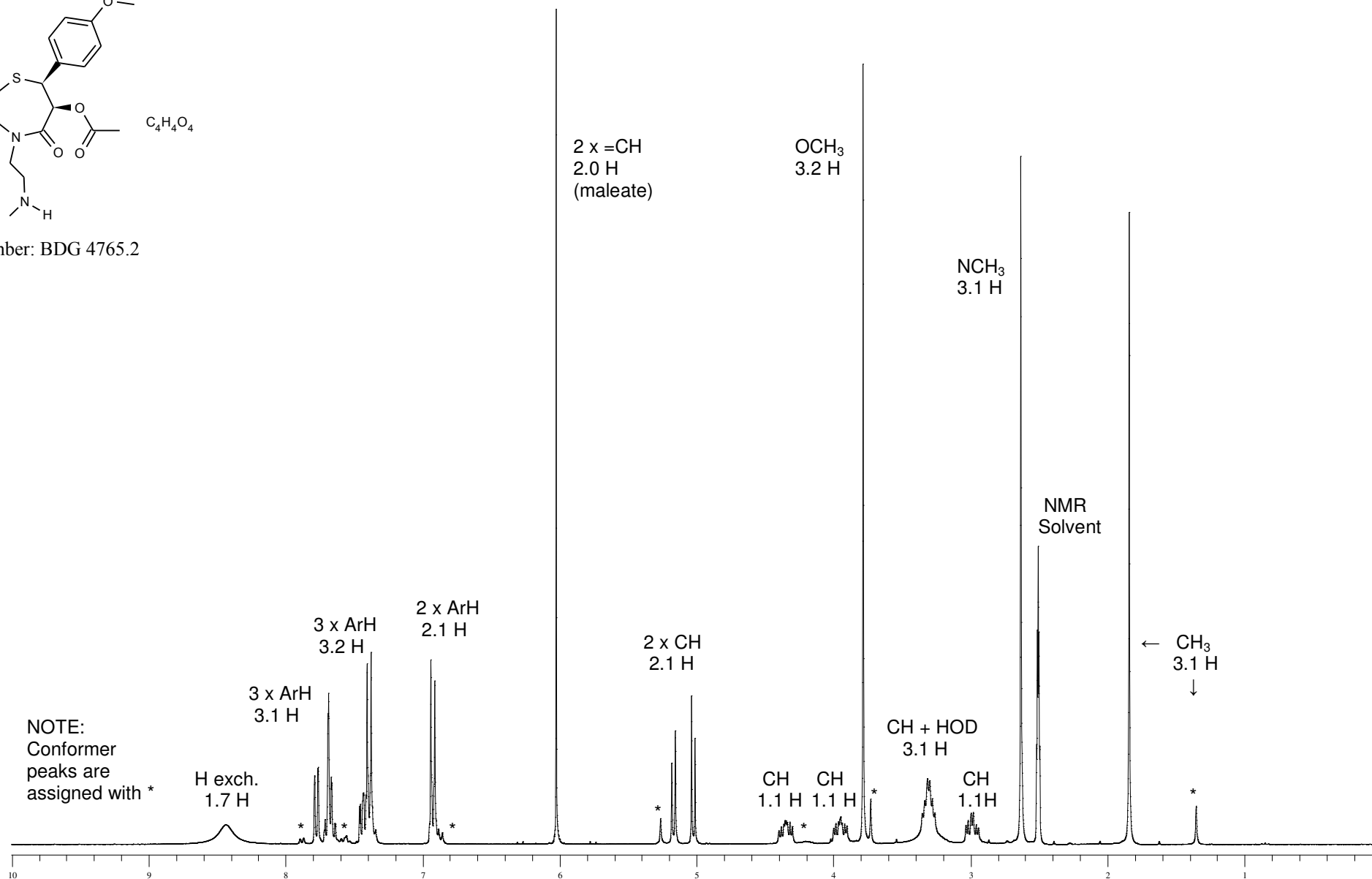


Proton NMR Spectrum of *N*-Desmethyldiltiazem Maleate in DMSO-d₆

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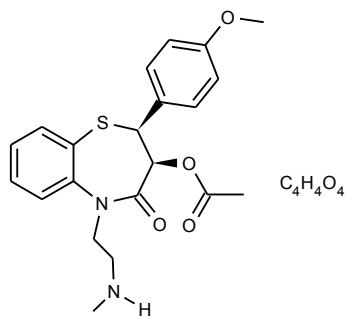
Lot Number: BDG 4765.2



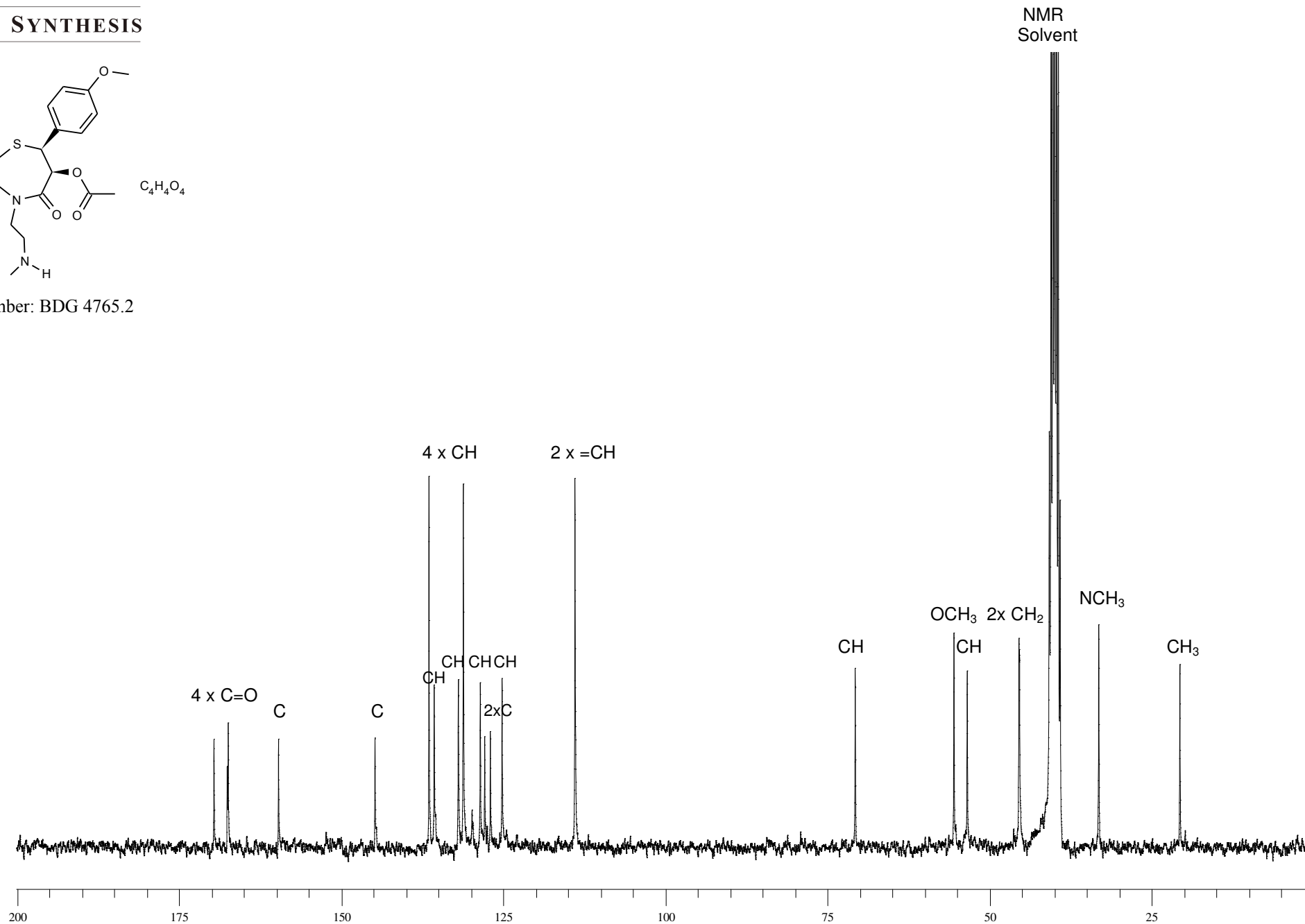


Carbon-13 NMR Spectrum of *N*-Desmethyldiltiazem Maleate in DMSO- d_6

BDG SYNTHESIS



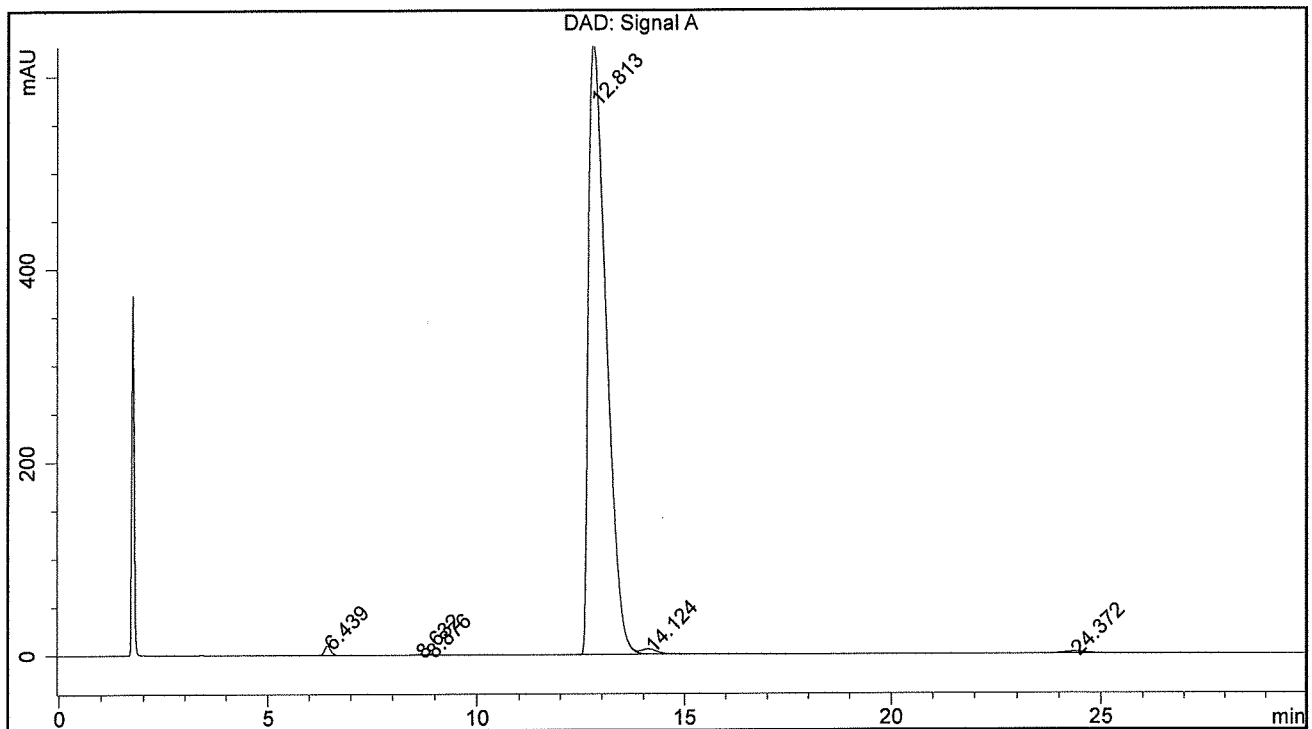
Lot Number: BDG 4765.2



BDG - Analysis of N-Desmethyldiltiazem Maleate

Column : Phenomenex Luna C18(2) 5um 250 x 4.6 mm
 Guard : Phenomenex Security Guard C18 RP 4 x 3 mm
 Mobile Phase : 70:25:5 50mM KH2PO4 + 0.02% Triethylamine pH=4.5 (H3PO4) : Acetonitrile : Ethanol
 Flow Rate : 1.5 mL/min
 Sample Solvent : Mobile Phase
 Column Temperature : 20C
 Injection Volume : 10 uL
 Detection : UV at 240 nm

Sample Name	BDG 4765.2	Instrument	AnalyticalLC01
Acquisition	03/05/2011, 19:10:22	Method (rev.)	LC10355a (8)
Sequence	BDG_03May2011b	Vial Position	1
Operator	solvation010\cerityadmin	Injection	1 of 2



Area Percent Report

Peak#	RT	Peak Height	Peak Area	Width	Area %
1	6.44 min	9.6816	101.0285	0.1597 min	0.527 %
2	8.63 min	0.5955	8.1862	0.1884 min	0.043 %
3	8.88 min	0.7868	13.7114	0.2313 min	0.072 %
4	12.81 min	633.1703	18819.2920	0.4588 min	98.200 %
5	14.12 min	5.3903	151.2442	0.4113 min	0.789 %
6	24.37 min	1.8361	70.6942	0.4672 min	0.369 %