



BDG SYNTHESIS

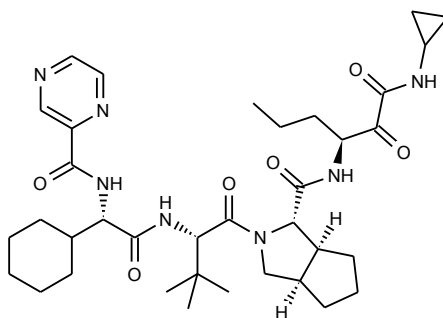
Certificate of Analysis

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

Barry Dent

Barry R. Dent, PhD, Director
6 June 2012

Name: Telaprevir
CAS Number: 402957-28-2
Structure:



Molecular Weight: $C_{36}H_{53}N_7O_6 = 679.85$
Lot Number: BDG 12523.4
Appearance: White, crystalline solid
Corrected Purity: 98.6 % (HPLC) - 3.9 % (chloroform) = 94.7 %
Re-test Date: 6 June 2013
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 chloroform (3.9 % w/w) is observed.

Impurities: traces of unidentified impurities are seen in the baseline.

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 680.4140. $C_{36}H_{54}N_7O_6$ $[M+H]^+$ requires m/z 680.4136. The deviation of 0.6 ppm is within normally accepted limits for the establishment of identity by HRMS.

HPLC

A sharp, symmetrical peak is observed (98.6 %). 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 60.62, H 7.64, N 13.57 %
$C_{36}H_{53}N_7O_6$	Requires:	C 63.60, H 7.86, N 14.42 %
$C_{36}H_{53}N_7O \cdot 0.3 CHCl_3$	Requires	C 60.92, H 7.51, N 13.70 %

The elemental analyses fall substantially outside those expected for anhydrous material; the presence of chloroform is reasonably expected from the method of purification, and the "best-fit" solvated molecular formula is 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).

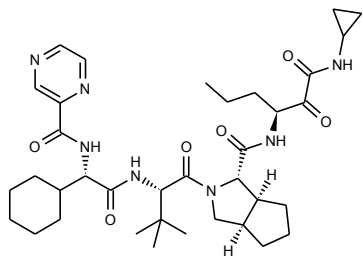
The available quantity of custom-synthesised material is always small, and this limits the extent and type of analytical data which can be obtained. This Certificate is presented in descriptive format for use by analytical chemists who are trained in the use of custom-synthesised materials. Custom materials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

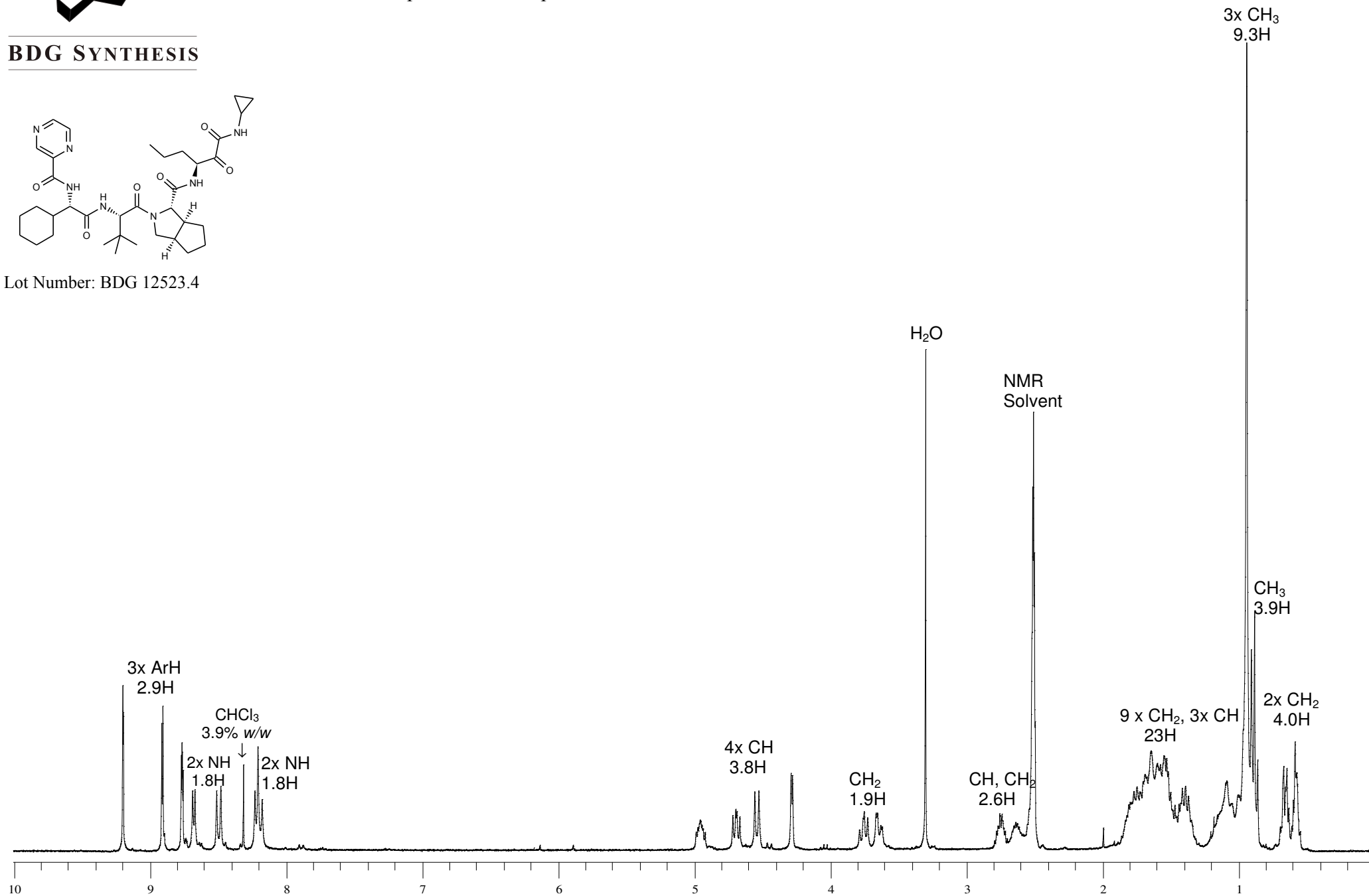


Proton NMR Spectrum of Telaprevir in DMSO-d₆

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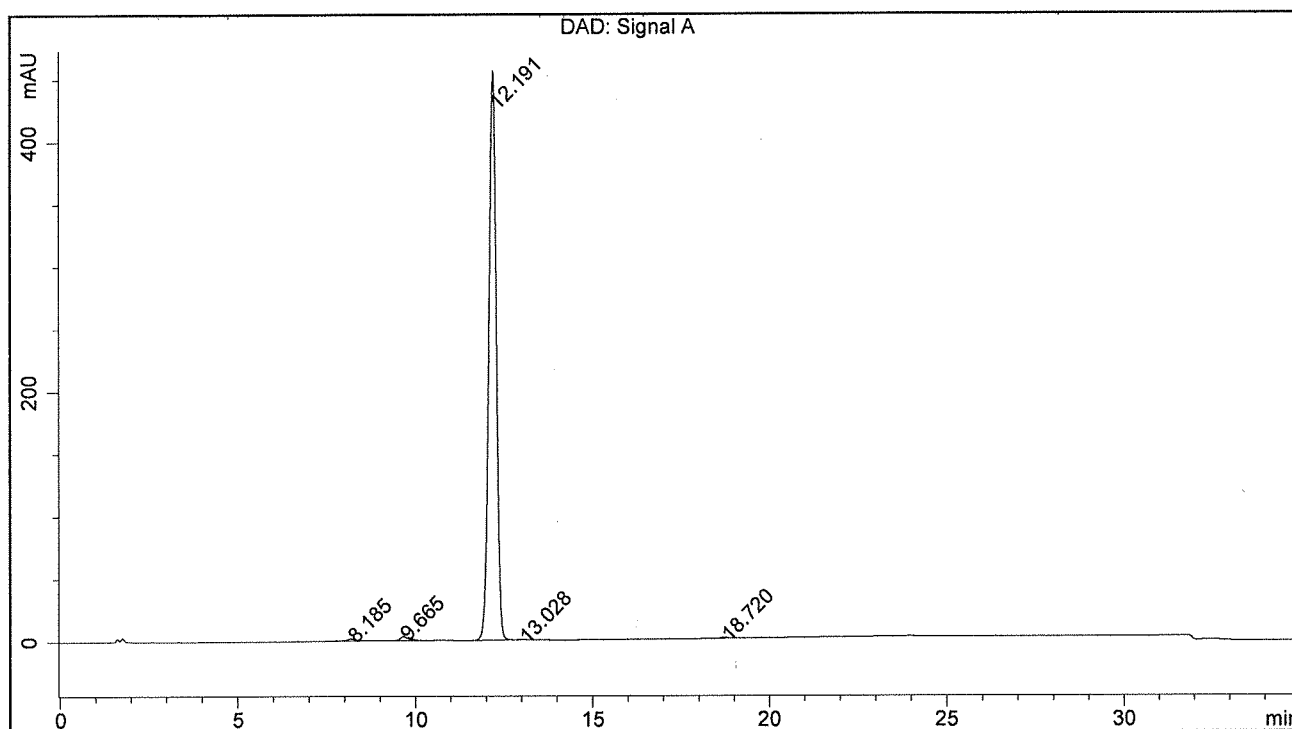
Lot Number: BDG 12523.4



BDG - Analysis of Telaprevir

Column : Phenomenex Luna C18(2) 5um 250 x 4.6 mm
 Guard : Phenomenex Security Guard C18 RP 4 x 3 mm
 Mobile Phase A : 30:70:0.05 Water : Methanol : Ammonia Solution
 Mobile Phase B : 100:0.05 Methanol : Ammonia Solution
 Gradient (A:B) : T0=100:0, T20=0:100, T28=0:100, T30=100:0, T35=100:0
 Flow Rate : 1.0 mL/min Sample Solvent : 30:70 Water : Methanol
 Column Temperature : 20C Injection Volume : 10 uL Detection : UV at 270 nm

Sample Name	BDG 12523.4	Instrument	AnalyticalLC01
Acquisition	06/06/2012, 19:52:51	Method (rev.)	LC10517a (7)
Sequence	BDG_06Jun2012h - Reprocessed	Vial Position	1
Operator	solvation010\cerityadmin	Injection	1 of 1



Area Percent Report

Peak#	RT	Peak Height	Peak Area	Width	Area %
1	8.19 min	1.6017	28.6885	0.2490 min	0.422 %
2	9.67 min	3.1924	51.7073	0.2310 min	0.760 %
3	12.19 min	455.6915	6706.1111	0.2277 min	98.586 %
4	13.03 min	0.3425	5.1787	0.1924 min	0.076 %
5	18.72 min	0.7918	10.5861	0.2020 min	0.156 %