

BDG SYNTHESIS

Certificate of Analysis

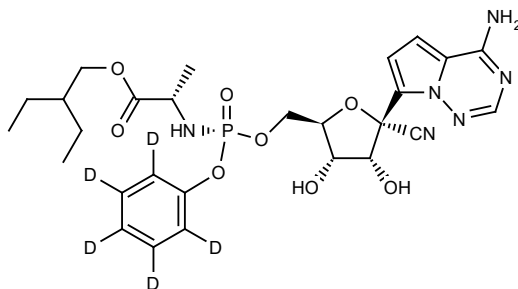
BDG Synthesis certifies that this reference material meets or exceeds the specifications stated herein.

Neil Beare

Neil Beare, PhD, Director
20 August 2020

Name: Remdesivir-d₅
CAS Number: 1809249-37-3 (unlabelled)

Structure:



Molecular Weight: C₂₇H₃₀D₅N₆O₈P = 607.61
Lot Number: BDG 17731.2
Appearance: White, amorphous solid
Corrected Purity: 99.3 % (HPLC) - 2.3 % (hexanes) = 97.0 %
Isotopic Purity: Under 0.5 % d₀
Re-test Date: 20 August 2025
Storage and Handling: Temperature: Freeze (-20°C) 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. Not stable when stored in solution.

Identity and Purity

Proton NMR Spectrum

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

Isotopic Labelling: signals at the sites of deuteration are absent, compared with the spectrum of unlabelled material, indicating clean deuteration.

Residual Solvents: a small amount of hexanes (2.3 % 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.

Isotopic Labelling: signals at the site of deuteration have collapsed to small multiplets compared with the spectrum of unlabelled material, indicating clean deuteration.

High-resolution Mass Spectrum (ESI+)

Found m/z 608.2653. $C_{27}H_{31}D_5N_6O_8P$ $[M+H]^+$ requires m/z 608.2646. The deviation of 1.2 ppm is within normally accepted limits for the establishment of identity by HRMS. No signal for d_0 material was seen (detection limit about 0.5 %).

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 53.33, H 5.17, D 1.72 %
$C_{27}H_{30}D_5N_6O_8P$	Requires:	C 53.37, H 4.98, D 1.66 %

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).

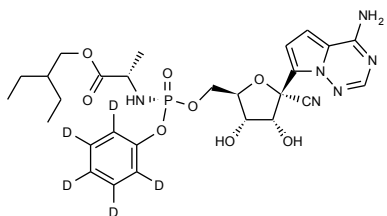
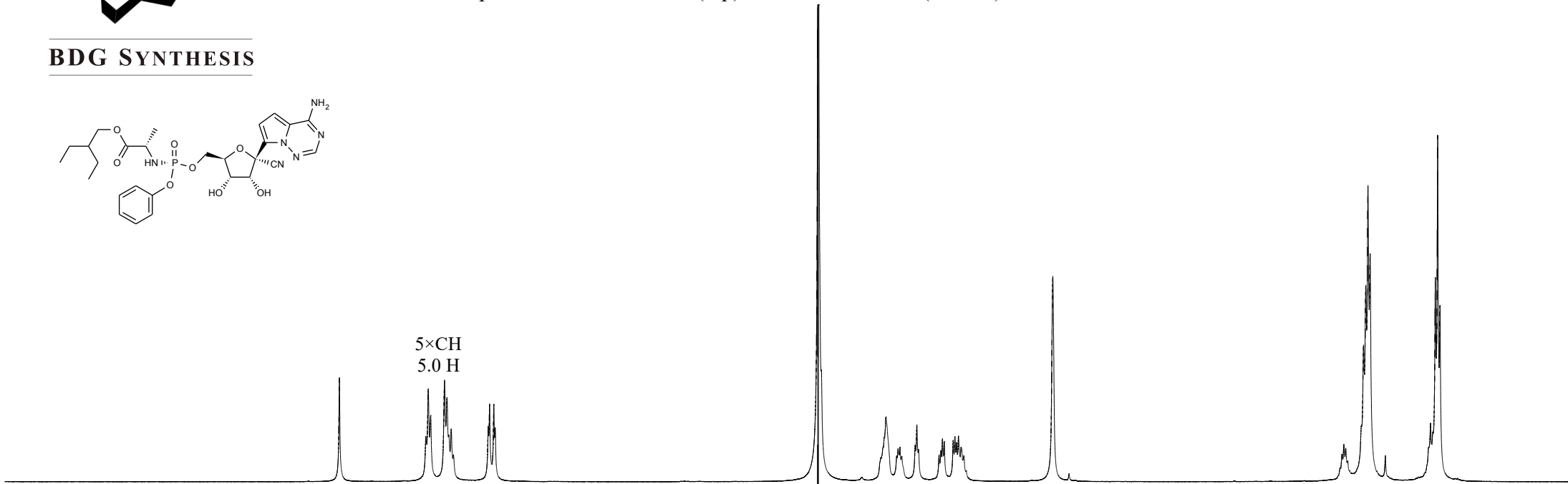
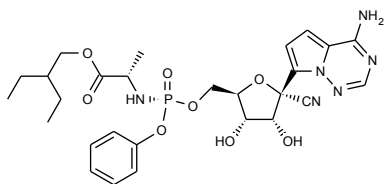
The available quantity of custom-synthesised material is always small, and this limits the extent and type of analytical data which can be obtained. This Certificate is presented in descriptive format for use by analytical chemists who are trained in the use of custom-synthesised materials. Custom materials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

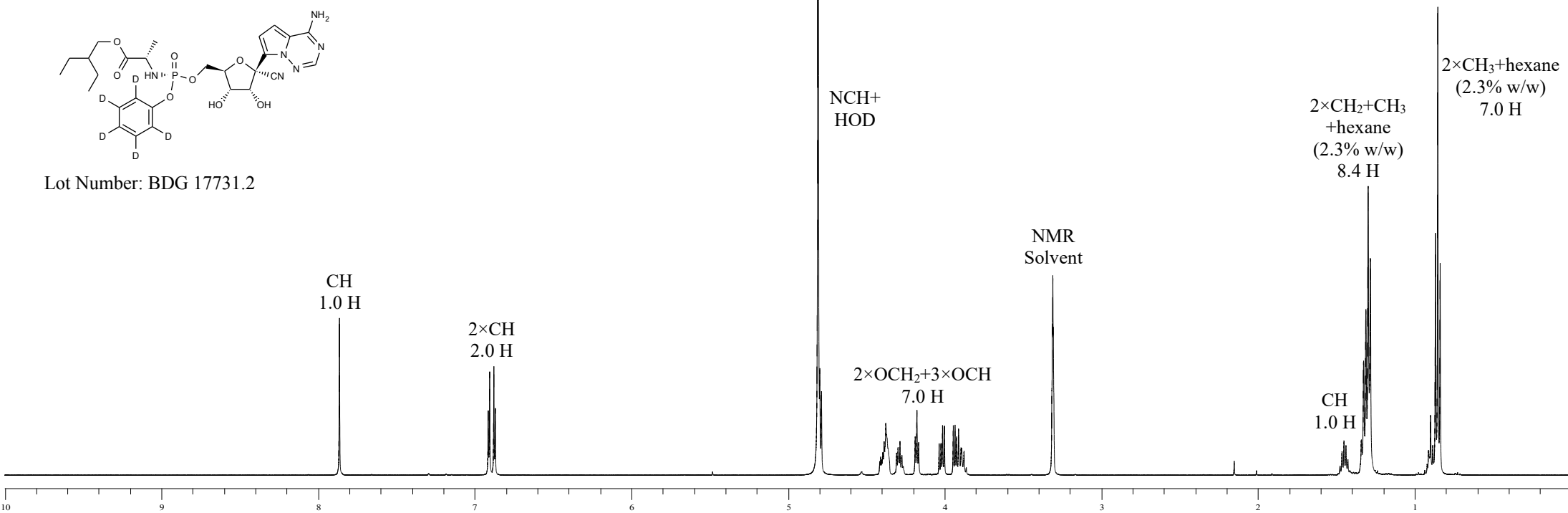


Proton NMR Spectrum of Remdesivir (top) and Remdesivir-d₅ (bottom) in Methanol-d₄

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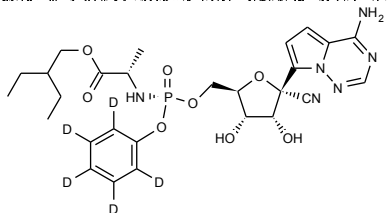
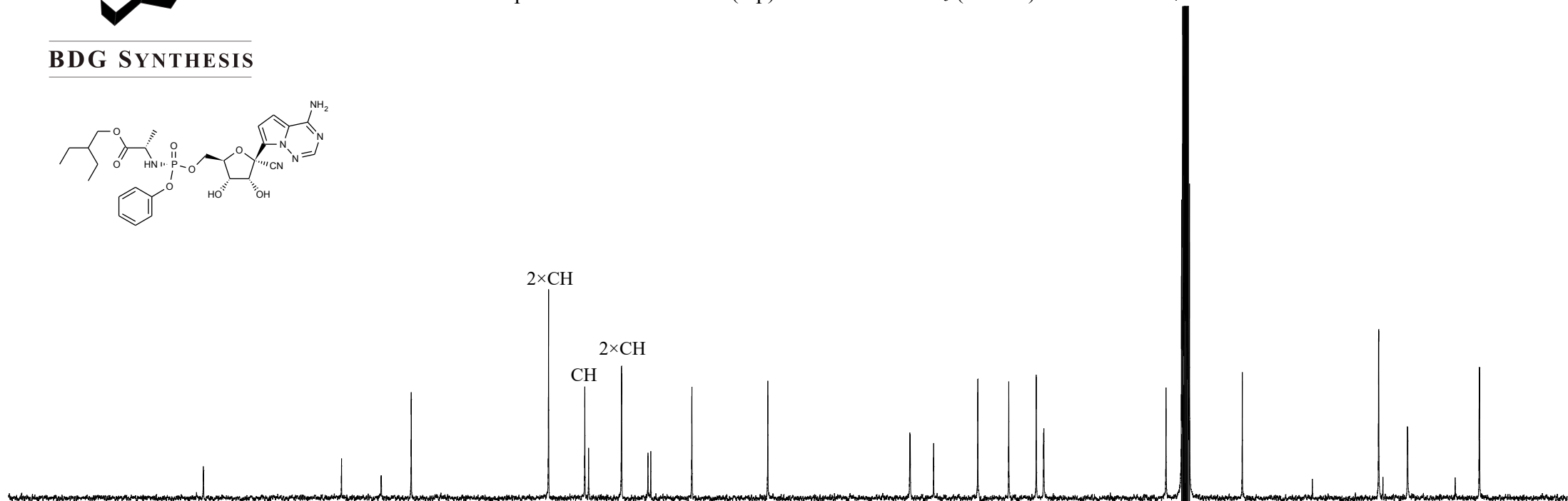
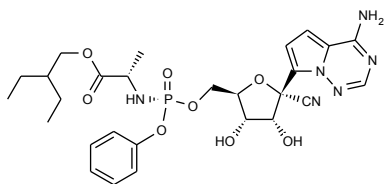
Lot Number: BDG 17731.2



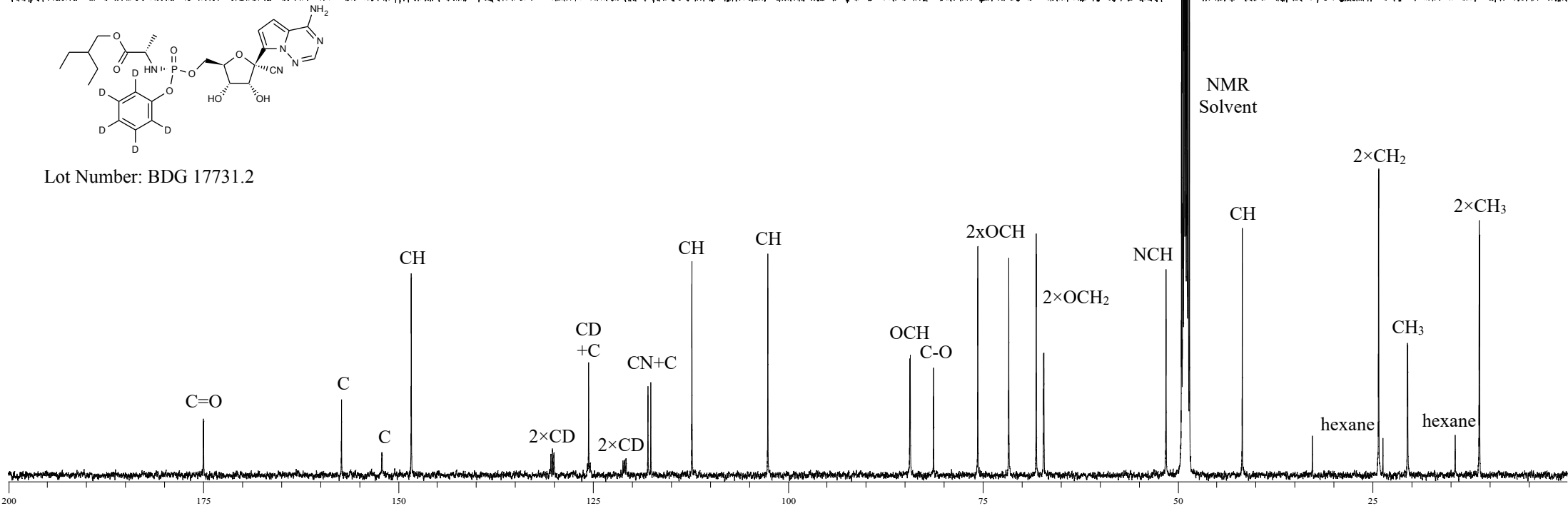


Carbon-13 NMR Spectrum of Remdesivir (top) and Remdesivir-d₅ (bottom) in Methanol-d₄

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Lot Number: BDG 17731.2

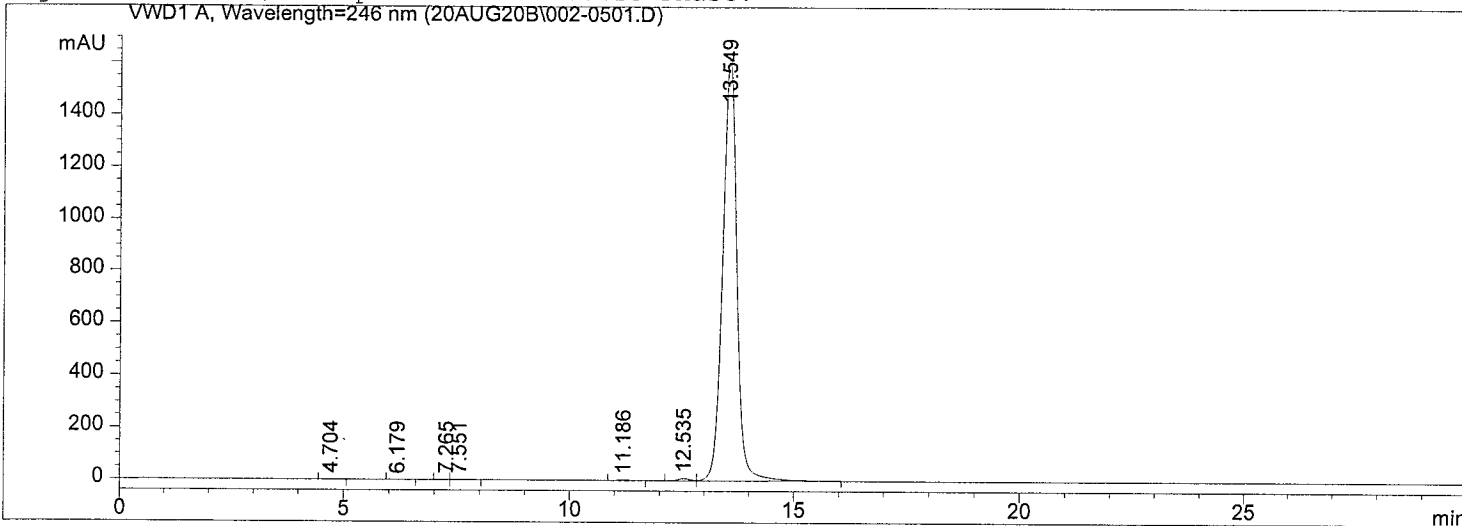


Inj Volume : 20 µl

Acq. Method : C:\HPCHEM\1\METHODS\LC30109A.M
Last changed : 8/20/20 12:15:58 PM by Bruce Hamilton
(modified after loading)

Analysis Method : C:\HPCHEM\1\METHODS\LC30109B.M
Last changed : 8/20/20 2:14:08 PM by Bruce Hamilton
BDG - Analysis of Remdesivir-d5

Phenomenex Luna C18(2) 250 x 4.6mm 5µm + SecurityGuard C18;
Mobile Phase 28:72:0.05 Water:Methanol:Formic Acid ; Flow 1.0 ml/min ; 35°C ; UV 246 nm ;
Injection 20 µl ; Sample Solvent Mobile Phase.



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Area Percent Report
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Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000

Signal 1: VWD1 A, Wavelength=246 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	4.704	BB	0.1988	11.01658	8.19861e-1	0.0306
2	6.179	PB	0.1707	6.52098	4.67652e-1	0.0181
3	7.265	PV	0.1808	6.71335	5.89696e-1	0.0187
4	7.551	VB	0.2434	20.89453	1.16408	0.0581
5	11.186	BP	0.2622	34.81314	1.86130	0.0968
6	12.535	PV	0.2954	176.47870	9.05543	0.4905
7	13.549	VB	0.3368	3.57208e4	1622.92297	99.2872

Totals : 3.59773e4 1636.88099

Results obtained with enhanced integrator!

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*** End of Report ***