CERTIFICATE OF ANALYSIS

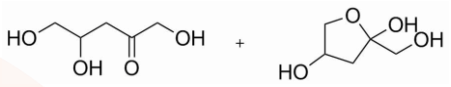
For Research Use Only

Version 2.0

Reference Material Name

Lactulose EP Impurity F

1,4,5-trihydroxypentan-2-one/2-(hydroxymethyl)tetrahydrofuran-2,4-diol



QCS CAT Number
RM-L010316

Lot Number
56584

CAS Number
3343-53-1+136272-61-2

Long-term Storage
-20 °C hygroscopic

Mol. Formula
C5H10O4

Shipping Condition
Blue Ice

Mol. Weight
134.13

Solubility
ACN/water

Test Description	Specifications	Results
Appearance	Colorless Oil	Conforms
Identification	NMR&MS	Conforms
Loss On Drying (by TGA)	N/A	1.64 %
Purity (HPLC)	Not less than 95.0 %	99.28 %
Assay (C5H10O4)	Not less than 90.0 %	97.65 %

Method of Characterisation: Assay(%) = (1-LOD(by TGA)) x Purity(%) / 100%

Certified Date	Retest Date	Reviewed and Approved By *Quality Control*	Release By *Quality Assurance*
28 Mar. 2024	27 Mar. 2027		

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ISO 9001:2015

Data File D:\DATA\2024\03\20240320\20240320-1 2024-03-20 11-09-53\RM-L010316.D
Sample Name:RM-L010316,56584

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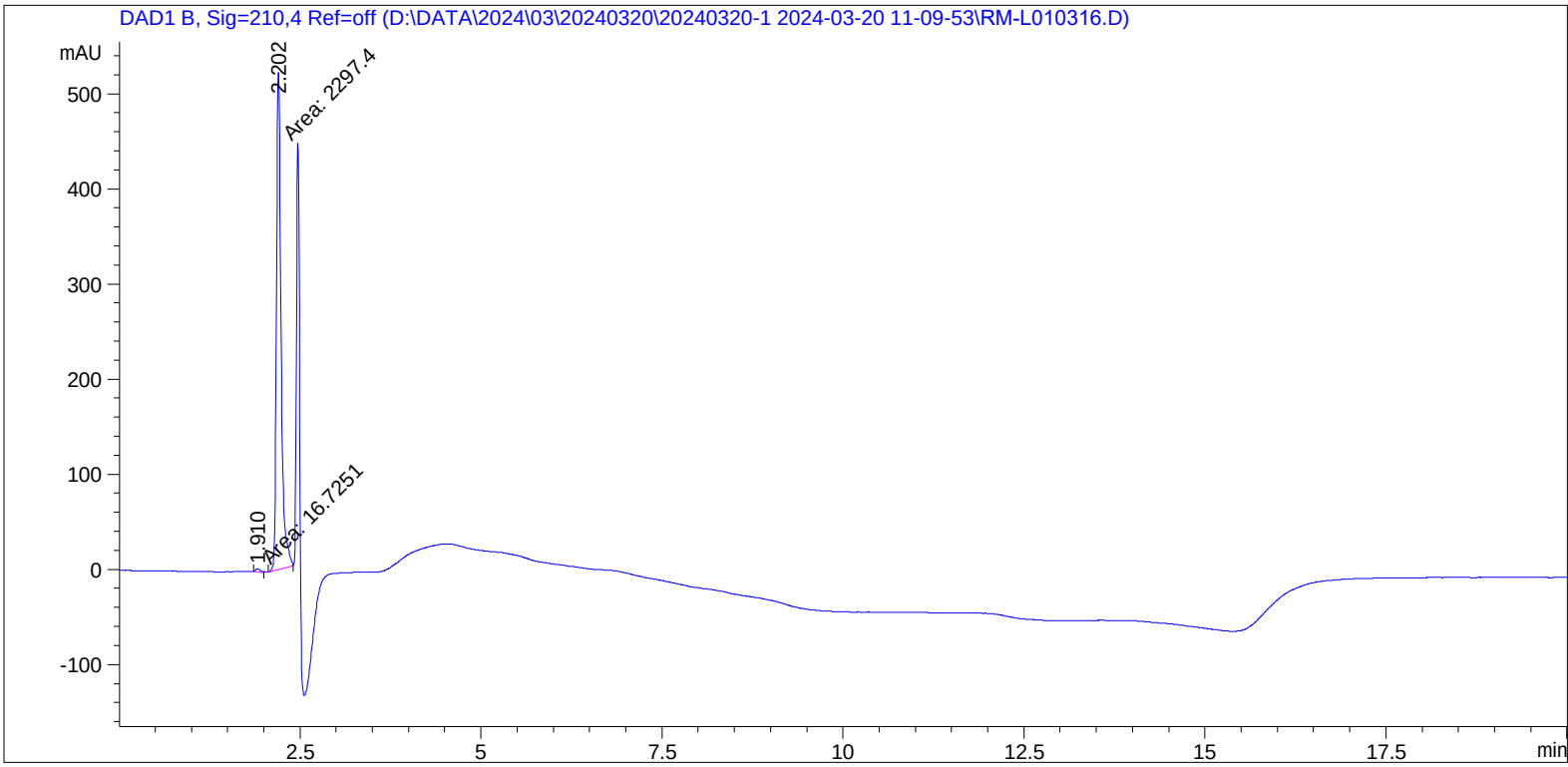
Acq. Operator : Seq. Line : 3
Acq. Instrument : Instrument 2 Location : Vial 9
Injection Date : 3/20/2024 11:58:22 AM Inj : 1
Inj Volume : 2.000 µl
Different Inj Volume from Sequence ! Actual Inj Volume : 20.000 µl
Acq. Method : D:\DATA\2024\03\20240320\20240320-1 2024-03-20 11-09-53\L+G+H2O-ACN+TFA+5-20-40+20MIN+1.0+40.M
Last changed : 1/23/2024 4:34:36 PM
Analysis Method : D:\METHOD\QCS\L+G+H2O-ACN+TFA+5-20-40+20MIN+1.0+40.M
Last changed : 1/23/2024 4:34:36 PM
Method Info : Column: Waters XBridge C18(4.6*150mm,3.5um)
Mobile phase A: 0.04%TFA-H2O
Mobile phase B: 0.02%TFA-ACN
Column tempreture: 40 Flow: 0.8mL/min Diluent: ACN-H2O

Time(min):	0.0	3.0	6.0	9.0	12.0	20.0
A(%):	95	80	60	60	95	95
B(%):	5	20	40	40	5	5

Additional Info : Peak(s) manually integrated



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Area Percent Report

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Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Data File D:\DATA\2024\03\20240320\20240320-1 2024-03-20 11-09-53\RM-L010316.D
Sample Name:RM-L010316,56584

Signal 1: DAD1 B, Sig=210,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.910	MM	0.0829	16.72510	3.36102	0.7227
2	2.202	MM	0.0730	2297.39502	524.46918	99.2773
Totals :				2314.12012	527.83019	

*** End of Report ***

Data File D:\DATA\2024\03\20240320\20240320-1 2024-03-20 11-09-53\H2O+ACN.D
Sample Name:RM-L010316,56584

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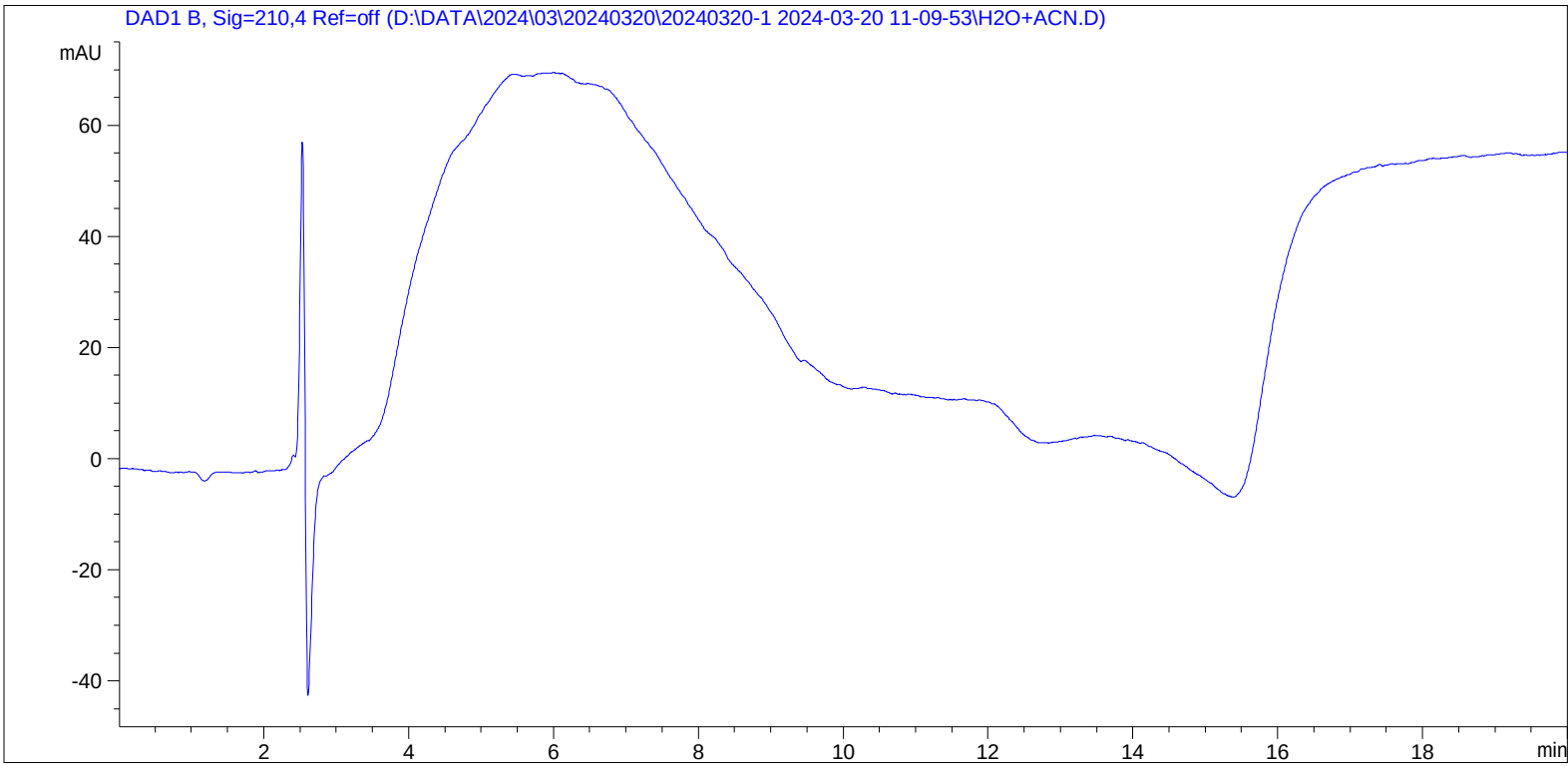
Acq. Operator : Seq. Line : 1
Acq. Instrument : Instrument 2 Location : Vial 3
Injection Date : 3/20/2024 11:13:55 AM Inj : 1
Inj Volume : 2.000 µl
Acq. Method : D:\DATA\2024\03\20240320\20240320-1 2024-03-20 11-09-53\L+G+H2O-ACN+TFA+5-20-40+20MIN+1.0+40.M
Last changed : 1/23/2024 4:34:36 PM
Analysis Method : D:\METHOD\QCS\L+G+H2O-ACN+TFA+5-20-40+20MIN+1.0+40.M
Last changed : 1/23/2024 4:34:36 PM
Method Info : Column: Waters XBridge C18(4.6*150mm,3.5um)
Mobile phase A: 0.04%TFA-H2O
Mobile phase B: 0.02%TFA-ACN
Column tempreture: 40 Flow: 0.8mL/min Diluent: ACN-H2O

Time(min):	0.0	3.0	6.0	9.0	12.0	20.0
A(%):	95	80	60	60	95	95
B(%):	5	20	40	40	5	5

Additional Info : Peak(s) manually integrated



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Area Percent Report

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Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

No peaks found

Data File D:\DATA\2024\03\20240320\20240320-1 2024-03-20 11-09-53\H2O+ACN.D
Sample Name:RM-L010316,56584

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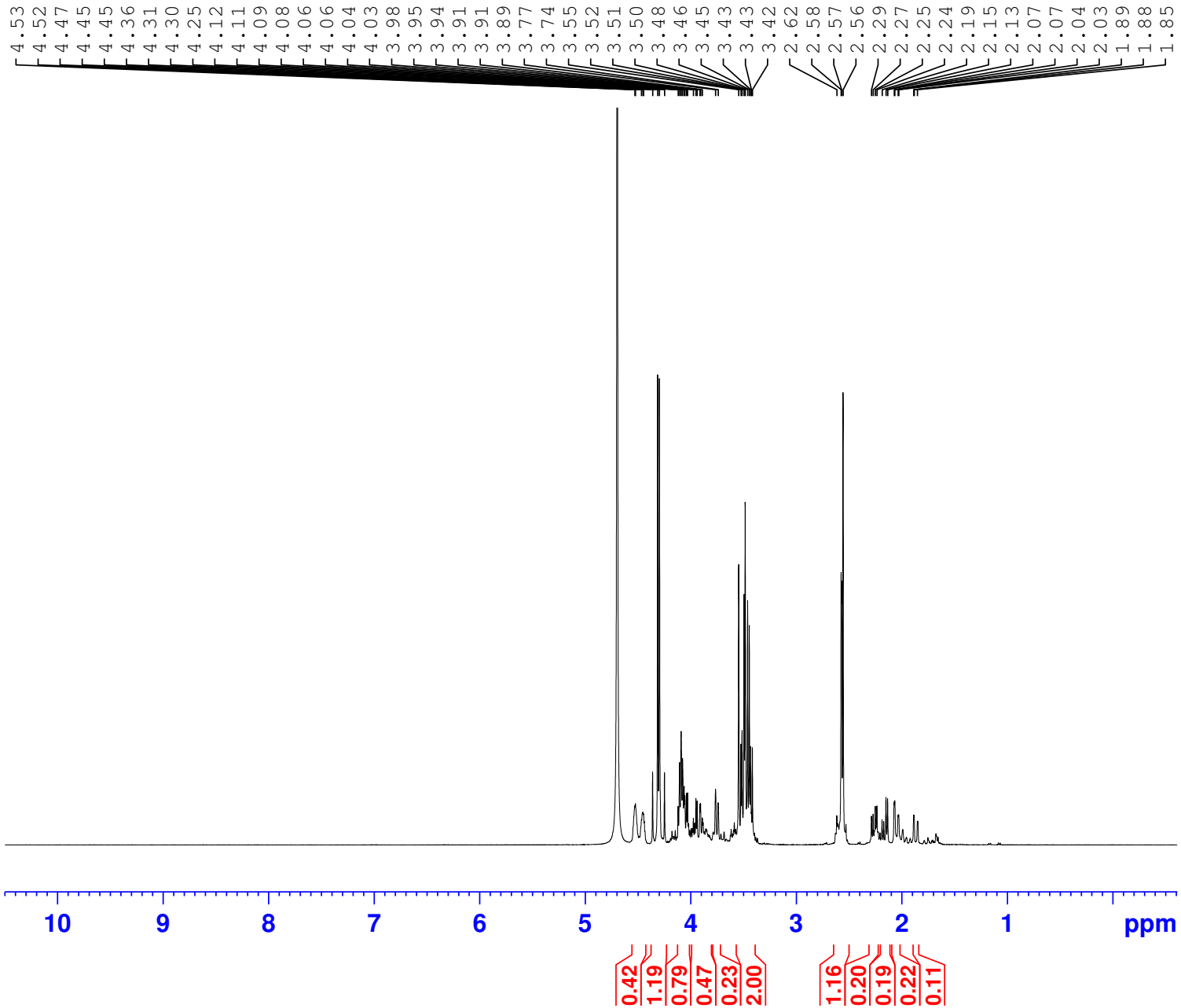
*** End of Report ***

Sample Name:RM-L010316,56584



Current Data Parameters

NAME	20240321-RM-L010316 HNMR
EXPNO	2
PROCNO	1

F2 - Acquisition Parameters

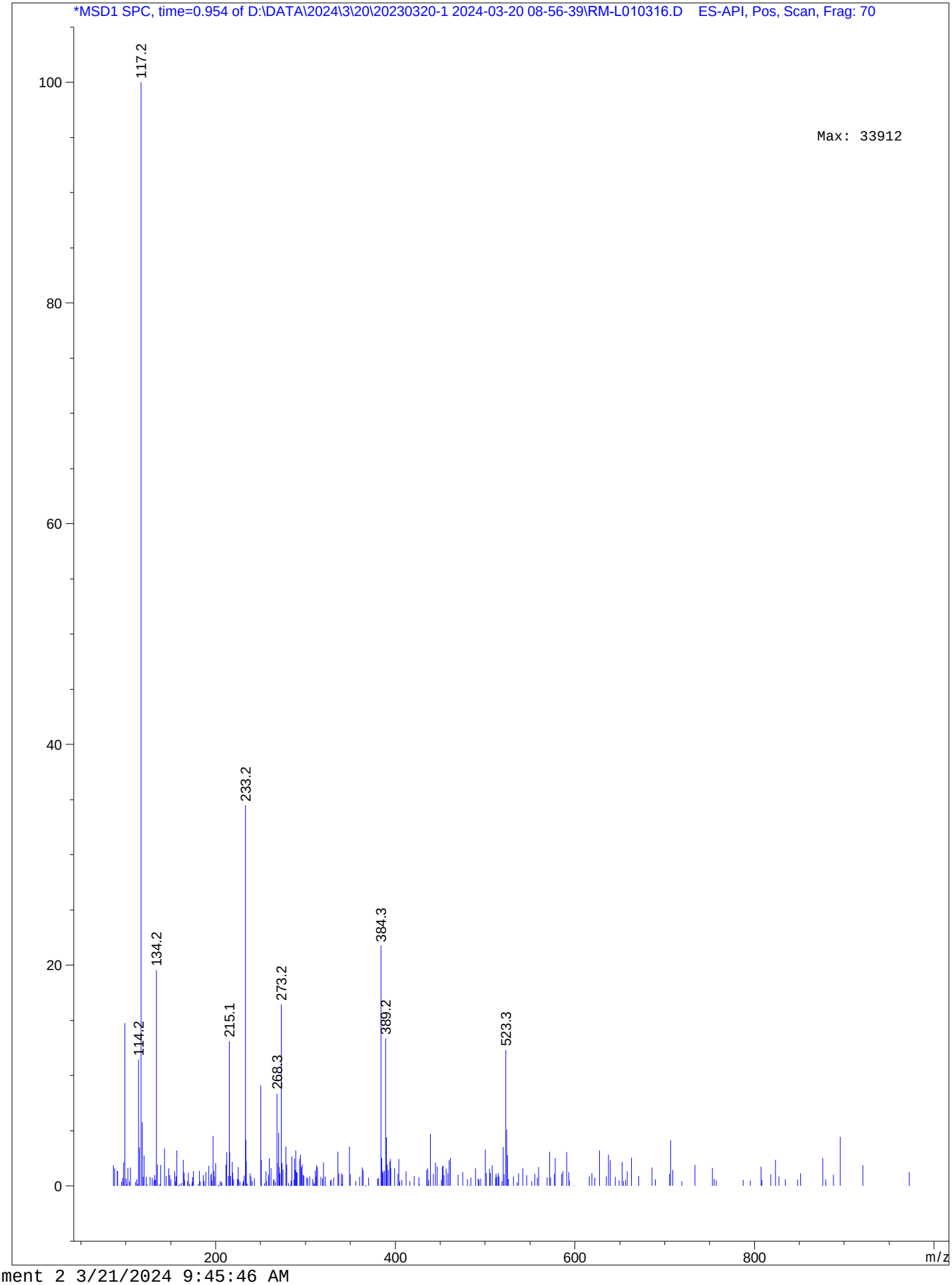
Date_	20240321
Time	20.06 h
INSTRUM	Avance
PROBHD	Z163739_0685 (
PULPROG	zg30
TD	65536
SOLVENT	D2O
NS	16
DS	2
SWH	8196.722 Hz
FIDRES	0.250144 Hz
AQ	3.9976959 sec
RG	71.8
DW	61.000 usec
DE	13.89 usec
TE	298.7 K
D1	1.00000000 sec
TD0	1
SFO1	400.2124713 MHz
NUC1	1H
P0	2.67 usec
P1	8.00 usec
PLW1	23.88400078 W

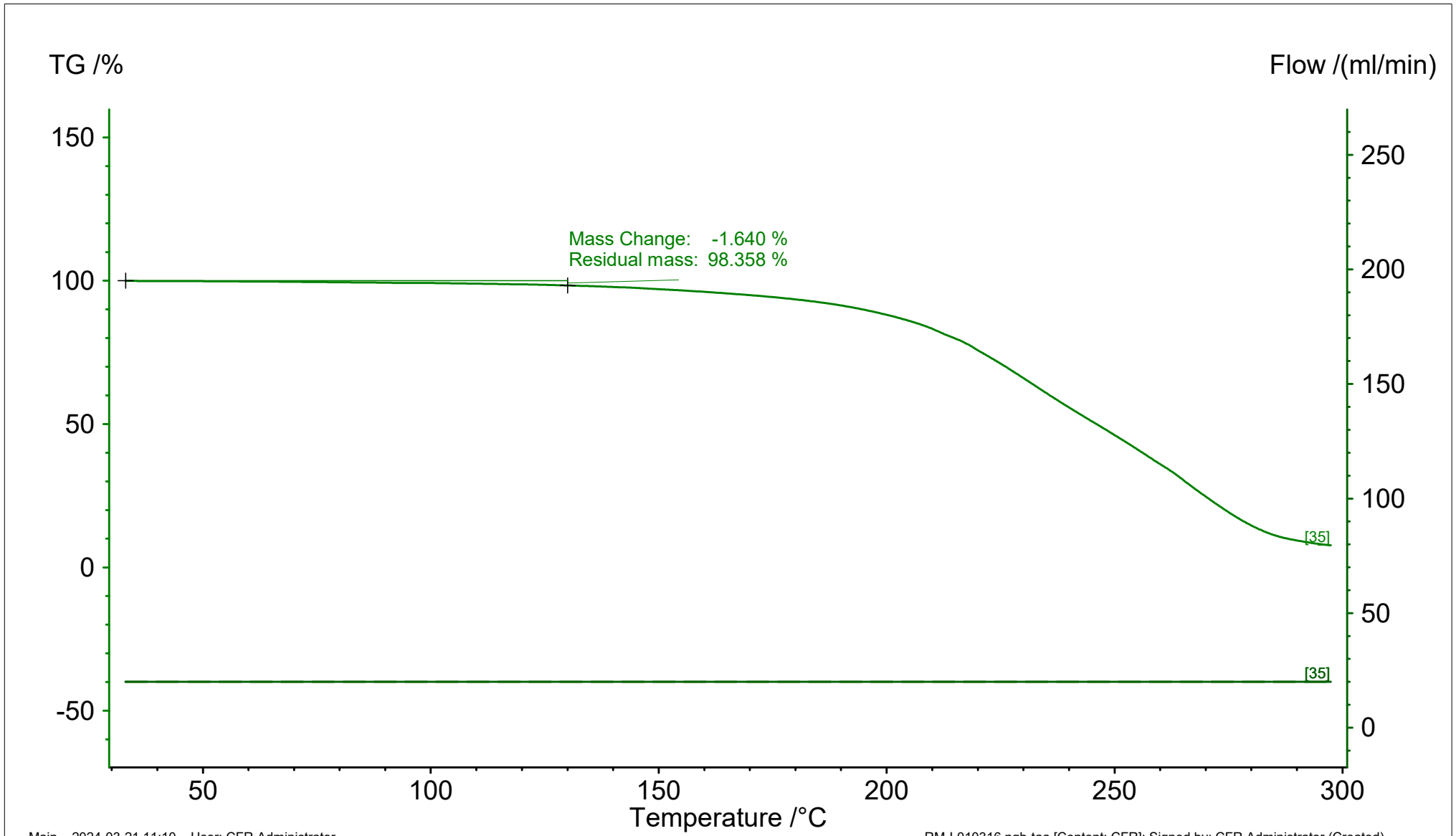
F2 - Processing parameters

SI	65536
SF	400.2100000 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

Sample Name:RM-L010316,56584

MS Spectrum





Instrument :	NETZSCH TG 209F3			**File :**	<ROOT>\20240321\RM-L010316.ngb-dt6		
Project :		**Sample :**	RM-L010316	**Sample car./TC :**	TG 209F3 std (Al2O3 support)/P	**Atmosphere :**	-- / N2 / N2
Identity :	RM-L010316	**Material :**		**Sample mass :**	10.2545 mg	**Corr/m. range :**	6:2:0/2000 mg
Date/time :	2024/3/21 10:46:30	**Correction file :**	BK 20240318.ngb-bt6	**Mode/type of meas. :**	TG/sample with correction		
Laboratory :		**Temp. calib. file :**	25-04-2021 13:44	**Segments :**	1/1		
Operator :	Admin	**Range :**	30°C/30.0(K/min)/300°C	**Crucible :**	Al2O3 85 µl, open		

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