

The synthesis and antiproliferative activity of isatin-7-sulfonamides

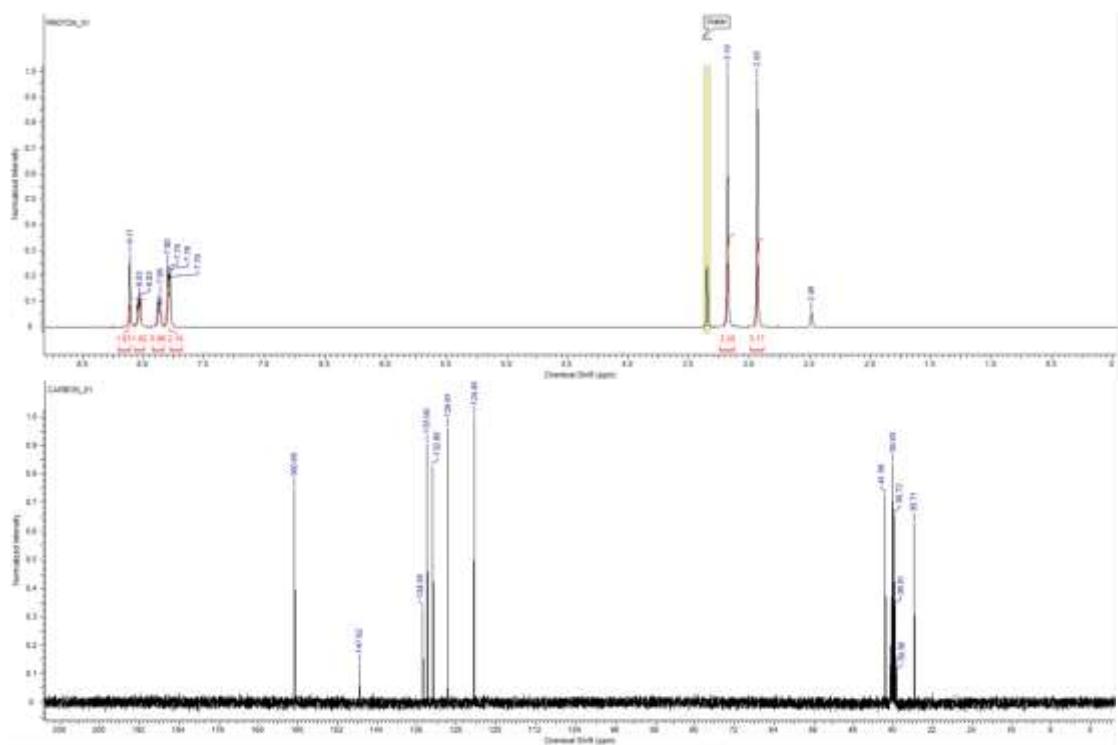
Stepan K. Krymov^{1*}, Diana I. Salnikova², Lyubov G. Dezenkova¹,
Fedor B. Bogdanov², Alexander M. Shcherbakov^{1,2}, Andrey E. Shchekotikhin^{1*}

¹ *Gause Institute of New Antibiotics,
11 B. Pirogovskaya St., Moscow 119021, Russia;
e-mail: krymov.s.k@gmail.com, shchekotikhin@gause-inst.ru*

² *Department of Experimental Tumor Biology,
N. N. Blokhin National Medical Research Center of Oncology,
Ministry of Health of the Russian Federation,
24 Kashirskoe Highway, Moscow 115522, Russia;
e-mail: dianasalnikova08@ya.ru, dezenkovalg@yahoo.com,
f.bogdanov.f@ya.ru, alex.scherbakov.2010@ya.ru*

SUPPLEMENTARY INFORMATION

***N,N*-Диметил-*N'*-((2-нитрофенил)сульфонил)формимидаид (5)**



Compound Spectrum List Report

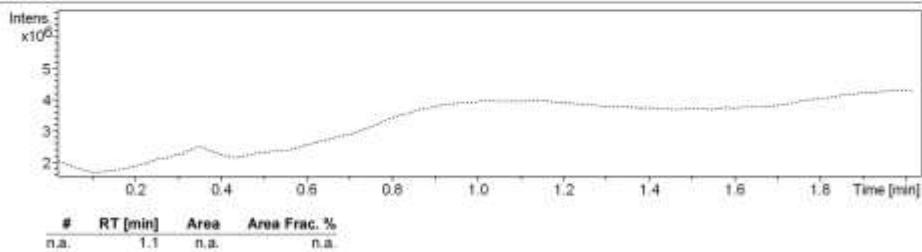
Analysis Info

Analysis Name: D:\Data\ST\ST-208_1.d
Method: tune_low.m
Sample Name: Tune wide
Comment:

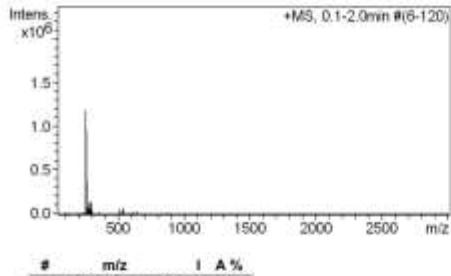
Acquisition Date: 1/20/2022 3:56:06 PM
Operator: Korolev
Instrument / Ser#: micrOTOF-Q II 10225

Acquisition Parameter

Source Type	ESI	Ion Polarity	Positive	Set Nebulizer	0.4 Bar
Focus	Active	Set Capillary	4500 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	500 V	Set Dry Gas	4.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	150.0 Vpp	Set Diverter Valve	Source

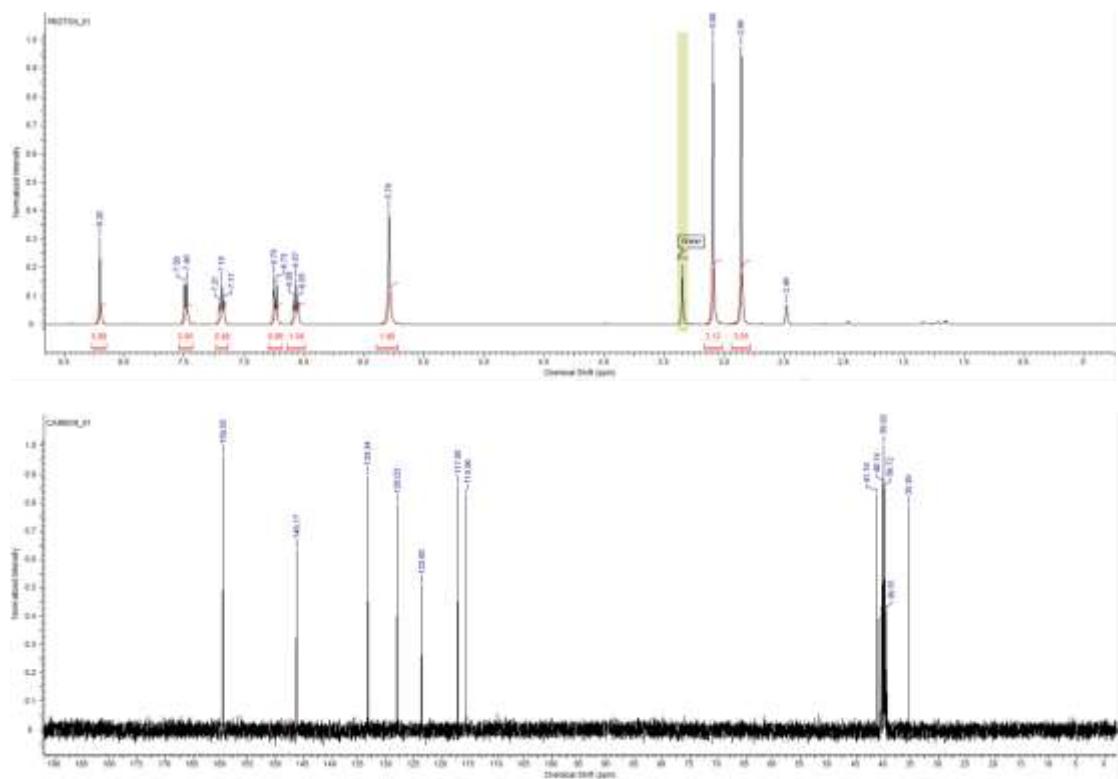


+MS, 0.1-2.0min #(6-120)



#	m/z	I	A %
1	258.0548	1183690	100.0
2	259.0583	188048	19.9
3	260.0533	98907	10.5
4	275.0820	60638	6.1
5	280.0378	138241	15.6
6	281.0398	17422	2.0
7	296.0113	131018	14.0
8	515.1012	52188	10.5
9	537.0833	63181	12.8
10	614.5712	20101	5.1

***N'*-(2-Аминофенил)сульфонил)-*N,N*-диметилформимидаид (6)**



Compound Spectrum List Report

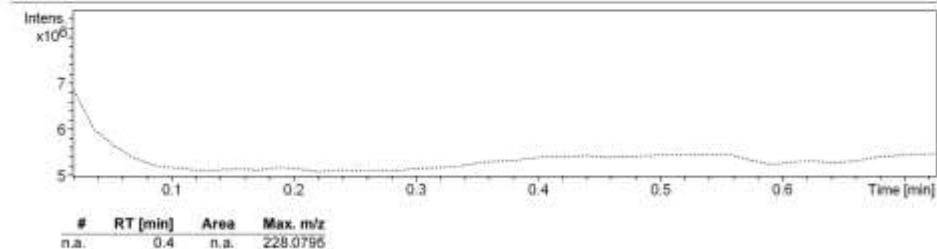
Analysis Info

Analysis Name: D:\Data\ST\ST-209.d
Method: tune_low.m
Sample Name: Tune wide
Comment:

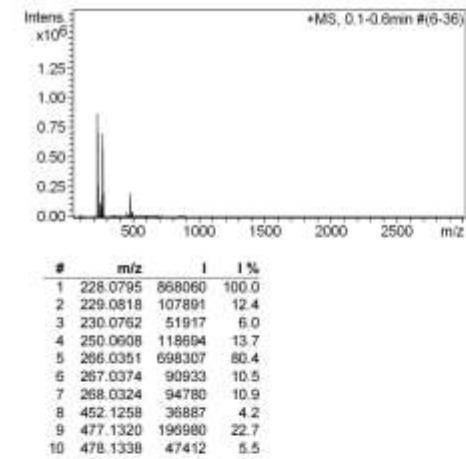
Acquisition Date: 1/20/2022 10:26:28 AM
Operator: Korolev
Instrument / Ser#: micrOTOF-Q II 10225

Acquisition Parameter

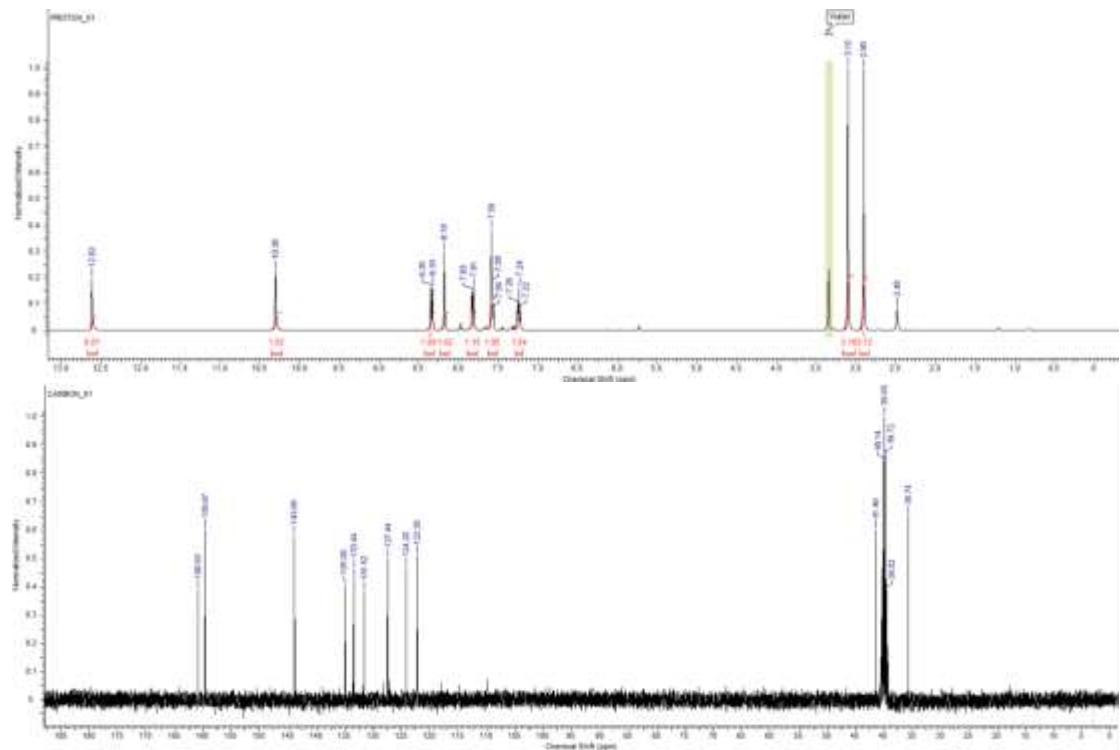
Source Type	ESI	Ion Polarity	Positive	Set Nebulizer	0.4 Bar
Focus	Active	Set Capillary	4500 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	500 V	Set Dry Gas	4.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	150.0 Vpp	Set Divert Valve	Source



+MS, 0.1-0.6min #(6-36)



***N*-(2-((Диметиламино)метилен)сульфамоил)фенил)-2-(гидроксимино)ацетамид (7а)**



Compound Spectrum List Report

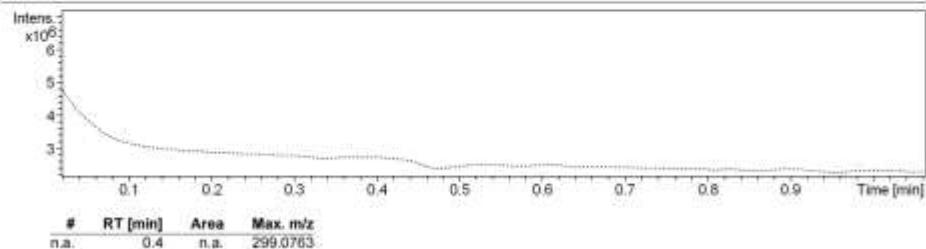
Analysis Info

Analysis Name: D:\Data\ST\ST-210(2).d
Method: tune_low.m
Sample Name: Tune wide
Comment:

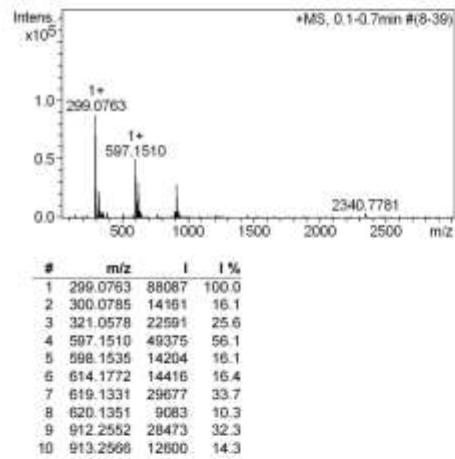
Acquisition Date: 1/21/2022 10:50:31 AM
Operator: Korolev
Instrument / Ser#: micrOTOF-Q II 10225

Acquisition Parameter

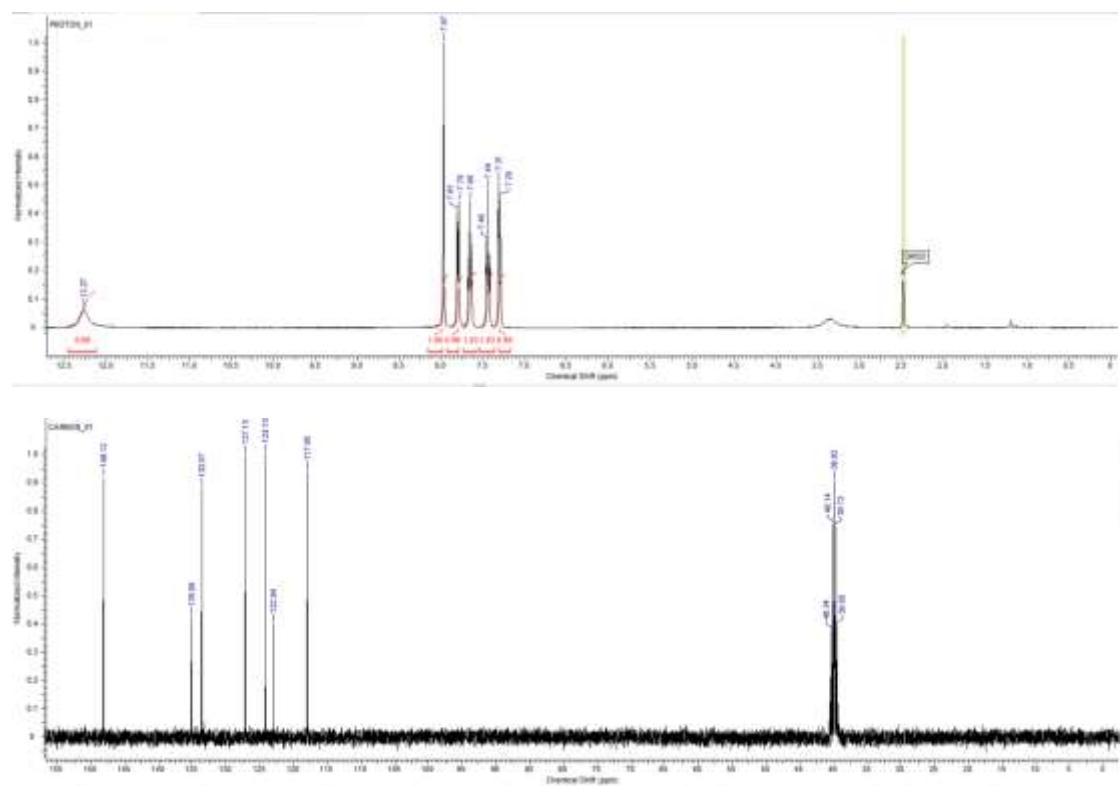
Source Type	ESI	Ion Polarity	Positive	Set Nebulizer	0.4 Bar
Focus	Active	Set Capillary	4500 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	500 V	Set Dry Gas	4.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	150.0 Vpp	Set Divert Valve	Source



+MS, 0.1-0.7min #(8-39)



4Н-бензо[*e*][1,2,4]тиадиазин 1,1-диоксид (7b)



Compound Spectrum List Report

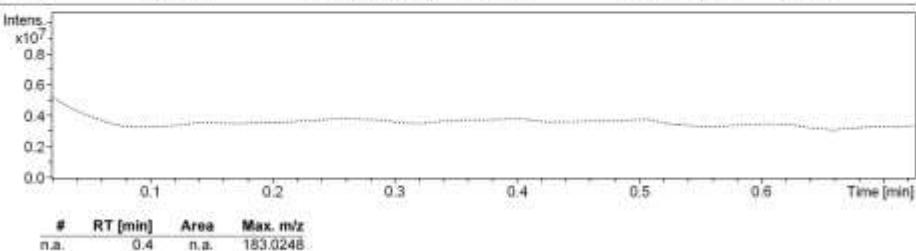
Analysis Info

Analysis Name: D:\Data\ST\ST-210(1+).d
Method: tune_low.m
Sample Name: Tune wide
Comment:

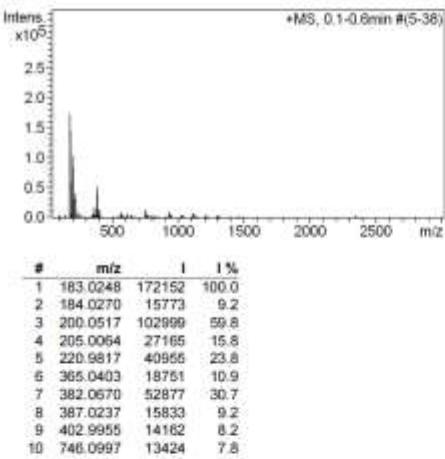
Acquisition Date: 1/21/2022 9:43:17 AM
Operator: Korolev
Instrument / Ser#: micrOTOF-Q II 10225

Acquisition Parameter

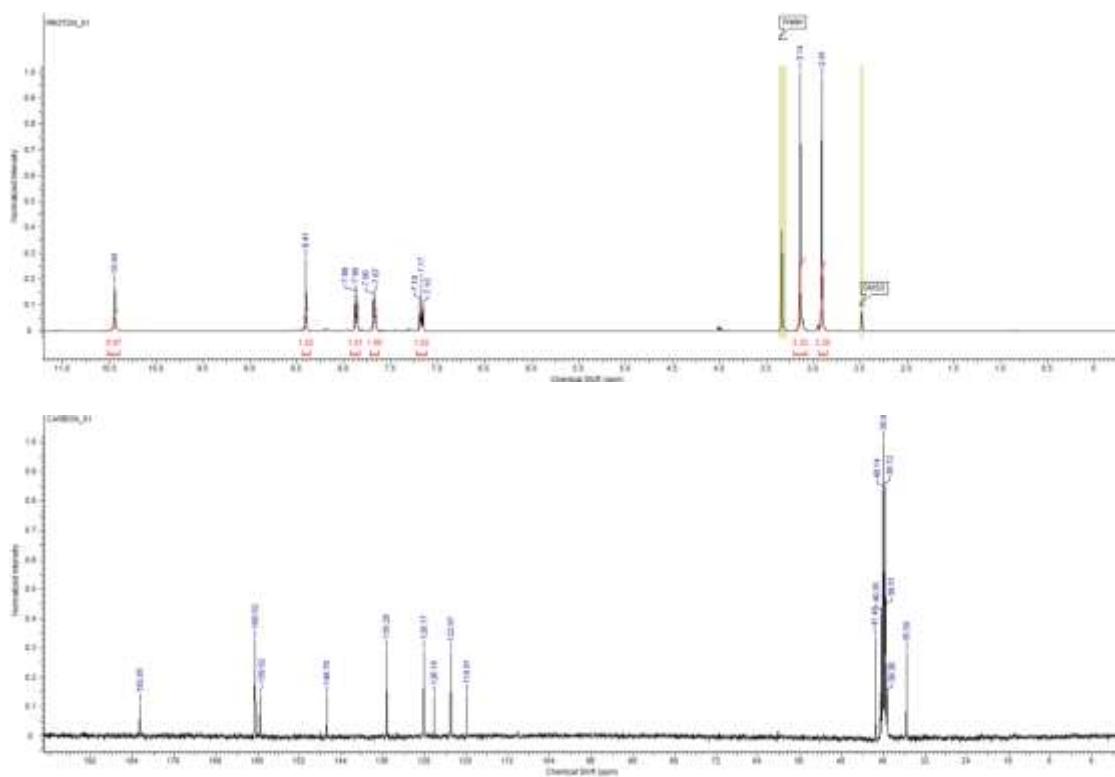
Source Type	ESI	Ion Polarity	Positive	Set Nebulizer	0.4 Bar
Focus	Active	Set Capillary	4500 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	500 V	Set Dry Gas	4.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	150.0 Vpp	Set Divert Valve	Source



+MS, 0.1-0.6min #(5-38)



***N'*-((Изатин-7-ил)сульфонил)-*N,N*-диметилформimidамид (8)**



Compound Spectrum List Report

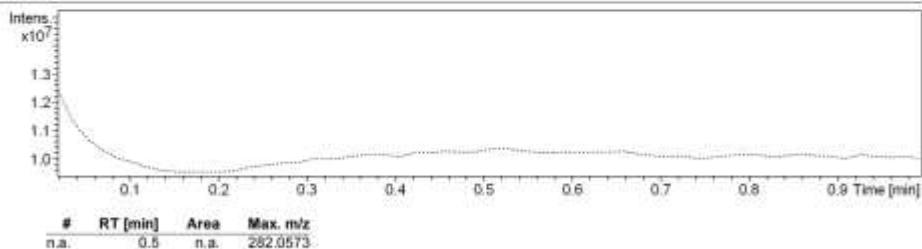
Analysis Info

Analysis Name D:\Data\ST\ST-212(1).d
Method tune_low.m
Sample Name Tune wide
Comment

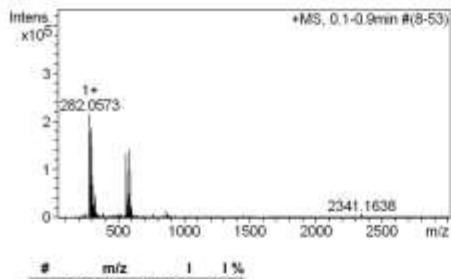
Acquisition Date 2/6/2022 8:32:48 AM
Operator Korolev
Instrument / Ser# micrOTOF-Q II 10225

Acquisition Parameter

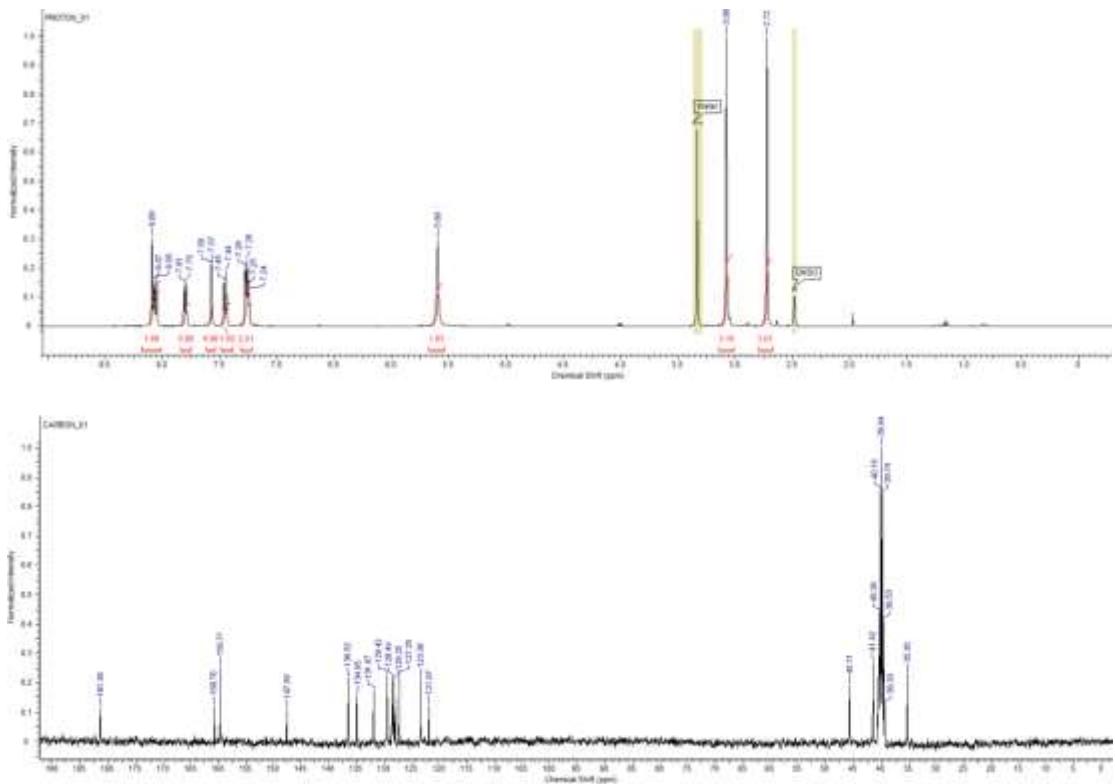
Source Type	ESI	Ion Polarity	Positive	Set Nebulizer	0.4 Bar
Focus	Active	Set Capillary	4500 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	500 V	Set Dry Gas	10.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	150.0 Vpp	Set Divert Valve	Source



+MS, 0.1-0.9min #(8-53)



N'-((1-(2,4-Дихлорбензил)-изатин-7-ил)сульфонил)-N,N-диметилформимидамид (9а)



Compound Spectrum List Report

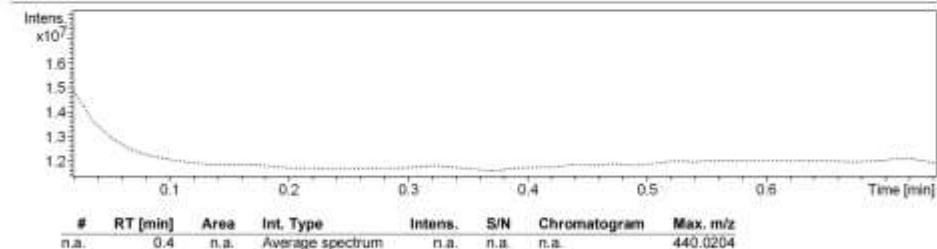
Analysis Info

Analysis Name D:\Data\ST\ST-213.d
Method nast(2).m
Sample Name Tune wide
Comment

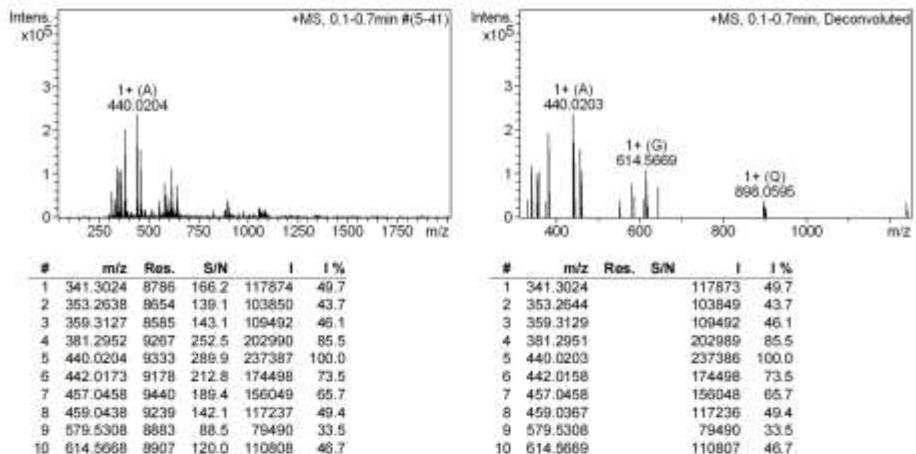
Acquisition Date 2/8/2022 8:59:01 AM
Operator Korolev
Instrument / Ser# micrOTOF-Q II 10225

Acquisition Parameter

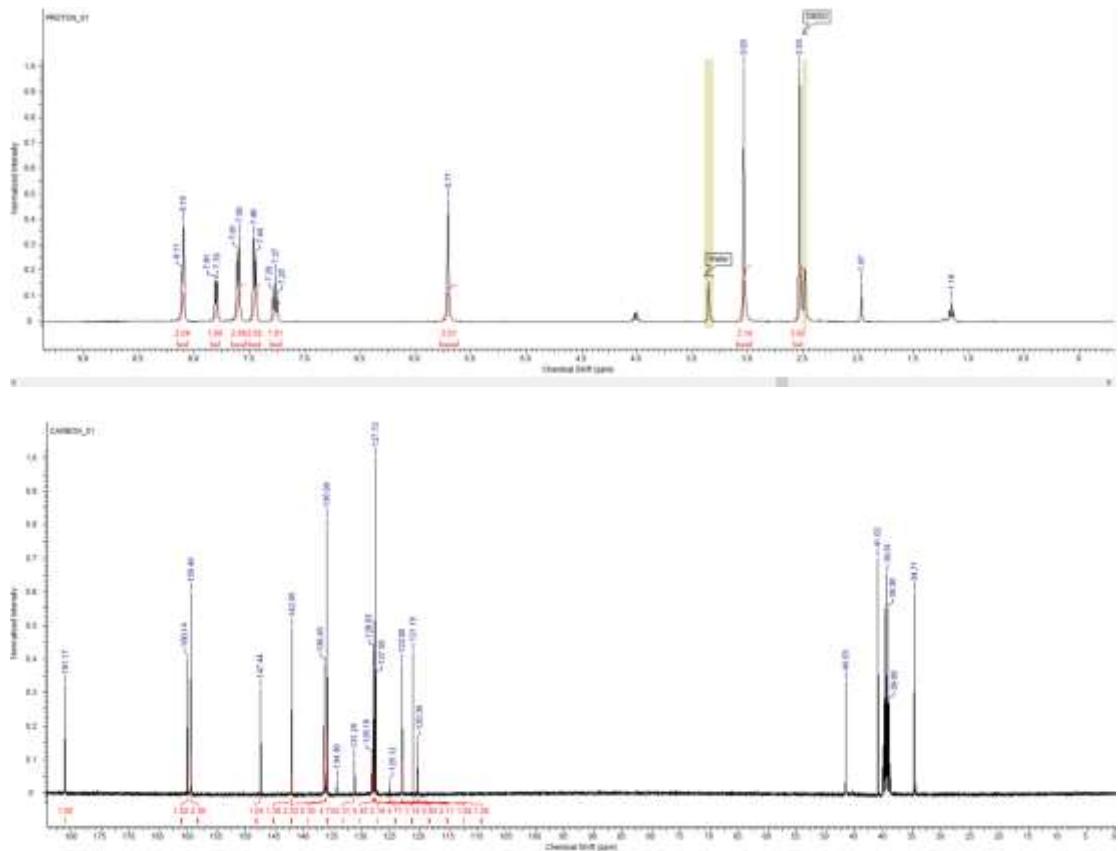
Source Type	ESI	Ion Polarity	Positive	Set Nebulizer	0.4 Bar
Focus	Active	Set Capillary	4000 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	-500 V	Set Dry Gas	4.0 l/min
Scan End	2000 m/z	Set Collision Cell RF	550.0 Vpp	Set Divert Valve	Source



+MS, 0.1-0.7min #(5-41)



N'-(1-(4-((Трифторметилтио)бензил)изатин-7-ил)сульфонил)-N,N-диметилформimid амид (9b)



Compound Spectrum List Report

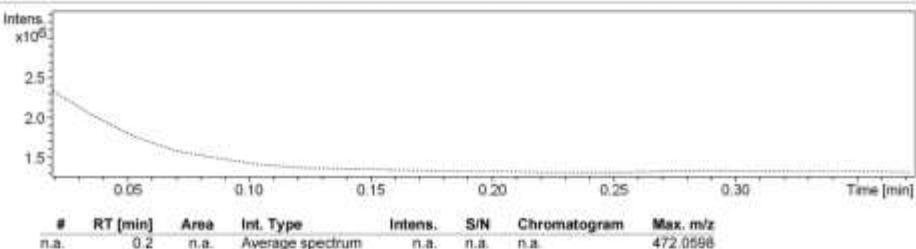
Analysis Info

Analysis Name: D:\Data\ST\ST-228.d
Method: tune_norm.m
Sample Name: Tune wide
Comment:

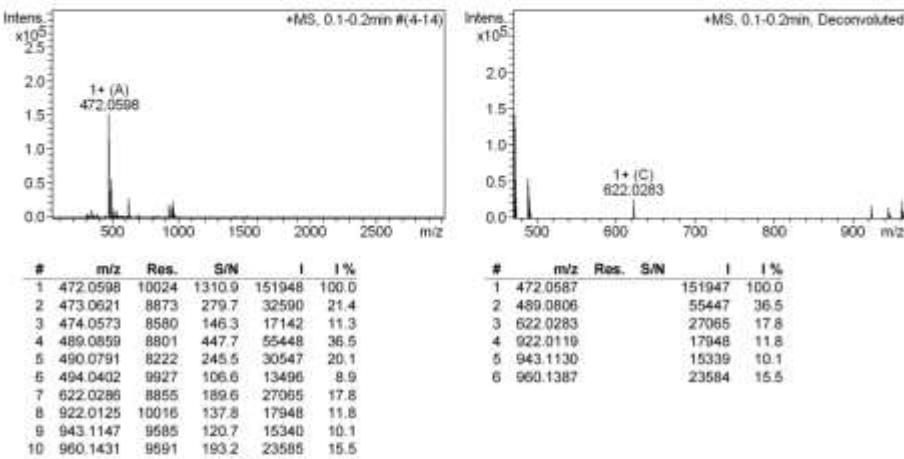
Acquisition Date: 5/29/2022 10:34:12 PM
Operator: Korolev
Instrument / Ser#: micrOTOF-Q II 10225

Acquisition Parameter

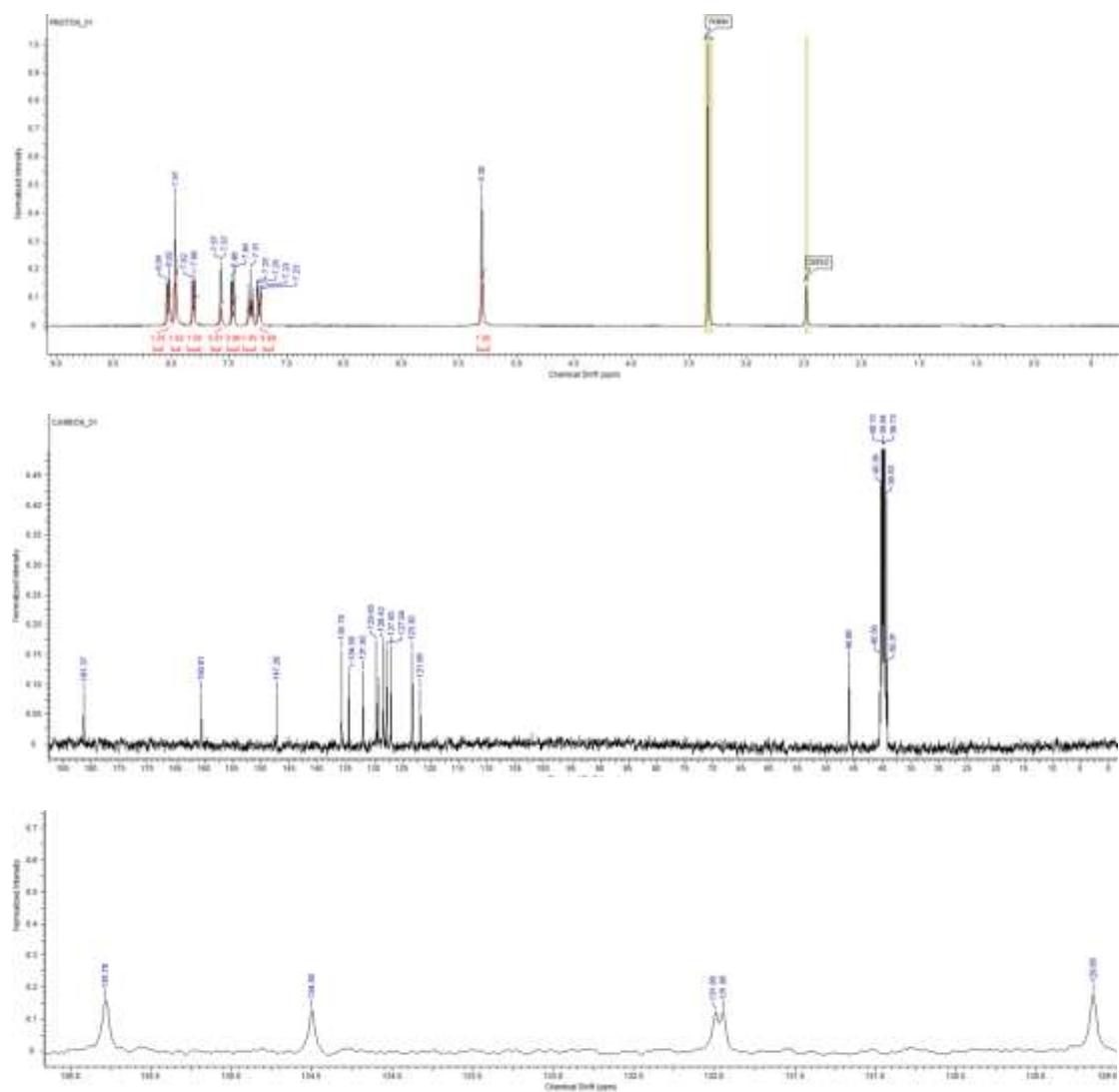
Source Type	ESI	Ion Polarity	Positive	Set Nebulizer	0.4 Bar
Focus	Active	Set Capillary	4500 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	-500 V	Set Dry Gas	4.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	550.0 Vpp	Set Diverter Valve	Source



+MS, 0.1-0.2min #(4-14)



1-(2,4-Дихлорбензил)-изатин-7-сульфонамид (2a)



Compound Spectrum List Report

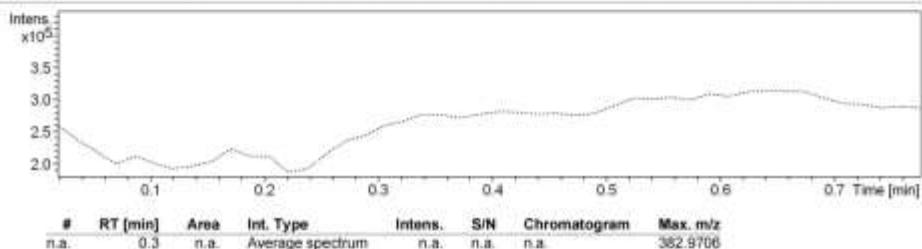
Analysis Info

Analysis Name: D:\Data\ST\ST-215(-).d
 Method: proba.m
 Sample Name: Tune wide
 Comment:

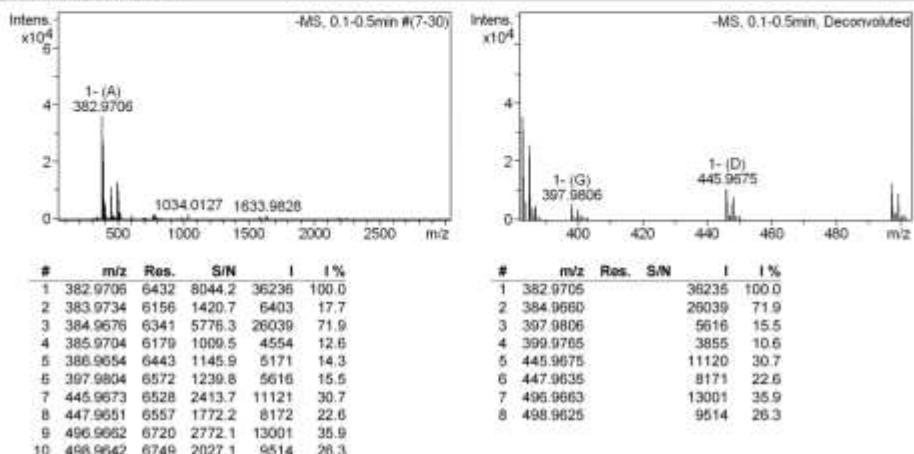
Acquisition Date: 4/10/2022 5:17:04 PM
 Operator: Korolev
 Instrument / Ser#: micrOTOF-Q II 10225

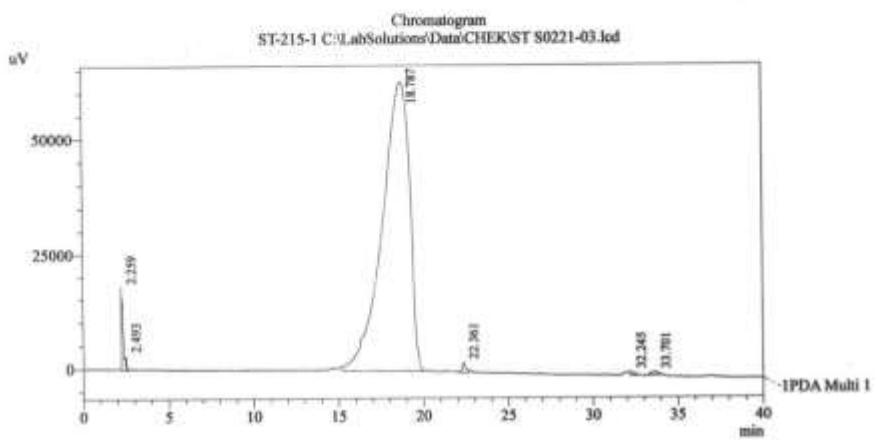
Acquisition Parameter

Source Type	ESI	Ion Polarity	Negative	Set Nebulizer	0.4 Bar
Focus	Not active	Set Capillary	3000 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	-500 V	Set Dry Gas	4.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	550.0 Vpp	Set Divert Valve	Source



-MS, 0.1-0.5min #(7-30)





1 PDA Multi 1 / 254nm 4nm

PDA Ch1 254nm 4nm

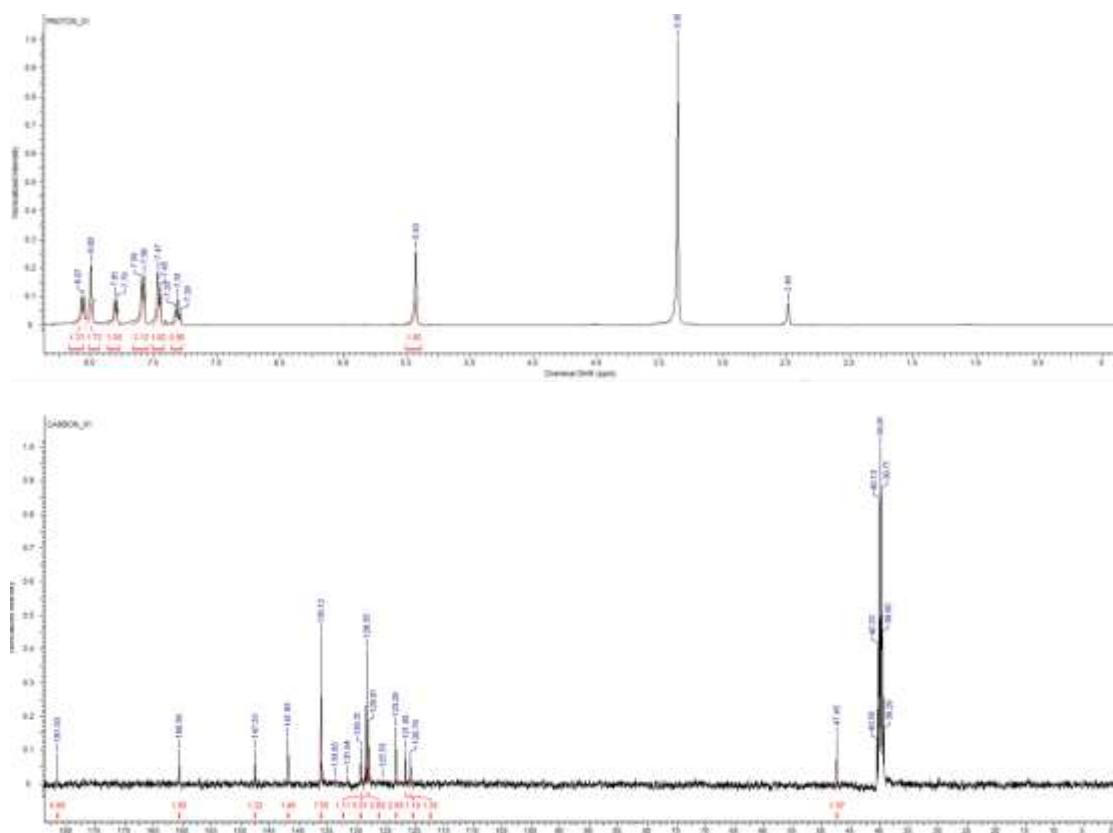
Peak#	Ret. Time	Area	Height	Area %
1	2.259	127254	17986	1.753
2	2.493	16179	3142	0.223
3	18.787	7057484	62594	97.203
4	22.361	30367	2167	0.418
5	32.245	10963	785	0.151
6	33.701	18348	652	0.253
Total		7260596	87727	100.000

Method Filename : FRA02CvA.lcm 28.02.2022 12:28:52

Time	Unit	Command	Value
0.01	Pumps	B.Conc	30
30.00	Pumps	B.Conc	80
40.00	Pumps	B.Conc	90
45.00	Pumps	B.Conc	30
55.00	Controller	Stop	

Shimadzu LC-20 AD; System - FRA 02 vA, Colon-Kromasil - C-18, 4.6x250 mm, 5 µm, N 59967
Elution: A - COOHNH4 0.2% pH 4.5; B - MeCN, fl - 1 ml/min, loop 20 µl

(4-((Трифторметил)тио)бензил)-изатин-7-сульфонамид (2b)



Compound Spectrum List Report

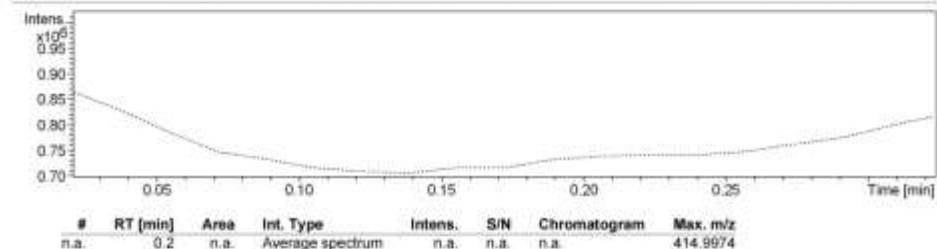
Analysis Info

Analysis Name: D:\Data\ST\ST-230(-).d
Method: tune_norm.m
Sample Name: Tune wide
Comment:

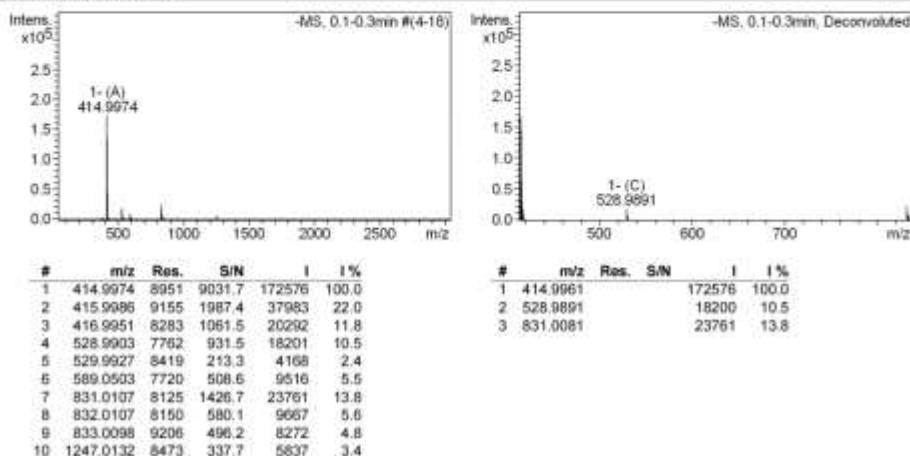
Acquisition Date: 5/29/2022 11:00:37 PM
Operator: Korolev
Instrument / Ser#: micrOTOF-Q II 10225

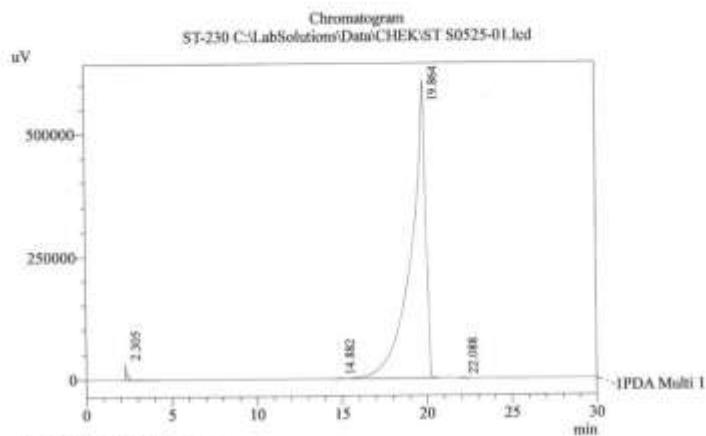
Acquisition Parameter

Source Type	ESI	Ion Polarity	Negative	Set Nebulizer	0.4 Bar
Focus	Active	Set Capillary	4000 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	-500 V	Set Dry Gas	4.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	550.0 Vpp	Set Diverter Valve	Source



-MS, 0.1-0.3min #(4-18)





1 PDA Multi 1 / 254nm 4nm

PDA Ch1 254nm 4nm

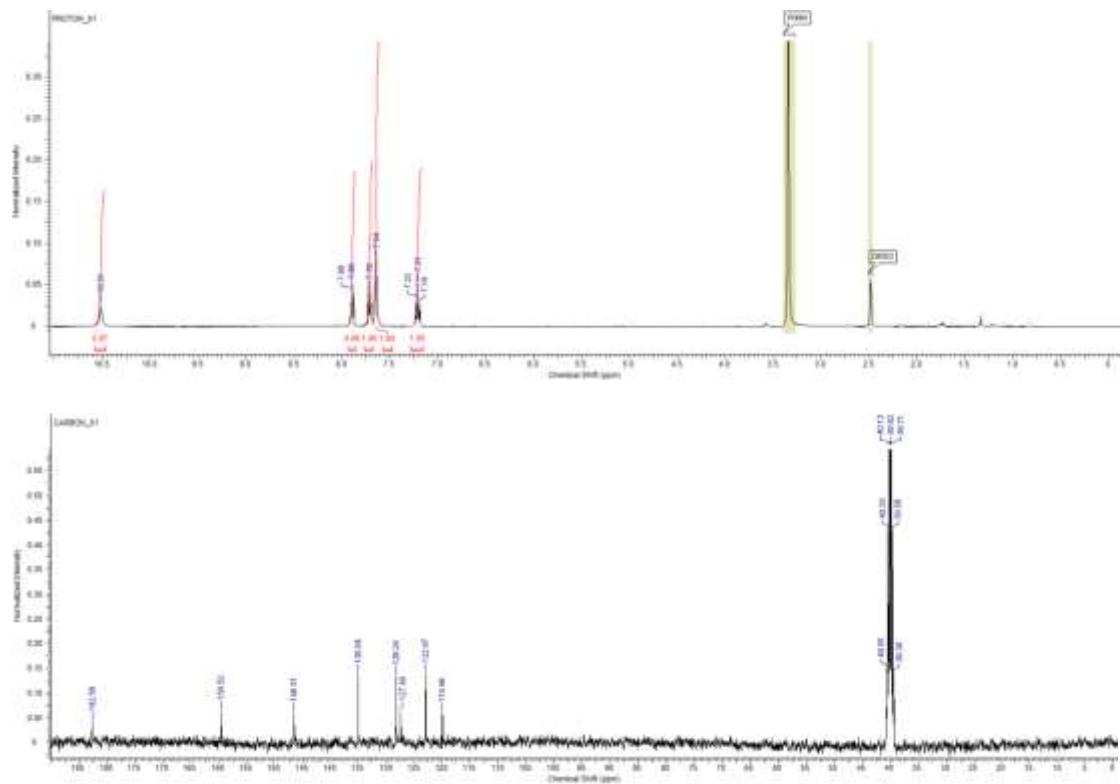
Peak#	Ret. Time	Area	Height	Area %
1	2.305	181409	33701	0.502
2	14.882	10657	884	0.029
3	19.864	35959981	669041	99.425
4	22.088	15989	1206	0.044
Total		36168056	6444832	100.000

Method File name : FOS.v.lcm 25.05.2022 14:22:28

Time	Unit	Command	Value
0.01	Pumps	B.Conc	30
30.00	Pumps	B.Conc	90
33.00	Pumps	B.Conc	30
45.00	Controller	Stop	

Shimadzu LC-20 AD; System - FOS Colon-Kromasil-100-5mkm, C-18, 4,6x250 mm, N 62511
Elution: A - H3PO4 0,01M pH 2,6; B - MeCN, fl - 1.0 ml/min, loop 20 µl

2,3-диоксоиндолин-7-сульфонамид 10



Compound Spectrum List Report

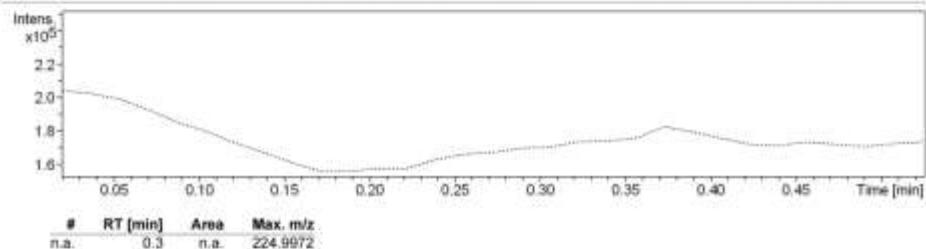
Analysis Info

Analysis Name: D:\Data\ST\ST-225.d
Method: tune_low.m
Sample Name: Tune wide
Comment:

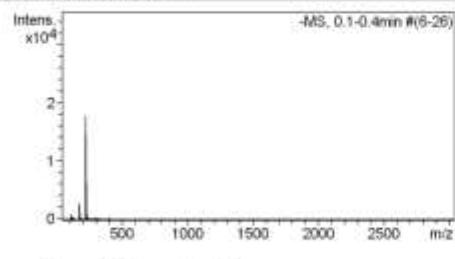
Acquisition Date: 4/23/2022 6:13:01 PM
Operator: Korolev
Instrument / Ser#: micrOTOF-Q II 10225

Acquisition Parameter

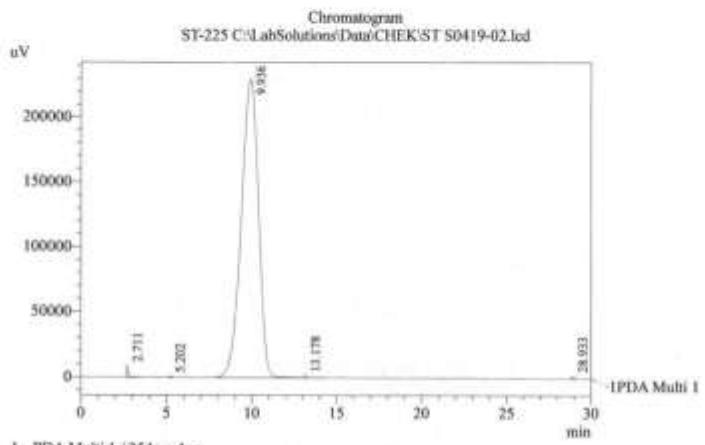
Source Type	ESI	Ion Polarity	Negative	Set Nebulizer	1.0 Bar
Focus	Active	Set Capillary	3500 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	-500 V	Set Dry Gas	4.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	150.0 Vpp	Set Divert Valve	Source



-MS, 0.1-0.4min #(6-26)



#	m/z	t	I %
1	112.9813	736	4.1
2	129.0419	261	1.5
3	173.0442	2831	15.9
4	224.9972	17779	100.0
5	226.0012	2111	11.9
6	226.9964	1182	6.6
7	227.2045	203	1.1
8	255.2362	226	1.3
9	287.9989	229	1.3
10	399.0564	315	1.8



I PDA Multi 1 / 254nm 4nm

PDA Ch1 254nm 4nm

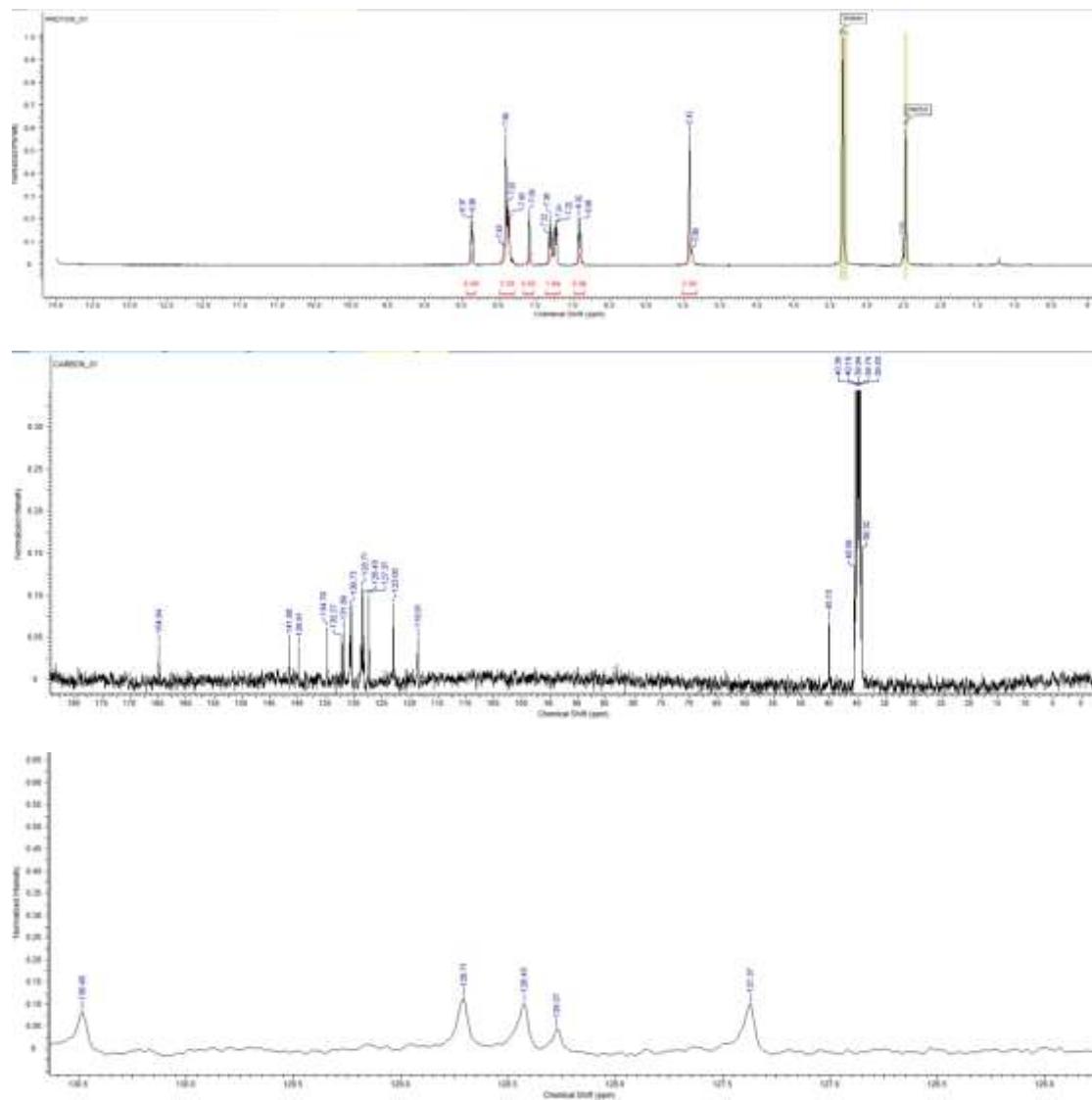
Peak#	Ret. Time	Area	Height	Aren %
1	2.711	58640	9299	0,358
2	5.202	10666	1094	0,065
3	9.936	16251574	229942	99,343
4	13.178	14749	1829	0,090
5	28.933	23409	2540	0,143
Total		16359038	244704	100,000

Method Filename : FOS Av.lcm 19.04.2022 12:17:25

Time	Unit	Command	Value
0.01	Pumps	B.Conc	10
30.00	Pumps	B.Conc	50
35.00	Pumps	B.Conc	10
45.00	Controller	Stop	

Shimadzu LC-20 AD; System - FOS Colon- Kromasil-100-5mkm, C-18, 4,6x250 mm, N 62511
Elution: A - H3PO4 0,01M pH 2,6; B - MeCN, fl - 1.0 ml/min, loop 20 mkl

**(Z)-1-(2,4-Дихлорбензил)-3-(гидроксиимино)-2-оксоиндолин-7-сульфонамид
(11a)**



Compound Spectrum List Report

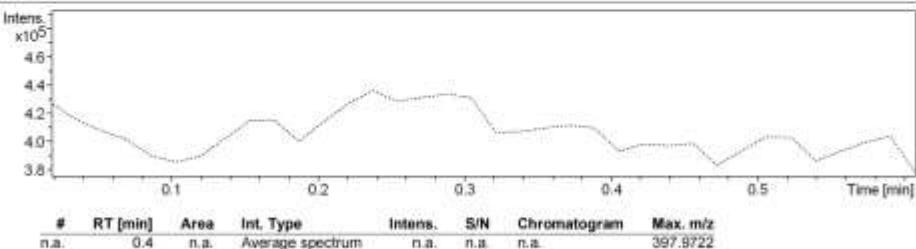
Analysis Info

Analysis Name D:\Data\ST\ST-220(-).d
Method proba.m
Sample Name Tune wide
Comment

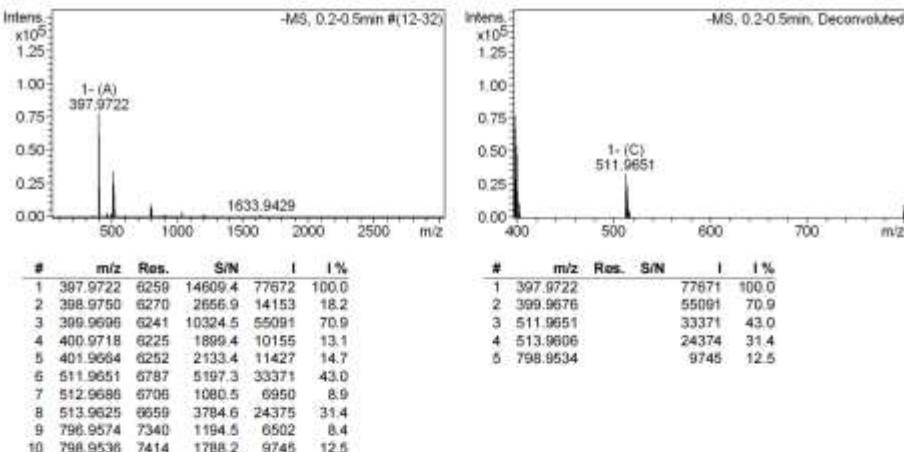
Acquisition Date 4/10/2022 4:56:28 PM
Operator Korolev
Instrument / Ser# micrOTOF-Q II 10225

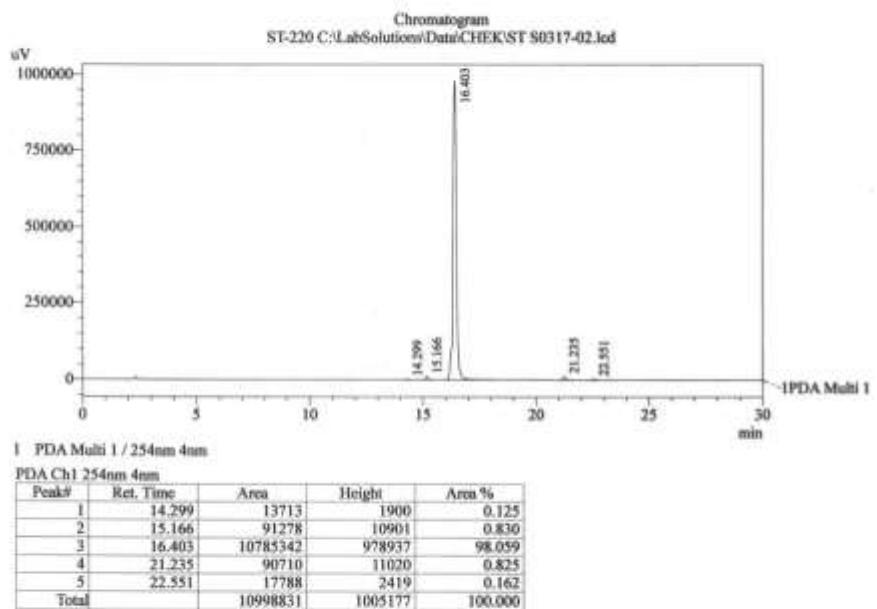
Acquisition Parameter

Source Type	ESI	Ion Polarity	Negative	Set Nebulizer	0.4 Bar
Focus	Not active	Set Capillary	3000 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	-500 V	Set Dry Gas	4.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	550.0 Vpp	Set Divert Valve	Source



-MS, 0.2-0.5min #(12-32)



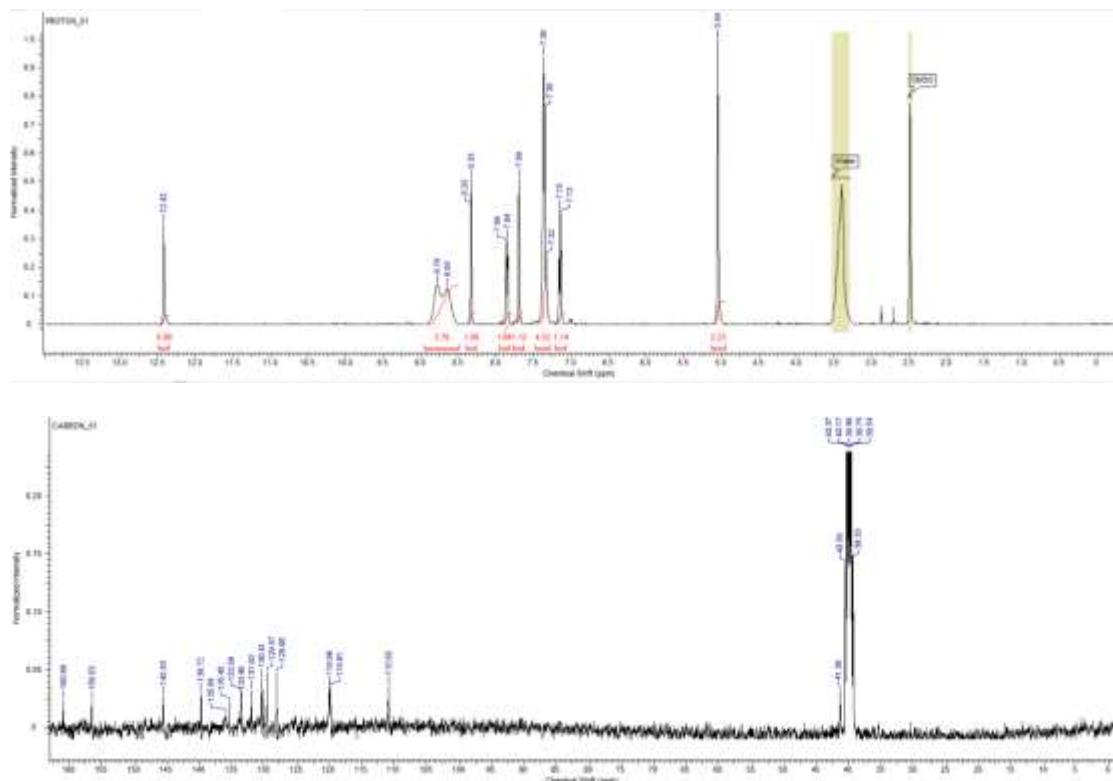


Method Filename : FRA02CvA.lcm 17.03.2022 13:06:30

Time	Unit	Command	Value
0.01	Pumps	B.Conc	30
30.00	Pumps	B.Conc	80
40.00	Pumps	B.Conc	90
45.00	Pumps	B.Conc	30
55.00	Controller	Stop	

Shimadzu LC-20 AD; System - FRA 02 vA, Colon- Kromasil C-18, 4.6x250 mm, 5 µm, N 59967
Elution: A - COOHNH4 0.2% pH 4.5; B - MeCN, fl - 1 ml/min, loop 20 µl

(Z)-2-(1-(2,4-Дихлорбензил)-2-оксо-7-сульфамоилиндолин-3-иминогуанидин гидрохлорид (11b)



Compound Spectrum List Report

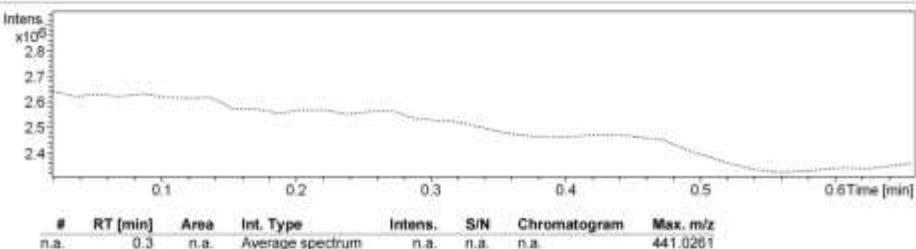
Analysis Info

Analysis Name: D:\Data\ST\ST-223.d
 Method: tune_wide.m
 Sample Name: Tune wide
 Comment:

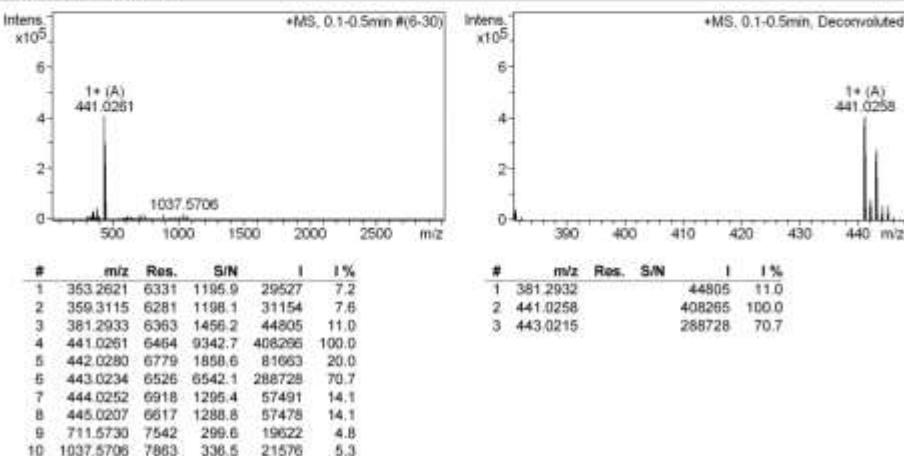
Acquisition Date: 4/10/2022 3:13:36 PM
 Operator: Korolev
 Instrument / Ser#: micrOTOF-Q II 10225

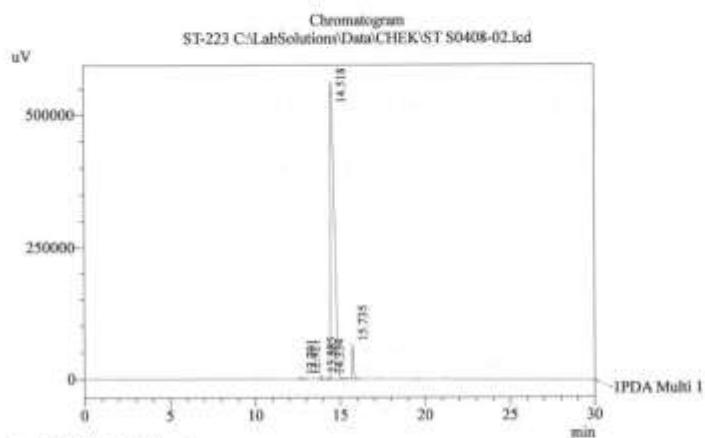
Acquisition Parameter

Source Type	ESI	Ion Polarity	Positive	Set Nebulizer	0.4 Bar
Focus	Not active	Set Capillary	4500 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	-500 V	Set Dry Gas	4.0 l/min
Scan End	3000 m/z	Set Collision Cell RF	550.0 Vpp	Set Divert Valve	Source



+MS, 0.1-0.5min #(6-30)





1 PDA Multi 1 / 270nm 4nm

PDA Ch1 270nm 4nm

Peak#	Ret. Time	Area	Height	Area %
1	12.701	15778	2242	0.162
2	12.921	11165	1911	0.115
3	13.885	36803	6574	0.379
4	14.334	19736	2654	0.203
5	14.518	9194422	563754	94.670
6	15.735	434170	65970	4.470
Total		9712074	643106	100.000

Method Filename : FOS Av.lcm 08.04.2022 13:25:10

Time	Unit	Command	Value
0.01	Pumps	B.Conc	20
30.00	Pumps	B.Conc	80
35.00	Pumps	B.Conc	20
45.00	Controller	Stop	

Shimadzu LC-20 AD; System - FOS Colon- Kromasil-100-5mkm. C-18, 4,6x250 mm. N 62511
Elution: A - H3PO4 0,01M pH 2,6; B - MeCN, fl - 1,0 ml/min, loop 20 mkl