

Supporting Information.

C@PA: Computer-aided Pattern Analysis to Predict Multitarget ABC Transporter Inhibitors

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Building, 10 Westbourne Street, Sydney, New South Wales 2065, Australia.
- * Corresponding author: Sven Marcel Stefan (s.m.stefan@medisin.uio.no)

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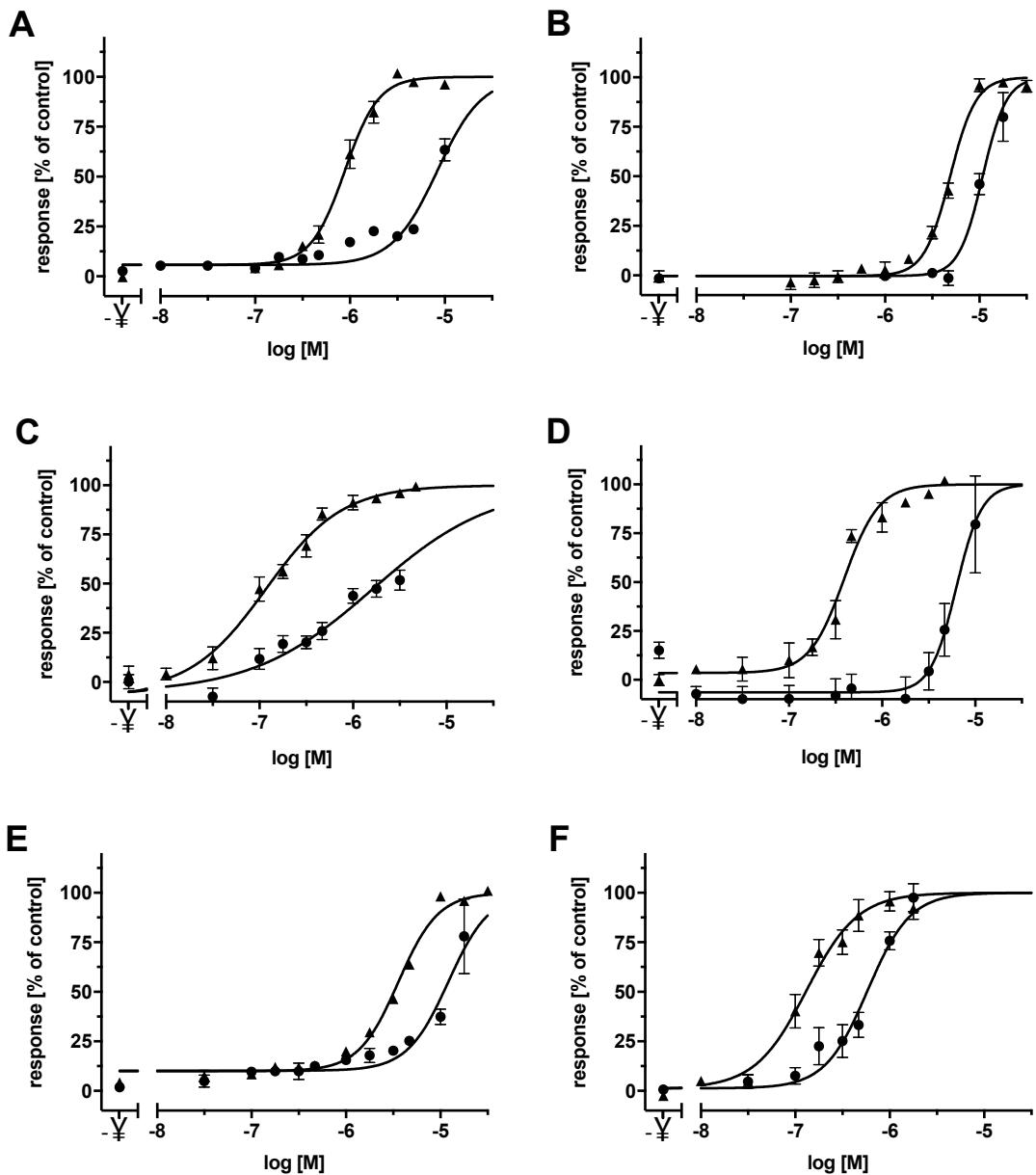
Supplementary Figure 1 A–F: Concentration-effect curves of compound **15** against ABCB1 (A and D), ABCC1 (B and E), and ABCG2 (C and F) as determined in calcein AM (A and B), pheophorbide A (C), Hoechst 33342 (D and F), and daunorubicin (E) assays.

Supplementary Figure 2 A–F: Concentration-effect curves of compound **18** against ABCB1 (A and D), ABCC1 (B and E), and ABCG2 (C and F) as determined in calcein AM (A and B), pheophorbide A (C), Hoechst 33342 (D and F), and daunorubicin (E) assays.

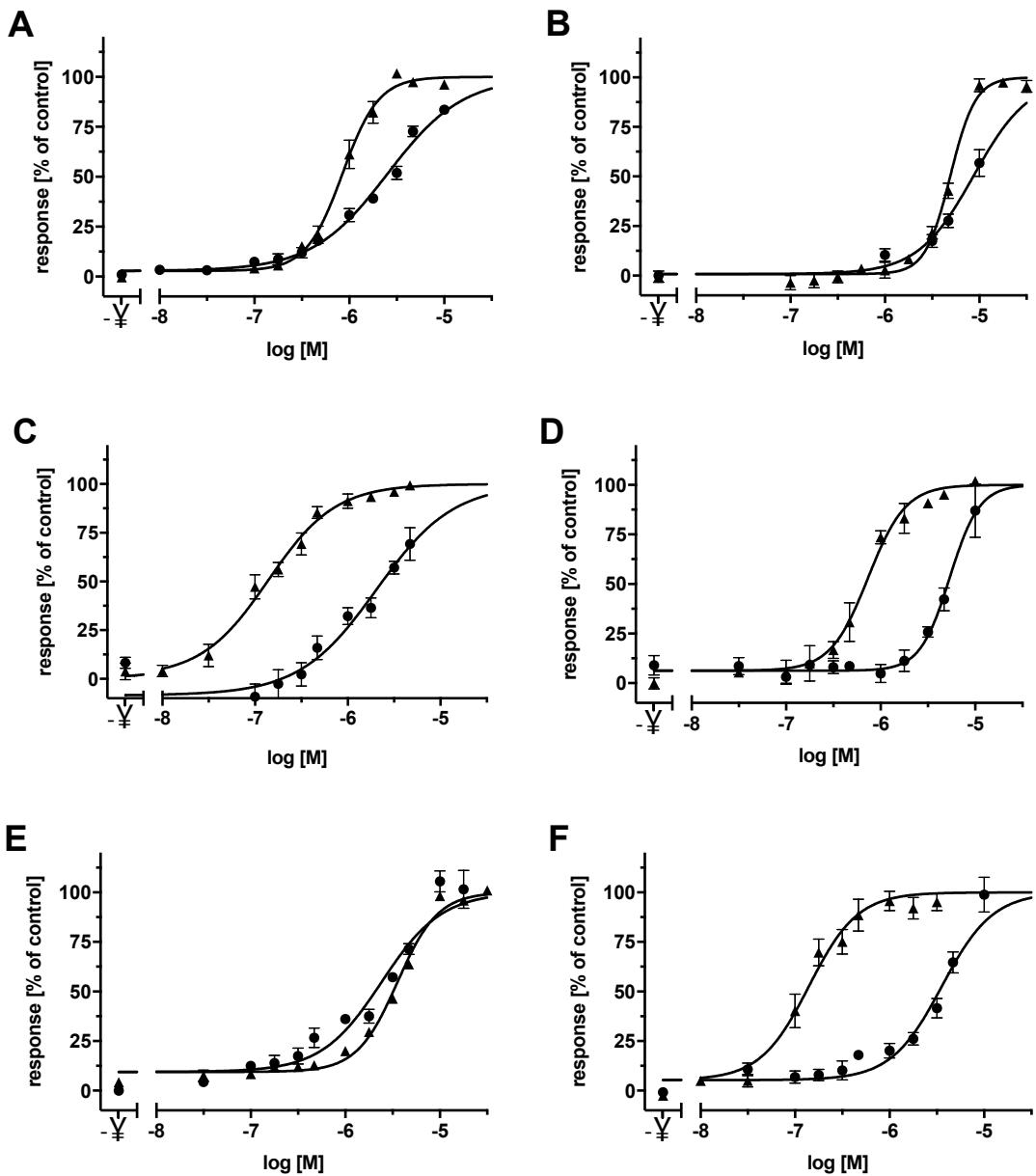
Supplementary Figure 3 A–F: Concentration-effect curves of compound **22** against ABCB1 (A and D), ABCC1 (B and E), and ABCG2 (C and F) as determined in calcein AM (A and B), pheophorbide A (C), Hoechst 33342 (D and F), and daunorubicin (E) assays.

Supplementary Figure 4 A–F: Concentration-effect curves of compound **26** against ABCB1 (A and D), ABCC1 (B and E), and ABCG2 (C and F) as determined in calcein AM (A and B), pheophorbide A (C), Hoechst 33342 (D and F), and daunorubicin (E) assays.

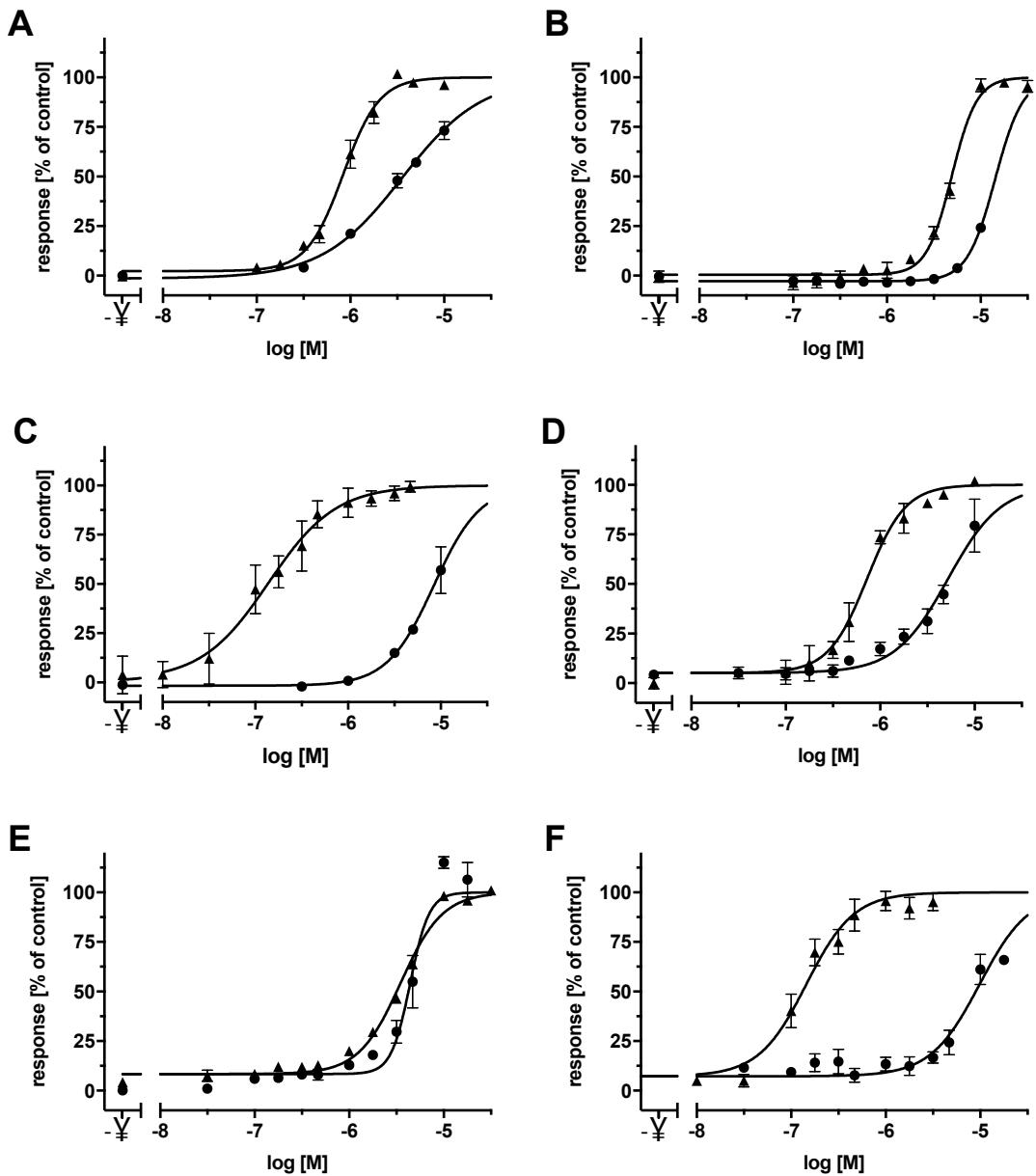
LC-MS data and NMR spectra of compounds 11–33.



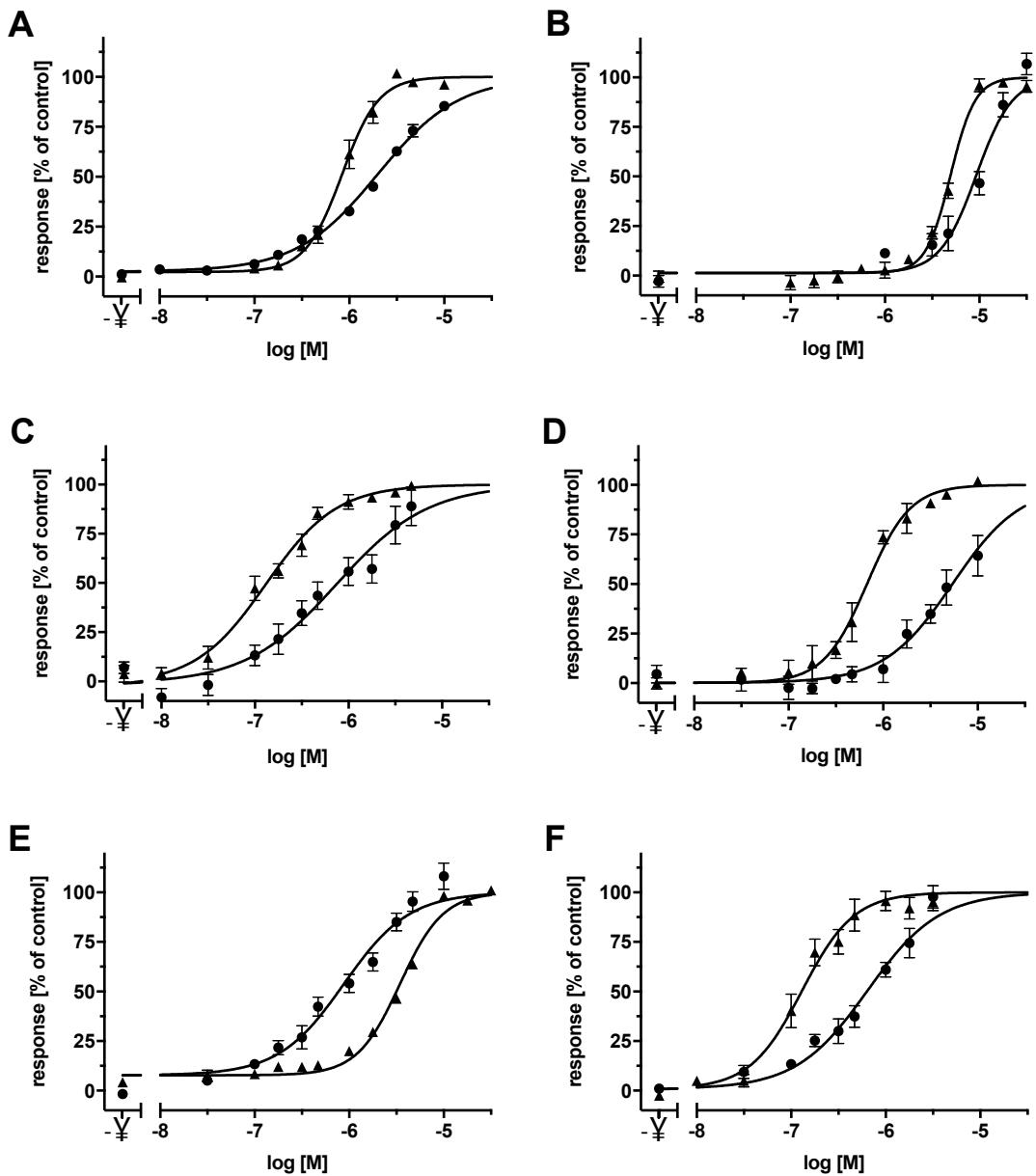
Supplementary Figure 1 A–F: Concentration-effect curves of compound **15** (●) as determined in calcein AM (A and B), pheophorbide A (C), Hoechst 33342 (D and F), and daunorubicin (E) assays using either ABCB1-overexpressing A2780/ADR cells (A and D), ABCC1-overexpressing H69AR cells (B and E), or ABCG2-overexpressing MDCK II BCRP cells (C and F). Data were normalized by defining the effect of 10 μ M cyclosporine A (▲; A, B, D, and E) and compound **34** (▲; C and F) as positive control (100%) and buffer medium was used as negative control (0%). Shown is mean \pm SEM of at least three independent experiments.



Supplementary Figure 2 A–F: Concentration-effect curves of compound **18** (●) as determined in calcein AM (A and B), pheophorbide A (C), Hoechst 33342 (D and F), and daunorubicin (E) assays using either ABCB1-overexpressing A2780/ADR cells (A and D), ABCC1-overexpressing H69AR cells (B and E), or ABCG2-overexpressing MDCK II BCRP cells (C and F). Data were normalized by defining the effect of 10 μ M cyclosporine A (▲; A, B, D, and E) and compound **34** (▲; C and F) as positive control (100%) and buffer medium was used as negative control (0%). Shown is mean \pm SEM of at least three independent experiments.



Supplementary Figure 3 A–F: Concentration-effect curves of compound **22** (●) as determined in calcein AM (A and B), pheophorbide A (C), Hoechst 33342 (D and F), and daunorubicin (E) assays using either ABCB1-overexpressing A2780/ADR cells (A and D), ABCC1-overexpressing H69AR cells (B and E), or ABCG2-overexpressing MDCK II BCRP cells (C and F). Data were normalized by defining the effect of 10 μ M cyclosporine A (▲; A, B, D, and E) and compound **34** (▲; C and F) as positive control (100%) and buffer medium was used as negative control (0%). Shown is mean \pm SEM of at least three independent experiments.



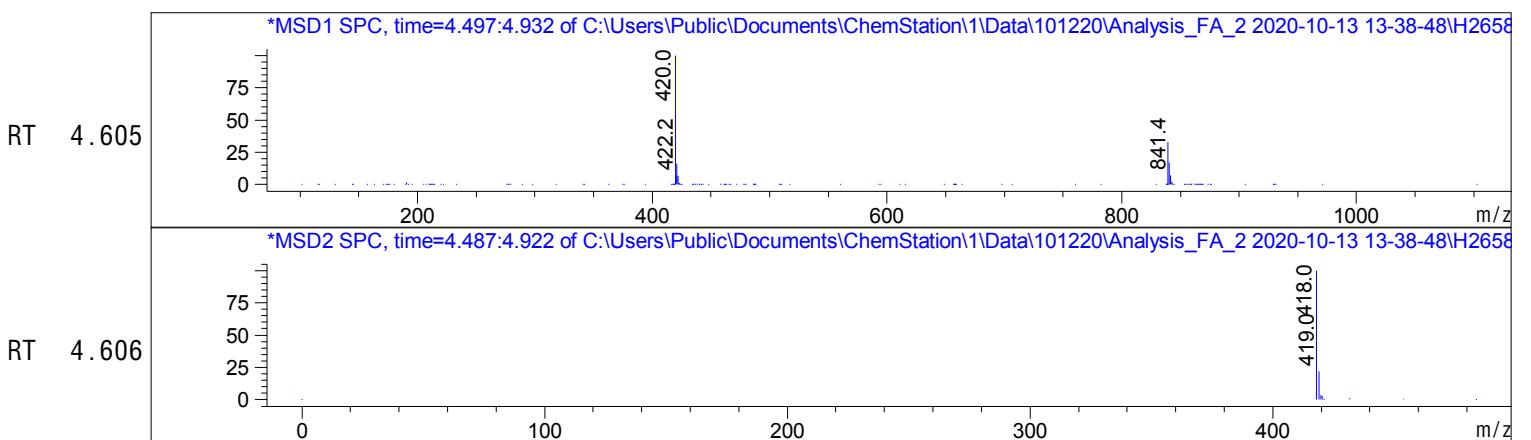
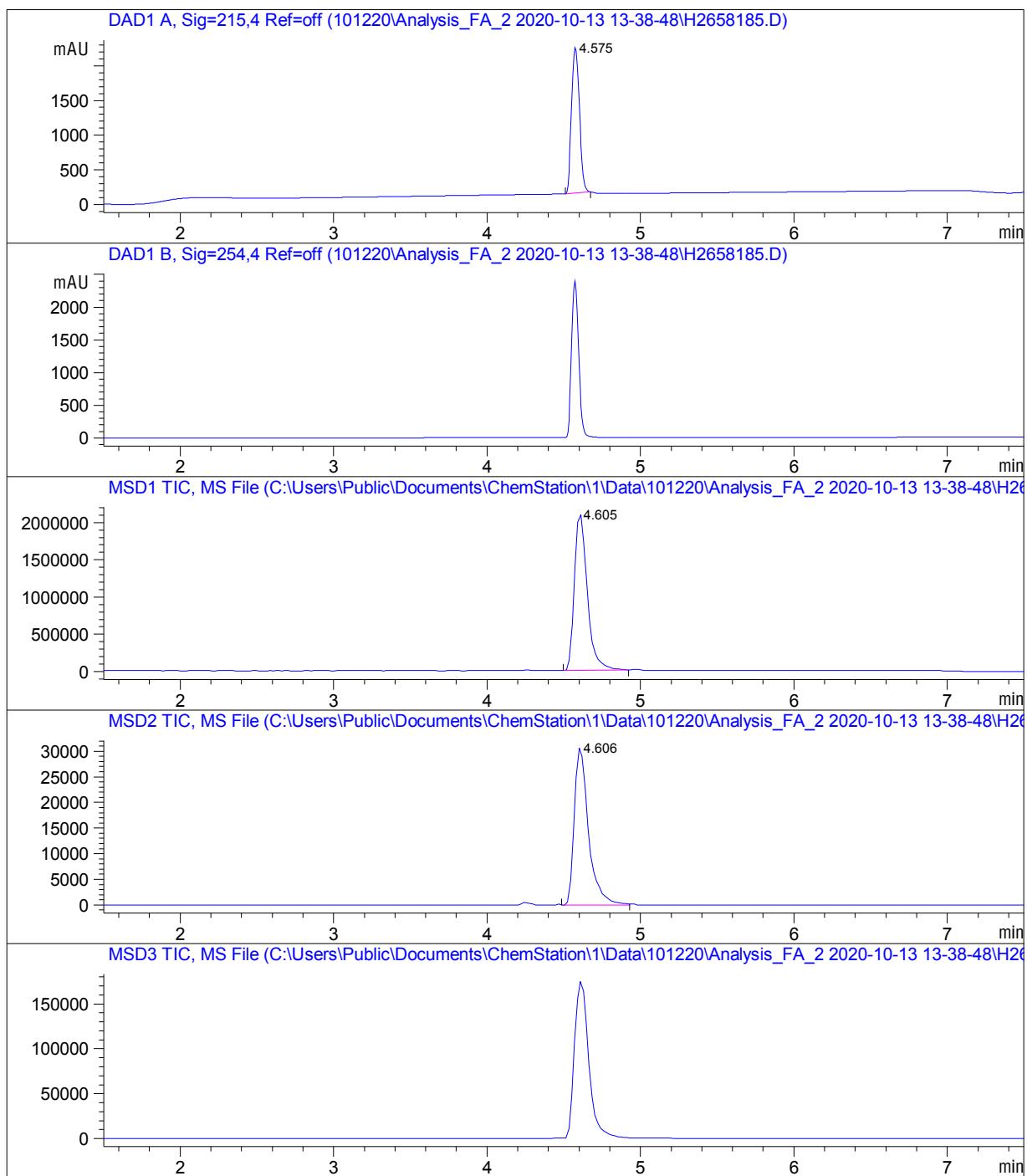
Supplementary Figure 4 A–F: Concentration-effect curves of compound **26** (●) as determined in calcein AM (A and B), pheophorbide A (C), Hoechst 33342 (D and F), and daunorubicin (E) assays using either ABCB1-overexpressing A2780/ADR cells (A and D), ABCC1-overexpressing H69AR cells (B and E), or ABCG2-overexpressing MDCK II BCRP cells (C and F). Data were normalized by defining the effect of 10 μ M cyclosporine A (▲; A, B, D, and E) and compound **34** (▲; C and F) as positive control (100%) and buffer medium was used as negative control (0%). Shown is mean \pm SEM of at least three independent experiments.

Compound 11

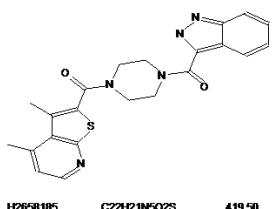
Sample
H2658185

0.1%FA-ACN 5-95%ACN 6 min. Zorbax-Eclipse-Plus C18 4.6 x
100mm, 3.5 μ m.

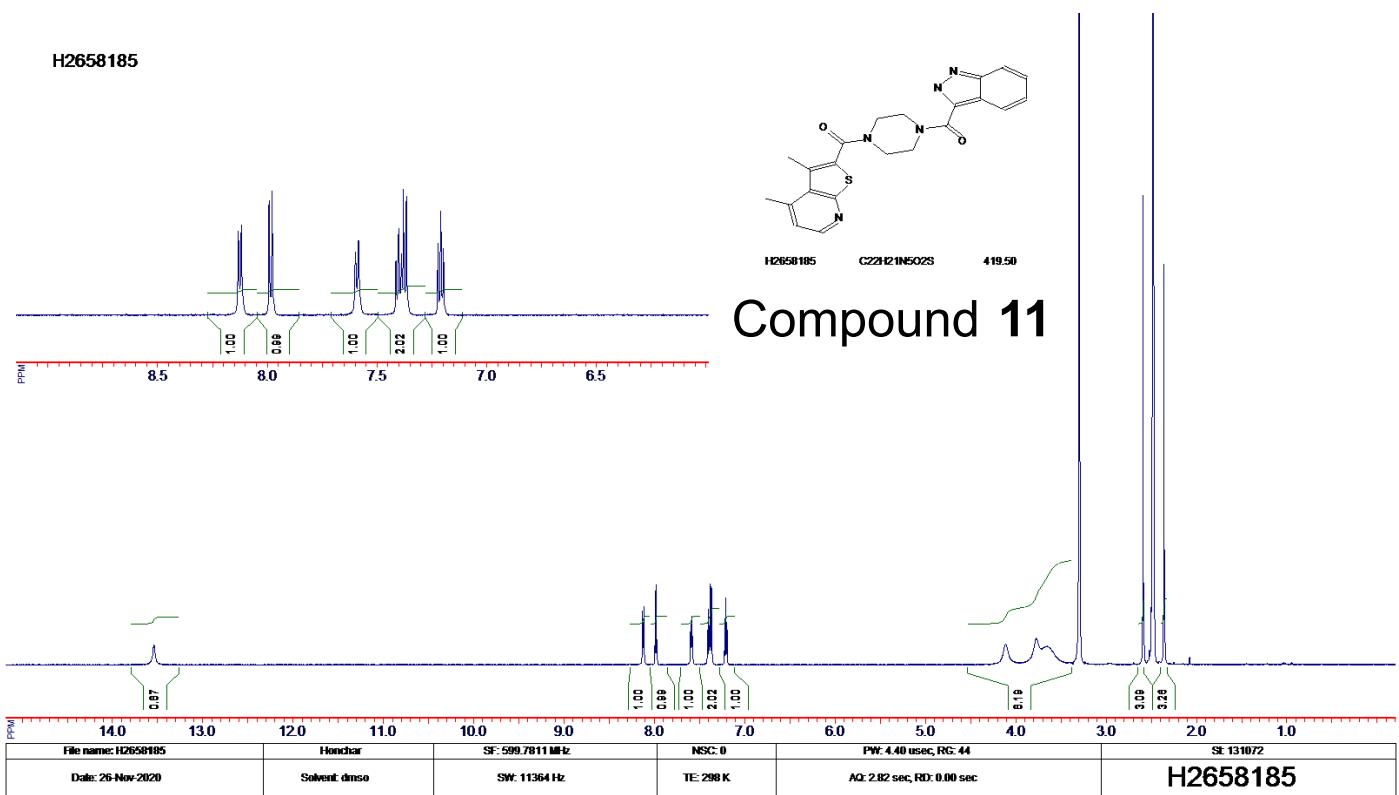
#	Time	Area%
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H2658185



Compound 11

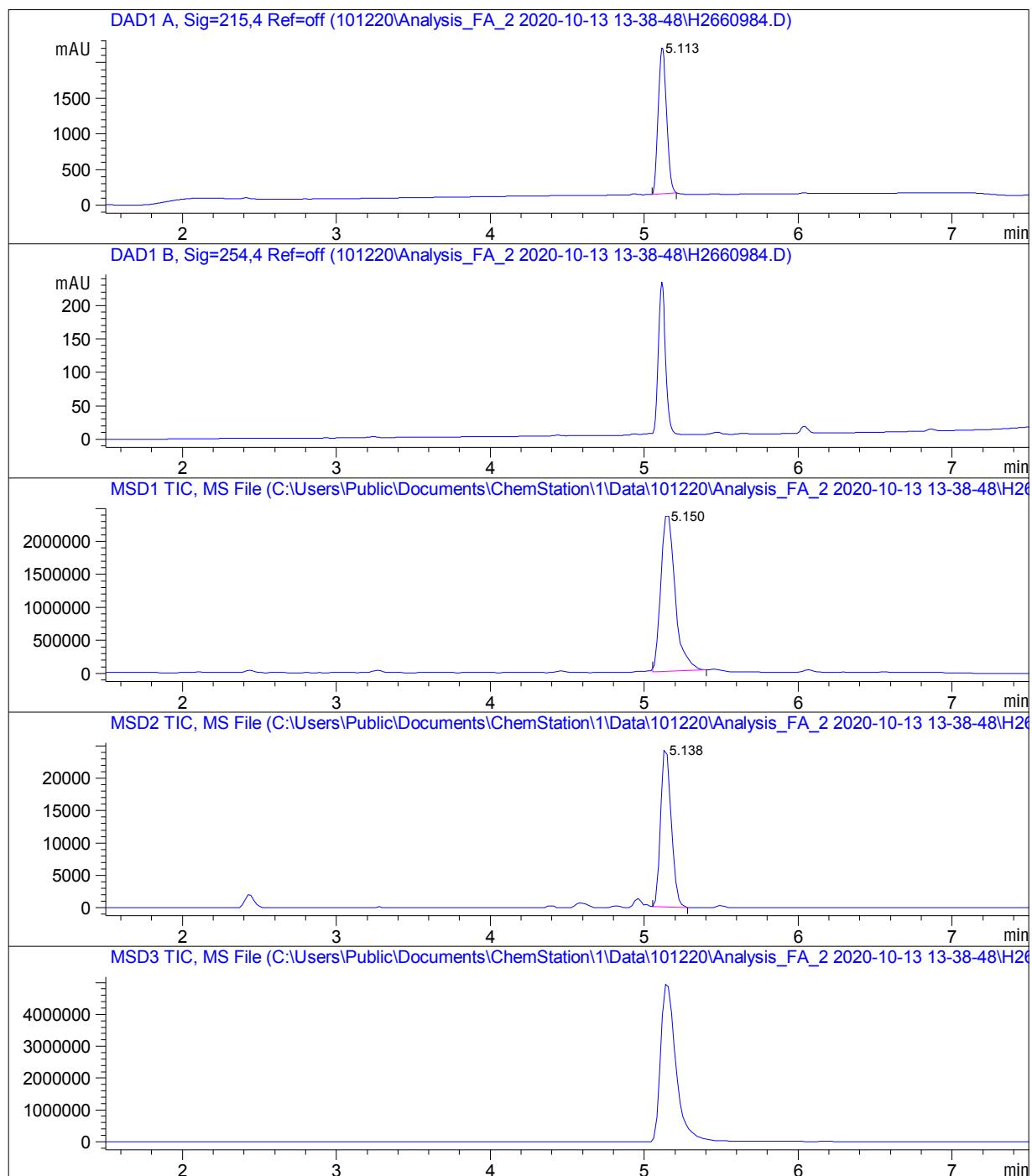


Compound 12

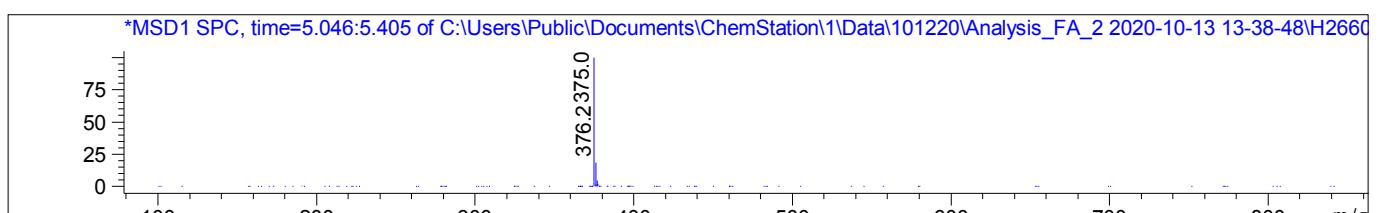
Sample
H2660984

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100mm, 3.5 μ m.

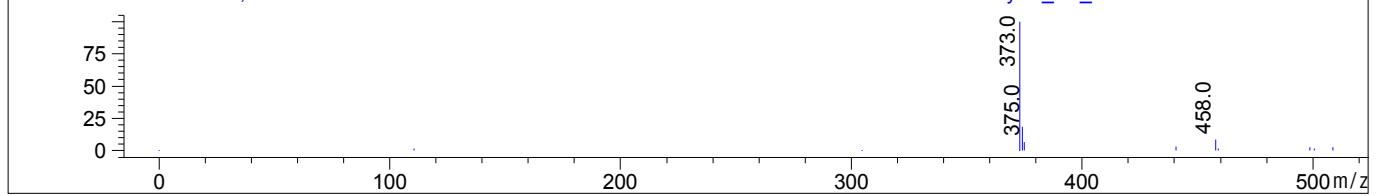
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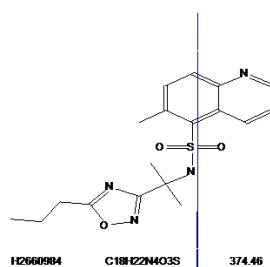
RT 5.150



RT 5.138



H2660984



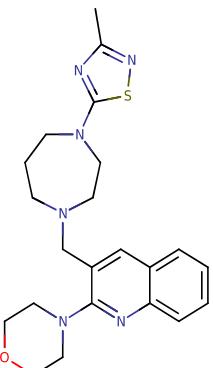
H2660984 C₁₈H₂₂N₄O₃S 374.46

Compound 12

File name: H2660984	Honchar	SF: 599.7811 MHz	NSC: 0	PW: 4.40 usec, RG: 44	St: 131072
Date: 26-Nov-2020	Solvent: dmso	SW: 11364 Hz	TE: 299 K	AO: 2.82 sec, RD: 0.00 sec	H2660984

Compound 13

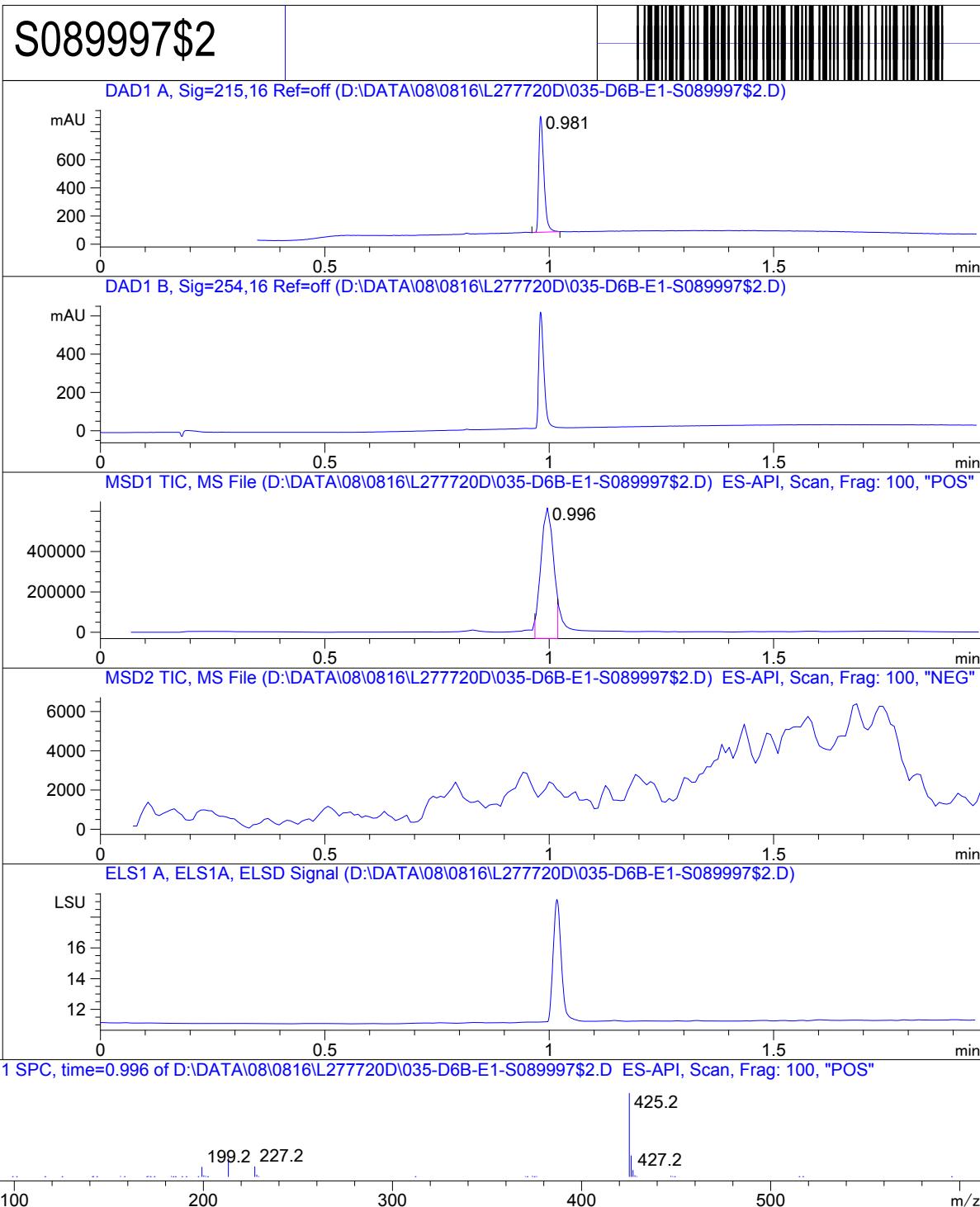
MaxPeak: 100.00%
Ret_Time: 0.981 min



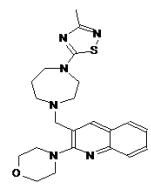
Mol Wt 424.56

Exact Mass 424.24

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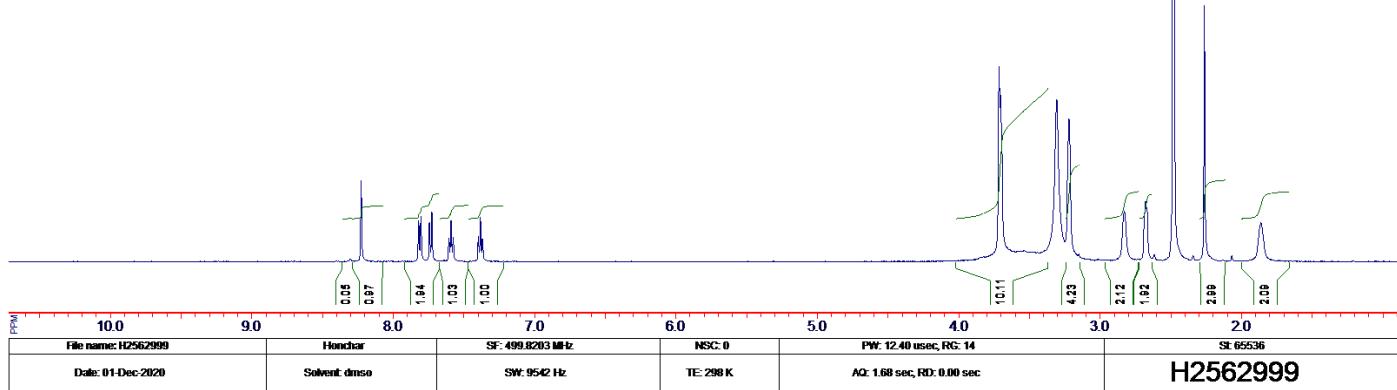


H2562999



H2562999 C₂₂H₂₈N₆S 424.56

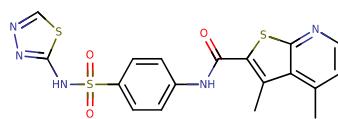
Compound 13



Compound 14

MaxPeak: 97.99%

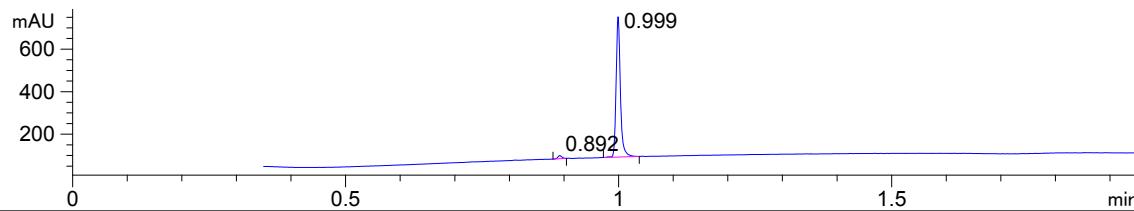
Ret_Time: 0.999 min



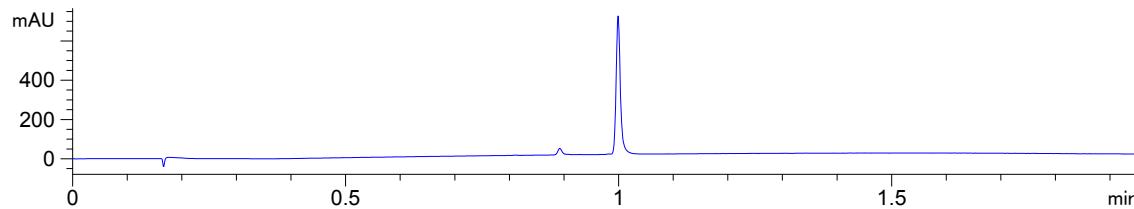
S089976\$2



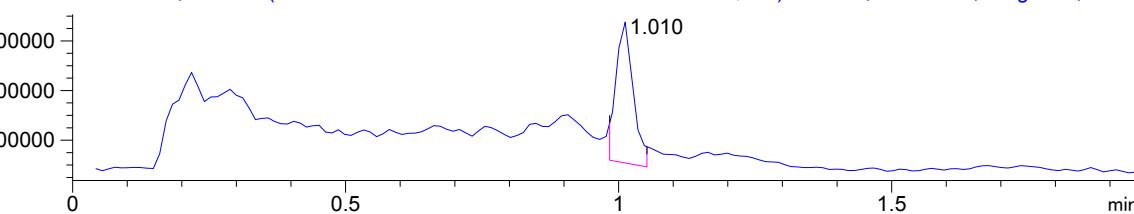
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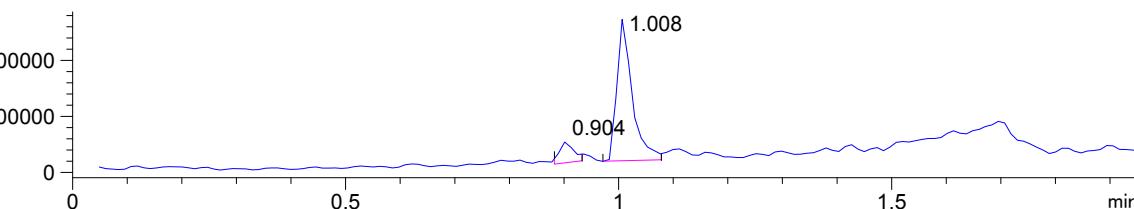
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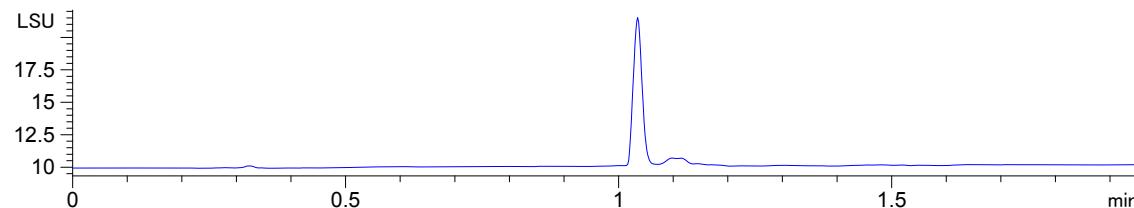
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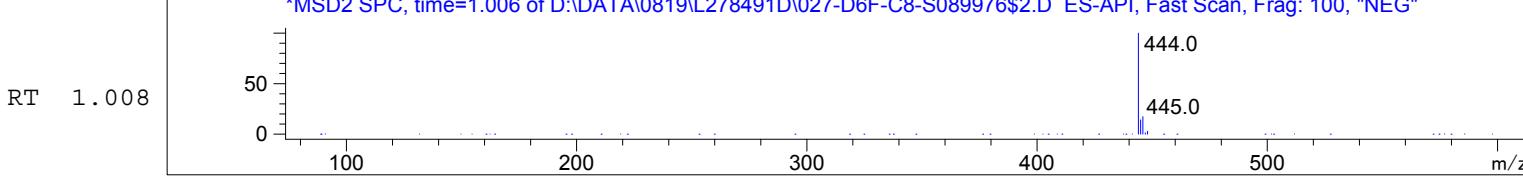
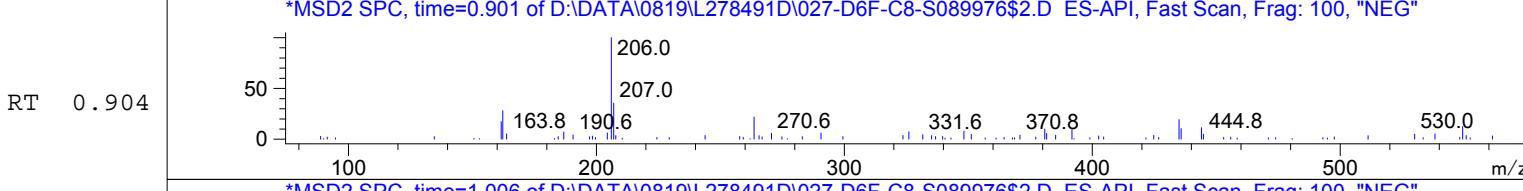
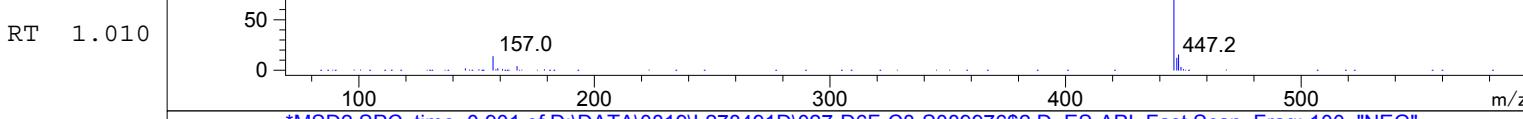
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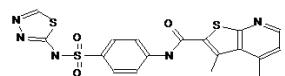
ELS1 A, ELS1A, ELSD Signal (D:\DATA\0819\L278491D\027-D6F-C8-S089976\$2.D)



*MSD1 SPC, time=1.012 of D:\DATA\0819\L278491D\027-D6F-C8-S089976\$2.D ES-API, Fast Scan, Frag: 100, "POS"

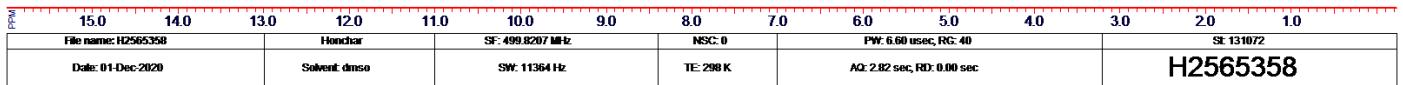


H2565358



H2565358 C18H15N5O3S3 445.53

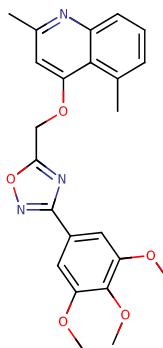
Compound 14



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Compound 15

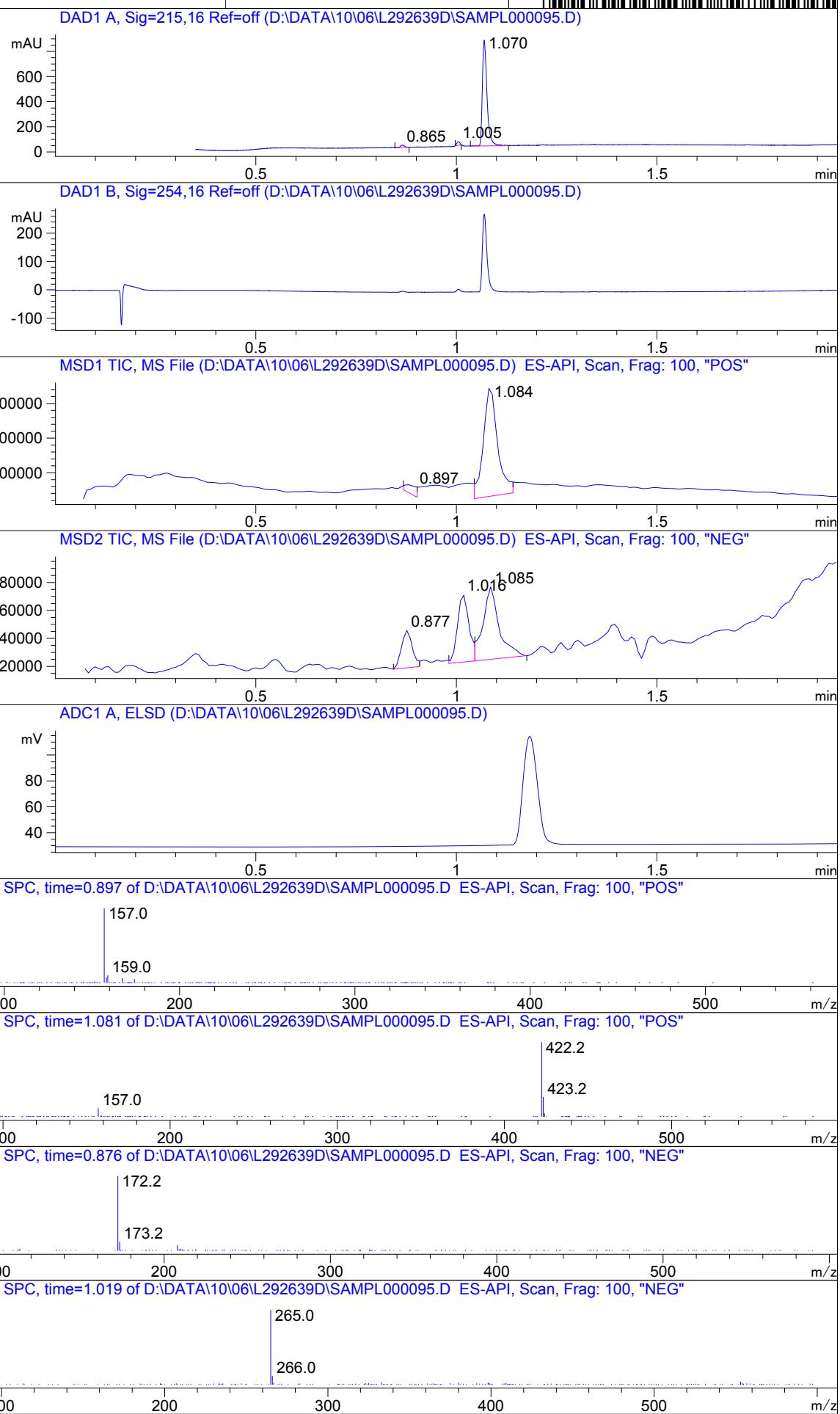
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Ret_Time: 1.070 min



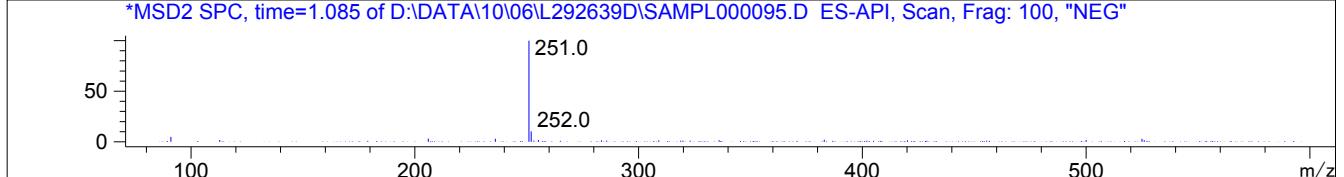
Mol Wt 421.45
Exact Mass 421.18

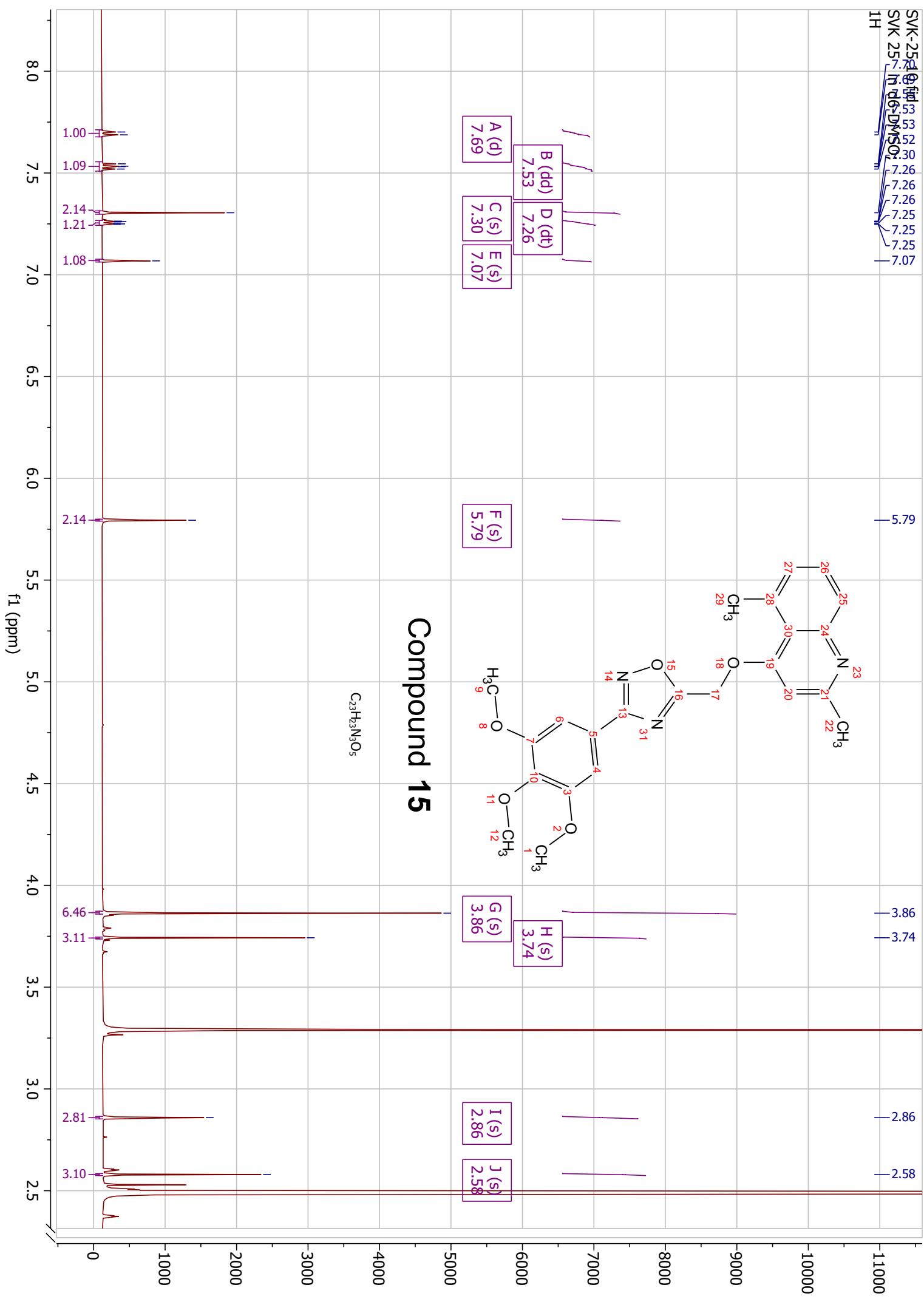
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2	1.005	2.12
3	1.070	95.91

S491337\$21



RT 1.085





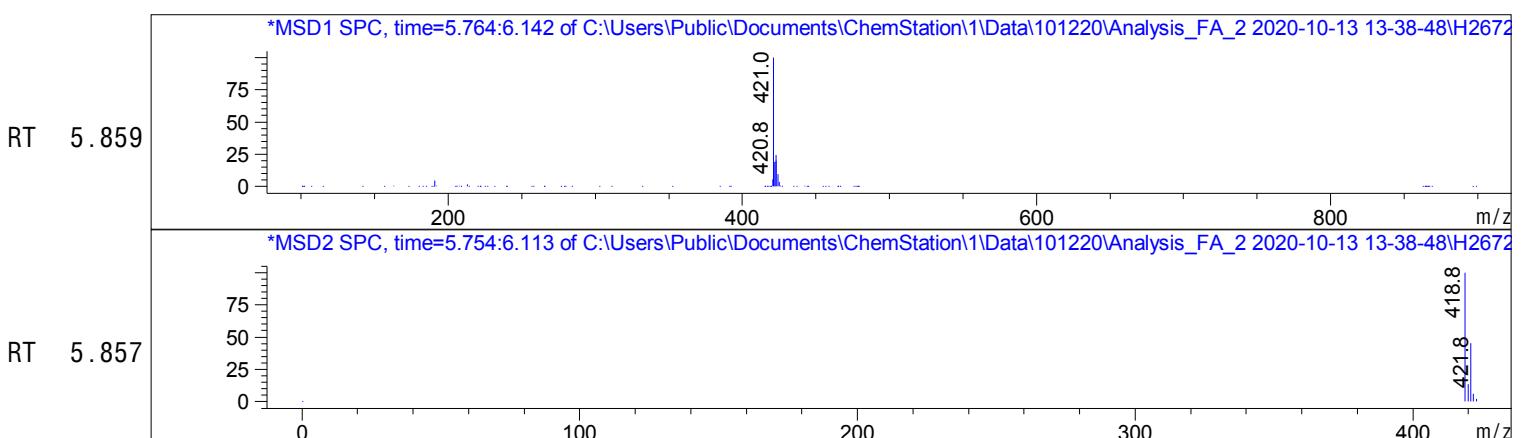
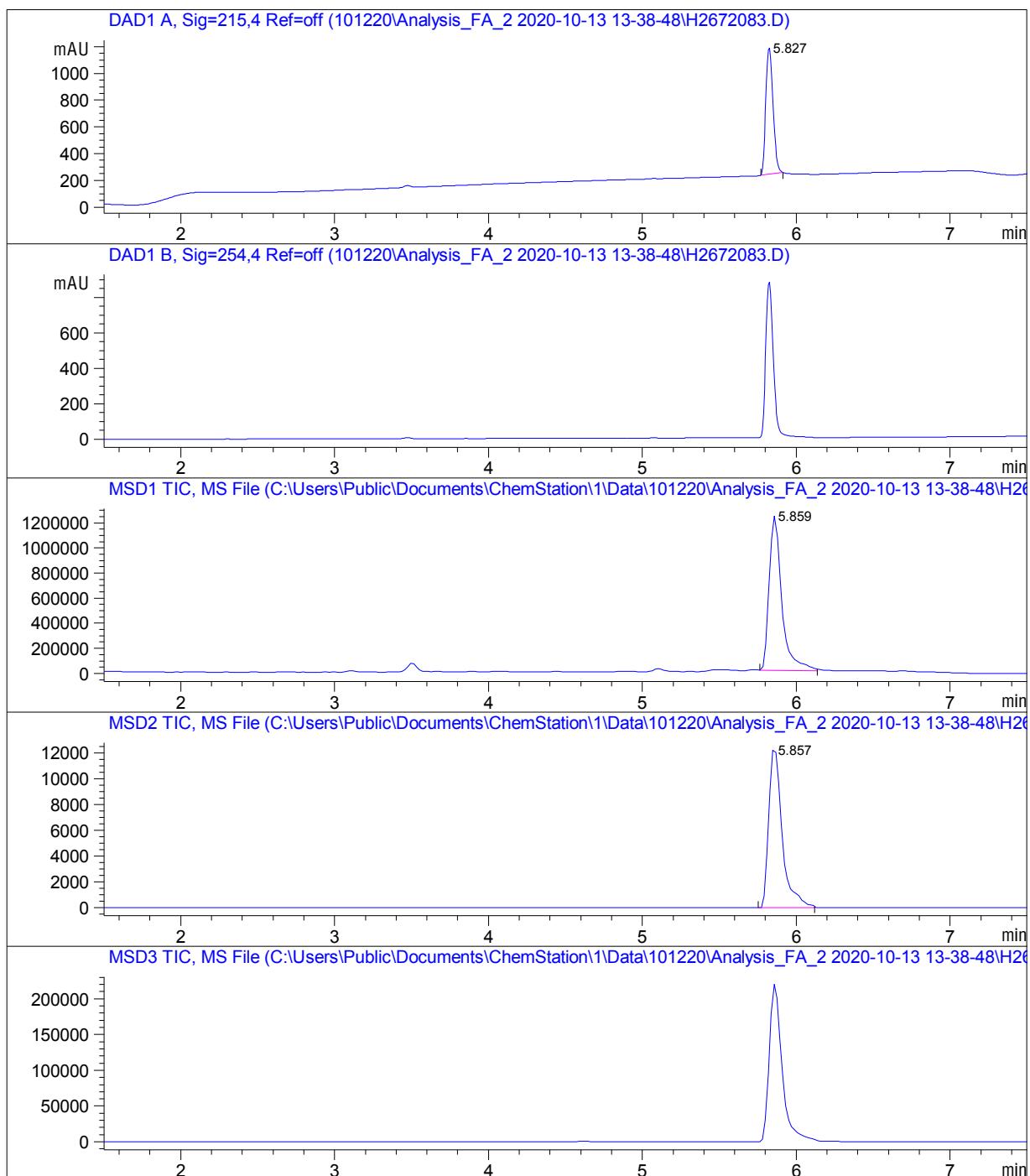
Compound 15

Compound 16

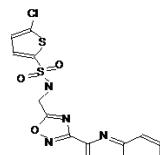
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H2672083

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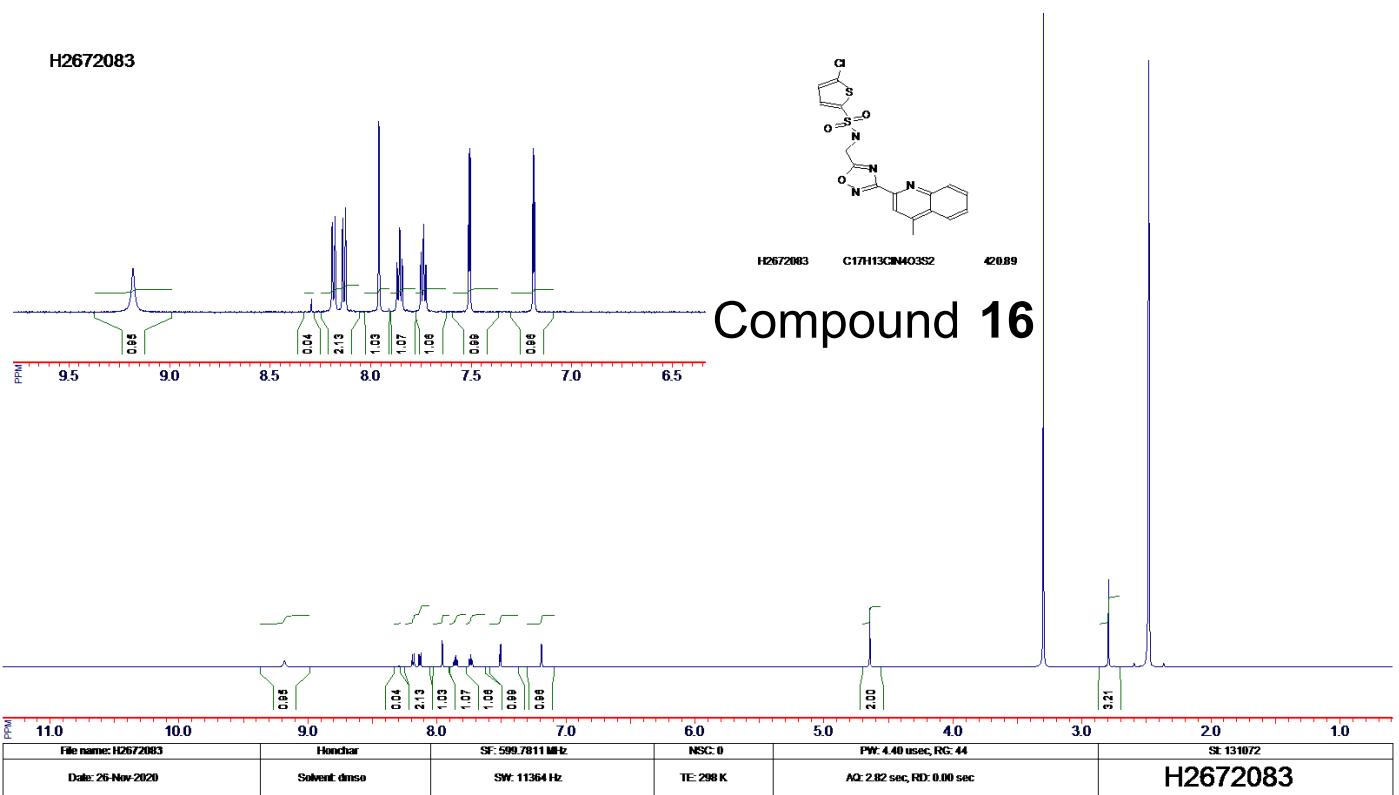


H2672083



H2672083 C17H13ClN4O3S2 420.89

Compound 16

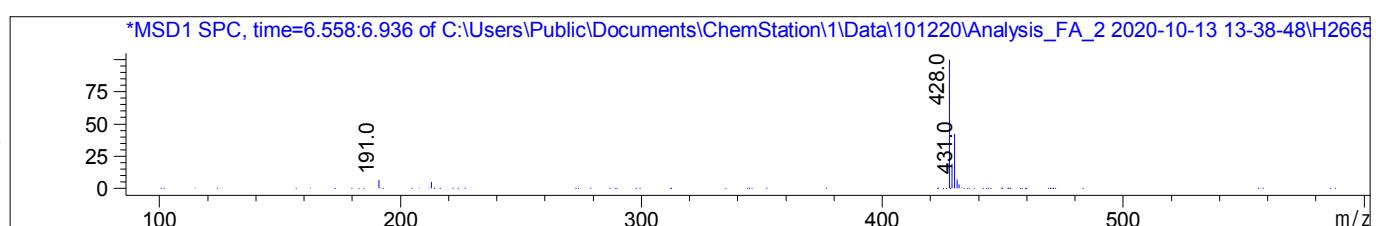
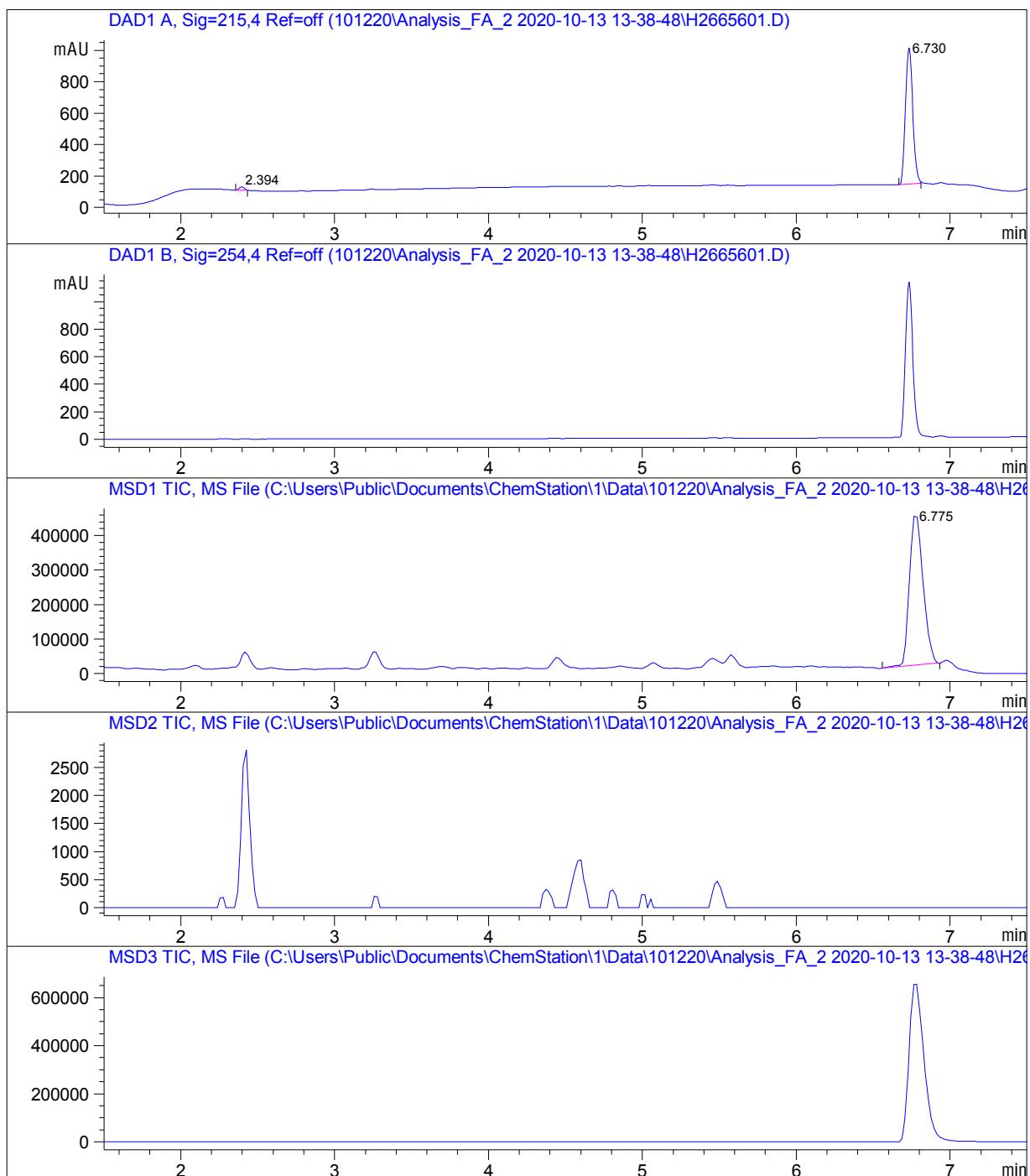


Compound 17

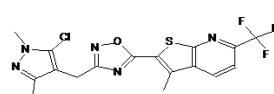
Sample
H2665601

0.1%FA-ACN 5-95%ACN 6 min. Zorbax-Eclipse-Plus C18 4.6 x
100mm, 3.5 μ m.

#	Time	Area%
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2	6.730	98.25



H2665601



H2665601 C17H13ClF3N5OS 427.83

Compound 17

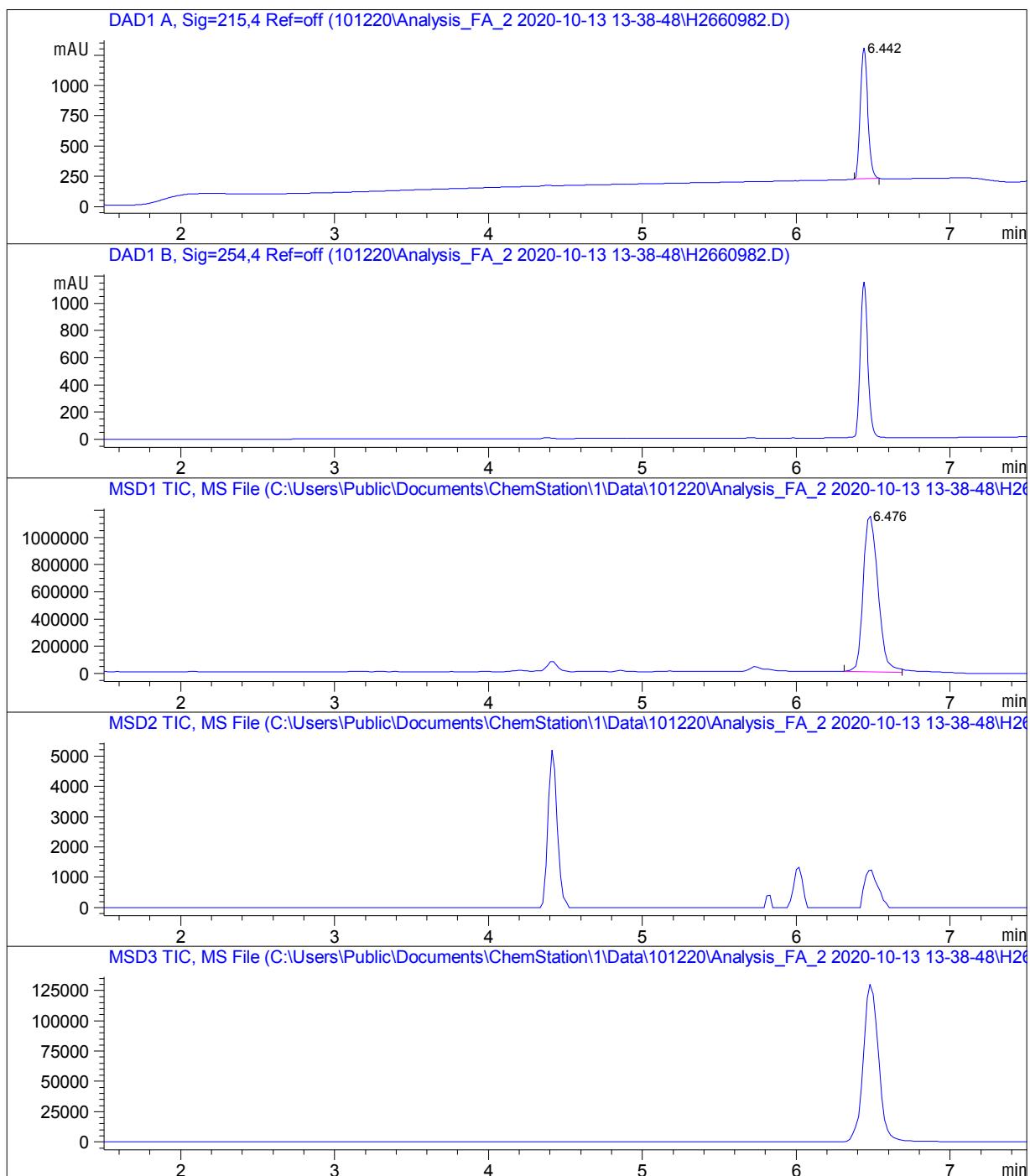
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Date: 26-Nov-2020	Solvent: dmso	SW: 11364 Hz	TE: 299 K	AO: 2.82 sec, RD: 0.00 sec	H2665601

Compound 18

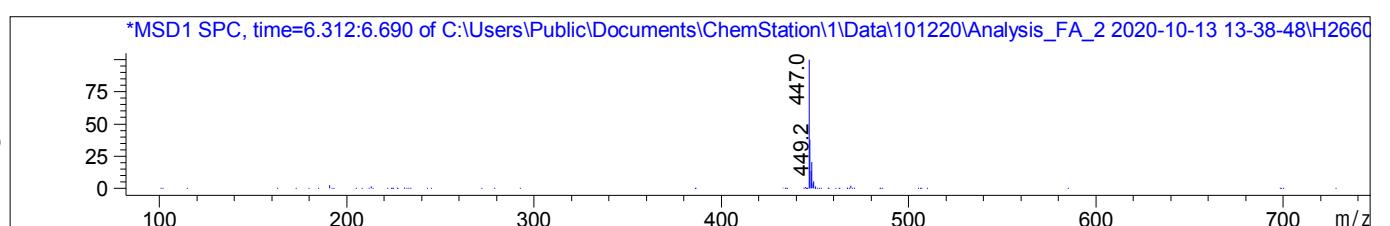
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H2660982

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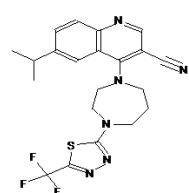
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RT 6.476

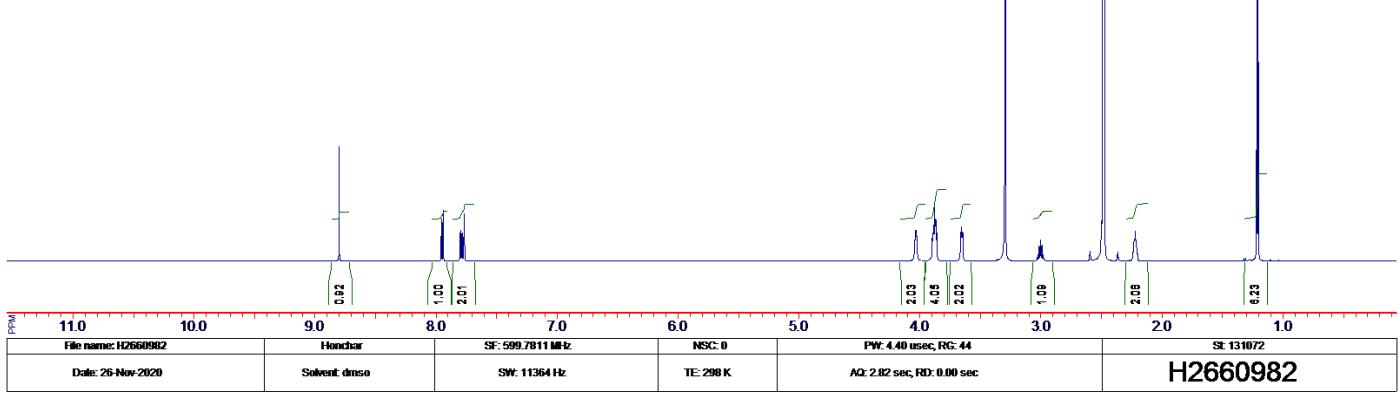


H2660982



H2660982 C21H21F3N6S 446

Compound 18

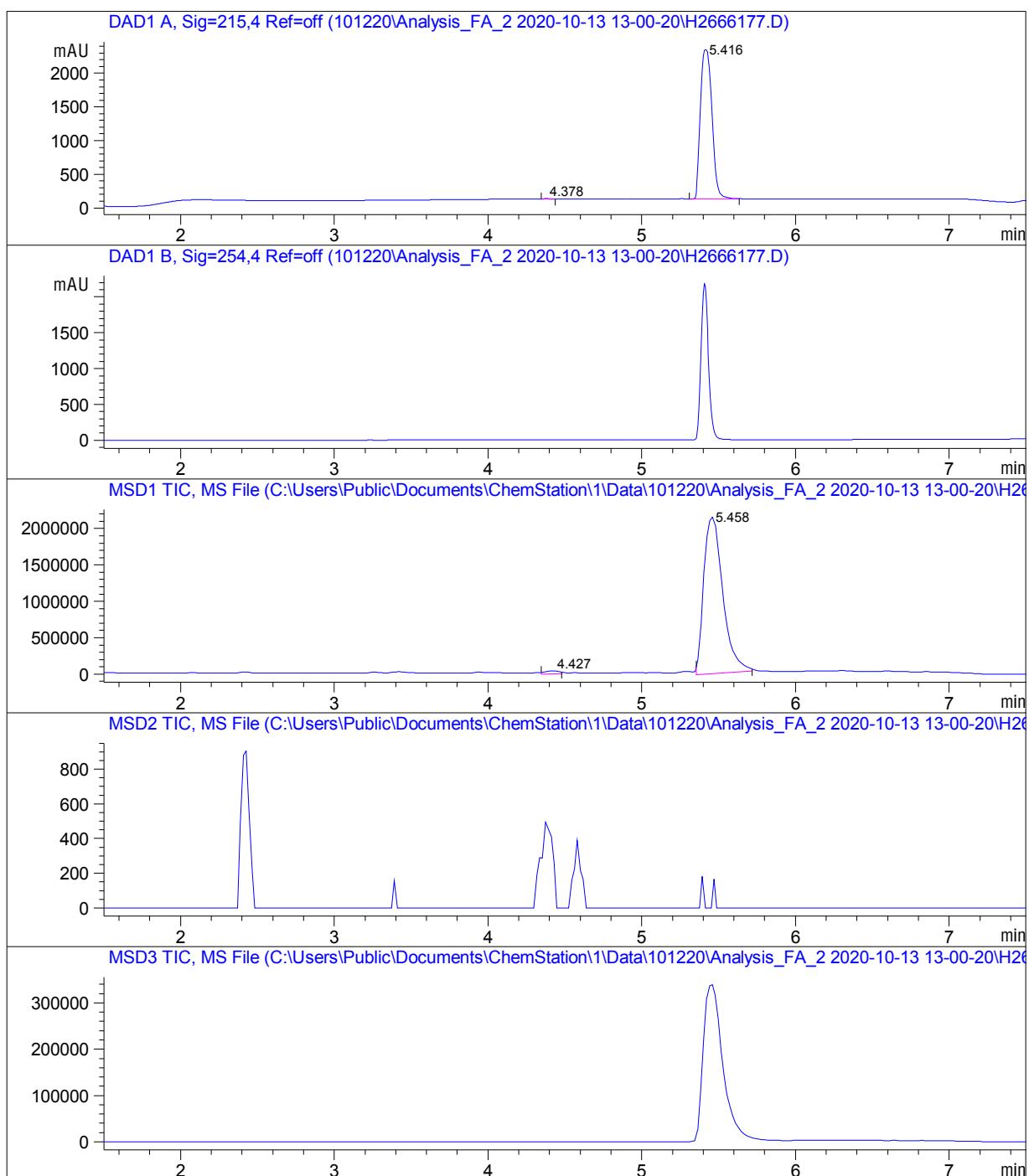


Compound 19

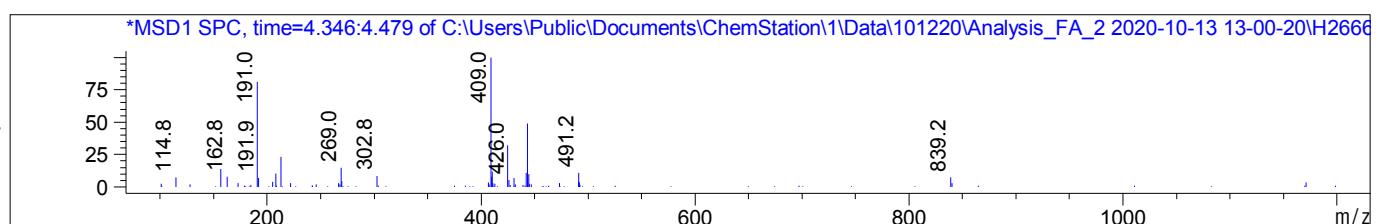
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H2666177

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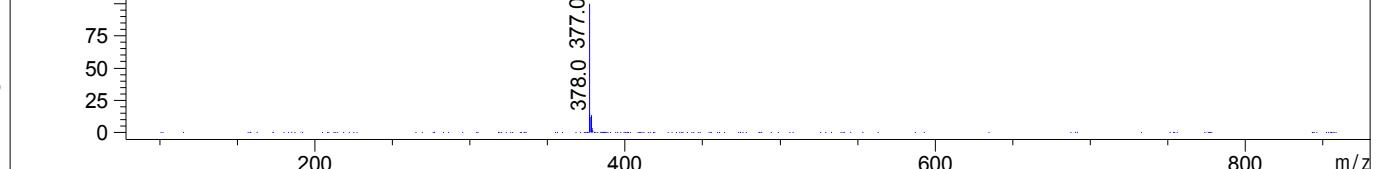
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2	5.416	99.72



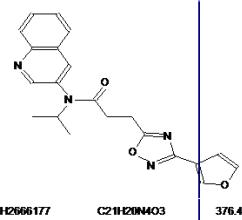
RT 4.427



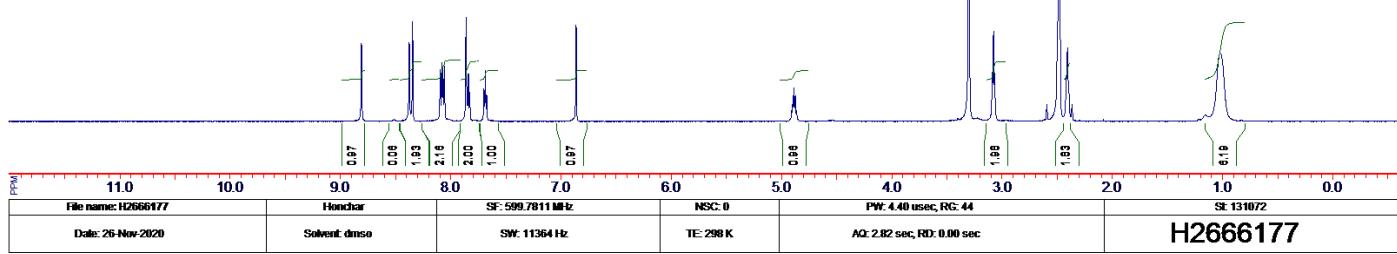
RT 5.458



H2666177

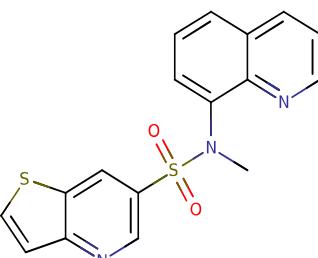


Compound 19



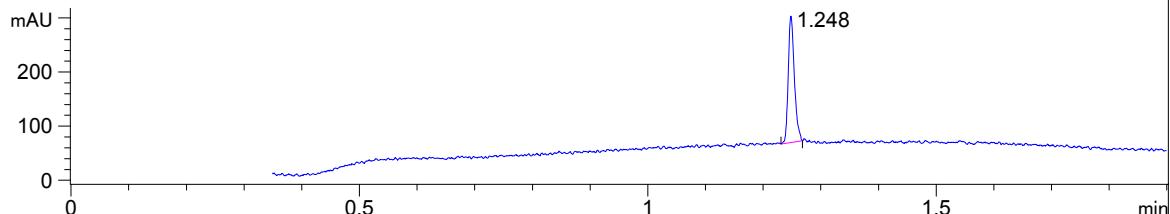
Compound 20

MaxPeak: 100.00%
Ret_Time: 1.248 min

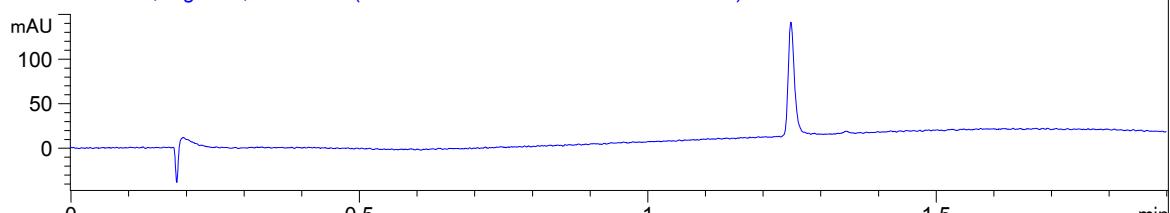


S089986\$3

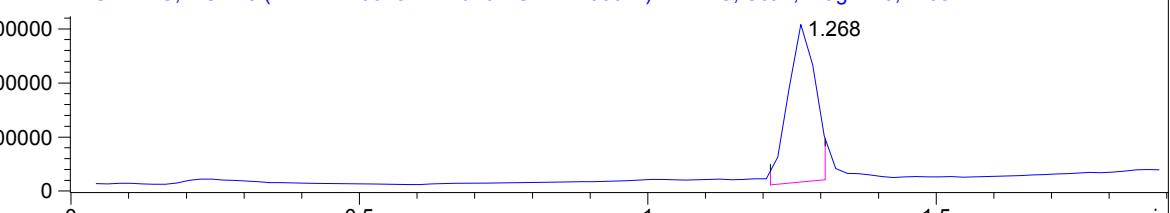
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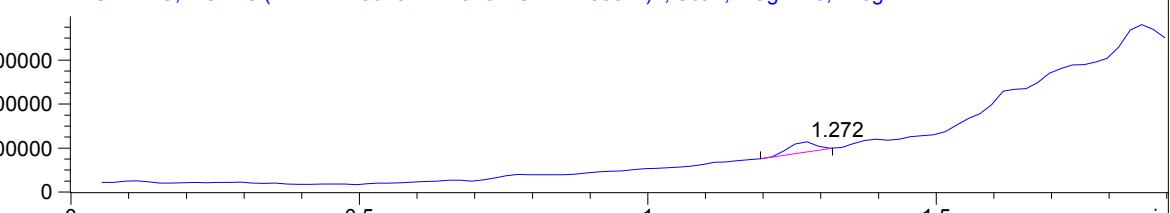
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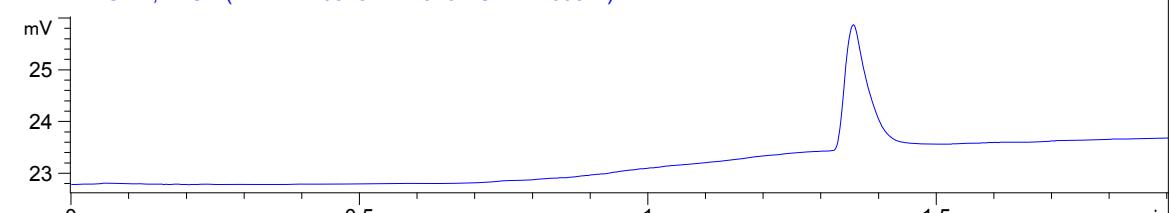
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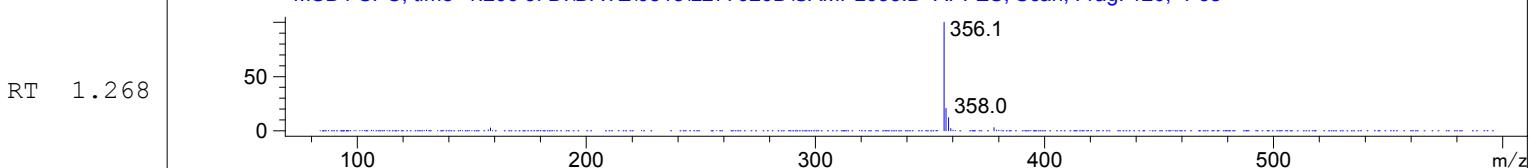
MSD2 TIC, MS File (D:\DATE\0818\L277926D\SAMPL033.D), Scan, Frag: 120, "Neg"



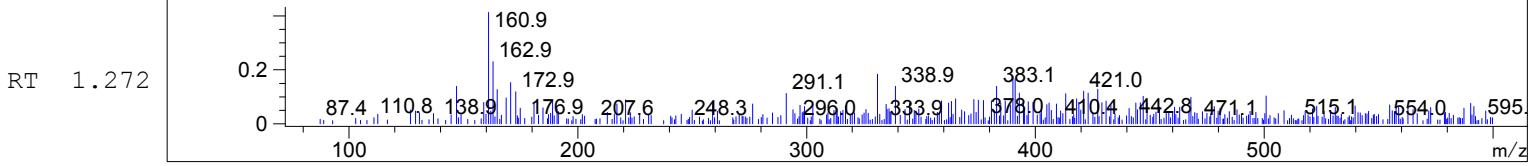
ADC1 B, ELSD (D:\DATE\0818\L277926D\SAMPL033.D)



*MSD1 SPC, time=1.266 of D:\DATE\0818\L277926D\SAMPL033.D API-ES, Scan, Frag: 120, "Pos"



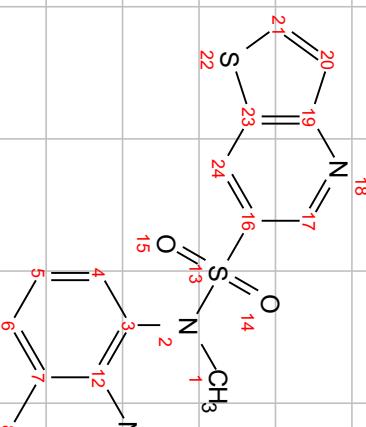
*MSD2 SPC, time=1.276 of D:\DATE\0818\L277926D\SAMPL033.D, Scan, Frag: 120, "Neg"



SV₁
 8.81
 8.71
 8.71
 8.43
 8.43
 8.42
 8.42
 8.38
 8.37
 8.36
 8.36
 8.28
 8.28
 8.27
 8.03
 8.03
 8.02
 8.02
 8.01
 7.78
 7.78
 7.77
 7.77
 7.68
 7.67
 7.67
 7.66
 7.66
 7.65
 7.65
 7.64
 7.64
 7.41
 7.40
 7.39
 7.38

1H

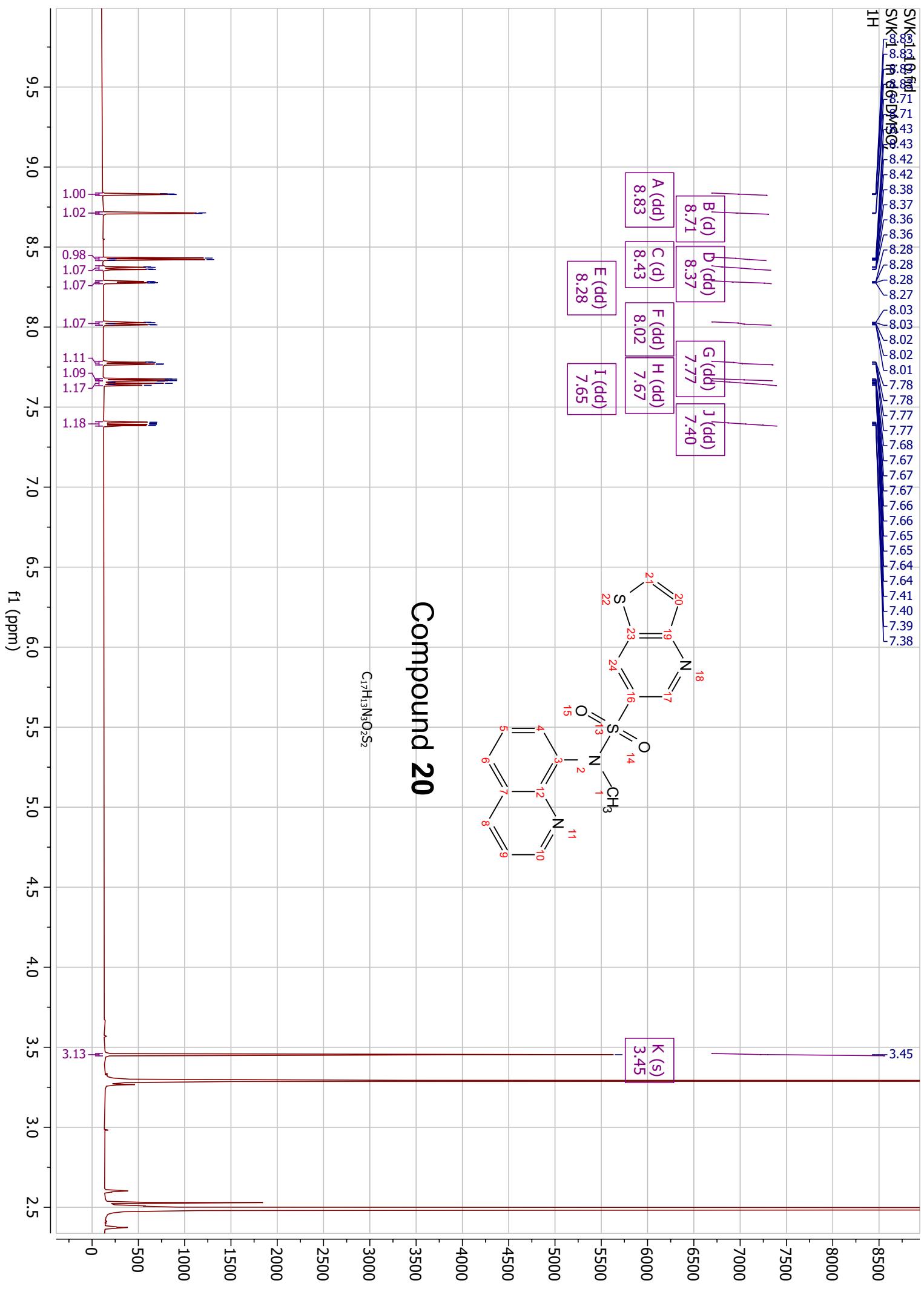
A (dd)	B (d)	C (d)	D (d)	E (dd)	F (dd)	G (dd)	H (dd)	I (dd)	J (dd)
8.83	8.71	8.43	8.02	8.28	8.02	7.77	7.67	7.65	7.40



K (s)	3.45

Compound 20

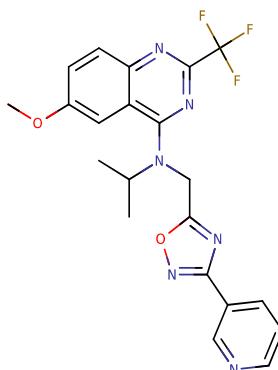
$C_{17}H_{13}N_3O_2S_2$



Compound 21

MaxPeak: 98.57%

Ret_Time: 1.513 min

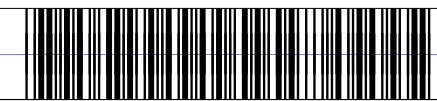


Mol Wt 444.41

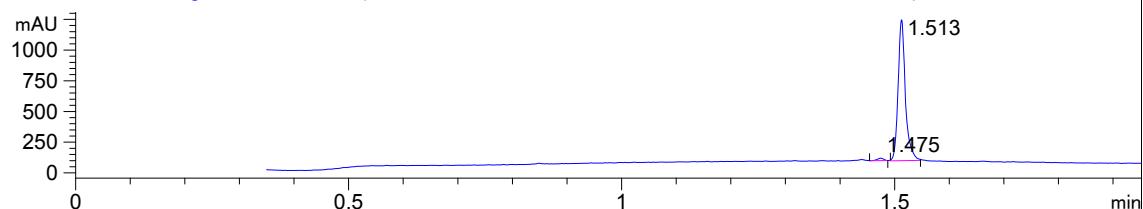
Exact Mass 444.17

#	Time	Area%
1	1.475	1.43
2	1.513	98.57

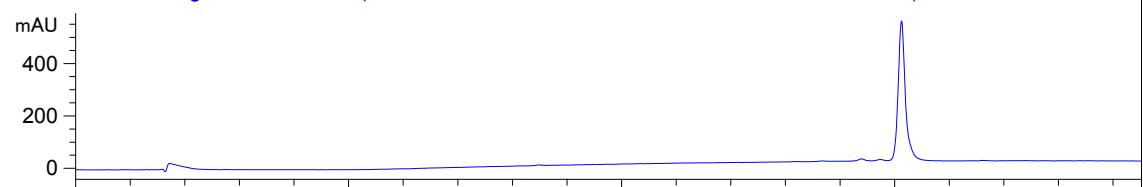
S089944\$22



DAD1 A, Sig=215,16 Ref=off (D:\DATA\08\0818\L277853D\046-D1B-D9-S089944\$22.D)



DAD1 B, Sig=254,16 Ref=off (D:\DATA\08\0818\L277853D\046-D1B-D9-S089944\$22.D)



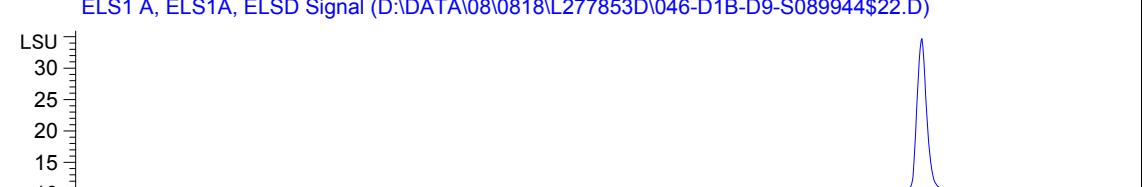
MSD1 TIC, MS File (D:\DATA\08\0818\L277853D\046-D1B-D9-S089944\$22.D) ES-API, Scan, Frag: 100, "POS"



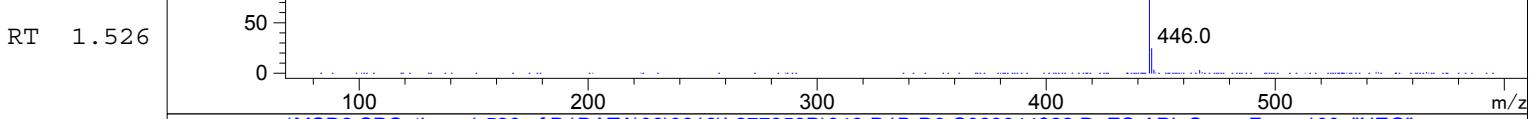
MSD2 TIC, MS File (D:\DATA\08\0818\L277853D\046-D1B-D9-S089944\$22.D) ES-API, Scan, Frag: 100, "NEG"



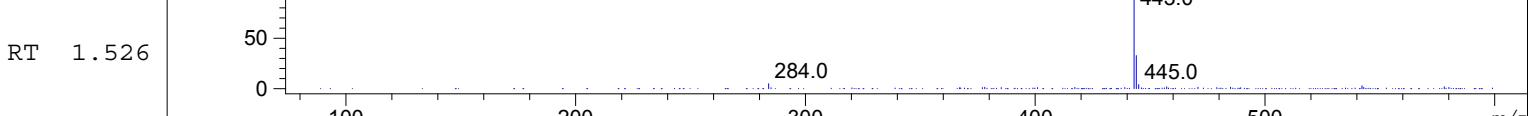
ELS1 A, ELS1A, ELSD Signal (D:\DATA\08\0818\L277853D\046-D1B-D9-S089944\$22.D)



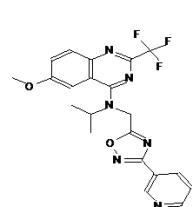
*MSD1 SPC, time=1.530 of D:\DATA\08\0818\L277853D\046-D1B-D9-S089944\$22.D ES-API, Scan, Frag: 100, "POS"



*MSD2 SPC, time=1.526 of D:\DATA\08\0818\L277853D\046-D1B-D9-S089944\$22.D ES-API, Scan, Frag: 100, "NEG"

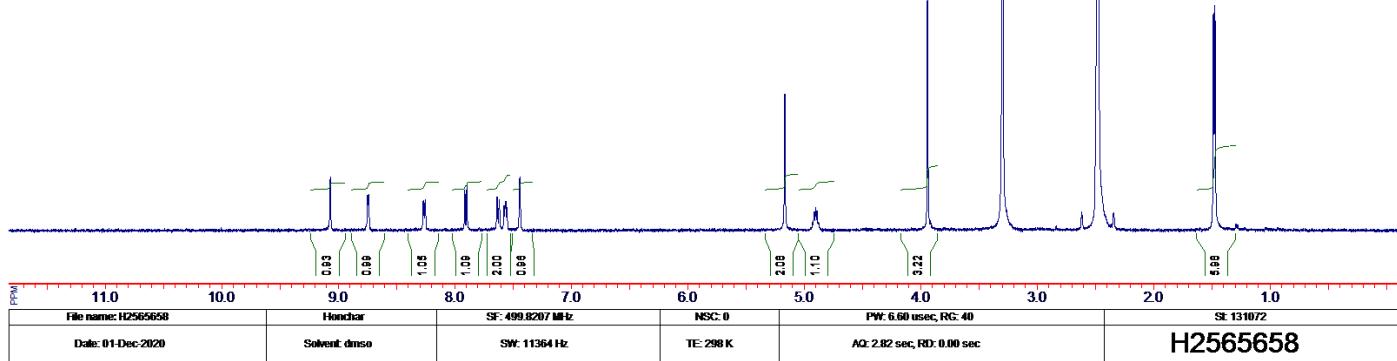


H2565658



H2565658 C₂₁H₁₉F₃N₆O₂ 444.42

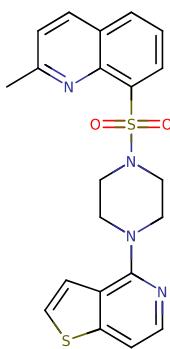
Compound 21



File name: H2565658	Honchar	SF: 499.8207 MHz	NSC: 0	PW: 6.60 usec, RG: 40	St: 131072
Date: 01-Dec-2020	Solvent: dmso	SW: 11364 Hz	TE: 299 K	AO: 2.82 sec, RD: 0.00 sec	H2565658

Compound 22

MaxPeak: 100.00%
Ret_Time: 1.110 min

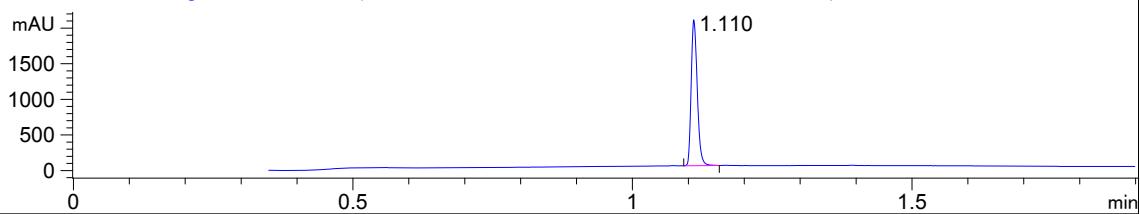


Mol Wt 424.54
Exact Mass 424.12

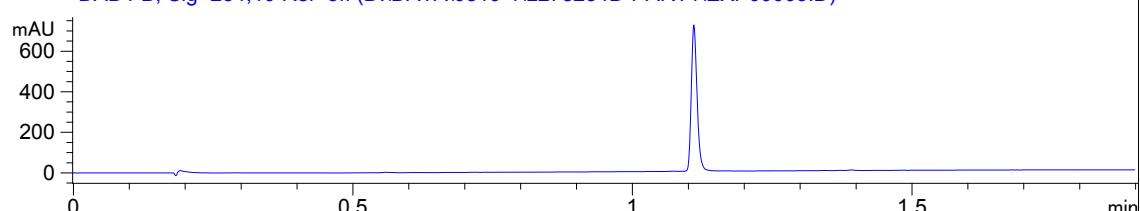
#	Time	Area%
1	1.110	100.00

S089988\$5

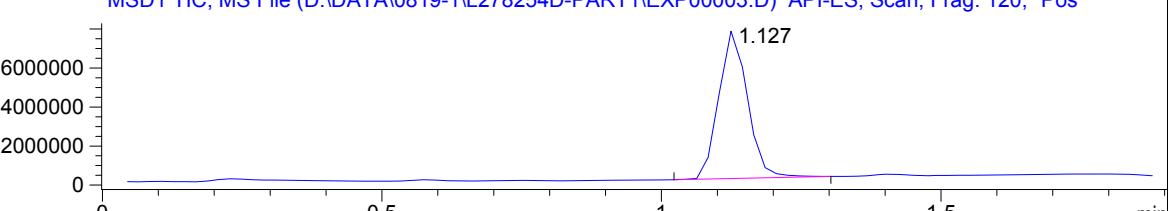
DAD1 A, Sig=215,10 Ref=off (D:\DATA\0819-1\L278254D-PART1\EXP00003.D)



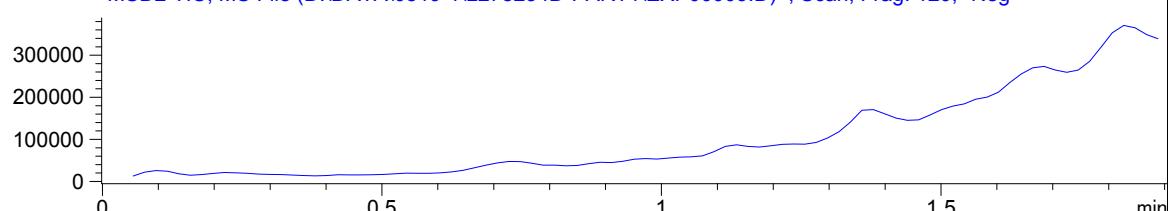
DAD1 B, Sig=254,10 Ref=off (D:\DATA\0819-1\L278254D-PART1\EXP00003.D)



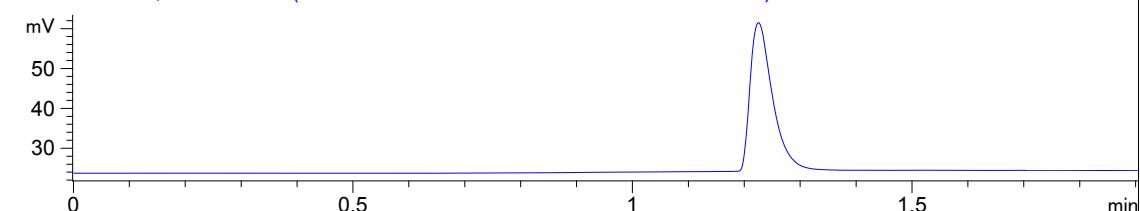
MSD1 TIC, MS File (D:\DATA\0819-1\L278254D-PART1\EXP00003.D) API-ES, Scan, Frag: 120, "Pos"



MSD2 TIC, MS File (D:\DATA\0819-1\L278254D-PART1\EXP00003.D) , Scan, Frag: 120, "Neg"



ADC1 A, ADC1 ELSD (D:\DATA\0819-1\L278254D-PART1\EXP00003.D)



*MSD1 SPC, time=1.124 of D:\DATA\0819-1\L278254D-PART1\EXP00003.D API-ES, Scan, Frag: 120, "Pos"

RT 1.127

50

0

100

200

300

400

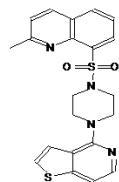
500

m/z

425.0

426.9

H2562997



H2562997 C₂₁H₂₀N₄O₂S2 424.53

Compound 22

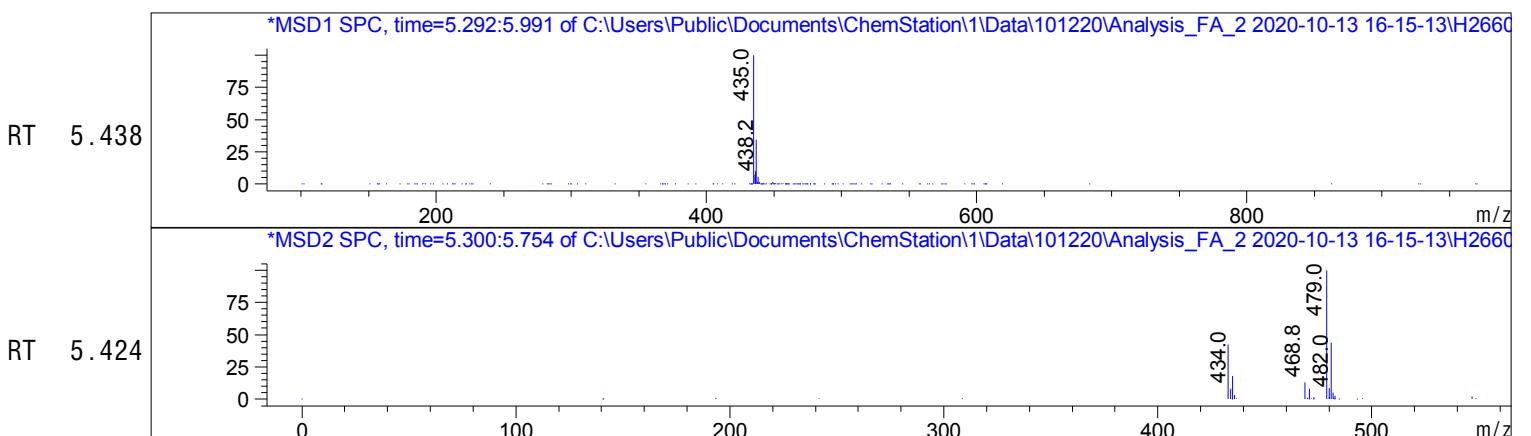
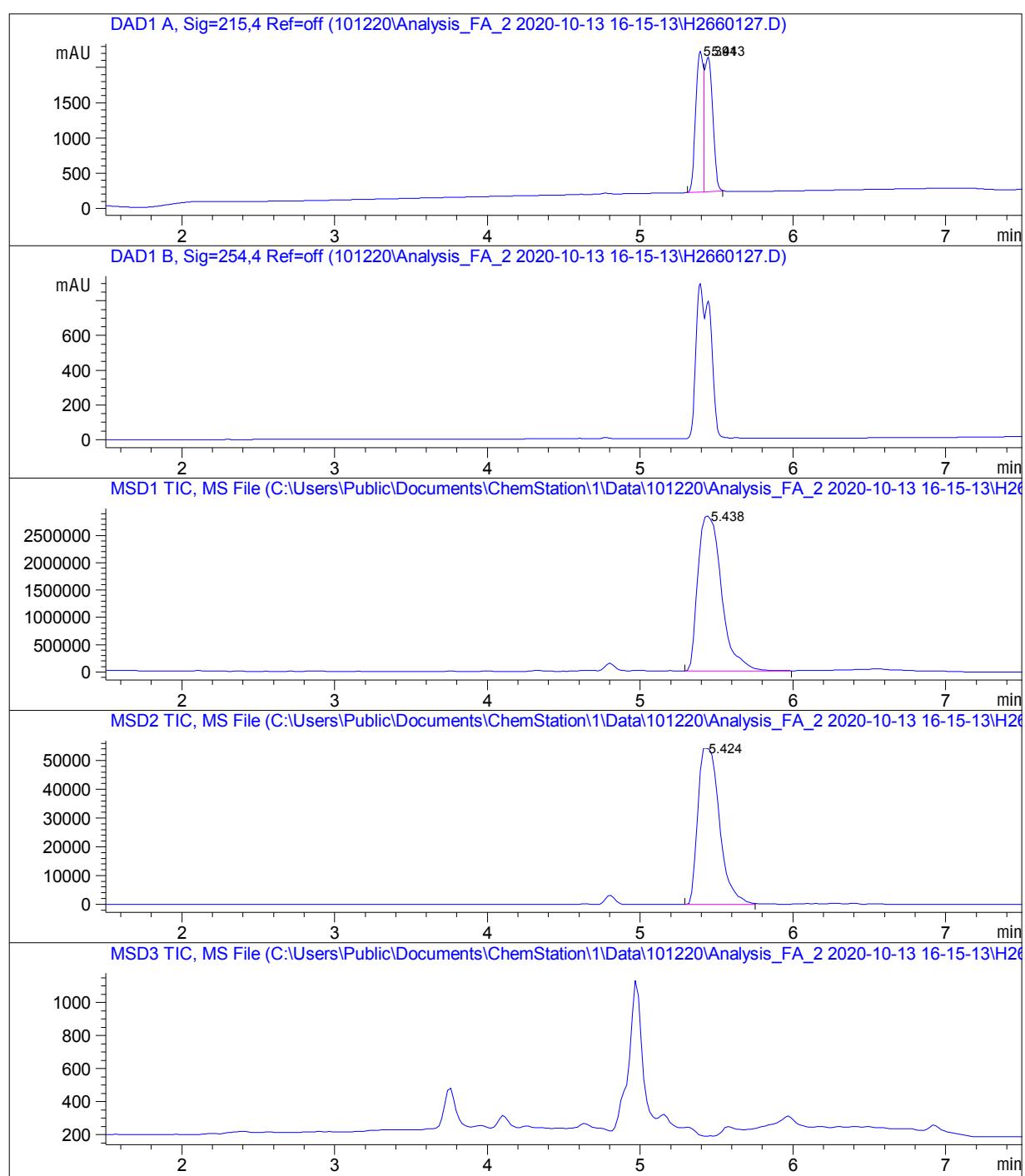


File name: H2562997	Honchar	SF: 499.8207 MHz	NSC: 0	PW: 6.60 usec, RG: 40	St: 131072
Date: 01-Dec-2020	Solvent: dmso	SW: 11364 Hz	TE: 299 K	AO: 2.82 sec, RD: 0.00 sec	H2562997

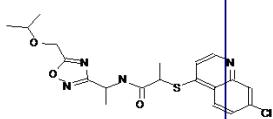
Compound 23

Sample H2660127 0.1%FA-ACN 5-95%ACN 6 min. Zorbax-Eclipse-Plus C18 4,6 x 100mm, 3.5 μ m.

#	Time	Area%
1	5.391	53.36
2	5.443	46.64

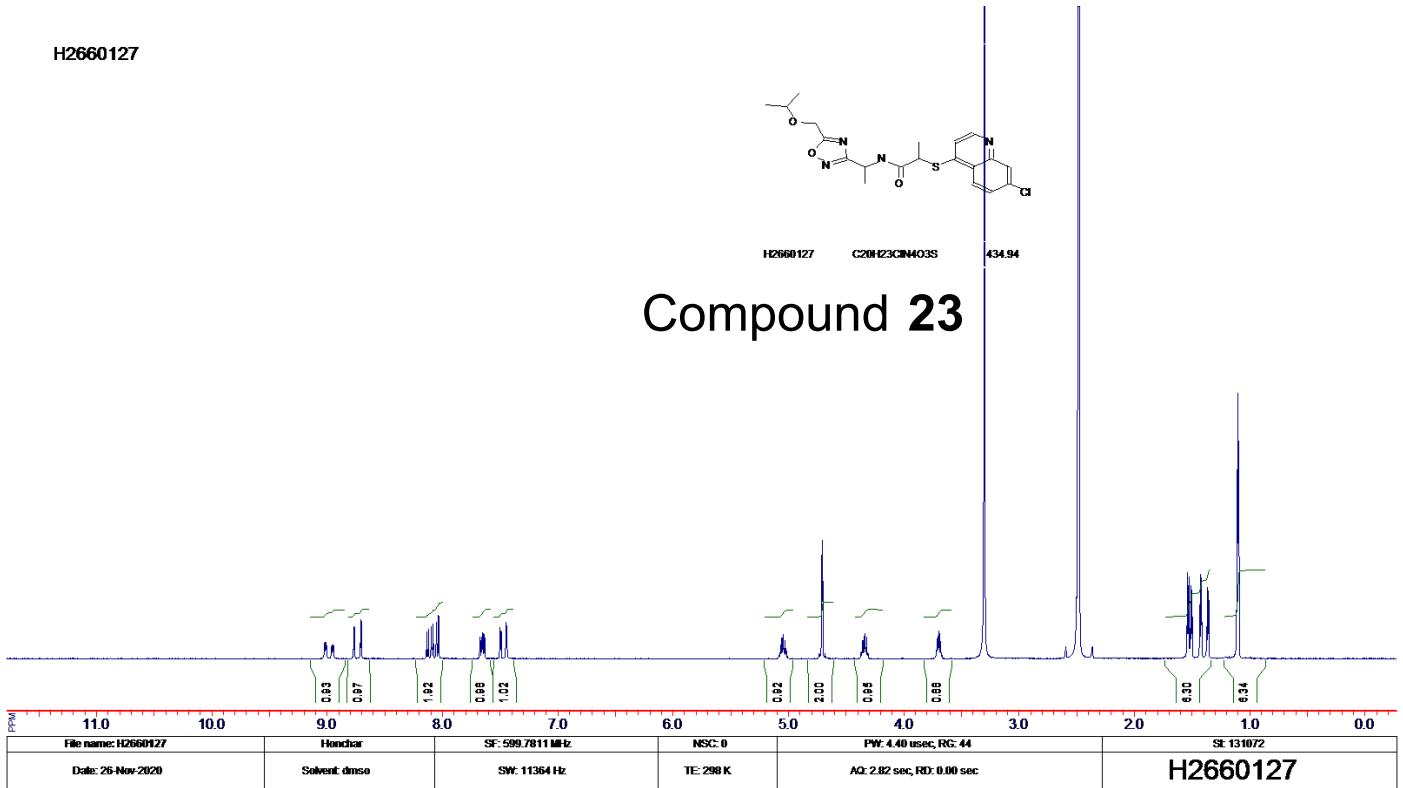


H2660127



H2660127 C20H23ClN4O3S 434.94

Compound 23

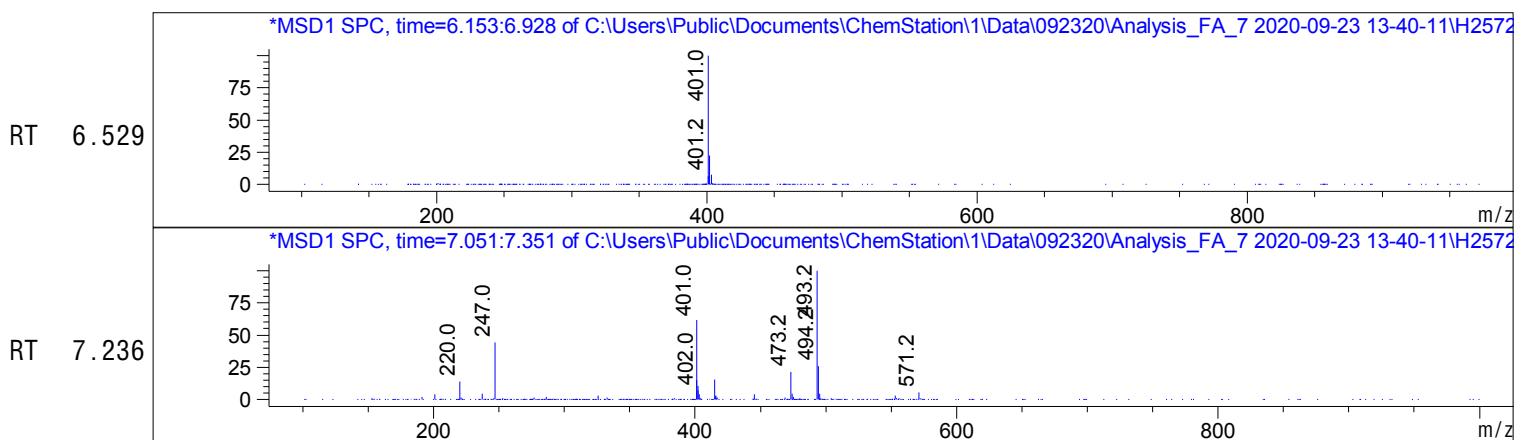
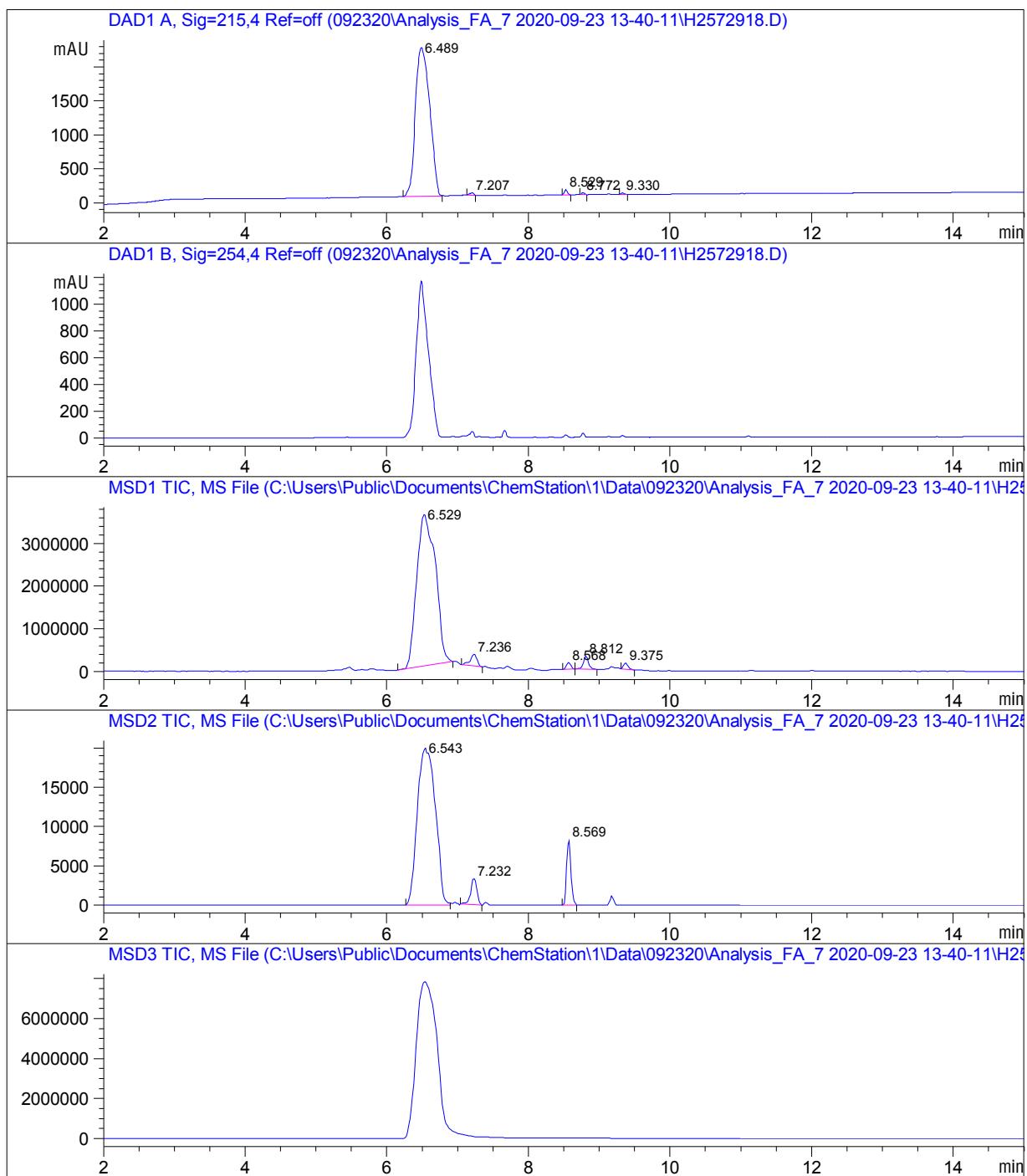


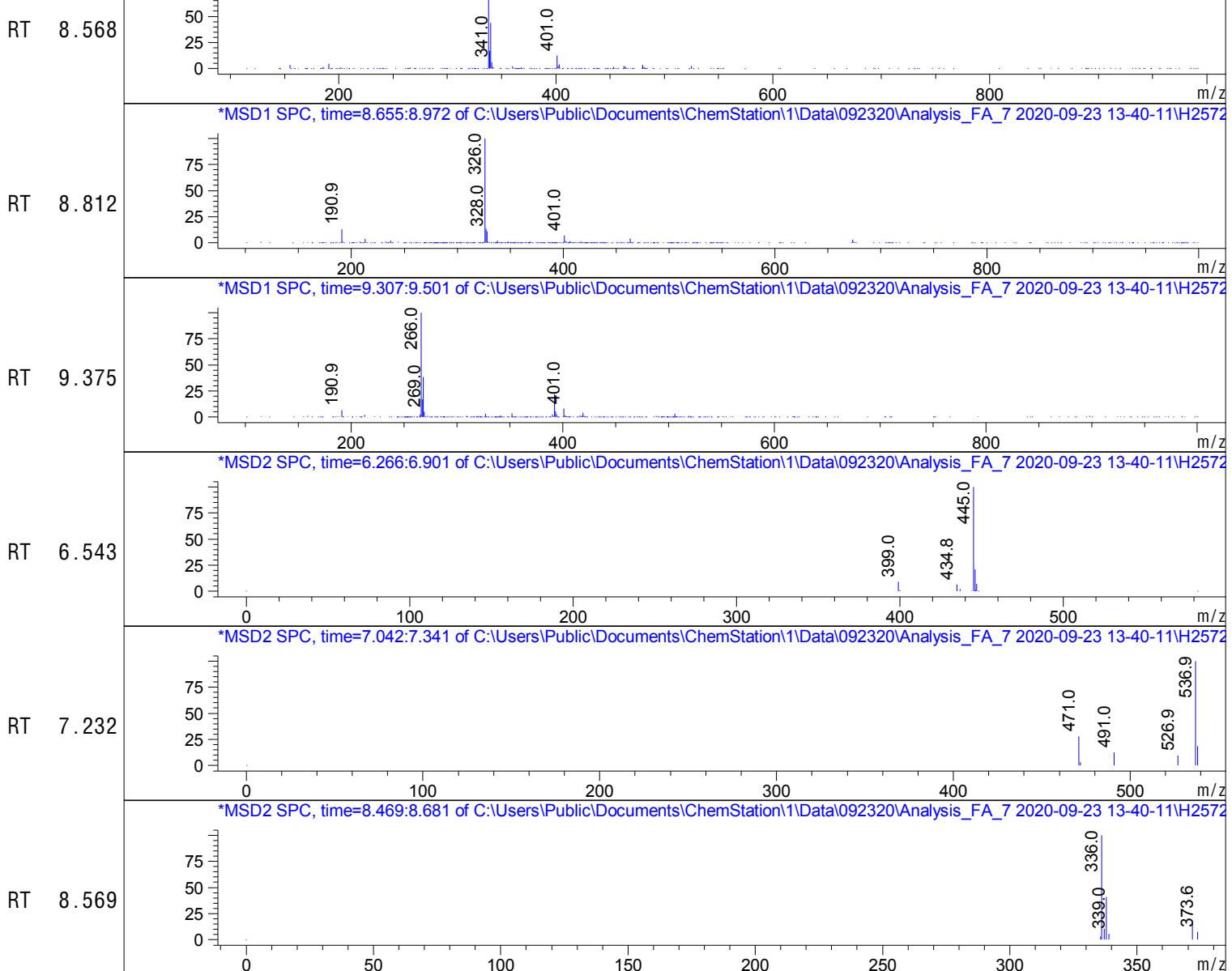
Compound 24

Sample
H2572918

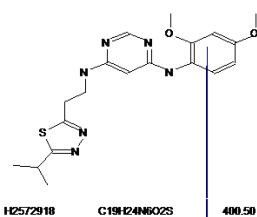
0.1%FA-ACN 5-95% ACN, 15 min. Kinetext C18 4.6 x 150mm, 2.6 u.

#	Time	Area%
1	6.489	98.38
2	7.207	0.45
3	8.529	0.70
4	8.772	0.27
5	9.330	0.20



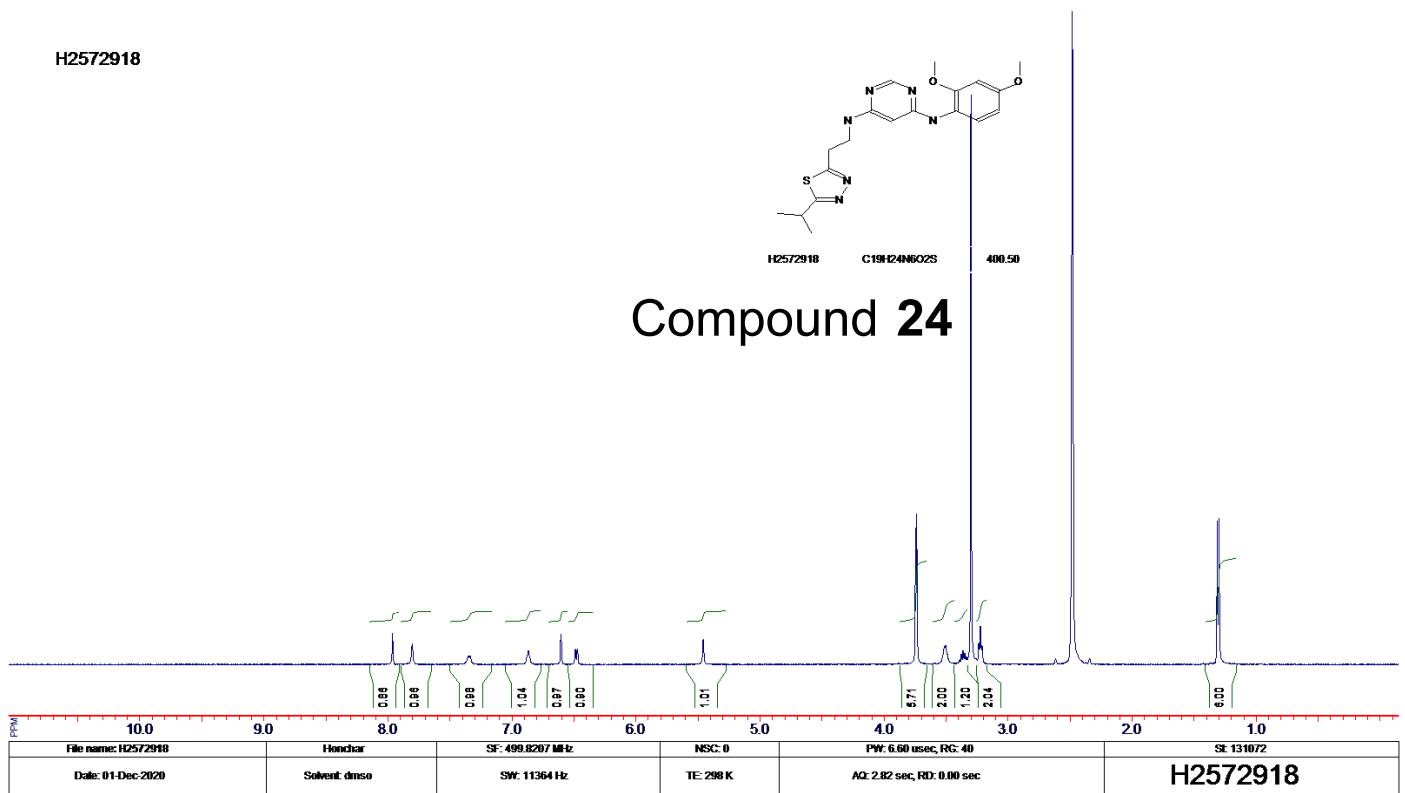


H2572918



H2572918 C19H24N6O2S 400.50

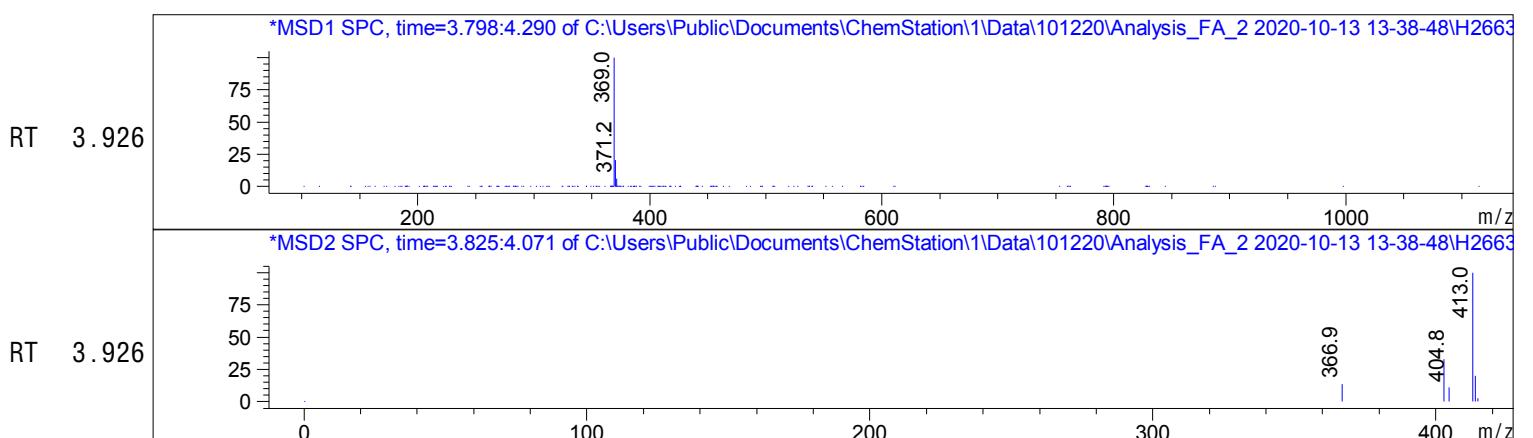
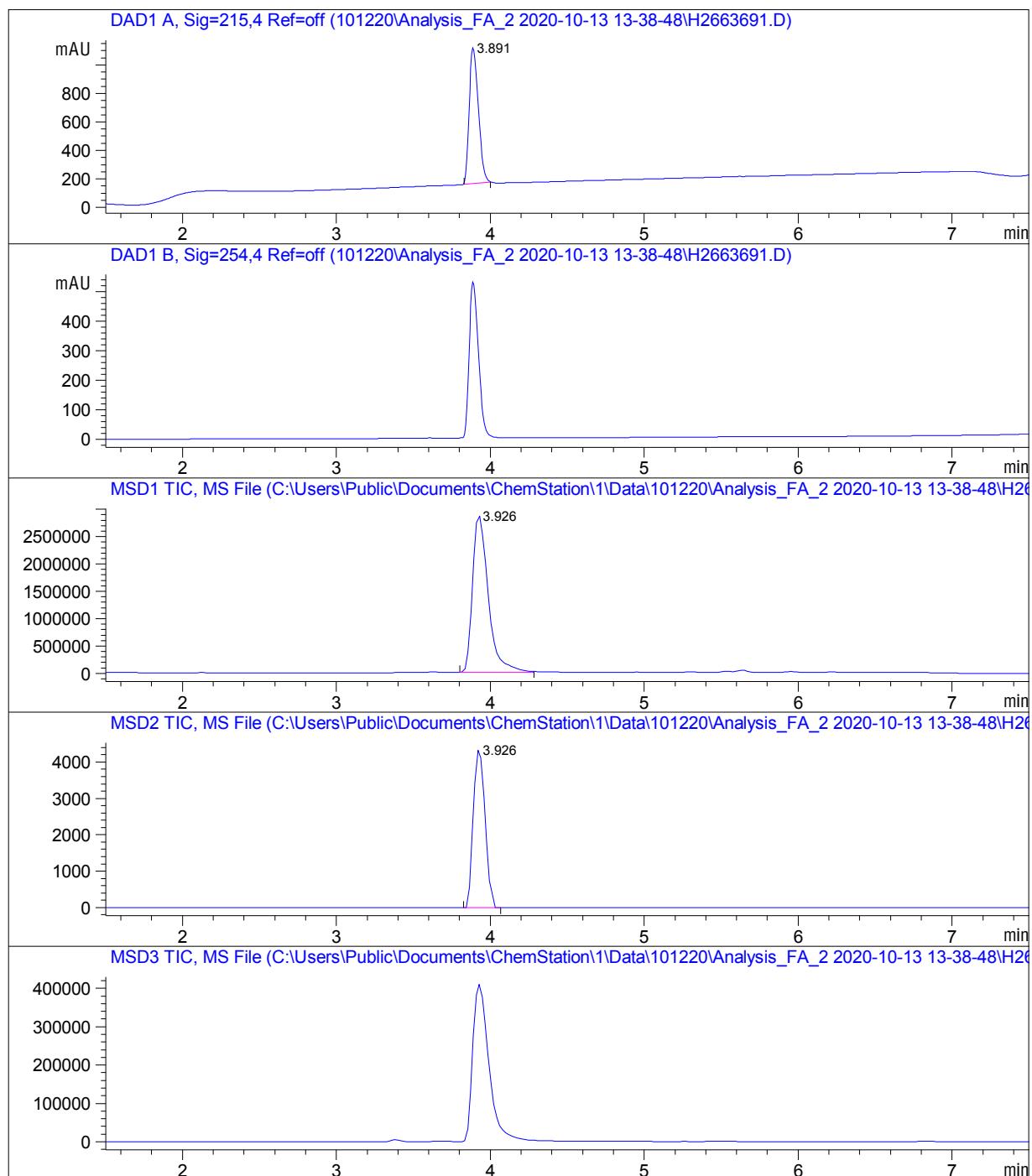
Compound 24



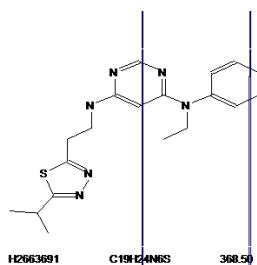
Sample H2663691 0.1%FA-ACN 5-95%ACN 6 min. Zorbax-Eclipse-Plus C18 4,6 x 100mm, 3.5 μ m.

Compound 25

#	Time	Area%
1	3.891	100.00



H2663691

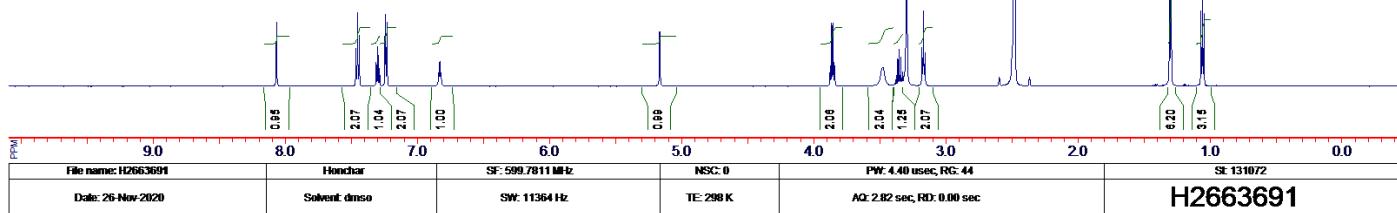


H2663691

C19H24N6S

368.50

Compound 25



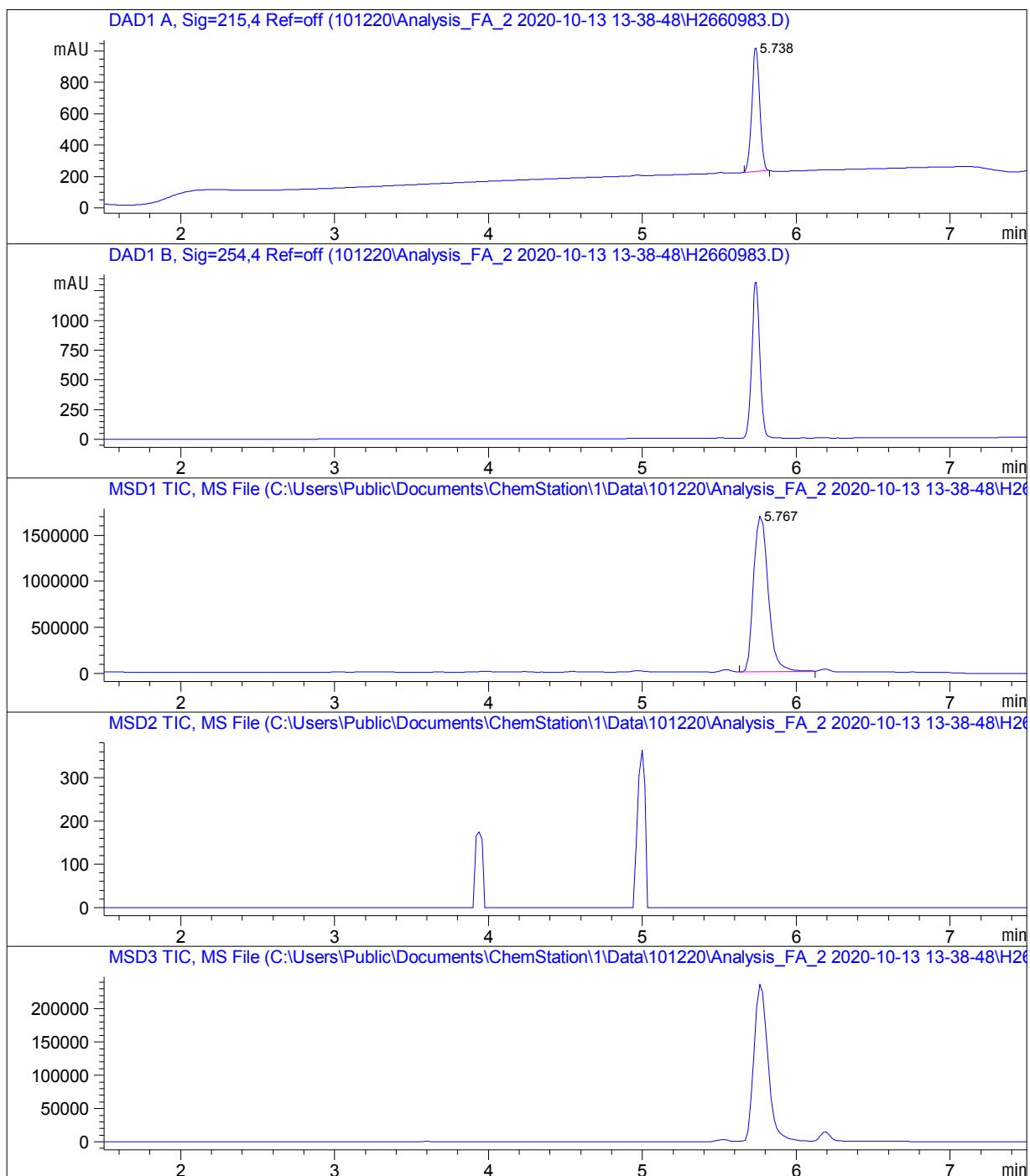
File name: H2663691	Honchar	SP: 599.7811 MHz	NSC: 0	PW: 4.40 usec, RG: 44	ST: 131072
Date: 26-Nov-2020	Solvent: dmso	SW: 11364 Hz	TE: 299 K	AO: 2.82 sec, RD: 0.00 sec	H2663691

Compound 26

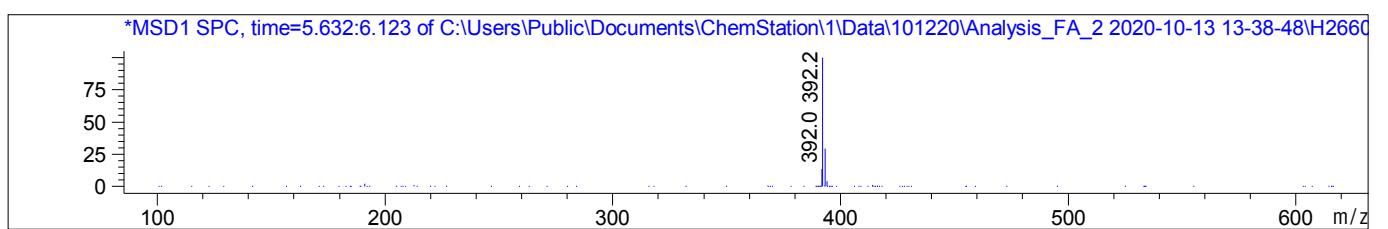
Sample
H2660983

0.1%FA-ACN 5-95%ACN 6 min. Zorbax-Eclipse-Plus C18 4.6 x
100mm, 3.5 μ m.

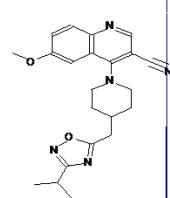
#	Time	Area%
1	5.738	100.00



RT 5.767

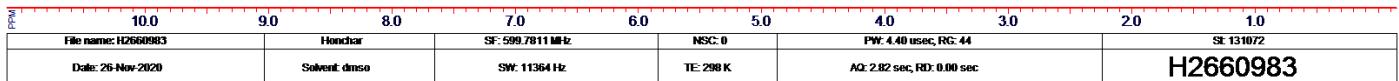


H2660983



H2660983 C22H25N5O2 391.47

Compound 26

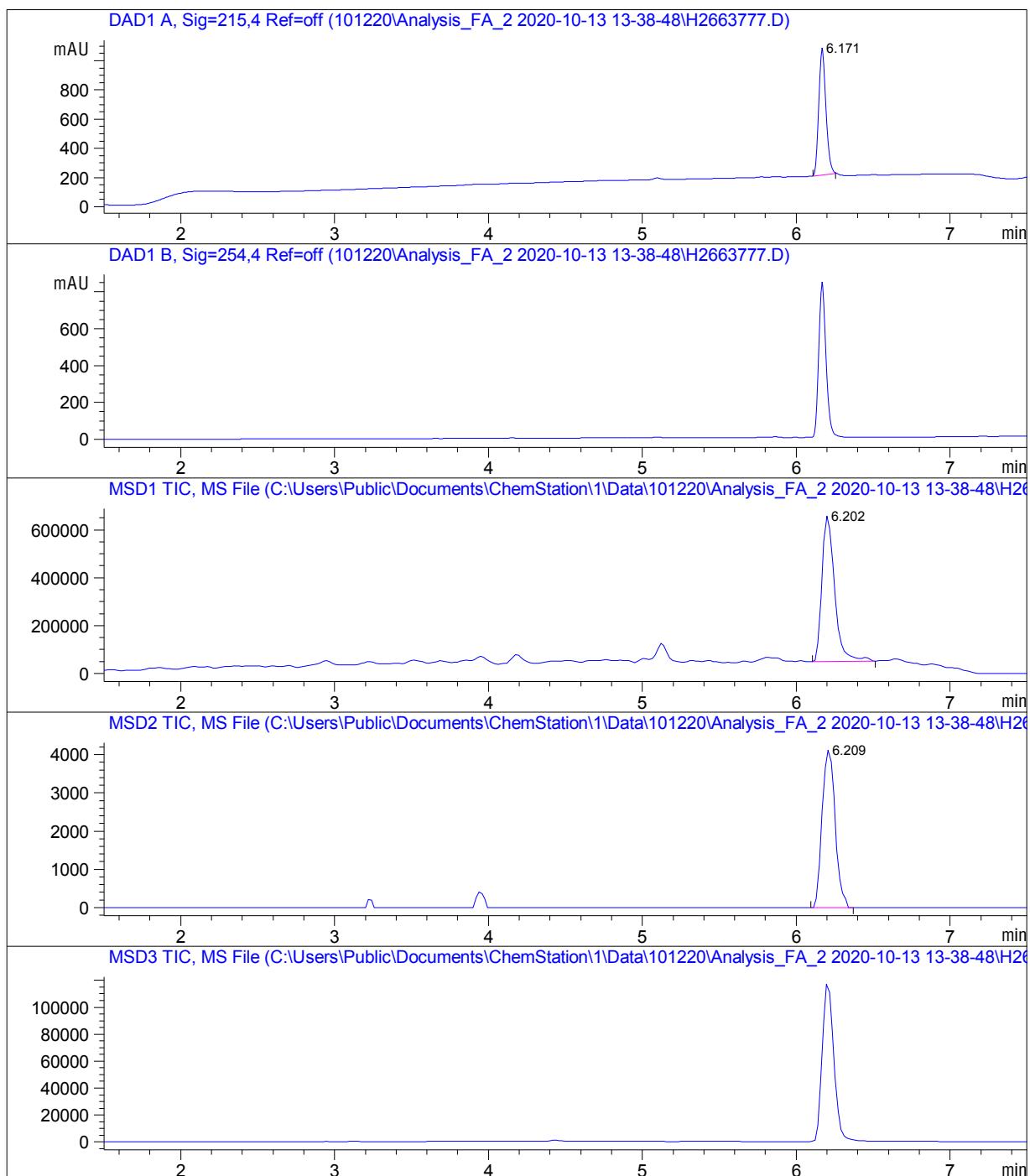


File name: H2660983	Honchar	SF: 599.7811 MHz	NSC: 0	PW: 4.40 usec, RG: 44	St: 131072
Date: 26-Nov-2020	Solvent: dmso	SW: 11364 Hz	TE: 299 K	AO: 2.82 sec, RD: 0.00 sec	H2660983

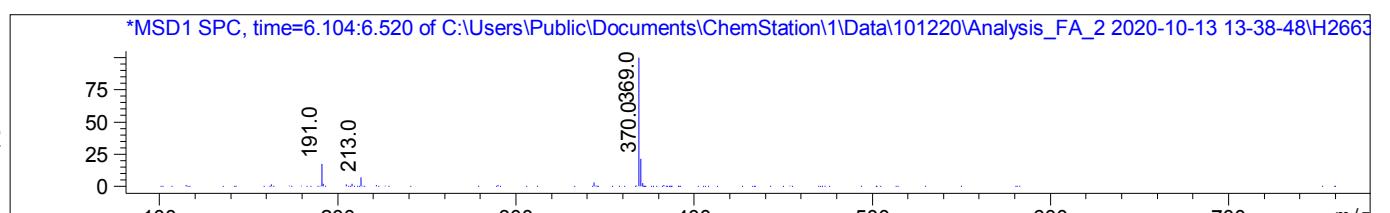
Compound 27

Sample H2663777 0.1%FA-ACN 5-95%ACN 6 min. Zorbax-Eclipse-Plus C18 4,6 x 100mm, 3.5 μ m.

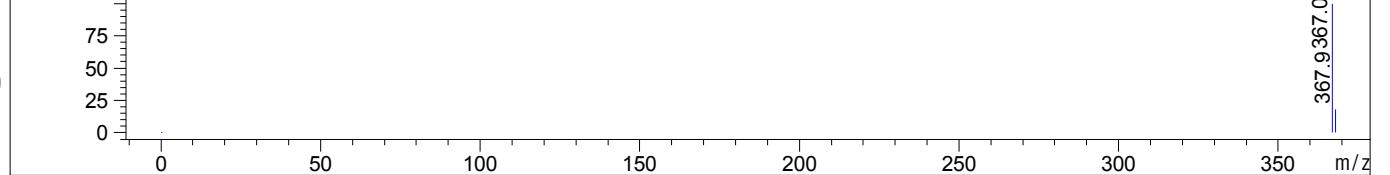
#	Time	Area%
1	6.171	100.00



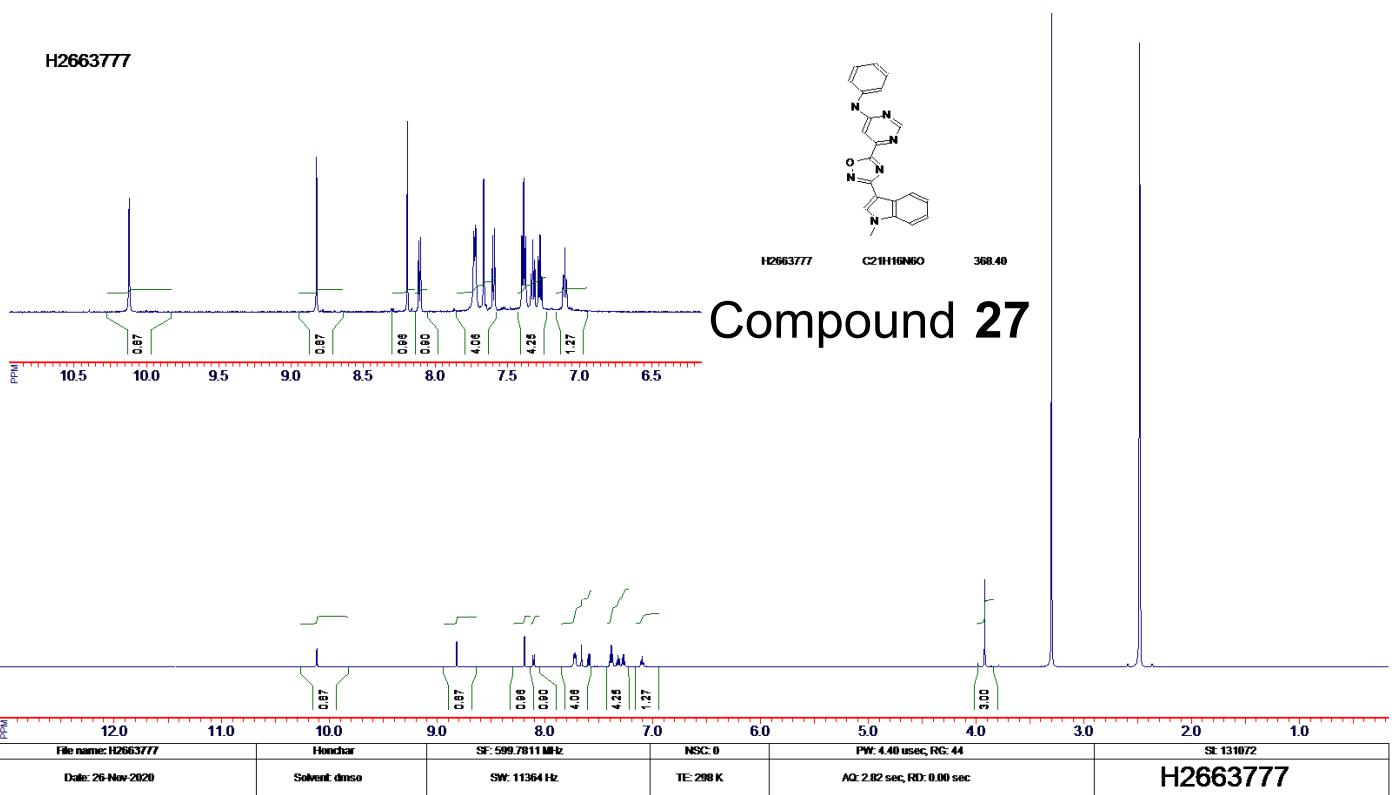
RT 6.202



RT 6.209



H2663777

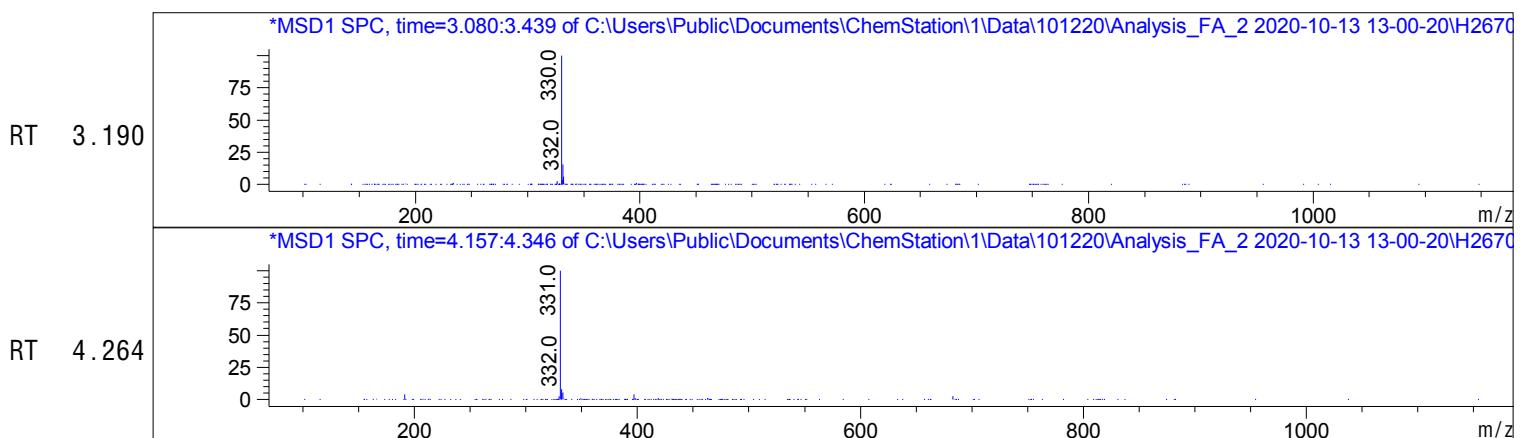
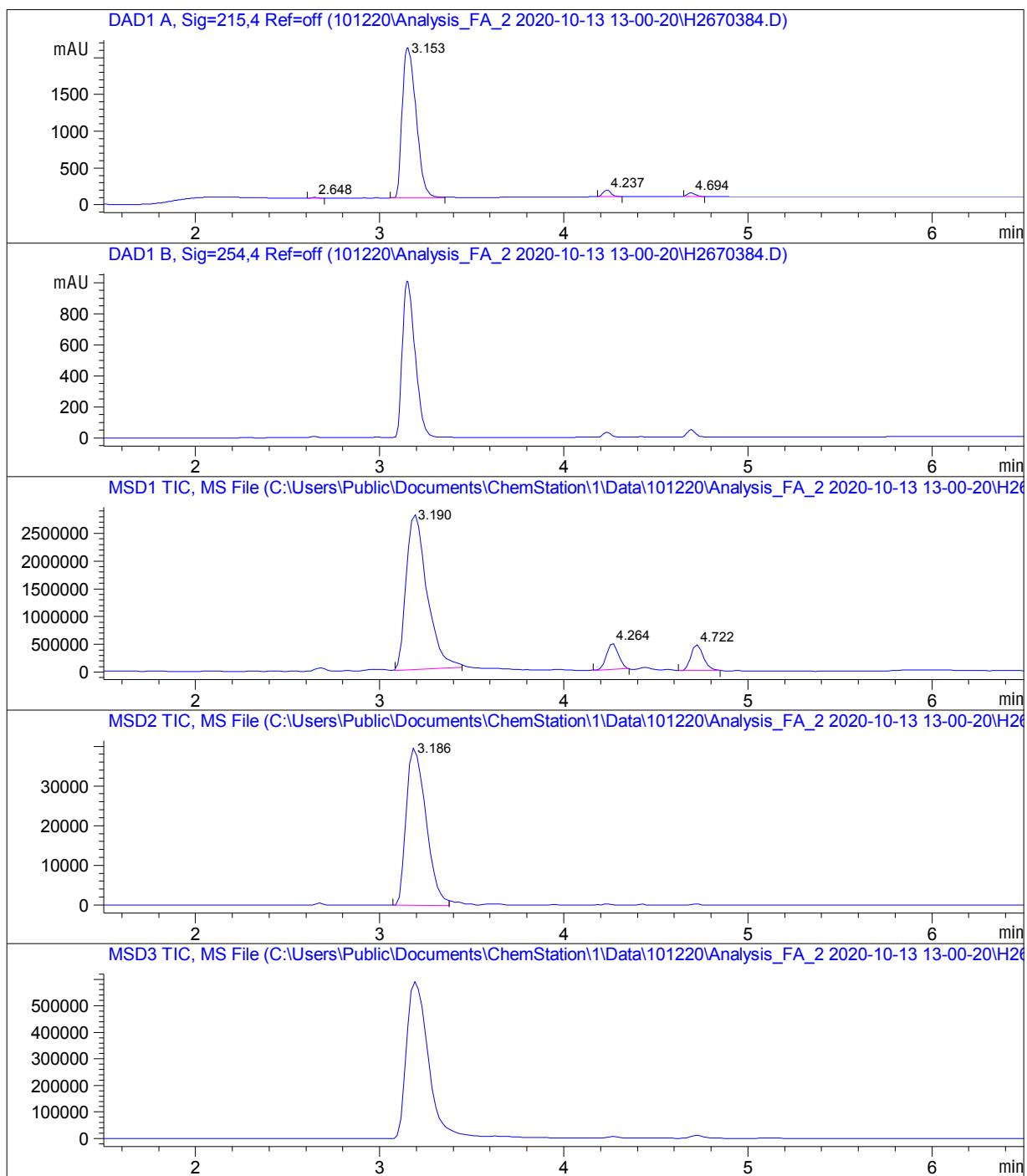


Compound 28

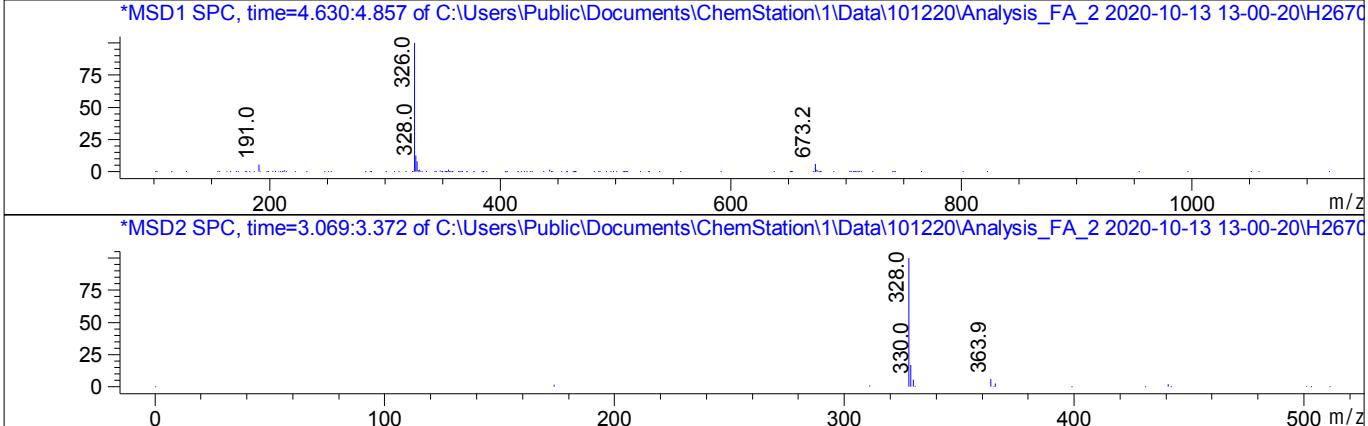
Sample
H2670384

0.1%FA-ACN 5-95%ACN 6 min. Zorbax-Eclipse-Plus C18 4.6 x
100mm, 3.5 μ m.

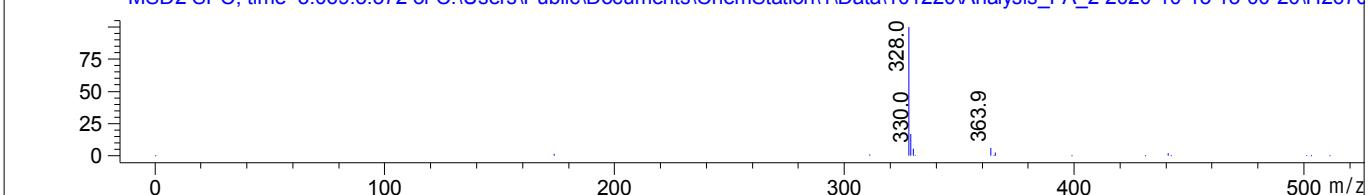
#	Time	Area%
1	2.648	0.35
2	3.153	95.66
3	4.237	2.50
4	4.694	1.49



RT 4.722

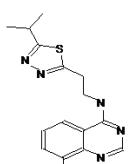


RT 3.186



H2670384

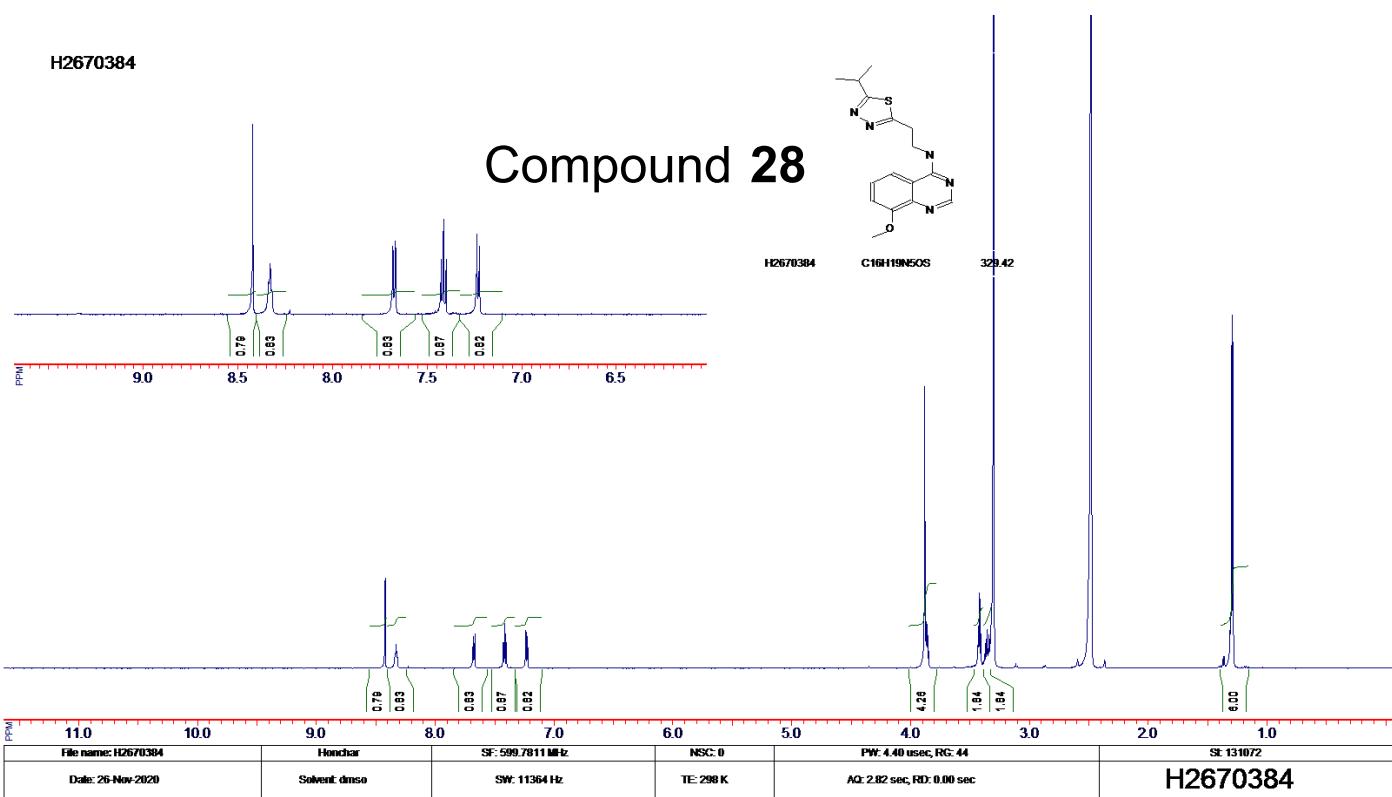
Compound 28



H2670384

C16H19N5OS

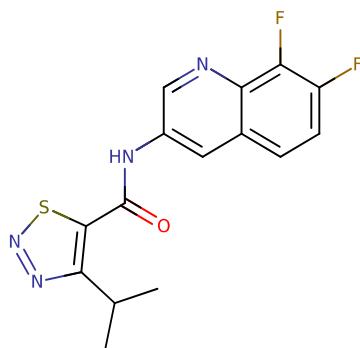
329.42



File name: H2670384	Honchar	SF: 599.7811 MHz	NSC: 0	PW: 4.40 usec, RG: 44	St: 131072
Date: 26-Nov-2020	Solvent: dmso	SW: 11364 Hz	TE: 299 K	AQ: 2.82 sec, RD: 0.00 sec	H2670384

MaxPeak: 100.00%
Ret_Time: 1.245 min

S089971\$6



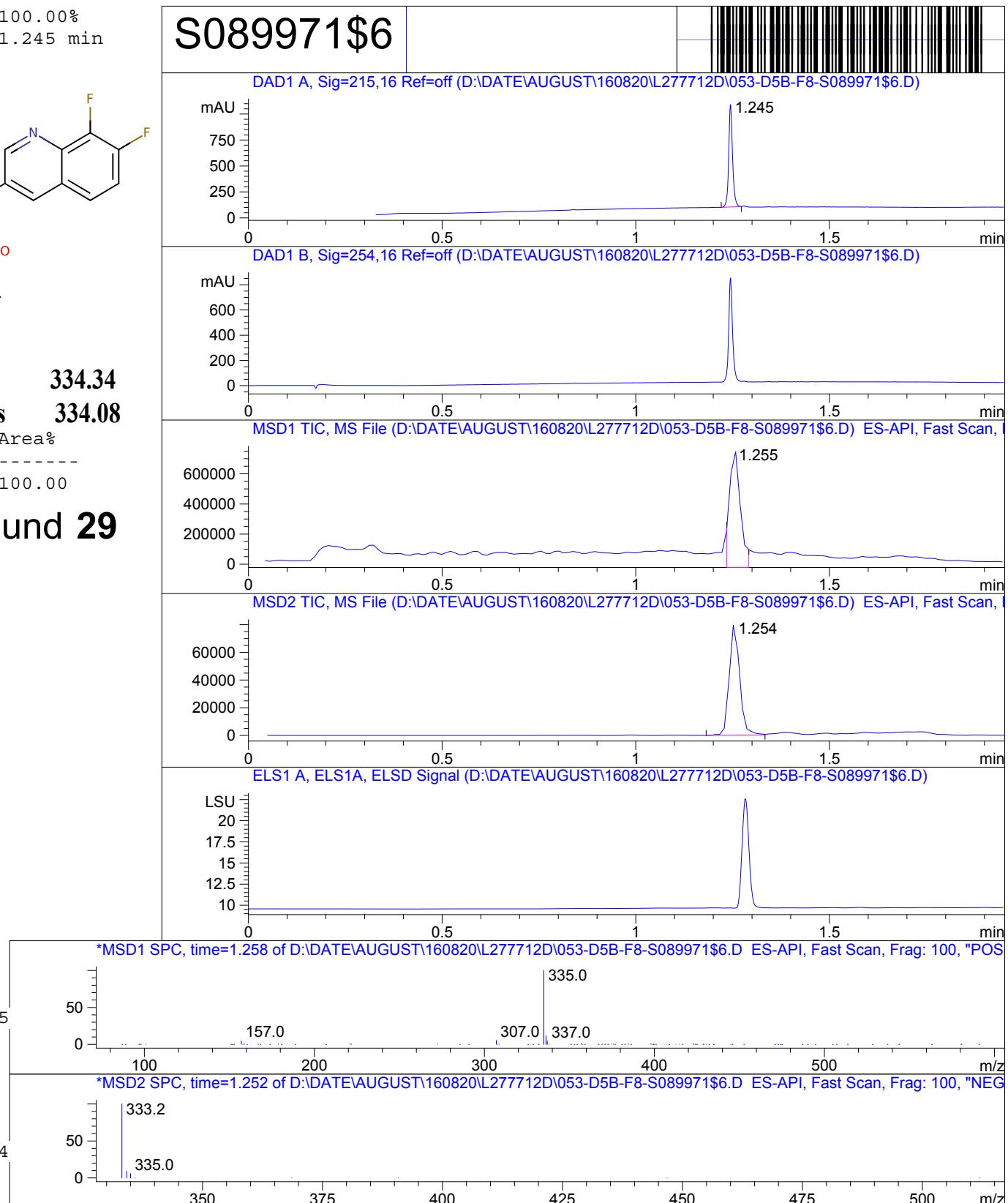
Mol Wt 334.34

Exact Mass 334.08

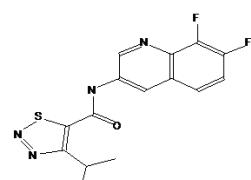
Time Area%

1 1.245 100.00

Compound 29

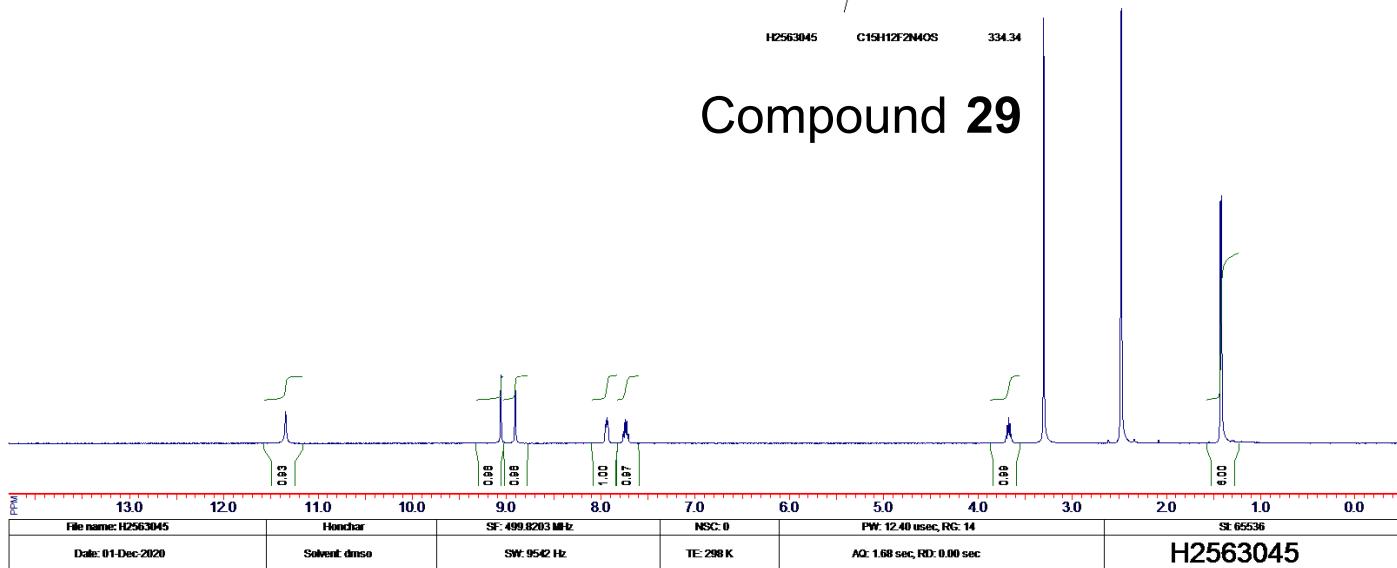


H2563045



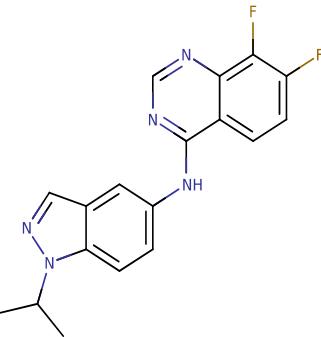
H2563045 C15H12F2N4OS 334.34

Compound 29



Compound 30

MaxPeak: 100.00%
Ret_Time: 1.273 min

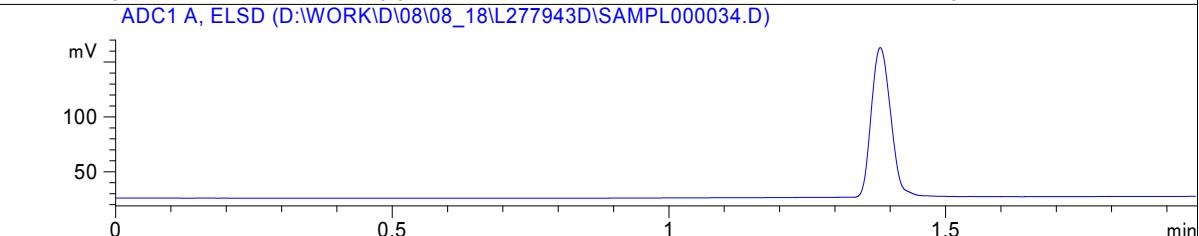
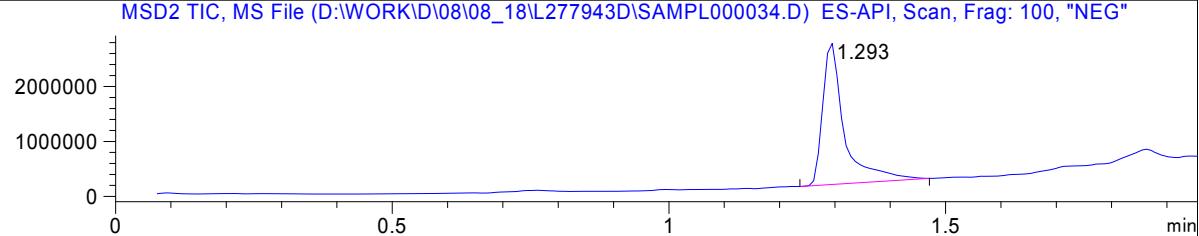
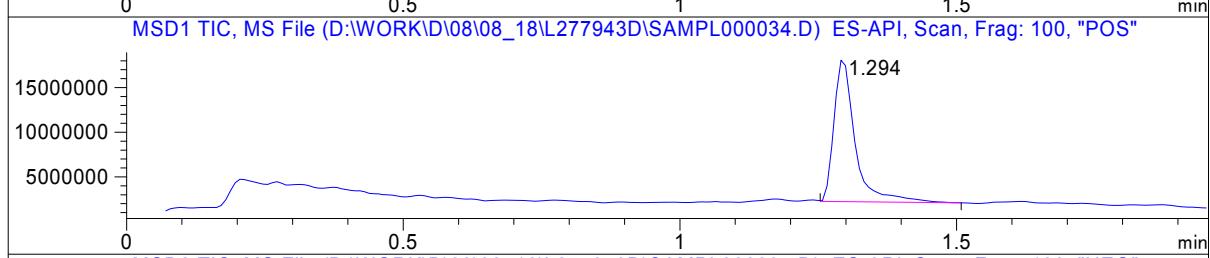
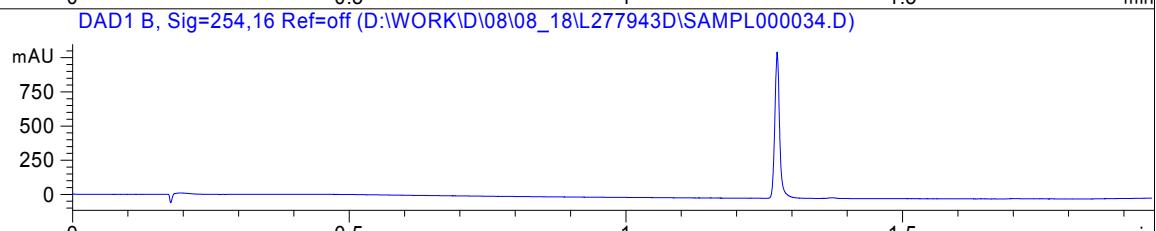
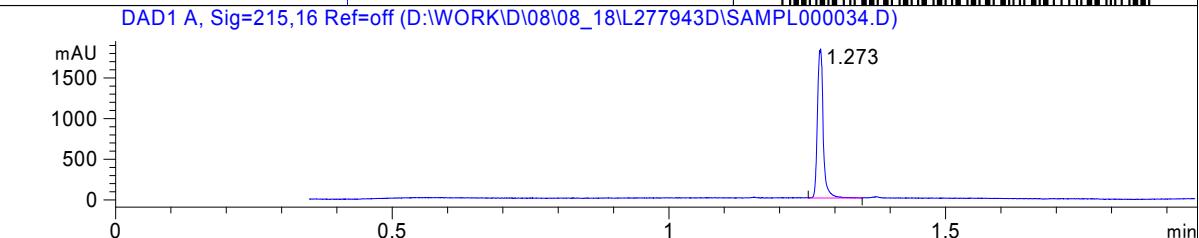


Mol Wt 339.34

Exact Mass 339.15

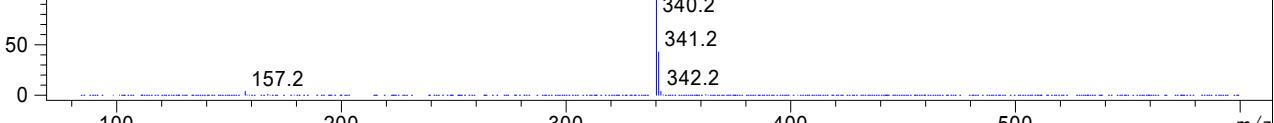
#	Time	Area%
1	1.273	100.00

S089954\$3

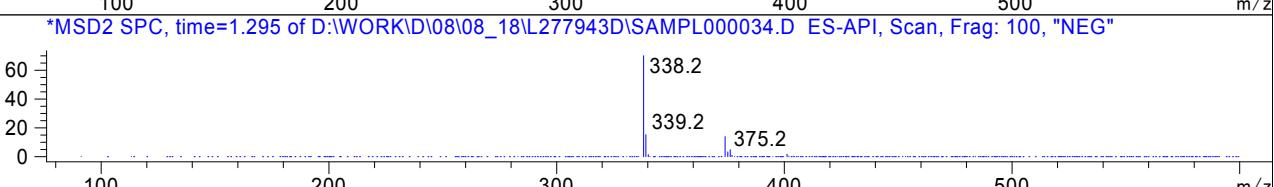


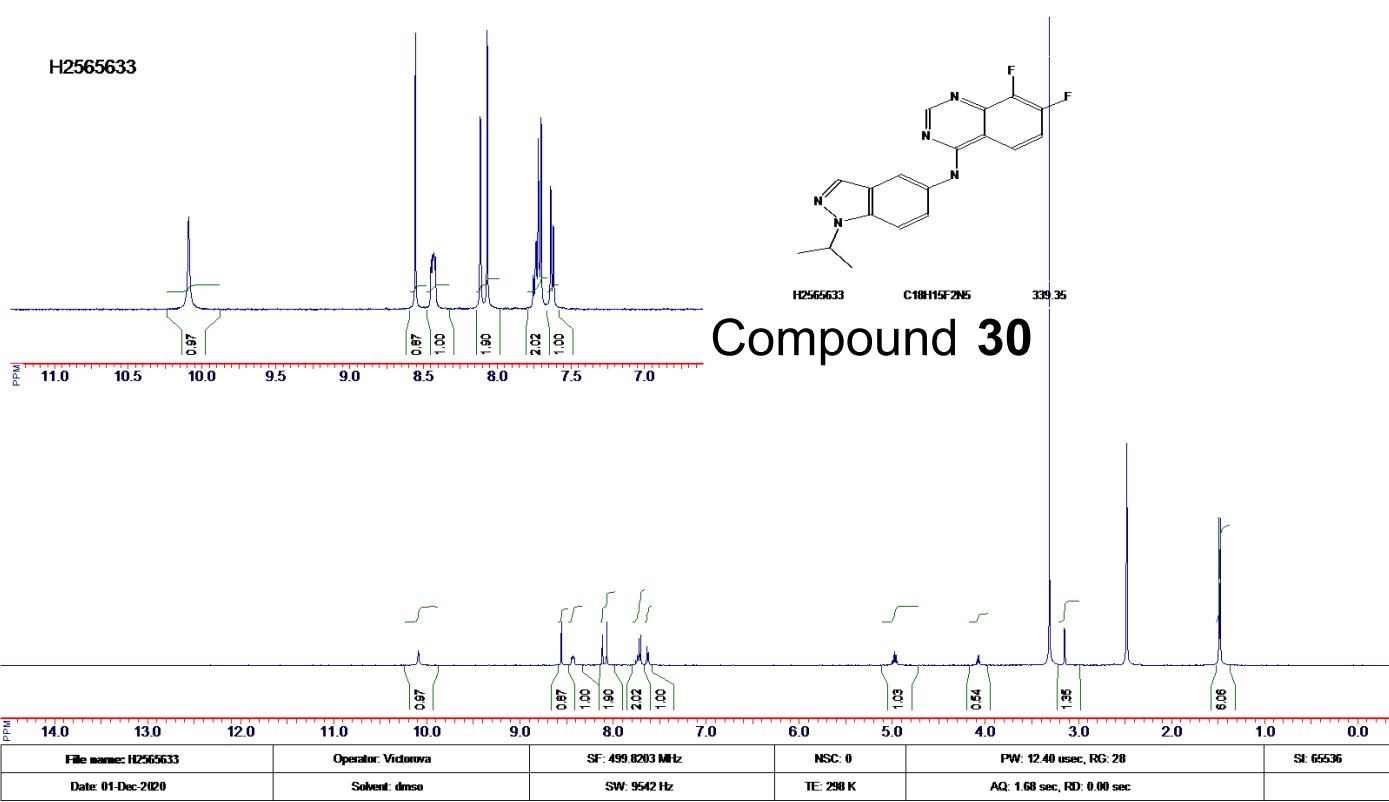
*MSD1 SPC, time=1.291 of D:\WORK\08\08_18\L277943D\SAMPL000034.D ES-API, Scan, Frag: 100, "POS"

RT 1.294



RT 1.293



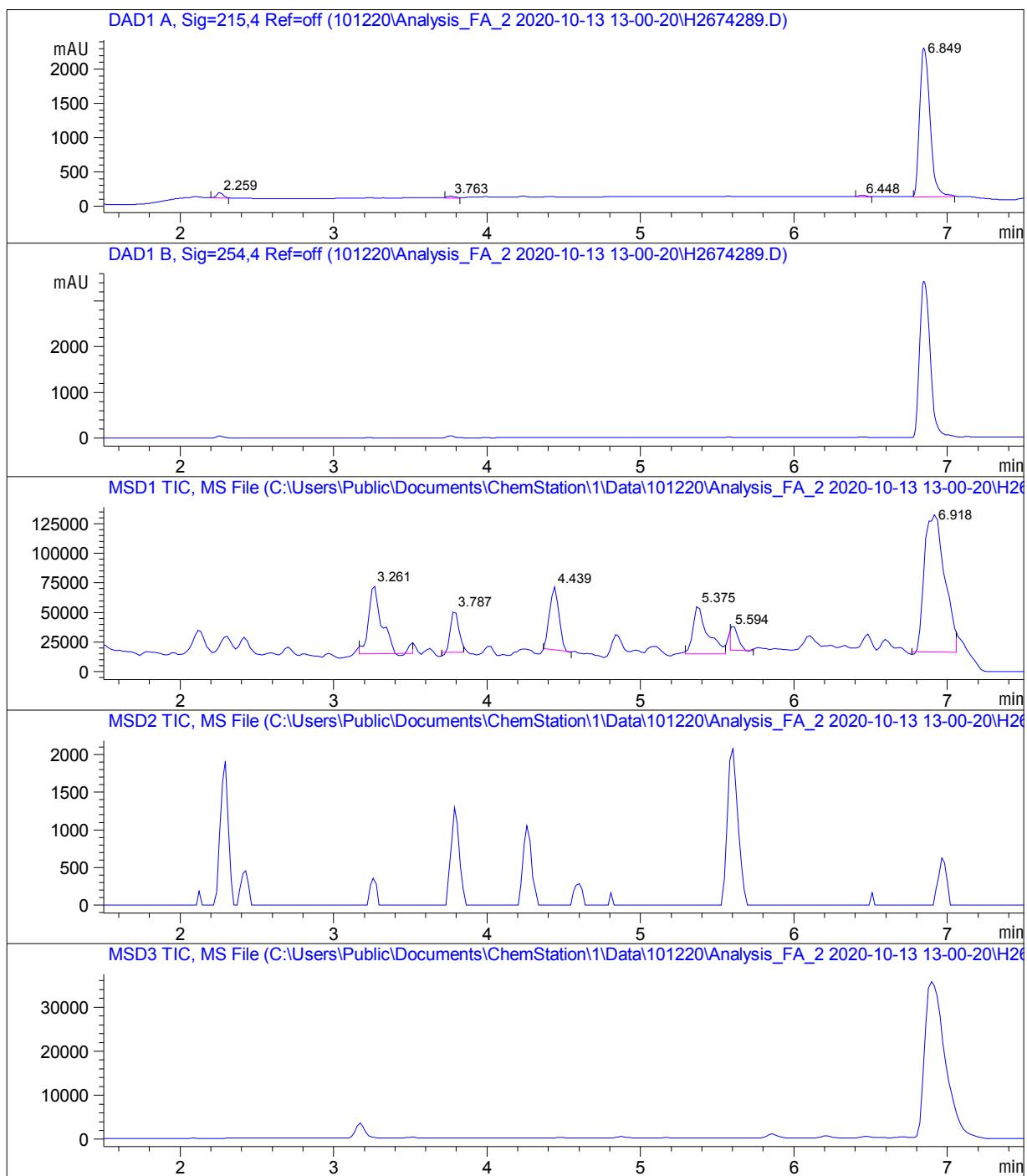


Compound 31

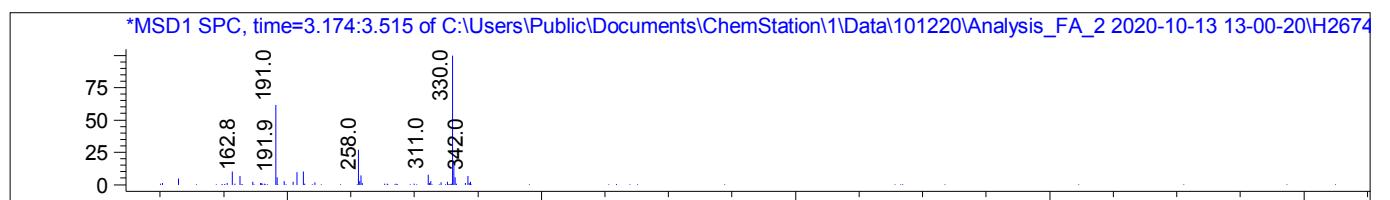
Sample
H2674289

0.1%FA-ACN 5-95%ACN 6 min. Zorbax-Eclipse-Plus C18 4.6 x
100mm, 3.5 μ m.

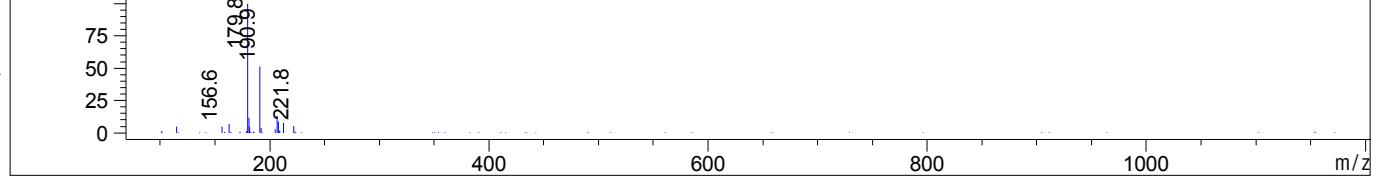
#	Time	Area%
1	2.259	2.14
2	3.763	0.89
3	6.448	0.80
4	6.849	96.18



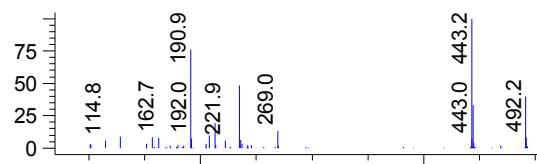
RT 3.261



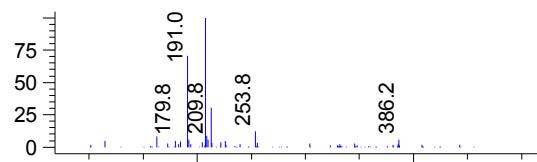
RT 3.787



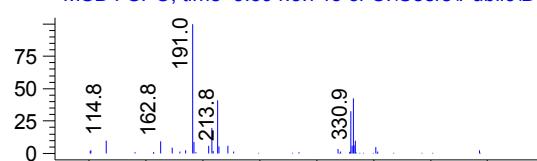
RT 4.439



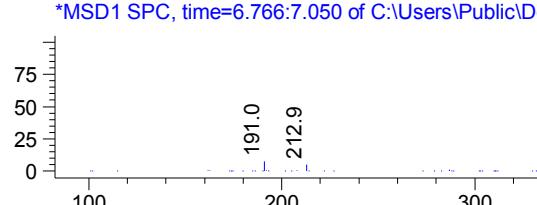
RT 5.375

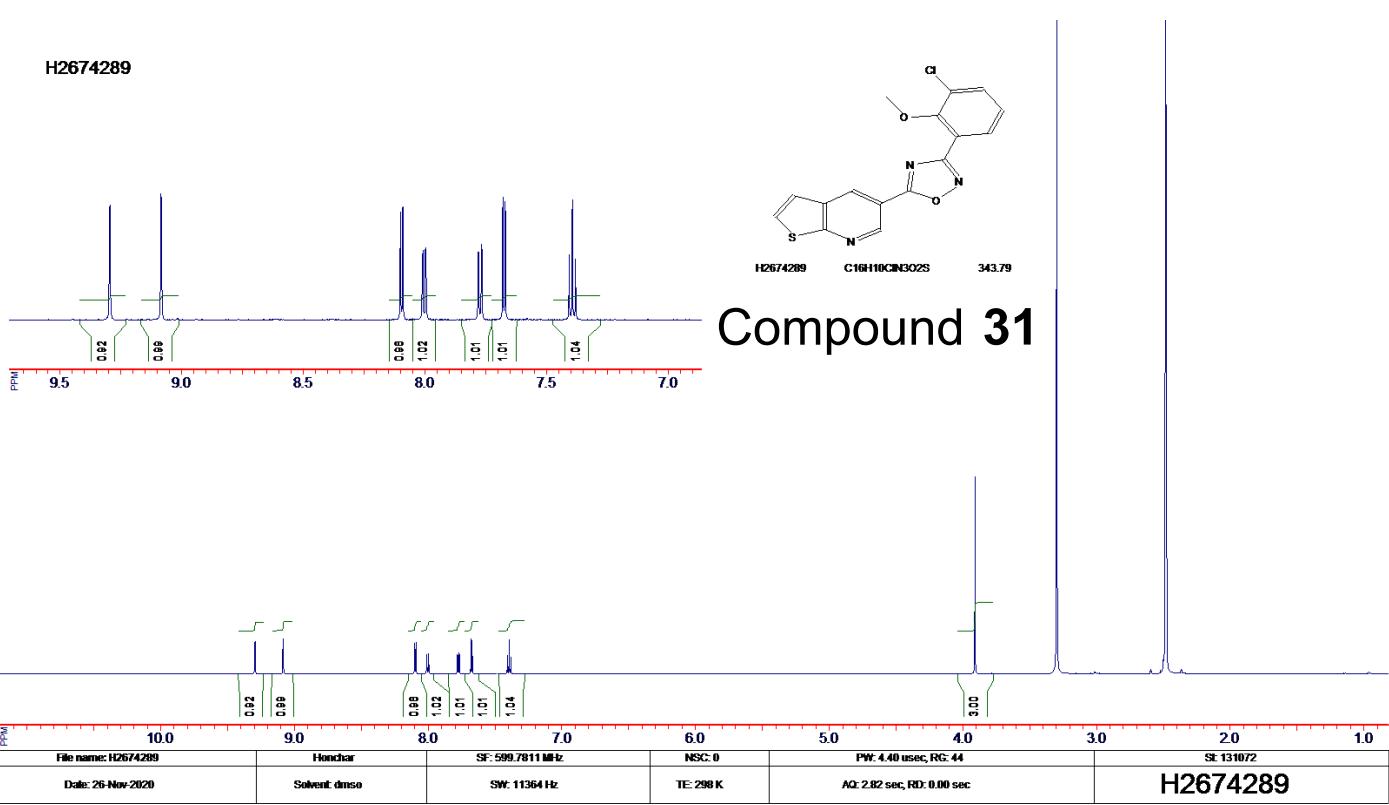


RT 5.594



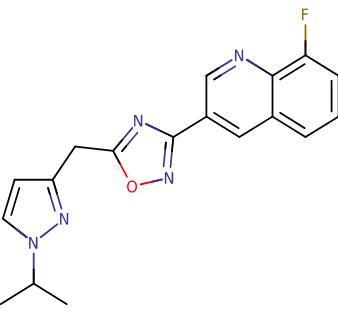
RT 6.918





Compound 32

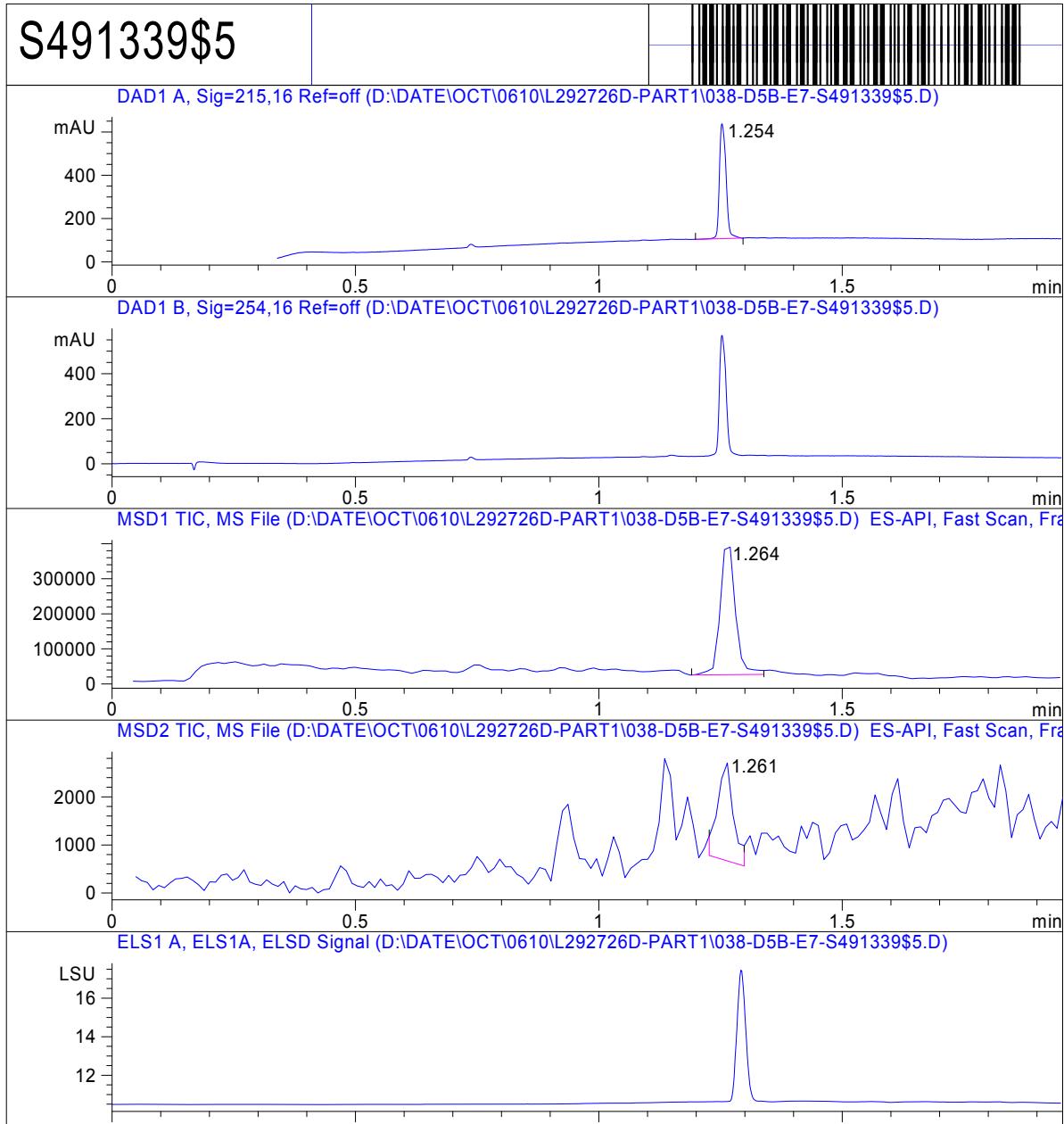
MaxPeak: 100.00%
Ret_Time: 1.254 min



Mol Wt 337.35

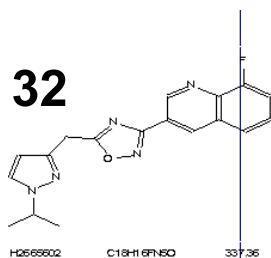
Exact Mass 337.15

#	Time	Area%
1	1.254	100.00

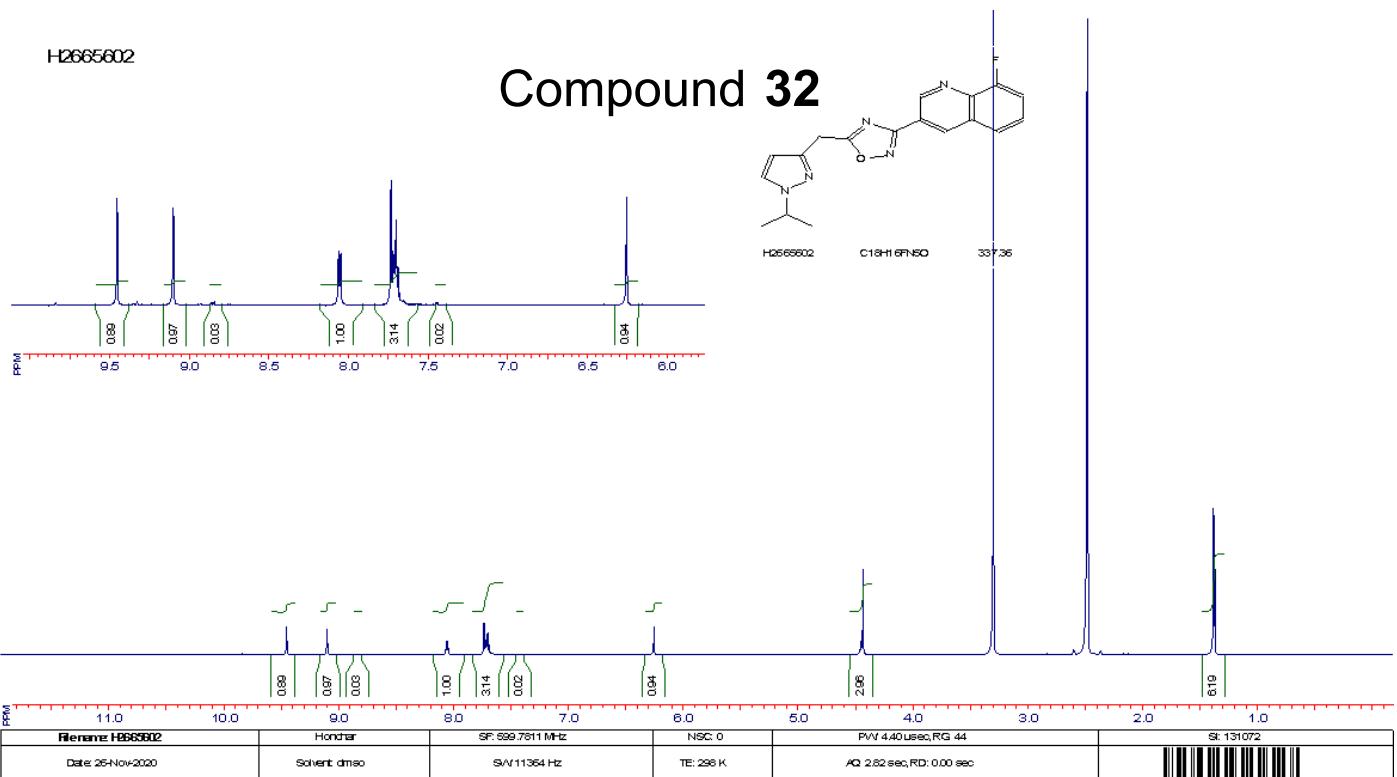


H2665602

Compound 32



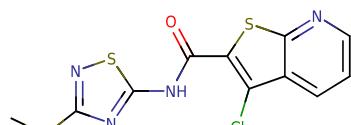
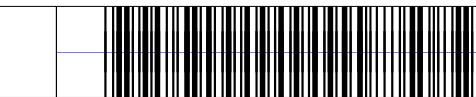
H2665602 C₁₈H₁₆FN₅O 337.36



Compound 33

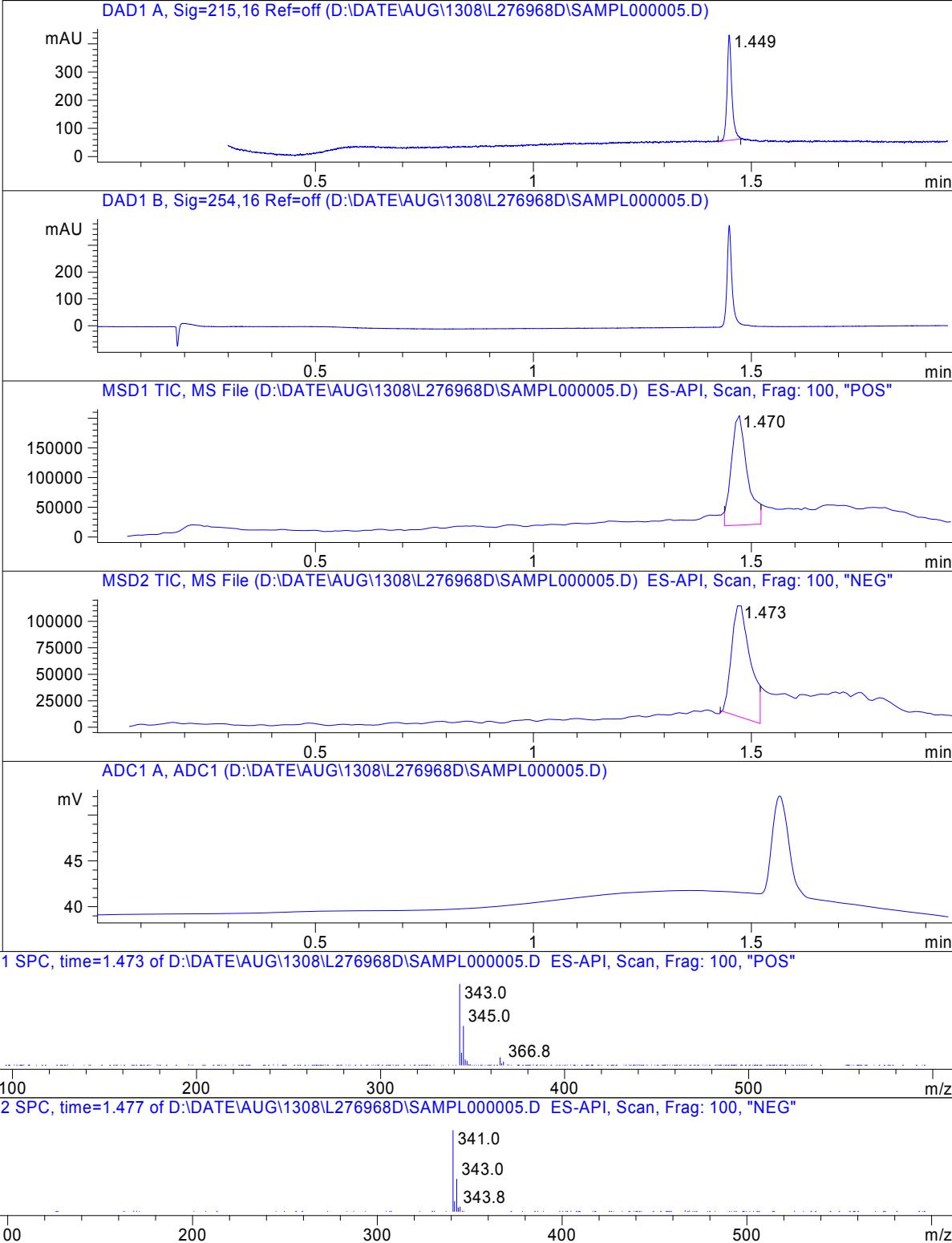
MaxPeak: 100.00%
Ret_Time: 1.449 min

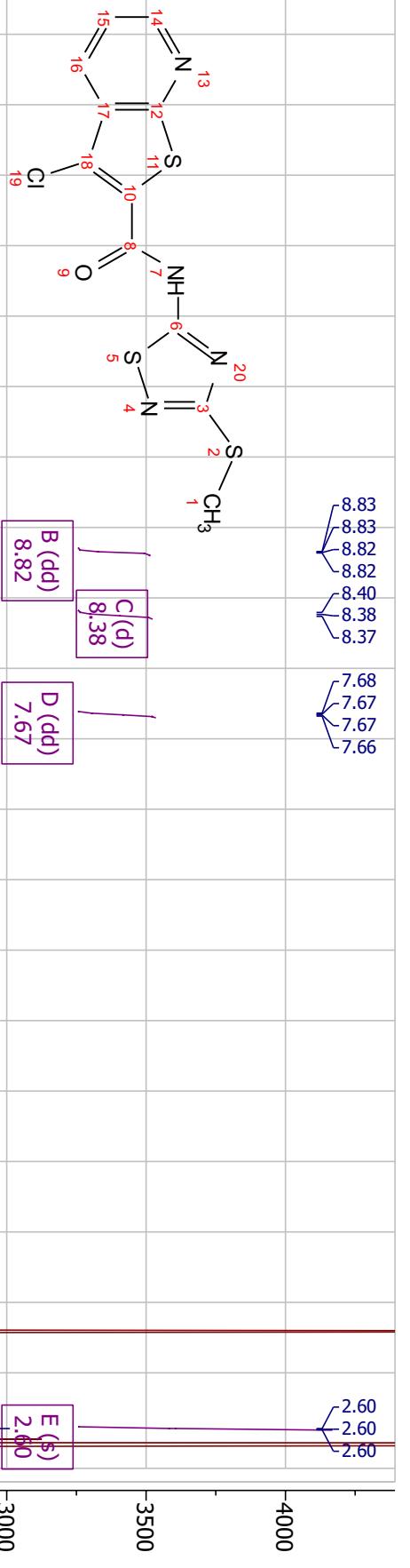
S089995\$3



Mol Wt 342.85
Exact Mass 341.94

#	Time	Area%
1	1.449	100.00





Compound 33

C₁₁H₇CN₄OS₃

