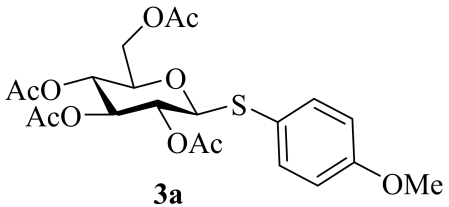
Supporting Information

Visible-Light-Mediated Synthesis of Anomeric *S*-Aryl Glycosides via Electron Donor–Acceptor Complex Using Thianthrenium Salts

Zhuoyi Zhou[#1], Yufeng Zhang[#1], Zhiqiang Yu[1], Yuping Liu[1], Zhen Wang[1], Qingju Zhang*[1], Liming Wang*[1]

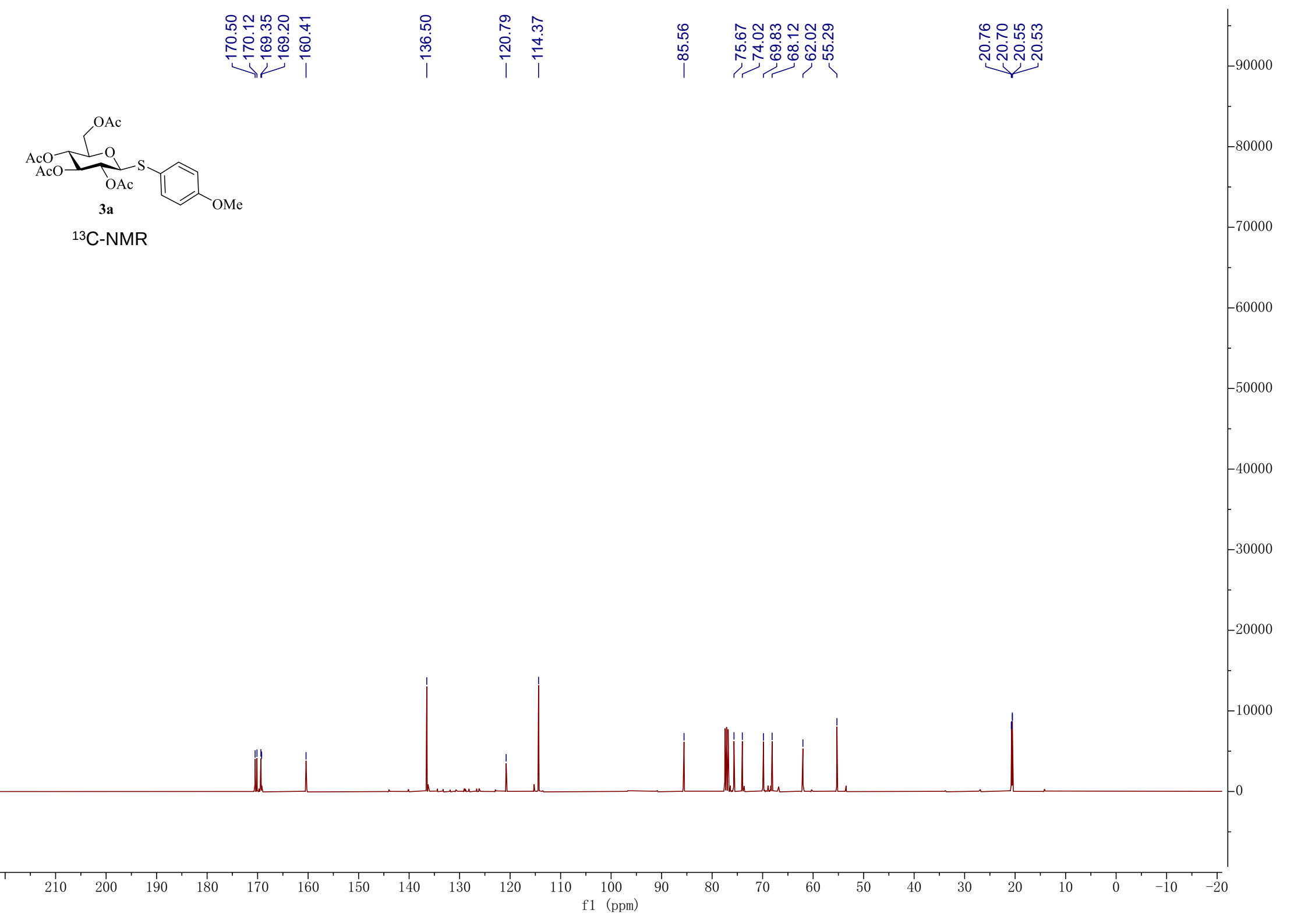
[1]National Research Centre for Carbohydrate Synthesis, College of Chemistry and Materials of Jiangxi Normal University, 99 Ziyang Avenue, Nanchang, 330022, China.

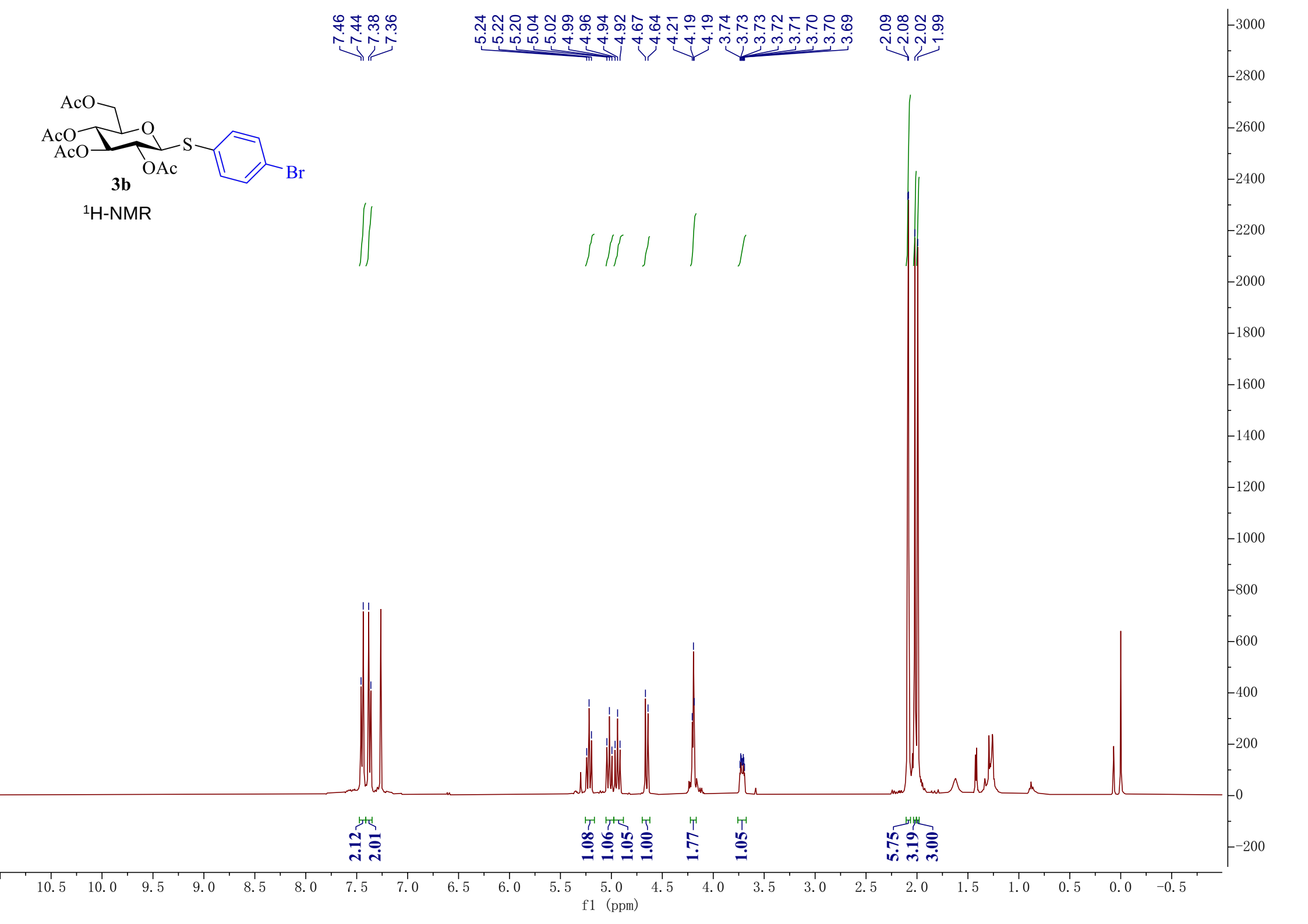

OAc
AcO
AcO
O
S
OAc
OMe

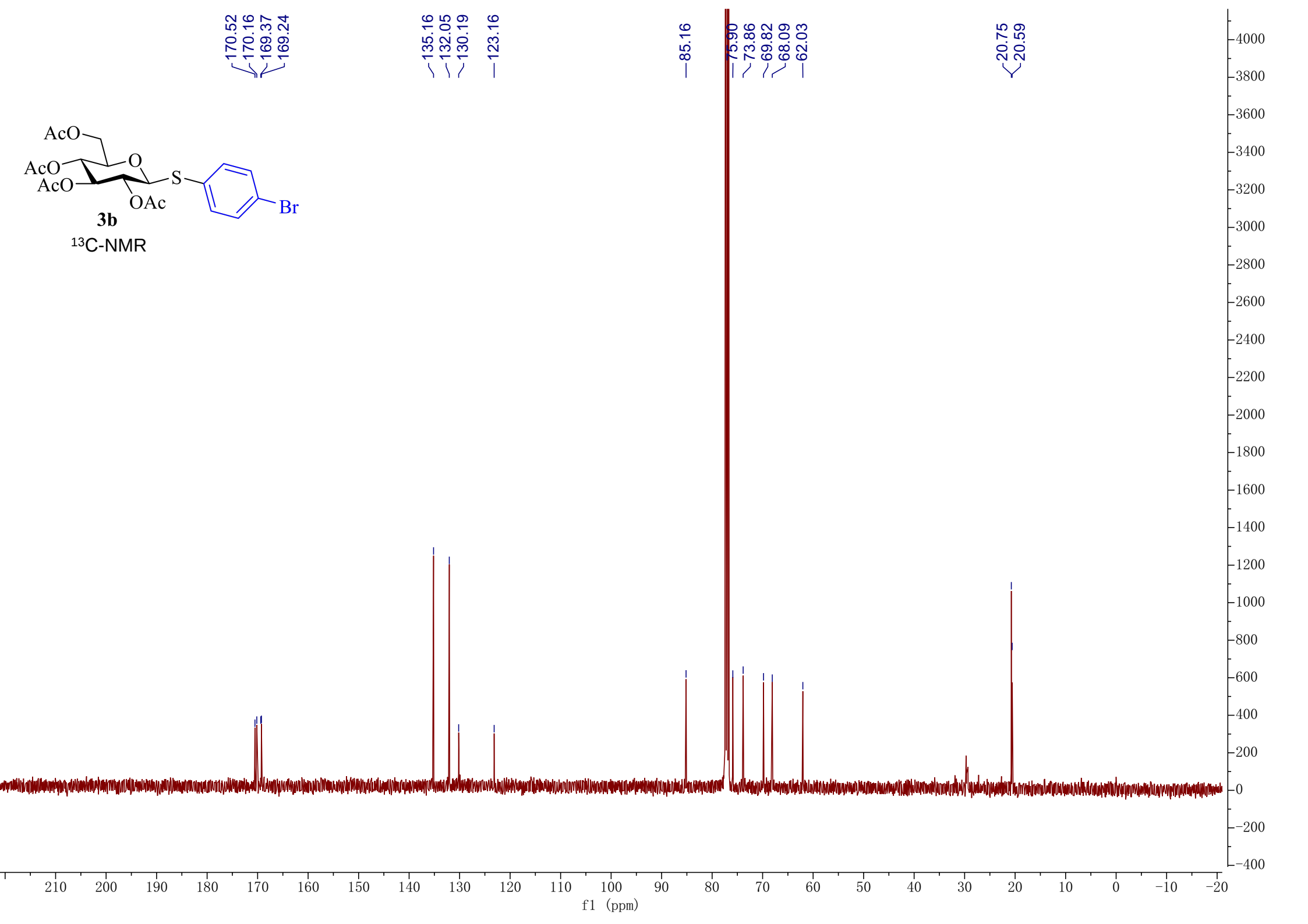
3a

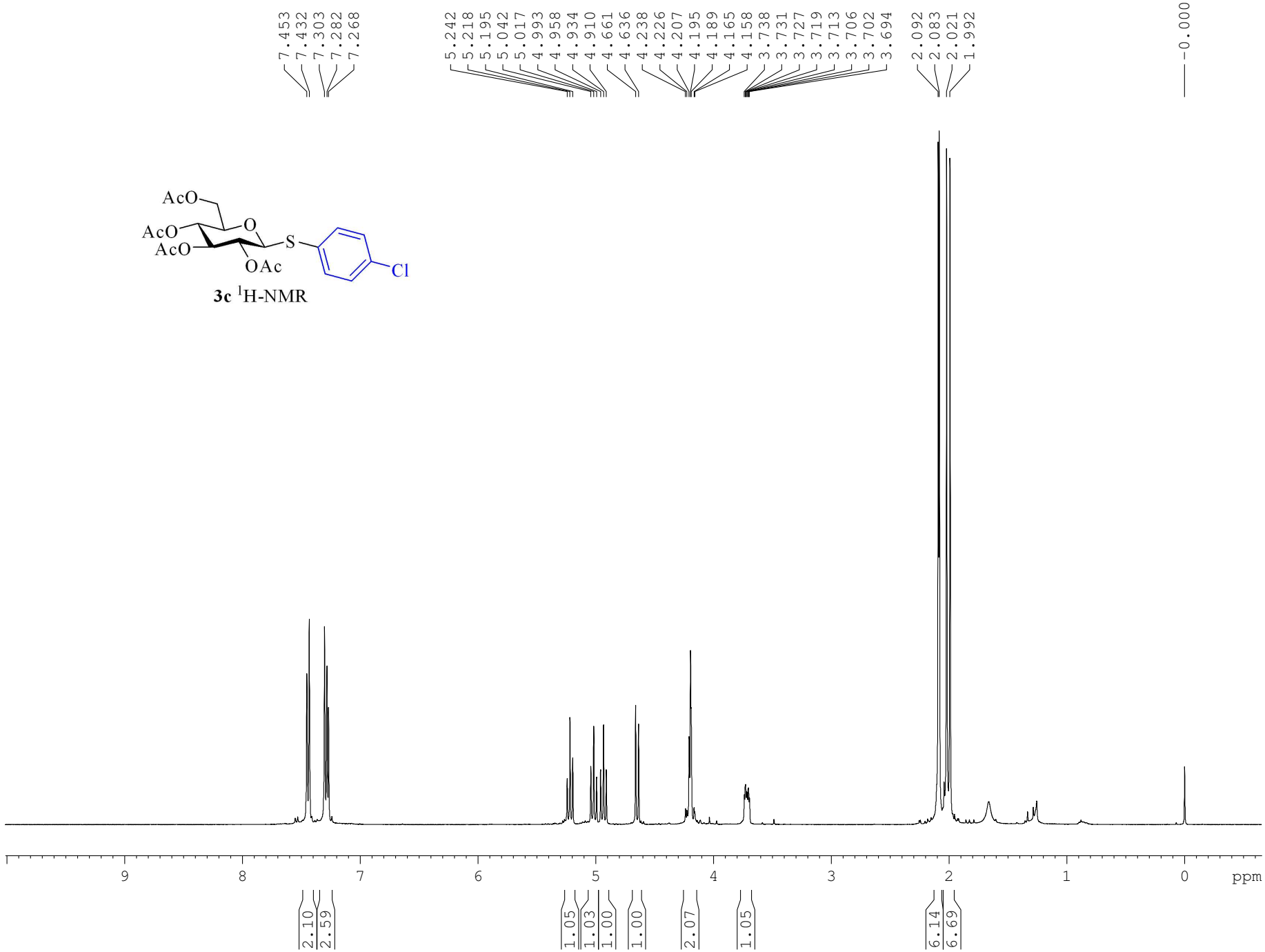
^{1}H-NMR

7.45
7.43
6.86
6.84
5.22
5.20
5.18
5.02
4.99
4.97
4.91
4.89
4.86
4.58
4.55
4.20
4.19
4.18
3.81
3.71
3.70
3.70
3.69
3.69
3.68
3.67
3.67
2.10
2.07
2.01
1.98
2.00
2.07
1.14
1.09
1.06
1.02
1.93
3.31
1.10
2.99
3.14
3.24
2.93
f1 (ppm)

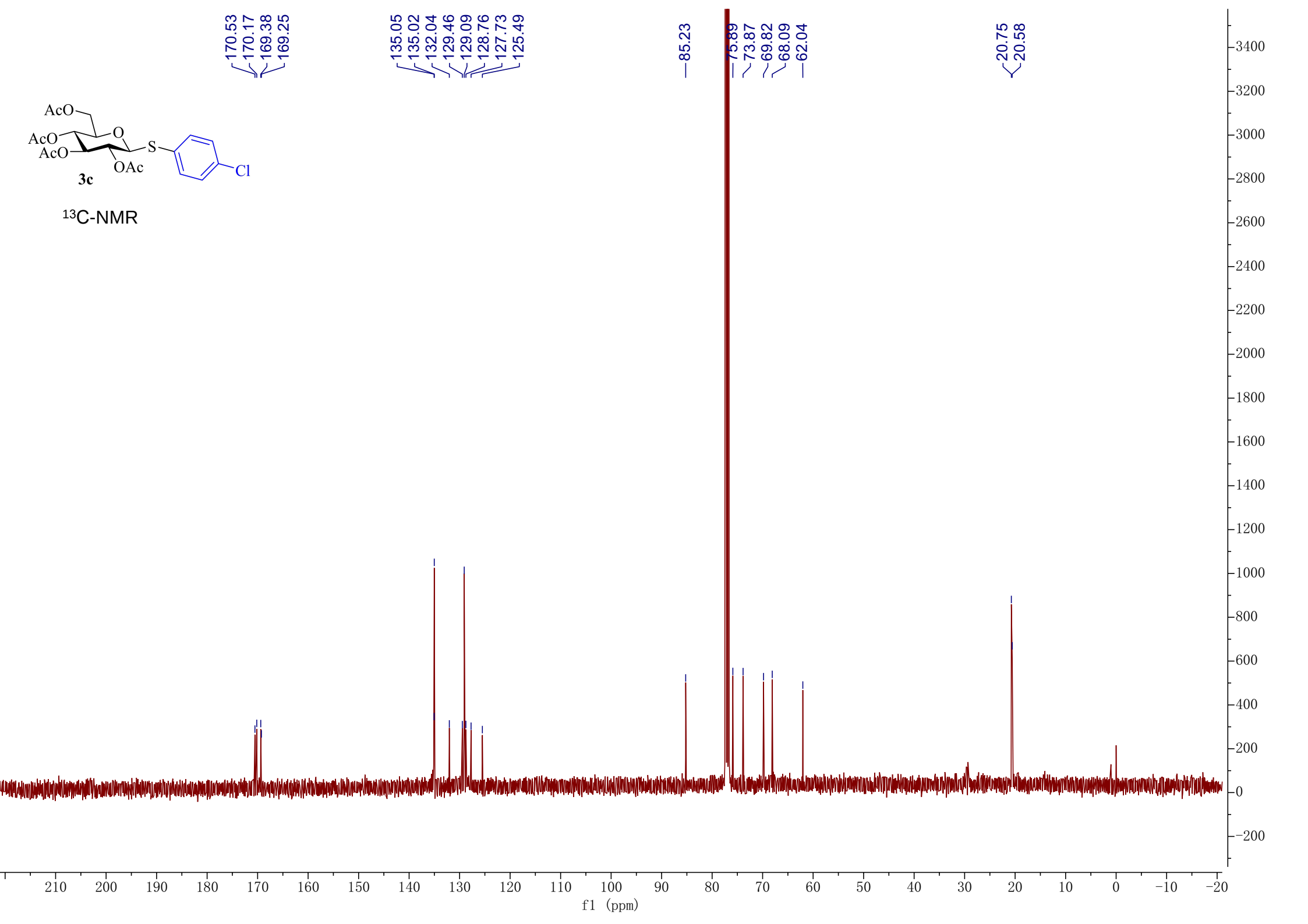

170.50
170.12
169.35
169.20
160.41
136.50
120.79
114.37
85.56
75.67
74.02
69.83
68.12
62.02
55.29
20.76
20.70
20.55
20.53
OAc
AcO
AcO
OAc
O
S
OMe
3a
13C-NMR
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
210
200
190
180
170
160
150
140
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120
110
100
90
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70
60
50
40
30
20
10
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−10
−20
f1 (ppm)

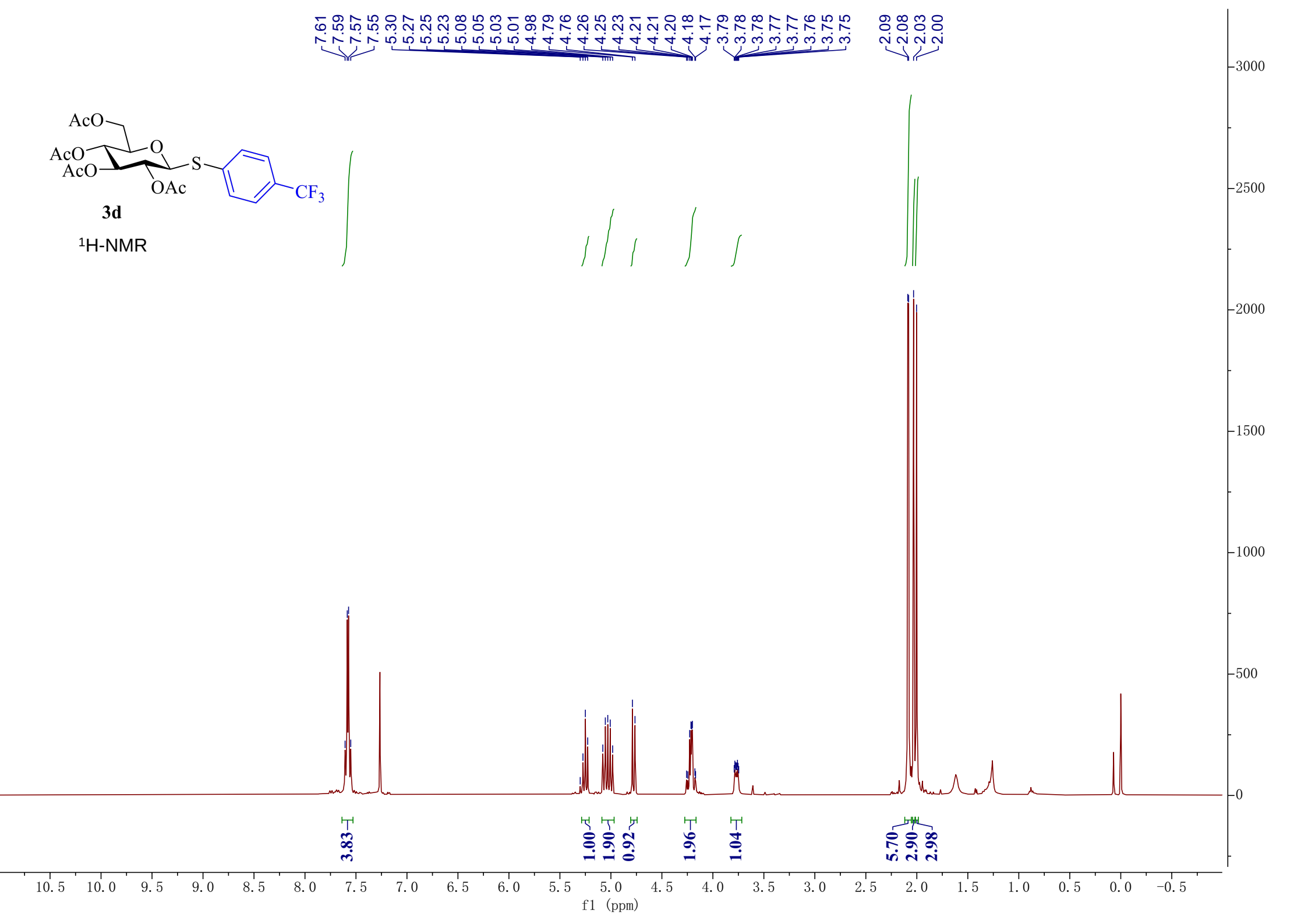

7.46
7.44
7.38
7.36
5.24
5.22
5.20
5.04
5.02
4.99
4.96
4.94
4.92
4.67
4.64
4.21
4.19
4.19
3.74
3.73
3.73
3.72
3.71
3.70
3.70
3.69
2.09
2.08
2.02
1.99
AcO
AcO
AcO
OAc
O
S
Br
3b
1H-NMR
2.12
2.01
1.08
1.06
1.05
1.00
1.77
1.05
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3.19
3.00
f1 (ppm)

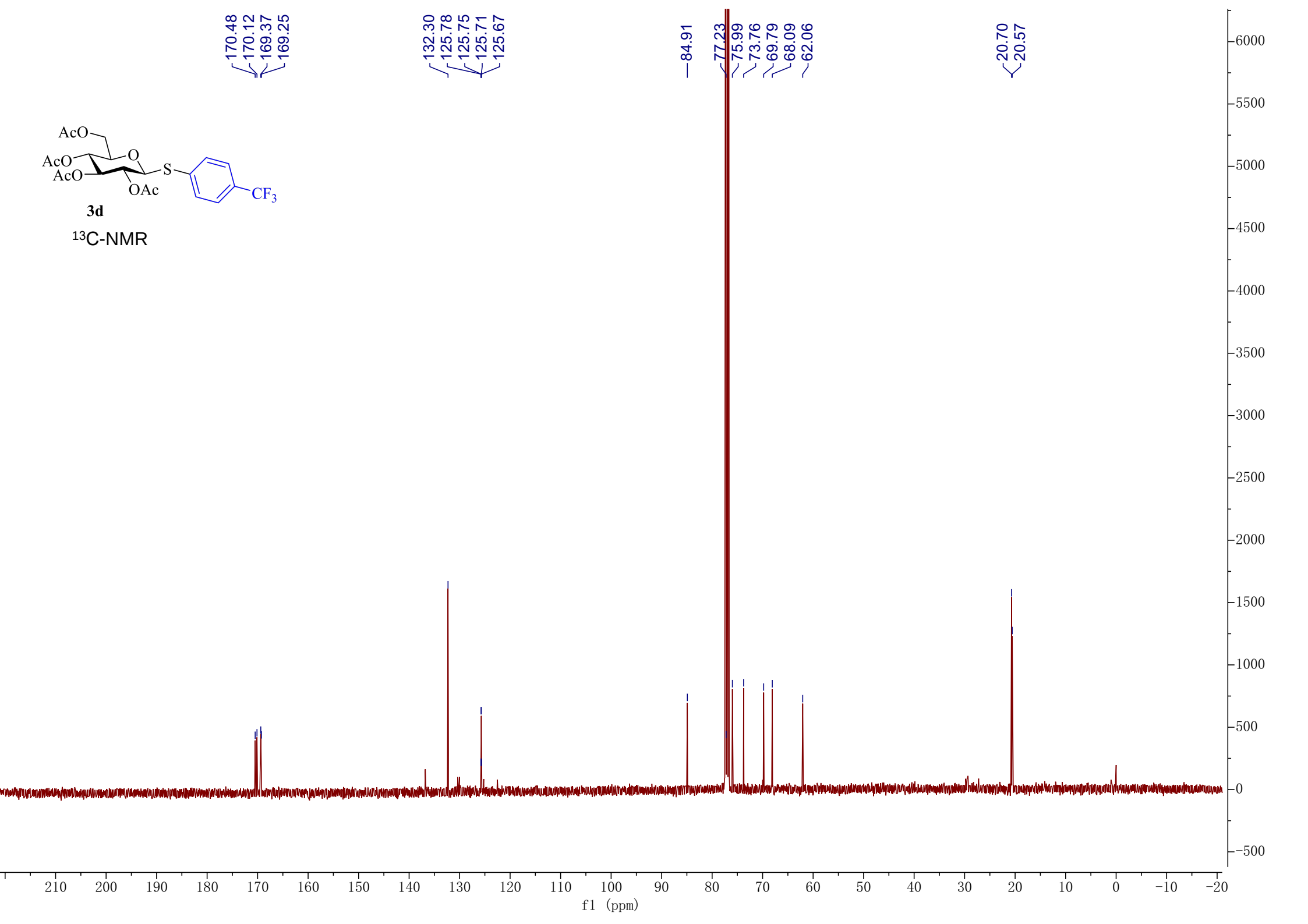

170.52
170.16
169.37
169.24
135.16
132.05
130.19
123.16
85.16
75.90
73.86
69.82
68.09
62.03
20.75
20.59
AcO
AcO
AcO
OAc
O
S
Br
3b
13C-NMR
f1 (ppm)

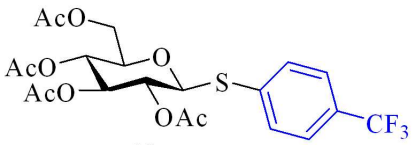

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7.282
7.268
5.242
5.218
5.195
5.042
5.017
4.993
4.958
4.934
4.910
4.661
4.636
4.238
4.226
4.207
4.195
4.189
4.165
4.158
3.738
3.731
3.727
3.719
3.713
3.706
3.702
3.694
2.092
2.083
2.021
1.992
0.000
AcO
AcO
AcO
O
OAc
S
Cl
9
8
7
6
5
4
3
2
1
0
ppm
2.10
2.59
1.05
1.03
1.00
1.00
2.07
1.05
6.14
6.69

3c ^{1}H-NMR


170.53
170.17
169.38
169.25
135.05
135.02
132.04
129.46
129.09
128.76
127.73
125.49
85.23
75.89
73.87
69.82
68.09
62.04
20.75
20.58
AcO
AcO
AcO
O
OAc
S
Cl
3c
13C-NMR
f1 (ppm)

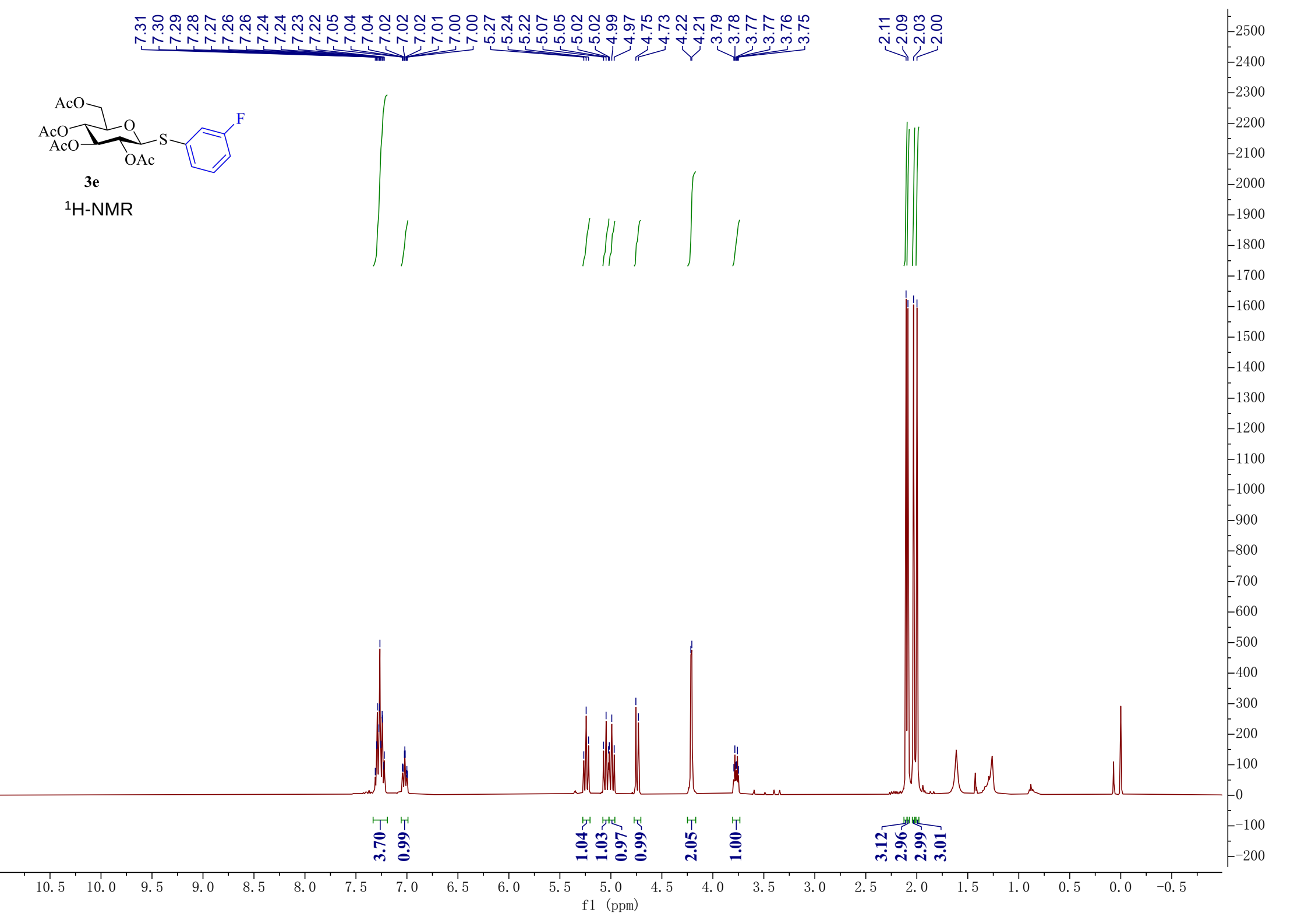

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7.57
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5.27
5.25
5.23
5.08
5.05
5.03
5.01
4.98
4.79
4.76
4.26
4.25
4.23
4.21
4.21
4.20
4.18
4.17
3.79
3.78
3.78
3.77
3.77
3.76
3.75
3.75
2.09
2.08
2.03
2.00
AcO
AcO
AcO
OAc
O
S
CF3
3d
1H-NMR
3000
2500
2000
1500
1000
500
0
3.83
1.00
1.90
0.92
1.96
1.04
5.70
2.90
2.98
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
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3.0
2.5
2.0
1.5
1.0
0.5
0.0
−0.5
f1 (ppm)

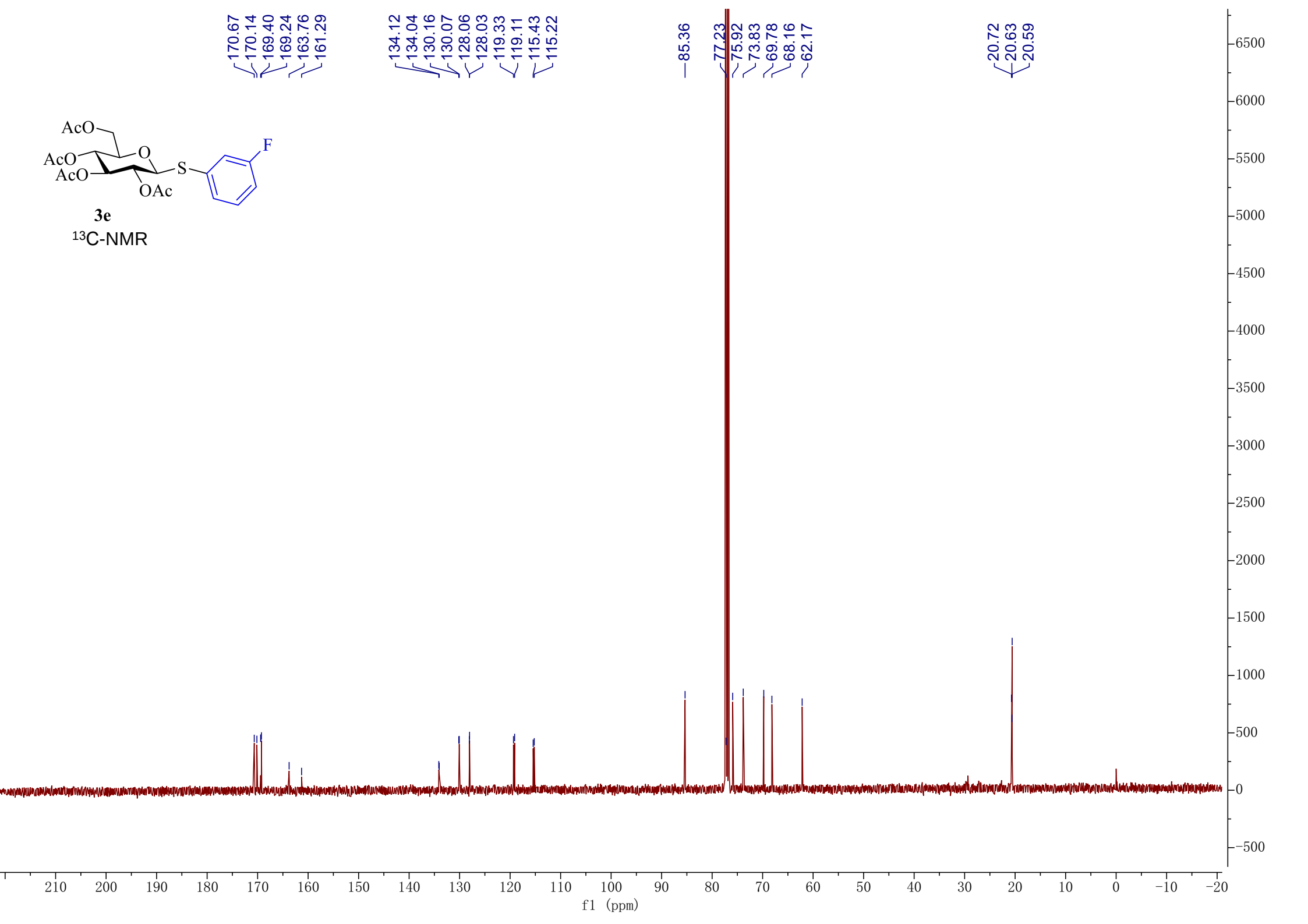

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132.30
125.78
125.75
125.71
125.67
84.91
77.23
75.99
73.76
69.79
68.09
62.06
20.70
20.57
AcO
AcO
AcO
OAc
O
S
CF3
3d
13C-NMR
f1 (ppm)

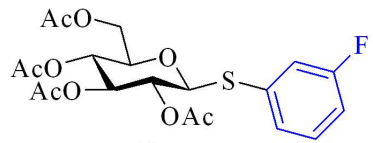

AcO
AcO
AcO
OAc
O
S
CF3

3d ^{19}F-NMR

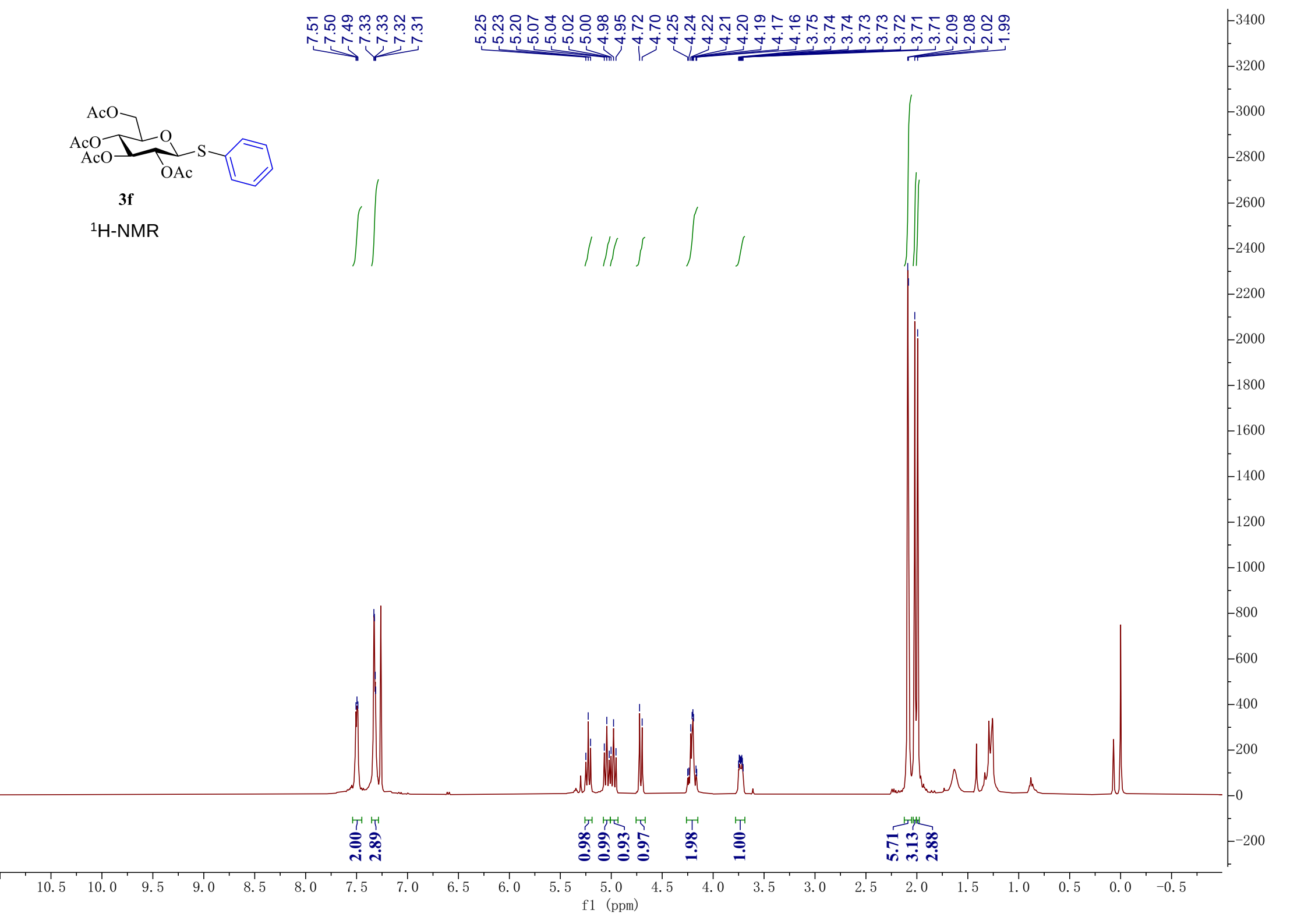
-62.763
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
ppm

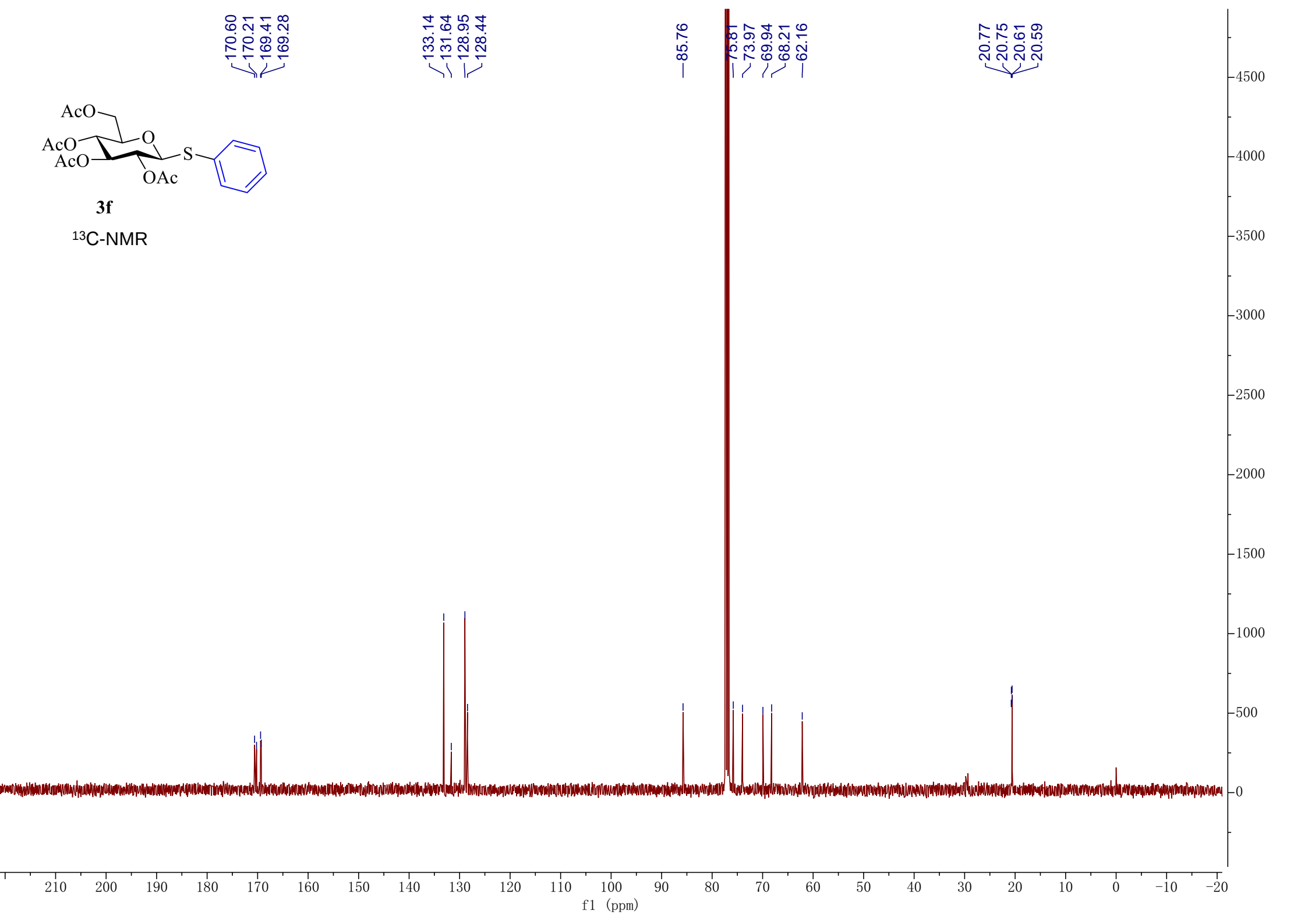

7.31
7.30
7.29
7.28
7.27
7.26
7.26
7.24
7.24
7.23
7.22
7.05
7.04
7.04
7.02
7.02
7.02
7.01
7.00
7.00
5.27
5.24
5.22
5.07
5.05
5.02
5.02
4.99
4.97
4.75
4.73
4.22
4.21
3.79
3.78
3.77
3.77
3.76
3.75
2.11
2.09
2.03
2.00
AcO
AcO
AcO
OAc
O
S
F
3e
1H-NMR
3.70
0.99
1.04
1.03
0.97
0.99
2.05
1.00
3.12
2.96
2.99
3.01
f1 (ppm)

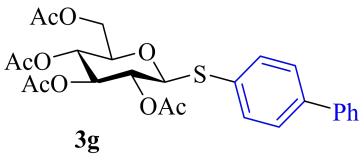

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163.76
161.29
134.12
134.04
130.16
130.07
128.06
128.03
119.33
119.11
115.43
115.22
85.36
77.23
75.92
73.83
69.78
68.16
62.17
20.72
20.63
20.59
AcO
AcO
AcO
OAc
O
S
F
3e
13C-NMR
f1 (ppm)



3e ^{19}F-NMR


AcO
AcO
AcO
OAc
O
S
3f
1H-NMR
7.51
7.50
7.49
7.33
7.33
7.32
7.31
5.25
5.23
5.20
5.07
5.04
5.02
5.00
4.98
4.95
4.72
4.70
4.25
4.24
4.22
4.21
4.20
4.19
4.17
4.16
3.75
3.74
3.74
3.73
3.73
3.72
3.71
3.71
2.09
2.08
2.02
1.99
2.00
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0.99
0.93
0.97
1.98
1.00
5.71
3.13
2.88
f1 (ppm)

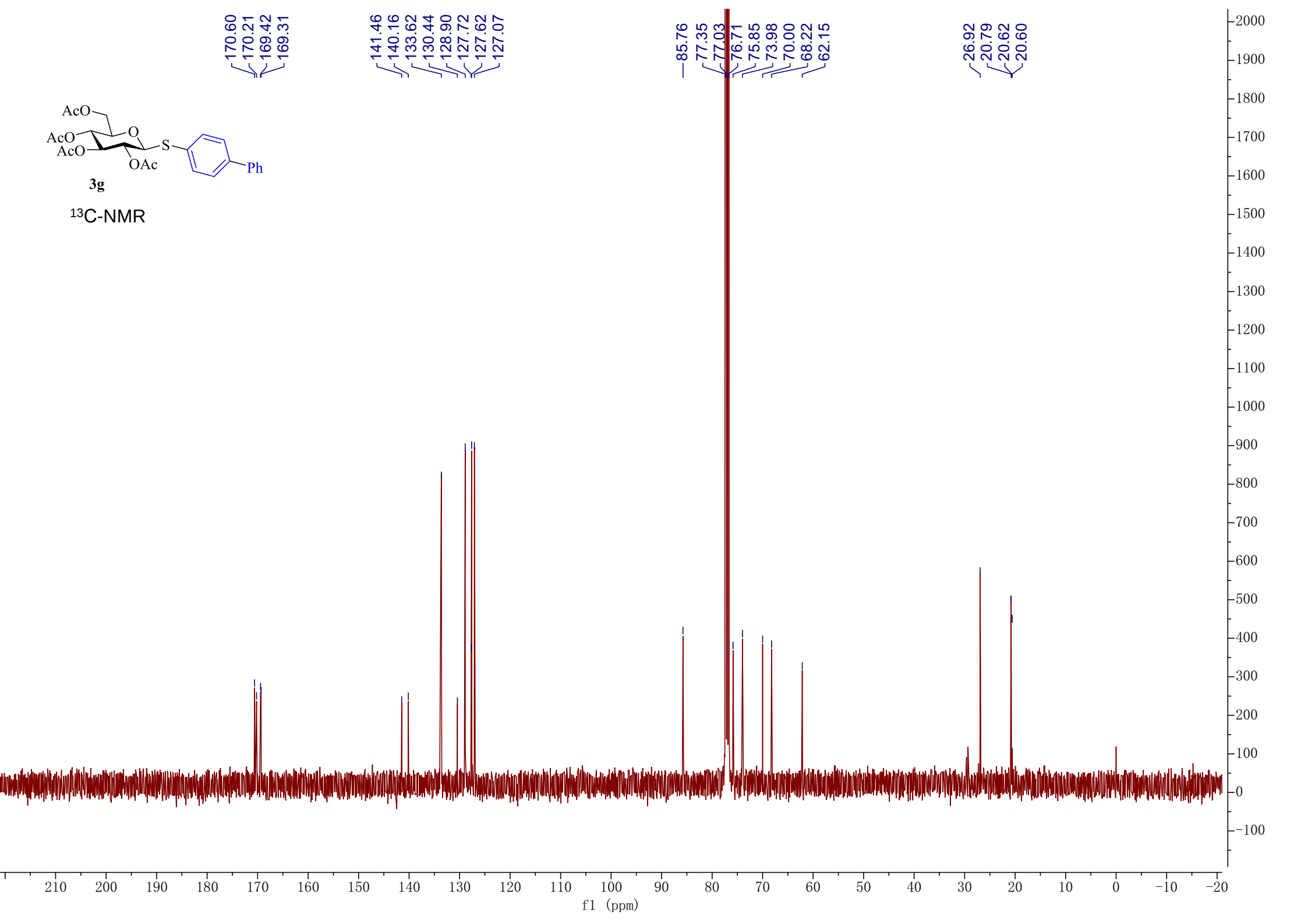

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169.28
133.14
131.64
128.95
128.44
85.76
75.81
73.97
69.94
68.21
62.16
20.77
20.75
20.61
20.59
AcO
AcO
AcO
O
S
OAc
3f
13C-NMR
4500
4000
3500
3000
2500
2000
1500
1000
500
0
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
−10
−20
f1 (ppm)

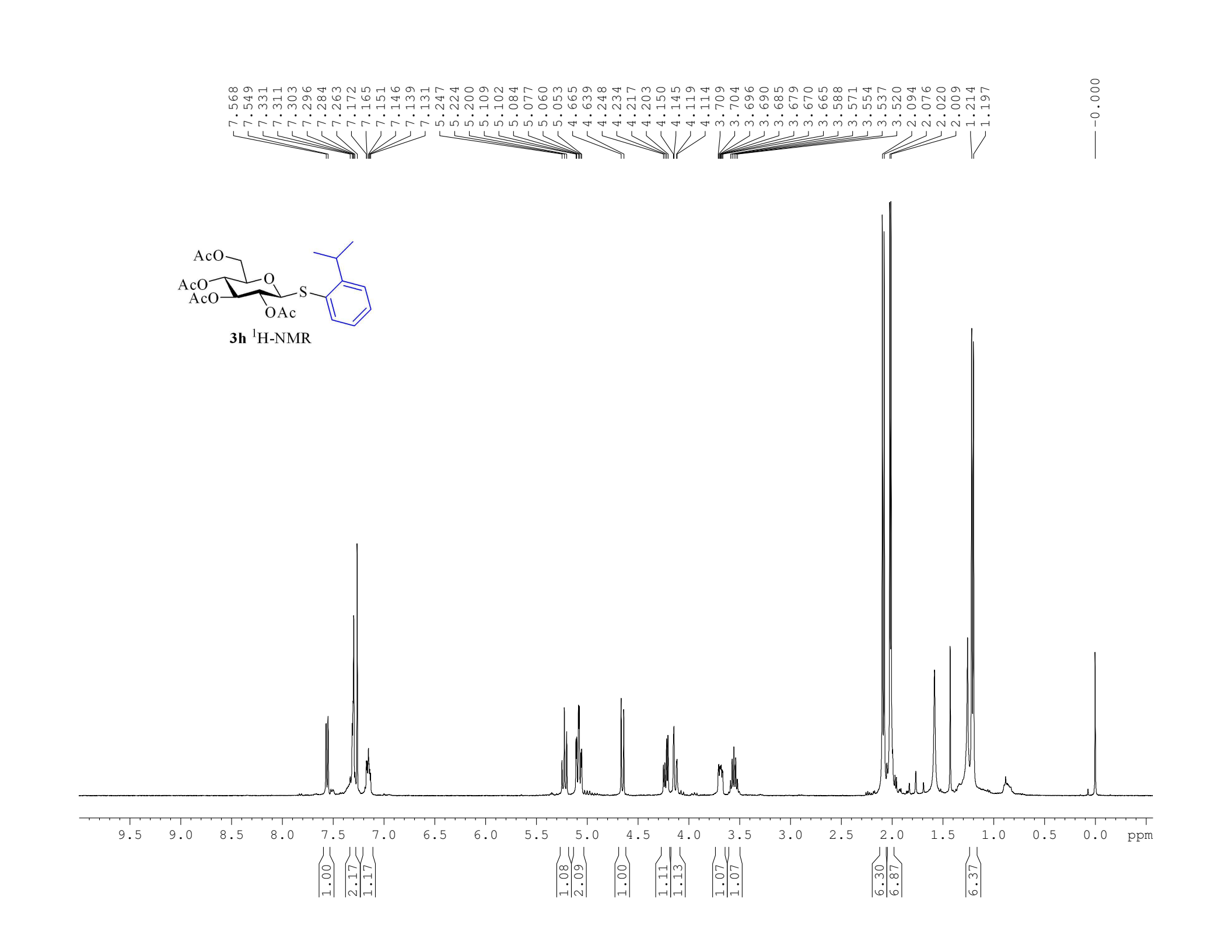

AcO
AcO
AcO
O
OAc
S
Ph

3g

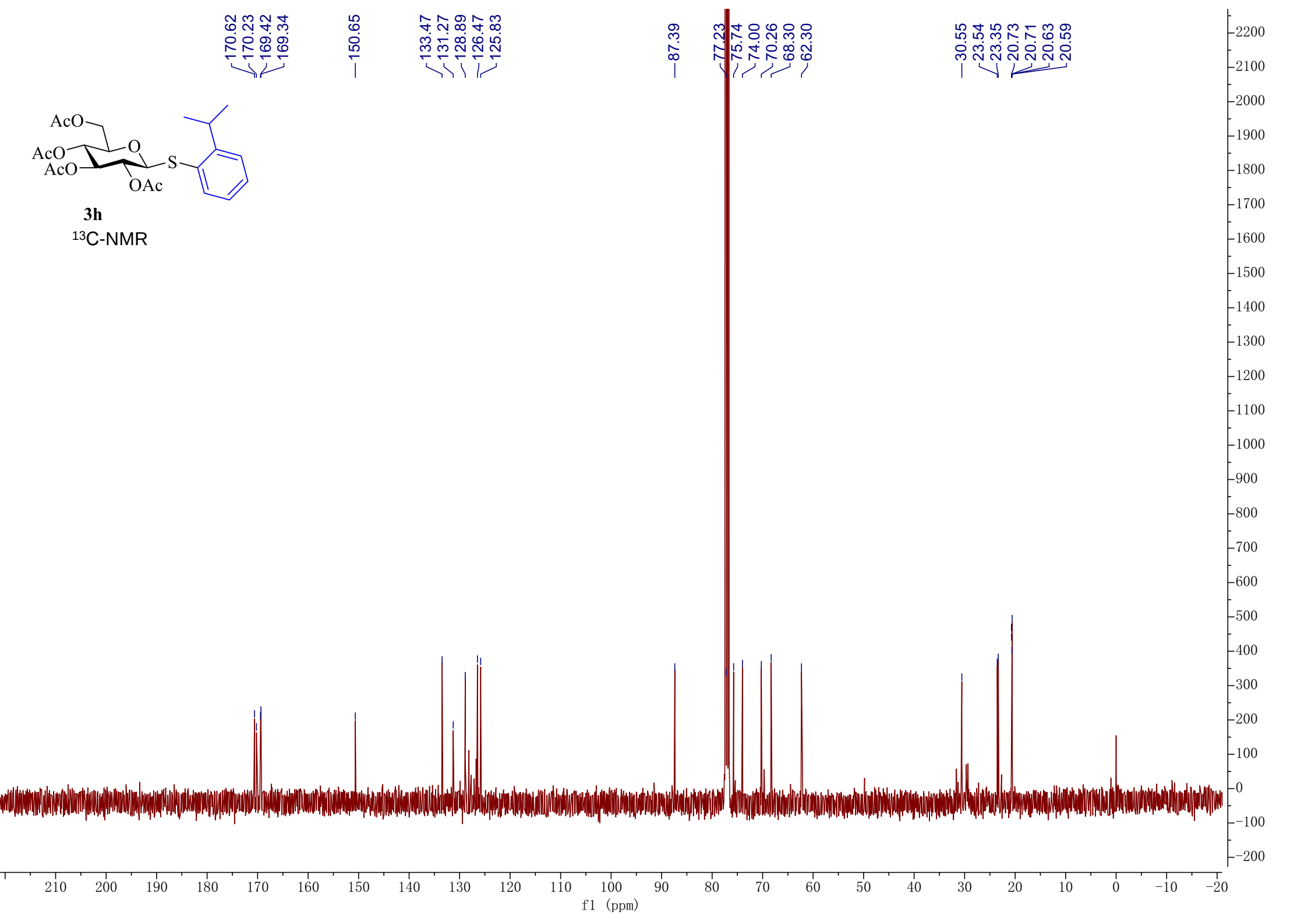
^{1}H-NMR

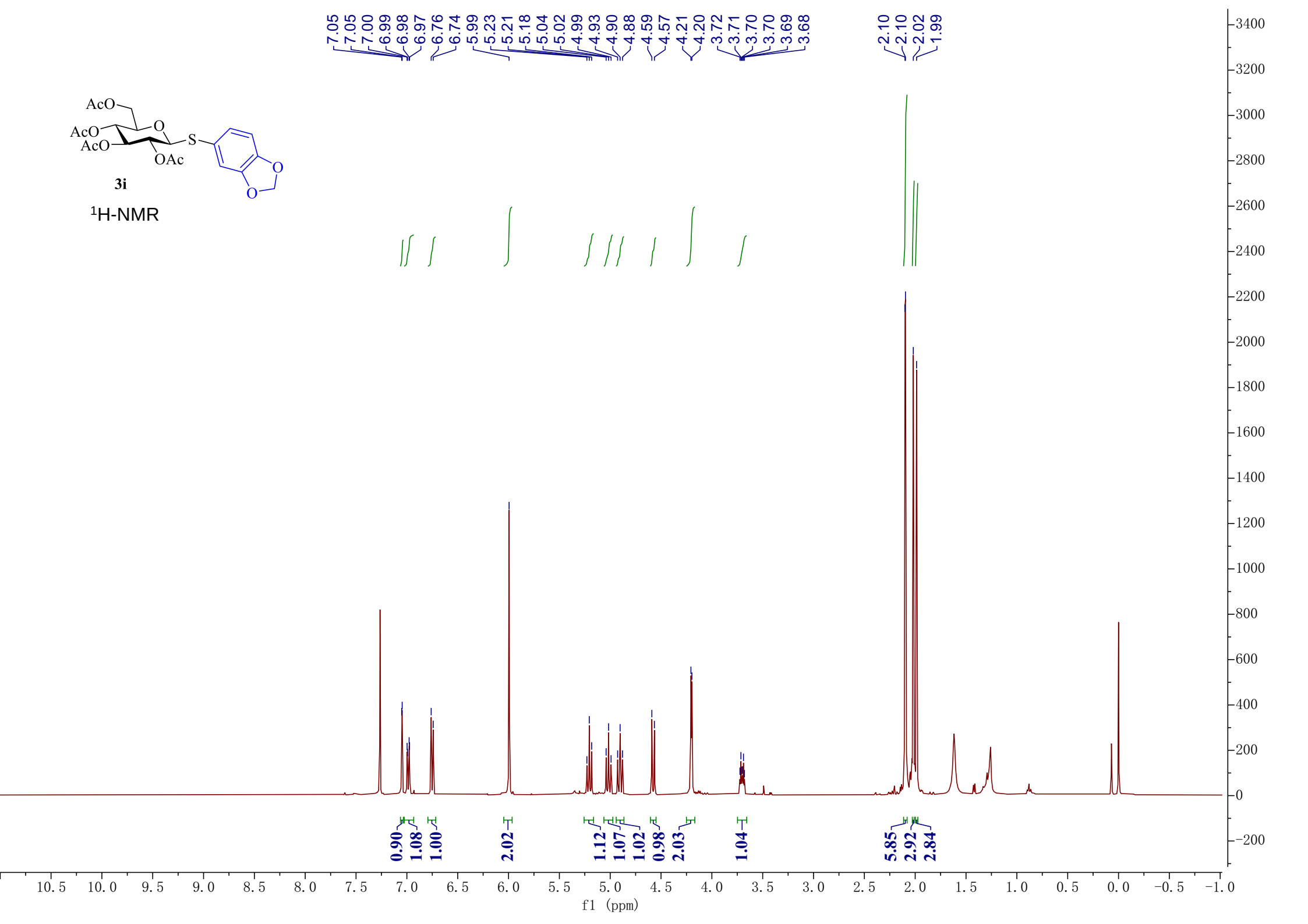
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5.27 5.24 5.22 5.09 5.06 5.04 5.01 4.99 4.75 4.72 4.27 4.26 4.24 4.22 4.22 4.21 4.19 4.18 3.77 3.77 3.76 3.76 3.75 3.74 3.74 3.73 2.11 2.09 2.02 2.00
6.10 2.14 1.23 1.10 2.12 1.00 2.15 1.05 2.91 2.95 3.01 3.15
f1 (ppm)

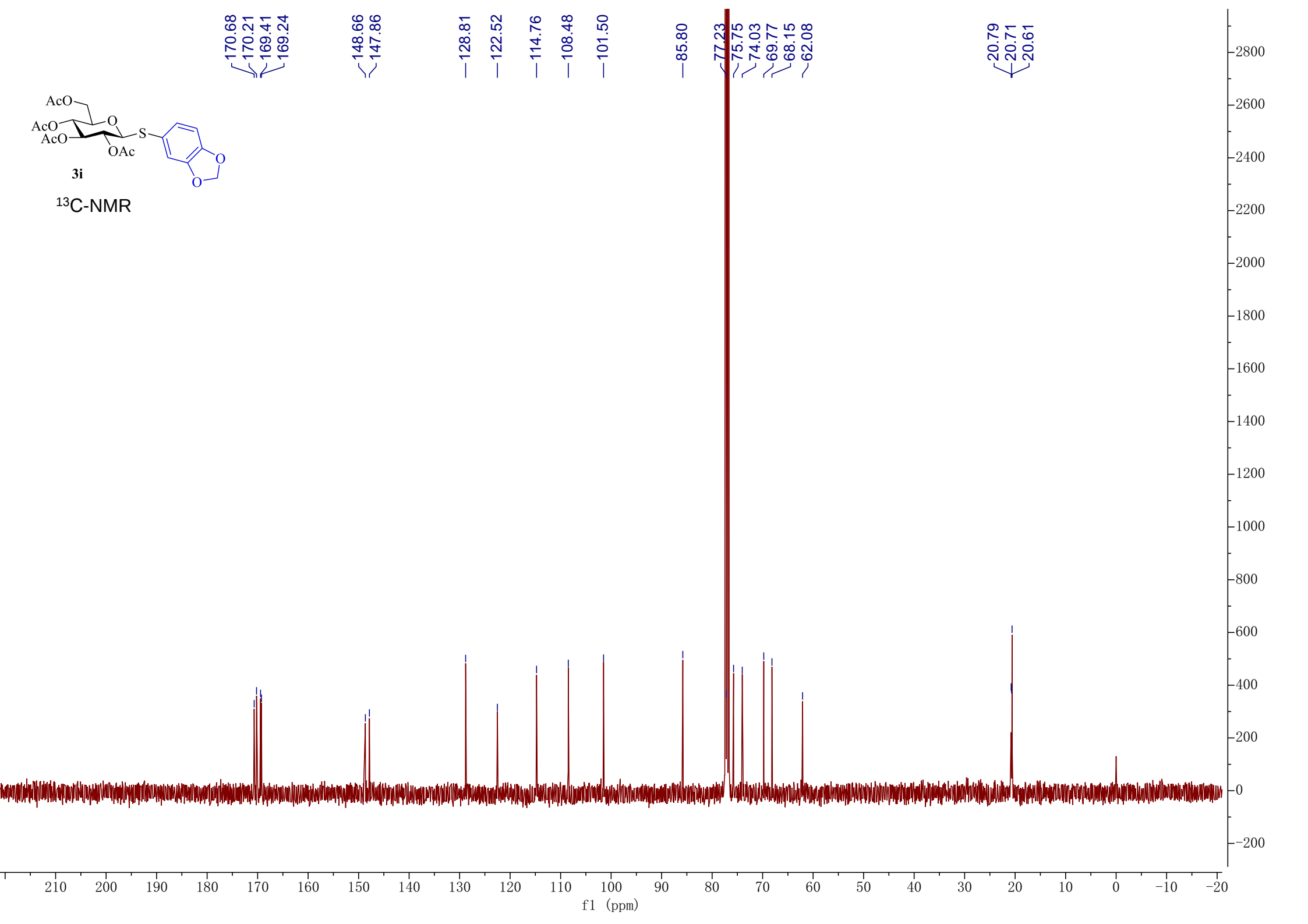

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169.31
141.46
140.16
133.62
130.44
128.90
127.72
127.62
127.07
85.76
77.35
77.03
76.71
75.85
73.98
70.00
68.22
62.15
26.92
20.79
20.62
20.60
AcO
AcO
AcO
OAc
O
S
Ph
3g
13C-NMR
f1 (ppm)

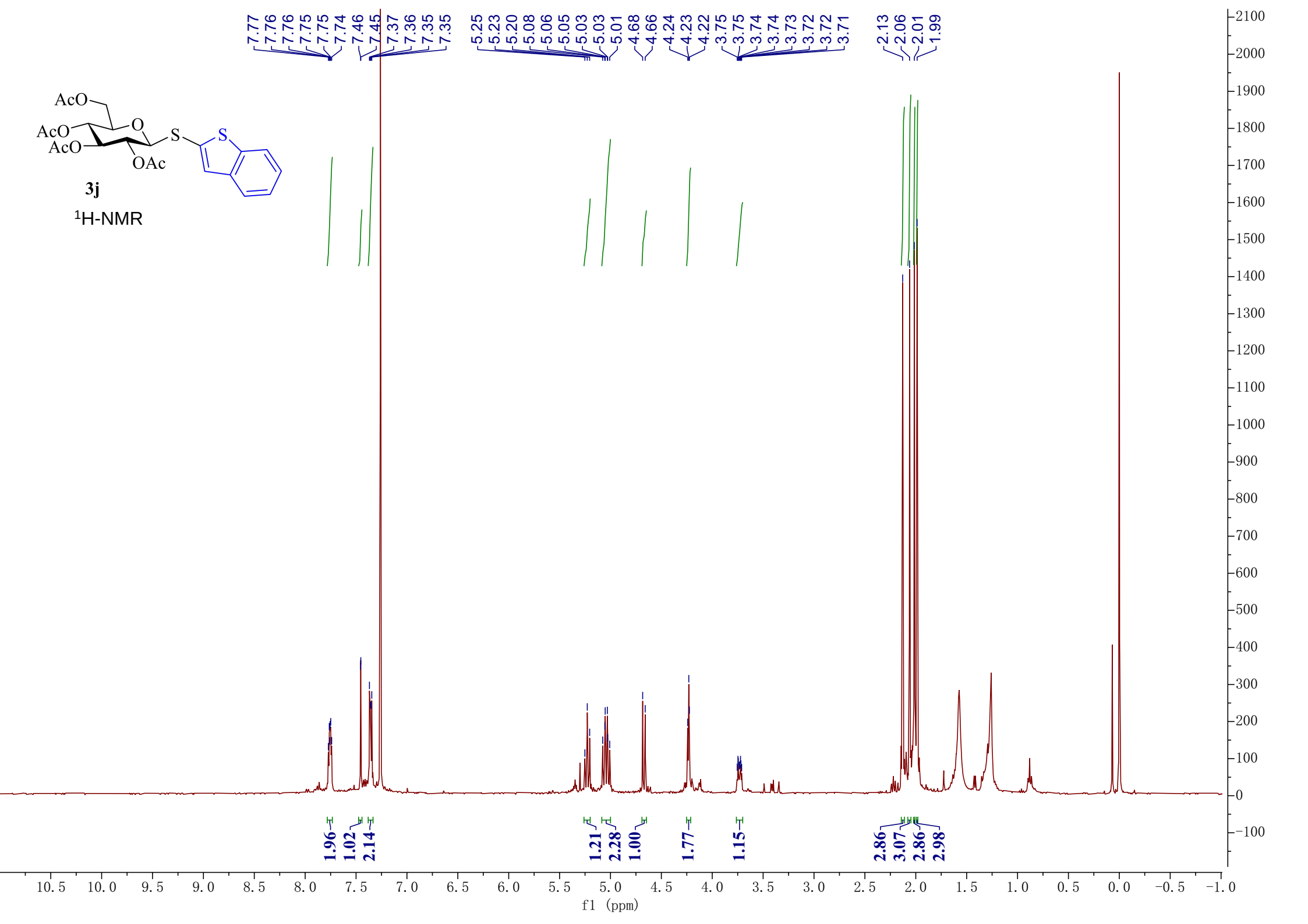

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7.263
7.172
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7.151
7.146
7.139
7.131
5.247
5.224
5.200
5.109
5.102
5.084
5.077
5.060
5.053
4.665
4.639
4.248
4.234
4.217
4.203
4.150
4.145
4.119
4.114
3.709
3.704
3.696
3.690
3.685
3.679
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3.571
3.554
3.537
3.520
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2.076
2.020
2.009
1.214
1.197
0.000
AcO
AcO
AcO
O
S
OAc
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
ppm
1.00
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2.09
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1.07
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6.37

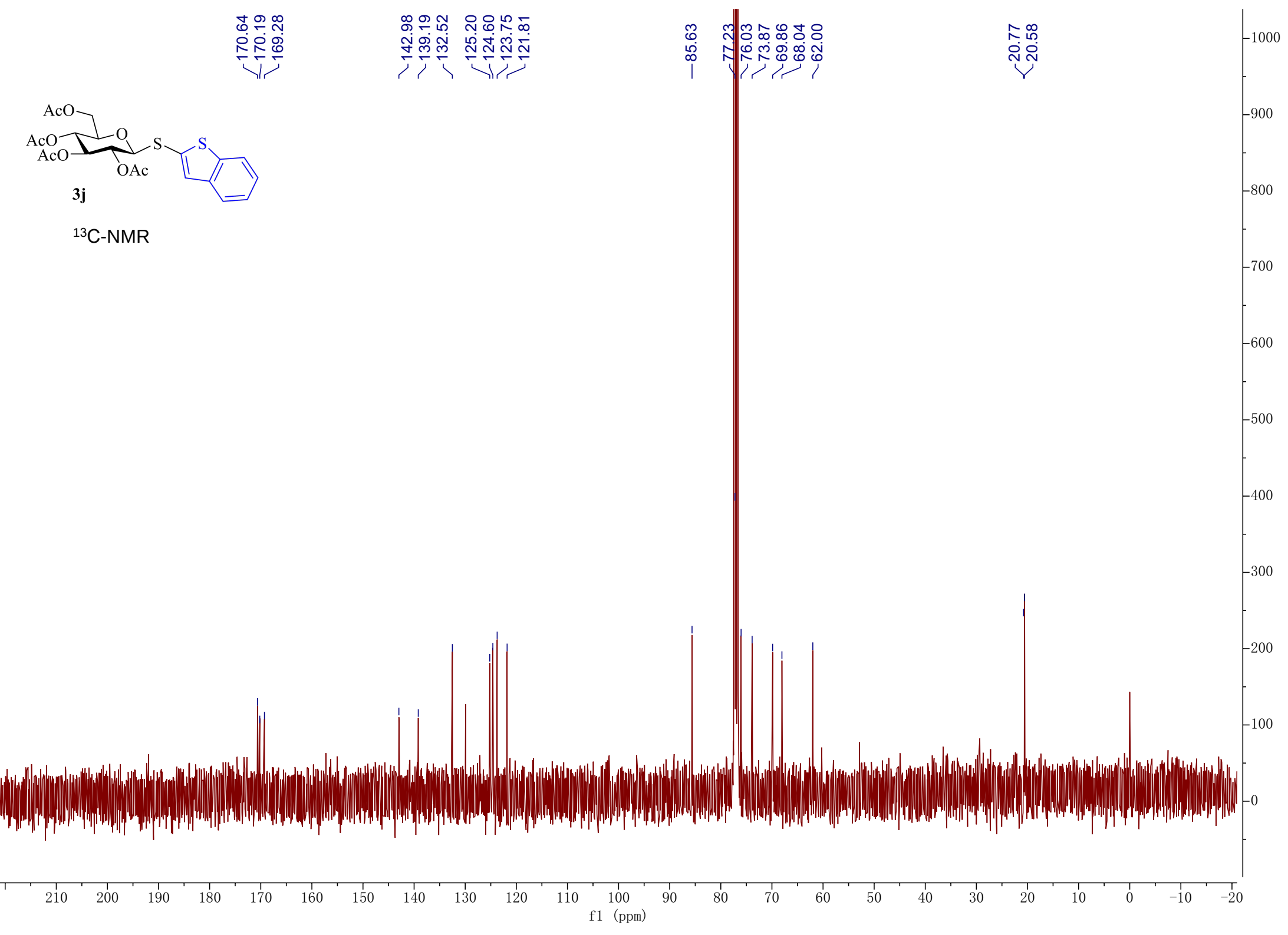
3h ^{1}H-NMR

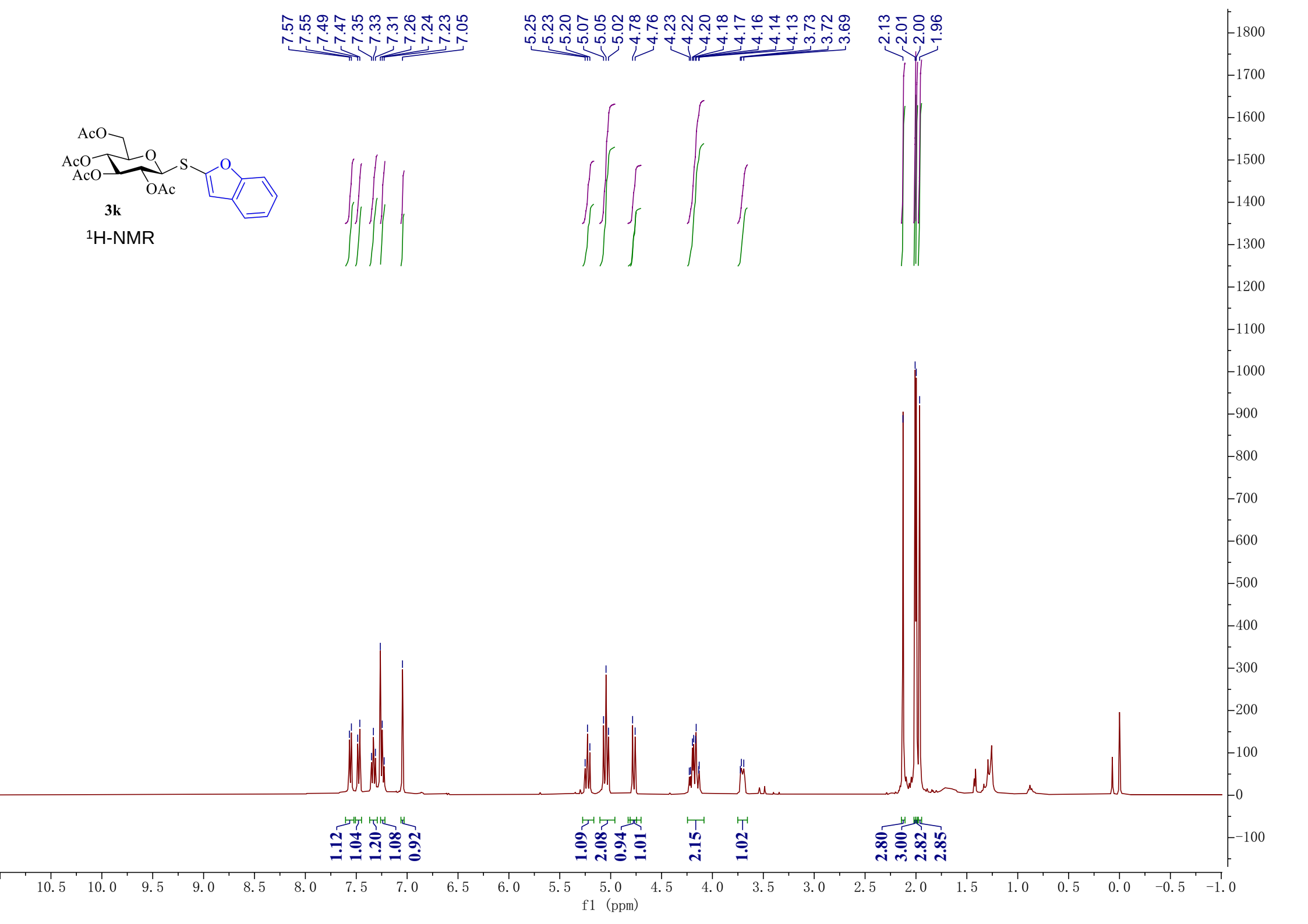

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150.65
133.47
131.27
128.89
126.47
125.83
87.39
77.23
75.74
74.00
70.26
68.30
62.30
30.55
23.54
23.35
20.73
20.71
20.63
20.59
AcO
AcO
AcO
OAc
O
S
3h
13C-NMR
f1 (ppm)

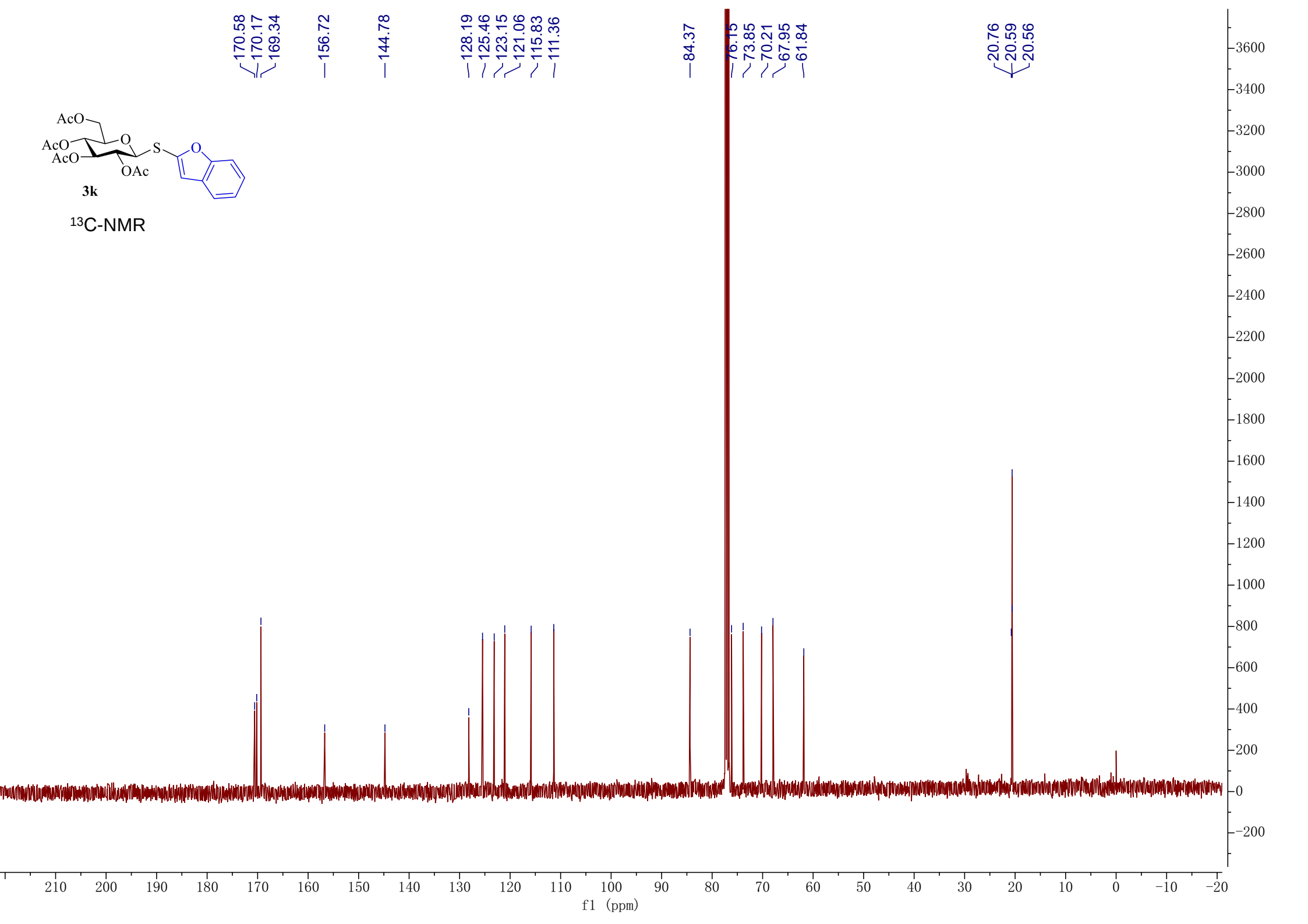

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7.05
7.00
6.99
6.98
6.97
6.76
6.74
5.99
5.23
5.21
5.18
5.04
5.02
4.99
4.93
4.90
4.88
4.59
4.57
4.21
4.20
3.72
3.71
3.70
3.70
3.69
3.68
2.10
2.10
2.02
1.99
AcO
AcO
AcO
OAc
O
S
O
O
3i
1H-NMR
0.90
1.08
1.00
2.02
1.12
1.07
1.02
0.98
2.03
1.04
5.85
2.92
2.84
f1 (ppm)

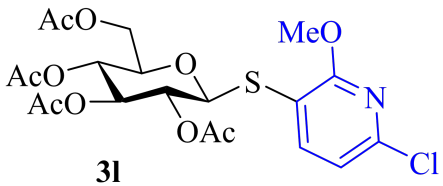

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169.24
148.66
147.86
128.81
122.52
114.76
108.48
101.50
85.80
77.23
75.75
74.03
69.77
68.15
62.08
20.79
20.71
20.61
AcO
AcO
AcO
OAc
O
S
O
O
3i
13C-NMR
f1 (ppm)


AcO
AcO
AcO
OAc
O
S
S
3j
1H-NMR
7.77 7.76 7.76 7.75 7.75 7.74 7.46 7.45 7.37 7.36 7.35 7.35
5.25 5.23 5.20 5.08 5.06 5.05 5.03 5.03 5.01
4.68 4.66 4.24 4.23 4.22
3.75 3.75 3.74 3.74 3.73 3.72 3.72 3.71
2.13 2.06 2.01 1.99
1.96 1.02 2.14 1.21 2.28 1.00 1.77 1.15 2.86 3.07 2.86 2.98
f1 (ppm)


170.64
170.19
169.28
142.98
139.19
132.52
125.20
124.60
123.75
121.81
85.63
77.23
76.03
73.87
69.86
68.04
62.00
20.77
20.58
AcO
AcO
AcO
O
OAc
S
S
3j
13C-NMR
1000
900
800
700
600
500
400
300
200
100
0
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
−10
−20
f1 (ppm)


7.57
7.55
7.49
7.47
7.35
7.33
7.31
7.26
7.24
7.23
7.05
5.25
5.23
5.20
5.07
5.05
5.02
4.78
4.76
4.23
4.22
4.20
4.18
4.17
4.16
4.14
4.13
3.73
3.72
3.69
2.13
2.01
2.00
1.96
AcO
AcO
AcO
OAc
O
S
O
3k
1H-NMR
1.12
1.04
1.20
1.08
0.92
1.09
2.08
0.94
1.01
2.15
1.02
2.80
3.00
2.82
2.85
f1 (ppm)

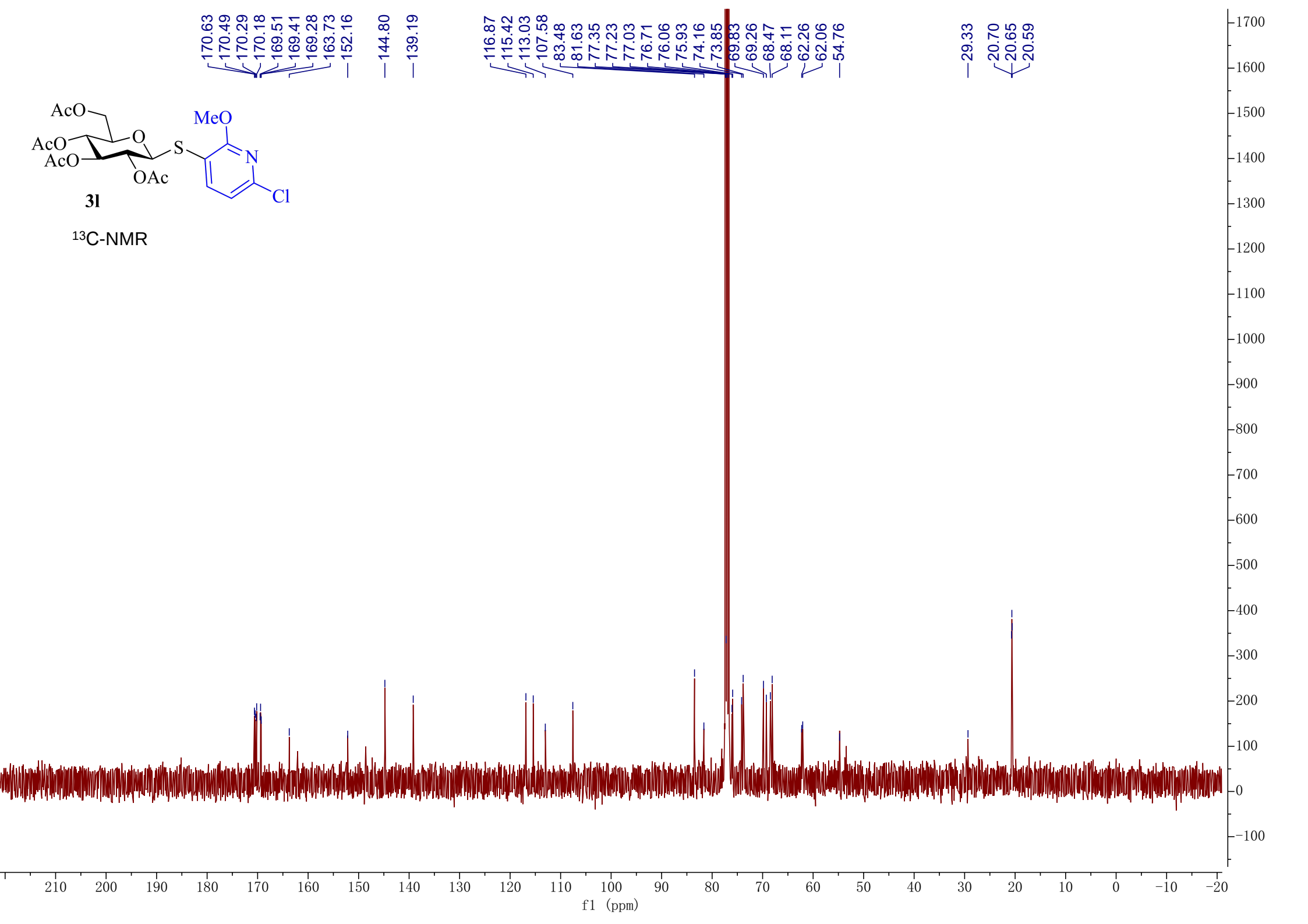

170.58
170.17
169.34
156.72
144.78
128.19
125.46
123.15
121.06
115.83
111.36
84.37
76.15
73.85
70.21
67.95
61.84
20.76
20.59
20.56
AcO
AcO
AcO
OAc
O
S
O
3k
13C-NMR
f1 (ppm)

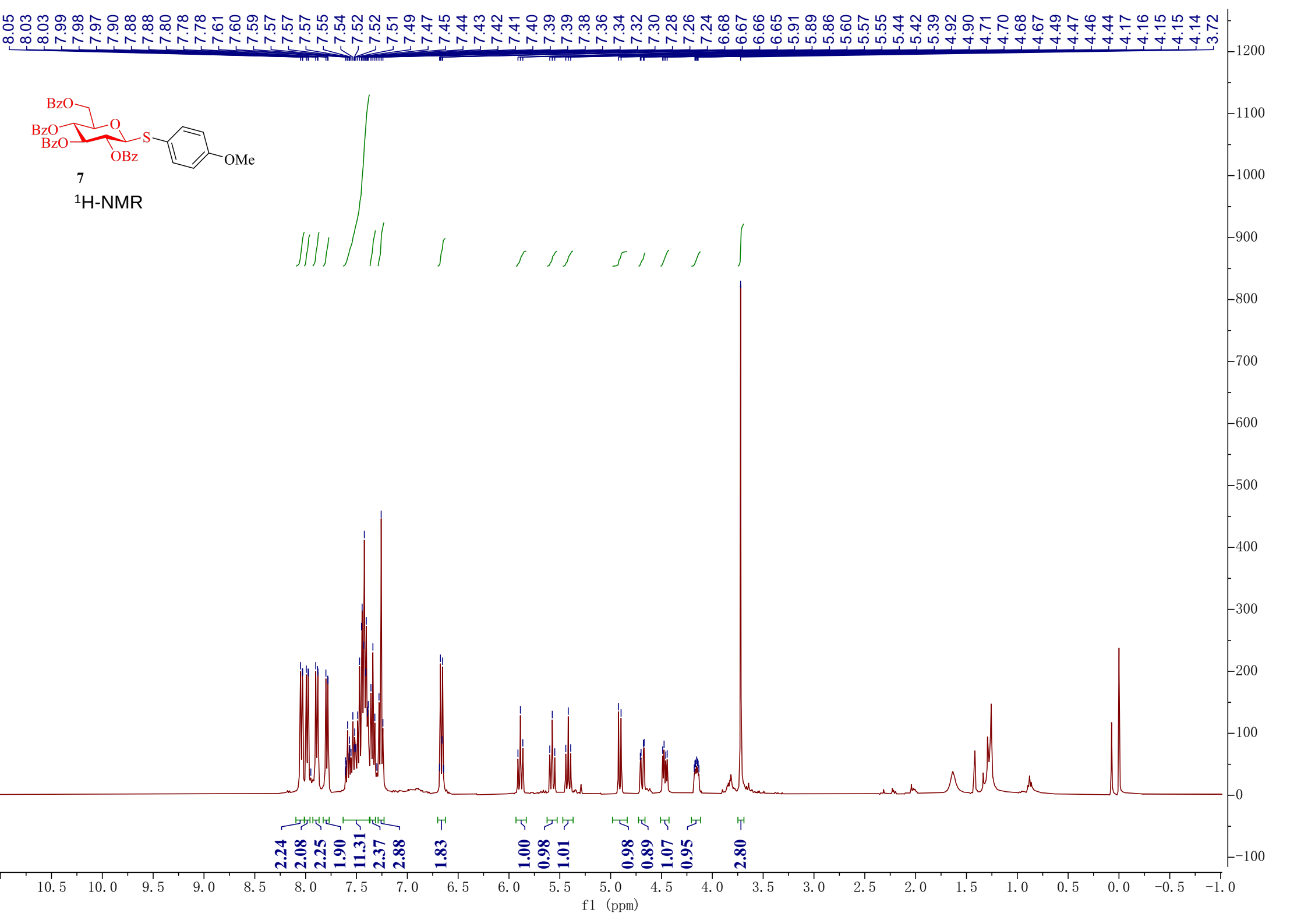

AcO
AcO
AcO
OAc
O
S
MeO
N
Cl

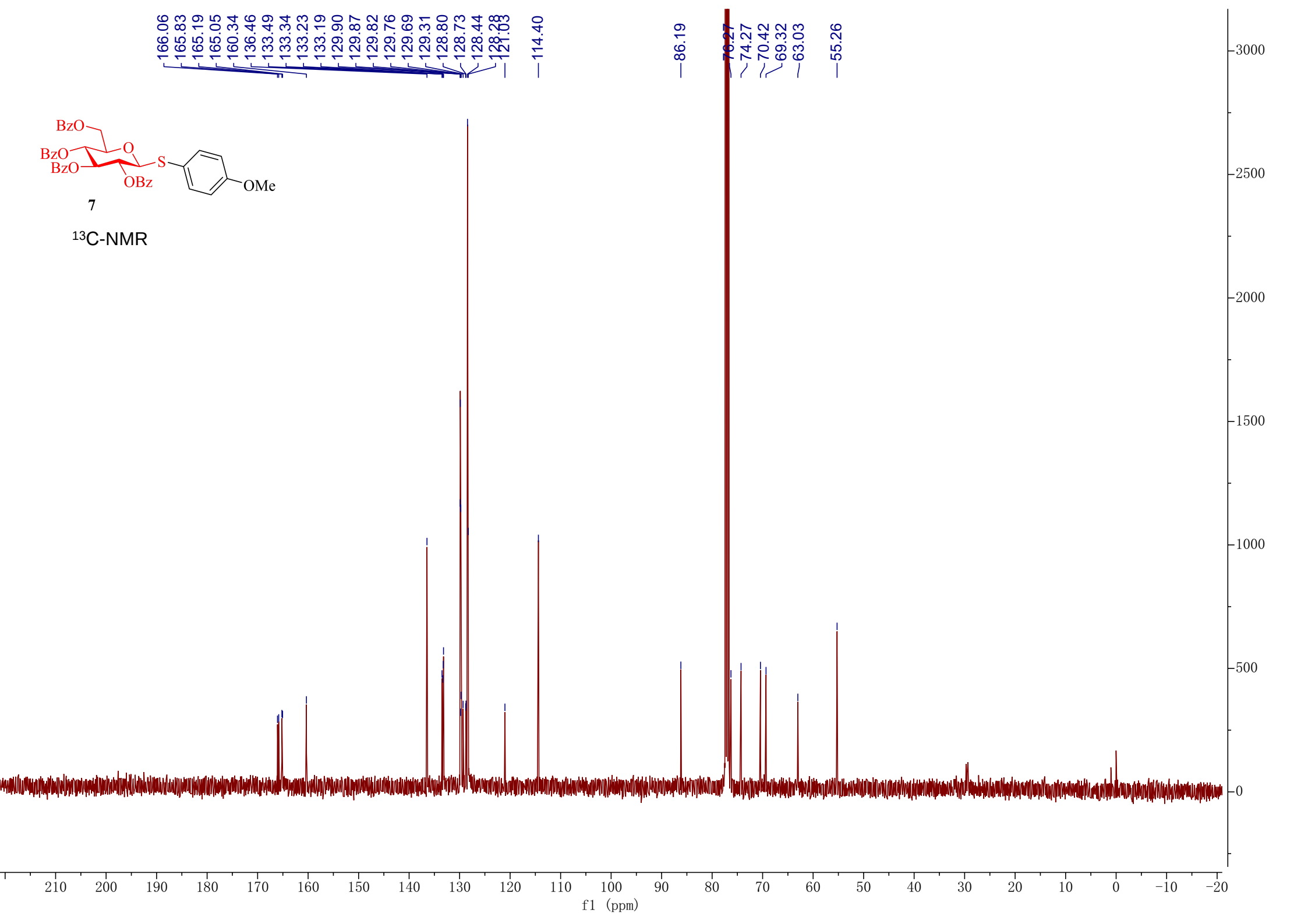
3l

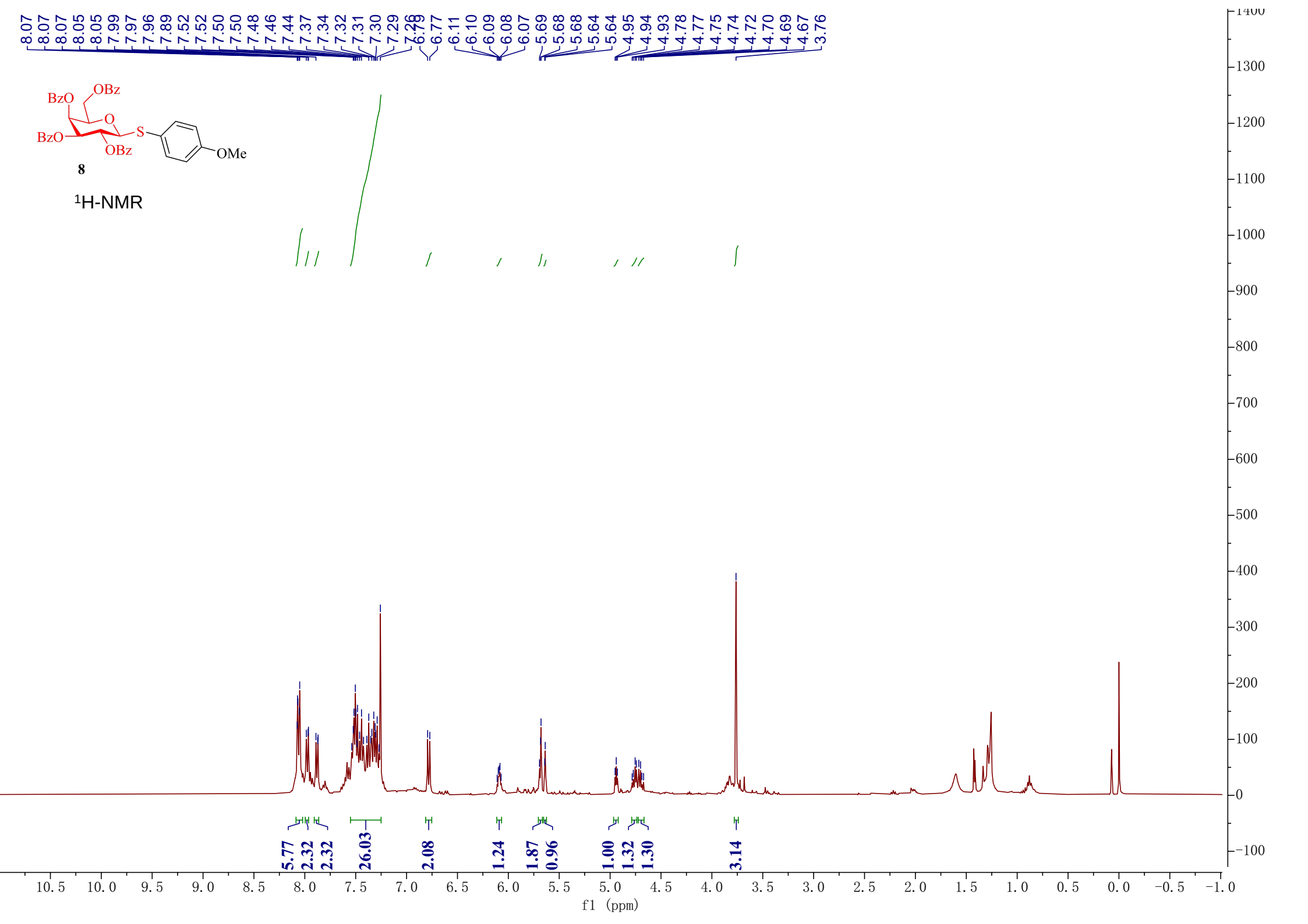
^{1}H-NMR

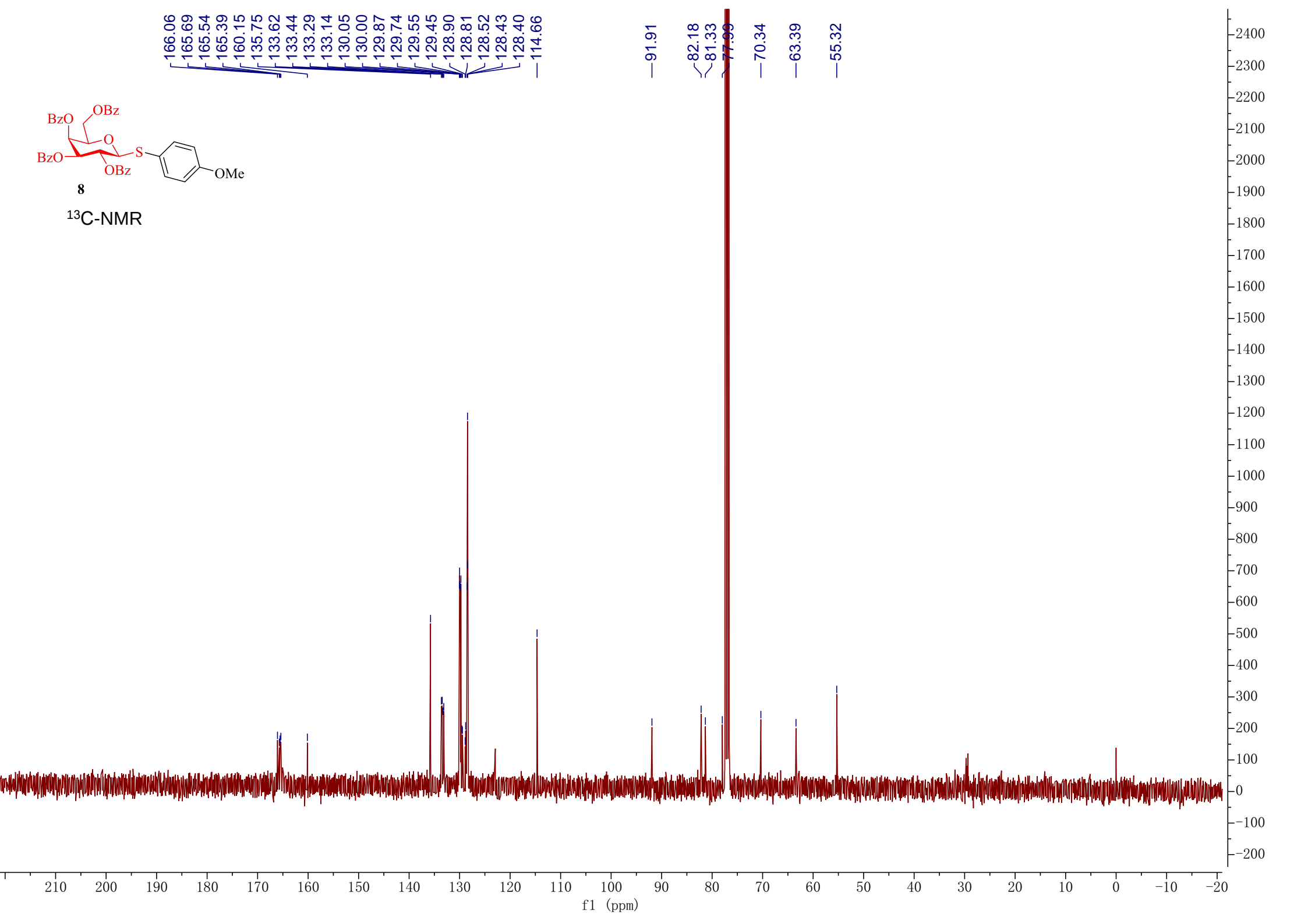
7.72 7.70 7.45 7.43 7.41 6.90 6.88 6.81 6.79 6.53 6.51 5.78 5.76 5.37 5.35 5.33 5.26 5.25 5.24 5.23 5.21 5.21 5.16 5.14 5.11 5.06 5.04 5.01 4.99 4.96 4.94 4.77 4.74 3.98 3.96 3.85 3.82 3.72 3.71 3.71 3.70 3.69 3.69 2.08 2.06 2.04 2.04 2.03 2.02 2.01 2.00
0.98 0.84 1.19 0.97 0.96 1.00 1.53 2.35 1.34 1.26 1.08 1.02 2.34 2.28 2.96 2.86 1.14 1.25 2.83 2.80 2.91 2.80 3.03 3.17 3.26 3.33
f1 (ppm)

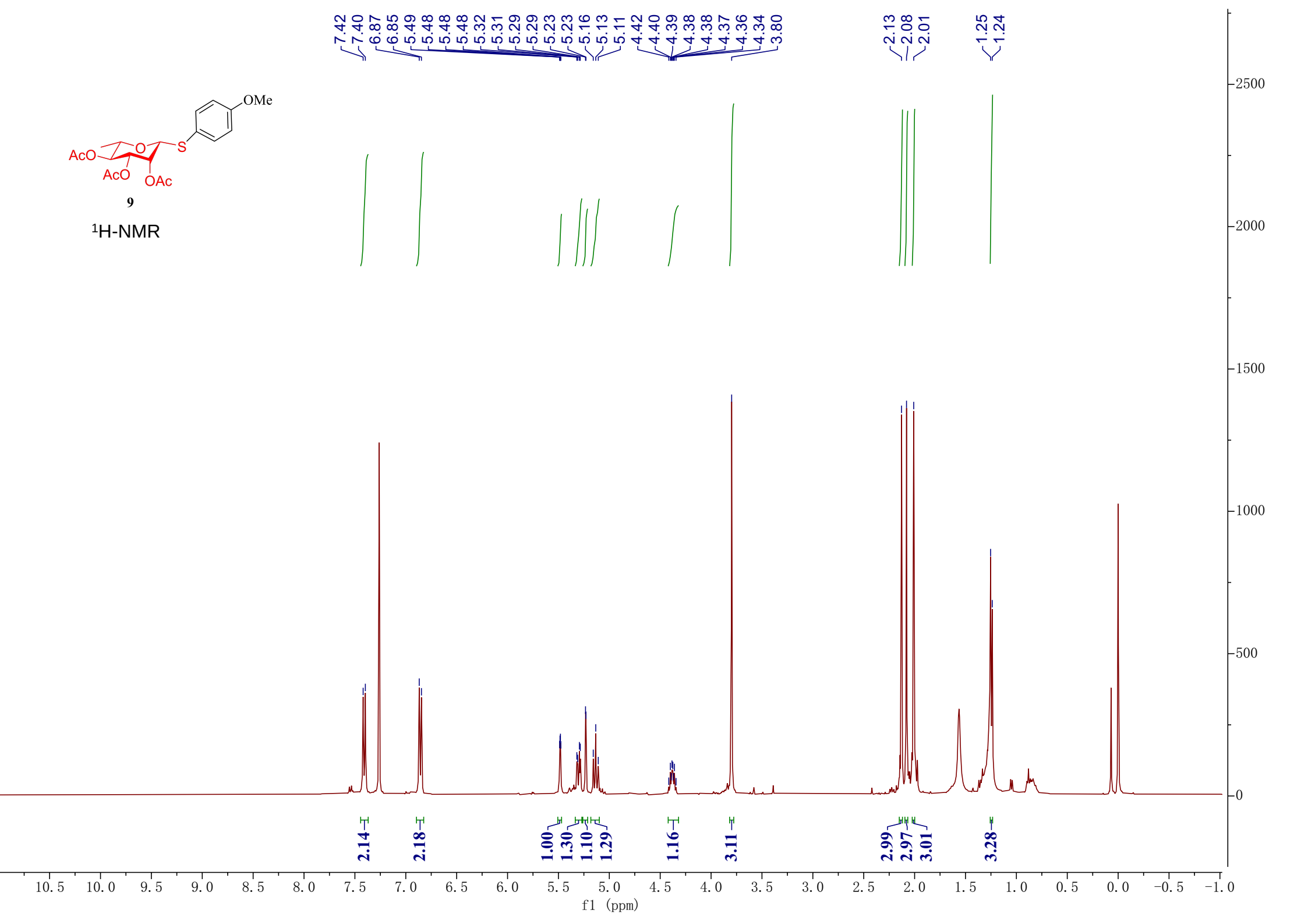

170.63
170.49
170.29
170.18
169.51
169.41
169.28
163.73
152.16
144.80
139.19
116.87
115.42
113.03
107.58
83.48
81.63
77.35
77.23
77.03
76.71
76.06
75.93
74.16
73.85
69.83
69.26
68.47
68.11
62.26
62.06
54.76
29.33
20.70
20.65
20.59
AcO
AcO
AcO
OAc
O
S
MeO
N
Cl
3l
13C-NMR
f1 (ppm)

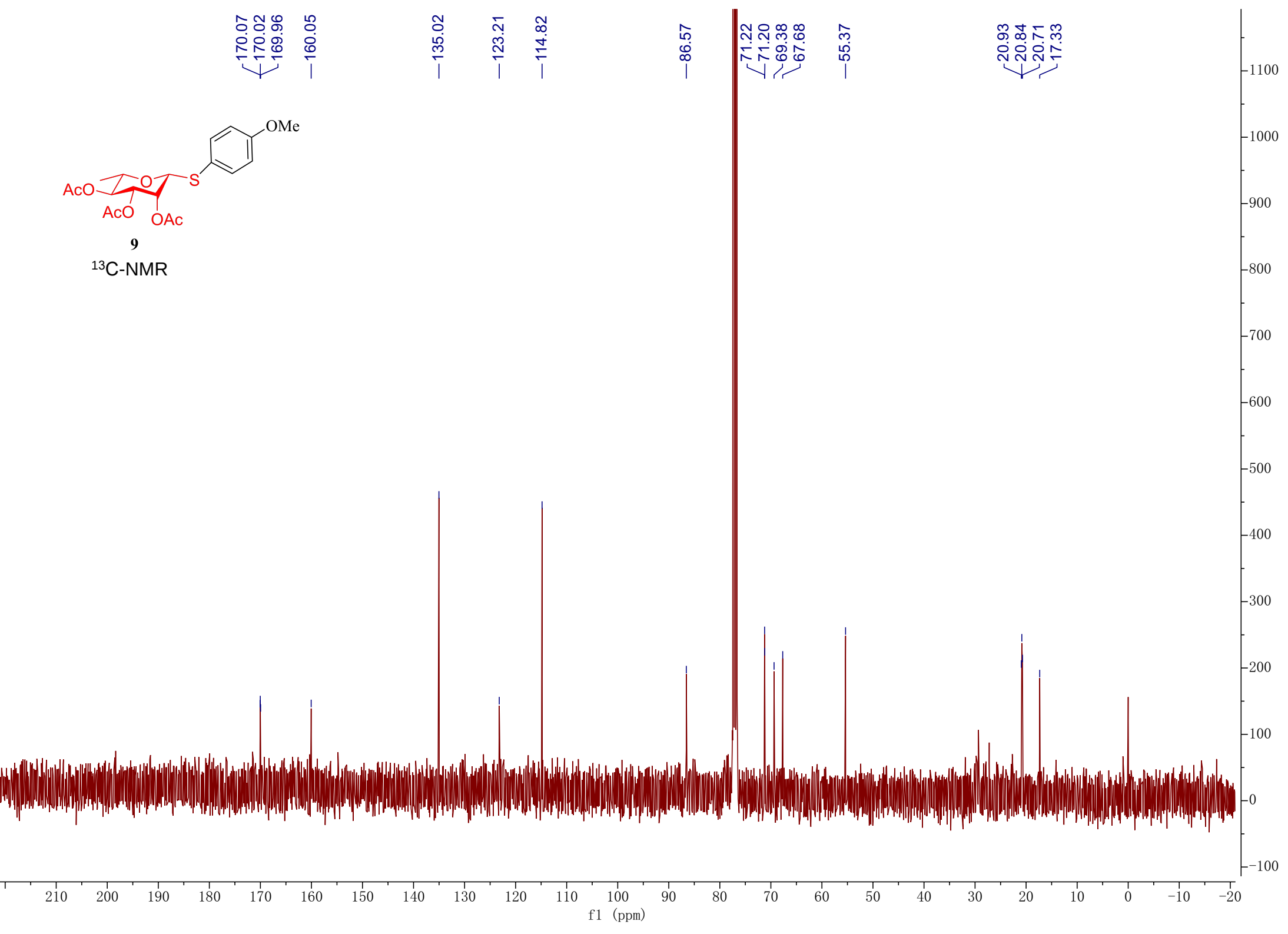

BzO
BzO
BzO
OBz
O
S
OMe
7
1H-NMR
f1 (ppm)


166.06
165.83
165.19
165.05
160.34
136.46
133.49
133.34
133.23
133.19
129.90
129.87
129.82
129.76
129.69
129.31
128.80
128.73
128.44
128.28
121.03
114.40
86.19
76.27
74.27
70.42
69.32
63.03
55.26
BzO
BzO
BzO
OBz
O
S
OMe
7
13C-NMR
3000
2500
2000
1500
1000
500
0
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
−10
−20
f1 (ppm)

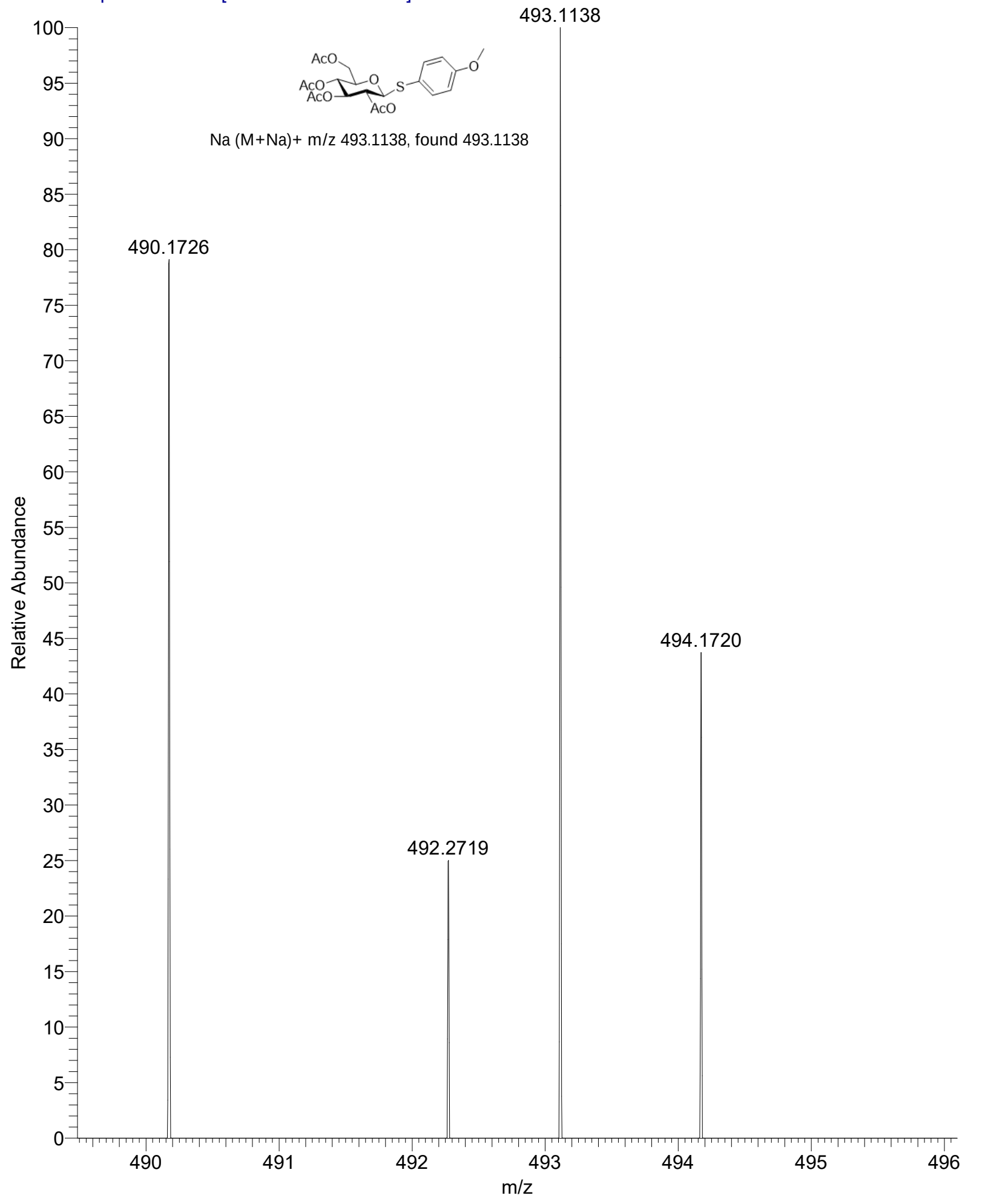

8.07 8.07 8.07 8.05 8.05 7.99 7.97 7.96 7.89 7.52 7.52 7.50 7.50 7.48 7.46 7.44 7.37 7.34 7.32 7.31 7.30 7.29 7.26 6.79 6.77 6.11 6.10 6.09 6.08 6.07 5.69 5.68 5.68 5.64 5.64 4.95 4.94 4.93 4.78 4.77 4.75 4.74 4.72 4.70 4.69 4.67 3.76
BzO
OBz
O
BzO
S
OBz
OMe
8
1H-NMR
5.77
2.32
2.32
26.03
2.08
1.24
1.87
0.96
1.00
1.32
1.30
3.14
f1 (ppm)


166.06
165.69
165.54
165.39
160.15
135.75
133.62
133.44
133.29
133.14
130.05
130.00
129.87
129.74
129.55
129.45
128.90
128.81
128.52
128.43
128.40
114.66
91.91
82.18
81.33
77.99
70.34
63.39
55.32
BzO
OBz
O
BzO
OBz
S
OMe
8
13C-NMR
f1 (ppm)

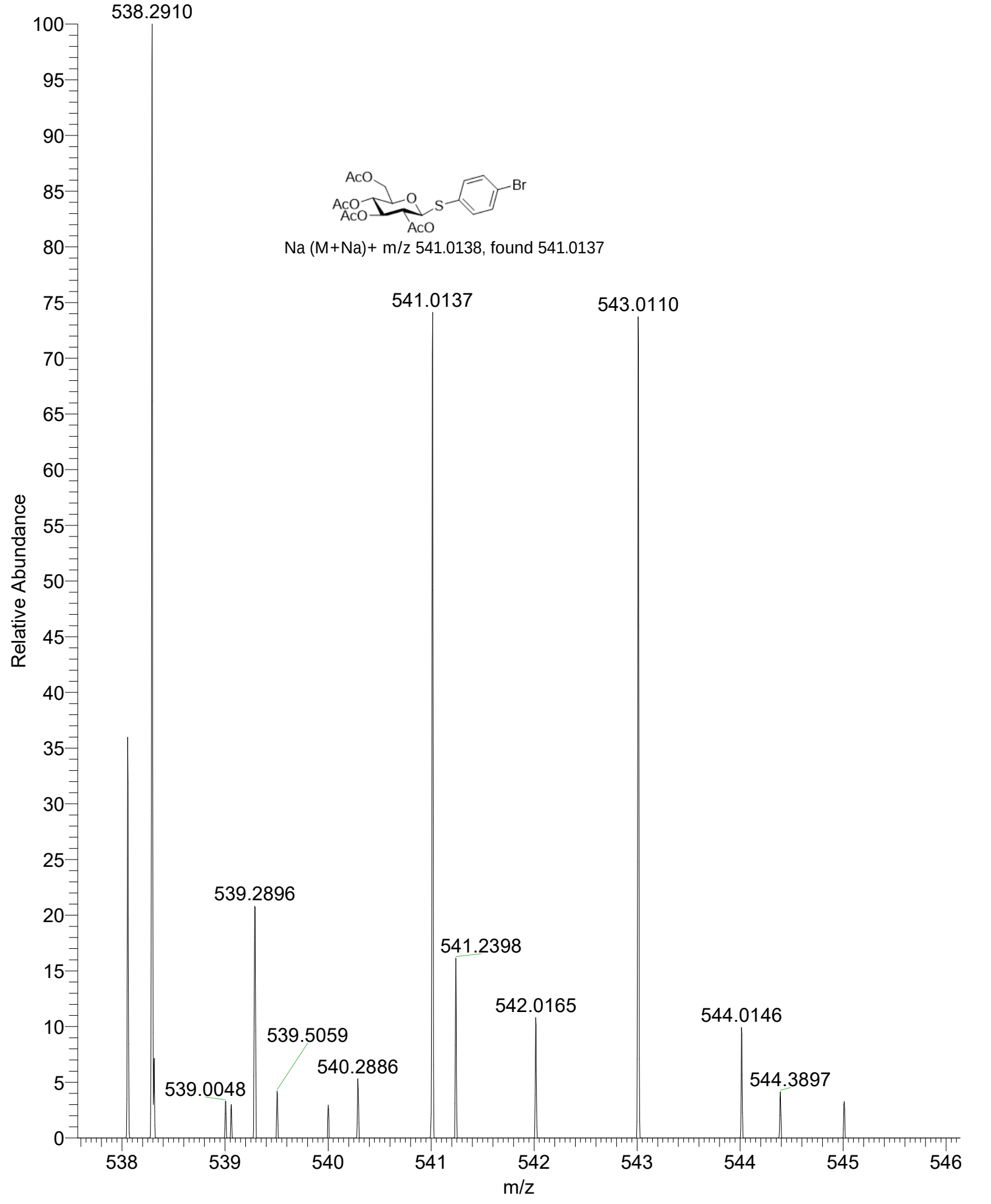

OMe
AcO
AcO
OAc
O
S
9
1H-NMR
7.42
7.40
6.87
6.85
5.49
5.48
5.48
5.48
5.32
5.31
5.29
5.29
5.23
5.23
5.16
5.13
5.11
4.42
4.40
4.39
4.38
4.38
4.37
4.36
4.34
3.80
2.13
2.08
2.01
1.25
1.24
2.14
2.18
1.00
1.30
1.10
1.29
1.16
3.11
2.99
2.97
3.01
3.28
2500
2000
1500
1000
500
0
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
f1 (ppm)


170.07
170.02
169.96
160.05
135.02
123.21
114.82
86.57
71.22
71.20
69.38
67.68
55.37
20.93
20.84
20.71
17.33
OMe
AcO
AcO
OAc
O
S
9
13C-NMR
f1 (ppm)

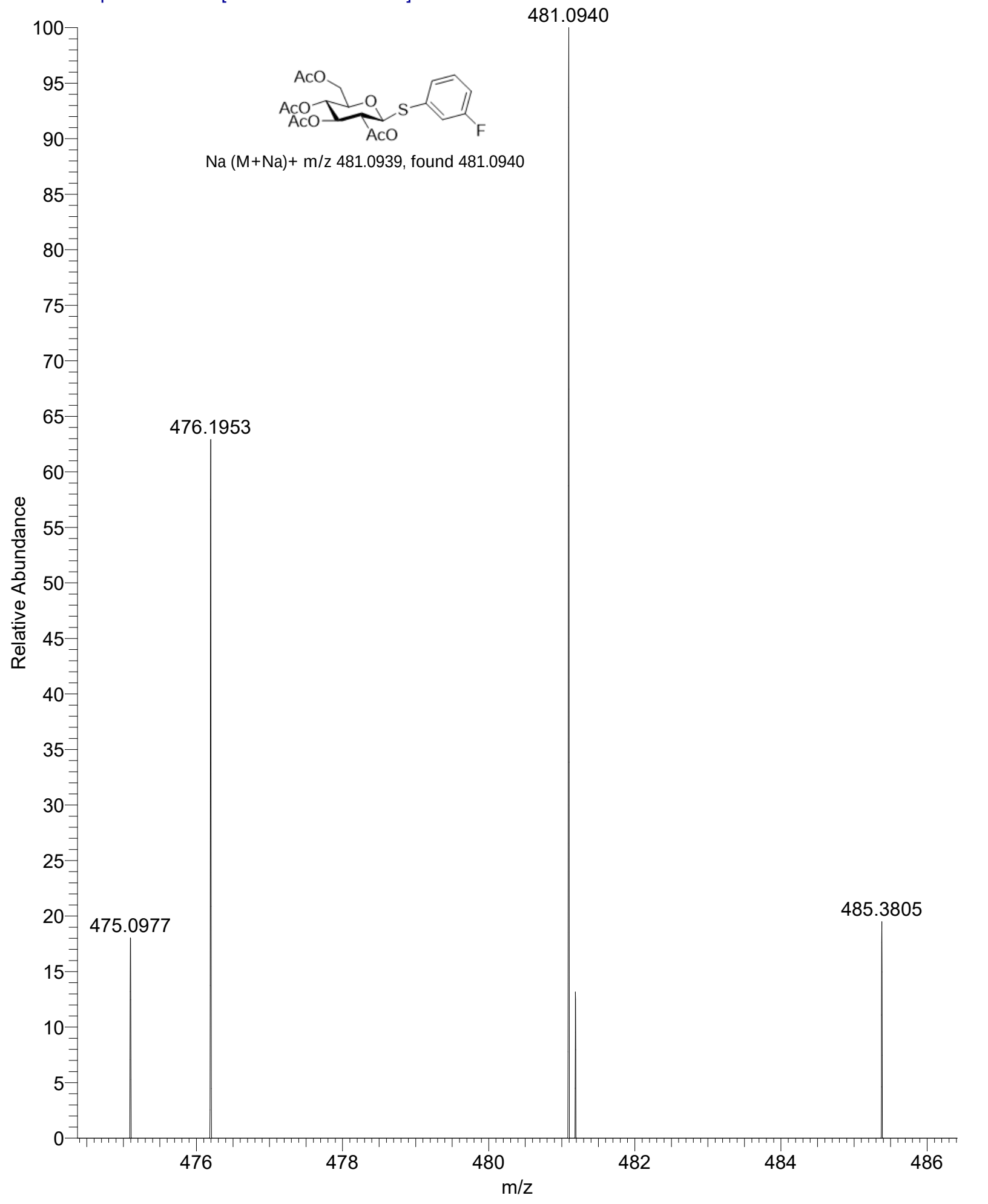
wamgzhen-1004 #14 RT: 0.06 AV: 1 NL: 2.04E5
T: FTMS + p ESI Full ms [150.0000-1500.0000]



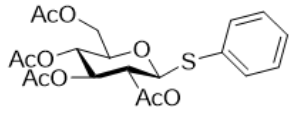
wamgzhen-1007 #34 RT: 0.15 AV: 1 NL: 1.36E6
T: FTMS + p ESI Full ms [150.0000-1500.0000]



wamgzhen-1010 #44 RT: 0.19 AV: 1 NL: 2.22E5
T: FTMS + p ESI Full ms [150.0000-1500.0000]



wamgzhen-1005 #15 RT: 0.07 AV: 1 NL: 2.49E5
T: FTMS + p ESI Full ms [150.0000-1500.0000]



Na (M+Na)+ m/z 463.1033, found 463.1033

457.0563
463.1033
464.9340
466.3191
467.0617
468.0802
469.3865

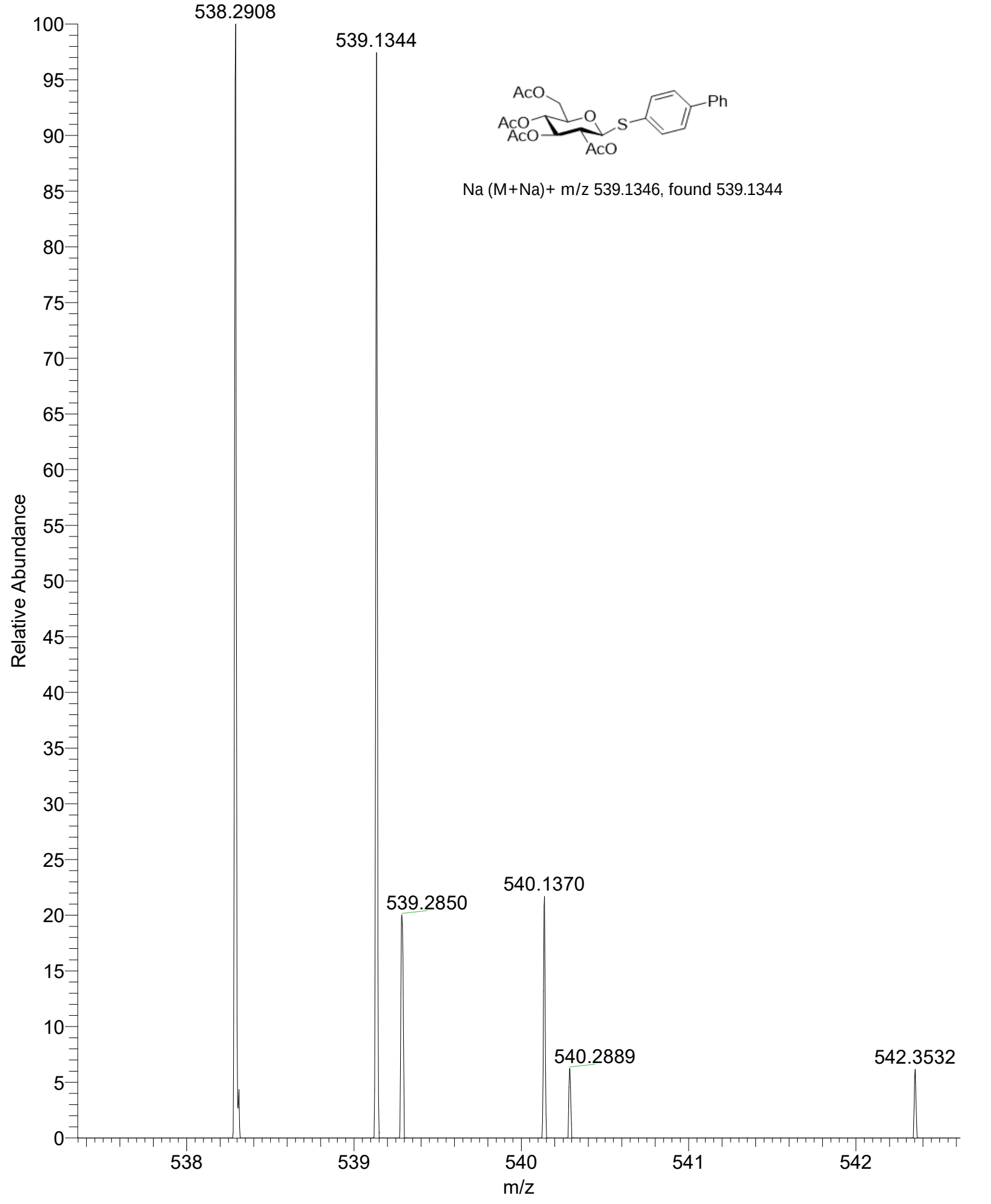
Relative Abundance

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8 5.0 5.2 5.4 5.6 5.8 6.0 6.2 6.4

458 460 462 464 466 468 470 472

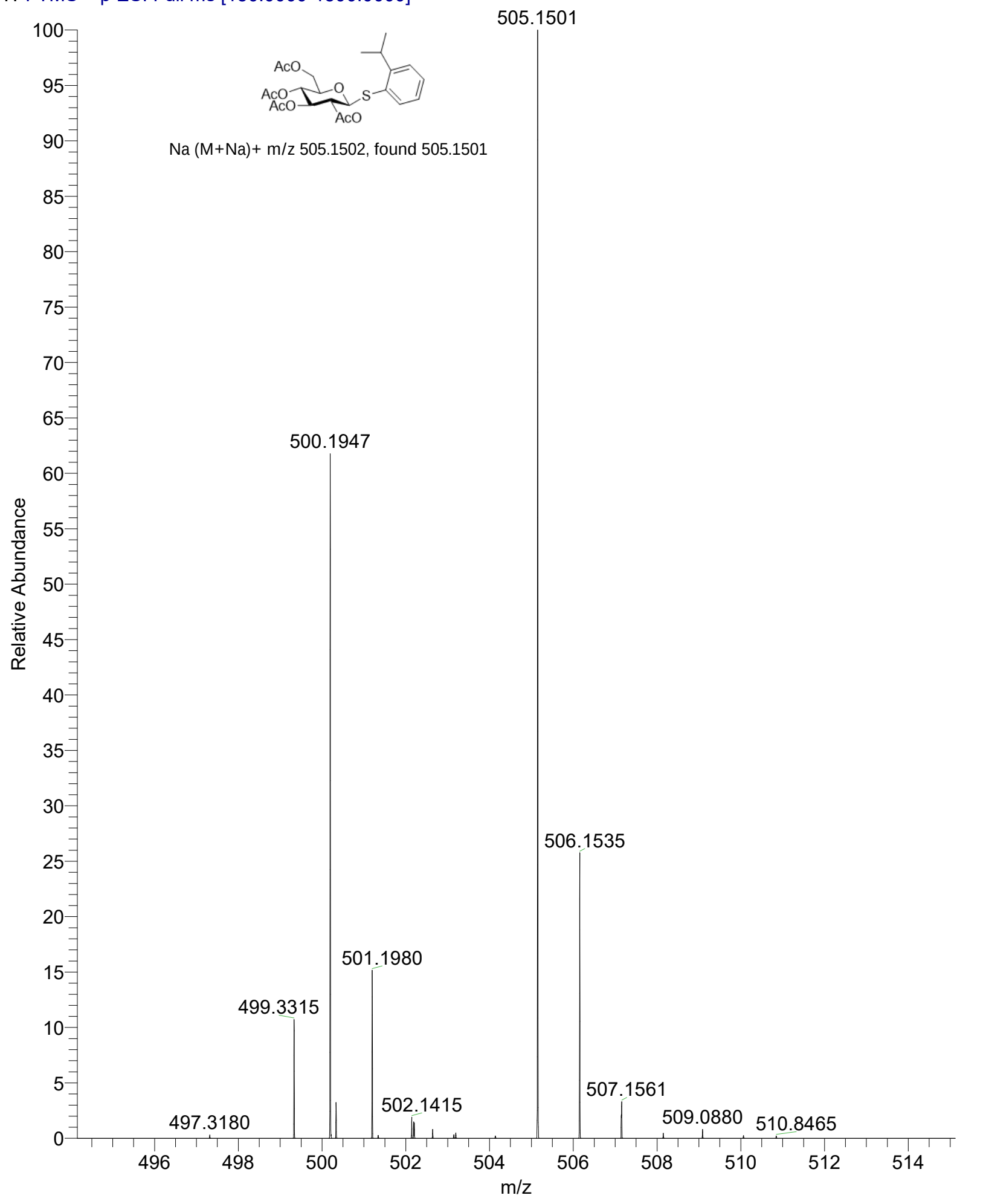
m/z

wamgzhen-1011 #20 RT: 0.09 AV: 1 NL: 6.31E5
T: FTMS + p ESI Full ms [150.0000-1500.0000]

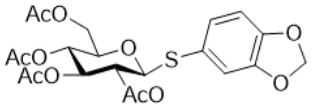


Na (M+Na)+ m/z 539.1346, found 539.1344

wamgzhen-1006 #40 RT: 0.18 AV: 1 NL: 6.82E6
T: FTMS + p ESI Full ms [150.0000-1500.0000]



wamgzhen-1009 #38 RT: 0.17 AV: 1 NL: 1.09E6
T: FTMS + p ESI Full ms [150.0000-1500.0000]

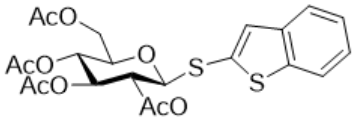


Na (M+Na)+ m/z 507.0931, found 507.0931

507.0931
499.3311
508.0963
502.1378
501.3387
503.1418
500.3343
504.3176
509.0977
511.0682
513.4117

Relative Abundance
m/z

wamgzhen-1008 #21 RT: 0.09 AV: 1 NL: 7.70E5
T: FTMS + p ESI Full ms [150.0000-1500.0000]

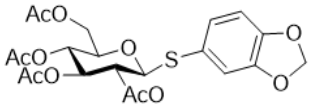


Na (M+Na)+ m/z 519.0753, found 519.0754

519.0754
519.2980
516.3583
520.3013
520.0779
517.3613
514.4159
518.2851

Relative Abundance
m/z
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
515
516
517
518
519
520
521

wamgzhen-1009 #38 RT: 0.17 AV: 1 NL: 1.09E6
T: FTMS + p ESI Full ms [150.0000-1500.0000]

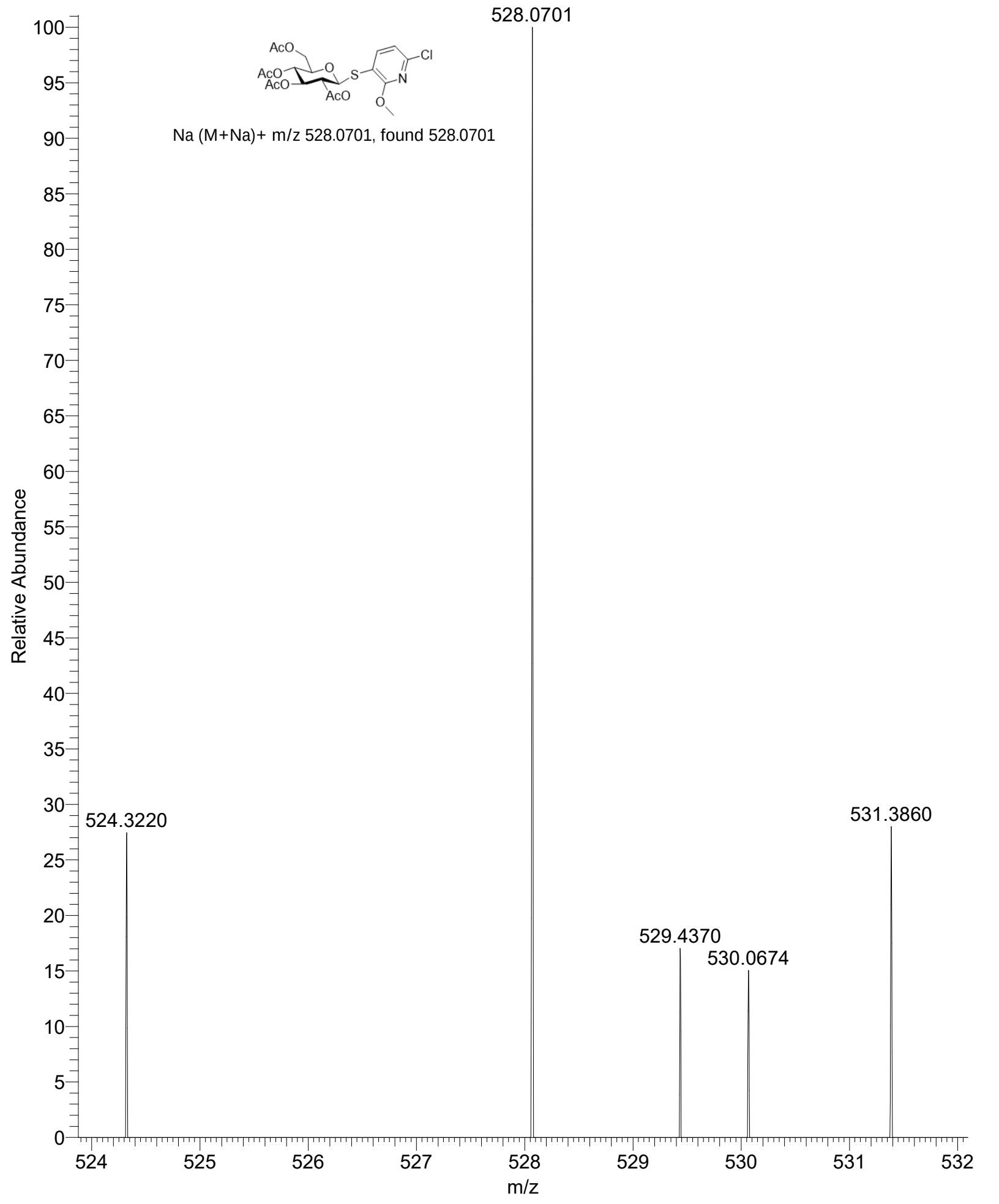


Na (M+Na)+ m/z 507.0931, found 507.0931

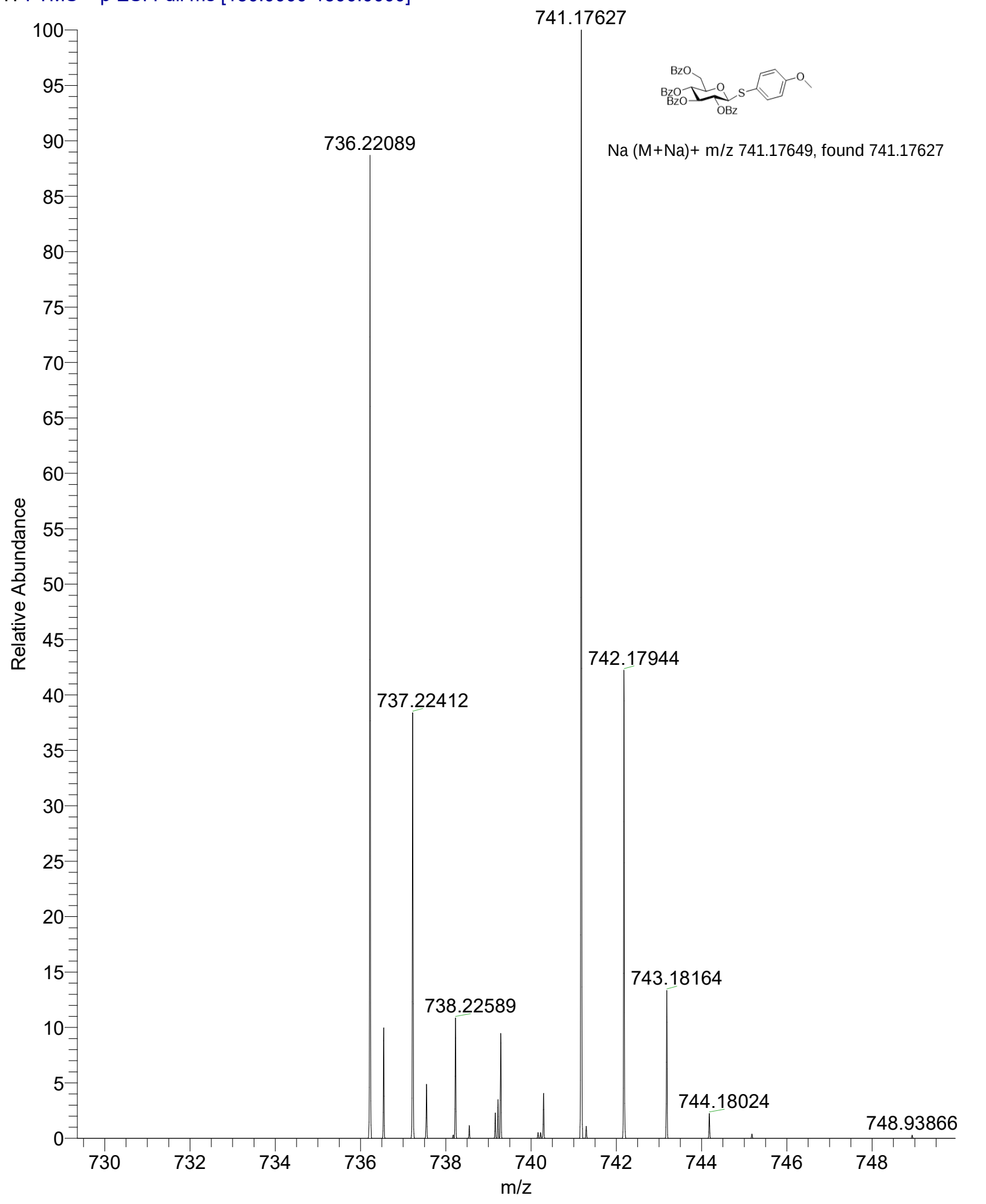
507.0931
499.3311
508.0963
502.1378
501.3387
503.1418
500.3343
504.3176
509.0977
511.0682
513.4117

Relative Abundance
m/z

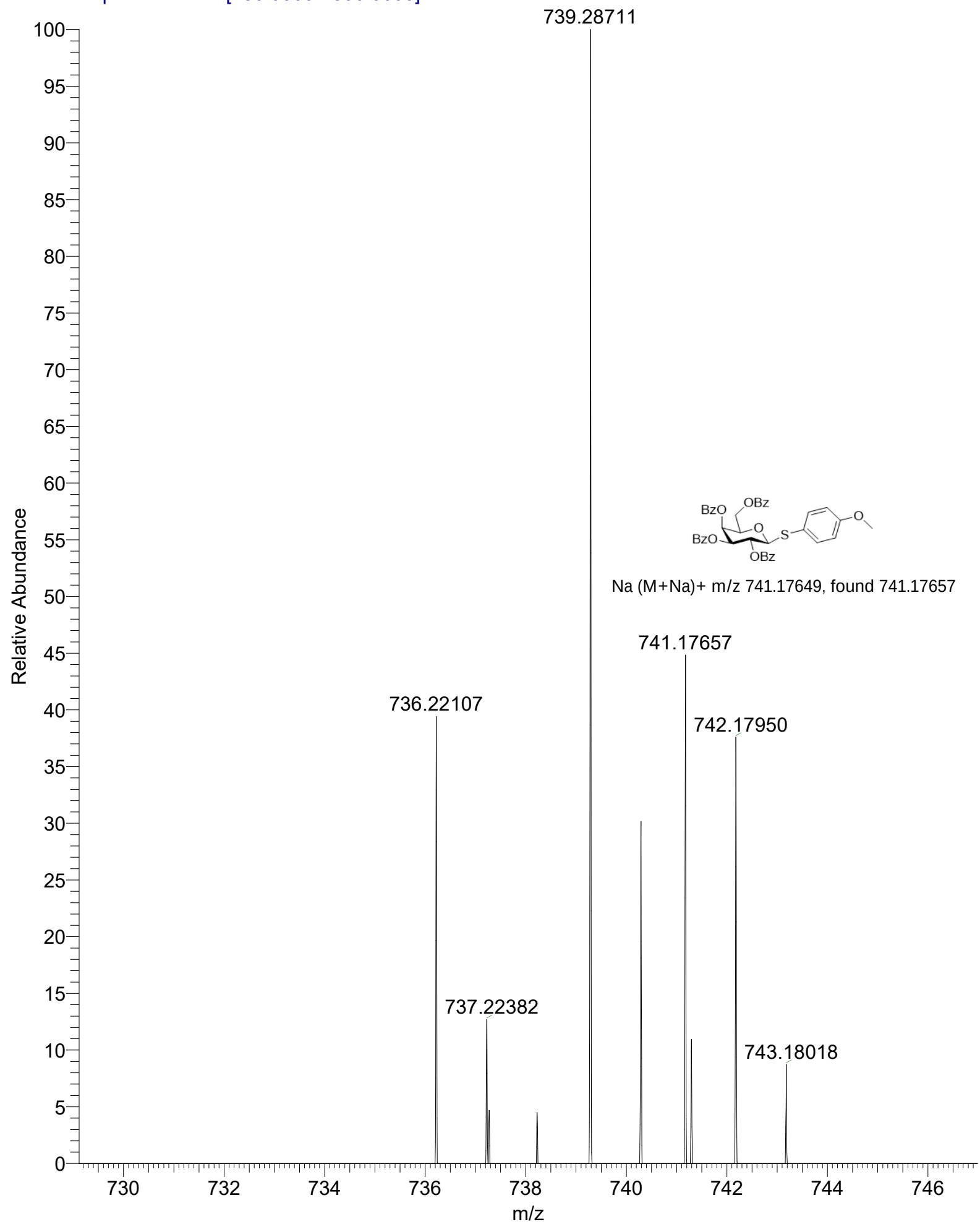
wamgzhen-1012 #36 RT: 0.16 AV: 1 NL: 1.41E5
T: FTMS + p ESI Full ms [150.0000-1500.0000]



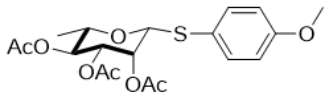
wamgzhen-1001 #25 RT: 0.11 AV: 1 NL: 1.13E7
T: FTMS + p ESI Full ms [150.0000-1500.0000]



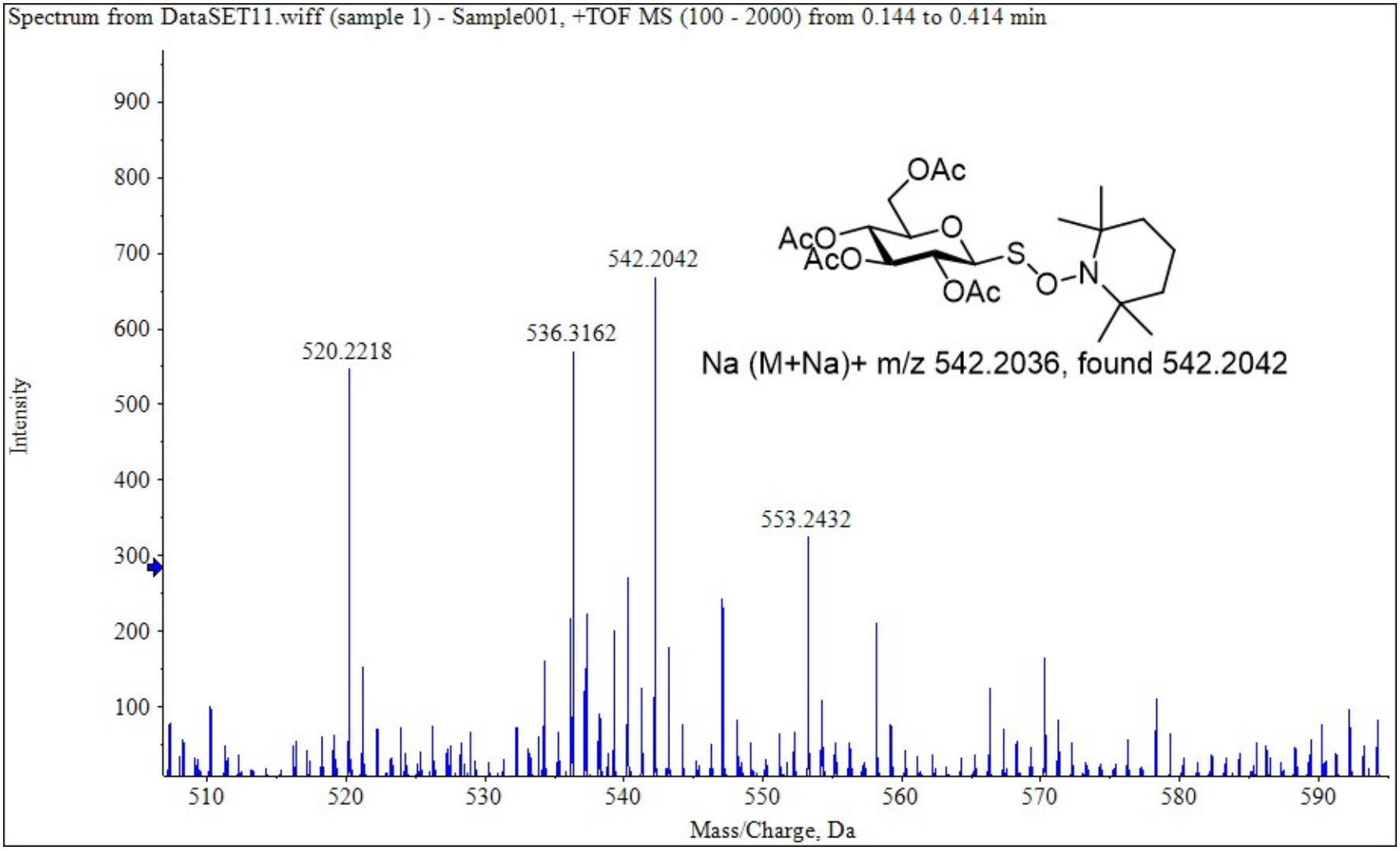
wamgzhen-1002 #5 RT: 0.02 AV: 1 NL: 5.67E5
T: FTMS + p ESI Full ms [150.0000-1500.0000]



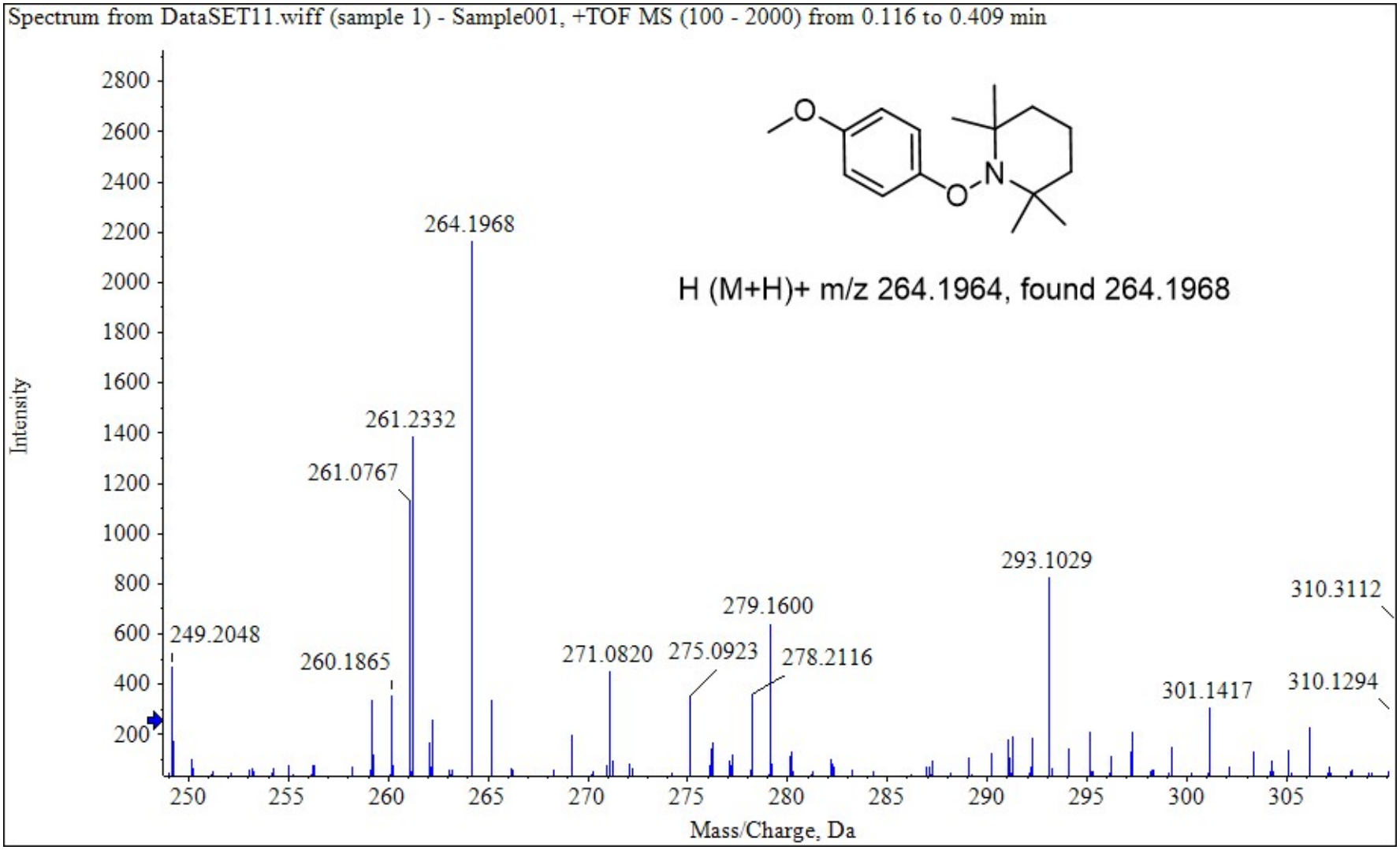
wamgzhen-1003 #21 RT: 0.09 AV: 1 NL: 1.40E6
T: FTMS + p ESI Full ms [150.0000-1500.0000]



Na (M+Na)+ m/z 435.1084, found 435.1084



2025/2/20 12:36:50



2025/2/20 12:27:46