Asymmetric Synthesis of Saturated and Unsaturated Hydroxy Fatty Acids (HFAs) and Study of Their Antiproliferative Activity

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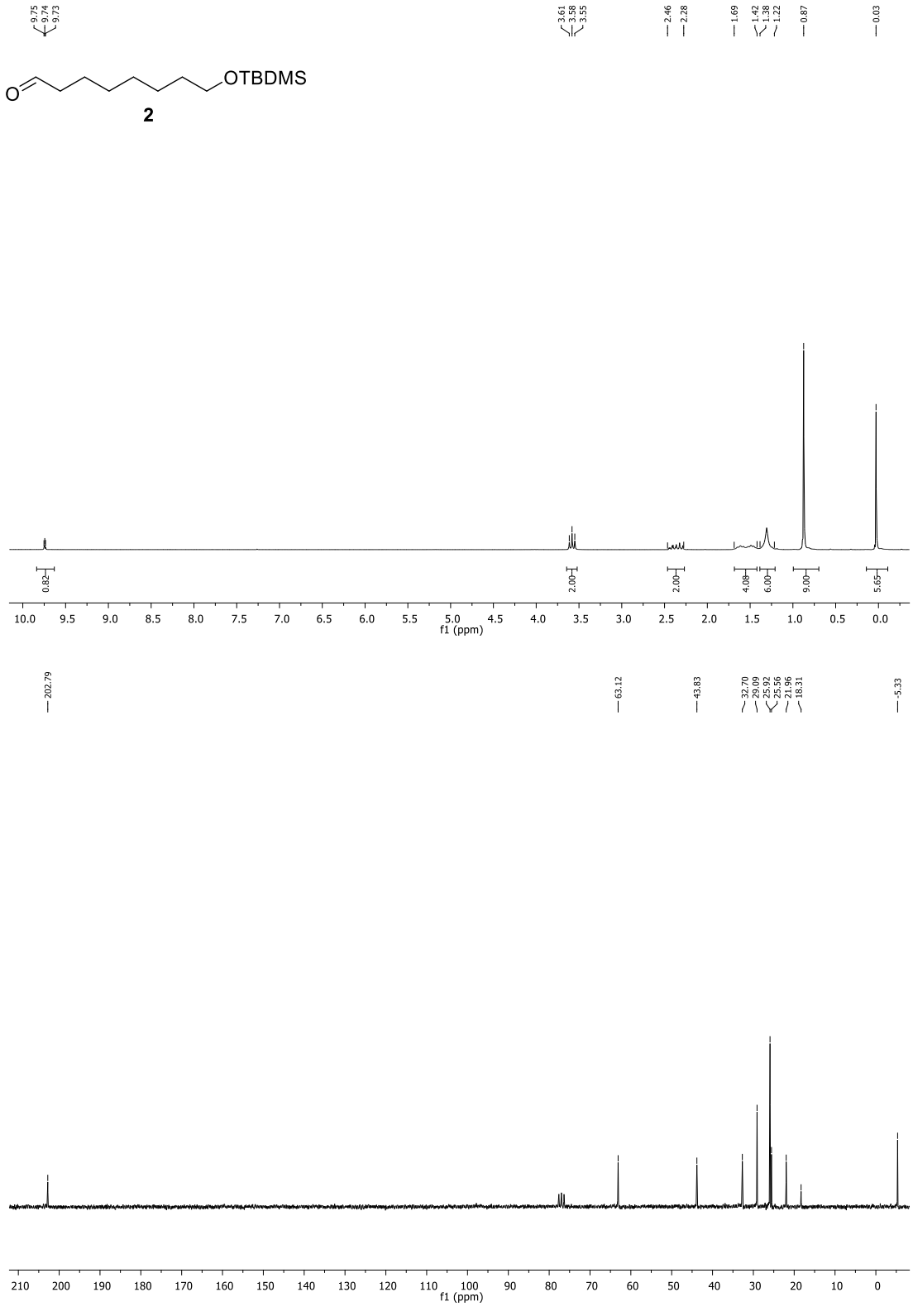
SUPPLEMENTARY MATERIALS

Table S1. 2-way ANOVA statistical analysis with multiple comparisons to DMSO, for all MTT tests of HFAs in A549 and SF268 human cancer cell lines ($p<0.05$ *, $p<0.01$ **, $p<0.001$ ***, $p<0.0001$ ****).

A549	10 μM	25 μM	35 μM	50 μM	75 μM	100 μM
6SHSA	ns	**	****	****	****	****
6RHSA	ns	ns	****	****	****	****
6SHPA	ns	****	****	****	****	****
6RHPA	ns	ns	ns	ns	****	****
7SHMA	ns	ns	ns	ns	****	****
7RHMA	ns	ns	ns	***	****	****
8SHPA	ns	**	****	****	****	****
8RHPA	ns	***	****	****	****	****
8SHSA	ns	ns	**	****	****	****
8RHSA	ns	ns	ns	****	****	****
11SHPA	ns	ns	ns	ns	ns	ns
11RHPA	ns	ns	ns	ns	ns	ns
11SHSA	ns	ns	ns	ns	****	****
11RHSA	ns	ns	ns	ns	****	****
7SHOA	ns	ns	ns	ns	****	****
7SHPOA	ns	ns	ns	ns	**	****
7RHSA	*	**	****	****	****	****
PA	-	ns	-	ns	-	ns
SA	-	ns	-	ns	-	ns

SF268	10 μM	25 μM	35 μM	50 μM	75 μM	100 μM
6SHPA	ns	ns	*	****	****	****
6RHPA	ns	ns	ns	ns	ns	ns
6SHSA	ns	ns	ns	ns	****	****
6RHSA	ns	ns	ns	ns	ns	***
8SHPA	ns	ns	ns	***	****	****
8RHPA	ns	ns	ns	****	****	****
8SHSA	ns	ns	ns	ns	*	***
8RHSA	ns	ns	*	ns	****	****
7RHSA	ns	****	-	****	-	****
PA	-	ns	-	ns	-	ns
SA	-	ns	-	ns	-	*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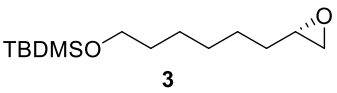
9.74
9.73
3.61
3.58
3.55
2.46
2.28
1.69
1.42
1.38
1.22
0.87
0.03
O
OTBDMS
2
0.82
2.00
2.00
4.08
6.00
9.00
5.65
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)
202.79
63.12
43.83
32.70
29.09
25.92
25.56
21.96
18.31
-5.33
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


TBDMSO
O

3

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2.79
2.70
2.68
2.66
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2.39
2.38
1.52
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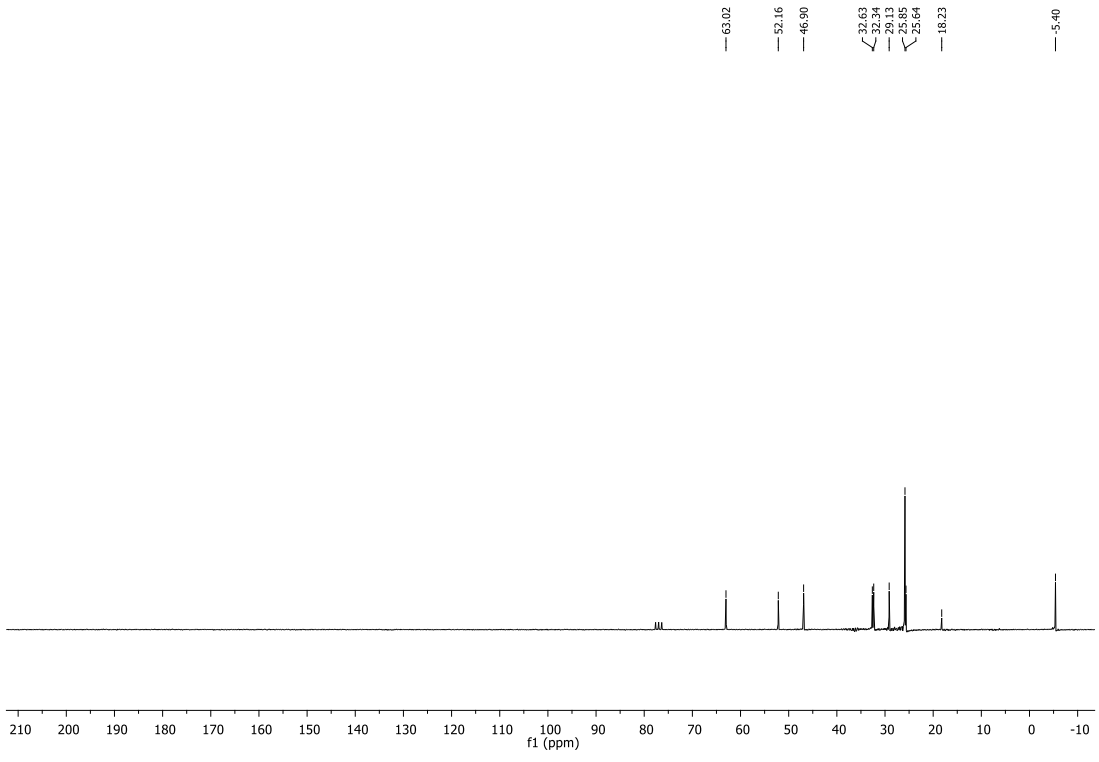
1.10
1.08
1.11
10.03
9.14
6.00
f1 (ppm)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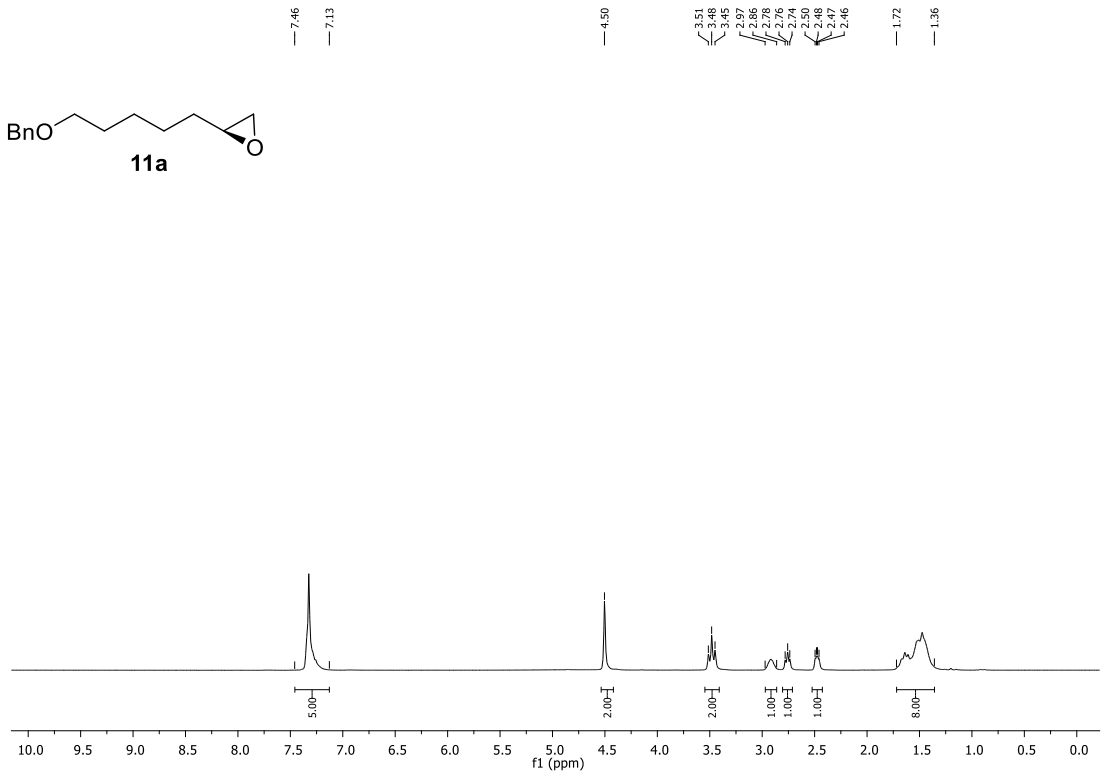
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2.48
2.47
2.46
1.72
1.36
BnO
O
11a
5.00
2.00
2.00
1.00
1.00
1.00
8.00
f1 (ppm)
138.34
128.22
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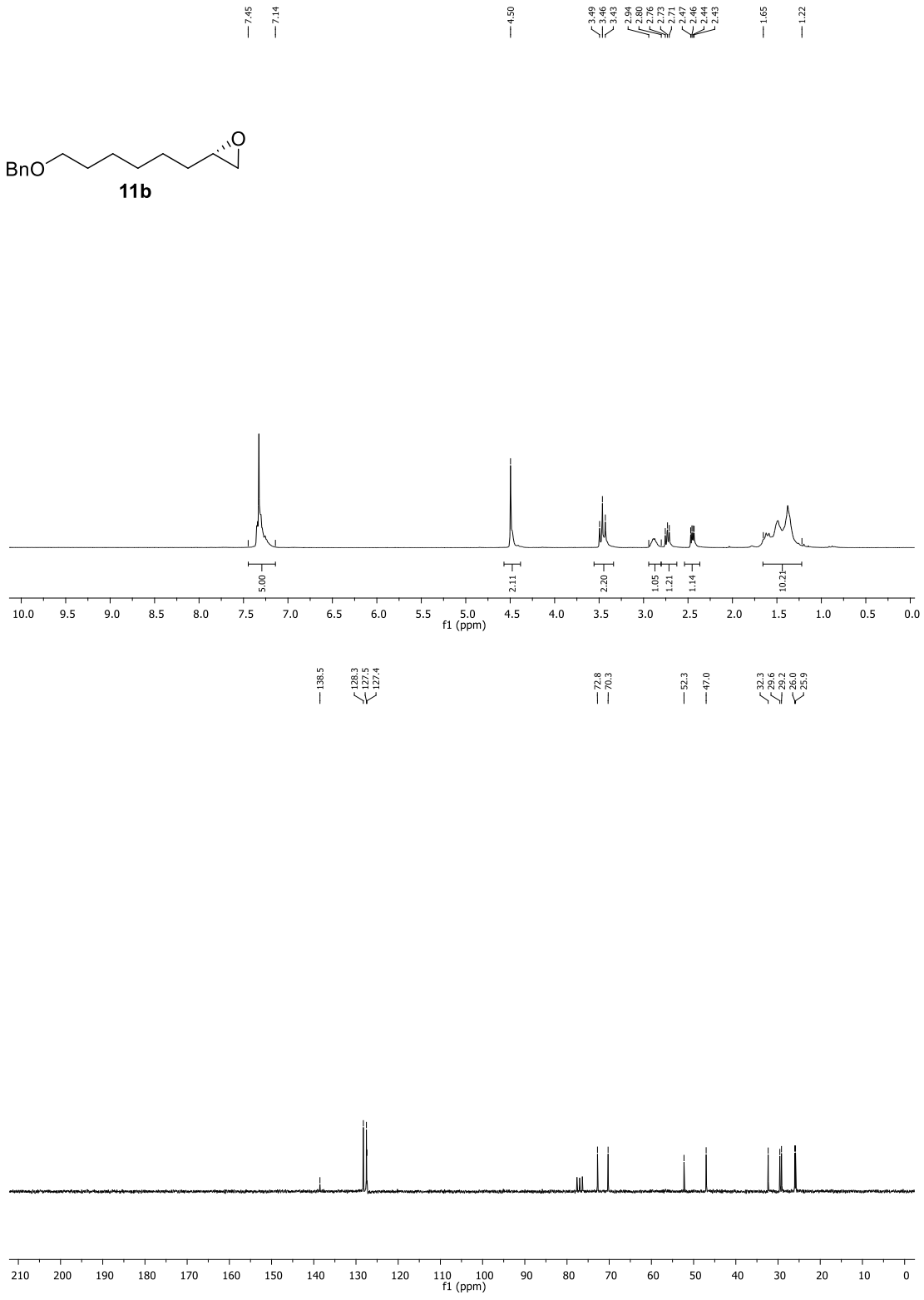
47.13
32.27
29.52
25.92
25.70
f1 (ppm)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2.80
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2.73
2.71
2.47
2.46
2.44
2.43
1.65
1.22
BnO
O
11b
5.00
2.11
2.20
1.05
1.21
1.14
10.21
f1 (ppm)
138.5
128.3
127.5
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32.3
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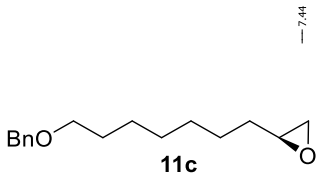
f1 (ppm)


BnO
O

11c

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3.48
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2.87
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2.76
2.74
2.50
2.48
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1.26
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1.00
1.00
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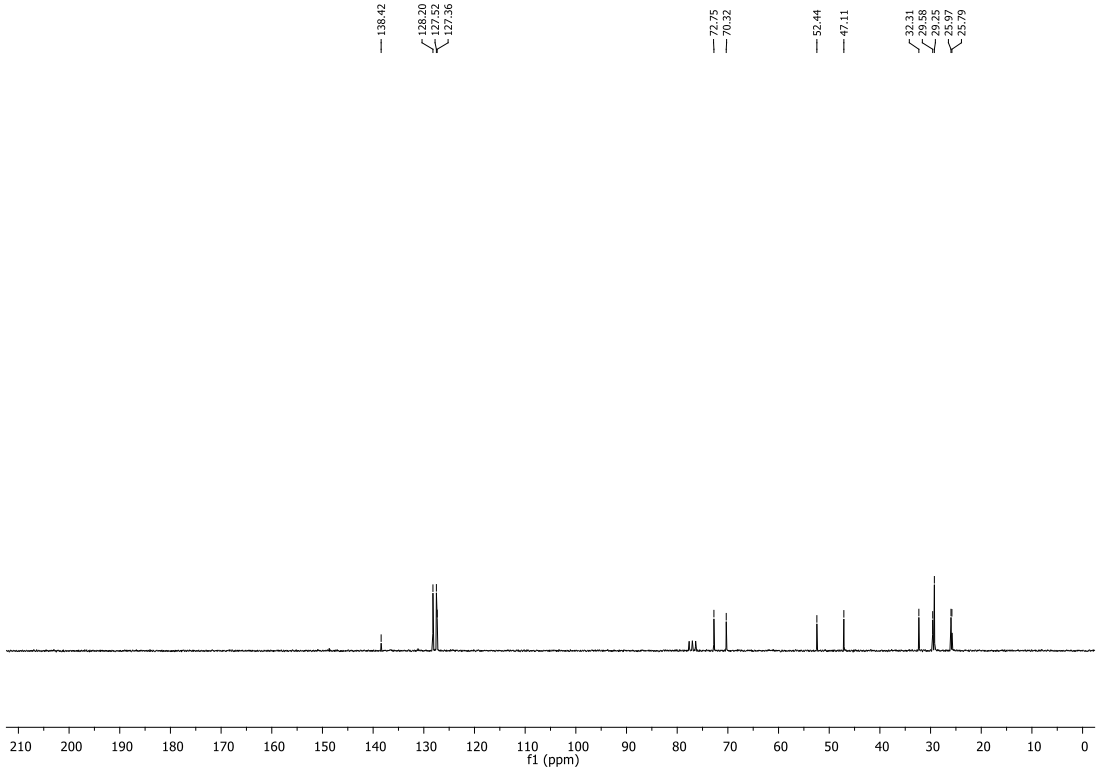
f1 (ppm)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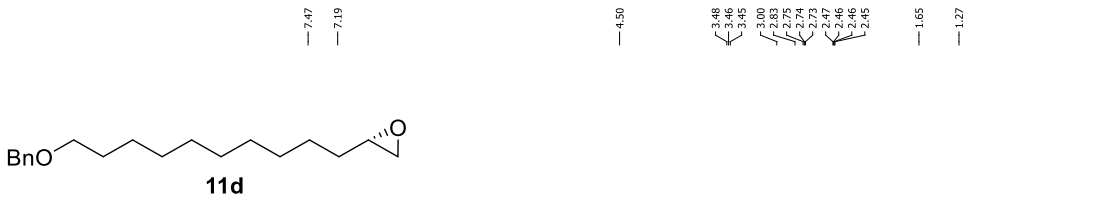
32.31
29.58
29.25
25.97
25.79
f1 (ppm)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7.19
4.50
3.48
3.46
3.45
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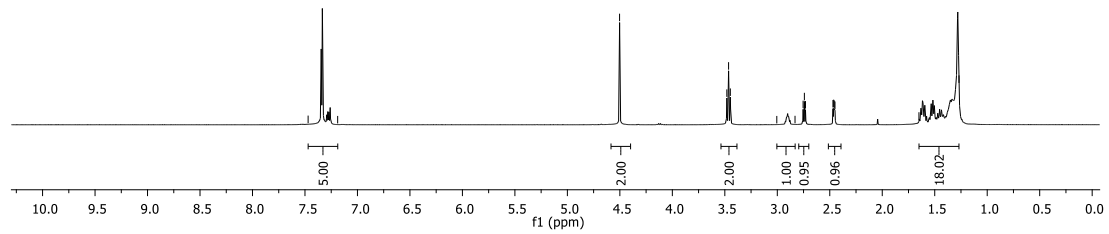
2.74
2.73
2.47
2.46
2.45
1.65
1.27
BnO
O

11d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1.00
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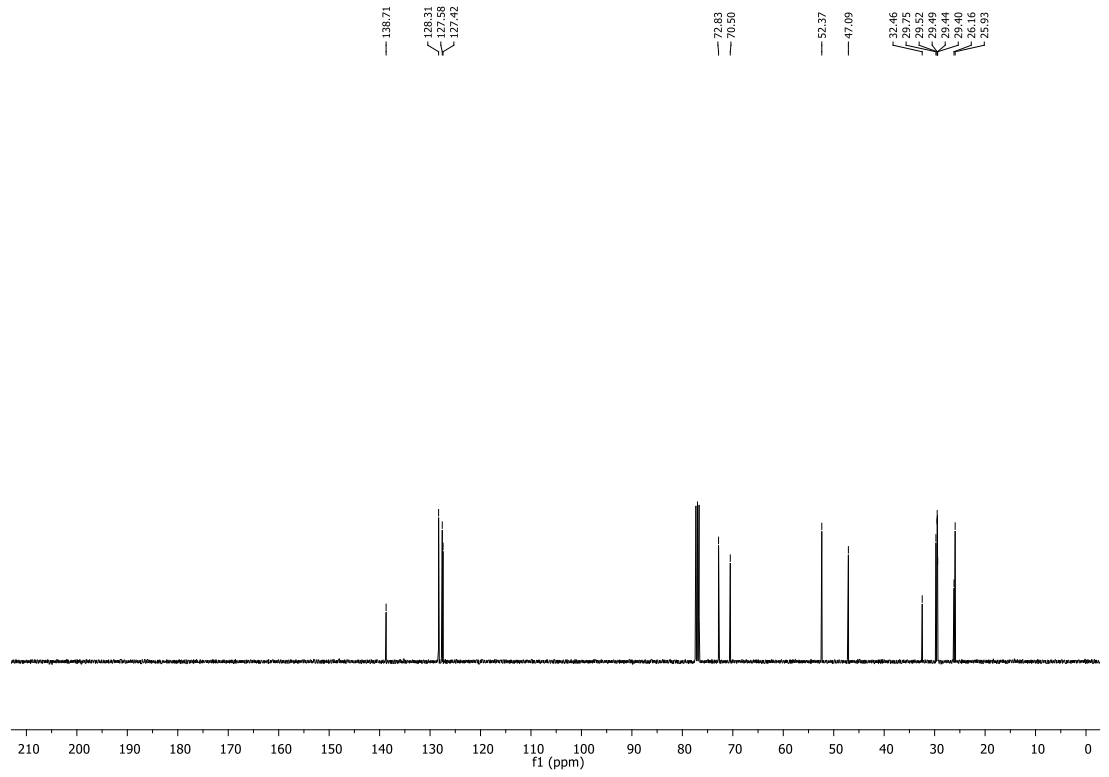
0.96
18.02
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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29.44
29.40
26.16
25.93
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


TBDMSO
O

25

3.62
3.61
3.59
2.96
2.86
2.76
2.74
2.73
2.50
2.42
1.58
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0.04
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0.96
1.00
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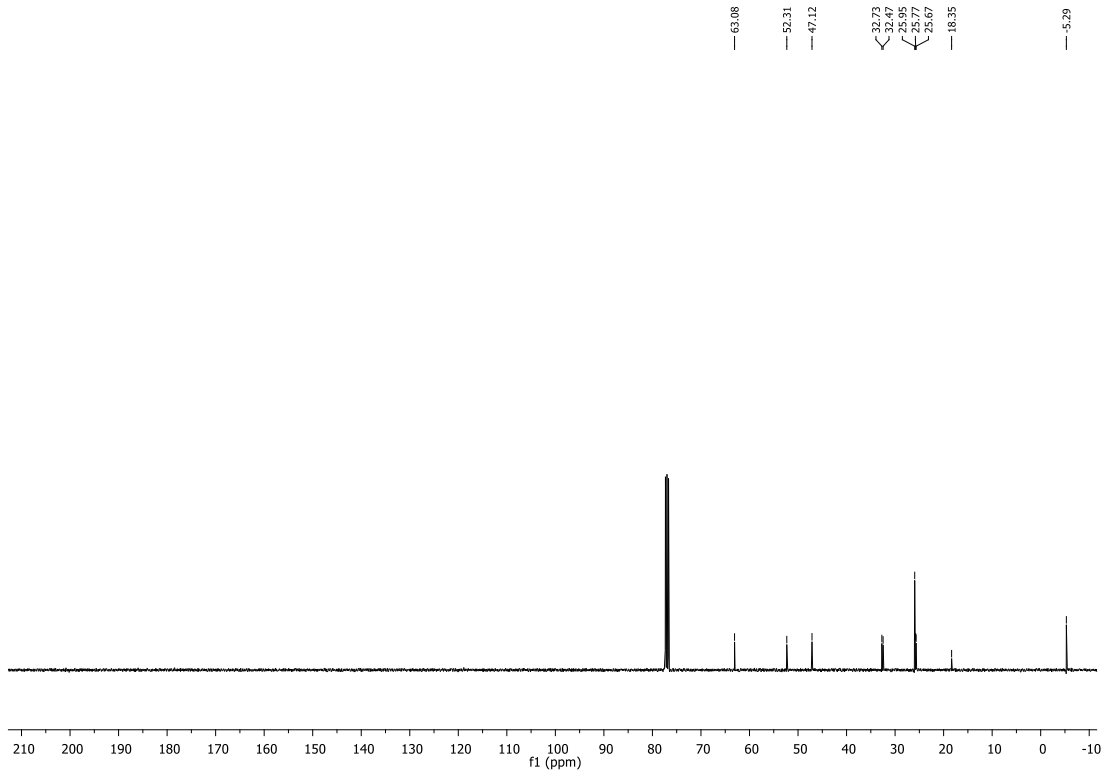
6.00
f1 (ppm)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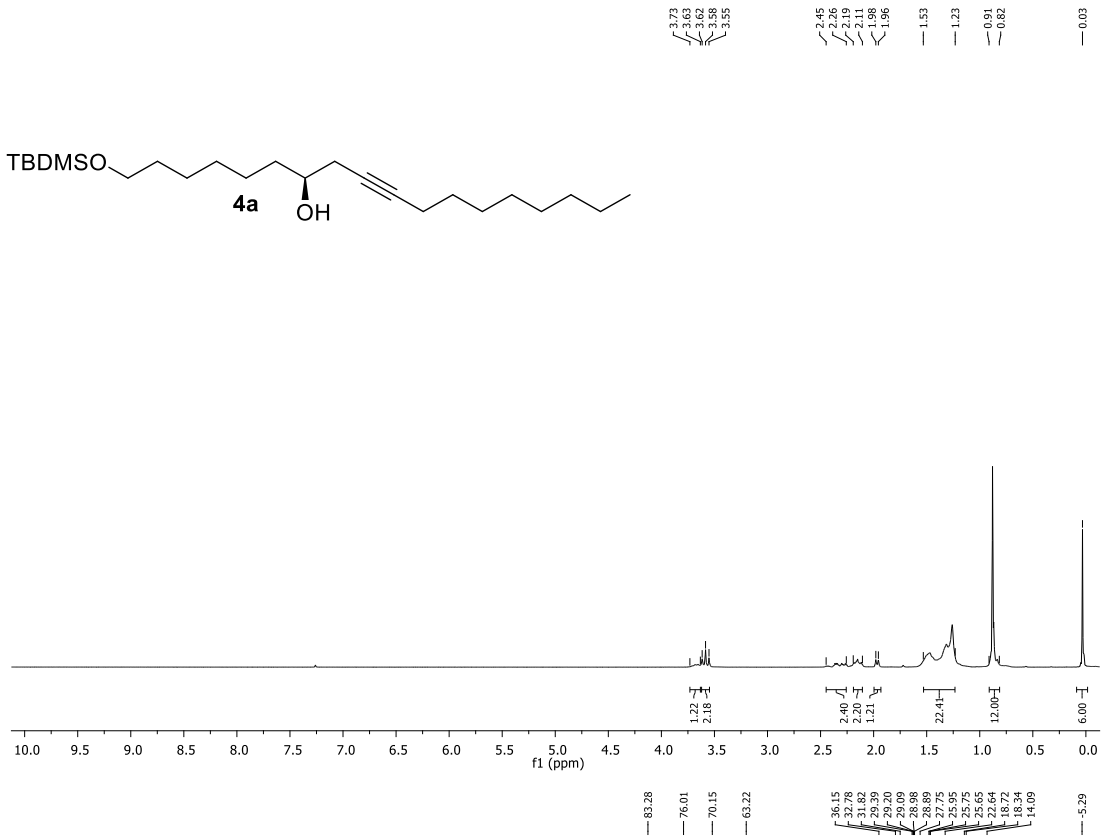
-5.29
f1 (ppm)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2.11
1.98
1.96
1.53
1.23
0.91
0.82
0.03
TBDMSO
4a
OH
1.22
2.18
2.40
2.20
1.21
22.41
12.00
6.00
f1 (ppm)
83.28
76.01
70.15
63.22
36.15
32.78
31.82
29.39
29.20
29.09
28.98
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25.75
25.65
22.64
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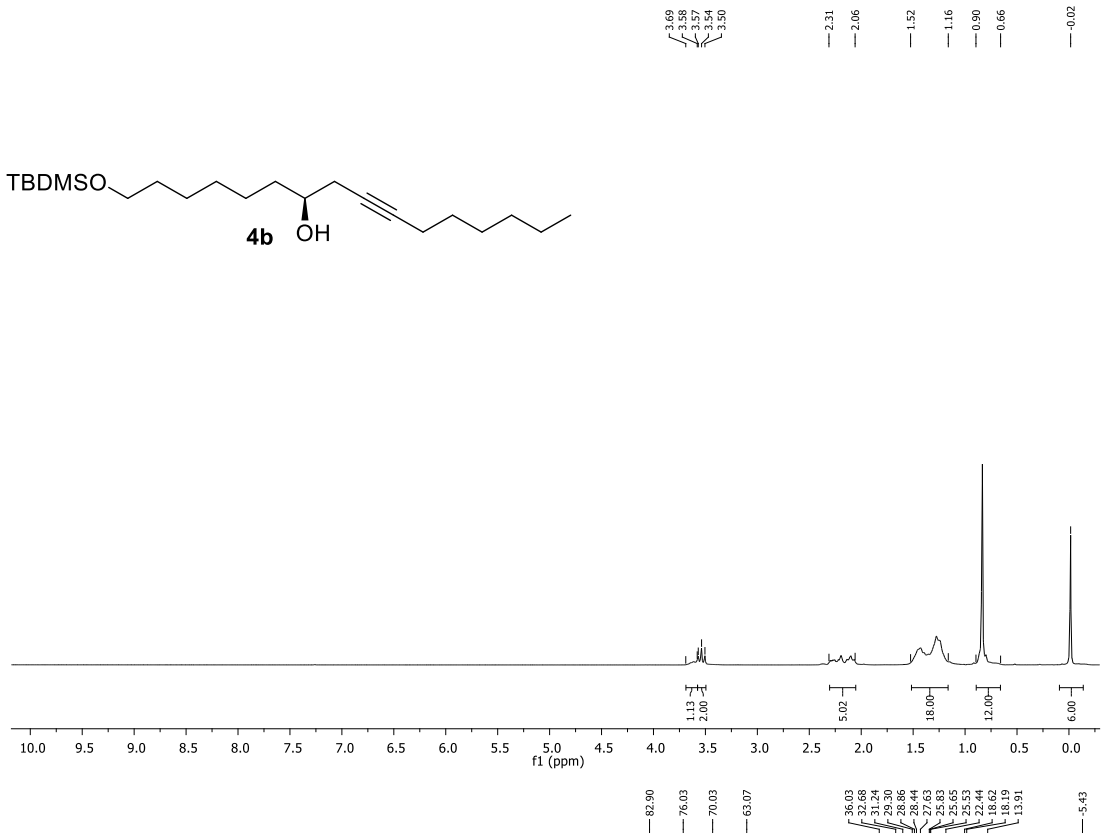
18.34
14.09
-5.29
f1 (ppm)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3.50
2.31
2.06
1.52
1.16
0.90
0.66
-0.02
TBDMSO
4b
OH
1.13
2.00
5.02
18.00
12.00
6.00
f1 (ppm)
82.90
76.03
70.03
63.07
36.03
32.68
31.24
29.30
28.86
28.44
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25.65
25.53
24.44
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18.19
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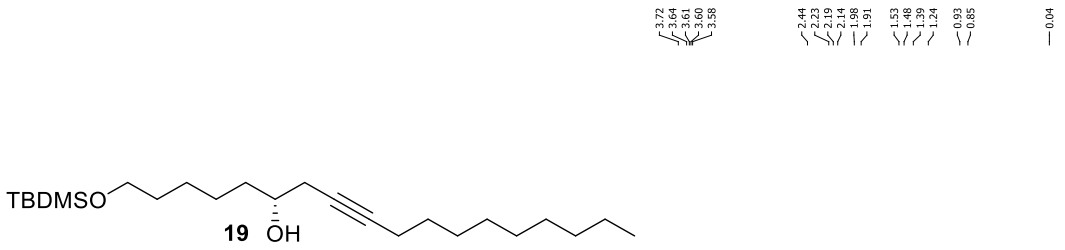
f1 (ppm)


TBDMSO
19 OH

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1.53
1.48
1.39
1.24
0.93
0.85
0.04
1.01
1.80
2.16
2.08
1.08
4.13
18.28
12.09
6.00
f1 (ppm)
83.36
76.00
70.15
63.16
36.22
32.77
31.87
29.49
29.28
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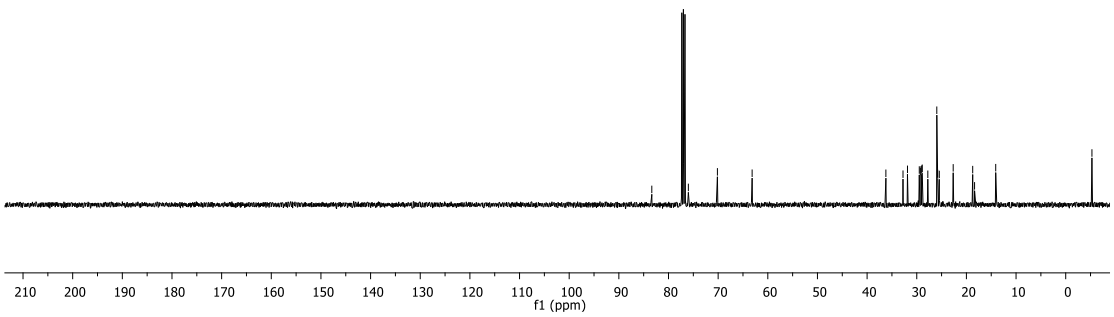
22.66
18.73
18.36
14.10
-5.28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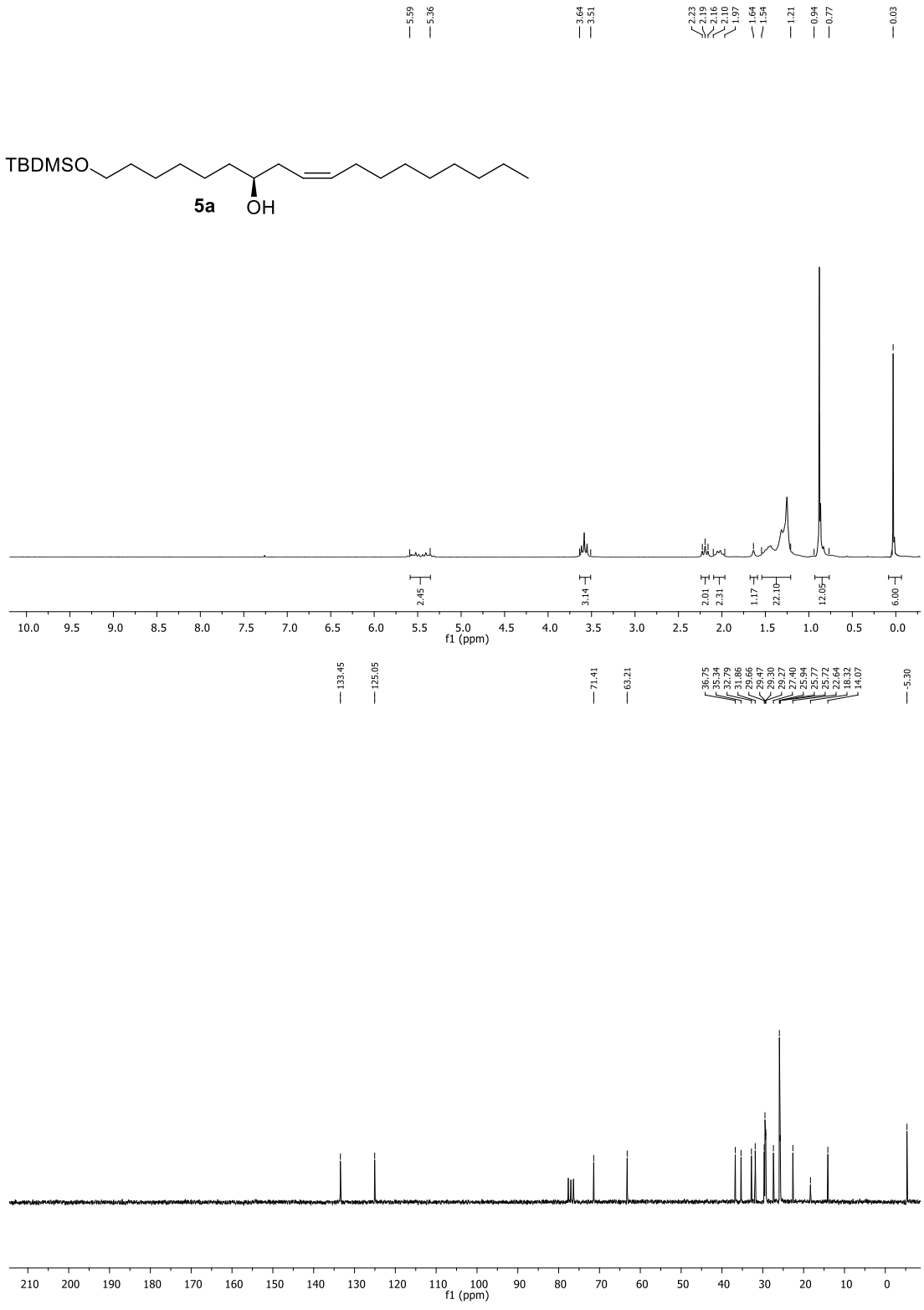
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0.77
0.03
TBDMSO
5a
OH
2.45
3.14
2.01
2.31
1.17
22.10
12.05
6.00
f1 (ppm)
133.45
125.05
71.41
63.21
36.75
35.34
32.79
31.86
29.66
29.47
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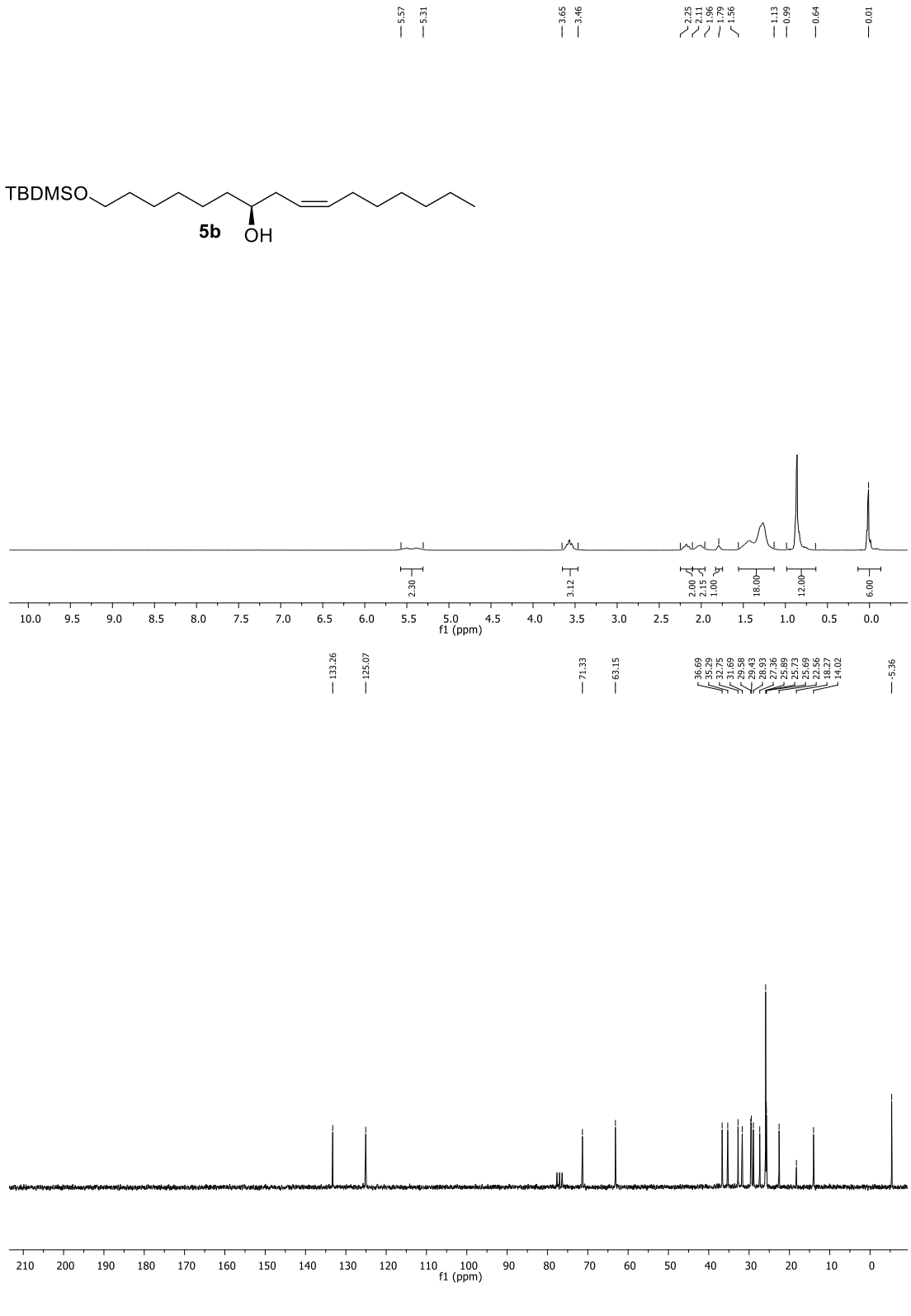
f1 (ppm)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0.01
TBDMSO
OH
5b
2.30
3.12
2.00
2.15
1.00
18.00
12.00
6.00
f1 (ppm)
133.26
125.07
71.33
63.15
36.69
35.29
32.75
31.69
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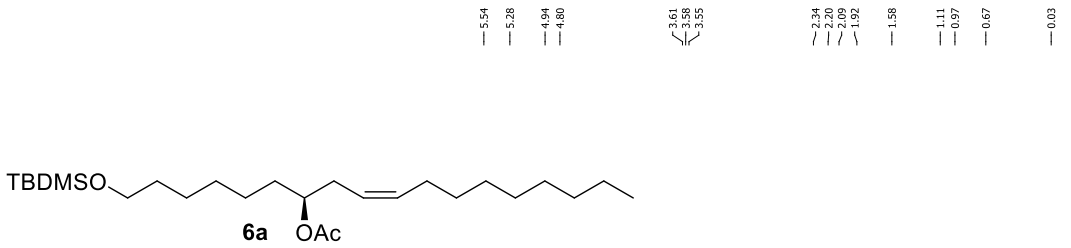
f1 (ppm)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4.80
3.61
3.58
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2.09
1.92
1.58
1.11
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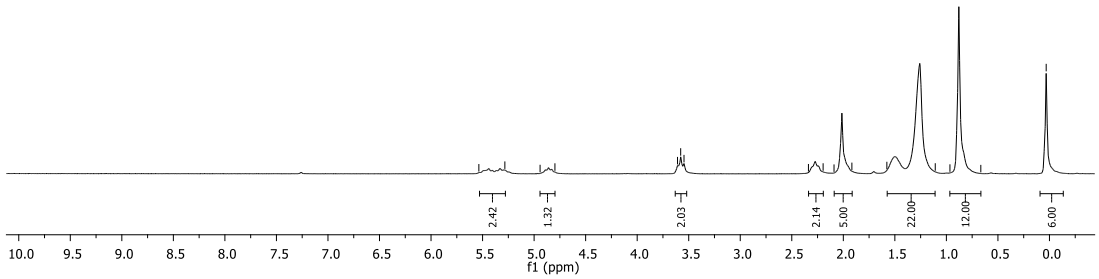
0.67
0.03
TBDMSO
6a
OAc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22.00
12.00
6.00
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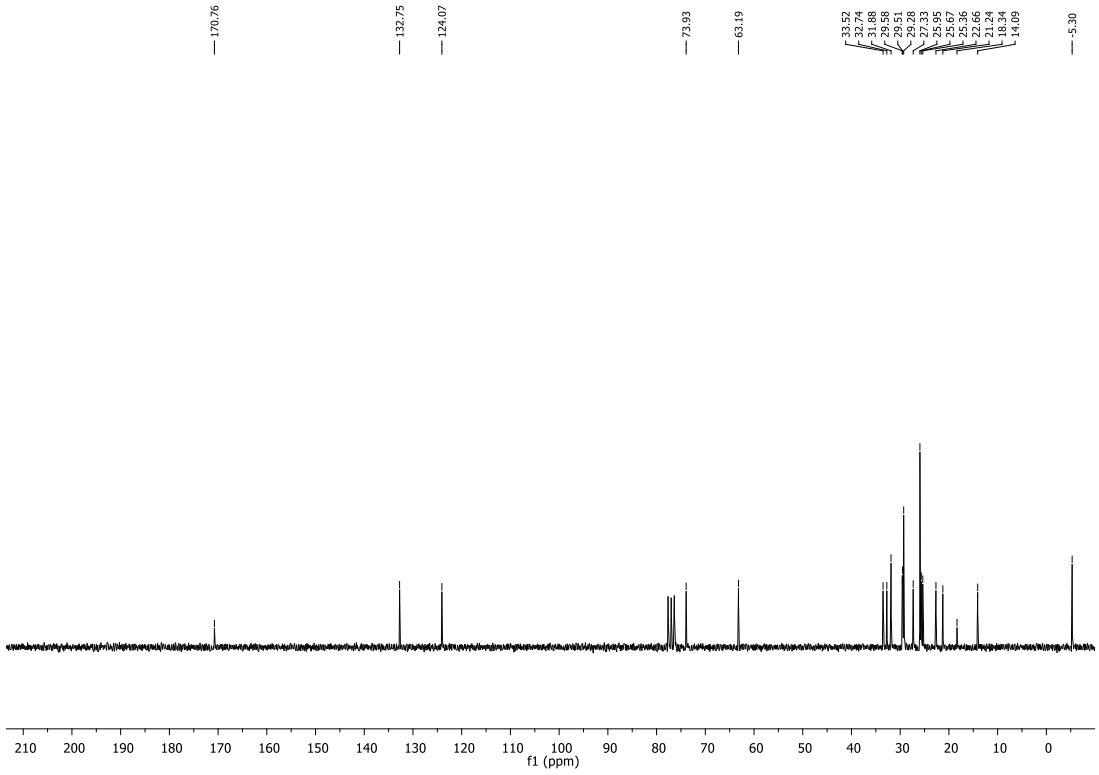
f1 (ppm)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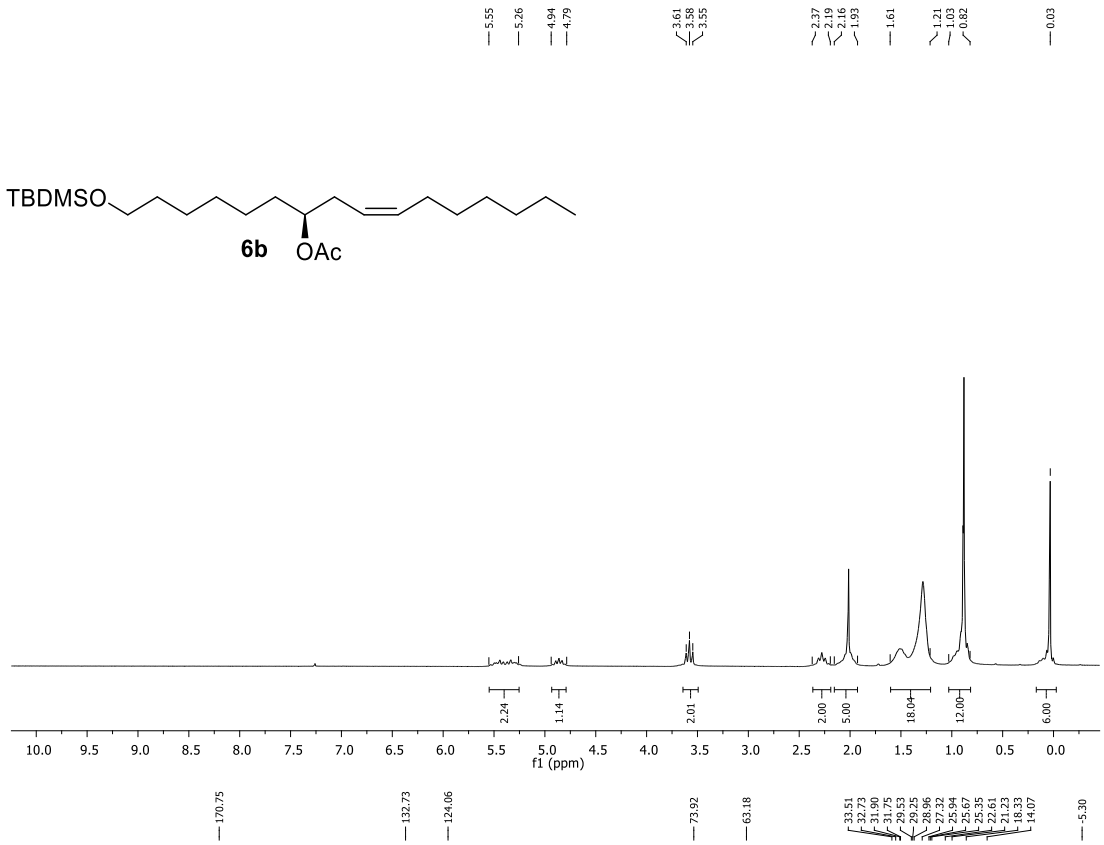
31.88
29.58
29.51
29.28
27.33
25.95
25.67
25.36
22.66
21.24
18.34
14.09
-5.30
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)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4.79
3.61
3.58
3.55
2.37
2.19
2.16
1.93
1.61
1.21
1.03
0.82
0.03
TBDMSO
6b
OAc
2.24
1.14
2.01
2.00
5.00
18.04
12.00
6.00
f1 (ppm)
170.75
132.73
124.06
73.92
63.18
33.51
32.73
31.90
31.75
29.53
29.25
28.96
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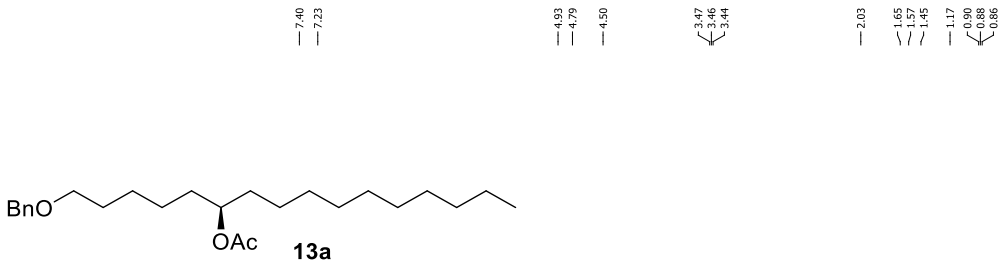
25.94
25.67
25.35
22.61
21.23
18.33
14.07
-5.30
f1 (ppm)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3.47
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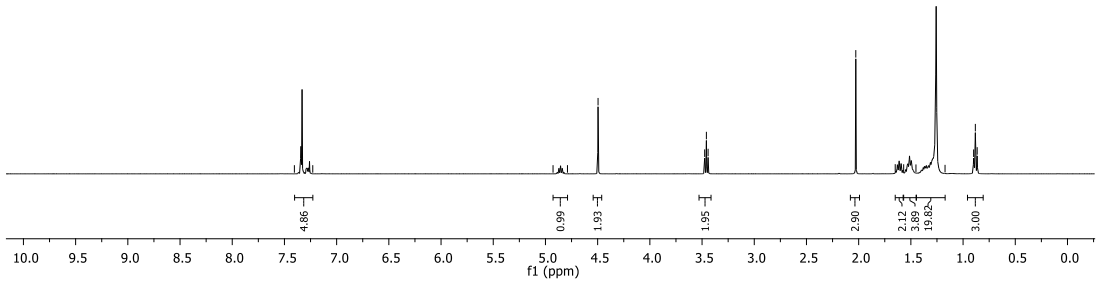
1.17
0.90
0.88
0.86
BnO
OAc

13a


4.86
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1.95
2.90
2.12
3.89
19.82
3.00
f1 (ppm)


170.90
138.64
128.32
127.59
127.46
74.33
72.86
70.30
34.09
34.04
31.88
29.64
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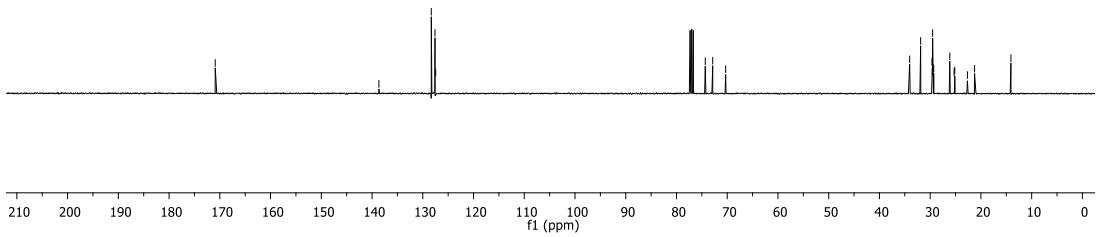
26.13
25.29
25.15
22.66
21.25
14.09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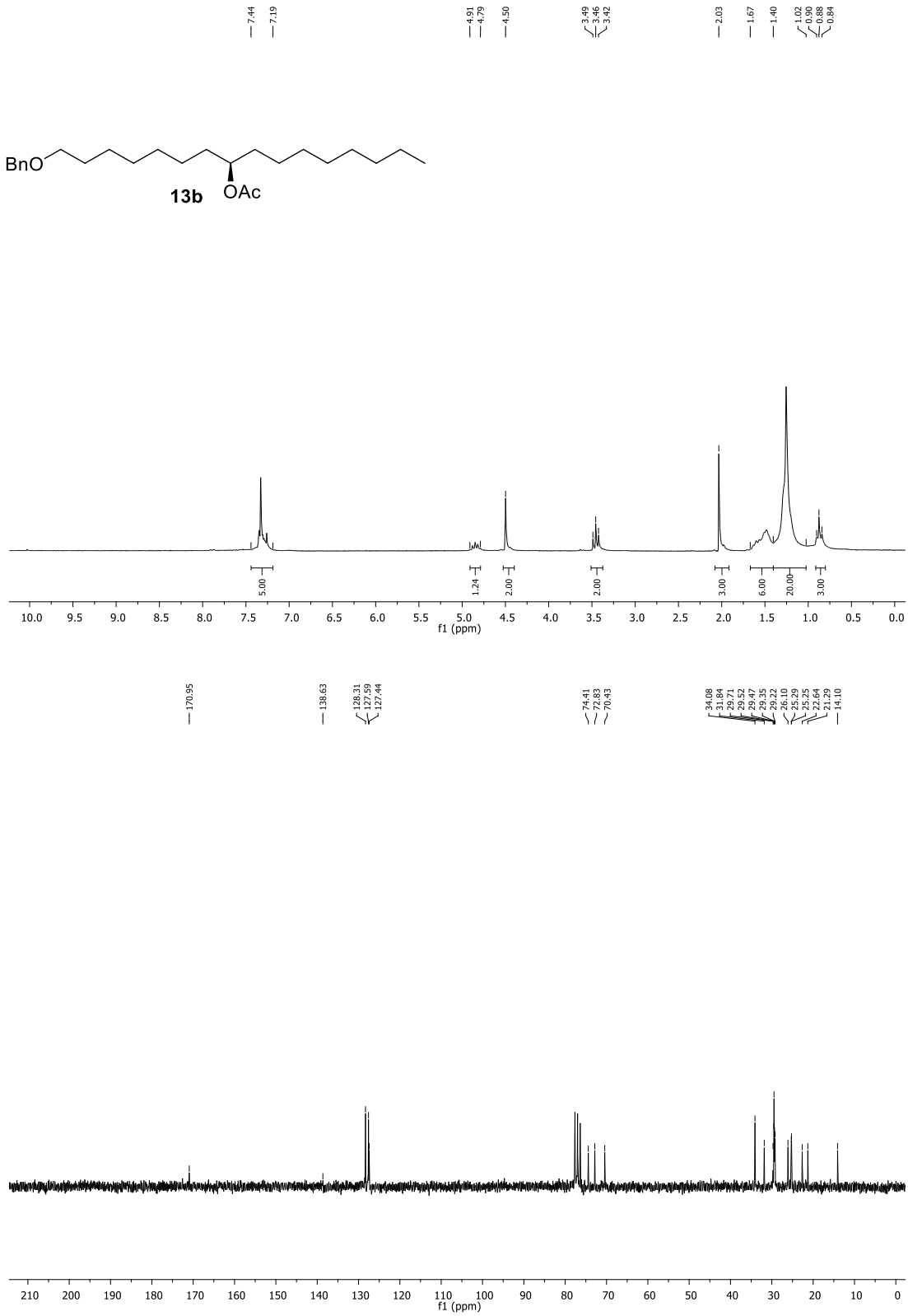
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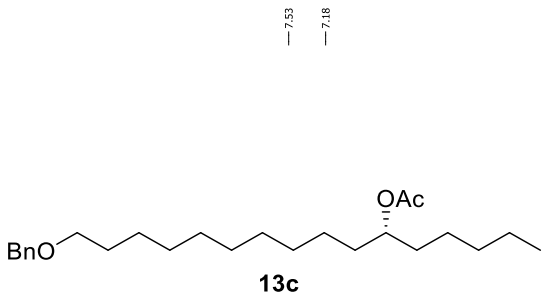
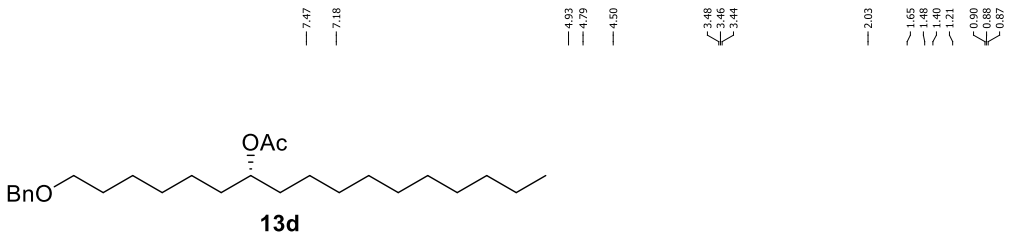
7.19
4.91
4.79
4.50
3.49
3.46
3.42
2.03
1.67
1.40
1.02
0.90
0.88
0.84
BnO
OAc
13b
5.00
1.24
2.00
2.00
3.00
6.00
20.00
3.00
f1 (ppm)
170.95
138.63
128.31
127.59
127.44
74.41
72.83
70.43
34.08
31.84
29.71
29.52
29.47
29.35
29.22
26.10
25.29
25.25
22.64
21.29
14.10
f1 (ppm)


OAc
BnO

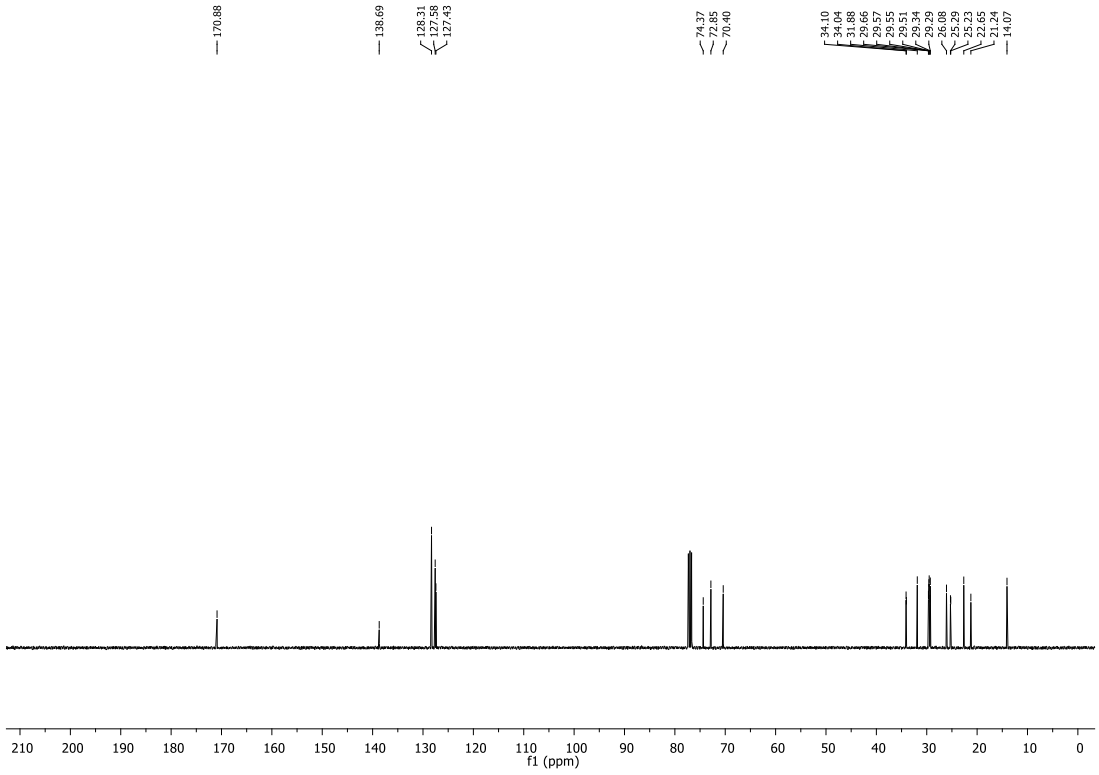
13c

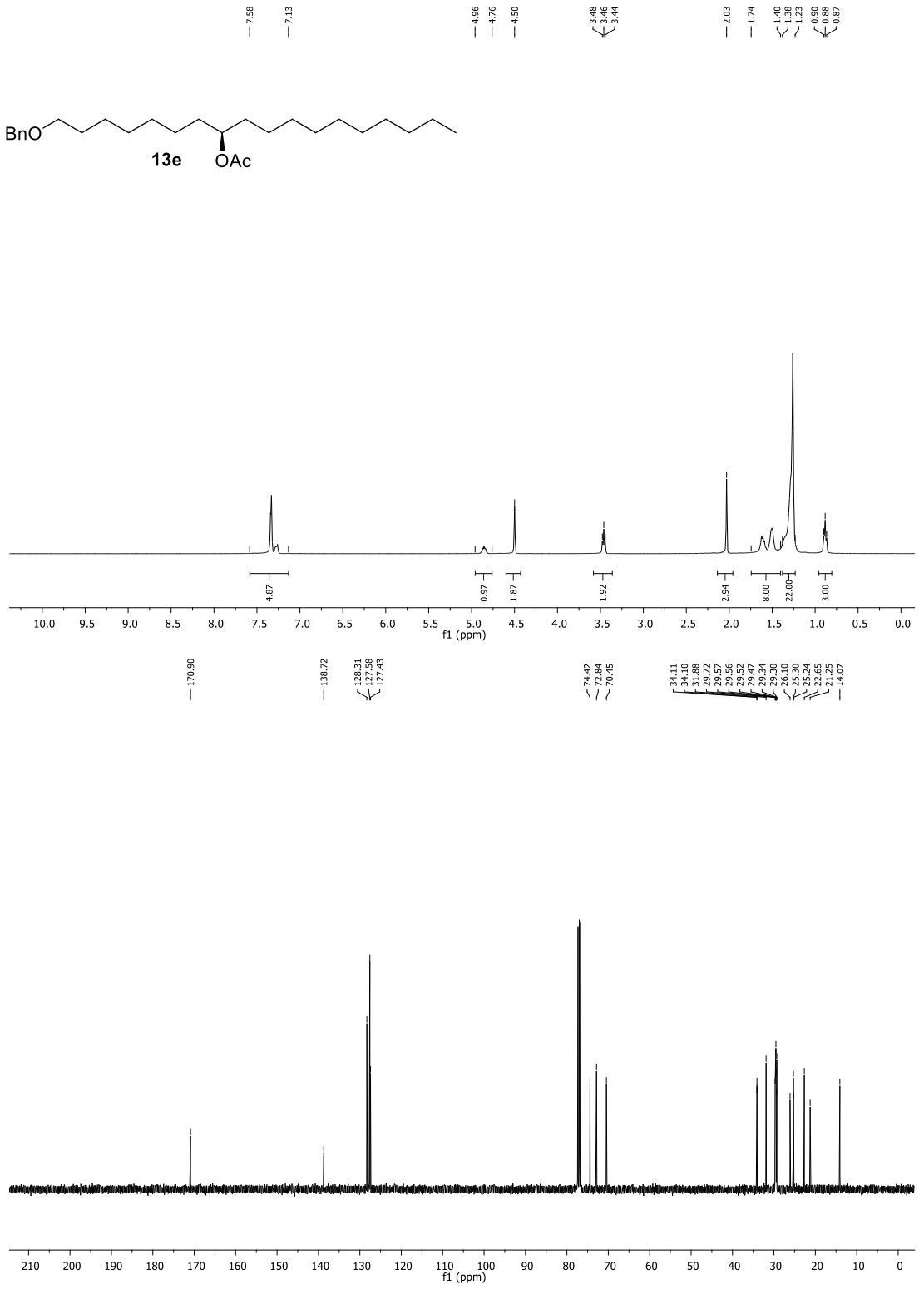
7.53
7.18
4.92
4.80
4.50
3.48
3.46
3.44
2.04
1.65
1.57
1.56
1.45
1.11
0.90
0.88
0.86
4.91
0.92
1.84
1.94
2.86
2.82
4.00
19.82
3.00
f1 (ppm)
170.95
138.71
128.32
127.60
127.44
74.44
72.84
70.51
34.11
34.06
31.71
29.76
29.54
29.52
29.50
29.45
26.17
25.30
24.96
22.53
21.29
13.99
f1 (ppm)

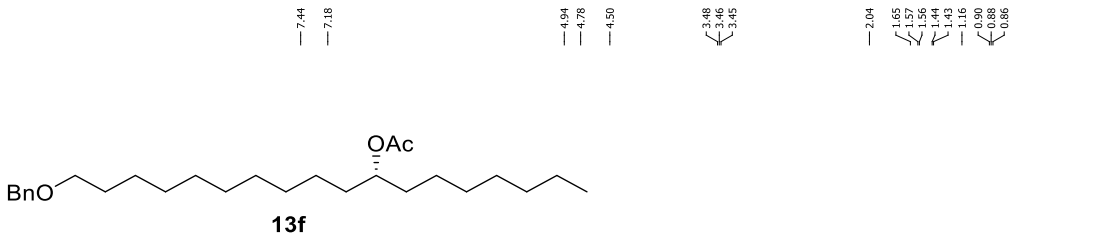

OAc
BnO

13d

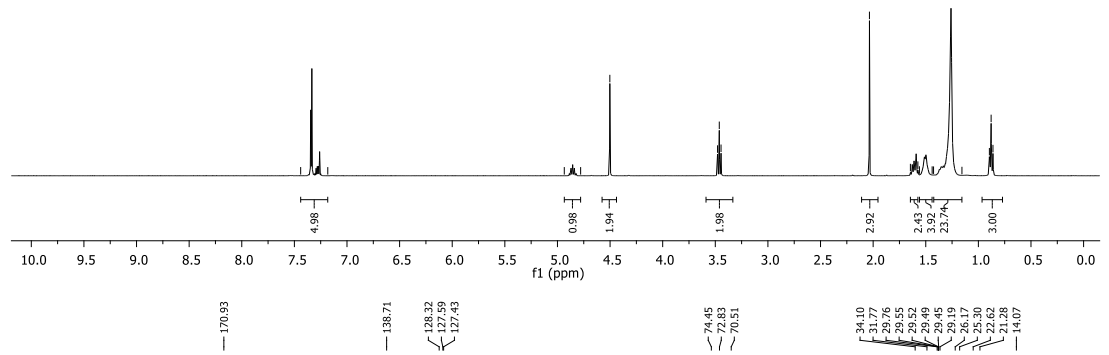
7.47
7.18
4.93
4.79
4.50
3.48
3.46
3.44
2.03
1.65
1.48
1.40
1.21
0.90
0.88
0.87
4.90
0.98
1.94
2.00
3.00
6.28
22.00
3.00
f1 (ppm)


170.88
138.69
128.31
127.58
127.43
74.37
72.85
70.40
34.10
34.04
31.88
29.66
29.57
29.55
29.51
29.34
29.29
26.08
25.29
25.23
22.65
21.24
14.07
f1 (ppm)


7.58
7.13
4.96
4.76
4.50
3.48
3.46
3.44
2.03
1.74
1.40
1.38
1.23
0.90
0.88
0.87
BnO
13e
OAc
4.87
0.97
1.87
1.92
2.94
8.00
22.00
3.00
f1 (ppm)
170.90
138.72
128.31
127.58
127.43
74.42
72.84
70.45
34.11
34.10
31.88
29.72
29.57
29.56
29.52
29.47
29.34
29.30
26.10
25.30
25.24
22.65
21.25
14.07
f1 (ppm)


7.44
7.18
4.94
4.78
4.50
3.48
3.46
3.45
2.04
1.65
1.57
1.55
1.44
1.43
1.16
0.90
0.88
0.86
OAc
BnO

13f


4.98
0.98
1.94
1.98
2.92
2.43
3.92
23.74
3.00
f1 (ppm)

170.93
138.71
128.32
127.59
127.43
74.45
72.83
70.51
34.10
31.77
29.76
29.55
29.52
29.49
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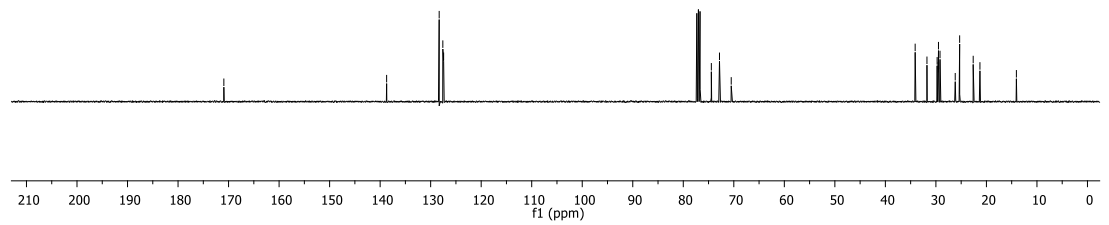
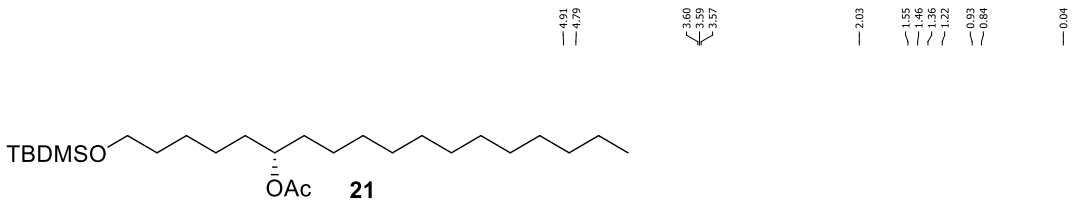
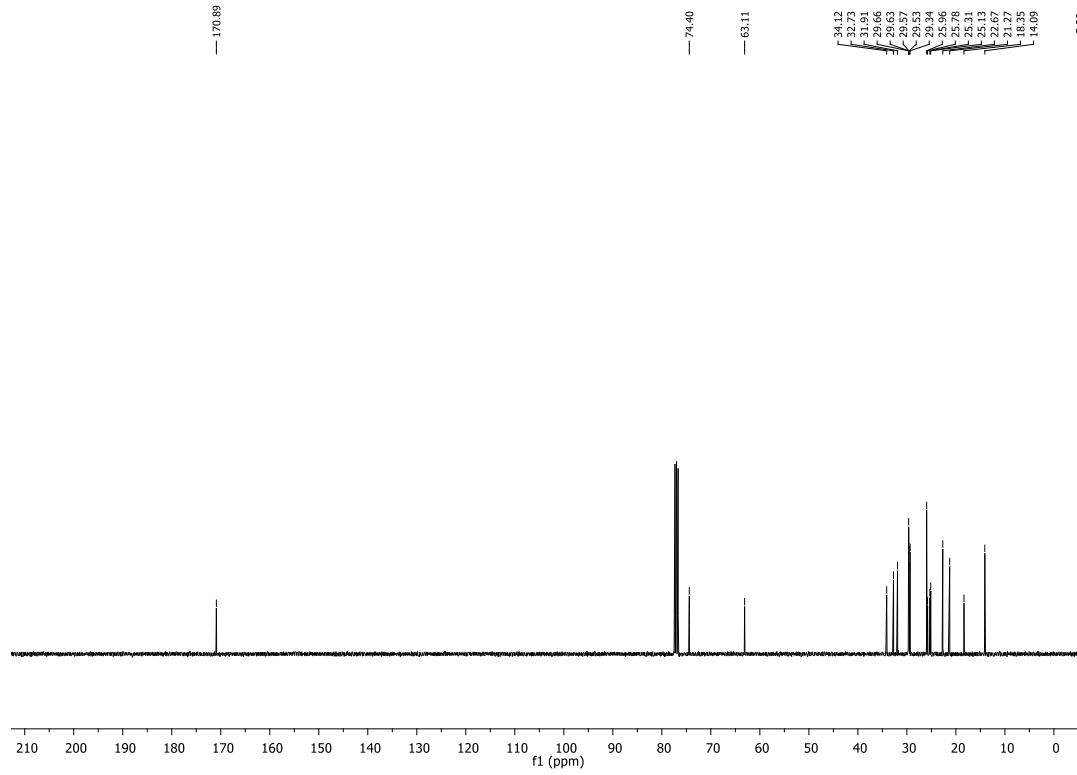
29.19
29.17
25.30
22.62
21.28
14.07

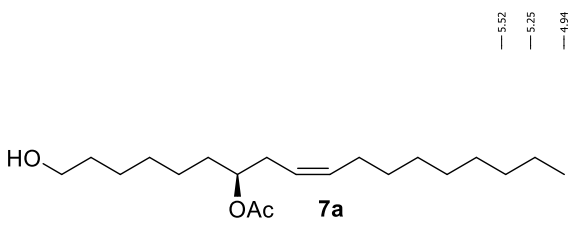

f1 (ppm)


TBDMSO
OAc

21

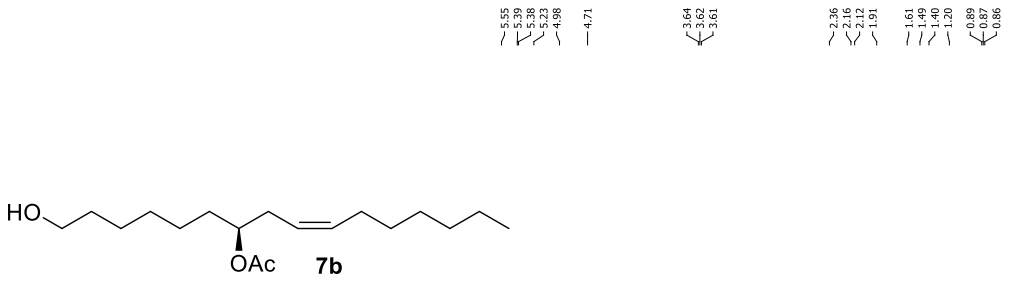
4.91
4.79
3.60
3.59
3.57
2.03
1.55
1.46
1.36
1.22
0.93
0.84
0.04
1.00
2.00
3.00
6.00
24.00
12.00
6.00
f1 (ppm)


170.89
74.40
63.11
34.12
32.73
31.91
29.66
29.63
29.57
29.53
29.34
25.96
25.78
25.31
25.13
22.67
21.27
19.35
14.09
-5.29
f1 (ppm)

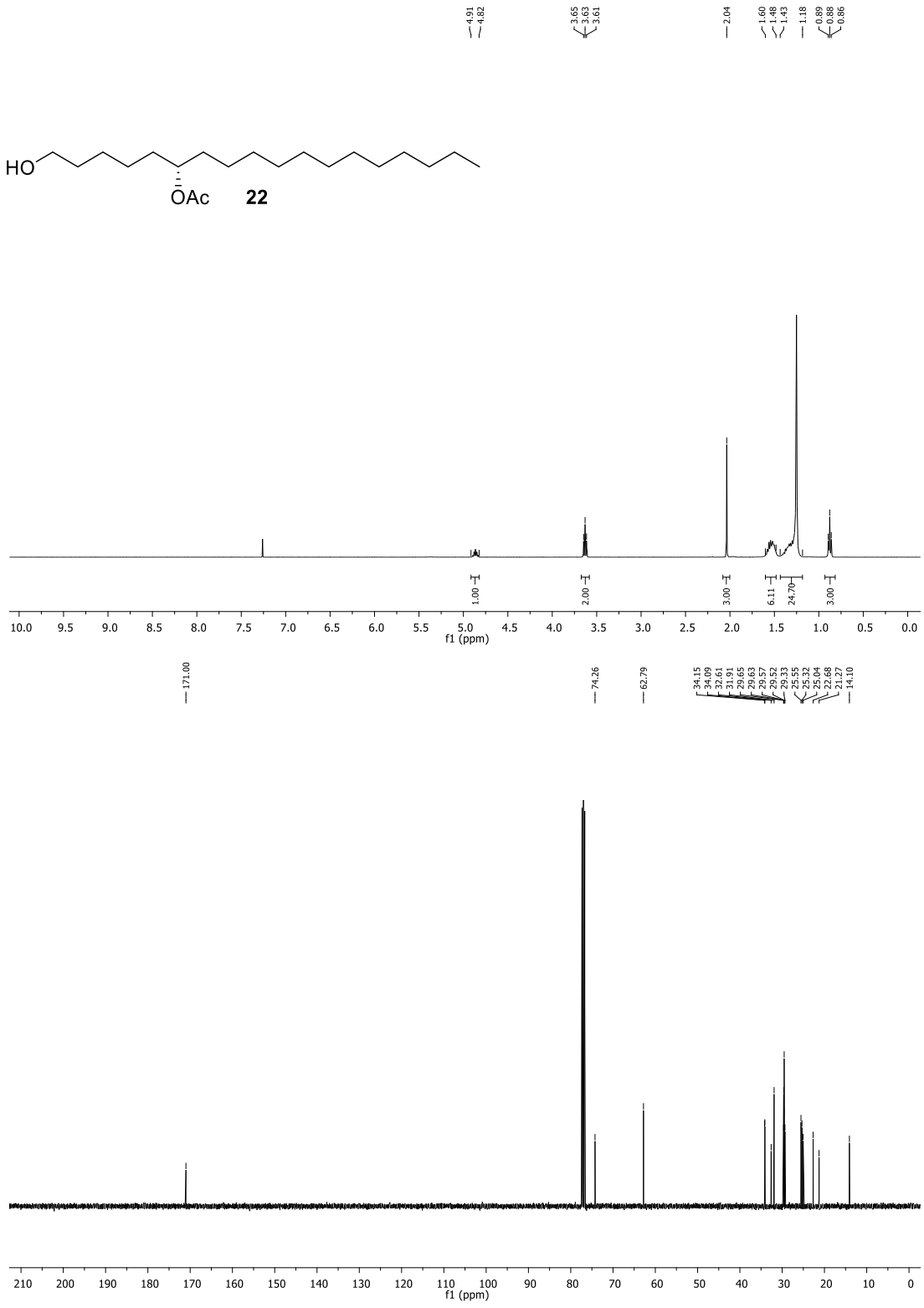

HO
OAc

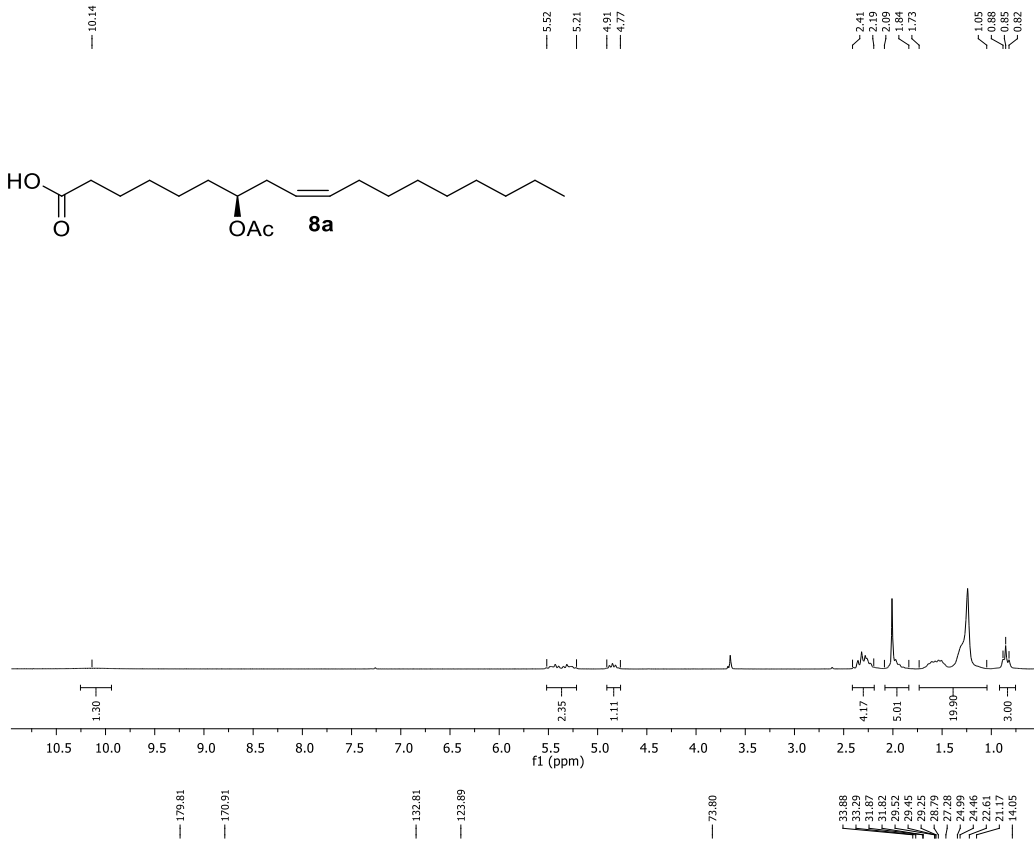
7a

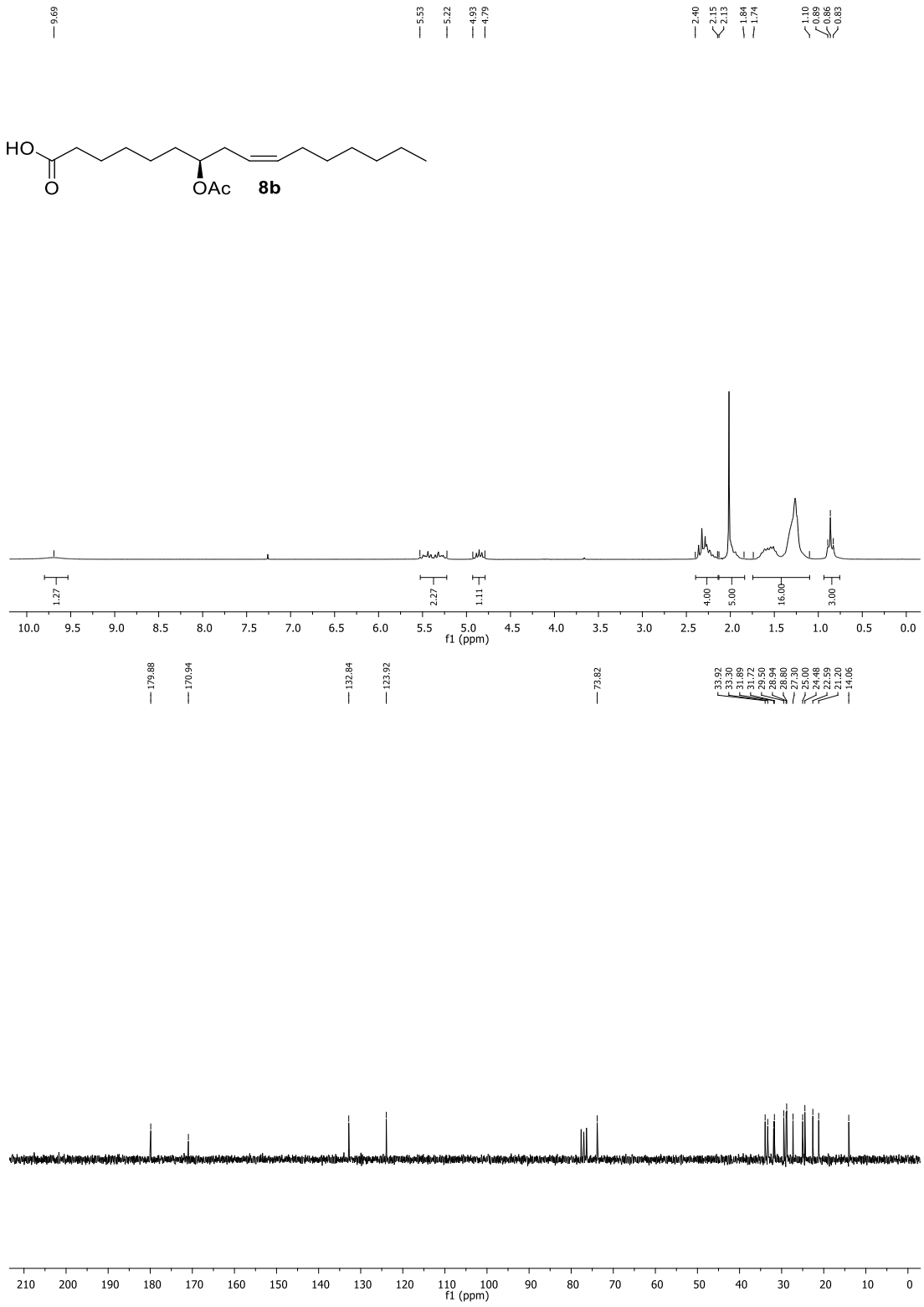
5.52
5.25
4.94
4.78
3.68
3.58
2.38
2.24
2.08
1.92
1.71
1.41
1.40
1.17
0.89
0.86
0.83
2.30
1.28
3.14
2.45
5.00
5.68
16.00
3.00
f1 (ppm)
170.83
132.77
124.01
73.88
62.83
33.46
32.98
32.59
31.89
31.84
29.54
29.47
29.26
29.16
27.30
25.57
25.30
22.62
22.22
14.06
f1 (ppm)

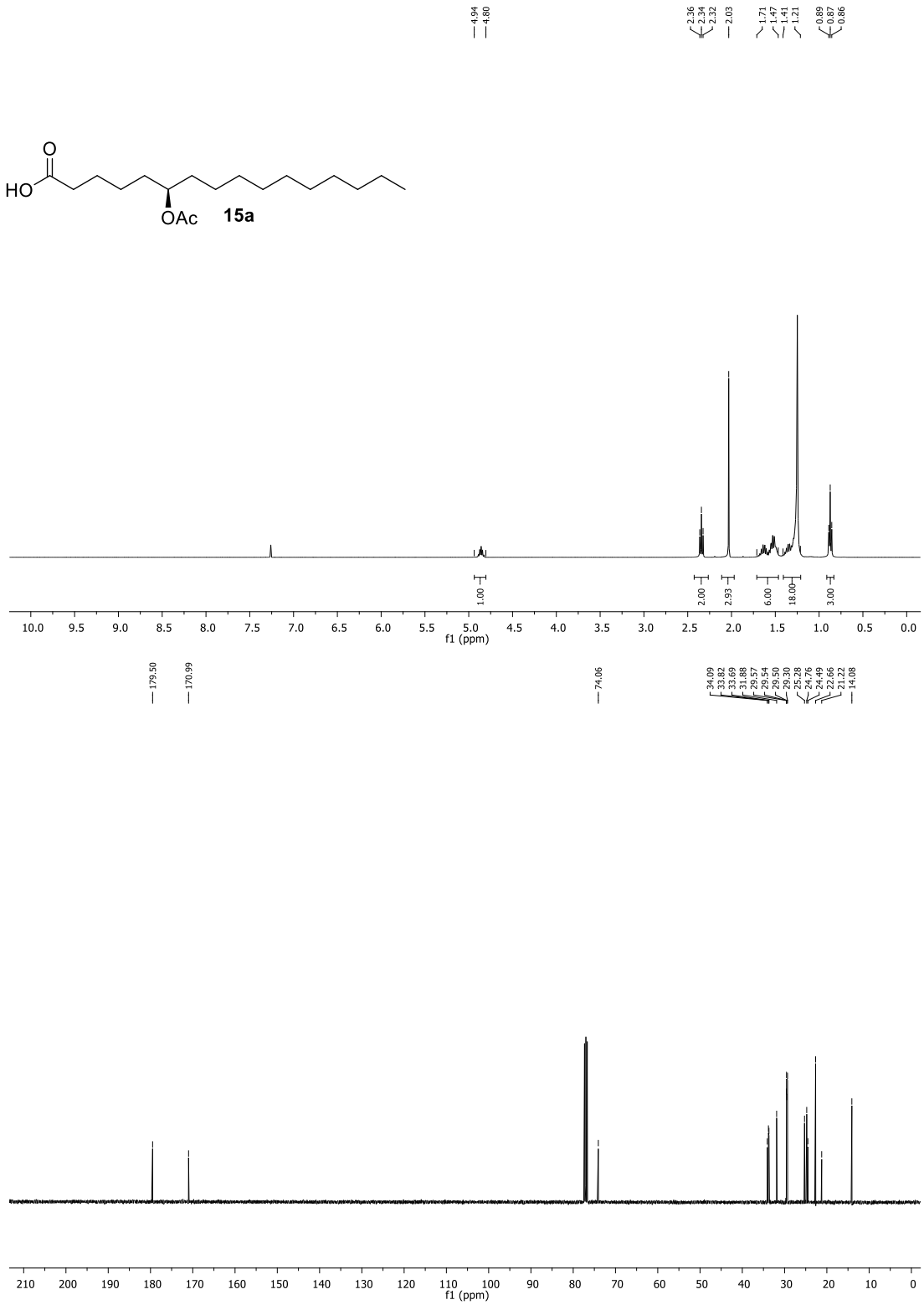

HO
OAc
7b

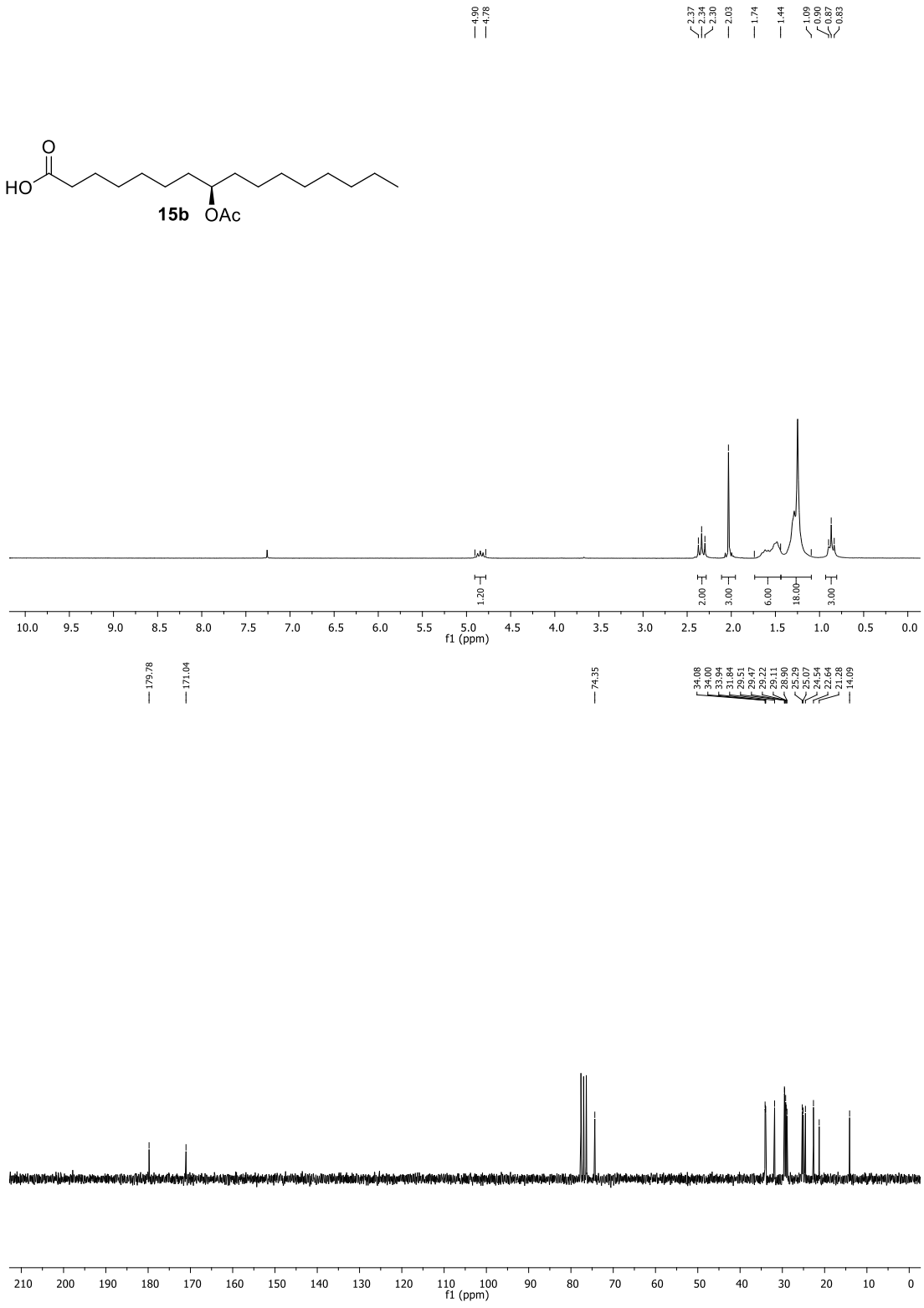
5.55
5.39
5.38
5.23
4.98
4.71
3.64
3.62
3.61
2.36
2.16
2.12
1.91
1.61
1.49
1.40
1.20
0.89
0.87
0.86
0.96
0.94
1.00
2.00
2.00
4.90
5.05
14.00
3.00
f1 (ppm)
170.85
132.79
124.04
73.90
62.89
33.48
32.62
31.91
31.74
29.52
29.17
28.95
27.33
25.58
25.31
22.60
21.23
14.06
f1 (ppm)

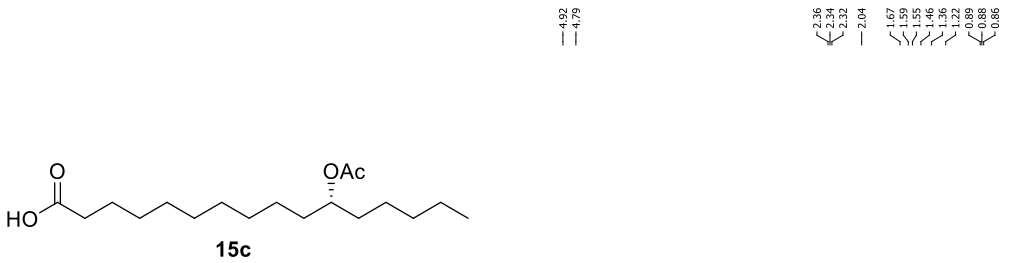

4.91
4.82
3.65
3.63
3.61
2.04
1.60
1.48
1.43
1.18
0.89
0.88
0.86
HO
OAc
22
1.00
2.00
3.00
6.11
24.70
3.00
f1 (ppm)
171.00
74.26
62.79
34.15
34.09
32.61
31.91
29.65
29.63
29.57
29.52
29.33
25.55
25.32
25.04
22.68
21.27
14.10
f1 (ppm)

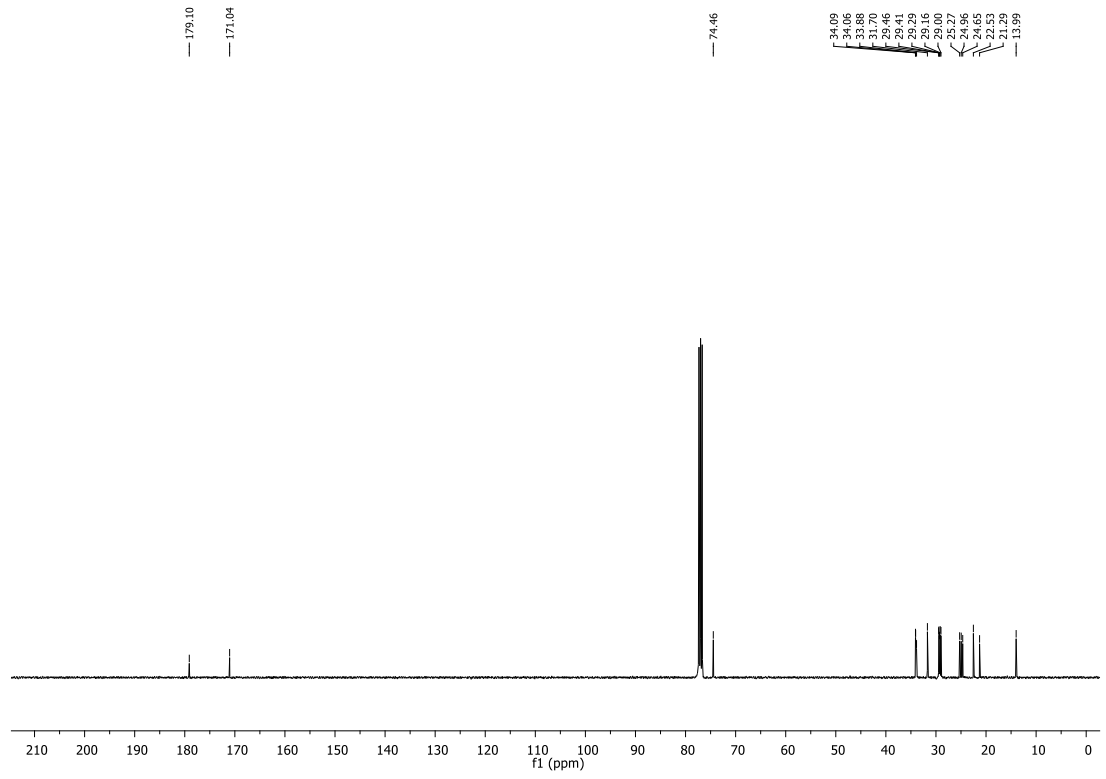

10.14
5.52
5.21
4.91
4.77
2.41
2.19
2.09
1.84
1.73
1.05
0.88
0.85
0.82
HO
O
OAc
8a
1.30
2.35
1.11
4.17
5.01
19.90
3.00
f1 (ppm)
179.81
170.91
132.81
123.89
73.80
33.88
33.29
31.87
31.82
29.52
29.45
29.25
28.79
27.28
24.99
24.46
22.61
21.17
14.05
f1 (ppm)


9.69
5.53
5.22
4.93
4.79
2.40
2.15
2.13
1.84
1.74
1.10
0.89
0.86
0.83
HO
O
OAc
8b
1.27
2.27
1.11
4.00
5.00
16.00
3.00
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
f1 (ppm)
179.88
170.94
132.84
123.92
73.82
33.92
33.30
31.89
31.72
29.50
29.34
28.80
27.30
25.00
24.48
22.59
21.20
14.06
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


4.94
4.80
2.36
2.34
2.32
2.03
1.71
1.47
1.41
1.21
0.89
0.87
0.86
HO
O
OAc
15a
1.00
2.00
2.93
6.00
18.00
3.00
f1 (ppm)
179.50
170.99
74.06
34.09
33.82
33.69
31.88
29.57
29.54
29.50
29.30
25.28
24.76
24.69
22.66
21.22
14.08
f1 (ppm)


4.90
4.78
2.37
2.34
2.30
2.03
1.74
1.44
1.09
0.90
0.87
0.83
O
HO
15b OAc
1.20
2.00
3.00
6.00
18.00
3.00
f1 (ppm)
179.78
171.04
74.35
34.08
34.00
33.94
31.84
29.51
29.47
29.22
29.11
28.90
28.29
25.07
24.54
22.64
21.28
14.09
f1 (ppm)


4.92
4.79
2.36
2.34
2.32
2.04
1.67
1.59
1.55
1.46
1.36
1.22
0.89
0.88
0.86
O
OAc
HO
15c
1.00
2.00
3.00
2.24
4.00
18.04
3.00
f1 (ppm)


179.10
171.04
74.46
34.09
34.06
33.88
31.70
29.46
29.41
29.29
29.16
29.00
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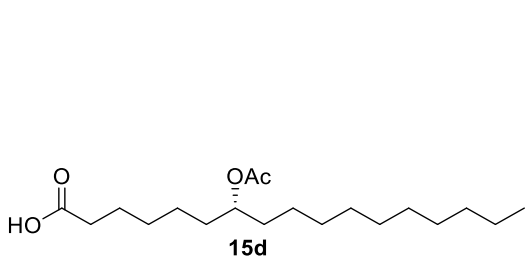
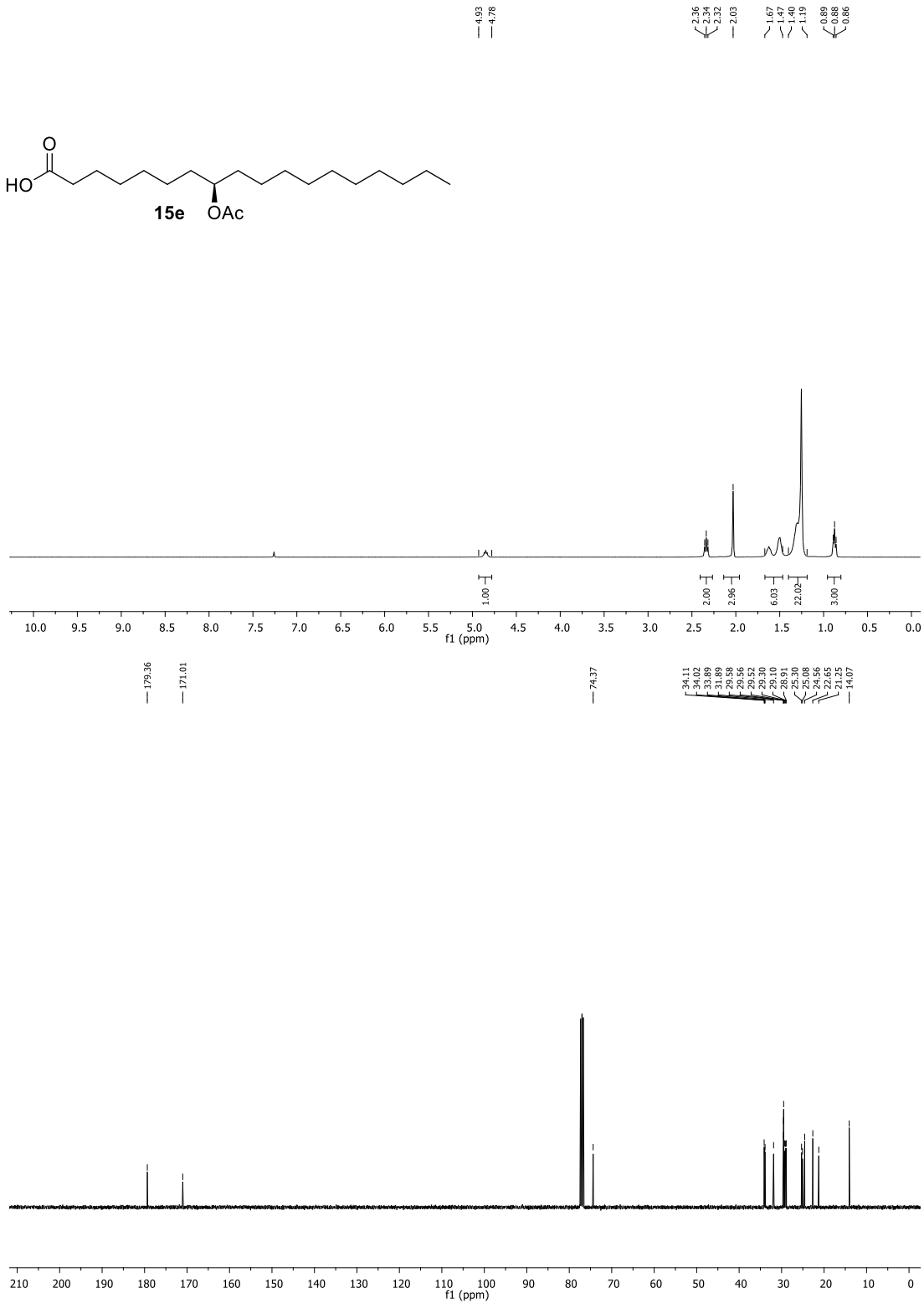
24.65
22.53
21.29
13.99
f1 (ppm)


O
OAc
HO

15d

4.93
4.79
2.37
2.35
2.33
2.04
1.68
1.60
1.58
1.45
1.41
1.18
0.89
0.88
0.86
0.83
1.90
2.83
2.17
4.00
20.00
3.00
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
f1 (ppm)
179.13
171.01
74.25
34.12
33.87
33.78
31.89
29.58
29.56
29.51
29.31
28.99
25.30
24.94
24.52
22.67
21.26
14.10
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


4.93
4.78
2.36
2.34
2.32
2.03
1.67
1.47
1.40
1.19
0.89
0.88
0.86
O
HO
15e
OAc
1.00
2.00
2.96
6.03
22.02
3.00
f1 (ppm)
179.36
171.01
74.37
34.11
34.02
33.89
31.89
29.58
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29.10
29.01
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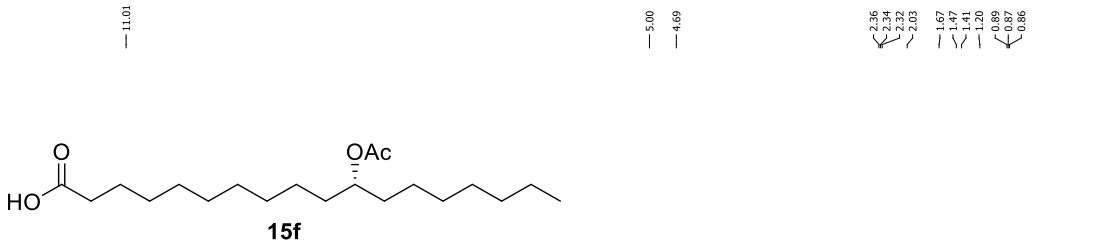
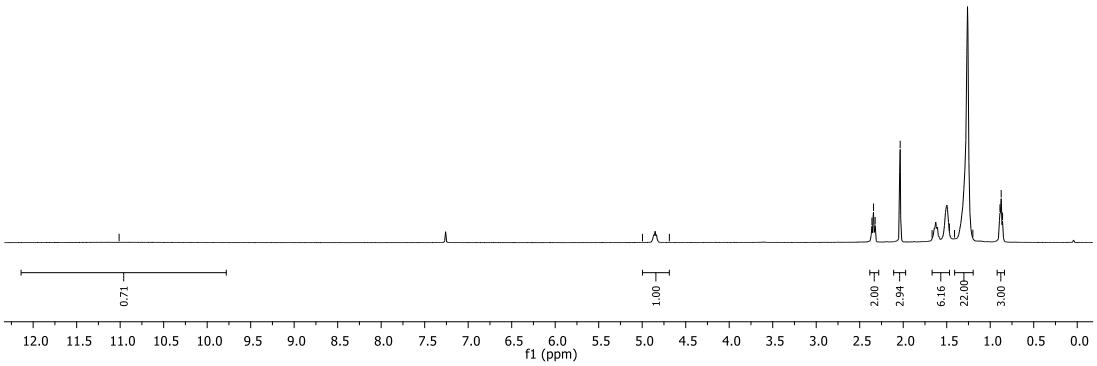
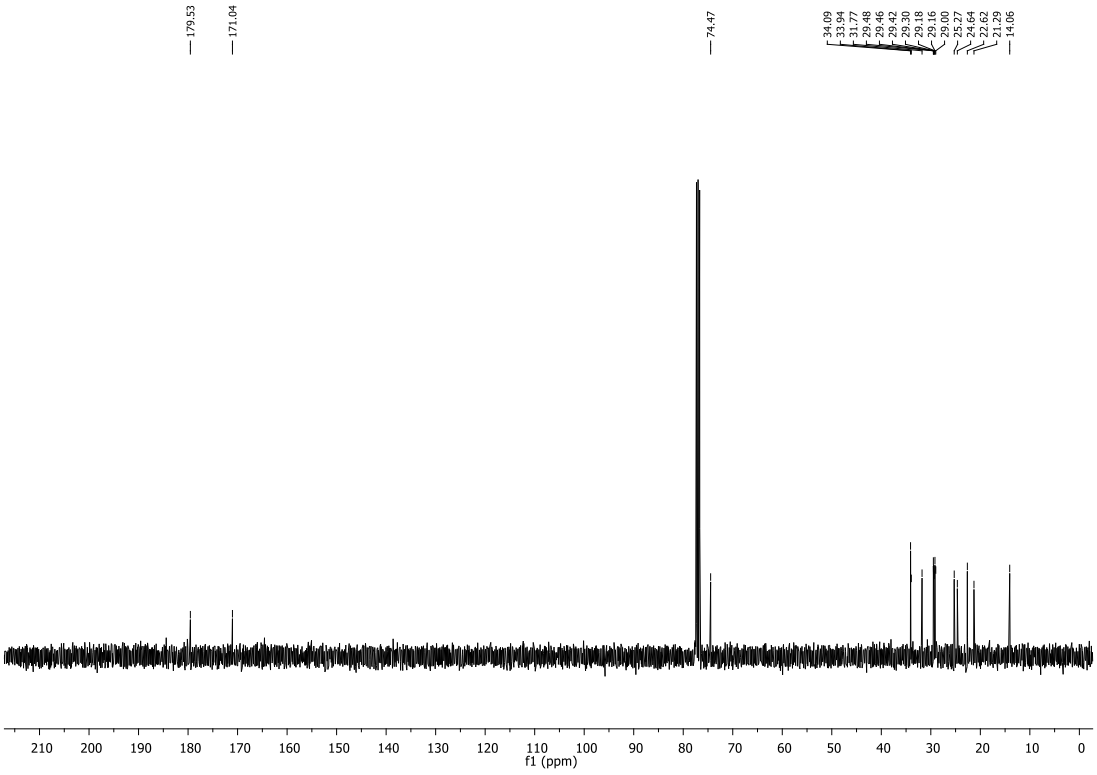
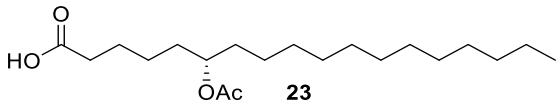
25.08
24.56
22.65
21.25
14.07
f1 (ppm)


11.01
5.00
4.69
2.36
2.34
2.32
2.03
1.67
1.47
1.41
1.20
0.89
0.87
0.86
O
OAc
HO

15f

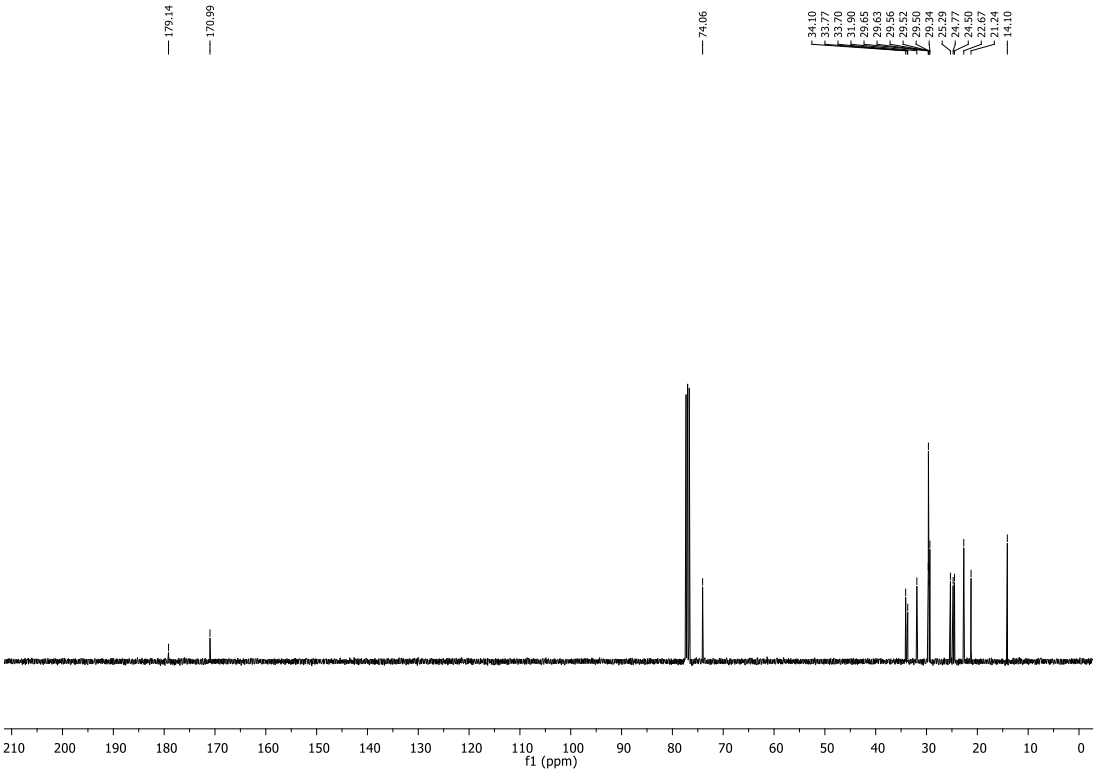

0.71
1.00
2.00
2.94
6.16
22.00
3.00
12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

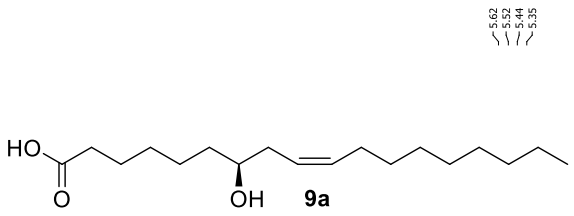

179.53
171.04
74.47
34.09
33.94
31.77
29.48
29.46
29.42
29.30
29.18
29.16
29.00
25.77
24.64
22.62
21.29
14.06
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


HO
O
OAc

23

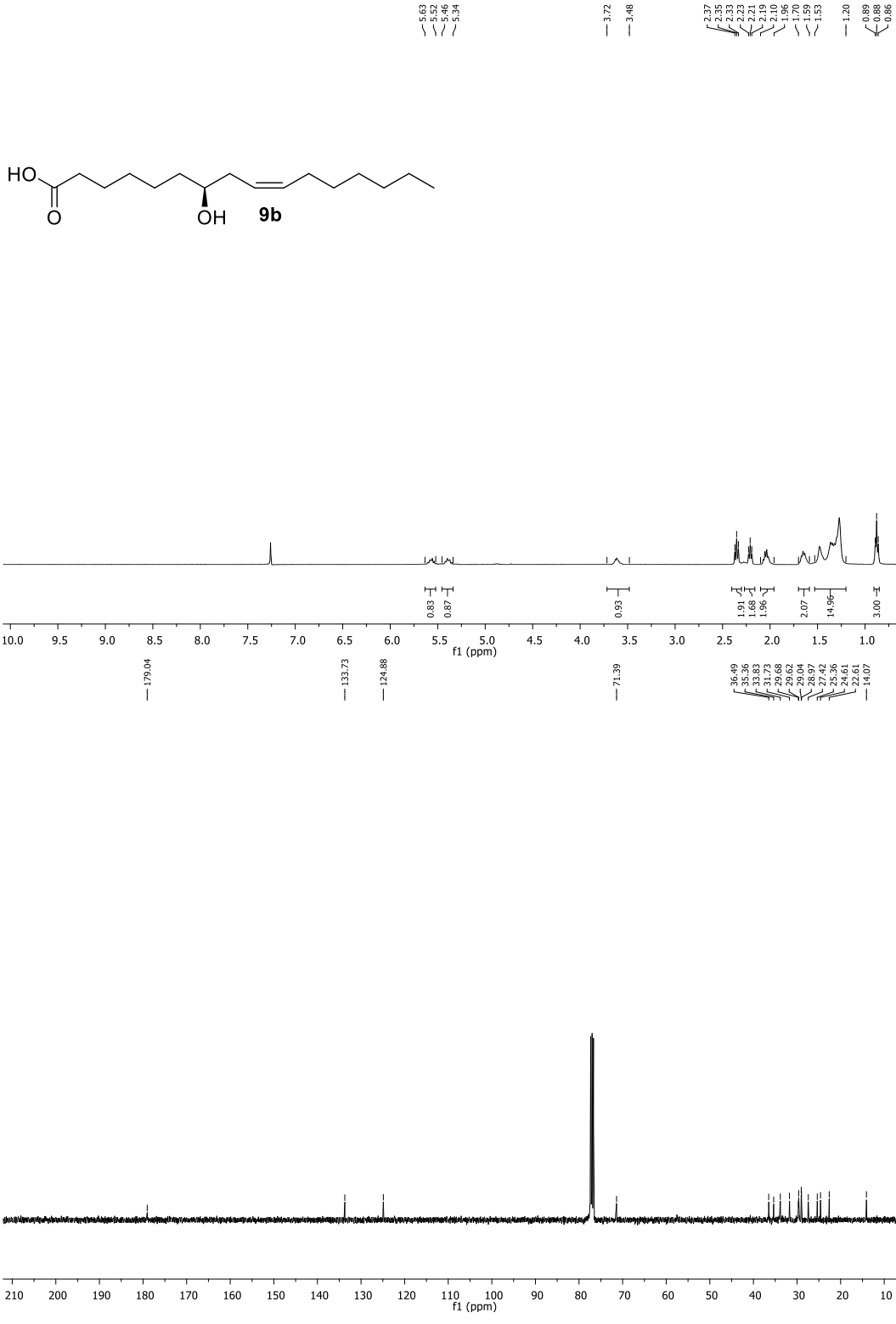
4.92
4.78
2.37
2.35
2.33
2.03
1.68
1.49
1.40
1.22
0.89
0.88
0.86
1.00
2.00
3.00
6.12
22.01
3.00
f1 (ppm)

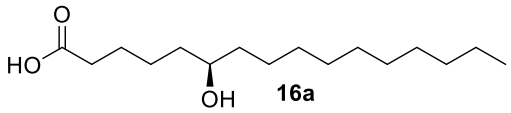

179.14
170.99
74.06
34.10
33.77
33.70
31.90
29.65
29.63
29.56
29.52
29.50
29.34
25.29
24.77
24.50
22.67
21.24
14.10
f1 (ppm)


HO
O
OH

9a

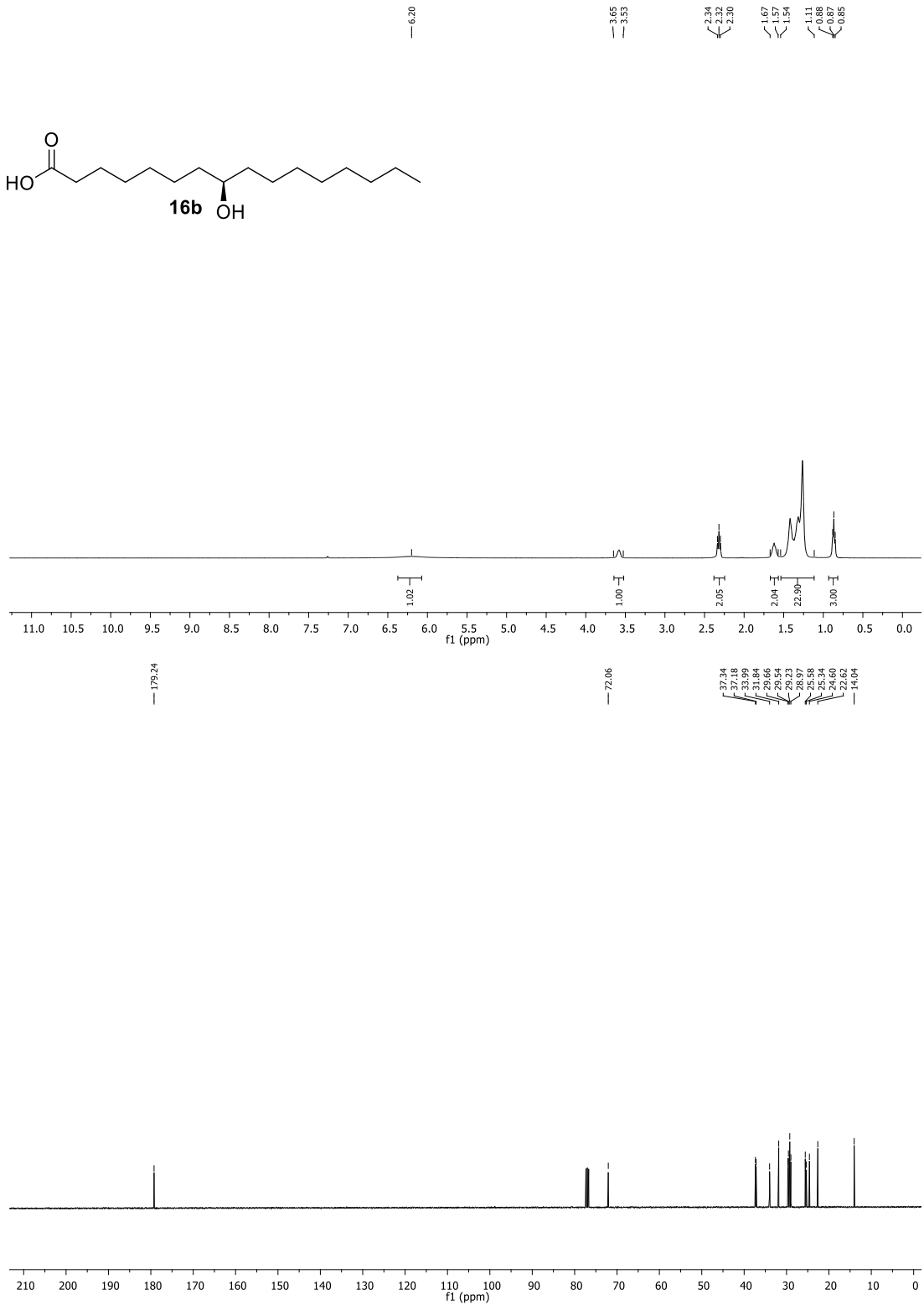
5.62
5.52
5.44
5.35
3.65
3.57
2.37
2.36
2.34
2.23
2.21
2.20
2.09
2.01
1.70
1.61
1.56
1.19
0.90
0.88
0.86
1.00
1.02
1.00
2.00
1.91
2.00
2.00
18.81
3.00
f1 (ppm)
179.01
133.74
124.89
71.39
36.52
35.38
33.81
31.87
29.66
29.49
29.32
29.27
29.05
27.43
25.36
24.61
22.66
14.08
f1 (ppm)

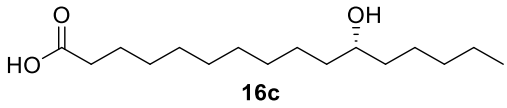

5.63
5.52
5.46
5.34
3.72
3.48
2.37
2.35
2.33
2.23
2.21
2.19
2.10
1.96
1.70
1.59
1.53
1.20
0.89
0.88
0.86
HO
O
OH
9b
0.83
0.87
0.93
1.91
1.68
1.96
2.07
14.96
3.00
f1 (ppm)
179.04
133.73
124.88
71.39
36.49
35.36
33.83
31.73
29.68
29.62
29.04
28.97
27.42
25.36
24.61
22.61
14.07
f1 (ppm)


O
HO
OH

16a

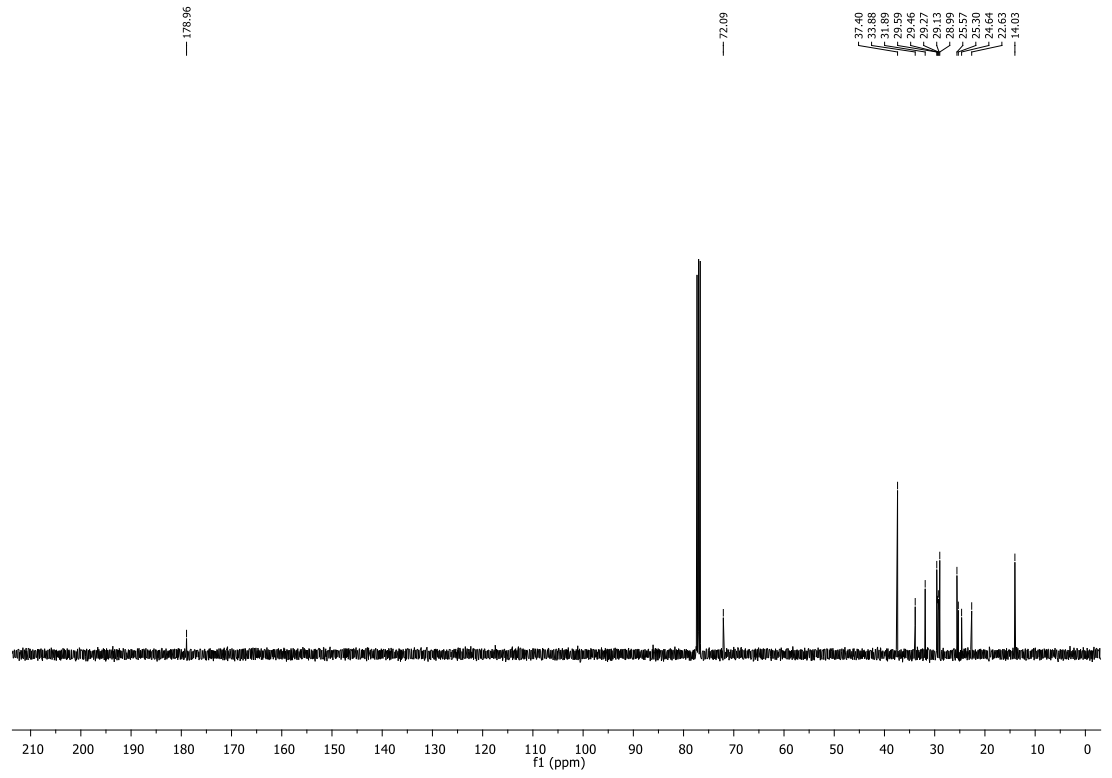
5.76
3.66
3.64
2.37
2.35
2.33
1.73
1.55
1.54
1.08
0.89
0.87
0.85
1.20
1.00
1.91
2.10
22.95
3.00
f1 (ppm)
179.09
71.79
37.42
36.83
33.93
31.88
29.65
29.59
29.31
25.60
25.06
24.64
22.65
14.07
f1 (ppm)

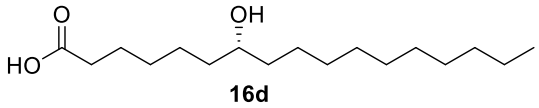

6.20
3.65
3.53
2.34
2.32
2.30
1.67
1.57
1.54
1.11
0.88
0.87
0.85
O
HO
16b
OH
1.02
1.00
2.05
2.04
22.90
3.00
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)
179.24
72.06
37.34
37.18
33.99
31.84
29.66
29.54
29.23
28.97
25.58
25.34
24.60
22.62
14.04
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


O
OH
HO

16c

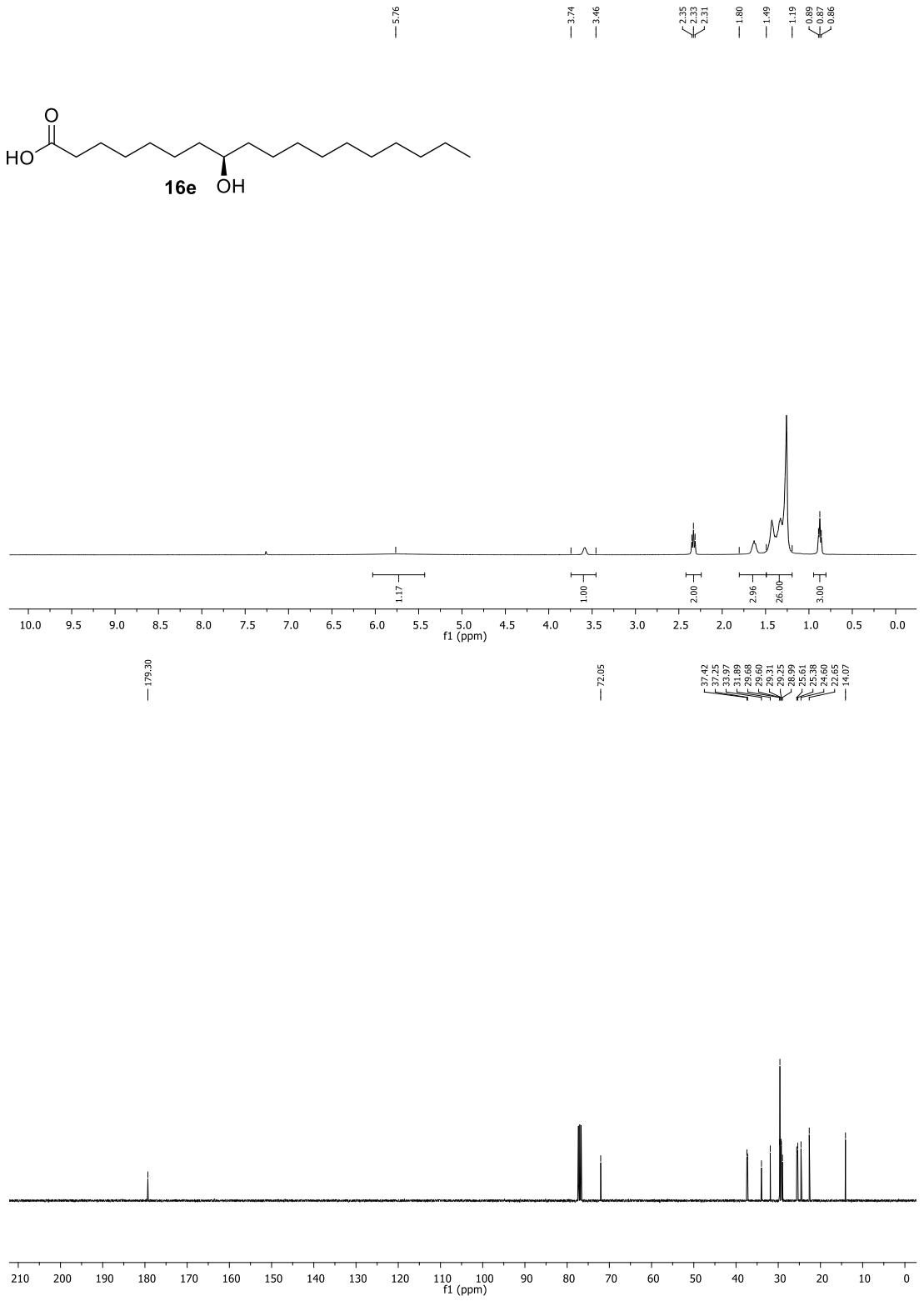
3.64
3.55
2.36
2.34
2.32
1.72
1.52
1.50
1.19
0.91
0.89
0.87
1.00
2.00
1.86
23.00
3.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

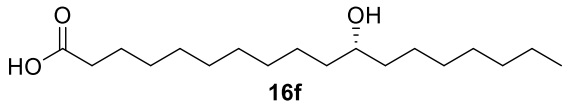

178.96
72.09
37.40
33.88
31.89
29.59
29.46
29.27
29.13
28.99
25.57
25.30
24.64
22.63
14.03
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


O
OH
HO

16d

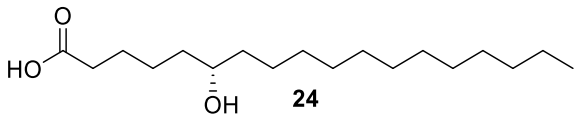
5.29
3.64
3.54
2.36
2.34
2.32
1.70
1.59
1.56
1.08
0.89
0.88
0.86
1.13
1.00
2.00
2.00
24.56
3.00
f1 (ppm)
179.14
71.99
37.45
37.08
33.90
31.89
29.68
29.60
29.31
29.06
25.61
25.22
24.63
22.66
14.07
f1 (ppm)


5.76
3.74
3.46
2.35
2.33
2.31
1.80
1.49
1.19
0.89
0.87
0.86
HO
O
OH
16e
1.17
1.00
2.00
2.96
26.00
3.00
f1 (ppm)
179.30
72.05
37.42
37.25
33.97
31.89
29.68
29.60
29.31
29.25
28.99
25.61
25.38
24.60
22.65
14.07
f1 (ppm)


O
OH
HO

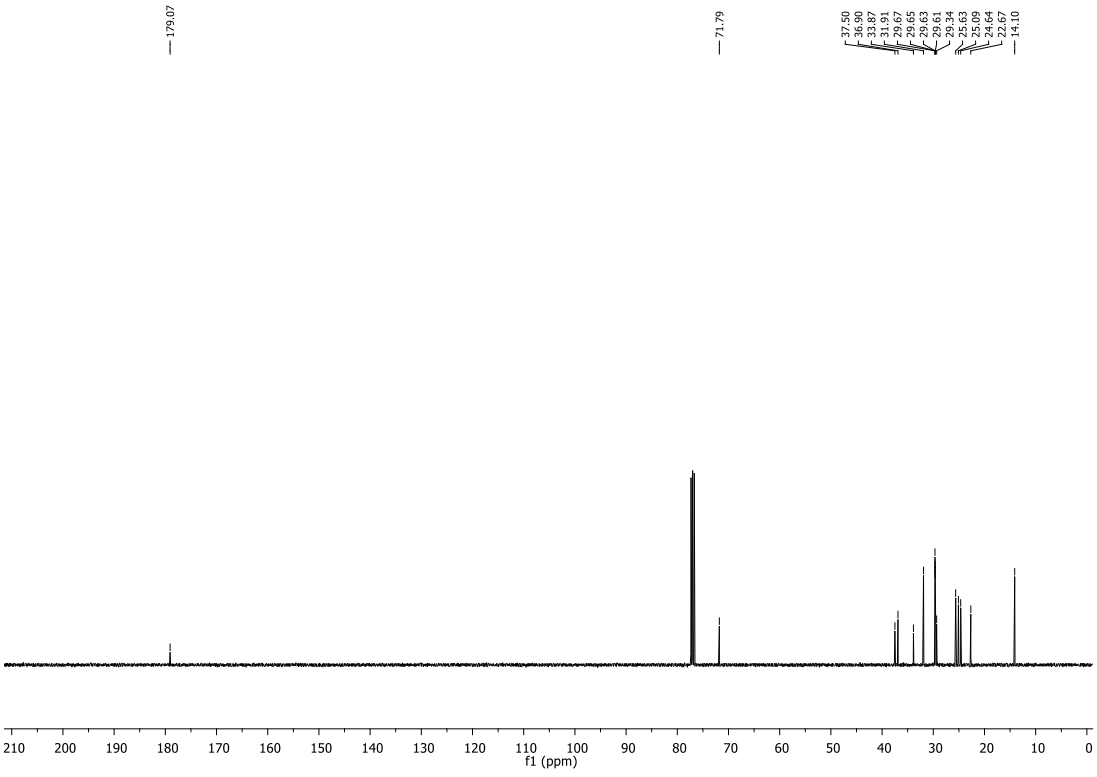
16f

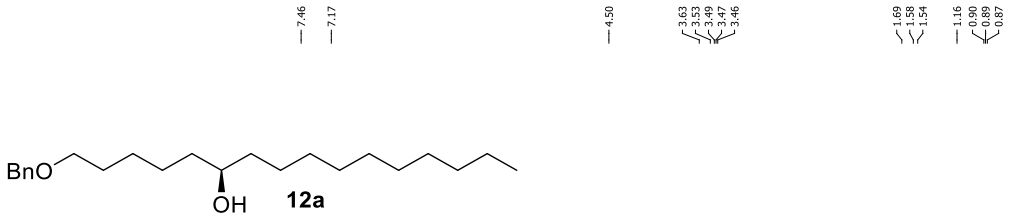
3.63
3.54
2.36
2.34
2.33
1.69
1.59
1.55
1.09
1.00
0.88
0.86
1.00
2.00
2.03
27.00
3.00
f1 (ppm)
179.00
72.09
37.44
37.40
33.89
31.82
29.65
29.59
29.46
29.28
29.13
28.99
25.63
25.58
24.65
22.64
14.08
f1 (ppm)

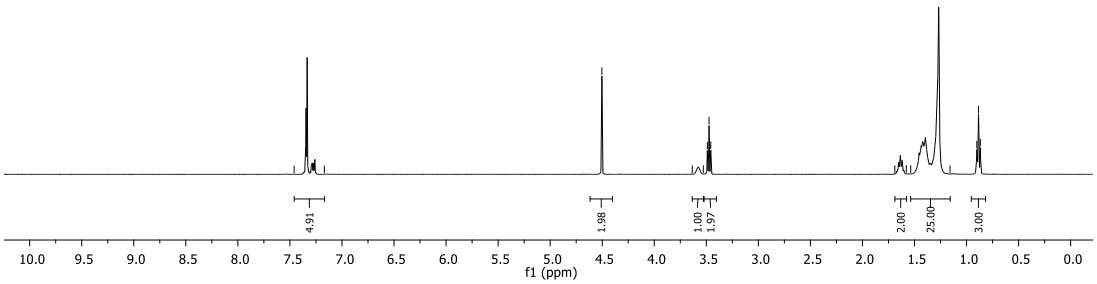

O
HO
OH

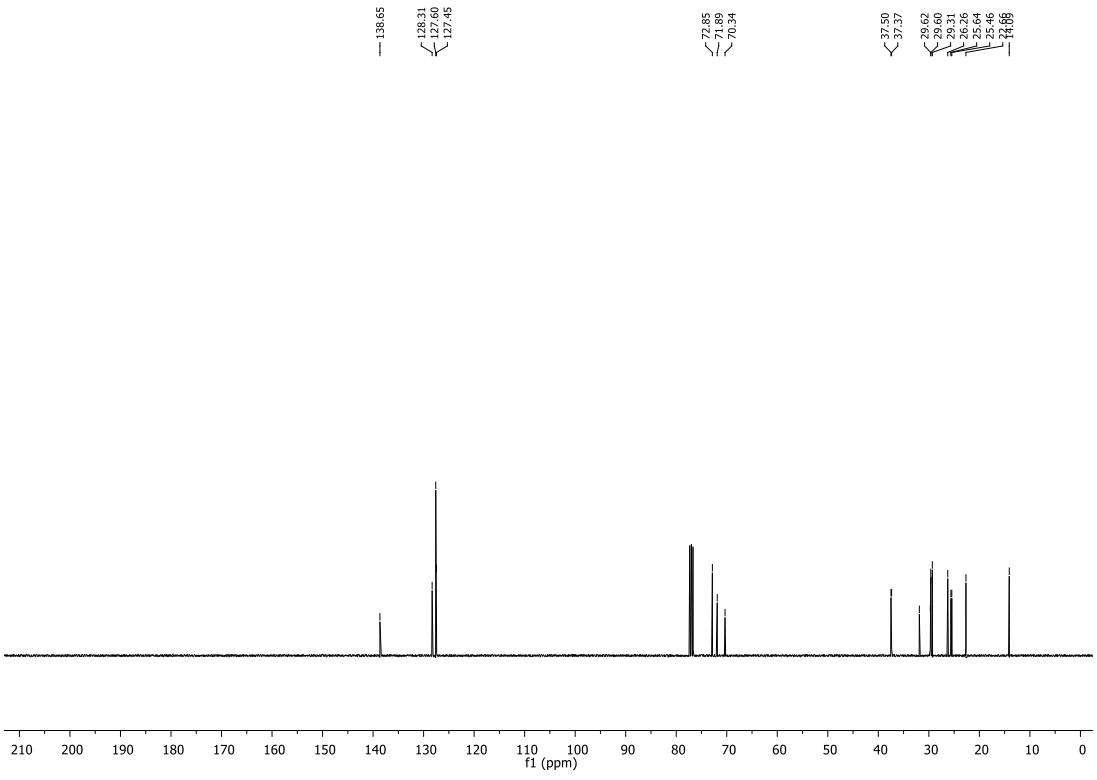
24

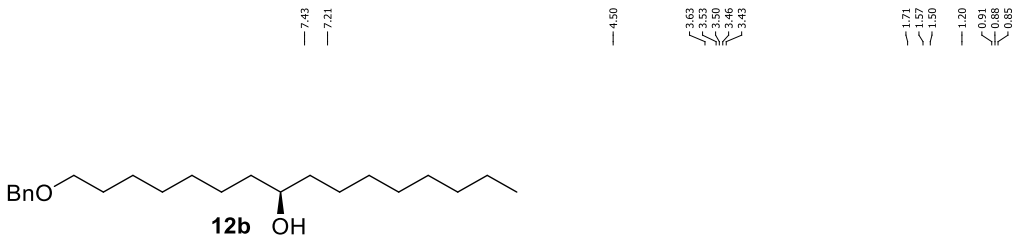
3.64
3.56
2.38
2.37
2.35
1.73
1.60
1.58
1.02
0.89
0.88
0.86
1.00
2.00
2.00
26.60
3.00
f1 (ppm)


179.07
71.79
37.50
36.90
33.87
31.91
29.67
29.65
29.63
29.61
29.34
25.63
25.09
24.64
22.67
14.10
f1 (ppm)

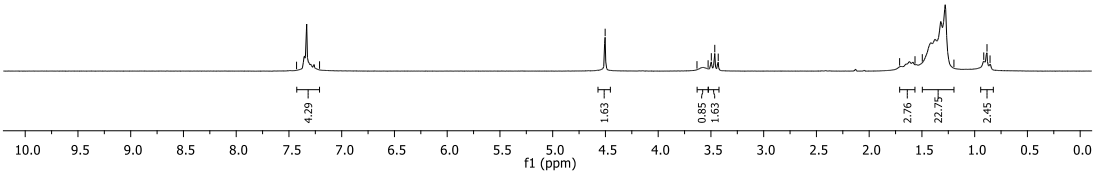

7.46
7.17
4.50
3.63
3.53
3.49
3.47
3.46
1.69
1.58
1.54
1.16
0.90
0.89
0.87
BnO
OH
12a

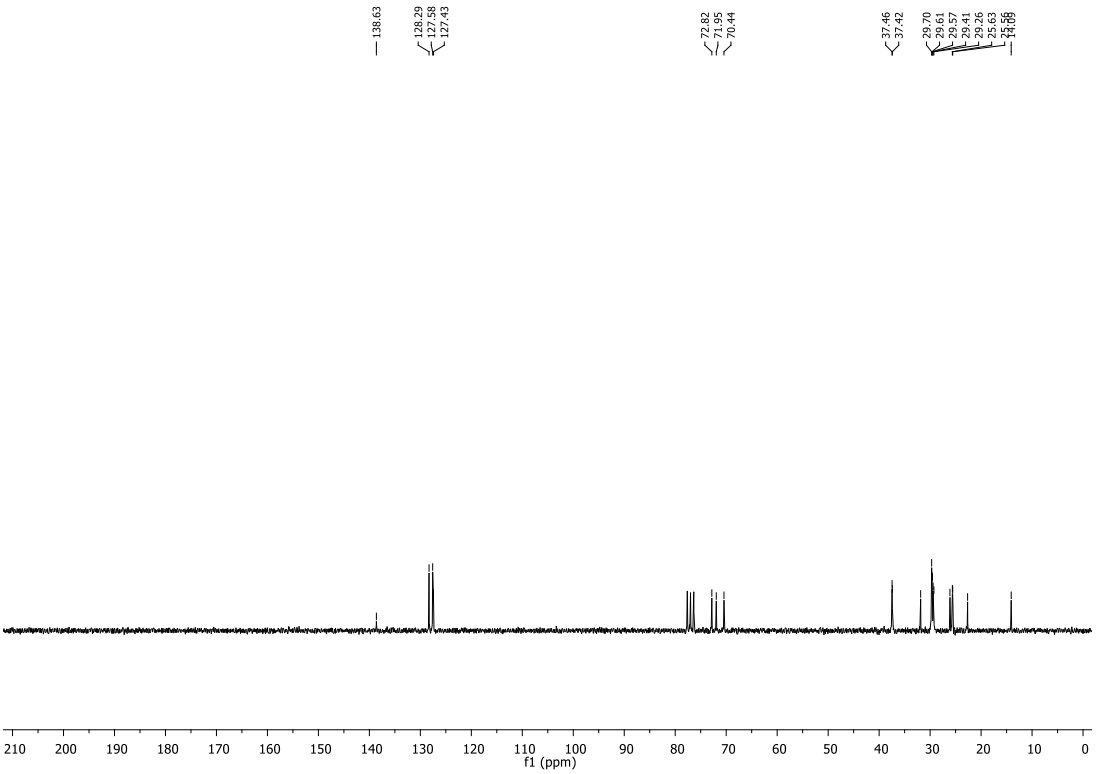

4.91
1.98
1.00
1.97
2.00
25.00
3.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

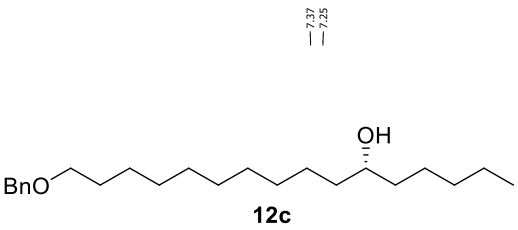

138.65
128.31
127.60
127.45
72.85
71.89
70.34
37.50
37.37
29.62
29.60
29.31
26.26
25.64
25.46
14.08
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


7.43
7.21
4.50
3.63
3.53
3.50
3.46
3.43
1.71
1.57
1.50
1.20
0.91
0.88
0.85
BnO
OH

12b

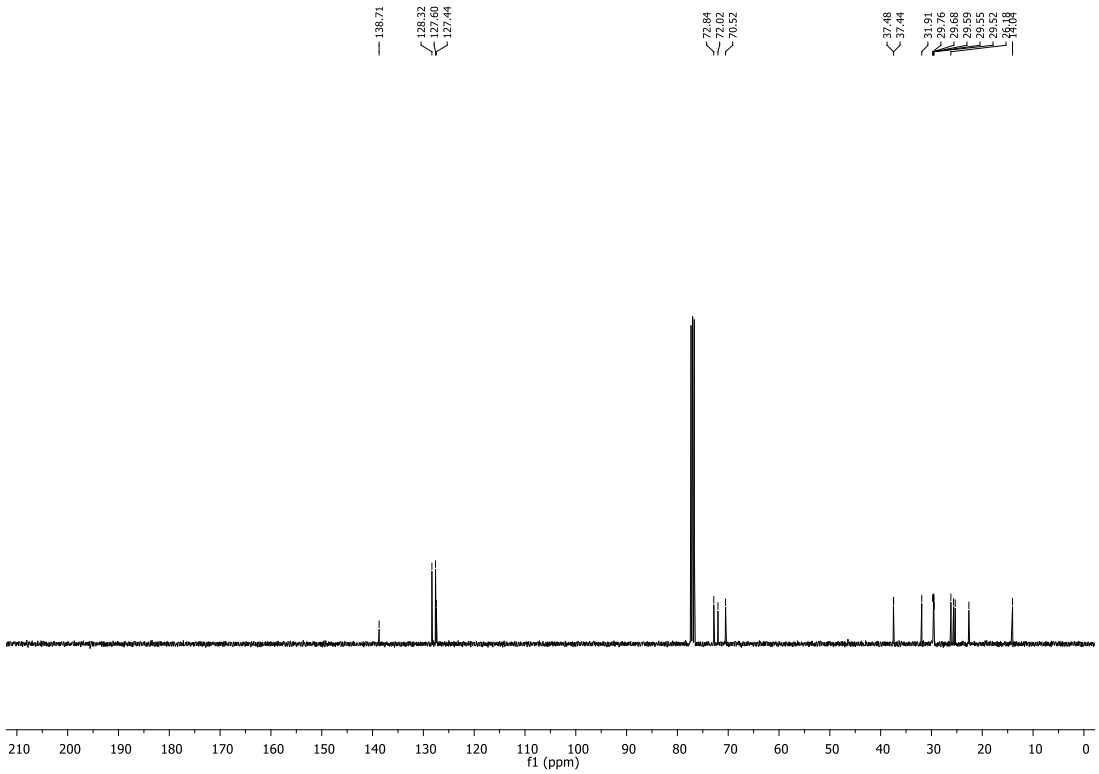

4.29
1.63
0.85
1.63
2.76
22.75
2.45
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

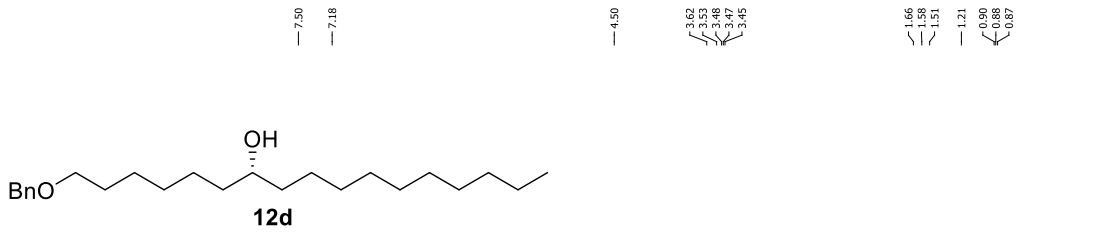

138.63
128.29
127.58
127.43
72.82
71.95
70.44
37.46
37.42
29.70
29.61
29.57
29.41
29.26
25.63
14.09
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


OH
BnO

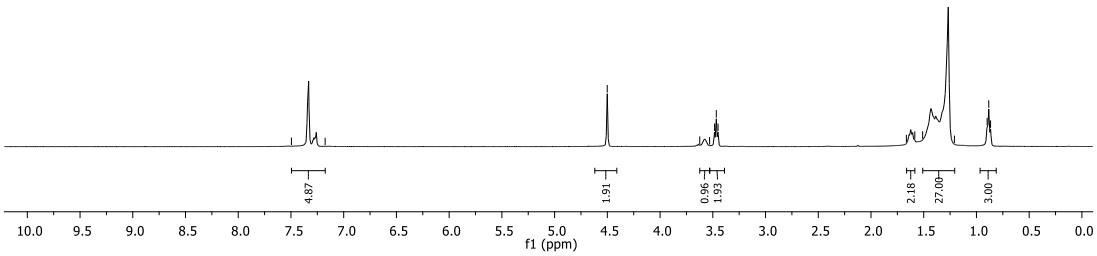
12c

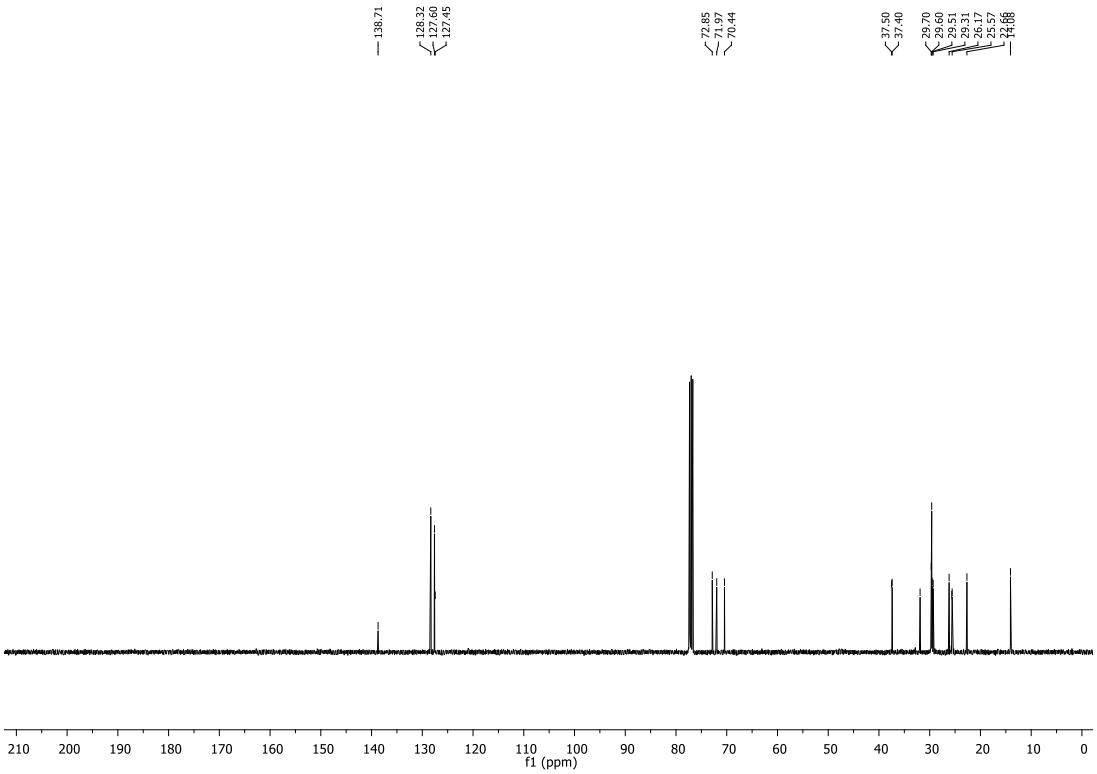
7.37
7.25
4.50
3.67
3.52
3.48
3.46
3.44
1.65
1.57
1.50
1.23
0.91
0.89
0.88
5.24
2.00
1.00
2.00
2.18
25.00
3.00
f1 (ppm)

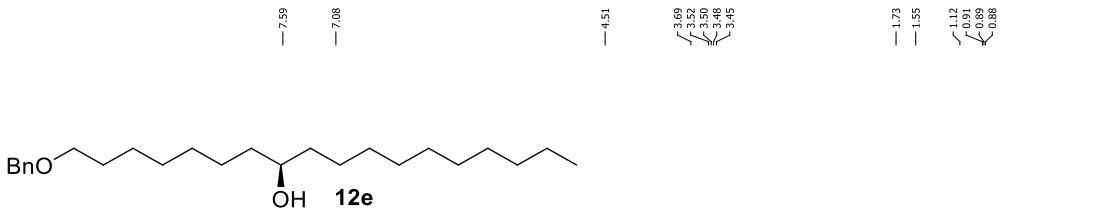

138.71
128.32
127.60
127.44
72.84
72.02
70.52
37.48
37.44
31.91
29.76
29.68
29.59
29.55
29.52
25.08
14.04
f1 (ppm)

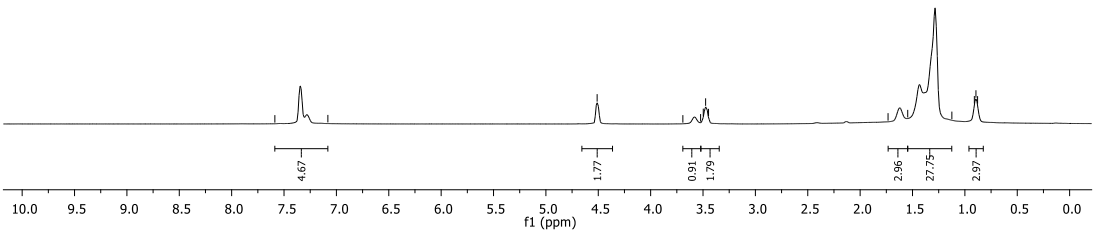

7.50
7.18
4.50
3.62
3.53
3.48
3.47
3.45
1.66
1.58
1.51
1.21
0.90
0.88
0.87
OH
BnO

12d

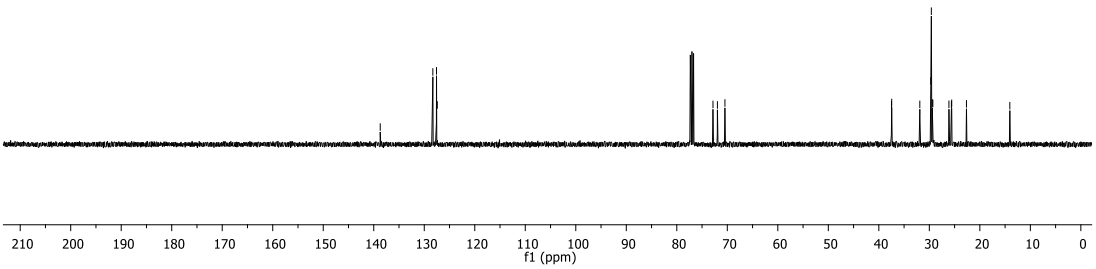

4.87
1.91
0.96
1.93
2.18
27.00
3.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

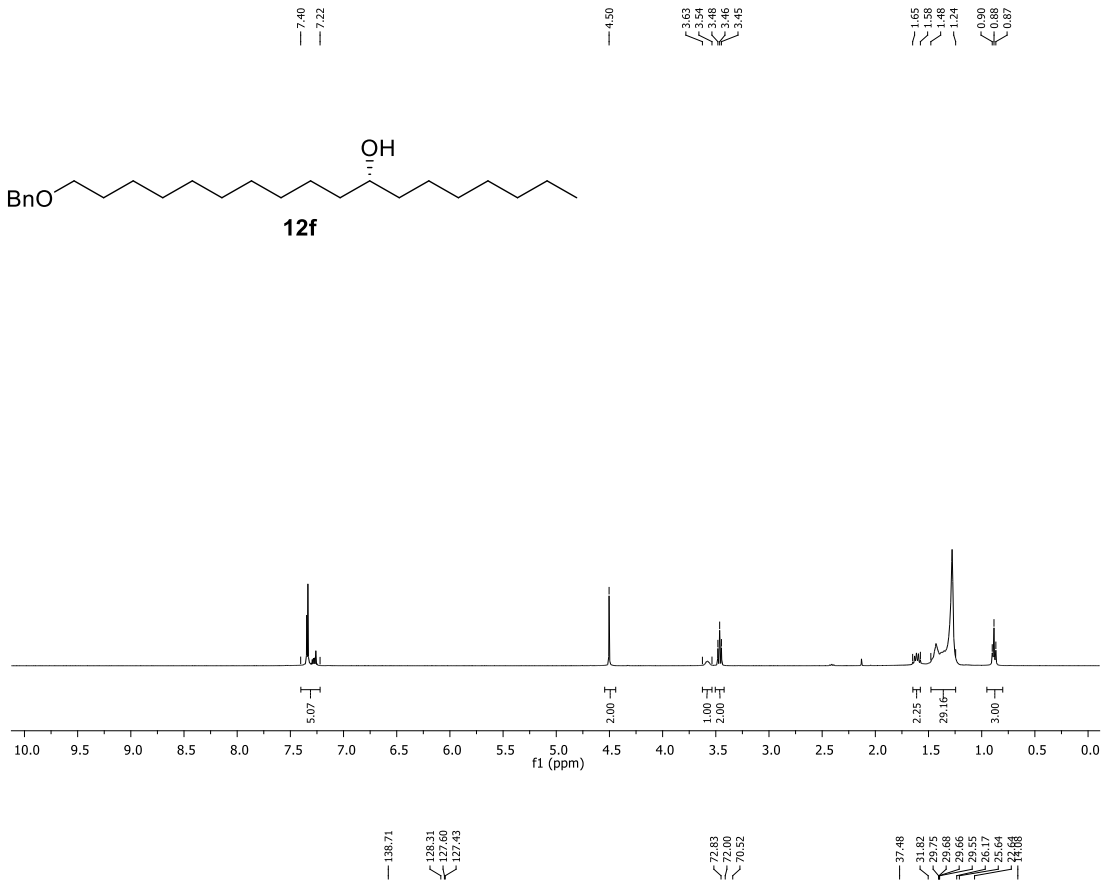

138.71
128.32
127.60
127.45
72.85
71.97
70.44
37.50
37.40
29.70
29.60
29.51
29.31
26.17
25.57
14.08
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

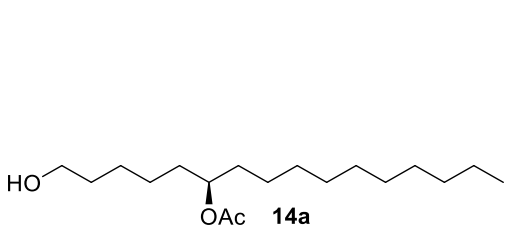

7.59
7.08
4.51
3.69
3.52
3.50
3.48
3.45
1.73
1.55
1.12
0.91
0.89
0.88
BnO
OH
12e


4.67
1.77
0.91
1.79
2.96
27.75
2.97
f1 (ppm)


138.72
128.30
127.58
127.42
72.83
71.96
70.47
37.49
37.45
29.71
29.60
29.41
29.30
26.12
25.57
14.08

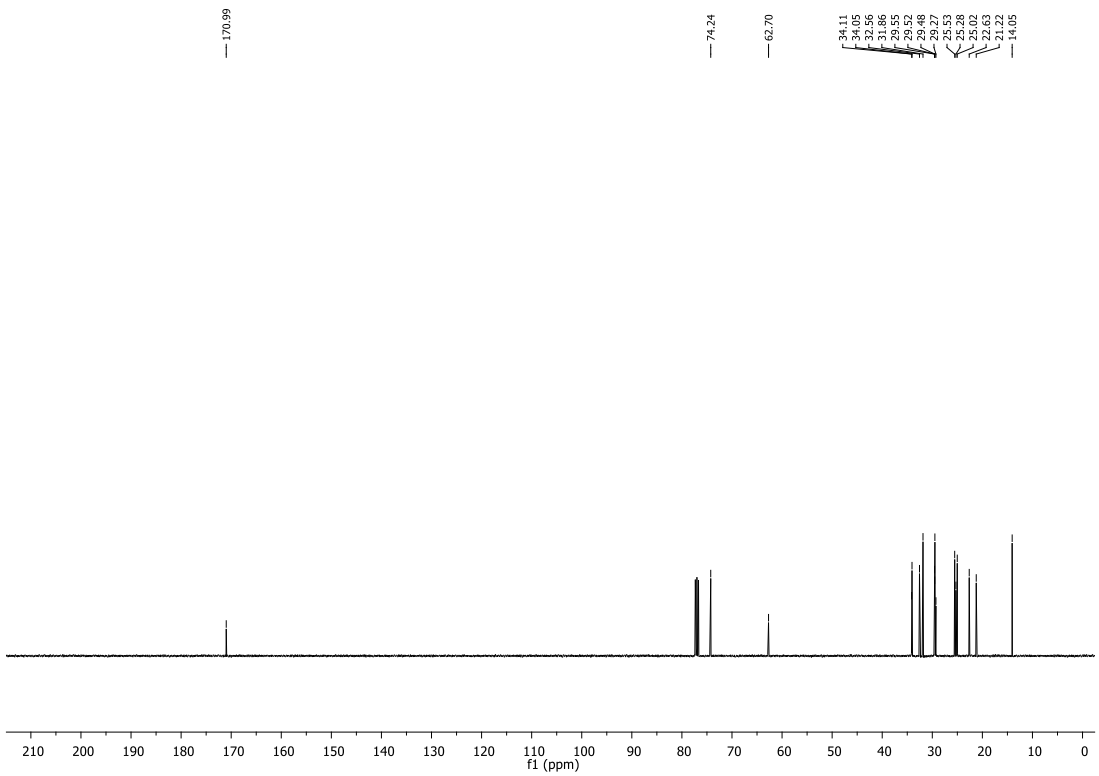

f1 (ppm)

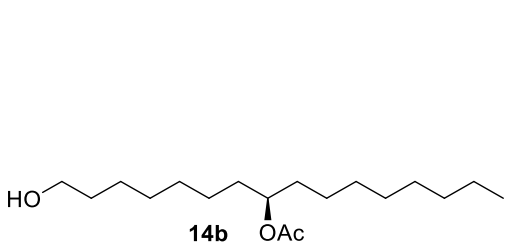

7.40
7.22
4.50
3.63
3.54
3.48
3.46
3.45
1.65
1.58
1.48
1.24
0.90
0.88
0.87
OH
BnO
12f
5.07
2.00
1.00
2.00
2.25
29.16
3.00
f1 (ppm)
138.71
128.31
127.60
127.43
72.83
72.00
70.52
37.48
31.82
29.75
29.68
29.66
29.55
26.17
25.64
22.64
14.08
f1 (ppm)


HO
OAc

14a

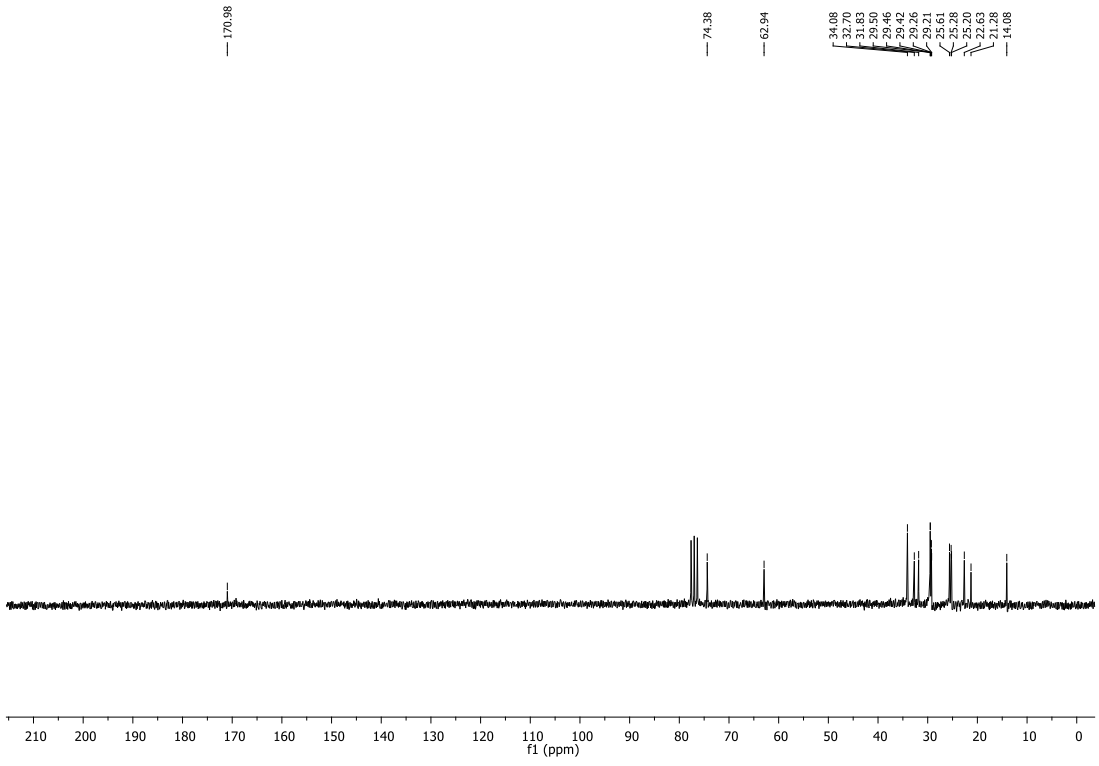
4.94
4.76
3.63
3.61
3.59
2.02
1.67
1.59
1.46
1.40
1.19
0.88
0.86
0.85
1.00
1.95
3.00
1.21
6.07
20.00
3.00
f1 (ppm)

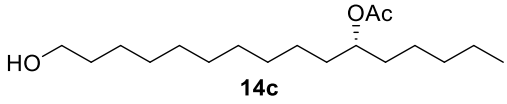

170.99
74.24
62.70
34.11
34.05
32.56
31.86
29.55
29.52
29.48
29.27
25.53
25.28
25.02
22.63
21.22
14.05
f1 (ppm)


HO
OAc

14b

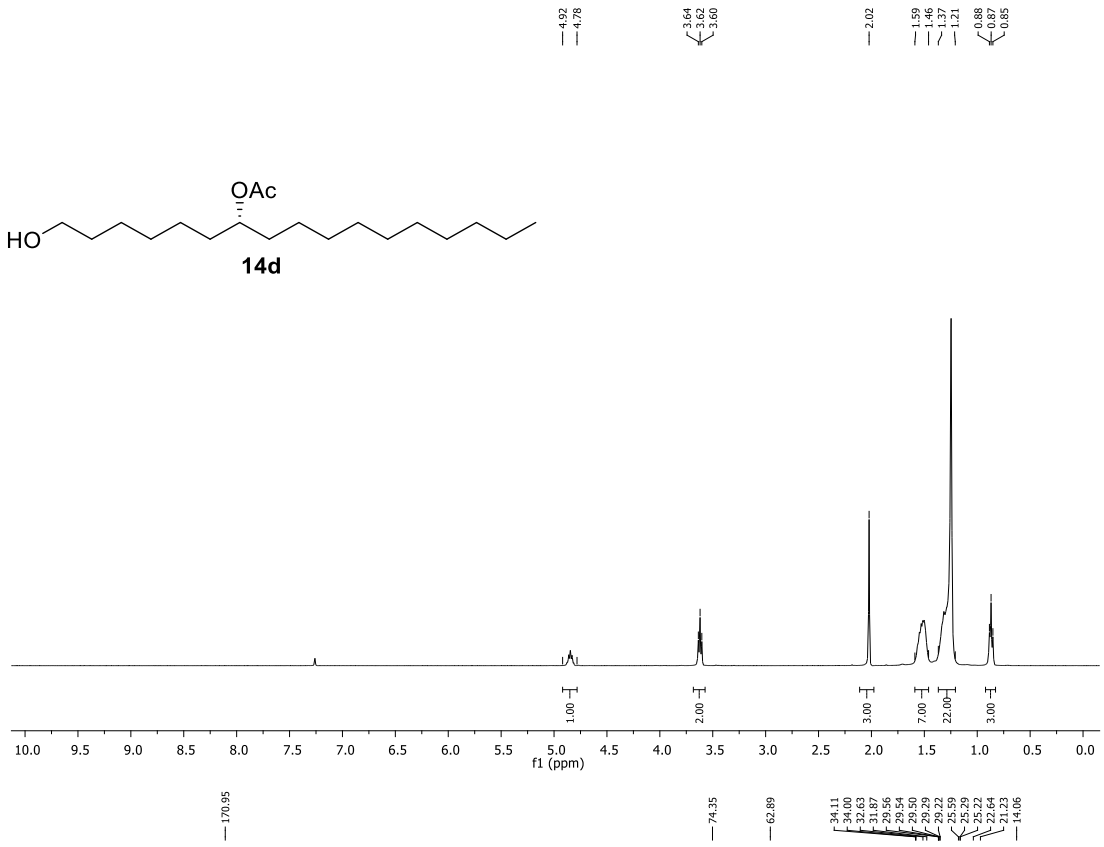
4.91
4.78
3.66
3.63
3.59
2.03
1.61
1.43
1.10
0.90
0.87
0.84
1.14
2.00
2.90
7.00
20.00
3.00
f1 (ppm)

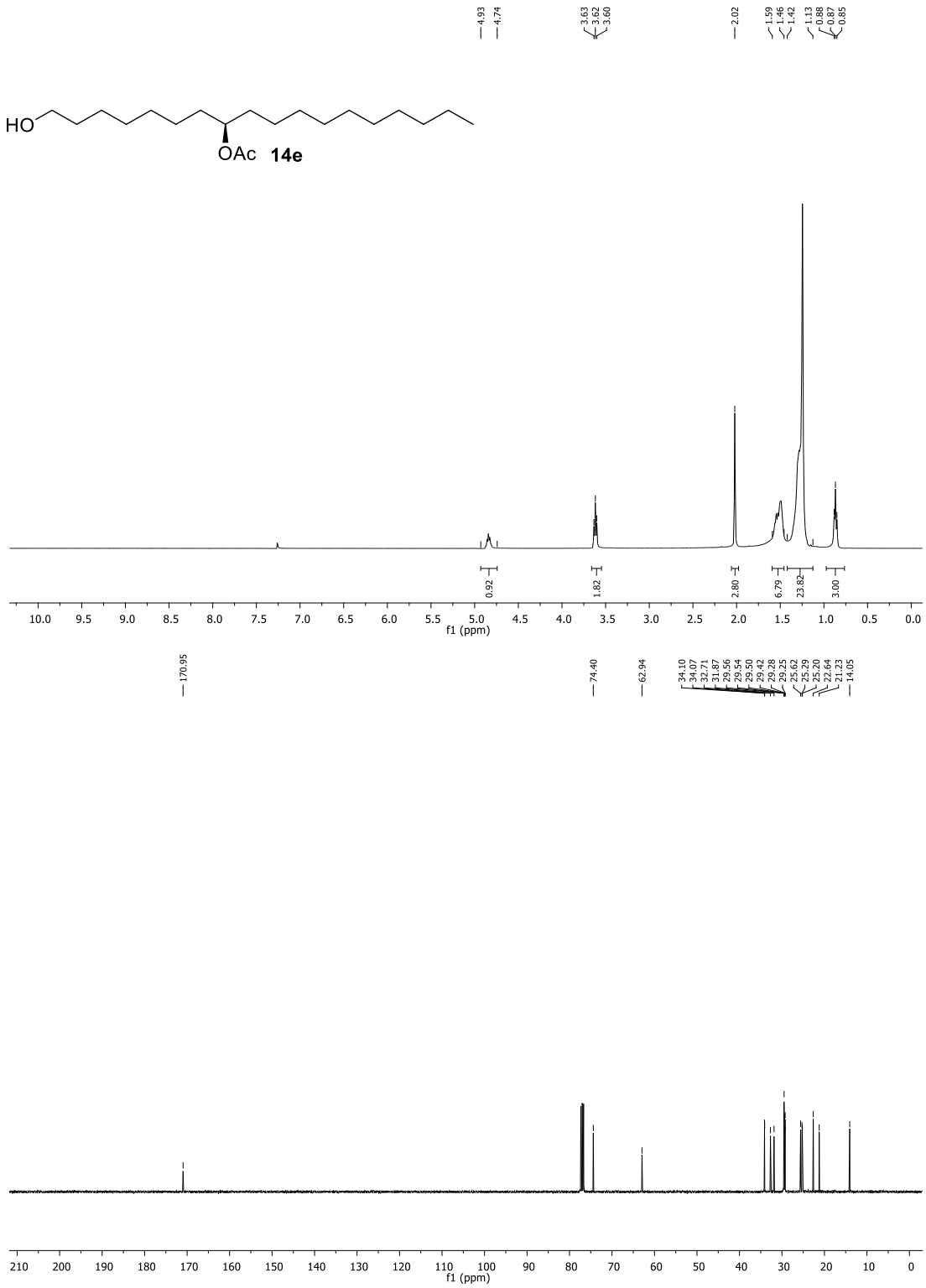

170.98
74.38
62.94
34.08
32.70
31.83
29.50
29.46
29.42
29.26
29.21
25.61
25.28
25.20
22.63
21.28
14.08
f1 (ppm)

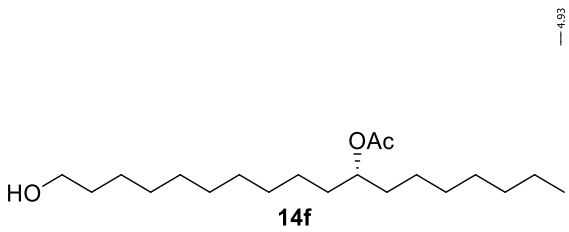

OAc
HO

14c

5.04
4.72
3.65
3.63
3.62
2.03
1.64
1.47
1.37
1.20
0.89
0.87
0.86
1.00
2.00
3.00
7.00
20.00
3.00
f1 (ppm)
170.99
74.44
63.06
34.09
34.06
32.78
31.70
29.52
29.48
29.47
29.44
29.37
25.70
25.28
24.96
22.53
21.29
13.99
f1 (ppm)

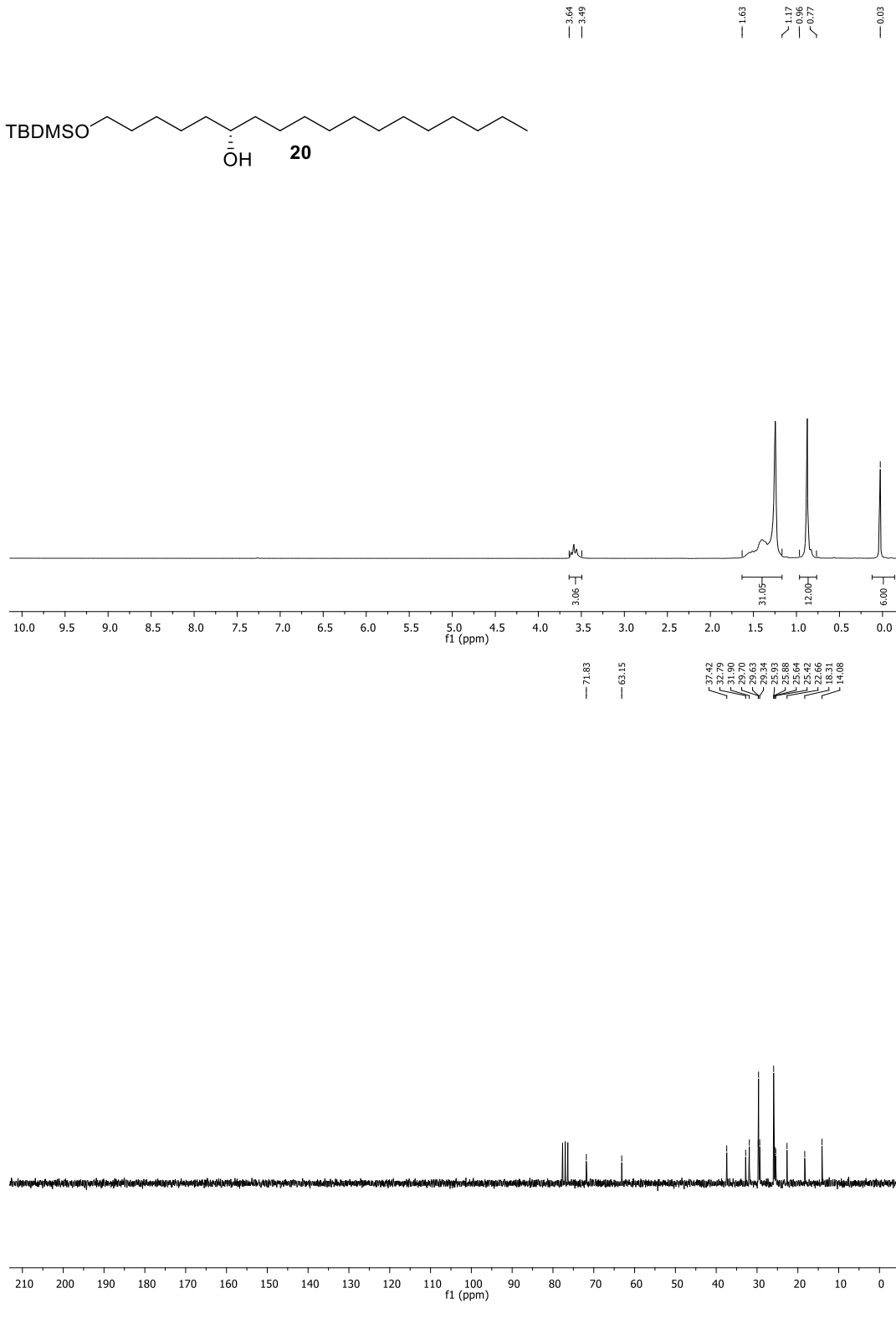

4.92
4.78
3.64
3.62
3.60
2.02
1.59
1.46
1.37
1.21
0.88
0.87
0.85
OAc
HO
14d
1.00
2.00
3.00
7.00
22.00
3.00
f1 (ppm)
170.95
74.35
62.89
34.11
34.00
32.63
31.87
29.56
29.54
29.50
29.29
29.22
25.59
25.29
25.22
22.64
21.23
14.06
f1 (ppm)


4.93
4.74
3.63
3.62
3.60
2.02
1.59
1.46
1.42
1.13
0.88
0.87
0.85
HO
OAc
14e
0.92
1.82
2.80
6.79
23.82
3.00
f1 (ppm)
170.95
74.40
62.94
34.10
34.07
32.71
31.87
29.66
29.54
29.50
29.42
29.28
29.25
25.62
25.29
25.20
22.64
21.23
14.05
f1 (ppm)


OAc
HO

14f

4.93
4.78
3.65
3.63
3.62
2.03
1.60
1.47
1.40
1.19
0.89
0.87
0.85
1.00
1.97
3.00
6.29
25.00
3.00
f1 (ppm)
170.98
74.45
63.05
34.10
32.78
31.77
29.52
29.48
29.46
29.44
29.36
29.18
25.70
25.30
25.28
22.62
21.28
14.06
f1 (ppm)


3.64
3.49
1.63
1.17
0.96
0.77
0.03
TBDMSO
OH
20
3.06
31.05
12.00
6.00
f1 (ppm)
71.83
63.15
37.42
32.79
31.90
29.70
29.63
29.34
25.93
25.88
25.64
25.42
22.66
18.31
14.08
-5.32
f1 (ppm)