Supporting Information

Solvent-controlled regioselective C(5)−H/N(1)−H bond alkylations of indolines and C(6)−H bond alkylations of 1,2,3,4-tetrahydroquinolines with *para*-quinone methides

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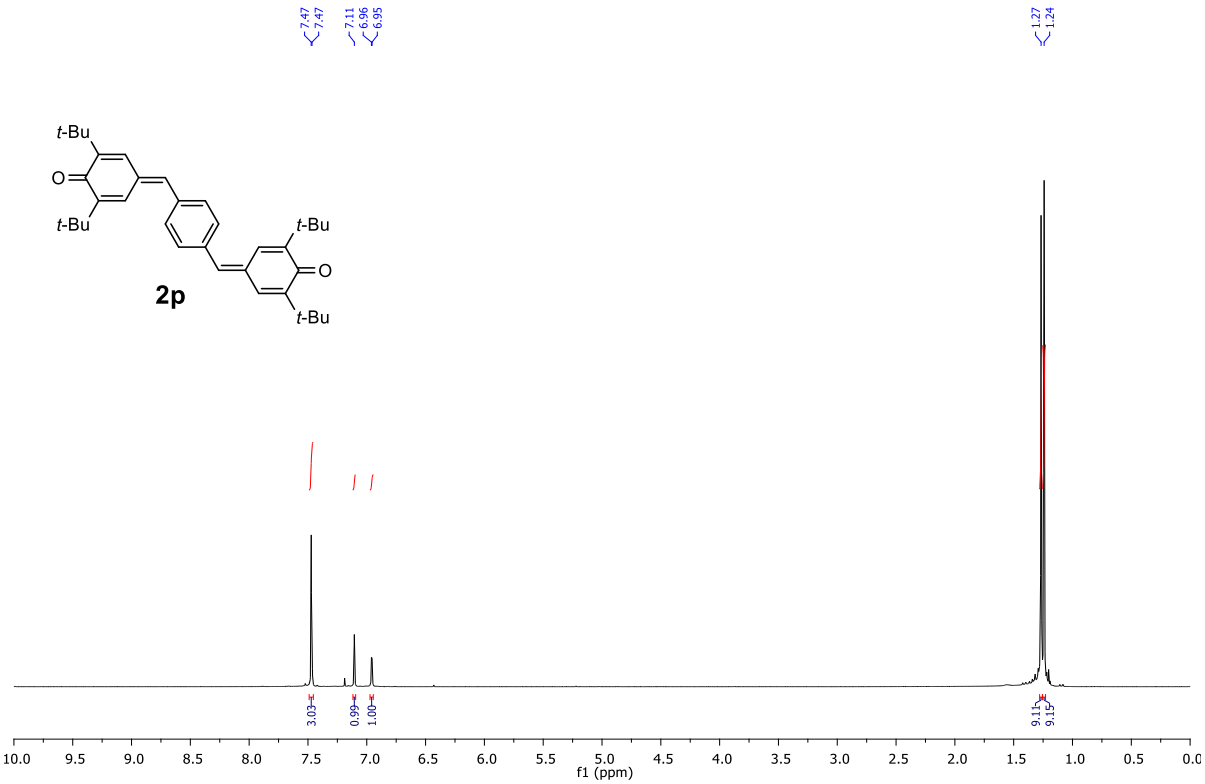
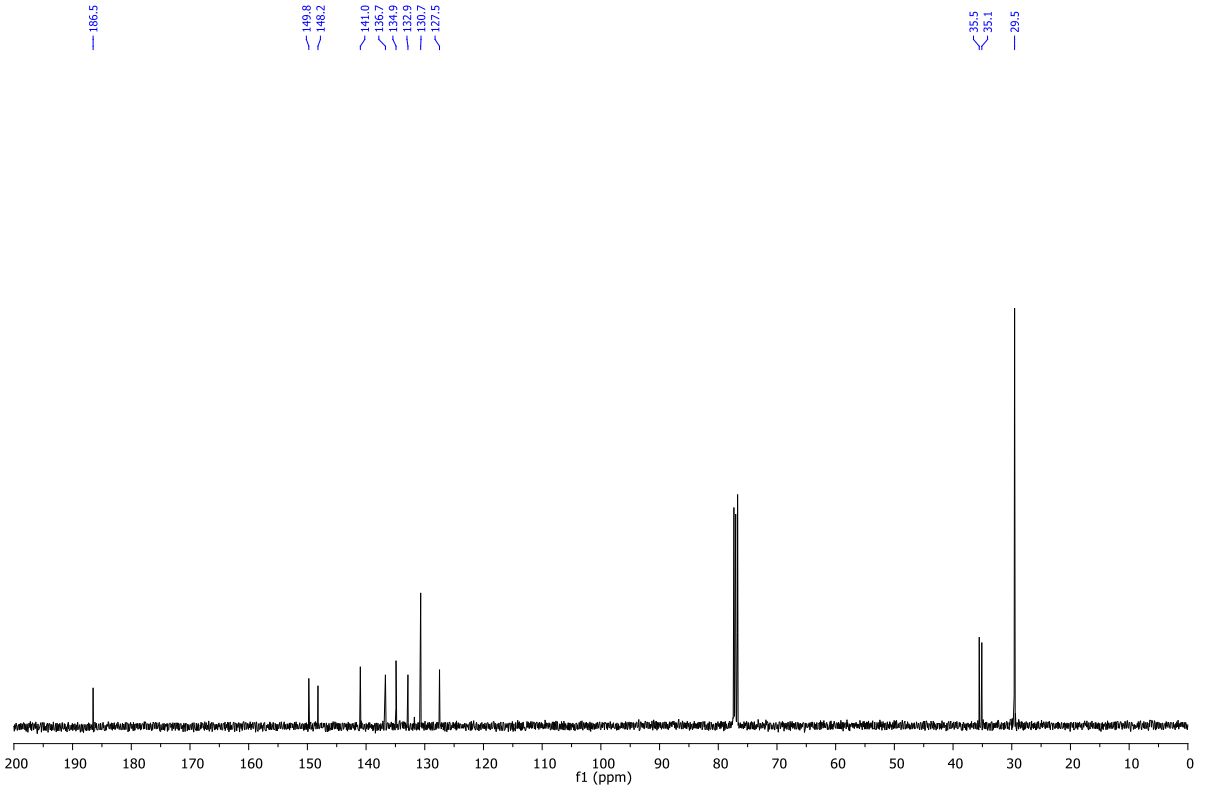
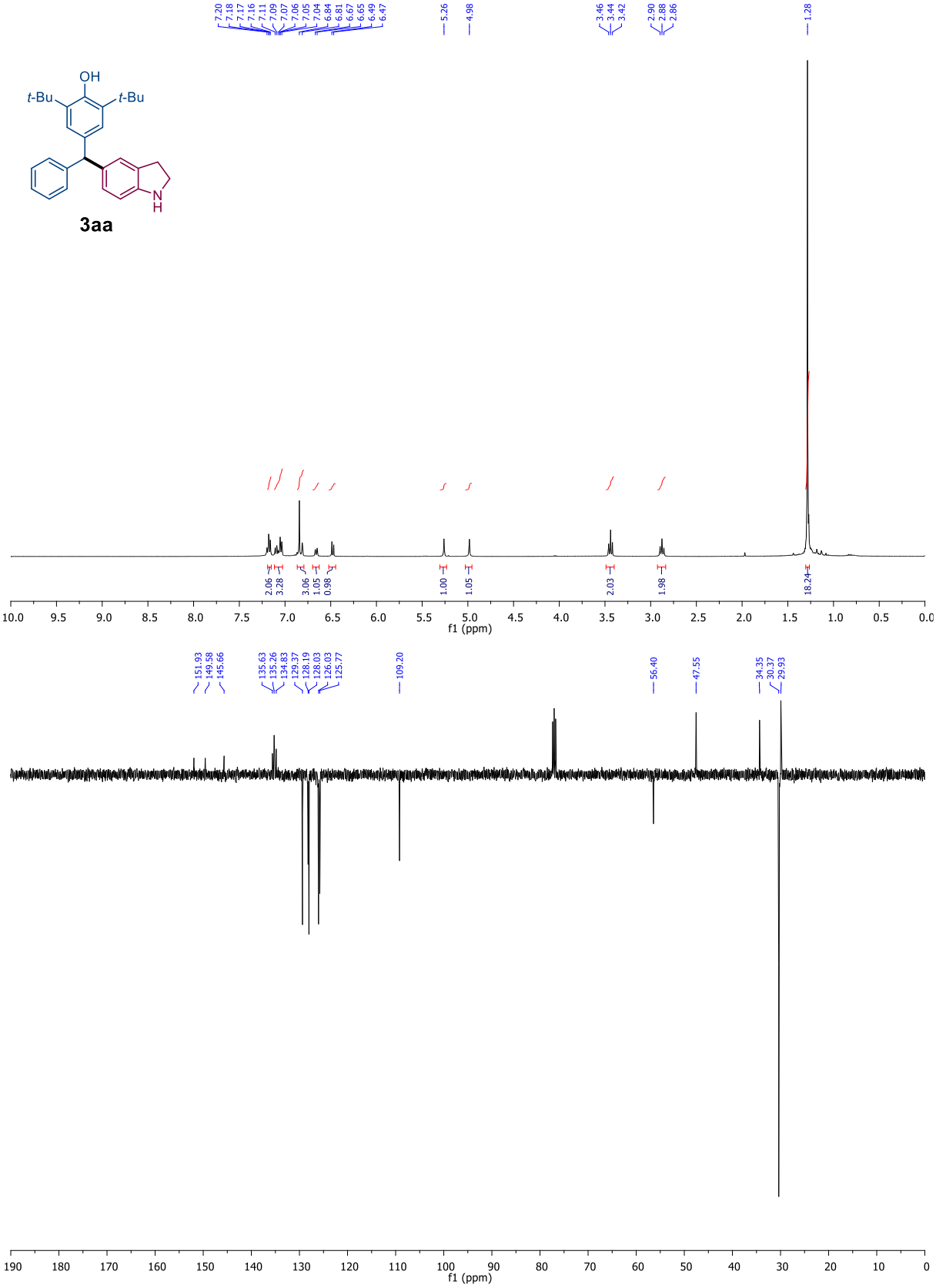
Table of Contents

1. ^{1}H NMR (400 MHz) and ^{13}C NMR (100 MHz) spectra of compounds



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3.44
3.42
2.90
2.88
2.86
1.28
OH
t-Bu
t-Bu
N
H
3aa
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3.28
3.06
1.05
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1.00
1.05
2.03
1.98
18.24
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145.66
135.63
135.26
134.83
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126.03
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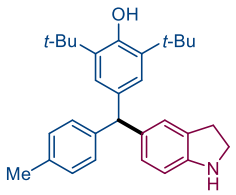
f1 (ppm)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N
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3ab

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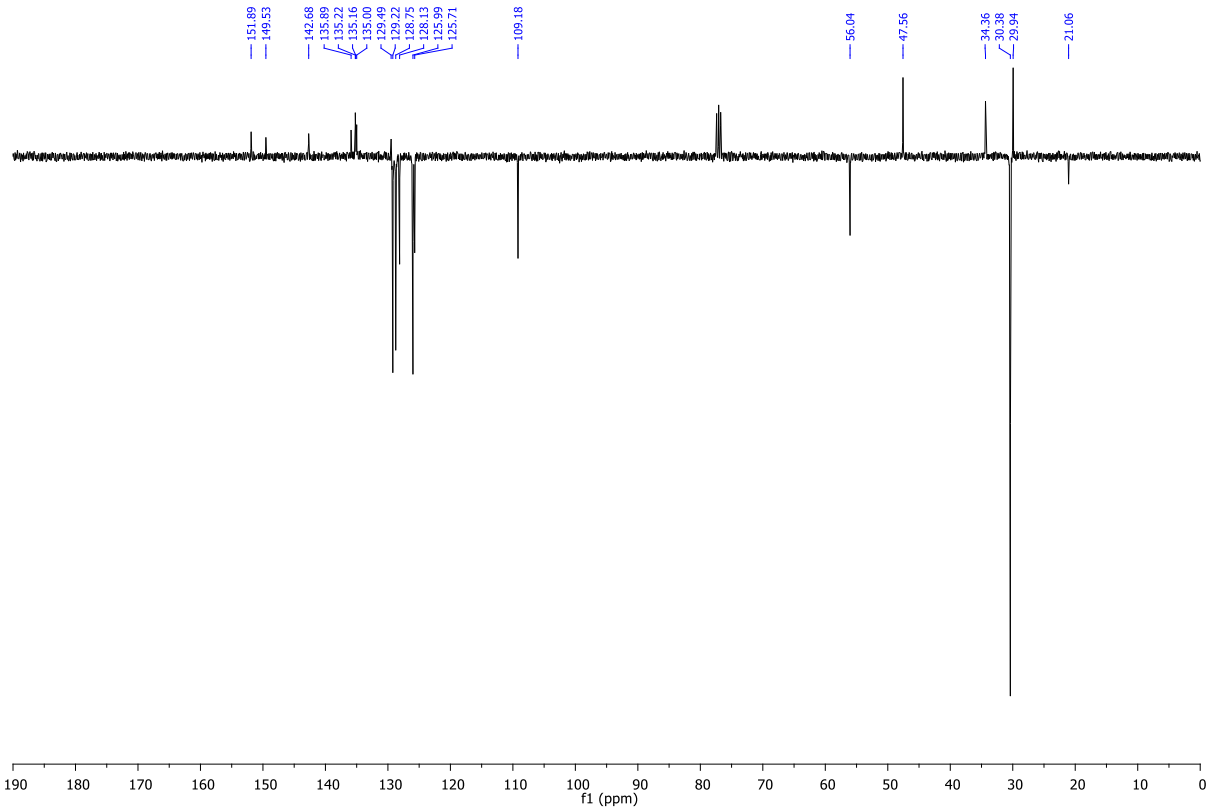
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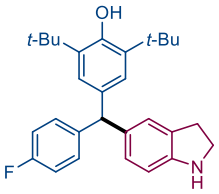
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t-Bu
F
N
H

3ac

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6.88
6.87
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6.85
6.84
6.83
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6.78
6.64
6.62
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6.47
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3.42
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2.88
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2.34
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1.00
1.07
1.00
2.08
2.13
18.31
f1 (ppm)


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159.96
152.02
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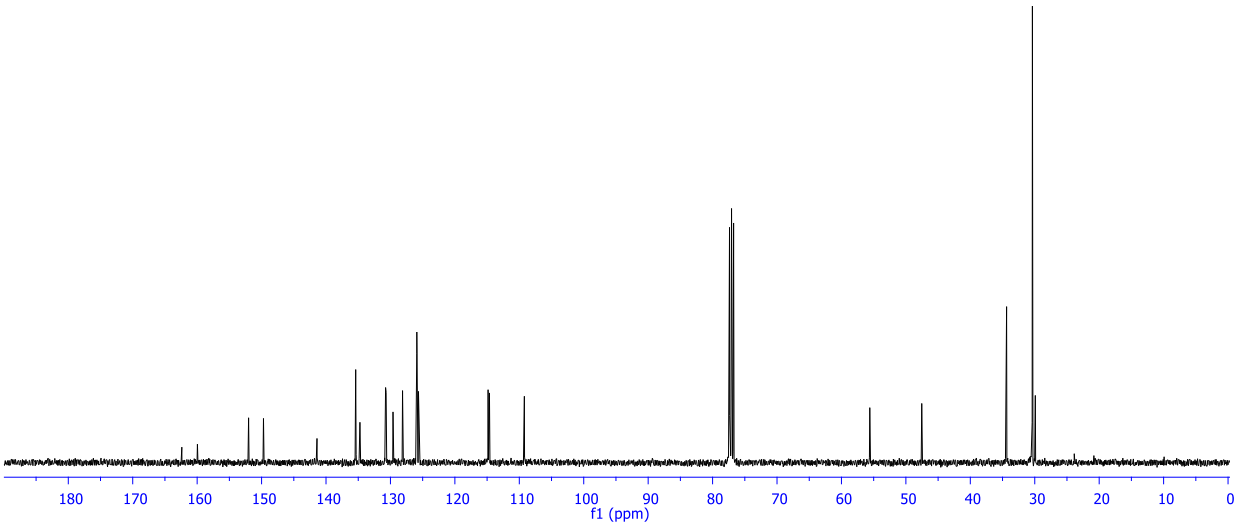
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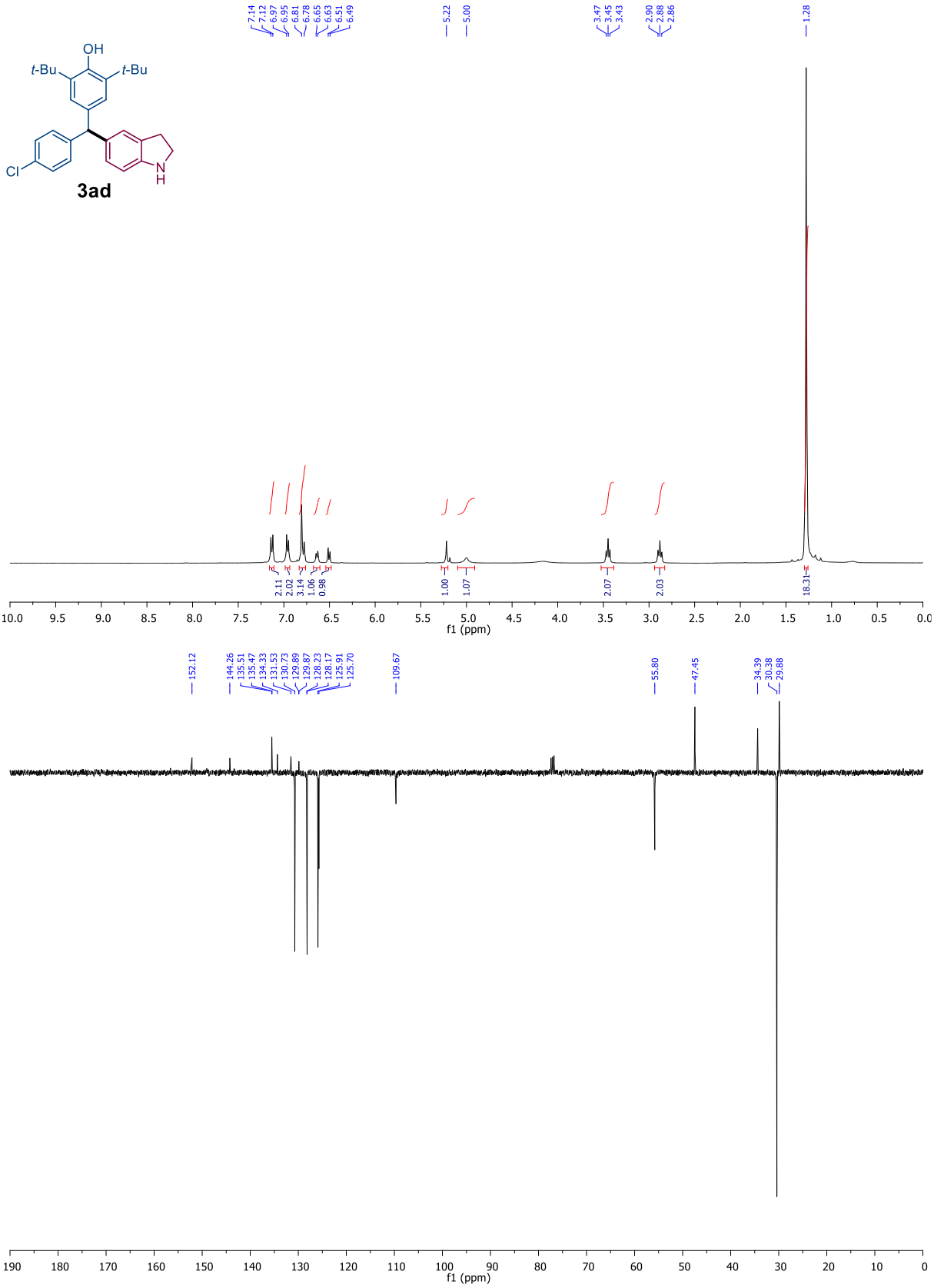
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1.00
1.07
2.07
2.03
18.31
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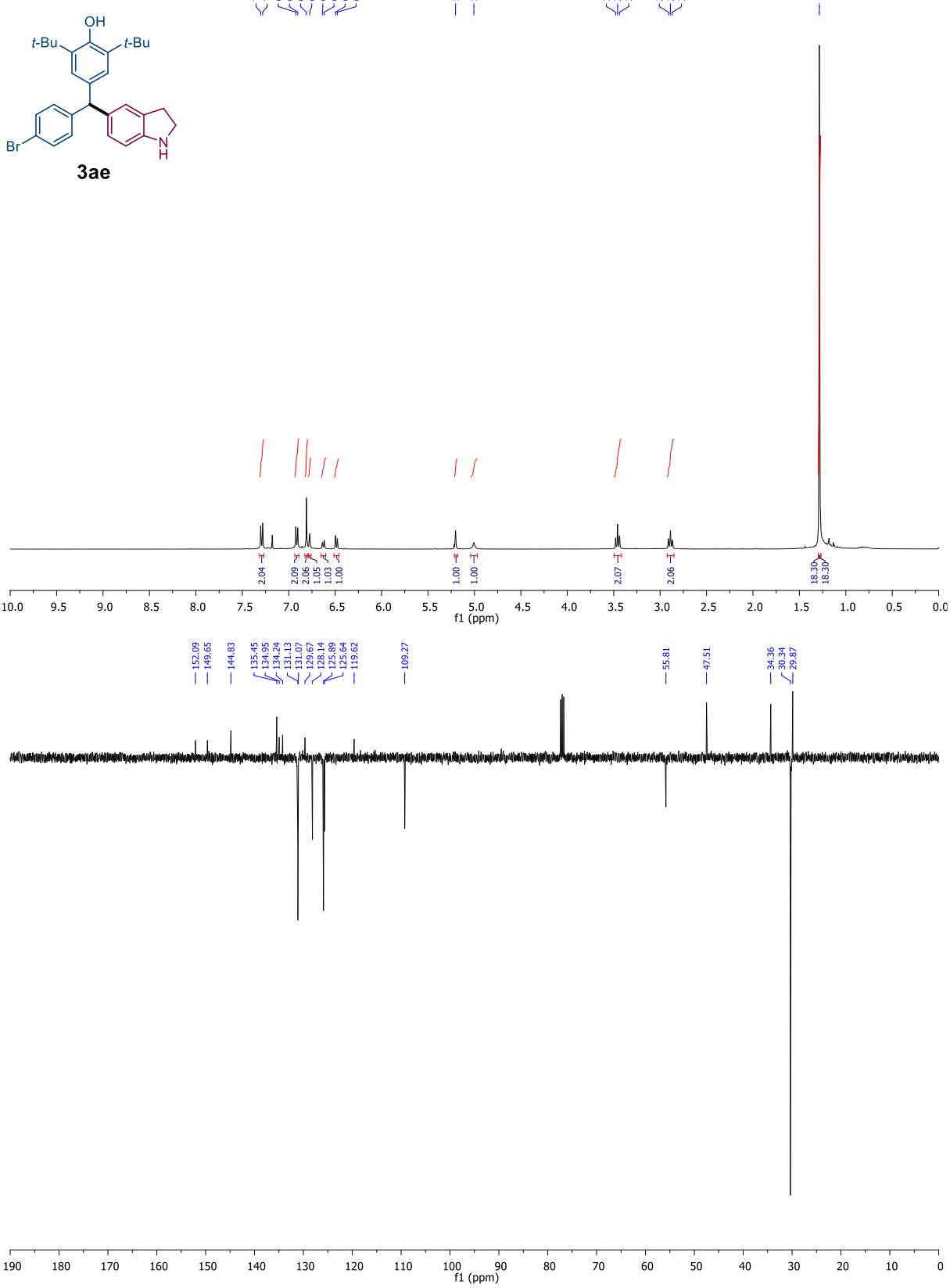
f1 (ppm)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3.46
3.44
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2.06
1.05
1.03
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2.07
2.06
18.30
18.30
f1 (ppm)
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144.83
135.45
134.95
134.24
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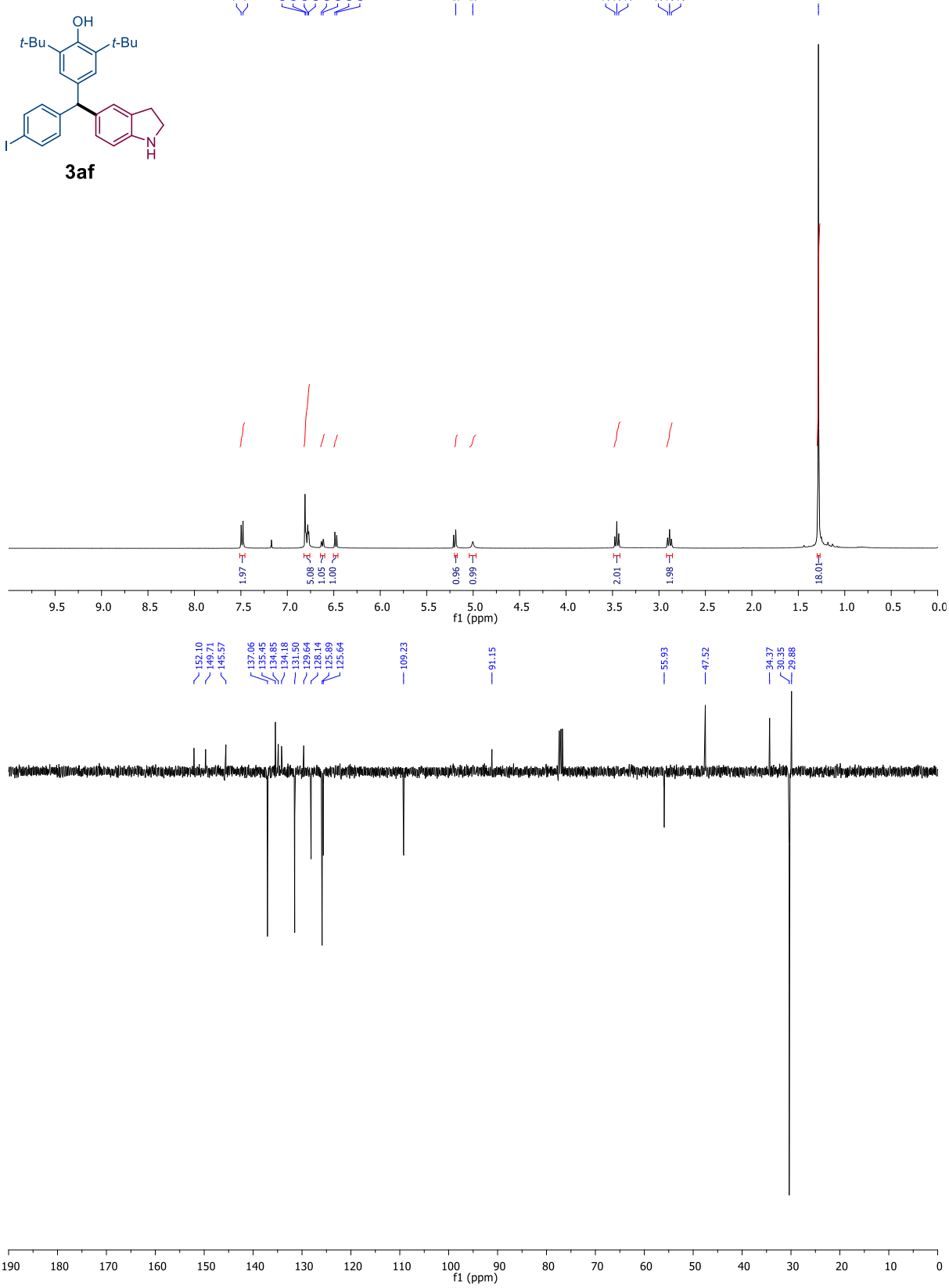
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3.47
3.45
3.43
2.91
2.89
2.87
1.28
1.97
5.08
1.05
1.00
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0.99
2.01
1.98
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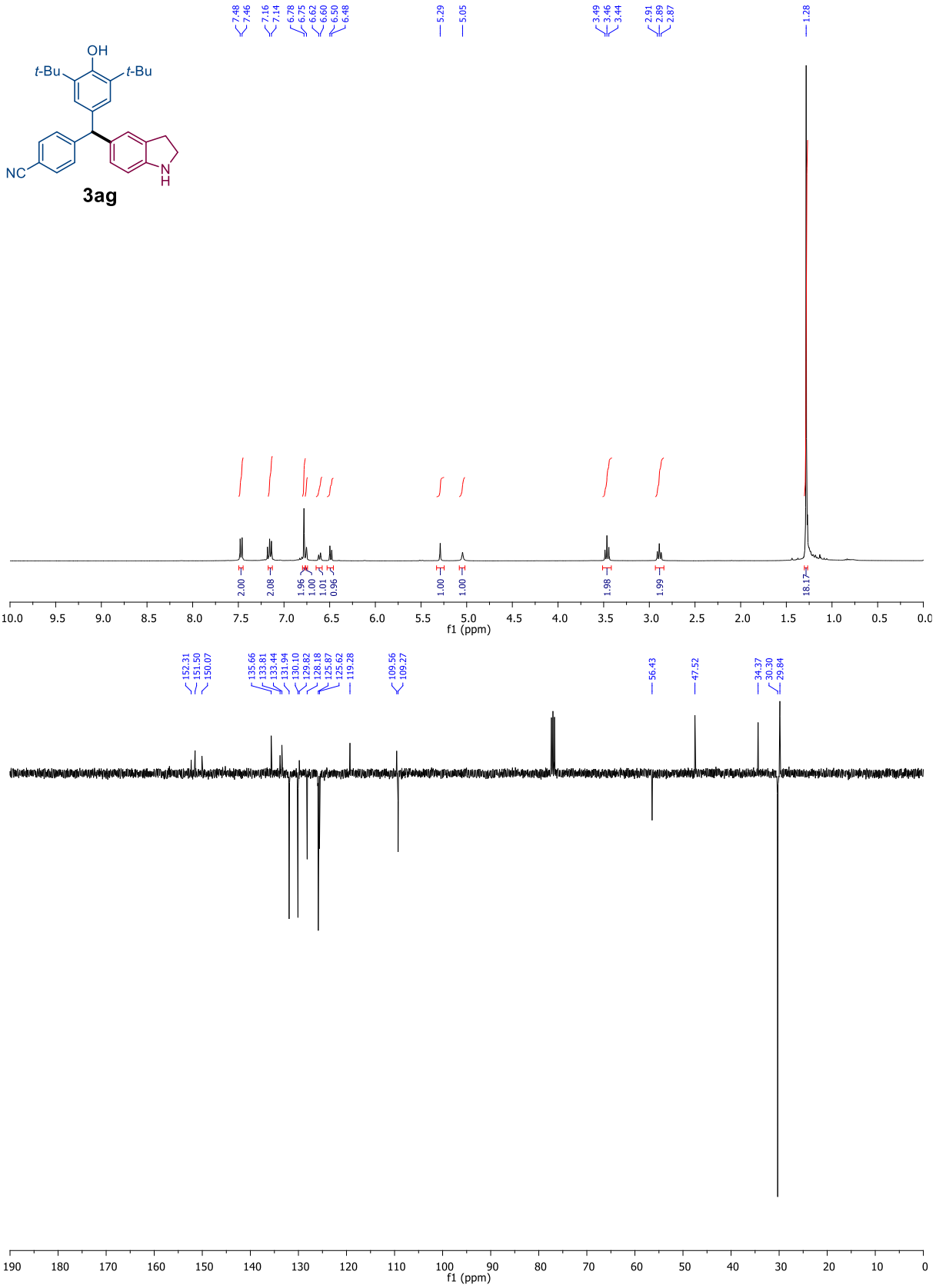
f1 (ppm)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2.89
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2.00
2.08
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1.00
1.00
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18.17
f1 (ppm)
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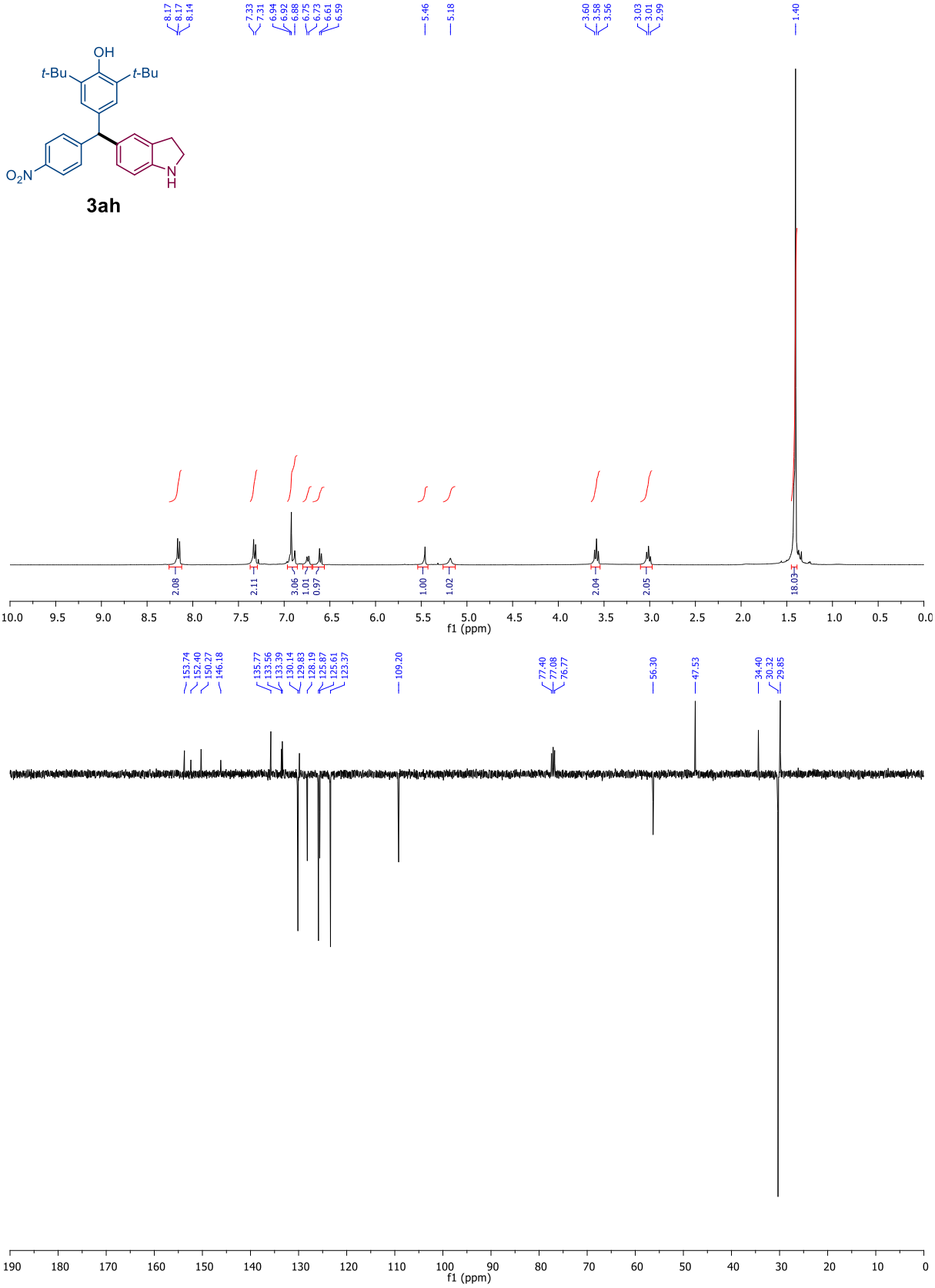
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3.58
3.56
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1.40
2.08
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2.05
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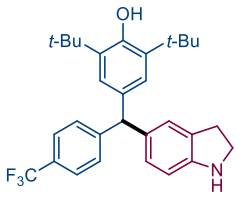
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N
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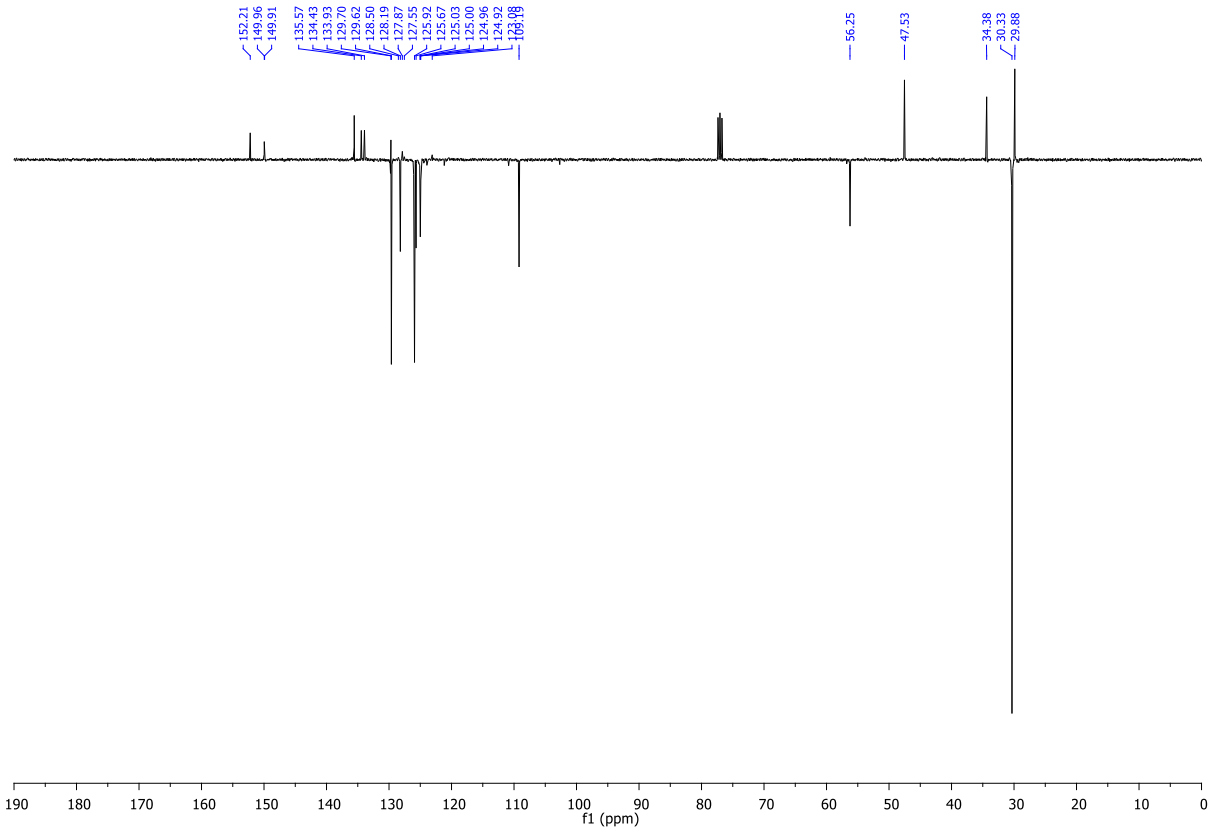
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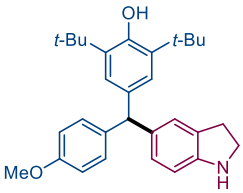
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t-Bu
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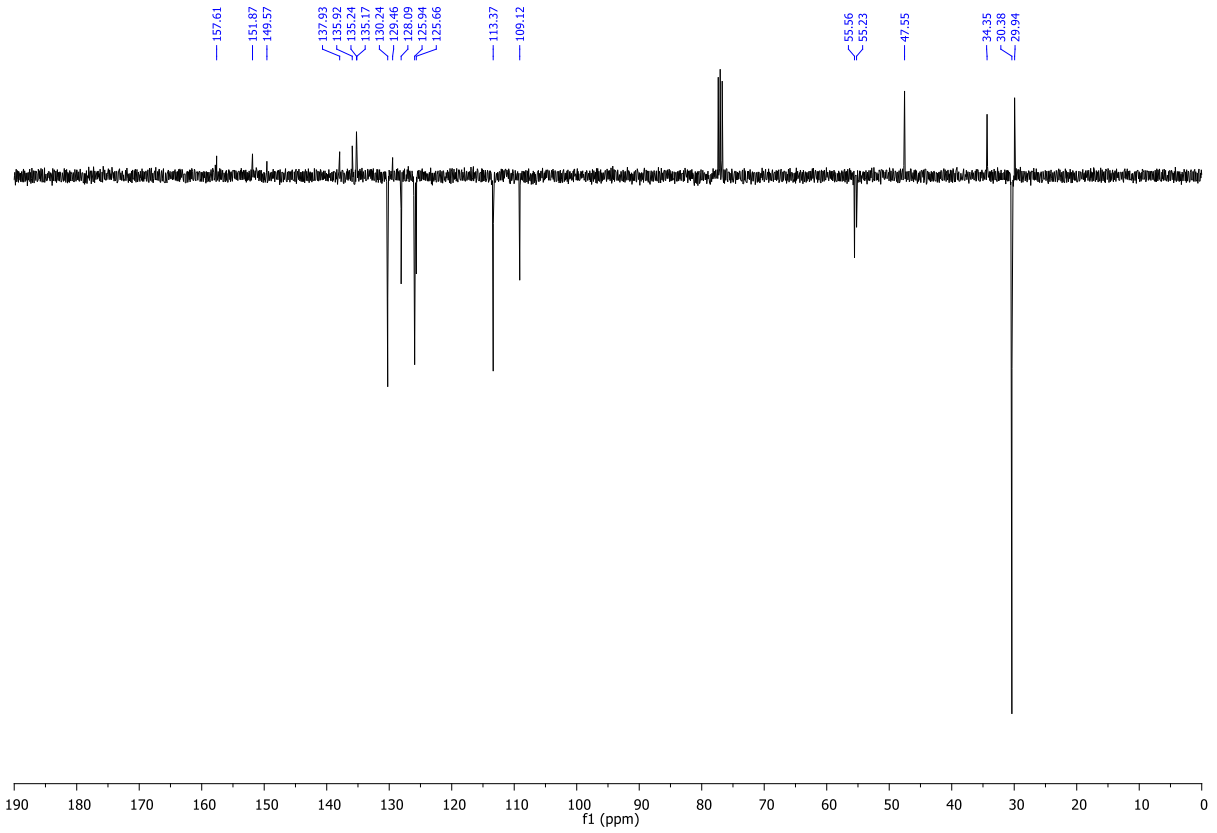
18.37
f1 (ppm)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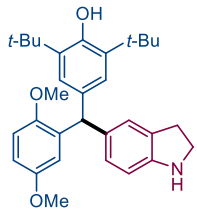
f1 (ppm)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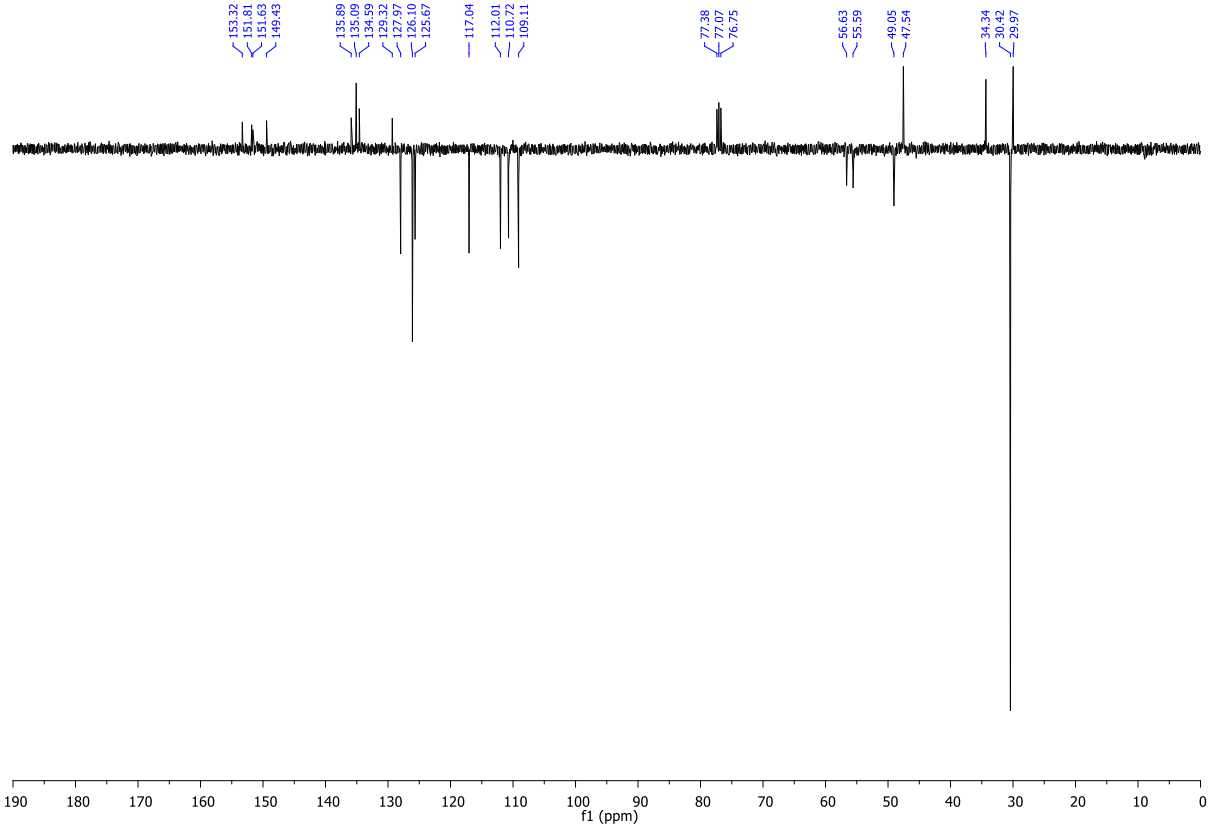
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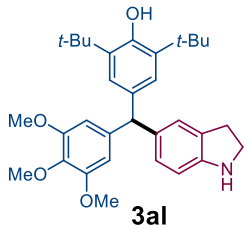
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3al

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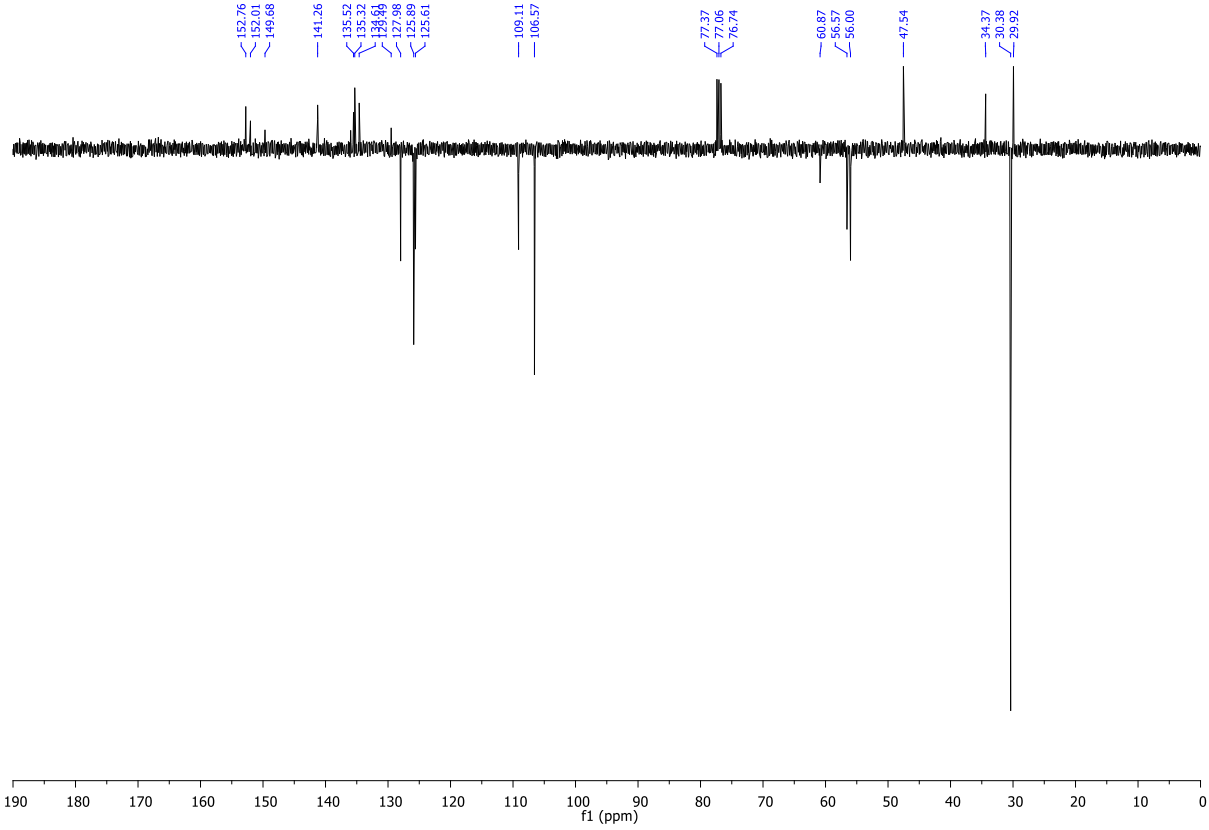
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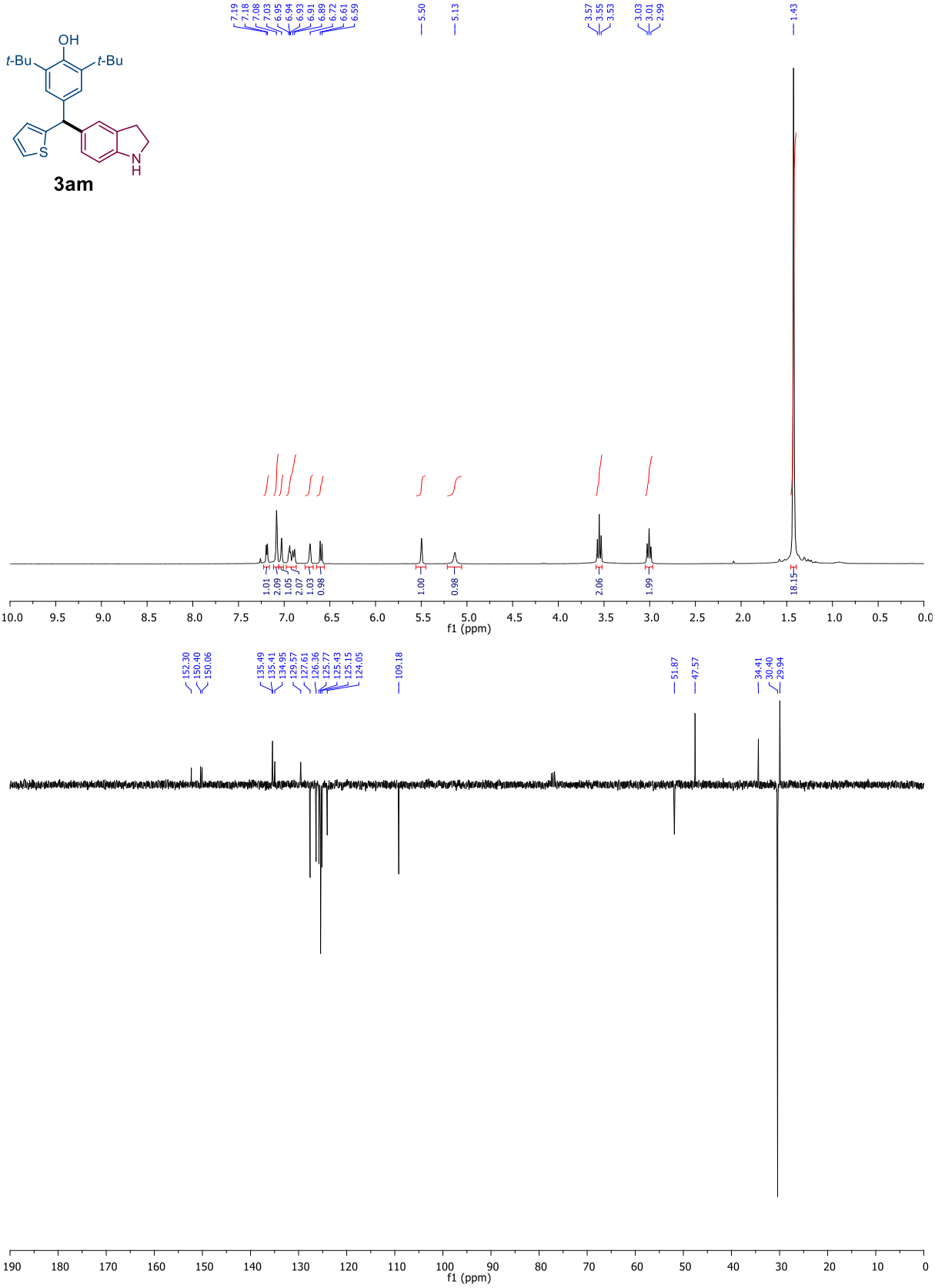
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6.89
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6.61
6.59
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3.55
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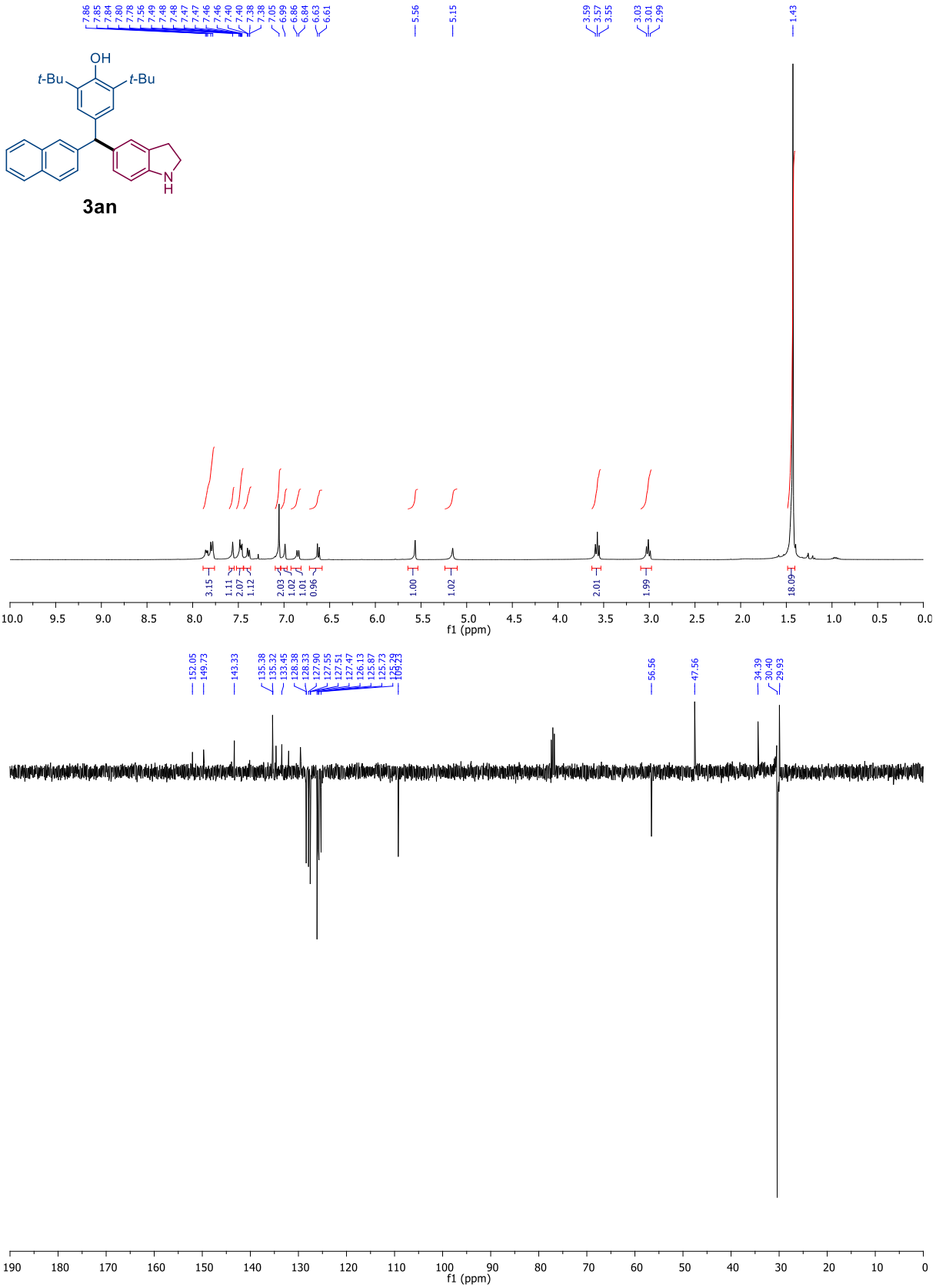
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1.43
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t-Bu
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18.09
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135.32
133.45
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128.33
127.90
127.55
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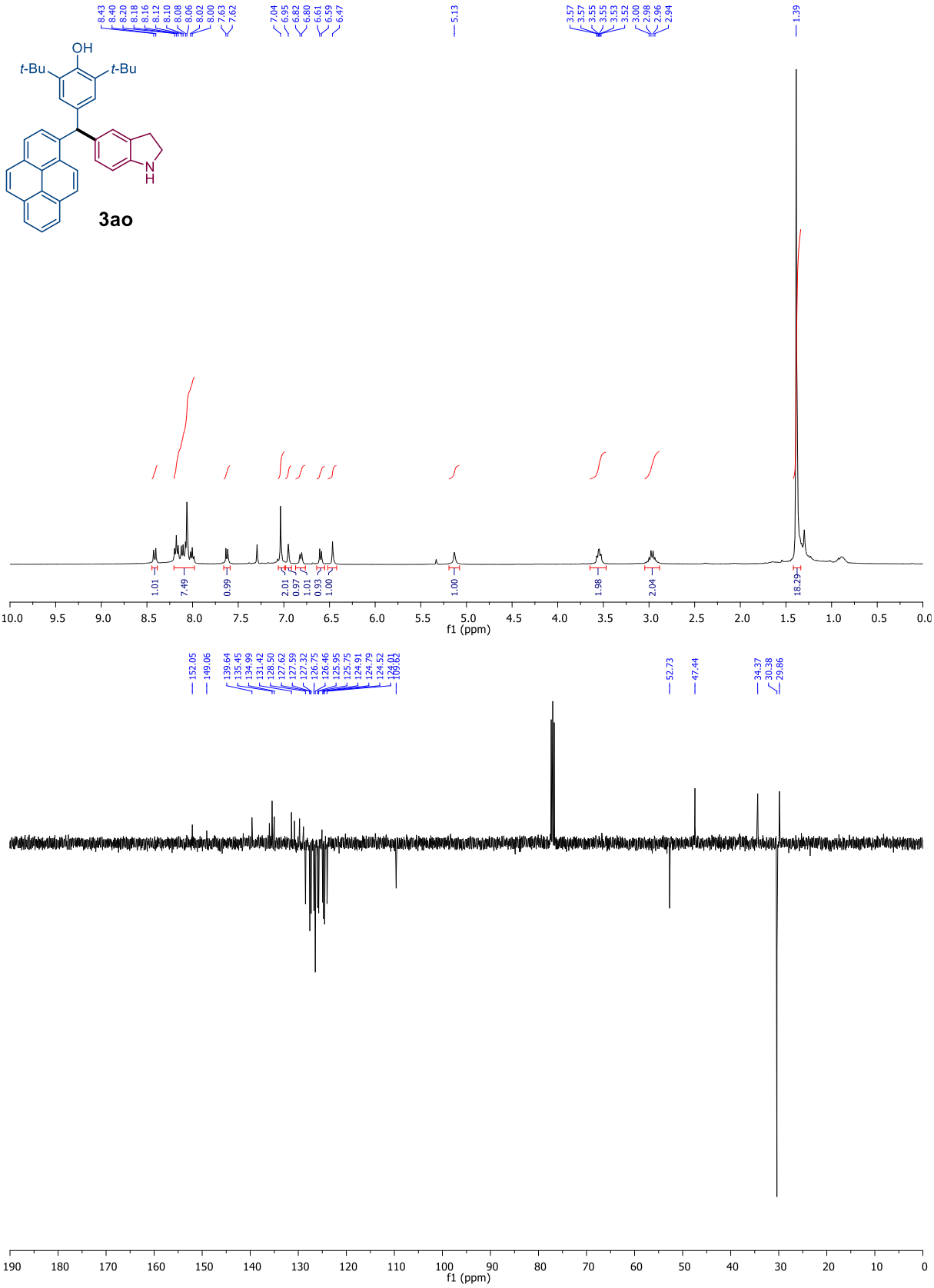
125.73
56.56
47.56
34.39
30.40
29.93
f1 (ppm)

3an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t-Bu
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2.04
18.29
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34.37
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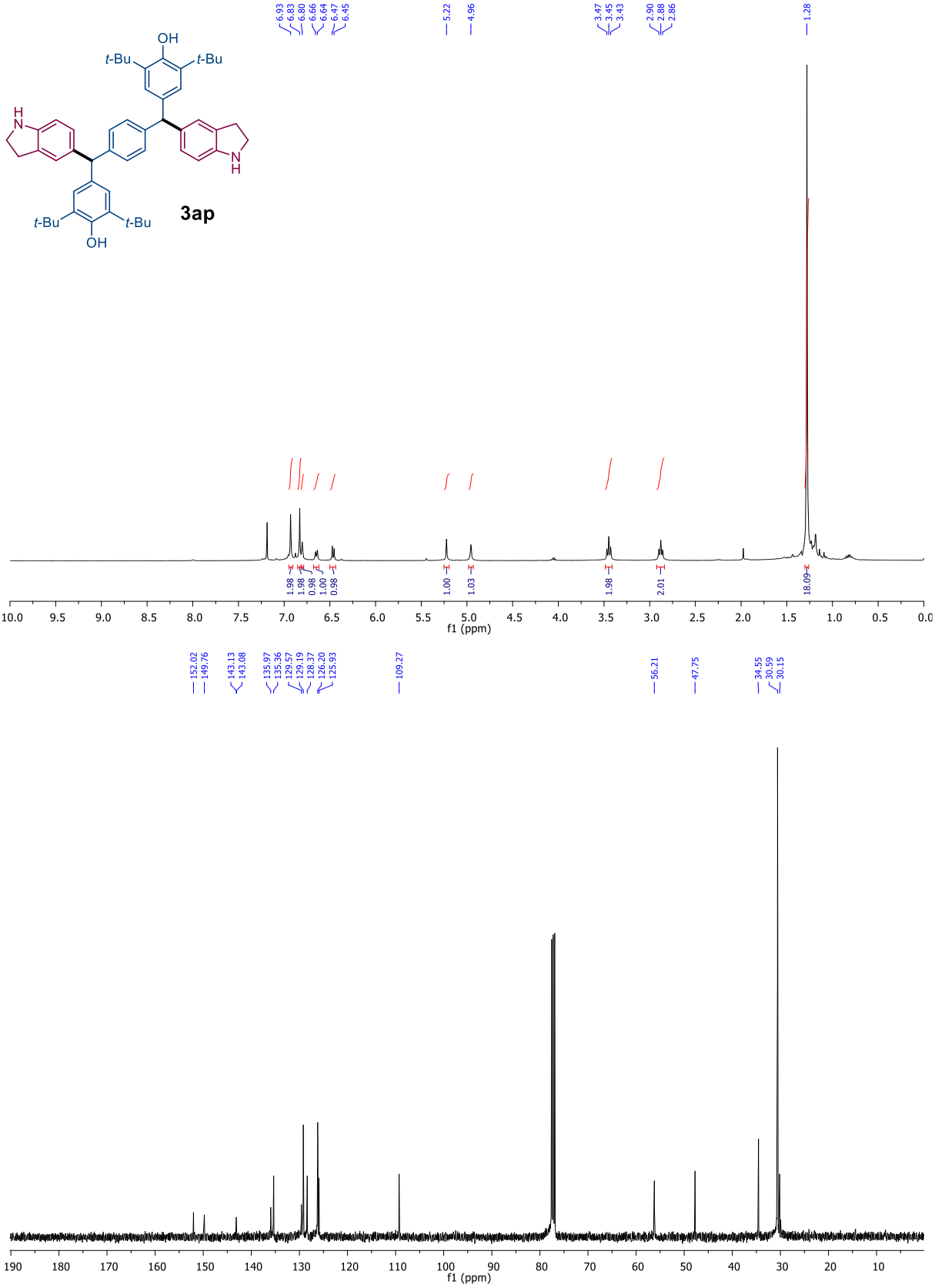
29.86
f1 (ppm)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3.47
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2.88
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1.98
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1.03
1.98
2.01
18.09
f1 (ppm)
152.02
149.76
143.13
143.08
135.97
135.36
129.57
129.19
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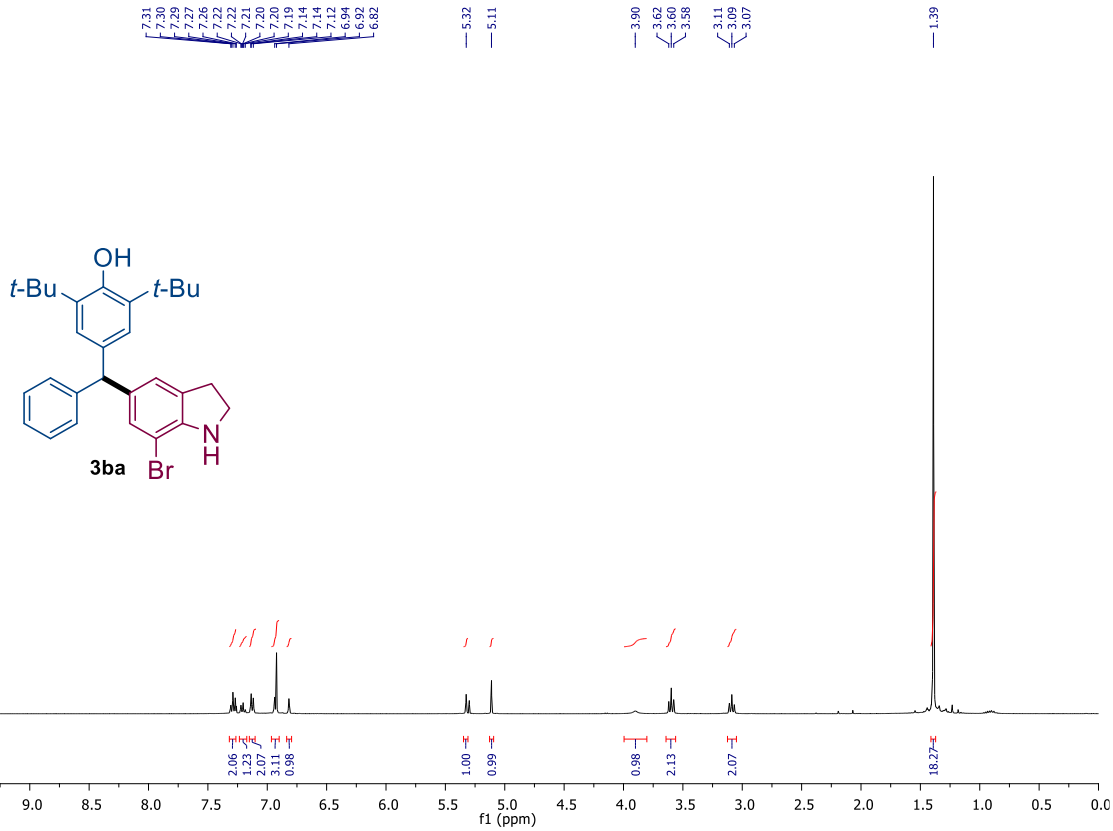
126.20
125.93
109.27
56.21
47.75
34.55
30.59
30.15
f1 (ppm)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7.30
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7.21
7.20
7.20
7.19
7.14
7.14
7.12
6.94
6.92
6.82
5.32
5.11
3.90
3.62
3.60
3.58
3.11
3.09
3.07
1.39
OH
t-Bu
t-Bu
N
H
Br
3ba
2.06
1.23
2.07
3.11
0.98
1.00
0.99
0.98
2.13
2.07
18.27
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
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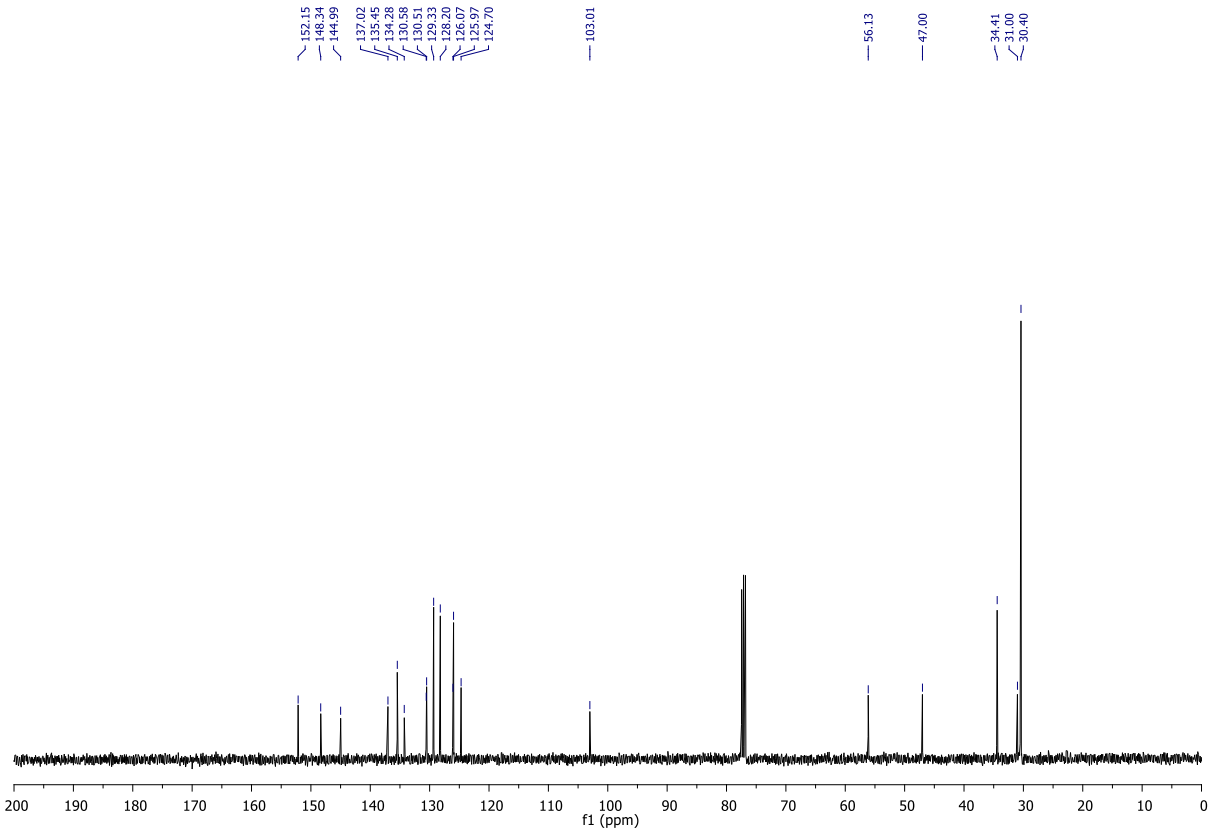
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)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134.28
130.58
130.51
129.33
128.20
126.07
125.97
124.70
103.01
56.13
47.00
34.41
31.00
30.40
200
190
180
170
160
150
140
130
120
110
100
90
80
70
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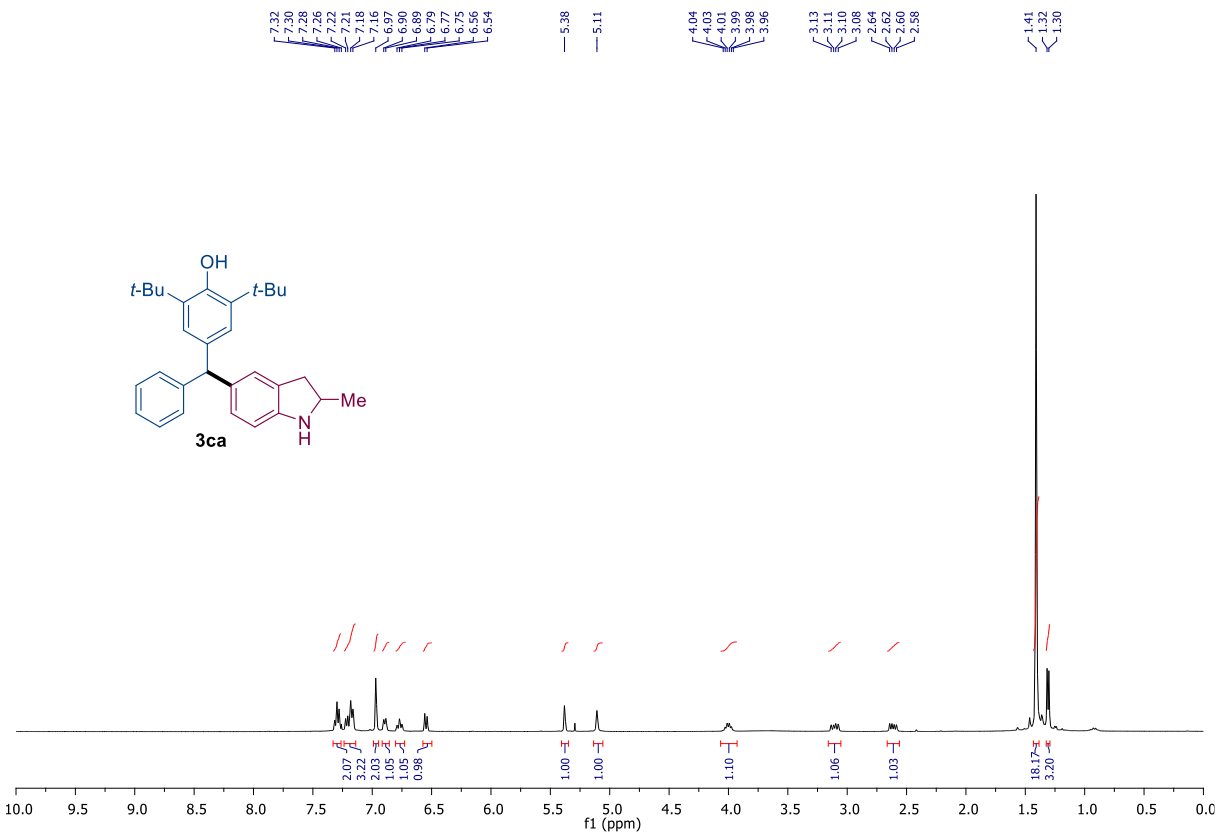
50
40
30
20
10
0
f1 (ppm)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7.30
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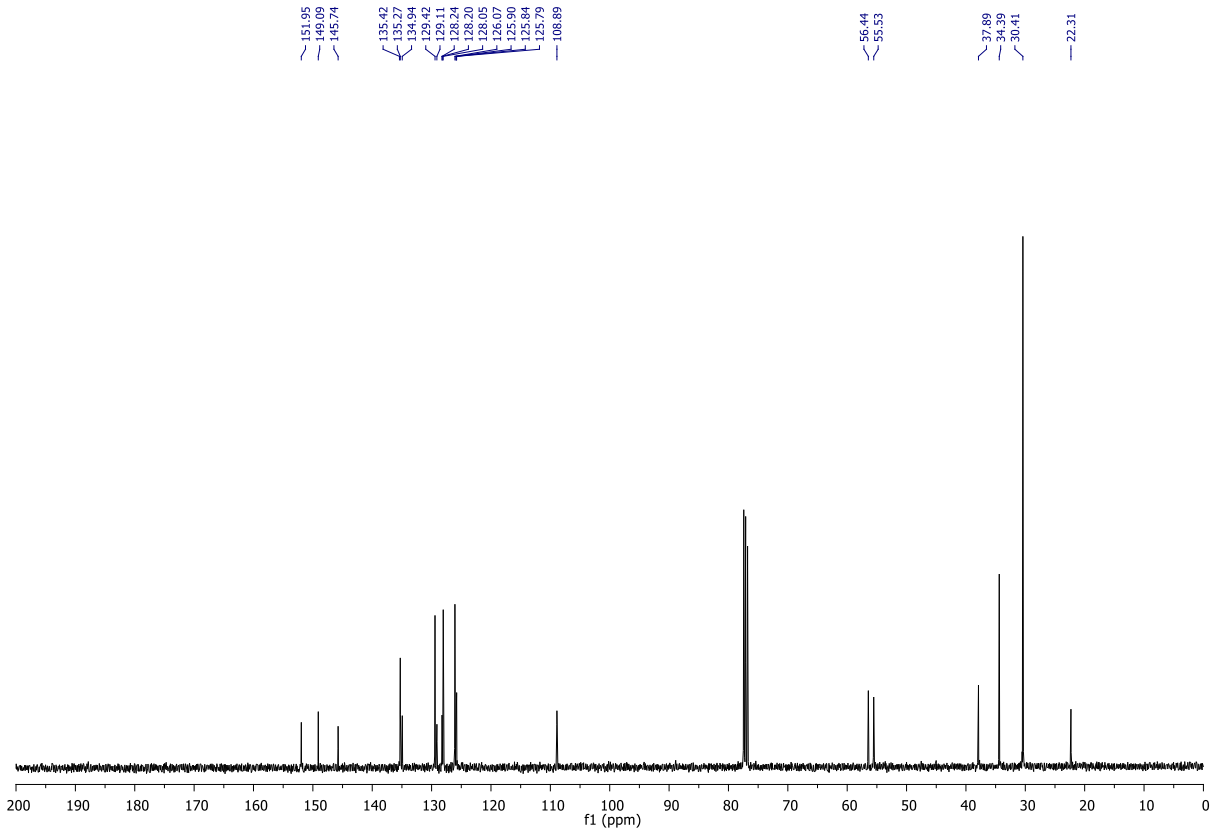
7.22
7.21
7.18
7.16
6.97
6.90
6.89
6.79
6.77
6.75
6.56
6.54
5.38
5.11
4.04
4.03
4.01
3.99
3.98
3.96
3.13
3.11
3.10
3.08
2.64
2.62
2.60
2.58
1.41
1.32
1.30
OH
t-Bu
t-Bu
Me
N
H
3ca
2.07
3.22
2.03
1.05
1.05
0.98
1.00
1.00
1.10
1.06
1.03
18.17
3.20
f1 (ppm)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134.94
129.42
129.11
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128.20
128.05
126.07
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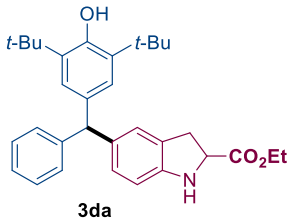
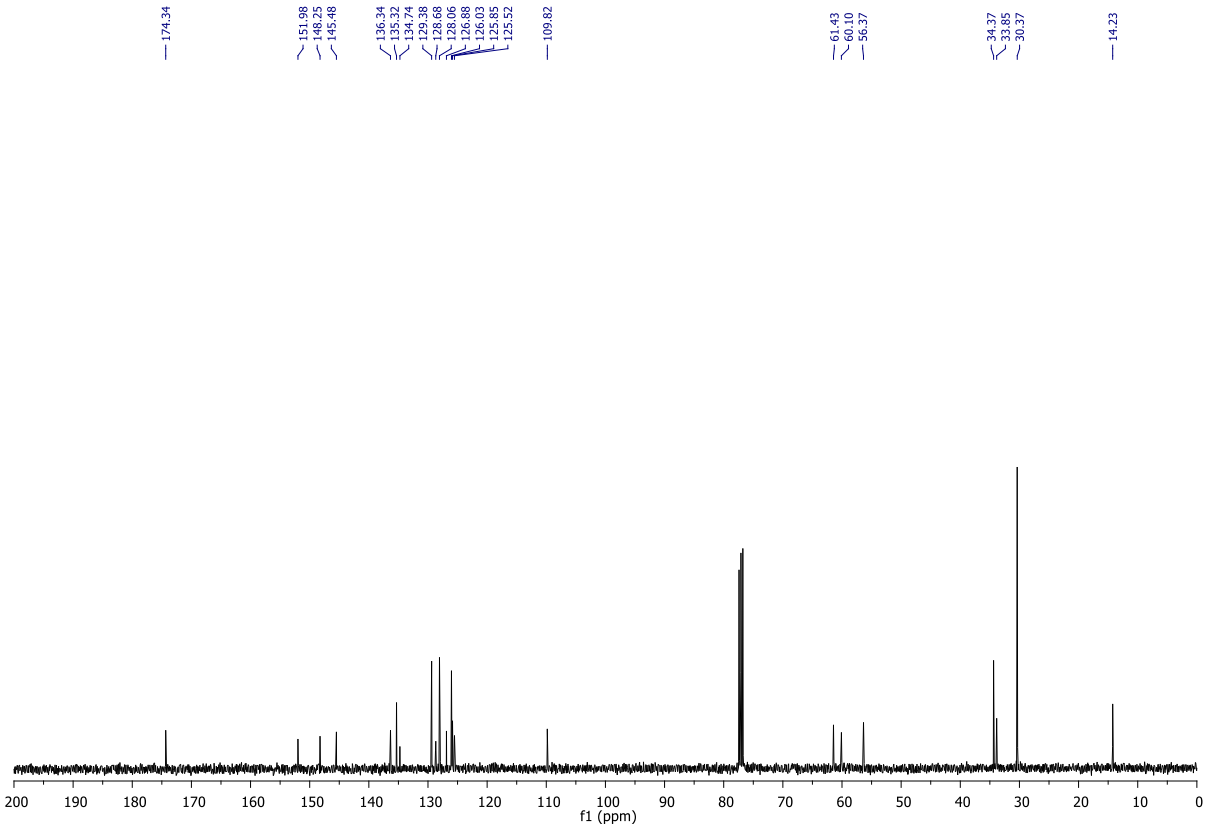
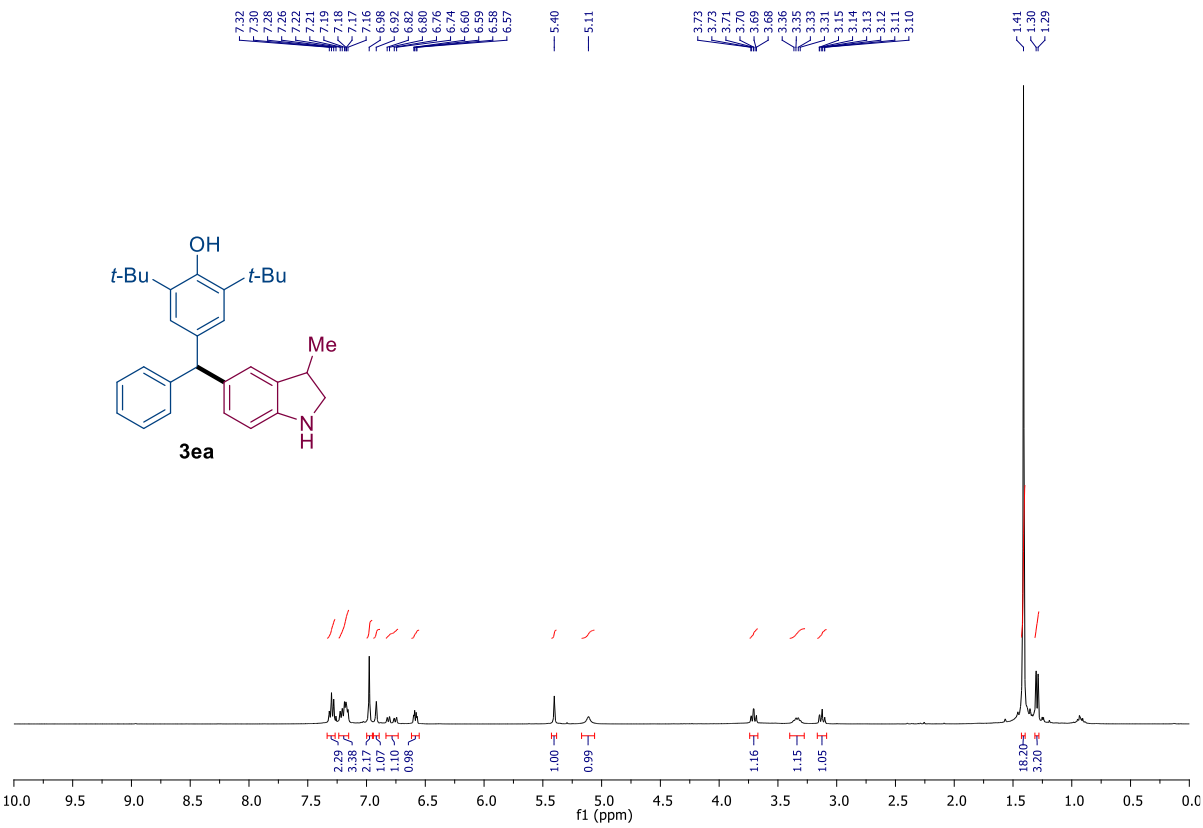
125.79
108.89
56.44
55.53
37.89
34.39
30.41
22.31
f1 (ppm)



3da

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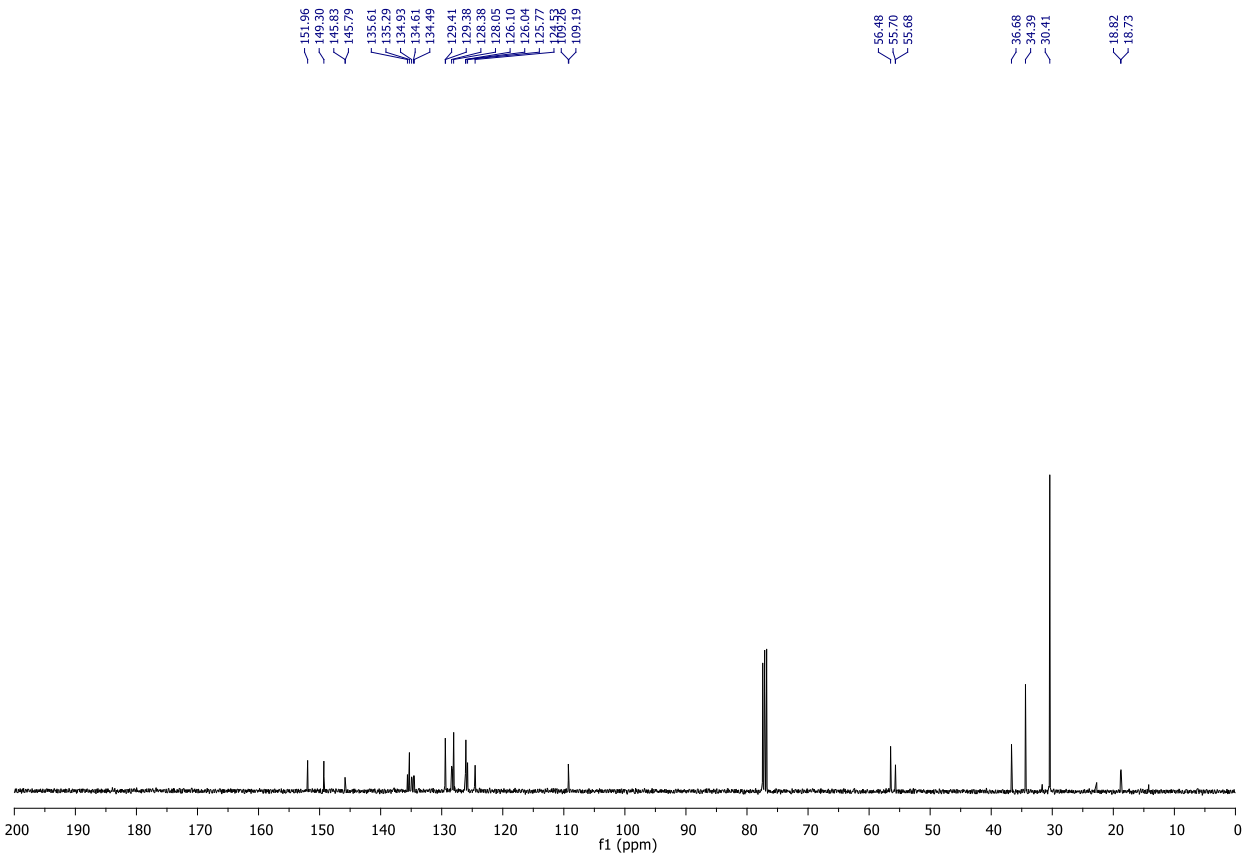
7.30
7.28
7.26
7.22
7.21
7.19
7.18
7.17
7.16
6.98
6.92
6.82
6.80
6.76
6.74
6.60
6.59
6.58
6.57
5.40
5.11
3.73
3.73
3.71
3.70
3.69
3.68
3.36
3.35
3.33
3.31
3.15
3.14
3.13
3.12
3.11
3.10
1.41
1.30
1.29
OH
t-Bu
t-Bu
Me
N
H
3ea
2.29
3.38
2.17
1.07
1.10
0.98
1.00
0.99
1.16
1.15
1.05
18.20
3.20
f1 (ppm)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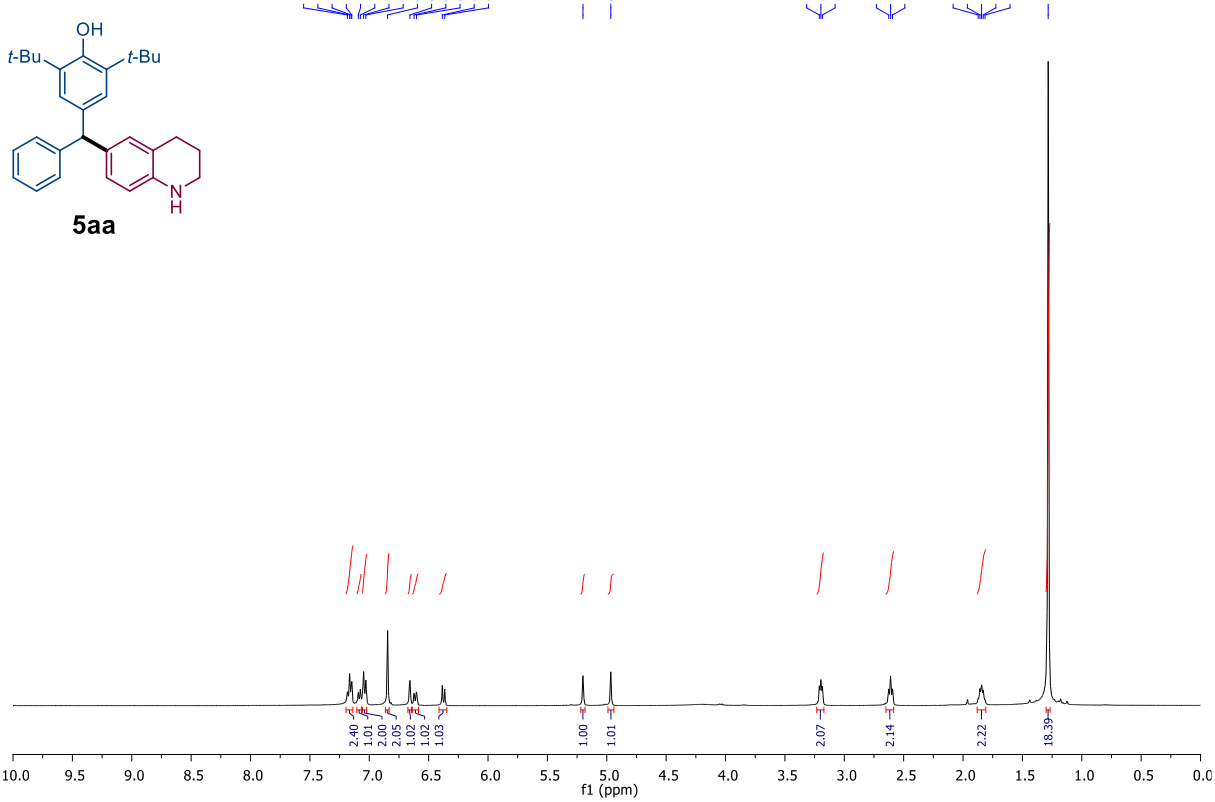
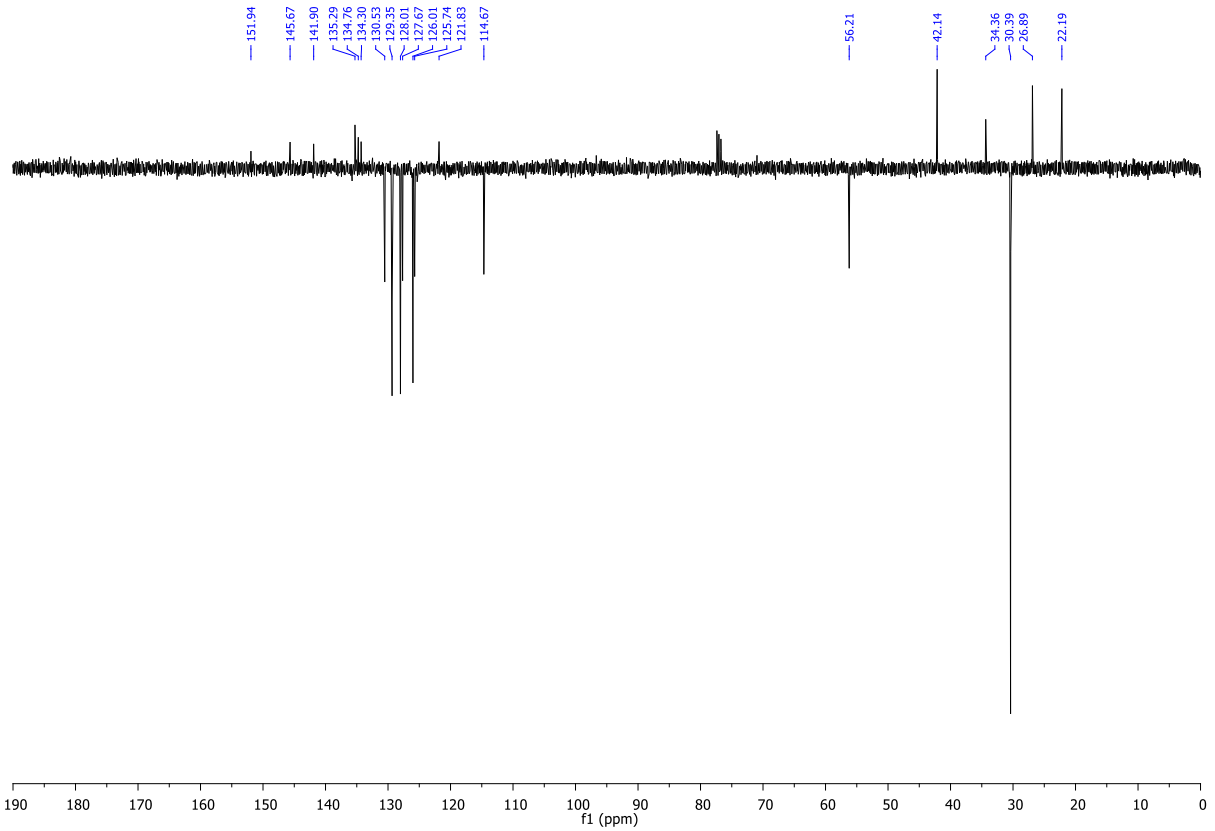
145.83
145.79
135.61
135.29
134.93
134.61
134.49
129.41
129.38
128.38
128.05
126.10
126.04
125.77
109.36
109.19
56.48
55.70
55.68
36.68
34.39
30.41
18.82
18.73
f1 (ppm)


OH
t-Bu
t-Bu
N
H
5aa
7.18
7.17
7.15
7.15
7.09
7.08
7.05
7.03
6.85
6.66
6.62
6.60
6.38
6.36
5.20
4.97
3.21
3.20
3.18
2.63
2.61
2.59
1.87
1.86
1.84
1.83
1.81
1.28
2.40
1.01
2.00
2.05
1.02
1.02
1.03
1.00
1.01
2.07
2.14
2.22
18.39
f1 (ppm)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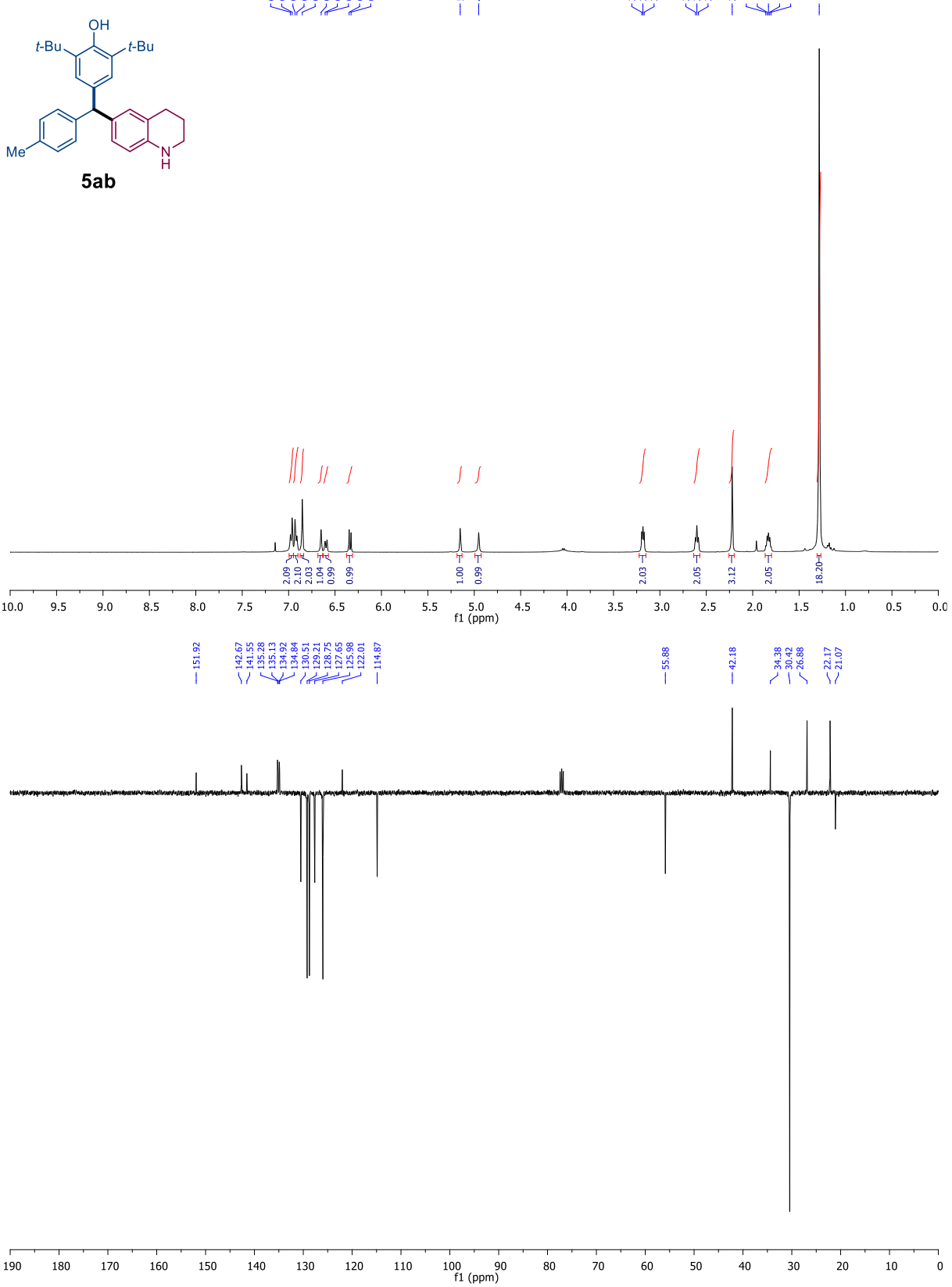
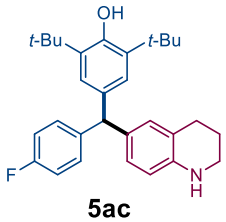
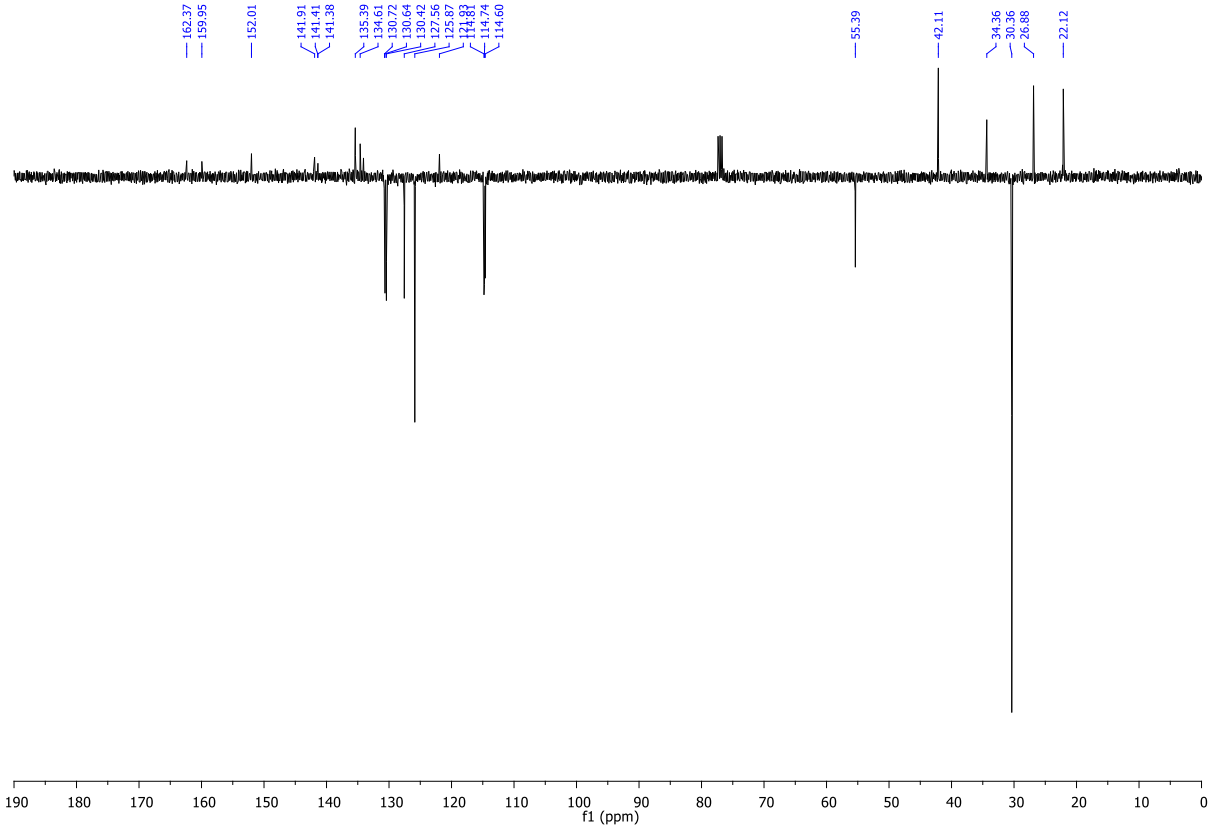
145.67
141.90
135.29
134.76
134.30
130.53
129.35
128.01
127.67
126.01
125.74
121.83
114.67
56.21
42.14
34.36
30.39
26.89
22.19
f1 (ppm)


OH
t-Bu
t-Bu
Me
N
H
5ab
6.98
6.96
6.93
6.91
6.85
6.65
6.61
6.59
6.35
6.33
5.15
4.95
3.20
3.18
3.17
2.62
2.60
2.59
2.22
1.86
1.84
1.83
1.82
1.80
1.28
2.09
2.10
2.03
1.04
0.99
0.99
1.00
0.99
2.03
2.05
3.12
2.05
18.20
f1 (ppm)
151.92
142.67
141.55
135.28
135.13
134.92
134.84
130.51
129.21
128.75
127.65
125.98
122.01
114.87
55.88
42.18
34.38
30.42
26.88
22.17
21.07
f1 (ppm)


OH
t-Bu
t-Bu
F
N
H

5ac

7.00
6.99
6.98
6.97
6.87
6.85
6.83
6.81
6.79
6.63
6.60
6.58
6.39
6.38
5.18
4.98
3.22
3.21
3.20
2.63
2.61
2.60
1.88
1.87
1.85
1.84
1.28
2.16
4.07
1.00
1.05
1.04
1.00
1.01
2.08
2.07
2.13
18.08
f1 (ppm)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159.95
152.01
141.91
141.41
141.38
135.39
134.61
130.72
130.64
130.42
127.56
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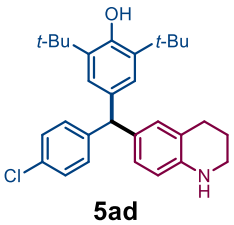
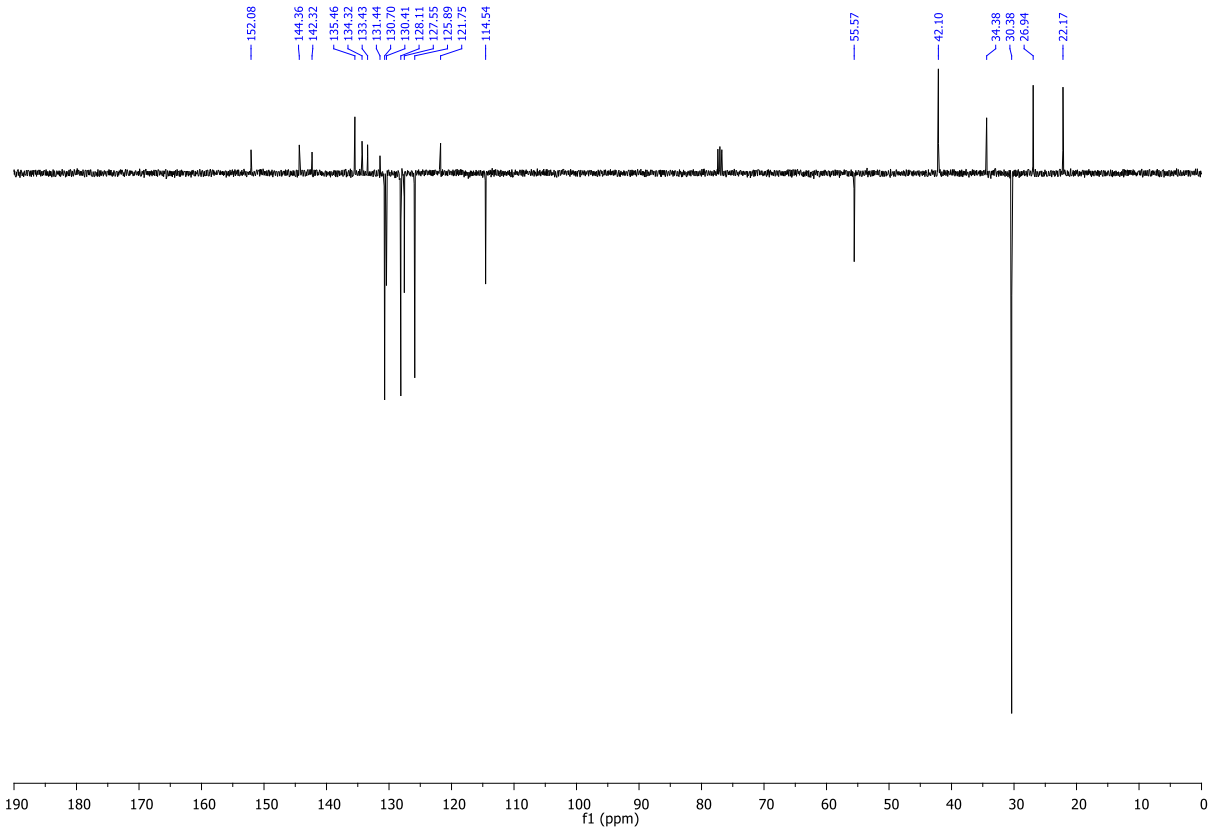
34.36
30.36
26.88
22.12
f1 (ppm)


OH
t-Bu
t-Bu
Cl
N
H

5ad

7.14
7.13
7.11
6.97
6.95
6.81
6.61
6.59
6.58
6.57
6.56
6.36
6.34
5.16
4.98
3.21
3.20
3.19
3.18
2.62
2.60
2.59
1.87
1.85
1.84
1.82
1.81
1.28
1.98
2.00
2.03
1.00
0.98
1.00
1.00
0.99
2.00
2.03
2.08
18.14
f1 (ppm)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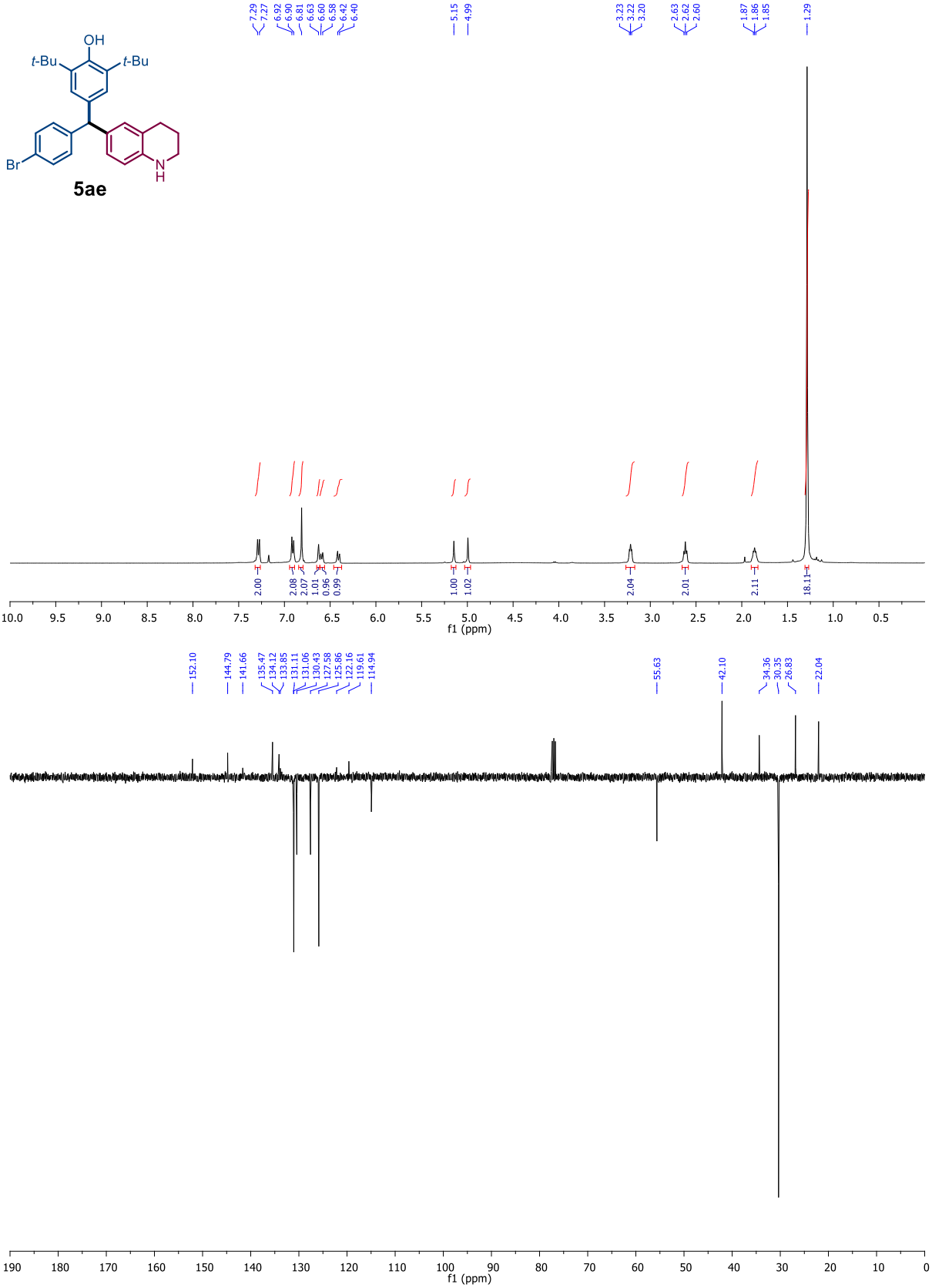
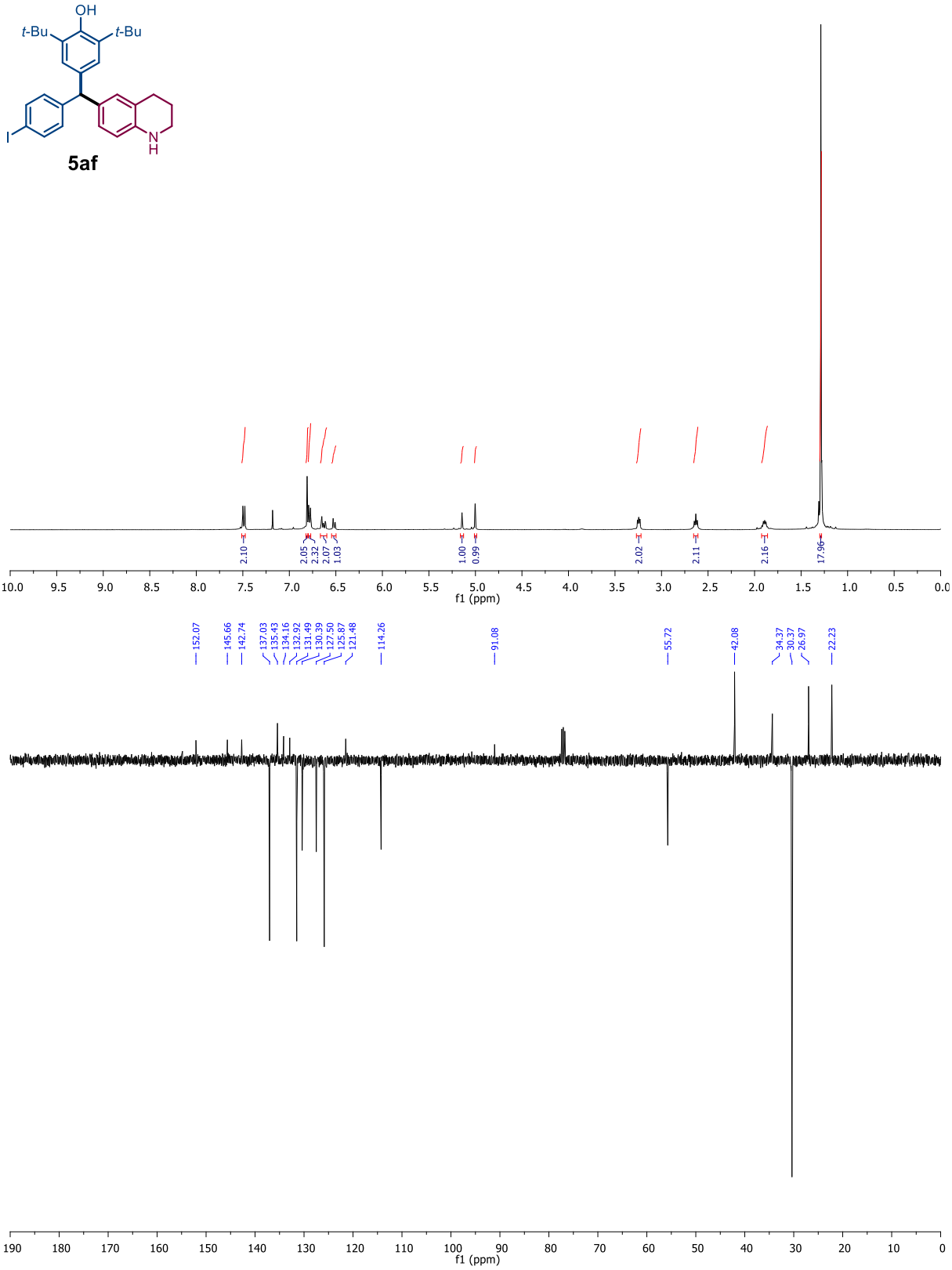
144.36
142.32
135.46
134.32
133.43
131.44
130.70
130.41
128.11
127.55
125.89
121.75
114.54
55.57
42.10
34.38
30.38
26.94
22.17
f1 (ppm)


OH
t-Bu
t-Bu
Br
N
H
5ae
7.29
7.27
6.92
6.90
6.81
6.63
6.60
6.58
6.42
6.40
5.15
4.99
3.23
3.22
3.20
2.63
2.62
2.60
1.87
1.86
1.85
1.29
2.00
2.08
2.07
1.01
0.96
0.99
1.00
1.02
2.04
2.01
2.11
18.11
f1 (ppm)
152.10
144.79
141.66
135.47
134.12
133.85
131.11
131.06
130.43
127.58
125.86
122.16
119.61
114.94
55.63
42.10
34.36
30.35
26.83
22.04
f1 (ppm)


OH
t-Bu
t-Bu
I
N
H
5af
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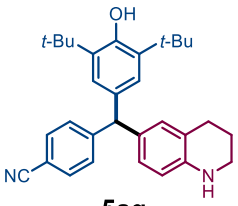
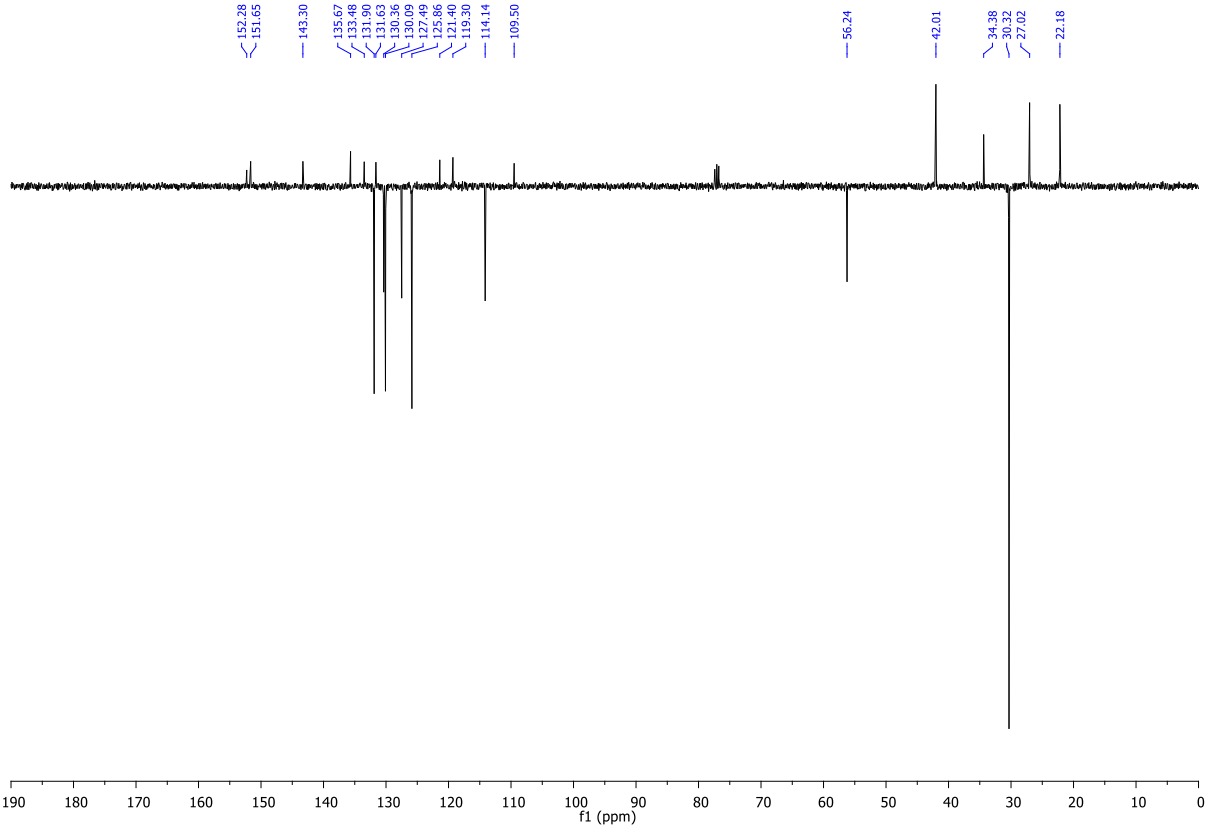
7.48
6.81
6.79
6.79
6.77
6.77
6.65
6.63
6.61
6.61
6.53
6.51
5.14
5.00
3.26
3.24
3.23
2.65
2.63
2.62
1.92
1.91
1.89
1.88
1.86
1.29
2.10
2.05
2.32
2.07
1.03
1.00
0.99
2.02
2.11
2.16
17.96
f1 (ppm)
152.07
145.66
142.74
137.03
135.43
134.16
132.92
131.49
130.39
127.50
125.87
121.48
114.26
91.08
55.72
42.08
34.37
30.37
26.97
22.23
f1 (ppm)


OH
t-Bu
t-Bu
NC
N
H

5ag

7.46
7.44
7.15
7.13
6.79
6.58
6.55
6.53
6.53
6.32
6.30
5.22
5.02
3.20
3.19
3.18
2.62
2.60
2.58
1.86
1.84
1.83
1.81
1.80
1.28
2.01
2.02
2.00
1.00
0.94
0.99
1.00
0.99
1.99
2.02
2.05
18.04
f1 (ppm)


152.28
151.65
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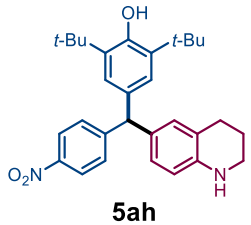
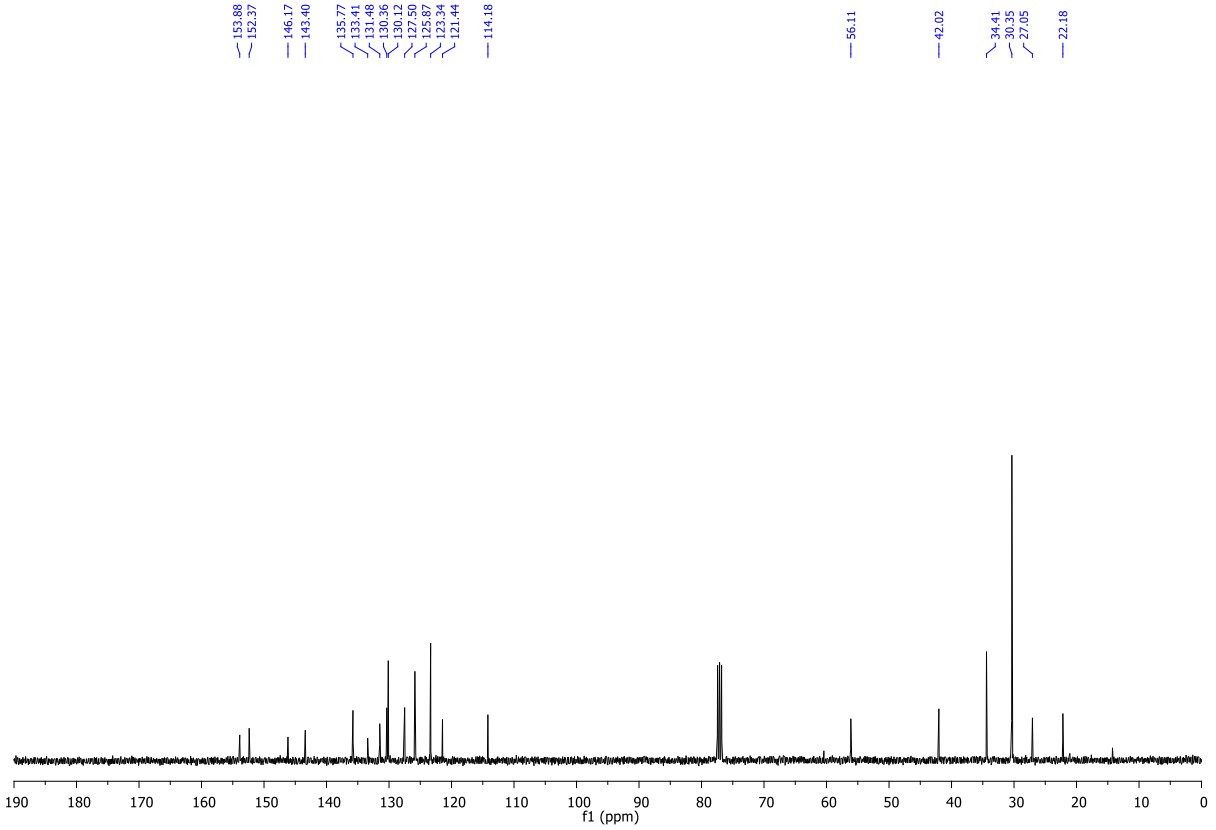
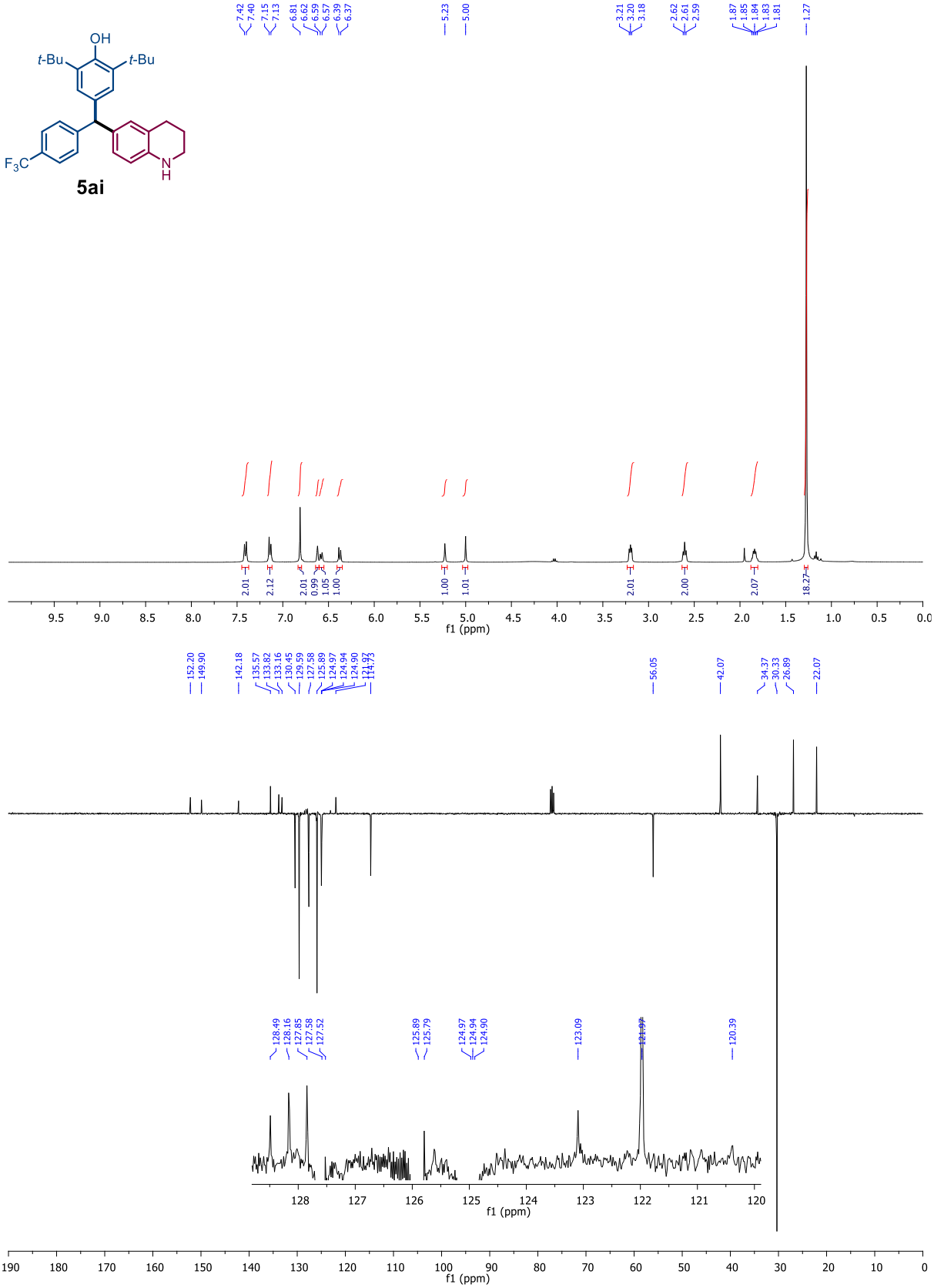
135.67
133.48
131.90
131.63
130.36
130.09
127.49
125.86
121.40
119.30
114.14
109.50
56.24
42.01
34.38
30.32
27.02
22.18
f1 (ppm)

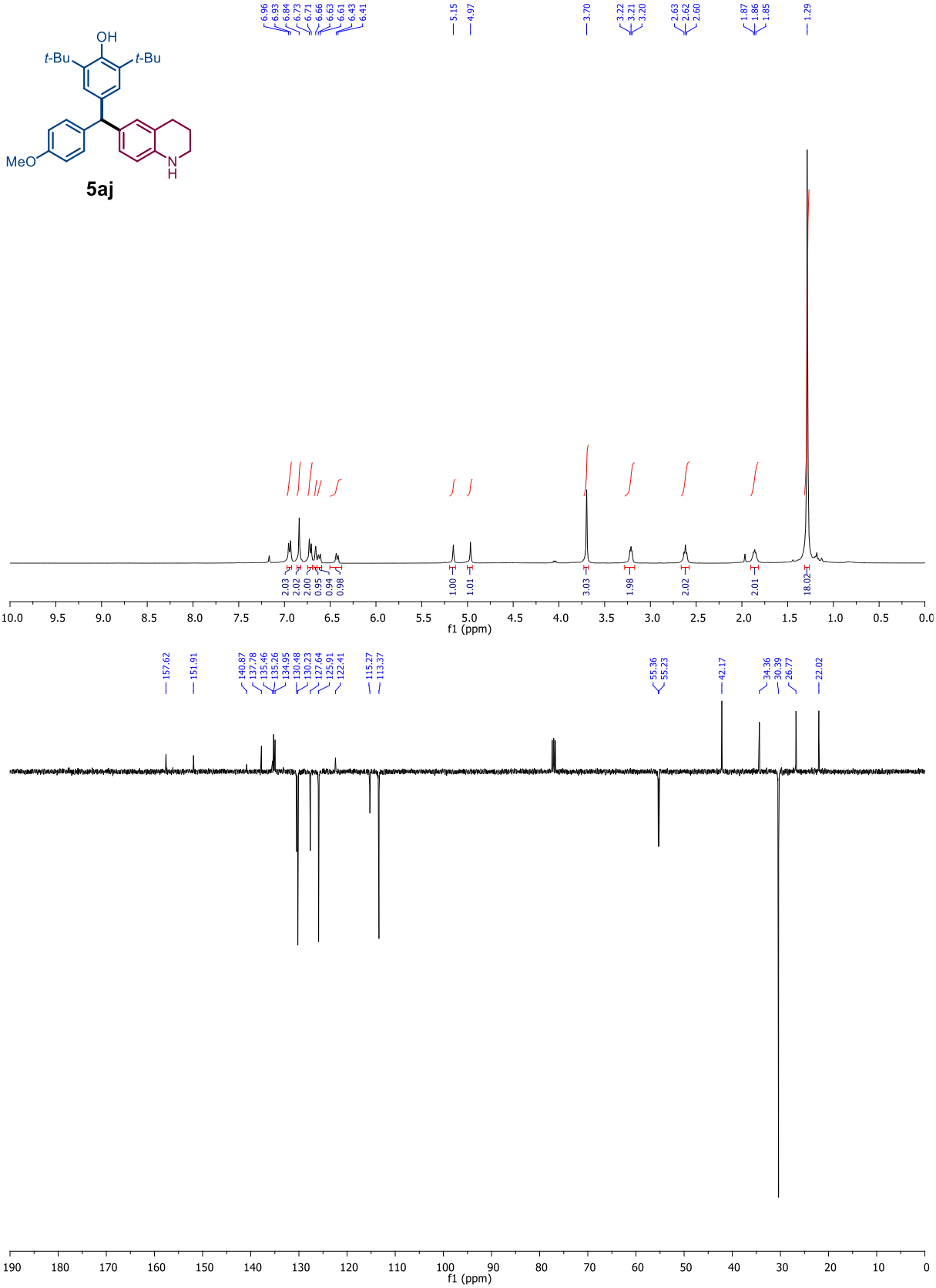

OH
t-Bu
t-Bu
O2N
N
H

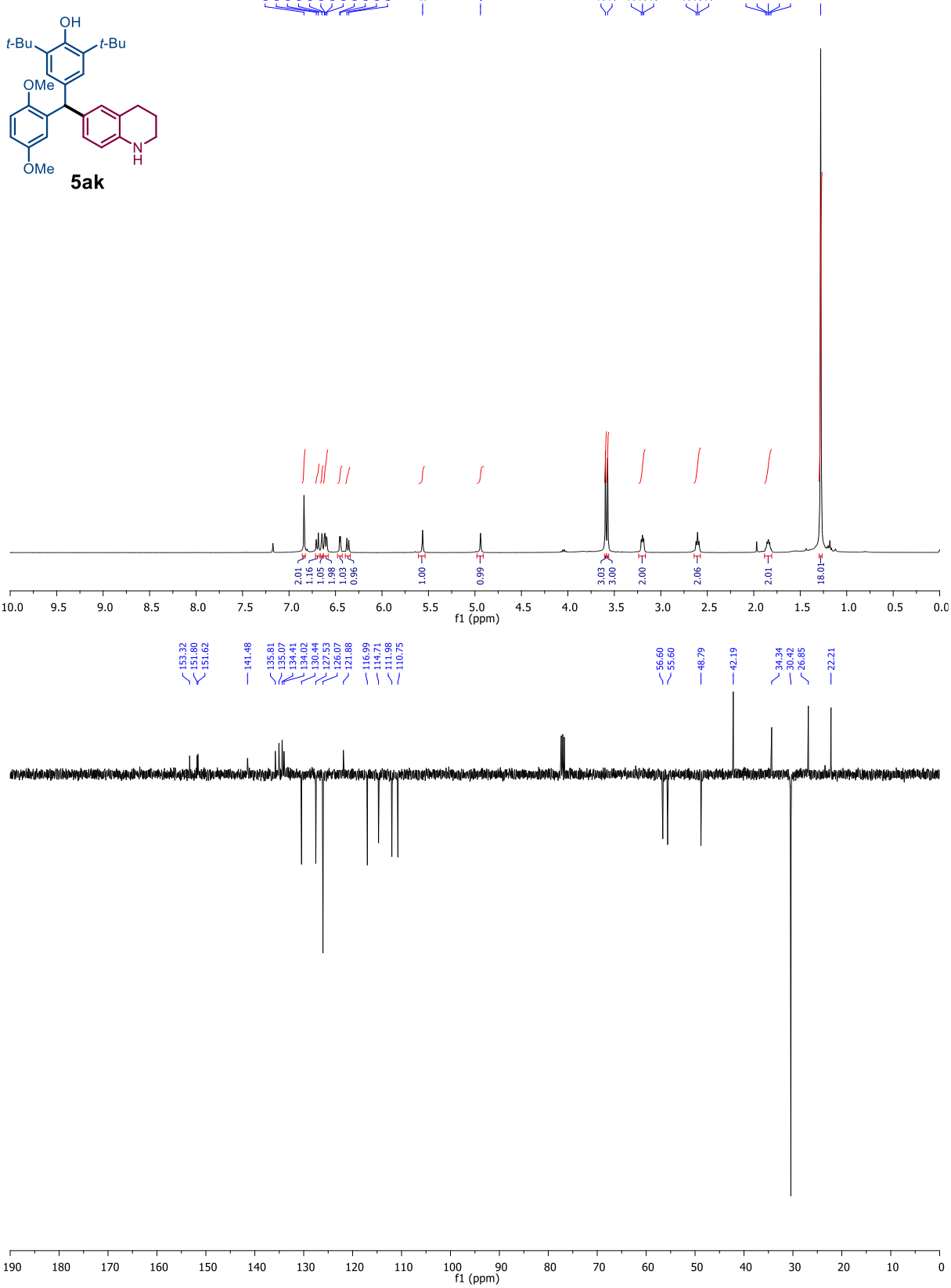
5ah

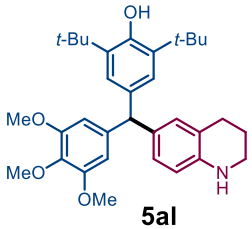
8.15
8.13
7.32
7.30
6.92
6.70
6.68
6.66
6.66
6.44
6.42
5.38
5.15
3.33
3.32
3.30
2.74
2.72
2.71
1.98
1.96
1.95
1.94
1.92
1.40
1.96
2.02
2.07
1.01
1.06
1.03
1.00
1.01
2.08
2.12
2.13
18.17
f1 (ppm)


153.88
152.37
146.17
143.40
135.77
133.41
131.48
130.36
130.12
127.50
125.87
123.34
121.44
114.18
56.11
42.02
34.41
30.35
27.05
22.18
f1 (ppm)


OH
t-Bu
t-Bu
F3C
N
H
5ai
f1 (ppm)
f1 (ppm)
f1 (ppm)

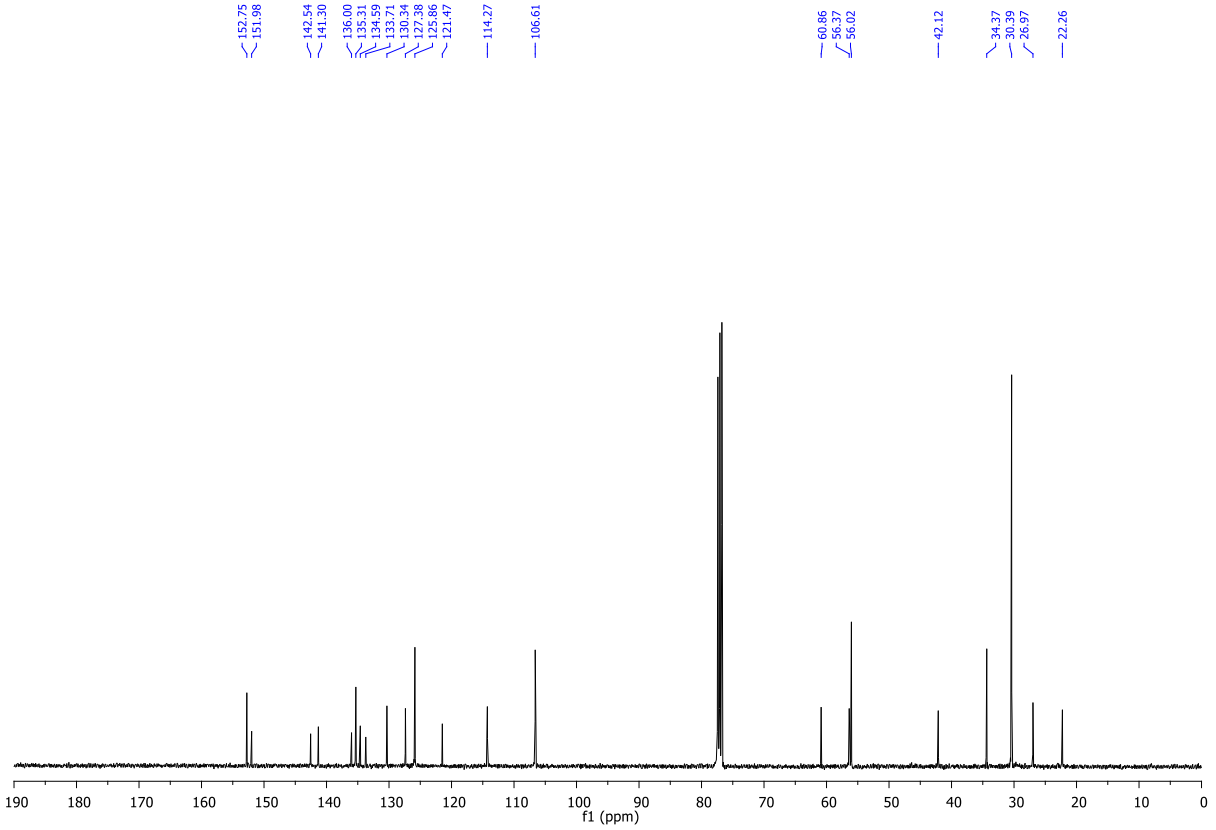

OH
t-Bu
t-Bu
MeO
N
H
5aj
6.96
6.93
6.84
6.73
6.71
6.66
6.63
6.61
6.43
6.41
5.15
4.97
3.70
3.22
3.21
3.20
2.63
2.62
2.60
1.87
1.86
1.85
1.29
2.03
2.02
2.00
0.95
0.94
0.98
1.00
1.01
3.03
1.98
2.02
2.01
18.02
f1 (ppm)
157.62
151.91
140.87
137.78
135.46
135.26
134.95
130.48
130.23
127.64
125.91
122.41
115.27
113.37
55.36
55.23
42.17
34.36
30.39
26.77
22.02
f1 (ppm)


OH
t-Bu
t-Bu
OMe
OMe
N
H
5ak
6.84
6.71
6.68
6.65
6.62
6.61
6.60
6.59
6.45
6.38
6.36
5.56
4.94
3.60
3.57
3.21
3.20
3.18
2.62
2.61
2.59
1.87
1.86
1.84
1.83
1.82
1.28
2.01
1.16
1.05
1.98
1.03
0.96
1.00
0.99
3.03
3.00
2.00
2.06
2.01
18.01
f1 (ppm)
153.32
151.80
151.62
141.48
135.81
135.07
134.41
134.02
130.44
127.53
126.07
121.88
116.99
114.71
111.98
110.75
56.60
55.60
48.79
42.19
34.34
30.42
26.85
22.21
f1 (ppm)


OH
t-Bu
t-Bu
MeO
MeO
OMe
N
H

5al

6.88
6.65
6.61
6.59
6.35
6.33
6.28
5.11
4.99
3.75
3.66
3.21
3.20
3.19
2.64
2.62
2.61
1.87
1.86
1.84
1.83
1.81
1.30
2.02
0.98
0.99
1.02
1.99
1.00
1.02
2.99
6.00
2.07
2.07
2.04
18.14
f1 (ppm)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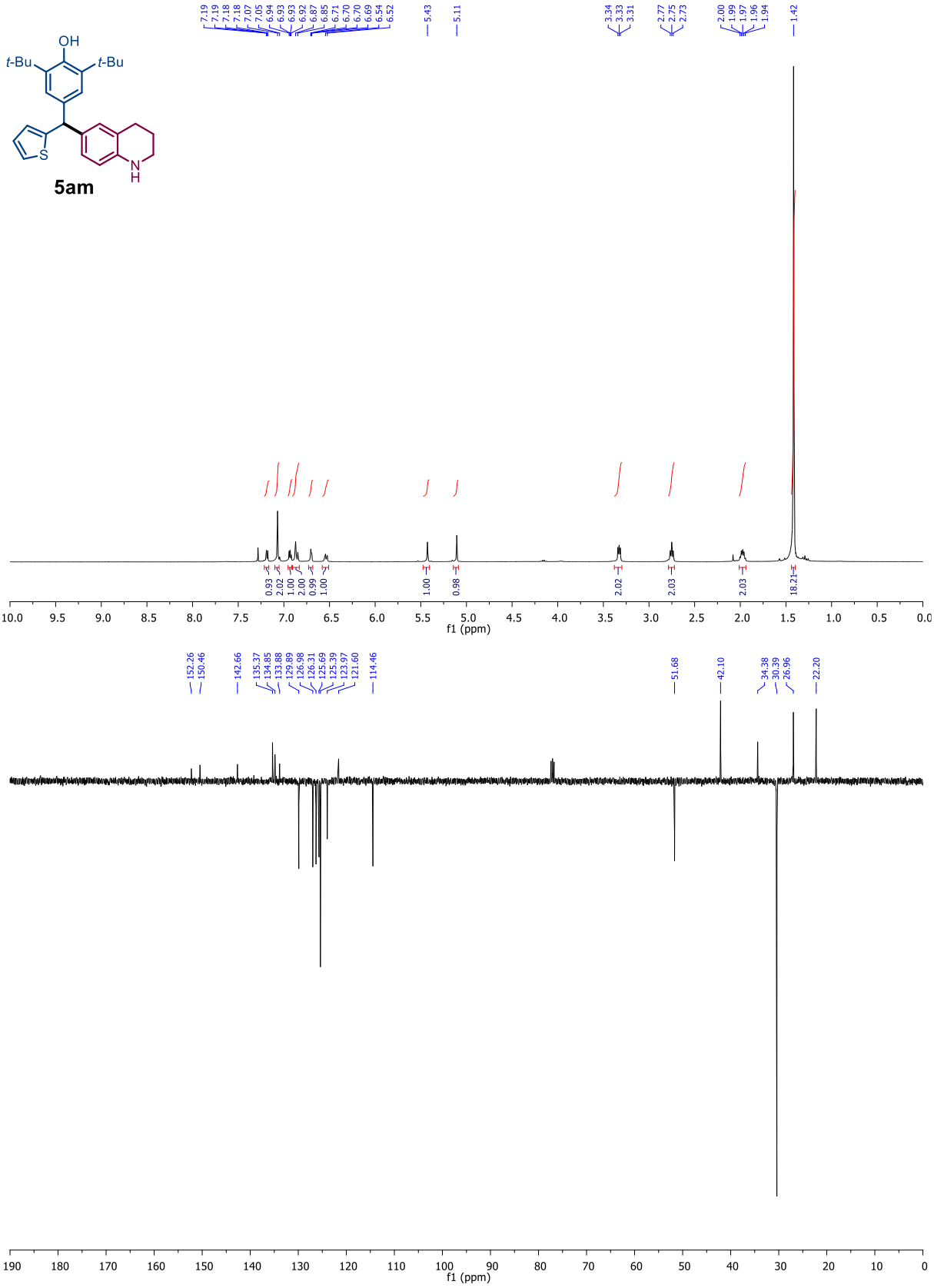
151.98
142.54
141.30
136.00
135.31
134.59
133.71
130.34
127.38
125.86
121.47
114.27
106.61
60.86
56.37
56.02
42.12
34.37
30.39
26.97
22.26
f1 (ppm)


OH
t-Bu
t-Bu
S
N
H
5am
7.19
7.19
7.18
7.18
7.07
7.05
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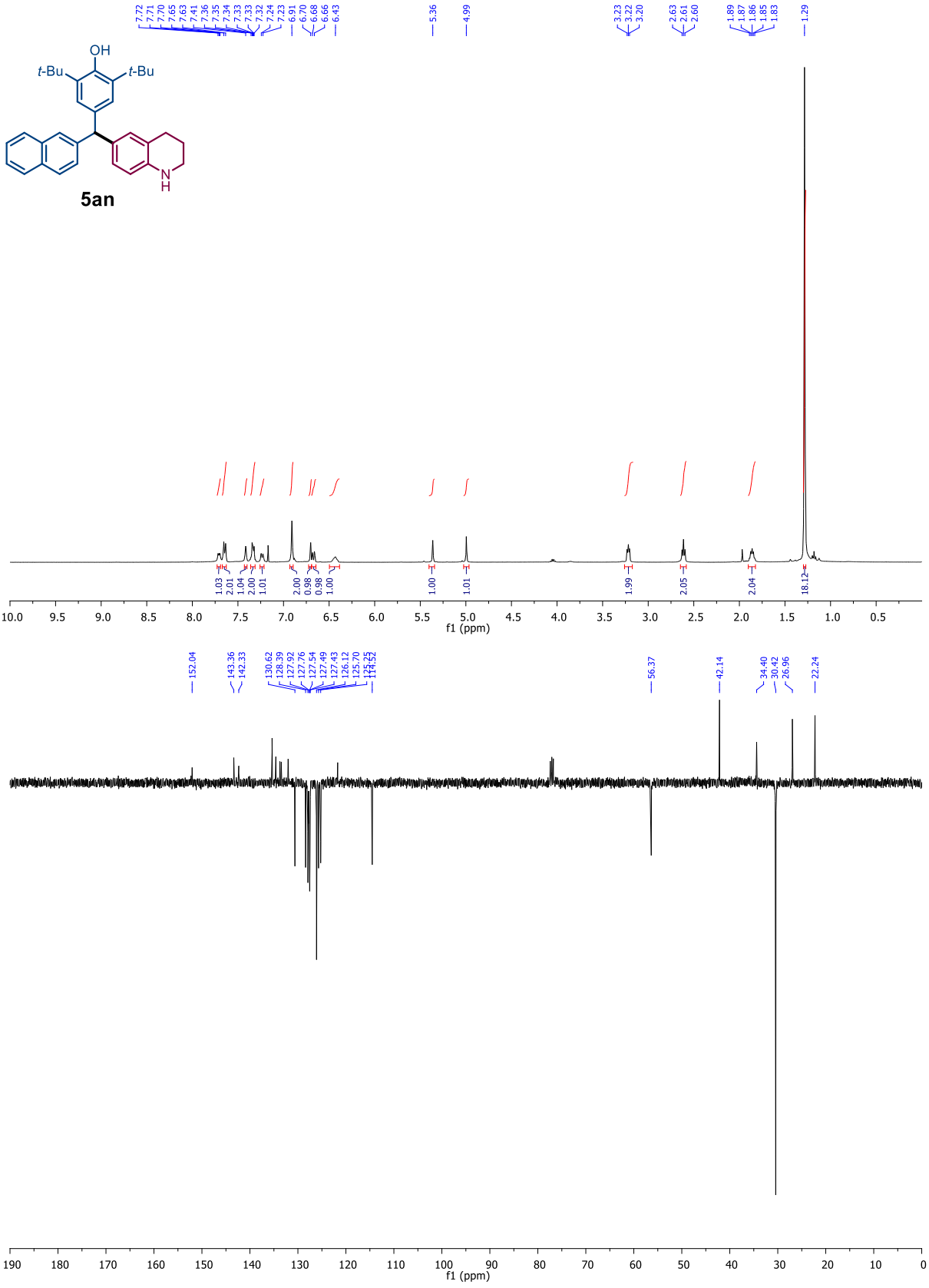
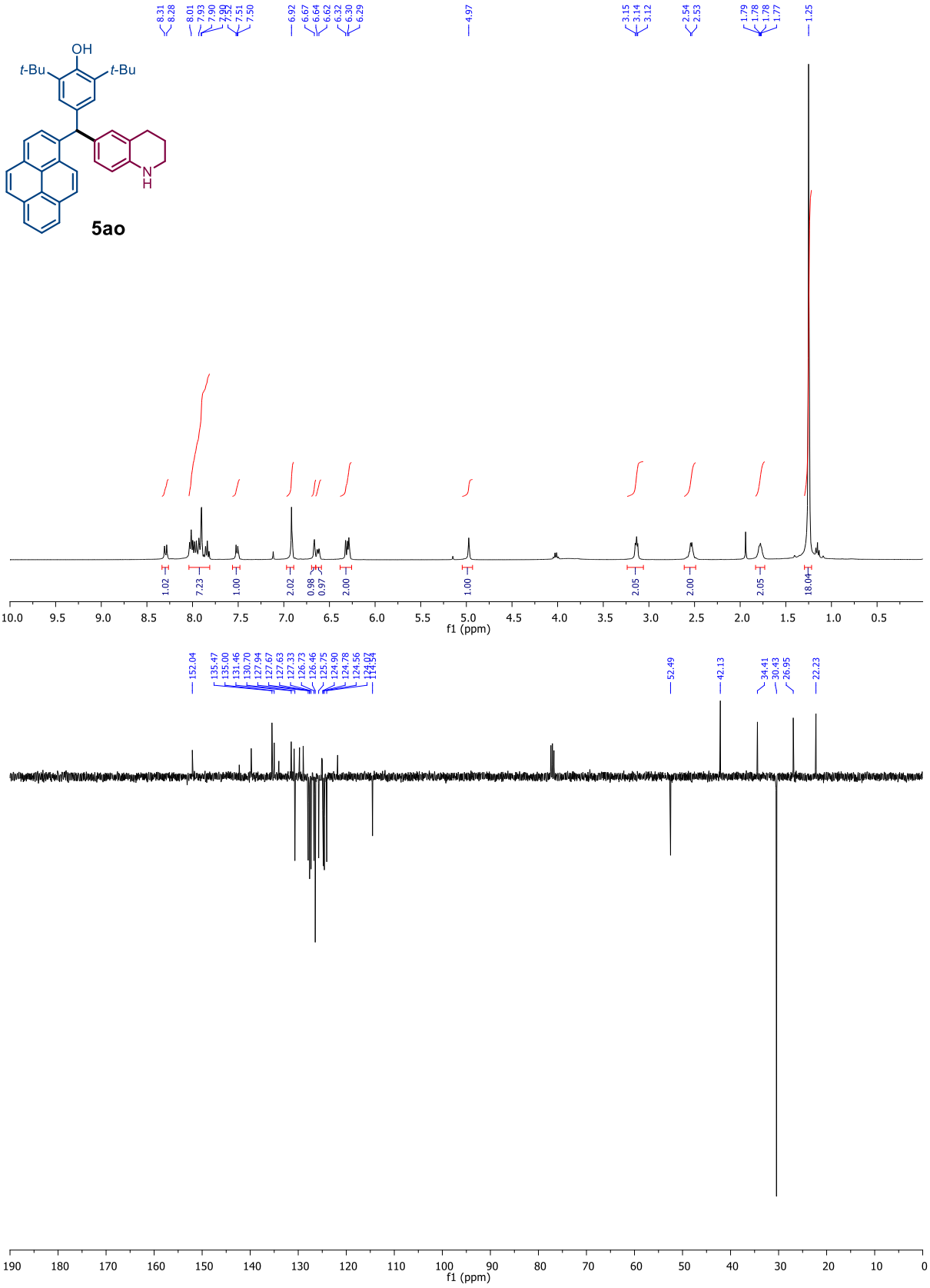
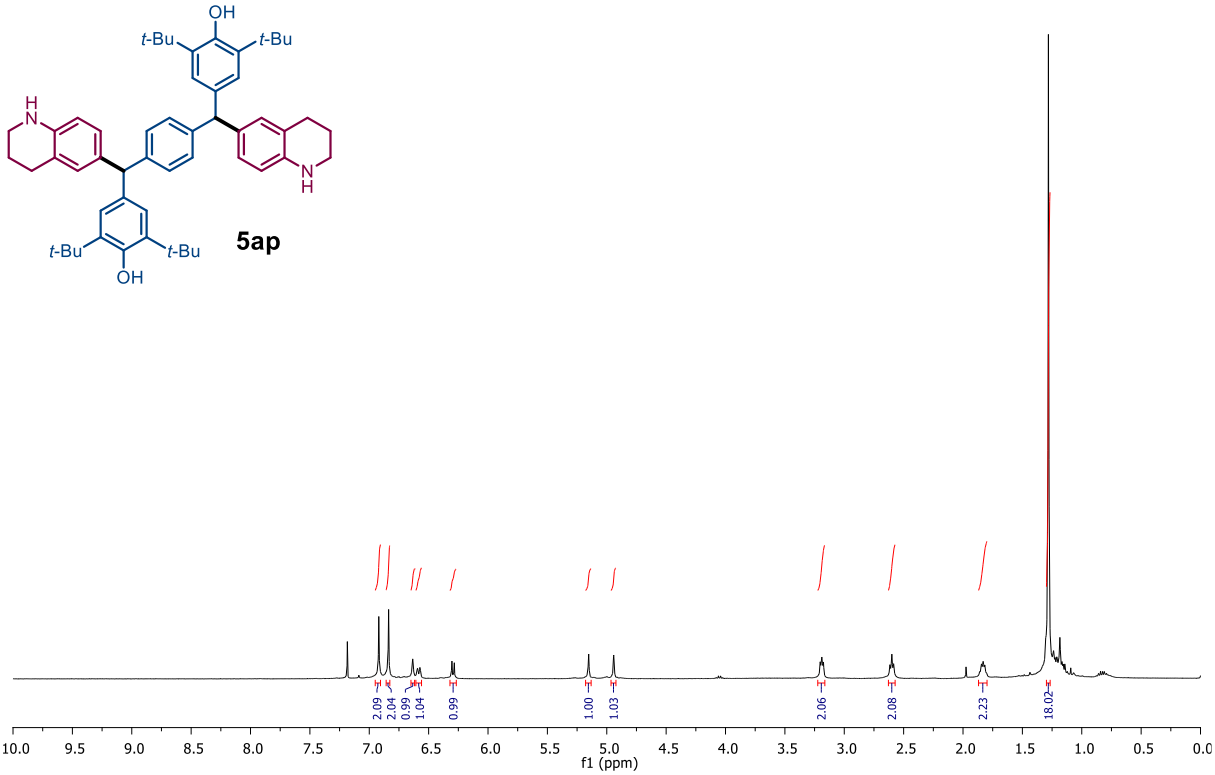
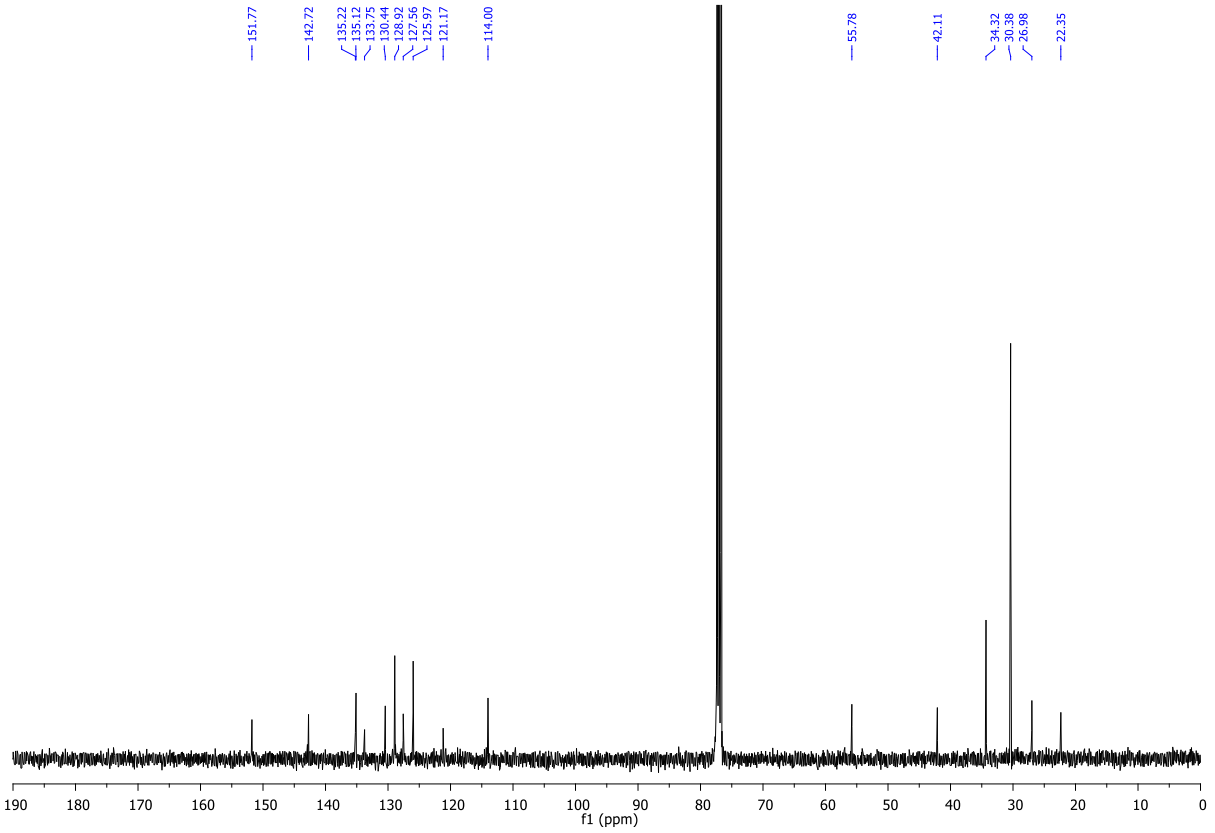
6.93
6.93
6.92
6.87
6.85
6.71
6.70
6.70
6.69
6.54
6.52
5.43
5.11
3.34
3.33
3.31
2.77
2.75
2.73
2.00
1.99
1.97
1.96
1.94
1.42
0.93
2.02
1.00
2.00
0.99
1.00
1.00
0.98
2.02
2.03
2.03
18.21
f1 (ppm)
152.26
150.46
142.66
135.37
134.85
133.88
129.89
126.98
126.31
125.69
125.39
123.97
121.60
114.46
51.68
42.10
34.38
30.39
26.96
22.20
f1 (ppm)


OH
t-Bu
t-Bu
N
H
5an
7.72
7.71
7.70
7.65
7.63
7.41
7.36
7.35
7.34
7.33
7.33
7.32
7.24
7.23
6.91
6.70
6.68
6.66
6.43
5.36
4.99
3.23
3.22
3.20
2.63
2.61
2.60
1.89
1.87
1.86
1.85
1.83
1.29
1.03
2.01
1.04
2.00
1.01
2.00
0.98
0.98
1.00
1.00
1.01
1.99
2.05
2.04
18.12
f1 (ppm)
152.04
143.36
142.33
130.62
128.39
127.92
127.76
127.54
127.49
127.43
126.12
125.70
125.25
114.52
56.37
42.14
34.40
30.42
26.96
22.24
f1 (ppm)


OH
t-Bu
t-Bu
N
H
5ao
8.31
8.28
8.01
7.93
7.90
7.52
7.51
7.50
6.92
6.67
6.64
6.62
6.32
6.30
6.29
4.97
3.15
3.14
3.12
2.54
2.53
1.79
1.78
1.78
1.77
1.25
1.02
7.23
1.00
2.02
0.98
0.97
2.00
1.00
2.05
2.00
2.05
18.04
f1 (ppm)
152.04
135.47
135.00
131.46
130.70
127.94
127.67
127.63
127.33
126.73
126.46
125.75
124.90
124.78
124.56
52.49
42.13
34.41
30.43
26.95
22.23
f1 (ppm)


6.92
6.84
6.63
6.59
6.57
6.30
6.28
5.15
4.94
4.94
3.20
3.19
3.18
2.62
2.60
2.58
1.84
1.83
1.82
1.28
2.09
2.04
0.99
1.04
0.99
1.00
1.03
2.06
2.08
2.23
18.02
f1 (ppm)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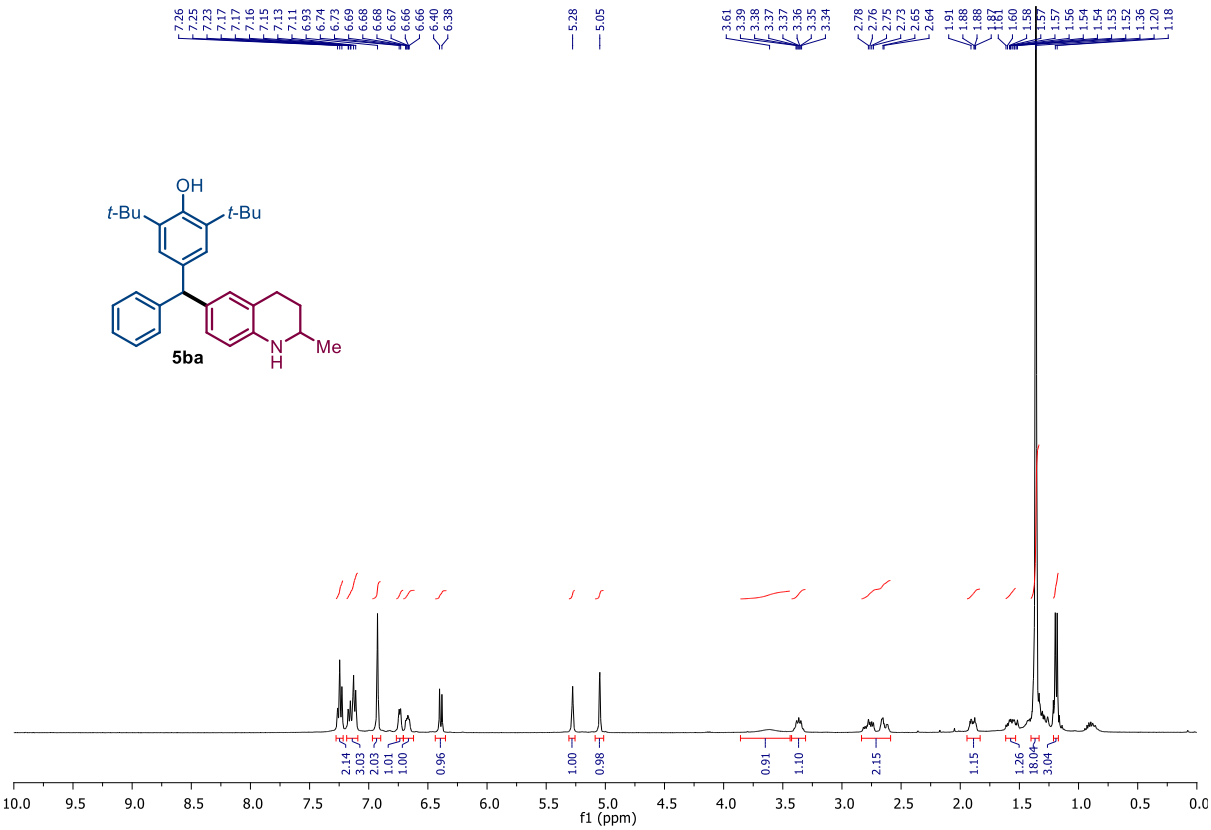
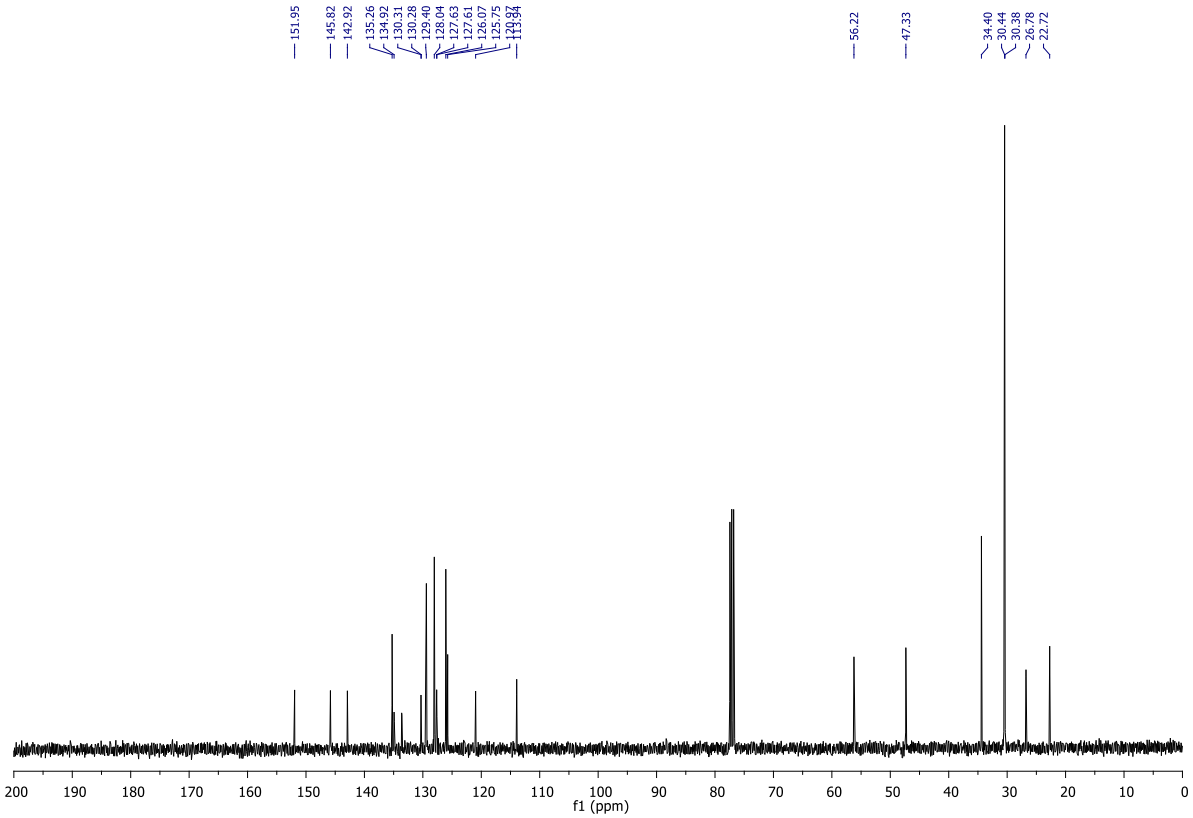
142.72
135.22
135.12
133.75
130.44
128.92
127.56
125.97
121.17
114.00
55.78
42.11
34.32
30.38
26.98
22.35
f1 (ppm)


7.26
7.25
7.23
7.17
7.17
7.16
7.15
7.13
7.11
6.93
6.74
6.73
6.69
6.68
6.68
6.67
6.66
6.66
6.40
6.38
5.28
5.05
3.61
3.39
3.38
3.37
3.37
3.36
3.35
3.34
2.78
2.76
2.75
2.73
2.65
2.64
1.91
1.88
1.88
1.87
1.60
1.58
1.57
1.57
1.56
1.54
1.54
1.53
1.52
1.36
1.20
1.18
OH
t-Bu
t-Bu
N
H
Me
5ba
2.14
3.03
2.03
1.01
1.00
0.96
1.00
0.98
0.91
1.10
2.15
1.15
1.26
18.04
3.04
f1 (ppm)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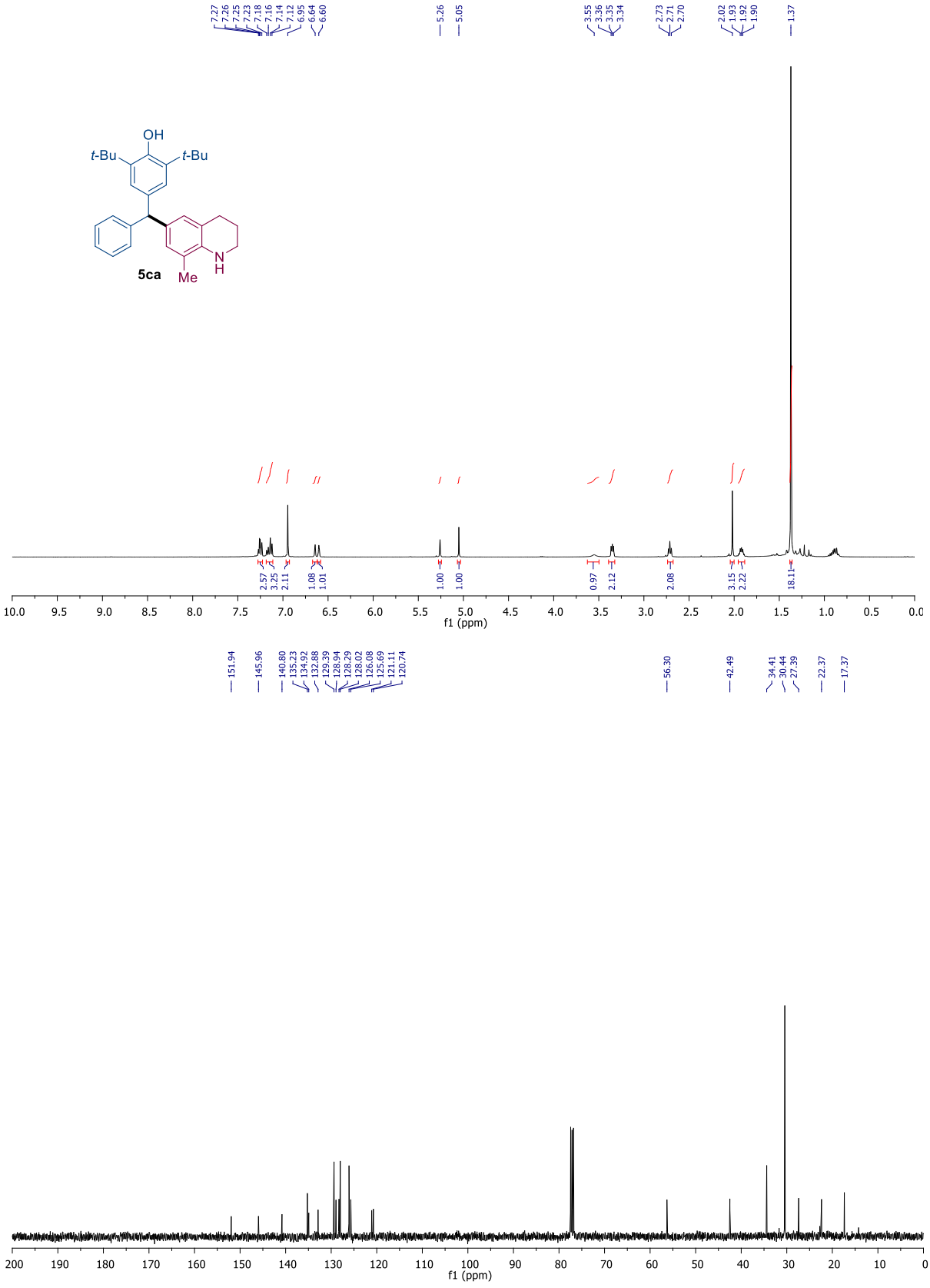
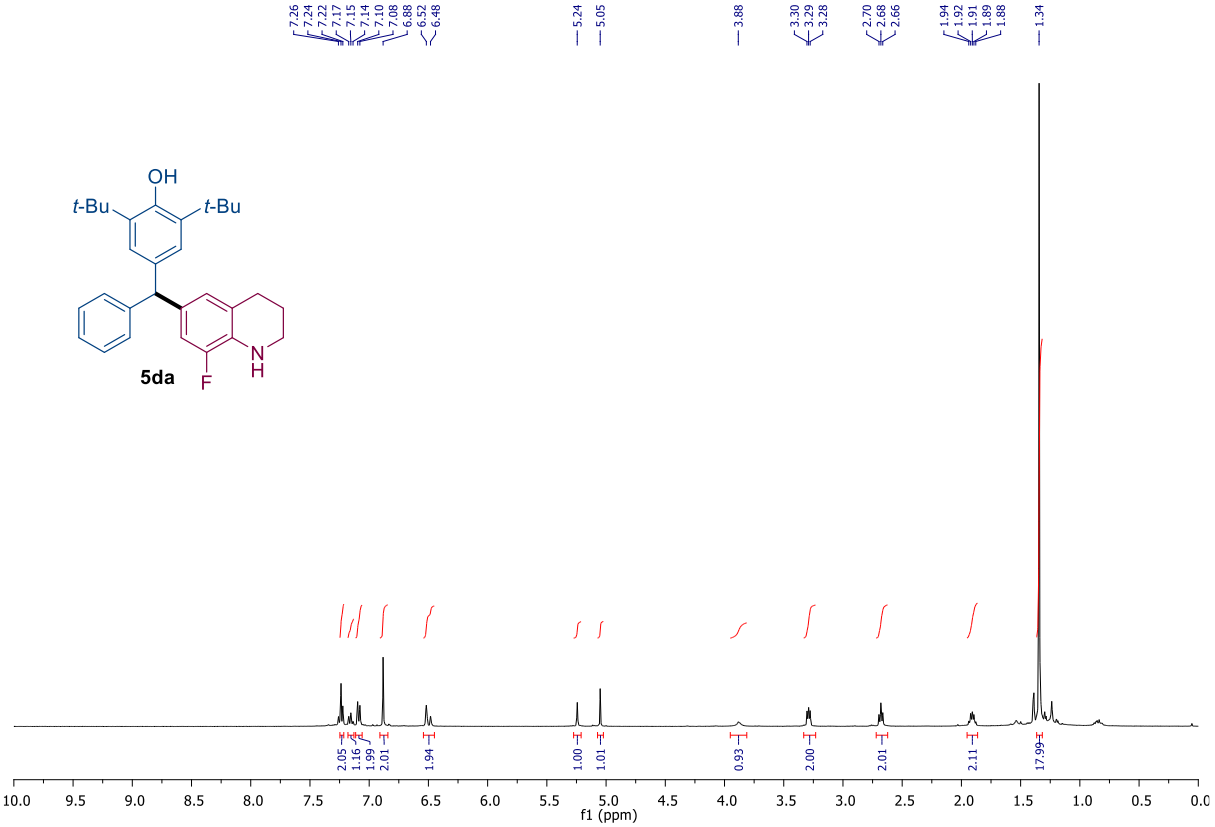
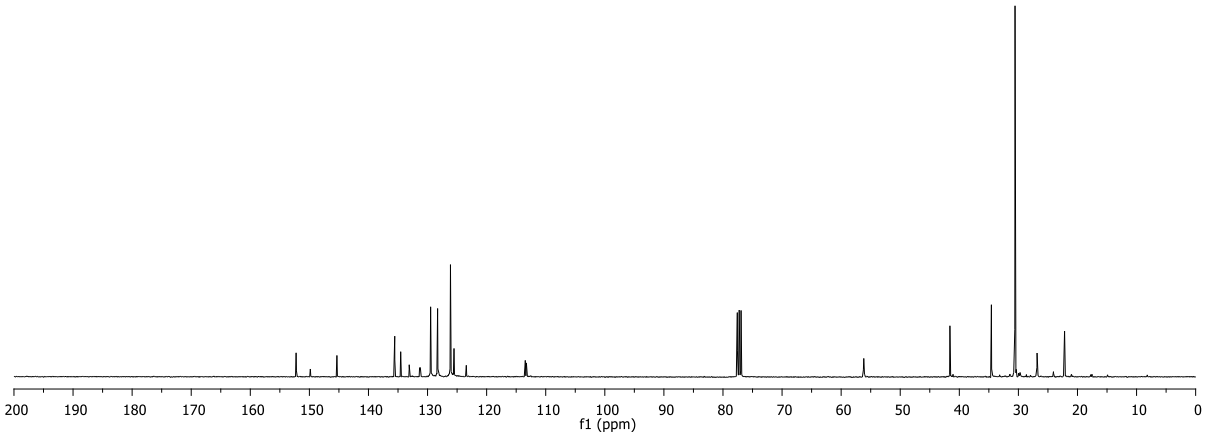
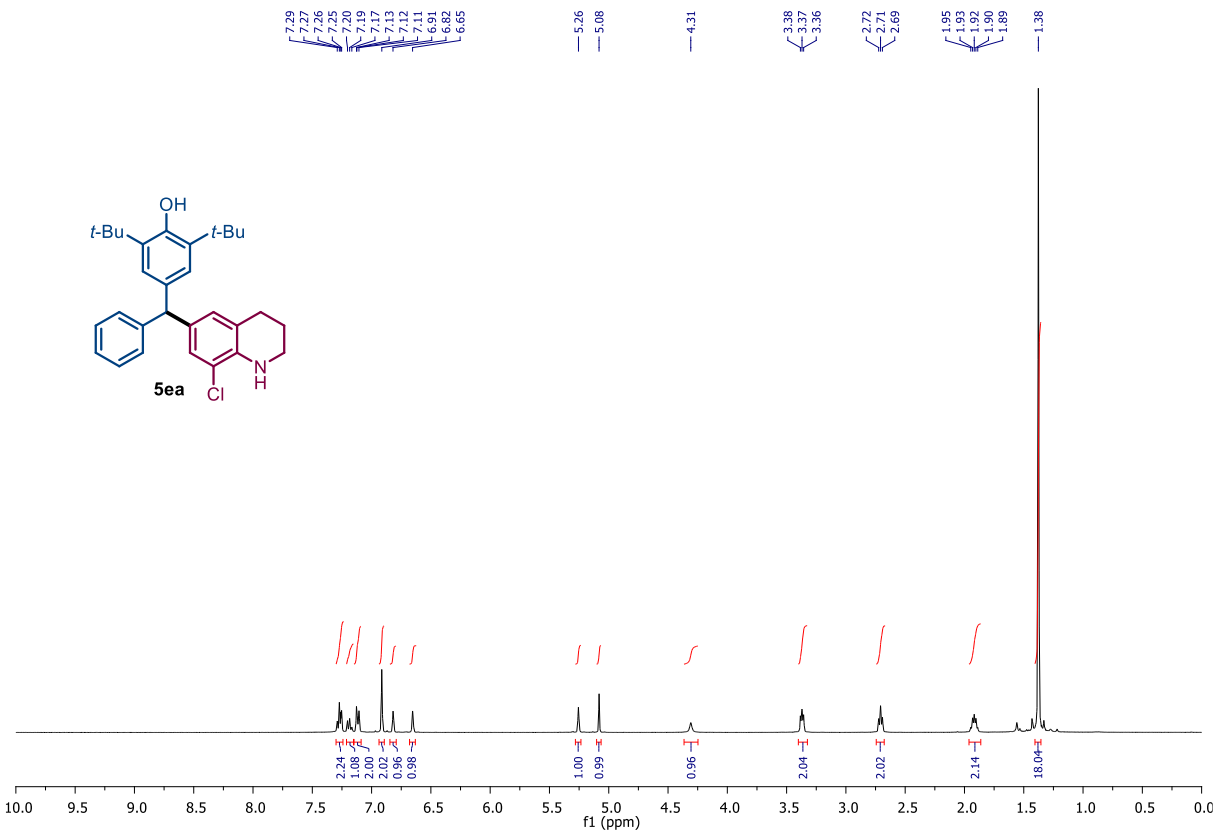
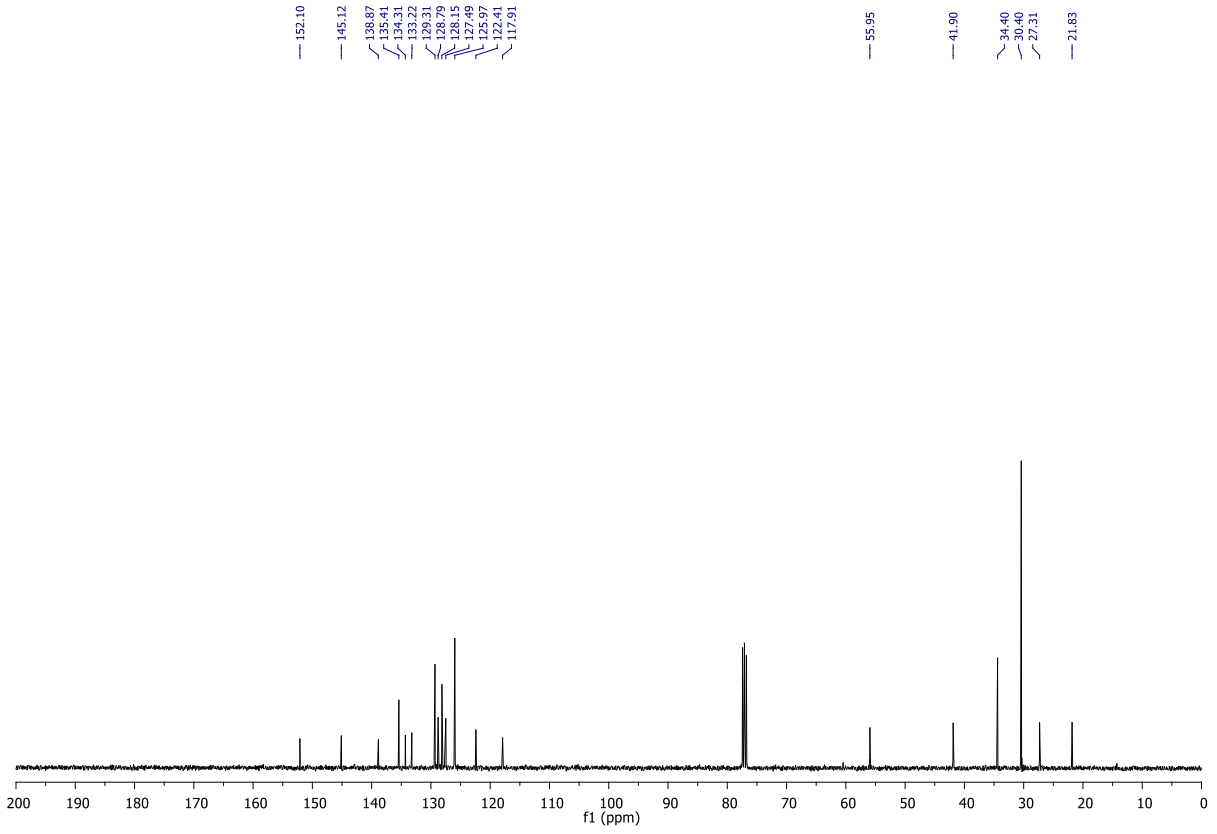
145.82
142.92
135.26
134.92
130.31
130.28
129.40
128.04
127.63
127.61
126.07
125.75
120.94
113.94
56.22
47.33
34.40
30.44
30.38
26.78
22.72
f1 (ppm)

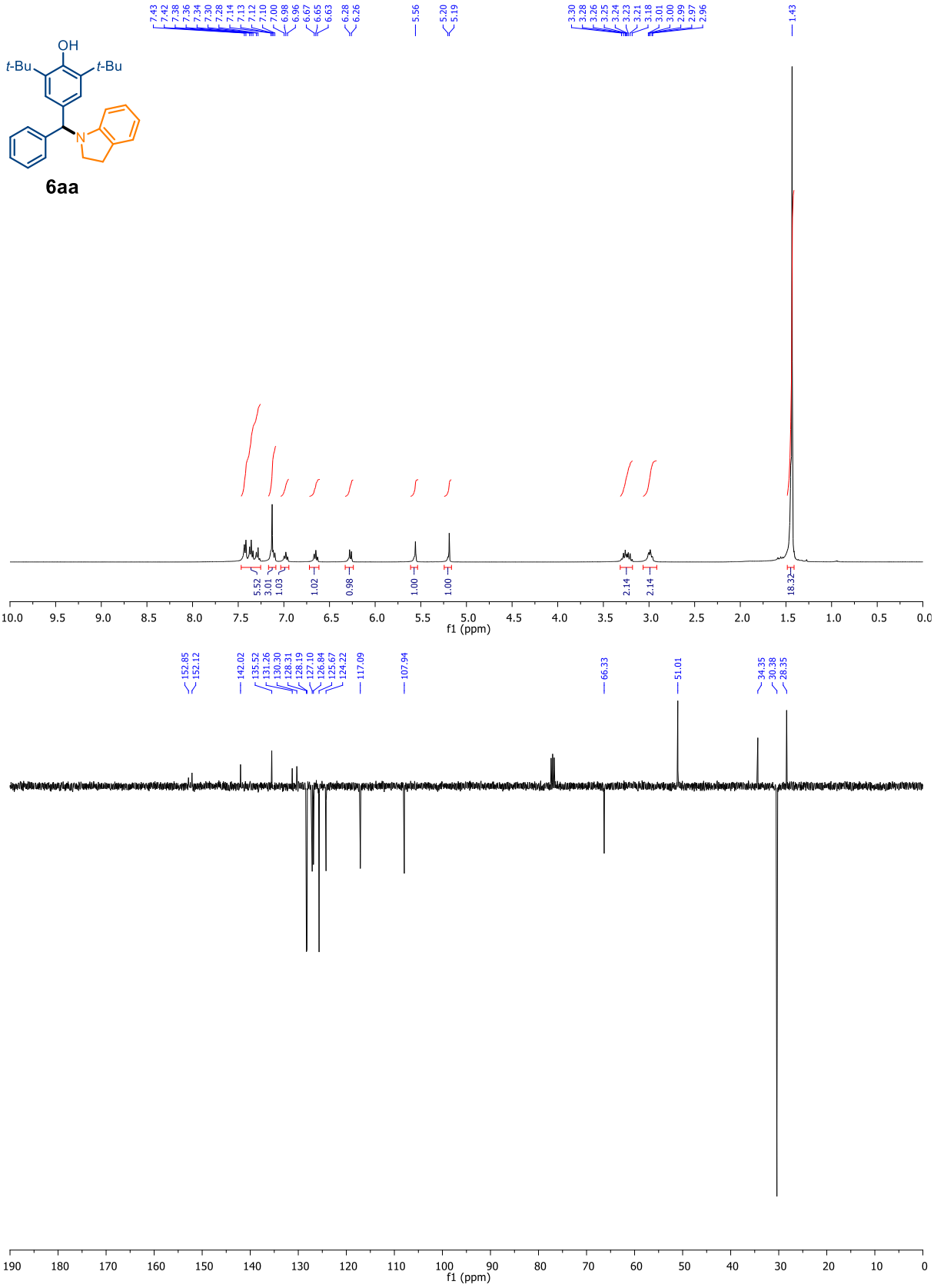

7.27
7.26
7.25
7.23
7.18
7.16
7.14
7.12
6.95
6.64
6.60
5.26
5.05
3.55
3.36
3.35
3.34
2.73
2.71
2.70
2.02
1.93
1.92
1.90
1.37
OH
t-Bu
t-Bu
N
H
Me
5ca
2.57
3.25
2.11
1.08
1.01
1.00
1.00
0.97
2.12
2.08
3.15
2.22
18.11
f1 (ppm)
151.94
145.96
140.80
135.23
134.92
132.88
129.39
128.94
128.29
128.02
126.08
125.69
121.11
120.74
56.30
42.49
34.41
30.44
27.39
22.37
17.37
f1 (ppm)

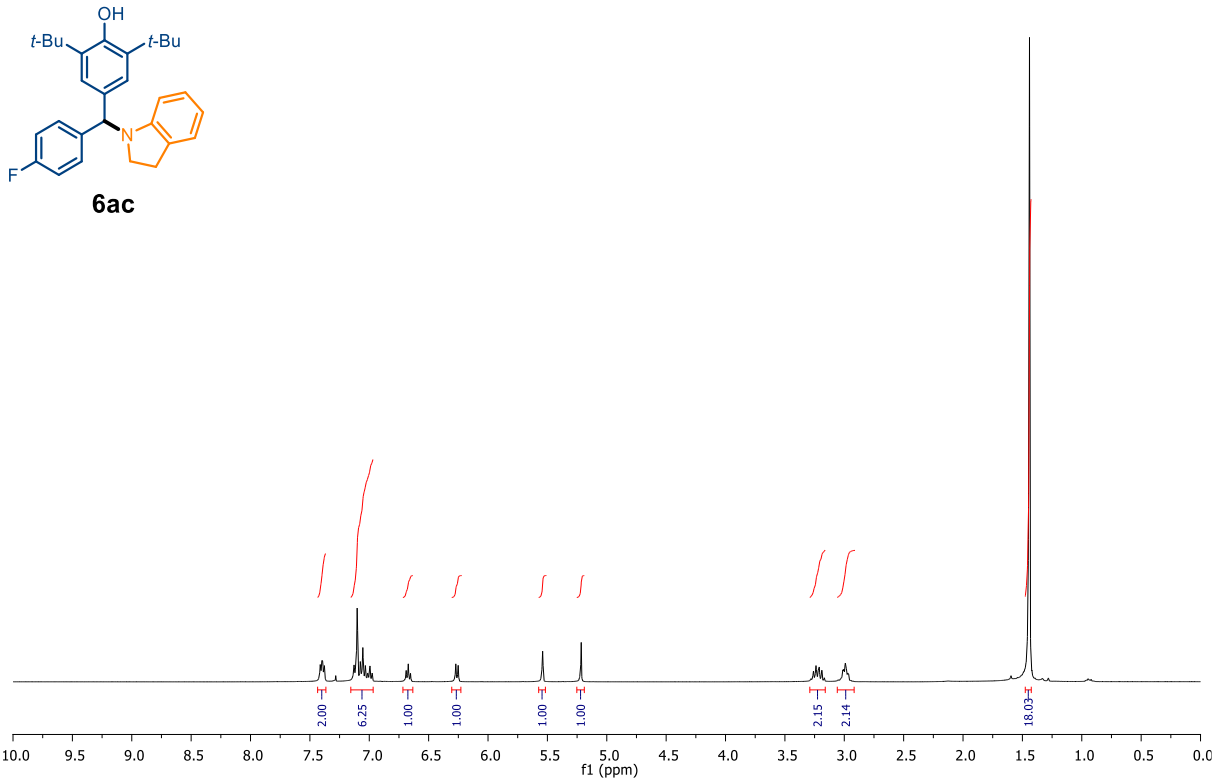

OH
t-Bu
t-Bu
N
H
F
5da
f1 (ppm)


f1 (ppm)

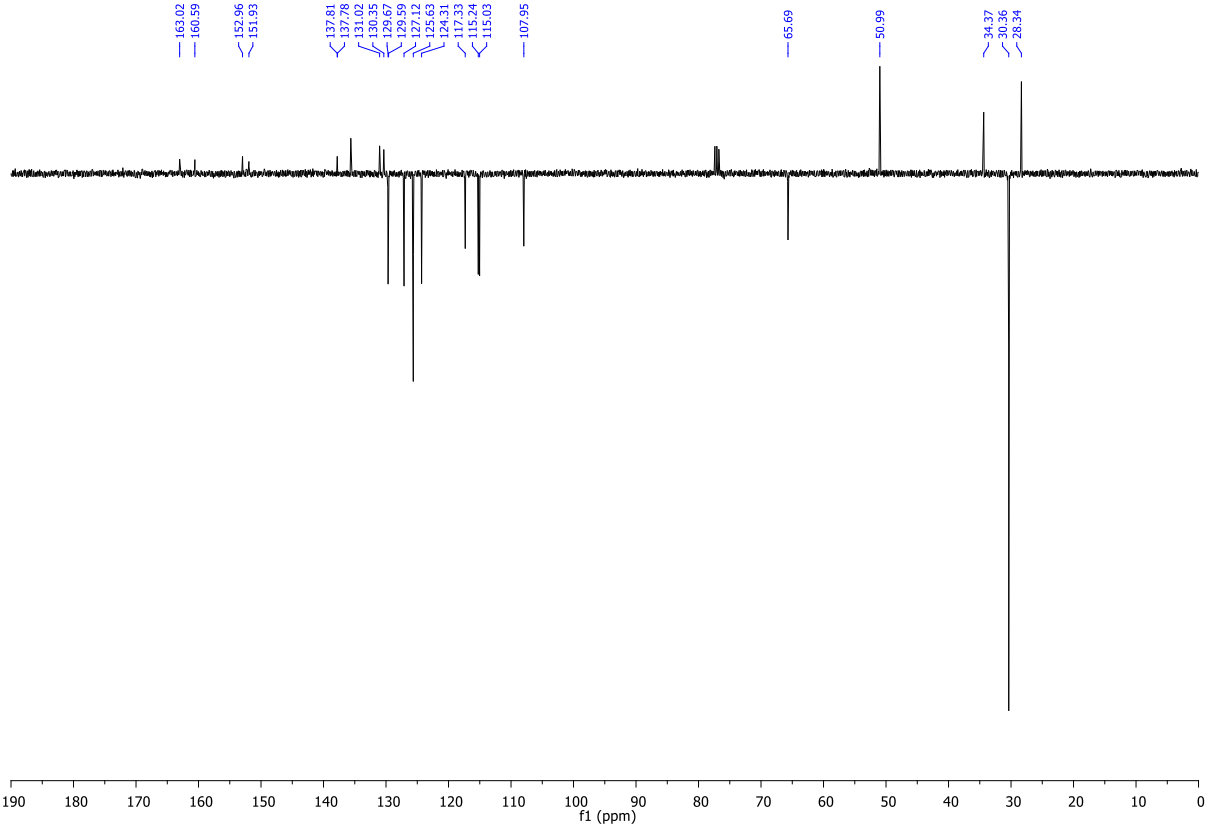

7.29
7.27
7.26
7.25
7.20
7.19
7.17
7.13
7.12
7.11
6.91
6.82
6.65
5.26
5.08
4.31
3.38
3.37
3.36
2.72
2.71
2.69
1.95
1.93
1.92
1.90
1.89
1.38
OH
t-Bu
t-Bu
N
H
Cl
5ea
2.24
1.08
2.00
2.02
0.96
0.98
1.00
0.99
0.96
2.04
2.02
2.14
18.04
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

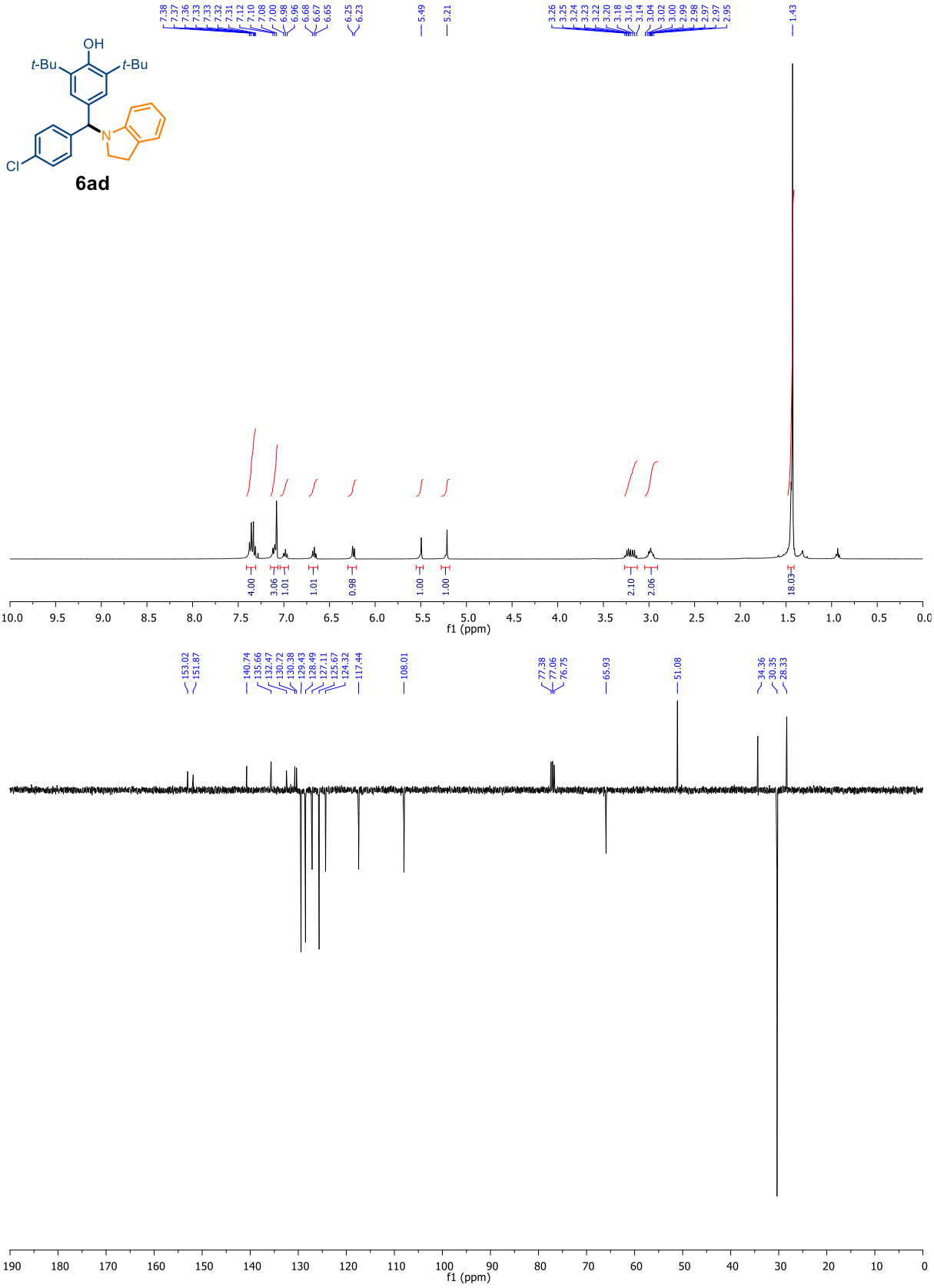

152.10
145.12
138.87
135.41
134.31
133.22
129.31
128.79
128.15
127.49
125.97
122.41
117.91
55.95
41.90
34.40
30.40
27.31
21.83
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

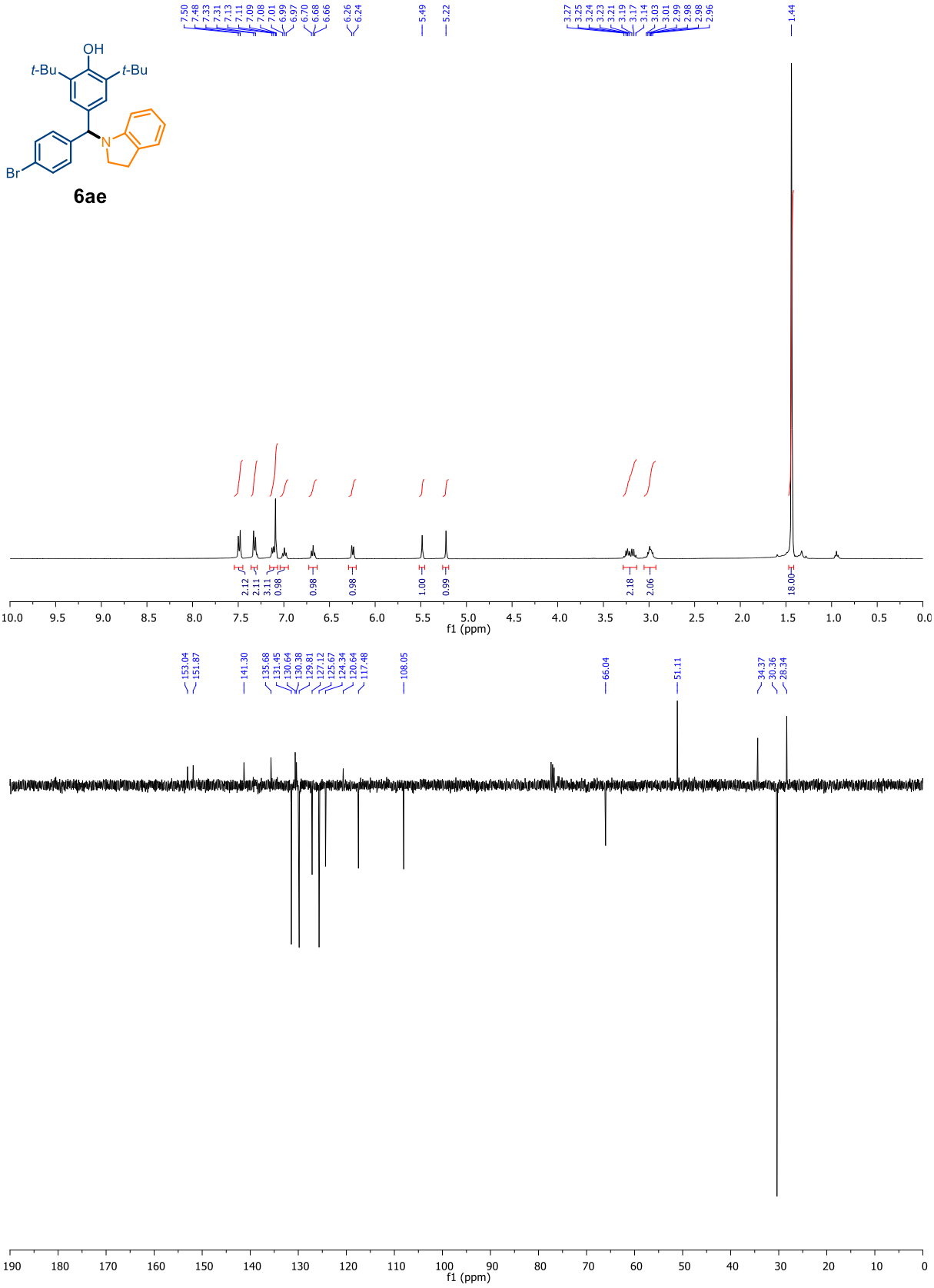

OH
t-Bu
t-Bu
N
6aa
7.43
7.42
7.38
7.36
7.34
7.30
7.28
7.14
7.13
7.12
7.10
7.00
6.98
6.96
6.67
6.65
6.63
6.28
6.26
5.56
5.20
5.19
3.30
3.28
3.26
3.25
3.24
3.23
3.21
3.18
3.01
3.00
2.99
2.97
2.96
1.43
5.52
3.01
1.03
1.02
0.98
1.00
1.00
2.14
2.14
18.32
f1 (ppm)
152.85
152.12
142.02
135.52
131.26
130.30
128.31
128.19
127.10
126.84
125.67
124.22
117.09
107.94
66.33
51.01
34.35
30.38
28.35
f1 (ppm)

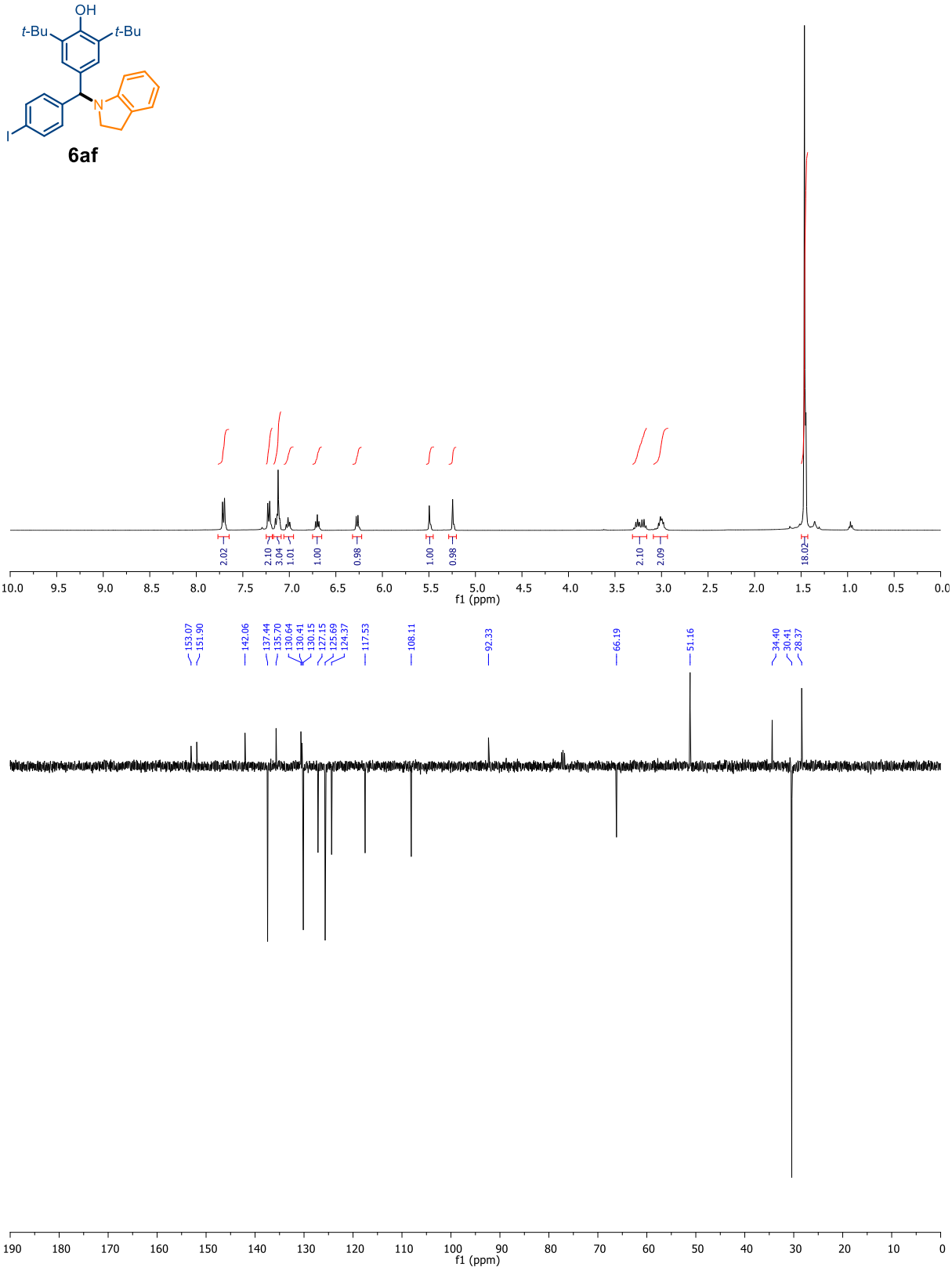

OH
t-Bu
t-Bu
F
N
7.41
7.40
7.39
7.38
7.10
7.08
6.67
6.65
6.27
6.25
5.54
5.22
3.26
3.24
3.22
3.21
3.19
3.17
3.01
3.00
2.99
2.97
2.96
1.44
2.00
6.25
1.00
1.00
1.00
1.00
2.15
2.14
18.03
f1 (ppm)

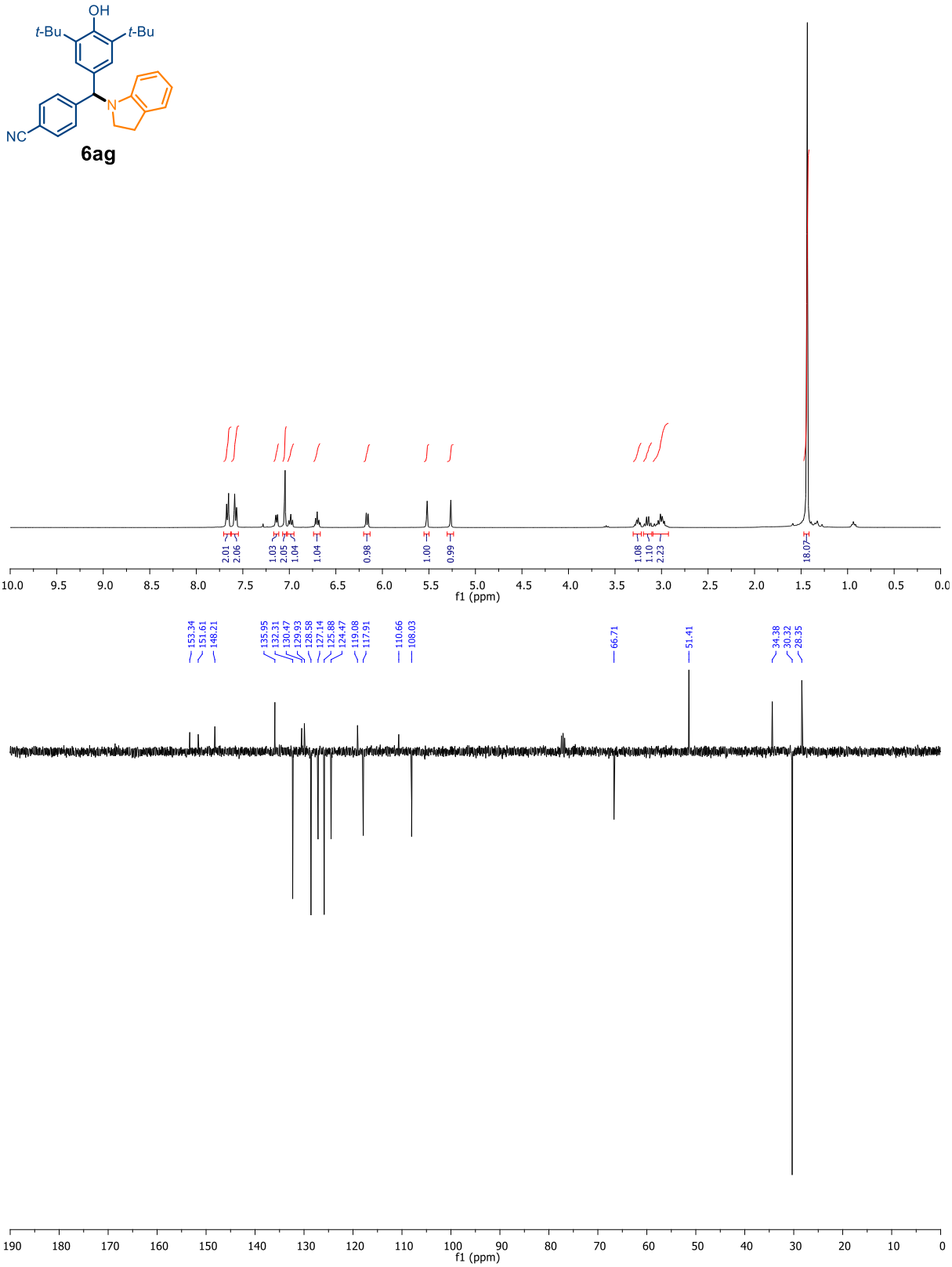
6ac

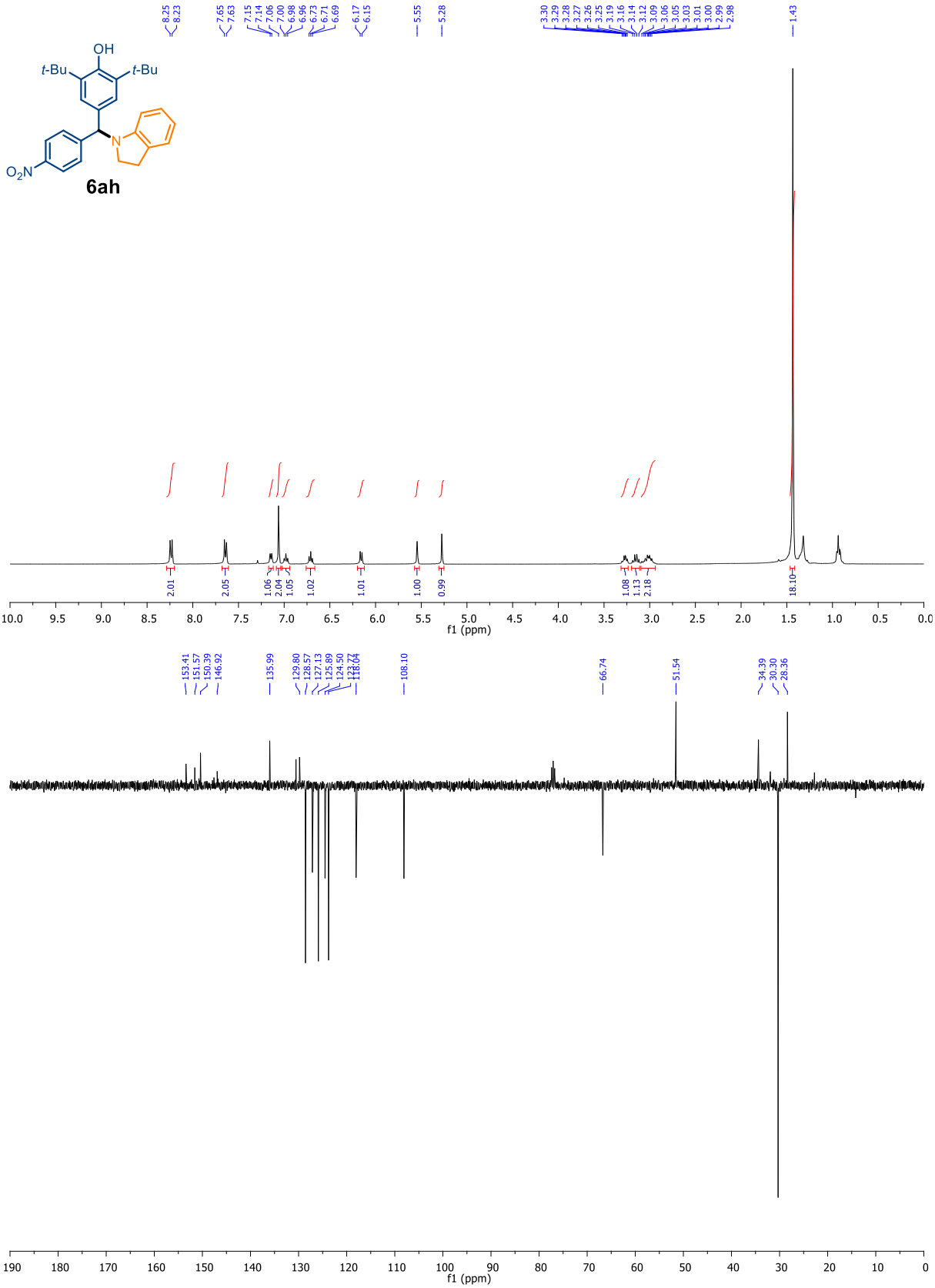

163.02
160.59
152.96
151.93
137.81
137.78
131.02
130.35
129.67
129.59
127.12
125.63
124.31
117.33
115.24
115.03
107.95
65.69
50.99
34.37
30.36
28.34
f1 (ppm)

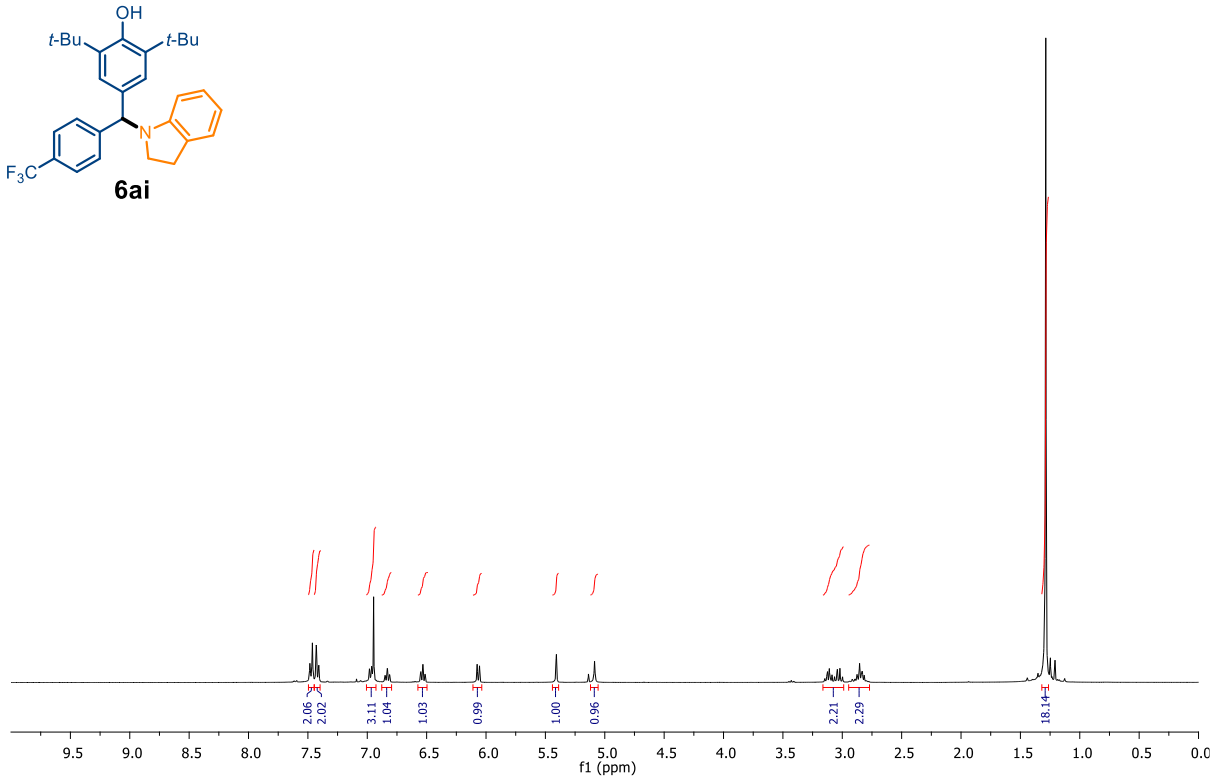

OH
t-Bu
t-Bu
Cl
N
6ad
7.38
7.37
7.36
7.33
7.33
7.32
7.31
7.12
7.10
7.08
7.00
6.98
6.96
6.68
6.67
6.65
6.25
6.23
5.49
5.21
3.26
3.25
3.24
3.23
3.22
3.20
3.18
3.16
3.14
3.04
3.02
3.00
2.99
2.98
2.97
2.97
2.95
1.43
4.00
3.06
1.01
1.01
0.98
1.00
1.00
2.10
2.06
18.03
f1 (ppm)
153.02
151.87
140.74
135.66
132.47
130.72
130.38
129.43
128.49
127.11
125.67
124.32
117.44
108.01
77.38
77.06
76.75
65.93
51.08
34.36
30.35
28.33
f1 (ppm)

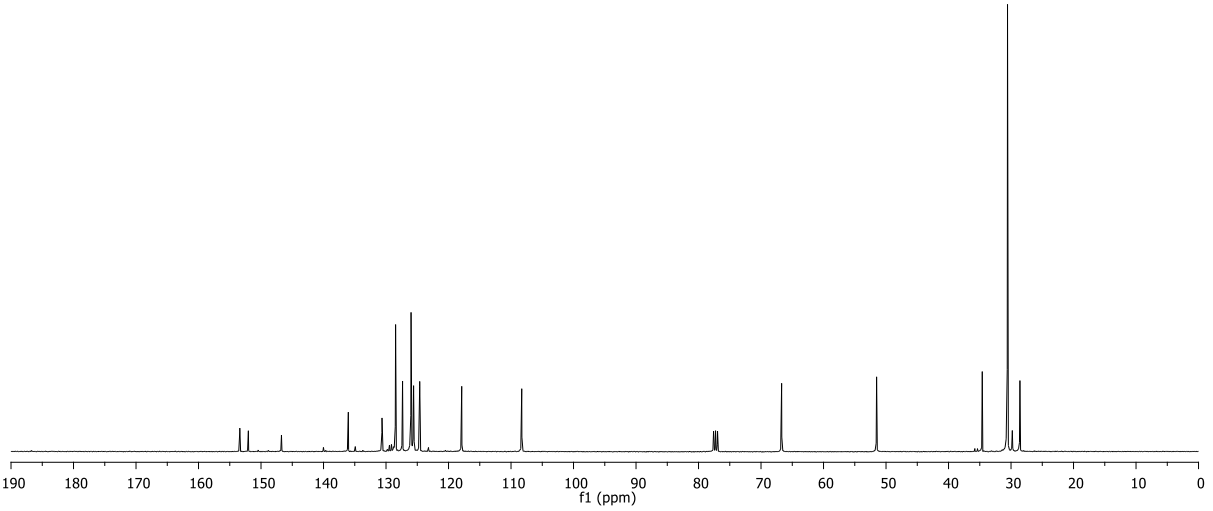

OH
t-Bu
t-Bu
N
Br
6ae
7.50
7.48
7.33
7.31
7.13
7.11
7.09
7.08
7.01
6.99
6.97
6.70
6.68
6.66
6.26
6.24
5.49
5.22
3.27
3.25
3.24
3.23
3.21
3.19
3.17
3.14
3.03
3.01
2.99
2.98
2.98
2.96
1.44
2.12
2.11
3.11
0.98
0.98
0.98
1.00
0.99
2.18
2.06
18.00
f1 (ppm)
153.04
151.87
141.30
135.68
131.45
130.64
130.38
129.81
127.12
125.67
124.34
120.64
117.48
108.05
66.04
51.11
34.37
30.36
28.34
f1 (ppm)


OH
t-Bu
t-Bu
N
I
6af
7.72
7.70
7.23
7.21
7.13
7.12
7.10
6.70
6.68
6.28
6.26
5.50
5.25
3.30
3.28
3.26
3.24
3.21
3.19
3.17
3.05
3.03
3.01
3.00
2.99
2.98
2.96
1.46
2.02
2.10
3.04
1.01
1.00
0.98
1.00
0.98
2.10
2.09
18.02
f1 (ppm)
153.07
151.90
142.06
137.44
135.70
130.64
130.41
130.15
127.15
125.69
124.37
117.53
108.11
92.33
66.19
51.16
34.40
30.41
28.37
f1 (ppm)


OH
t-Bu
t-Bu
N
NC
6ag
7.67
7.65
7.59
7.57
7.15
7.13
7.05
6.98
6.72
6.70
6.68
6.17
6.15
5.52
5.26
3.29
3.27
3.26
3.25
3.24
3.23
3.18
3.16
3.14
3.12
3.10
3.08
3.05
3.04
3.01
2.99
2.97
2.95
2.95
2.93
1.43
2.01
2.06
1.03
2.05
1.04
1.04
0.98
1.00
0.99
1.08
1.10
2.23
18.07
f1 (ppm)
153.34
151.61
148.21
135.95
132.31
130.47
129.93
128.58
127.14
125.88
124.47
119.08
117.91
110.66
108.03
66.71
51.41
34.38
30.32
28.35
f1 (ppm)


OH
t-Bu
t-Bu
N
O2N
6ah
8.25
8.23
7.65
7.63
7.15
7.14
7.06
7.00
6.98
6.96
6.73
6.71
6.69
6.17
6.15
5.55
5.28
3.30
3.29
3.28
3.27
3.26
3.25
3.19
3.16
3.14
3.12
3.09
3.06
3.05
3.03
3.01
3.00
2.99
2.98
1.43
2.01
2.05
1.06
2.04
1.05
1.02
1.01
1.00
0.99
1.08
1.13
2.18
18.10
f1 (ppm)
153.41
151.57
150.39
146.92
135.99
129.80
128.57
127.13
125.89
124.50
123.77
118.04
108.10
66.74
51.54
34.39
30.30
28.36
f1 (ppm)


OH
t-Bu
t-Bu
N
F3C
6ai
7.48
7.46
7.43
7.41
6.98
6.96
6.95
6.83
6.55
6.53
6.51
6.07
6.06
5.41
5.09
3.15
3.13
3.12
3.11
3.10
3.09
3.06
3.04
3.02
3.00
2.92
2.89
2.88
2.85
2.84
2.83
2.81
1.29
2.06
2.02
3.11
1.04
1.03
0.99
1.00
0.96
2.21
2.29
18.14
f1 (ppm)


153.40
152.02
146.73
136.03
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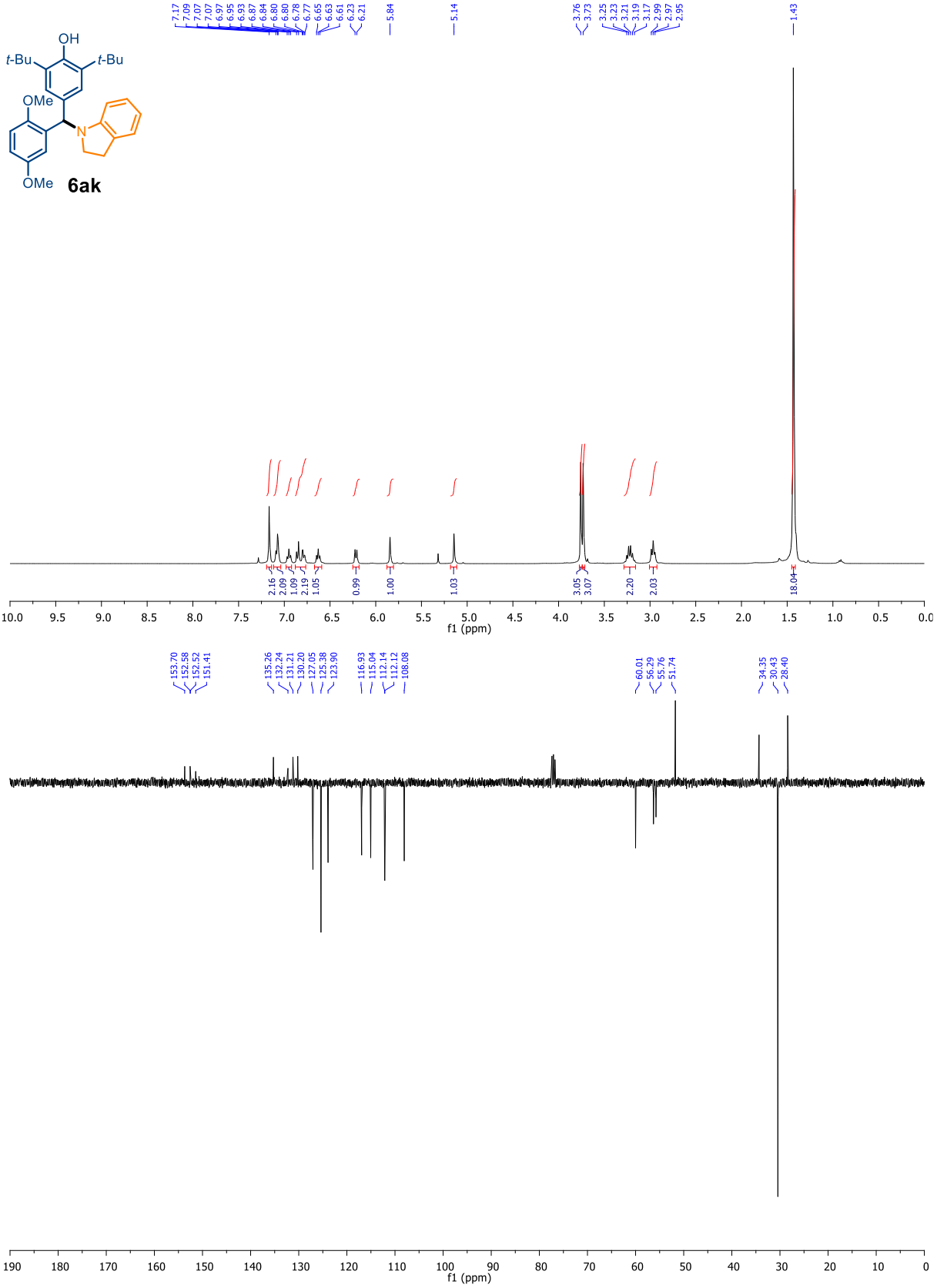
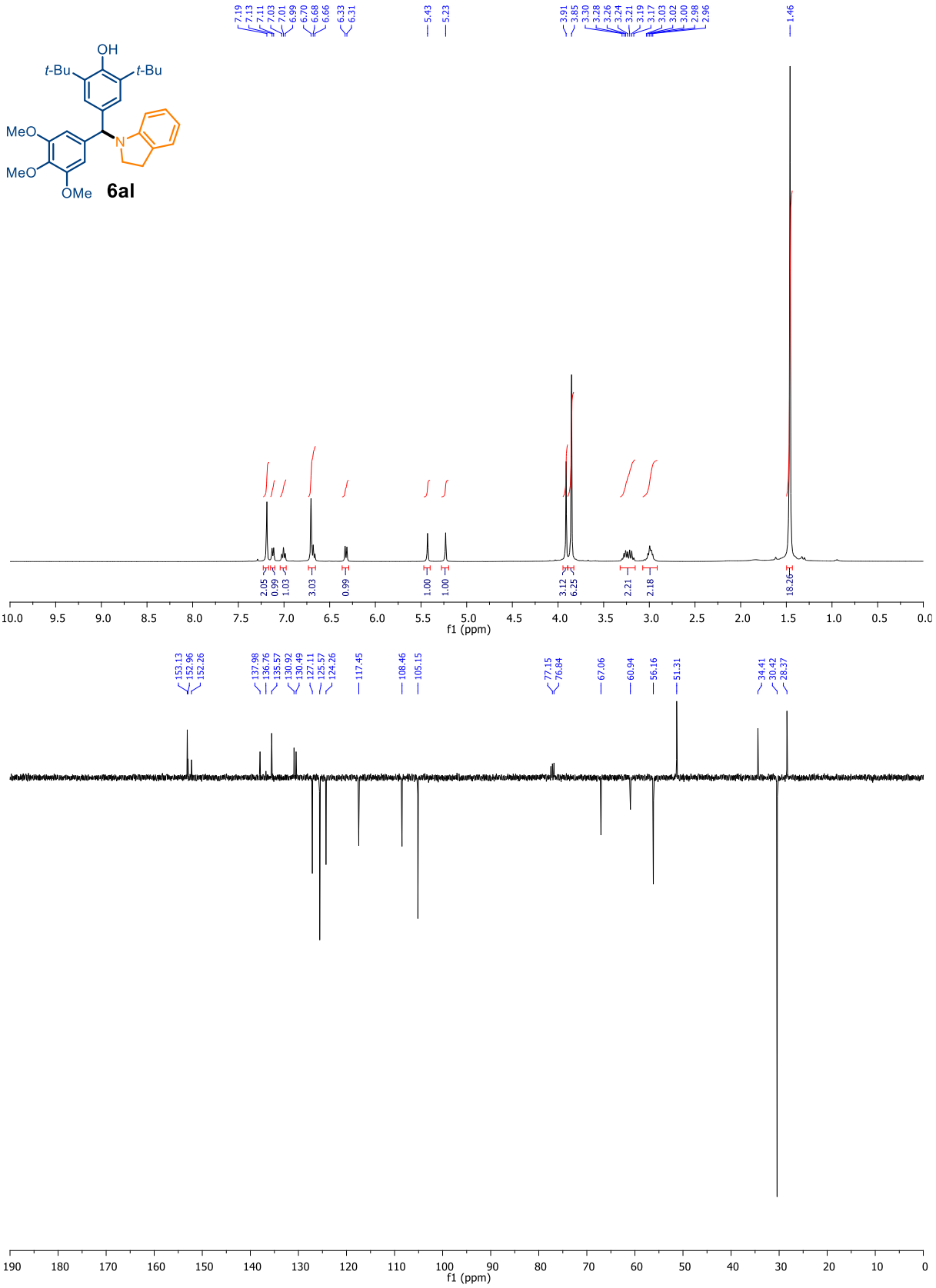
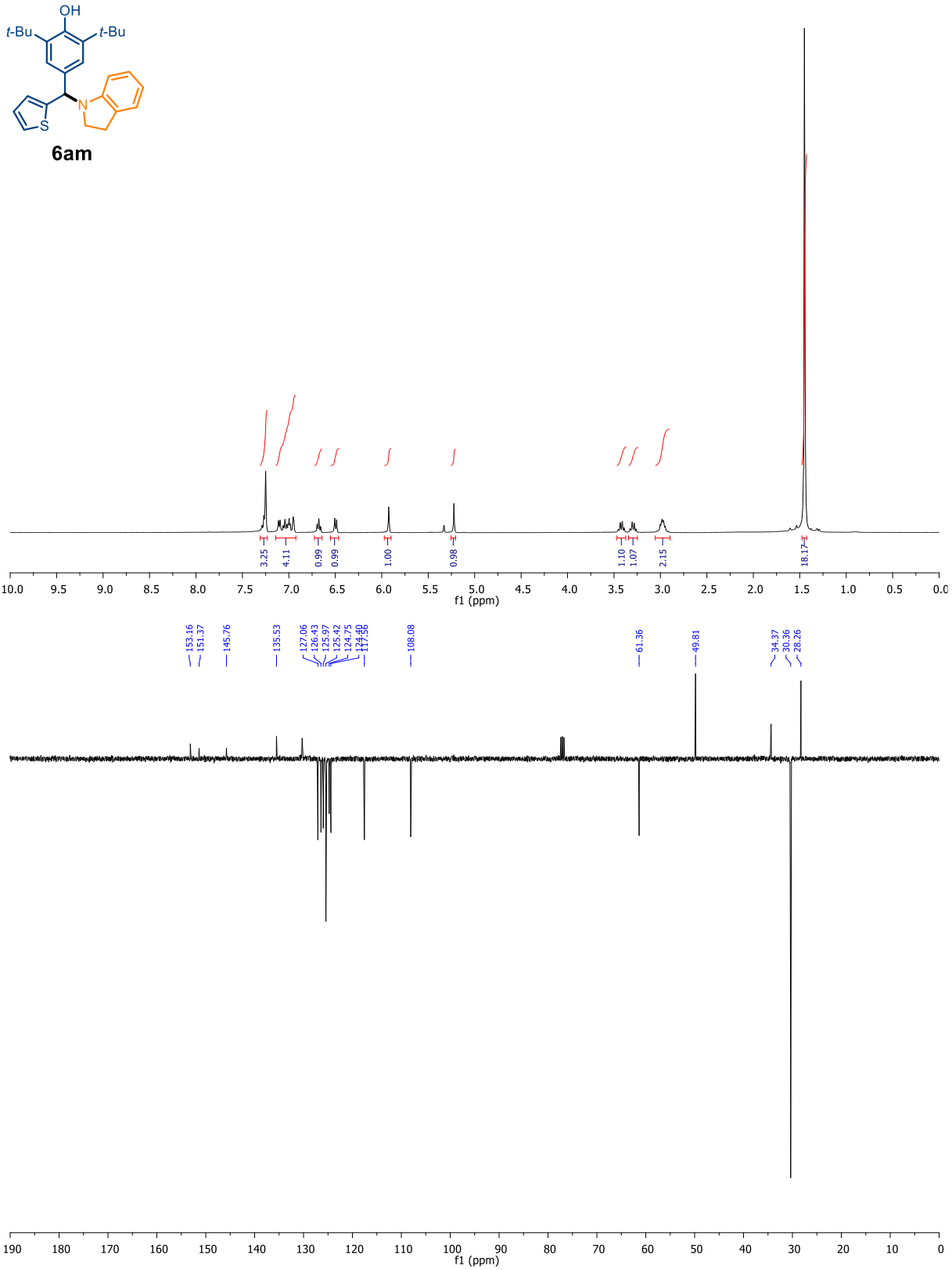
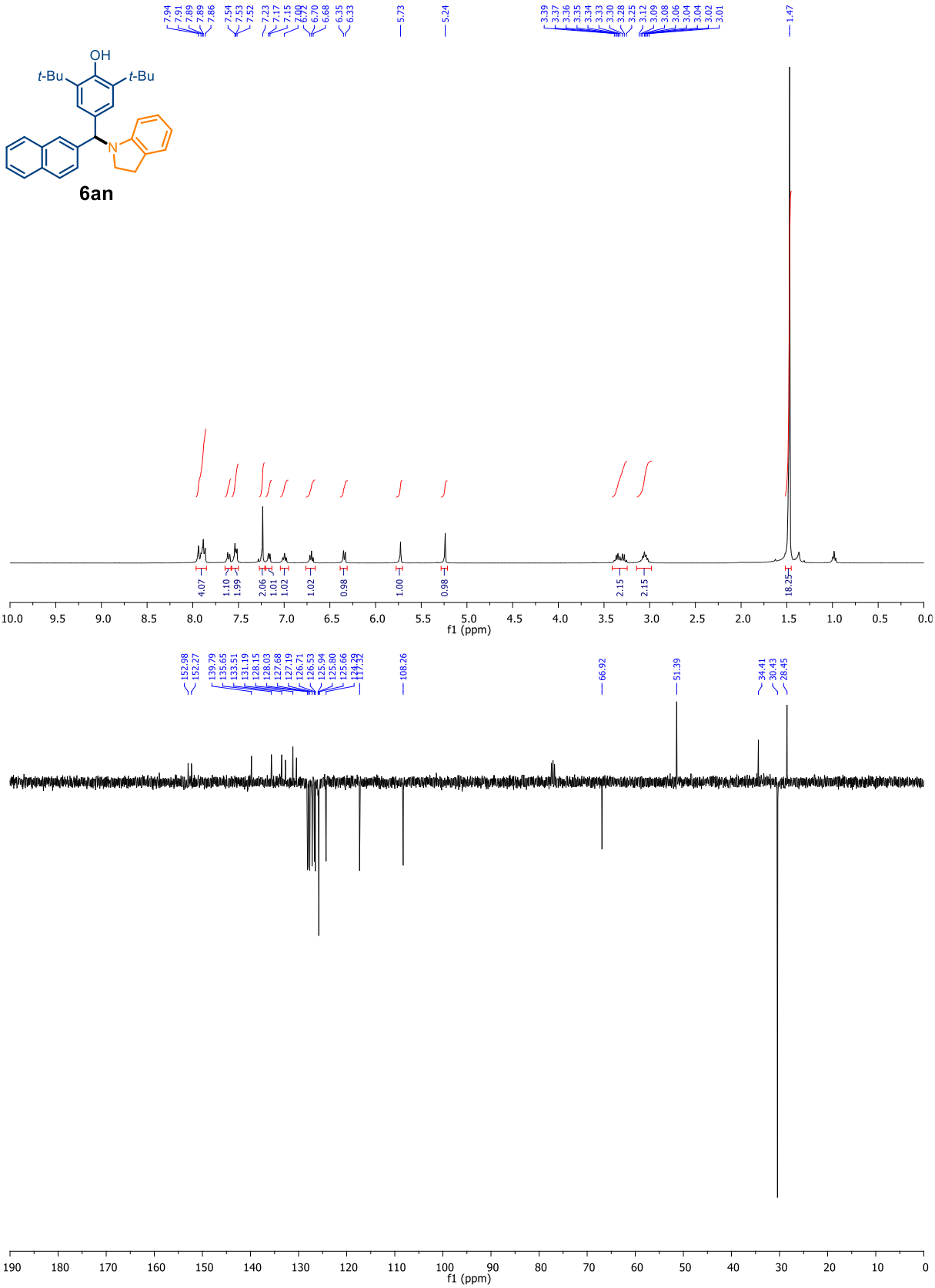
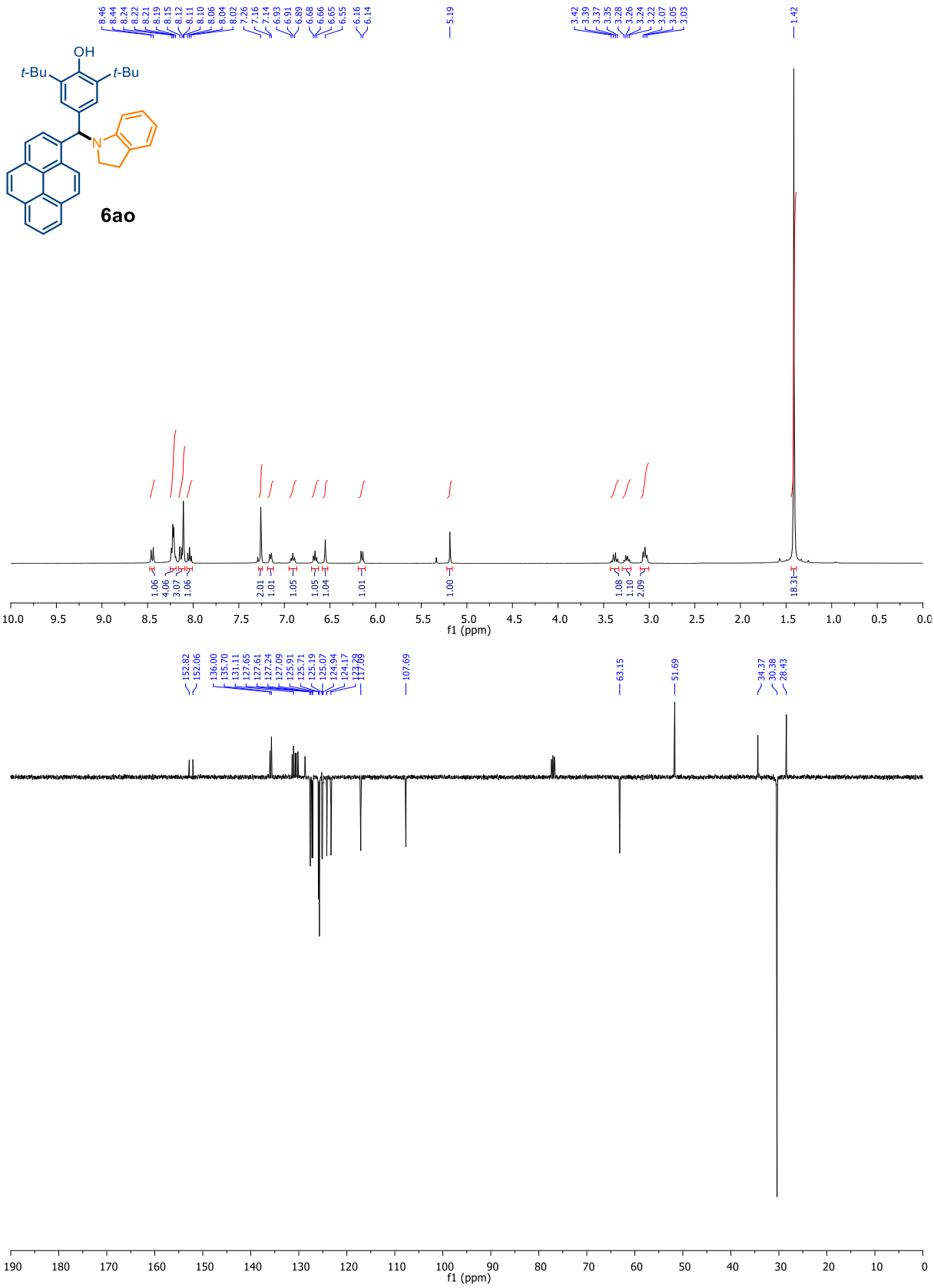
130.60
128.47
127.35
126.00
125.62
125.59
125.55
125.52
124.61
66.70
51.51
34.60
30.56
28.58
f1 (ppm)

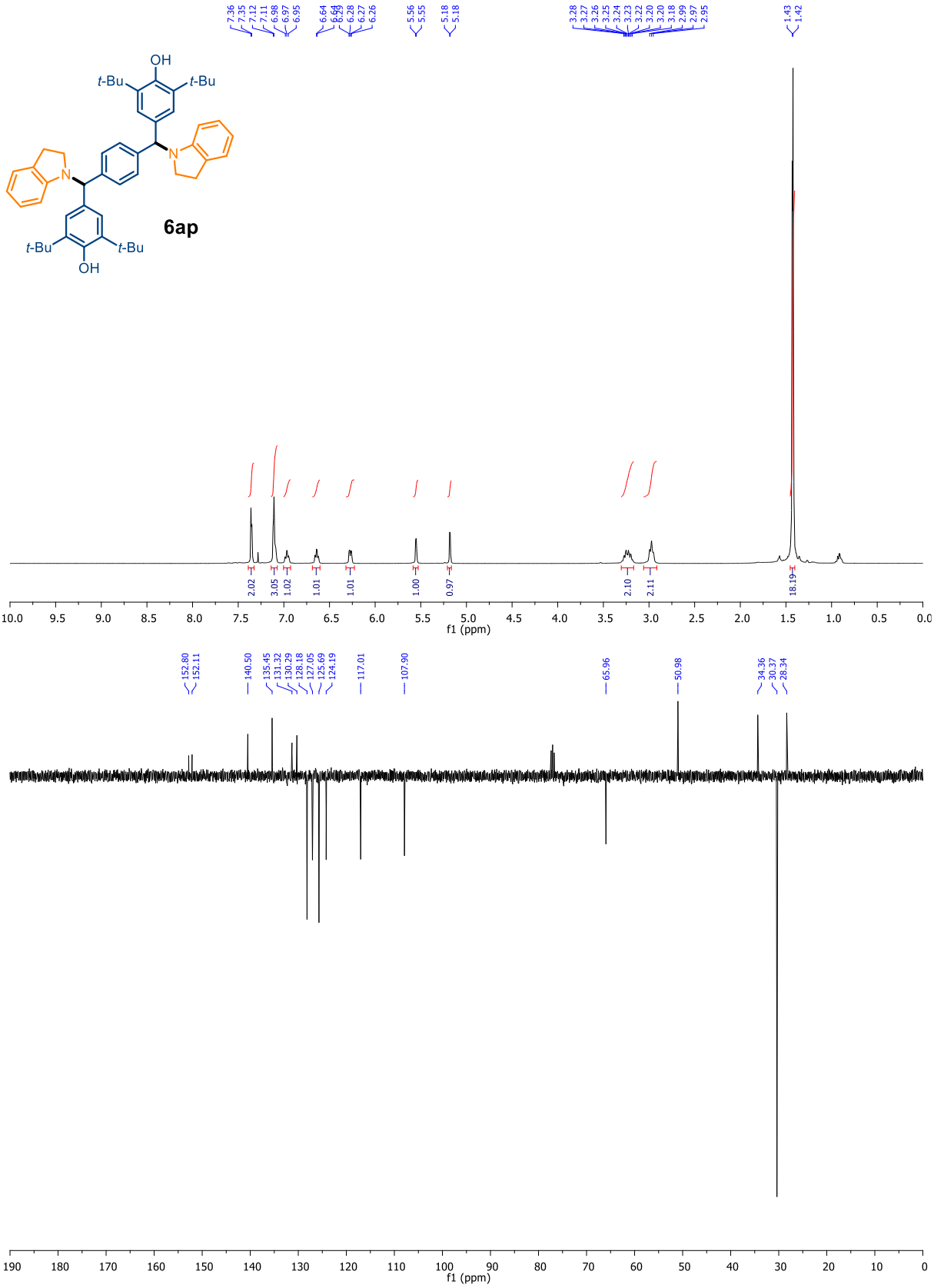

OH
t-Bu
t-Bu
OMe
OMe
N
6ak
7.17
7.09
7.07
7.07
6.97
6.95
6.93
6.87
6.84
6.80
6.80
6.78
6.77
6.65
6.63
6.61
6.23
6.21
5.84
5.14
3.76
3.73
3.25
3.23
3.21
3.19
3.17
2.99
2.97
2.95
1.43
2.16
2.09
1.09
2.19
1.05
0.99
1.00
1.03
3.05
3.07
2.20
2.03
18.04
f1 (ppm)
153.70
152.58
152.52
151.41
135.26
132.24
131.21
130.20
127.05
125.38
123.90
116.93
115.04
112.14
112.12
108.08
60.01
56.29
55.76
51.74
34.35
30.43
28.40
f1 (ppm)

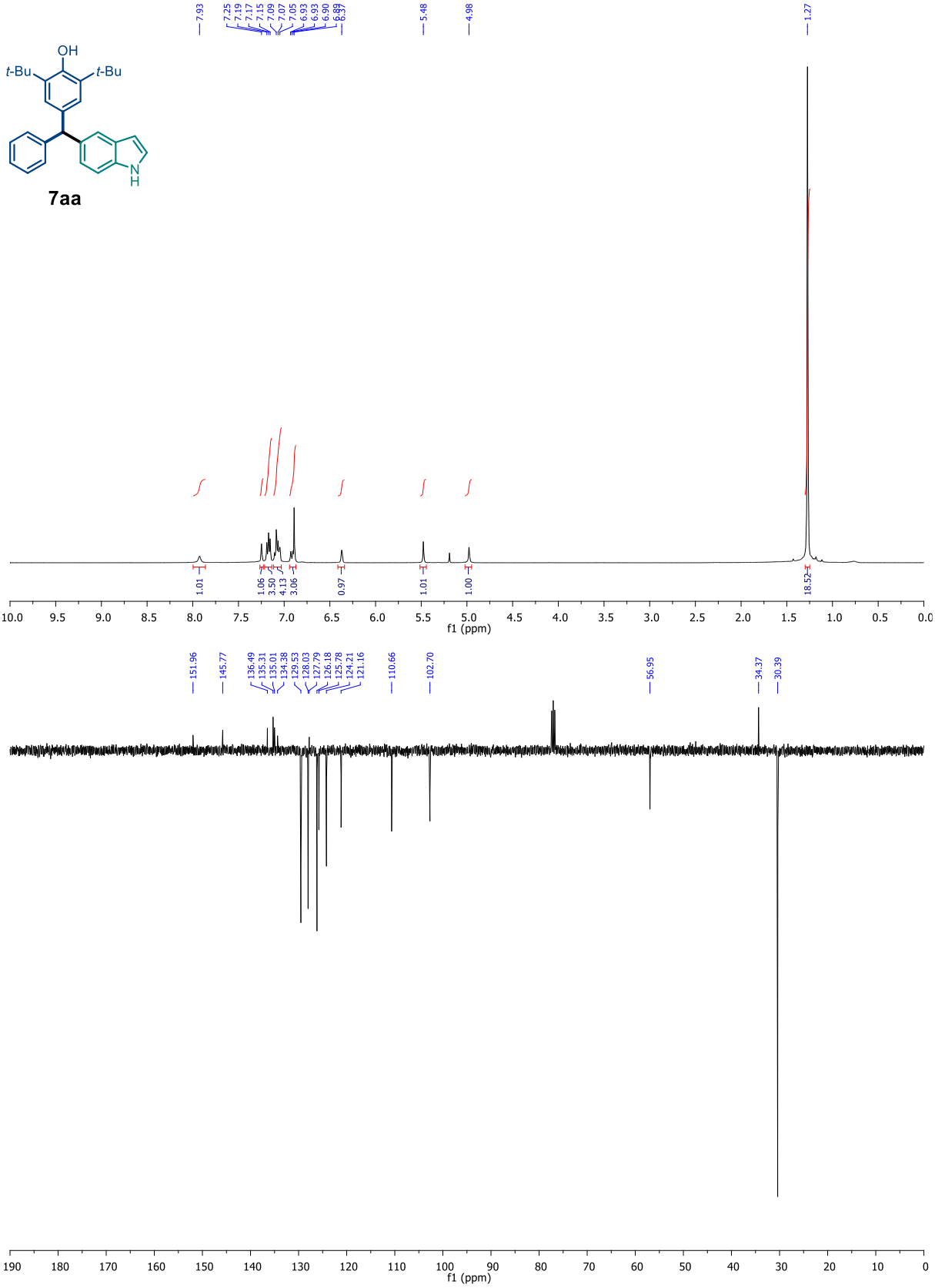

OH
t-Bu
t-Bu
MeO
MeO
OMe
6al
7.19
7.13
7.11
7.03
7.01
6.99
6.70
6.68
6.66
6.33
6.31
5.43
5.23
3.91
3.85
3.30
3.28
3.26
3.24
3.21
3.19
3.17
3.03
3.02
3.00
2.98
2.96
1.46
2.05
0.99
1.03
3.03
0.99
1.00
1.00
3.12
6.25
2.21
2.18
18.26
f1 (ppm)
153.13
152.96
152.26
137.98
136.76
135.57
130.92
130.49
127.11
125.57
124.26
117.45
108.46
105.15
77.15
76.84
67.06
60.94
56.16
51.31
34.41
30.42
28.37
f1 (ppm)

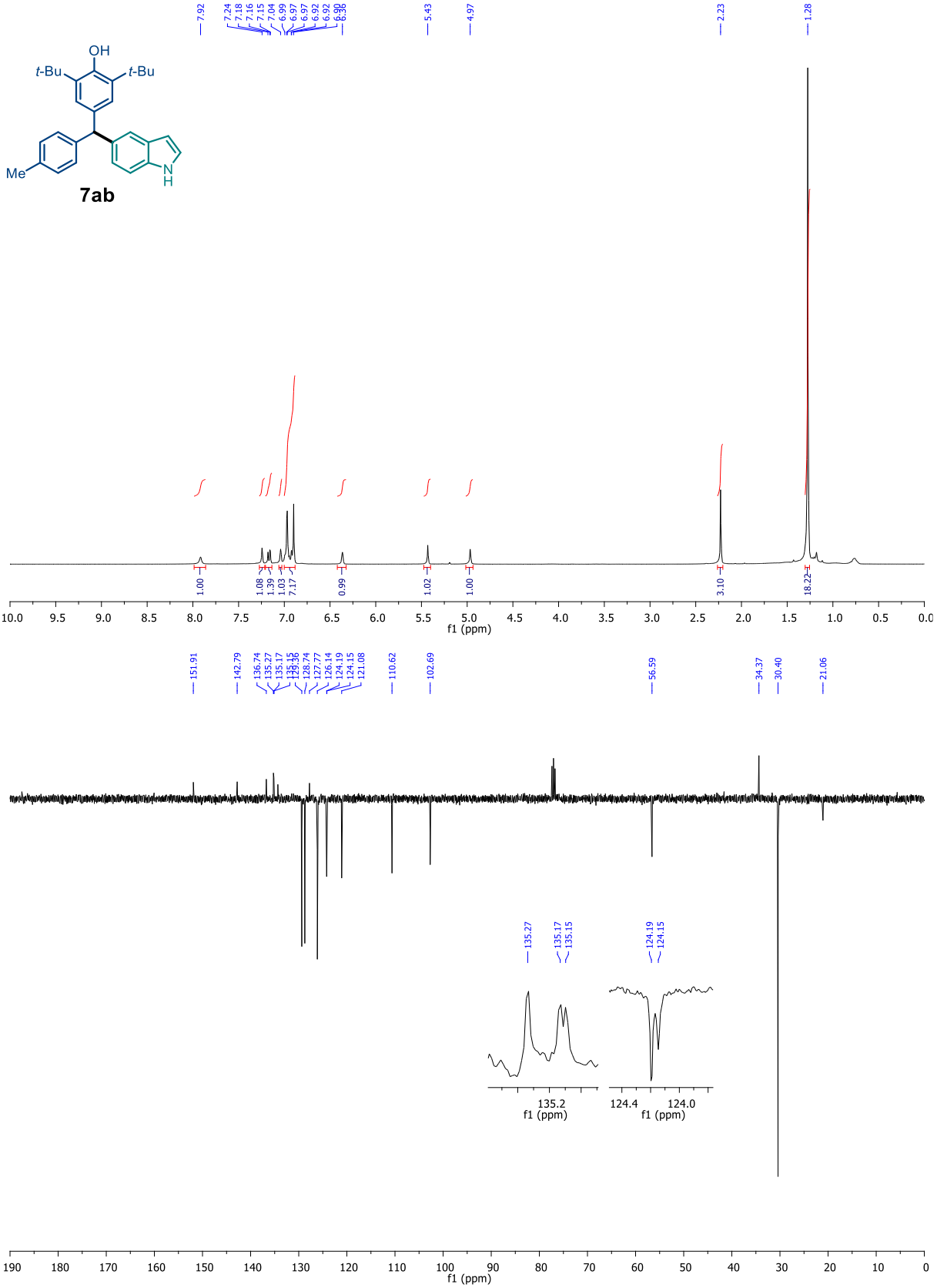

OH
t-Bu
t-Bu
N
S
6am
7.29
7.29
7.27
7.25
7.11
7.09
7.06
7.04
7.02
7.01
7.01
7.00
7.00
6.99
6.95
6.95
6.70
6.68
6.66
6.51
6.49
5.92
5.22
3.45
3.43
3.41
3.39
3.33
3.30
3.28
3.26
3.04
3.02
3.00
2.98
2.97
2.95
2.93
1.45
3.25
4.11
0.99
0.99
1.00
0.98
1.10
1.07
2.15
18.17
f1 (ppm)
153.16
151.37
145.76
135.53
127.06
126.43
125.97
125.42
124.75
124.40
117.58
108.08
61.36
49.81
34.37
30.36
28.26
f1 (ppm)

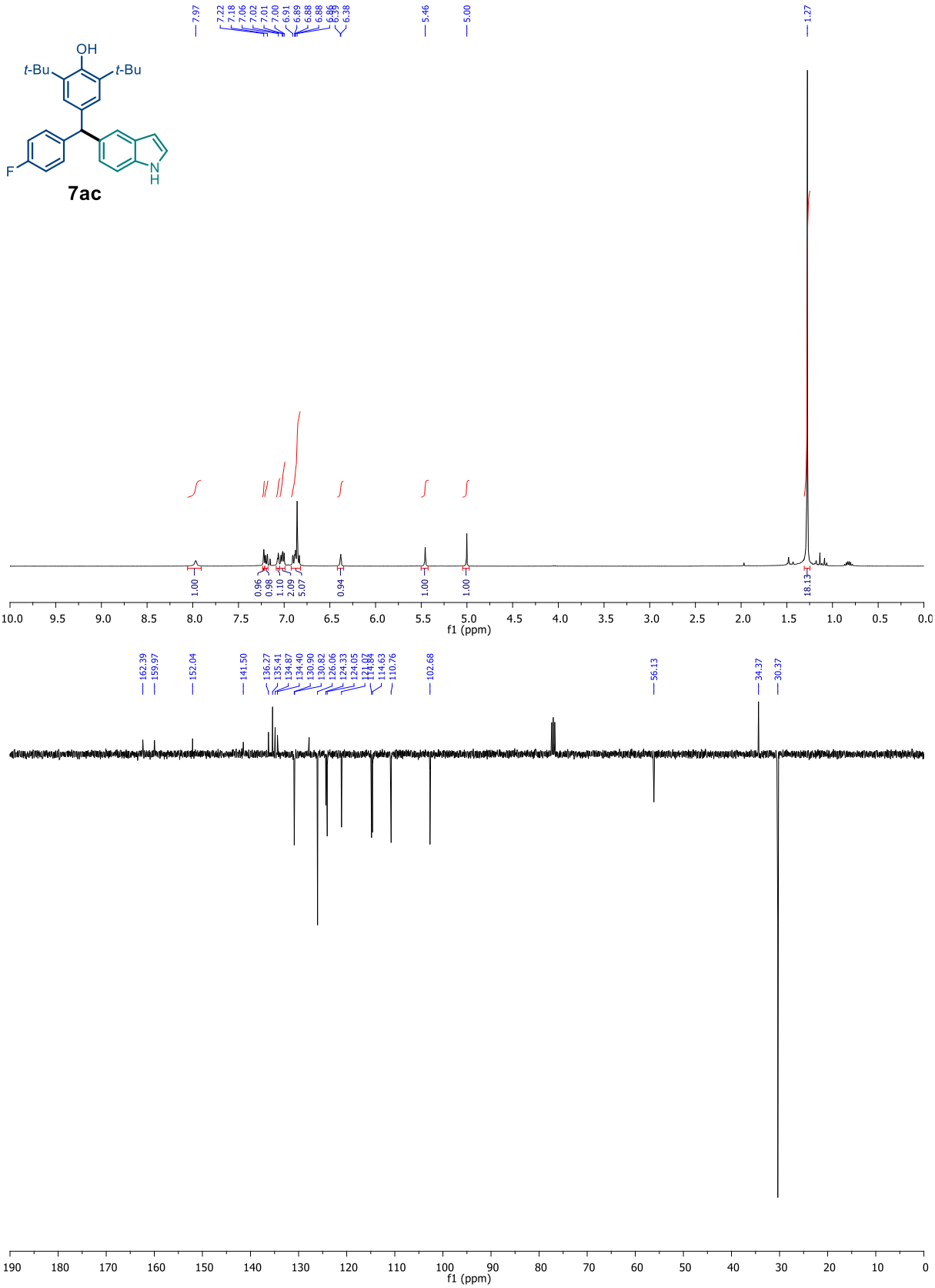

OH
t-Bu
t-Bu
N
6an
7.94
7.91
7.89
7.89
7.86
7.54
7.53
7.52
7.23
7.17
7.15
6.70
6.68
6.35
6.33
5.73
5.24
3.39
3.37
3.36
3.35
3.34
3.33
3.30
3.28
3.25
3.12
3.09
3.08
3.06
3.04
3.04
3.02
3.01
1.47
4.07
1.10
1.99
2.06
1.01
1.02
1.02
0.98
1.00
0.98
2.15
2.15
18.25
f1 (ppm)
152.98
152.27
139.79
135.65
133.51
131.19
128.15
128.03
127.68
127.19
126.71
126.53
125.94
125.80
125.66
108.26
66.92
51.39
34.41
30.43
28.45
f1 (ppm)

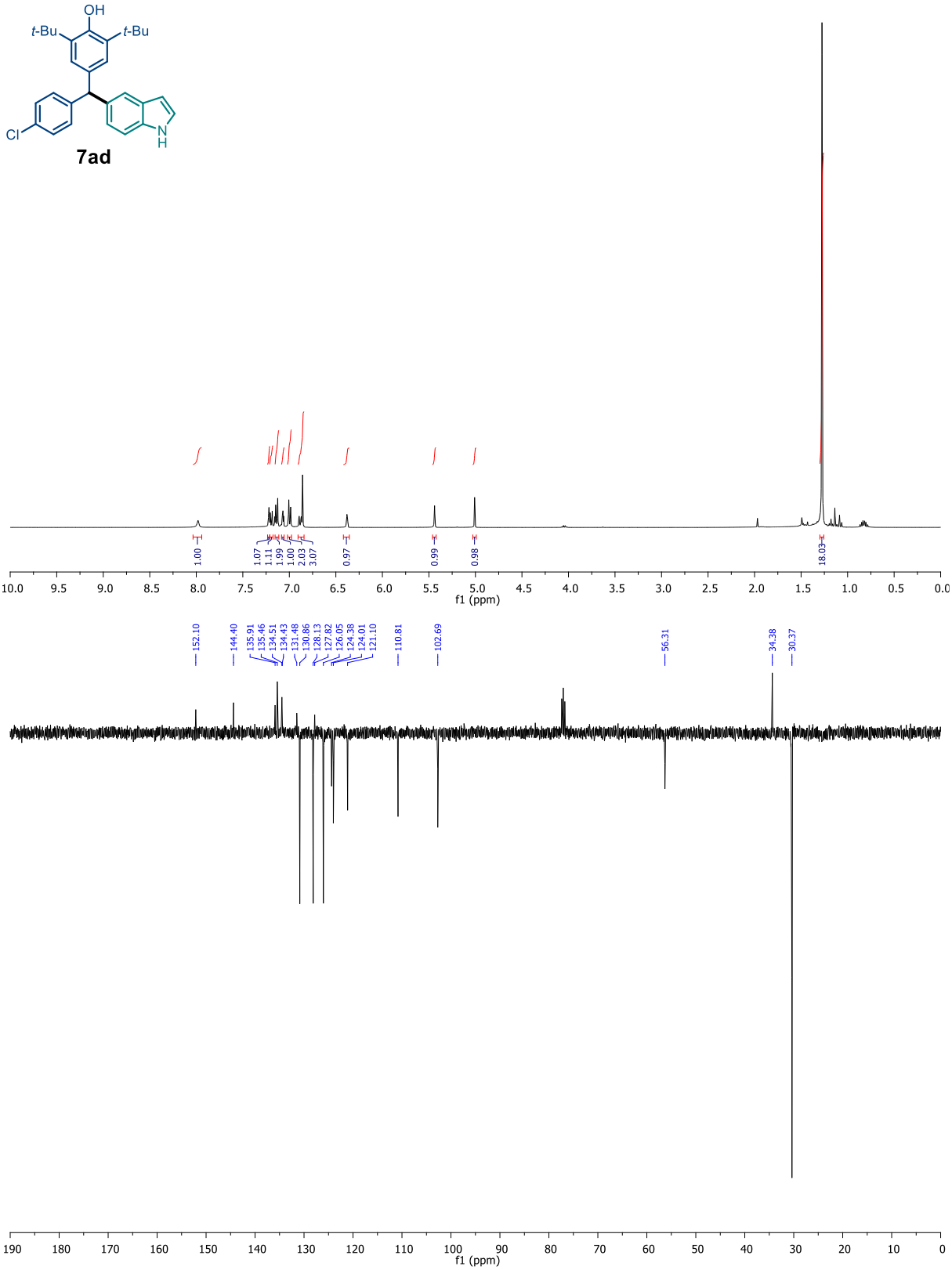

8.46
8.44
8.24
8.22
8.21
8.19
8.15
8.12
8.11
8.10
8.06
8.04
8.02
7.26
7.16
7.14
6.93
6.91
6.89
6.68
6.66
6.65
6.55
6.16
6.14
5.19
3.42
3.39
3.37
3.35
3.28
3.26
3.24
3.22
3.07
3.05
3.03
1.42
OH
t-Bu
t-Bu
N
6ao
1.06
4.06
3.07
1.06
2.01
1.01
1.05
1.05
1.04
1.01
1.00
1.08
1.10
2.09
18.31
f1 (ppm)
152.82
152.06
136.00
135.70
131.11
127.65
127.61
127.24
127.09
125.91
125.71
125.19
125.07
124.94
124.17
107.69
63.15
51.69
34.37
30.38
28.43
f1 (ppm)

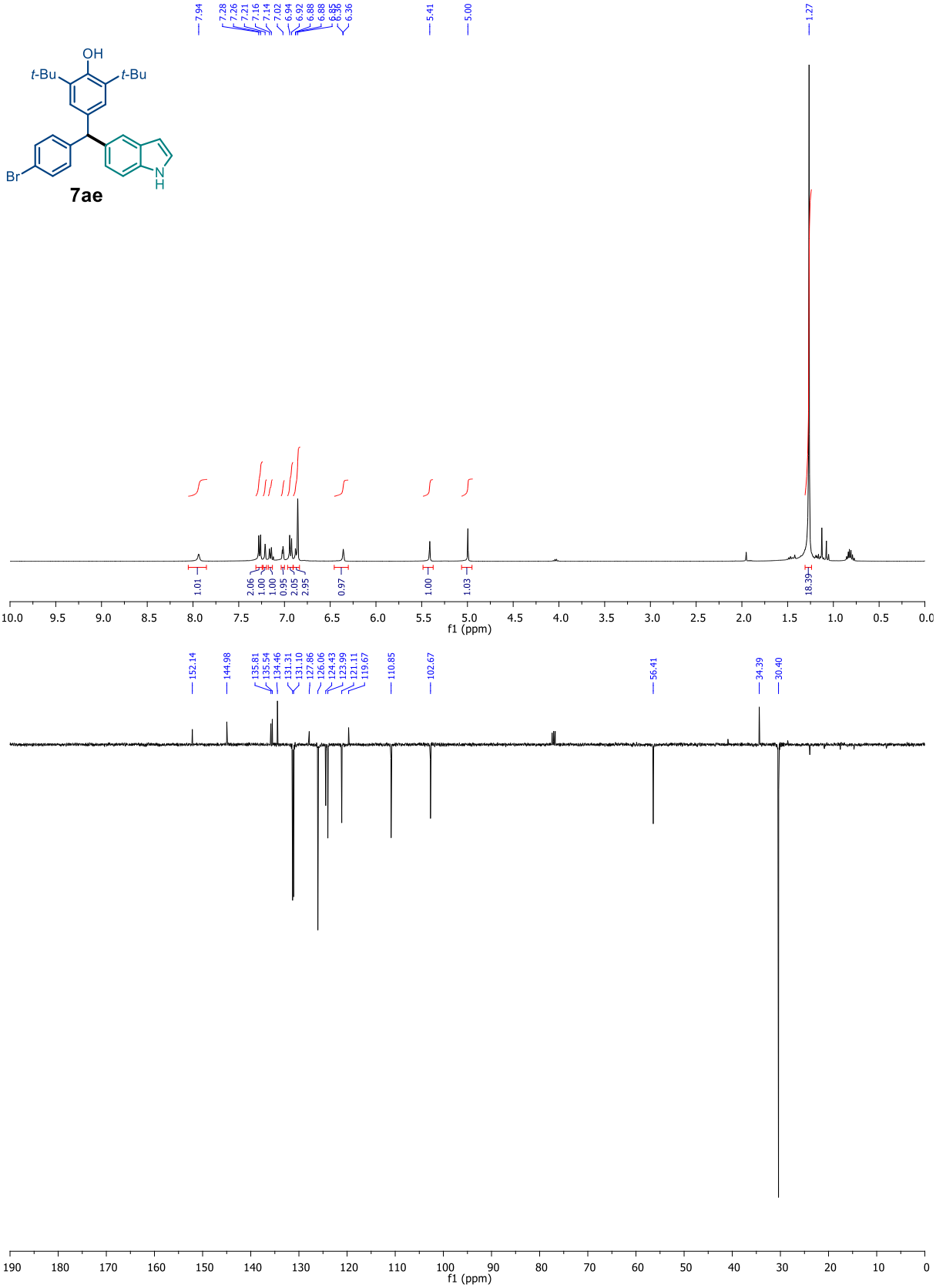

OH
t-Bu
t-Bu
N
N
t-Bu
t-Bu
OH
6ap
7.36
7.35
7.12
7.11
6.98
6.97
6.95
6.64
6.64
6.63
6.63
6.28
6.27
6.26
5.56
5.55
5.18
5.18
3.28
3.27
3.26
3.25
3.24
3.23
3.22
3.20
3.20
3.18
2.99
2.97
2.95
1.43
1.42
2.02
3.05
1.02
1.01
1.01
1.00
0.97
2.10
2.11
18.19
f1 (ppm)
152.80
152.11
140.50
135.45
131.32
130.29
128.18
127.05
125.69
124.19
117.01
107.90
65.96
50.98
34.36
30.37
28.34
f1 (ppm)

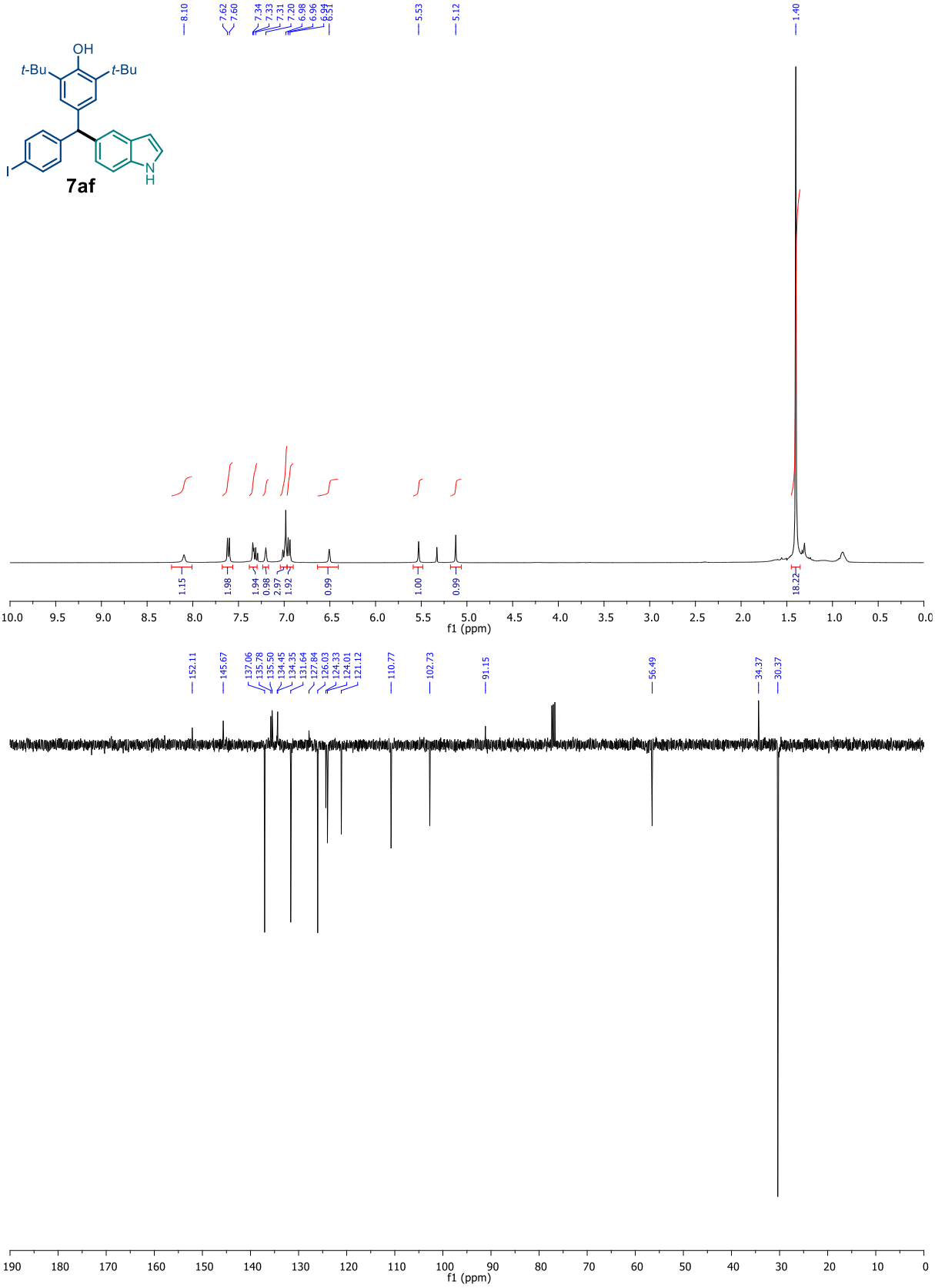

OH
t-Bu
t-Bu
N
H
7aa
7.93
7.25
7.19
7.17
7.15
7.09
7.07
7.05
6.93
6.93
6.90
6.89
6.37
5.48
4.98
1.27
1.01
1.06
3.50
4.13
3.06
0.97
1.01
1.00
18.52
f1 (ppm)
151.96
145.77
136.49
135.31
135.01
134.38
129.53
128.03
127.79
126.18
125.78
124.21
121.16
110.66
102.70
56.95
34.37
30.39
f1 (ppm)

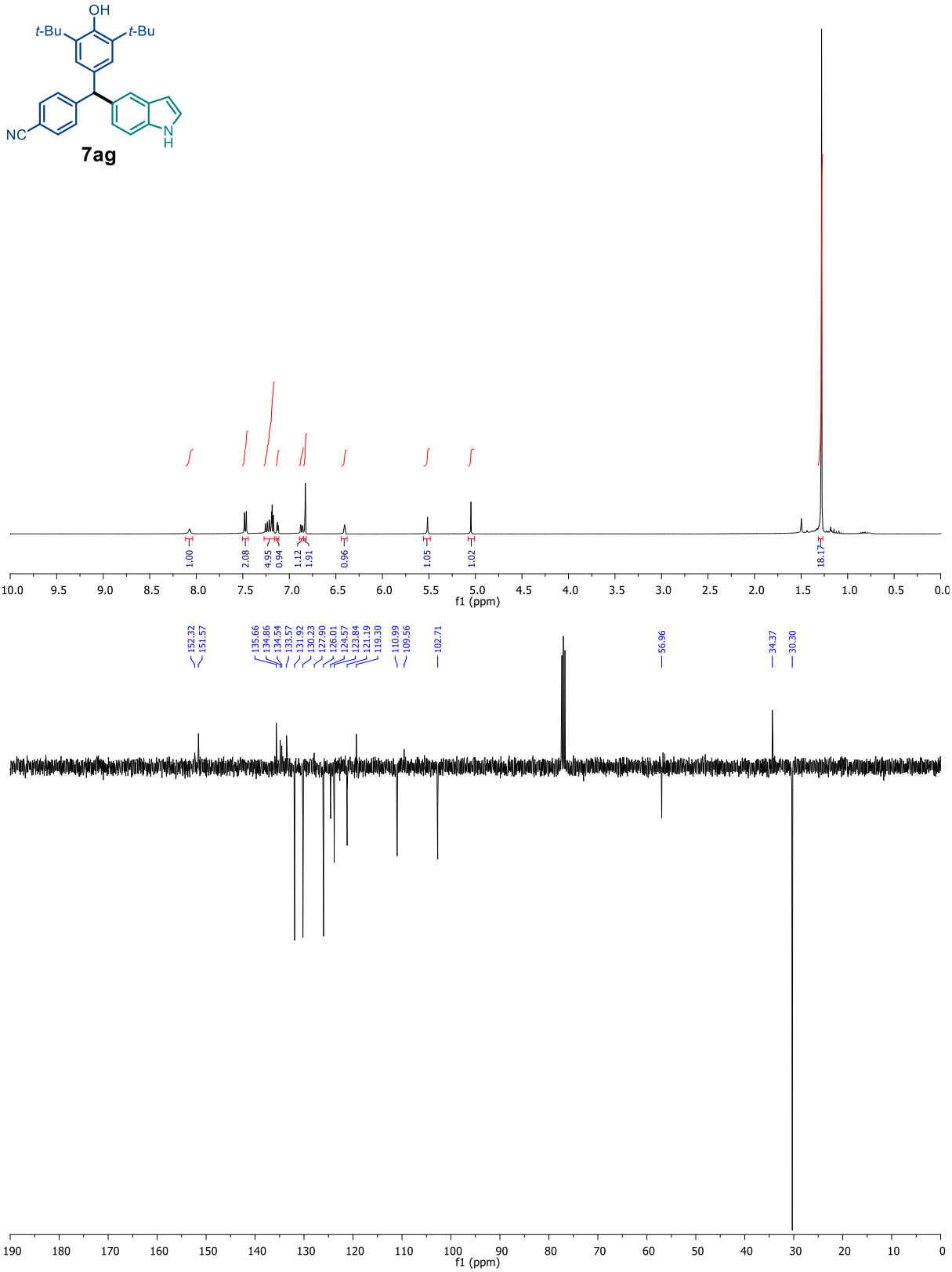

OH
t-Bu
t-Bu
Me
N
H
7ab
7.92
7.24
7.18
7.16
7.15
7.04
6.99
6.97
6.97
6.92
6.92
6.90
6.36
5.43
4.97
2.23
1.28
1.00
1.08
1.39
1.03
7.17
0.99
1.02
1.00
3.10
18.22
f1 (ppm)
151.91
142.79
136.74
135.27
135.17
135.15
128.74
127.77
126.14
124.19
124.15
121.08
110.62
102.69
56.59
34.37
30.40
21.06
135.27
135.17
135.15
124.19
124.15
135.2
124.4
124.0
f1 (ppm)

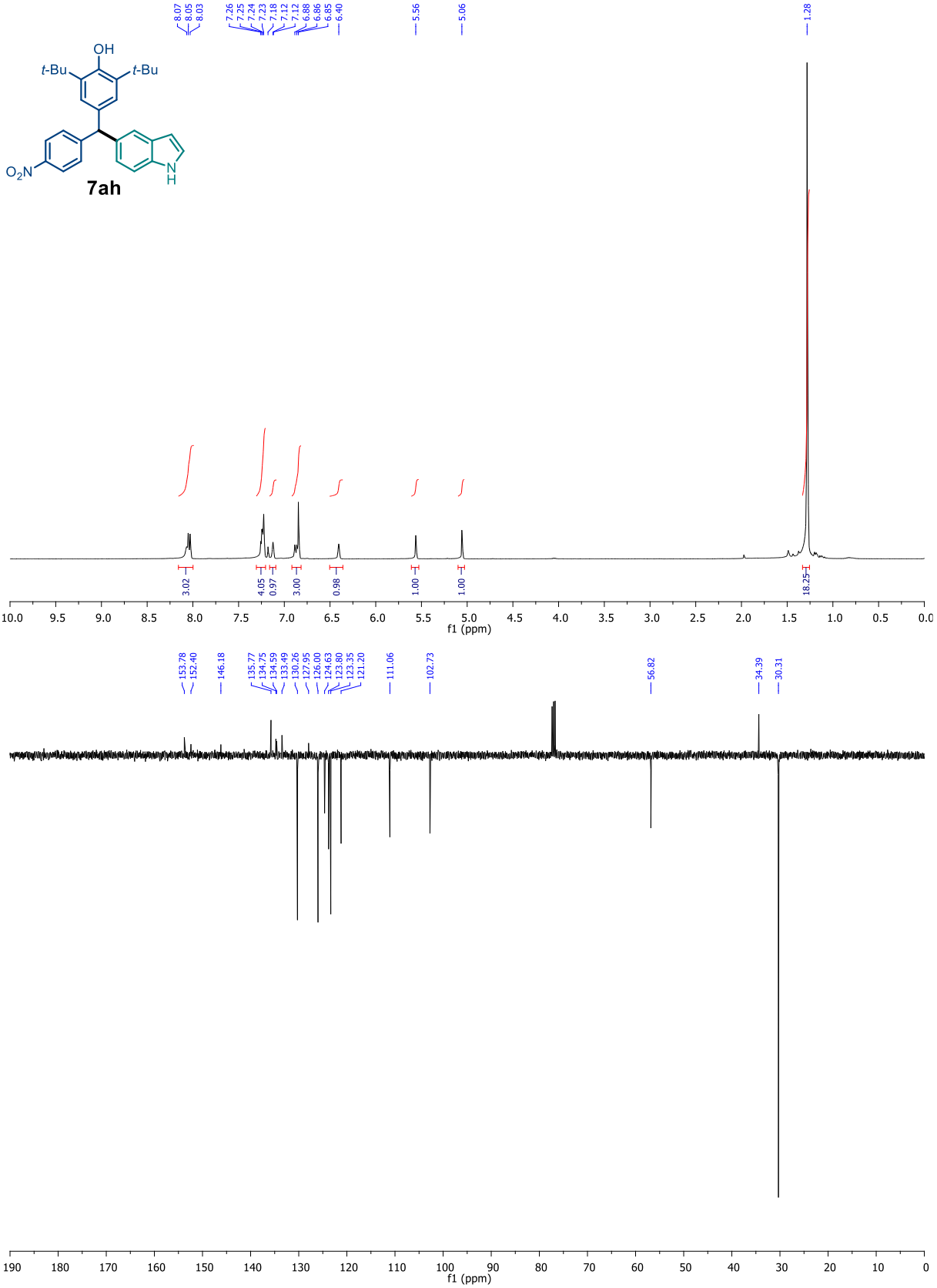

OH
t-Bu
t-Bu
F
N
H
7ac
7.97
7.22
7.18
7.06
7.02
7.01
7.00
6.91
6.89
6.88
6.88
6.38
5.46
5.00
1.27
1.00
0.96
0.98
1.10
2.09
5.07
0.94
1.00
1.00
18.13
f1 (ppm)
162.39
159.97
152.04
141.50
136.27
135.41
134.87
134.40
130.90
130.82
126.06
124.33
124.05
114.63
110.76
102.68
56.13
34.37
30.37
f1 (ppm)

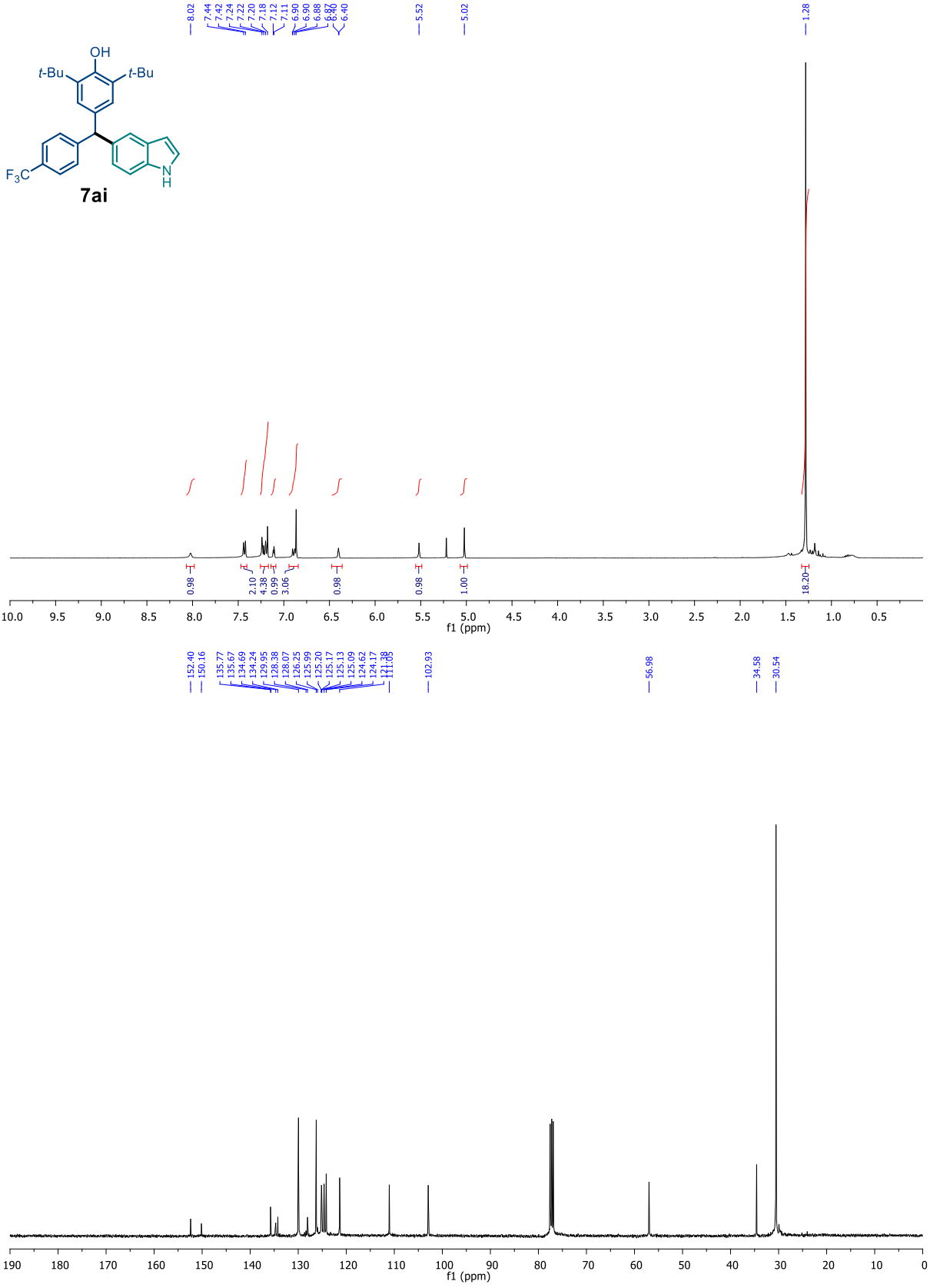

OH
t-Bu
t-Bu
Cl
N
H
7ad
7.98
7.22
7.21
7.18
7.15
7.13
7.08
7.07
7.06
7.01
6.99
6.38
5.44
5.01
1.27
1.00
1.07
1.11
1.99
1.00
2.03
3.07
0.97
0.99
0.98
18.03
f1 (ppm)
152.10
144.40
135.91
135.46
134.51
134.43
131.48
130.86
128.13
127.82
126.05
124.38
124.01
121.10
110.81
102.69
56.31
34.38
30.37
f1 (ppm)

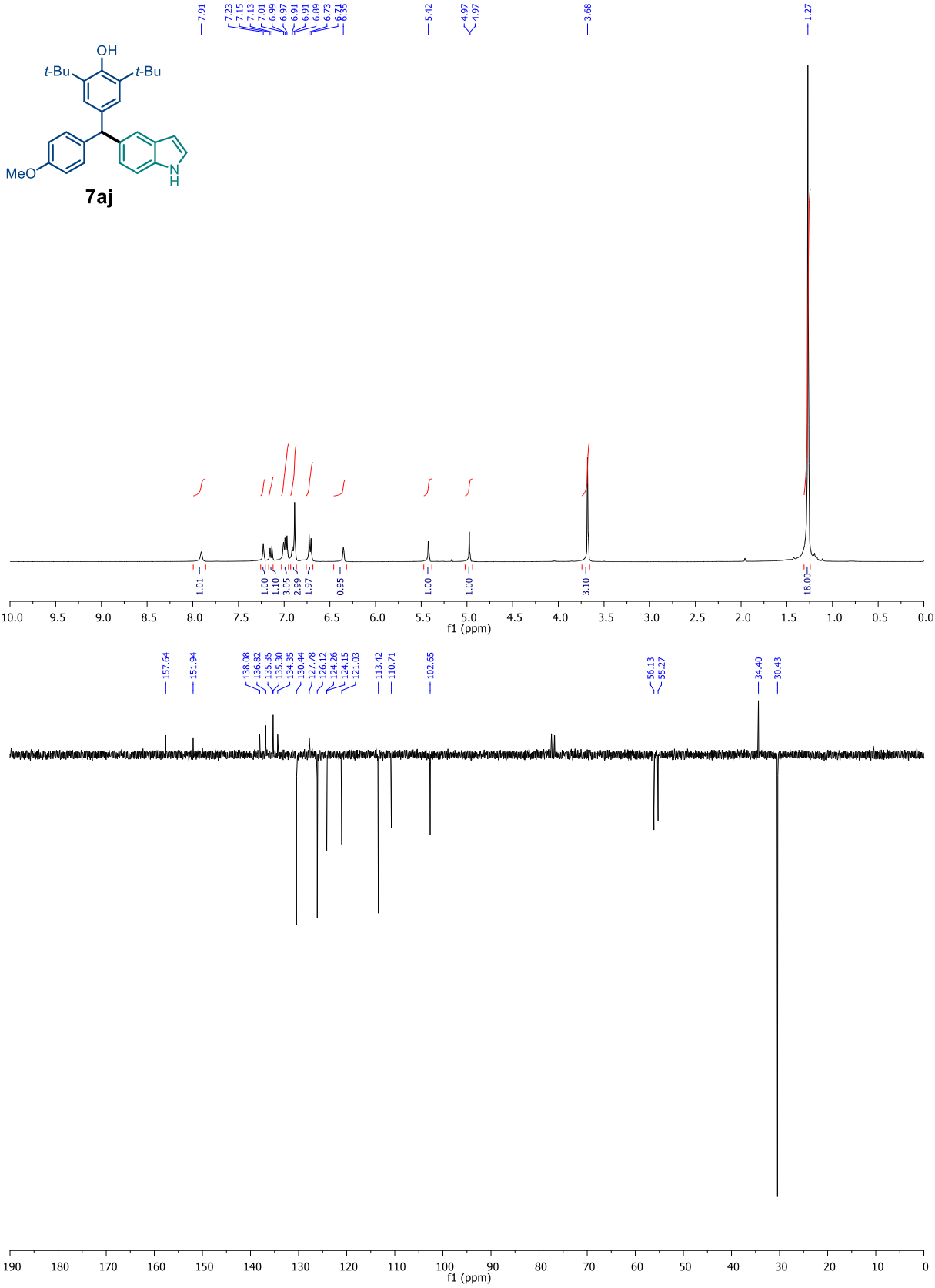

OH
t-Bu
t-Bu
Br
N
H
7ae
7.94
7.28
7.26
7.21
7.16
7.14
7.02
6.94
6.92
6.88
6.88
6.85
6.36
5.41
5.00
1.27
1.01
2.06
1.00
1.00
0.95
2.05
2.95
0.97
1.00
1.03
18.39
f1 (ppm)
152.14
144.98
135.81
135.54
134.46
131.31
131.10
127.86
126.06
124.43
123.99
121.11
119.67
110.85
102.67
56.41
34.39
30.40
f1 (ppm)

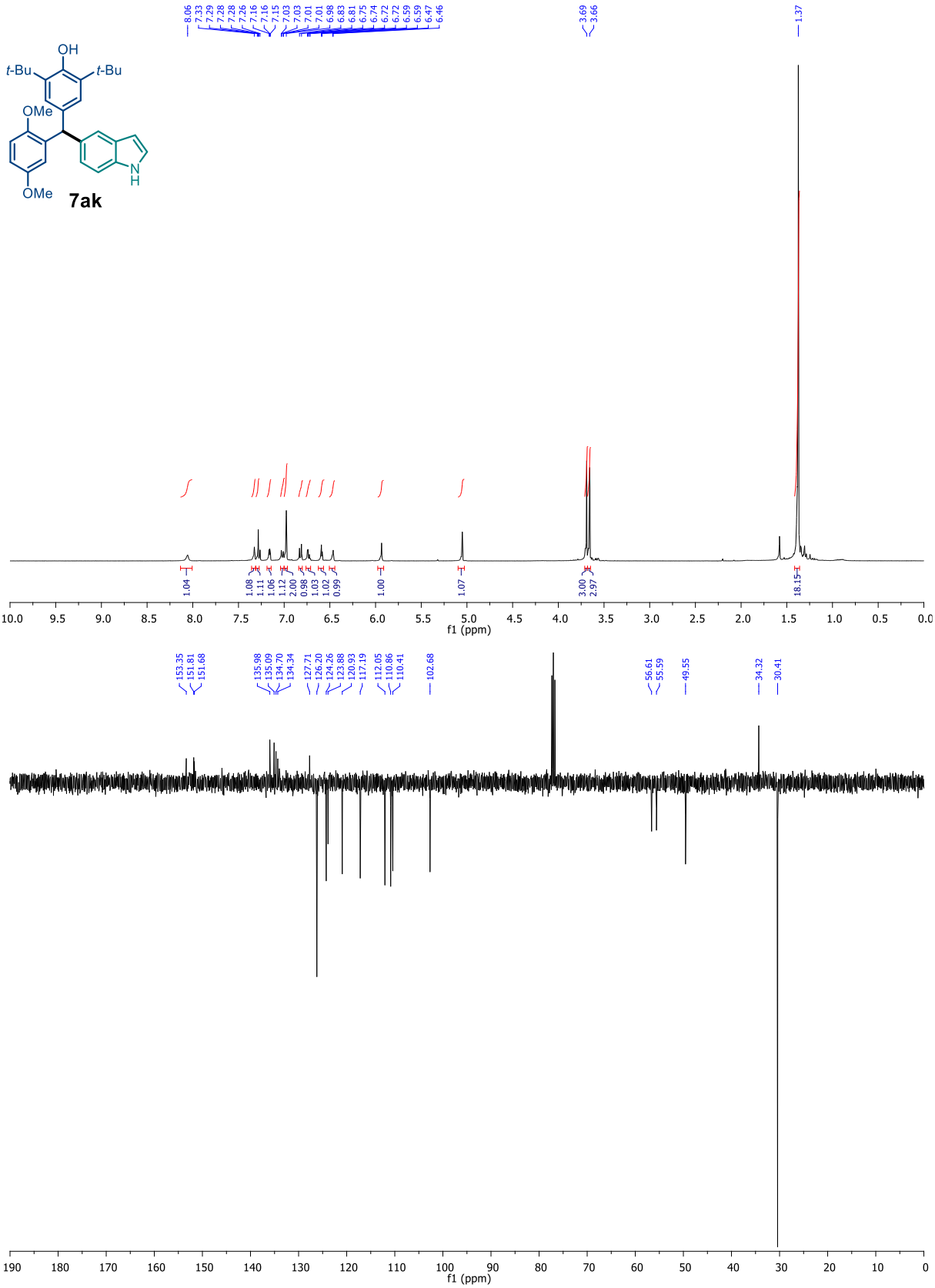

OH
t-Bu
t-Bu
I
N
H
7af
8.10
7.62
7.60
7.34
7.33
7.31
7.20
6.98
6.96
6.94
6.91
5.53
5.12
1.40
1.15
1.98
1.94
0.98
2.97
1.92
0.99
1.00
0.99
18.22
f1 (ppm)
152.11
145.67
137.06
135.78
135.50
134.45
134.35
131.64
127.84
126.03
124.33
124.01
121.12
110.77
102.73
91.15
56.49
34.37
30.37
f1 (ppm)

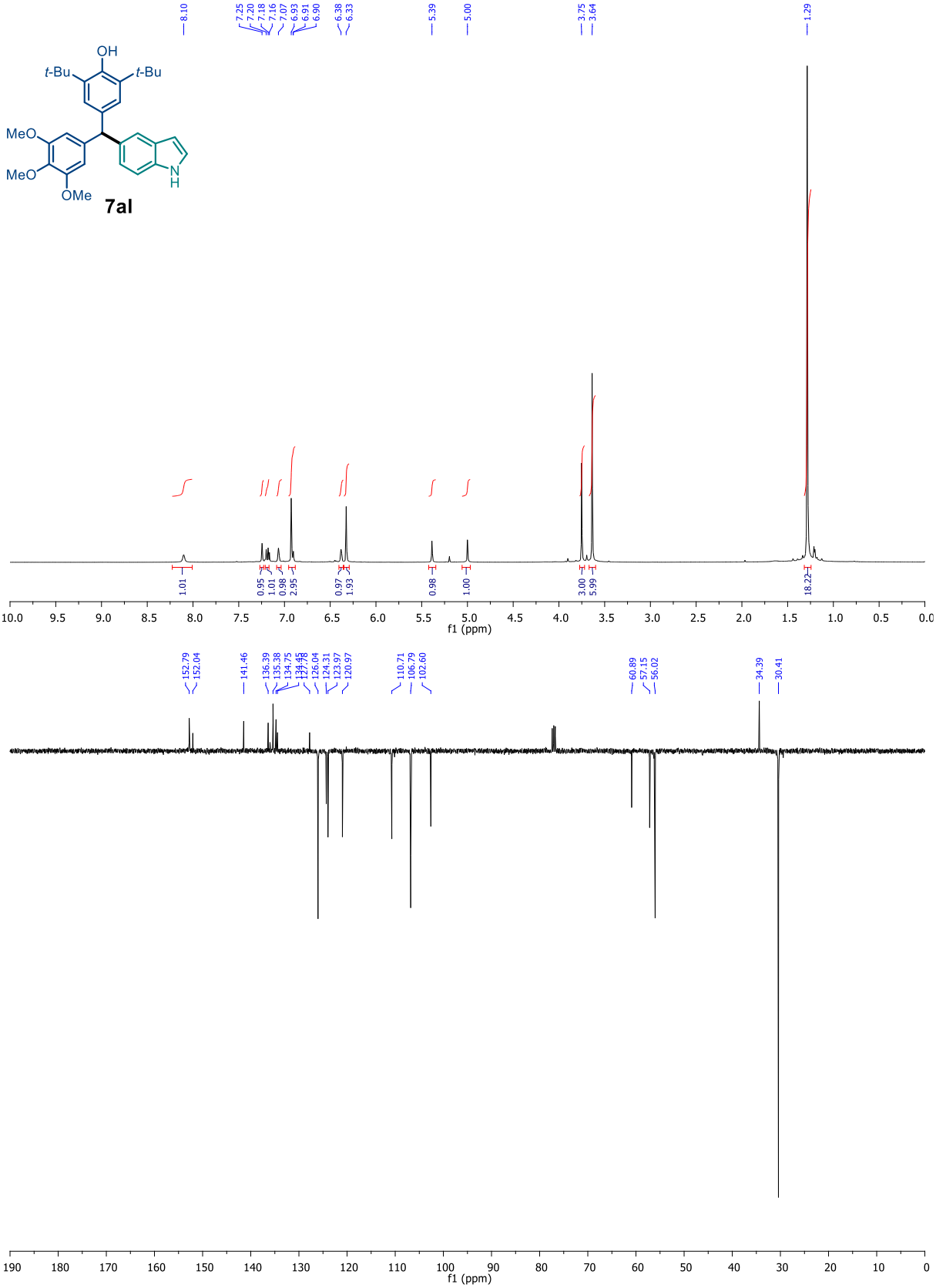

OH
t-Bu
t-Bu
NC
N
H
7ag
8.07
7.48
7.46
7.24
7.22
7.19
7.18
7.17
7.13
6.88
6.88
6.83
6.41
6.40
5.52
5.05
1.28
1.00
2.08
4.95
0.94
1.12
1.91
0.96
1.05
1.02
18.17
f1 (ppm)
152.32
151.57
135.66
134.86
134.54
133.57
131.92
130.23
127.90
126.01
124.57
123.84
121.19
119.30
110.99
109.56
102.71
56.96
34.37
30.30
f1 (ppm)


OH
t-Bu
t-Bu
O2N
N
H
7ah
8.07
8.05
8.03
7.26
7.25
7.24
7.23
7.18
7.12
7.12
6.88
6.86
6.85
6.40
5.56
5.06
1.28
3.02
4.05
0.97
3.00
0.98
1.00
1.00
18.25
f1 (ppm)
153.78
152.40
146.18
135.77
134.75
134.59
133.49
130.26
127.95
126.00
124.63
123.80
123.35
121.20
111.06
102.73
56.82
34.39
30.31
f1 (ppm)


OH
t-Bu
t-Bu
F3C
N
H
7ai
8.02
7.44
7.42
7.24
7.22
7.20
7.18
7.12
7.11
6.90
6.90
6.88
6.87
6.40
5.52
5.02
1.28
0.98
2.10
4.38
0.99
3.06
0.98
0.98
1.00
18.20
f1 (ppm)
152.40
150.16
135.77
135.67
134.69
134.24
129.95
128.38
128.07
126.25
125.99
125.20
125.17
125.13
125.09
124.62
124.17
102.93
56.98
34.58
30.54
f1 (ppm)


OH
t-Bu
t-Bu
MeO
N
H
7aj
7.91
7.23
7.15
7.13
7.01
6.99
6.97
6.91
6.91
6.89
6.73
6.71
6.35
5.42
4.97
4.97
3.68
1.27
1.01
1.00
1.10
3.05
2.99
1.97
0.95
1.00
1.00
3.10
18.00
f1 (ppm)
157.64
151.94
138.08
136.82
135.35
135.30
134.35
130.44
127.78
126.12
124.26
124.15
121.03
113.42
110.71
102.65
56.13
55.27
34.40
30.43
f1 (ppm)


OH
t-Bu
t-Bu
OMe
OMe
N
H
7ak
8.06
7.33
7.29
7.28
7.28
7.26
7.16
7.16
7.15
7.03
7.03
7.01
7.01
6.98
6.83
6.81
6.75
6.74
6.72
6.72
6.59
6.59
6.47
6.46
3.69
3.66
1.37
1.04
1.08
1.11
1.06
1.12
2.00
0.98
1.03
1.02
0.99
1.00
1.07
3.00
2.97
18.15
f1 (ppm)
153.35
151.81
151.68
135.98
135.09
134.70
134.34
127.71
126.20
124.26
123.88
120.93
117.19
112.05
110.86
110.41
102.68
56.61
55.59
49.55
34.32
30.41
f1 (ppm)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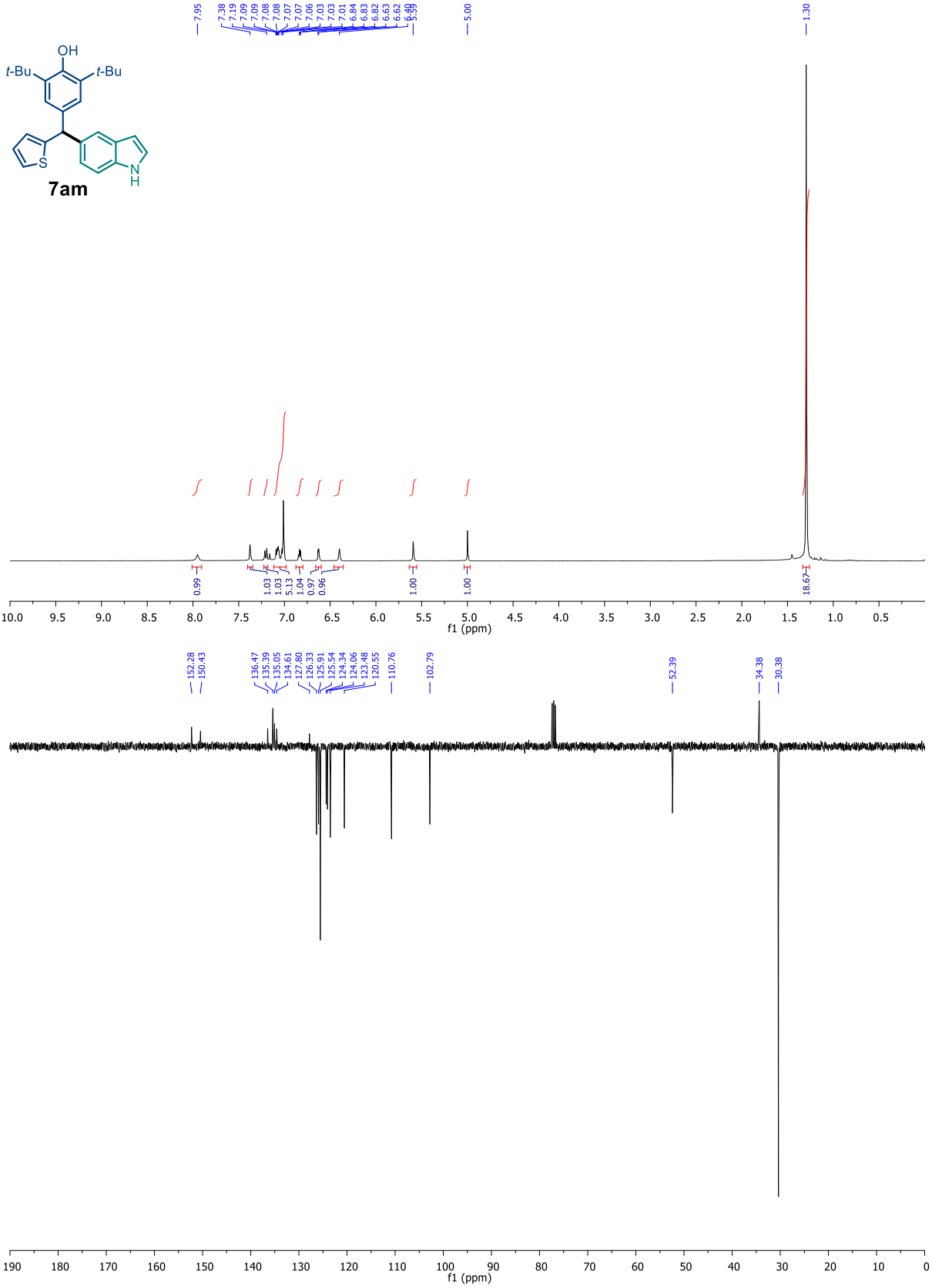
t-Bu
t-Bu
MeO
MeO
OMe
N
H
7al
8.10
7.25
7.20
7.18
7.16
7.07
6.93
6.91
6.90
6.38
6.33
5.39
5.00
3.75
3.64
1.29
1.01
0.95
1.01
0.98
2.95
0.97
1.93
0.98
1.00
3.00
5.99
18.22
f1 (ppm)
152.79
152.04
141.46
136.39
135.38
134.75
126.04
124.31
123.97
120.97
110.71
106.79
102.60
60.89
57.15
56.02
34.39
30.41
f1 (ppm)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t-Bu
S
N
H
7am
7.95
7.38
7.19
7.09
7.09
7.08
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7.07
7.07
7.06
7.03
7.03
7.01
6.84
6.83
6.82
6.63
6.62
6.60
5.99
5.00
1.30
0.99
1.03
1.03
5.13
1.04
0.97
0.96
1.00
1.00
18.67
f1 (ppm)
152.28
150.43
136.47
135.39
135.05
134.61
127.80
126.33
125.91
125.54
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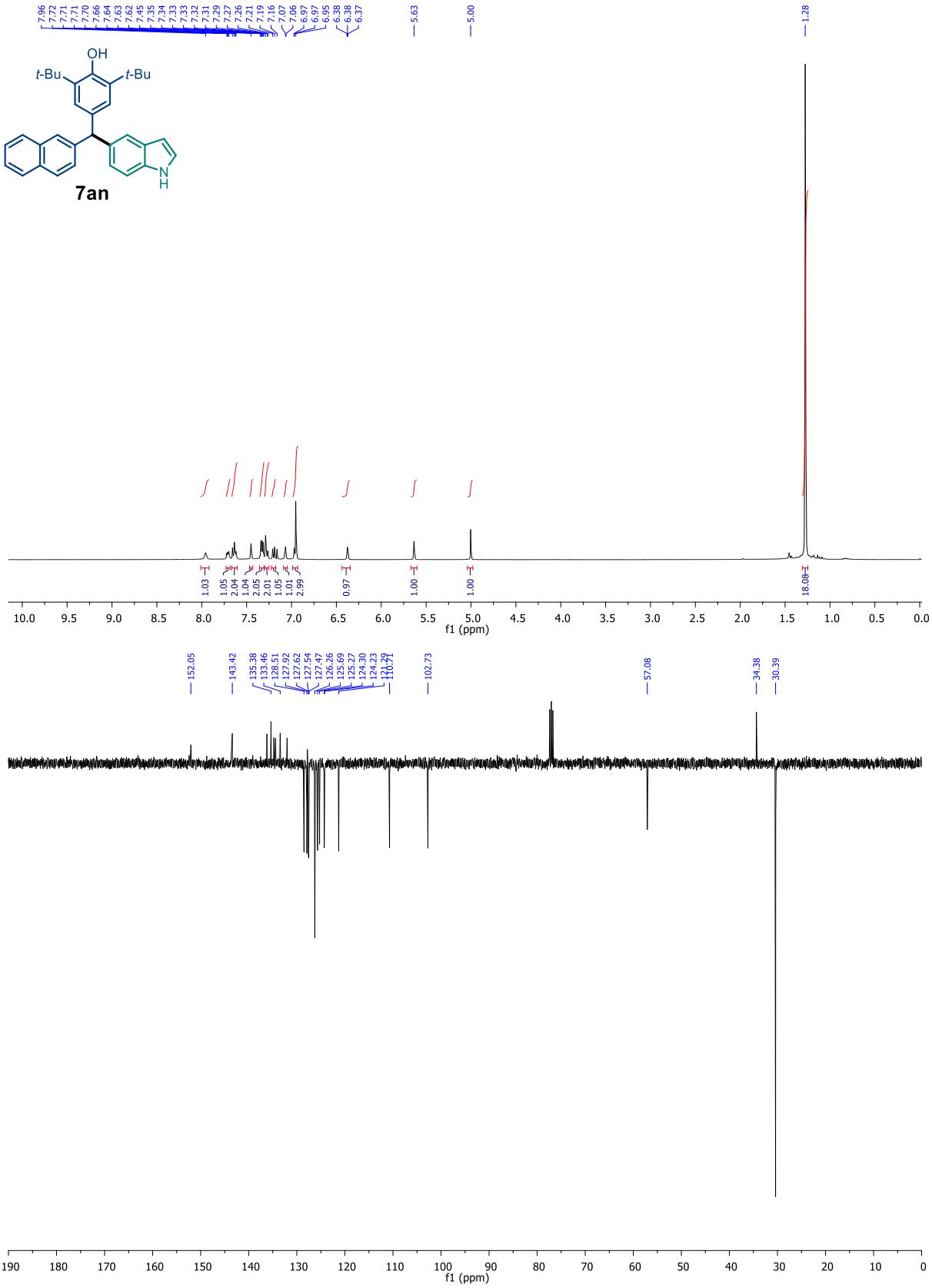
124.06
123.48
120.55
110.76
102.79
52.39
34.38
30.38
f1 (ppm)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7.66
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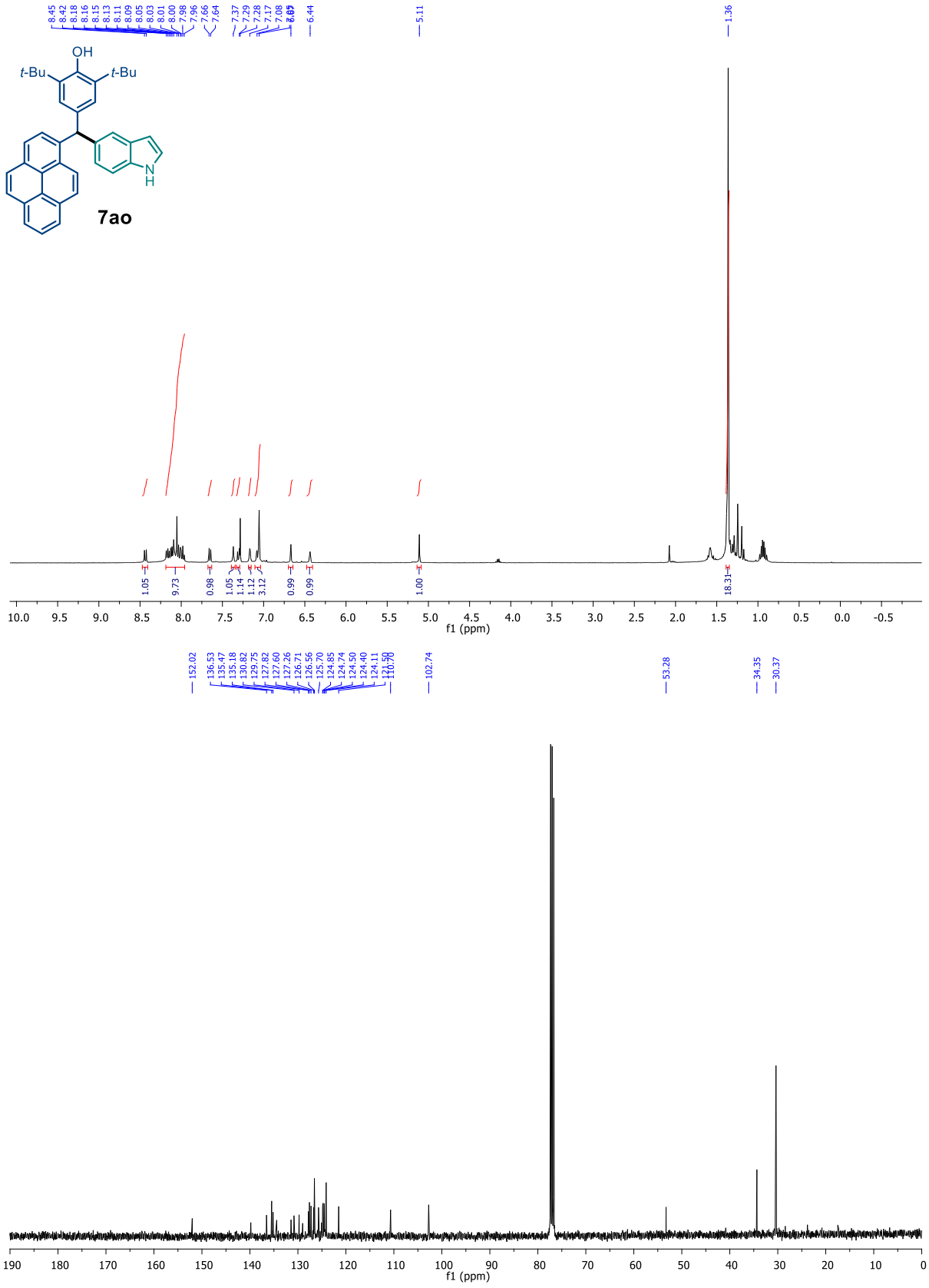
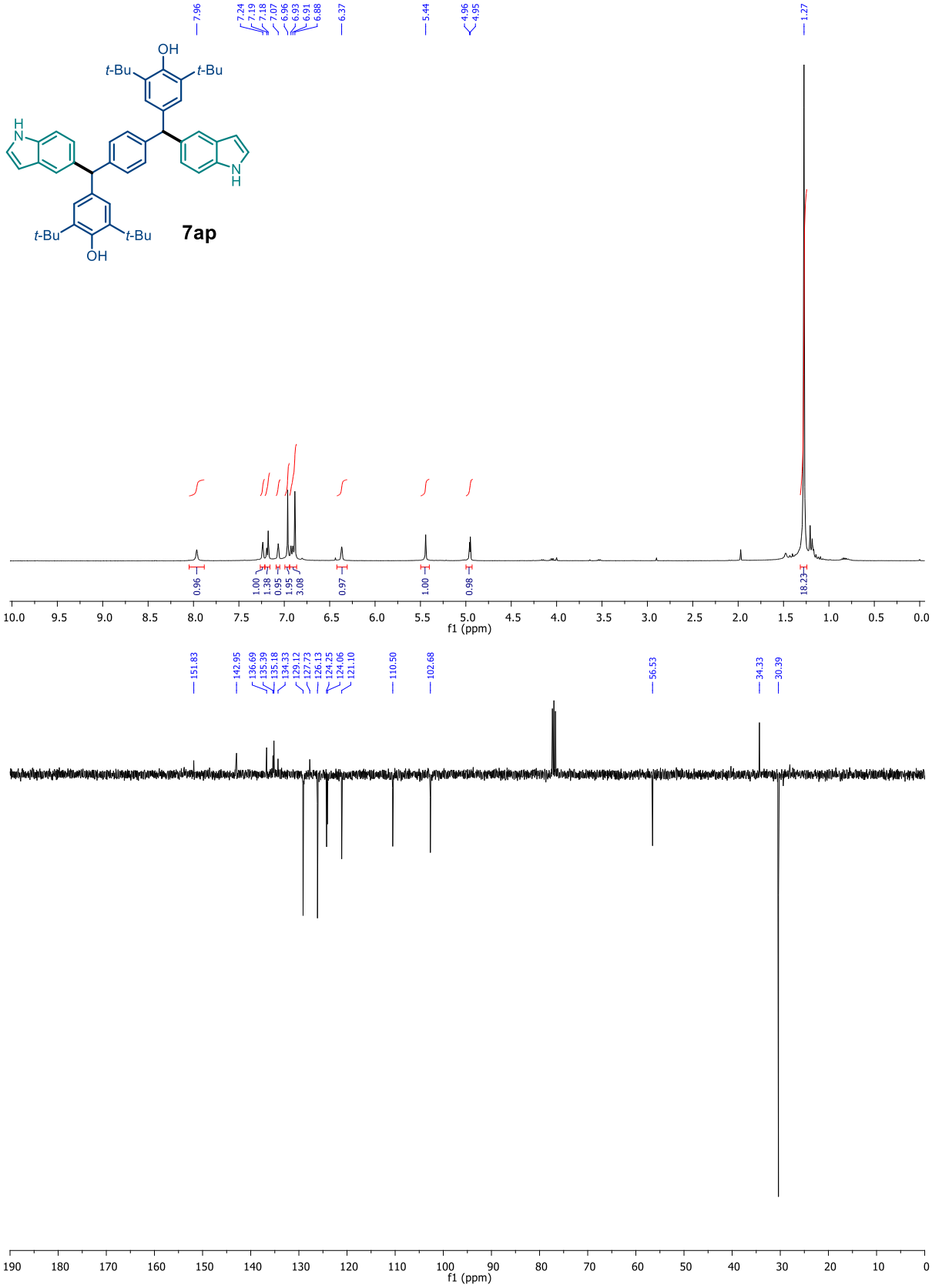
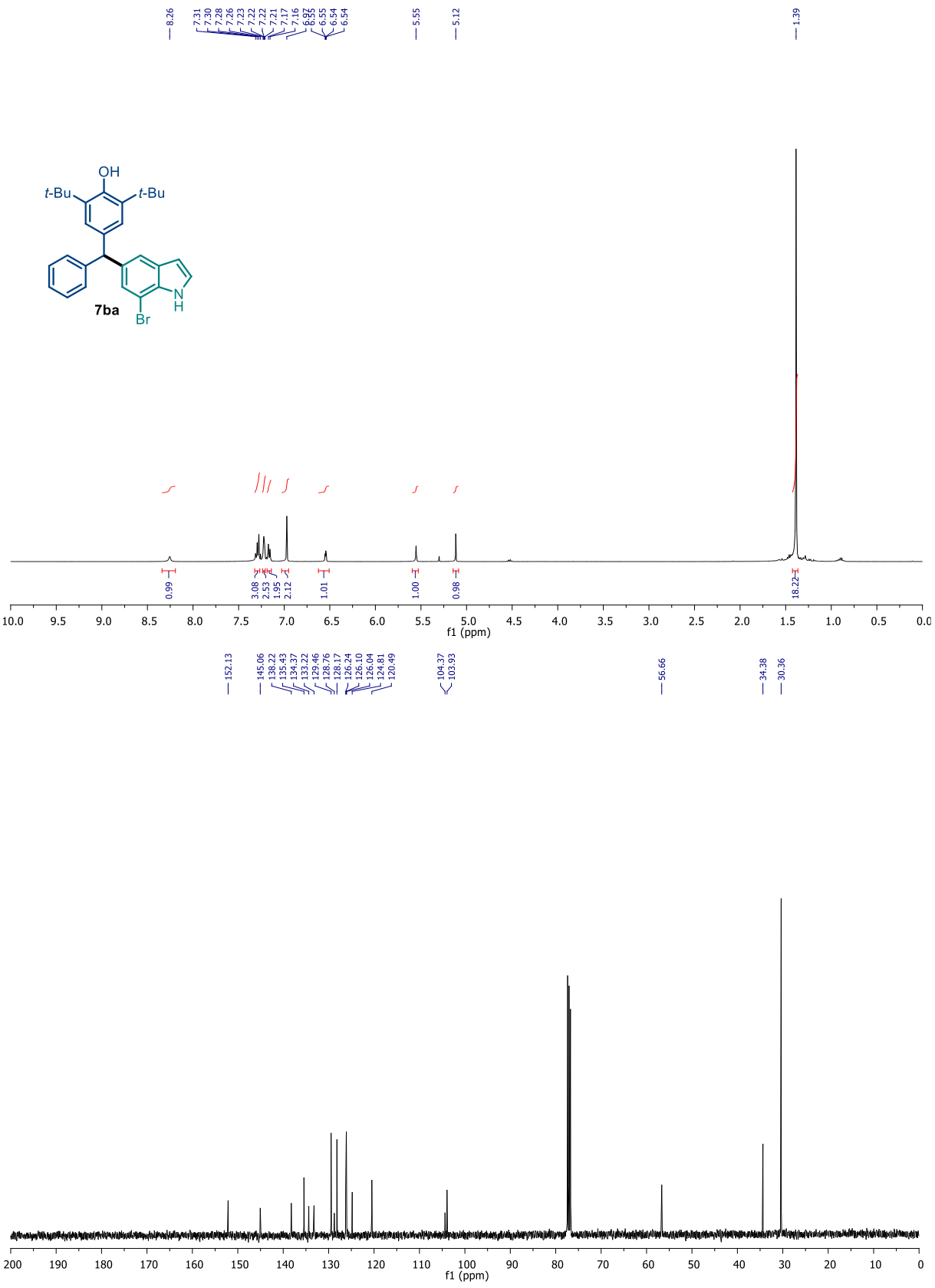
7.63
7.62
7.45
7.35
7.34
7.33
7.33
7.32
7.31
7.29
7.27
7.26
7.21
7.19
7.16
7.07
7.06
6.97
6.95
6.38
6.38
6.37
5.63
5.00
1.28
OH
t-Bu
t-Bu
N
H
7an
1.03
1.05
2.04
1.04
2.05
2.01
1.05
1.01
2.99
0.97
1.00
1.00
18.09
f1 (ppm)
152.05
143.42
135.38
133.46
128.51
127.92
127.62
127.54
127.47
126.26
125.69
125.27
124.30
124.23
110.71
102.73
57.08
34.38
30.39
f1 (ppm)


8.45
8.42
8.18
8.16
8.15
8.13
8.11
8.09
8.05
8.03
8.01
8.00
7.98
7.96
7.66
7.64
7.37
7.29
7.28
7.17
7.08
6.44
5.11
1.36
OH
t-Bu
t-Bu
N
H
7ao
1.05
9.73
0.98
1.05
1.14
1.12
3.12
0.99
0.99
1.00
18.31
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
f1 (ppm)
152.02
136.53
135.47
135.18
130.82
129.75
127.82
127.60
127.26
126.71
126.56
125.70
124.85
124.74
124.50
124.40
124.11
102.74
53.28
34.35
30.37
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


7.96
7.24
7.19
7.18
7.07
6.96
6.93
6.91
6.88
6.37
5.44
4.96
4.95
1.27
OH
t-Bu
t-Bu
H
N
N
H
t-Bu
t-Bu
OH
7ap
0.96
1.00
1.38
0.95
1.95
3.08
0.97
1.00
0.98
18.23
f1 (ppm)
151.83
142.95
136.69
135.39
135.18
134.33
129.12
127.73
126.13
124.25
124.06
121.10
110.50
102.68
56.53
34.33
30.39
f1 (ppm)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7.31
7.30
7.28
7.26
7.23
7.22
7.21
7.17
7.16
6.55
6.54
6.54
5.55
5.12
1.39
OH
t-Bu
t-Bu
N
H
Br
7ba
0.99
3.08
2.53
1.95
2.12
1.01
1.00
0.98
18.22
f1 (ppm)
152.13
145.06
138.22
135.43
134.37
133.22
129.46
128.76
128.17
126.24
126.10
126.04
124.81
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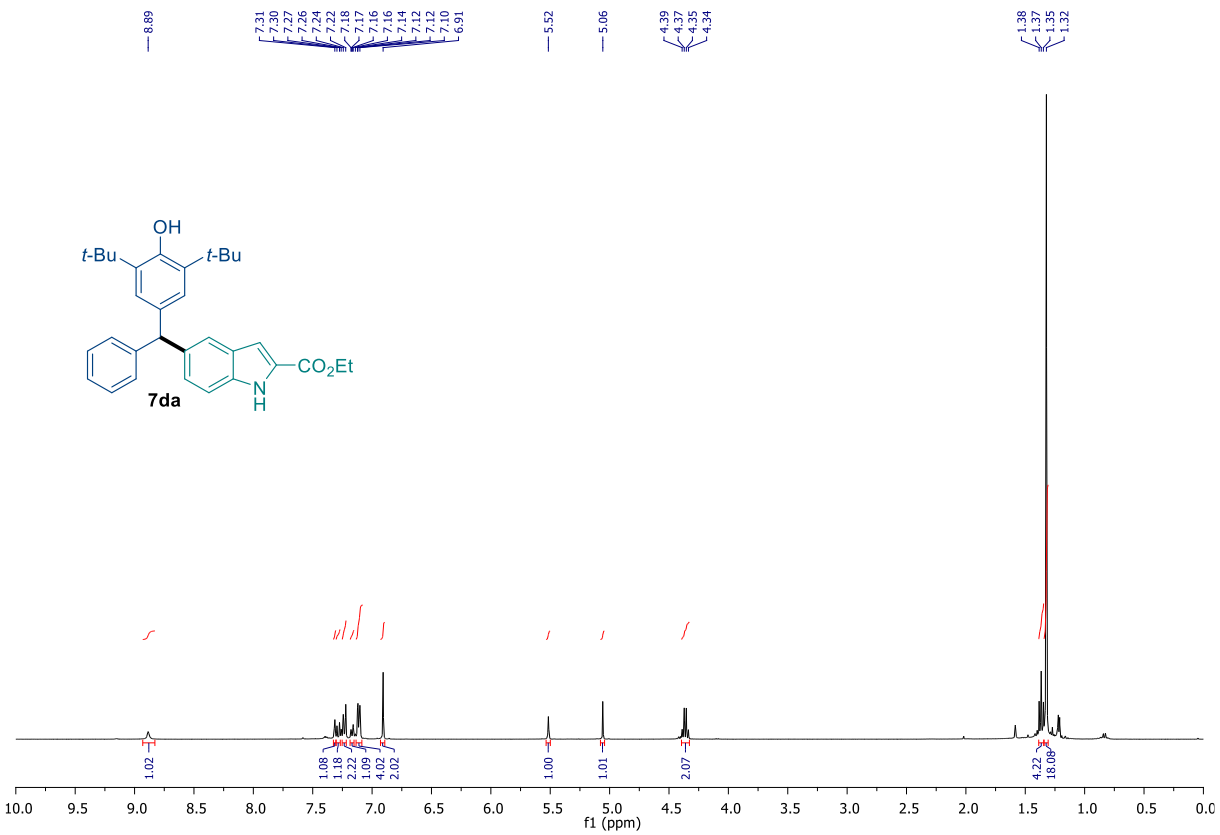
103.93
56.66
34.38
30.36
f1 (ppm)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7.31
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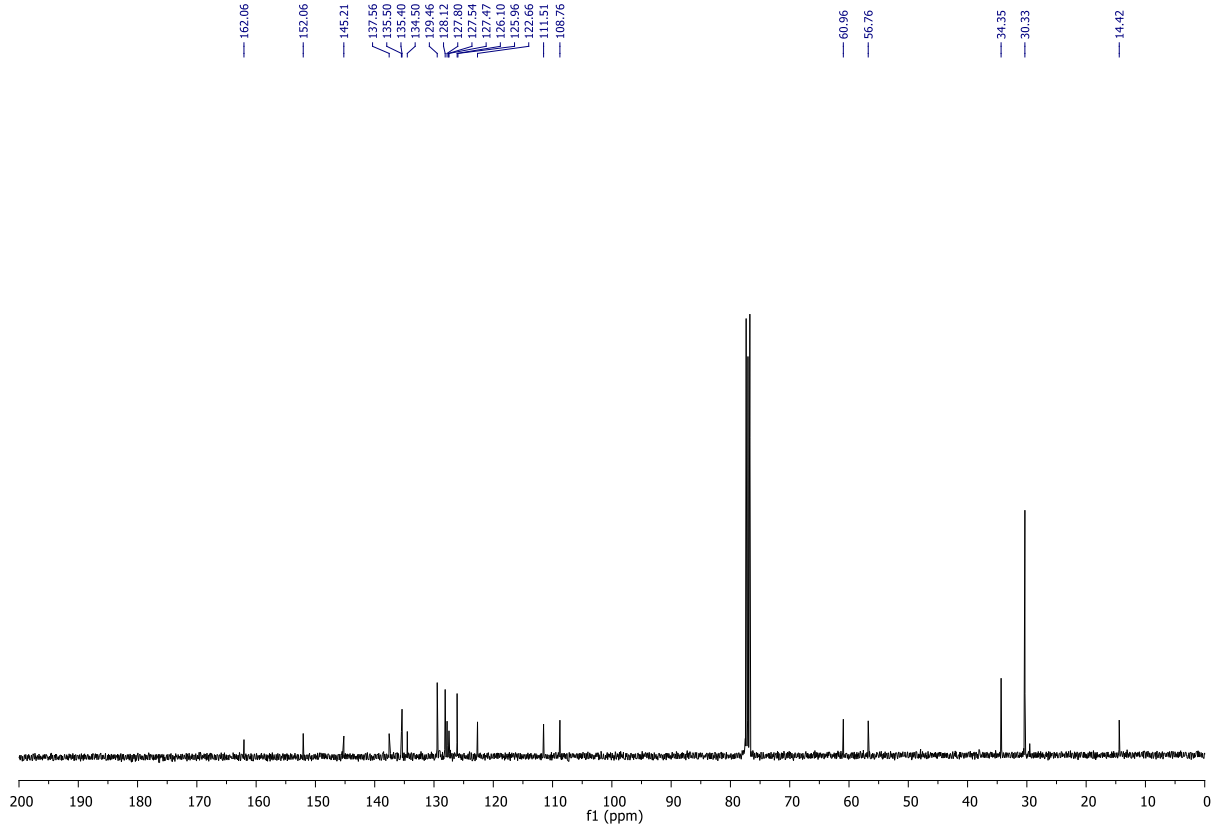
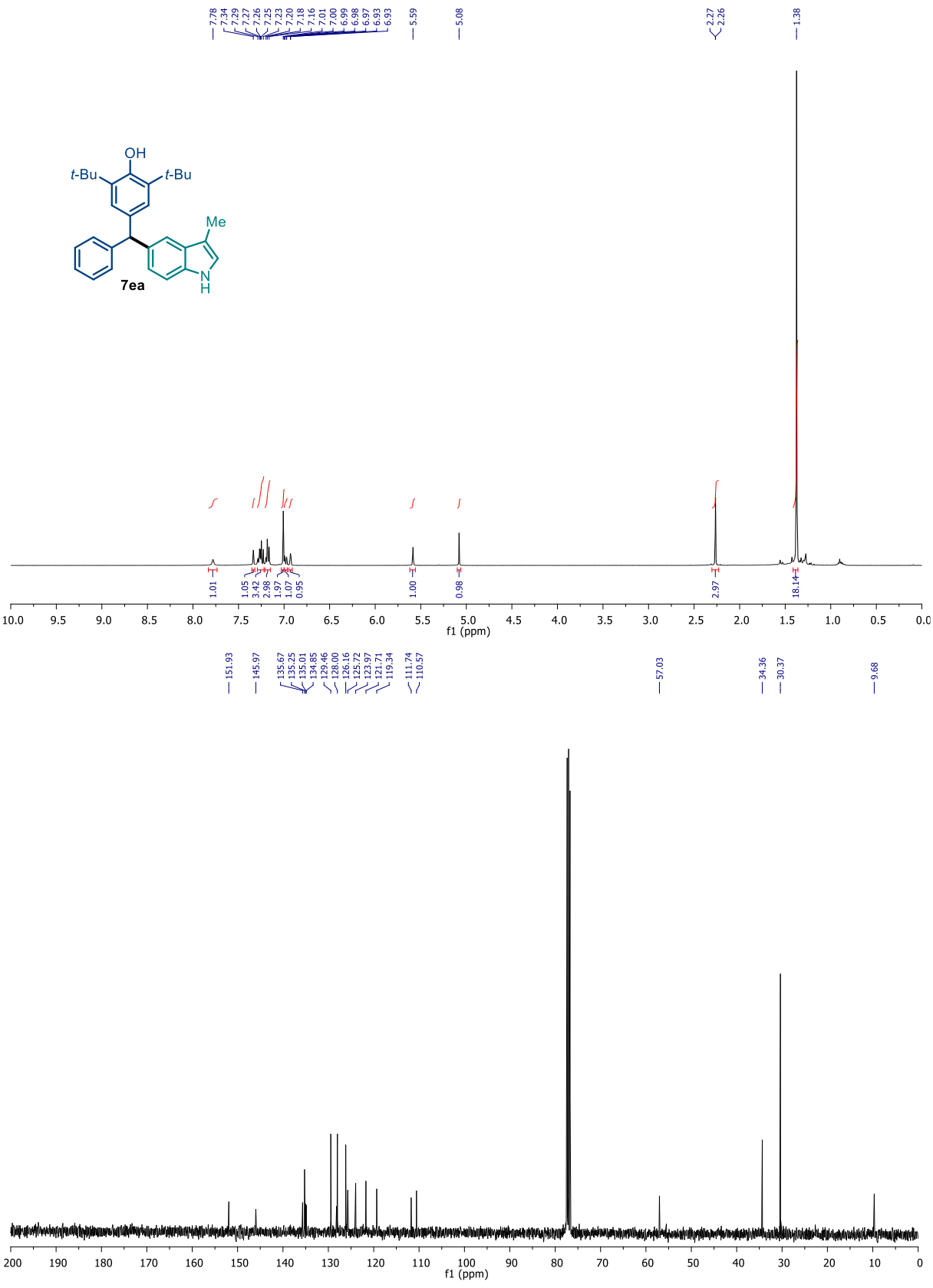
7.27
7.26
7.24
7.22
7.18
7.17
7.16
7.16
7.14
7.12
7.12
7.10
6.91
5.52
5.06
4.39
4.37
4.35
4.34
1.38
1.37
1.35
1.32
OH
t-Bu
t-Bu
CO2Et
N
H
7da
1.02
1.08
1.18
2.22
1.09
4.02
2.02
1.00
1.01
2.07
4.22
18.09
f1 (ppm)


162.06
152.06
145.21
137.56
135.50
135.40
134.50
129.46
128.12
127.80
127.54
127.47
126.10
125.96
122.66
111.51
108.76
60.96
56.76
34.35
30.33
14.42
f1 (ppm)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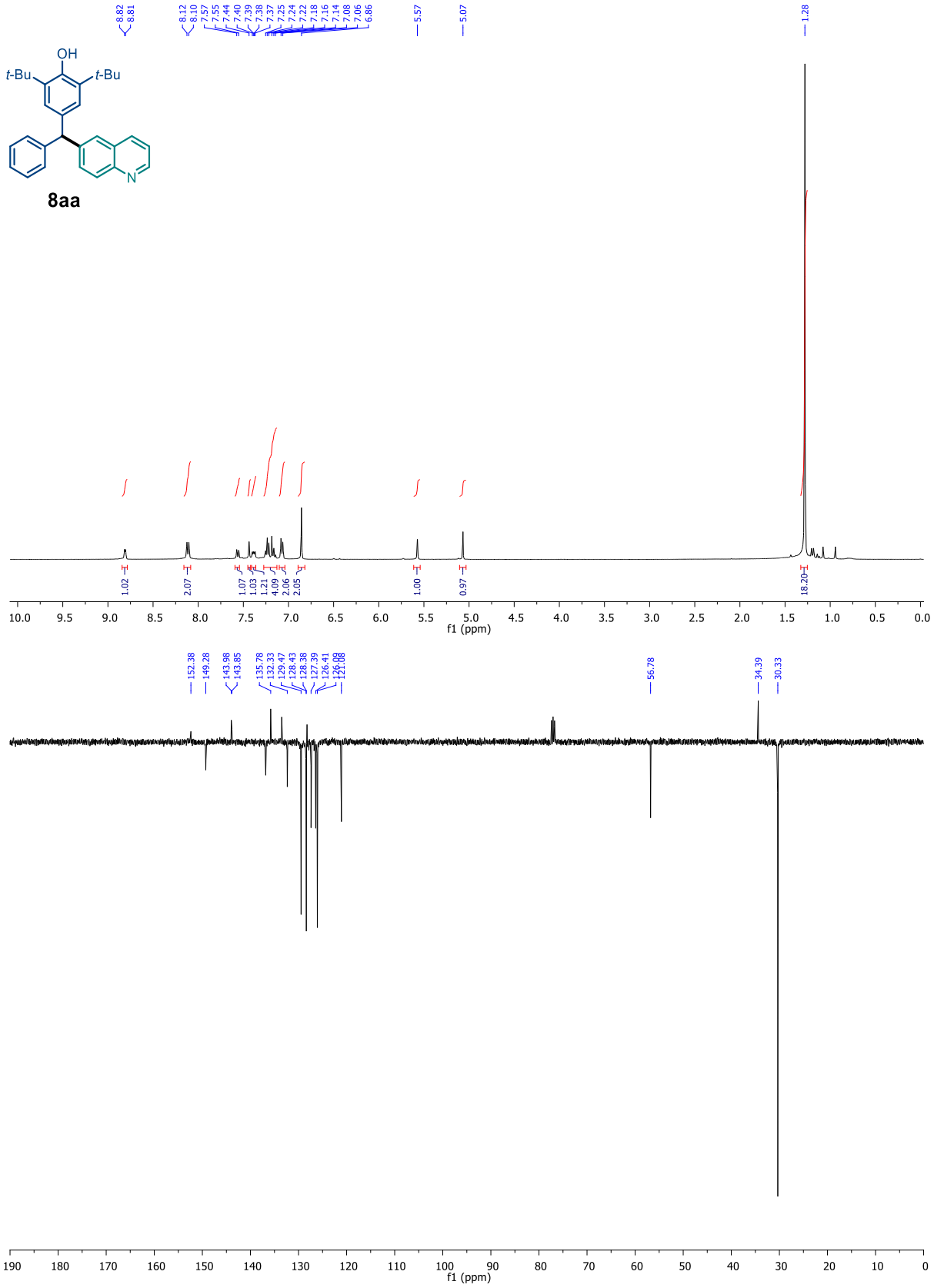
7.34
7.29
7.27
7.26
7.25
7.23
7.20
7.18
7.16
7.01
7.00
6.99
6.98
6.97
6.93
6.93
5.59
5.08
2.27
2.26
1.38
OH
t-Bu
t-Bu
Me
N
H
7ea
1.01
1.05
3.42
2.98
1.97
1.07
0.95
1.00
0.98
2.97
18.14
f1 (ppm)
151.93
145.97
135.67
135.25
135.01
134.85
129.46
128.00
126.16
125.72
123.97
121.71
119.34
111.74
110.57
57.03
34.36
30.37
9.68
f1 (ppm)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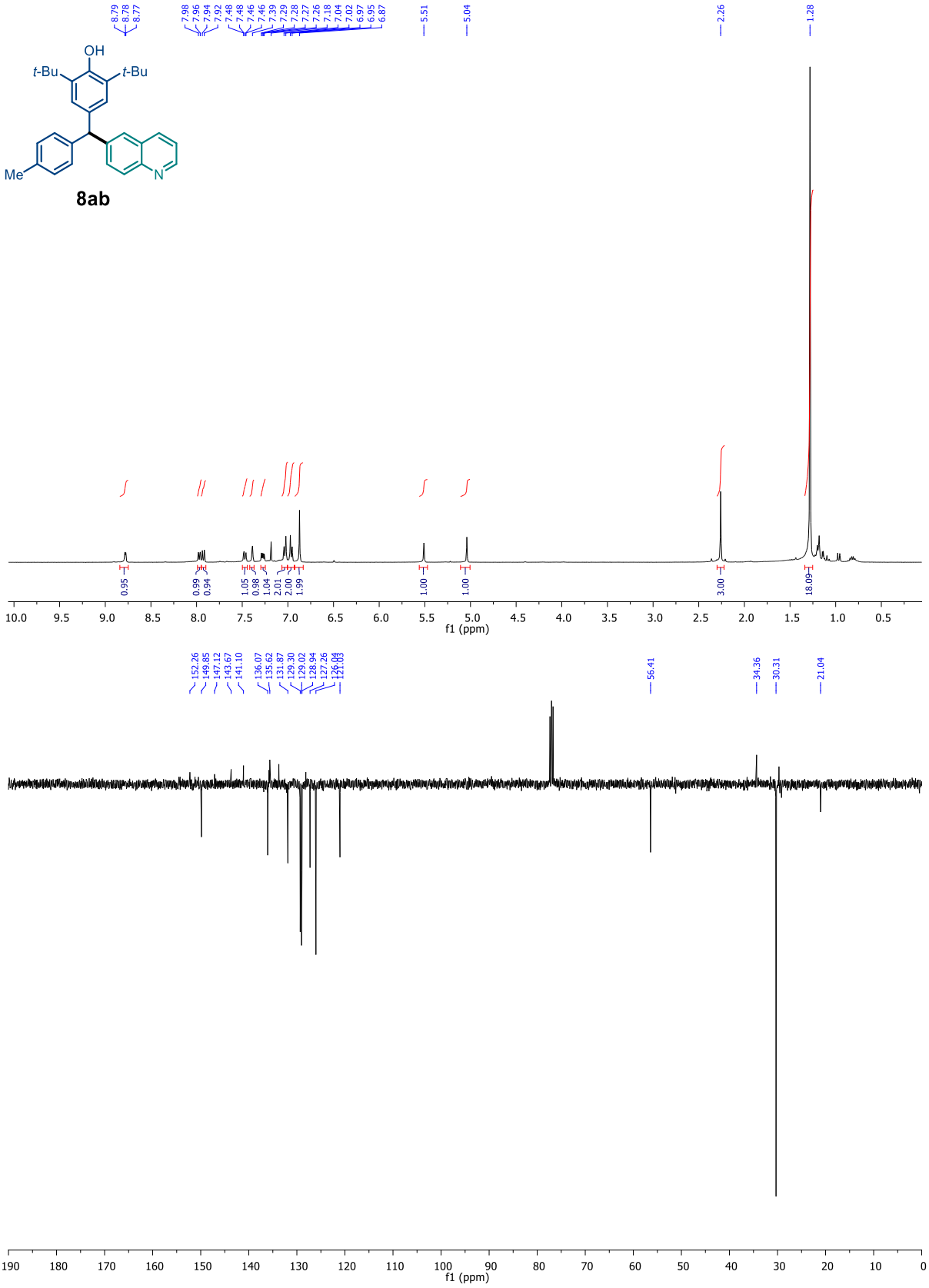
8.81
8.12
8.10
7.57
7.55
7.44
7.40
7.39
7.38
7.37
7.25
7.24
7.22
7.18
7.16
7.14
7.08
7.06
6.86
5.57
5.07
1.28
OH
t-Bu
t-Bu
N
8aa
1.02
2.07
1.07
1.03
1.21
4.09
2.06
2.05
1.00
0.97
18.20
f1 (ppm)
152.38
149.28
143.98
143.85
135.78
132.33
129.47
128.43
128.38
127.39
126.41
126.09
121.08
56.78
34.39
30.33
f1 (ppm)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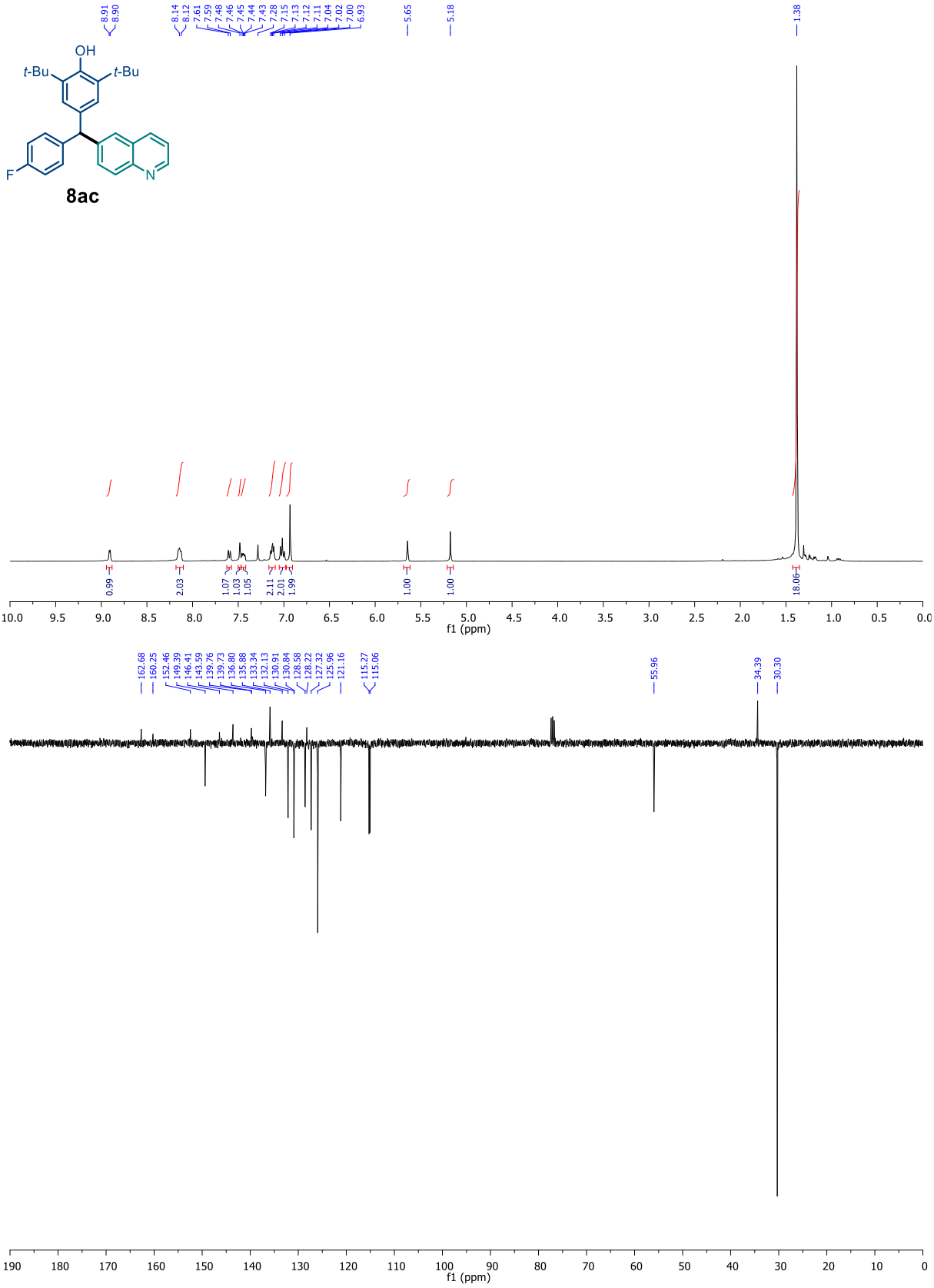
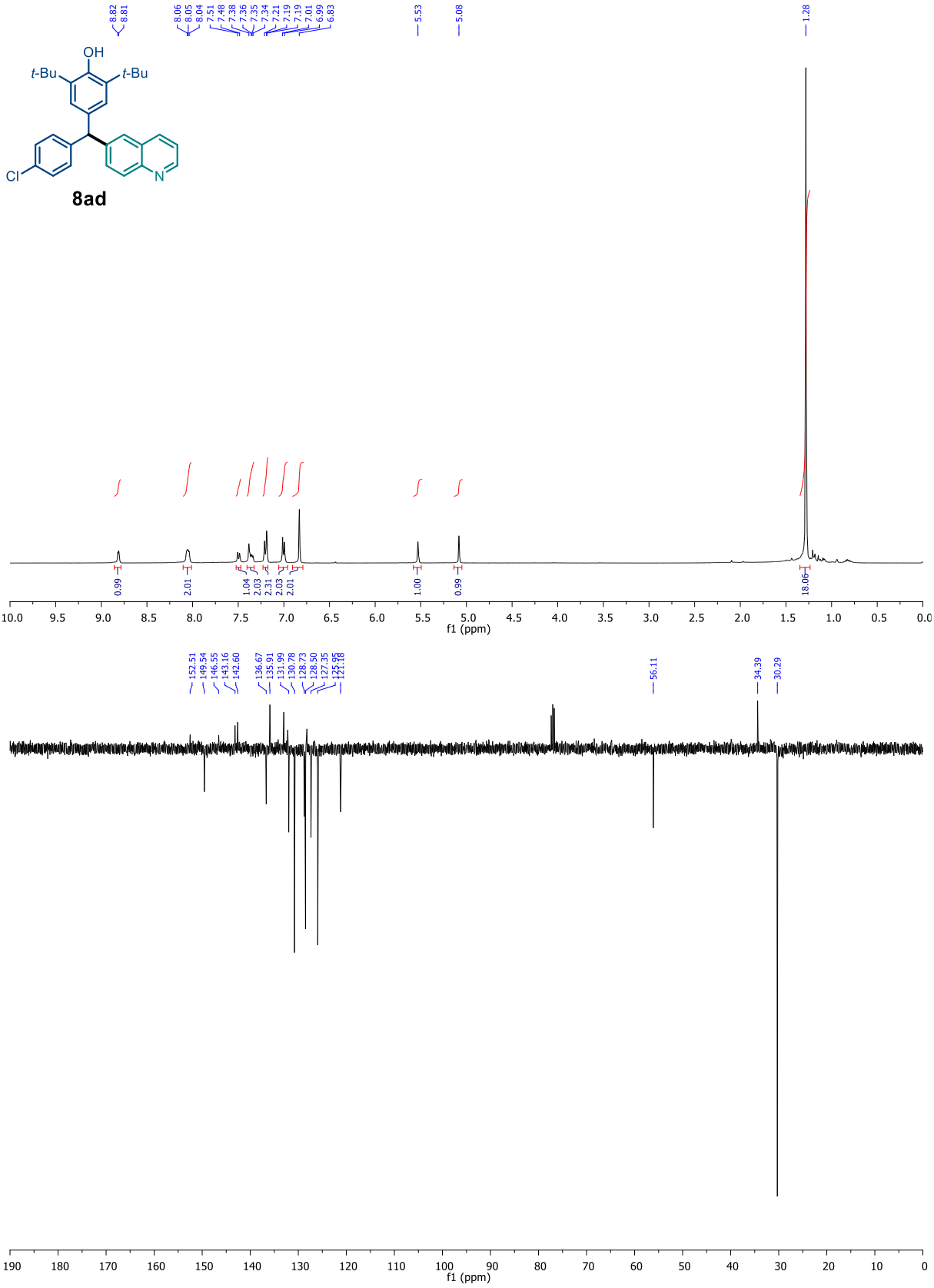
7.94
7.92
7.48
7.46
7.39
7.29
7.28
7.27
7.26
7.18
7.04
7.02
6.97
6.95
6.87
5.51
5.04
2.26
1.28
OH
t-Bu
t-Bu
Me
N
8ab
0.95
0.99
0.94
1.05
0.98
1.04
2.01
2.00
1.99
1.00
1.00
3.00
18.09
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)
152.26
149.85
147.12
143.67
141.10
136.07
135.62
131.87
129.30
129.02
128.94
127.26
126.04
121.03
56.41
34.36
30.31
21.04
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


OH
t-Bu
t-Bu
F
N
8ac
8.91
8.90
8.14
8.12
7.61
7.59
7.48
7.46
7.45
7.44
7.43
7.28
7.15
7.13
7.12
7.11
7.04
7.02
7.00
6.93
5.65
5.18
1.38
0.99
2.03
1.07
1.03
1.05
2.11
2.01
1.99
1.00
1.00
18.06
f1 (ppm)
162.68
160.25
152.46
149.39
146.41
143.59
139.76
139.73
136.80
135.88
133.34
132.13
130.91
130.84
128.58
128.22
127.32
125.96
121.16
115.27
115.06
55.96
34.39
30.30
f1 (ppm)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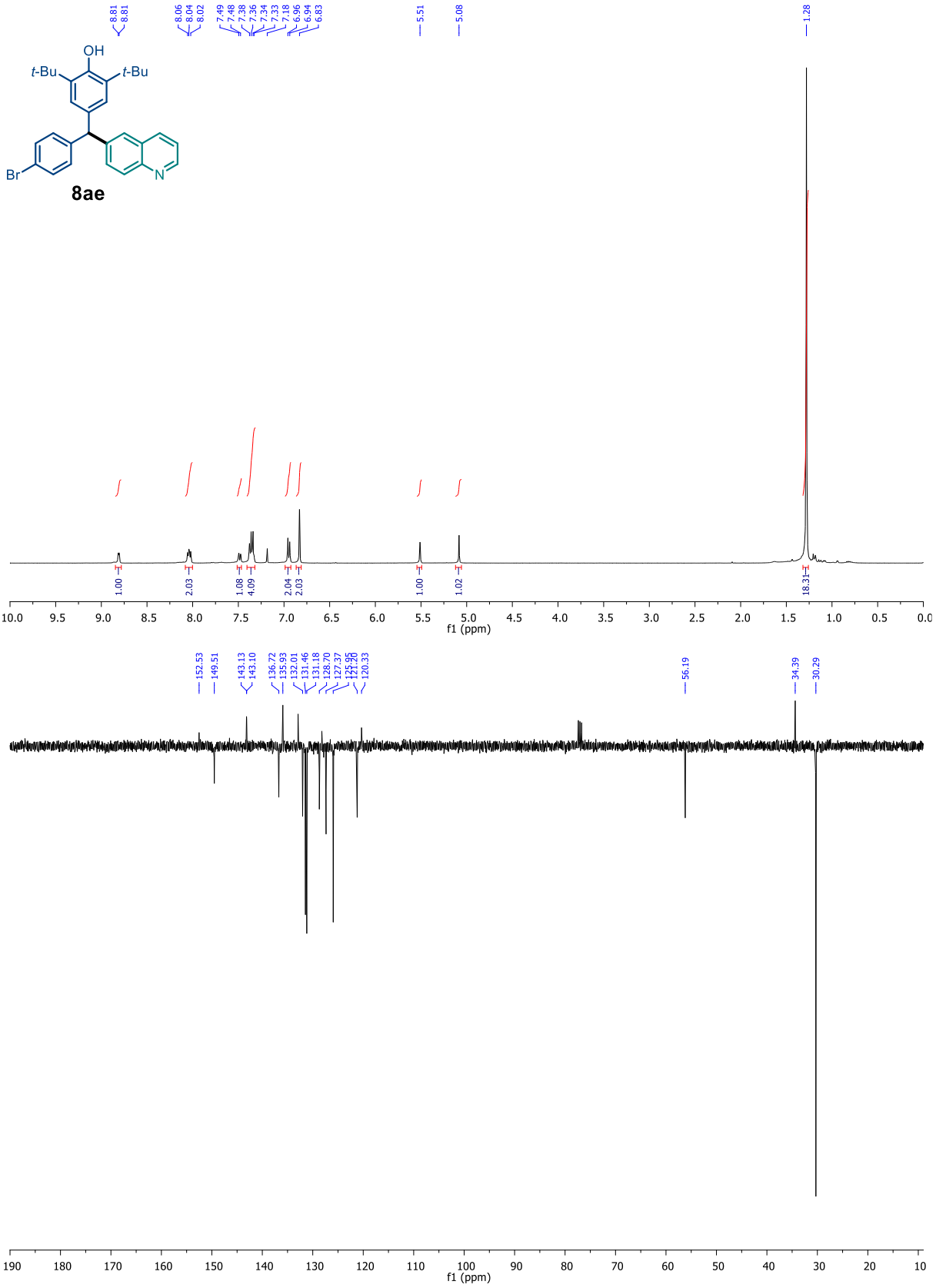
7.48
7.38
7.36
7.35
7.34
7.21
7.19
7.19
7.01
6.99
6.83
5.53
5.08
1.28
OH
t-Bu
t-Bu
Cl
N
8ad
0.99
2.01
1.04
2.03
2.31
2.03
2.01
1.00
0.99
18.06
f1 (ppm)
152.51
149.54
146.55
143.16
142.60
136.67
135.91
131.99
130.78
128.73
128.50
127.35
125.95
121.18
56.11
34.39
30.29
f1 (ppm)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8.81
8.06
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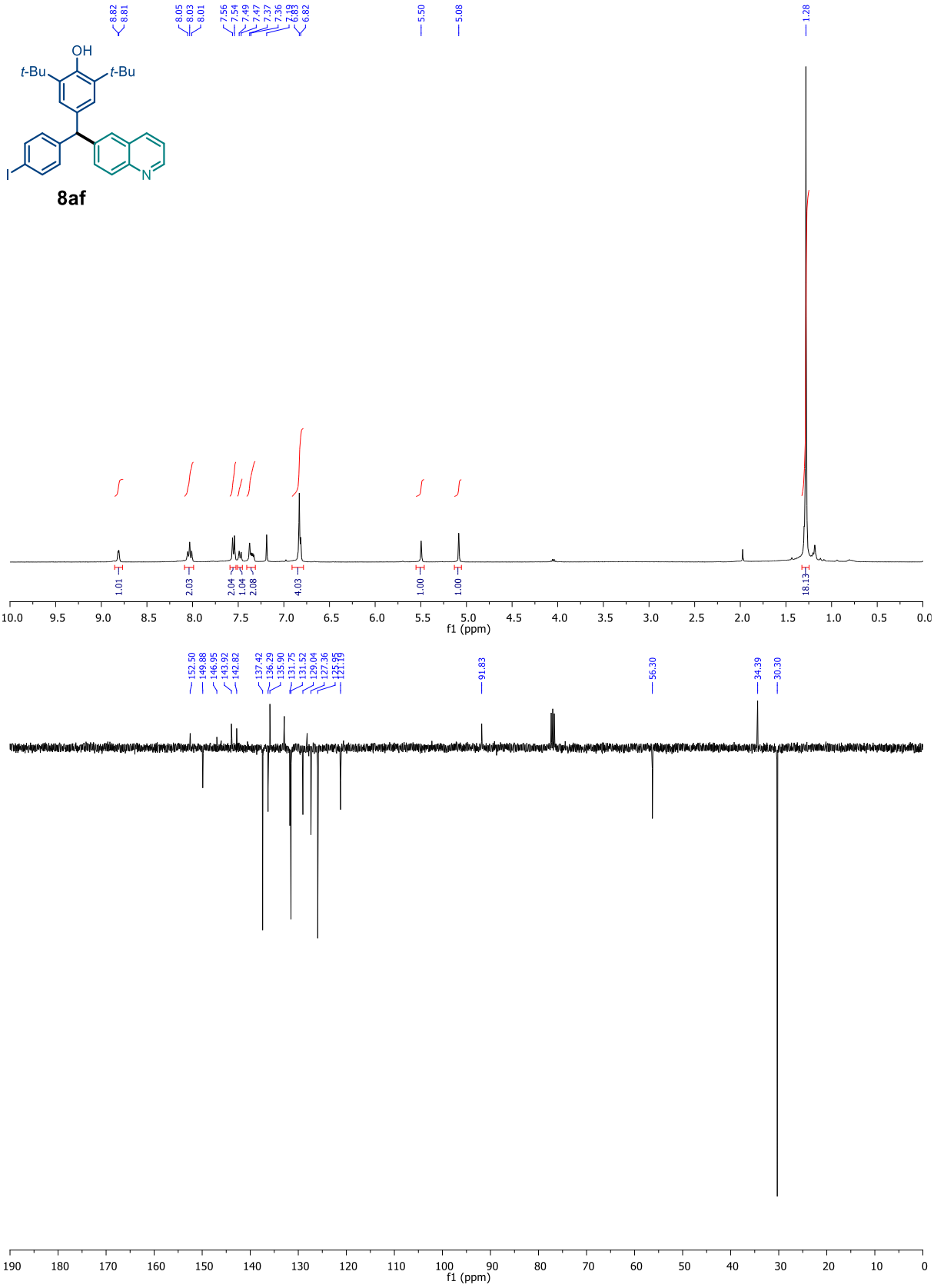
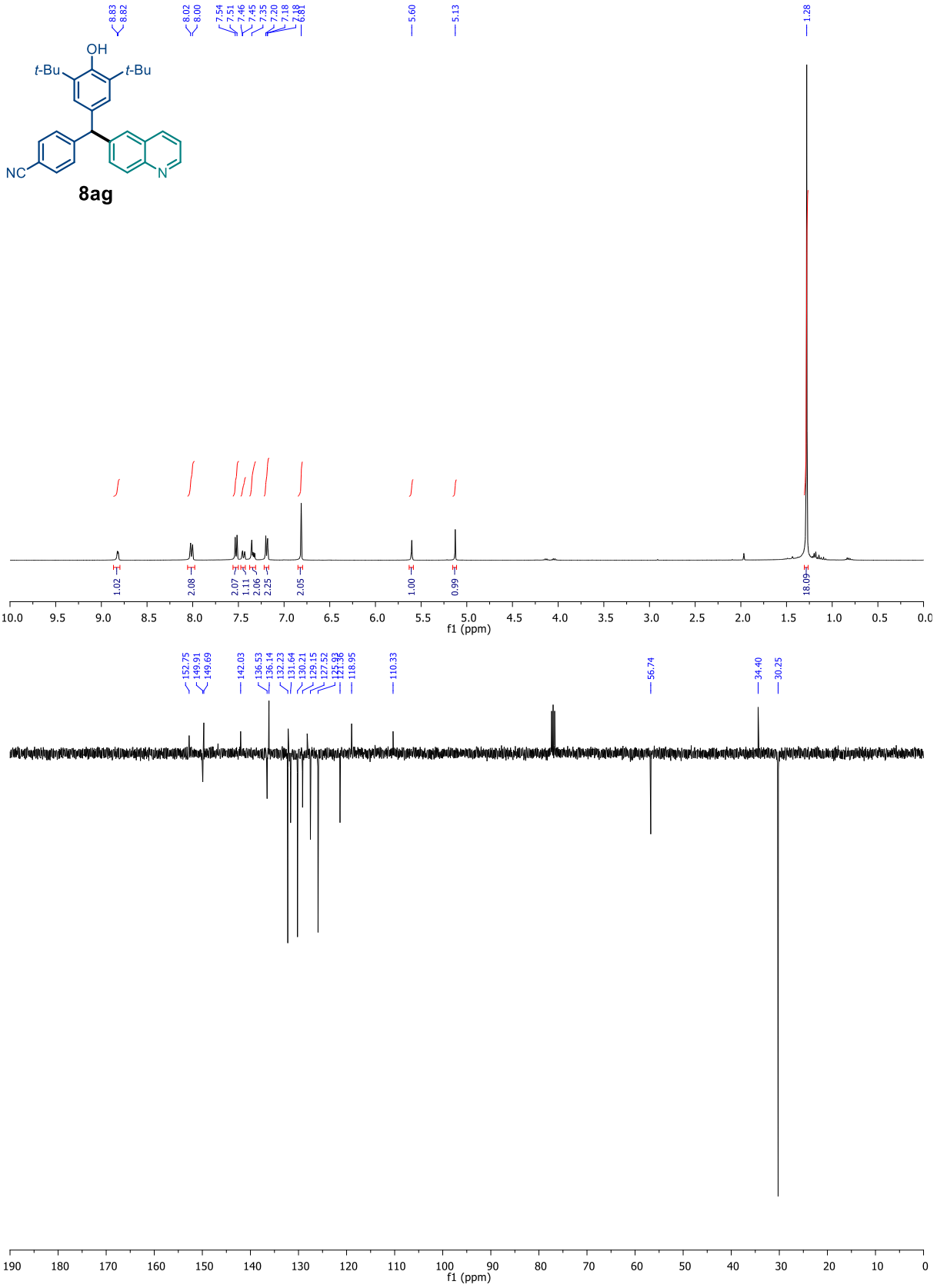
8.02
7.49
7.48
7.38
7.36
7.34
7.33
7.18
6.96
6.94
6.83
5.51
5.08
1.28
OH
t-Bu
t-Bu
Br
N
8ae
1.00
2.03
1.08
4.09
2.04
2.03
1.00
1.02
18.31
f1 (ppm)
152.53
149.51
143.13
143.10
136.72
135.93
132.01
131.46
131.18
128.70
127.37
56.19
34.39
30.29
120.33
f1 (ppm)


OH
t-Bu
t-Bu
I
N
8af
8.82
8.81
8.05
8.03
8.01
7.56
7.54
7.49
7.47
7.37
7.36
7.19
6.85
6.82
5.50
5.08
1.28
1.01
2.03
2.04
1.04
2.08
4.03
1.00
1.00
18.13
f1 (ppm)
152.50
149.88
146.95
143.92
142.82
137.42
136.29
135.90
131.75
131.52
129.04
127.36
125.95
121.19
91.83
56.30
34.39
30.30
f1 (ppm)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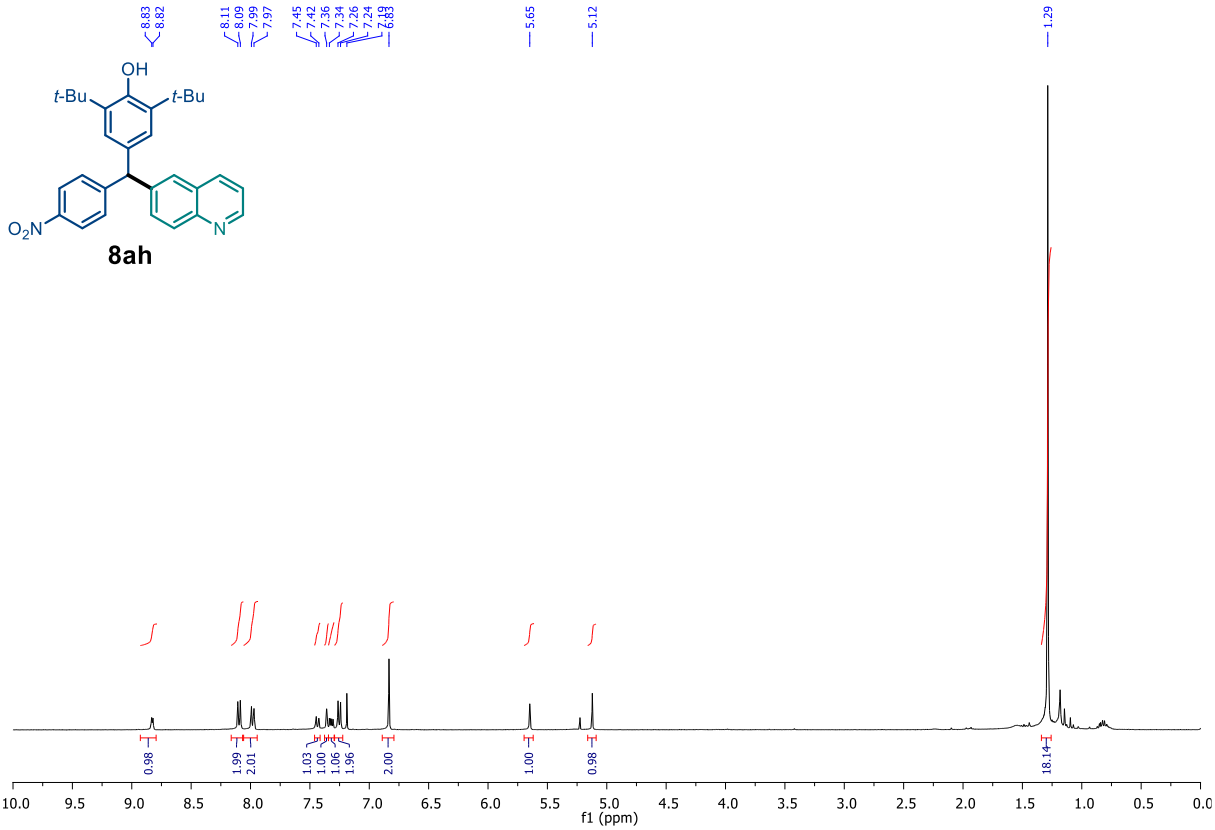
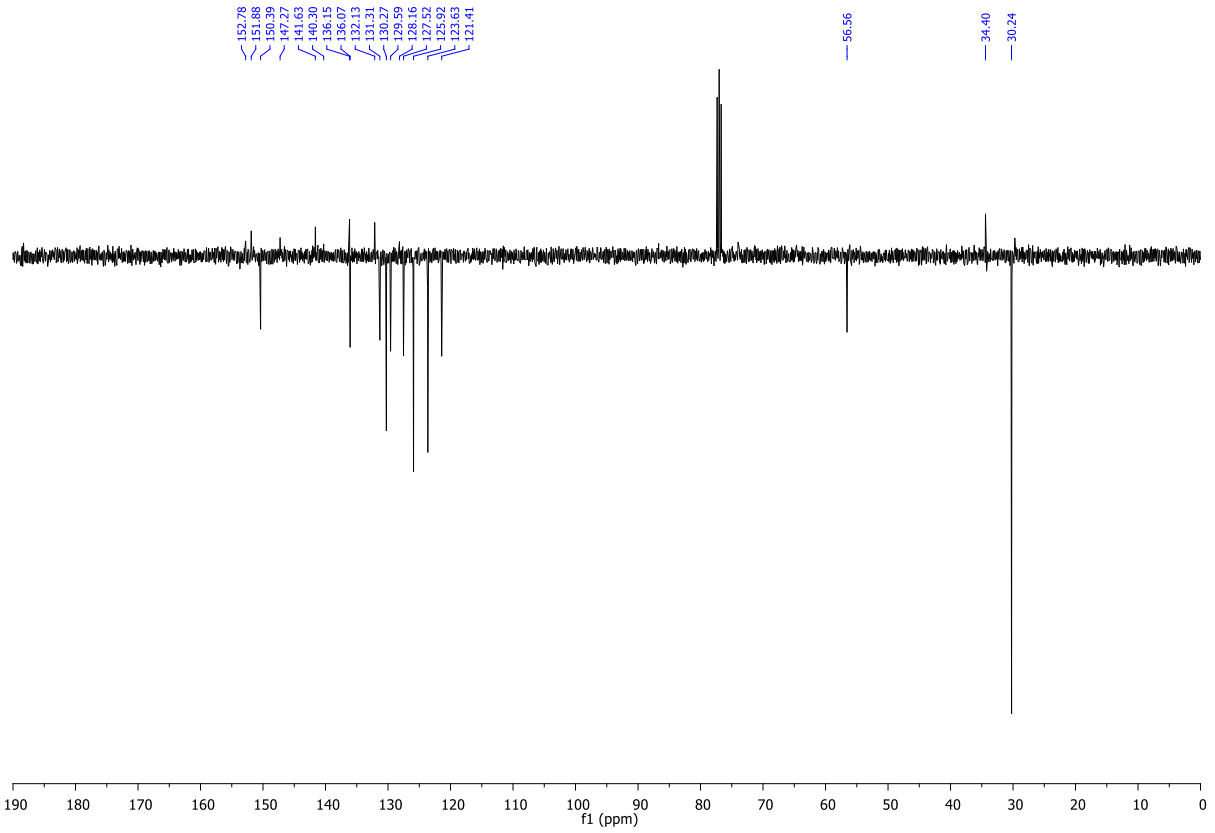
8.82
8.02
8.00
7.54
7.51
7.46
7.45
7.35
7.20
7.18
7.01
6.81
5.60
5.13
1.28
OH
t-Bu
t-Bu
NC
N
8ag
1.02
2.08
2.07
1.11
2.06
2.25
2.05
1.00
0.99
18.09
f1 (ppm)
152.75
149.91
149.69
142.03
136.53
136.14
132.23
131.64
130.21
129.15
127.52
125.93
121.36
118.95
110.33
56.74
34.40
30.25
f1 (ppm)


8.83
8.82
8.11
8.09
7.99
7.97
7.45
7.42
7.36
7.34
7.26
7.24
7.19
6.83
5.65
5.12
1.29
OH
t-Bu
t-Bu
O2N
N
0.98
1.99
2.01
1.03
1.00
1.06
1.96
2.00
1.00
0.98
18.14
f1 (ppm)

8ah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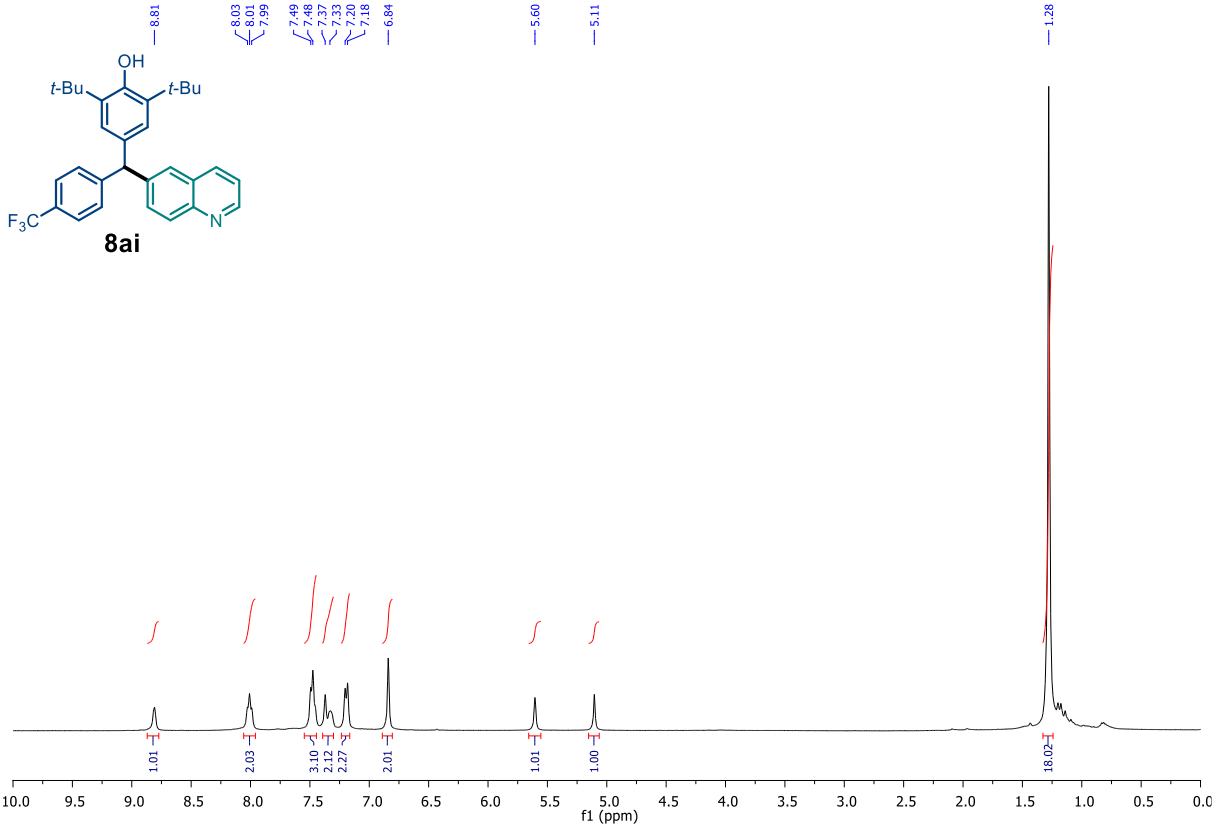
140.30
136.15
136.07
132.13
131.31
130.27
129.59
128.16
127.52
125.92
123.63
121.41
56.56
34.40
30.24
f1 (ppm)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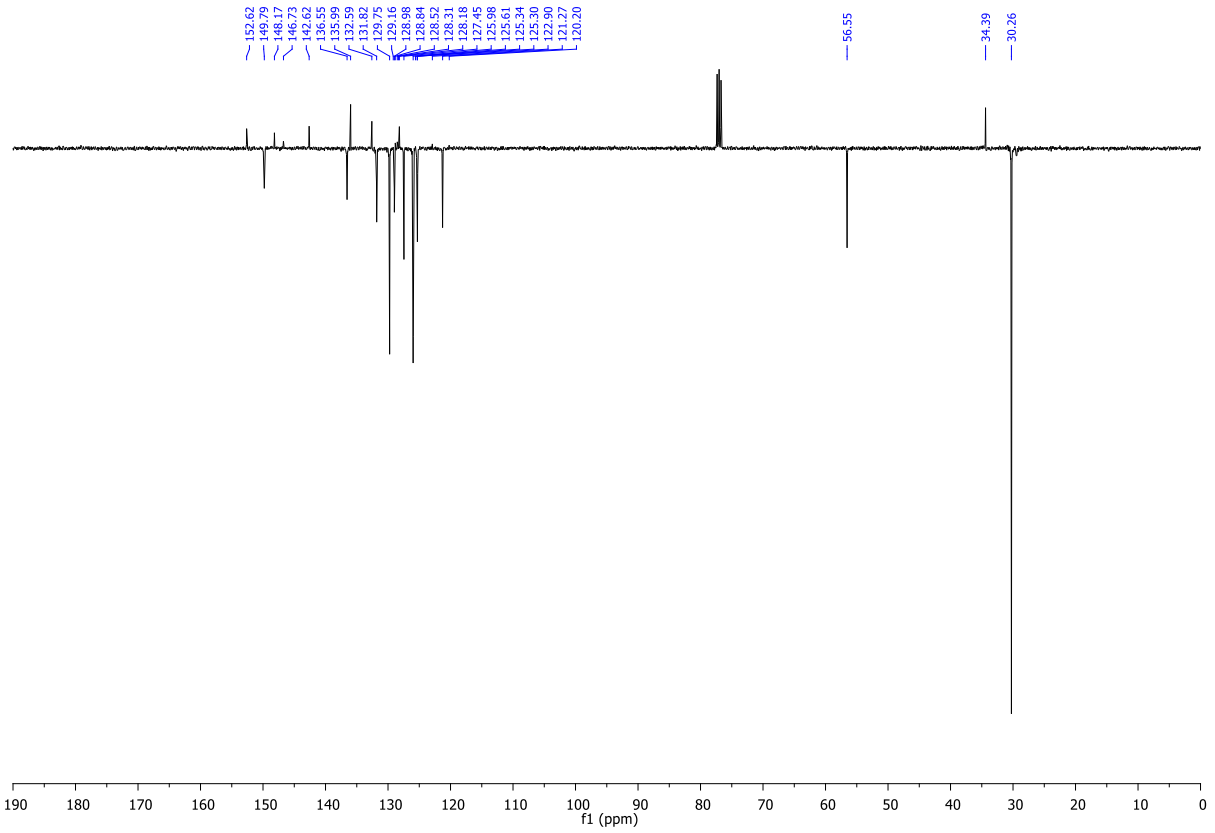
8.03
8.01
7.99
7.49
7.48
7.37
7.33
7.20
7.18
6.84
5.60
5.11
1.28
OH
t-Bu
t-Bu
F3C
N
8ai
1.01
2.03
3.10
2.12
2.27
2.01
1.01
1.00
18.02
f1 (ppm)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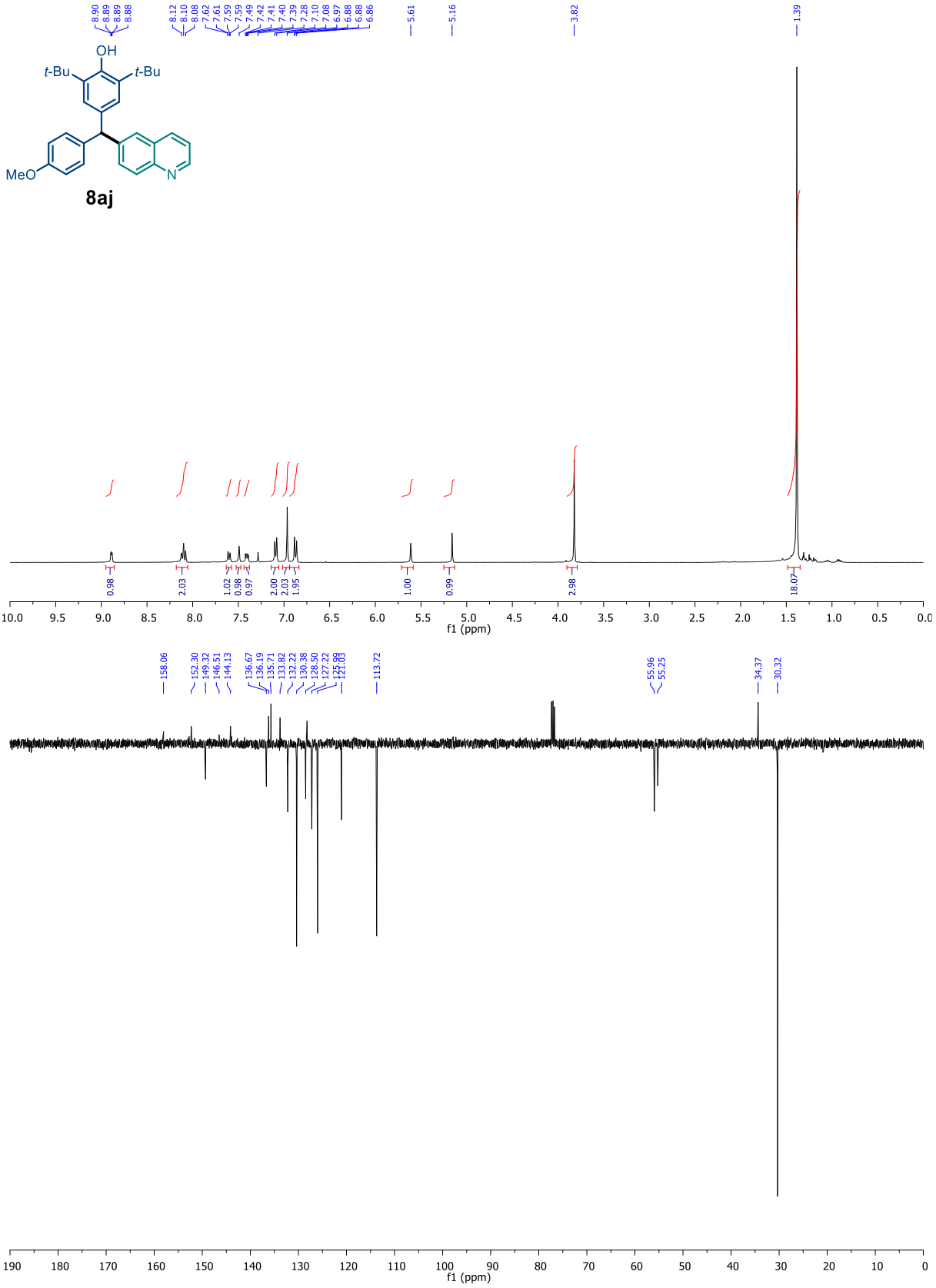
136.55
135.99
132.59
131.82
129.75
129.16
128.98
128.84
128.52
128.31
128.18
127.45
125.98
125.61
125.34
125.30
122.90
121.27
120.20
56.55
34.39
30.26
f1 (ppm)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8.10
8.08
7.62
7.61
7.59
7.59
7.49
7.42
7.41
7.40
7.39
7.28
7.10
7.08
6.97
6.88
6.88
6.86
5.61
5.16
3.82
1.39
OH
t-Bu
t-Bu
MeO
N
8aj
0.98
2.03
1.02
0.98
0.97
2.00
2.03
1.95
1.00
0.99
2.98
18.07
f1 (ppm)
158.06
152.30
149.32
146.51
144.13
136.67
136.19
135.71
133.82
132.22
130.38
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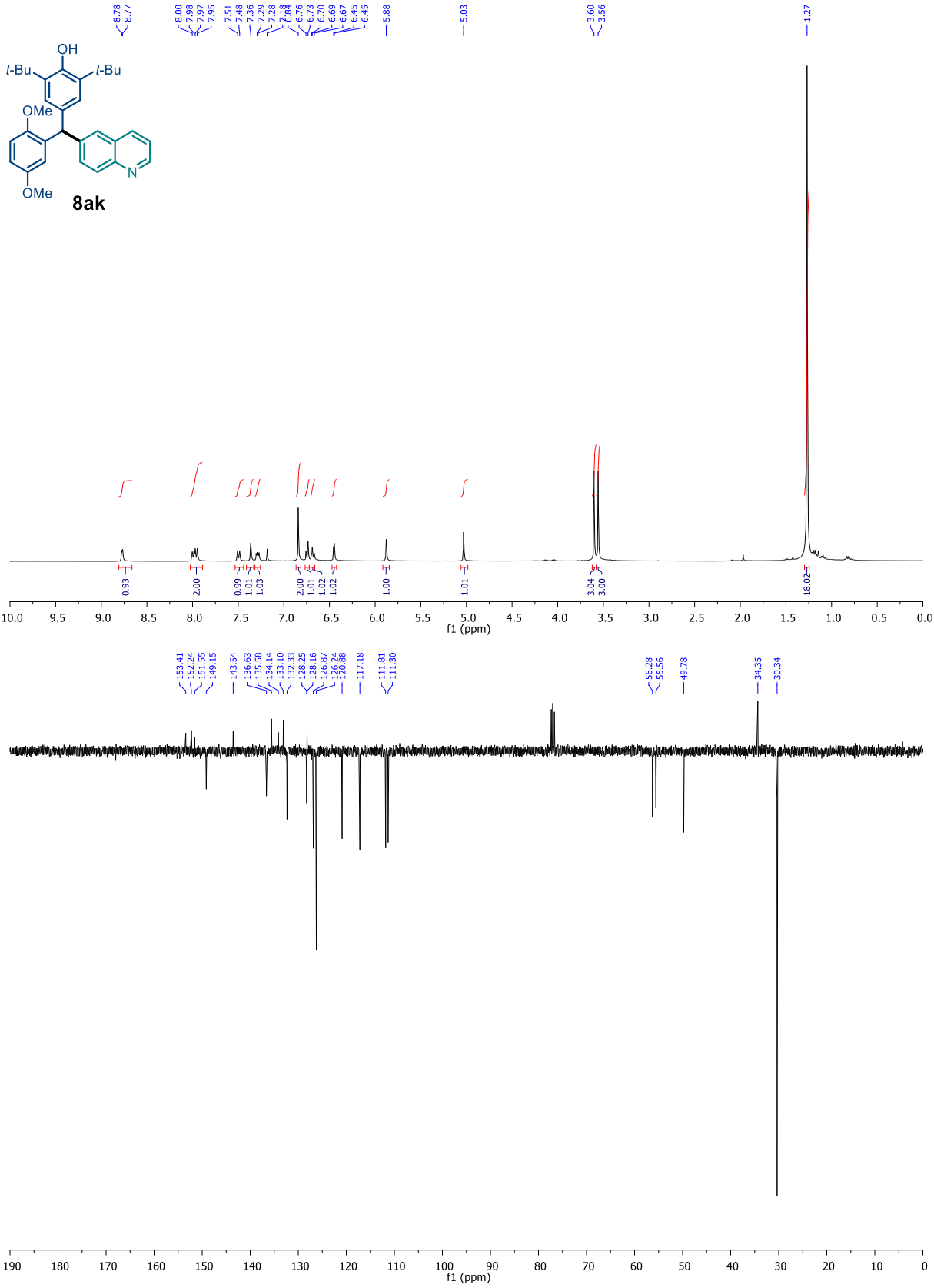
127.22
125.99
121.03
113.72
55.96
55.25
34.37
30.32
f1 (ppm)


OH
t-Bu
t-Bu
OMe
OMe
N
8ak
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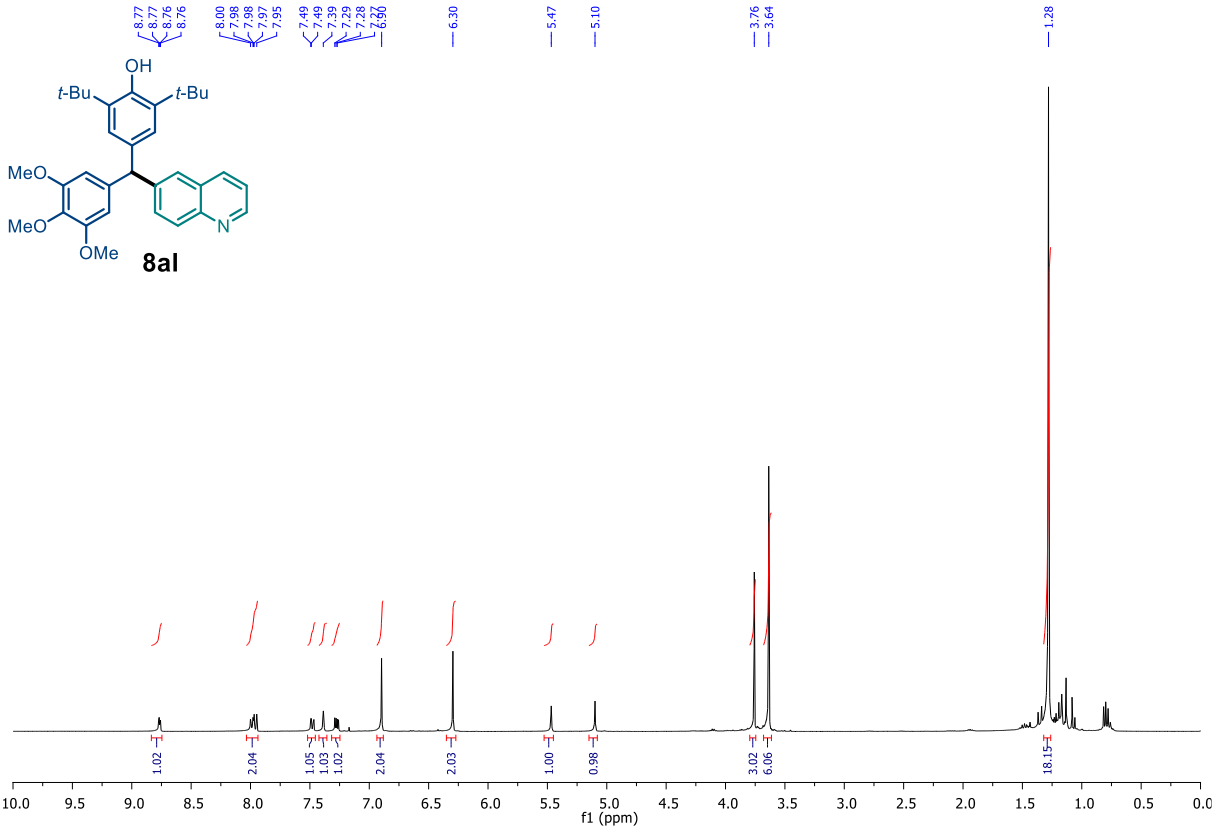
8.77
8.00
7.98
7.97
7.95
7.51
7.48
7.36
7.29
7.28
7.18
6.84
6.76
6.73
6.70
6.69
6.67
6.45
6.45
5.88
5.03
3.60
3.56
1.27
0.93
2.00
0.99
1.01
1.03
2.00
1.01
1.02
1.02
1.00
1.01
3.04
3.00
18.02
f1 (ppm)
153.41
152.24
151.55
149.15
143.54
136.63
135.58
134.14
133.10
132.33
128.25
128.16
126.87
126.24
120.88
117.18
111.81
111.30
56.28
55.56
49.78
34.35
30.34
f1 (ppm)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8.77
8.76
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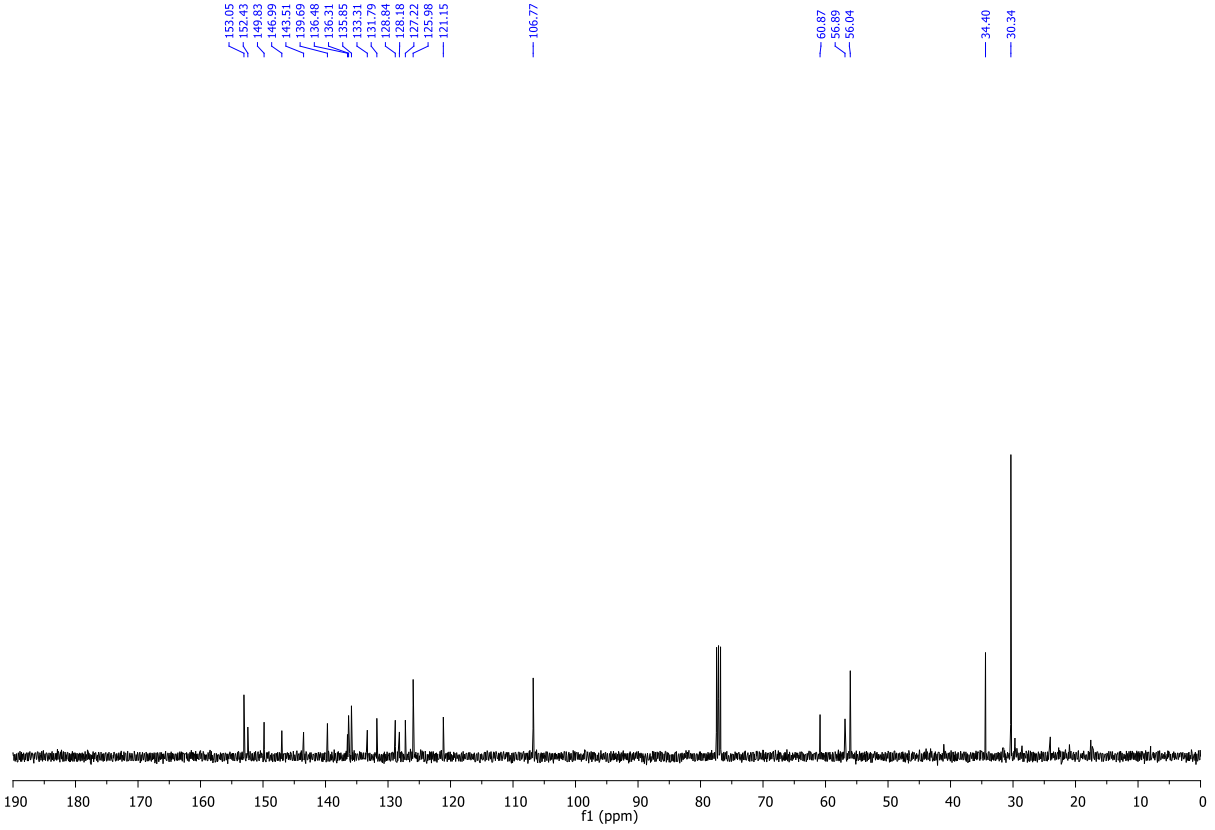
7.98
7.98
7.97
7.95
7.49
7.49
7.39
7.29
7.28
7.27
6.90
6.30
5.47
5.10
3.76
3.64
1.28
OH
t-Bu
t-Bu
MeO
MeO
OMe
N
8aI
1.02
2.04
1.05
1.03
1.02
2.04
2.03
1.00
0.98
3.02
6.06
18.15
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)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139.69
136.48
136.31
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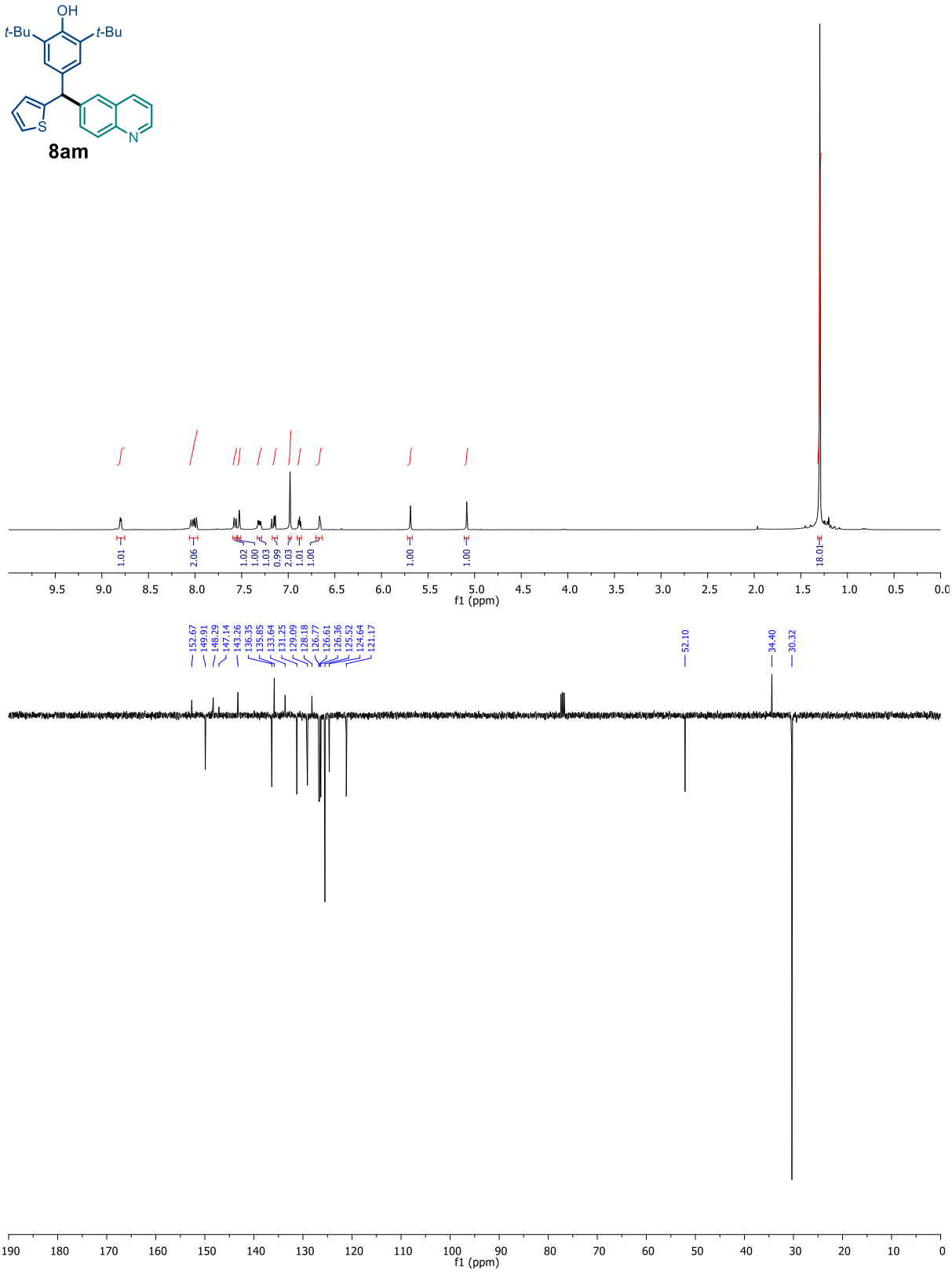
133.31
131.79
128.84
128.18
127.22
125.98
121.15
106.77
60.87
56.89
56.04
34.40
30.34
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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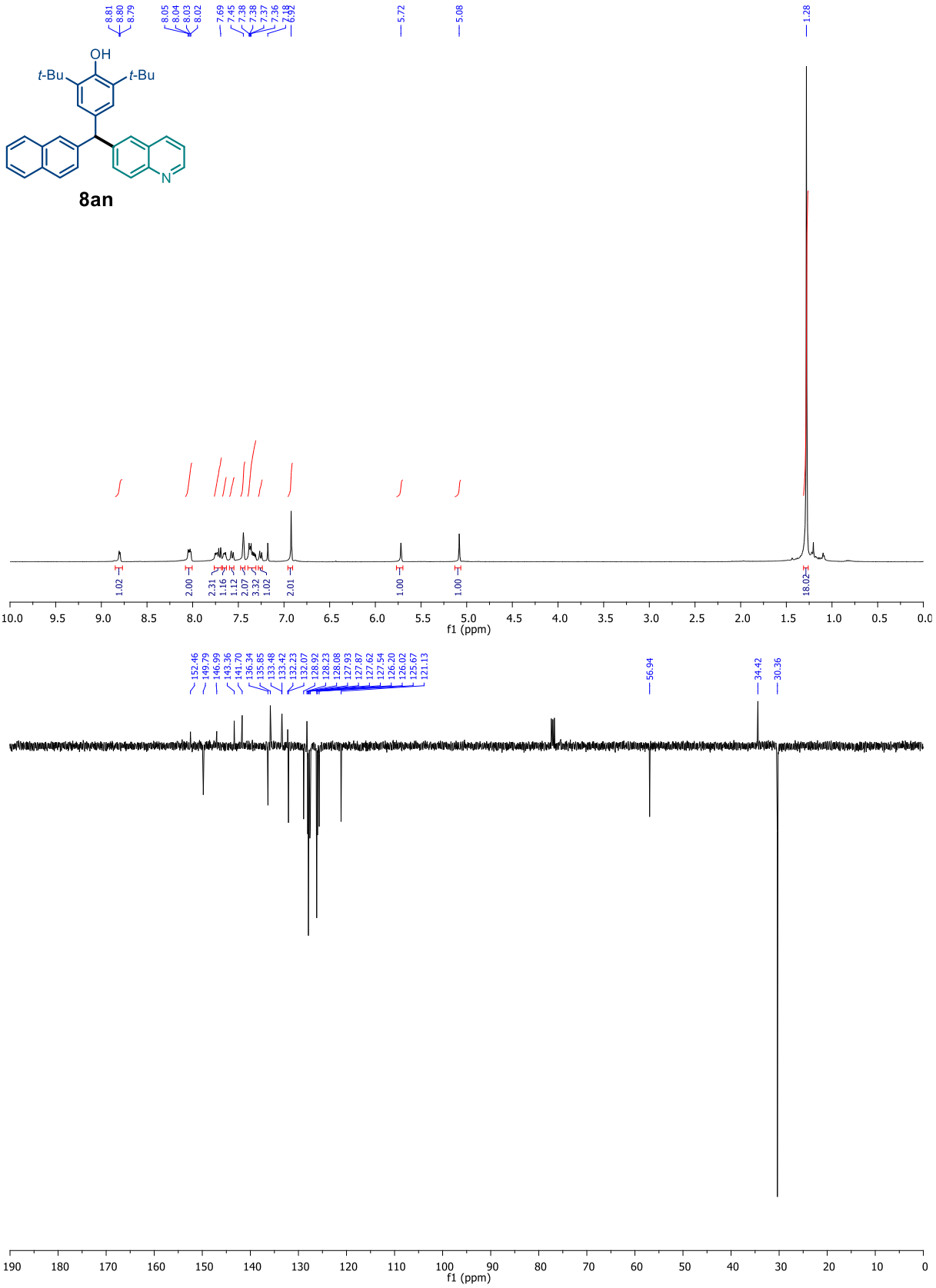
8.79
8.04
8.02
8.01
7.98
7.58
7.58
7.56
7.56
7.53
7.33
7.31
7.30
7.18
7.15
7.14
6.98
6.89
6.88
6.87
6.66
6.66
5.69
5.09
1.30
OH
t-Bu
t-Bu
S
N
8am
1.01
2.06
1.02
1.00
1.03
0.99
2.03
1.01
1.00
1.00
1.00
18.01
f1 (ppm)
152.67
149.91
148.29
147.14
143.26
136.35
135.85
133.64
131.25
129.09
128.18
126.77
126.61
126.36
125.52
124.64
121.17
52.10
34.40
30.32
f1 (ppm)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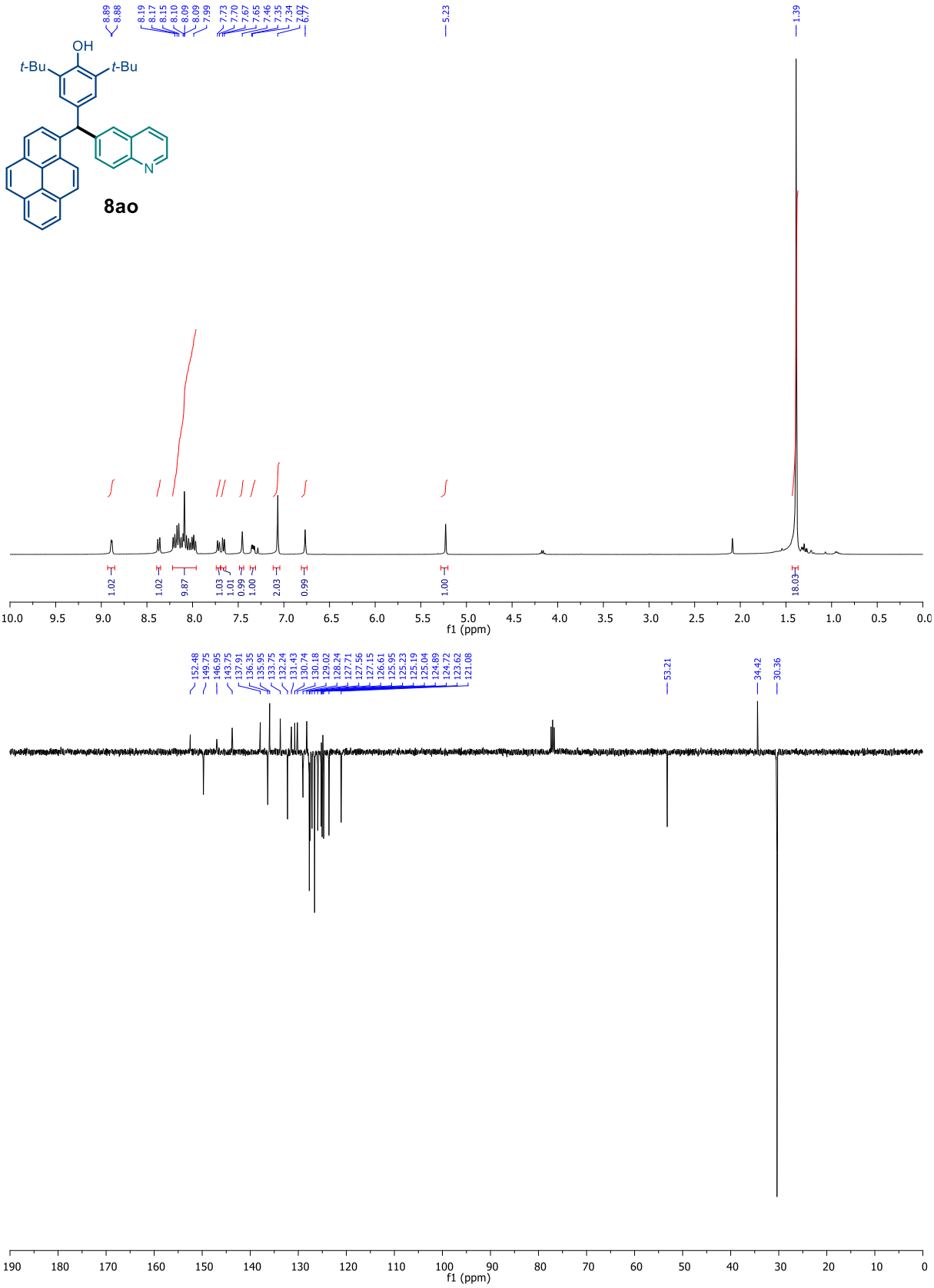
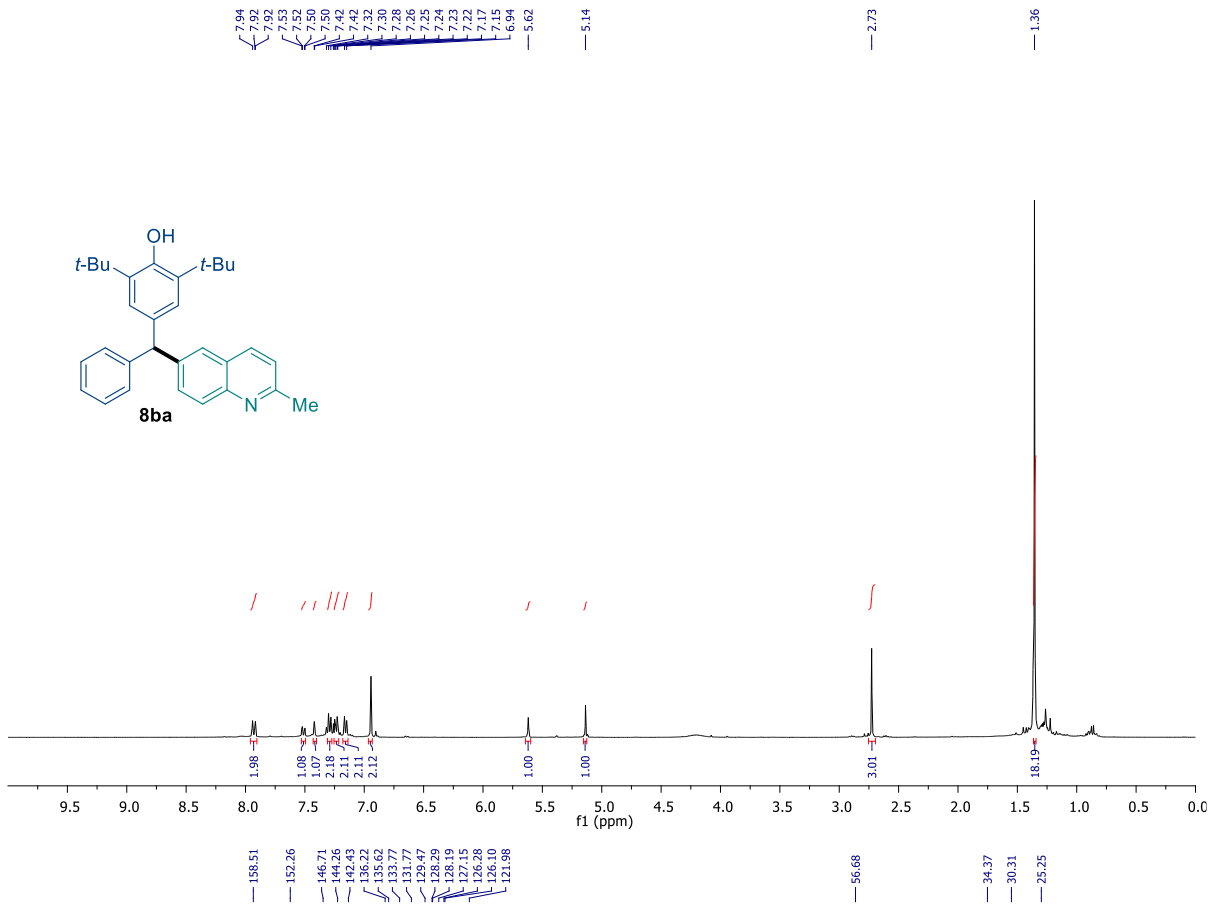
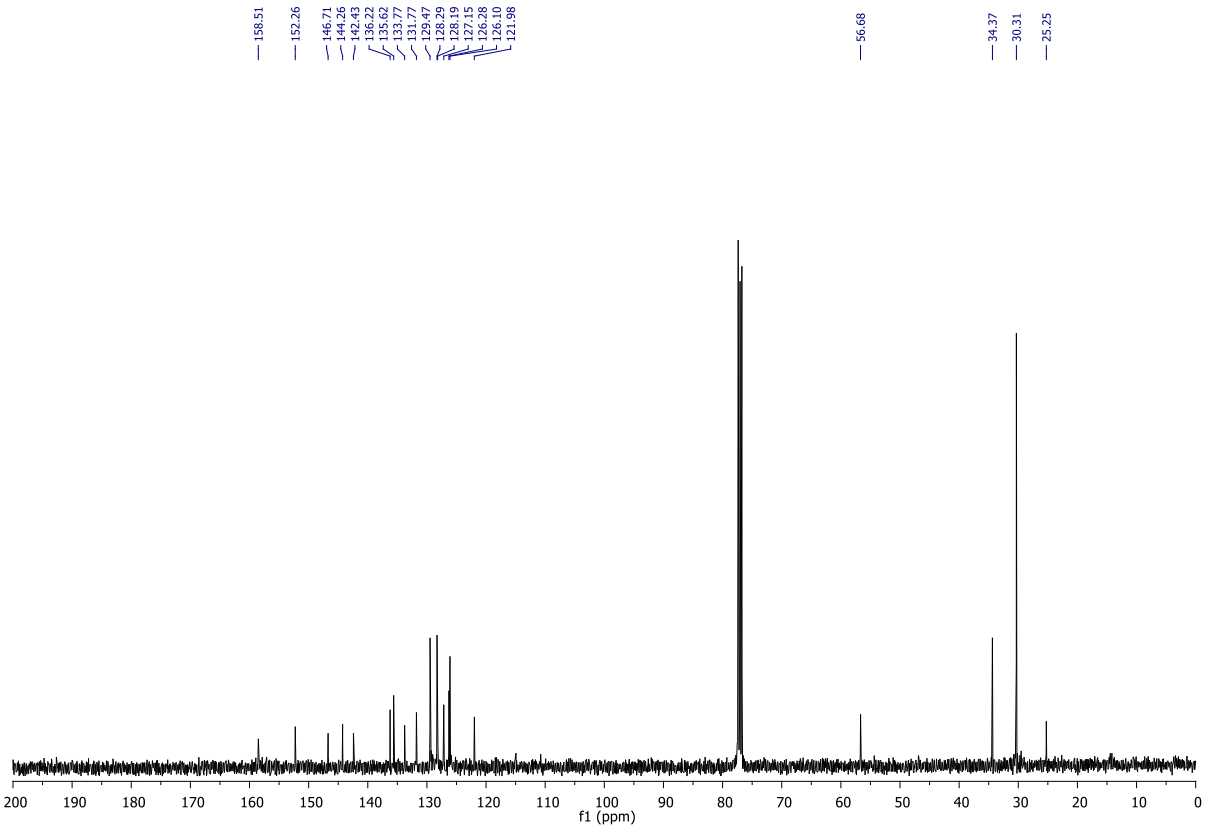
8.80
8.79
8.05
8.04
8.03
8.02
7.69
7.45
7.38
7.38
7.37
7.36
7.33
6.93
5.72
5.08
1.28
OH
t-Bu
t-Bu
N
8an
1.02
2.00
2.31
1.16
1.12
2.07
3.32
1.02
2.01
1.00
1.00
18.02
f1 (ppm)
152.46
149.79
146.99
143.36
141.70
136.34
135.85
133.48
133.42
132.23
132.07
128.92
128.23
128.08
127.93
127.87
127.62
127.54
126.20
126.02
125.67
121.13
56.94
34.42
30.36
f1 (ppm)


8.89
8.88
8.19
8.17
8.15
8.10
8.09
8.09
7.99
7.73
7.70
7.67
7.65
7.46
7.35
7.34
7.07
6.77
5.23
1.39
OH
t-Bu
t-Bu
N
8ao
1.02
1.02
9.87
1.03
1.01
0.99
1.00
2.03
0.99
1.00
18.03
f1 (ppm)
152.48
149.75
146.95
143.75
137.91
136.35
135.95
133.75
132.24
131.43
130.74
130.18
129.02
128.24
127.71
127.56
127.15
126.61
125.95
125.23
125.19
125.04
124.89
124.72
123.62
121.08
53.21
34.42
30.36
f1 (ppm)


7.94
7.92
7.92
7.53
7.52
7.50
7.50
7.42
7.42
7.32
7.30
7.28
7.26
7.25
7.24
7.23
7.22
7.17
7.15
6.94
5.62
5.14
2.73
1.36
OH
t-Bu
t-Bu
N
Me
8ba
1.98
1.08
1.07
2.18
2.11
2.11
2.12
1.00
1.00
3.01
18.19
f1 (ppm)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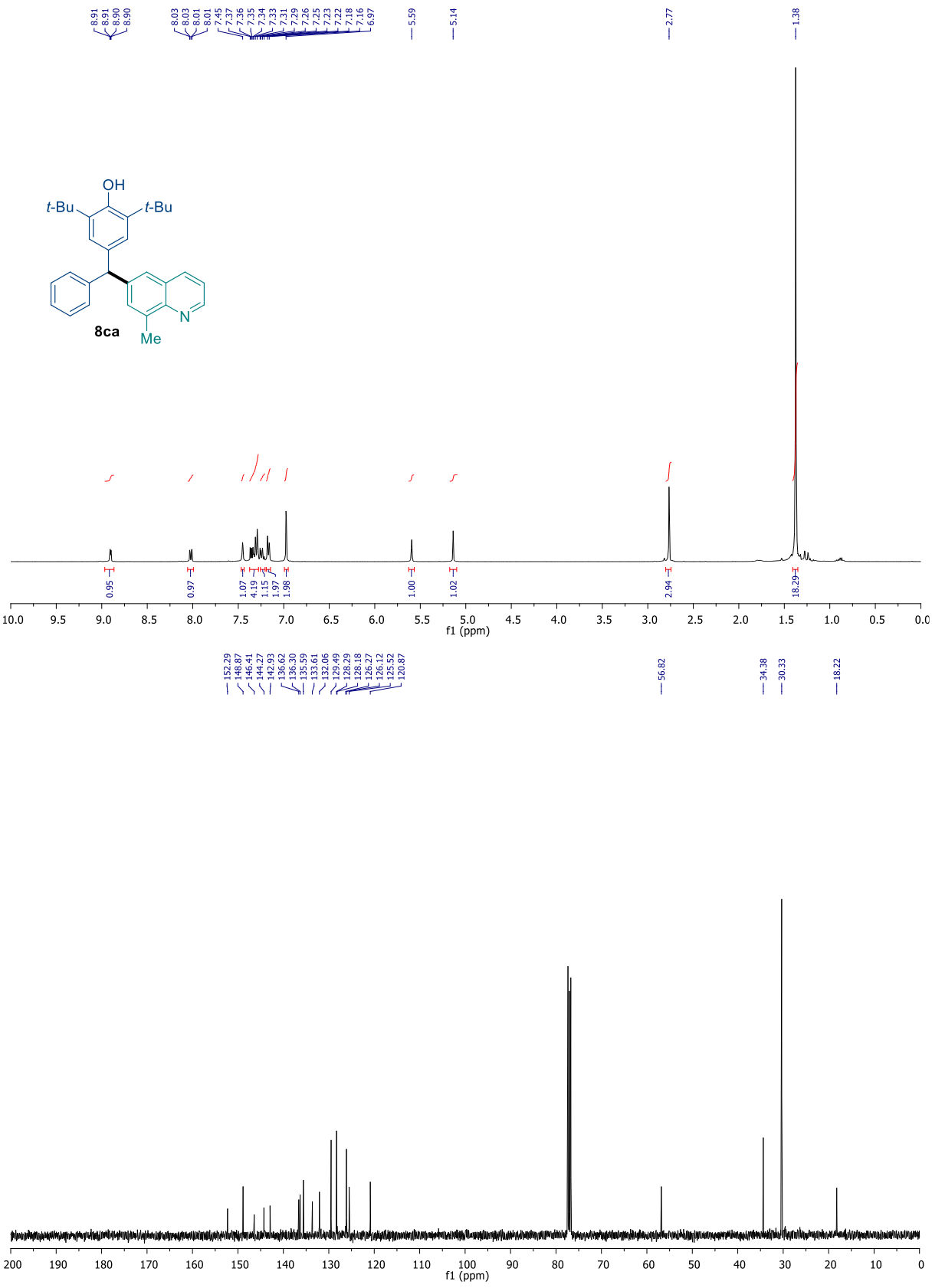
152.26
146.71
144.26
142.43
136.22
135.62
135.52
133.77
131.47
129.47
128.29
128.19
127.15
126.28
126.10
121.98
56.68
34.37
30.31
25.25
f1 (ppm)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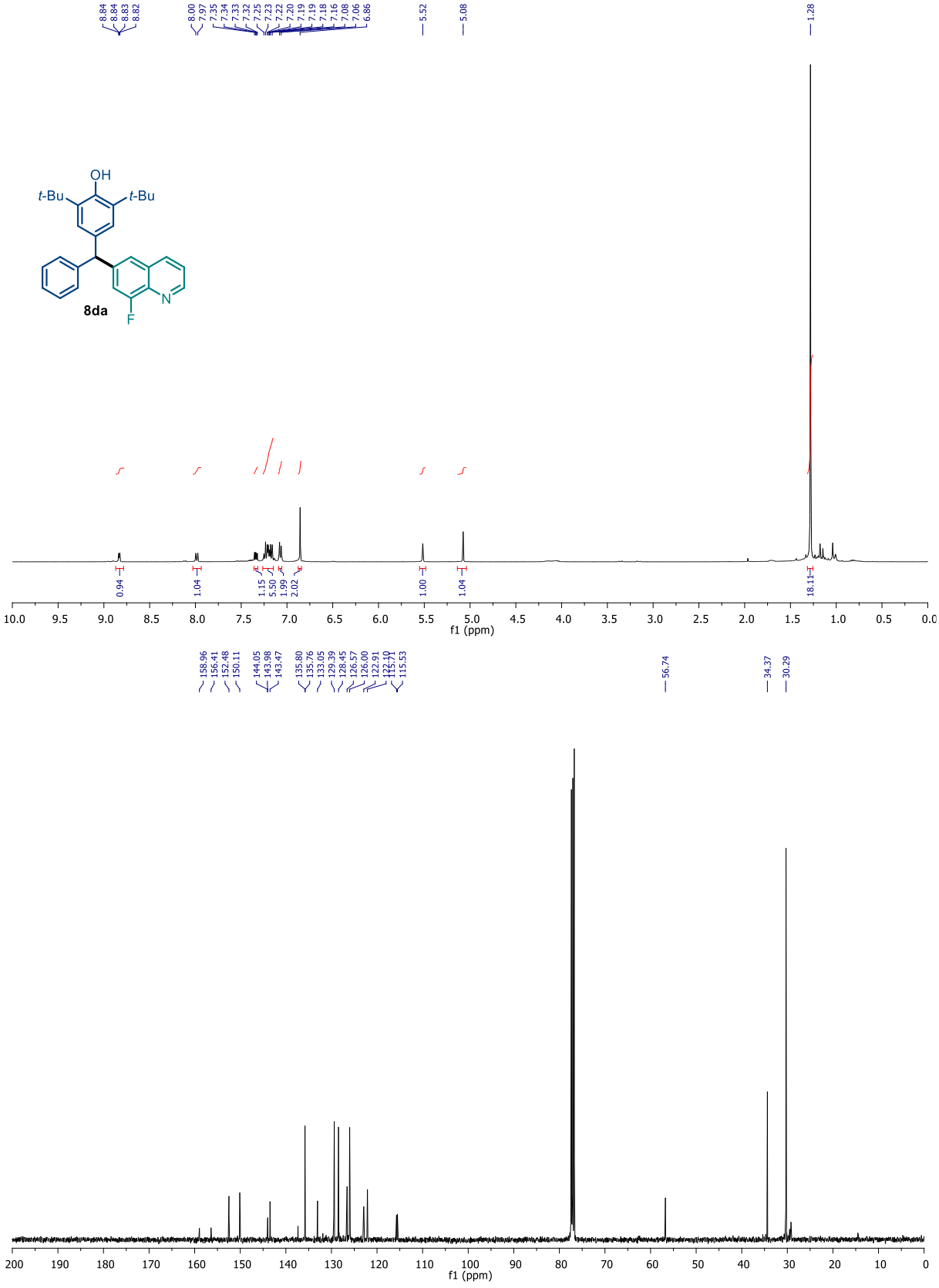
8.91
8.90
8.90
8.03
8.03
8.01
8.01
7.45
7.37
7.36
7.35
7.34
7.33
7.31
7.29
7.26
7.25
7.23
7.22
7.18
7.16
6.97
5.59
5.14
2.77
1.38
OH
t-Bu
t-Bu
N
Me
8ca
0.95
0.97
1.07
4.19
1.15
1.97
1.98
1.00
1.02
2.94
18.29
f1 (ppm)
152.29
148.87
146.41
144.27
142.93
136.62
136.30
135.59
133.61
132.06
129.49
128.29
128.18
126.27
126.12
125.52
120.87
56.82
34.38
30.33
18.22
f1 (ppm)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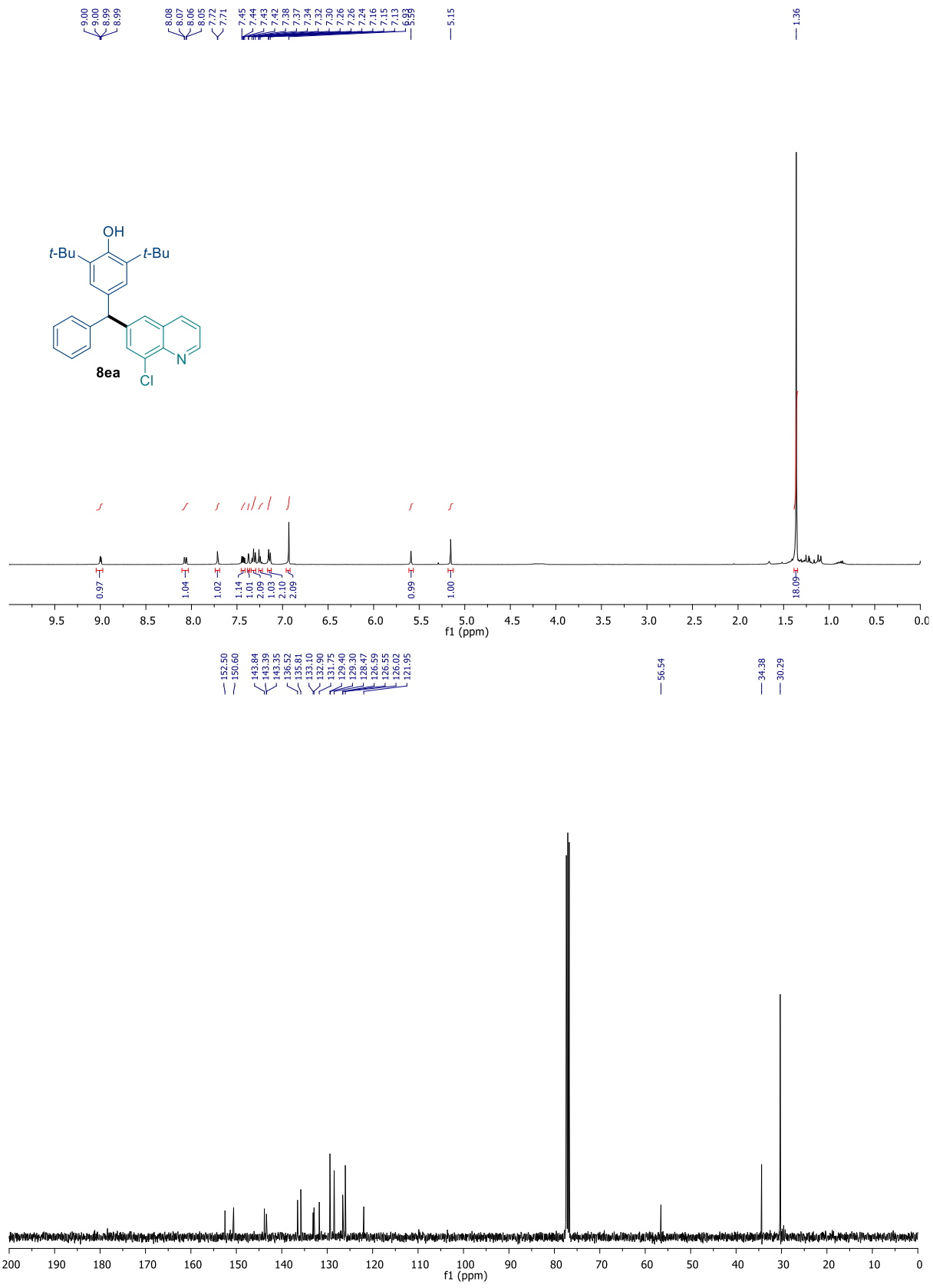
8.84
8.83
8.82
8.00
7.97
7.35
7.34
7.33
7.32
7.25
7.23
7.22
7.20
7.19
7.19
7.18
7.16
7.08
7.06
6.86
5.52
5.08
1.28
OH
t-Bu
t-Bu
N
F
8da
0.94
1.04
1.15
5.50
1.99
2.02
1.00
1.04
18.11
f1 (ppm)
158.96
156.41
152.48
150.11
144.05
143.98
143.47
135.80
135.76
133.05
129.39
128.45
126.57
126.00
122.91
56.74
34.37
30.29
115.53
f1 (ppm)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9.00
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8.99
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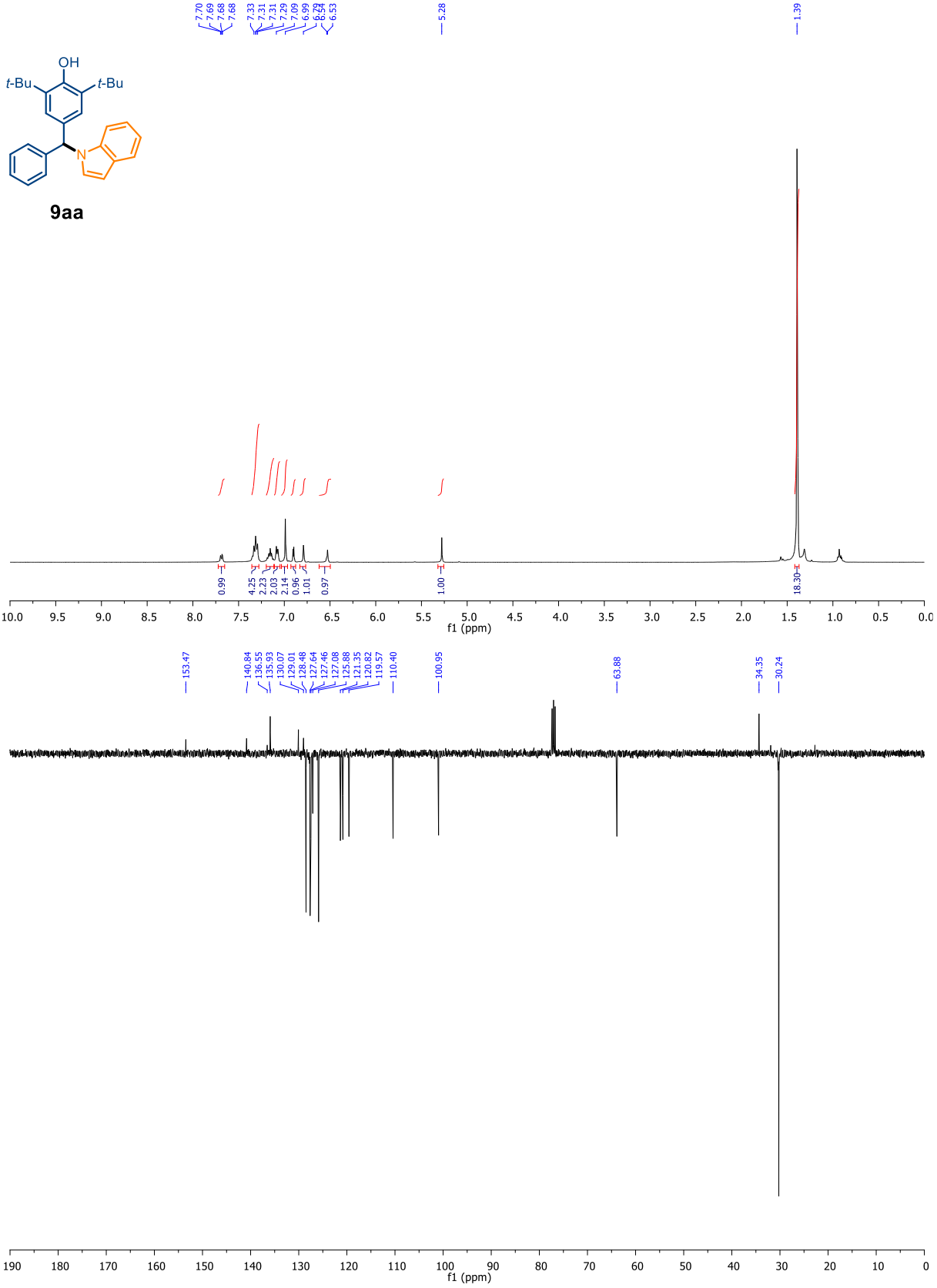
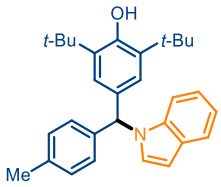
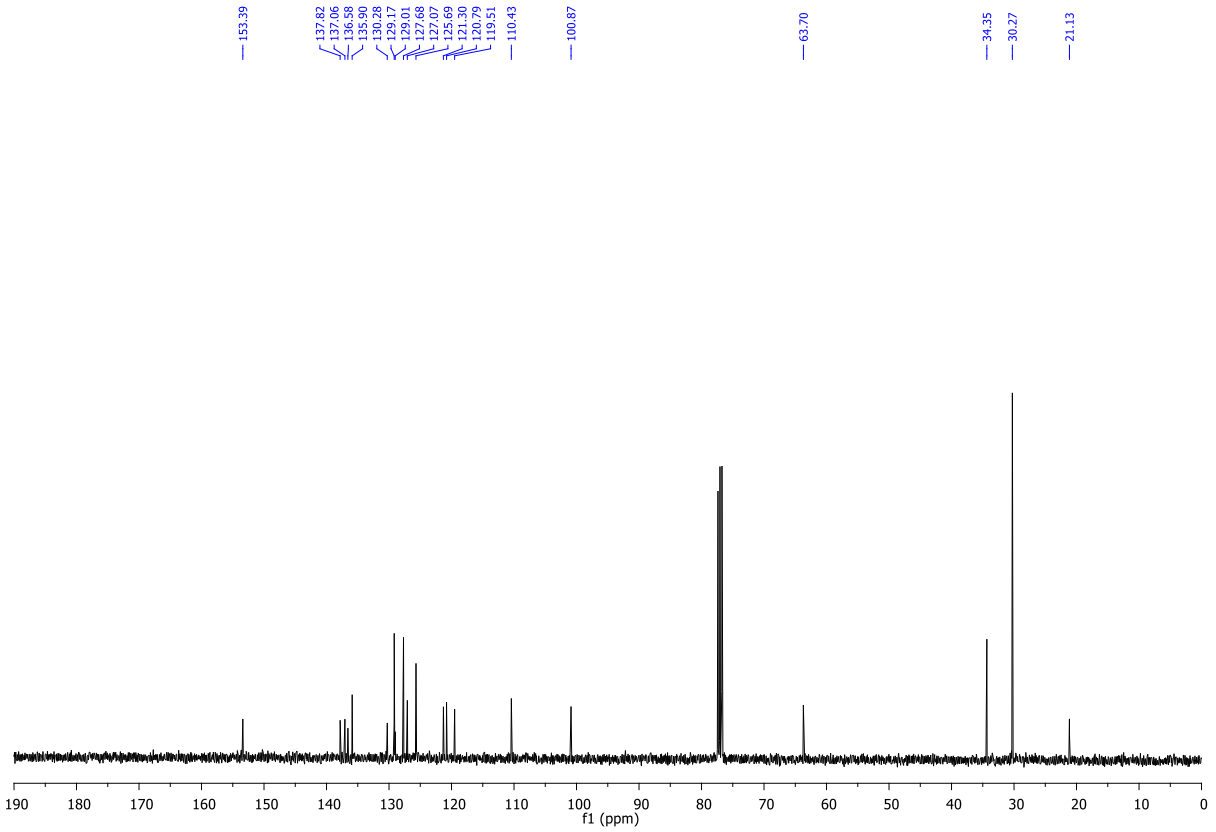
8.07
8.06
8.05
7.72
7.71
7.45
7.44
7.43
7.42
7.38
7.37
7.34
7.32
7.30
7.26
7.26
7.24
7.16
7.15
7.13
6.93
5.99
5.15
1.36
OH
t-Bu
t-Bu
N
Cl
8ea
0.97
1.04
1.02
1.14
1.01
2.09
1.03
2.10
2.09
0.99
1.00
18.09
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)
152.50
150.60
143.84
143.39
143.35
136.52
135.81
133.10
132.90
131.75
129.40
129.30
128.47
126.59
126.55
126.02
121.95
56.54
34.38
30.29
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

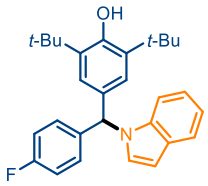

OH
t-Bu
t-Bu
N
9aa
7.70
7.69
7.68
7.68
7.33
7.31
7.31
7.29
7.09
6.99
6.29
6.54
6.53
5.28
1.39
0.99
4.25
2.23
2.03
2.14
0.96
1.01
0.97
1.00
18.30
f1 (ppm)
153.47
140.84
136.55
135.93
130.07
129.01
128.48
127.64
127.46
127.08
125.88
121.35
120.82
119.57
110.40
100.95
63.88
34.35
30.24
f1 (ppm)


OH
t-Bu
t-Bu
N
Me

9ab

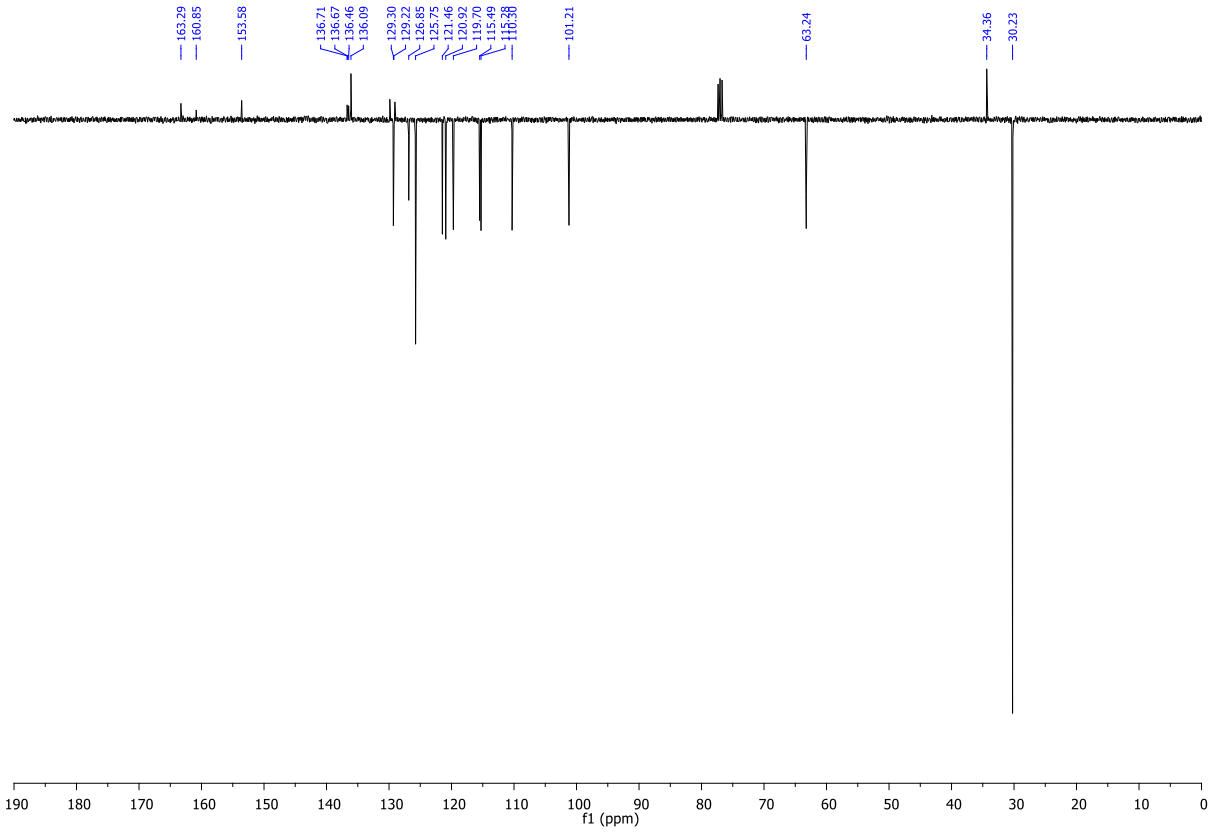
7.56
7.54
7.54
7.19
7.17
7.04
7.03
7.01
6.99
6.86
6.84
6.78
6.77
6.62
6.39
6.39
5.13
2.23
1.26
1.01
1.05
4.18
4.07
1.00
1.04
1.00
1.00
3.07
18.16
f1 (ppm)

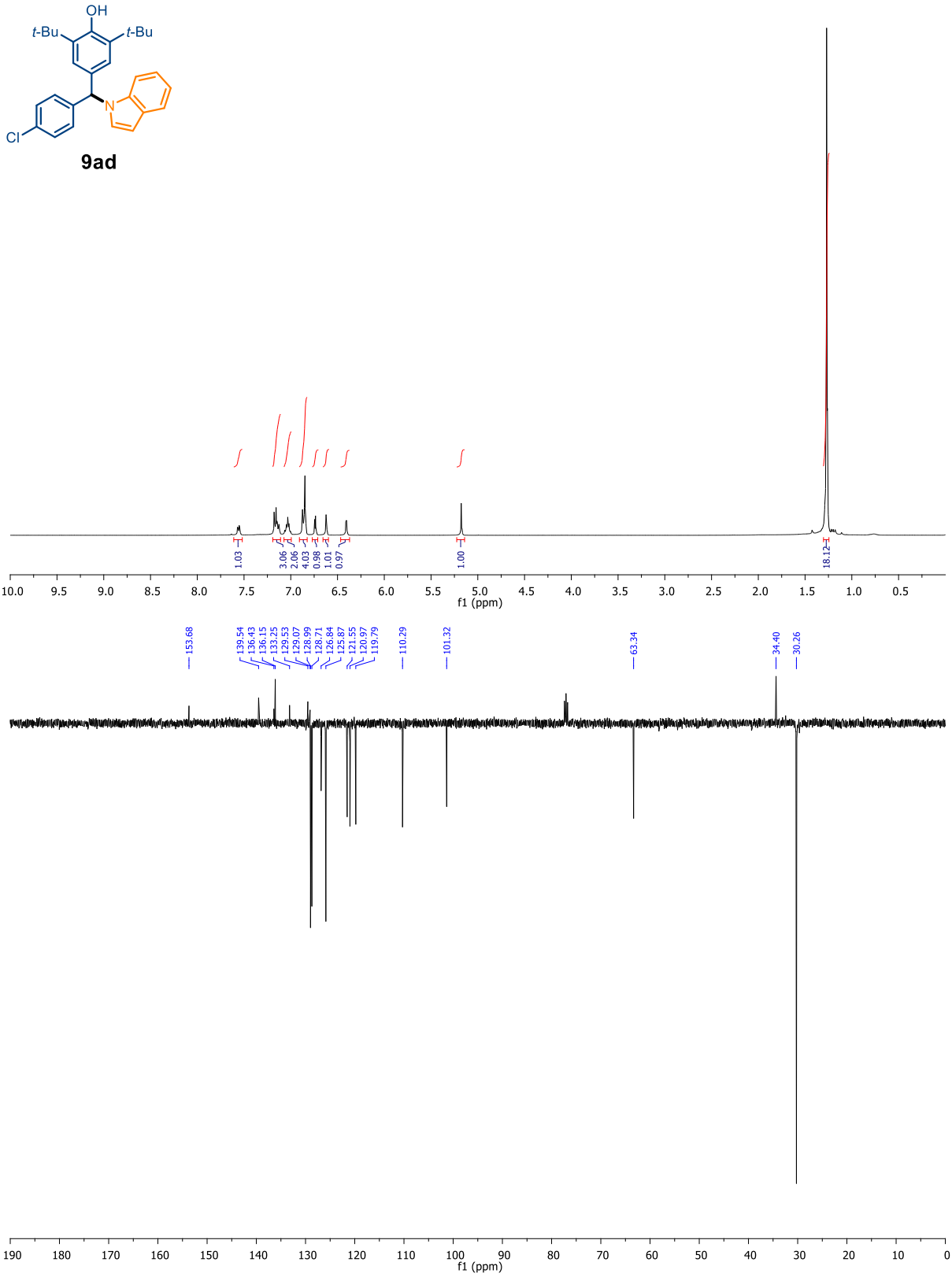

153.39
137.82
137.06
136.58
135.90
130.28
129.17
129.01
127.68
127.07
125.69
121.30
120.79
119.51
110.43
100.87
63.70
34.35
30.27
21.13
f1 (ppm)


OH
t-Bu
t-Bu
F
N

9ac

7.57
7.55
7.55
7.16
7.14
7.07
7.05
7.04
7.02
7.00
6.93
6.91
6.90
6.89
6.87
6.84
6.75
6.74
6.64
6.41
5.49
1.27
1.01
1.20
2.23
3.98
1.99
1.00
1.03
0.98
1.00
18.10
f1 (ppm)


163.29
160.85
153.58
136.71
136.67
136.46
136.09
129.30
129.22
126.85
125.75
121.46
120.92
119.70
115.49
115.38
110.30
101.21
63.24
34.36
30.23
f1 (ppm)


OH
t-Bu
t-Bu
Cl
N
9ad
7.57
7.56
7.55
7.55
7.18
7.17
7.16
7.15
7.14
7.05
7.04
7.03
7.03
7.02
6.87
6.85
6.74
6.74
6.62
6.41
6.40
5.18
1.27
1.03
3.06
2.06
4.03
0.98
1.01
0.97
1.00
18.12
f1 (ppm)
153.68
139.54
136.43
136.15
133.25
129.53
129.07
128.99
128.71
126.84
125.87
121.55
120.97
119.79
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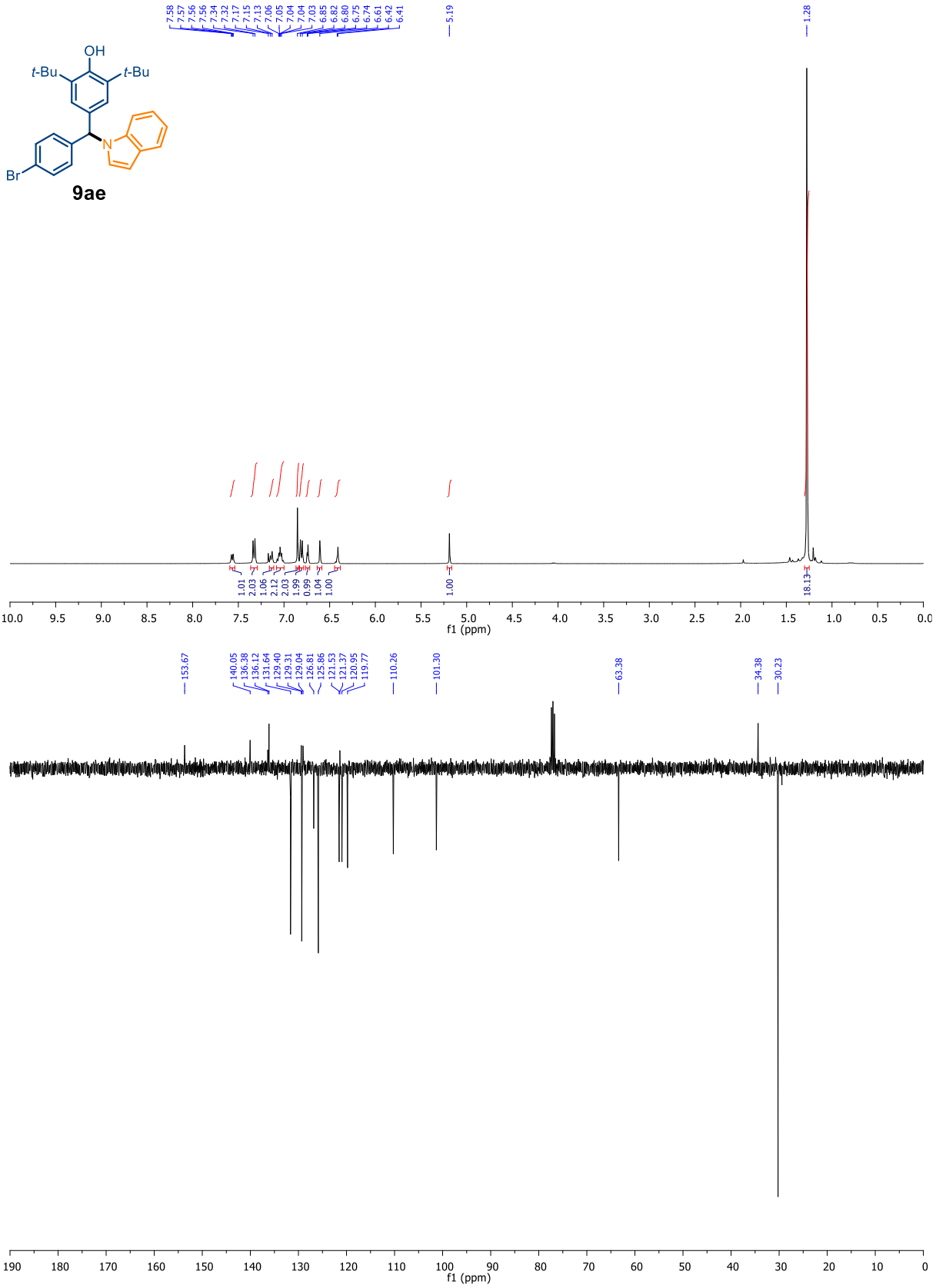
101.32
63.34
34.40
30.26
f1 (ppm)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t-Bu
t-Bu
Br
N
9ae
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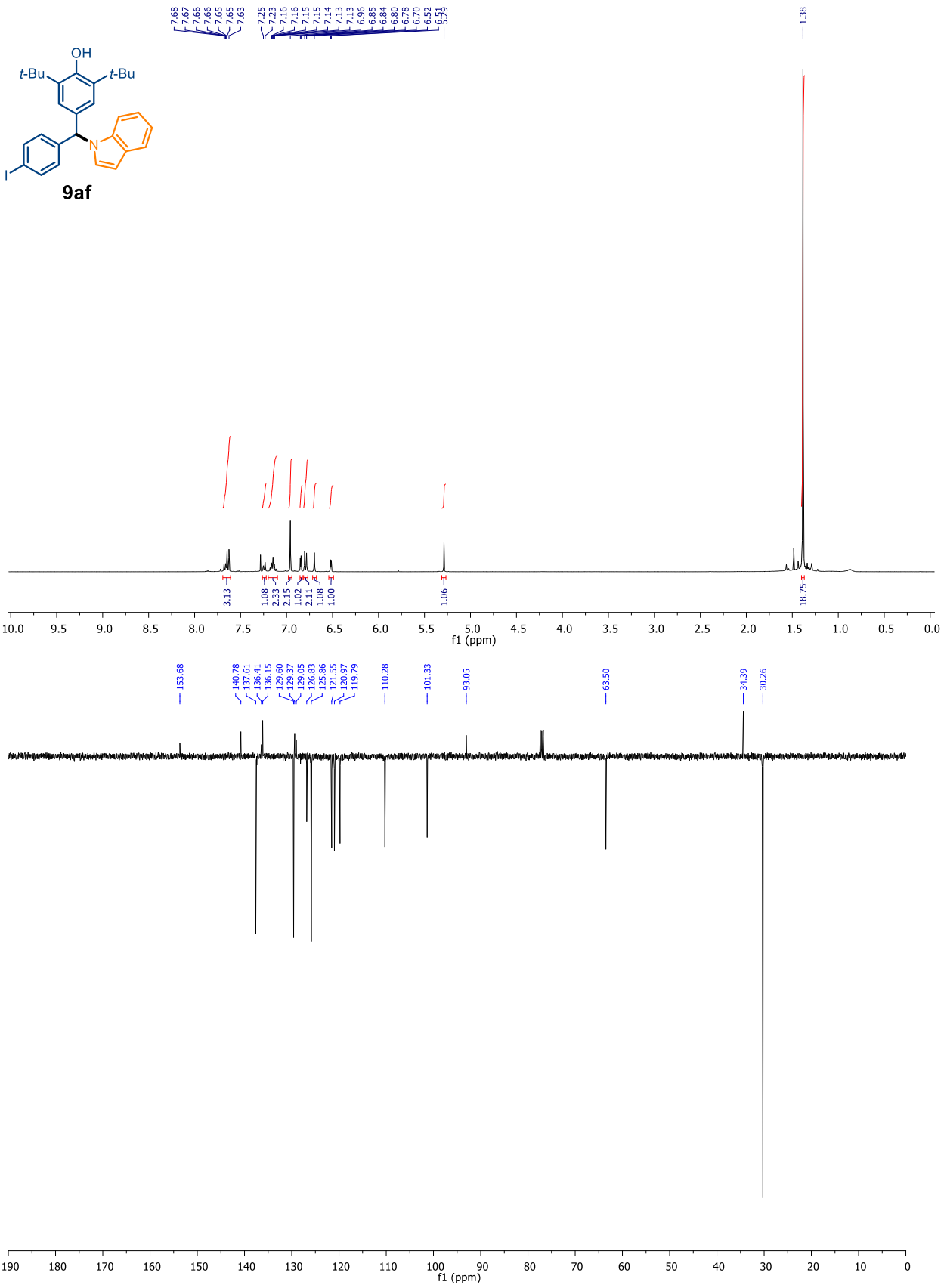
7.57
7.56
7.56
7.56
7.34
7.32
7.17
7.15
7.13
7.06
7.05
7.04
7.04
7.03
6.85
6.82
6.80
6.75
6.74
6.61
6.42
6.41
5.19
1.28
1.01
2.03
1.06
2.12
2.03
1.99
0.99
1.04
1.00
1.00
18.13
f1 (ppm)
153.67
140.05
136.38
136.12
131.64
129.40
129.31
129.04
126.81
125.86
121.53
121.37
120.95
119.77
110.26
101.30
63.38
34.38
30.23
f1 (ppm)


OH
t-Bu
t-Bu
I
N
9af
7.68
7.67
7.66
7.66
7.65
7.65
7.63
7.25
7.23
7.16
7.16
7.15
7.15
7.14
7.13
7.13
6.96
6.85
6.84
6.80
6.78
6.70
6.52
6.51
6.50
1.38
3.13
1.08
2.33
2.15
1.02
2.11
1.08
1.00
1.06
18.75
f1 (ppm)
153.68
140.78
137.61
136.41
136.15
129.60
129.37
129.05
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120.97
119.79
110.28
101.33
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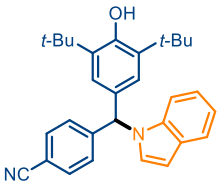
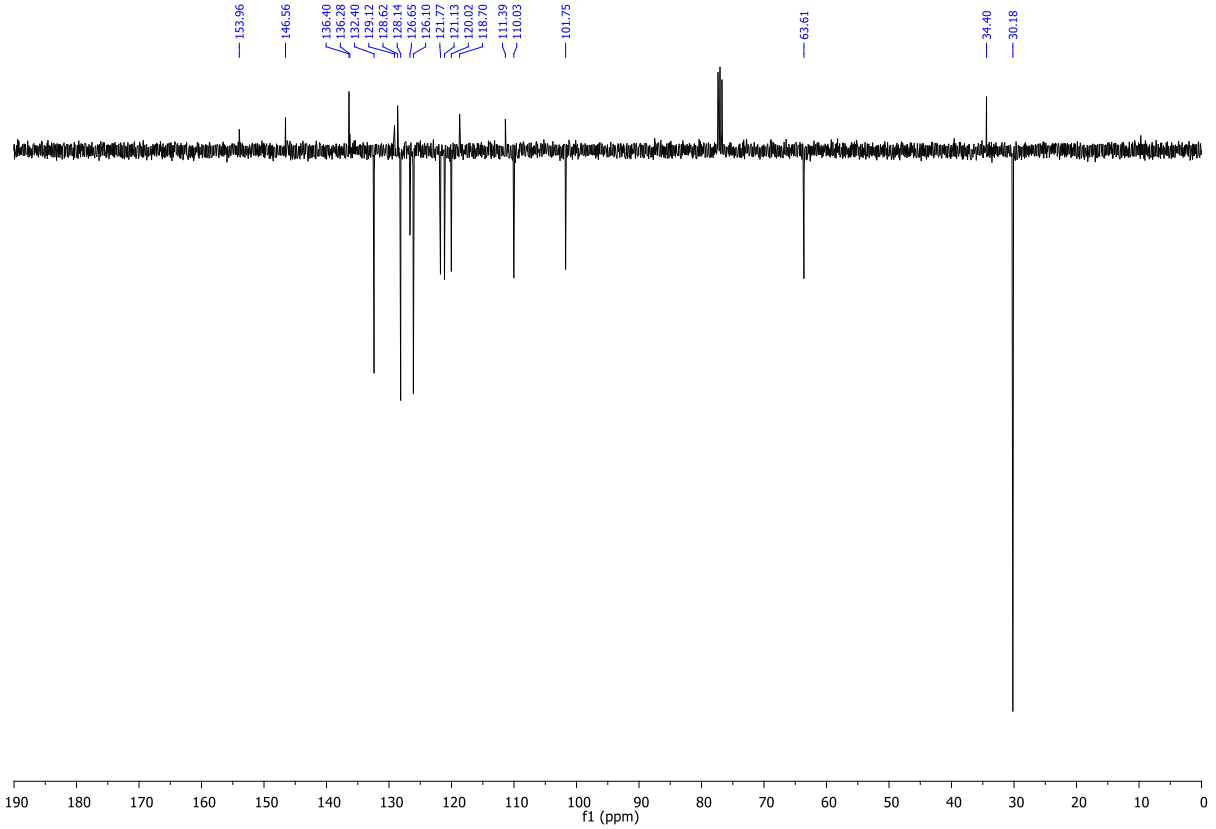
63.50
34.39
30.26
f1 (ppm)


OH
t-Bu
t-Bu
N
NC

9ag

7.59
7.59
7.58
7.58
7.57
7.56
7.51
7.51
7.49
7.08
7.08
7.07
7.06
7.05
7.05
7.04
7.04
7.02
7.00
6.84
6.73
6.73
6.68
6.45
6.44
5.24
1.28
1.04
2.07
3.11
2.15
2.06
0.99
1.04
0.98
1.00
18.11
f1 (ppm)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111.39
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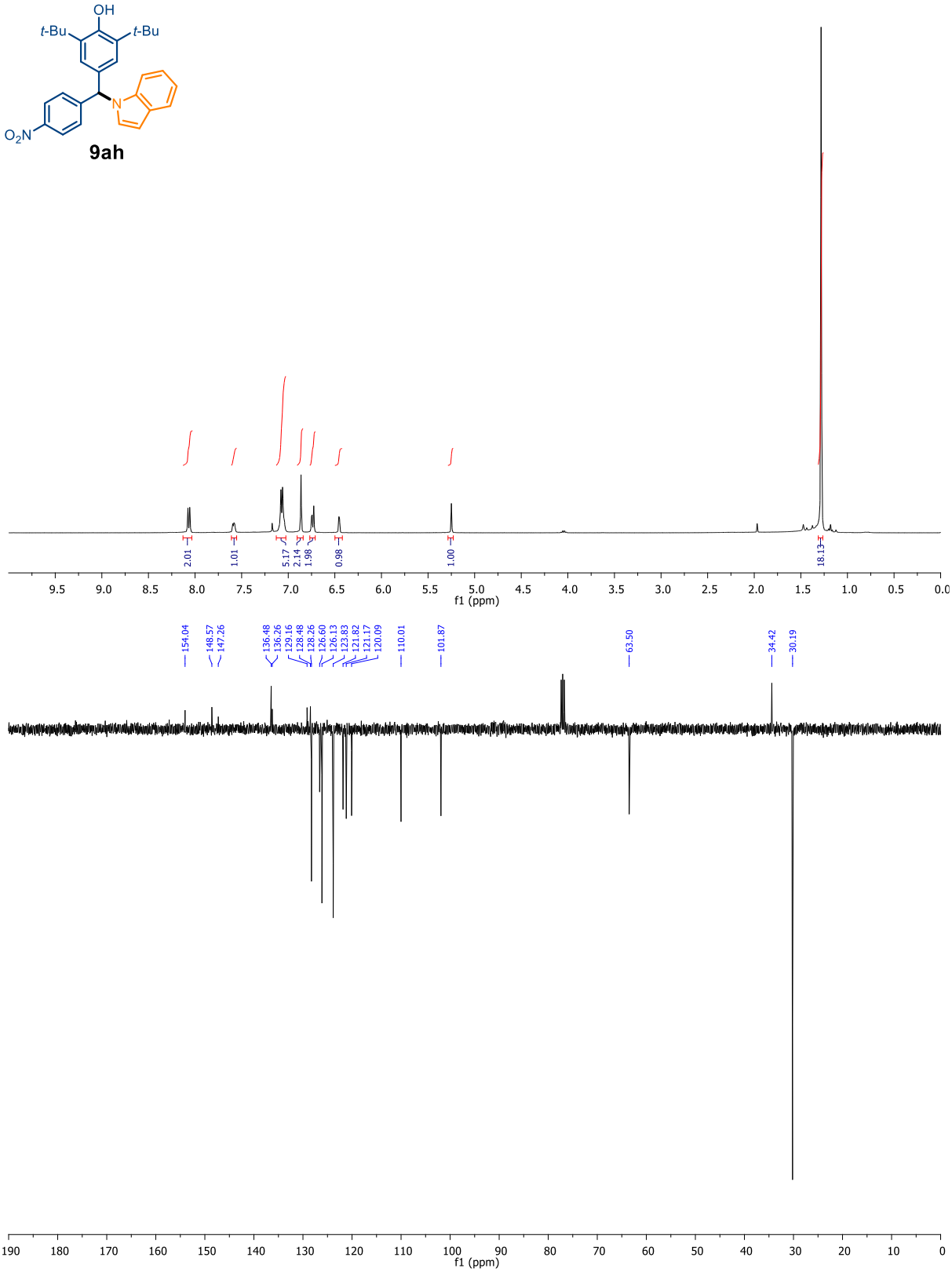
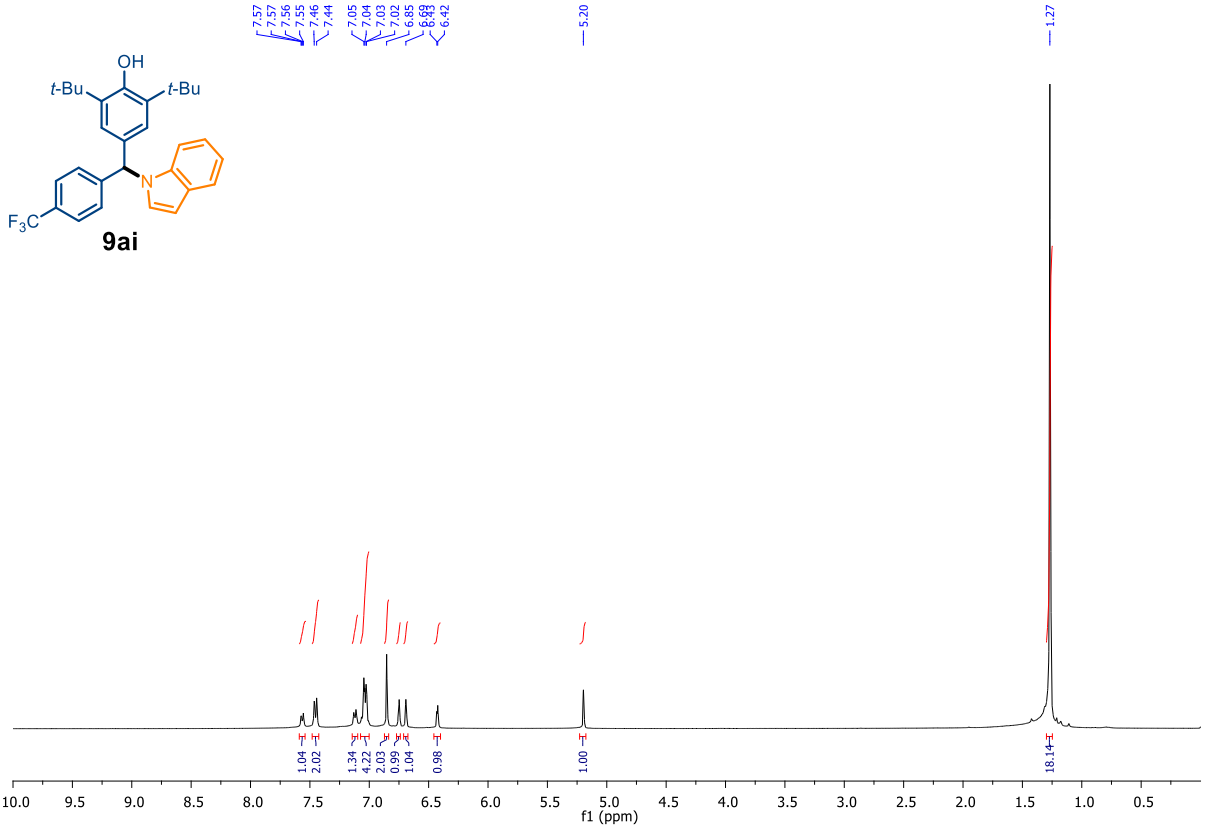
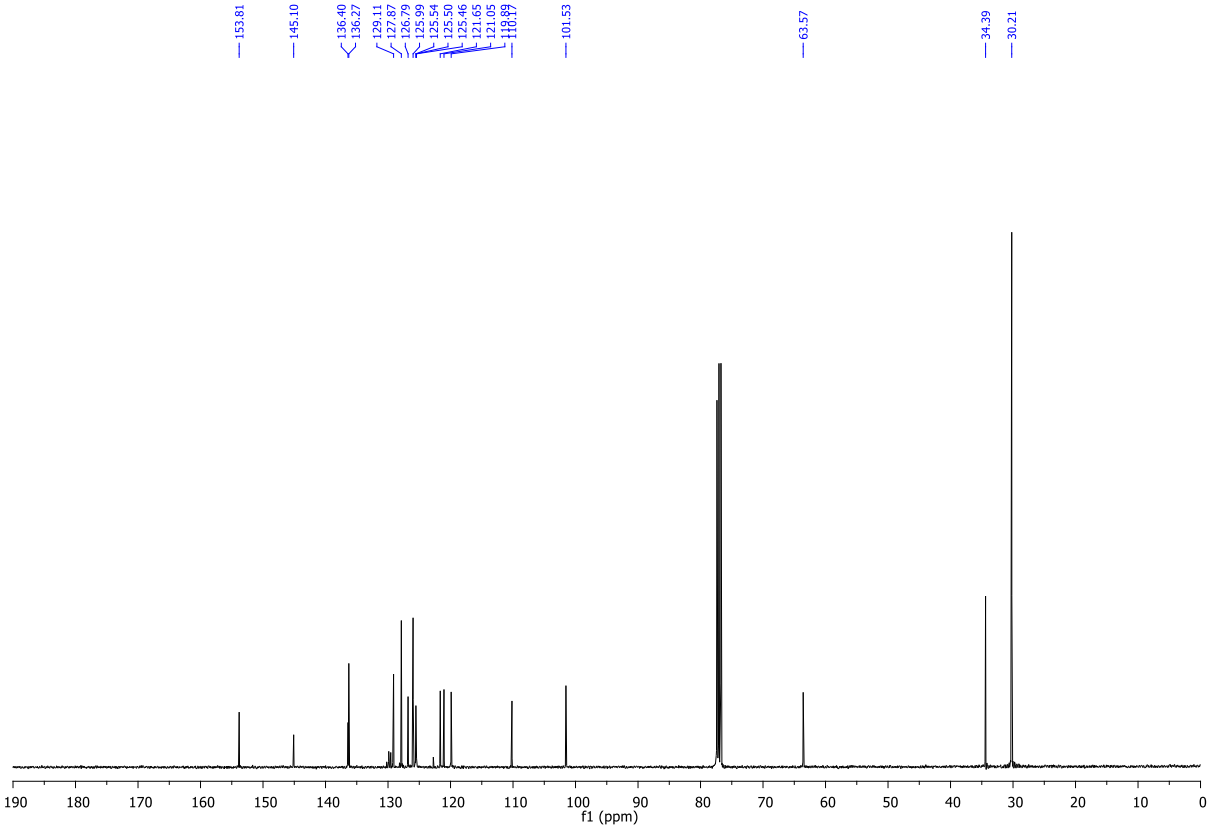
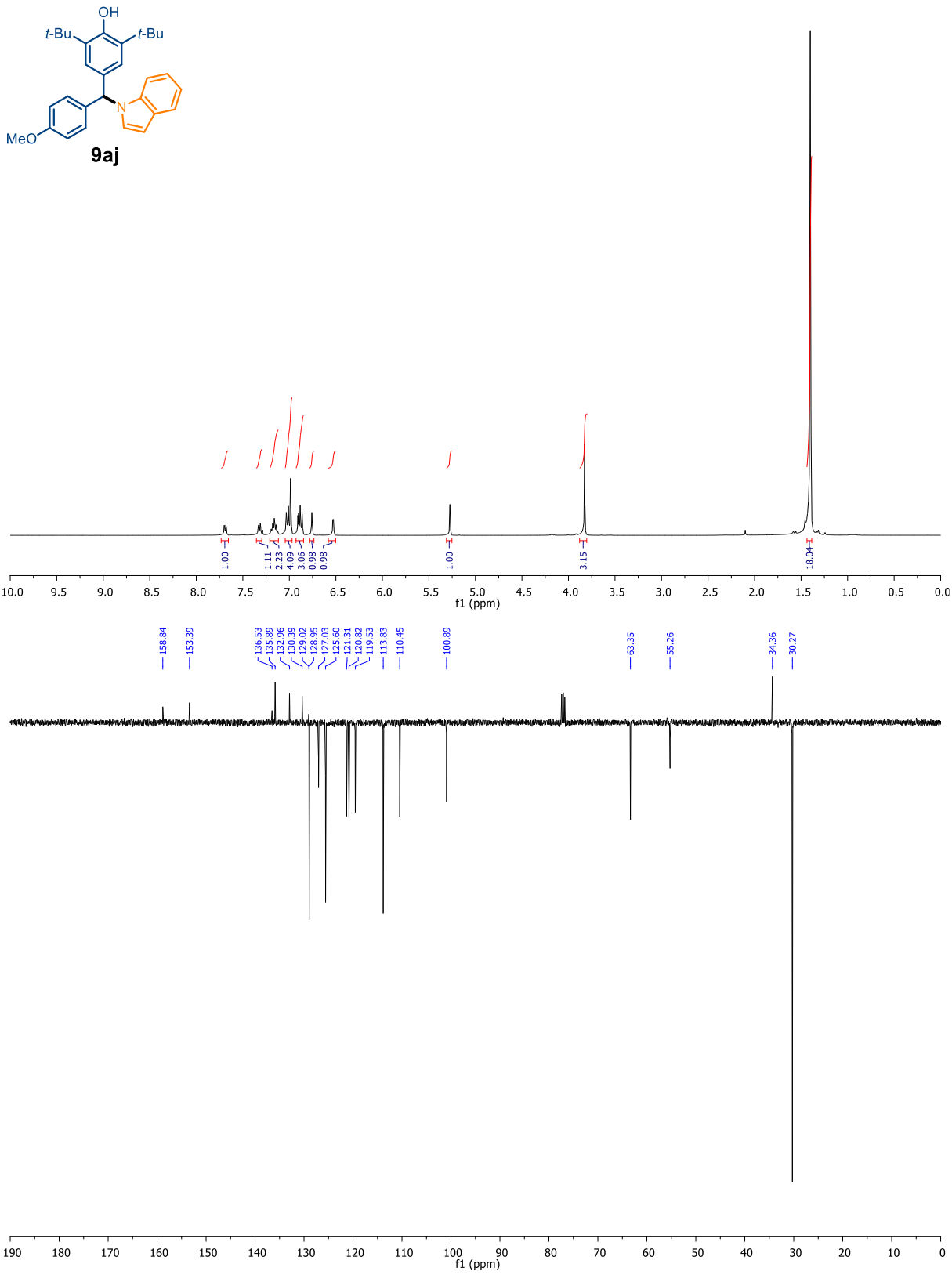
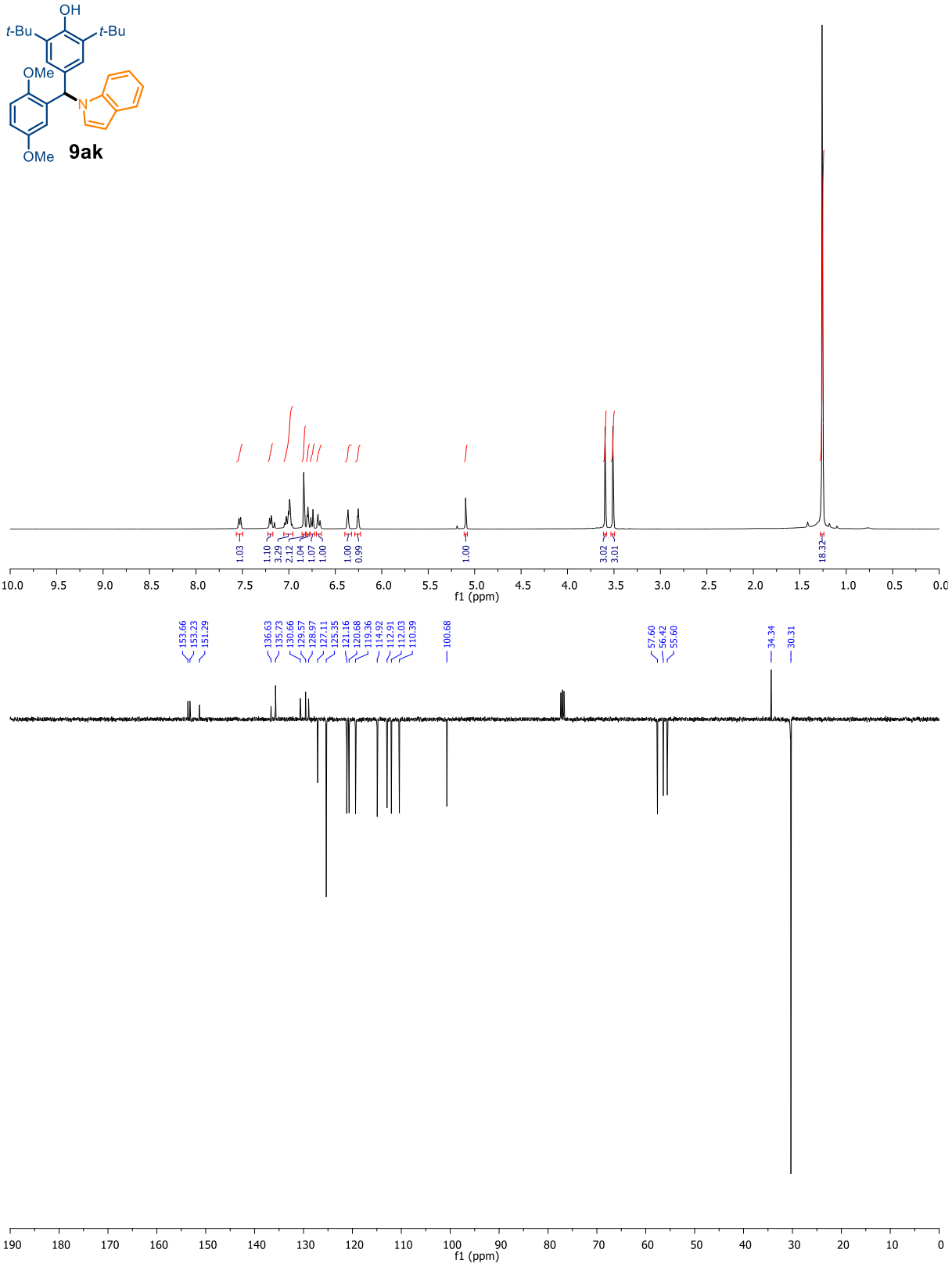
63.61
34.40
30.18
f1 (ppm)

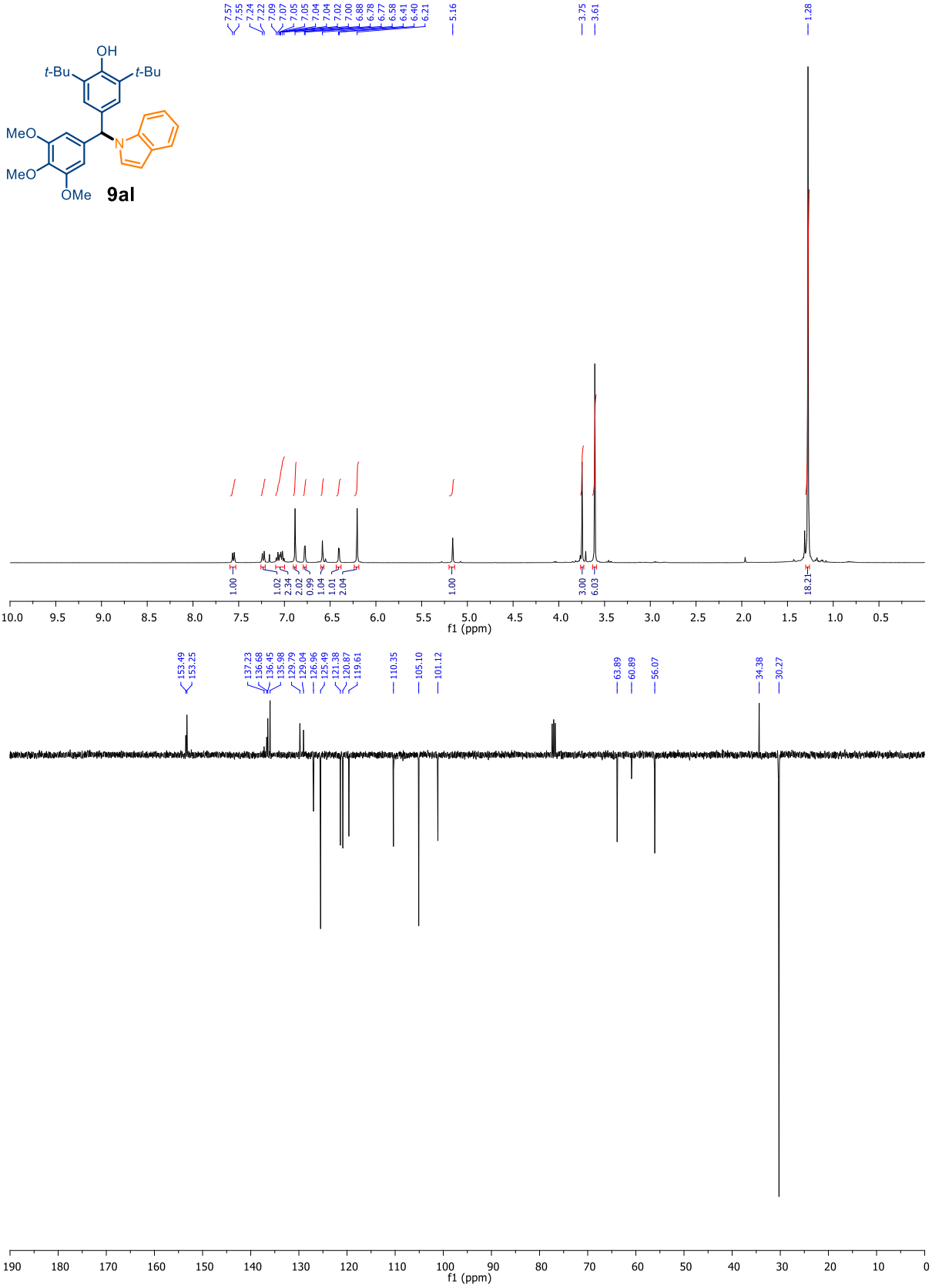

OH
t-Bu
t-Bu
N
O2N
9ah
8.08
8.06
7.59
7.58
7.57
7.08
7.06
6.86
6.75
6.74
6.73
6.46
6.45
5.25
1.28
1.28
2.01
1.01
5.17
2.14
1.98
0.98
1.00
18.13
f1 (ppm)
154.04
148.57
147.26
136.48
136.26
129.16
128.48
128.26
126.60
126.13
123.83
121.82
121.17
120.09
110.01
101.87
63.50
34.42
30.19
f1 (ppm)

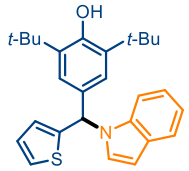

OH
t-Bu
t-Bu
F3C
N
9ai
7.57
7.57
7.56
7.55
7.46
7.44
7.05
7.04
7.03
7.02
6.85
6.69
6.43
6.42
5.20
1.27
1.04
2.02
1.34
4.22
2.03
0.99
1.04
0.98
1.00
18.14
f1 (ppm)


153.81
145.10
136.40
136.27
129.11
127.87
126.79
125.99
125.54
125.50
125.46
121.65
121.05
119.89
110.17
101.53
63.57
34.39
30.21
f1 (ppm)


OH
t-Bu
t-Bu
MeO
N
9aj
7.70
7.68
7.68
7.33
7.31
7.18
7.18
7.16
7.16
7.14
7.03
7.01
6.99
6.91
6.90
6.89
6.88
6.86
6.76
6.53
5.77
3.83
1.40
1.00
1.11
2.23
4.09
3.06
0.98
0.98
1.00
3.15
18.04
f1 (ppm)
158.84
153.39
136.53
135.89
132.96
130.39
129.02
128.95
127.03
125.60
121.31
120.82
119.53
113.83
110.45
100.89
63.35
55.26
34.36
30.27
f1 (ppm)

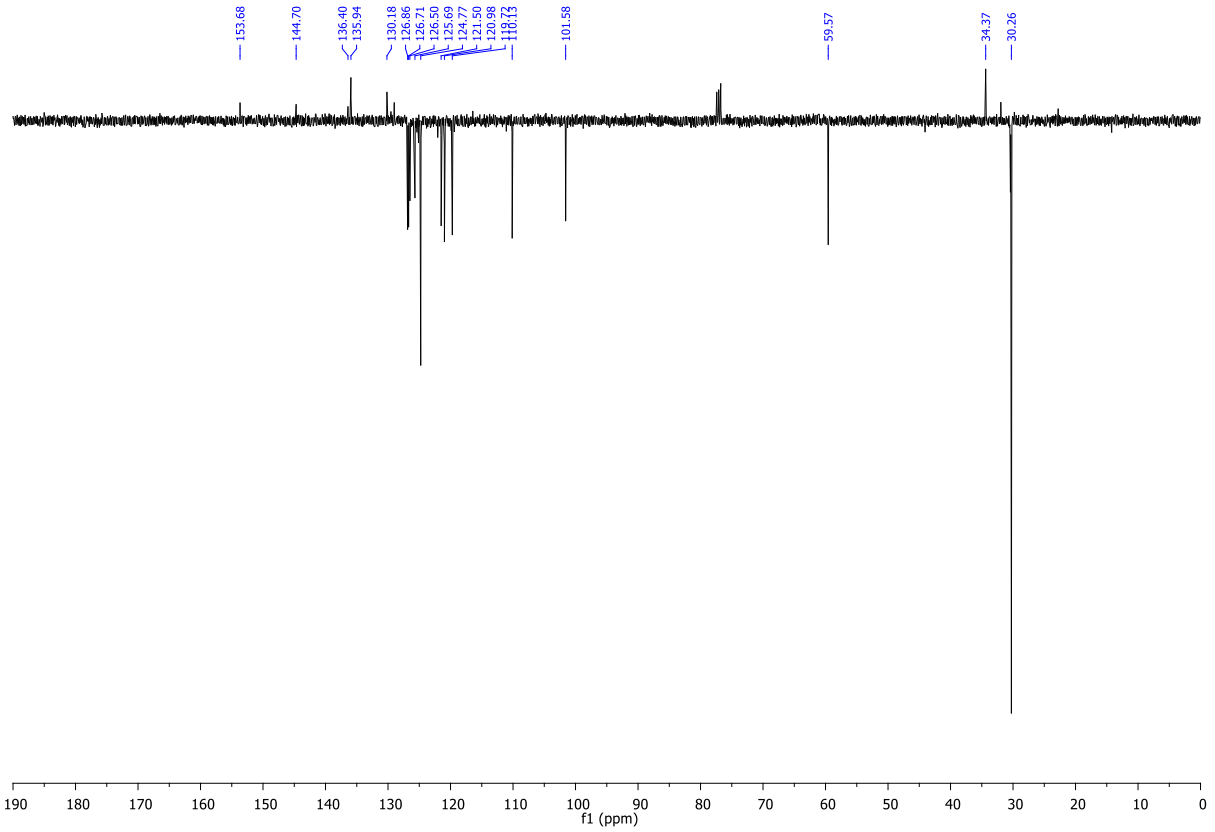

OH
t-Bu
t-Bu
OMe
OMe
9ak
7.54
7.52
7.00
6.99
6.99
6.84
6.80
6.79
6.43
6.36
6.26
6.25
5.10
3.60
3.51
1.26
1.03
1.10
3.29
2.12
1.04
1.07
1.00
1.00
0.99
1.00
3.02
3.01
18.32
f1 (ppm)
153.66
153.23
151.29
136.63
135.73
130.66
129.57
128.97
127.11
125.35
121.16
120.68
119.36
114.92
112.91
112.03
110.39
100.68
57.60
56.42
55.60
34.34
30.31
f1 (ppm)

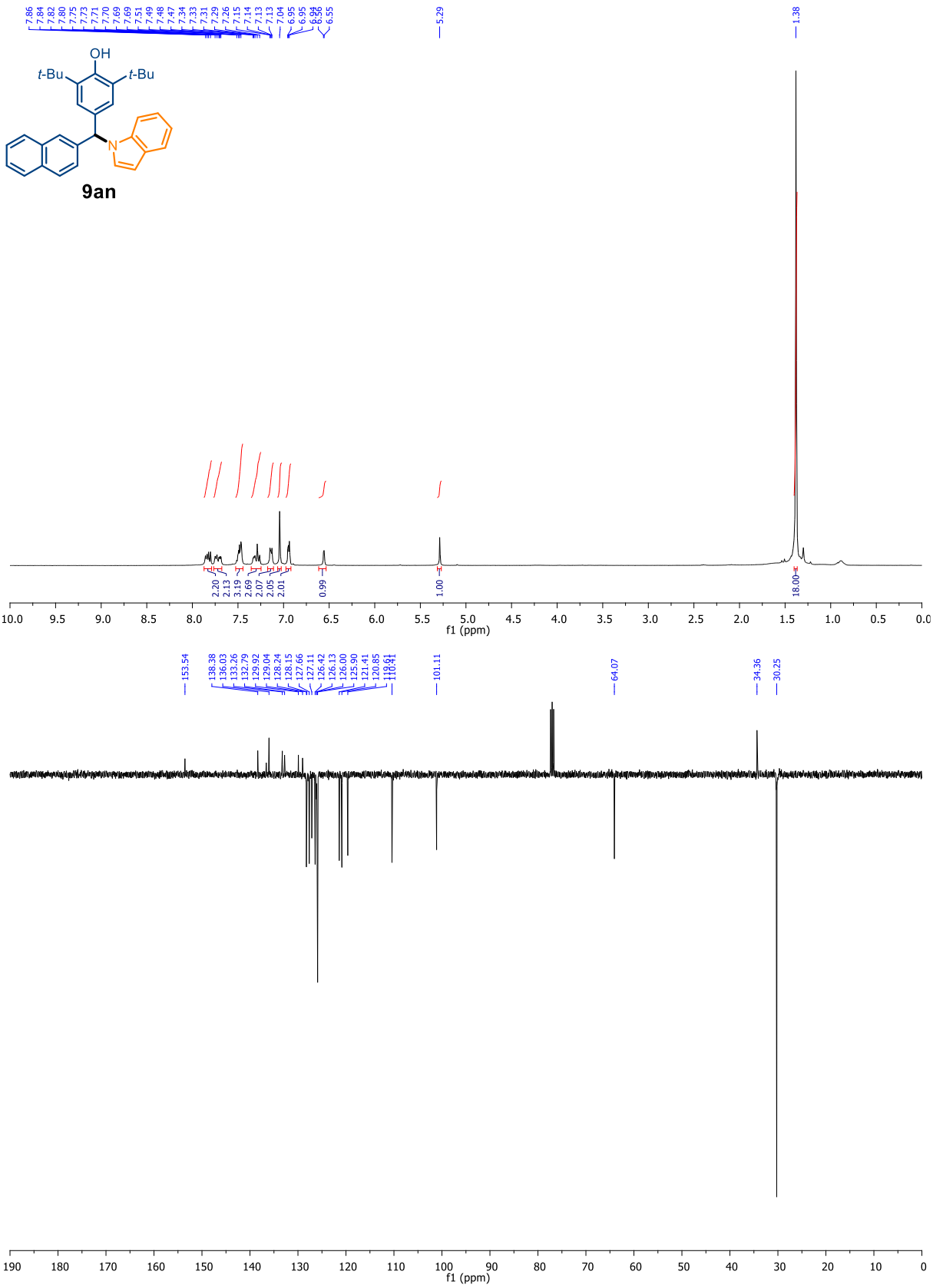

OH
t-Bu
t-Bu
MeO
MeO
OMe
9al
7.57
7.55
7.24
7.22
7.09
7.07
7.05
7.05
7.04
7.04
7.02
7.00
6.88
6.78
6.77
6.58
6.41
6.40
6.21
5.16
3.75
3.61
1.28
1.00
1.02
2.34
2.02
0.99
1.04
1.01
2.04
1.00
3.00
6.03
18.21
f1 (ppm)
153.49
153.25
137.23
136.68
136.45
135.98
129.79
129.04
126.96
125.49
121.38
120.87
119.61
110.35
105.10
101.12
63.89
60.89
56.07
34.38
30.27
f1 (ppm)

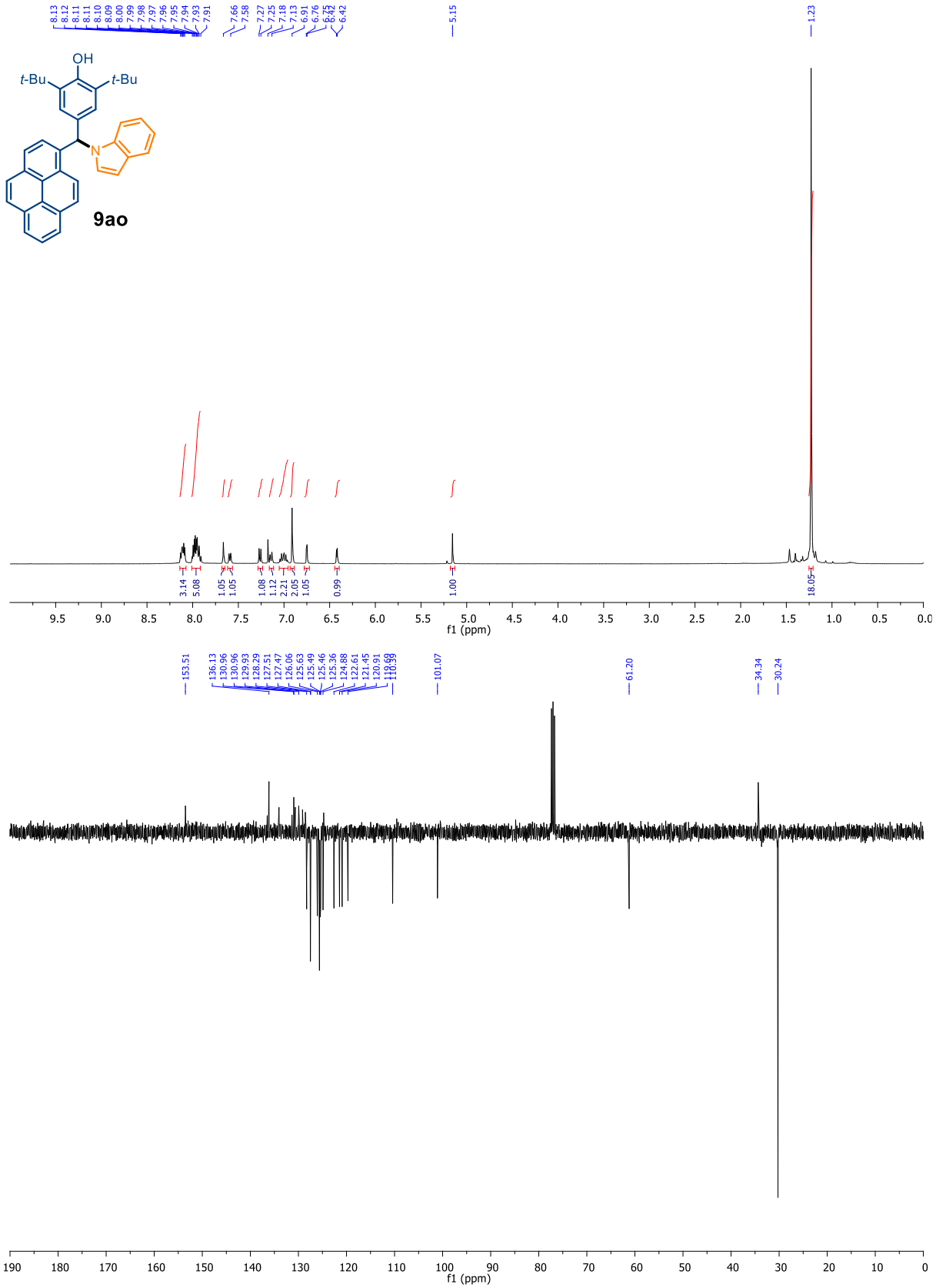

OH
t-Bu
t-Bu
N
S

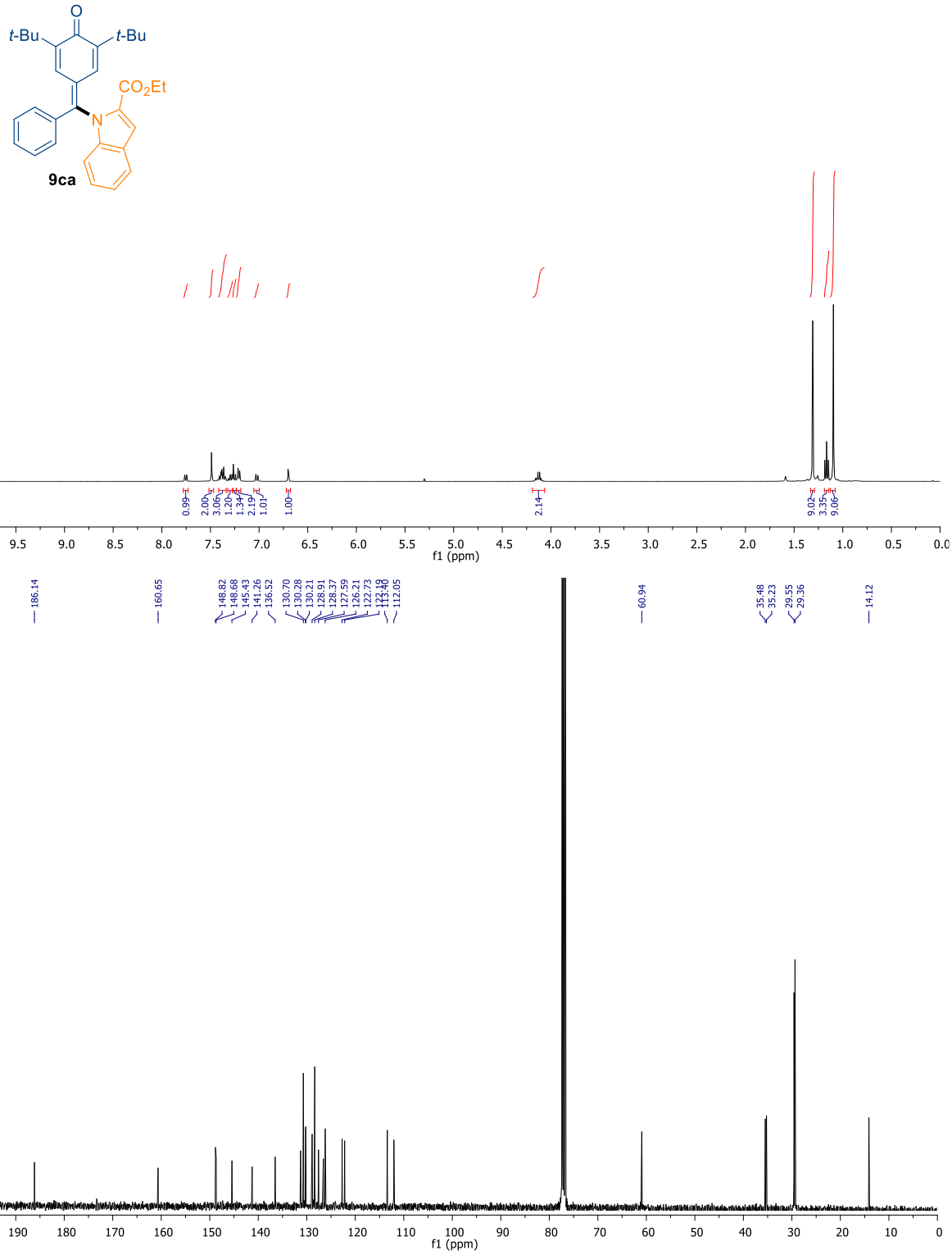
9am

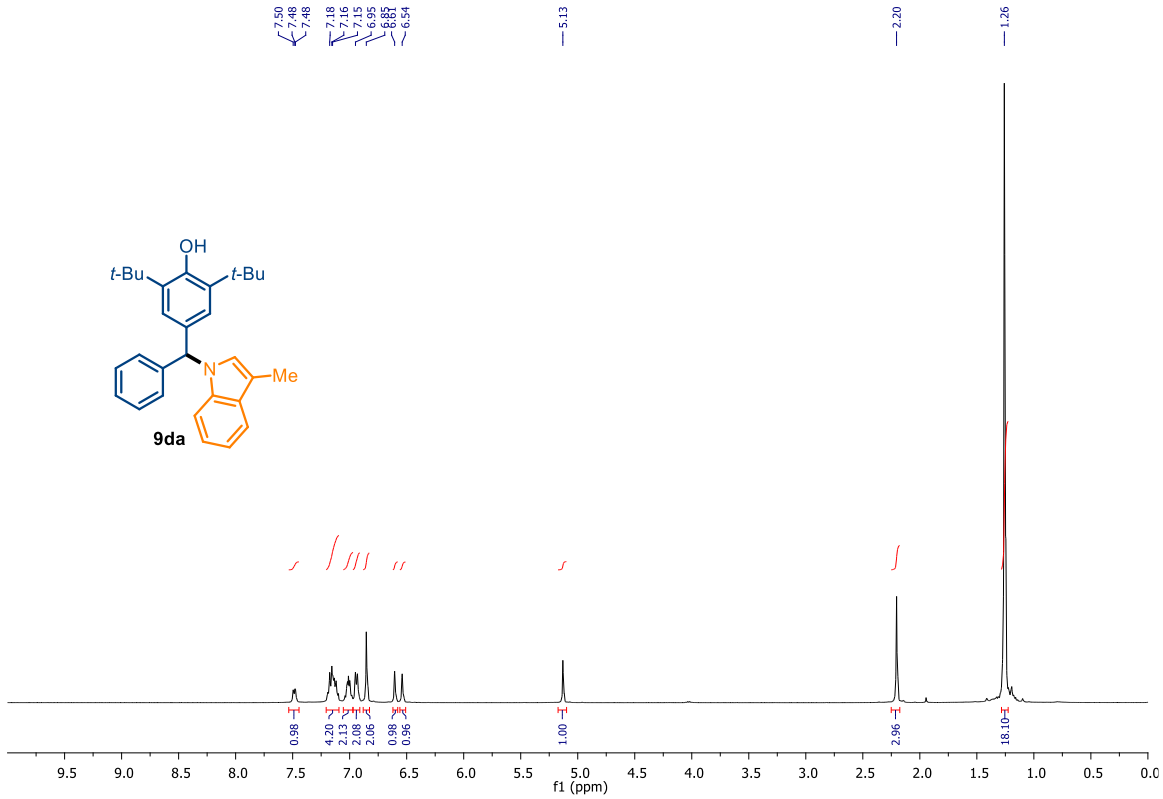
7.71
7.69
7.43
7.41
7.32
7.31
7.23
7.19
7.17
7.11
7.10
7.08
7.07
6.99
6.99
6.82
6.82
6.81
6.58
6.57
5.30
1.42
1.05
1.14
1.04
3.06
2.06
1.00
2.07
1.02
0.99
1.00
18.00
f1 (ppm)

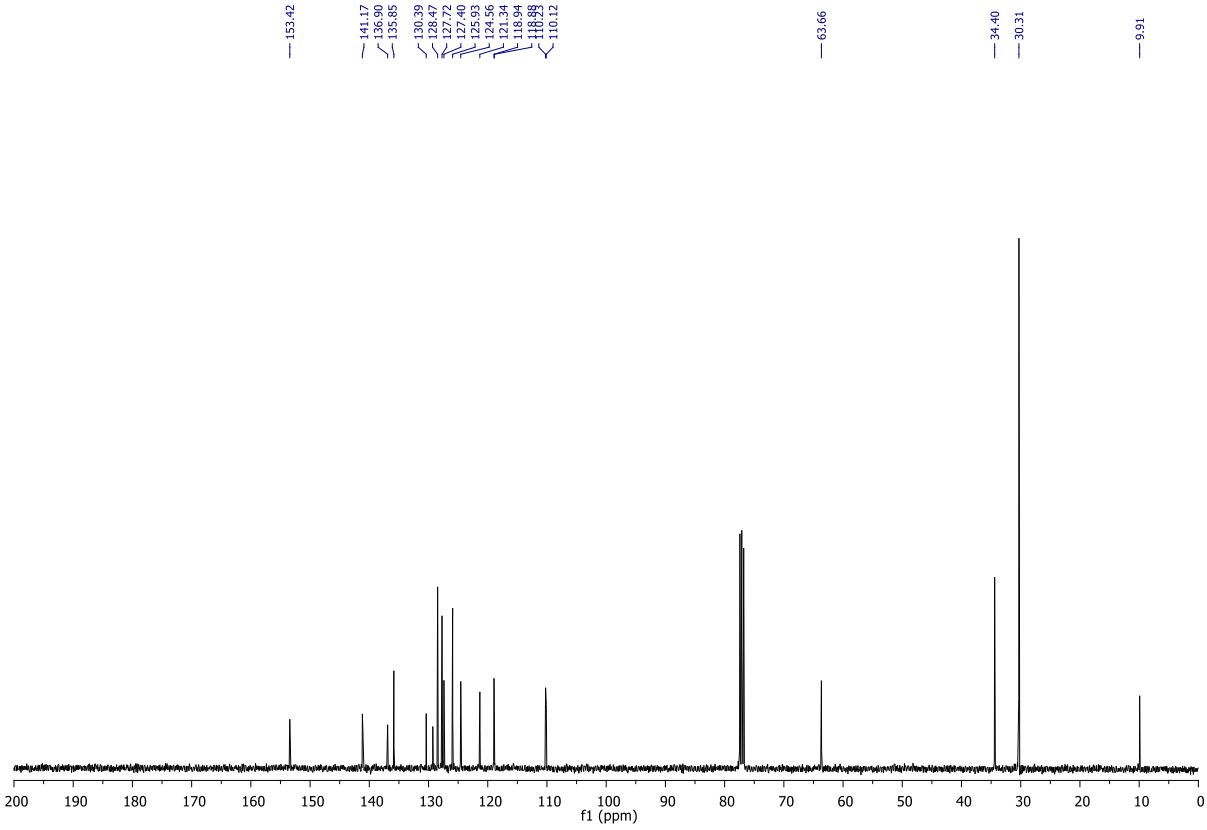

153.68
144.70
136.40
135.94
130.18
126.86
126.71
126.50
125.69
124.77
121.50
120.98
119.73
110.13
101.58
59.57
34.37
30.26
f1 (ppm)


7.86
7.84
7.82
7.80
7.75
7.73
7.71
7.70
7.69
7.69
7.51
7.49
7.48
7.47
7.34
7.33
7.31
7.29
7.26
7.15
7.14
7.13
7.13
7.04
6.95
6.95
6.94
6.56
6.55
5.29
1.38
OH
t-Bu
t-Bu
N
9an
2.20
2.13
3.19
2.69
2.07
2.05
2.01
0.99
1.00
18.00
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)
153.54
138.38
136.03
133.26
132.79
129.92
129.04
128.24
128.15
127.66
127.11
126.42
126.13
126.00
125.90
121.41
120.85
119.61
110.41
101.11
64.07
34.36
30.25
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


OH
t-Bu
t-Bu
N
9ao
f1 (ppm)
f1 (ppm)


7.76
7.74
7.49
7.48
7.36
7.26
7.22
6.78
6.70
4.19
4.17
4.16
4.15
4.14
4.13
4.12
4.12
4.11
4.10
4.09
4.07
1.31
1.18
1.17
1.15
1.10
t-Bu
t-Bu
O
CO2Et
N
9ca
0.99
2.00
3.06
1.20
1.34
2.19
1.01
1.00
2.14
9.02
3.35
9.06
f1 (ppm)
186.14
160.65
148.82
148.68
145.43
141.26
136.52
130.70
130.28
130.21
128.91
128.37
127.59
126.21
122.73
112.05
60.94
35.48
35.23
29.55
29.36
14.12
f1 (ppm)


7.50
7.48
7.48
7.18
7.16
7.15
6.95
6.85
6.81
6.54
5.13
2.20
1.26
OH
t-Bu
t-Bu
N
Me
9da
0.98
4.20
2.13
2.08
2.06
0.98
0.96
1.00
2.96
18.10
f1 (ppm)


153.42
141.17
136.90
135.85
130.39
128.47
127.72
127.40
125.93
124.56
121.34
118.94
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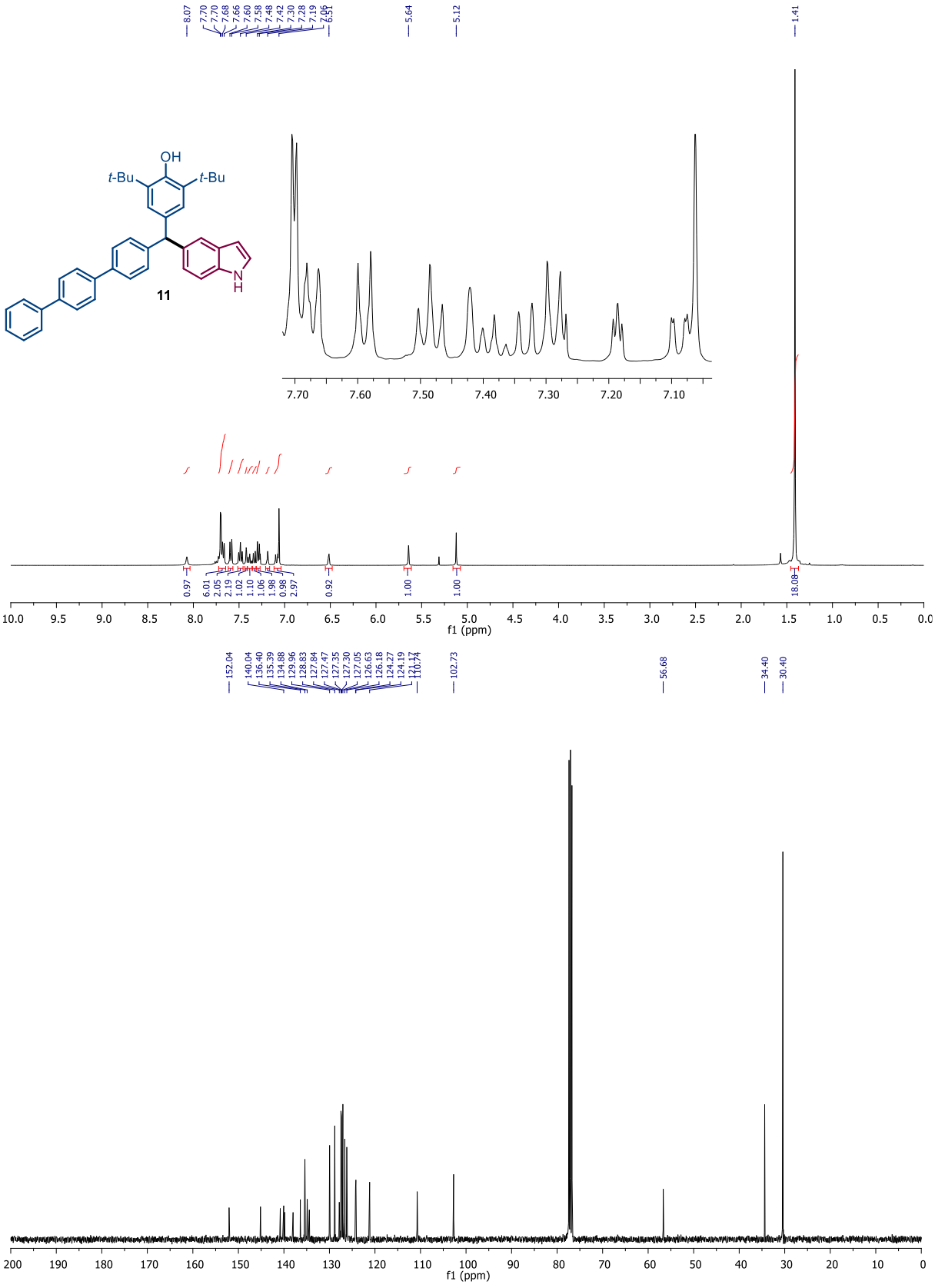
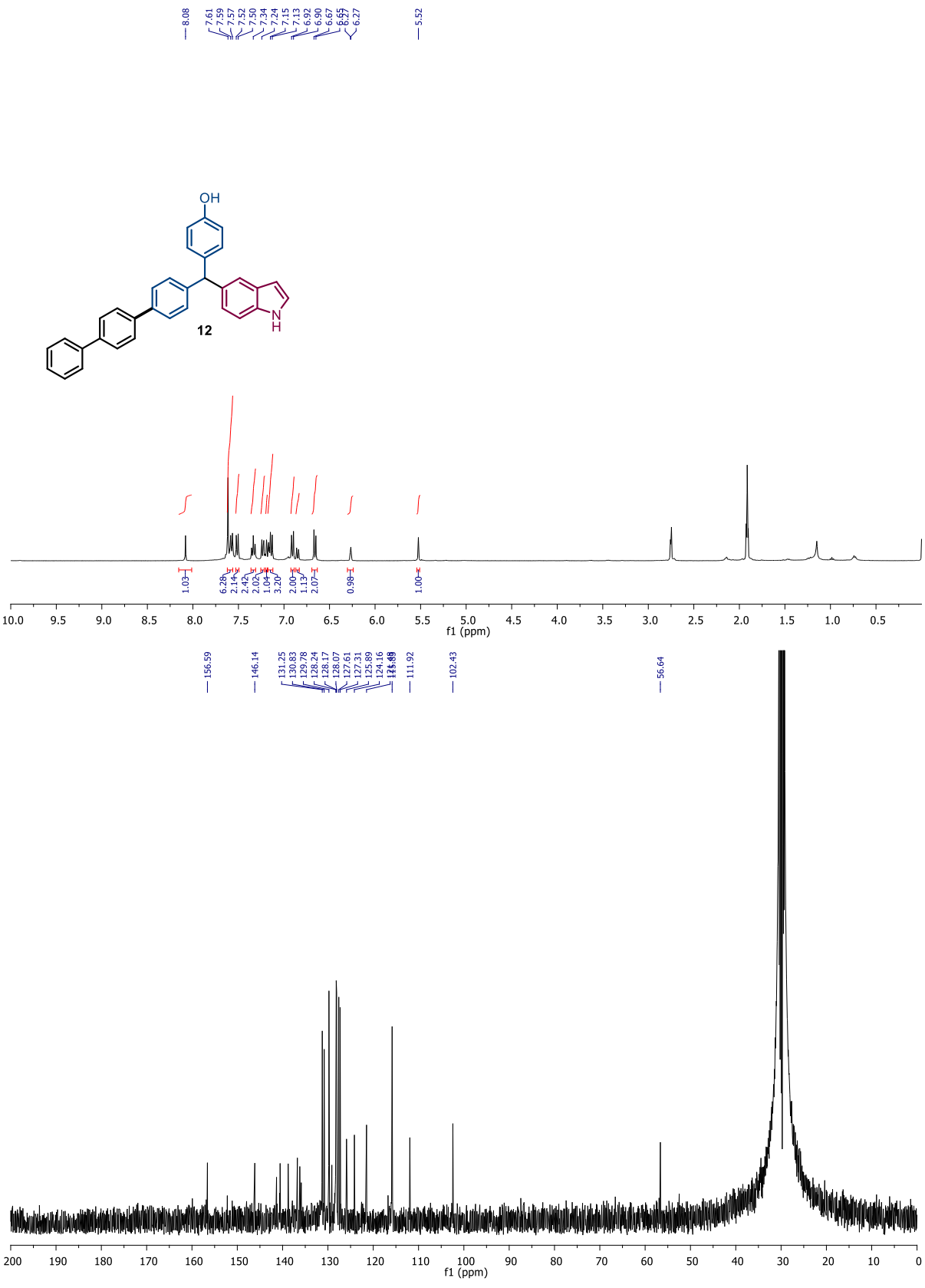
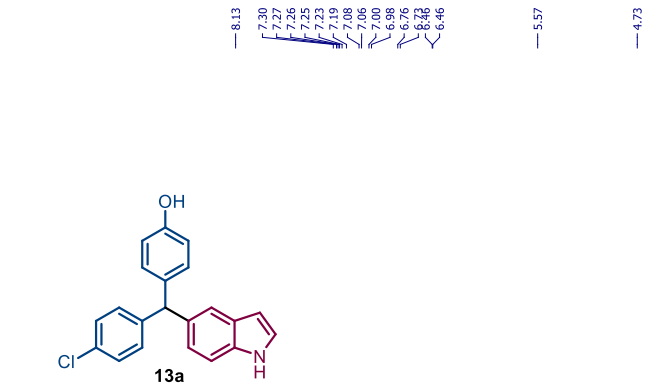
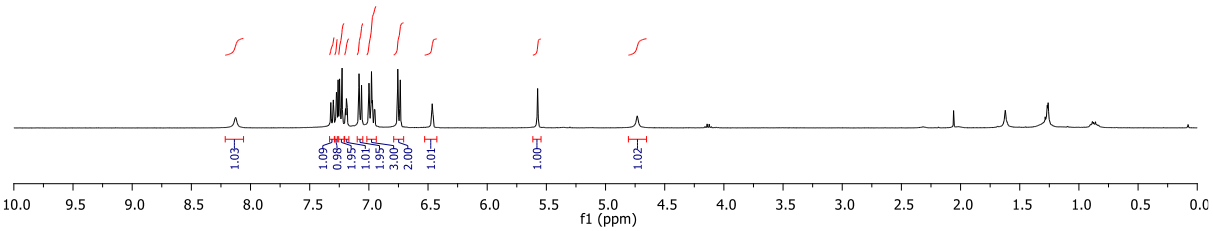
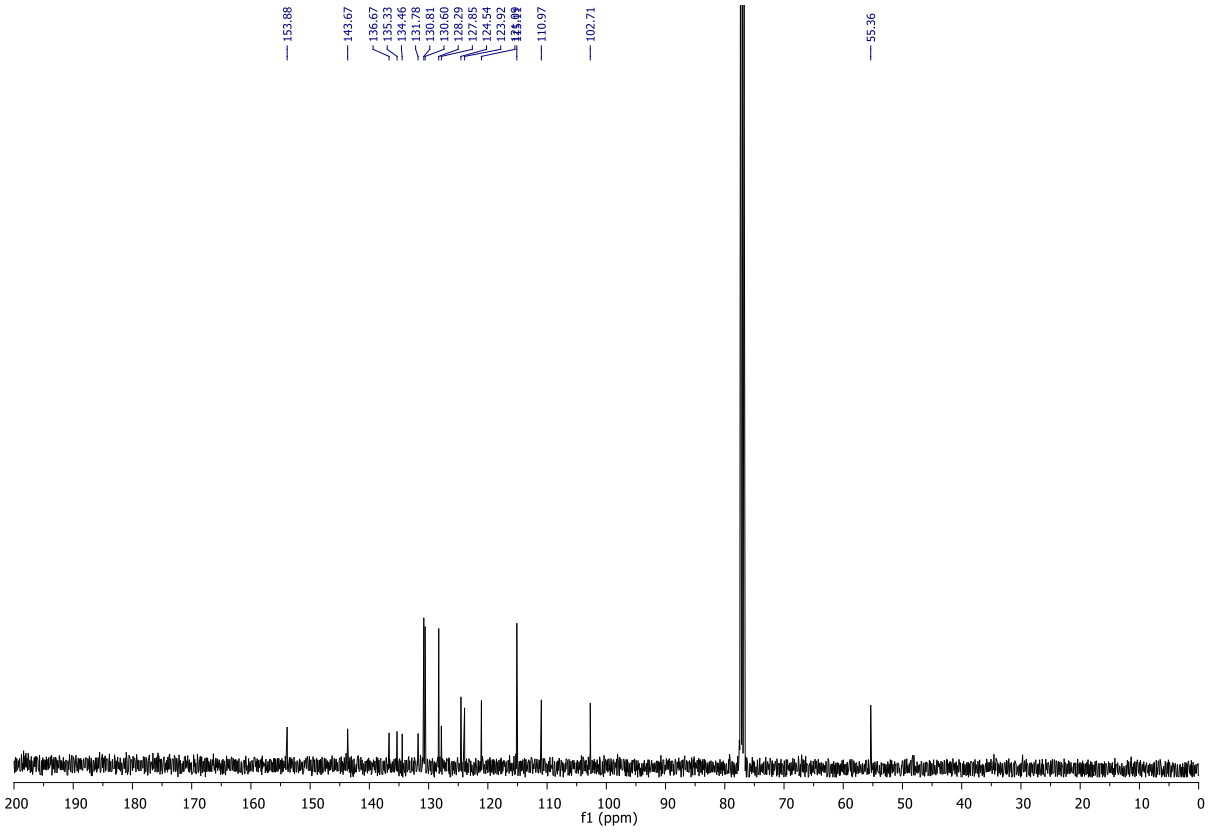
63.66
34.40
30.31
9.91
f1 (ppm)

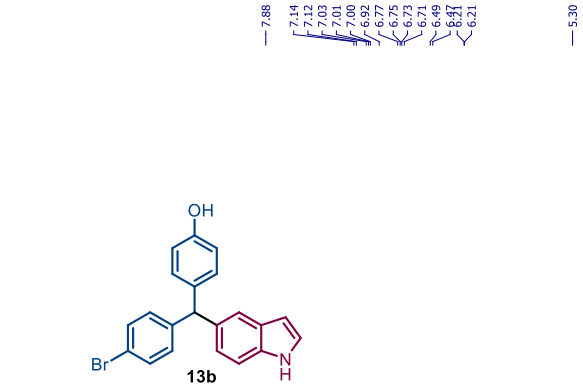

8.07
7.70
7.70
7.68
7.66
7.60
7.58
7.48
7.42
7.30
7.28
7.19
7.06
6.91
5.64
5.12
1.41
OH
t-Bu
t-Bu
N
H
11
0.97
6.01
2.05
2.19
1.02
1.10
1.06
1.98
0.98
2.97
0.92
1.00
1.00
18.08
f1 (ppm)
152.04
140.04
136.40
135.39
134.88
129.96
128.83
127.84
127.47
127.35
127.30
127.05
126.63
126.18
124.27
124.19
121.17
110.74
102.73
56.68
34.40
30.40
f1 (ppm)


8.08
7.61
7.59
7.57
7.52
7.50
7.34
7.24
7.15
7.13
6.92
6.90
6.67
6.65
6.27
5.52
OH
N
H
12
1.03
6.28
2.14
2.42
2.02
1.04
3.20
2.00
1.13
2.07
0.98
1.00
f1 (ppm)
156.59
146.14
131.25
130.83
129.78
128.24
128.17
128.07
127.61
127.31
125.89
124.16
111.92
102.43
56.64
f1 (ppm)


8.13
7.30
7.27
7.26
7.25
7.23
7.19
7.08
7.06
7.00
6.98
6.76
6.43
6.46
5.57
4.73
OH
Cl
N
H
13a


1.03
1.09
0.98
1.95
1.01
1.95
3.00
2.00
1.01
1.00
1.02
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)


153.88
143.67
136.67
135.33
134.46
131.78
130.81
130.60
128.29
127.85
124.54
123.92
110.97
102.71
55.36
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


7.88
7.14
7.12
7.03
7.01
7.00
6.92
6.77
6.75
6.73
6.71
6.49
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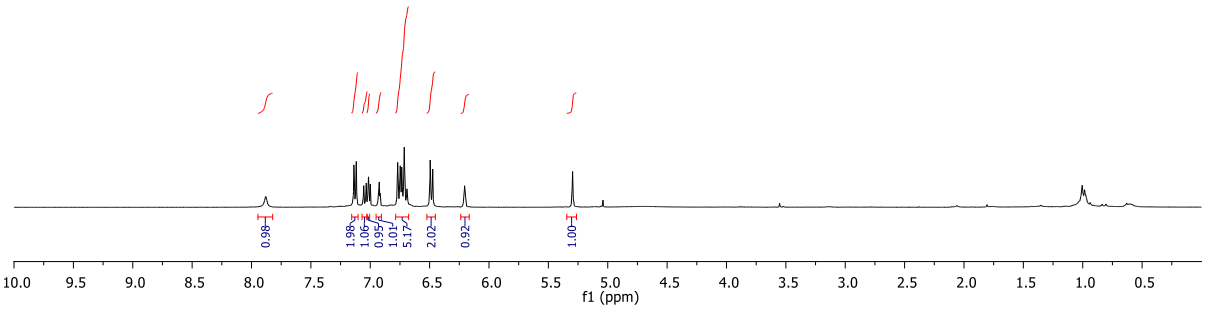
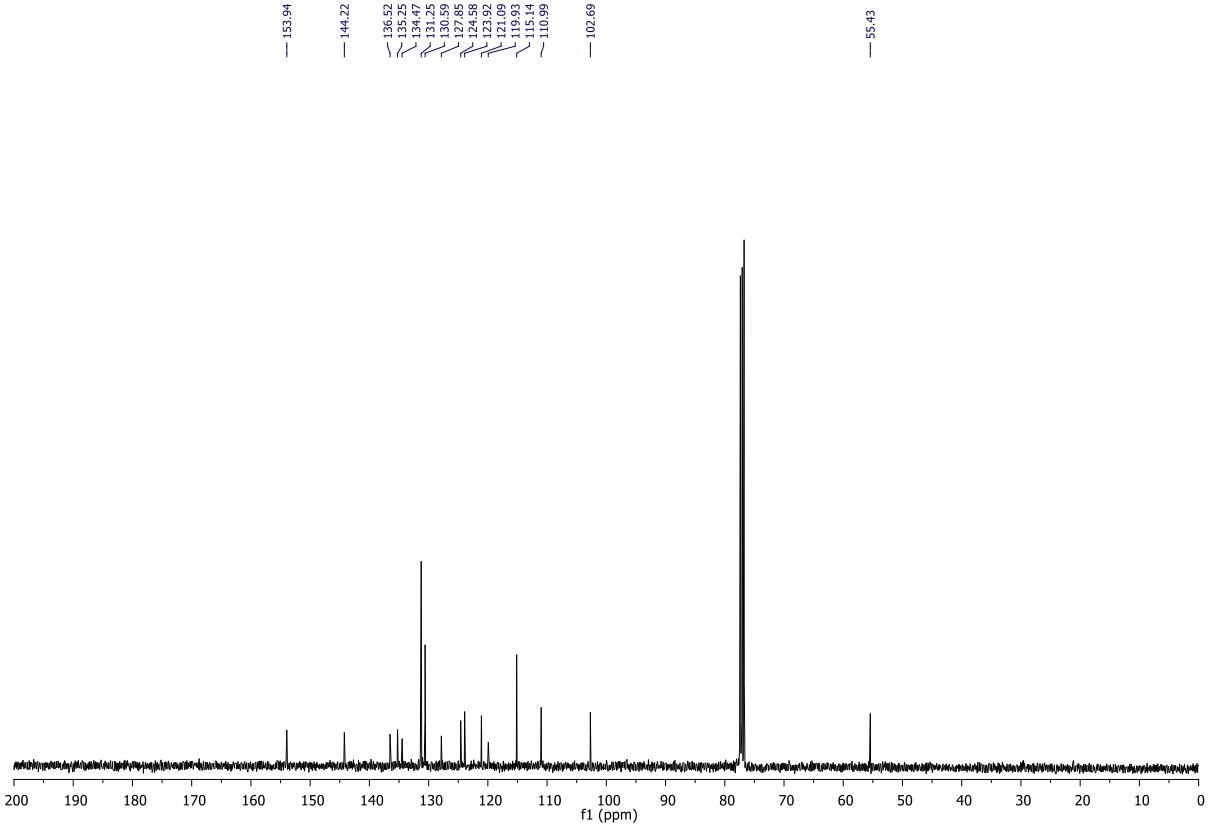
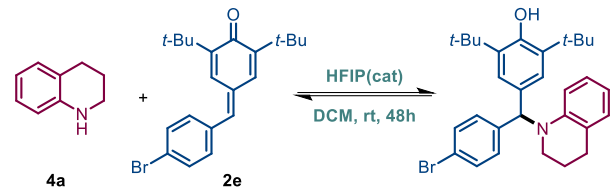
6.21
5.30
OH
Br
N
H
13b

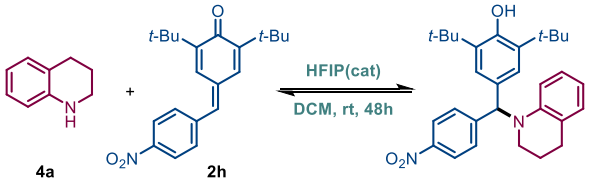

0.98
1.98
1.06
0.95
1.01
5.17
2.02
0.92
1.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)


153.94
144.22
136.52
135.25
134.47
131.25
130.59
127.85
124.58
123.92
121.09
119.93
115.14
110.99
102.69
55.43
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

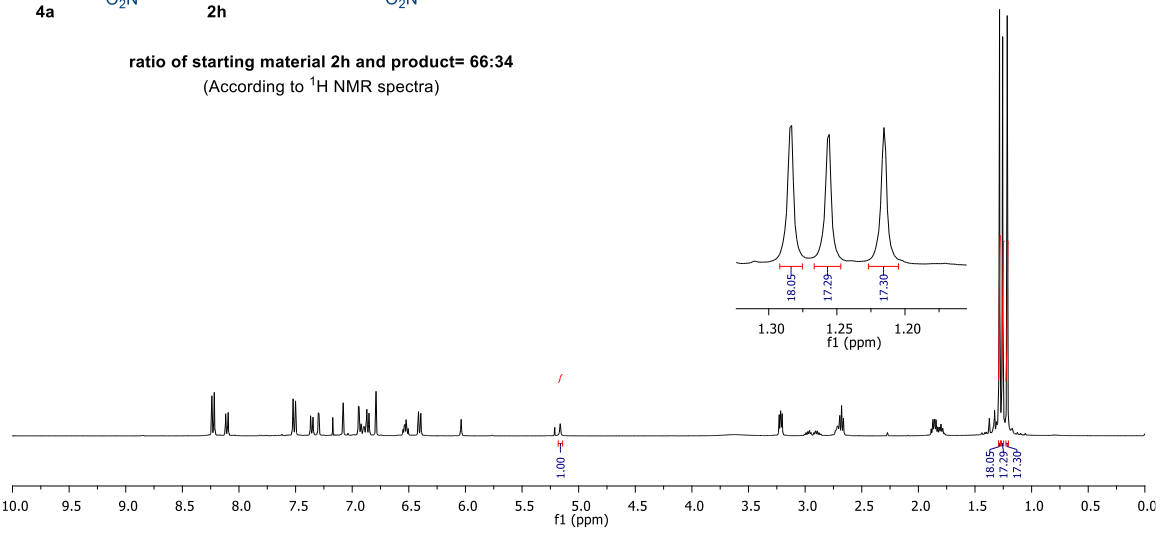
2. ^{1}H NMR monitoring of reactions between 4a and *p*-QMs (2e, 2h, and 2j)

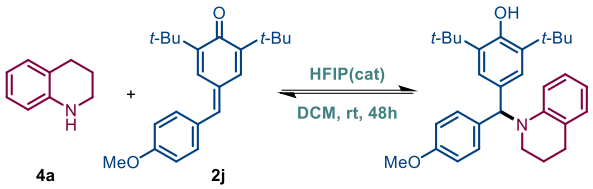


ratio of starting material 2e and product= 49:51
(According to ^{1}H NMR spectra)



ratio of starting material 2h and product= 66:34
(According to ^{1}H NMR spectra)





4a 2j

Ratio of starting material 2j and product= 51:49

(According to ^{1}H NMR spectra)