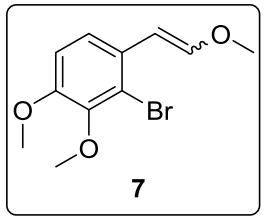
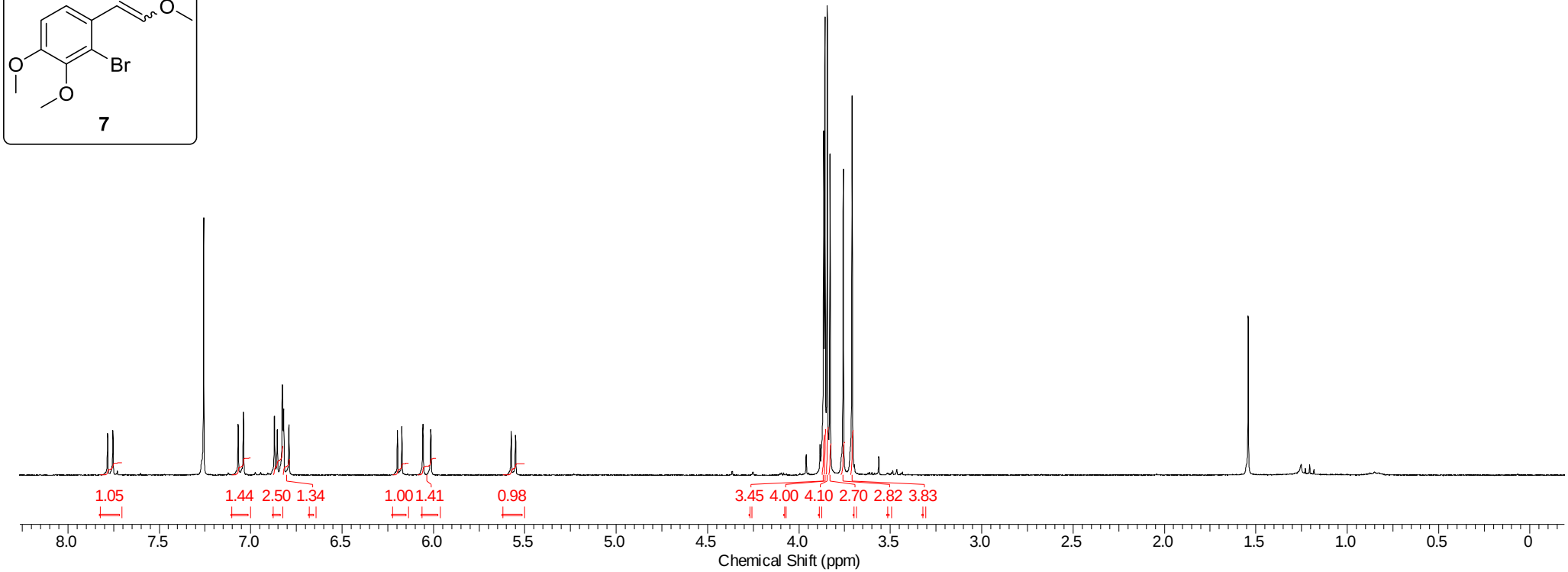
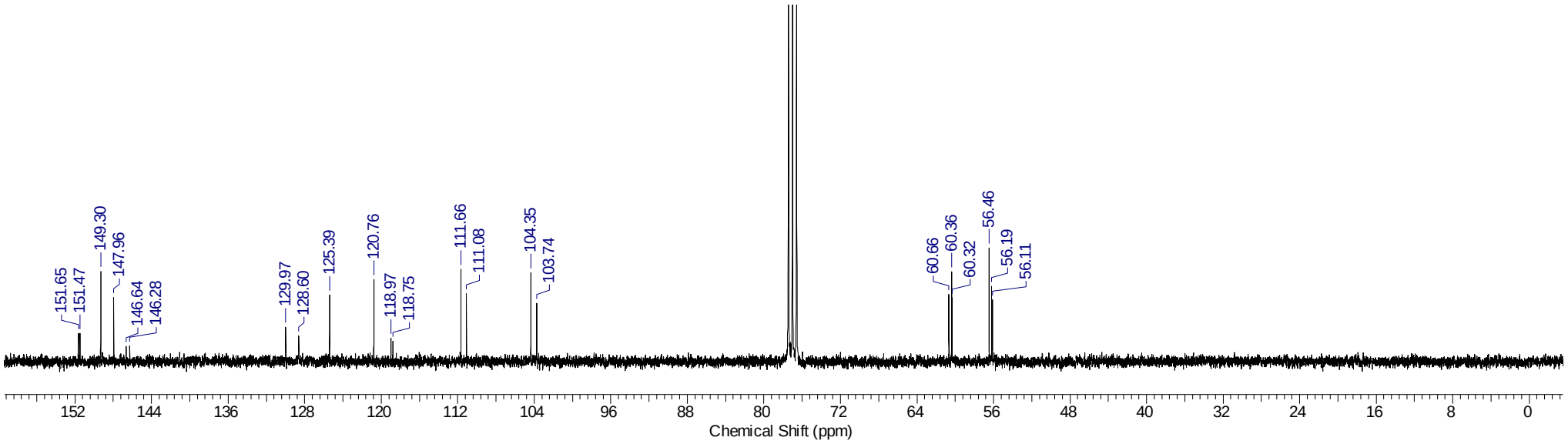
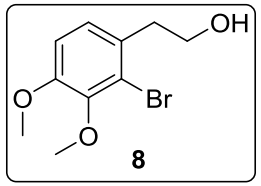
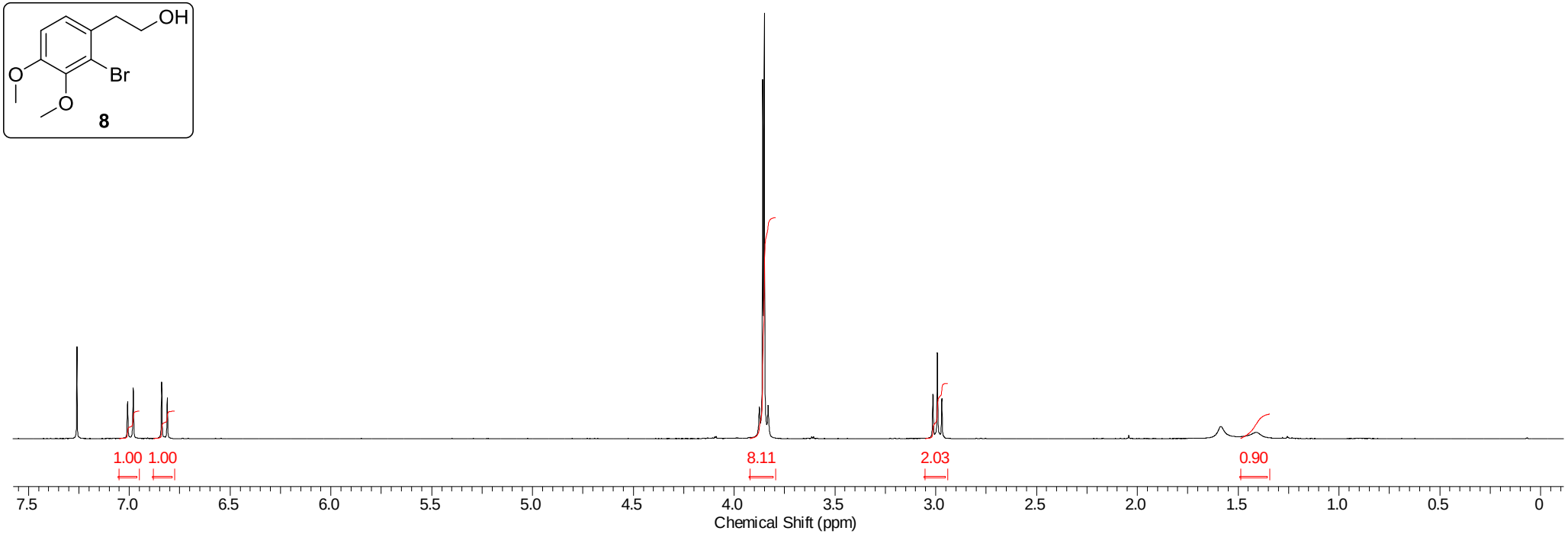
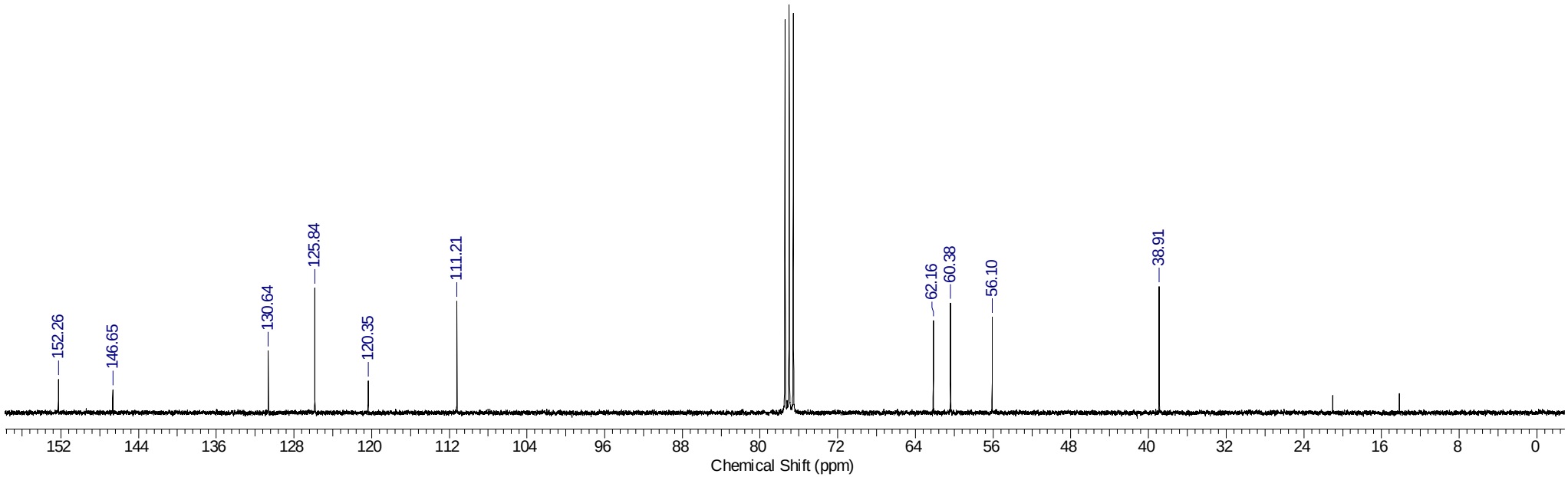

O
Br
O
O
7

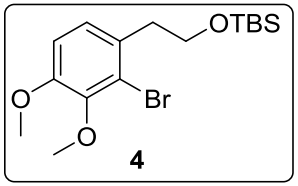

1.05
1.44
2.50
1.34
1.00
1.41
0.98
3.45
4.00
4.10
2.70
2.82
3.83
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
Chemical Shift (ppm)

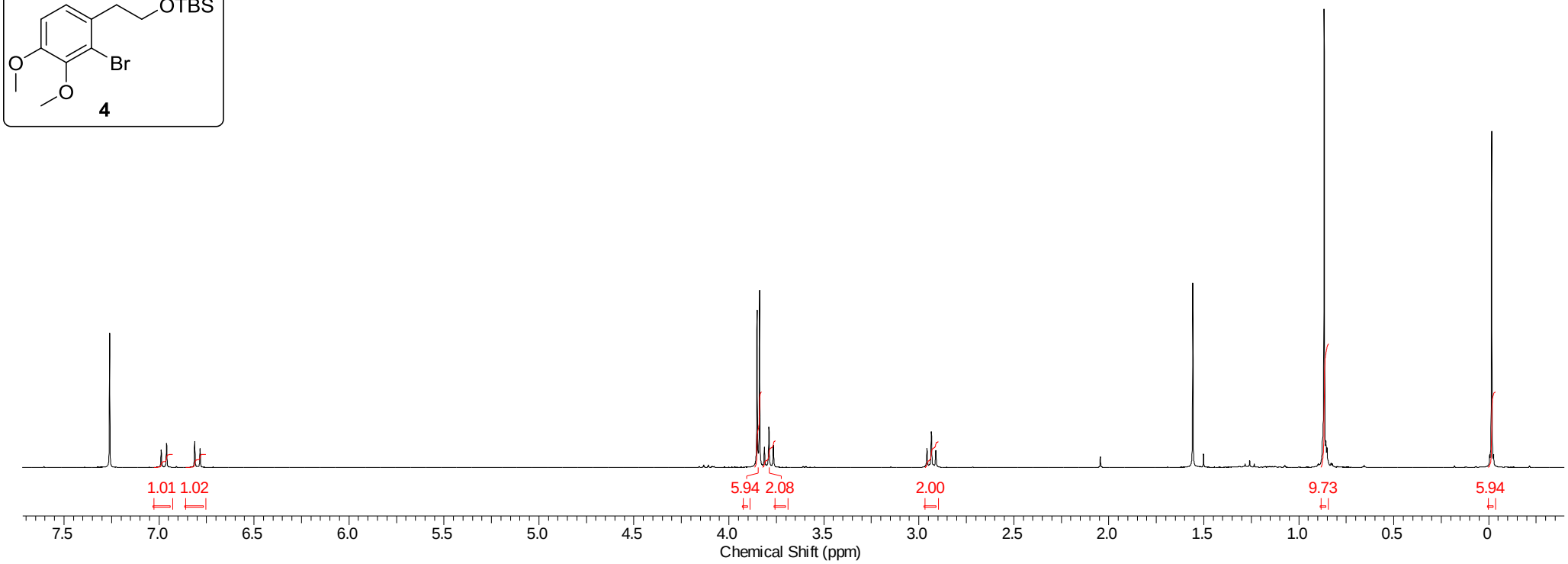

151.65
151.47
149.30
147.96
146.64
146.28
129.97
128.60
125.39
120.76
118.97
118.75
111.66
111.08
104.35
103.74
60.66
60.36
60.32
56.46
56.19
56.11
152
144
136
128
120
112
104
96
88
80
72
64
56
48
40
32
24
16
8
0
Chemical Shift (ppm)

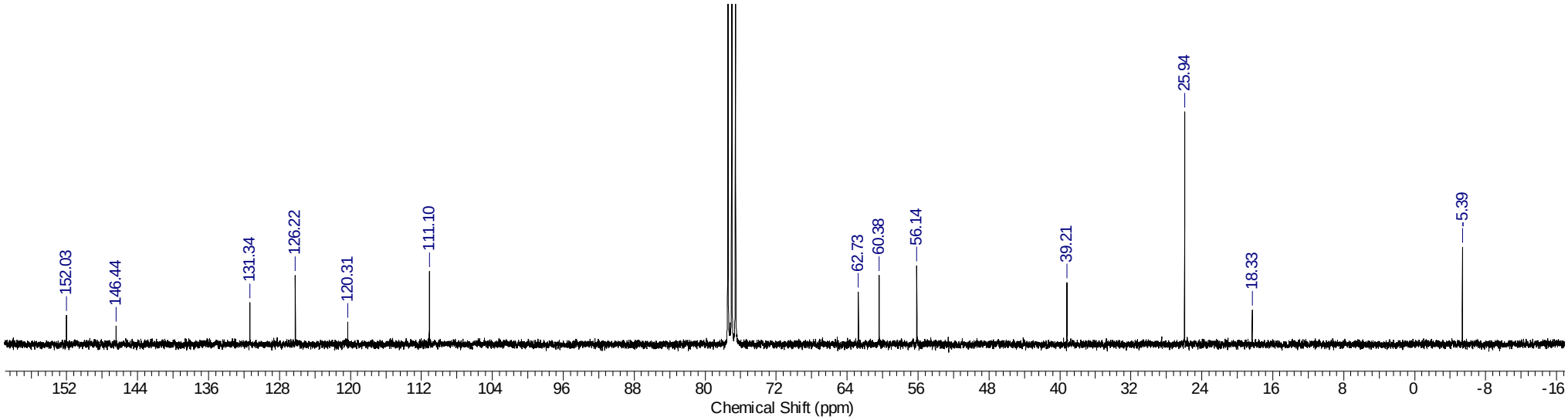

OH
Br
O
O
8

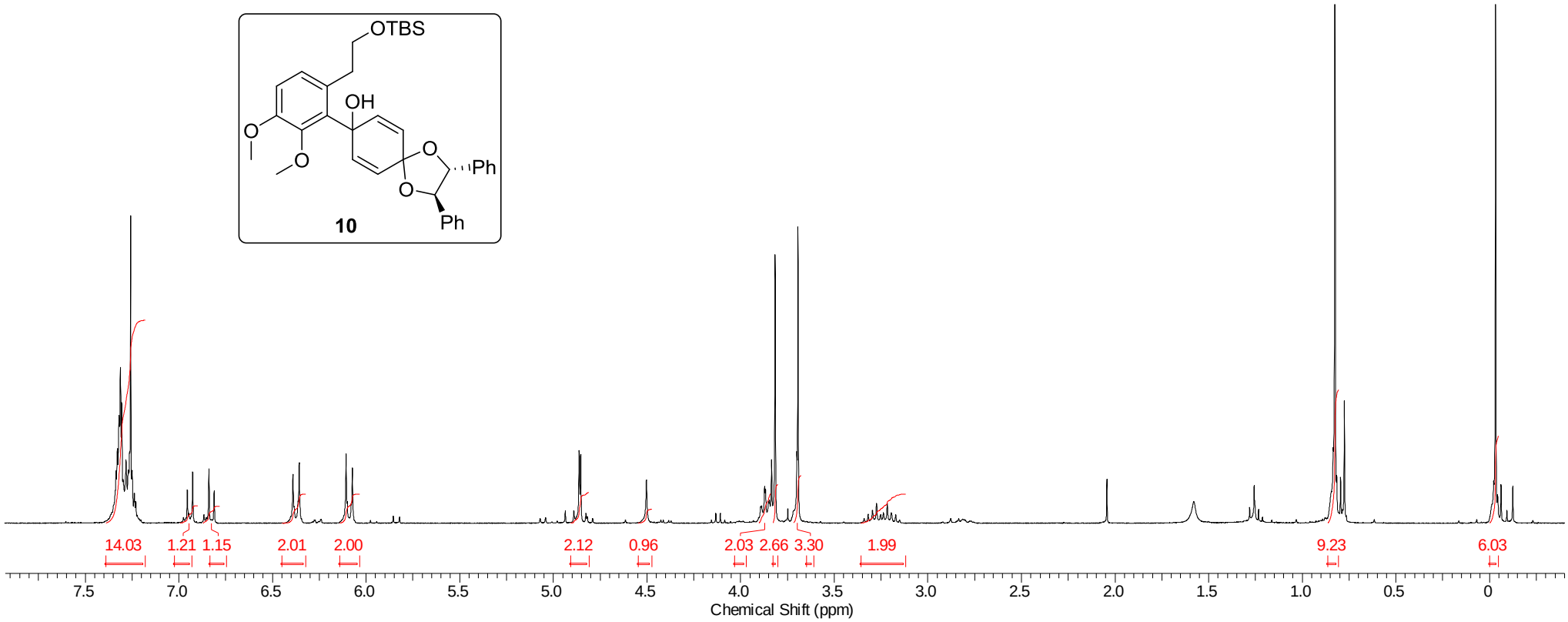

1.00
1.00
8.11
2.03
0.90
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
Chemical Shift (ppm)

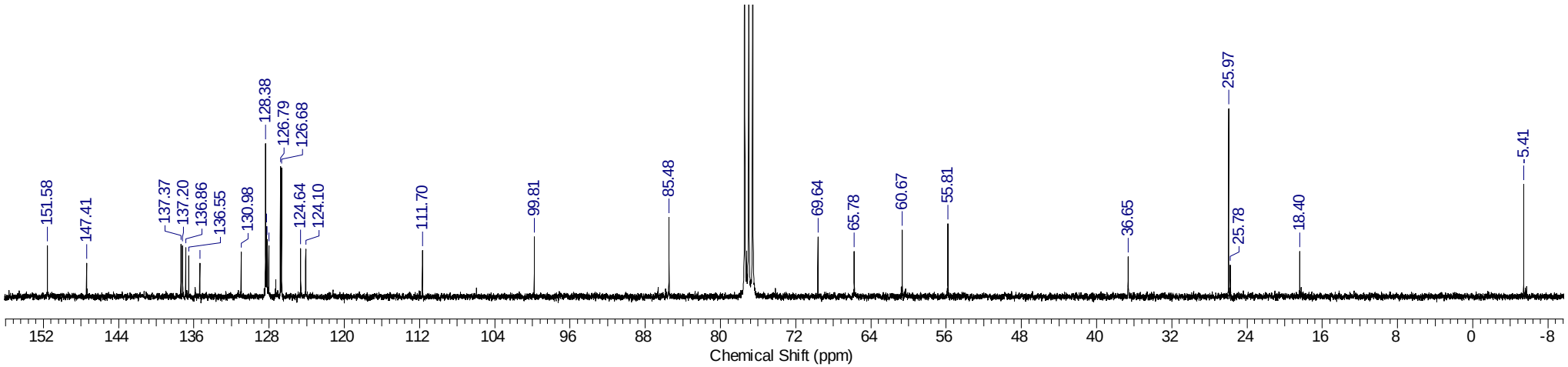

152.26
146.65
130.64
125.84
120.35
111.21
62.16
60.38
56.10
38.91
152
144
136
128
120
112
104
96
88
80
72
64
56
48
40
32
24
16
8
0
Chemical Shift (ppm)

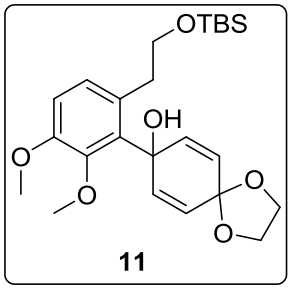

OTBS
Br
O
O
4

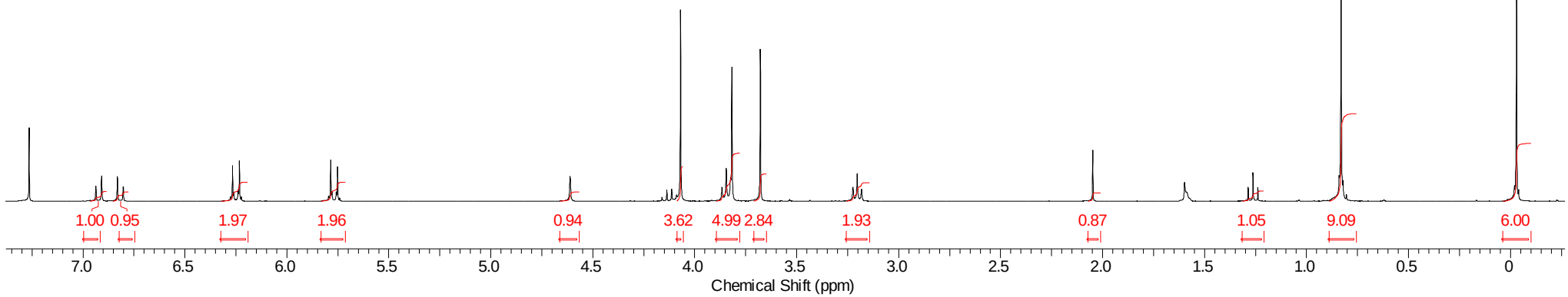

1.01
1.02
5.94
2.08
2.00
9.73
5.94
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
Chemical Shift (ppm)

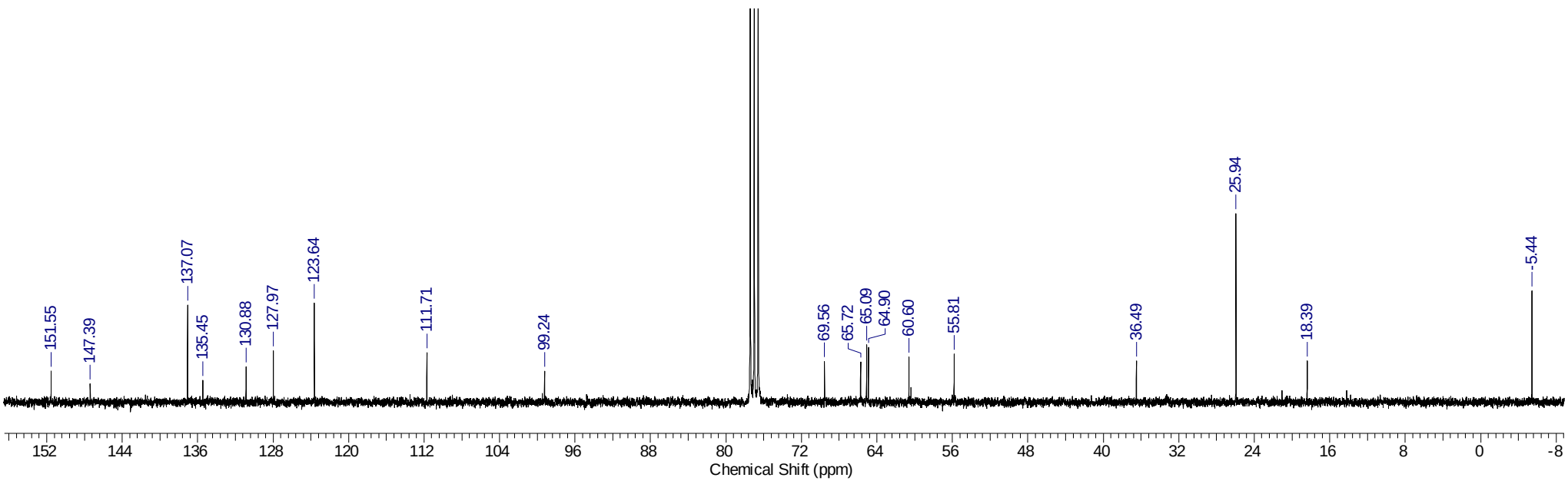

152.03
146.44
131.34
126.22
120.31
111.10
62.73
60.38
56.14
39.21
25.94
18.33
-5.39
152
144
136
128
120
112
104
96
88
80
72
64
56
48
40
32
24
16
8
0
-8
-16
Chemical Shift (ppm)

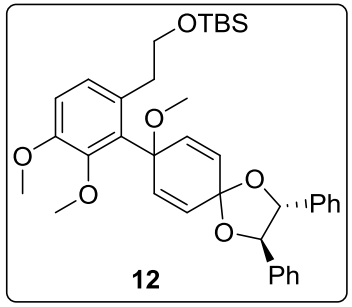

OTBS
OH
O
O
O
O
Ph
Ph
10
14.03
1.21
1.15
2.01
2.00
2.12
0.96
2.03
2.66
3.30
1.99
9.23
6.03
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
Chemical Shift (ppm)

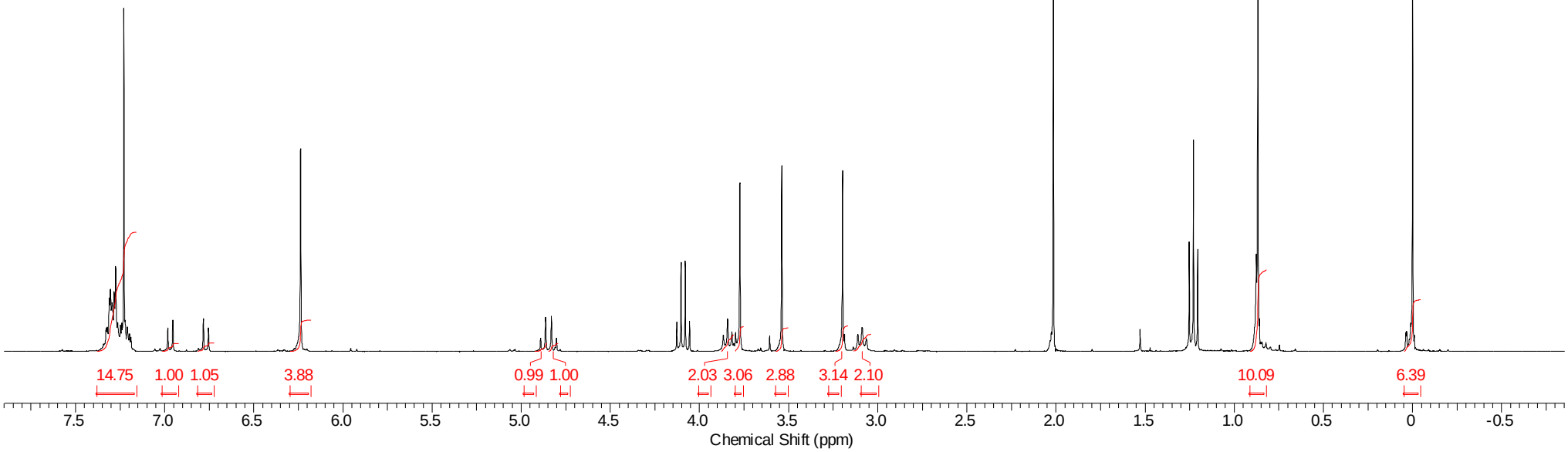

151.58
147.41
137.37
137.20
136.86
136.55
130.98
128.38
126.79
126.68
124.64
124.10
111.70
99.81
85.48
69.64
65.78
60.67
55.81
36.65
25.97
25.78
18.40
-5.41
152
144
136
128
120
112
104
96
88
80
72
64
56
48
40
32
24
16
8
0
-8
Chemical Shift (ppm)

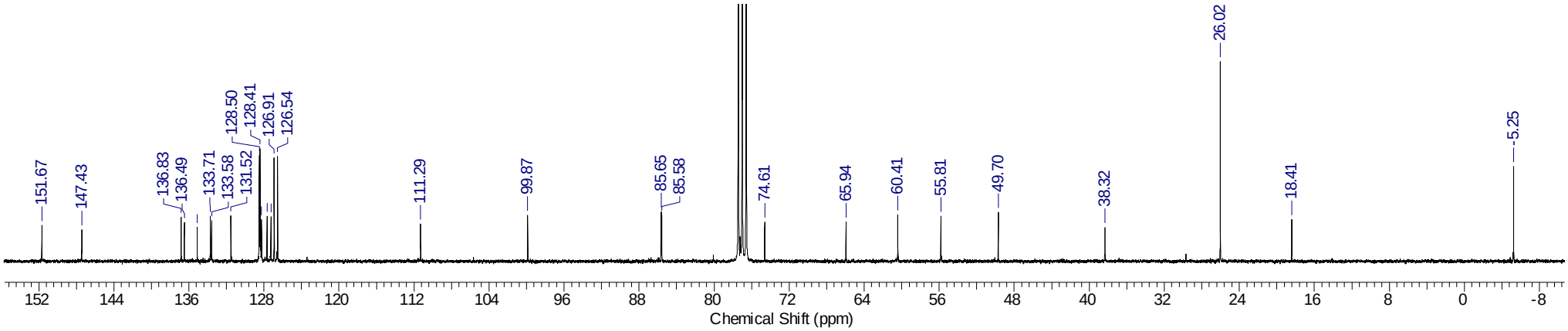

OTBS
OH
O
O
O
O
11


1.00
0.95
1.97
1.96
0.94
3.62
4.99
2.84
1.93
0.87
1.05
9.09
6.00
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
Chemical Shift (ppm)

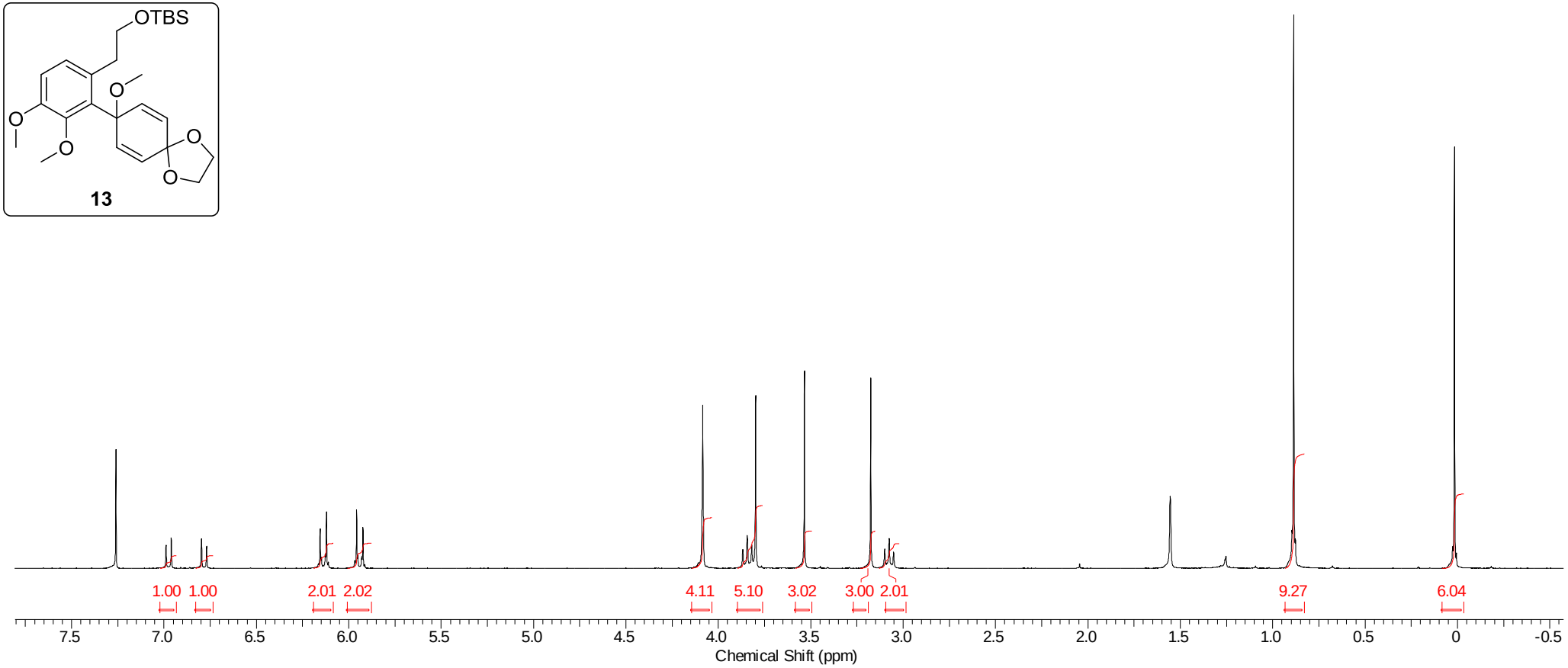

151.55
147.39
137.07
135.45
130.88
127.97
123.64
111.71
99.24
69.56
65.72
65.09
64.90
60.60
55.81
36.49
25.94
18.39
-5.44
152
144
136
128
120
112
104
96
88
80
72
64
56
48
40
32
24
16
8
0
-8
Chemical Shift (ppm)

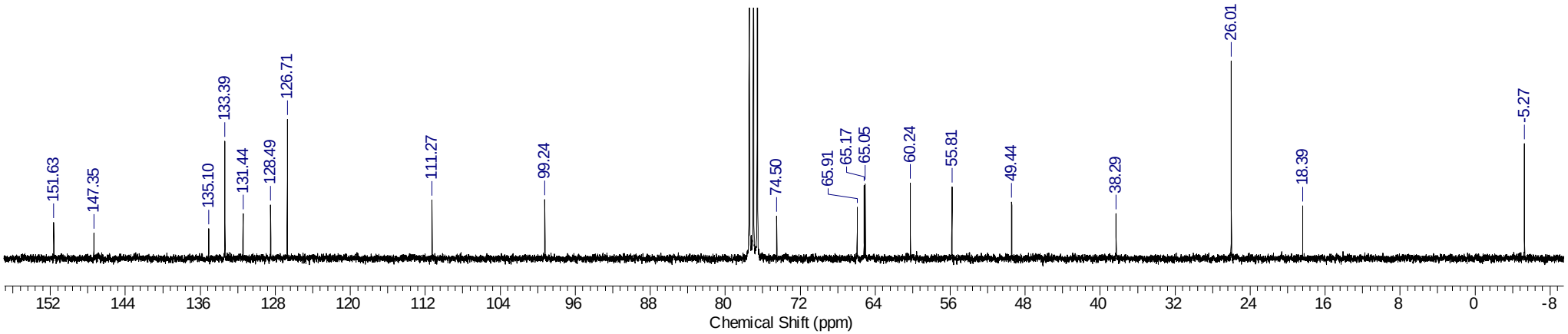

OTBS
O
O
O
O
O
Ph
Ph
12

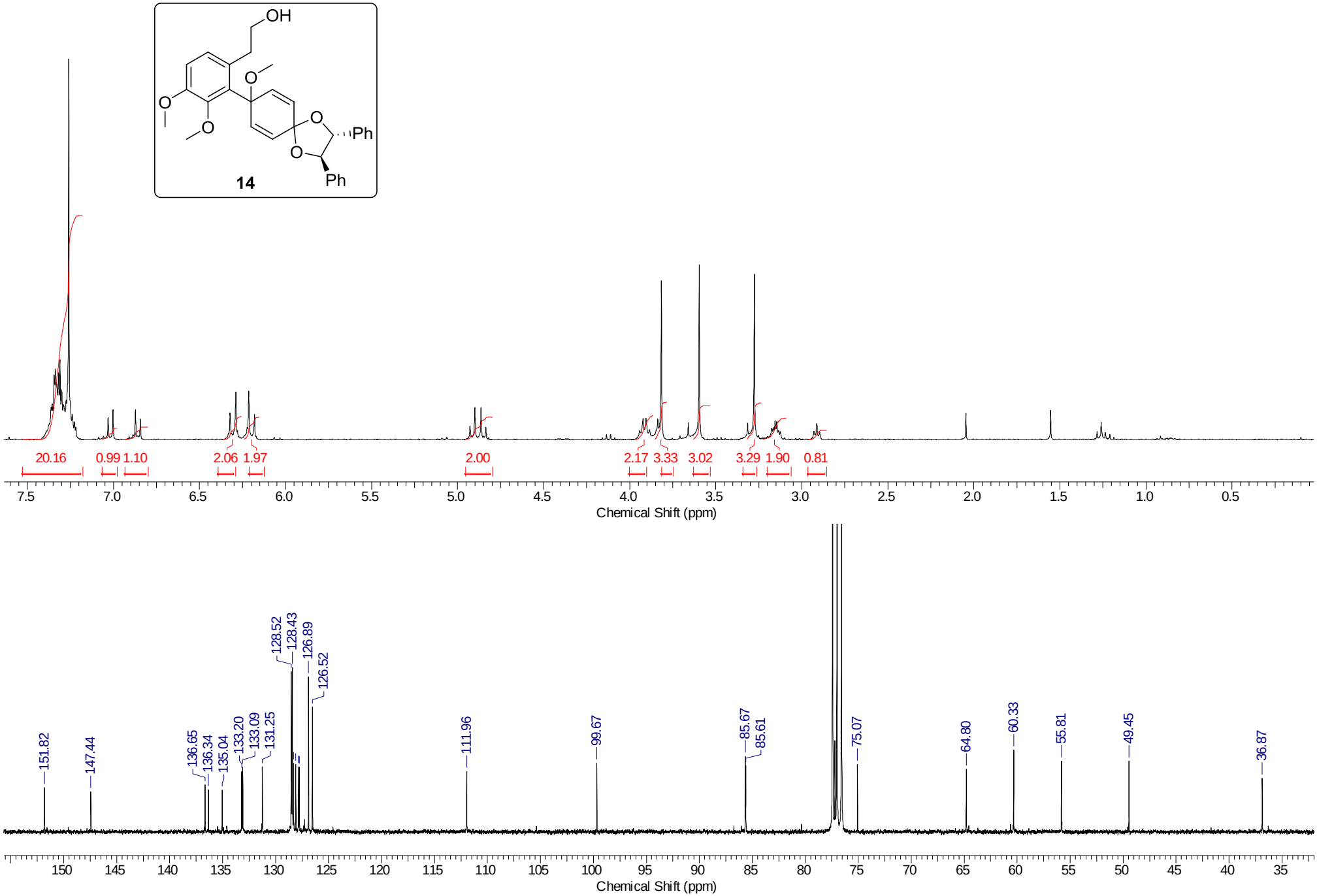

14.75
1.00
1.05
3.88
0.99
1.00
2.03
3.06
2.88
3.14
2.10
10.09
6.39
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
Chemical Shift (ppm)

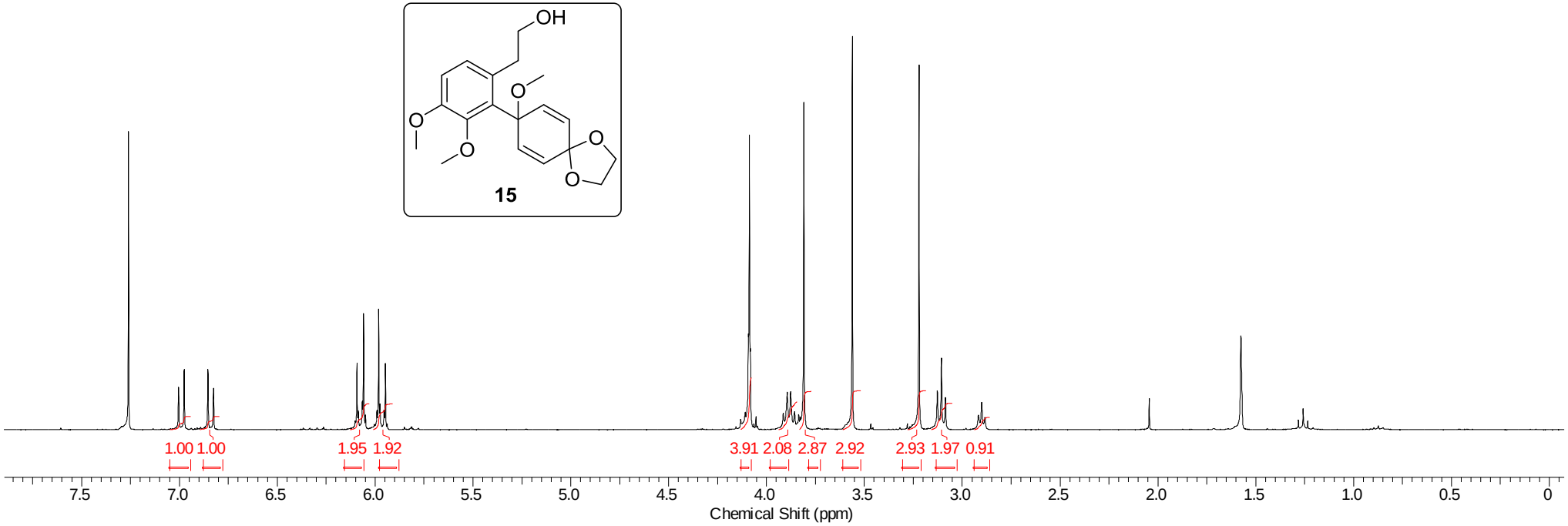

151.67
147.43
136.83
136.49
133.71
133.58
131.52
128.50
128.41
126.91
126.54
111.29
99.87
85.65
85.58
74.61
65.94
60.41
55.81
49.70
38.32
26.02
18.41
-5.25
152
144
136
128
120
112
104
96
88
80
72
64
56
48
40
32
24
16
8
0
-8
Chemical Shift (ppm)

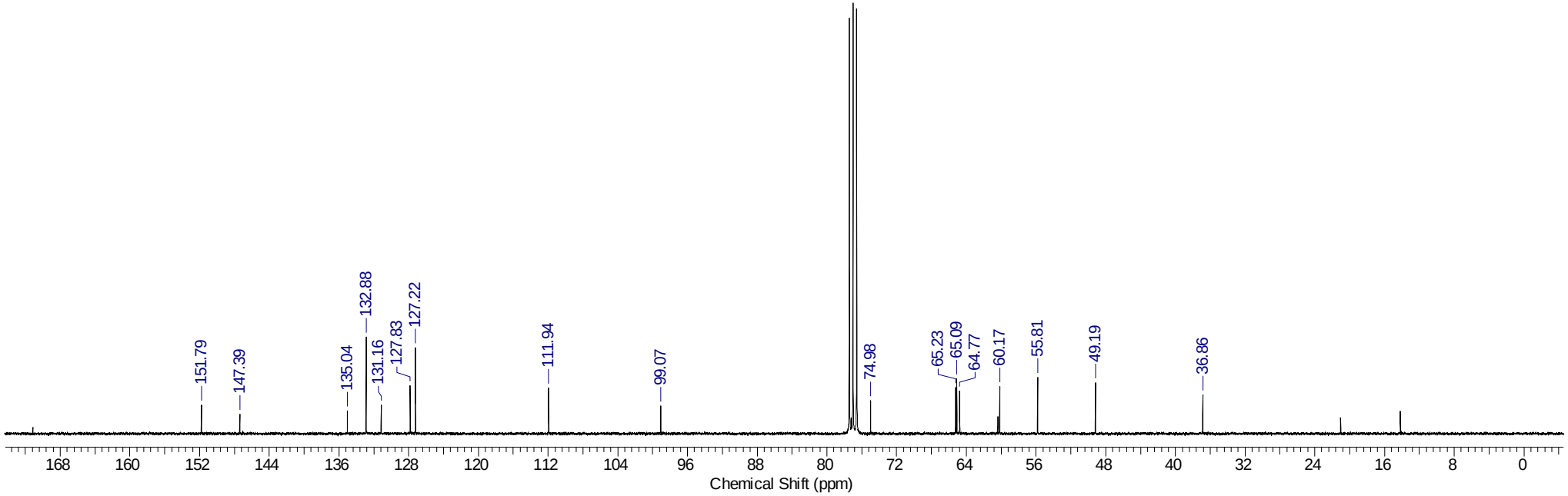
OTBS
O
O
O
O
O
13

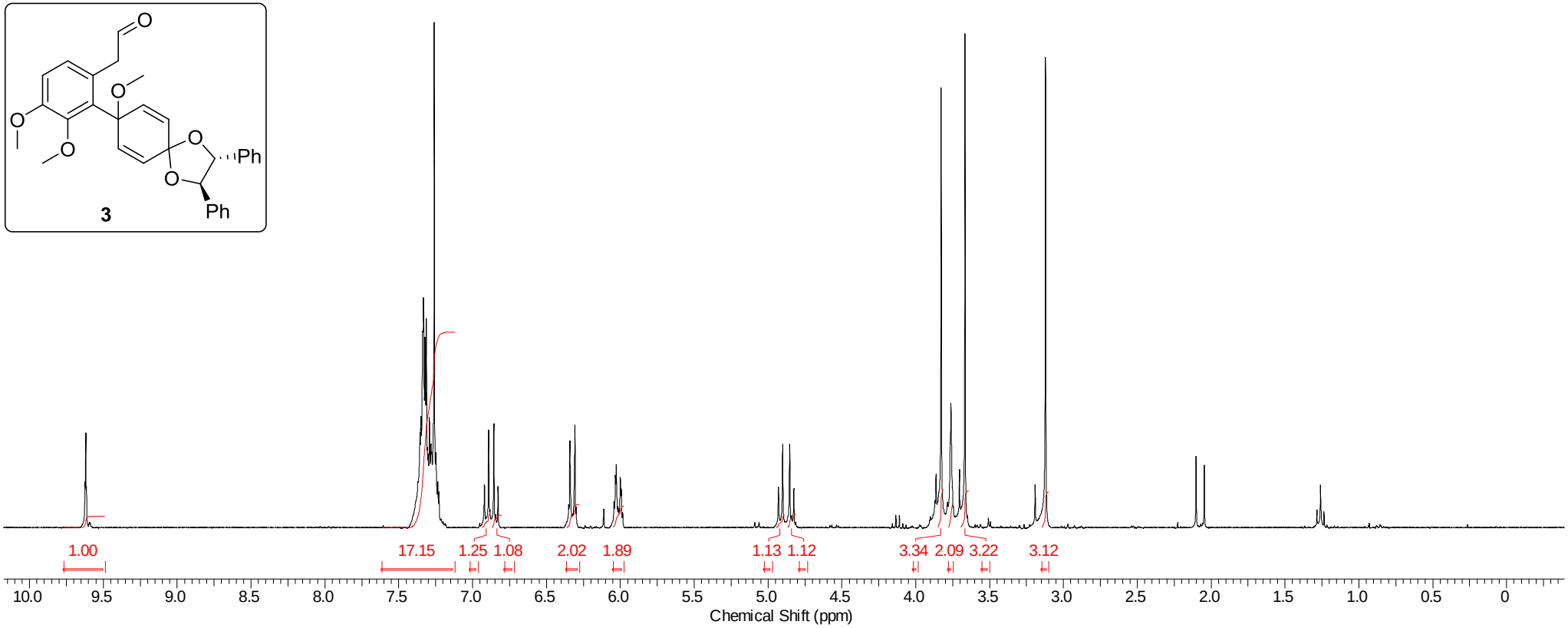

1.00 1.00 2.01 2.02 4.11 5.10 3.02 3.00 2.01 9.27 6.04
7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0 -0.5
Chemical Shift (ppm)

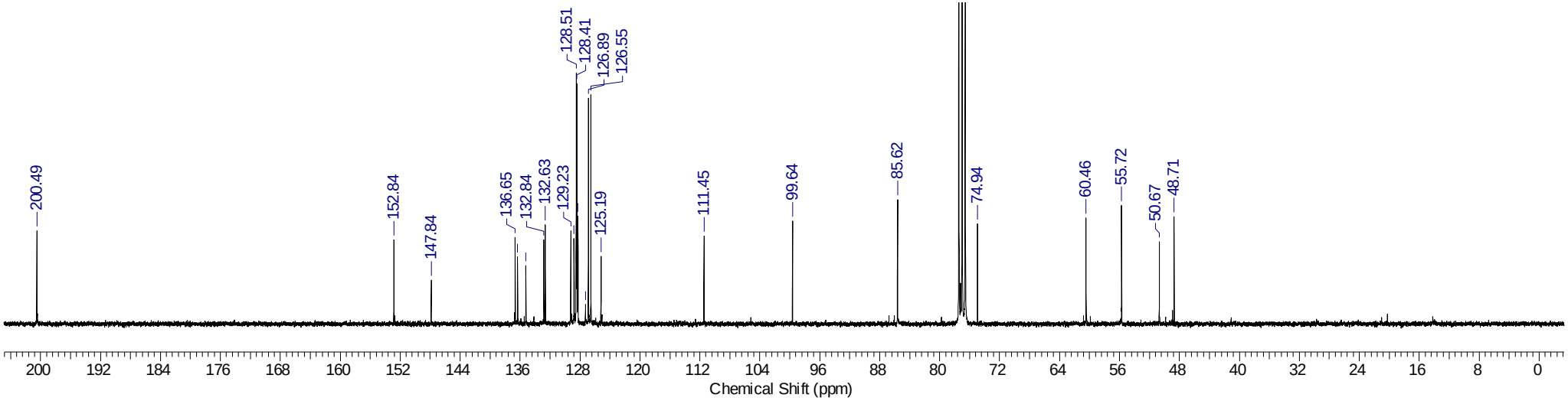

151.63 147.35 135.10 133.39 131.44 128.49 126.71 111.27 99.24 74.50 65.91 65.17 65.05 60.24 55.81 49.44 38.29 26.01 18.39 -5.27
152 144 136 128 120 112 104 96 88 80 72 64 56 48 40 32 24 16 8 0 -8
Chemical Shift (ppm)


OH
O
O
O
O
O
Ph
Ph
14
20.16
0.99
1.10
2.06
1.97
2.00
2.17
3.33
3.02
3.29
1.90
0.81
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
Chemical Shift (ppm)
151.82
147.44
136.65
136.34
135.04
133.20
133.09
131.25
128.52
128.43
126.89
126.52
111.96
99.67
85.67
85.61
75.07
64.80
60.33
55.81
49.45
36.87
150
145
140
135
130
125
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
Chemical Shift (ppm)

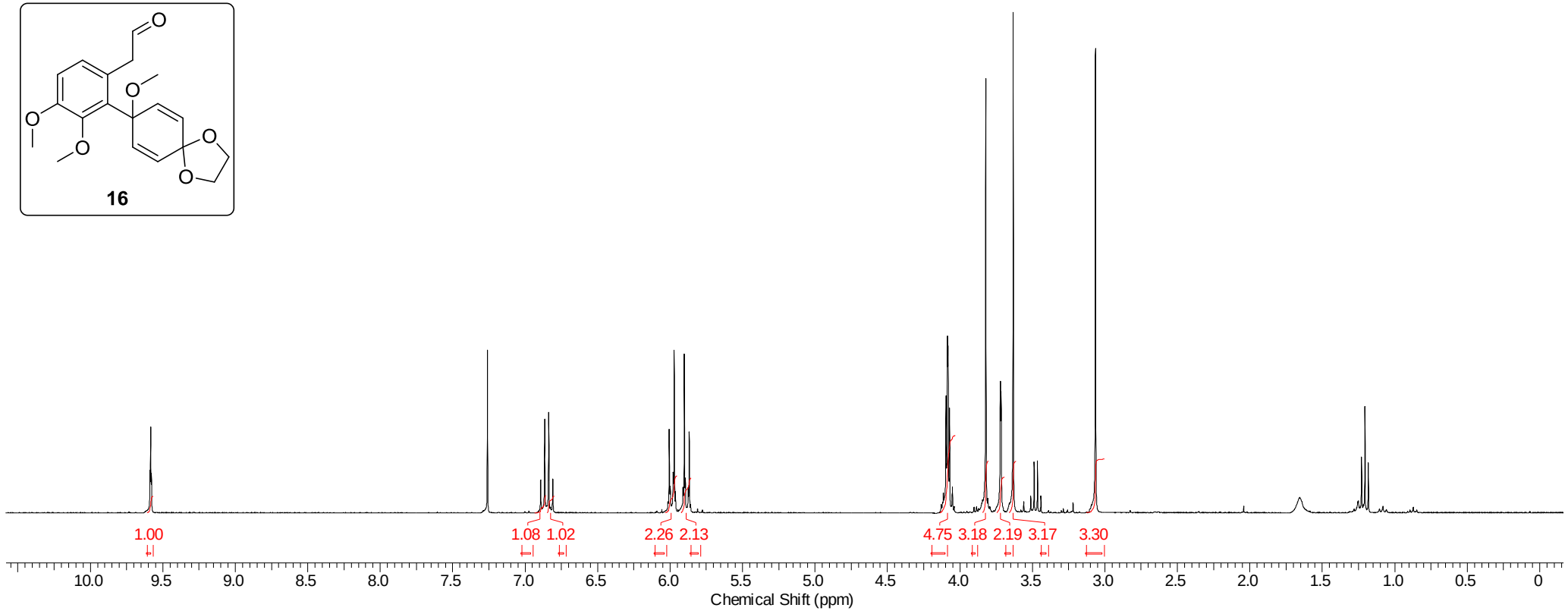

OH
O
O
O
O
O
15
1.00 1.00
1.95 1.92
3.91 2.08 2.87 2.92
2.93 1.97 0.91
7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0
Chemical Shift (ppm)

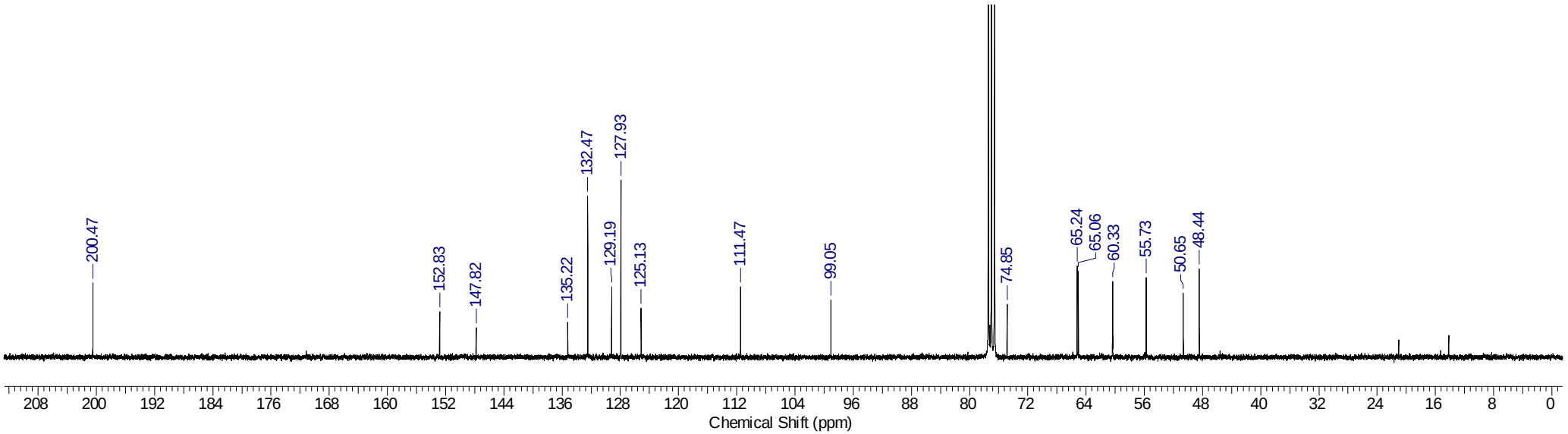

151.79
147.39
135.04
132.88
131.16
127.83
127.22
111.94
99.07
74.98
65.23
65.09
64.77
60.17
55.81
49.19
36.86
168 160 152 144 136 128 120 112 104 96 88 80 72 64 56 48 40 32 24 16 8 0
Chemical Shift (ppm)

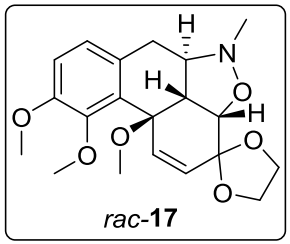

3
1.00
17.15
1.25
1.08
2.02
1.89
1.13
1.12
3.34
2.09
3.22
3.12
Chemical Shift (ppm)


200.49
152.84
147.84
136.65
132.84
132.63
129.23
128.51
128.41
126.89
126.55
125.19
111.45
99.64
85.62
74.94
60.46
55.72
50.67
48.71
Chemical Shift (ppm)

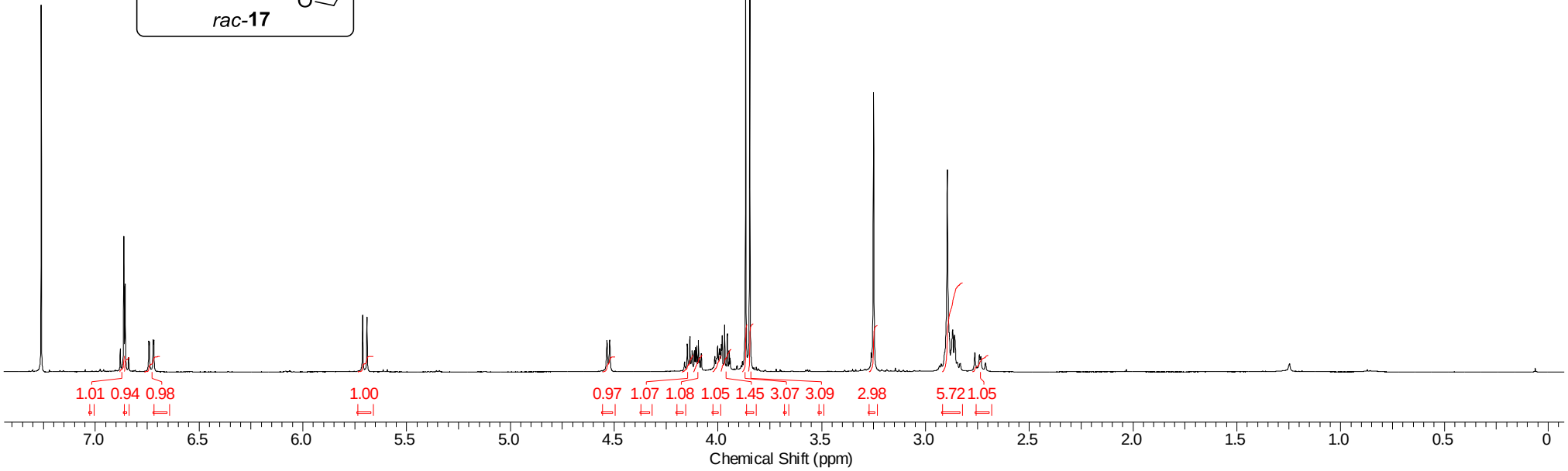
16

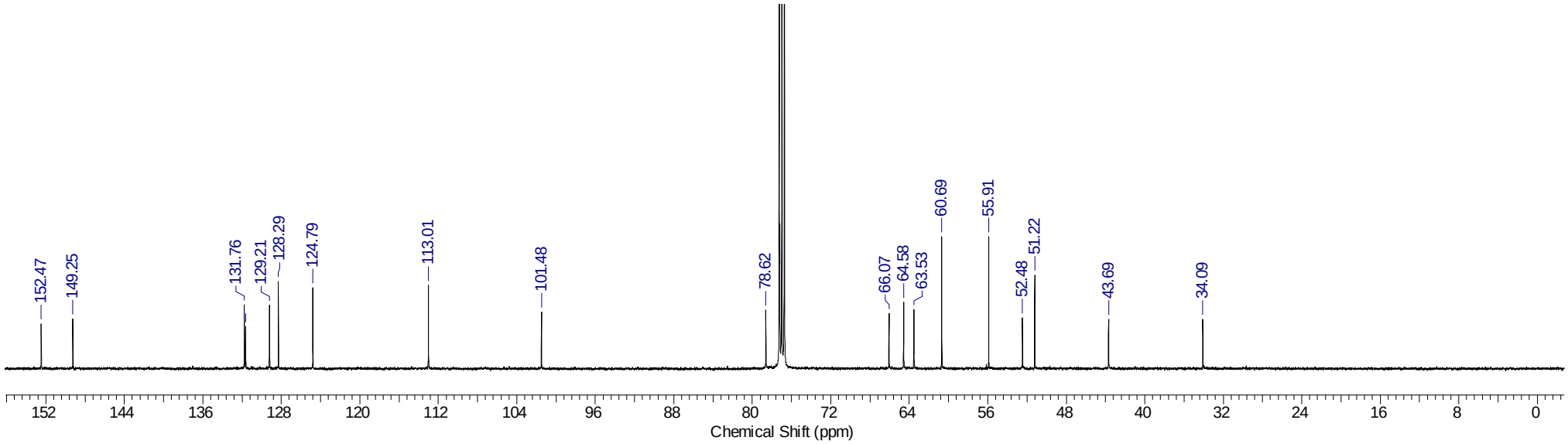

1.00
1.08 1.02
2.26 2.13
4.75 3.18 2.19 3.17
3.30
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0
Chemical Shift (ppm)


200.47
152.83
147.82
135.22
132.47
129.19
127.93
125.13
111.47
99.05
74.85
65.24
65.06
60.33
55.73
50.65
48.44
208 200 192 184 176 168 160 152 144 136 128 120 112 104 96 88 80 72 64 56 48 40 32 24 16 8 0
Chemical Shift (ppm)


H
N
H
O
H
O
O
O
O
O

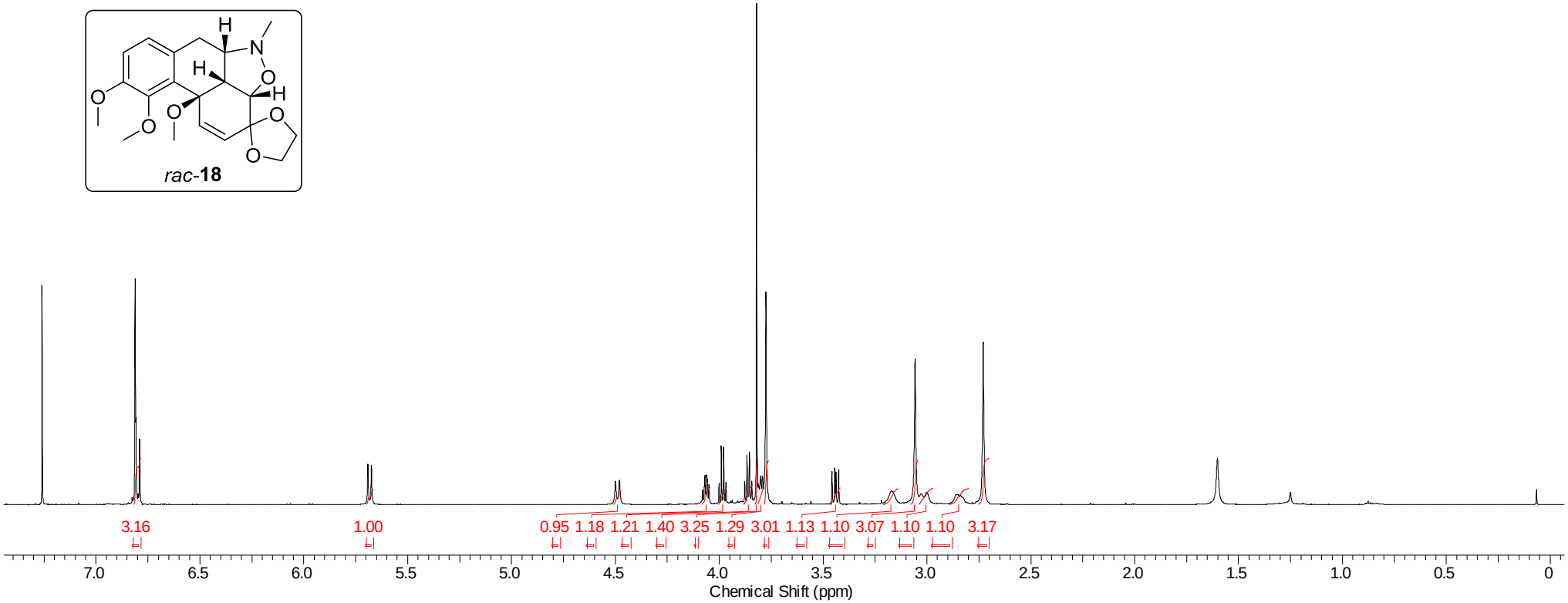
rac-**17**

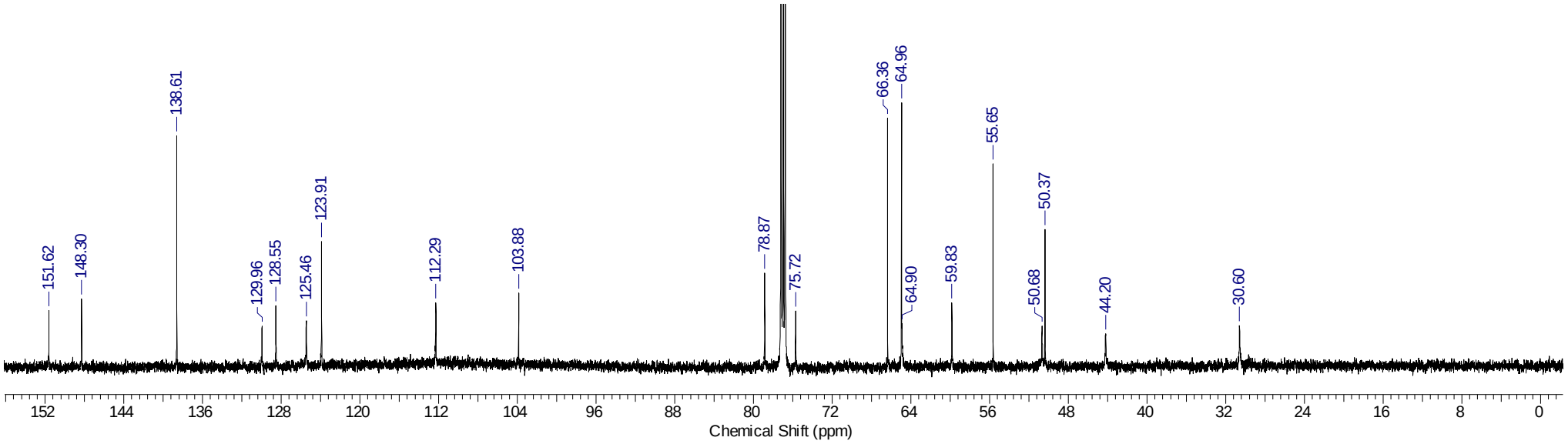

1.01 0.94 0.98
1.00
0.97 1.07 1.08 1.05 1.45 3.07 3.09
2.98
5.72 1.05
7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0
Chemical Shift (ppm)

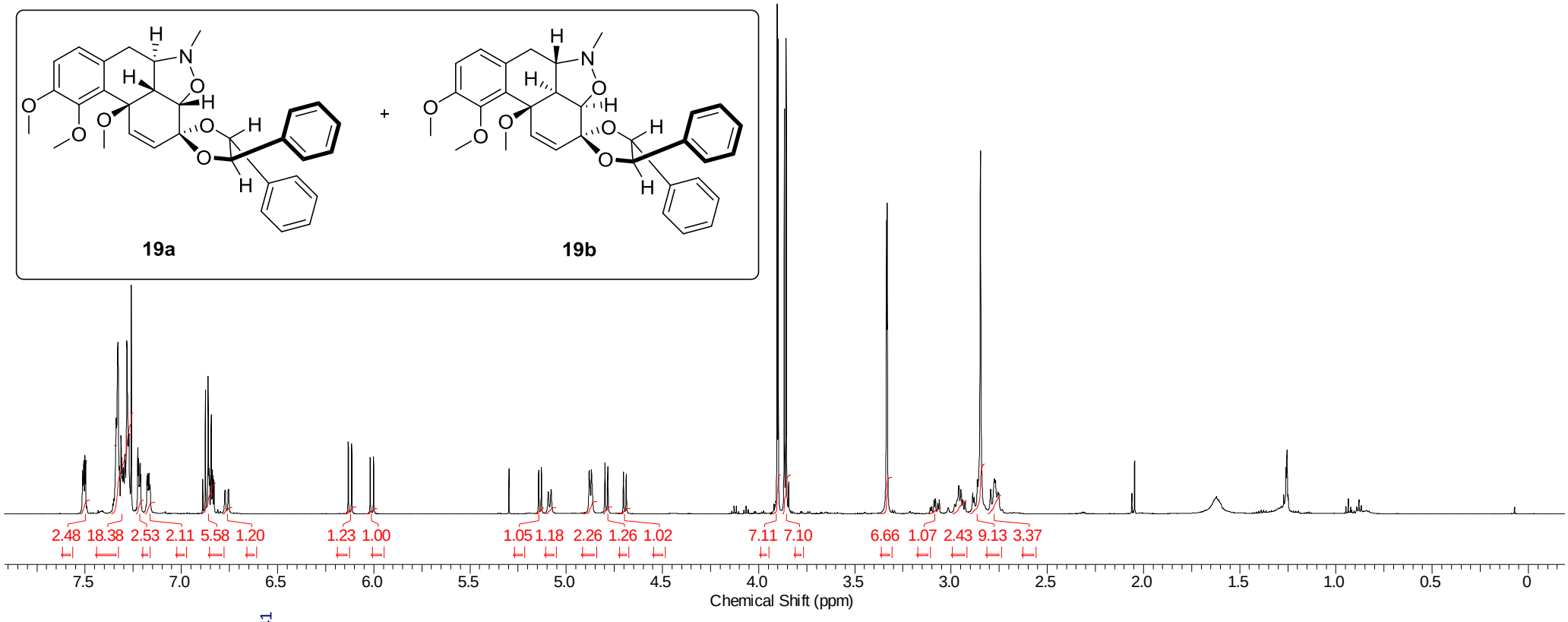

152.47
149.25
131.76
129.21
128.29
124.79
113.01
101.48
78.62
66.07
64.58
63.53
60.69
55.91
52.48
51.22
43.69
34.09
152 144 136 128 120 112 104 96 88 80 72 64 56 48 40 32 24 16 8 0
Chemical Shift (ppm)

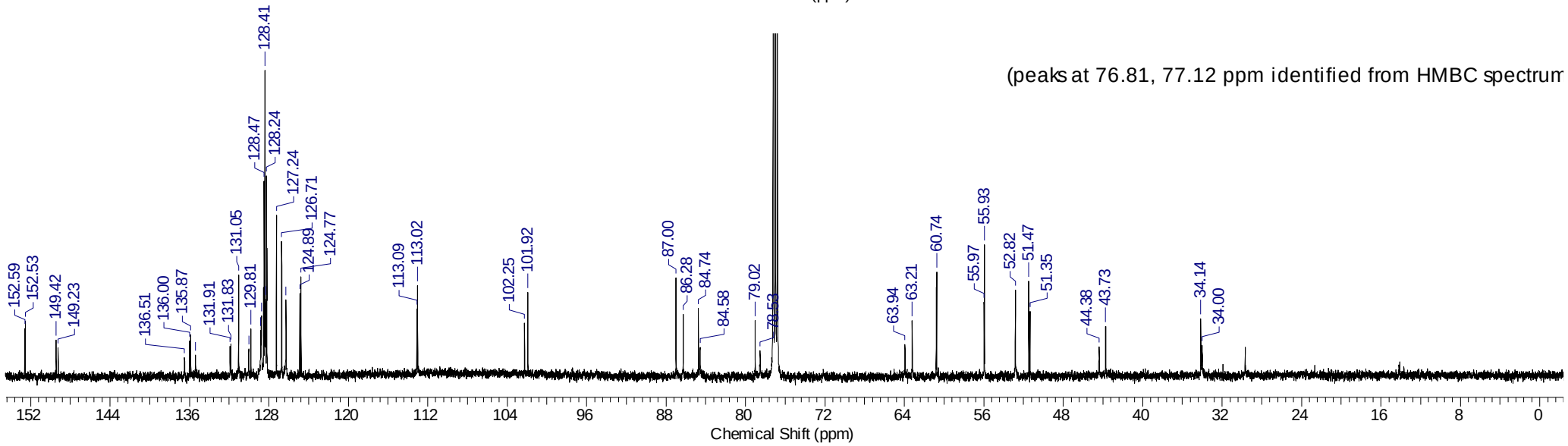
H
N
H
O
H
O
O
O
O
O
O

rac-**18**

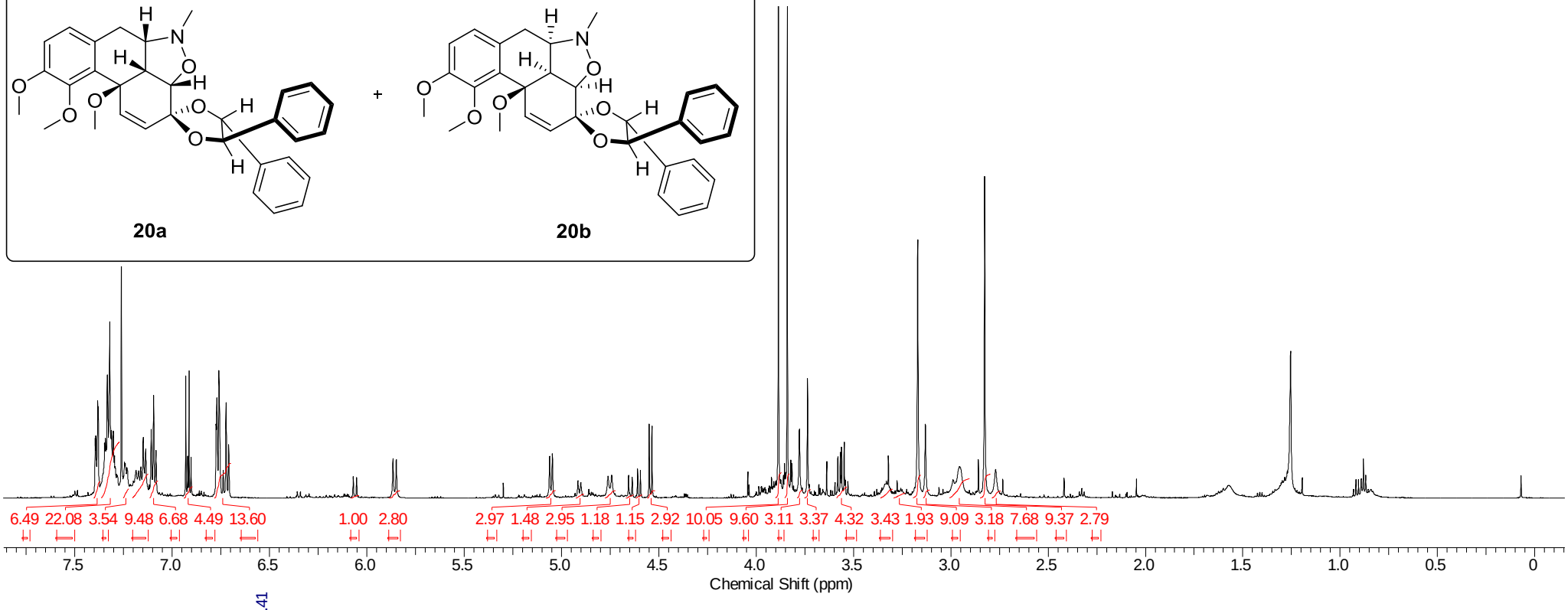

3.16
1.00
0.95 1.18 1.21 1.40 3.25 1.29 3.01 1.13 1.10 3.07 1.10 1.10 3.17
7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0
Chemical Shift (ppm)

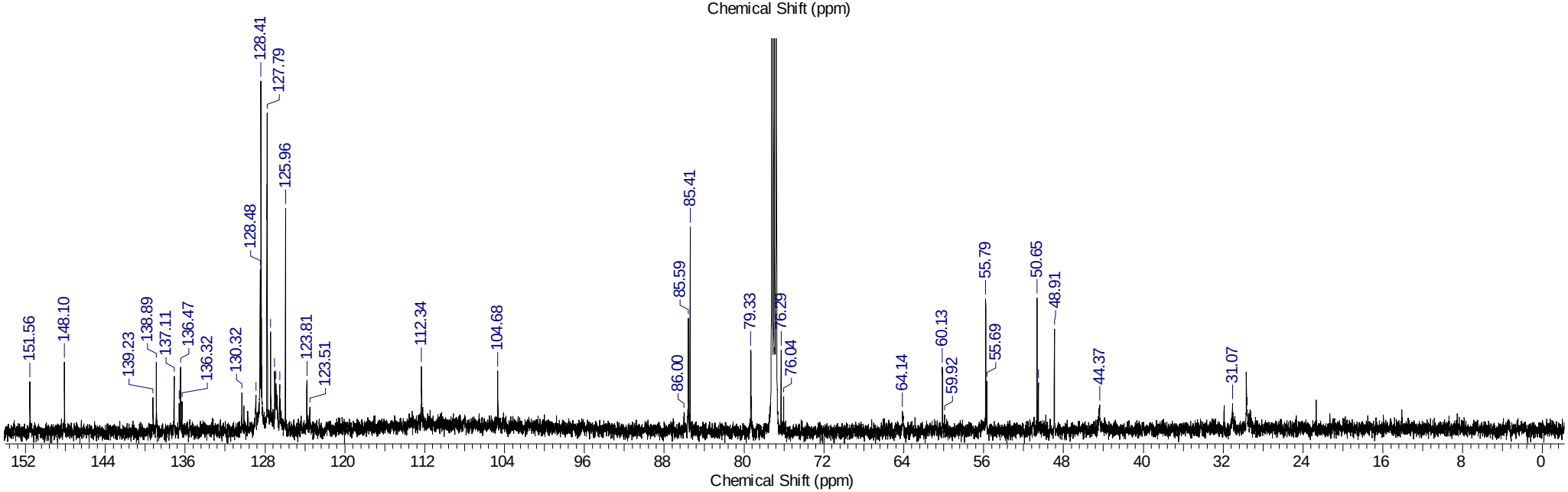

151.62
148.30
138.61
129.96
128.55
125.46
123.91
112.29
103.88
78.87
75.72
66.36
64.96
64.90
59.83
55.65
50.68
50.37
44.20
30.60
152 144 136 128 120 112 104 96 88 80 72 64 56 48 40 32 24 16 8 0
Chemical Shift (ppm)

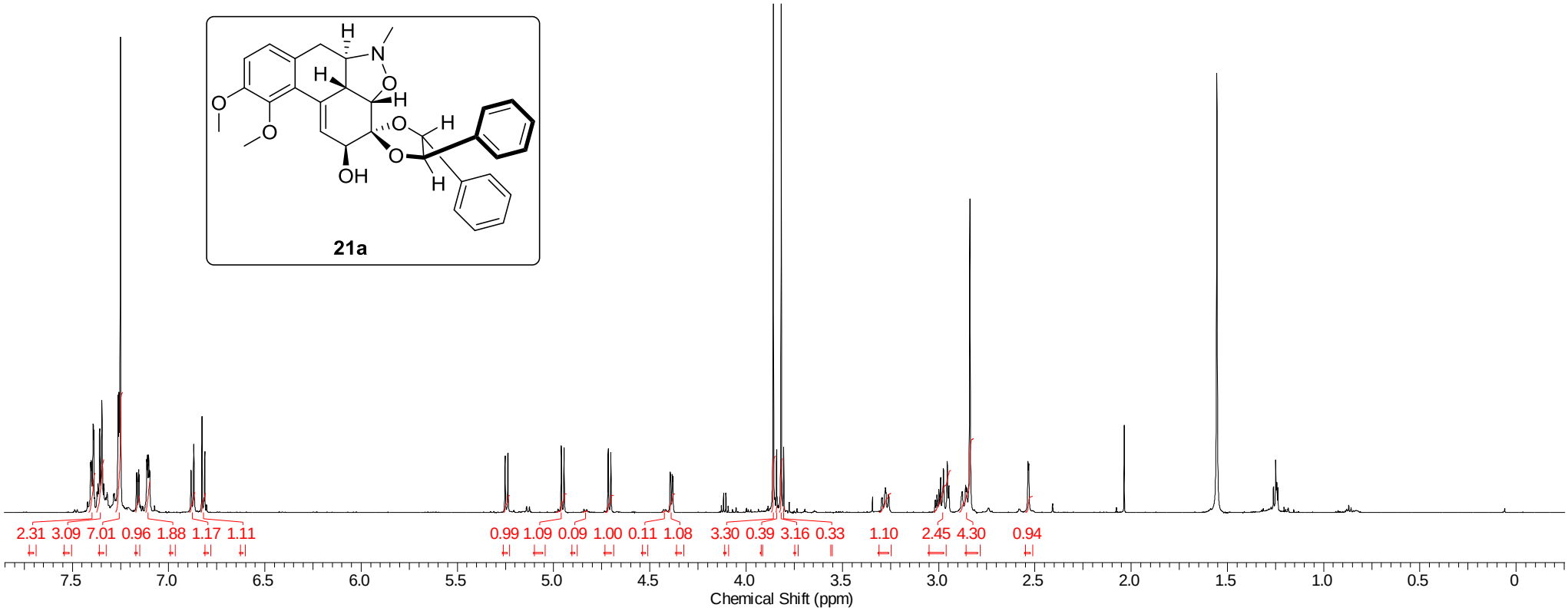

19a
19b
2.48 18.38 2.53 2.11 5.58 1.20
1.23 1.00
1.05 1.18 2.26 1.26 1.02
7.11 7.10
6.66 1.07 2.43 9.13 3.37
Chemical Shift (ppm)

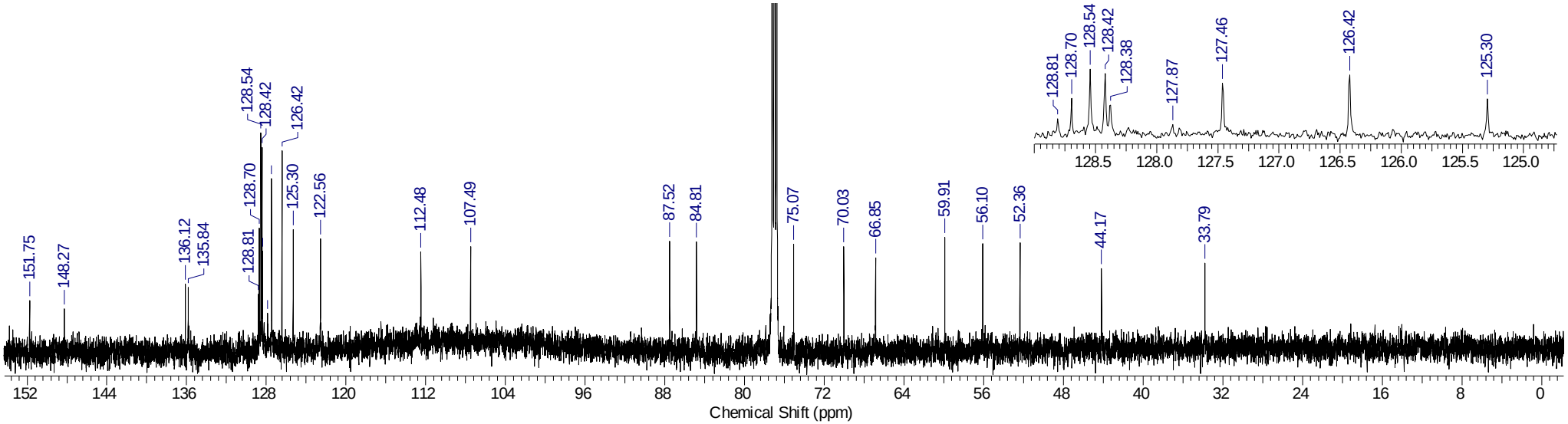

(peaks at 76.81, 77.12 ppm identified from HMBC spectrum
152.59 152.53 149.42 149.23 136.51 136.00 135.87 131.91 131.83 131.05 129.81 128.41 128.47 128.24 127.24 126.71 124.89 124.77 113.09 113.02 102.25 101.92 87.00 86.28 84.74 84.58 79.02 78.53 63.94 63.21 60.74 55.97 55.93 52.82 51.47 51.35 44.38 43.73 34.14 34.00
Chemical Shift (ppm)

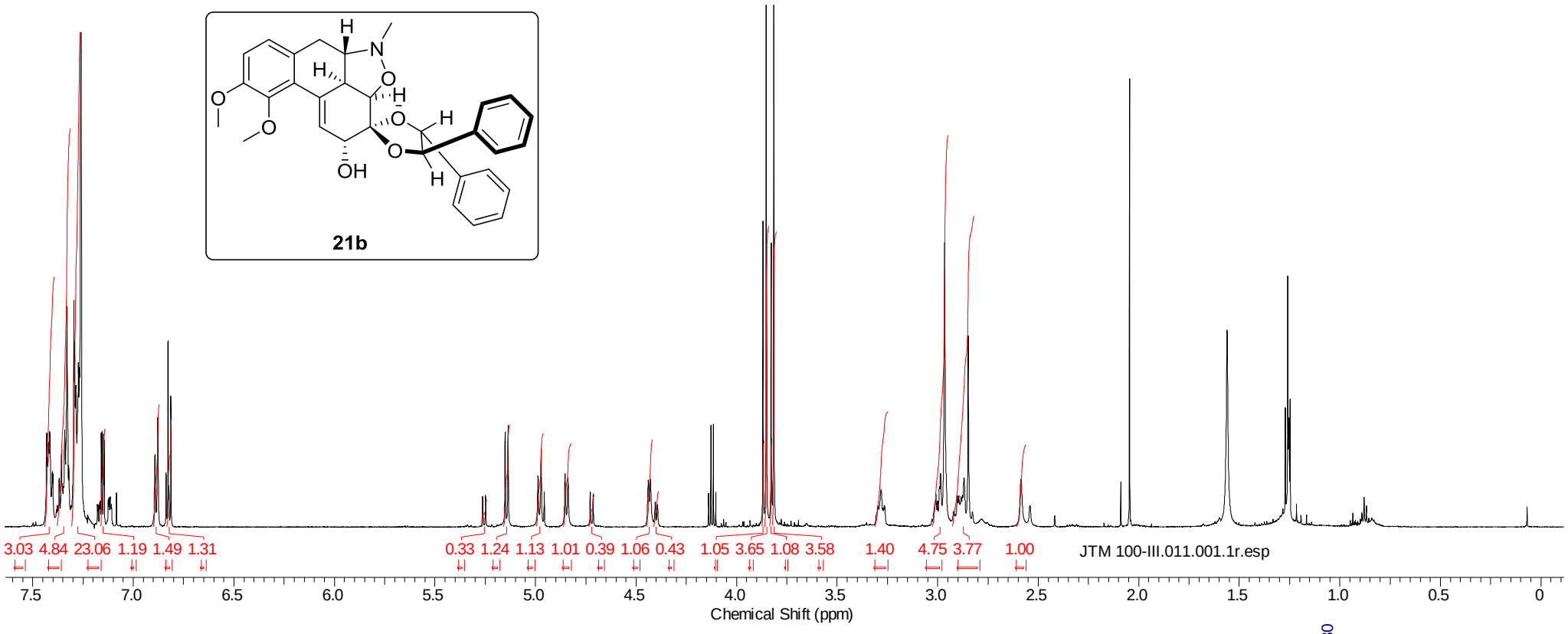
20a
+
20b

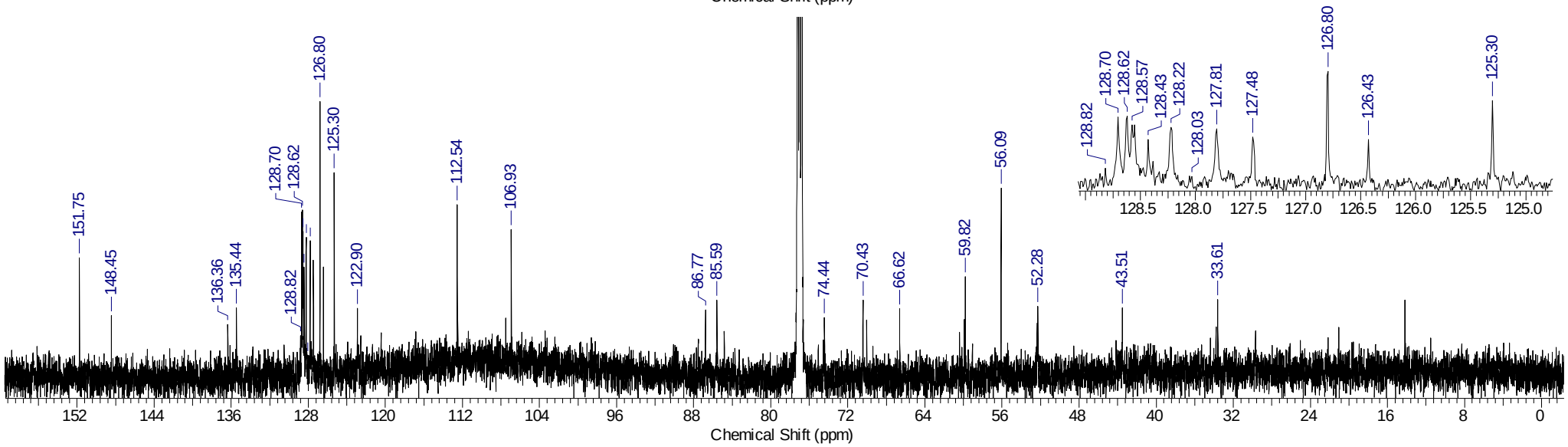

6.49 22.08 3.54 9.48 6.68 4.49 13.60 1.00 2.80 2.97 1.48 2.95 1.18 1.15 2.92 10.05 9.60 3.11 3.37 4.32 3.43 1.93 9.09 3.18 7.68 9.37 2.79
7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0
Chemical Shift (ppm)


151.56 148.10 139.23 138.89 137.11 136.47 136.32 130.32 128.48 128.41 127.79 125.96 123.81 123.51 112.34 104.68 86.00 85.59 85.41 79.33 76.29 76.04 64.14 60.13 59.92 55.79 55.69 50.65 48.91 44.37 31.07
152 144 136 128 120 112 104 96 88 80 72 64 56 48 40 32 24 16 8 0
Chemical Shift (ppm)


21a
2.31 3.09 7.01 0.96 1.88 1.17 1.11
0.99 1.09 0.09 1.00 0.11 1.08
3.30 0.39 3.16 0.33
1.10
2.45 4.30
0.94
Chemical Shift (ppm)


151.75
148.27
136.12
135.84
128.81
128.70
128.54
128.42
126.42
125.30
122.56
112.48
107.49
87.52
84.81
75.07
70.03
66.85
59.91
56.10
52.36
44.17
33.79
128.81
128.70
128.54
128.42
128.38
127.87
127.46
126.42
125.30
Chemical Shift (ppm)


21b
3.03 4.84 23.06 1.19 1.49 1.31
0.33 1.24 1.13 1.01 0.39 1.06 0.43 1.05 3.65 1.08 3.58 1.40 4.75 3.77 1.00
JTM 100-III.011.001.1r.esp
Chemical Shift (ppm)


151.75
148.45
136.36
135.44
128.82
128.70
128.62
126.80
125.30
122.90
112.54
106.93
86.77
85.59
74.44
70.43
66.62
59.82
56.09
52.28
43.51
33.61
128.82
128.70
128.62
128.57
128.43
128.22
128.03
127.81
127.48
126.80
126.43
125.30
Chemical Shift (ppm)