Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

One-pot domino reactions for selective synthesis of functionalized 2,8-oxazabicyclo[3.3.1]nones and *5H*-indeno[1,2-*b*]pyridine-5-ones[†]

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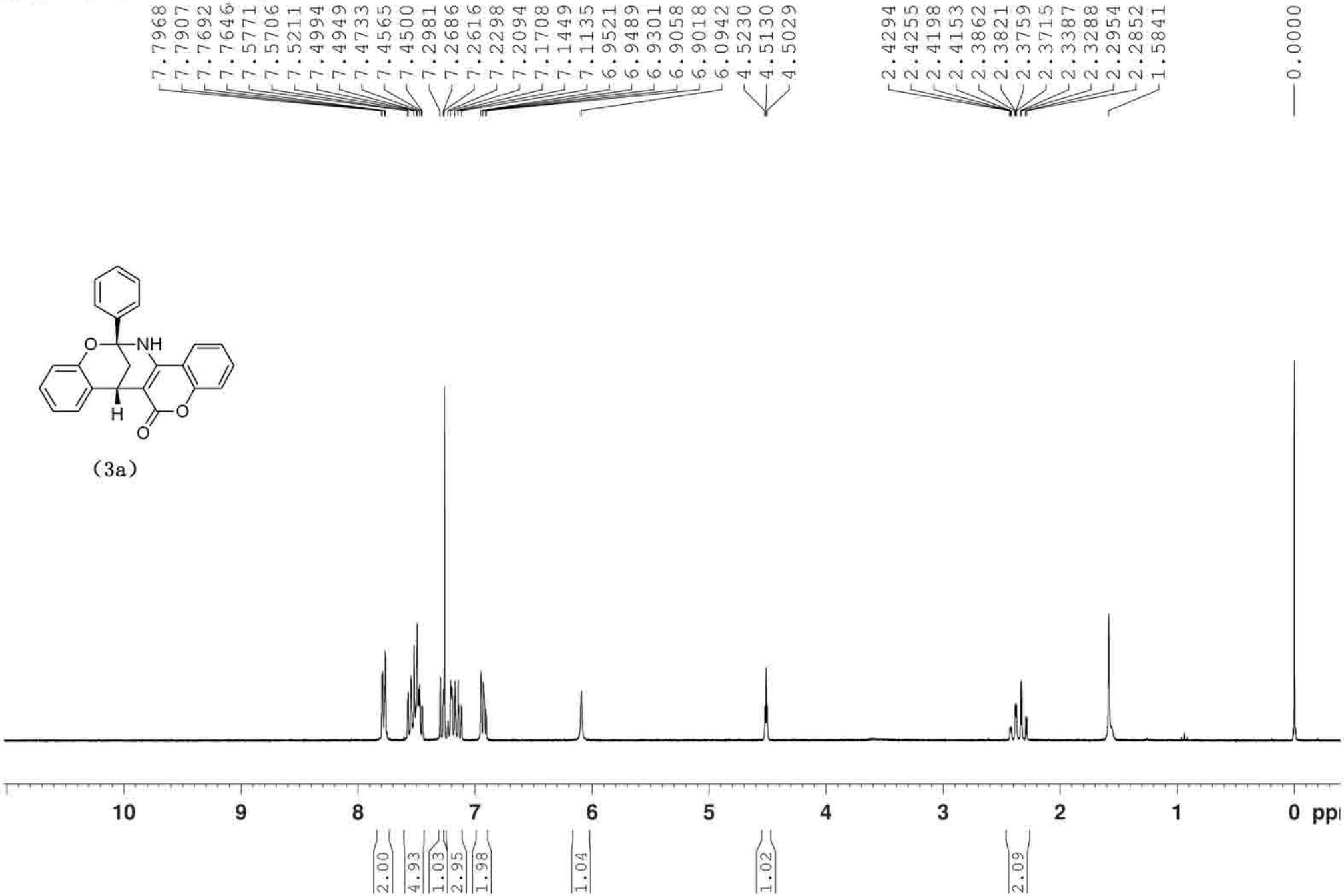
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H
O
O
(3a)
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7
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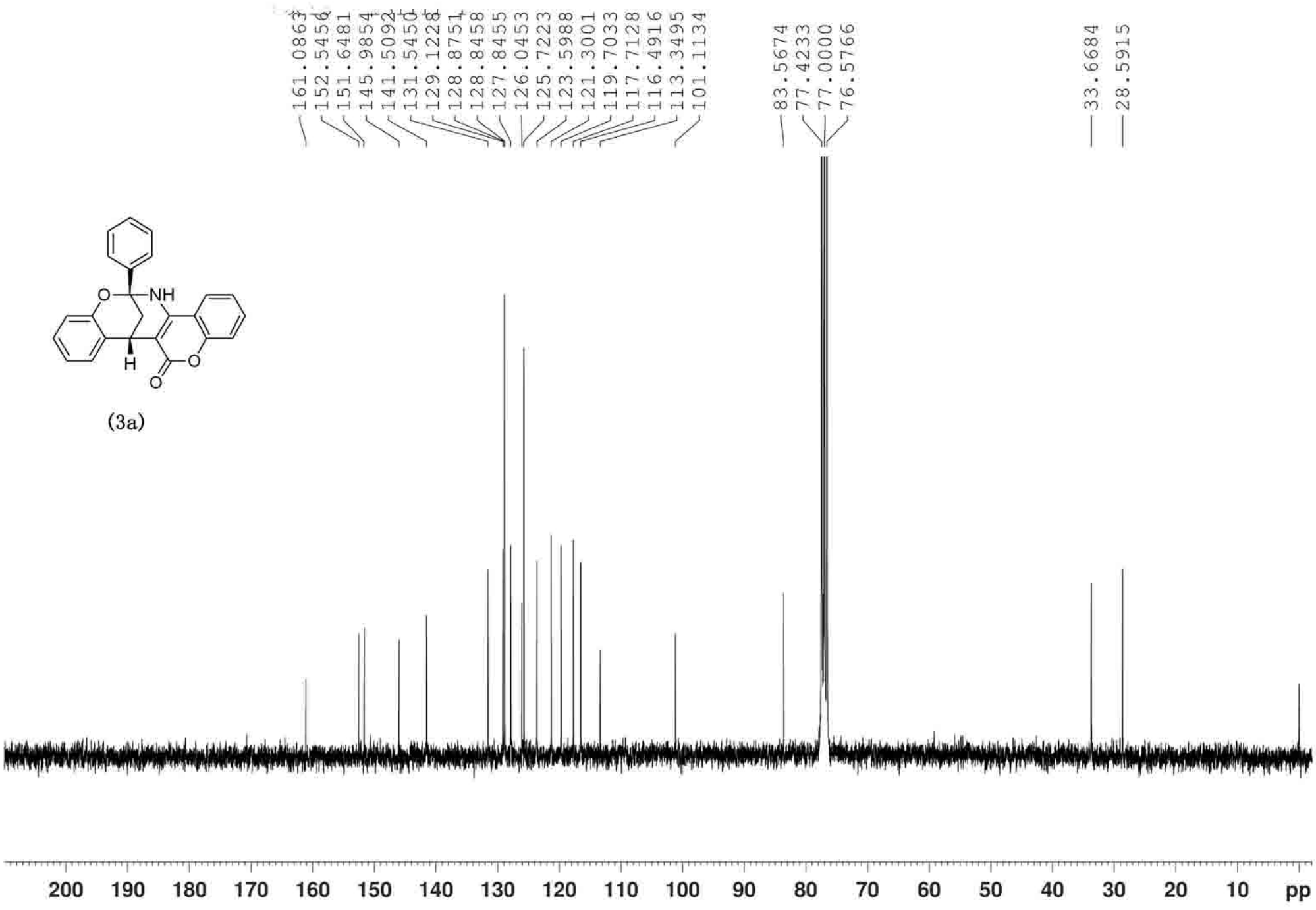
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O
NH
H
O
O
(3a)
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10
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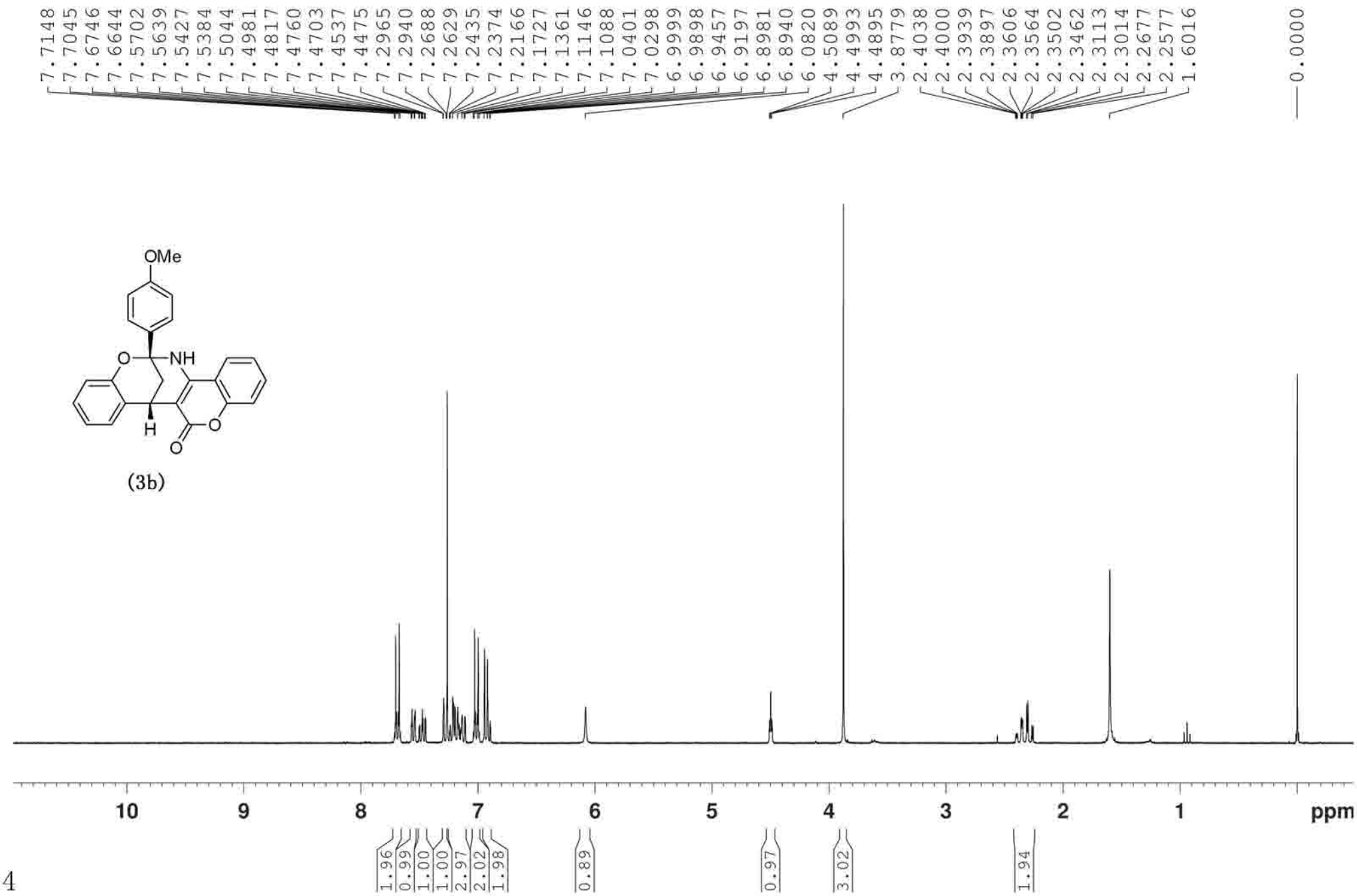
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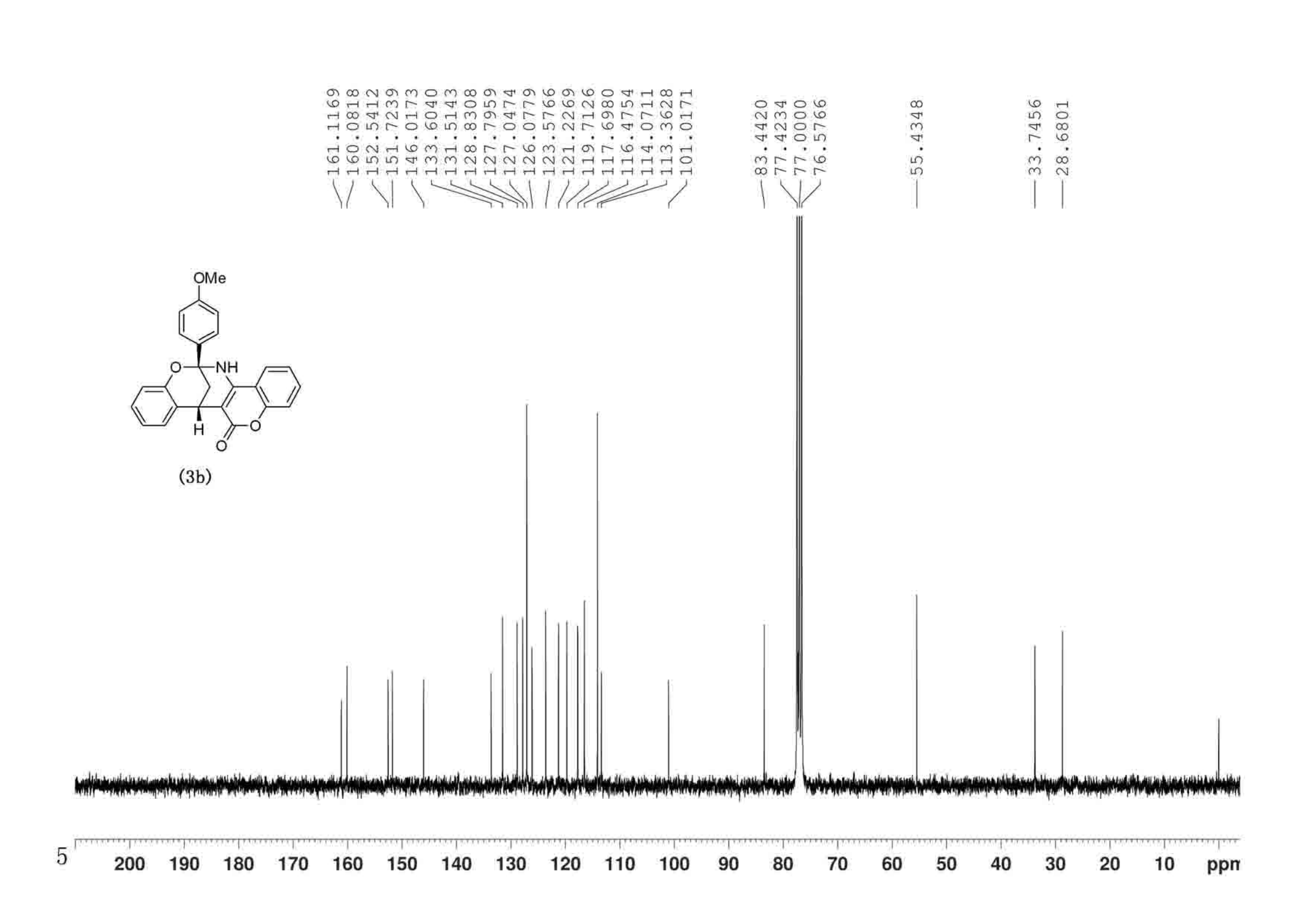
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NH
H
O
O
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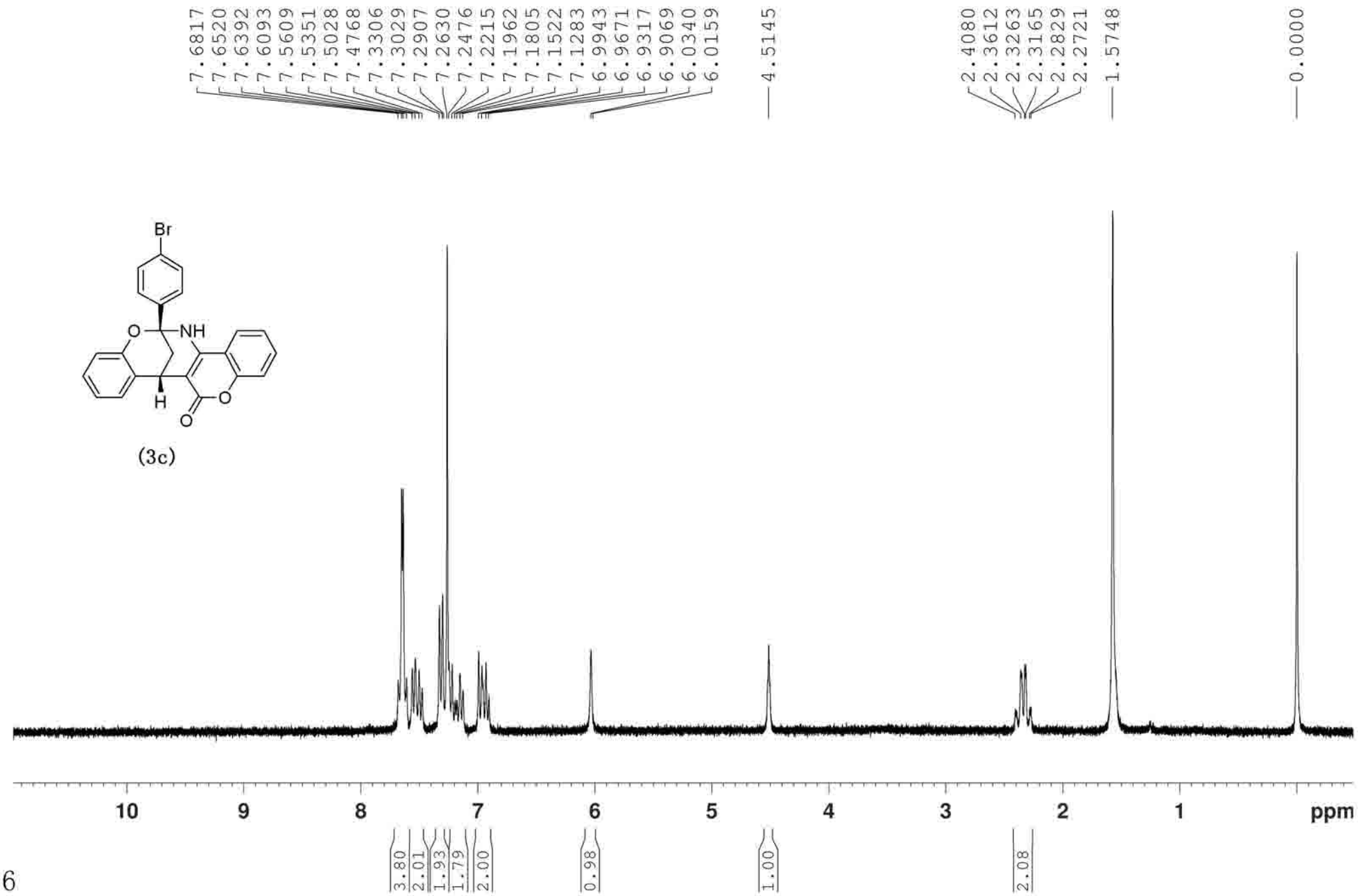
10
ppm

(3b)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H
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O
(3c)
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8
7
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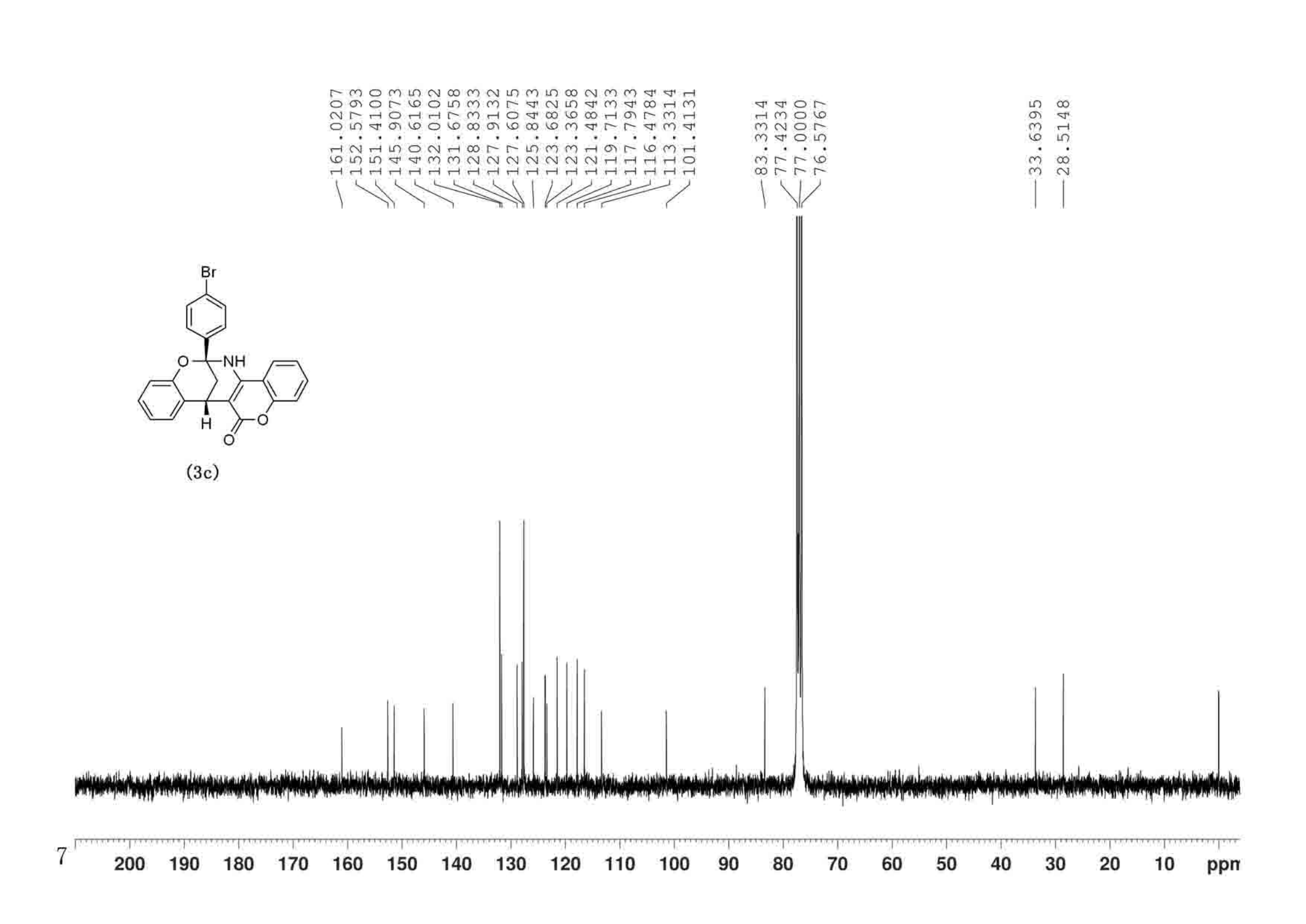
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H
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O
(3c)
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150
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130
120
110
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60
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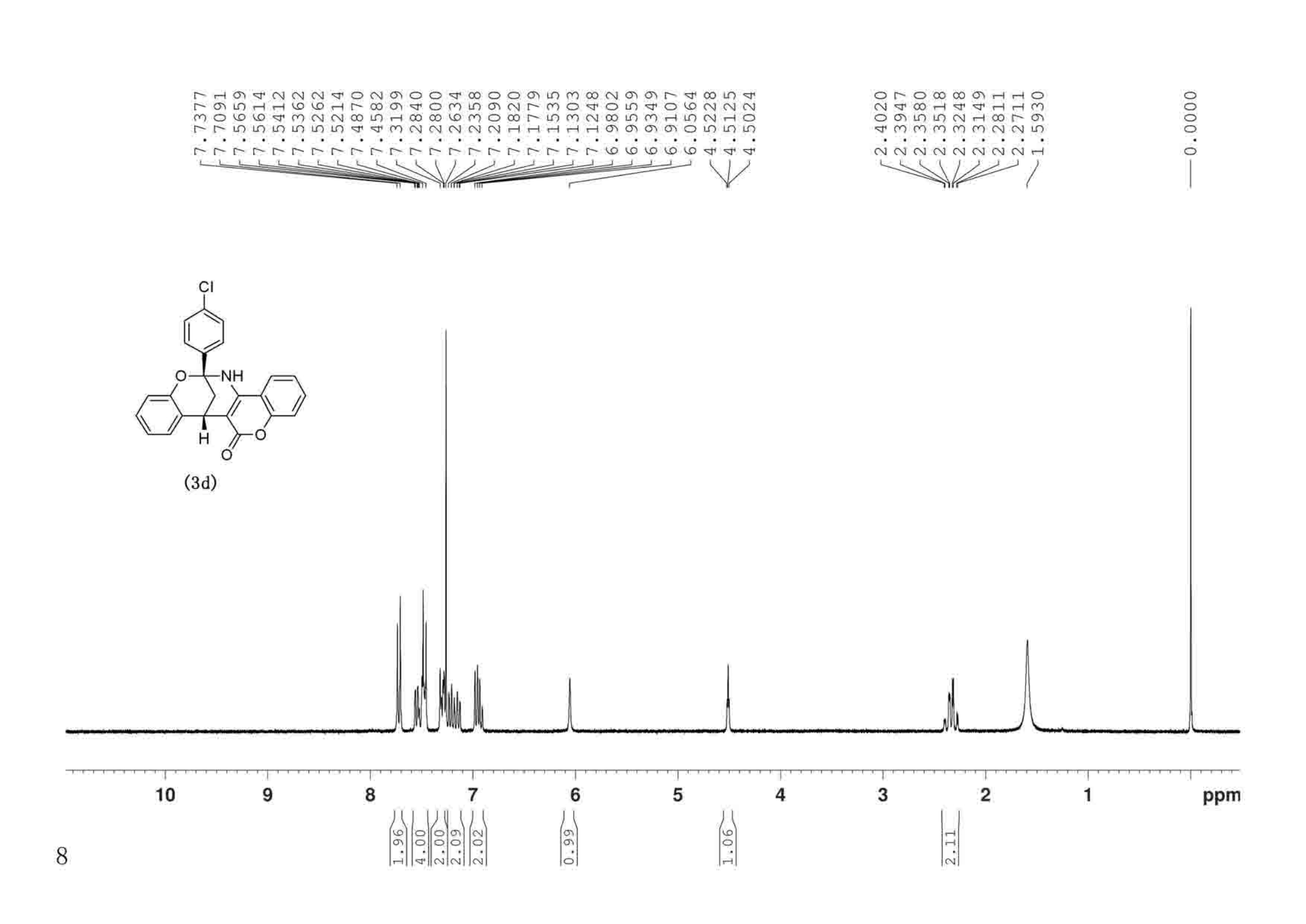
20
10
ppm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NH
H
O
O
(3d)
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8
7
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2.00
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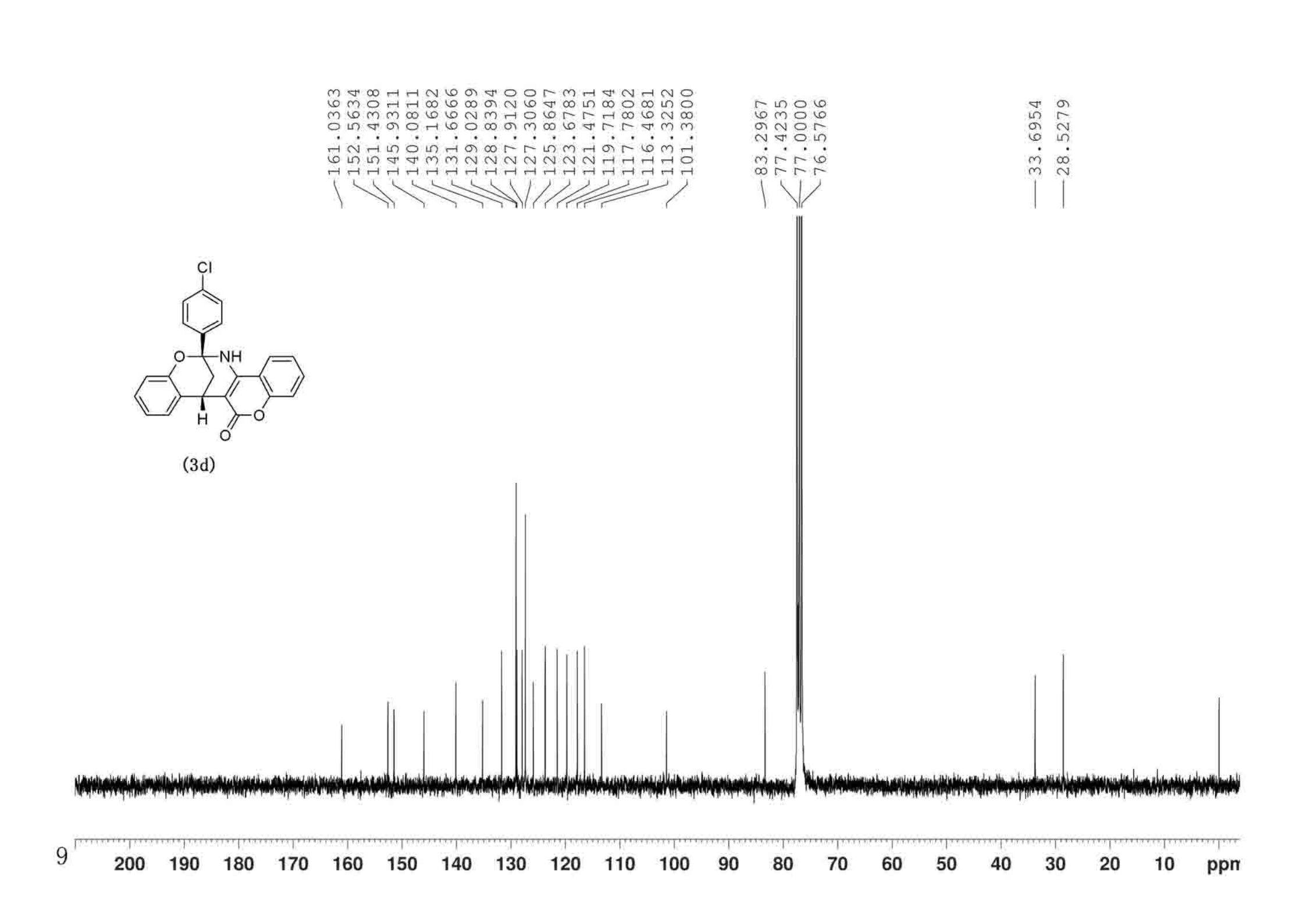
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77.0000
76.5766
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Cl
O
NH
H
O
O
(3d)
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150
140
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120
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60
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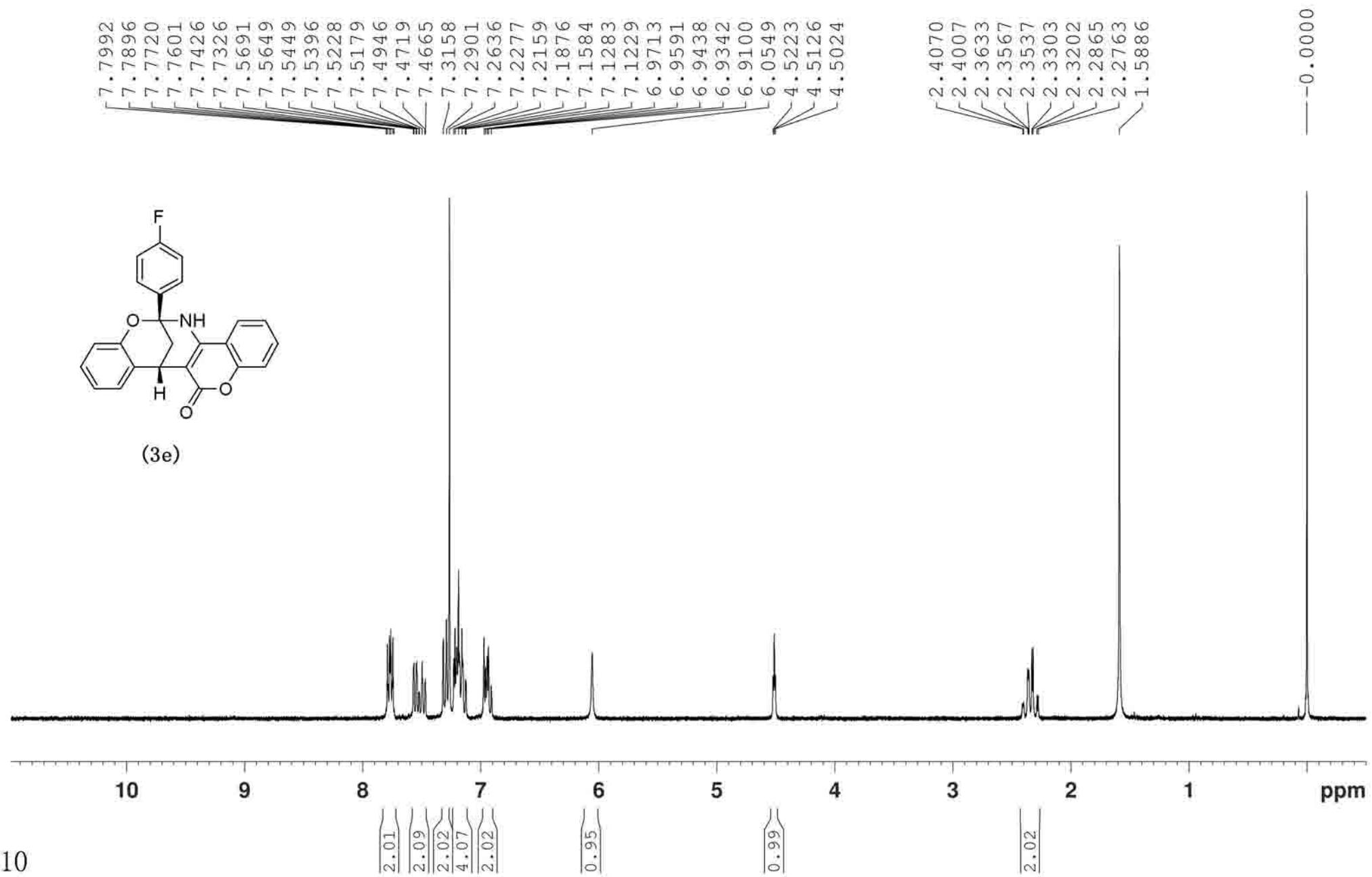
30
20
10
ppm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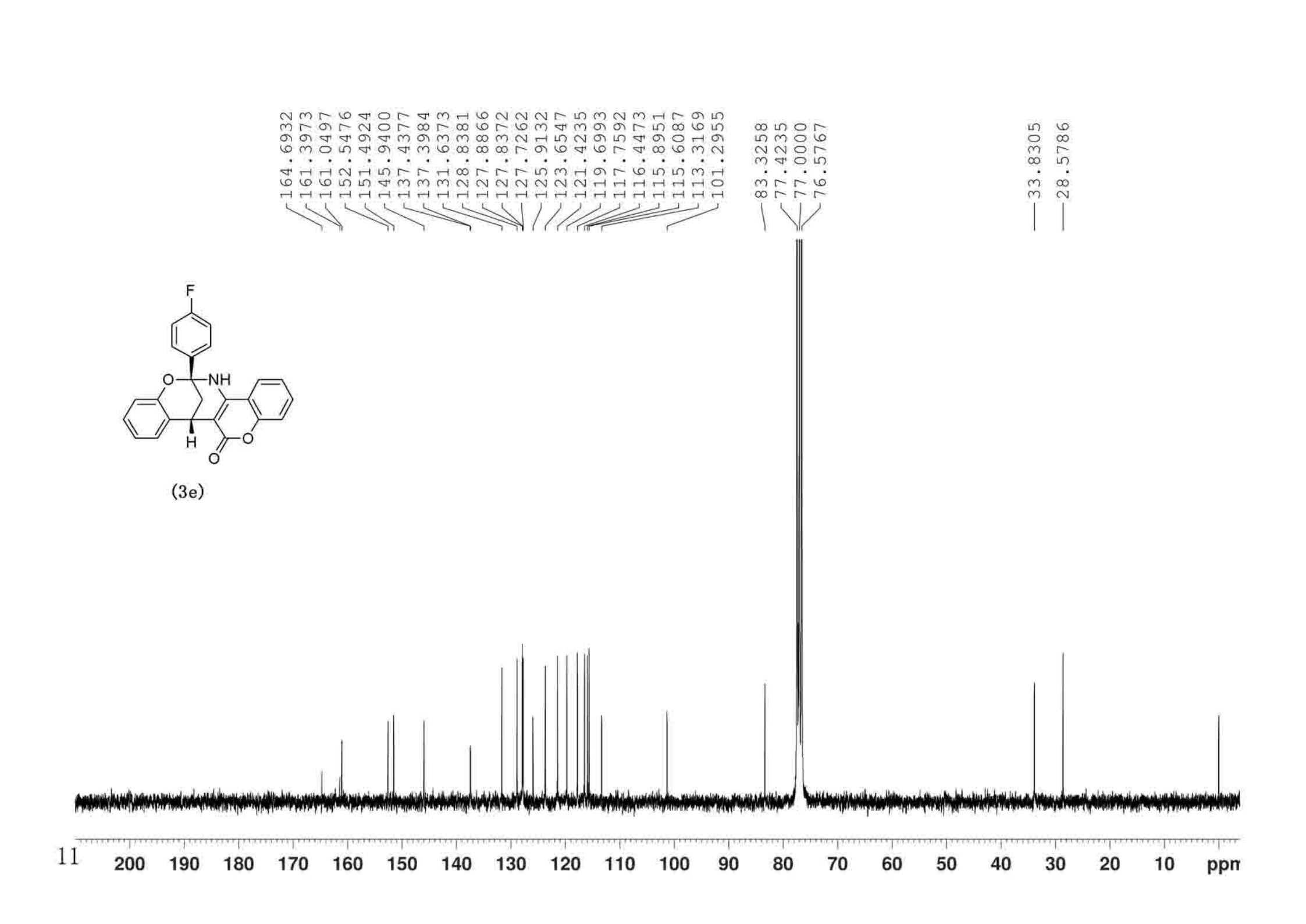
2.02

(3e)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F
O
NH
H
O
O
(3e)
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150
140
130
120
110
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10
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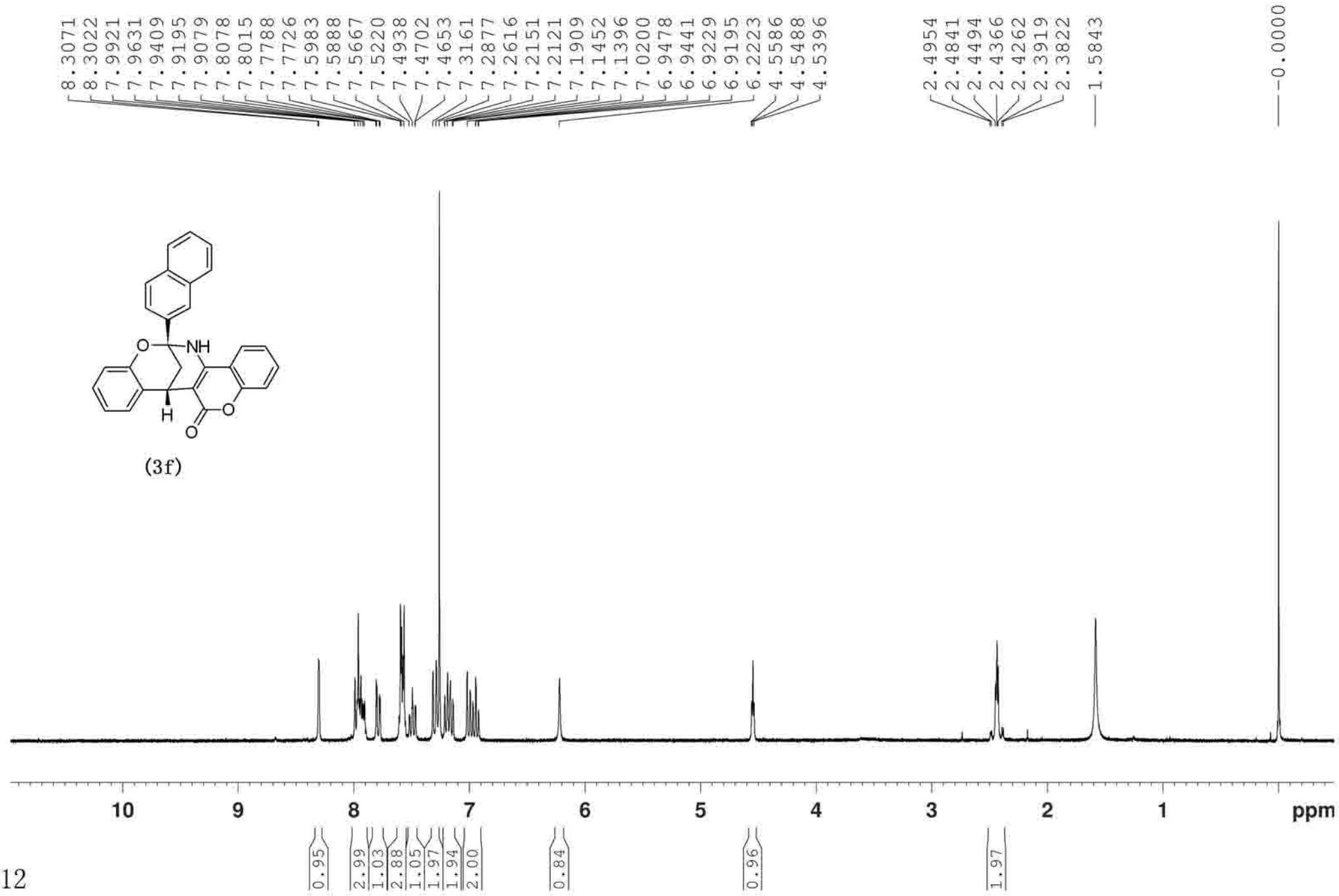
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H
O
O
(3f)
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9
8
7
6
5
4
3
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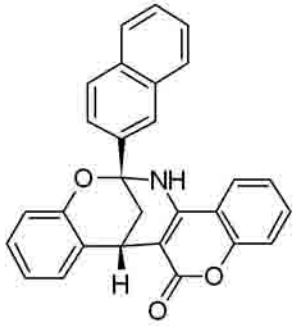

(3f)

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13

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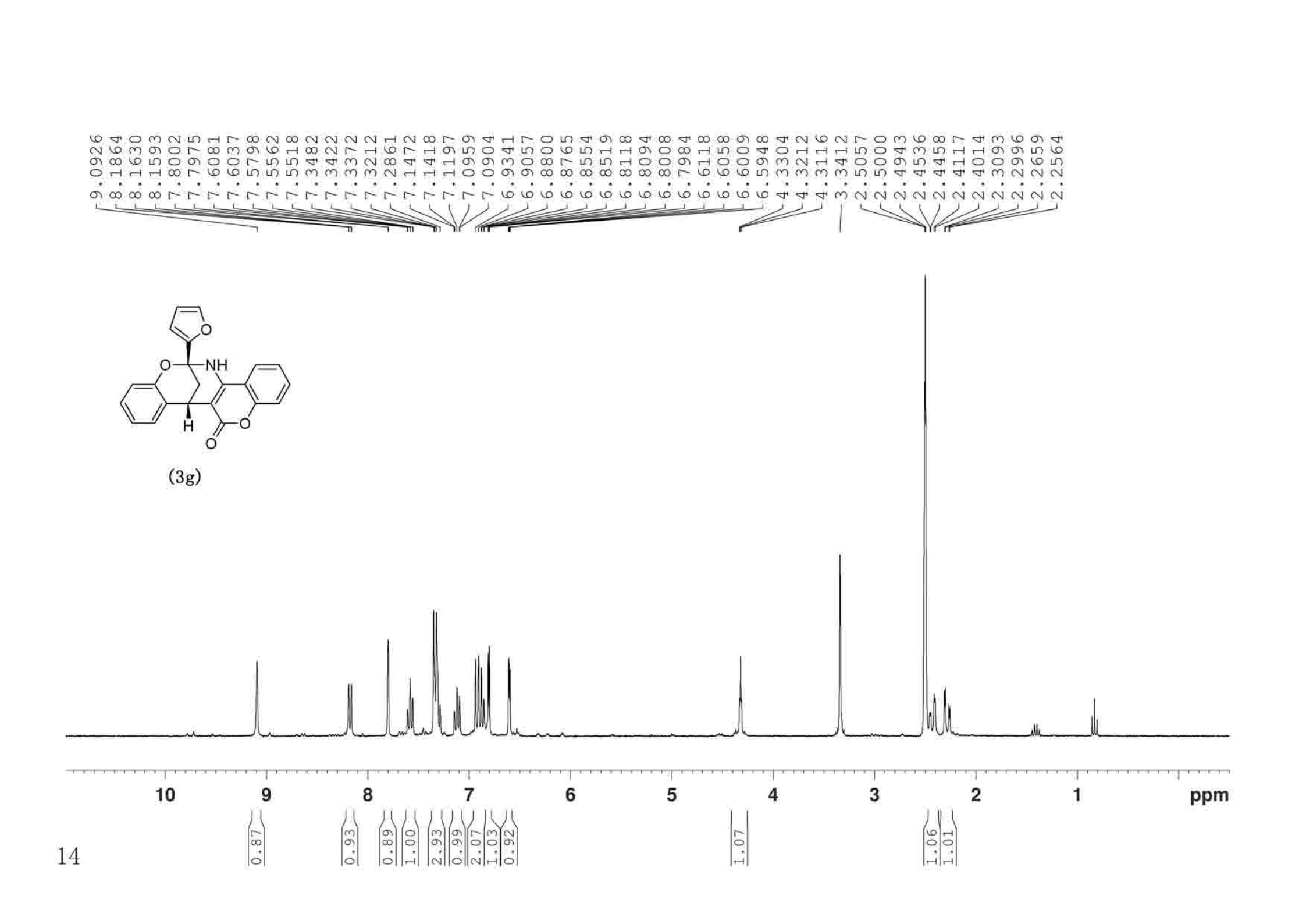
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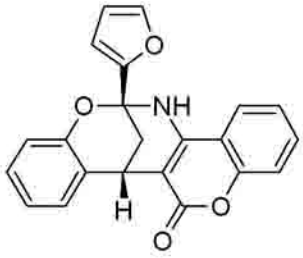
(3g)



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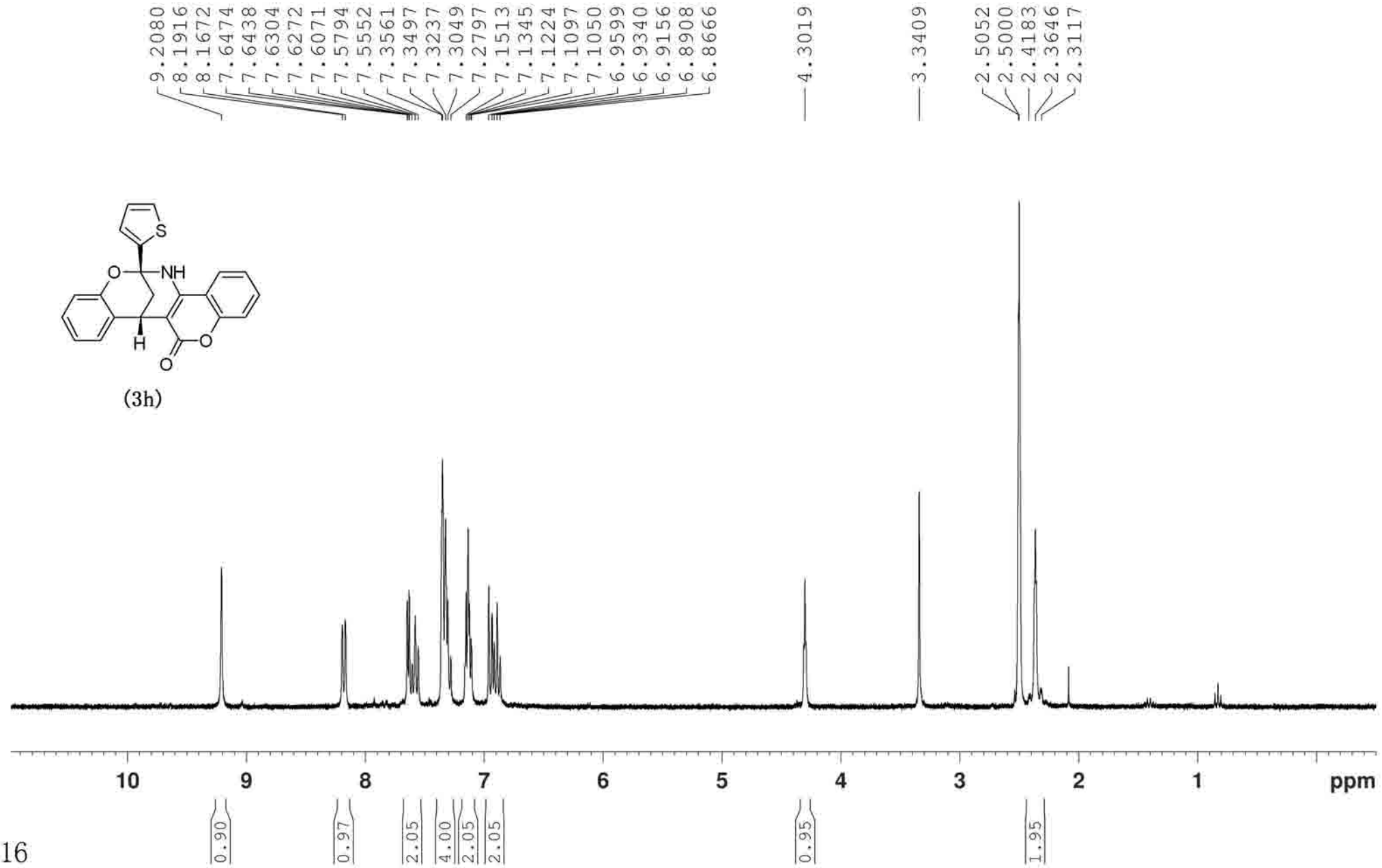
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O
O
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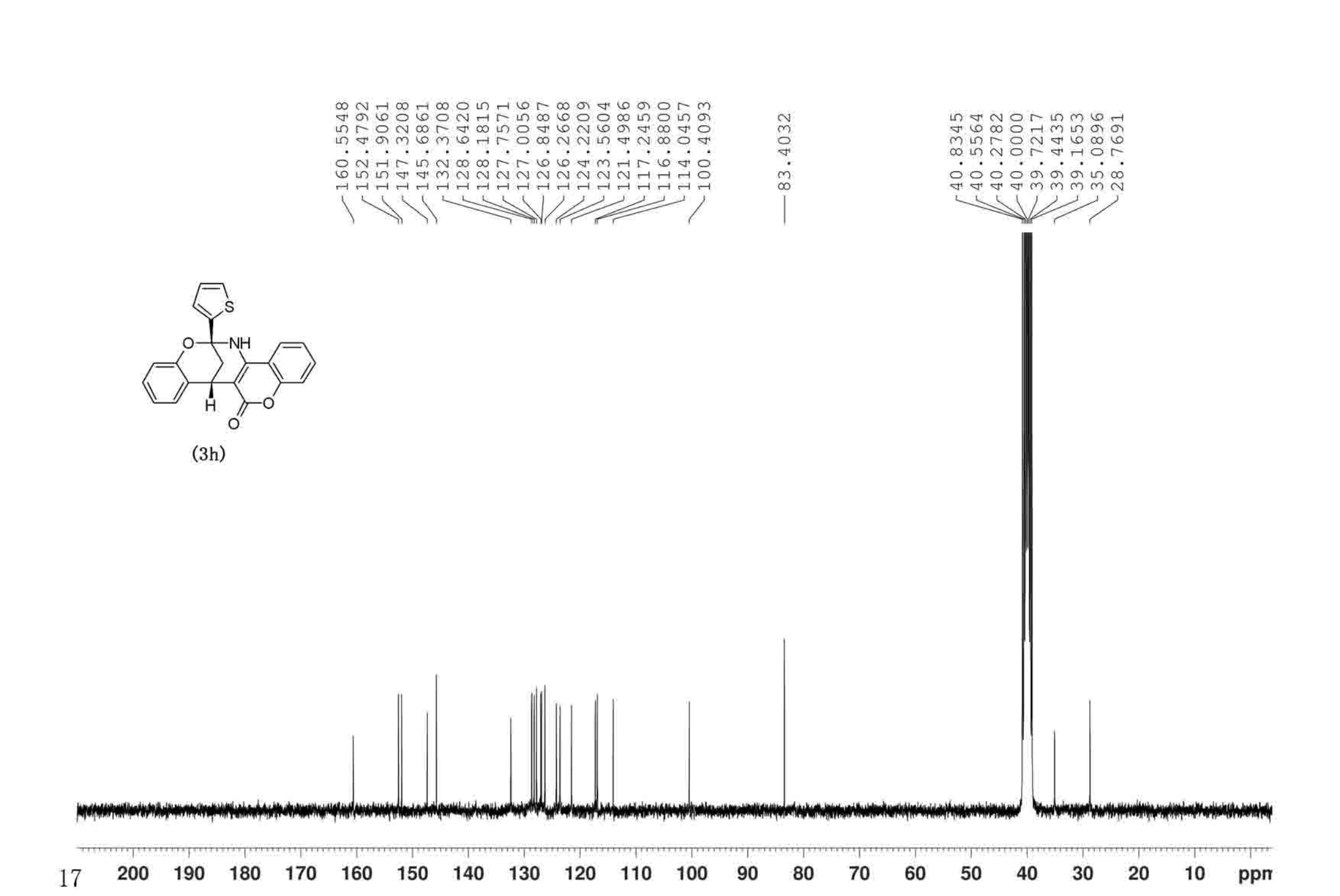
(3h)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O
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H
O
O
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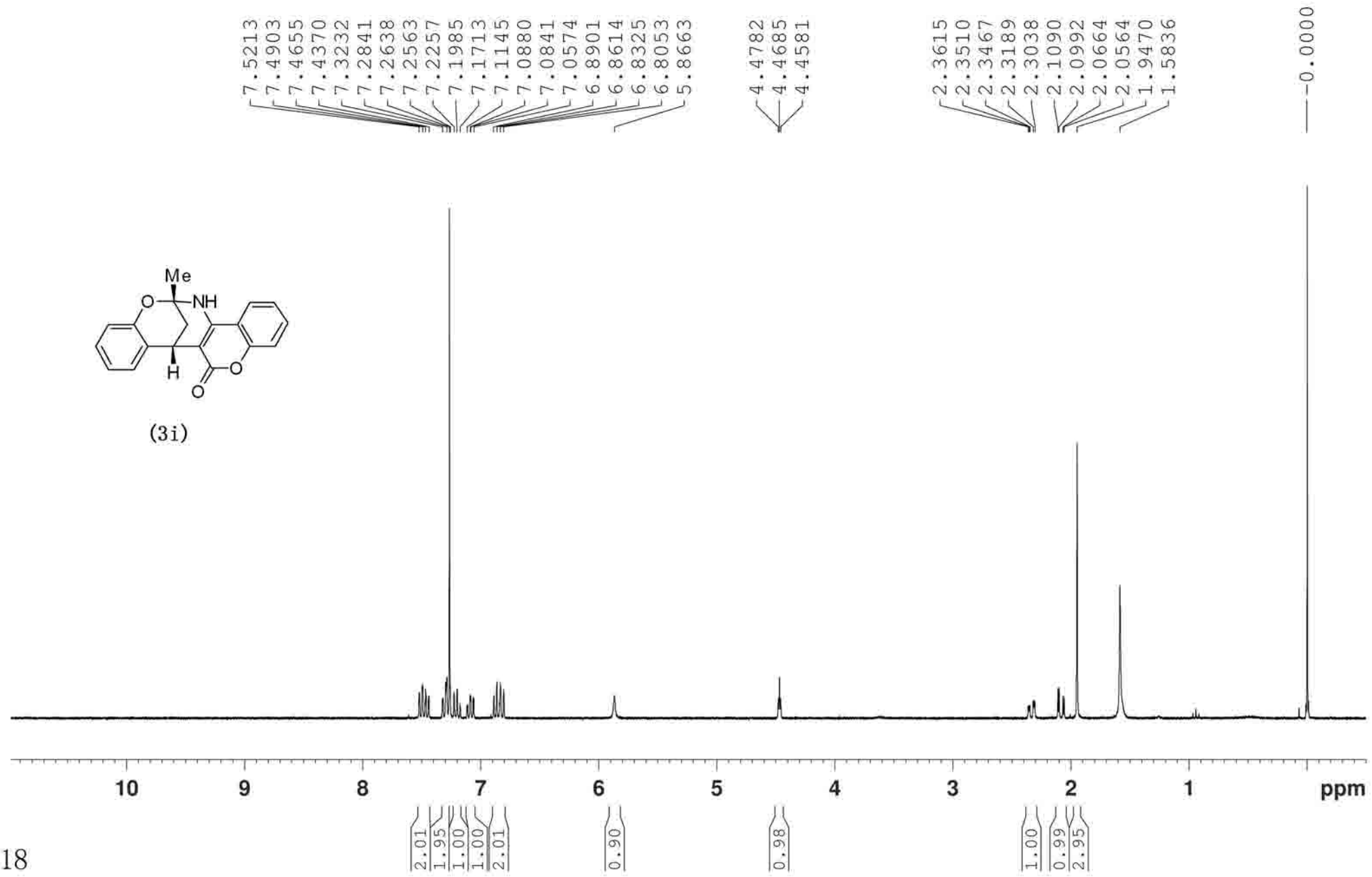
(3h)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O
NH
H
O
O
10
9
8
7
6
5
4
3
2
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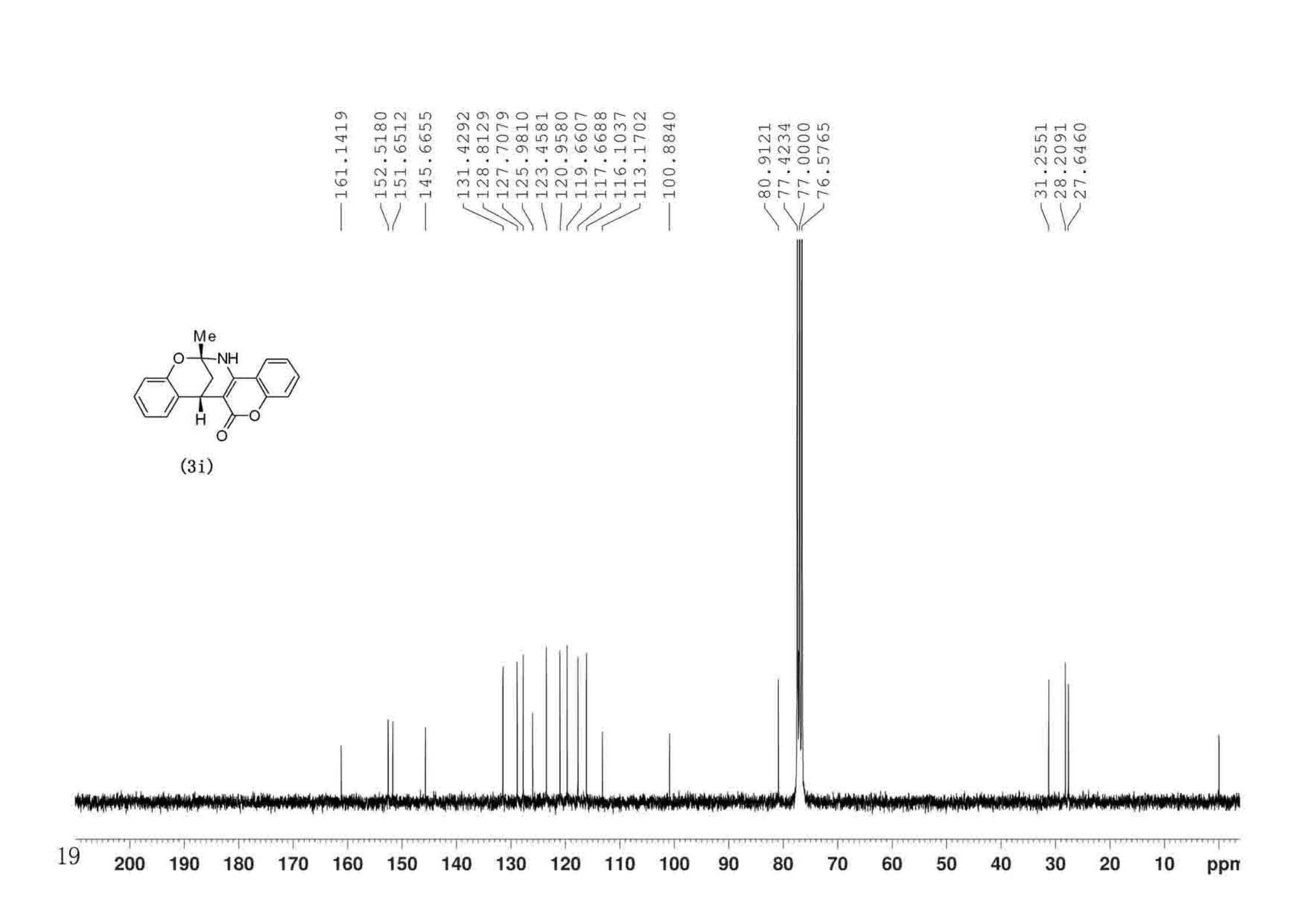
(3i)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O
NH
H
O
O
(3i)
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10
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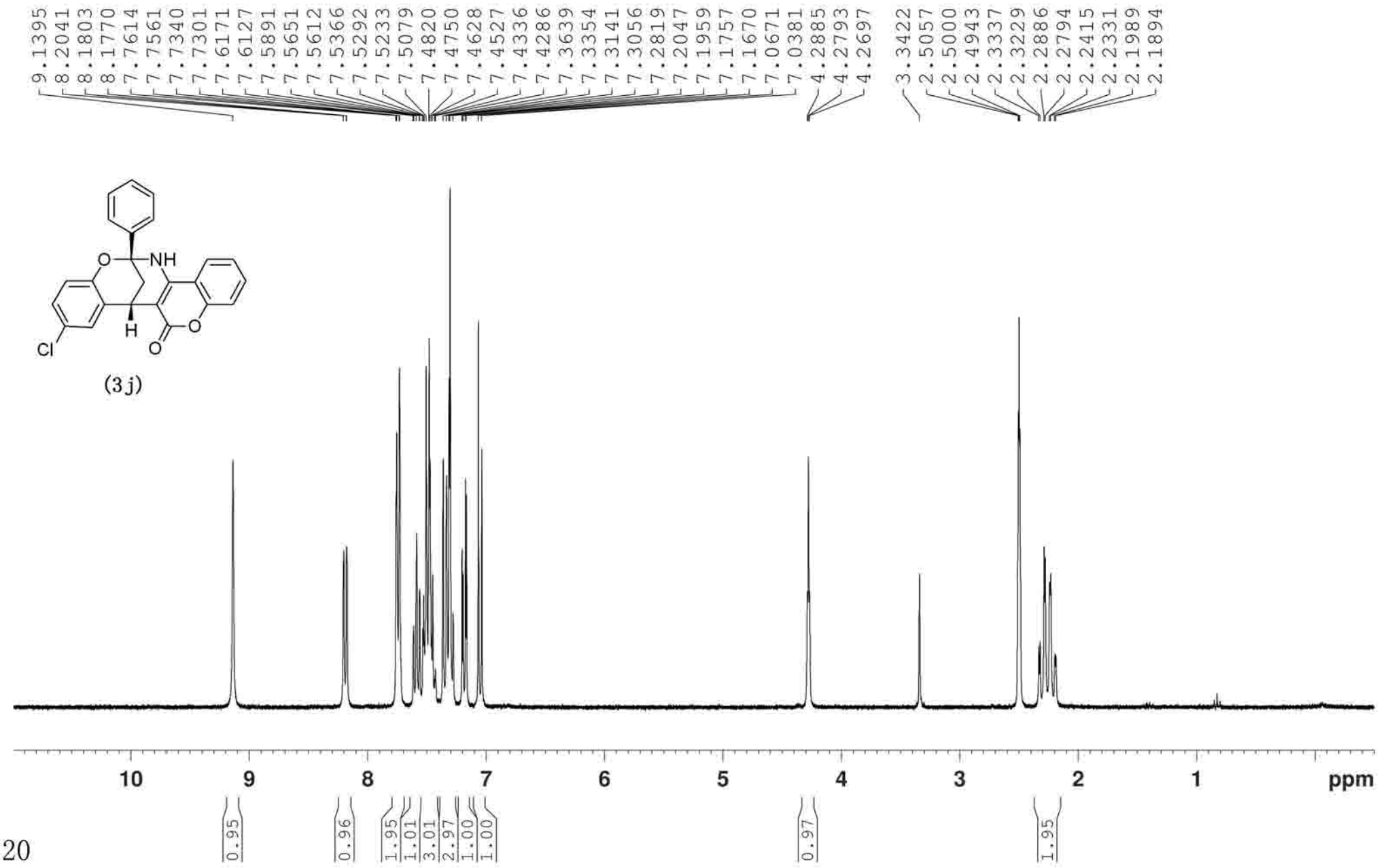
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NH
H
O
O
Cl
(3j)
10
9
8
7
6
5
4
3
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1
ppm
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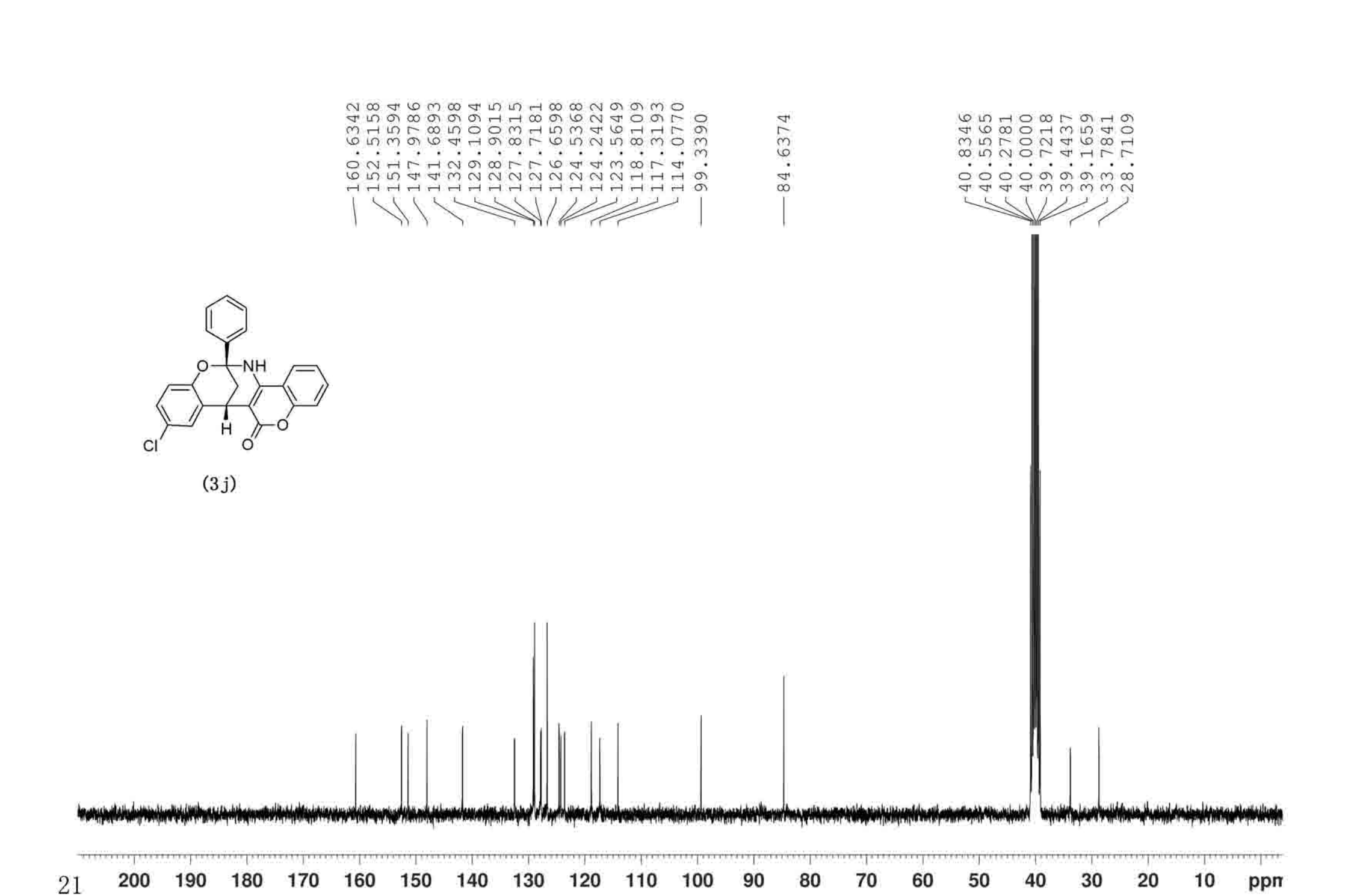
0.96
1.95
1.01
3.01
2.97
1.00
1.00
0.97
1.95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126.6598
124.5368
124.2422
123.5649
118.8109
117.3193
114.0770
99.3390
84.6374
40.8346
40.5565
40.2781
40.0000
39.7218
39.4437
39.1659
33.7841
28.7109
O
NH
H
O
O
Cl
(3j)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
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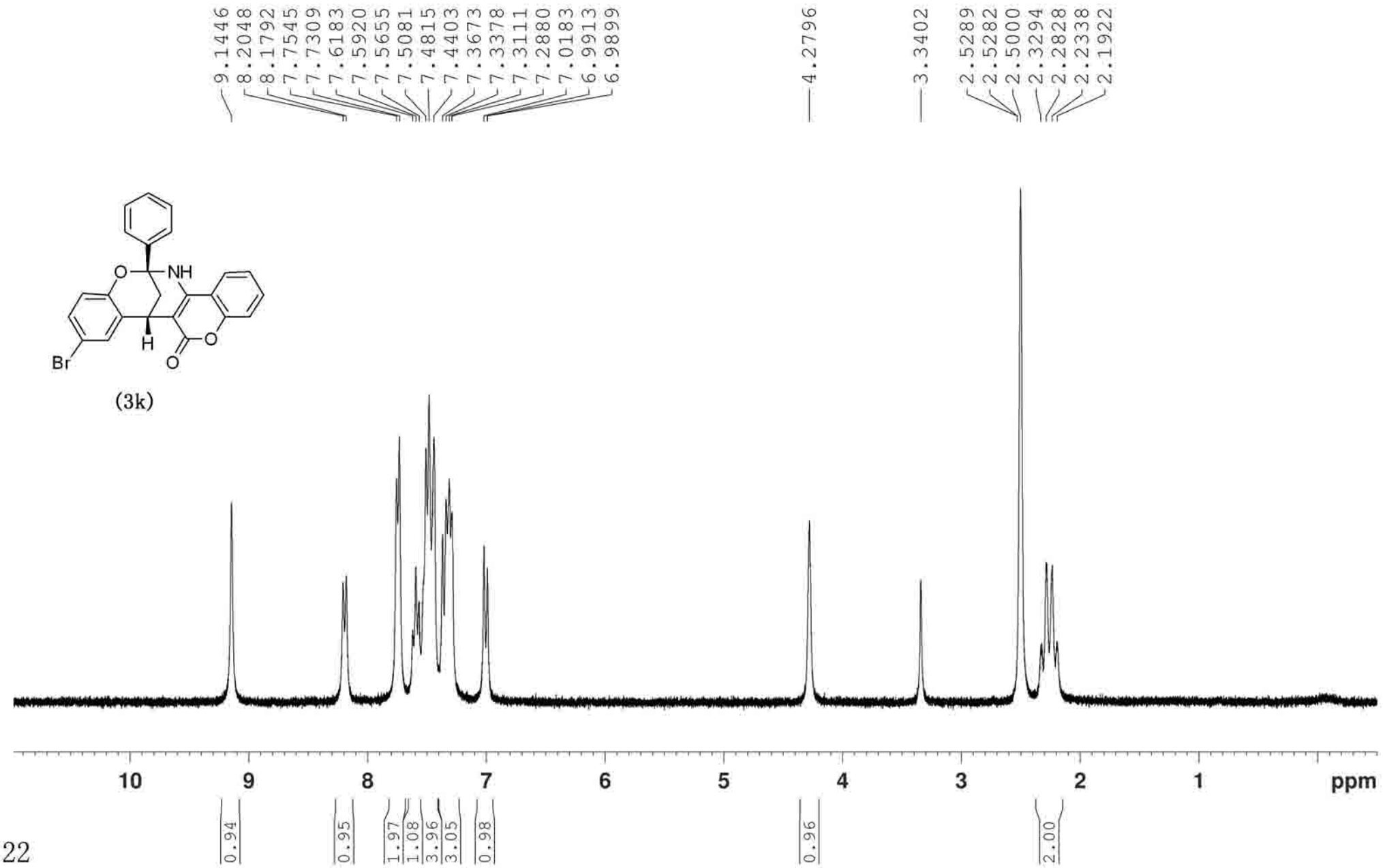
40
30
20
10
ppm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8.2048
8.1792
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7.7309
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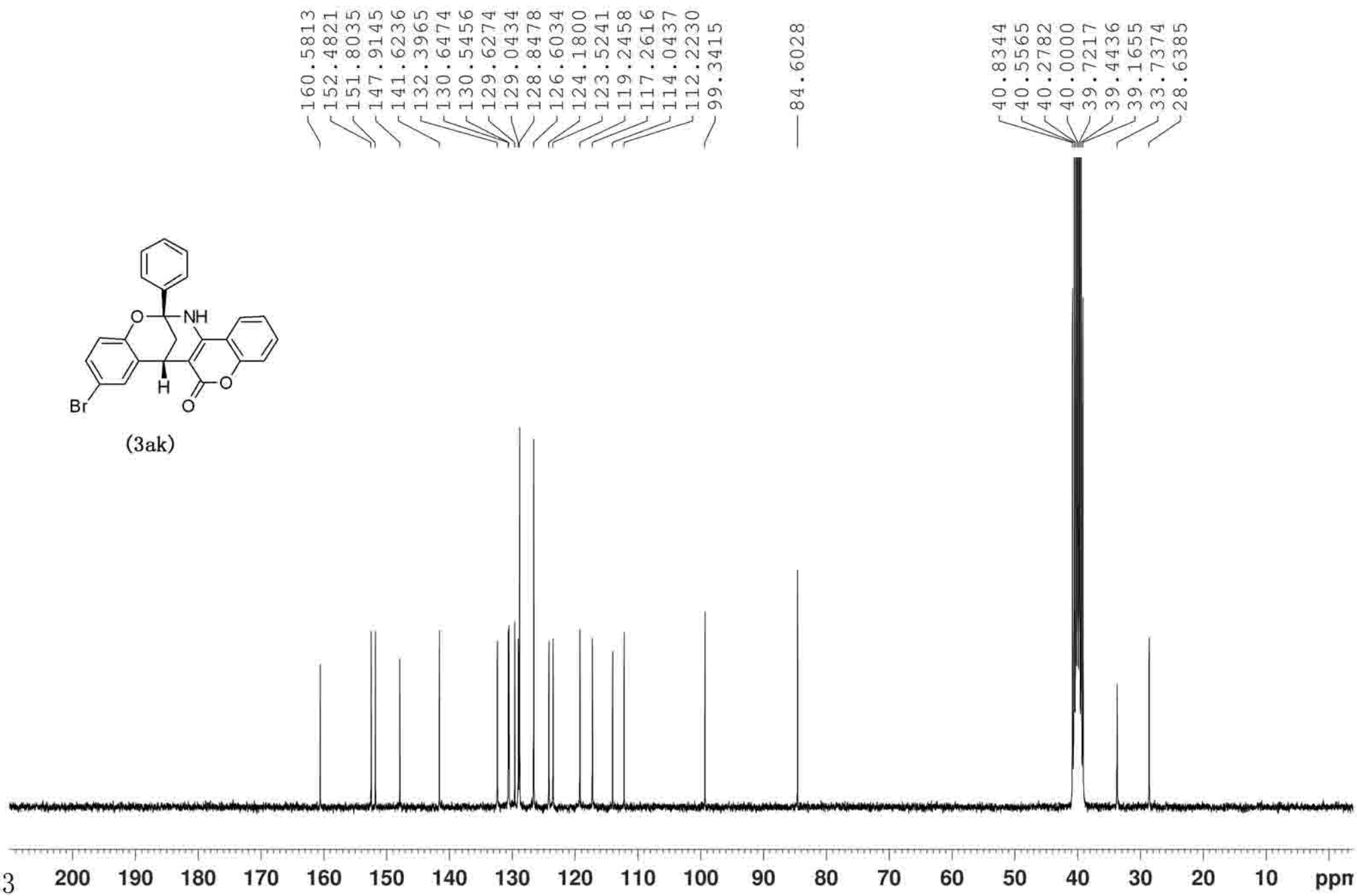
7.5920
7.5655
7.5081
7.4815
7.4403
7.3673
7.3378
7.3111
7.2880
7.0183
6.9913
6.9899
4.2796
3.3402
2.5289
2.5282
2.5000
2.3294
2.2828
2.2338
2.1922
O
NH
H
O
O
Br
(3k)
10
9
8
7
6
5
4
3
2
1
ppm
0.94
0.95
1.97
1.08
3.96
3.05
0.98
0.96
2.00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151.8035
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130.6474
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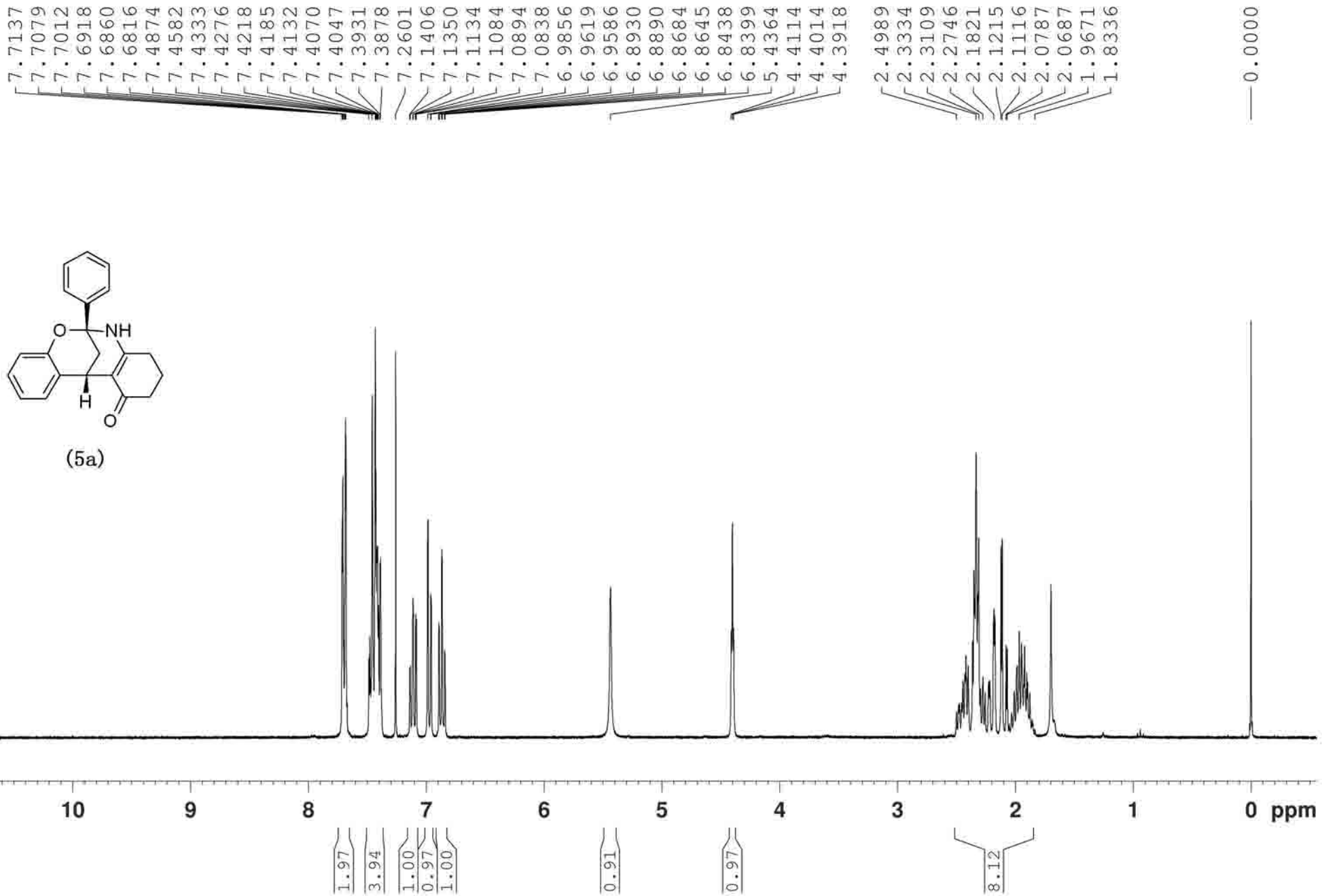
129.6274
129.0434
128.8478
126.6034
124.1800
123.5241
119.2458
117.2616
114.0437
112.2230
99.3415
84.6028
40.8344
40.5565
40.2782
40.0000
39.7217
39.4436
39.1655
33.7374
28.6385
O
NH
H
O
O
Br
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

(3ak)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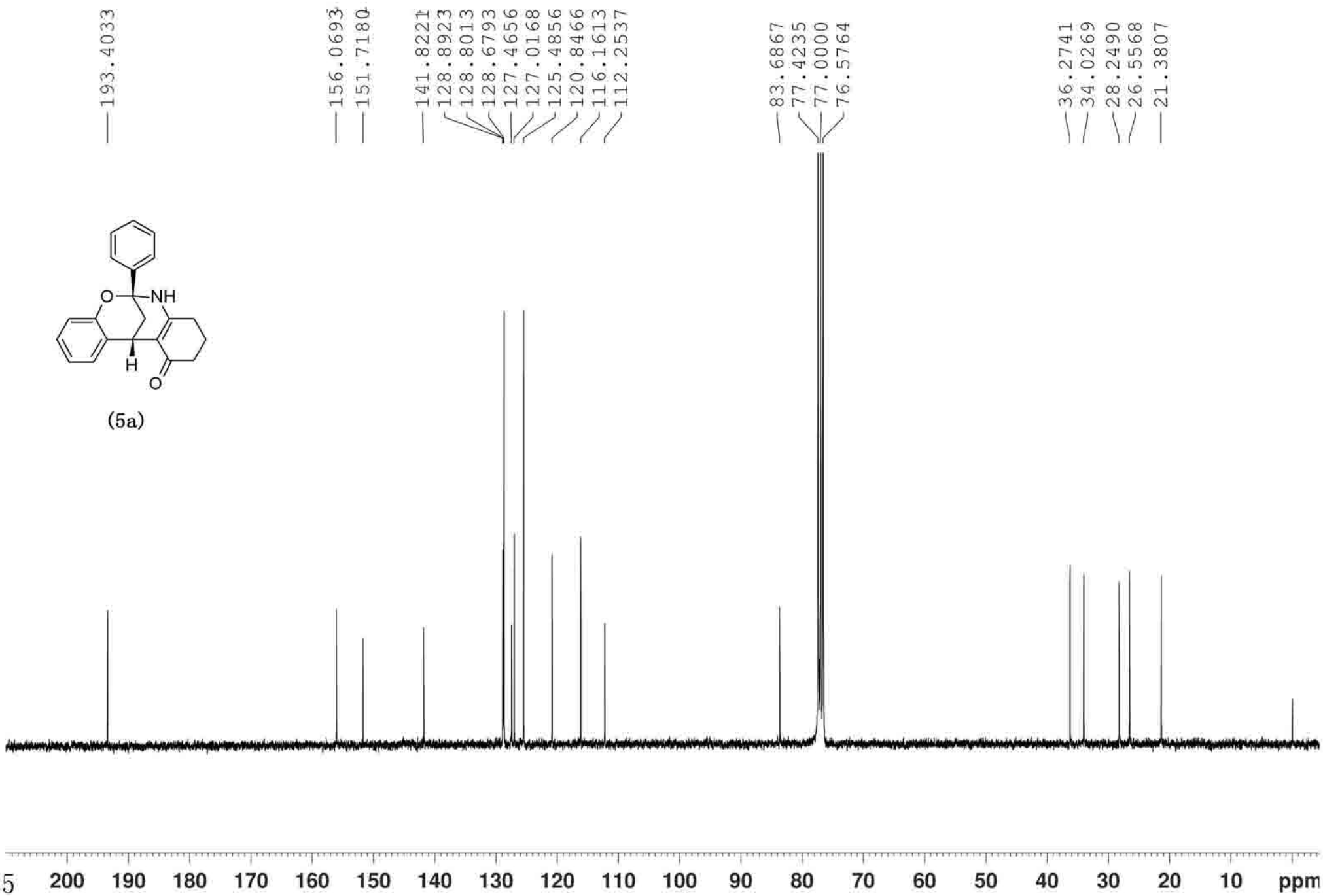
7.6816
7.4874
7.4582
7.4333
7.4276
7.4218
7.4185
7.4132
7.4070
7.4047
7.3931
7.3878
7.2601
7.1406
7.1350
7.1134
7.1084
7.0894
7.0838
6.9856
6.9619
6.9586
6.8930
6.8890
6.8684
6.8645
6.8438
6.8399
5.4364
4.4114
4.4014
4.3918
2.4989
2.3334
2.3109
2.2746
2.1821
2.1215
2.1116
2.0787
2.0687
1.9671
1.8336
0.0000
O
NH
H
O
(5a)
10
9
8
7
6
5
4
3
2
1
0 ppm
1.97
3.94
1.00
0.97
1.00
0.91
0.97
8.12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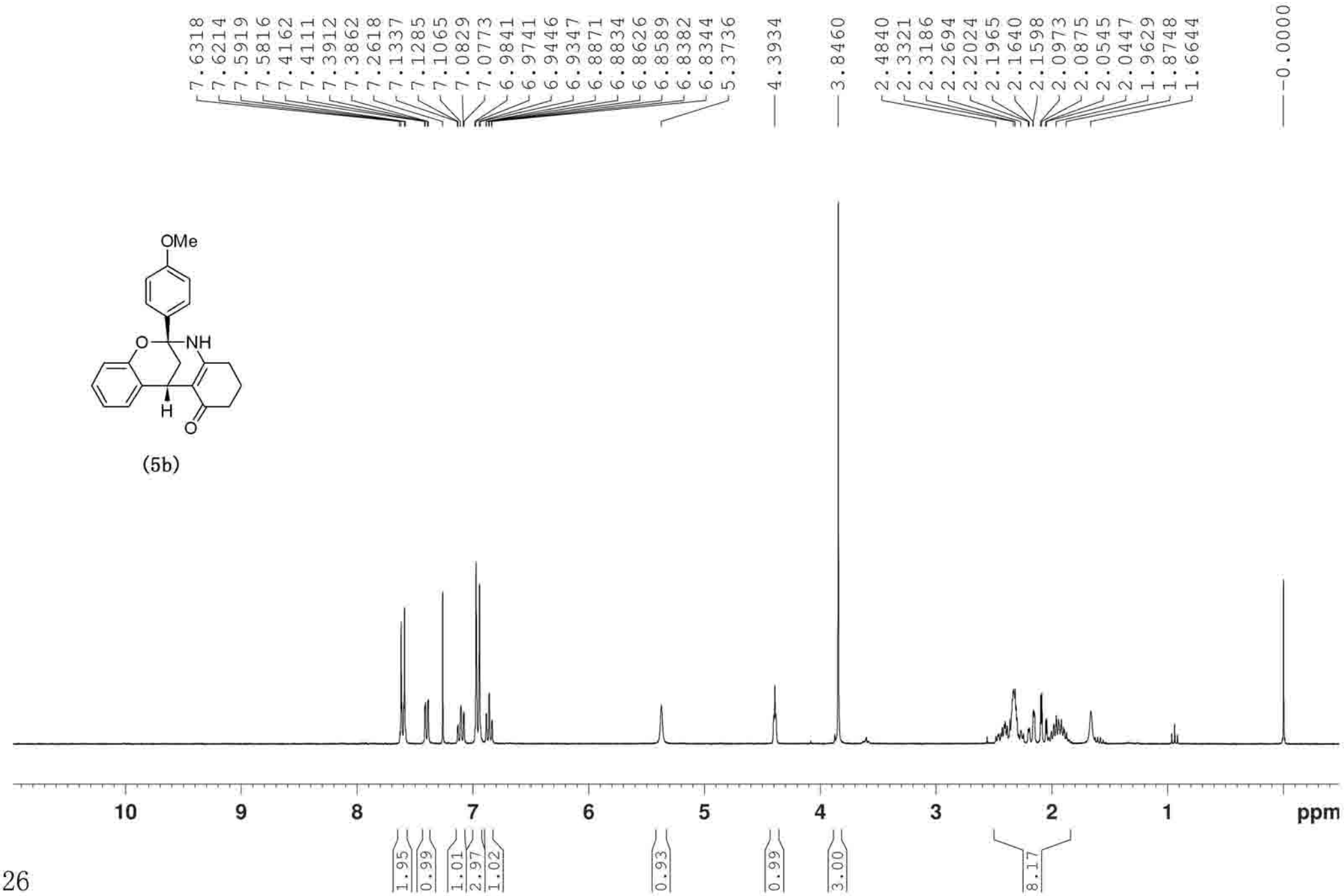
127.4656
127.0168
125.4856
120.8466
116.1613
112.2537
83.6867
77.4235
77.0000
76.5764
36.2741
34.0269
28.2490
26.5568
21.3807
O
NH
H
O
(5a)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm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7.6214
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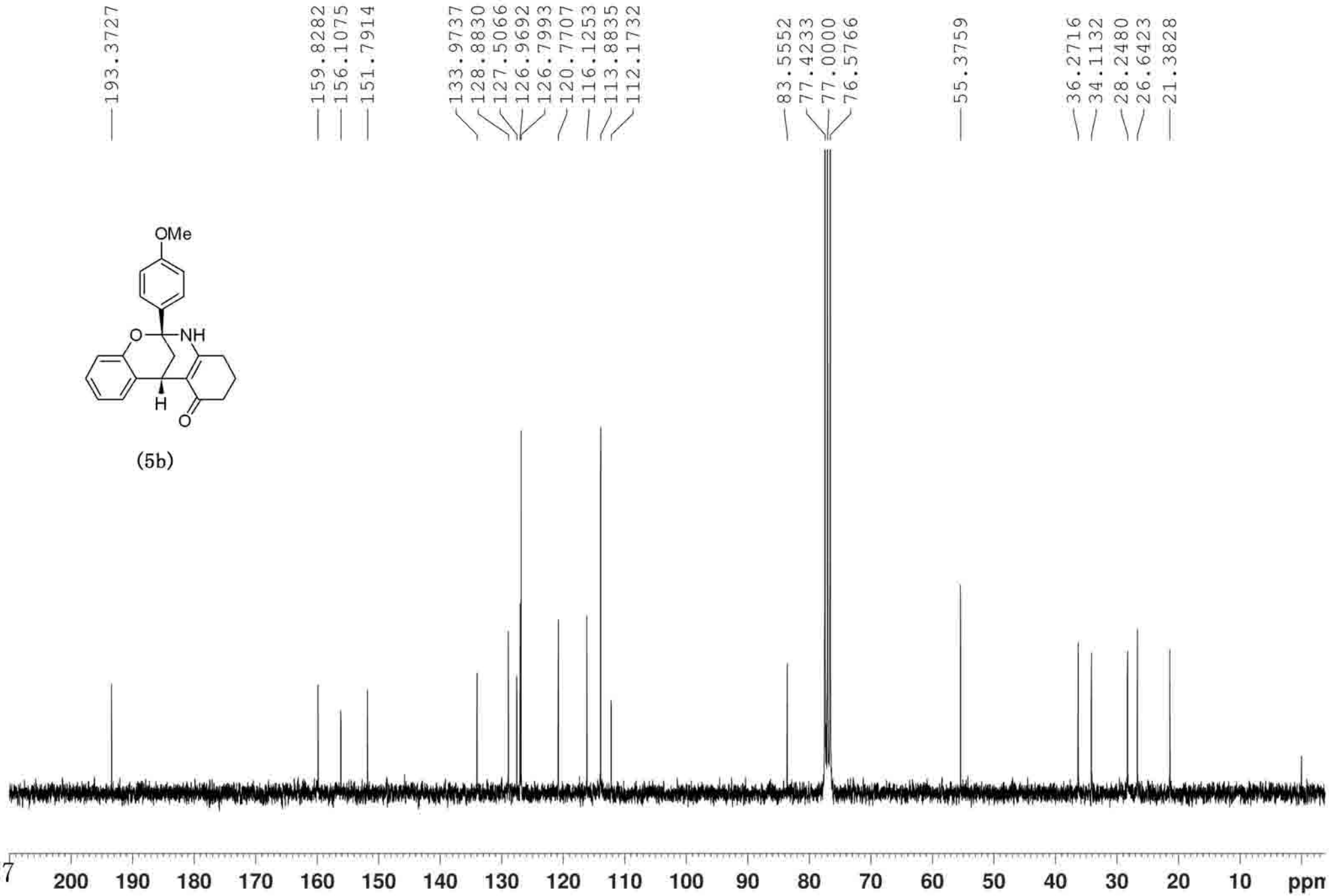
7.5816
7.4162
7.4111
7.3912
7.3862
7.2618
7.1337
7.1285
7.1065
7.0829
7.0773
6.9841
6.9741
6.9446
6.9347
6.8871
6.8834
6.8626
6.8589
6.8382
6.8344
5.3736
4.3934
3.8460
2.4840
2.3321
2.3186
2.2694
2.2024
2.1965
2.1640
2.1598
2.0973
2.0875
2.0545
2.0447
1.9629
1.8748
1.6644
0.0000
OMe
O
NH
H
O
(5b)
10
9
8
7
6
5
4
3
2
1
ppm
1.95
0.99
1.01
2.97
1.02
0.93
0.99
3.00
8.17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151.7914
133.9737
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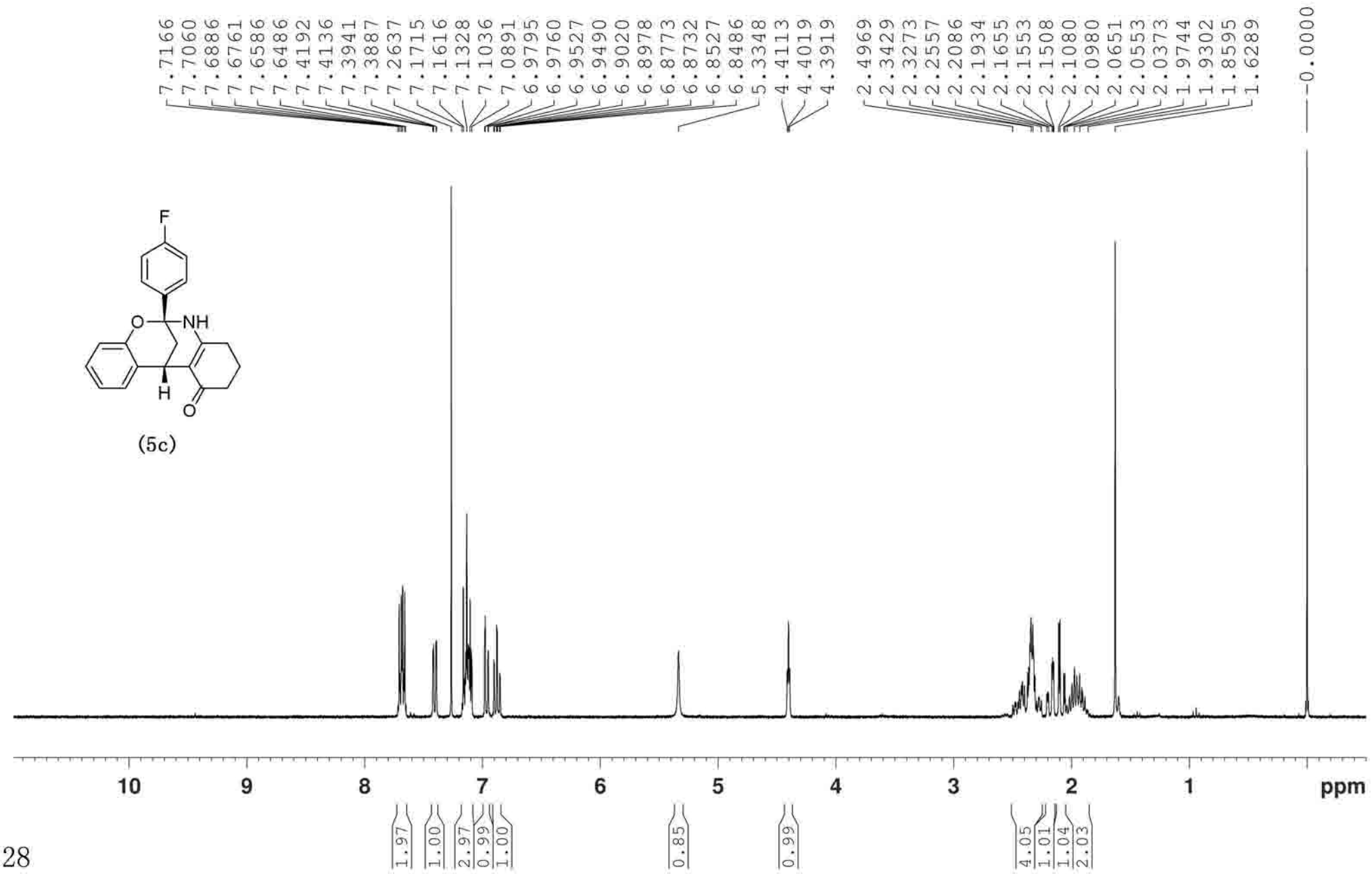
127.5066
126.9692
126.7993
120.7707
116.1253
113.8835
112.1732
83.5552
77.4233
77.0000
76.5766
55.3759
36.2716
34.1132
28.2480
26.6423
21.3828
OMe
O
NH
H
O
(5b)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm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7.6586
7.6486
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7.3941
7.3887
7.2637
7.1715
7.1616
7.1328
7.1036
7.0891
6.9795
6.9760
6.9527
6.9490
6.9020
6.8978
6.8773
6.8732
6.8527
6.8486
5.3348
4.4113
4.4019
4.3919
2.4969
2.3429
2.3273
2.2557
2.2086
2.1934
2.1655
2.1553
2.1508
2.1080
2.0980
2.0651
2.0553
2.0373
1.9744
1.9302
1.8595
1.6289
0.0000
F
O
NH
H
O
10
9
8
7
6
5
4
3
2
1
ppm
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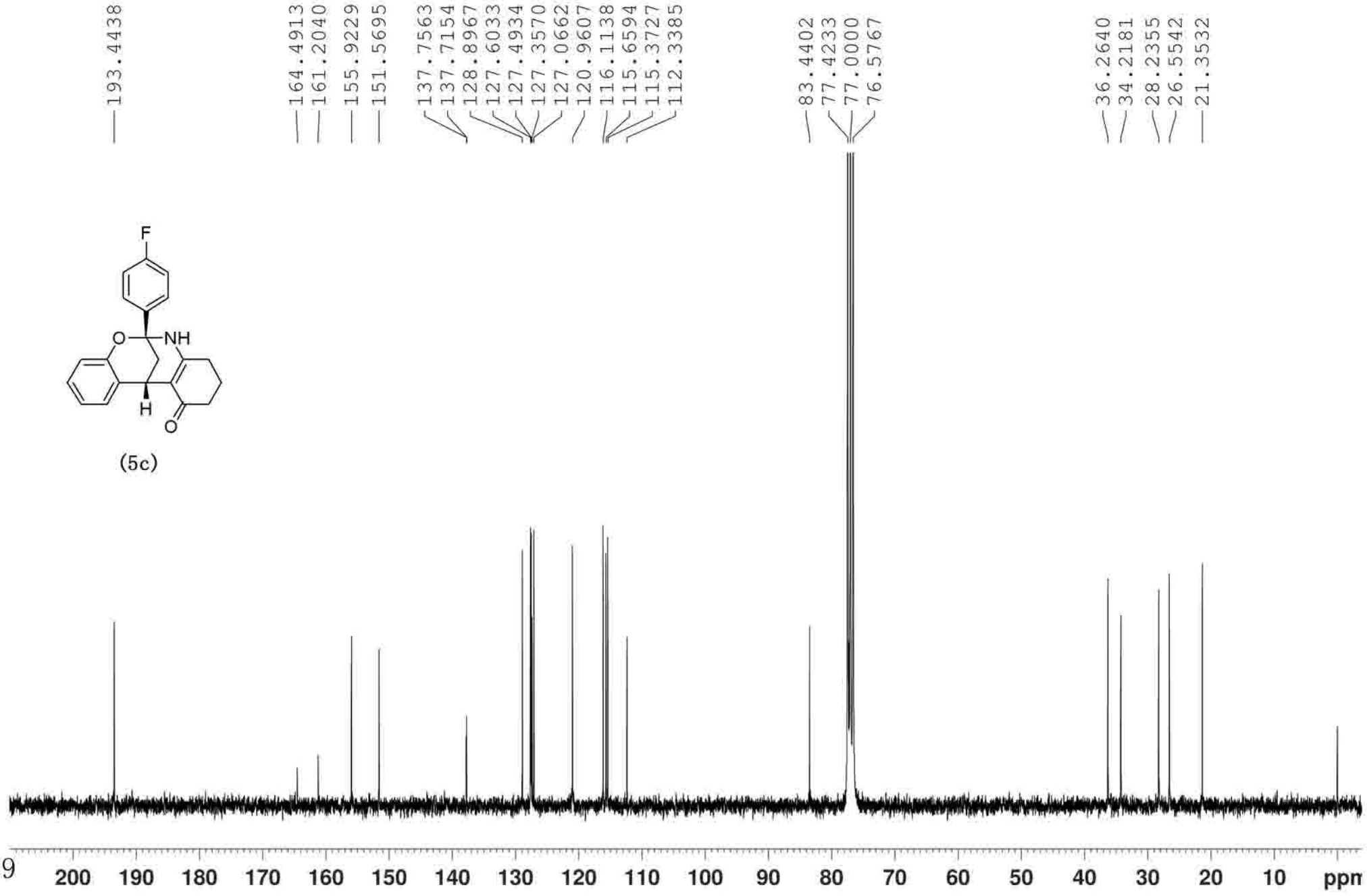
1.00
2.97
0.99
1.00
0.85
0.99
4.05
1.01
1.04
2.03

(5c)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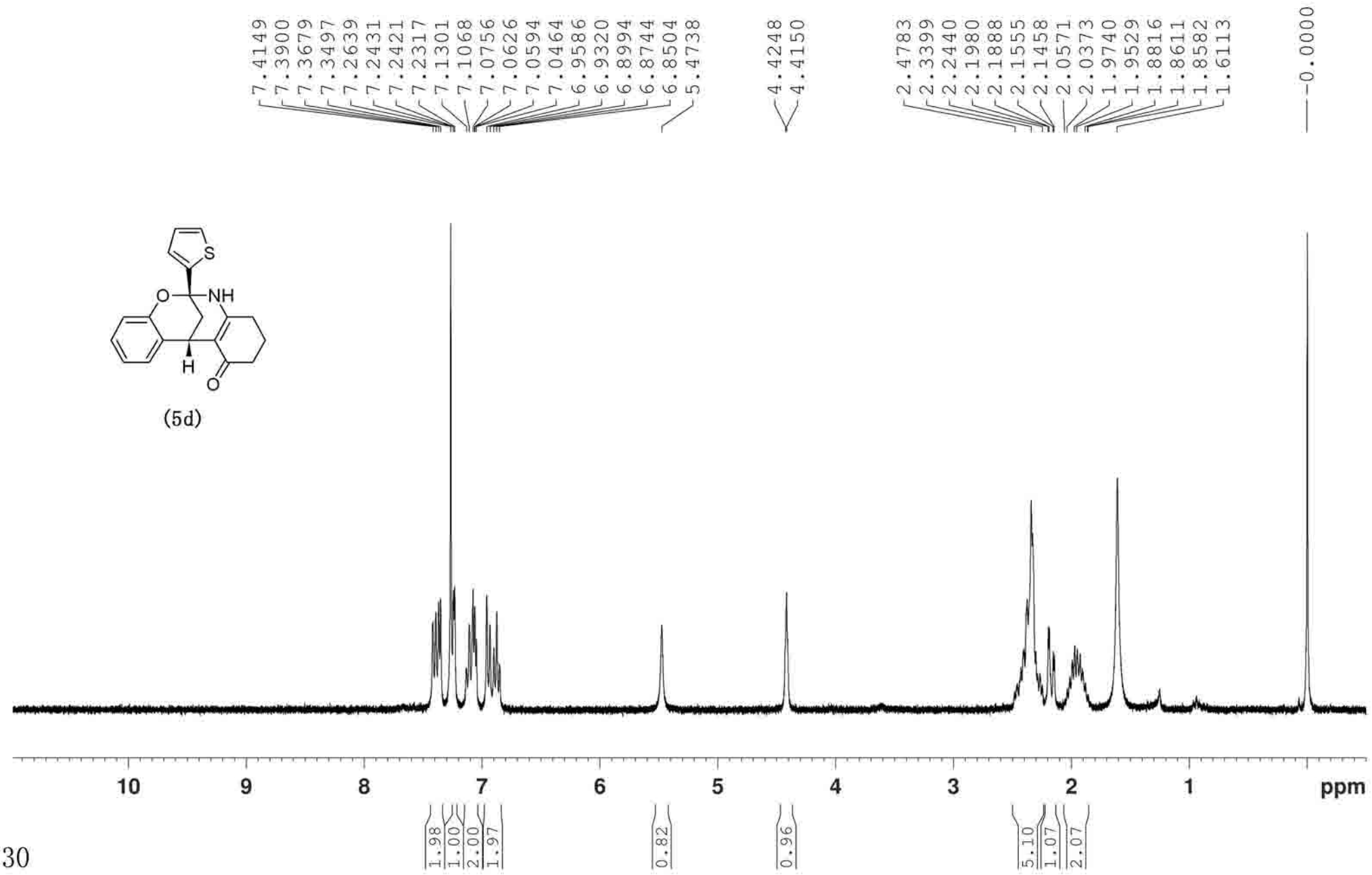
127.4934
127.3570
127.0662
120.9607
116.1138
115.6594
115.3727
112.3385
83.4402
77.4233
77.0000
76.5767
36.2640
34.2181
28.2355
26.5542
21.3532
F
O
NH
H
O
(5c)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm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7.3679
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7.2639
7.2431
7.2421
7.2317
7.1301
7.1068
7.0756
7.0626
7.0594
7.0464
6.9586
6.9320
6.8994
6.8744
6.8504
5.4738
4.4248
4.4150
2.4783
2.3399
2.2440
2.1980
2.1888
2.1555
2.1458
2.0571
2.0373
1.9740
1.9529
1.8816
1.8611
1.8582
1.6113
0.0000
S
O
NH
H
O
10
9
8
7
6
5
4
3
2
1
ppm
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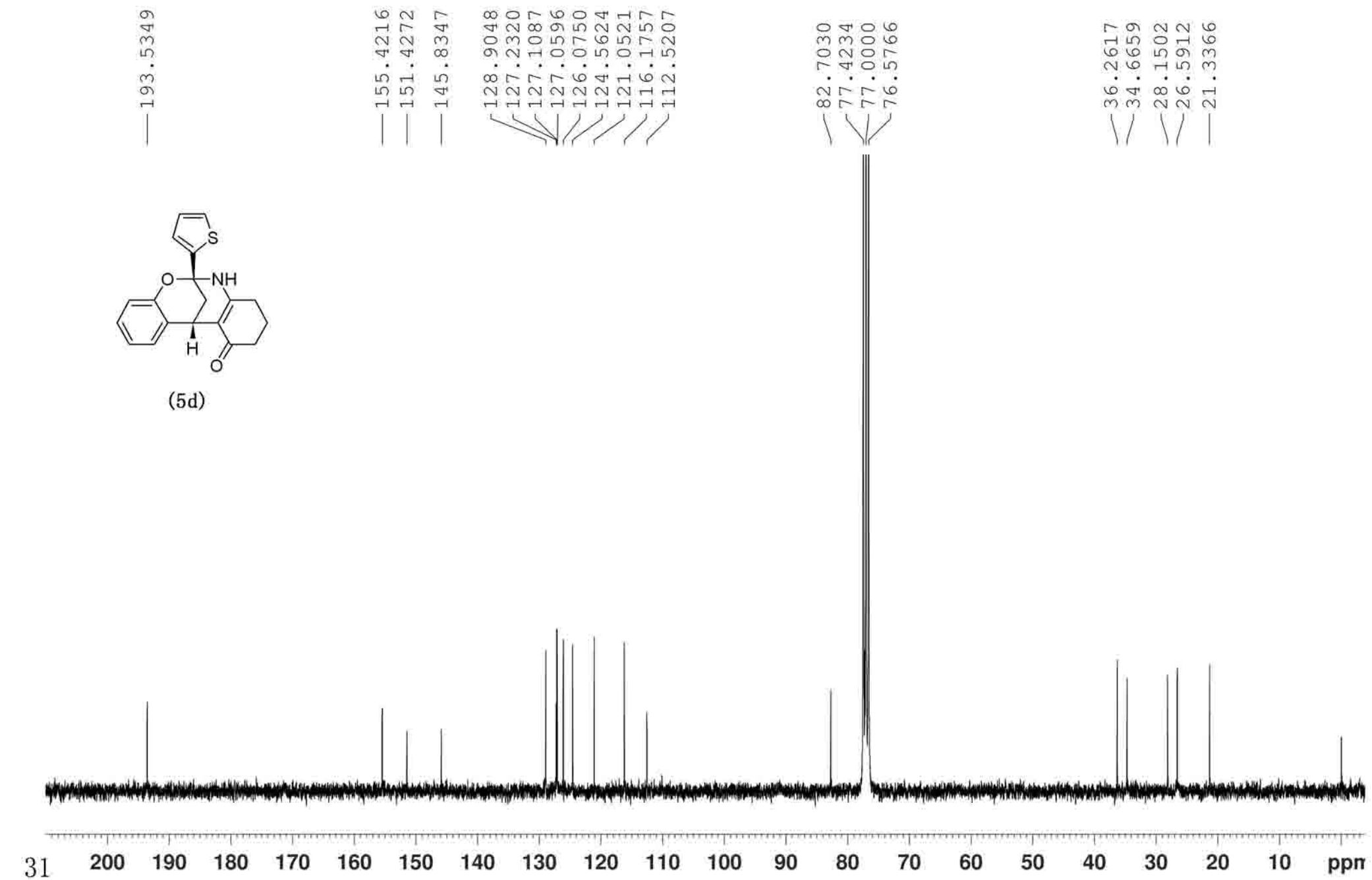
1.00
2.00
1.97
0.82
0.96
5.10
1.07
2.07

(5d)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127.0596
126.0750
124.5624
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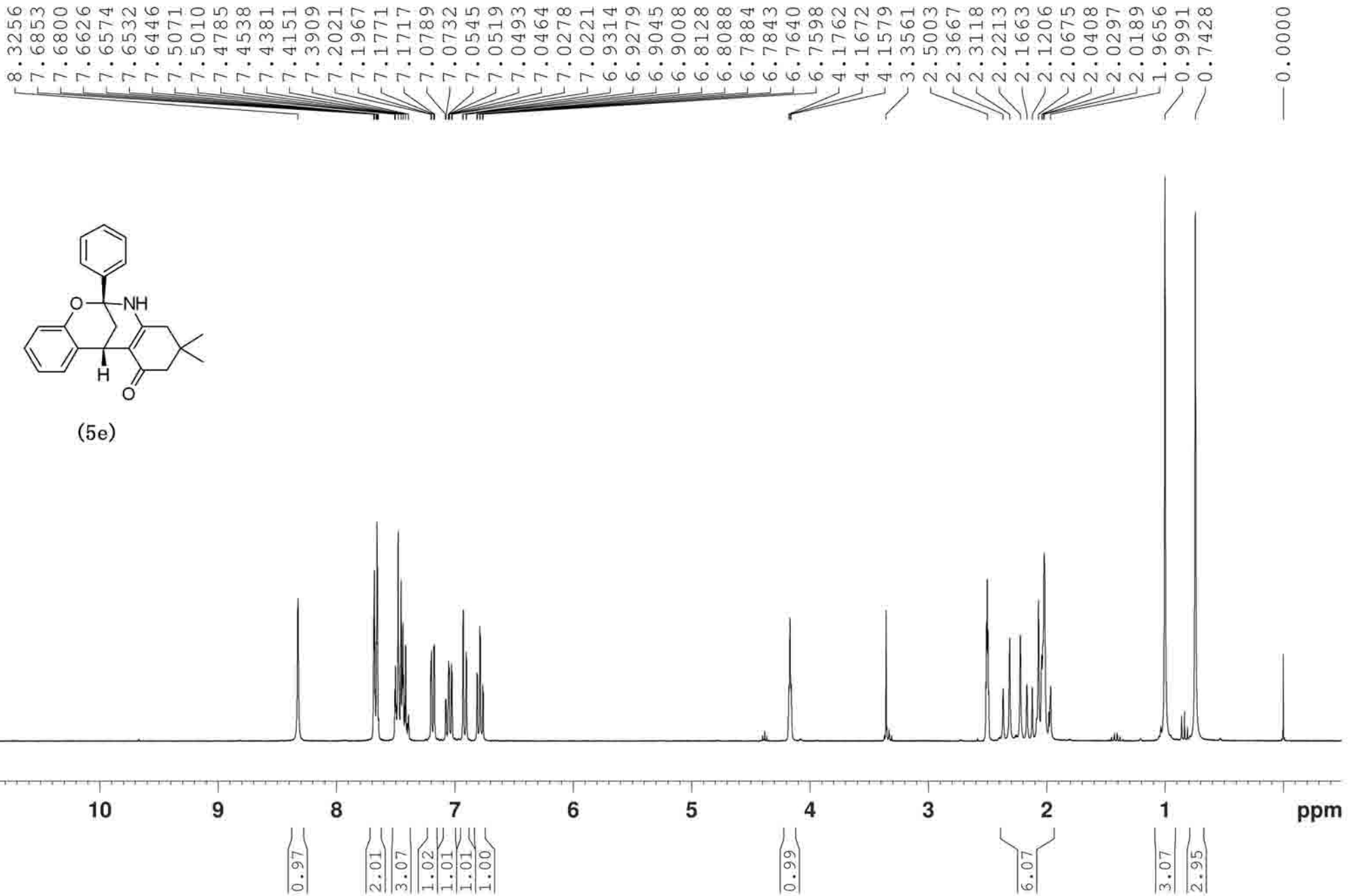
112.5207
82.7030
77.4234
77.0000
76.5766
36.2617
34.6659
28.1502
26.5912
21.3366
S
O
NH
H
O
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

(5d)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7.5010
7.4785
7.4538
7.4381
7.4151
7.3909
7.2021
7.1967
7.1771
7.1717
7.0789
7.0732
7.0545
7.0519
7.0493
7.0464
7.0278
7.0221
6.9314
6.9279
6.9045
6.9008
6.8128
6.8088
6.7884
6.7843
6.7640
6.7598
4.1762
4.1672
4.1579
3.3561
2.5003
2.3667
2.3118
2.2213
2.1663
2.1206
2.0675
2.0408
2.0297
2.0189
1.9656
0.9991
0.7428
0.0000
O
NH
H
O
(5e)
10
9
8
7
6
5
4
3
2
1
ppm
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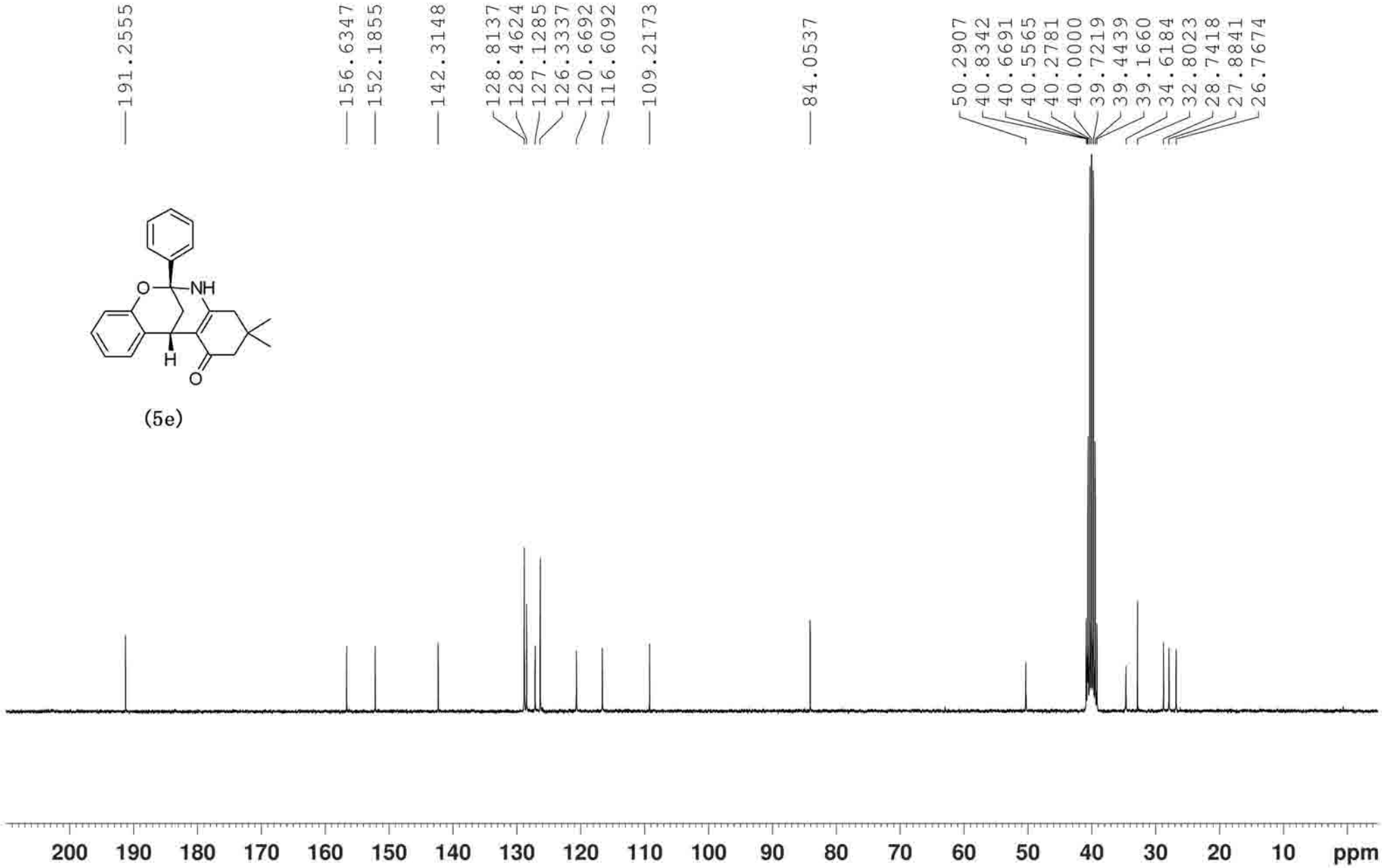
2.01
3.07
1.02
1.01
1.01
1.00
0.99
6.07
3.07
2.95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127.1285
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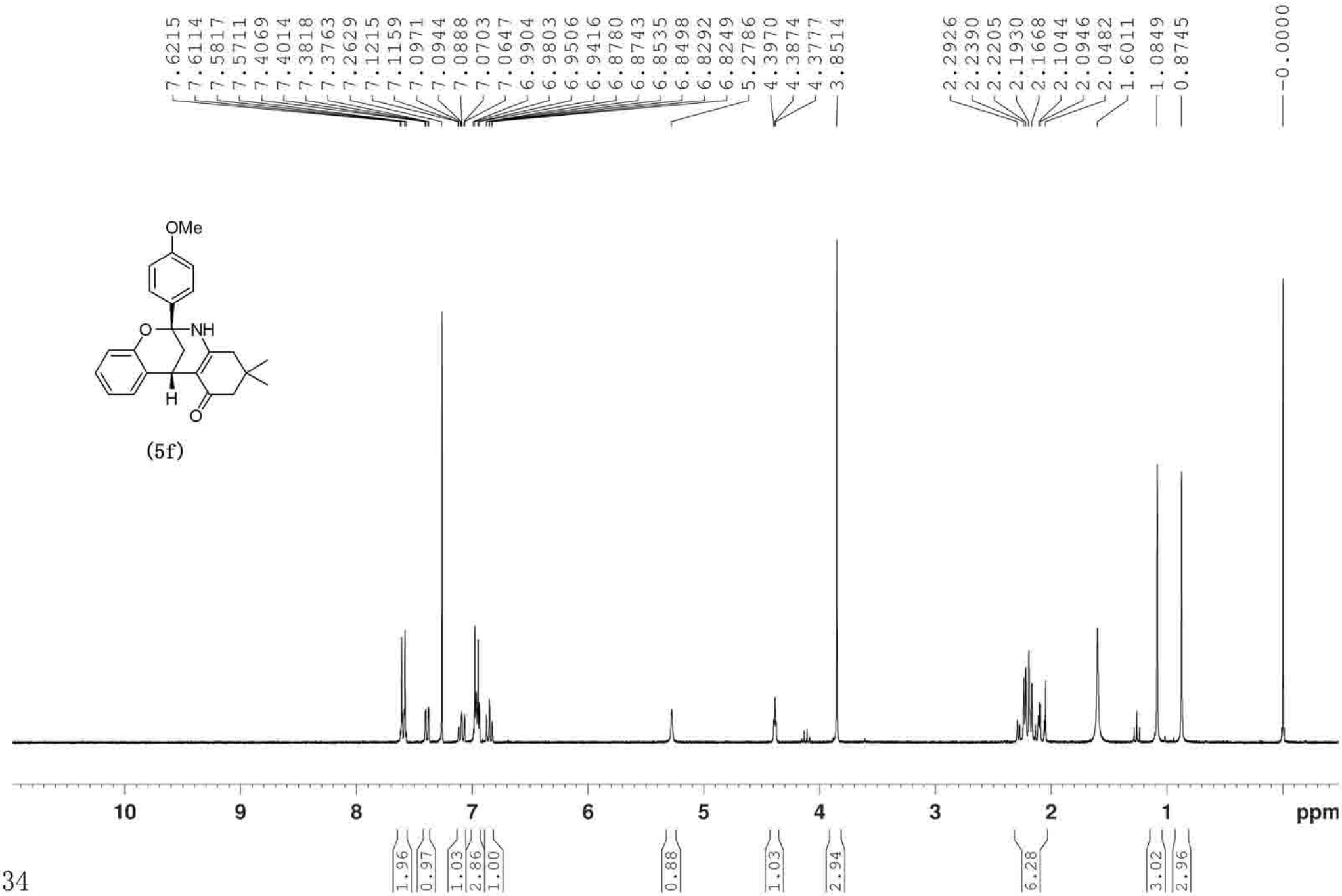
116.6092
109.2173
84.0537
50.2907
40.8342
40.6691
40.5565
40.2781
40.0000
39.7219
39.4439
39.1660
34.6184
32.8023
28.7418
27.8841
26.7674
O
NH
H
O
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

(5e)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7.4014
7.3818
7.3763
7.2629
7.1215
7.1159
7.0971
7.0944
7.0888
7.0703
7.0647
6.9904
6.9803
6.9506
6.9416
6.8780
6.8743
6.8535
6.8498
6.8292
6.8249
5.2786
4.3970
4.3874
4.3777
3.8514
2.2926
2.2390
2.2205
2.1930
2.1668
2.1044
2.0946
2.0482
1.6011
1.0849
0.8745
0.0000
OMe
O
NH
H
O
(5f)
10
9
8
7
6
5
4
3
2
1
ppm
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1.03
2.86
1.00
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1.03
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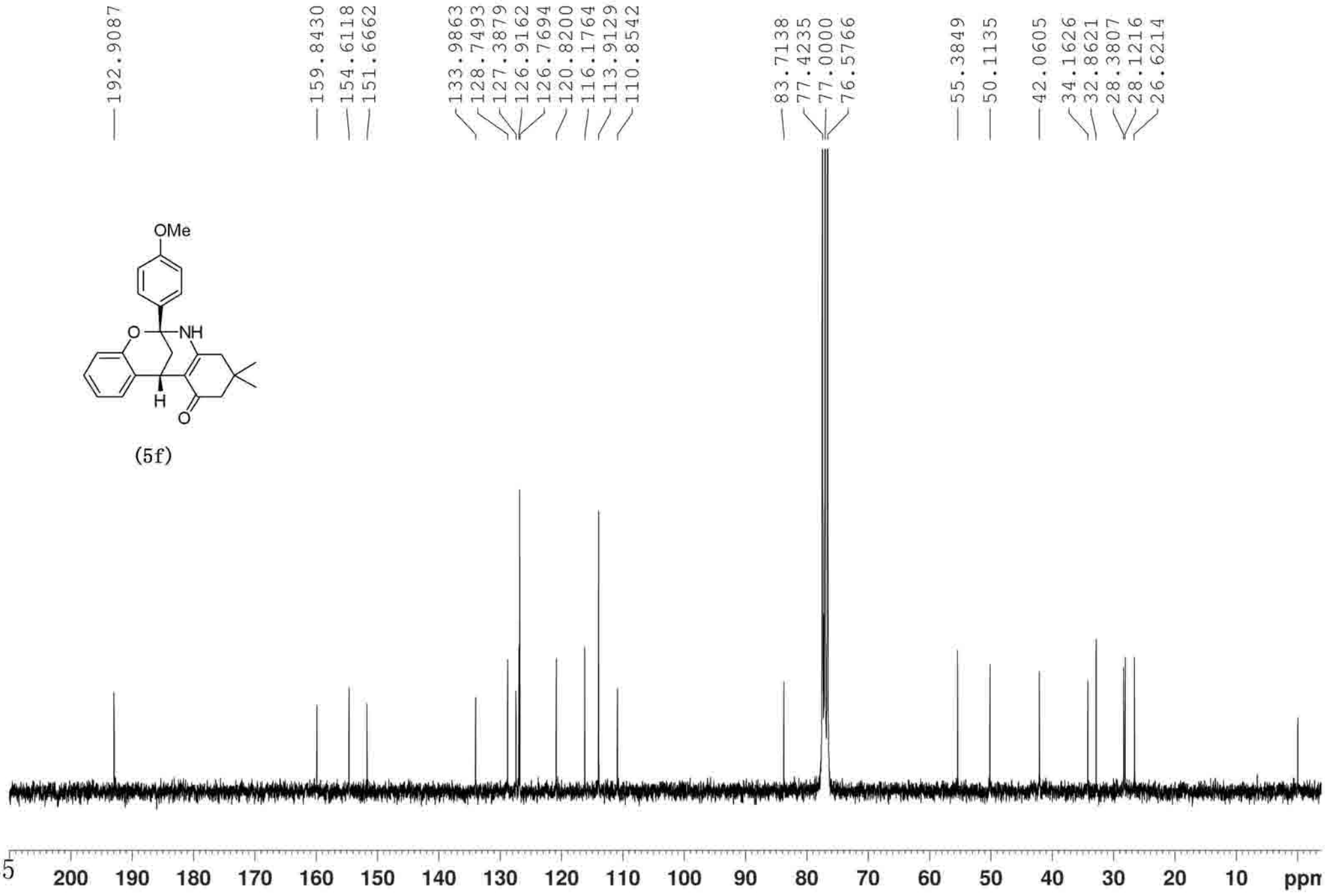
6.28
3.02
2.96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126.7694
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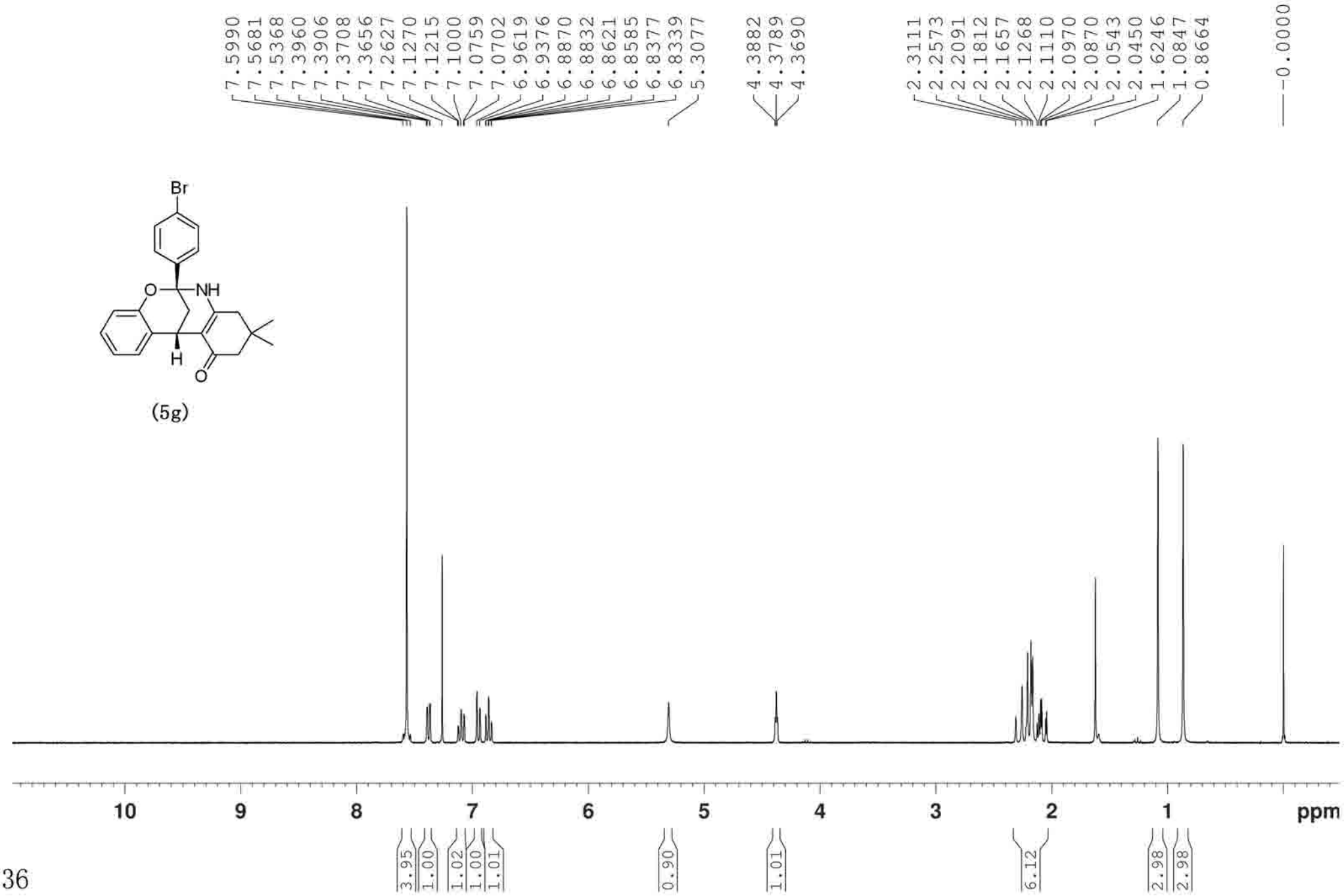
110.8542
83.7138
77.4235
77.0000
76.5766
55.3849
50.1135
42.0605
34.1626
32.8621
28.3807
28.1216
26.6214
OMe
O
NH
H
O
(5f)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm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7.3656
7.2627
7.1270
7.1215
7.1000
7.0759
7.0702
6.9619
6.9376
6.8870
6.8832
6.8621
6.8585
6.8377
6.8339
5.3077
4.3882
4.3789
4.3690
2.3111
2.2573
2.2091
2.1812
2.1657
2.1268
2.1110
2.0970
2.0870
2.0543
2.0450
1.6246
1.0847
0.8664
0.0000
Br
O
NH
H
O
(5g)
10
9
8
7
6
5
4
3
2
1
ppm
3.95
1.00
1.02
1.00
1.01
0.90
1.01
6.12
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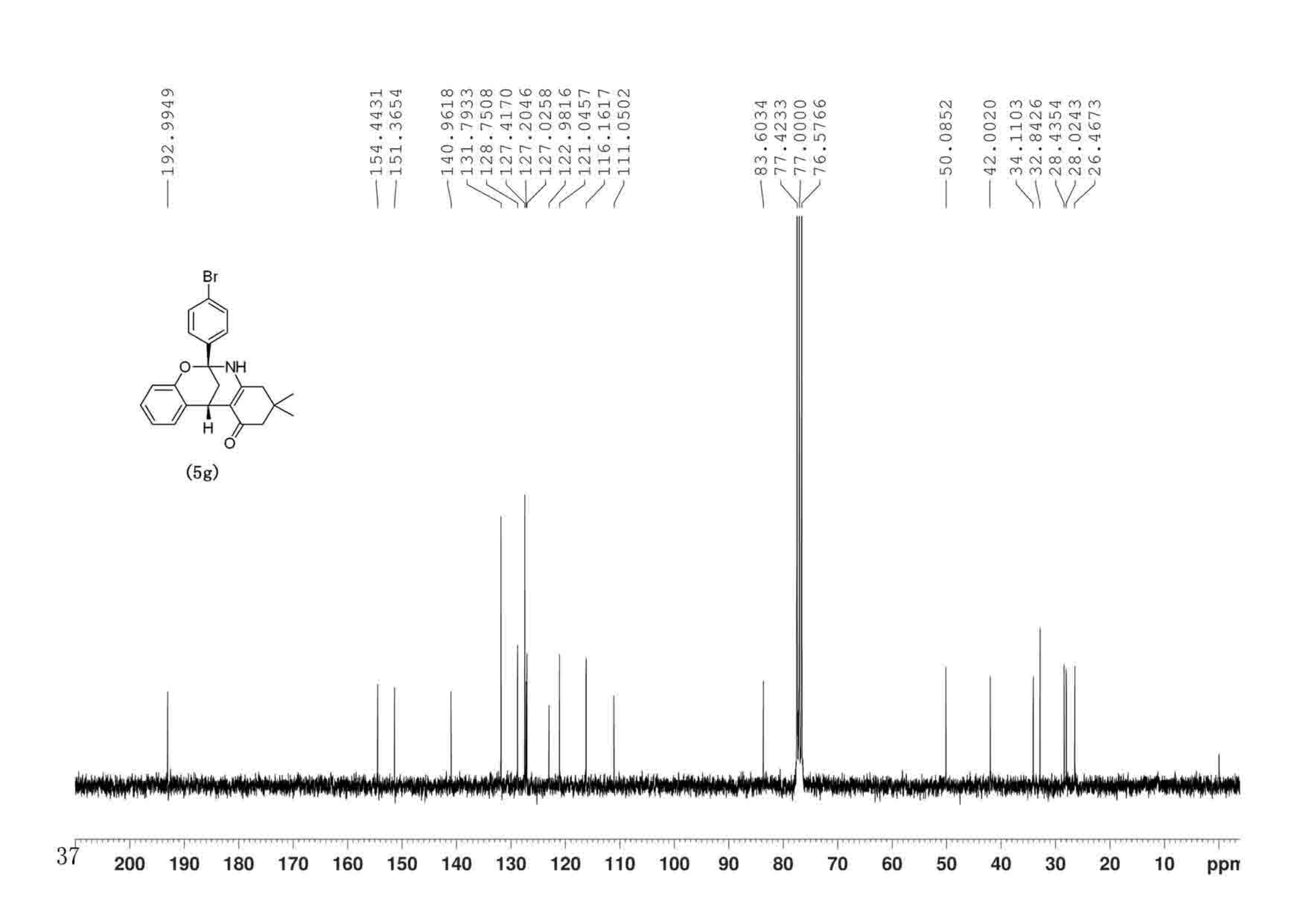
2.98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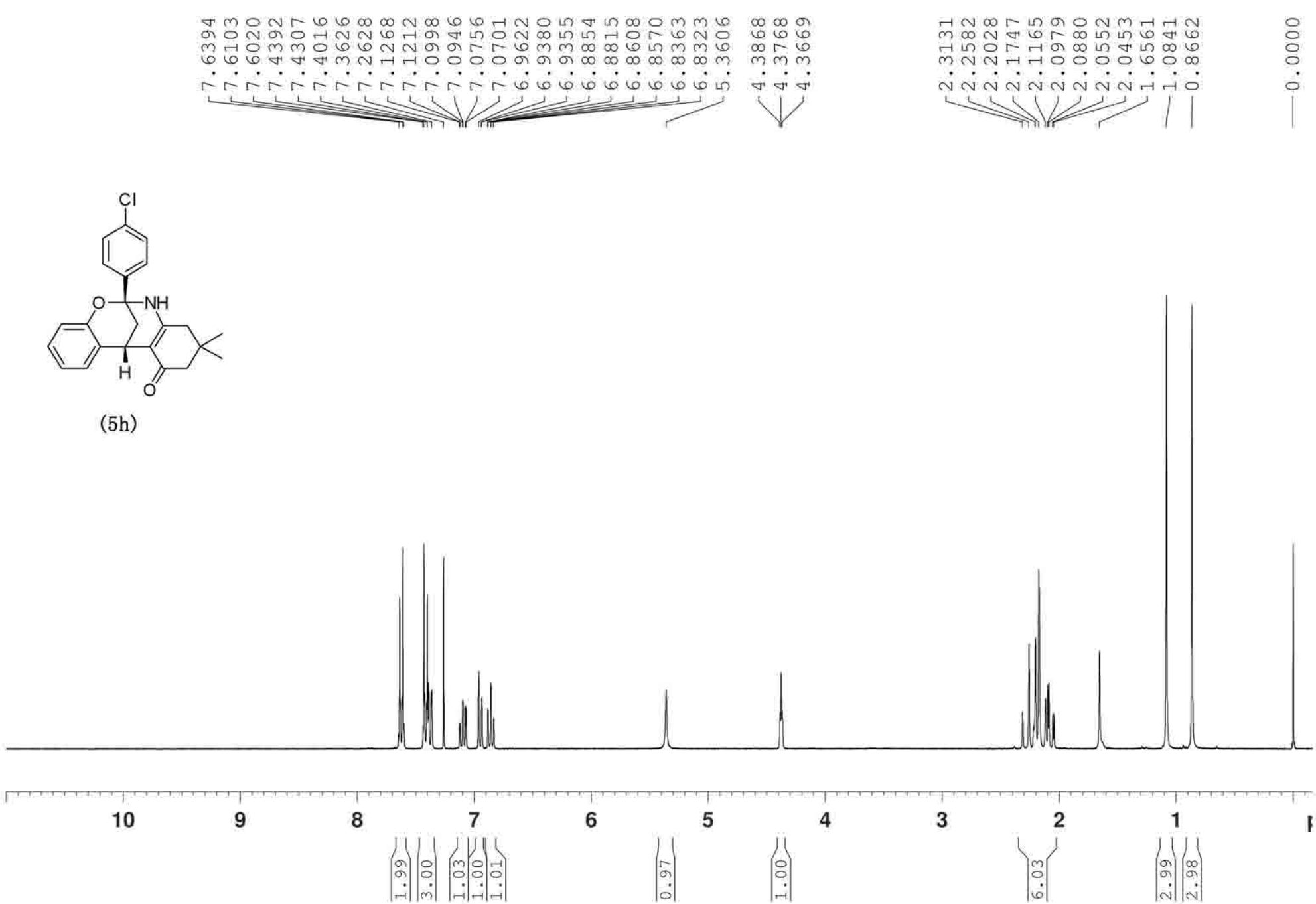
111.0502
83.6034
77.4233
77.0000
76.5766
50.0852
42.0020
34.1103
32.8426
28.4354
28.0243
26.4673
Br
O
NH
H
O
(5g)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm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7.0998
7.0946
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7.0701
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6.8854
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6.8608
6.8570
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6.8323
5.3606
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4.3768
4.3669
2.3131
2.2582
2.2028
2.1747
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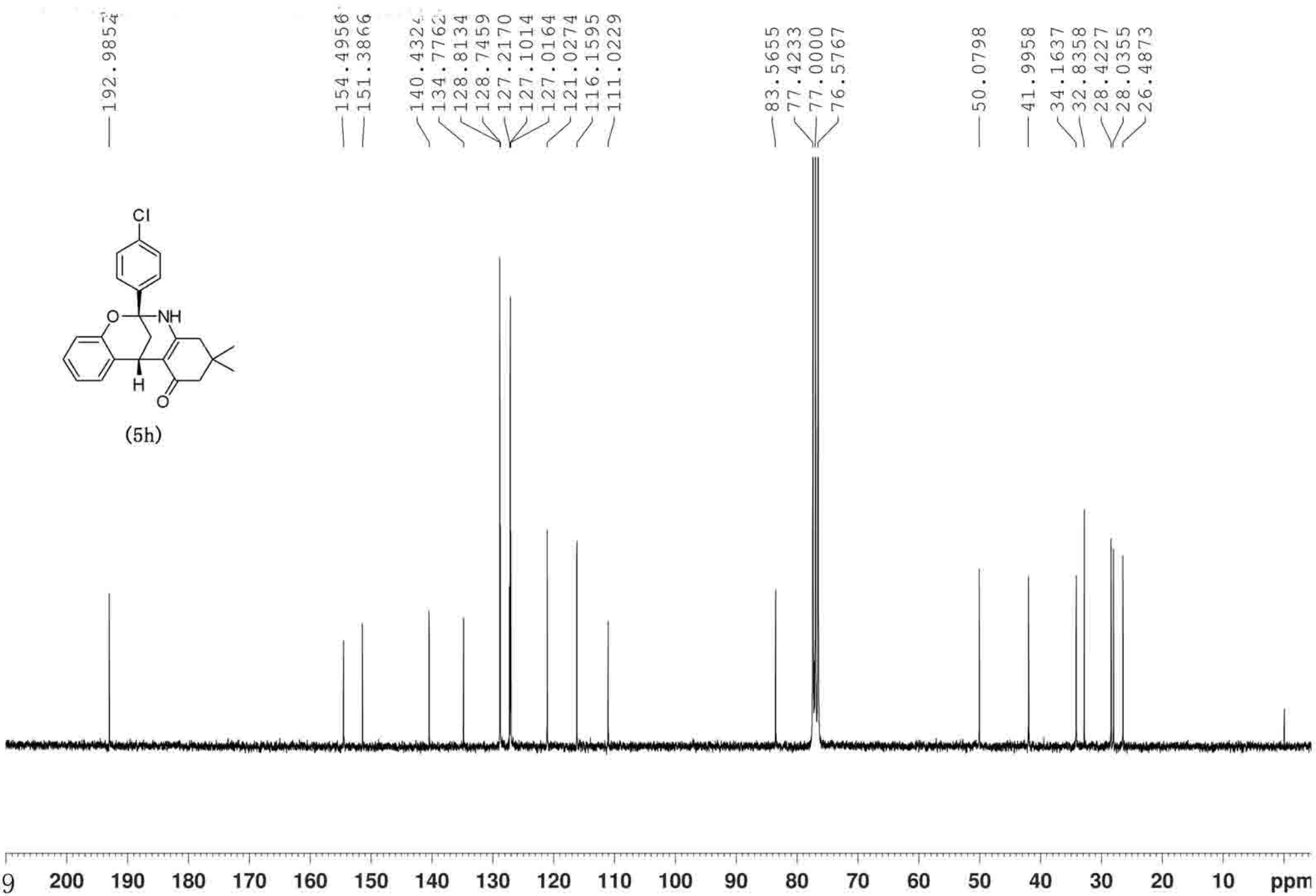
2.0979
2.0880
2.0552
2.0453
1.6561
1.0841
0.8662
0.0000
Cl
O
NH
H
O
10
9
8
7
6
5
4
3
2
1
1.99
3.00
1.03
1.00
1.01
0.97
1.00
6.03
2.99
2.98

(5h)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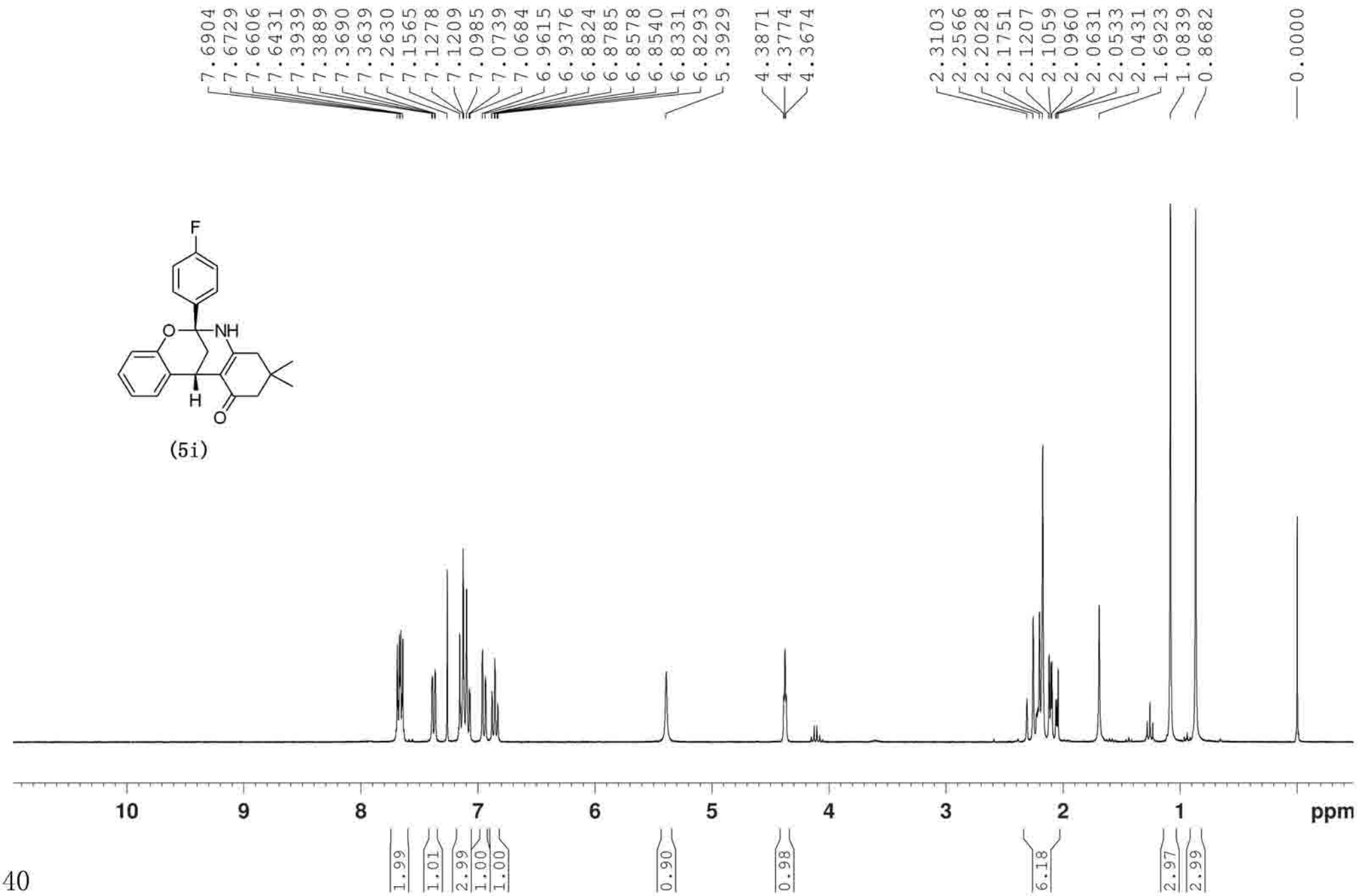
111.0229
83.5655
77.4233
77.0000
76.5767
50.0798
41.9958
34.1637
32.8358
28.4227
28.0355
26.4873
Cl
O
NH
H
O
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

(5h)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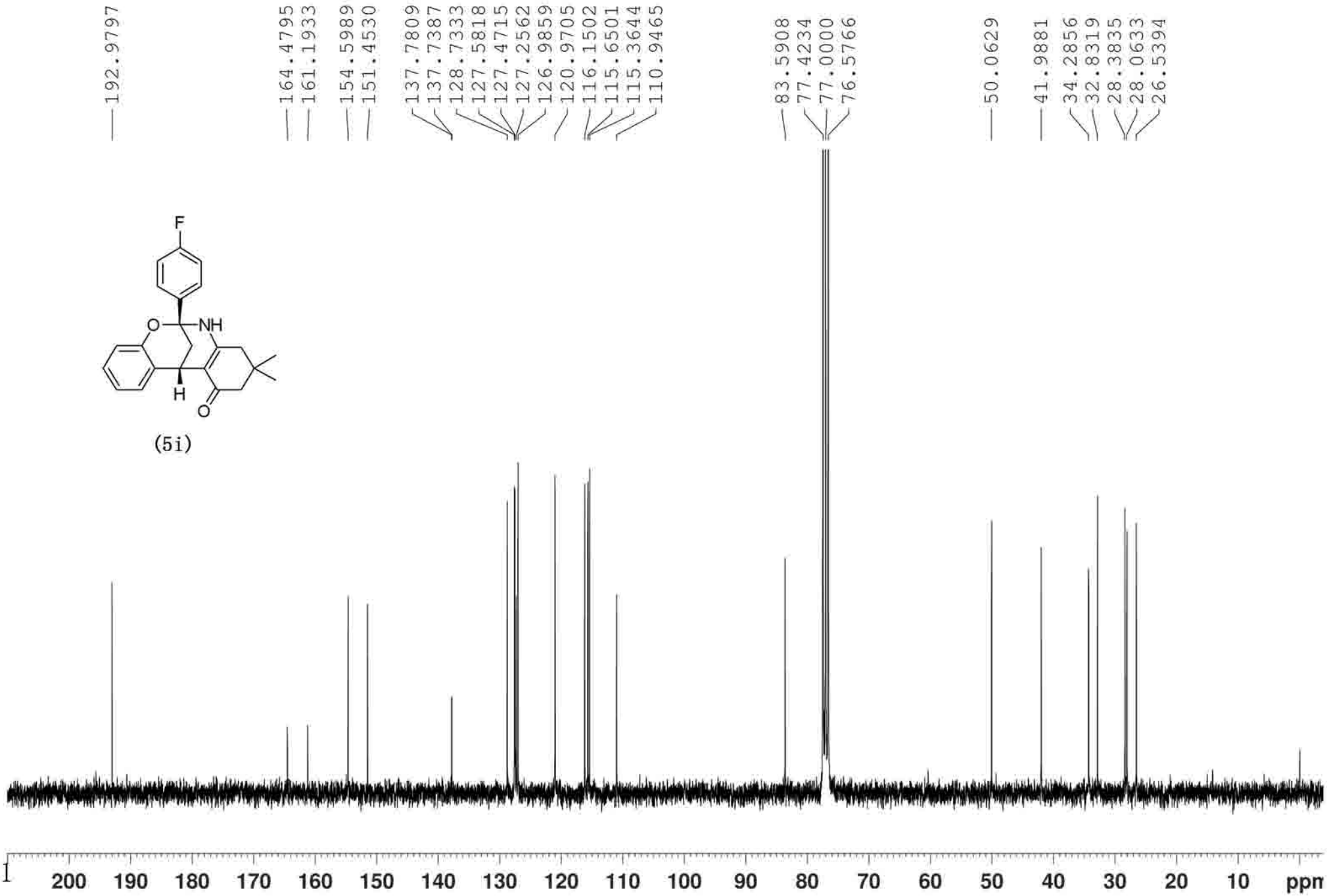
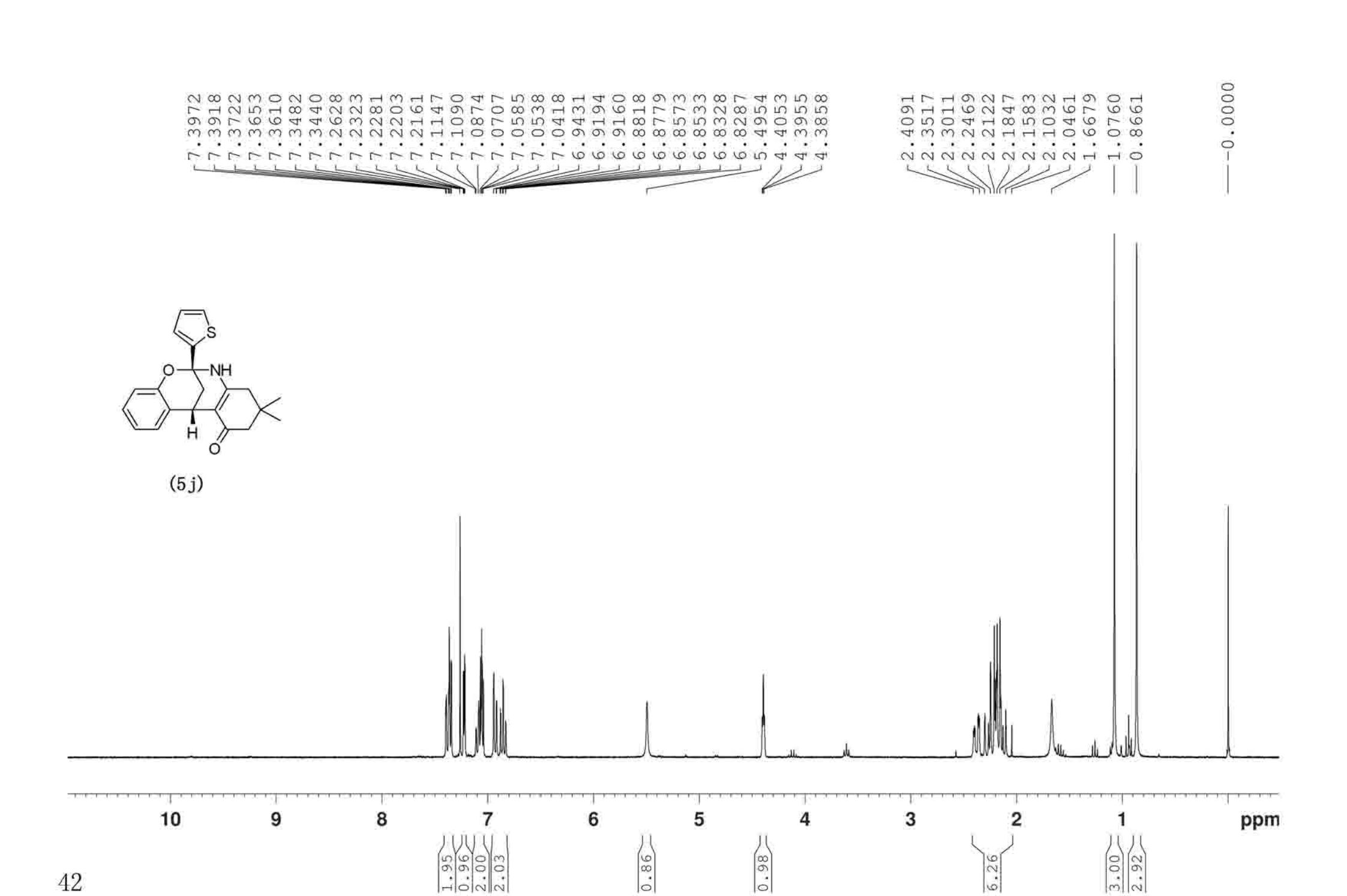
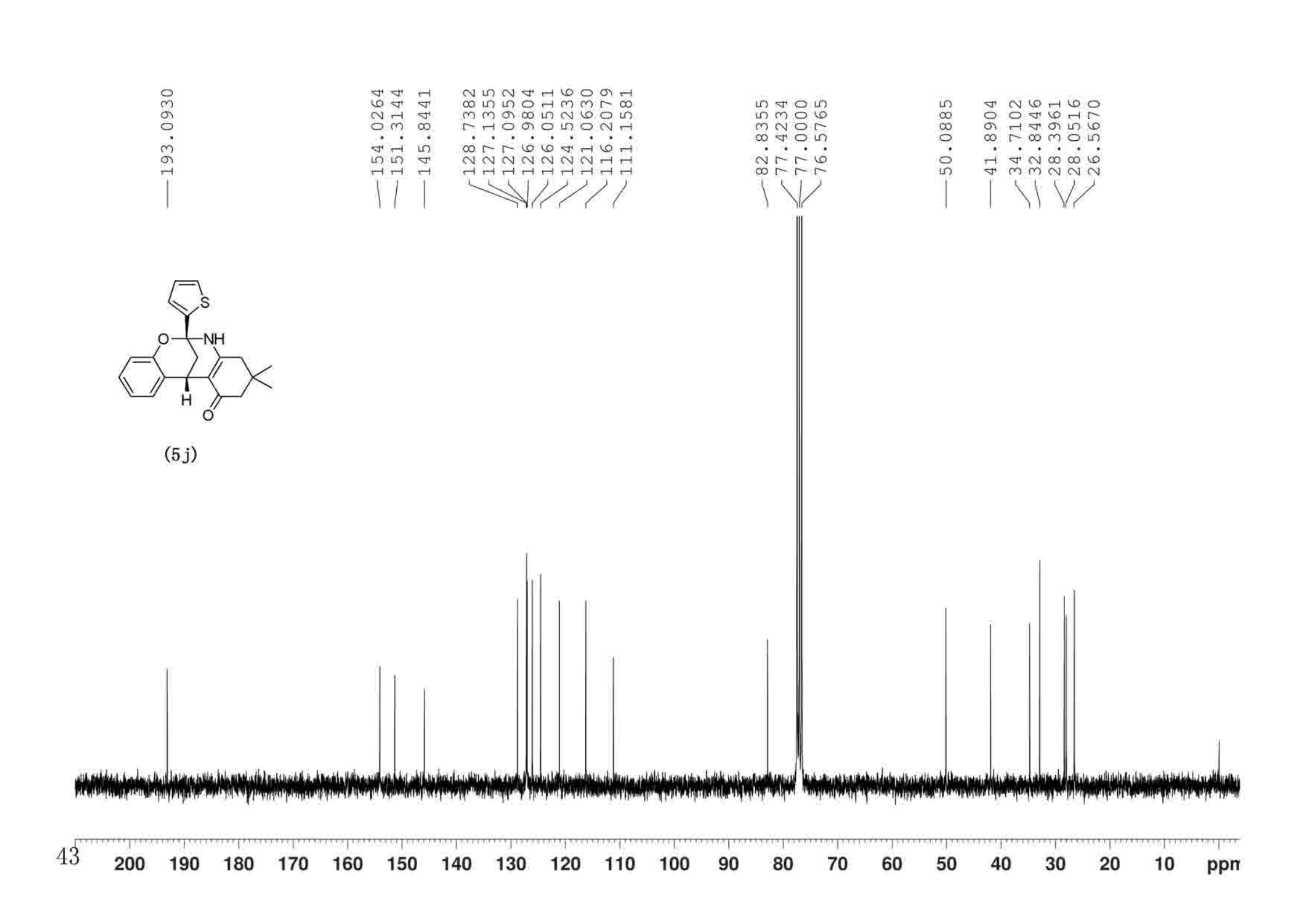
7.6729
7.6606
7.6431
7.3939
7.3889
7.3690
7.3639
7.2630
7.1565
7.1278
7.1209
7.0985
7.0739
7.0684
6.9615
6.9376
6.8824
6.8785
6.8578
6.8540
6.8331
6.8293
5.3929
4.3871
4.3774
4.3674
2.3103
2.2566
2.2028
2.1751
2.1207
2.1059
2.0960
2.0631
2.0533
2.0431
1.6923
1.0839
0.8682
0.0000
F
O
NH
H
O
(5i)
10
9
8
7
6
5
4
3
2
1
ppm
1.99
1.01
2.99
1.00
1.00
0.90
0.98
6.18
2.97
2.99


192.9797
164.4795
161.1933
154.5989
151.4530
137.7809
137.7387
128.7333
127.5818
127.4715
127.2562
126.9859
120.9705
116.1502
115.6501
115.3644
110.9465
83.5908
77.4234
77.0000
76.5766
50.0629
41.9881
34.2856
32.8319
28.3835
28.0633
26.5394
F
O
NH
H
O
(5i)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm


7.3972
7.3918
7.3722
7.3653
7.3610
7.3482
7.3440
7.2628
7.2323
7.2281
7.2203
7.2161
7.1147
7.1090
7.0874
7.0707
7.0585
7.0538
7.0418
6.9431
6.9194
6.9160
6.8818
6.8779
6.8573
6.8533
6.8328
6.8287
5.4954
4.4053
4.3955
4.3858
2.4091
2.3517
2.3011
2.2469
2.2122
2.1847
2.1583
2.1032
2.0461
1.6679
1.0760
0.8661
0.0000
S
O
NH
H
O
(5j)
10
9
8
7
6
5
4
3
2
1
ppm
1.95
0.96
2.00
2.03
0.86
0.98
6.26
3.00
2.92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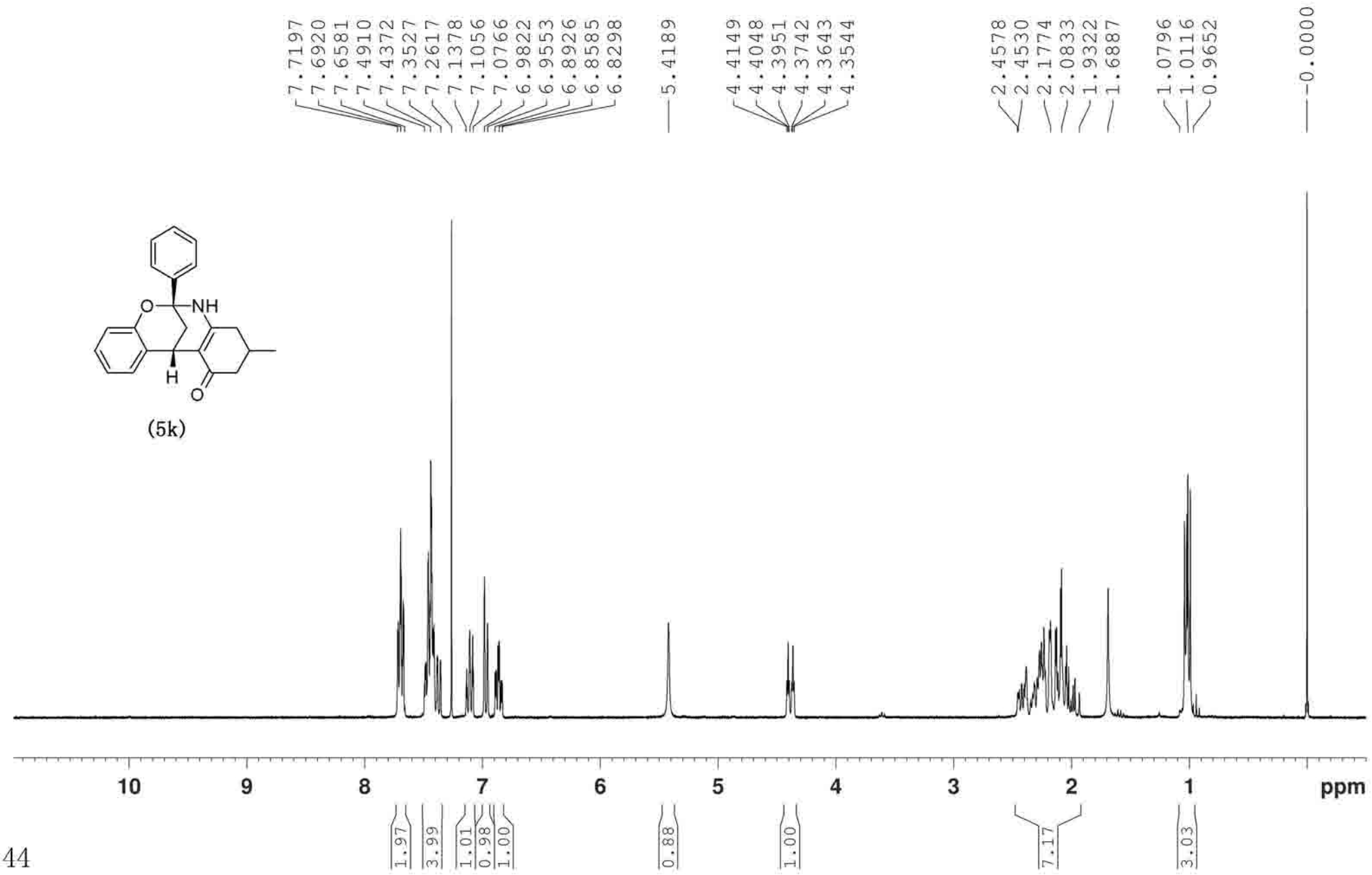
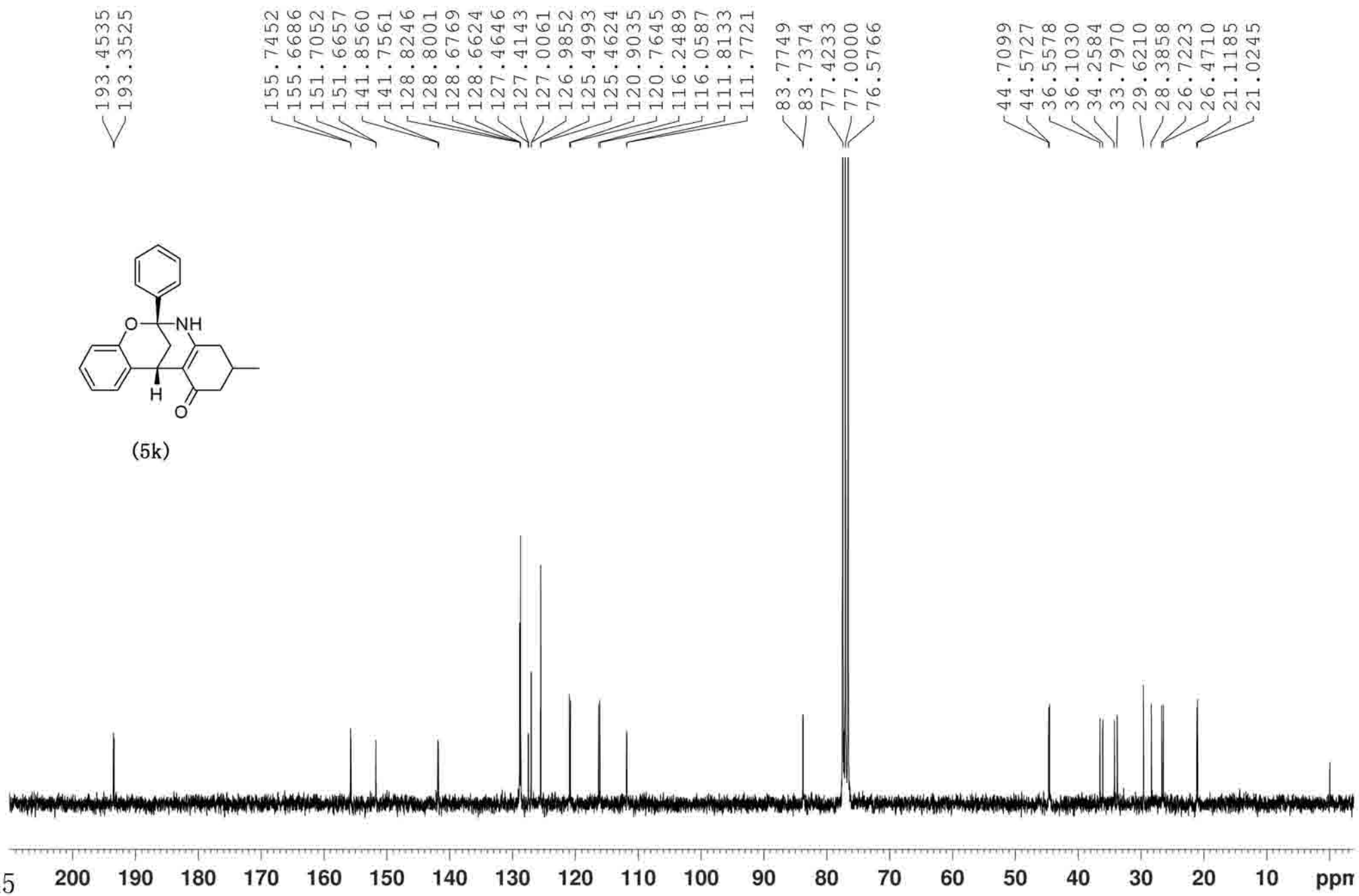
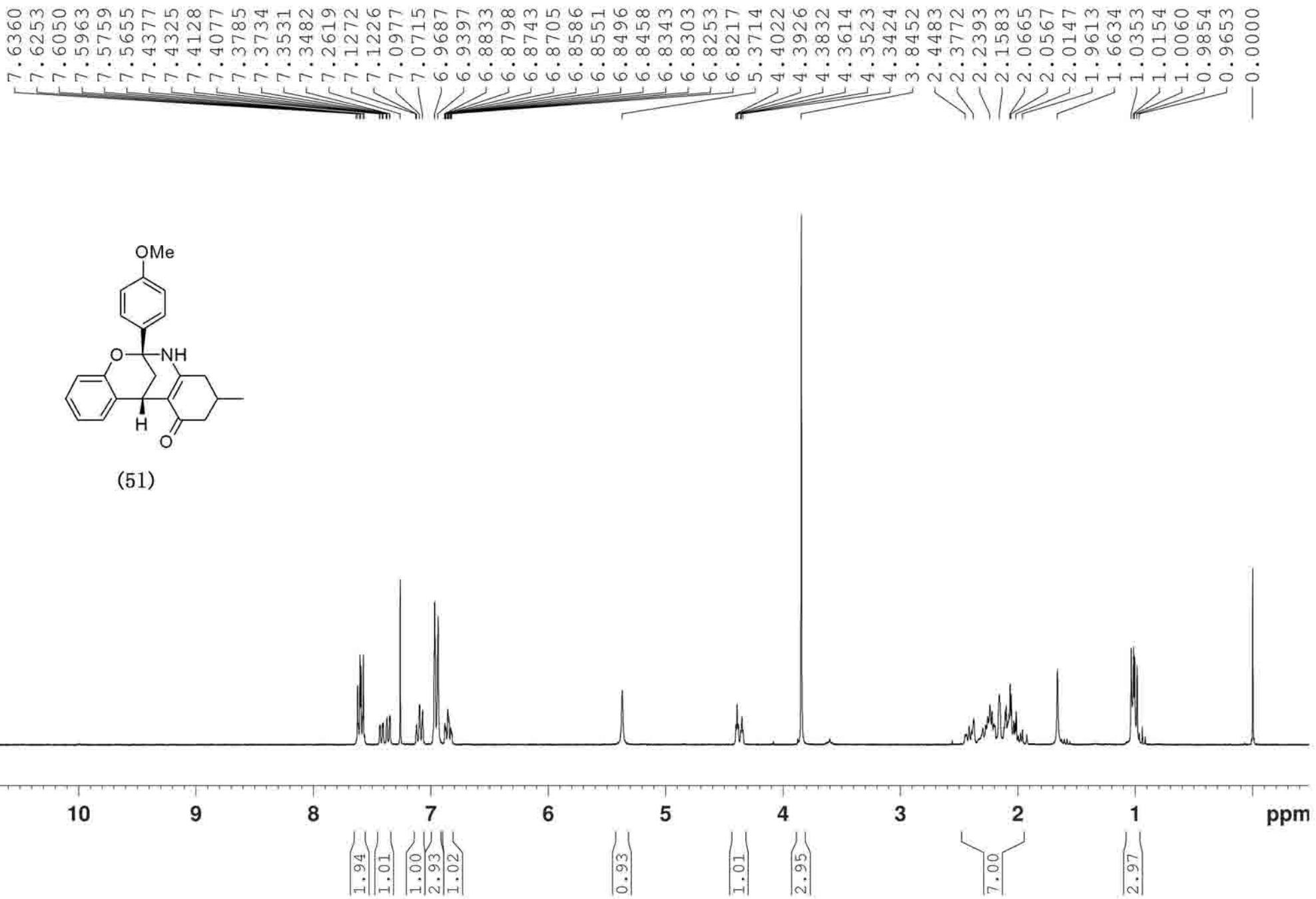
154.0264
151.3144
145.8441
128.7382
127.1355
127.0952
126.9804
126.0511
124.5236
121.0630
116.2079
111.1581
82.8355
77.4234
77.0000
76.5765
50.0885
41.8904
34.7102
32.8446
28.3961
28.0516
26.5670
S
O
NH
H
O
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

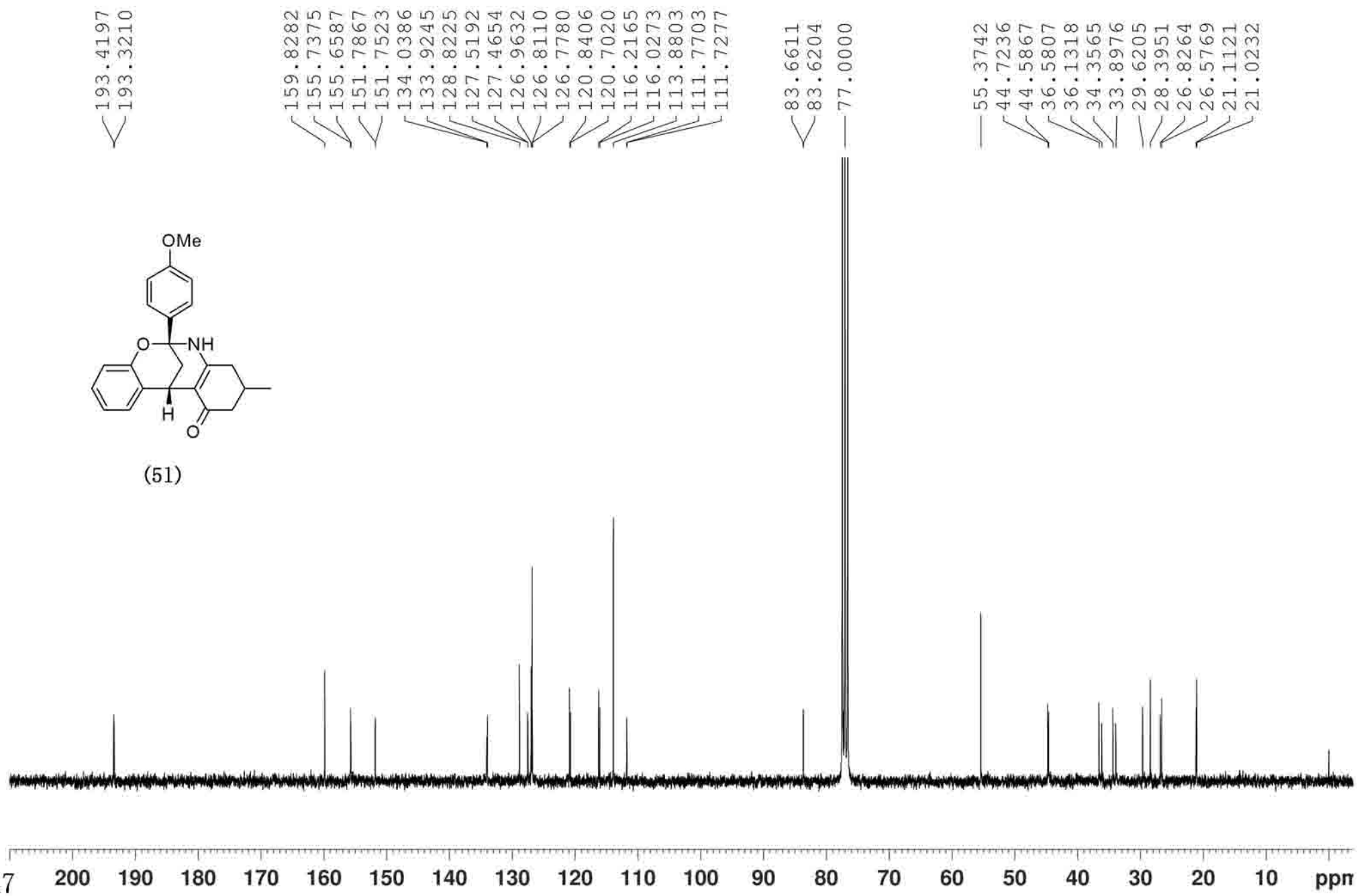
(5j)


7.7197
7.6920
7.6581
7.4910
7.4372
7.3527
7.2617
7.1378
7.1056
7.0766
6.9822
6.9553
6.8926
6.8585
6.8298
5.4189
4.4149
4.4048
4.3951
4.3742
4.3643
4.3544
2.4578
2.4530
2.1774
2.0833
1.9322
1.6887
1.0796
1.0116
0.9652
0.0000
O
NH
H
O
(5k)
10
9
8
7
6
5
4
3
2
1
ppm
1.97
3.99
1.01
0.98
1.00
0.88
1.00
7.17
3.03


193.4535
193.3525
155.7452
155.6686
151.7052
151.6657
141.8560
141.7561
128.8246
128.8001
128.6769
128.6624
127.4646
127.4143
127.0061
126.9852
125.4993
125.4624
120.9035
120.7645
116.2489
116.0587
111.8133
111.7721
83.7749
83.7374
77.4233
77.0000
76.5766
44.7099
44.5727
36.5578
36.1030
34.2584
33.7970
29.6210
28.3858
26.7223
26.4710
21.1185
21.0245
O
NH
H
O
(5k)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm


7.6360
7.6253
7.6050
7.5963
7.5759
7.5655
7.4377
7.4325
7.4128
7.4077
7.3785
7.3734
7.3531
7.3482
7.2619
7.1272
7.1226
7.0977
7.0715
6.9687
6.9397
6.8833
6.8798
6.8743
6.8705
6.8586
6.8551
6.8496
6.8458
6.8343
6.8303
6.8253
6.8217
5.3714
4.4022
4.3926
4.3832
4.3614
4.3523
4.3424
3.8452
2.4483
2.3772
2.2393
2.1583
2.0665
2.0567
2.0147
1.9613
1.6634
1.0353
1.0154
1.0060
0.9854
0.9653
0.0000
OMe
O
NH
H
O
10
9
8
7
6
5
4
3
2
1
ppm
1.94
1.01
1.00
2.93
1.02
0.93
1.01
2.95
7.00
2.97

(51)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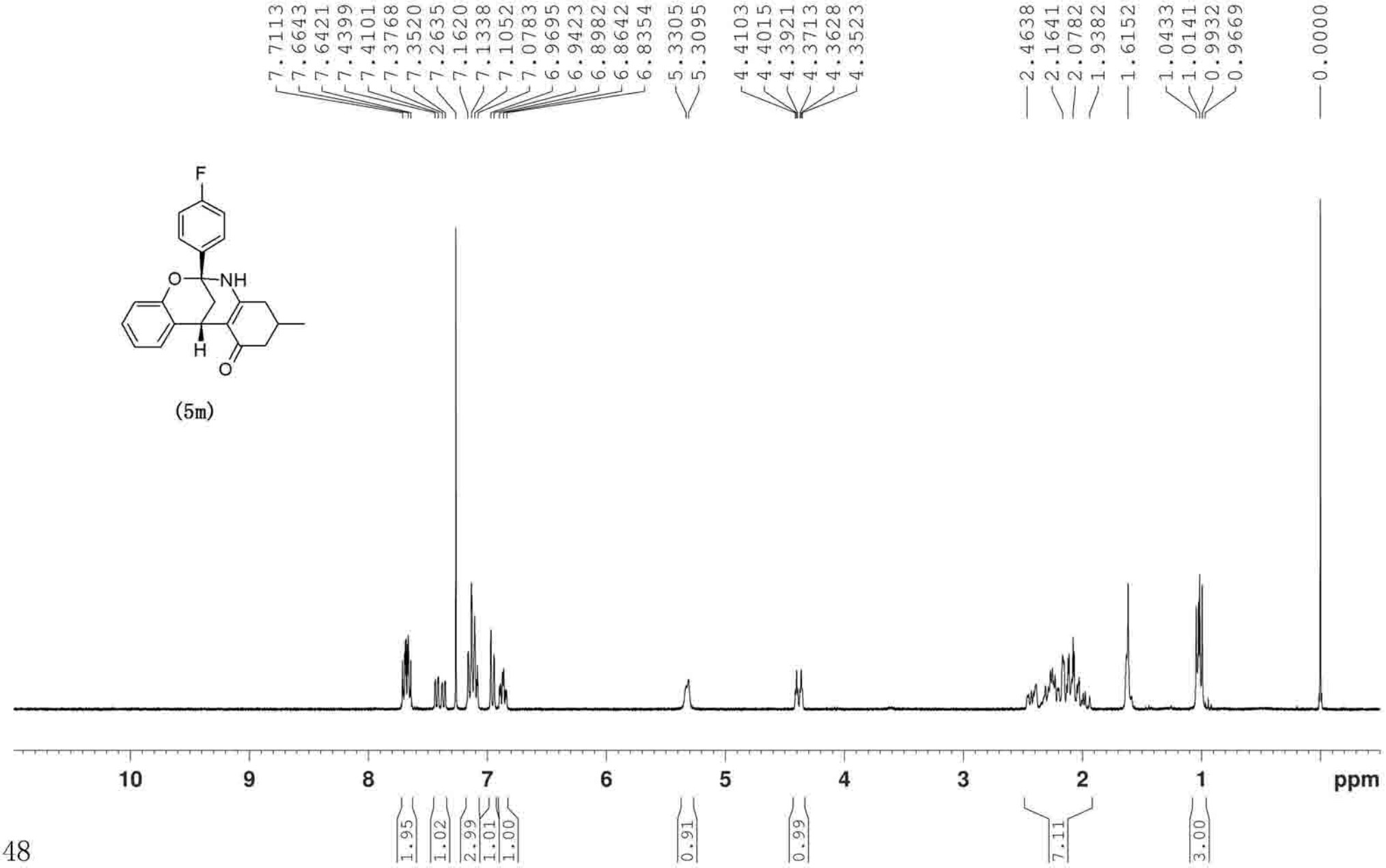
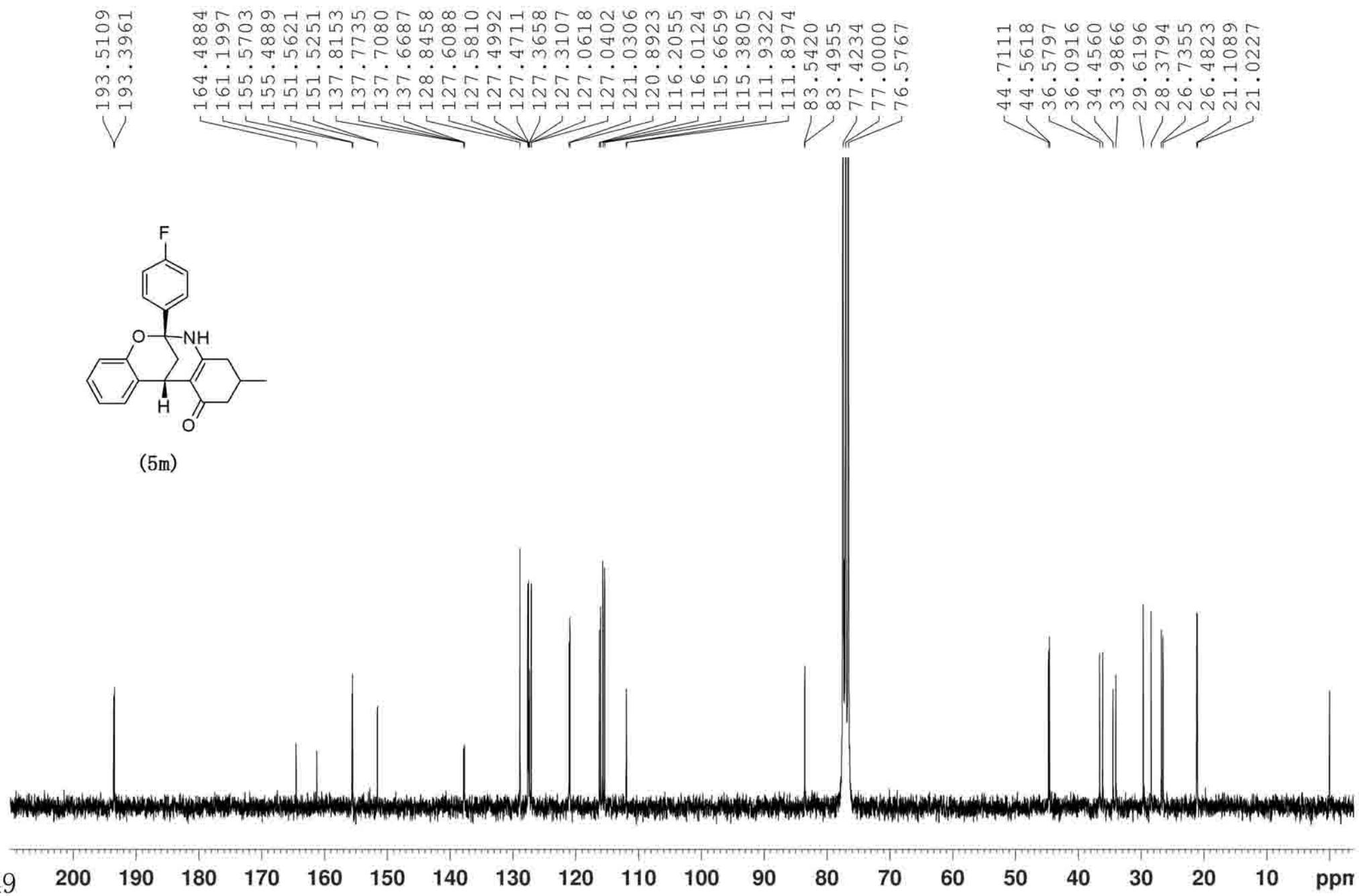
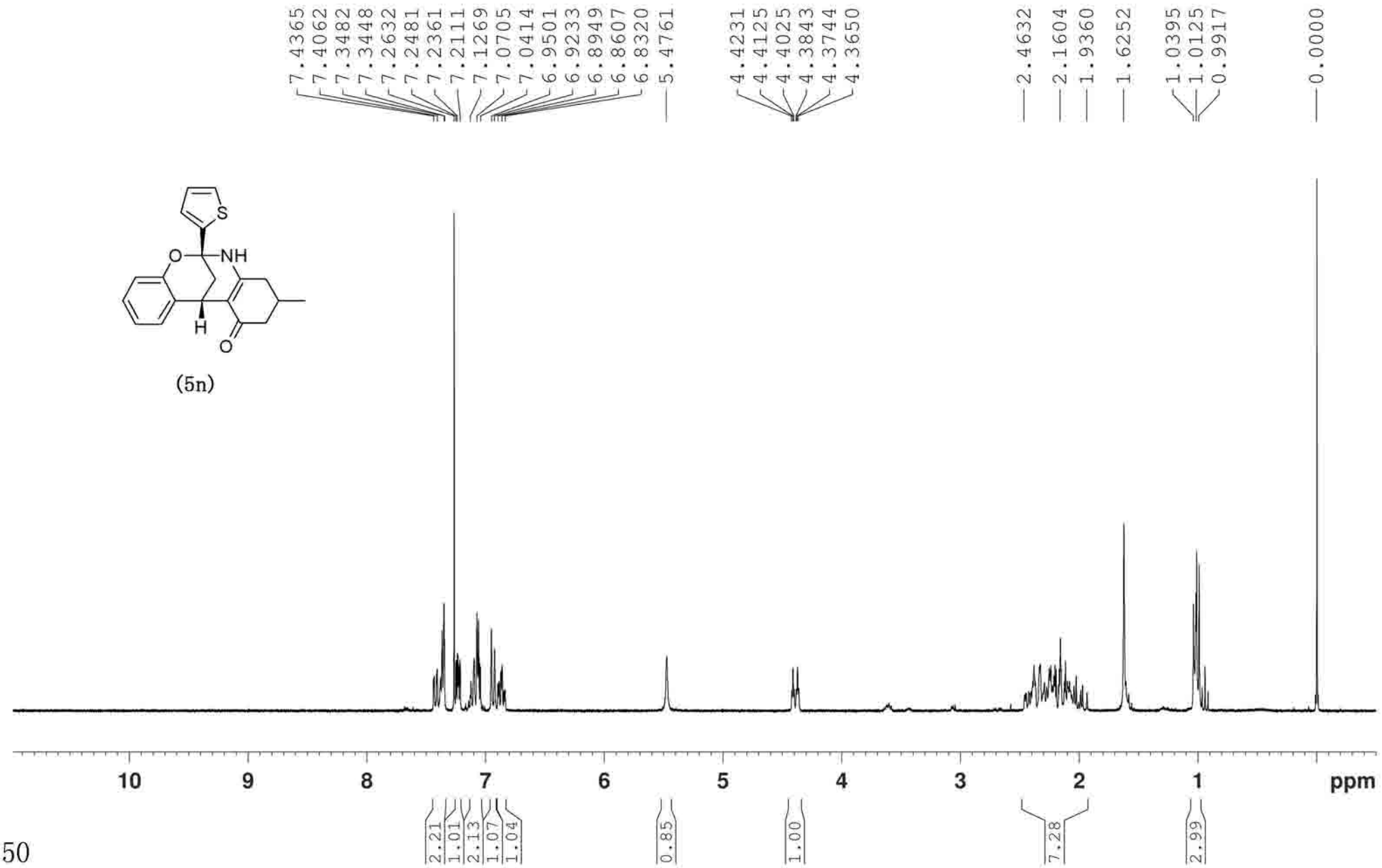
193.3210
159.8282
155.7375
155.6587
151.7867
151.7523
134.0386
133.9245
128.8225
127.5192
127.4654
126.9632
126.8110
126.7780
120.8406
120.7020
116.2165
116.0273
113.8803
111.7703
111.7277
83.6611
83.6204
77.0000
55.3742
44.7236
44.5867
36.5807
36.1318
34.3565
33.8976
29.6205
28.3951
26.8264
26.5769
21.1121
21.0232
OMe
O
NH
H
O
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

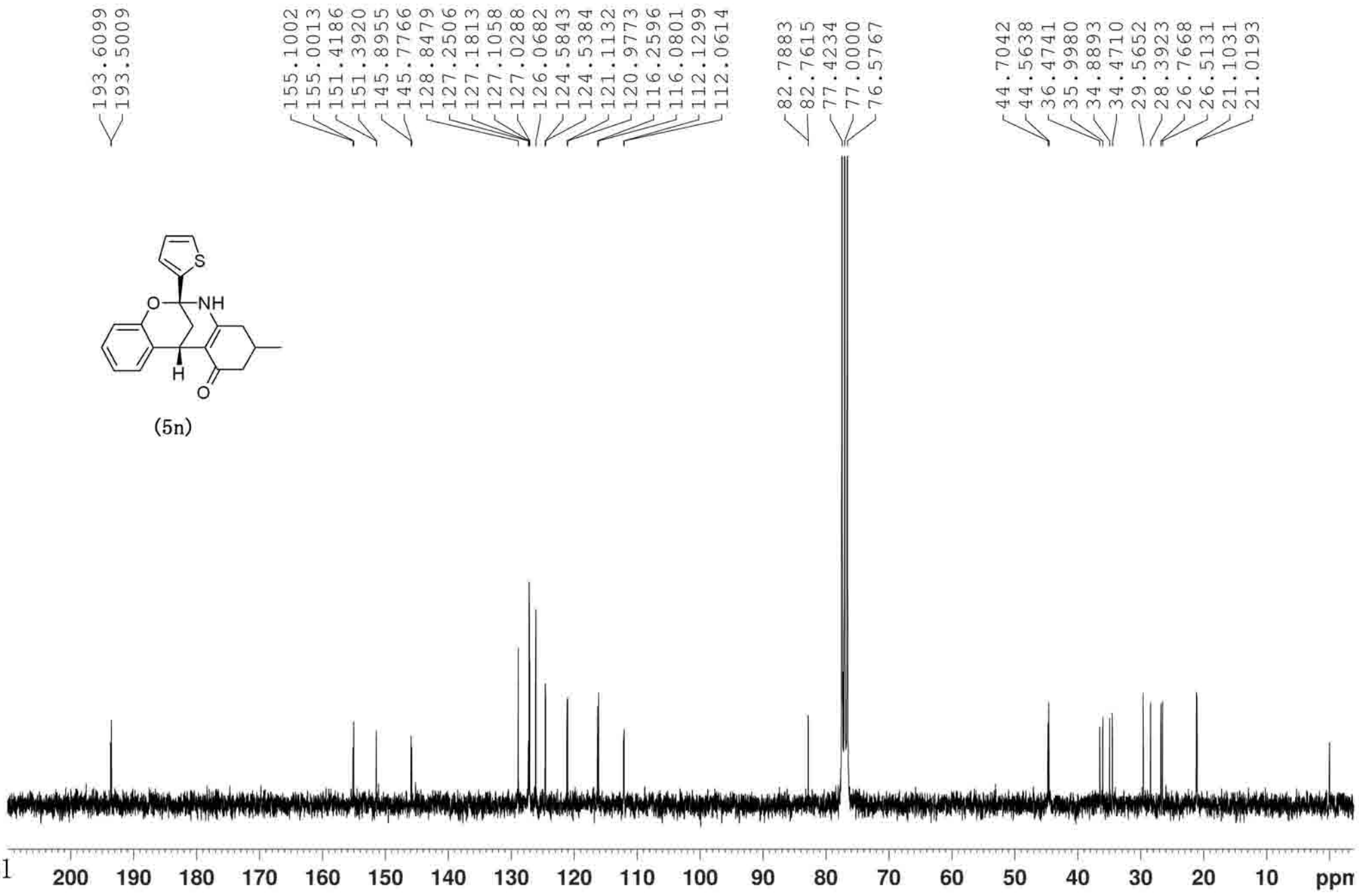
(51)


7.7113
7.6643
7.6421
7.4399
7.4101
7.3768
7.3520
7.2635
7.1620
7.1338
7.1052
7.0783
6.9695
6.9423
6.8982
6.8642
6.8354
5.3305
5.3095
4.4103
4.4015
4.3921
4.3713
4.3628
4.3523
2.4638
2.1641
2.0782
1.9382
1.6152
1.0433
1.0141
0.9932
0.9669
0.0000
F
O
NH
H
O
(5m)
10
9
8
7
6
5
4
3
2
1
ppm
1.95
1.02
2.99
1.01
1.00
0.91
0.99
7.11
3.00


193.5109
193.3961
164.4884
161.1997
155.5703
155.4889
151.5621
151.5251
137.8153
137.7735
137.7080
137.6687
128.8458
127.6088
127.5810
127.4992
127.4711
127.3658
127.3107
127.0618
127.0402
121.0306
120.8923
116.2055
116.0124
115.6659
115.3805
111.9322
111.8974
83.5420
83.4955
77.4234
77.0000
76.5767
44.7111
44.5618
36.5797
36.0916
34.4560
33.9866
29.6196
28.3794
26.7355
26.4823
21.1089
21.0227
F
O
NH
H
O
(5m)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm


7.4365
7.4062
7.3482
7.3448
7.2632
7.2481
7.2361
7.2111
7.1269
7.0705
7.0414
6.9501
6.9233
6.8949
6.8607
6.8320
5.4761
4.4231
4.4125
4.4025
4.3843
4.3744
4.3650
2.4632
2.1604
1.9360
1.6252
1.0395
1.0125
0.9917
0.0000
S
O
NH
H
O
10
9
8
7
6
5
4
3
2
1
ppm
2.21
1.01
2.13
1.07
1.04
0.85
1.00
7.28
2.99

(5n)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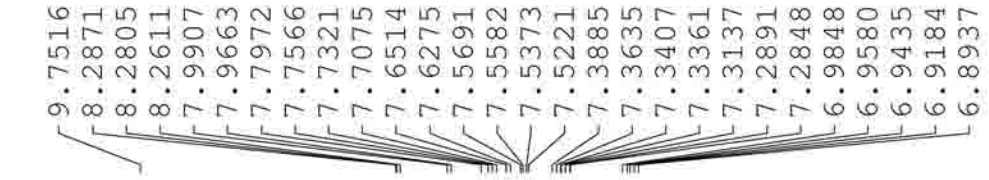
193.5009
155.1002
155.0013
151.4186
151.3920
145.8955
145.7766
128.8479
127.2506
127.1813
127.1058
127.0288
126.0682
124.5843
124.5384
121.1132
120.9773
116.2596
116.0801
112.1299
112.0614
82.7883
82.7615
77.4234
77.0000
76.5767
44.7042
44.5638
36.4741
35.9980
34.8893
34.4710
29.5652
28.3923
26.7668
26.5131
21.1031
21.0193
S
O
NH
H
O
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

(5n)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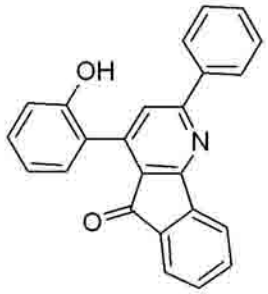
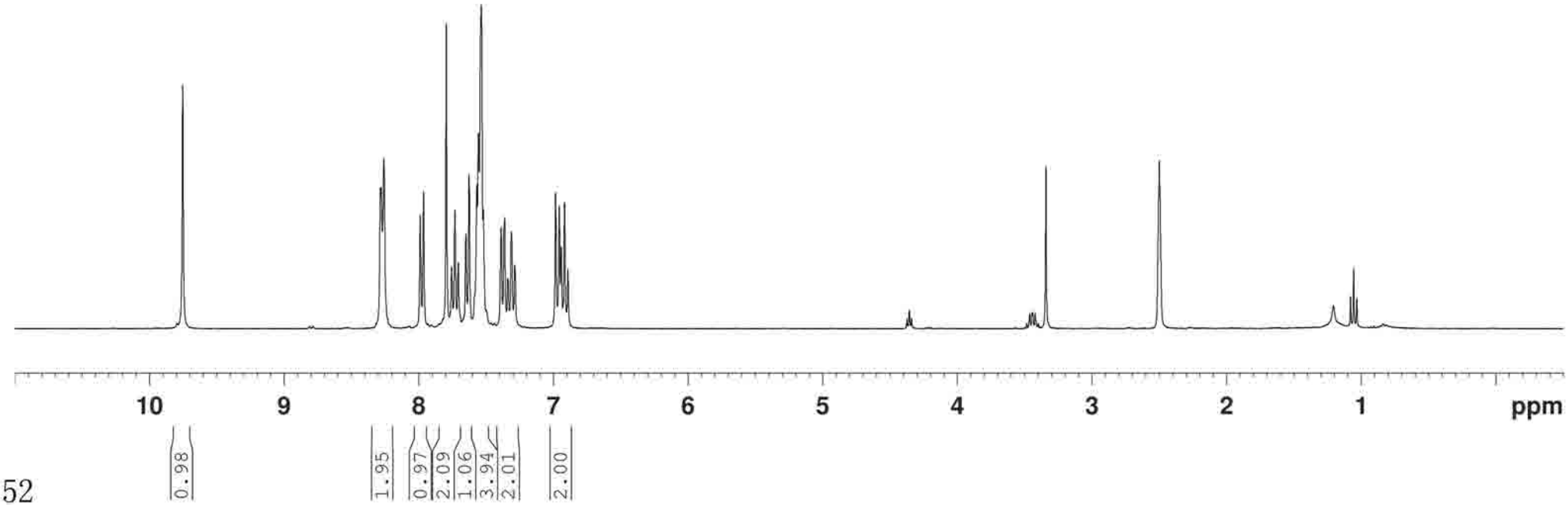
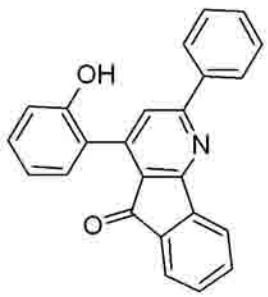
8.2871
8.2805
8.2611
7.9907
7.9663
7.7972
7.7566
7.7321
7.7075
7.6514
7.6275
7.5691
7.5582
7.5373
7.5221
7.3885
7.3635
7.3407
7.3361
7.3137
7.2891
7.2848
6.9848
6.9580
6.9435
6.9184
6.8937
2.5000


OH
N
O

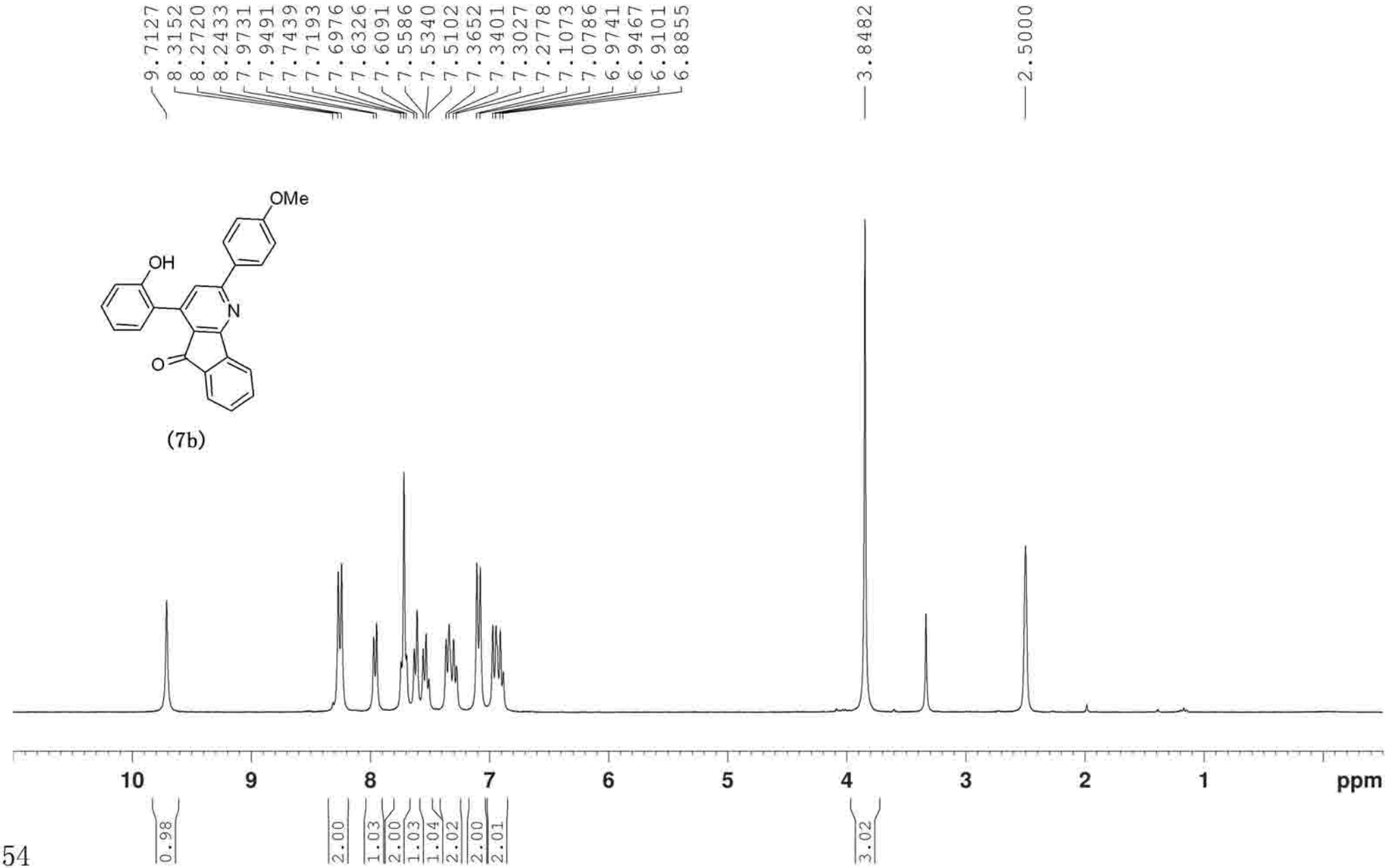
(7a)

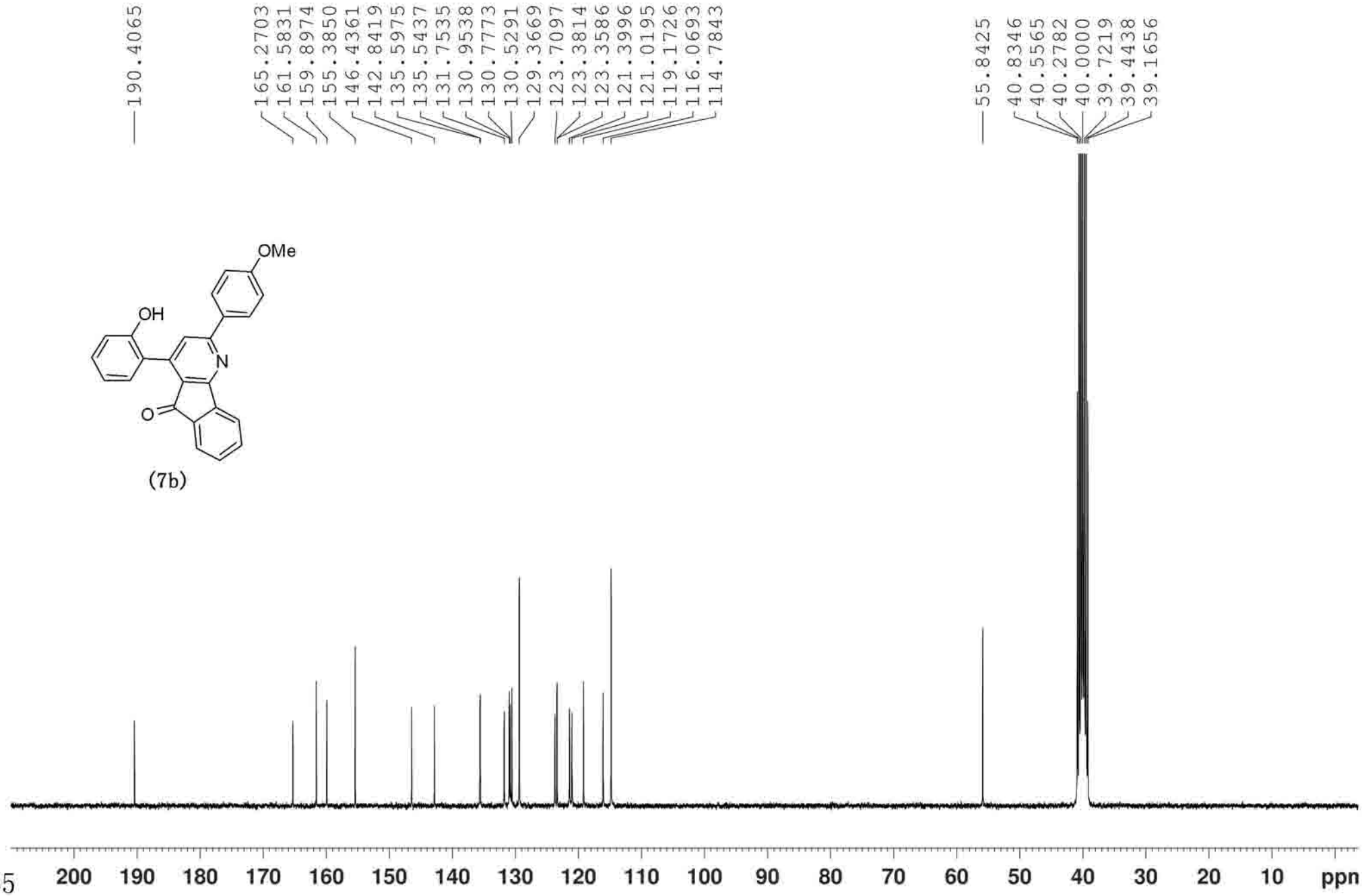

10
9
8
7
6
5
4
3
2
1
ppm
0.98
1.95
0.97
2.09
1.06
3.94
2.01
2.00

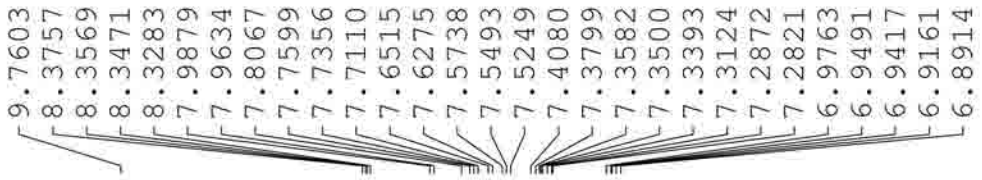

OH
N
O

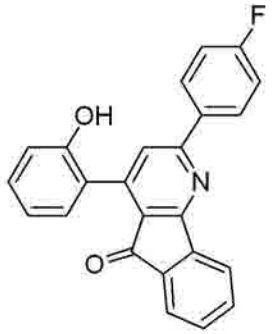
(7a)

190.4148
165.2801
160.0979
155.4040
146.5245
142.8243
138.1355
135.7429
135.4708
131.8530
131.0285
130.8966
130.6648
129.3931
127.7569
124.0778
123.8347
123.1801
122.5620
121.1203
119.1969
116.1005
40.8345
40.5564
40.2783
40.0000
39.7217
39.4435
39.1654
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppm

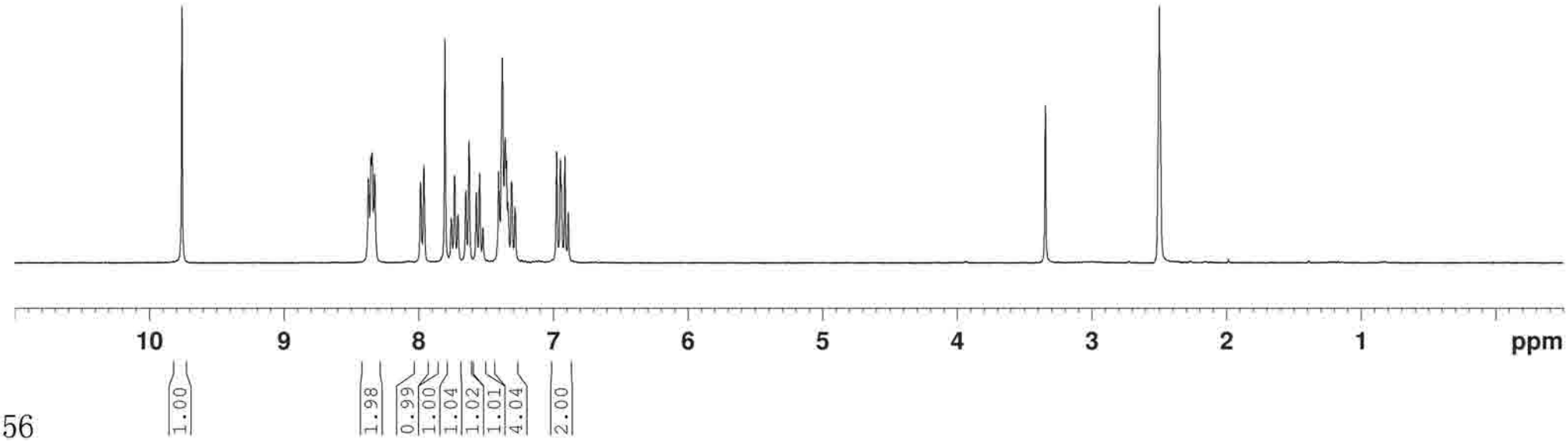

9.7127
8.3152
8.2720
8.2433
7.9731
7.9491
7.7439
7.7193
7.6976
7.6326
7.6091
7.5586
7.5340
7.5102
7.3652
7.3401
7.3027
7.2778
7.1073
7.0786
6.9741
6.9467
6.9101
6.8855
3.8482
2.5000
OMe
OH
N
O
(7b)
10
9
8
7
6
5
4
3
2
1
ppm
0.98
2.00
1.03
2.00
1.03
1.04
2.02
2.00
2.01
3.02

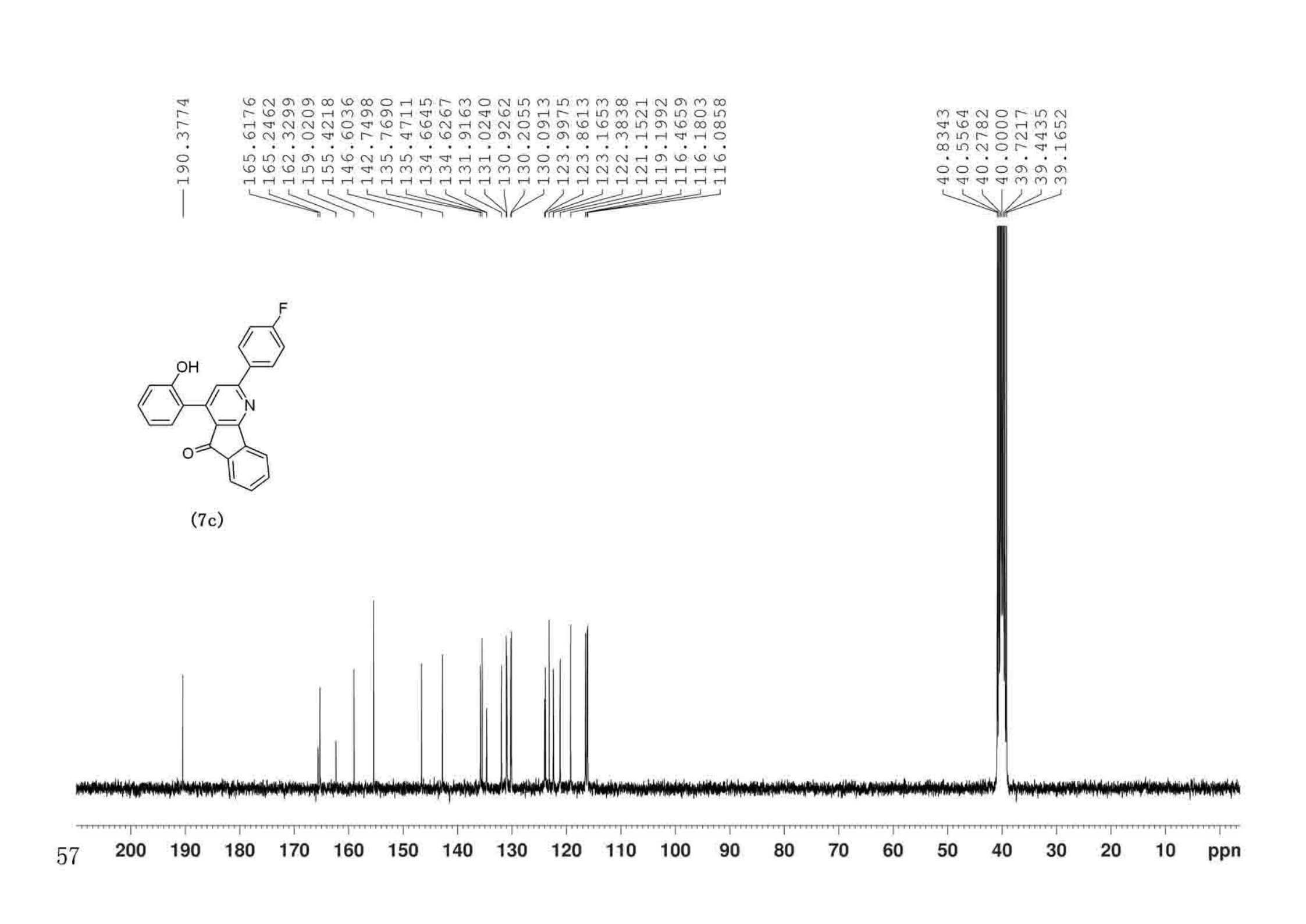

190.4065
165.2703
161.5831
159.8974
155.3850
146.4361
142.8419
135.5975
135.5437
131.7535
130.9538
130.7773
130.5291
129.3669
123.7097
123.3814
123.3586
121.3996
121.0195
119.1726
116.0693
114.7843
55.8425
40.8346
40.5565
40.2782
40.0000
39.7219
39.4438
39.1656
OMe
OH
N
O
(7b)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
ppn


9.7603
8.3757
8.3569
8.3471
8.3283
7.9879
7.9634
7.8067
7.7599
7.7356
7.7110
7.6515
7.6275
7.5738
7.5493
7.5249
7.4080
7.3799
7.3582
7.3500
7.3393
7.3124
7.2872
7.2821
6.9763
6.9491
6.9417
6.9161
6.8914
2.5000


F
OH
N
O

(7c)


10
9
8
7
6
5
4
3
2
1
ppm
1.00
1.98
0.99
1.00
1.04
1.02
1.01
4.04
2.00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165.6176
165.2462
162.3299
159.0209
155.4218
146.6036
142.7498
135.7690
135.4711
134.6645
134.6267
131.9163
131.0240
130.9262
130.2055
130.0913
123.9975
123.8613
123.1653
122.3838
121.1521
119.1992
116.4659
116.1803
116.0858
40.8343
40.5564
40.2782
40.0000
39.7217
39.4435
39.1652
F
OH
N
O
(7c)
200
190
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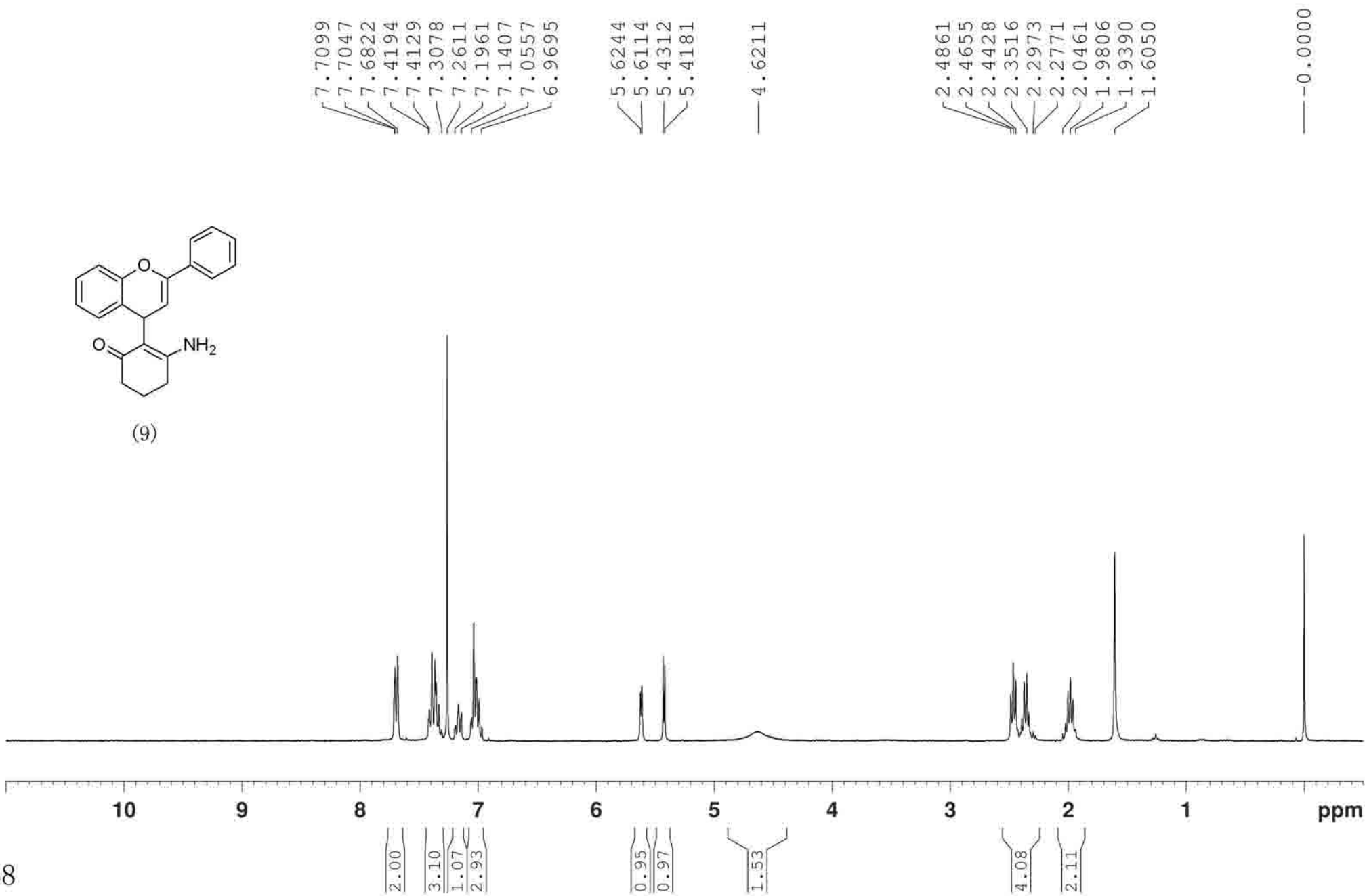
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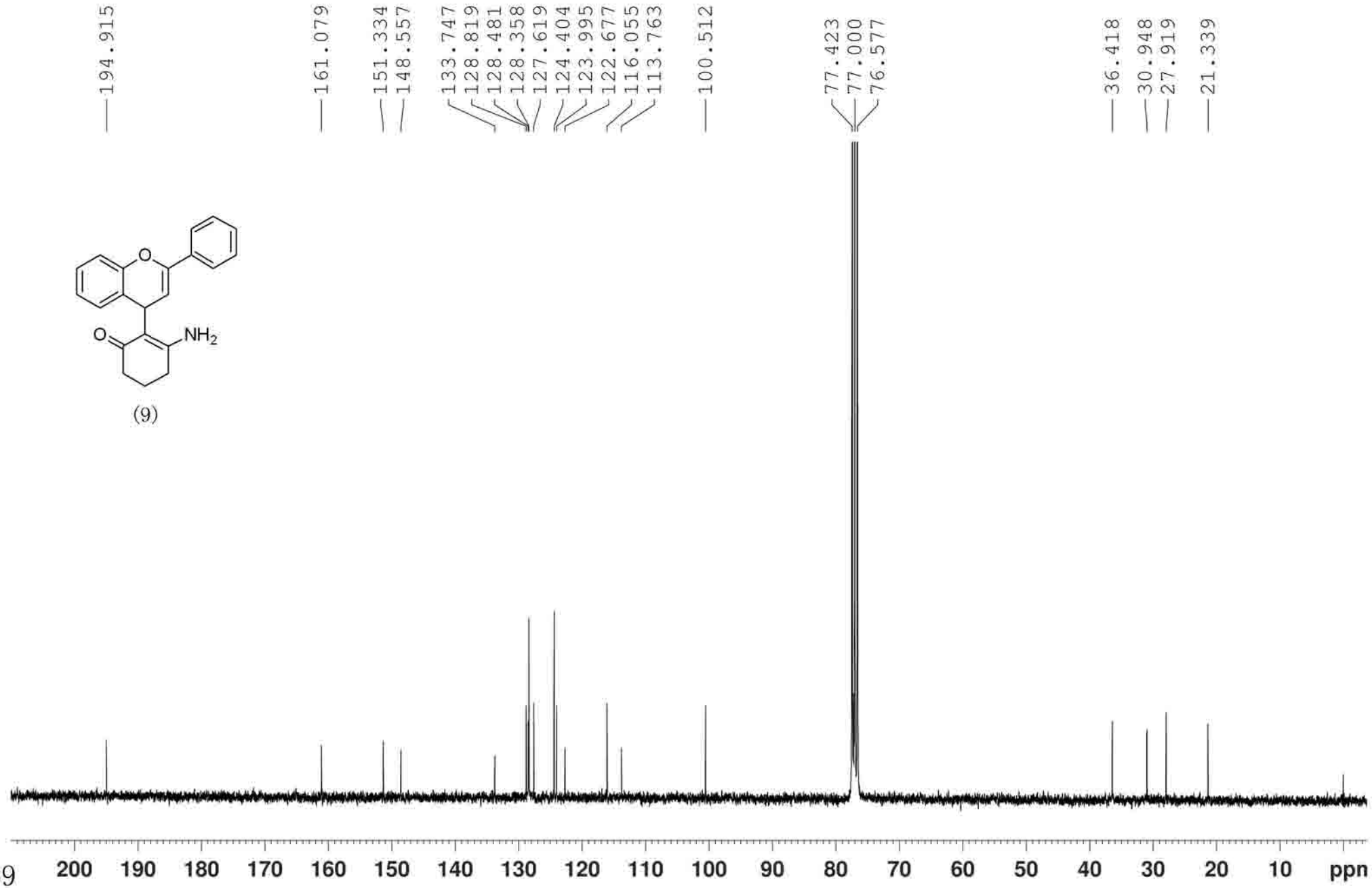
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