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The synthesis of 8-substituted indolizidines from enaminone precursors

Sultan, Saleem Syed

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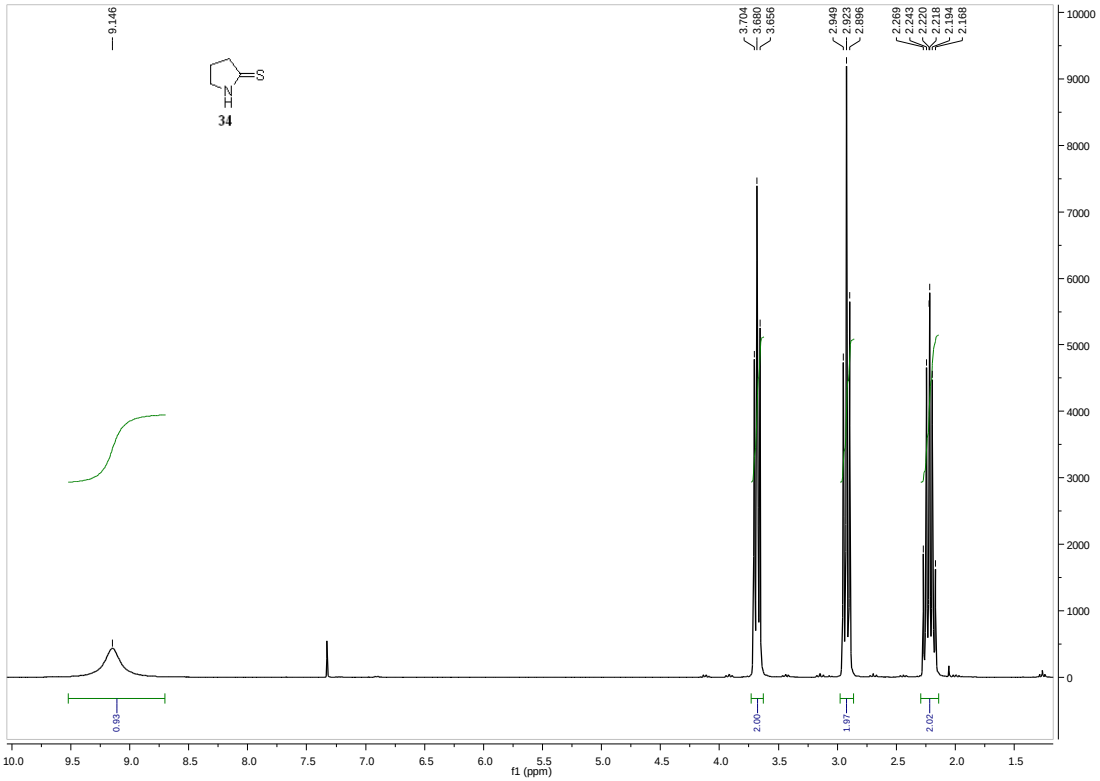
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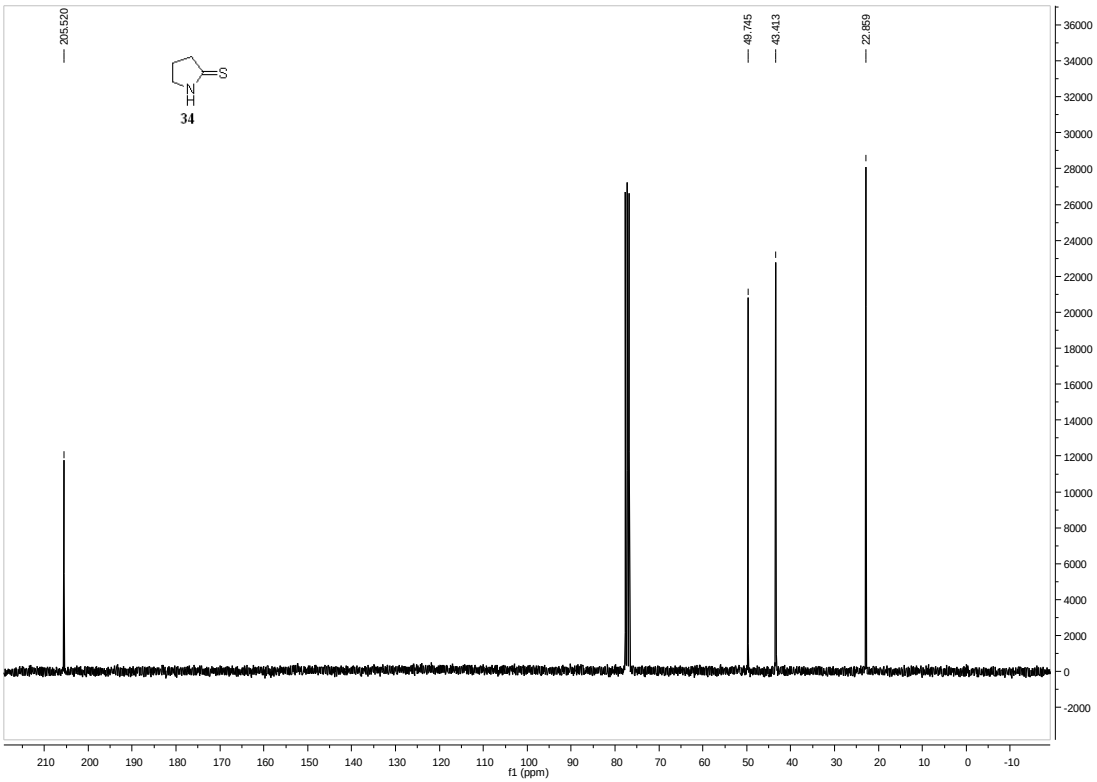
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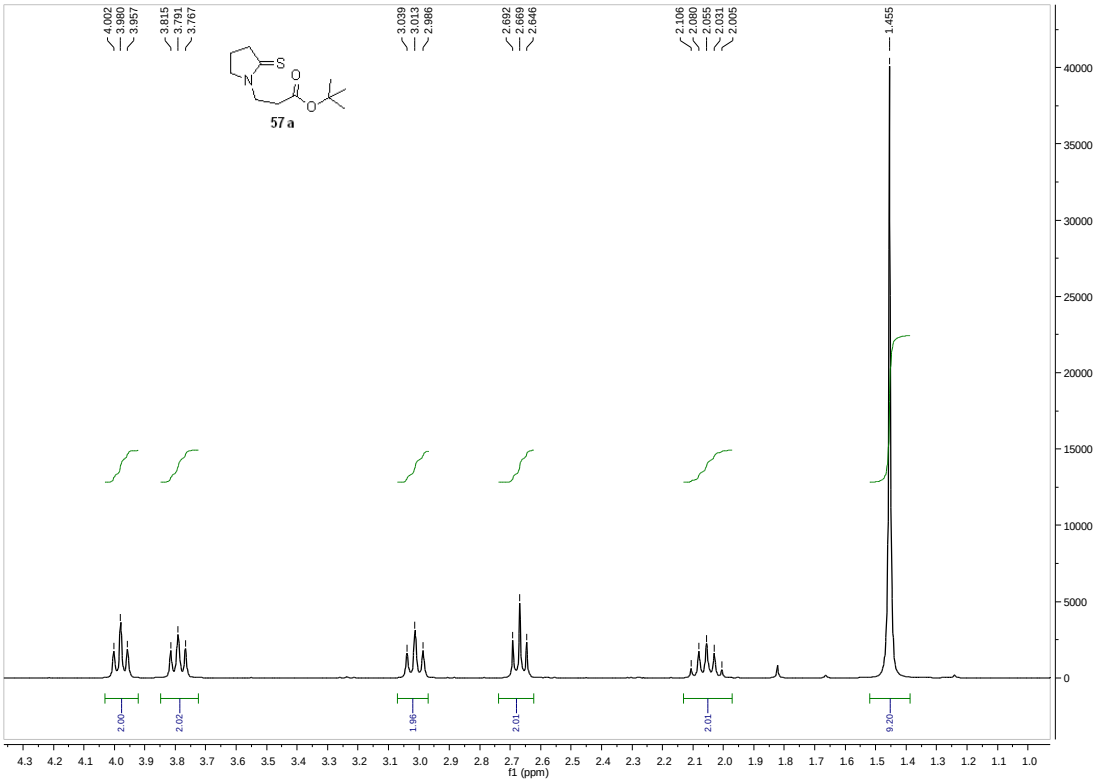
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O
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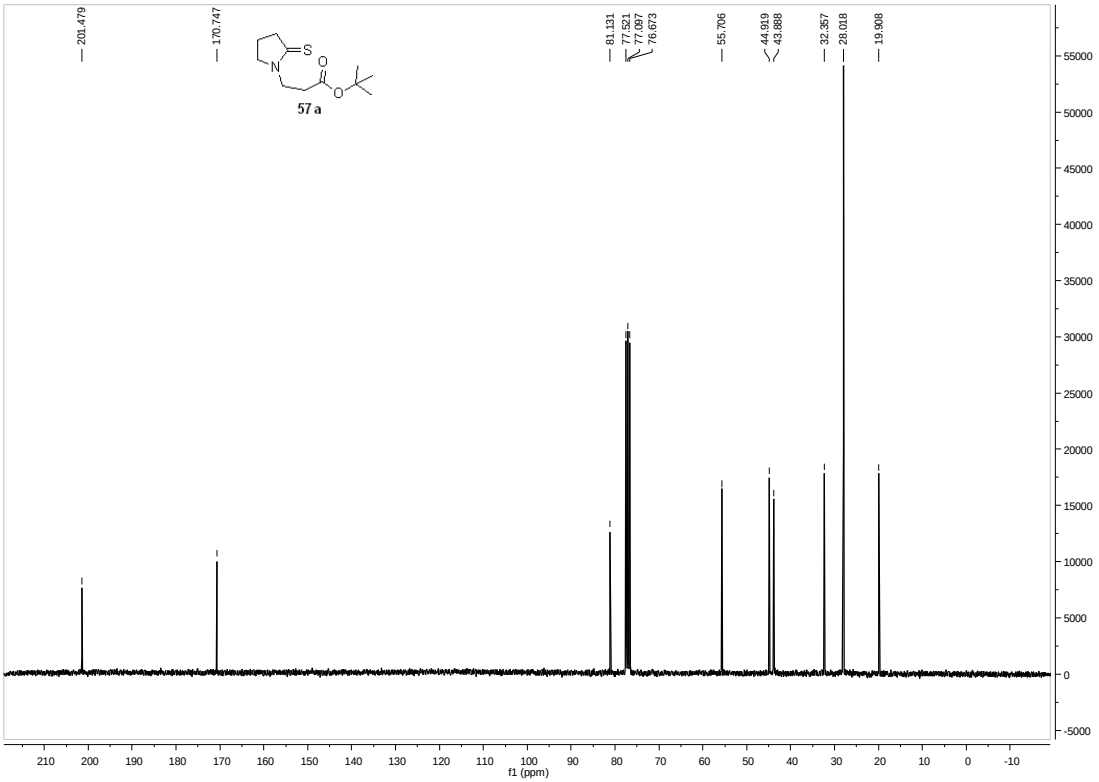
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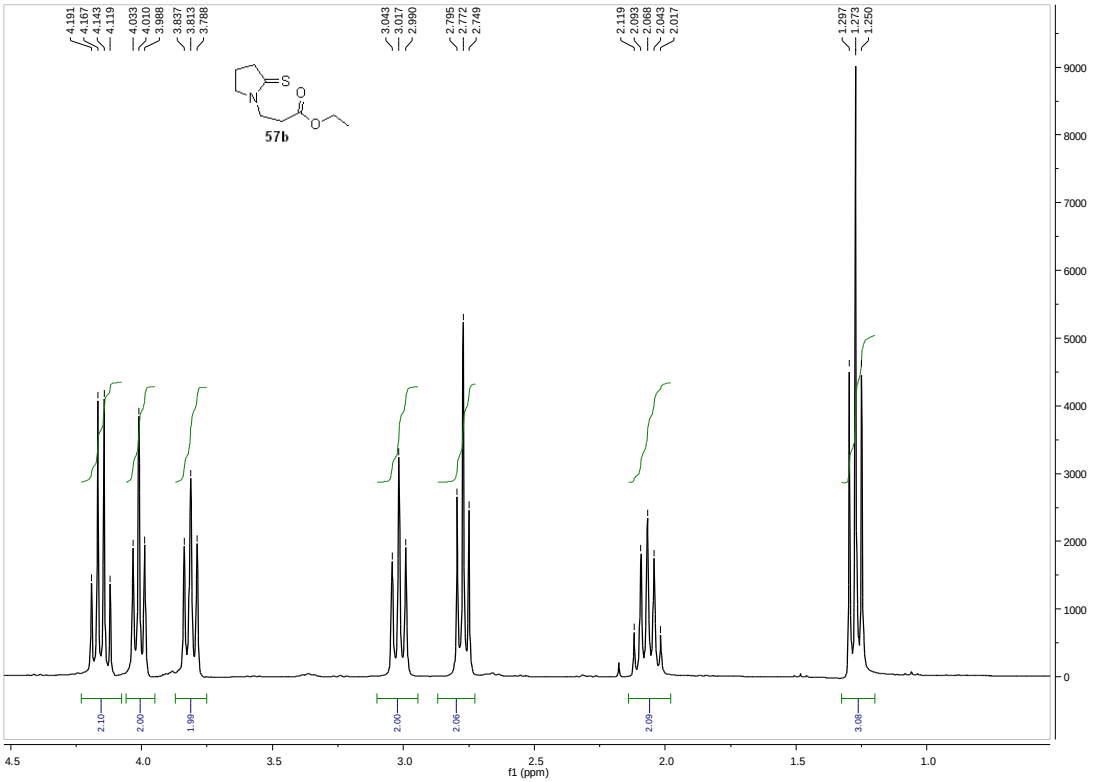
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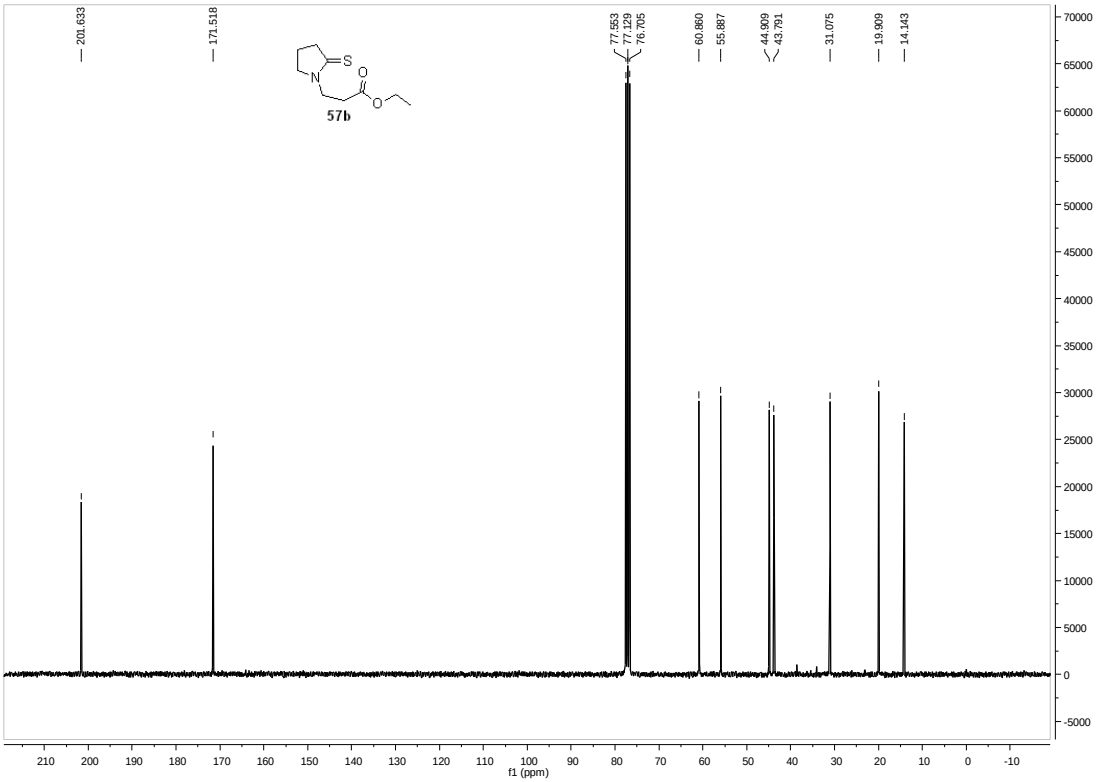
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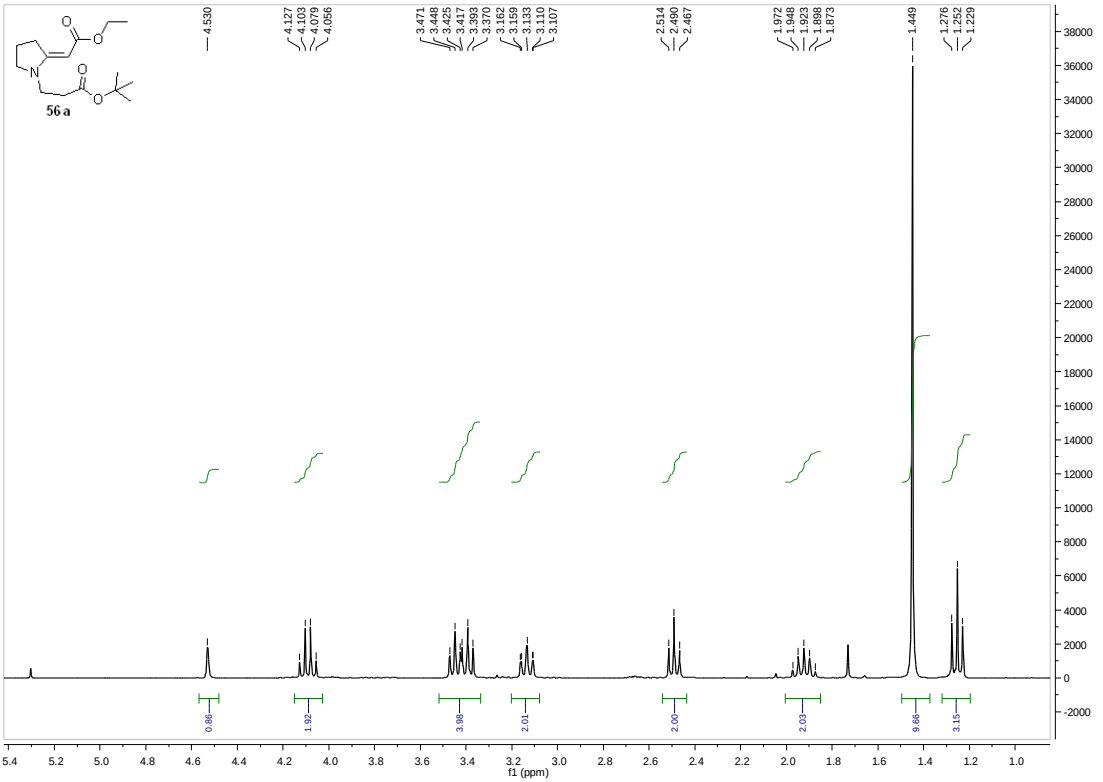
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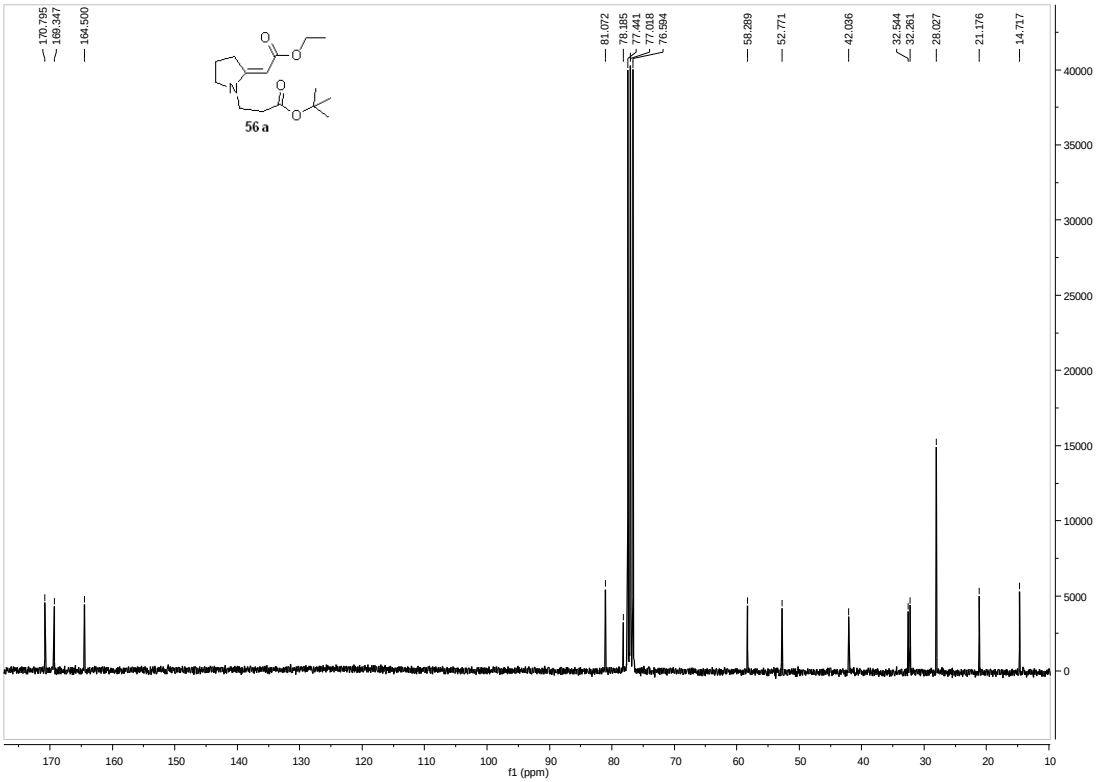
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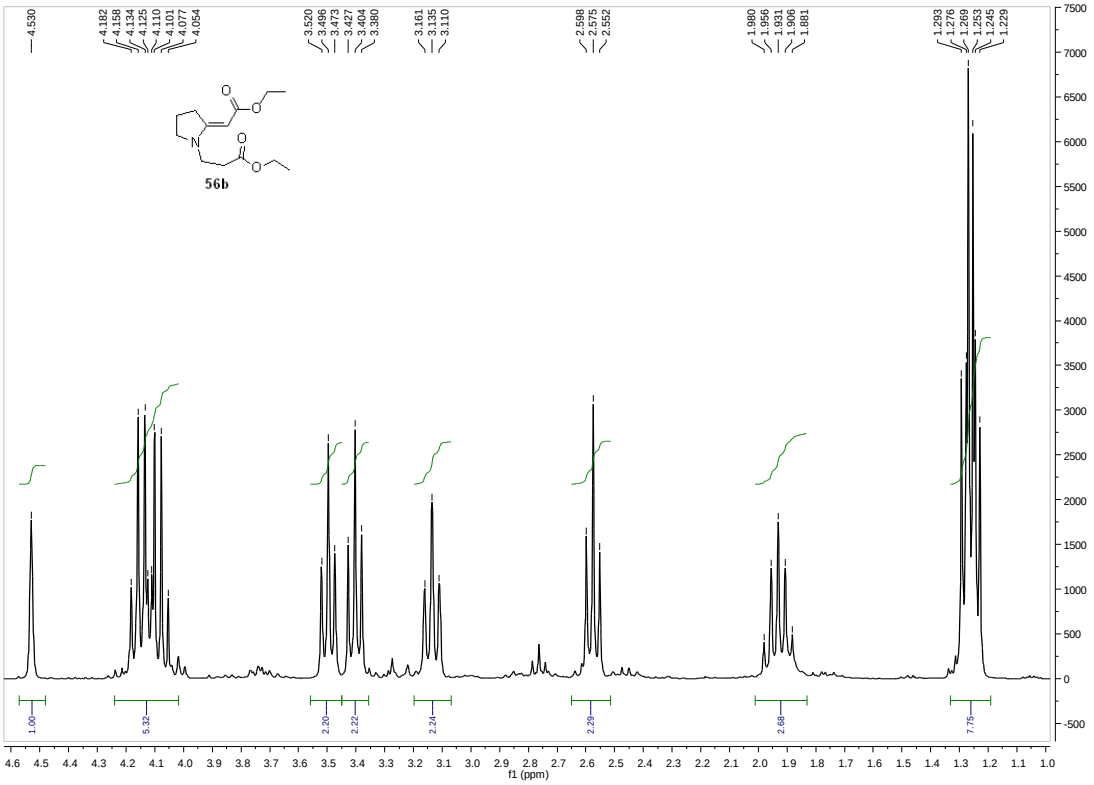
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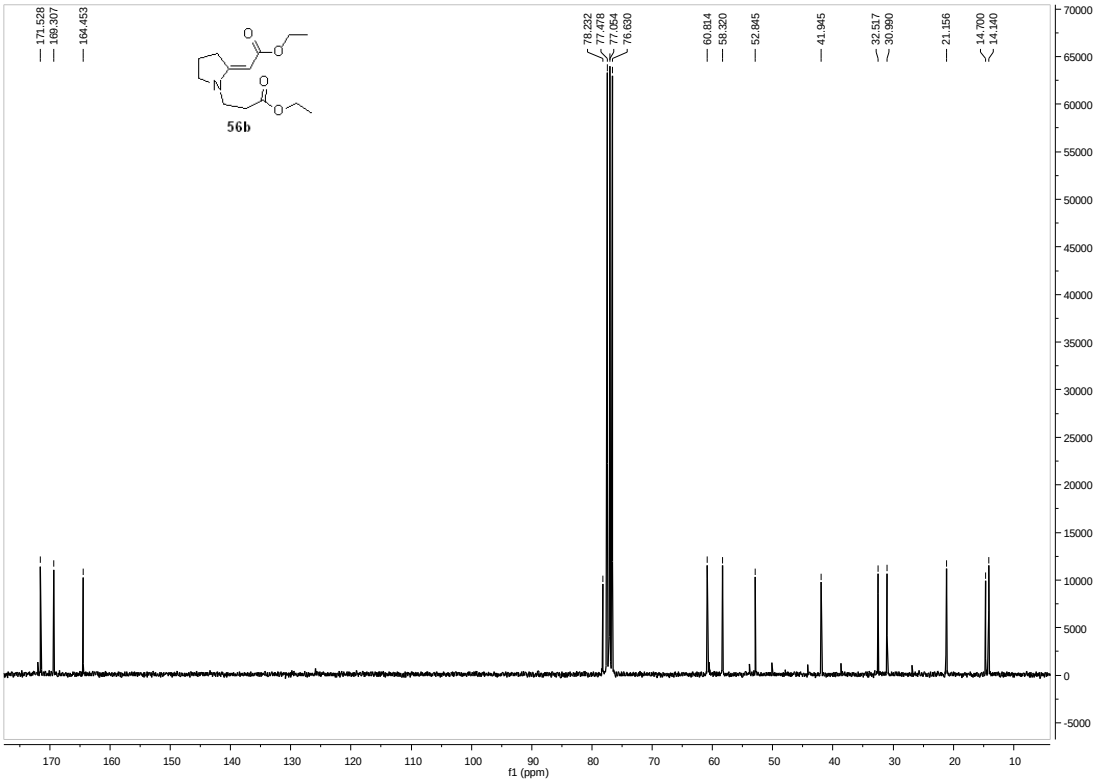
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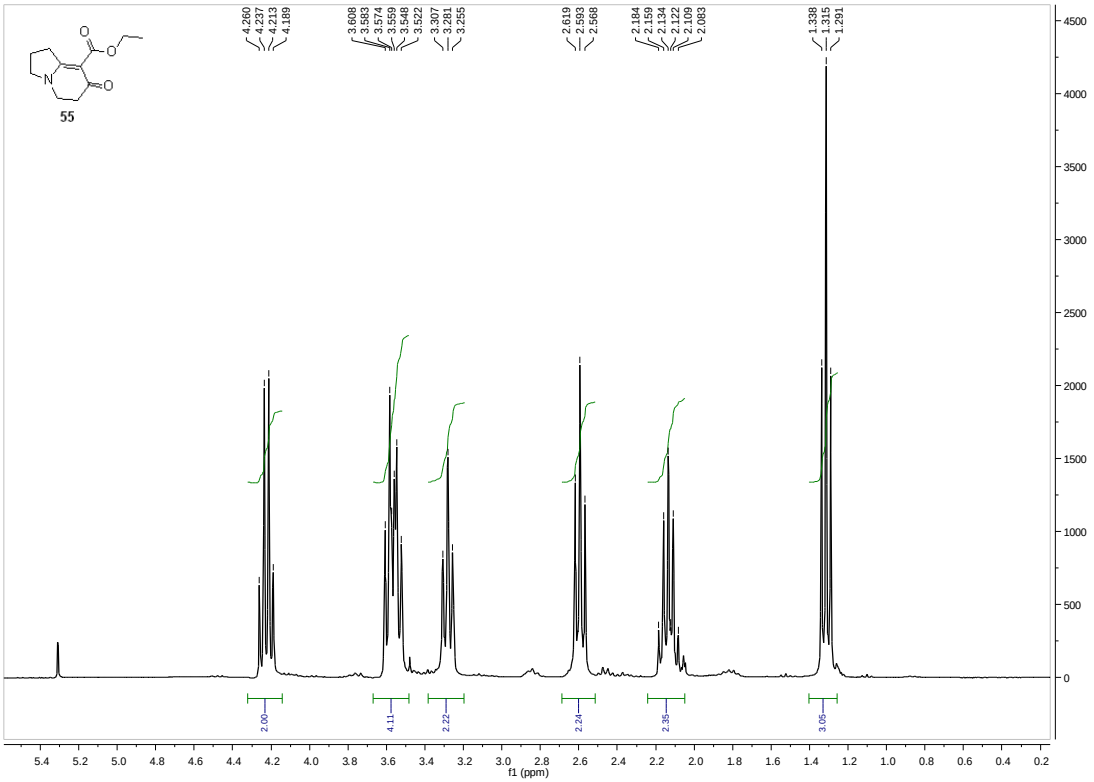
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2.593
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2.159
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2.122
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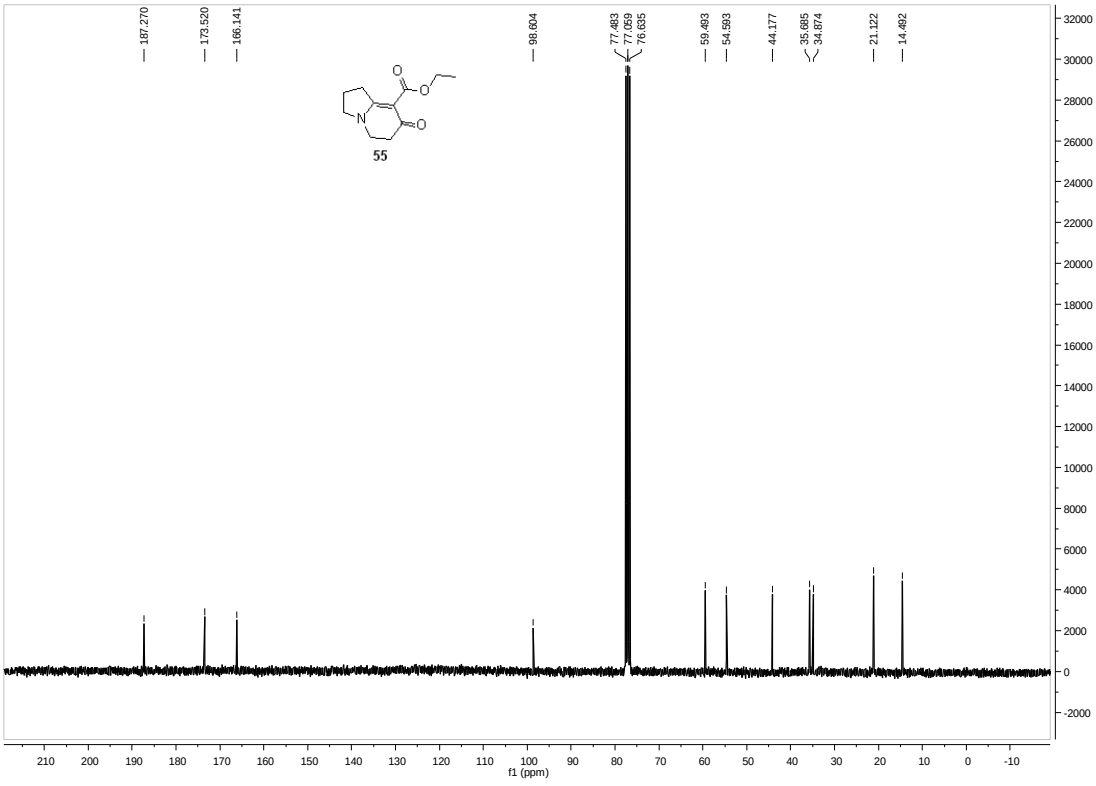
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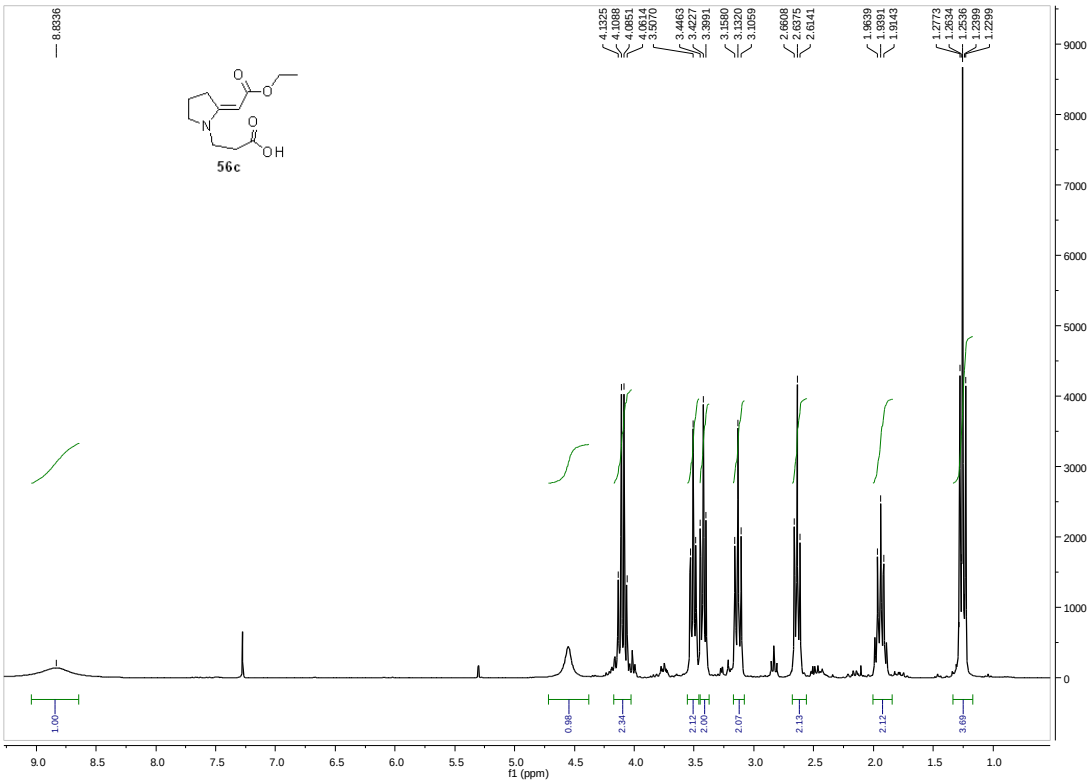
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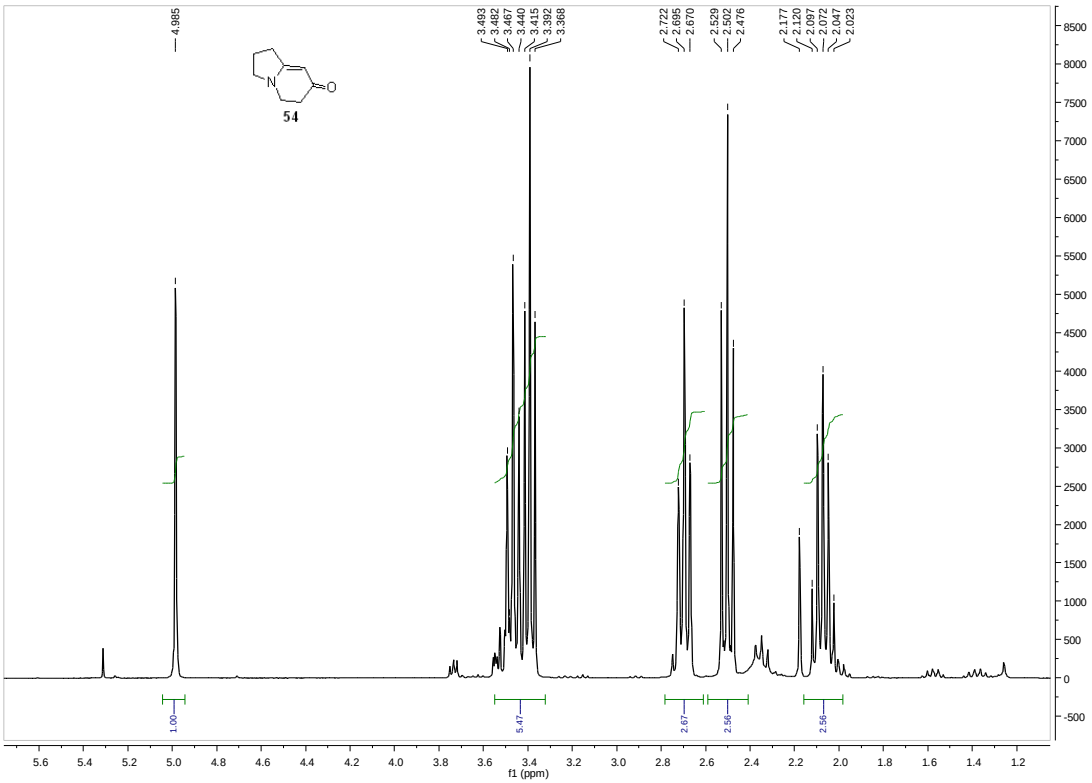
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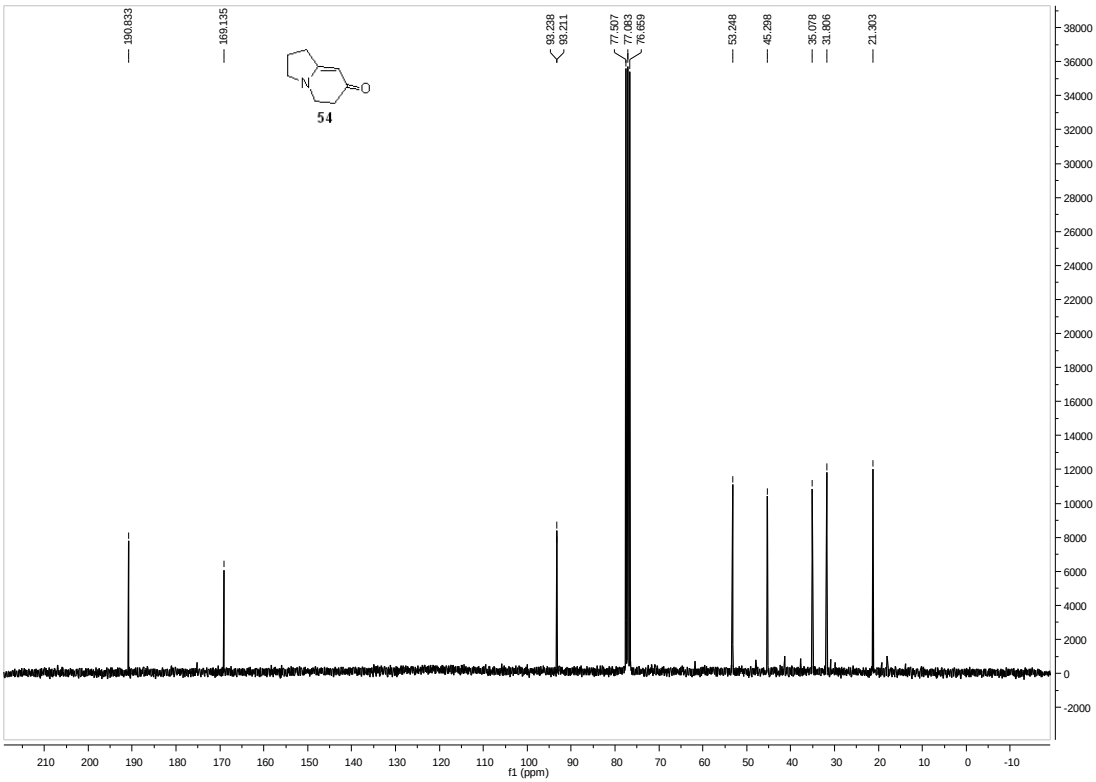
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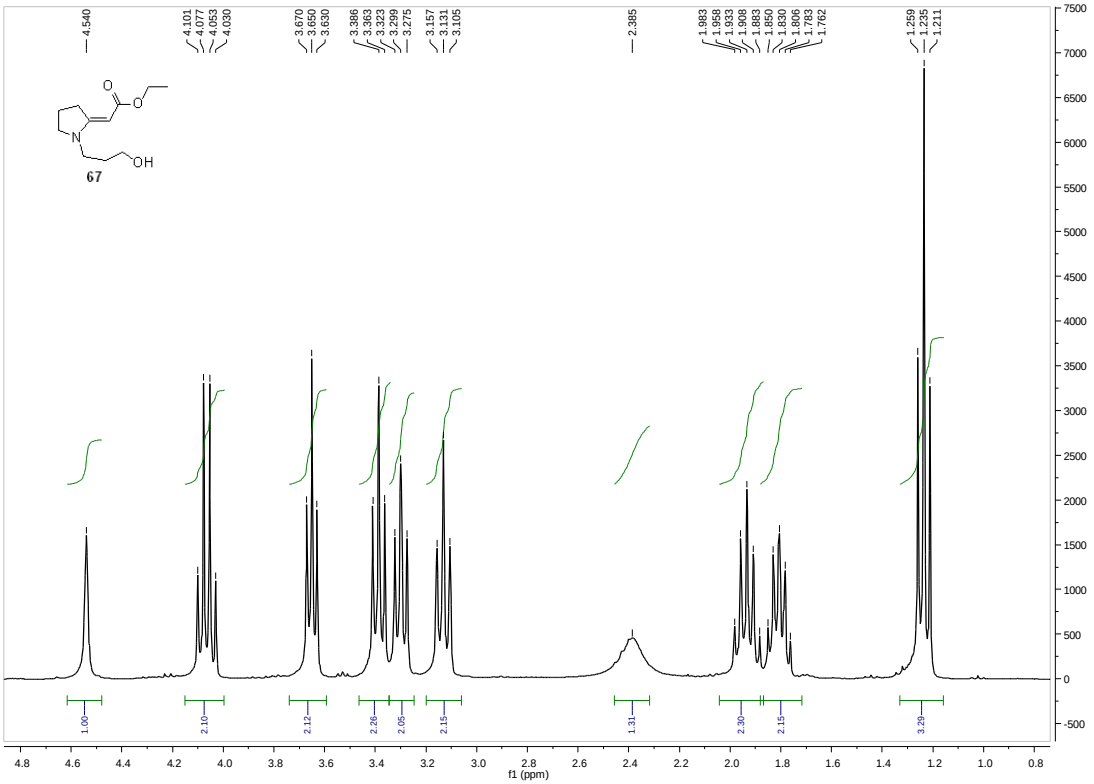
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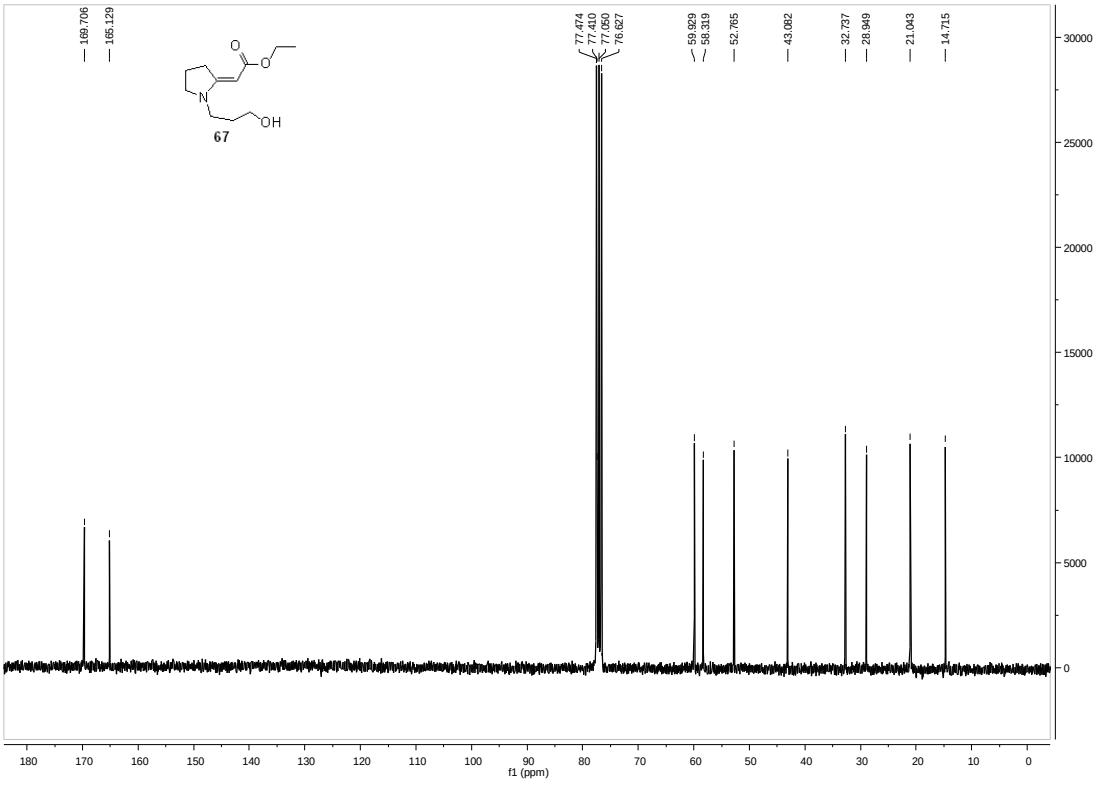
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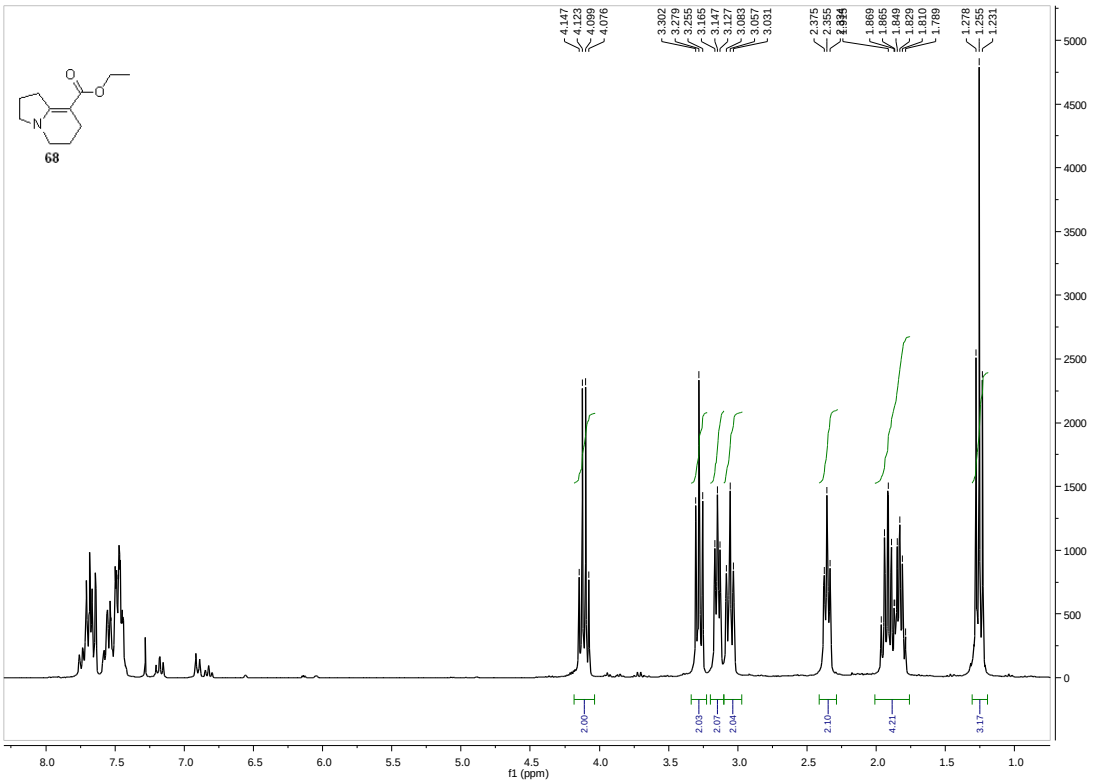
f1 (ppm)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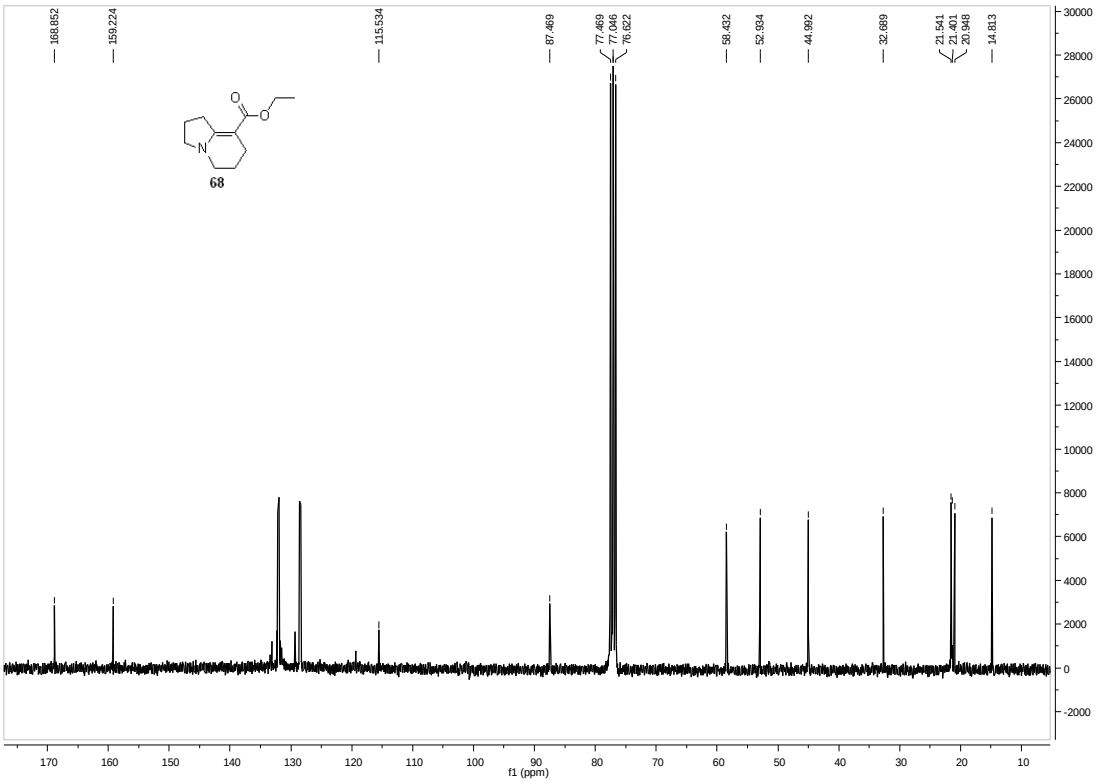
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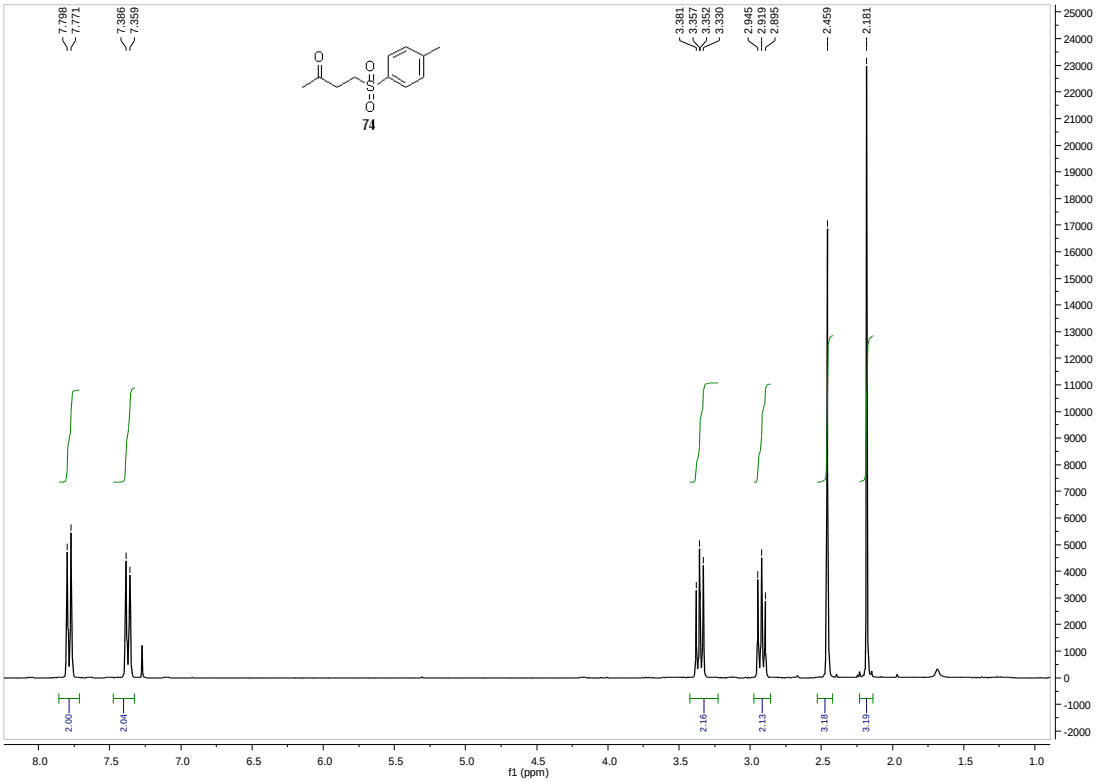
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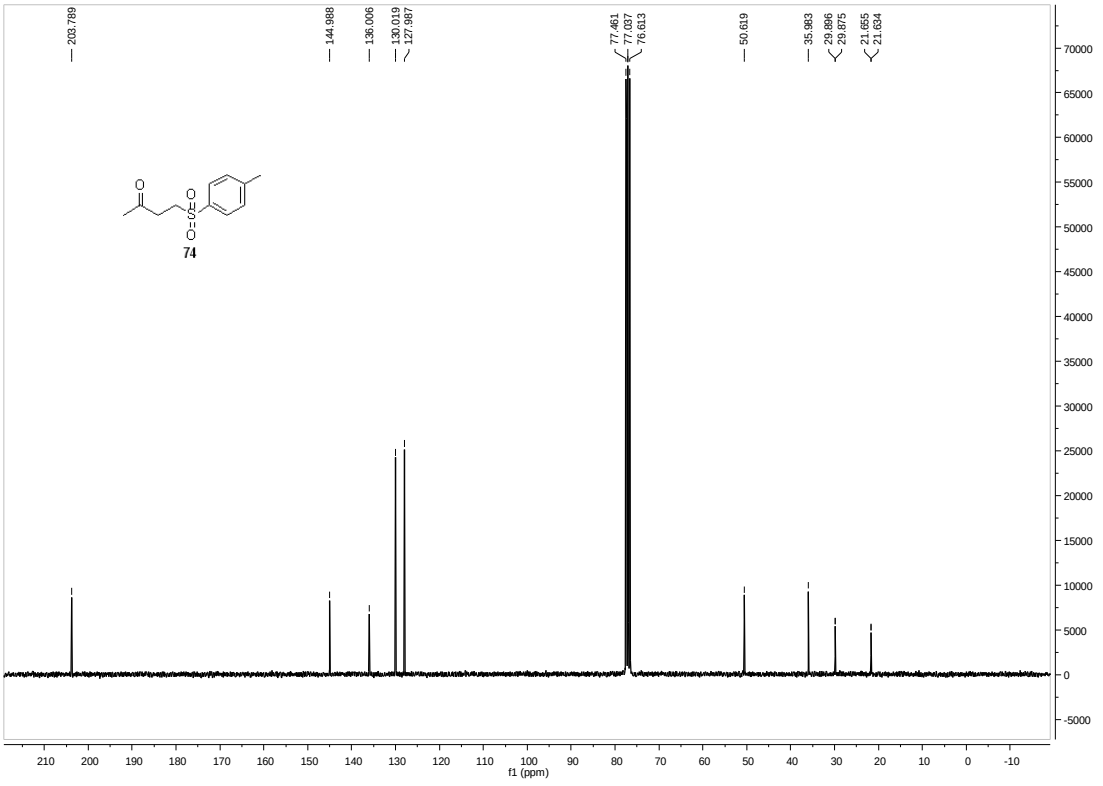
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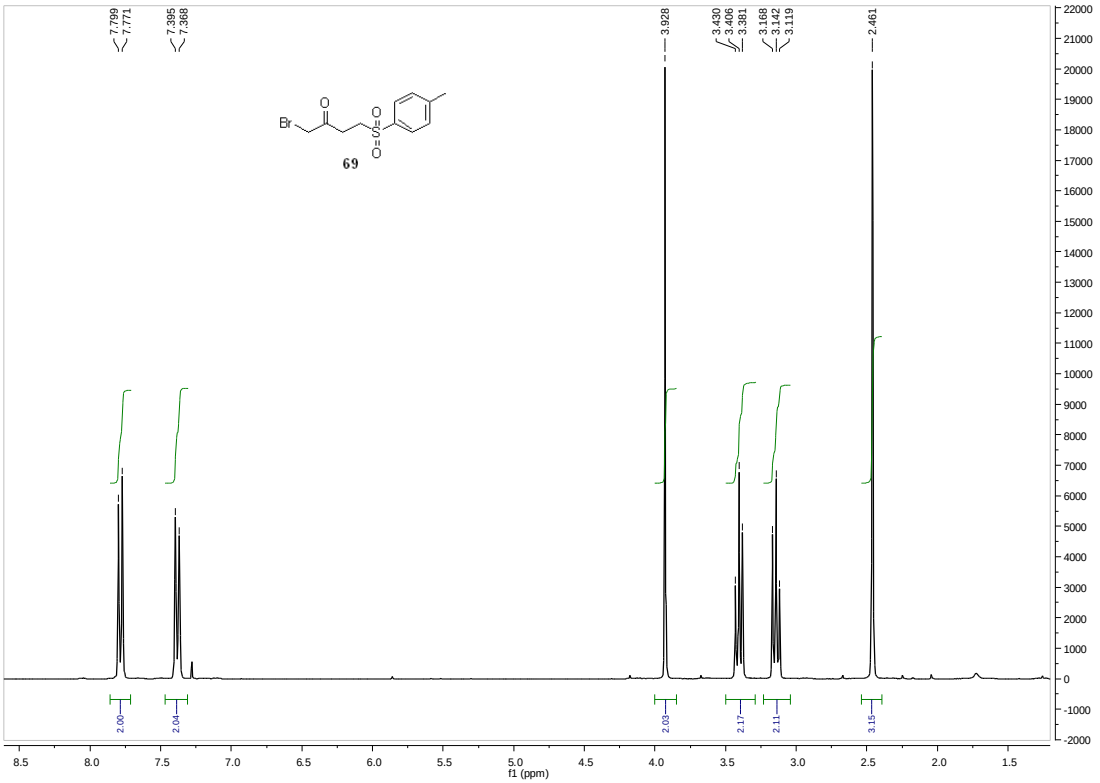
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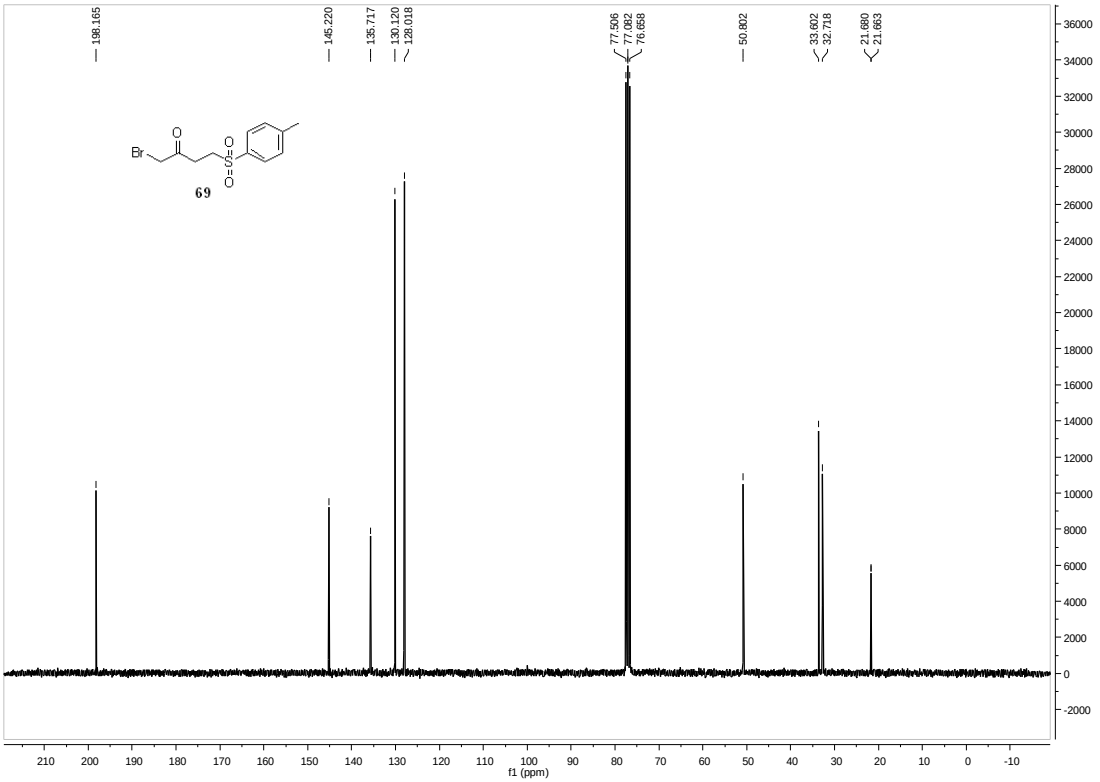
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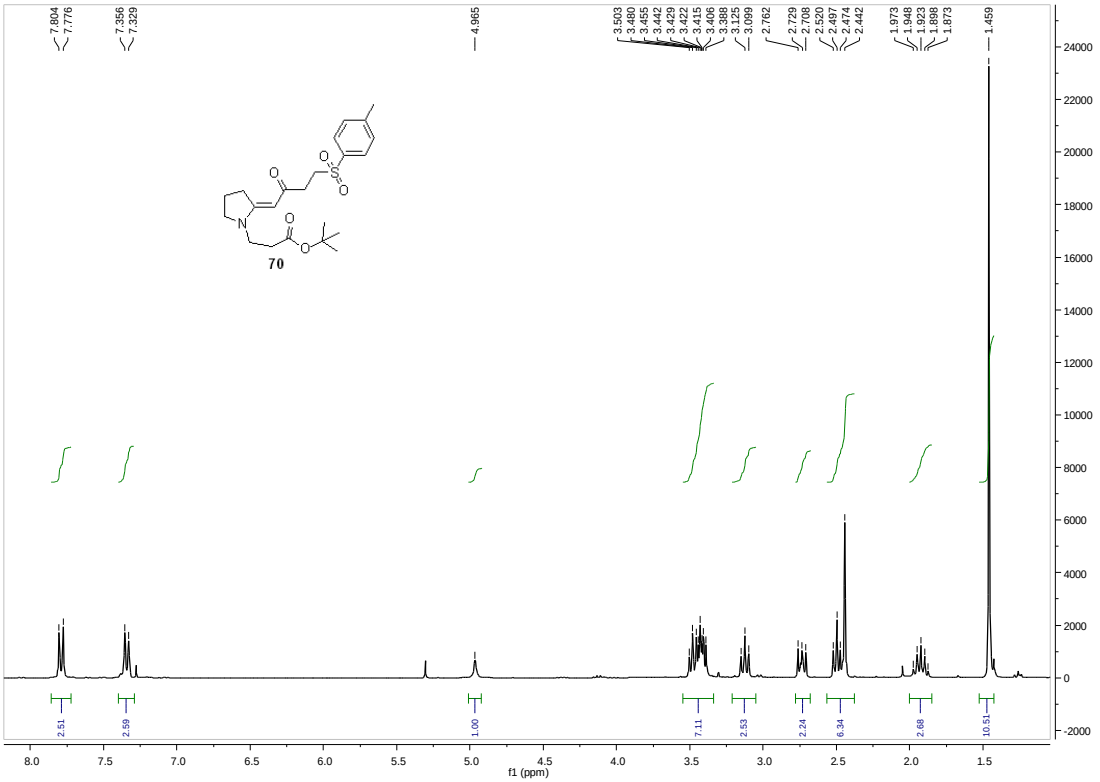
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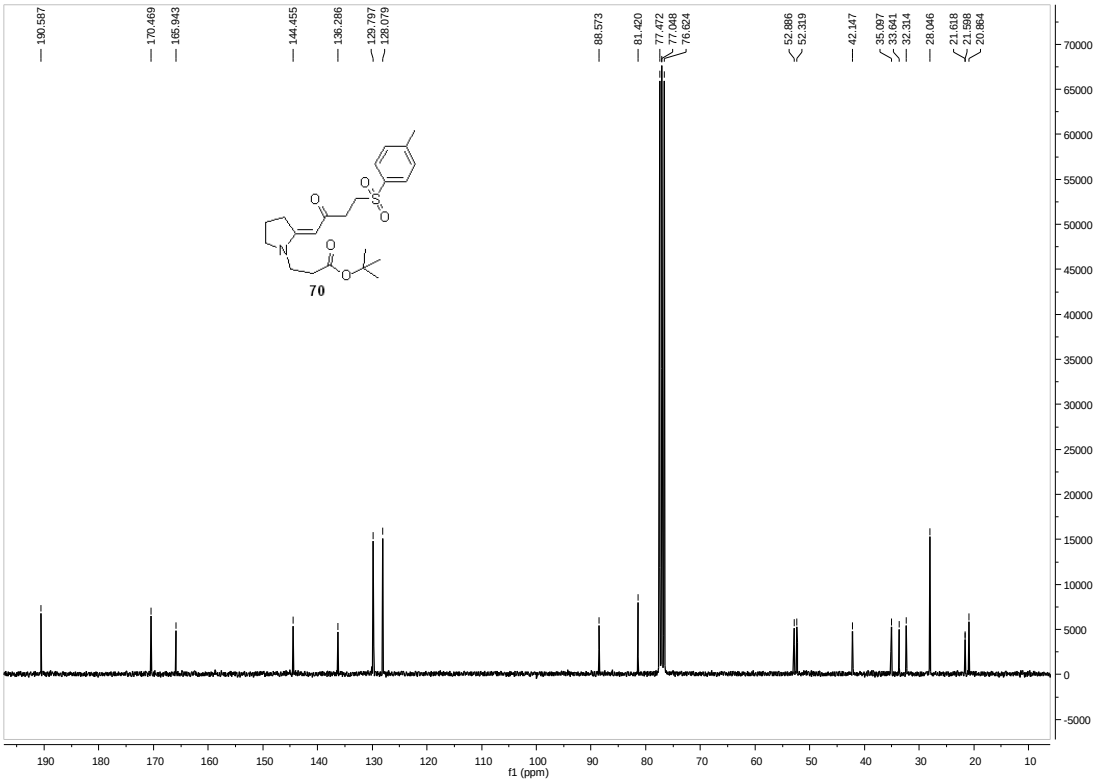
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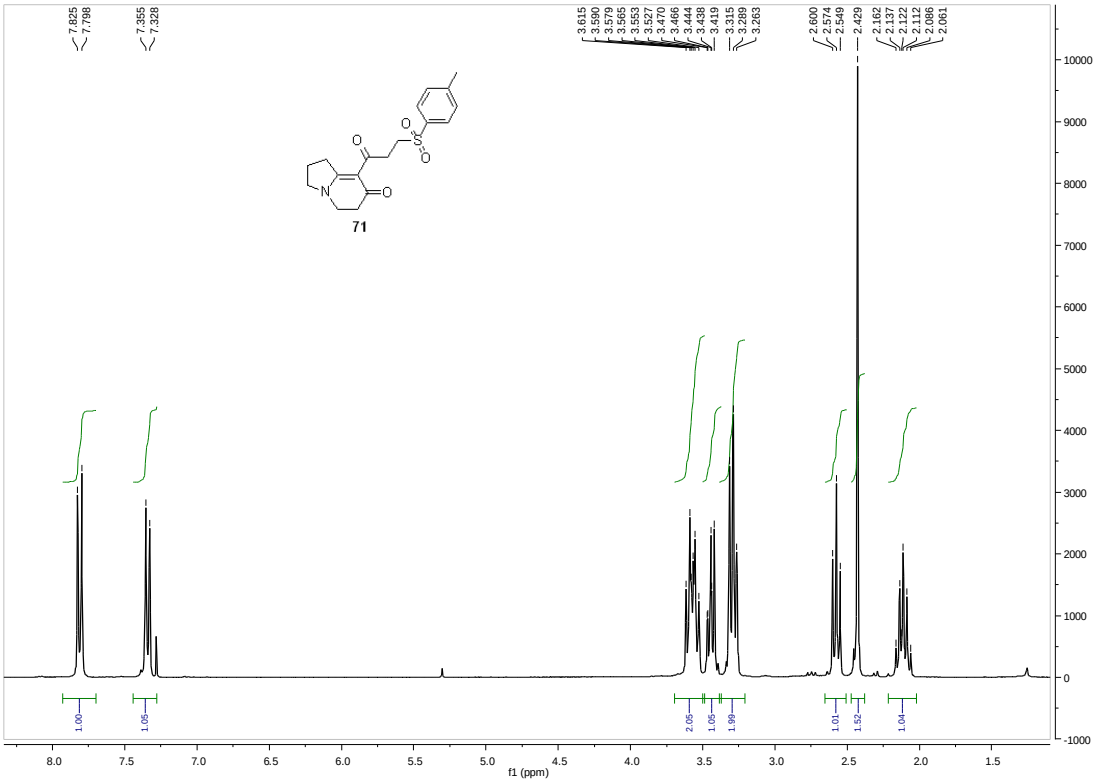
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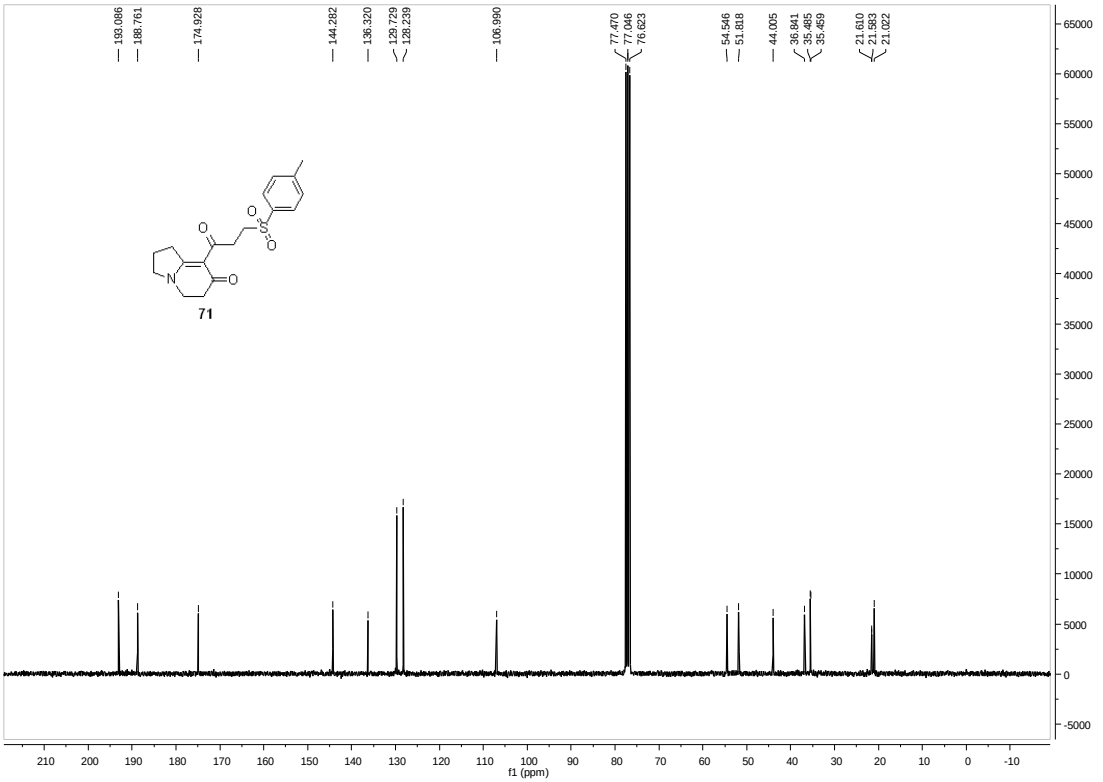
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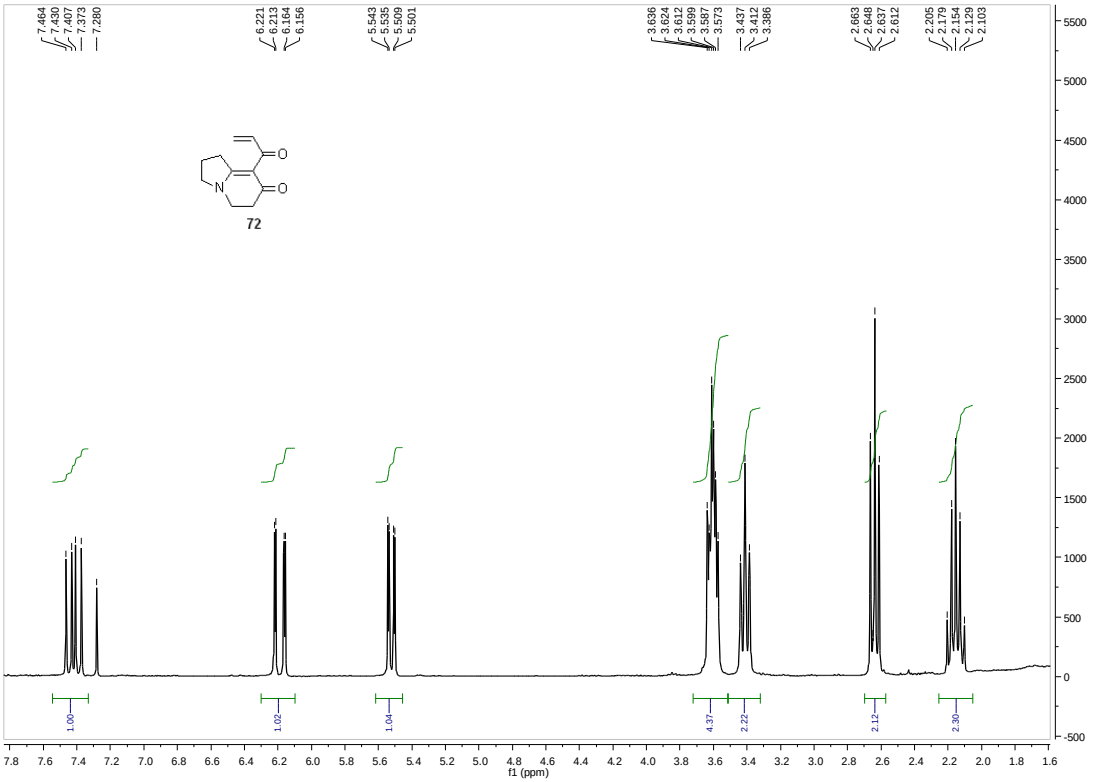
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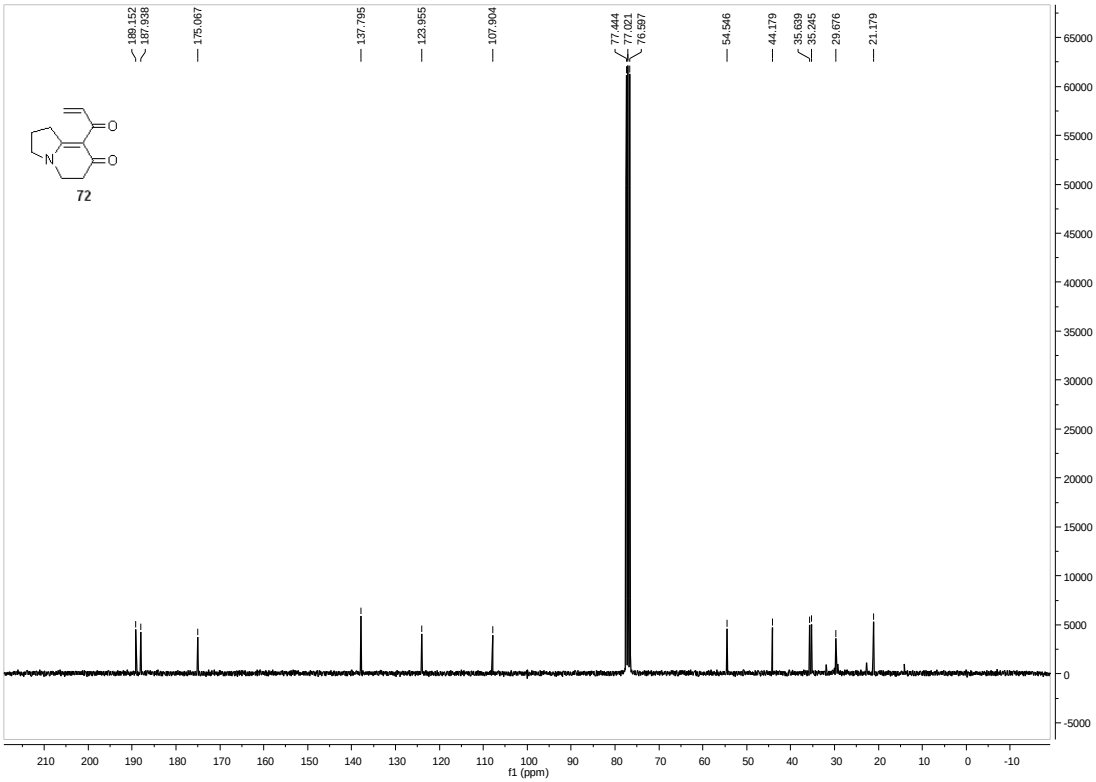
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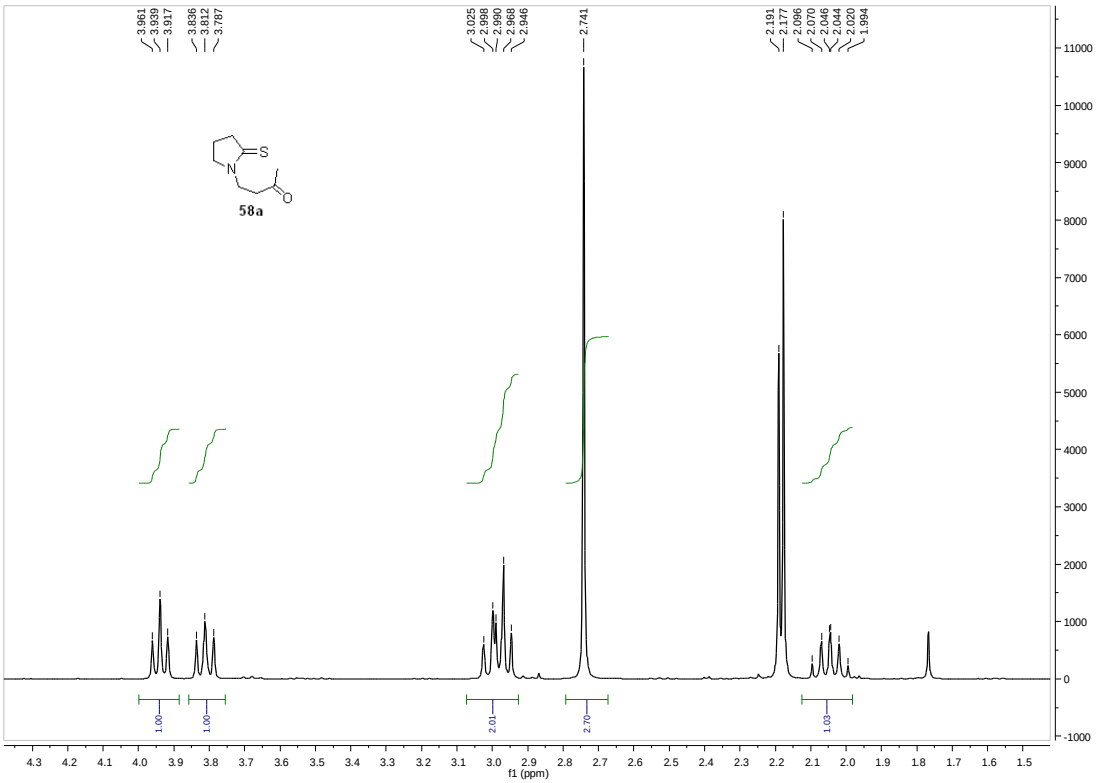
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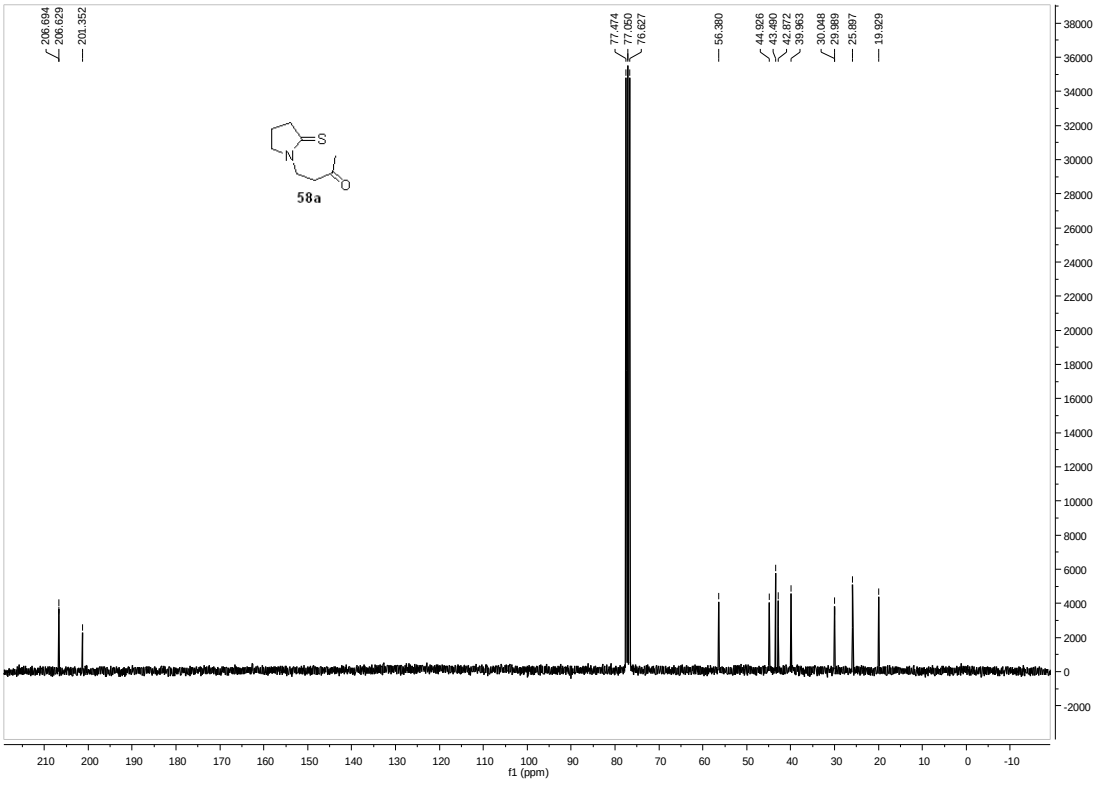
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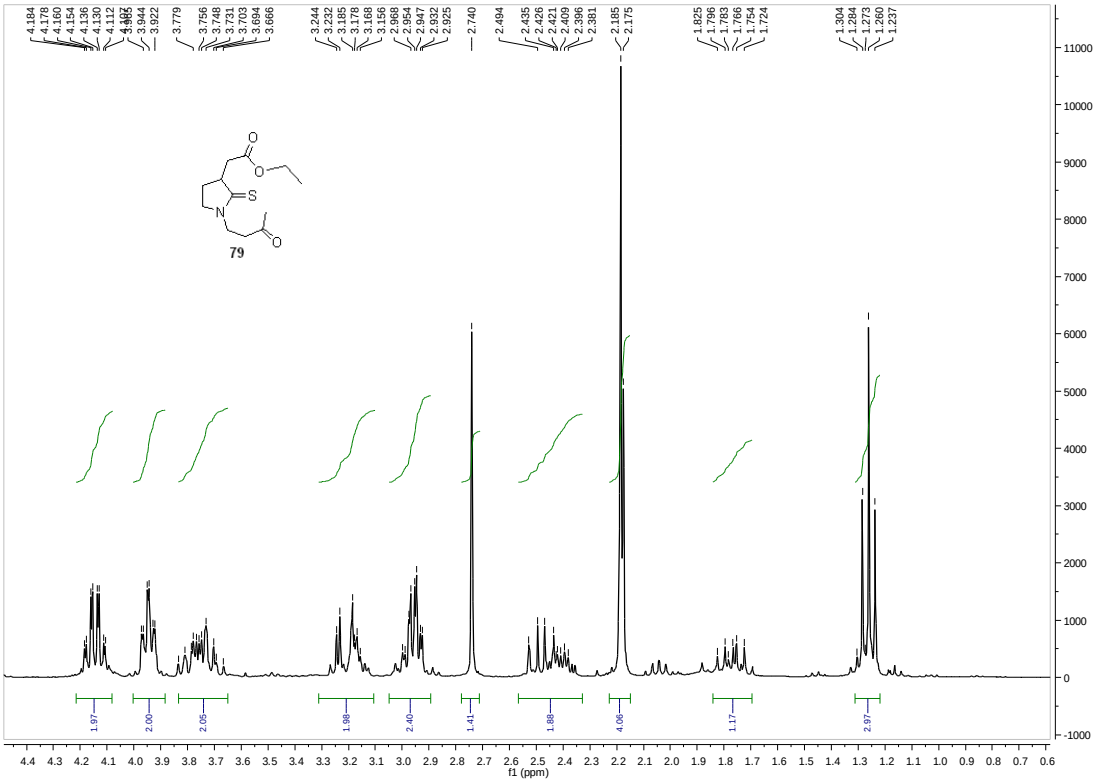
19.929
58a
f1 (ppm)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4.178
4.160
4.154
4.136
4.130
4.112
3.944
3.922
3.779
3.756
3.748
3.731
3.703
3.694
3.666
3.244
3.232
3.185
3.178
3.168
3.156
2.968
2.954
2.947
2.932
2.925
2.740
2.494
2.435
2.426
2.421
2.409
2.396
2.381
2.185
2.175
1.825
1.796
1.783
1.766
1.754
1.724
1.304
1.284
1.273
1.260
1.237
79
1.97
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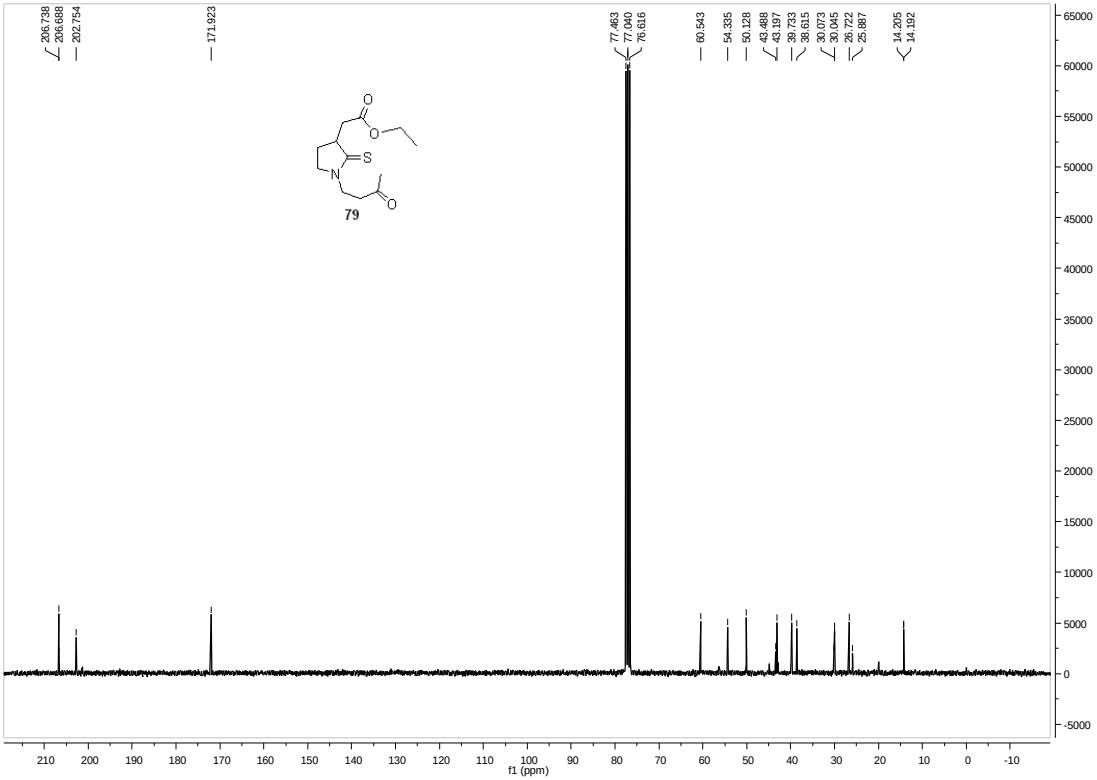
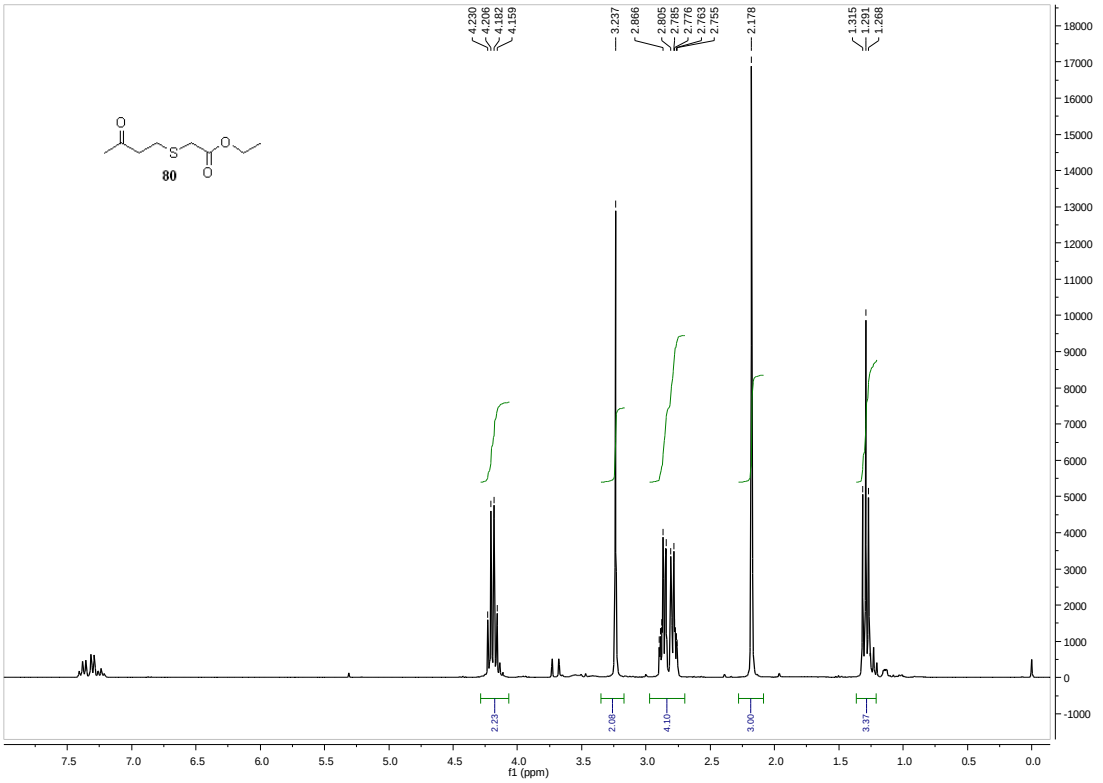
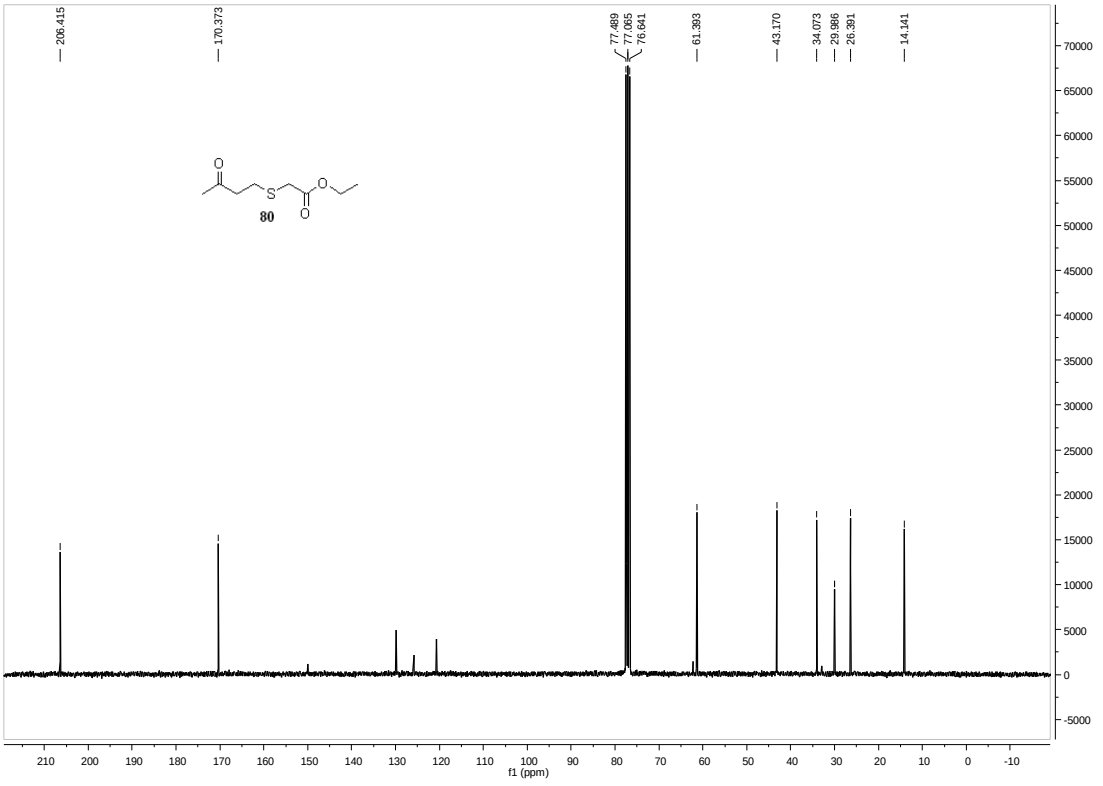
2.05
1.98
2.40
1.41
1.88
4.06
1.17
2.97
f1 (ppm)


206.738
206.688
202.754
171.923
77.463
77.040
76.616
60.543
54.335
50.128
43.488
43.197
39.733
38.615
30.073
30.045
26.722
25.887
14.205
14.192
79
f1 (ppm)


4.230
4.206
4.182
4.159
3.237
2.866
2.805
2.785
2.776
2.763
2.755
2.178
1.315
1.291
1.268
80
2.23
2.08
4.10
3.00
3.37
f1 (ppm)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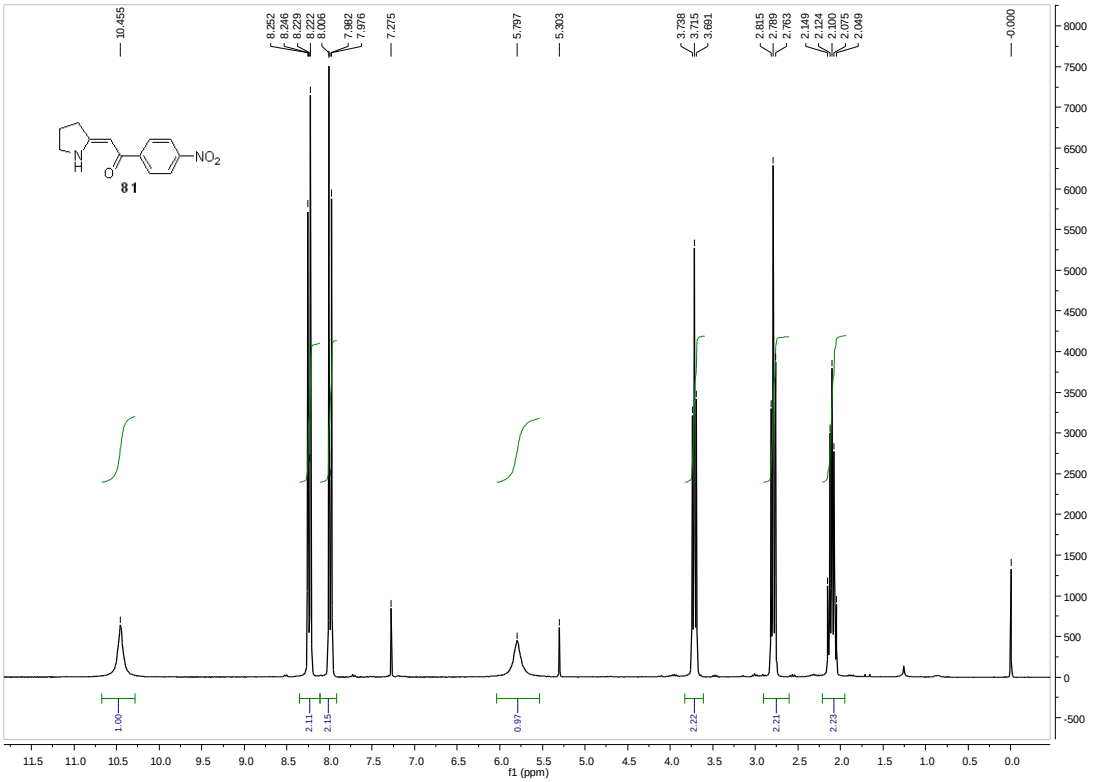
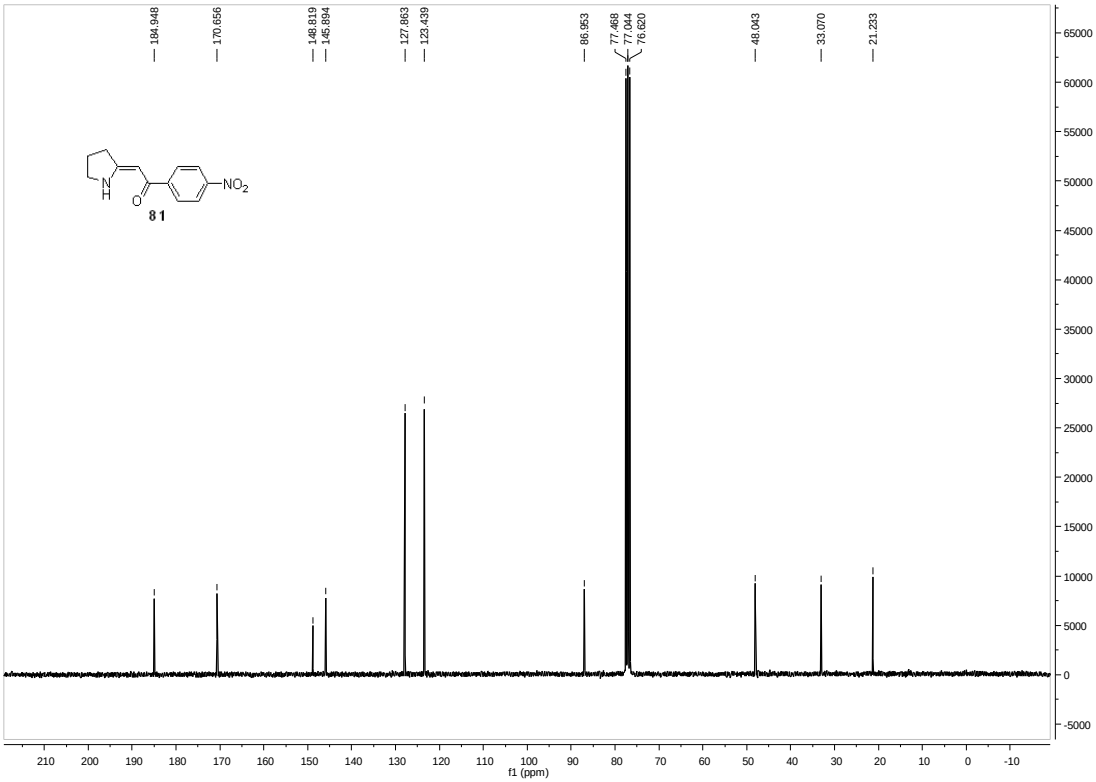
61.393
43.170
34.073
29.986
26.391
14.141
80
f1 (ppm)


10.455
8.252
8.246
8.229
8.222
8.006
7.982
7.976
7.275
5.797
5.303
3.738
3.715
3.691
2.815
2.789
2.763
2.149
2.124
2.100
2.075
2.049
-0.000
NO2
81
1.00
2.11
2.15
0.97
2.22
2.21
2.23
f1 (ppm)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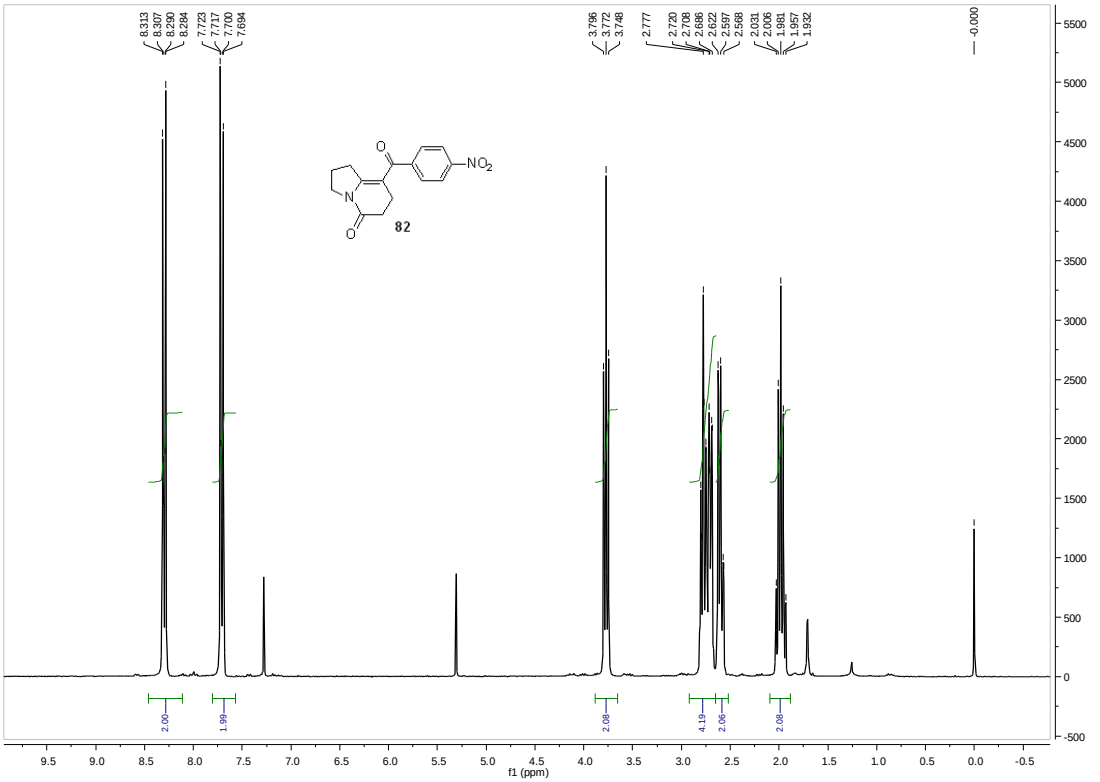
170.656
148.819
145.894
127.863
123.439
86.853
77.468
77.044
76.620
48.043
33.070
21.233
NO2
81
f1 (ppm)


8.313
8.307
8.290
8.284
7.723
7.717
7.700
7.694
3.796
3.772
3.748
2.777
2.720
2.708
2.686
2.622
2.597
2.568
2.031
2.006
1.981
1.957
1.932
-0.000
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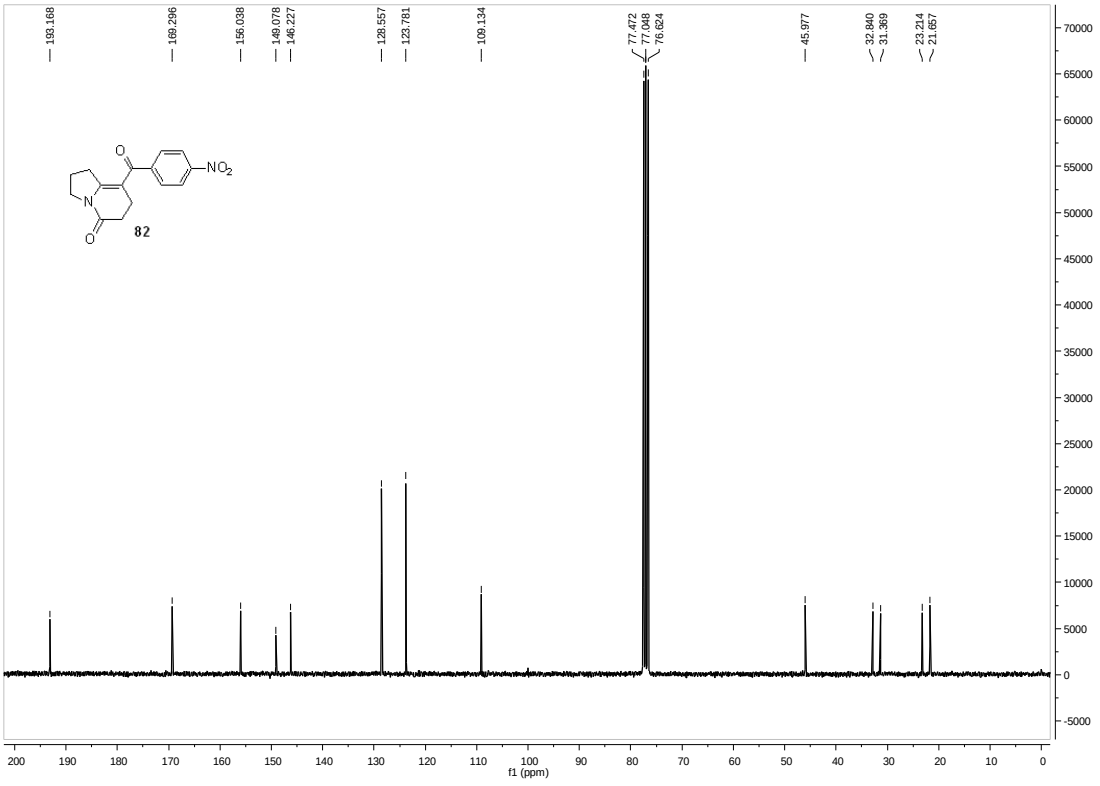
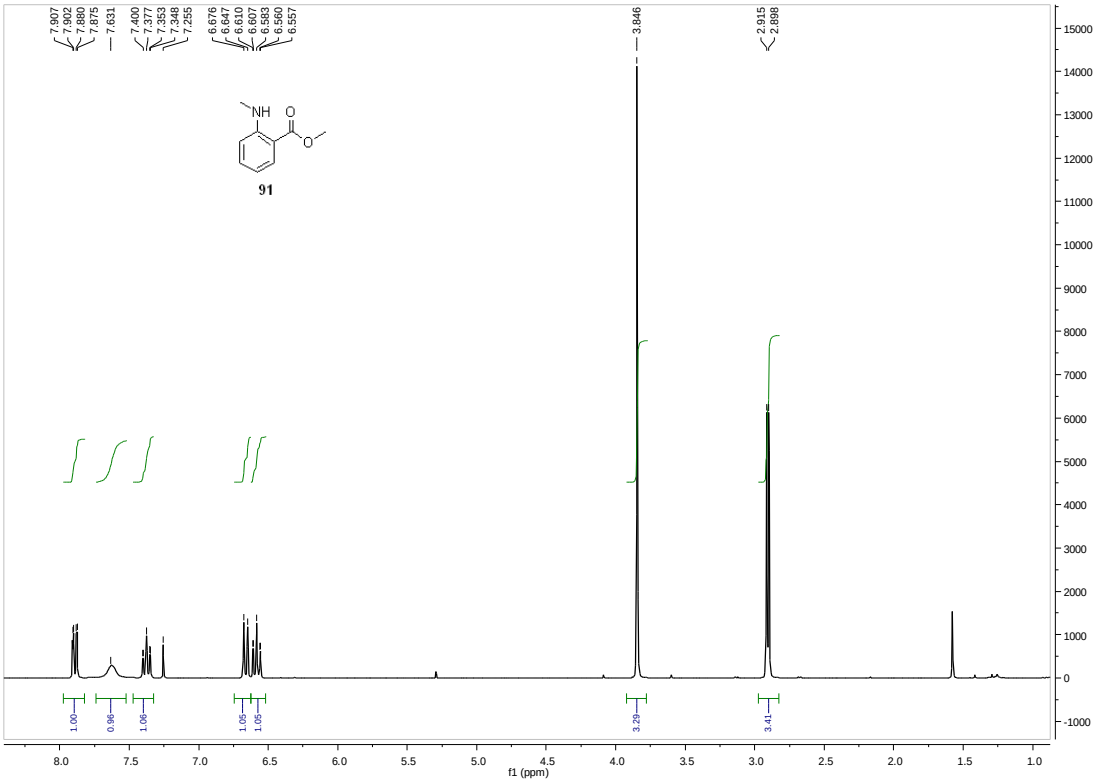
NO2
N
O
82
2.00
1.99
2.08
4.19
2.06
2.09
f1 (ppm)


193.168
169.296
156.038
149.078
146.227
128.557
123.781
109.134
77.472
77.048
76.624
45.977
32.840
31.369
23.214
21.657
O
NO2
N
O
82
f1 (ppm)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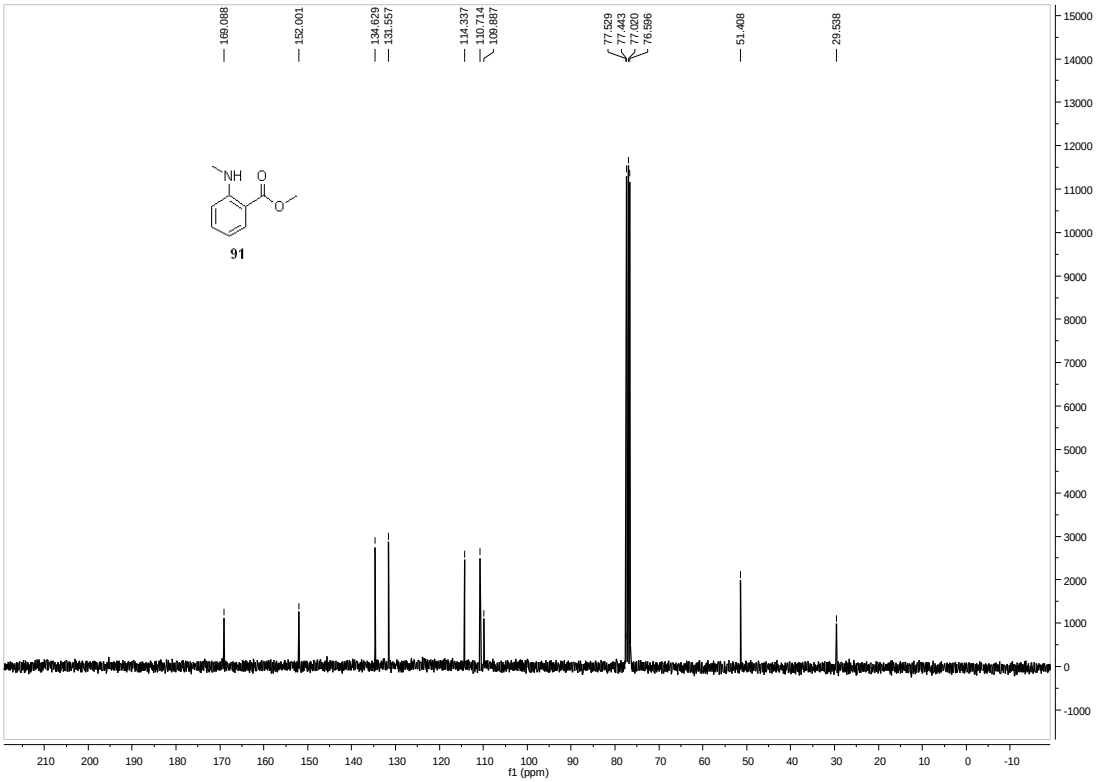
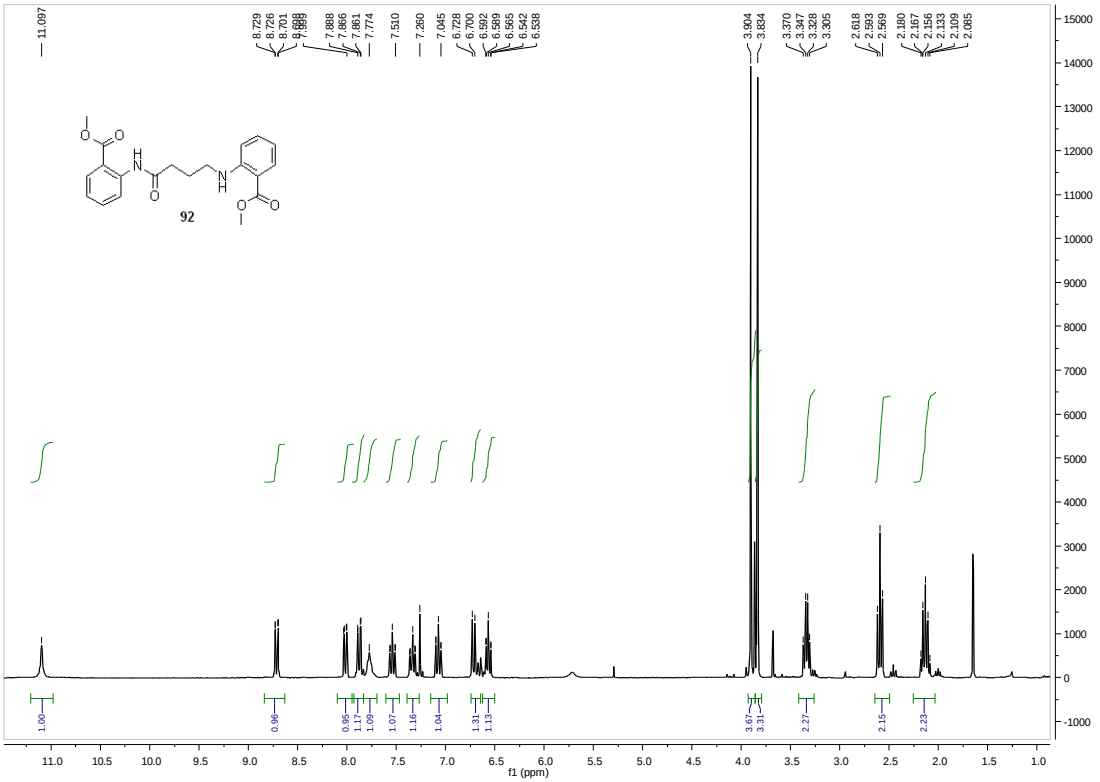
7.902
7.880
7.875
7.631
7.400
7.377
7.353
7.348
7.255
6.676
6.647
6.610
6.607
6.583
6.560
6.557
3.846
2.915
2.898
NH
O
O
91
1.00
0.98
1.06
1.05
1.05
3.29
3.41
f1 (ppm)


169.088
152.001
134.629
131.557
114.337
110.714
109.887
77.529
77.443
77.020
76.596
51.408
29.538
NH
O
O
91
f1 (ppm)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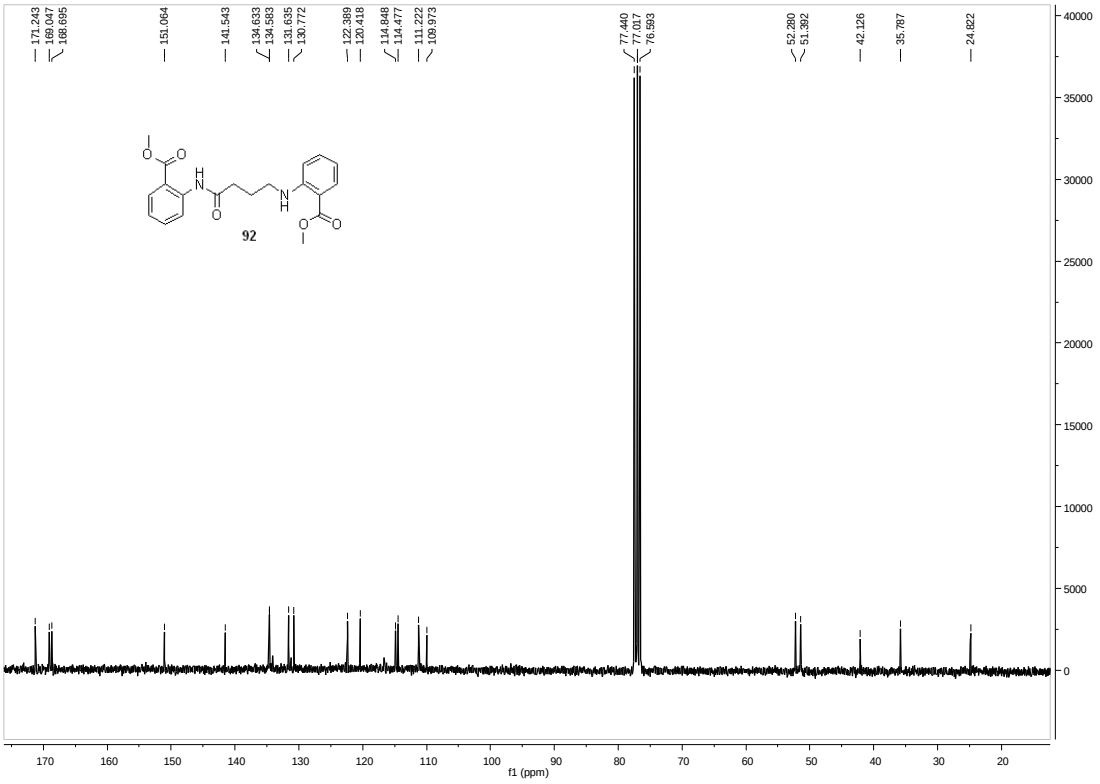
8.729
8.726
8.701
7.888
7.866
7.861
7.774
7.510
7.260
7.045
6.728
6.700
6.592
6.589
6.565
6.542
6.538
3.904
3.834
3.370
3.347
3.328
3.305
2.618
2.593
2.569
2.180
2.167
2.156
2.133
2.109
2.085
92
f1 (ppm)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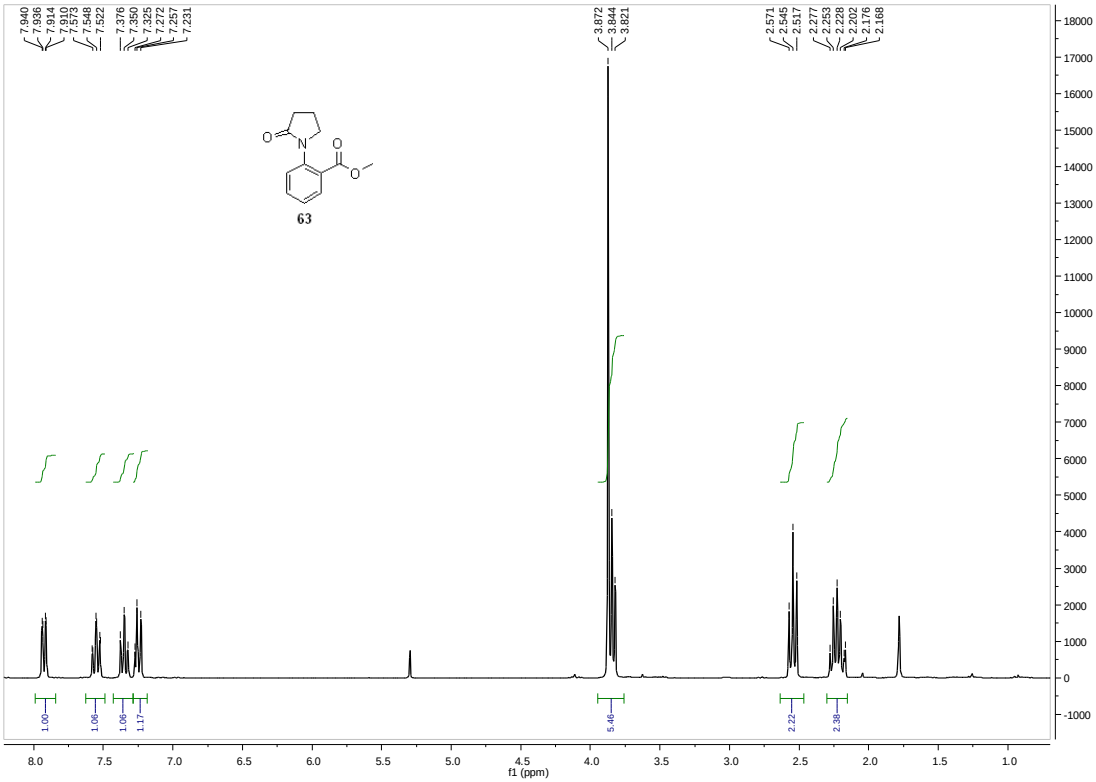
169.047
168.695
151.064
141.543
134.633
134.583
131.635
130.772
122.389
120.418
114.848
114.477
111.222
109.973
77.440
77.017
76.593
52.280
51.392
42.126
35.787
24.822
92
f1 (ppm)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7.936
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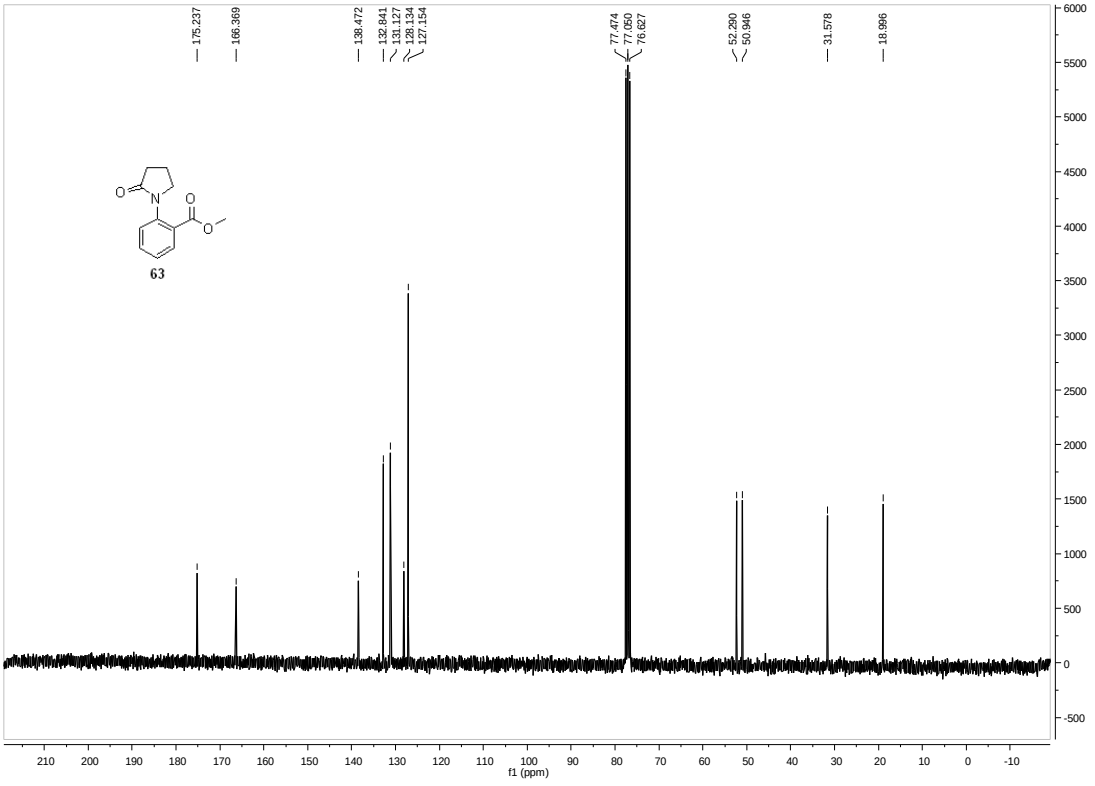
7.910
7.573
7.548
7.522
7.376
7.350
7.325
7.272
7.257
7.231
3.872
3.844
3.821
2.571
2.545
2.517
2.277
2.253
2.228
2.202
2.176
2.168
63
1.00
1.08
1.08
1.17
5.46
2.22
2.38
f1 (ppm)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138.472
132.841
131.127
128.134
127.154
77.474
77.050
76.627
52.290
50.946
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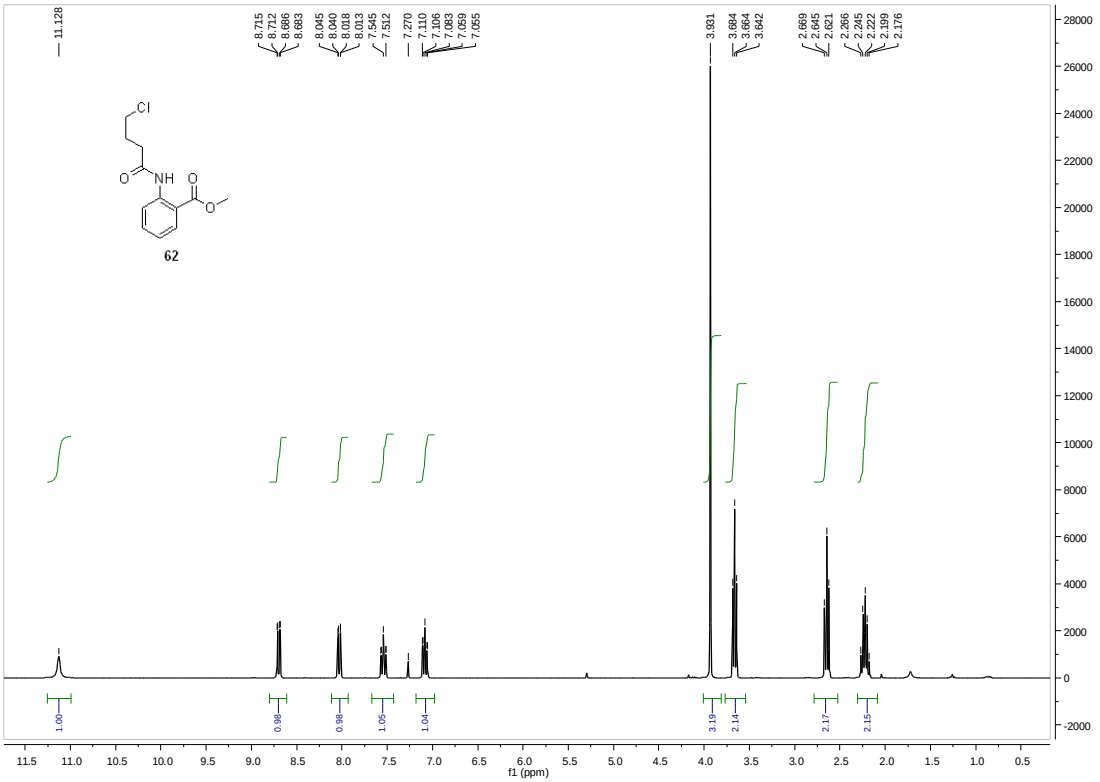
18.996
63
f1 (ppm)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8.715
8.712
8.686
8.683
8.045
8.040
8.018
8.013
7.545
7.512
7.270
7.110
7.106
7.083
7.059
7.055
3.931
3.684
3.664
3.642
2.669
2.645
2.621
2.266
2.245
2.222
2.199
2.176
Cl
NH
O
O
O
62
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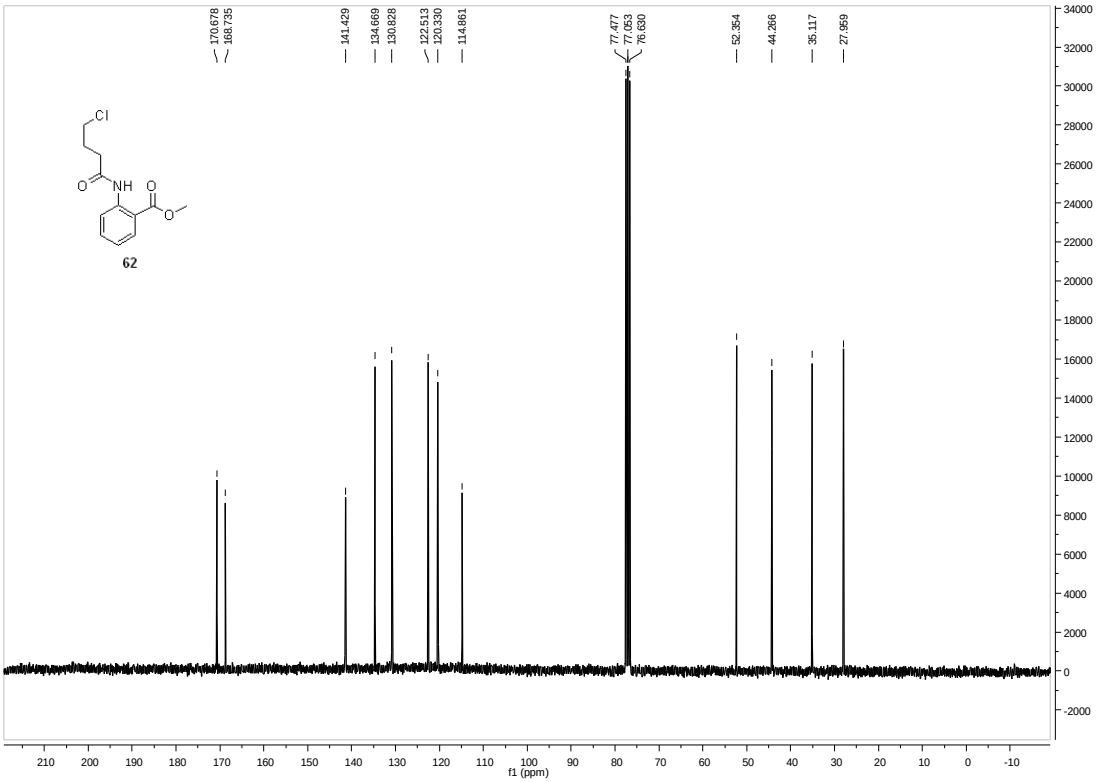
0.98
0.98
1.05
1.04
3.19
2.14
2.17
2.15
f1 (ppm)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120.330
114.861
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76.630
52.354
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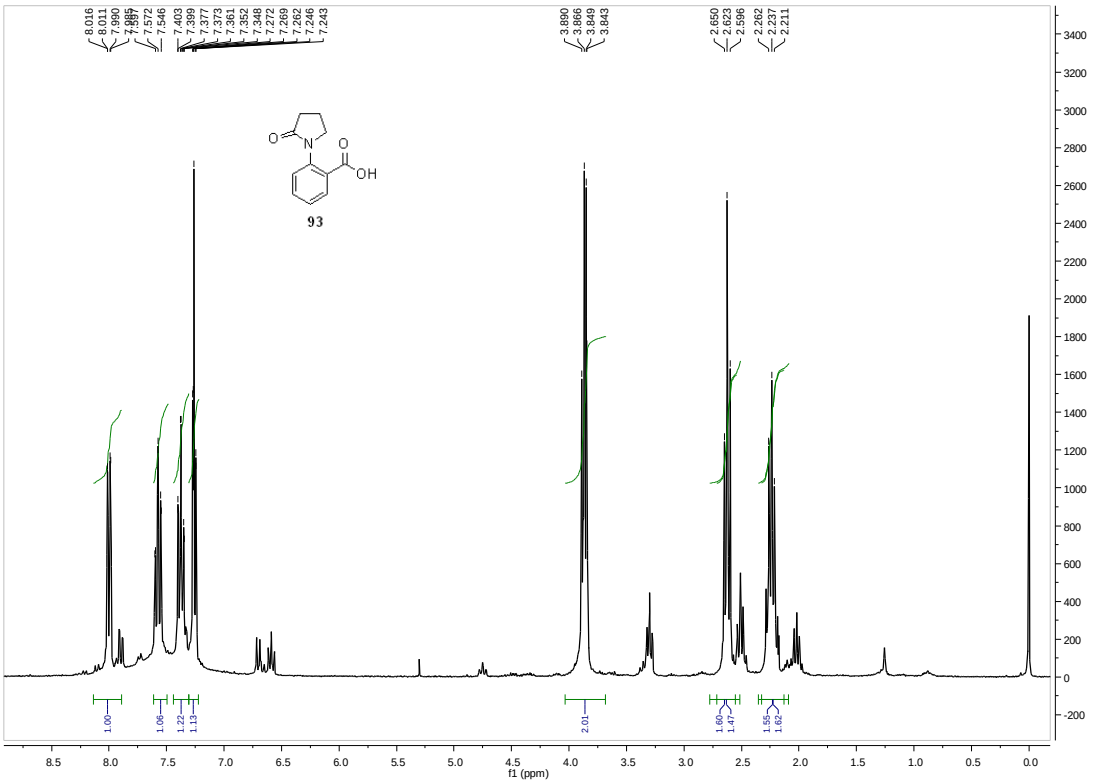
35.117
27.959
Cl
NH
O
O
O
62
f1 (ppm)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8.011
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7.572
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7.403
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7.377
7.373
7.361
7.352
7.348
7.272
7.269
7.262
7.246
7.243
3.890
3.866
3.849
3.843
2.650
2.623
2.596
2.262
2.237
2.211
O
N
O
OH
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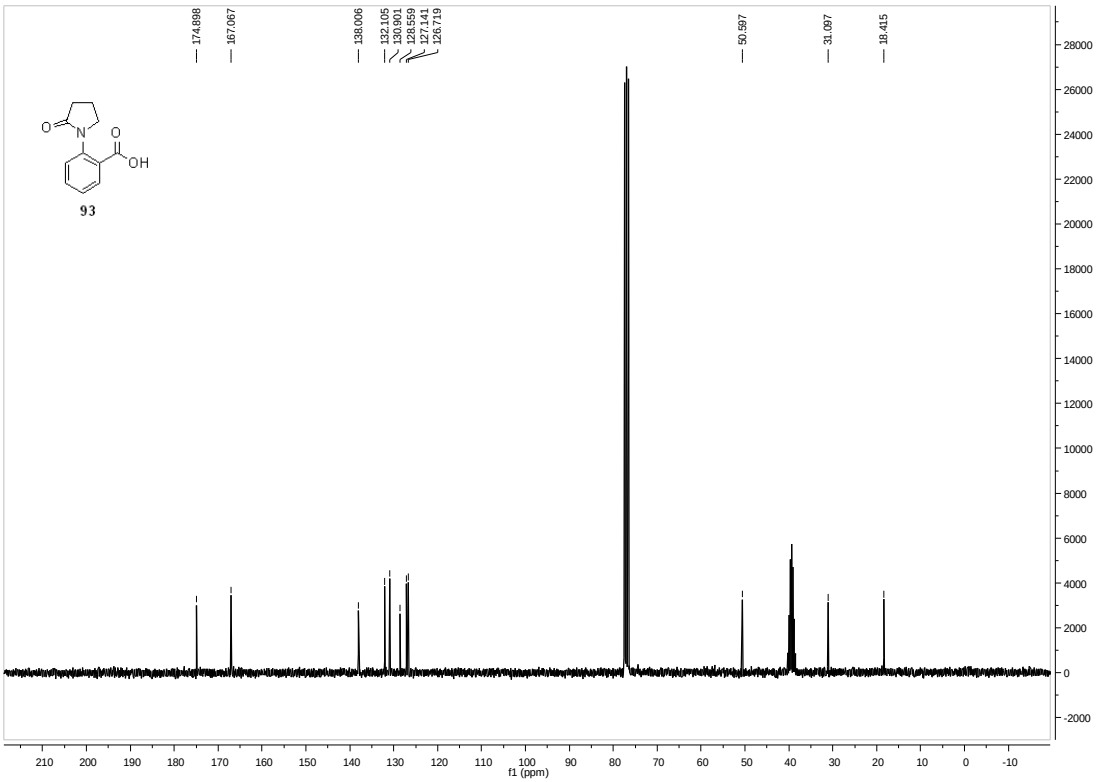
1.08
1.22
1.13
2.01
1.60
1.47
1.55
1.62
f1 (ppm)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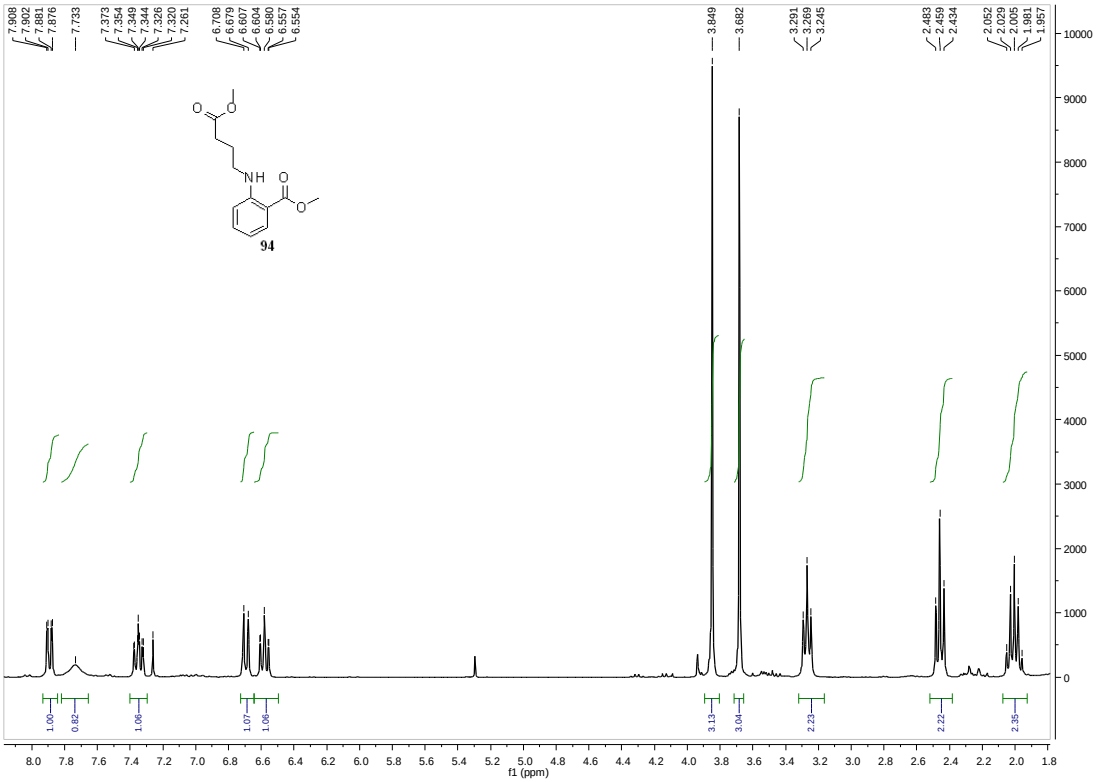
167.067
138.006
132.105
130.901
128.559
127.141
126.719
50.597
31.097
18.415
O
N
O
OH
93
f1 (ppm)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7.349
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7.320
7.261
6.708
6.679
6.607
6.604
6.580
6.557
6.554
3.849
3.682
3.291
3.269
3.245
2.483
2.459
2.434
2.052
2.029
2.005
1.981
1.957
NH
O
O
O
O
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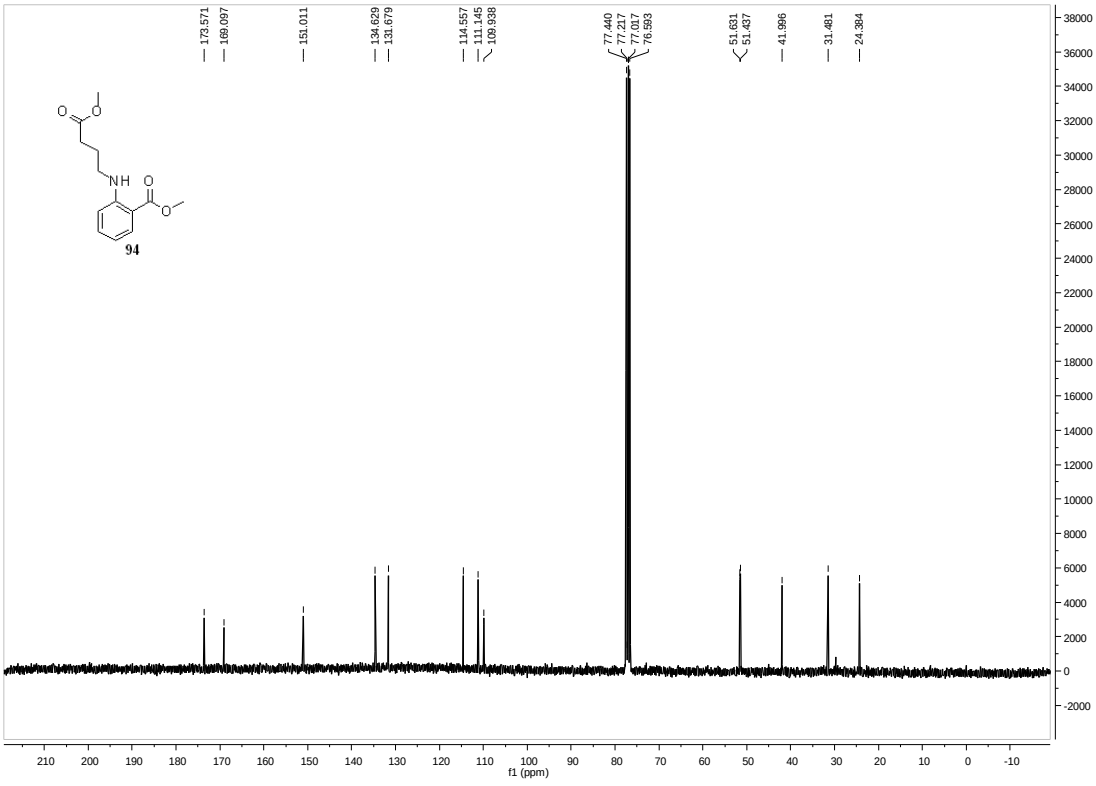
1.00
0.82
1.06
1.07
1.06
3.13
3.04
2.23
2.22
2.35
f1 (ppm)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151.011
134.629
131.679
114.557
111.145
109.938
77.440
77.217
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76.593
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51.437
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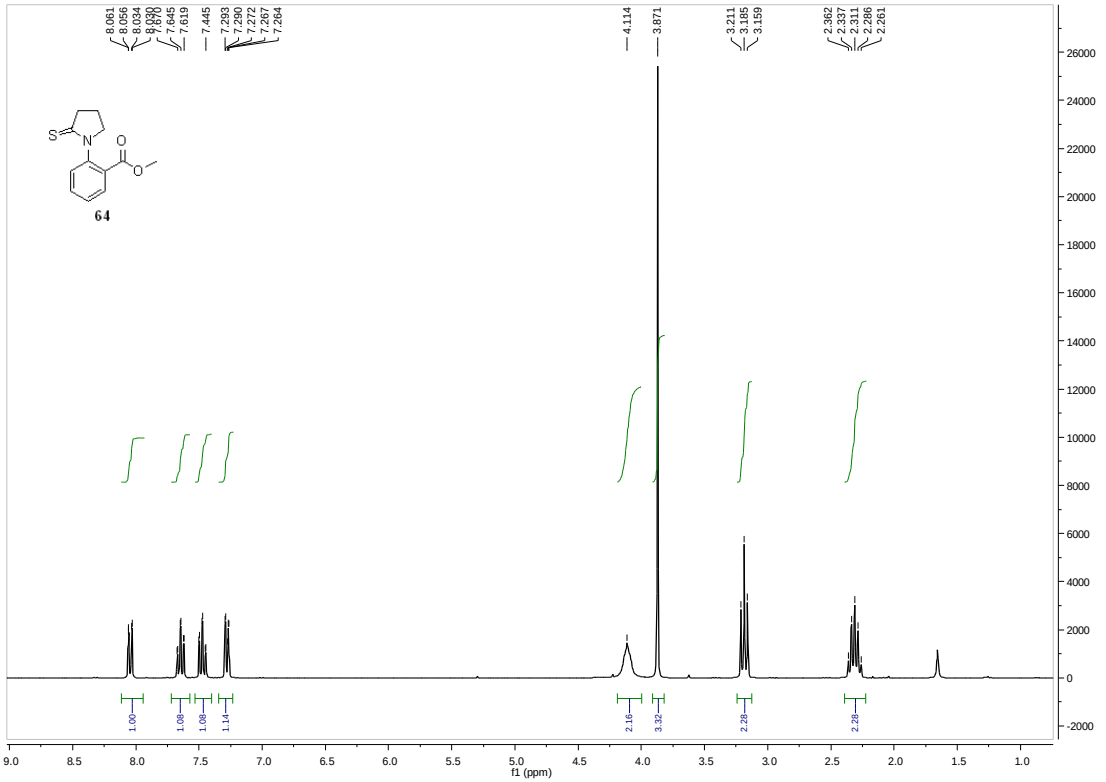
31.481
24.384
NH
O
O
O
O
94
f1 (ppm)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7.619
7.445
7.293
7.290
7.272
7.267
7.264
4.114
3.871
3.211
3.185
3.159
2.362
2.337
2.311
2.286
2.261
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1.00
1.09
1.08
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3.32
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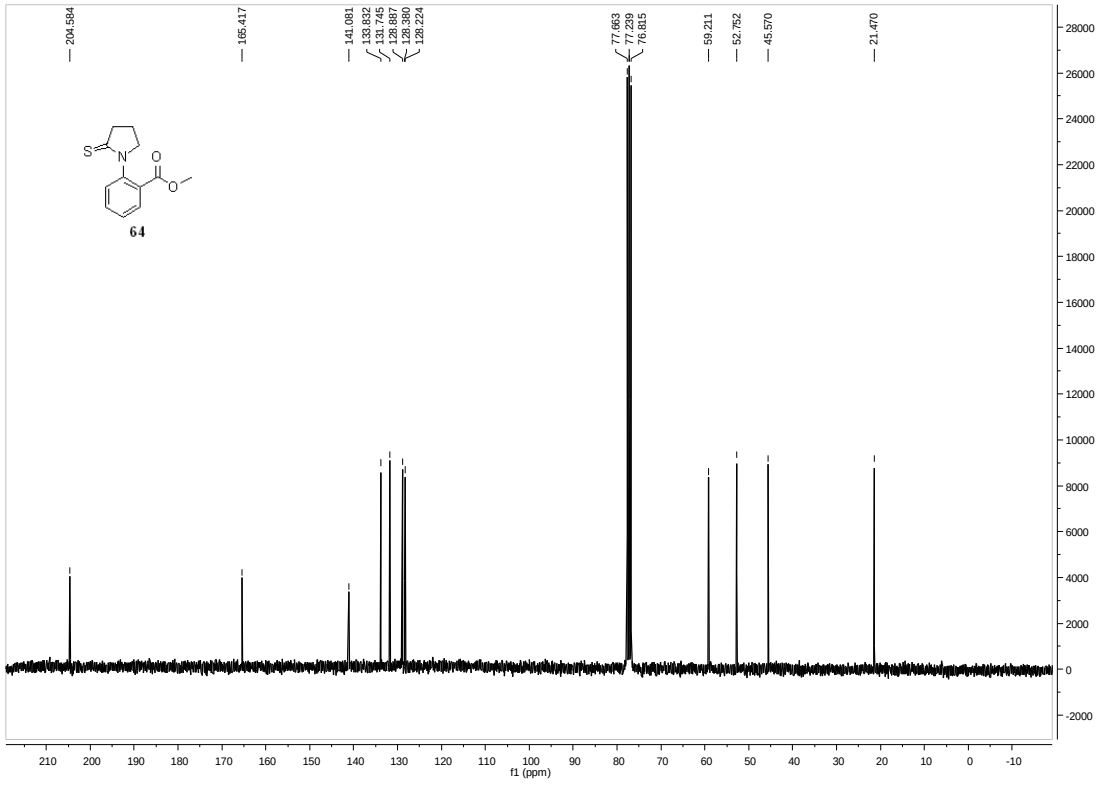
2.28
f1 (ppm)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133.832
131.745
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128.380
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76.815
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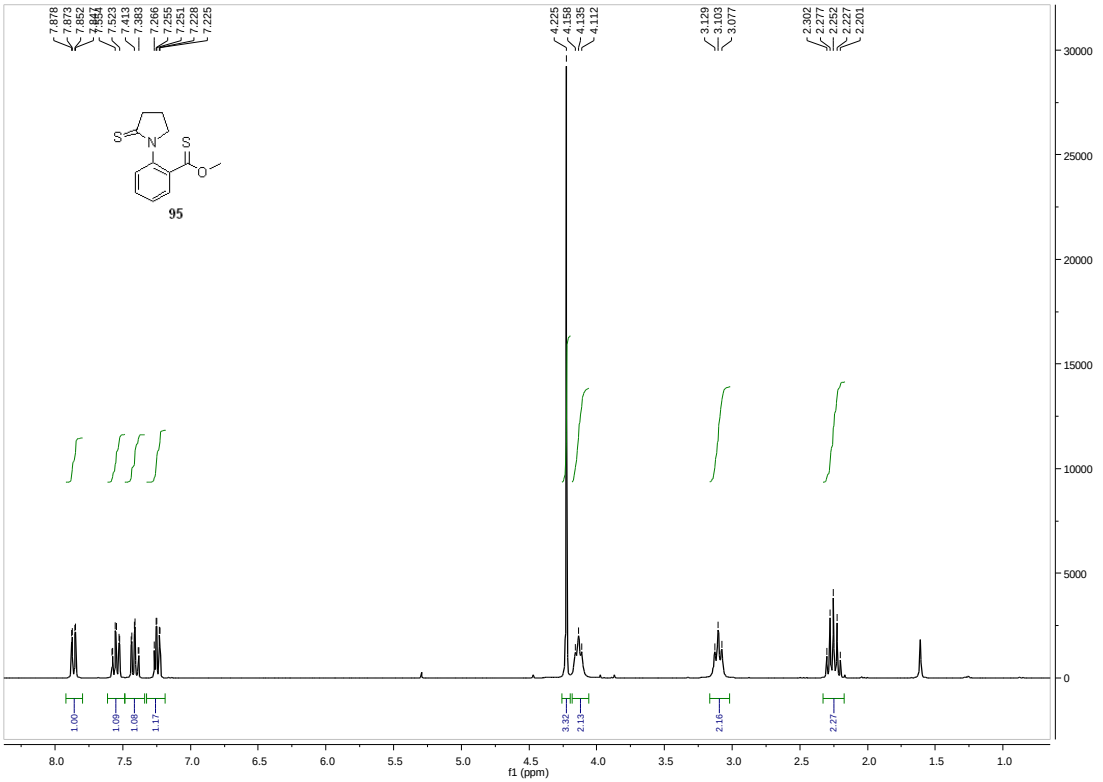
21.470
64
f1 (ppm)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7.251
7.228
7.225
4.225
4.158
4.135
4.112
3.129
3.103
3.077
2.302
2.277
2.252
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2.201
95
1.00
1.09
1.08
1.17
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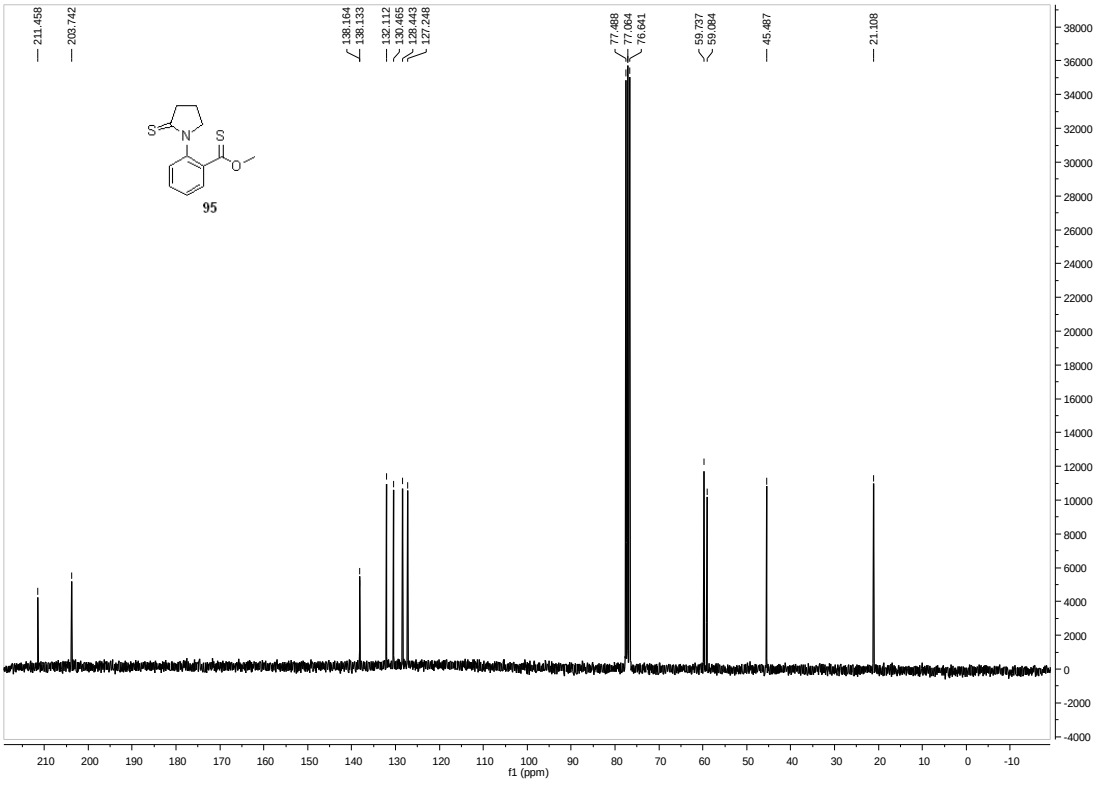
2.13
2.16
2.27
f1 (ppm)


211.458
203.742
138.164
138.133
132.112
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127.248
77.488
77.064
76.641
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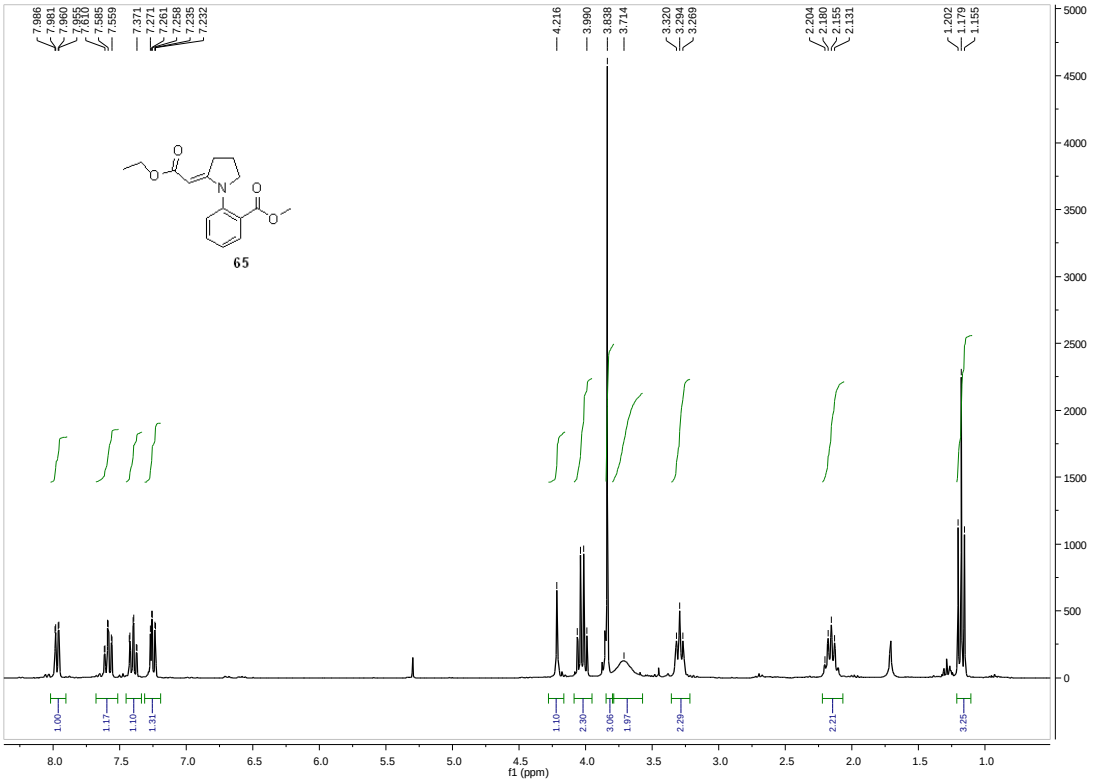
21.108
95
f1 (ppm)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7.261
7.258
7.235
7.232
4.216
3.990
3.838
3.714
3.320
3.294
3.269
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2.160
2.155
2.131
1.202
1.179
1.155
65
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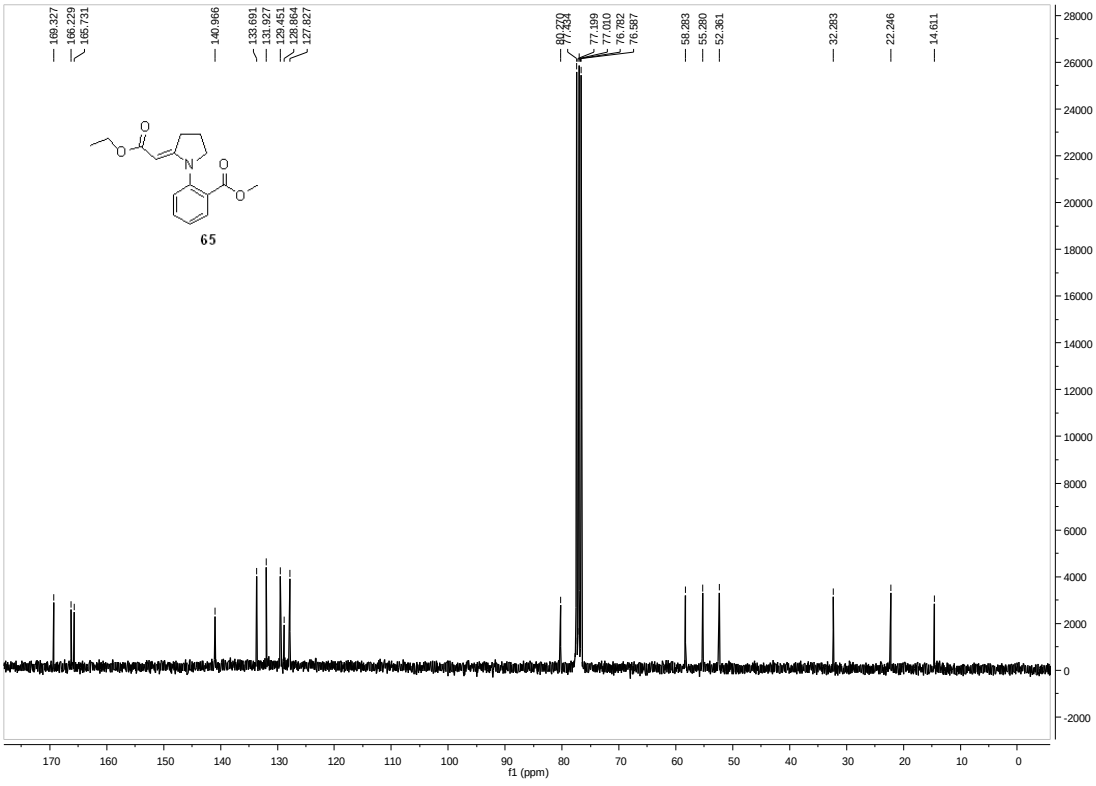
2.29
2.21
3.25
f1 (ppm)


169.327
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165.731
140.966
133.691
131.927
129.451
128.864
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76.897
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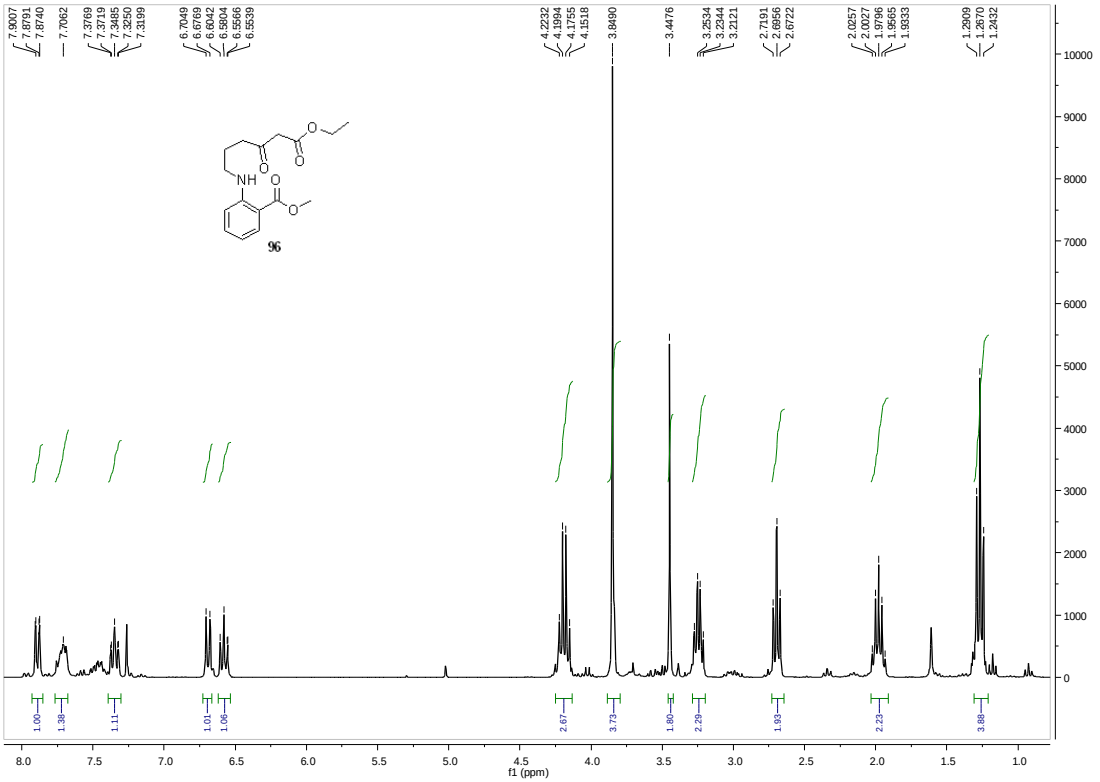
55.280
52.361
32.283
22.246
14.611
65
f1 (ppm)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7.8740
7.7062
7.3769
7.3719
7.3485
7.3250
7.3199
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6.6042
6.5804
6.5566
6.5539
4.2232
4.1994
4.1755
4.1518
3.8490
3.4476
3.2534
3.2344
3.2121
2.7191
2.6956
2.6722
2.0257
2.0027
1.9796
1.9555
1.9333
1.2909
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O
O
O
O
O
96
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1.80
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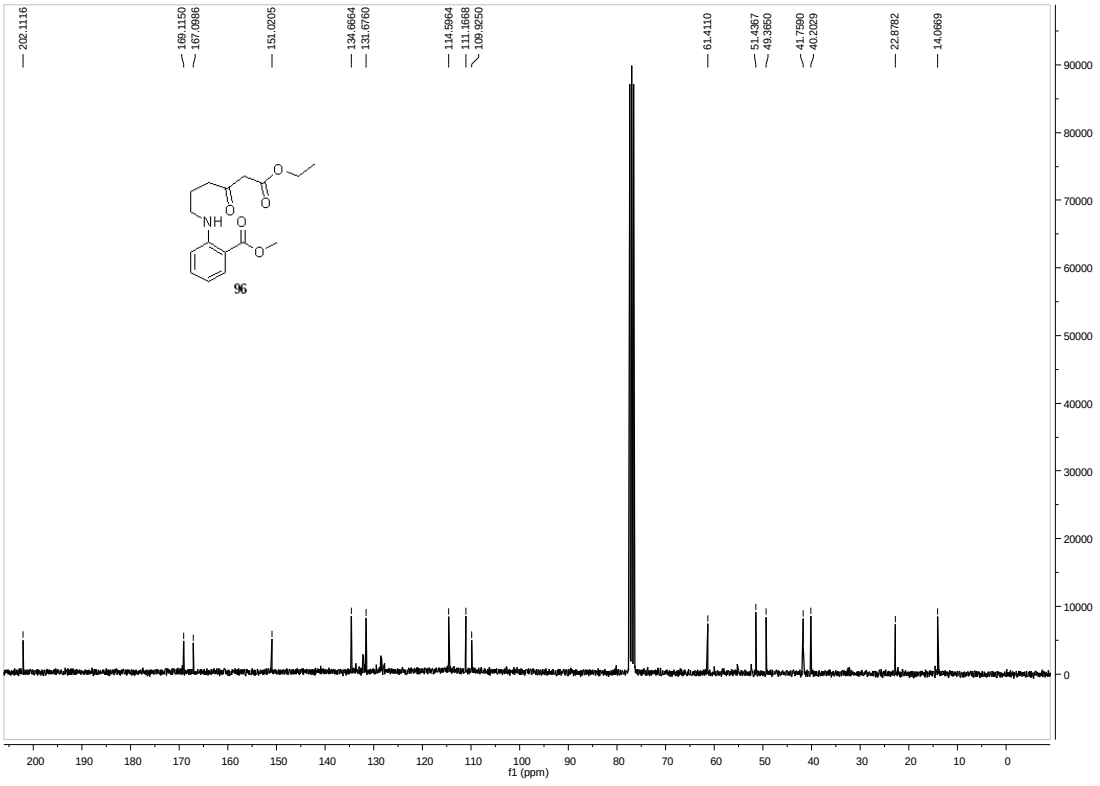
3.88
f1 (ppm)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167.0986
151.0205
134.6664
131.6760
114.5964
111.1668
109.9250
61.4110
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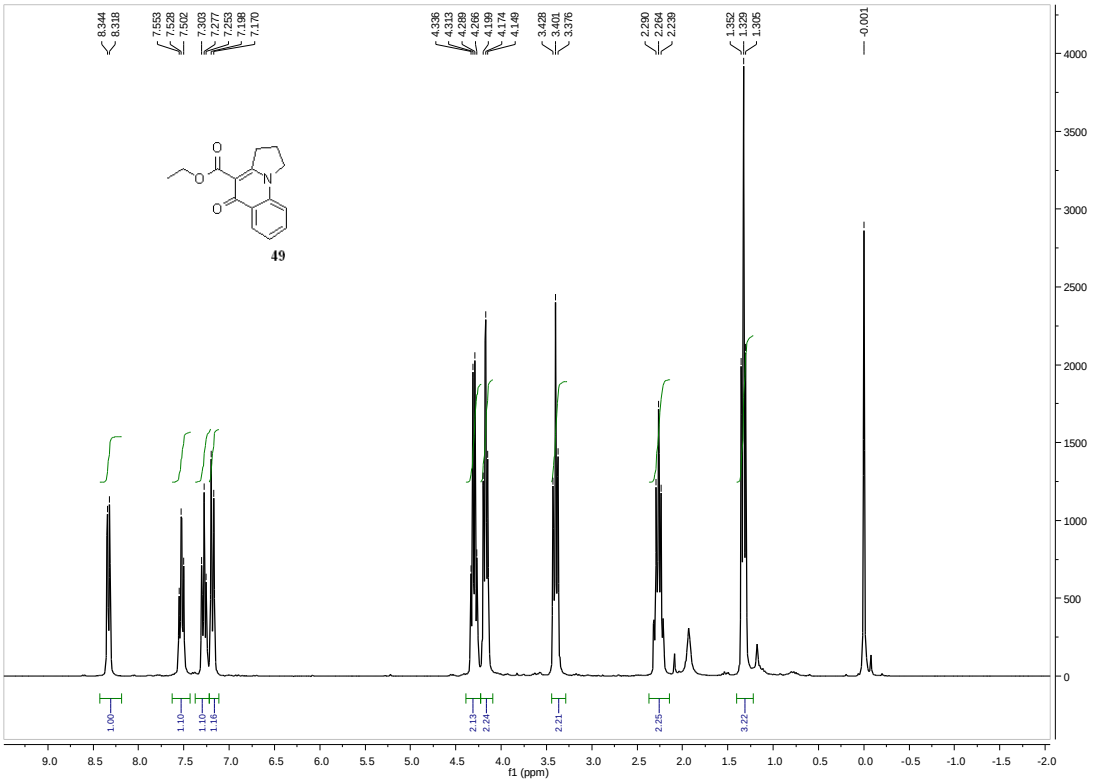
O
O
96
f1 (ppm)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7.253
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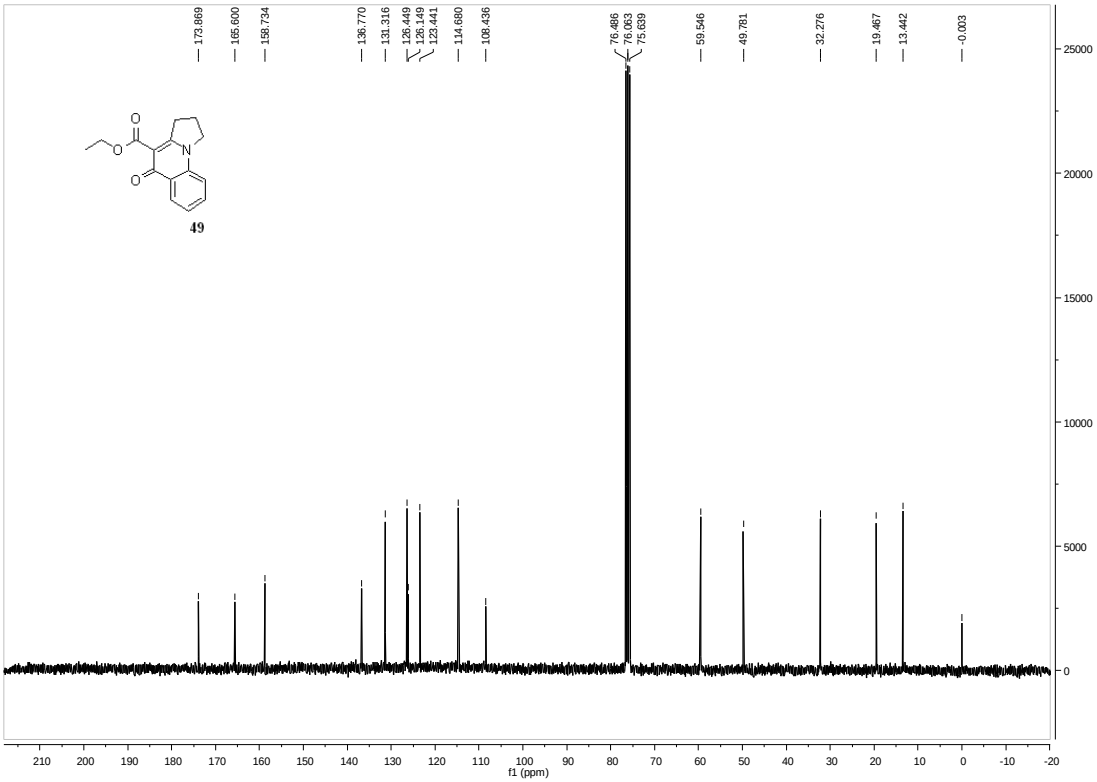
7.170
4.336
4.313
4.289
4.266
4.199
4.174
4.149
3.428
3.401
3.376
2.290
2.264
2.239
1.352
1.329
1.305
-0.001
1.00
1.10
1.10
1.18
2.13
2.24
2.21
2.25
3.22
f1 (ppm)

49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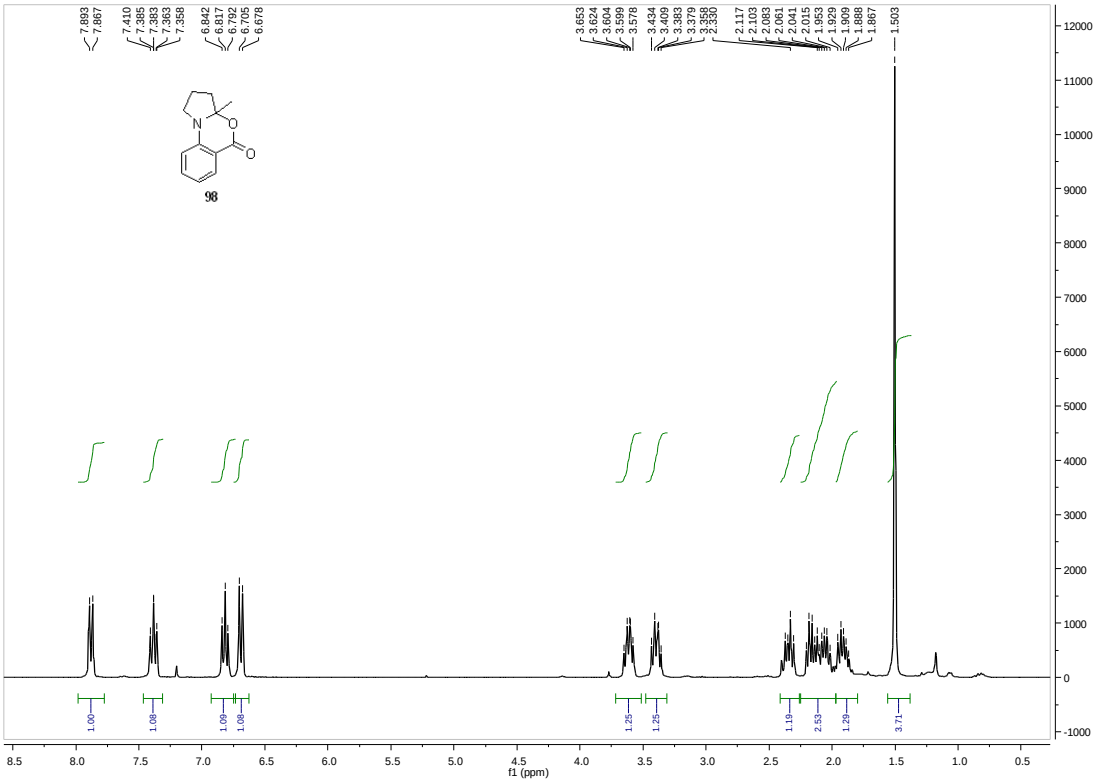
158.734
136.770
131.316
126.449
126.149
123.441
114.680
108.436
76.486
76.063
75.639
59.546
49.781
32.276
19.467
13.442
-0.003
f1 (ppm)

49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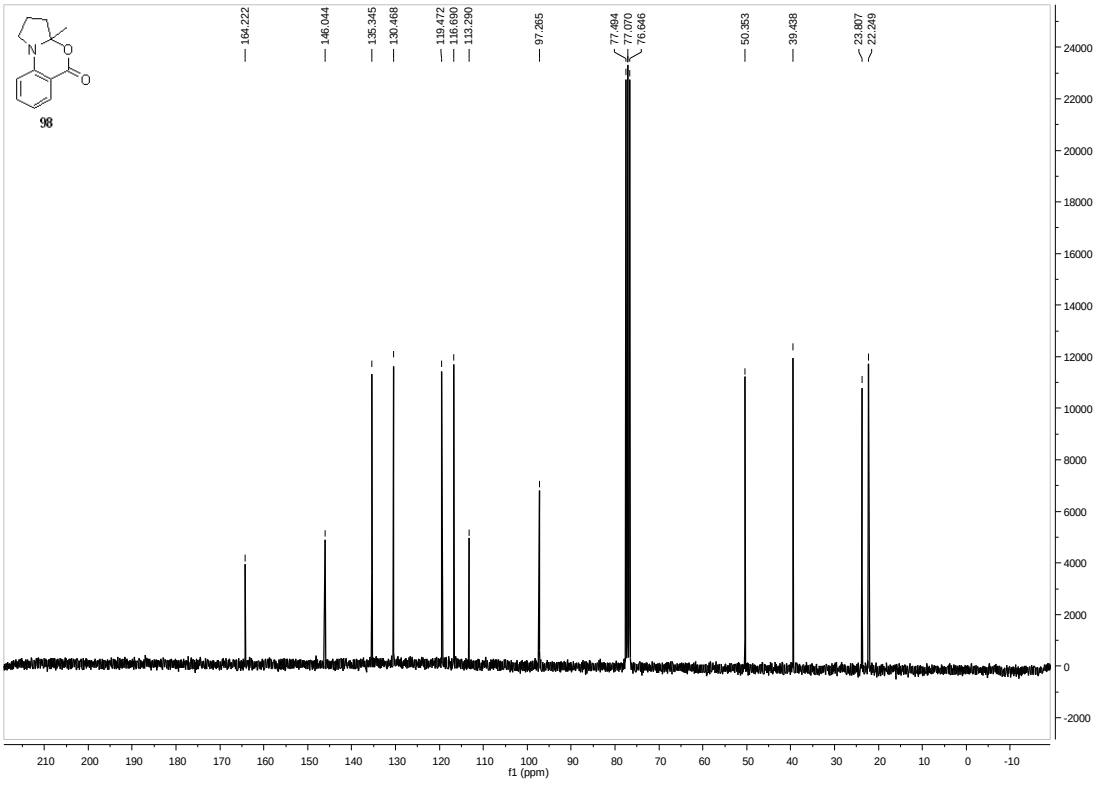
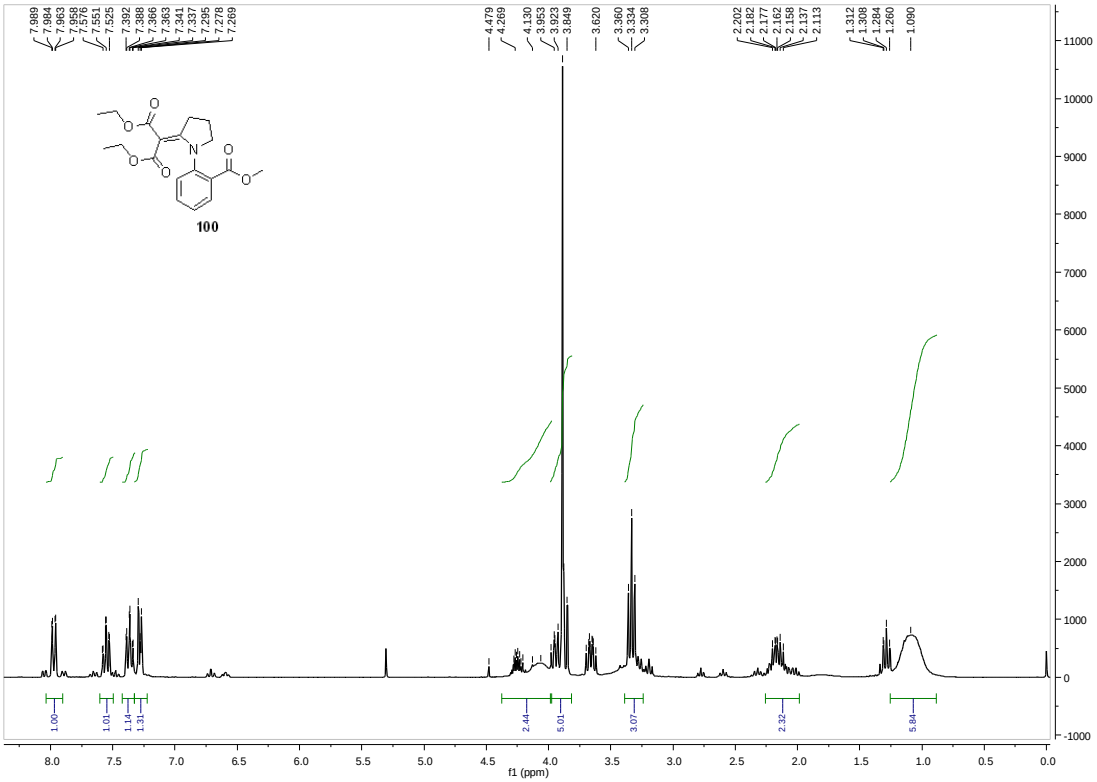
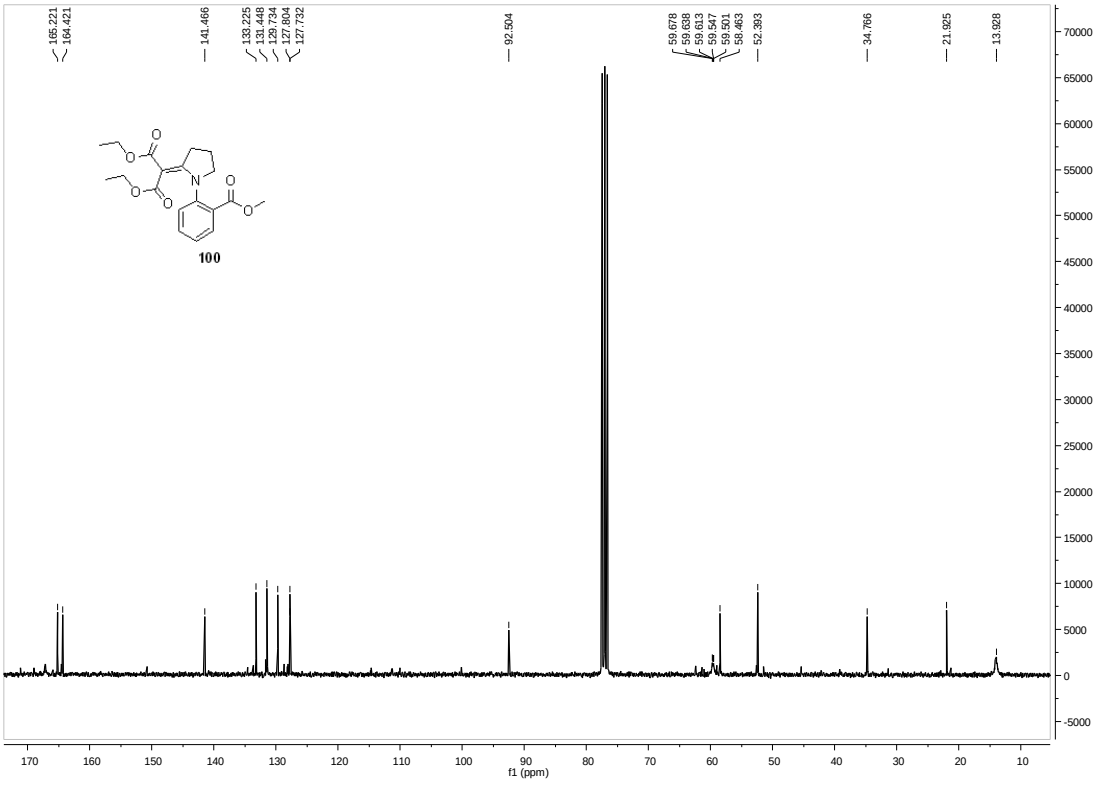
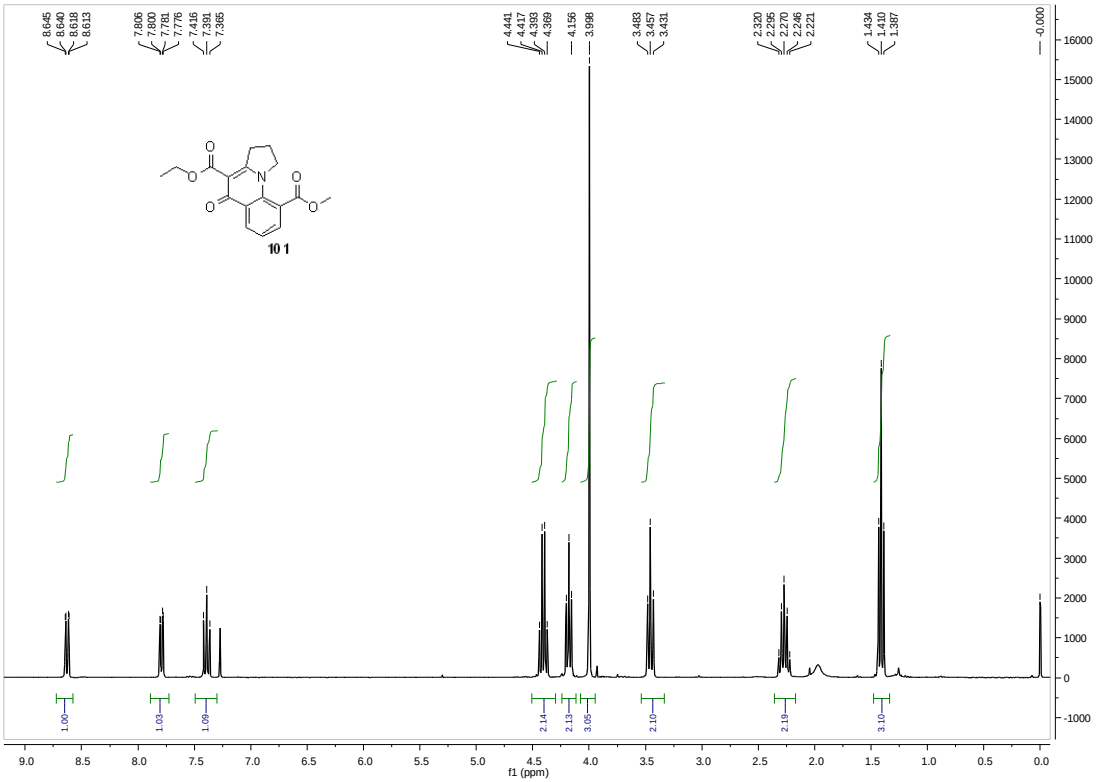
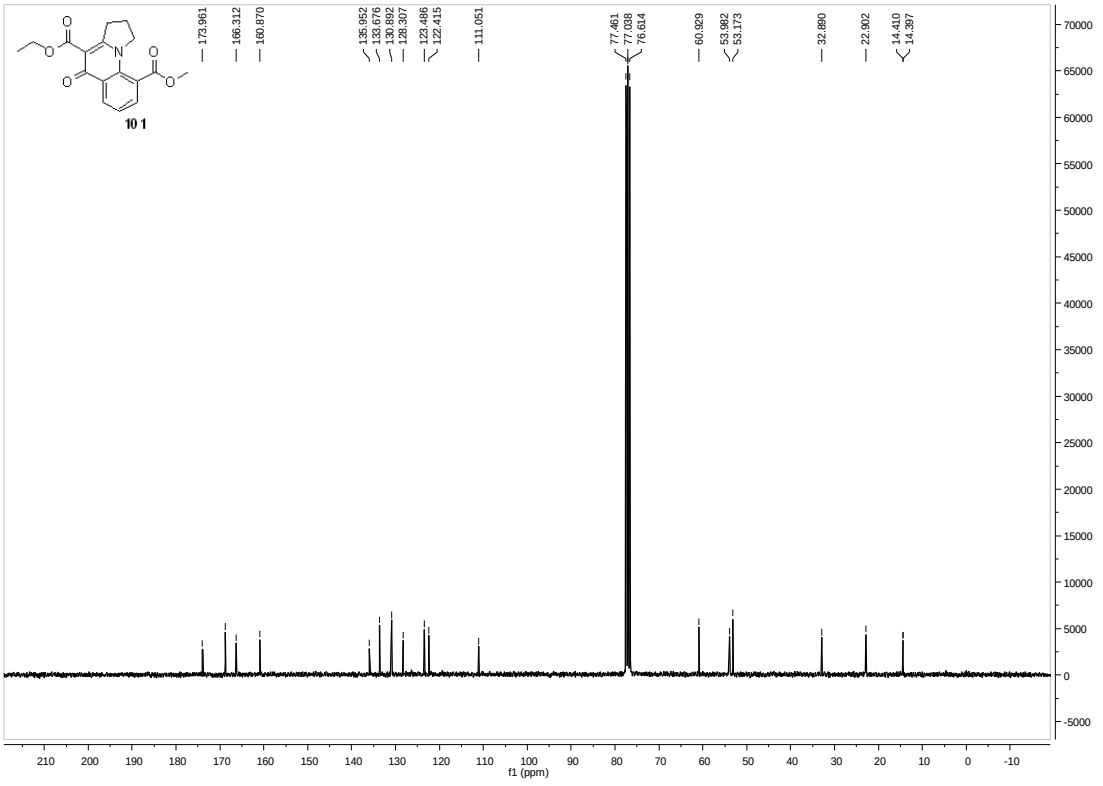
7.867
7.410
7.385
7.383
7.363
7.358
6.842
6.817
6.792
6.705
6.678
3.653
3.624
3.604
3.599
3.578
3.434
3.409
3.383
3.379
3.358
2.330
2.117
2.103
2.083
2.061
2.041
2.015
1.953
1.929
1.909
1.888
1.867
1.503
98
1.00
1.08
1.09
1.08
1.25
1.25
1.19
2.53
1.29
3.71
f1 (ppm)

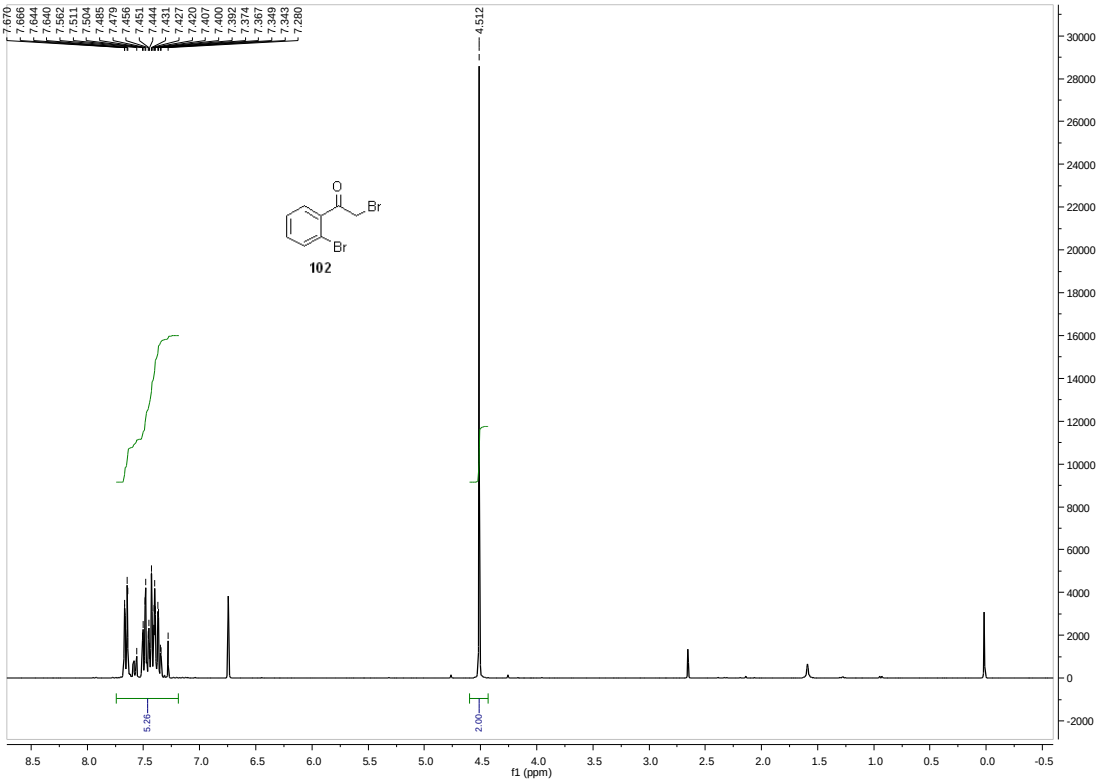

164.222
146.044
135.345
130.468
119.472
116.690
113.290
97.265
77.494
77.070
76.646
50.353
39.438
23.807
22.249
98
f1 (ppm)

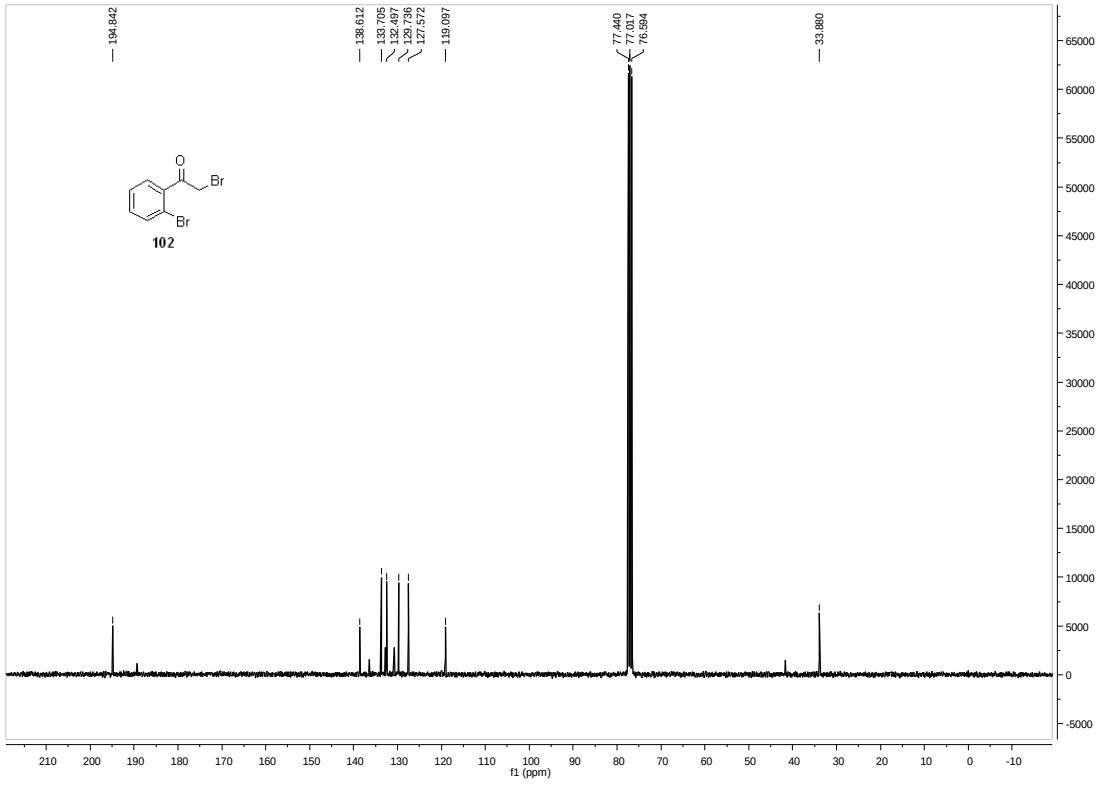

7.989
7.984
7.963
7.958
7.576
7.551
7.525
7.392
7.388
7.366
7.363
7.341
7.337
7.295
7.278
7.269
4.479
4.269
4.130
3.953
3.923
3.849
3.620
3.360
3.334
3.308
2.202
2.182
2.177
2.162
2.158
2.137
2.113
1.312
1.308
1.284
1.260
1.090
100
1.00
1.01
1.14
1.31
2.44
5.01
3.07
2.32
5.84
f1 (ppm)

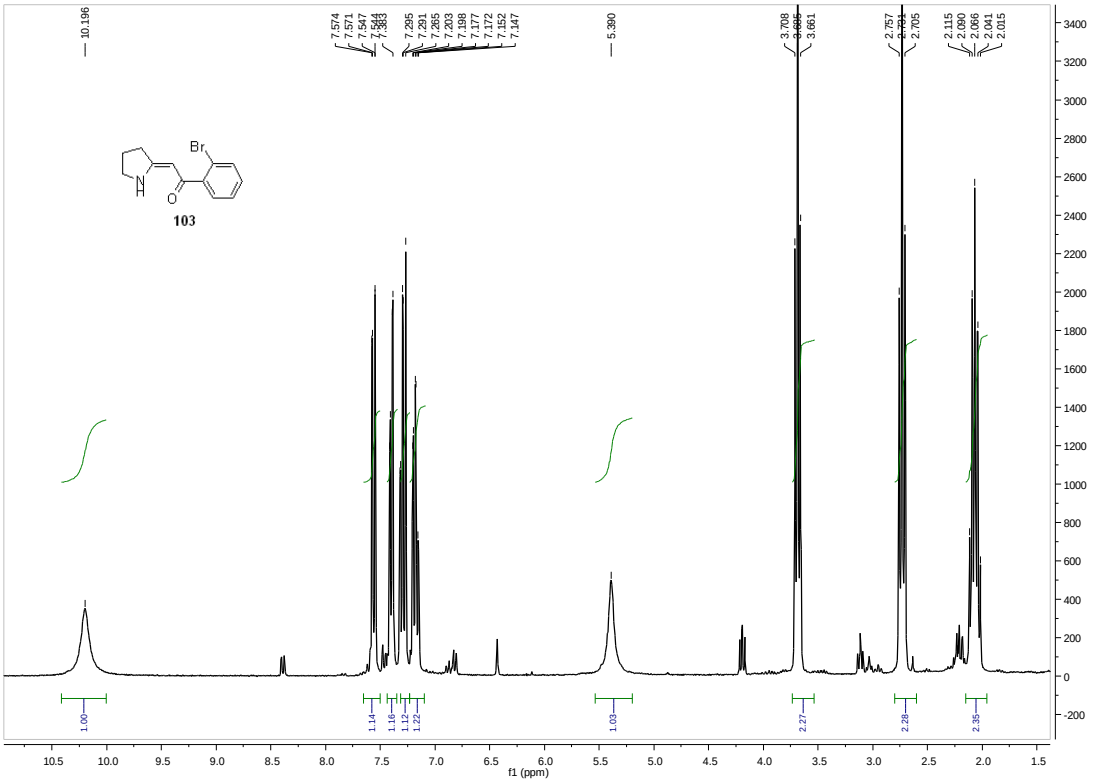

165.221
164.421
141.466
133.225
131.448
129.734
127.804
127.732
92.504
59.678
59.638
59.613
59.547
59.501
58.463
52.393
34.766
21.925
13.928
100
f1 (ppm)

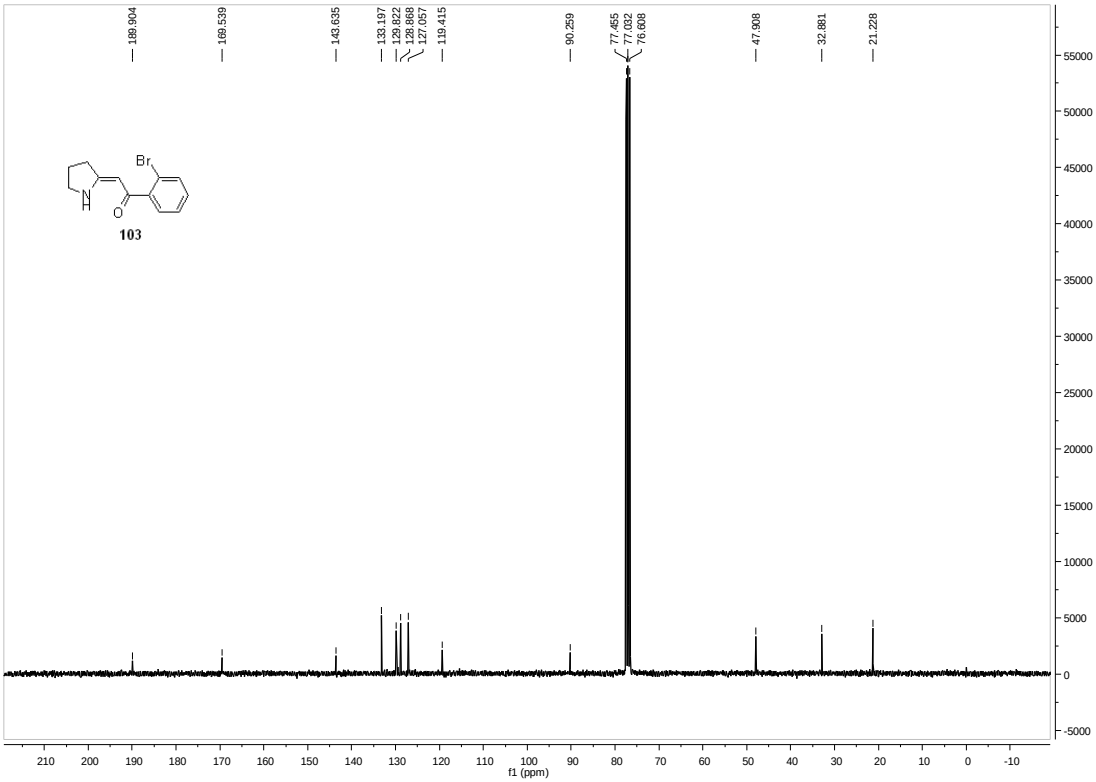

8.645
8.640
8.618
8.613
7.806
7.800
7.781
7.776
7.416
7.391
7.365
4.441
4.417
4.393
4.369
4.156
3.998
3.483
3.457
3.431
2.320
2.295
2.270
2.246
2.221
1.434
1.410
1.387
-0.000
10 1
1.00
1.03
1.09
2.14
2.13
3.05
2.10
2.19
3.10
f1 (ppm)


173.961
166.312
160.870
135.952
133.676
130.892
128.307
123.486
122.415
111.051
77.461
77.038
76.614
60.929
53.992
53.173
32.890
22.902
14.410
14.397
10 1
f1 (ppm)


7.670
7.666
7.644
7.640
7.562
7.511
7.504
7.485
7.479
7.456
7.451
7.444
7.431
7.427
7.420
7.407
7.400
7.392
7.374
7.367
7.349
7.343
7.280
4.512
O
Br
Br
102
5.26
2.00
f1 (ppm)


194.842
138.612
133.705
132.497
129.736
127.572
119.097
77.440
77.017
76.594
33.880
O
Br
Br
102
f1 (ppm)


10.196
7.574
7.571
7.547
7.544
7.383
7.295
7.291
7.265
7.203
7.198
7.177
7.172
7.152
7.147
5.390
3.708
3.685
3.661
2.757
2.731
2.705
2.115
2.030
2.006
2.041
2.015
Br
O
N
H
103
1.00
1.14
1.16
1.12
1.22
1.03
2.27
2.28
2.35
f1 (ppm)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169.539
143.635
133.197
129.822
128.868
127.057
119.415
90.259
77.455
77.032
76.608
47.908
32.881
21.228
Br
O
N
H
103
f1 (ppm)