Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Metal Triflates Promoted Synthesis of Naphthalenes

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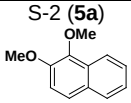
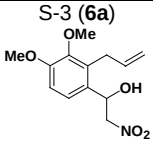
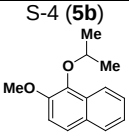
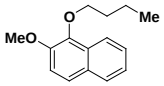
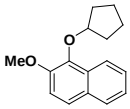
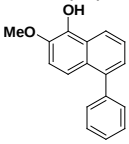
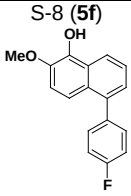
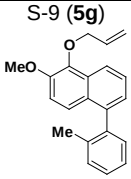
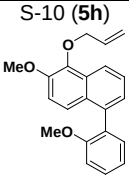
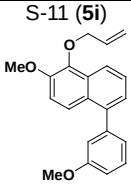
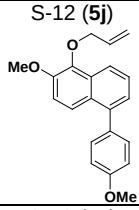
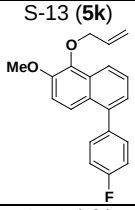
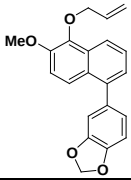
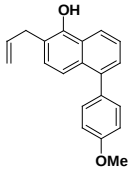
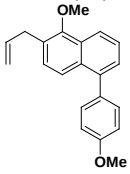
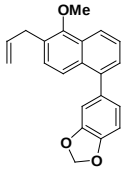
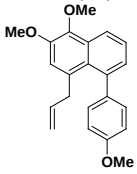
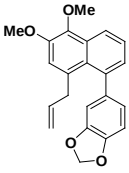
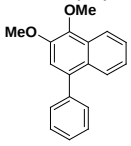
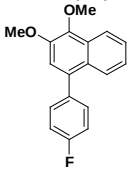
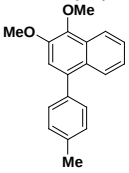
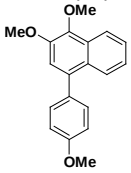
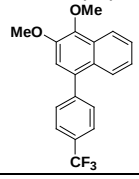
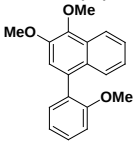
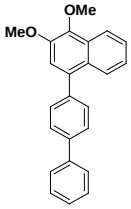
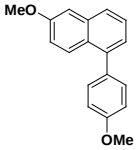
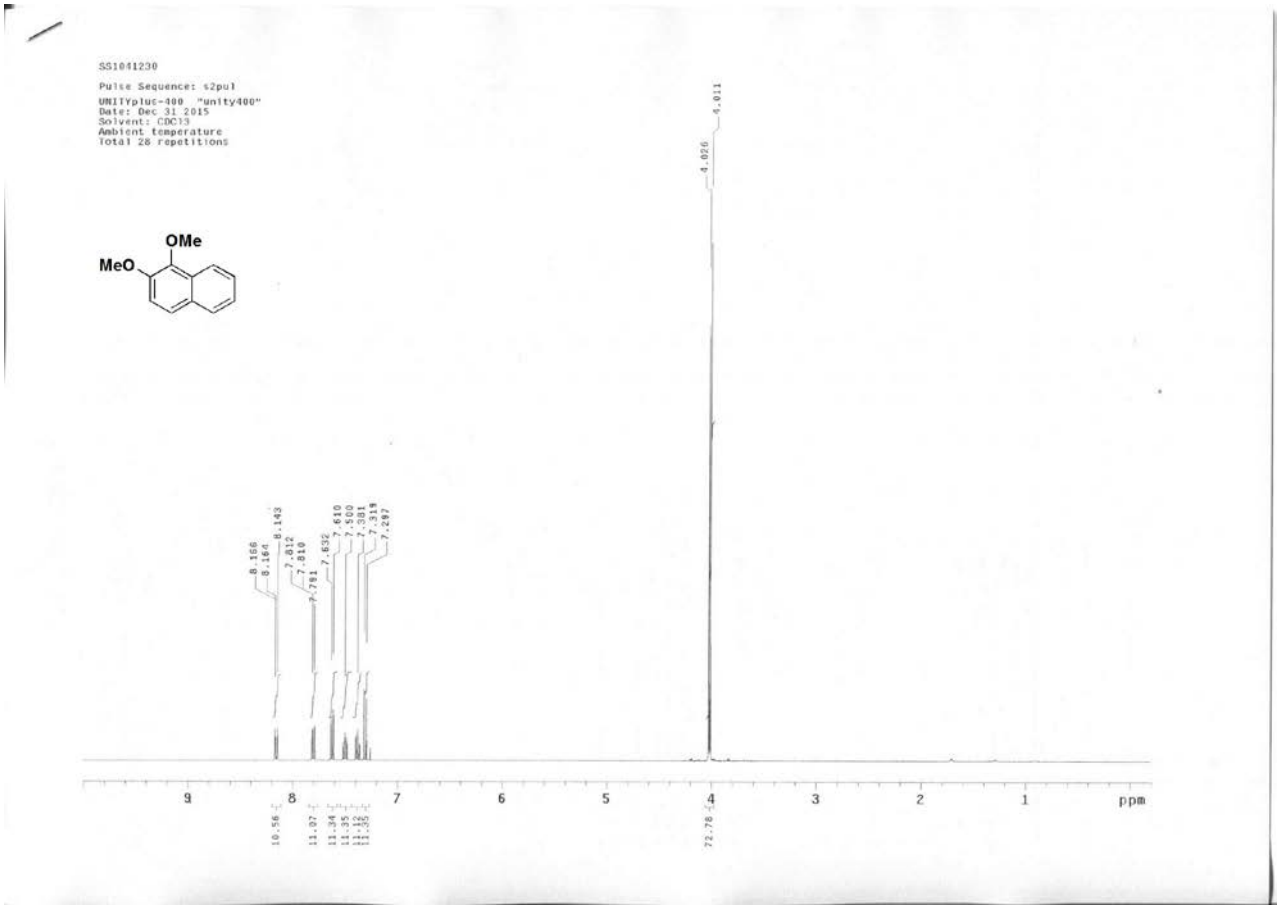
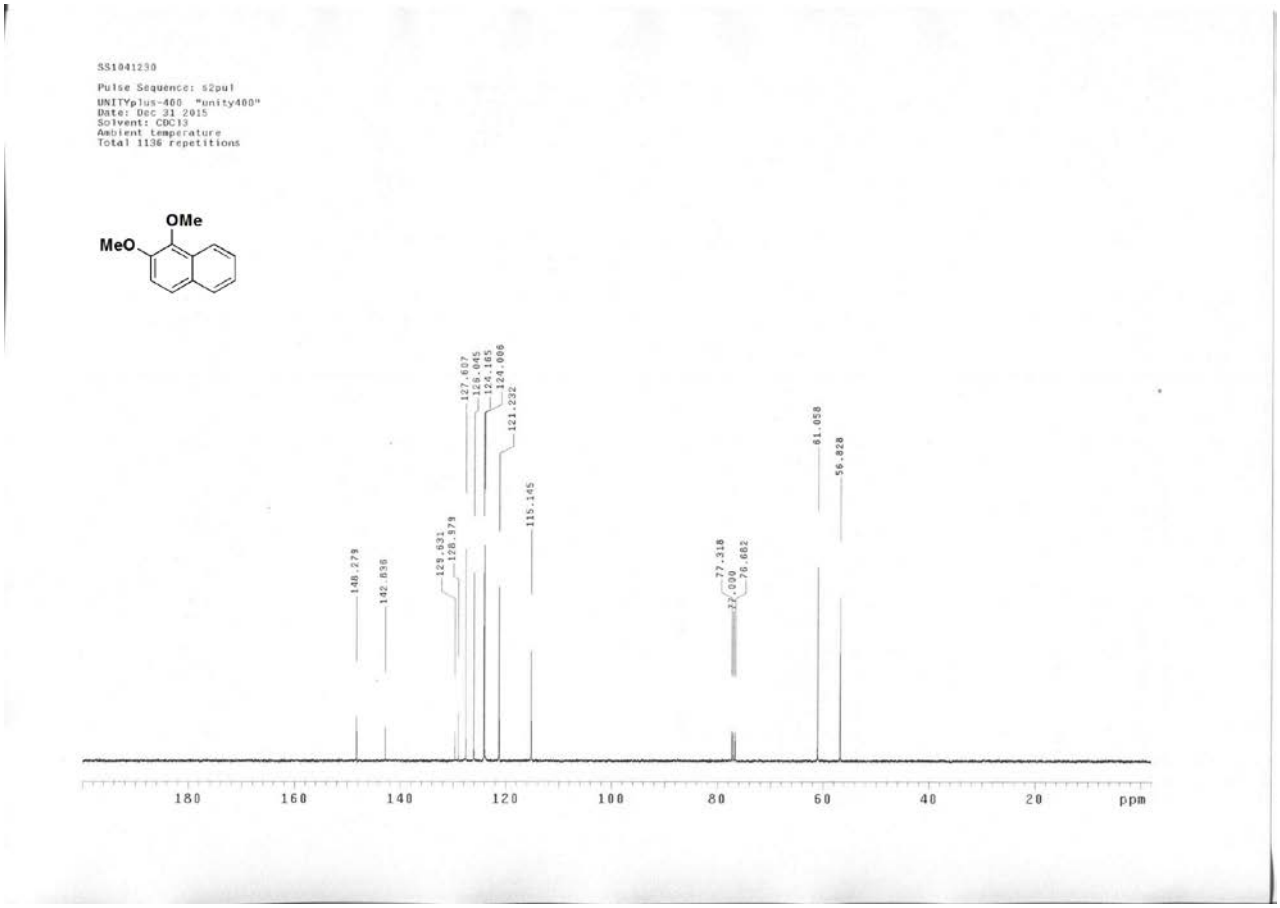
(1) Additional scanned photocopies (pages S-2~S-27)

(2) X-ray crystal data of **5e**, **5f**, **8d**, **8g**, **9a** and **9b** (pages S-28~S-33)

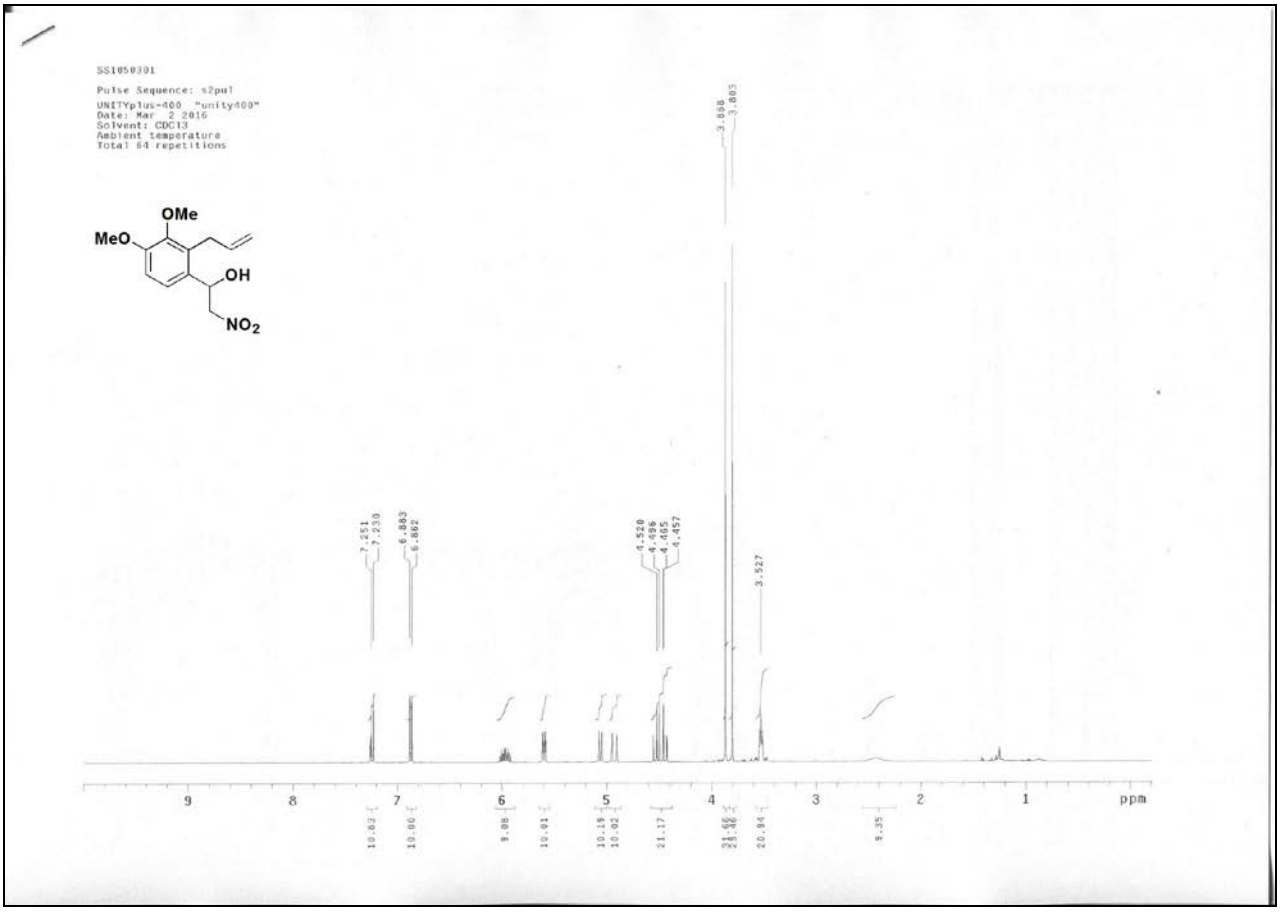
S-2 (**5a**) 	S-3 (**6a**) 	S-4 (**5b**) 	S-5 (**5c**) 	S-6 (**5d**) 	S-7 (**5e**) 
S-8 (**5f**) 	S-9 (**5g**) 	S-10 (**5h**) 	S-11 (**5i**) 	S-12 (**5j**) 	S-13 (**5k**) 
S-14 (**5l**) 	S-15 (**5m**) 	S-16 (**5n**) 	S-17 (**5o**) 	S-18 (**7a**) 	S-19 (**7b**) 
S-20 (**8a**) 	S-21 (**8b**) 	S-22 (**8c**) 	S-23 (**8d**) 	S-24 (**8e**) 	S-25 (**8f**) 
S-26 (**8g**) 	S-27 (**9a**) 				

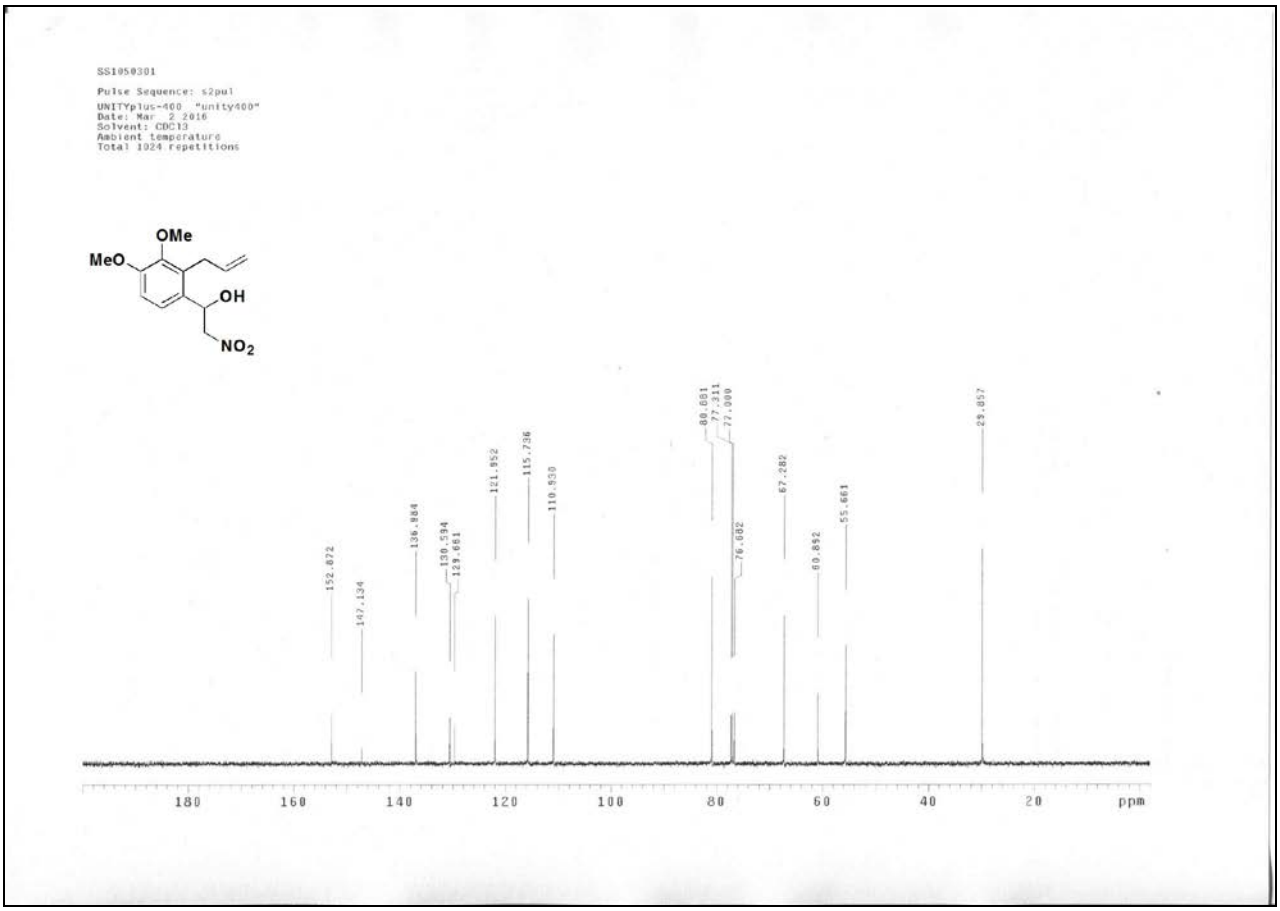
Compound 5a


SS1041230
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Dec 31 2015
Solvent: CDCl3
Ambient temperature
Total 28 repetitions
OMe
MeO
8.166
8.164
8.143
7.812
7.810
7.791
7.632
7.610
7.500
7.481
7.319
7.297
4.026
4.011
9
8
7
6
5
4
3
2
1
ppm
10.56
11.07
11.34
11.35
11.12
11.35
72.78

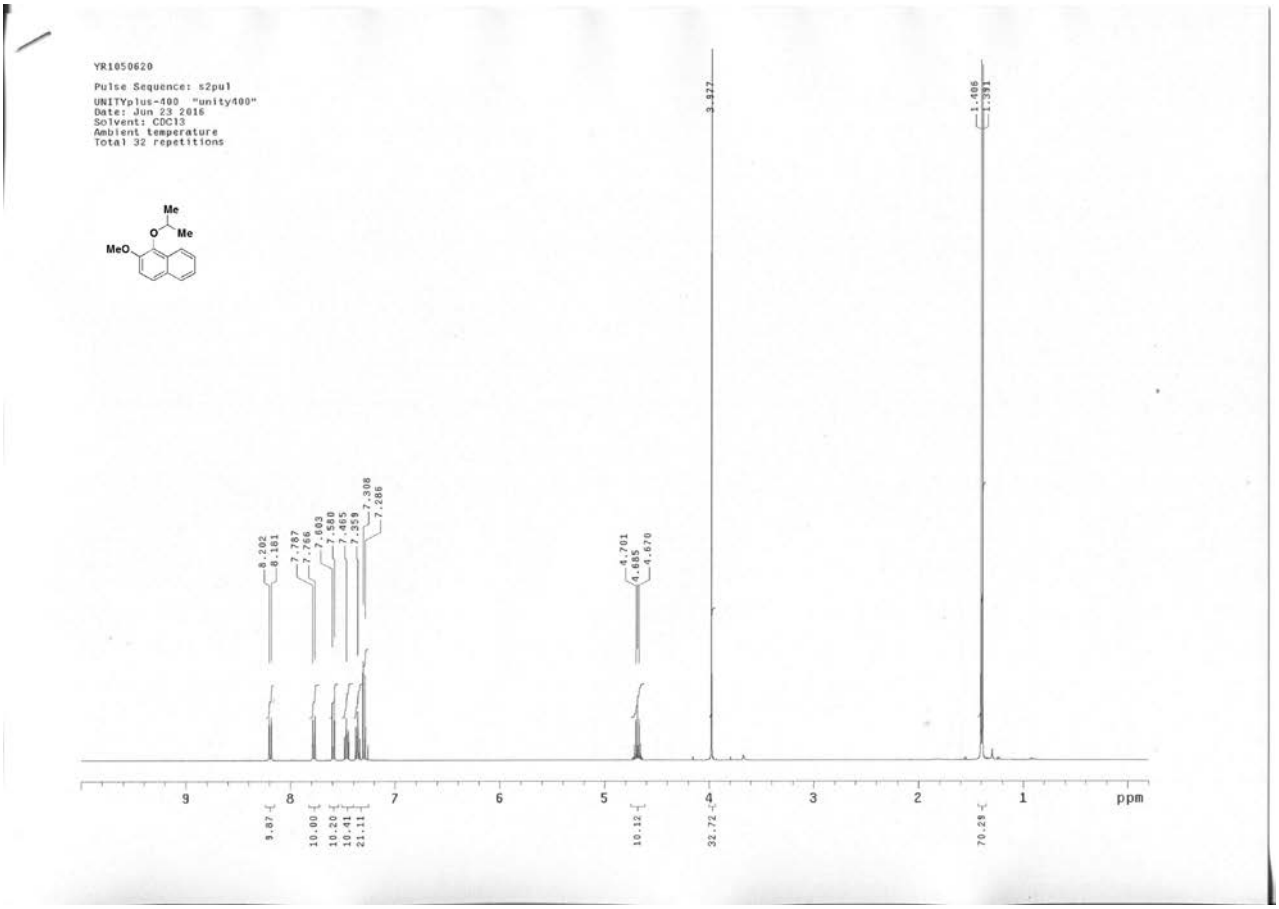

SS1041230
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Dec 31 2015
Solvent: CDCl3
Ambient temperature
Total 1136 repetitions
OMe
MeO
148.279
142.836
129.631
128.979
127.607
126.045
124.455
124.006
121.232
115.145
77.318
77.000
76.682
61.058
56.828
180
160
140
120
100
80
60
40
20
ppm

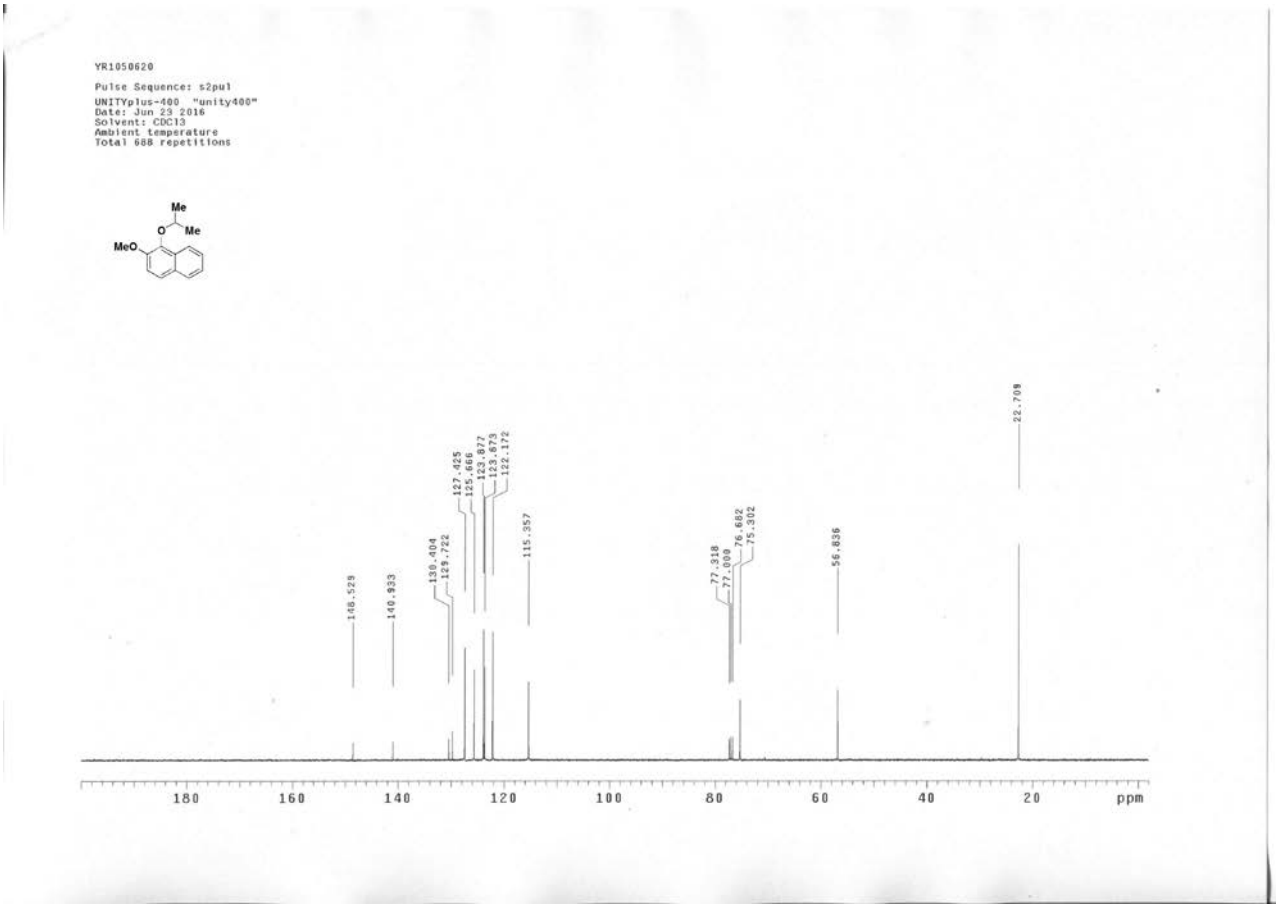
Compound 6a


SS1050301
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Mar 2 2016
Solvent: CDCl3
Ambient temperature
Total 64 repetitions
OMe
MeO
OH
NO2
7.251
7.230
6.883
6.862
4.520
4.496
4.485
4.457
3.606
3.603
3.527
9
8
7
6
5
4
3
2
1
ppm
10.63
10.00
9.88
10.01
10.19
10.02
21.17
21.66
25.46
20.94
9.35

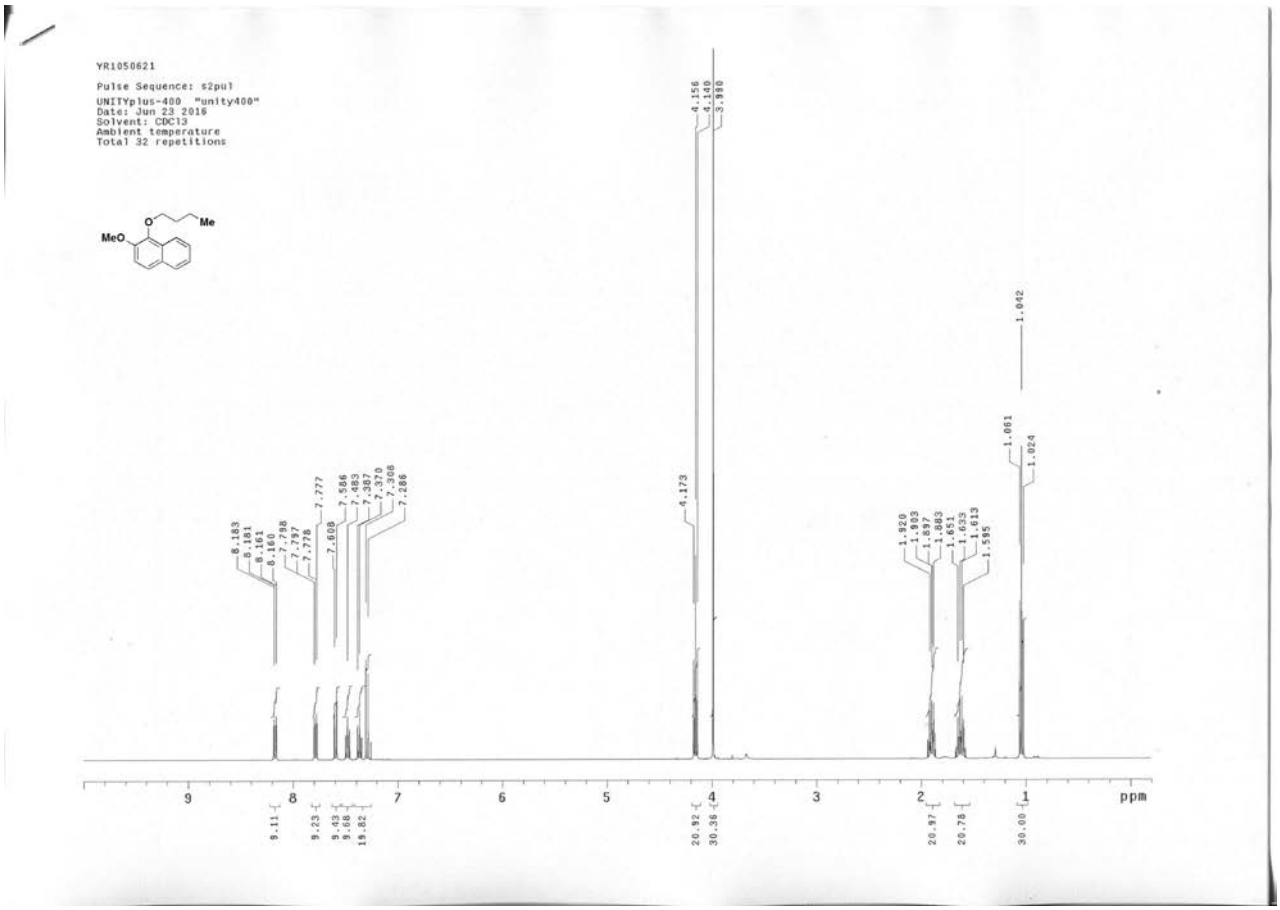

SS1050301
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Mar 2 2016
Solvent: CDCl3
Ambient temperature
Total 1024 repetitions
OMe
MeO
OH
NO2
152.672
147.134
136.984
130.534
129.661
121.952
115.736
110.930
80.681
77.211
77.000
76.682
67.282
60.892
55.661
25.857
180
160
140
120
100
80
60
40
20
ppm

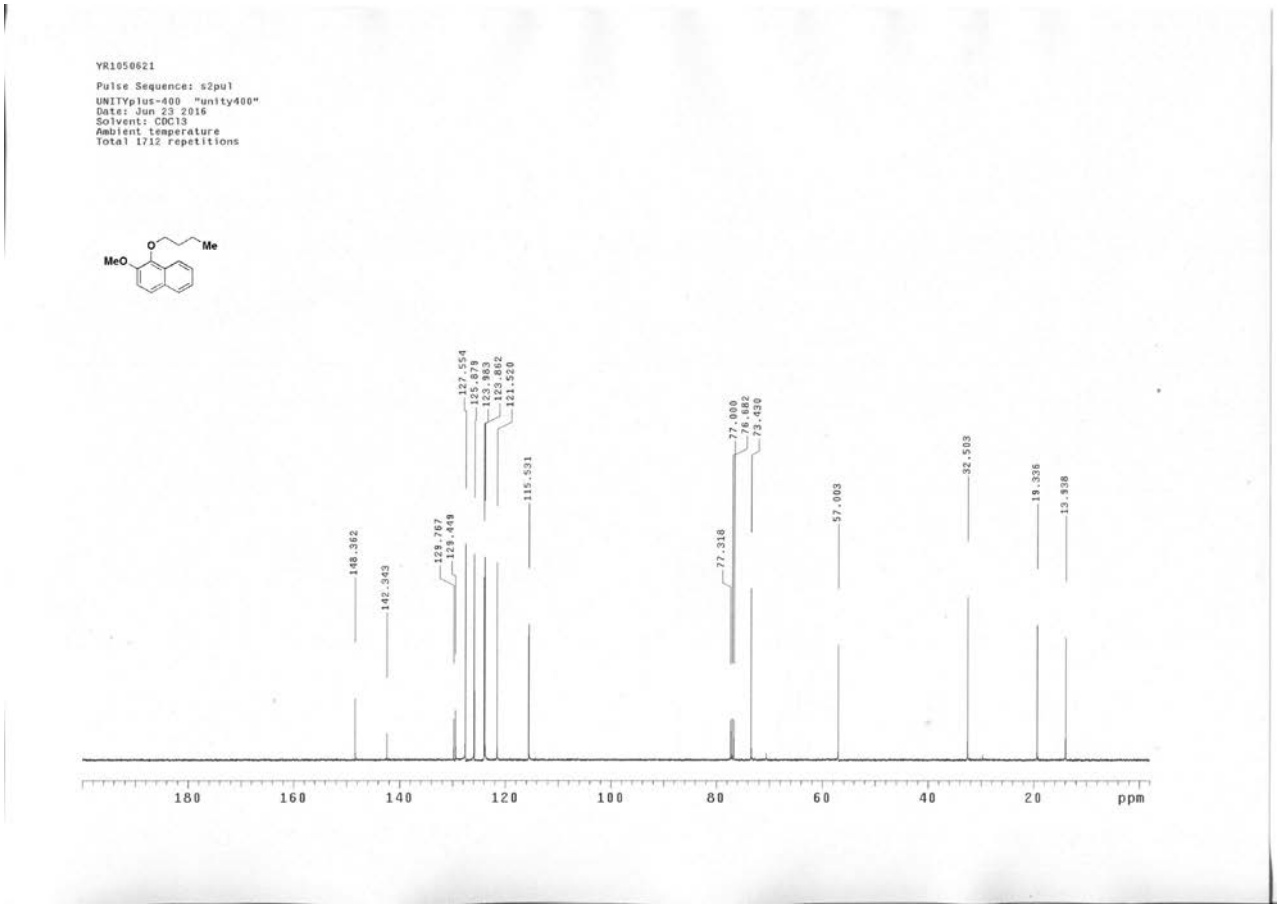
Compound 5b


YR1050620
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Jun 23 2016
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
Me
O
Me
MeO
8.202
8.181
7.787
7.766
7.603
7.580
7.465
7.359
7.306
7.286
4.701
4.685
4.670
3.927
1.406
1.391
9.07
10.00
10.20
10.41
21.11
10.12
32.72
70.29
ppm

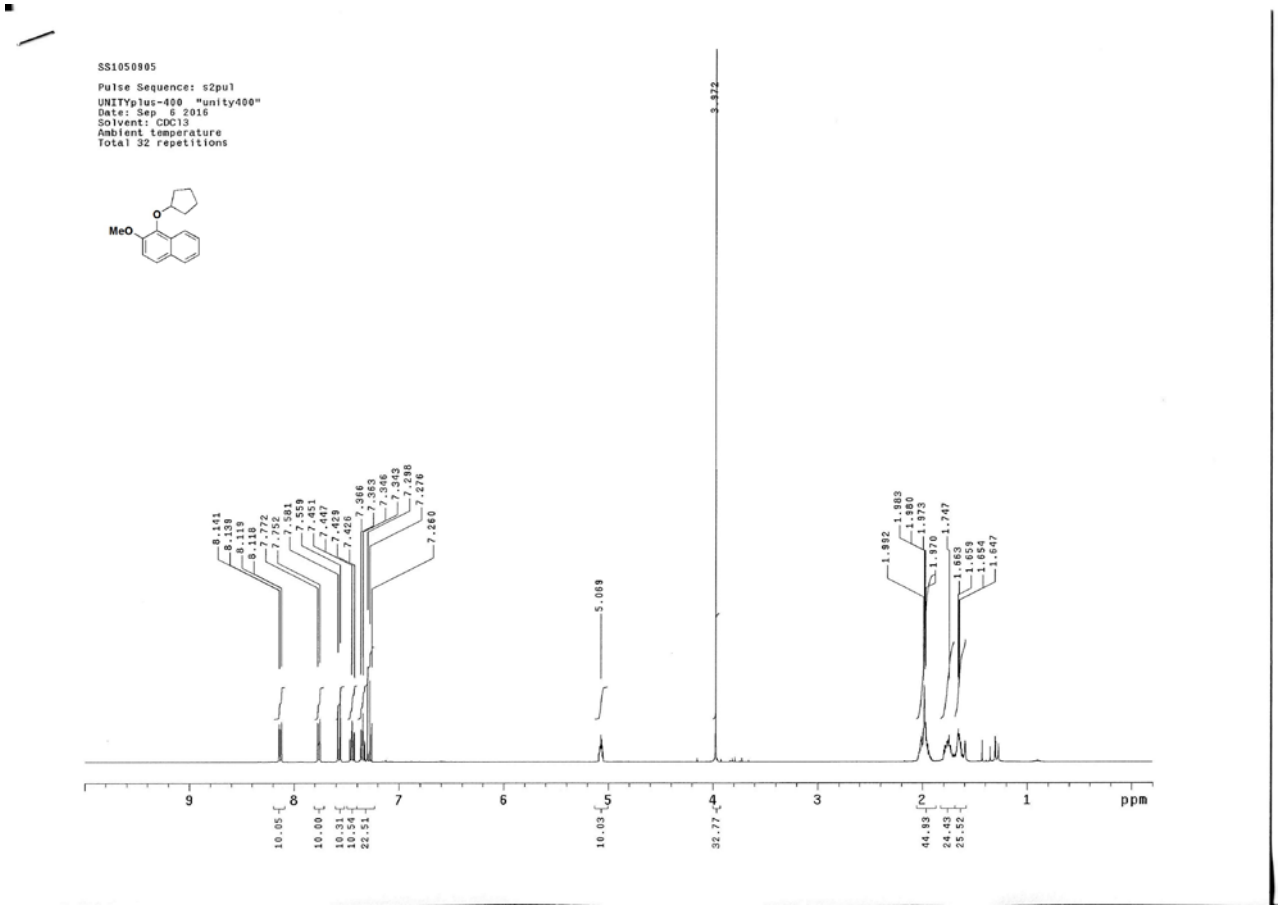

YR1050620
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Jun 23 2016
Solvent: CDCl3
Ambient temperature
Total 688 repetitions
Me
O
Me
MeO
146.529
140.933
130.404
129.722
127.425
125.666
123.877
123.673
122.172
115.357
77.318
77.000
76.682
75.302
56.836
22.709
ppm

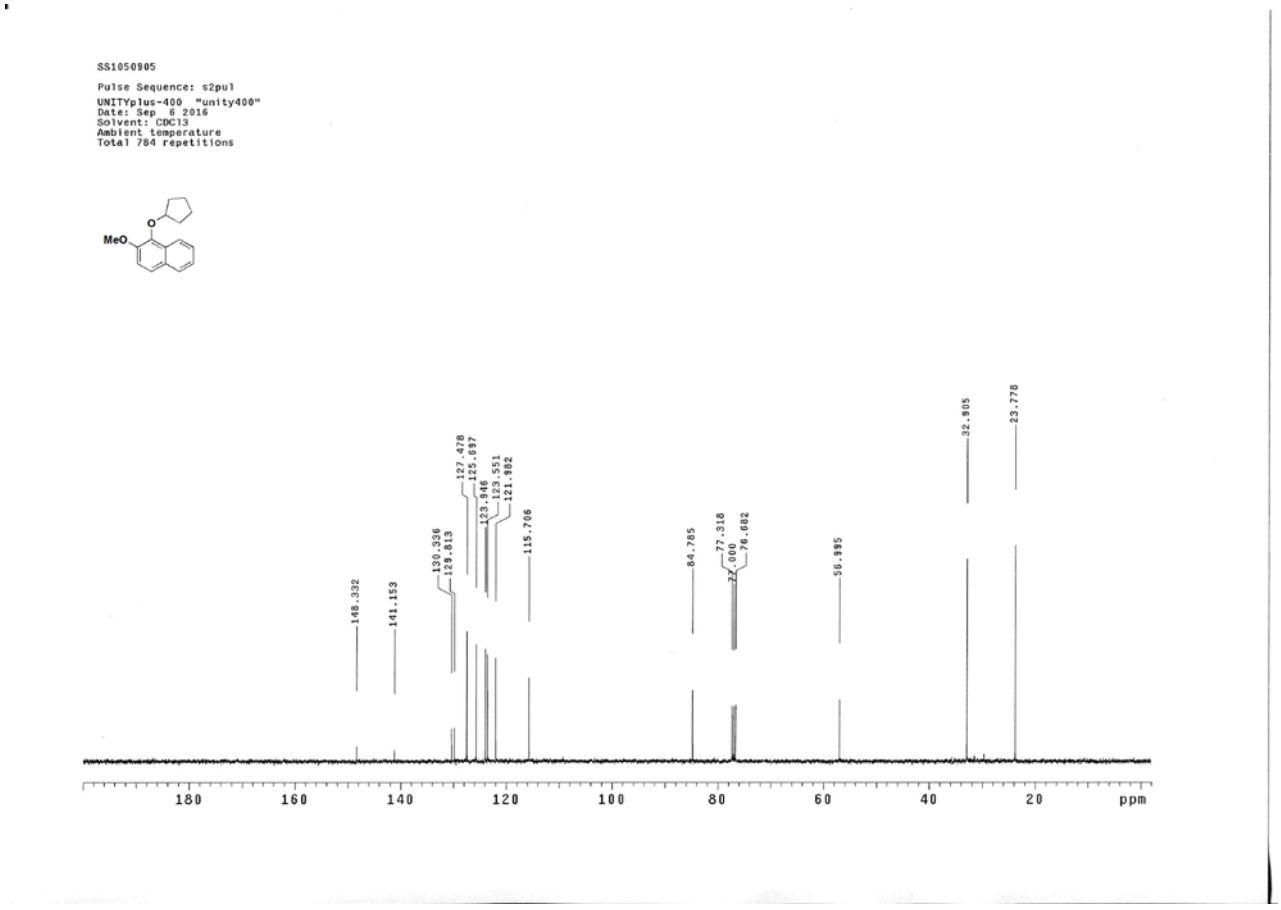
Compound 5c


YR1050621
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Jun 23 2016
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
MeO
O
Me
8.183
8.181
8.161
8.160
7.798
7.797
7.778
7.777
7.608
7.586
7.483
7.367
7.370
7.308
7.286
4.156
4.140
3.990
4.173
1.920
1.903
1.897
1.883
1.653
1.633
1.613
1.595
1.061
1.042
1.024
9
8
7
6
5
4
3
2
1
ppm
9.11
9.23
9.48
9.46
19.82
20.92
30.36
20.97
20.78
30.00

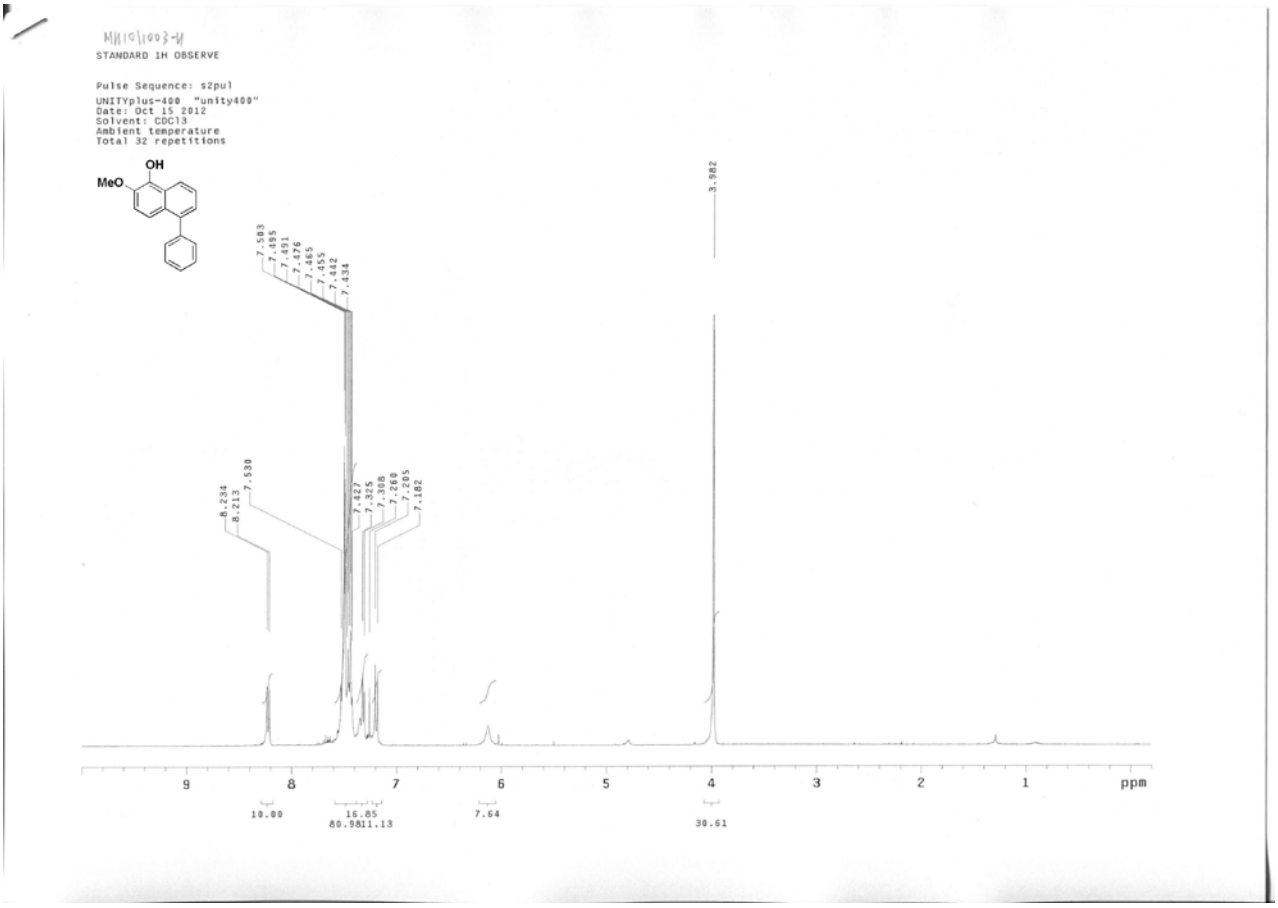

YR1050621
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Jun 23 2016
Solvent: CDCl3
Ambient temperature
Total 1712 repetitions
MeO
O
Me
148.362
142.343
129.767
129.449
127.554
125.879
123.983
123.862
121.520
115.531
77.000
76.682
73.430
77.318
57.003
32.503
19.336
13.938
180
160
140
120
100
80
60
40
20
ppm

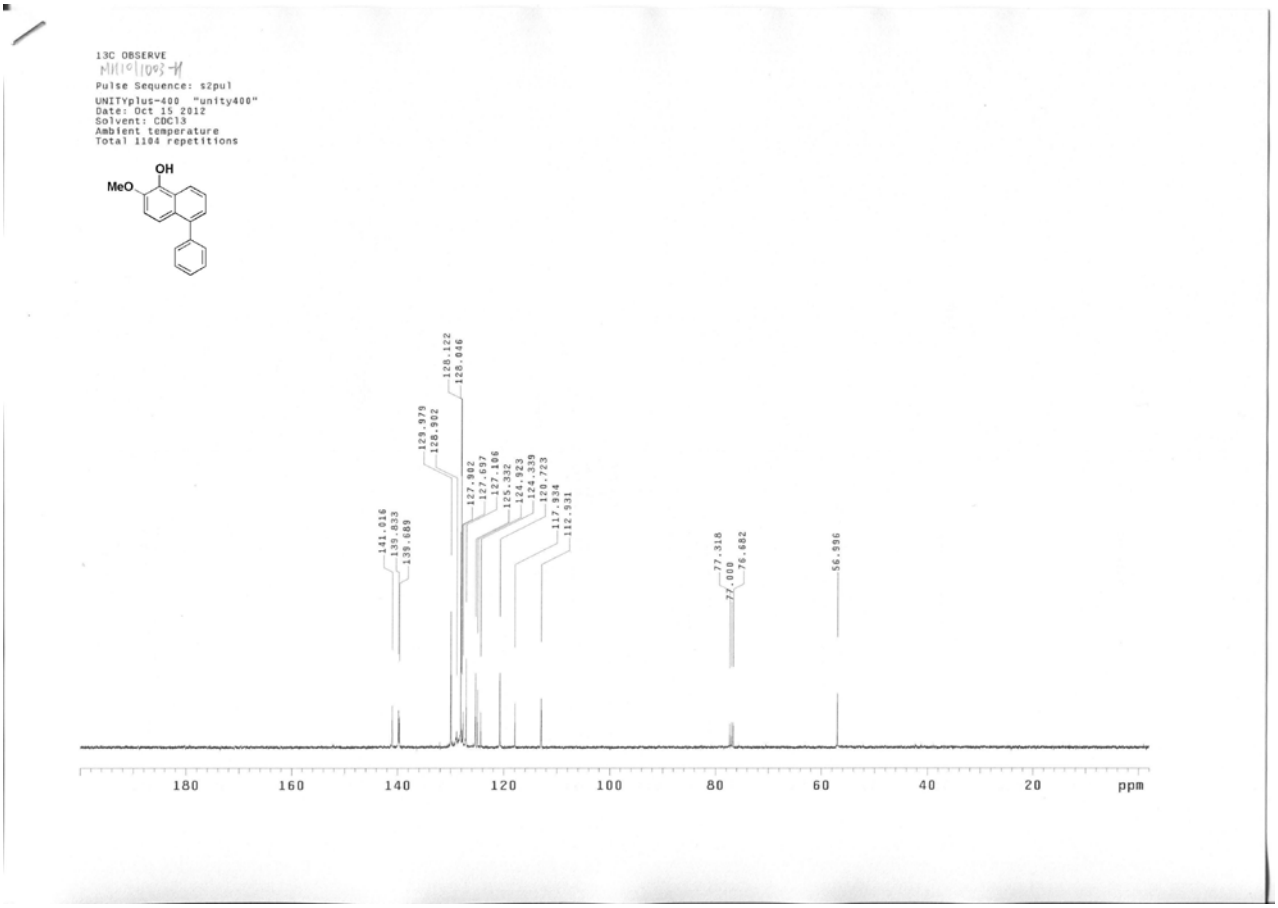
Compound 5d


SS1050905
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 6 2016
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
MeO
8.141
8.139
8.119
8.117
7.772
7.752
7.581
7.559
7.451
7.447
7.428
7.426
7.366
7.363
7.346
7.343
7.298
7.276
7.260
5.069
3.972
1.983
1.980
1.973
1.970
1.747
1.663
1.659
1.654
1.647
ppm
10.05
10.00
10.31
10.54
22.51
10.03
32.77
44.93
24.43
25.52

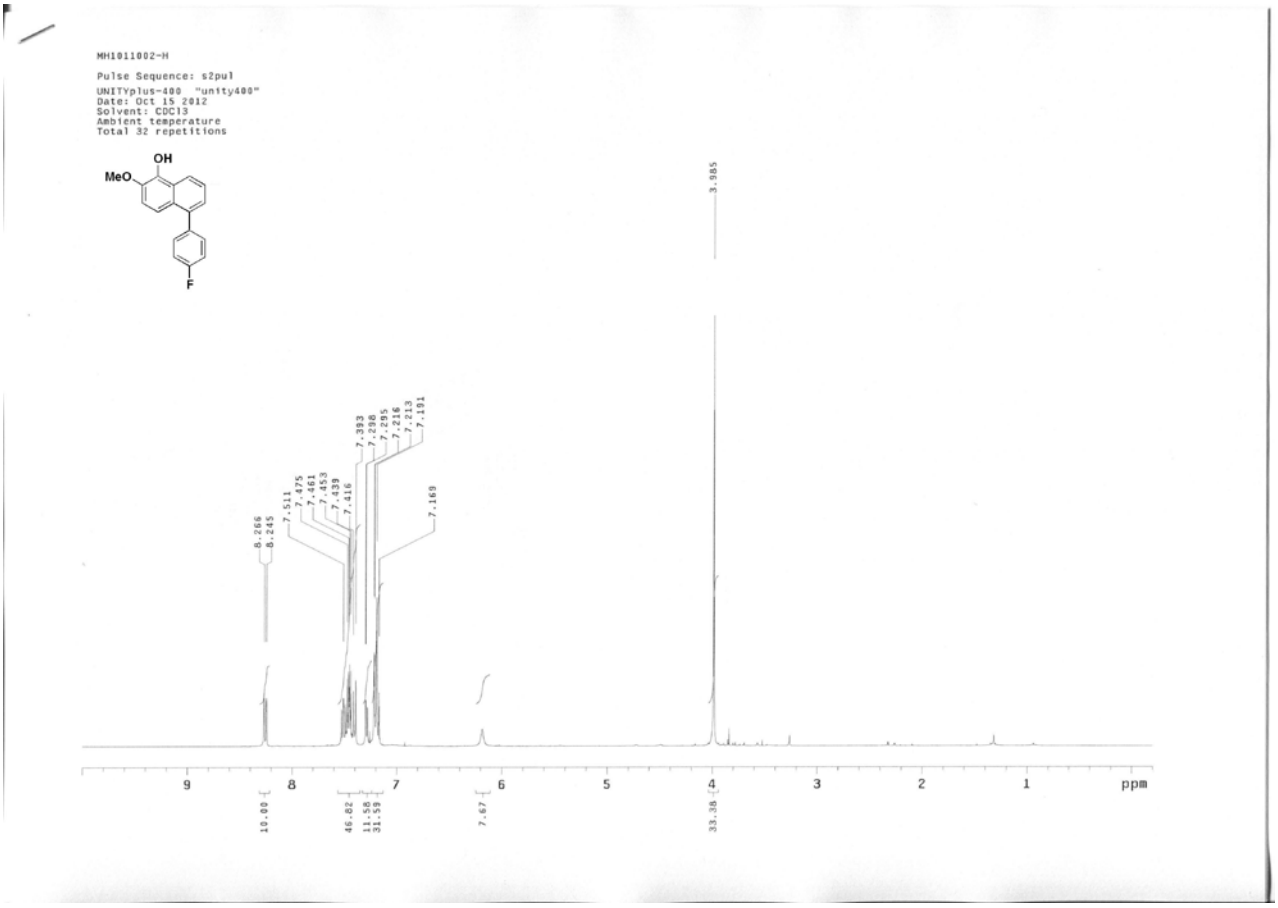

SS1050905
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 6 2016
Solvent: CDCl3
Ambient temperature
Total 784 repetitions
MeO
148.332
141.153
130.336
129.813
127.478
125.697
123.946
123.551
121.882
115.706
84.785
77.318
77.000
76.682
56.995
32.905
23.778
ppm

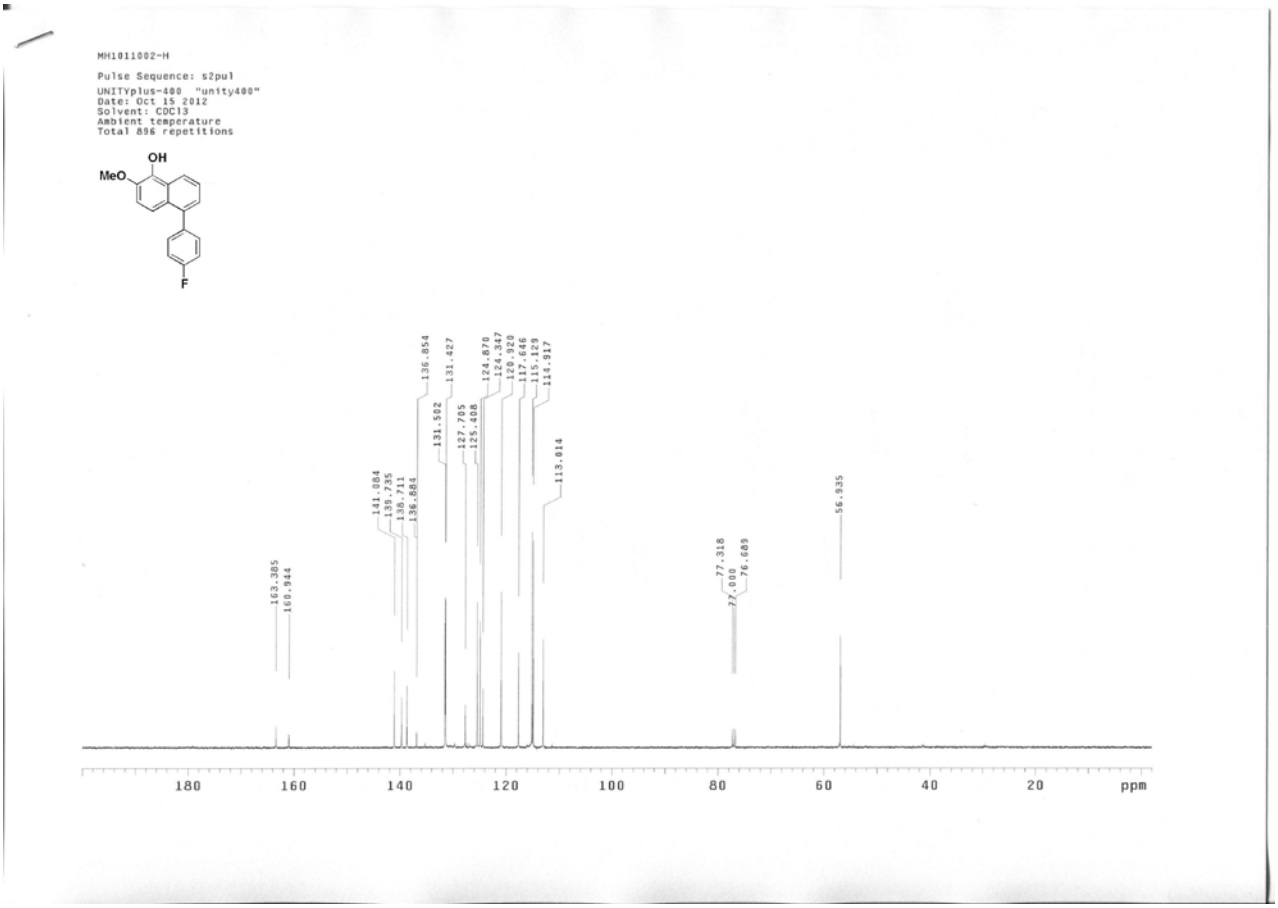
Compound 5e


STANDARD 1H OBSERVE
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 15 2012
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
OH
MeO
8.234
8.213
7.530
7.503
7.495
7.491
7.476
7.465
7.455
7.442
7.434
7.427
7.325
7.308
7.260
7.205
7.182
3.982
9
8
7
6
5
4
3
2
1
ppm
10.00
16.85
80.98
11.13
7.64
30.61

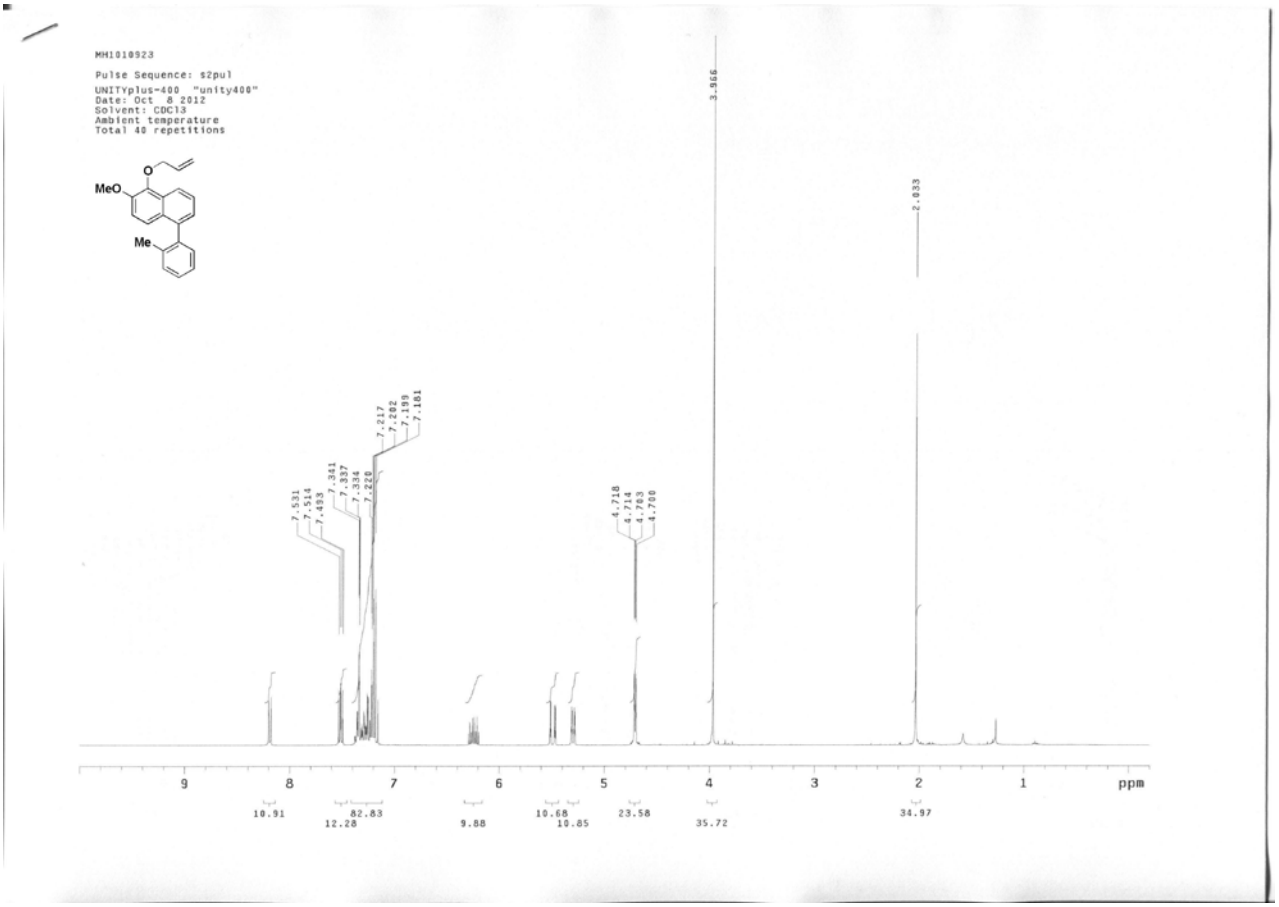

13C OBSERVE
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 15 2012
Solvent: CDCl3
Ambient temperature
Total 1104 repetitions
OH
MeO
141.016
139.833
139.669
129.979
128.902
128.122
128.046
127.902
127.697
127.186
125.332
124.923
124.339
120.723
117.384
112.931
77.316
77.000
76.682
56.996
180
160
140
120
100
80
60
40
20
ppm

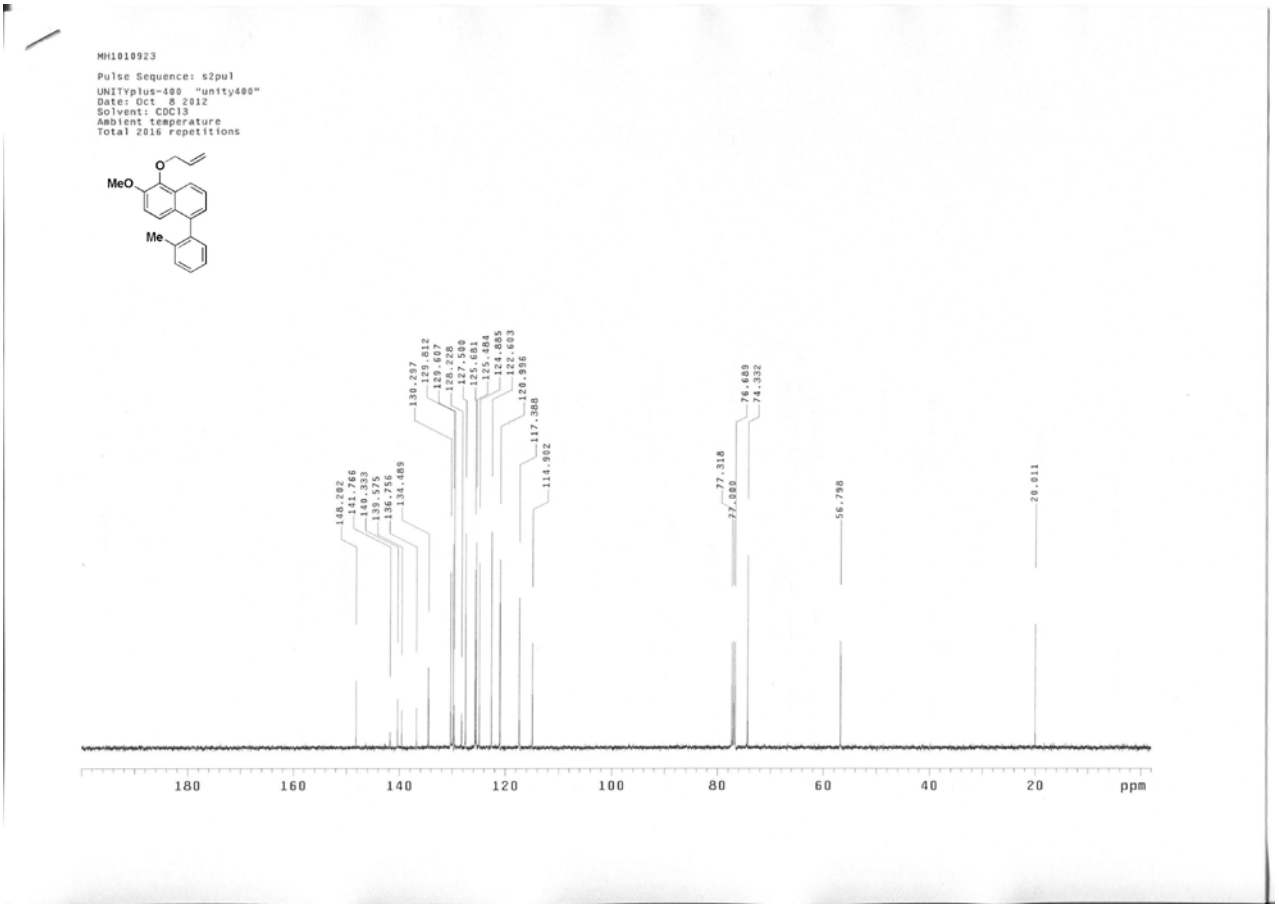
Compound 5f


MH1011002-H
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 15 2012
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
OH
MeO
F
8.266
8.245
7.511
7.475
7.461
7.453
7.439
7.416
7.393
7.298
7.295
7.216
7.213
7.191
7.169
3.985
ppm
10.00
46.82
11.58
31.59
7.67
33.38

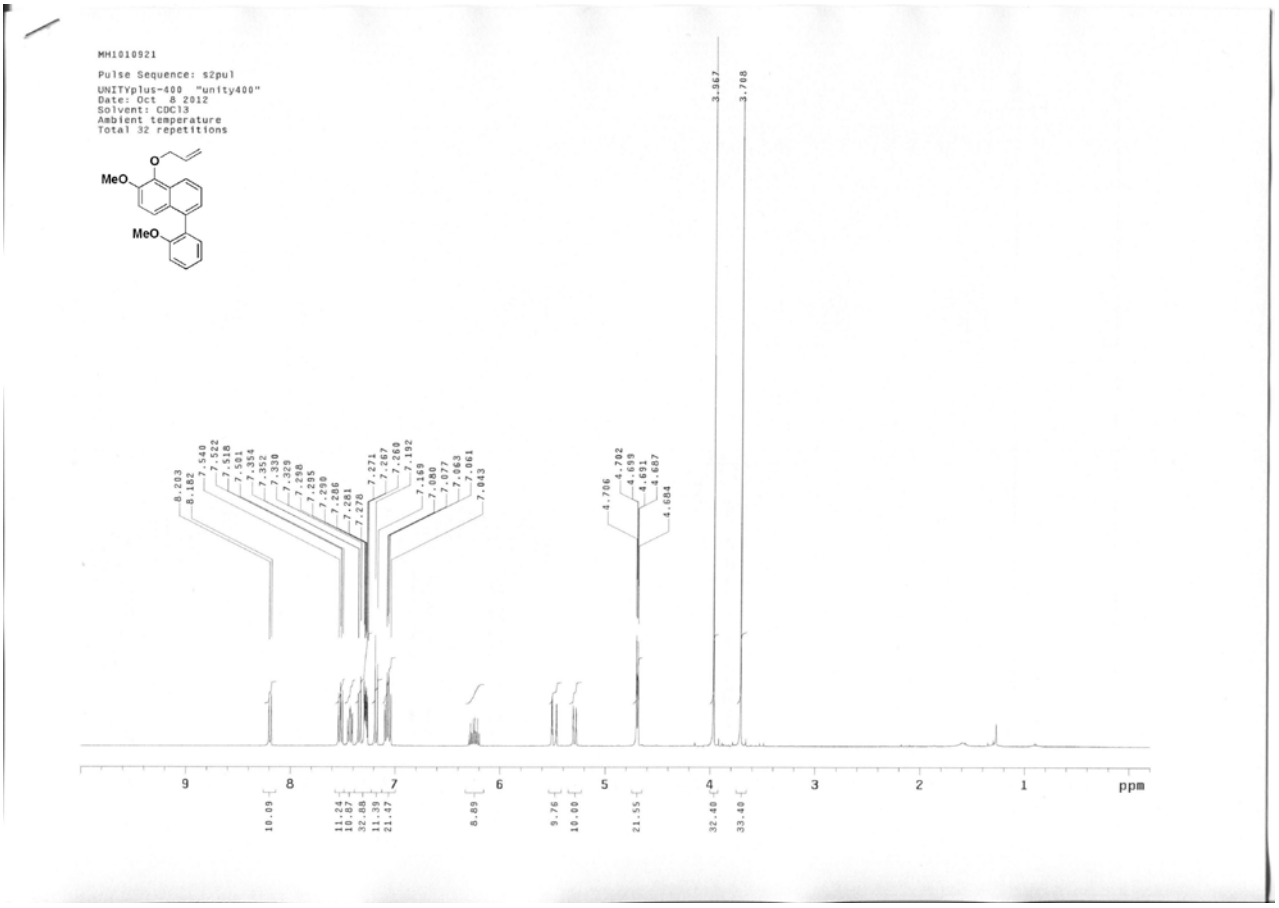

MH1011002-H
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 15 2012
Solvent: CDCl3
Ambient temperature
Total 896 repetitions
OH
MeO
F
163.385
160.944
141.084
139.735
138.711
136.884
136.854
131.502
131.427
127.705
125.408
124.870
124.347
120.920
117.646
115.129
114.917
113.014
77.318
77.000
76.689
56.935
ppm

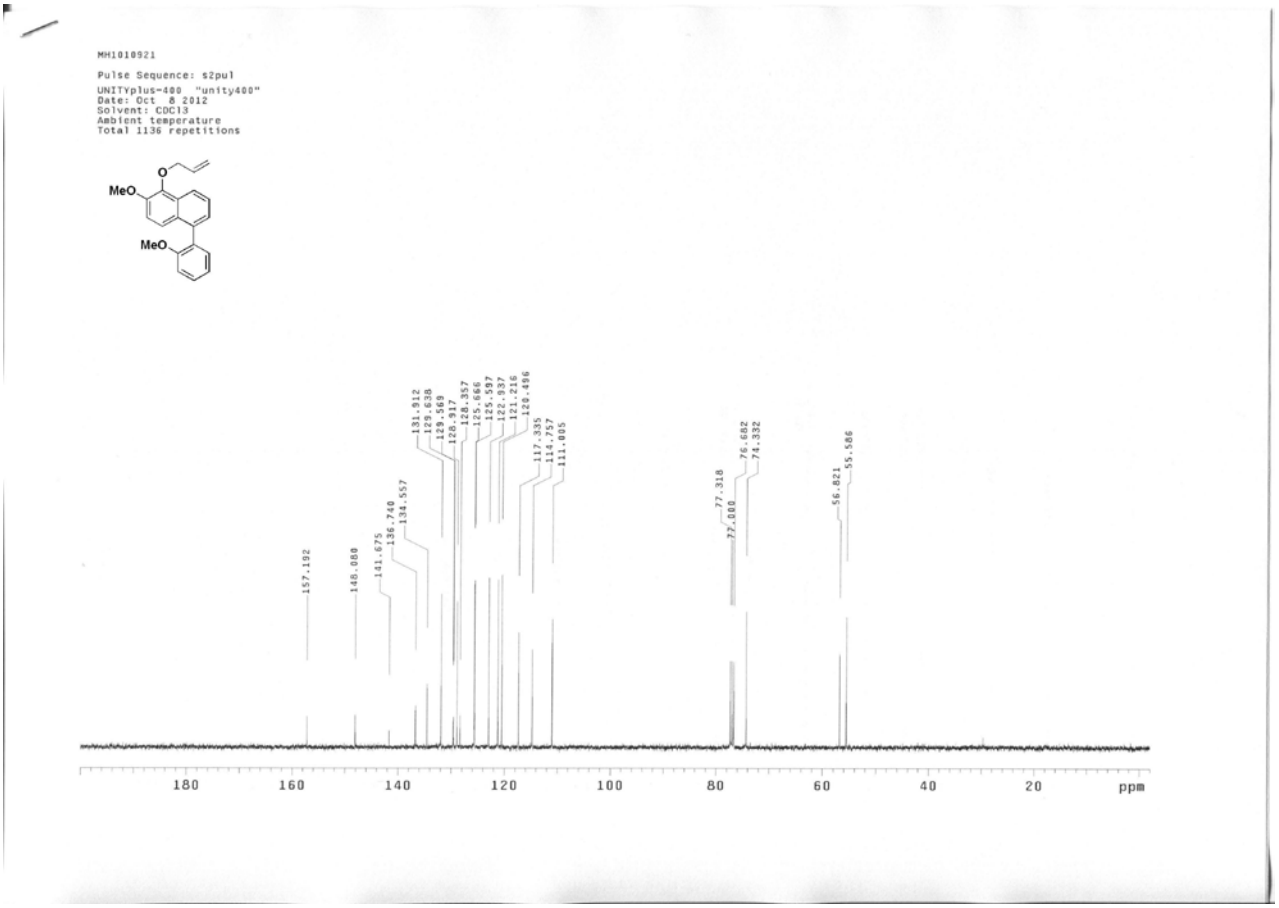
Compound 5g


MH1010923
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 8 2012
Solvent: CDCl3
Ambient temperature
Total 40 repetitions
MeO
Me
3.966
2.033
7.531
7.514
7.438
7.433
7.341
7.337
7.334
7.220
7.217
7.202
7.199
7.181
4.718
4.714
4.763
4.700
9
8
7
6
5
4
3
2
1
ppm
10.91
12.28
82.83
9.88
10.68
10.85
23.58
35.72
34.97

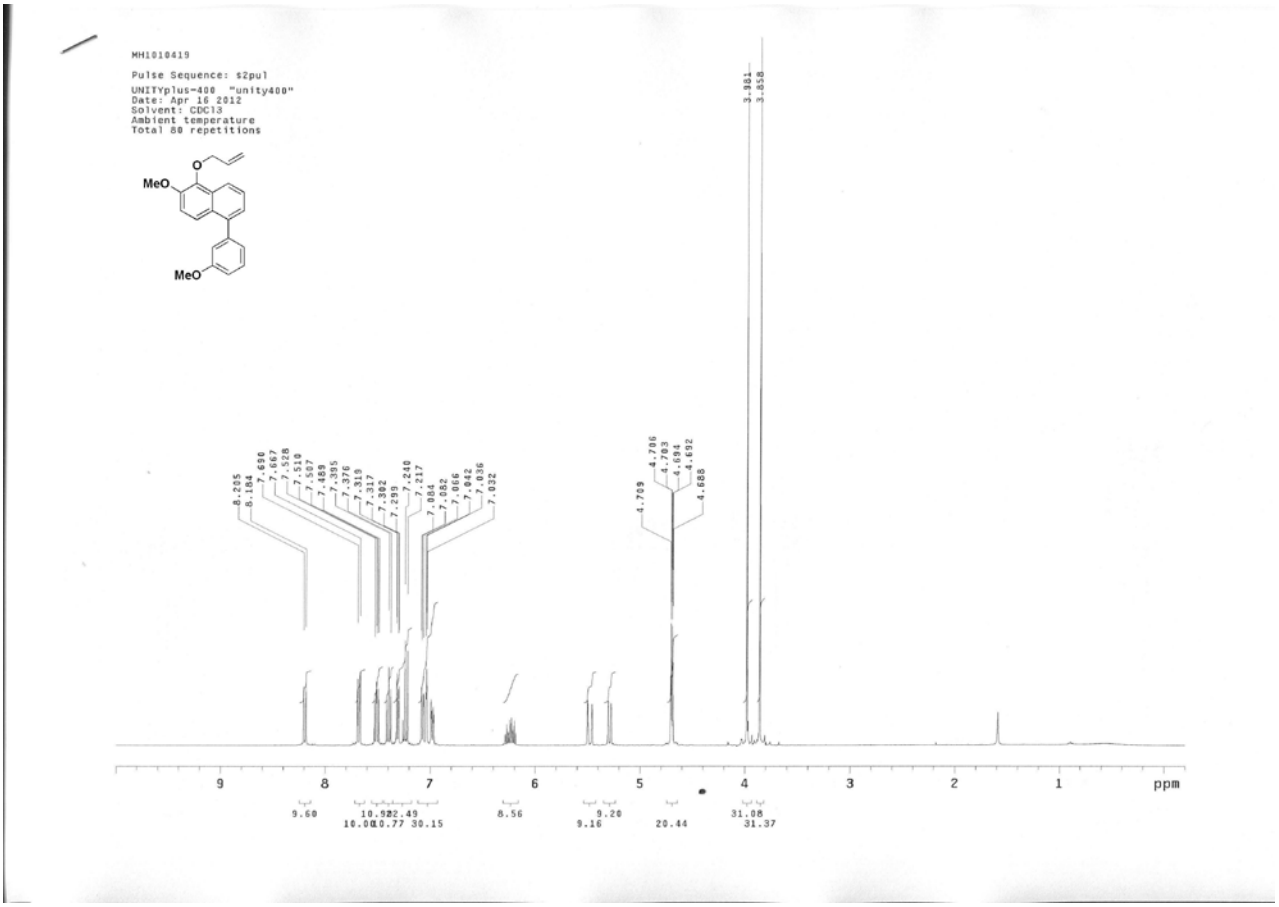

MH1010923
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 8 2012
Solvent: CDCl3
Ambient temperature
Total 2016 repetitions
MeO
Me
148.202
141.766
140.333
138.575
136.756
134.489
130.297
129.812
129.607
128.228
127.650
127.581
125.484
124.885
122.603
120.996
117.388
114.902
77.318
77.000
76.689
74.332
56.798
20.011
180
160
140
120
100
80
60
40
20
ppm

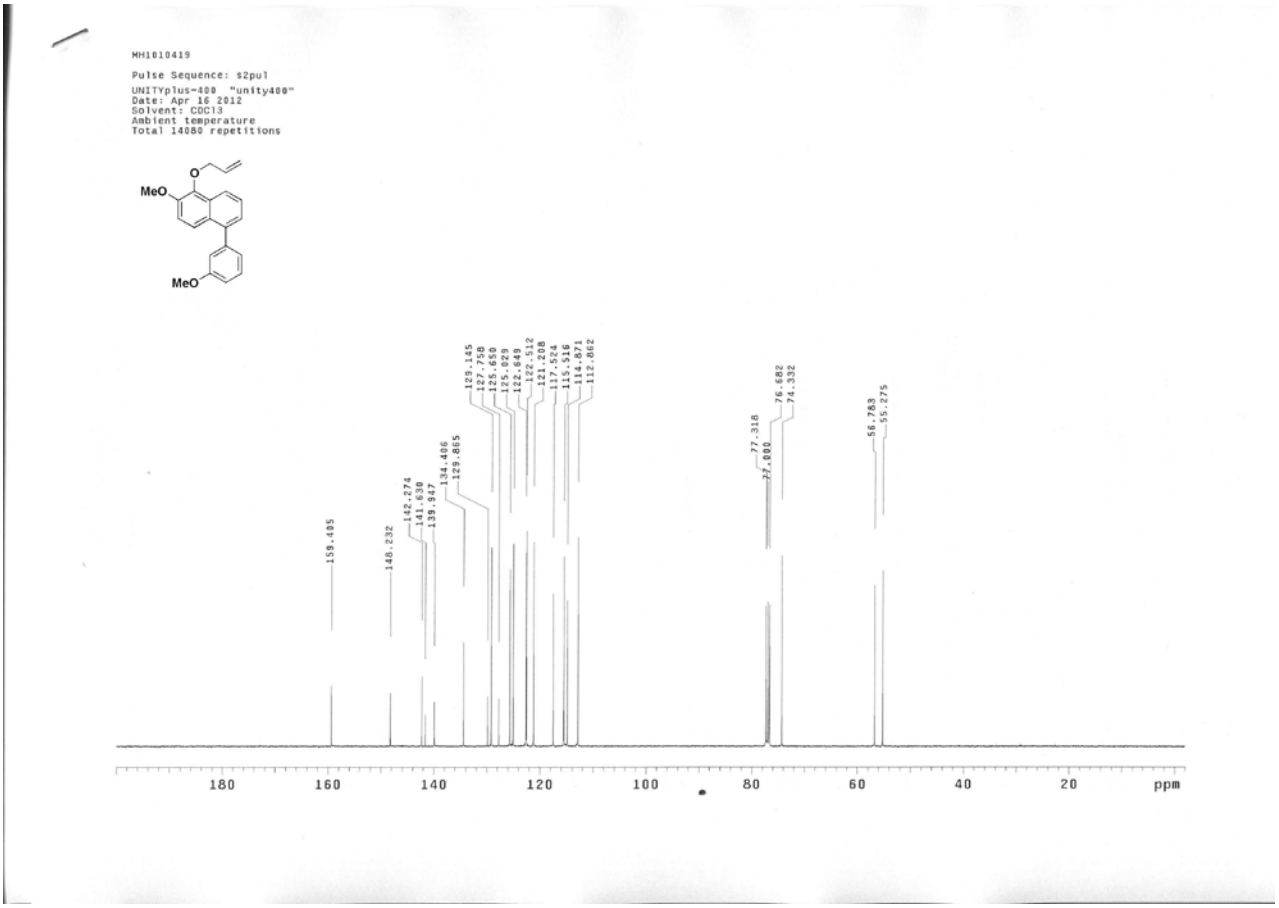
Compound 5h


MH1010921
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 8 2012
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
MeO
MeO
3.867
3.708
8.203
8.182
7.540
7.522
7.518
7.501
7.354
7.352
7.330
7.329
7.298
7.295
7.290
7.286
7.284
7.276
7.271
7.267
7.260
7.192
7.189
7.080
7.077
7.063
7.061
7.043
4.766
4.702
4.699
4.691
4.687
4.684
9
8
7
6
5
4
3
2
1
ppm
10.09
11.84
19.08
31.00
11.39
21.47
8.69
9.76
10.00
21.55
32.40
33.40

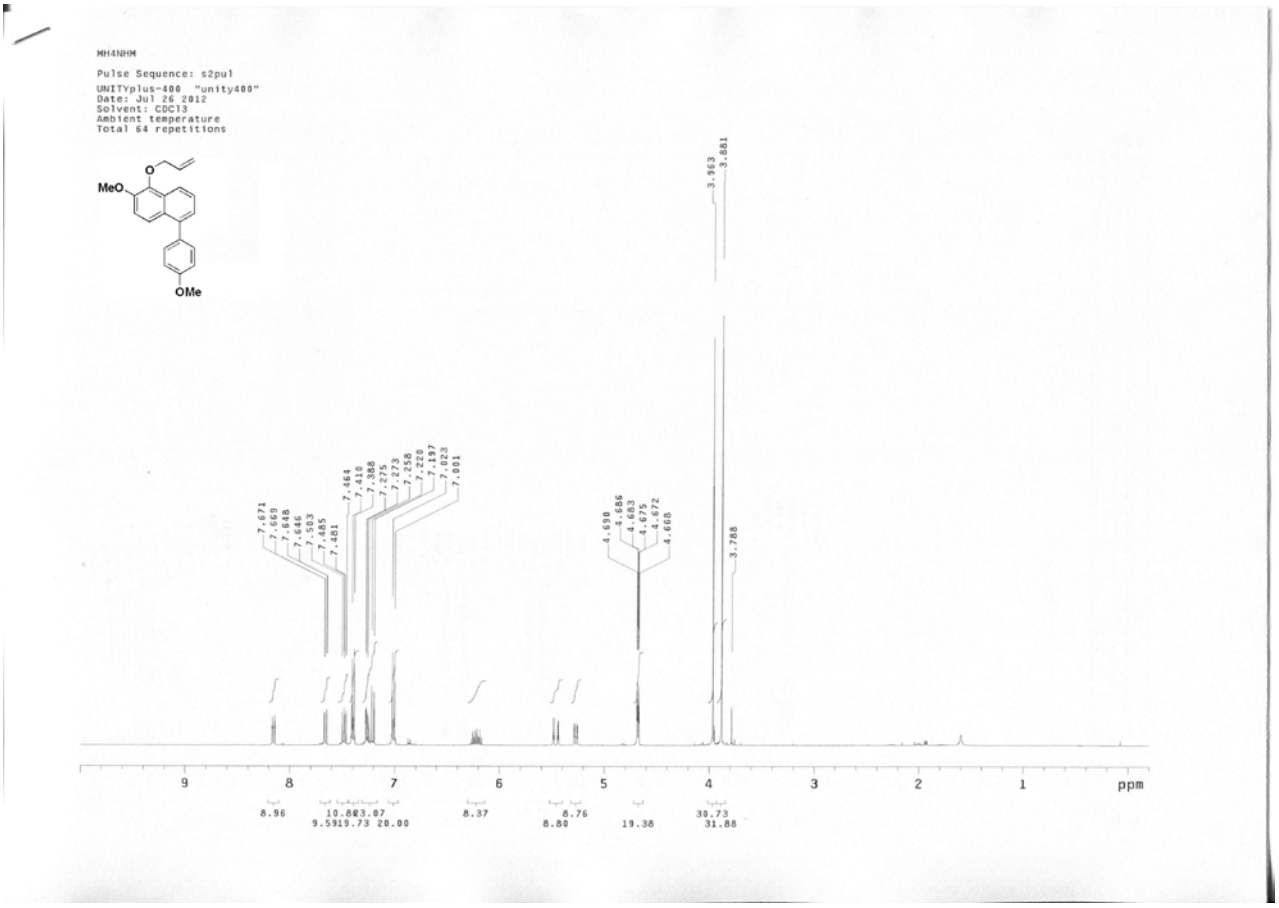

MH1010921
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 8 2012
Solvent: CDCl3
Ambient temperature
Total 1136 repetitions
MeO
MeO
157.192
148.080
141.675
136.749
134.557
131.912
129.638
129.569
128.917
128.357
125.666
123.597
122.937
121.216
120.496
117.335
114.757
111.805
77.318
77.000
76.682
74.332
56.821
55.586
180
160
140
120
100
80
60
40
20
ppm

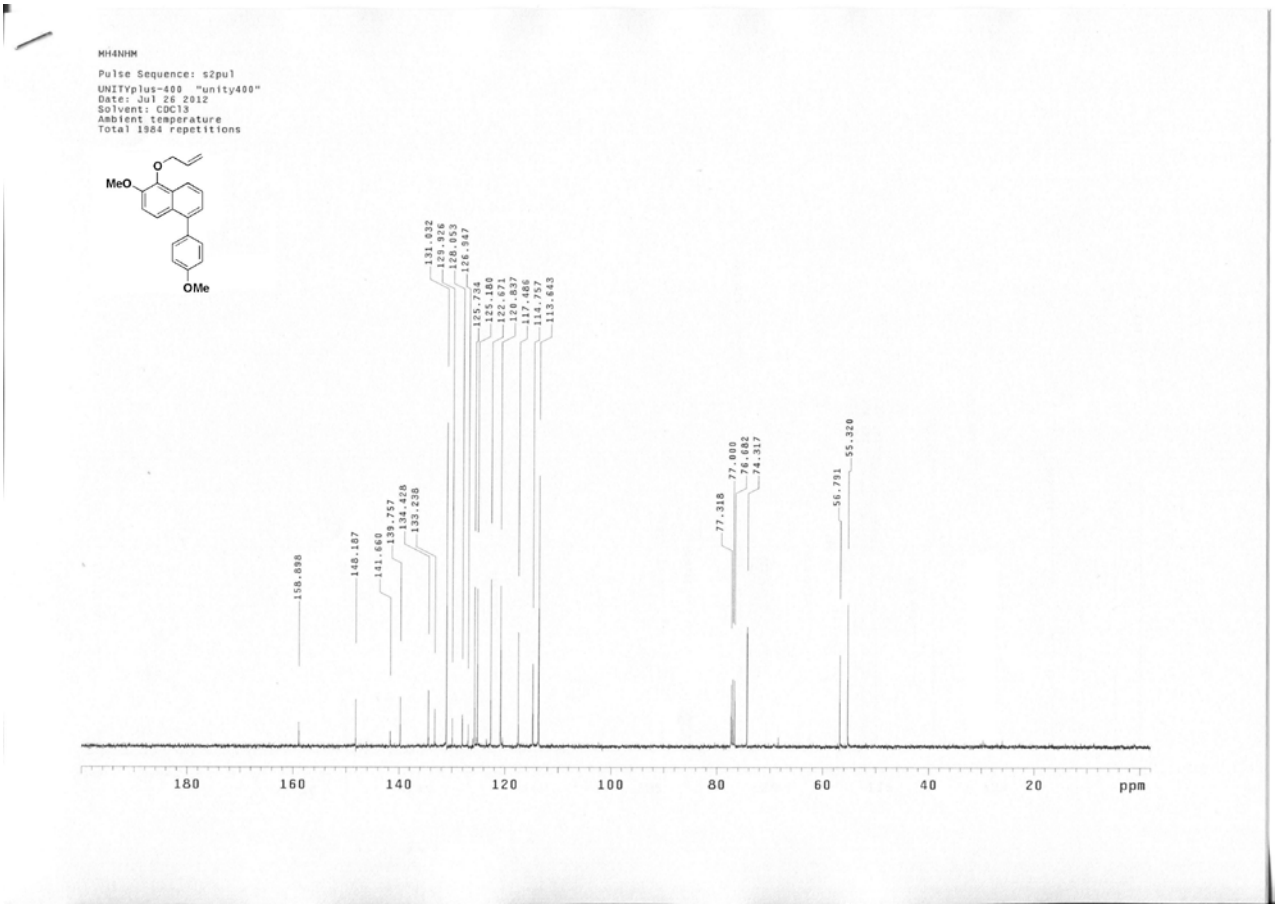
Compound 5i


MH1010419
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Apr 16 2012
Solvent: CDCl3
Ambient temperature
Total 80 repetitions
MeO
MeO
8.205
8.184
7.680
7.667
7.528
7.510
7.507
7.488
7.376
7.319
7.317
7.302
7.299
7.240
7.217
7.084
7.082
7.066
7.042
7.036
7.032
4.709
4.706
4.703
4.694
4.692
4.688
3.981
3.858
ppm
9.60
10.52
22.49
8.56
9.20
20.44
31.08
31.37

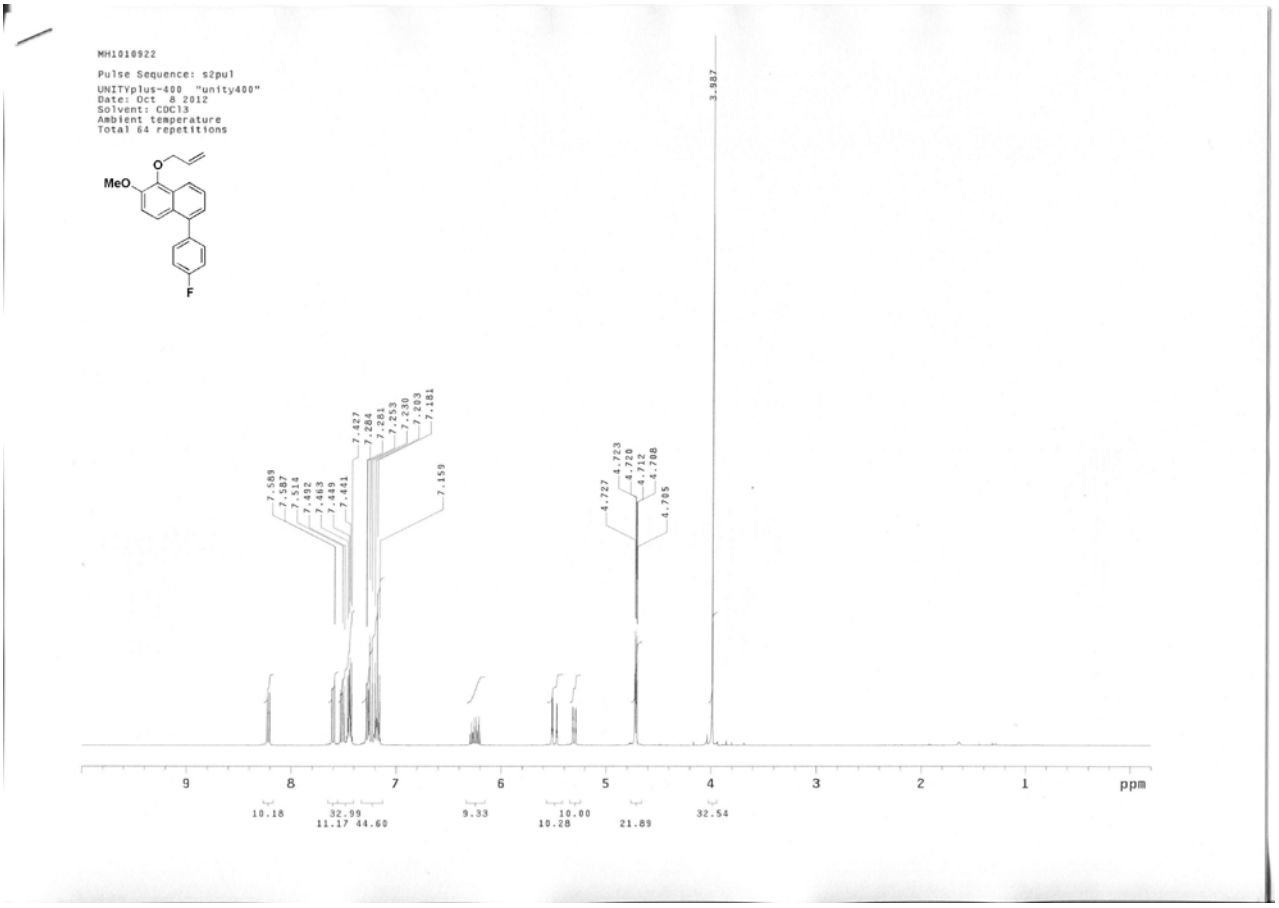

MH1010419
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Apr 16 2012
Solvent: CDCl3
Ambient temperature
Total 14080 repetitions
MeO
MeO
159.485
148.232
142.274
141.630
139.547
134.406
129.865
129.145
127.758
125.658
125.029
122.681
122.512
121.208
117.524
115.516
114.871
112.862
77.318
77.000
76.682
74.332
56.763
55.275
ppm

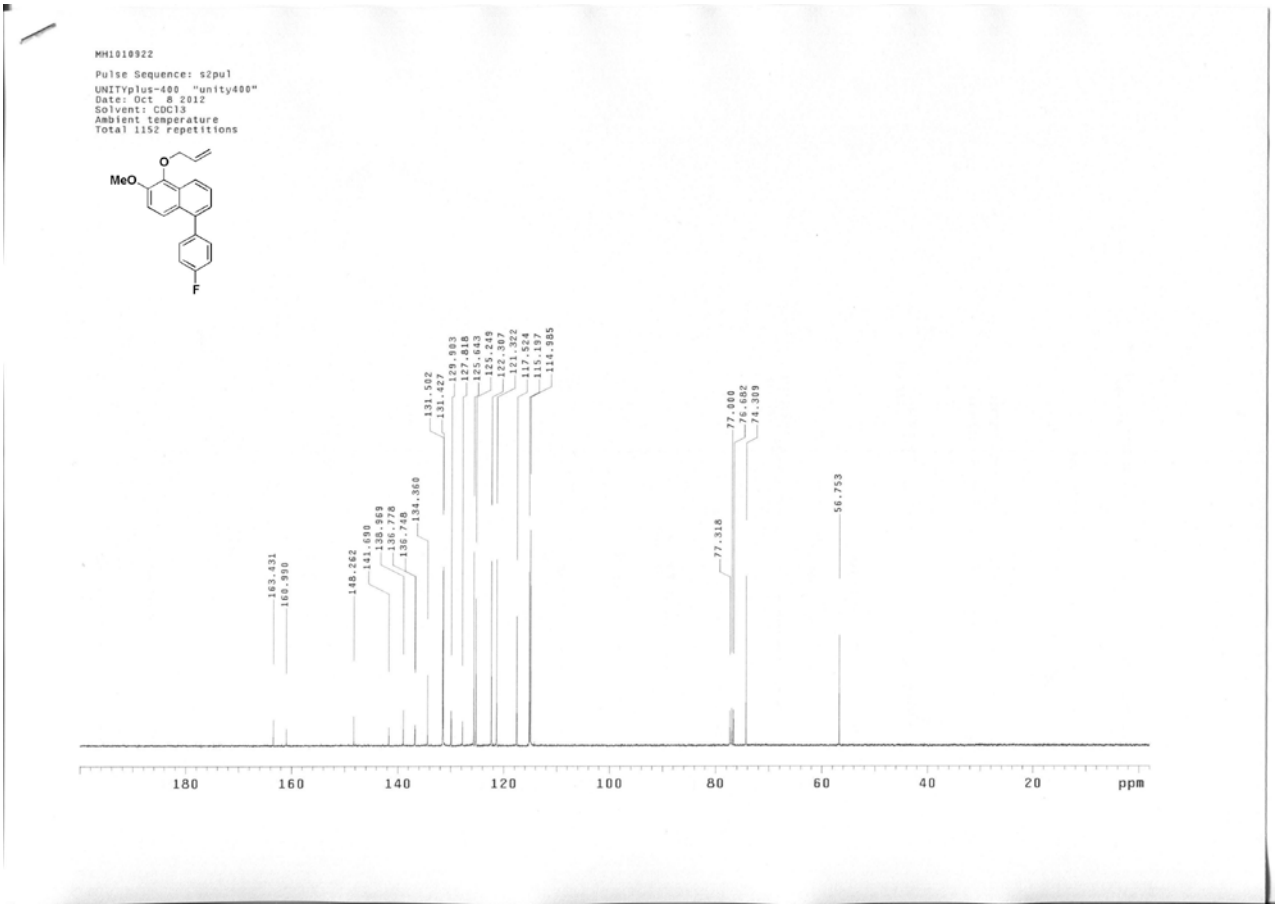
Compound 5j


MH4NHM
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Jul 26 2012
Solvent: CDCl3
Ambient temperature
Total 64 repetitions
MeO
OMe
3.963
3.881
7.671
7.669
7.648
7.646
7.503
7.485
7.481
7.464
7.410
7.388
7.275
7.273
7.258
7.226
7.197
7.023
7.001
4.690
4.686
4.683
4.675
4.672
4.668
3.788
9
8
7
6
5
4
3
2
1
ppm
8.96
10.08
3.07
9.59
19.73
20.00
8.37
8.76
8.80
19.38
39.73
31.88

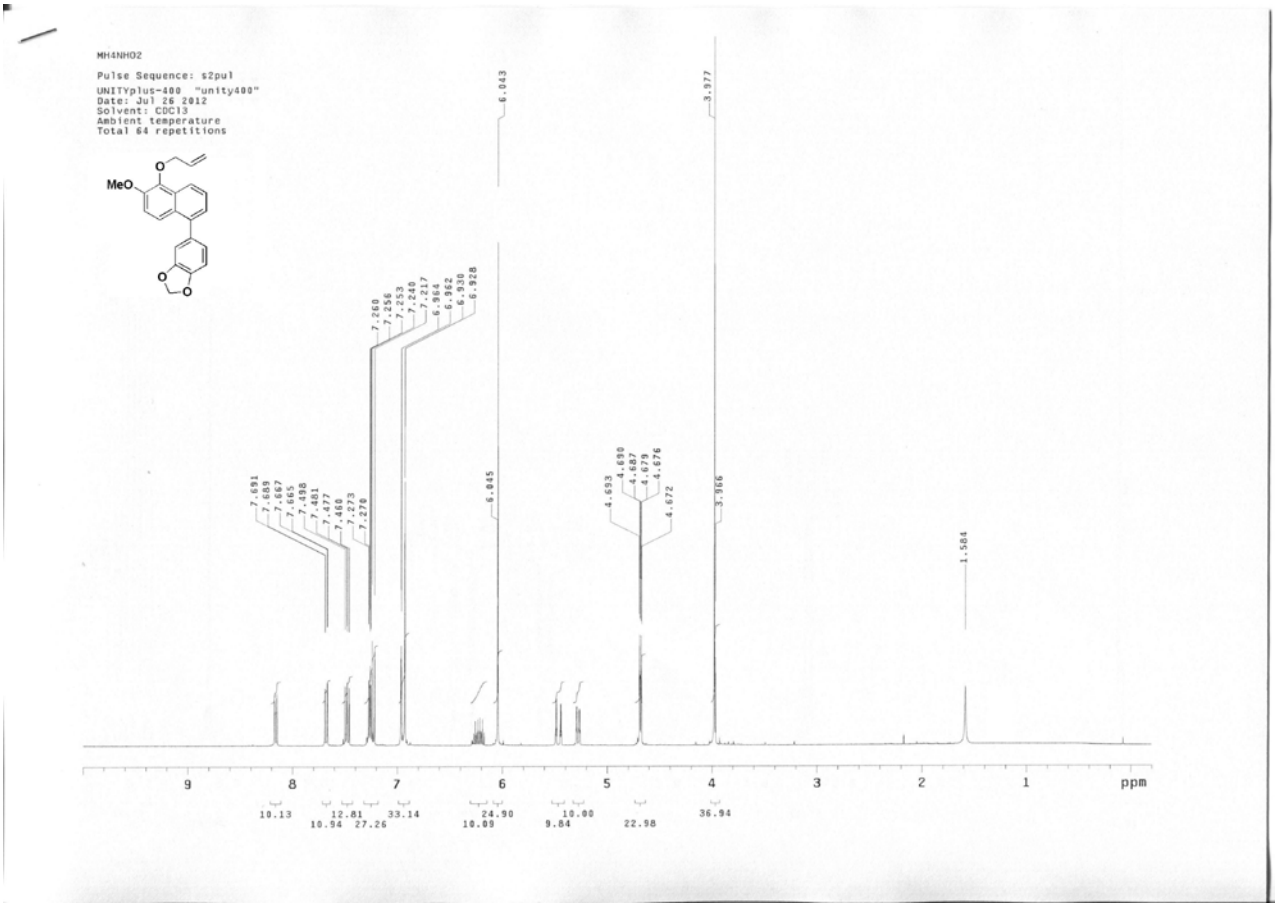

MH4NHM
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Jul 26 2012
Solvent: CDCl3
Ambient temperature
Total 1984 repetitions
MeO
OMe
158.698
148.187
141.660
139.757
134.428
133.238
131.032
129.926
128.053
126.947
125.734
123.160
122.671
120.837
117.486
114.757
113.643
77.318
77.000
76.682
74.317
56.791
55.320
180
160
140
120
100
80
60
40
20
ppm

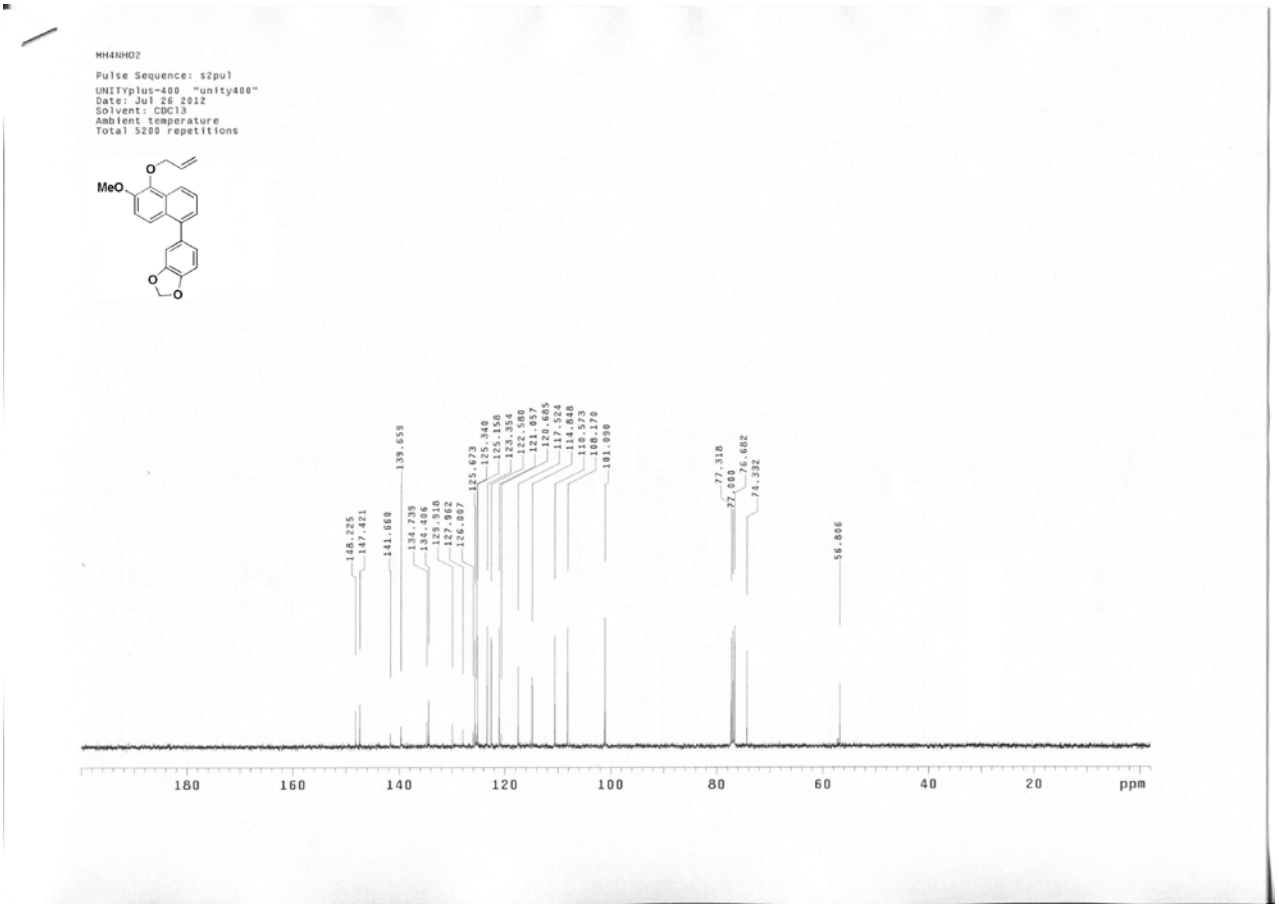
Compound 5k


MH1010922
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 8 2012
Solvent: CDCl3
Ambient temperature
Total 64 repetitions
MeO
F
3.987
7.589
7.587
7.514
7.492
7.468
7.449
7.441
7.427
7.284
7.261
7.253
7.240
7.203
7.181
7.159
4.727
4.723
4.720
4.712
4.708
4.705
9
8
7
6
5
4
3
2
1
ppm
10.18
32.99
11.17 44.60
9.33
10.00
10.28
21.89
32.54

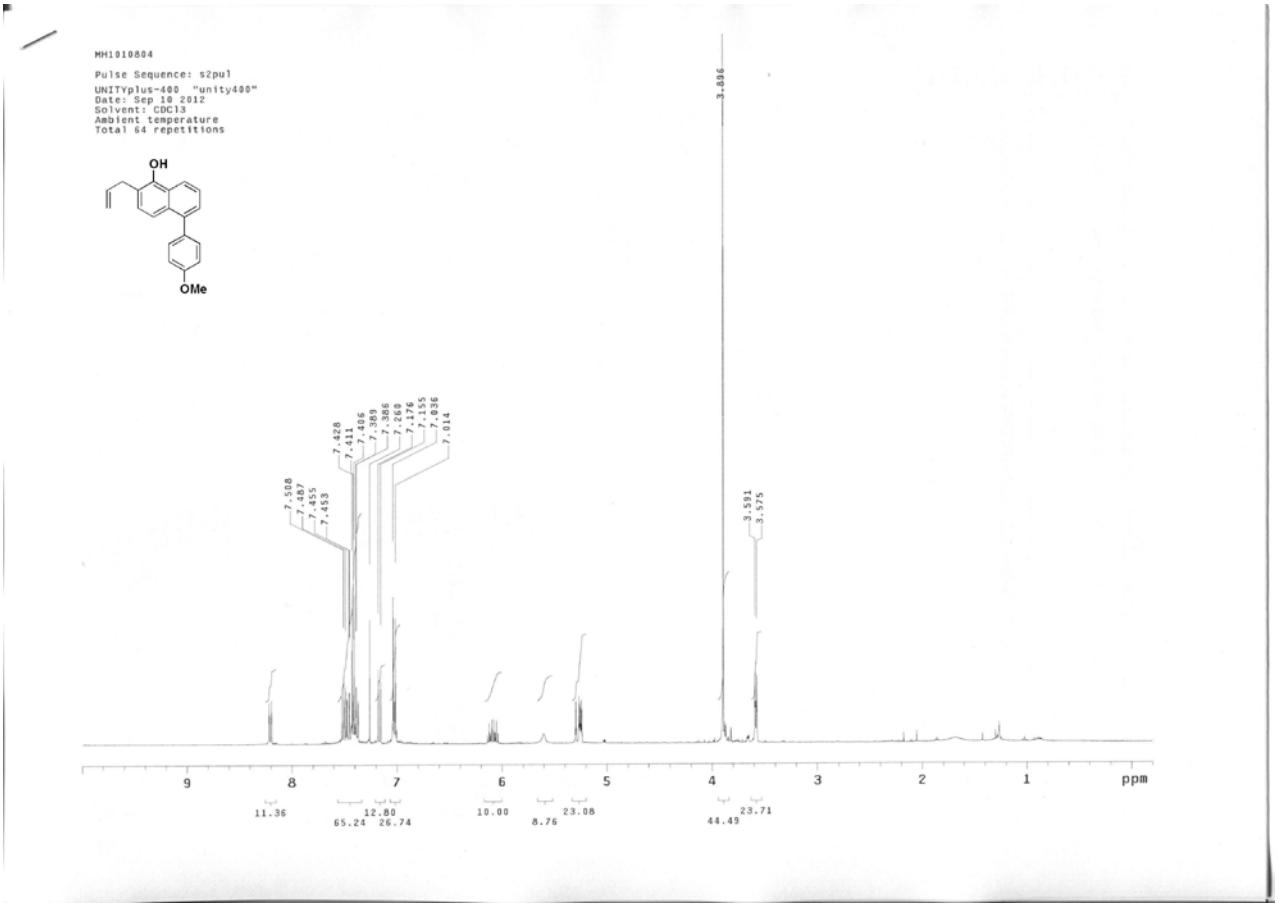

MH1010922
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 8 2012
Solvent: CDCl3
Ambient temperature
Total 1152 repetitions
MeO
F
163.431
160.990
148.262
141.690
136.969
136.728
135.744
134.360
131.502
131.427
129.903
127.818
125.643
123.748
123.307
121.322
117.524
115.197
114.985
77.000
76.682
74.309
77.318
56.753
180
160
140
120
100
80
60
40
20
ppm

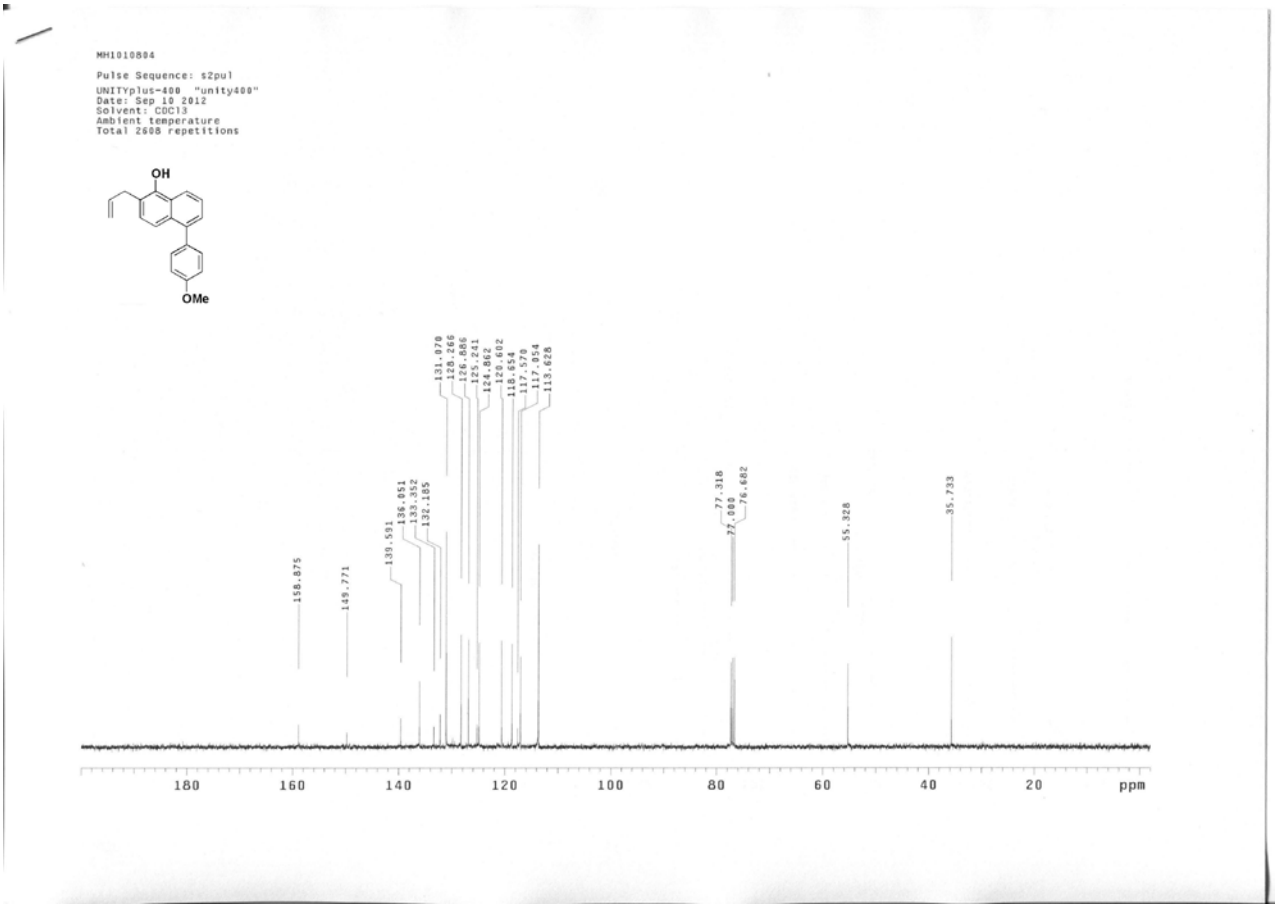
Compound 5l


MH4NHO2
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Jul 26 2012
Solvent: CDCl3
Ambient temperature
Total 64 repetitions
MeO
7.691
7.689
7.667
7.665
7.498
7.481
7.477
7.460
7.273
7.270
7.260
7.256
7.253
7.240
7.217
6.964
6.962
6.930
6.928
6.043
6.045
4.693
4.690
4.687
4.679
4.676
4.672
3.977
3.966
1.584
9
8
7
6
5
4
3
2
1
ppm
10.13
12.81
10.94
27.26
33.14
24.90
10.09
10.00
9.84
22.98
36.94

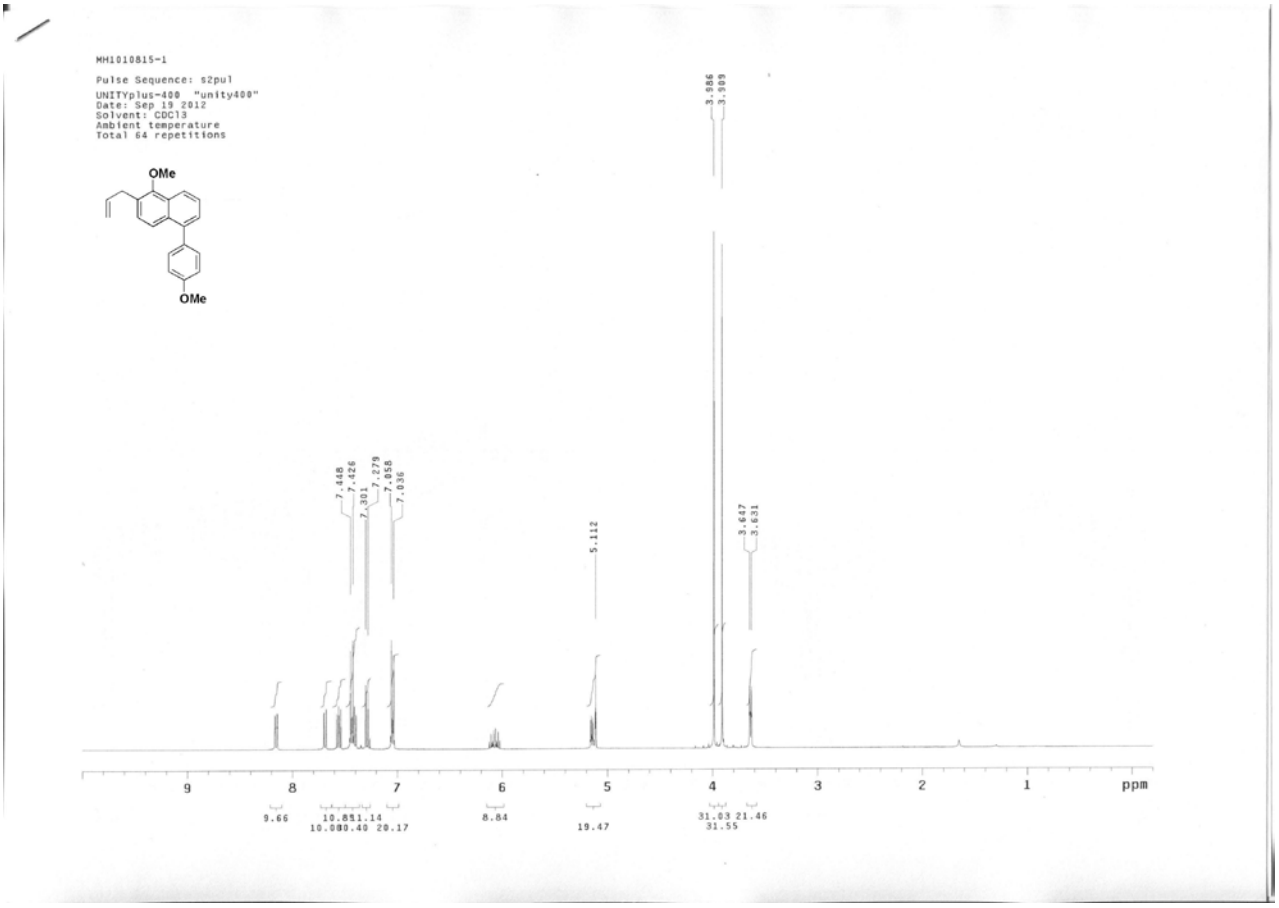

MH4NHO2
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Jul 26 2012
Solvent: CDCl3
Ambient temperature
Total 5200 repetitions
MeO
148.225
147.421
141.660
139.659
134.739
134.406
129.918
127.962
126.987
125.673
125.340
125.158
123.354
122.580
121.957
121.685
117.524
114.848
110.573
108.170
101.090
77.318
77.000
76.682
74.332
56.866
180
160
140
120
100
80
60
40
20
ppm

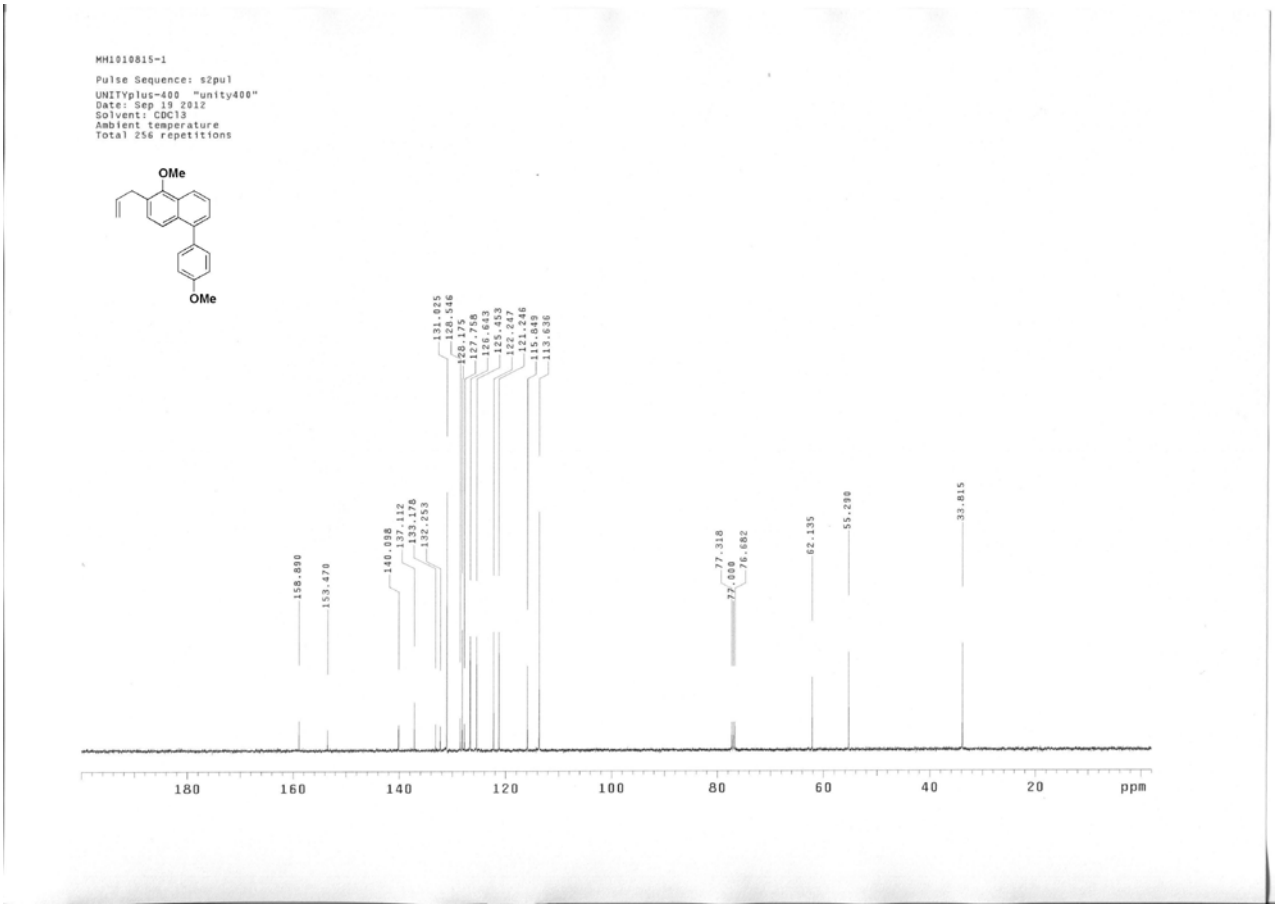
Compound 5m


MH1010804
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 10 2012
Solvent: CDCl3
Ambient temperature
Total 64 repetitions
OH
OMe
7.508
7.487
7.455
7.453
7.428
7.411
7.406
7.389
7.386
7.268
7.176
7.155
7.036
7.014
3.886
3.591
3.575
9
8
7
6
5
4
3
2
1
ppm
11.36
12.80
65.24
26.74
10.00
8.76
23.08
44.49
23.71

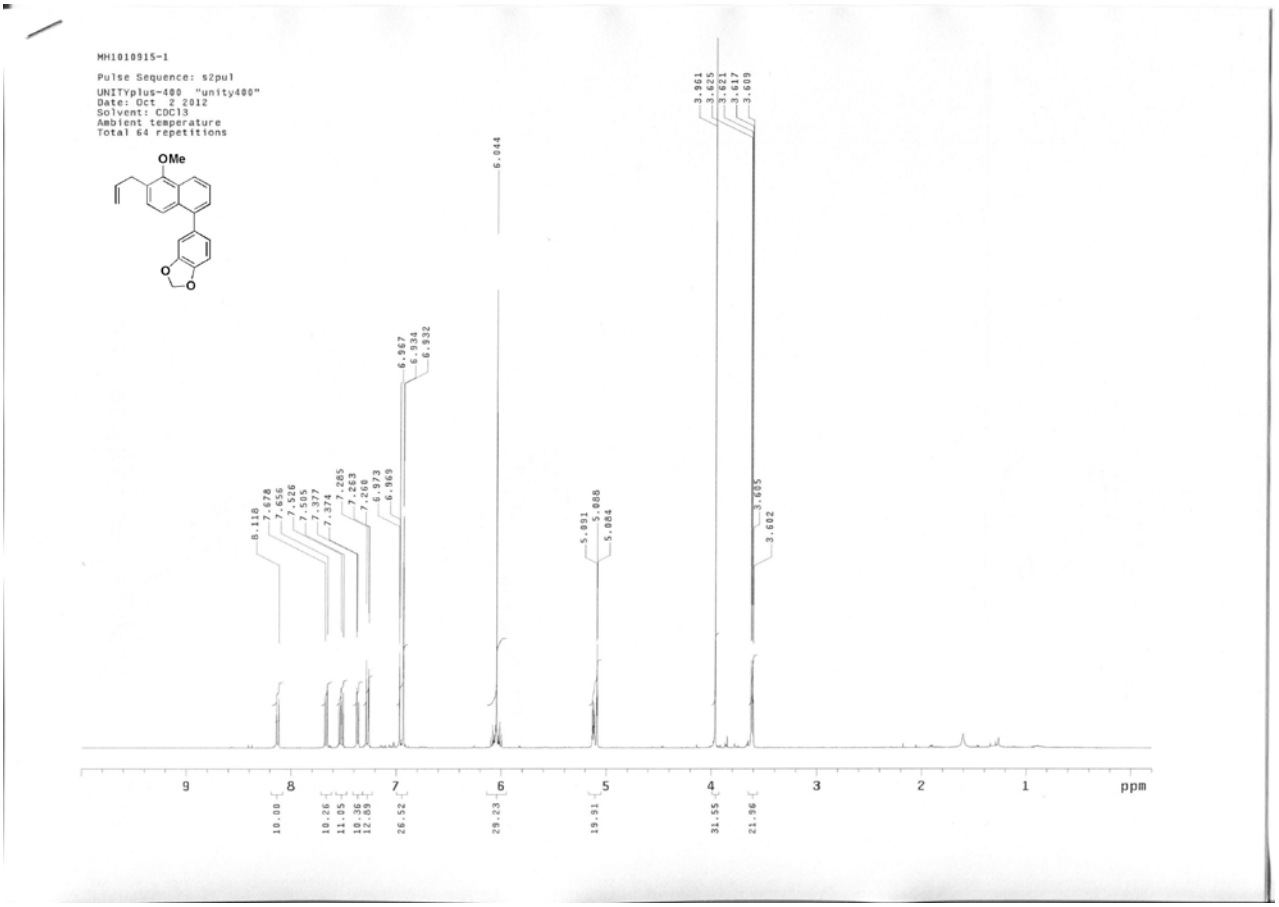

MH1010804
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 10 2012
Solvent: CDCl3
Ambient temperature
Total 2608 repetitions
OH
OMe
158.875
149.771
139.591
136.051
133.352
132.185
131.070
128.266
126.886
125.241
124.862
120.602
118.654
117.570
117.054
113.628
77.318
77.000
76.682
55.328
35.733
180
160
140
120
100
80
60
40
20
ppm

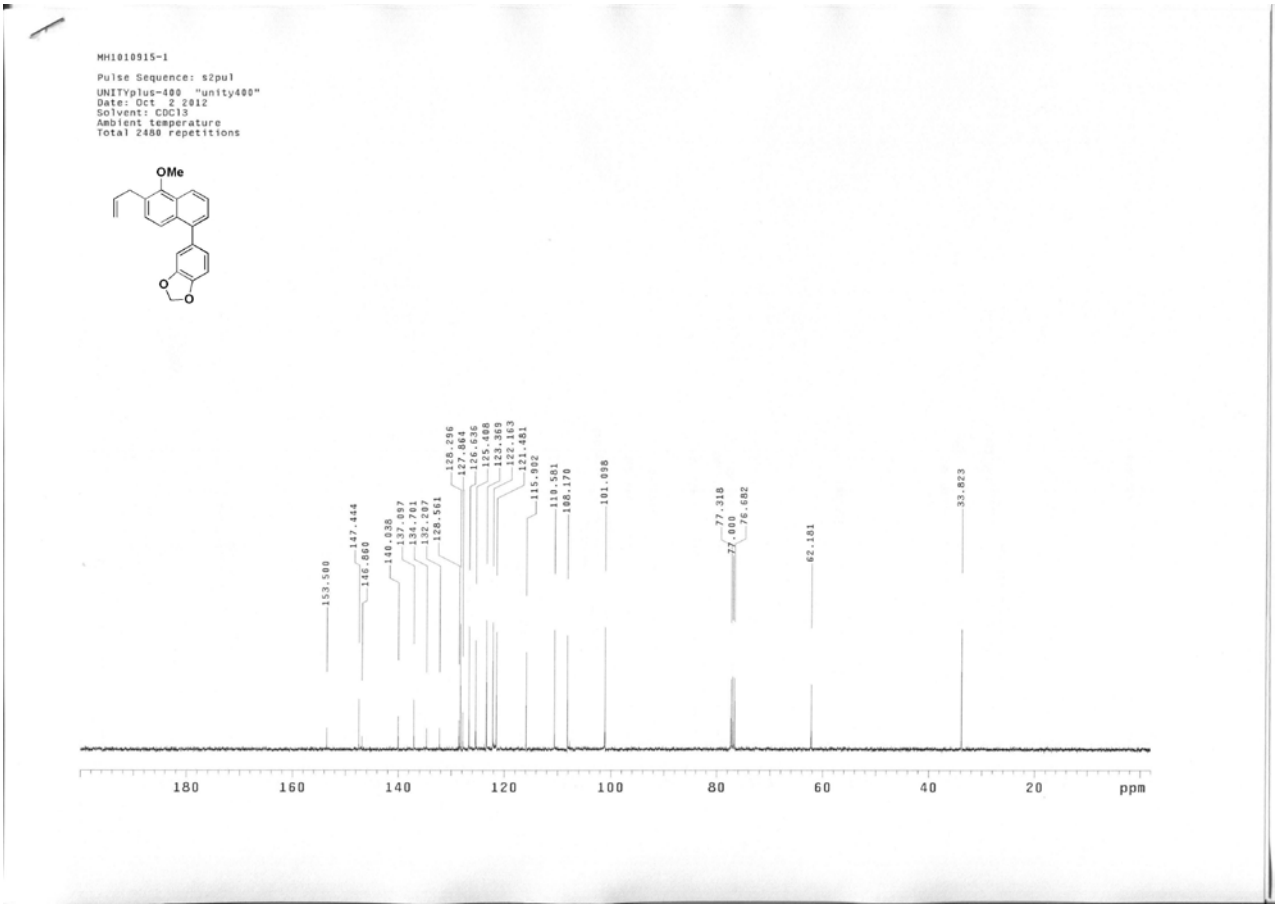
Compound 5n


MH1010815-1
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 19 2012
Solvent: CDCl3
Ambient temperature
Total 64 repetitions
OMe
OMe
7.448
7.426
7.301
7.279
7.058
7.036
5.112
3.986
3.969
3.647
3.631
9
8
7
6
5
4
3
2
1
ppm
9.66
10.85
11.14
10.08
0.40
20.17
8.84
19.47
31.03
21.46
31.55

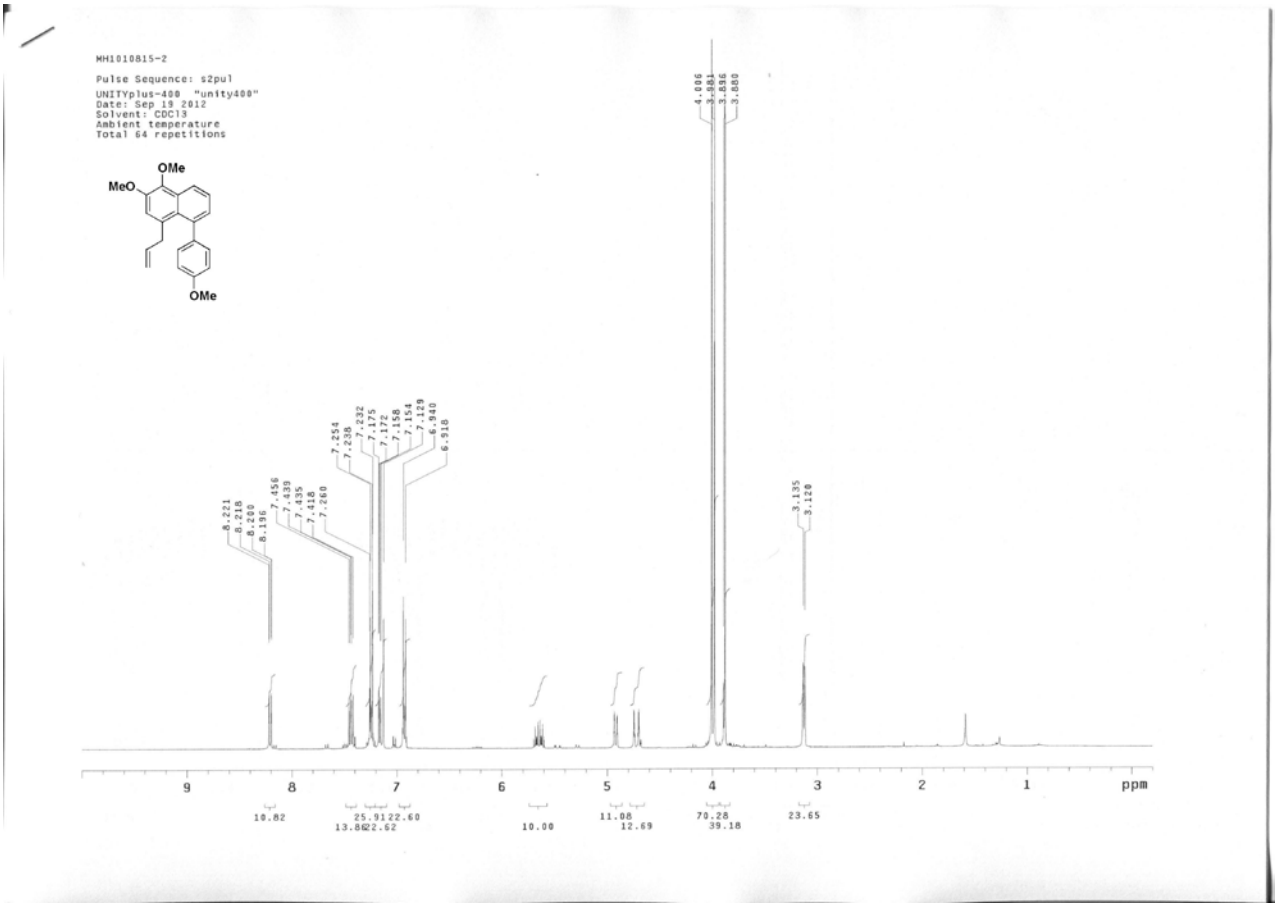

MH1010815-1
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 19 2012
Solvent: CDCl3
Ambient temperature
Total 256 repetitions
OMe
OMe
158.890
153.470
140.098
137.112
133.178
132.253
131.025
128.546
128.175
127.758
126.643
125.453
122.247
121.246
115.649
113.636
77.318
77.000
76.682
62.135
55.290
33.815
180
160
140
120
100
80
60
40
20
ppm

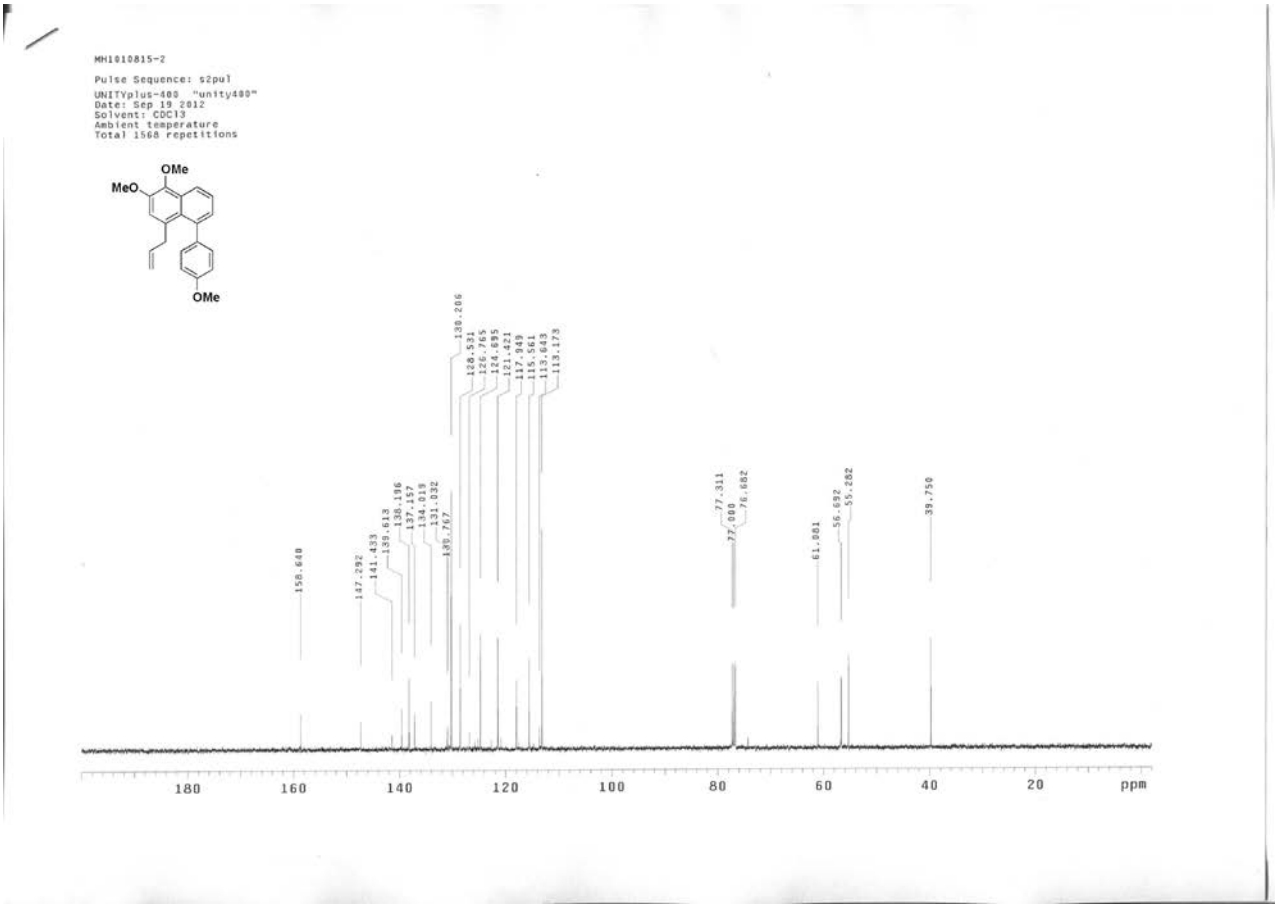
Compound 5o


MH1010915-1
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 2 2012
Solvent: CDCl3
Ambient temperature
Total 64 repetitions
OMe
8.118
7.678
7.655
7.526
7.505
7.377
7.374
7.285
7.263
7.260
7.233
6.969
6.967
6.934
6.932
6.044
5.091
5.088
5.084
3.961
3.625
3.621
3.617
3.609
3.685
3.682
ppm

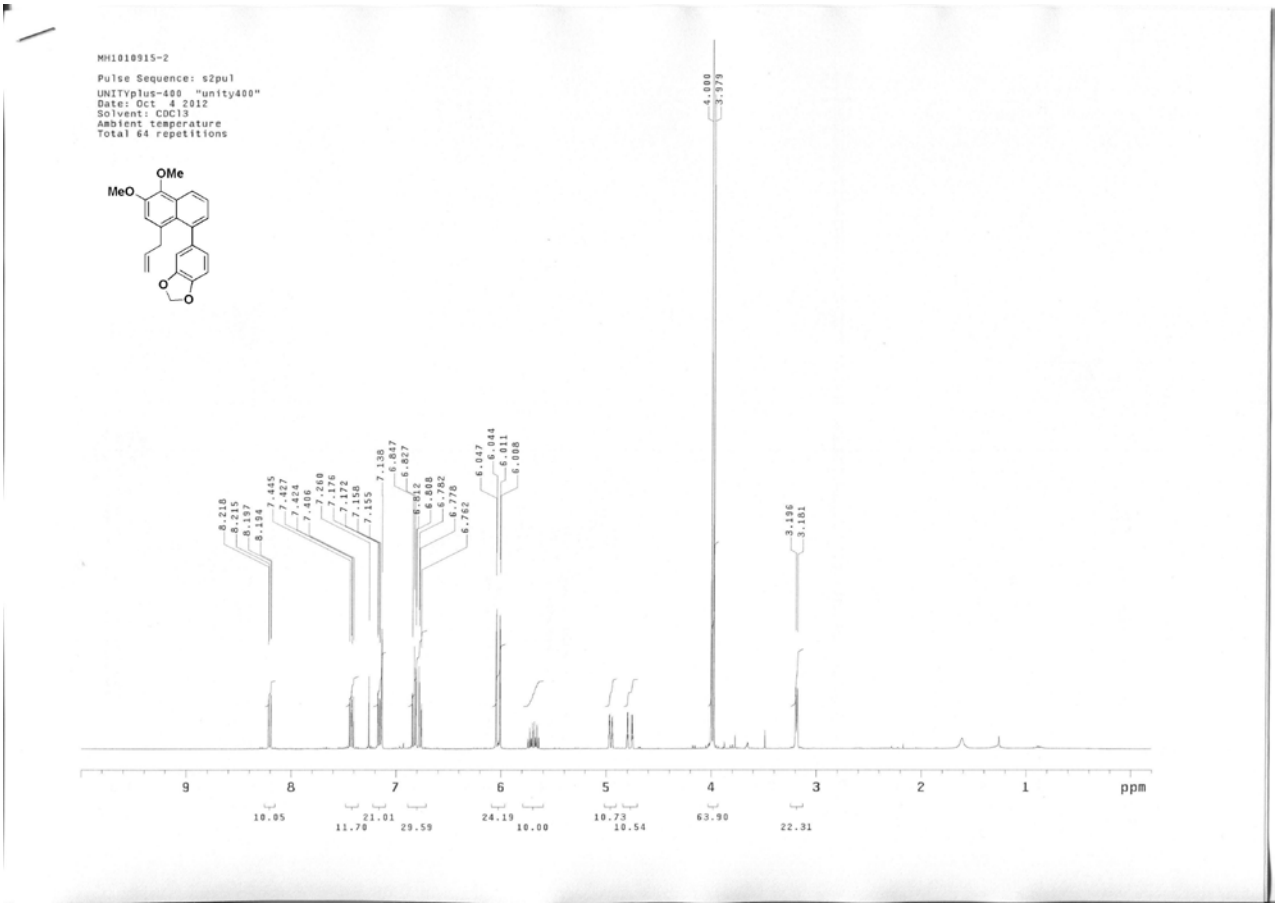

MH1010915-1
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 2 2012
Solvent: CDCl3
Ambient temperature
Total 2480 repetitions
OMe
153.500
147.444
146.860
140.038
137.097
134.701
132.207
128.561
128.296
127.664
126.836
125.488
123.369
122.163
121.461
115.092
110.581
108.170
101.098
77.318
77.000
76.682
62.181
33.823
ppm

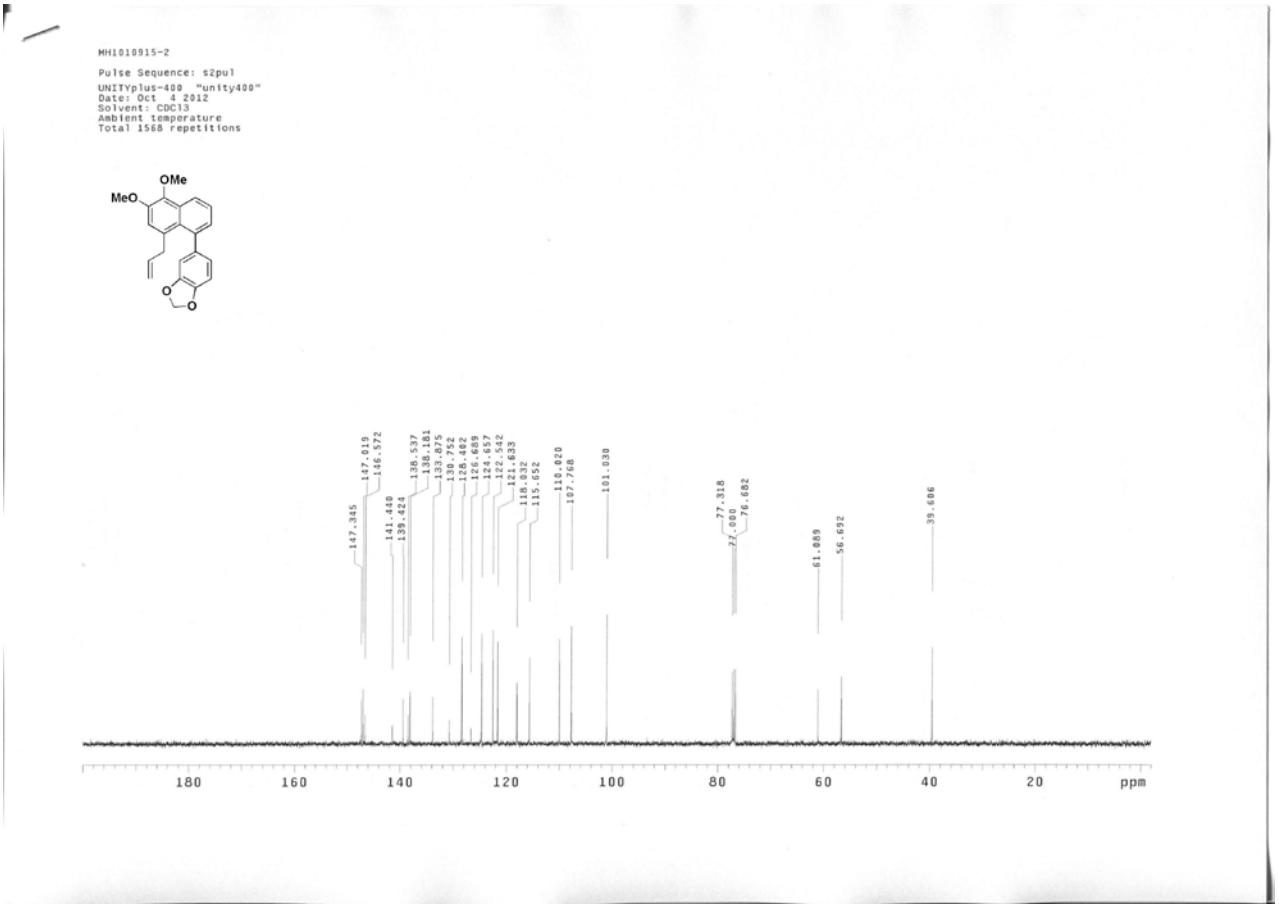
Compound 7a


MH1010815-2
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 19 2012
Solvent: CDCl3
Ambient temperature
Total 64 repetitions
OMe
MeO
OMe
4.006
3.881
3.836
3.800
7.254
7.238
7.232
7.175
7.172
7.158
7.154
7.129
6.940
6.918
8.221
8.218
8.200
8.196
7.456
7.439
7.435
7.418
7.260
3.135
3.120
9
8
7
6
5
4
3
2
1
ppm
10.82
25.91
13.86
22.62
12.60
10.00
11.08
12.69
70.28
39.18
23.65

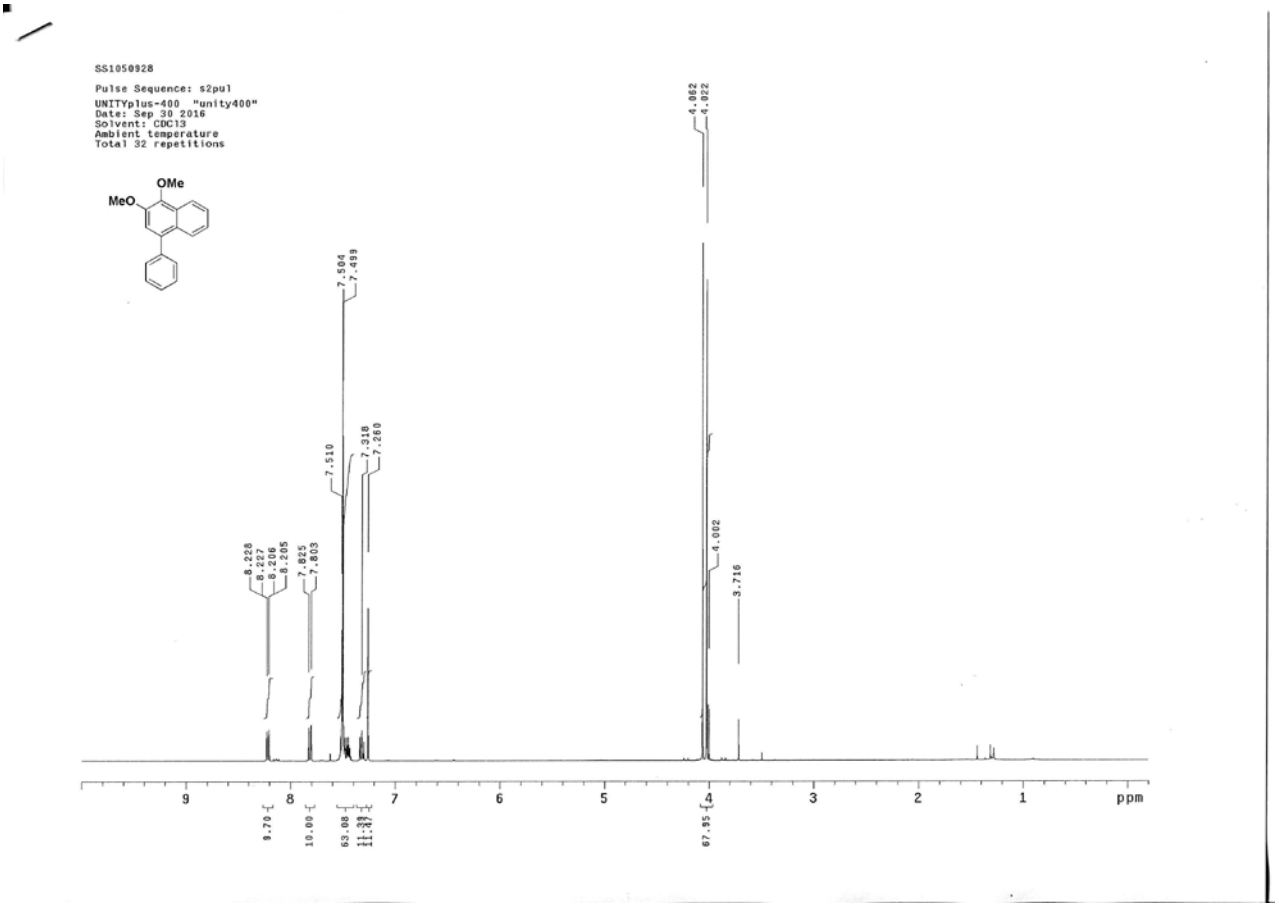

MH1010815-2
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 19 2012
Solvent: CDCl3
Ambient temperature
Total 1568 repetitions
OMe
MeO
OMe
158.640
147.292
141.433
139.613
138.196
137.157
134.019
131.032
130.767
130.206
128.531
126.765
124.695
121.421
117.949
115.541
115.048
113.173
77.311
77.000
76.682
61.001
56.682
55.282
39.750
180
160
140
120
100
80
60
40
20
ppm

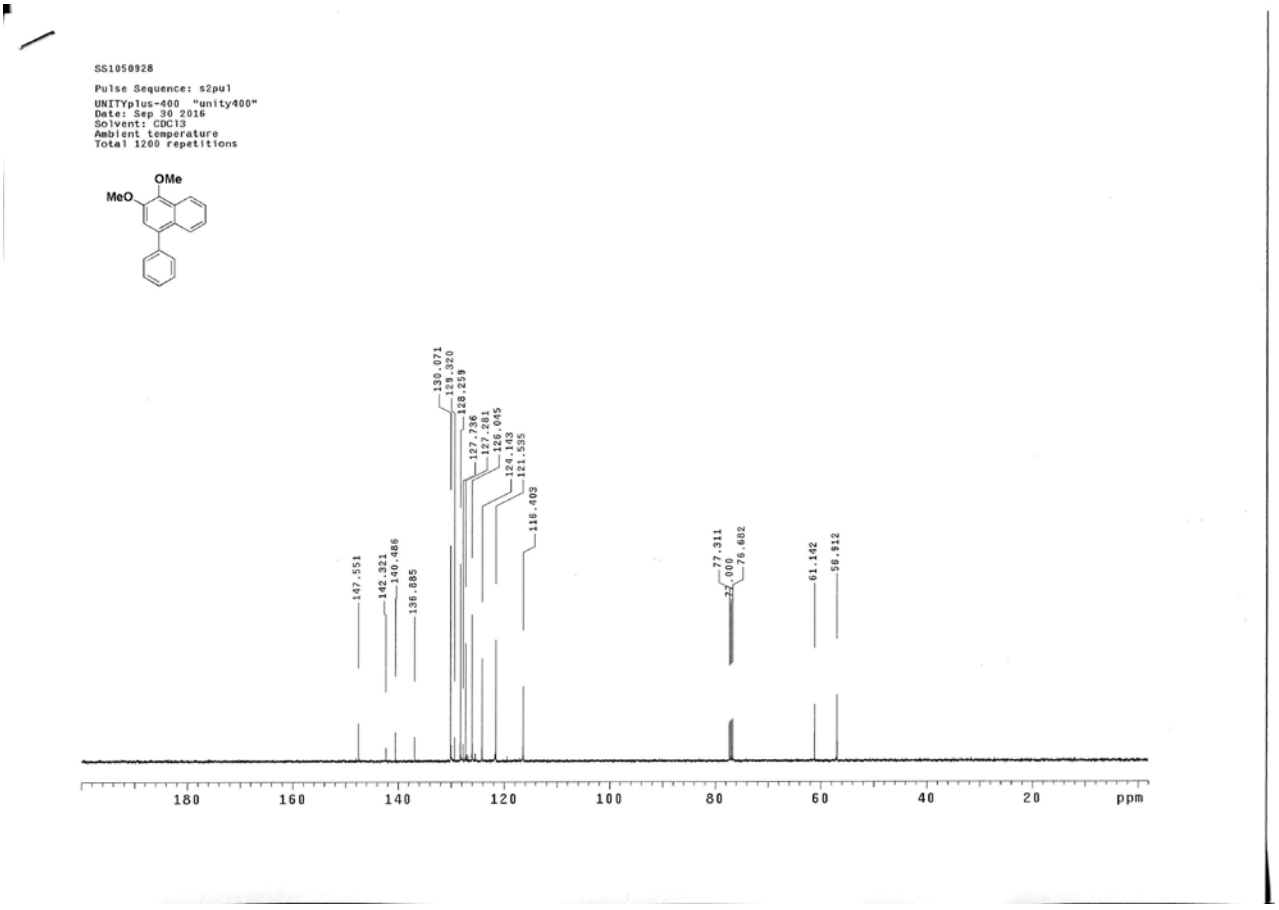
Compound 7b


MH1010915-2
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 4 2012
Solvent: CDCl3
Ambient temperature
Total 64 repetitions
OMe
MeO
O
O
8.218
8.215
8.197
8.194
7.445
7.427
7.424
7.406
7.280
7.176
7.172
7.158
7.155
7.138
6.847
6.827
6.812
6.808
6.782
6.778
6.762
6.047
6.044
6.011
6.008
4.000
3.979
3.196
3.161
9
8
7
6
5
4
3
2
1
ppm
10.05
11.70
21.01
29.59
24.19
10.00
10.73
10.54
63.90
22.31

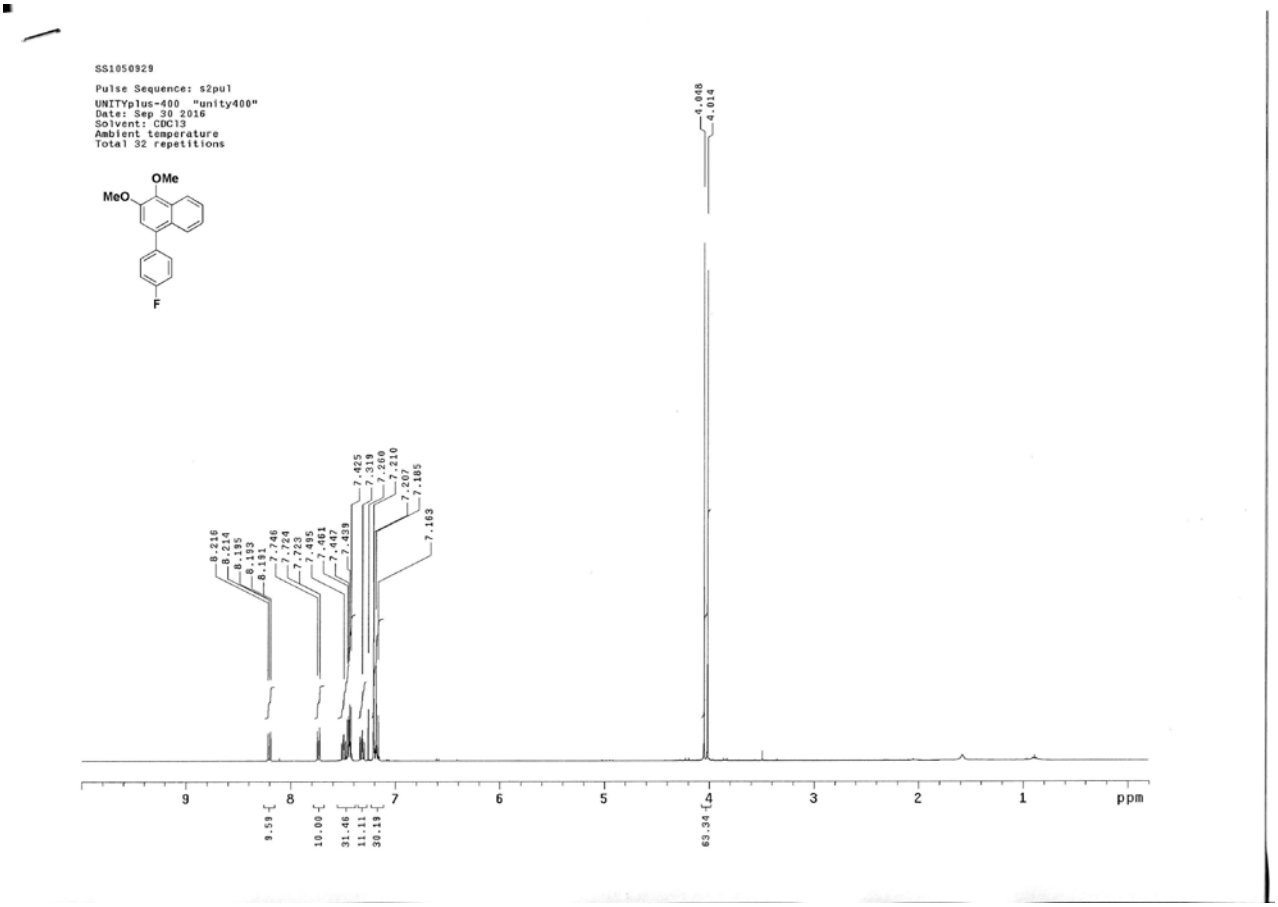

MH1010915-2
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 4 2012
Solvent: CDCl3
Ambient temperature
Total 1568 repetitions
OMe
MeO
O
O
147.345
147.019
146.572
141.440
139.424
138.537
138.181
133.875
130.752
128.482
125.698
124.657
122.542
121.633
118.032
115.652
110.020
107.768
101.030
77.318
77.000
76.682
61.089
56.692
39.606
180
160
140
120
100
80
60
40
20
ppm

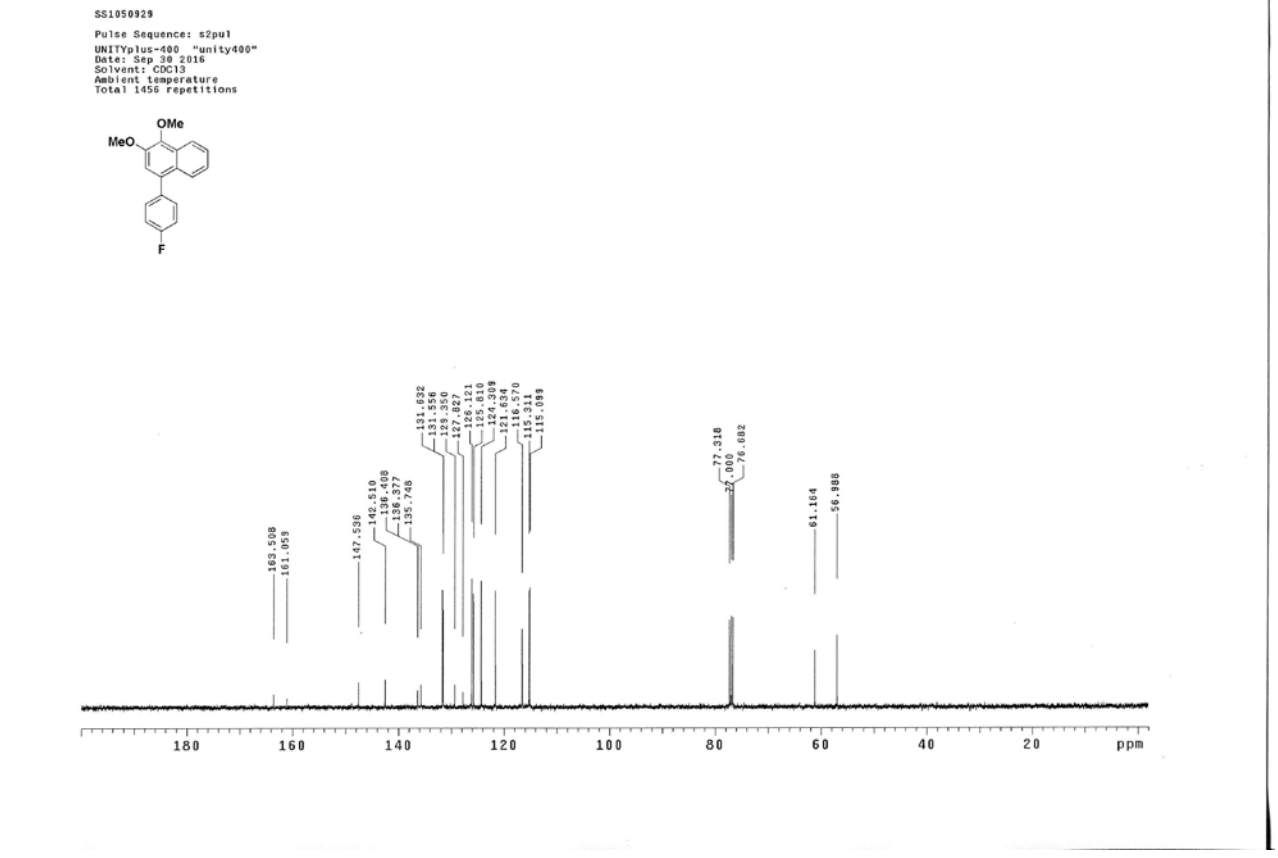
Compound 8a


SS1050928
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 30 2016
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
OMe
MeO
8.228
8.227
8.206
8.205
7.825
7.803
7.510
7.504
7.499
7.318
7.280
4.002
4.022
4.002
3.716
ppm

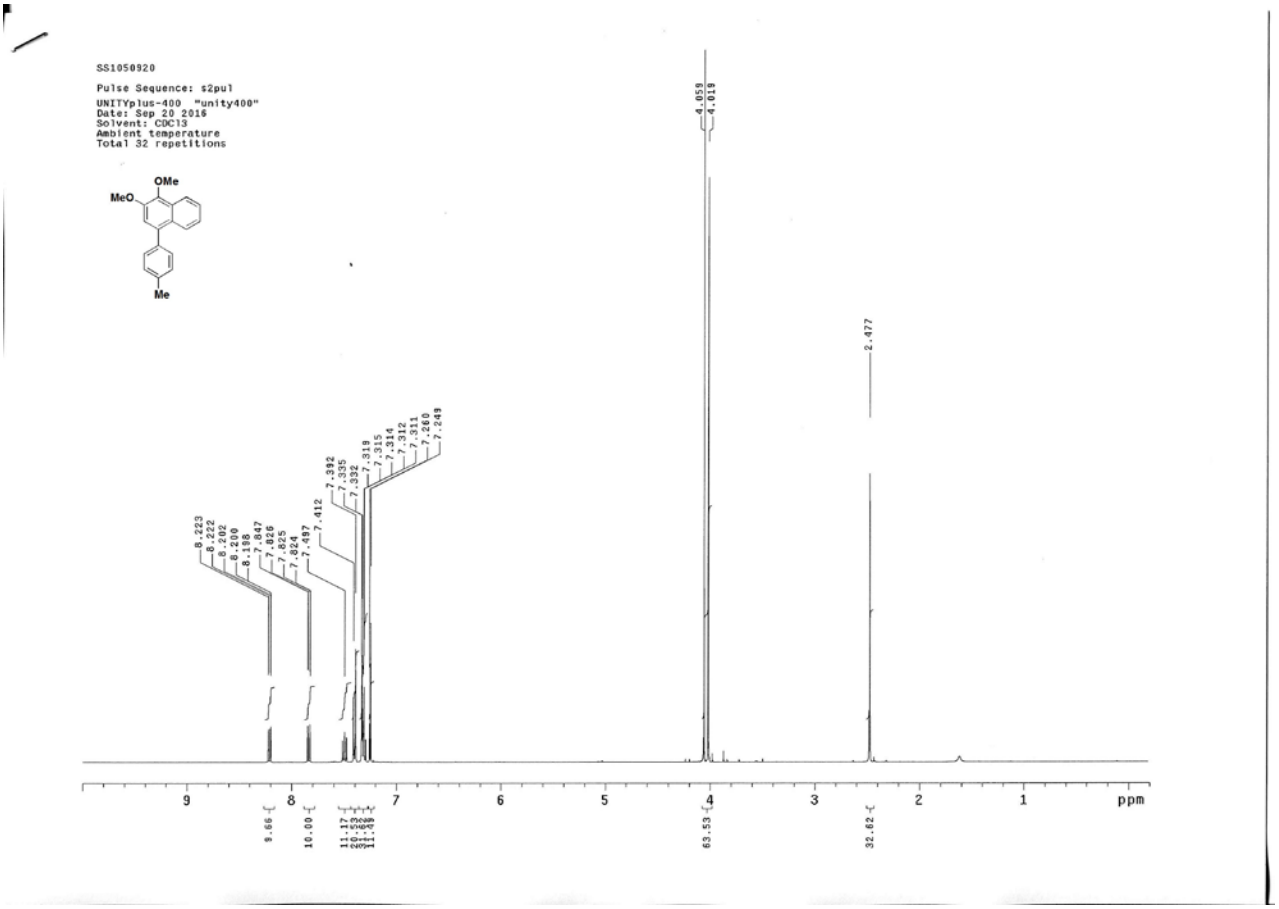

SS1050928
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 30 2016
Solvent: CDCl3
Ambient temperature
Total 1200 repetitions
OMe
MeO
147.551
142.321
140.486
136.885
130.071
129.320
128.259
127.736
127.281
126.045
124.143
121.535
110.403
77.311
77.000
76.682
61.142
56.912
ppm

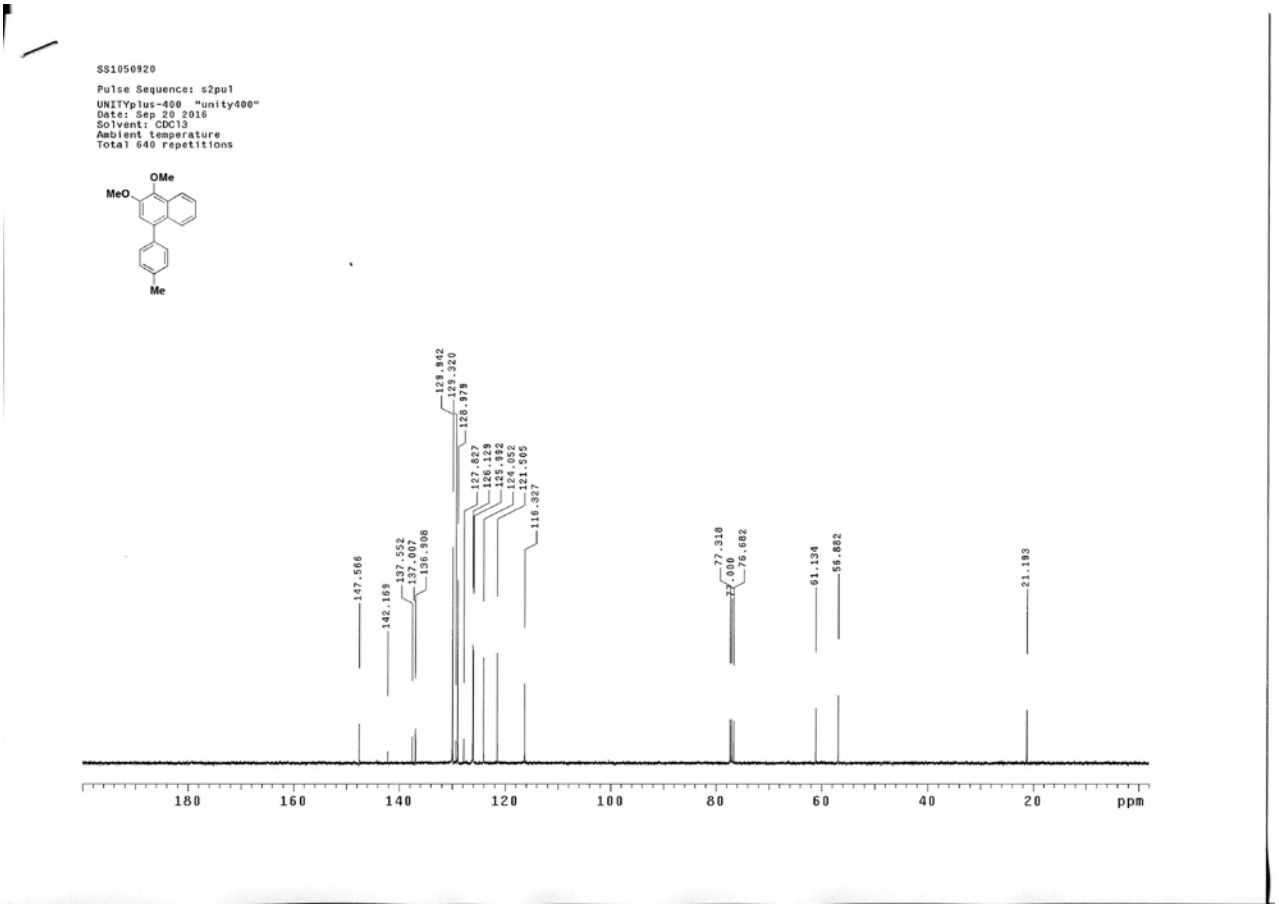
Compound 8b


SS1050929
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 30 2016
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
OMe
MeO
F
8.216
8.214
8.195
8.193
8.191
7.746
7.724
7.723
7.495
7.481
7.467
7.439
7.425
7.319
7.260
7.210
7.207
7.185
7.163
4.048
4.014
9.59
10.00
31.46
11.11
30.19
63.34
ppm

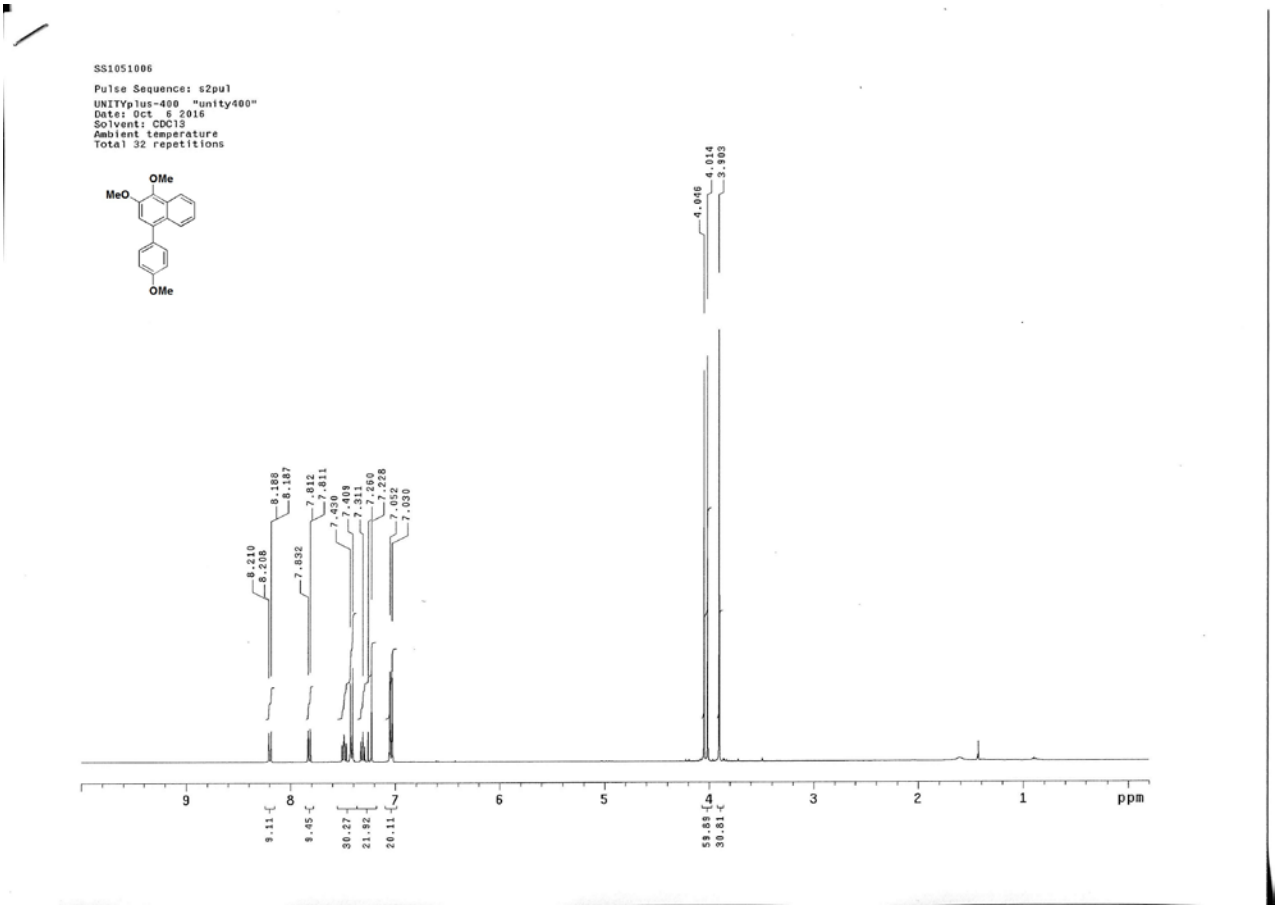

SS1050929
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 30 2016
Solvent: CDCl3
Ambient temperature
Total 1456 repetitions
OMe
MeO
F
163.508
161.059
147.536
142.510
136.408
136.377
135.748
131.692
131.656
131.556
124.350
127.827
126.121
125.810
124.309
121.834
116.570
115.311
115.099
77.318
77.000
76.682
61.164
56.988
ppm

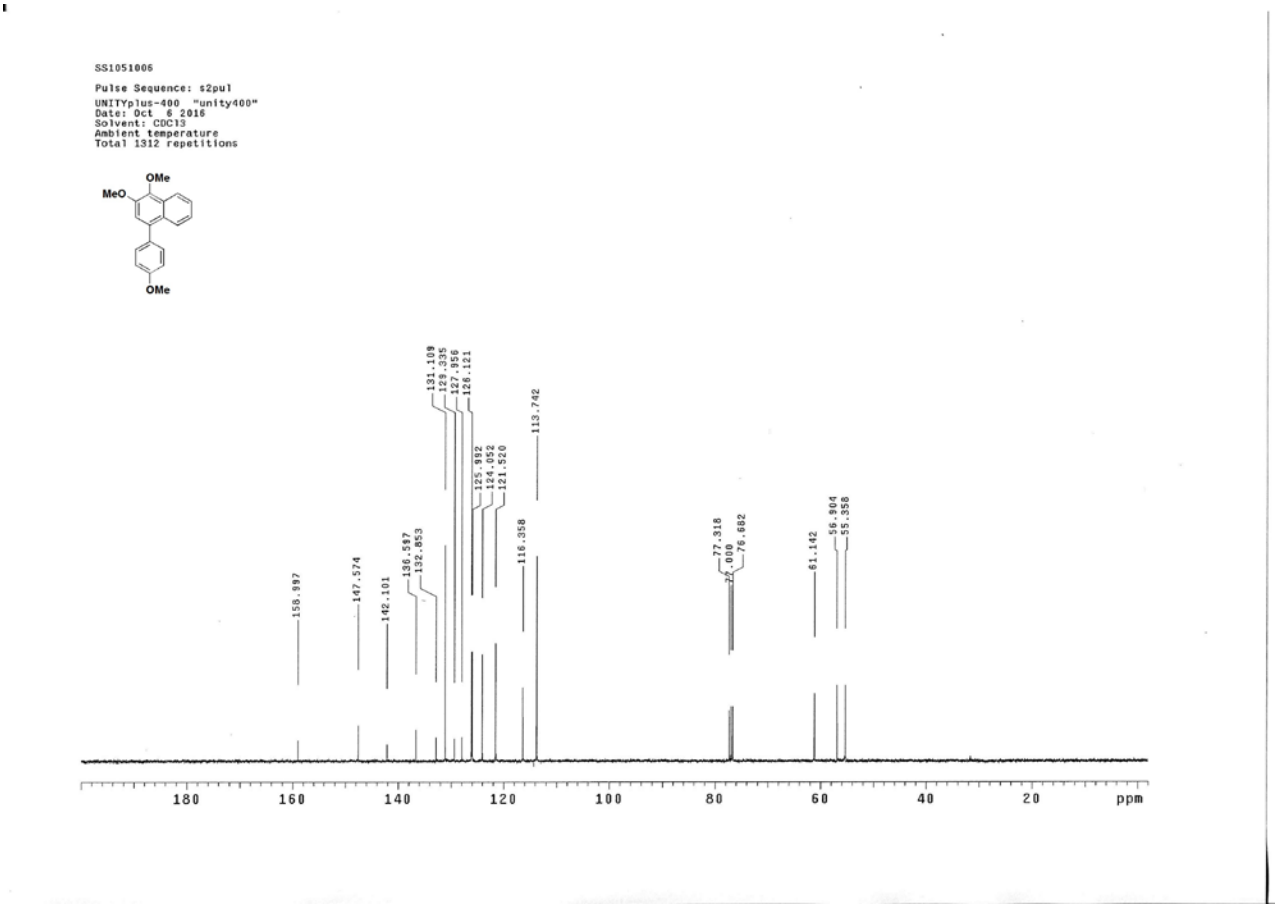
Compound 8c


SS1050920
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 20 2016
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
OMe
MeO
Me
8.223
8.222
8.202
8.200
8.188
7.847
7.826
7.825
7.824
7.497
7.412
7.392
7.335
7.332
7.318
7.316
7.314
7.312
7.311
7.260
7.249
4.058
4.019
2.477
9.66
10.00
11.17
20.63
63.53
32.62
ppm

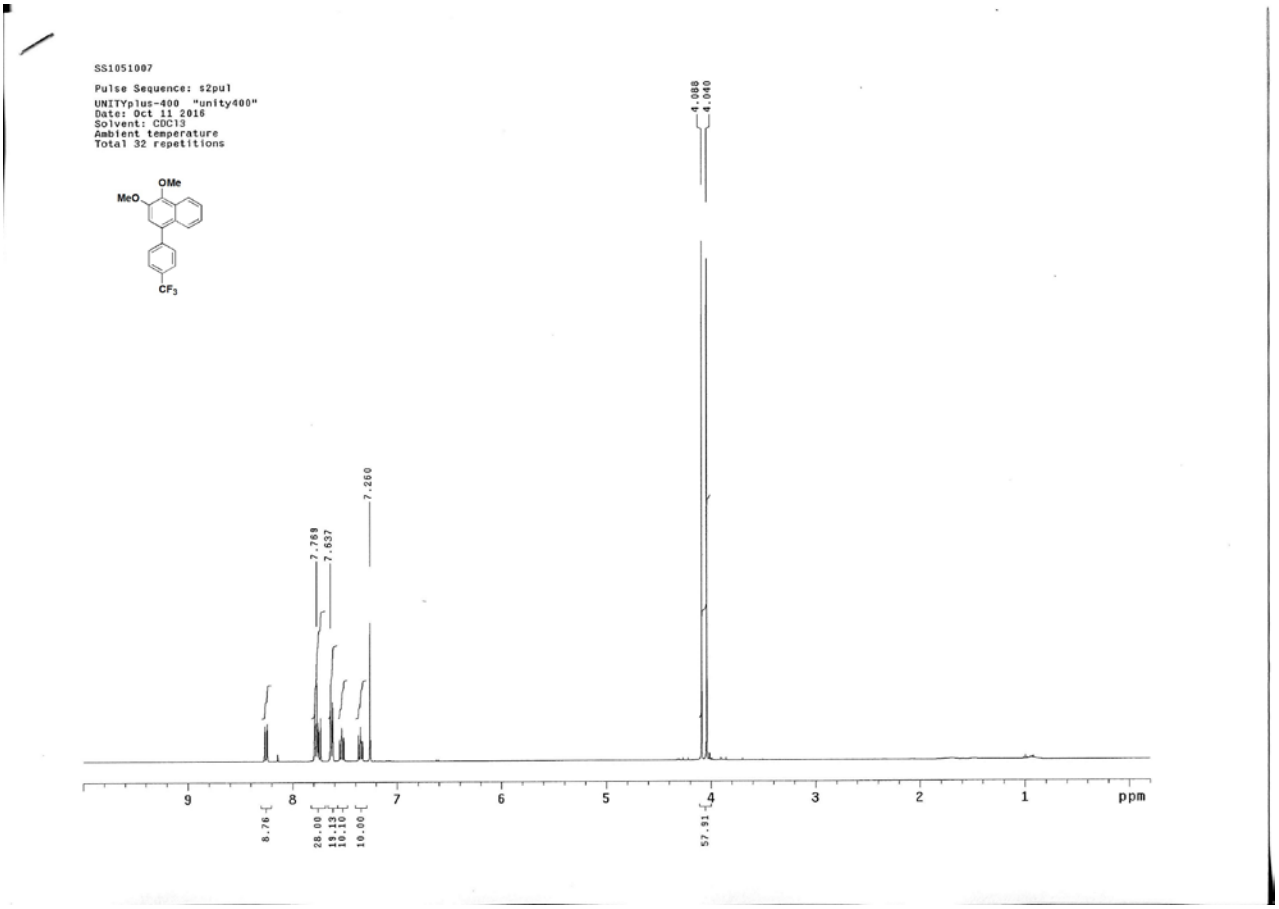

SS1050920
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Sep 20 2016
Solvent: CDCl3
Ambient temperature
Total 640 repetitions
OMe
MeO
Me
147.566
142.169
137.552
137.007
136.908
129.942
129.320
128.979
127.827
126.129
125.992
124.052
121.505
116.327
77.318
77.000
76.682
61.134
56.882
21.193
ppm

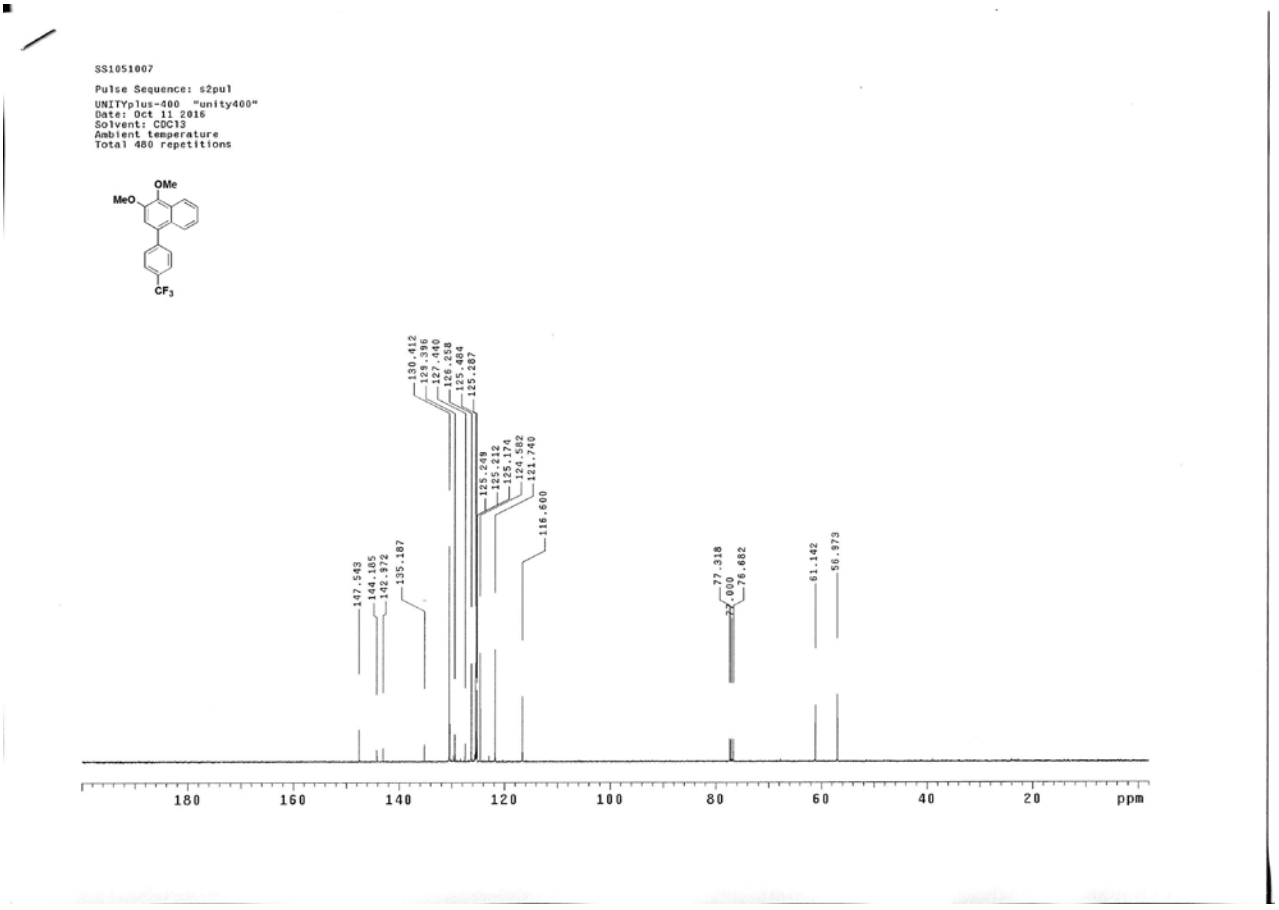
Compound 8d


SS1051006
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 6 2016
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
OMe
MeO
OMe
8.210
8.208
8.188
8.187
7.832
7.812
7.811
7.450
7.409
7.311
7.260
7.228
7.052
7.030
4.046
4.014
3.903
9.11
9.45
30.27
21.82
20.11
59.69
30.81
ppm

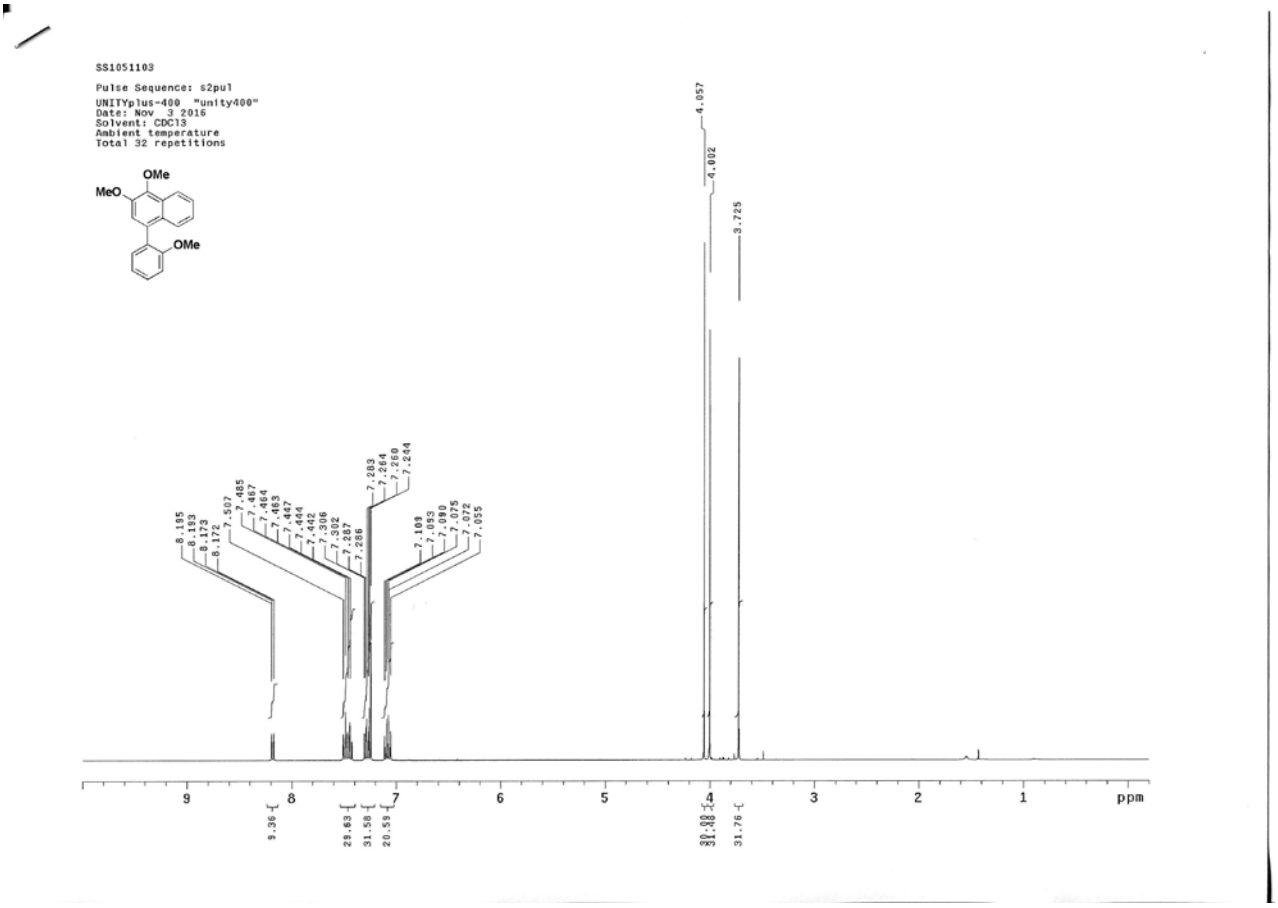

SS1051006
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 6 2016
Solvent: CDCl3
Ambient temperature
Total 1312 repetitions
OMe
MeO
OMe
158.997
147.574
142.101
136.587
132.853
131.109
129.335
127.956
126.121
125.892
124.052
121.520
113.742
116.358
77.318
77.000
76.682
61.142
56.904
55.358
ppm

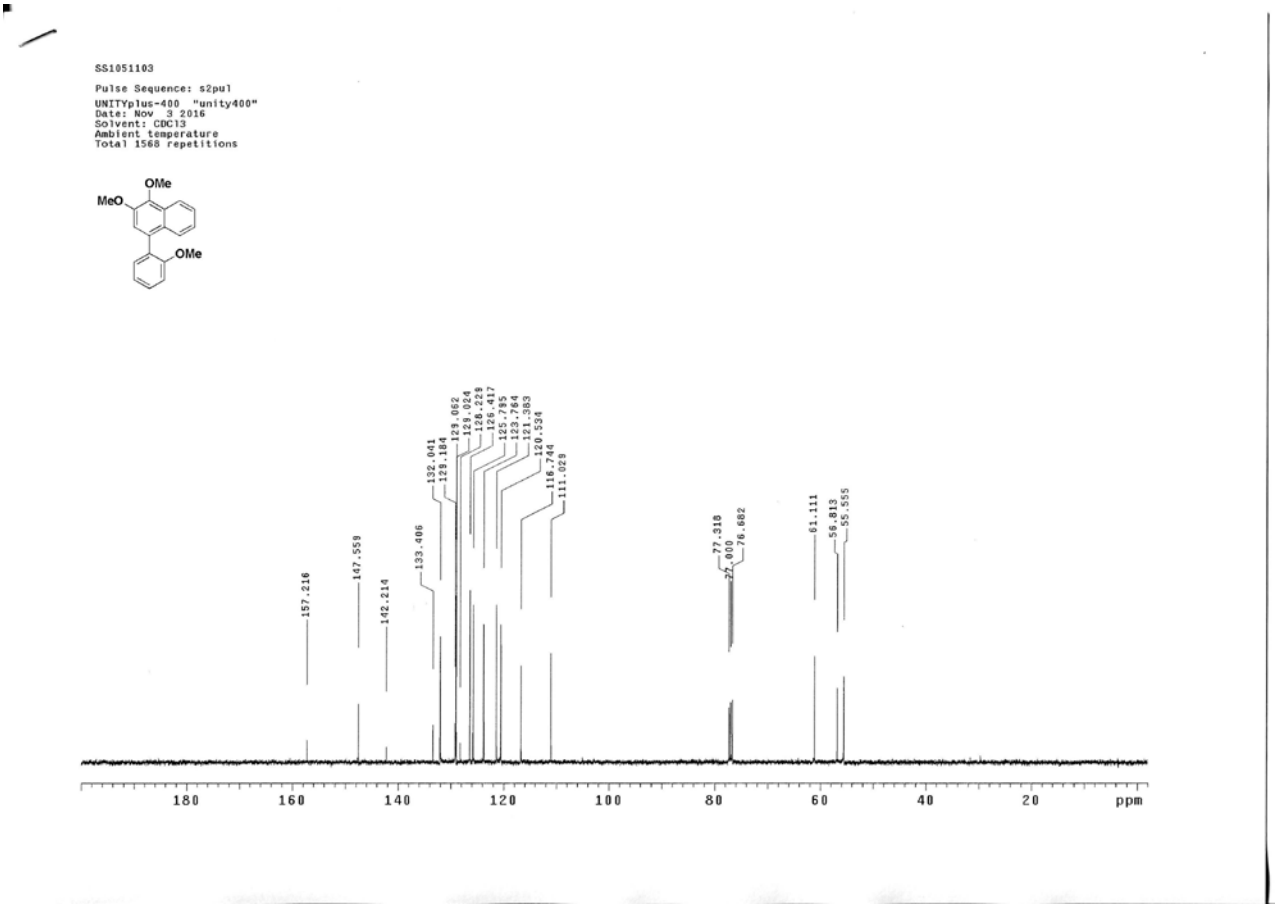
Compound 8e


SS1051007
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 11 2016
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
OMe
MeO
CF3
4.088
4.040
7.769
7.637
7.260
8.76
28.00
13.13
10.10
10.00
57.91
ppm

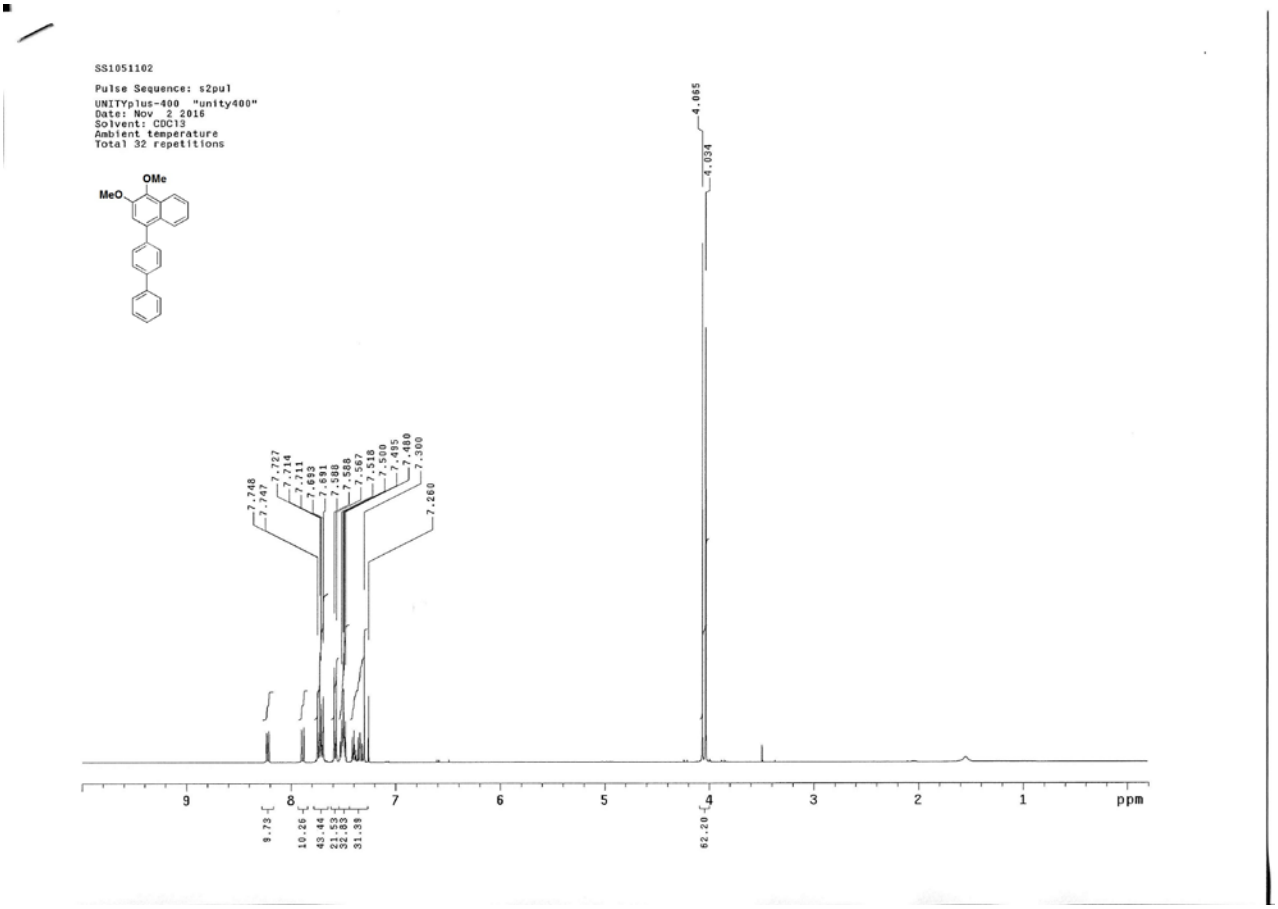

SS1051007
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Oct 11 2016
Solvent: CDCl3
Ambient temperature
Total 480 repetitions
OMe
MeO
CF3
130.412
129.396
127.440
126.258
125.464
125.287
125.249
125.212
125.174
124.582
121.740
116.600
147.543
144.185
142.972
135.187
77.318
77.000
76.682
61.142
56.973
ppm

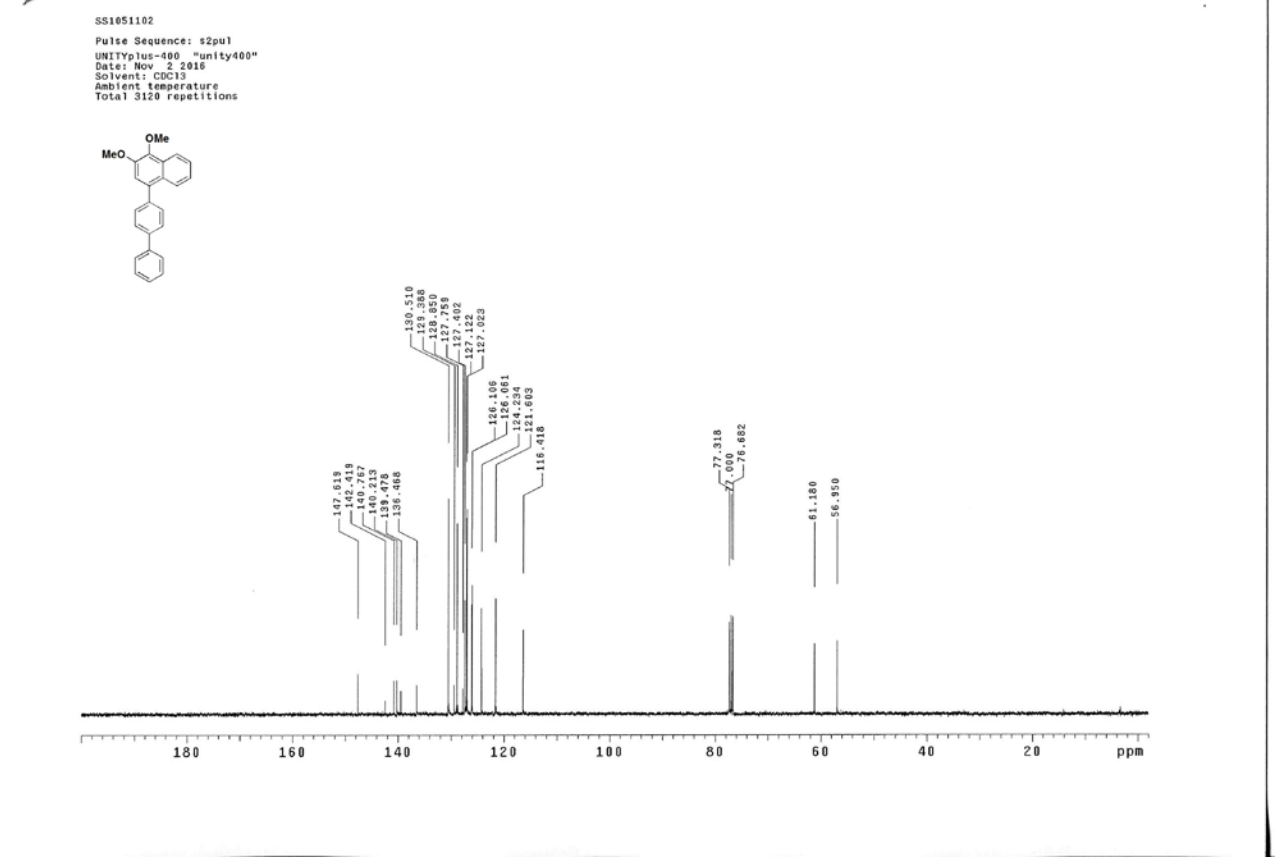
Compound 8f


SS1051103
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Nov 3 2016
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
OMe
MeO
OMe
4.057
4.002
3.725
8.195
8.193
8.173
8.172
7.507
7.485
7.467
7.464
7.463
7.447
7.444
7.442
7.306
7.302
7.287
7.286
7.283
7.264
7.260
7.244
7.109
7.093
7.090
7.075
7.072
7.055
9.36
28.63
31.58
20.59
30.00
31.76
ppm

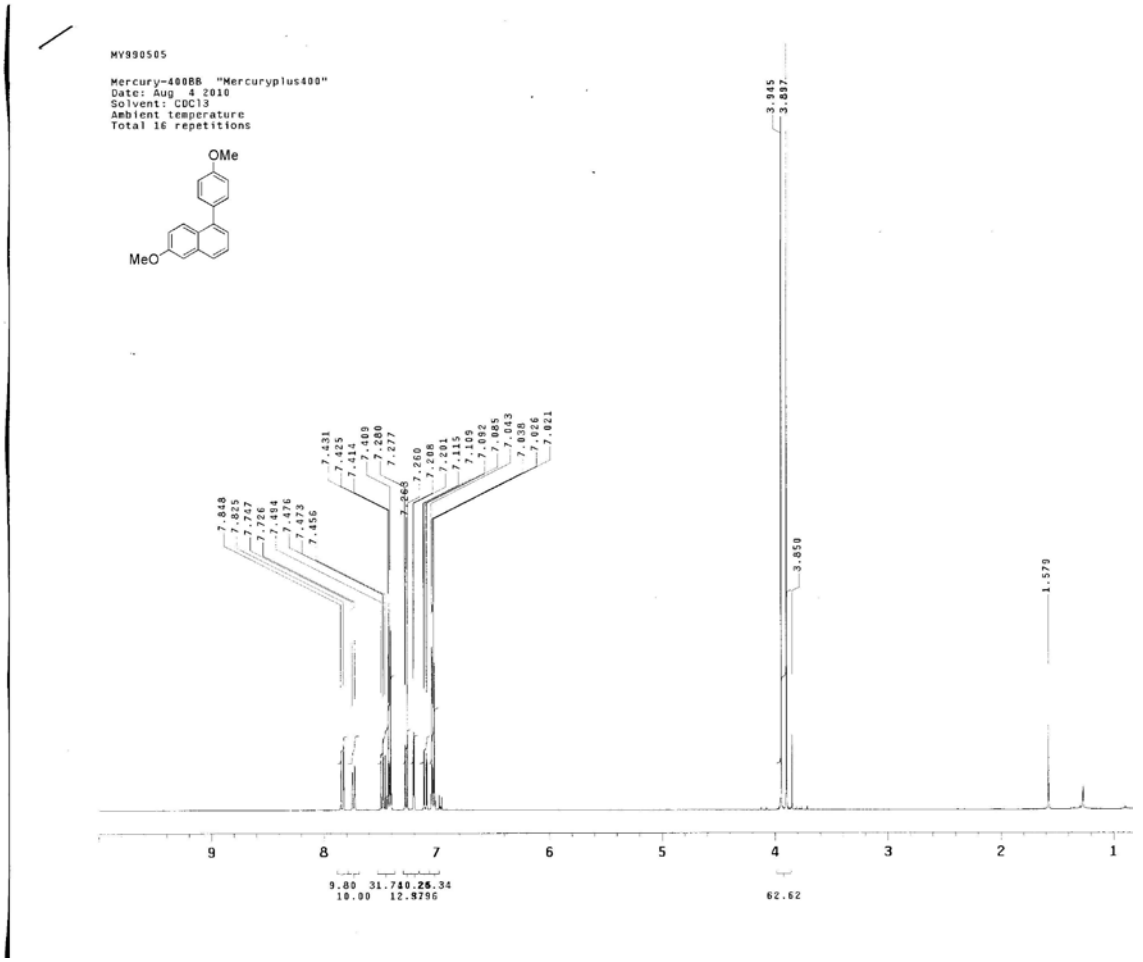

SS1051103
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Nov 3 2016
Solvent: CDCl3
Ambient temperature
Total 1568 repetitions
OMe
MeO
OMe
157.216
147.559
142.214
133.406
132.041
129.184
129.062
129.024
126.229
125.417
125.185
123.764
121.363
120.534
116.744
111.029
77.318
77.000
76.682
61.111
56.813
55.555
ppm

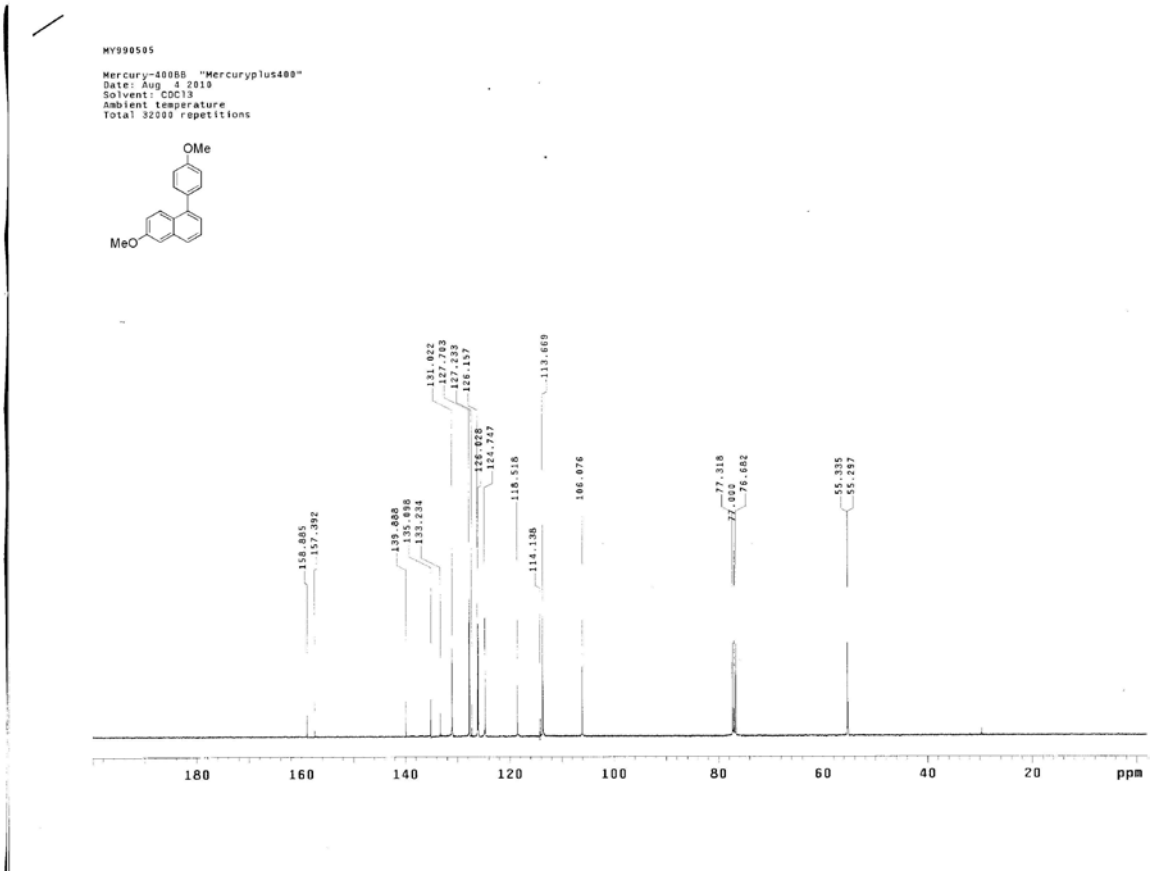
Compound 8g


SS1051102
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Nov 2 2016
Solvent: CDCl3
Ambient temperature
Total 32 repetitions
OMe
MeO
4.065
4.034
7.748
7.747
7.727
7.714
7.711
7.693
7.691
7.588
7.588
7.567
7.518
7.500
7.495
7.480
7.300
7.260
9
8
7
6
5
4
3
2
1
ppm
9.73
10.26
43.44
21.53
32.83
31.39
62.20

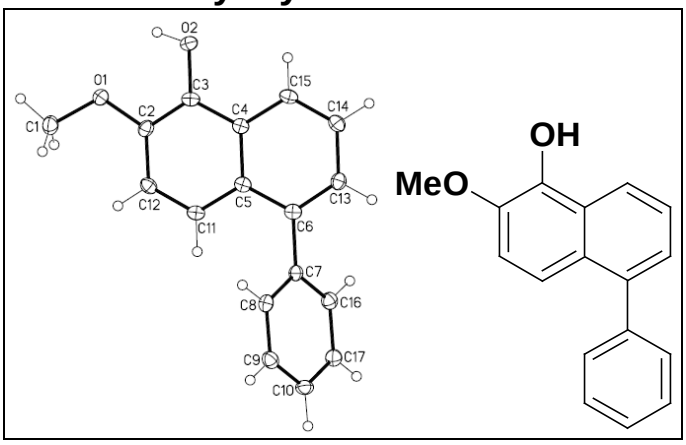

SS1051102
Pulse Sequence: s2pul
UNITYplus-400 "unity400"
Date: Nov 2 2016
Solvent: CDCl3
Ambient temperature
Total 3120 repetitions
OMe
MeO
130.510
129.388
128.850
127.759
127.402
127.122
127.023
126.106
126.061
124.264
121.603
116.418
147.618
142.419
140.767
140.213
139.478
136.468
77.318
77.000
76.682
61.180
56.950
180
160
140
120
100
80
60
40
20
ppm

Compound 9a


MY990505
Mercury-400BB "Mercuryplus400"
Date: Aug 4 2010
Solvent: CDCl3
Ambient temperature
Total 16 repetitions
OMe
MeO
3.945
3.897
3.859
1.579
7.848
7.825
7.747
7.726
7.494
7.476
7.473
7.456
7.431
7.425
7.414
7.409
7.280
7.277
7.268
7.260
7.208
7.201
7.115
7.109
7.092
7.085
7.043
7.038
7.026
7.021
9.80
31.74
10.25
5.34
10.00
12.87
9.96
62.62

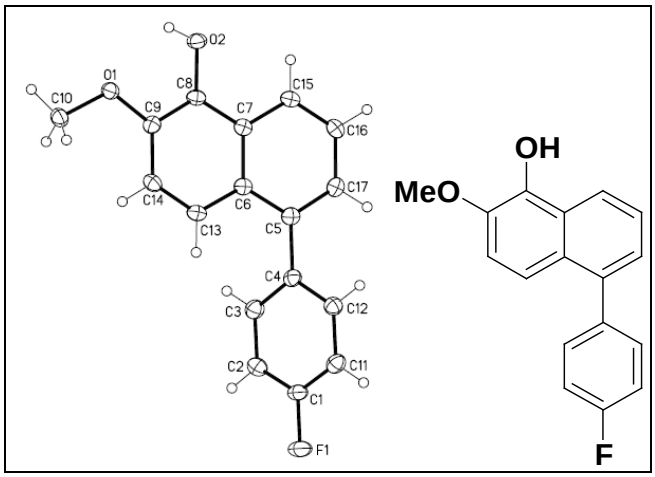

MY990505
Mercury-400BB "Mercuryplus400"
Date: Aug 4 2010
Solvent: CDCl3
Ambient temperature
Total 32000 repetitions
OMe
MeO
158.865
157.392
139.888
135.698
133.234
131.022
127.783
127.235
126.157
126.028
124.747
118.518
114.138
113.669
106.076
77.318
77.000
76.682
55.335
55.297

X-ray crystal data of 5e



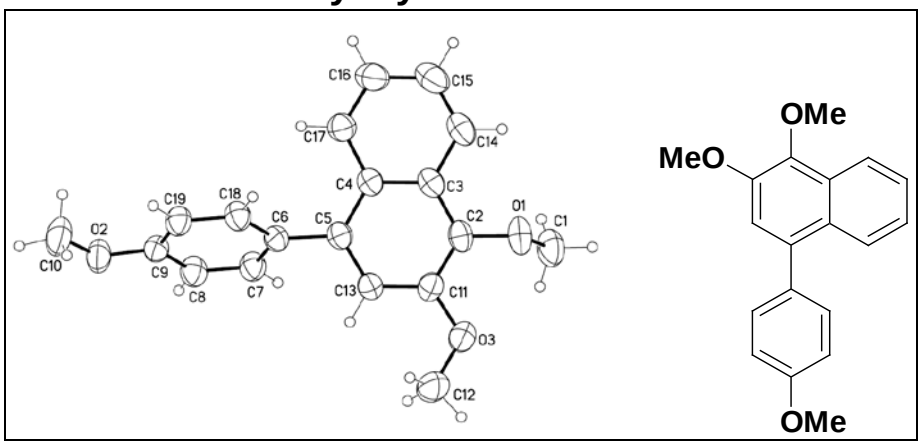
Empirical formula	C17 H14 O2	
Formula weight	250.28	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Orthorhombic	
Space group	F d d 2	
Unit cell dimensions	a = 13.3885(3) Å	α = 90°.
	b = 66.3135(18) Å	β = 90°.
	c = 5.5816(2) Å	γ = 90°.
Volume	4955.6(2) $Å^3$	
Z	16	
Density (calculated)	1.342 Mg/m^3	
Absorption coefficient	0.087 mm^{-1}	
F(000)	2112	
Crystal size	0.25 x 0.25 x 0.12 mm^3	
Theta range for data collection	1.23 to 26.39°.	
Index ranges	-10<=h<=16, -82<=k<=82, -6<=l<=6	
Reflections collected	11029	
Independent reflections	2518 [R(int) = 0.0603]	
Completeness to theta = 26.39°	99.9 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.9486 and 0.8690	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	2518 / 1 / 174	
Goodness-of-fit on F^2	1.168	
Final R indices [I>2sigma(I)]	R1 = 0.0325, wR2 = 0.0807	
R indices (all data)	R1 = 0.0428, wR2 = 0.1154	
Absolute structure parameter	0.2(13)	
Largest diff. peak and hole	0.404 and -0.542 e.$Å^{-3}$	

X-ray crystal data of 5f



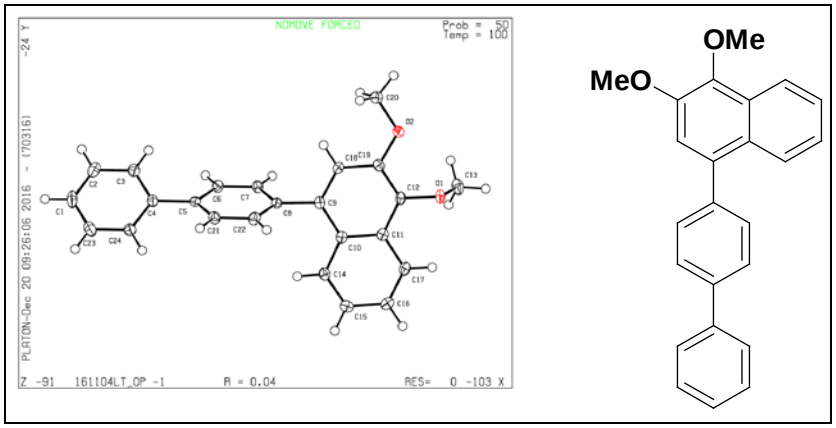
Empirical formula	C17 H13 F O2	
Formula weight	268.27	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P -1	
Unit cell dimensions	a = 6.7021(11) Å	α = 85.327(6)°.
	b = 7.9371(12) Å	β = 80.530(6)°.
	c = 12.170(2) Å	γ = 82.517(6)°.
Volume	631.92(18) $Å^3$	
Z	2	
Density (calculated)	1.410 Mg/m^3	
Absorption coefficient	0.101 mm^{-1}	
F(000)	280	
Crystal size	0.18 x 0.10 x 0.10 mm^3	
Theta range for data collection	1.70 to 26.38°.	
Index ranges	-8<=h<=7, -9<=k<=7, -15<=l<=15	
Reflections collected	9259	
Independent reflections	2547 [R(int) = 0.0243]	
Completeness to theta = 26.38°	98.6 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.9486 and 0.9019	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	2547 / 0 / 183	
Goodness-of-fit on F^2	1.089	
Final R indices [I>2sigma(I)]	R1 = 0.0343, wR2 = 0.0907	
R indices (all data)	R1 = 0.0431, wR2 = 0.1097	
Largest diff. peak and hole	0.231 and -0.223 $e.Å^{-3}$	

X-ray crystal data of 8d



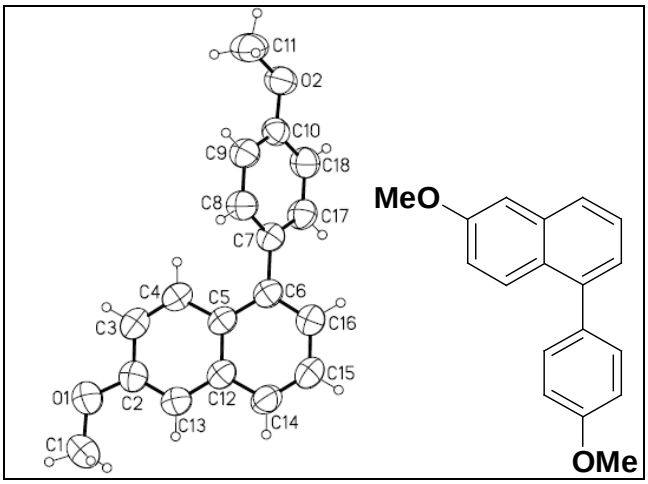
Empirical formula	C19 H18 O3	
Formula weight	294.33	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/c	
Unit cell dimensions	a = 13.3450(12) Å	α = 90°.
	b = 15.2538(14) Å	β = 99.819(2)°.
	c = 7.5723(7) Å	γ = 90°.
Volume	1518.9(2) $Å^3$	
Z	4	
Density (calculated)	1.287 Mg/m^3	
Absorption coefficient	0.086 mm^{-1}	
F(000)	624	
Crystal size	0.15 x 0.10 x 0.10 mm^3	
Theta range for data collection	2.045 to 26.421°.	
Index ranges	-16<=h<=16, -18<=k<=19, -9<=l<=4	
Reflections collected	12198	
Independent reflections	3116 [R(int) = 0.0580]	
Completeness to theta = 25.242°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.9485 and 0.8689	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3116 / 0 / 202	
Goodness-of-fit on F^2	0.996	
Final R indices [I>2sigma(I)]	R1 = 0.0504, wR2 = 0.1026	
R indices (all data)	R1 = 0.1172, wR2 = 0.1285	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.146 and -0.186 $e.Å^{-3}$	

X-ray crystal data of 8g



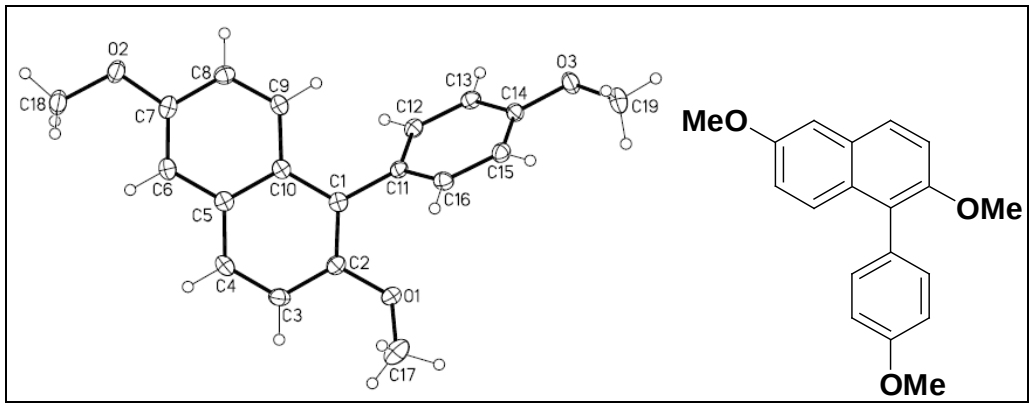
Empirical formula	C24 H20 O2	
Formula weight	340.40	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P -1	
Unit cell dimensions	a = 6.6111(3) Å	α = 106.574(2)°.
	b = 9.8830(5) Å	β = 94.682(2)°.
	c = 14.4700(8) Å	γ = 104.105(2)°.
Volume	867.14(8) $Å^3$	
Z	2	
Density (calculated)	1.304 Mg/m^3	
Absorption coefficient	0.082 mm^{-1}	
F(000)	360	
Crystal size	0.12 x 0.10 x 0.10 mm^3	
Theta range for data collection	1.488 to 26.356°.	
Index ranges	-7<=h<=8, -12<=k<=10, -17<=l<=18	
Reflections collected	11883	
Independent reflections	3534 [R(int) = 0.0262]	
Completeness to theta = 25.242°	99.7 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.9485 and 0.8919	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3534 / 0 / 237	
Goodness-of-fit on F^2	1.072	
Final R indices [I>2sigma(I)]	R1 = 0.0386, wR2 = 0.1084	
R indices (all data)	R1 = 0.0460, wR2 = 0.1231	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.231 and -0.211 $e.Å^{-3}$	

X-ray crystal data of 9a



Empirical formula	C18 H16 O2	
Formula weight	264.31	
Temperature	295(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 1 21/c 1	
Unit cell dimensions	a = 7.654(4) Å	α = 90°.
	b = 13.820(8) Å	β = 98.379(9)°.
	c = 13.657(8) Å	γ = 90°.
Volume	1429.0(14) $Å^3$	
Z	4	
Density (calculated)	1.229 Mg/m^3	
Absorption coefficient	0.079 mm^{-1}	
F(000)	560	
Crystal size	0.30 x 0.20 x 0.18 mm^3	
Theta range for data collection	2.11 to 26.46°.	
Index ranges	-9<=h<=9, -17<=k<=15, -12<=l<=17	
Reflections collected	8979	
Independent reflections	2937 [R(int) = 0.0271]	
Completeness to theta = 26.46°	99.4 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.9486 and 0.8266	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	2937 / 0 / 183	
Goodness-of-fit on F^2	1.049	
Final R indices [I>2sigma(I)]	R1 = 0.0475, wR2 = 0.1271	
R indices (all data)	R1 = 0.0711, wR2 = 0.1581	
Largest diff. peak and hole	0.160 and -0.175 $e.Å^{-3}$	

X-ray crystal data of 9b



Empirical formula	C19 H18 O3	
Formula weight	294.33	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	C 1 c 1	
Unit cell dimensions	a = 8.6905(3) Å	α = 90°.
	b = 21.9250(7) Å	β = 108.3260(10)°.
	c = 8.2652(3) Å	γ = 90°.
Volume	1494.97(9) $Å^3$	
Z	4	
Density (calculated)	1.308 Mg/m^3	
Absorption coefficient	0.088 mm^{-1}	
F(000)	624	
Crystal size	0.30 x 0.25 x 0.25 mm^3	
Theta range for data collection	1.86 to 26.52°.	
Index ranges	-8<=h<=10, -27<=k<=27, -10<=l<=10	
Reflections collected	5988	
Independent reflections	2742 [R(int) = 0.0146]	
Completeness to theta = 26.52°	99.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.9486 and 0.8716	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	2742 / 2 / 202	
Goodness-of-fit on F^2	1.052	
Final R indices [I>2sigma(I)]	R1 = 0.0277, wR2 = 0.0732	
R indices (all data)	R1 = 0.0291, wR2 = 0.0743	
Absolute structure parameter	0.9(7)	
Largest diff. peak and hole	0.194 and -0.156 $e.Å^{-3}$	