

Supporting Information

Metal free tandem reactions of 2-iodoaryl ynones with sodium azide for the synthesis of benzoisoxazole containing 1,2,3-triazoles

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Email address: qy Zhang@nwpu.edu.cn (Q. Zhang);

fengtaozhou@163.com (F. Zhou)

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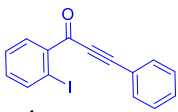
1. Copies NMR spectra

S1

1. Copies of NMR Spectra for Compounds

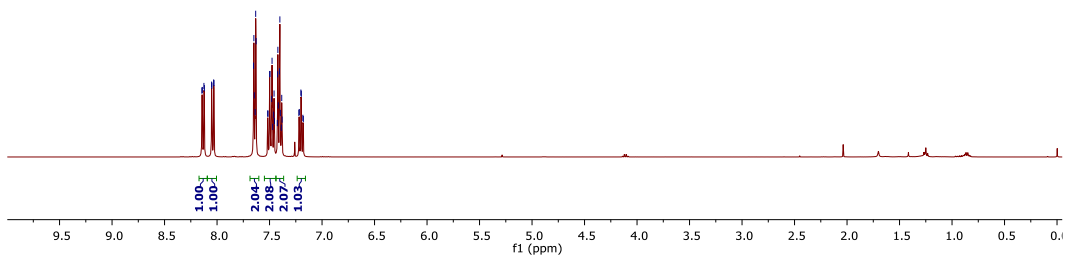
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8.096
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7.653
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7.645
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7.635
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7.515
7.499
7.496
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7.476
7.475
7.461
7.457
7.453
7.426
7.423
7.421
7.417
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7.384
7.381
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7.217
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7.183
7.178



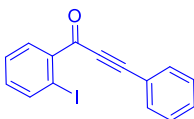
1a

¹H NMR (400 MHz, CDCl₃)



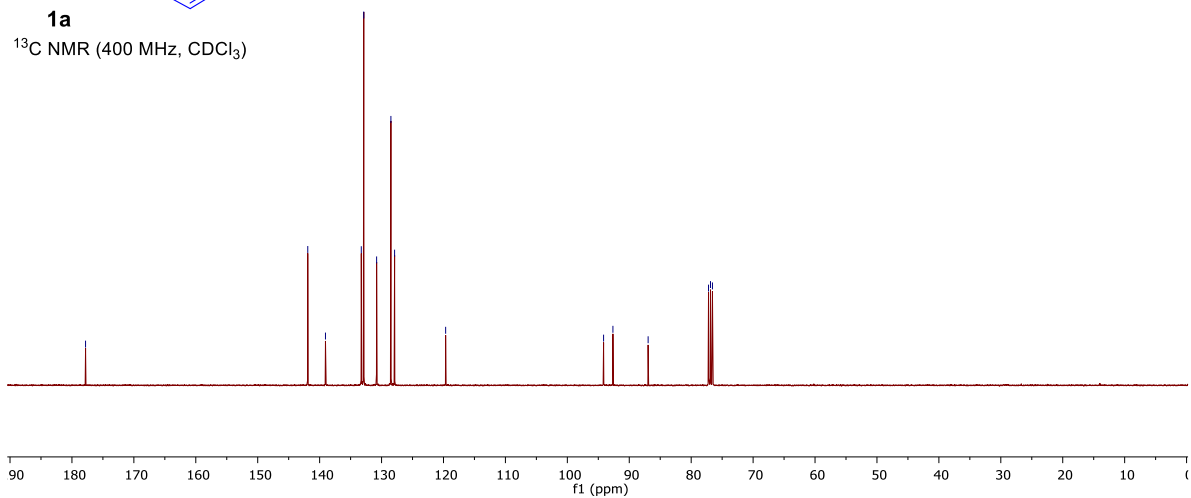
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177.802
141.917
139.058
133.273
132.876
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119.653
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77.201
76.882
76.565

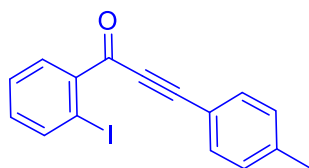


1a

¹³C NMR (400 MHz, CDCl₃)

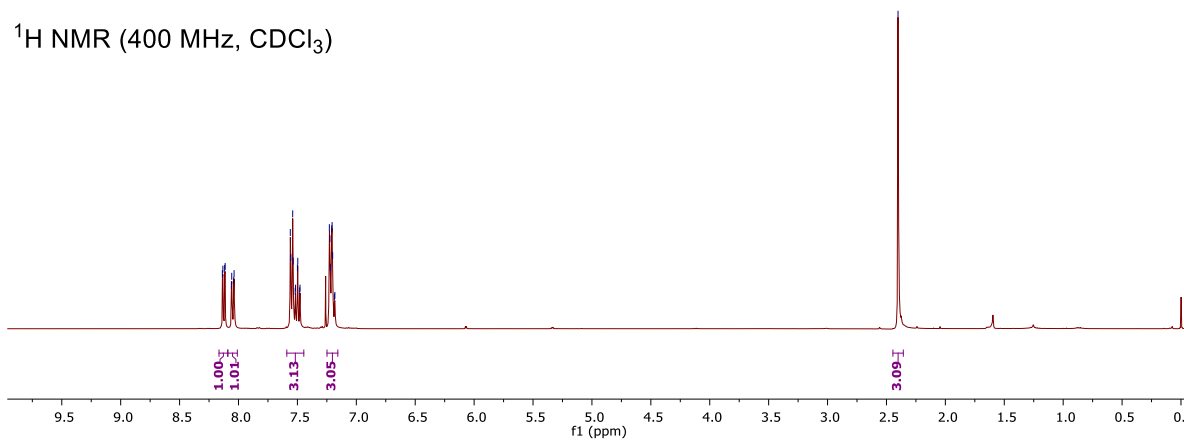


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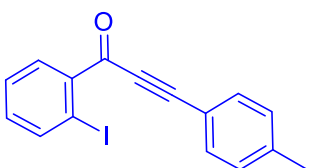


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^1H NMR (400 MHz, CDCl_3)

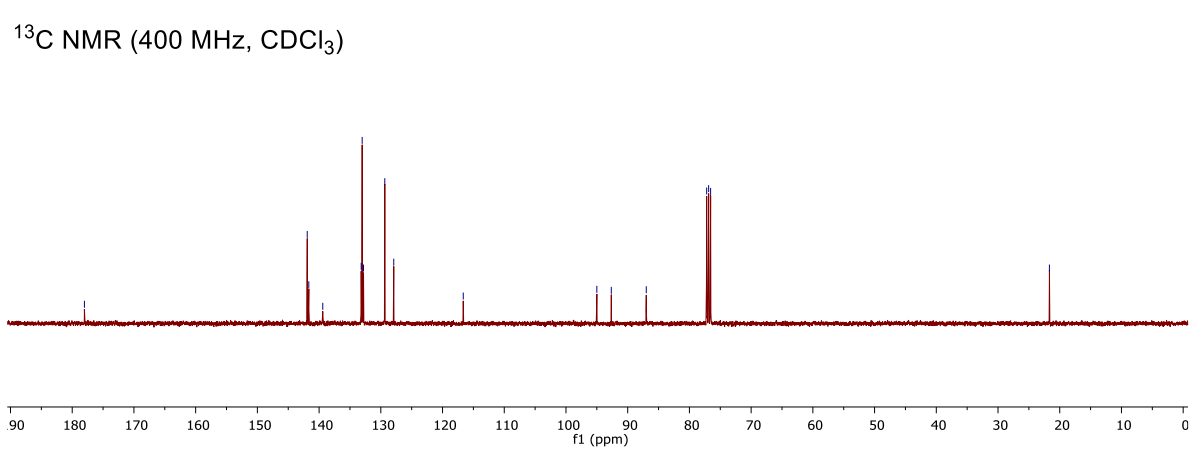


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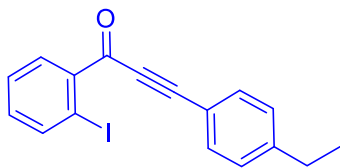


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^{13}C NMR (400 MHz, CDCl_3)

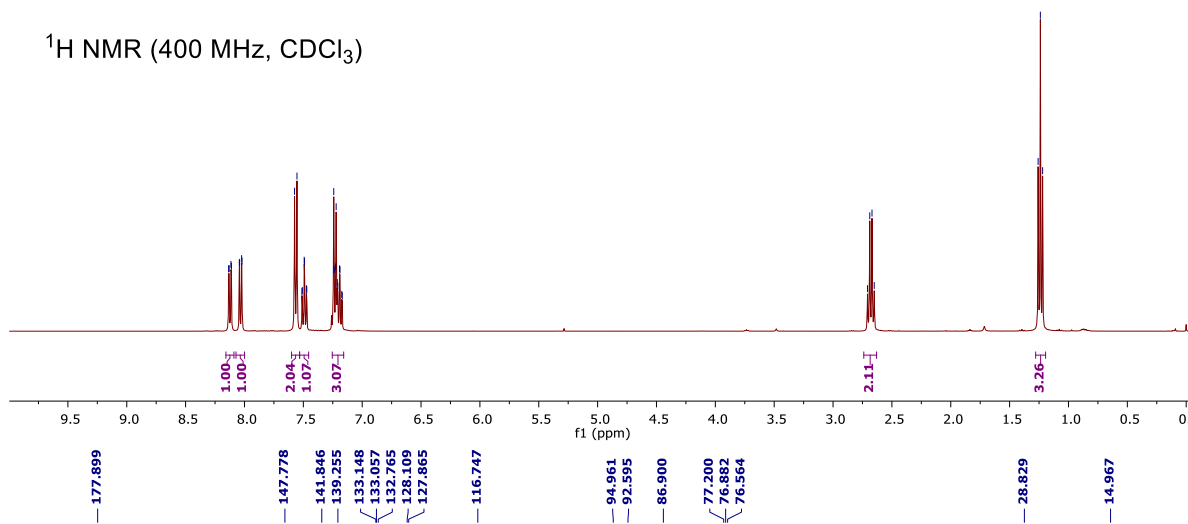


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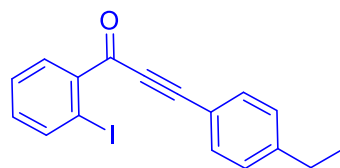


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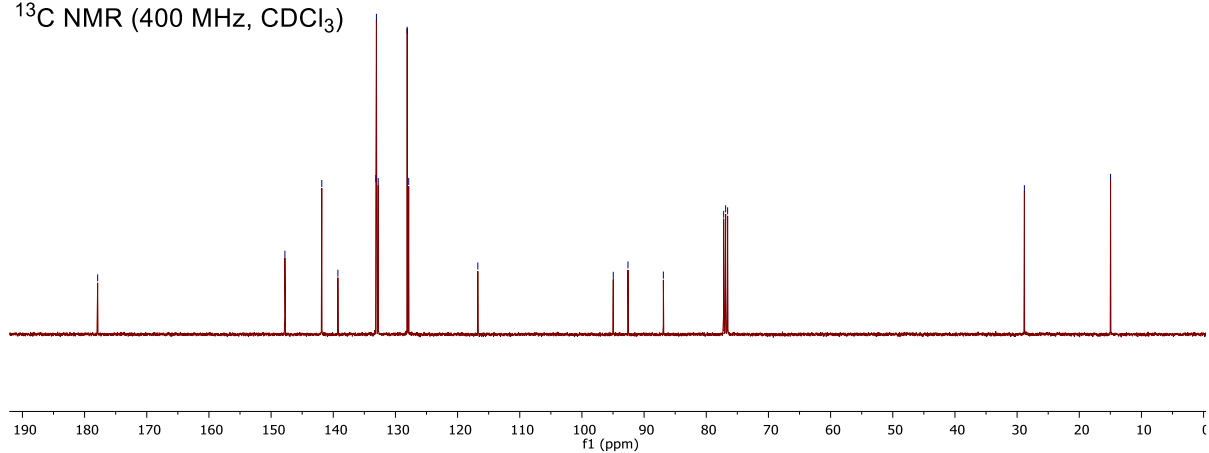


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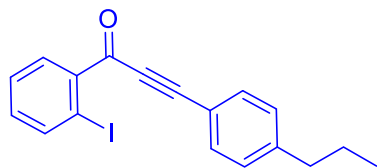
^{13}C NMR (400 MHz, CDCl_3)



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8.046
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7.490
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7.223
7.203
7.194
7.191
7.172

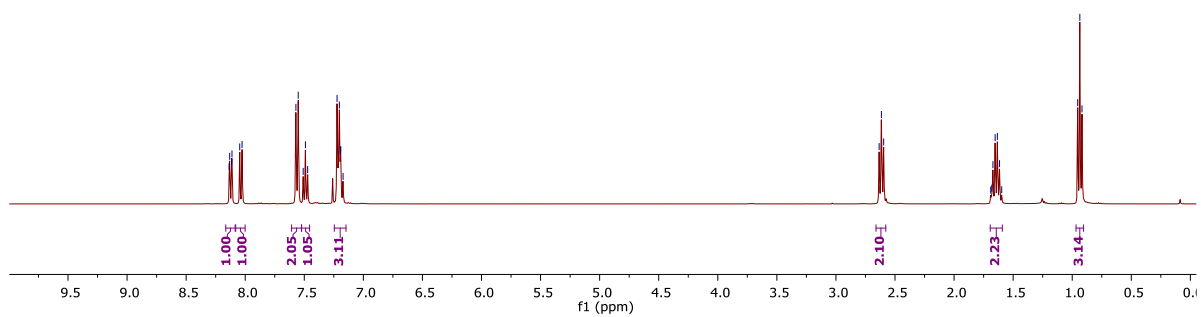
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0.917

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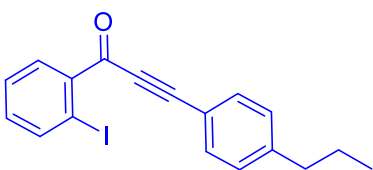
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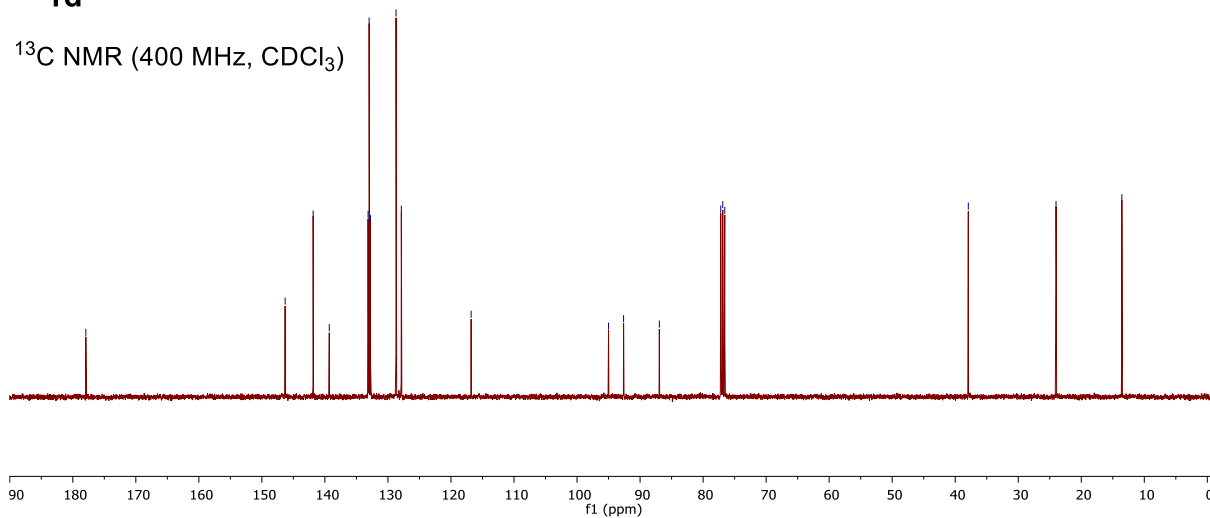
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37.922
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13.563

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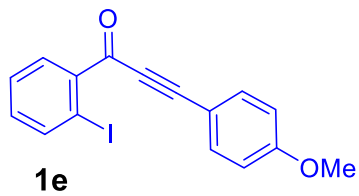


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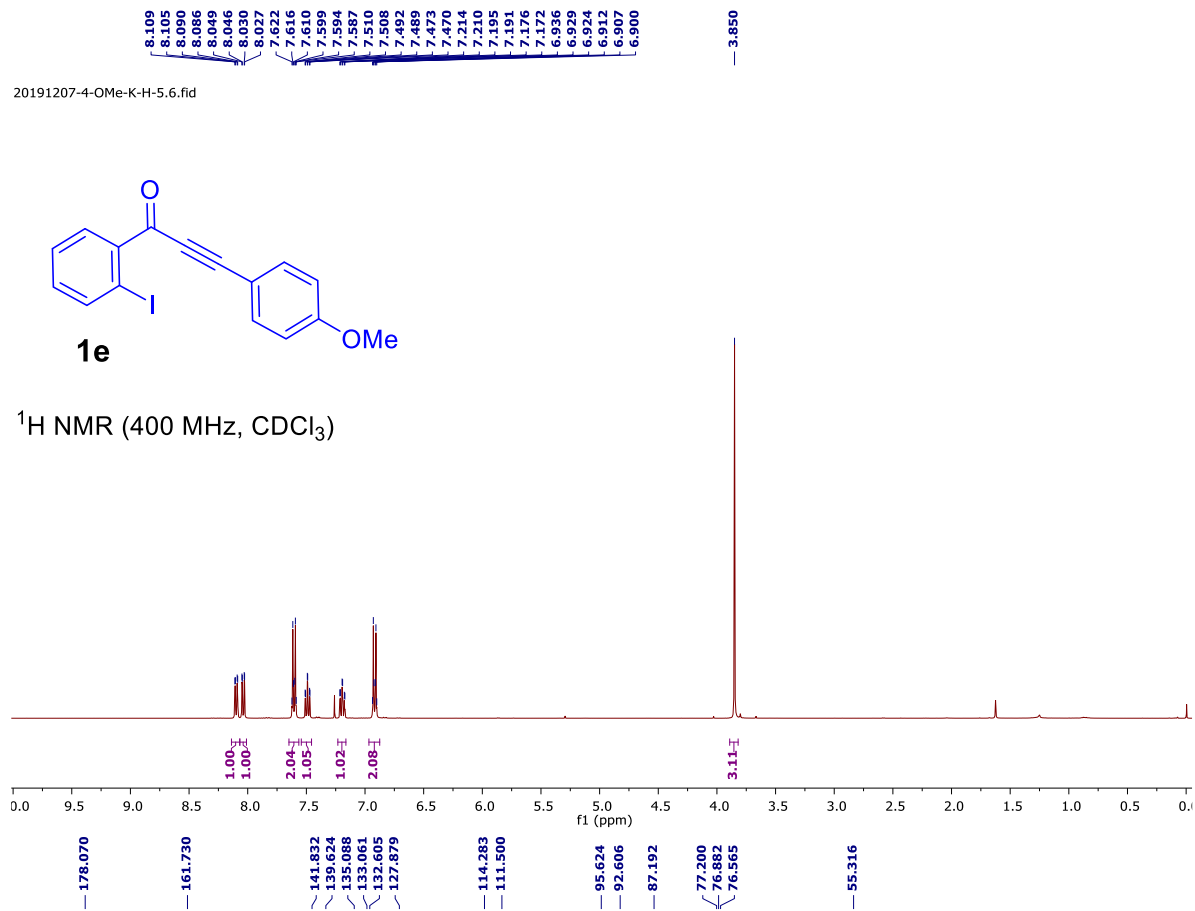
^{13}C NMR (400 MHz, CDCl_3)



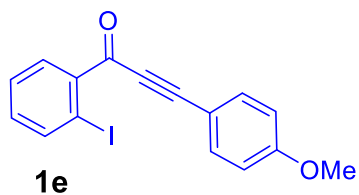
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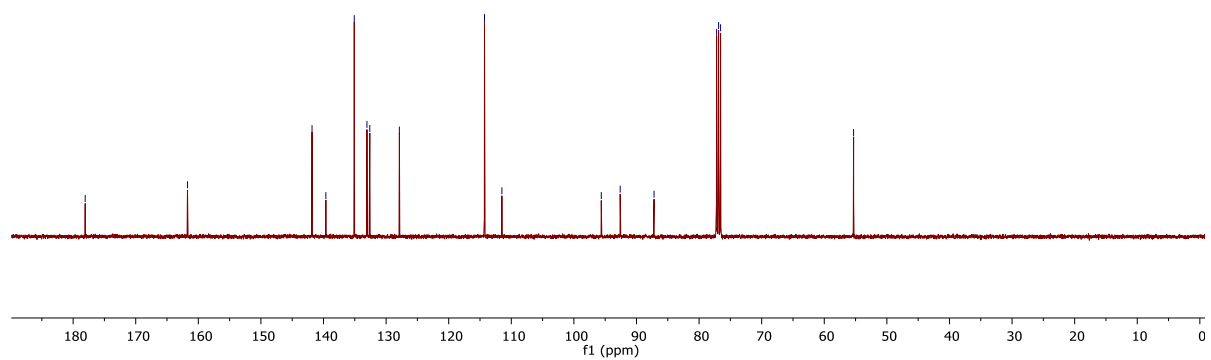
¹H NMR (400 MHz, CDCl₃)



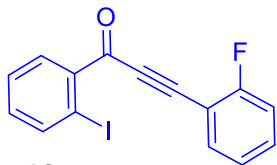
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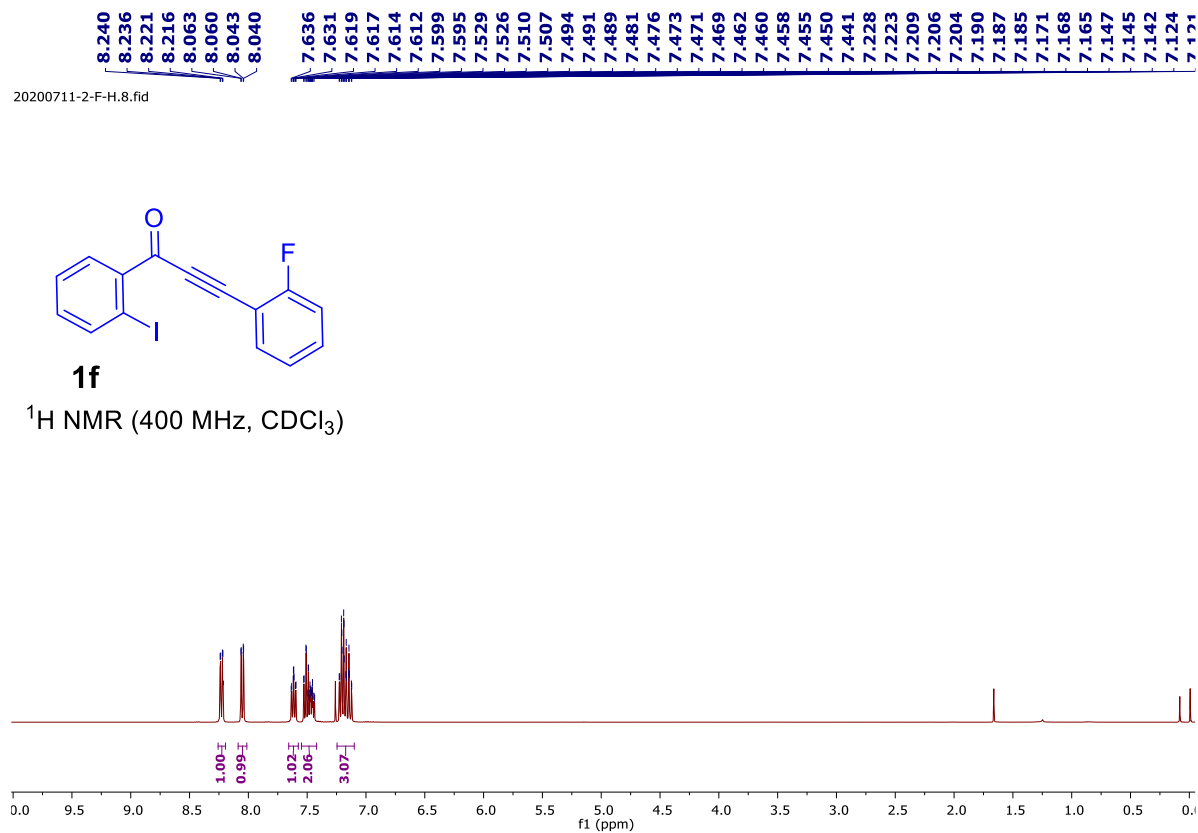


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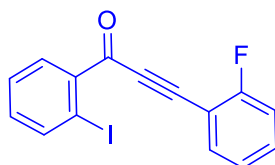


1f

¹H NMR (400 MHz, CDCl₃)

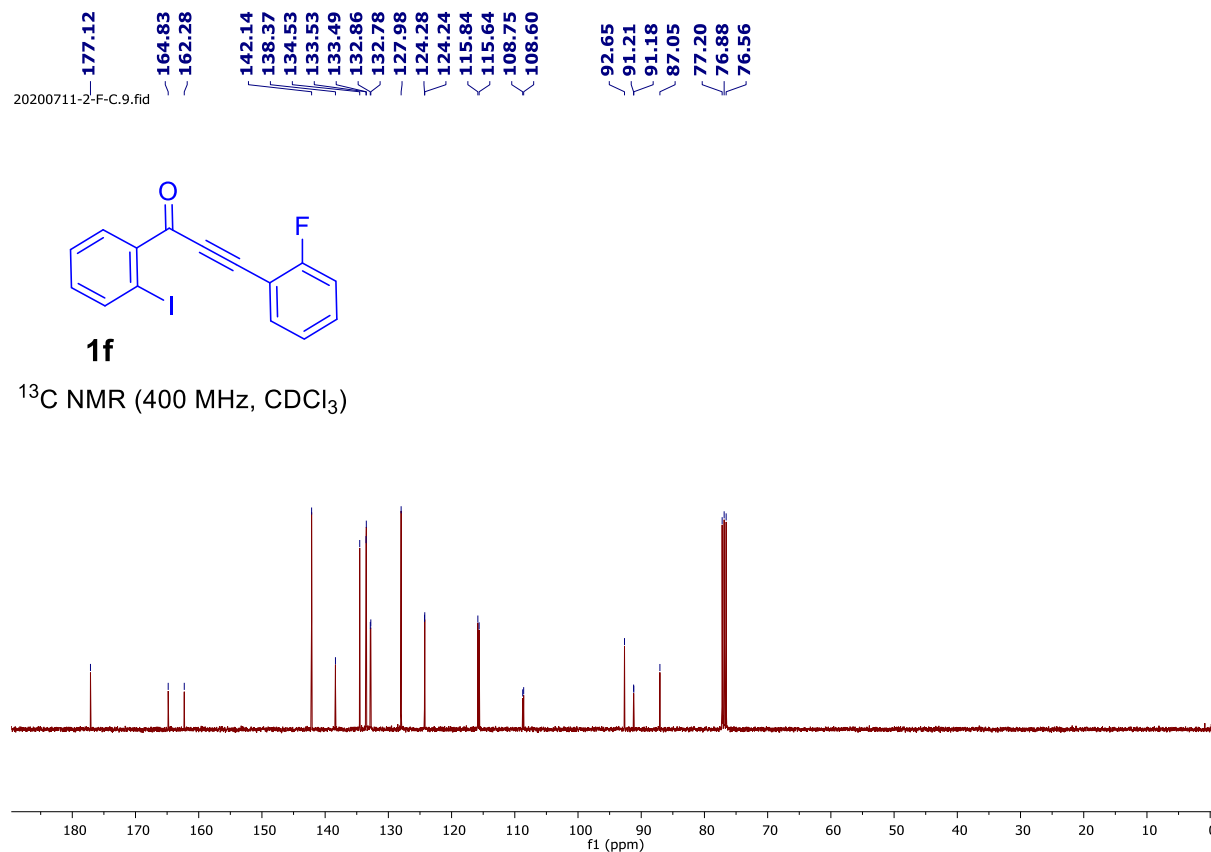


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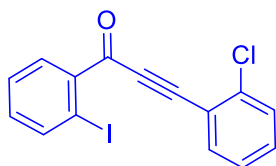
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¹³C NMR (400 MHz, CDCl₃)



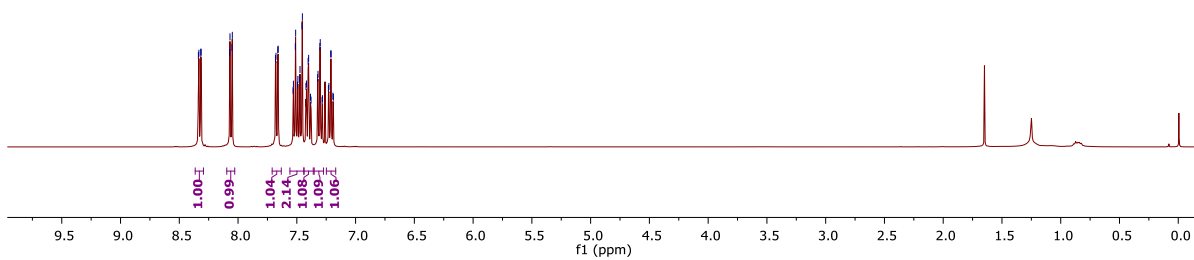
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7.532
7.529
7.513
7.510
7.494
7.491
7.476
7.473
7.456
7.453
7.422
7.418
7.404
7.399
7.383
7.379
7.323
7.320
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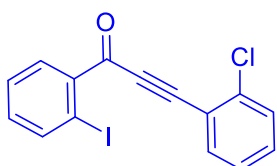
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^1H NMR (400 MHz, CDCl_3)



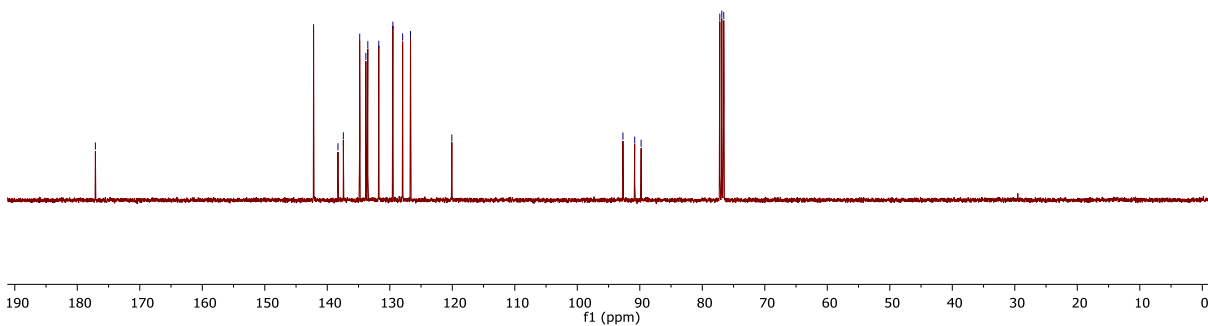
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137.431
134.813
133.832
133.517
131.758
129.505
127.944
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77.200
76.882
76.564

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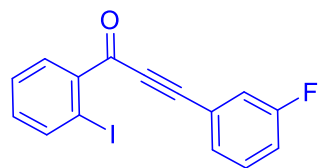


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^{13}C NMR (400 MHz, CDCl_3)

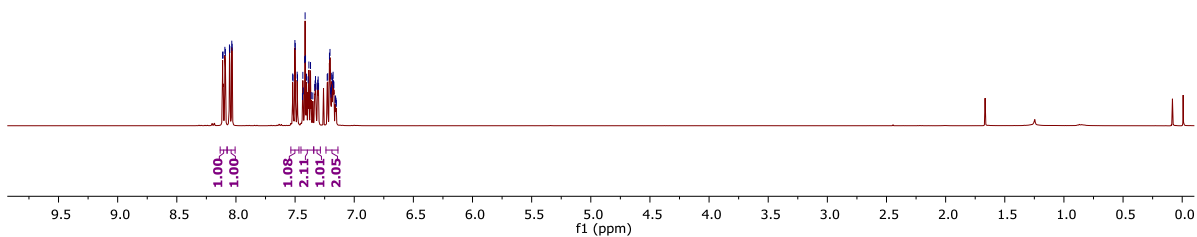


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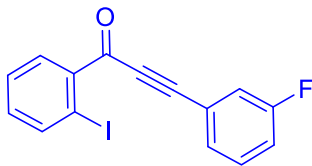


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^1H NMR (400 MHz, CDCl_3)

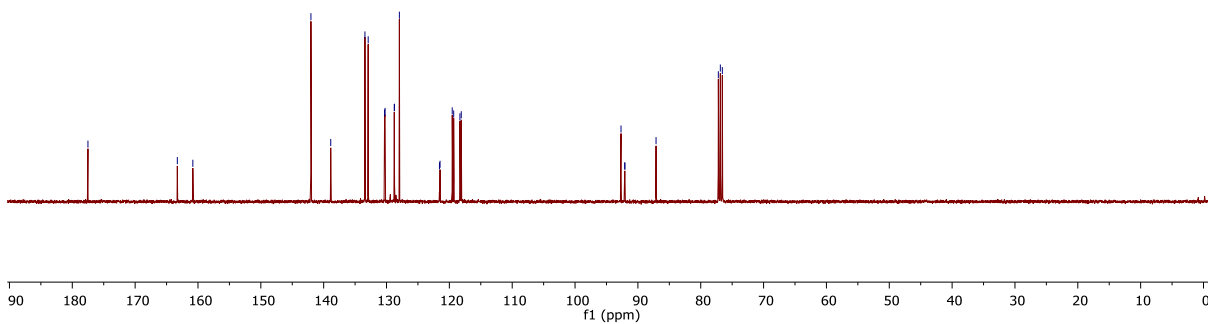


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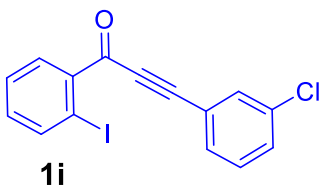


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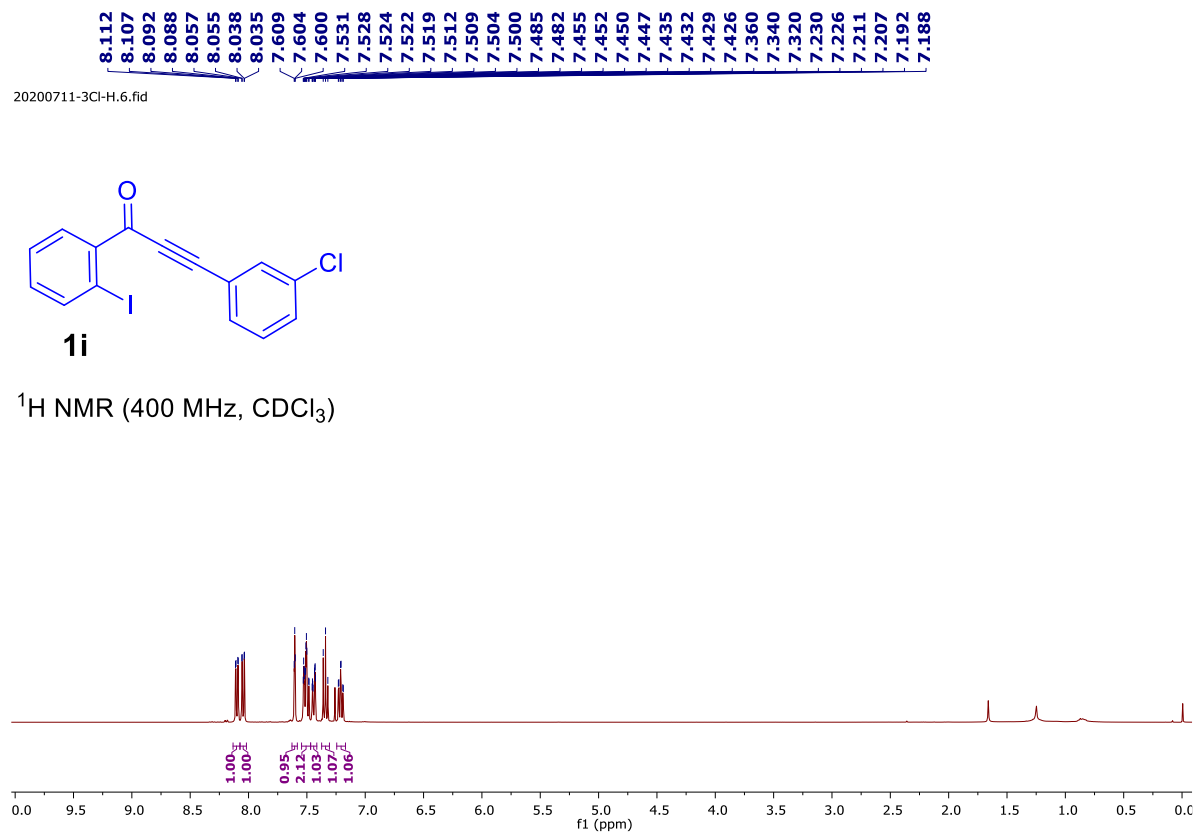
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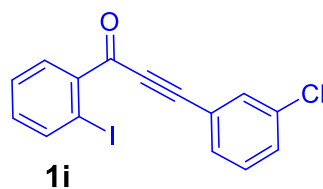
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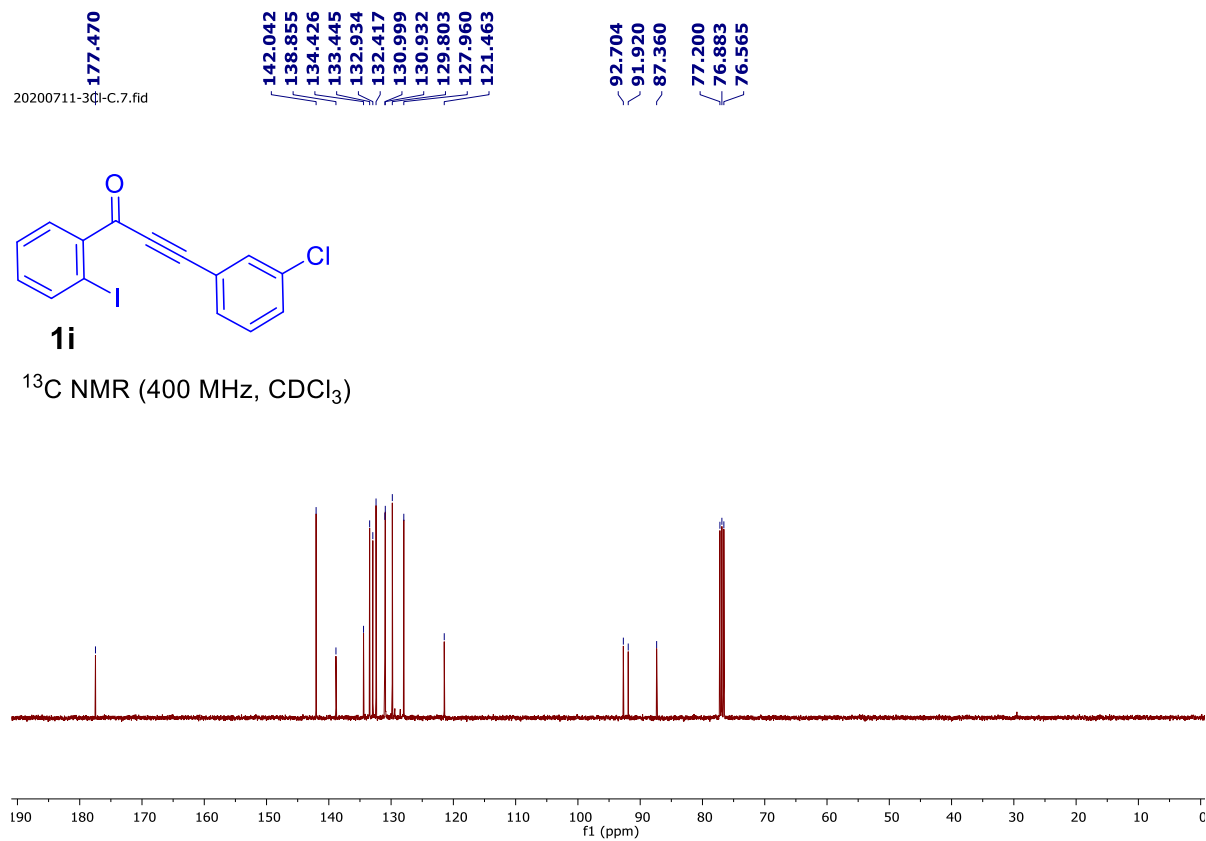
¹H NMR (400 MHz, CDCl₃)



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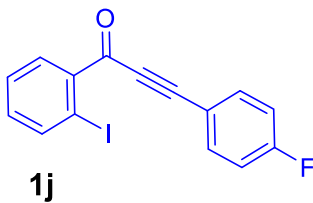


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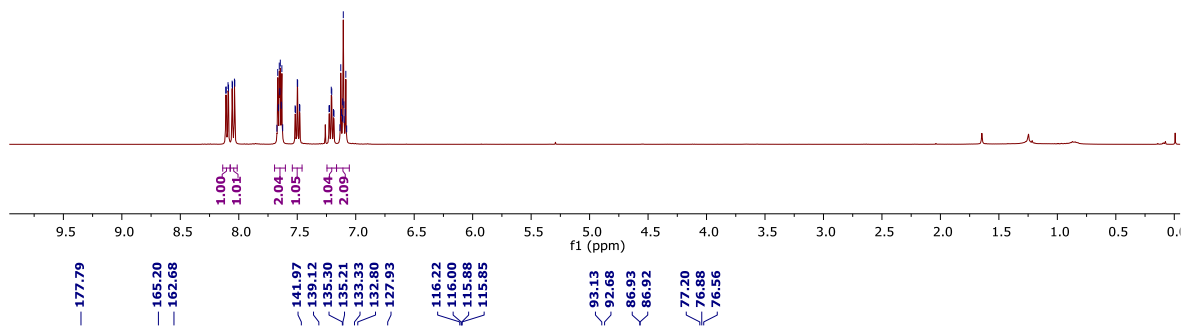


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8.107
8.102
8.096
8.097
8.054
8.037
8.034
7.674
7.667
7.661
7.654
7.649
7.645
7.637
7.632
7.624
7.518
7.515
7.500
7.497
7.481
7.478
7.228
7.224
7.209
7.205
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7.077

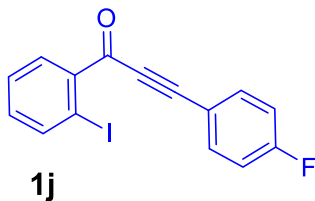
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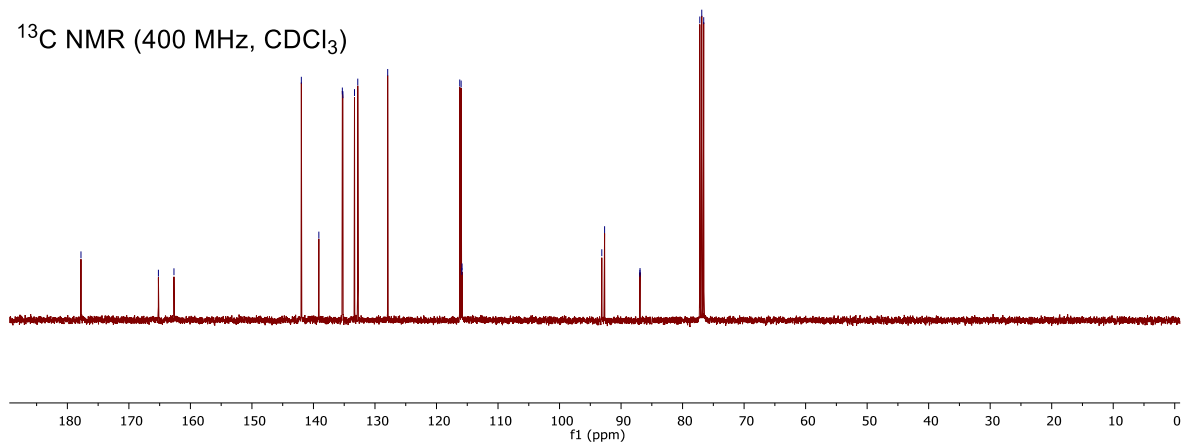
¹H NMR (400 MHz, CDCl₃)



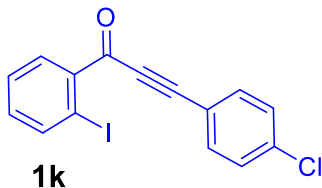
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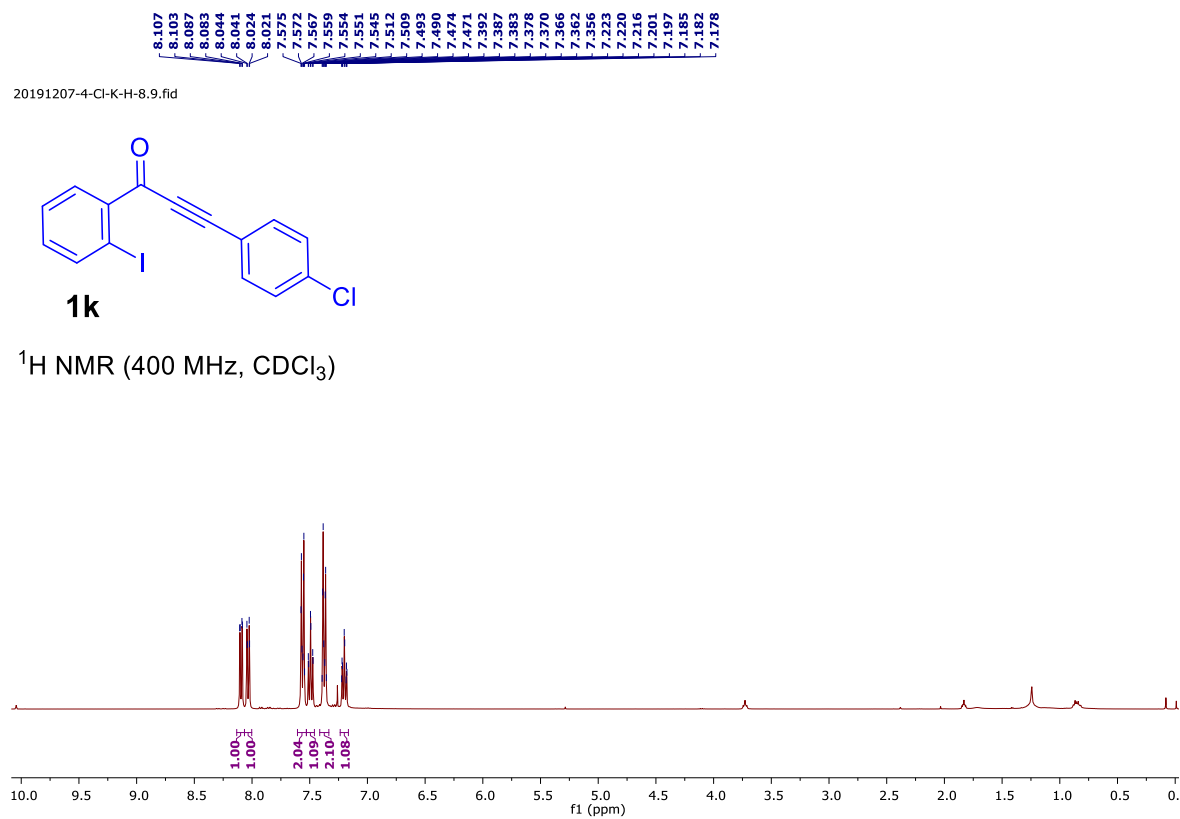
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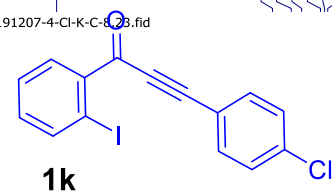
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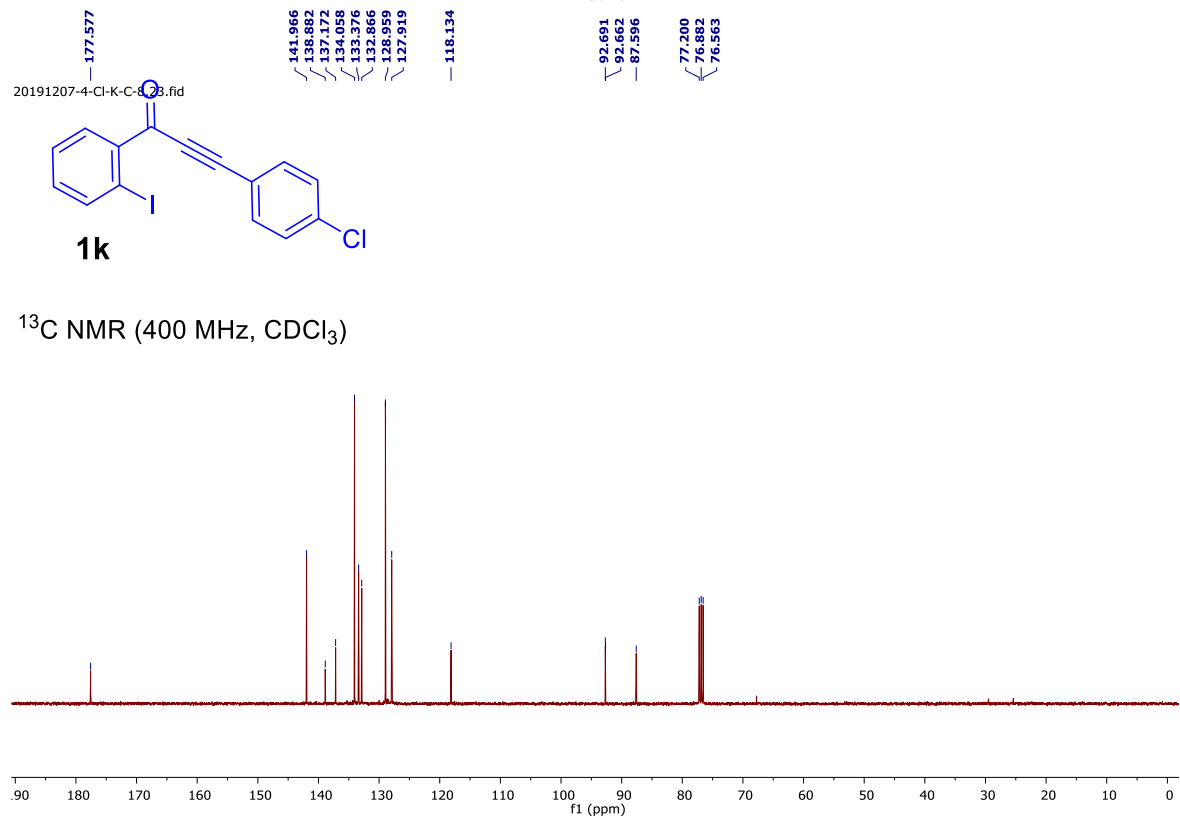
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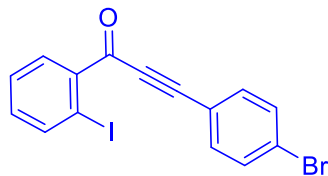


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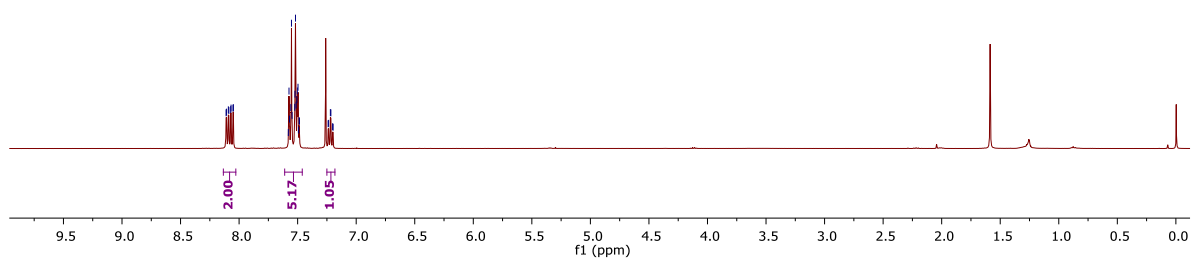
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7.569
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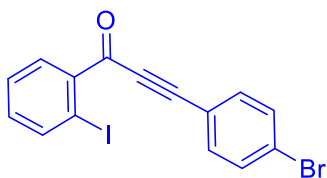
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^1H NMR (400 MHz, CDCl_3)



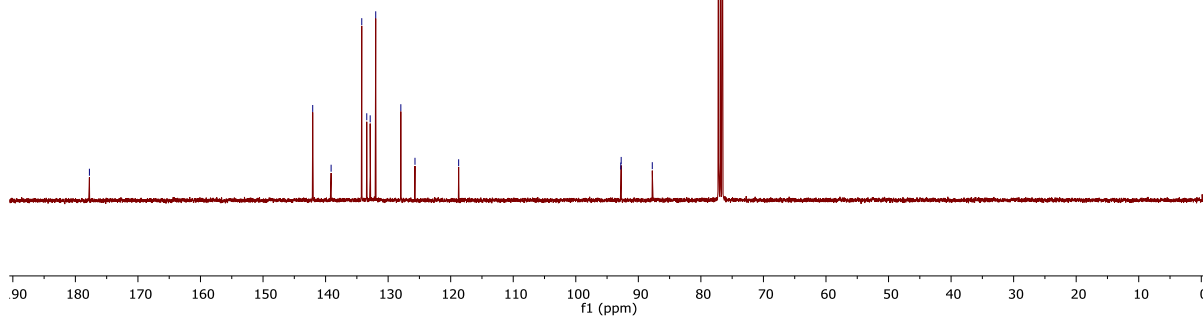
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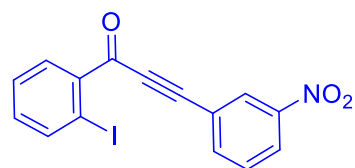
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142.058
139.117
134.216
133.416
132.870
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87.770
77.200
76.882
76.565



11

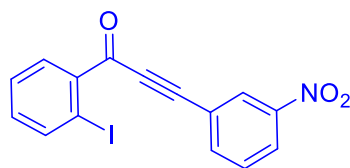
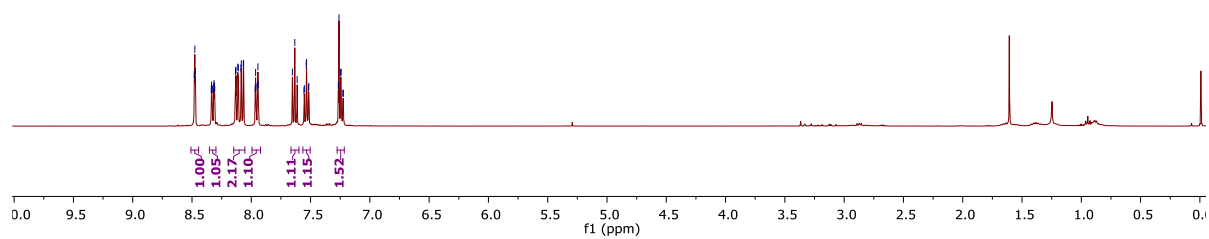
^{13}C NMR (400 MHz, CDCl_3)





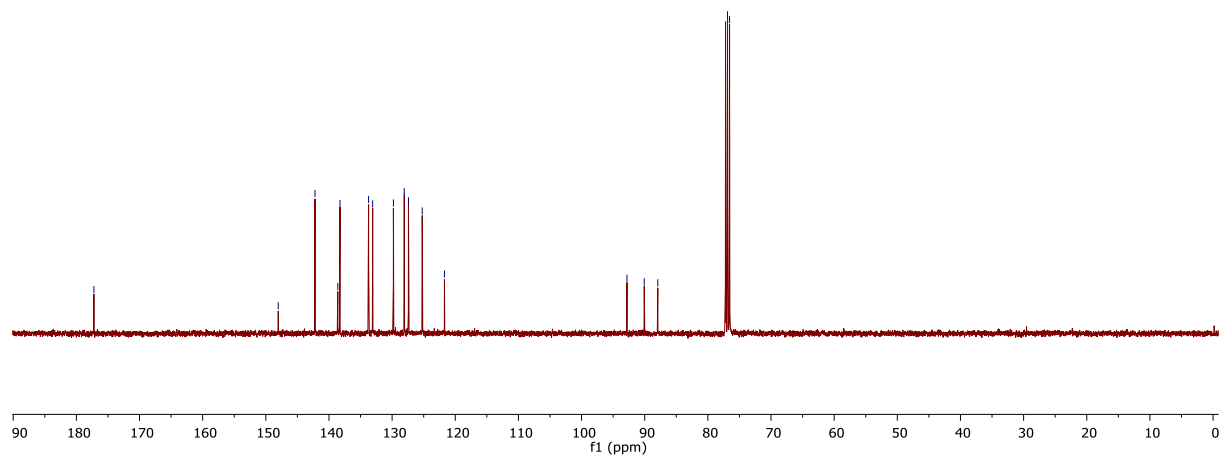
1m

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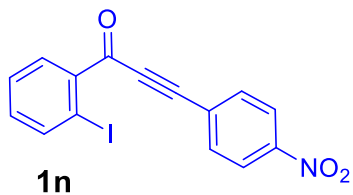
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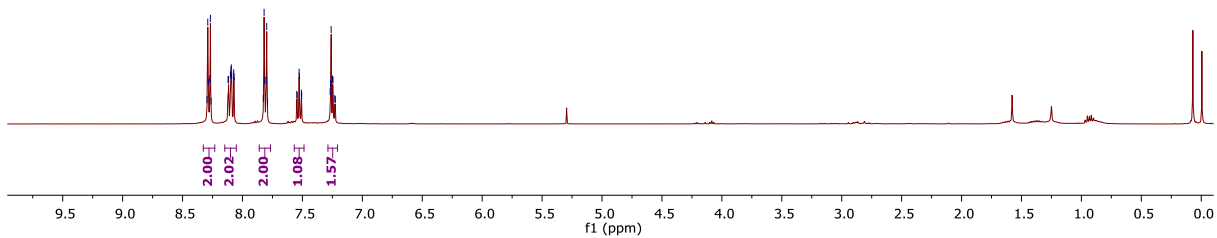


8.296
8.290
8.285
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8.262
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8.073
8.070
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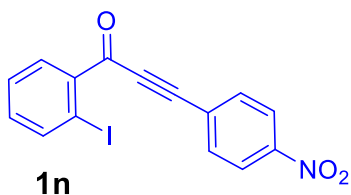


$^1\text{H NMR}$ (400 MHz, CDCl_3)

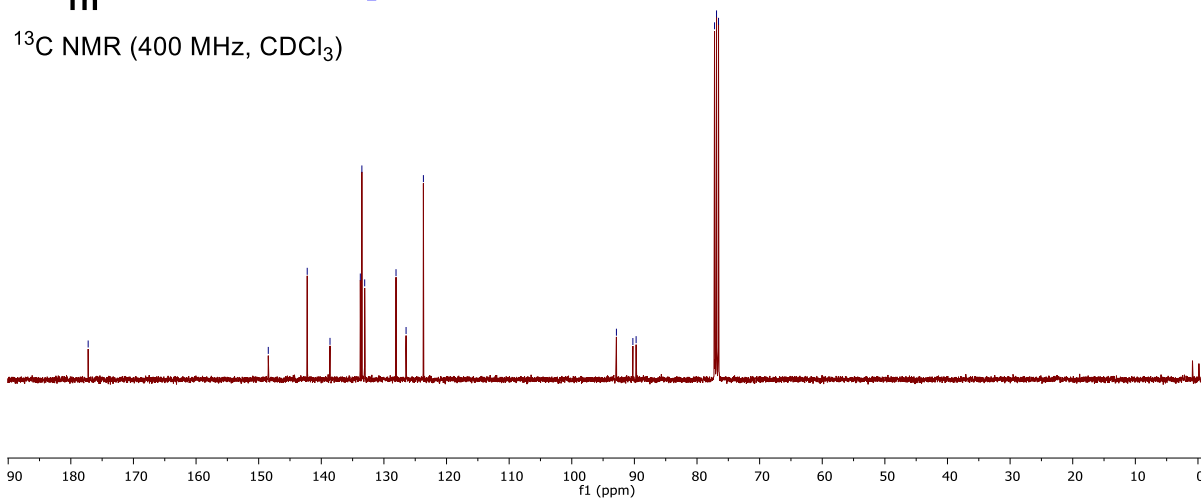


177.230
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142.247
138.610
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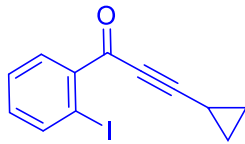
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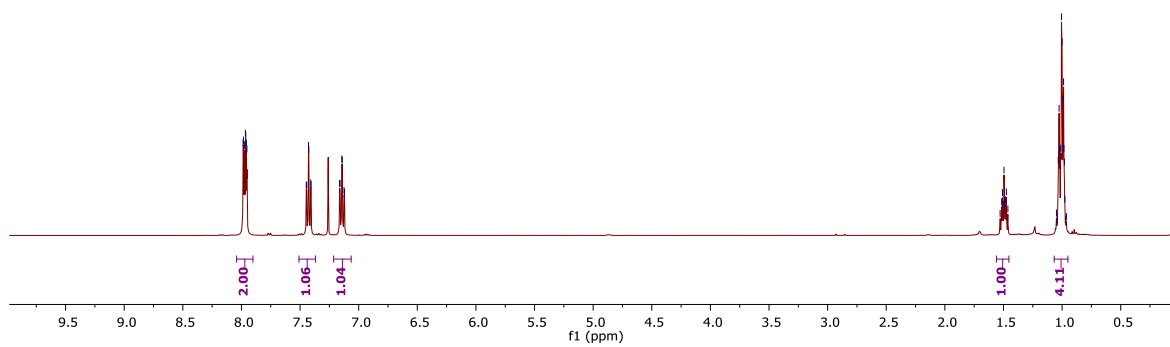


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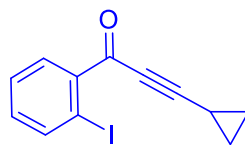


1o

^1H NMR (400 MHz, CDCl_3)

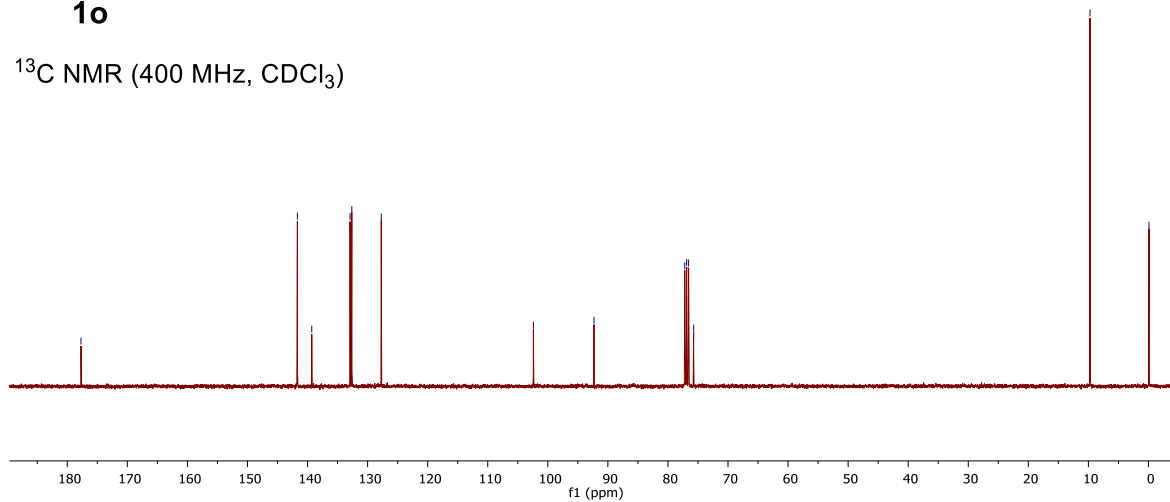


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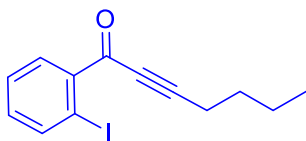


1o

^{13}C NMR (400 MHz, CDCl_3)

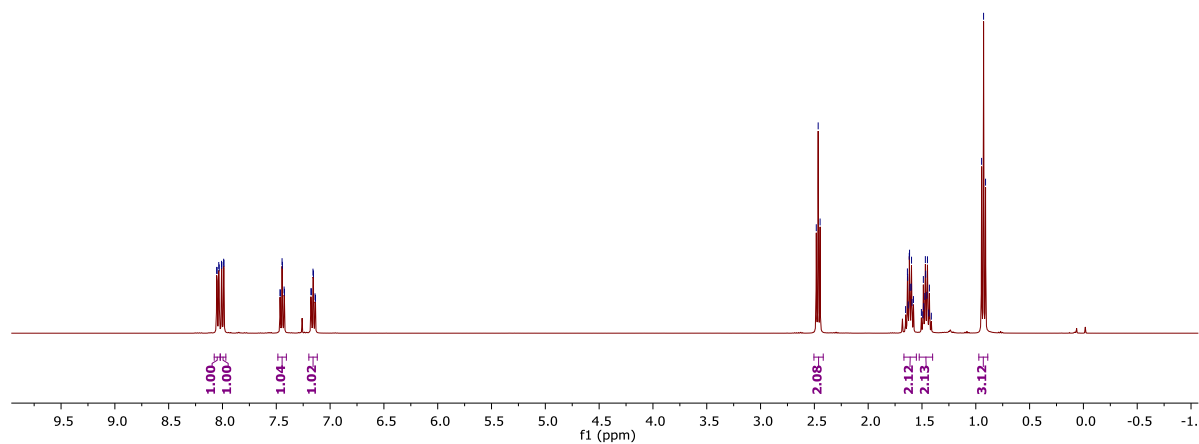


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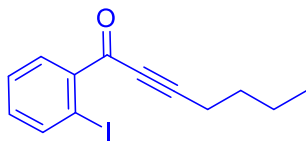


1p

¹H NMR (400 MHz, CDCl₃)

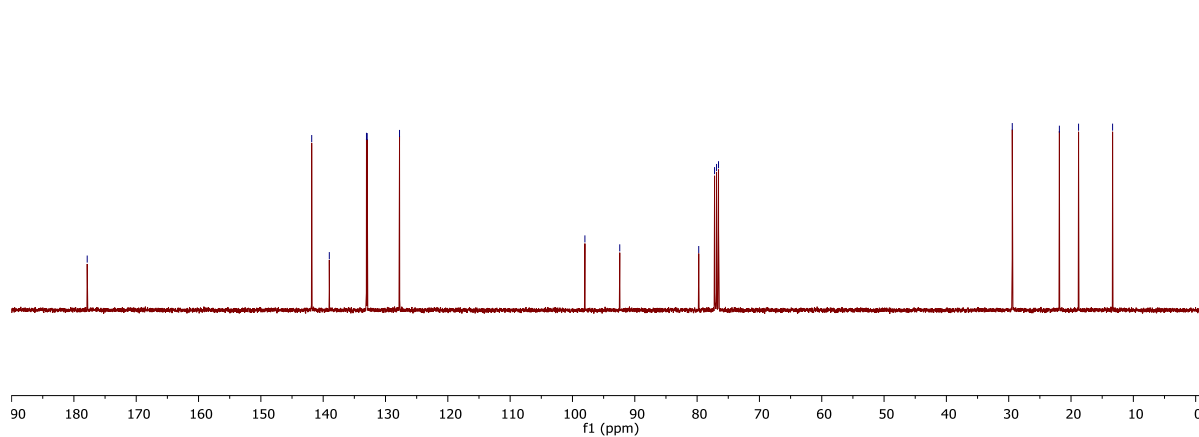


20191207-n-Bu-K-C-6.21.fid



1p

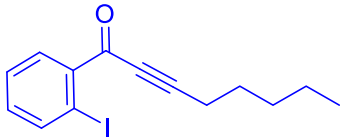
¹³C NMR (400 MHz, CDCl₃)



8.057
8.033
8.034
8.004
7.984
7.459
7.440
7.422
7.175
7.172
7.168
7.156
7.152
7.137
7.133

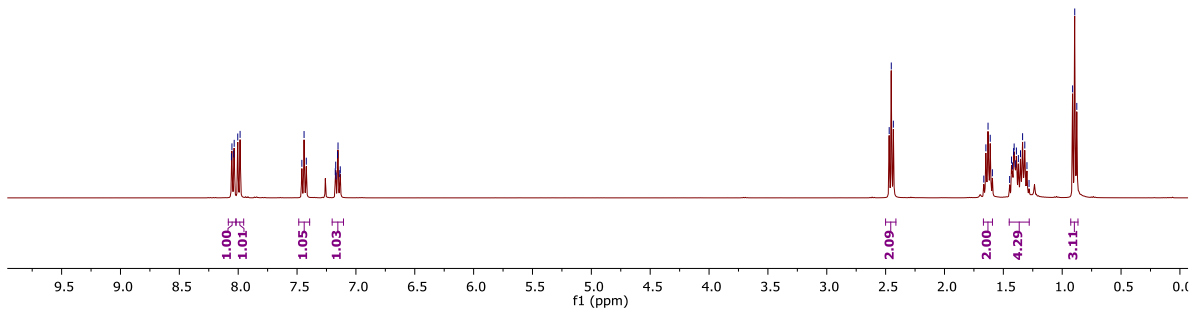
2.470
2.452
2.434
1.666
1.648
1.630
1.612
1.593
1.496
1.430
1.423
1.413
1.408
1.399
1.389
1.372
1.354
1.336
1.318
1.299
1.282
0.912
0.894
0.876

20200124-4-H.30.fid

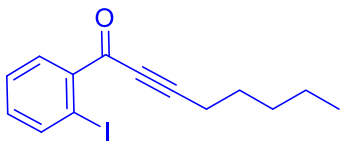


1q

¹H NMR (400 MHz, CDCl₃)

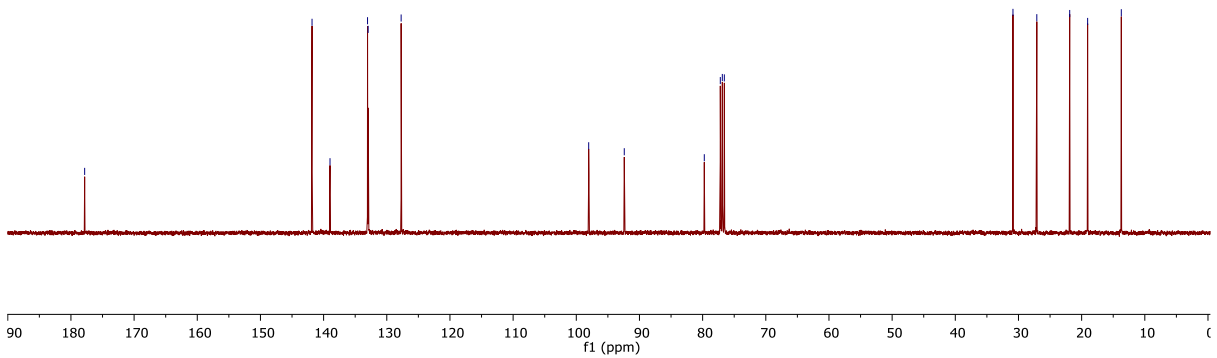


20200124-4-C.31.fid

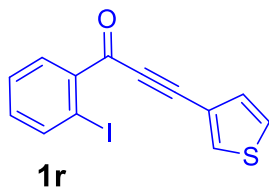


1q

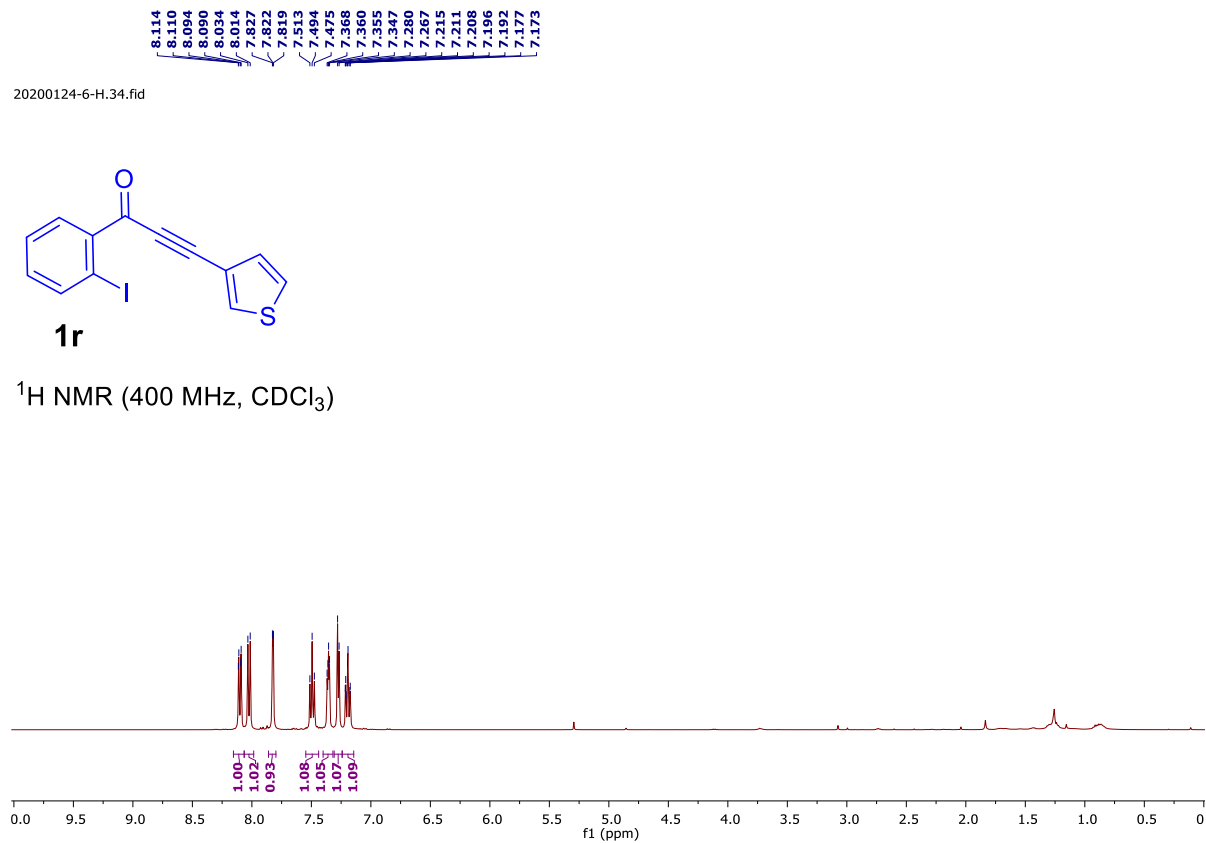
¹³C NMR (400 MHz, CDCl₃)



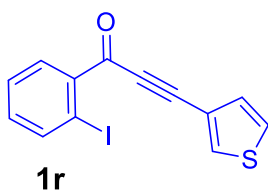
20200124-6-H.34.fid



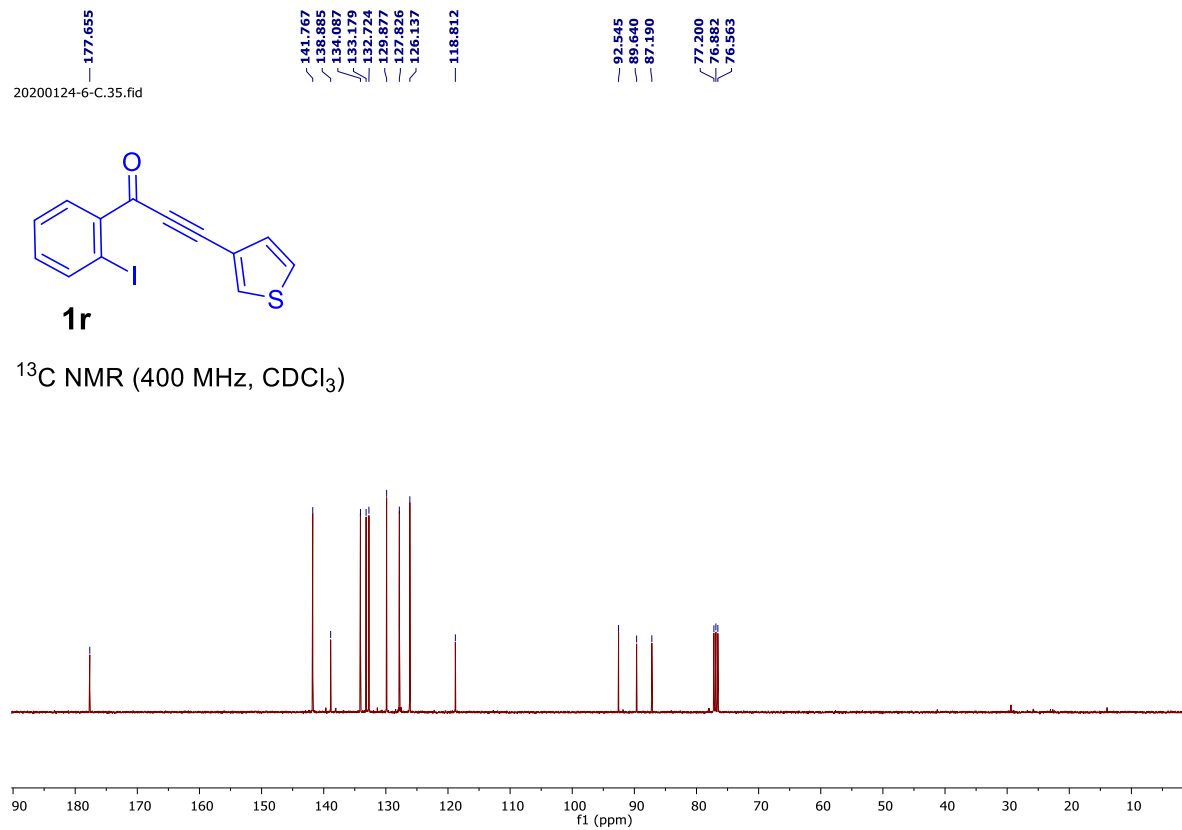
¹H NMR (400 MHz, CDCl₃)



20200124-6-C.35.fid

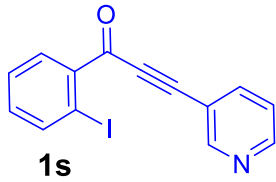


¹³C NMR (400 MHz, CDCl₃)

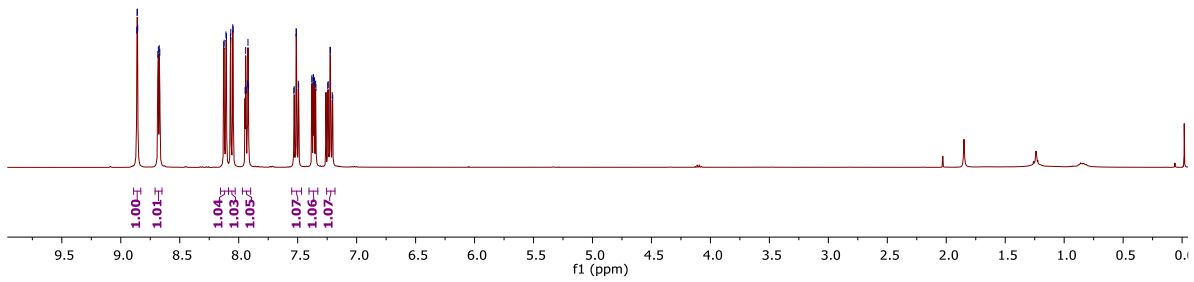


8.864
8.862
8.859
8.857
8.886
8.851
8.669
8.138
8.123
8.108
8.104
8.070
8.067
8.050
8.047
7.946
7.941
7.936
7.926
7.921
7.917
7.532
7.529
7.514
7.511
7.495
7.492
7.380
7.378
7.368
7.365
7.360
7.358
7.348
7.346
7.245
7.241
7.226
7.222
7.207
7.203

20191207-Pyri-K-H-9.10.fid

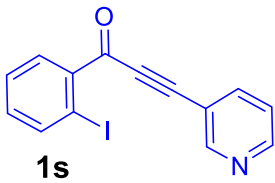


¹H NMR (400 MHz, CDCl₃)

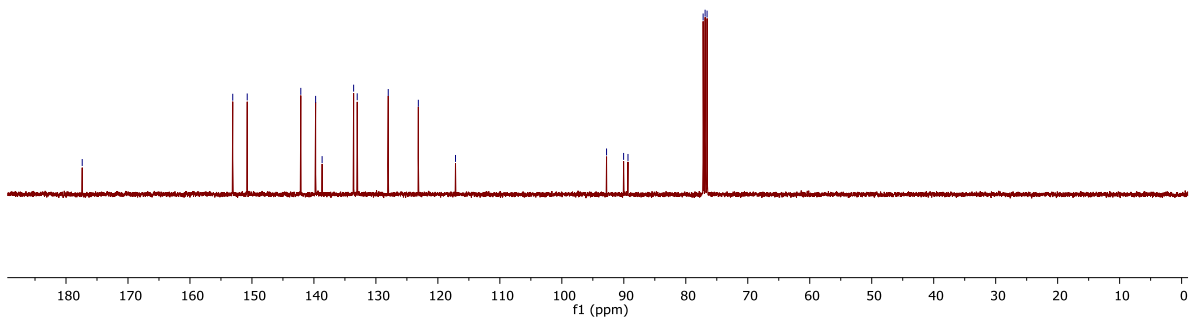


177.383
153.097
150.760
142.116
136.726
136.676
133.593
133.012
128.007
123.152
117.154
82.783
80.051
89.327
77.200
76.882
76.564

20191207-Pyri-K-C-9.24.fid

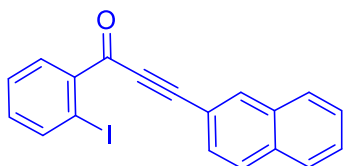


¹³C NMR (400 MHz, CDCl₃)



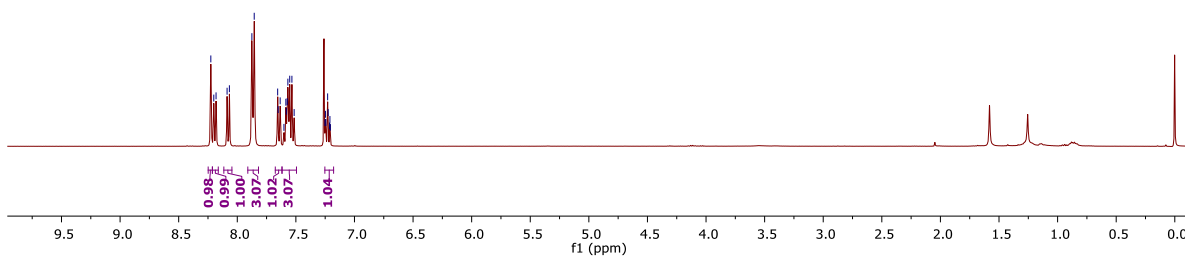
8.226
8.200
8.181
8.087
8.067
7.875
7.855
7.655
7.634
7.602
7.585
7.582
7.574
7.568
7.552
7.534
7.515
7.252
7.248
7.244
7.229
7.225
7.213
7.209
7.206

20200718-S22S15-H.20.fid



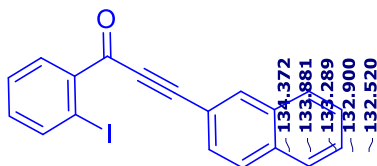
1t

¹H NMR (400 MHz, CDCl₃)



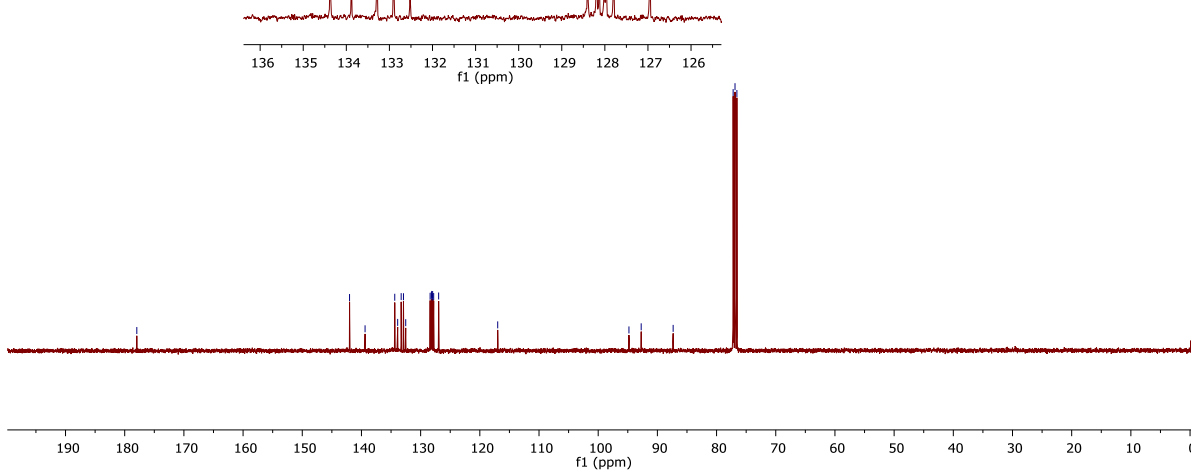
177.956
142.010
139.388
134.372
133.881
133.289
132.900
132.520
128.398
128.191
128.130
128.011
127.970
127.796
126.957
116.979
94.806
92.736
87.336
77.201
76.884
76.566

20200718-S22S15-Q1.41.fid



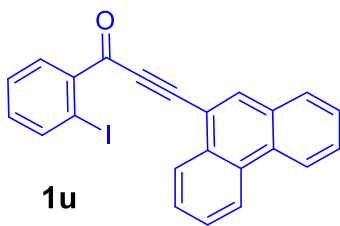
1t

¹³C NMR (400 MHz, CDCl₃)

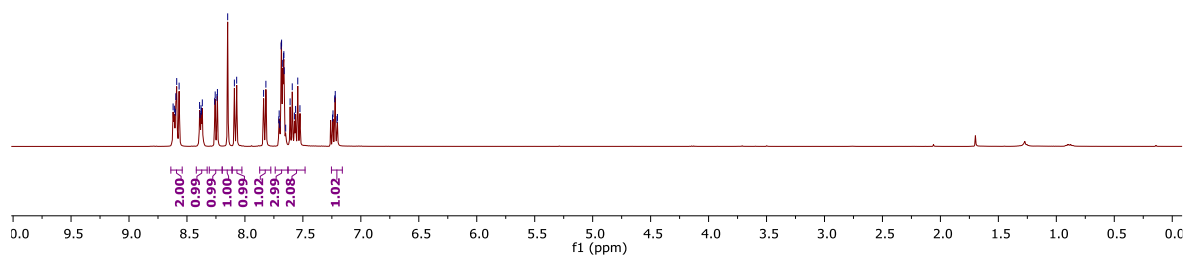


8.620
8.609
8.600
8.596
8.589
8.568
8.391
8.387
8.379
8.375
8.367
8.261
8.256
8.254
8.237
8.149
8.091
8.071
8.071
7.839
7.819
7.708
7.704
7.700
7.688
7.684
7.674
7.666
7.666
7.661
7.648
7.610
7.592
7.573
7.563
7.544
7.525
7.284
7.240
7.225
7.221
7.206
7.202

20200129-5-H.56.fid

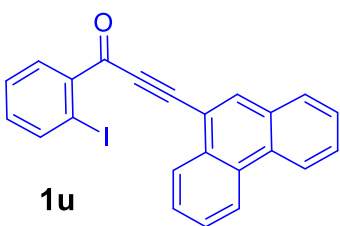


¹H NMR (400 MHz, CDCl₃)

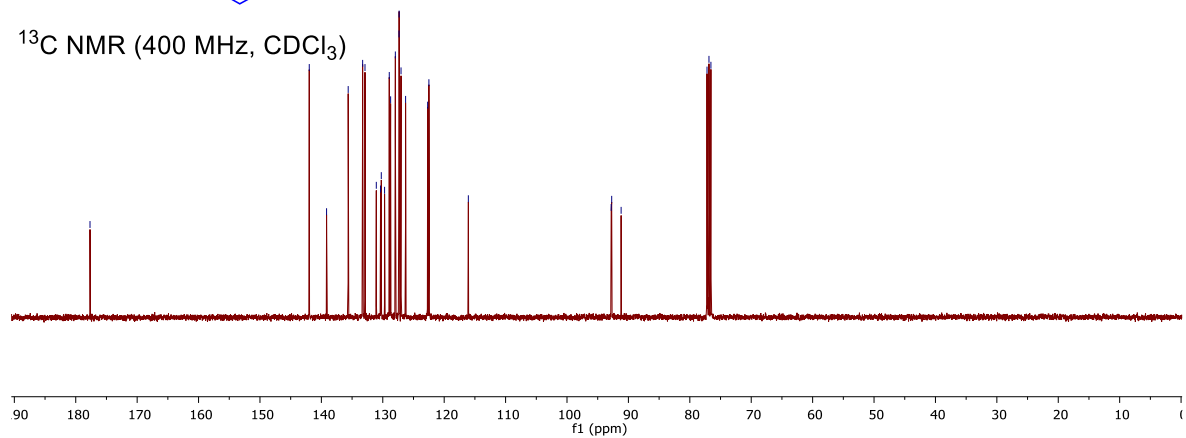


177.678
141.974
138.132
133.290
132.897
131.056
130.363
130.243
129.707
128.944
128.722
127.954
127.355
127.340
127.027
126.284
122.694
122.489
116.066
92.805
92.721
91.187
77.200
76.882
76.564

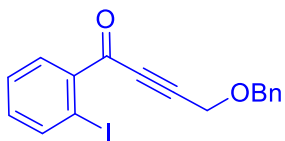
20200129-5-C.57.fid



¹³C NMR (400 MHz, CDCl₃)

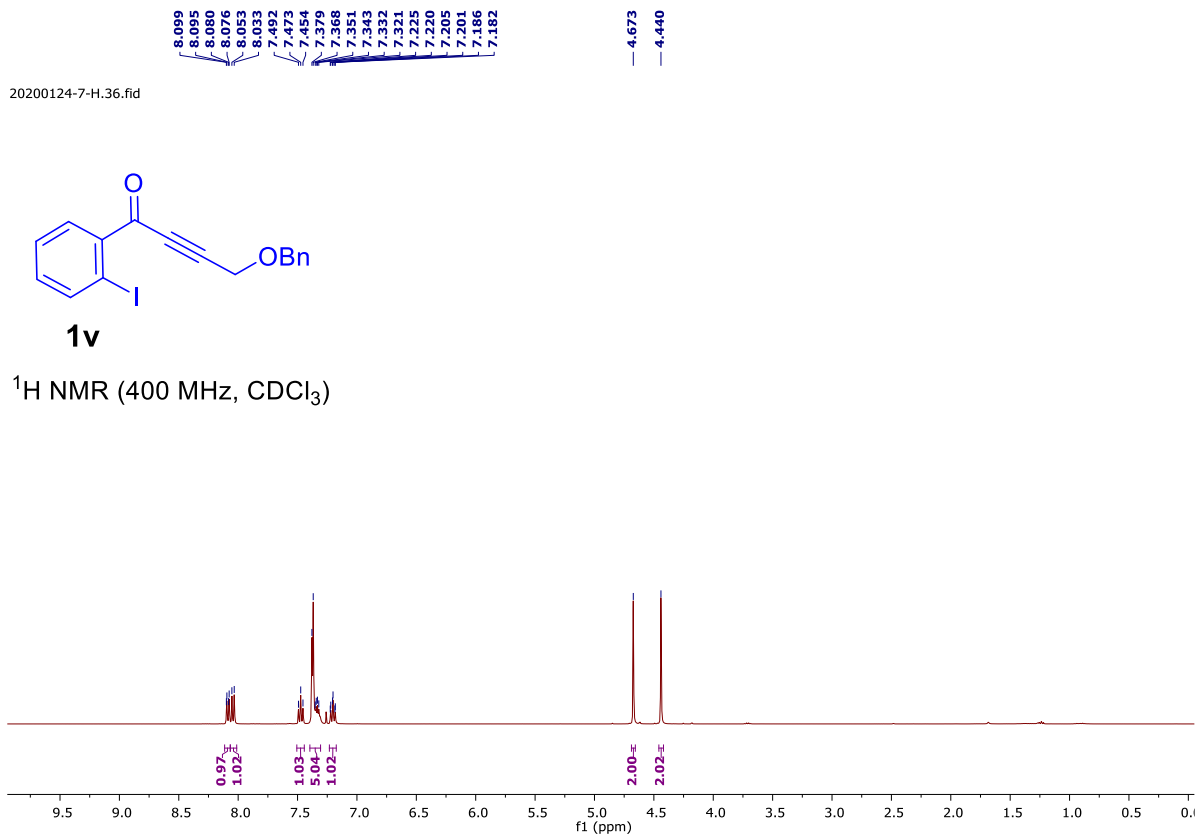


20200124-7-H.36.fid

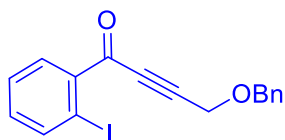


1v

^1H NMR (400 MHz, CDCl_3)

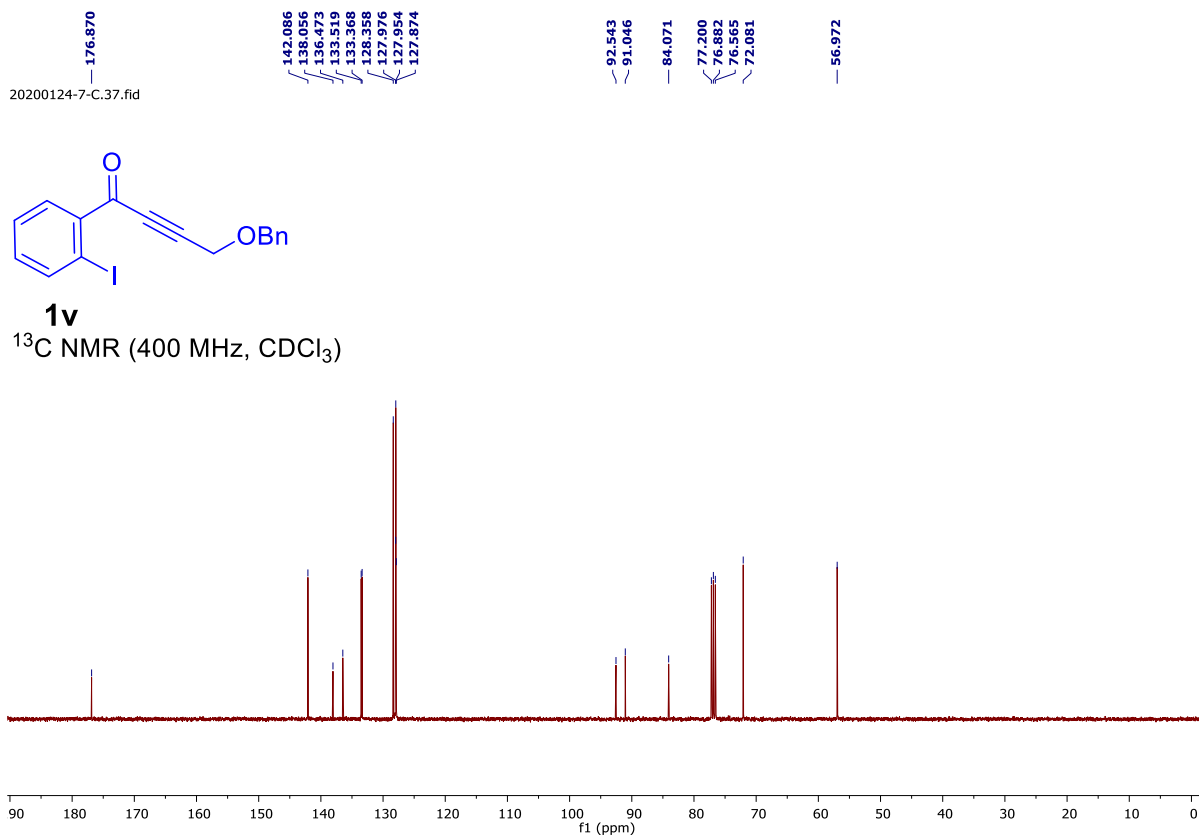


20200124-7-C.37.fid

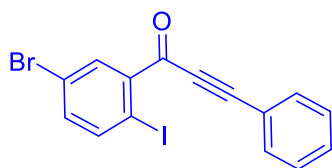


1v

^{13}C NMR (400 MHz, CDCl_3)

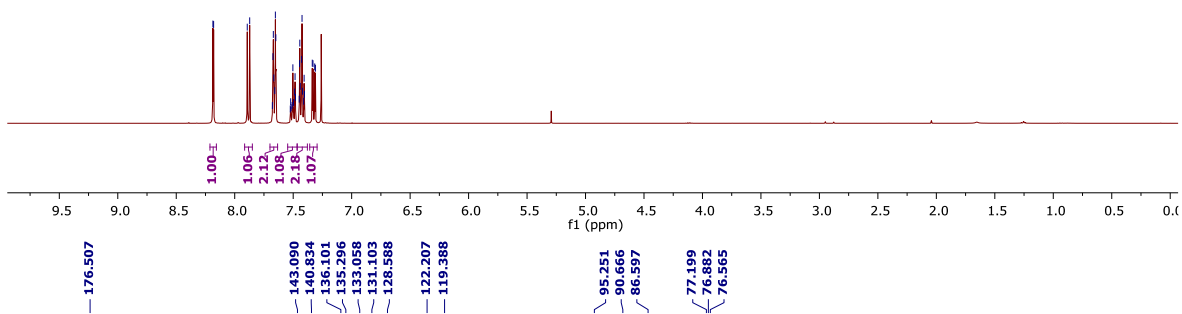


20191209-5-Br-Phe-K-H-13.36.fid

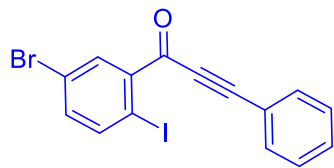


1ab

^1H NMR (400 MHz, CDCl_3)

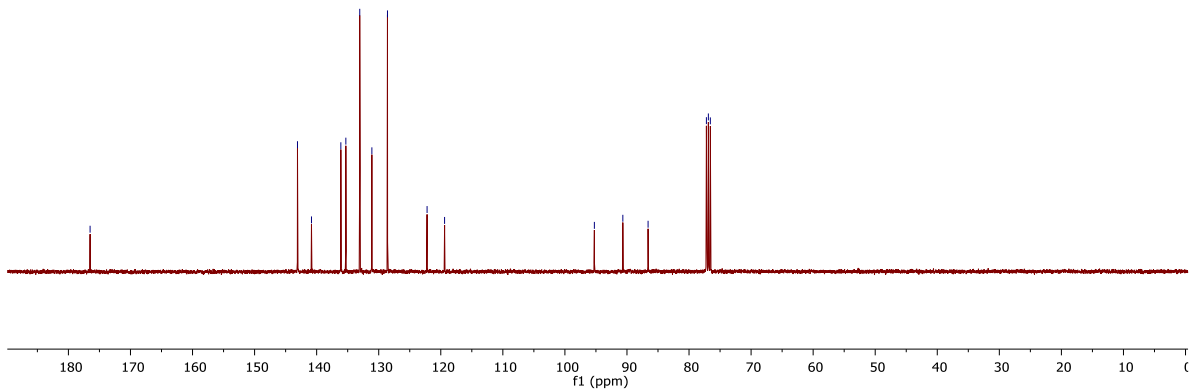


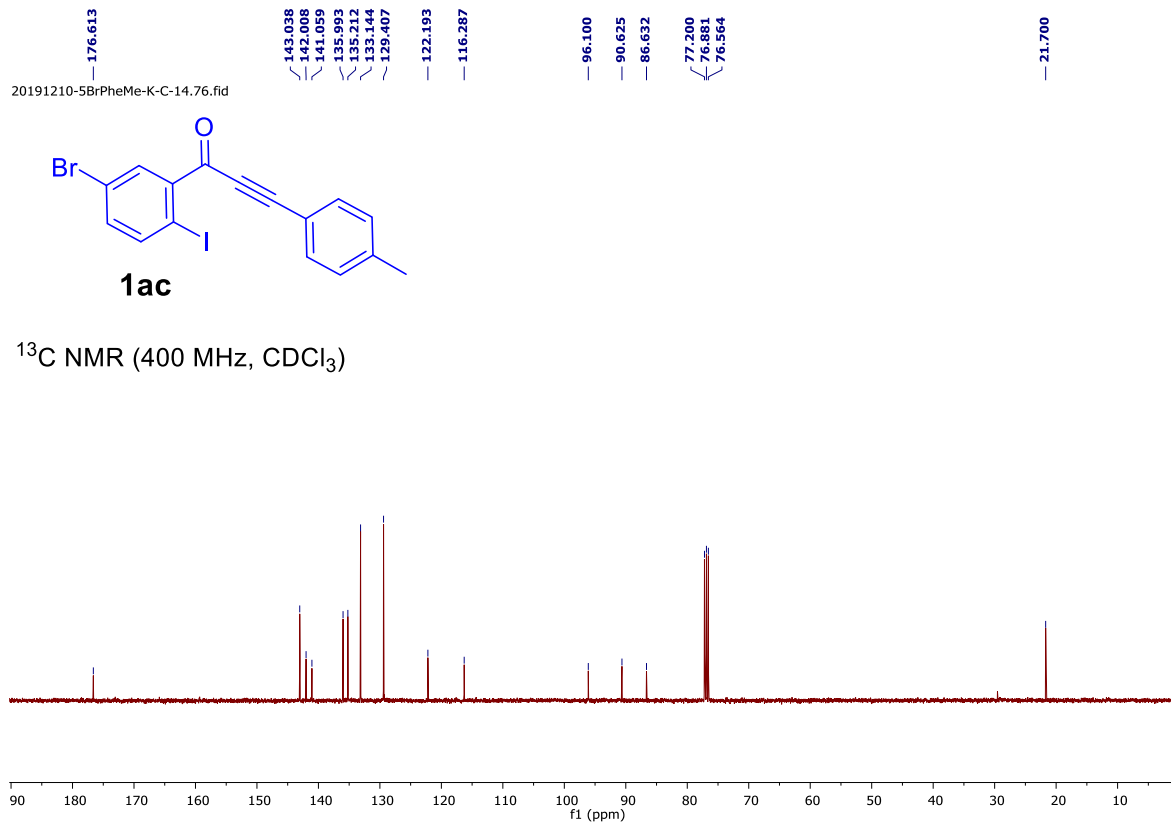
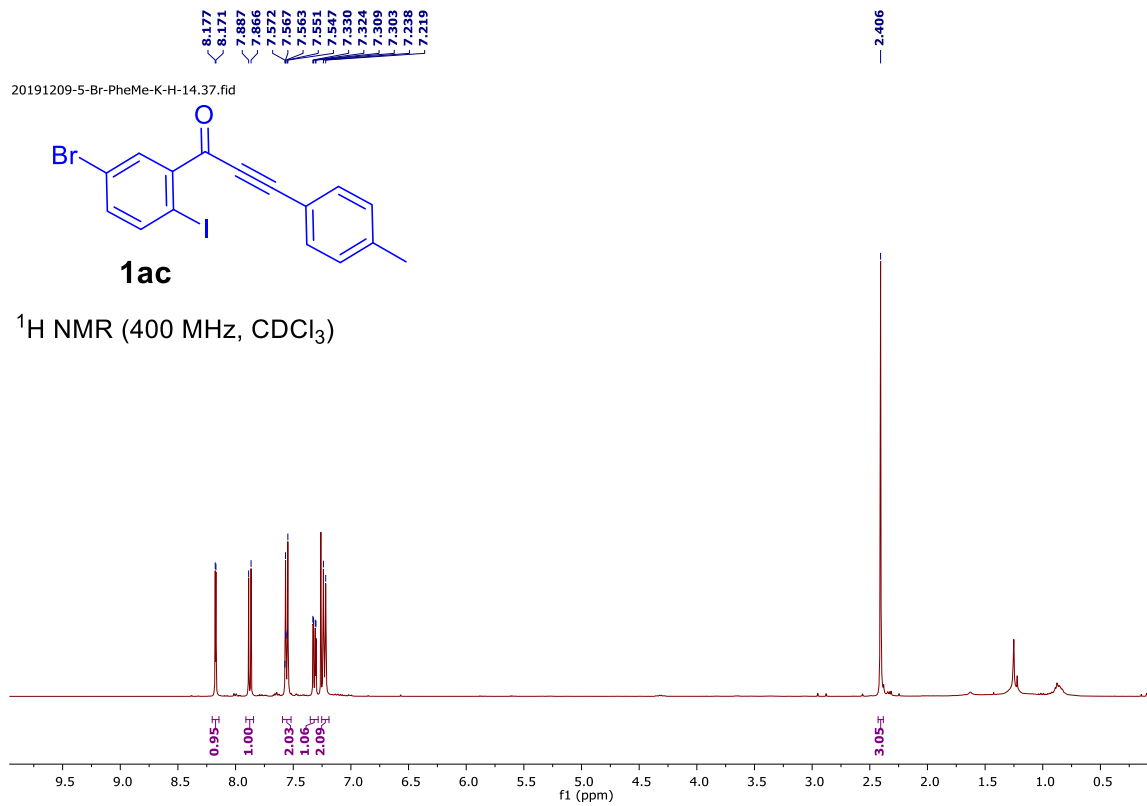
20191210-5BrPhe-K-C-13.75.fid



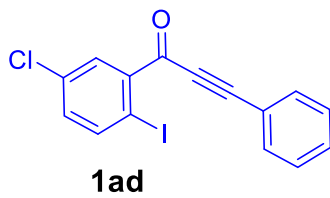
1ab

^{13}C NMR (400 MHz, CDCl_3)

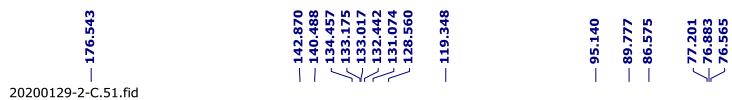
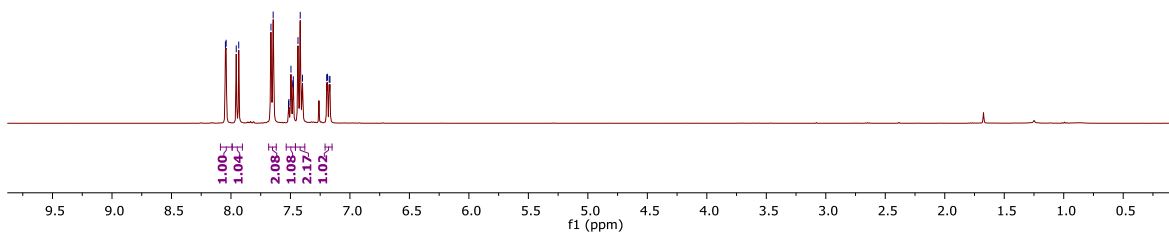




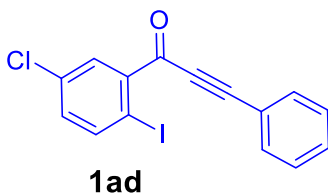
20200129-2-H.50.fid



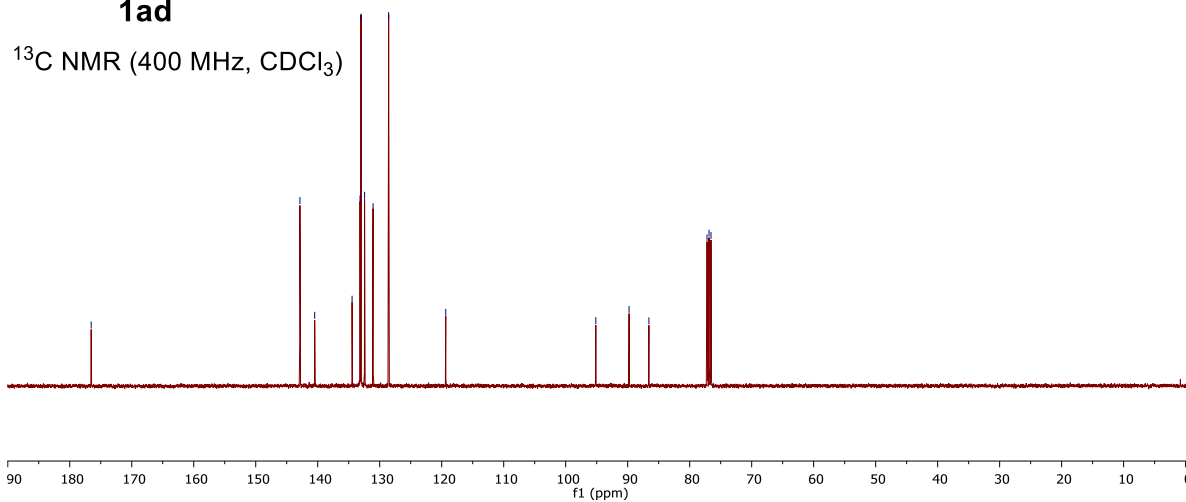
¹H NMR (400 MHz, CDCl₃)

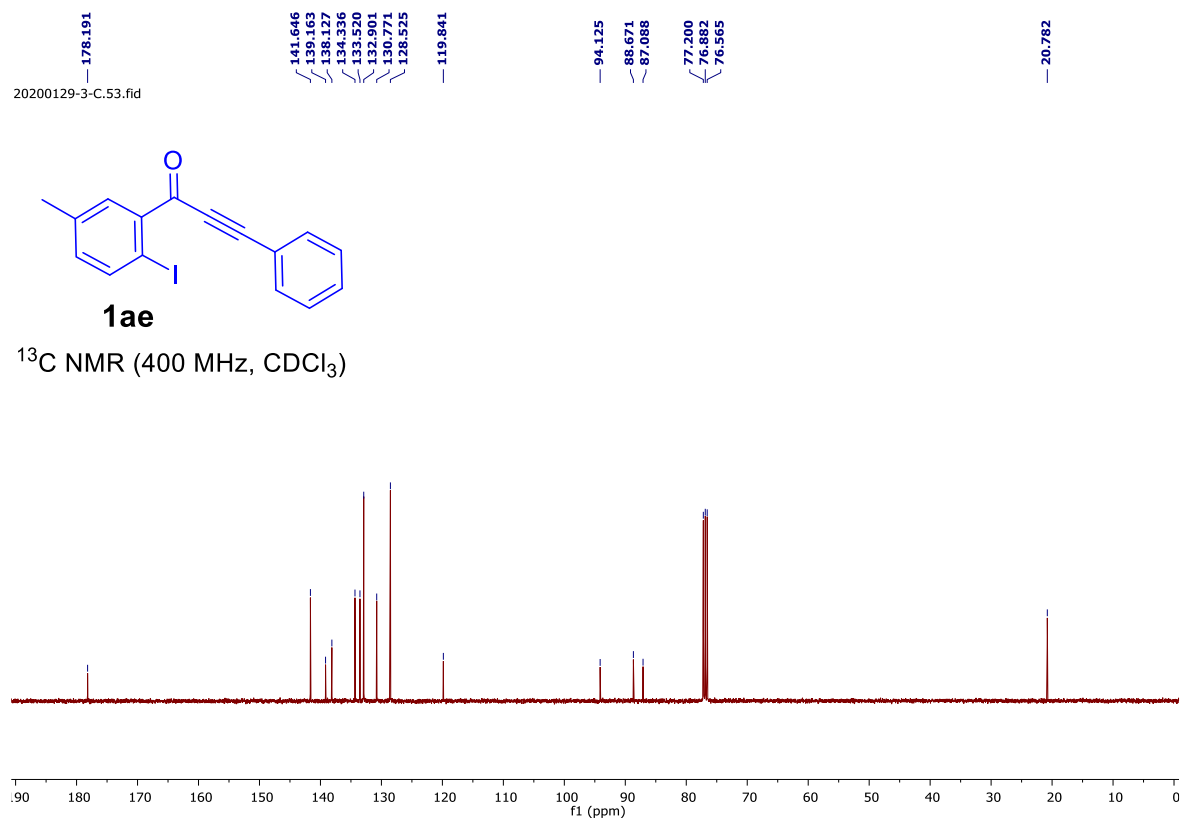
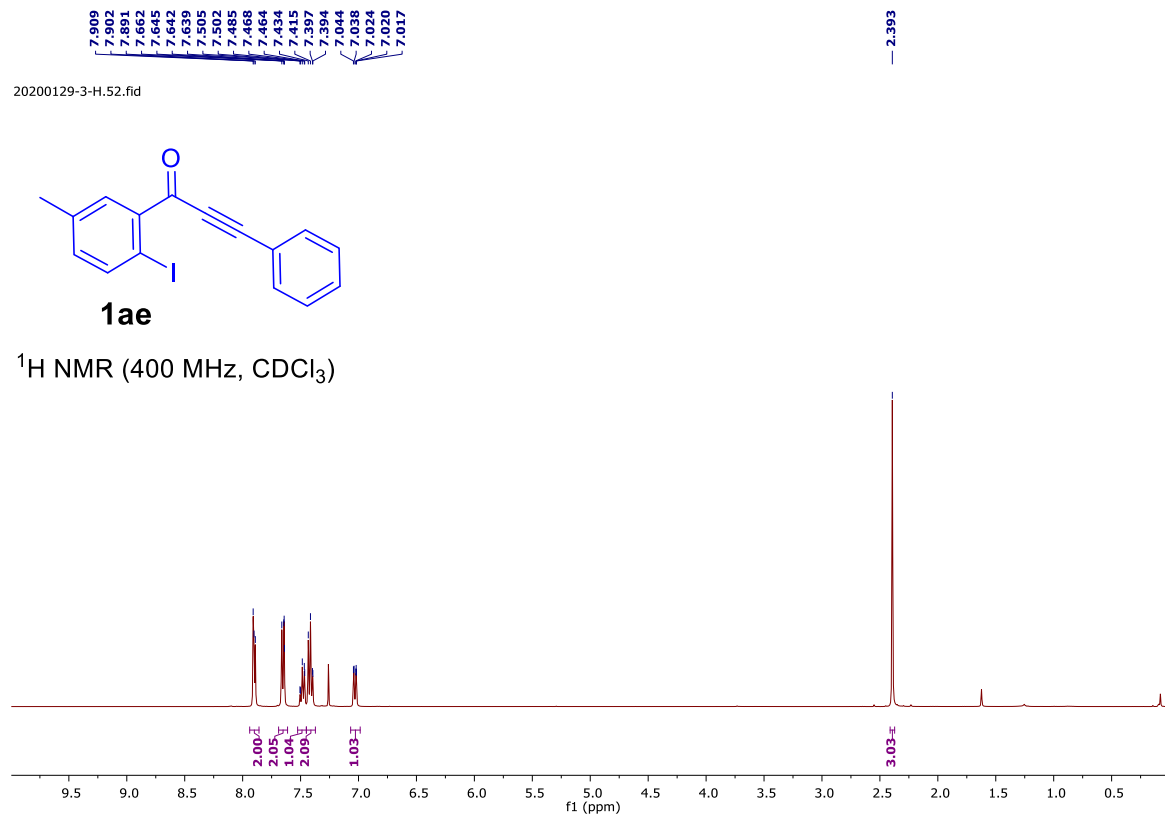


20200129-2-C.51.fid

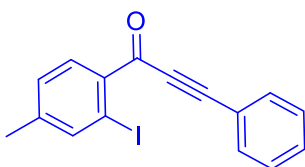


¹³C NMR (400 MHz, CDCl₃)



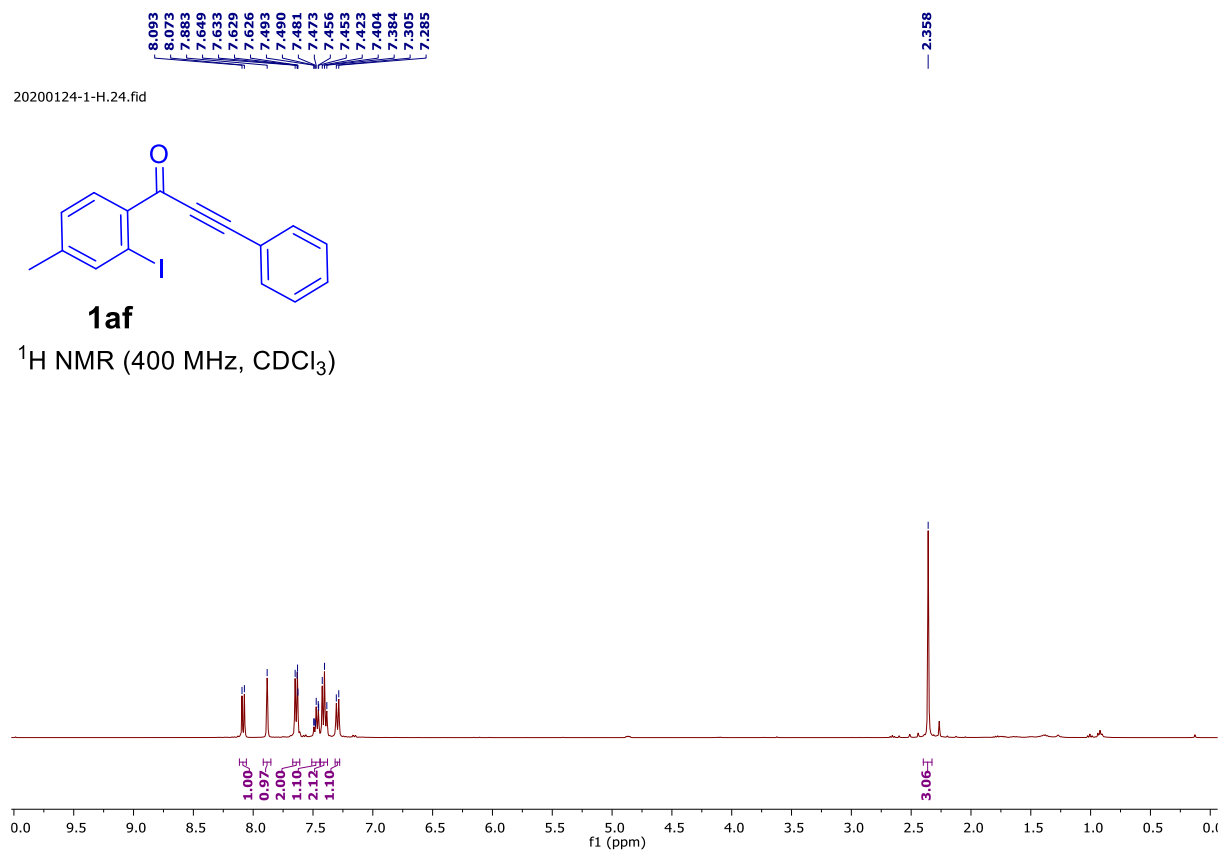


20200124-1-H.24.fid

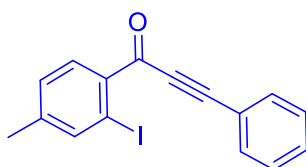


1af

^1H NMR (400 MHz, CDCl_3)

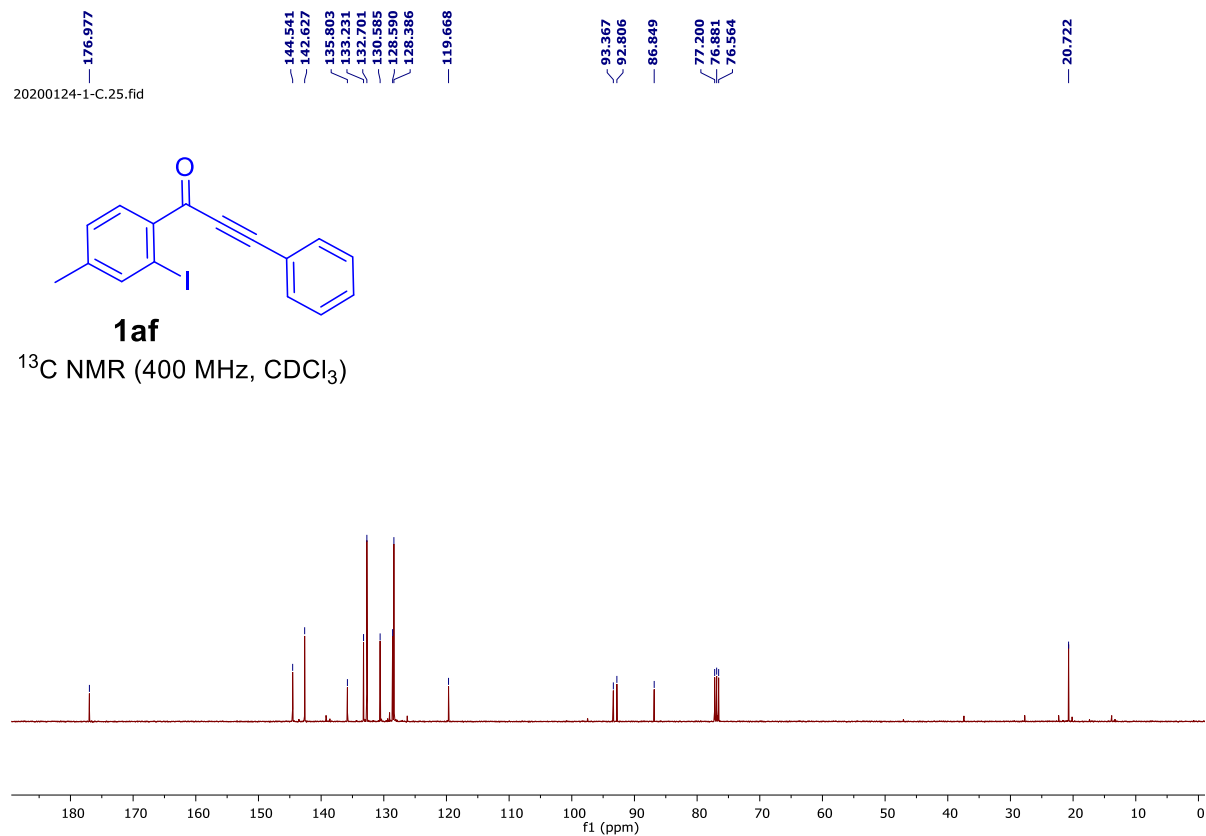


20200124-1-C.25.fid



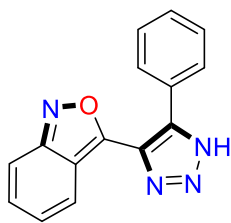
1af

^{13}C NMR (400 MHz, CDCl_3)



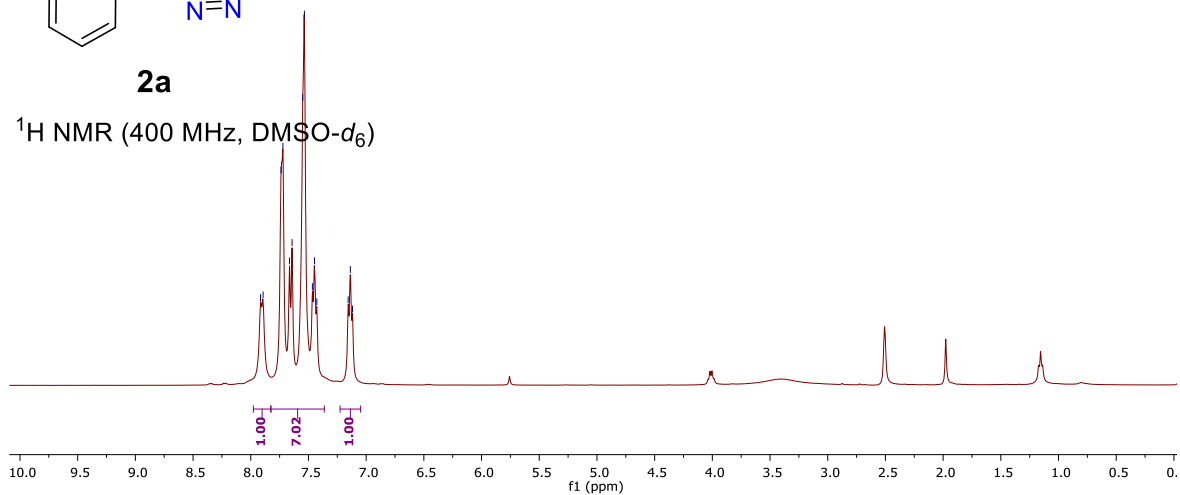
7.916
7.893
7.738
7.721
7.664
7.642
7.550
7.466
7.448
7.427
7.156
7.137
7.118

20191212-P22P1-H1.2.fid



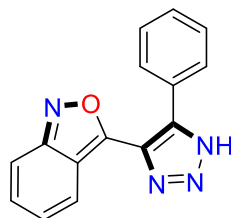
2a

^1H NMR (400 MHz, $\text{DMSO}-d_6$)



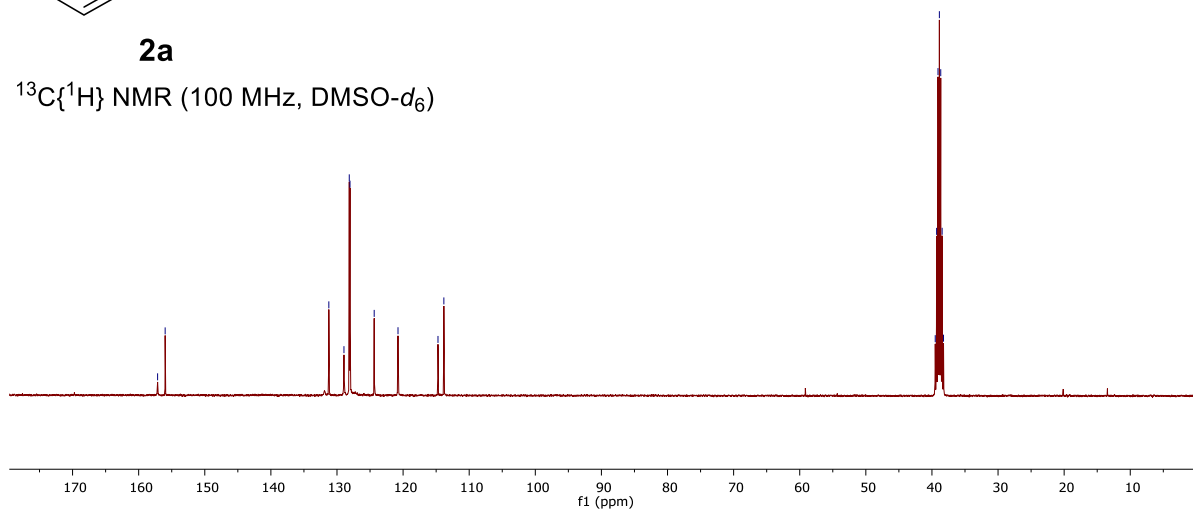
157.135
155.993
131.233
128.945
128.142
128.031
124.371
120.770
114.721
113.833

20191212-P22P1-C1.3.fid

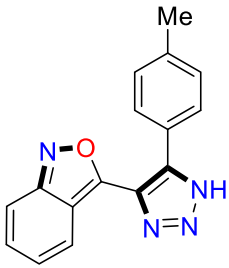


2a

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO}-d_6$)

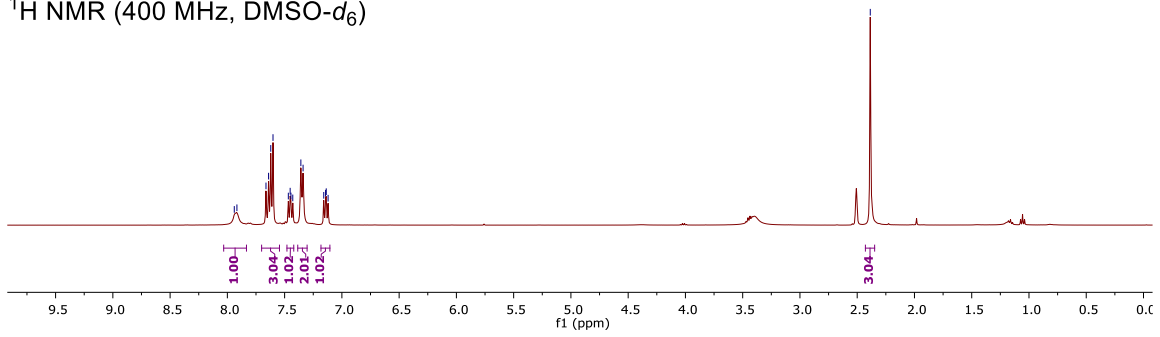


20200125-P22P2-H.41.fid

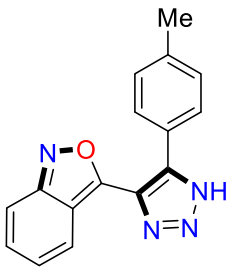


2b

^1H NMR (400 MHz, DMSO- d_6)

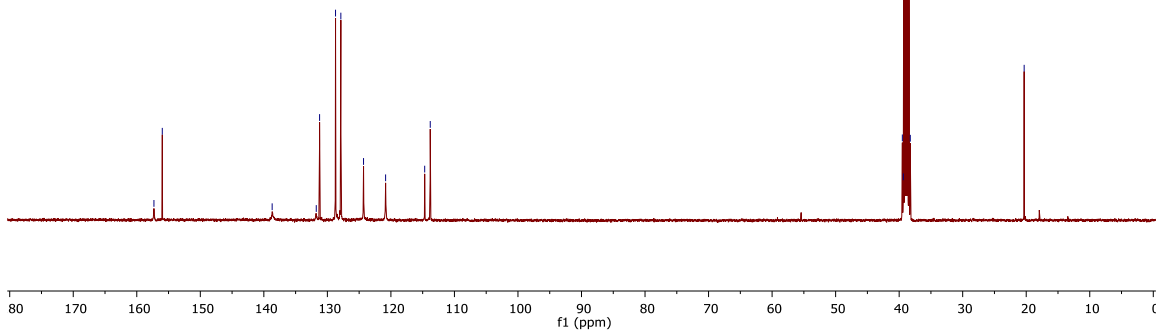


20200125-P22P2-C.42.fid

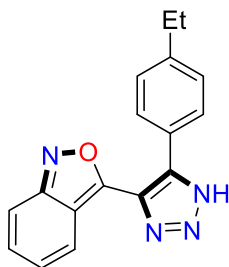


2b

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6)

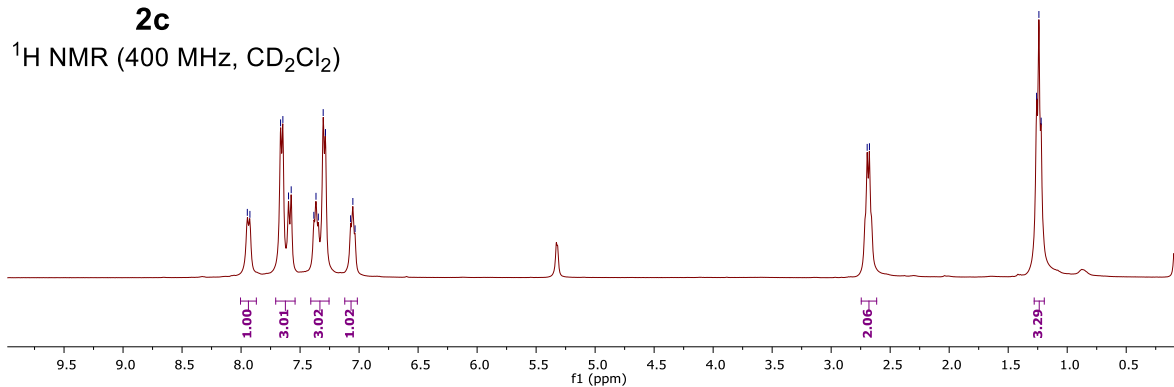


20191214-P22P3-H.3.fid
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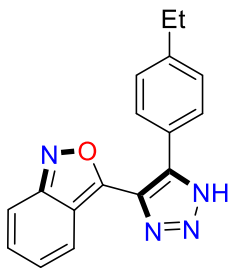


2c

^1H NMR (400 MHz, CD_2Cl_2)

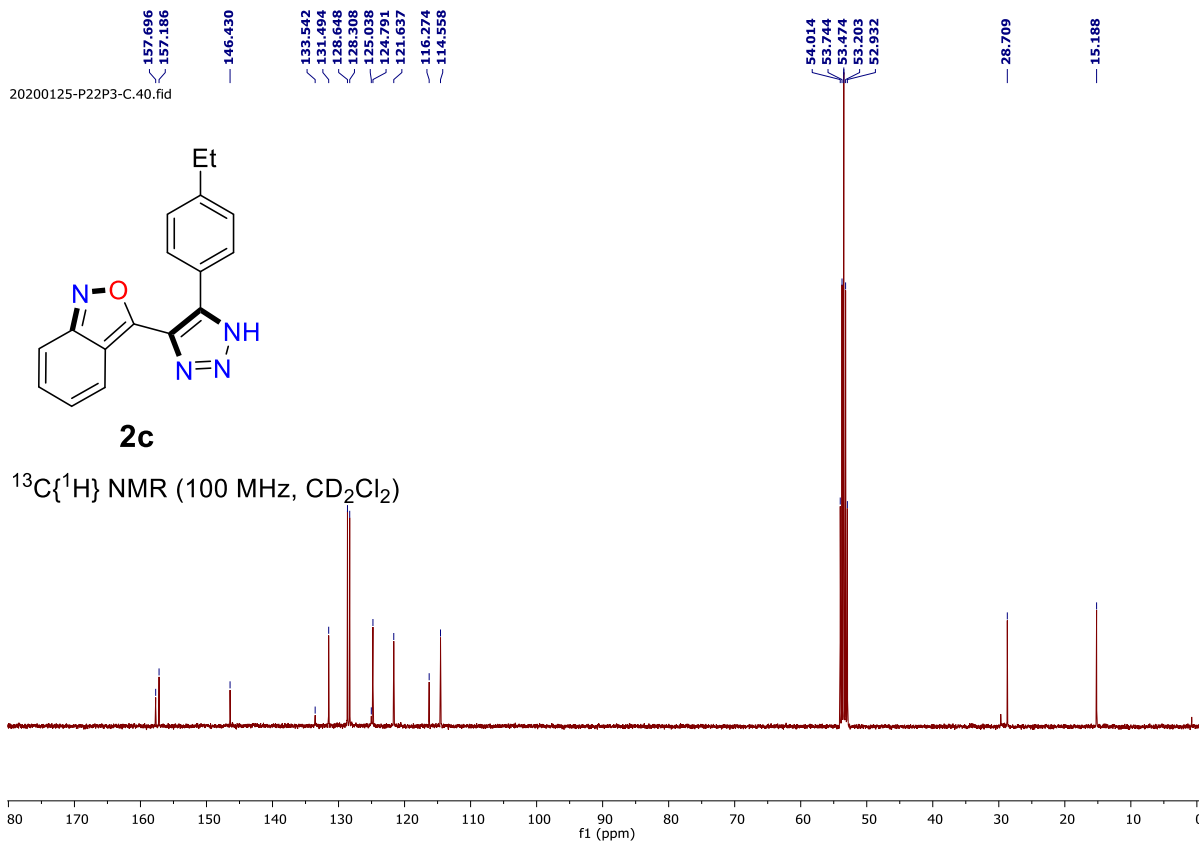


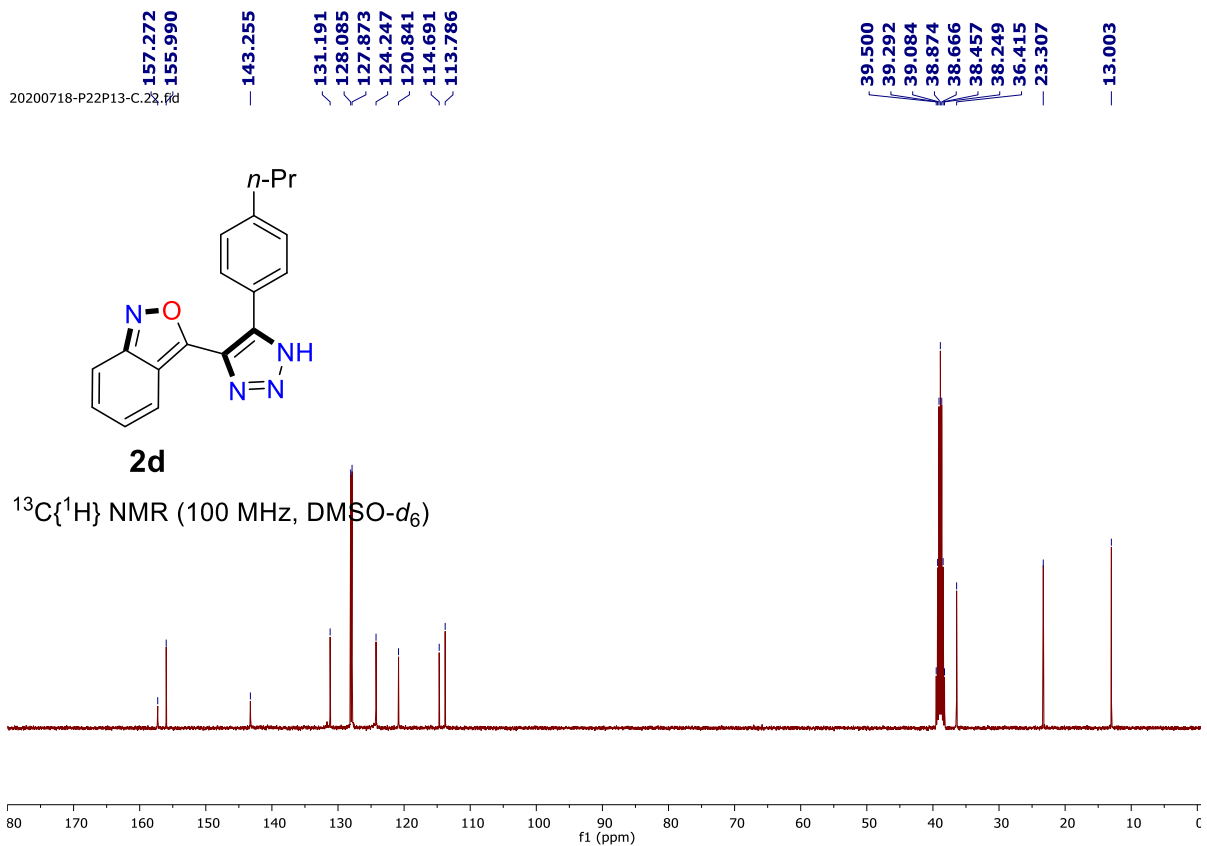
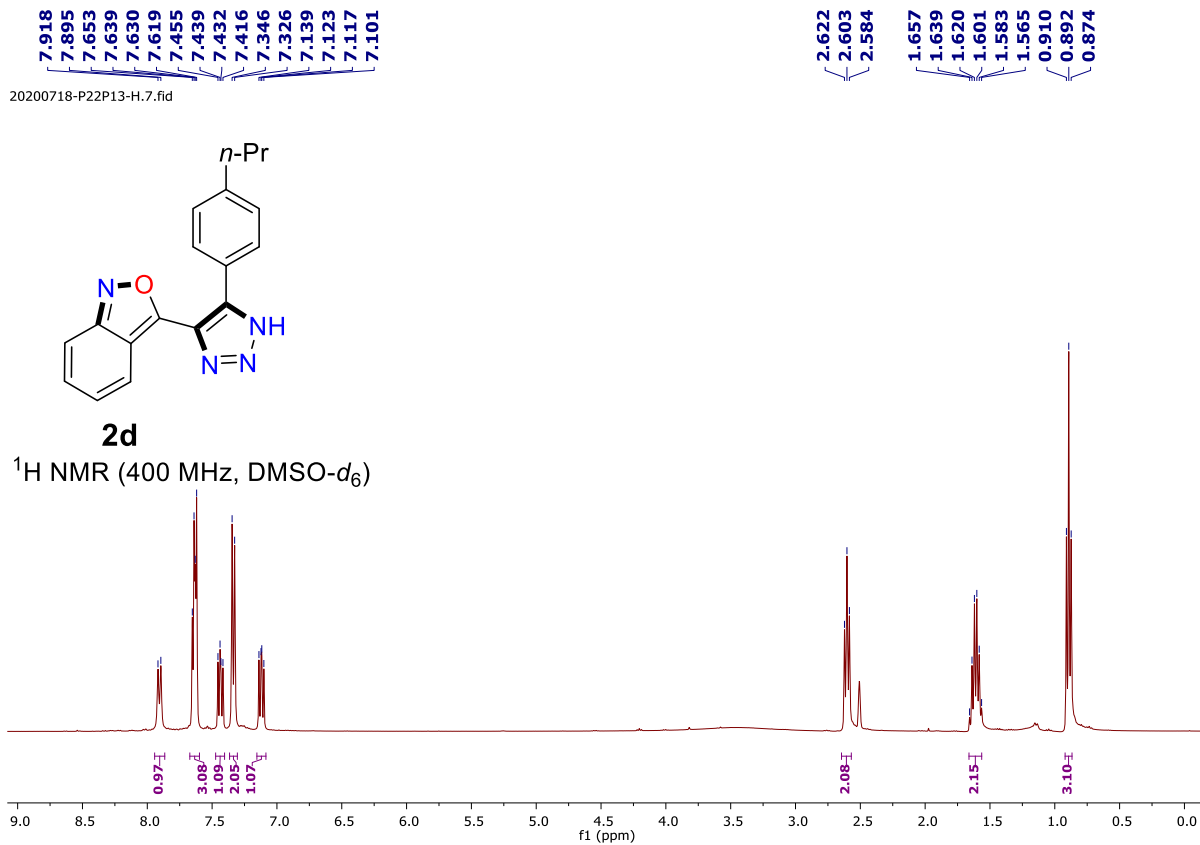
20200125-P22P3-C.40.fid

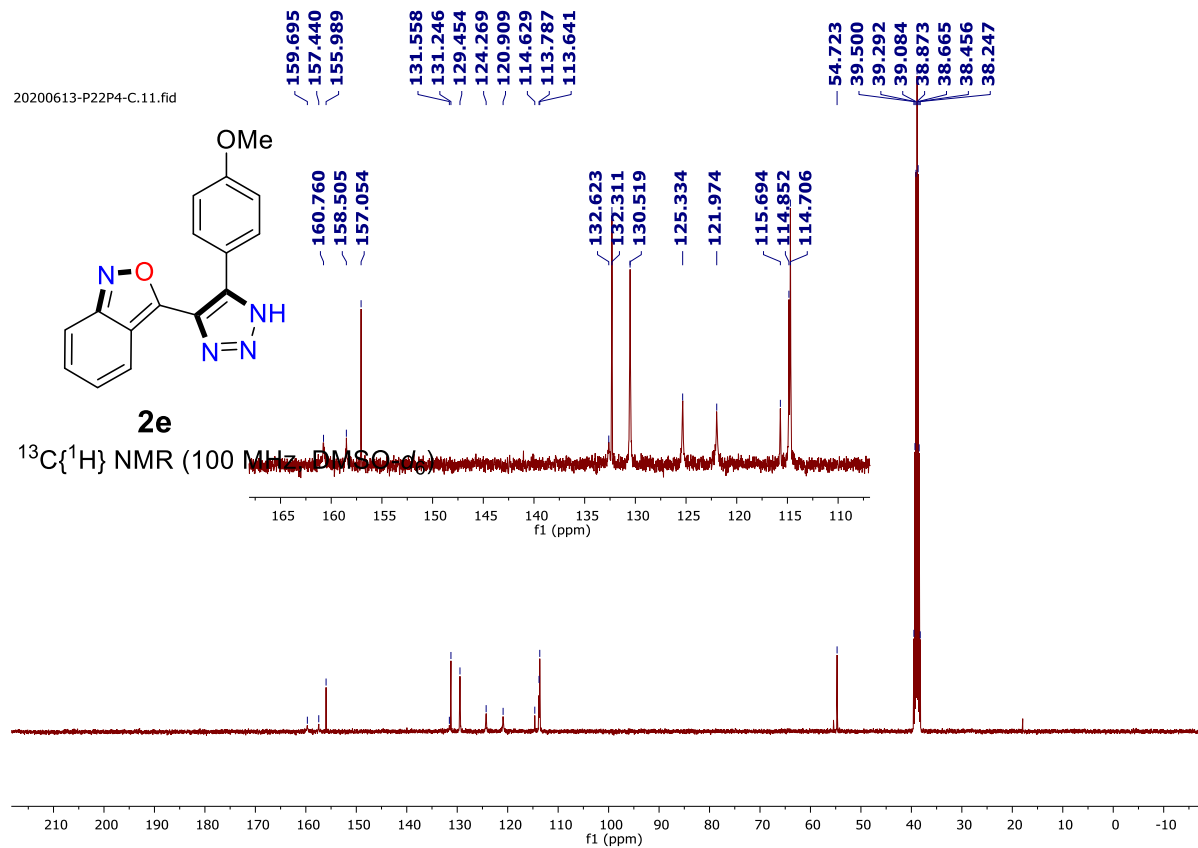
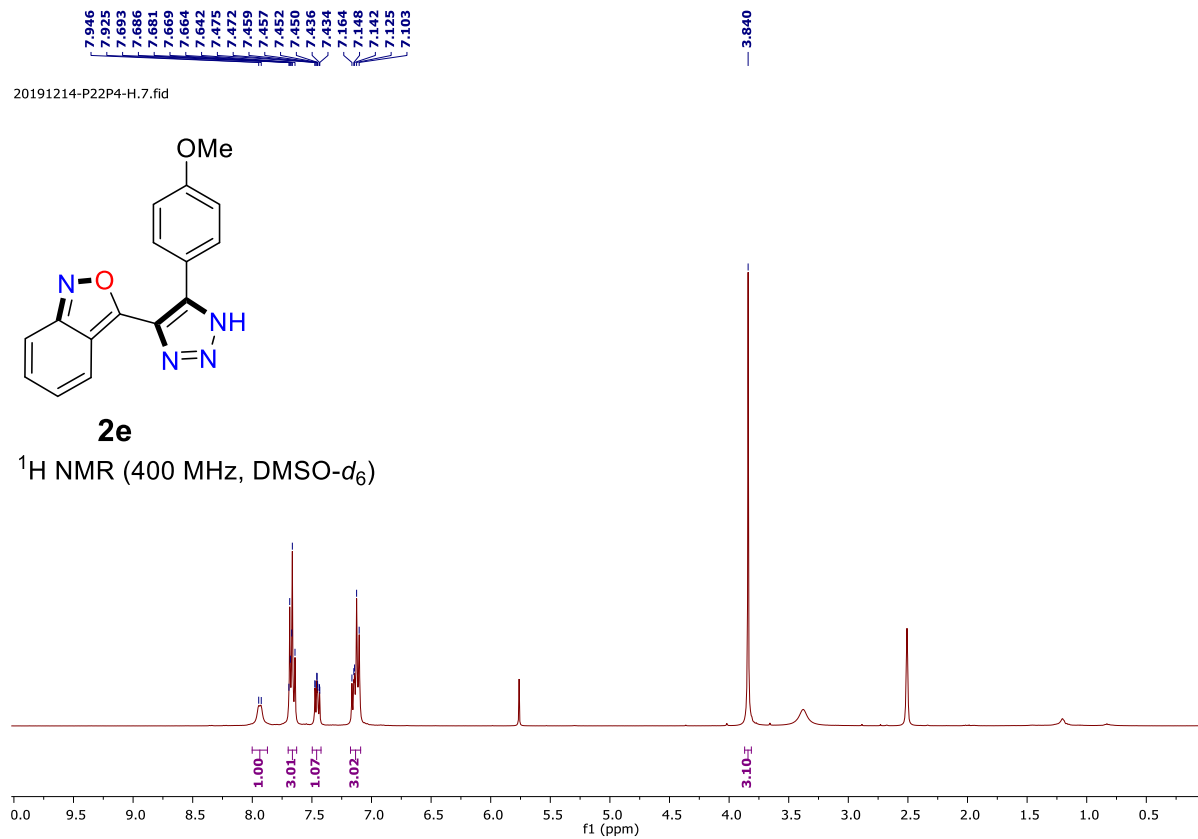


2c

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, CD_2Cl_2)

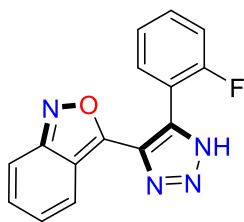






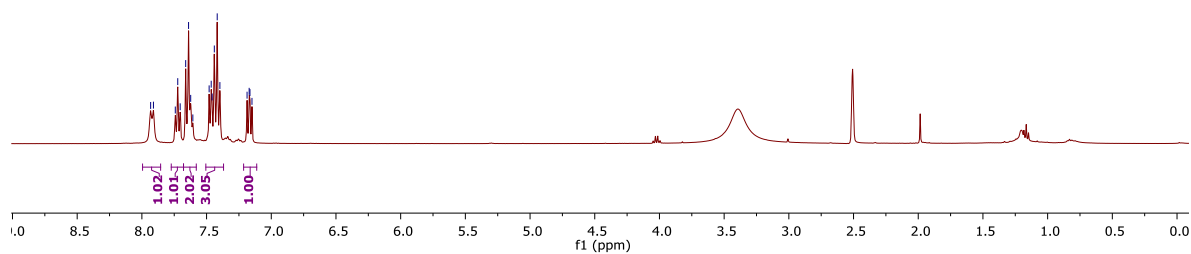
7.932
7.911
7.742
7.723
7.704
7.662
7.639
7.623
7.606
7.480
7.464
7.457
7.440
7.418
7.397
7.187
7.171
7.165
7.149

20200718-P22P24-H.18.fid



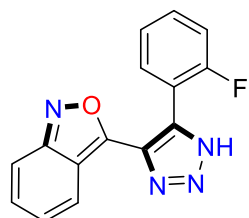
2f

^1H NMR (400 MHz, $\text{DMSO-}d_6$)



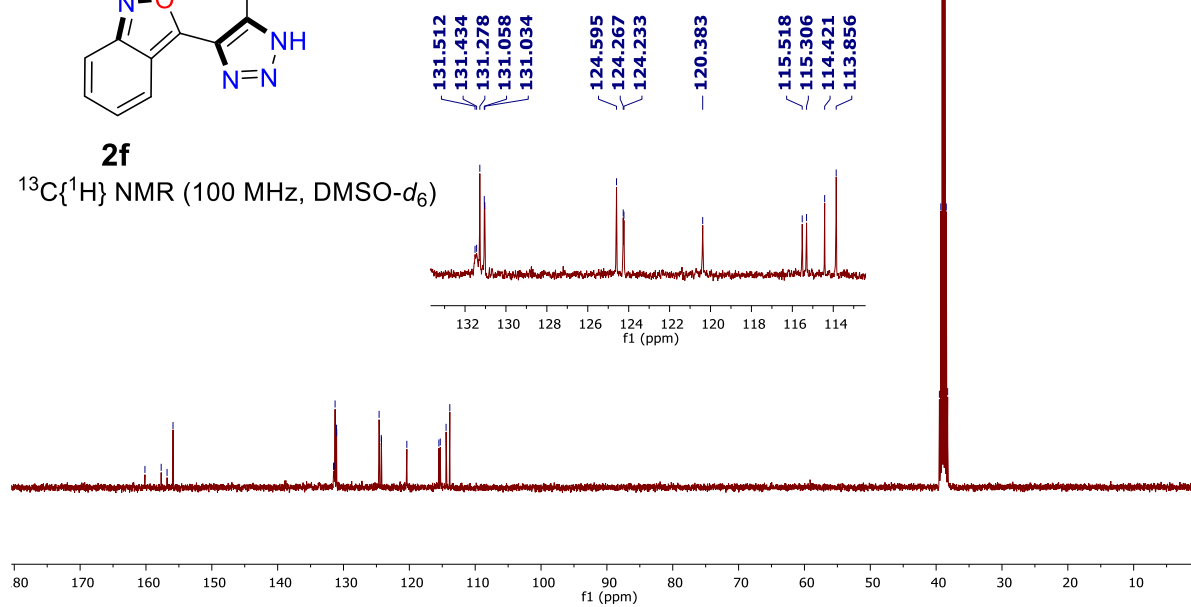
160.156
157.690
156.795
155.891

20200718-P22P24-C.35.fid



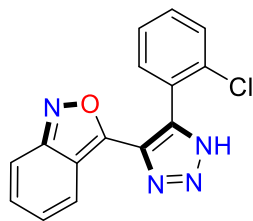
2f

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO-}d_6$)



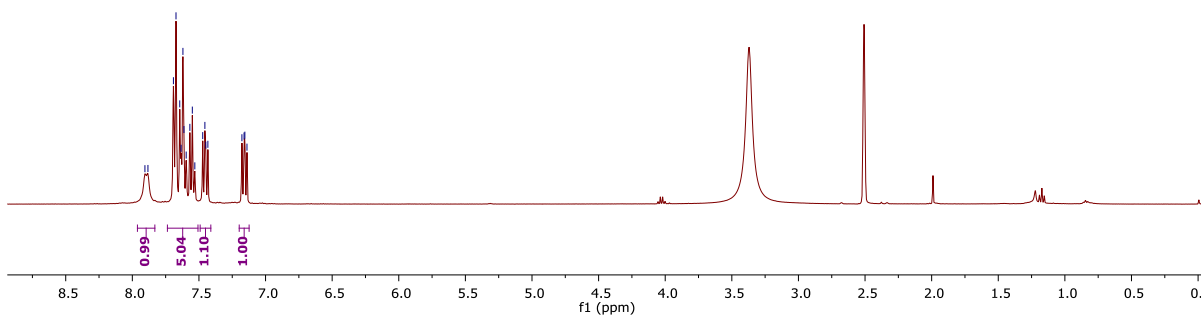
7.905
7.883
7.692
7.672
7.644
7.634
7.620
7.613
7.596
7.568
7.550
7.531
7.472
7.455
7.449
7.433
7.177
7.161
7.155
7.139

20200718-P22P22-H.16.fid



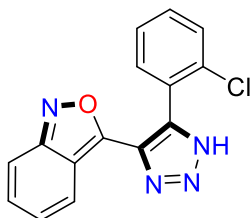
2g

^1H NMR (400 MHz, DMSO- d_6)



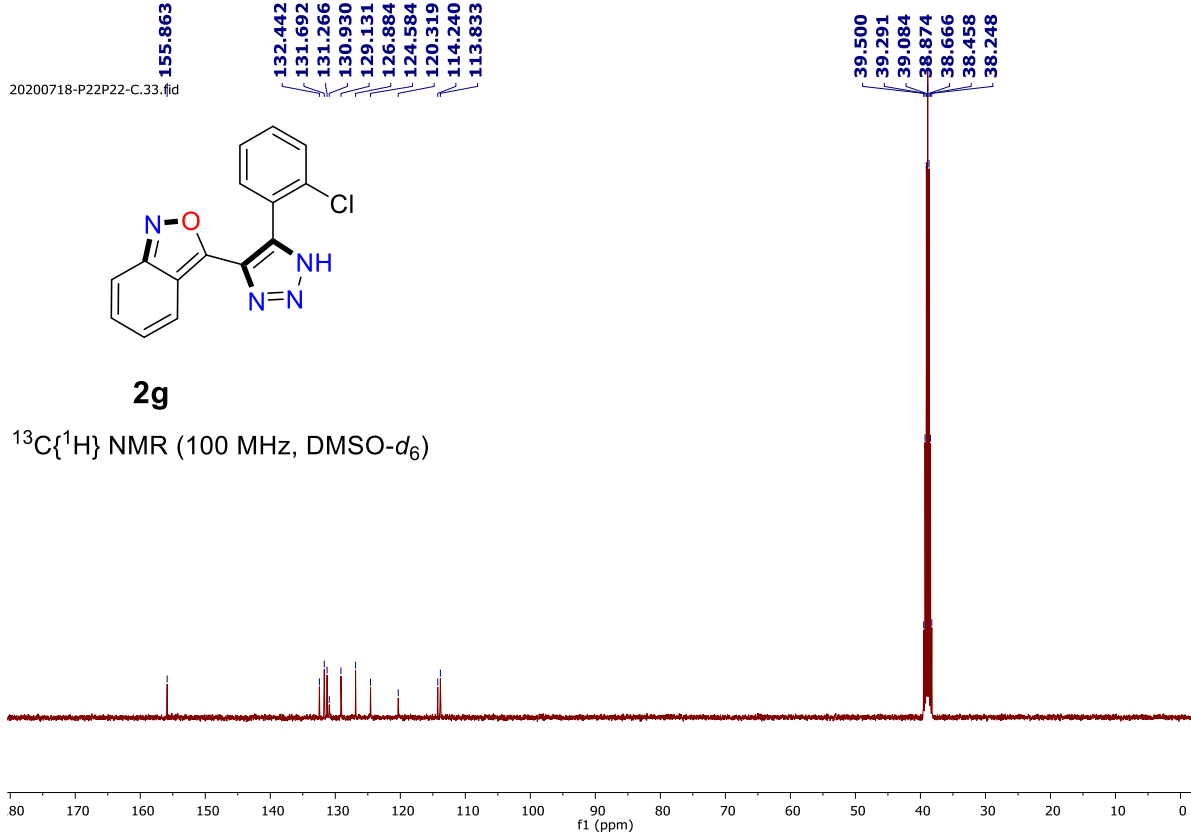
155.863
132.442
131.692
131.266
130.930
129.131
126.884
124.584
120.319
114.240
113.833

20200718-P22P22-C.33.fid



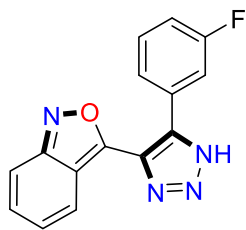
2g

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6)



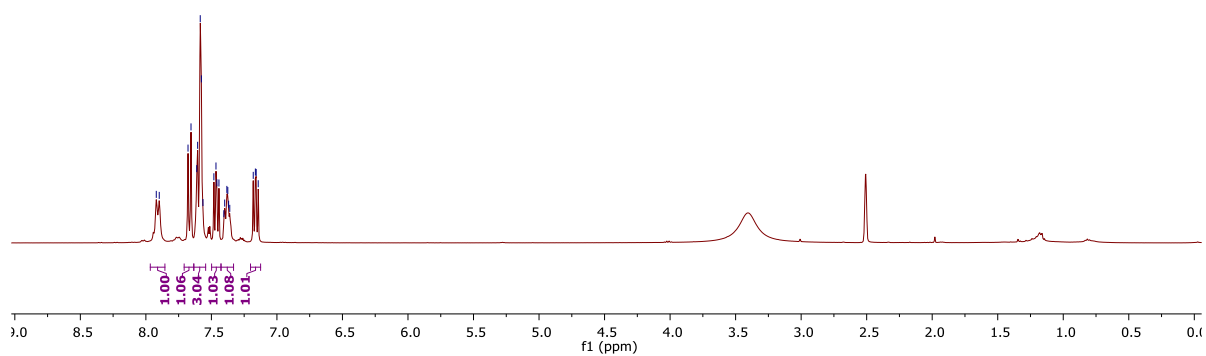
7.921
7.898
7.678
7.656
7.612
7.605
7.585
7.576
7.565
7.481
7.465
7.458
7.443
7.405
7.399
7.382
7.375
7.369
7.360
7.181
7.164
7.158
7.143

20200718-P22P25-H.19.fid



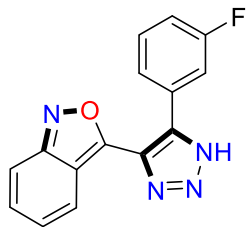
2h

^1H NMR (400 MHz, $\text{DMSO-}d_6$)



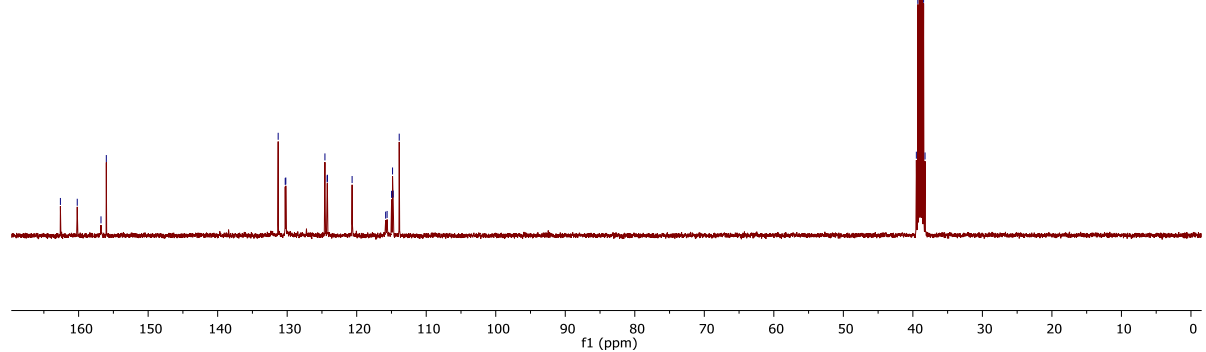
162.62
160.20
156.78
156.02
131.30
130.28
130.20
124.57
124.24
124.22
120.66
115.84
115.63
114.98
114.84
114.76
113.88
39.50
39.29
39.08
38.88
38.67
38.46
38.25

20200718-P22P25-C.39.fid



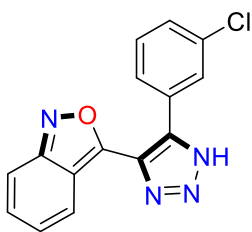
2h

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO-}d_6$)



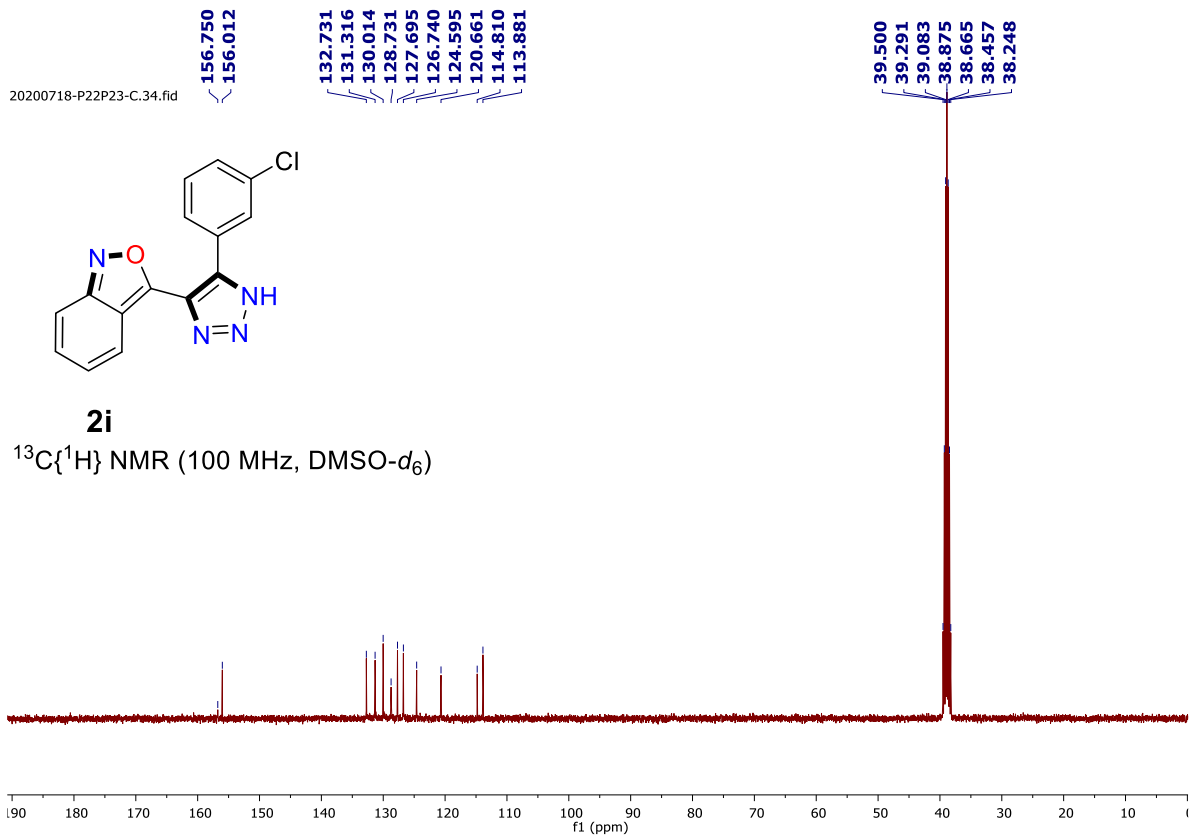
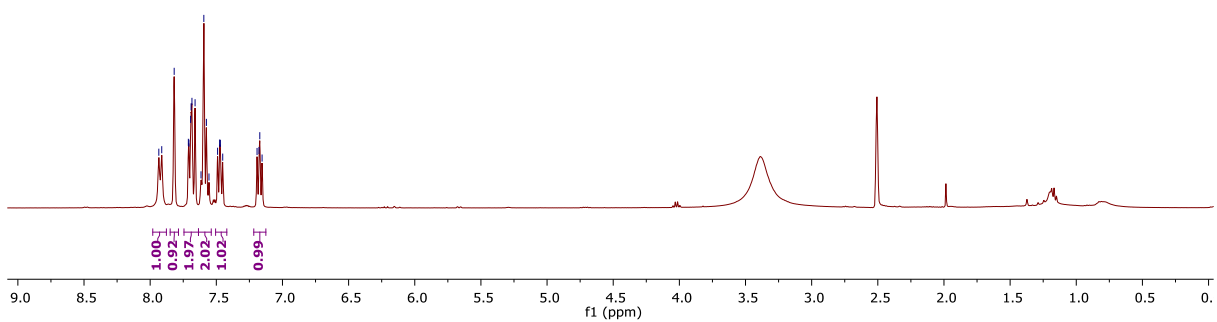
7.935
7.912
7.818
7.711
7.707
7.694
7.691
7.684
7.661
7.616
7.594
7.575
7.555
7.490
7.475
7.469
7.452
7.192
7.177
7.171
7.154

20200718-P22P23-H.17.fid



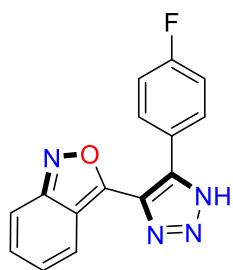
2i

^1H NMR (400 MHz, $\text{DMSO-}d_6$)



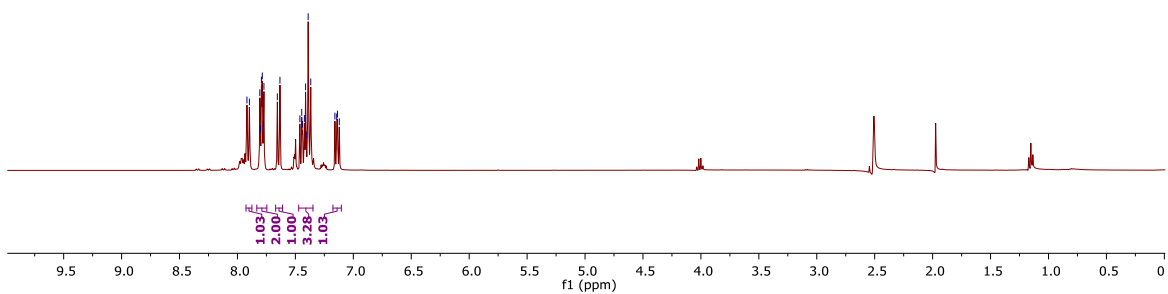
20200609-P22P6-H.10.fid

7.918
7.897
7.807
7.802
7.793
7.785
7.776
7.772
7.656
7.633
7.461
7.445
7.438
7.422
7.412
7.406
7.390
7.367
7.159
7.143
7.137
7.121



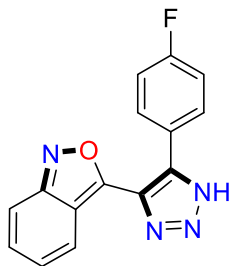
2j

^1H NMR (400 MHz, $\text{DMSO}-d_6$)



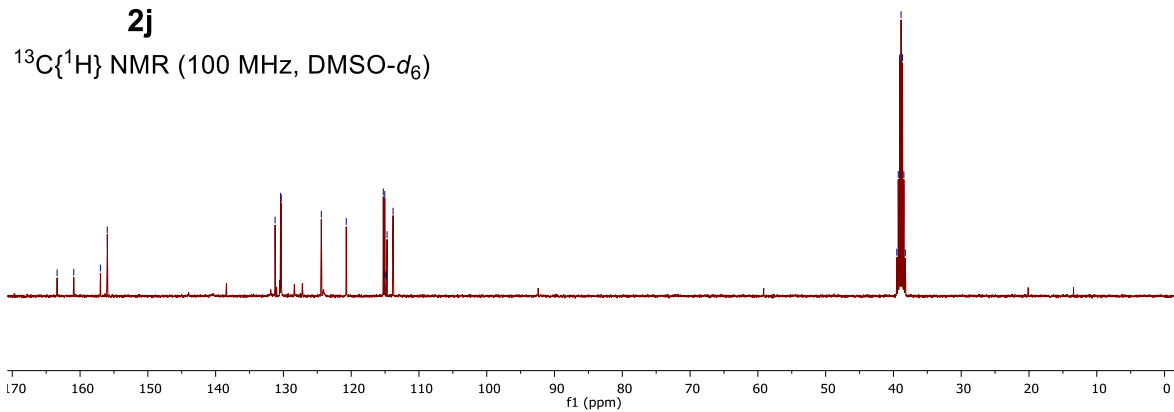
20200613-P22P6-C.13.fid

163.39
160.93
157.00
155.98
131.23
130.41
130.33
124.41
120.73
115.27
115.05
114.98
114.76
114.71
113.82
39.50
39.29
39.08
38.88
38.67
38.46
38.25



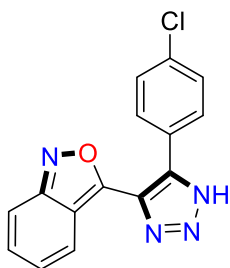
2j

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO}-d_6$)



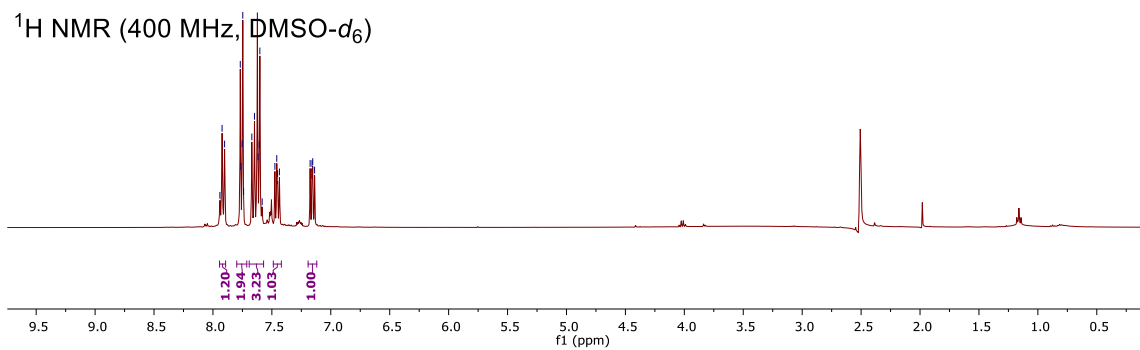
7.941
7.923
7.901
7.768
7.763
7.752
7.747
7.740
7.670
7.648
7.623
7.617
7.607
7.602
7.582
7.474
7.459
7.451
7.436
7.175
7.159
7.153
7.138

20200609-P22P7-H.9.fid



2k

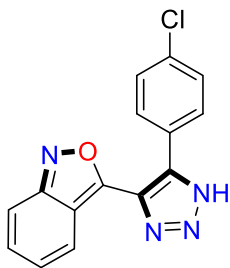
^1H NMR (400 MHz, $\text{DMSO-}d_6$)



156.851
155.993
20200613-P22P7-C.14.fid

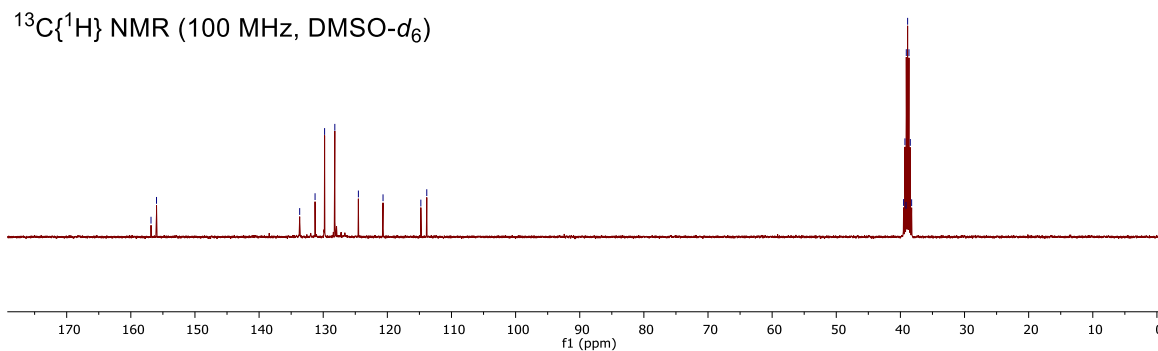
133.670
131.270
129.785
128.190
124.516
120.673
114.776
113.852

39.500
39.292
39.133
39.082
38.873
38.665
38.456
38.247



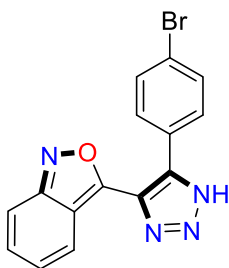
2k

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO-}d_6$)



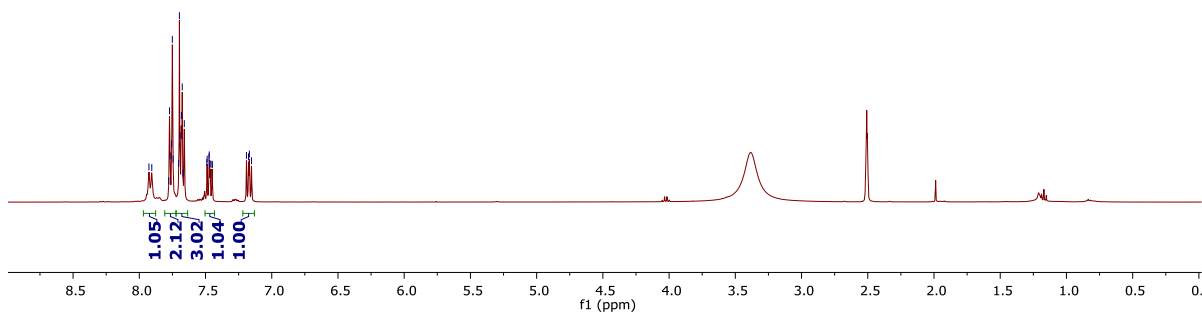
7.927
7.906
7.778
7.772
7.767
7.756
7.750
7.745
7.703
7.697
7.682
7.676
7.670
7.660
7.490
7.488
7.474
7.472
7.467
7.465
7.451
7.449
7.191
7.175
7.169
7.153

2020-0724-P22P28-H.188.fid



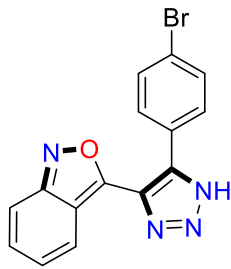
21

^1H NMR (400 MHz, $\text{DMSO-}d_6$)



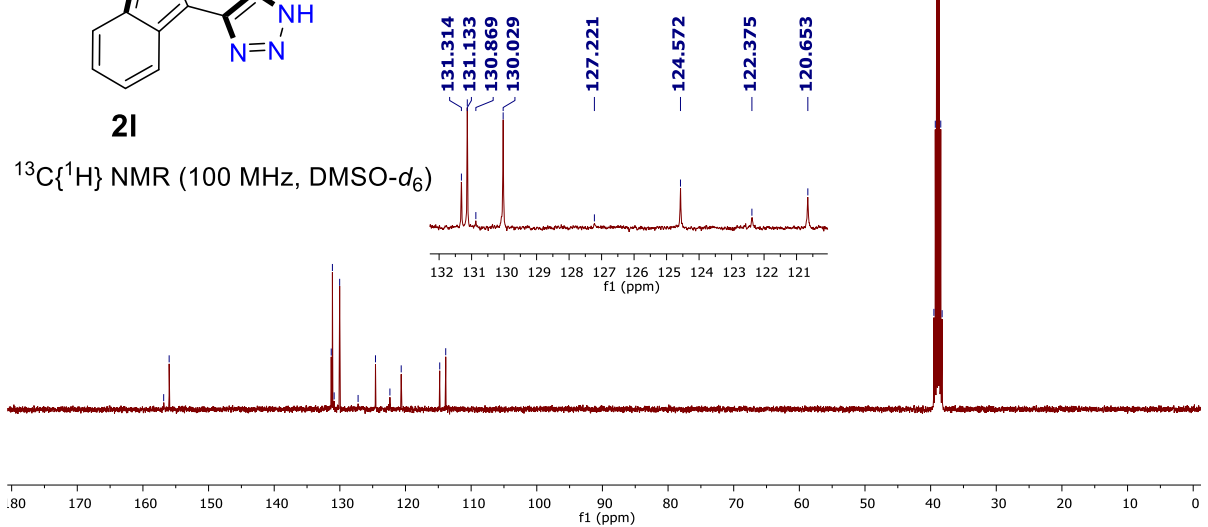
156.840
156.003
131.314
131.133
130.869
130.029
127.221
124.572
122.375
120.653
114.784
113.872
39.500
39.292
39.084
38.874
38.665
38.457
38.249

2020-0724-P22P28-C.196.fid



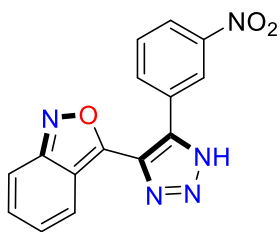
21

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO-}d_6$)



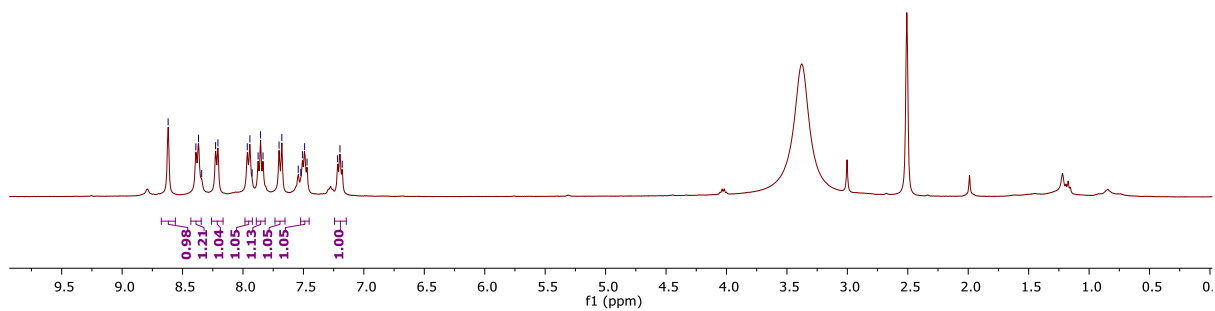
8.619
8.390
8.368
8.342
8.227
8.207
7.965
7.943
7.925
7.875
7.855
7.834
7.701
7.679
7.543
7.522
7.508
7.490
7.470
7.217
7.198
7.179

2020-0724-P22P26-H.186.fid



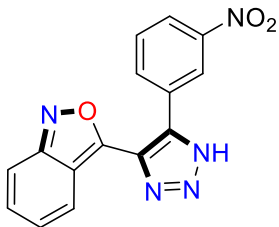
2m

^1H NMR (400 MHz, DMSO- d_6)



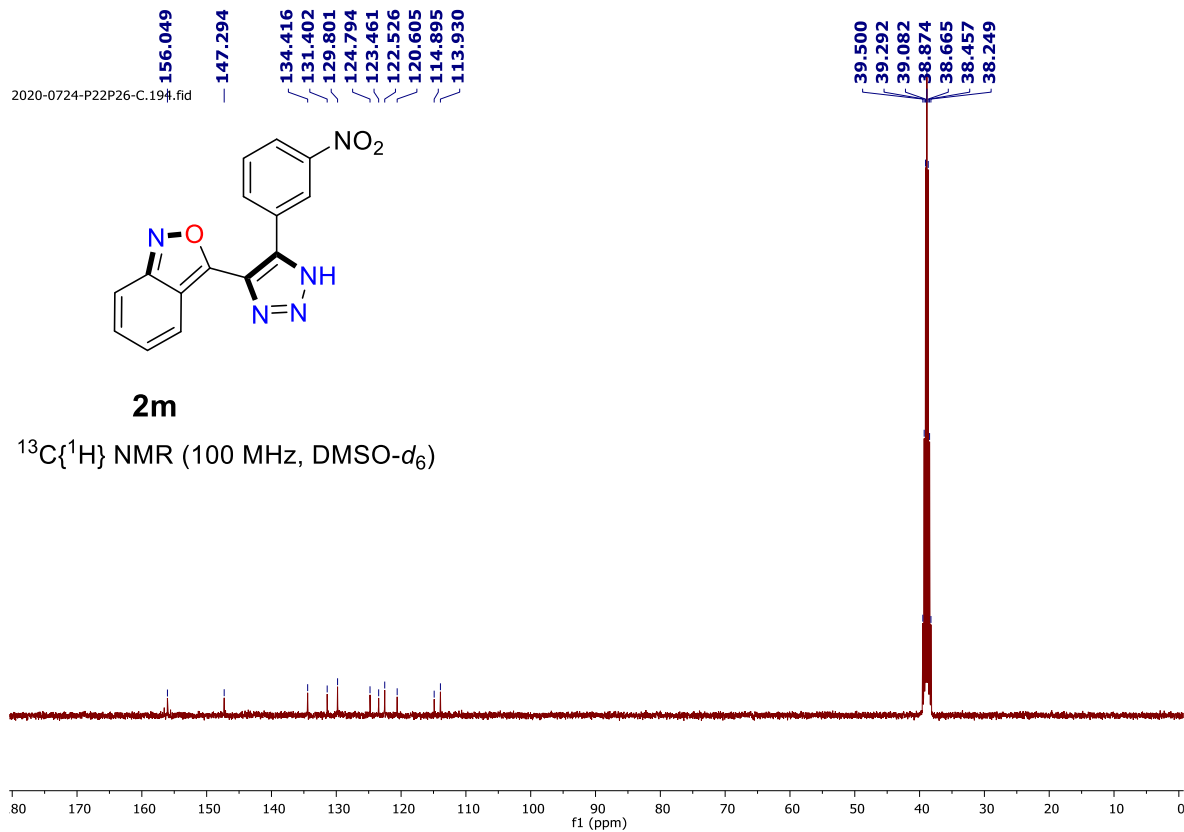
156.049
147.294
134.416
131.402
129.801
124.794
123.461
122.526
120.605
114.895
113.930

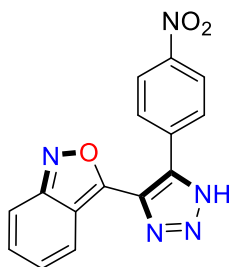
2020-0724-P22P26-C.194.fid



2m

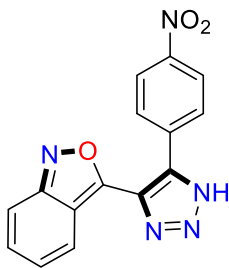
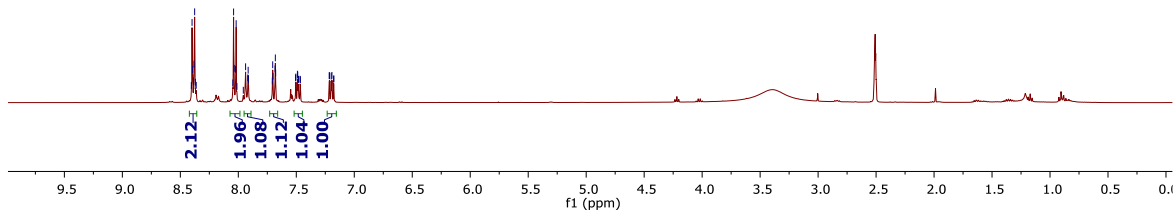
$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6)





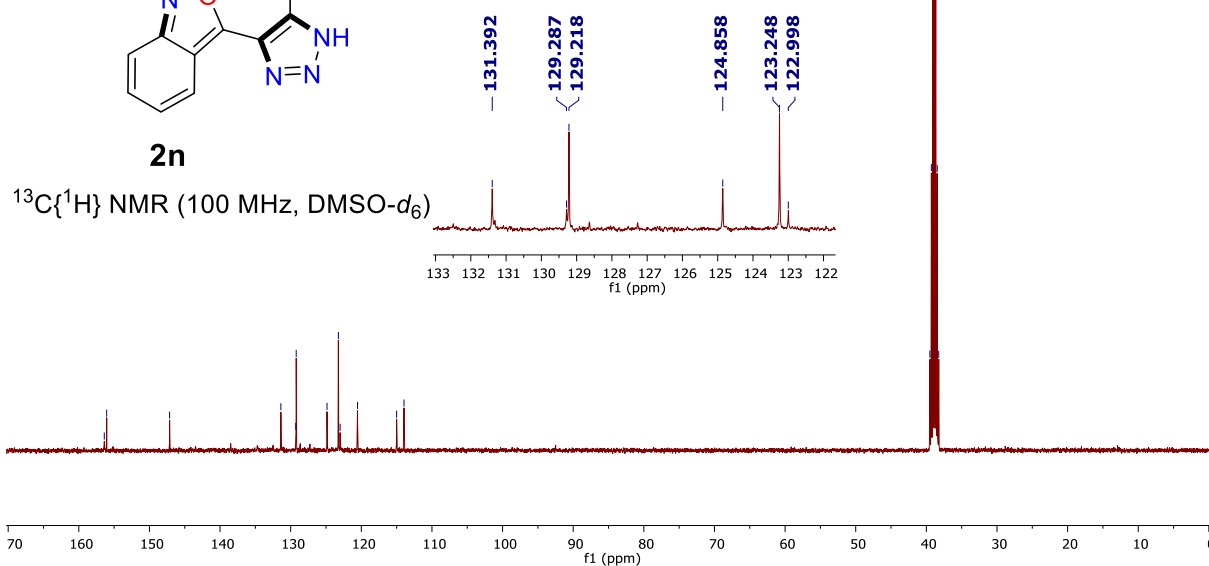
2n

^1H NMR (400 MHz, $\text{DMSO}-d_6$)



2n

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO}-d_6$)

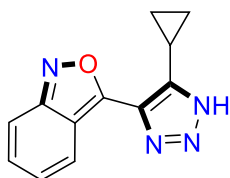


20200613-P22P12-H.21.fid

8.091
8.069
7.677
7.654
7.492
7.490
7.477
7.474
7.470
7.467
7.461
7.454
7.451
7.186
7.170
7.164
7.148

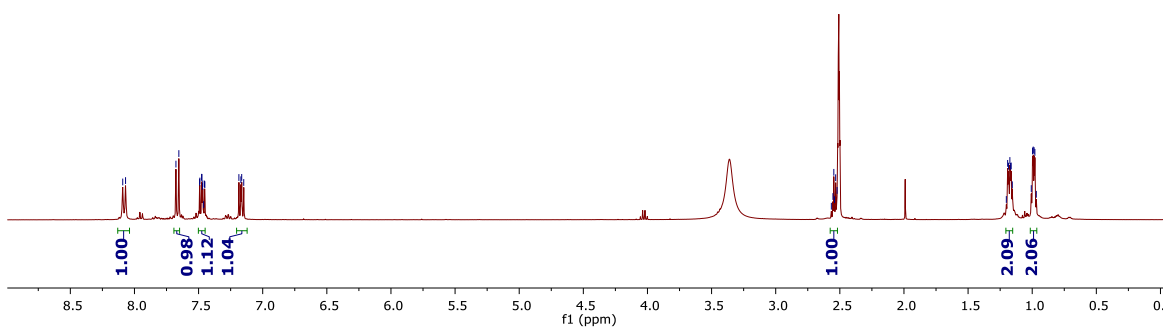
2.566
2.554
2.547
2.541
2.533
2.522

1.191
1.184
1.174
1.170
1.164
1.155
1.007
0.997
0.992
0.985
0.979
0.968



2o

^1H NMR (400 MHz, DMSO- d_6)



20200613-P22P12-C.22.fid

158.620
156.546

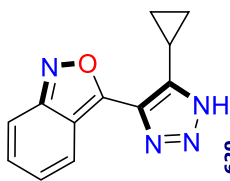
134.080
131.923

124.656
121.531

114.443
114.233

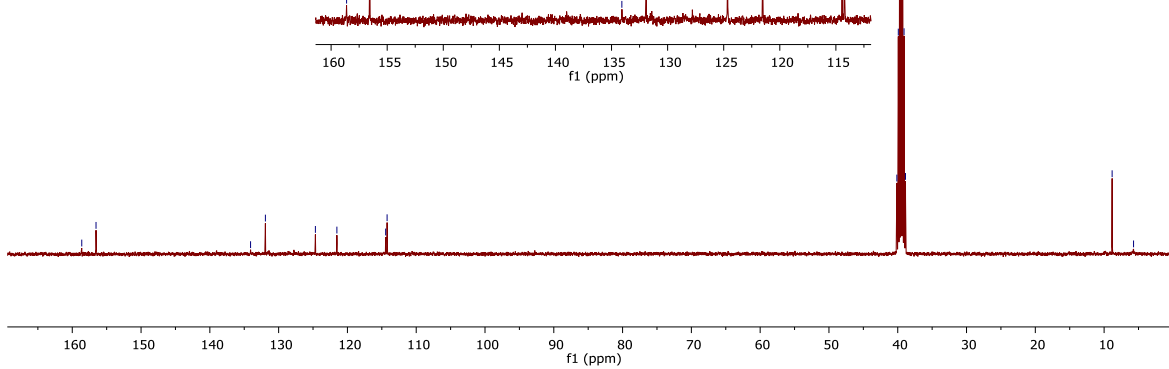
40.128
39.918
39.710
39.502
39.293
39.083
38.874

8.834
5.720

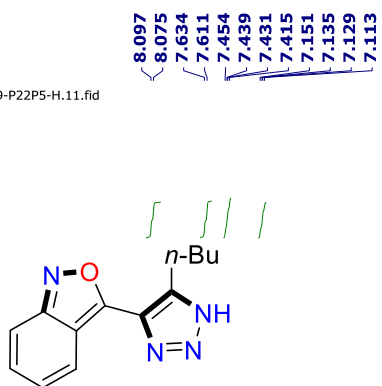


2o

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6)

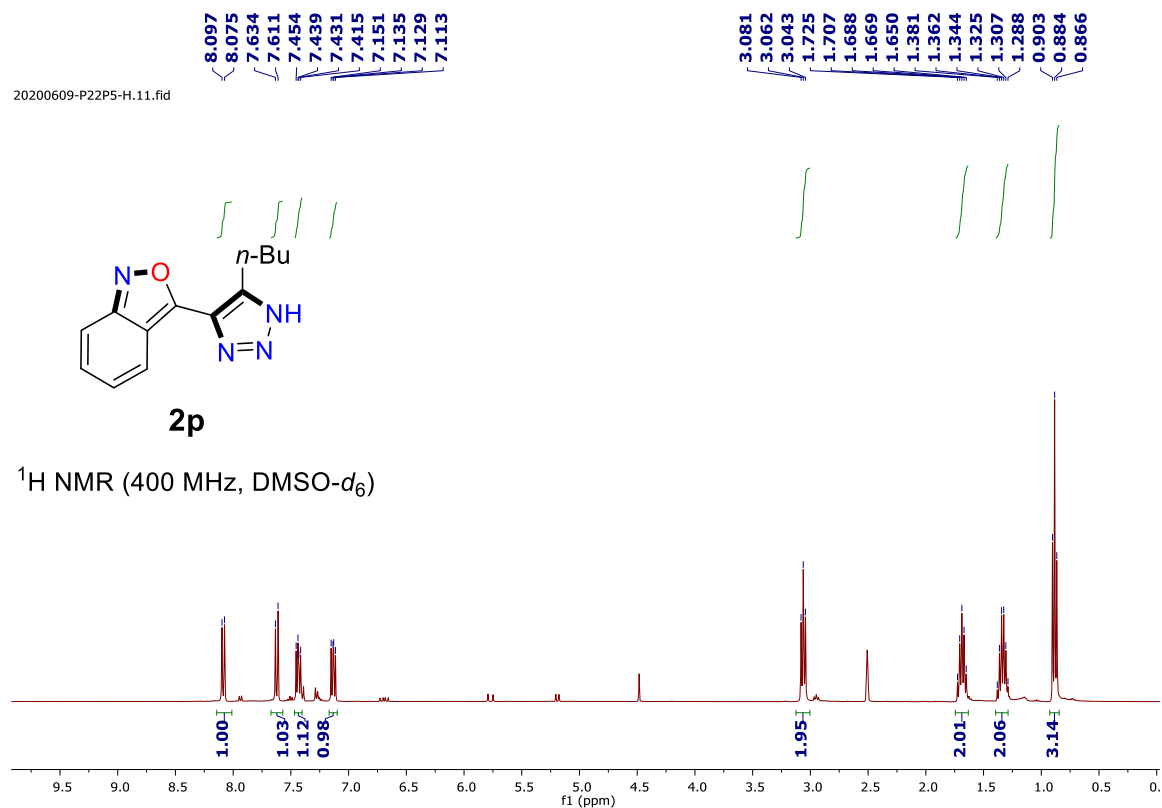


20200609-P22P5-H.11.fid

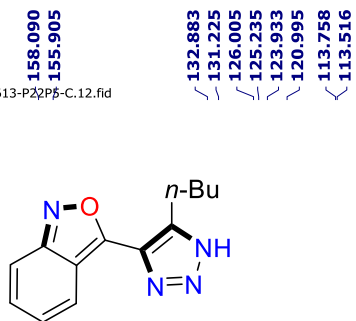


2p

^1H NMR (400 MHz, DMSO- d_6)

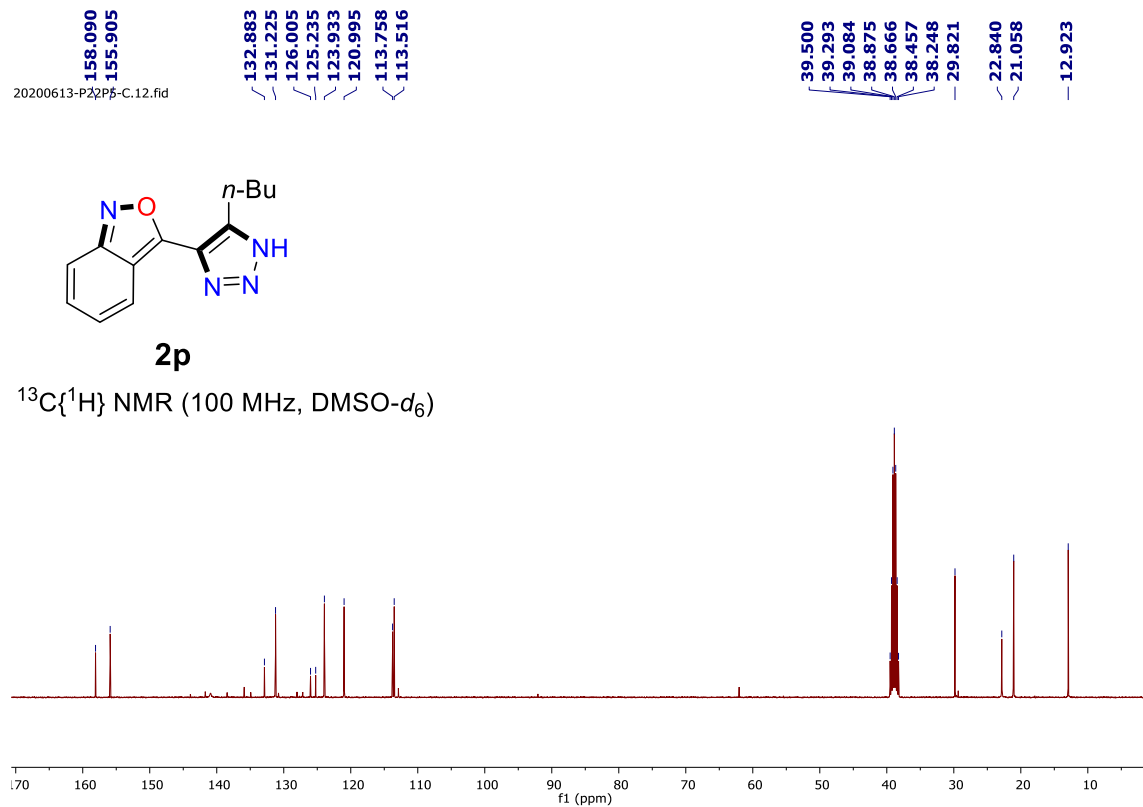


20200613-P22P5-C.12.fid



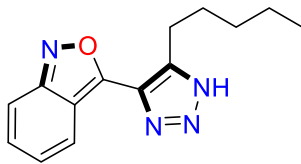
2p

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6)



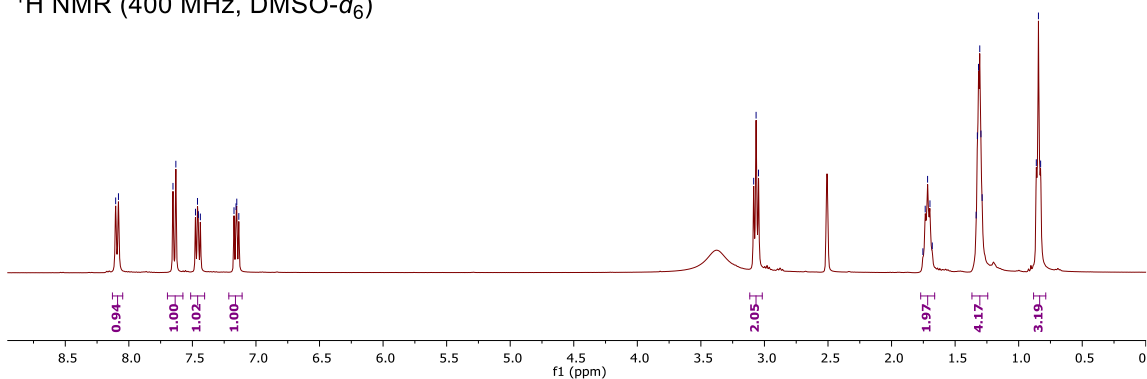
20200718-P22P17-H.11.fid

8.104
8.082
7.653
7.630
7.476
7.460
7.453
7.437
7.173
7.157
7.151
7.135



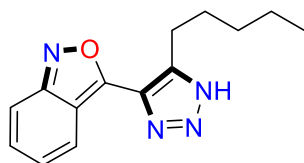
2q

^1H NMR (400 MHz, DMSO- d_6)



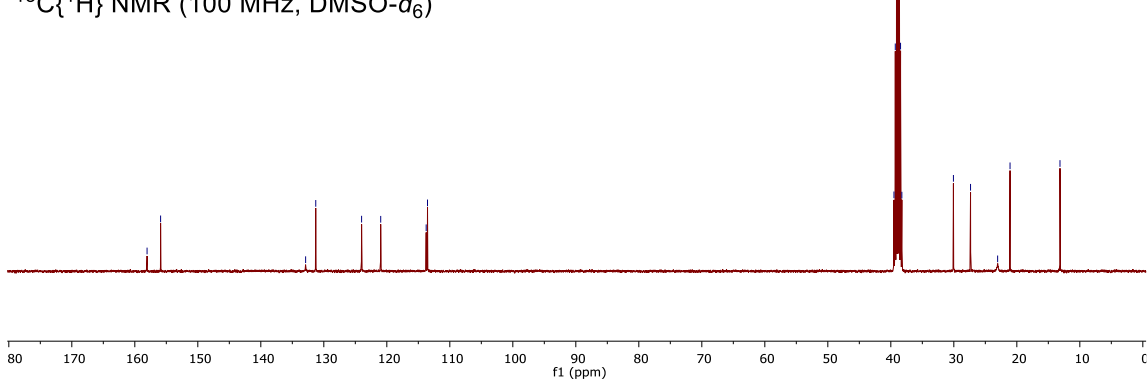
20200718-P22P17-C.28.fid

158.053
155.906
132.887
131.279
124.003
120.969
113.753
113.540
39.501
39.291
39.083
38.874
38.666
38.456
38.248
30.062
27.346
23.045
21.076
13.148



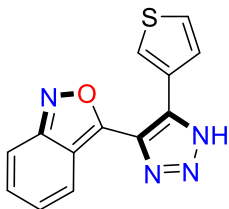
2q

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6)



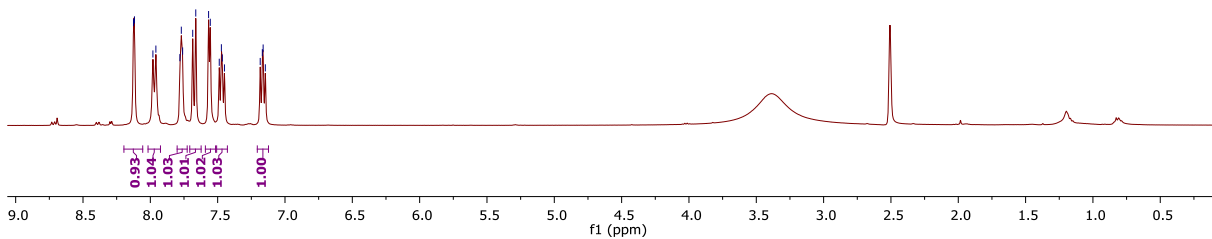
8.125
8.118
7.981
7.959
7.780
7.770
7.760
7.685
7.663
7.567
7.555
7.488
7.472
7.466
7.450
7.184
7.168
7.162
7.146

20200729-P22P14-H.4.fid



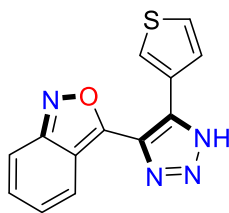
2r

^1H NMR (400 MHz, DMSO- d_6)



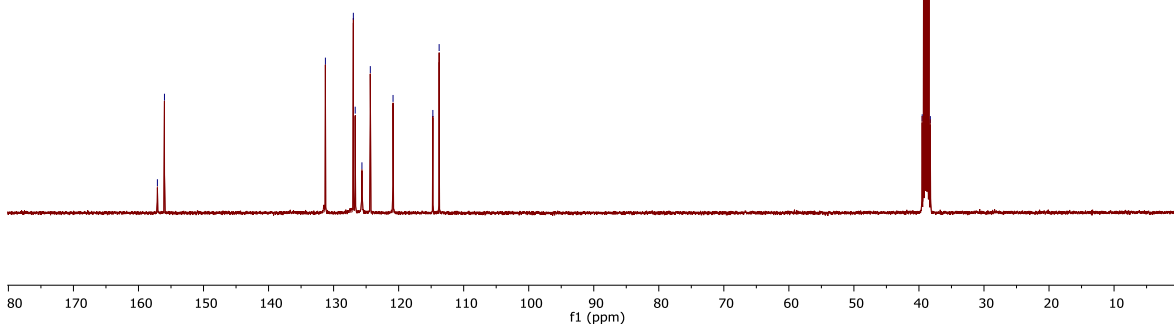
157.090
156.005
131.260
126.962
126.677
125.643
124.354
120.859
114.740
113.771
39.500
39.292
39.083
38.875
38.665
38.456
38.248

20200822-P22P14-C.7.fid



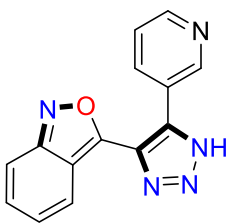
2r

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6)



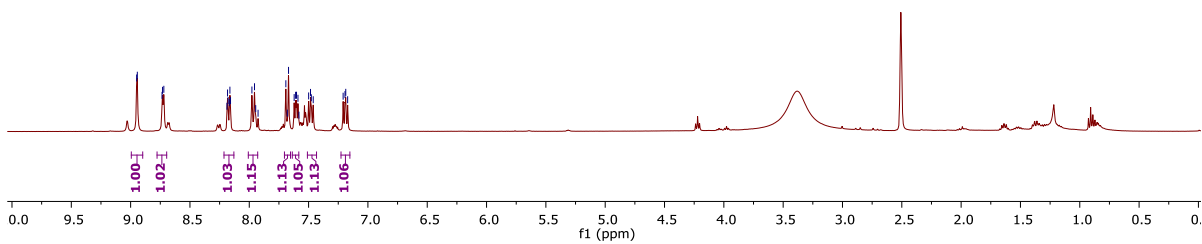
2020-0724-P22P8-H.185.fid

8.949
8.944
8.735
8.731
8.720
8.188
8.183
8.178
8.168
8.163
8.158
7.978
7.956
7.946
7.926
7.692
7.679
7.669
7.622
7.610
7.602
7.590
7.581
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7.484
7.477
7.461
7.209
7.193
7.187
7.171



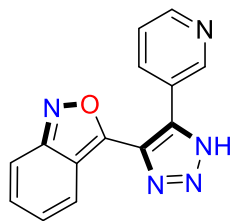
2s

^1H NMR (400 MHz, $\text{DMSO-}d_6$)



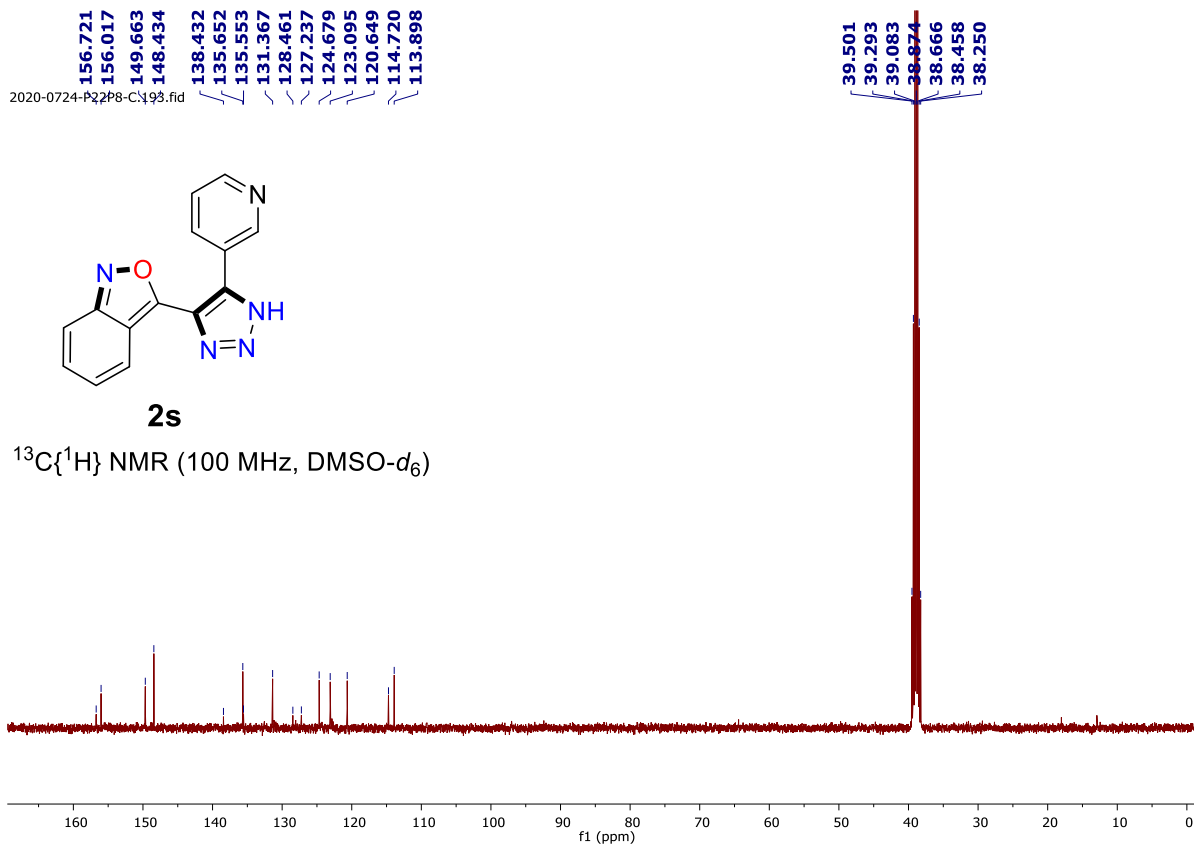
2020-0724-P22P8-C.193.fid

156.721
156.017
149.663
148.434
138.432
135.652
135.553
131.367
128.461
127.237
124.679
123.095
120.649
114.720
113.898



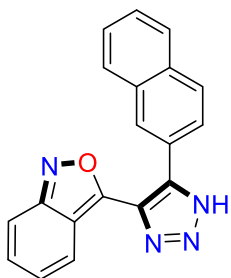
2s

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO-}d_6$)



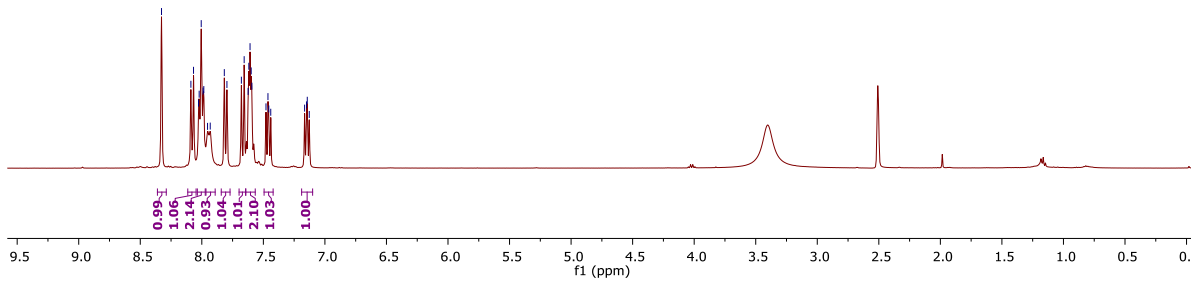
8.327
8.089
8.067
8.027
8.022
8.005
7.990
7.984
7.953
7.932
7.817
7.796
7.679
7.656
7.624
7.618
7.608
7.599
7.593
7.479
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7.456
7.440
7.165
7.149
7.143
7.127

20200718-P22P15-H.9.fid



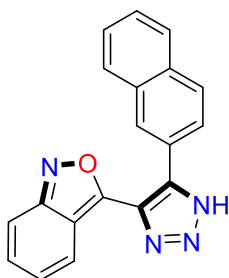
2t

^1H NMR (400 MHz, DMSO- d_6)



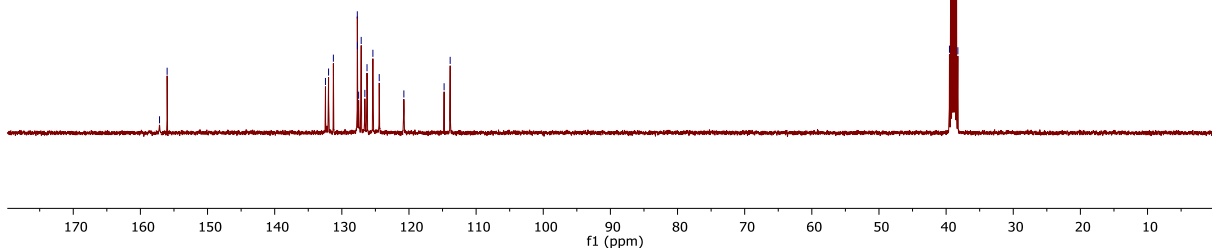
157.152
156.019
132.437
131.975
131.260
127.694
127.674
127.499
127.115
126.571
126.248
125.373
124.429
120.761
114.768
113.863
39.500
39.292
39.083
38.874
38.665
38.457
38.248

20200718-P22P15-C.24.fid



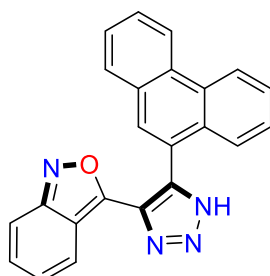
2t

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6)



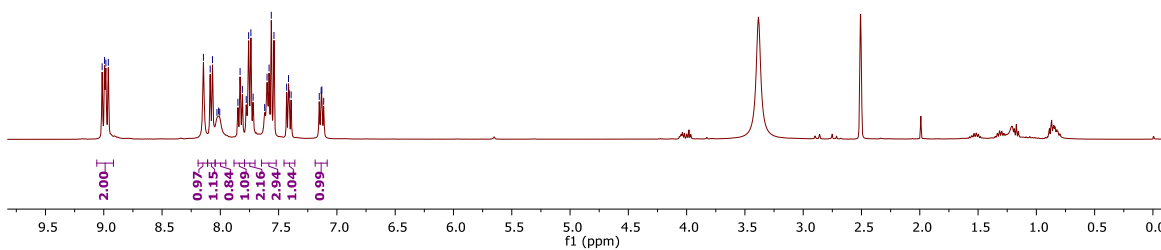
20200718-P22P16-H-10.fid

9.014
8.993
8.982
8.961
8.145
8.087
8.067
8.029
8.015
8.005
7.849
7.831
7.811
7.778
7.757
7.738
7.719
7.620
7.599
7.582
7.563
7.540
7.431
7.415
7.408
7.393
7.151
7.135
7.129
7.113



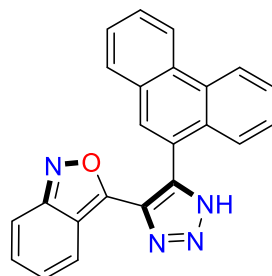
2u

^1H NMR (400 MHz, $\text{DMSO}-d_6$)



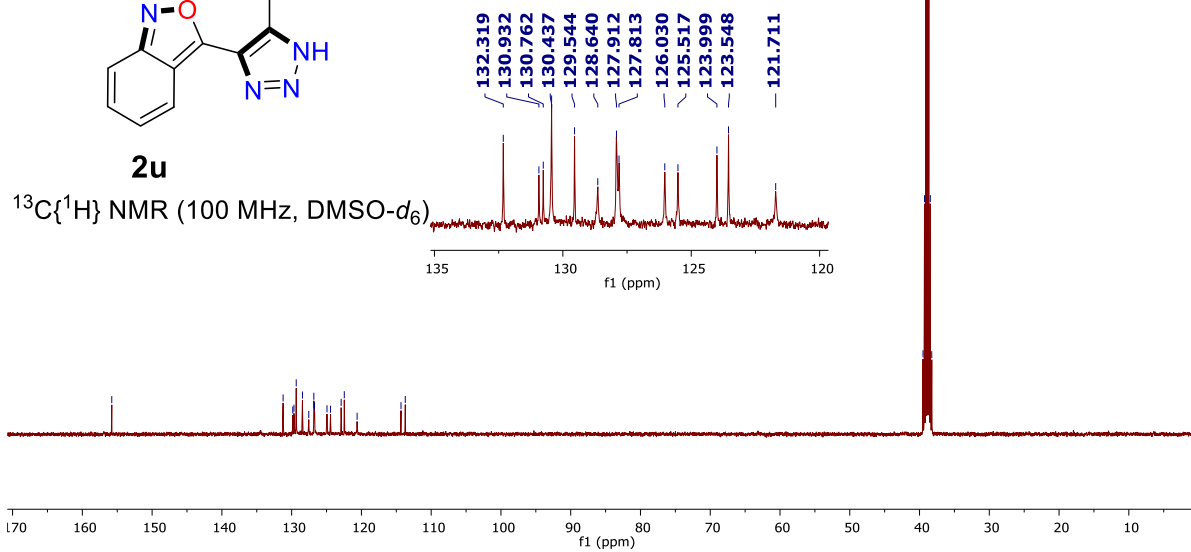
20200718-P22P17-C-27.fid

155.782
131.225
129.838
129.668
129.343
128.450
127.546
126.818
126.719
124.936
124.423
122.905
122.454
120.617
114.324
113.713

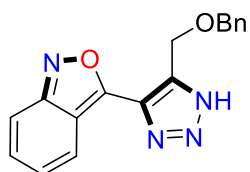


2u

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO}-d_6$)

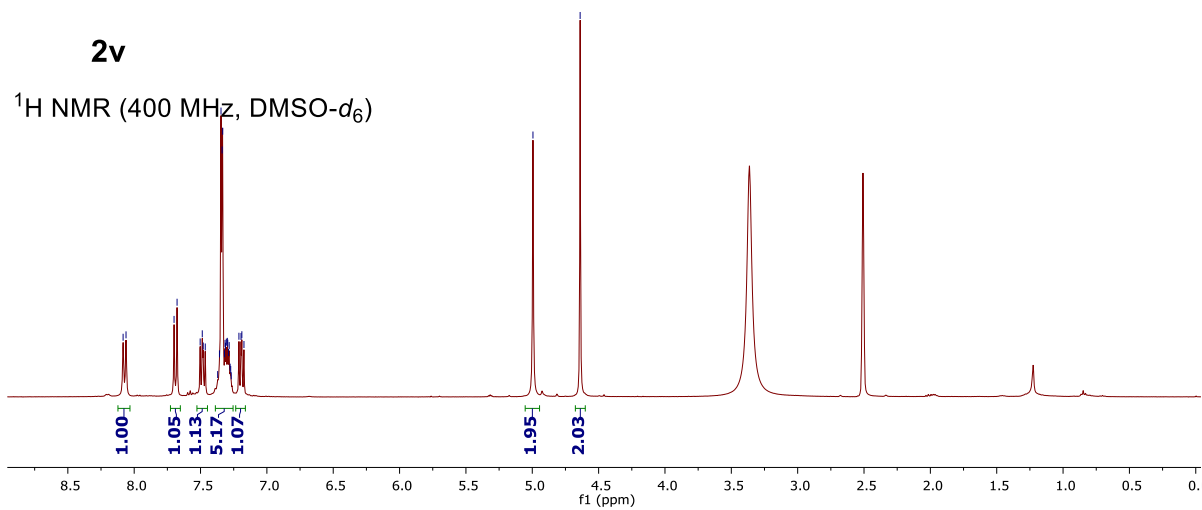


2020-0724-P22P29-H.189.fid

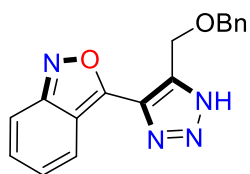


2v

^1H NMR (400 MHz, DMSO- d_6)

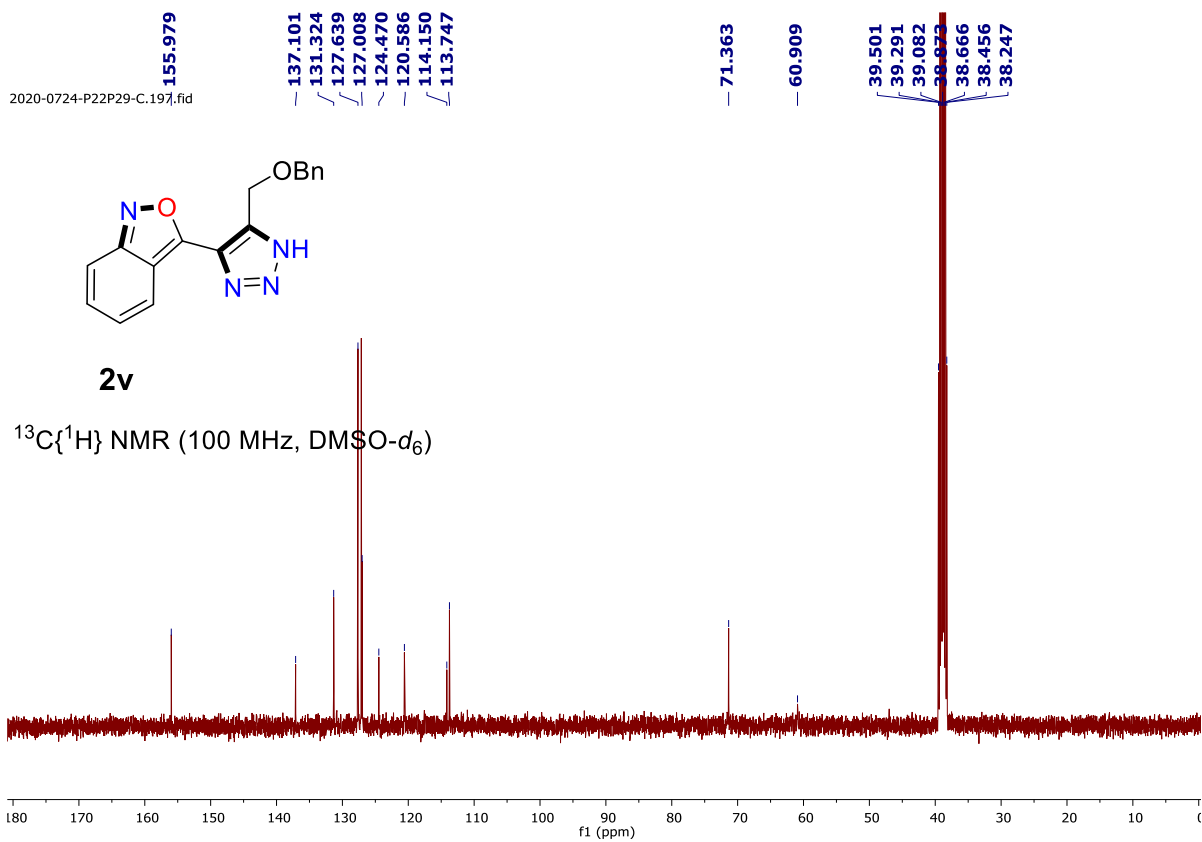


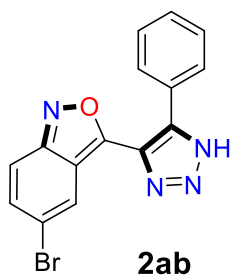
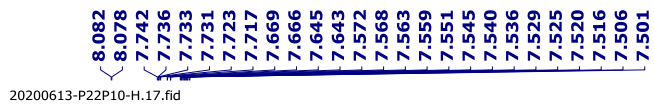
2020-0724-P22P29-C.197.fid



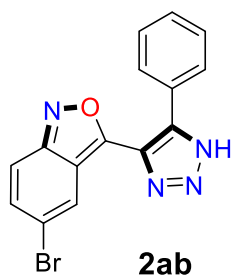
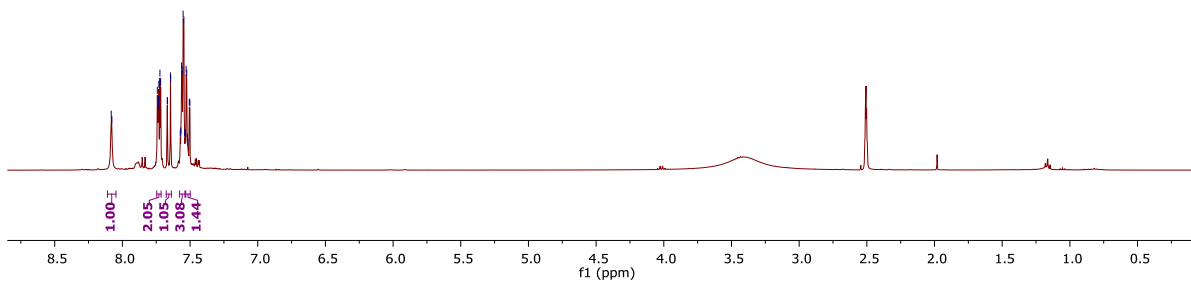
2v

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6)

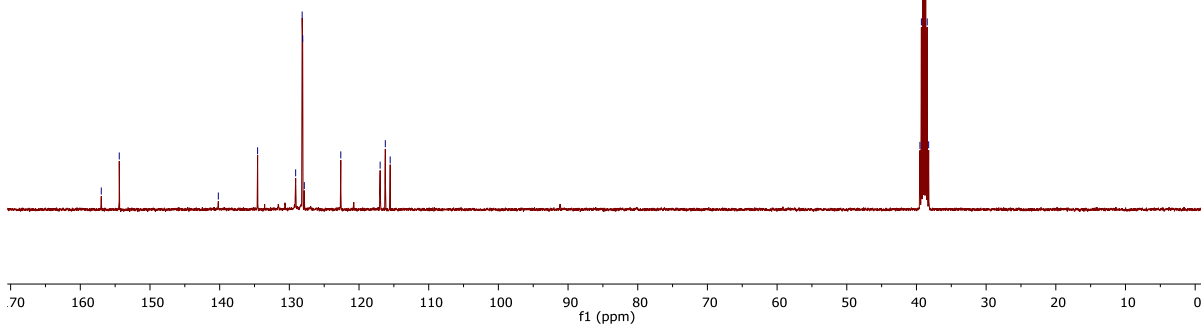




^1H NMR (400 MHz, $\text{DMSO}-d_6$)



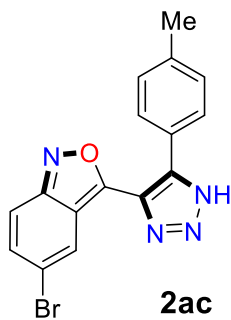
$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO}-d_6$)



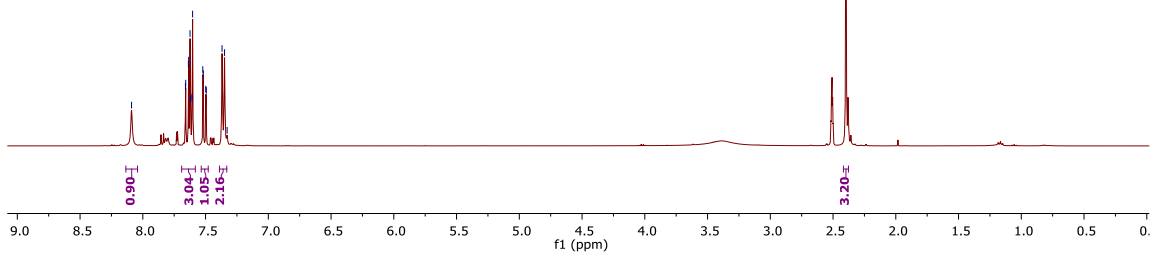
20200613-P22P11-H.19.fid

8.090
7.660
7.658
7.637
7.635
7.624
7.619
7.608
7.603
7.522
7.518
7.499
7.494
7.369
7.349
7.328

2.397



^1H NMR (400 MHz, $\text{DMSO}-d_6$)



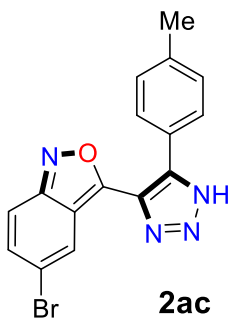
20200613-P22P11-C.20.fid

157.099
154.371

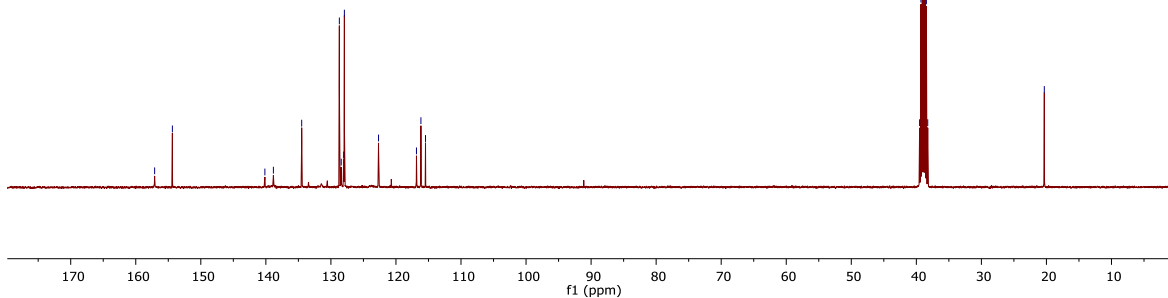
140.149
138.841
134.491
128.701
128.415
128.035
127.927
122.678
116.846
116.162
115.456

39.500
39.292
39.084
38.875
38.665
38.457
38.248

20.326

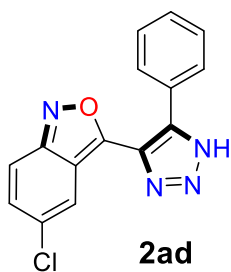


$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO}-d_6$)

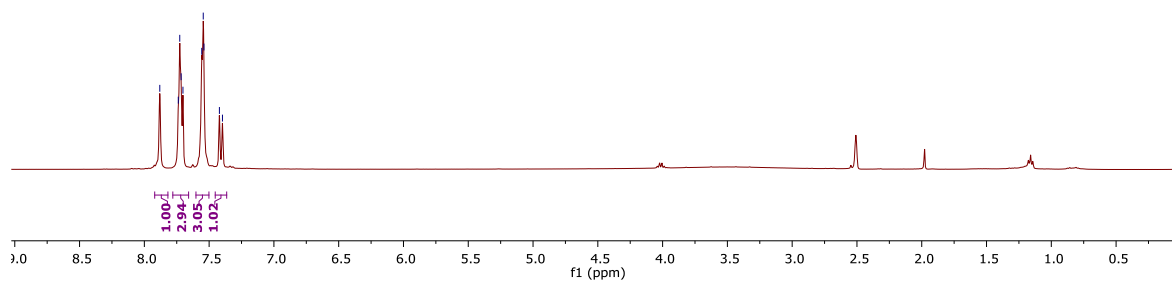


20200718-P22P20-H.14.fid

7.881
7.738
7.727
7.716
7.702
7.557
7.545
7.540
7.421
7.397



^1H NMR (400 MHz, DMSO- d_6)

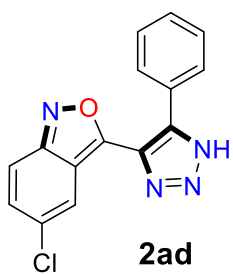


20200718-P22P20-C.31.fid

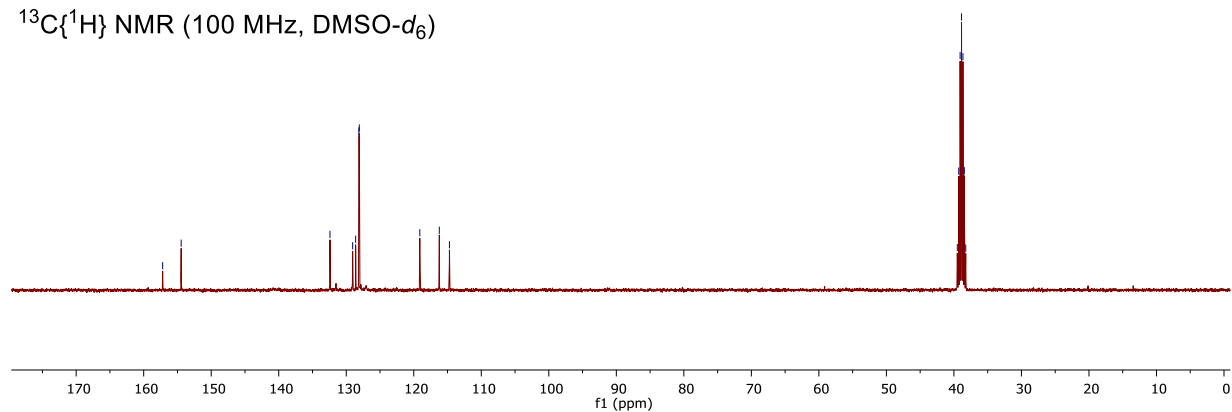
157.194
154.448

132.410
129.052
128.608
128.138
128.065
119.104
116.218
114.719

39.499
39.291
39.082
38.874
38.664
38.456
38.247

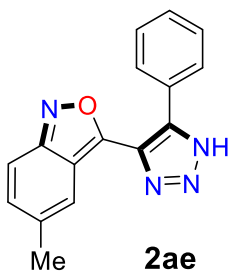


$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6)

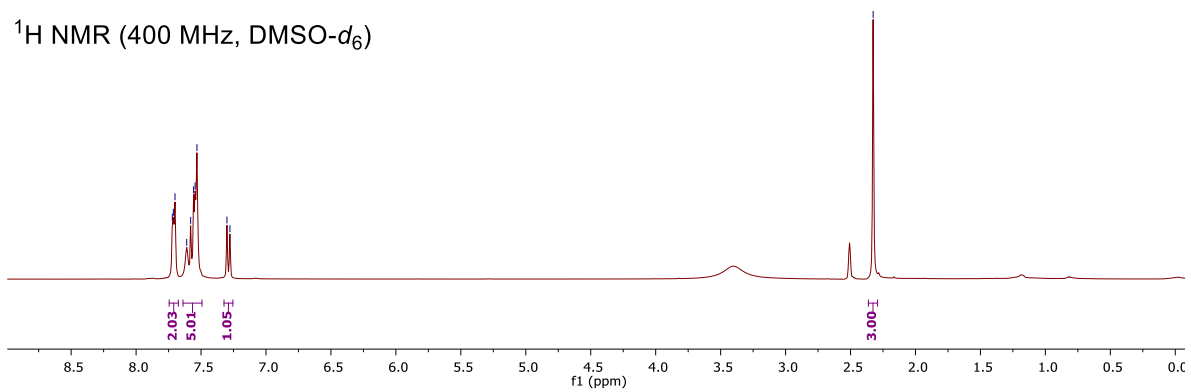


20200718-P22P18-H.12.fid

7.721
7.713
7.701
7.610
7.580
7.557
7.546
7.532
7.301
7.278

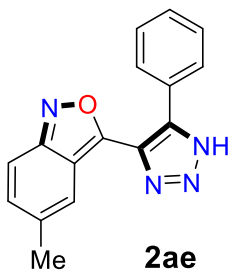


^1H NMR (400 MHz, $\text{DMSO}-d_6$)

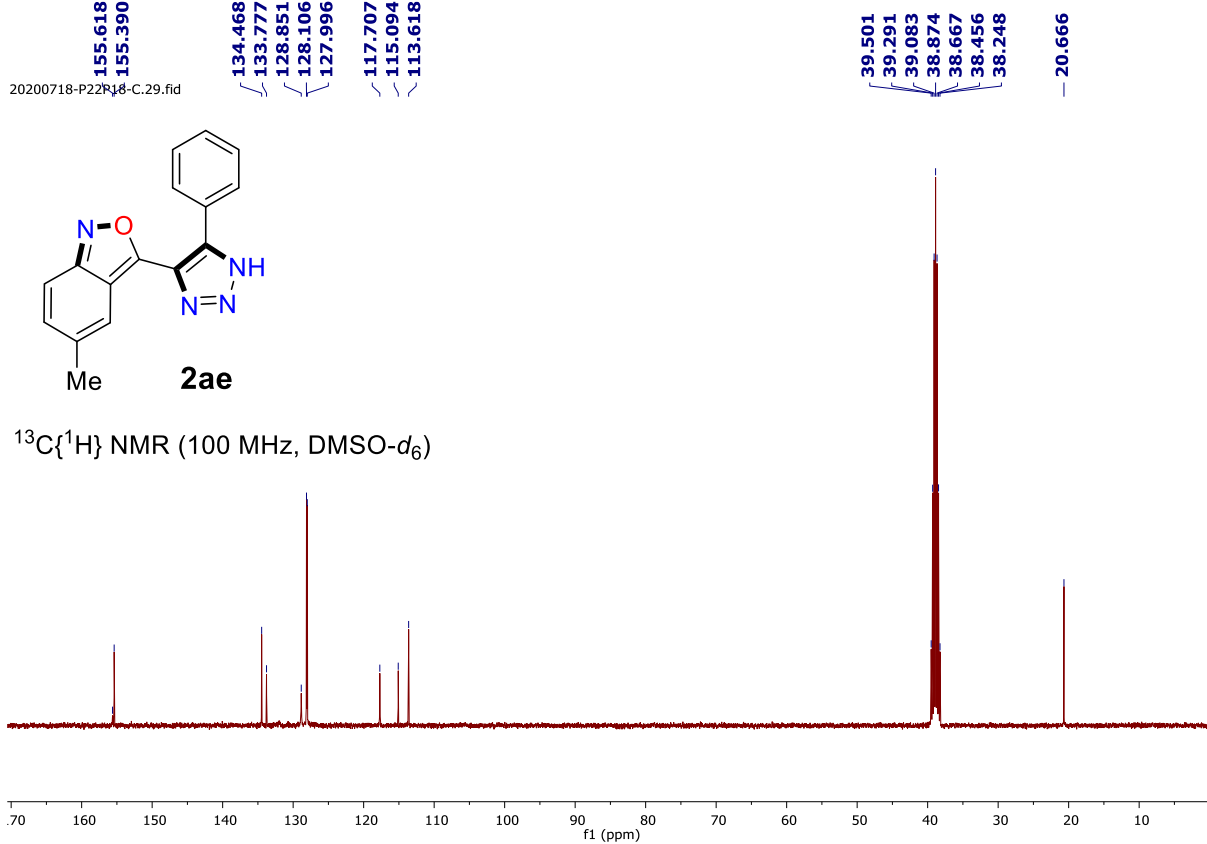


20200718-P22P18-C.29.fid

155.618
155.390
134.468
133.777
128.851
128.106
127.996
117.707
115.094
113.618

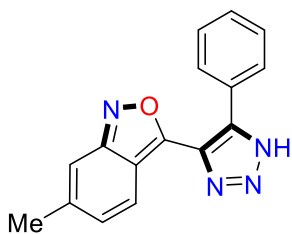


$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO}-d_6$)



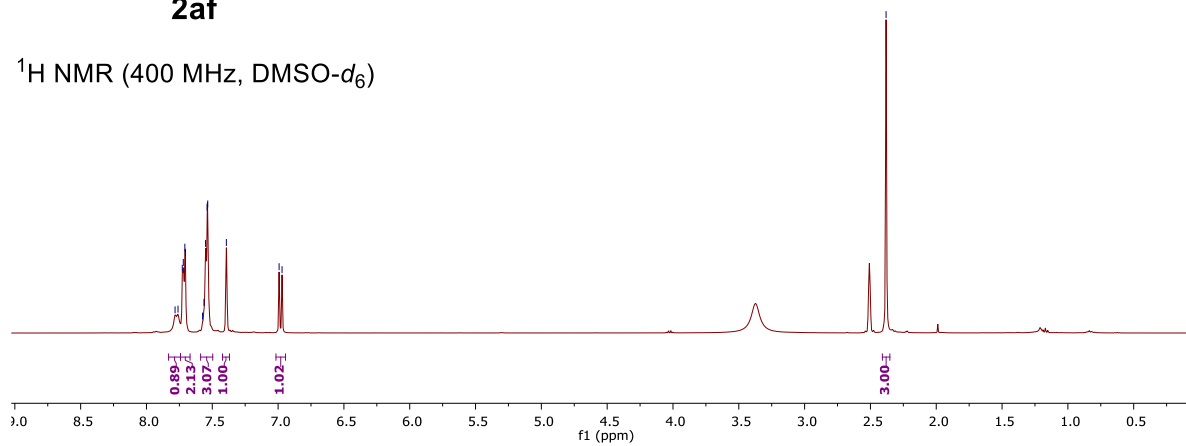
20200718-P22P19-H.13.fid

7.783
7.760
7.728
7.720
7.708
7.704
7.563
7.551
7.539
7.534
6.992
6.970



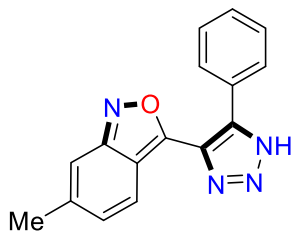
2af

^1H NMR (400 MHz, $\text{DMSO-}d_6$)



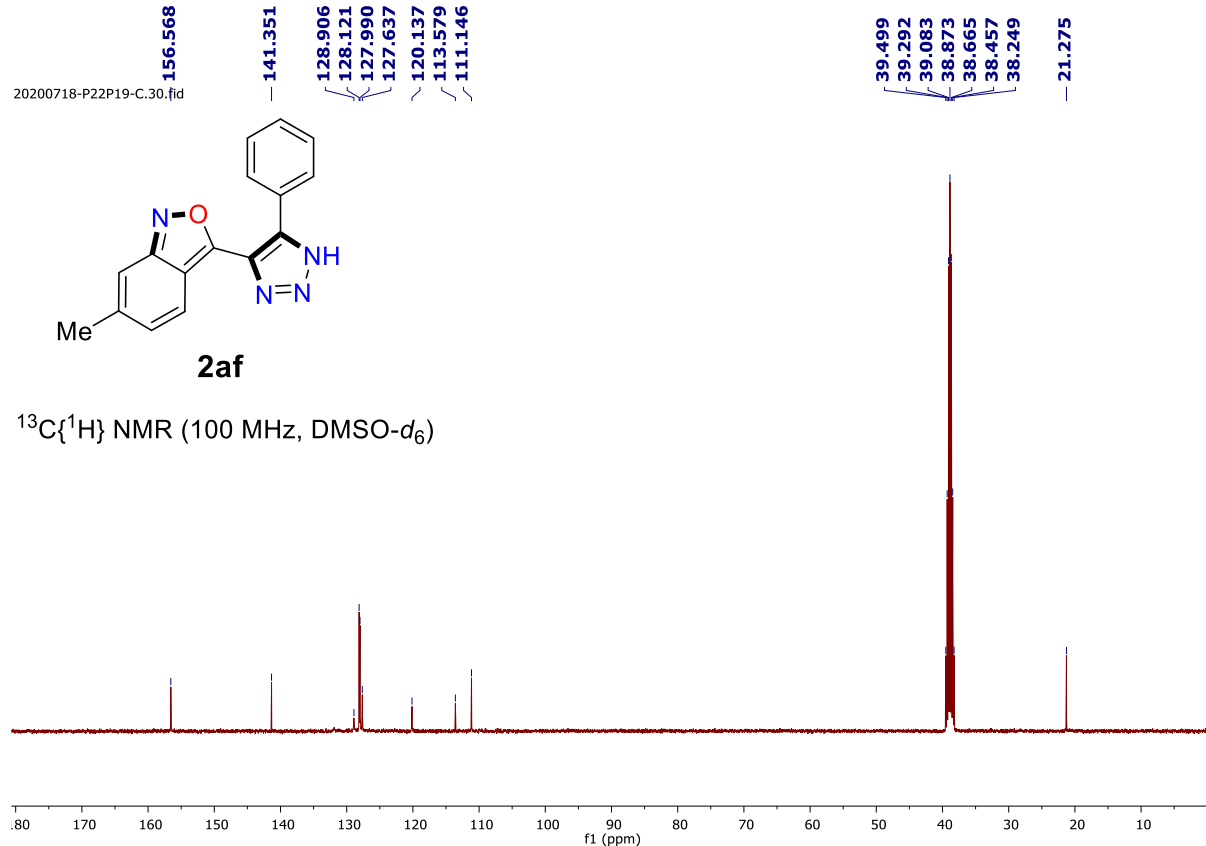
20200718-P22P19-C.30.fid

156.568
141.351
128.906
128.121
127.990
127.637
120.137
113.579
111.146



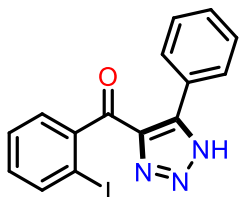
2af

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO-}d_6$)



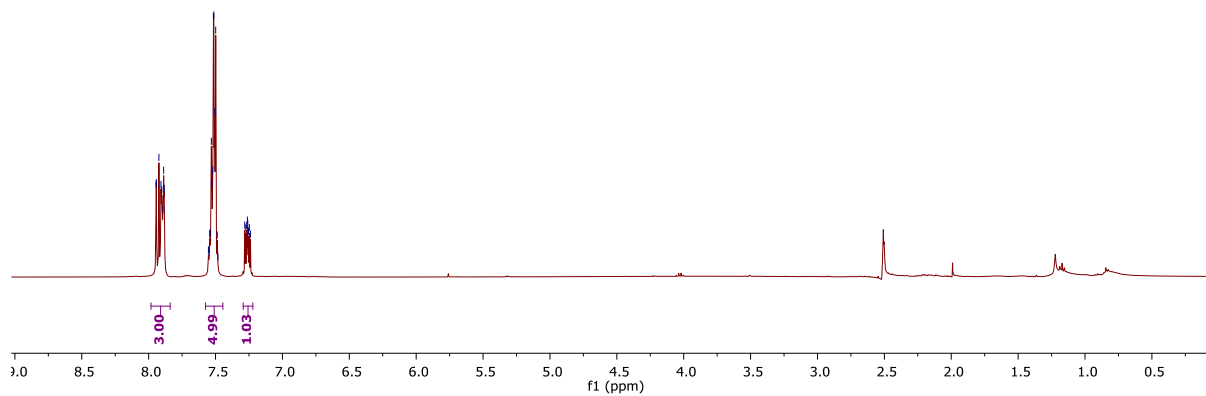
20200818-RT-P22P1-H.4.fid

7.944
7.942
7.923
7.908
7.902
7.888
7.884
7.859
7.844
7.839
7.831
7.827
7.821
7.816
7.813
7.806
7.799
7.787
7.783
7.782
7.774
7.767
7.762
7.759
7.754
7.747
7.739



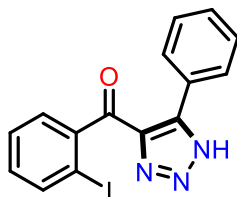
3a

^1H NMR (400 MHz, $\text{DMSO-}d_6$)



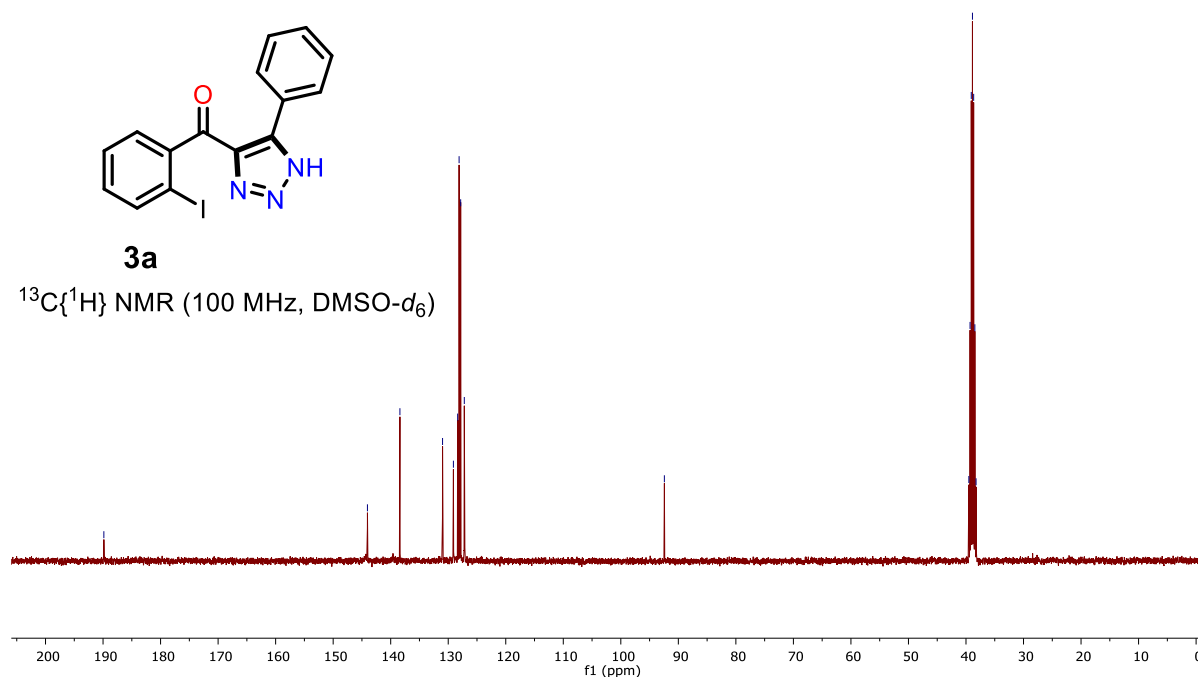
20200822-RT-P22P1-C.2.fid

189.859
144.041
138.397
130.985
129.099
128.362
128.109
127.836
127.205
92.428
39.502
39.292
39.083
38.875
38.667
38.459
38.248



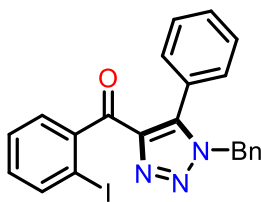
3a

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO-}d_6$)



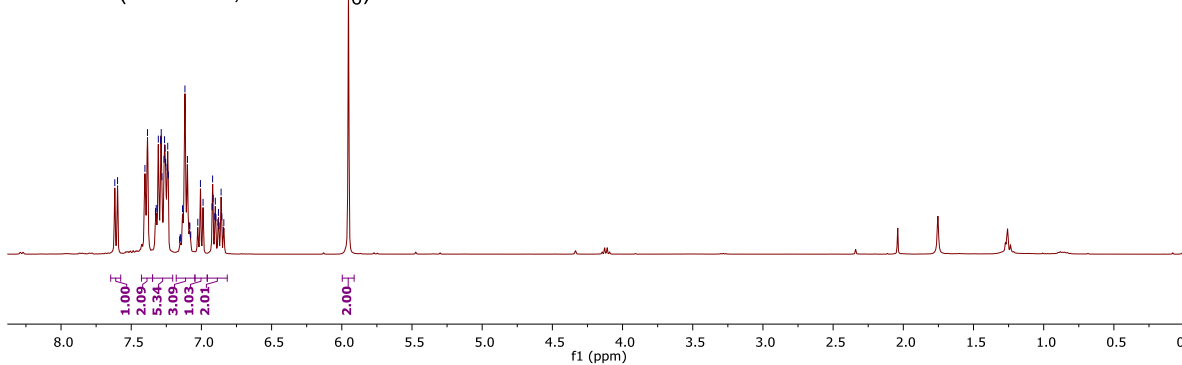
7.617
7.597
7.402
7.384
7.327
7.322
7.307
7.290
7.286
7.282
7.266
7.263
7.259
7.255
7.244
7.240
7.236
7.155
7.151
7.147
7.135
7.117
7.099
7.086
7.082
7.076
7.026
7.007
6.988
6.924
6.920
6.916
6.905
6.901
6.897
6.882
6.878
6.874
6.860
6.855
6.844
6.840
5.952

20200729-No.Cu-1-H.8.fid



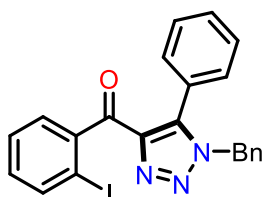
3b

^1H NMR (400 MHz, DMSO- d_6)



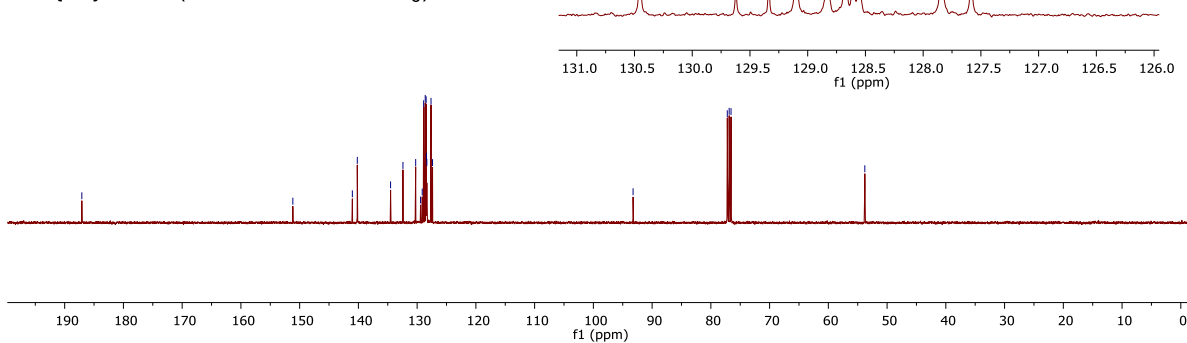
187.078
151.158
141.028
140.188
134.520
132.415
130.248
129.417
129.132
128.895
128.624
128.469
128.403
128.350
127.637
127.378
93.240
77.201
76.883
76.565
53.790

20200729-No.Cu-1-C.11.fid



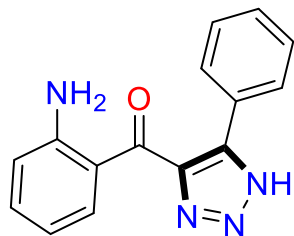
3b

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, DMSO- d_6)



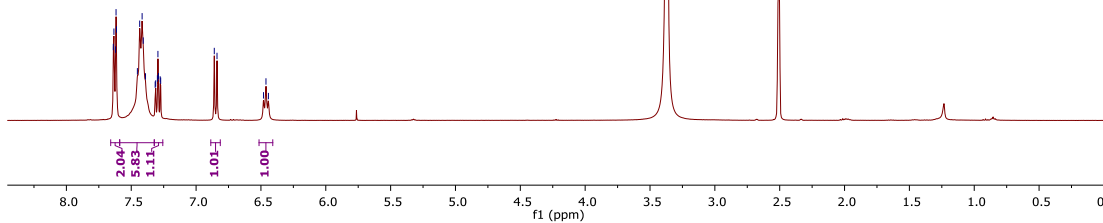
7.638
7.634
7.621
7.617
7.614
7.453
7.435
7.416
7.407
7.390
7.316
7.312
7.298
7.294
7.290
7.277
7.273
6.860
6.839
6.480
6.461
6.442

20200818-ringopen-H.7.fid



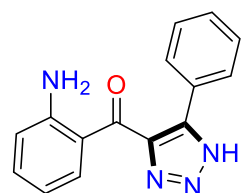
4

^1H NMR (400 MHz, $\text{DMSO-}d_6$)



190.526

20200822-ringopen-C2.6.fid



4

$^{13}\text{C}\{^1\text{H}\}$ NMR (100 MHz, $\text{DMSO-}d_6$)

