

Supporting Information

Magnetically recoverable and reusable CuFe₂O₄ nanoparticles-catalyzed synthesis of benzoxazoles, benzothiazoles and benzimidazoles using dioxygen as oxidant

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^a Shandong Province Key Laboratory of Life-Organic Analysis, School of Chemistry and Chemical Engineering, Qufu Normal University, Qufu 273165, P. R. China

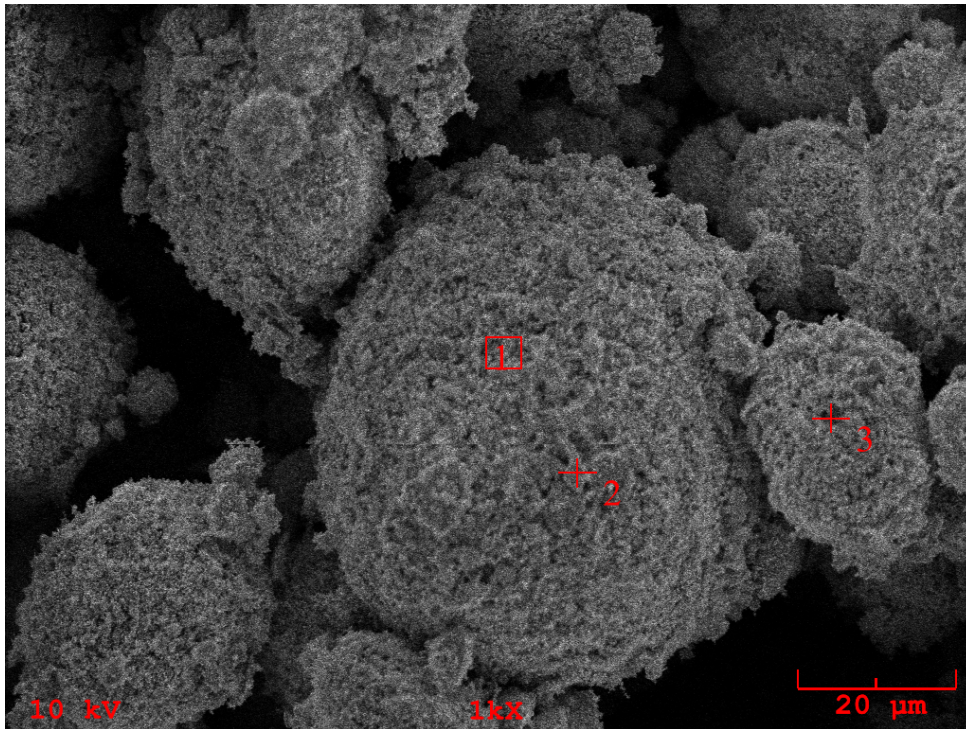
* Fax: +86-5374458306; E-mail: huawang_qfnu@126.com

^b Beijing Key Laboratory for Analytical Methods and Instrumentation, Department of Chemistry, Tsinghua University, Beijing 100084, P. R. China

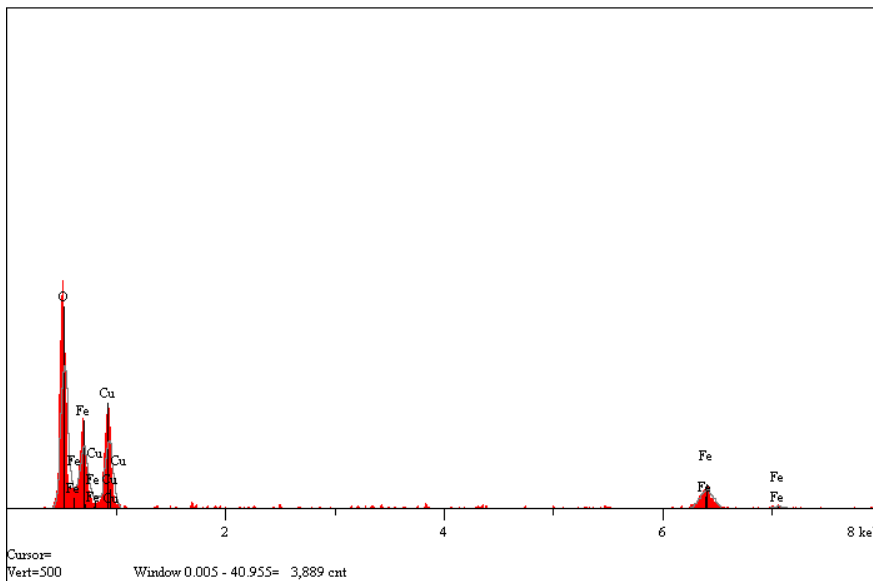
^c Key Laboratory of Adaptation and Evolution of Plateau Biota, Northwest Institute of Plateau Biology, Chinese Academy of Science, Xining 810008, P. R. China

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EDX spectrum of CuFe ₂ O ₄	P2
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Analysis Report: Image1-1



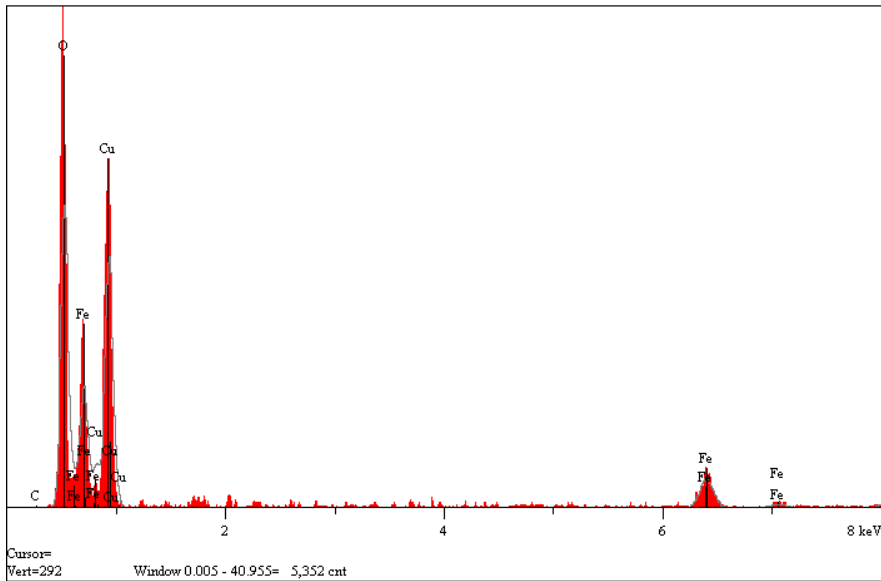
Elt.	Line	Intensity (c/s)	Atomic %	Conc	Units	Error 2-sig	
O	Ka	40.08	43.701	17.473	wt. %	1.057	
Fe	Ka	9.94	35.725	49.856	wt. %	5.775	
Cu	Ka	0.61	20.574	32.671	wt. %	15.249	
			100.000	100.000	wt. %		Total

kV 10.0

Takeoff Angle 35.0°

Elapsed Livetime 30.0

Analysis Report: Image1-2

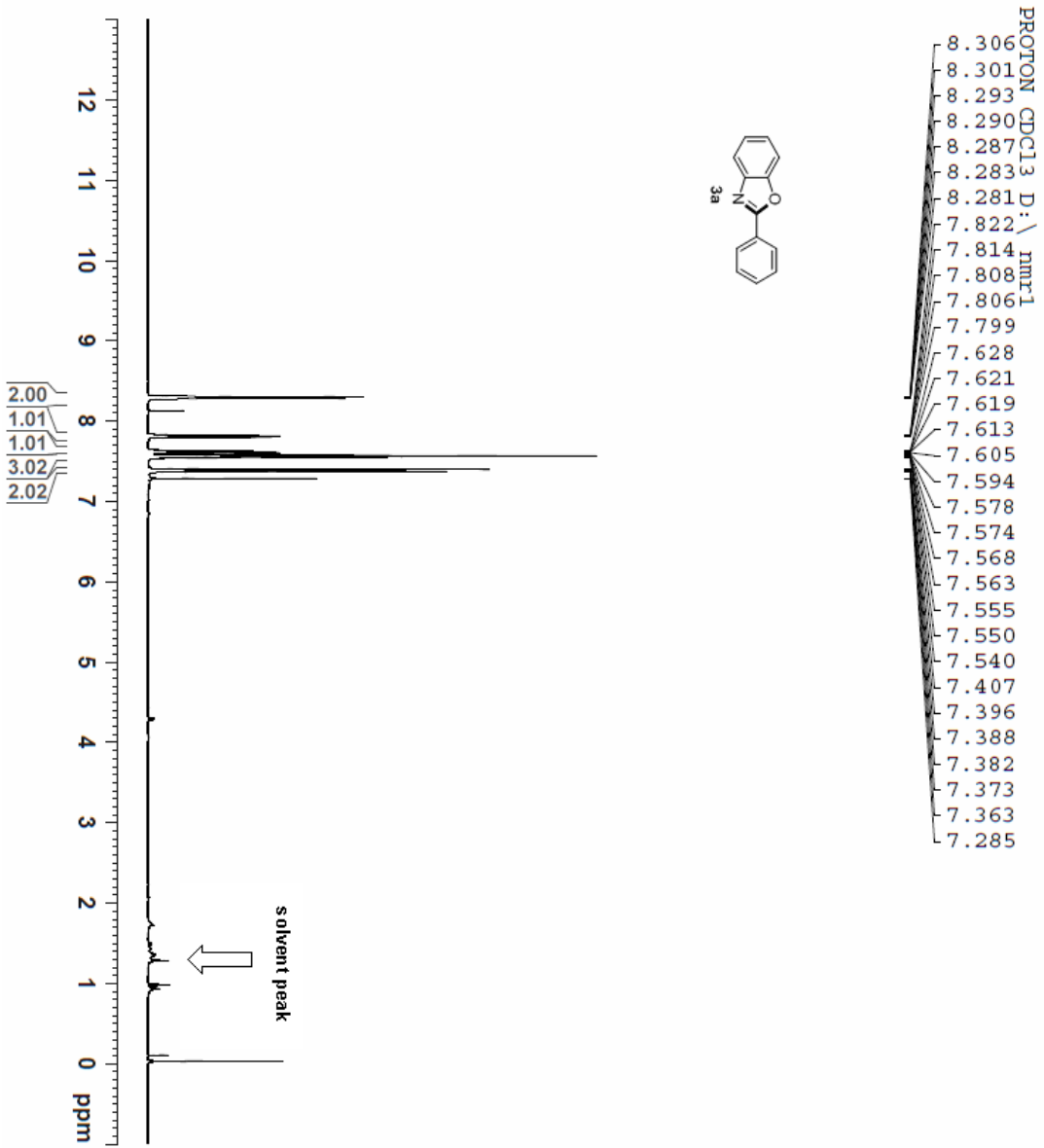


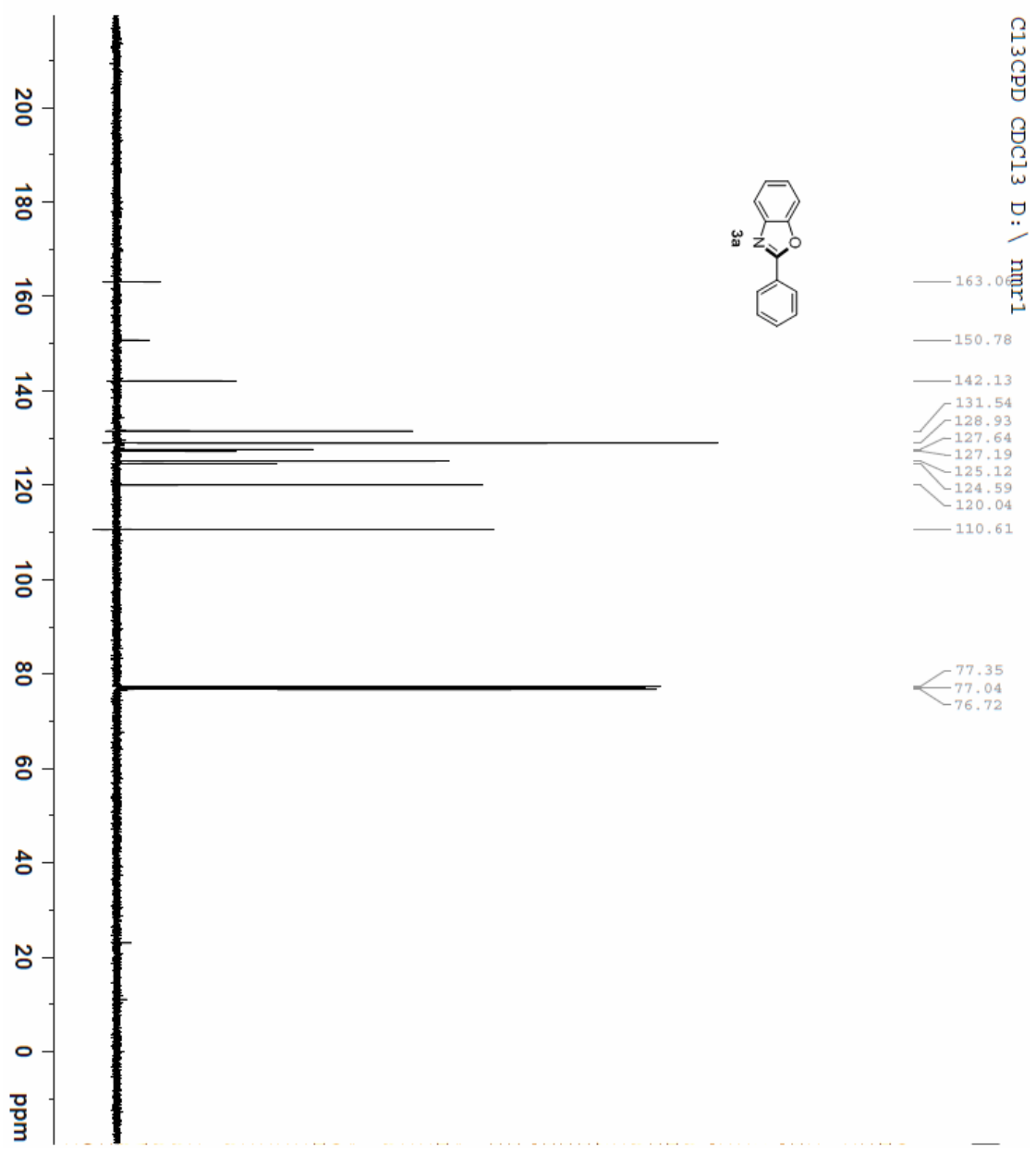
Elt.	Line	Intensity (c/s)	Atomic %	Conc	Units	Error 2-sig	
C	Ka	0.00	0.000	0.000	wt. %	0.000	
O	Ka	49.35	43.990	17.288	wt. %	0.974	
Fe	Ka	8.88	24.916	34.177	wt. %	4.462	
Cu	Ka	1.17	31.094	48.535	wt. %	16.412	
			100.000	100.000	wt. %		Total
							1

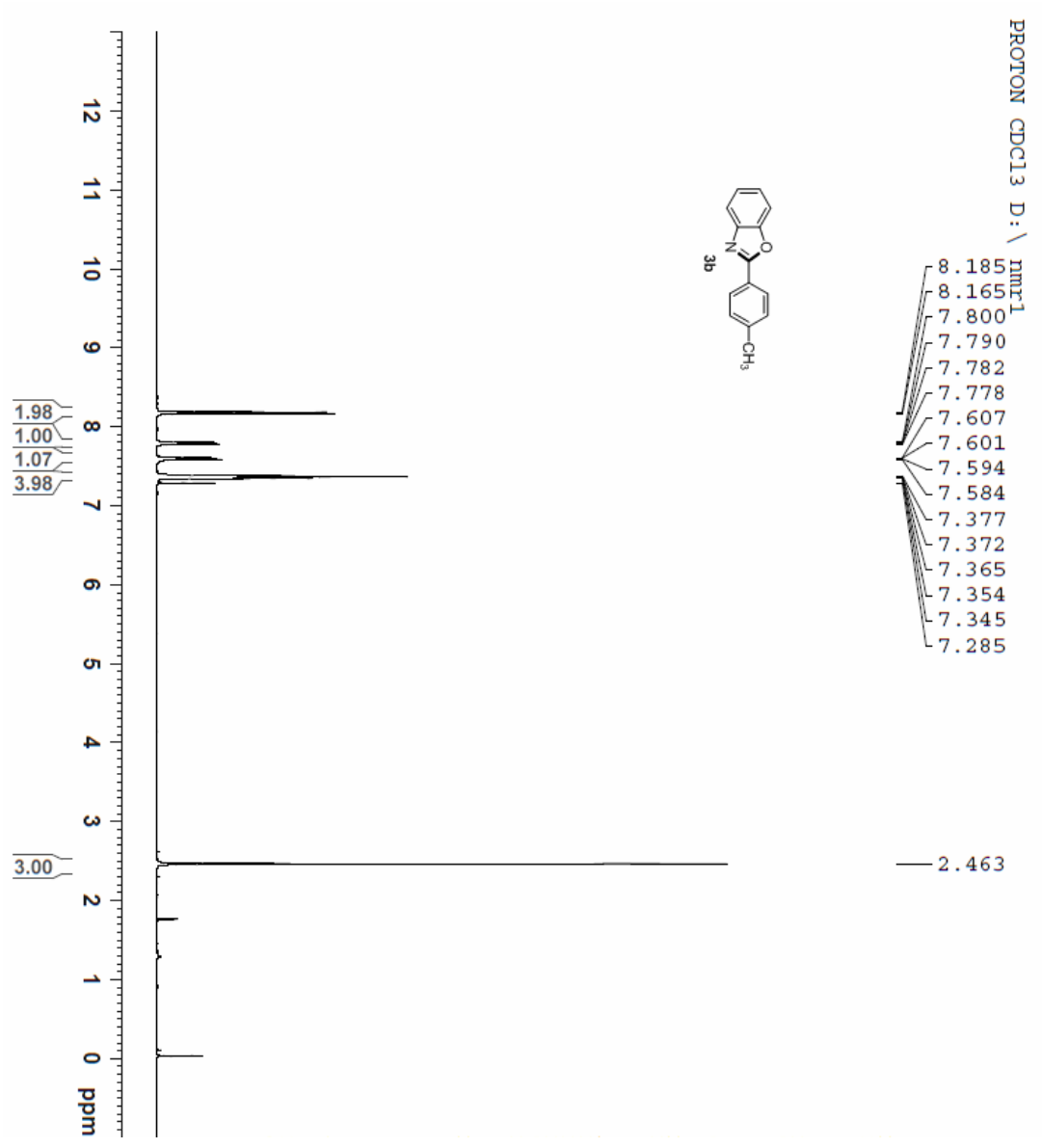
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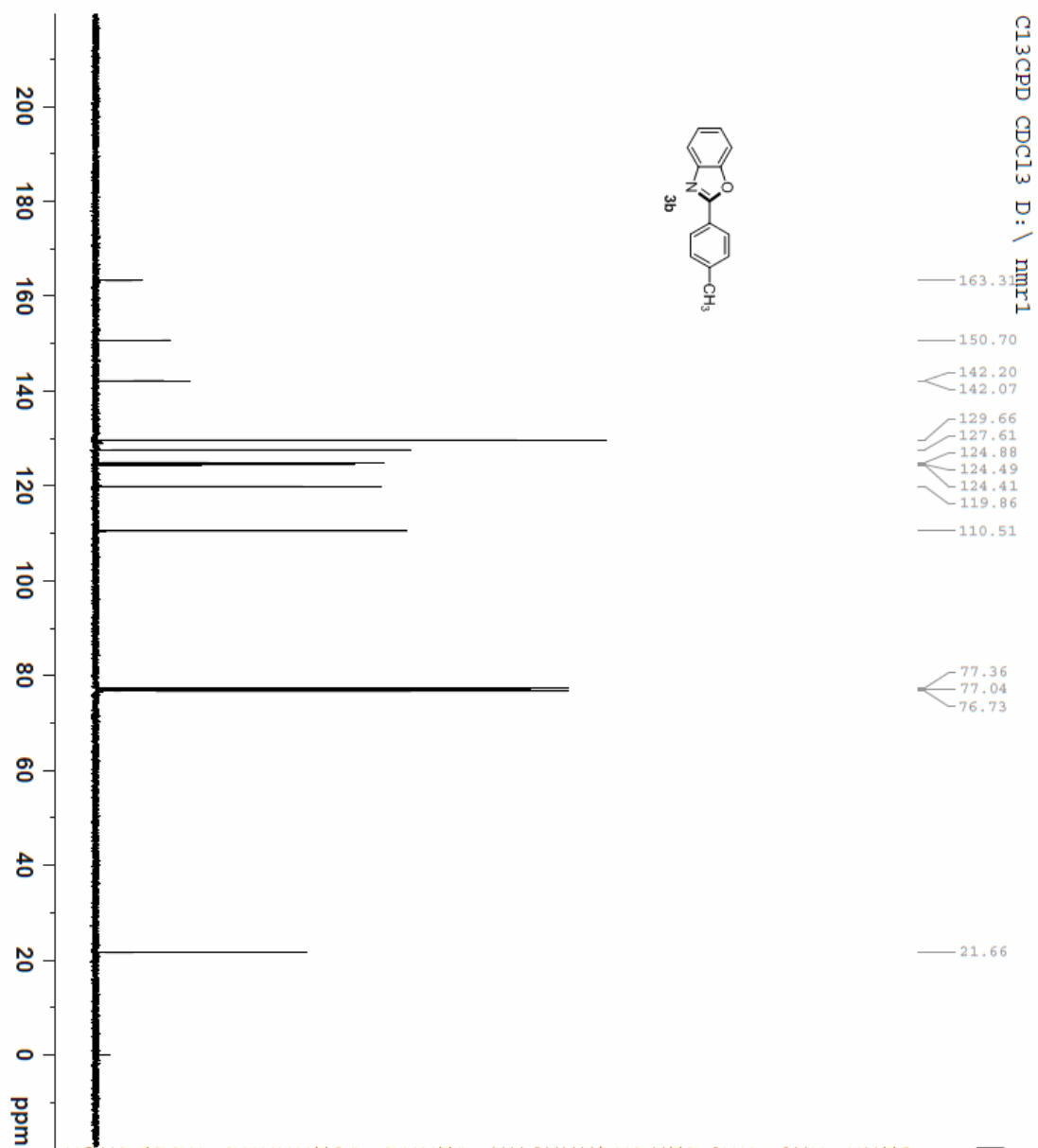
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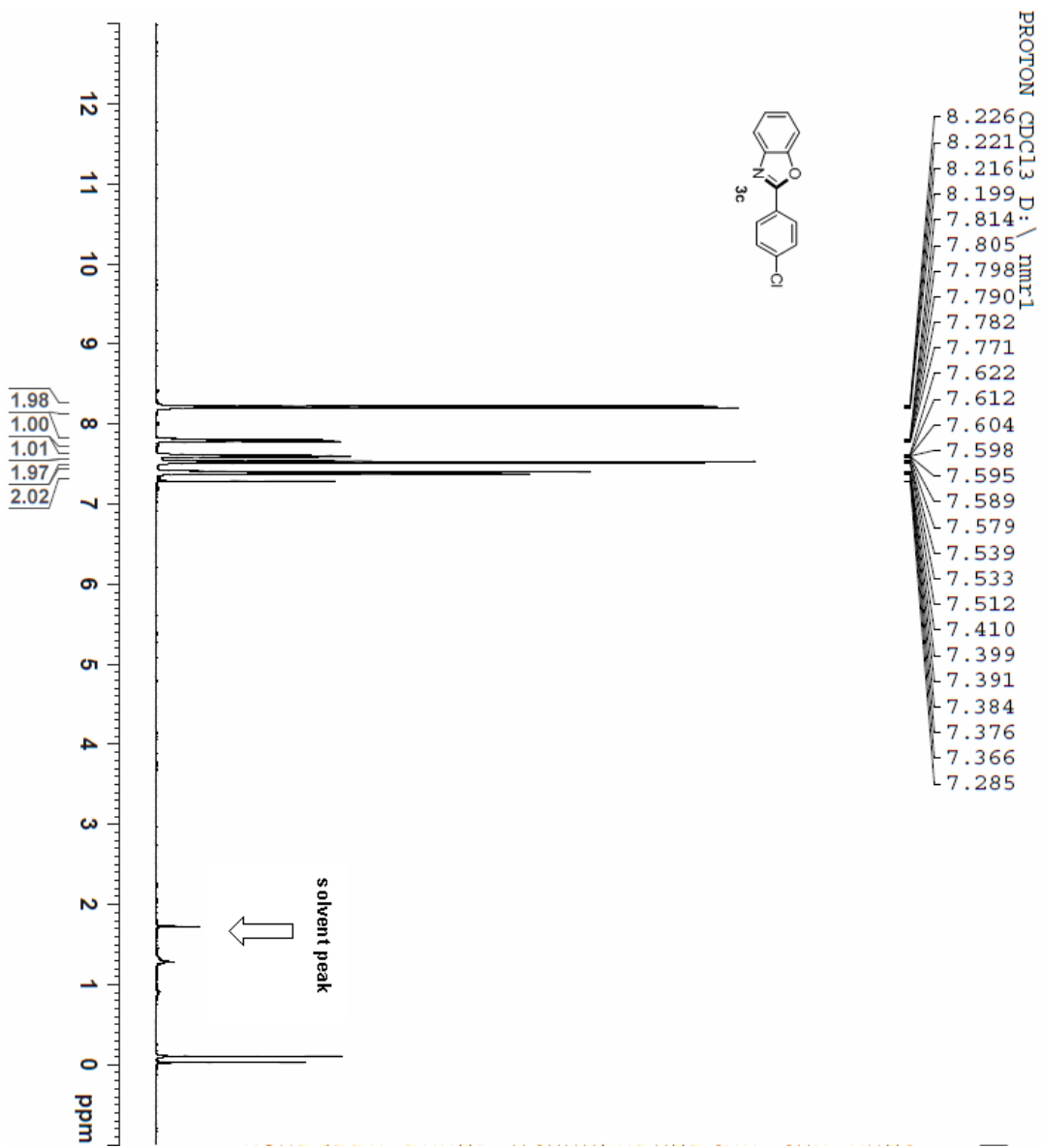
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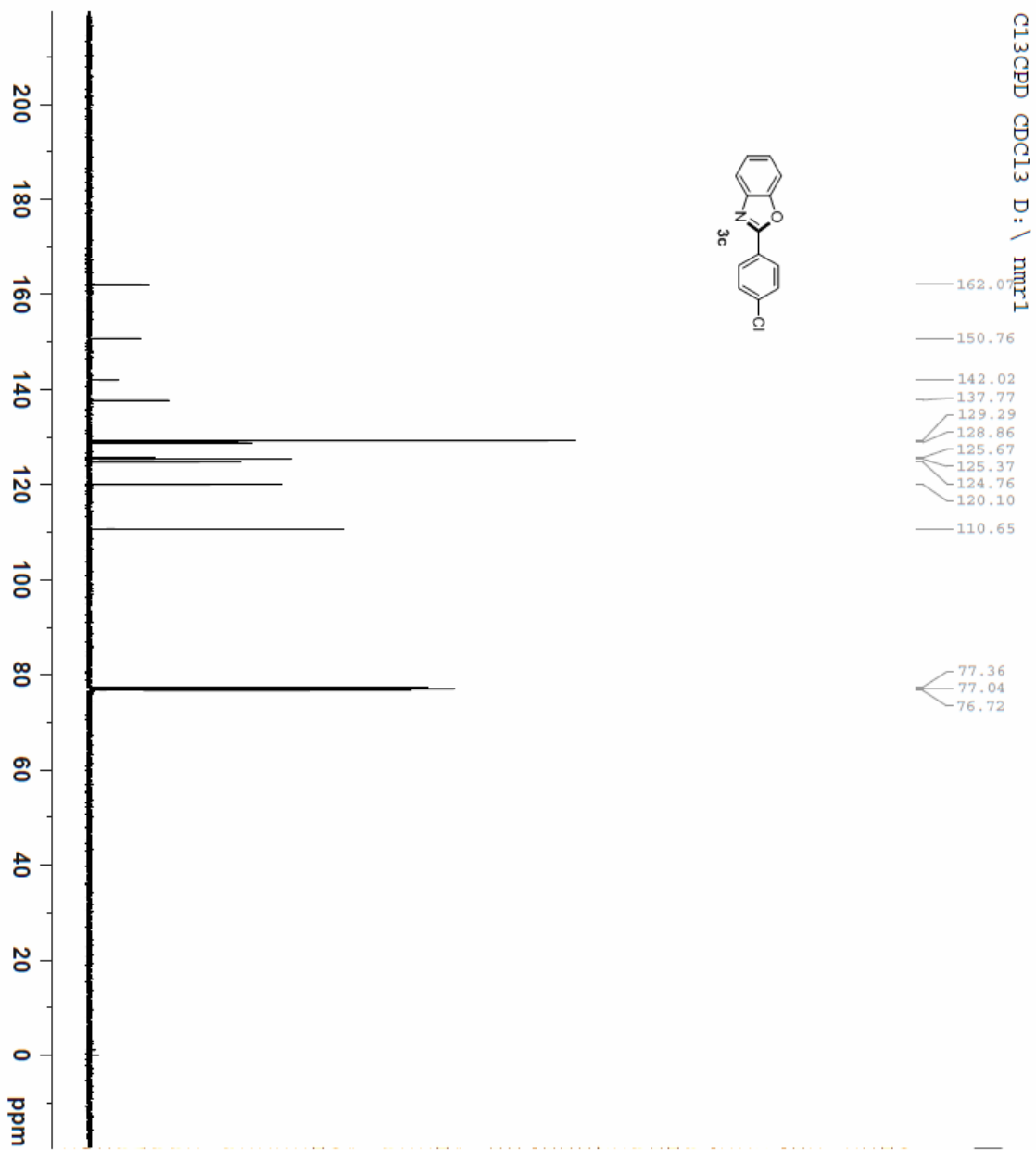






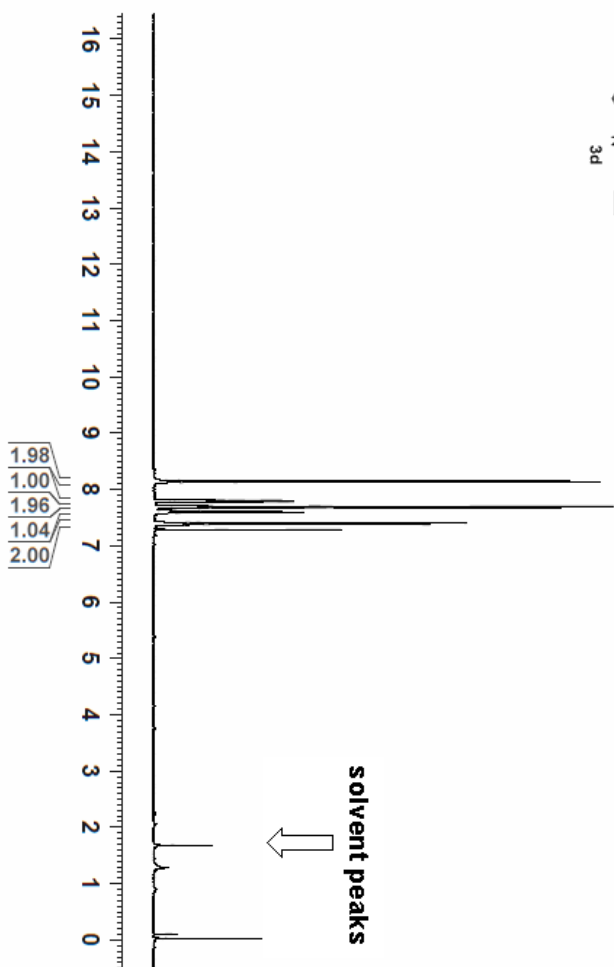
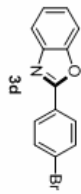


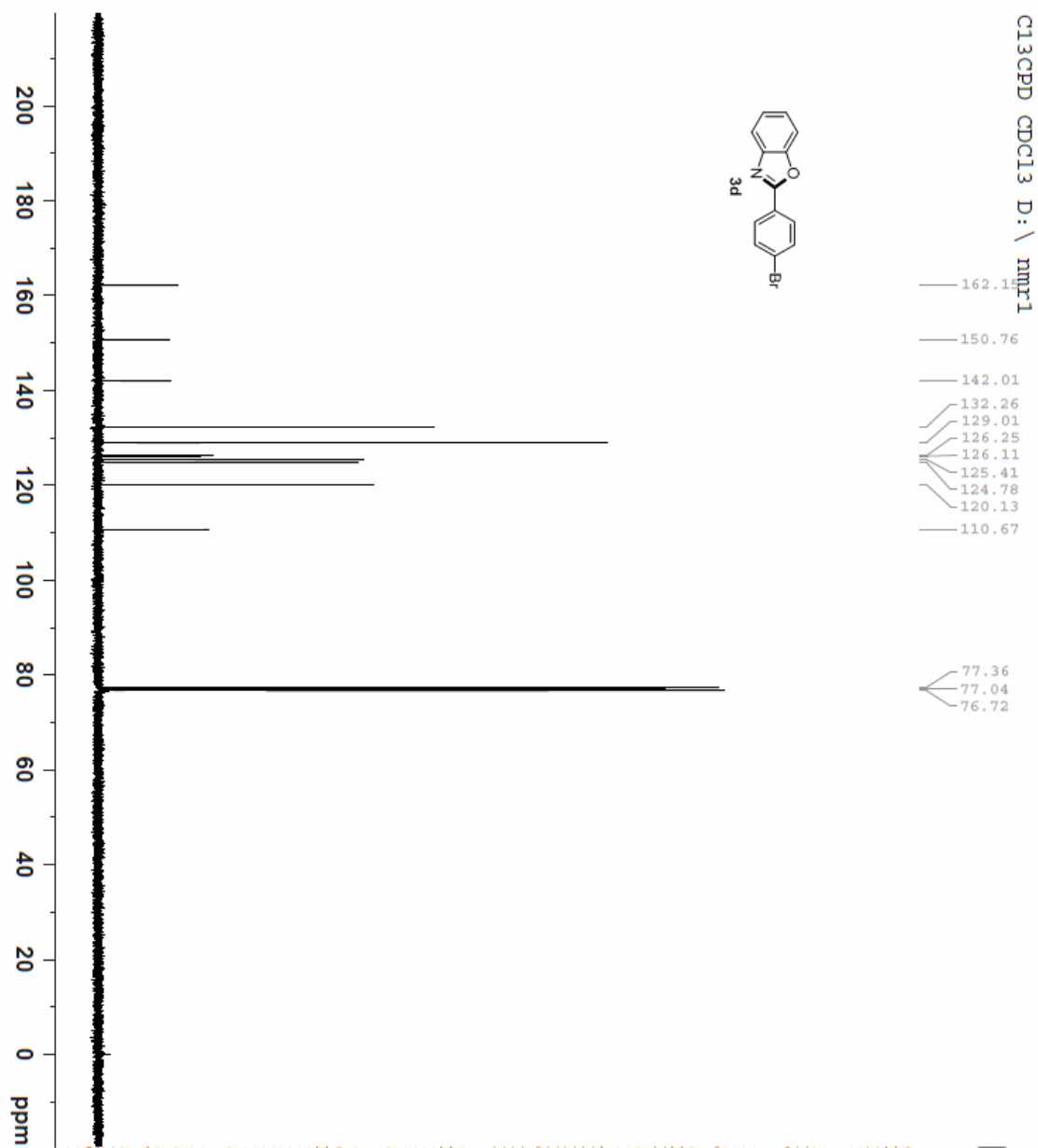


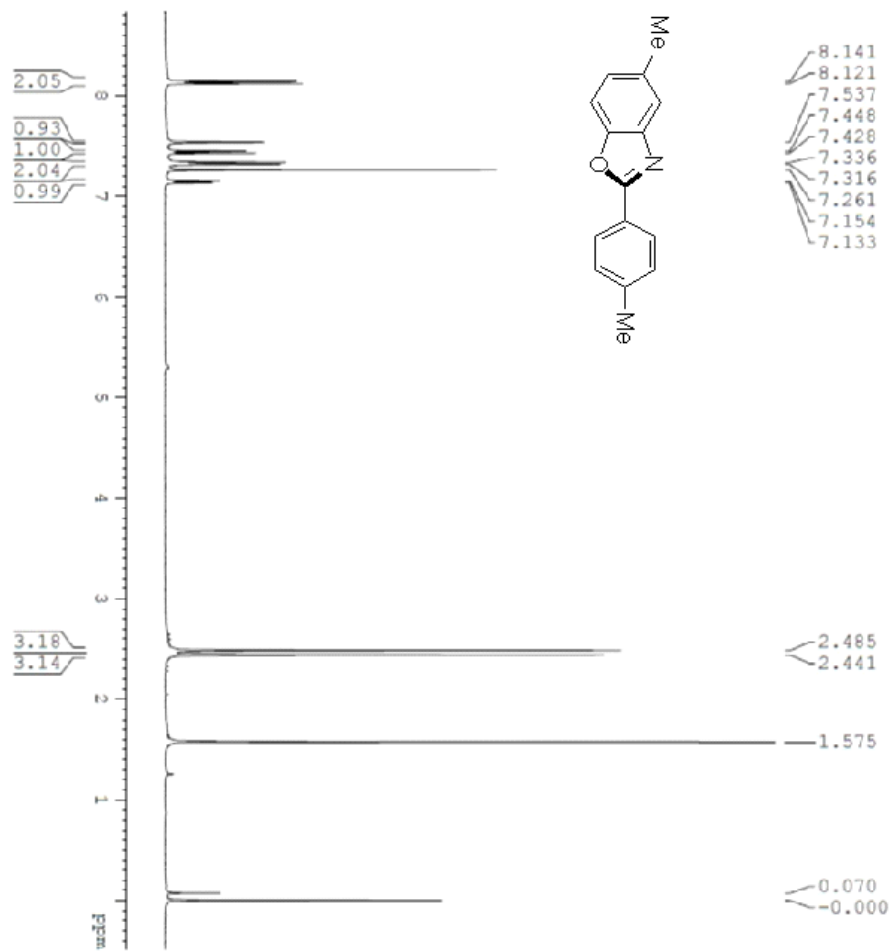


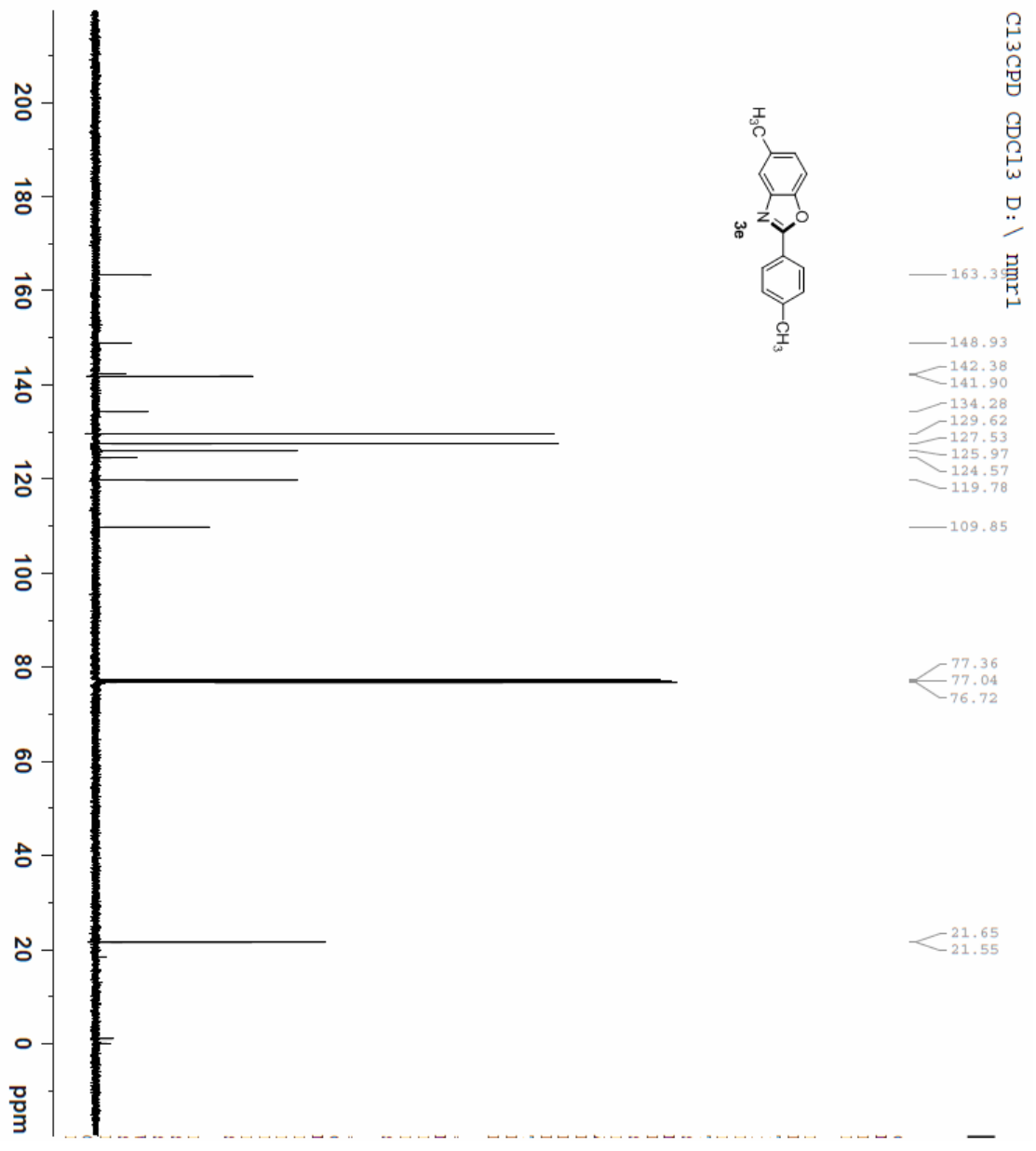
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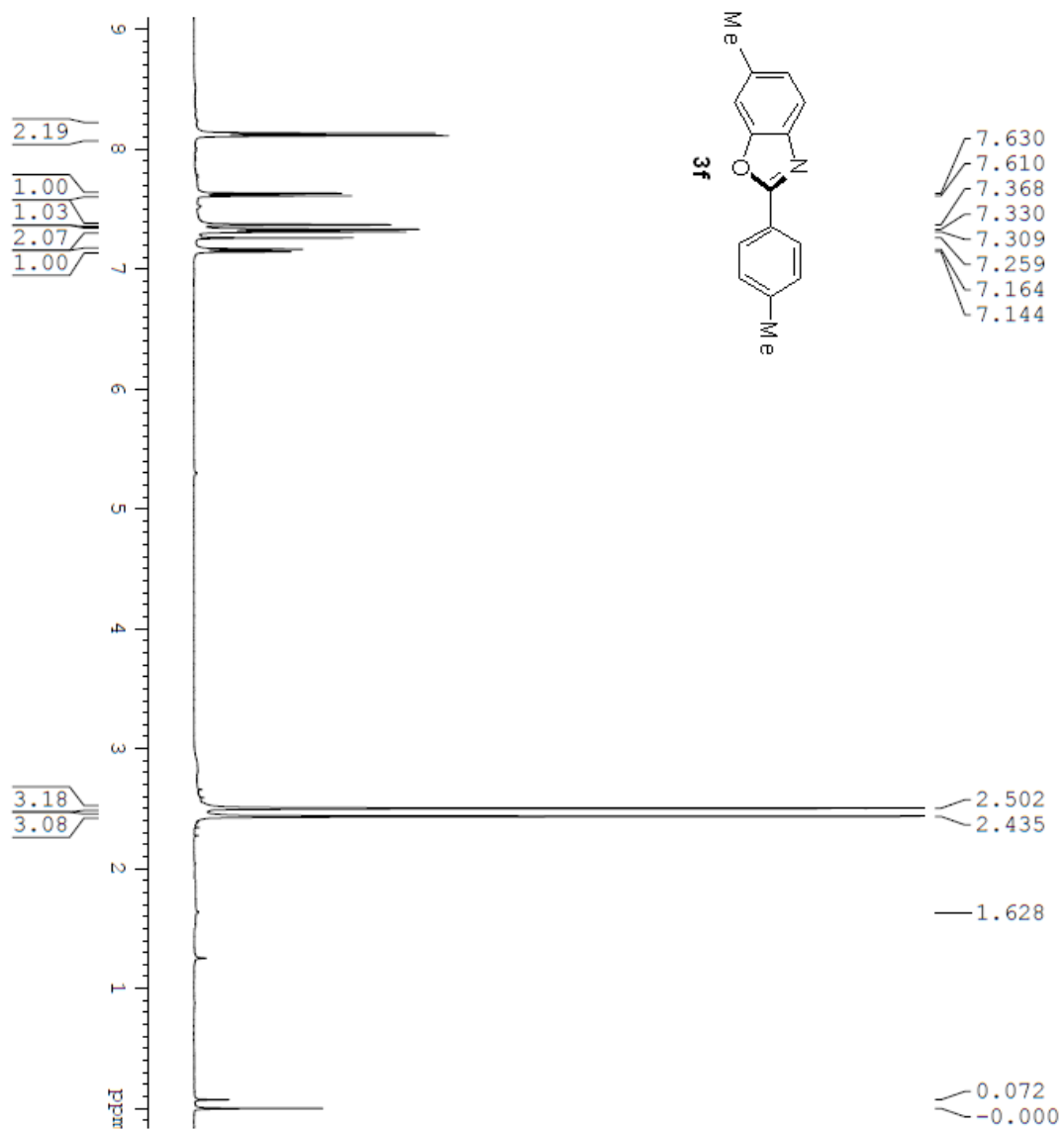
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7.412
7.404
7.397
7.394
7.390
7.380
7.369
7.285



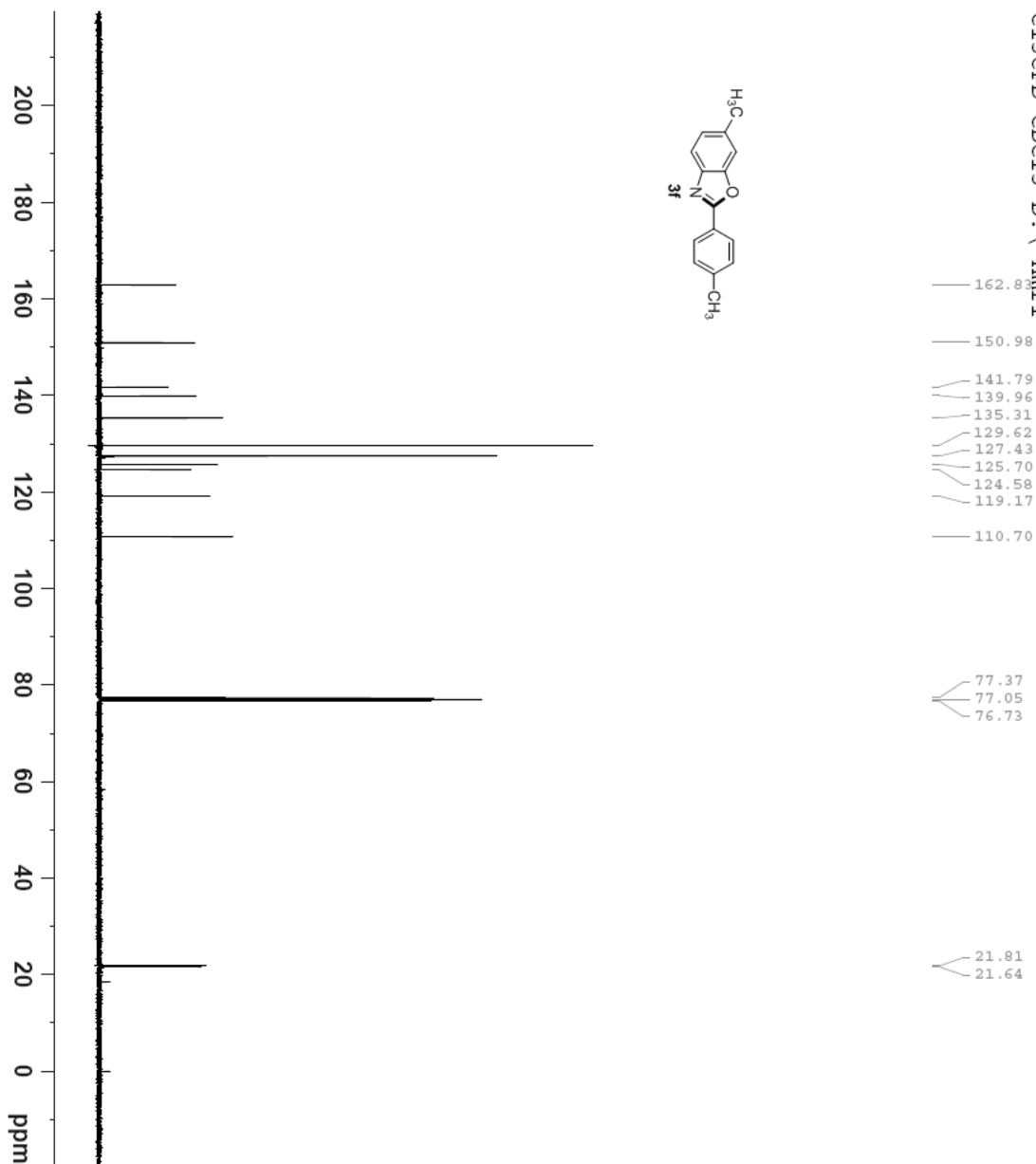
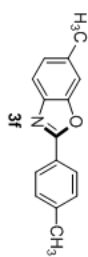


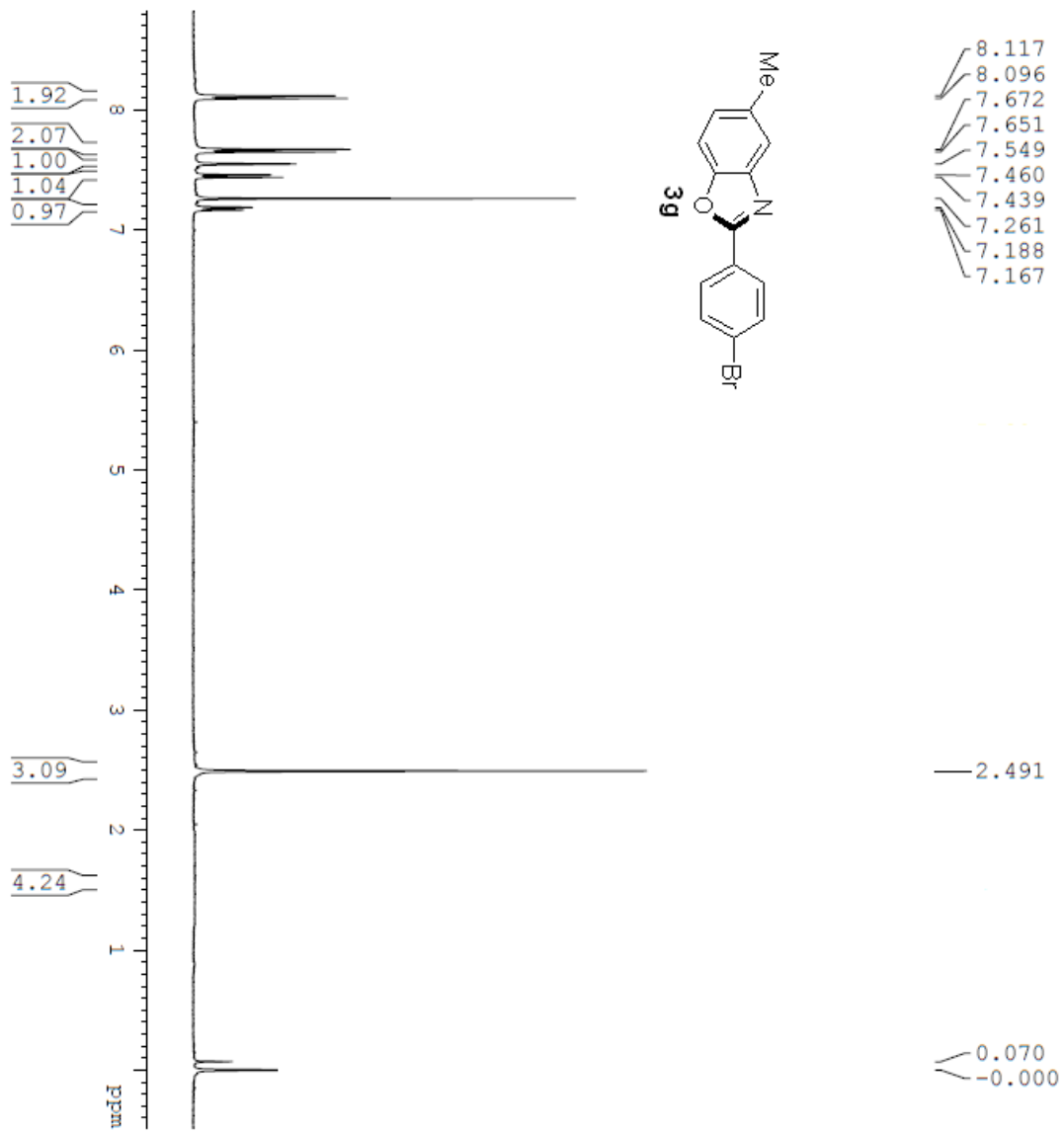






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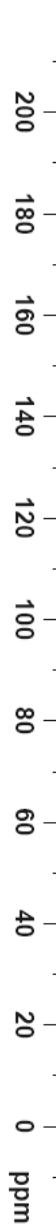
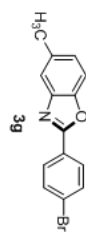


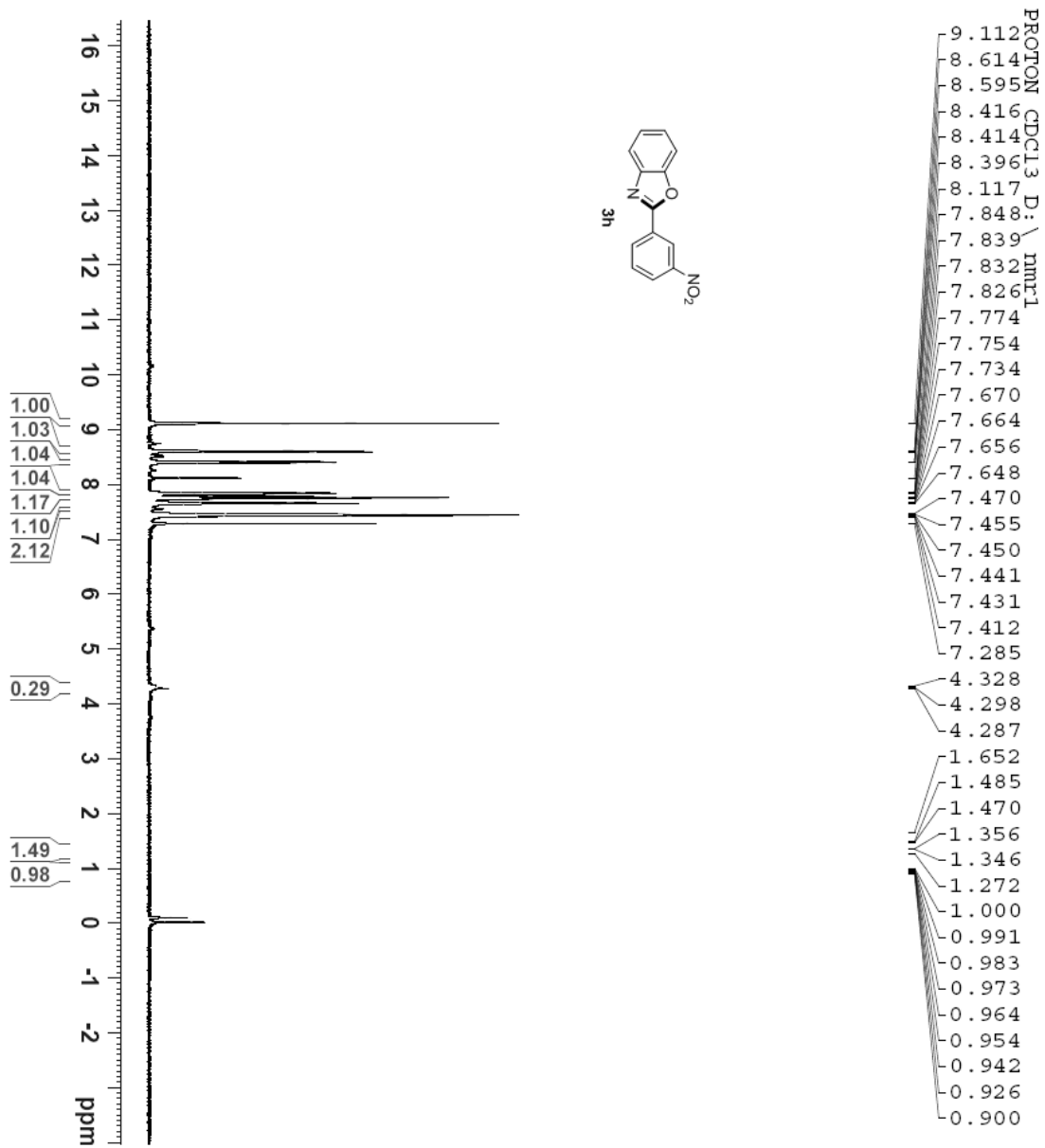
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126.26
126.05
119.99
110.00

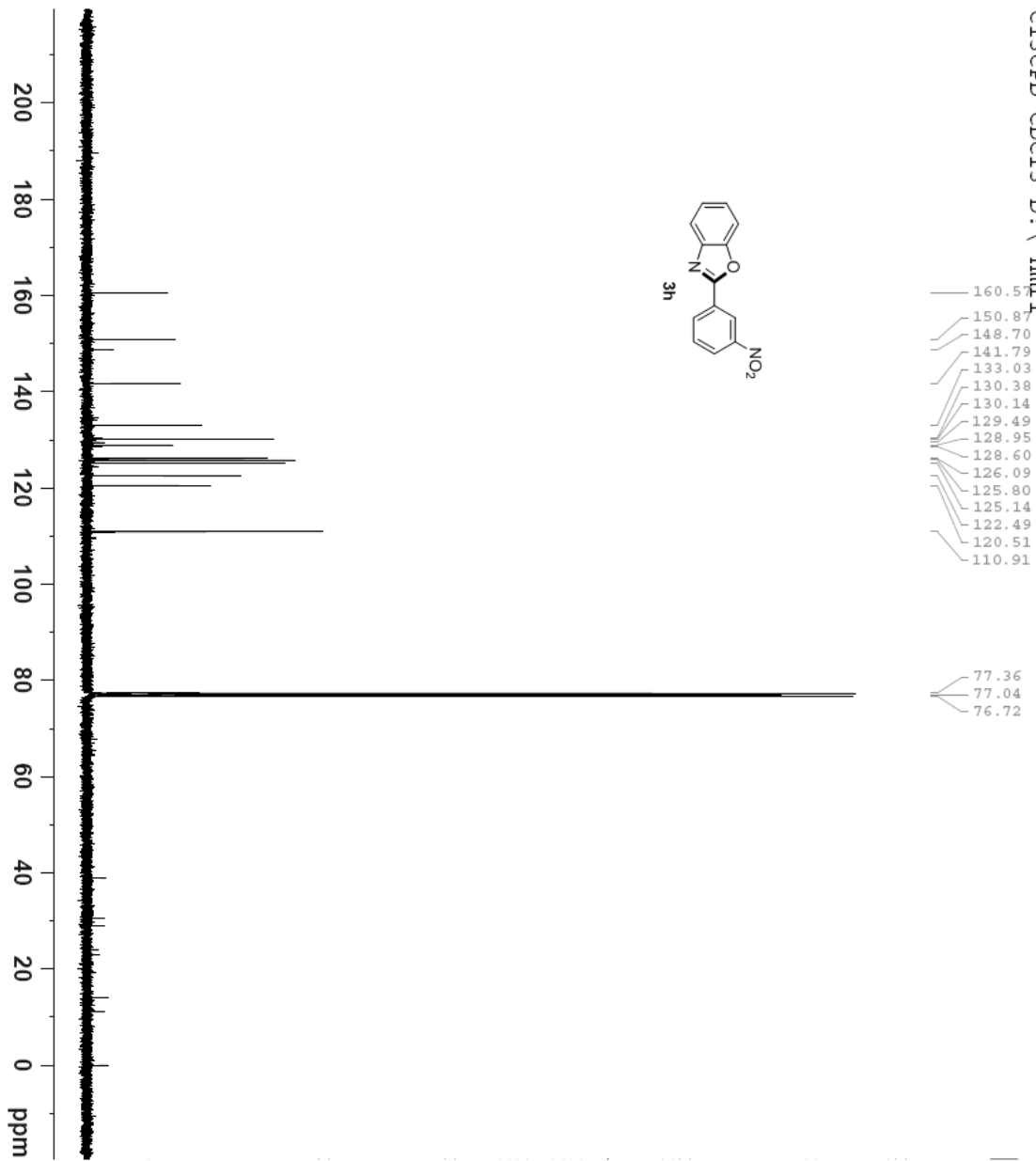
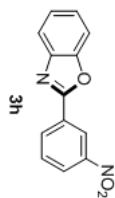
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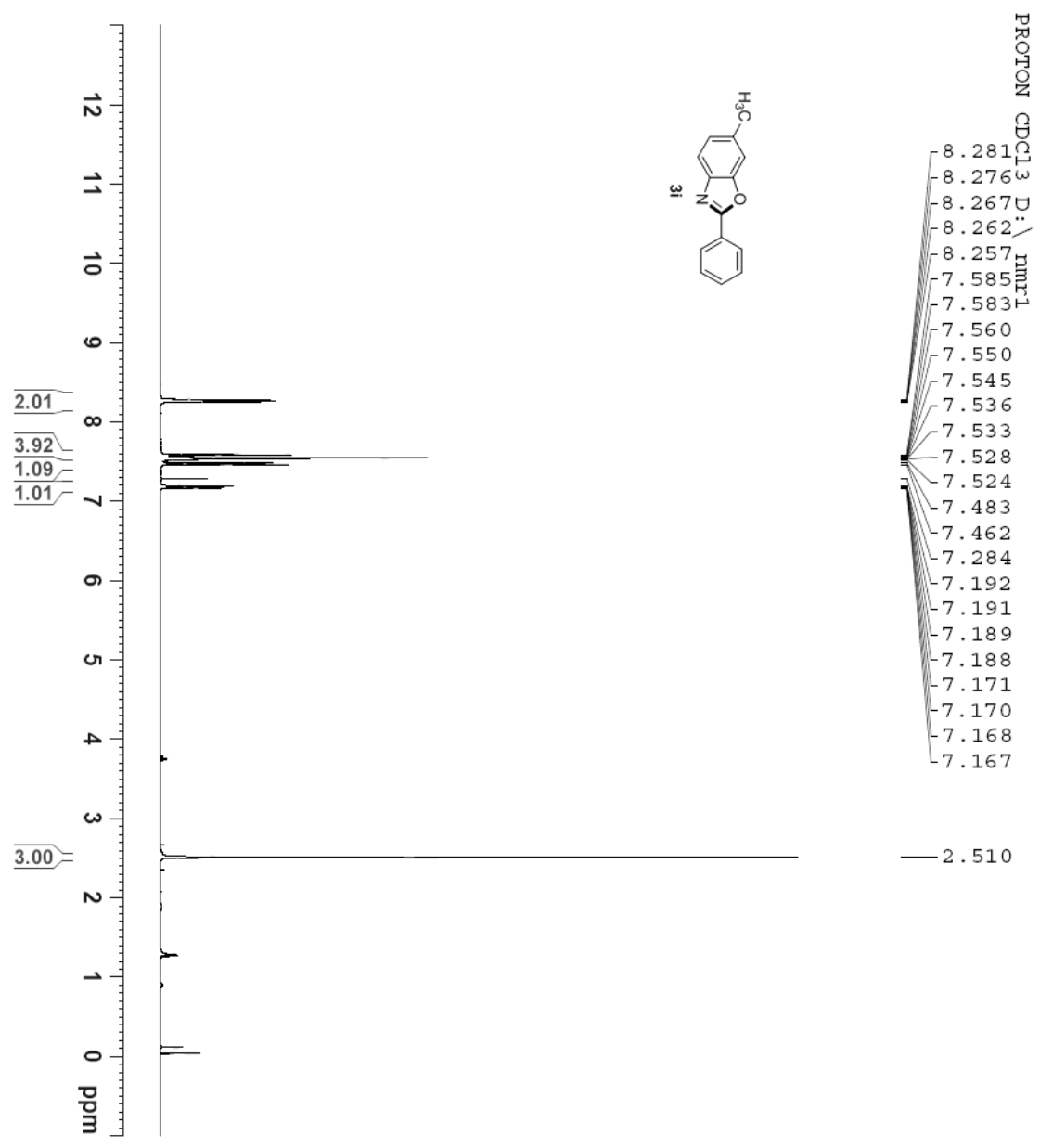
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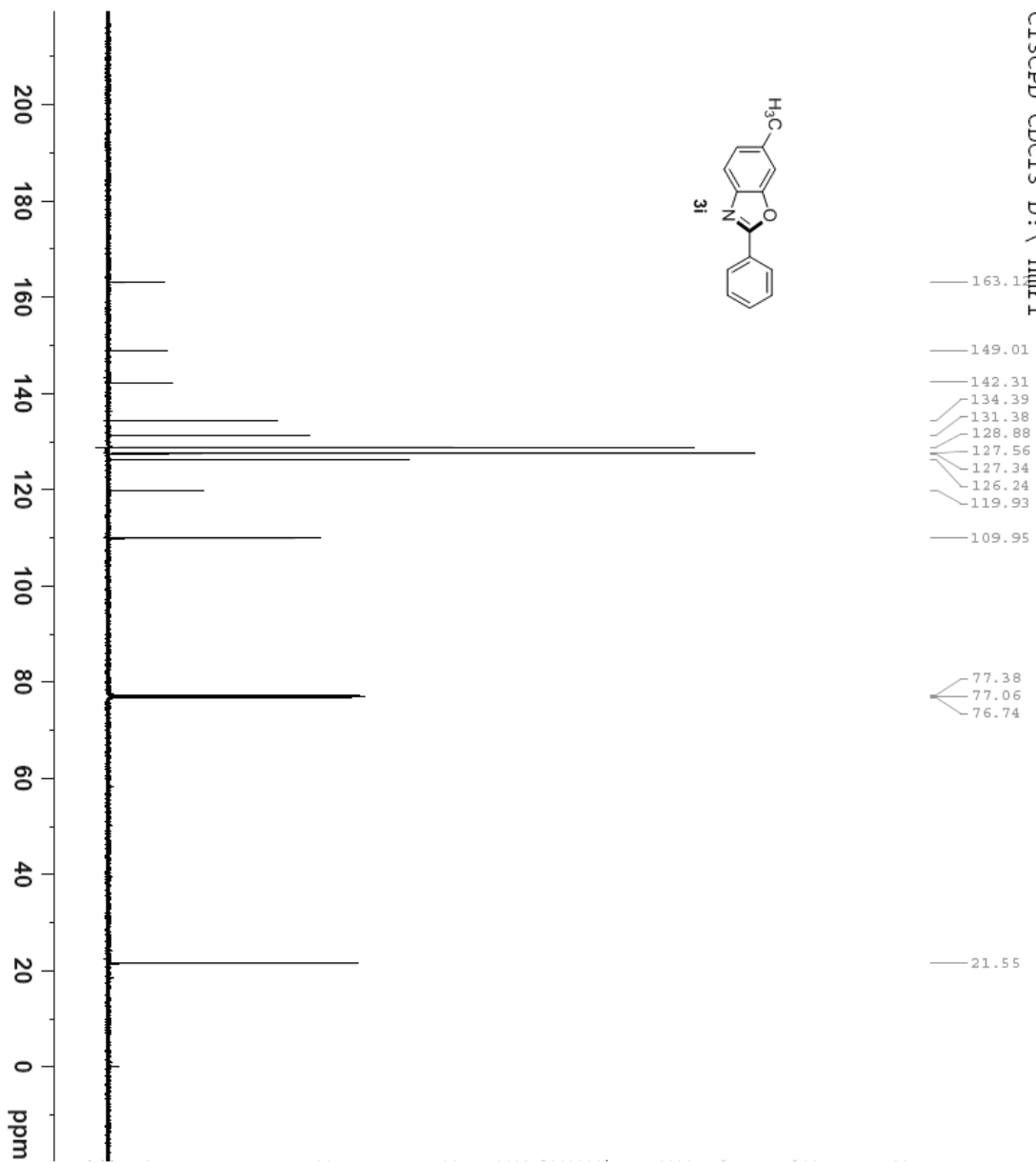
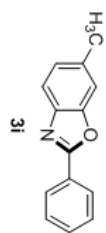


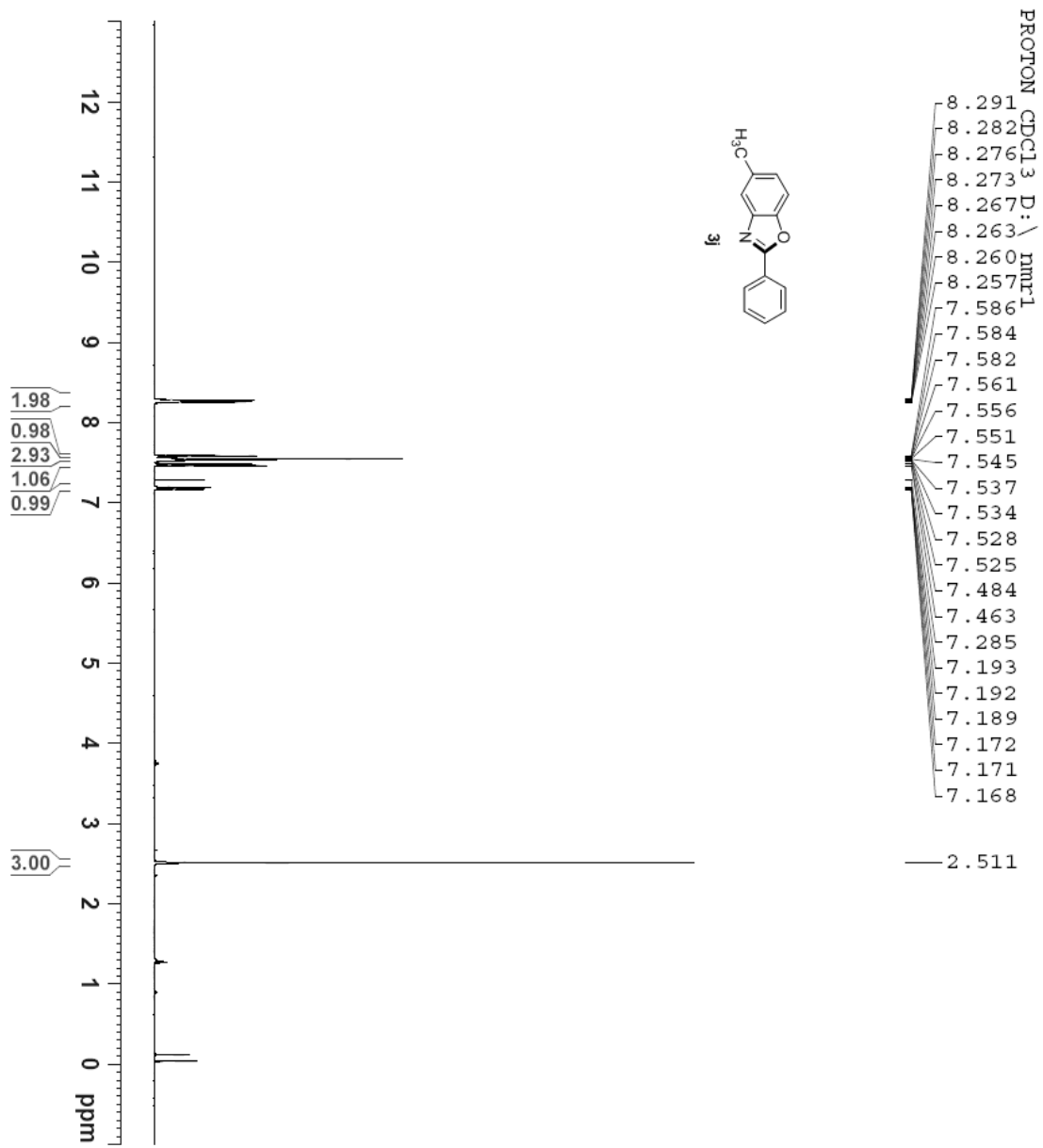
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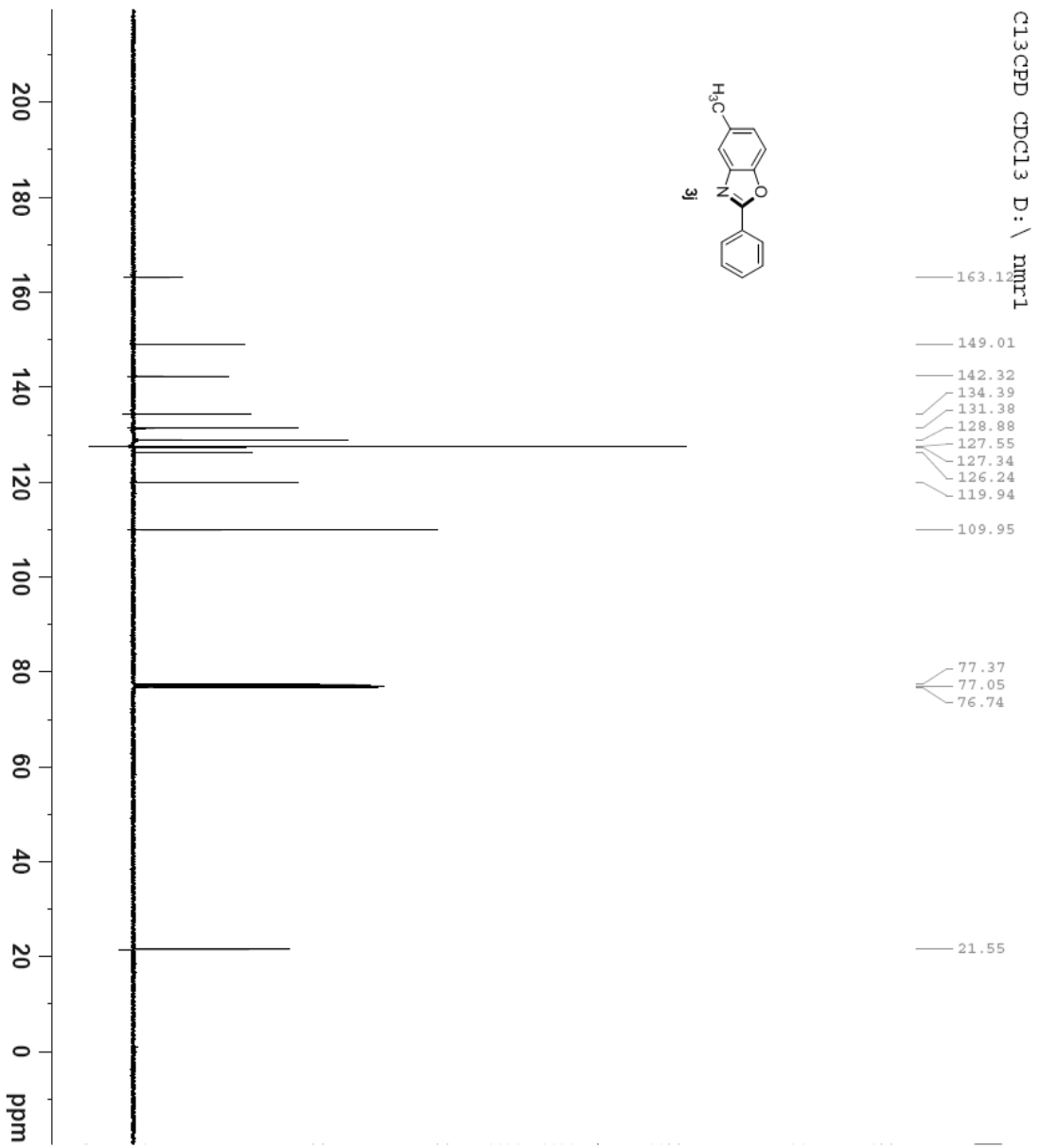




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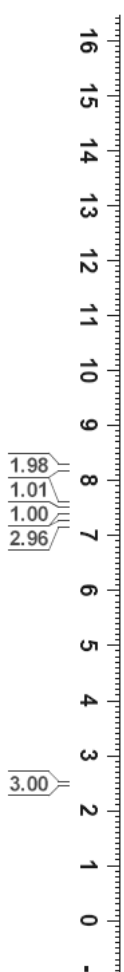
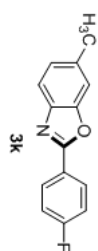




PROTON CDCl3 D: \

nmr1

- 8.272
- 8.267
- 8.258
- 8.255
- 8.250
- 8.242
- 8.237
- 7.560
- 7.559
- 7.468
- 7.447
- 7.285
- 7.243
- 7.221
- 7.204
- 7.199
- 7.189
- 7.187
- 7.167
- 2.506

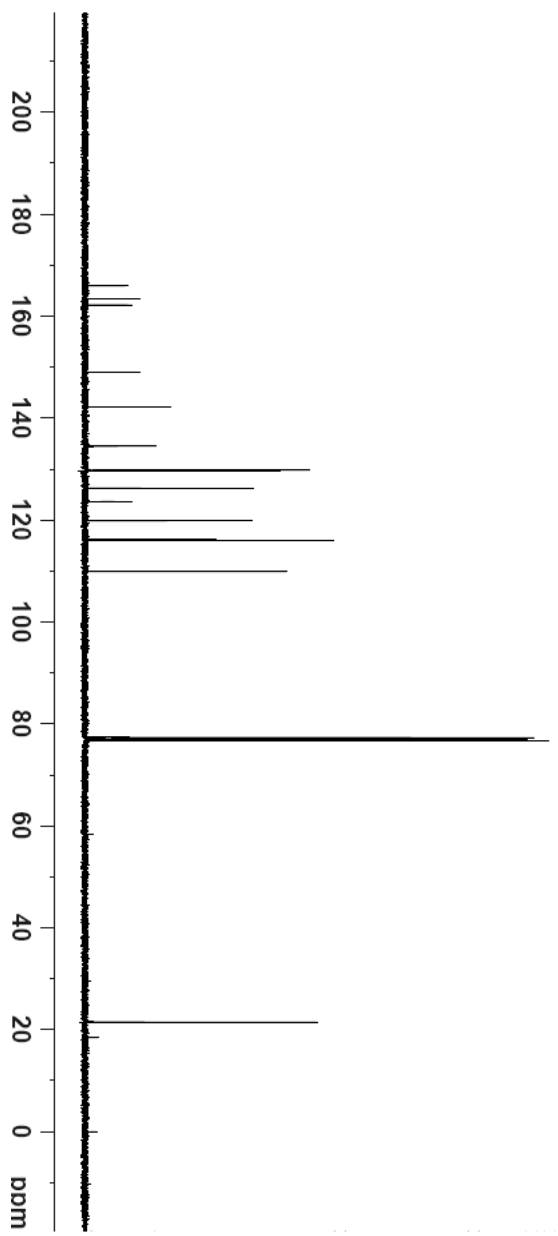
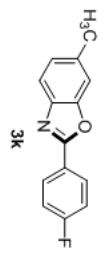


C13CPD CDCl3 D: \ pmr1

- 165.98
- 163.47
- 162.24
- 149.01
- 142.25
- 134.50
- 129.79
- 129.70
- 126.26
- 123.68
- 123.64
- 119.89
- 116.25
- 116.03
- 109.92

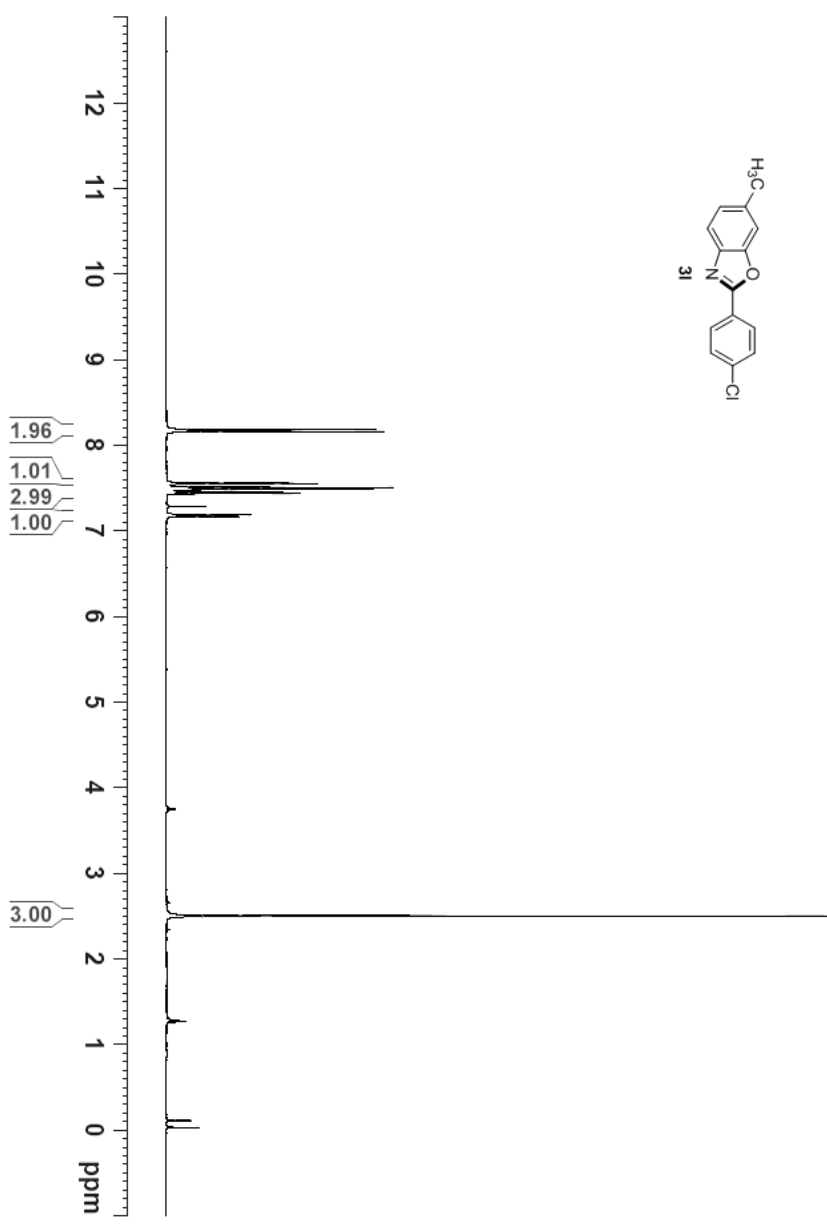
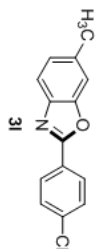
- 77.36
- 77.04
- 76.72

- 21.53



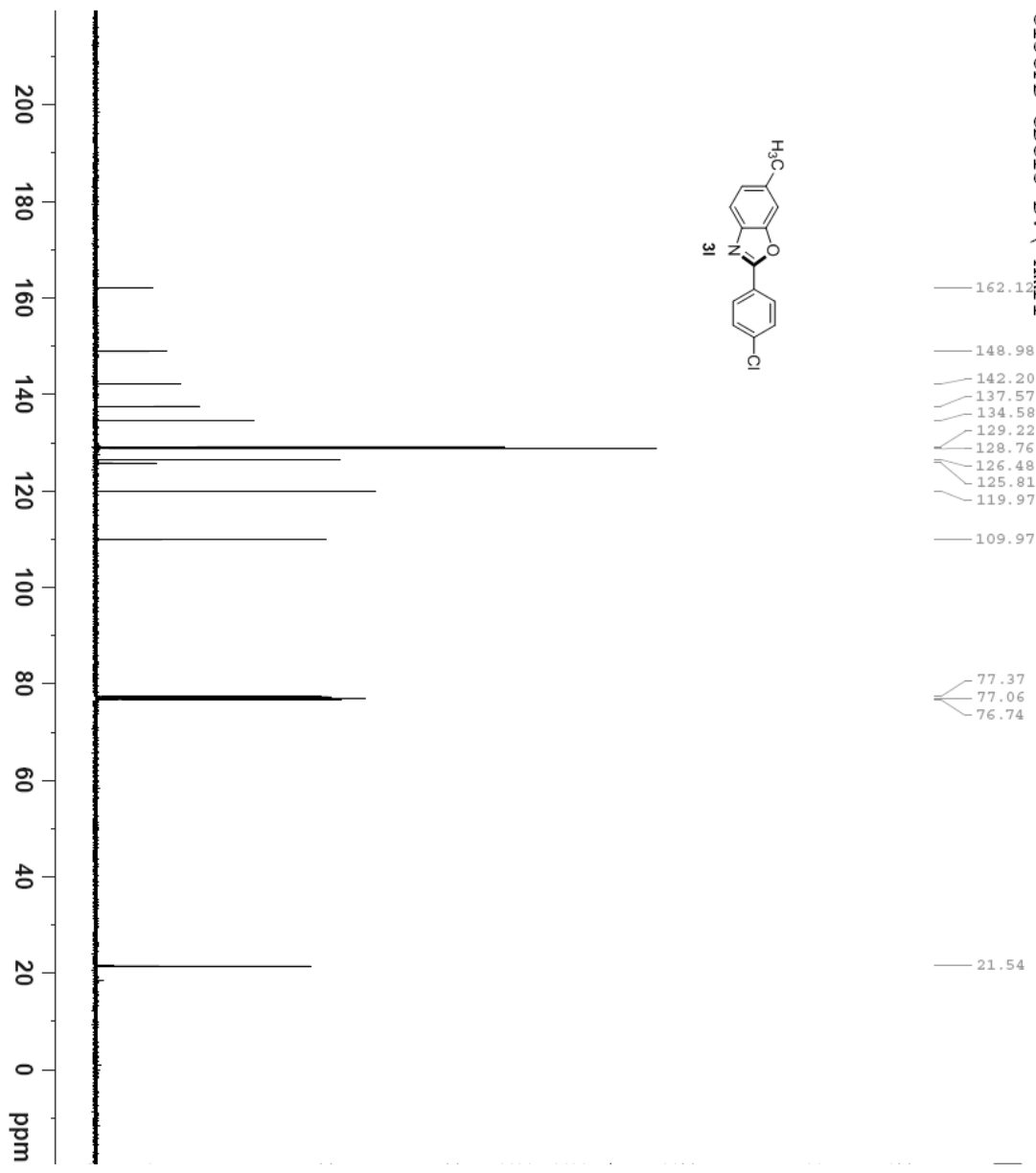
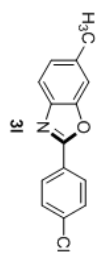
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- 8.182
- 8.161
- 7.555
- 7.506
- 7.485
- 7.458
- 7.437
- 7.285
- 7.188
- 7.168



— 2.501

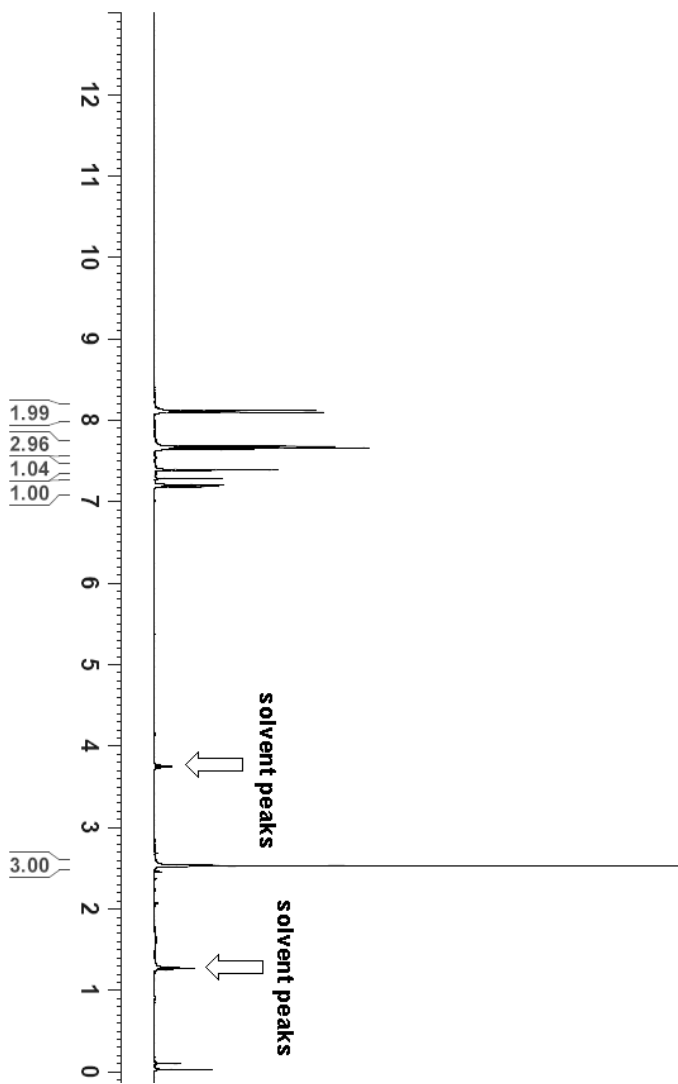
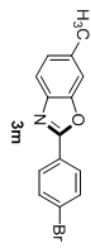
C13CPD CDCl3 D: \ nmr1



PROTON CDCl3 D: \ nmr1

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7.392
7.284
7.207
7.187

2.528

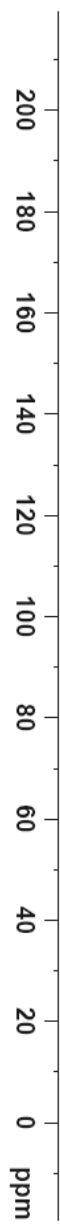
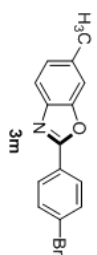


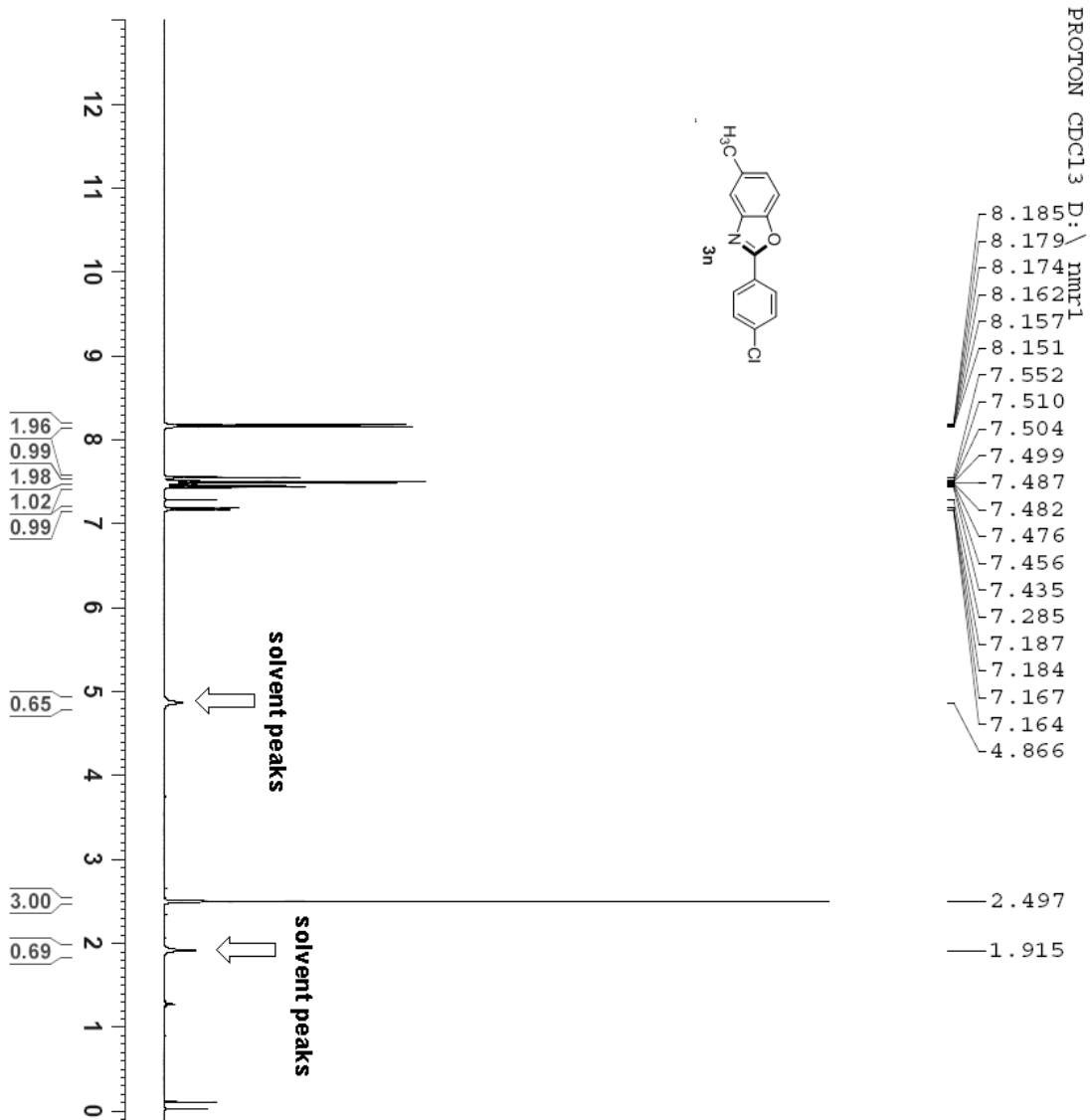
C13CPD CDCl3 D: \ nmr1

- 161.65
- 151.04
- 139.81
- 135.93
- 132.19
- 128.85
- 126.28
- 126.03
- 125.94
- 119.43
- 110.81

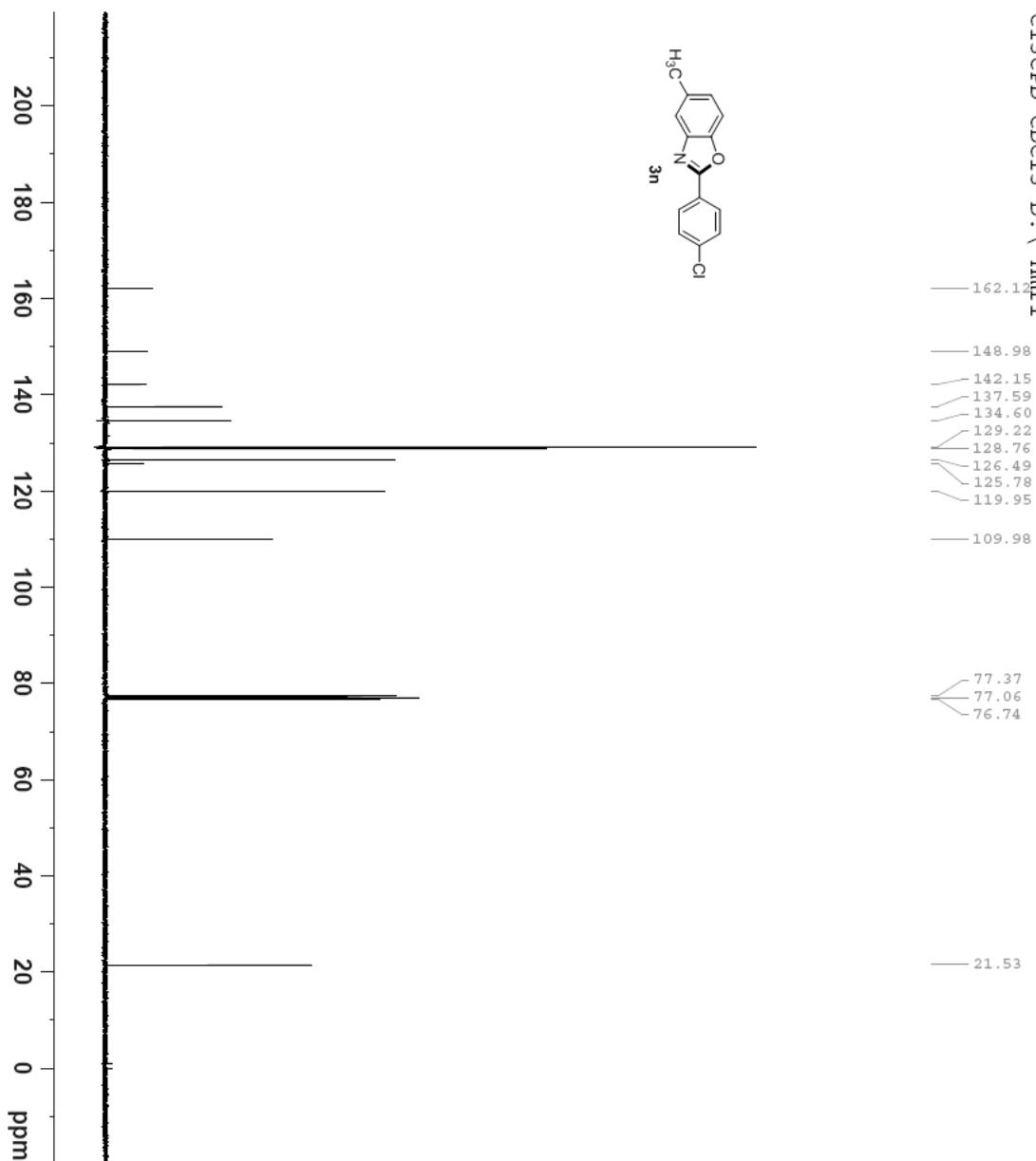
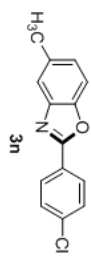
- 77.36
- 77.04
- 76.72

- 21.86





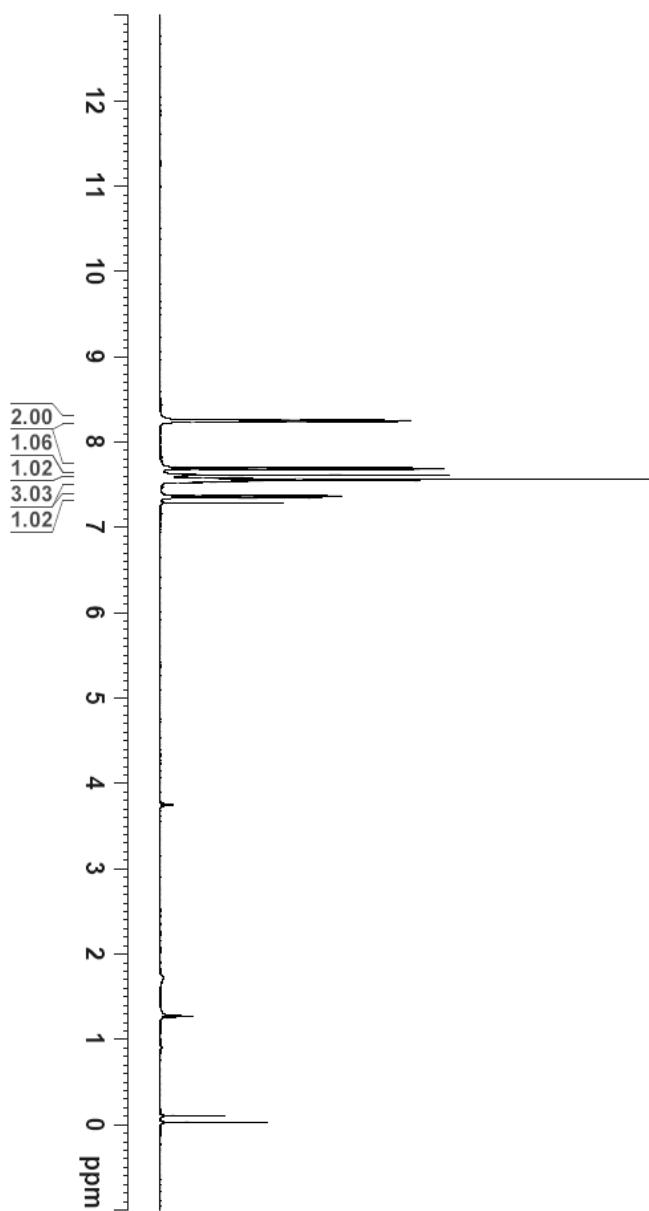
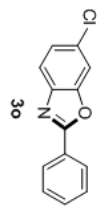
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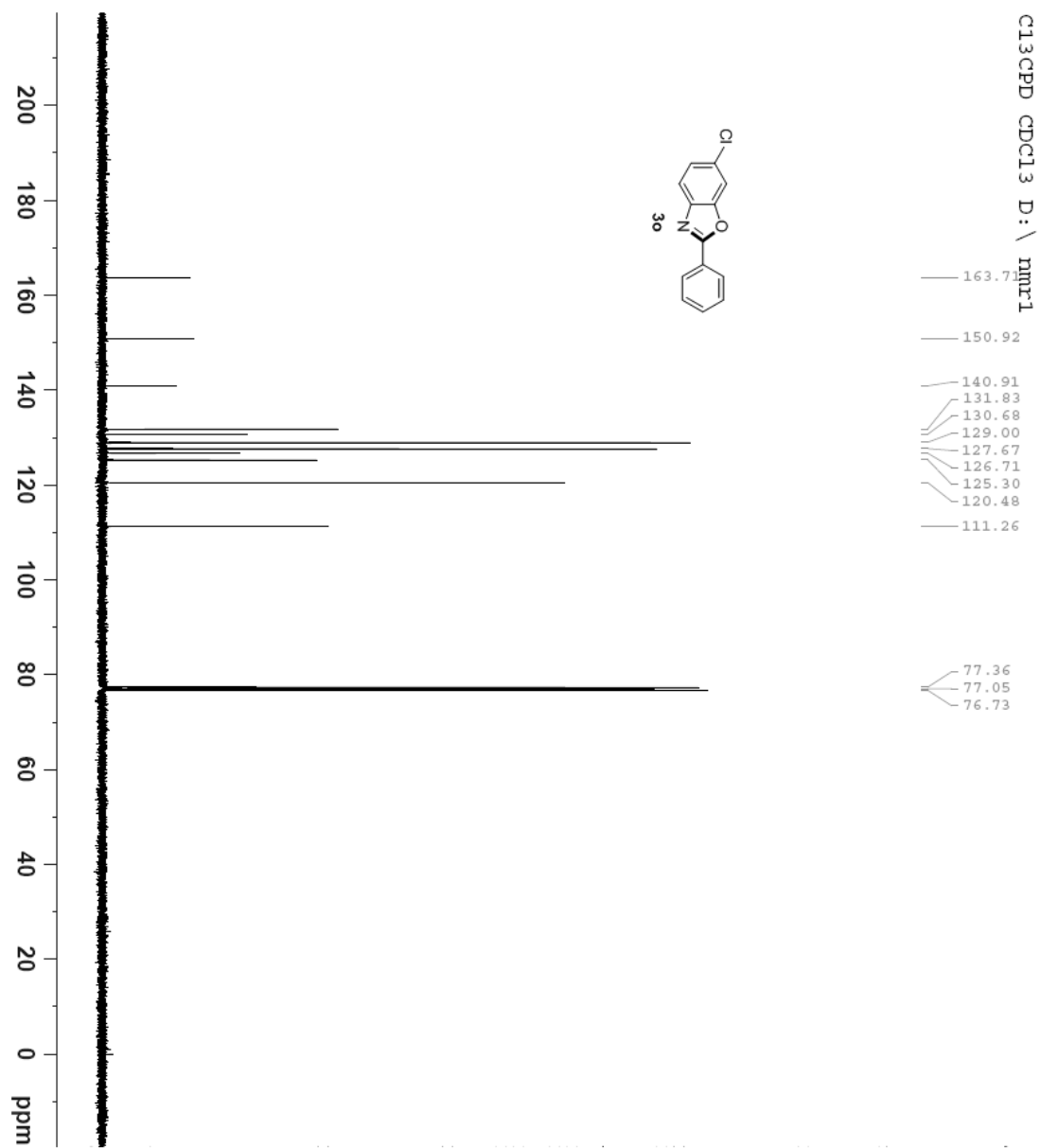


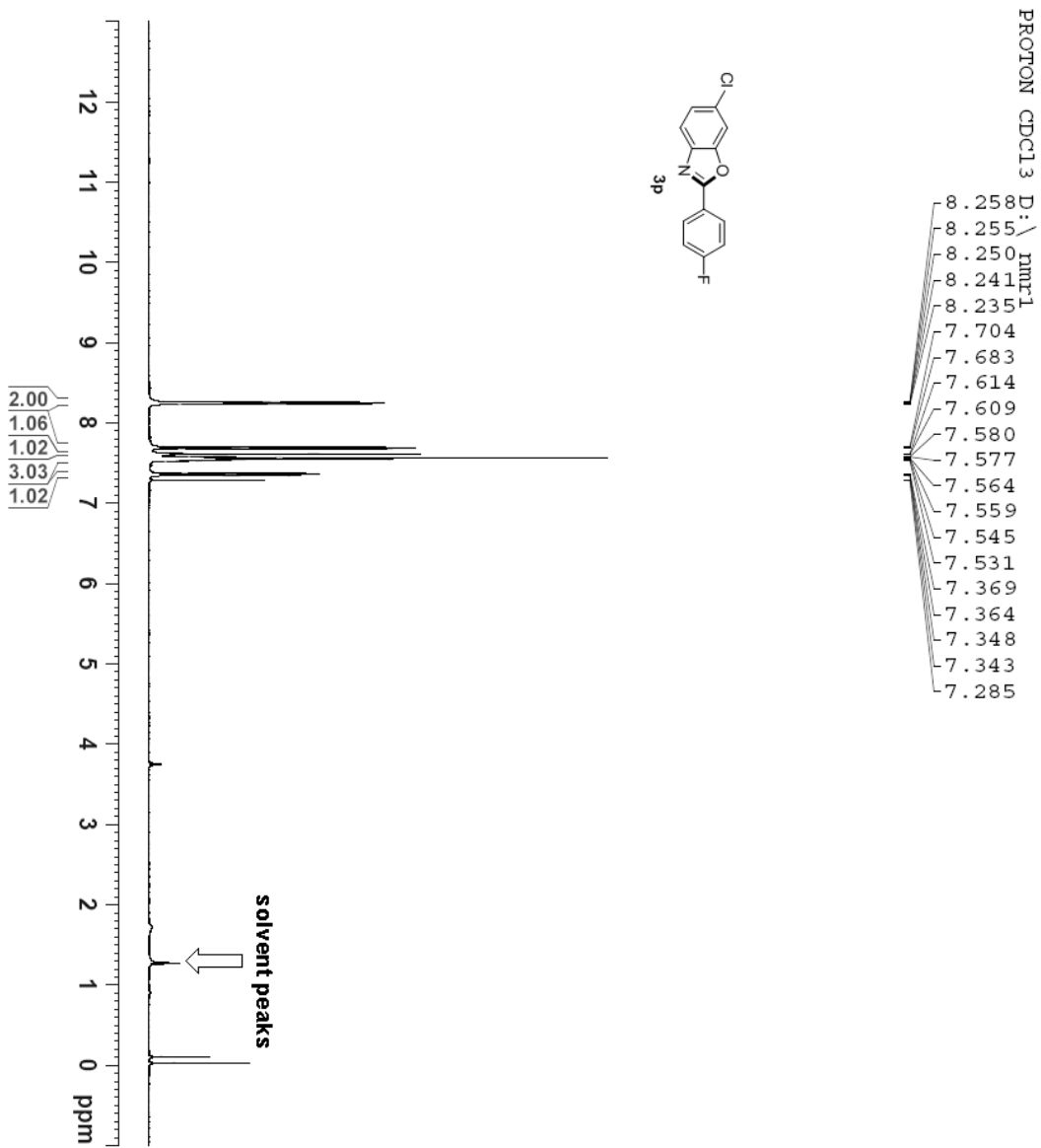
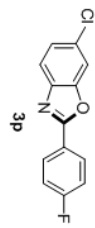
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D:\nmr1

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- 8.255
- 8.250
- 8.241
- 8.235
- 7.704
- 7.683
- 7.614
- 7.609
- 7.580
- 7.577
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- 7.559
- 7.545
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- 7.364
- 7.348
- 7.343
- 7.285

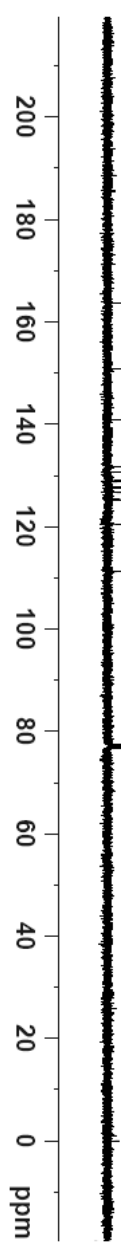
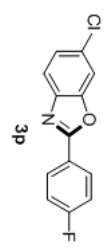


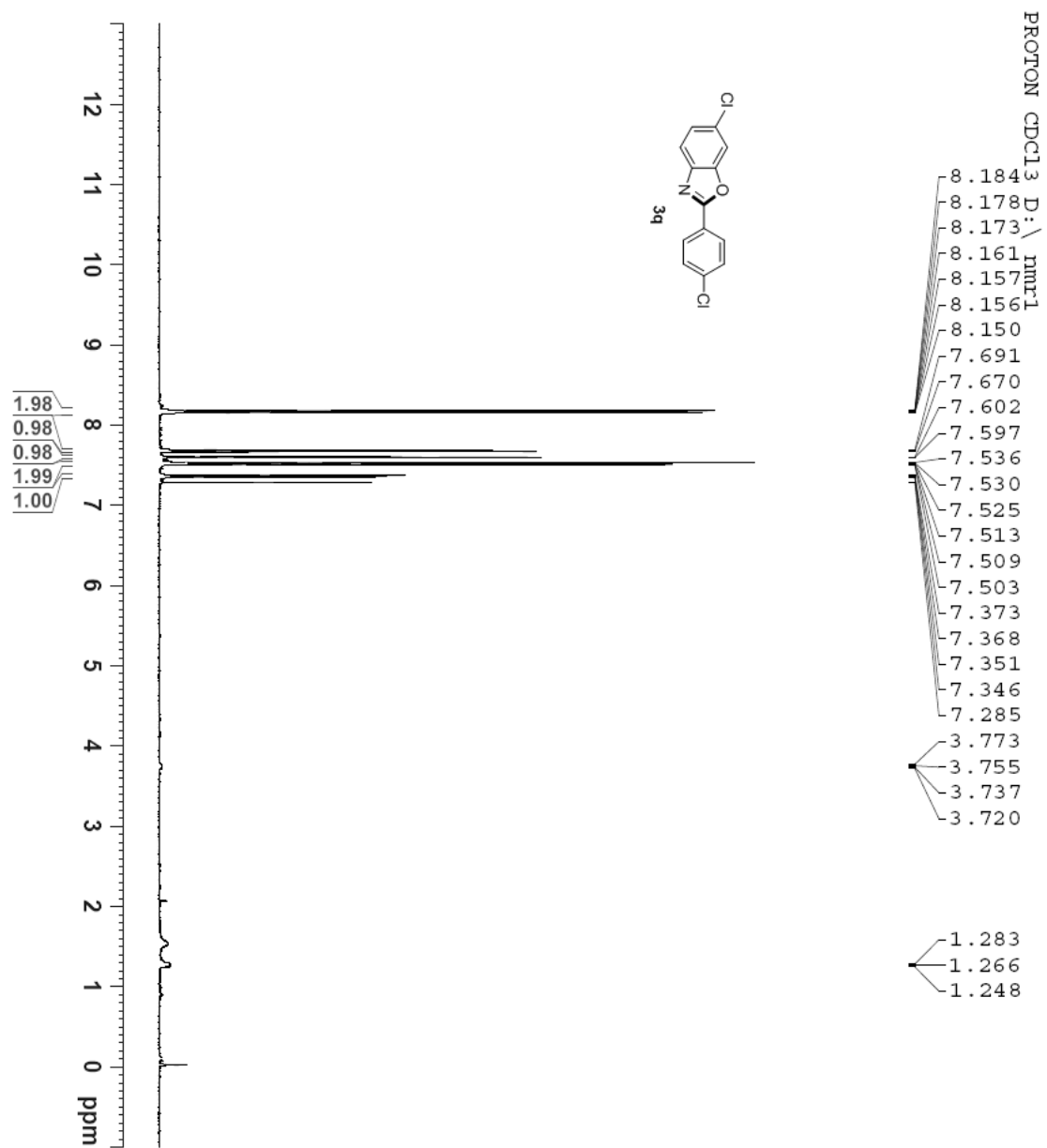




C13CPD CDCl3 D: \ nmr1

- 163.71
- 150.92
- 140.91
- 131.83
- 130.68
- 129.00
- 127.67
- 126.71
- 125.30
- 120.48
- 111.26
- 77.36
- 77.05
- 76.73

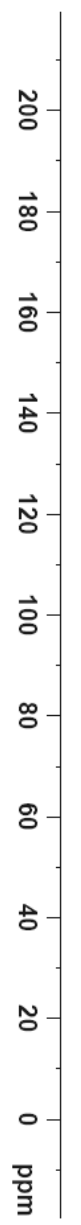
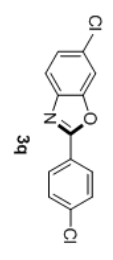




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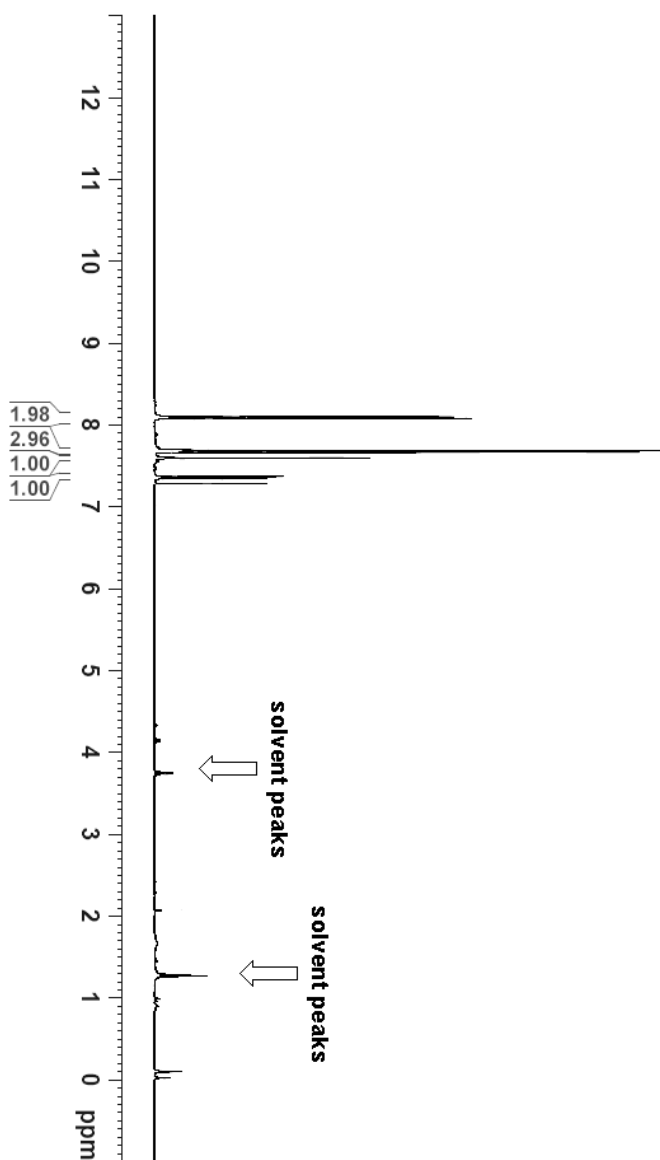
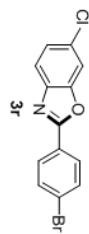
- 162.73
- 150.90
- 140.79
- 138.12
- 130.96
- 129.37
- 128.88
- 125.49
- 125.19
- 120.56
- 111.29

- 77.35
- 77.04
- 76.72

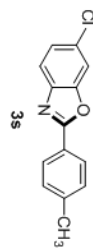


PROTON CDCl3 D: \ nmr1

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8.102
8.097
8.085
8.081
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7.345
7.285

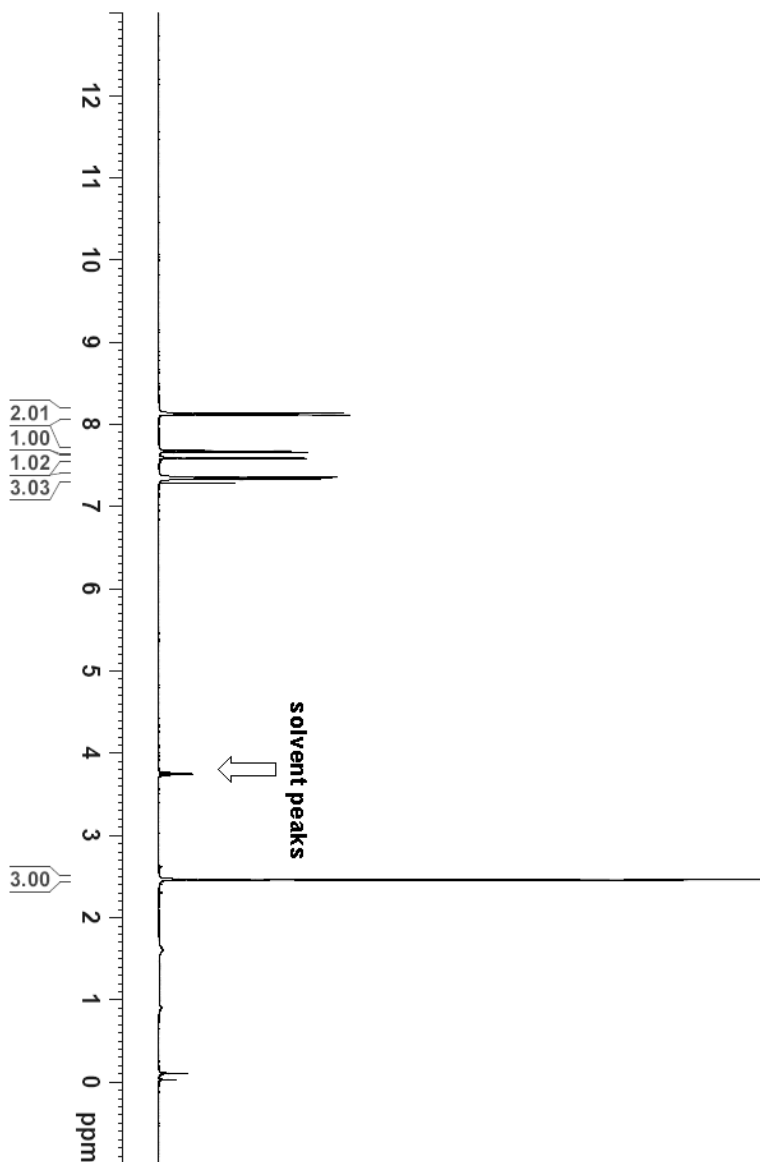


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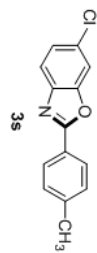


8.136
8.116
7.680
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7.590
7.586
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7.353
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7.336
7.332
7.327
7.285

2.460



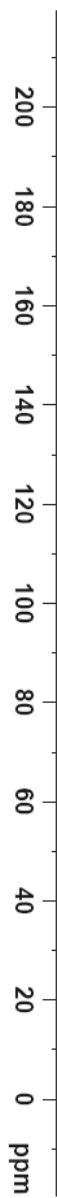
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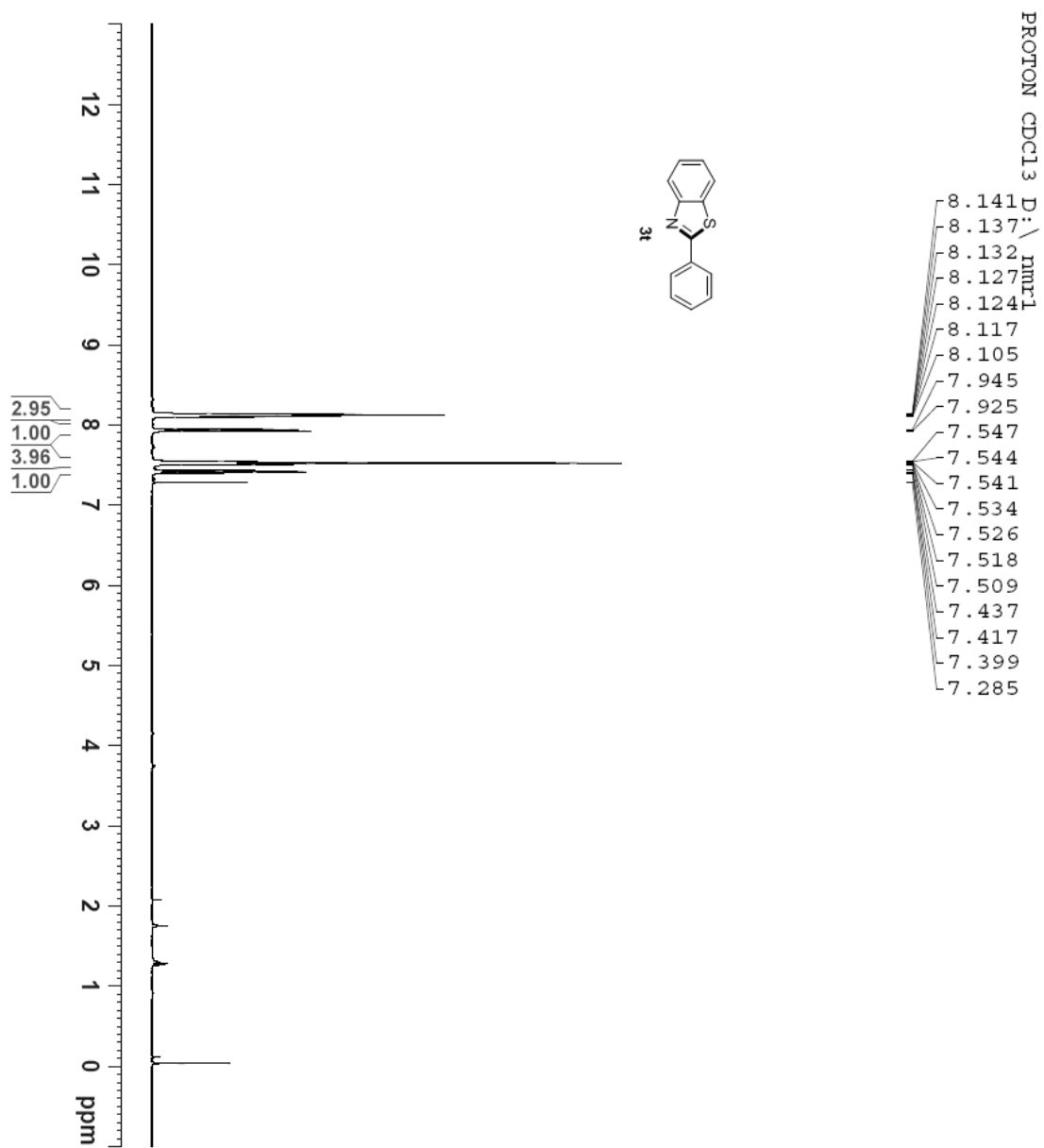


- 163.99
- 150.86
- 142.46
- 140.97
- 130.41
- 129.73
- 127.64
- 125.18
- 123.92
- 120.28
- 111.16

- 77.36
- 77.04
- 76.72

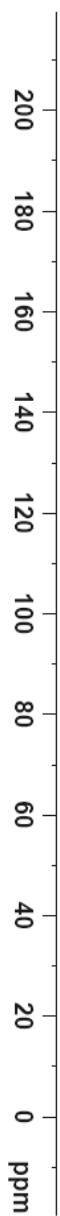
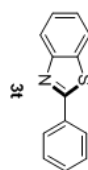
- 21.69





C13CPD CDCl3 D: \ jmmr1

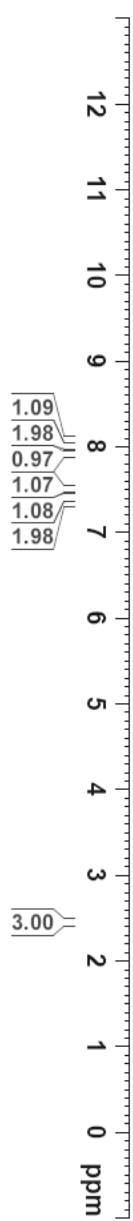
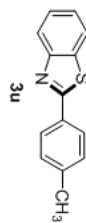
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- 154.16
- 135.09
- 133.64
- 131.00
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- 123.26
- 121.65
- 77.38
- 77.06
- 76.74



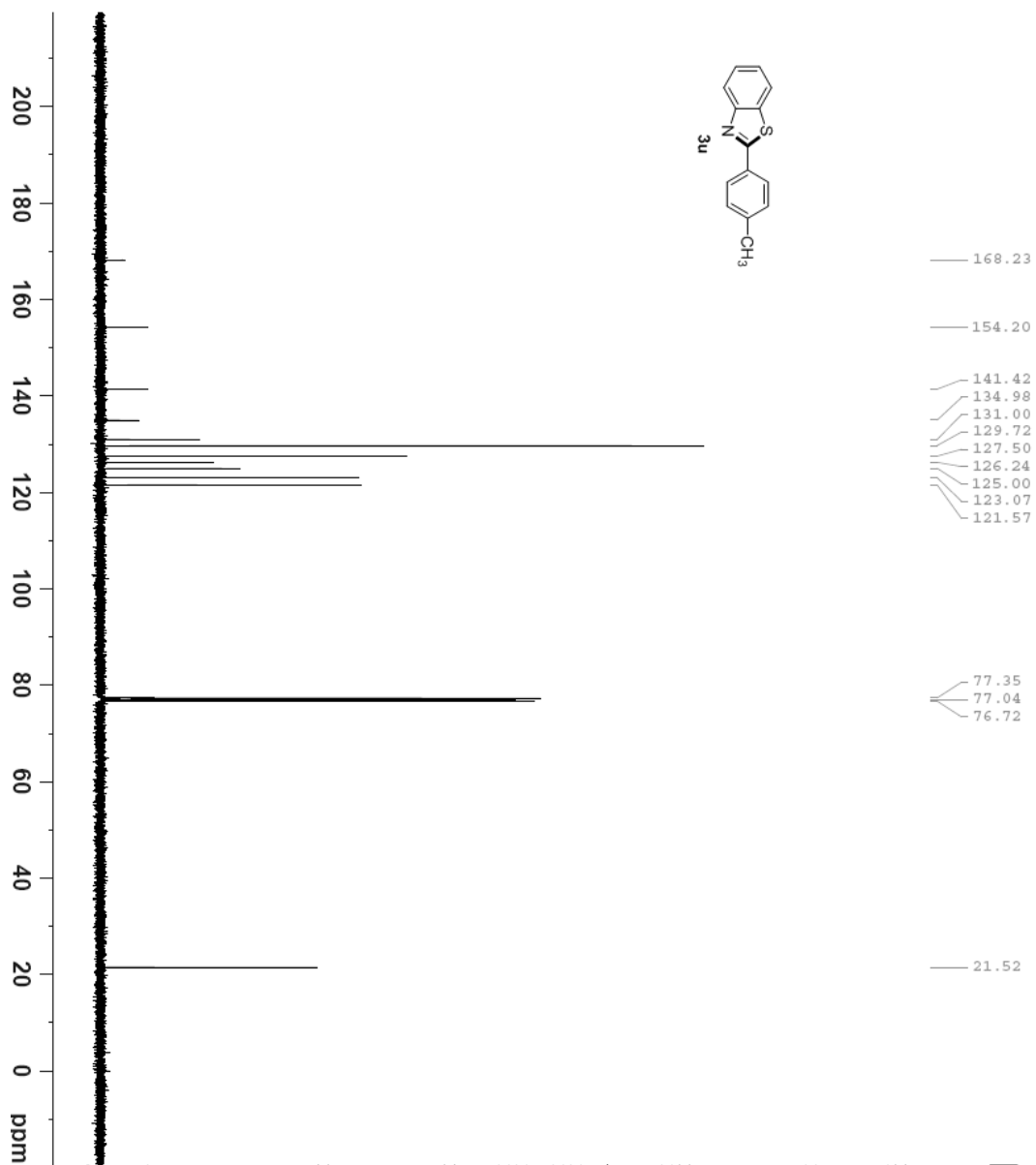
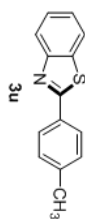
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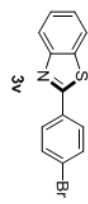
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7.376
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7.314
7.285

2.453

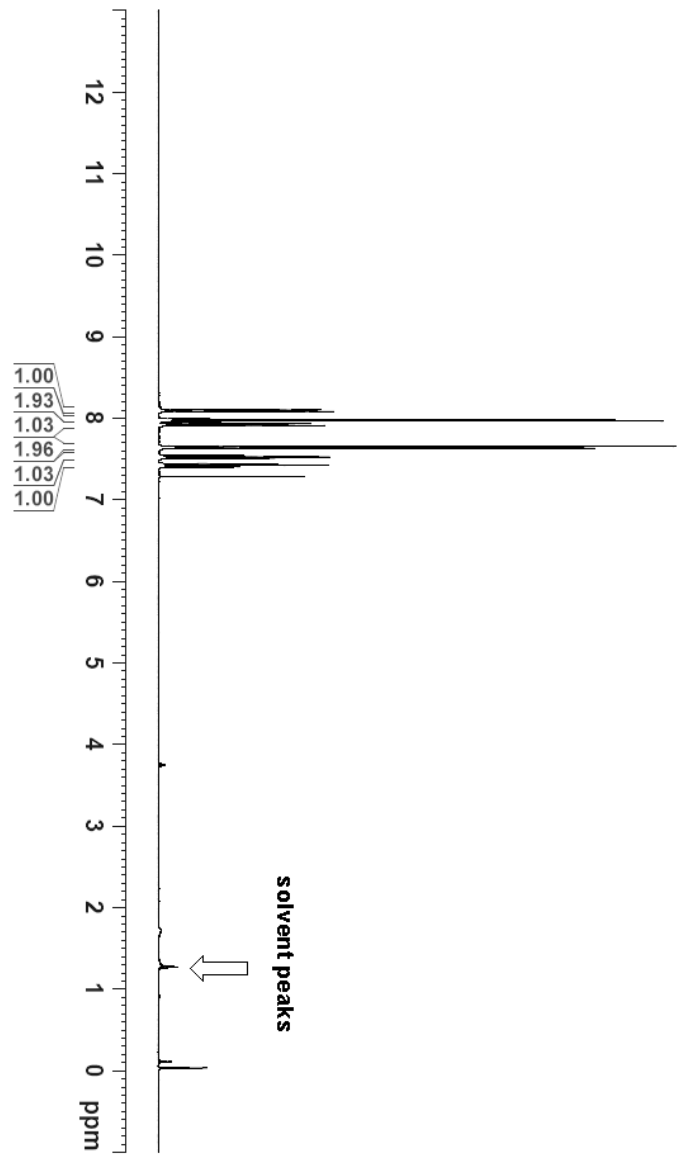


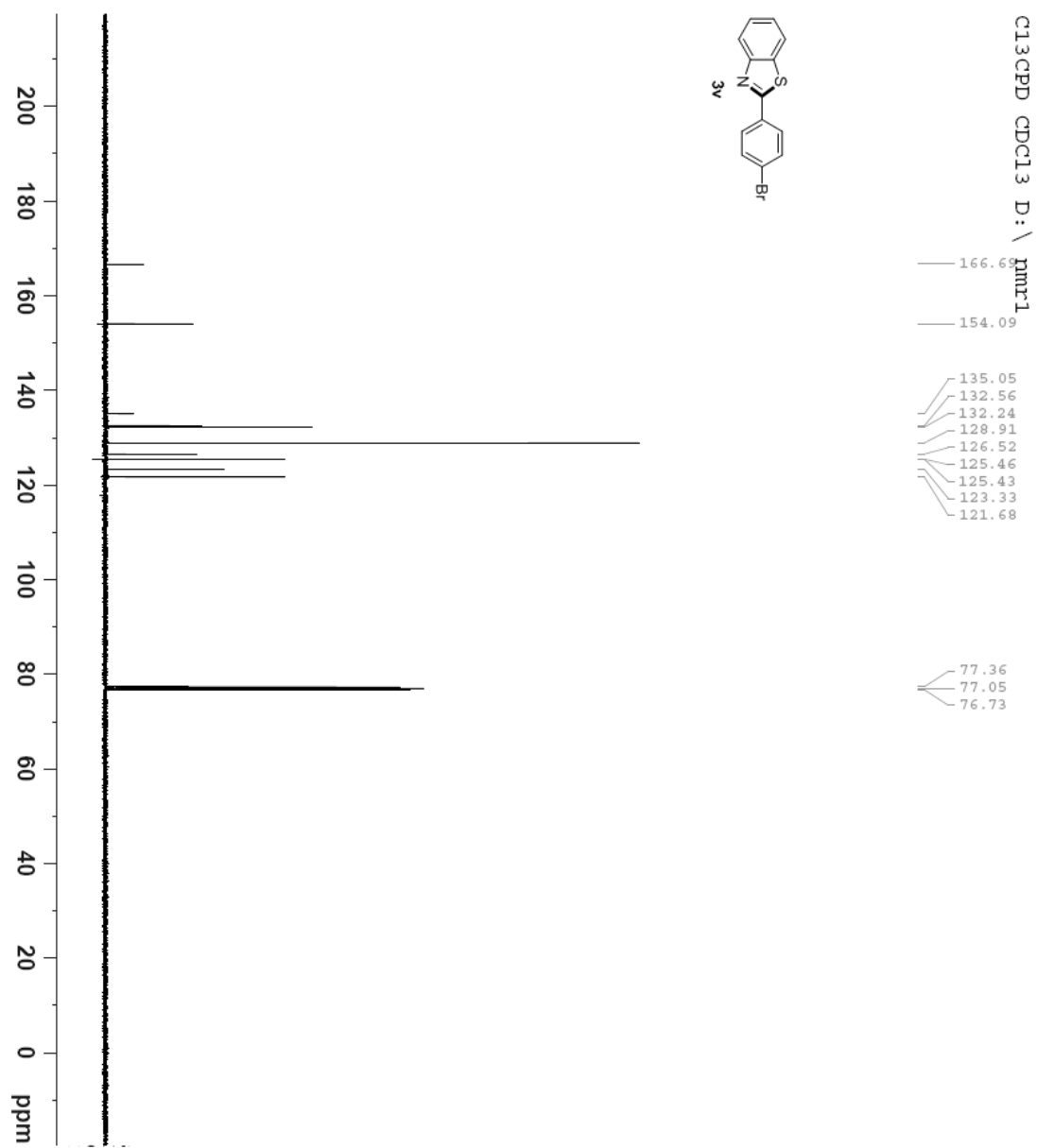
C13CPD CDCl3 D: \ nmr1

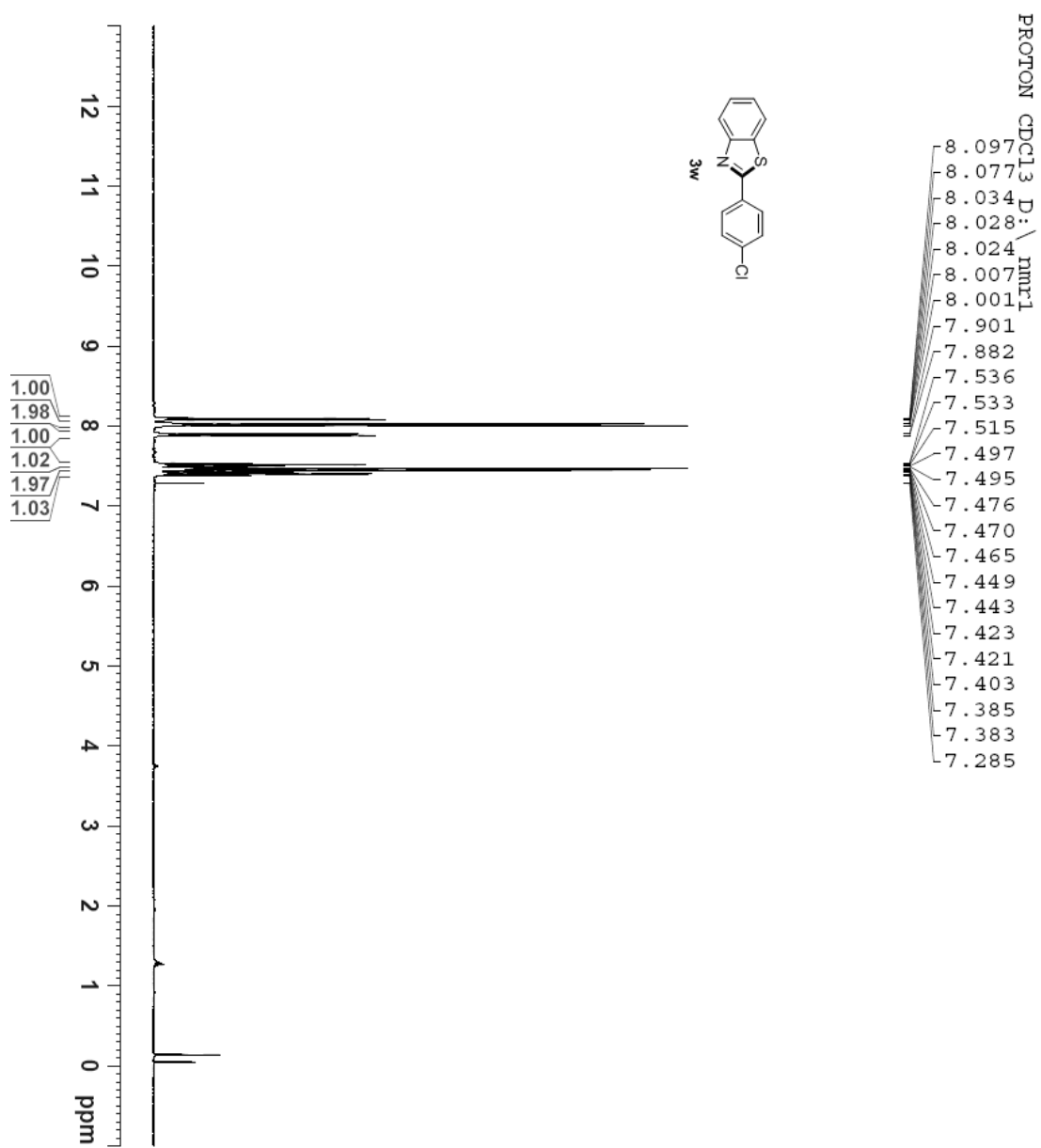




PROTON CDCl3 D: / nmr1
8.103
8.102
8.083
7.993
7.987
7.982
7.970
7.965
7.959
7.931
7.930
7.911
7.910
7.661
7.655
7.650
7.638
7.633
7.627
7.547
7.544
7.529
7.527
7.509
7.506
7.443
7.440
7.423
7.405
7.402
7.285

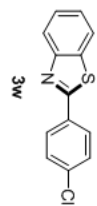




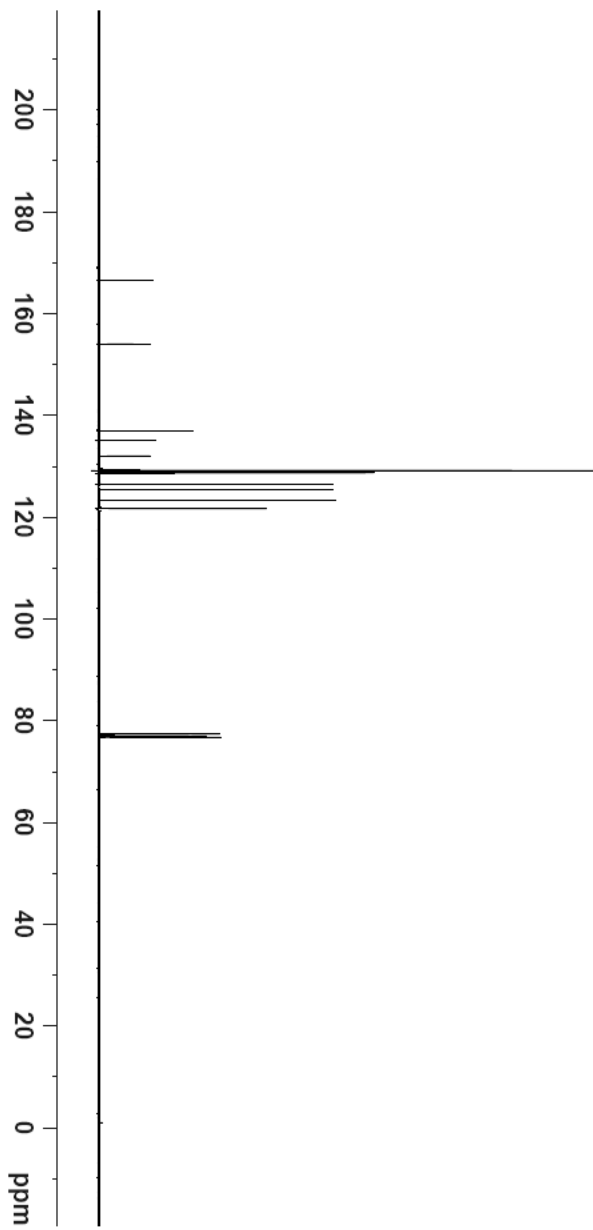


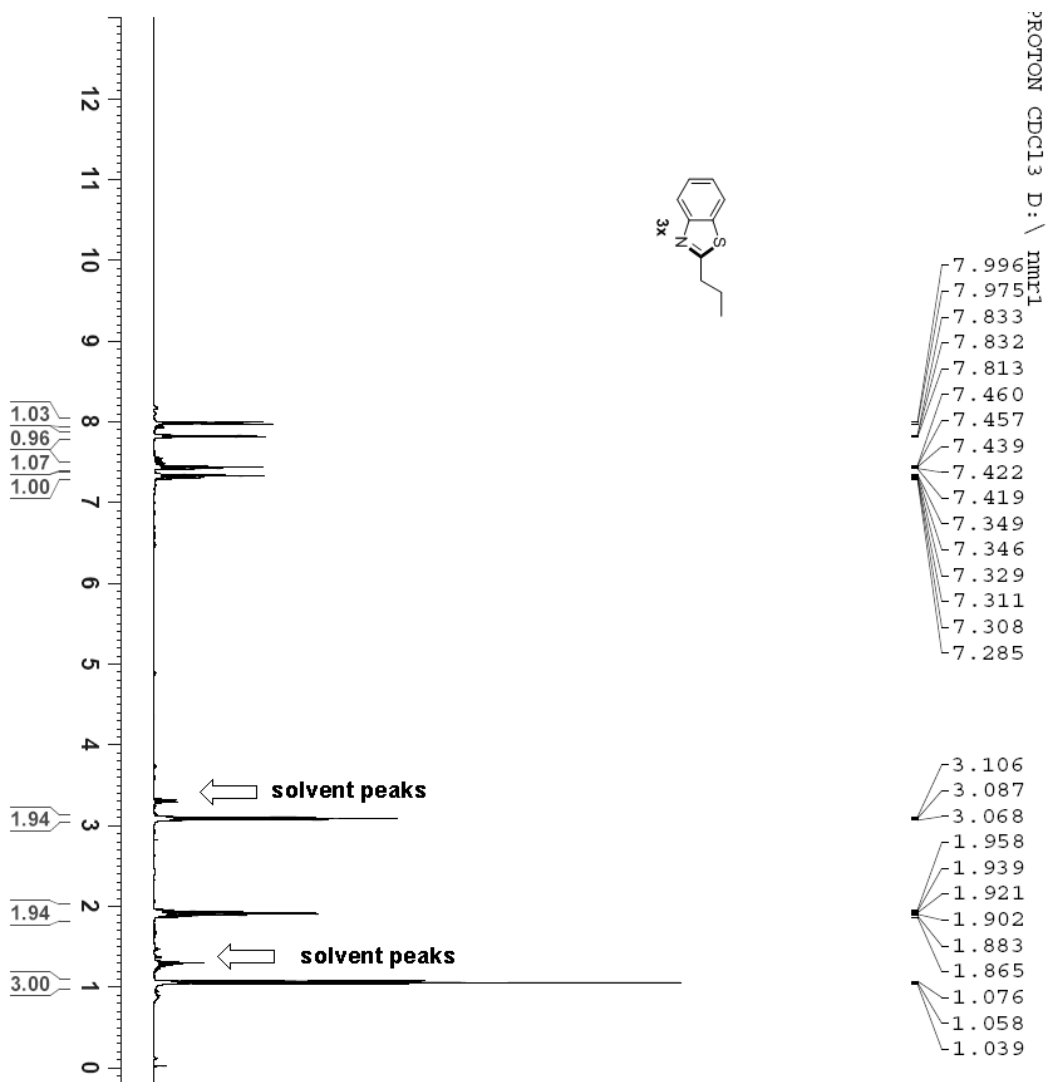
C13CPD CDCl3 D: \

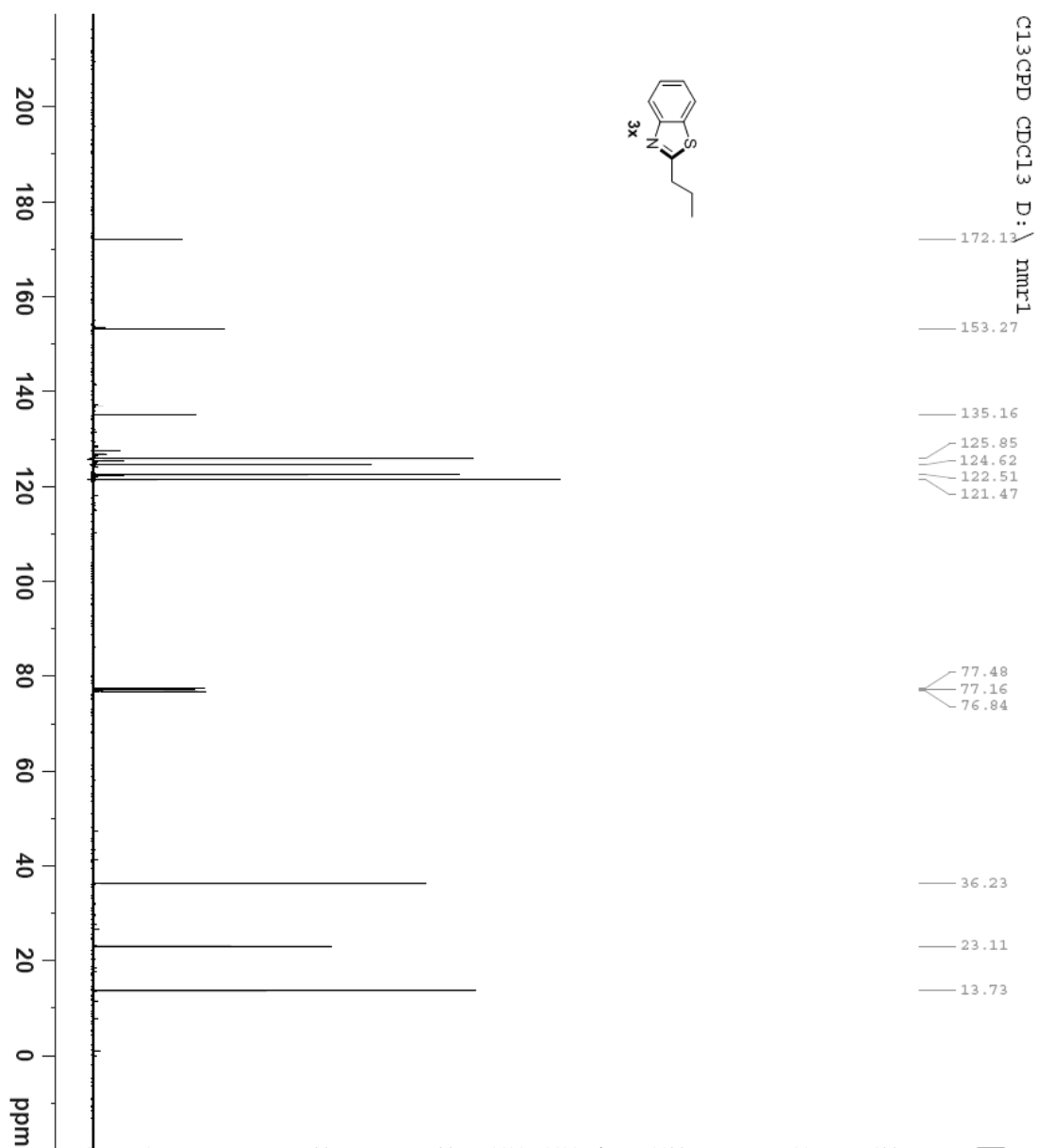
nmr1



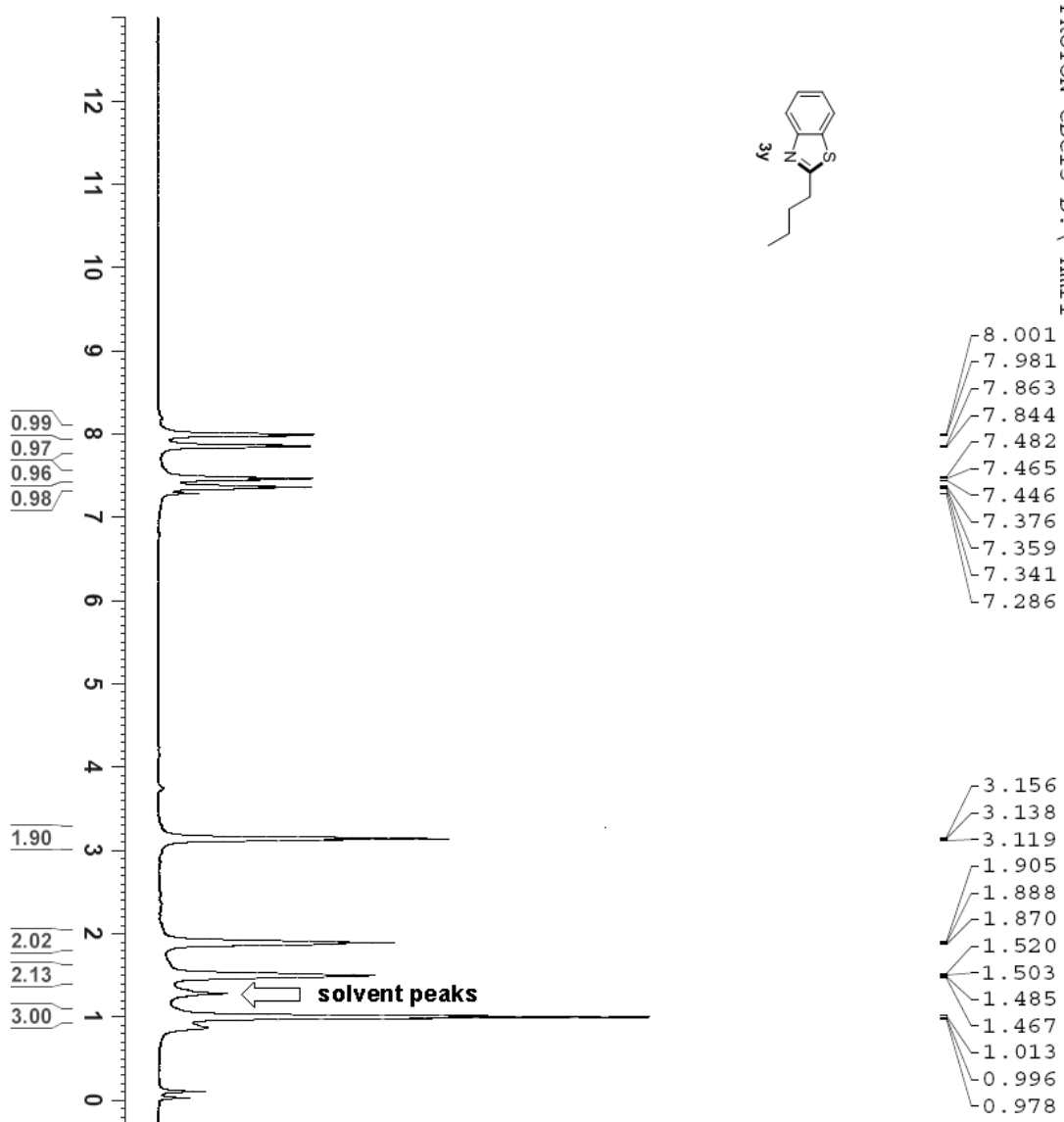
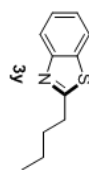
- 166.58
- 154.07
- 137.02
- 135.07
- 132.10
- 129.26
- 128.70
- 126.49
- 125.42
- 123.32
- 121.66
- 77.42
- 77.10
- 76.79

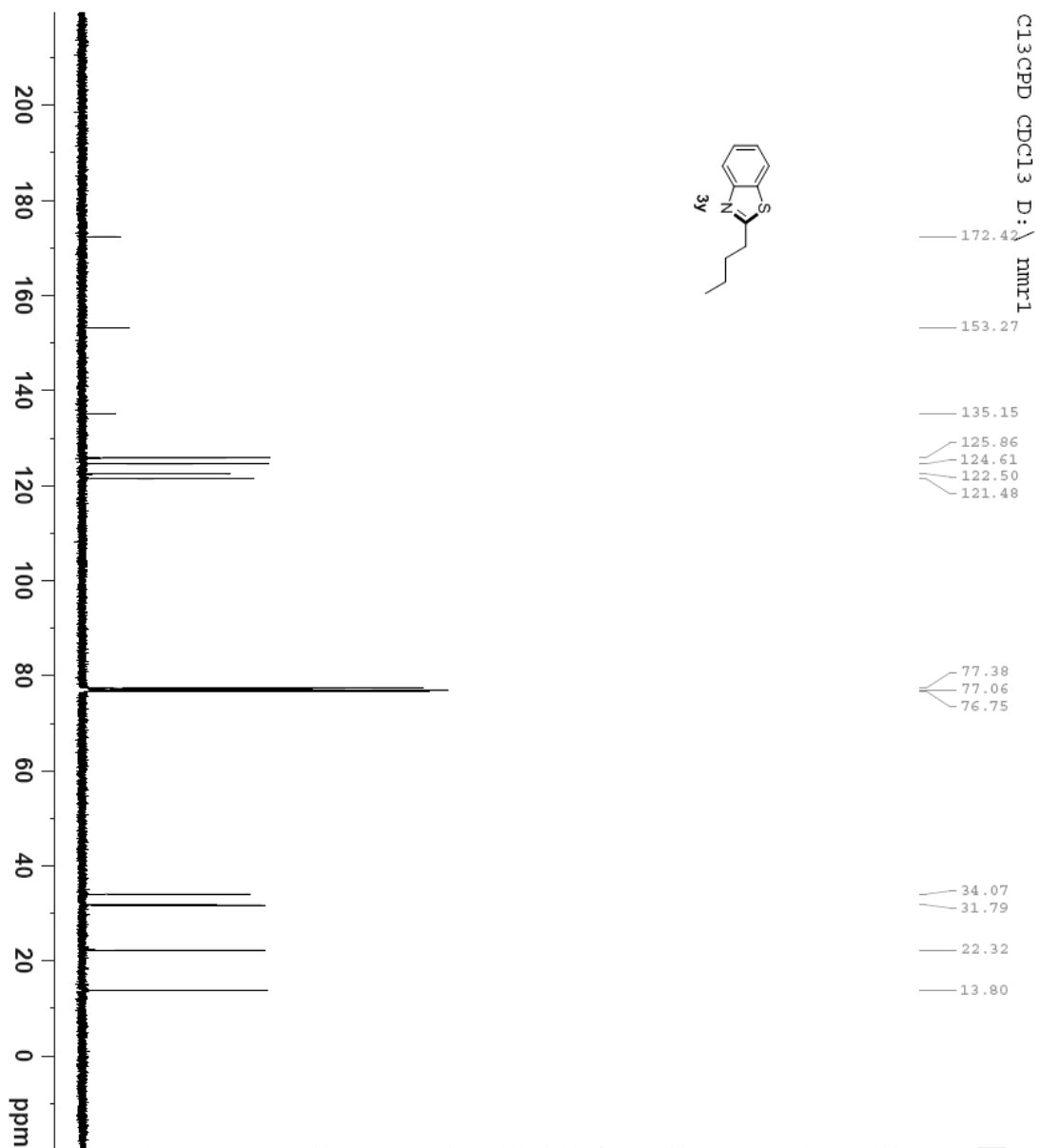


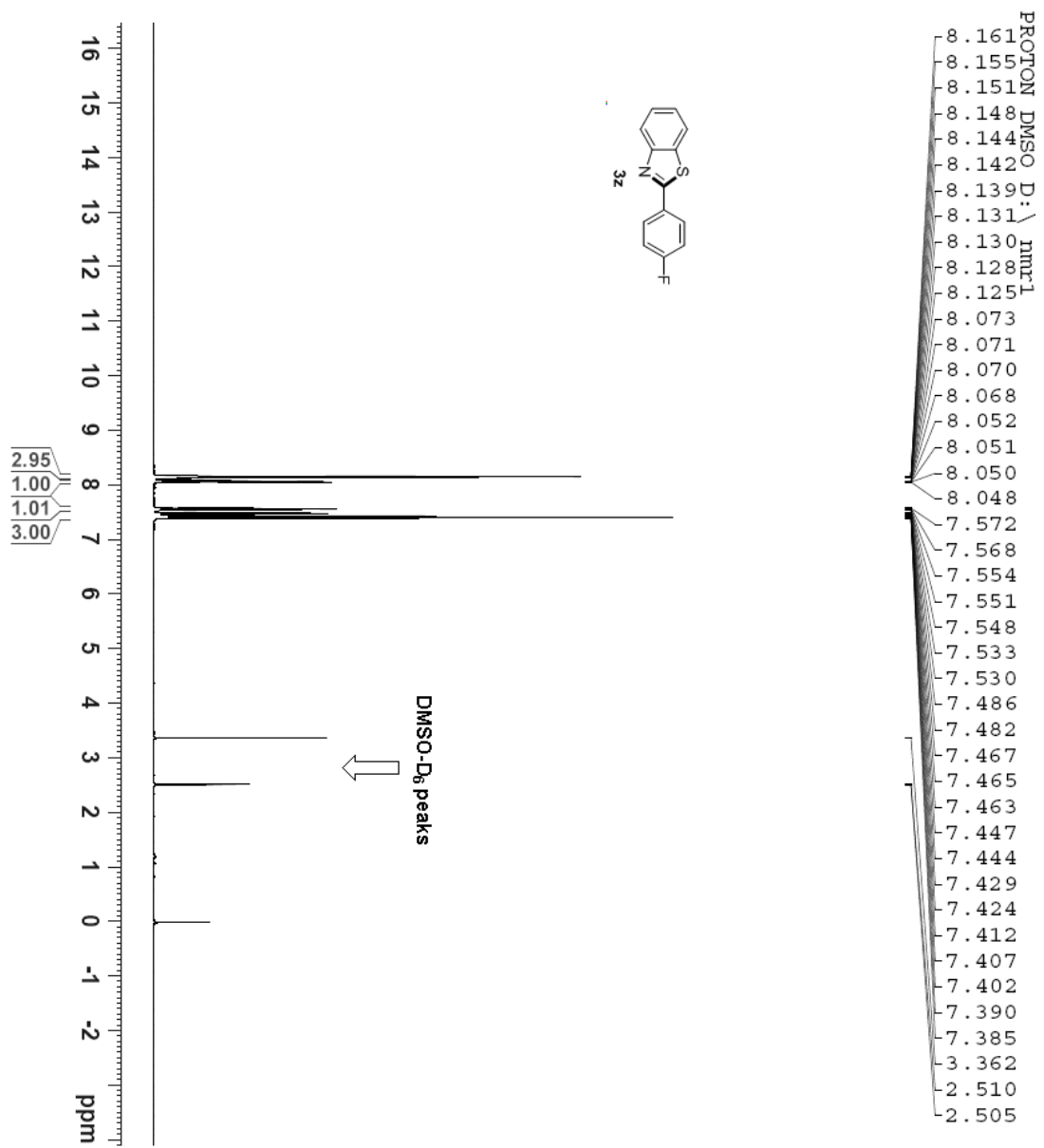


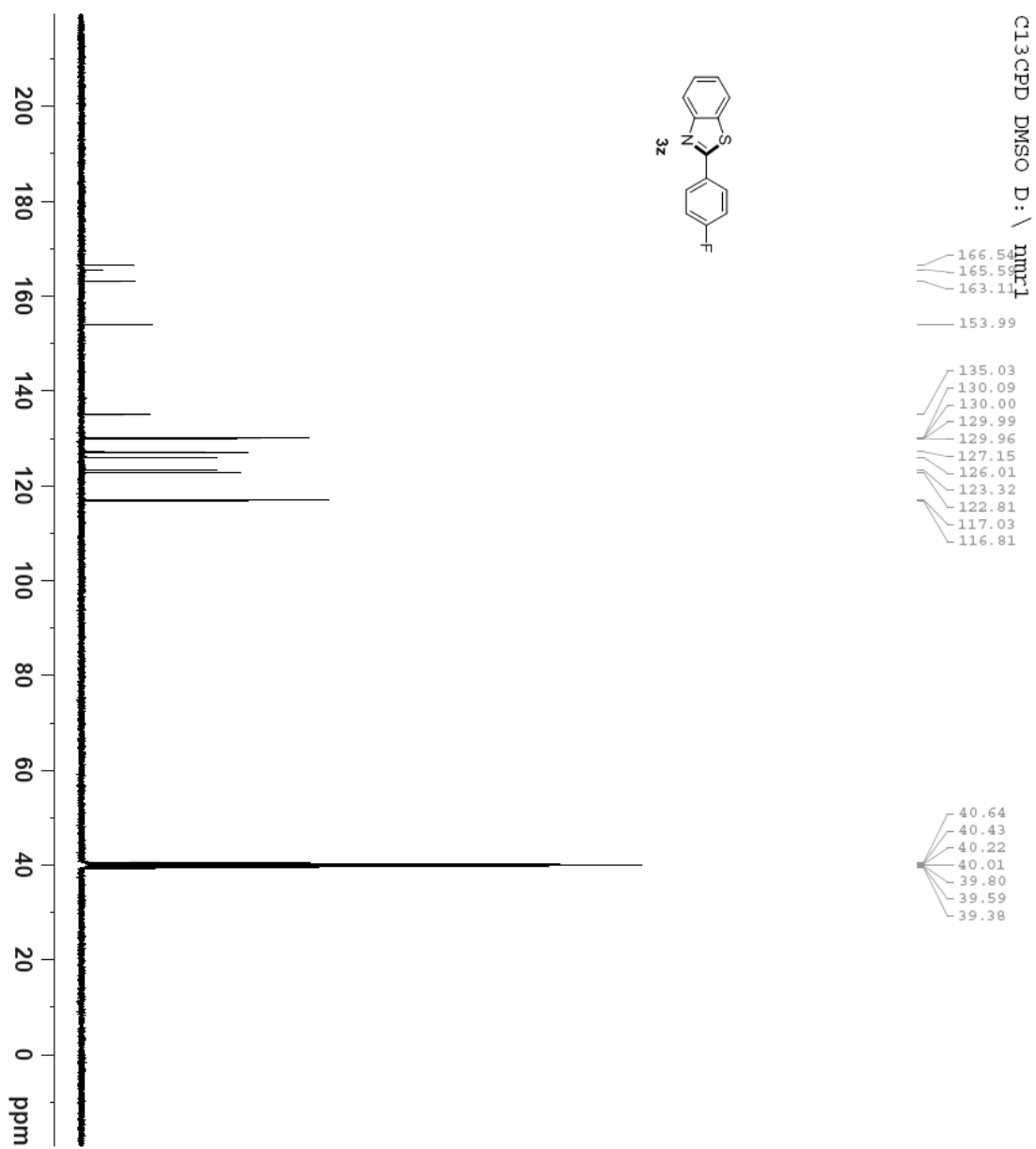


PROTON CDCl3 D: \ nmr1



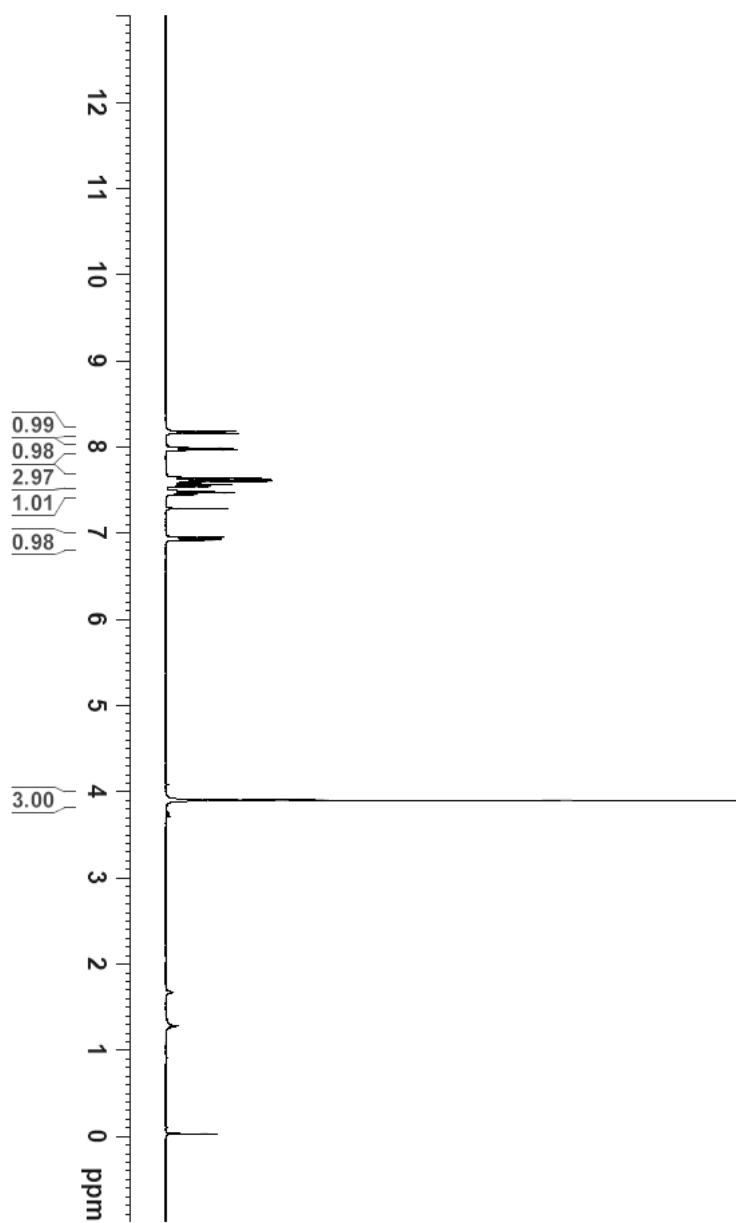
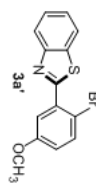






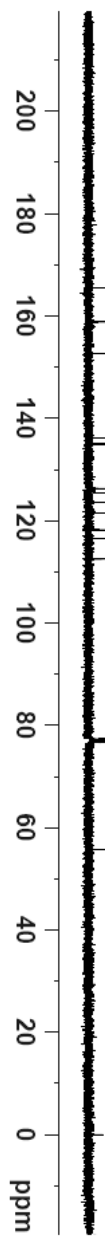
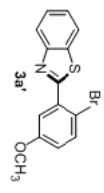
PROTON CDCl3 D:

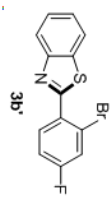
nmr1
8.180
8.159
7.987
7.968
7.641
7.619
7.604
7.597
7.581
7.561
7.543
7.488
7.468
7.450
7.285
6.949
6.942
6.927
6.920
— 3.899



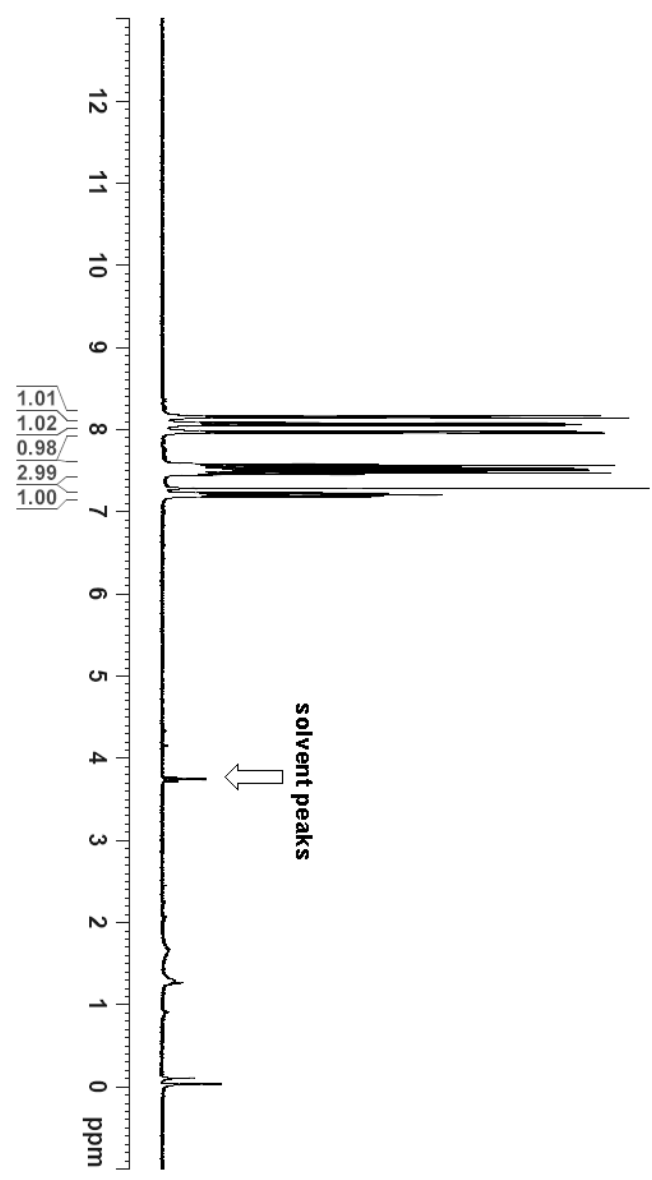
C13CPD CDCl3 D: \ nmr1

- 165.57
- 158.85
- 152.63
- 136.18
- 135.08
- 134.82
- 126.32
- 125.54
- 123.59
- 121.47
- 118.22
- 116.61
- 112.51
- 77.36
- 77.05
- 76.73
- 55.74



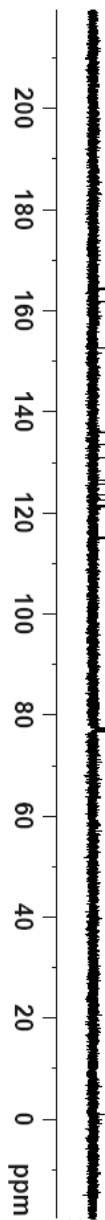
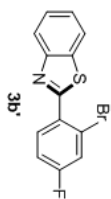


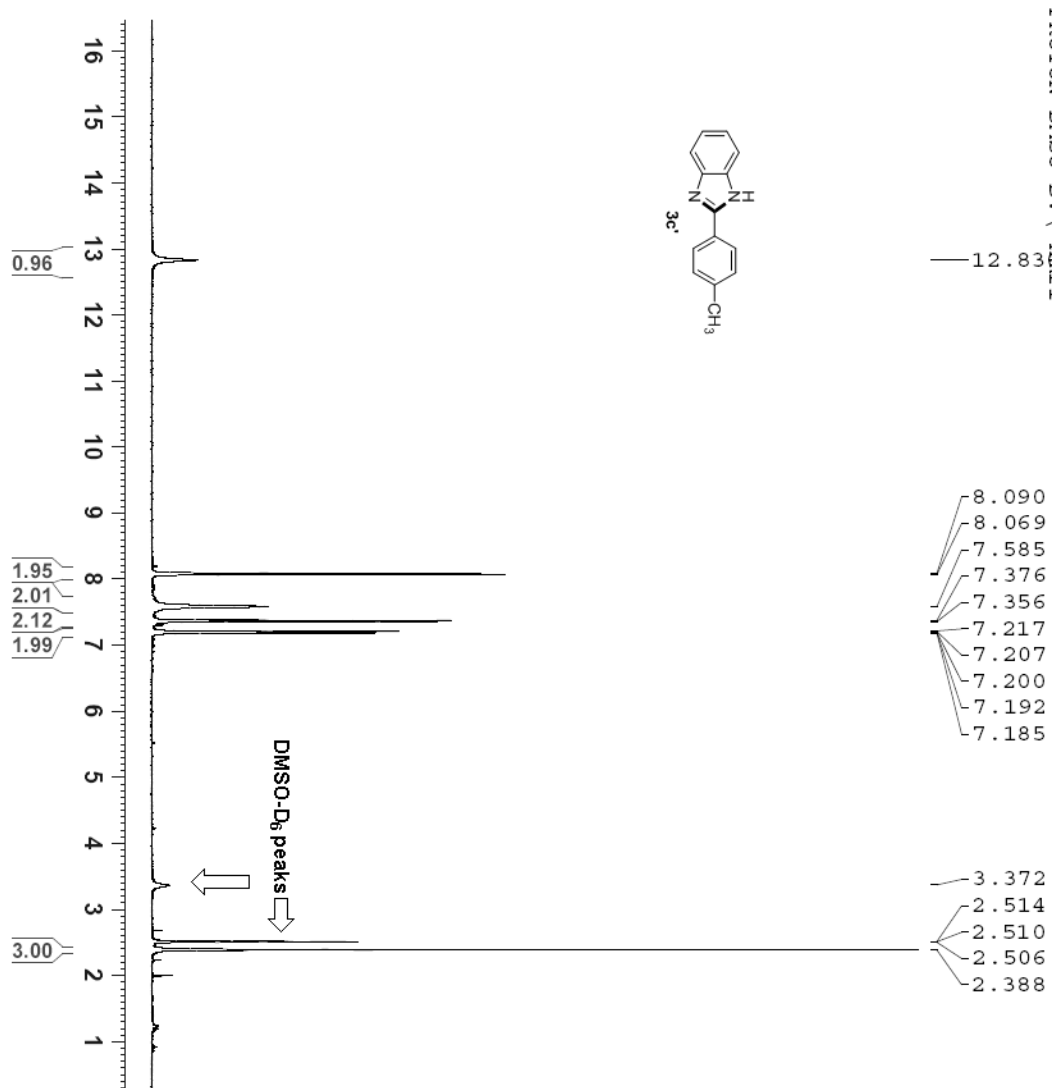
PROTON CDCl₃ D: \nmr1
8.165
8.145
8.085
8.070
8.063
8.048
7.982
7.962
7.584
7.581
7.566
7.563
7.546
7.543
7.528
7.522
7.508
7.501
7.491
7.489
7.471
7.453
7.451
7.285
7.228
7.222
7.209
7.207
7.203
7.200
7.187
7.181



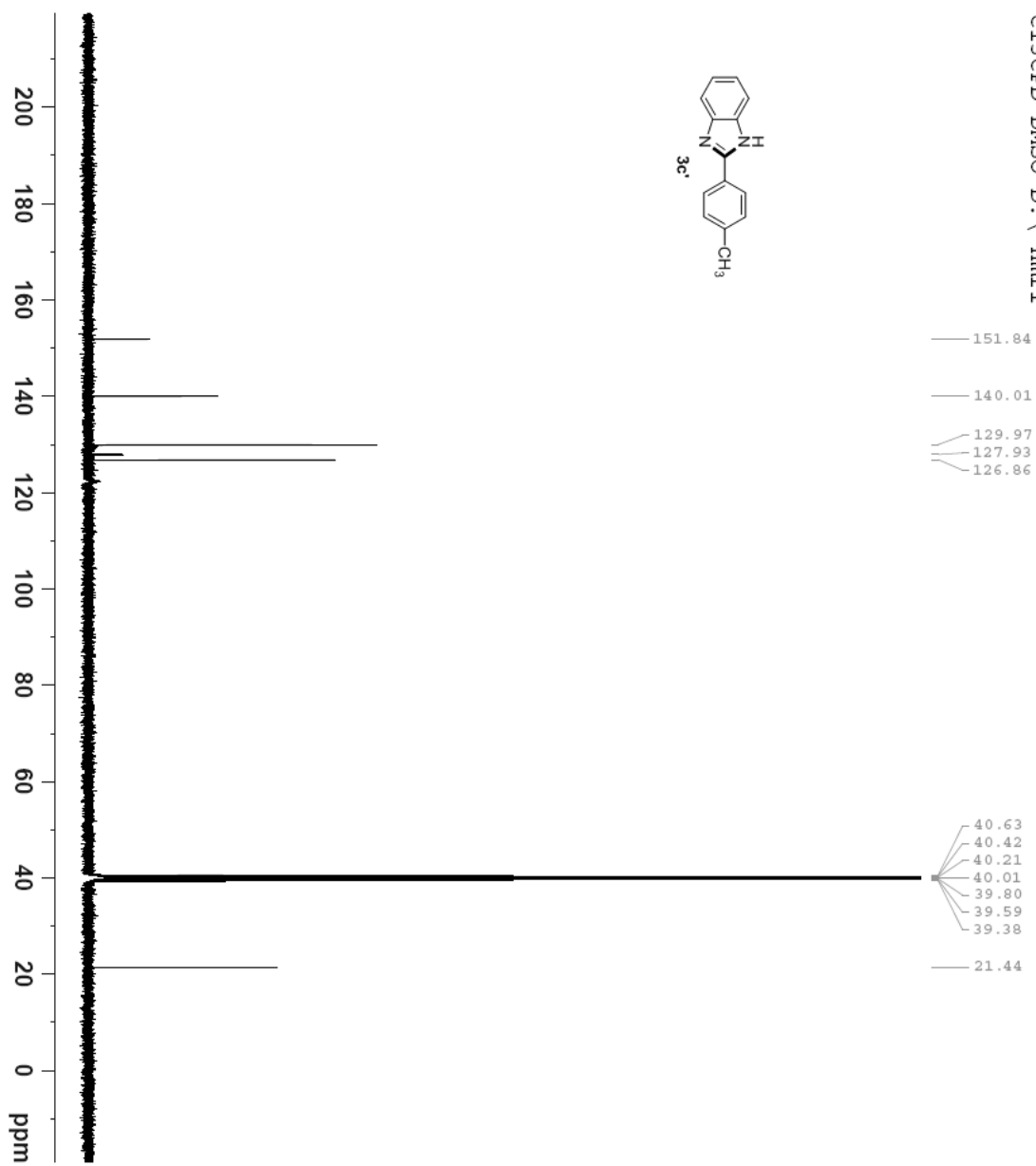
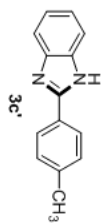
C13CPD CDCl3 D: \ pmr1

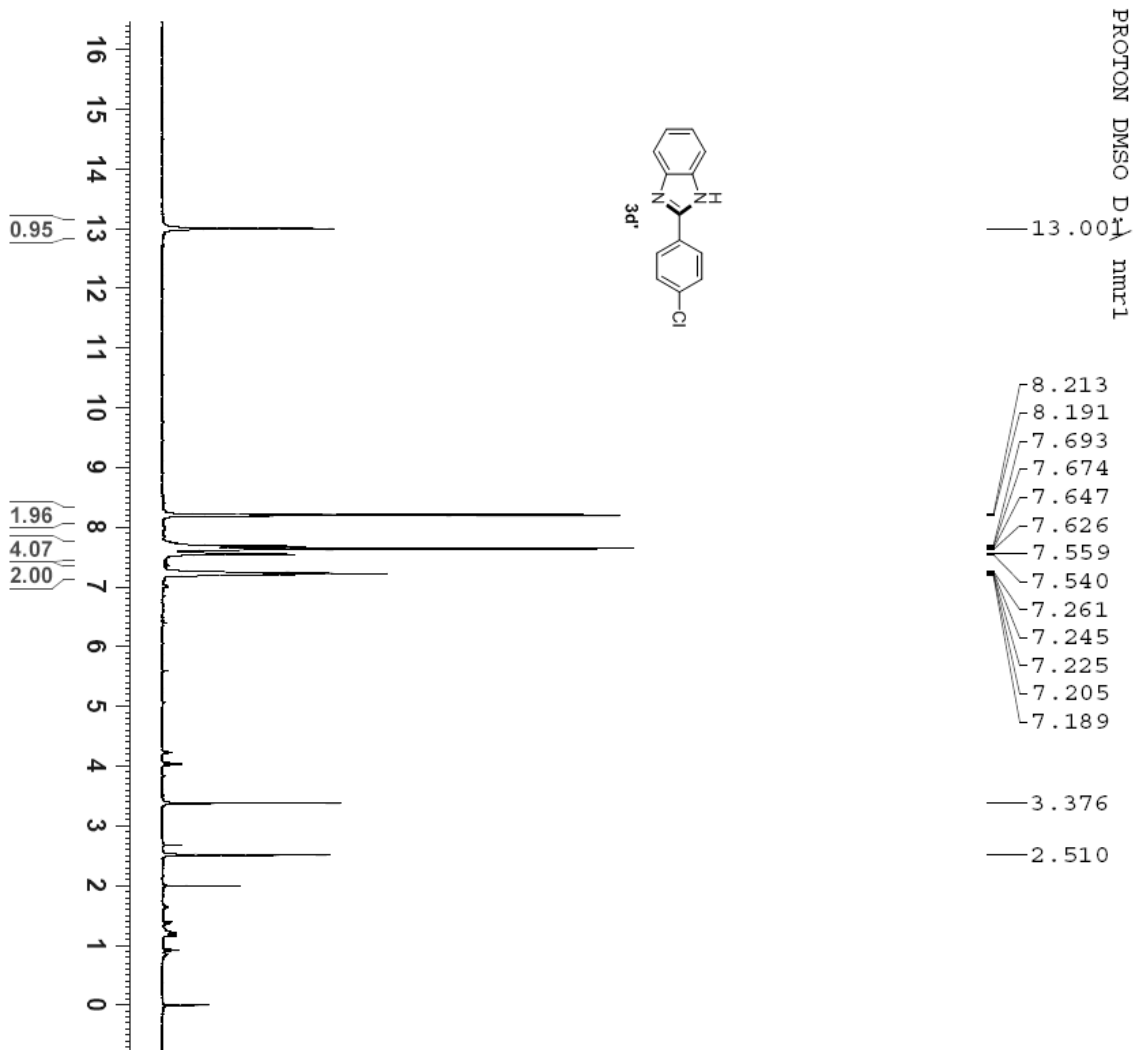
- 164.58
- 164.33
- 161.76
- 152.65
- 136.08
- 133.62
- 133.53
- 130.95
- 130.91
- 126.40
- 125.59
- 123.57
- 122.63
- 122.53
- 121.44
- 121.19
- 115.24
- 115.03
- 77.35
- 77.03
- 76.71



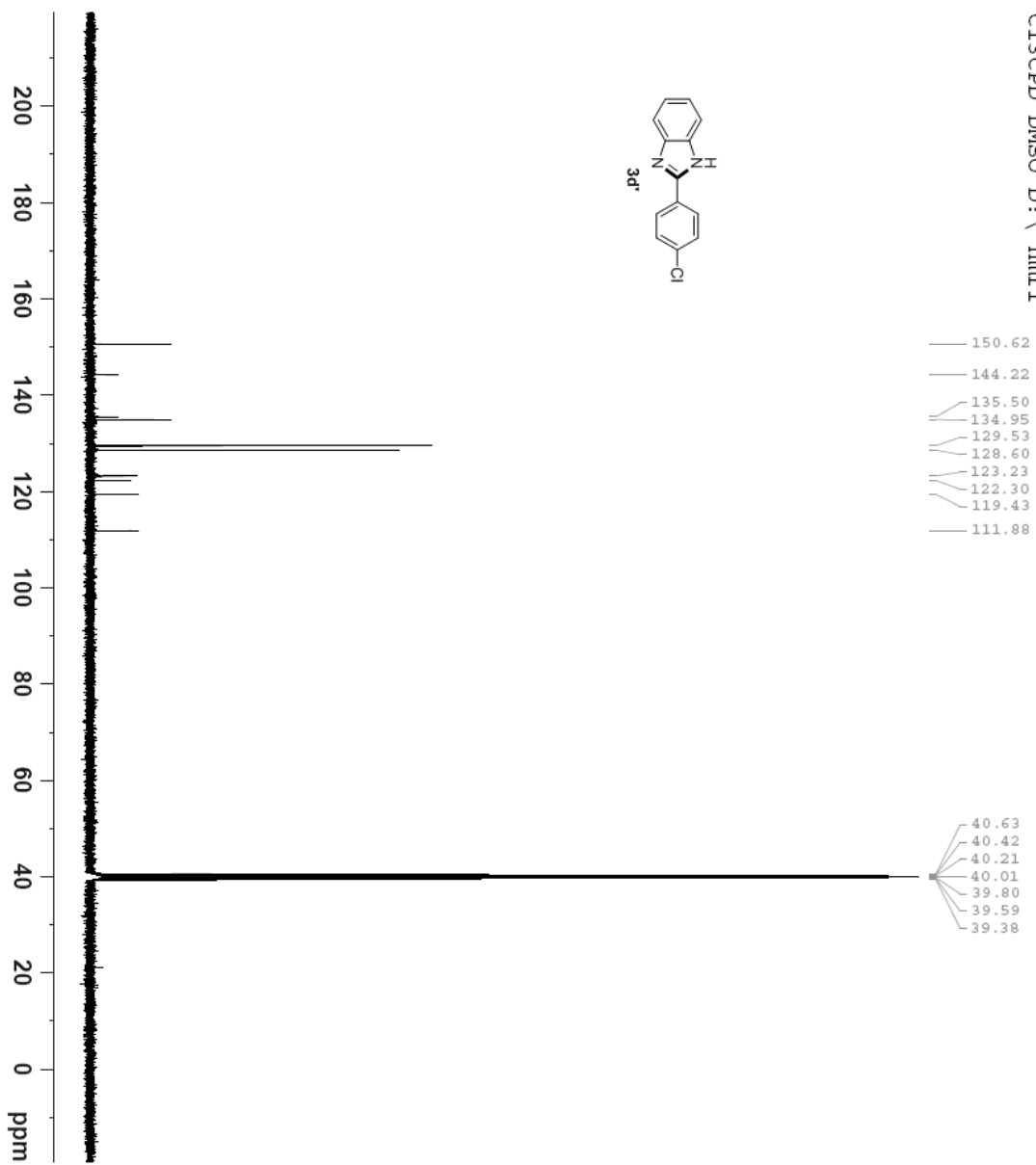
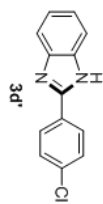


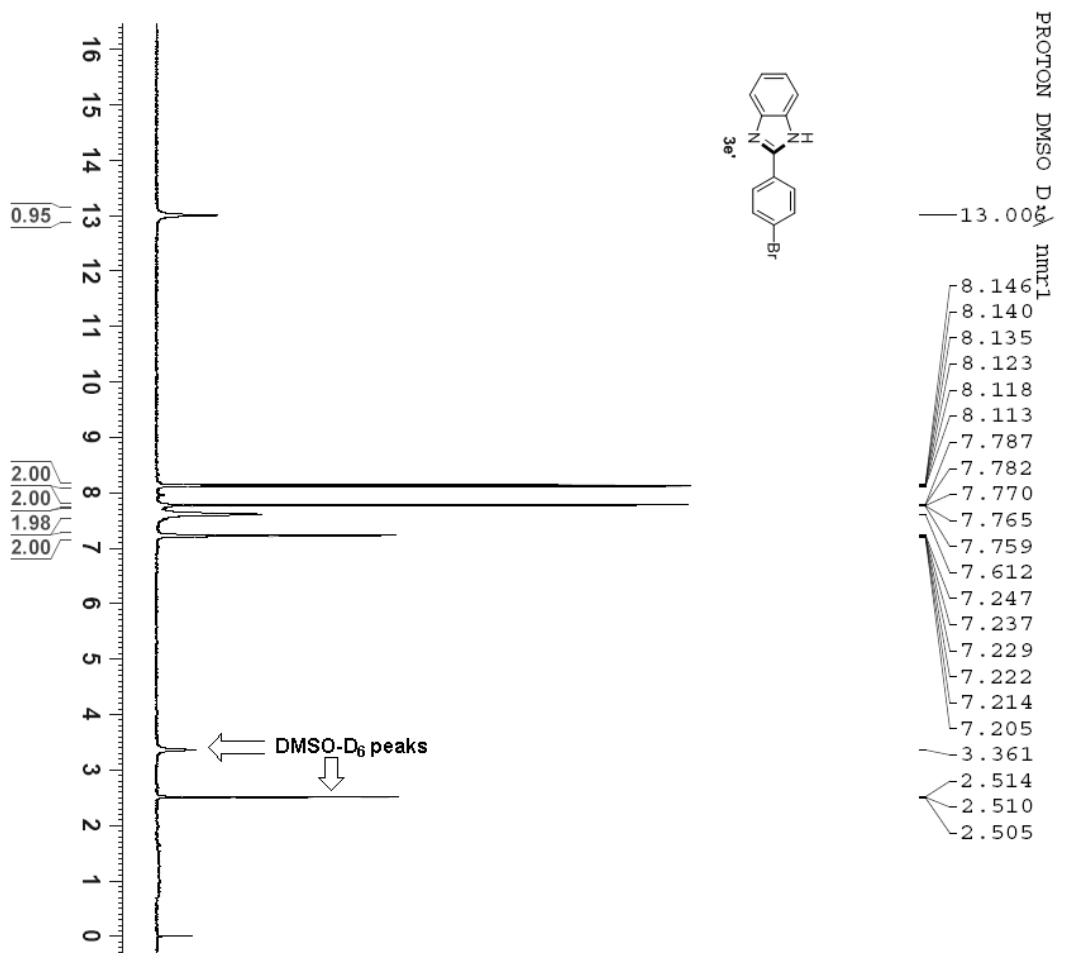
C13CPD DMSO D: \ nmr1



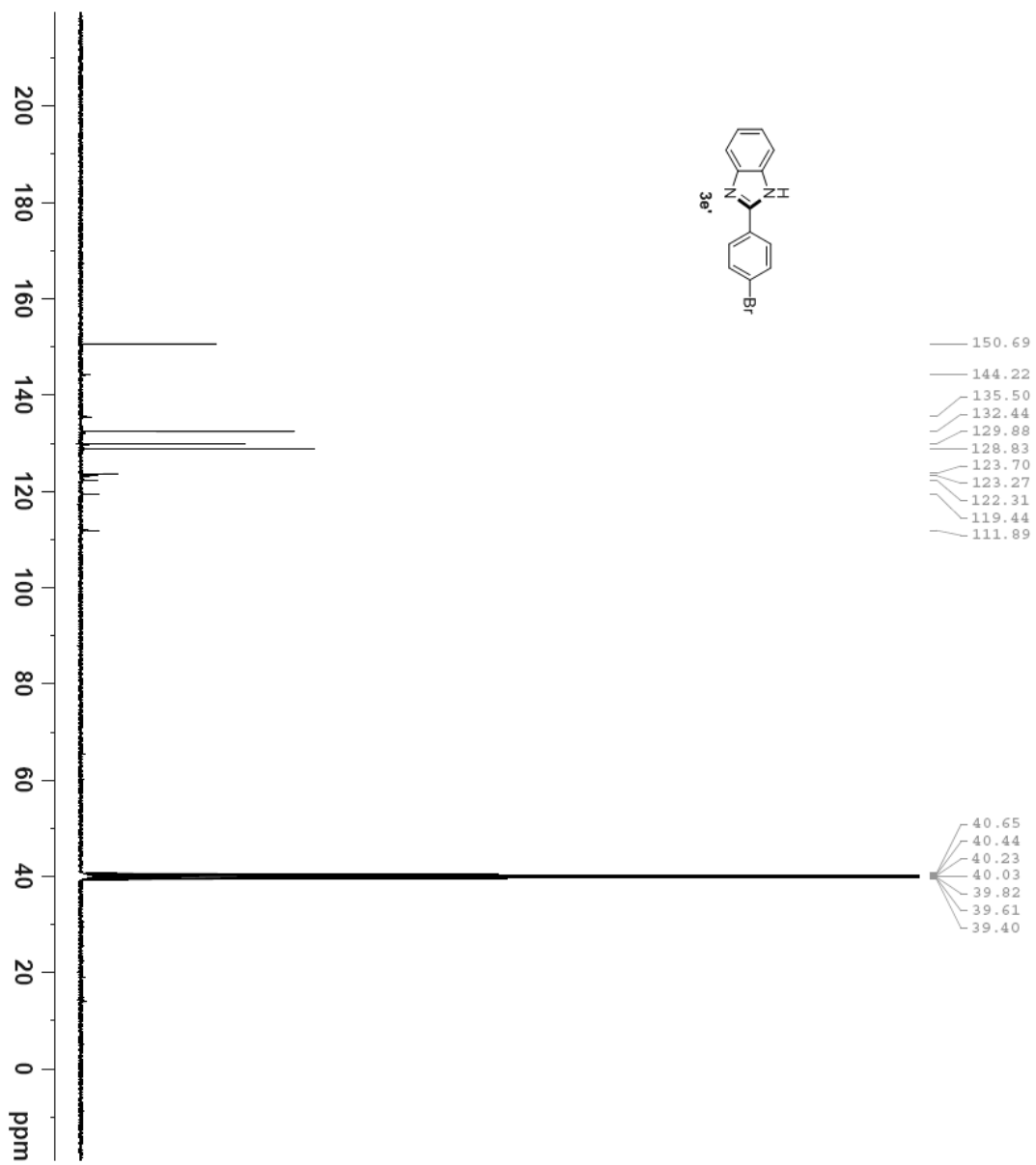
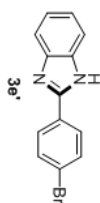


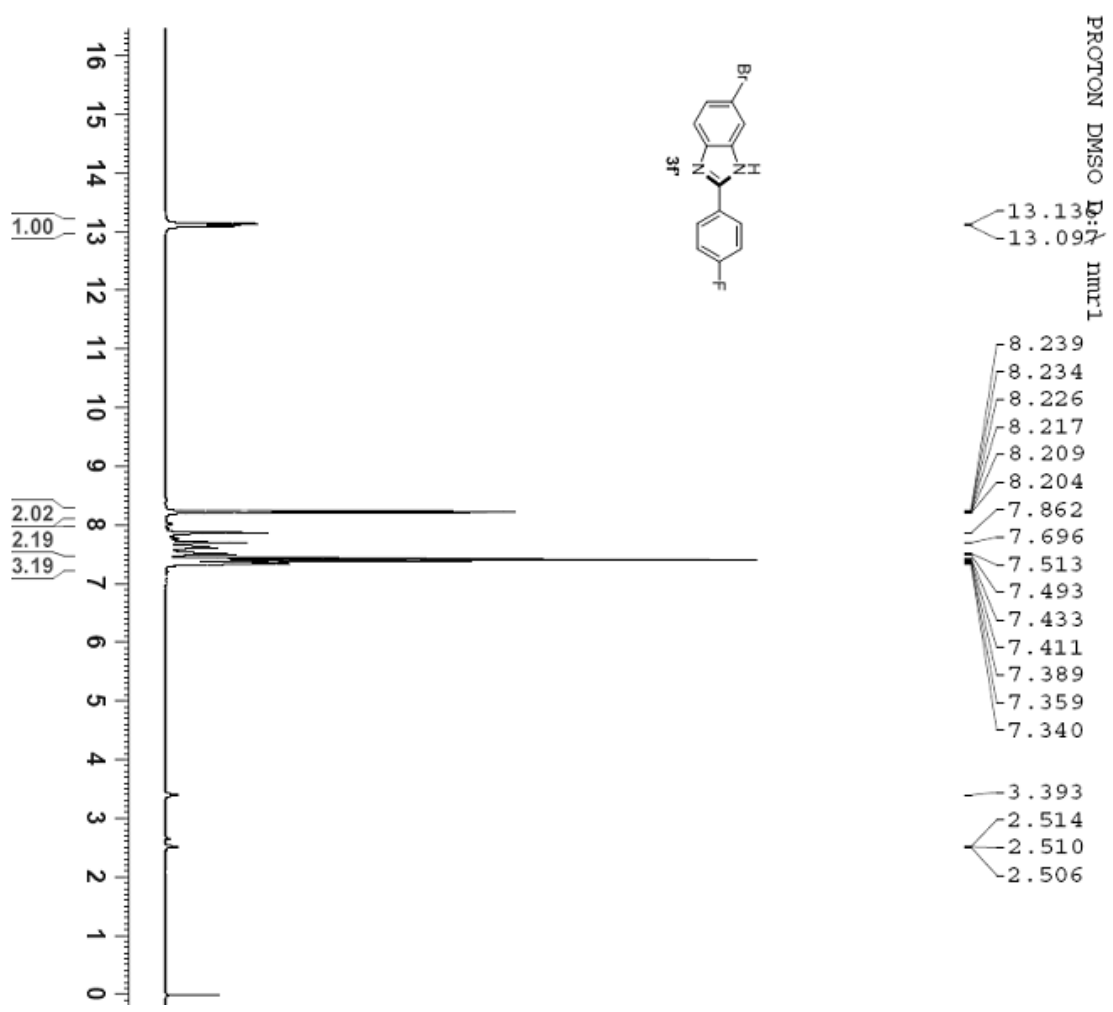
C13CPD DMSO D: \ nmr1

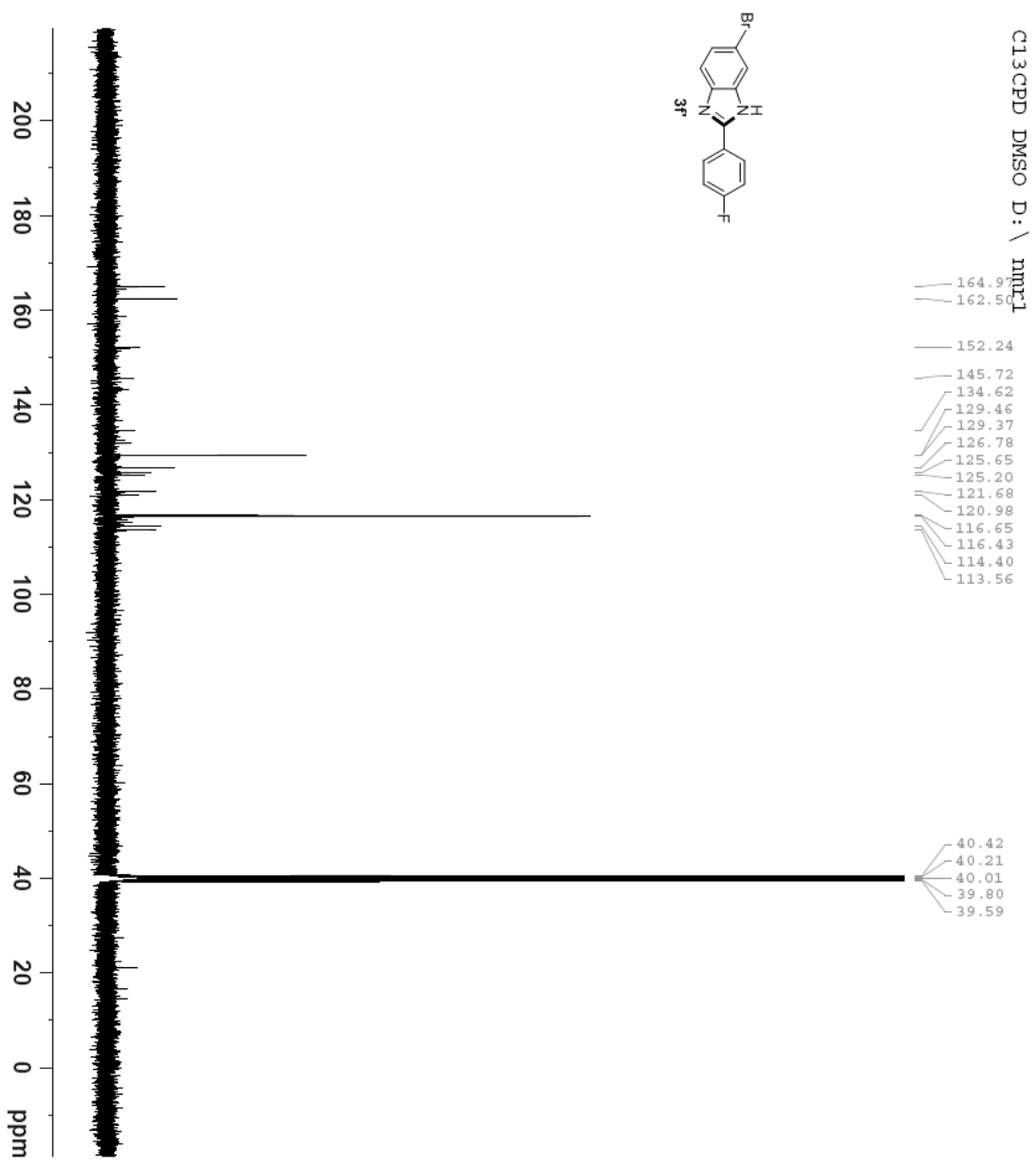


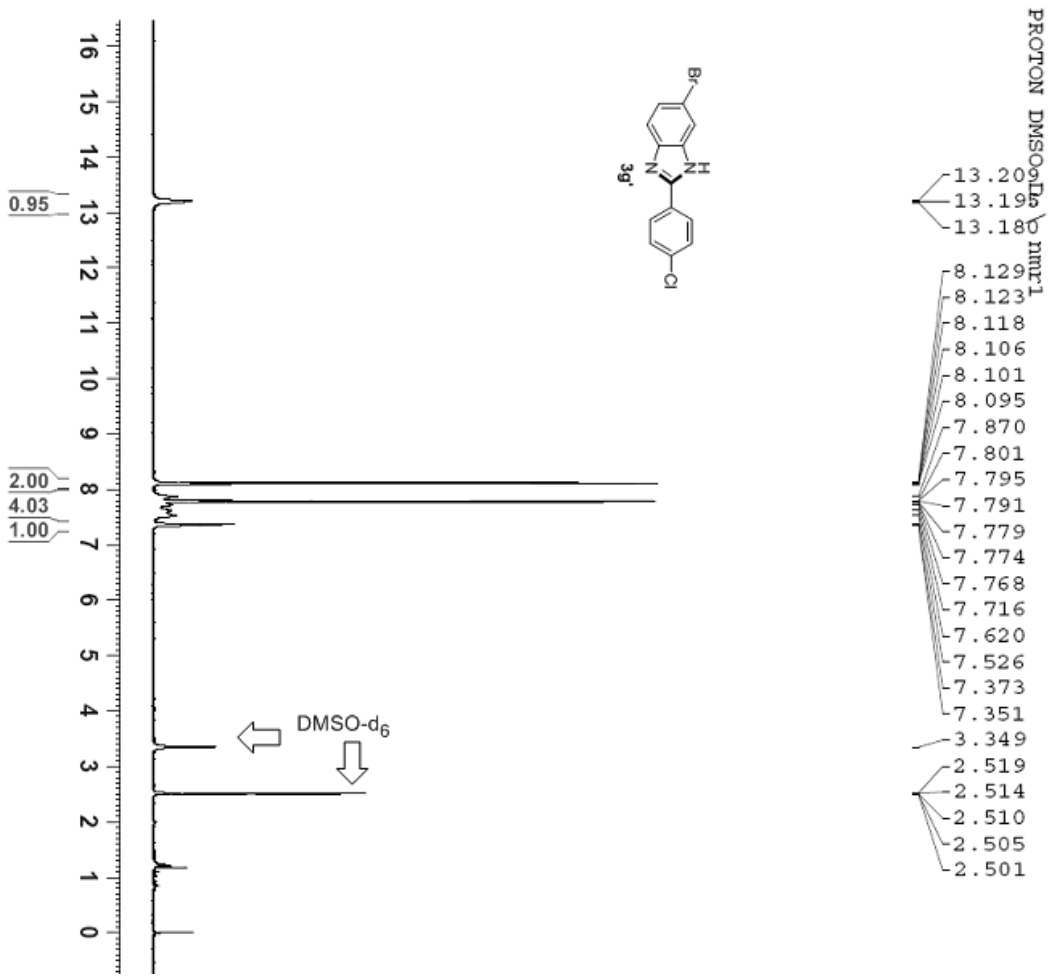


C13CPD DMSO D: \ nmr1



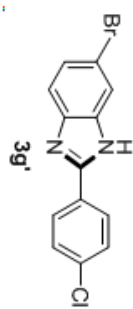






C13CPD DMSO D: \ nmr1

152.09
132.46
129.38
128.97
125.84
125.34
124.15
121.82
121.10
114.53
113.64



40.68
40.47
40.26
40.05
39.84
39.64
39.43

