

Development of a Suzuki Cross-Coupling Reaction between 2-Azidoarylboronic Pinacolate Esters and Vinyl Triflates to Enable the Synthesis of [2,3]-Fused Indole Heterocycles

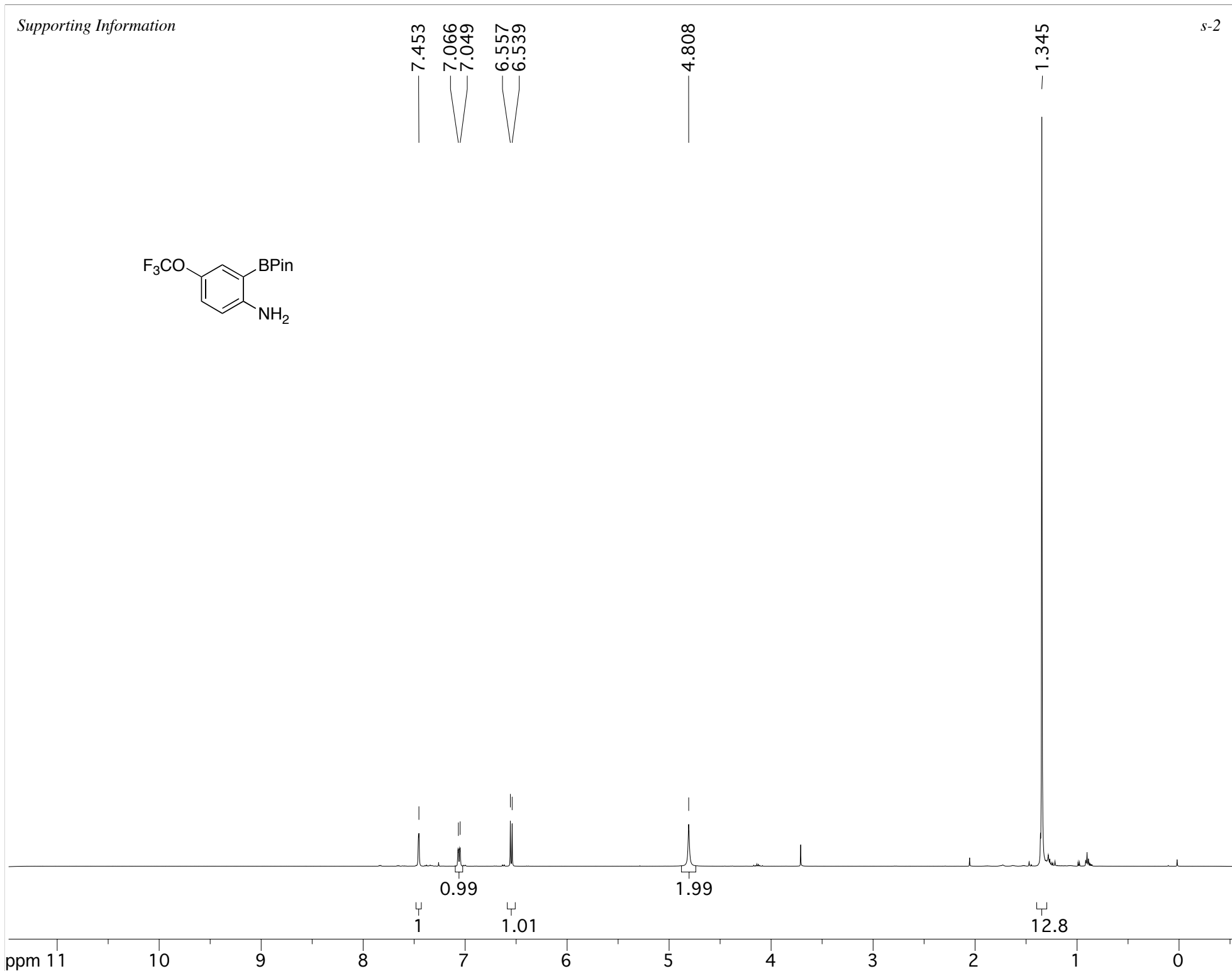
Navendu Jana, Quyen Nguyen and Tom G. Driver*

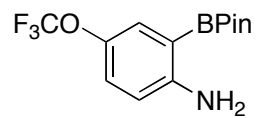
*Department of Chemistry, University of Illinois at Chicago
845 West Taylor Street, Chicago, Illinois, 60607-7061*

¹H and ¹³C NMR Spectral Data

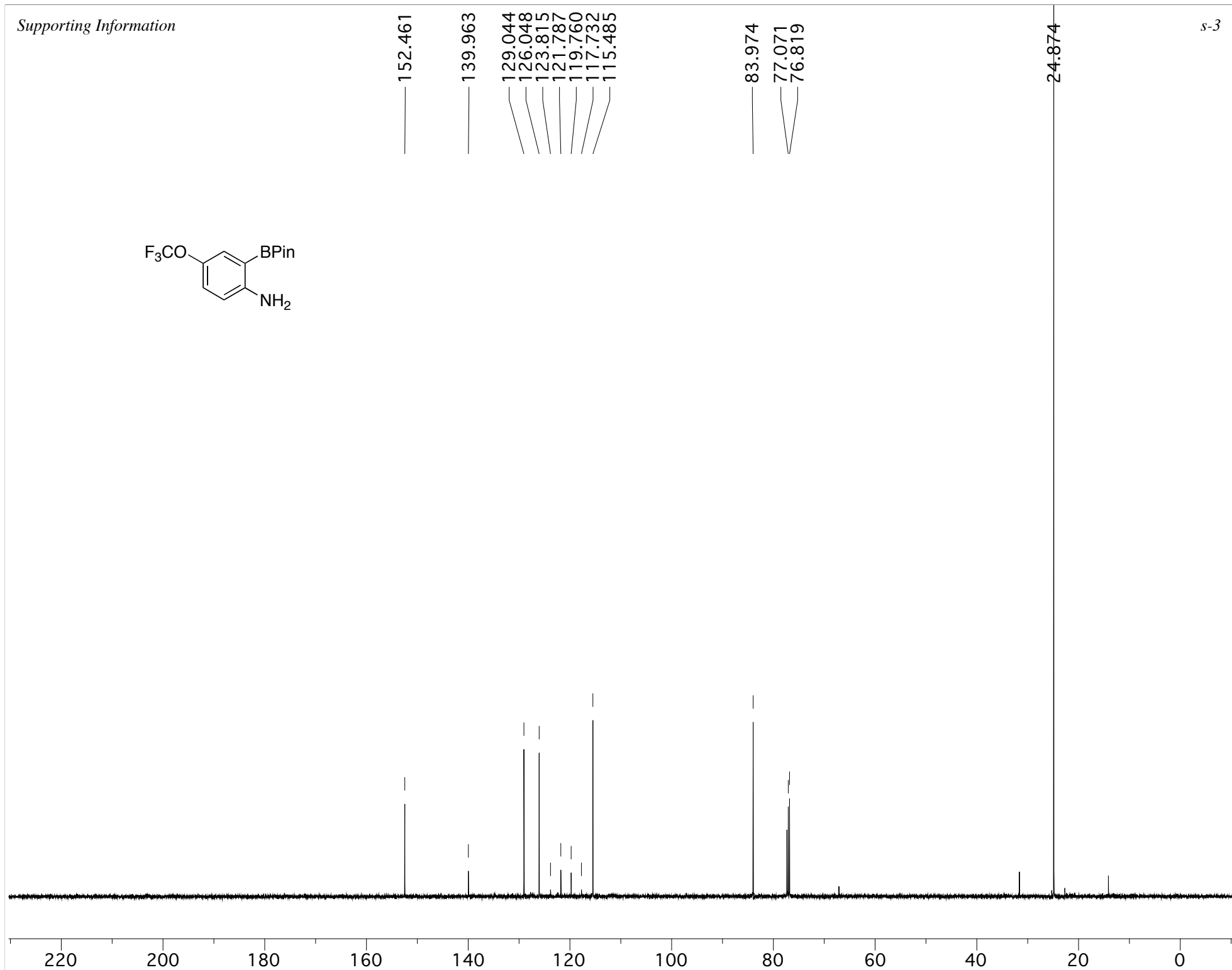
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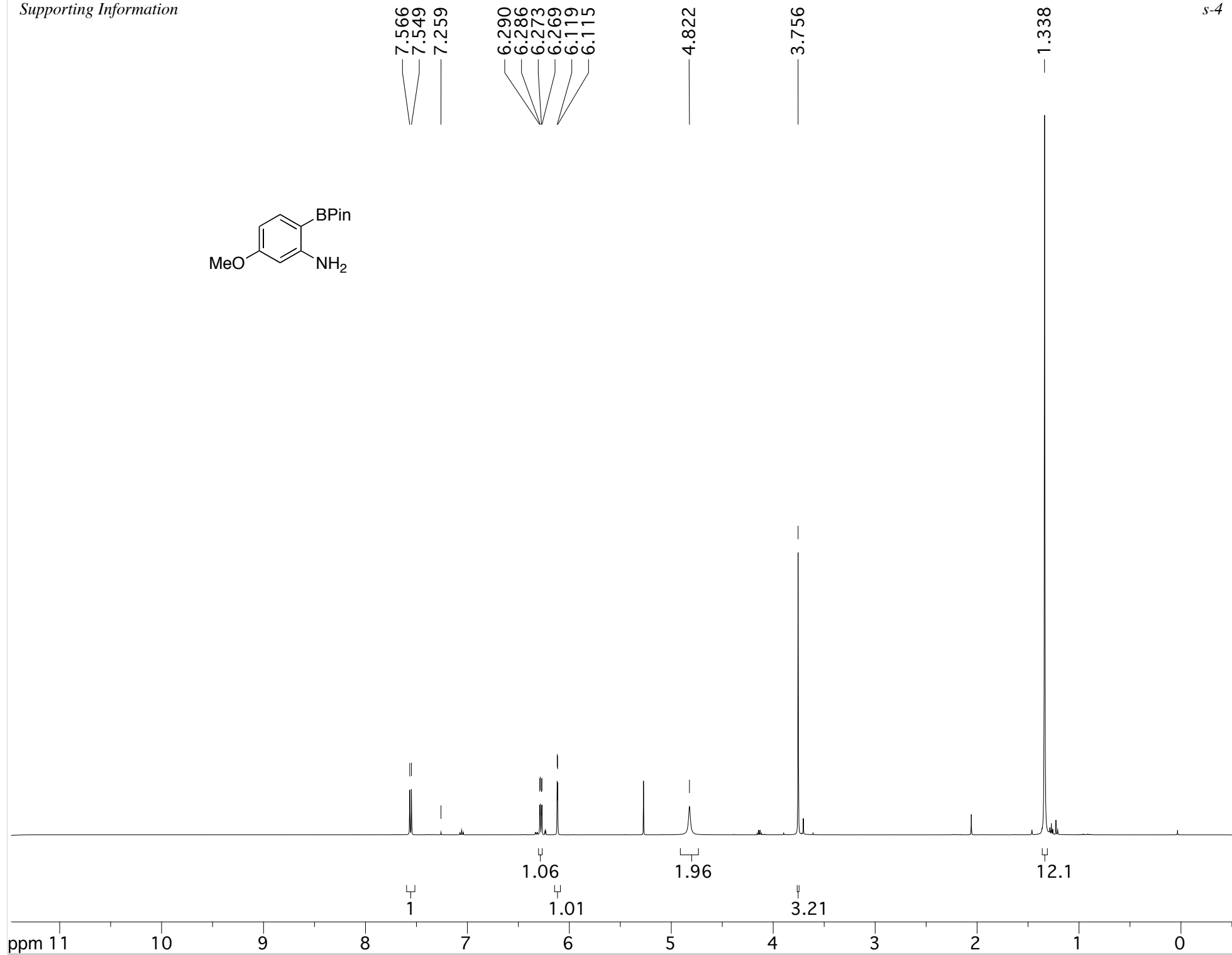
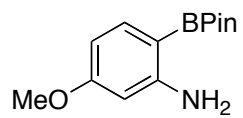
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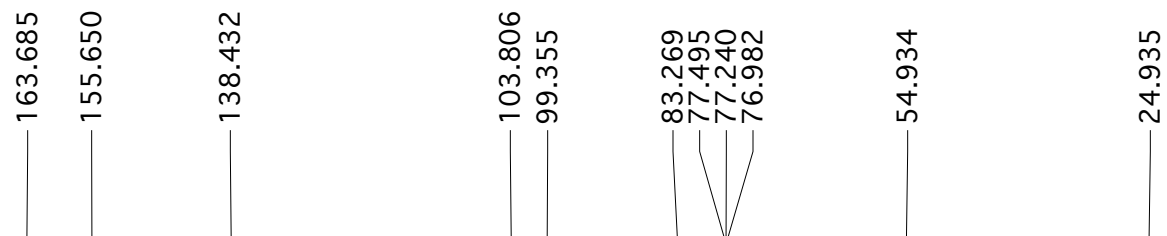
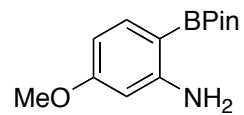


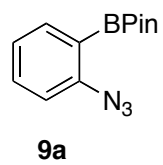


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139.963
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123.815
121.787
119.760
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76.819
24.874



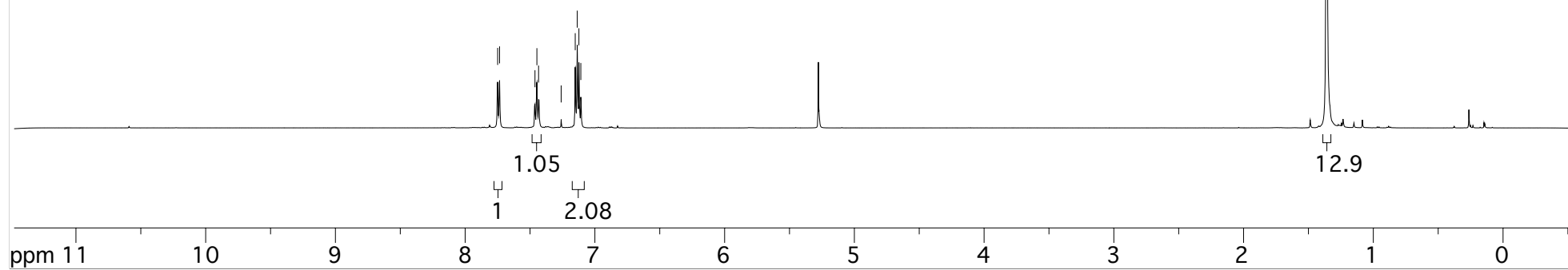


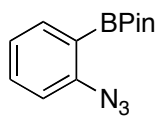
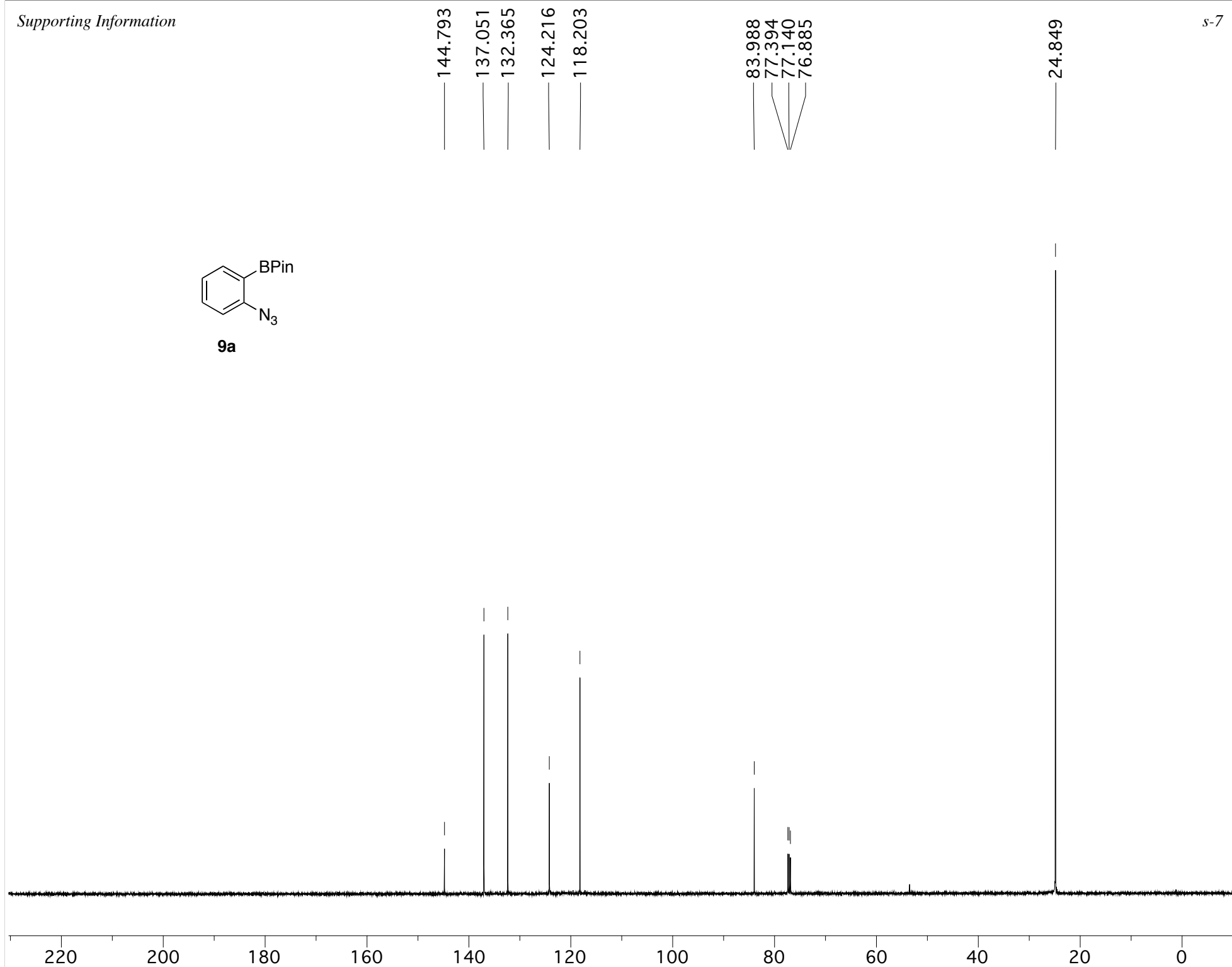


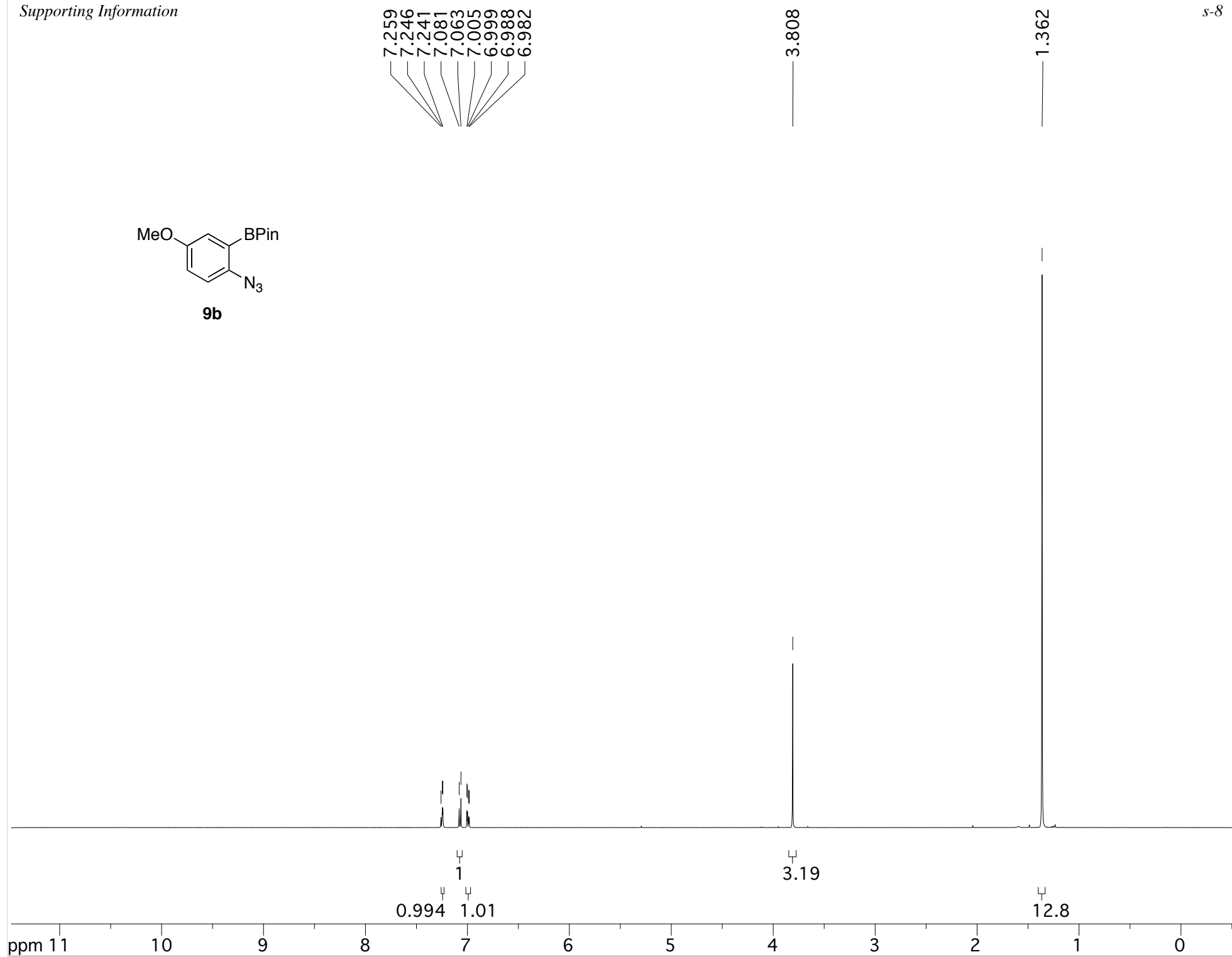
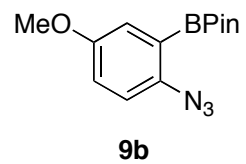


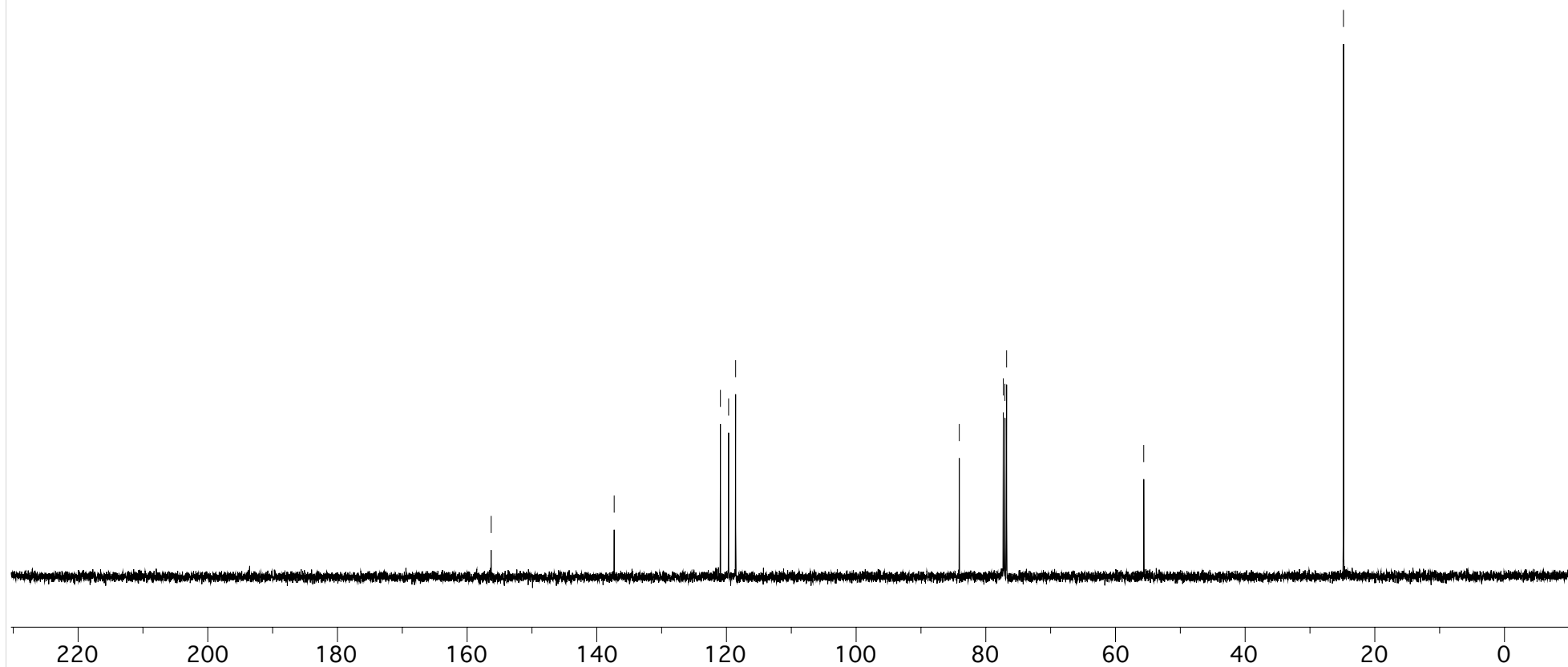
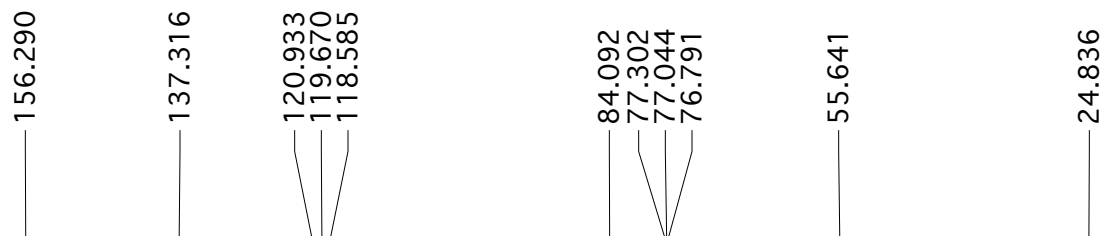
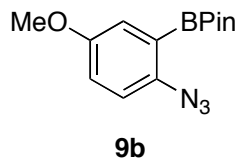
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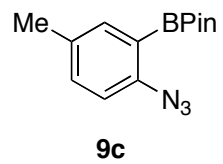
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**9a**







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7.054
7.038

2.316

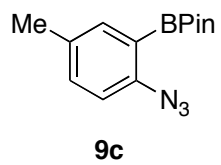
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3

12.2

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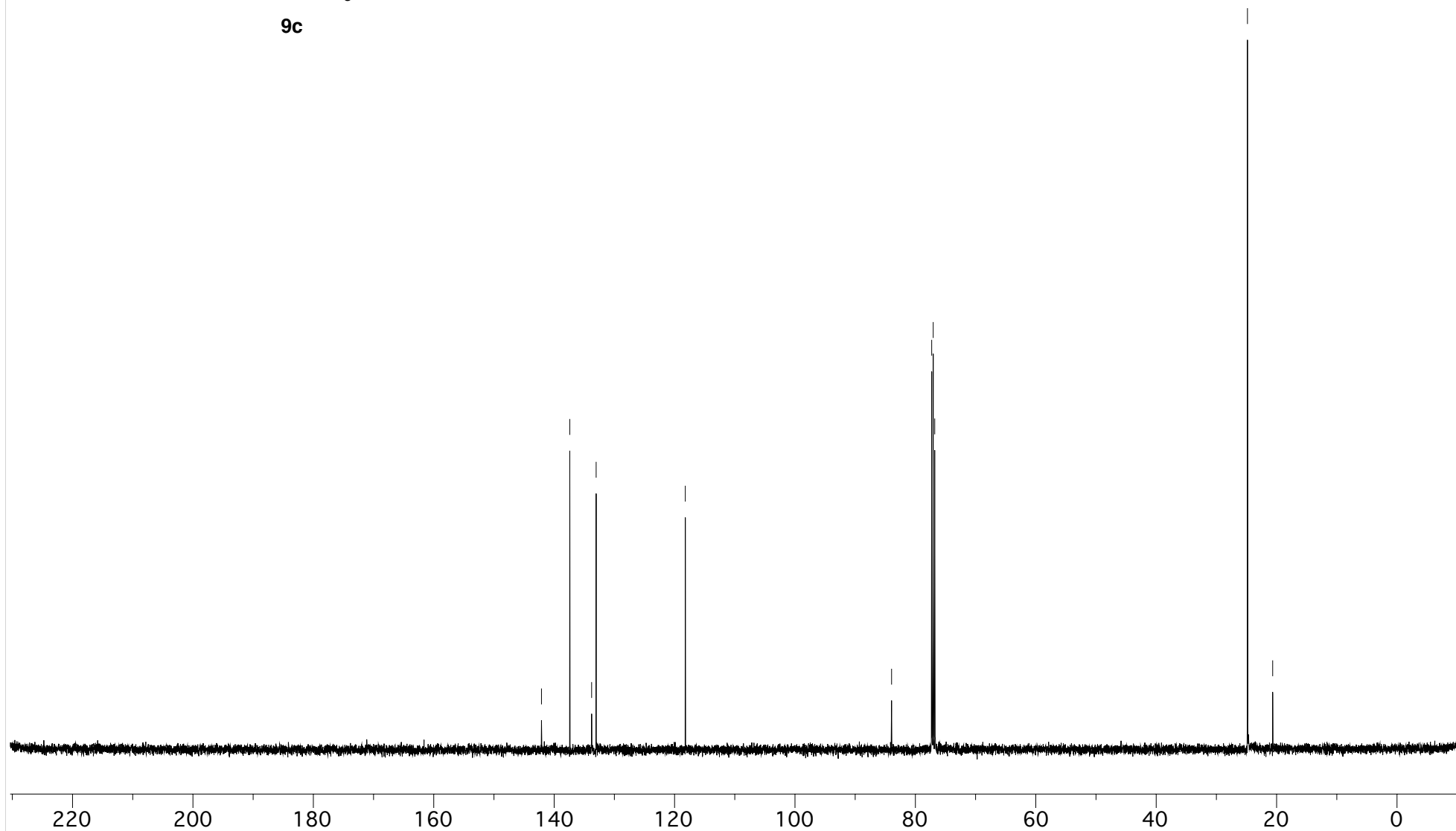


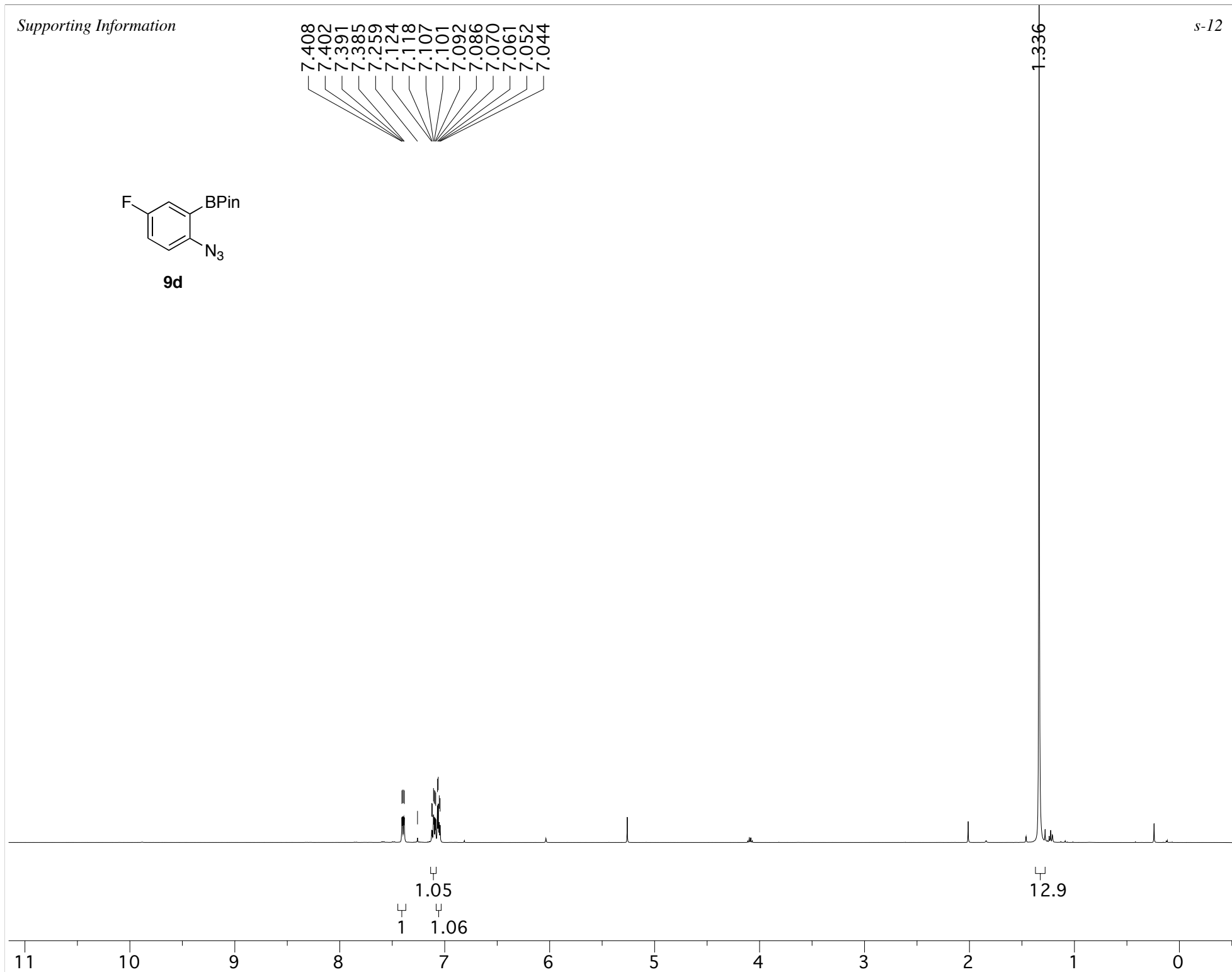
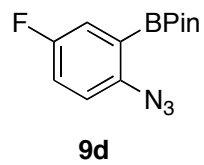
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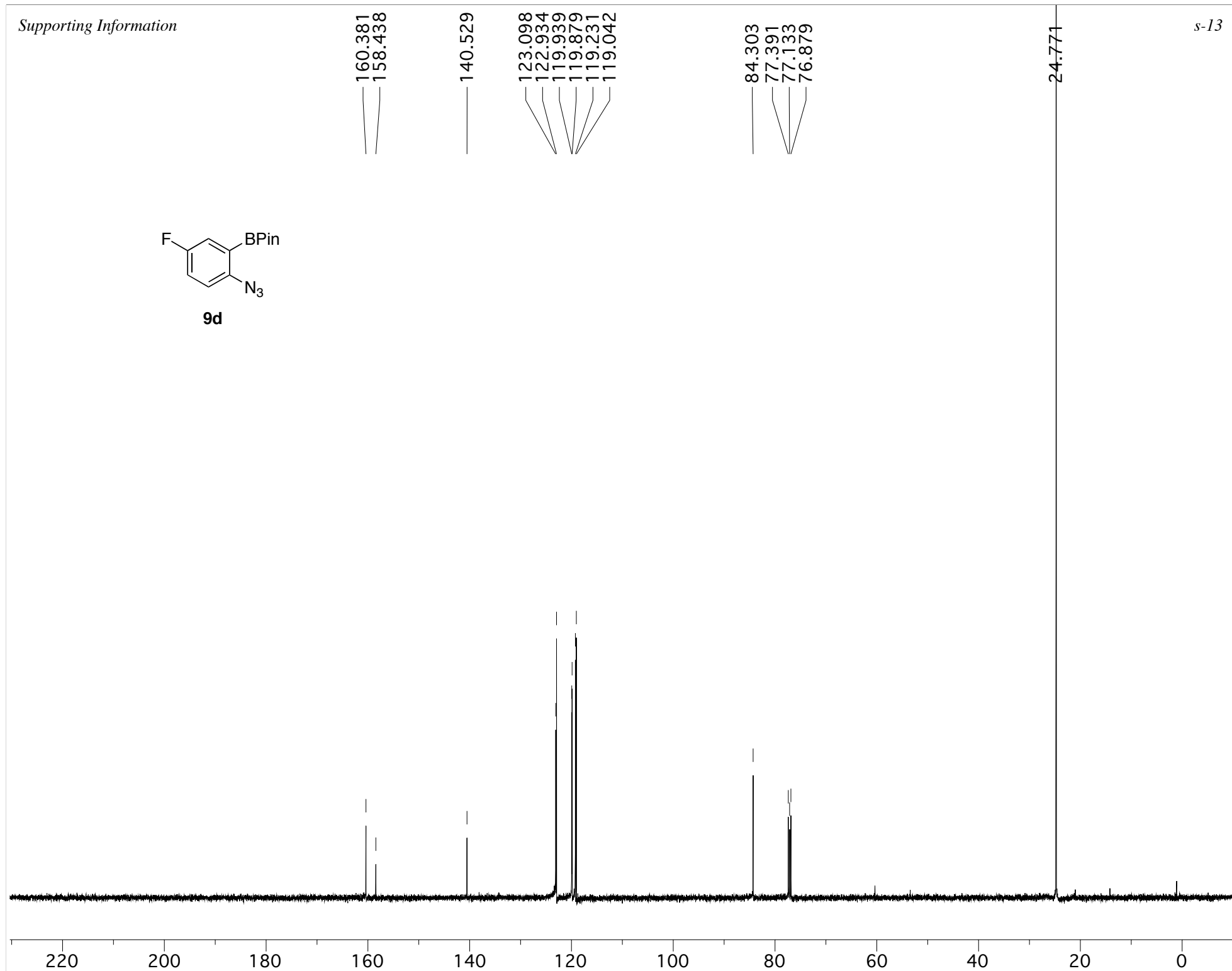
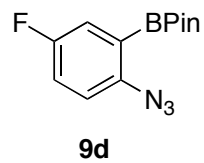
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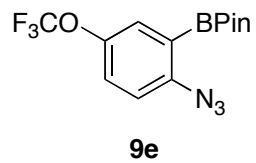
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24.841
20.651



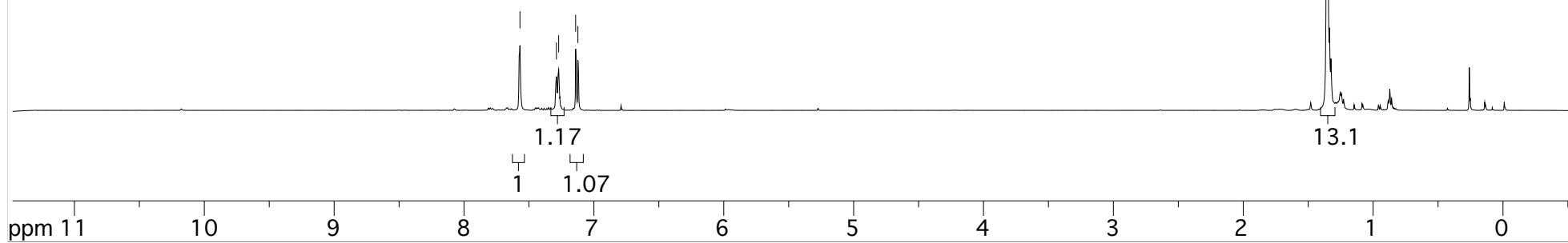


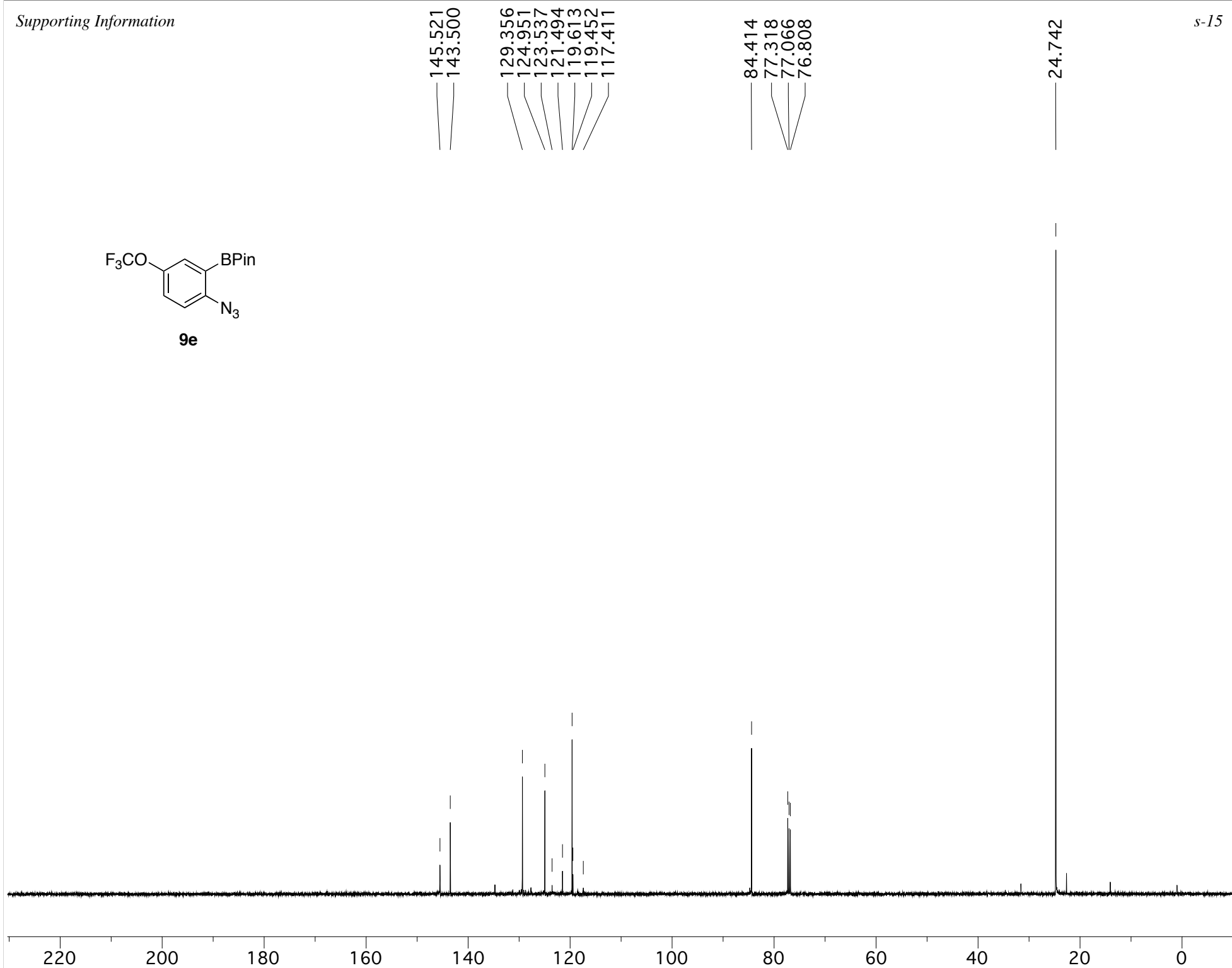
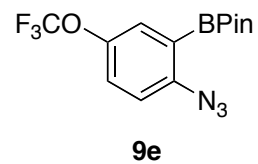


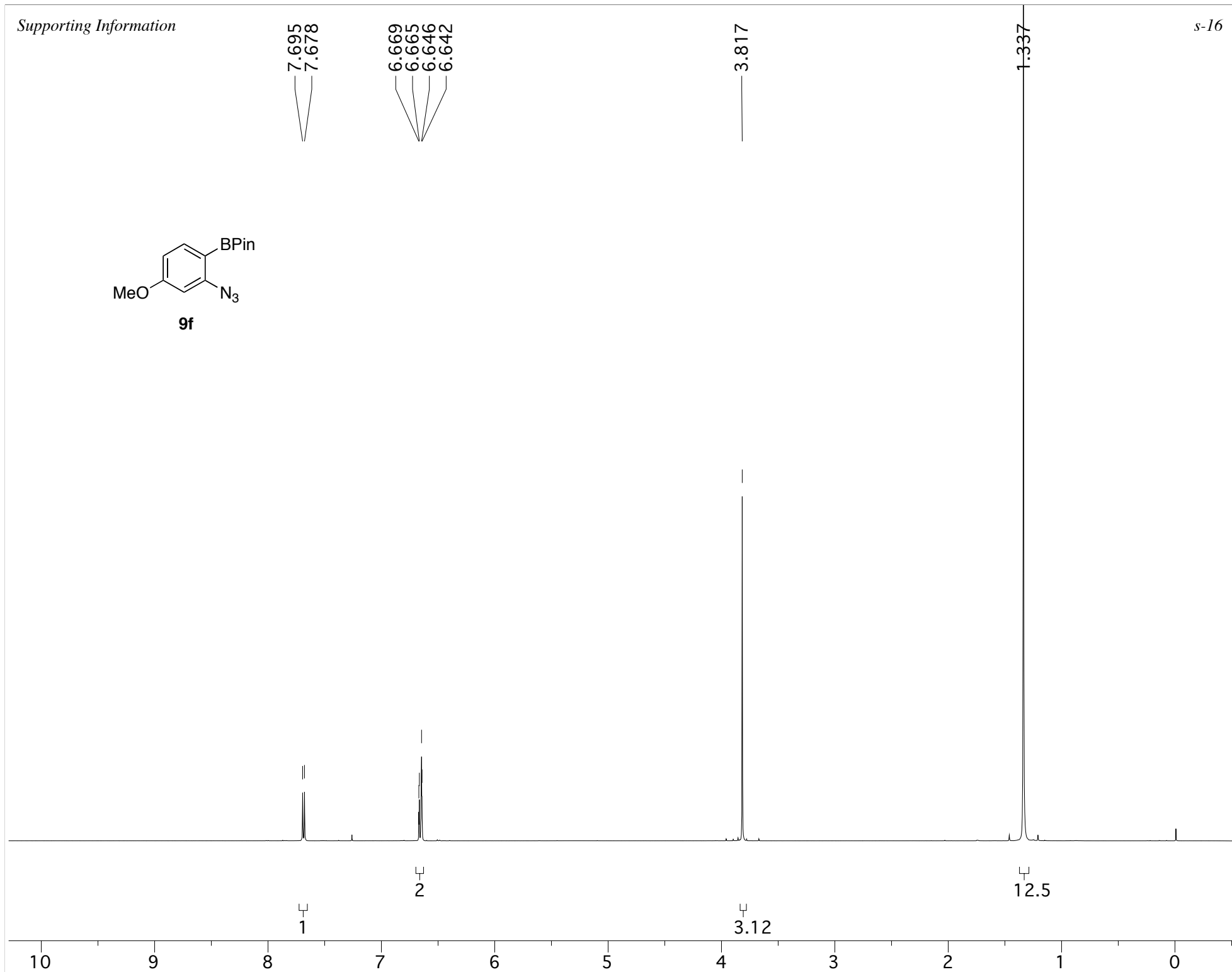
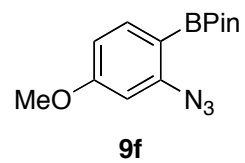


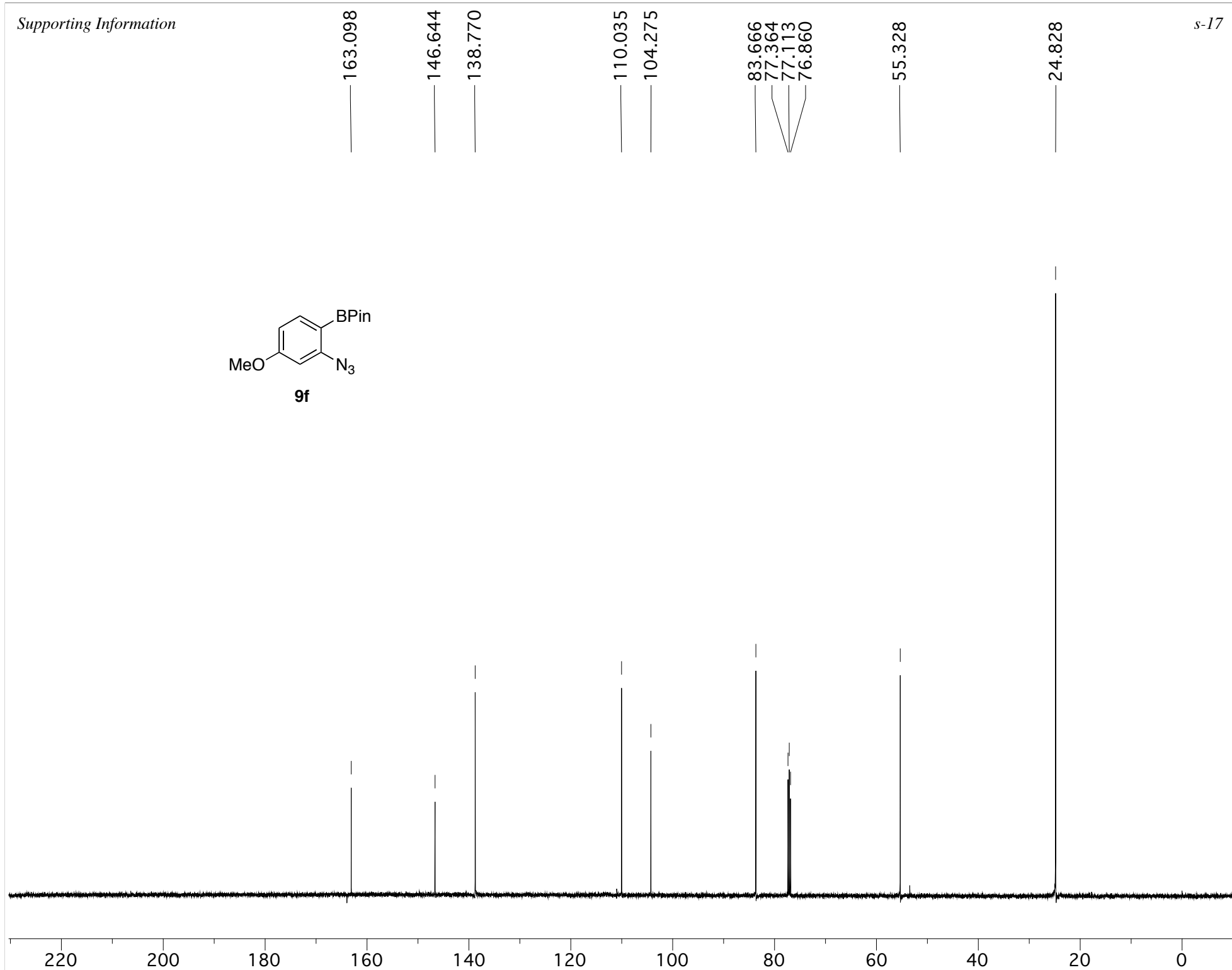
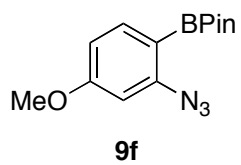
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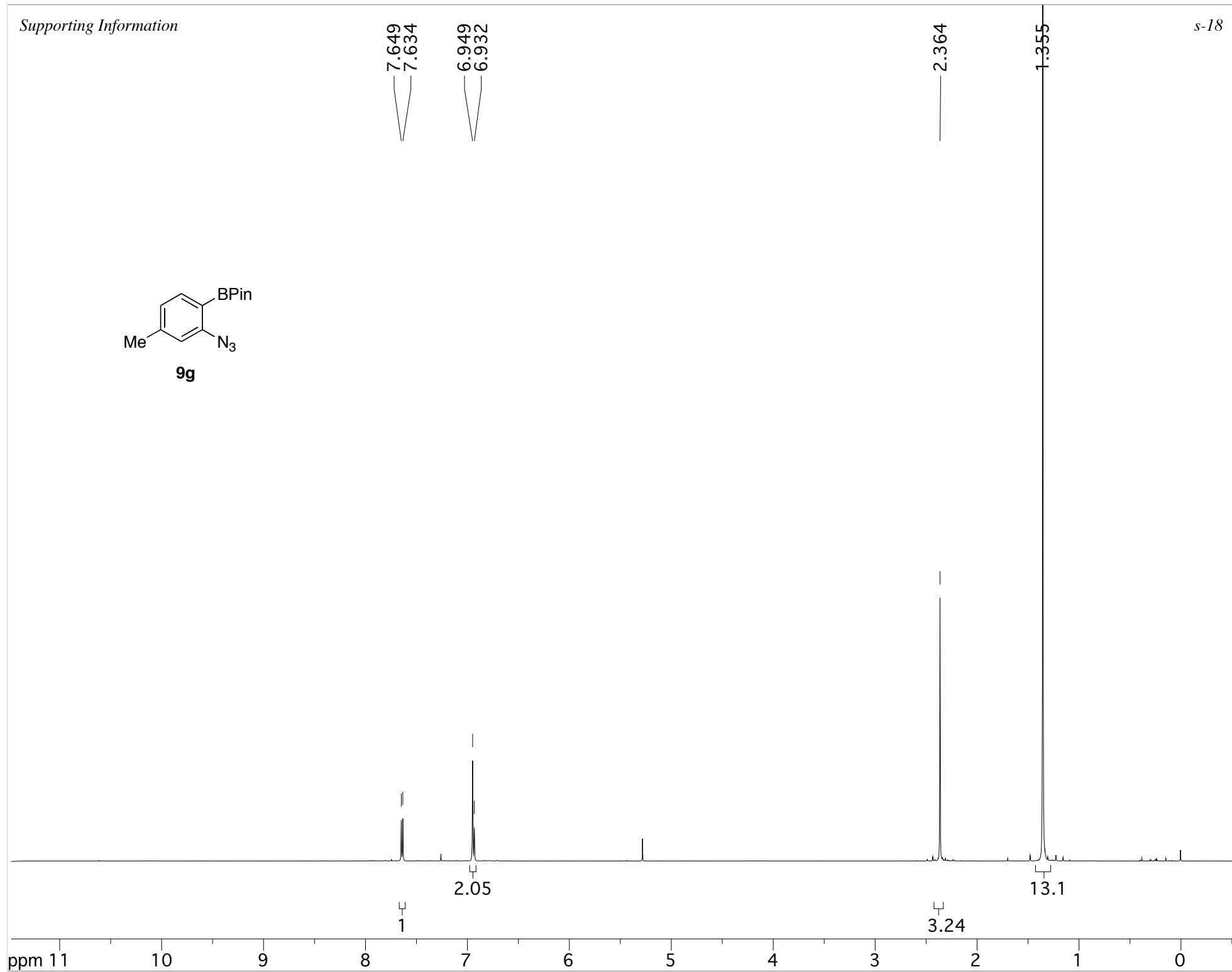
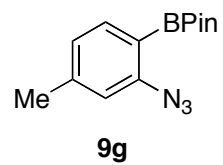
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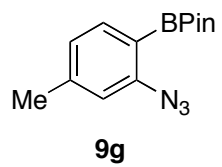








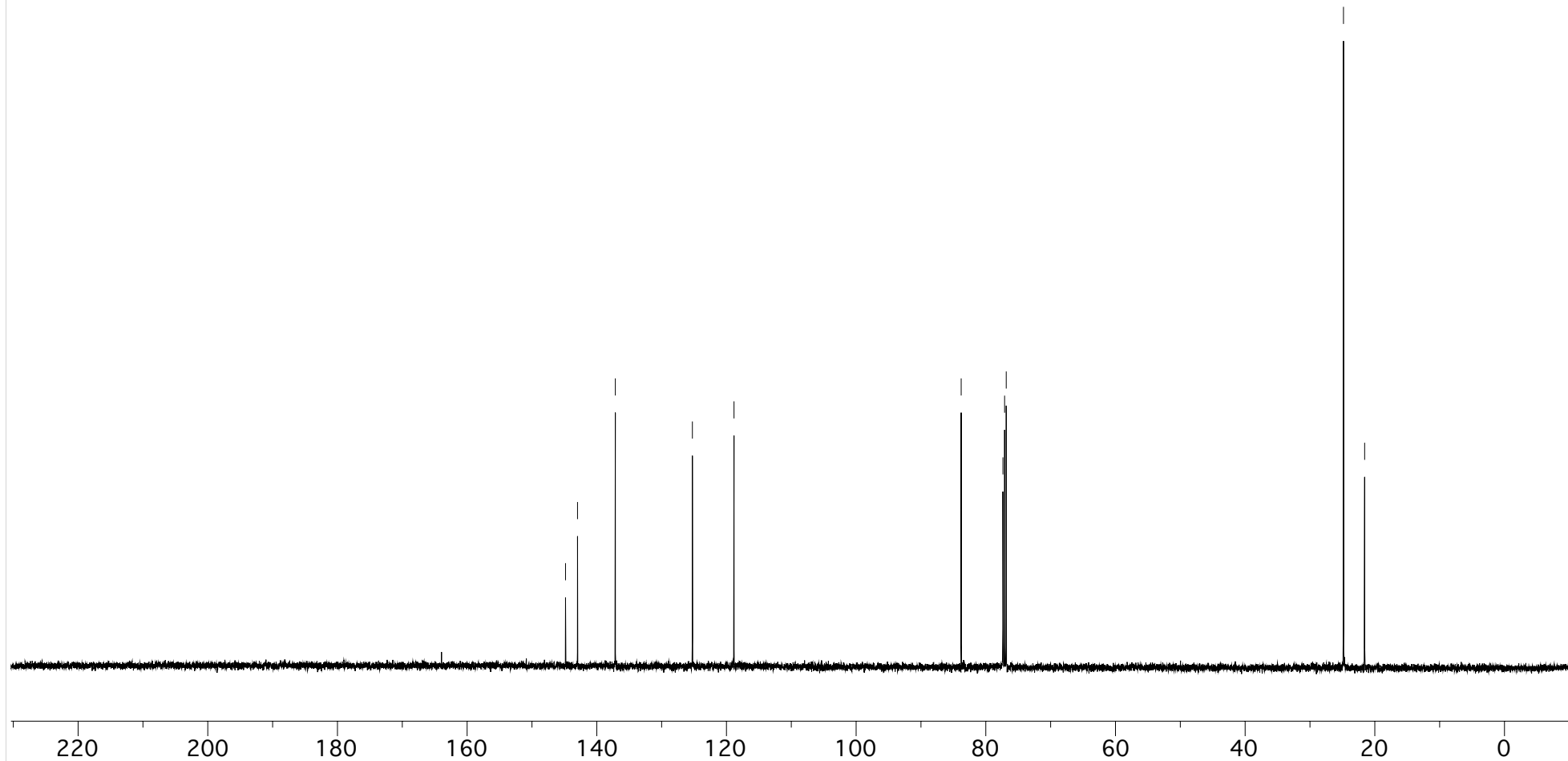


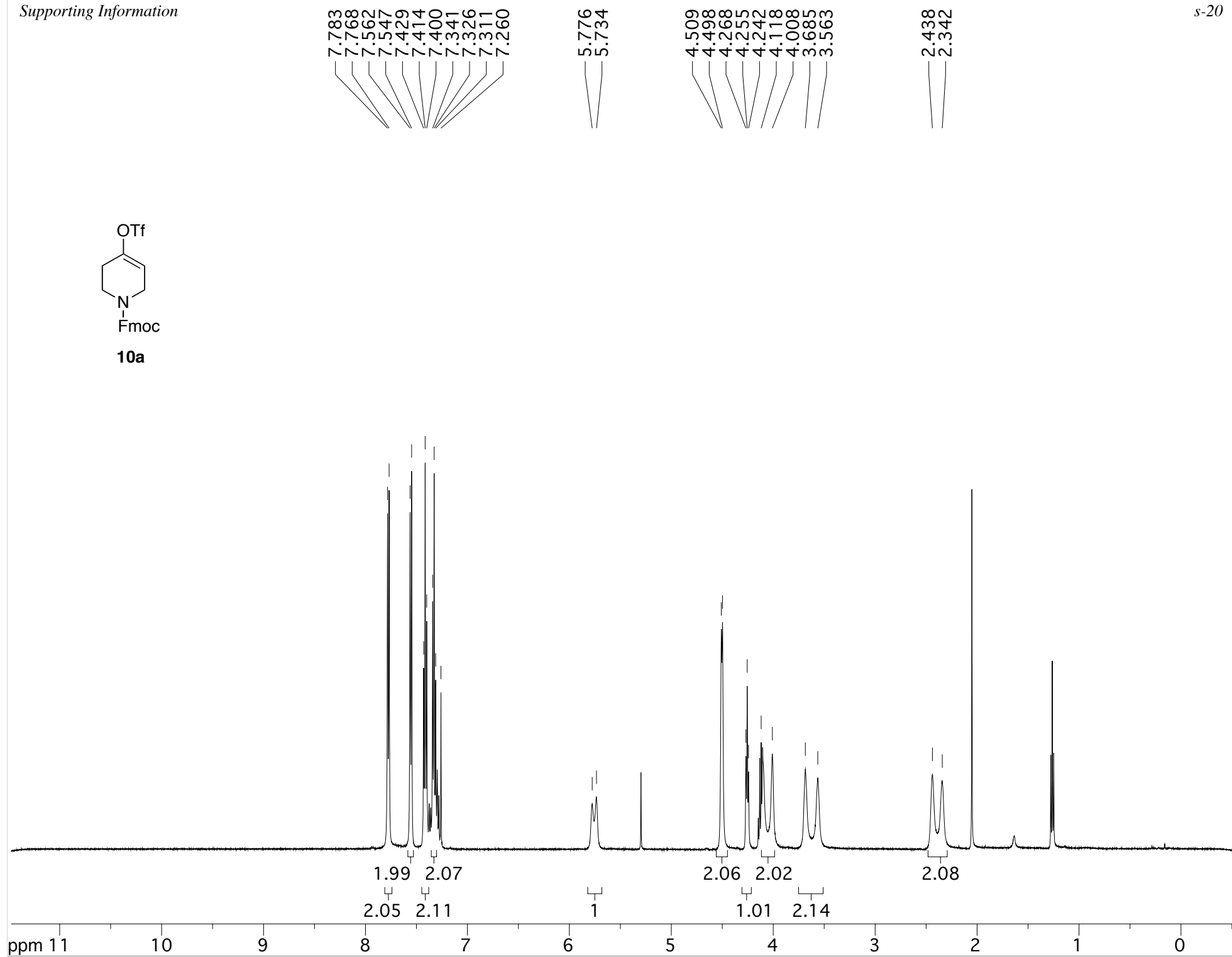
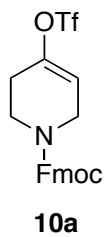


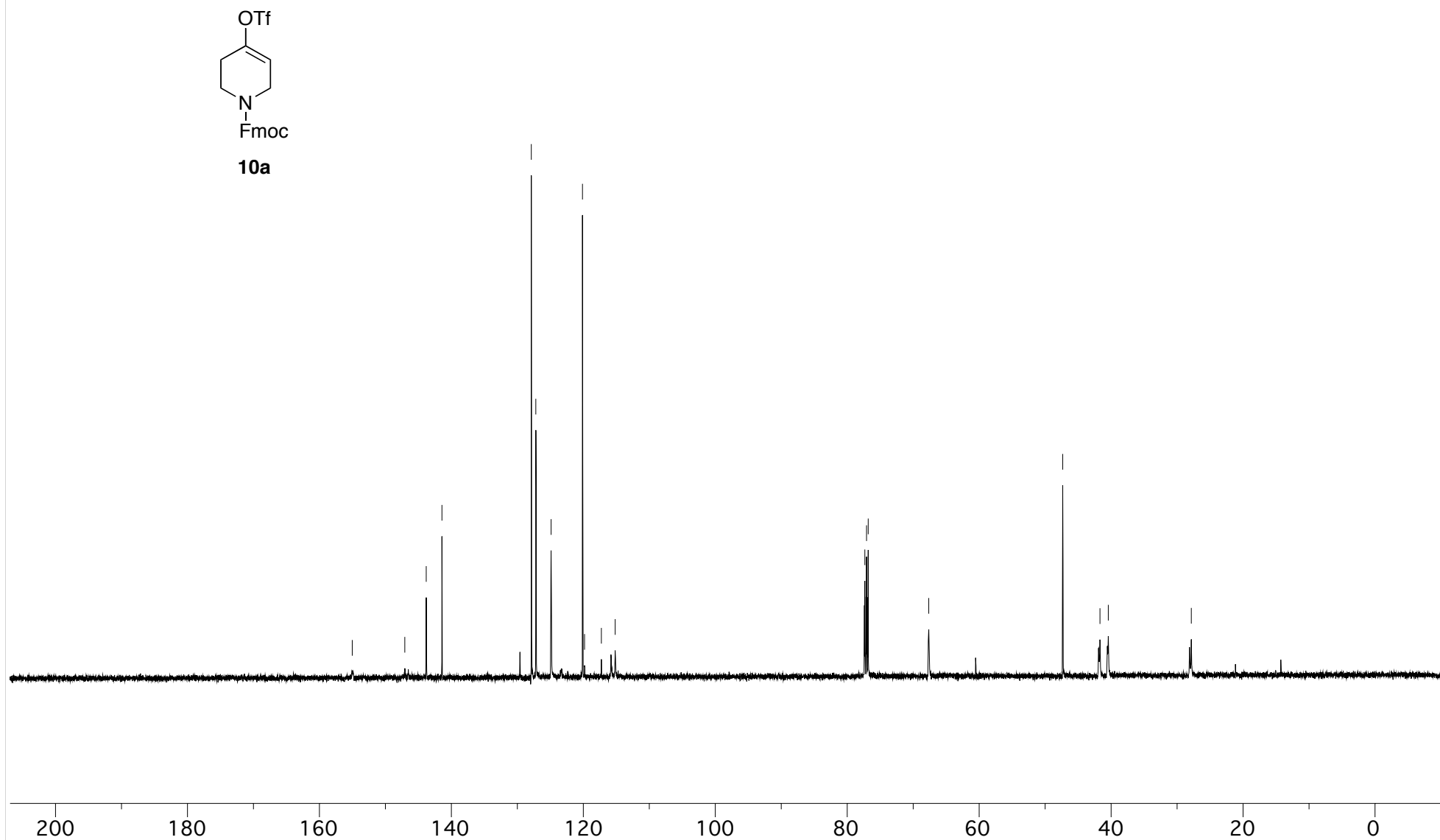
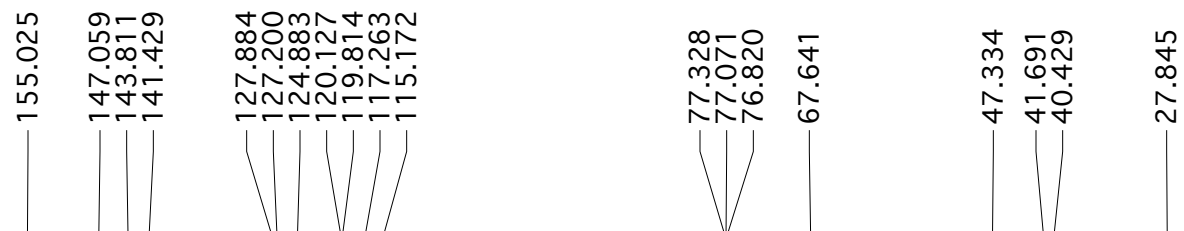
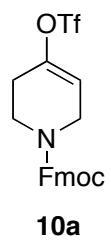
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118.835

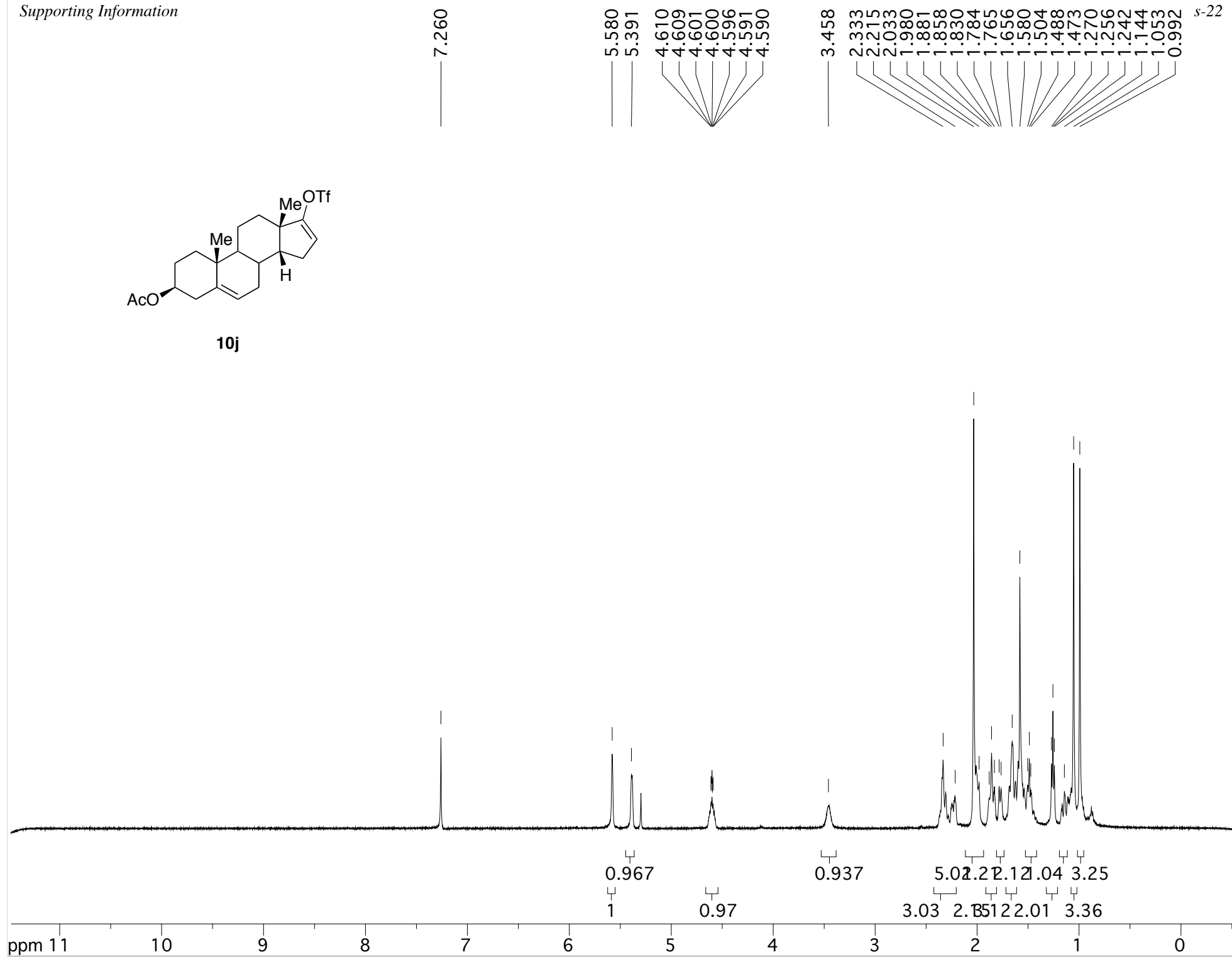
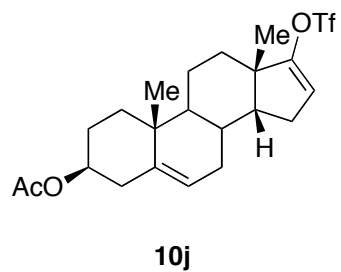
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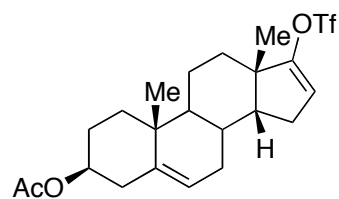
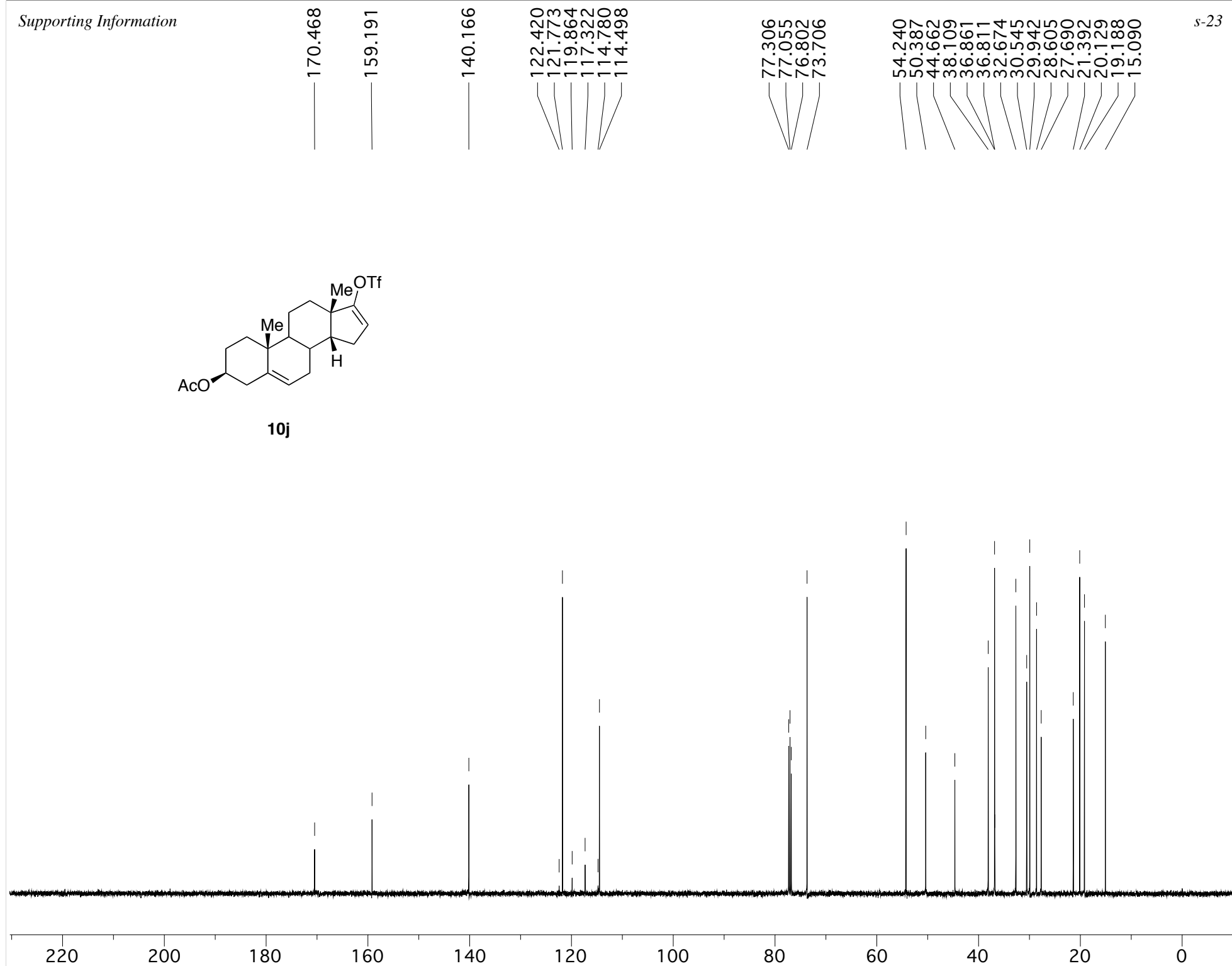
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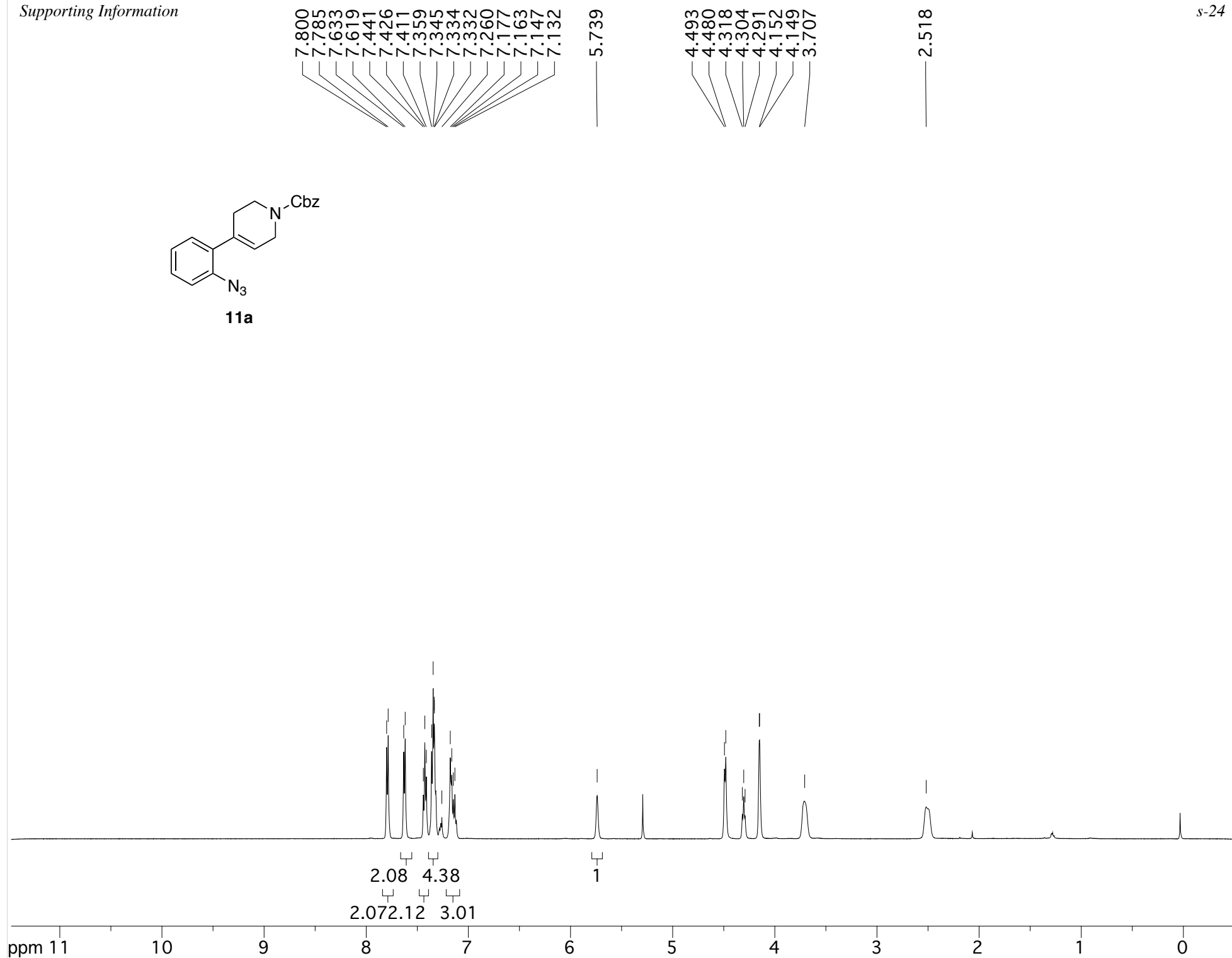
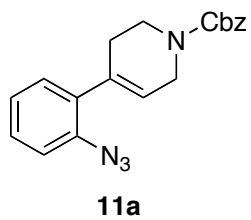


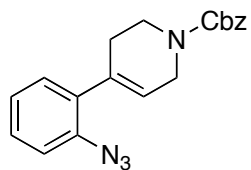






**10j**



**11a**

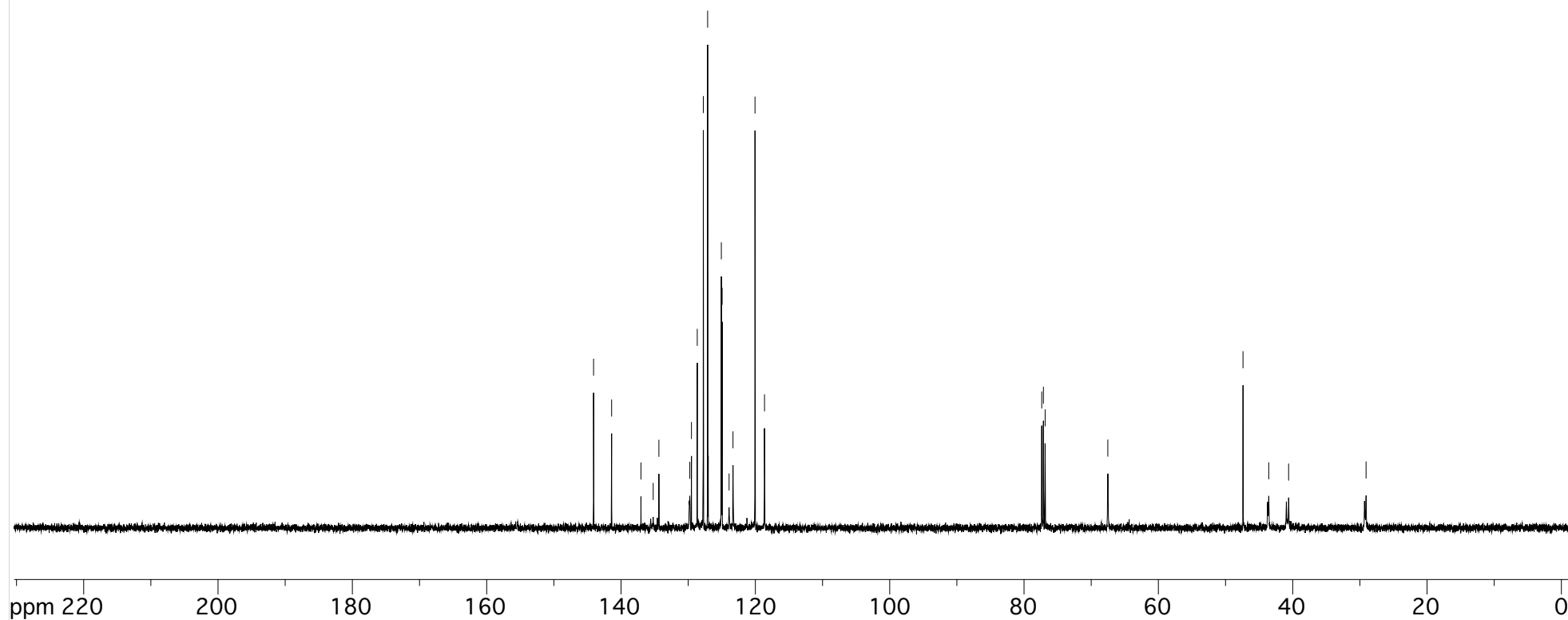
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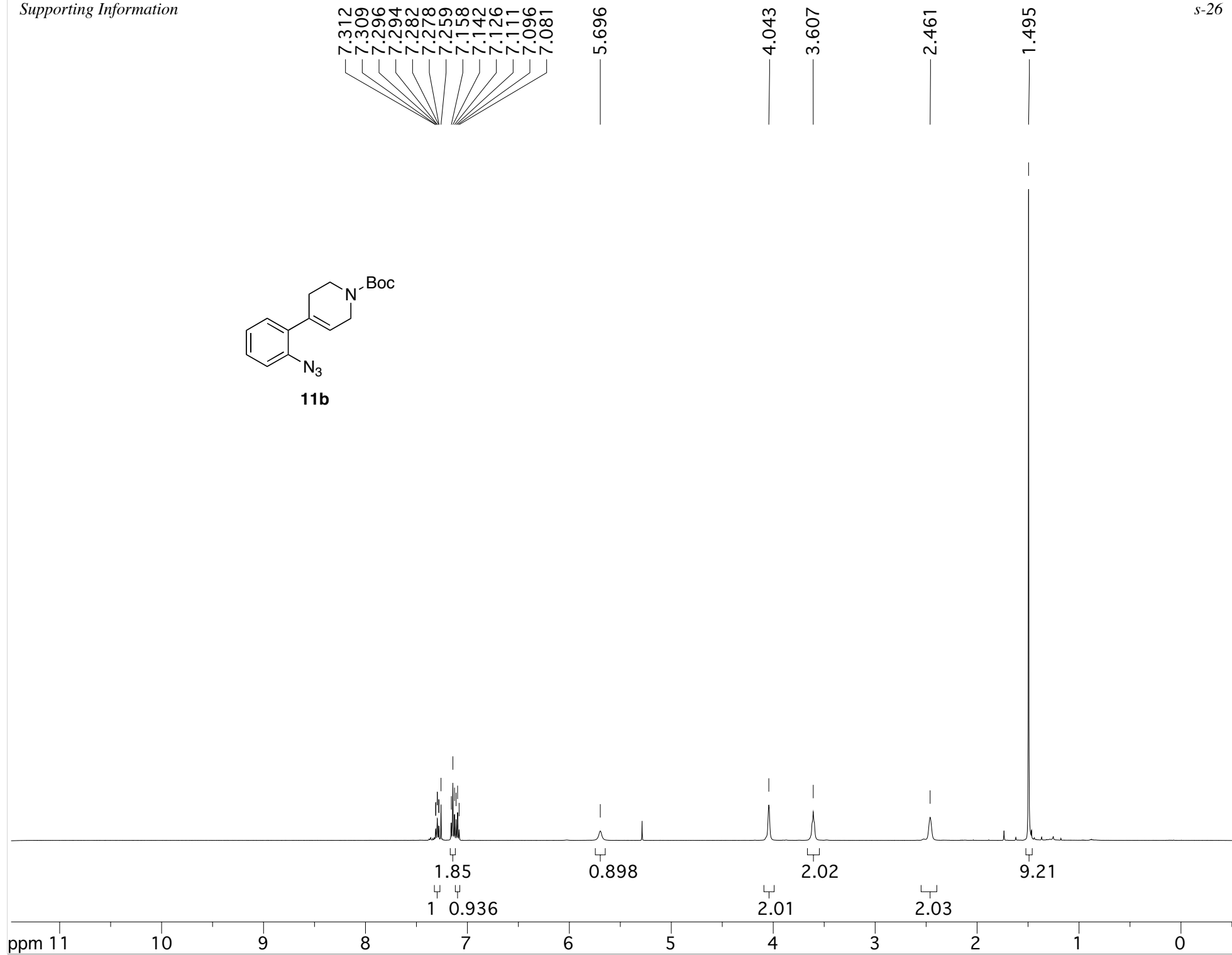
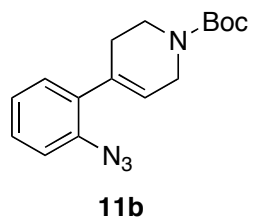
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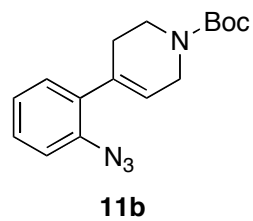
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40.612

29.081







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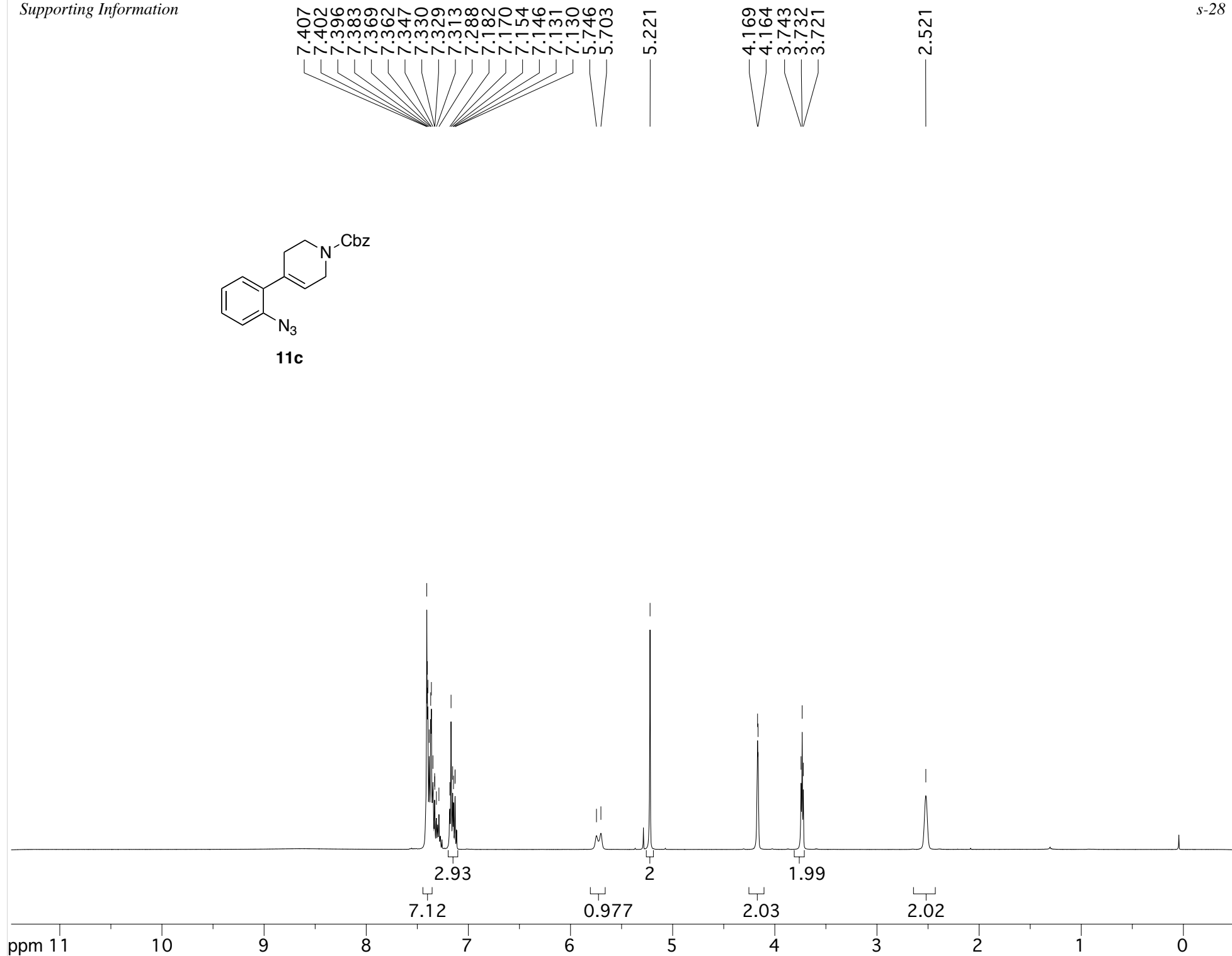
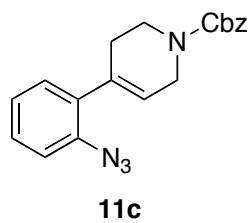
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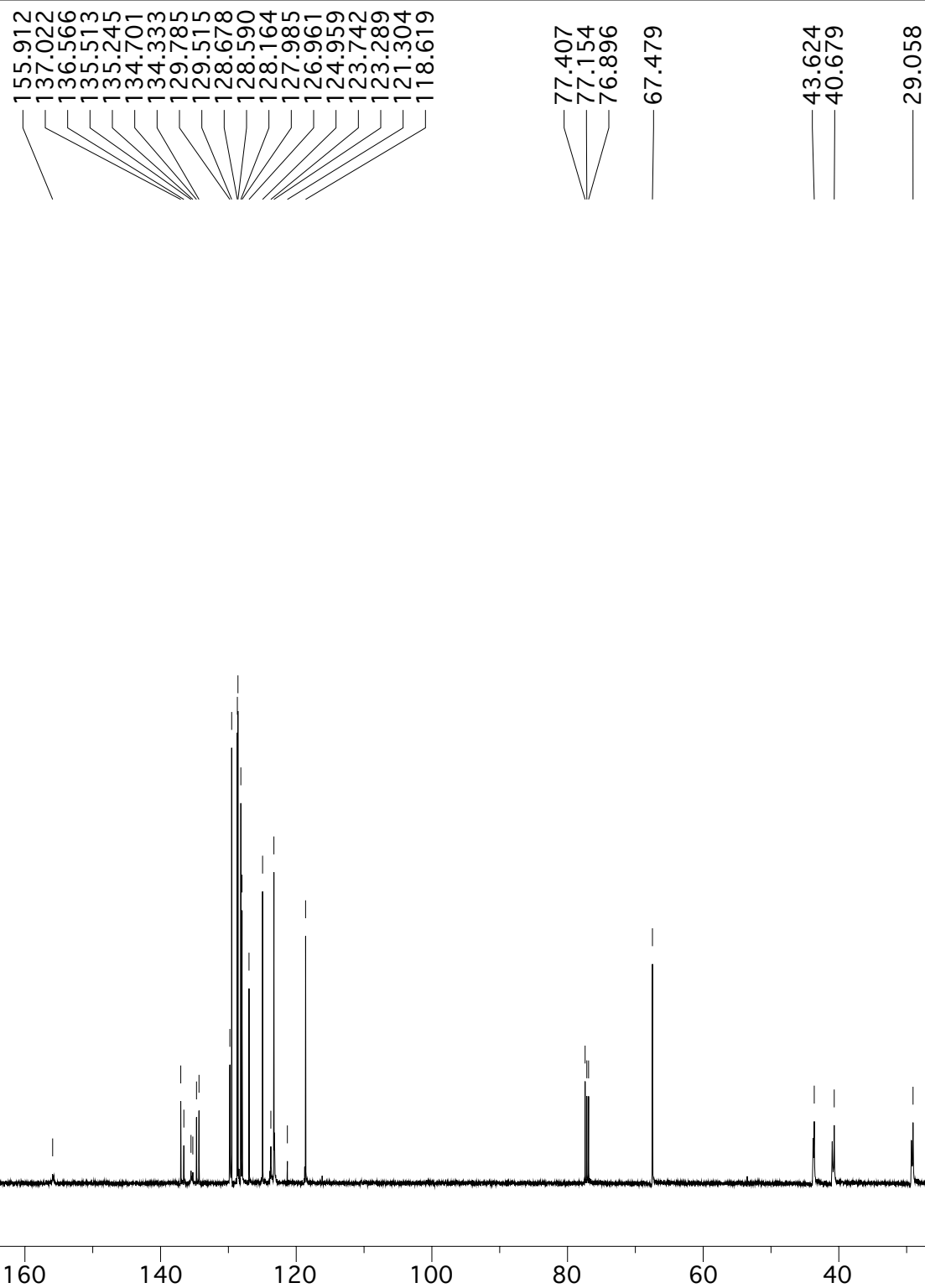
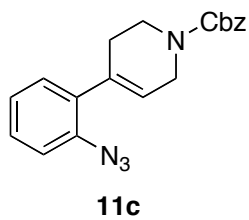
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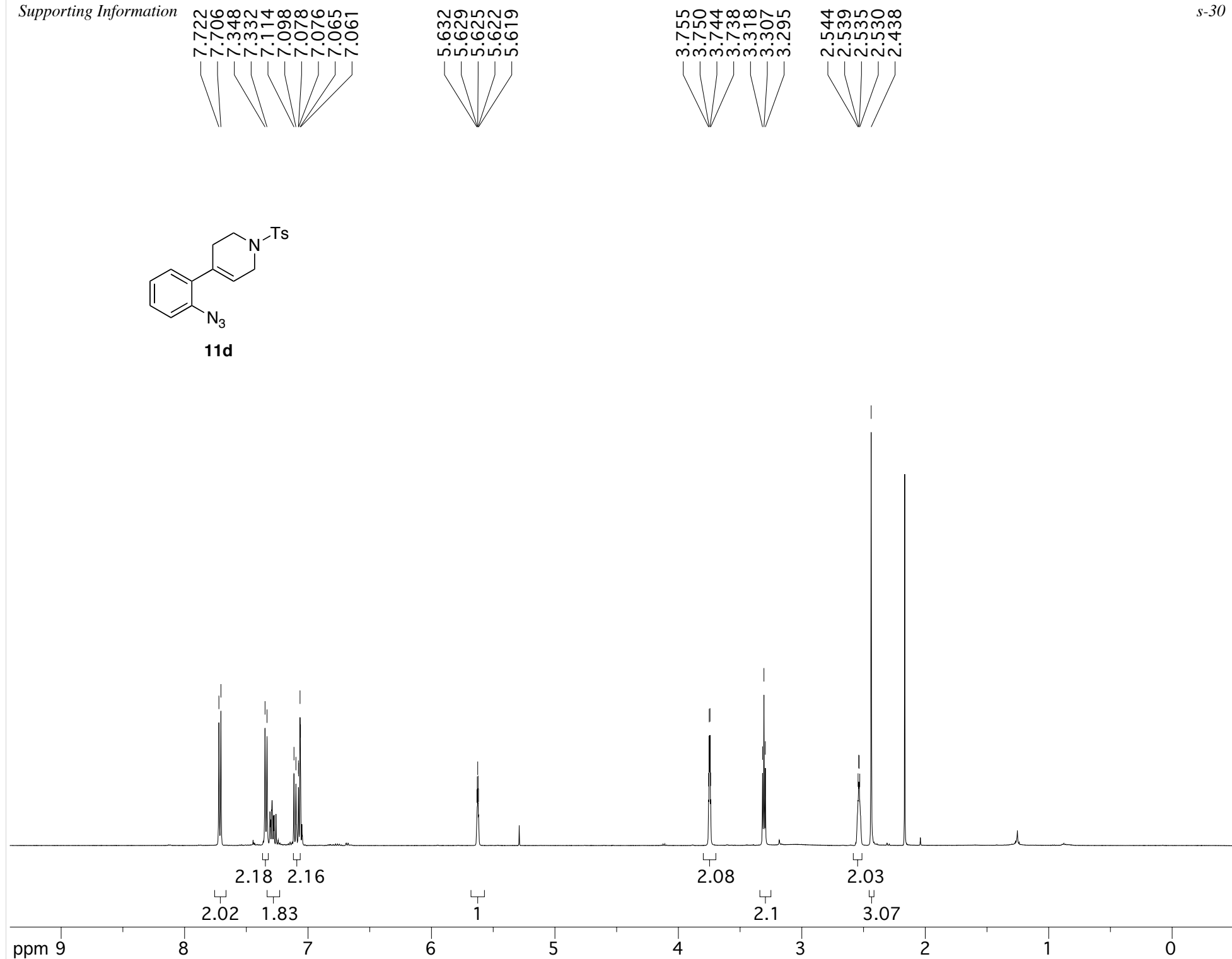
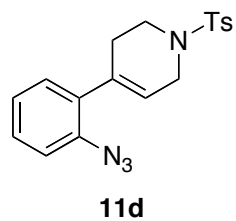
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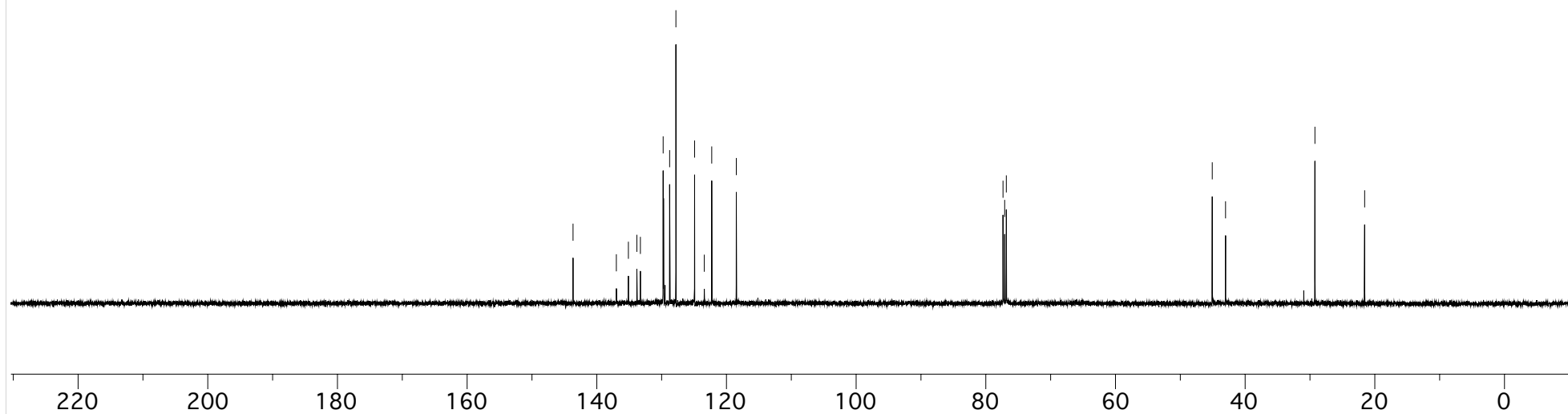
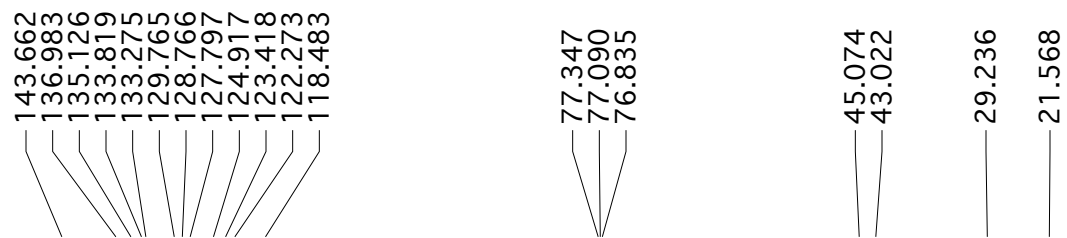
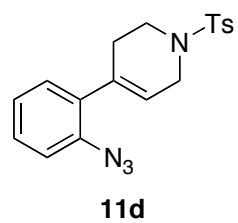
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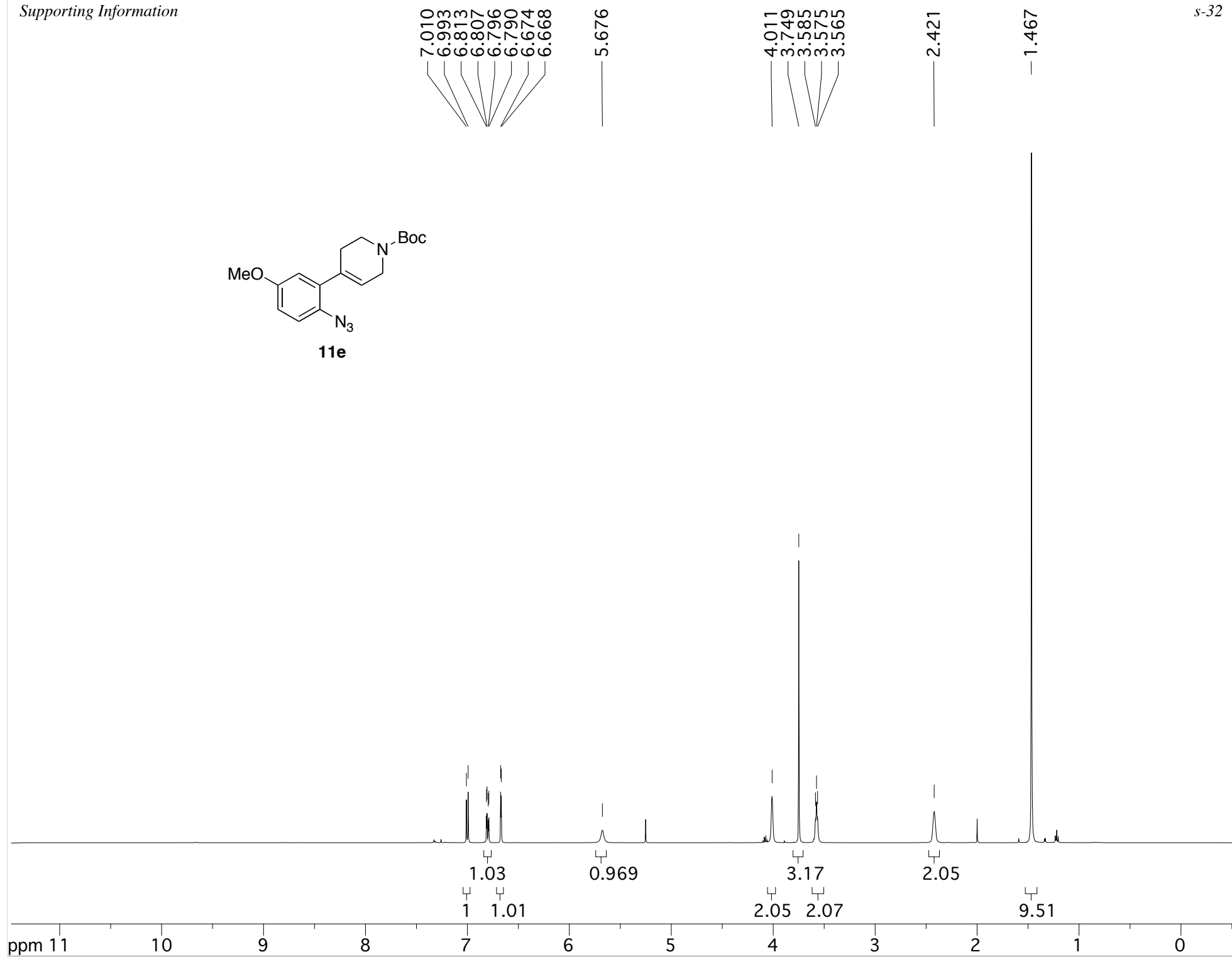
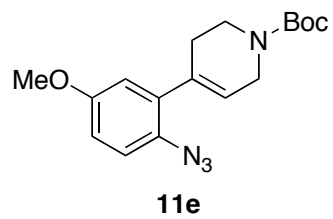
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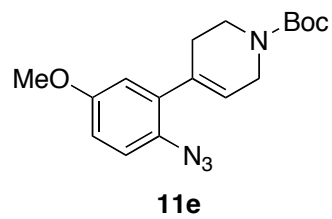




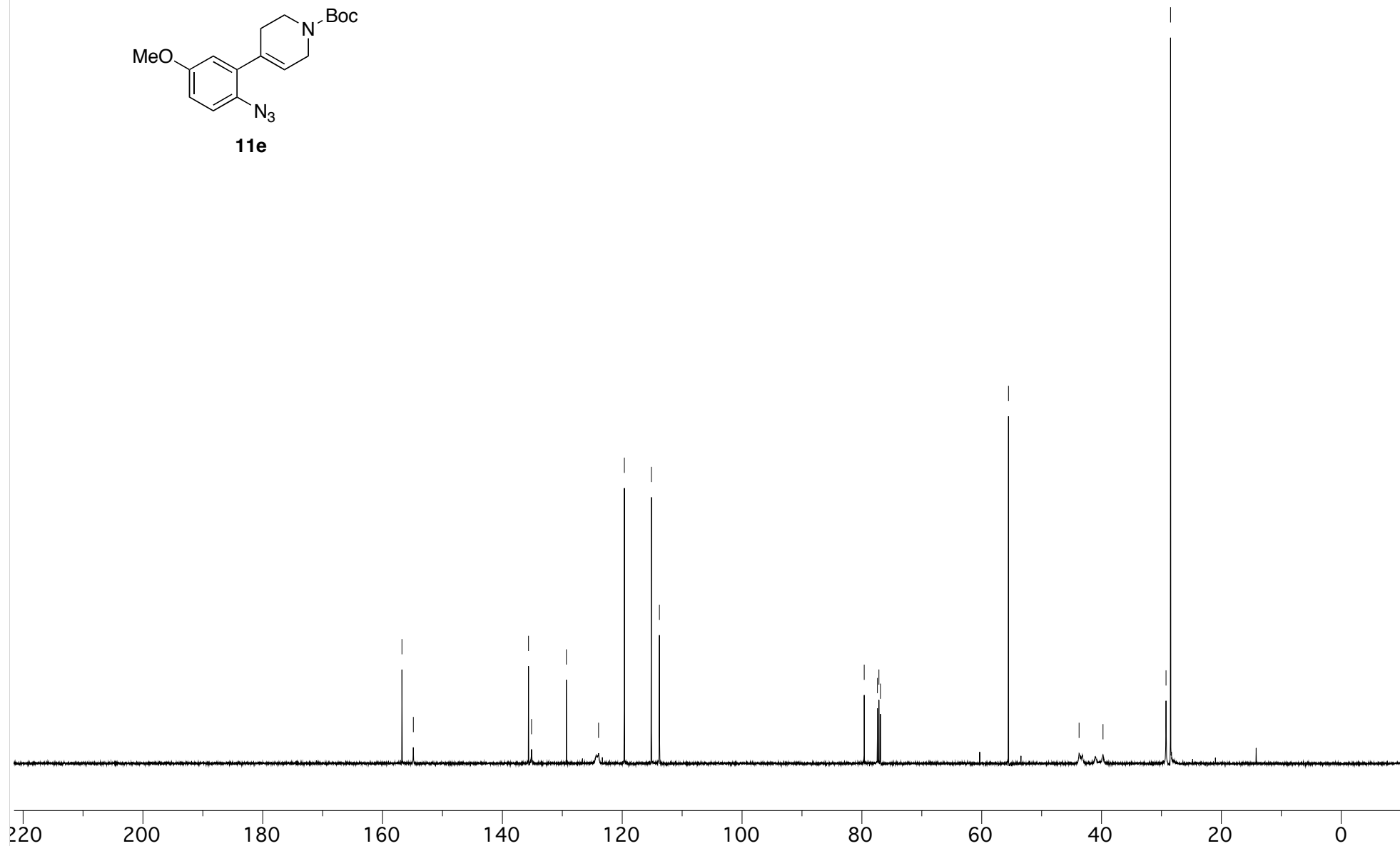


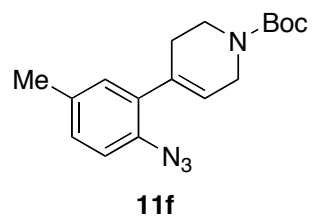






156.766	135.641	79.613	55.533	43.748	29.237
154.867	135.135	77.409		39.753	28.488
	129.324	77.157			
	123.949	76.905			
	119.643				
	115.133				
	113.795				





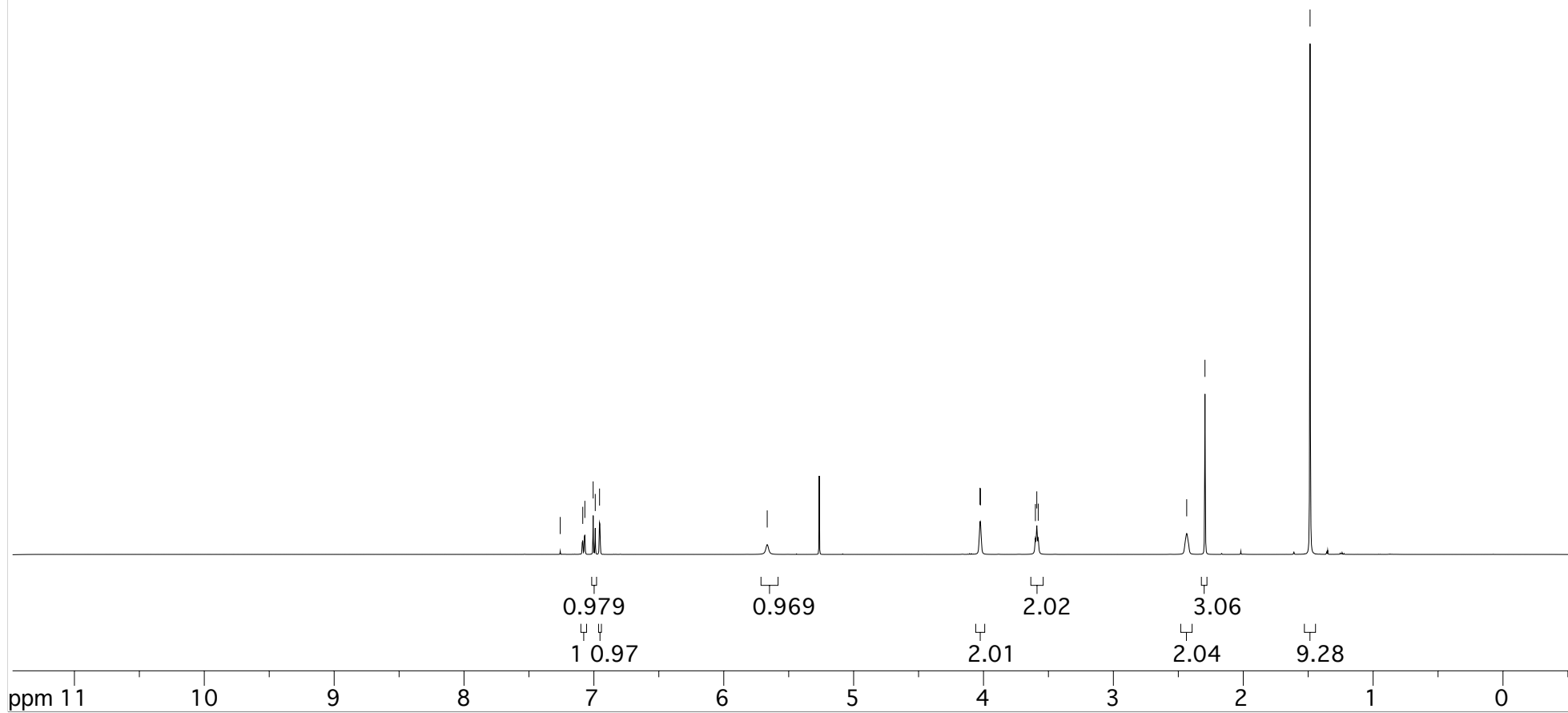
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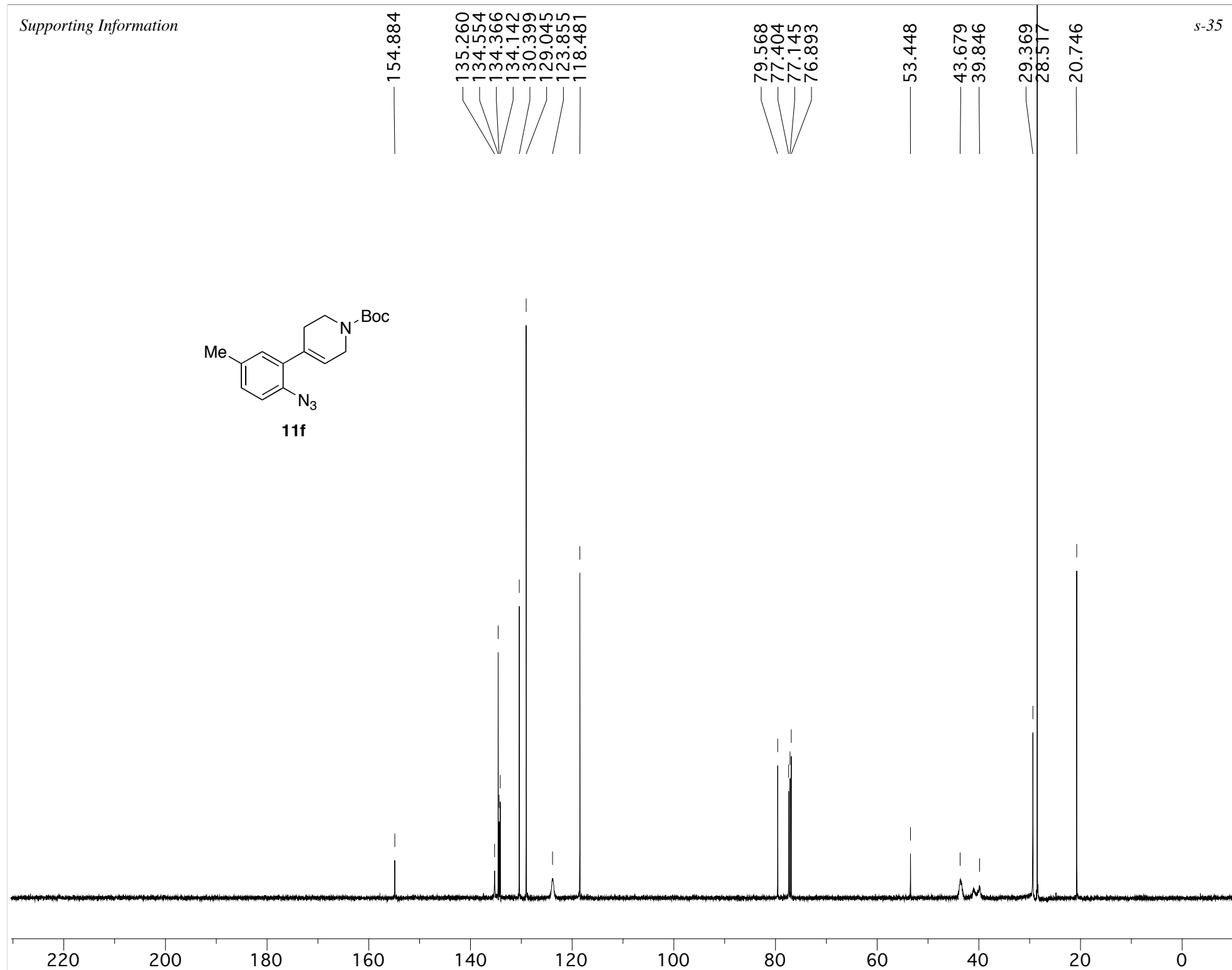
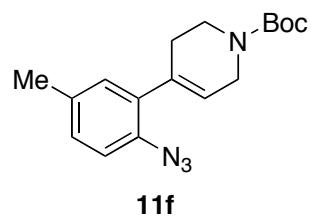
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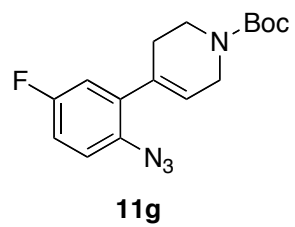
4.027
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3.590
3.579

2.435
2.295

1.486







7.260
7.084
7.075
7.067
7.057
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6.993
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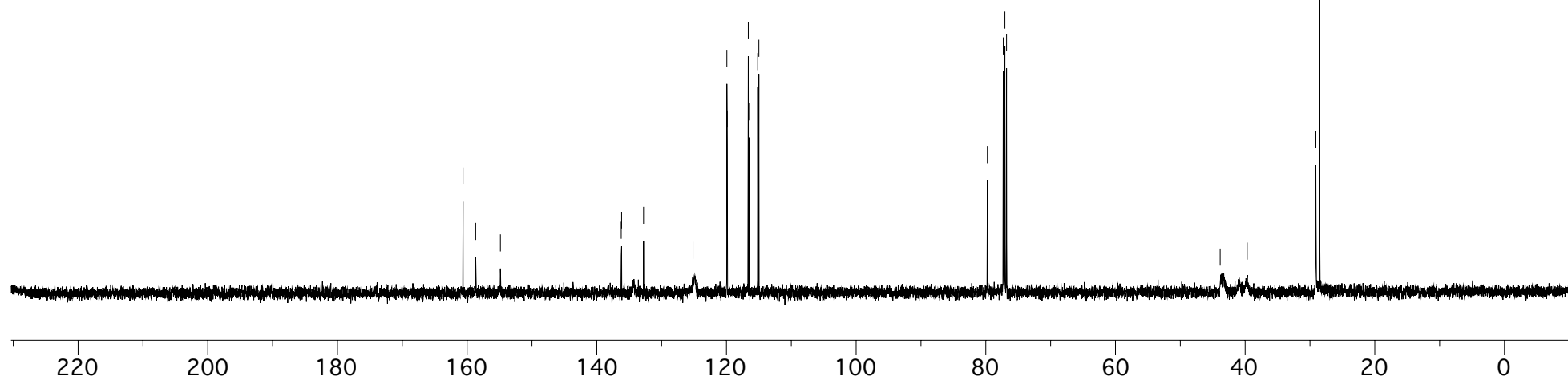
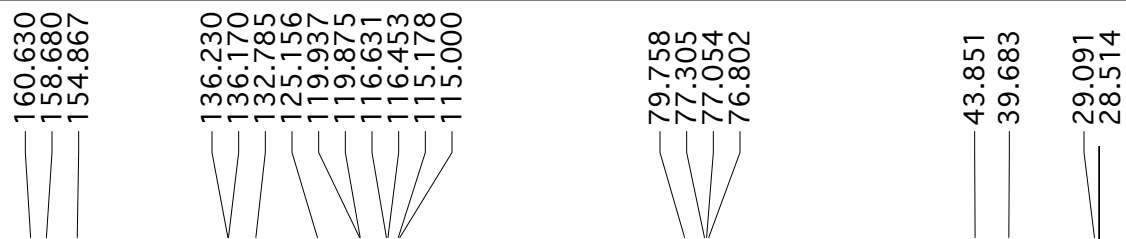
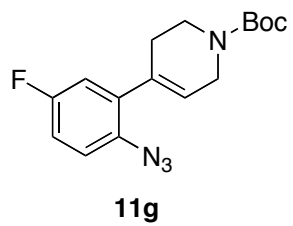
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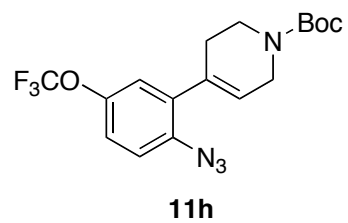
2.438

1.489

11 10 9 8 7 6 5 4 3 2 1 0

0.989 1.02 1.02 2.12 2.14 2.438 9.82





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7.157
7.144
7.140
7.130
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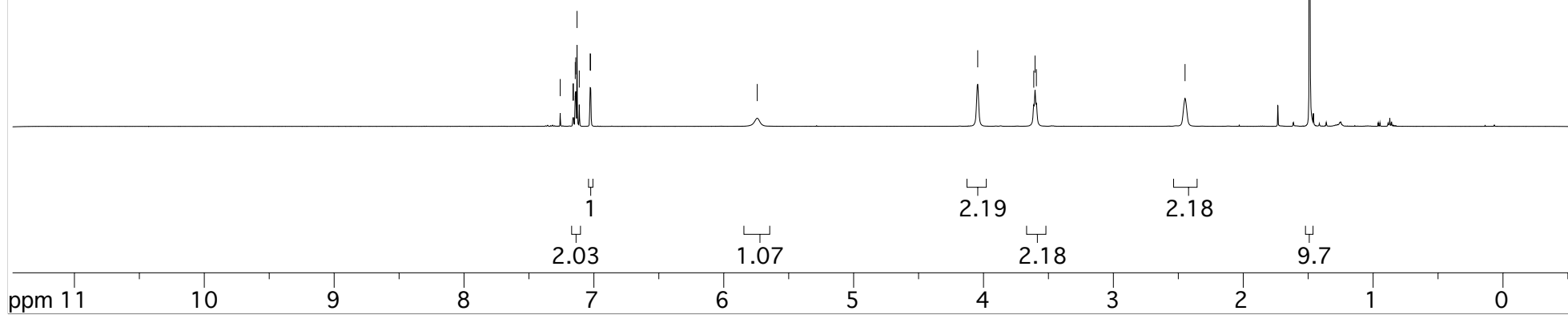
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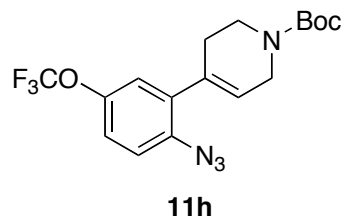
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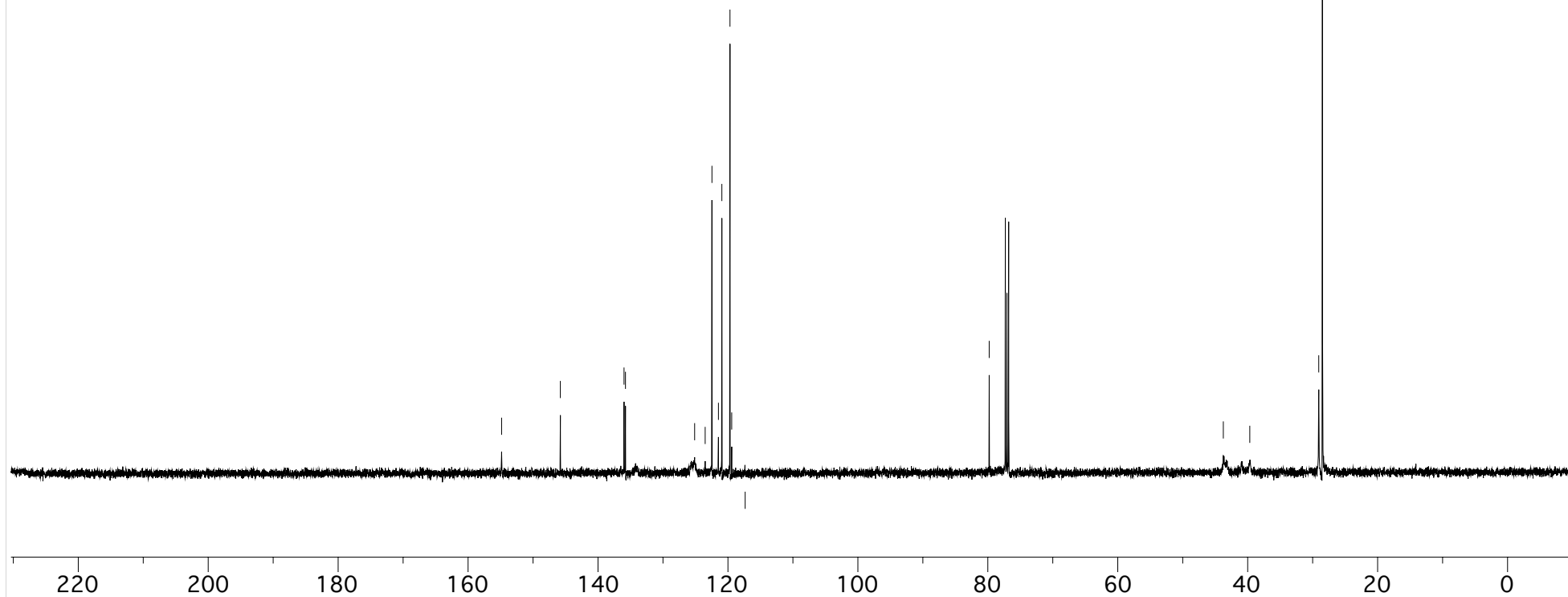
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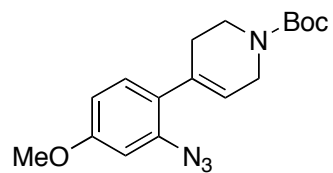
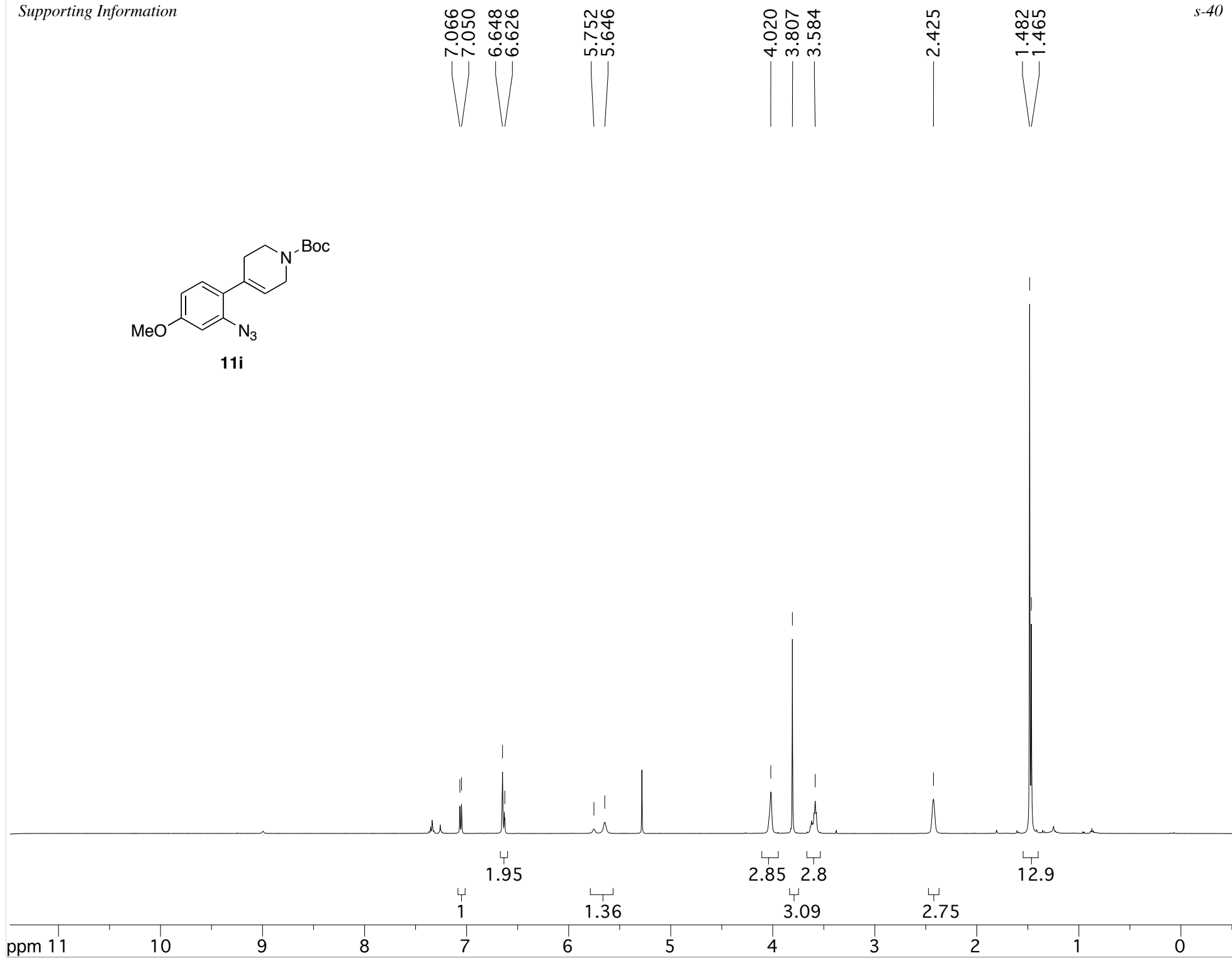
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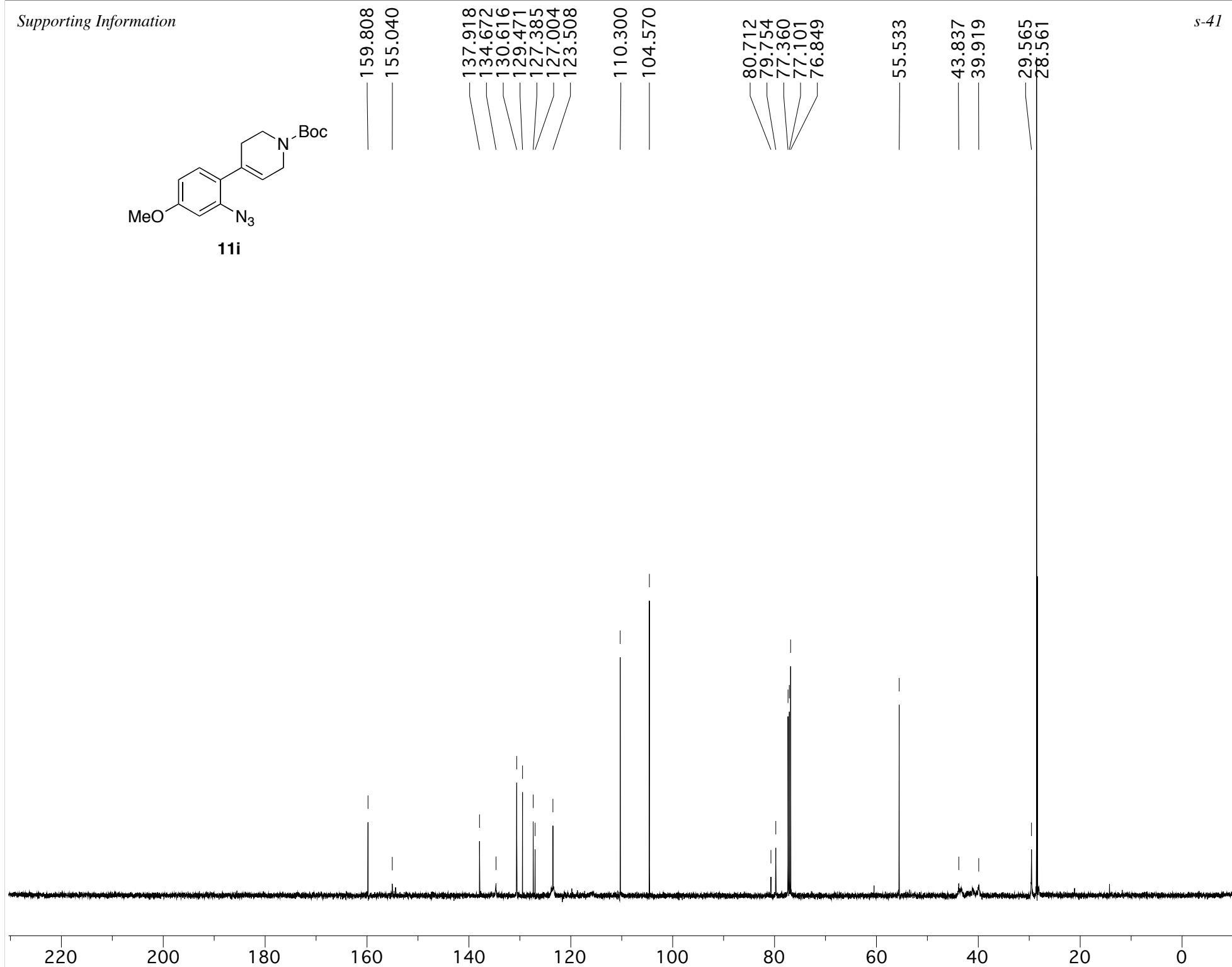
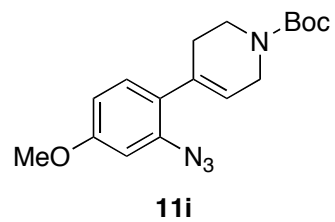


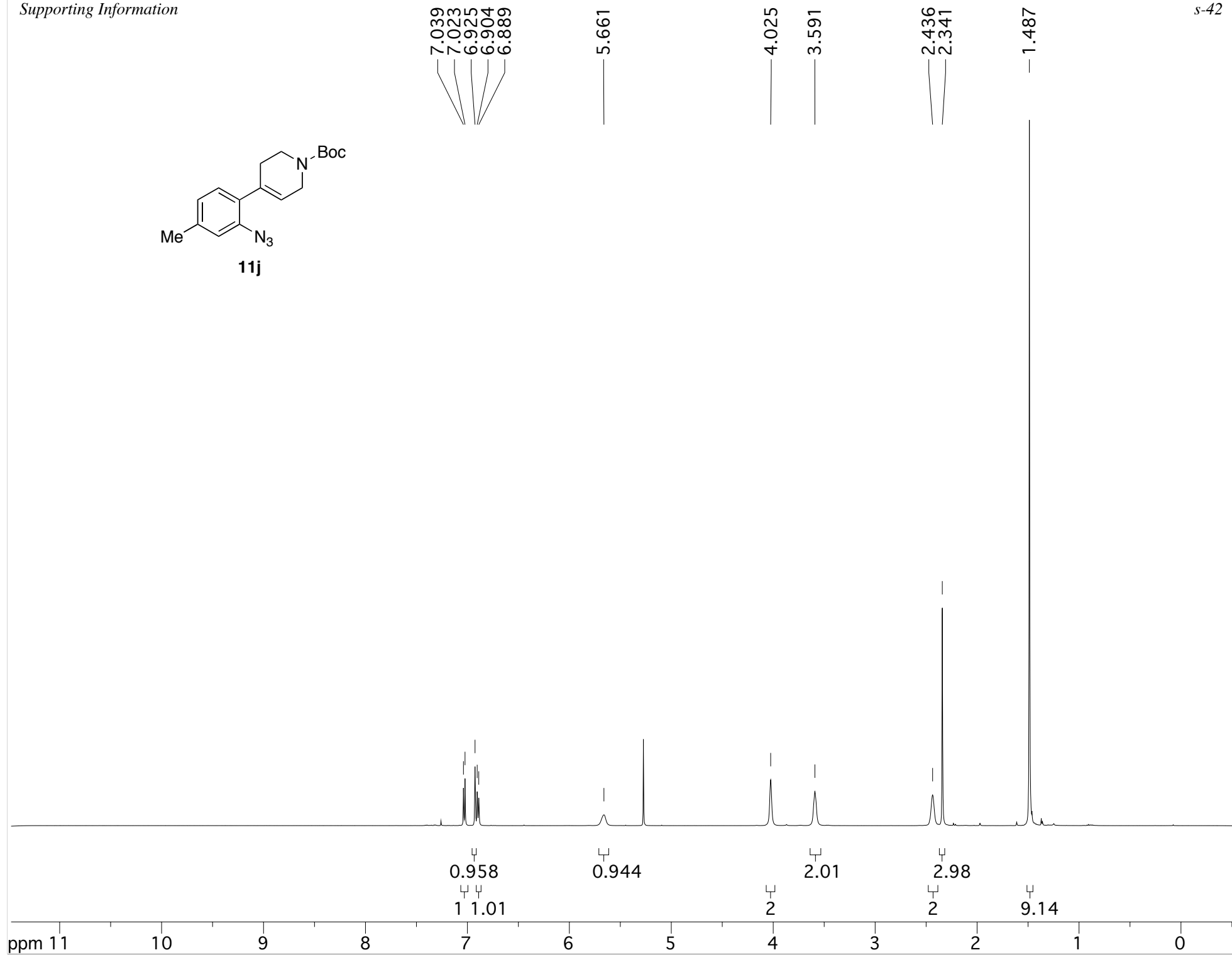
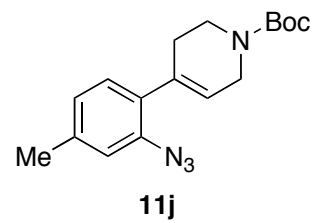


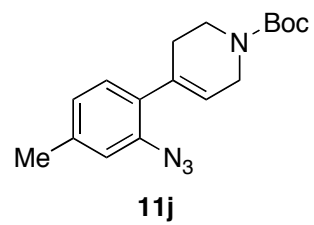
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145.798
135.995
135.773
125.127
123.506
122.462
121.465
120.937
119.687
119.423
117.350
79.788
43.751
39.678
29.063
28.488



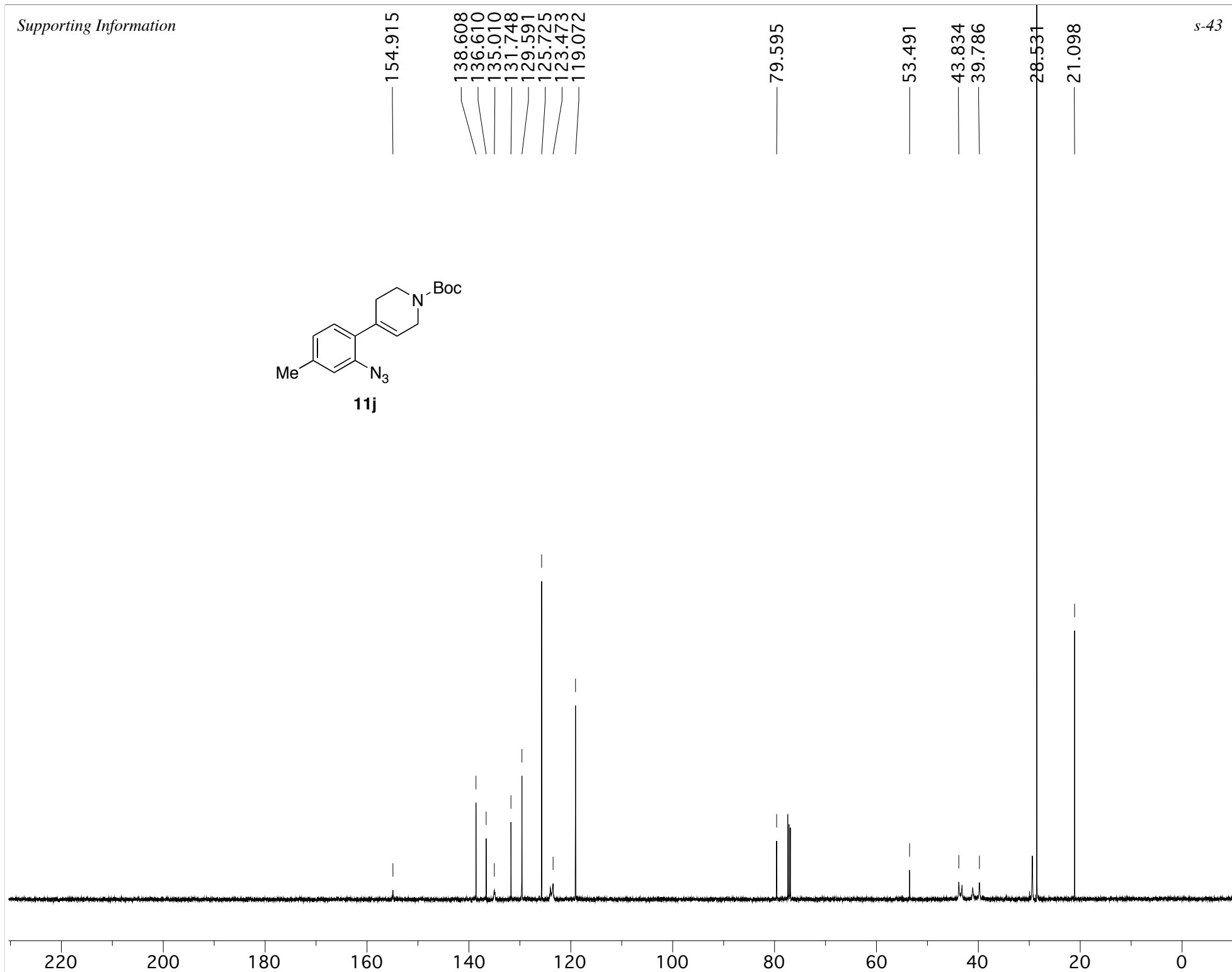
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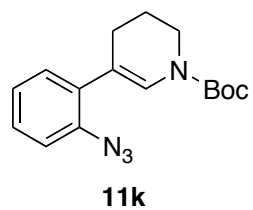






154.915
138.608
136.610
135.010
131.748
129.591
125.725
123.473
119.072
79.595
53.491
43.834
39.786
28.531
21.098





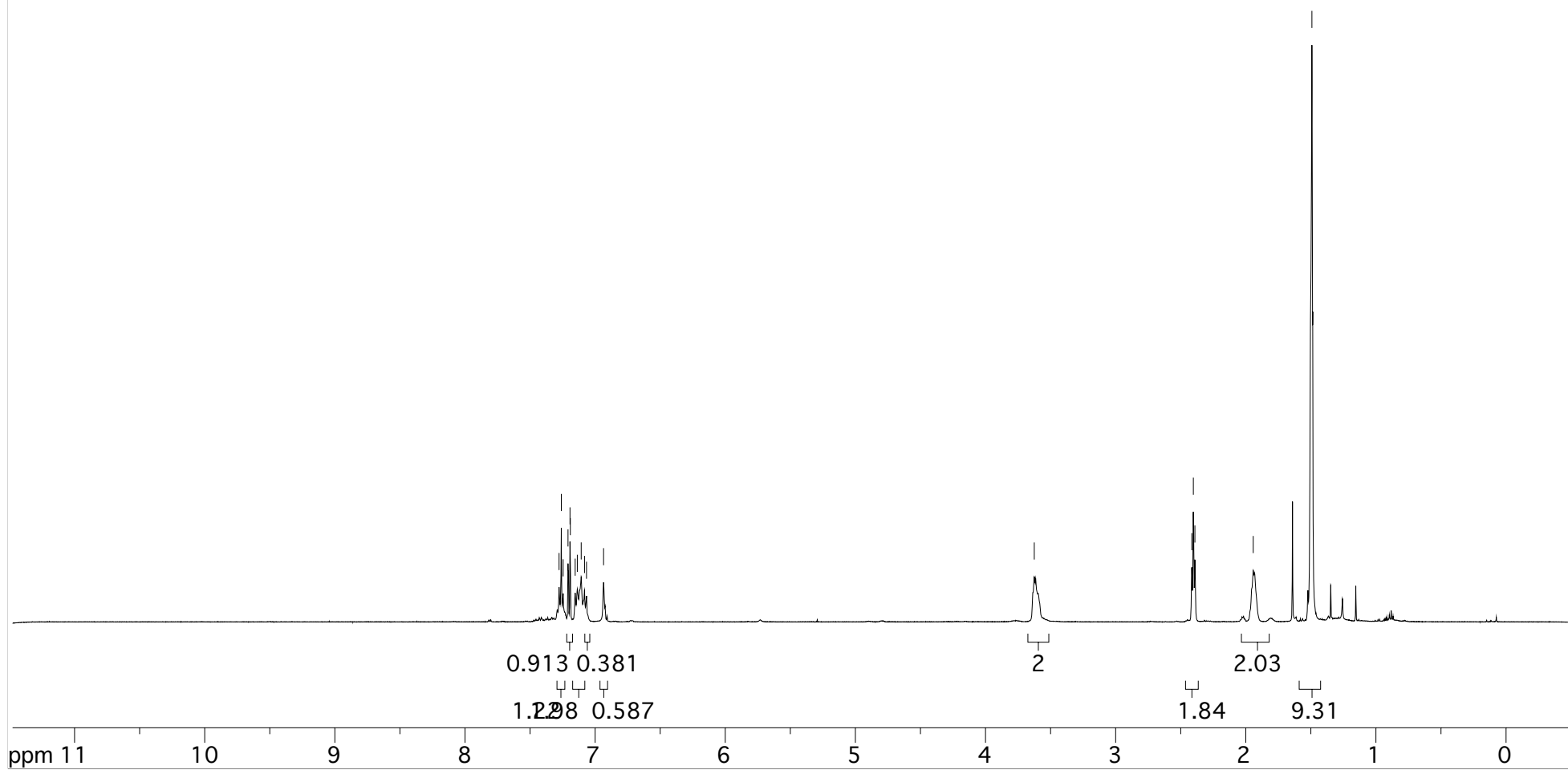
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7.260
7.246
7.208
7.193
7.190
7.153
7.137
7.107
7.081
7.066
6.935

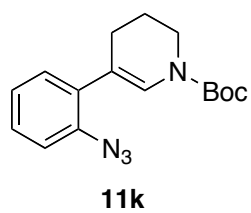
3.625

2.415
2.403
2.391

1.943

1.492





152.373

133.841

130.049

129.339

127.781

125.468

124.858

120.995

118.696

117.822

115.023

80.946

77.309

77.055

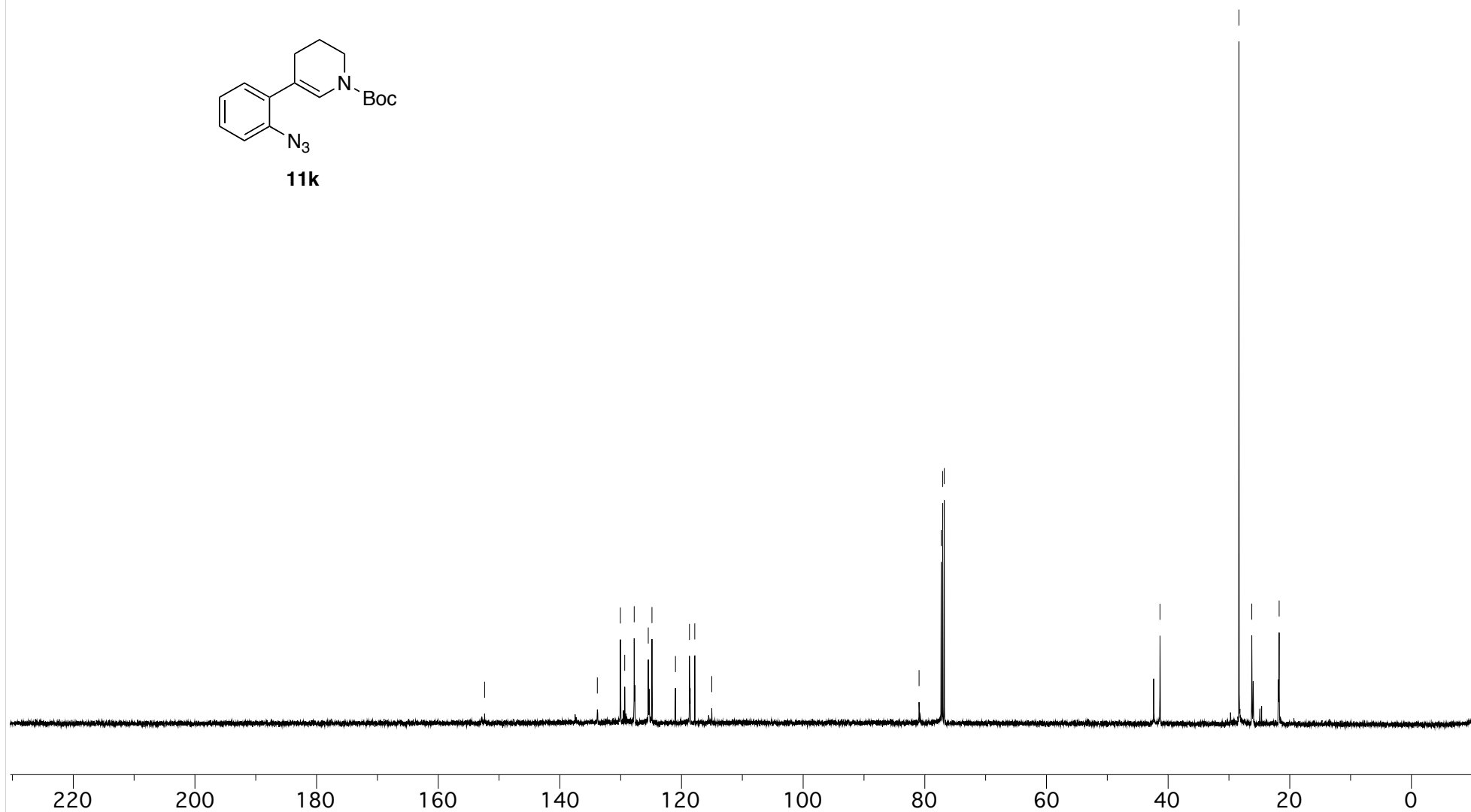
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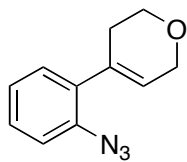
41.329

28.359

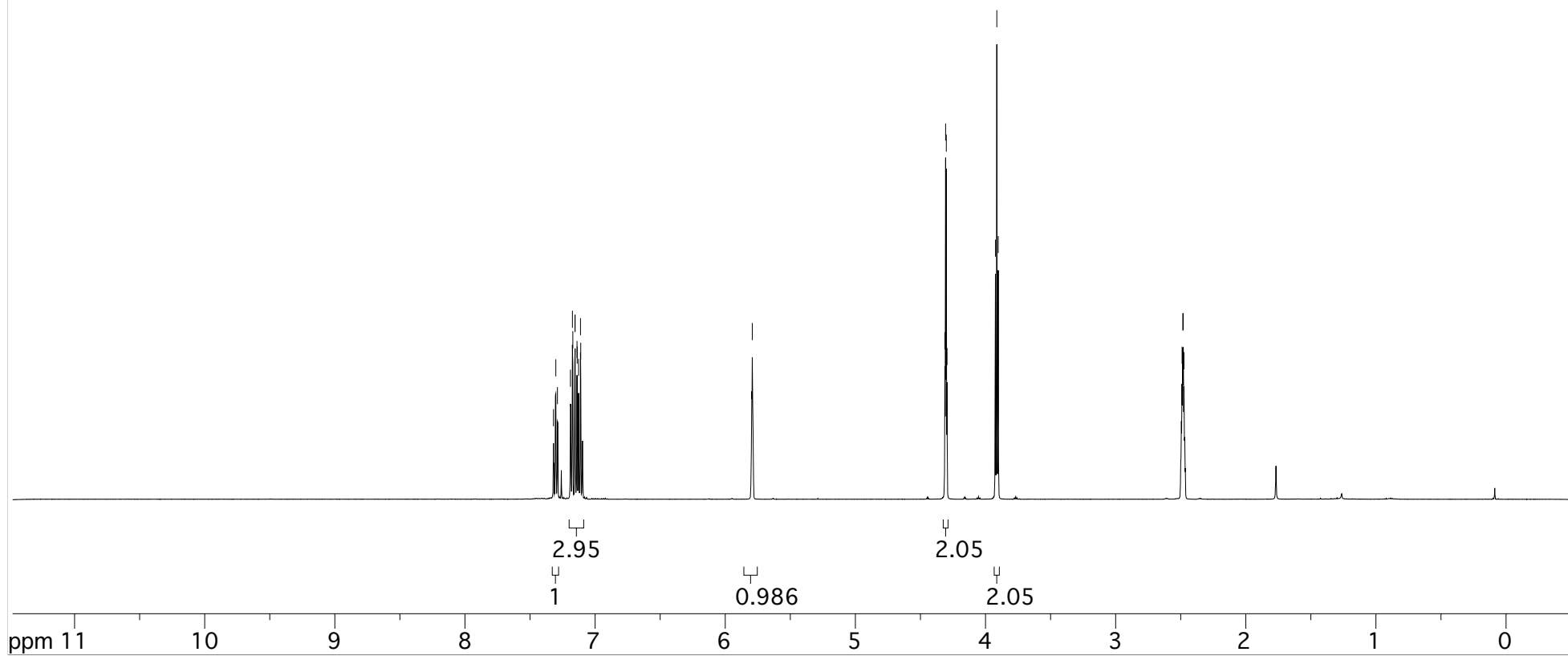
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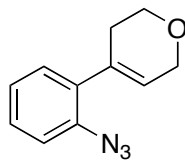
21.743



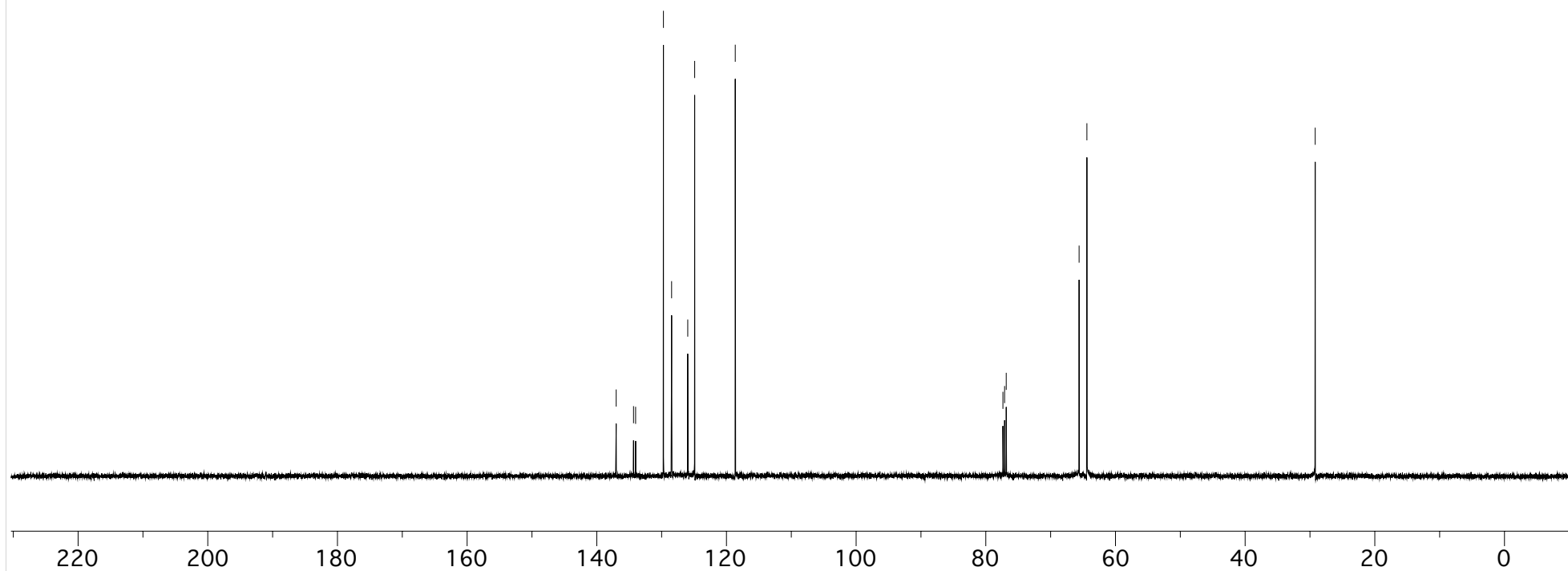
**11l**

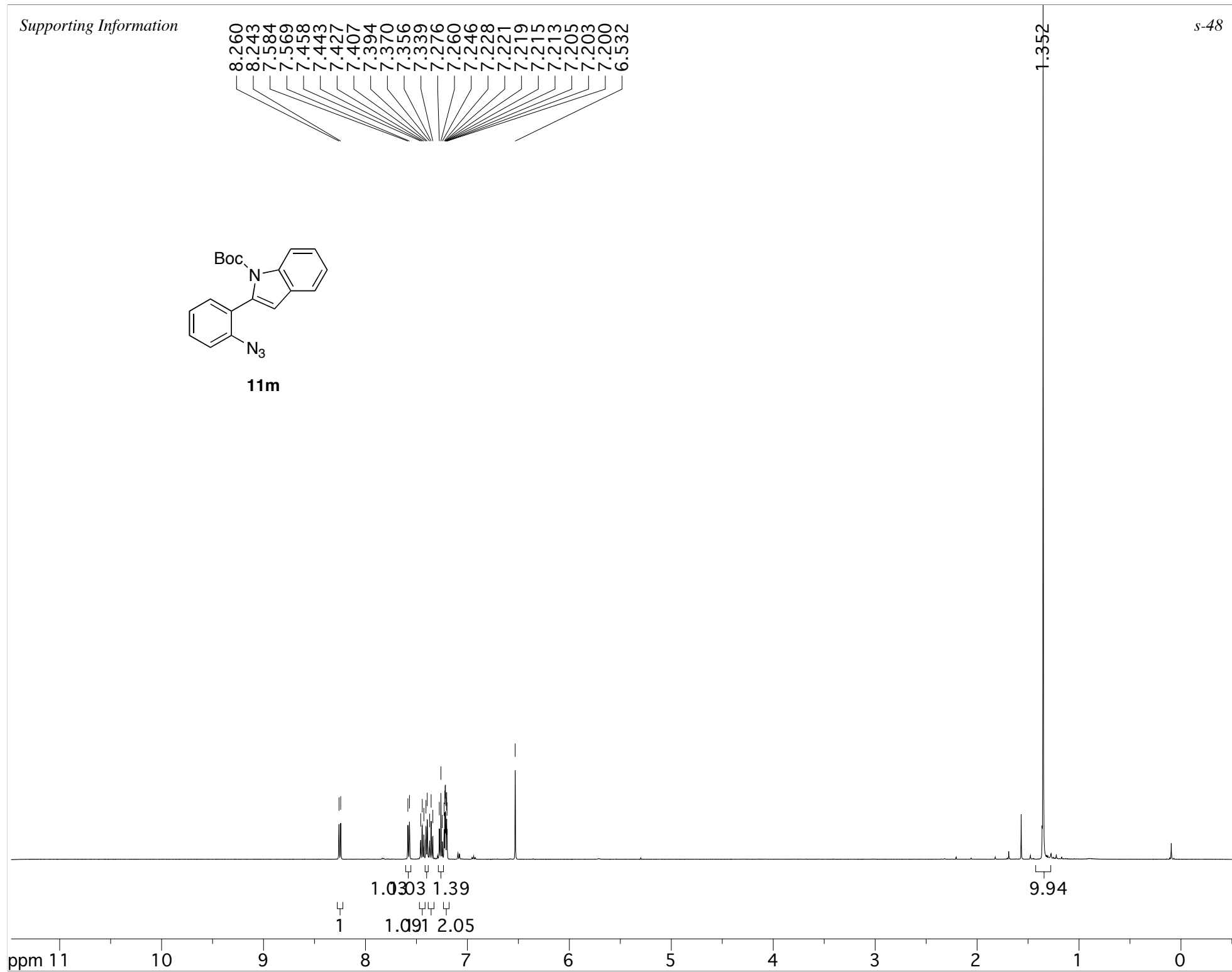
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7.302
7.289
7.189
7.174
7.171
7.155
7.154
7.139
7.138
7.127
7.112
7.110
5.792
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4.301
4.296
3.924
3.913
3.902
2.489
2.484
2.480
2.475

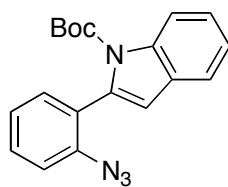
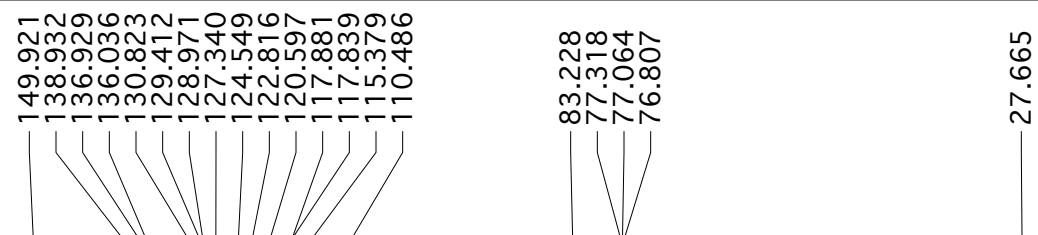


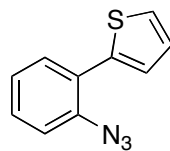
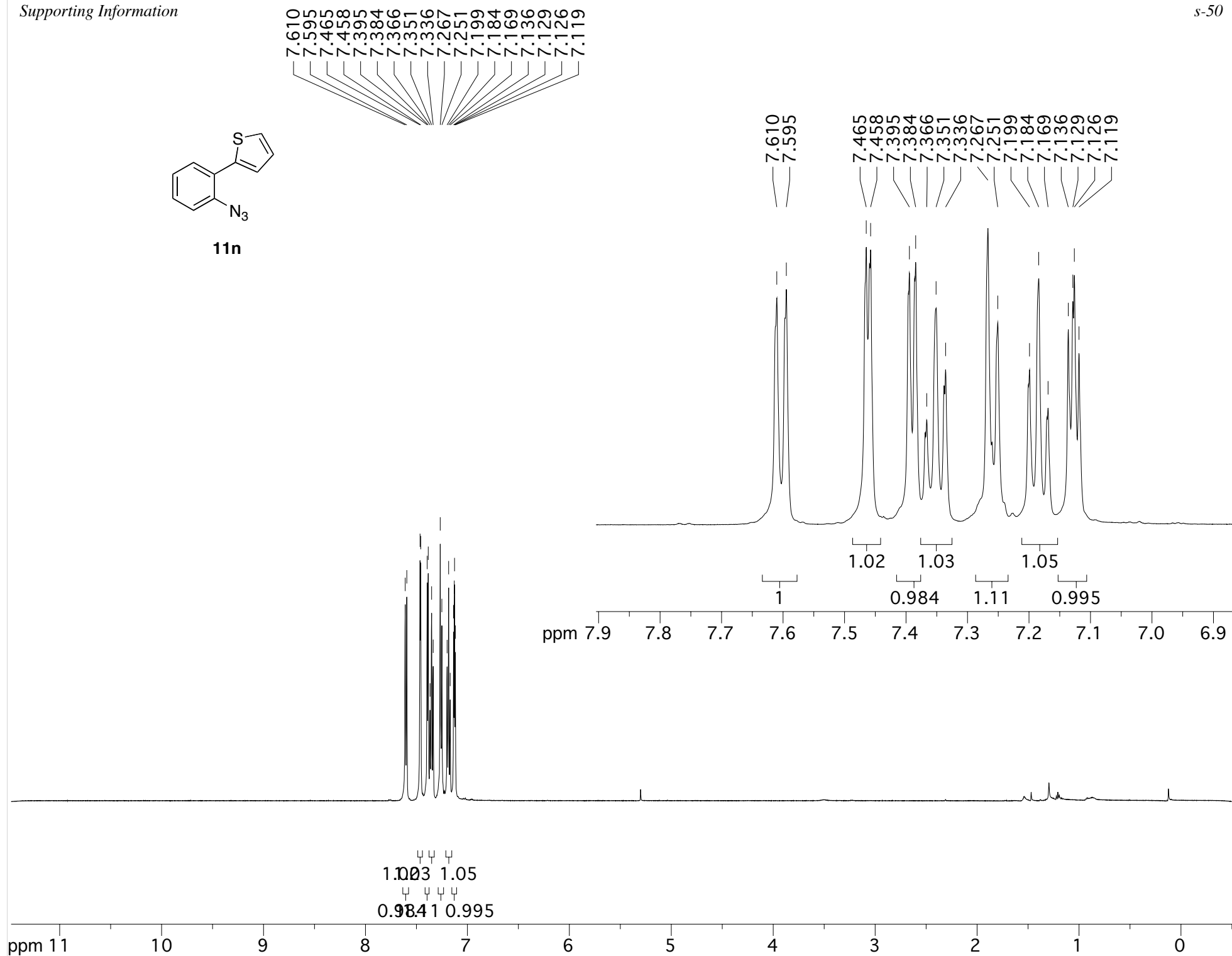
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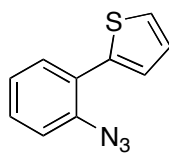
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134.011	76.849		
129.721			
128.462			
125.971			
124.902			
118.644			





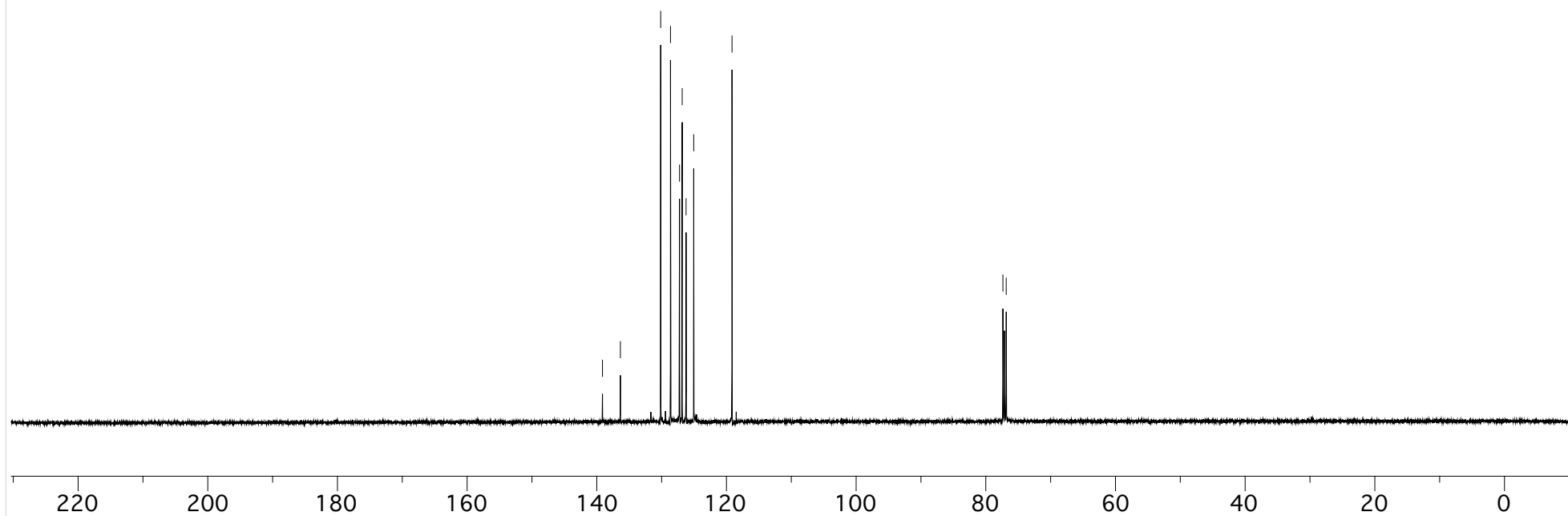
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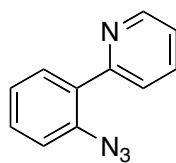
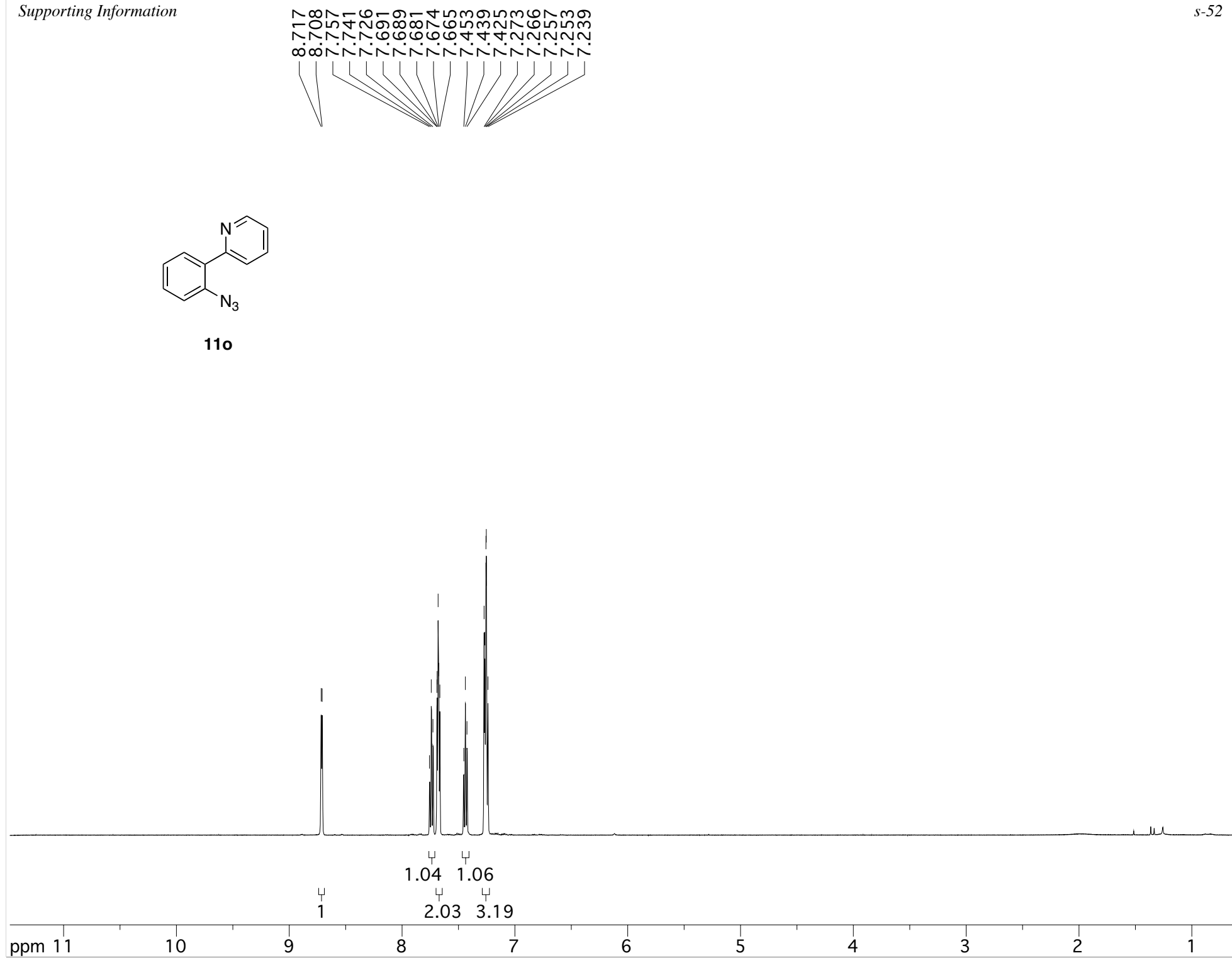
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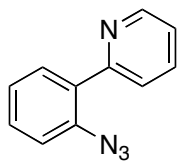
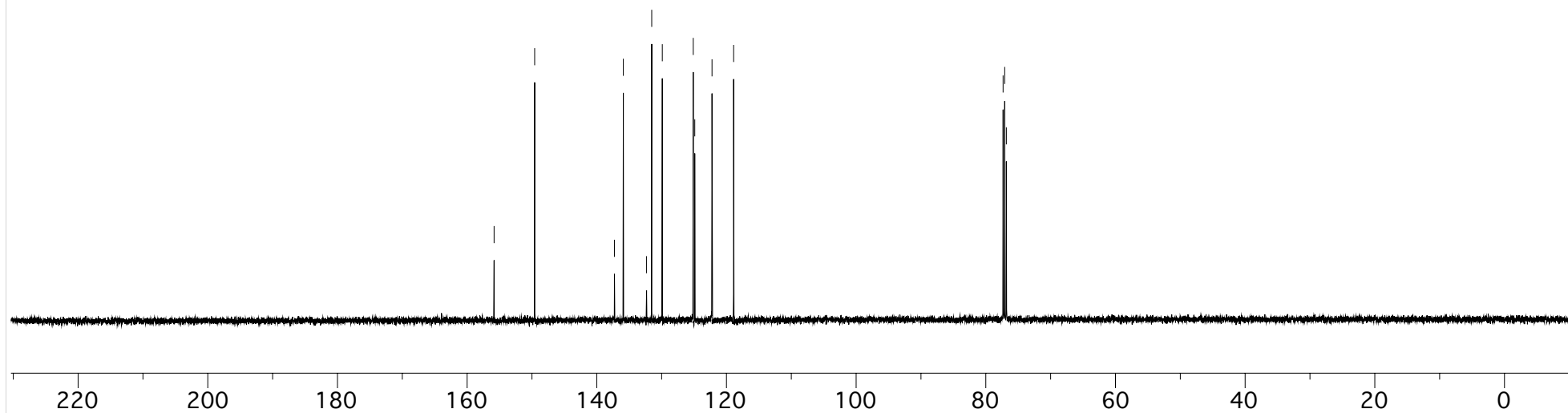
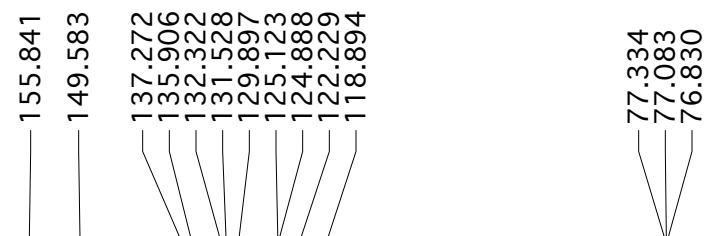
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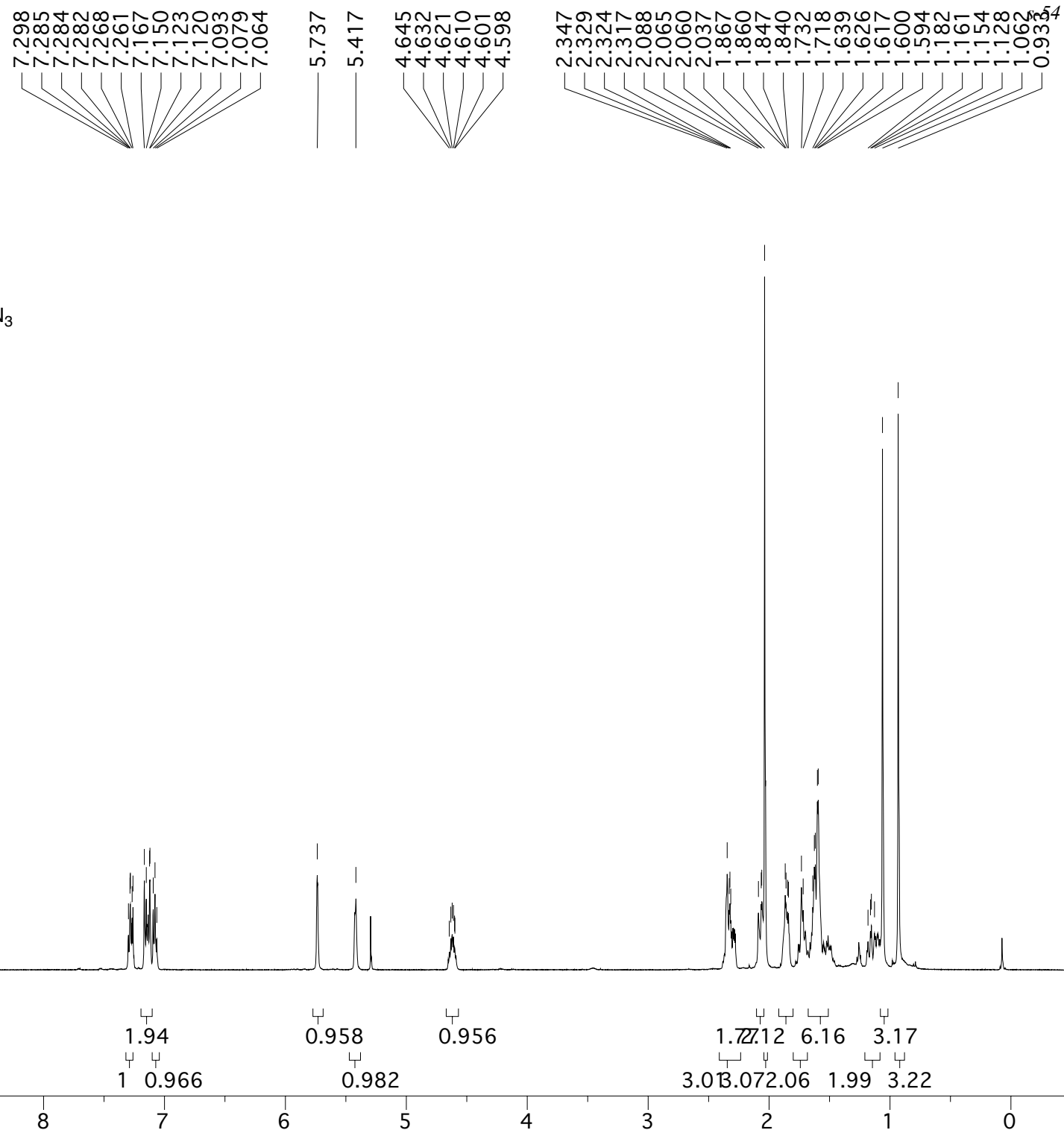
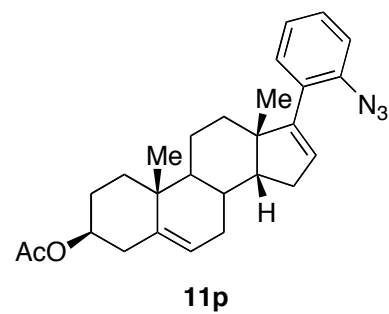
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130.147
128.634
127.238
126.827
126.229
125.050
119.144

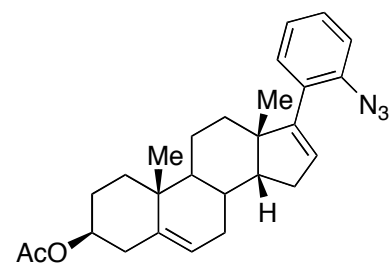
77.363
76.851



**11o**

**11o**



**11p**

170.557

151.084

140.004

137.967

130.519

129.955

128.088

124.124

122.463

118.555

77.317

77.063

76.807

73.940

56.869

50.435

49.069

38.180

36.950

34.906

32.188

31.645

30.750

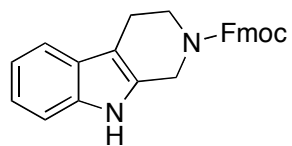
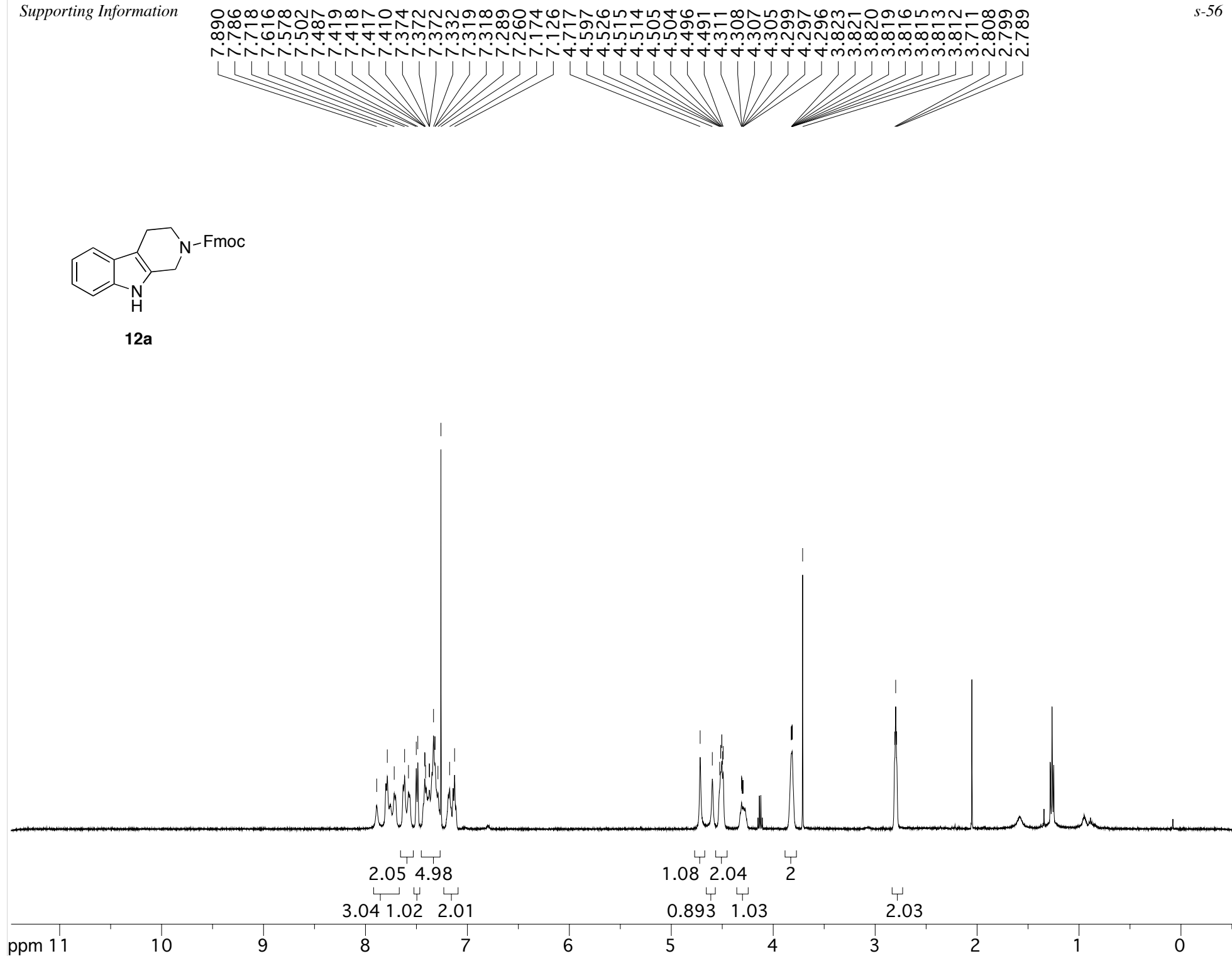
27.782

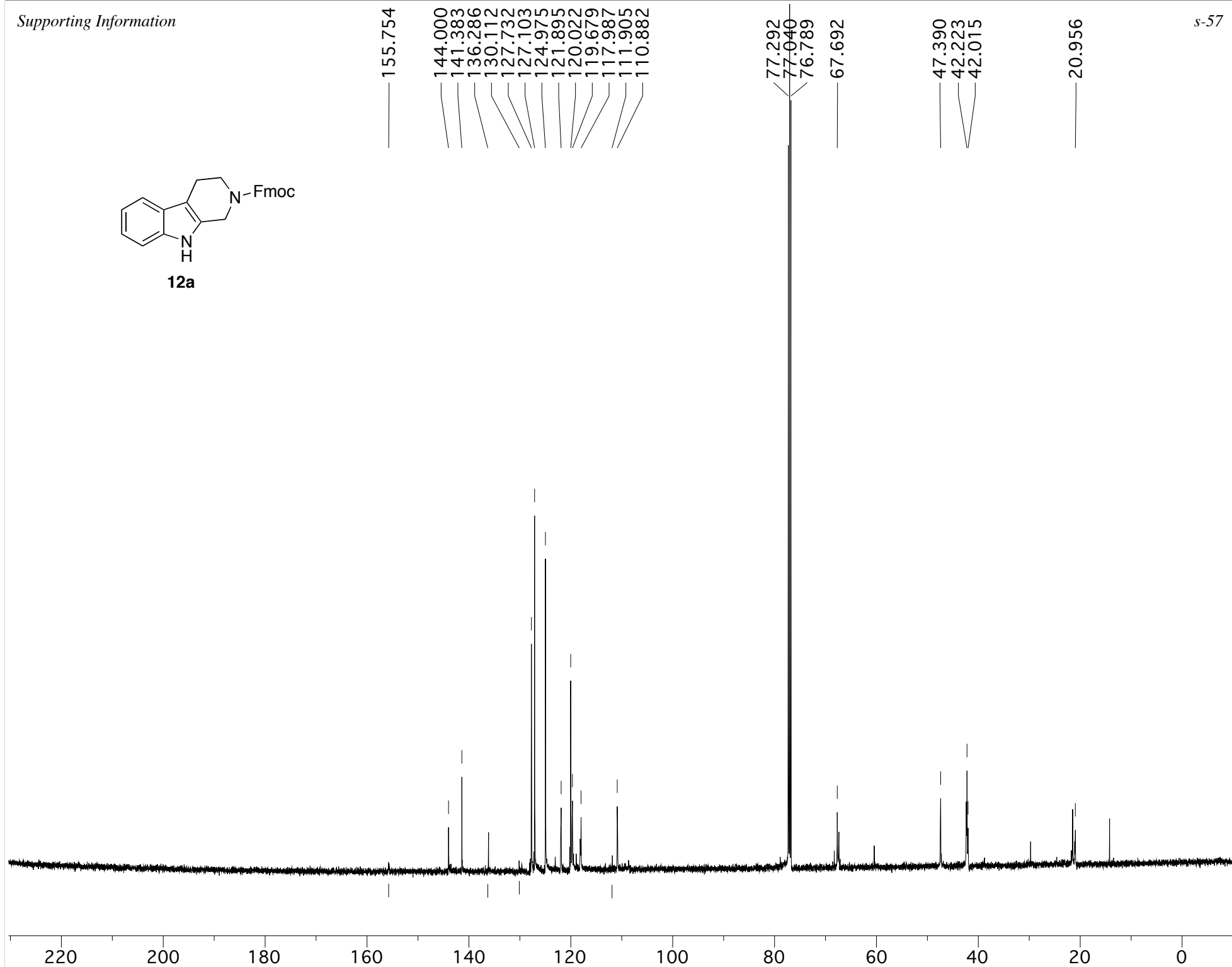
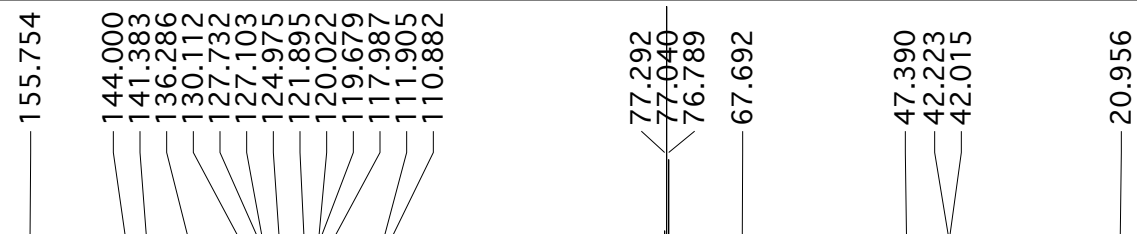
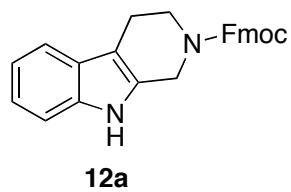
21.479

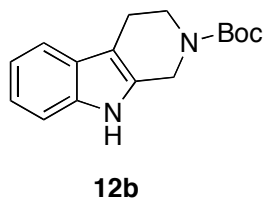
20.821

19.292

16.338

**12a**





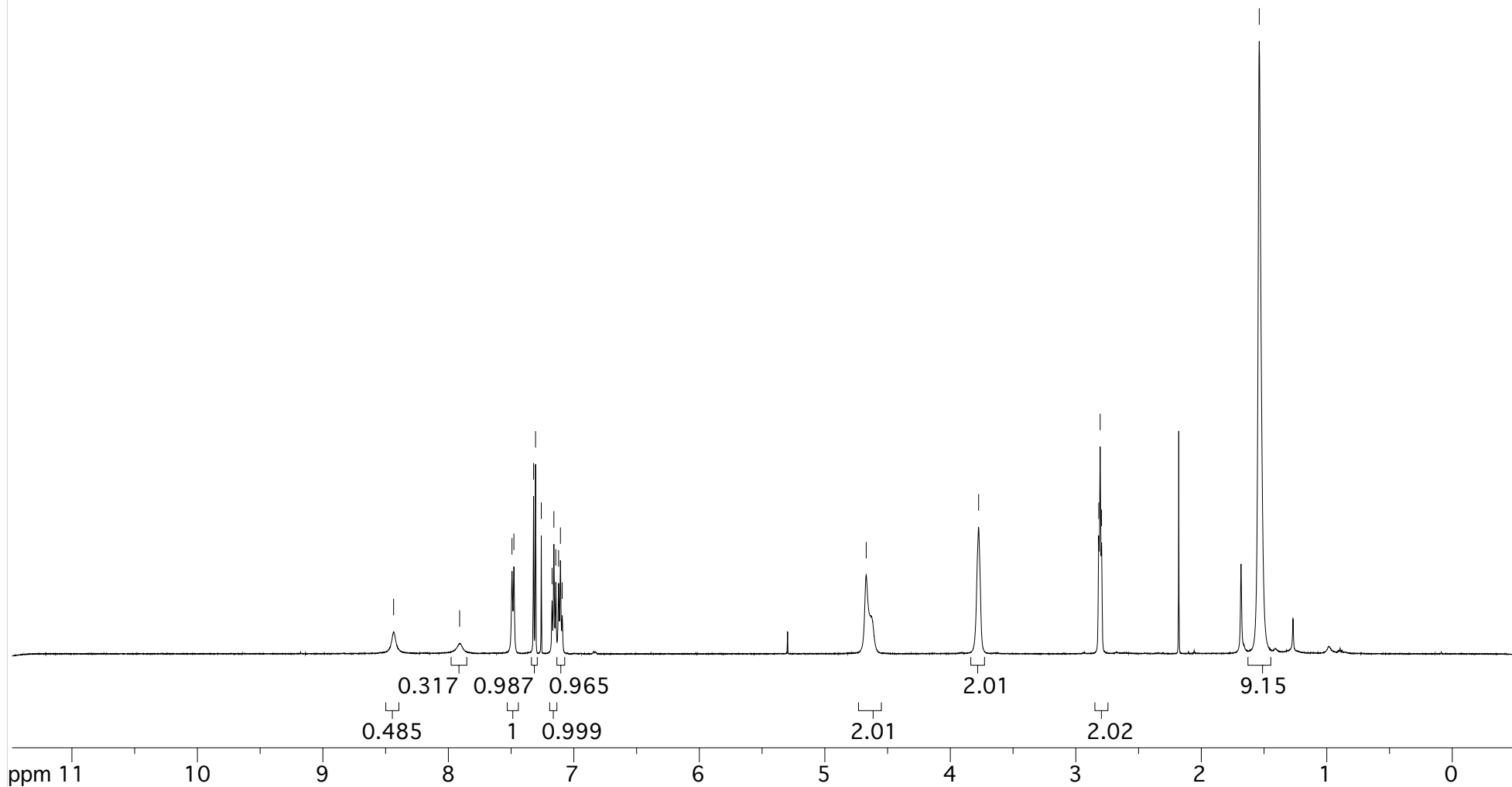
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7.493
7.478
7.321
7.305
7.260
7.173
7.159
7.144
7.122
7.107
7.093

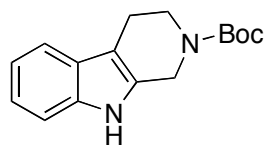
4.670

3.774

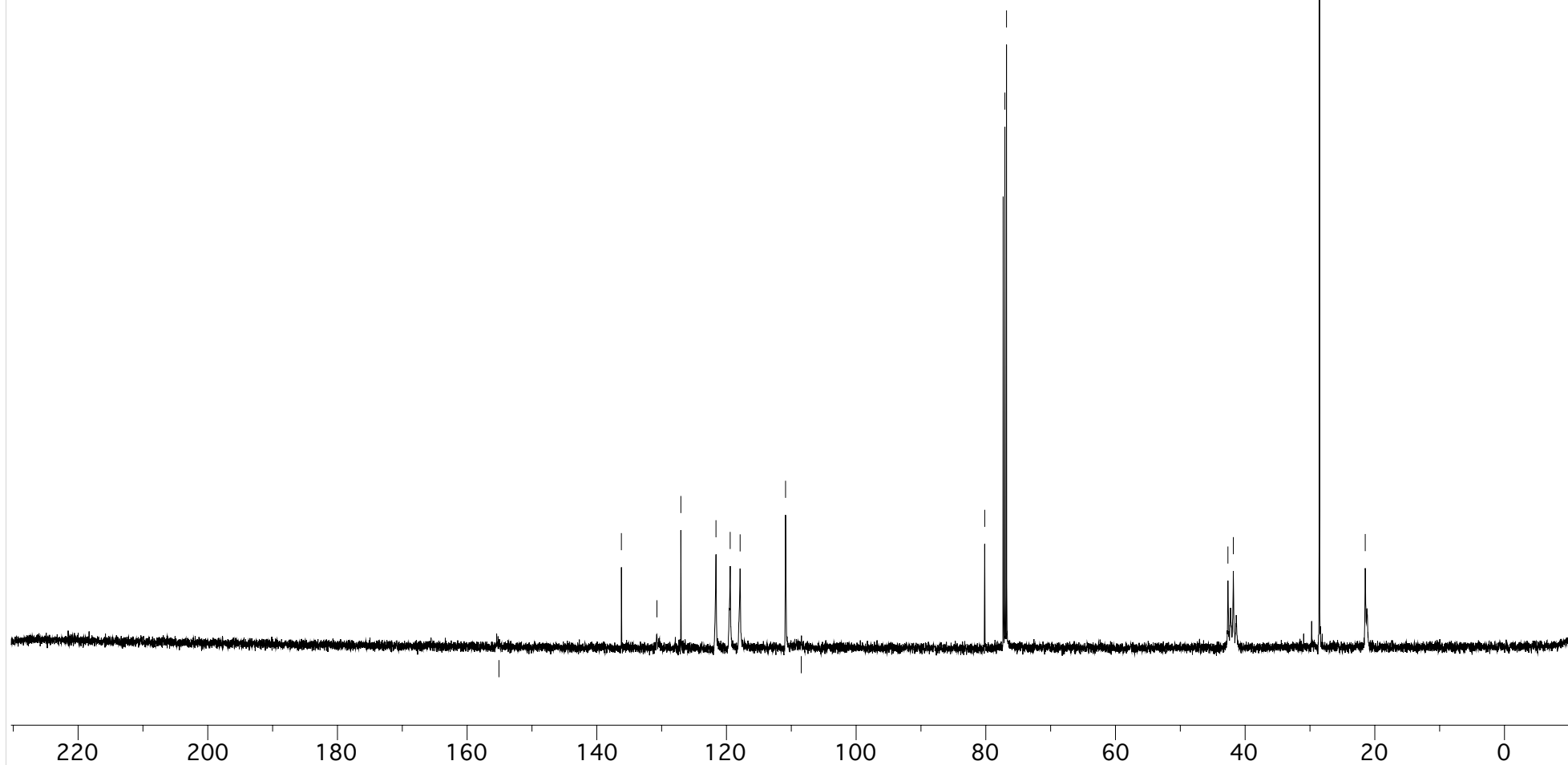
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2.806
2.795

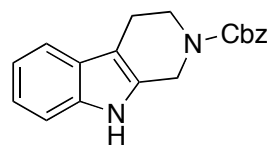
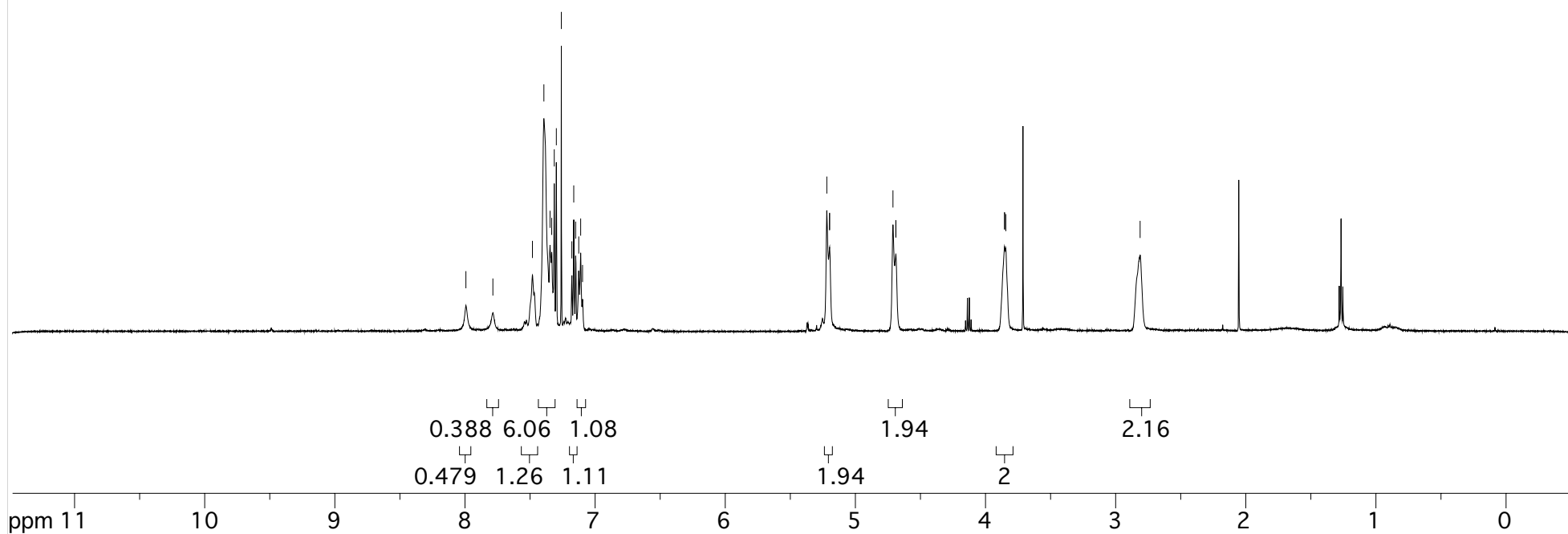
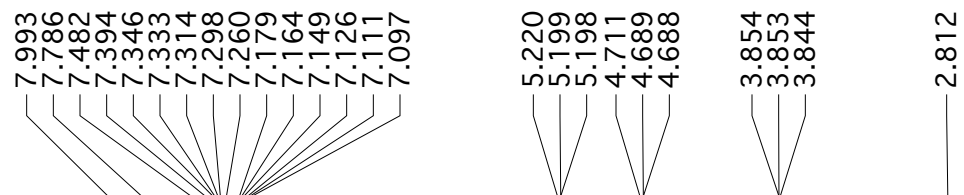
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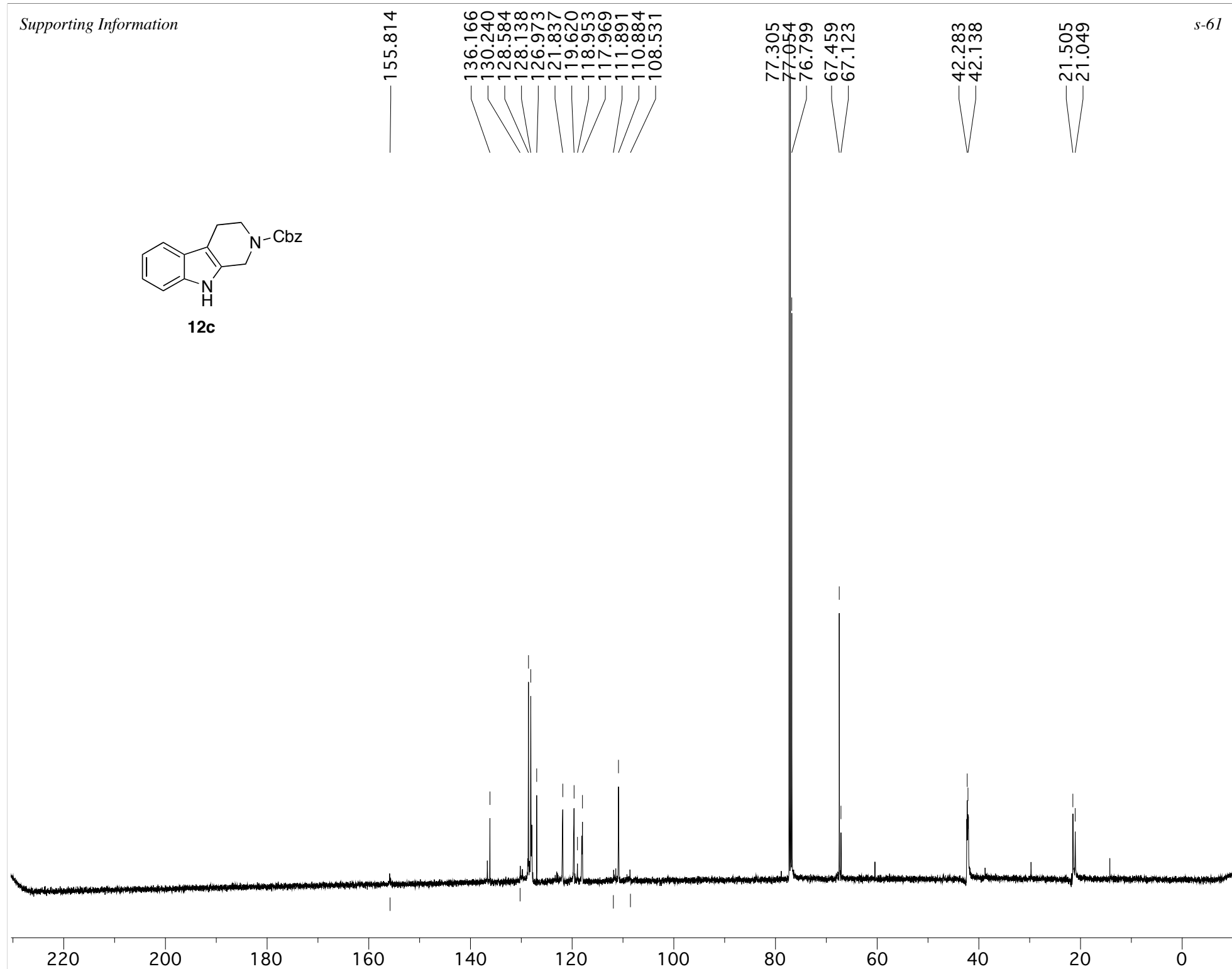
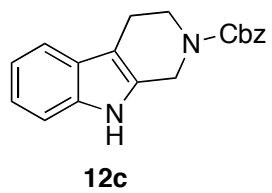


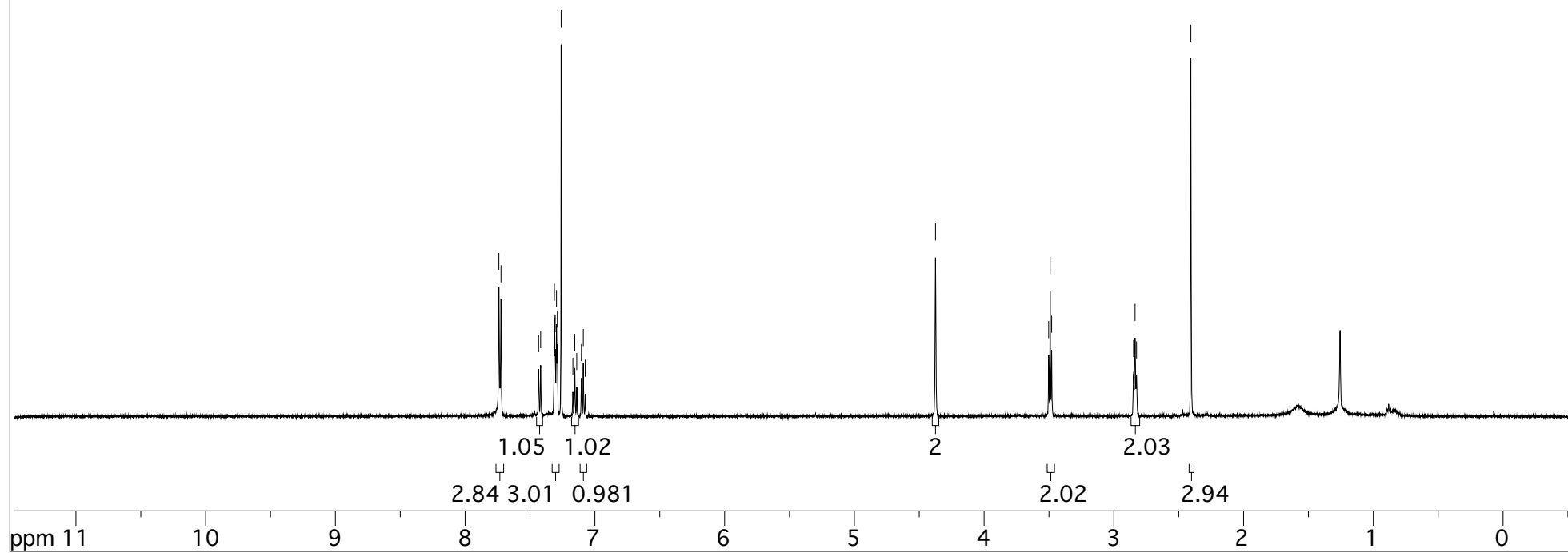
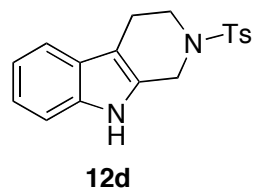
**12b**

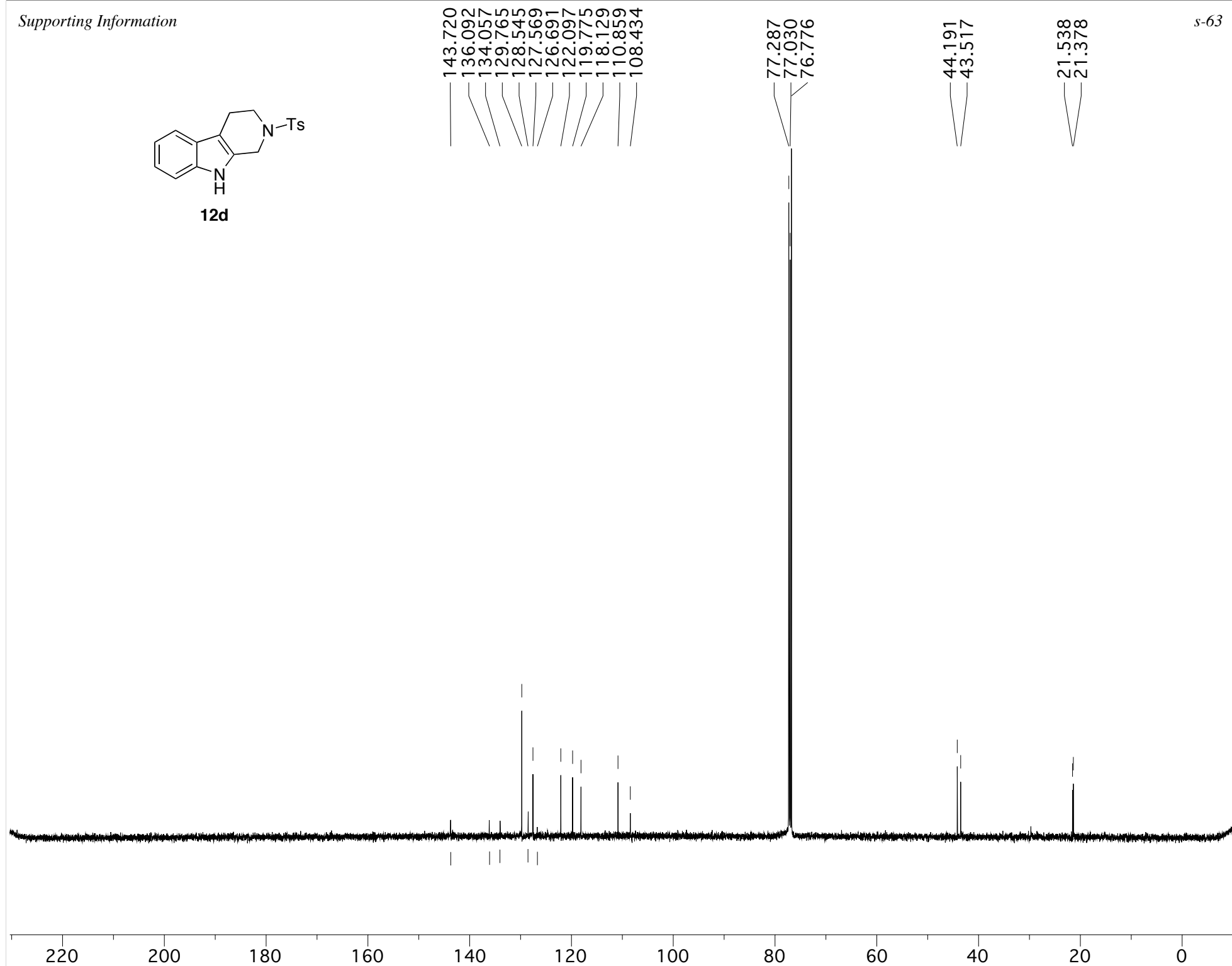
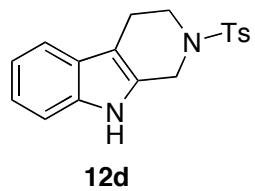
155.089
136.206
130.723
127.032
121.617
119.426
117.893
110.884
108.464
80.164
77.057
76.805
42.655
41.820
28.547
21.476

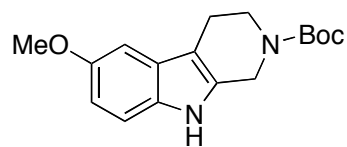
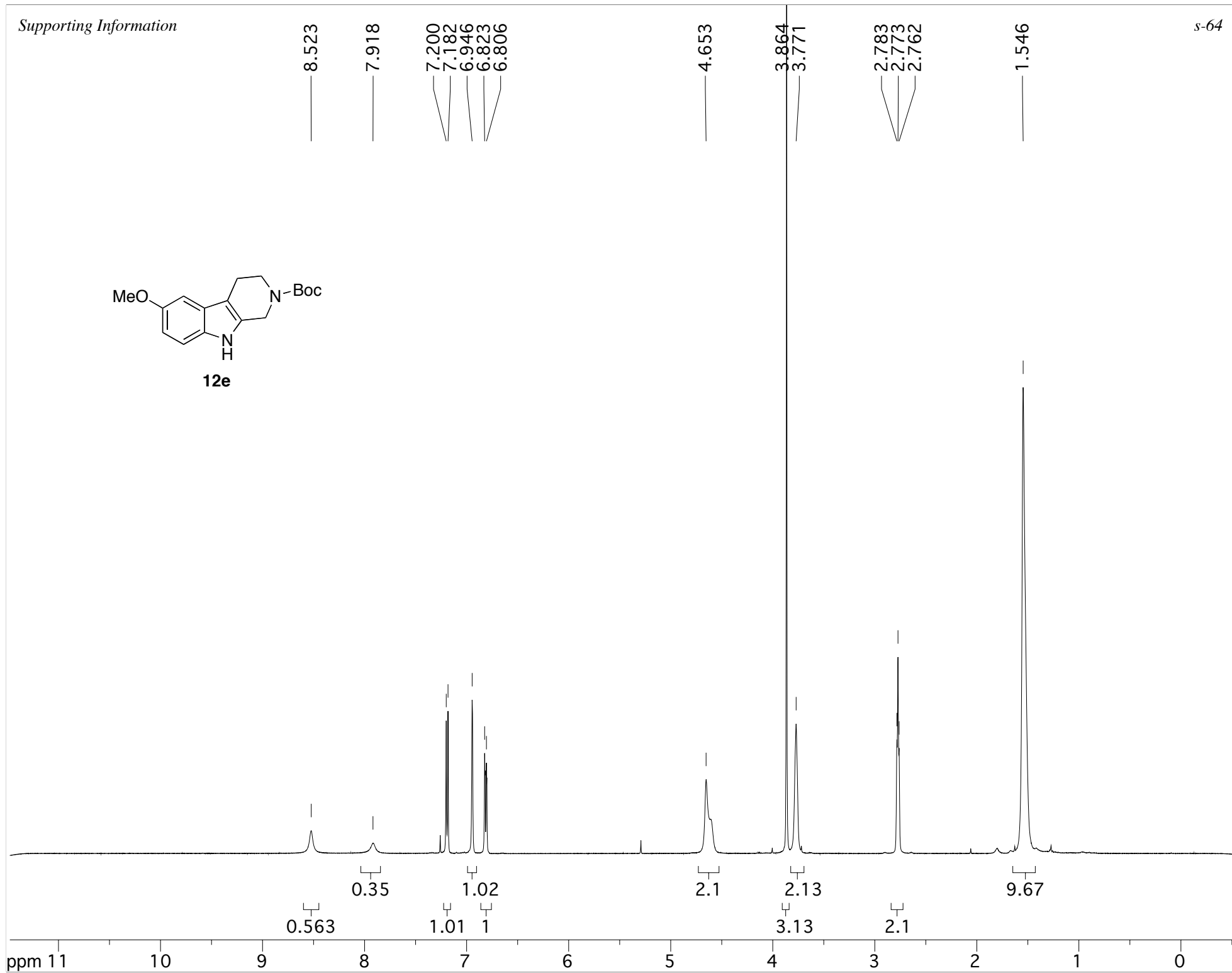


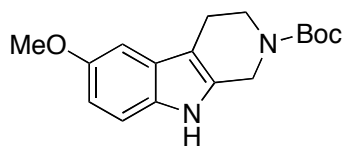
**12c**



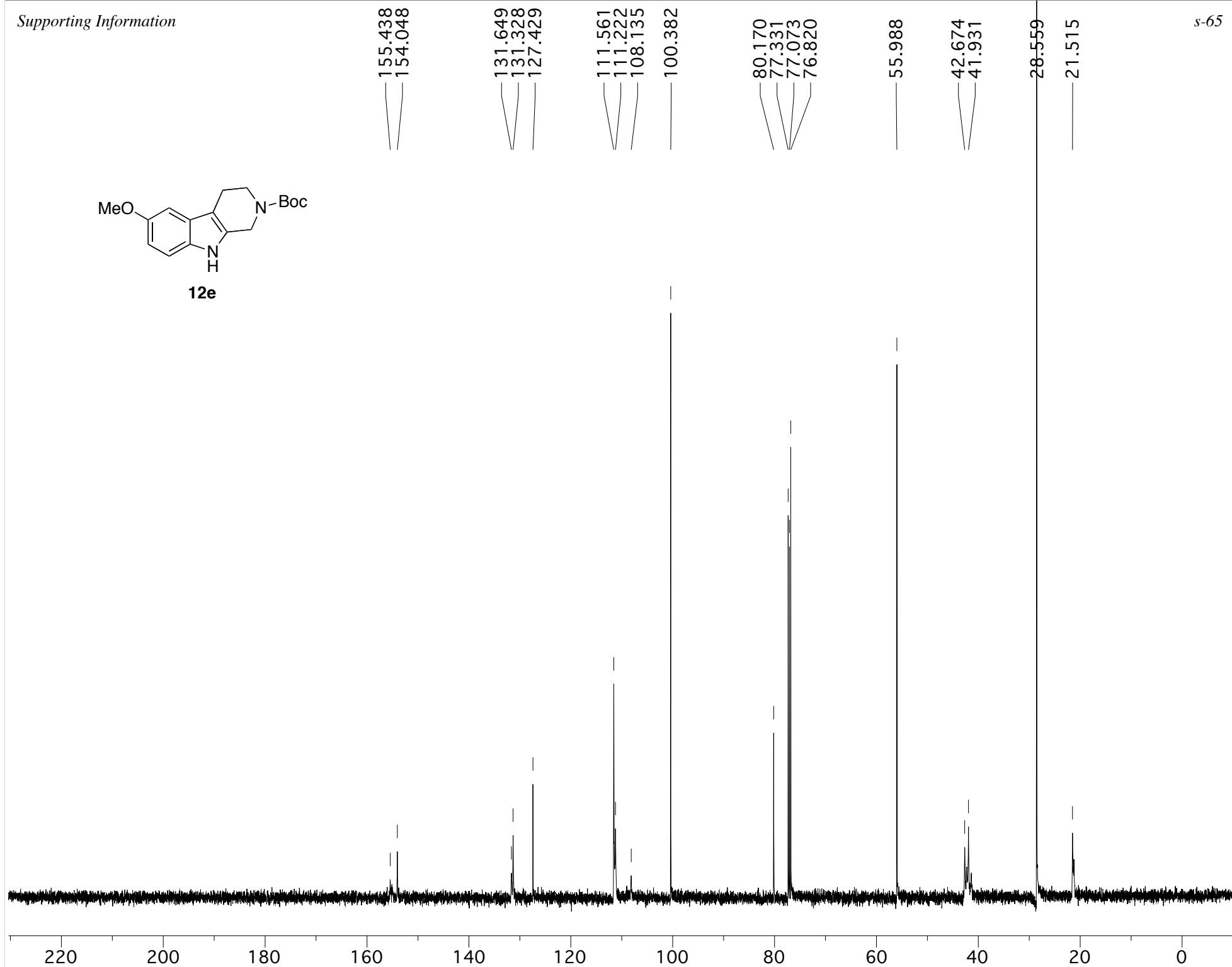


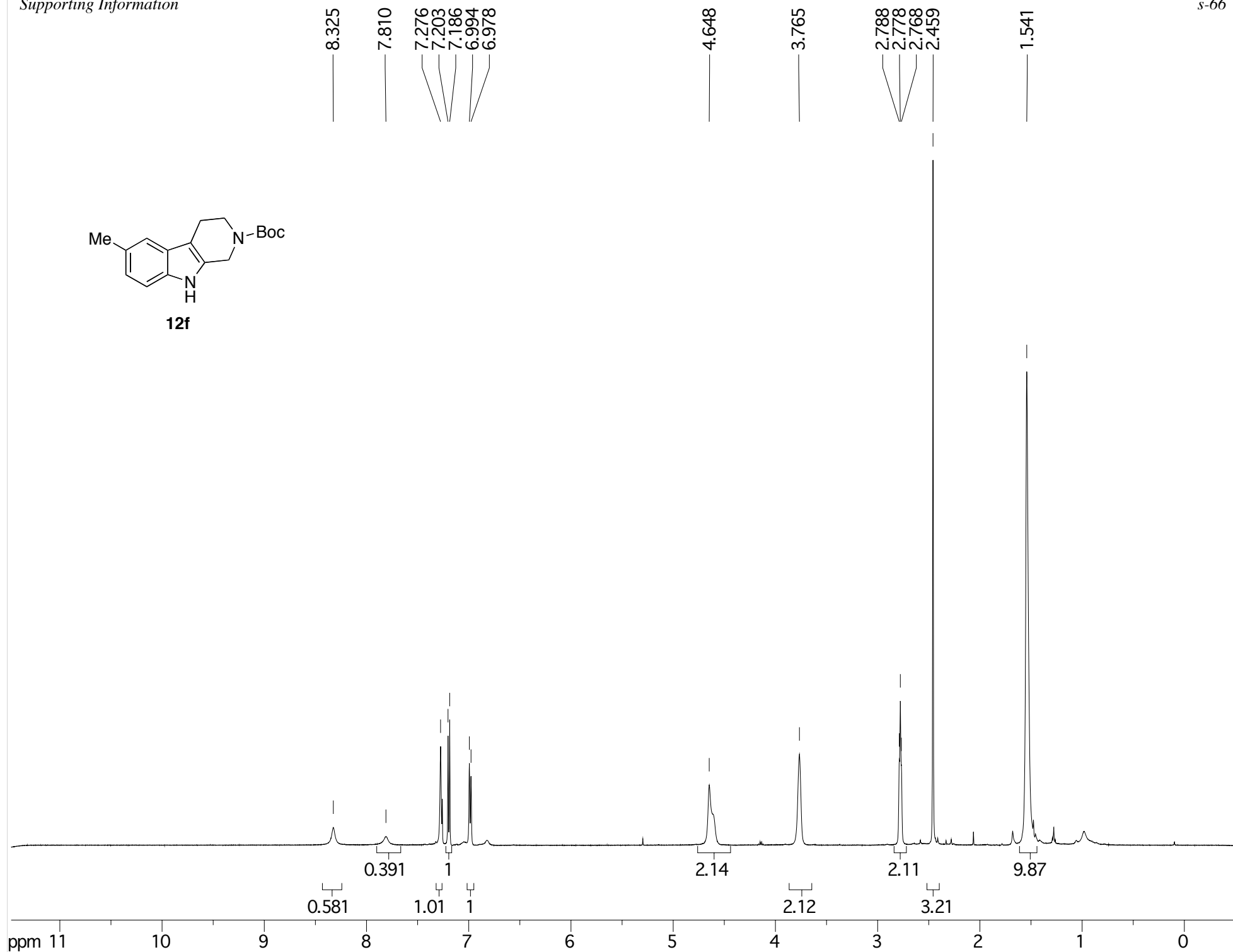
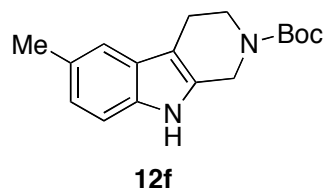


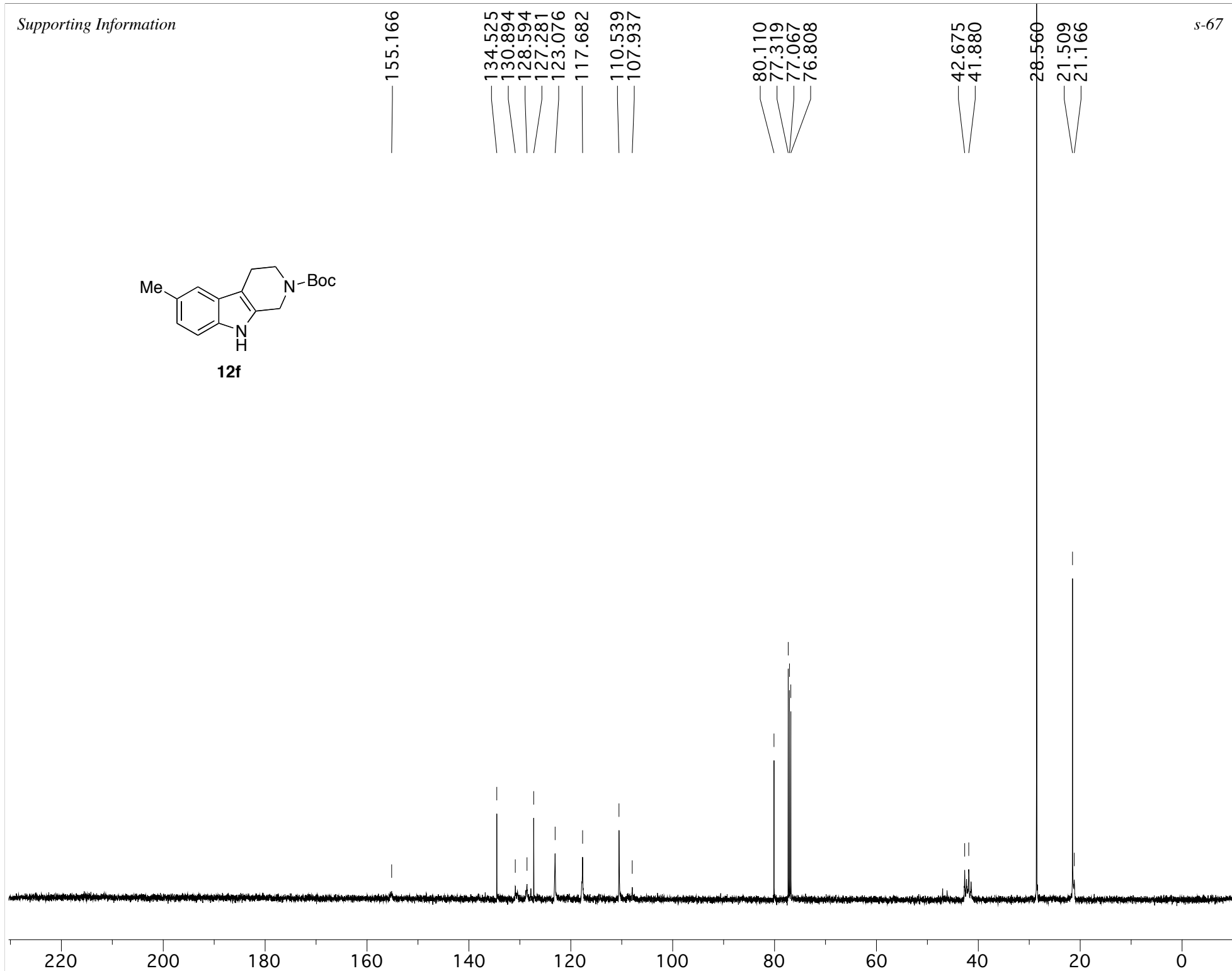
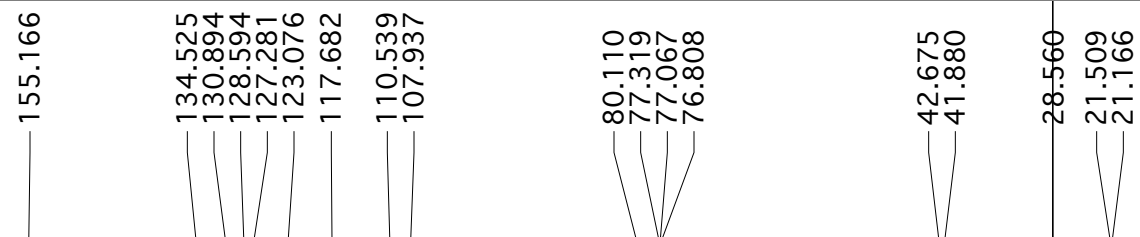
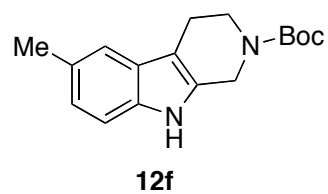
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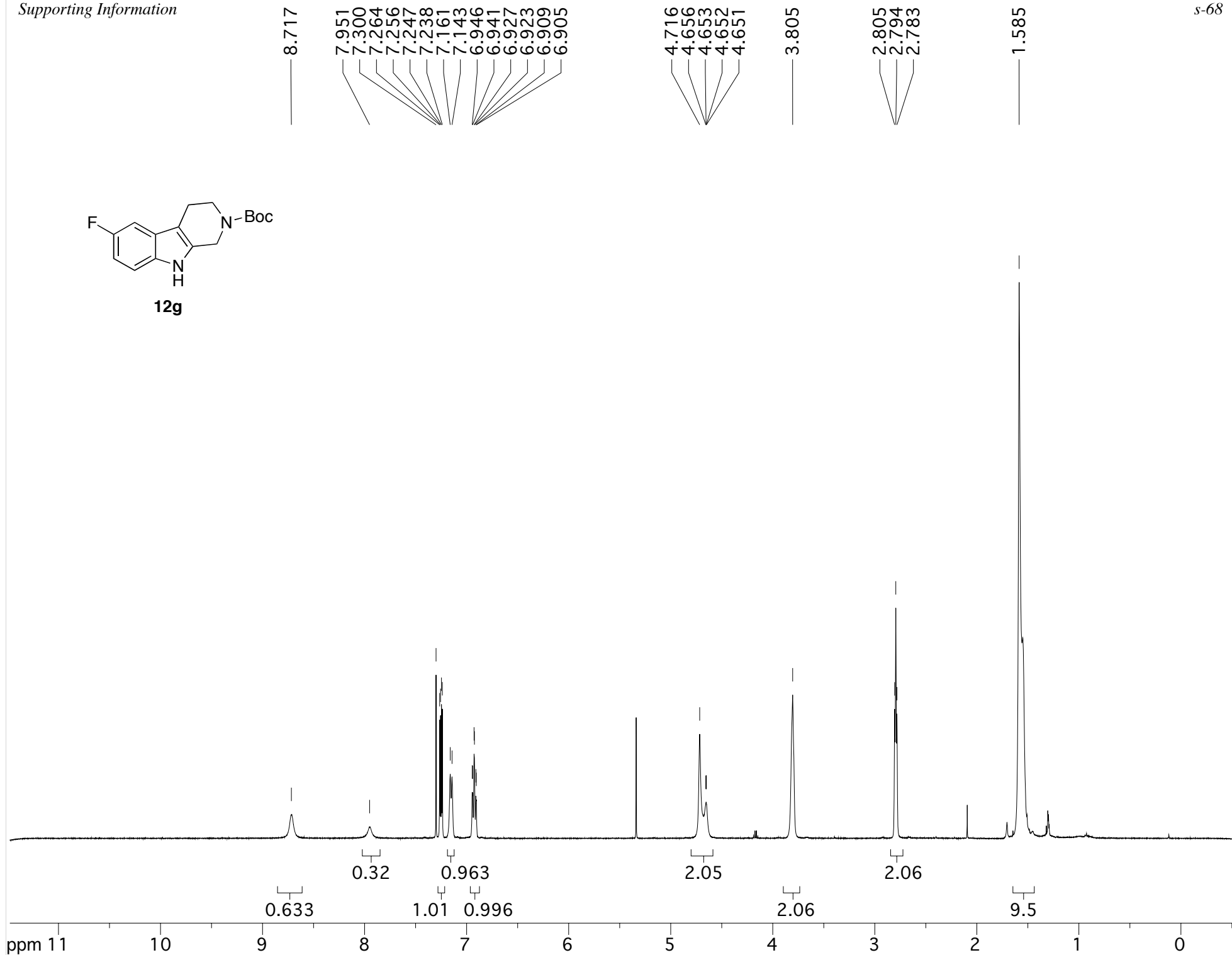
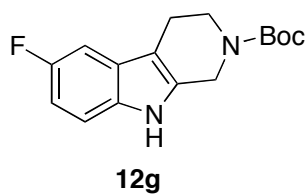
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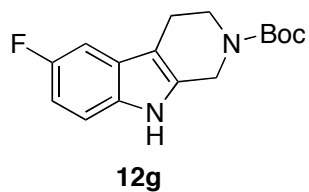
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154.048
131.649
131.328
127.429
111.561
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108.135
100.382
80.170
77.331
77.073
76.820
55.988
42.674
41.931
28.559
21.515



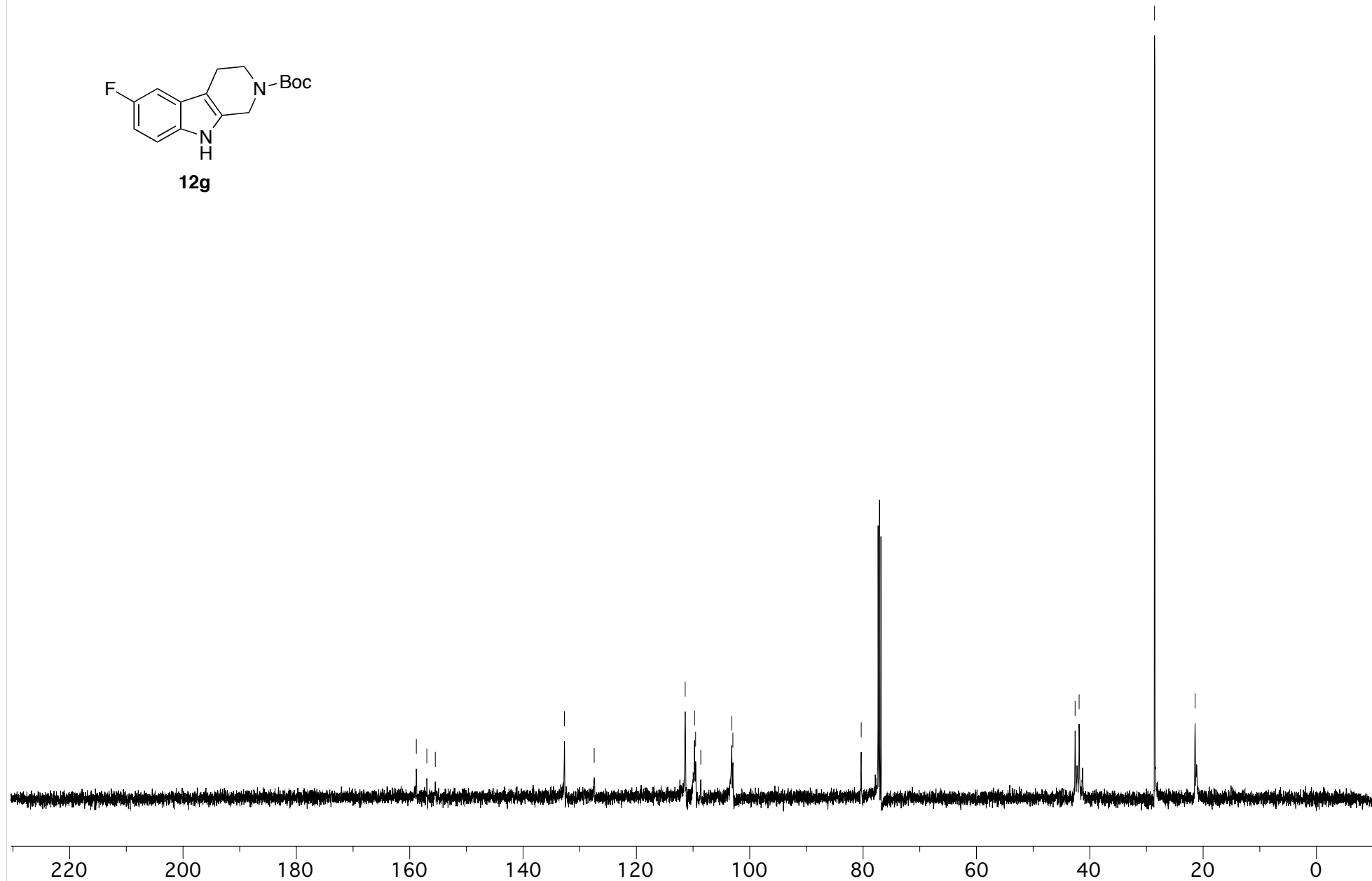


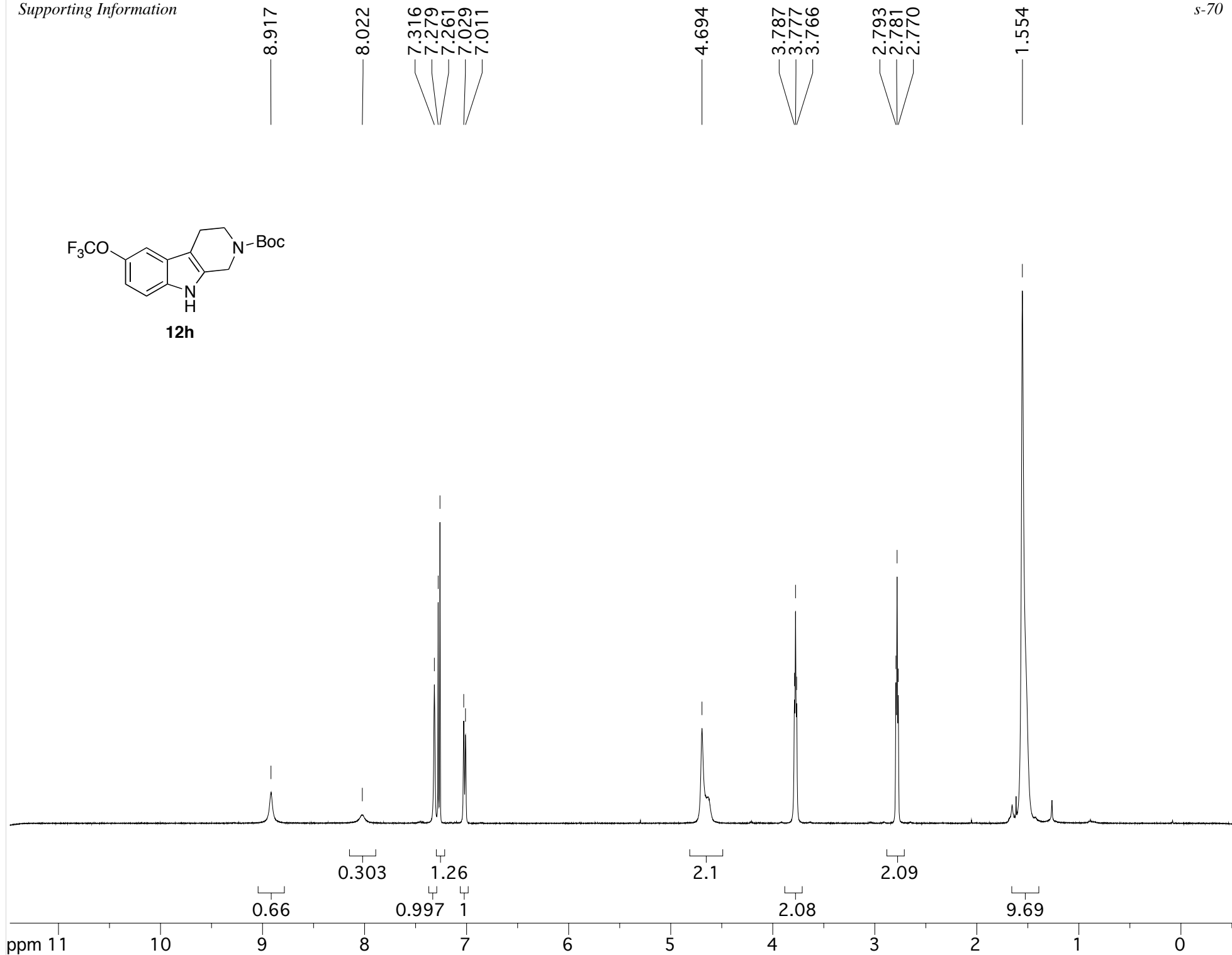
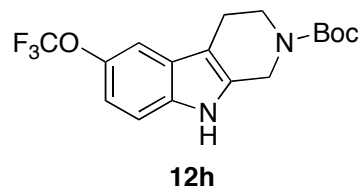


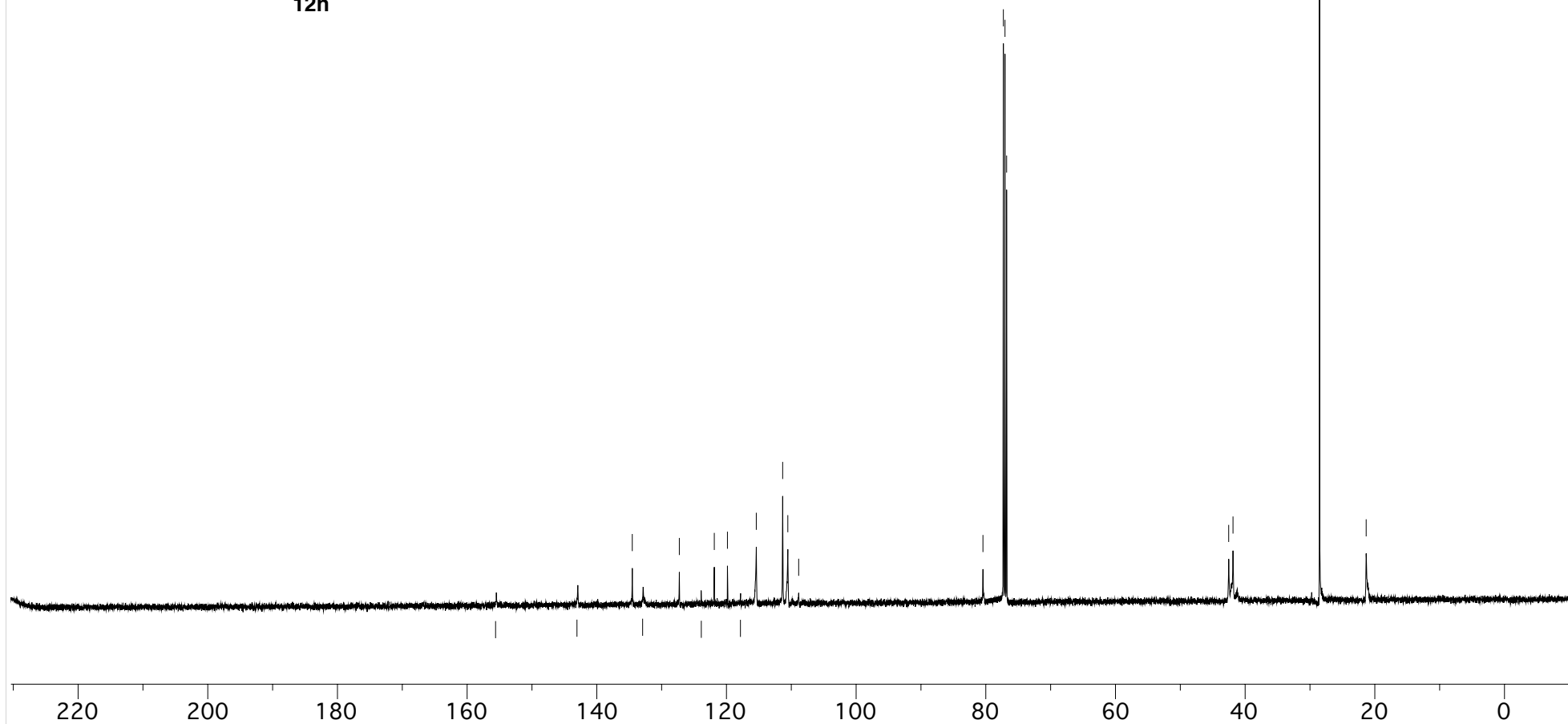
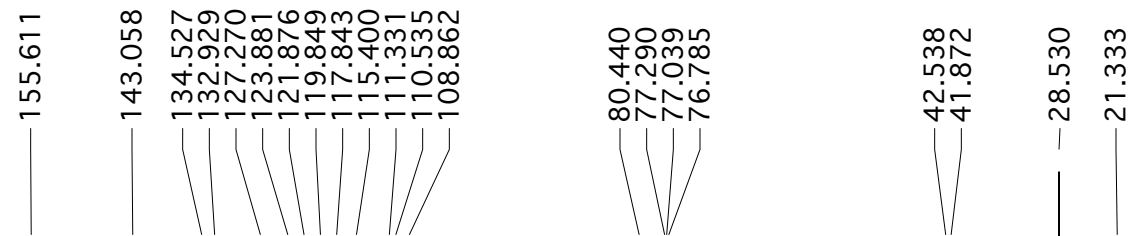
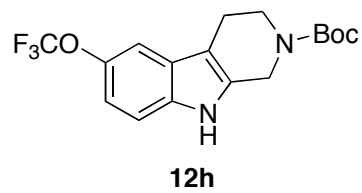


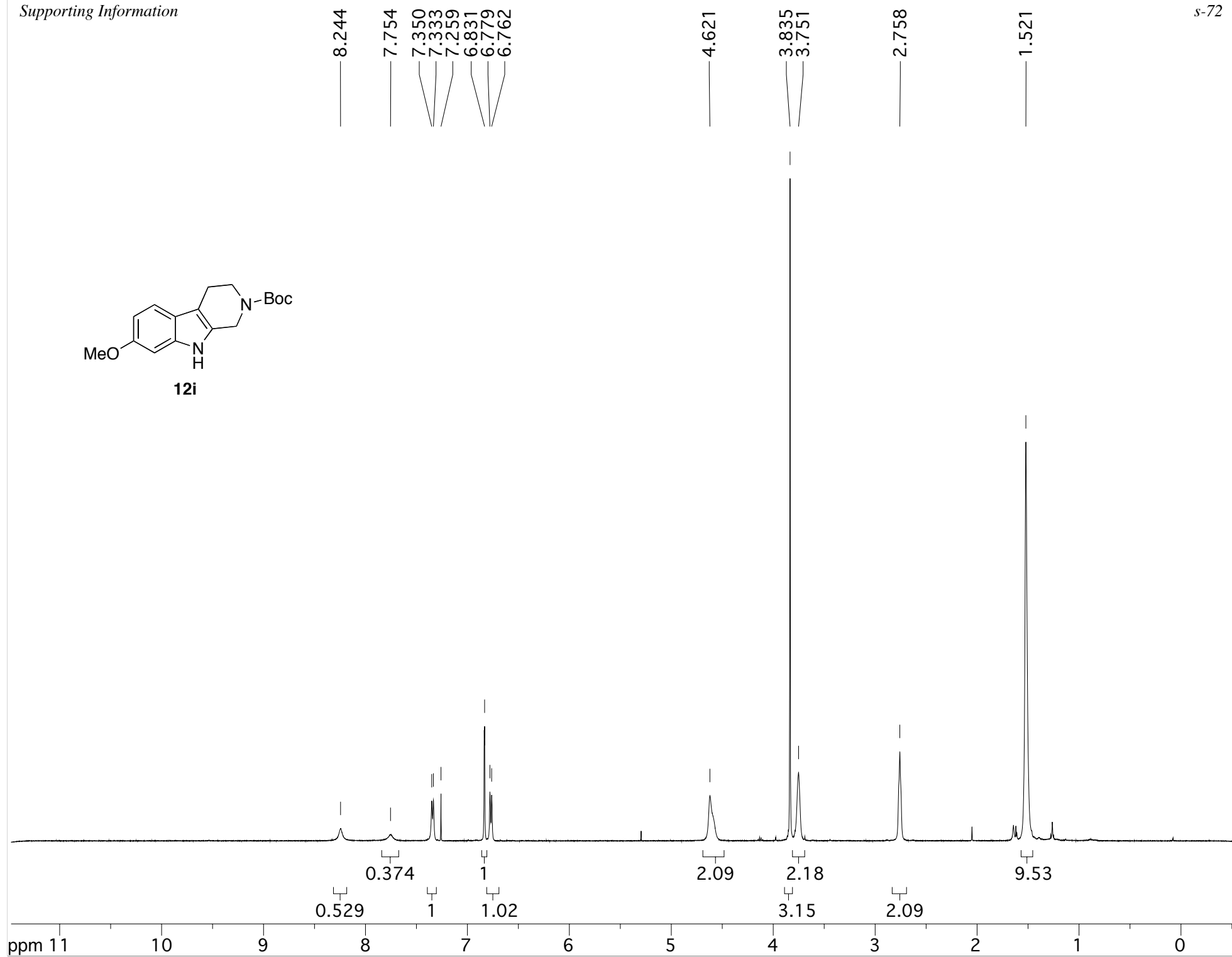
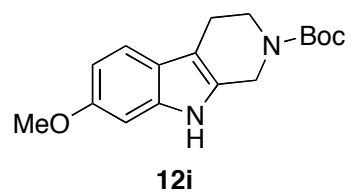


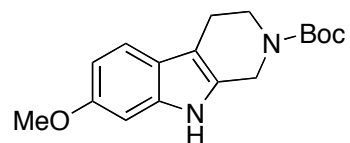
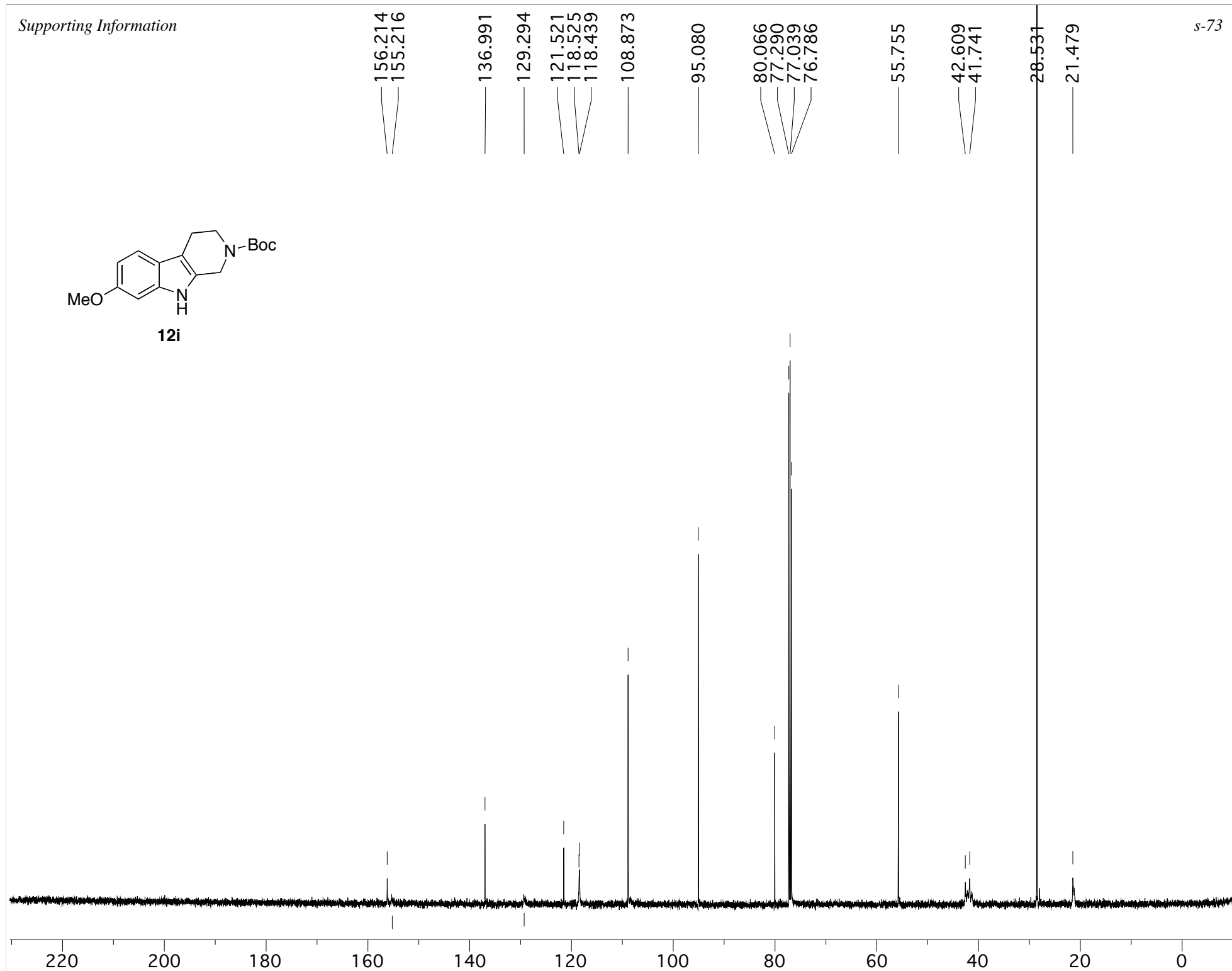
158.832	132.700	111.391	80.329	42.593	28.576
156.984	127.447	109.734		41.882	21.417
155.487		109.551			
		108.640			
		103.181			
		102.976			

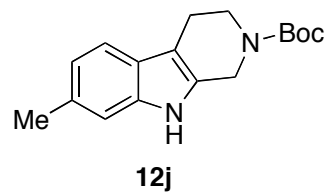




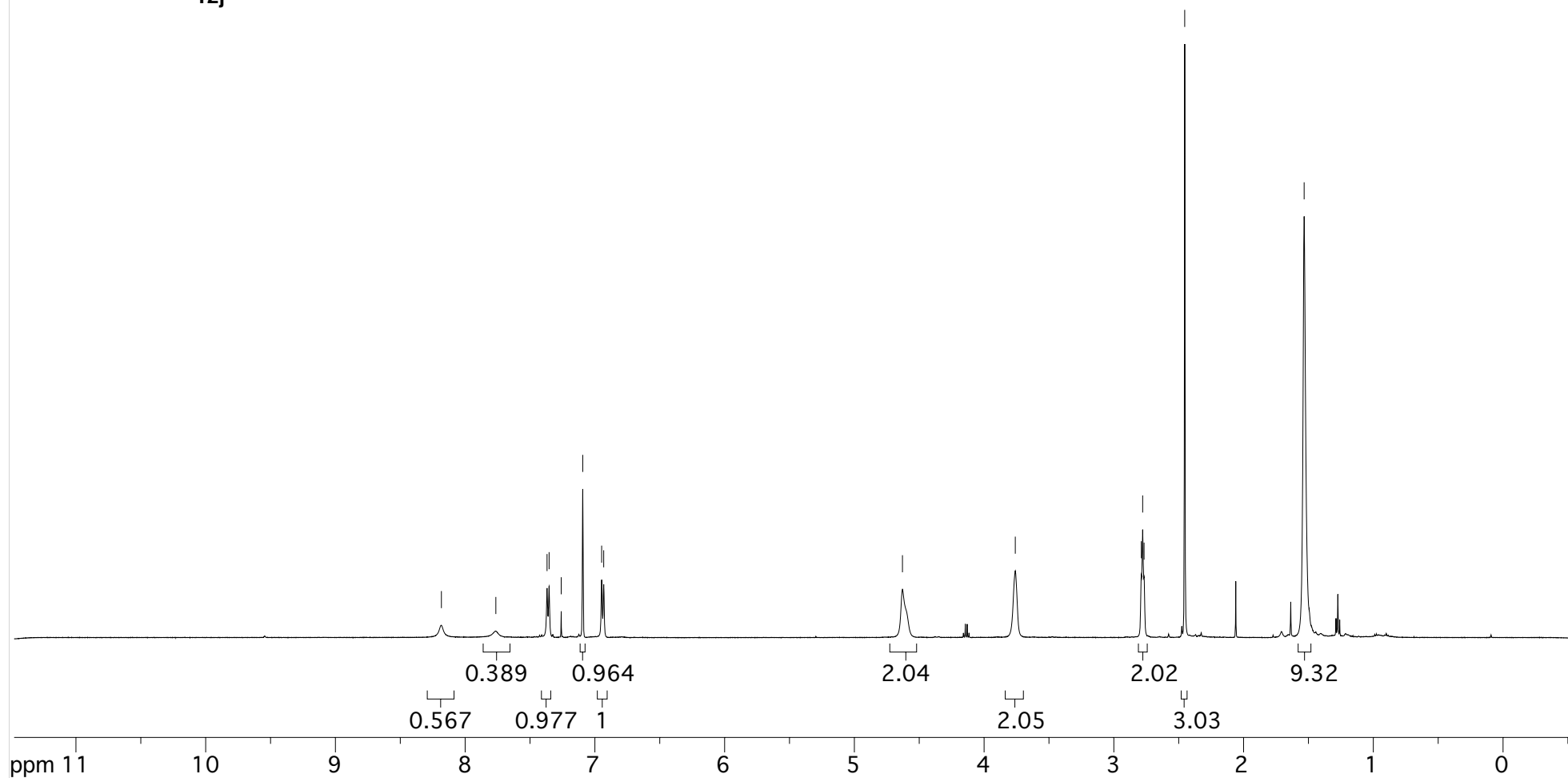


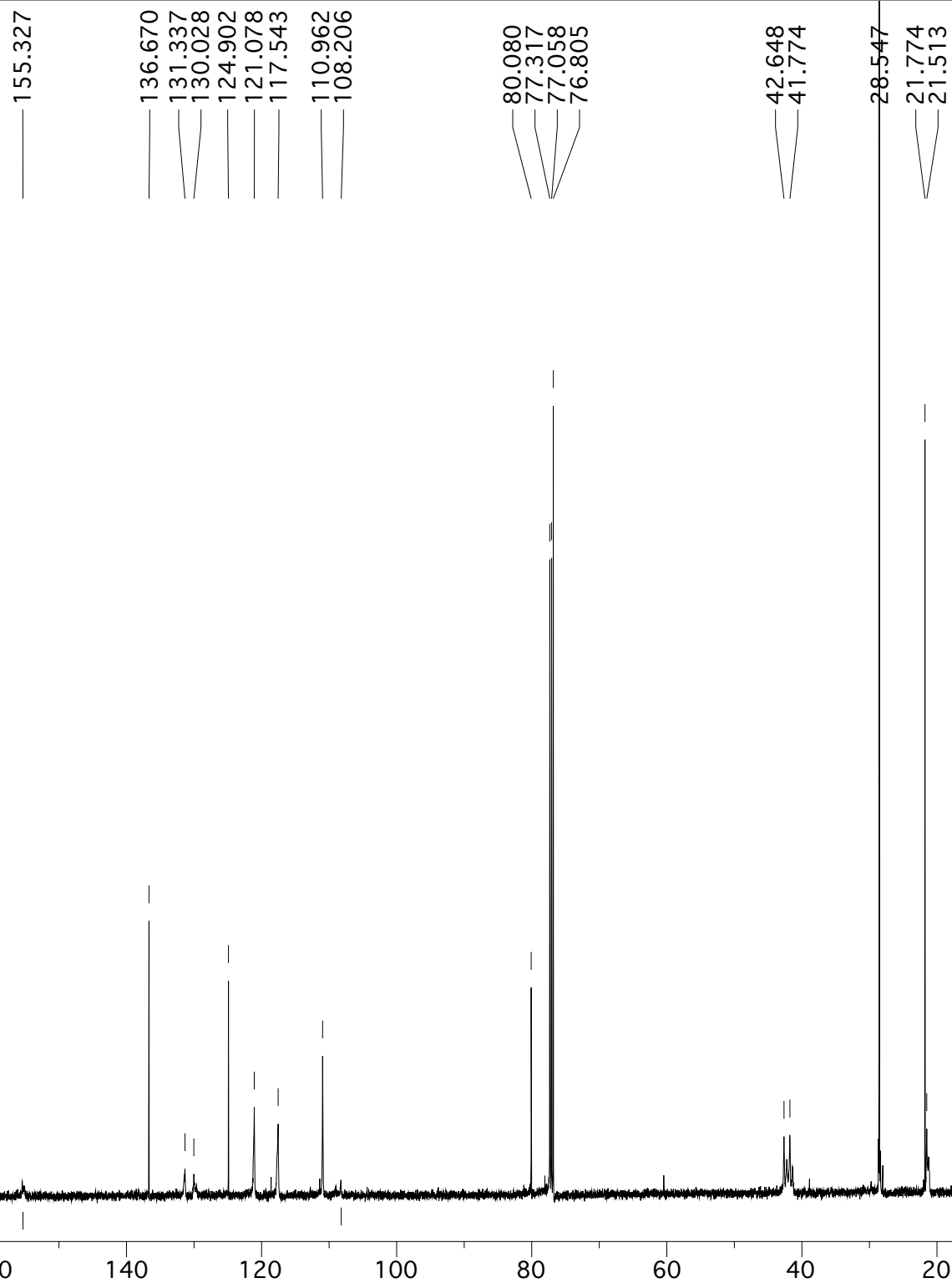
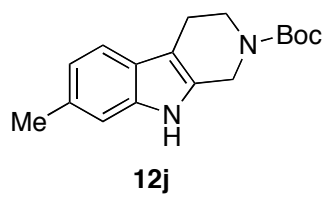


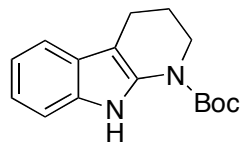
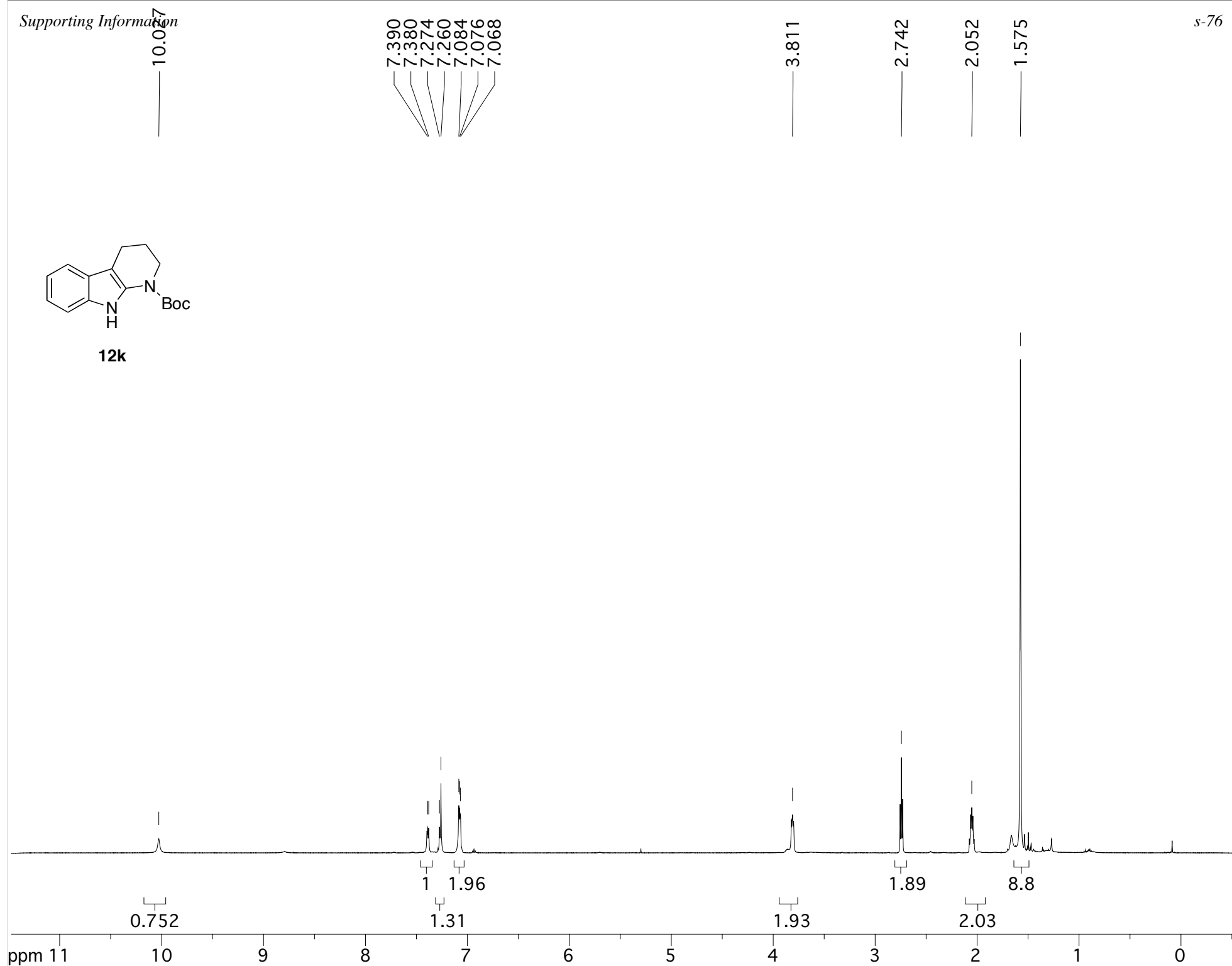
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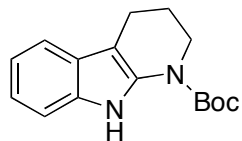
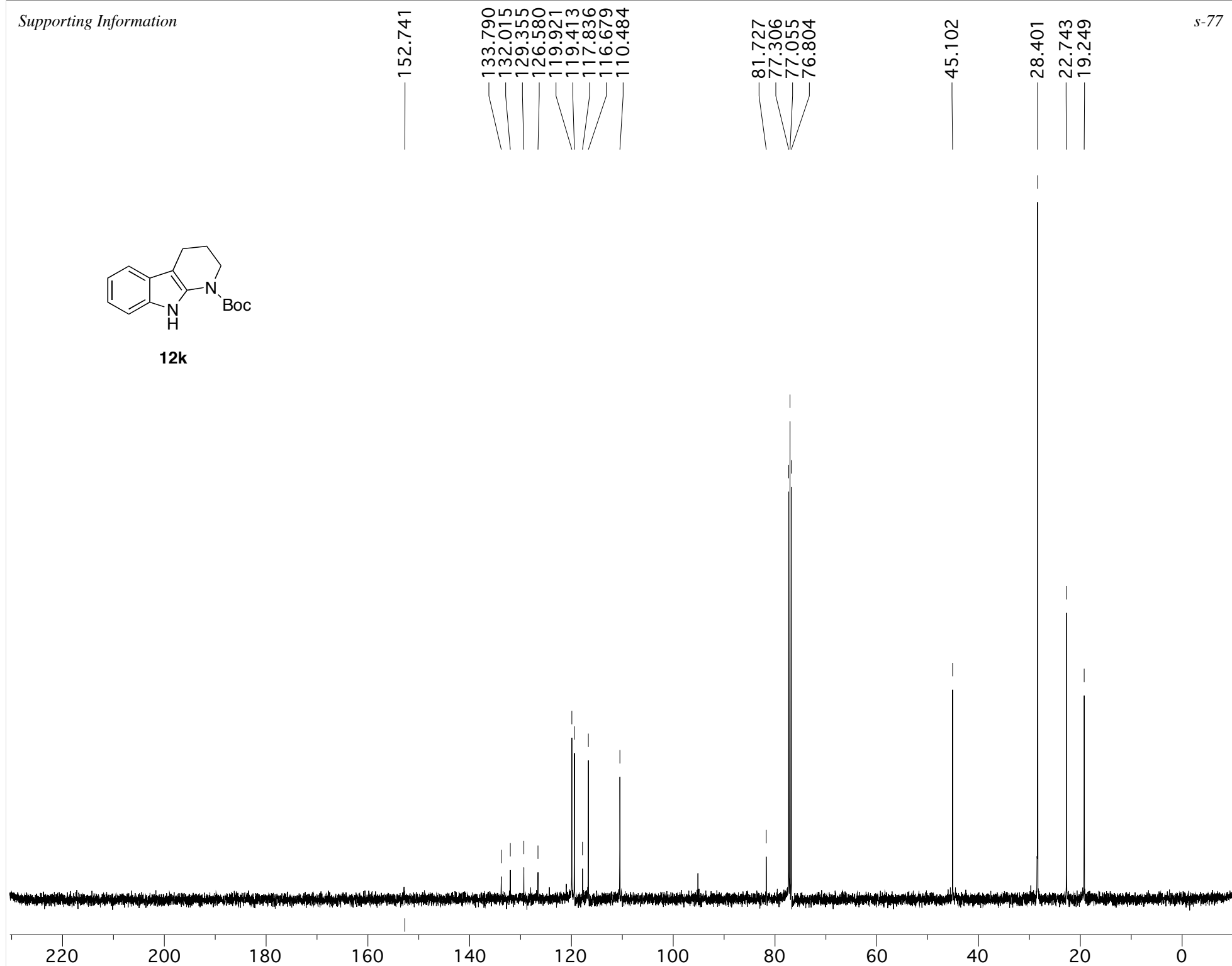


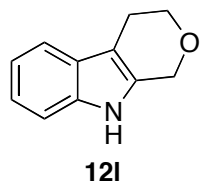
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7.369
7.353
7.260
7.093
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6.932
4.629
3.760
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2.778
2.767
2.454
1.533





**12k**

**12k**

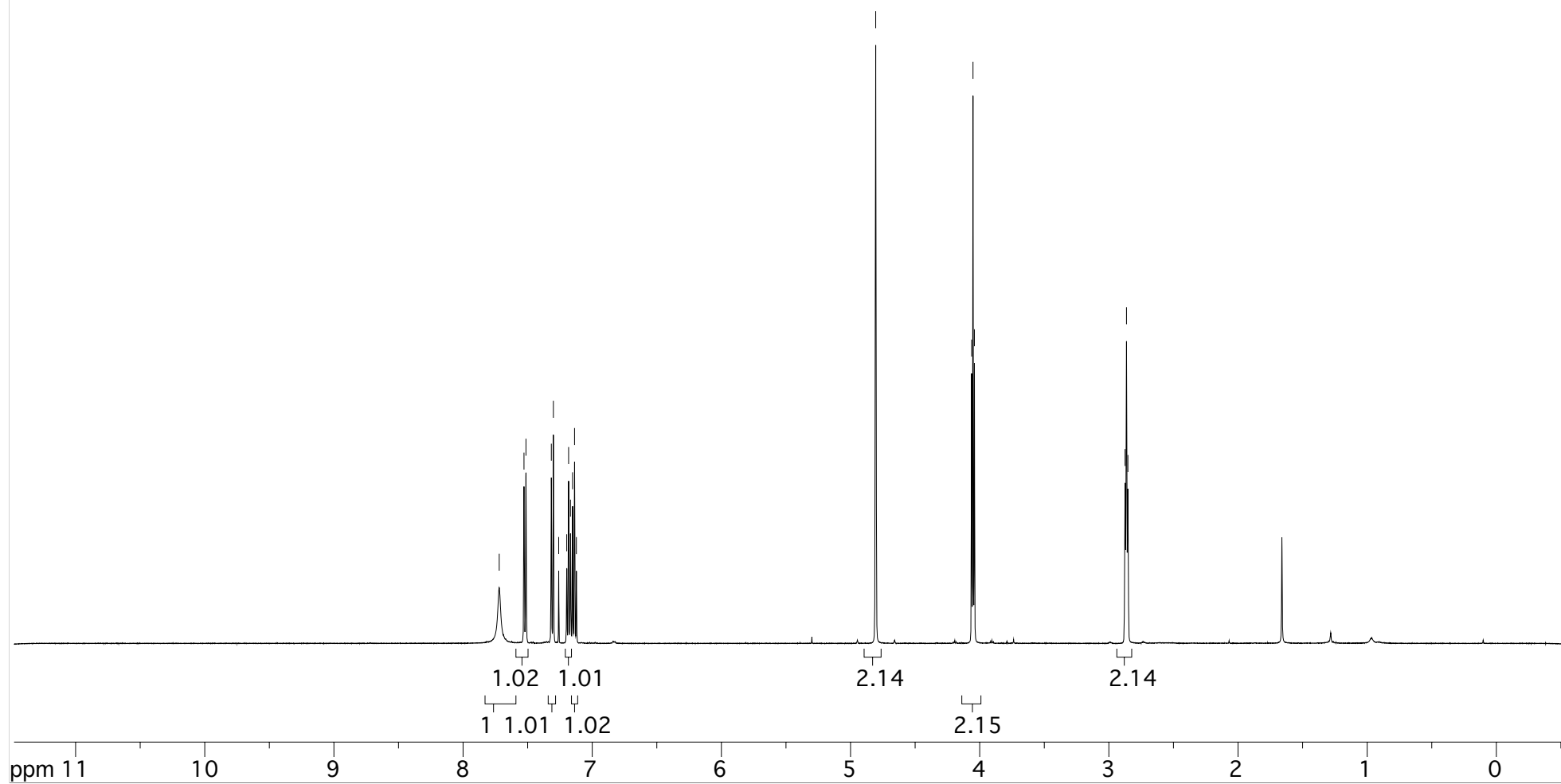


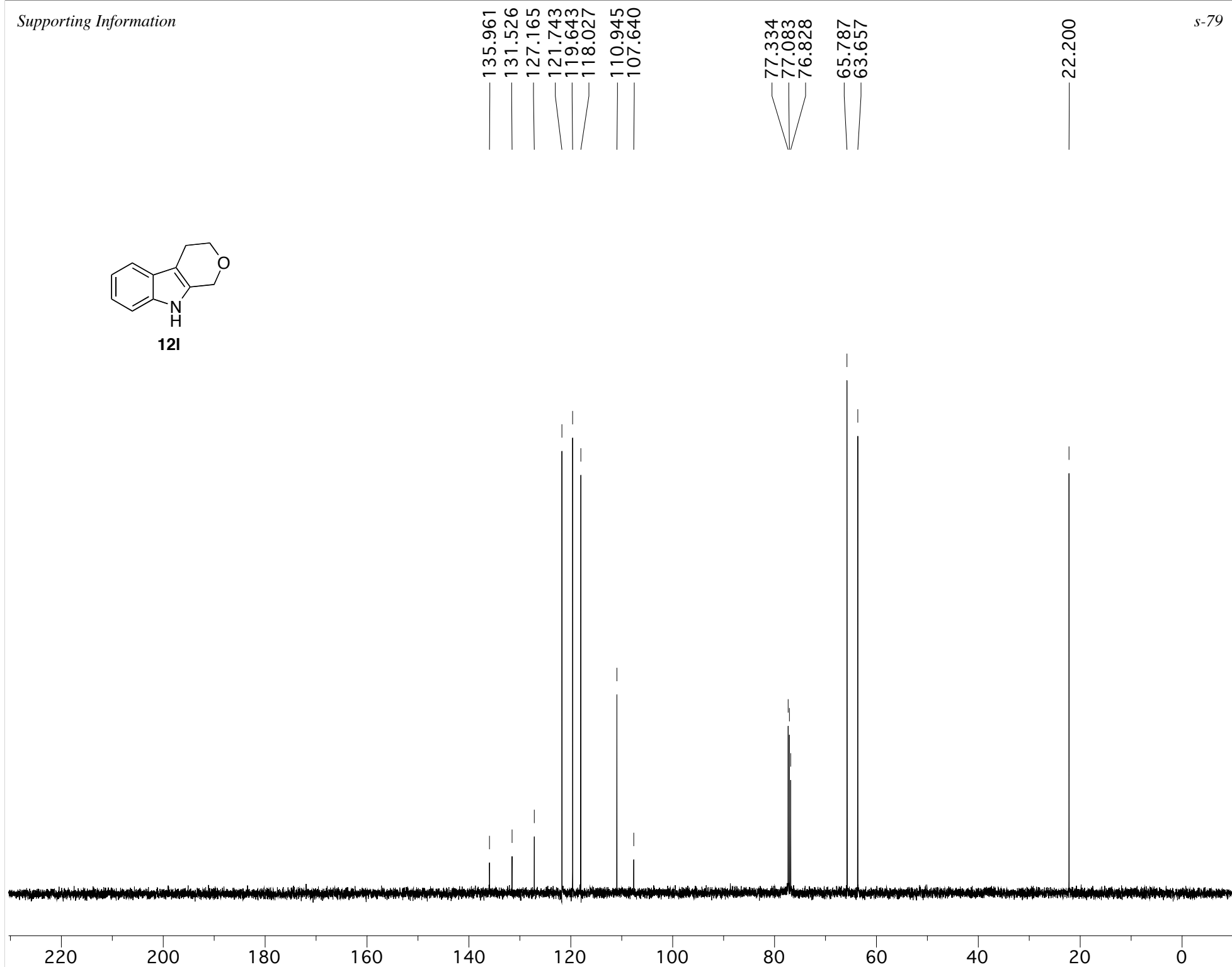
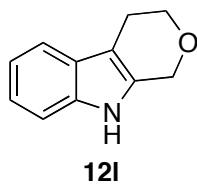
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7.301
7.260
7.197
7.183
7.168
7.152
7.137
7.123

4.805

4.063
4.052
4.041

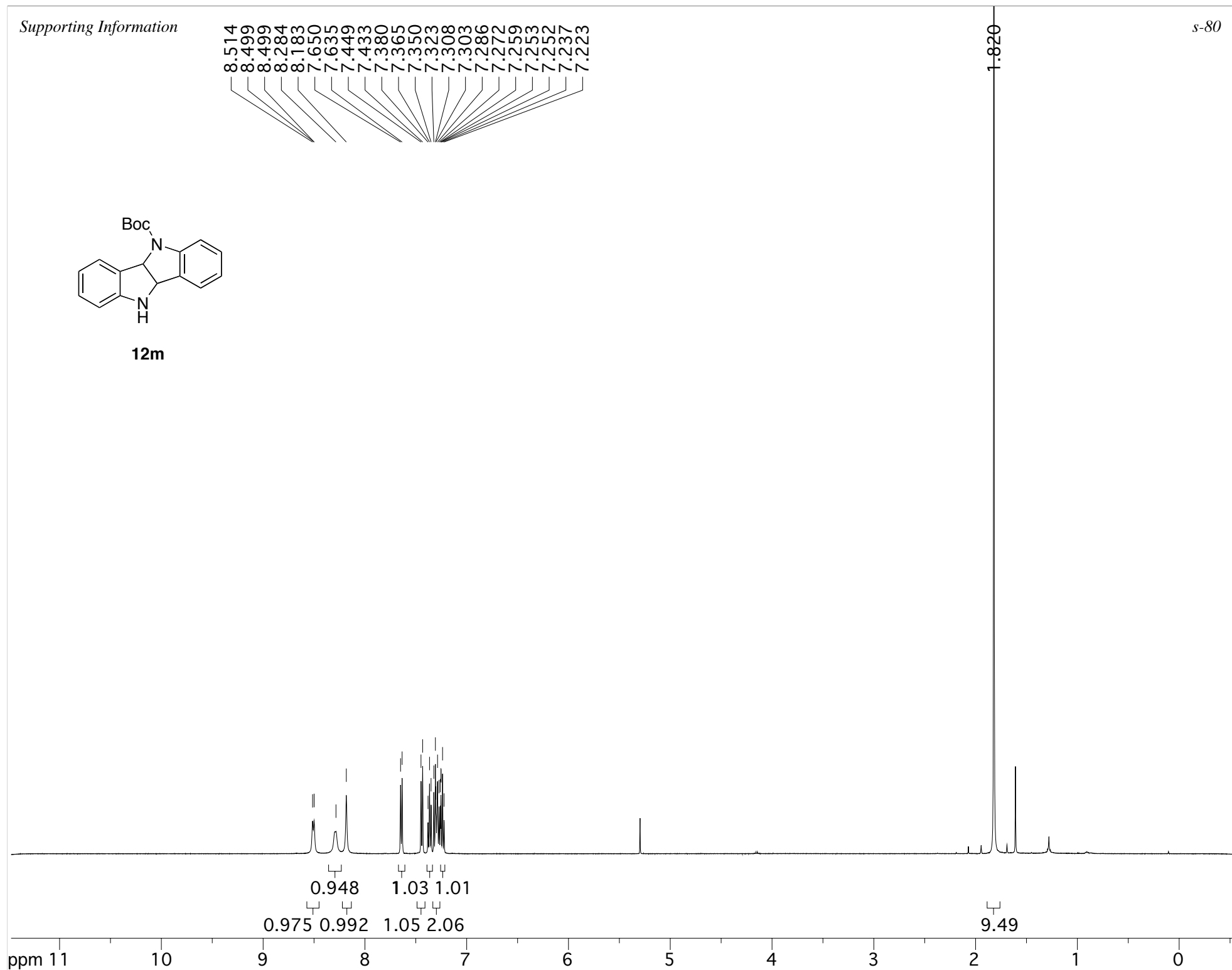
2.874
2.864
2.853

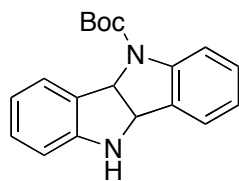
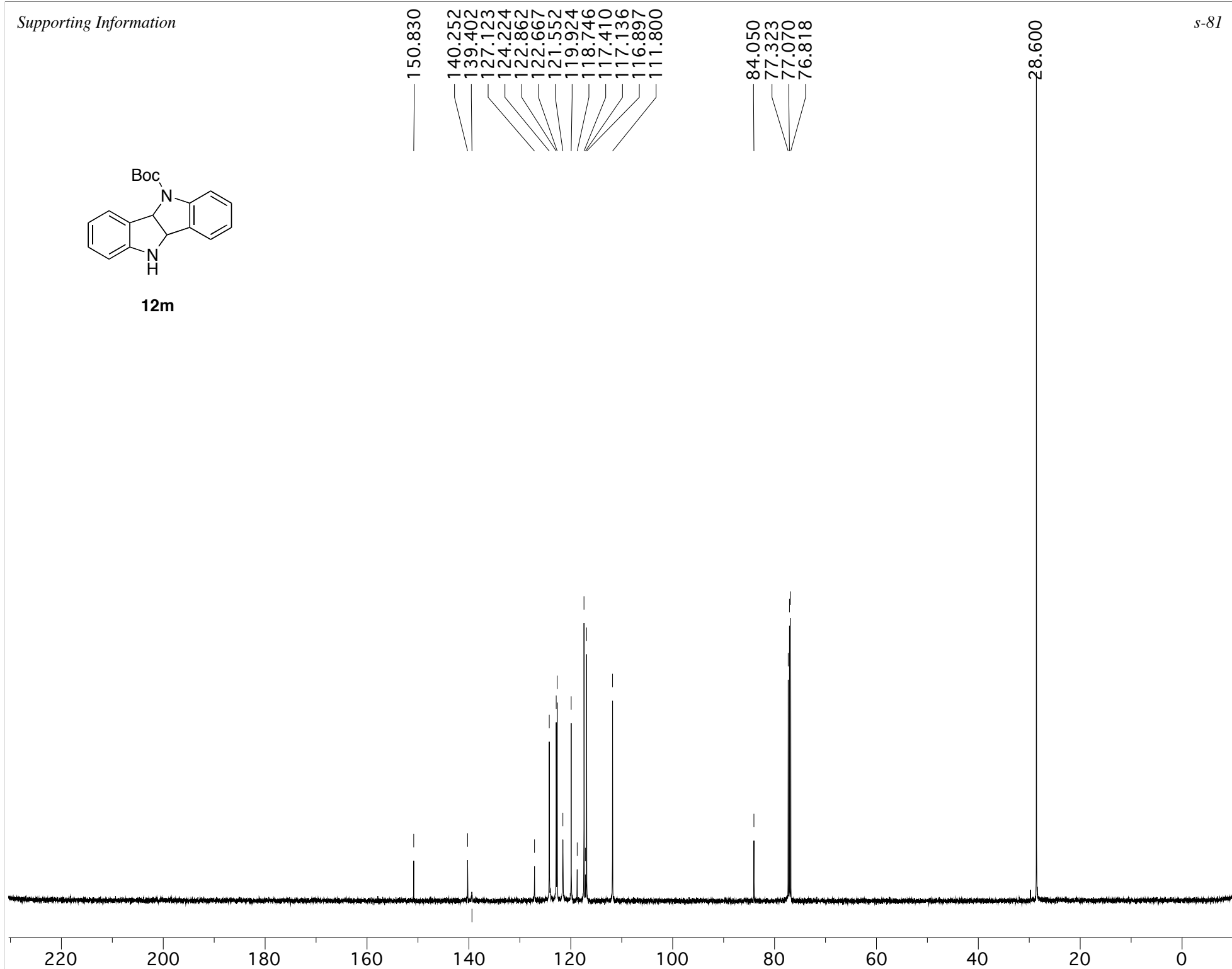


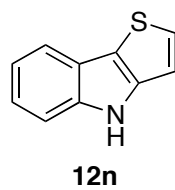




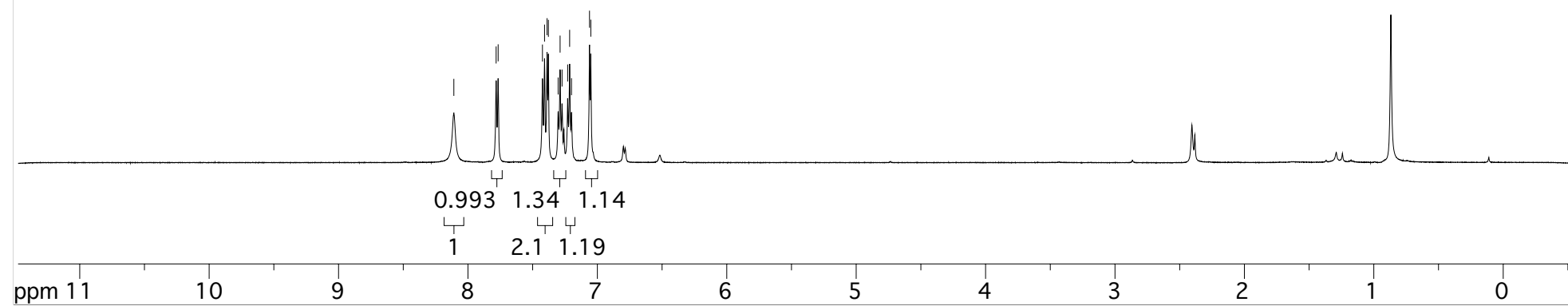
12m

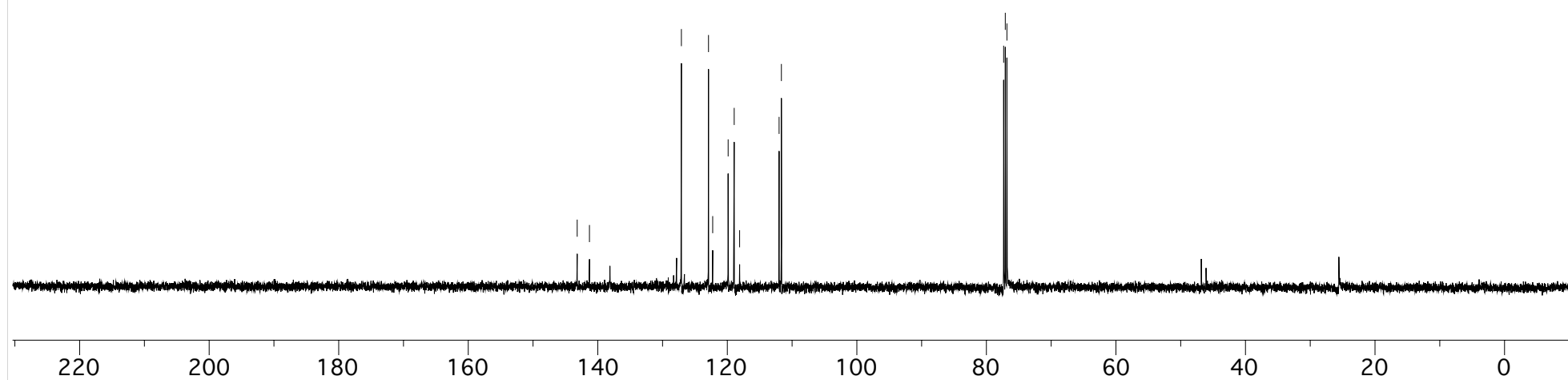
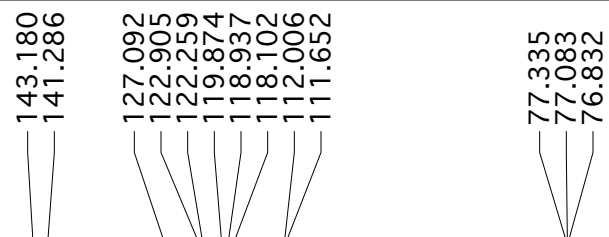
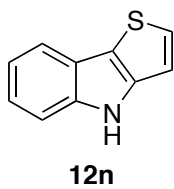


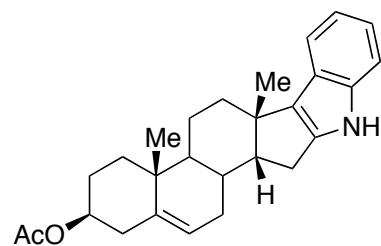
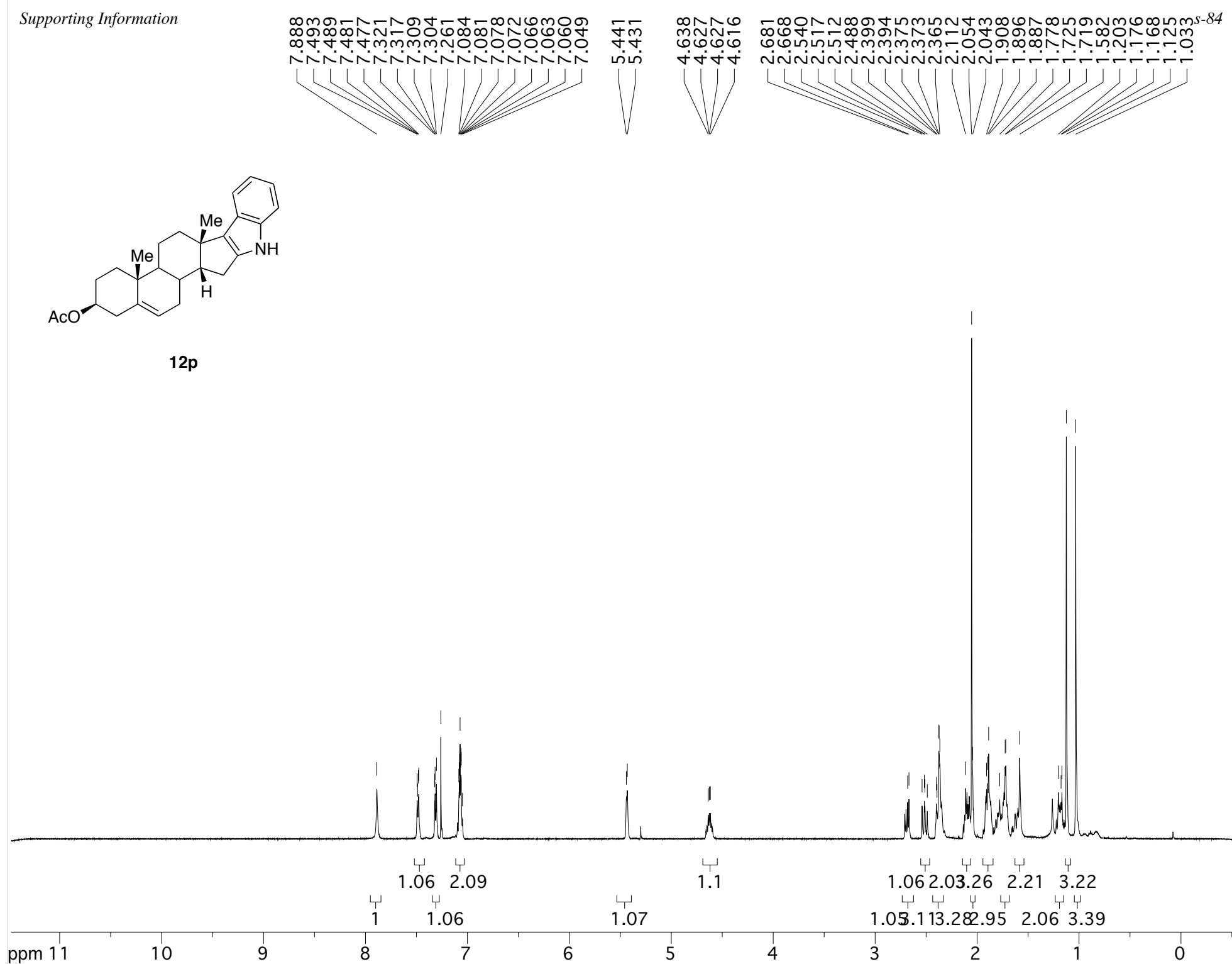
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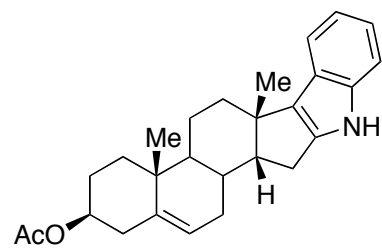


8.109
7.782
7.767
7.424
7.408
7.389
7.379
7.303
7.288
7.273
7.230
7.214
7.200
7.061
7.051





**12p**

**12p**