Electronic Supplementary Material (ESI) for Dalton Transactions.

Supplementary Information

CuI incorporated cobalt ferrite nanoparticle as magnetically separable catalyst for oxidative amidation reaction

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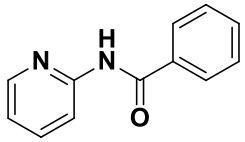
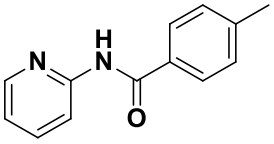
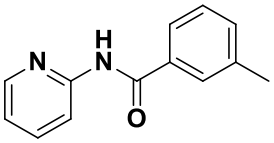
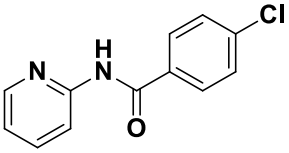
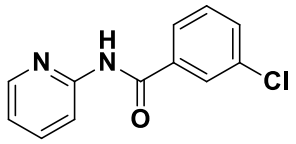
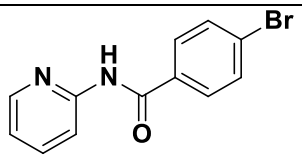
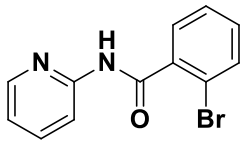
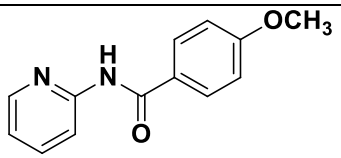
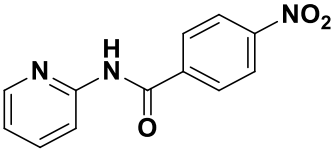
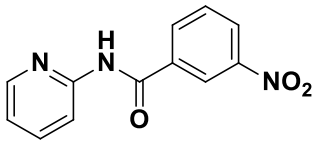
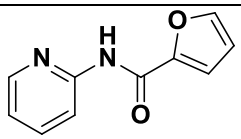
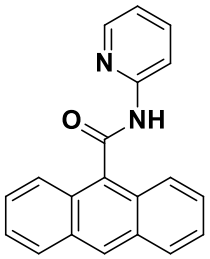
Contents:-

Experimental Data:

^{1}H NMR and ^{13}C spectra were recorded in Bruker Advance 300 MHz instrument. Chemical shifts are given in δ units relative to the tetramethylsilane (TMS) signal as an internal reference in $CDCl_3$. Coupling constants (*J*) are reported in hertz (Hz). Silica gel (230-400 mesh) was used for column chromatography.

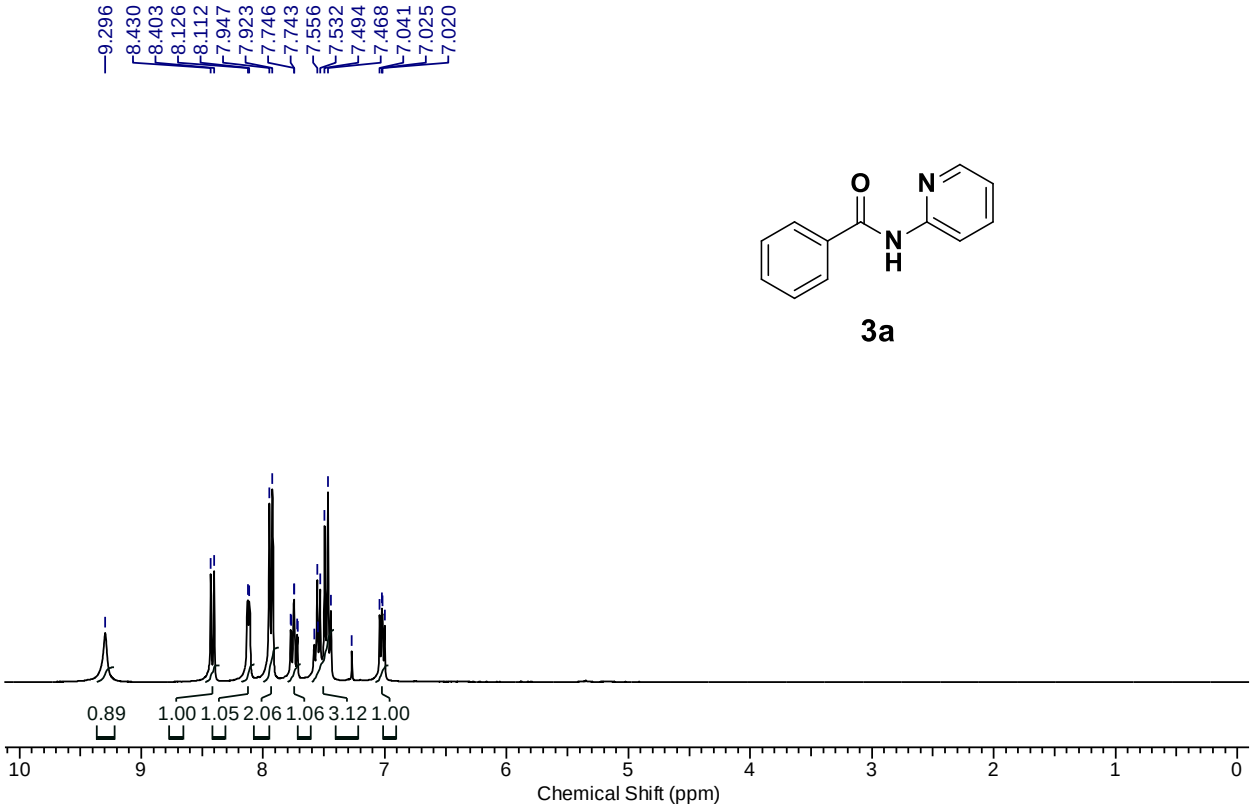
Sl No.	NMR Data	Structure
1	***N*-(pyridin-2-yl)benzamide (3a):** [1] White crystalline solid, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 9.29 (s,1H), 8.41 (d, 8.4Hz, 1H), 8.11 (d, 4.2Hz, 1H), 7.93 (d, 2H, 7.2Hz), 7.77-7.71 (m, 1H), 7.57-7.44 (m, 3H), 7.03-6.99 (m, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 166.0, 151.7, 147.7, 138.5, 134.3, 132.1, 128.7, 119.8, 114.3.	
2	**4-methyl-*N*-(pyridin-2-yl)benzamide (3b)**: [1] White Solid, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.74 (s, 1H), 8.40 (d, 8.4Hz, 1H), 8.27 (d, 1H, 3.9Hz), 7.84 (d, 7.8Hz, 2H), 7.31 (d, 7.8Hz, 2H), 7.78-7.73 (m, 1H), 7.30 (d, 8.4Hz, 1H), 2.43 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 165.7, 151.6, 147.8, 142.9, 138.5, 131.3, 129.5, 127.2, 119.8, 114.1, 21.5.	
3	**3-methyl-*N*-(pyridin-2-yl)benzamide (3c)**: [2] White solid, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 9.76 (s, 1H), 8.45 (d, 1H, 8.4Hz), 8.11 (d, 1H, 4.8Hz), 7.78-7.74 (m, 3H), 7.36-7.33 (m, 2H), 7.01 (t, 1H, 6.9 Hz), 2.38 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 166.3, 151.8, 147.1, 138.6, 138.3, 134.0, 132.8, 128.1, 124.5, 119.6, 114.6, 21.9.	
4	**4-chloro-*N*-(pyridin-2-yl)benzamide (3d)**: [1] White crystalline solid, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 9.76 (s,1H), 8.37 (d, 8.4.Hz, 1H), 7.99 (d, 3.9Hz, 1H), 7.86 (d, 8.4Hz,2H), 7.71 (t, 8.4Hz, 1H), 7.38 (d, 2H, 8.4Hz), 6.99 (t, 1H, 5.1 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 165.1, 151.6, 147.5, 138.5, 138.3, 132.7, 128.8, 119.9, 114.6.	

5	**3-chloro-*N*-(pyridin-2-yl)benzamide (3e):** [4] White solid, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.94 (s, 1H), 8.38 (d, 8.1Hz, 1H), 8.25 (d, 3.6Hz, 1H), 7.89 (d, 2H, 8.4Hz), 7.77 (t, 1H, 7.5Hz), 7.47 (d, 2H, 8.4Hz), 7.09 (t, 6.6Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 164.7, 151.4, 147.7, 138.6, 132.5, 129.1, 128.7, 120.1, 114.3.	
6	**4-bromo-*N*-(pyridin-2-yl)benzamide (3f):** [1] White crystalline solid, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 9.42 (s,1H), 8.38 (d, 8.4Hz,1H), 8.10 (d, 3.9Hz, 1H), 7.81-7.72 (m, 3H), 7.58 (d, 8.4Hz, 2H), 7.04 (t, 6.3Hz,1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 165.1, 151.5, 147.6, 138.6, 133.1, 131.9, 128.9, 126.9, 120.0, 114.5.	
7	**2-bromo-*N*-(pyridin-2-yl)benzamide (3g):** [1] White crystalline solid, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 10.60 (s, 1H), 8.39 (d, 8.1Hz, 1H), 7.69 (t, 7,5Hz, 1H), 7.57-7.52 (m, 2H), 7.40-7.29 (m, 3H), 6.86-6.82 (m, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 166.6, 151.6, 146.9, 138.6, 138.0, 133.3, 131.3, 129.0, 127.5, 119.8, 119.5, 114.7	
8	**4-methoxy-*N*-(pyridin-2-yl)benzamide (3h):** [1] Yellow solid, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 9.52 (s, 1H), 8.41 (d, 8.4 Hz, 1H), 8.17 (s, 1H), 7.94 (d, 8.7Hz, 2H), 7.76-7.71 (m, 1H), 7.03-6.99 (m, 1H), 6.93 (d, 8.7Hz, 2H), 3.83 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 165.6, 162.6, 151.9, 147.2, 138.6, 131.8, 129.4, 126.2, 119.5, 114.5, 113.8, 113.4, 55.3.	
9	**4-nitro-*N*-(pyridin-2-yl)benzamide (3i):** [3] White solid, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 11.20 (s, 1H), 8.40-8.16 (m, 6H), 7.86 (t, 8.1Hz, 1H), 7.21-7.17 (m, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 164.7, 151.9, 149.3, 148.2, 139.9, 138.4, 129.7, 123.5, 120.4, 114.9.	

10	**3-nitro-*N*-(pyridin-2-yl)benzamide (3j):** [4] Pale yellow solid, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 9.76 (s, 1H), 8.77 (s, 1H), 8.37-8.22 (m, 4H), 8.14 (d, 3.6Hz, 1H), 7.79-7.55 (m, 3H), 7.06 (t, 6Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 163.7, 151.2, 147.7, 138.7, 139.9, 133.3, 129.9, 126.5, 122.5, 120.4, 114.7.	
11	***N*-(pyridin-2-yl)furan-2-carboxamide (3k)**: [1] White solid, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.83 (s, 1H), 8.33 (d, 8.7Hz, 2H), 7.77-7.74 (m, 1H), 7.54 (s, 1H), 7.28 (d, 3.3Hz, 1H), 7.09-7.05 (m, 1H), 6.58-6.57 (m, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 156.2, 150.9, 147.9, 144.7, 138.4, 119.9, 115.9, 114.1, 112.6.	
12	***N*-(pyridin-2-yl) anthracene-9-carboxamide (3l):** Yellow crystal, ^{1}H NMR (300 MHz, $CDCl_3$) δ: 9.88 (s,1H), 8.54 (d, 2H, 6Hz), 8.13 (d, 2H, 8.1Hz), 8.03 (d, 8.1Hz, 2H), 7.71-7.65 (m, 1H), 7.57-7.47 (m, 4H), 7.21 (d, 4.2Hz, 1H), 6.78-6.74 (m, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ: 168.4, 151.4, 147.2, 138.4, 130.9, 128.7, 128.5, 127.9, 127.2, 126.9, 125.6, 124.7, 119.8, 114.3. HRMS (ES) m/z 299.1188 [M+H, 100].	

References

1. S. Yang, H. Yan, X. Ren, X. Shi, J. Li, Y. Wang and G. Huang, Tetrahedron, 2013, **69**, 6431.
2. K. Yan, D. Yang, W. Wei, G. Li, M. Sun, Q. Zhang, L. Tian and H. Wang, RSC Adv., 2015, **5**, 100102.
3. E. S. Devi, A. Alanthadka, A. Tamilselvi, S. Nagarajan, V. Sridharana and C. U. Maheswari, Org. Biomol. Chem., 2016, **14**, 8228.
4. V. Pappula, C. Ravi, S. Samanta and S. Adimurthy, ChemistrySelect, 2017, **2**, 5887.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7.025
7.020
O
N
N
H
3a
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4
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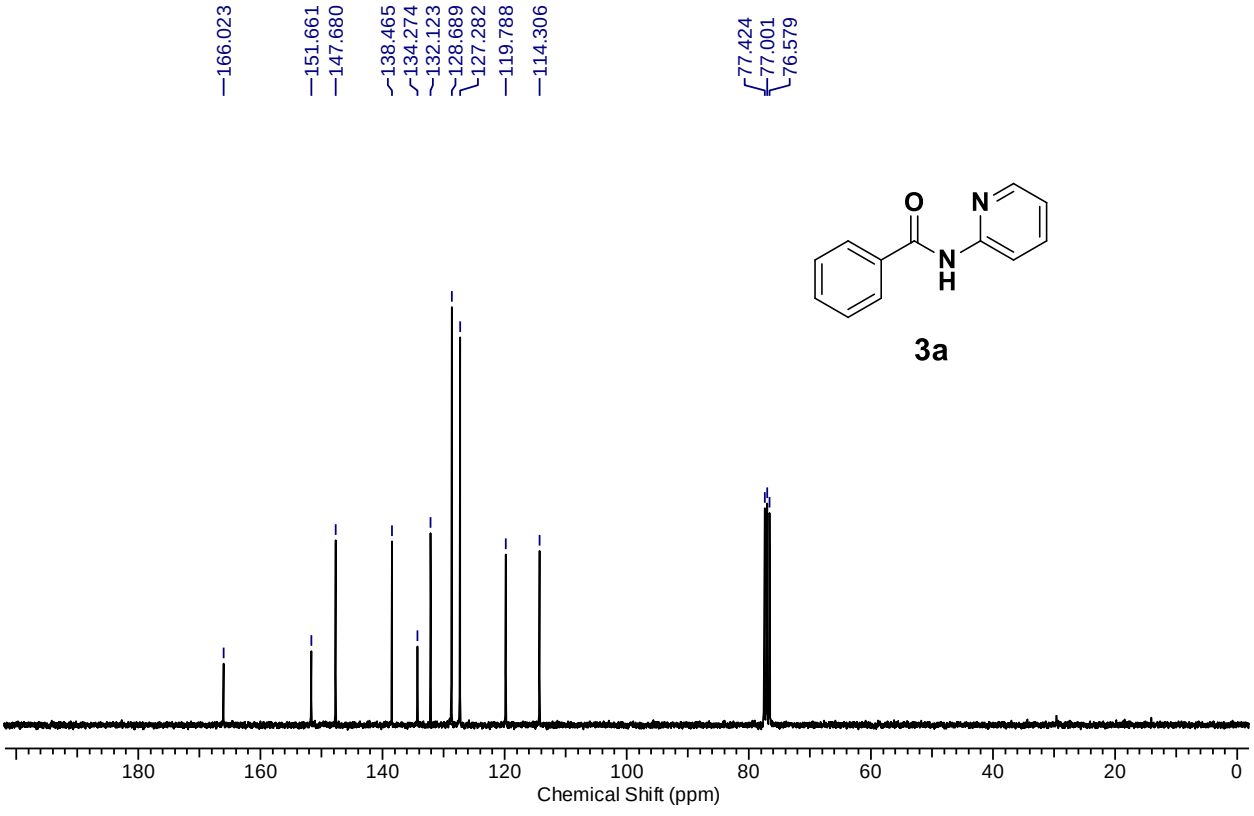
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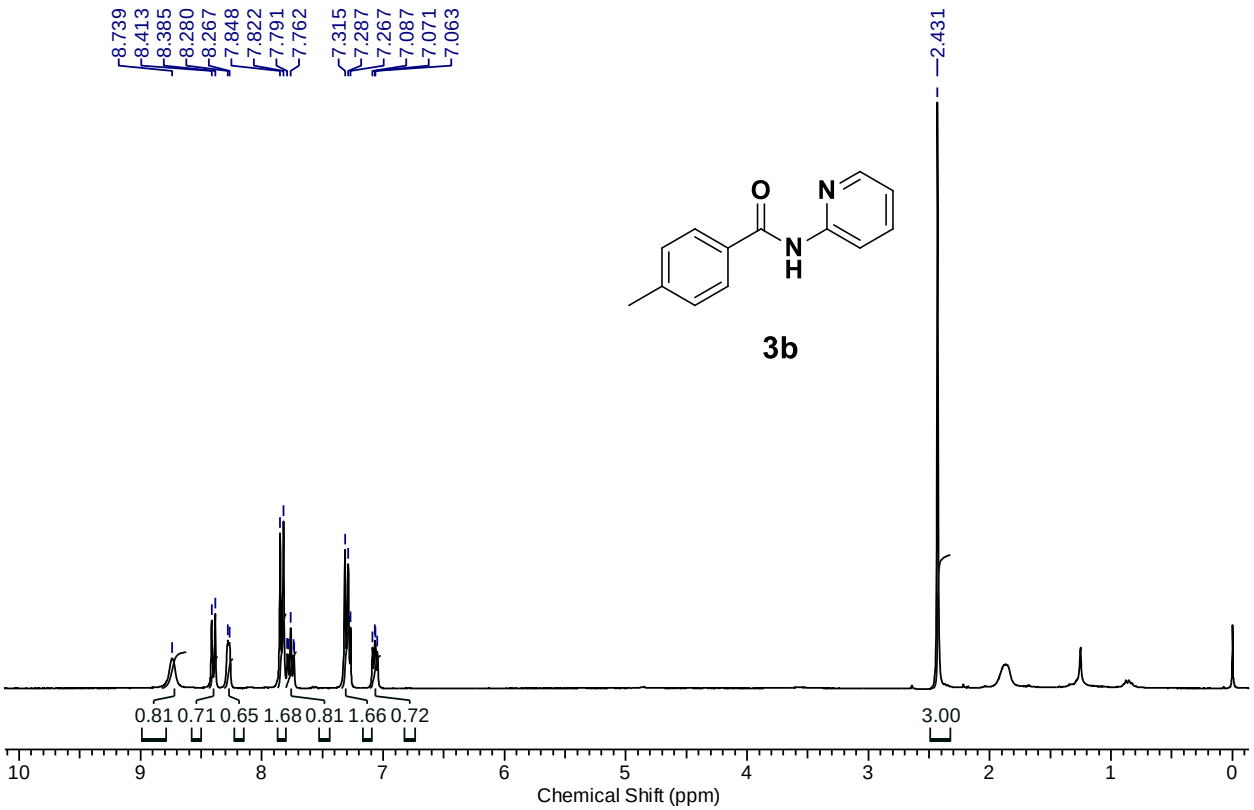
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7.087
7.071
7.063
2.431
O
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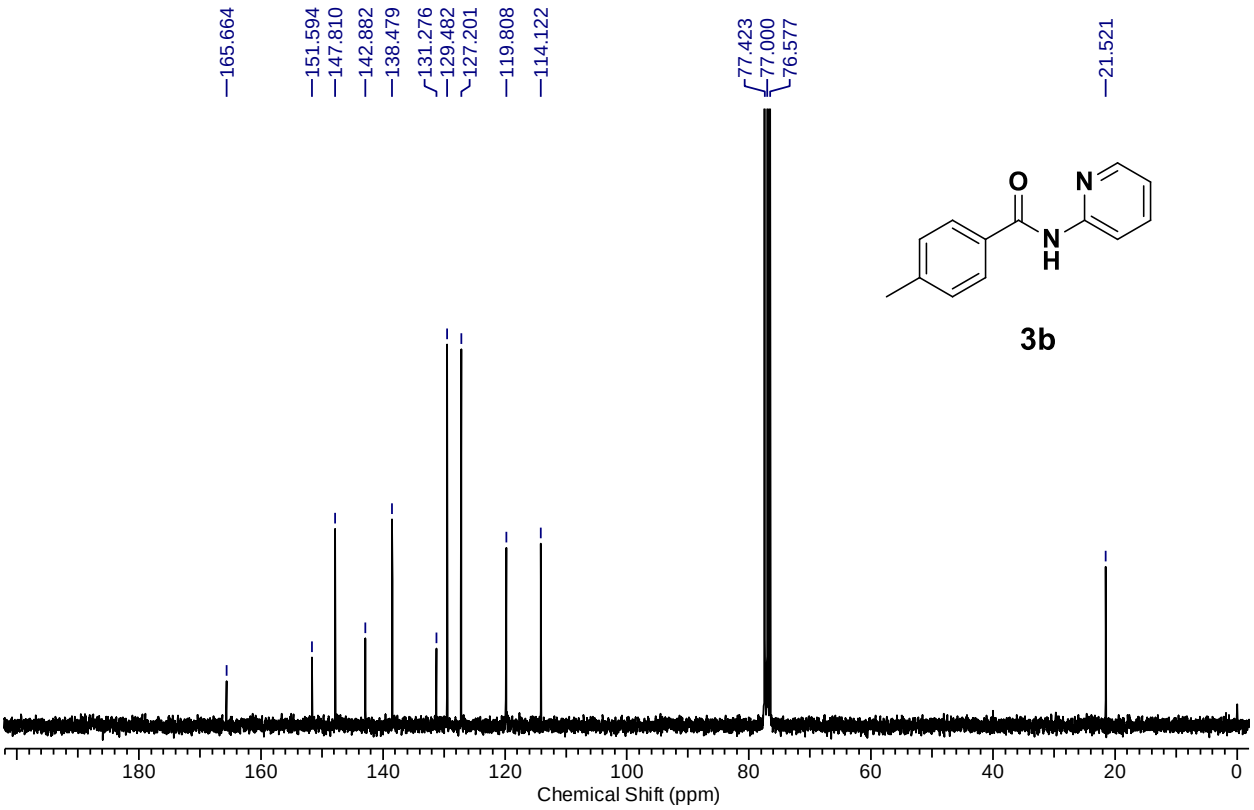
Chemical Shift (ppm)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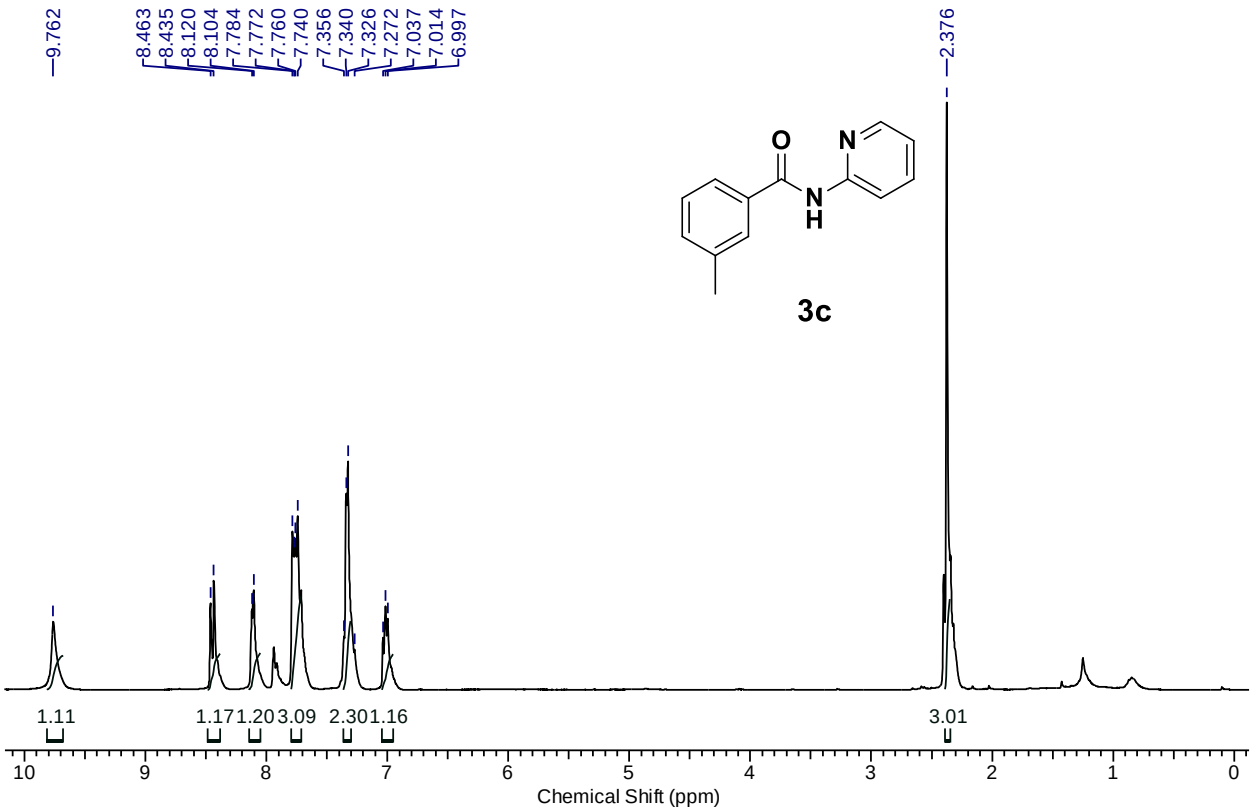
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7.037
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N
H
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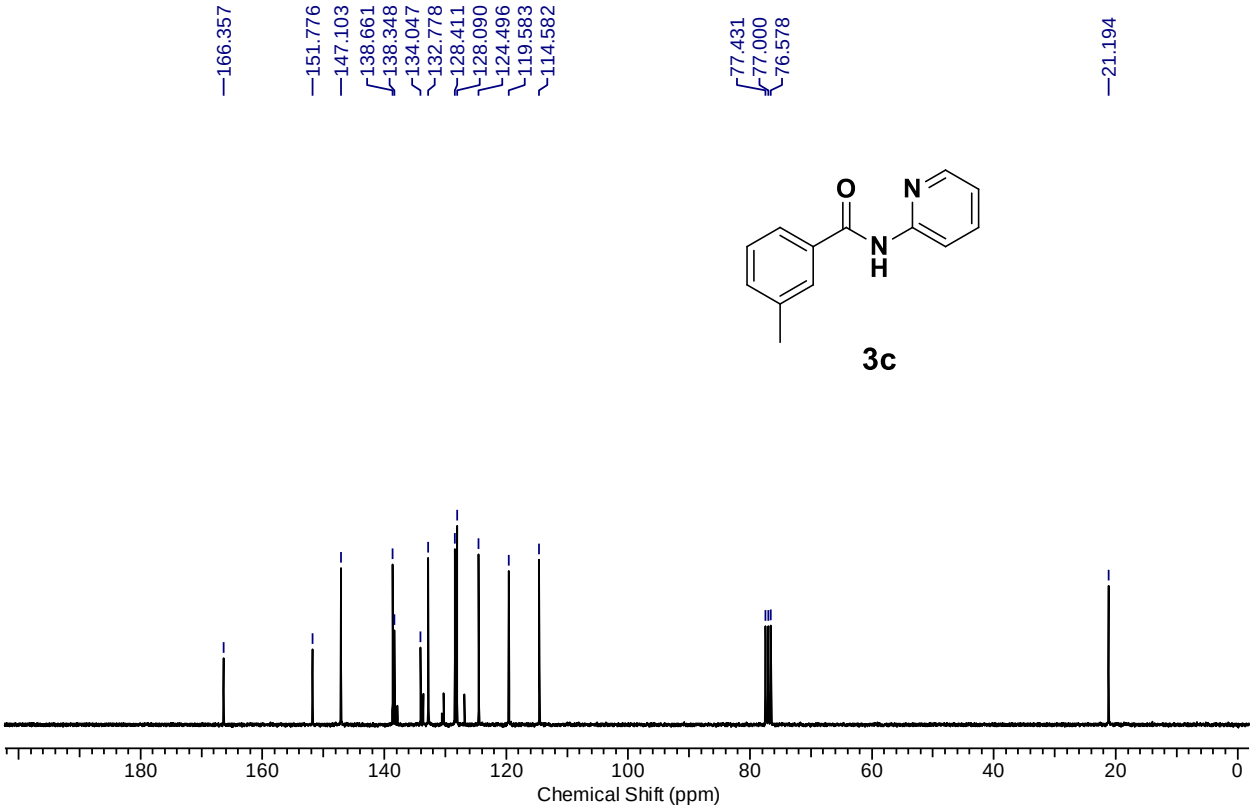
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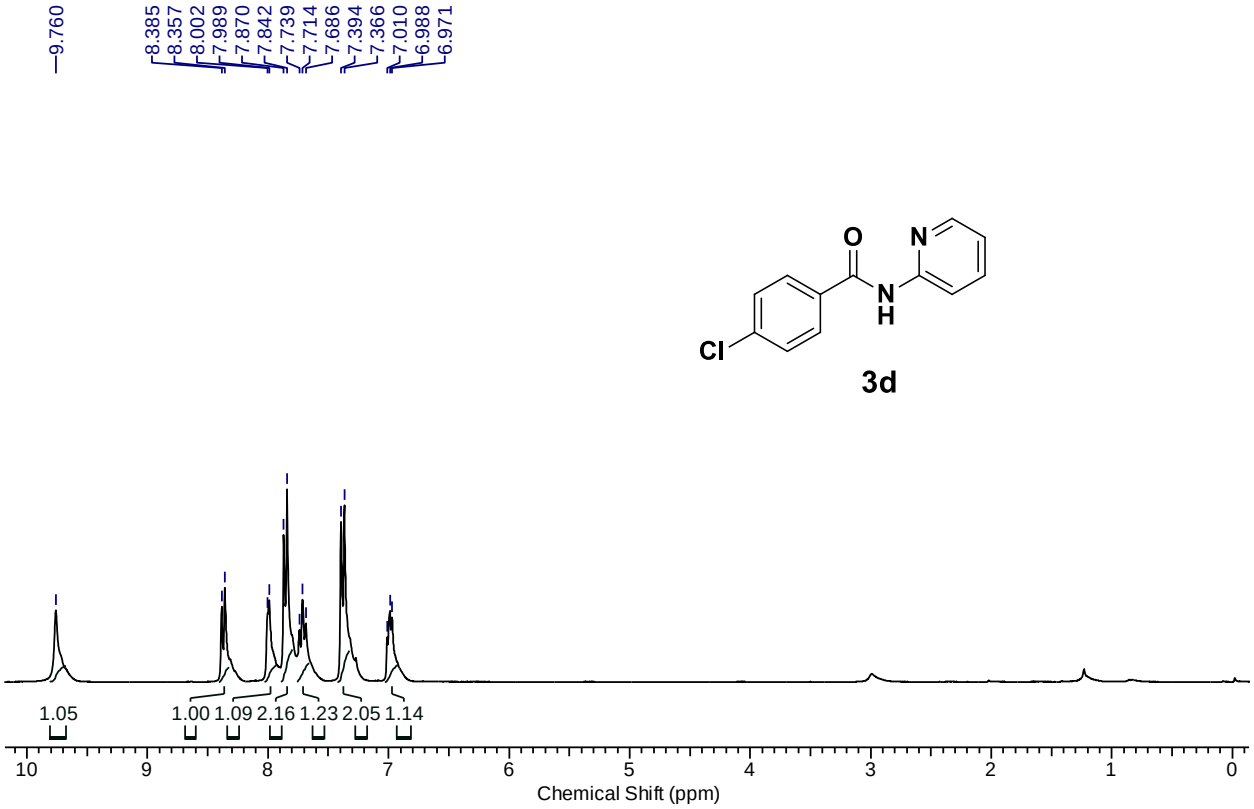
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H
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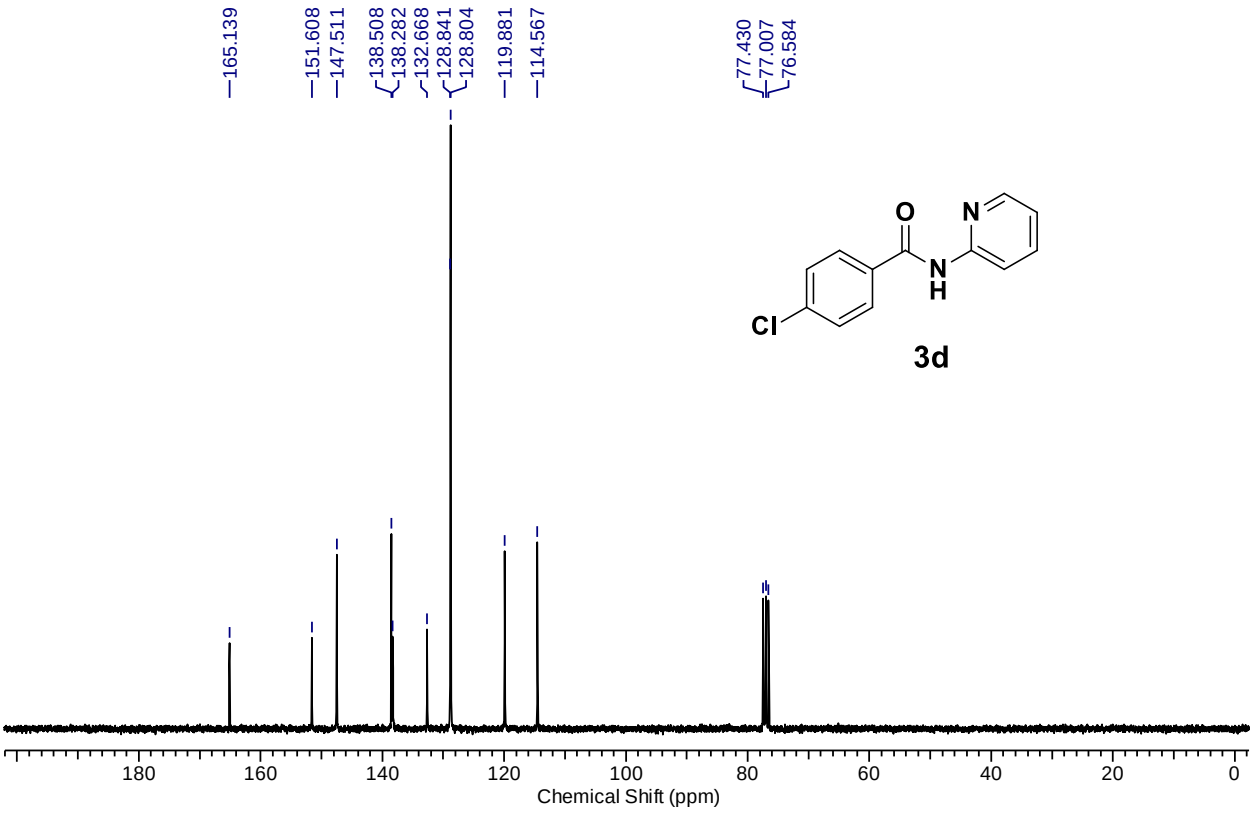
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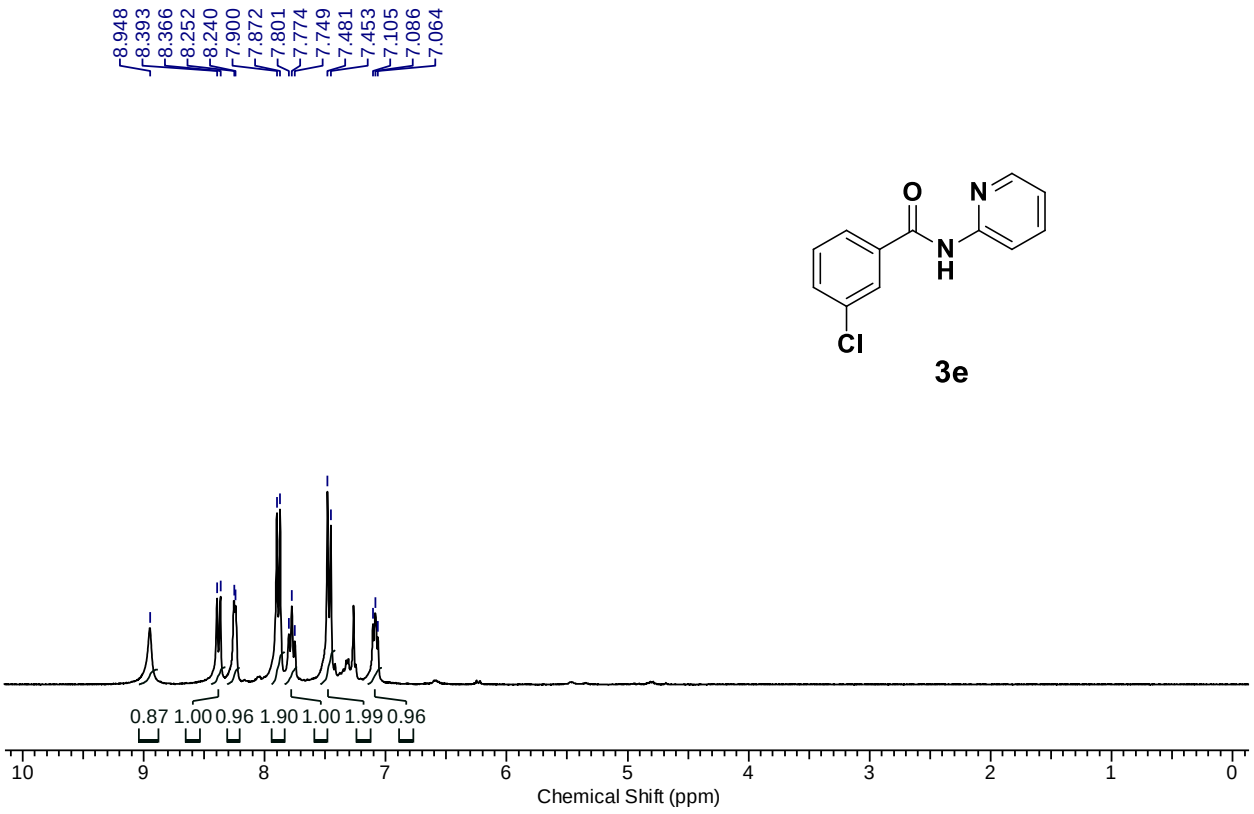
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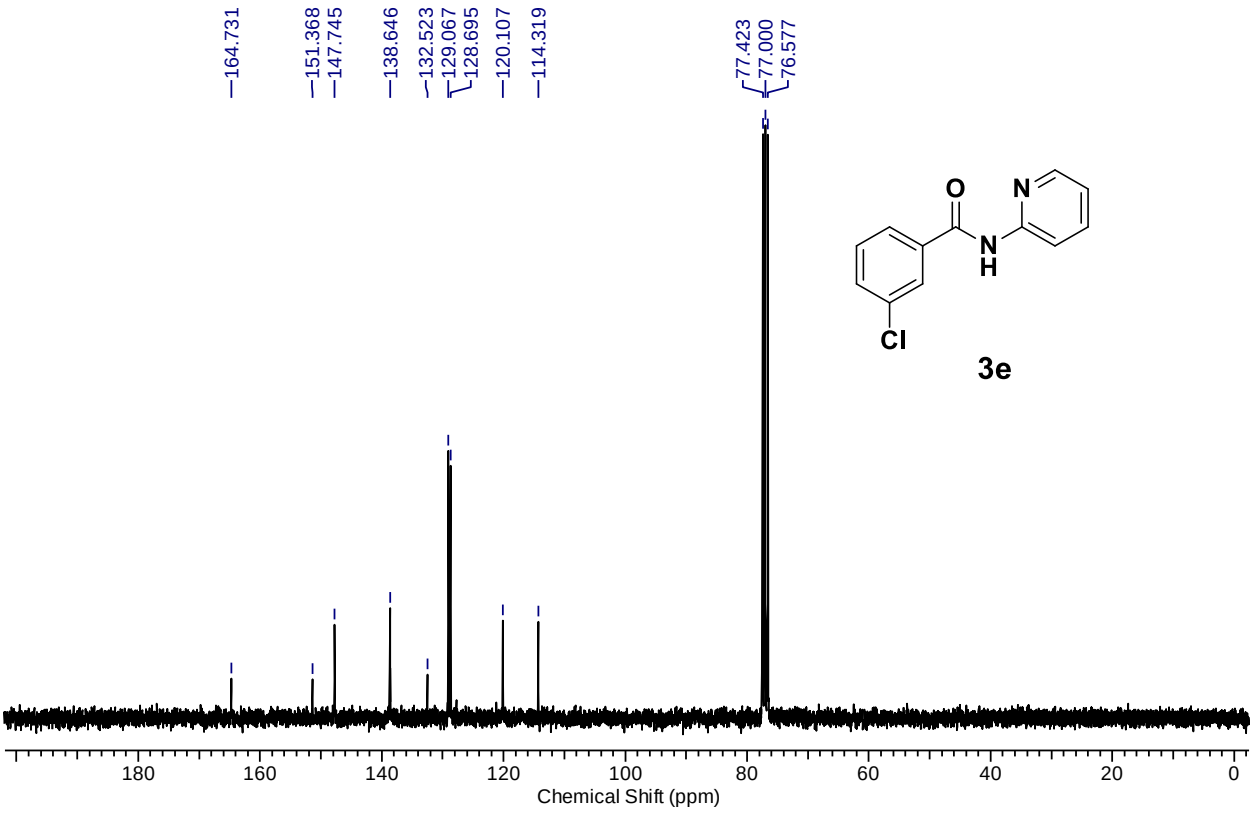
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H
Cl
3e
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Chemical Shift (ppm)


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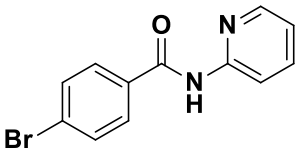
O
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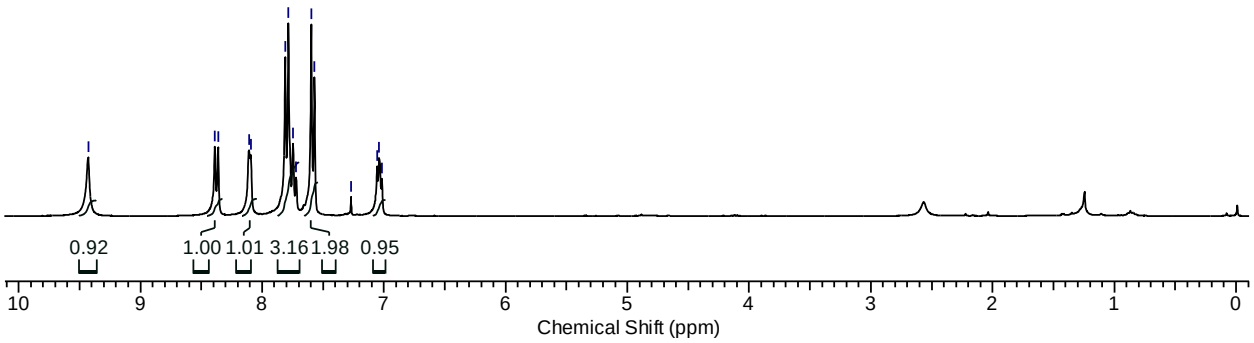
Br

3f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1
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Chemical Shift (ppm)


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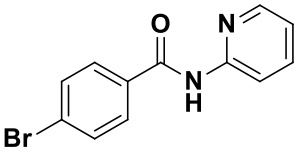
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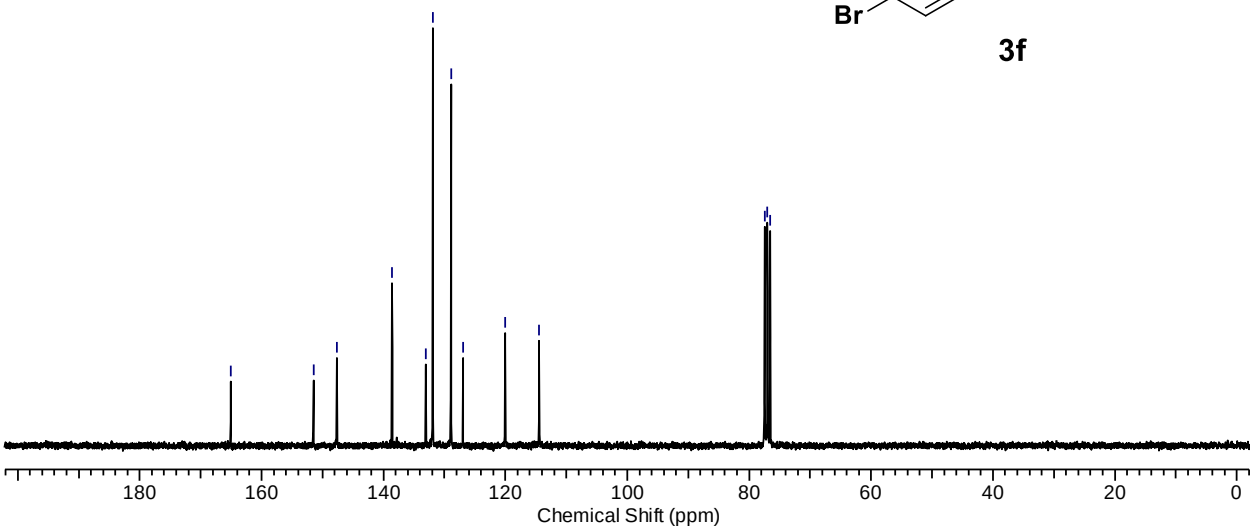
Br

3f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60
40
20
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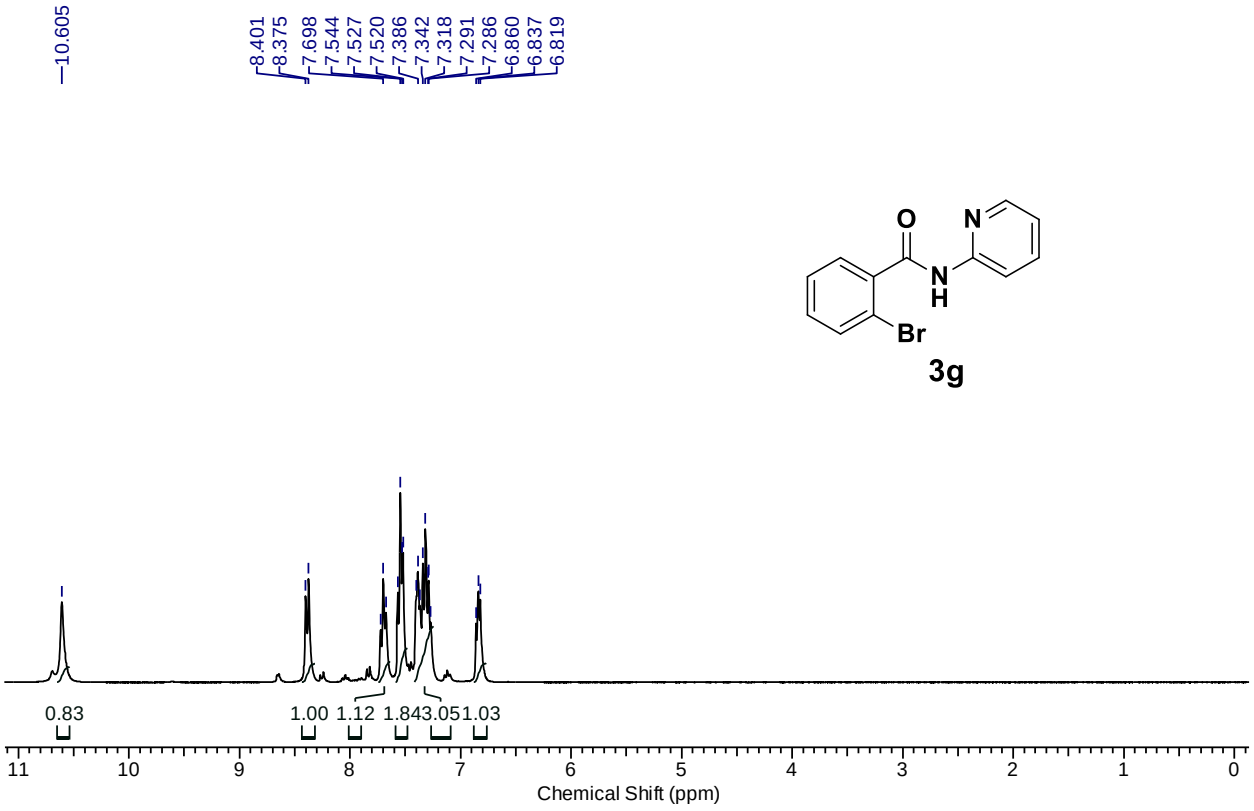
Chemical Shift (ppm)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7.286
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6.837
6.819
O
N
N
H
Br
3g
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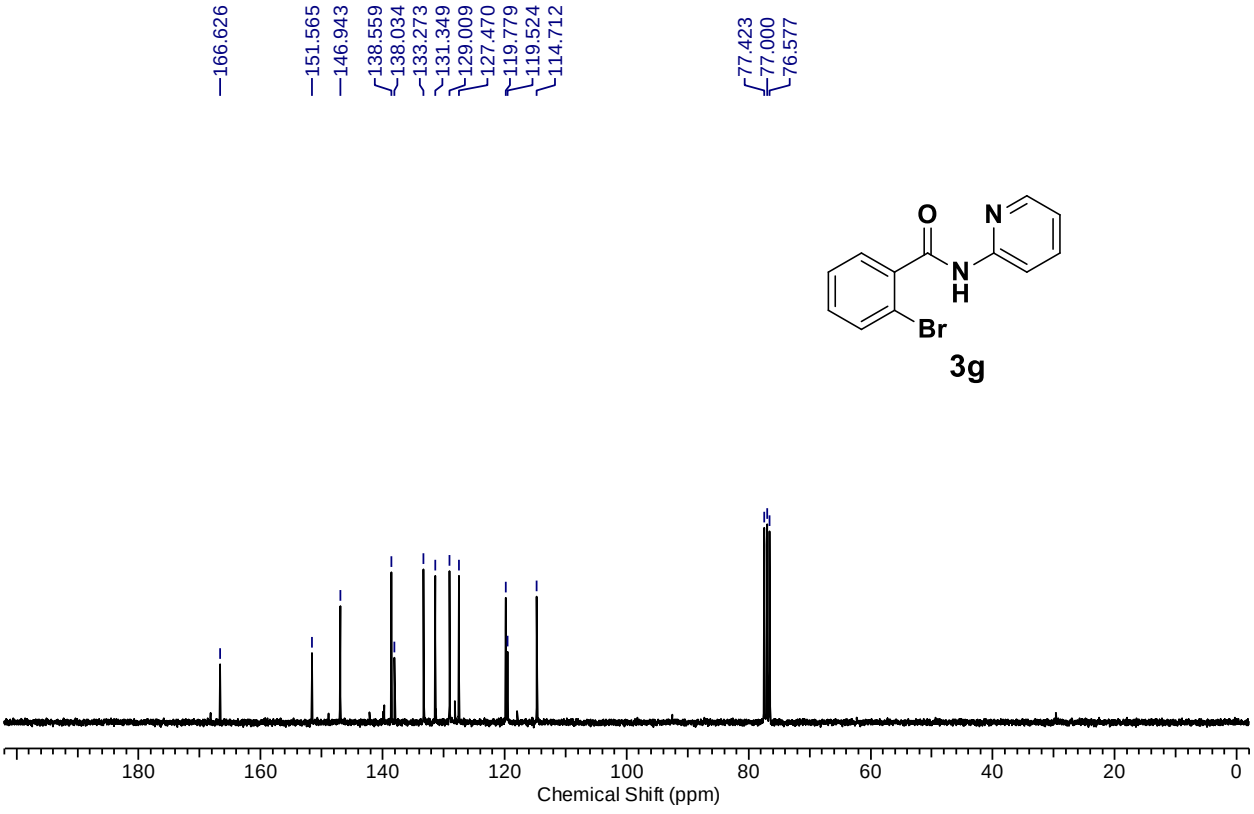
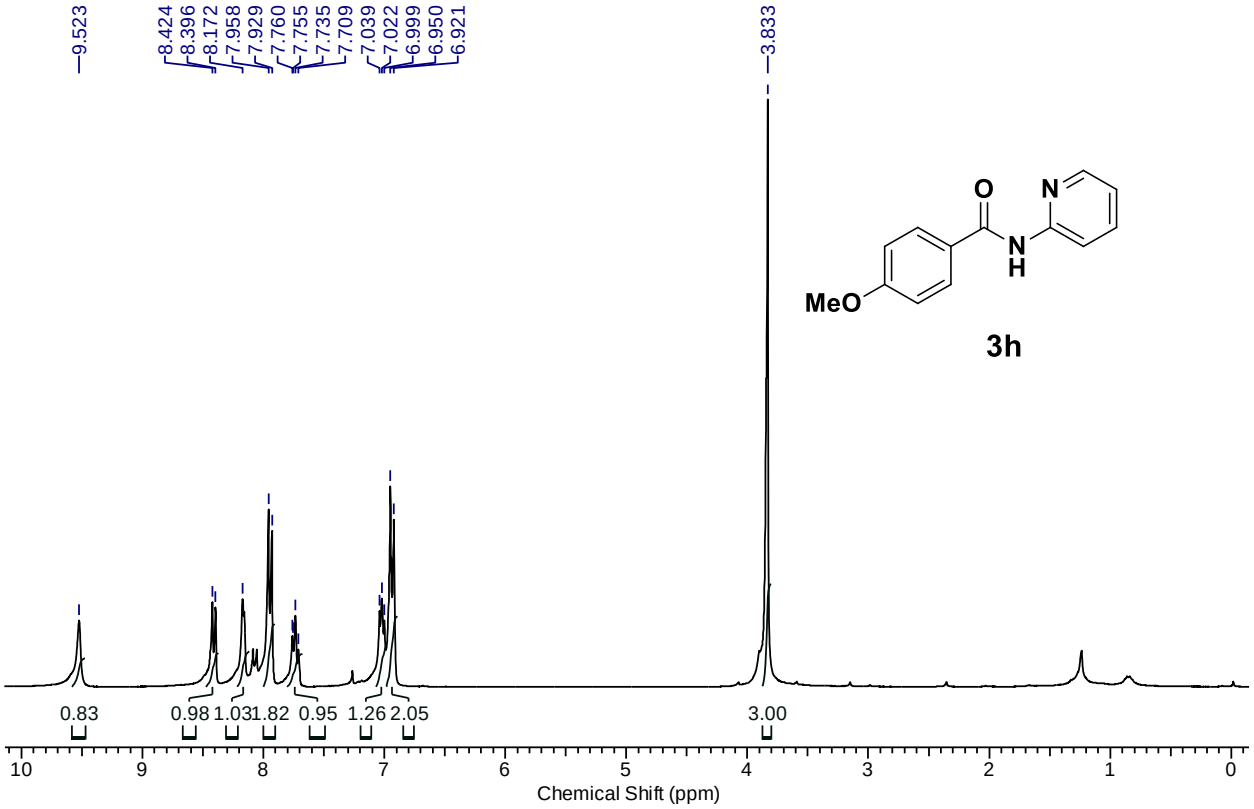
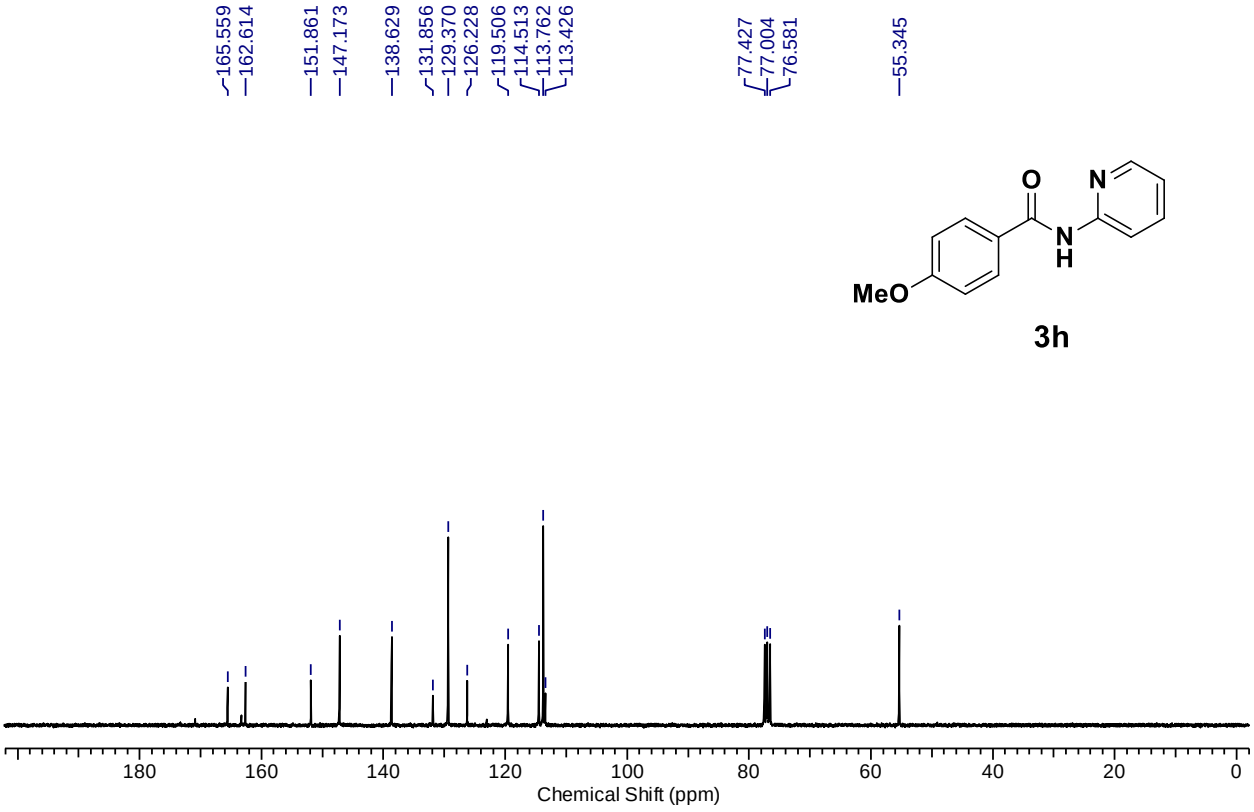
1.00
1.12
1.84
3.05
1.03
11
10
9
8
7
6
5
4
3
2
1
0
Chemical Shift (ppm)

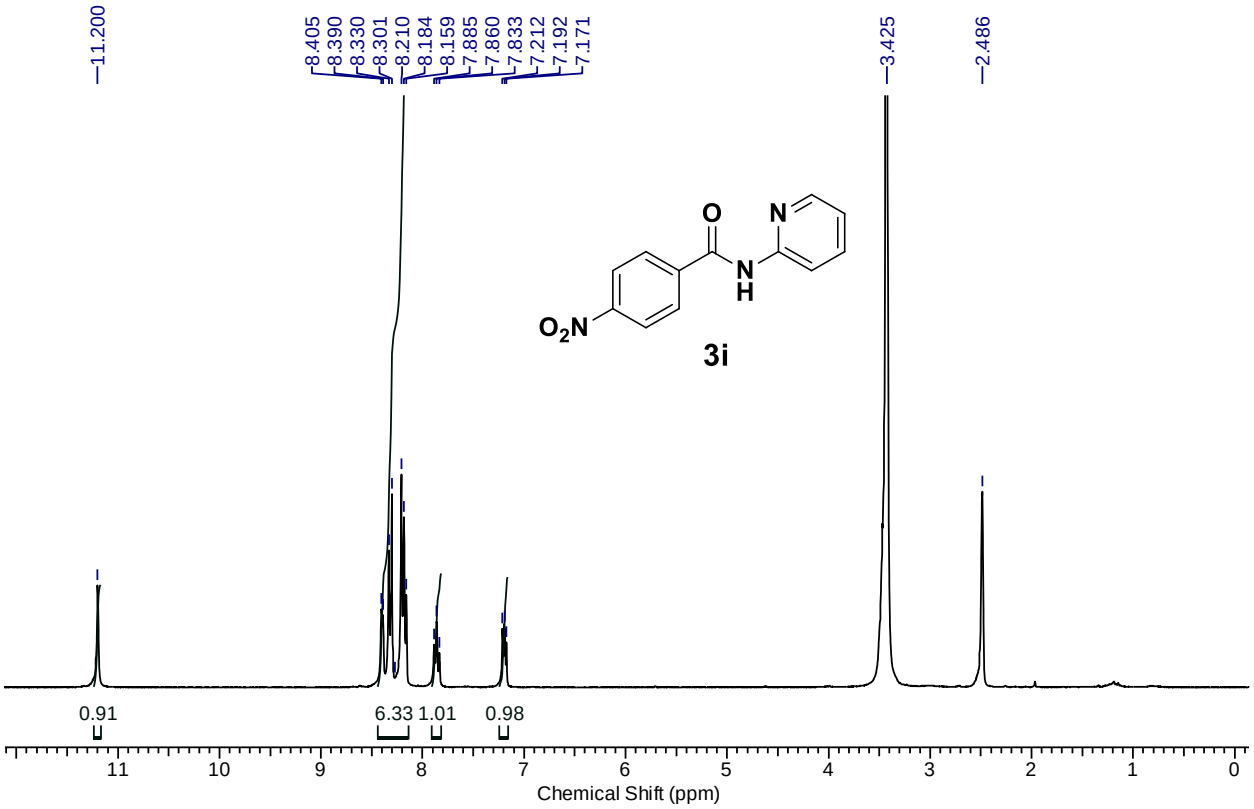

166.626
151.565
146.943
138.559
138.034
133.273
131.349
129.009
127.470
119.779
119.524
114.712
77.423
77.000
76.577
O
N
N
H
Br
3g
180
160
140
120
100
80
60
40
20
0
Chemical Shift (ppm)

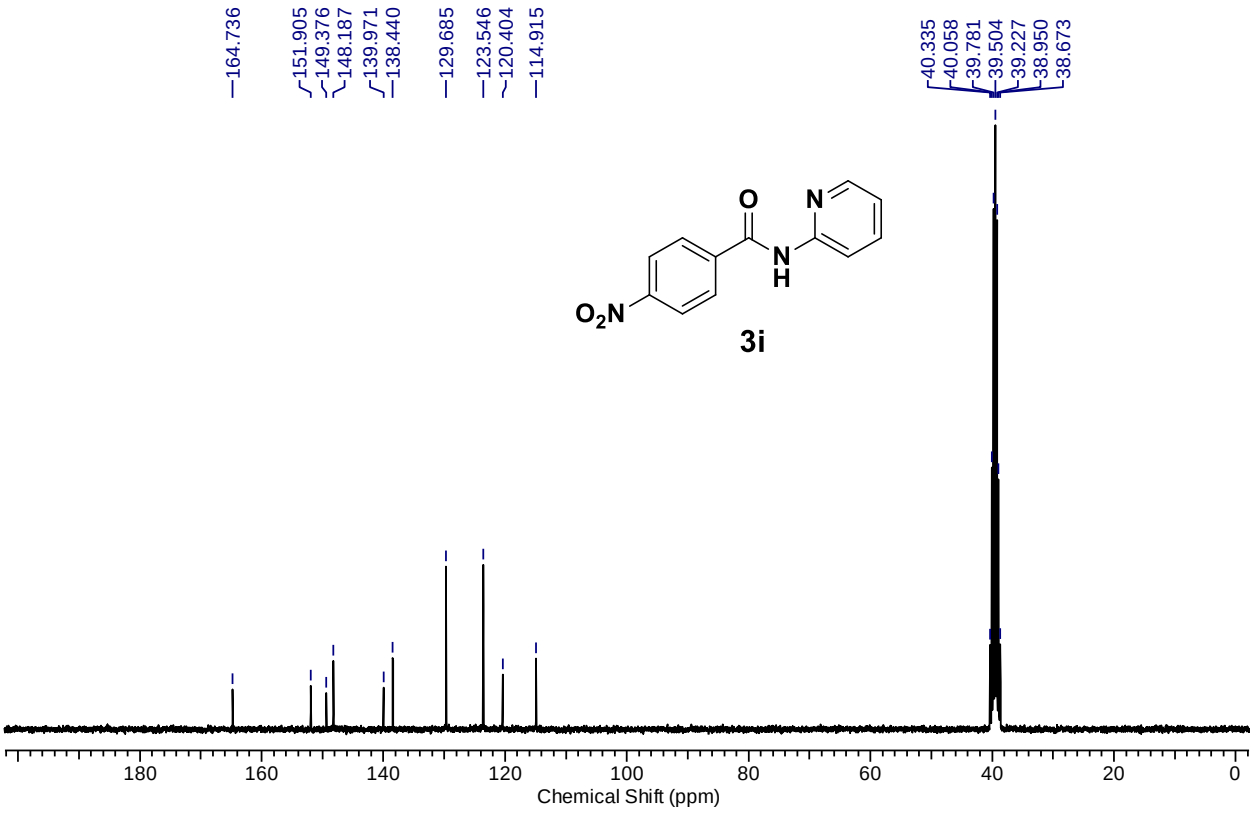

9.523
8.424
8.396
8.172
7.958
7.929
7.760
7.755
7.735
7.709
7.039
7.022
6.999
6.950
6.921
3.833
O
N
N
H
MeO
0.83
0.98
1.03
1.82
0.95
1.26
2.05
3.00
10
9
8
7
6
5
4
3
2
1
0
Chemical Shift (ppm)

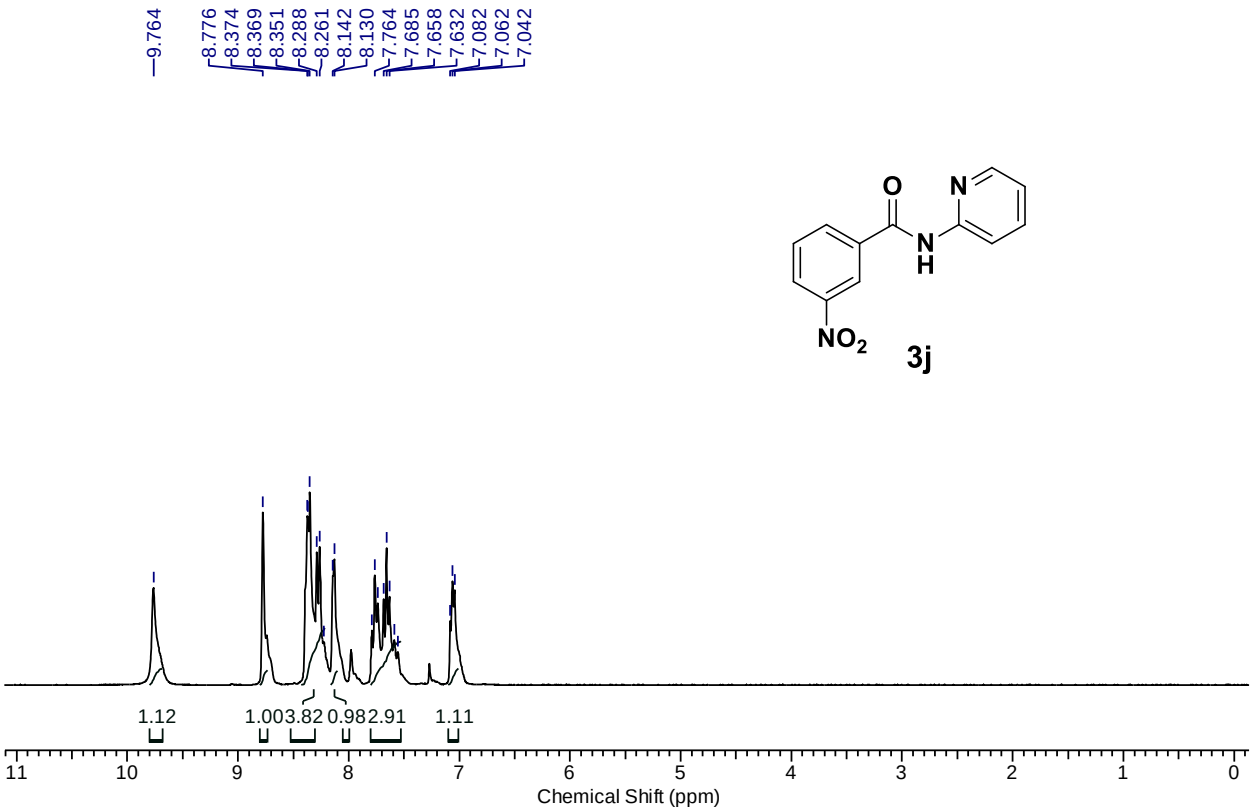
3h

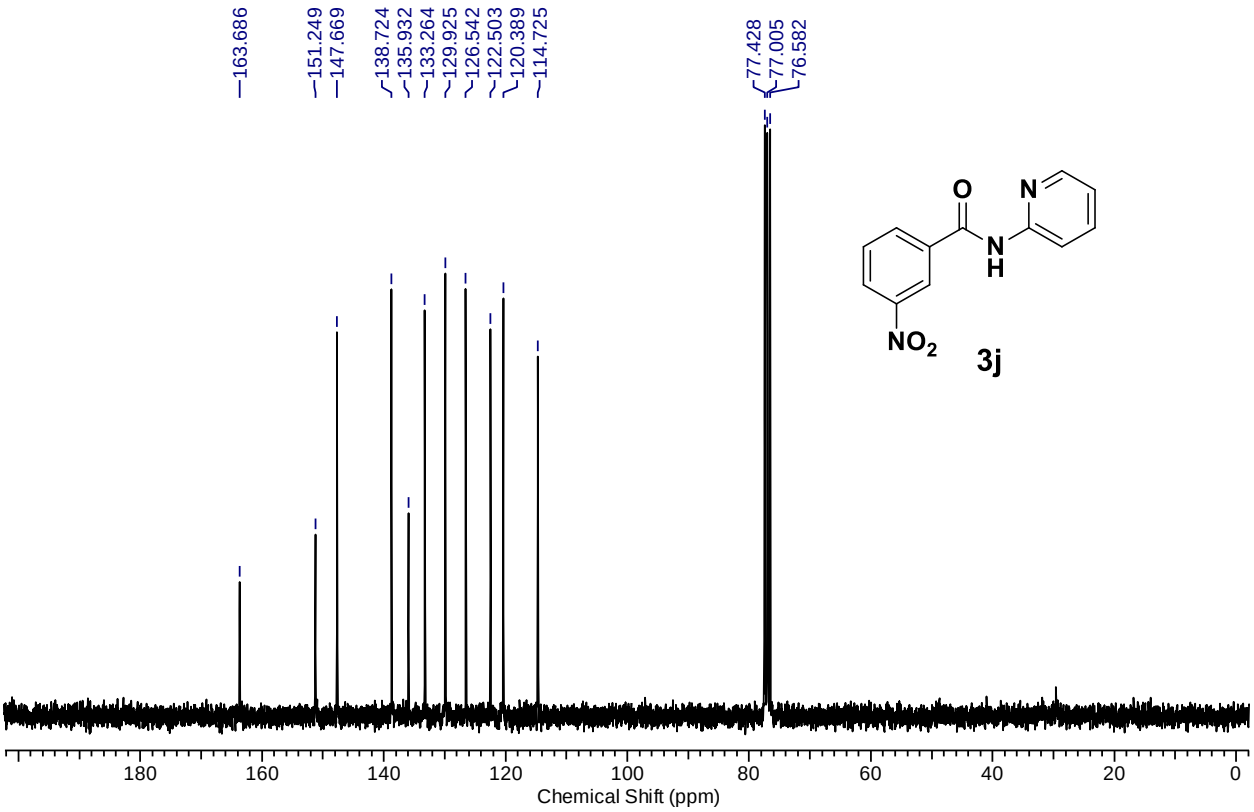

165.559
162.614
151.861
147.173
138.629
131.856
129.370
126.228
119.506
114.513
113.762
113.426
77.427
77.004
76.581
55.345
O
N
N
H
MeO
180
160
140
120
100
80
60
40
20
0
Chemical Shift (ppm)

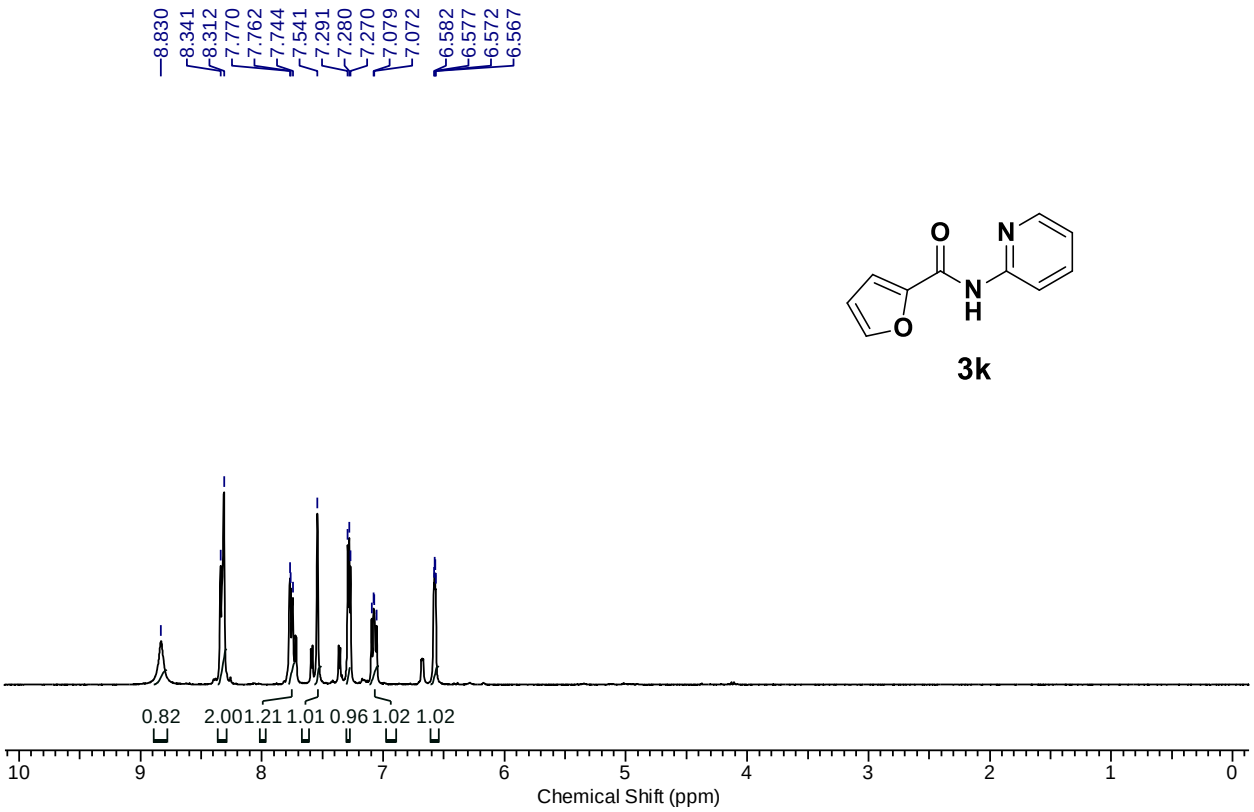
3h

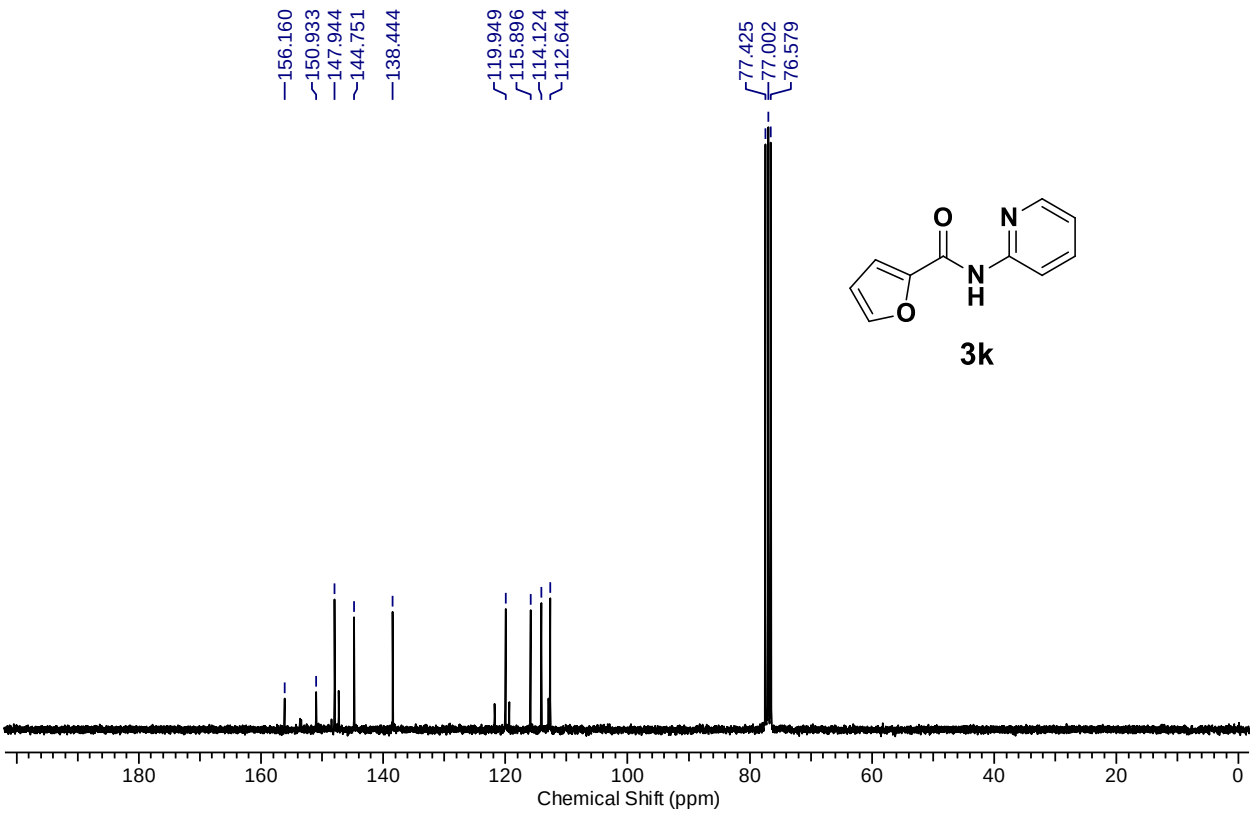

11.200
8.405
8.390
8.330
8.301
8.210
8.184
8.159
7.885
7.860
7.833
7.212
7.192
7.171
3.425
2.486
O
N
N
H
O2N
3i
0.91
6.33
1.01
0.98
Chemical Shift (ppm)

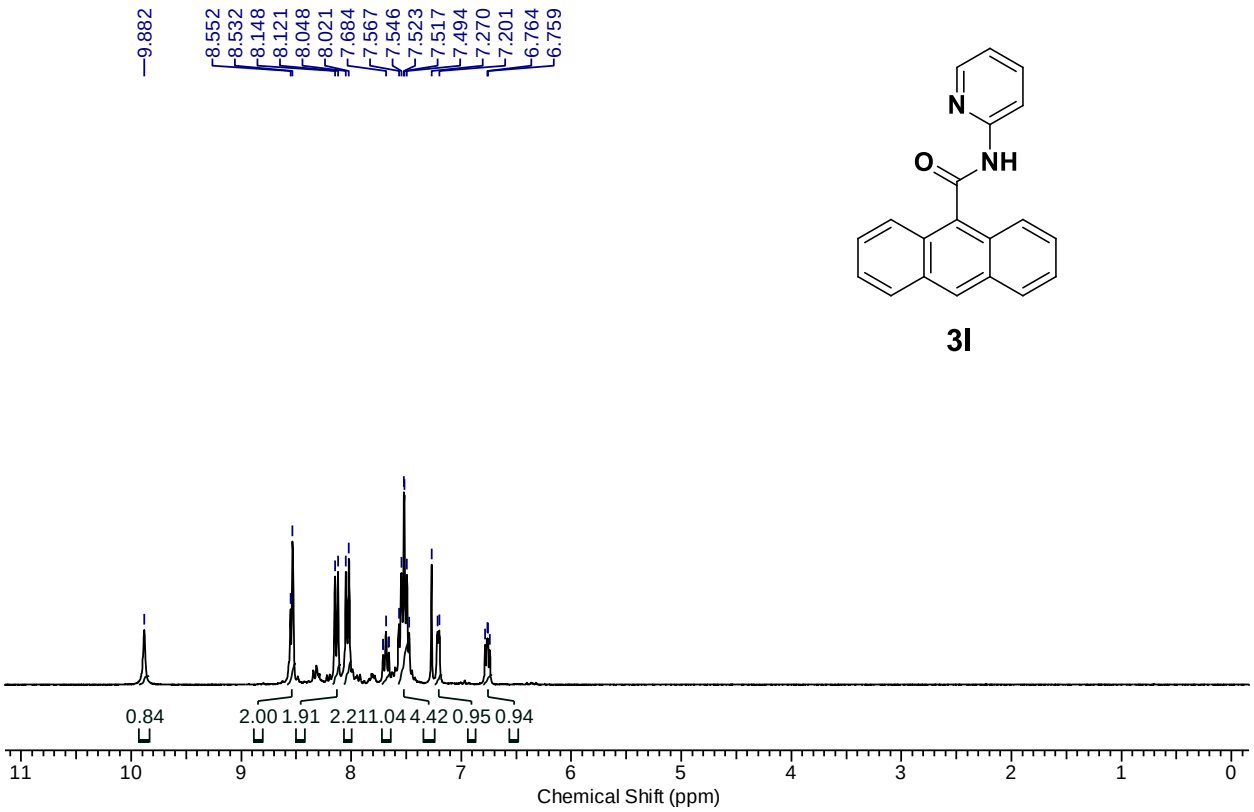

164.736
151.905
149.376
148.187
139.971
138.440
129.685
123.546
120.404
114.915
40.335
40.058
39.781
39.504
39.227
38.950
38.673
O
N
N
H
O2N
3i
Chemical Shift (ppm)


9.764
8.776
8.374
8.369
8.351
8.288
8.261
8.142
8.130
7.764
7.685
7.658
7.632
7.082
7.062
7.042
O
N
N
H
NO2
3j
1.12
1.00
3.82
0.98
2.91
1.11
Chemical Shift (ppm)

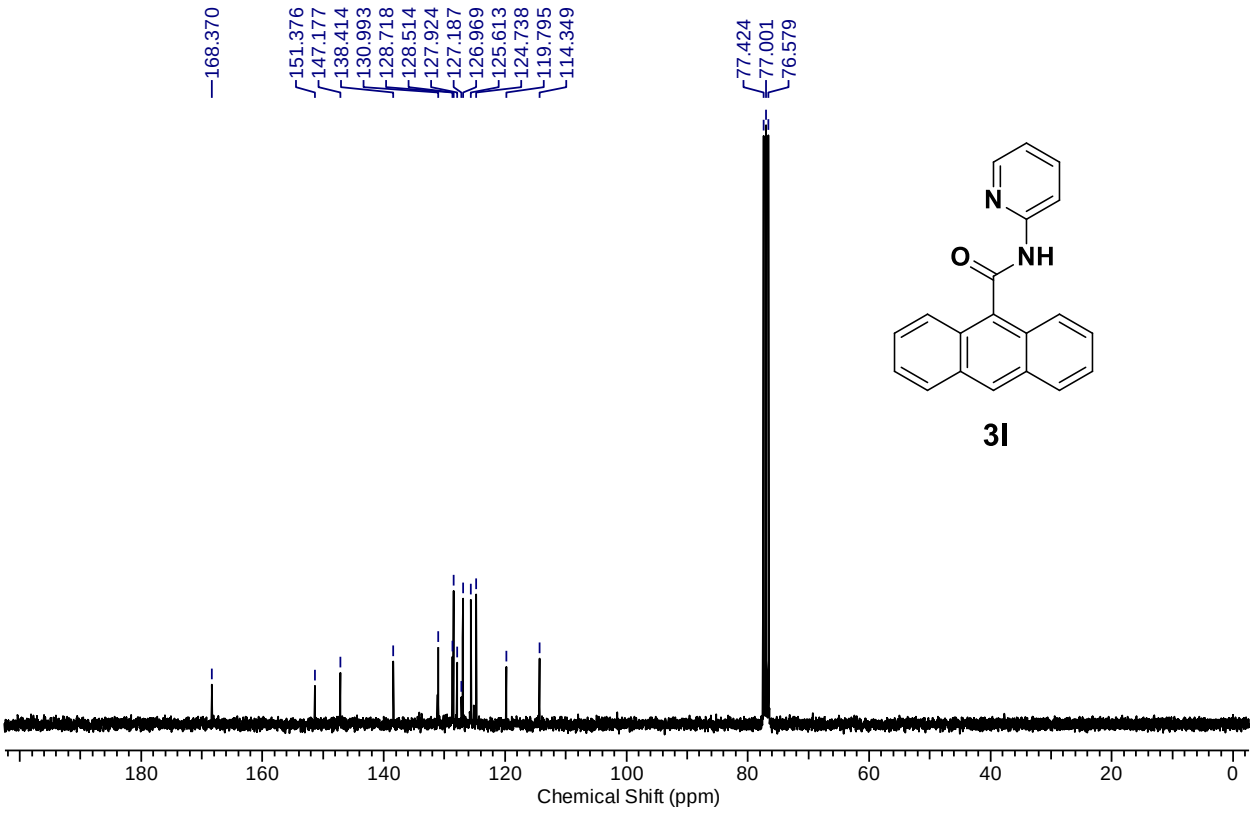

163.686
151.249
147.669
138.724
135.932
133.264
129.925
126.542
122.503
120.389
114.725
77.428
77.005
76.582
O
N
N
H
NO2
3j
Chemical Shift (ppm)


8.830
8.341
8.312
7.770
7.762
7.744
7.541
7.291
7.280
7.270
7.079
7.072
6.582
6.577
6.572
6.567
O
N
N
H
O
3k
0.82
2.00
1.21
1.01
0.96
1.02
1.02
10
9
8
7
6
5
4
3
2
1
0
Chemical Shift (ppm)


156.160
150.933
147.944
144.751
138.444
119.949
115.896
114.124
112.644
77.425
77.002
76.579
O
N
N
H
O
3k
180
160
140
120
100
80
60
40
20
0
Chemical Shift (ppm)

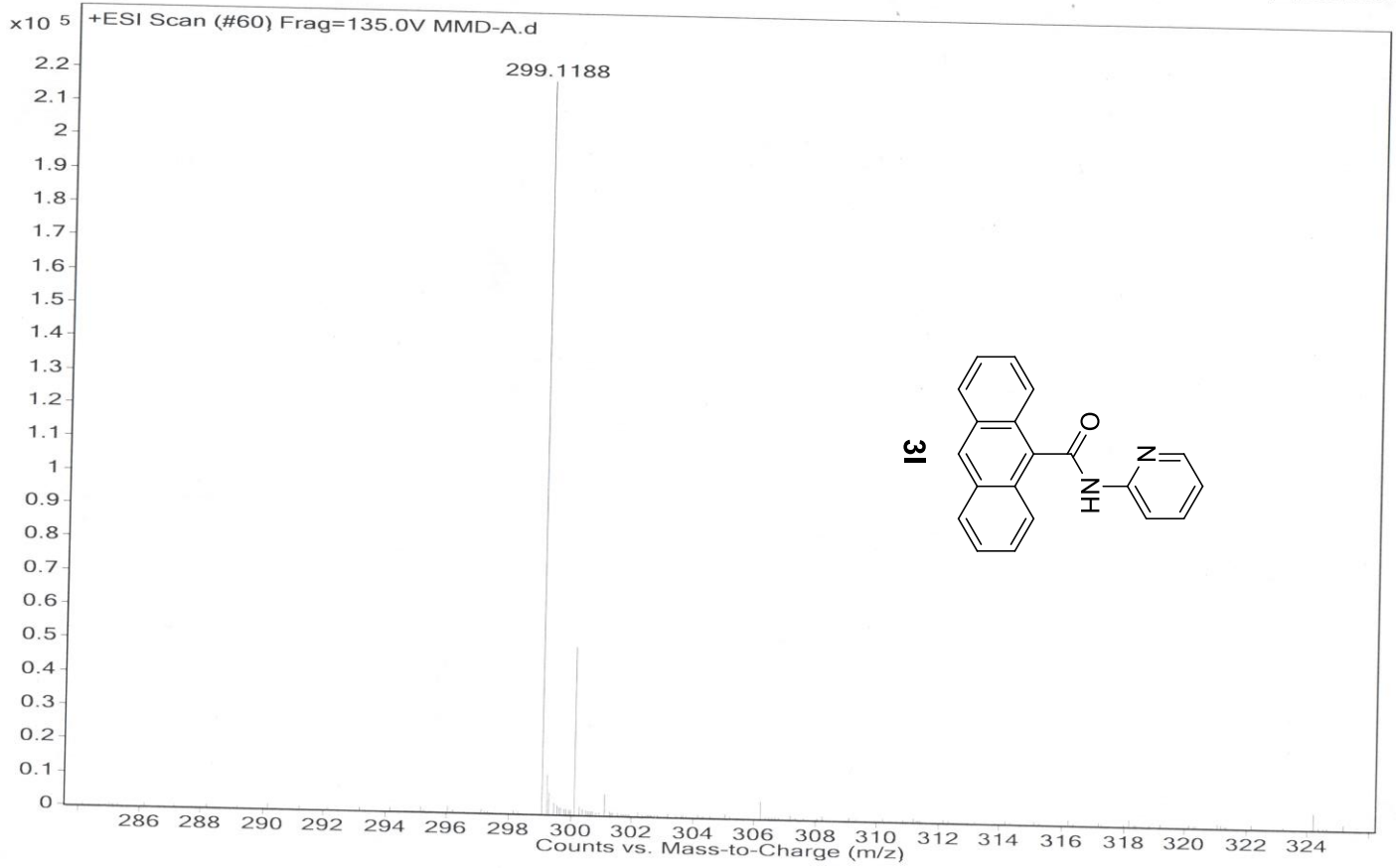

9.882
8.552
8.532
8.148
8.121
8.048
8.021
7.684
7.567
7.546
7.523
7.517
7.494
7.270
7.201
6.764
6.759
N
O
NH
0.84
2.00
1.91
2.21
1.04
4.42
0.95
0.94
Chemical Shift (ppm)

3l


168.370
151.376
147.177
138.414
130.993
128.718
128.514
127.924
127.187
126.969
125.613
124.738
119.795
114.349
77.424
77.001
76.579
N
O
NH
Chemical Shift (ppm)

3l

Sample Name	MMD-A	**Position**	Vial 1	**Instrument Name**	QTOF	**User Name**	
Inj Vol	-1	**InjPosition**		**SampleType**	Sample	**IRM Calibration Status**	Success
Data Filename	MMD-A.d	**ACQ Method**		**Comment**		**Acquired Time**	8/30/2018 4:45:27 PM



3l