Electronic Supplementary Material (ESI) for RSC Advances.

NH_4PF_6-Promoted Cyclodehydration of α-Amino Carbonyl Compounds: Efficient Synthesis of Pyrrolo[3,2,1-*ij*]quinoline and Indole derivatives

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Supporting Information

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1. General information

^{1}H and ^{13}C NMR spectra were measured on a Bruker Avance-Ⅲ 500 instrument (500 MHz for ^{1}H, 125 MHz for ^{13}C NMR spectroscopy) using $CDCl_3$ as the solvent. Chemical shifts for ^{1}H and ^{13}C NMR were referred to internal Me_4Si (0 ppm) as the standard. Mass spectra were measured on a Shimadzu GC-MS-QP2010 Plus spectrometer (EI). HRMS (ESI) analysis was measured on a Bruker micrOTOF-Q II instrument. The following abbreviations (or combinations thereof) were used to explain multiplicities: s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet.

2. Evaluating Lewis acid and Bronsted acids for the reaction [a]

1a **2a**

entry	Additive (equiv)	Solvent	Yield (%)[b]
1	$FeCl_3$ (0.5)	HFIP	8
2	$ZnCl_2$ (0.5)	HFIP	8
3	$AlCl_3$ (0.5)	HFIP	12
4	AgOTf (0.5)	HFIP	10
5[c]	H_2SO_4 (2)	HFIP	22
6[d]	HCl (2)	HFIP	47
7[e]	HPF_6 (2)	HFIP	33
8	AcOH (2)	HFIP	trace
9	TsOH (2)	HFIP	12
10	TsOH (2)	CH_3CN	16
11	CF_3COOH (2)	HFIP	32
12	CF_3COOH (2)	CH_3CN	0

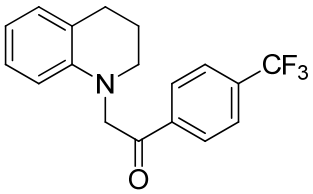
[a] Reaction conditions: **1a** (0.2 mmol), additive (0.5 – 2 equiv) in solvent (2 mL) at 110 °C for 24 h. [b] Isolated yields. [c] H_2SO_4 (98%). [d] HCl (36%). [e] HPF_6 (60% in water).

3. General Experimental Procedure

General procedure for NH_4PF_6-promoted synthesis of pyrrolo[3,2,1-*ij*]quinolines and indoles:

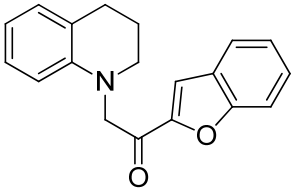
A 15-mL tube with a Teflon cap, equipped with a magnetic stirring bar, was charged with substrate (0.20 mmol) and NH_4PF_6 (65.2 mg, 0.40 mmol, 2.0 equiv), and then HFIP (2 mL) was added. The tube was then capped and submerged in a preheated oil bath at 110 °C. The reaction mixture was stirred for 24 h and cooled to room temperature. The crude reaction mixture was diluted with AcOEt, filtered through a Celite pad, and washed with AcOEt. The filtrate was concentrated *in vacuo*, and the resulting residue was purified by column chromatography, using hexane/EtOAc as the eluent.

4. Analytical data for the following compounds 1i, 1l, 1q, 2a – 2n, 3m and 4a – 4n:

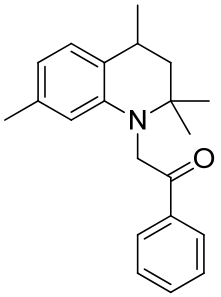


2-(3,4-dihydroquinolin-1(2H)-yl)-1-(4-(trifluoromethyl)phenyl)ethanone (1i). Yellow solid. M.P.: 128.6 – 129.3℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.09 (d, *J* = 8.0 Hz, 2H), 7.78 (d, *J* = 8.0 Hz, 2H), 6.99 – 6.95 (m, 2H), 6.64 (t, *J* = 7.5 Hz, 1H), 6.30 (d, *J* = 8.5 Hz, 1H), 4.71 (s, 2H), 3.39 (t, *J* = 6.0 Hz, 2H), 2.83 (t, *J* = 6.5 Hz, 2H), 2.09 – 1.98 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 196.1, 144.8,

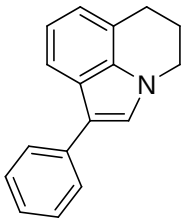
138.2, 134.8 (q, J_{C-F} = 32.6Hz), 129.3, 128.2, 127.1, 125.9 (q, J_{C-F} = 3.6Hz), 123.5 (d, J_{C-F} = 271.3Hz), 123.0, 117.0, 110.2, 58.1, 50.6, 27.9, 22.3. LRMS (EI, 70 eV) *m/z* (%): 319 (16), 301 (11), 146 (100), 130 (11), 118 (9). HRMS (ESI) for $C_{18}H_{17}F_3NO$ $(M+H)^+$: calcd 320.1257, found 320.1270.



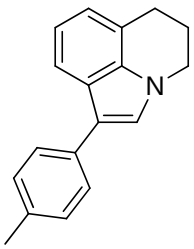
1-(benzofuran-2-yl)-2-(3,4-dihydroquinolin-1(2H)-yl)ethanone (1l). Yellow solid. M.P.: 115.1 – 116.3℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.72 – 7.70 (m, 1H), 7.60 – 7.58 (m, 2H), 7.51 – 7.48 (m, 1H), 7.34 – 7.31 (m, 1H), 6.99 – 6.96 (m, 2H), 6.63 – 6.60 (m, 1H), 6.42 (d, *J* = 8.5 Hz, 1H), 4.65 (s, 2H), 3.44 (t, *J* = 6.0 Hz, 2H), 2.83 (t, *J* = 6.4 Hz, 2H), 2.06 – 2.02 (m, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 188.8, 155.5, 151.5, 145.0, 129.3, 128.5, 127.1, 126.9, 124.1, 123.5, 122.9, 116.9, 112.9, 112.5, 110.7, 58.2, 50.9, 28.0, 22.3. LRMS (EI, 70 eV) *m/z* (%): 291 (3), 273 (100), 244 (7), 189 (3), 136 (6). HRMS (ESI) for $C_{19}H_{18}NO_2$ $(M+H)^+$: calcd 292.1332, found 292.1326.



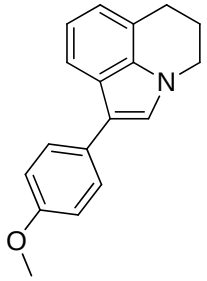
1-phenyl-2-(2,2,4,7-tetramethyl-3,4-dihydroquinolin-1(2H)-yl)ethanone (1q). Yellow solid. M.P.: 88.2-89.1℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.07 – 8.05 (m, 2H), 7.62 (t, *J* = 7.4 Hz, 1H), 7.53 – 7.49 (m, 2H), 7.05 (d, *J* = 7.7 Hz, 1H), 6.45 (d, *J* = 7.6 Hz, 1H), 5.91 (s, 1H), 4.84 (d, *J* = 18.7 Hz, 1H), 4.57 (d, *J* = 18.7 Hz, 1H), 3.01 – 2.93 (m, 1H), 2.13 (s, 3H), 1.77 – 1.75 (m, 2H), 1.34 (d, *J* = 6.6 Hz, 3H), 1.24 (d, *J* = 9.0 Hz, 6H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 196.9, 144.5, 136.4, 135.8, 133.3, 128.8, 127.8, 125.9, 124.6, 116.9, 111.9, 54.3, 52.3, 46.6, 29.7, 27.0, 25.2, 21.6, 20.1. LRMS (EI, 70 eV) *m/z* (%): 307 (3), 289 (22), 202 (100), 93 (15), 77 (10). HRMS (ESI) for $C_{21}H_{26}NO$ $(M+H)^+$: calcd 308.2009, found 308.2015.



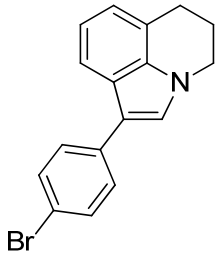
1-phenyl-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2a). Yellow solid. 95% yield (44.3 mg). M.P.: 63.3 – 64.2℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.76 (d, *J* = 8.0 Hz, 1H), 7.69 – 7.67 (m, 2H), 7.43 – 7.40 (m, 2H), 7.27 – 7.22 (m, 2H), 7.10 – 7.08 (m, 1H), 6.96 (d, *J* = 7.0 Hz, 1H), 4.18 (t, *J* = 6.0 Hz, 2H), 3.01 (t, *J* = 6.1 Hz, 2H), 2.28 – 2.23 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 136.2, 135.0, 128.8, 126.9, 125.5, 123.8, 123.7, 122.1, 120.4, 119.0, 117.6, 116.6, 44.2, 24.8, 22.8. LRMS (EI, 70 eV) *m/z* (%): 233 (100), 232 (33), 204 (6), 154 (5), 88 (2). HRMS (ESI) for $C_{17}H_{16}N$ $(M+H)^+$: calcd 234.1277, found 234.1282.



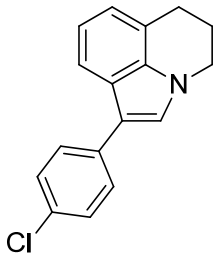
1-(p-tolyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2b). Yellow solid. 92% yield (45.6 mg). M.P.: 103.2 – 104.0℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.74 (d, *J* = 8.0 Hz, 1H), 7.58 (d, *J* = 7.5 Hz, 2H), 7.25 – 7.23 (m, 3H), 7.08 (t, *J* = 7.5 Hz, 1H), 6.95 (d, *J* = 7.0 Hz, 1H), 4.19 (t, *J* = 6.0 Hz, 2H), 3.01 (t, *J* = 6.1 Hz, 2H), 2.39 (s, 3H), 2.29 – 2.24 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 134.0, 133.9, 132.2, 128.4, 125.8, 122.7, 122.4, 120.9, 119.2, 117.8, 116.5, 115.5, 43.1, 23.7, 21.8, 20.1. LRMS (EI, 70 eV) *m/z* (%): 247 (100), 246 (35), 231 (8), 154 (10), 128 (16) 73 (4). HRMS (ESI) for $C_{18}H_{18}N$ $(M+H)^+$: calcd 248.1434, found 248.1429.



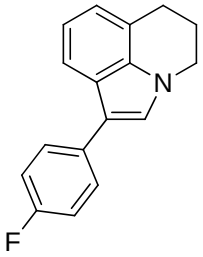
1-(4-methoxyphenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2c). White solid. 78% yield (41.2 mg). M.P.: 126.1 – 126.8℃.^{1}H NMR (500 MHz, $CDCl_3$) δ 7.70 (d, *J* = 8.0 Hz, 1H), 7.61 – 7.59 (m, 2H), 7.19 (s, 1H), 7.07 (d, *J* = 8.0 Hz, 1H), 7.00 – 6.94 (m, 3H), 4.17 (t, *J* = 6.0 Hz, 2H), 3.85 (s, 3H), 3.00 (t, *J* = 6.1 Hz, 2H), 2.28 – 2.24 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 157.8, 134.9, 128.9, 128.0, 123.8, 123.1, 122.0, 120.2, 118.9, 117.5, 116.3, 114.3, 55.4, 44.2, 24.8, 22.99. LRMS (EI, 70 eV) *m/z* (%): 263 (100), 248 (92), 240 (11), 192 (60), 131 (12). HRMS (ESI) for $C_{18}H_{18}NO$ $(M+H)^+$: calcd 264.1383, found 264.1382.



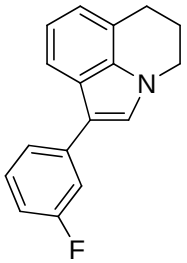
1-(4-bromophenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2d). Yellow solid. 82% yield (51.3 mg). M.P.: 155.3 – 156.5℃.^{1}H NMR (500 MHz, $CDCl_3$) δ 7.70 – 7.69 (m, 1H), 7.55 – 7.51 (m, 4H), 7.27 (s, 1H), 7.11 (d, *J* = 8.0 Hz, 1H), 6.98 (d, *J* = 7.1 Hz, 1H), 4.19 (t, *J* = 6.0 Hz, 2H), 3.02 (t, *J* = 6.1 Hz, 2H), 2.29 – 2.24 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 135.2, 135.0, 131.8, 128.3, 123.9, 123.5, 122.2, 120.7, 119.2, 118.9, 117.3, 115.4, 44.3, 24.7, 22.8. LRMS (EI, 70 eV) *m/z* (%): 311 (100), 313 (98), 312 (40), 230 (20), 102 (15). HRMS (ESI) for $C_{17}H_{15}BrN$ $(M+H)^+$: calcd 312.0382, found 312.0379.



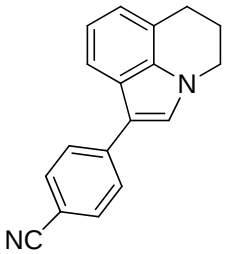
1-(4-chlorophenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2e). Yellow solid. 84% yield (45.2 mg). M.P.: 127.5 – 128.3℃.^{1}H NMR (500 MHz, $CDCl_3$) δ 7.69 (d, *J* = 8.0 Hz, 1H), 7.60 – 7.57 (m, 2H), 7.38 – 7.35 (m, 2H), 7.24 (s, 1H), 7.10 (d, *J* = 8.0 Hz, 1H), 6.96 (d, *J* = 7.2 Hz, 1H), 4.17 (t, *J* = 6.0 Hz, 2H), 3.00 (t, *J* = 6.1 Hz, 2H), 2.27 – 2.22 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 135.0, 134.7, 131.0, 128.9, 128.0, 123.9, 123.6, 122.2, 120.6, 119.2, 117.3, 115.4, 44.3, 24.7, 22.8. LRMS (EI, 70 eV) *m/z* (%): 267 (100), 266 (36), 230 (15), 154 (11), 88 (25) 75 (10). HRMS (ESI) for $C_{17}H_{15}ClN$ $(M+H)^+$: calcd 268.0888, found 268.0886.



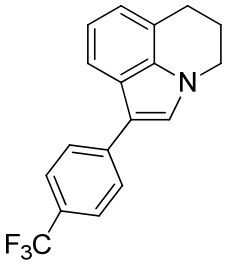
1-(4-fluorophenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2f). Yellow oil. 87% yield (43.9 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.68 (d, J = 8.1 Hz, 1H), 7.60 (d, J = 8.5 Hz, 2H), 7.21 (s, 1H), 7.15 – 7.05 (m, 3H), 6.96 (d, J = 7.0 Hz, 1H), 4.17 (t, J = 6.0 Hz, 2H), 3.01 (t, J = 6.1 Hz, 2H), 2.31 – 2.20 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 161.2 (d, J_{C-F} = 242.5 Hz), 134.9, 132.2 (d, J_{C-F} = 3.1 Hz), 128.2 (d, J_{C-F} = 7.6 Hz), 123.7, 123.5, 122.1, 120.5, 119.1, 117.2, 115.7, 115.6 (d, J_{C-F} = 21.1 Hz), 44.2, 24.7, 22.8. LRMS (EI, 70 eV) *m/z* (%): 251 (100), 232 (9), 207 (5), 154 (11), 125 (11) 75 (4). HRMS (ESI) for $C_{17}H_{15}FN$ $(M+H)^+$: calcd 252.1183, found 252.1177.



1-(3-fluorophenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2g). Yellow oil. 86% yield (43.3 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.73 (d, J = 8.1 Hz, 1H), 7.44 (d, J = 7.8 Hz, 1H), 7.38 – 7.32 (m, 2H), 7.22 (s, 1H), 7.12 – 7.09 (m, 1H), 6.97 – 6.89 (m, 2H), 4.17 (t, J = 6.0 Hz, 2H), 3.00 (t, J = 6.1 Hz, 2H), 2.27 – 2.22 (m, 2H). ^{13}C NMR (125MHz, $CDCl_3$) δ 163.4 (d, J_{C-F} = 243 Hz), 138.5 (d, J_{C-F} = 8.3 Hz), 135.0, 130.1 (d, J_{C-F} = 8.8 Hz), 124.2, 122.3 (d, J_{C-F} = 2.6 Hz), 122.3, 122.2, 120.7, 119.2, 117.4, 115.5 (d, J_{C-F} = 2.4 Hz), 113.3 (d, J_{C-F} = 21.6 Hz), 112.0 (d, J_{C-F} = 21.1 Hz), 44.3, 24.7, 22.80. LRMS (EI, 70 eV) *m/z* (%): 251 (100), 222 (6), 154 (3), 125 (3). HRMS (ESI) for $C_{17}H_{15}FN$ $(M+H)^+$: calcd 252.1183, found 252.1178.

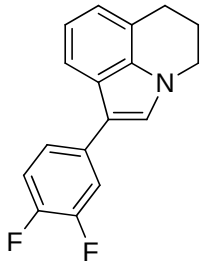


4-(5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinolin-1-yl)benzonitrile (2h). White solid. 53% yield (27.3 mg). M.P.: 135.5 – 136.2℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.76 – 7.72 (m, 3H), 7.67 – 7.65 (m, 2H), 7.38 (s, 1H), 7.15 (d, J = 8.0 Hz, 1H), 7.01 (d, J = 7.2 Hz, 1H), 4.21 (t, J = 6.0 Hz, 2H), 3.03 (t, J = 6.1 Hz, 2H), 2.30 – 2.25 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 141.2, 135.2, 132.6, 126.5, 125.1, 123.4, 122.5, 121.3, 119.7, 119.6, 117.3, 114.8, 108.1, 44.5, 24.7, 22.7. LRMS (EI, 70 eV) *m/z* (%): 258 (100), 242 (5), 230 (6), 202 (4), 128 (8). HRMS (ESI) for $C_{18}H_{15}N_2$ $(M+H)^+$: calcd 259.1230, found 259.1227.

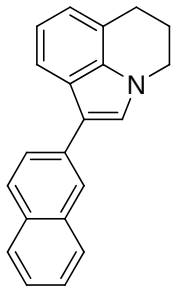


1-(4-(trifluoromethyl)phenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2i). Yellow solid. 78% yield (46.9 mg). M.P.: 95.2 – 96.0℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.75 (dd, J = 13.2, 4.6 Hz, 3H), 7.64 (d, J = 8.0 Hz, 2H), 7.33 (s, 1H), 7.13 (dd, J = 8.0, 7.1 Hz, 1H), 6.99 (dd, J = 7.1, 0.7 Hz, 1H),

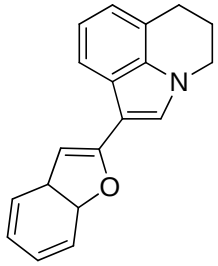
4.18 (t, J = 6.0 Hz, 2H), 3.02 (t, J = 6.1 Hz, 2H), 2.28 – 2.23 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 140.0, 135.1, 127.1 (q, J_{C-F} = 32.1 Hz), 126.5, 125.7 (q, J_{C-F} = 3.9 Hz), 124.6, 124.6 (q, J_{C-F} =269.9 Hz) 123.5, 122.4, 121.0, 119.4, 117.3, 115.2, 44.4, 24.7, 22.8. LRMS (EI, 70 eV) *m/z* (%): 301 (100), 300 (77), 245 (10), 230 (19), 123 (23). HRMS (ESI) for $C_{18}H_{15}F_3N$ $(M+H)^+$: calcd 302.1151, found 302.1171.



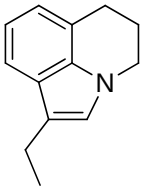
1-(3,4-difluorophenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2j). Yellow oil. 92% yield (49.5 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.67 (d, J = 8.0 Hz, 1H), 7.46-7.41 (m, 1H), 7.36 – 7.33 (m, 1H), 7.22 – 7.15 (m, 2H), 7.12 – 7.10 (m, 1H), 6.97 (d, J = 6.6 Hz, 1H), 4.18 (t, J = 6.0 Hz, 2H), 3.01 (t, J = 6.1 Hz, 2H), 2.28-2.34 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 150.6 (dd, J_{C-F} = 245.3, J_{C-F} = 12.8 Hz), 148.5 (dd, J_{C-F} = 244.4, J_{C-F} = 12.8 Hz), 135.0, 133.4 (dd, J_{C-F} = 6.6, J_{C-F} = 3.8 Hz), 123.9, 123.4, 122.4 (dd, J_{C-F} = 3.4, J_{C-F} = 5.8 Hz) , 122.2, 120.8, 119.3, 117.4 (d, J_{C-F} = 16.6 Hz), 117.0, 115.3 (d, J_{C-F} = 17.4 Hz), 114.7, 44.3, 24.7, 22.8. LRMS (EI, 70 eV) *m/z* (%): 269 (100), 241 (7), 213 (3), 154 (7), 135 (8). HRMS (ESI) for $C_{17}H_{14}F_2N$ $(M+H)^+$: calcd 270.1089, found 270.1081.



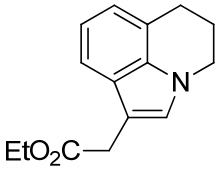
1-(naphthalen-2-yl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2k). Yellow solid. 72% yield (40.9 mg). M.P.: 115.1 – 116.2℃.^{1}H NMR (500 MHz, $CDCl_3$) δ 8.14 (s, 1H), 7.90 – 7.86 (m, 3H), 7.84 – 7.81 (m, 2H), 7.50 – 7.46 (m, 1H), 7.44 – 7.40 (m, 2H), 7.15 (d, J = 7.9 Hz, 1H), 7.00 (d, J = 7.0 Hz, 1H), 4.22 (t, J = 6.0 Hz, 2H), 3.04 (t, J = 6.1 Hz, 2H), 2.31 – 2.26 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 135.1, 134.1, 133.7, 131.8, 128.2, 127.7, 127.7, 126.1, 126.1, 125.0, 124.3, 124.2, 123.9, 122.2, 120.6, 119.2, 117.7, 116.5, 44.3, 24.8, 22.8. LRMS (EI, 70 eV) *m/z* (%): 283 (100), 254 (7), 226 (5), 141 (8), 139 (4). HRMS (ESI) for $C_{21}H_{18}N$ $(M+H)^+$: calcd 284.1434, found 284.1419.



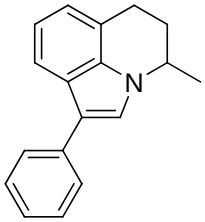
1-(3a,7a-dihydrobenzofuran-2-yl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2l). Yellow solid. 72% yield (39.5 mg). M.P.: 138.7 – 139.5℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.80 (d, J = 8.0 Hz, 1H), 7.61 (s, 1H), 7.55 – 7.54 (m, 1H), 7.48 – 7.47 (m, 1H), 7.21 – 7.16 (m, 3H), 7.00 (d, J = 7.1 Hz, 1H), 6.86 (d, J = 0.5 Hz, 1H), 4.20 (t, J = 6.0 Hz, 2H), 3.01 (t, J = 6.1 Hz, 2H), 2.29 – 2.24 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 153.9, 153.5, 134.8, 130.1, 124.7, 122.9, 122.8, 122.6, 122.3, 121.1, 120.0, 119.6, 117.8, 110.5, 107.0, 98.8, 44.5, 24.6, 22.8. LRMS (EI, 70 eV) *m/z* (%): 273 (100), 245 (6), 189 (3), 136 (6), 120 (3). HRMS (ESI) for $C_{19}H_{18}NO$ $(M+H)^+$: calcd 274.1226, found 274.1222.



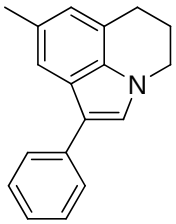
1-ethyl-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2m). Yellow oil. 92% yield (34.2 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.41 (d, *J* = 7.9 Hz, 1H), 7.00 – 6.97 (m, 1H), 6.89 (d, *J* = 7.0 Hz, 1H), 6.85 (s, 1H), 4.13 – 4.06 (m, 2H), 2.97 (t, *J* = 6.1 Hz, 2H), 2.80 – 2.76 (m, 2H), 2.24 – 2.20 (m, 2H), 1.34 – 1.31 (m, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 134.6, 125.2, 122.7, 121.6, 118.9, 118.3, 117.4, 116.6, 43.8, 24.8, 23.0, 18.7, 15.0. LRMS (EI, 70 eV) *m/z* (%): 185 (37), 170 (100), 168 (4), 142 (16), 115 (5). HRMS (ESI) for $C_{13}H_{16}N$ $(M+H)^+$: calcd 186.1277, found 186.1274.



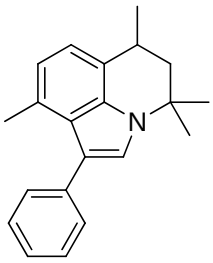
Ethyl 2-(5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinolin-1-yl)acetate (2n). Yellow oil. 61% yield (29.8 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.42 (d, *J* = 8.0 Hz, 1H), 7.05 – 7.01 (m, 2H), 6.91 (d, *J* = 7.0 Hz, 1H), 4.16 (q, *J* = 7.0 Hz, 2H), 4.11 (t, *J* = 6.0 Hz, 2H), 3.75 (s, 2H), 2.97 (t, *J* = 6.1 Hz, 2H), 2.24 – 2.19 (m, 2H), 1.28 – 1.25 (m, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 172.3, 134.4, 125.3, 125.0, 121.7, 119.6, 118.6, 116.6, 106.9, 60.7, 44.0, 31.7, 24.7, 22.9, 14.3. LRMS (EI, 70 eV) *m/z* (%): 170 (100), 142 (27), 243 (3), 83 (2). HRMS (ESI) for $C_{15}H_{18}NO_2$ $(M+H)^+$: calcd 244.1332, found 244.1330.



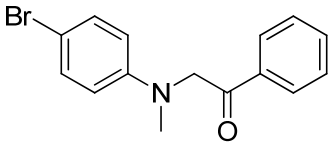
4-methyl-1-phenyl-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2o). Yellow oil. 78% yield (38.5 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.76 (d, *J* = 8.1 Hz, 1H), 7.68 (dd, *J* = 8.2, 1.1 Hz, 2H), 7.41 (t, *J* = 8.1 Hz, 2H), 7.36 (s, 1H), 7.24 – 7.21 (m, 1H), 7.11 – 7.10 (m, 1H), 6.97 – 6.95 (m, 1H), 4.35 – 4.29 (m, 1H), 3.03 – 3.00 (m, 2H), 2.25 – 2.22 (m, 1H), 2.00 – 1.96 (m, 1H), 1.55 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 136.4, 135.0, 128.8, 127.0, 125.5, 124.0, 122.1, 122.0, 120.3, 119.0, 117.5, 116.8, 49.8, 30.71, 23.62, 20.79. LRMS (EI, 70 eV) *m/z* (%): 247 (91), 246 (32), 232 (100), 230 (20), 204 (9), 154 (7). HRMS (ESI) for $C_{18}H_{18}N$ $(M+H)^+$: calcd 248.1434, found 248.1441.



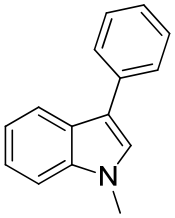
8-methyl-1-phenyl-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2p). Yellow oil. 73% yield (36.1 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.71 – 7.66 (m, 2H), 7.54 (s, 1H), 7.41 (t, *J* = 7.7 Hz, 2H), 7.23 – 7.20 (m, 2H), 6.81 (s, 1H), 4.14 (t, *J* = 6.0 Hz, 2H), 2.96 (t, *J* = 6.0 Hz, 2H), 2.46 (s, 3H), 2.25 – 2.20 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 136.5, 133.5, 129.8, 128.8, 126.9, 125.4, 124.0, 123.8, 121.8, 120.8, 117.1, 116.2, 44.2, 24.8, 23.1, 22.0. LRMS (EI, 70 eV) *m/z* (%): 247 (100), 246 (32), 230 (10), 123 (7), 108 (5). HRMS (ESI) for $C_{18}H_{18}N$ $(M+H)^+$: calcd 248.1434, found 248.1439.



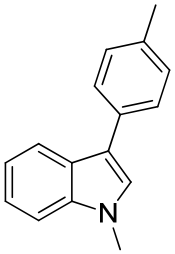
4,4,6,9-tetramethyl-1-phenyl-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2q). Yellow oil. 76% yield (43.9 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.46 (d, *J* = 7.0 Hz, 2H), 7.36 (t, *J* = 7.6 Hz, 2H), 7.29 (t, *J* = 7.4 Hz, 1H), 7.17 (s, 1H), 7.00 (d, *J* = 7.2 Hz, 1H), 6.84 (d, *J* = 7.2 Hz, 1H), 3.27 – 3.23 (m, 1H), 2.31 (s, 3H), 2.01 (dd, *J* = 13.2, 4.7 Hz, 1H), 1.85 (t, *J* = 12.7 Hz, 1H), 1.66 (s, 3H), 1.48 (d, *J* = 6.7 Hz, 3H), 1.42 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.5, 133.7, 130.6, 128.6, 127.7, 126.1, 124.2, 123.6, 121.6, 121.2, 118.8, 116.9, 53.9, 46.4, 29.1, 28.9, 27.2, 20.6, 18.7. LRMS (EI, 70 eV) *m/z* (%): 289 (72), 274 (100), 258 (15), 244 (19), 230 (6). HRMS (ESI) for $C_{21}H_{24}N$ $(M+H)^+$: calcd 290.1903, found 290.1915.



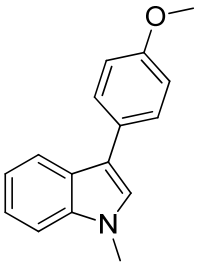
2-((4-bromophenyl)(methyl)amino)-1-phenylethanone (3m). Yellow solid. M.P.: 119.6 – 120.5℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.97 – 7.95 (m, 2H), 7.63 – 7.60 (m, 1H), 7.51-7.48 (m, 2H), 7.28 – 7.25 (m, 2H), 6.54 – 6.51 (m, 2H), 4.75 (s, 2H), 3.07 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 195.9, 148.3, 135.3, 133.7, 131.9, 128.9, 127.8, 113.9, 109.1, 58.8, 39.7. LRMS (EI, 70 eV) *m/z* (%): 305 (13), 287 (48), 285 (48), 200 (97), 198 (100) 165 (10). HRMS (ESI) for $C_{15}H_{15}BrNO$ $(M+H)^+$: calcd 304.0332, found 304.0324.



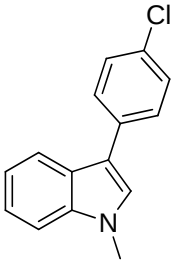
1-methyl-3-phenyl-1H-indole (4a)[1]. Yellow solid. 93% yield (38.6 mg). M.P.: 61.8 – 62.9℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.95 (d, *J* = 8.0 Hz, 1H), 7.67 – 7.65 (m, 2H), 7.45 – 7.41 (m, 2H), 7.35 (d, *J* = 8.2 Hz, 1H), 7.29 – 7.25 (m, 2H), 7.21 – 7.17 (m, 2H), 3.80 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.5, 135.7, 128.8, 127.4, 126.6, 126.2, 125.7, 122.0, 120.0, 119.9, 116.8, 109.6, 32.9. LRMS (EI, 70 eV) *m/z* (%): 207 (100), 192 (12), 165 (32), 103 (12).



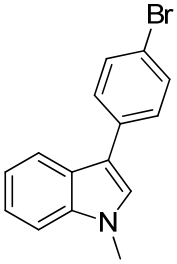
1-methyl-3-(p-tolyl)-1H-indole (4b)[2]**.** Yellow solid. 86% yield (38.0 mg). M.P.: 65.5 – 66.2℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.93 (d, *J* = 8.0 Hz, 1H), 7.55 (d, *J* = 8.0 Hz, 2H), 7.34 (d, *J* = 8.2 Hz, 1H), 7.28 – 7.24 (m, 3H), 7.19 – 7.16 (m, 2H), 3.79 (s, 3H), 2.39 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.5, 135.3, 132.8, 129.5, 127.3, 126.3, 121.9, 120.0, 119.8, 116.7, 109.5, 32.8, 21.2. LRMS (EI, 70 eV) *m/z* (%): 221 (100), 204 (9), 178 (11), 165 (7), 110 (7).



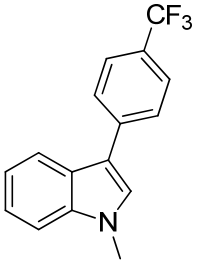
3-(4-methoxyphenyl)-1-methyl-1H-indole (4c)[2]**.** White solid. 71% yield (33.8 mg). M.P.: 171.3 – 171.8℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.89 (d, *J* = 8.0 Hz, 1H), 7.57 – 7.55 (m, 2H), 7.34 (d, *J* = 8.2 Hz, 1H), 7.28 – 7.24 (m, 1H), 7.18 – 7.15 (m, 1H), 7.13 (s, 1H), 7.00 – 6.97 (m, 2H), 3.84 (s, 3H), 3.80 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 158.0, 137.4, 128.5, 128.3, 126.3, 126.0, 121.9, 119.9, 119.7, 116.5, 114.3, 109.5, 55.4, 32.8. LRMS (EI, 70 eV) *m/z* (%): 237 (92), 222 (100), 194 (11), 151 (6), 118 (9).



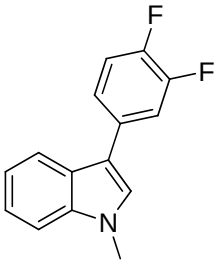
3-(4-chlorophenyl)-1-methyl-1H-indole (4d)[1]**.** 72% yield (34.9 mg). Yellow solid. M.P.: 95.1 – 96.1℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.87 (d, *J* = 8.0 Hz, 1H), 7.57 – 7.55 (m, 2H), 7.39 – 7.35 (m, 3H), 7.30 – 7.27 (m, 1H), 7.21 – 7.18 (m, 2H), 3.81 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.5, 134.2, 131.3, 128.9, 128.4, 126.6, 126.0, 122.2, 120.1, 119.7, 115.6, 109.7, 32.9. LRMS (EI, 70 eV) *m/z* (%): 241 (100), 226 (12), 190 (13), 163 (11), 102 (10).



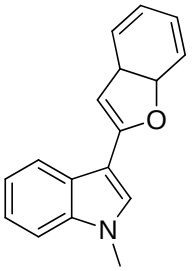
3-(4-bromophenyl)-1-methyl-1H-indole (4e)[2]**.** Yellow solid. 91% yield (51.9 mg). M.P.: 107.2 – 108.3℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.88 (d, *J* = 8.0 Hz, 1H), 7.55 – 7.50 (m, 4H), 7.34 (d, *J* = 8.2 Hz, 1H), 7.31 – 7.28 (m, 1H), 7.22 – 7.19 (m, 2H), 3.82 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.6, 134.7, 131.8, 128.8, 126.7, 125.9, 122.2, 120.2, 119.7, 119.3, 115.6, 109.7, 32.9. LRMS (EI, 70 eV) *m/z* (%): 287 (100), 285 (100), 190 (15), 165 (15), 164 (11).



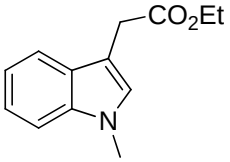
1-methyl-3-(4-(trifluoromethyl)phenyl)-1H-indole (4f)[4]**.** Yellow solid. 65% yield (35.7 mg). M.P.: 81.0 – 81.5℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.93 (d, *J* = 8.0 Hz, 1H), 7.75 (d, *J* = 8.1 Hz, 2H), 7.66 (d, *J* = 8.1 Hz, 2H), 7.38 (d, *J* = 8.2 Hz, 1H), 7.33 – 7.29 (m, 2H), 7.23 – 7.21 (m, 1H), 3.84 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 139.4, 137.6, 127.6, 127.3, 127.1, 125.9, 125.7 (q, J_{C-F} = 3.8 Hz), 124.6 (q, J_{C-F} = 270.1 Hz), 122.4, 120.5, 119.7, 115.4, 109.8, 33.0. LRMS (EI, 70 eV) *m/z* (%): 275 (100), 260 (7), 165 (12), 128 (5), 137 (5).



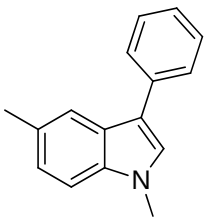
3-(3,4-difluorophenyl)-1-methyl-1H-indole (4g). Yellow oil. 61% yield (29.8 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.85 (d, J = 8.0 Hz, 1H), 7.44 – 7.40 (m, 1H), 7.36 (d, J = 8.2 Hz, 1H), 7.33 – 7.28 (m, 2H), 7.22 – 7.17 (m, 3H), 3.83 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 150.6 (dd, J_{C-F} = 232.4, J = 12.6 Hz), 148.7 (dd, J_{C-F} = 231.8, J_{C-F} = 12.9 Hz), 137.5, 132.8 (dd, J_{C-F} = 6.6, J_{C-F} = 3.9 Hz), 126.7, 125.9, 123.0 (dd, J_{C-F} = 5.8, J_{C-F} = 3.3 Hz), 122.3, 120.3, 119.4, 117.4(d, J_{C-F} = 17.3 Hz), 115.8 (d, J_{C-F} = 17.3 Hz), 114.9, 109.7, 32.9. LRMS (EI, 70 eV) *m/z* (%): 243 (100), 201 (33), 175 (5), 121 (13), 128 (8). HRMS (ESI) for $C_{15}H_{12}F_2N$ $(M+H)^+$: calcd 244.0932, found 244.0922.



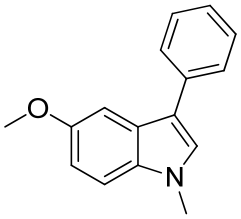
3-(3a,7a-dihydrobenzofuran-2-yl)-1-methyl-1H-indole (4h)[1]. Yellow solid. 47% yield (23.3mg). M.P.: 108.3 – 109.0℃.^{1}H NMR (500 MHz, $CDCl_3$) δ 8.03 (d, J = 7.8 Hz, 1H), 7.58 (s, 1H), 7.56 – 7.54 (m, 1H), 7.49 – 7.47 (m, 1H), 7.36 (d, J = 7.9 Hz, 1H), 7.33 – 7.26 (m, 2H), 7.23 – 7.20 (m, 2H), 6.87 (s, 1H), 3.82 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 153.9, 153.0, 137.4, 129.9, 127.6, 125.1, 123.0, 122.7, 122.5, 120.7, 120.4, 120.0, 110.6, 109.8, 107.0, 99.0, 33.1. LRMS (EI, 70 eV) *m/z* (%): 247 (100), 232 (5), 176 (10), 123 (18).



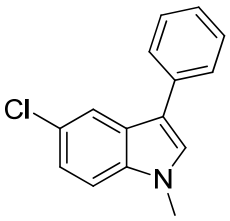
Ethyl 2-(1-methyl-1H-indol-3-yl)acetate (4i)[3]. Yellow oil. 71% yield (30.7 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.59 (d, J = 7.9 Hz, 1H), 7.28 (d, J = 8.2 Hz, 1H), 7.23 – 7.20 (m, 1H), 7.13 – 7.10 (m, 1H), 7.02 (s, 1H), 4.17 – 4.13 (m, 2H), 3.73 (d, J = 6.3 Hz, 5H), 1.25 (t, J = 7.1 Hz, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 172.2, 137.0, 127.7, 127.7, 121.7, 119.1, 119.0, 109.3, 107.0, 60.8, 32.7, 31.4, 14.3. LRMS (EI, 70 eV) *m/z* (%): 217 (15), 144 (100), 128 (4), 102 (5).



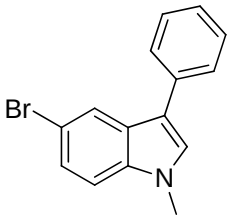
1,5-dimethyl-3-phenyl-1H-indo (4j)[5]. Yellow solid. 70% yield (31.1 mg). M.P.: 64.3 – 64.9℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.74 (s, 1H), 7.67 – 7.64 (m, 2H), 7.45 – 7.42 (m, 2H), 7.28 – 7.24 (m, 2H), 7.18 (s, 1H), 7.12 – 7.10 (m, 1H), 3.79 (s, 3H), 2.49 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 136.0, 135.9, 129.2, 128.7, 127.4, 126.7, 126.4, 125.6, 123.6, 119.6, 116.2, 109.3, 32.9, 21.6. LRMS (EI, 70 eV) *m/z* (%): 221 (100), 220 (45), 178 (11), 102 (8), 76 (3).



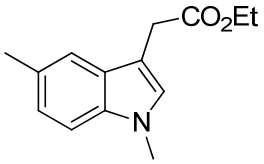
5-methoxy-1-methyl-3-phenyl-1H-indole (4k). Yellow solid. 68% yield (28.4 mg). M.P.: 78.8 – 79.9℃. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.62 (d, *J* = 7.1 Hz, 2H), 7.43 (t, *J* = 7.7 Hz, 2H), 7.39 (d, *J* = 2.4 Hz, 1H), 7.28 – 7.24 (m, 2H), 7.19 (s, 1H), 6.94 (dd, *J* = 8.8, 2.4 Hz, 1H), 3.87 (s, 3H), 3.80 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 154.6, 135.8, 132.9, 128.8, 127.2, 127.2, 126.5, 125.6, 116.3, 112.3, 110.3, 101.9, 56.1, 33.0. LRMS (EI, 70 eV) *m/z* (%): 237 (100), 194(46), 152(24), 118 (10), 76 (6). HRMS (ESI) for $C_{16}H_{16}NO$ $(M+H)^+$: calcd 238.1226, found 238.1229.



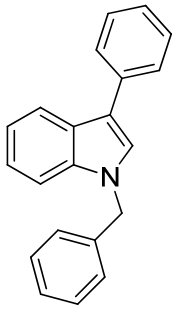
5-chloro-1-methyl-3-phenyl-1H-indole (4l). Yellow oil. 87% yield (42.2 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.88 (d, *J* = 1.8 Hz, 1H), 7.60 – 7.58 (m, 2H), 7.45 – 7.42 (m, 2H), 7.30 – 7.24 (m, 2H), 7.22 – 7.20 (m, 2H), 3.80 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 135.9, 135.0, 128.9, 127.7, 127.3, 127.2, 126.1, 125.9, 122.3, 119.4, 116.5, 110.6, 33.1. LRMS (EI, 70 eV) *m/z* (%): 241 (100), 204 (10), 190 (13), 165 (20), 102 (16). HRMS (ESI) for $C_{15}H_{13}ClN$ $(M+H)^+$: calcd 242.0731, found 242.0736. HRMS (ESI) for $C_{15}H_{13}ClN$ $(M+H)^+$: calcd 242.0731, found 242.0736.



5-bromo-1-methyl-3-phenyl-1H-indole (4m). Brown oil. 65% yield (37.4 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.03 (s, 1H), 7.58 (d, *J* = 7.2 Hz, 2H), 7.43 (t, *J* = 7.7 Hz, 2H), 7.34 – 7.26 (m, 2H), 7.19 (d, *J* = 8.6 Hz, 2H), 3.78 (s, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 136.2, 134.9, 128.9, 127.8, 127.6, 127.3, 126.1, 124.8, 122.5, 116.5, 113.5, 111.0, 33.0. LRMS (EI, 70 eV) *m/z* (%): 287 (100), 286 (97), 204 (20), 165 (28), 163 (18) 102 (15). HRMS (ESI) for $C_{15}H_{13}BrN$ $(M+H)^+$: calcd 286.0226, found 286.0233.



Ethyl 2-(1,5-dimethyl-1H-indol-3-yl)acetate (4n). Yellow oil. 68% yield (31.5 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.41 – 7.36 (m, 1H), 7.17 (d, *J* = 8.3 Hz, 1H), 7.04 (dd, *J* = 8.3, 1.3 Hz, 1H), 6.98 (s, 1H), 4.16 (q, *J* = 7.1 Hz, 2H), 3.72 (s, 5H), 2.45 (s, 3H), 1.26 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 172.2, 135.4, 128.3, 127.9, 127.8, 123.4, 118.7, 109.0, 106.4, 60.7, 32.7, 31.34 (s), 21.5, 14.3. LRMS (EI, 70 eV) *m/z* (%): 231 (100), 242 (5), 230 (6), 202 (4), 128 (8). HRMS (ESI) for $C_{14}H_{18}NO_2$ $(M+H)^+$: calcd 232.1332, found 232.1332.



1-benzyl-3-phenyl-1H-indole (4o). Yellow oil. 85% yield (48.1 mg). ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.97 (d, *J* = 7.3 Hz, 1H), 7.66 (dd, *J* = 8.2, 1.1 Hz, 2H), 7.42 (t, *J* = 8.0 Hz, 2H), 7.33 – 7.16 (m, 10H), 5.34 (s, 2H). ^{13}C NMR (125 MHz, $CDCl_3$) δ 137.3, 137.2, 135.6, 128.9, 128.8, 127.8, 127.5, 127.0, 126.5, 126.0, 125.9, 122.2, 120.2, 120.1, 117.5, 110.1, 50.2. LRMS (EI, 70 eV) *m/z* (%): 283 (100), 192 (51), 165 (21), 92 (7), 65 (11). HRMS (ESI) for $C_{21}H_{18}N$ $(M+H)^+$: calcd 284.1434, found 284.1442.

5. References

1. J. R. Donald and J. K. R. Taylor, *Synlett.*, 2009, **1**, 59 – 62.
2. R. J. Phipps, N. P. Grimster and M. J. Gaunt, *J. Am. Chem. Soc*., 2008, **130**, 8172 – 8174.
3. W. Chen, I. N. Gaisina, H. Gunosewoyo, S. A. Malekiani, T. Hanania and A. P. Kozikowski, *ChemMedChem*., 2011, **6**, 1587 – 1592.
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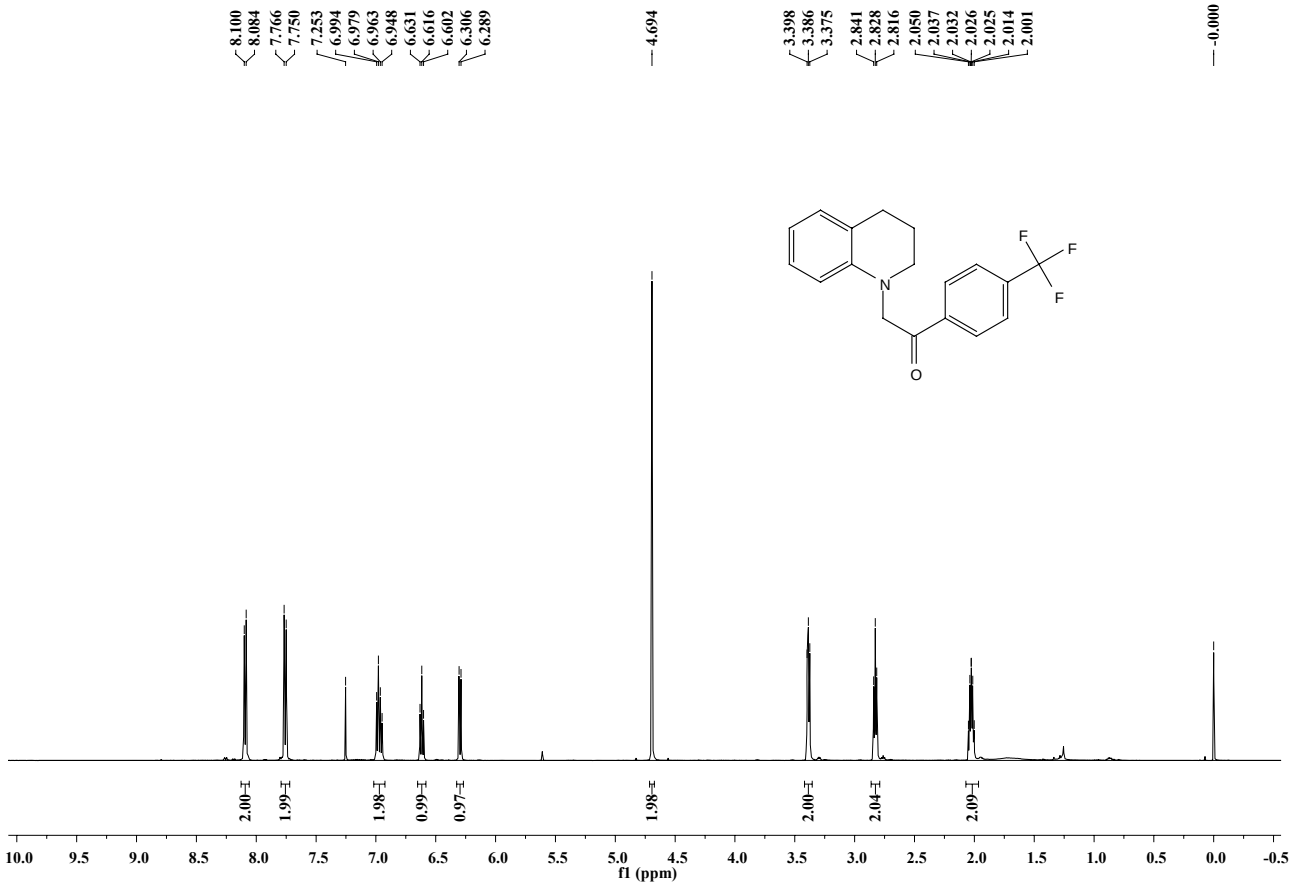
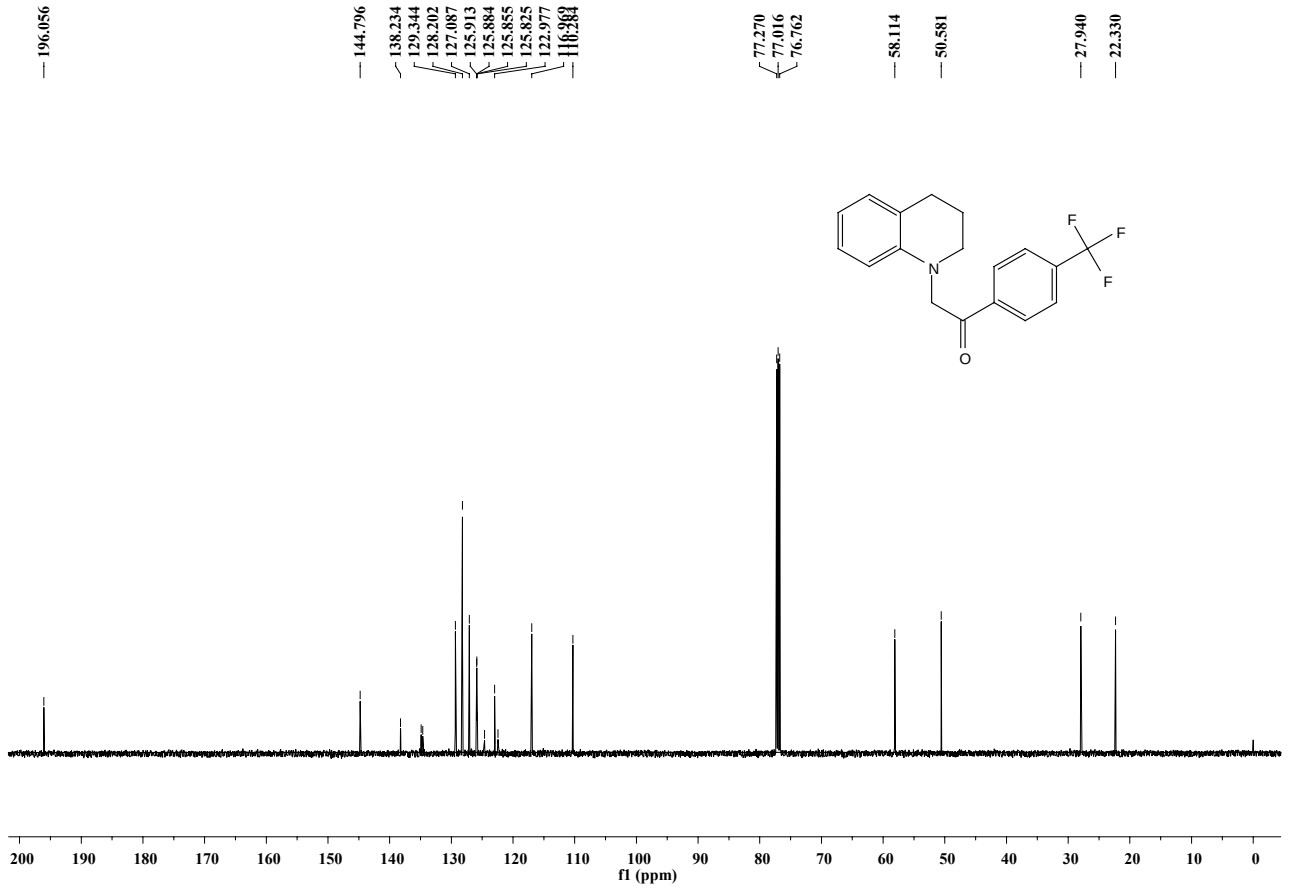
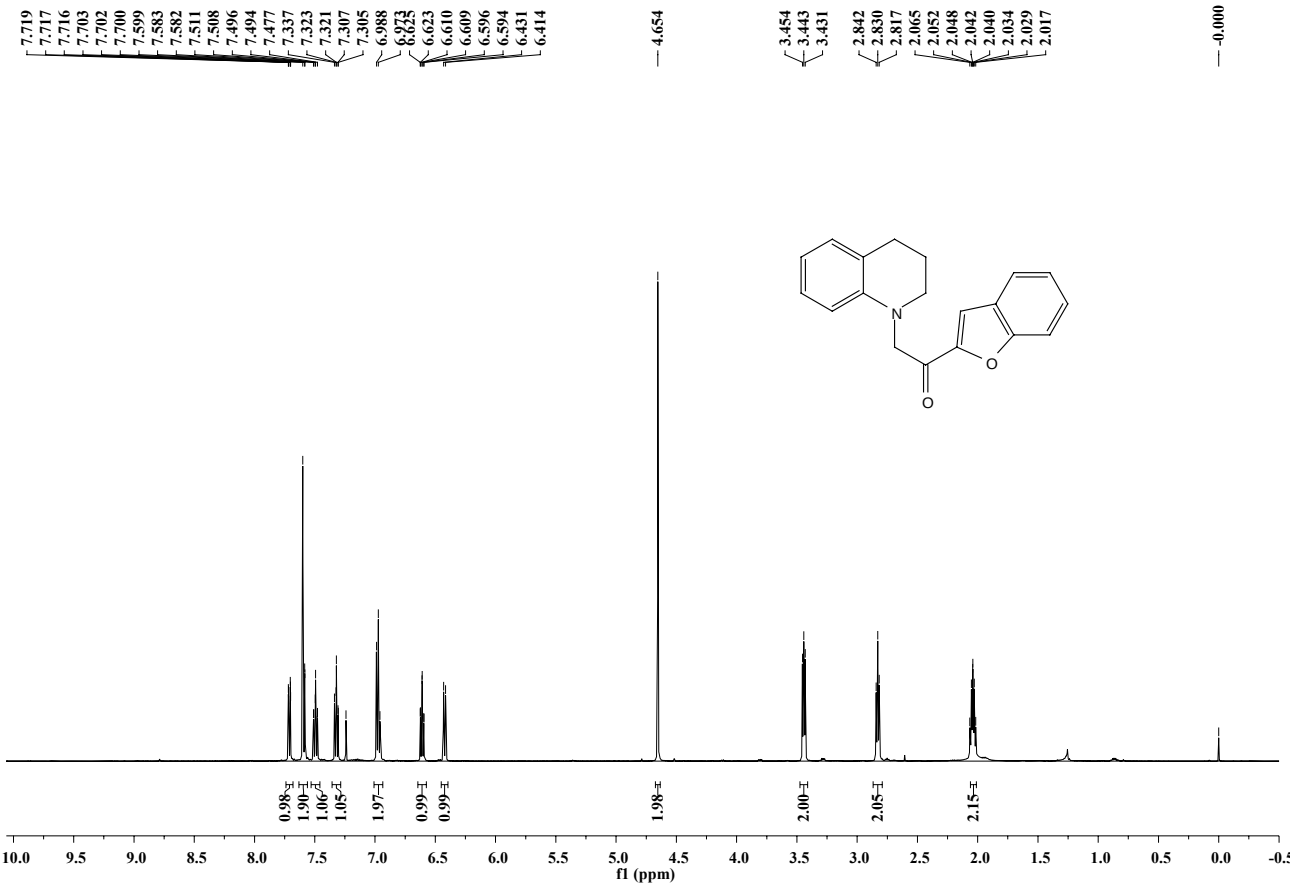
6. NMR Spectra for products

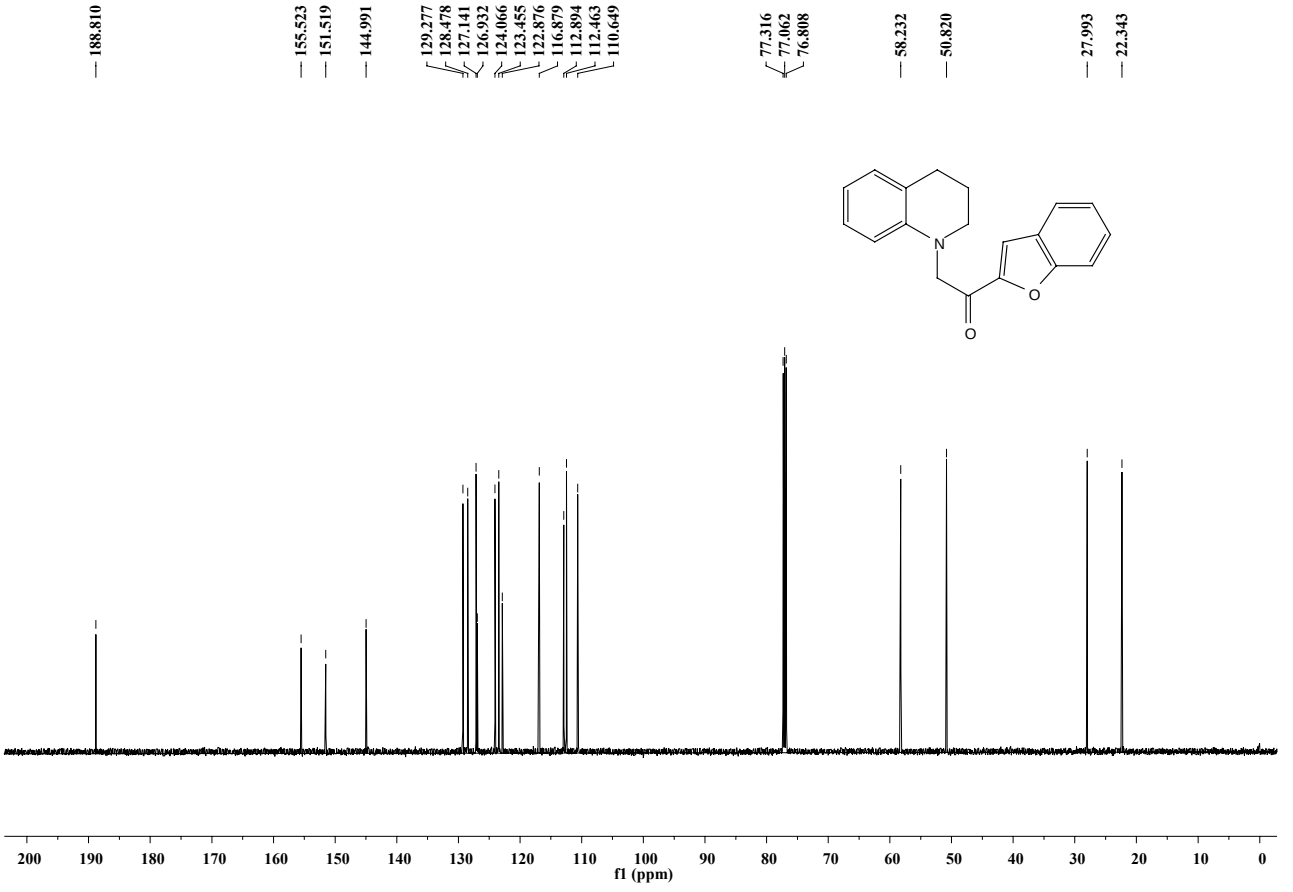
2-(3,4-dihydroquinolin-1(2H)-yl)-1-(4-(trifluoromethyl)phenyl)ethanone (1i)



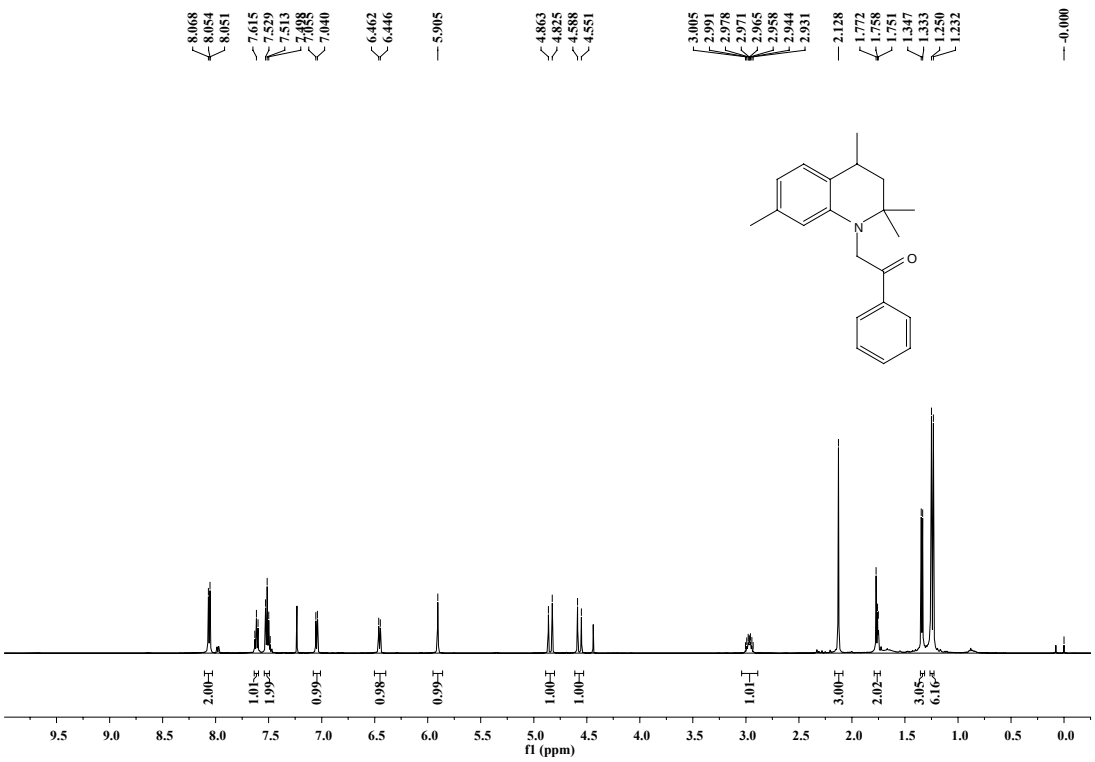


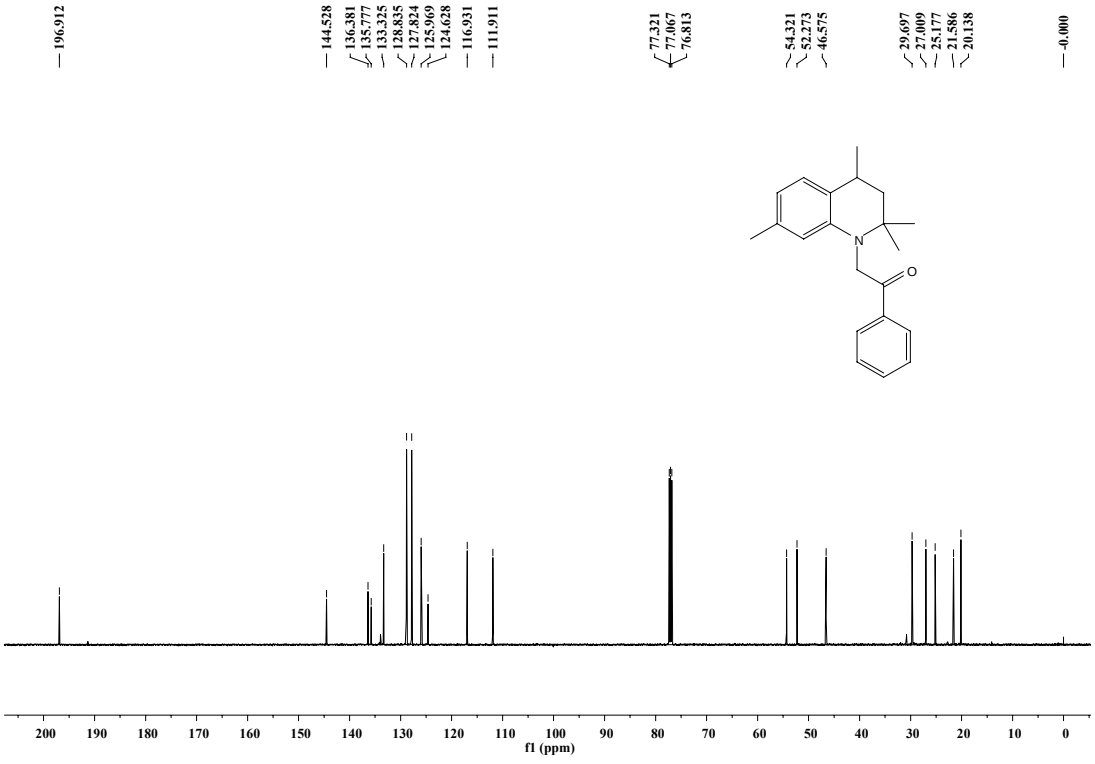
1-(benzofuran-2-yl)-2-(3,4-dihydroquinolin-1(2H)-yl)ethanone (1l)



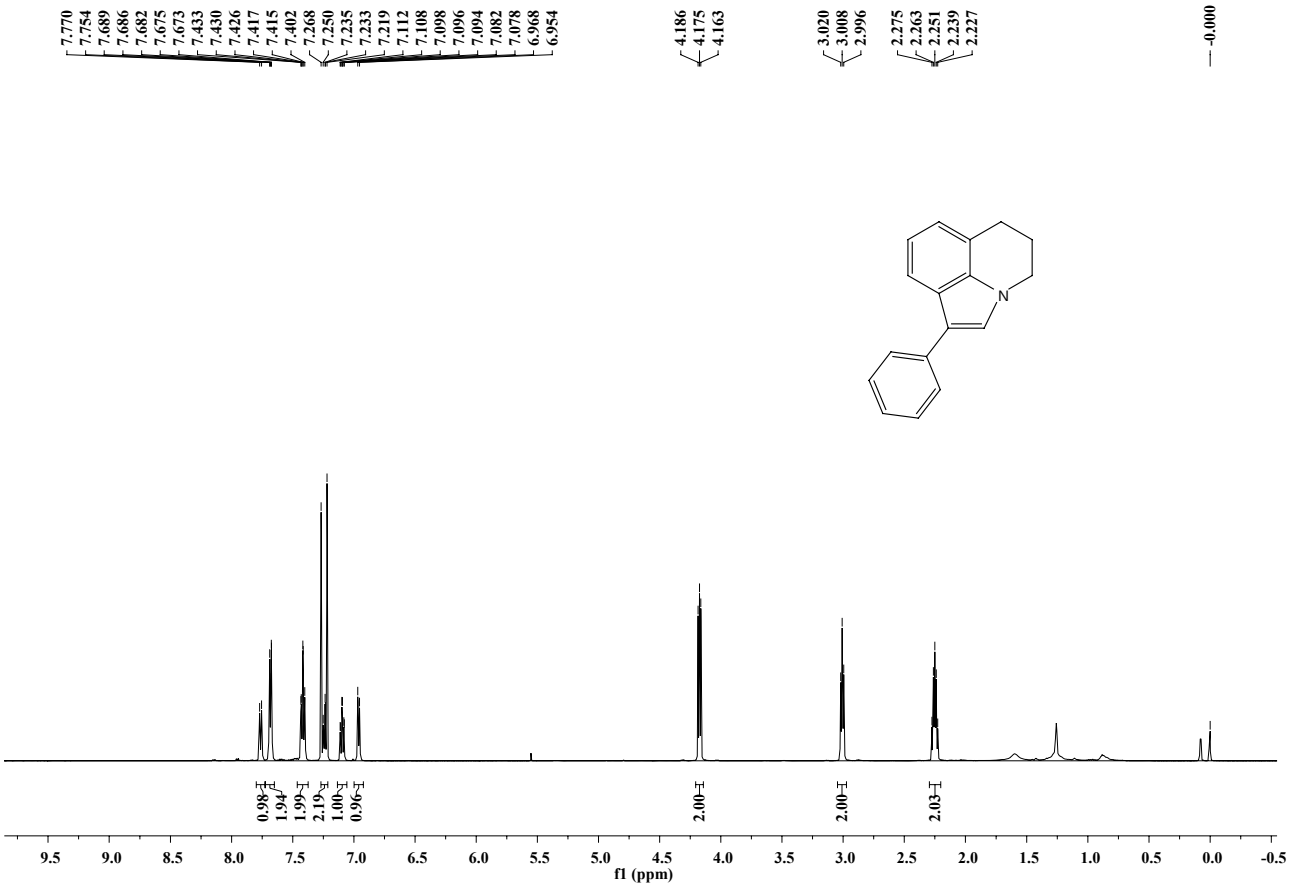


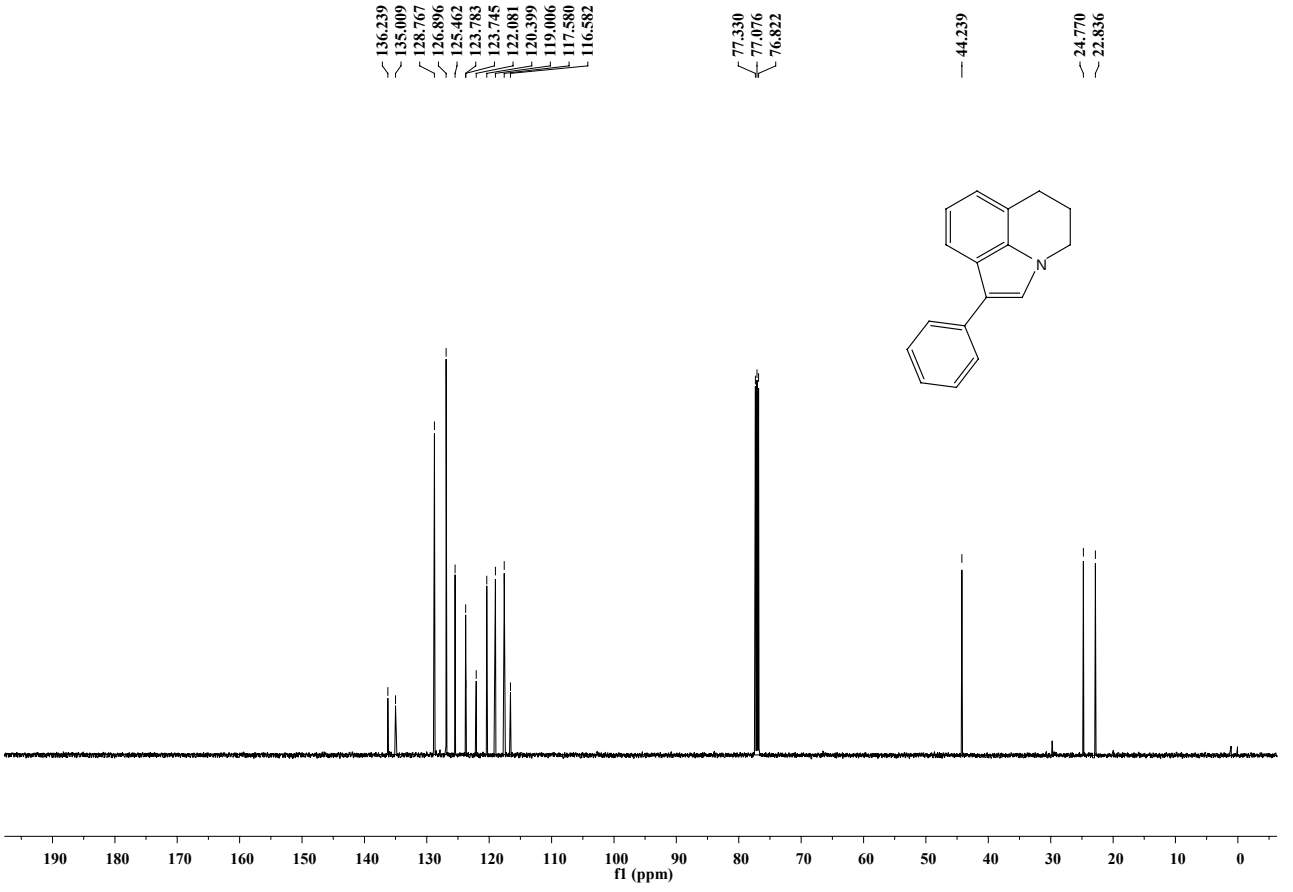
1-phenyl-2-(2,2,4,7-tetramethyl-3,4-dihydroquinolin-1(2H)-yl)ethanone (1q)



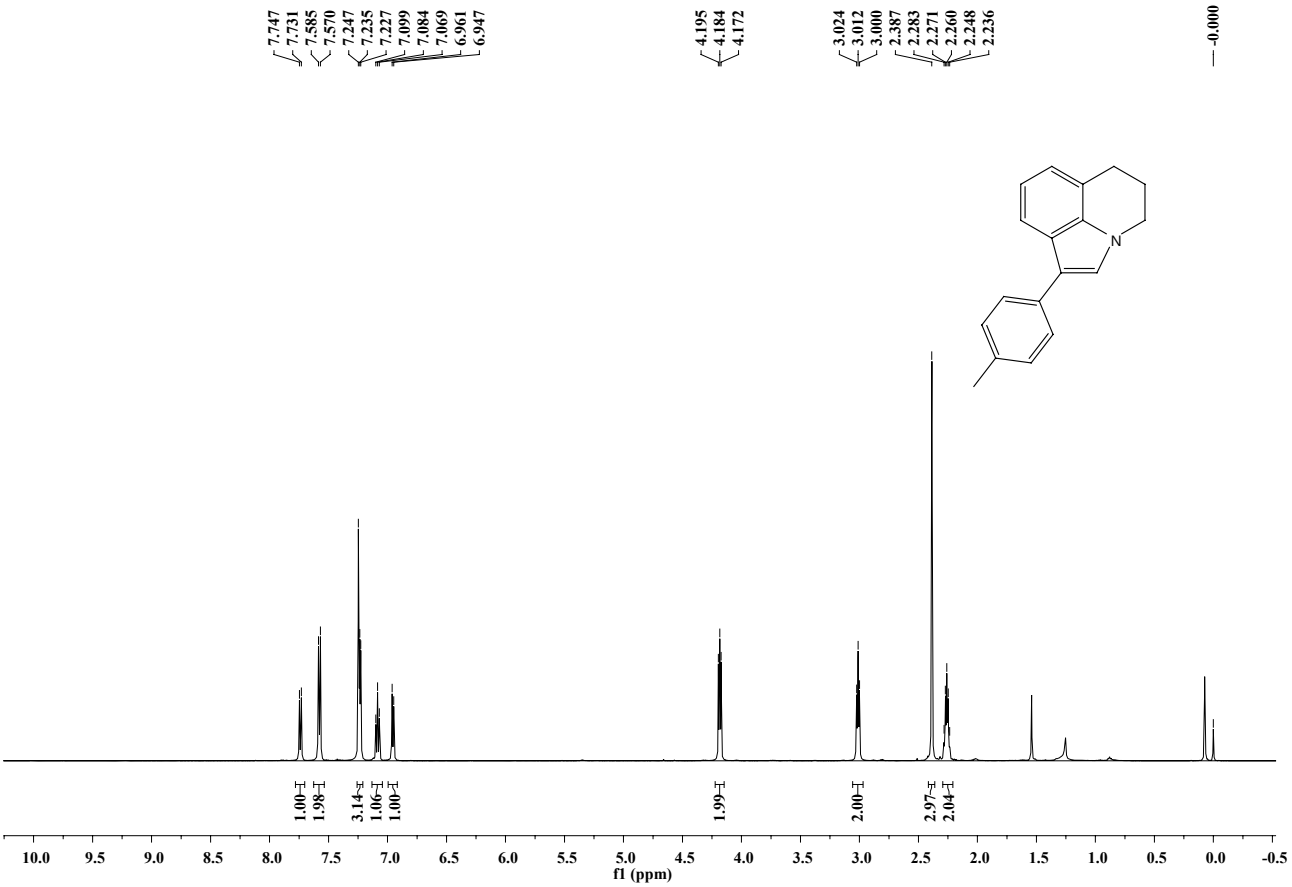


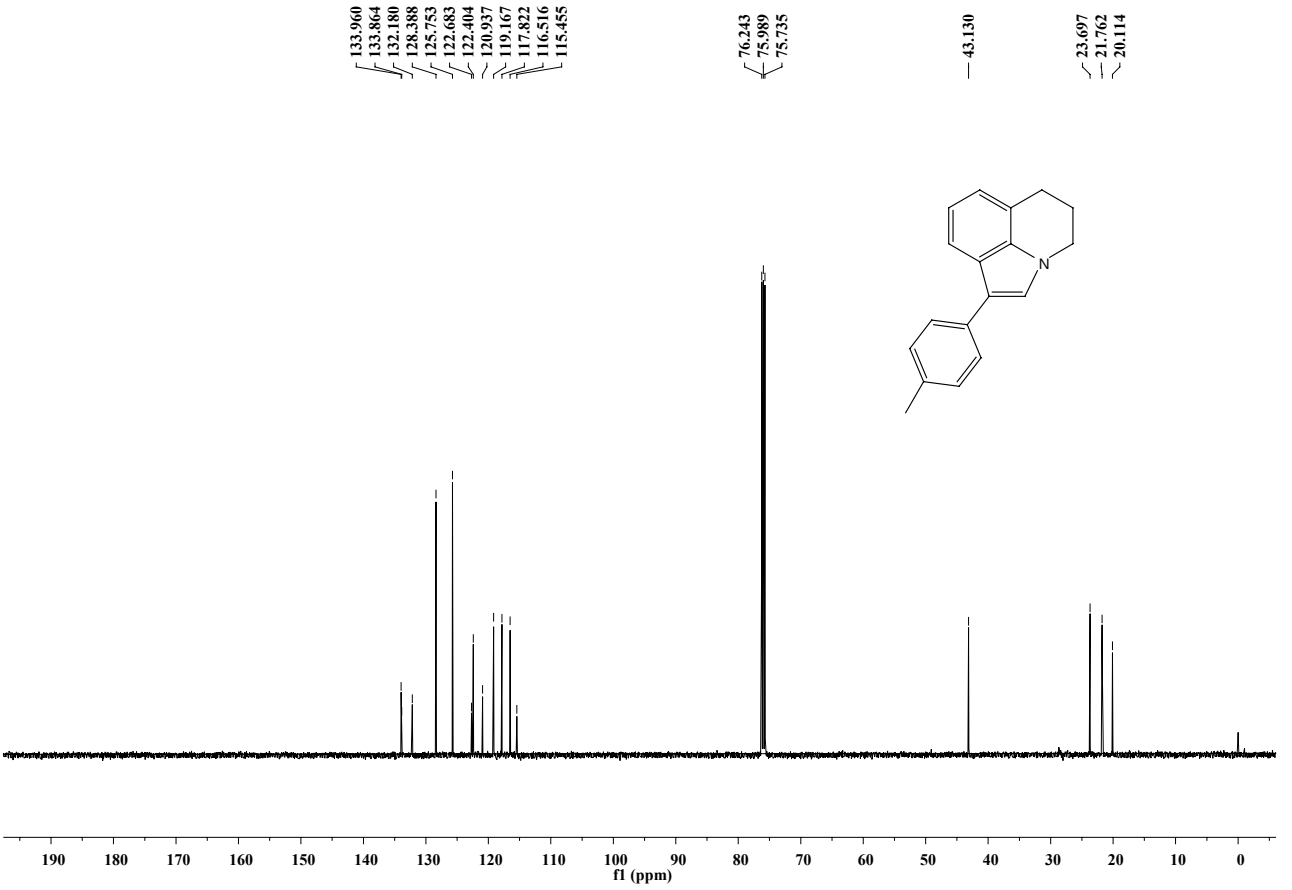
1-phenyl-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2a)



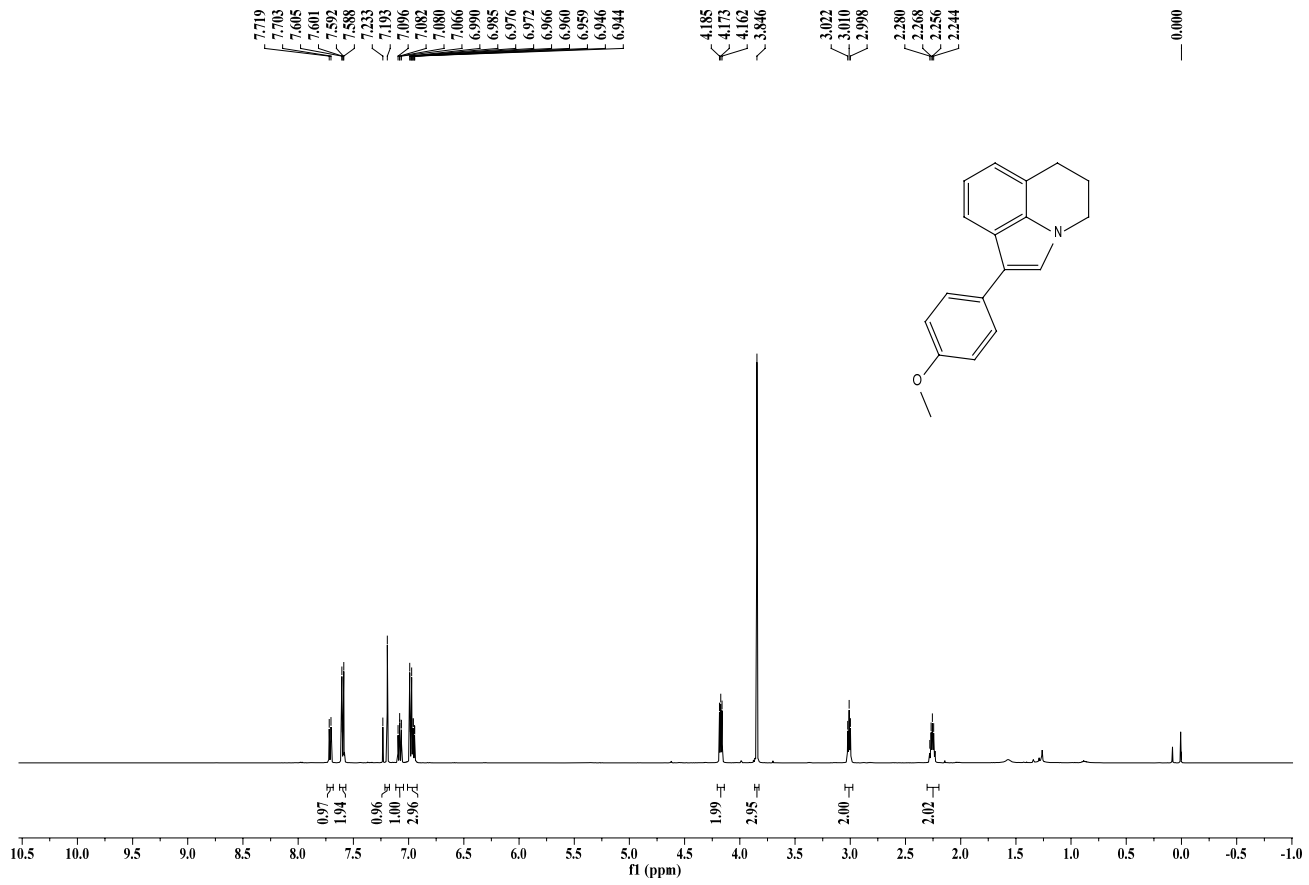


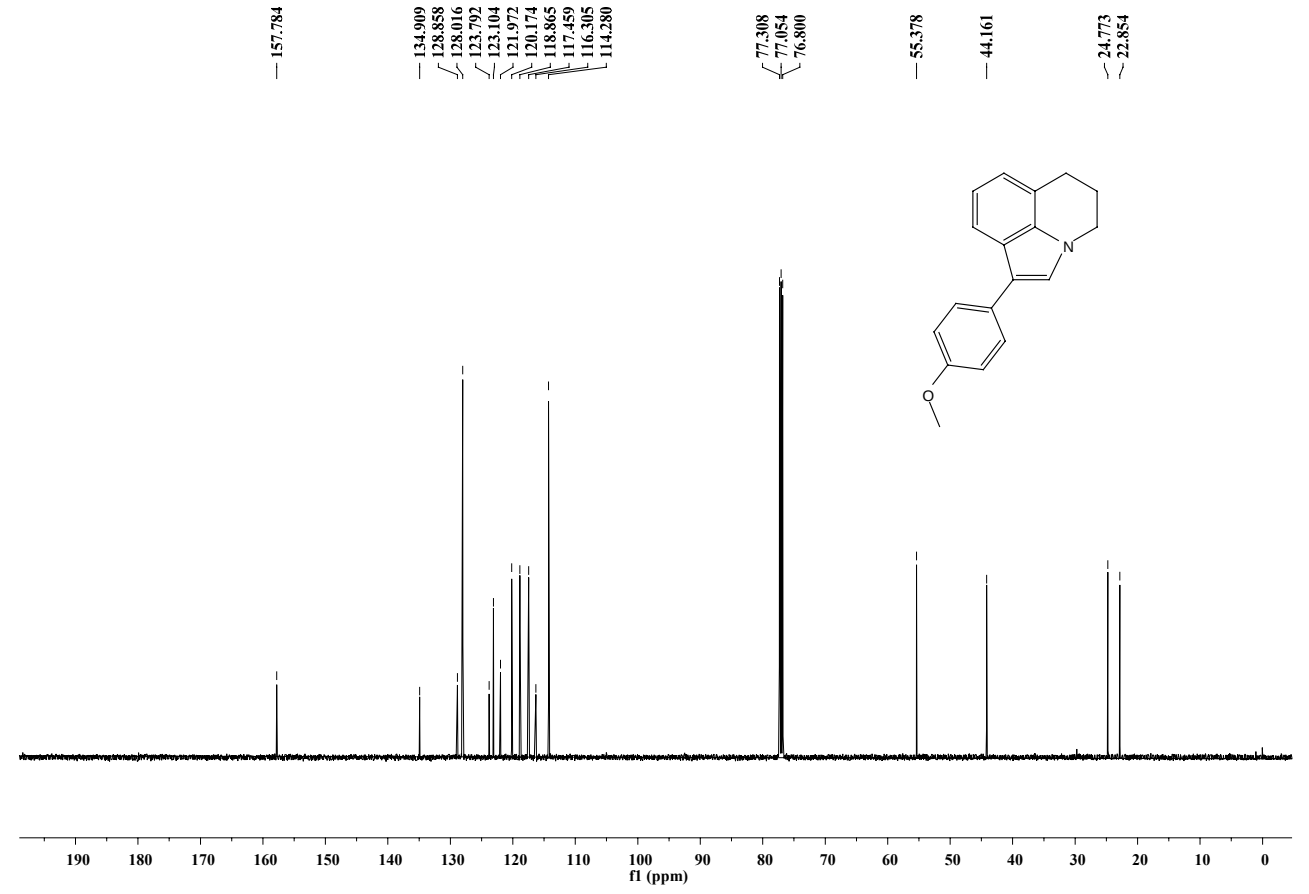
1-(p-tolyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2b)



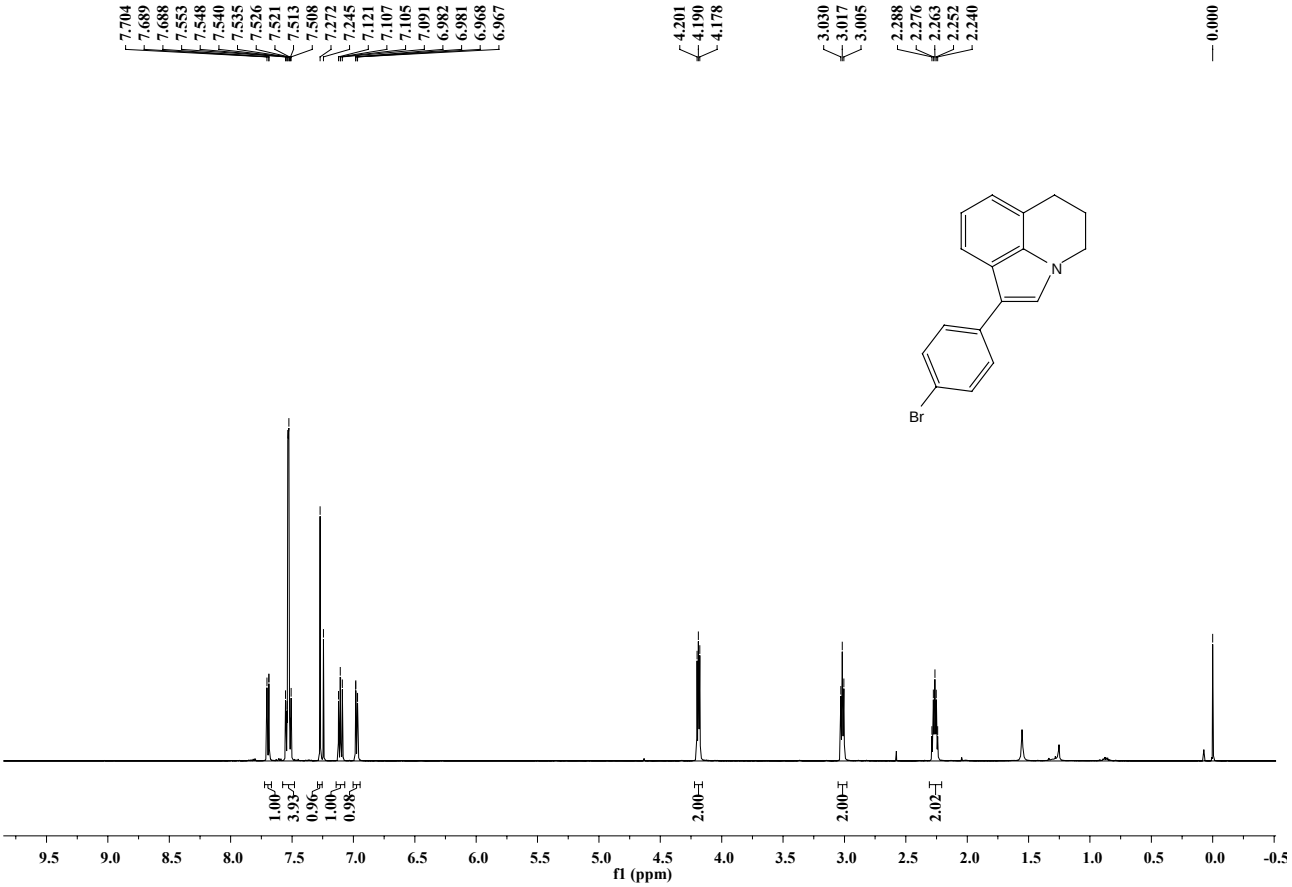


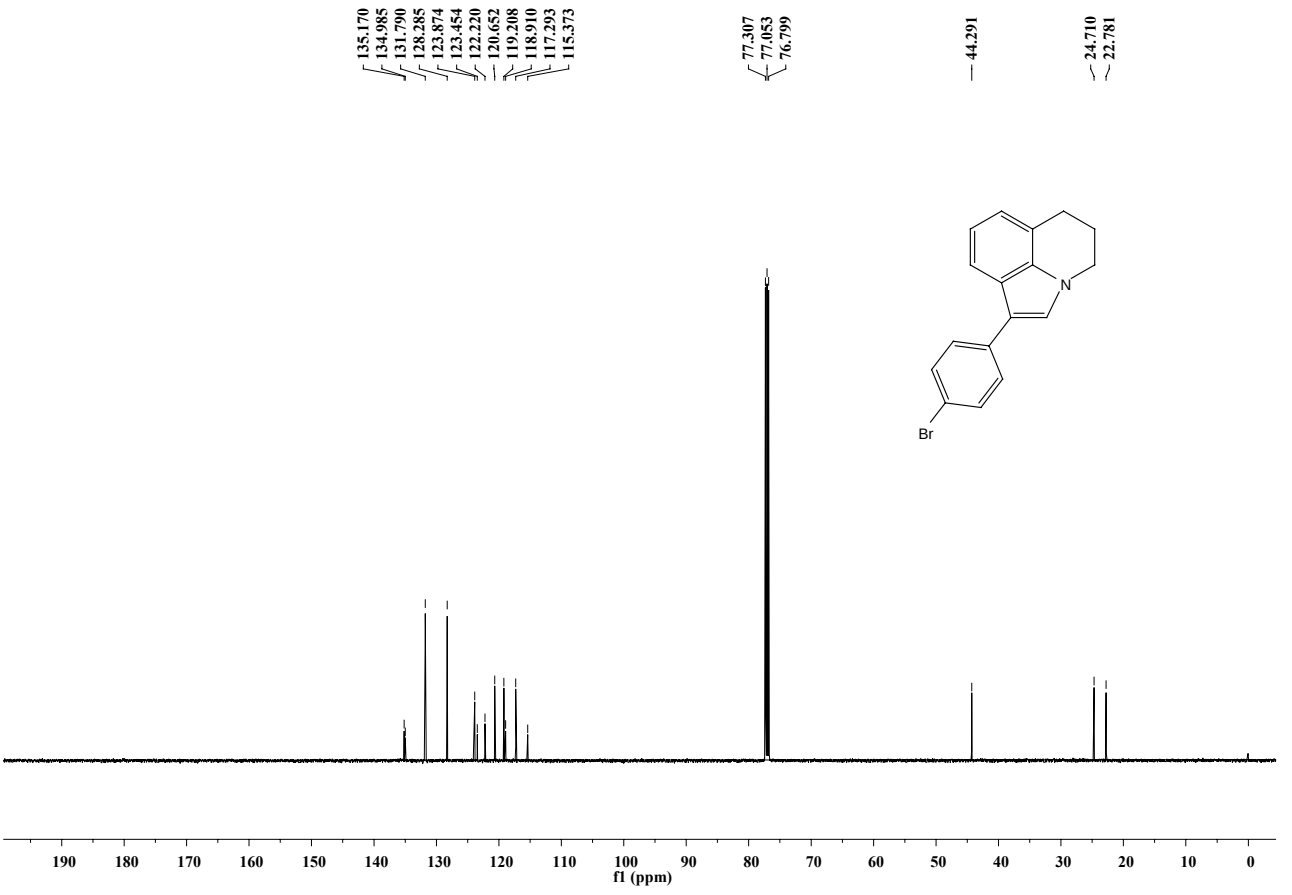
1-(4-methoxyphenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2c)



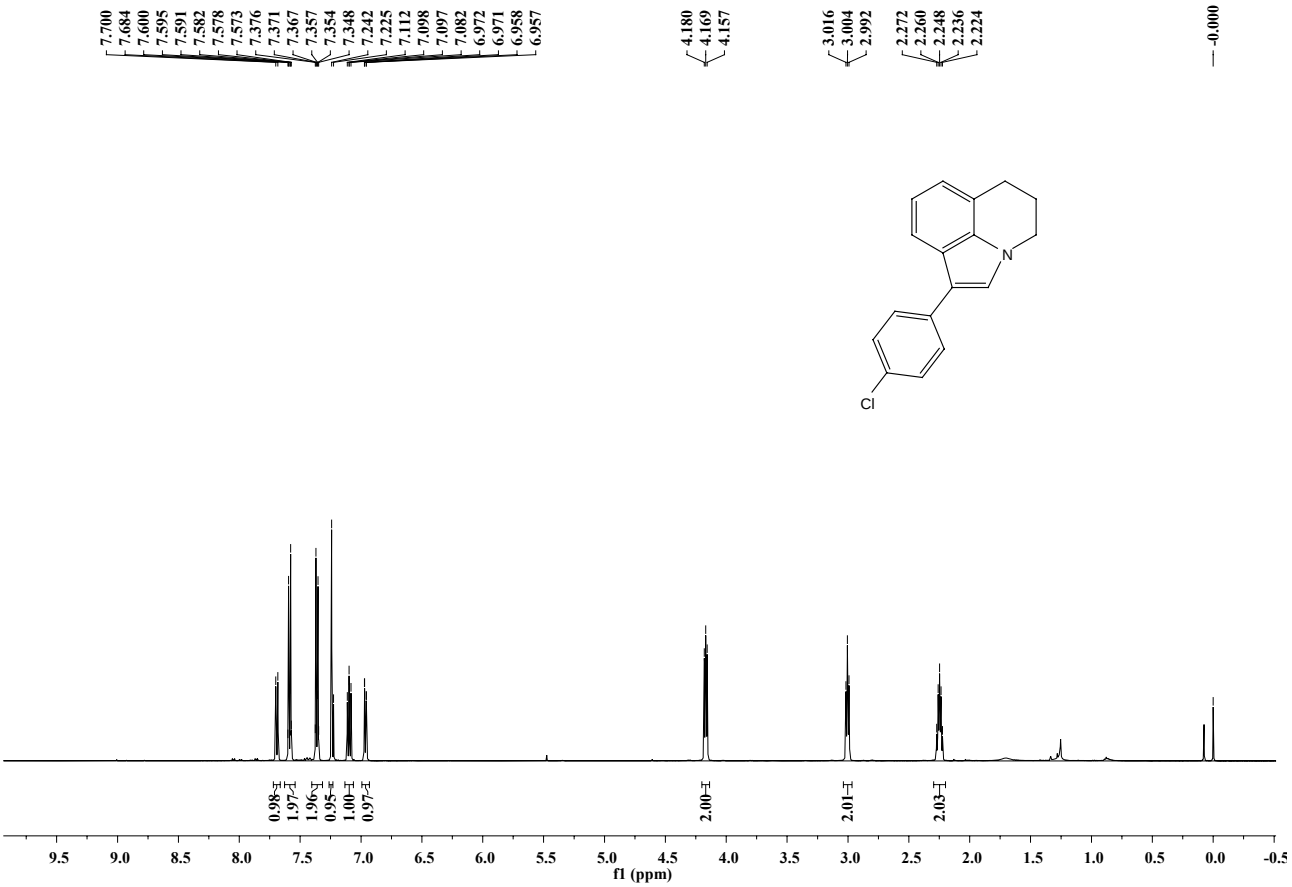


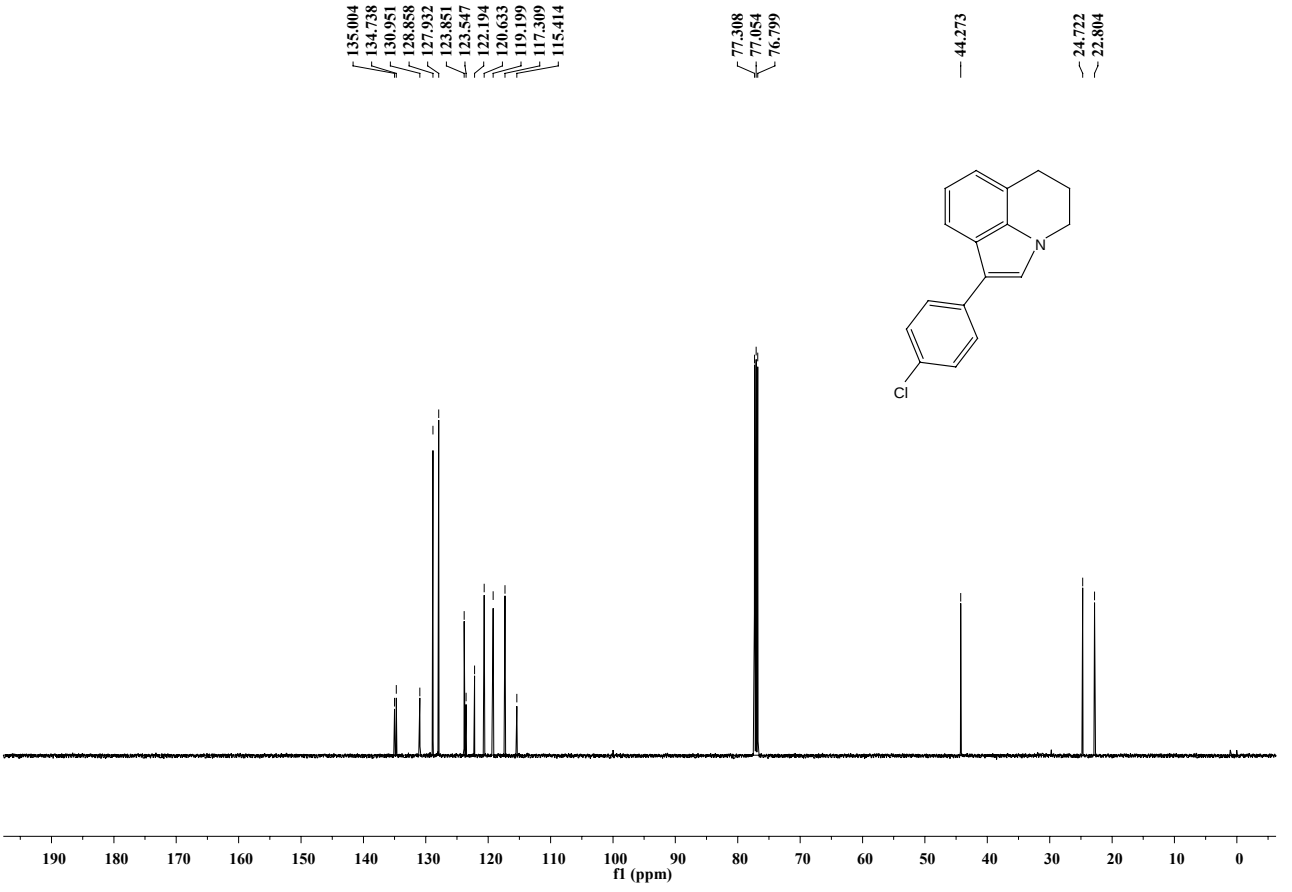
1-(4-bromophenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2d)



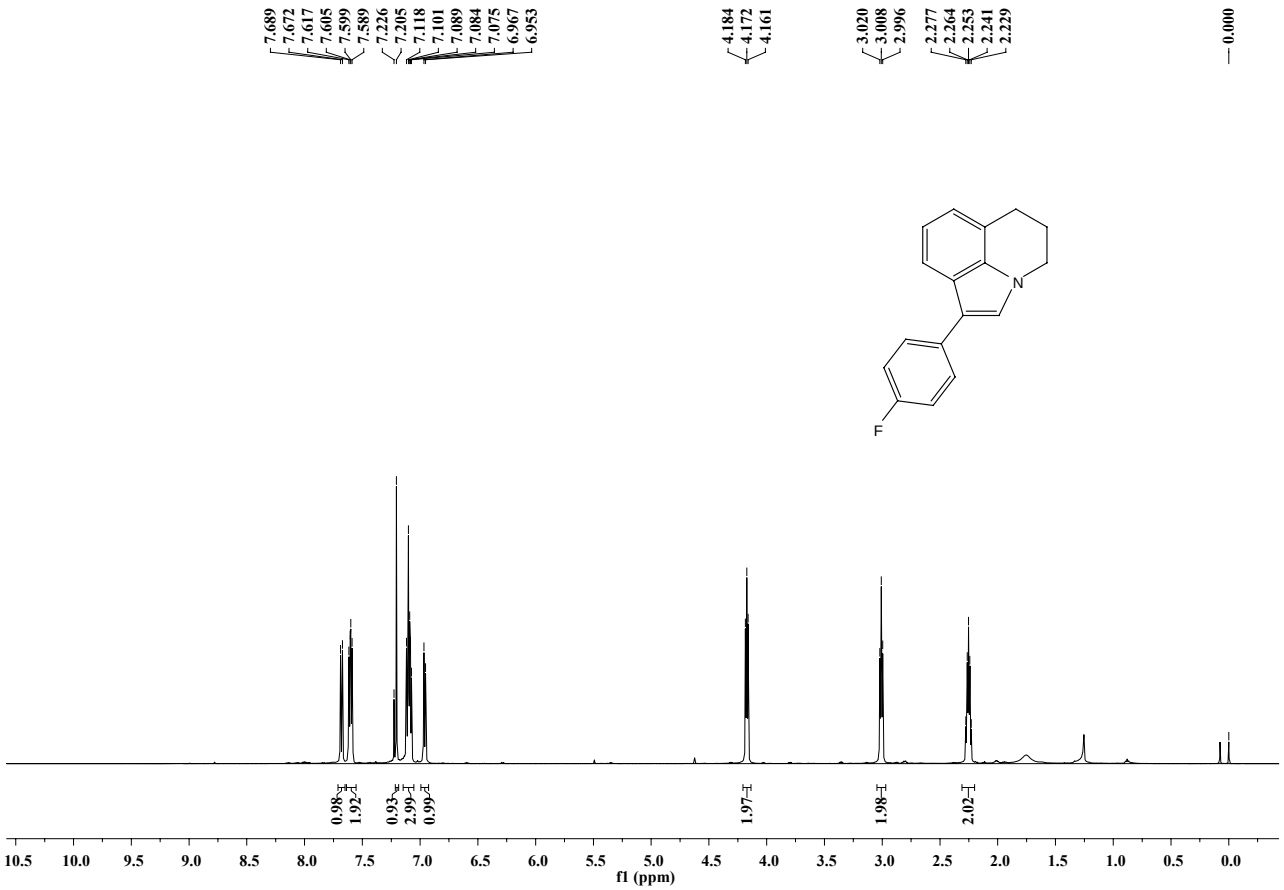


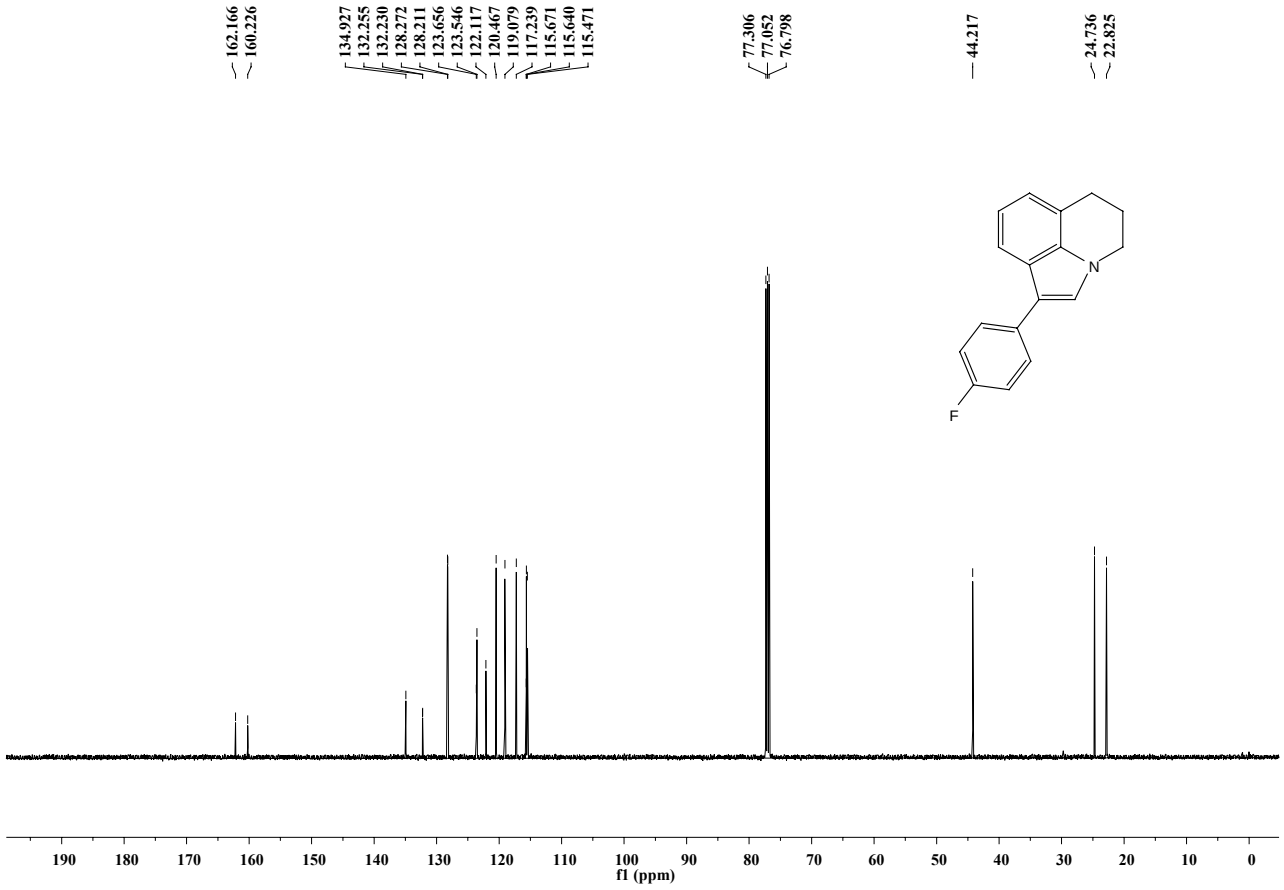
1-(4-chlorophenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2e)



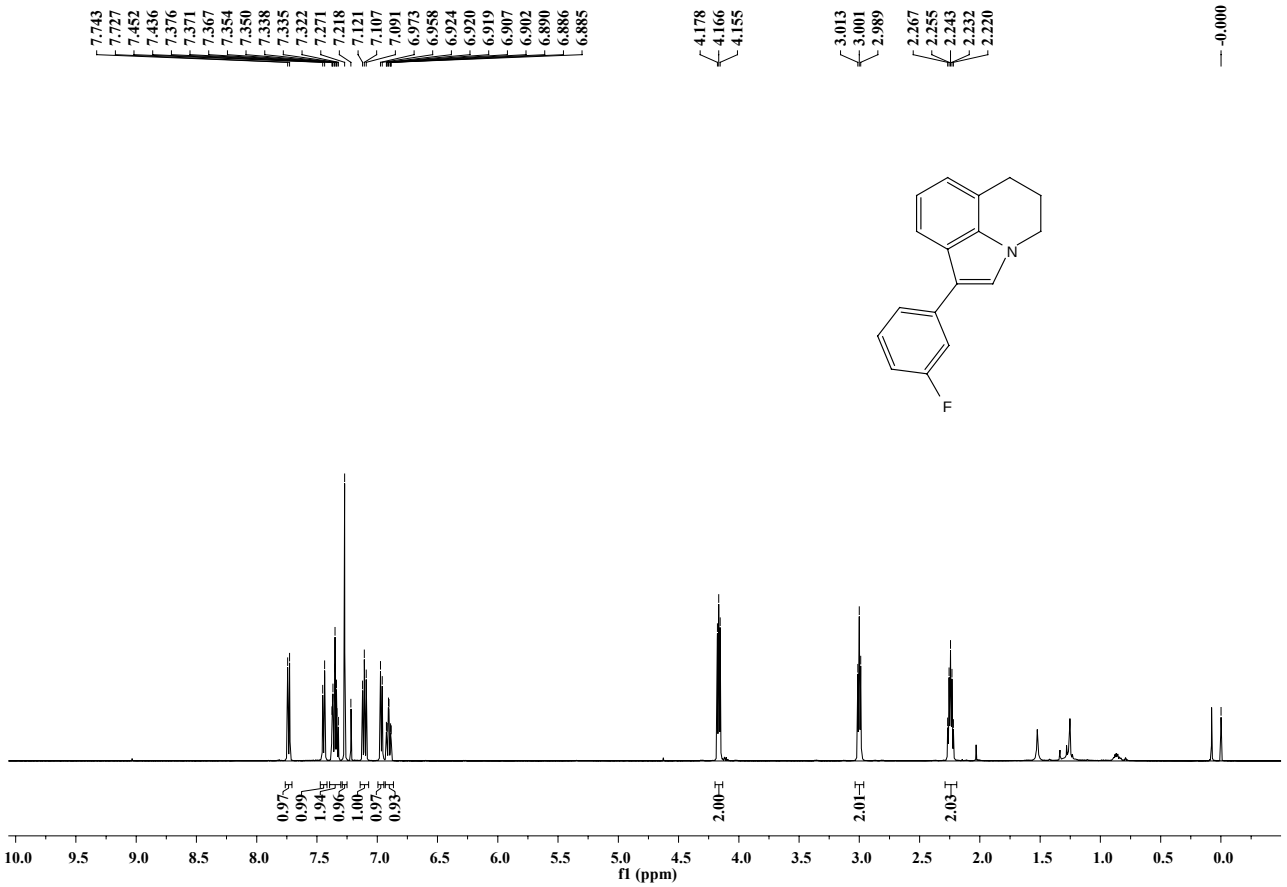


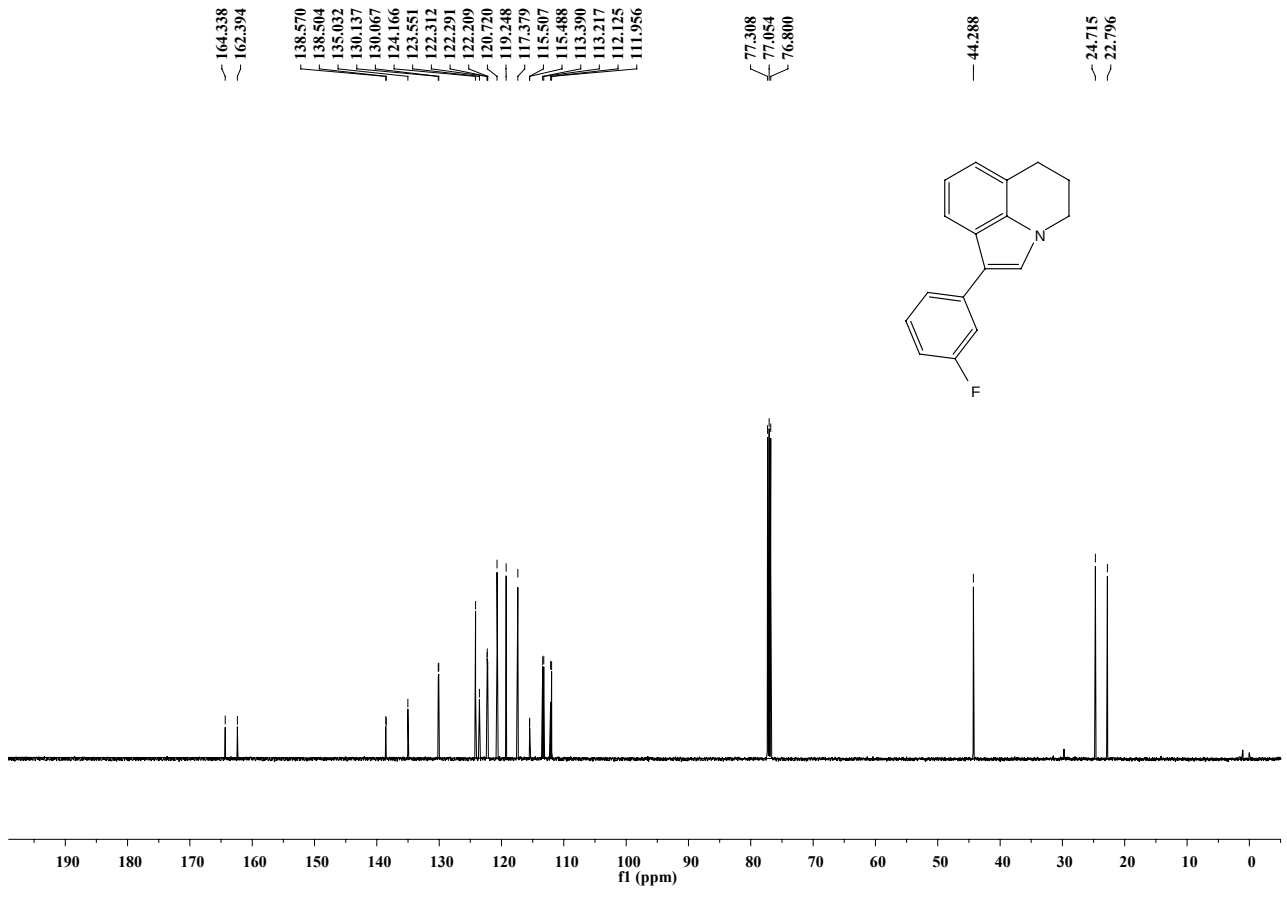
1-(4-fluorophenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2f)



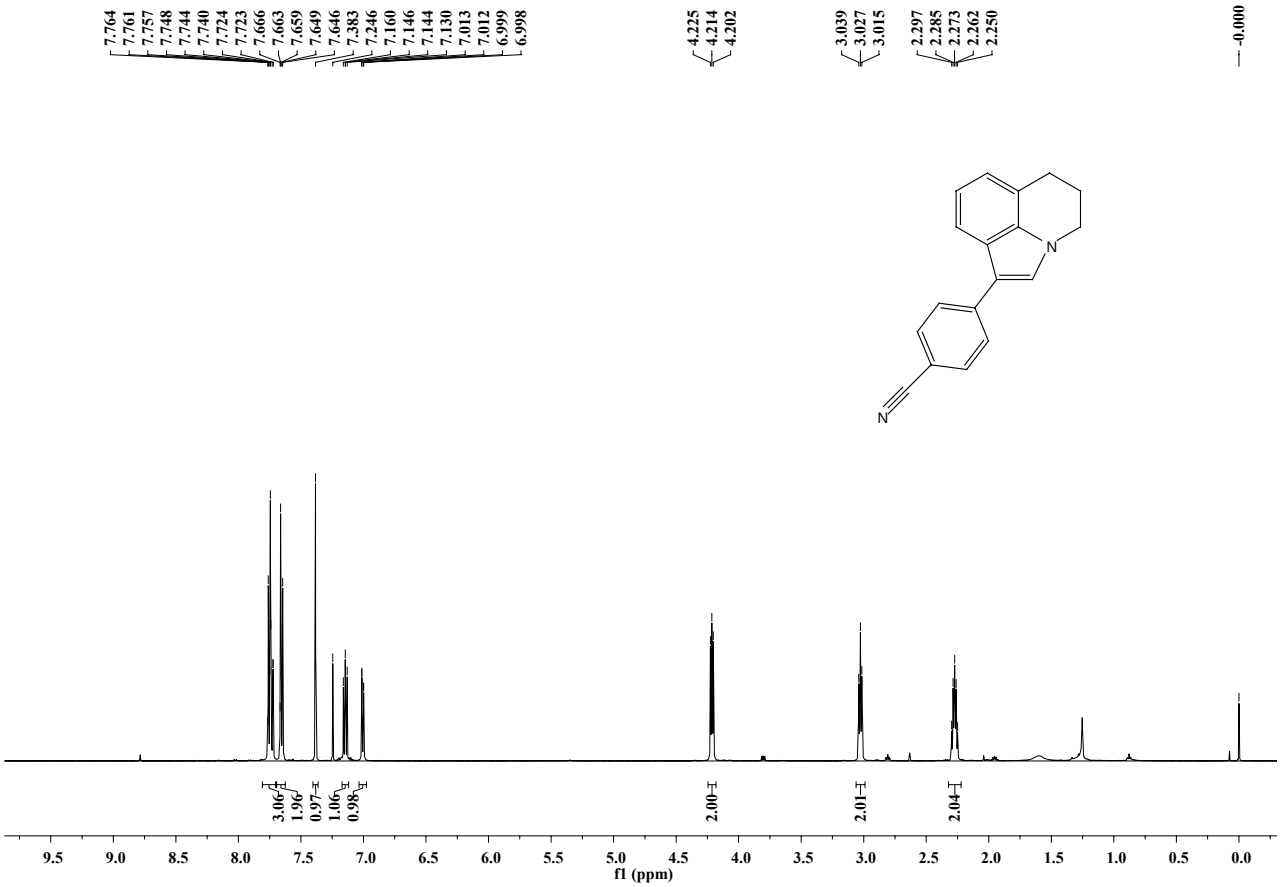


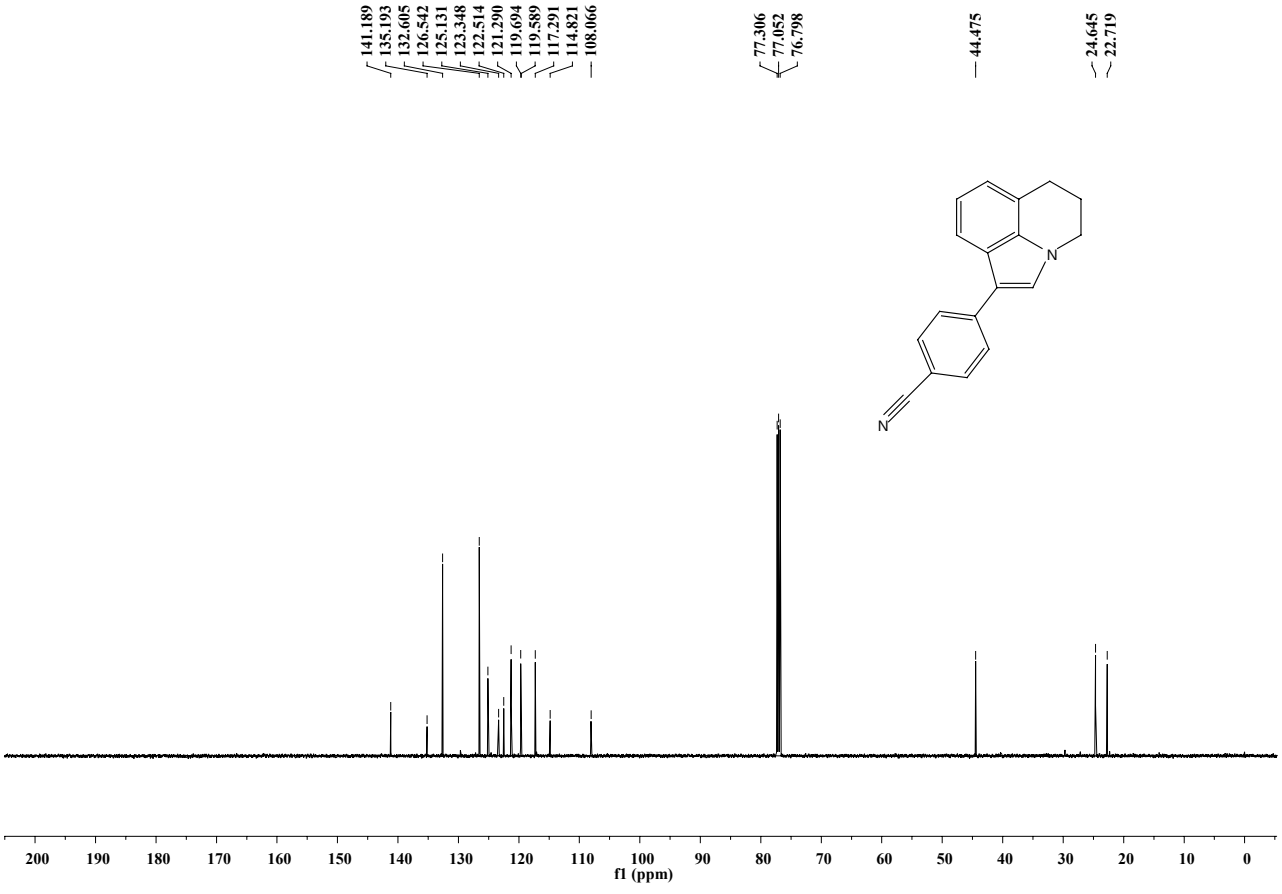
1-(3-fluorophenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2g)



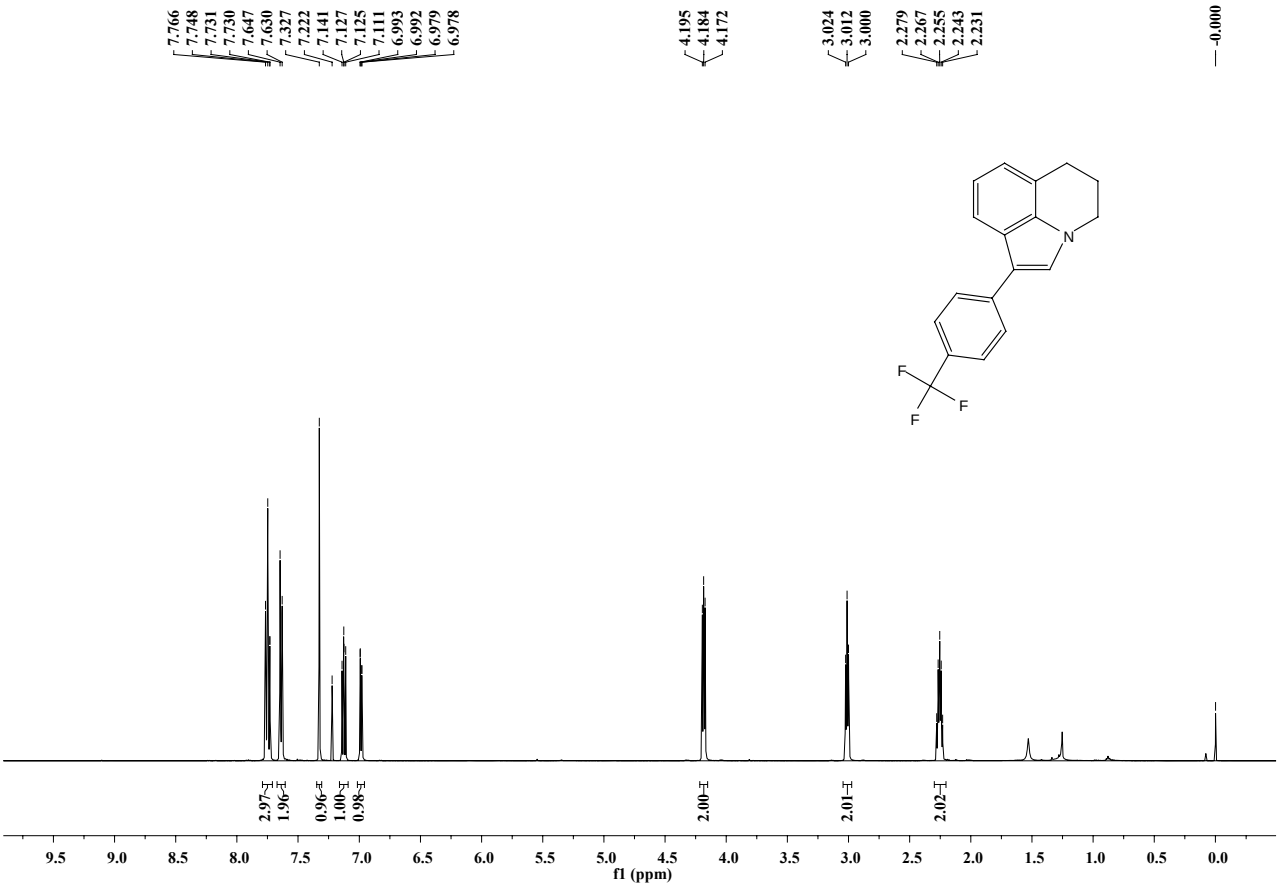


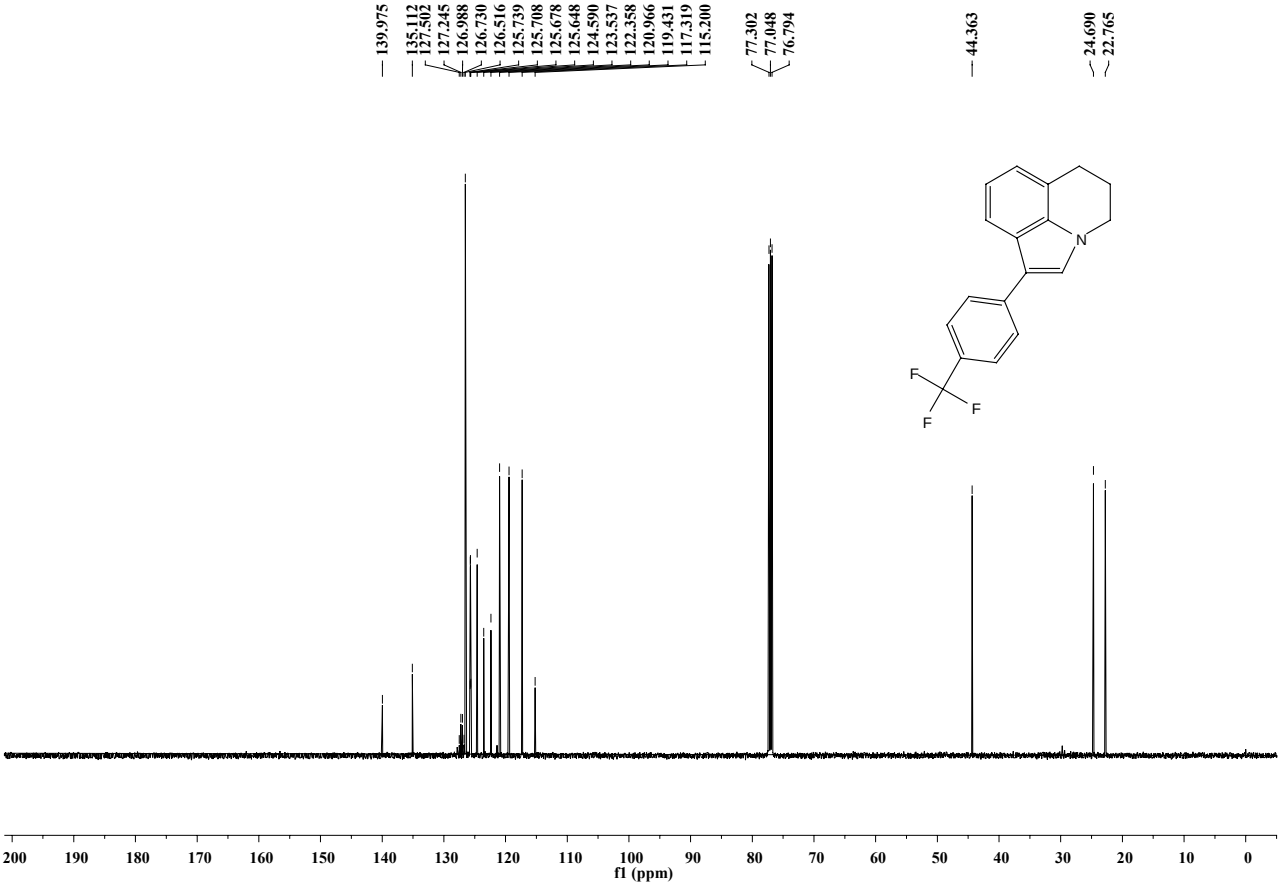
4-(5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinolin-1-yl)benzonitrile (2h)



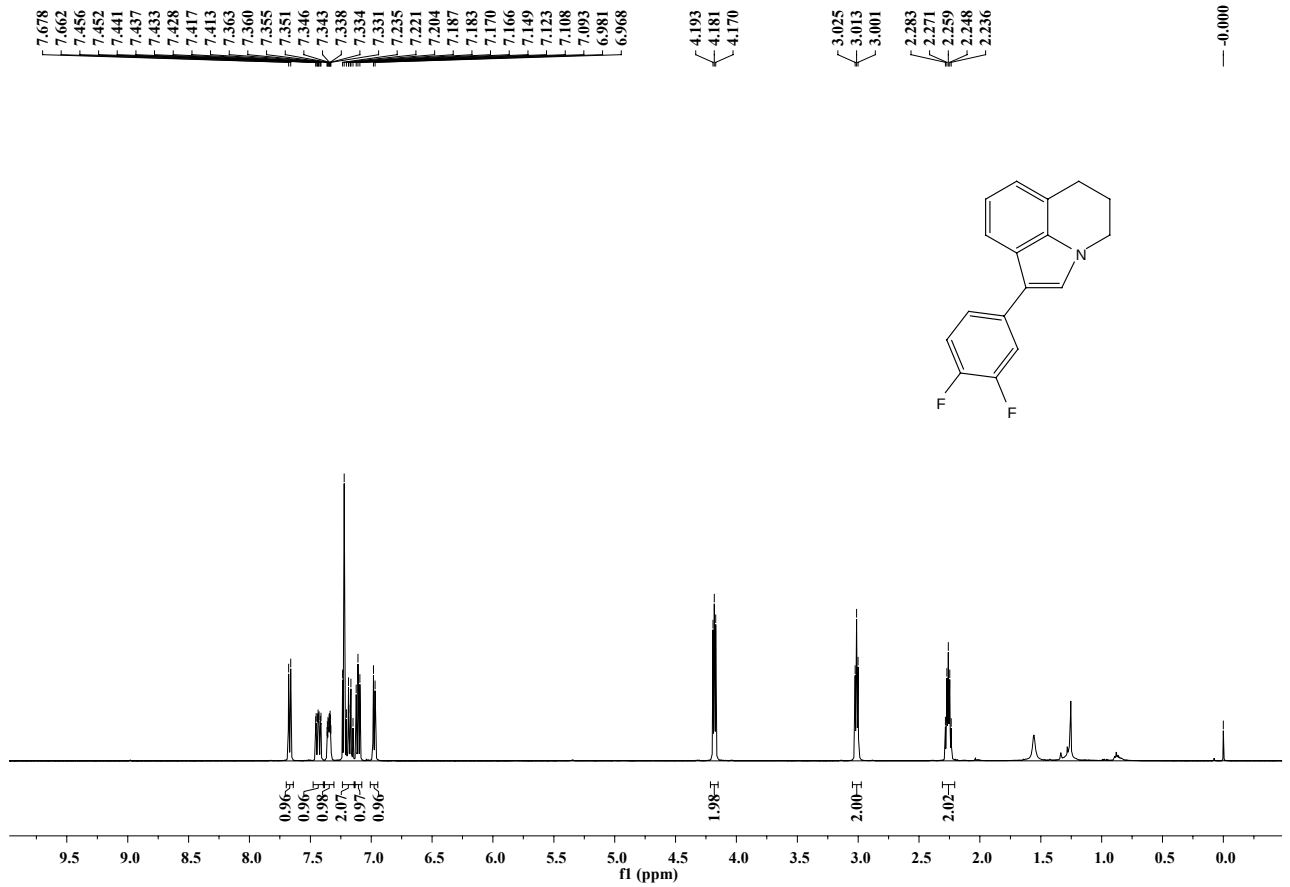


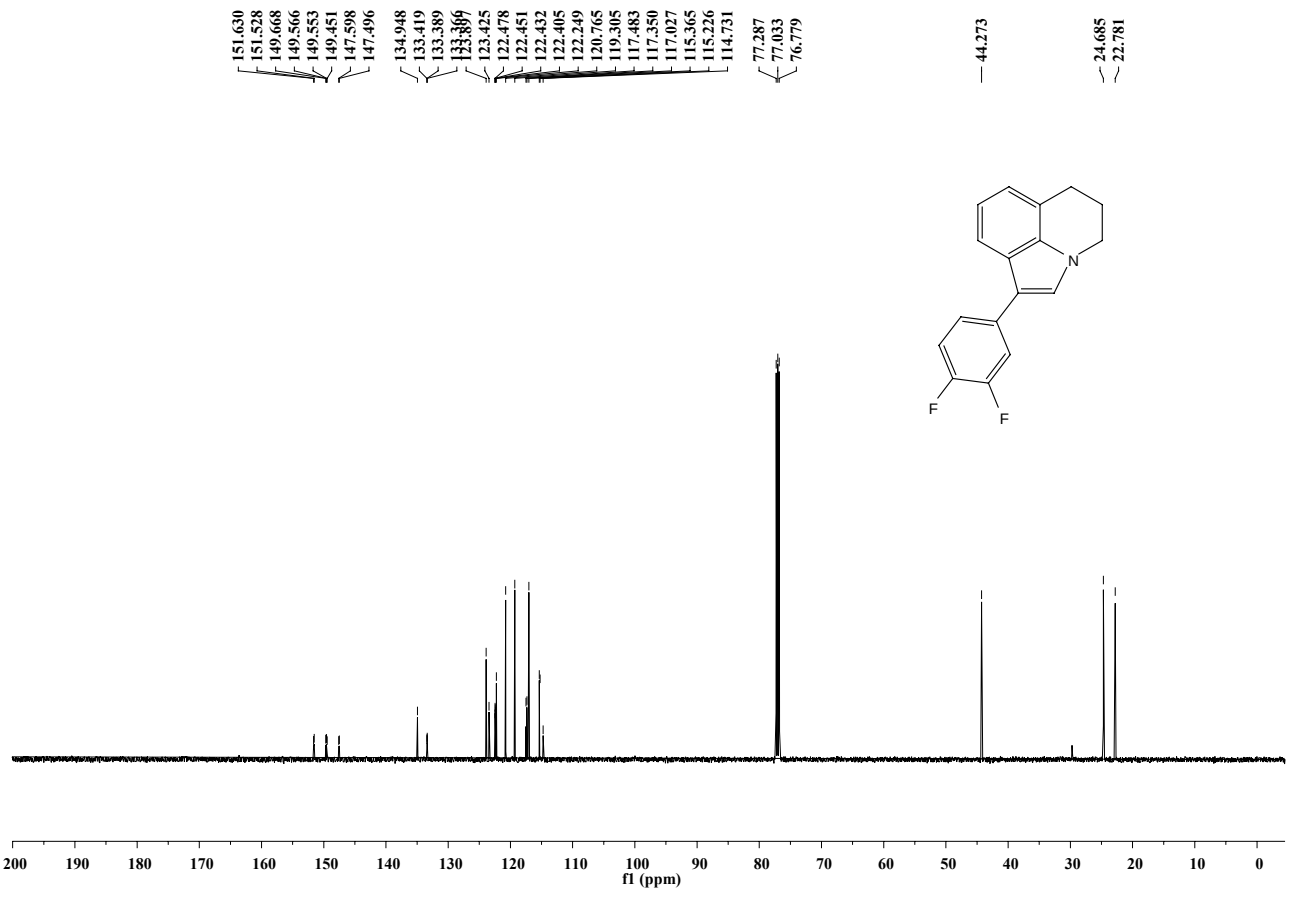
1-(4-(trifluoromethyl)phenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2i)



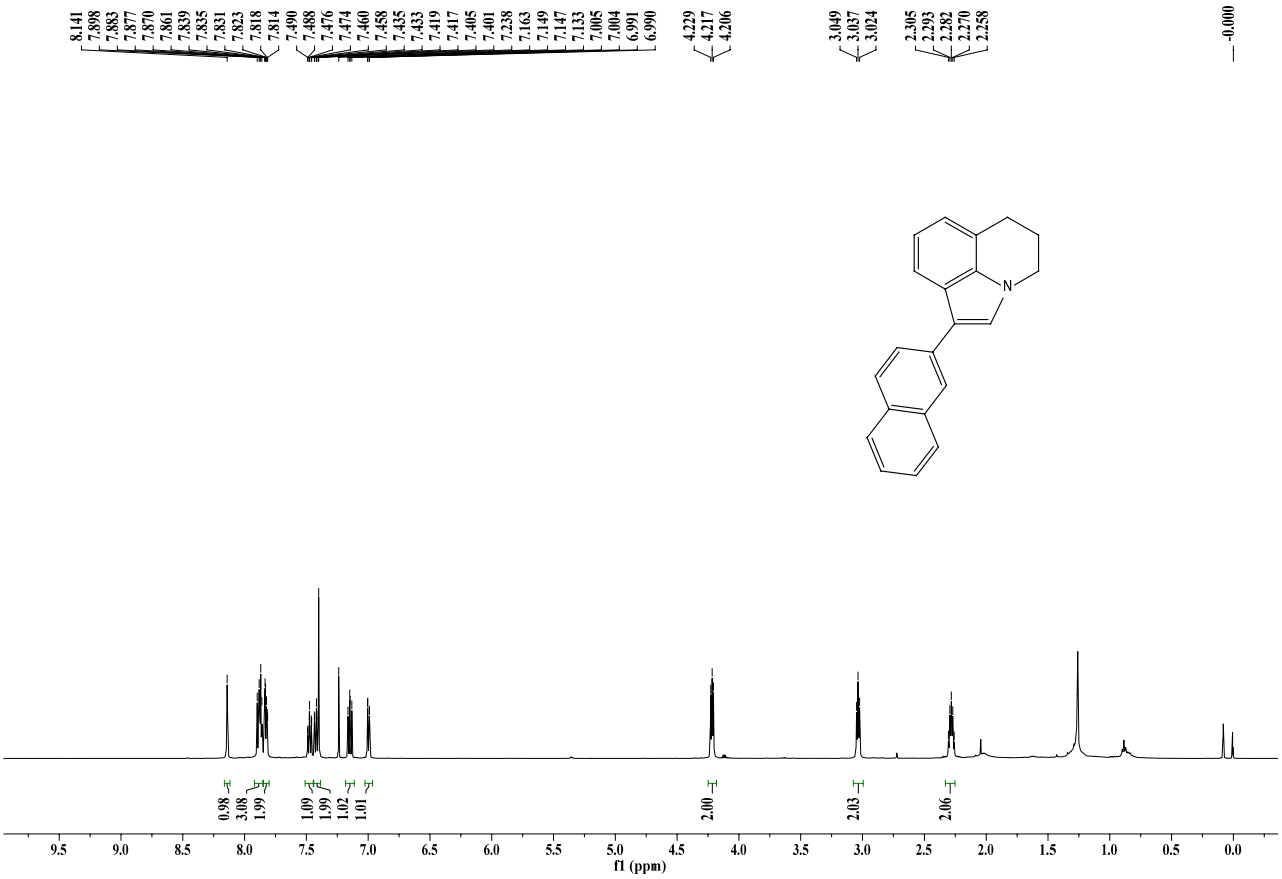


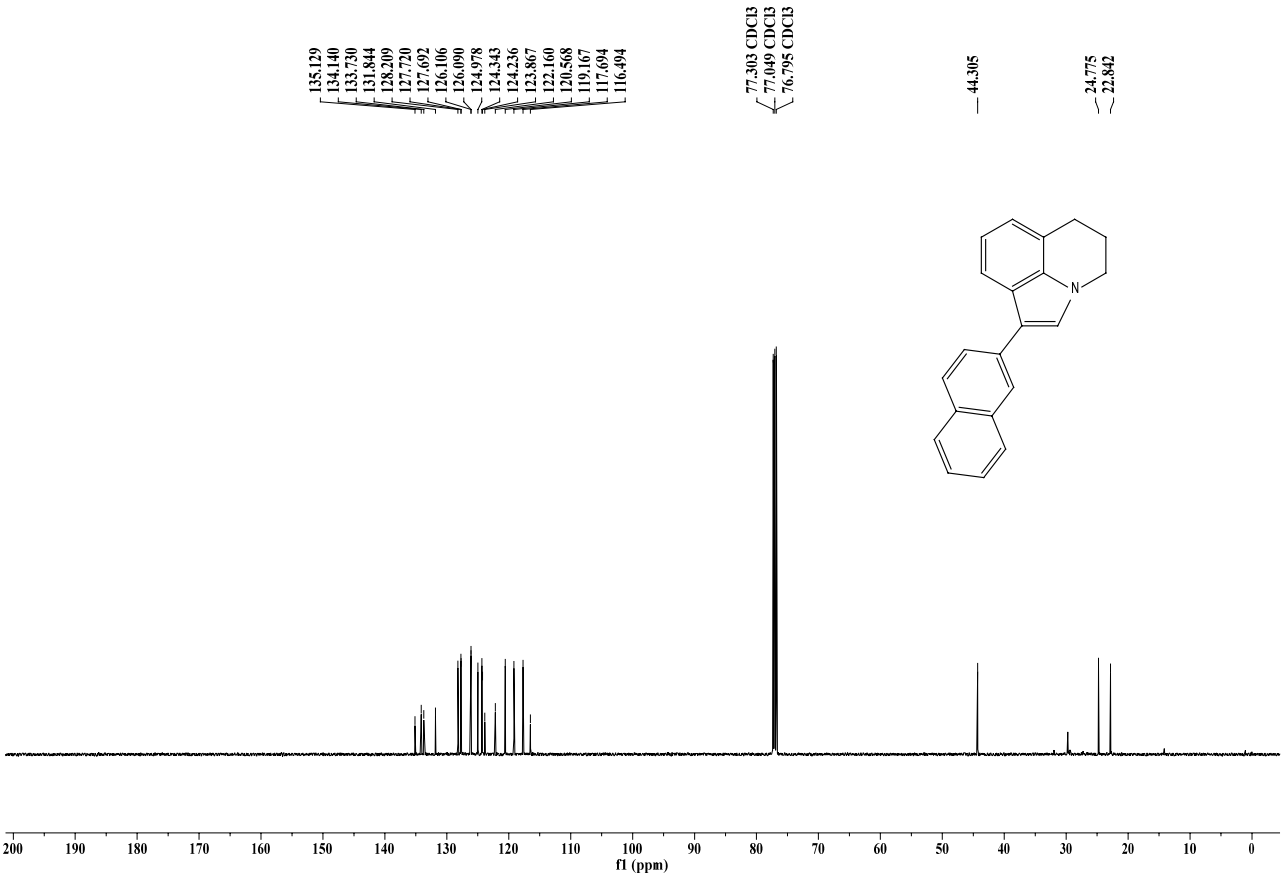
1-(3,4-difluorophenyl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2j)



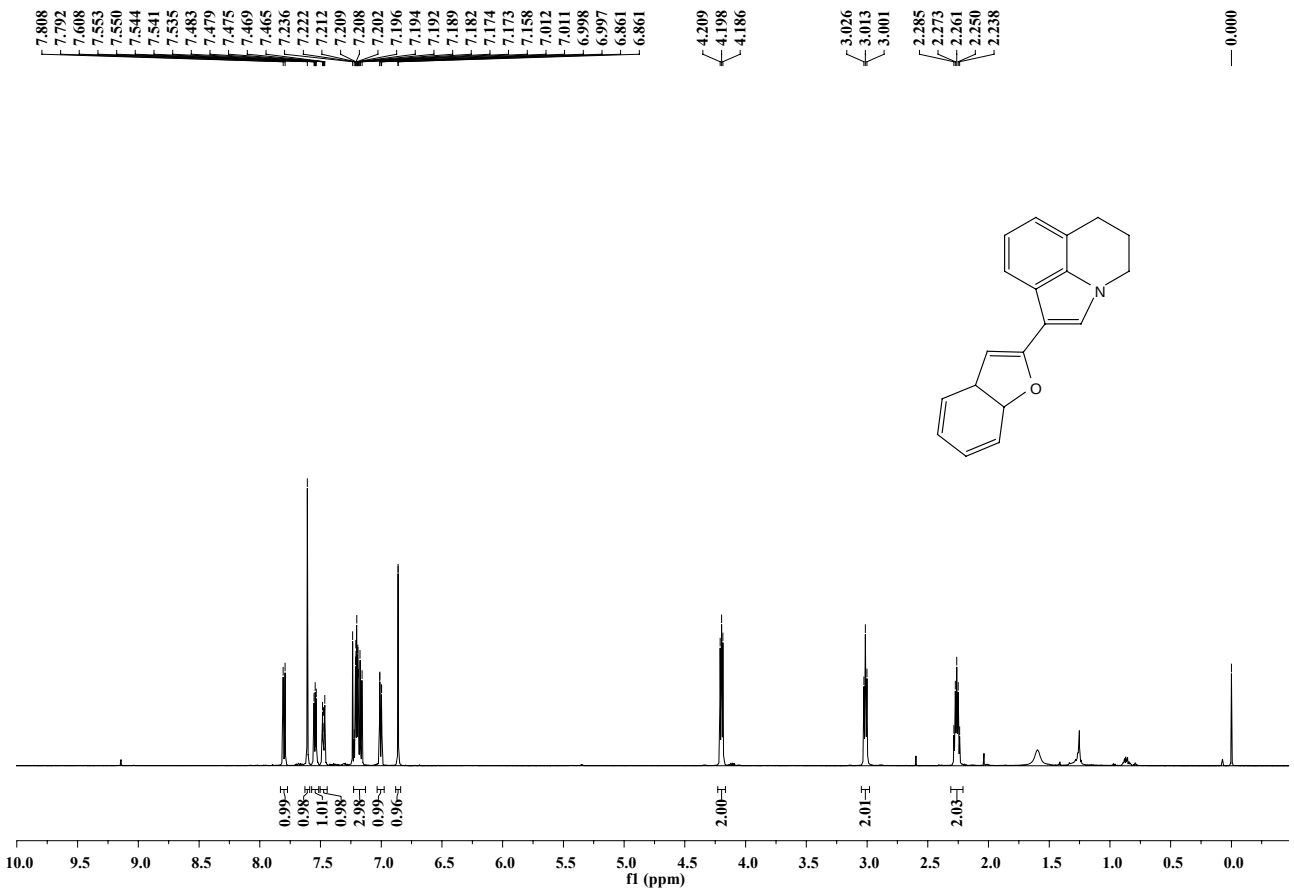


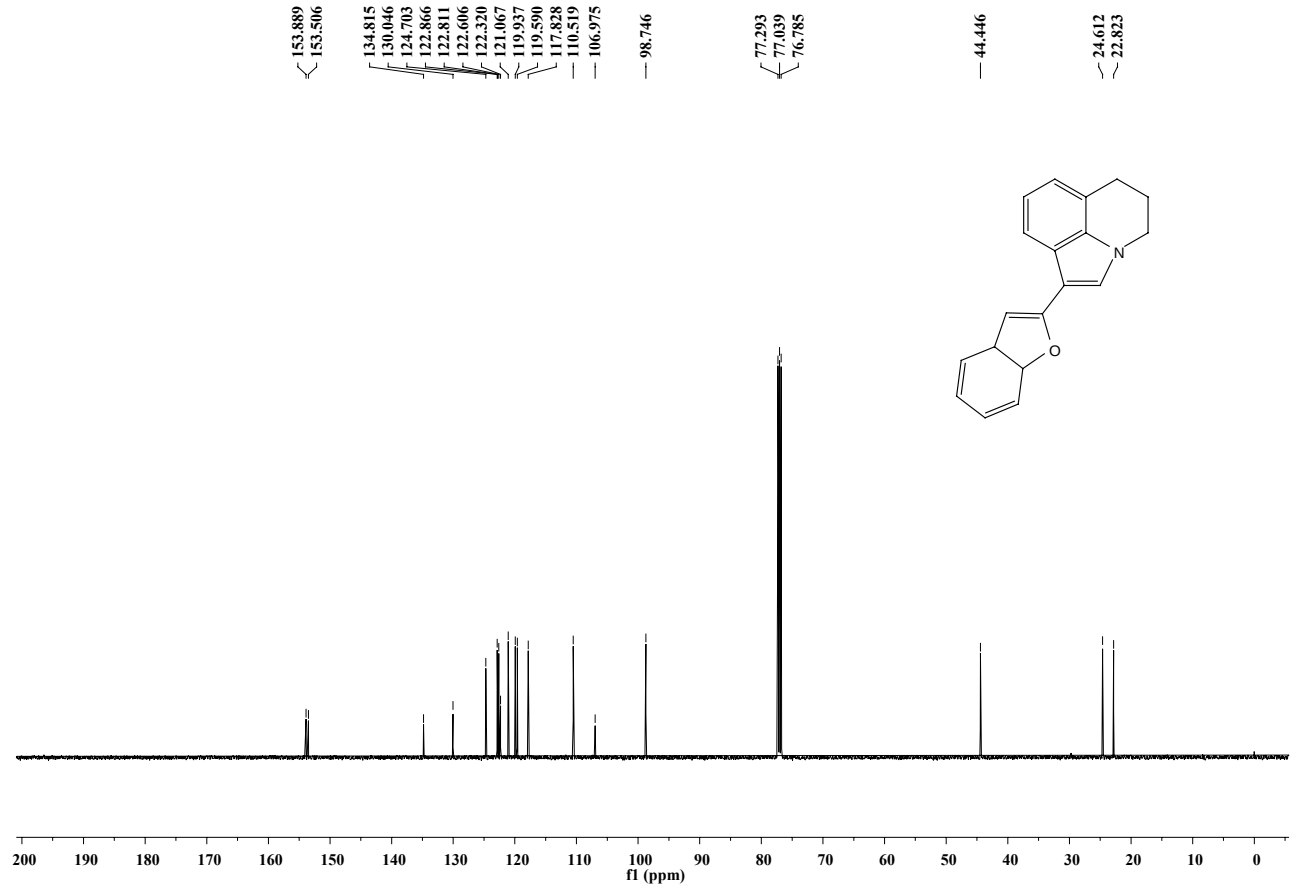
1-(naphthalen-2-yl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2k)



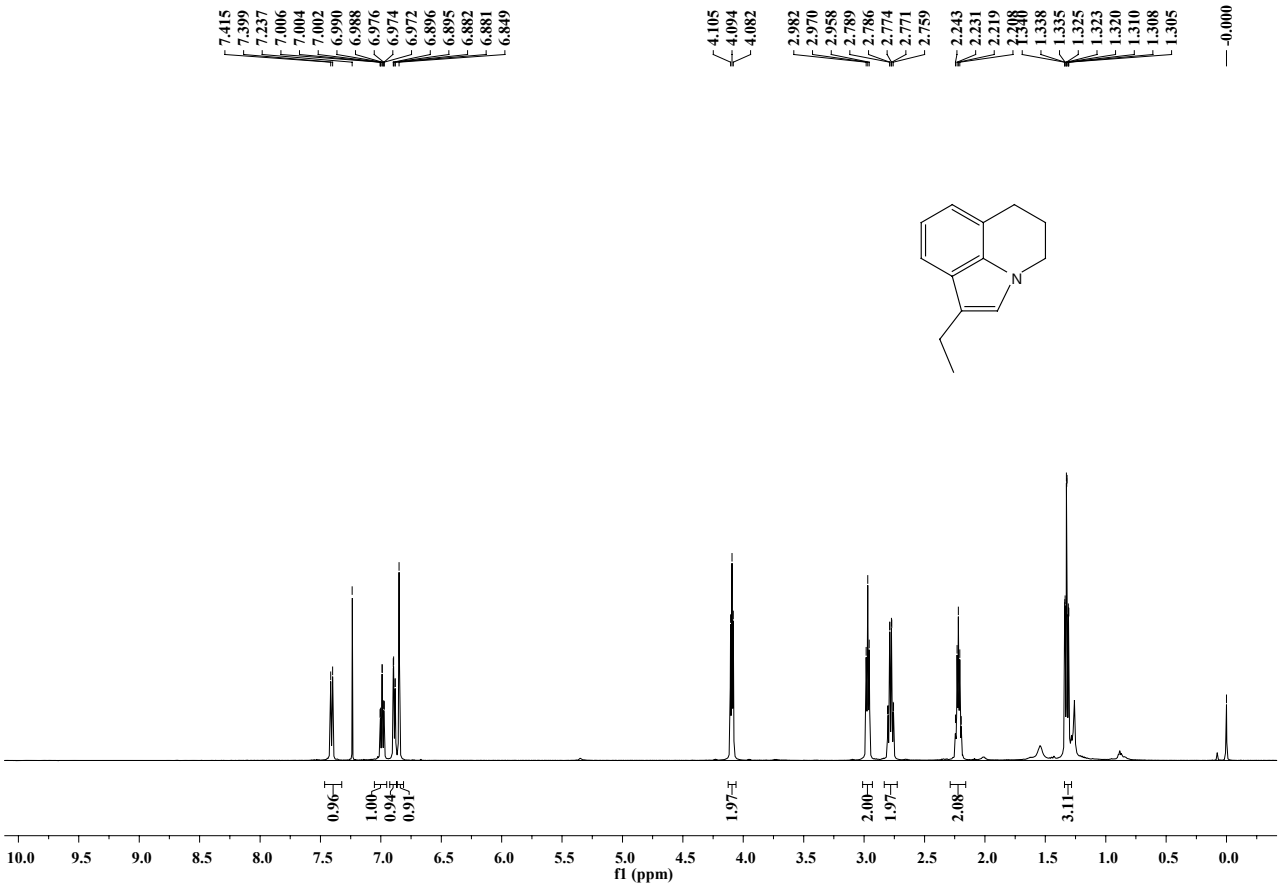


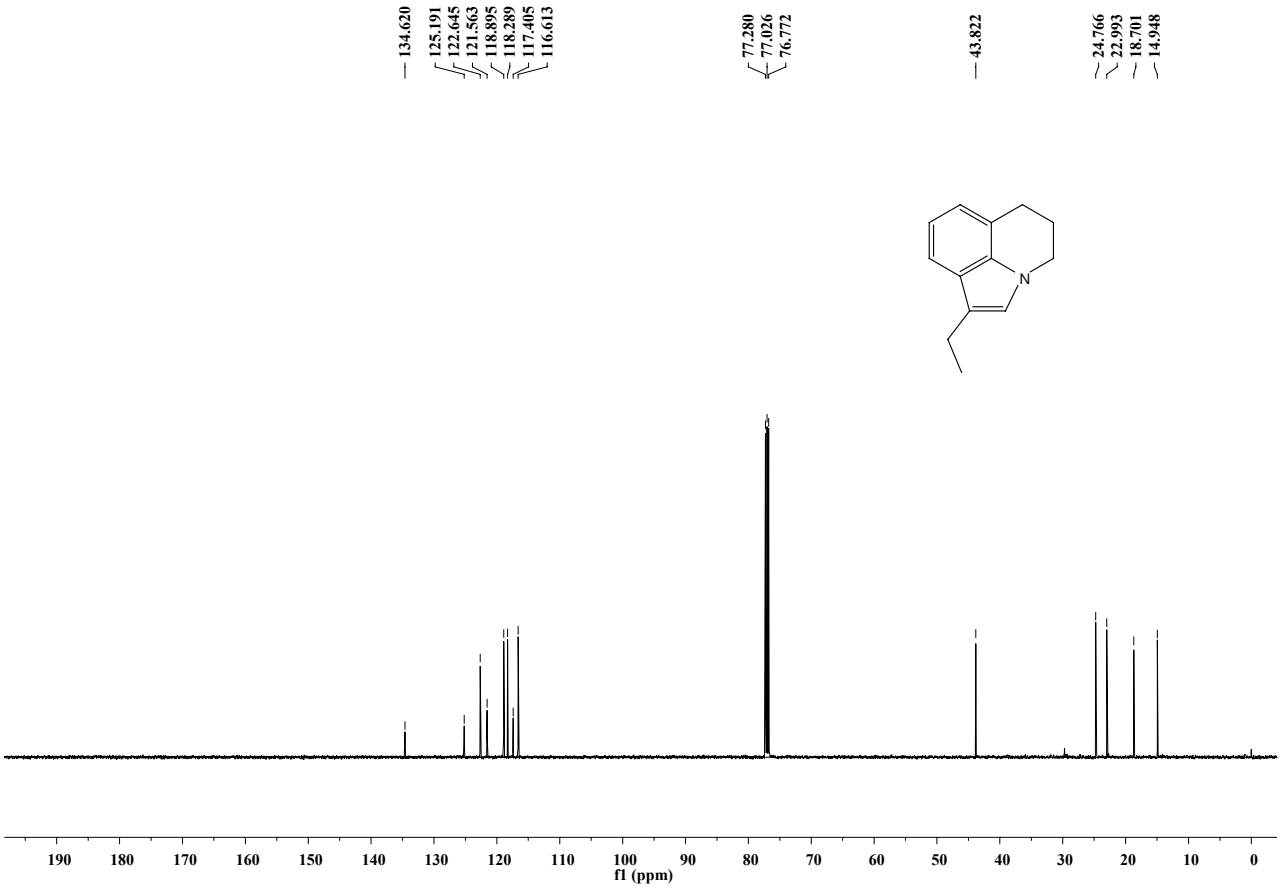
1-(3a,7a-dihydrobenzofuran-2-yl)-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2l)



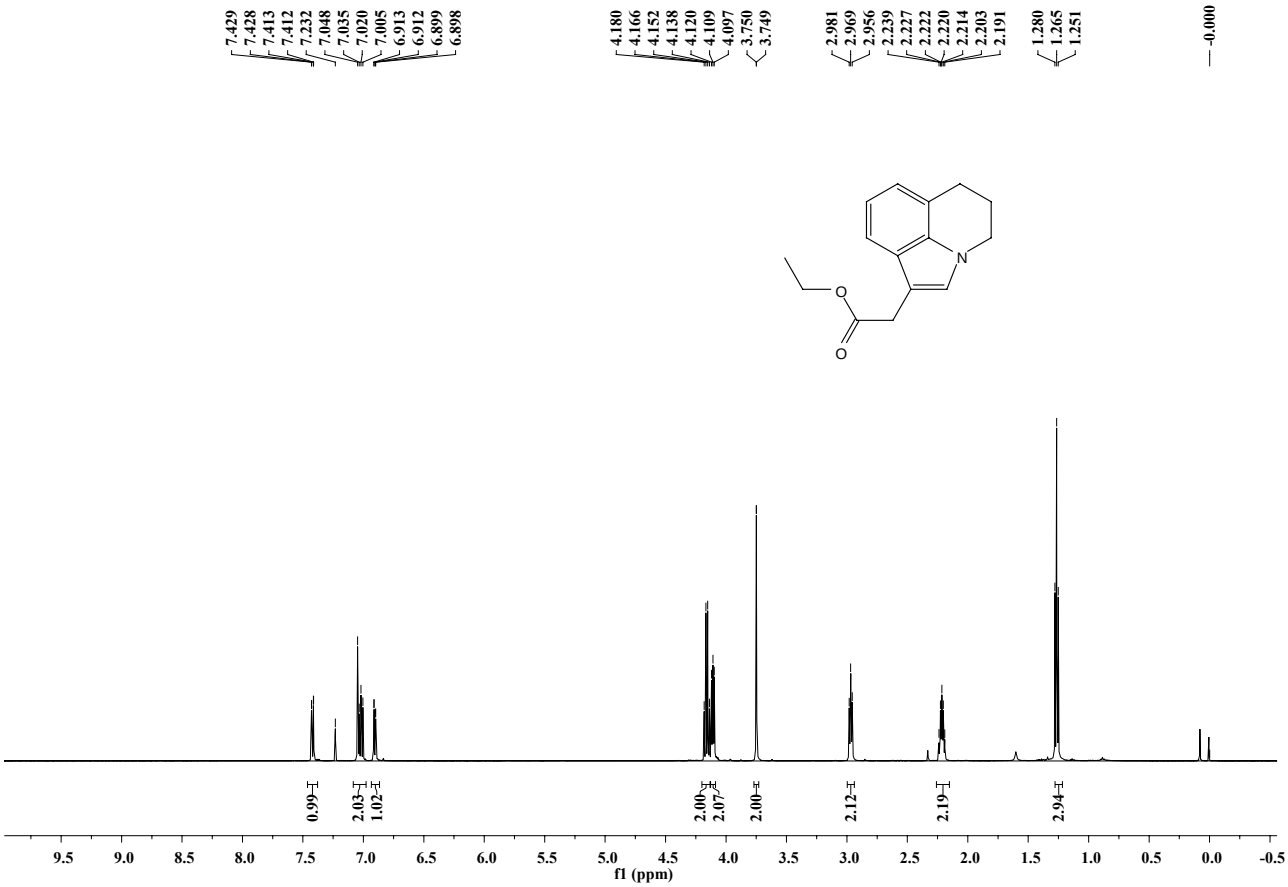


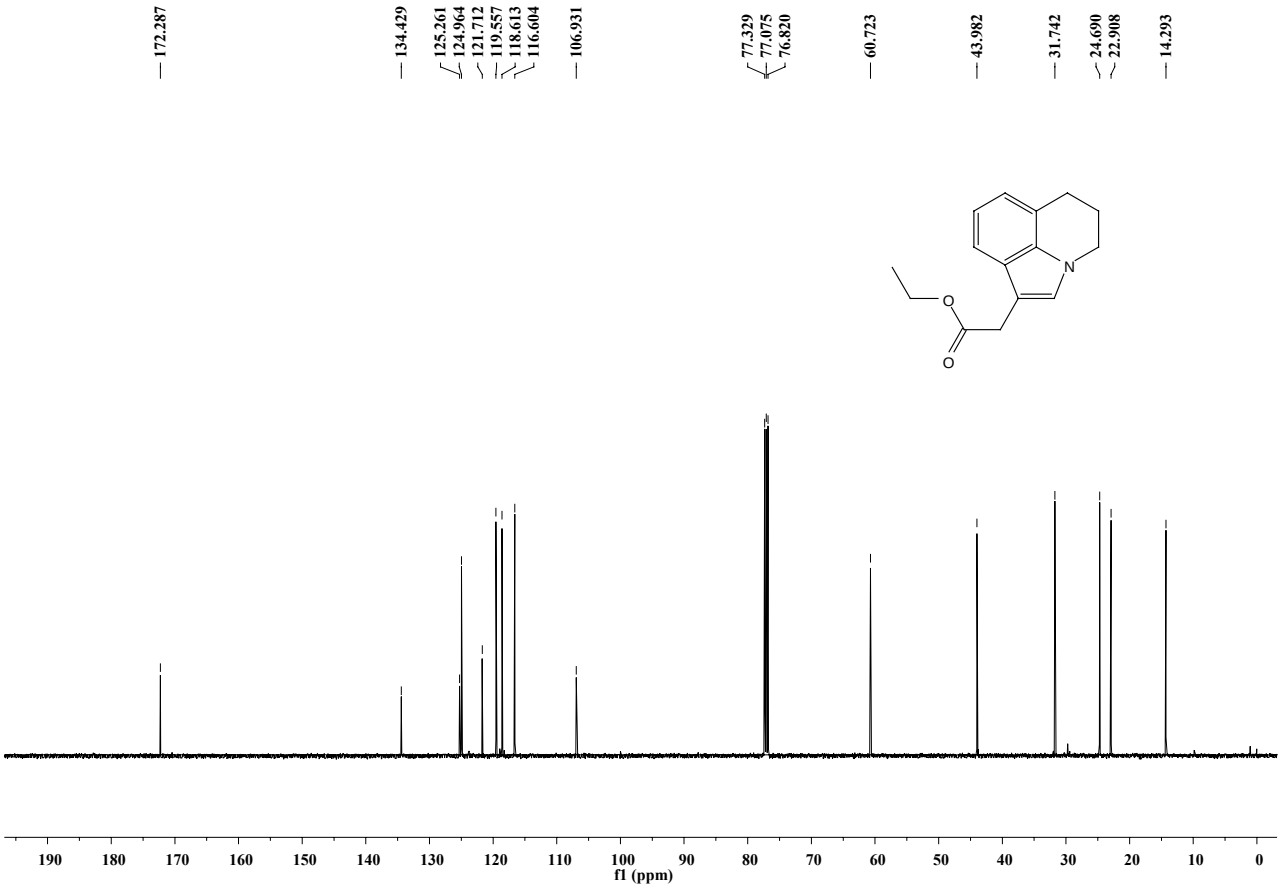
1-ethyl-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2m)



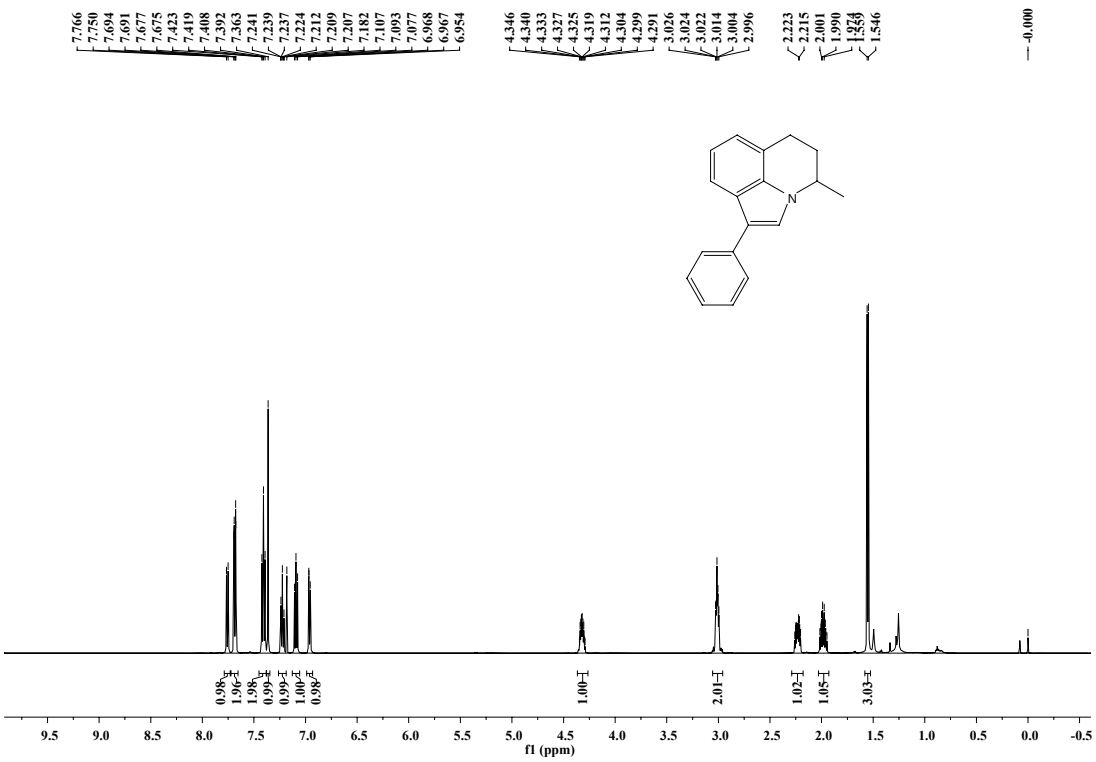


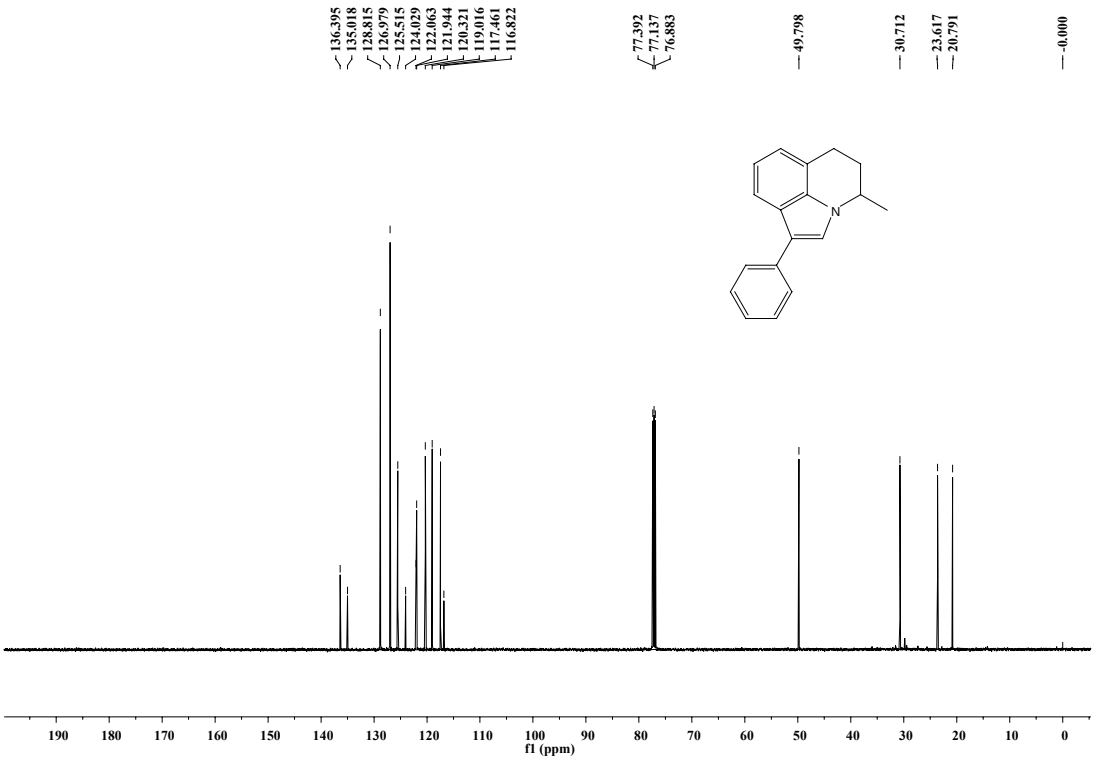
Ethyl 2-(5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinolin-1-yl)acetate (2n)



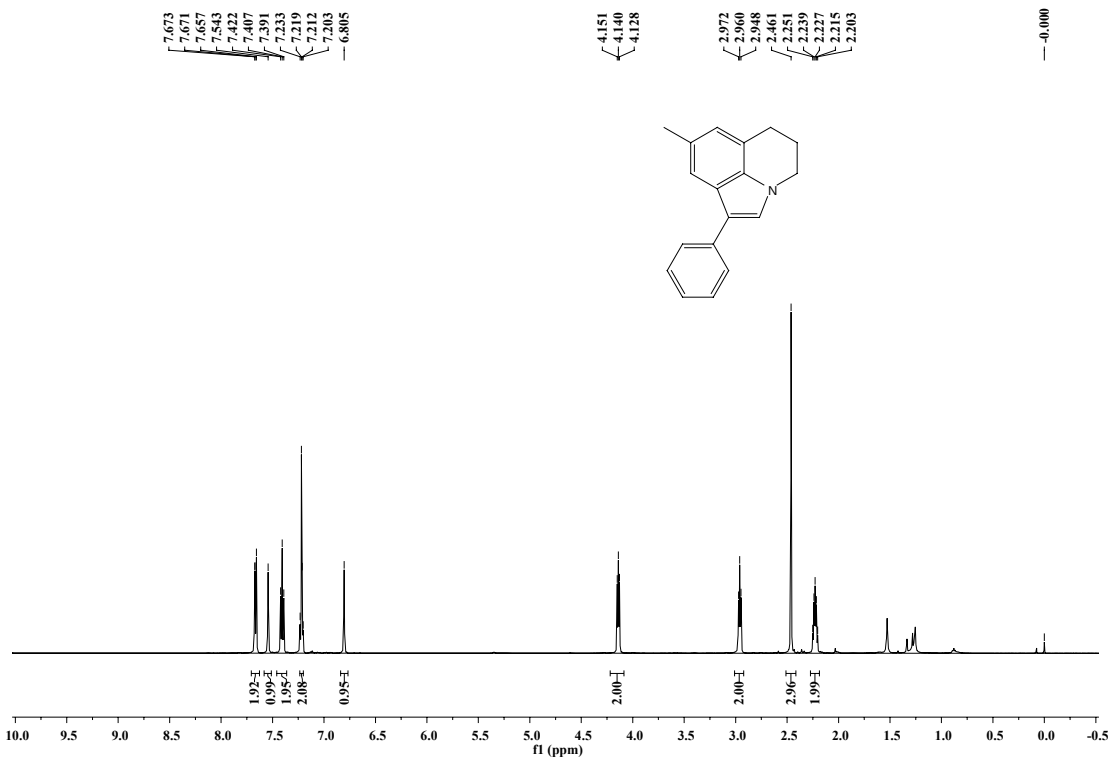


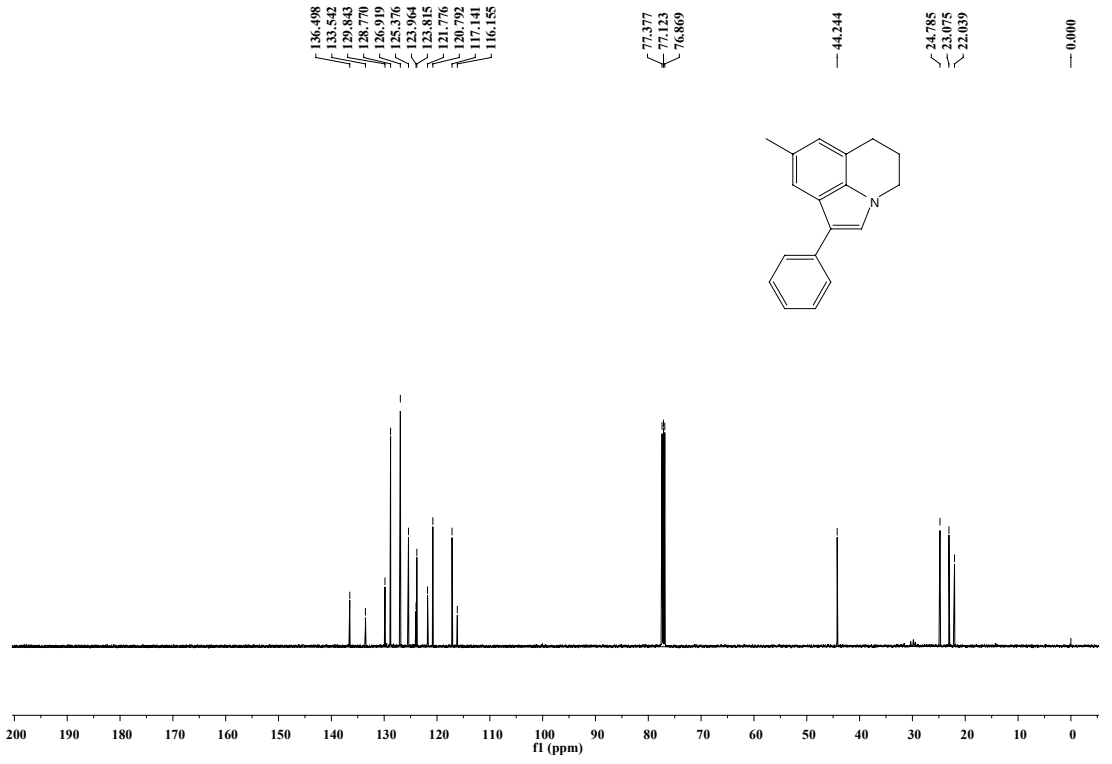
4-methyl-1-phenyl-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2o)



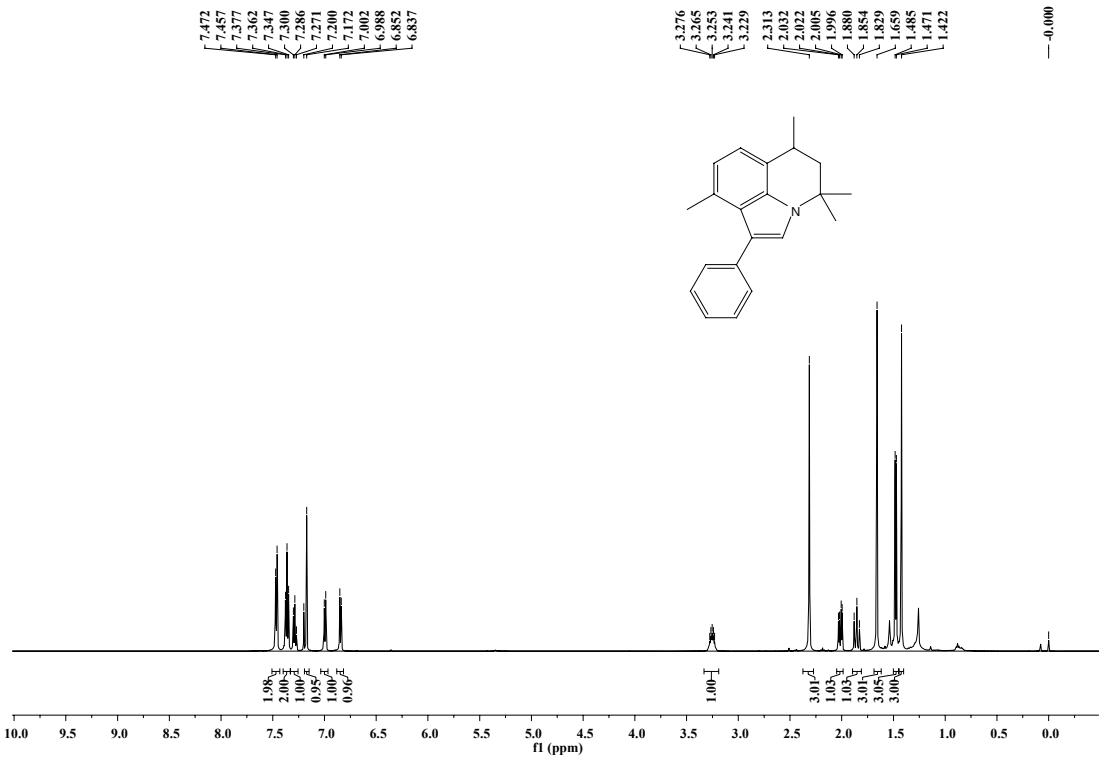


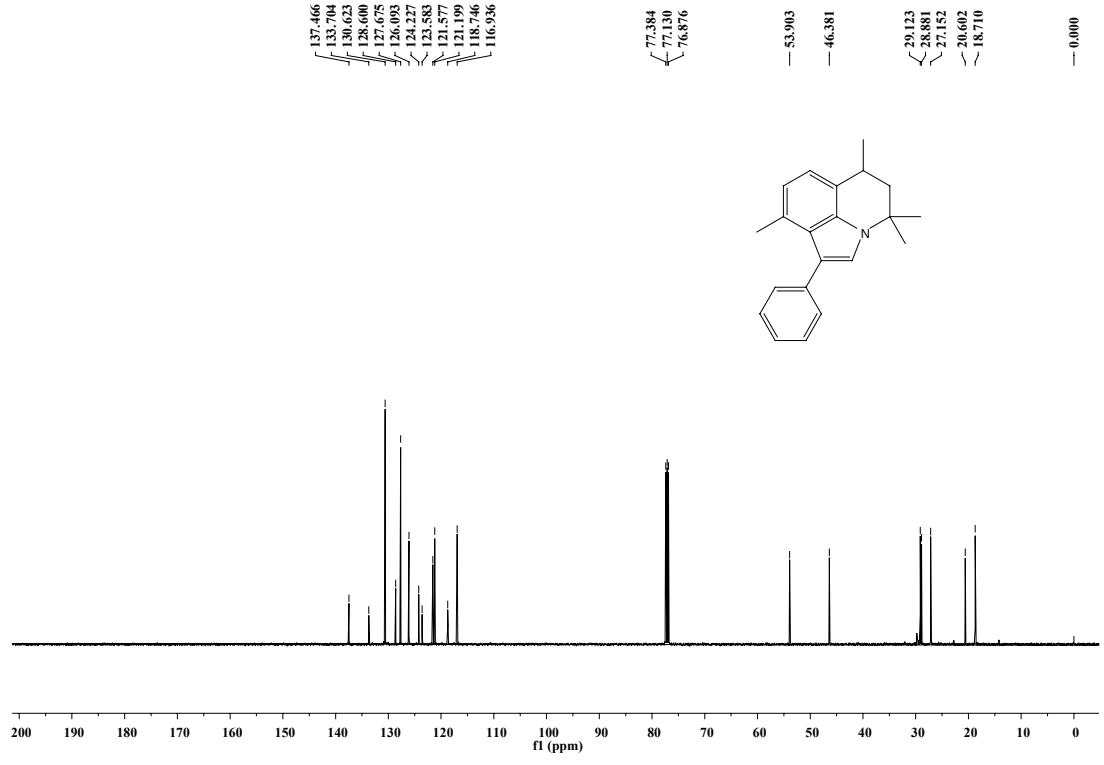
8-methyl-1-phenyl-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2p)



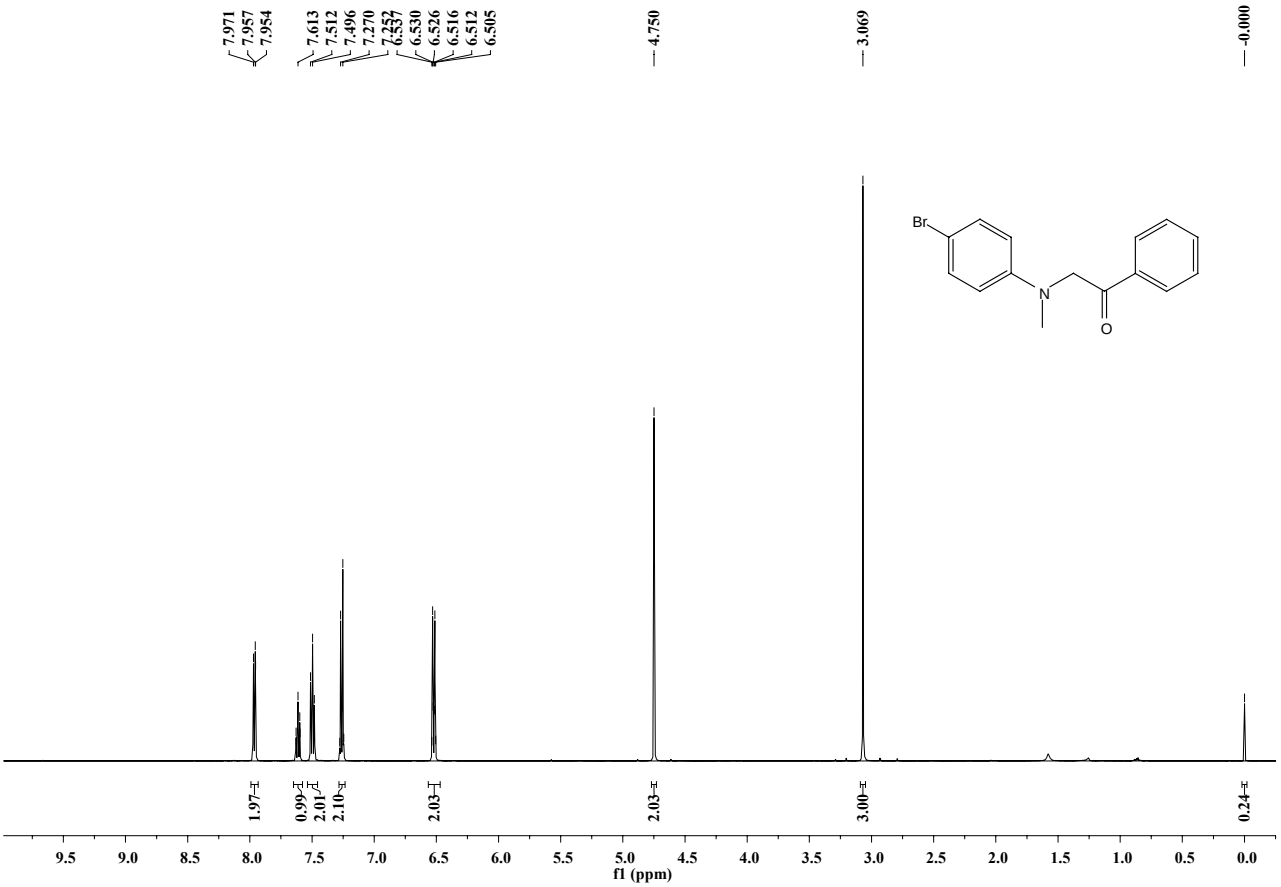


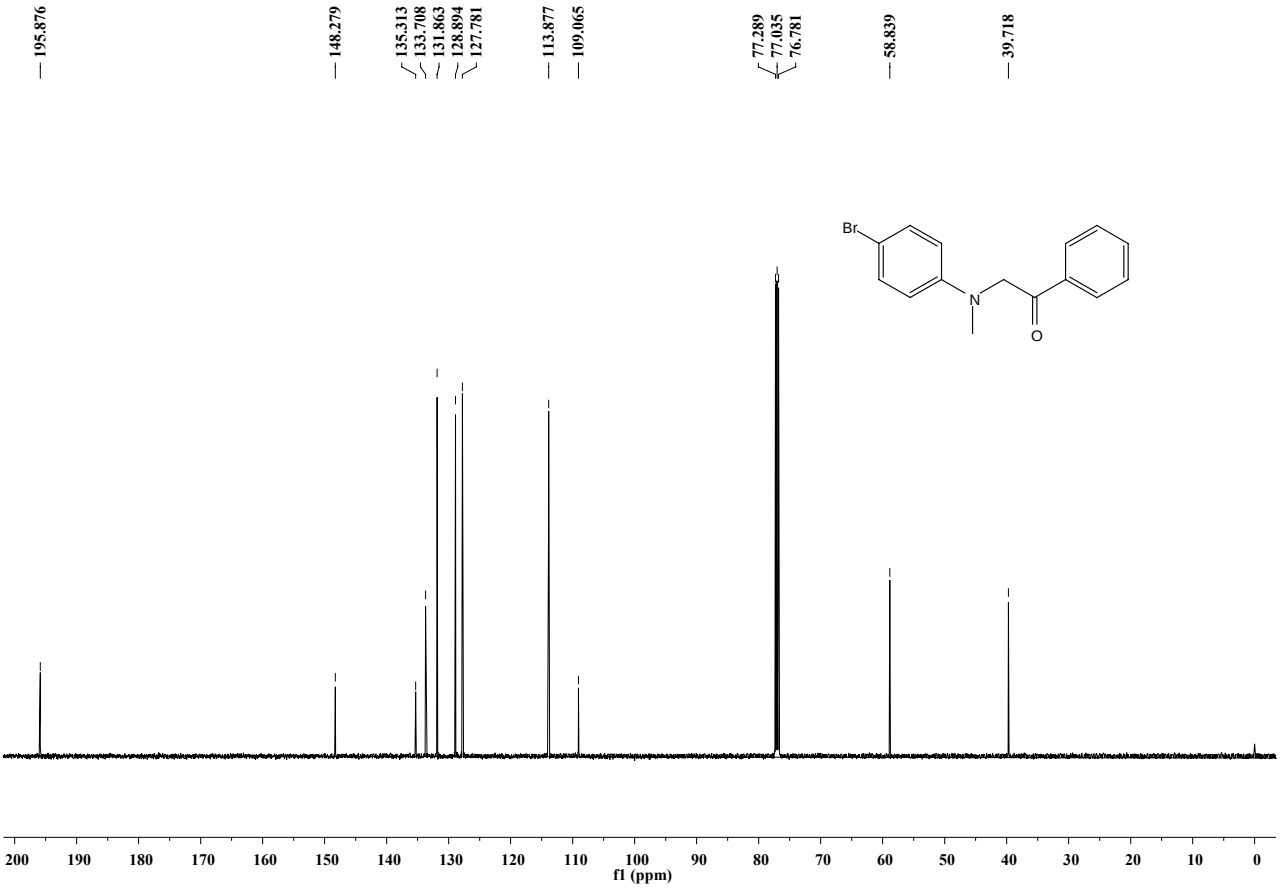
4,4,6,9-tetramethyl-1-phenyl-5,6-dihydro-4H-pyrrolo[3,2,1-ij]quinoline (2q)



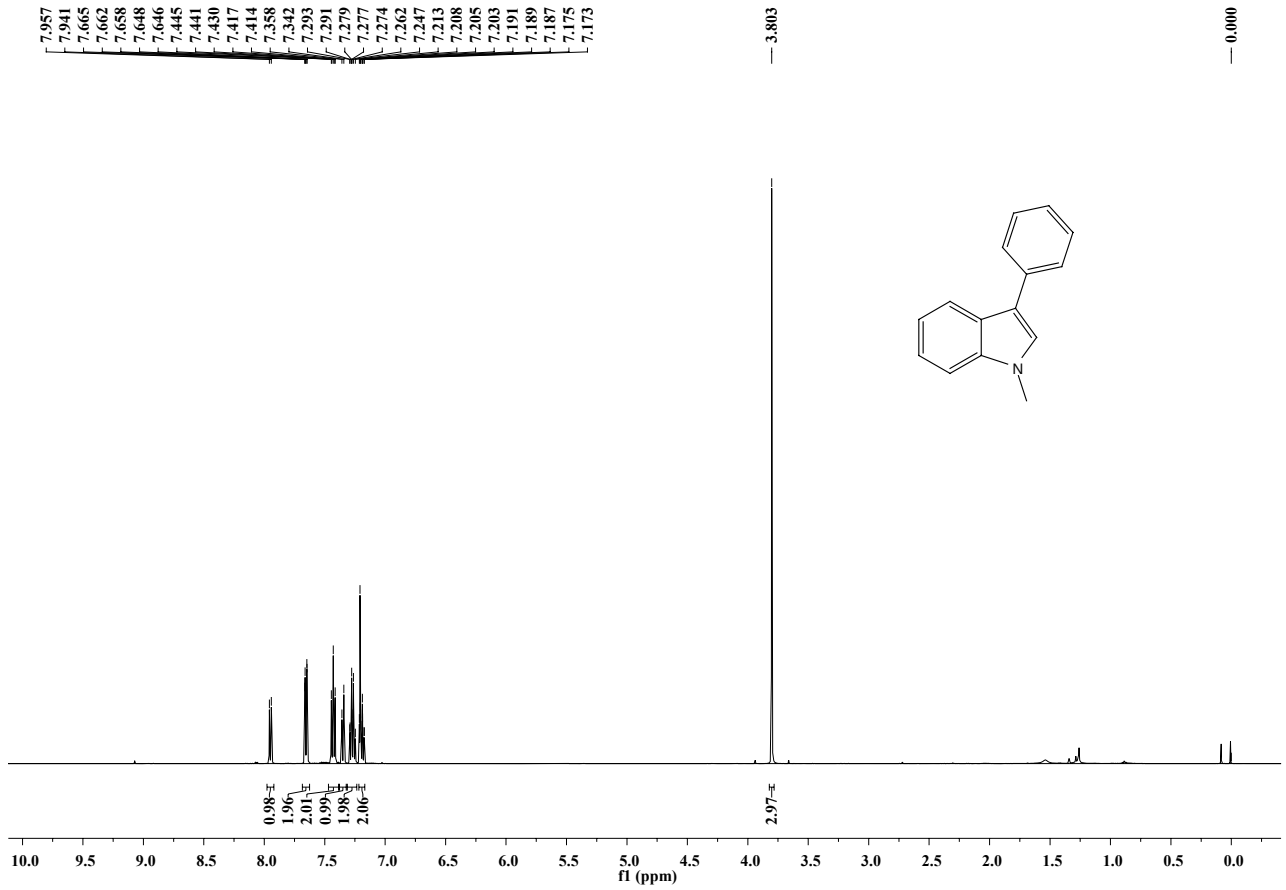


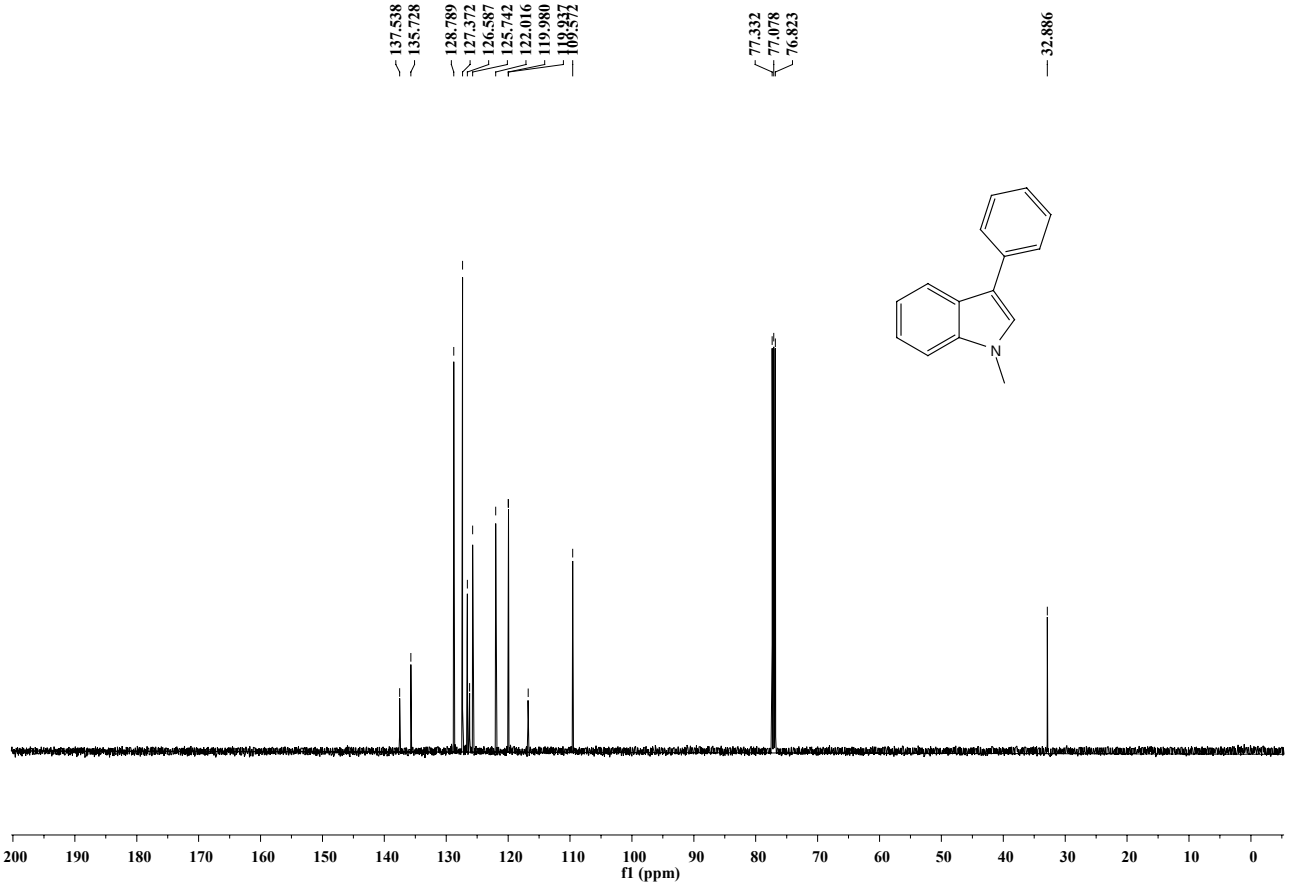
2-((4-bromophenyl)(methyl)amino)-1-phenylethanone (3m)



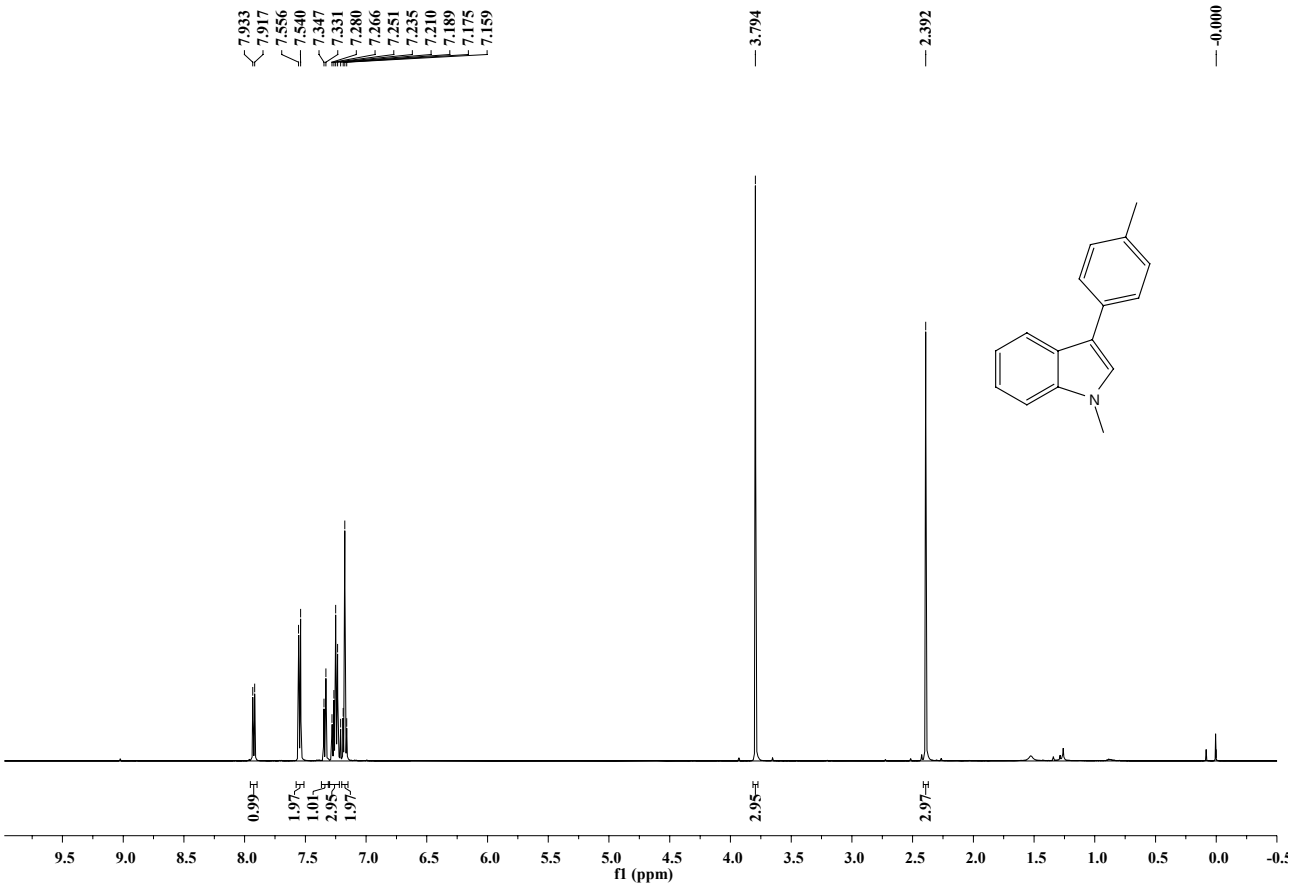


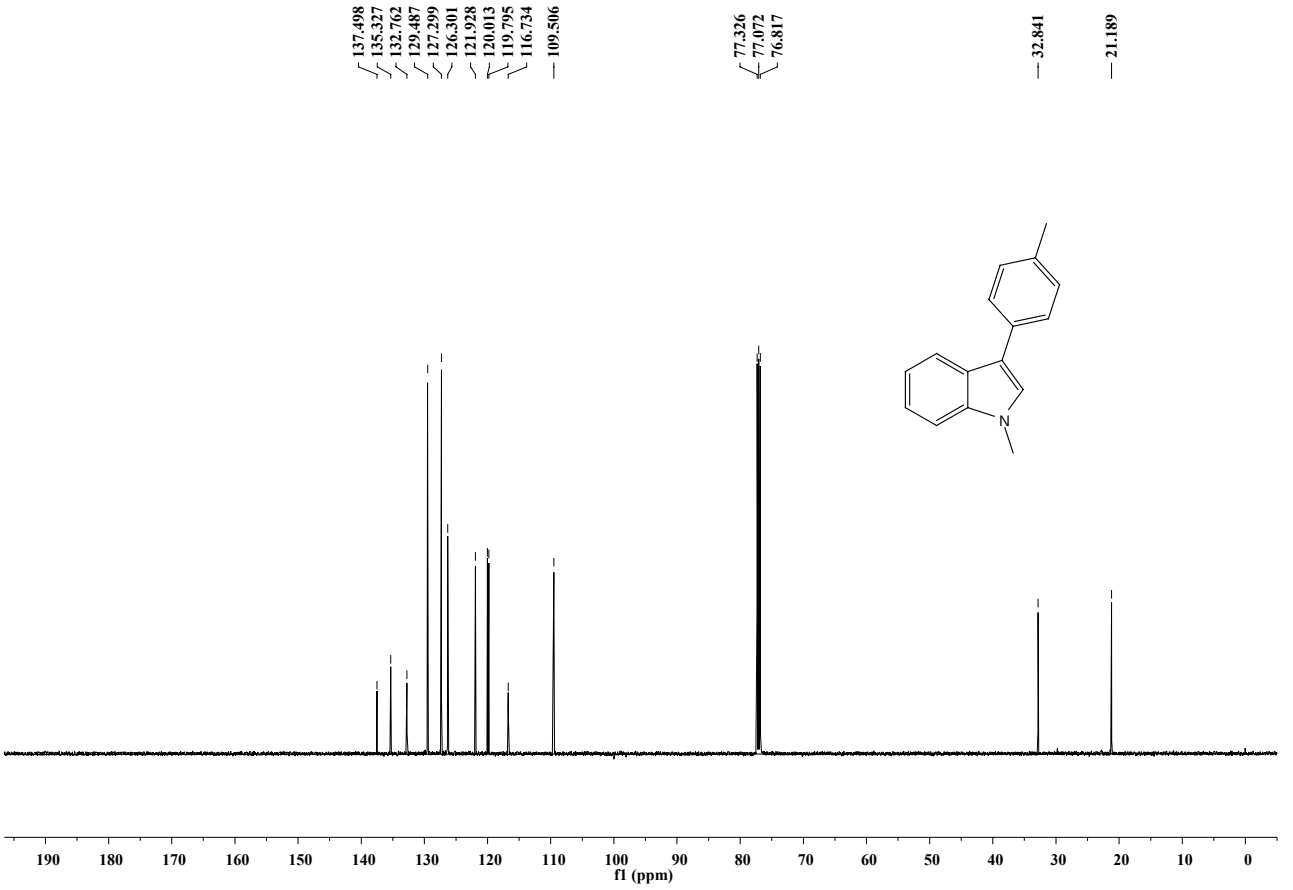
1-methyl-3-phenyl-1H-indole （4a）



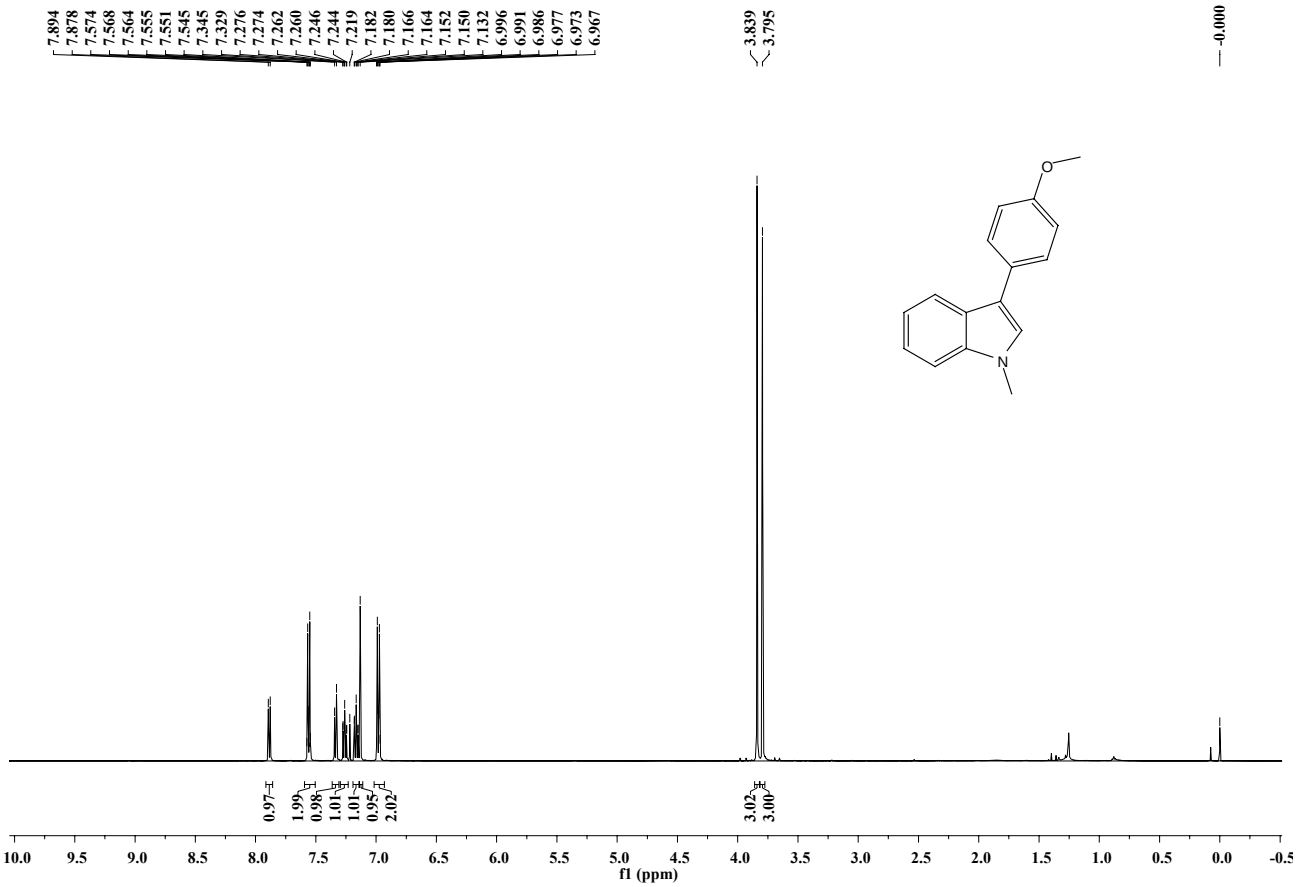


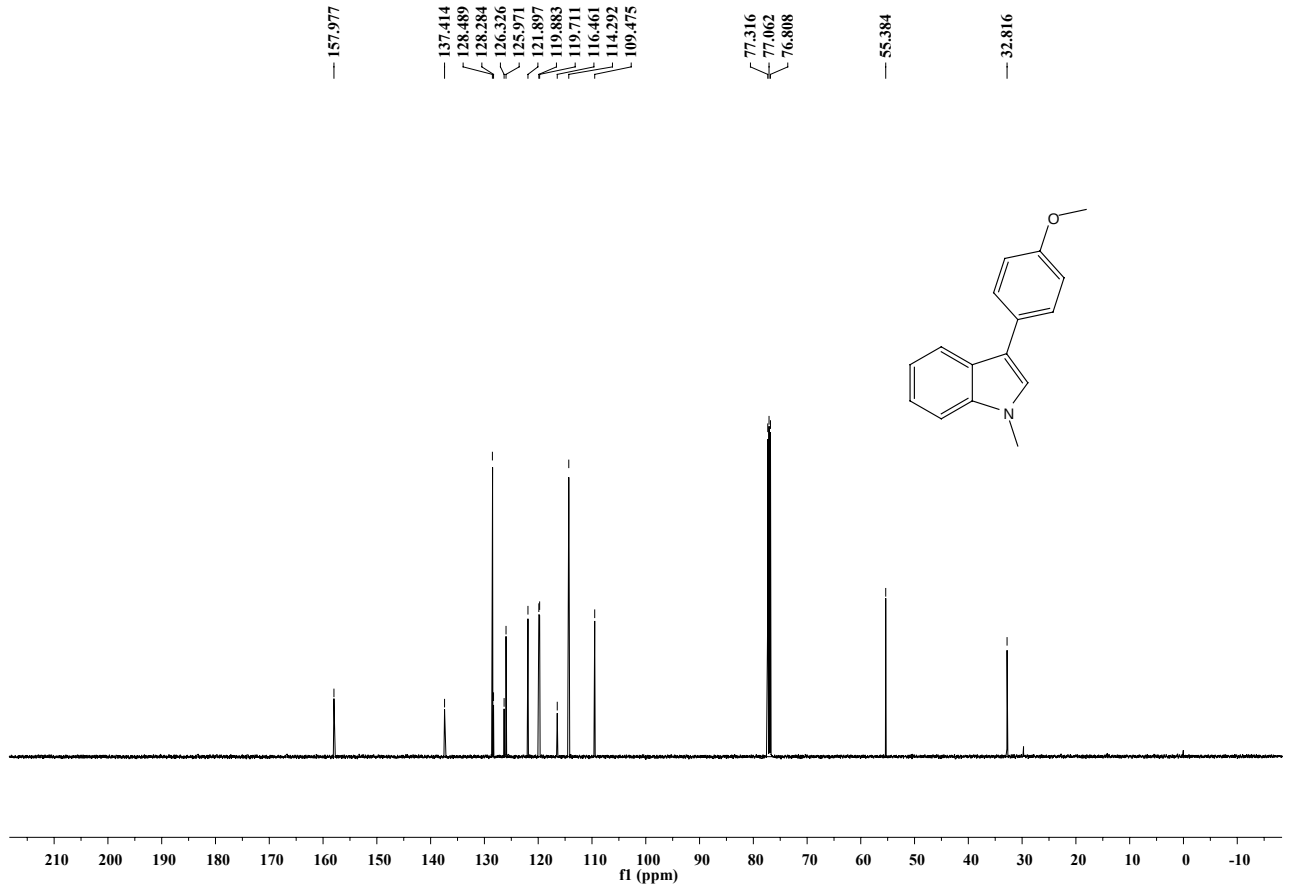
1-methyl-3-(p-tolyl)-1H-indole (4b)



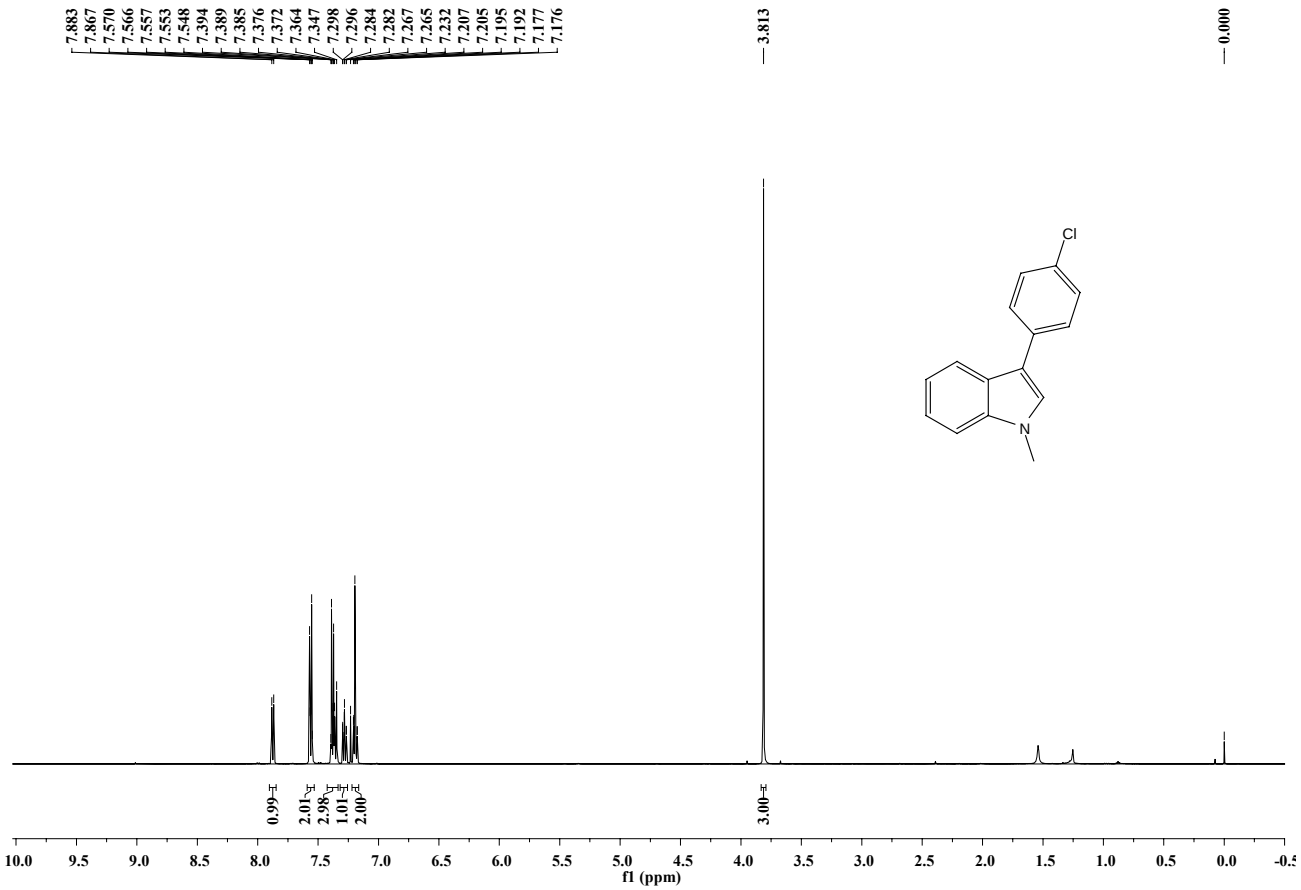


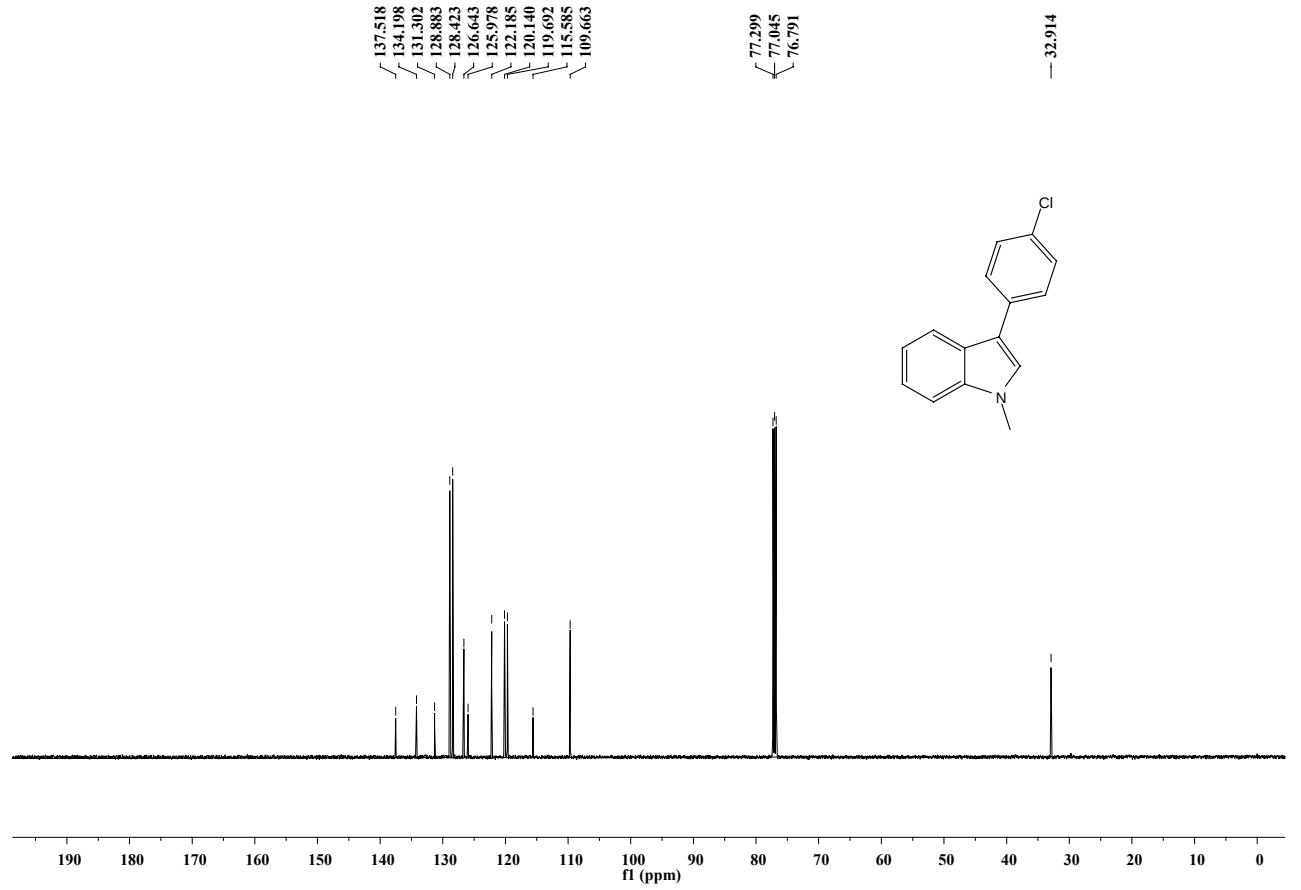
3-(4-methoxyphenyl)-1-methyl-1H-indole (4c)



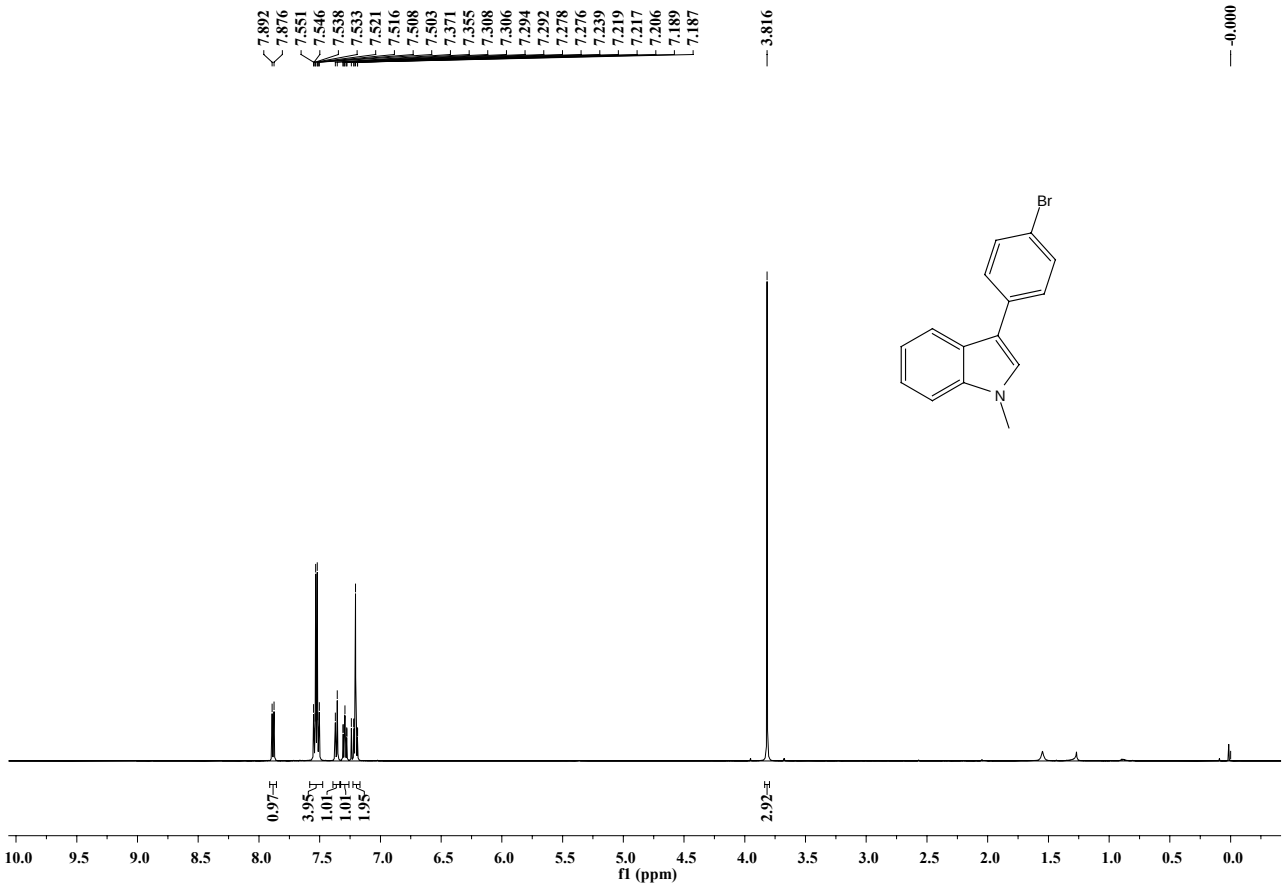


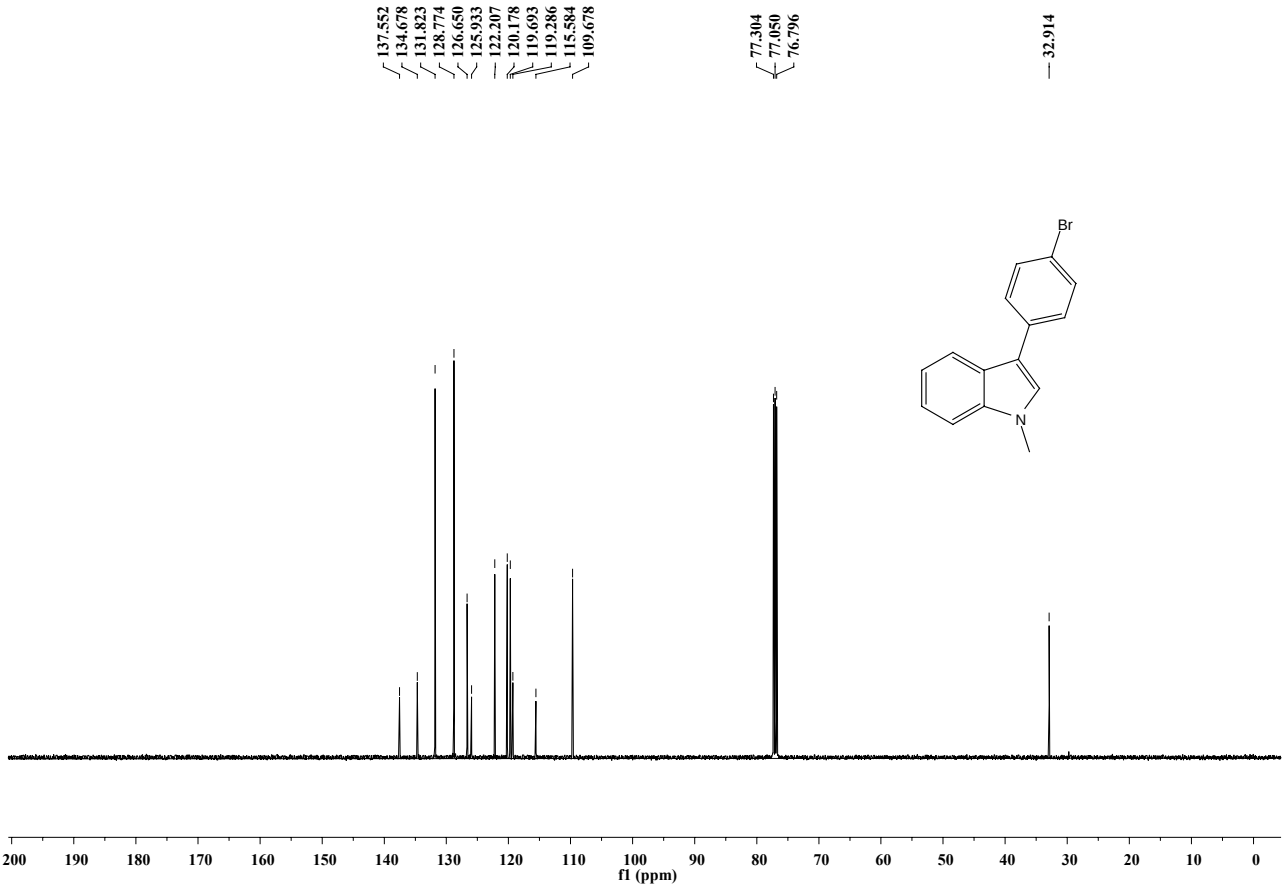
3-(4-chlorophenyl)-1-methyl-1H-indole (4d)



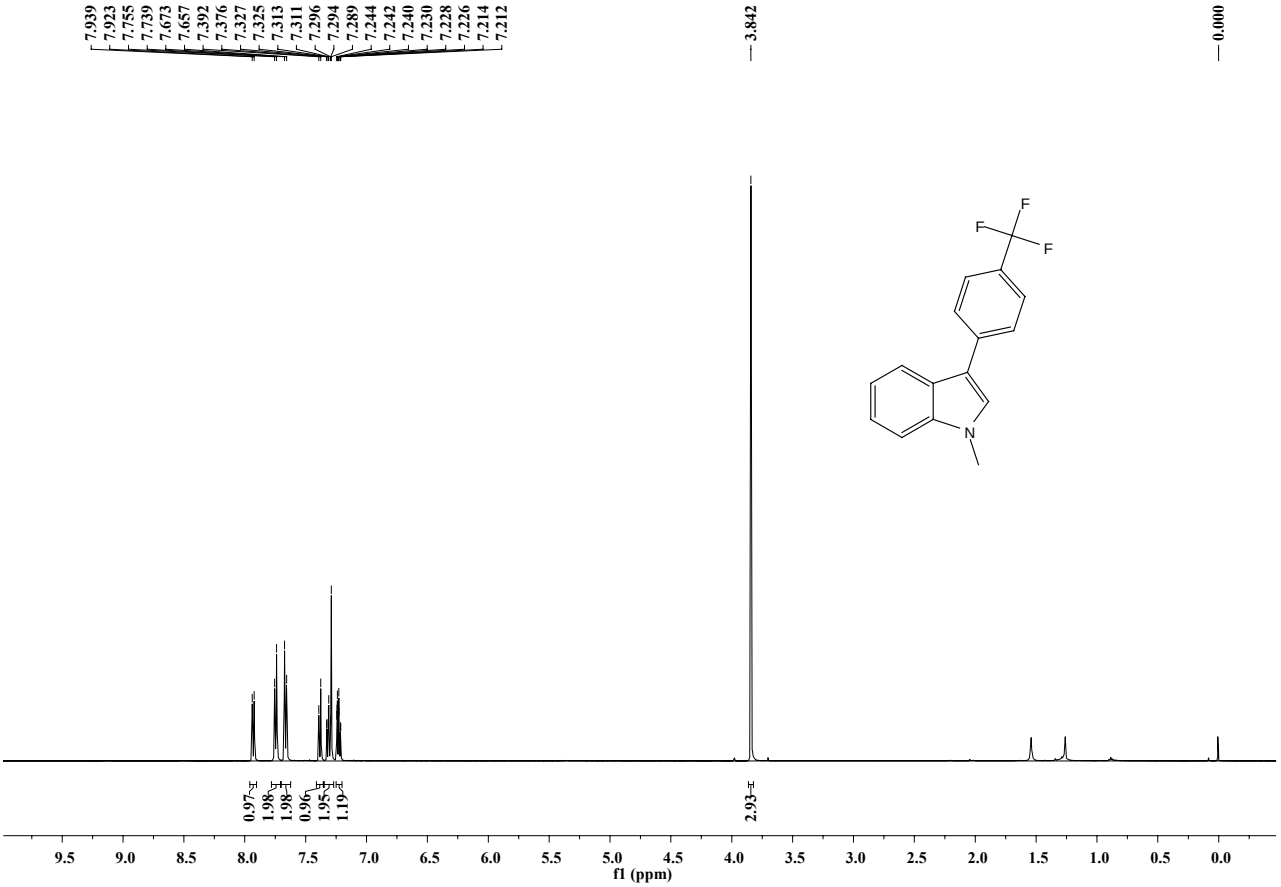


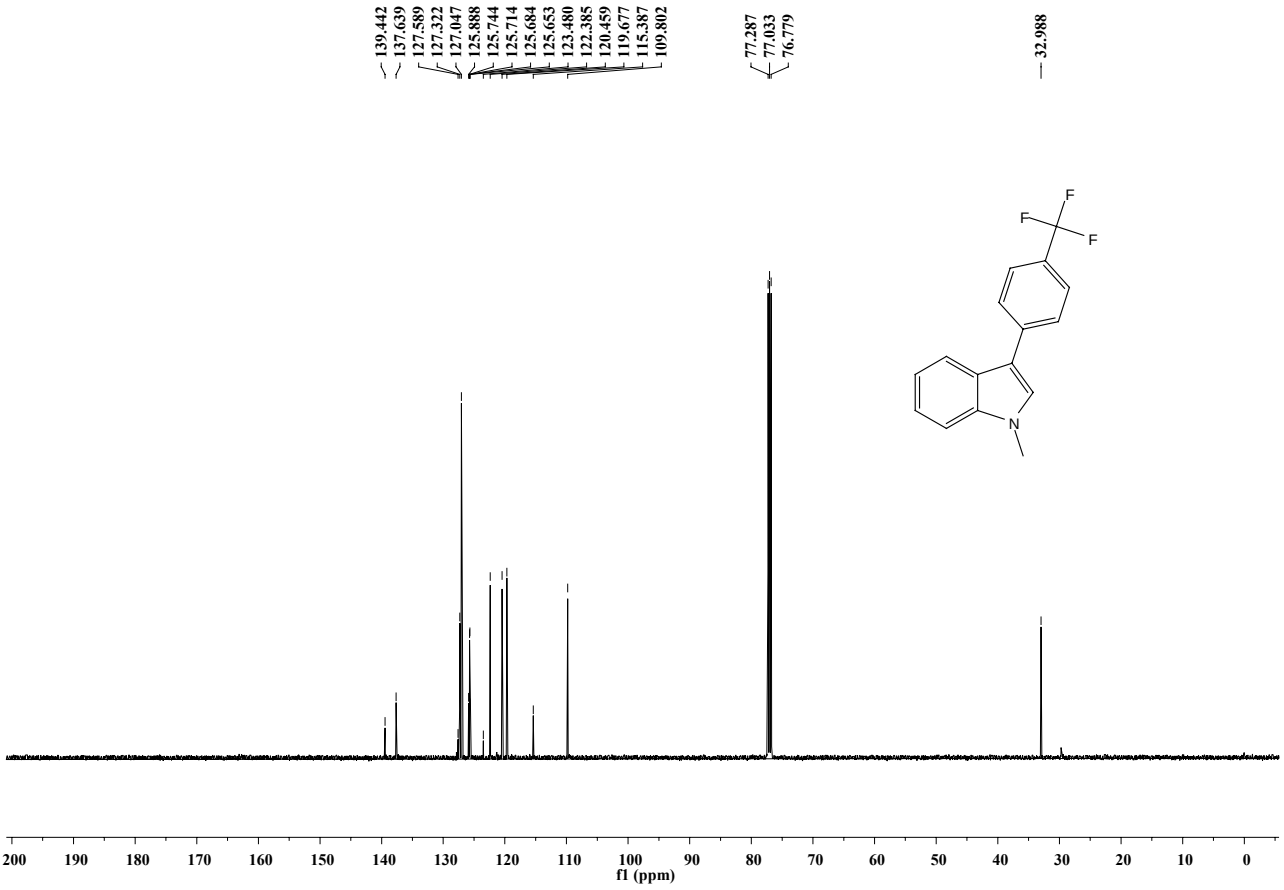
3-(4-bromophenyl)-1-methyl-1H-indole (4e)



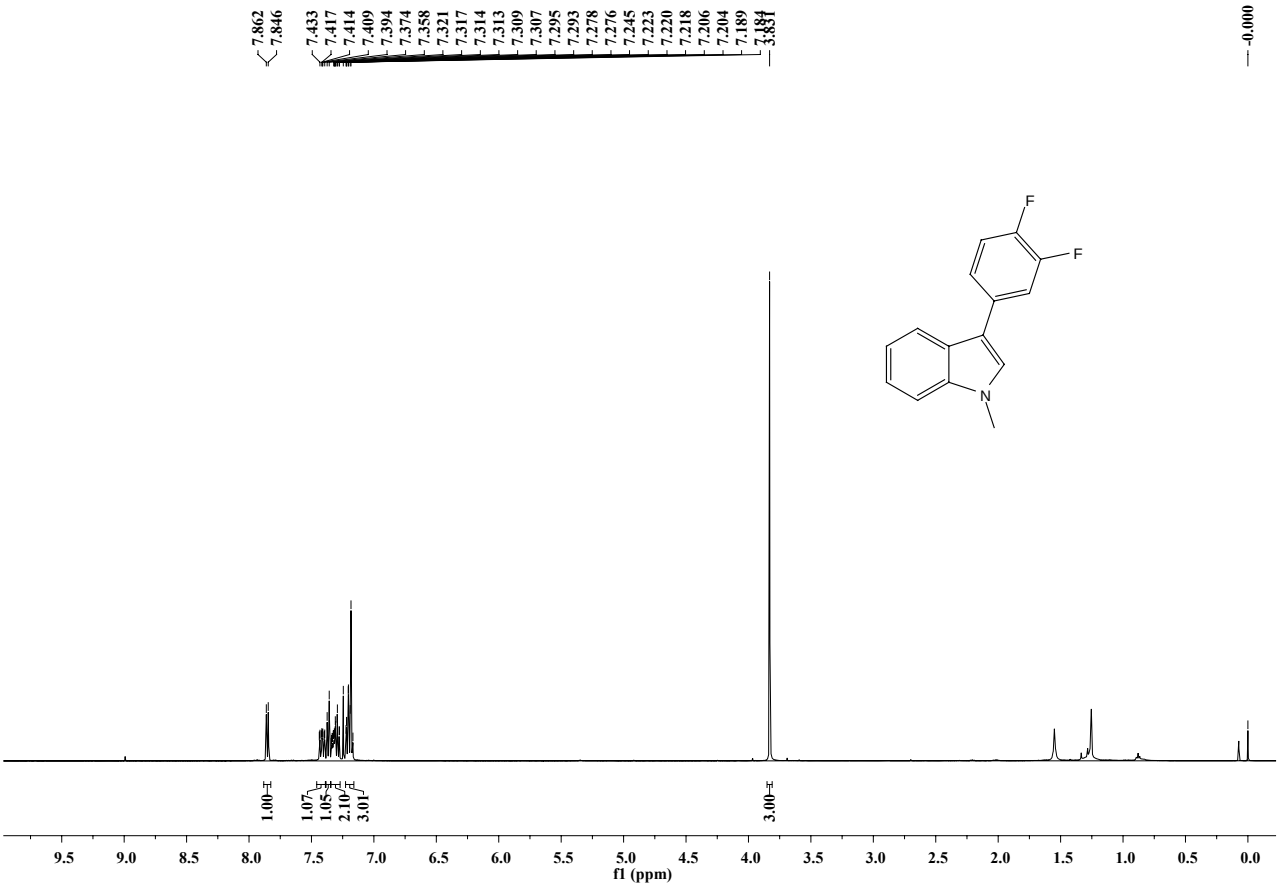


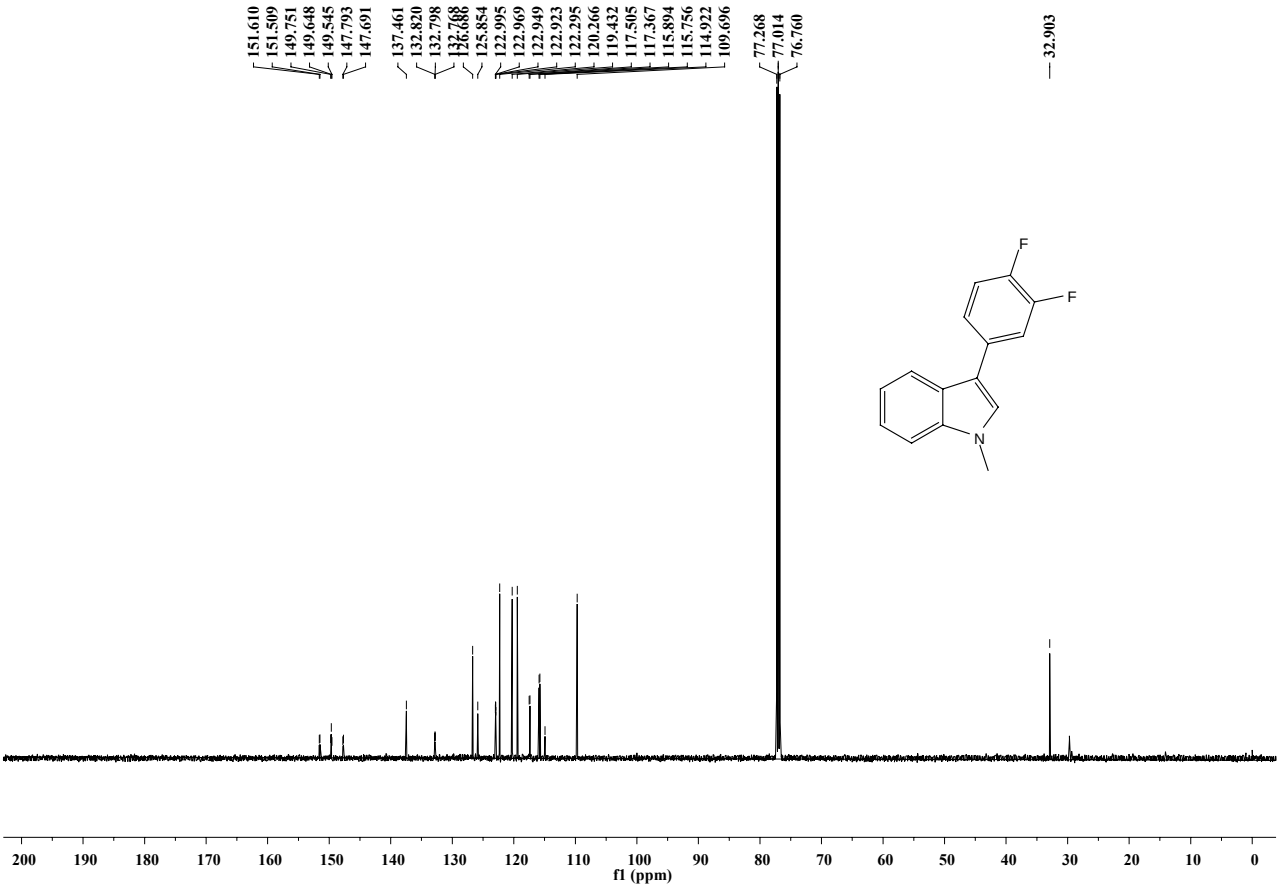
1-methyl-3-(4-(trifluoromethyl)phenyl)-1H-indole (4f)



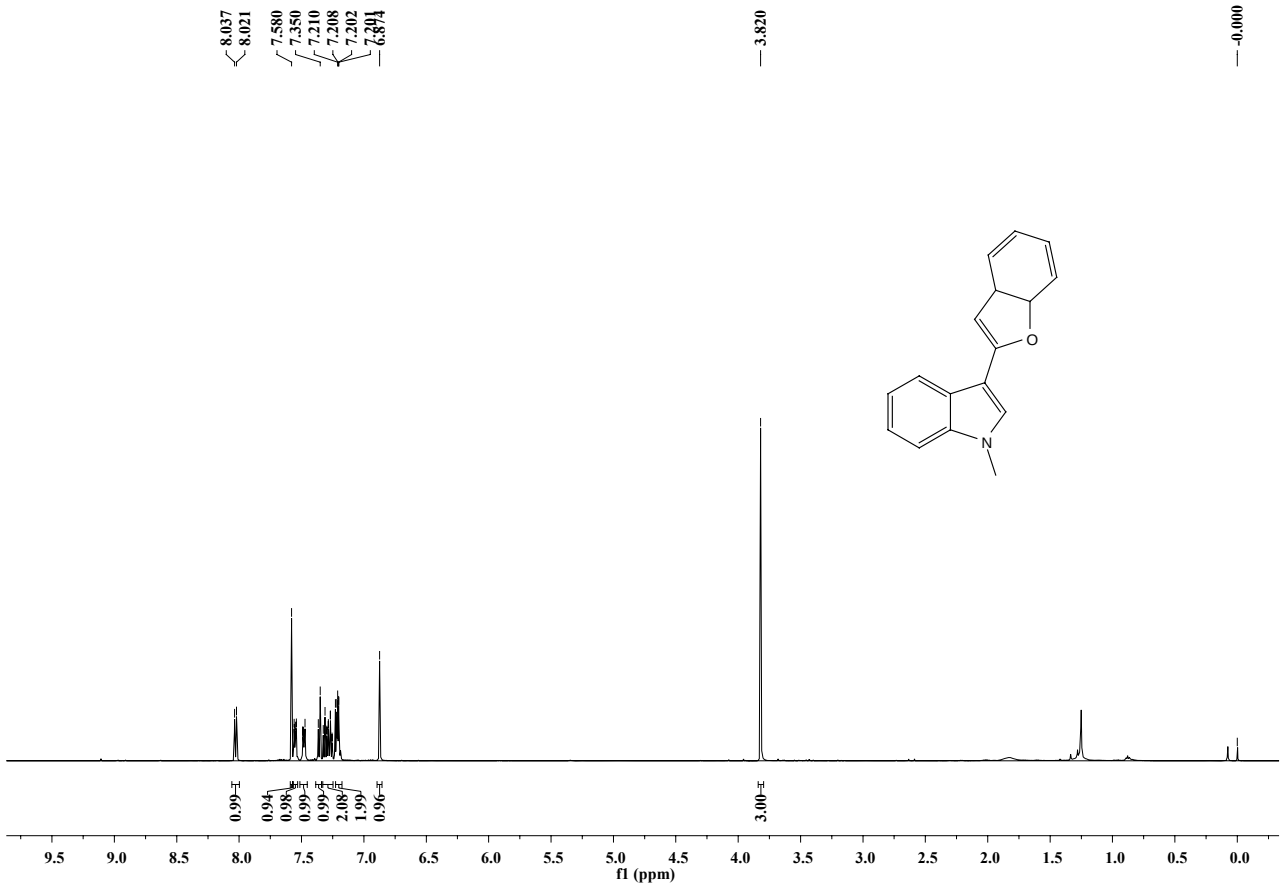


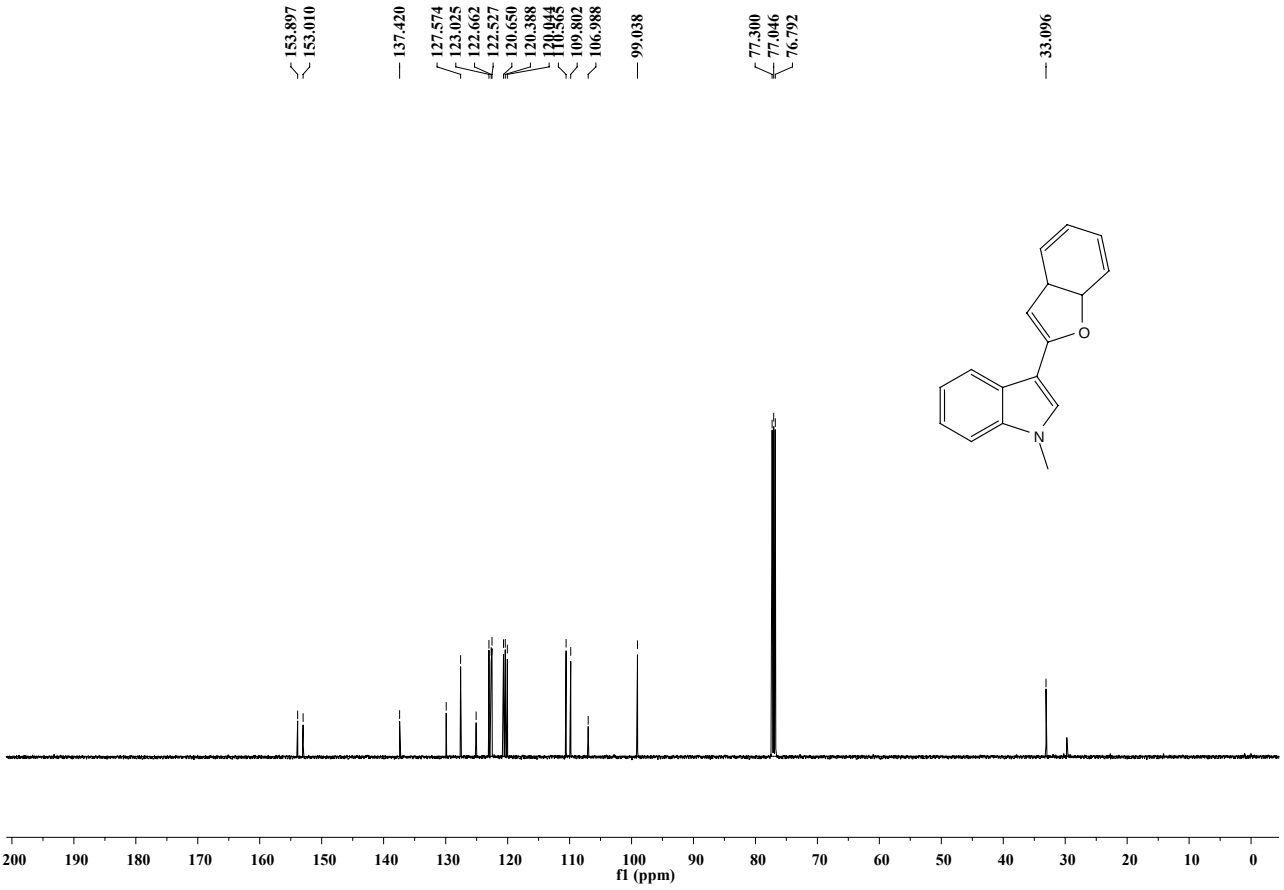
3-(3,4-difluorophenyl)-1-methyl-1H-indole (4g)



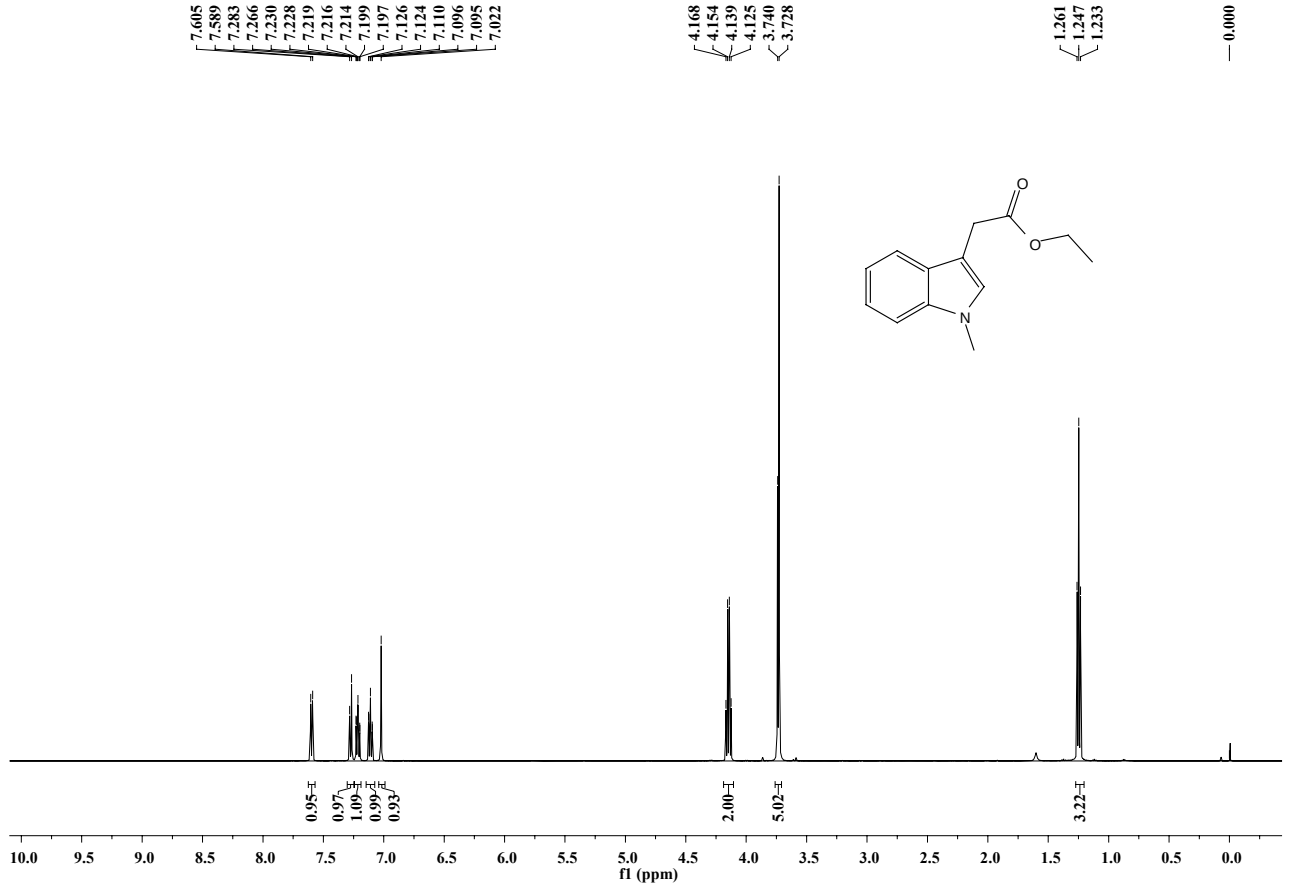


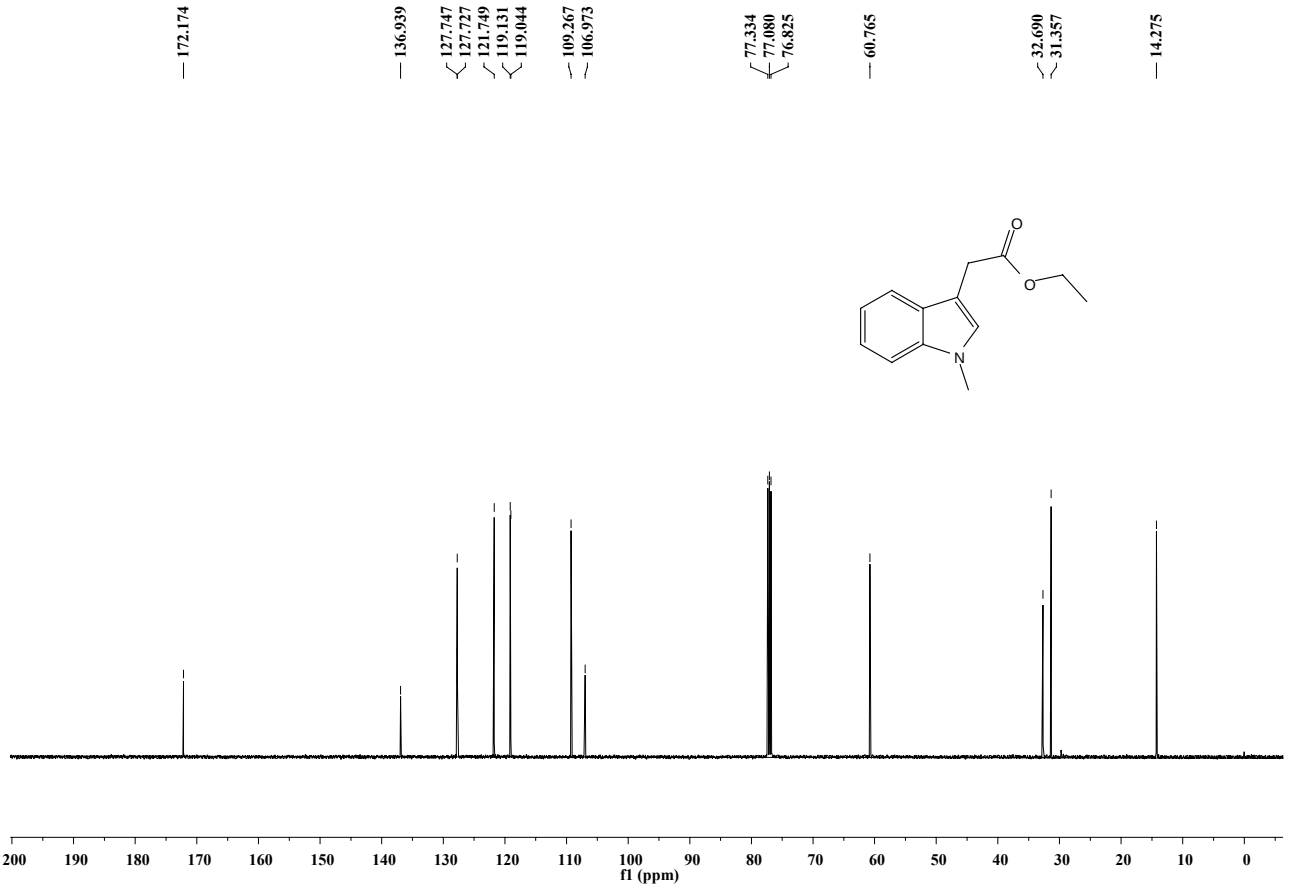
3-(3a,7a-dihydrobenzofuran-2-yl)-1-methyl-1H-indole (4h)



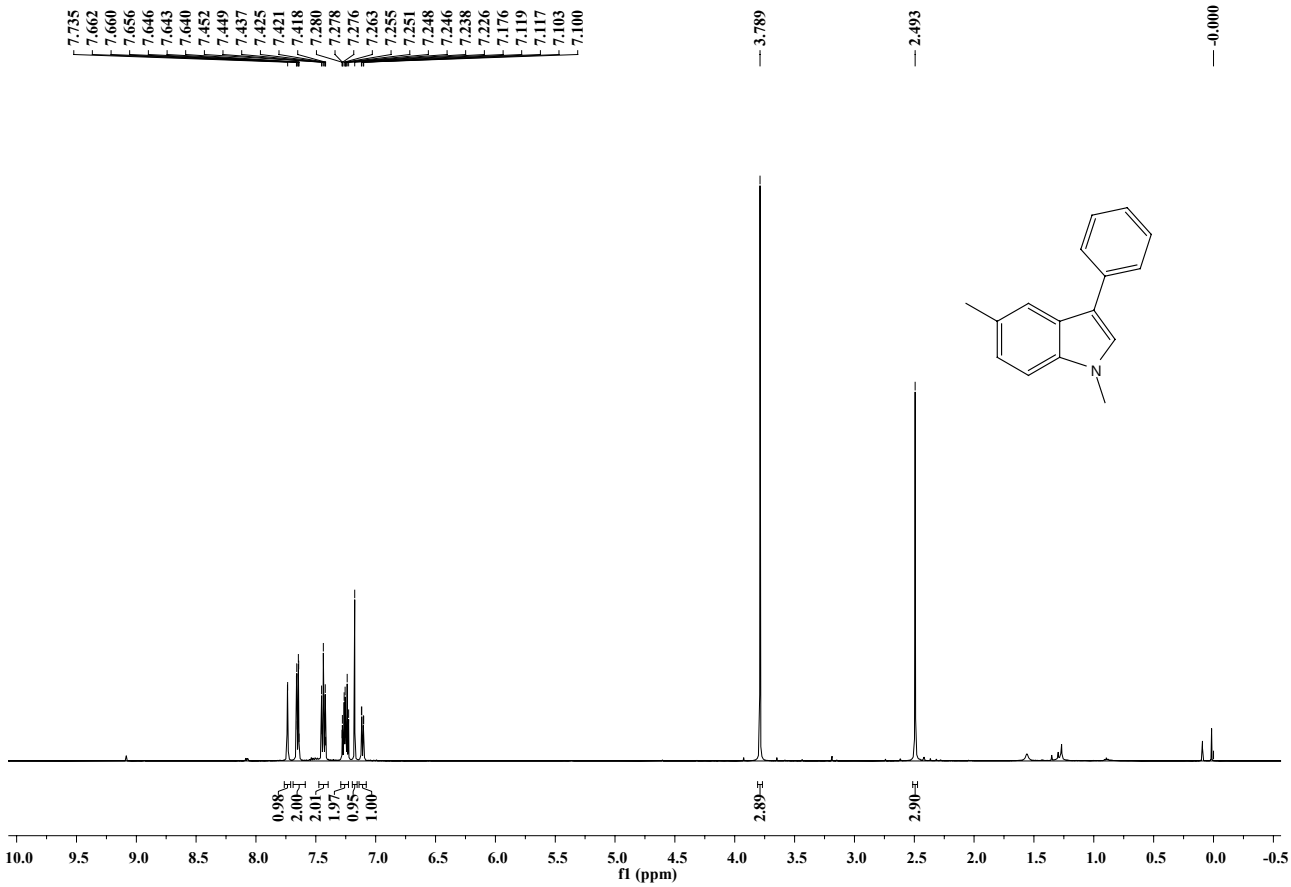


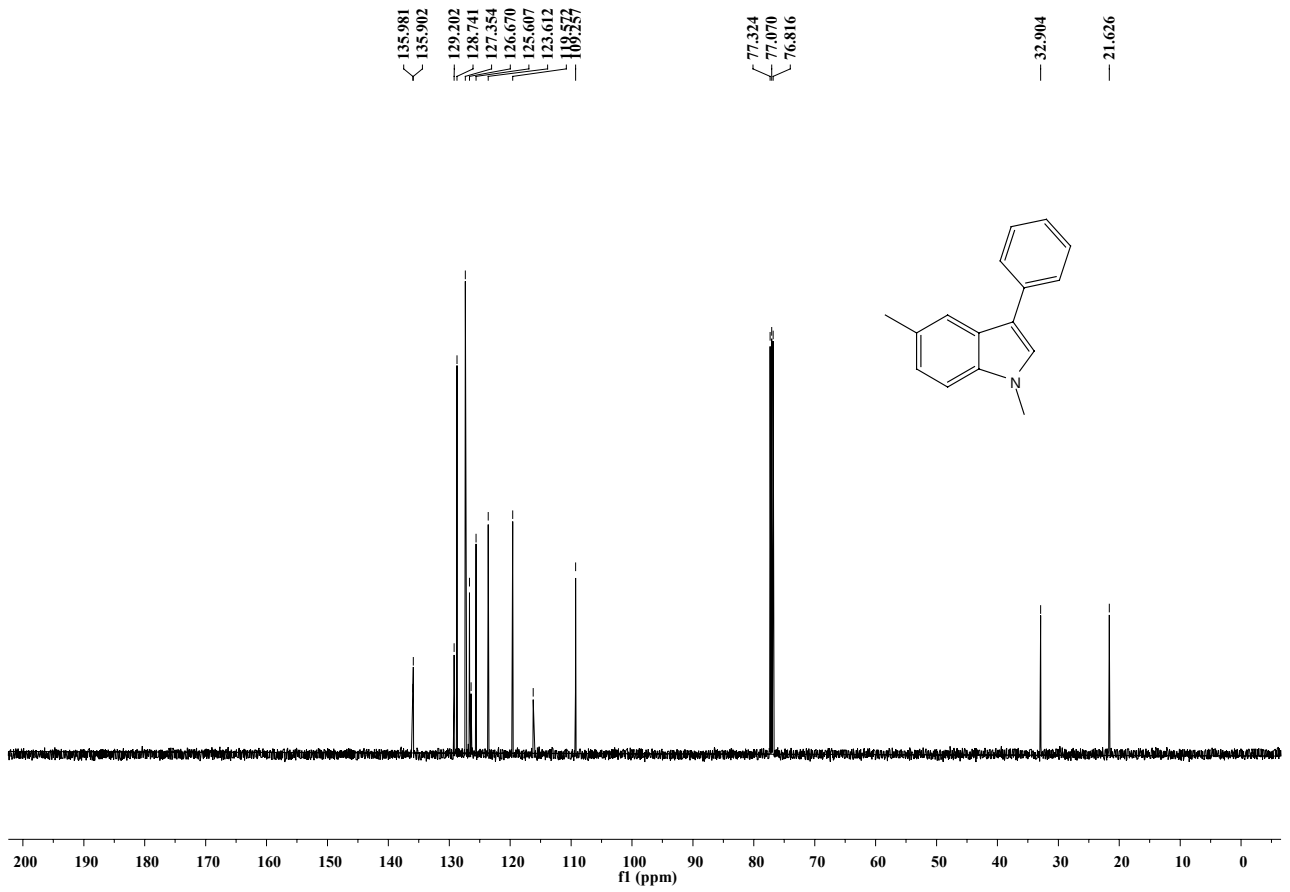
Ethyl 2-(1-methyl-1H-indol-3-yl)acetate (4i)



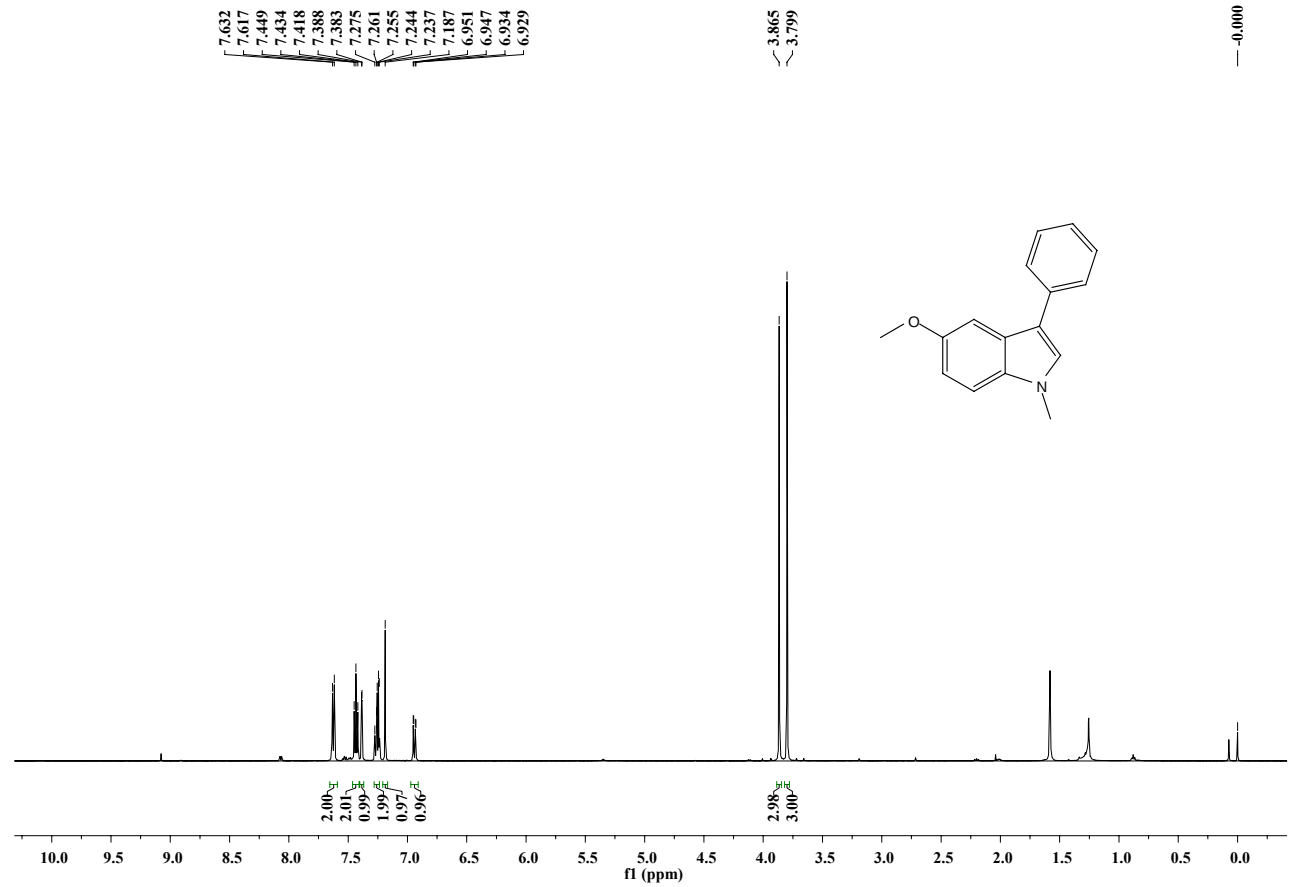


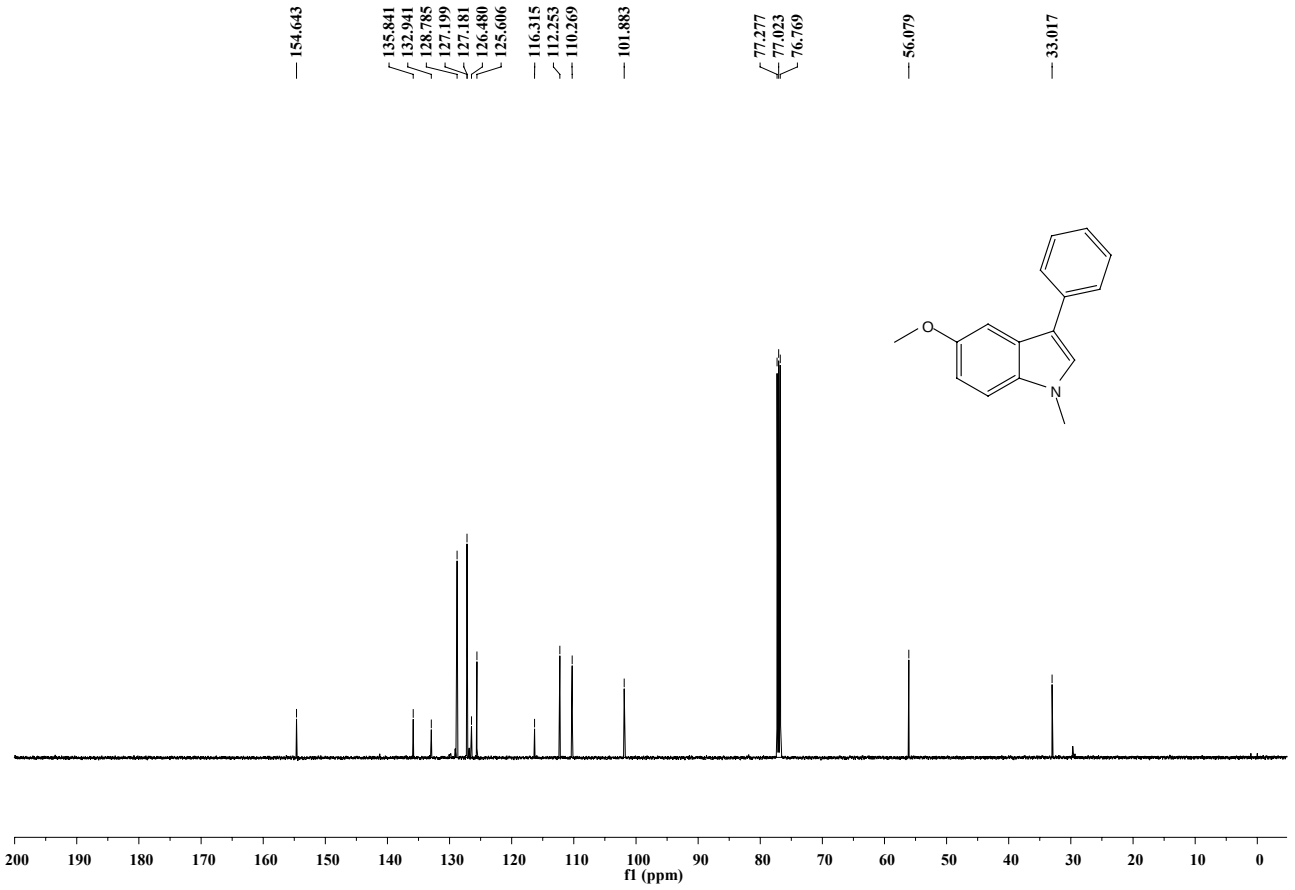
1,5-dimethyl-3-phenyl-1H-indole (4j)



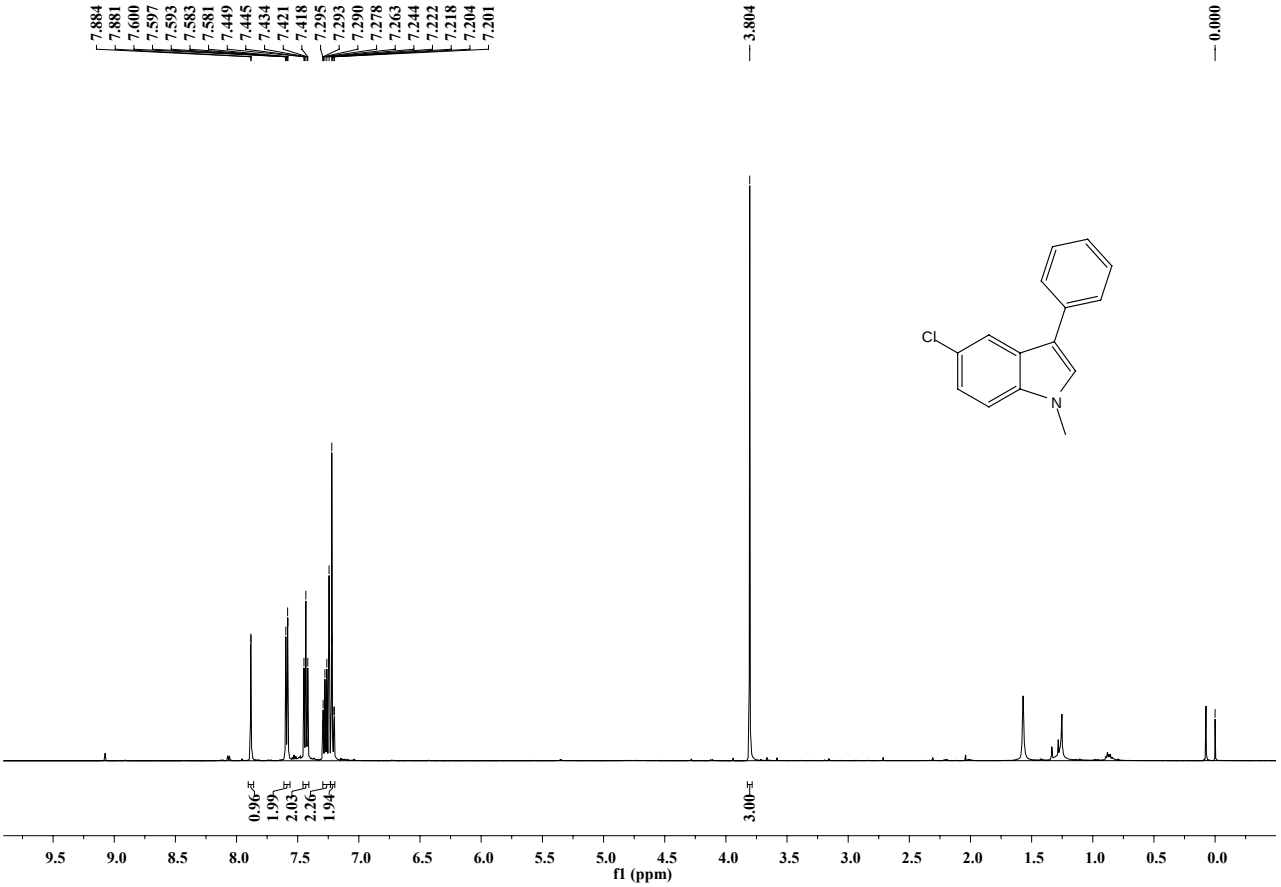


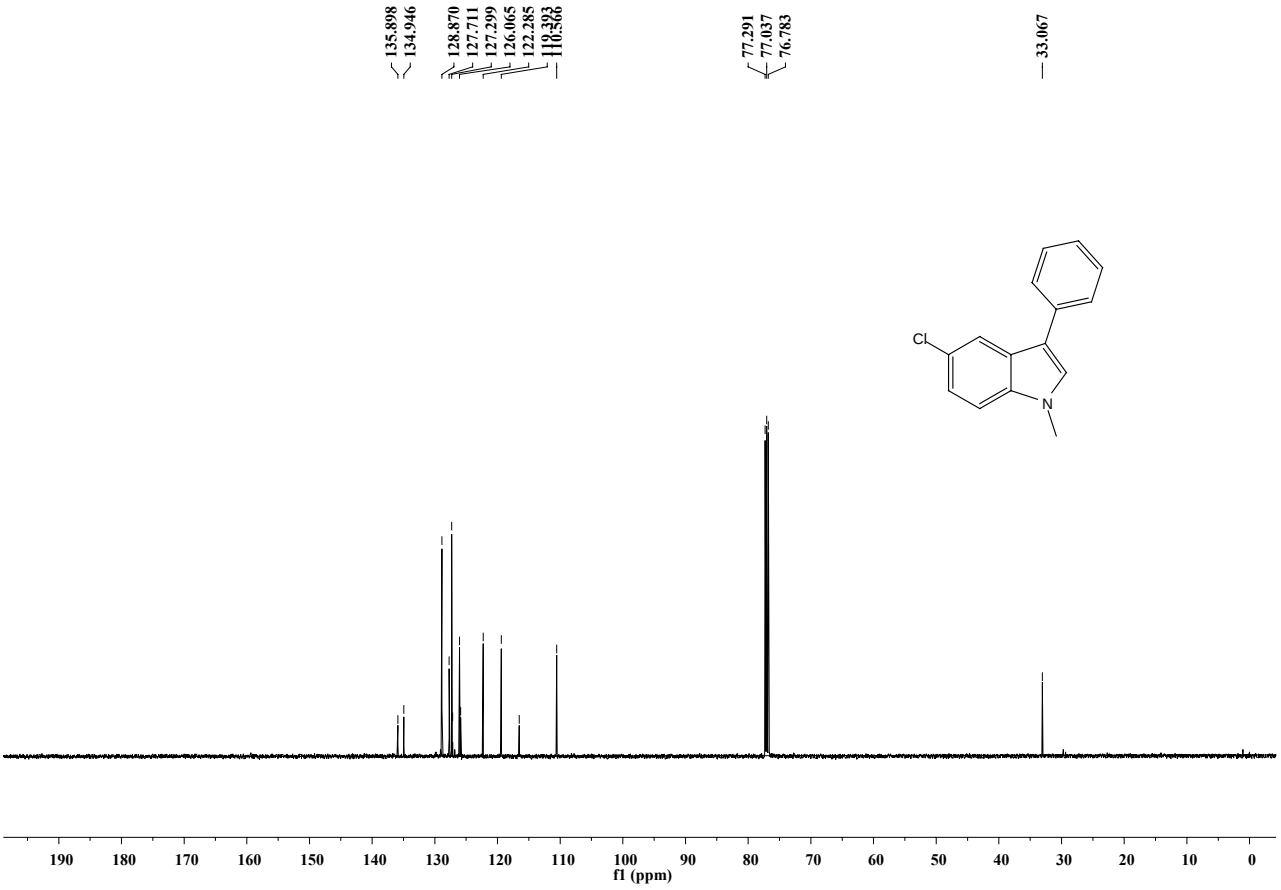
5-methoxy-1-methyl-3-phenyl-1H-indole (4k)



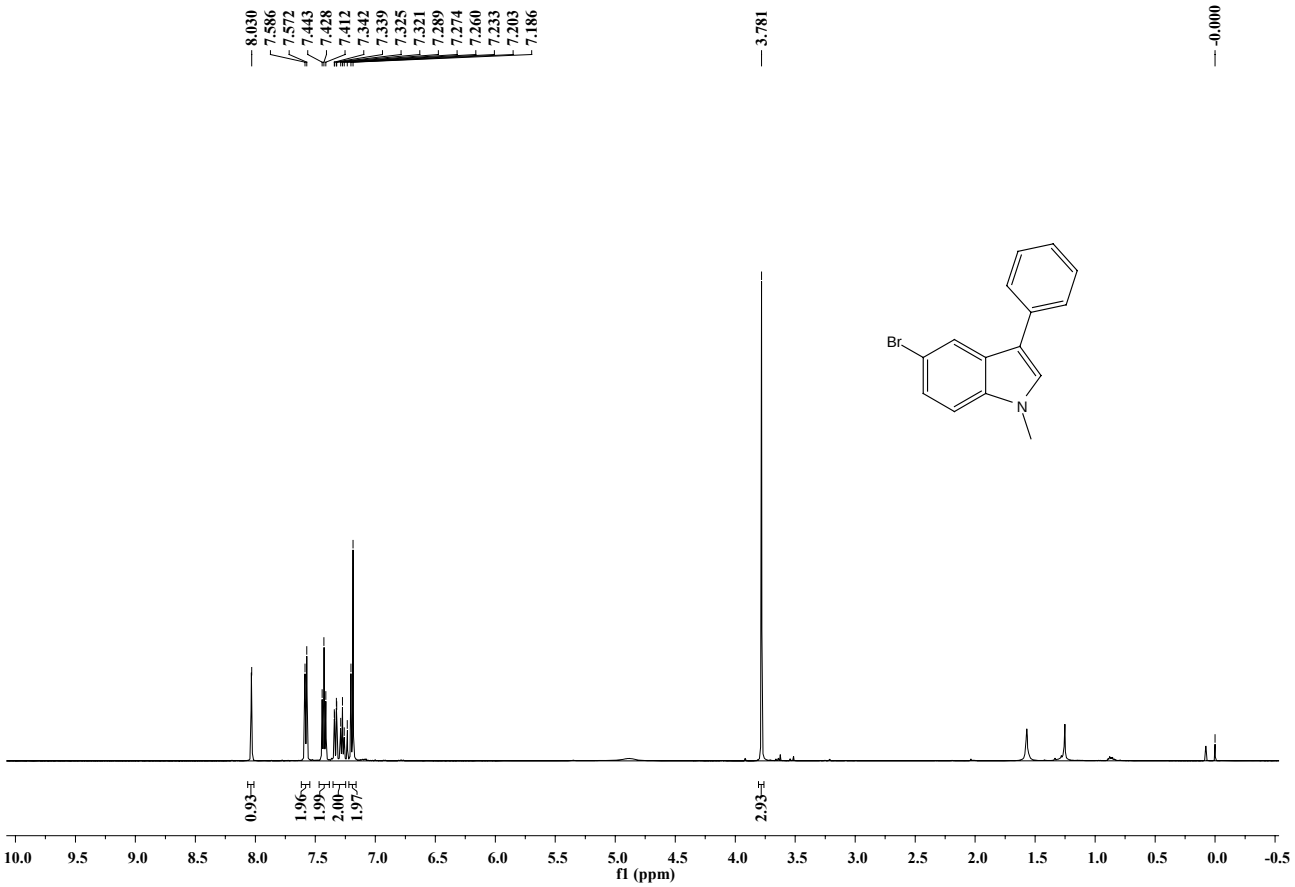


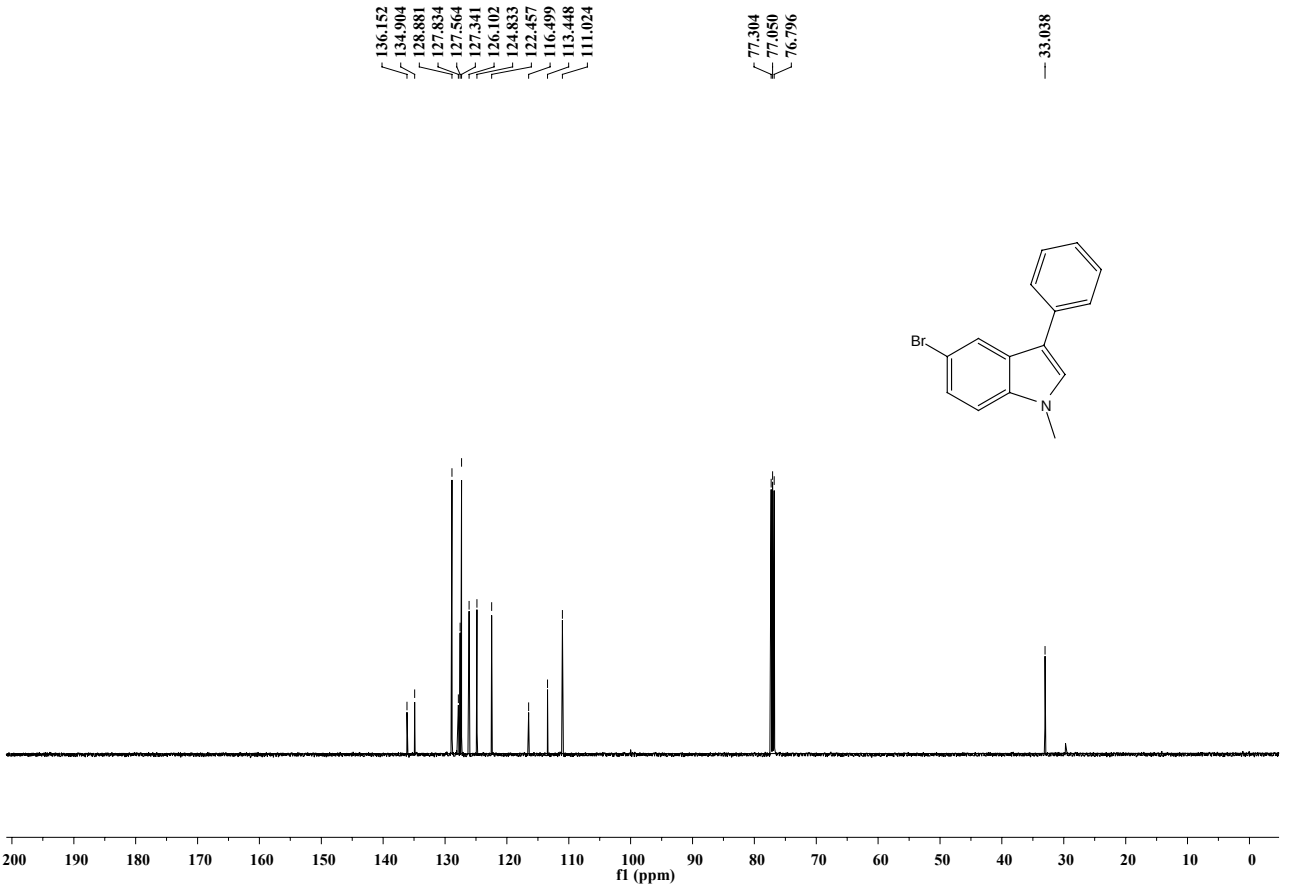
5-chloro-1-methyl-3-phenyl-1H-indole (4l)



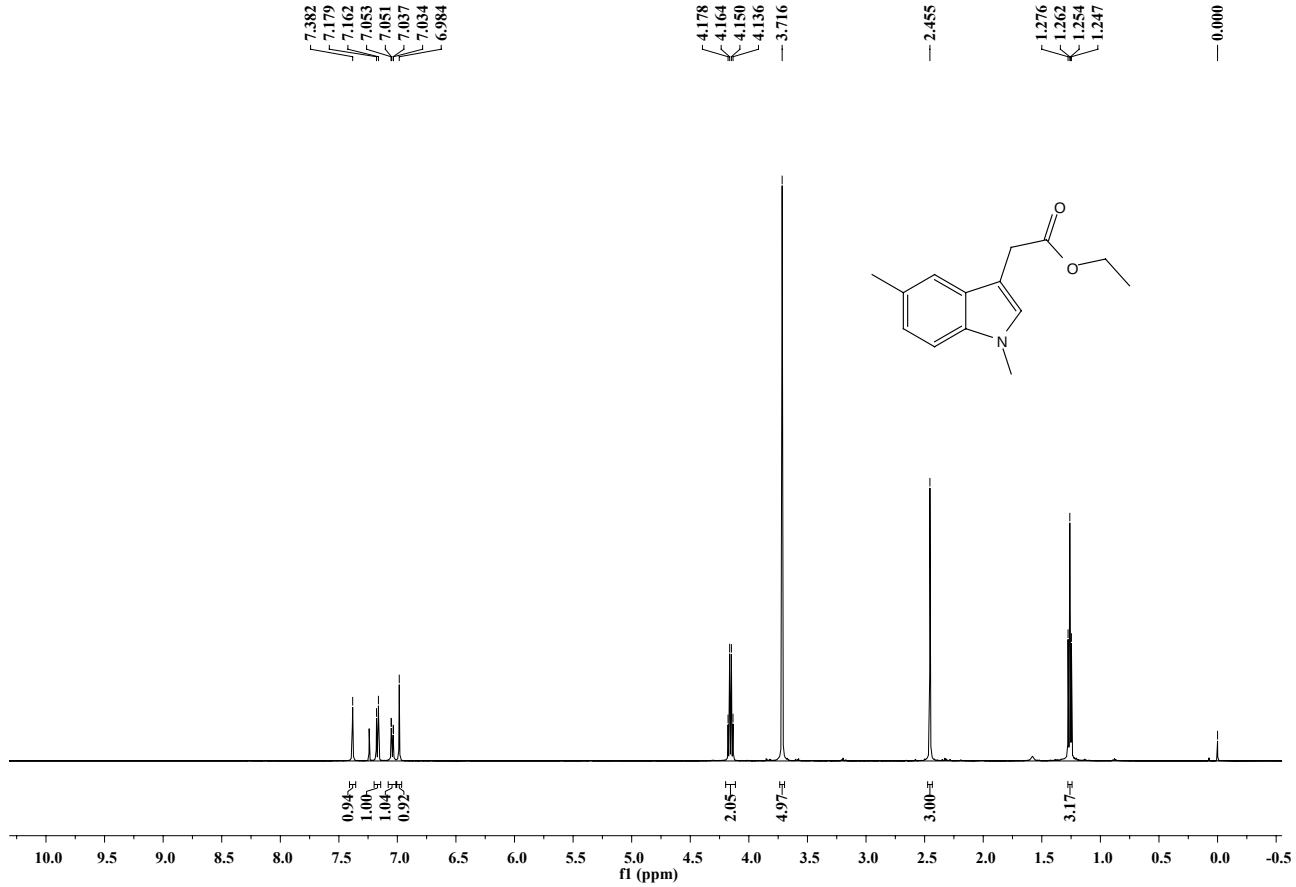


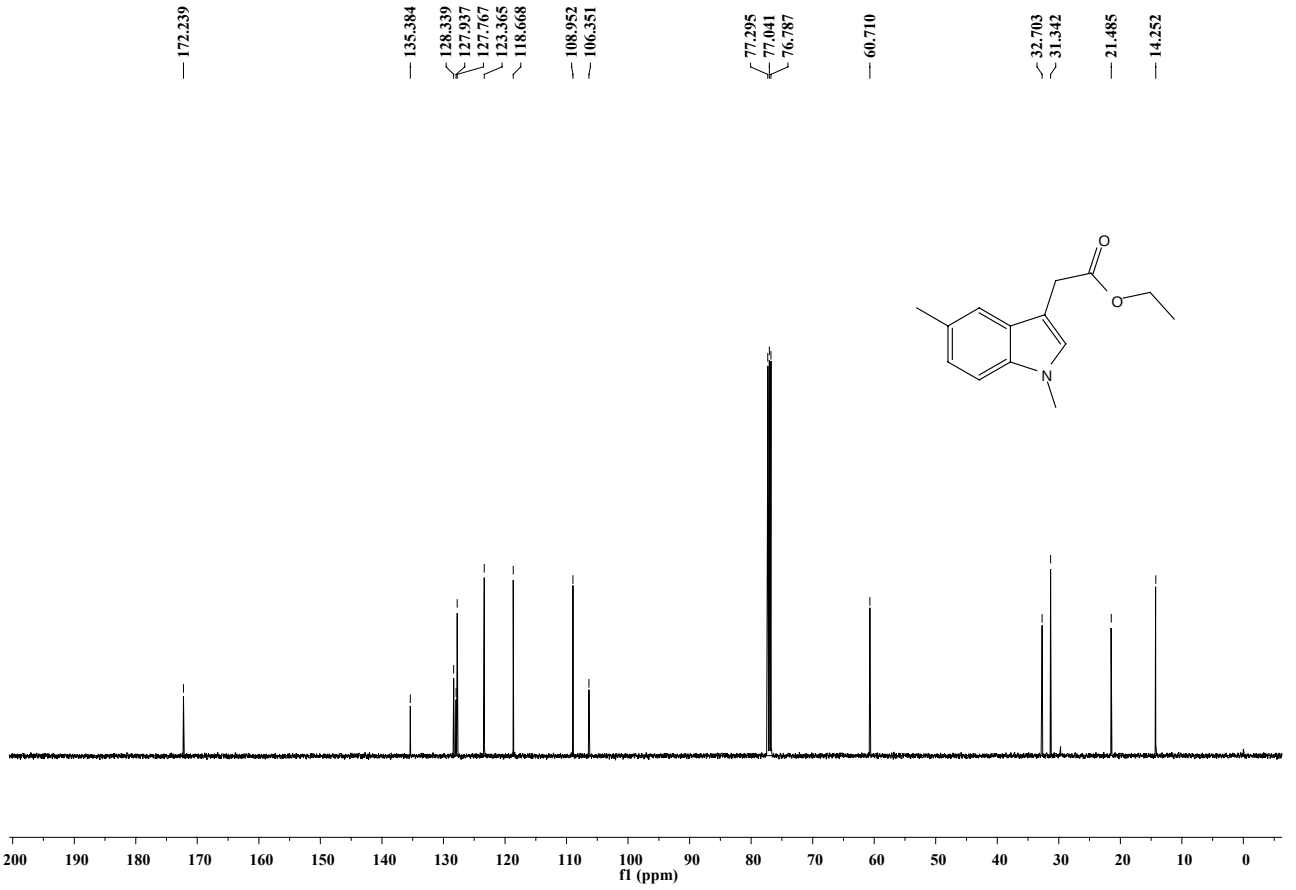
5-bromo-1-methyl-3-phenyl-1H-indole (4m)





Ethyl 2-(1,5-dimethyl-1H-indol-3-yl)acetate (4n)





1-benzyl-3-phenyl-1H-indole (4o)