Electronic Supplementary Material (ESI) for ChemComm.

Supporting Information

Aerobic C-N Bond Activation: A Simple Strategy to Construct Pyridines and Quinolines

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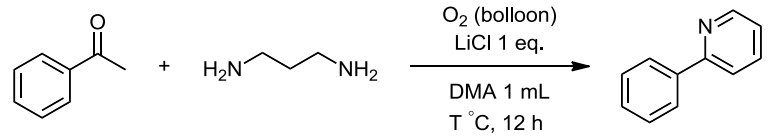
General information

The reactions were conducted under oxygen atmosphere with a balloon fitted on a Schlenk tube. All glassware was oven dried at 110 ℃ for hours and cooled down under vacuum. DMA was purified by distillation with calcium hydride. LiCl is anhydrous. Unless otherwise noted, materials were obtained from commercial suppliers and used without further purification. Thin layer chromatography (TLC) employed glass 0.25 mm silica gel plates. Flash chromatography columns were packed with 100-200 mesh silica gel in petroleum (bp. 60-90 ℃). GC-MS spectra were recorded on a Varian GC-MS 3900-2100T. EPR spectra were recorded on a Bruker A-200 spectrometer. ^{1}H and ^{13}C NMR data were recorded with Bruker ADVANCE III (400 MHz) spectrometers with tetramethylsilane as an internal standard. All chemical shifts (δ) are reported in ppm and coupling constants (*J*) in Hz. All chemical shifts are reported relative to tetramethylsilane and d-solvent peaks (77.3 ppm, chloroform), respectively. High resolution mass spectra (HRMS) were measured with a Waters Micromass GCT instrument, accurate masses are reported for the molecular ion ($[M+H]^{+}$).

General procedure

LiCl (21 mg, 0.5 mmol) was added in a Schlenk tube. The Schlenk tube was then sealed with septa and fitted with an oxygen balloon, filled with oxygen. DMA (1 mL), ketone (0.5 mmol) and diamine (2.5 mmol) were injected in the tube via a syringe in turn. The reaction was then heated up to 160 ℃ and kept stirring for 12 hours. After completion of the reaction, the mixture was quenched by water and extracted with ethyl ether (3 * 10 mL). The organic layers were combined and dried over sodiumsulfate. The pure product was obtained by flash column chromatography on silica gel (petroleumether : ethyl acetate 100 : 1).

Table S1. The effects of the temperature and the ratio of **1a** and **2a**[a].

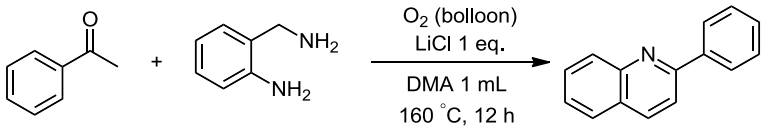


1a **2a** **3a**

Entry	**1a**	**2a**	T	Yield of **3a**[b]
1	0.5 mmol	2.5 mmol	160	60%
2	0.5 mmol	1.5 mmol	160	45%
3	0.5 mmol	2.5 mmol	140	46%
4	0.5 mmol	2.5 mmol	120	19%

[a] Reaction conditions: **1a** (0.5 mmol), **2a** (1.5-2.5 mmol), LiCl (0.5 mmol), DMA 1.0 mL, 12 h, under O_2 (1 atm); [b] The yield was determined by GC analysis, calibrated using biphenyl as the internal standard.

Table S2. The effects of the temperature and the ratio of **1a** and **2b**[a].

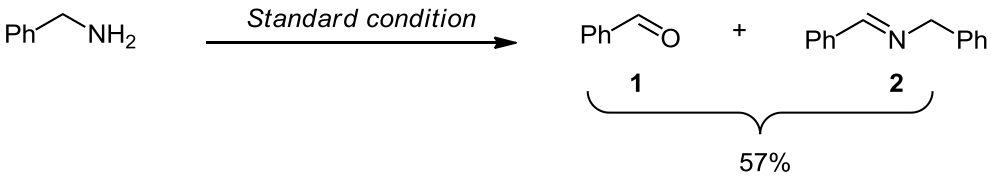


1a **2b** **4a**

Entry	**1a**	**2b**	Yield of **4a**[b]
1	0.5 mmol	0.60 mmol	44%
2	0.5 mmol	0.75 mmol	52%
3	0.5 mmol	1.00 mmol	72%
4	0.5 mmol	1.50 mmol	76%
5	0.5 mmol	2.50 mmol	90% (88%)
6	0.5 mmol	2.50 mmol	73%[c]

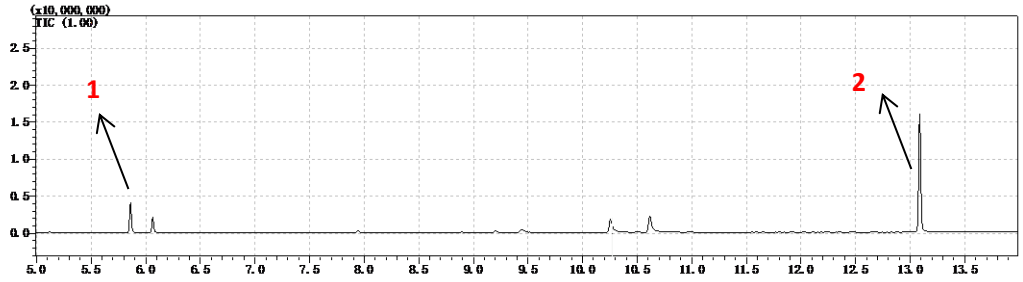
[a] Reaction conditions: **1a** (0.5 mmol), **2b** (0.6-2.5 mmol), LiCl(0.5 mmol), DMA 1.0 mL, 160 °C, 12 h, under O_2 (1 atm); [b] The yield was determined by GC analysis, calibrated using biphenyl as the internal standard, the yield in parenthesis was isolated yield. [C]120 °C

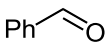
Control Experiments



LiCl (21 mg, 0.5 mmol) was added in a Schlenk tube. The Schlenk tube was then sealed with septa and fitted with an oxygen balloon, filled with oxygen. DMA (1 mL),

benzylamine (270 mg, 2.5 mmol)was injected in the tube via a syringe in turn. The reaction was then heated up to 160 ℃ and kept stirring for 12 hours. After completion of the reaction, the mixture was quenched by water and extracted with ethyl ether (3 * 10 mL). The organic layers were combined and dried over sodiumsulfate.





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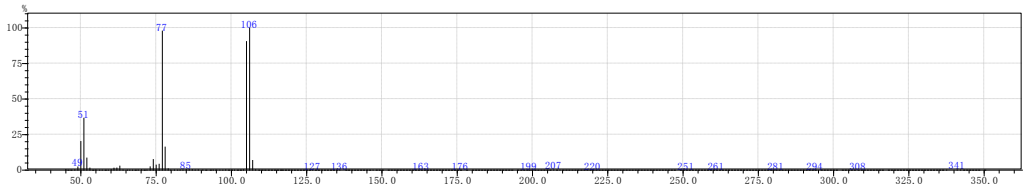

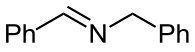

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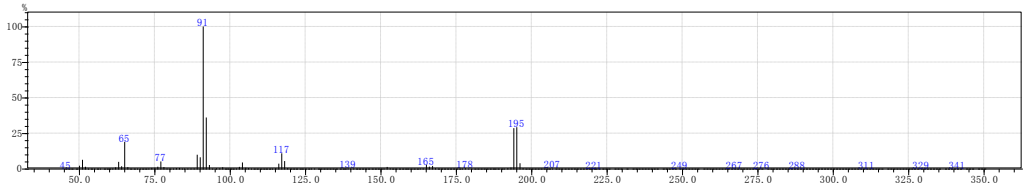
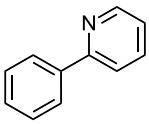
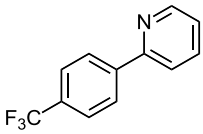


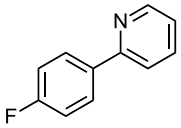
Detailed descriptions for products:



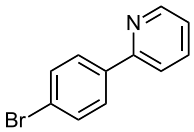
2-Phenylpyridine (3a)[1]: Isolated yield = 63%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.83 – 8.60 (m, 1H), 8.11 – 7.91 (m, 2H), 7.84 – 7.65 (m, 2H), 7.55 – 7.48 (m, 2H), 7.47 – 7.40 (m, 1H), 7.37 – 7.15 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.4, 149.6, 139.4, 136.7, 128.9, 128.7, 126.9, 122.1, 120.6.



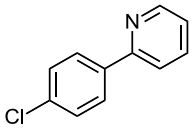
2-(4-(Trifluoromethyl)phenyl)pyridine (3b)[1]: Isolated yield = 45%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97 – 8.53 (m, 1H), 8.10 (d, *J* = 8.0 Hz, 2H), 7.93 – 7.50 (m, 4H), 7.34 – 7.24 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.8, 149.9, 142.6, 137.0, 130.7 (q, *J* = 32.6 Hz), 127.1, 125.6 (q, *J* = 3.7 Hz), 124.2 (q, *J* = 273.0 Hz), 122.9, 120.8. ^{19}F NMR (377 MHz, $CDCl_3$) δ -62.6.



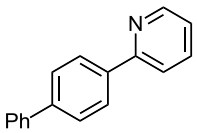
2-(4-Fluorophenyl)pyridine (3c)[2]: Isolated yield = 31%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.73 – 8.61 (m, 1H), 8.04 – 7.93 (m, 2H), 7.80 – 7.73 (m, 1H), 7.72 – 7.65 (m, 1H), 7.25 – 7.21 (m, 1H), 7.20 – 7.11 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 163.5 (d, *J* = 249.3 Hz), 156.4, 149.7, 136.8, 135.5 (d, *J* = 3.1 Hz), 128.7 (d, *J* = 8.4 Hz), 122.1, 120.3, 115.7 (d, *J* = 21.6 Hz). ^{19}F NMR (377 MHz, $CDCl_3$) δ -113.16.



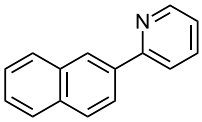
2-(4-Bromophenyl)pyridine (3d)[3]: Isolated yield = 57%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.71 – 8.63 (m, 1H), 7.90 – 7.83 (m, 2H), 7.77 – 7.65 (m, 2H), 7.62 – 7.55 (m, 2H), 7.26 – 7.21 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.2, 149.7, 138.2, 136.8, 131.8, 128.4, 123.4, 122.4, 120.3.



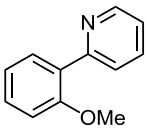
2-(4-Chlorophenyl)pyridine (3e)[2]: Isolated yield = 50%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.70 (d, *J* = 4.4 Hz, 1H), 7.95 (d, *J* = 8.8 Hz, 2H), 7.80 – 7.66 (m, 2H), 7.45 (d, *J* = 8.8 Hz, 2H), 7.30 – 7.21 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.1, 149.7, 137.7, 136.8, 135.0, 128.9, 128.1, 122.3, 120.3.



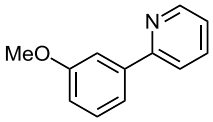
2-([1,1'-Biphenyl]-4-yl)pyridine (3f)[4]: Isolated yield = 56%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.70 (d, *J* = 4.8 Hz, 1H), 8.07 (d, *J* = 8.0 Hz, 2H), 7.77 – 7.60 (m, 6H), 7.44 (t, *J* = 7.6 Hz, 2H), 7.35 (t, *J* = 7.2 Hz, 1H), 7.24 – 7.15 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.9, 149.7, 141.6, 140.5, 138.2, 136.7, 128.8, 127.5, 127.4, 127.2, 127.0, 122.1, 120.4.



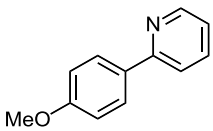
2-(Naphthalen-2-yl)pyridine (3g)[1]: Isolated yield = 60%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.73 (d, *J* = 4.0 Hz, 1H), 8.47 (s, 1H), 8.12 (dd, *J* = 8.8, 2.0 Hz, 1H), 7.98 – 7.90 (m, 2H), 7.89 – 7.80 (m, 2H), 7.74 (td, *J* = 7.6, 2.0 Hz, 1H), 7.56 – 7.44 (m, 2H), 7.27 – 7.16 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.2, 149.7, 136.8, 136.6, 133.6, 133.4, 128.7, 128.4, 127.6, 126.5, 126.2(64), 126.2(56), 124.5, 122.1, 120.8.



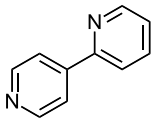
2-(2-Methoxyphenyl)pyridine (3h)[5]: Isolated yield = 41%.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.74 – 8.66 (m, 1H), 7.80 (d, *J* = 8.0 Hz, 1H), 7.75 (dd, *J* = 7.6, 1.6 Hz, 1H), 7.69 (td, *J* = 7.6, 2.0 Hz, 1H), 7.41 – 7.33 (m, 1H), 7.23 – 7.23 (m, 1H), 7.08 (td, *J* = 7.6, 0.8 Hz, 1H), 7.00 (d, *J* = 8.4 Hz, 1H), 3.84 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.8, 156.0, 149.3, 135.6, 131.1, 129.9, 129.0, 125.1, 121.6, 121.0, 111.2, 55.5.



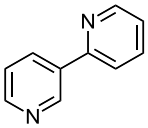
2-(3-Methoxyphenyl)pyridine (3i)[1]: Isolated yield = 64%.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.71 – 8.66 (m, 1H), 7.76 – 7.67 (m, 2H), 7.59 (dd, *J* = 2.4, 1.6 Hz, 1H), 7.56 – 7.51 (m, 1H), 7.37 (t, *J* = 8.0 Hz, 1H), 7.24 – 7.18 (m, 1H), 6.97 (m, *J* = 8.4, 2.8, 1.0 Hz, 1H), 3.88 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 160.0, 157.1, 149.5, 140.8, 136.7, 129.7, 122.2, 120.7, 119.2, 115.0, 111.9, 55.3.



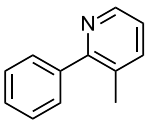
2-(4-Methoxyphenyl)pyridine (3j)[1]: Isolated yield = 76%.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.70 – 8.64 (m, 1H), 8.05 – 7.90 (m, 2H), 7.75 – 7.60 (m, 2H), 7.23 – 7.12 (m, 1H), 7.07 – 6.97 (m, 2H), 3.87 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 160.3, 157.0, 149.4, 136.6, 131.9, 128.1, 121.3, 119.7, 114.0, 55.2.



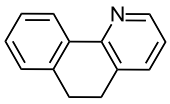
2,4'-Bipyridine (3k)[1]: Isolated yield = 34%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.79 – 8.67 (m, 3H), 7.90 (dd, *J* = 4.8, 1.6 Hz, 2H), 7.85 – 7.74 (m, 2H), 7.38 – 7.31 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 154.4, 150.3, 150.0, 146.3, 137.0, 123.7, 121.0, 120.8.



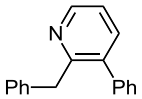
2,3'-Bipyridine (3l)[1]: Isolated yield = 36%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.18 (d, *J* = 2.0 Hz, 1H), 8.75 – 8.65 (m, 1H), 8.63 (dd, *J* = 4.8, 1.6 Hz, 1H), 8.32 – 8.26 (m, 1H), 7.79 – 7.69 (m, 2H), 7.37 (dd, *J* = 8.0, 4.8 Hz, 1H), 7.28 – 7.22 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 154.6, 149.9, 149.8, 148.1, 136.9, 134.7, 134.2, 123.5, 122.7, 120.5.



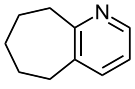
3-Methyl-2-phenylpyridine (3m)[6]: Isolated yield = 41%.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.56 (d, *J* = 3.6 Hz, 1H), 7.60 (d, *J* = 7.6 Hz, 1H), 7.58 – 7.52 (m, 2H), 7.51 – 7.45 (m, 2H), 7.44 – 7.38 (m, 1H), 7.20 (dd, *J* = 7.6, 4.8 Hz, 1H), 2.38 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 158.6, 146.9, 140.5, 138.4, 130.7, 128.9, 128.1, 127.8, 122.0, 20.0.



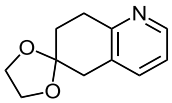
5,6-Dihydrobenzo[h]quinoline (3n)[7]: Isolated yield = 60%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.57 (dd, *J* = 4.8, 1.6 Hz, 1H), 8.35 (dd, *J* = 7.6, 1.2 Hz, 1H), 7.52 (dd, *J* = 7.6, 1.6 Hz, 1H), 7.45 – 7.31 (m, 2H), 7.26 (d, *J* = 7.2 Hz, 1H), 7.15 (dd, *J* = 7.6, 4.8 Hz, 1H), 2.96 (s, 4H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 152.5, 147.7, 138.1, 135.5, 134.5, 131.8, 129.0, 127.7, 127.1, 124.9, 122.2, 28.1, 28.0.



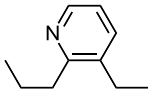
2-Benzyl-3-phenylpyridine (3q)[8]: Isolated yield = 57%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.58 (dd, *J* = 4.8, 1.6 Hz, 1H), 7.51 (dd, *J* = 7.8, 1.8 Hz, 1H), 7.40 – 7.33 (m, 3H), 7.23 – 7.13 (m, 5H), 7.12 – 7.07 (m, 1H), 7.00 (d, *J* = 7.2 Hz, 2H), 4.15 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.7, 148.3, 139.9, 139.5, 137.7, 137.4, 129.1, 128.7, 128.2, 128.1, 127.5, 125.8, 121.2, 41.5.



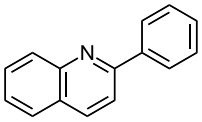
6,7,8,9-Tetrahydro-5H-cyclohepta[b]pyridine (3r)[9]: Isolated yield = 82%.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.28 (dd, *J* = 5.2, 1.6 Hz, 1H), 7.36 (dd, *J* = 7.2, 1.2 Hz, 1H), 7.00 (dd, *J* = 7.2, 4.8 Hz, 1H), 3.07 – 2.98 (m, 2H), 2.80 – 2.70 (m, 2H), 1.90 – 1.80 (m, 2H), 1.74 – 1.59 (m, 4H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 163.1, 146.0, 138.0, 136.3, 121.0, 39.3, 35.2, 32.4, 27.8, 26.3.



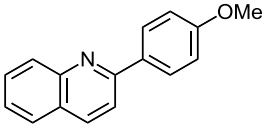
7',8'-Dihydro-5'H-spiro[[1,3]dioxolane-2,6'-quinoline] (3s): Isolated yield = 42%.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.39 – 8.26 (m, 1H), 7.31 (d, *J* = 7.6 Hz, 1H), 7.02 (dd, *J* = 8.0, 4.8 Hz, 1H), 4.01 (s, 4H), 3.11 (t, *J* = 6.8 Hz, 2H), 2.96 (s, 2H), 2.02 (t, *J* = 6.8 Hz, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.7, 147.2, 137.0, 129.4, 121.0, 107.4, 64.6, 38.4, 31.5, 30.9. HRMS (ESI) calcd for $C_{11}H_{13}NO_2$ $[M+H]^+$: 192.1025; found: 192.1018.



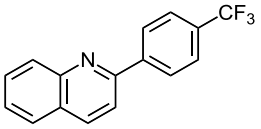
3-Ethyl-2-propylpyridine (3t)[10]: Isolated yield = 34%.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.37 (dd, *J* = 4.8, 1.6 Hz, 1H), 7.44 (dd, *J* = 7.6, 1.6 Hz, 1H), 7.06 (dd, *J* = 7.6, 4.8 Hz, 1H), 2.82 – 2.75 (m, 2H), 2.66 (q, *J* = 7.6 Hz, 2H), 1.80 – 1.69 (m, 2H), 1.23 (t, *J* = 7.6 Hz, 3H), 1.01 (t, *J* = 7.6 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.0, 146.5, 136.7, 135.8, 121.2, 36.9, 25.1, 22.9, 14.8, 14.3.



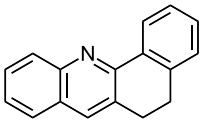
2-Phenylquinoline (4a)[11]: Isolated yield = 88%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.24 – 8.12 (m, 4H), 7.87 (d, *J* = 8.4 Hz, 1H), 7.81 (d, *J* = 8.0 Hz, 1H), 7.75 – 7.69 (m, 1H), 7.56 – 7.49 (m, 3H), 7.49 – 7.42 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.4, 148.3, 139.7, 136.8, 129.7, 129.7, 129.31, 128.8, 127.6, 127.5, 127.2, 126.3, 119.0.



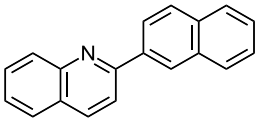
2-(4-Methoxyphenyl)quinoline (4b)[11]: Isolated yield = 85%.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.20 – 8.08 (m, 4H), 7.78 (t, *J* = 8.8 Hz, 2H), 7.74 – 7.65 (m, 1H), 7.51 – 7.44 (m, 1H), 7.03 (d, *J* = 8.8 Hz, 2H), 3.86 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 160.7, 156.8, 148.2, 136.6, 132.2, 129.5, 129.4, 128.8, 127.4, 126.8, 125.9, 118.5, 114.2, 55.3.



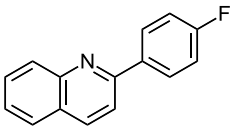
2-(4-(Trifluoromethyl)phenyl)quinoline (4c)[11]: Iolated yield = 58%.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.28 – 8.15 (m, 4H), 7.86 – 7.79 (m, 2H), 7.74 (t, *J* = 8.4 Hz, 3H), 7.54 (t, *J* = 7.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.6, 148.2, 142.9, 137.1, 131.0 (q, *J* = 32.5 Hz), 130.0, 129.8, 127.8, 127.5, 127.4, 126.8, 125.7 (q, *J* = 3.7 Hz), 124.2 (q, *J* = 273.0 Hz), 118.7. ^{19}F NMR (377 MHz, $CDCl_3$) δ -62.51.



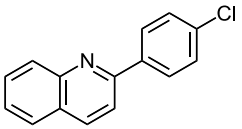
5,6-Dihydrobenzo[c]acridine (4d)[12]: Isolated yield = 52%.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.64 (dd, *J* = 7.6, 1.2 Hz, 1H), 8.20 (d, *J* = 8.8 Hz, 1H), 7.93 (d, *J* = 0.4 Hz, 1H), 7.82 – 7.74 (m, 1H), 7.73 – 7.65 (m, 1H), 7.54 – 7.45 (m, 2H), 7.42 (td, *J* = 7.6, 1.6 Hz, 1H), 7.34 – 7.30 (m, 1H), 3.18 – 3.10 (m, 2H), 3.07 – 3.00 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 153.3, 147.6, 139.4, 134.7, 133.6, 130.5, 129.6, 129.3, 128.6, 127.9, 127.8, 127.3, 126.9, 126.0, 28.8, 28.3.



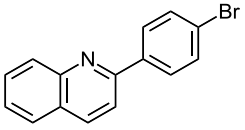
2-(Naphthalen-2-yl)quinoline (4e)[13]: Iolated yield = 78%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.59 (s, 1H), 8.36 (dd, *J* = 8.2, 1.8 Hz, 1H), 8.21 (dd, *J* = 8.4, 5.6 Hz, 2H), 8.02 – 7.94 (m, 3H), 7.92 – 7.84 (m, 1H), 7.81 (d, *J* = 8.0 Hz, 1H), 7.78 – 7.68 (m, 1H), 7.57 – 7.45 (m, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.1, 148.3, 136.9, 136.8, 133.8, 133.5, 129.7, 129.7, 128.8, 128.6, 127.7, 127.5, 127.2, 127.1, 127.0, 126.3, 125.0, 119.1.



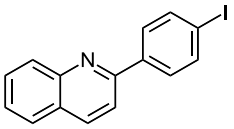
2-(4-Fluorophenyl)quinoline (4f)[14]: Isolated yield = 80%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 – 8.08 (m, 4H), 7.80 – 7.73 (m, 2H), 7.73 – 7.66 (m, 1H), 7.53 – 7.43 (m, 1H), 7.21 – 7.14 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 163.7 (d, *J* = 249.8 Hz), 156.1, 148.1, 136.8, 135.7 (d, *J* = 3.1 Hz), 129.7, 129.6, 129.4, 129.3, 127.4, 127.0, 126.3, 118.5, 115.7 (d, *J* = 21.7 Hz). ^{19}F NMR (377 MHz, CDCl3) δ -112.38.



2-(4-Chlorophenyl)quinoline (4g)[14]: Isolated yield = 75%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 – 8.10 (m, 2H), 8.09 – 8.03 (m, 2H), 7.80 – 7.65 (m, 3H), 7.53 – 7.41 (m, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.8, 148.1, 137.9, 136.8, 135.4, 129.8, 129.6, 128.9, 128.7, 127.4, 127.1, 126.4, 118.4.



2-(4-Bromophenyl)quinoline (4h)[11]: Isolated yield = 71%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.20 (d, *J* = 8.4 Hz, 1H), 8.15 (d, *J* = 8.4 Hz, 1H), 8.09 – 7.99 (m, 2H), 7.81 (d, *J* = 8.4 Hz, 2H), 7.78 – 7.70 (m, 1H), 7.68 – 7.60 (m, 2H), 7.57 – 7.49 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.0, 148.2, 138.4, 137.0, 131.9, 129.9, 129.7, 129.1, 127.5, 127.2, 126.5, 123.9, 118.5.



2-(4-Iodophenyl)quinoline (4i): Isolated yield = 74%.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.14 (d, *J* = 8.4 Hz, 2H), 7.92 – 7.67 (m, 7H), 7.56 – 7.46 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 156.0, 148.2, 139.0, 137.9, 136.9, 129.8, 129.7, 129.2, 127.5, 127.2, 126.5, 118.4, 95.9. HRMS (ESI) calcd for $C_{11}H_{13}NO_2$ $[M+H]^+$: 192.1025; found: 192.1018. HRMS (ESI) calcd for $C_{15}H_{10}IN$ $[M+H]^+$: 331.9936; found: 331.9925.

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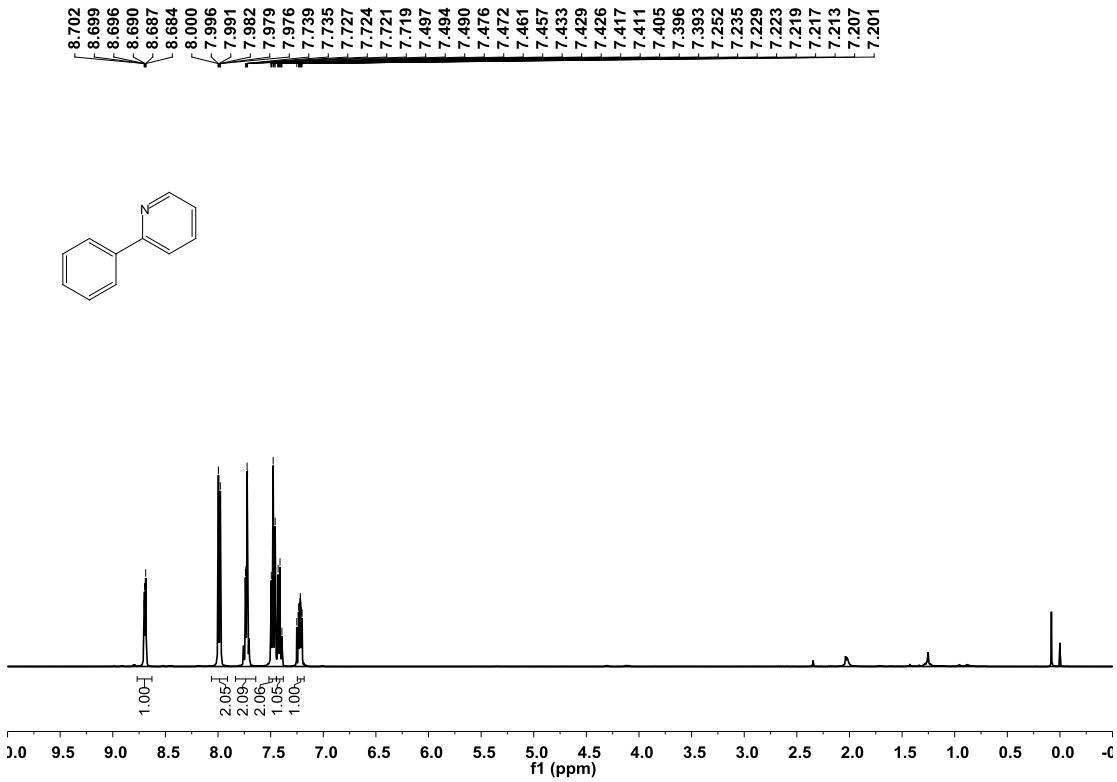
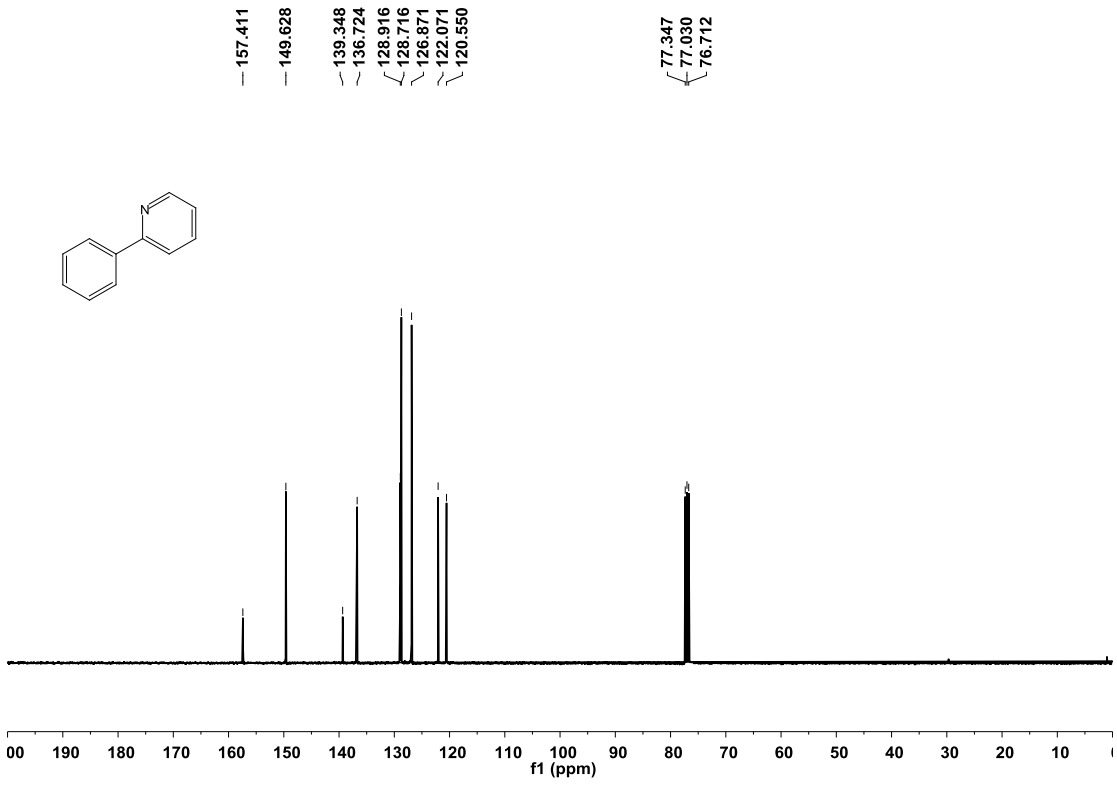
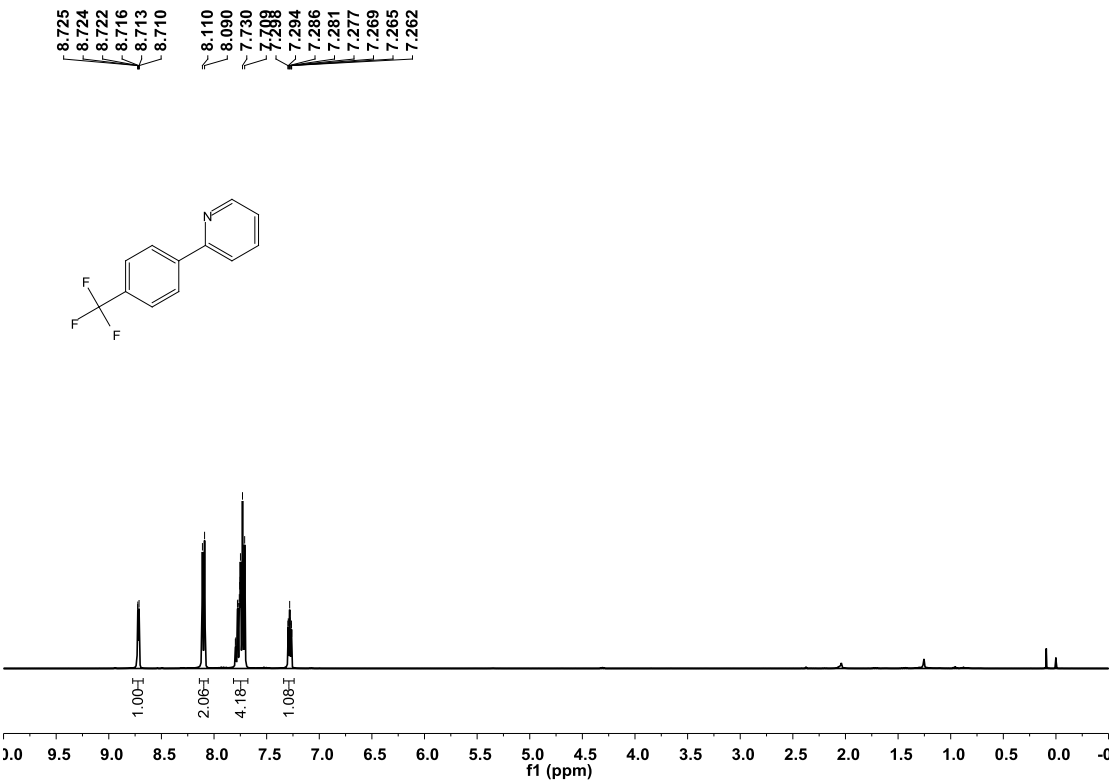


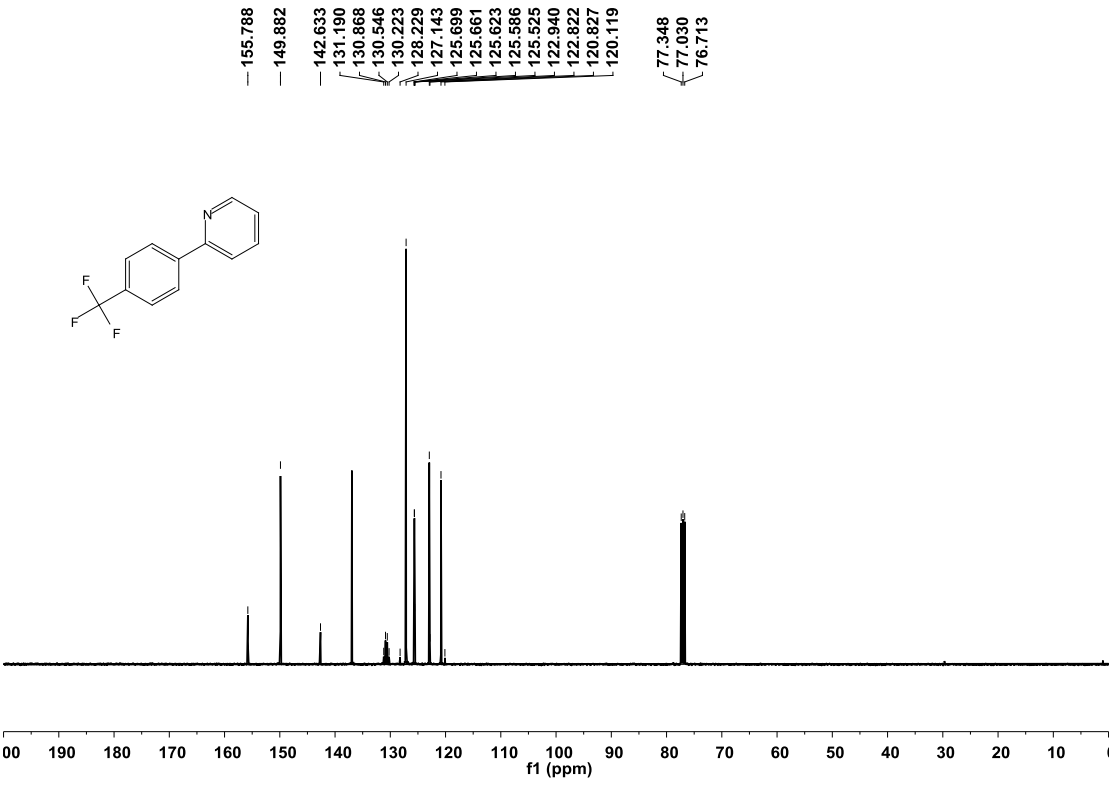
^{1}H NMR spectrum of 2-phenylpyridine(3a)



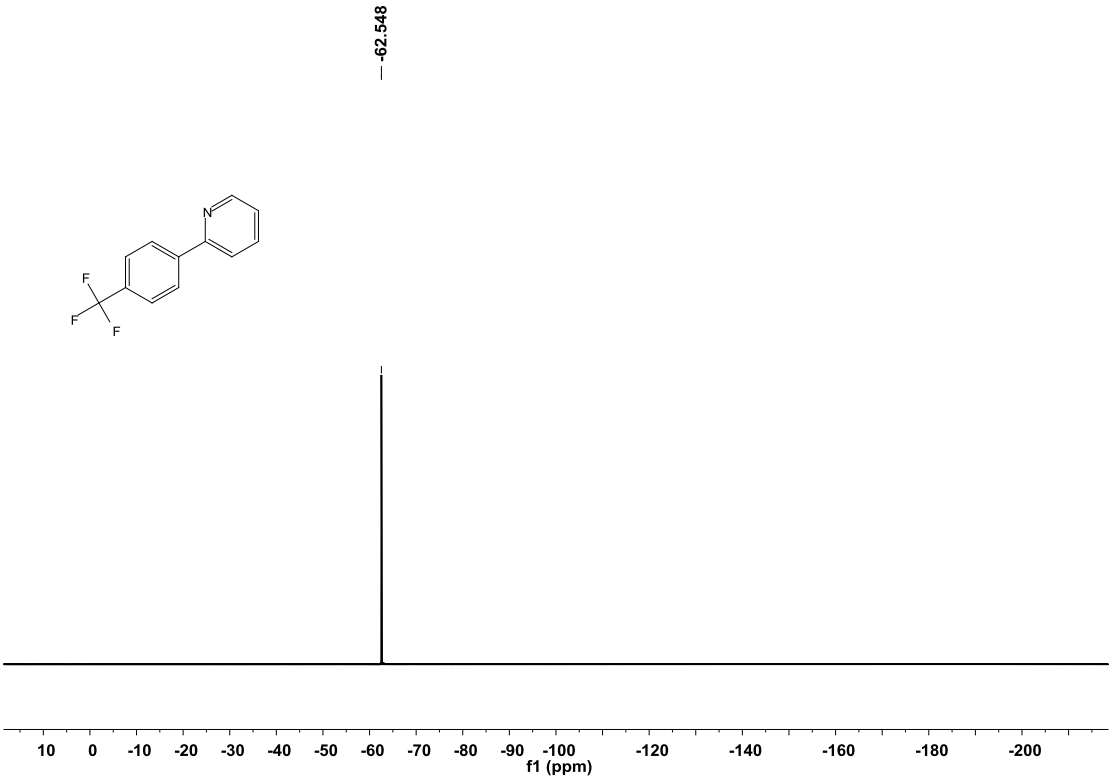
^{13}C NMR spectrum of 2-phenylpyridine(3a)



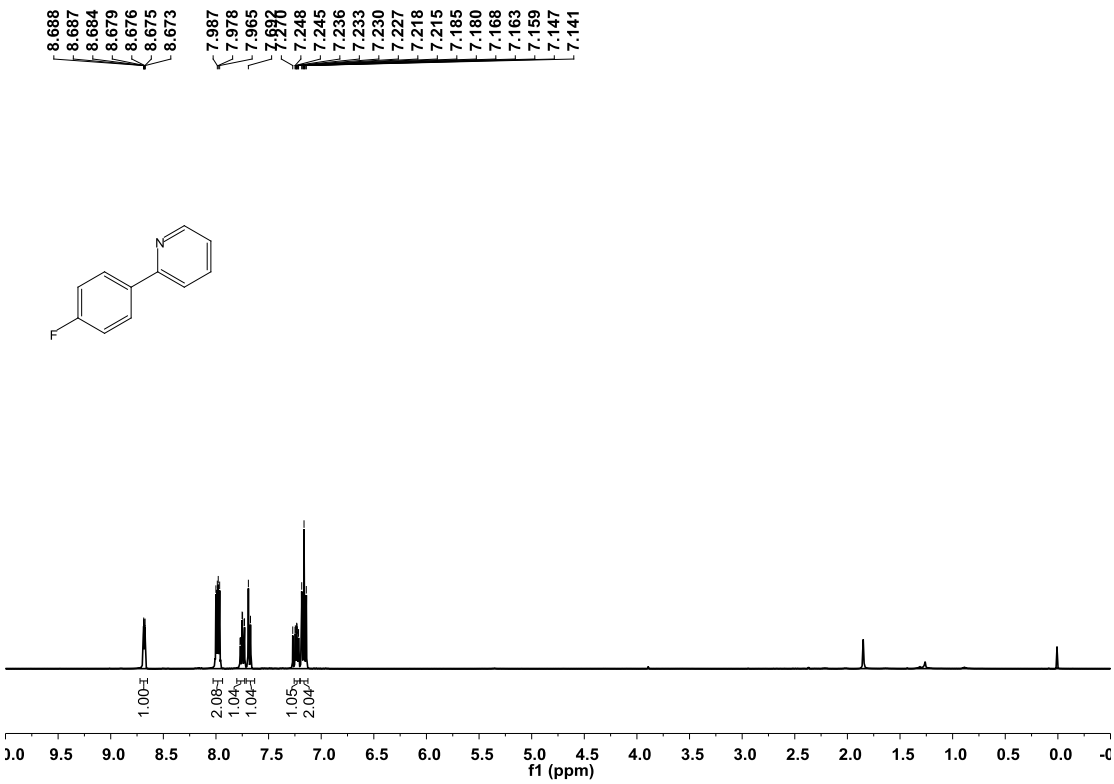
^{1}H NMR spectrum of 2-(4-(trifluoromethyl)phenyl)pyridine(3b)



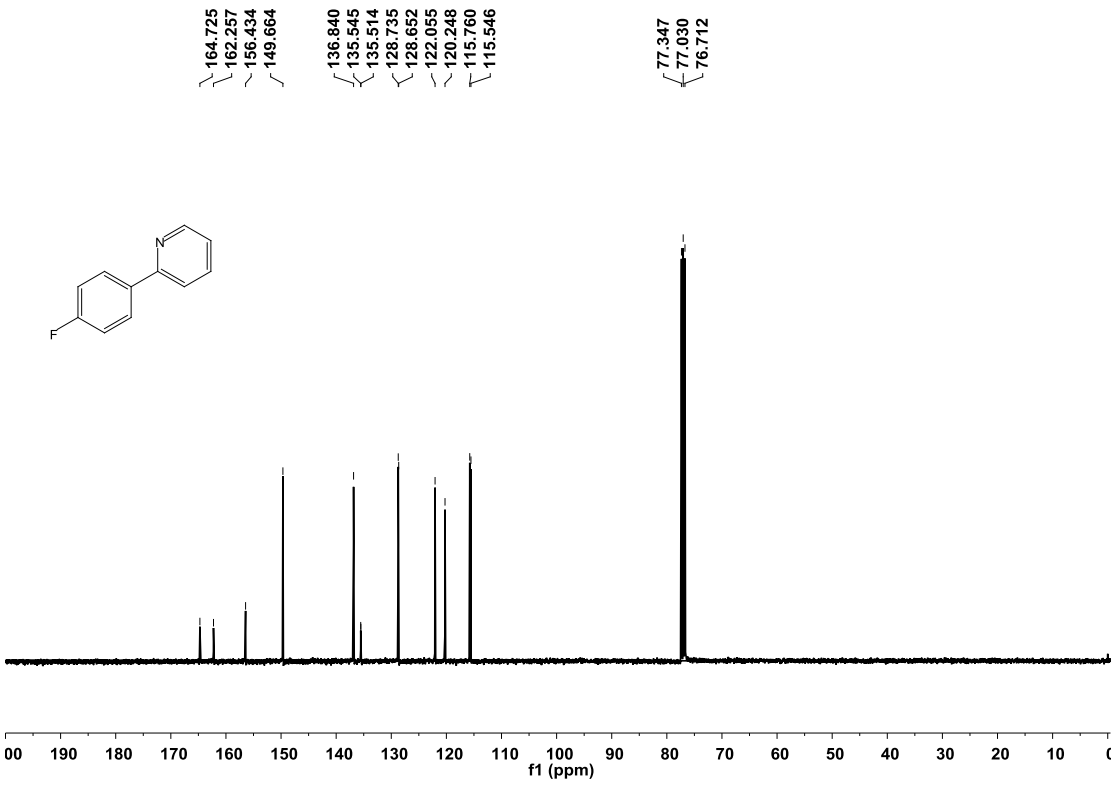
^{13}C NMR spectrum of 2-(4-(trifluoromethyl)phenyl)pyridine(3b)



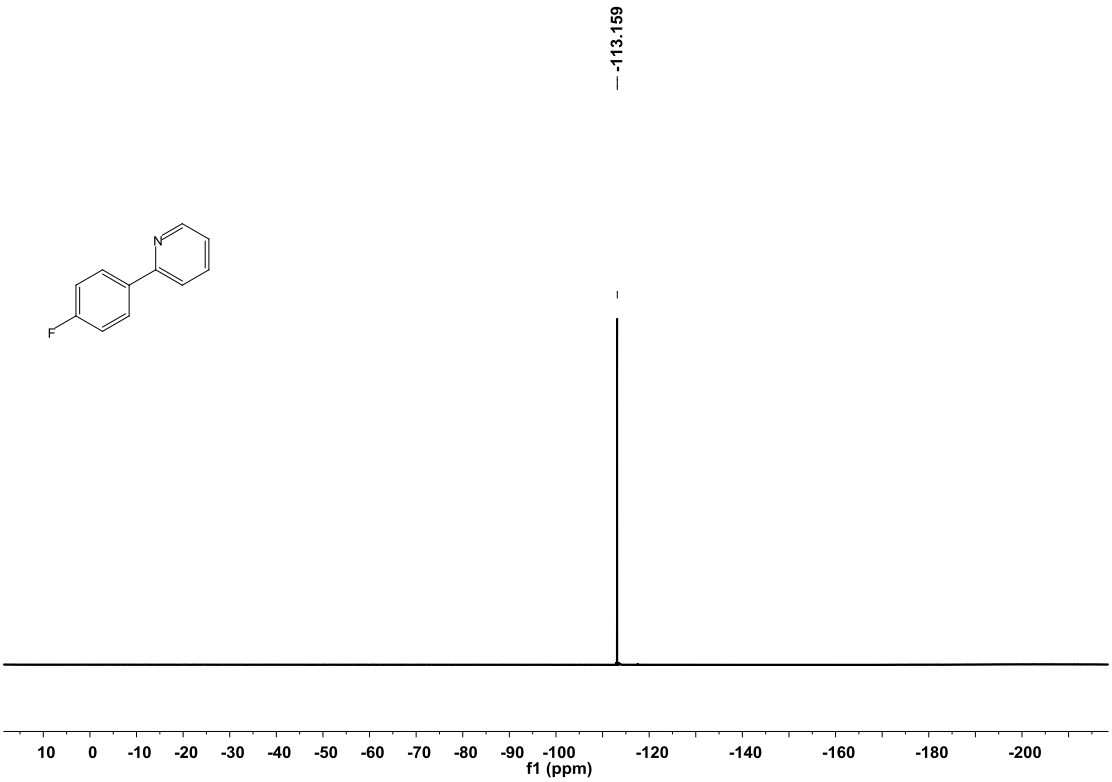
^{19}F NMR spectrum of 2-(4-(trifluoromethyl)phenyl)pyridine(3b)



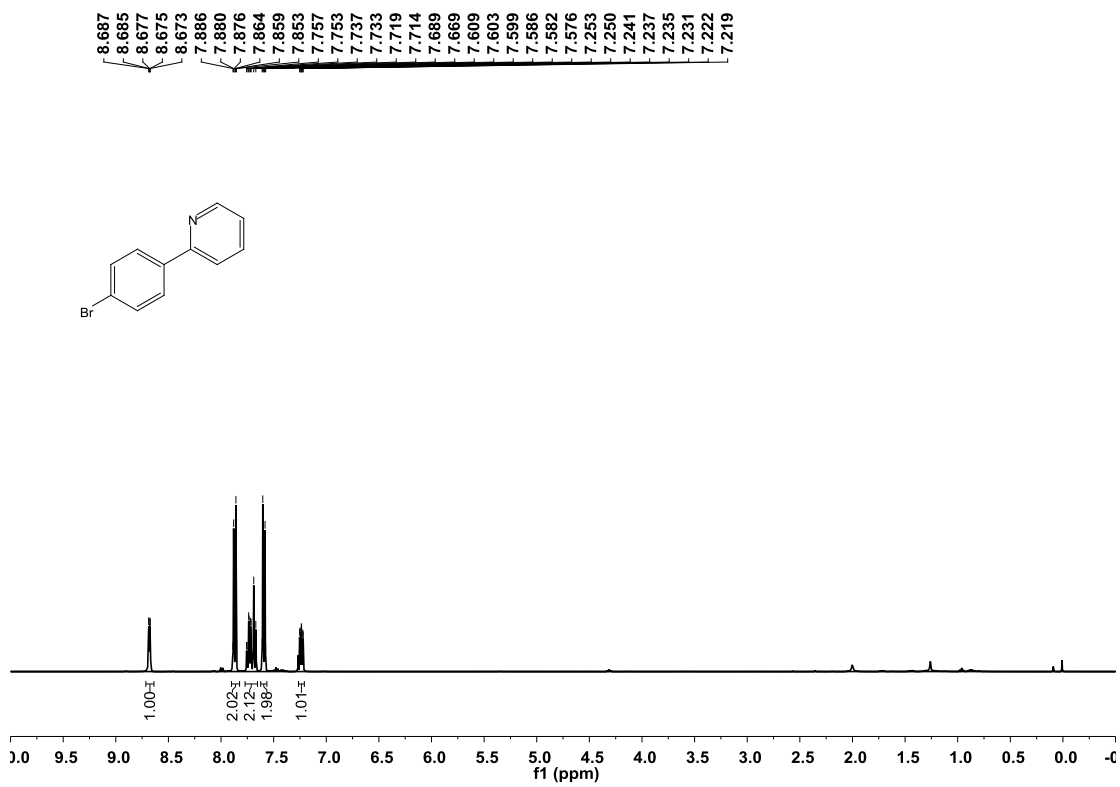
^{1}H NMR spectrum of 2-(4-fluorophenyl)pyridine(3c)



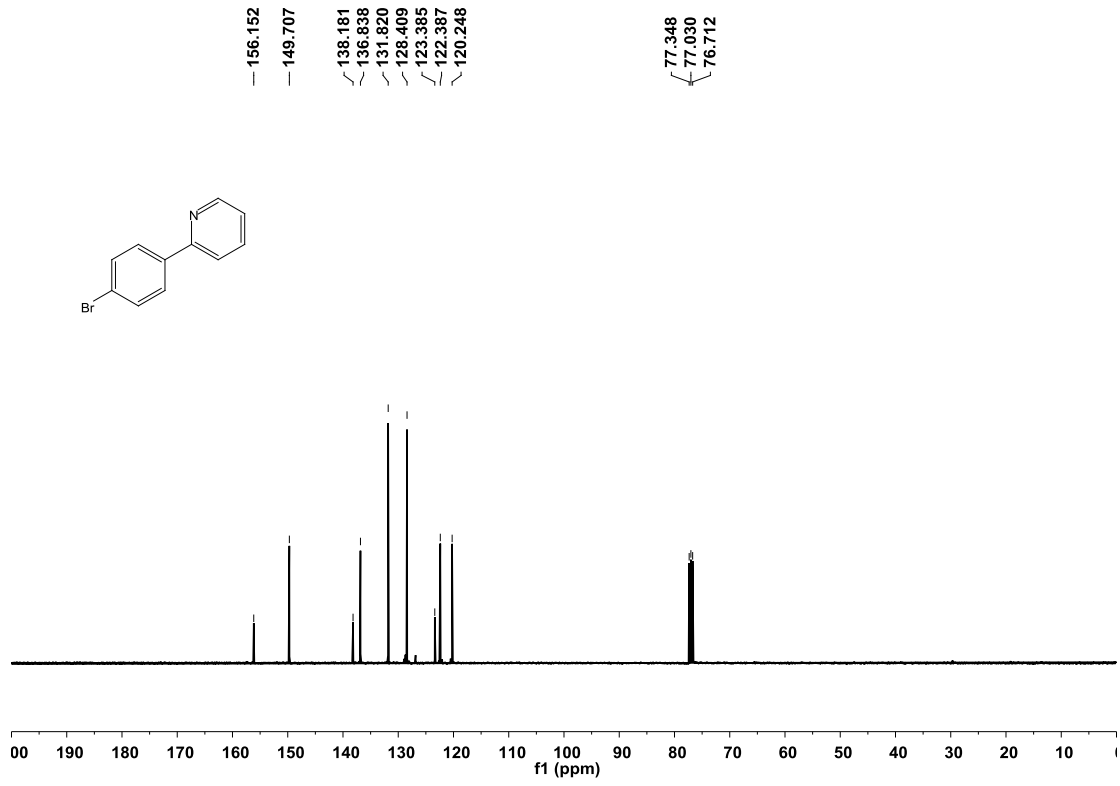
^{13}C NMR spectrum of 2-(4-fluorophenyl)pyridine(3c)



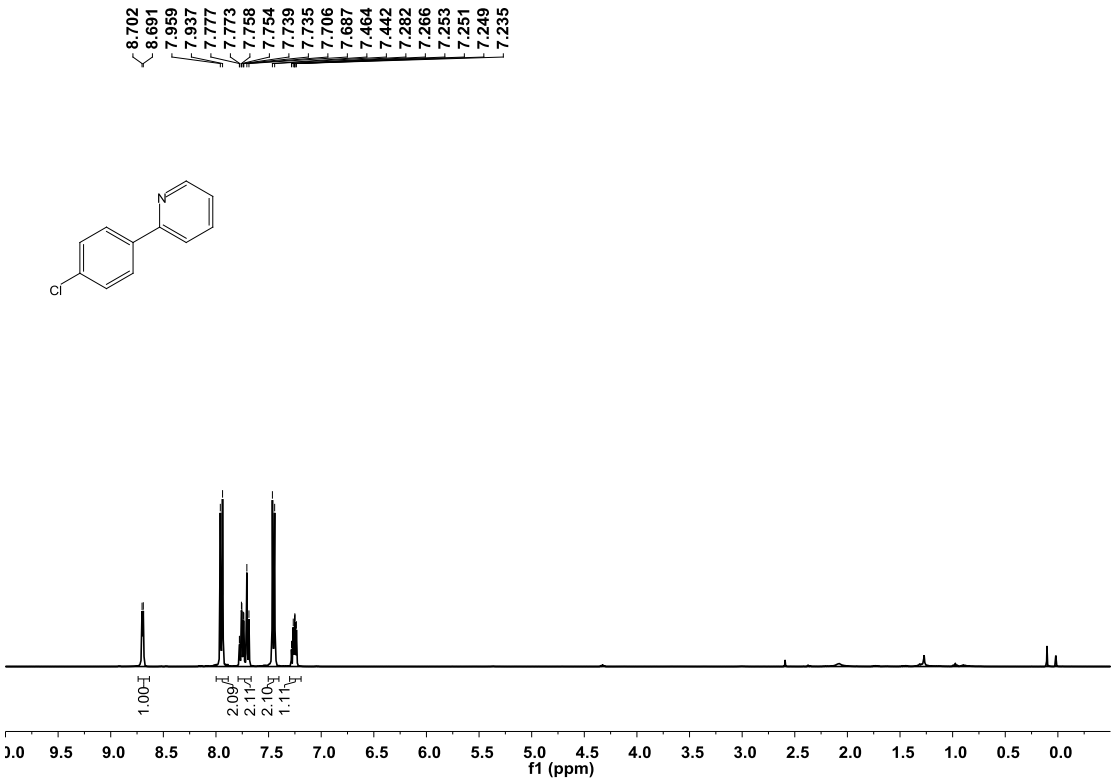
^{19}F NMR spectrum of 2-(4-fluorophenyl)pyridine(3c)



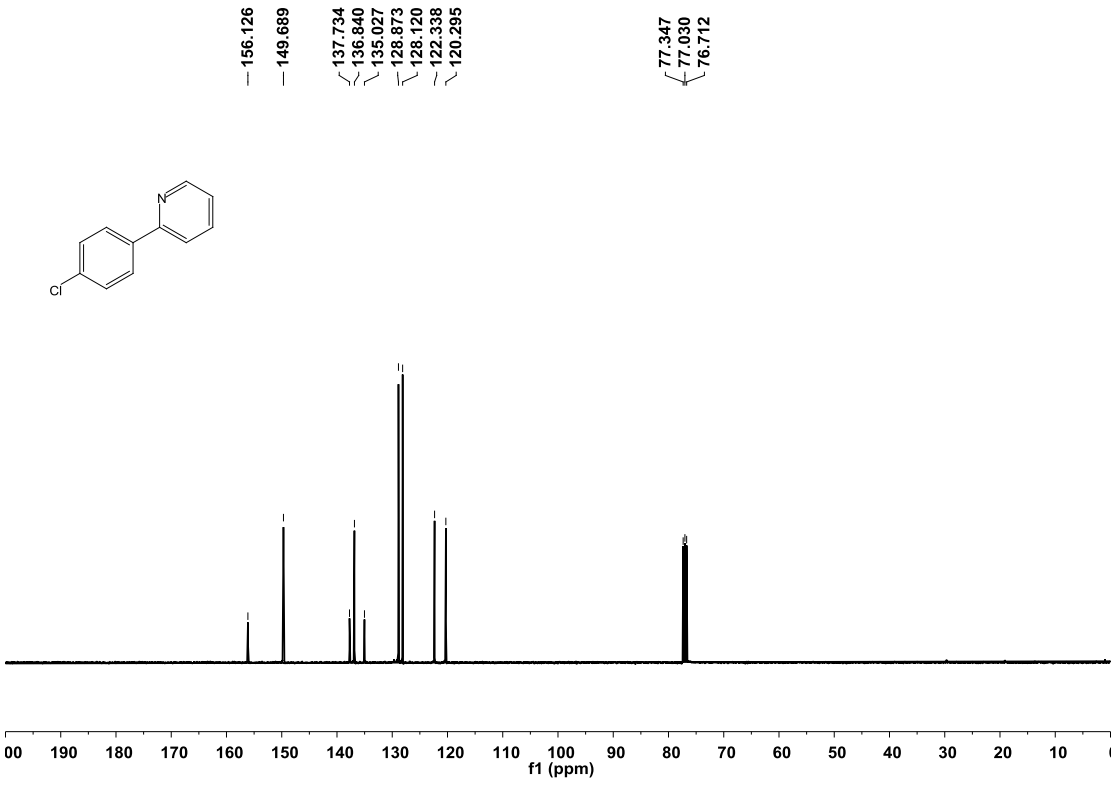
^{1}H NMR spectrum of 2-(4-bromophenyl)pyridine(3d)



^{13}C NMR spectrum of 2-(4-bromophenyl)pyridine(3d)



^{1}H NMR spectrum of 2-(4-chlorophenyl)pyridine(3e)



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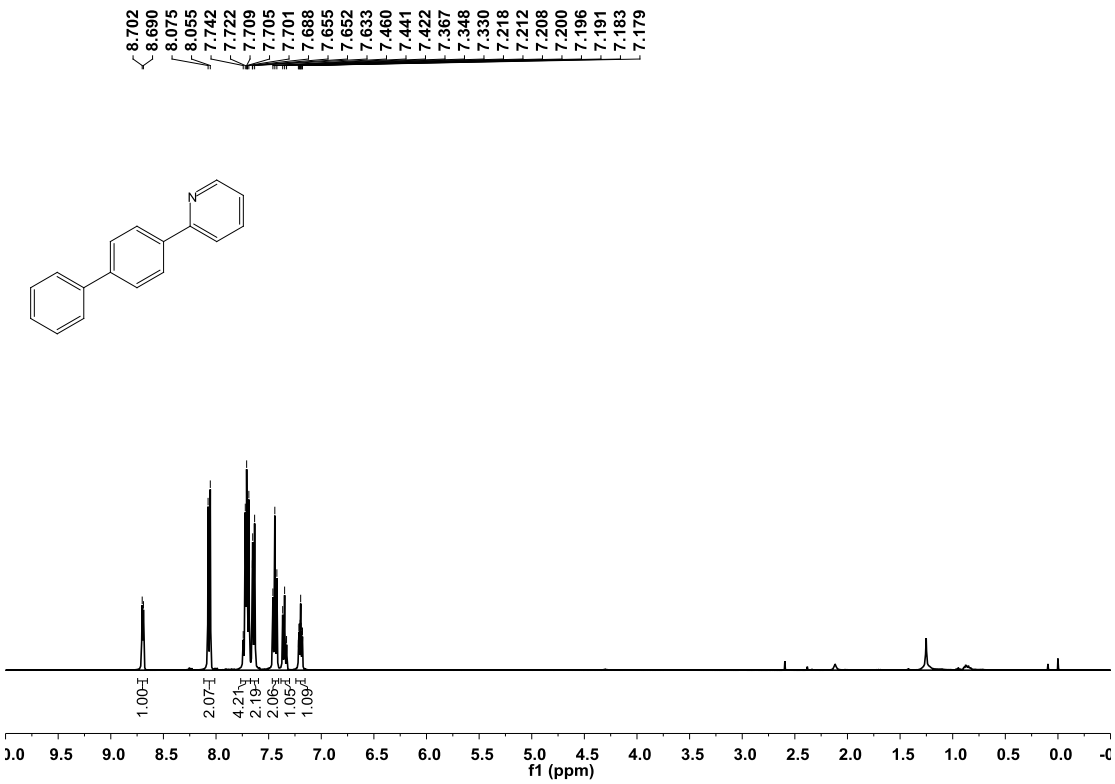
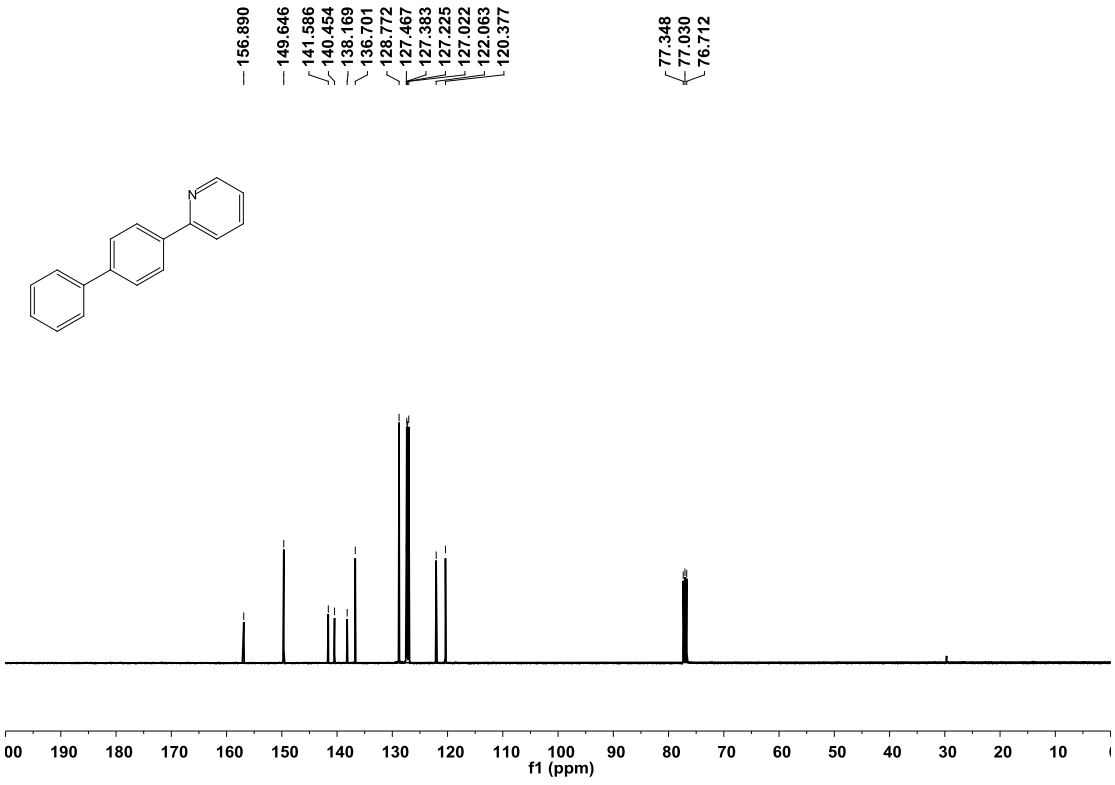
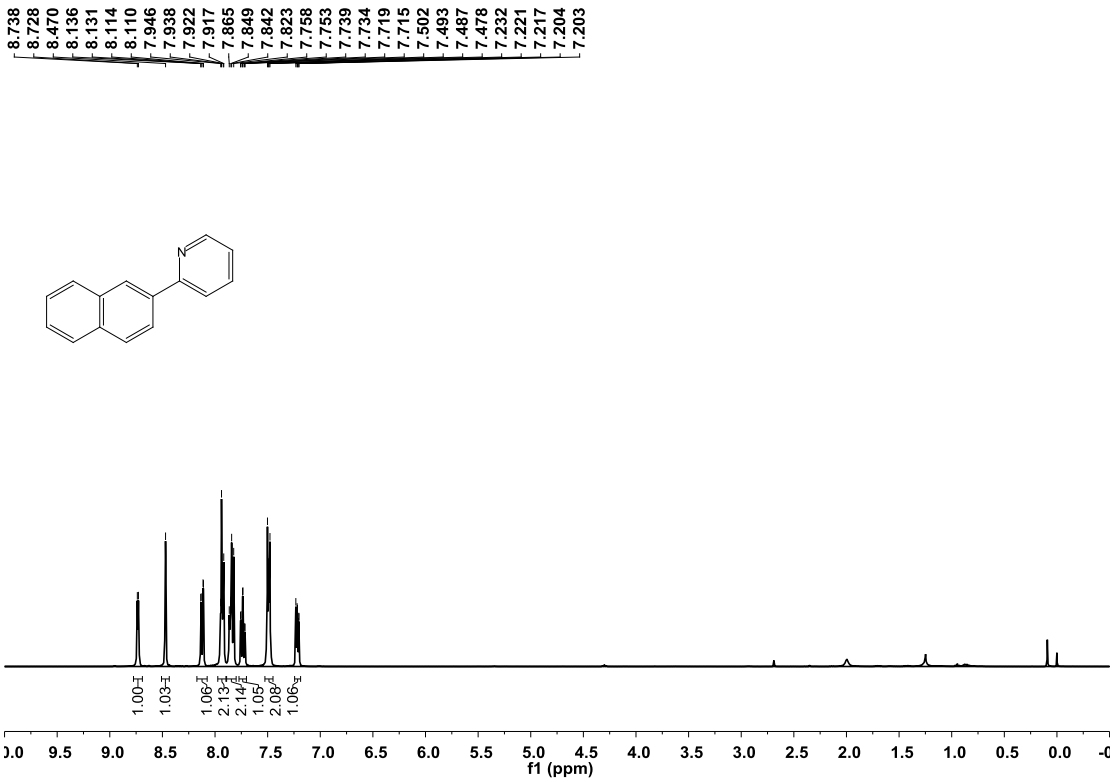


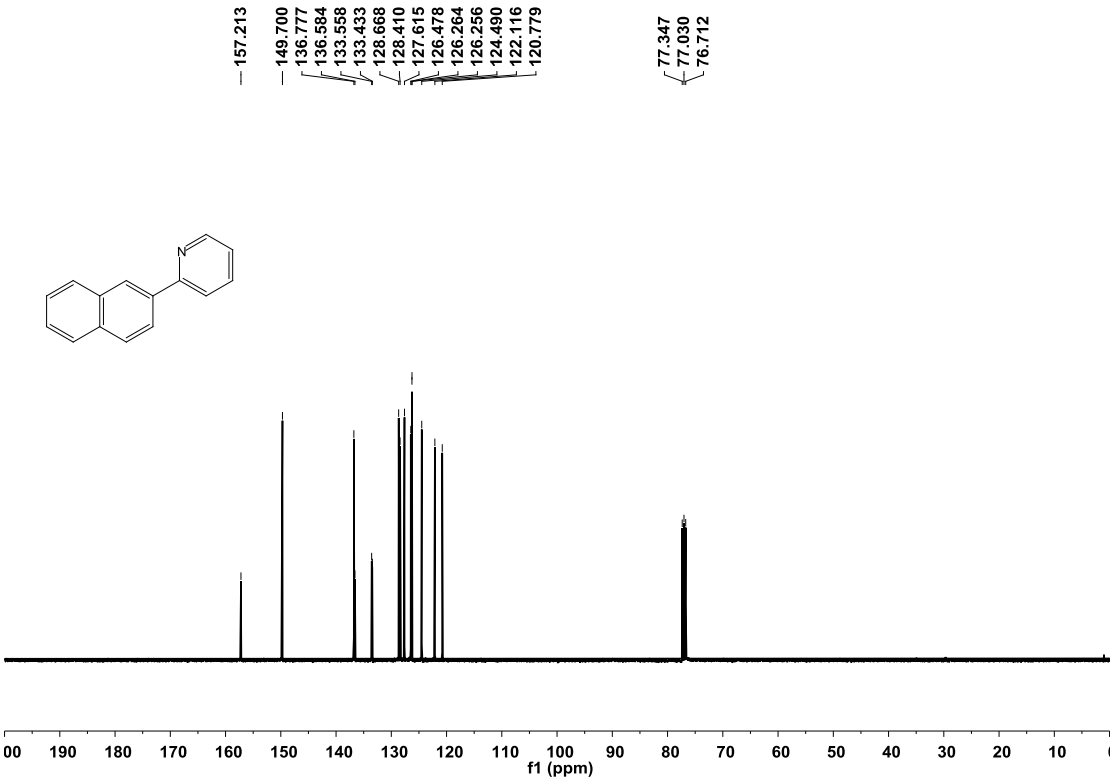
^{1}H NMR spectrum of 2-([1,1'-biphenyl]-4-yl)pyridine(3f)



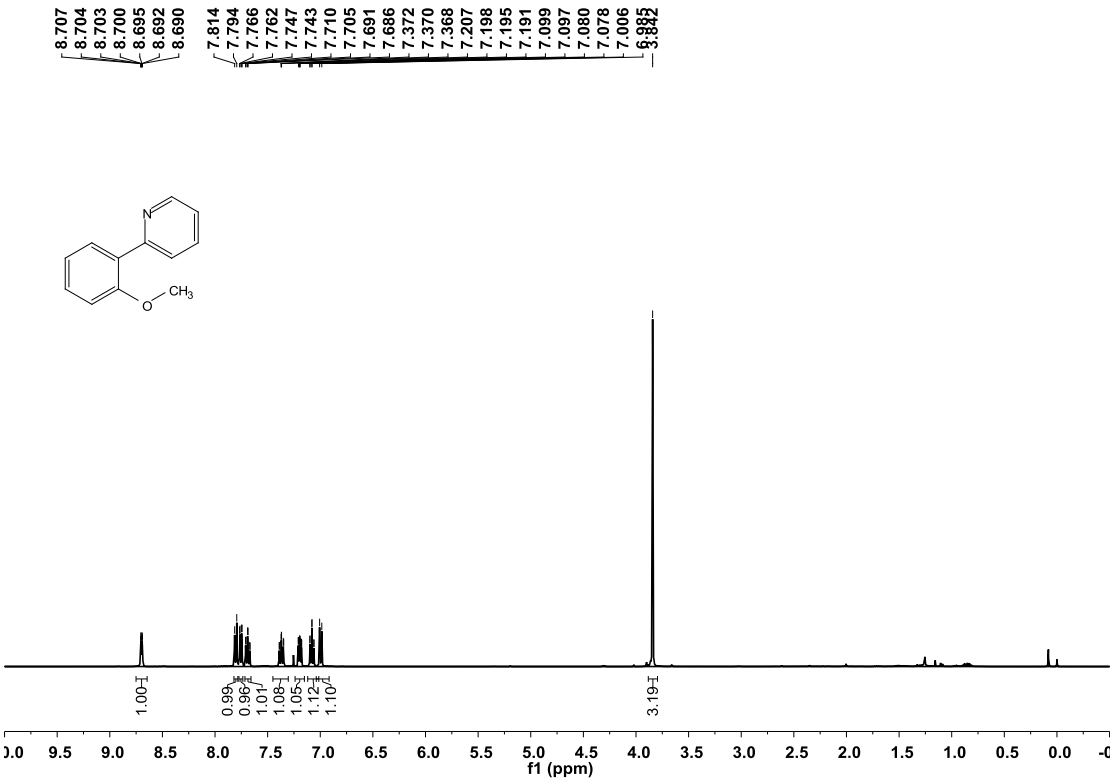
^{13}C NMR spectrum of 2-([1,1'-biphenyl]-4-yl)pyridine(3f)



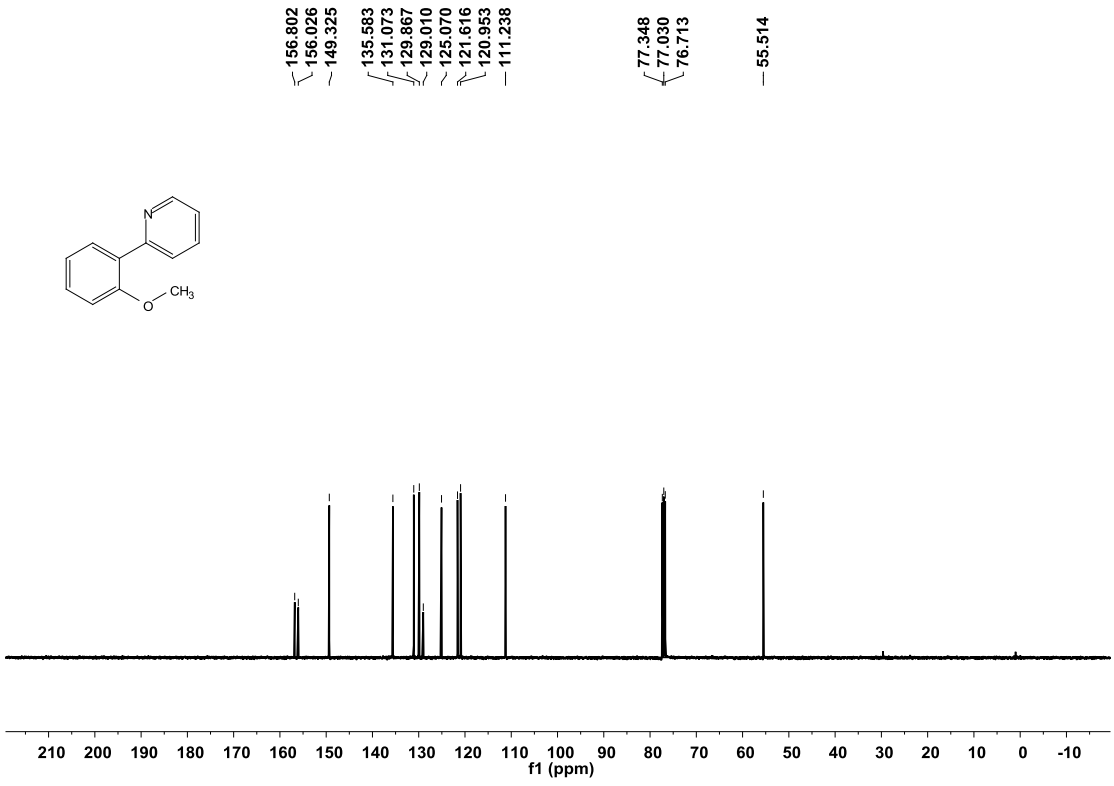
^{1}H NMR spectrum of 2-(naphthalen-2-yl)pyridine(3g)



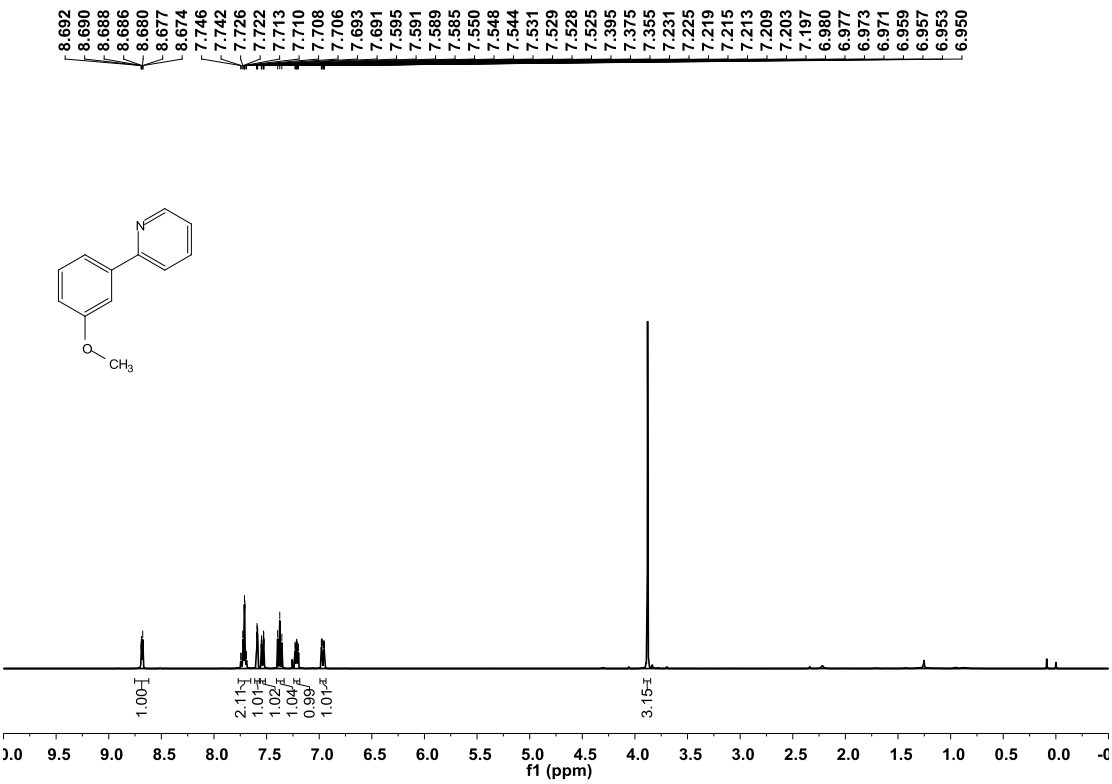
^{13}C NMR spectrum of 2-(naphthalen-2-yl)pyridine(3g)



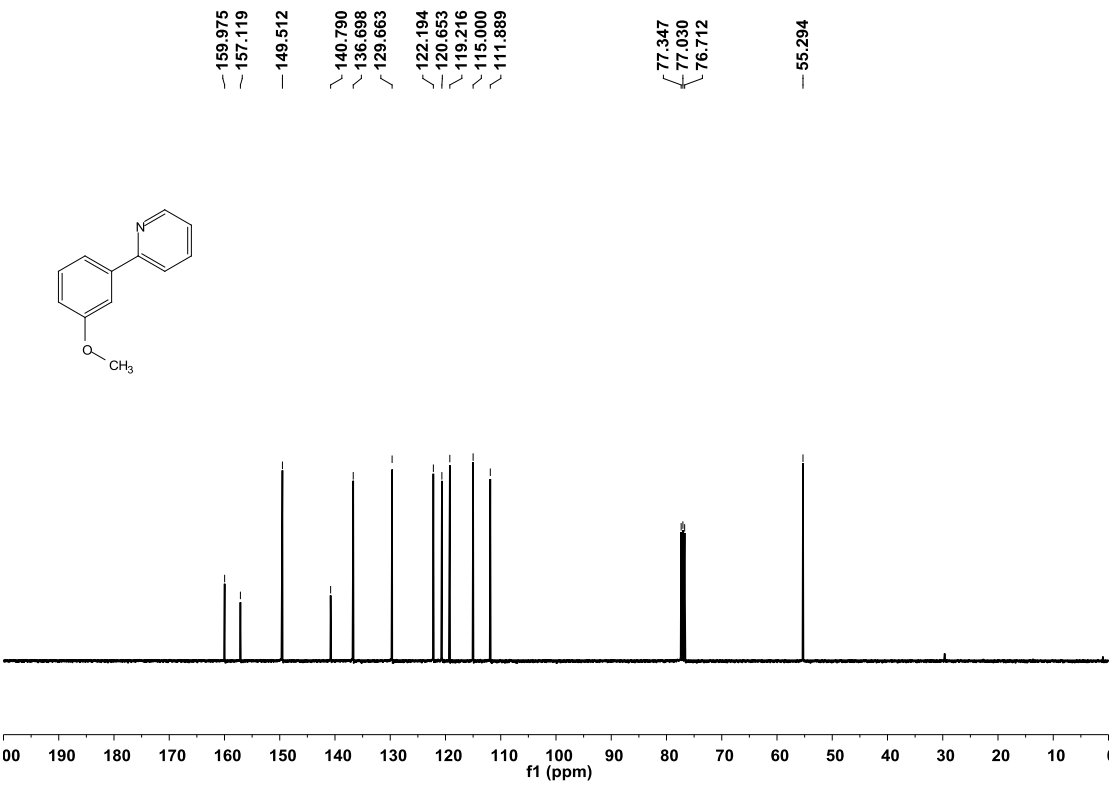
^{1}H NMR spectrum of 2-(2-methoxyphenyl)pyridine(3h)



^{13}C NMR spectrum of 2-(2-methoxyphenyl)pyridine(3h)



^{1}H NMR spectrum of 2-(3-methoxyphenyl)pyridine(3i)



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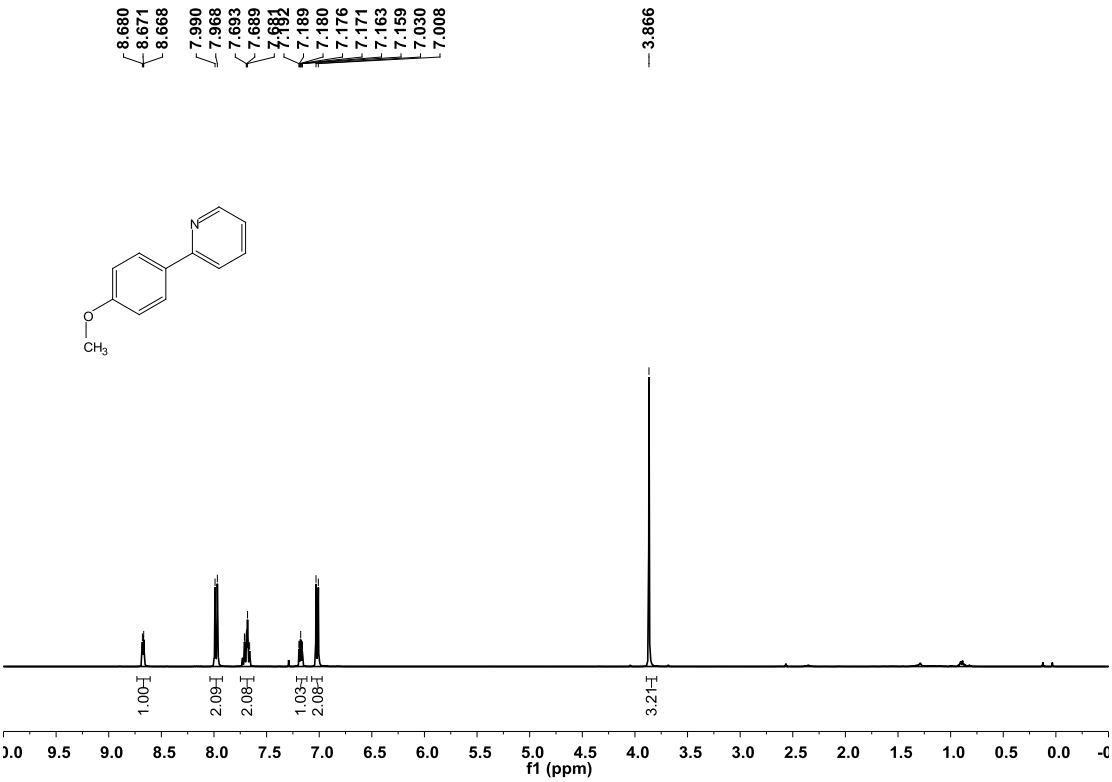
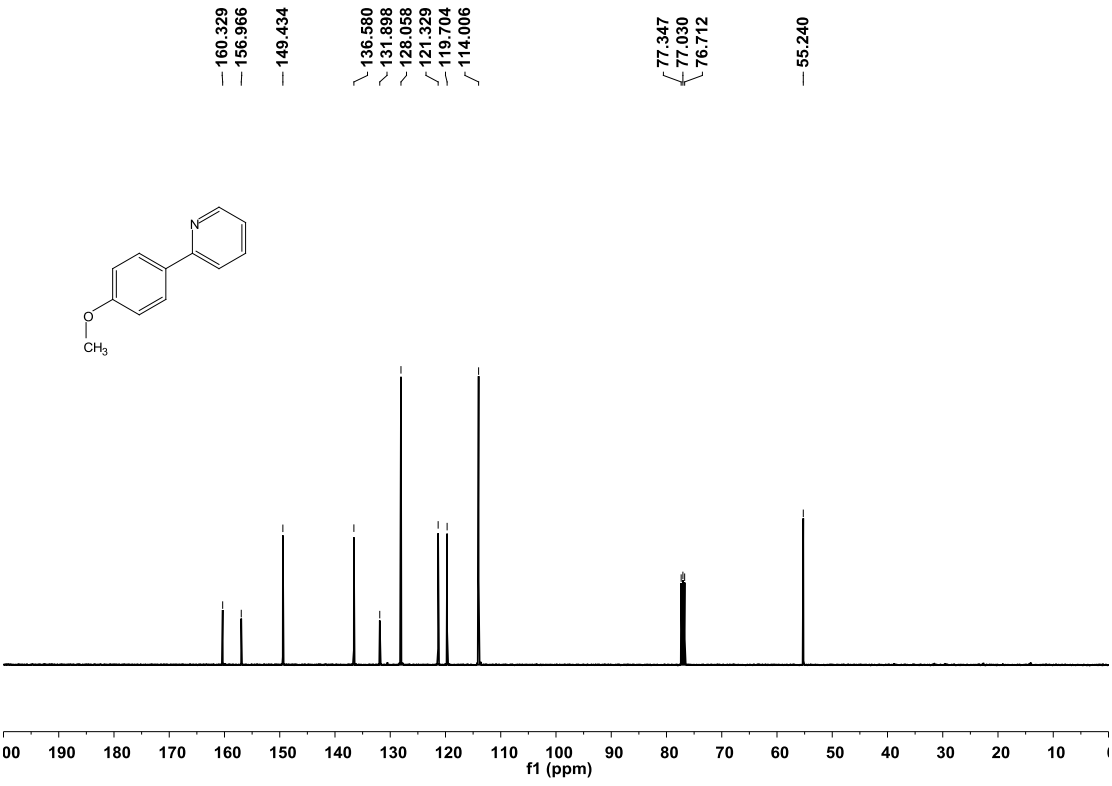
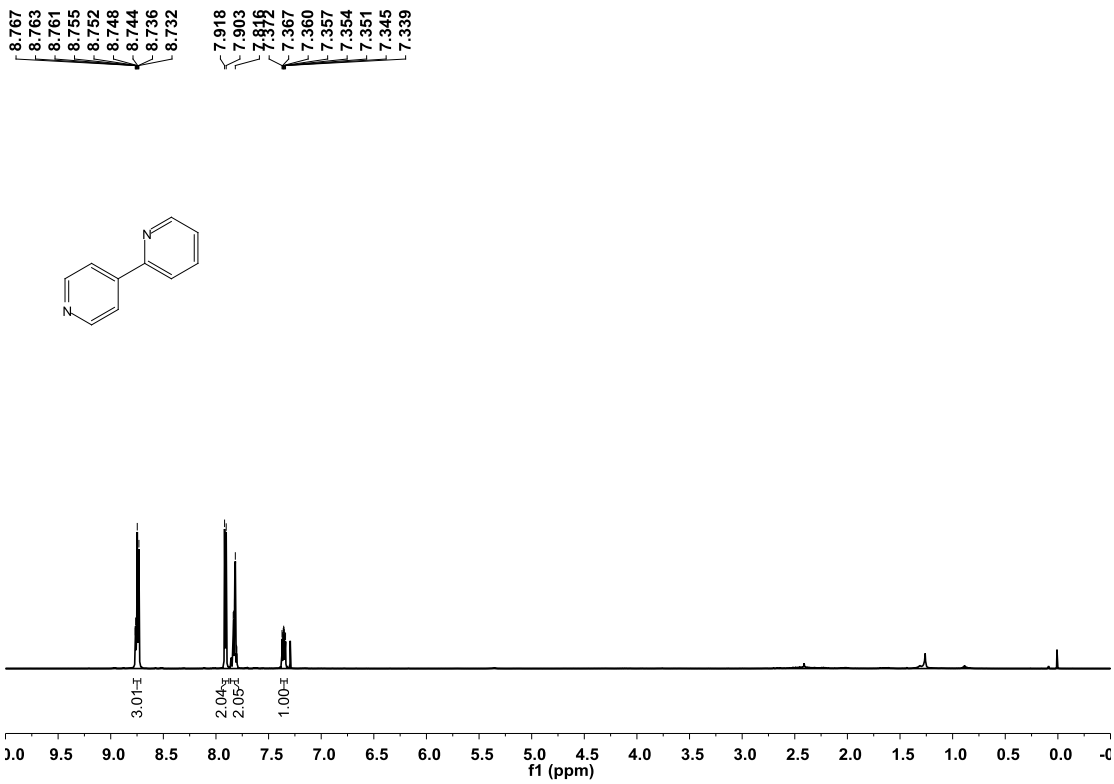


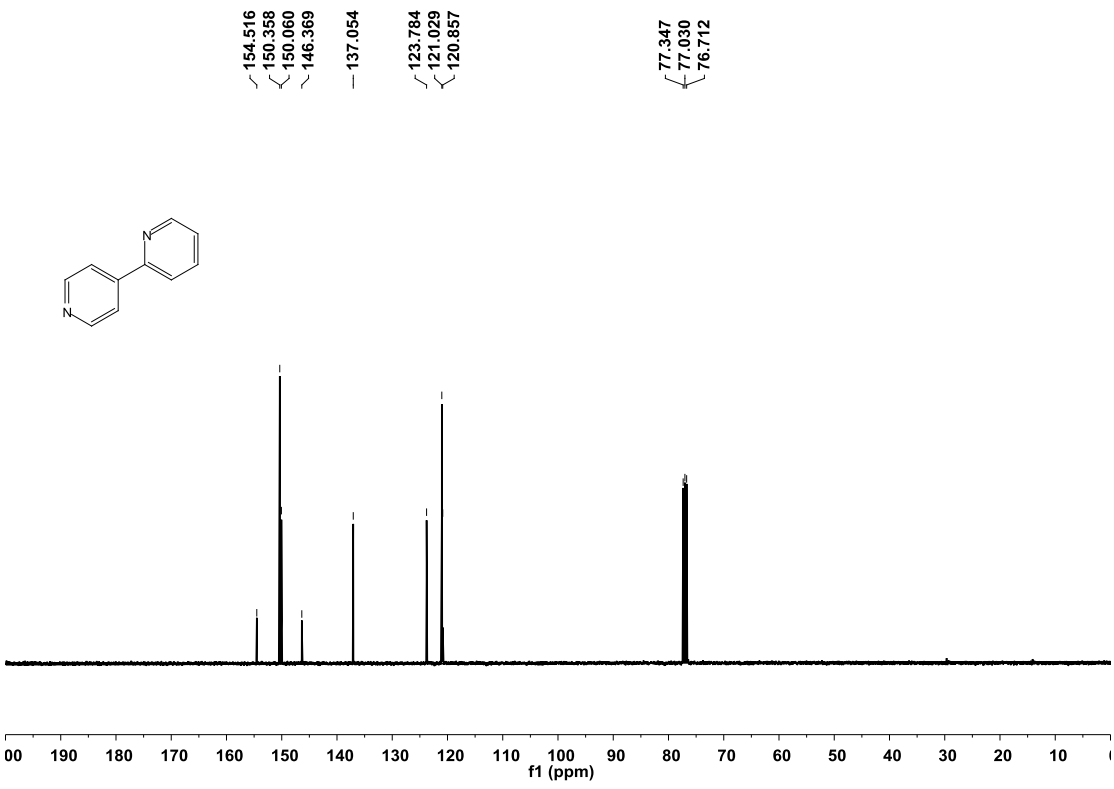
^{1}H NMR spectrum of 2-(4-methoxyphenyl)pyridine(3j)



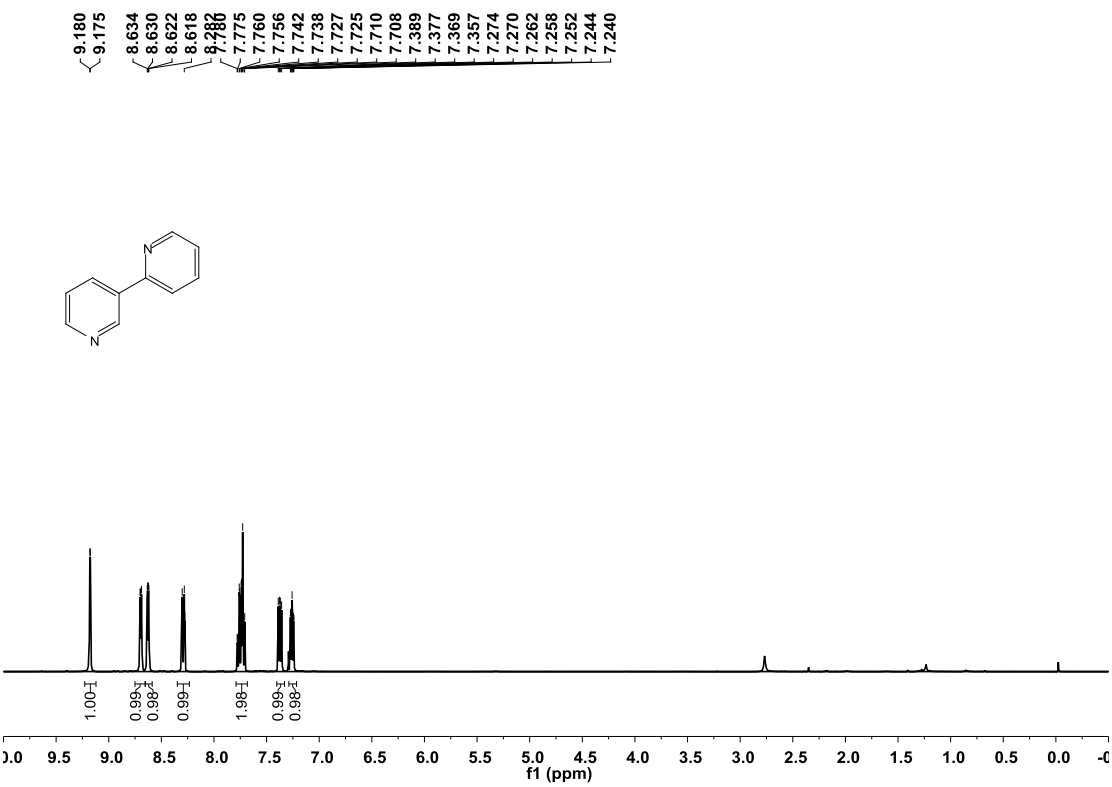
^{13}C NMR spectrum of 2-(4-methoxyphenyl)pyridine(3j)



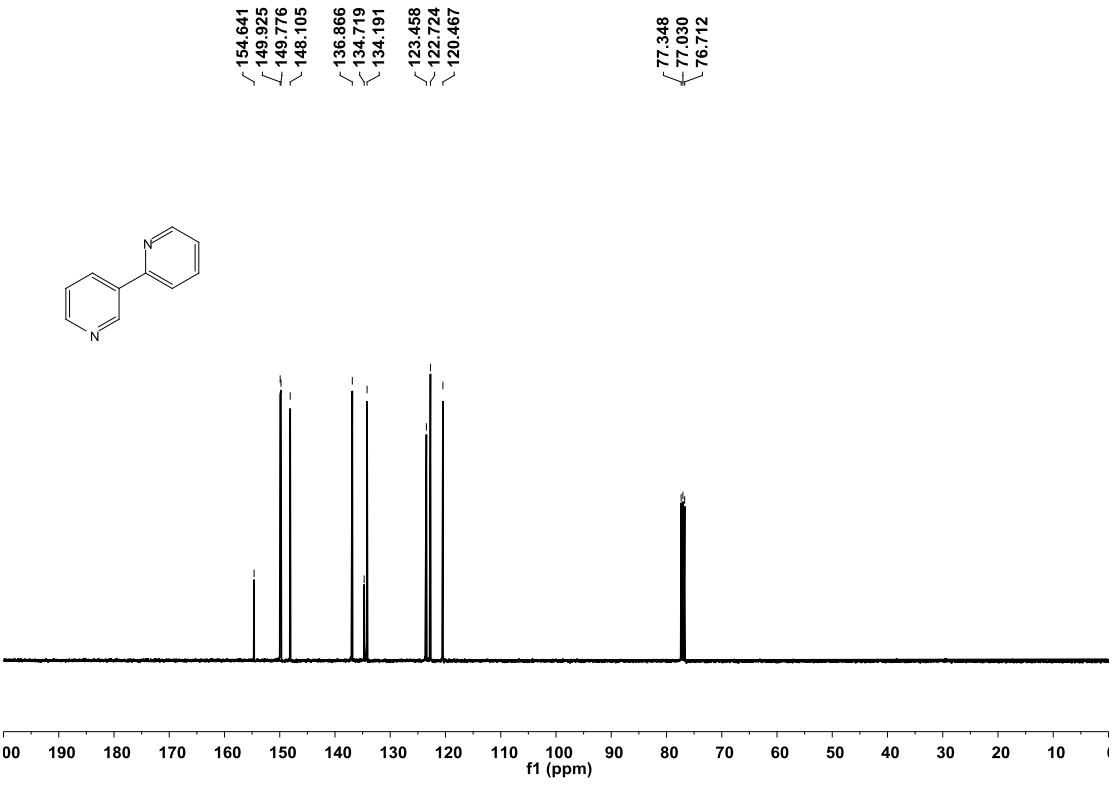
^{1}H NMR spectrum of 2,4'-bipyridine(3k)



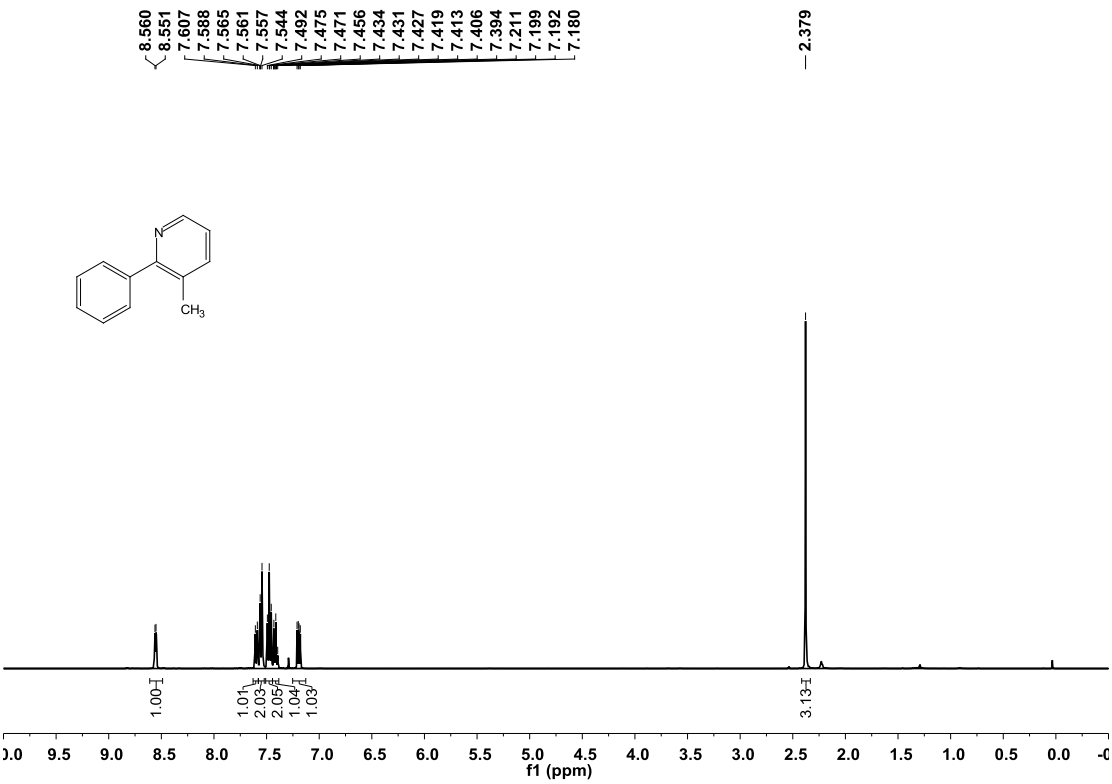
^{13}C NMR spectrum of 2,4'-bipyridine(3k)



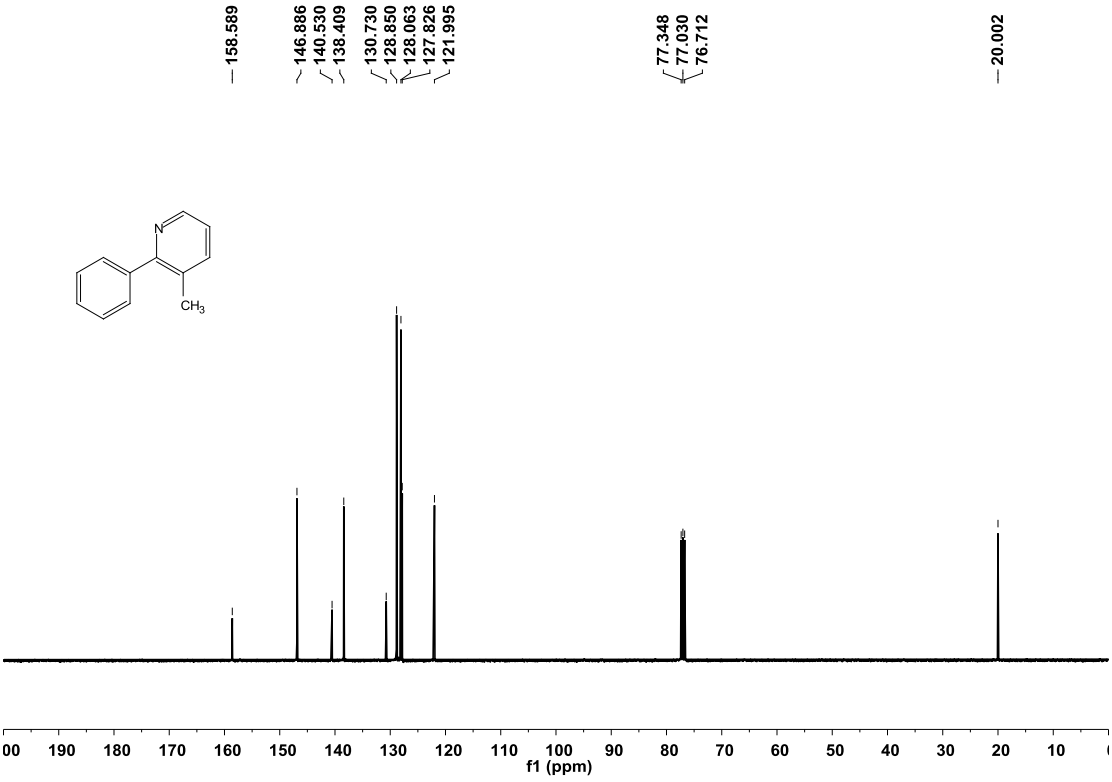
^{1}H NMR spectrum of 2,3'-bipyridine(3l)



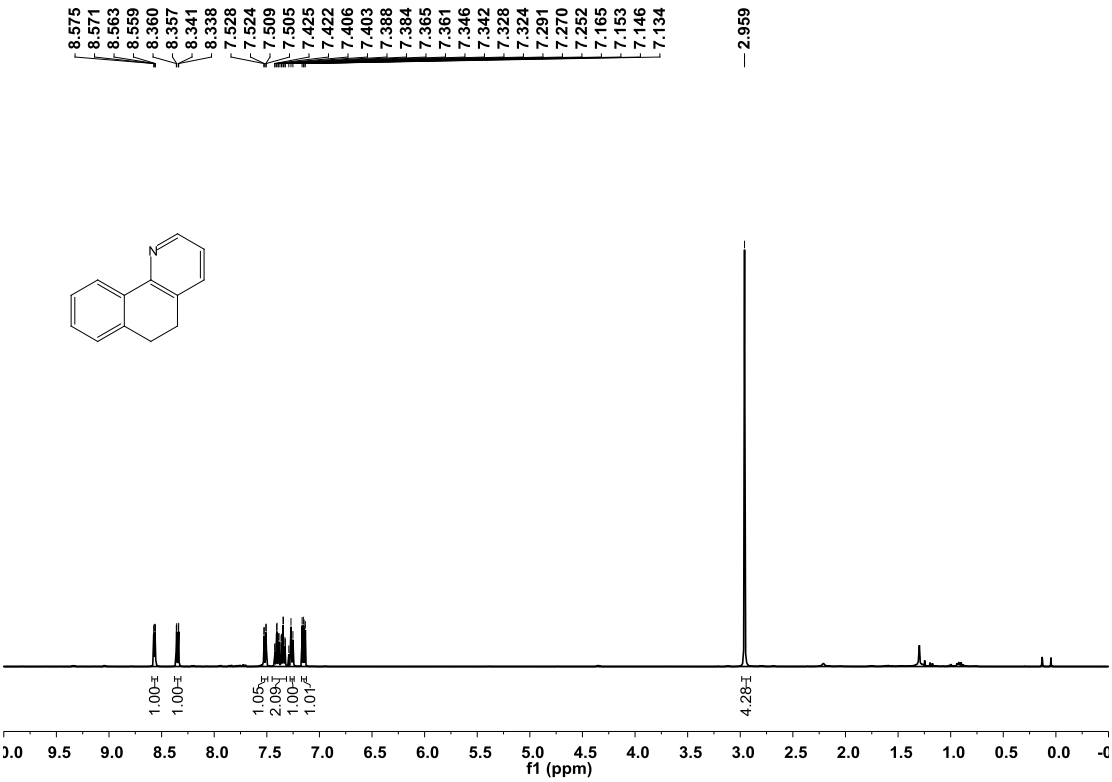
^{13}C NMR spectrum of 2,3'-bipyridine(3l)



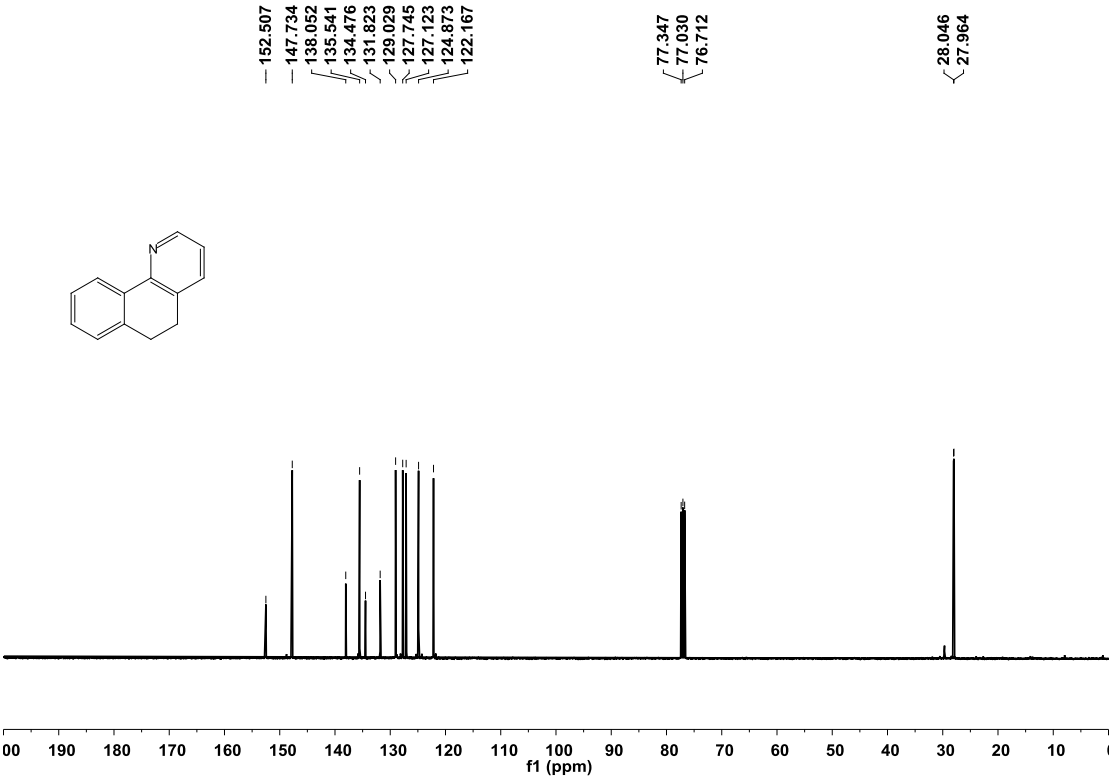
^{1}H NMR spectrum of 3-methyl-2-phenylpyridine(3m)



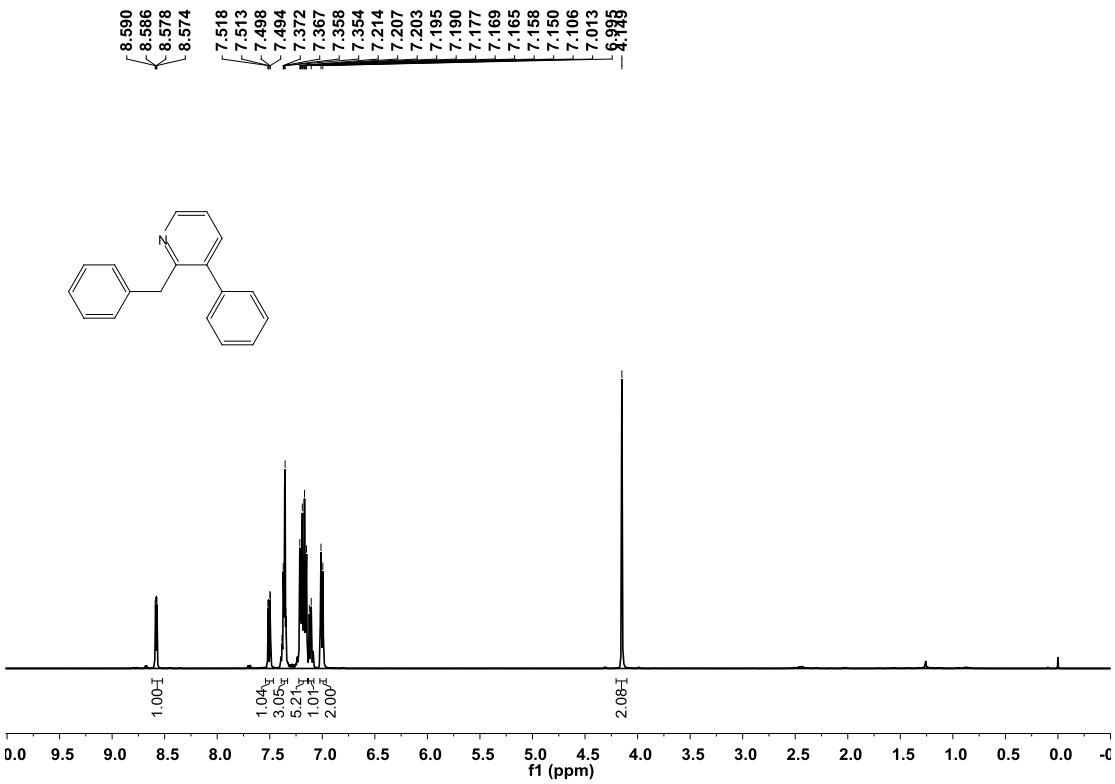
^{13}C NMR spectrum of 3-methyl-2-phenylpyridine(3m)



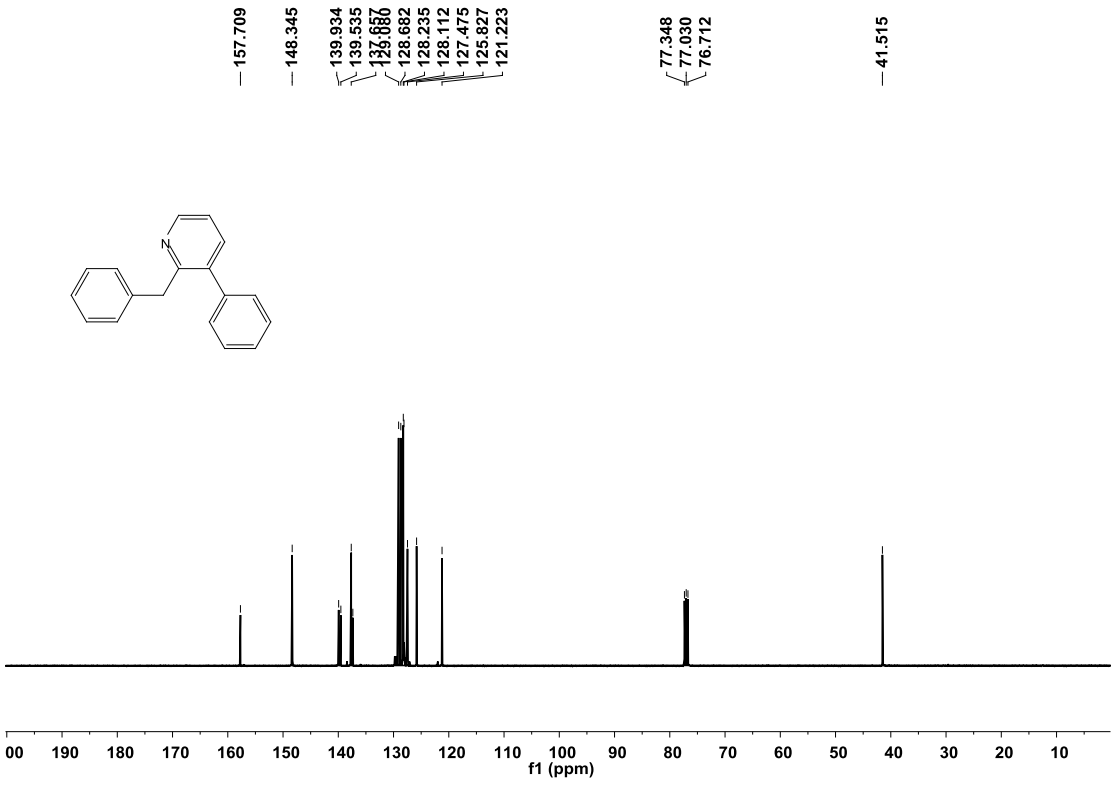
^{1}H NMR spectrum of 5,6-dihydrobenzo[h]quinoline(3n)



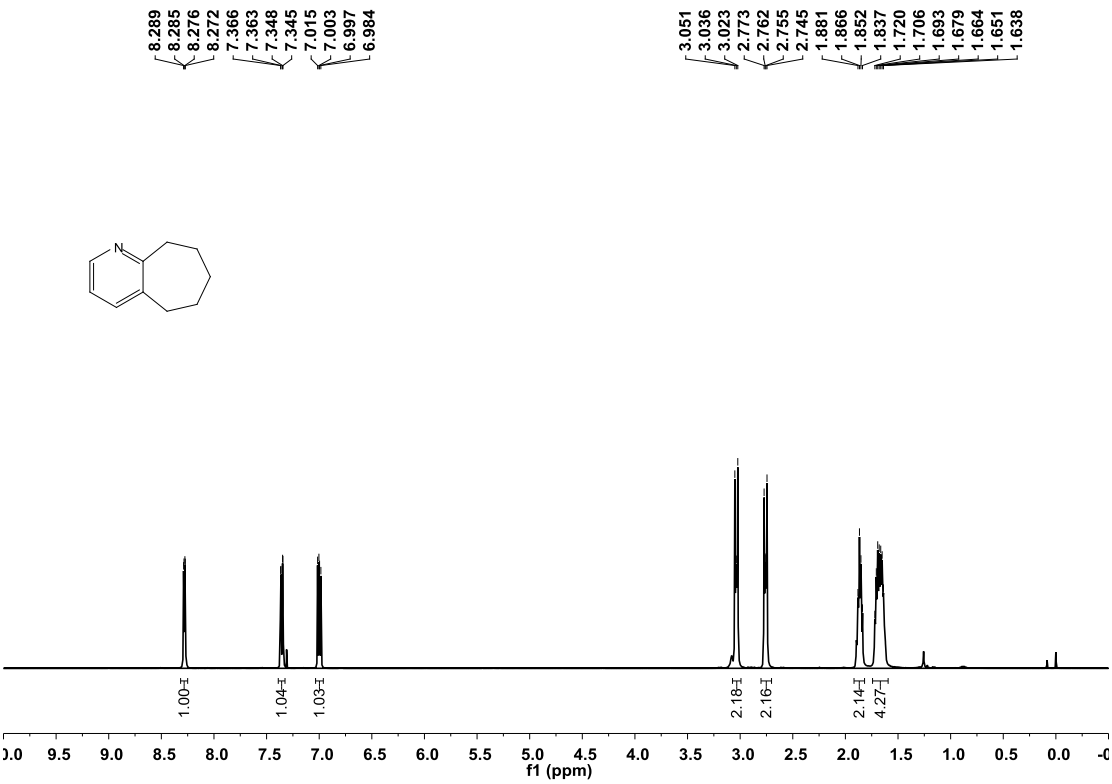
^{13}C NMR spectrum of 5,6-dihydrobenzo[h]quinoline(3n)



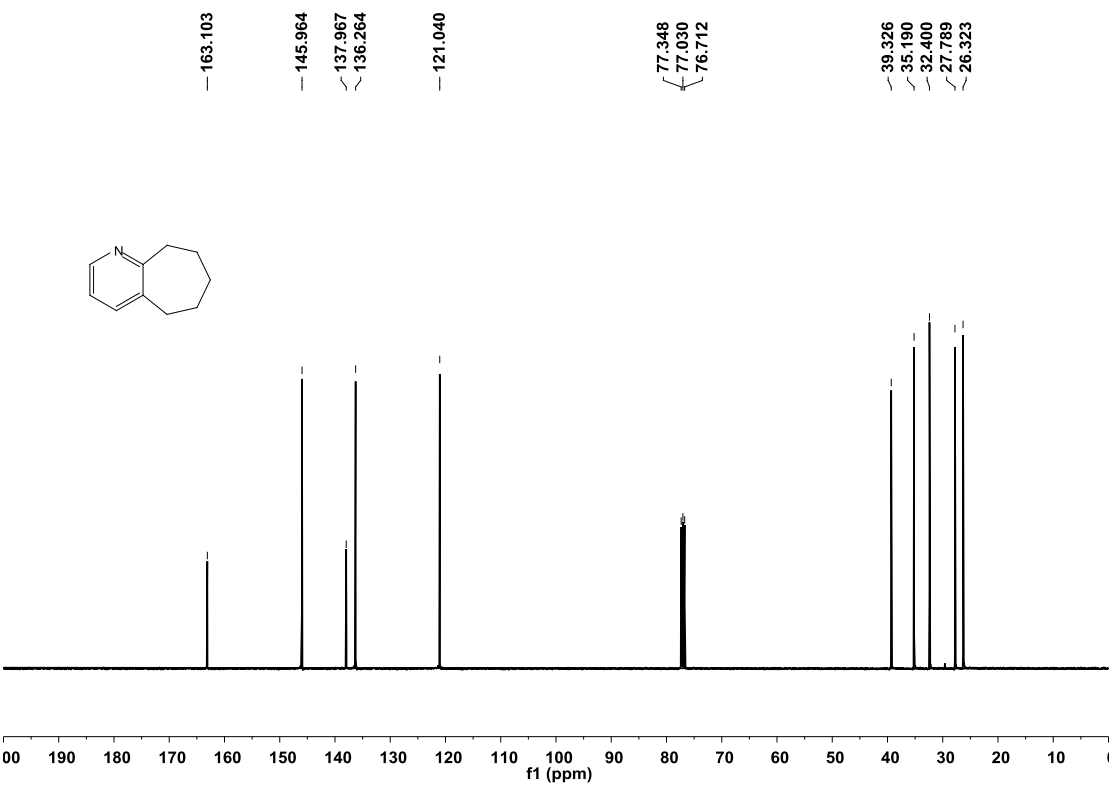
^{1}H NMR spectrum of 2-benzyl-3-phenylpyridine(3q)



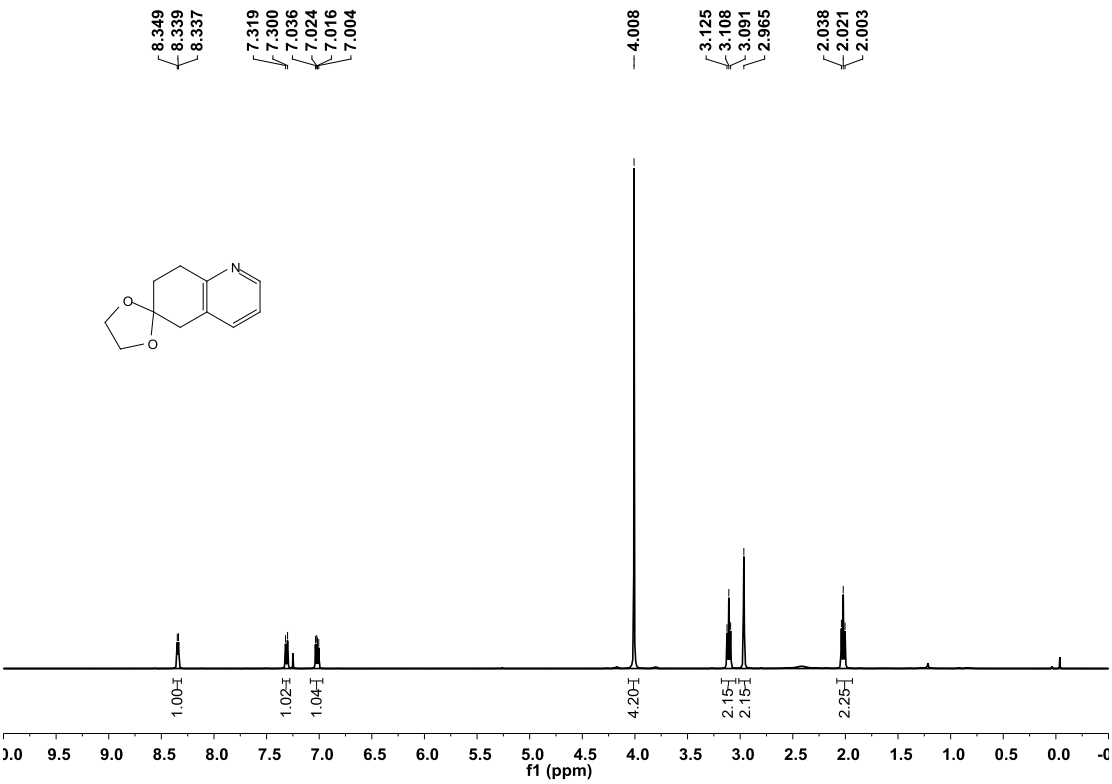
^{13}C NMR spectrum of 2-benzyl-3-phenylpyridine(3q)



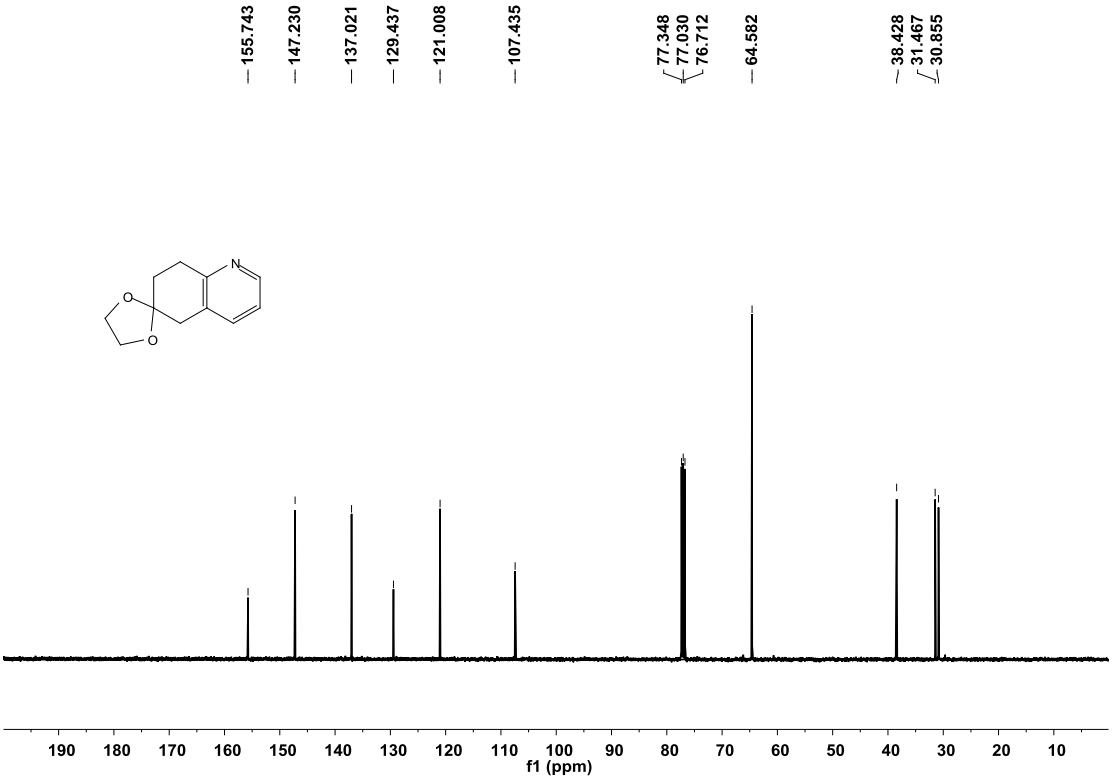
^{1}H NMR spectrum of 6,7,8,9-tetrahydro-5H-cyclohepta[b]pyridine(3r)



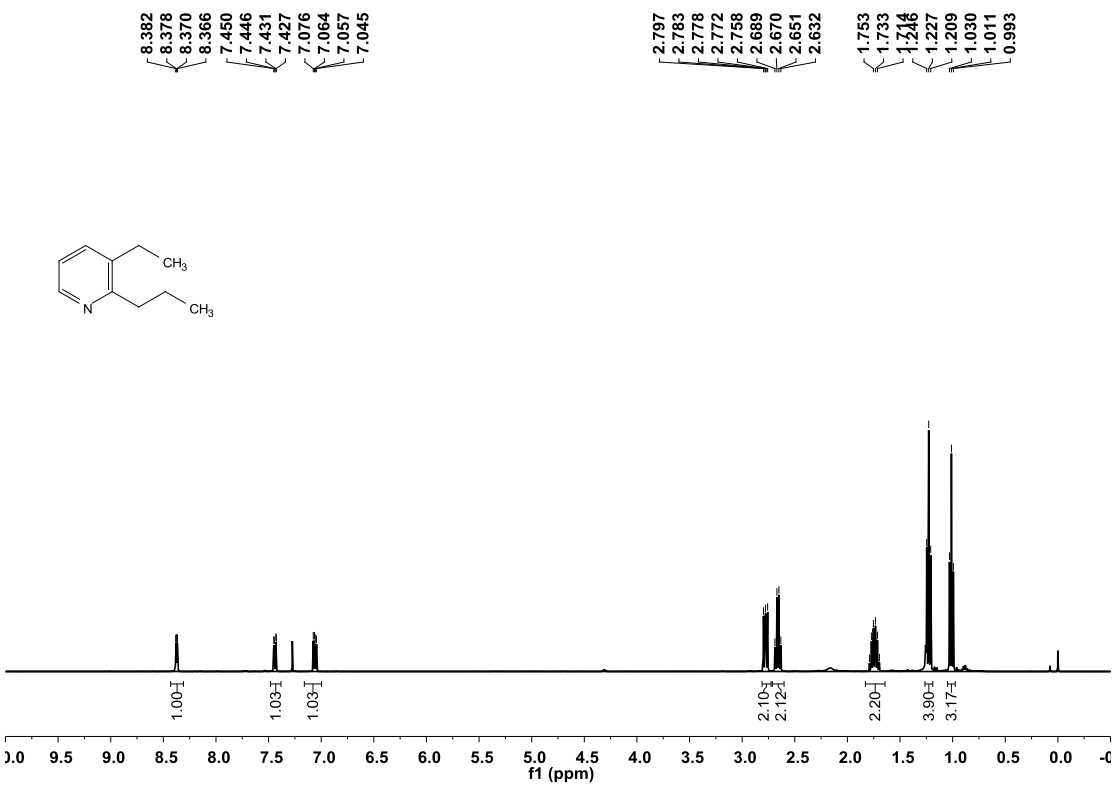
^{13}C NMR spectrum of 6,7,8,9-tetrahydro-5H-cyclohepta[b]pyridine(3r)



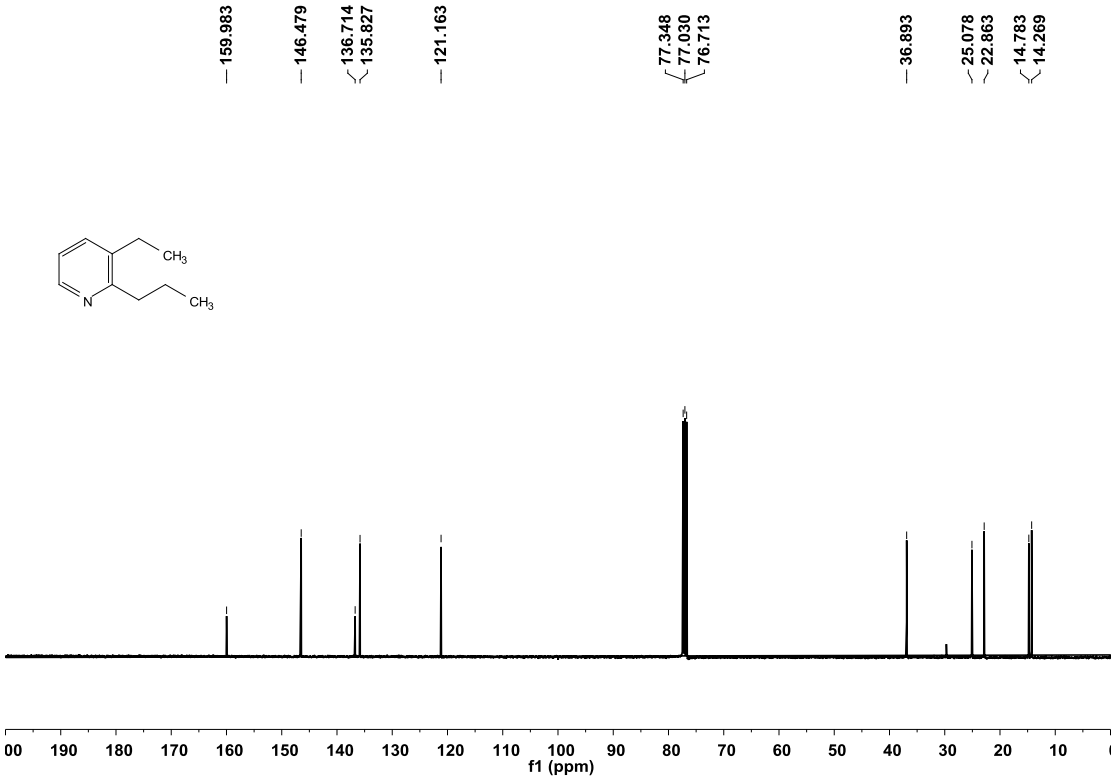
^{1}H NMR spectrum of 7',8'-dihydro-5'H-spiro[[1,3]dioxolane-2,6'-quinoline](3s)



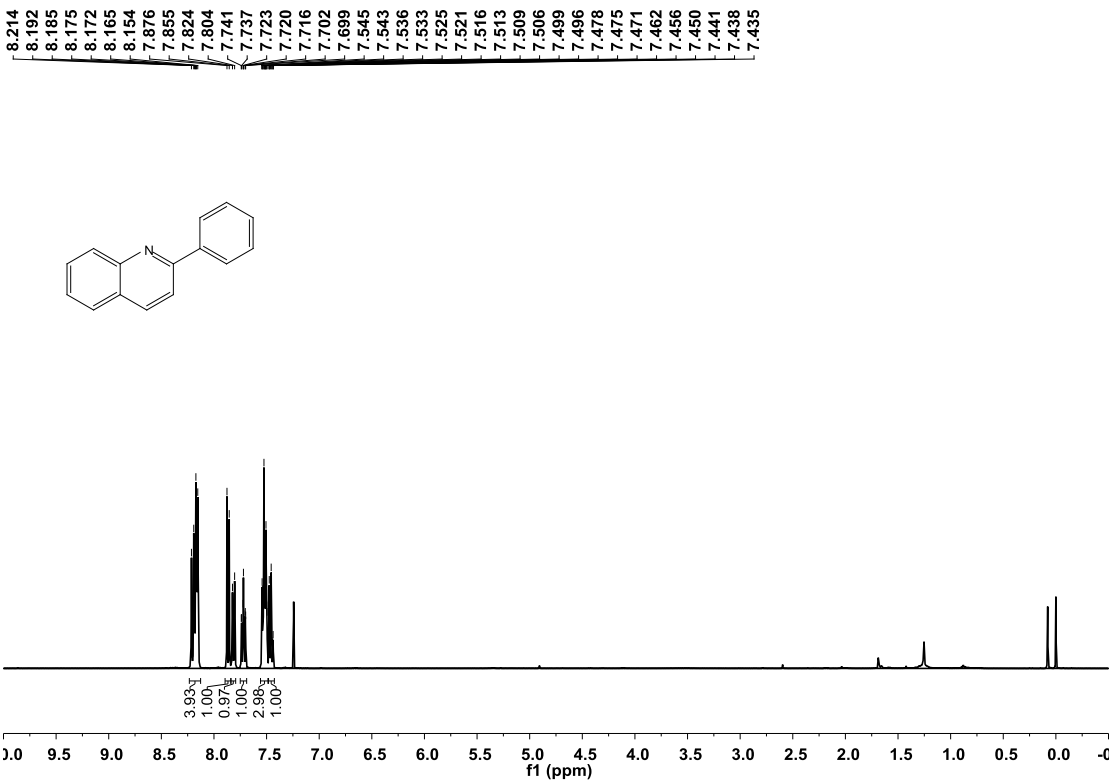
^{13}C NMR spectrum of 7',8'-dihydro-5'H-spiro[[1,3]dioxolane-2,6'-quinoline](3s)



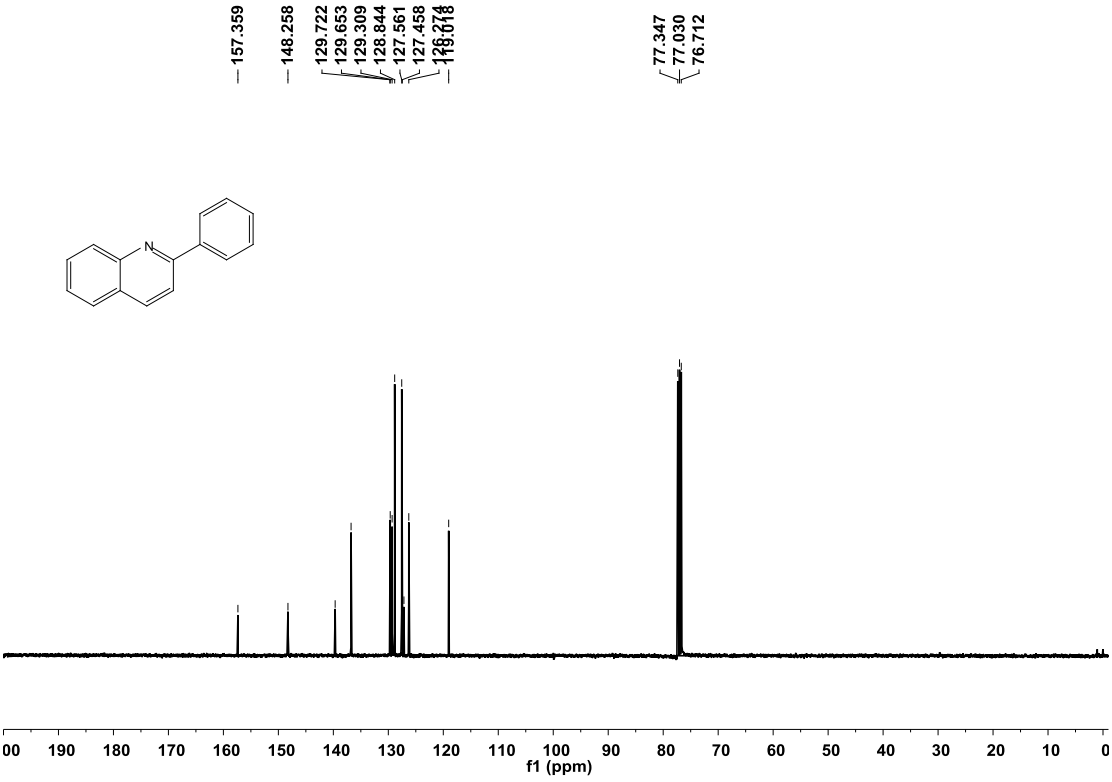
^{1}H NMR spectrum of 3-ethyl-2-propylpyridine(3t)



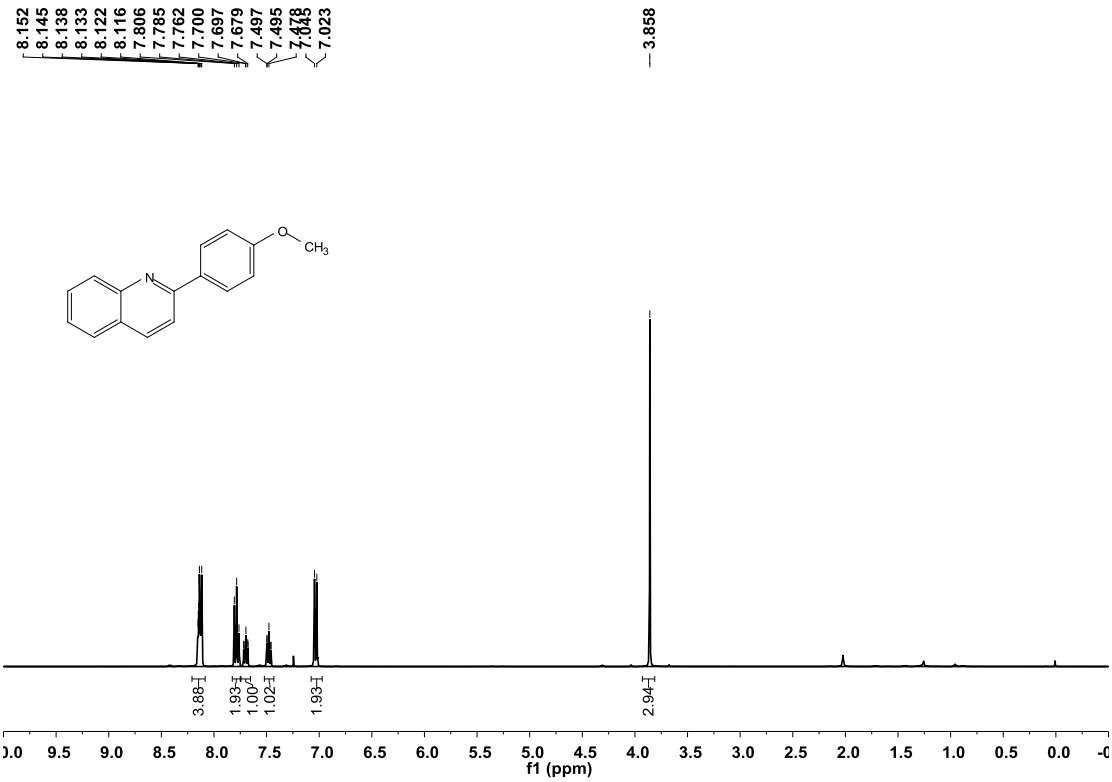
^{13}C NMR spectrum of 3-ethyl-2-propylpyridine(3t)



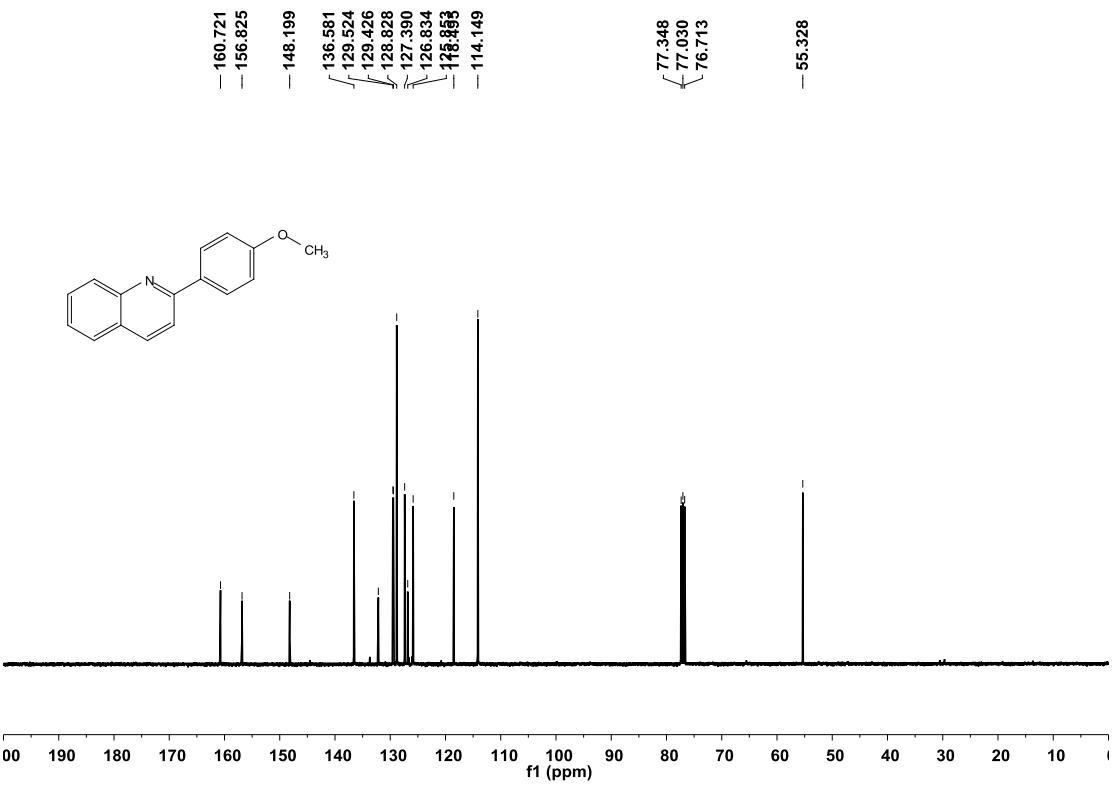
^{1}H NMR spectrum of 2-phenylquinoline(4a)



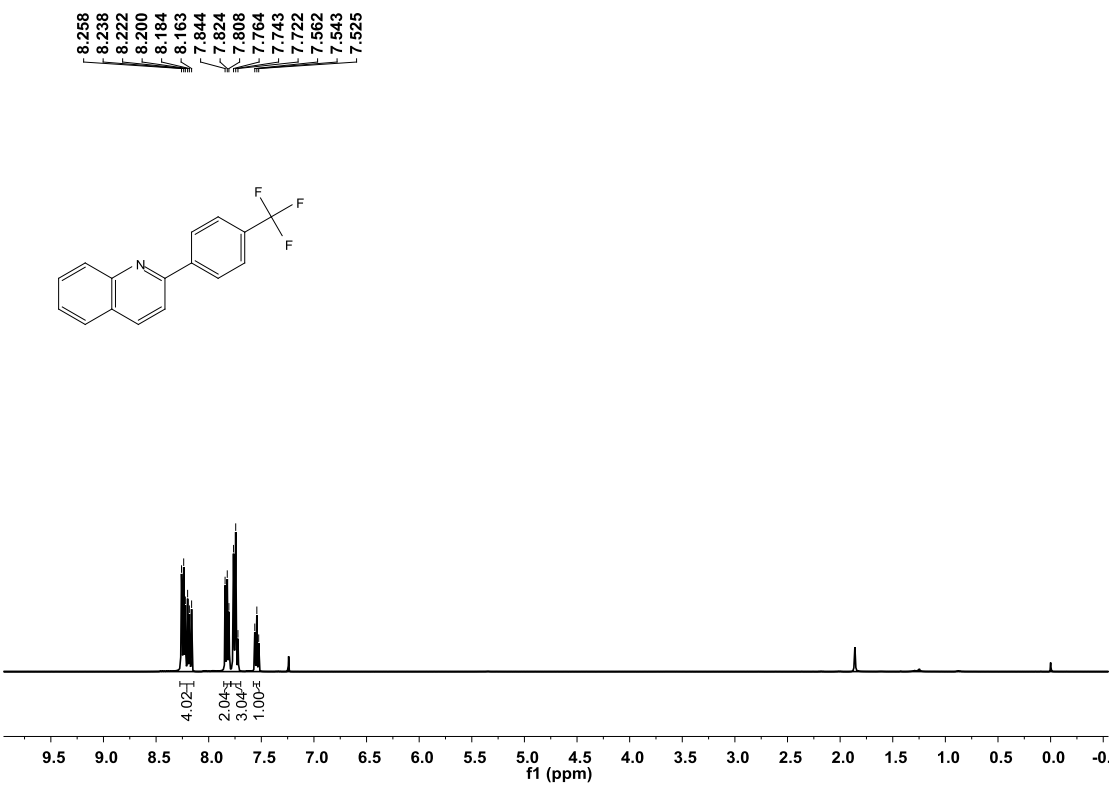
^{13}C NMR spectrum of 2-phenylquinoline(4a)



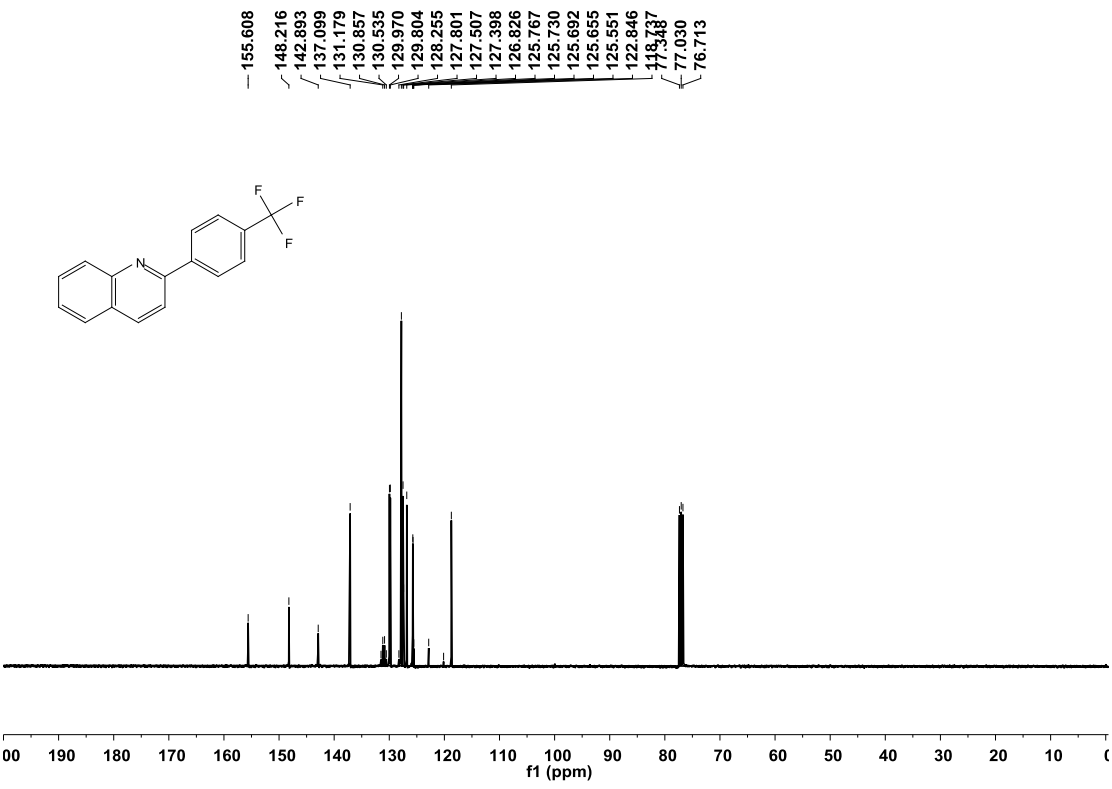
^{1}H NMR spectrum of 2-(4-methoxyphenyl)quinoline(4b)



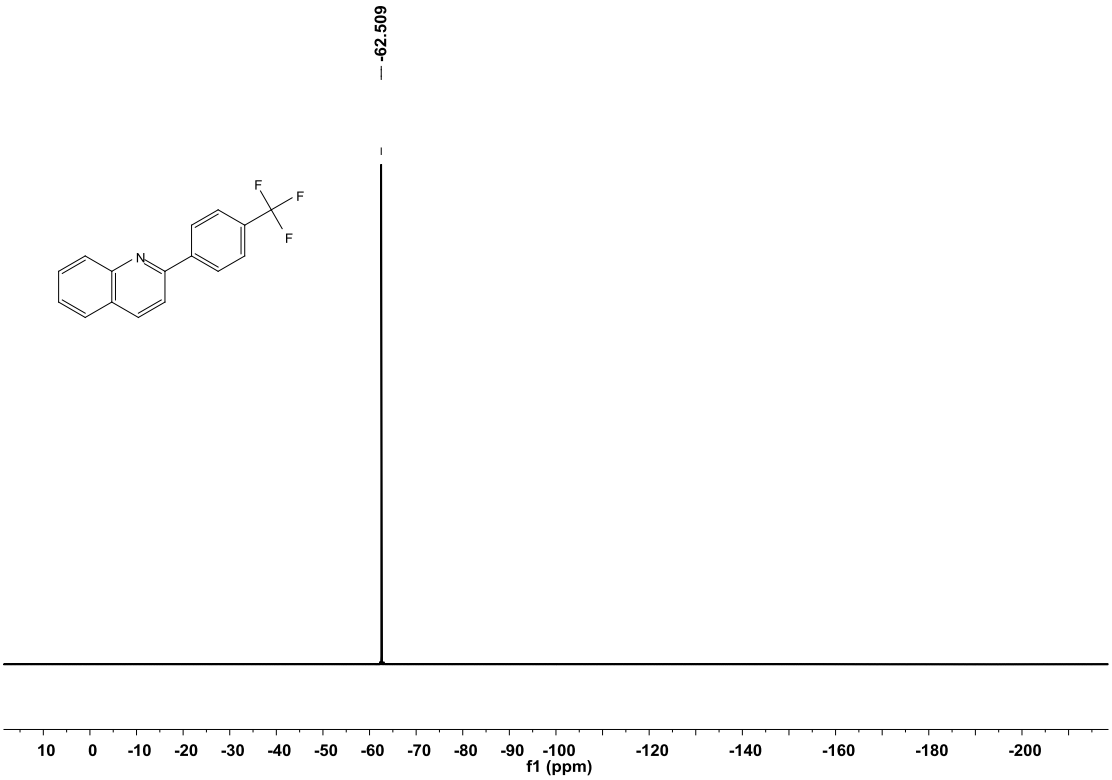
^{13}C NMR spectrum of 2-(4-methoxyphenyl)quinoline(4b)



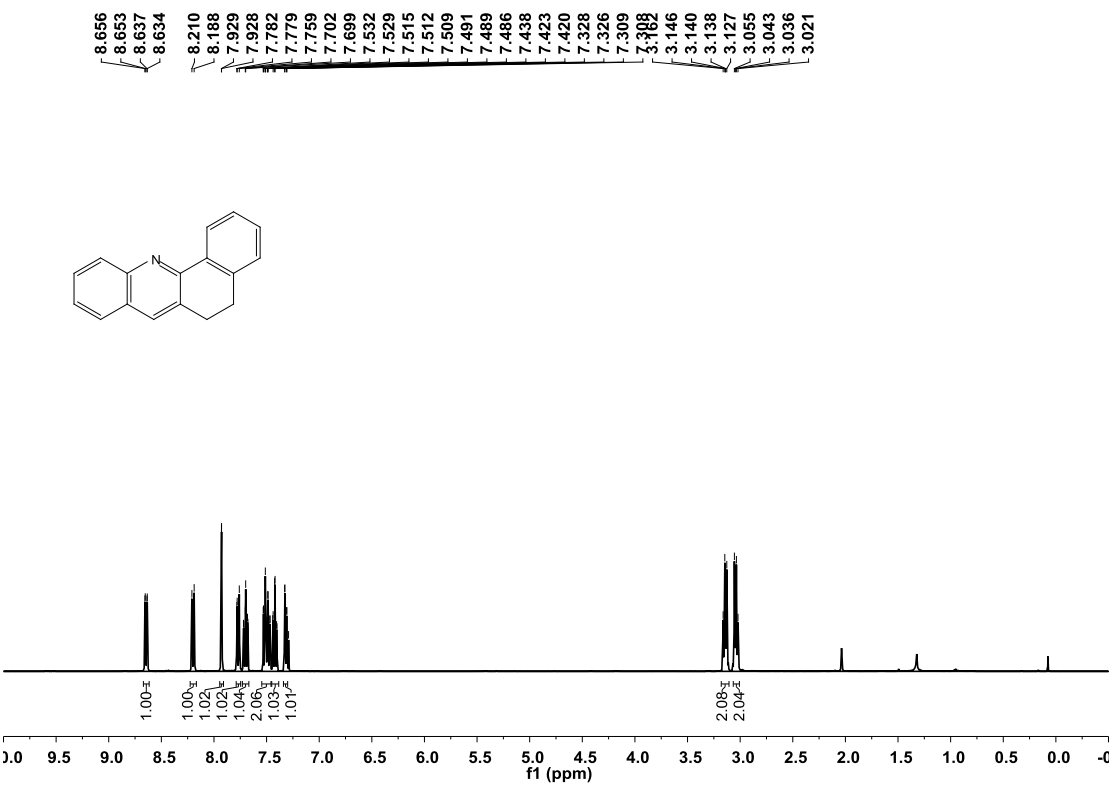
^{1}H NMR spectrum of 2-(4-(trifluoromethyl)phenyl)quinoline(4c)



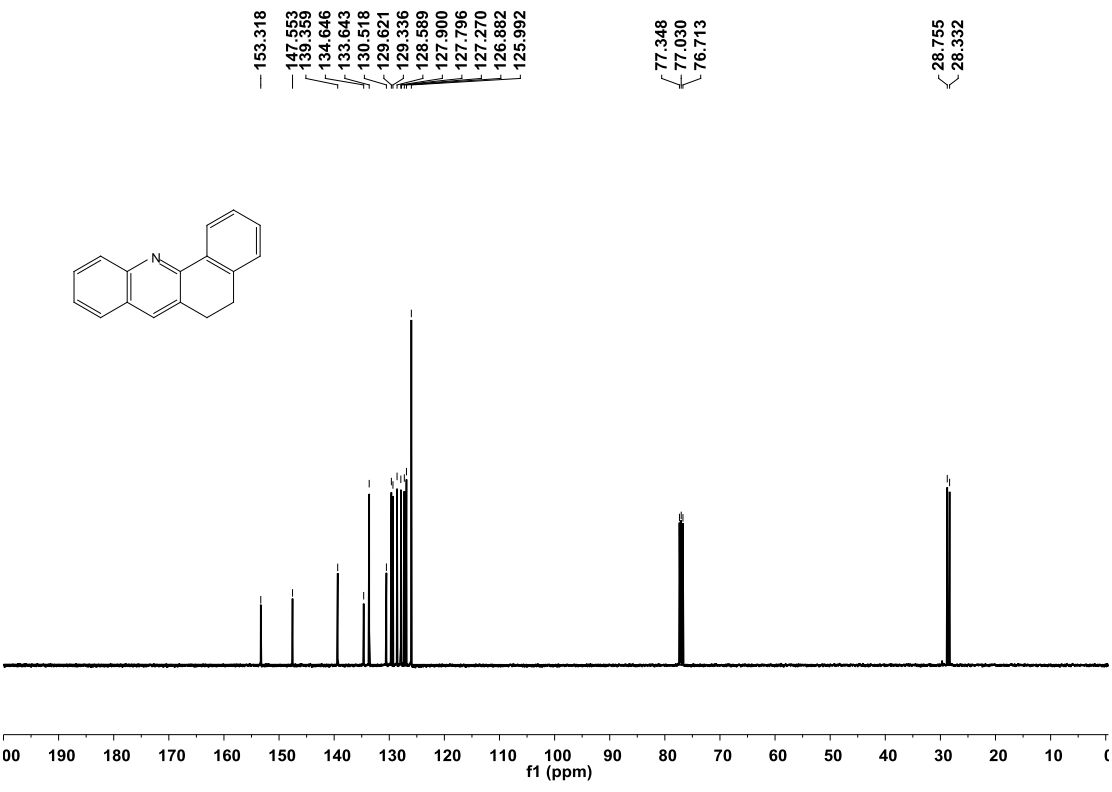
^{13}C NMR spectrum of 2-(4-(trifluoromethyl)phenyl)quinoline(4c)



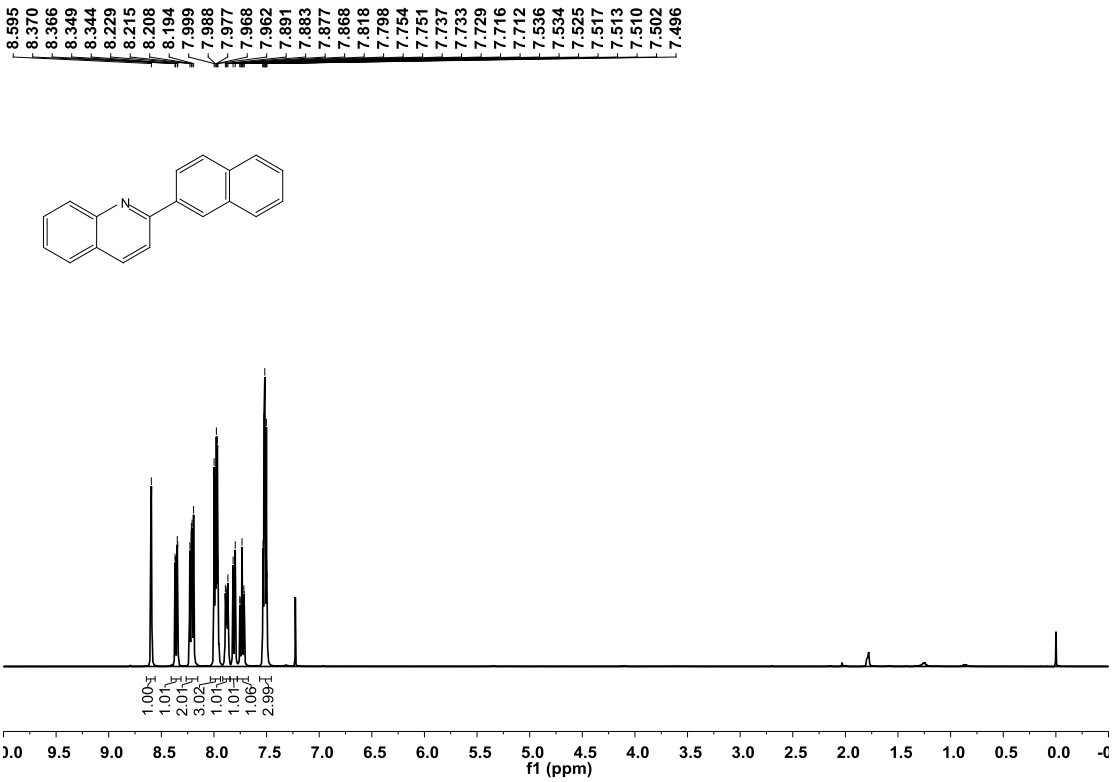
^{19}F NMR spectrum of 2-(4-(trifluoromethyl)phenyl)quinoline(4c)



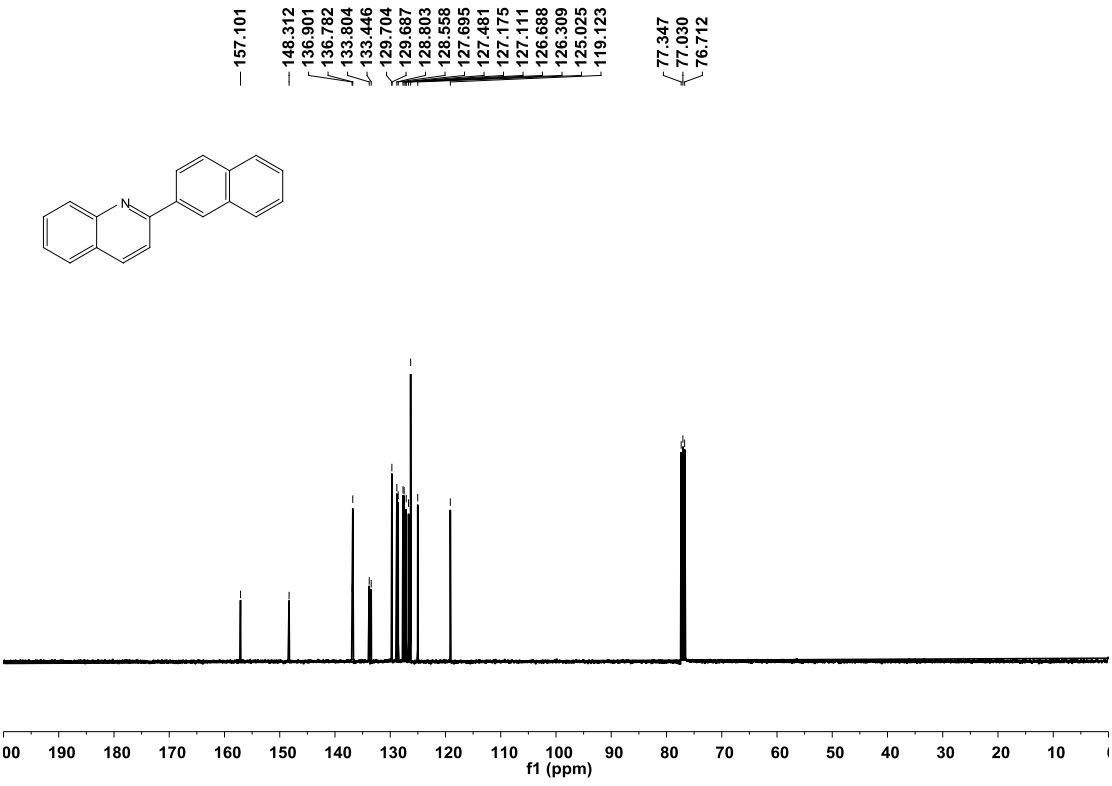
^{1}H NMR spectrum of 5,6-dihydrobenzo[c]acridine(4d)



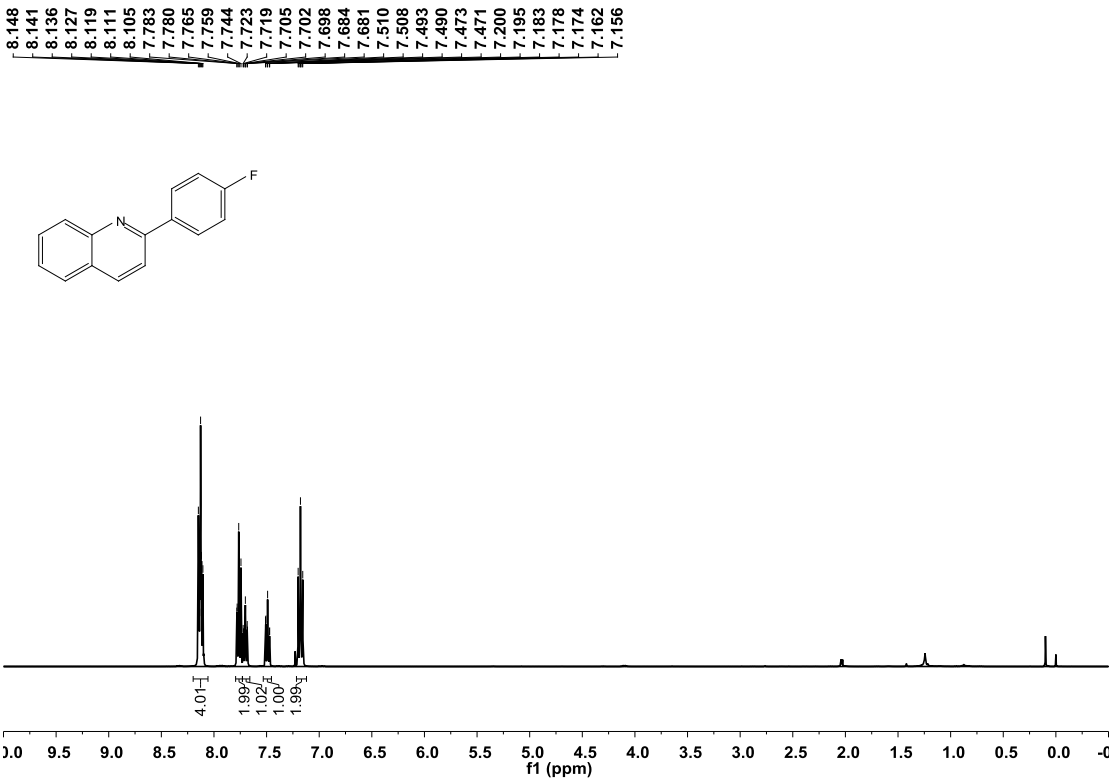
^{13}C NMR spectrum of 5,6-dihydrobenzo[c]acridine(4d)



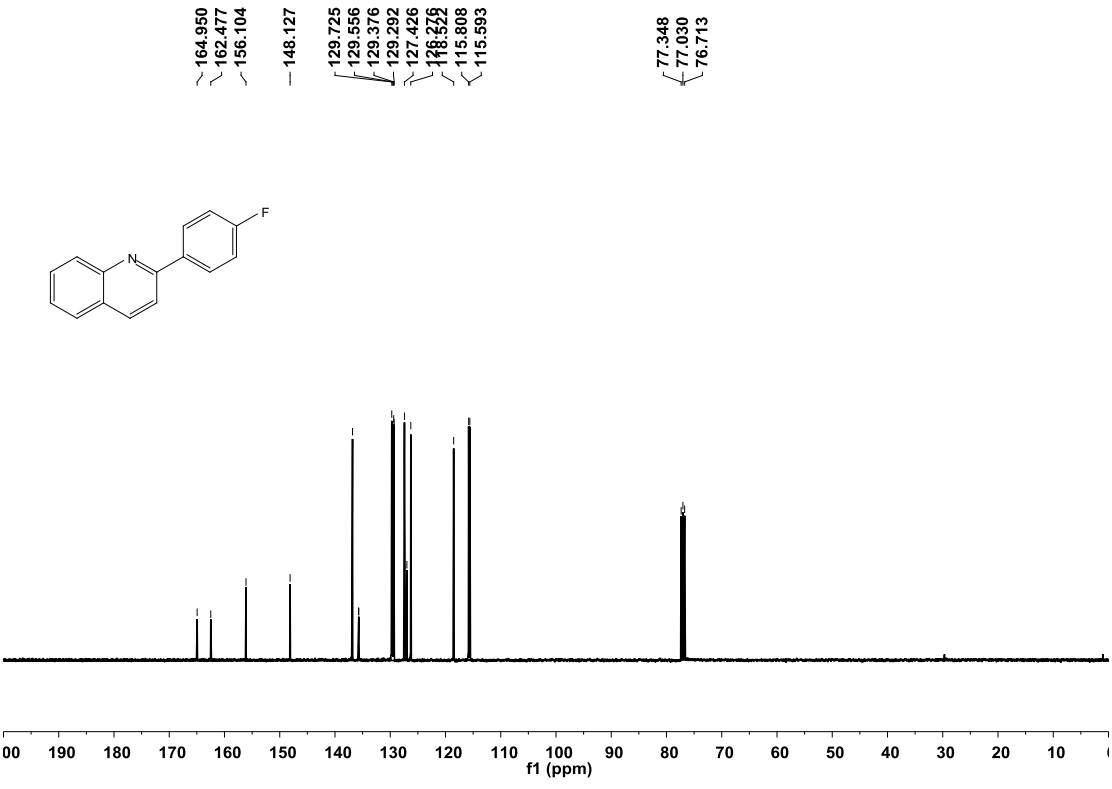
^{1}H NMR spectrum of 2-(naphthalen-2-yl)quinoline(4e)



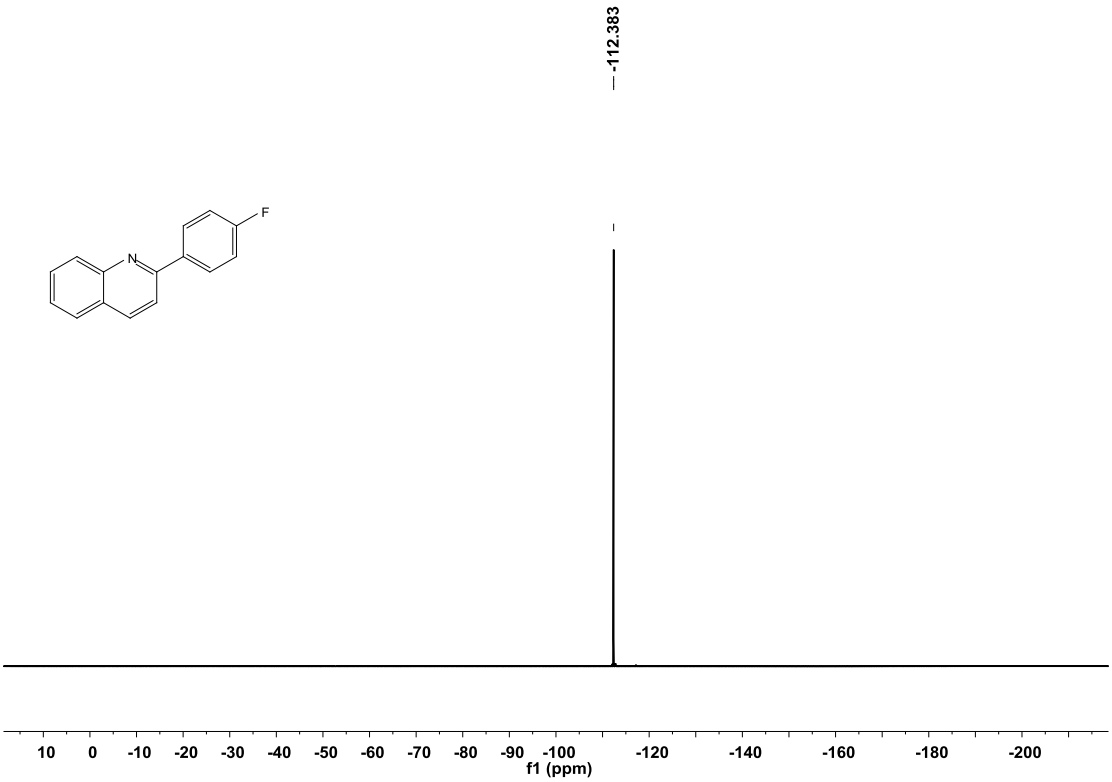
^{13}C NMR spectrum of 2-(naphthalen-2-yl)quinoline(4e)



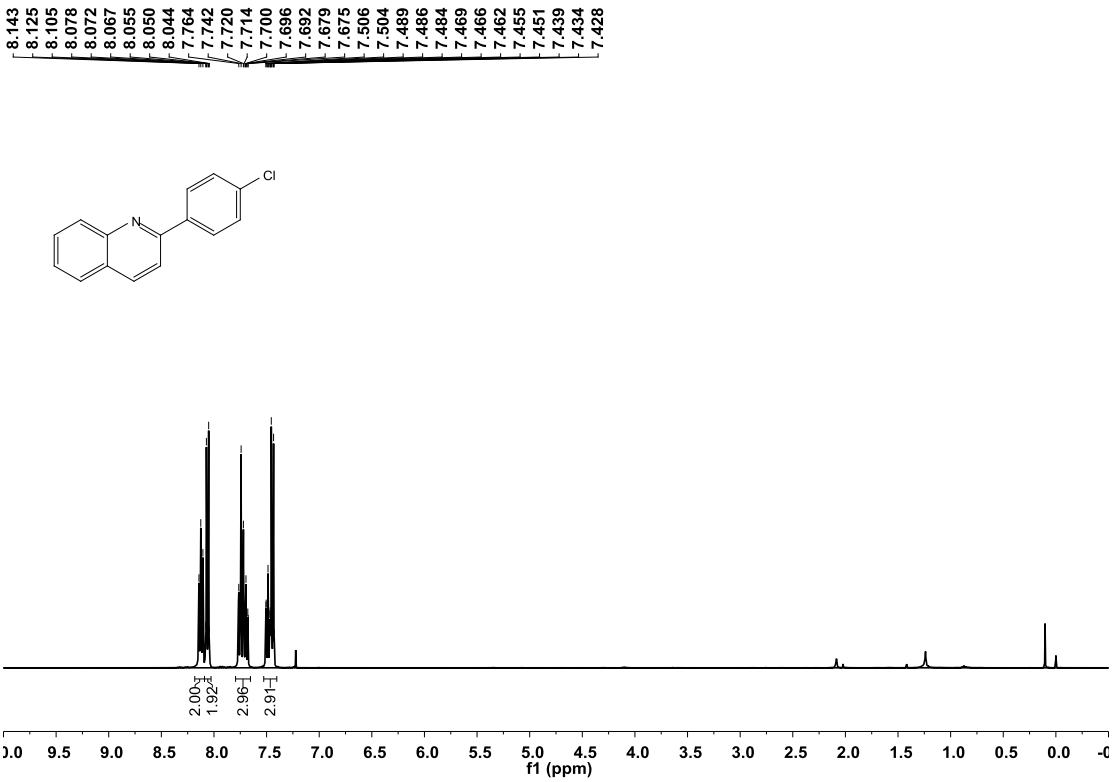
^{1}H NMR spectrum of 2-(4-fluorophenyl)quinoline(4f)



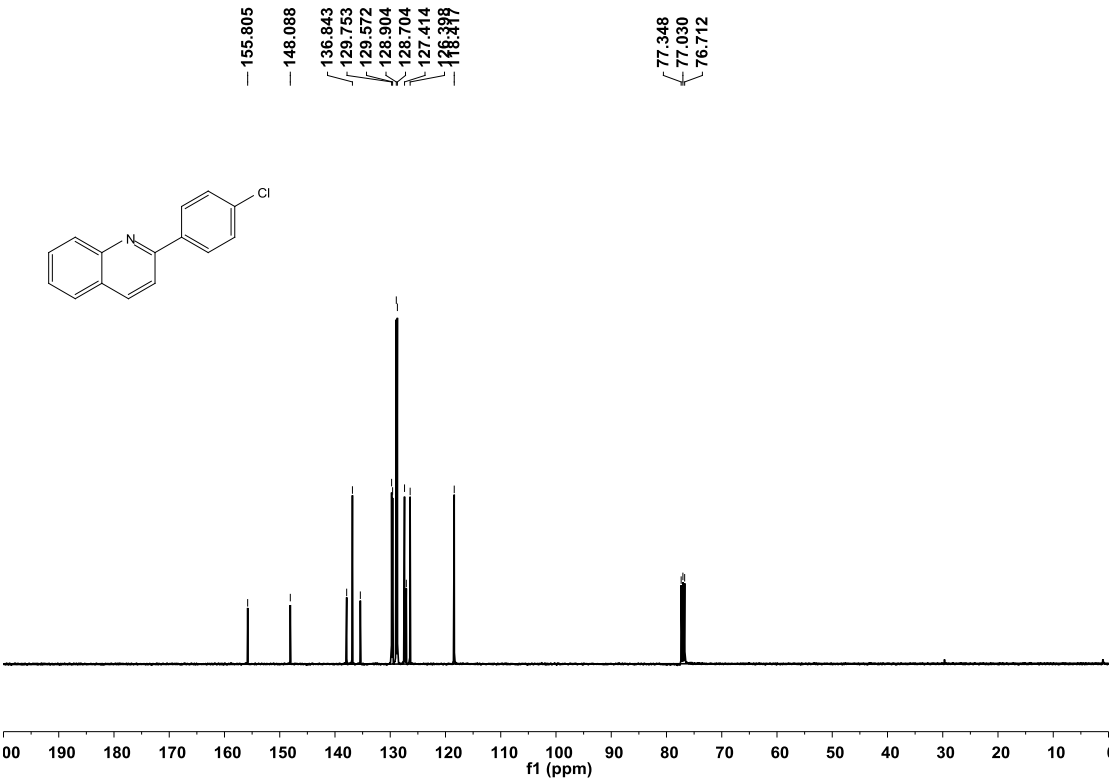
^{13}C NMR spectrum of 2-(4-fluorophenyl)quinoline(4f)



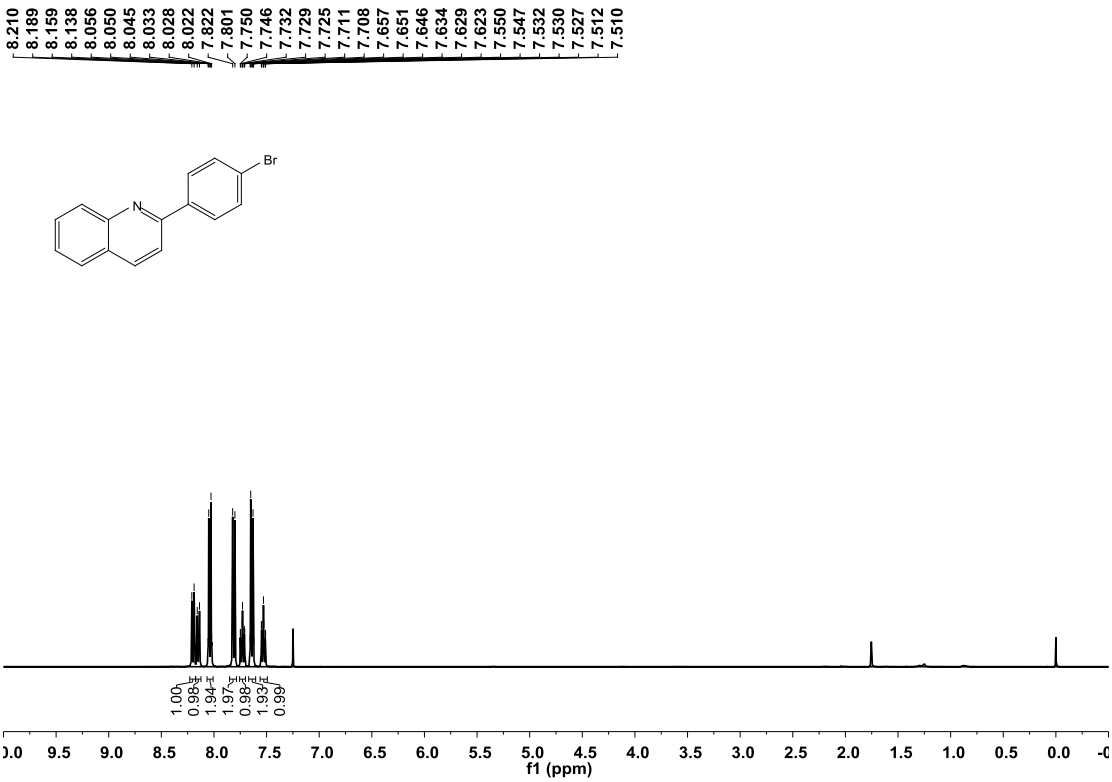
^{19}F NMR spectrum of 2-(4-fluorophenyl)quinoline(4f)



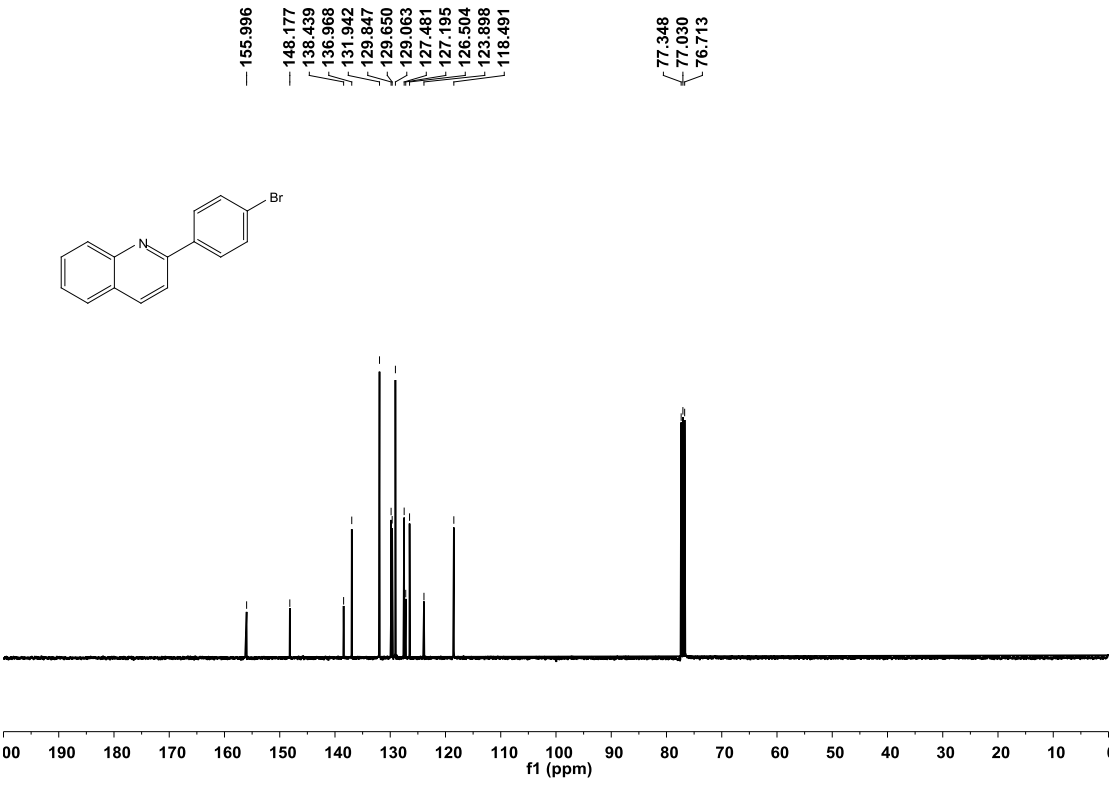
^{1}H NMR spectrum of 2-(4-chlorophenyl)quinoline(4g)



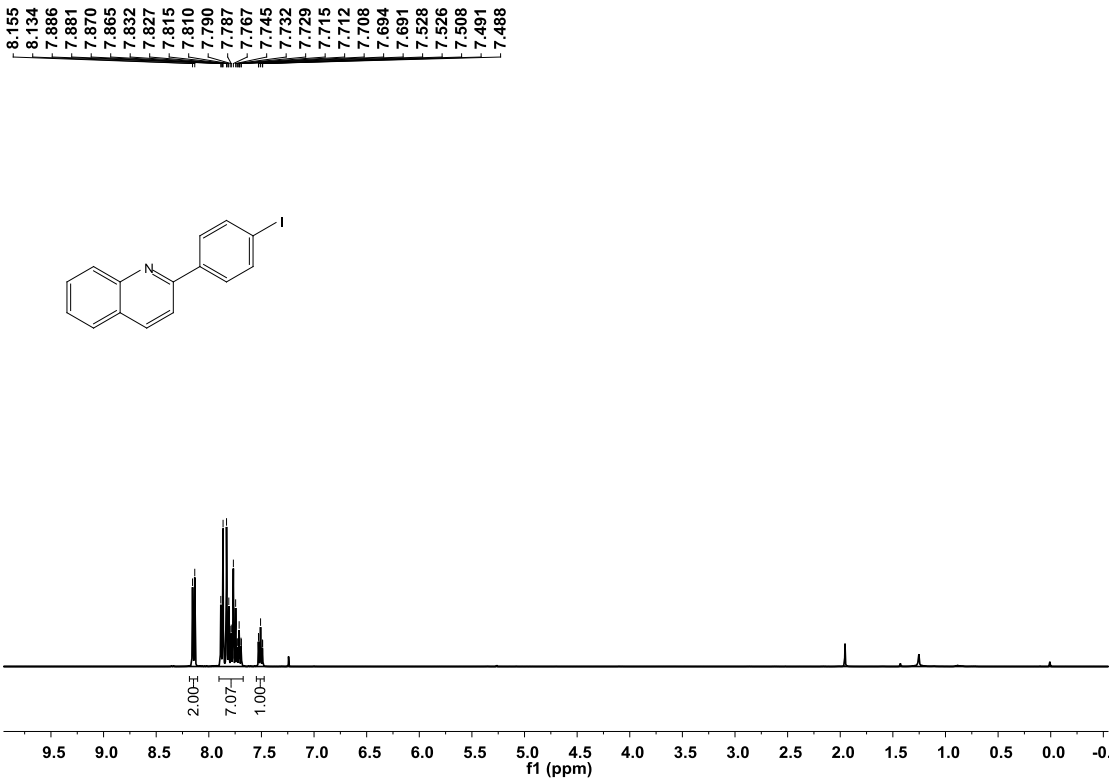
^{13}C NMR spectrum of 2-(4-chlorophenyl)quinoline(4g)



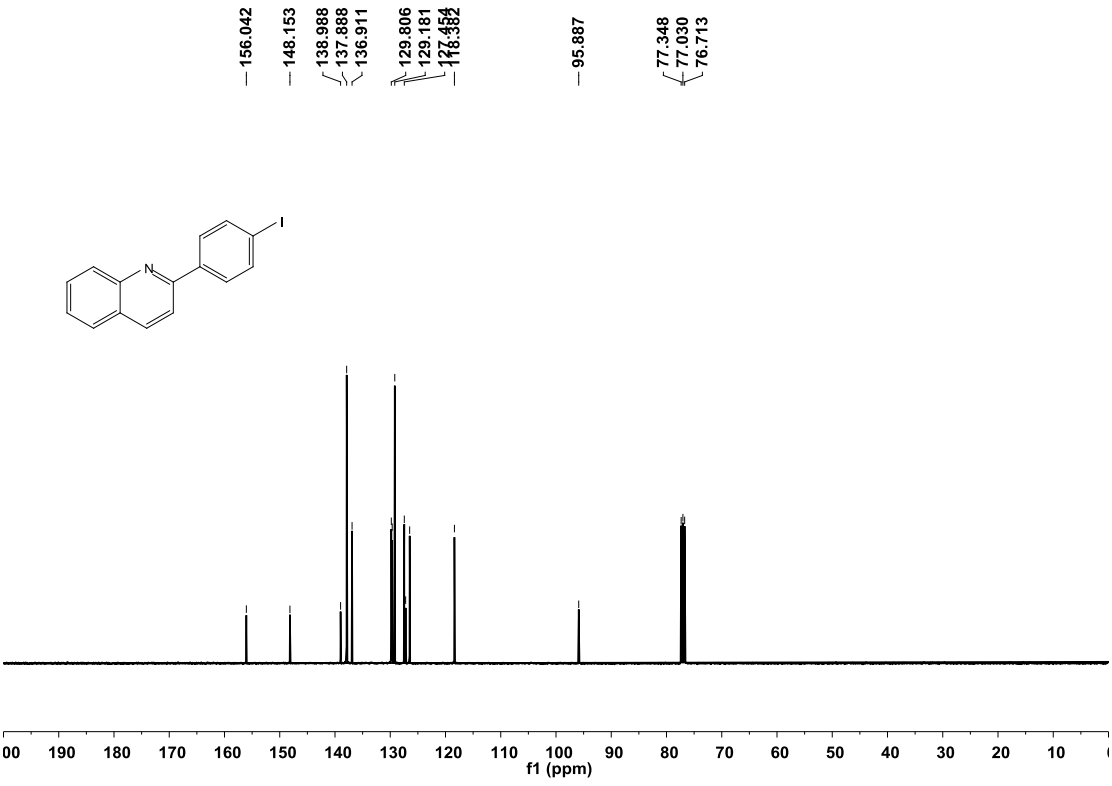
^{1}H NMR spectrum of 2-(4-bromophenyl)quinoline(4h)



^{13}C NMR spectrum of 2-(4-bromophenyl)quinoline(4h)



^{1}H NMR spectrum of 2-(4-iodophenyl)quinoline(4i)



^{13}C NMR spectrum of 2-(4-iodophenyl)quinoline(4i)