

**Acetylene-driven superbases-mediated self-organization  
of (het)arylpyridines from (het)aromatic nitriles**

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### General information.

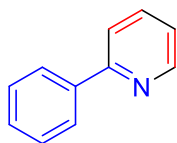
$^1\text{H}$  (400 MHz),  $^{13}\text{C}$  (101 MHz) and  $^{15}\text{N}$  (41 MHz) NMR spectra were recorded on a Bruker AV400 instrument in  $\text{CDCl}_3$ . The  $^1\text{H}$  and  $^{13}\text{C}$  chemical shifts ( $\delta$ ) were referenced to  $\text{CDCl}_3$  (7.27 ppm and 77.0 respectively). The values of the  $\delta^{15}\text{N}$  were measured through the 2D  $^1\text{H}$ - $^{15}\text{N}$  HMBC experiment and were referenced to  $\text{CH}_3\text{NO}_2$  (0.0 ppm). Coupling constants ( $J$ ) in hertz (Hz) were measured from one-dimensional spectra and multiplicities were abbreviated as following: s (singlet), d (doublet), m (multiplet), dd (doublet of doublets), ddd (doublet of doublet of doublets). Melting points (uncorrected) were measured on a SMP50 Stuart apparatus. Mass spectra of positive electron ionization ions (70 eV) were registered on a «LECO Pegasus BT» with a chromatograph «Agilent 8890».

Thin layer chromatography was carried out on Merck silica gel 60 F254 pre-coated aluminium foil sheets (eluent: diethyl ether/hexane = 1:3) and were visualized using UV light (254 nm).

### Synthesis of pyridines **2** (general procedure).

A mixture of nitrile **1** (5 mmol),  $\text{KOH}\cdot 0.5\text{H}_2\text{O}$  (5 mmol, 0.32 g), and MeOH (5 mmol, 0.16 g) in DMSO with 0.05% of water content (50 mL) was placed into a 0.25 dm<sup>3</sup> steel Parr reactor equipped with mechanical stirrer, manometer, and gas inlet valve for charging acetylene. The reactor was fed with acetylene under pressure  $\sim 3$  atm from commercially available acetylene cylinder and then decompressed to atmospheric pressure to remove air. The reactor was fed with acetylene again ( $\sim 14$  atm), the reaction mixture was stirred at room temperature for 5 min (acetylene pressure dropped up to  $\sim 3$ -4 atm) and heated (heating mantle) at 90 °C for 10 min. After cooling to room temperature, the mixture was diluted with water (100 mL) and extracted with diethyl ether ( $4 \times 45$  mL). Diethyl ether extracts were washed with  $\text{H}_2\text{O}$  ( $3 \times 15$  mL) and evaporated under reduced pressure. The pure pyridines **2a-k** were obtained by column chromatography (basic  $\text{Al}_2\text{O}_3$ , eluent: *n*-hexane/diethyl ether with gradient from 1:0 to 1:1).

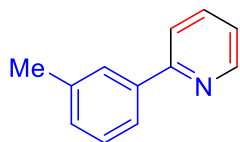
#### 2-Phenylpyridine **2a**<sup>S1</sup>



Following the general procedure, **2a** was prepared from **1a** (5 mmol, 0.52 g). **2a** was isolated as pale-yellow oil (0.280 g, 36% yield).  $^1\text{H}$  NMR ( $\text{CDCl}_3$ )  $\delta$ : 8.73-8.70 (m, 1H, H<sub>6</sub>), 8.02-8.00 (m, 2H, H<sup>o</sup>), 7.76-7.74 (m, 2H, H<sub>3</sub>, H<sub>4</sub>), 7.51-7.48 (m, 2H, H<sup>m</sup>), 7.44-7.41 (m, 1H, H<sup>p</sup>), 7.25-7.22 (m, 1H, H<sub>5</sub>).

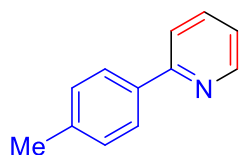
$^{13}\text{C}\{^1\text{H}\}$  NMR ( $\text{CDCl}_3$ )  $\delta$ : 157.5 ( $\text{C}^2$ ), 149.7 ( $\text{C}^6$ ), 139.4 ( $\text{C}^i$ ), 136.7 ( $\text{C}^4$ ), 128.9 ( $\text{C}^p$ ), 128.7 ( $\text{C}^m$ ), 126.9 ( $\text{C}^o$ ), 122.0 ( $\text{C}^3$ ), 120.5 ( $\text{C}^5$ ).  $^{15}\text{N}$  NMR,  $\delta$ : -74.5. MS (EI):  $m/z$  calcd for  $\text{C}_{11}\text{H}_9\text{N}$  155.073  $[\text{M}]^+$ ; found 155.084 (100.0 %).

### 2-(*m*-Tolyl)pyridine **2b**<sup>S2</sup>



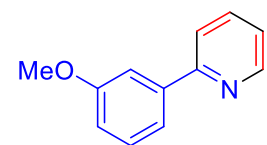
Following the general procedure, **2b** was prepared from **1b** (5 mmol, 0.586 g). **2b** was isolated as pale-yellow oil (0.262 g, 31% yield).  $^1\text{H}$  NMR ( $\text{CDCl}_3$ )  $\delta$ : 8.71-8.70 (m, 1H,  $\text{H}^6$ ), 7.86 (s, 1H,  $\text{H}^2$ ), 7.78-7.72 (m, 3H,  $\text{H}^3$ ,  $\text{H}^4$ ,  $\text{H}^4$ ), 7.40-7.36 (m, 1H,  $\text{H}^5$ ), 7.26-7.21 (m, 2H,  $\text{H}^5$ ,  $\text{H}^6$ ), 2.45 (s, 3H, 3-Me).  $^{13}\text{C}\{^1\text{H}\}$  NMR ( $\text{CDCl}_3$ )  $\delta$ : 157.7 ( $\text{C}^2$ ), 149.6 ( $\text{C}^6$ ), 139.4 ( $\text{C}^1$ ), 138.4 ( $\text{C}^3$ ), 136.7 ( $\text{C}^4$ ), 129.7 ( $\text{C}^4$ ), 128.6 ( $\text{C}^5$ ), 127.6 ( $\text{C}^2$ ), 124.0 ( $\text{C}^6$ ), 122.0 ( $\text{C}^3$ ), 120.6 ( $\text{C}^5$ ), 21.5 (3-Me). MS (EI):  $m/z$  calcd for  $\text{C}_{12}\text{H}_{11}\text{N}$  169.089  $[\text{M}]^+$ ; found 169.017 (100.0 %).

### 2-(*p*-Tolyl)pyridine **2c**<sup>S3</sup>



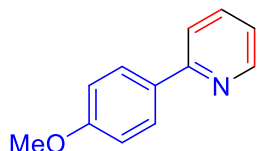
Following the general procedure, **2c** was prepared from **1c** (5 mmol, 0.586 g). **2c** was isolated as pale-yellow oil (0.254 g, 30% yield).  $^1\text{H}$  NMR ( $\text{CDCl}_3$ )  $\delta$ : 8.70-8.69 (m, 1H,  $\text{H}^6$ ), 7.93-7.91 (m, 2H,  $\text{H}^o$ ), 7.74-7.69 (m, 2H,  $\text{H}^3$ ,  $\text{H}^4$ ), 7.31-7.29 (m, 2H,  $\text{H}^m$ ), 7.21-7.18 (m, 1H,  $\text{H}^5$ ), 2.42 (s, 3H, 4-Me).  $^{13}\text{C}\{^1\text{H}\}$  NMR ( $\text{CDCl}_3$ )  $\delta$ : 157.4 ( $\text{C}^2$ ), 149.5 ( $\text{C}^6$ ), 138.8 ( $\text{C}^p$ ), 136.6 ( $\text{C}^i$ ,  $\text{C}^4$ ), 129.4 ( $\text{C}^m$ ), 126.7 ( $\text{C}^o$ ), 121.7 ( $\text{C}^5$ ), 120.1 ( $\text{C}^3$ ), 21.2 (4-Me). MS (EI):  $m/z$  calcd for  $\text{C}_{12}\text{H}_{11}\text{N}$  169.089  $[\text{M}]^+$ ; found 169.032 (100.0 %).

### 2-(3-Methoxyphenyl)pyridine **2d**<sup>S4</sup>



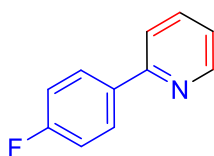
Following the general procedure, **2d** was prepared from **1d** (5 mmol, 0.66 g). **2d** was isolated as pale-yellow oil (0.259 g, 28% yield).  $^1\text{H}$  NMR ( $\text{CDCl}_3$ )  $\delta$ : 8.71-8.70 (m, 1H,  $\text{H}^6$ ), 7.78-7.72 (m, 2H,  $\text{H}^3$ ,  $\text{H}^4$ ), 7.60 (br. s, 1H,  $\text{H}^2$ ), 7.57-7.54 (m, 1H,  $\text{H}^6$ ), 7.42-7.37 (m, 1H,  $\text{H}^5$ ), 7.26-7.23 (m, 1H,  $\text{H}^5$ ), 7.00-6.97 (m, 1H,  $\text{H}^4$ ), 3.91 (s, 3H, OMe).  $^{13}\text{C}\{^1\text{H}\}$  NMR ( $\text{CDCl}_3$ )  $\delta$ : 160.1 ( $\text{C}^3$ ), 157.2 ( $\text{C}^2$ ), 149.6 ( $\text{C}^6$ ), 140.9 ( $\text{C}^1$ ), 136.7 ( $\text{C}^4$ ), 129.7 ( $\text{C}^5$ ), 122.2 ( $\text{C}^5$ ), 120.6 ( $\text{C}^3$ ), 119.3 ( $\text{C}^6$ ), 115.0 ( $\text{C}^4$ ), 112.0 ( $\text{C}^2$ ), 55.3 (OMe).  $^{15}\text{N}$  NMR,  $\delta$ : -74.0. MS (EI):  $m/z$  calcd for  $\text{C}_{12}\text{H}_{11}\text{NO}$  185.084  $[\text{M}]^+$ ; found 185.020 (73.43 %).

## 2-(4-Methoxyphenyl)pyridine **2e**<sup>S5</sup>



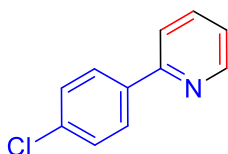
Following the general procedure, **2e** was prepared from **1e** (5 mmol, 0.66 g). **2e** was isolated as white powder (0.268 g, 29% yield). M.p. 53.0-55.0 °C. <sup>1</sup>H NMR (CDCl<sub>3</sub>) δ: 8.67-8.66 (m, 1H, H<sub>6</sub>), 7.98-7.95 (m, 2H, H<sup>o</sup>), 7.74-7.66 (m, 2H, H<sub>3</sub>, H<sub>4</sub>), 7.20-7.16 (m, 1H, H<sub>5</sub>), 7.02-7.00 (m, 2H, H<sup>m</sup>), 3.88 (s, 3H, OMe). <sup>13</sup>C{<sup>1</sup>H} NMR (CDCl<sub>3</sub>) δ: 160.4 (C<sup>p</sup>), 157.1 (C<sub>2</sub>), 149.5 (C<sub>6</sub>), 136.6 (C<sub>4</sub>), 132.0 (C<sup>i</sup>), 128.1 (C<sup>m</sup>), 121.4 (C<sub>5</sub>), 119.8 (C<sub>3</sub>), 114.1 (C<sup>o</sup>), 55.3 (4-OMe). MS (EI): m/z calcd for C<sub>12</sub>H<sub>11</sub>NO 185.084 [M]<sup>+</sup>; found 185.092 (100.0 %).

## 2-(4-Fluorophenyl)pyridine **2f**<sup>S2</sup>



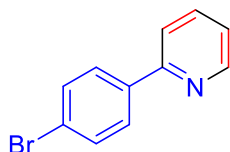
Following the general procedure (using 5 mmol of Bu<sup>t</sup>OH instead of MeOH), **2f** was prepared from **1f** (5 mmol, 0.61 g). **2f** was isolated as pale-yellow oil (0.130 g, 15% yield). <sup>1</sup>H NMR (CDCl<sub>3</sub>) δ: 8.70-8.68 (m, 1H, H<sub>6</sub>), 8.01-7.98 (m, 2H, H<sup>o</sup>), 7.78-7.74 (m, 1H, H<sub>4</sub>), 7.70-7.68 (m, 1H, H<sub>3</sub>), 7.25-7.22 (m, 1H, H<sub>5</sub>), 7.19-7.15 (m, 2H, H<sup>m</sup>). <sup>13</sup>C{<sup>1</sup>H} NMR (CDCl<sub>3</sub>) δ: 163.5 (d, *J* = 248.2 Hz, C<sup>p</sup>), 156.4 (C<sub>2</sub>), 149.6 (C<sub>6</sub>), 136.8 (C<sub>4</sub>), 135.5 (d, *J* = 2.8 Hz, C<sup>i</sup>), 128.7 (d, *J* = 8.3 Hz, C<sup>o</sup>), 122.0 (C<sub>5</sub>), 120.3 (C<sub>3</sub>), 115.6 (d, *J* = 21.6 Hz, C<sup>m</sup>). MS (EI): m/z calcd for C<sub>11</sub>H<sub>8</sub>FN 173.064 [M]<sup>+</sup>; found 173.074 (100.0 %).

## 2-(4-Chlorophenyl)pyridine **2g**<sup>S5</sup>



Following the general procedure, **2g** was prepared from **1g** (5 mmol, 0.69 g). **2g** as pale-yellow oil (0.171 g, 18% yield) and **2e** (0.120 g, 13% yield) were isolated. **2g**: <sup>1</sup>H NMR (CDCl<sub>3</sub>) δ: 8.71-8.69 (m, 1H, H<sub>6</sub>), 7.95 (d, *J* = 8.6 Hz, 2H, H<sup>o</sup>), 7.79-7.75 (m, 1H, H<sub>4</sub>), 7.72-7.70 (m, 1H, H<sub>3</sub>), 7.46 (d, *J* = 8.6 Hz, 2H, H<sup>m</sup>), 7.26-7.24 (m, 1H, H<sub>5</sub>). <sup>13</sup>C{<sup>1</sup>H} NMR (CDCl<sub>3</sub>) δ: 156.2 (C<sub>2</sub>), 149.7 (C<sub>6</sub>), 137.8 (C<sup>i</sup>), 136.8 (C<sub>4</sub>), 135.1 (C<sup>p</sup>), 128.9 (C<sup>m</sup>), 128.1 (C<sup>o</sup>), 122.3 (C<sub>5</sub>), 120.3 (C<sub>3</sub>). MS (EI): m/z calcd for C<sub>11</sub>H<sub>8</sub>ClN 189.035 [M]<sup>+</sup>; found 189.054 (100.0 %).

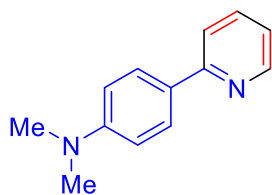
## 2-(4-Bromophenyl)pyridine **2h**<sup>S5</sup>



Following the general procedure, **2h** was prepared from **1h** (2.5 mmol, 0.45 g). **2h** as colorless crystals (0.222 g, 19% yield) and **2e** (0.09 g, 10% yield) were isolated. **2h**: <sup>1</sup>H NMR (CDCl<sub>3</sub>) δ: 8.71-8.69 (m, 1H, H<sub>6</sub>), 7.90-7.87 (m, 2H, H<sup>o</sup>), 7.79-7.74 (m, 1H, H<sub>4</sub>), 7.72-7.70 (m, 1H, H<sub>3</sub>), 7.63-7.60 (m, 1H, H<sup>m</sup>), 7.26-7.24 (m, 1H, H<sub>5</sub>). <sup>13</sup>C{<sup>1</sup>H} NMR (CDCl<sub>3</sub>) δ: 156.3 (C<sub>2</sub>), 149.8 (C<sub>6</sub>), 138.3 (C<sup>i</sup>),

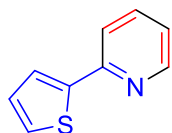
136.9 (C4), 131.9 (C<sup>m</sup>), 128.4 (C<sup>o</sup>), 123.4 (C<sup>p</sup>), 122.4 (C5), 120.3 (C3). MS (EI): m/z calcd for C<sub>11</sub>H<sub>8</sub>BrN 232.984 [M]<sup>+</sup>; found 233.067 (89.39 %).

#### ***N,N*-Dimethyl-4-(pyridin-2-yl)aniline **2i****<sup>S6</sup>



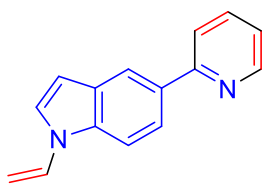
Following the general procedure, **2i** was prepared from **1i** (5 mmol, 0.73 g). **2i** was isolated as pale-yellow powder (0.180 g, 18% yield). M.p. 75.0-82.0 °C. <sup>1</sup>H NMR (CDCl<sub>3</sub>) δ: 8.64-8.62 (m, 1H, H<sub>6</sub>), 7.93 (d, *J* = 8.9 Hz, 2H, H<sup>o</sup>), 7.68-7.65 (m, 2H, H<sub>3</sub>, H<sub>4</sub>), 7.12-7.09 (m, 1H, H<sub>5</sub>), 6.81 (d, *J* = 8.9 Hz, 1H, H<sup>m</sup>), 3.03 (s, 6H, NMe<sub>2</sub>). <sup>13</sup>C{<sup>1</sup>H} NMR (CDCl<sub>3</sub>) δ: 157.5 (C<sub>2</sub>), 151.0 (C<sup>p</sup>), 149.3 (C<sub>6</sub>), 136.4 (C<sub>4</sub>), 127.7 (C<sup>m</sup>), 127.2 (C<sup>i</sup>), 120.5 (C<sub>5</sub>), 119.1 (C<sub>3</sub>), 112.2 (C<sup>o</sup>), 40.3 (NMe<sub>2</sub>). MS (EI): m/z calcd for C<sub>13</sub>H<sub>14</sub>N<sub>2</sub> 198.116 [M]<sup>+</sup>; found 198.102 (100.0 %).

#### **2-(Thiophen-2-yl)pyridine **2j****<sup>S7</sup>



Following the general procedure, **2j** was prepared from **1j** (5 mmol, 0.54 g). **2j** was isolated as pale-yellow oil (0.105 g, 13% yield). <sup>1</sup>H NMR (CDCl<sub>3</sub>) δ: 8.58-8.56 (m, 1H, H<sub>6</sub>), 7.69-7.64 (m, 2H, H<sub>3</sub>, H<sub>4</sub>), 7.58 (dd, *J* = 3.7, 1.1 Hz, 1H, H<sup>3</sup>), 7.40 (dd, *J* = 5.1, 1.1 Hz, 1H, H<sup>5</sup>), 7.15-7.10 (m, 2H, H<sub>5</sub>, H<sup>4</sup>). <sup>13</sup>C{<sup>1</sup>H} NMR (CDCl<sub>3</sub>) δ: 152.5 (C<sub>2</sub>), 149.5 (C<sub>6</sub>), 144.8 (C<sup>2</sup>), 136.6 (C<sub>4</sub>), 128.0 (C<sup>4</sup>), 127.5 (C<sup>5</sup>), 124.4 (C<sup>3</sup>), 121.8 (C<sub>5</sub>), 118.7 (C<sub>3</sub>). <sup>15</sup>N NMR, δ: -79.2. MS (EI): m/z calcd for C<sub>9</sub>H<sub>7</sub>NS 161.030 [M]<sup>+</sup>; found 161.055 (100.0 %).

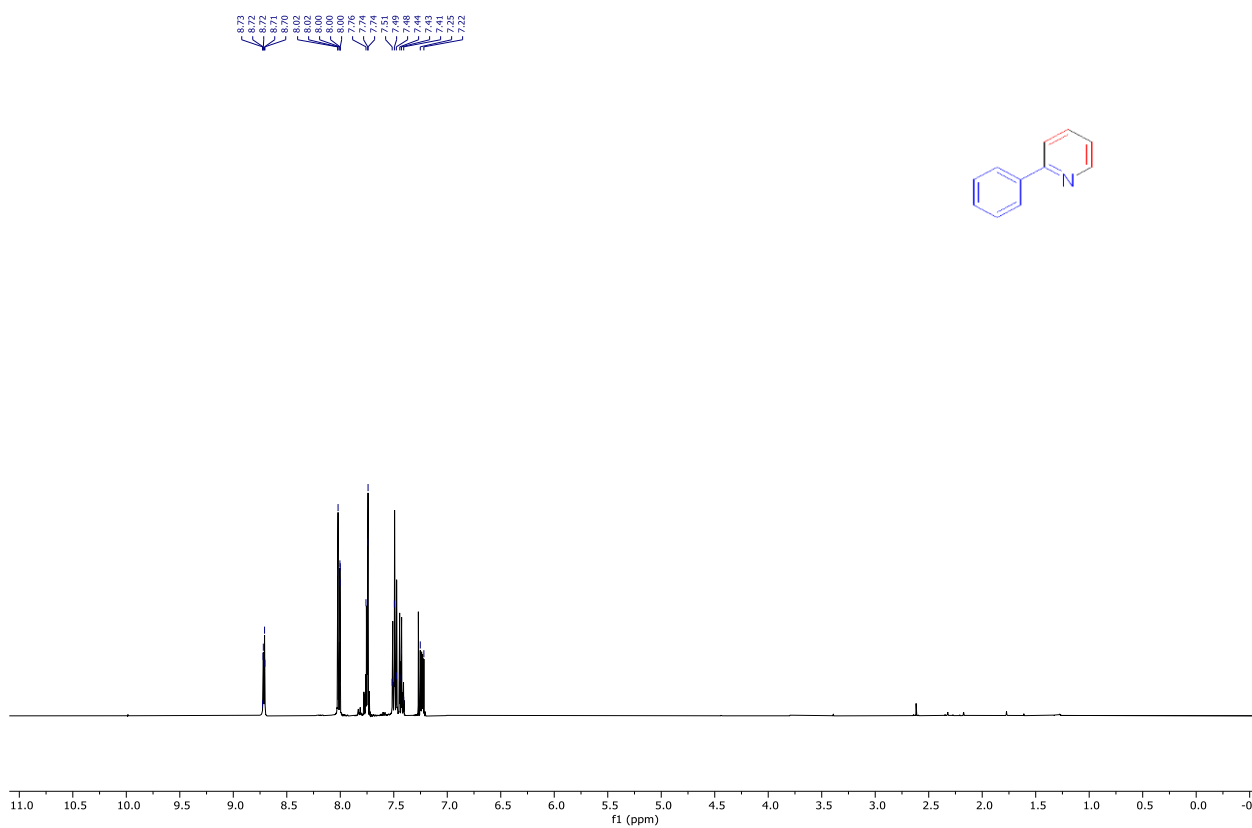
#### **5-(Pyridin-2-yl)-1-vinyl-1*H*-indole **2k****



Following the general procedure, **2k** was prepared from 5-cyano-1*H*-indole **1k** (3 mmol, 0.41 g). **2k** was isolated as pale-yellow powder (0.154 g, 14% yield). M.p. 81.0-55.0 °C. <sup>1</sup>H NMR (CDCl<sub>3</sub>) δ: 8.71-8.69 (m, 1H, H<sub>6</sub>), 8.27-8.26 (m, 1H, H<sup>4</sup>), 7.96 (dd, *J* = 8.7, 1.8 Hz, 1H, H<sup>6</sup>), 7.81-7.73 (m, 2H, H<sub>3</sub>, H<sub>4</sub>), 7.56 (d, *J* = 8.7 Hz, 1H, H<sup>7</sup>), 7.47 (d, *J* = 3.4 Hz, 1H, H<sup>2</sup>), 7.27 (dd, *J* = 15.7, 9.0 Hz, 1H, CH=CH<sub>2</sub>), 7.22-7.18 (m, 1H, H<sub>5</sub>), 6.72 (d, *J* = 3.4 Hz, 1H, H<sup>3</sup>), 5.24 (dd, *J* = 15.7, 1.4 Hz, 1H, CH=CH<sub>2</sub>), 4.82 (dd, *J* = 9.0, 1.4 Hz, 1H, CH=CH<sub>2</sub>). <sup>13</sup>C{<sup>1</sup>H} NMR (CDCl<sub>3</sub>) δ: 158.3 (C<sub>2</sub>), 149.5 (C<sub>6</sub>), 136.6 (C<sub>4</sub>), 136.0 (C<sup>7a</sup>), 132.4 (C<sup>5</sup>), 129.6 (C<sup>4a</sup>), 129.5 (=CH), 124.1, 122.0, 121.3, 120.3, 119.9 (C<sup>2</sup>, C<sub>3</sub>, C<sup>6</sup>, C<sub>5</sub>, C<sup>4</sup>) 109.7 (C<sup>7</sup>), 105.6 (C<sup>3</sup>), 96.9 (=CH<sub>2</sub>). MS (EI): m/z calcd for C<sub>15</sub>H<sub>12</sub>N<sub>2</sub> 220.100 [M]<sup>+</sup>; found 220.133 (100.0 %).

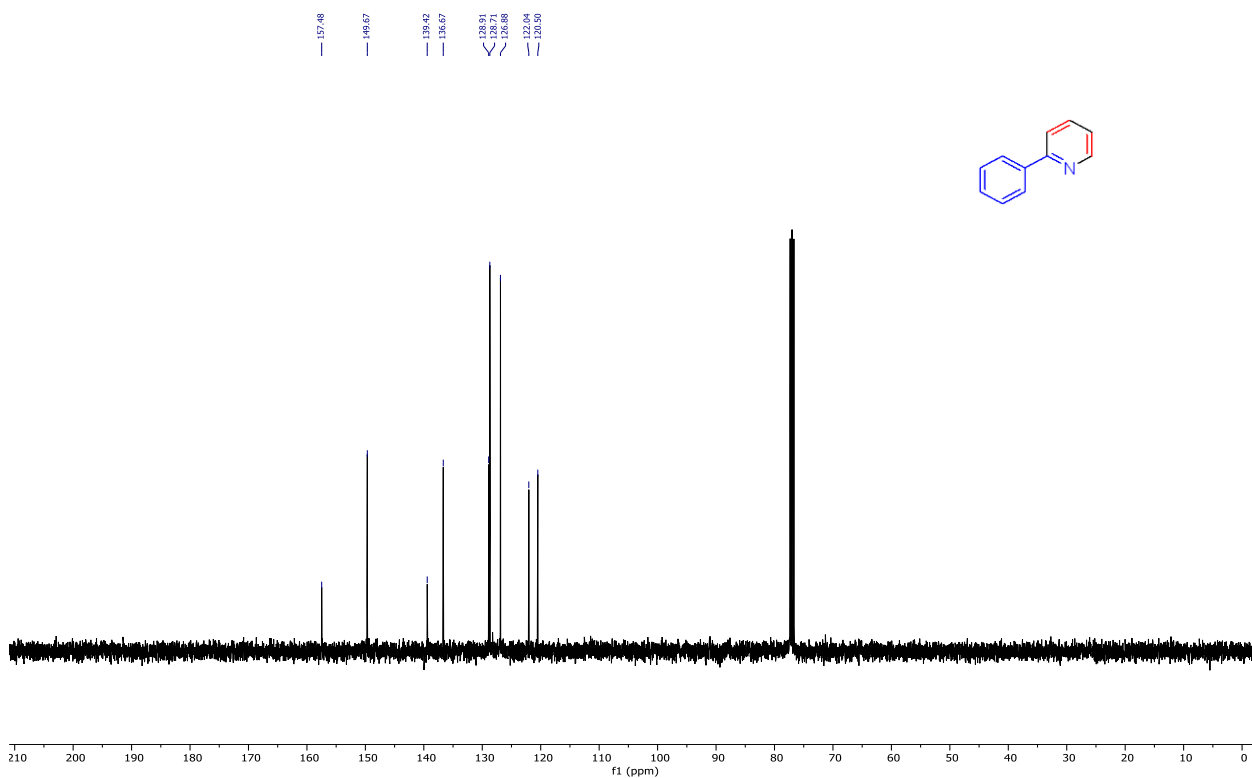
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<sup>1</sup>H NMR Spectrum of 2a

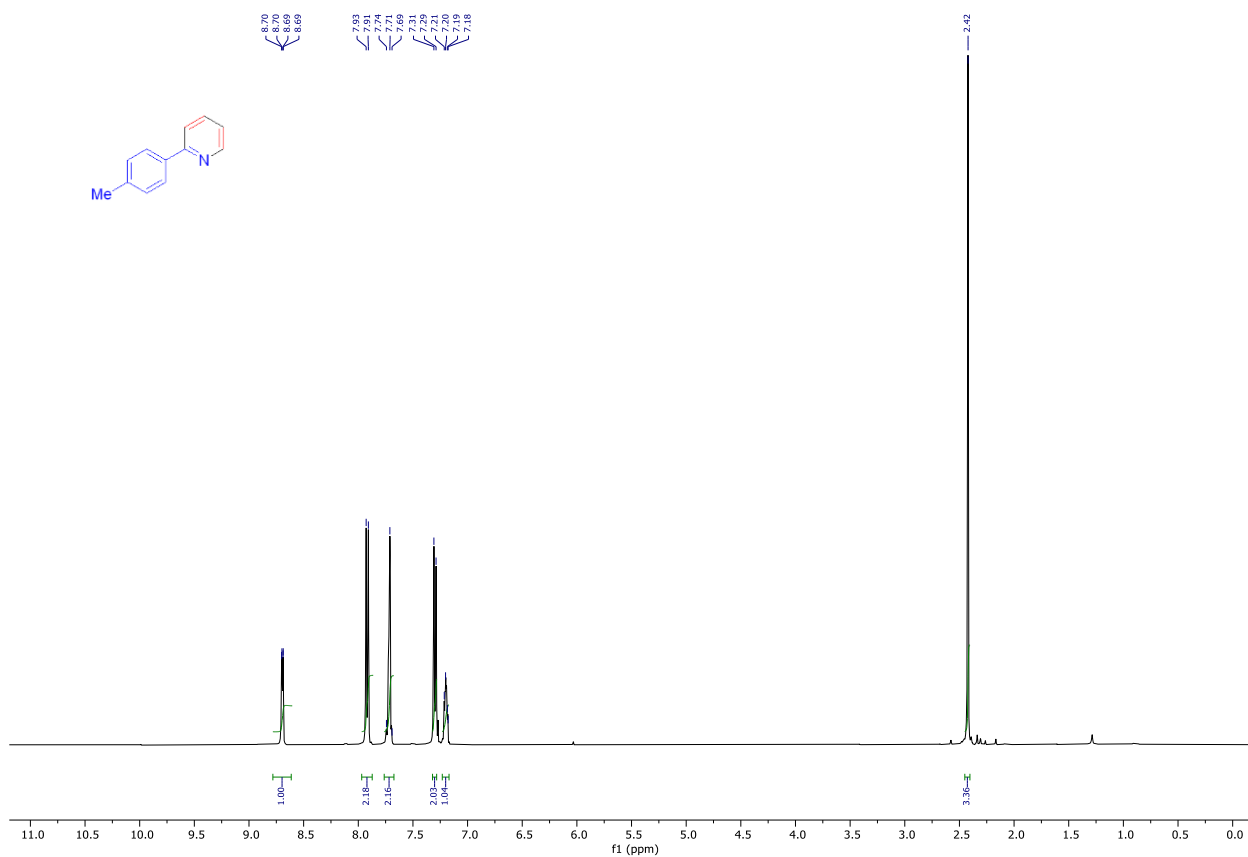
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<sup>13</sup>C NMR Spectrum of 2a

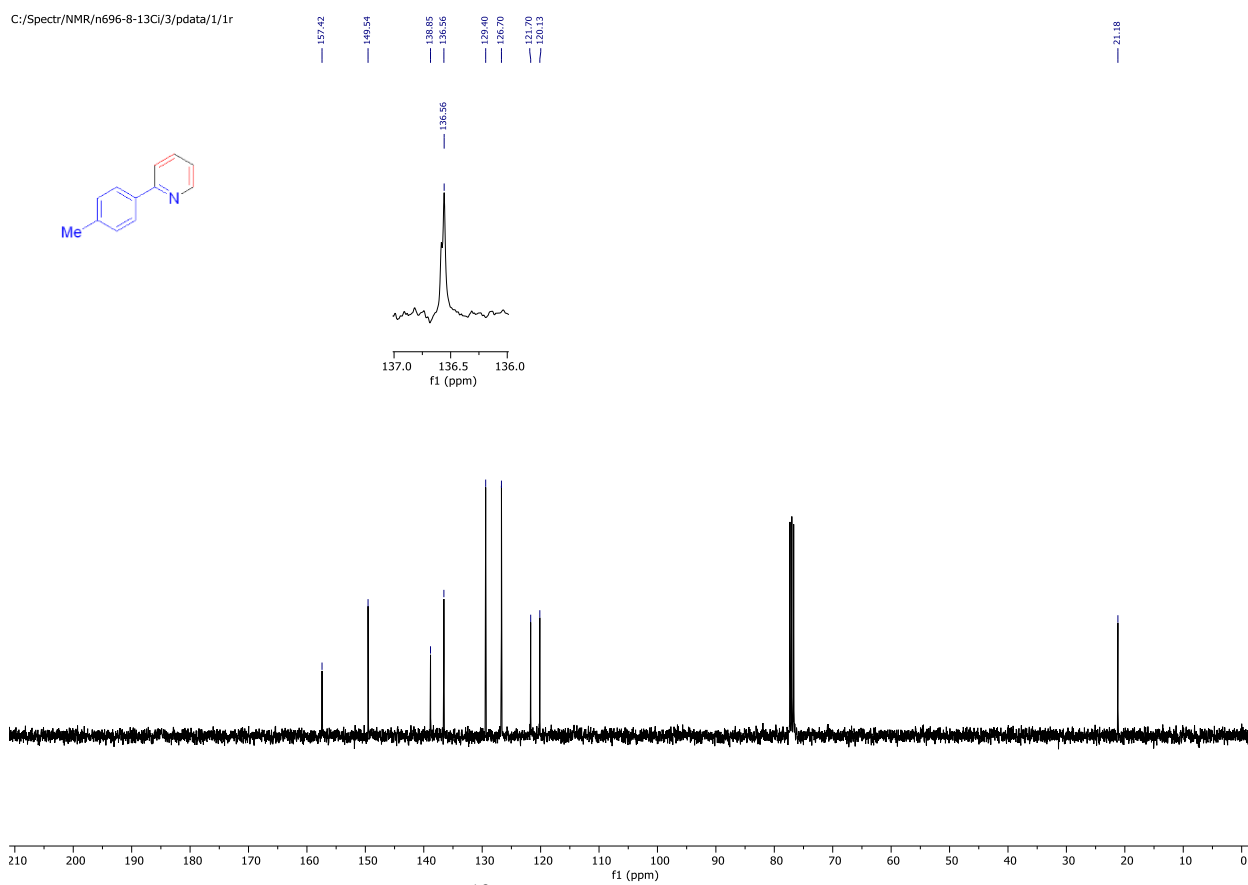


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<sup>1</sup>H NMR Spectrum of **2c**

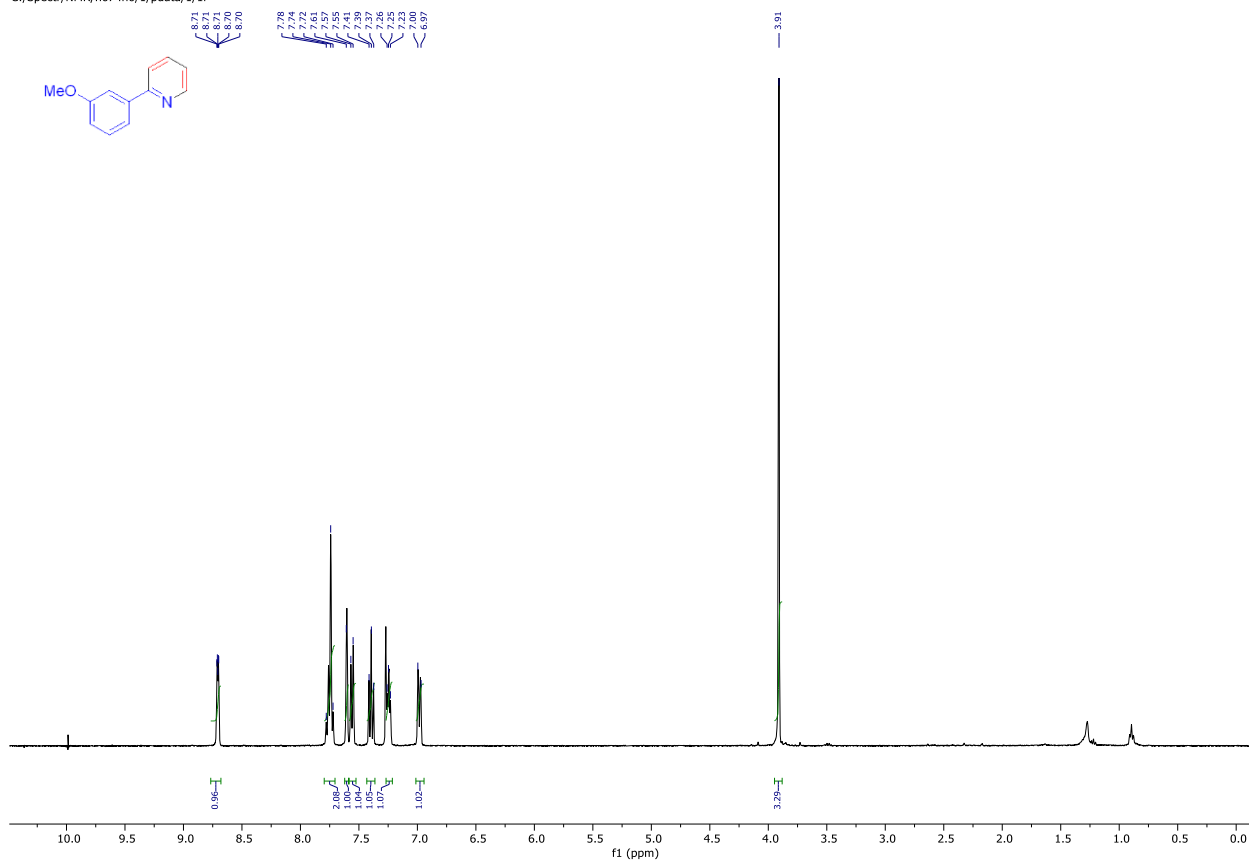
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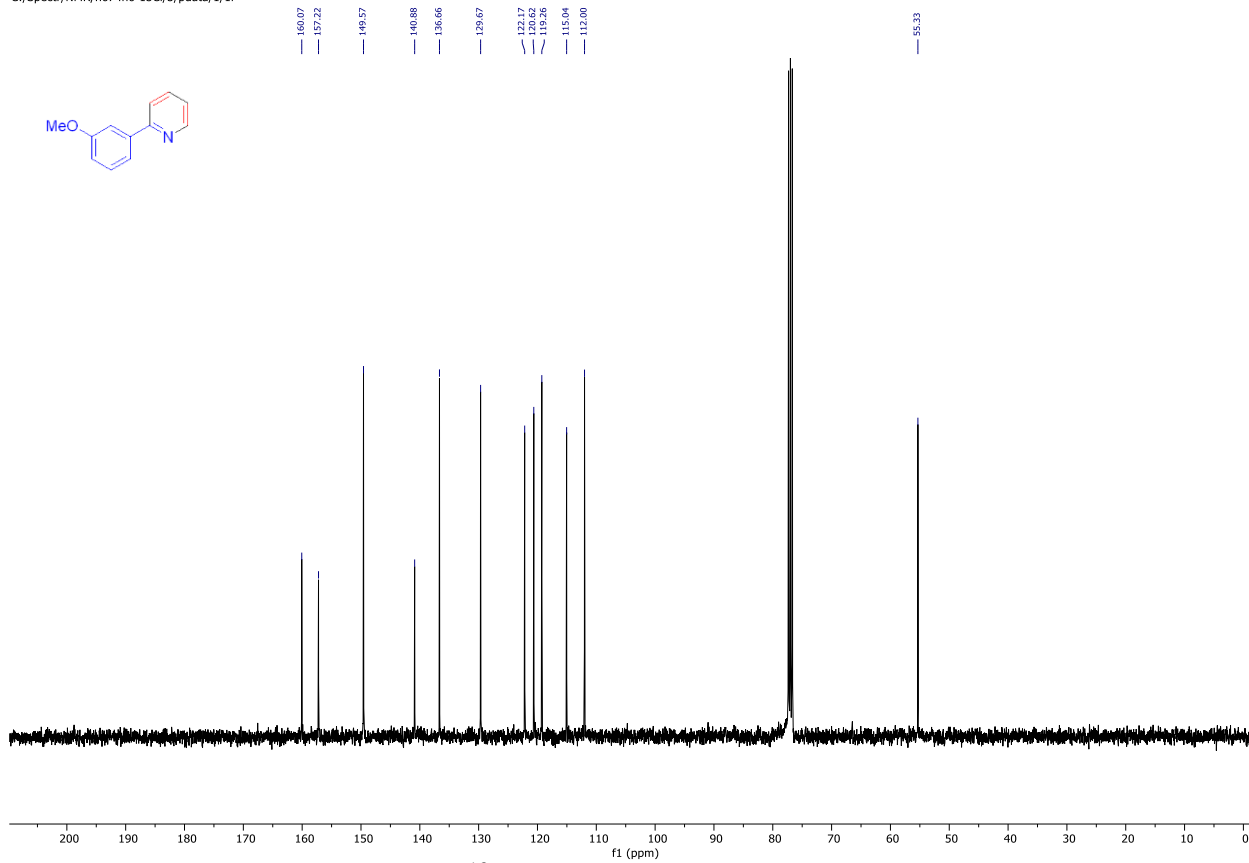
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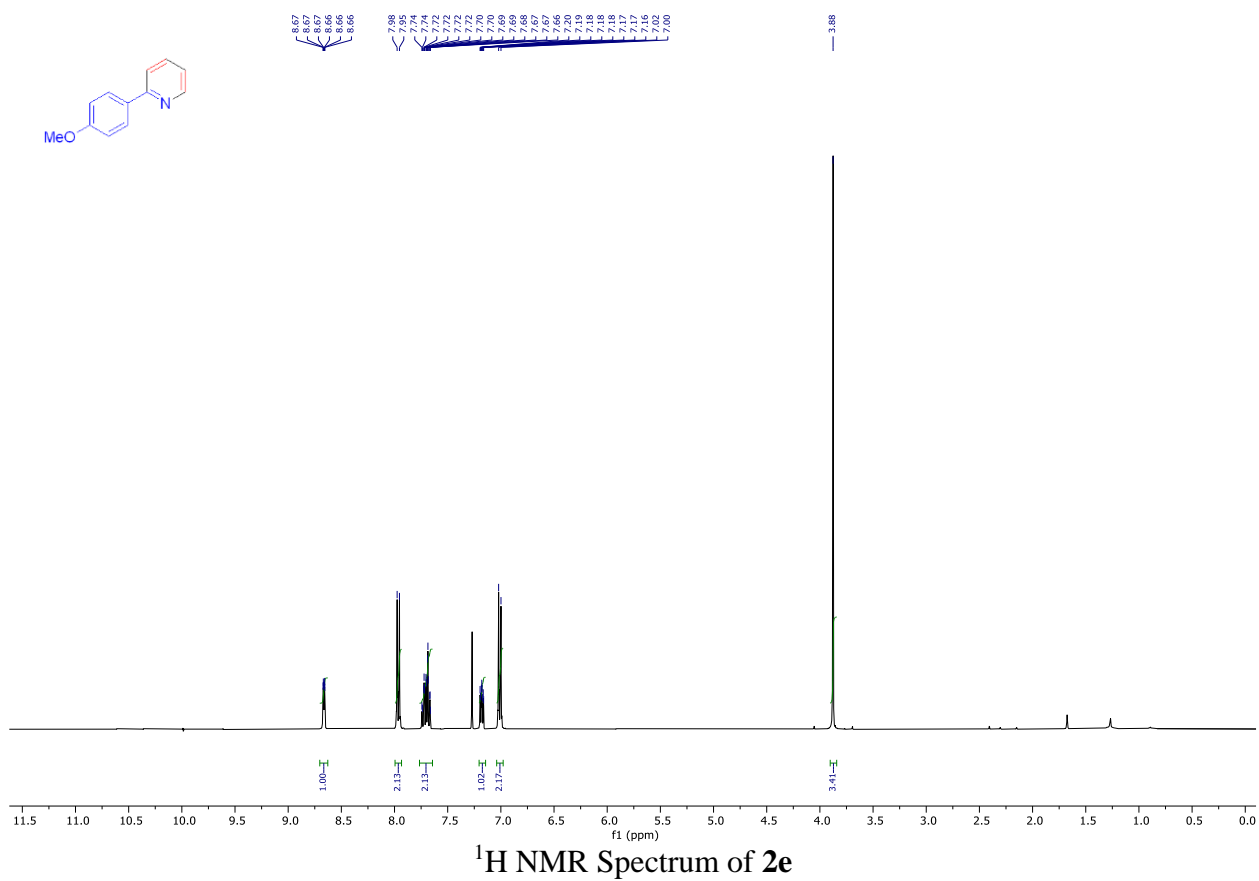
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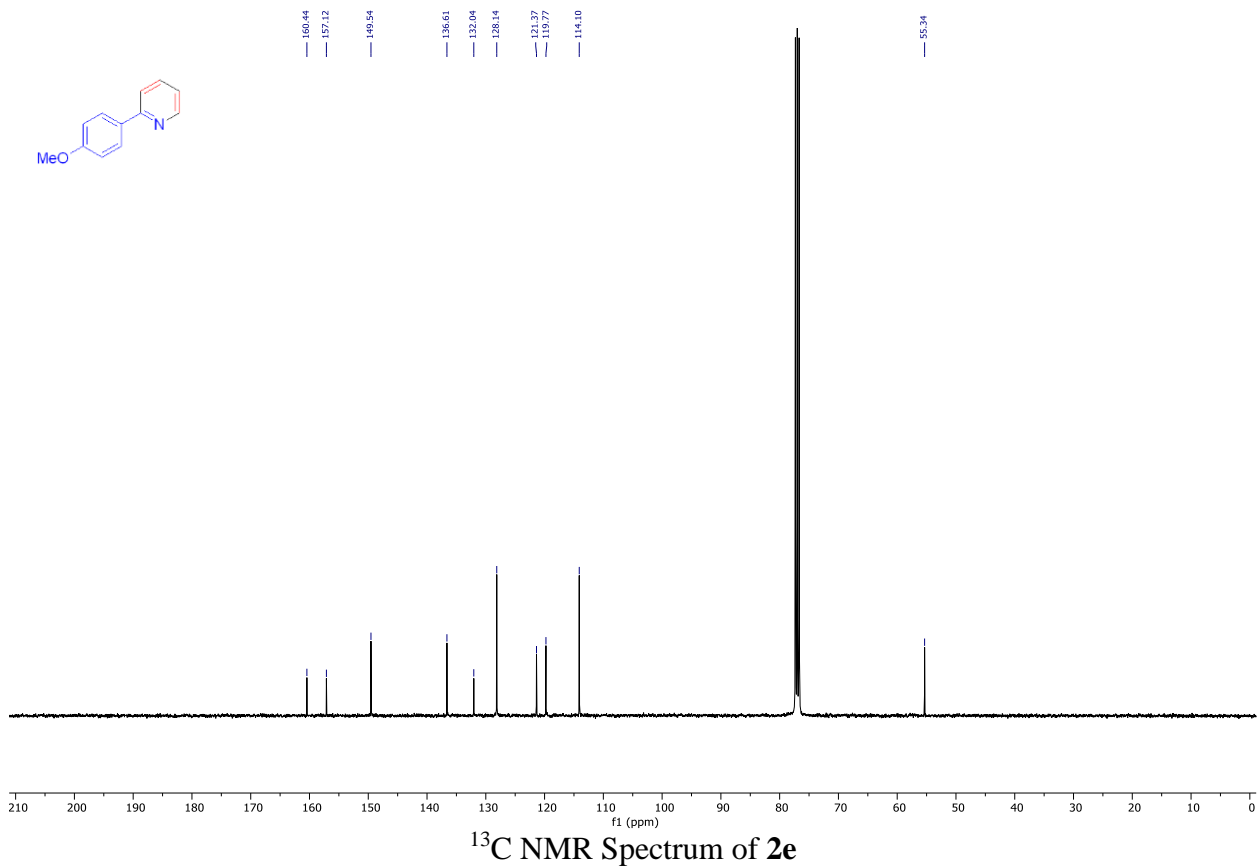
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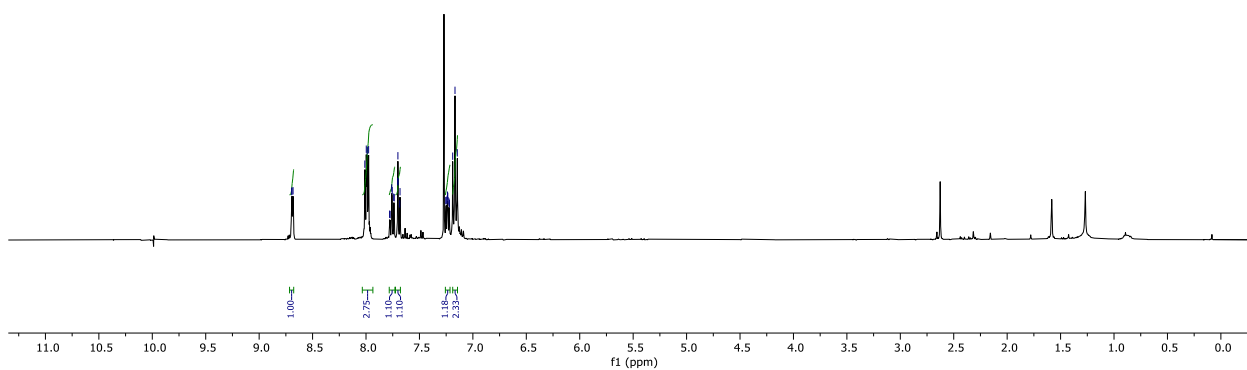
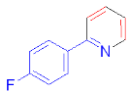
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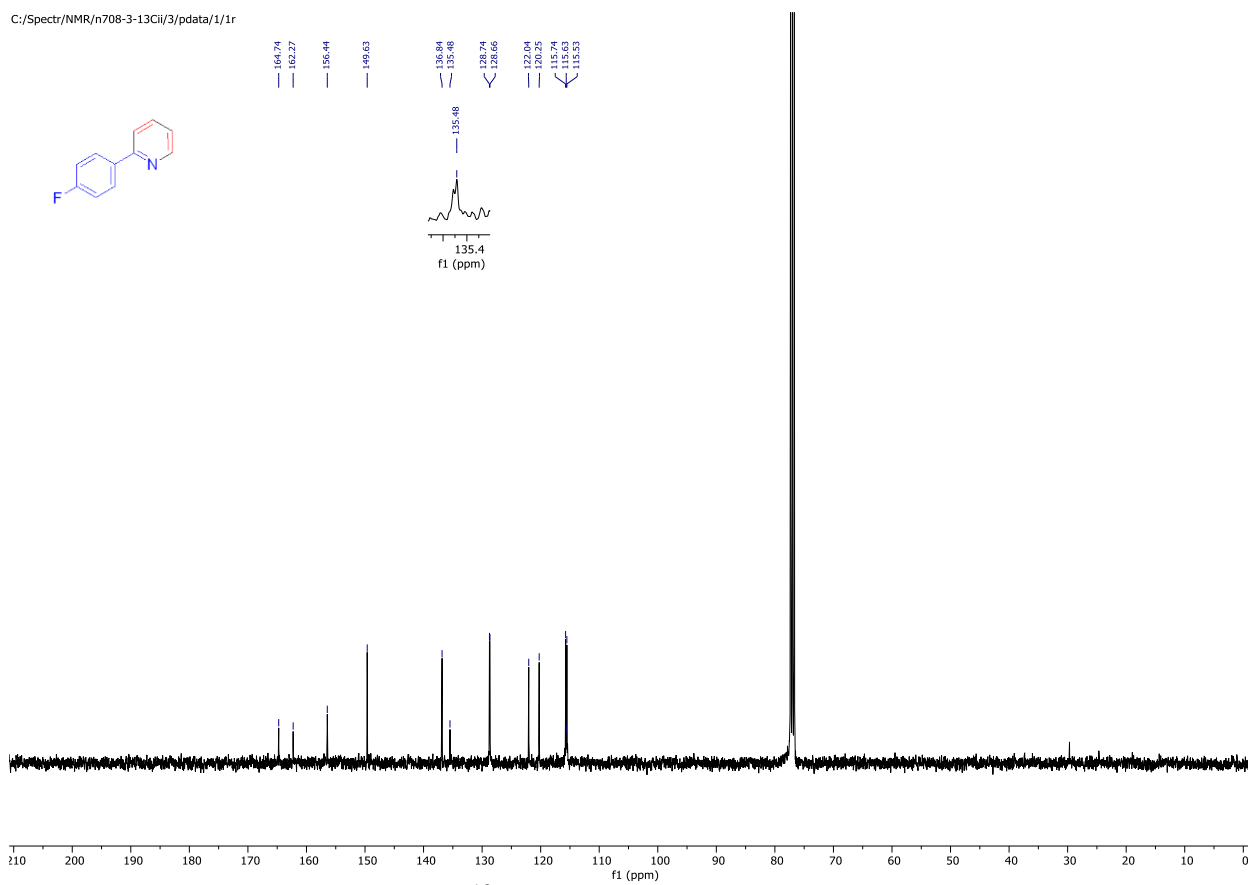
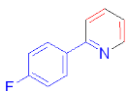
8.70  
8.69  
8.68  
8.01  
8.00  
7.99  
7.98  
7.78  
7.77  
7.76  
7.75  
7.74  
7.70  
7.70  
7.68  
7.68  
7.25  
7.24  
7.24  
7.23  
7.23  
7.22  
7.22  
7.19  
7.15

<sup>1</sup>H NMR Spectrum of **2f**

164.74  
—  
162.27  
—  
156.44  
—  
149.63  
—  
136.84  
135.48  
135.48  
135.48  
128.66  
128.66  
122.04  
120.25  
118.74  
118.53  
118.53

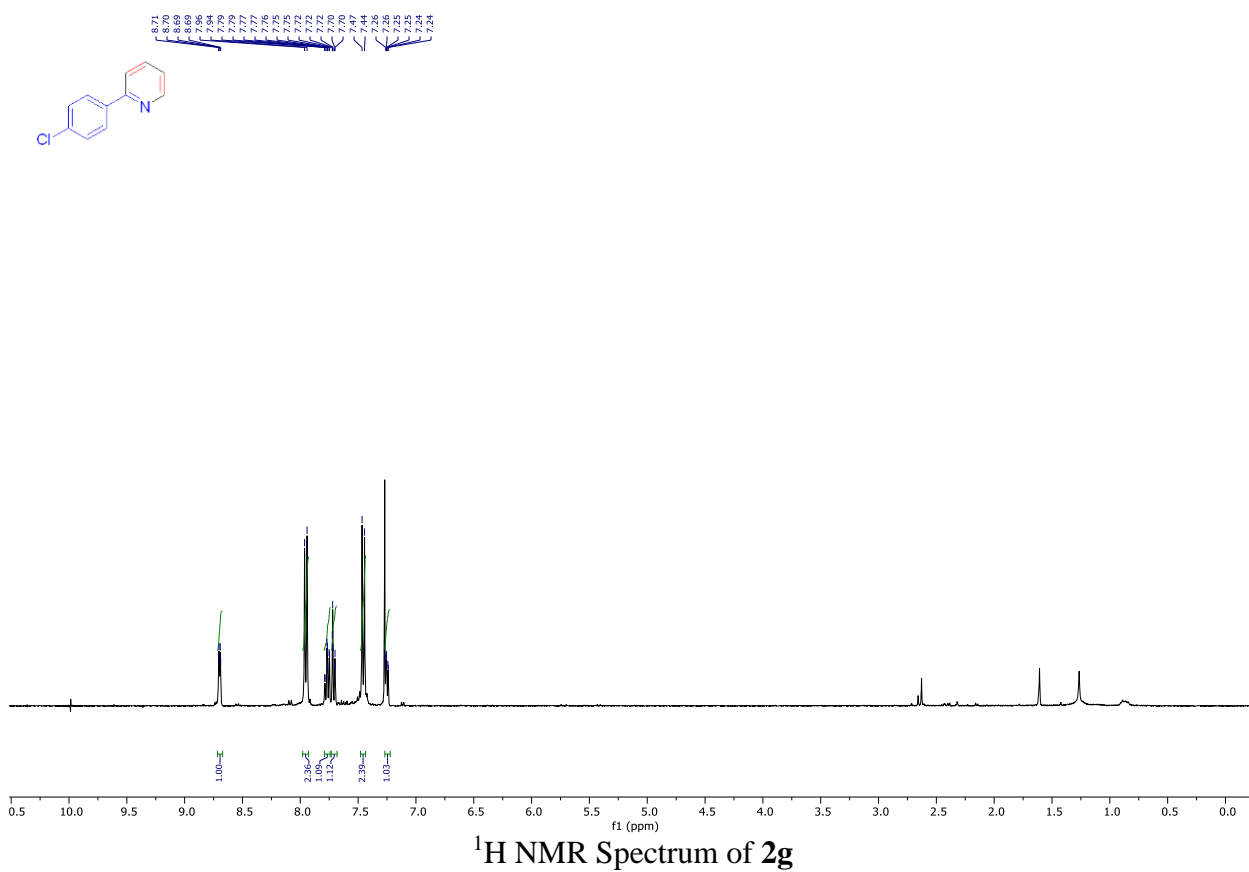
f1 (ppm)

135.4

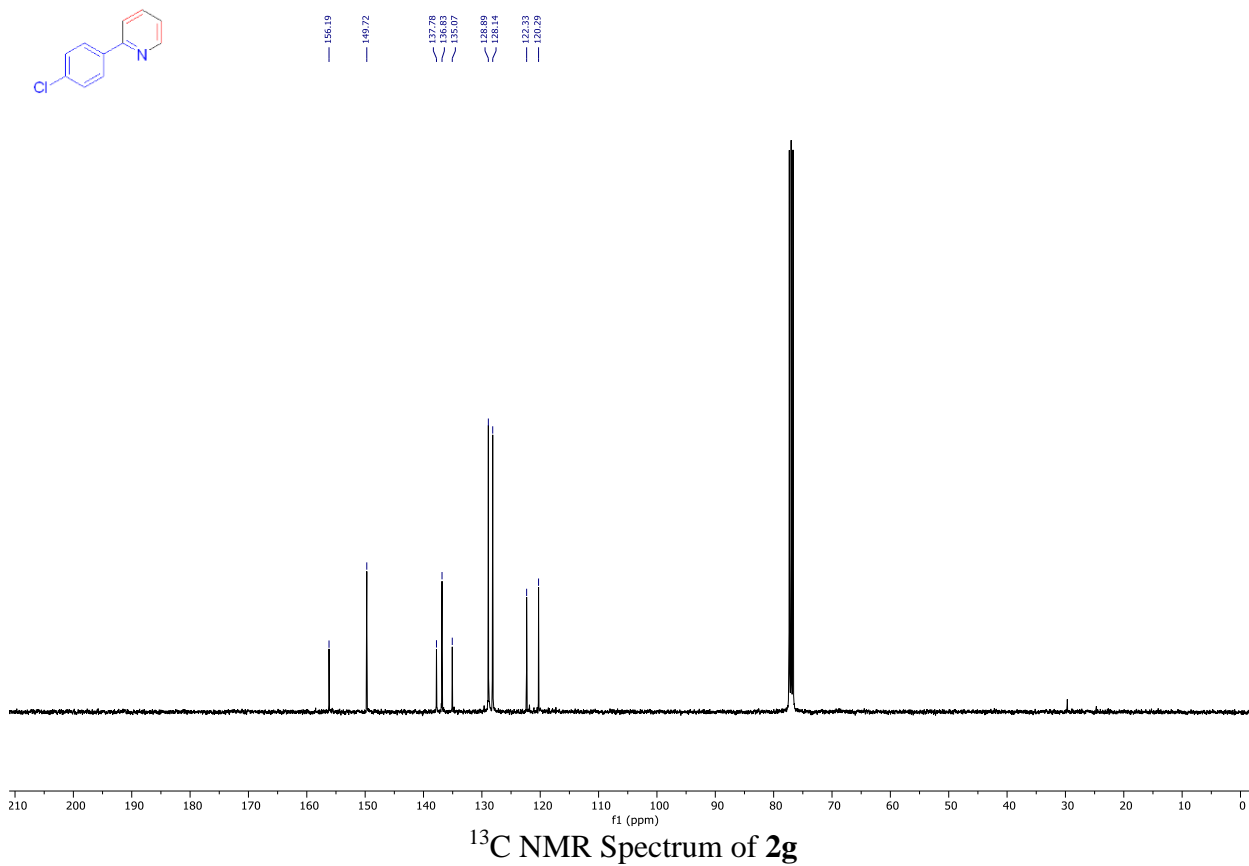


<sup>13</sup>C NMR Spectrum of **2f**

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C:/Spectr/NMR/n732-5-13C/3/pdata/1/1r



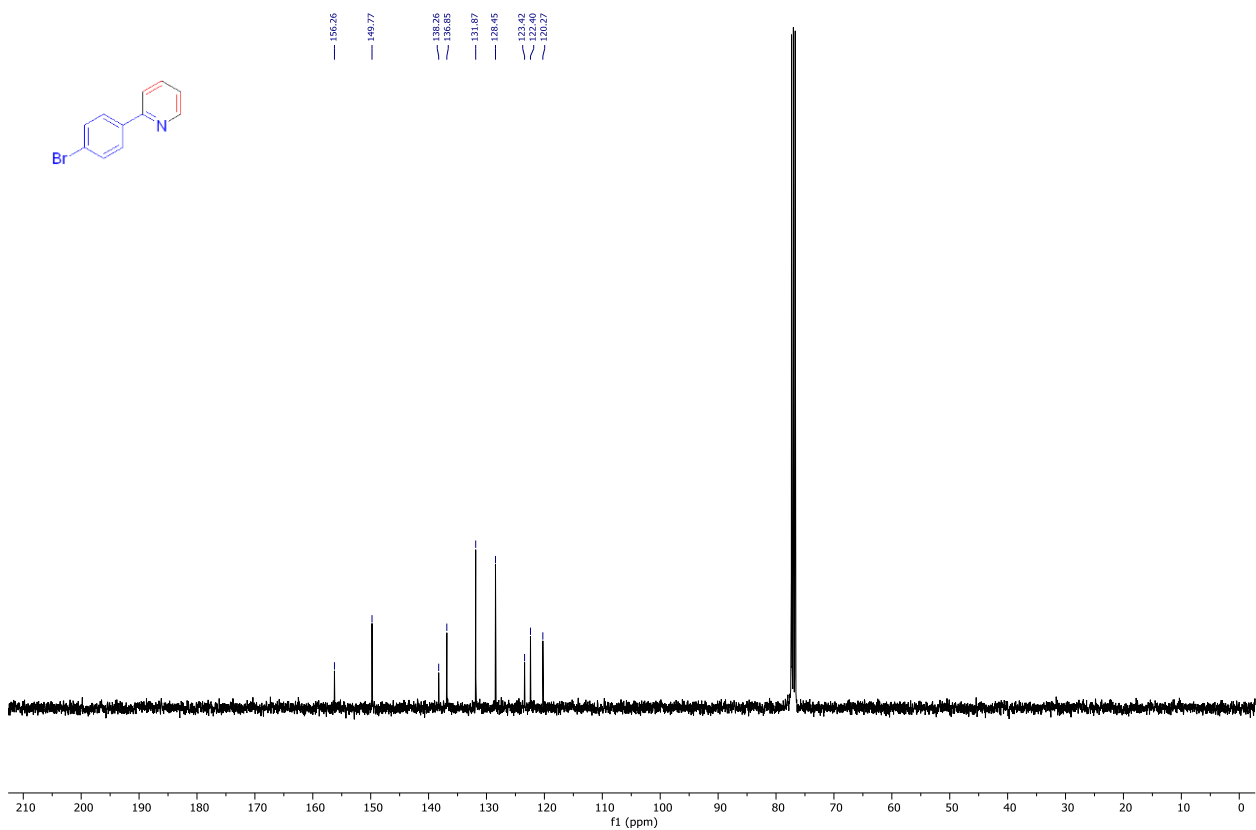
Brc1ccc(cc1)-c2ccncc2

Chemical structure: 4-bromopyridine

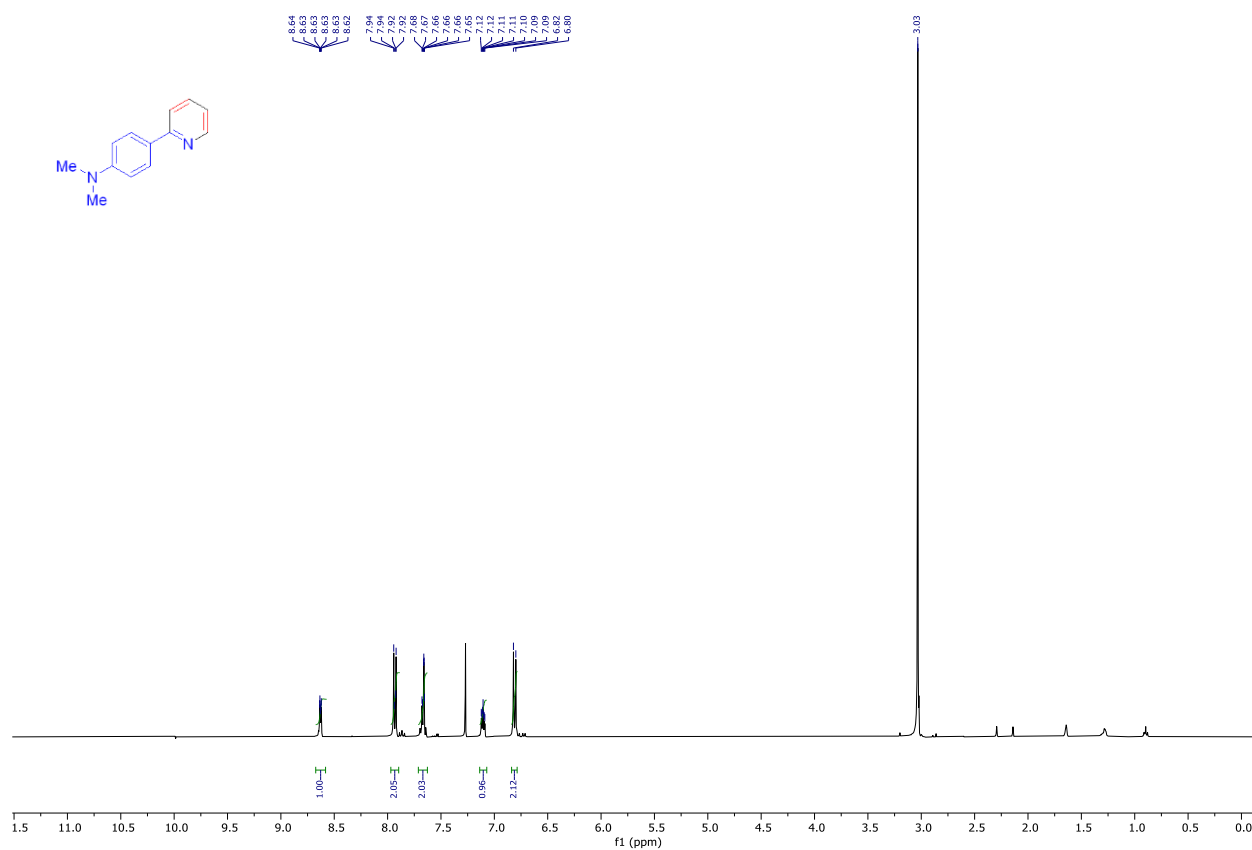
<sup>1</sup>H NMR spectrum (ppm):

- 8.71, 8.70, 8.69, 8.68, 8.67, 8.66, 8.65, 8.64, 8.63, 8.62, 8.61, 8.60, 8.59, 8.58, 8.57, 8.56, 8.55, 8.54, 8.53, 8.52, 8.51, 8.50, 8.49, 8.48, 8.47, 8.46, 8.45, 8.44, 8.43, 8.42, 8.41, 8.40, 8.39, 8.38, 8.37, 8.36, 8.35, 8.34, 8.33, 8.32, 8.31, 8.30, 8.29, 8.28, 8.27, 8.26, 8.25, 8.24, 8.23, 8.22, 8.21, 8.20, 8.19, 8.18, 8.17, 8.16, 8.15, 8.14, 8.13, 8.12, 8.11, 8.10, 8.09, 8.08, 8.07, 8.06, 8.05, 8.04, 8.03, 8.02, 8.01, 8.00, 7.99, 7.98, 7.97, 7.96, 7.95, 7.94, 7.93, 7.92, 7.91, 7.90, 7.89, 7.88, 7.87, 7.86, 7.85, 7.84, 7.83, 7.82, 7.81, 7.80, 7.79, 7.78, 7.77, 7.76, 7.75, 7.74, 7.73, 7.72, 7.71, 7.70, 7.69, 7.68, 7.67, 7.66, 7.65, 7.64, 7.63, 7.62, 7.61, 7.60, 7.59, 7.58, 7.57, 7.56, 7.55, 7.54, 7.53, 7.52, 7.51, 7.50, 7.49, 7.48, 7.47, 7.46, 7.45, 7.44, 7.43, 7.42, 7.41, 7.40, 7.39, 7.38, 7.37, 7.36, 7.35, 7.34, 7.33, 7.32, 7.31, 7.30, 7.29, 7.28, 7.27, 7.26, 7.25, 7.24, 7.23, 7.22, 7.21, 7.20, 7.19, 7.18, 7.17, 7.16, 7.15, 7.14, 7.13, 7.12, 7.11, 7.10, 7.09, 7.08, 7.07, 7.06, 7.05, 7.04, 7.03, 7.02, 7.01, 7.00, 6.99, 6.98, 6.97, 6.96, 6.95, 6.94, 6.93, 6.92, 6.91, 6.90, 6.89, 6.88, 6.87, 6.86, 6.85, 6.84, 6.83, 6.82, 6.81, 6.80, 6.79, 6.78, 6.77, 6.76, 6.75, 6.74, 6.73, 6.72, 6.71, 6.70, 6.69, 6.68, 6.67, 6.66, 6.65, 6.64, 6.63, 6.62, 6.61, 6.60, 6.59, 6.58, 6.57, 6.56, 6.55, 6.54, 6.53, 6.52, 6.51, 6.50, 6.49, 6.48, 6.47, 6.46, 6.45, 6.44, 6.43, 6.42, 6.41, 6.40, 6.39, 6.38, 6.37, 6.36, 6.35, 6.34, 6.33, 6.32, 6.31, 6.30, 6.29, 6.28, 6.27, 6.26, 6.25, 6.24, 6.23, 6.22, 6.21, 6.20, 6.19, 6.18, 6.17, 6.16, 6.15, 6.14, 6.13, 6.12, 6.11, 6.10, 6.09, 6.08, 6.07, 6.06, 6.05, 6.04, 6.03, 6.02, 6.01, 6.00, 5.99, 5.98, 5.97, 5.96, 5.95, 5.94, 5.93, 5.92, 5.91, 5.90, 5.89, 5.88, 5.87, 5.86, 5.85, 5.84, 5.83, 5.82, 5.81, 5.80, 5.79, 5.78, 5.77, 5.76, 5.75, 5.74, 5.73, 5.72, 5.71, 5.70, 5.69, 5.68, 5.67, 5.66, 5.65, 5.64, 5.63, 5.62, 5.61, 5.60, 5.59, 5.58, 5.57, 5.56, 5.55, 5.54, 5.53, 5.52, 5.51, 5.50, 5.49, 5.48, 5.47, 5.46, 5.45, 5.44, 5.43, 5.42, 5.41, 5.40, 5.39, 5.38, 5.37, 5.36, 5.35, 5.34, 5.33, 5.32, 5.31, 5.30, 5.29, 5.28, 5.27, 5.26, 5.25, 5.24, 5.23, 5.22, 5.21, 5.20, 5.19, 5.18, 5.17, 5.16, 5.15, 5.14, 5.13, 5.12, 5.11, 5.10, 5.09, 5.08, 5.07, 5.06, 5.05, 5.04, 5.03, 5.02, 5.01, 5.00, 4.99, 4.98, 4.97, 4.96, 4.95, 4.94, 4.93, 4.92, 4.91, 4.90, 4.89, 4.88, 4.87, 4.86, 4.85, 4.84, 4.83, 4.82, 4.81, 4.80, 4.79, 4.78, 4.77, 4.76, 4.75, 4.74, 4.73, 4.72, 4.71, 4.70, 4.69, 4.68, 4.67, 4.66, 4.65, 4.64, 4.63, 4.62, 4.61, 4.60, 4.59, 4.58, 4.57, 4.56, 4.55, 4.54, 4.53, 4.52, 4.51, 4.50, 4.49, 4.48, 4.47, 4.46, 4.45, 4.44, 4.43, 4.42, 4.41, 4.40, 4.39, 4.38, 4.37, 4.36, 4.35, 4.34, 4.33, 4.32, 4.31, 4.30, 4.29, 4.28, 4.27, 4.26, 4.25, 4.24, 4.23, 4.22, 4.21, 4.20, 4.19, 4.18, 4.17, 4.16, 4.15, 4.14, 4.13, 4.12, 4.11, 4.10, 4.09, 4.08, 4.07, 4.06, 4.05, 4.04, 4.03, 4.02, 4.01, 4.00, 3.99, 3.98, 3.97, 3.96, 3.95, 3.94, 3.93, 3.92, 3.91, 3.90, 3.89, 3.88, 3.87, 3.86, 3.85, 3.84, 3.83, 3.82, 3.81, 3.80, 3.79, 3.78, 3.77, 3.76, 3.75, 3.74, 3.73, 3.72, 3.71, 3.70, 3.69, 3.68, 3.67, 3.66, 3.65, 3.64, 3.63, 3.62, 3.61, 3.60, 3.59, 3.58, 3.57, 3.56, 3.55, 3.54, 3.53, 3.52, 3.51, 3.50, 3.49, 3.48, 3.47, 3.46, 3.45, 3.44, 3.43, 3.42, 3.41, 3.40, 3.39, 3.38, 3.37, 3.36, 3.35, 3.34, 3.33, 3.32, 3.31, 3.30, 3.29, 3.28, 3.27, 3.26, 3.25, 3.24, 3.23, 3.22, 3.21, 3.20, 3.19, 3.18, 3.17, 3.16, 3.15, 3.14, 3.13, 3.12, 3.11, 3.10, 3.09, 3.08, 3.07, 3.06, 3.05, 3.04, 3.03, 3.02, 3.01, 3.00, 2.99, 2.98, 2.97, 2.96, 2.95, 2.94, 2.93, 2.92, 2.91, 2.90, 2.89, 2.88, 2.87, 2.86, 2.85, 2.84, 2.83, 2.82, 2.81, 2.80, 2.79, 2.78, 2.77, 2.76, 2.75, 2.74, 2.73, 2.72, 2.71, 2.70, 2.69, 2.68, 2.67, 2.66, 2.65, 2.64, 2.63, 2.62, 2.61, 2.60, 2.59, 2.58, 2.57, 2.56, 2.55, 2.54, 2.53, 2.52, 2.51, 2.50, 2.49, 2.48, 2.47, 2.46, 2.45, 2.44, 2.43, 2.42, 2.41, 2.40, 2.39, 2.38, 2.37, 2.36, 2.35, 2.34, 2.33, 2.32, 2.31, 2.30, 2.29, 2.28, 2.27, 2.26, 2.25, 2.24, 2.23, 2.22, 2.21, 2.20, 2.19, 2.18, 2.17, 2.16, 2.15, 2

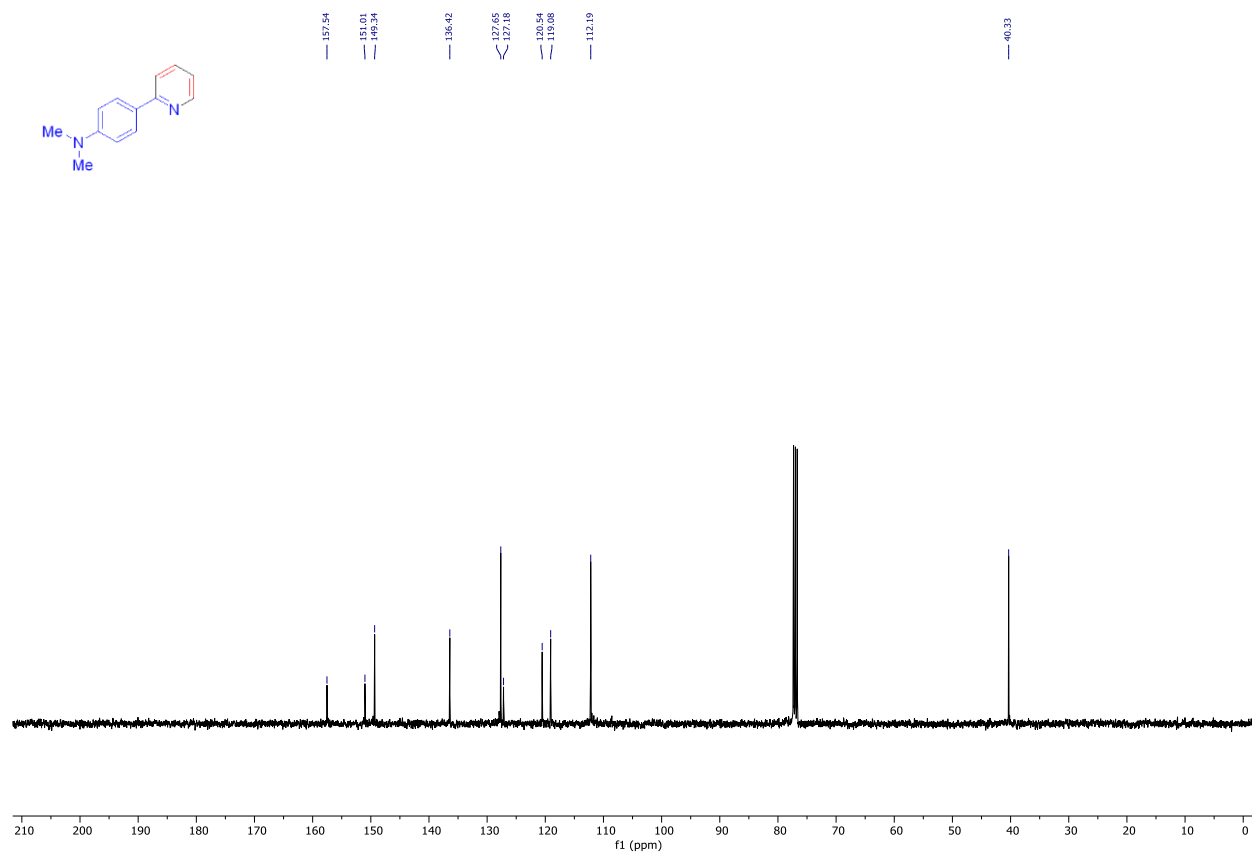
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 $^{13}\text{C}$  NMR Spectrum of **2h**

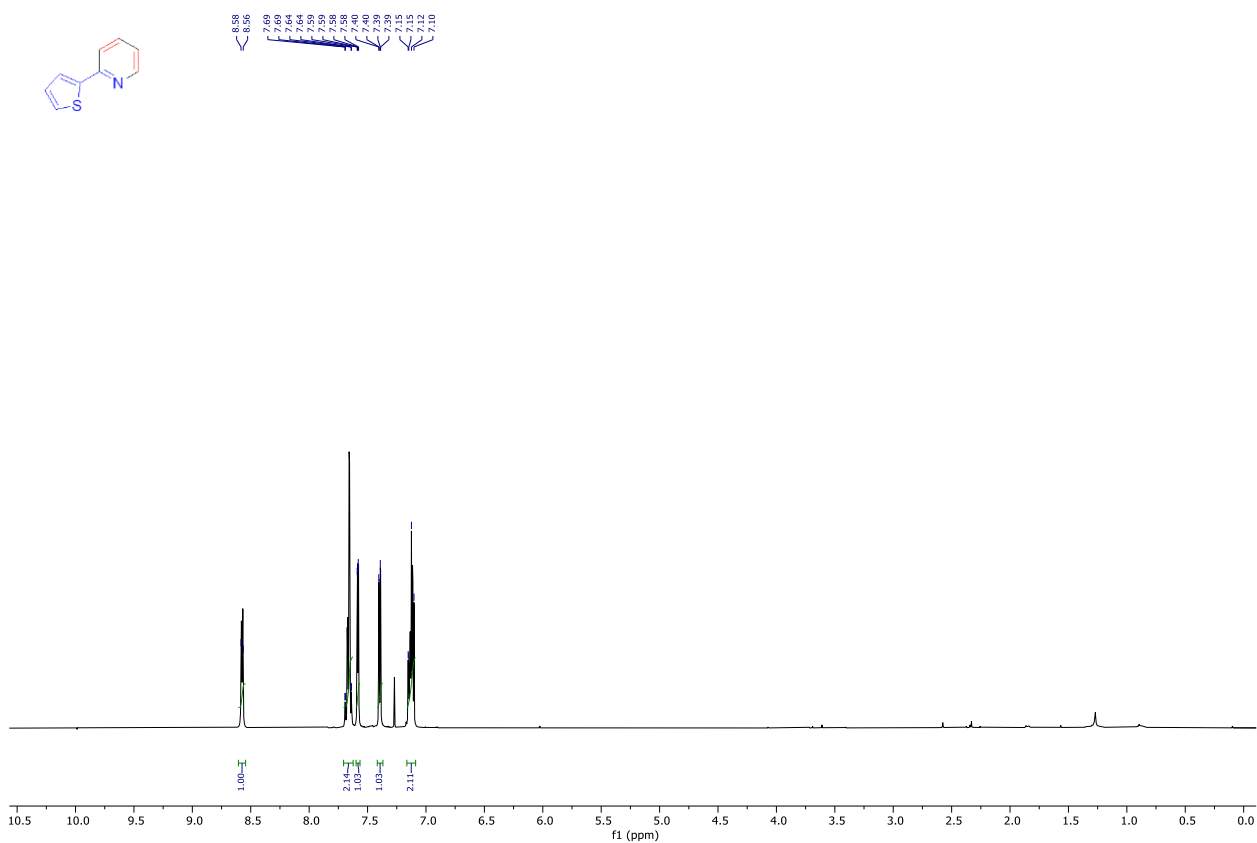
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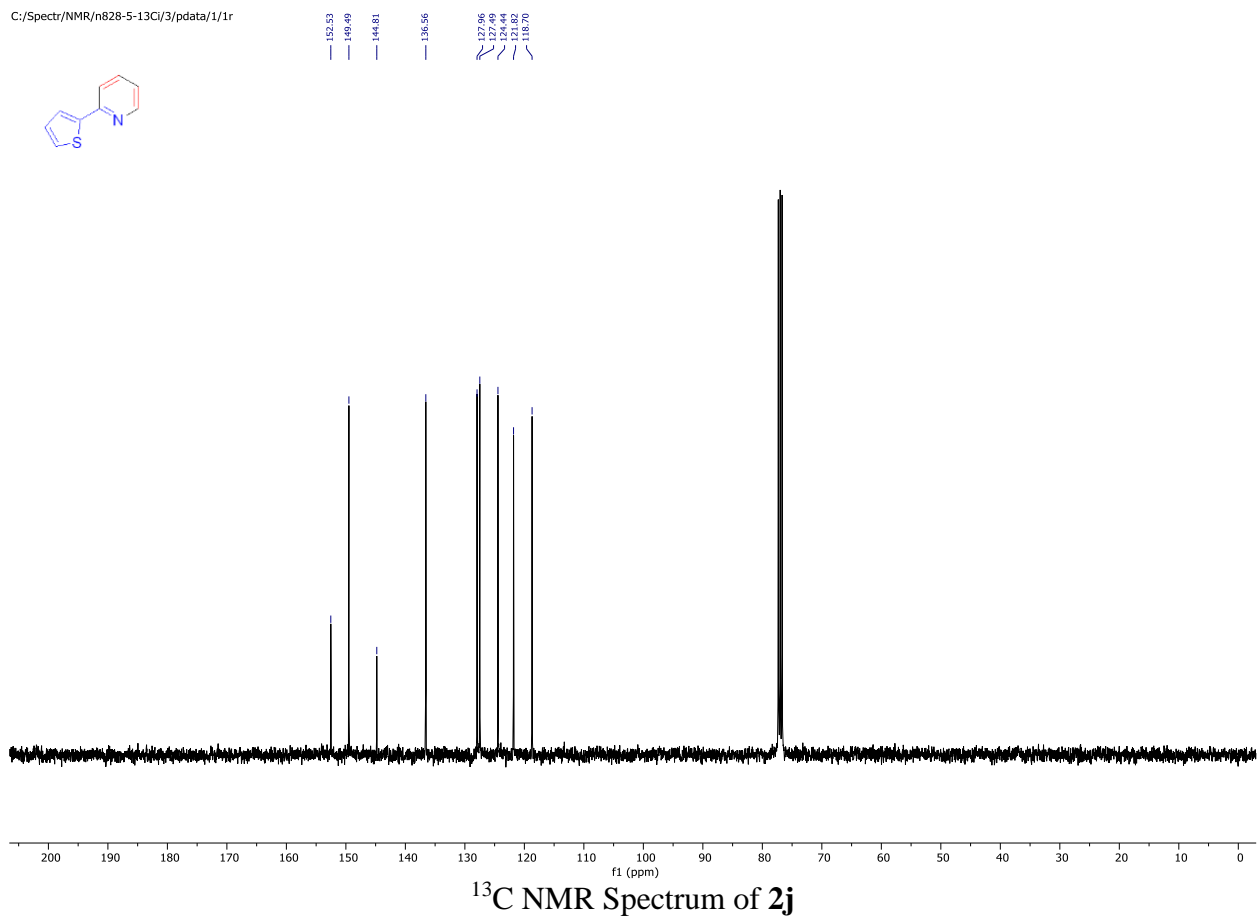
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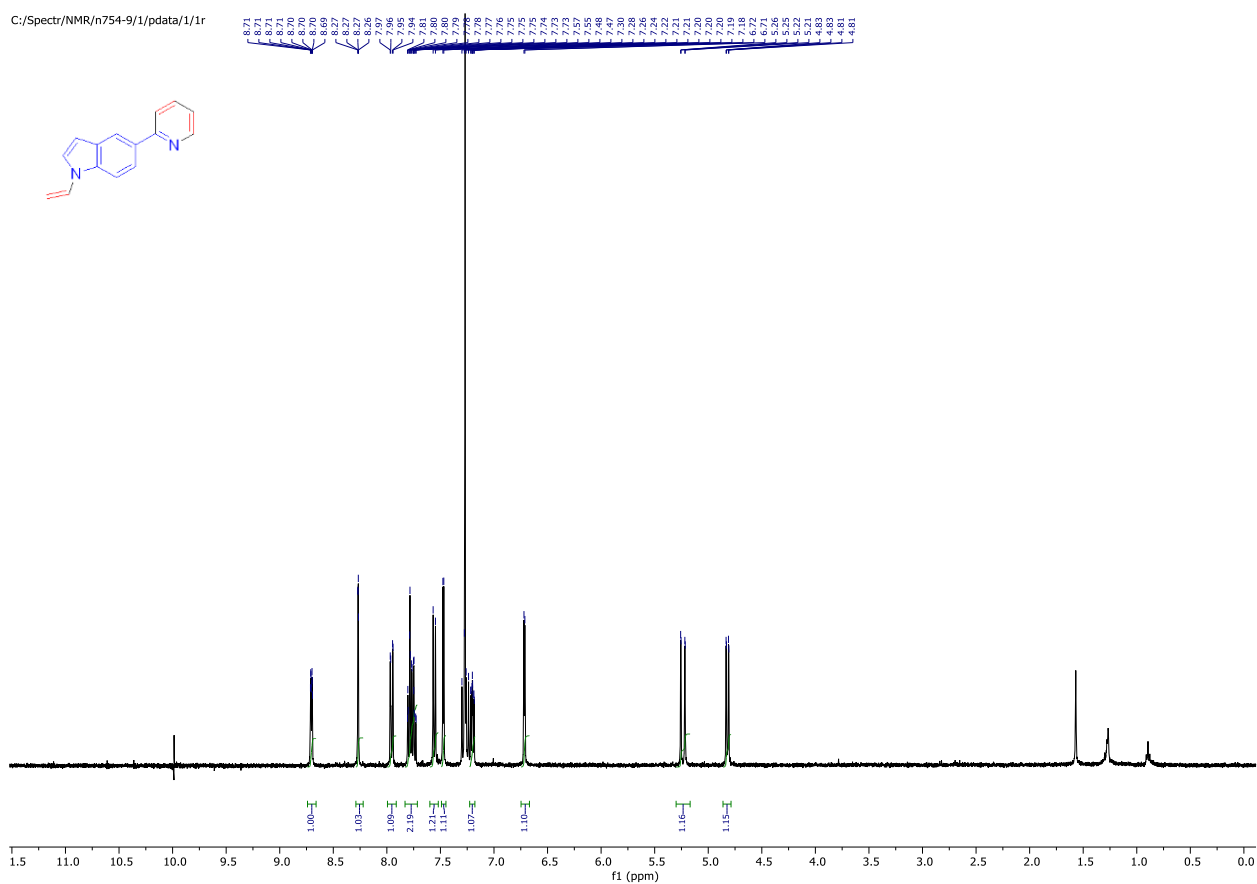
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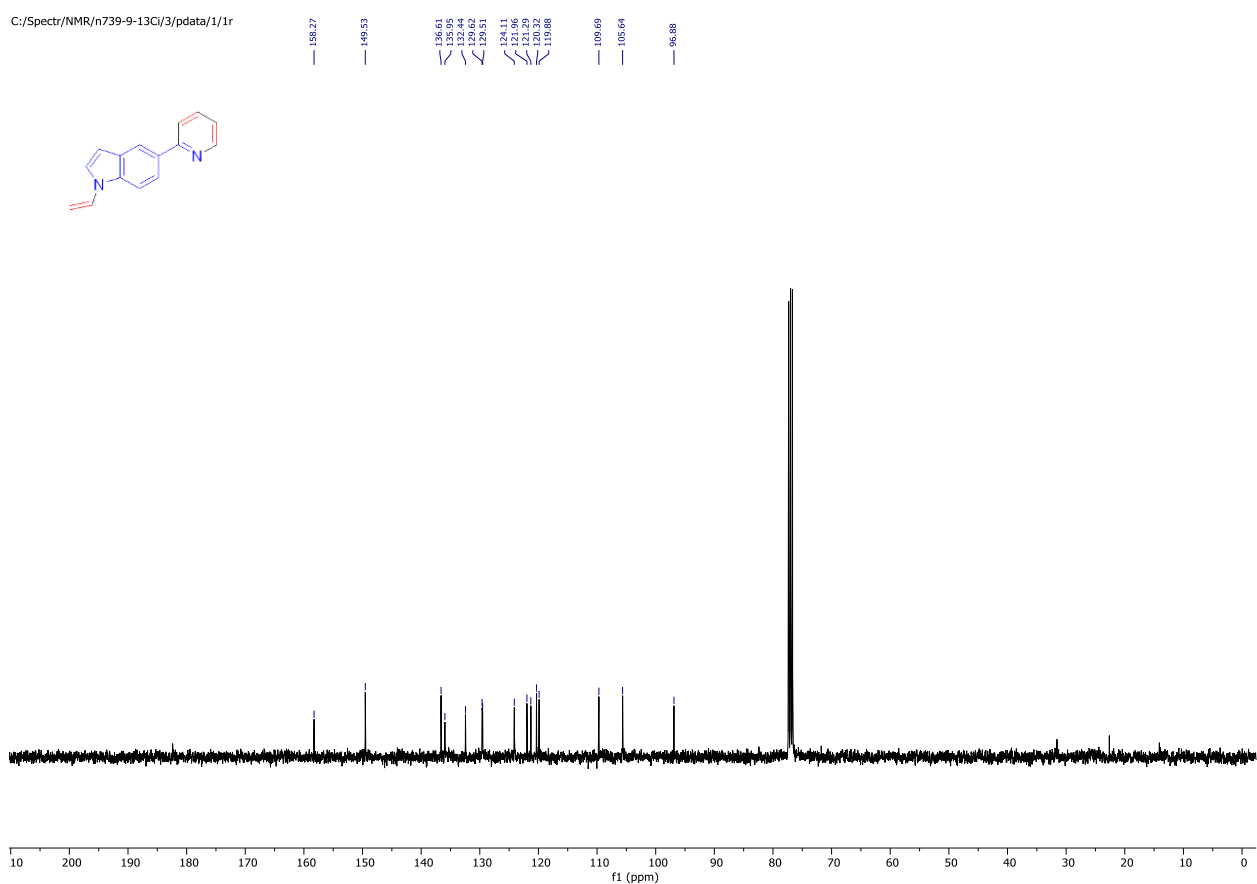
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C:/Spectr/NMR/n739-9-13C/3/pdata/1/1r





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