

## Supporting Information

# Substitution of Nitro Group with Grignard Reagents: Facile Arylation and Alkenylation of Pyridine *N*-oxides

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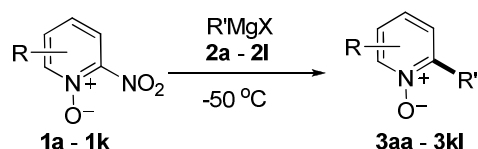
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## General

All NMR spectra were collected using a 400 MHz or 500 MHz Bruker NMR (100 MHz or 125 MHz for  $^{13}\text{C}$  spectroscopy) and all spectra recorded with tetramethylsilane as an internal standard unless otherwise noted. EI mass spectra were recorded on TRACE MS spectrometer. Infrared data were acquired using an AVATAR 360 FT-IR spectrophotometer. Melting points recorded on a TECH X-4 microscopic instrument and are uncorrected.

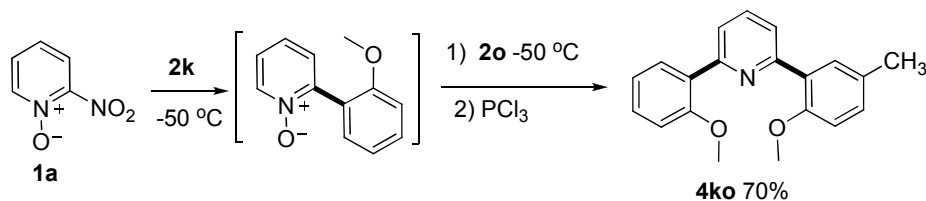
All reagents and solvents used for Grignard reagents and reactions were freshly dehydrated before use. The corresponding glassware was oven dried ( $120\text{ }^\circ\text{C}$ ) and cooled under a stream of argon gas. Functionalized Grignard reagents such as 2-dimethylcarbamoylphenyl magnesium chloride or 2-cyanophenyl magnesium chloride were prepared via iodine-magnesium exchange using *i*-PrMgCl•LiCl according to the Knochel's method<sup>1</sup> and titrated before use.<sup>2</sup> Other Grignard reagents were purchased or prepared according to standard procedure and titrated before use.<sup>2</sup>

### General Procedure for Arylation or Alkenylation of 2-Nitropyridine-*N*-oxides with Grignard Reagents



A dry argon-flushed flask equipped with a magnetic stirrer, was charged with 2-nitropyridine-*N*-oxide (1.0 mmol). Dry THF (50 mL) was added, the mixture was cooled to  $-50\text{ }^\circ\text{C}$ , followed by the dropwise addition of RMgBr (1.0 mL, 1.2 M in THF, 1.2 mmol) using a syringe. The mixture was stirred at  $-50\text{ }^\circ\text{C}$  until the reaction was completed (checked by TLC). The reaction was quenched by adding a 10% solution of  $\text{Na}_2\text{CO}_3$  (20 mL) followed by removing THF in vacuo. The remaining aqueous phase was extracted with  $\text{CH}_2\text{Cl}_2$  ( $5 \times 40\text{ mL}$ ), and the organic fractions were combined and dried over  $\text{Na}_2\text{SO}_4$ . Evaporation of  $\text{CH}_2\text{Cl}_2$  left a crude residue that was purified by flash chromatography to give the desired products.

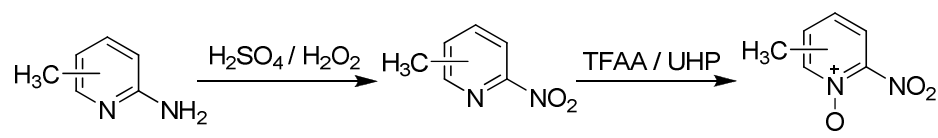
### Typical procedure for one-pot iterative arylation or alkenylation of pyridine-*N*-oxide (4ko, Scheme 3)



A dry argon-flushed flask equipped with a magnetic stirrer, was charged with 2-nitropyridine *N*-oxide (1a, 140 mg, 1.0 mmol). Dry THF (50 mL) was added, the mixture was cooled to  $-50\text{ }^\circ\text{C}$ , and 2-methoxyphenyl magnesium bromide (2k, 1.0

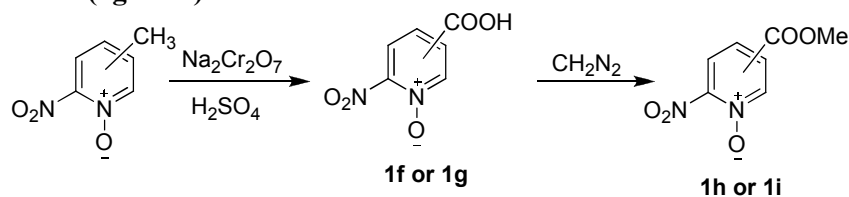
mL, 1.1 M in THF, 1.1 mmol) was then added dropwise through a syringe. The mixture was stirred at that temperature until **1a** was consumed (monitored by TLC). Then, 2-methoxy-5-methylphenyl magnesium bromide (**2o**, 1.0 mL, 1.2 M in THF, 1.2 mmol) was added dropwise through a syringe. Upon completion of the reaction (monitored by TLC), the mixture was warmed to 0 °C and PCl<sub>3</sub> (0.20g, 1.5 mmol) was added. The mixture was allowed to come to room temperature and stirred for 2 h. The mixture was treated with saturated aqueous Na<sub>2</sub>CO<sub>3</sub> (30 mL) and THF was removed by distillation in vacuo. The aqueous phase was extracted with CH<sub>2</sub>Cl<sub>2</sub> (5 × 30 mL), and the organic fractions were dried (Na<sub>2</sub>SO<sub>4</sub>), and concentrated in vacuo. The crude residue was purified by flash chromatography to yield **4ko** as a white solid (214mg, 70%).

**General procedure for preparation 2-nitropyridine *N*-oxide (1a) or 2-nitropicoline *N*-oxide (1b-1e)**



- (1) According to reported procedure:<sup>3</sup> 2-aminopyridine or 2-aminopicoline (53 mmol) was dissolved in conc. H<sub>2</sub>SO<sub>4</sub> (150 mL) and was cooled to 0 ~ 5 °C. To the mixture, 20% H<sub>2</sub>O<sub>2</sub> (70 mL) was added dropwise. The mixture was allowed to warm to room temperature and stirred overnight. The mixture was neutralized with saturated aqueous solution of Na<sub>2</sub>CO<sub>3</sub> and extracted with CH<sub>2</sub>Cl<sub>2</sub>. The combined organic layer was dried over Na<sub>2</sub>SO<sub>4</sub>. After concentration by rotary evaporation the product was afforded in an about 60% yield and was used directly in next step.
- (2) According to reported procedure:<sup>4</sup> 2-nitropyridine or 2-nitropicoline (30 mmol) was dissolved in CH<sub>2</sub>Cl<sub>2</sub> (200 mL) and urea peroxide (6.0g, 0.064 mol) was added. The mixture was stirred and cooled to 0 ~ 5 °C. To the mixture, (CF<sub>3</sub>CO)<sub>2</sub>O (15 mL) was added dropwise. After stirring at that temperature for 30 min, the mixture was allowed to warm to room temperature and stirred until the oxidation was completed. The reaction was quenched with an aqueous solution of Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> to destroy any residual peroxides before being poured into a saturated aqueous solution of NaHCO<sub>3</sub> and extracted with CH<sub>2</sub>Cl<sub>2</sub>. The combined organic layers were dried over Na<sub>2</sub>SO<sub>4</sub>. After concentration by rotary evaporation the residue was purified by flash column chromatography over silica to afford the desired product.

**Preparation of 2-nitro-4(5)-pyridinecarboxylic acid *N*-oxide (1f or 1h) and their methyl esters (1g or 1i)**



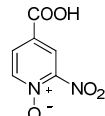
- (1) 2-Nitropicoline *N*-oxide (1.5g, 10 mmol) was dissolved in conc. H<sub>2</sub>SO<sub>4</sub> (10 mL),

and the mixture was stirred and warmed to 30 °C. To the mixture, Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> (2.9g, 10 mmol) was added in portions in 2.5 h. Stirring was continued for 2.0 h at that temperature after the addition. The mixture was poured into ice water (20~30 mL) and allowed to stand at 4 °C for 8 hr. A yellow solid precipitated which was collected by filtration, washed with icy water (3×5 mL) and dried in vacuo. Yield: 0.46 g (25%).

- (2) 2-Nitropyridinecarboxylic acid *N*-oxide (0.2g, 1 mmol) was dissolved in CH<sub>2</sub>Cl<sub>2</sub> (20 mL), an ethereal solution of CH<sub>2</sub>N<sub>2</sub> (2 mmol) was added. The mixture was allowed to stand at room temperature for 2 h. The desired product was afforded in an above 90% yield after evaporation of the solvents in vacuo.

## Compound characterization

### 4-Carboxy-2-nitropyridine *N*-oxide

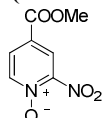


**1f**

Pale yellow solid; m.p. 221-223 °C; R<sub>f</sub> = 0.48 (petroleum ether/ethyl acetate/acetic acid = 1:1:0.01).

IR (cm<sup>-1</sup>, KBr): 3421, 3110, 3068, 3057, 1725, 1570, 1388, 1257, 1228, 1120, 1089, 938, 897, 865; <sup>1</sup>H NMR (400 MHz, C MeOD) δ(ppm): 8.41 (d, *J* = 6.8 Hz, 1H), 8.35 (d, *J* = 2.3 Hz, 1H), 8.02 (dd, *J* = 6.8 Hz, *J* = 2.3 Hz, 1H); <sup>13</sup>C NMR (100 MHz, MeOD) δ(ppm): 164.6, 142.8, 130.6, 129.2, 122.2; MS(ESI): (M-1)(m/z, 183); Anal. Calcd for C<sub>8</sub>H<sub>4</sub>N<sub>2</sub>O<sub>5</sub>: C, 39.14; H, 2.19; N, 15.22. Found: C, 39.01; H, 2.25; N, 15.37.

### 4-(Methoxycarbonyl)-2-nitropyridine *N*-oxide

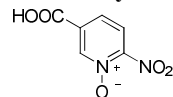


**1g**

Pale yellow solid; m.p. 112-113 °C; R<sub>f</sub> = 0.51 (petroleum ether/ethyl acetate = 1:1).

IR (cm<sup>-1</sup>, KBr): 3113, 3065, 2943, 1738, 1718, 1617, 1548, 1441, 1282, 1210, 763; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ(ppm): 8.32 (d, *J* = 6.8 Hz, 1H), 8.27 (d, *J* = 2.3 Hz, 1H), 8.02 (dd, *J* = 6.8, 2.3 Hz, 1H), 4.00 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ(ppm): 162.3, 141.8, 127.4, 126.3, 121.2, 53.4; MS(ESI): [M+H]<sup>+</sup> (m/z, 199); Anal. Calcd for C<sub>7</sub>H<sub>6</sub>N<sub>2</sub>O<sub>5</sub>: C, 42.43; H, 3.05; N, 14.14. Found: C, 42.35; H, 3.18; N, 14.23.

### 5-Carboxy-2-nitropyridine *N*-oxide



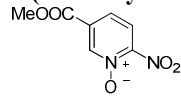
**1h**

Pale yellow solid, m.p. 158-160 °C; R<sub>f</sub> = 0.36 (petroleum ether/ethyl acetate/acetic acid = 1:1:0.01).

IR (cm<sup>-1</sup>, KBr): 3431, 3119, 3092, 3061, 1720, 1560, 1394, 1274, 1231, 1121, 948, 906, 760, 738; <sup>1</sup>H NMR (400 MHz, MeOD) δ (ppm): 8.77 (s, 1H), 8.02 (d, *J* = 8.4 Hz, 1H), 7.97 (d, *J* = 8.4 Hz, 1H); <sup>13</sup>C NMR (100 MHz, MeOD) δ(ppm): 164.1, 143.2, 133.6, 129.6, 121.7; MS(ESI): (M-1)

(m/z, 183); Anal. Calcd for C<sub>6</sub>H<sub>4</sub>N<sub>2</sub>O<sub>5</sub>: C, 39.14; H, 2.19; N, 15.22. Found: C, 39.37; H, 1.97; N, 15.36.

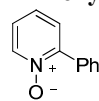
### 5-(Methoxycarbonyl)-2-nitropyridine *N*-oxide



**1i**

Pale yellow solid; m.p. 107-108 °C; R<sub>f</sub> = 0.46 (petroleum ether/ethyl acetate = 1:1). IR (cm<sup>-1</sup>, KBr): 3021, 3057, 3021, 1735, 1620, 1539, 1433, 1358, 1286, 1211, 1138, 765, 722; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ (ppm): 8.86 (d, *J* = 1.2 Hz, 1H), 7.93 (dd, *J* = 8.5, 1.5 Hz, 1H), 7.72 (d, *J* = 8.5 Hz, 1H), 4.02 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (ppm): 162.3, 141.8, 127.5, 126.3, 121.3, 53.3; MS (ESI): [M+H]<sup>+</sup> (m/z, 199); Anal. Calcd for C<sub>7</sub>H<sub>6</sub>N<sub>2</sub>O<sub>5</sub>: C, 42.43; H, 3.05; N, 14.14. Found: C, 42.46; H, 3.08; N, 14.08.

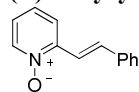
### 2-Phenylpyridine *N*-oxide<sup>[5]</sup>



**3aa**

Pale white solid, m.p. 155- 158 °C (lit.: 155-157 °C); R<sub>f</sub> = 0.18 (petroleum ether/ethyl acetate = 1:1). IR (cm<sup>-1</sup>, KBr): 3062, 3044, 1477, 1418, 1241, 841, 759, 724, 697; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ (ppm): 8.27 (d, *J* = 6.1 Hz, 1H), 7.74 (d, *J* = 7.4 Hz, 2H), 7.41-7.35 (m, 4H), 7.26-7.19 (m, 1H), 7.18-7.14 (m, 1H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (ppm): 149.3, 140.5, 132.6, 129.6, 129.3, 128.3, 127.4, 125.8, 124.5; MS (EI): 170 (M-1, 70), 171 (M<sup>+</sup>, 35), 154 (25), 142 (40), 117 (100), 115 (45), 63 (70).

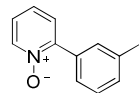
### (*E*)-2-styrylpyridine *N*-oxide



**3ab**

Pale yellow solid, m.p. 149- 150 °C; R<sub>f</sub> = 0.12 (ethyl acetate). IR (cm<sup>-1</sup>, KBr): 3050, 1628, 1491, 1439, 1426, 1239, 1198, 1181, 974, 852, 759; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ (ppm): 8.26 (d, *J* = 6.3 Hz, 1H), 7.83 (d, *J* = 16.7 Hz, 1H), 7.64 (d, *J* = 8.4 Hz, 1H), 7.61 (d, *J* = 7.5 Hz, 2H), 7.46-7.33 (m, 4H), 7.24 (m, 1H), 7.13 (t, *J* = 6.4 Hz, 1H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (ppm): 148.0, 140.0, 136.2, 135.6, 129.1, 128.8, 127.5, 125.4, 123.6, 122.9, 118.8; MS (ESI): [M+Na]<sup>+</sup> (m/z, 220), [2M+Na]<sup>+</sup> (m/z, 417); Anal. Calcd for C<sub>13</sub>H<sub>11</sub>NO: C, 79.16; H, 5.62; N, 7.10. Found: C, 78.89; H, 5.37; N, 6.96.

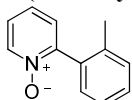
### 2-(3-Methylphenyl)pyridine *N*-oxide



**3ac**

Pale solid, m.p. 129-131 °C; R<sub>f</sub> = 0.19 (petroleum ether/ethyl acetate = 1:1). IR (cm<sup>-1</sup>, KBr): 3035, 2916, 1472, 1397, 1244, 1188, 1110, 1038, 870, 777, 690; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ (ppm): 8.26 (d, *J* = 6.3 Hz, 1H), 7.56 (s, 1H), 7.50 (d, *J* = 7.6 Hz, 1H), 7.34-7.30 (m, 2H), 7.23-7.12 (m, 3H), 2.34 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (ppm): 149.6, 140.5, 137.9, 132.6, 130.4, 129.8, 128.2, 127.4, 126.3, 125.6, 124.3, 21.4; MS (ESI): [M]<sup>+</sup> (m/z, 185), [M+H]<sup>+</sup> (m/z, 186); Anal. Calcd for C<sub>12</sub>H<sub>11</sub>NO: C, 77.81; H, 5.99; N, 7.56. Found: C, 77.67; H, 5.72; N, 7.13.

### 2-(2-Methylphenyl)pyridine *N*-oxide<sup>[6]</sup>

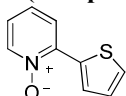


**3ad**

Pale solid, m.p. 121-123 °C (lit.:123-124 °C);  $R_f = 0.18$  (petroleum ether/ethyl acetate = 1:1).

IR (cm<sup>-1</sup>, KBr): 3059, 2926, 1476, 1419, 1245, 1013, 845, 772, 586, 489; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 8.34 (s, 1H), 7.37-7.23 (m, 7H), 2.25 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 150.8, 140.0, 137.8, 133.1, 130.1, 129.5, 129.3, 127.9, 125.9, 125.2, 124.9, 19.5.

### 2-(Thiophen-2-yl)pyridine *N*-oxide

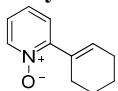


**3ae**

Pale solid, m.p. 143-146 °C;  $R_f = 0.16$  (petroleum ether/ethyl acetate = 1:1).

IR (cm<sup>-1</sup>, KBr): 3069, 1517, 1480, 1414, 1250, 1221, 854, 835, 754, 721, 530; <sup>1</sup>H NMR (400MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 8.33 (d,  $J = 6.5$  Hz, 1H), 7.94 (d,  $J = 8.3$  Hz, 1H), 7.86 (d,  $J = 3.0$  Hz, 1H), 7.57 (d,  $J = 4.4$  Hz, 1H), 7.31 (t,  $J = 8.1$ Hz, 1H), 7.22-7.20 (m, 1H), 7.14-7.11(m, 1H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 143.2, 139.6, 131.6, 130.9, 127.1, 126.0, 125.6, 122.3, 122.1; MS(ESI): [M+H]<sup>+</sup> (m/z, 178, 100); Anal. Calcd for C<sub>9</sub>H<sub>7</sub>NOS: C, 60.99; H, 3.98; N, 7.90. Found: C, 60.78; H, 4.31; N, 8.34.

### 2-Cyclohexenylpyridine *N*-oxide

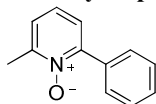


**3af**

Pale yellow liquid,  $R_f = 0.13$  (ethyl acetate).

IR (cm<sup>-1</sup>, KBr): 3019, 3008, 2968, 2923, 2875, 1611, 1569, 1531, 1485, 1379, 1356, 1308, 1258, 1232, 1163, 1083, 815, 698 ; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 8.20 (d,  $J = 6.4$  Hz, 1H), 7.20 (d,  $J = 4.5$  Hz, 2H), 7.15-7.11 (m, 1H), 6.14-6.12 (m, 1H), 2.52 (br s, 2H), 2.27-2.23 (m, 2H), 1.78-1.71 (m, 4H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 152.5, 140.1, 133.8, 131.8, 126.2, 125.8, 123.9, 25.8, 25.6, 22.3, 21.8; MS(ESI): [M+H]<sup>+</sup> (m/z, 176); Anal. Calcd for C<sub>11</sub>H<sub>13</sub>ClNO: C, 75.40; H, 7.48; N, 7.99. Found: C, 75.76; H, 7.35; N, 8.23.

### 2-Methyl-6-phenylpyridine *N*-oxide<sup>[5]</sup>

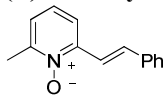


**3ba**

Pale solid, m.p. 121-123 °C (lit.:118-119 °C);  $R_f = 0.47$  (petroleum ether/ethyl acetate = 2:1).

IR (cm<sup>-1</sup>, KBr): 3059, 3014, 1480, 1453, 1259, 1238, 837, 769, 705; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 8.33 (d,  $J = 6.2$ Hz, 1H), 7.73 (d,  $J = 8.1$ Hz, 1H), 7.43-7.41 (m, 1H), 7.30-7.26 (m, 3H), 7.22-7.18 (m, 1H), 2.41(s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 150.0, 149.5, 133.3, 129.4, 129.3, 128.1, 125.1, 125.0, 124.9, 18.6.

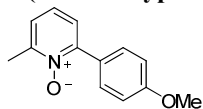
### (*E*)-2-methyl-6-styrylpyridine *N*-oxide



**3bb**

Pale yellow solid, m.p. 86-87 °C;  $R_f = 0.38$  (petroleum ether/ethyl acetate = 2:1). IR ( $\text{cm}^{-1}$ , KBr): 3058, 2904, 1666, 1626, 1557, 1496, 1448, 1389, 1376, 1245, 969, 835, 773, 745;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.88 (d,  $J = 16.7$  Hz, 1H), 7.60 (d,  $J = 7.3$  Hz, 2H), 7.54 (t,  $J = 5.1$  Hz, 1H), 7.46-7.37 (m, 3H), 7.34-7.30 (m, 1H), 7.25 (d,  $J = 7.1$  Hz, 1H), 7.15 (d,  $J = 5.1$  Hz, 1H), 2.56 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 149.5, 147.9, 136.4, 135.2, 128.9, 128.8, 127.4, 124.6, 124.1, 120.7, 119.6, 18.4; MS (ESI):  $[\text{M}+\text{Na}]^+$  ( $m/z$ , 234),  $[\text{2M}+\text{Na}]^+$  ( $m/z$ , 445); Anal. Calcd for  $\text{C}_{14}\text{H}_{13}\text{NO}$ : C, 79.59; H, 6.20; N, 6.63. Found: C, 79.30; H, 6.02; N, 6.42.

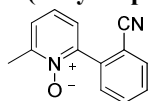
### 2-(4-Methoxyphenyl)-6-methylpyridine *N*-oxide



**3bg**

Pale yellow solid, m.p. 64-65 °C;  $R_f = 0.33$  (petroleum ether/ethyl acetate = 1:1). IR ( $\text{cm}^{-1}$ , KBr): 2925, 1607, 1575, 1517, 1438, 1445, 1371, 1295, 1251, 1180, 1101, 1030, 832, 777;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.76 (d,  $J = 8.7$  Hz, 2H), 7.31-7.30 (m, 1H), 7.20 (s, 2H), 6.98 (d,  $J = 8.7$  Hz, 2H), 3.86 (s, 3H), 2.58 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 160.3, 149.9, 149.2, 130.9, 125.5, 125.0, 124.6, 124.5, 113.5, 55.3, 18.6; MS (ESI):  $[\text{M}+\text{H}]^+$  ( $m/z$ , 216),  $[\text{2M}+\text{Na}]^+$  ( $m/z$ , 453); Anal. Calcd for  $\text{C}_{13}\text{H}_{13}\text{NO}_2$ : C, 72.54; H, 6.09; N, 6.51. Found: C, 72.23; H, 5.89; N, 6.37.

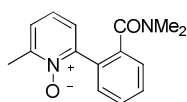
### 2-(2-Cyanophenyl)-6-methylpyridine *N*-oxide



**3bh**

Pale yellow solid, m.p. 200-201 °C;  $R_f = 0.41$  (petroleum ether/ethyl acetate = 2:1). IR ( $\text{cm}^{-1}$ , KBr): 3049, 3018, 2991, 2223, 1560, 1472, 1441, 1372, 1261, 1241, 997, 841, 786;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.80 (d,  $J = 7.7$  Hz, 1H), 7.75-7.64 (m, 2H), 7.57-7.53 (m, 1H), 7.42-7.32 (m, 2H), 7.30-7.27 (m, 1H), 2.60 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 150.2, 148.3, 136.7, 133.1, 132.5, 130.9, 129.5, 126.8, 125.6, 124.9, 117.5, 113.1, 18.3; MS (ESI):  $[\text{M}+\text{Na}]^+$  ( $m/z$ , 211),  $[\text{2M}+\text{Na}]^+$  ( $m/z$ , 233); Anal. Calcd for  $\text{C}_{13}\text{H}_{10}\text{N}_2\text{O}$ : C, 74.27; H, 4.79; N, 13.33. Found: C, 74.01; H, 4.63; N, 13.16.

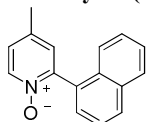
### 2-(Dimethylcarbamoylphenyl)-6-methylpyridine *N*-oxide



**3bi**

Pale yellow solid, m.p. 132-133 °C;  $R_f = 0.38$  (petroleum ether/ethyl acetate = 2:1). IR ( $\text{cm}^{-1}$ , KBr): 2985, 2929, 1733, 1464, 1421, 1300, 1227, 1105, 987, 857;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.54-7.50 (m, 1H), 7.48-7.45 (m, 2H), 7.41-7.39 (m, 1H), 7.32 (dd,  $J = 7.5$ , 2.0 Hz, 1H), 7.24 (dd,  $J = 7.5$ , 2.0 Hz, 1H), 7.20-7.17 (m, 1H), 2.97 (s, 3H), 2.93 (s, 3H), 2.50 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 170.9, 149.0, 148.5, 136.9, 131.8, 130.6, 128.9, 128.8, 126.6, 125.5, 125.4, 124.4, 39.4, 35.0, 18.4; MS (ESI):  $[\text{M}+\text{Na}]^+$  ( $m/z$ , 279); Anal. Calcd for  $\text{C}_{13}\text{H}_{10}\text{N}_2\text{O}$ : C, 74.27; H, 4.79; N, 13.33. Found: C, 74.01; H, 4.63; N, 13.16.

### 4-Methyl-6-(naphthalen-1-yl)pyridine *N*-oxide<sup>[7]</sup>

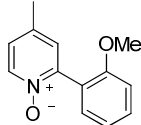


**3cj**

Pale solid, m.p. 133-136 °C (lit.: 135-137 °C);  $R_f = 0.47$  (petroleum ether/ethyl acetate = 2:1).

IR (cm<sup>-1</sup>, KBr): 3042, 1478, 1461, 1417, 1236, 838, 780, 505; <sup>1</sup>H NMR (500MHz, CDCl<sub>3</sub>) δ (ppm): 8.37 (d, *J* = 5.0Hz, 1H), 7.99 (d, *J* = 8.2Hz, 1H), 7.94 (d, *J* = 8.0Hz, 1H), 7.59 (t, *J* = 7.3Hz, 1H), 7.54-7.49 (m, 4H), 7.28 (d, *J* = 6.9Hz, 1H), 7.22 (s, 1H), 2.44 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (ppm): 149.0, 137.9, 137.2, 133.8, 130.8, 130.1, 129.6, 128.7, 127.2, 126.9, 126.2, 125.6, 124.2, 29.4.

### 2-(2-Methoxyphenyl)-4-methylpyridine *N*-oxide

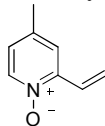


**3ck**

Pale yellow solid, m.p. 147-148 °C; R<sub>f</sub> = 0.22 (ethyl acetate/ethanol = 10:1).

IR (cm<sup>-1</sup>, KBr): 2959, 1605, 1587, 1535, 1457, 14335, 1389, 1302, 1297, 1205, 1157, 1024, 887; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ (ppm): 8.23 (d, *J* = 6.6 Hz, 1H), 7.46-7.41 (m, 1H), 7.36 (dd, *J* = 7.5, 1.3 Hz, 1H), 7.15 (d, *J* = 1.6 Hz, 1H), 7.07-7.00 (m, 3H), 3.83 (s, 3H), 2.36 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (ppm): 157.2, 147.2, 139.3, 136.5, 130.9, 130.6, 128.9, 125.5, 122.3, 120.6, 111.3, 55.8, 20.3; MS (ESI): [M+Na]<sup>+</sup> (m/z, 238), [2M+Na]<sup>+</sup> (m/z, 453); Anal. Calcd for C<sub>13</sub>H<sub>13</sub>NO<sub>2</sub>: C, 72.54; H, 6.09; N, 6.51. Found: C, 72.31; H, 5.92; N, 6.37.

### 4-Methyl-2-vinylpyridine *N*-oxide

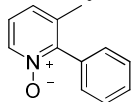


**3cl**

Pale yellow liquid, R<sub>f</sub> = 0.17 (ethyl acetate/ethanol = 10:1).

IR (cm<sup>-1</sup>, KBr): 3023, 2995, 2927, 1635, 1577, 1482, 1411, 1235, 1178, 1025, 766, 526; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ (ppm): 8.13 (d, *J* = 6.6 Hz, 1H), 7.41-7.33 (m, 2H), 7.00 (dd, *J* = 6.6, 2.2 Hz, 1H), 6.05 (d, *J* = 17.9 Hz, 1H), 5.68 (d, *J* = 11.4 Hz, 1H), 2.37 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (ppm): 147.0, 139.1, 137.3, 127.8, 125.3, 121.0; MS(ESI): [M+H]<sup>+</sup> (m/z, 136); Anal. Calcd for C<sub>8</sub>H<sub>9</sub>NO: C, 71.09; H, 6.71; N, 10.36. Found: C, 71.25; H, 6.67; N, 10.55.

### 3-Methyl-2-phenylpyridine *N*-oxide

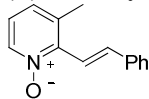


**3da**

Pale solid, m.p. 168-169 °C; R<sub>f</sub> = 0.32 (petroleum ether/ethyl acetate = 1:1).

IR (cm<sup>-1</sup>, KBr): 3069, 3023, 2949, 2914, 1477, 1444, 1419, 1274, 1245, 1053, 1012, 806, 763, 740; <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ (ppm): 8.26 (d, *J* = 6.0Hz, 1H), 7.54-7.52 (m, 2H), 7.48-7.45 (m, 1H), 7.37 (d, *J* = 7.3Hz, 2H), 7.22-7.16 (m, 2H), 2.13 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ (ppm): 149.8, 137.8, 136.0, 132.3, 129.1, 129.0, 128.8, 127.7, 123.9, 19.9; MS (EI): 186 (M+1,70), 185 (M<sup>+</sup>, 75), 184 (M-1, 100), 168 (70), 130 (30), 51 (35); Anal. Calcd for C<sub>12</sub>H<sub>11</sub>NO: C, 77.81; H, 5.99; N, 7.56. Found: C, 77.99; H, 5.76; N, 7.21.

### (*E*)-3-methyl-2-styrylpyridine *N*-oxide



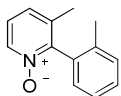
**3db**

Pale yellow solid, m.p. 95-96 °C; R<sub>f</sub> = 0.15(ethyl acetate).

IR (cm<sup>-1</sup>, KBr): 3013, 2950, 1603, 1523, 1487, 1456, 1378, 1355, 1223, 956, 933, 766, 738; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ (ppm): 8.18 (d, *J* = 6.4 Hz, 1H), 7.93 (d, *J* = 16.5 Hz, 1H), 7.59 (d, *J* = 7.3 Hz, 2H), 7.41-7.31 (m, 4H), 7.11 (d, *J* = 7.7 Hz, 1H), 7.04-7.00 (m, 1H), 2.51 (s, 3H); <sup>13</sup>C

NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 146.3, 138.5, 138.2, 136.9, 135.3, 128.8, 127.9, 127.2, 122.2, 118.2, 20.6; MS(ESI): [M+Na]<sup>+</sup> (m/z, 234), [2M+Na]<sup>+</sup> (m/z, 445); Anal. Calcd for C<sub>14</sub>H<sub>13</sub>NO: C, 79.59; H, 6.20; N, 6.63. Found: C, 79.29; H, 5.97; N, 6.39.

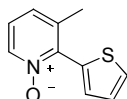
### 3-Methyl-2-(*o*-tolyl)pyridine *N*-oxide



#### 3dd

Pale solid, m.p.158-160 °C; R<sub>f</sub> = 0.36 (petroleum ether/ethyl acetate = 1:1). IR (cm<sup>-1</sup>, KBr): 3067, 3022, 2920, 1473, 1421, 1275, 1245, 1120, 1012, 804, 763, 586; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 8.19-8.18 (m, 1H), 7.31-7.28 (m, 3H), 7.24-7.19 (m, 2H), 7.11 (d, *J* = 5.5Hz, 1H), 2.06 (s, 3H), 1.95 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 150.1, 137.6, 136.8, 136.1, 132.0, 130.4, 129.2, 128.6, 127.1, 126.3, 123.9, 19.3, 18.9; MS(ESI): [M+H]<sup>+</sup> (m/z, 200, 100), 182 (15), 168 (20); Anal. Calcd for C<sub>13</sub>H<sub>13</sub>NO: C, 78.36; H, 6.58; N, 7.03. Found: C, 78.12; H, 6.94; N, 7.61.

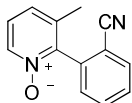
### 3-Methyl-2-(thiophen-2-yl)pyridine *N*-oxide



#### 3de

Yellow liquid, R<sub>f</sub> = 0.28 (petroleum ether/ethyl acetate = 1:1). IR (cm<sup>-1</sup>, KBr): 3387, 3100, 1473, 1447, 1424, 1269, 1249, 1194, 1038, 958, 729; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 8.30 (d, *J* = 6.1Hz, 1H), 7.56 (d, *J* = 4.7Hz, 1H), 7.39 (d, *J* = 2.4Hz, 1H), 7.27-7.22 (m, 1H), 7.15-7.09 (m, 2H), 2.40 (s, 3H); <sup>13</sup>C NMR (100MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 143.8, 137.7, 136.2, 131.0, 129.1, 129.0, 125.9, 123.1, 21.6; MS(ESI): [M+H]<sup>+</sup> (m/z, 192, 100%); Anal. Calcd for C<sub>10</sub>H<sub>9</sub>NOS: C, 62.80; H, 4.74; N, 7.32. Found: C, 62.65; H, 4.27; N, 7.76.

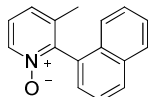
### 2-(2-Cyanophenyl)-3-methylpyridine *N*-oxide



#### 3dh

Pale solid, m.p.135-140°C; R<sub>f</sub> = 0.32 (petroleum ether/ethyl acetate = 1:1). IR (cm<sup>-1</sup>, KBr): 3119, 3053, 2994, 2223, 1590, 1460, 1439, 1416, 1275, 1233, 1041, 1013, 789, 780; <sup>1</sup>H NMR (400MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 8.19 (s, 1H), 7.76 (d, *J* = 7.6Hz, 1H), 7.68 (t, *J* = 7.4Hz, 1H), 7.51 (t, *J* = 7.6 Hz, 1H), 7.40 (d, *J* = 7.6 Hz, 1H), 7.18 (s, 2H), 2.06 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$ (ppm): 146.3, 137.8, 136.4, 136.3, 133.2, 133.1, 130.4, 129.5, 127.6, 125.2, 116.9, 113.4, 19.1; MS(ESI): [M+H]<sup>+</sup> (m/z, 211, 100); Anal. Calcd for C<sub>13</sub>H<sub>10</sub>N<sub>2</sub>O: C, 74.27; H, 4.79; N, 13.33. Found: C, 74.54; H, 4.65; N, 13.74.

### 3-Methyl-2-(naphthalen-1-yl)pyridine *N*-oxide

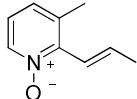


#### 3dj

Pale solid, m.p. 226-229 °C; R<sub>f</sub> = 0.41 (petroleum ether/ethyl acetate = 1:1). IR (cm<sup>-1</sup>, KBr): 3062, 1597, 1482, 1424, 1239, 1087, 1043, 968, 807, 780, 765, 583; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 8.25 (s, 1H), 7.89 (d, *J* = 8.2Hz, 1H), 7.84 (d, *J* = 8.1Hz, 1H), 7.52 (t, *J* = 7.3Hz, 1H), 7.42 (t, *J* = 6.9Hz, 1H), 7.35 (d, *J* = 3.2Hz, 2H), 7.26 (d, *J* = 8.3Hz, 1H), 7.19 (s,

2H), 1.92 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 149.0, 137.9, 137.2, 133.8, 130.8, 130.1, 129.6, 128.7, 127.2, 126.9, 126.2, 125.6, 124.2, 19.4; MS(EI):  $[\text{M}+\text{H}]^+$  (m/z, 236, 100),  $[\text{2M}+\text{H}]^+$  (m/z, 471, 25); Anal. Calcd for  $\text{C}_{16}\text{H}_{13}\text{NO}$ : C, 81.68; H, 5.57; N, 5.95. Found: C, 81.52; H, 5.78; N, 5.45.

### (E)-3-methyl-2-(prop-1-enyl)pyridine N-oxide

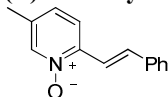


#### 3dm

Pale solid, m.p. 50-51  $^\circ\text{C}$ ;  $R_f$  = 0.11 (ethyl acetate).

IR ( $\text{cm}^{-1}$ , KBr): 3058, 2986, 2917, 1646, 1588, 1478, 1438, 1422, 1398, 1379, 1366, 1278, 1255, 1180, 1097, 1028, 958, 829, 723;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 8.17 (d,  $J$  = 6.1 Hz, 1H), 7.14-7.08 (m, 2H), 6.37 (d,  $J$  = 11.4 Hz, 1H), 6.20-6.12 (m, 1H), 2.27 (s, 3H), 1.62 (dd,  $J$  = 6.9, 1.4 Hz, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 147.1, 137.3, 135.8, 132.8, 127.3, 123.2, 121.0, 18.9, 15.8; MS(ESI):  $[\text{M}+\text{Na}]^+$  (m/z, 172),  $[\text{2M}+\text{Na}]^+$  (m/z, 321); Anal. Calcd for  $\text{C}_9\text{H}_{11}\text{NO}$ : C, 72.46; H, 7.43; N, 9.39. Found: C, 72.09; H, 7.25; N, 9.18.

### (E)-5-methyl-2-styrylpyridine N-oxide

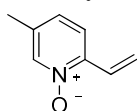


#### 3eb

Pale yellow solid, m.p. 136-137  $^\circ\text{C}$ ;  $R_f$  = 0.15 (petroleum ether/ethyl acetate = 1:1).

IR ( $\text{cm}^{-1}$ , KBr): 3059, 3029, 2985, 1504, 1447, 1383, 1268, 1260, 1164, 986, 812, 751, 712;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 8.12 (s, 1H), 7.80 (d,  $J$  = 16.7 Hz, 1H), 7.60 (d,  $J$  = 7.4 Hz, 2H), 7.54 (d,  $J$  = 8.2 Hz, 1H), 7.40-7.30 (m, 4H), 7.07 (d,  $J$  = 8.1 Hz, 1H), 2.30 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 145.2, 139.7, 136.3, 134.5, 134.3, 128.9, 128.8, 127.4, 126.9, 122.2, 118.7, 18.0; MS(ESI):  $[\text{M}+\text{Na}]^+$  (m/z, 234),  $[\text{2M}+\text{Na}]^+$  (m/z, 445); Anal. Calcd for  $\text{C}_{14}\text{H}_{13}\text{NO}$ : C, 79.59; H, 6.20; N, 6.63. Found: C, 79.23; H, 5.99; N, 6.38.

### 5-Methyl-2-vinylpyridine N-oxide

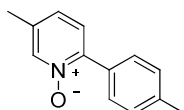


#### 3el

Pale yellow liquid,  $R_f$  = 0.53 (ethyl acetate).

IR ( $\text{cm}^{-1}$ , KBr): 3052, 3010, 2988, 1653, 1579, 1466, 1427, 1418, 1976, 1377, 1267, 1190, 1027, 759, 716;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 8.09 (s, 1H), 7.41-7.32 (m, 2H), 7.05 (d,  $J$  = 8.2 Hz, 1H), 6.01 (d,  $J$  = 17.9 Hz, 1H), 5.61 (d,  $J$  = 11.4 Hz, 1H), 2.30 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 147.0, 139.1, 137.2, 127.9, 125.2, 123.5, 120.9, 20.3; MS(ESI):  $[\text{M}+\text{Na}]^+$  (m/z, 158); Anal. Calcd for  $\text{C}_8\text{H}_9\text{NO}$ : C, 71.09; H, 6.71; N, 10.36. Found: C, 71.23; H, 6.52; N, 10.38.

### 5-Methyl-2-(p-tolyl)pyridine N-oxide



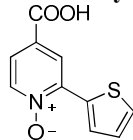
#### 3en

Pale solid, m.p. 143-145  $^\circ\text{C}$ ;  $R_f$  = 0.27 (petroleum ether/ethyl acetate = 1:1).

IR ( $\text{cm}^{-1}$ , KBr): 3034, 2917, 1495, 1454, 1376, 1171, 822, 800, 595;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 8.22 (s, 1H), 7.71 (d,  $J$  = 8.1 Hz, 2H), 7.33-7.26 (m, 3H), 7.13 (d,  $J$  = 7.4 Hz, 1H), 2.40 (s, 3H), 2.33 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 146.7, 140.3, 139.5, 134.8, 129.7, 129.1,

128.9, 127.3, 126.5, 21.4, 17.9; MS(ESI):  $[M+H]^+$  (m/z, 200); Anal. Calcd for  $C_{13}H_{13}NO$ : C, 78.36; H, 6.58; N, 7.03. Found: C, 78.67; H, 6.09; N, 7.46.

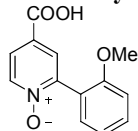
#### 4-Carboxy-2-(thiophen-2-yl)pyridine *N*-oxide



**3fe**

Pale yellow solid, m.p. 240-241 °C;  $R_f$  = 0.61 (petroleum ether/ethylacetate/acetic acid = 1:1:0.01). IR ( $cm^{-1}$ , KBr): 3397, 2998, 1729, 1611, 1523, 1500, 1467, 1334, 1267, 1212, 1045, 1031, 899, 737;  $^1H$  NMR (400 MHz, MeOD)  $\delta$ (ppm): 8.72 (d,  $J$  = 2.2 Hz, 1H), 8.44 (d,  $J$  = 6.8 Hz, 1H), 8.16 (d,  $J$  = 4.0 Hz, 1H), 7.83 (dd,  $J$  = 6.8, 2.2 Hz, 1H), 7.74 (d,  $J$  = 5.1 Hz, 1H), 7.29 (t,  $J$  = 4.5 Hz, 1H);  $^{13}C$  NMR (100 MHz, MeOD)  $\delta$ (ppm): 144.6, 141.1, 132.7, 131.9, 131.2, 130.1, 127.7, 124.5, 123.6; MS(ESI):  $[M+H]^+$  (m/z, 222); Anal. Calcd for  $C_{10}H_7NO_3S$ : C, 54.29; H, 3.19; N, 6.33. Found: C, 54.43; H, 3.26; N, 6.15.

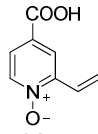
#### 4-Carboxy-2-(2-methoxyphenyl)pyridine *N*-oxide



**3fk**

Pale yellow solid, m.p. 210-211 °C;  $R_f$  = 0.53 (petroleum ether/ethyl acetate/acetic acid=1:1:0.01). IR ( $cm^{-1}$ , KBr): 3433, 2933, 1722, 1621, 1545, 1523, 1446, 1433, 1369, 1296, 1238, 1175, 1103, 1022, 847, 766;  $^1H$  NMR (400 MHz, MeOD)  $\delta$ (ppm): 8.45 (d,  $J$  = 7.4 Hz, 1H), 7.99-7.98 (m, 2H), 7.51 (t,  $J$  = 7.4 Hz, 1H), 7.36 (dd,  $J$  = 7.4, 1.1 Hz, 1H), 7.15 (d,  $J$  = 8.3 Hz, 1H), 7.09 (t,  $J$  = 7.4 Hz, 1H), 3.82 (s, 3H);  $^{13}C$  NMR (100 MHz, MeOD)  $\delta$ (ppm): 166.1, 158.8, 150.1, 141.4, 132.8, 131.5, 130.7, 130.2, 126.6, 122.5, 121.6, 112.5, 56.22; MS(ESI):  $[M+H]^+$  (m/z, 246); Anal. Calcd for  $C_{13}H_{11}NO_4$ : C, 63.67; H, 4.52; N, 5.71. Found: C, 63.89; H, 4.35; N, 5.26.

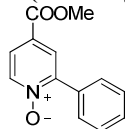
#### 4-Carboxy-2-vinylpyridine *N*-oxide



**3fl**

Pale yellow solid, m.p. 140-141 °C;  $R_f$  = 0.43 (petroleum ether/ethyl acetate/acetic acid=1:1:0.01). IR ( $cm^{-1}$ , KBr): 3445, 3012, 2989, 2915, 1730, 1632, 1578, 1477, 1413, 1245, 1156, 1033, 899, 675;  $^1H$  NMR (400 MHz, MeOD)  $\delta$ (ppm): 8.36 (d,  $J$  = 6.8 Hz, 1H), 8.28 (d,  $J$  = 2.4 Hz, 1H), 7.88 (dd,  $J$  = 6.8, 2.4 Hz, 1H), 7.36-7.28 (m, 1H), 6.32 (d,  $J$  = 17.9 Hz, 1H), 5.79 (d,  $J$  = 11.4 Hz, 1H);  $^{13}C$  NMR (100 MHz, MeOD)  $\delta$ (ppm): 151.7, 143.8, 133.4, 130.6, 128.5, 127.6, 126.1; MS(ESI):  $[M+H]^+$  (m/z, 166); Anal. Calcd for  $C_8H_7NO_3$ : C, 58.18; H, 4.27; N, 8.48. Found: C, 58.33; H, 4.12; N, 8.58.

#### 4-(Methoxycarbonyl)-2-phenylpyridine *N*-oxide<sup>[8]</sup>

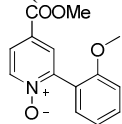


**3ga**

Pale yellow solid, m.p. 106-107 °C;  $R_f$  = 0.27 (petroleum ether/ethyl acetate = 1:1). IR ( $cm^{-1}$ , KBr): 3061, 2945, 2870, 1733, 1603, 1493, 1451, 1437, 1379, 1292, 1222, 1126, 1049, 910, 800, 756;  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  (ppm): 8.94 (d,  $J$  = 1.1 Hz, 1H), 7.90-7.85 (m, 3H),

7.55-7.50 (m, 4H), 4.02 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 164.1, 149.5, 140.7, 131.7, 130.0, 129.2, 128.4, 127.7, 126.3, 124.4, 52.8.

#### 4-(Methoxycarbonyl)-2-(2-methoxyphenyl)pyridine *N*-oxide

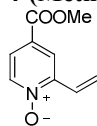


**3gk**

Pale solid, m.p. 114-115 °C;  $R_f$  = 0.15 (petroleum ether/ethyl acetate = 1:1).

IR ( $\text{cm}^{-1}$ , KBr): 3015, 2967, 1736, 1622, 1605, 1553, 1527, 1433, 1419, 1346, 1278, 1233, 1148, 1115, 1025, 966, 886;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 8.33 (d,  $J$  = 6.8 Hz, 1H), 7.97 (d,  $J$  = 2.4 Hz, 1H), 7.83 (dd,  $J$  = 6.8, 2.4 Hz, 1H), 7.46 (td,  $J$  = 8.4, 0.6 Hz, 1H), 7.37 (dd,  $J$  = 7.5, 1.6 Hz, 1H), 7.07 (td,  $J$  = 7.5, 0.6 Hz, 1H), 7.02 (d,  $J$  = 8.4 Hz, 1H), 3.93 (s, 3H), 3.82 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 164.3, 157.3, 148.4, 140.16, 131.4, 130.6, 128.7, 125.5, 124.7, 121.4, 120.6, 111.3, 55.8, 52.6; MS(ESI):  $[\text{M}+\text{H}]^+$  ( $m/z$ , 260); Anal. Calcd for  $\text{C}_{14}\text{H}_{13}\text{NO}_4$ : C, 64.86; H, 5.05; N, 5.40. Found: C, 64.96; H, 4.88; N, 5.13.

#### 4-(Methoxycarbonyl)-2-vinylpyridine *N*-oxide

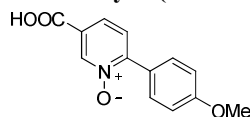


**3gl**

Pale yellow solid, m.p. 93-95 °C;  $R_f$  = 0.32 (petroleum ether/ethyl acetate = 2:1).

IR ( $\text{cm}^{-1}$ , KBr): 3009, 2968, 2934, 1735, 1612, 1557, 1479, 1422, 1289, 1134, 1055, 982, 768;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 8.23 (d,  $J$  = 6.8 Hz, 1H), 8.13 (d,  $J$  = 2.4 Hz, 1H), 7.73 (dd,  $J$  = 6.8, 2.4 Hz, 1H), 7.37-7.30 (m, 1H), 6.17 (d,  $J$  = 17.9 Hz, 1H), 5.73 (d,  $J$  = 11.4 Hz, 1H), 3.96 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 164.1, 148.0, 139.9, 127.2, 125.9, 124.0, 123.6, 121.9; MS(ESI):  $[\text{M}+\text{H}]^+$  ( $m/z$ , 166); Anal. Calcd for  $\text{C}_9\text{H}_9\text{NO}_3$ : C, 60.33; H, 5.06; N, 7.82. Found: C, 60.56; H, 5.16; N, 7.63.

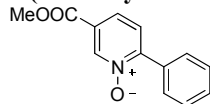
#### 5-Carboxy-2-(4-methoxyphenyl)pyridine *N*-oxide



**3hg**

Pale yellow solid, m.p. 225-226 °C;  $R_f$  = 0.39 (petroleum ether/ethyl acetate/acetic acid = 1:1:0.01). IR ( $\text{cm}^{-1}$ , KBr): 3440, 2987, 1732, 1633, 1610, 1533, 1519, 1437, 1427, 1357, 1286, 1245, 1159, 1120, 1033, 887, 783;  $^1\text{H}$  NMR (400 MHz, MeOD)  $\delta$  (ppm): 8.85 (s, 1H), 8.09 (dd,  $J$  = 8.3, 1.1 Hz, 1H), 7.90 (d,  $J$  = 8.8 Hz, 2H), 7.78 (d,  $J$  = 8.3 Hz, 1H), 7.08 (d,  $J$  = 8.8 Hz, 2H), 3.88 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz, MeOD)  $\delta$  (ppm): 162.9, 142.5, 132.3, 130.6, 128.5, 114.8, 55.9; MS(ESI):  $[\text{M}+\text{H}]^+$  ( $m/z$ , 246); Anal. Calcd for  $\text{C}_{13}\text{H}_{11}\text{NO}_4$ : C, 63.67; H, 4.52; N, 5.71. Found: C, 63.61; H, 4.49; N, 5.13.

#### 5-(Methoxycarbonyl)-2-phenylpyridine *N*-oxide



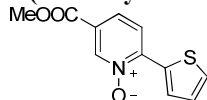
**3ia**

Pale yellow solid, m.p. 105-106 °C;  $R_f$  = 0.33 (petroleum ether/ethyl acetate = 1:1).

IR ( $\text{cm}^{-1}$ , KBr): 3039, 1720, 1617, 1546, 1475, 1453, 1412, 1304, 1264, 1237, 1129, 1077, 958, 872, 811, 768, 721;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 8.94 (d,  $J$  = 1.1 Hz, 1H), 7.91-7.85 (m, 3H), 7.55-7.50 (m, 4H), 3.99 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 164.1, 149.5, 140.7,

131.7, 130.0, 129.2, 128.4, 127.7, 126.3, 124.3, 52.8; MS(ESI):  $[M+H]^+$  (m/z, 230); Anal. Calcd for  $C_{13}H_{11}NO_3$ : C, 68.11; H, 4.84; N, 6.11. Found: C, 68.23; H, 4.93; N, 6.02.

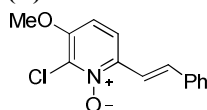
### 5-(Methoxycarbonyl)-2-(thiophen-2-yl)pyridine *N*-oxide



**3ie**

Pale yellow solid, m.p.221-223°C;  $R_f$  = 0.36 (petroleum ether/ethyl acetate = 1:1). IR ( $cm^{-1}$ , KBr): 3010, 2985, 1736, 1605, 1533, 1511, 1434, 1312 1275, 1253, 1037, 953, 856, 729;  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  (ppm): 8.91 (d,  $J$  = 1.1 Hz, 1H), 8.00 (d,  $J$  = 8.6 Hz, 1H), 7.95 (d,  $J$  = 4.0 Hz, 1H), 7.88 (dd,  $J$  = 8.6, 1.5 Hz, 1H), 7.66 (d,  $J$  = 5.1 Hz, 1H), 7.27-7.26 (m, 1H), 3.98 (s, 3H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$  (ppm): 163.5, 145.9, 140.8, 132.6, 130.8, 128.7, 126.5, 125.9, 125.2, 121.6, 52.9; MS(ESI):  $[M+H]^+$  (m/z, 236); Anal. Calcd for  $C_{11}H_9NO_3S$ : C, 56.16; H, 3.86; N, 5.95. Found: C, 56.28; H, 3.73; N, 5.91.

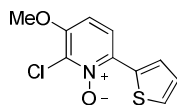
### (*E*)-2-chloro-3-methoxy-6-styrylpyridine *N*-oxide



**3jb**

Pale yellow solid, m.p.151-152 °C;  $R_f$  = 0.32 (petroleum ether/ethyl acetate = 1:1). IR ( $cm^{-1}$ , KBr): 3024, 2957, 2923, 1583, 1545, 1475, 1369, 1313, 1223, 1086, 967, 802, 685;  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  (ppm): 7.70 (d,  $J$  = 16.5 Hz, 1H), 7.57 (d,  $J$  = 7.5 Hz, 2H), 7.49 (d,  $J$  = 8.6 Hz, 1H), 7.39-7.26 (m, 4H), 6.89 (d,  $J$  = 8.6 Hz, 1H), 3.97 (s, 3H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$  (ppm): 153.0, 142.9, 136.4, 134.0, 128.8, 127.3, 119.4, 119.0, 108.8, 57.0; MS(ESI):  $[M+H]^+$  (m/z, 262),  $[2M+Na]^+$  (m/z, 545); Anal. Calcd for  $C_{14}H_{12}ClNO_2$ : C, 64.25; H, 4.62; N, 5.35. Found: C, 63.98; H, 4.37; N, 5.03.

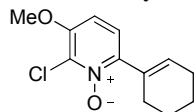
### 2-Chloro-3-methoxy-6-(thiophen-2-yl)pyridine *N*-oxide



**3je**

Pale yellow solid, yield: 80%; m.p.160-161 °C;  $R_f$  = 0.42 (petroleum ether/ethyl acetate = 1:1). IR ( $cm^{-1}$ , KBr): 3051, 2970,1592, 1546, 1515, 1476, 1373, 1259, 1238, 1087, 1068, 802, 685;  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  (ppm): 7.82 (d,  $J$  = 9.3 Hz, 1H), 7.75 (d,  $J$  = 3.4 Hz, 1H), 7.52 (d,  $J$  = 5.0 Hz, 1H), 7.18 (t,  $J$  = 4.4 Hz, 1H), 7.04 (d,  $J$  = 9.3 Hz, 1H), 4.01 (s, 3H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$ (ppm): 151.8, 138.5, 131.9, 129.7, 126.0, 125.9, 118.6, 109.7, 57.0; MS(ESI):  $[2M+Na]^+$  (m/z,263); Anal. Calcd for  $C_{10}H_8BrNO_2S$ : C, 41.97; H, 2.82; N, 4.89. Found: C, 41.79; H, 2.78; N, 4.67.

### 2-Chloro-6-cyclohexenyl-3-methoxy pyridine *N*-oxide

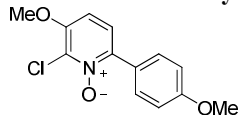


**3jf**

Pale yellow solid, m.p.134-135 °C;  $R_f$  = 0.53 (petroleum ether/ethyl acetate = 1:1). IR ( $cm^{-1}$ , KBr): 3021, 3011, 2936, 2895, 2858, 2846, 1603, 1550, 1477, 1342, 1304, 1232, 1207, 1085, 1055, 815, 804;  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  (ppm): 7.07 (d,  $J$  = 8.8 Hz, 1H), 6.83 (d,  $J$  = 8.8 Hz, 1H), 6.00-5.98 (m, 1H), 3.95 (s, 3H), 2.47-2.45 (m, 2H), 2.24-2.21 (m, 2H), 1.78-1.70 (m, 4H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$ (ppm): 153.1, 147.3, 133.7, 131.2, 121.8, 108.3, 56.8, 26.1,

25.6, 22.3, 21.8; MS(ESI):  $[M+H]^+$  (m/z, 240),  $[2M+Na]^+$  (m/z, 501); Anal. Calcd for  $C_{12}H_{14}ClNO_2$ : C, 60.13; H, 5.89; N, 5.84. Found: C, 59.87; H, 5.62; N, 5.60.

**2-Chloro-3-methoxy-6-(4-methoxyphenyl)pyridine *N*-oxide**

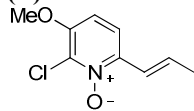


**3jg**

Pale yellow solid, m.p.158-159 °C;  $R_f$  = 0.37 (petroleum ether/ethyl acetate = 2:1).

IR ( $cm^{-1}$ , KBr): 2953, 2912, 1606, 1514, 1472, 1438, 1291, 1253, 1235, 1176, 1090, 913, 836, 802;  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  (ppm): 7.73 (d,  $J$  = 8.6 Hz, 2H), 7.27 (d,  $J$  = 8.9 Hz, 1H), 6.97 (d,  $J$  = 8.5 Hz, 2H), 6.92 (d,  $J$  = 8.9 Hz, 1H), 3.98 (s, 3H), 3.85 (s, 3H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$ (ppm): 155.0, 147.7, 138.5, 128.8, 125.5, 119.5, 117.4, 108.3, 103.1, 51.6, 50.0; MS(ESI):  $[M+H]^+$  (m/z, 266),  $[2M+Na]^+$  (m/z, 553); Anal. Calcd for  $C_{13}H_{12}ClNO_3$ : C, 58.77; H, 4.55; N, 5.27. Found: C, 58.51; H, 4.39; N, 5.03.

**(*E*)-2-chloro-3-methoxy-6-(prop-1-enyl)pyridine *N*-oxide**

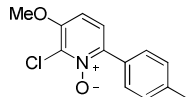


**3jm**

Pale yellow solid, m.p.112-113 °C;  $R_f$  = 0.32 (ethyl acetate).

IR ( $cm^{-1}$ , KBr): 3113, 3047, 2940, 1549, 1476, 1447, 1365, 1307, 1274, 1223, 1088, 828, 718;  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$ (ppm): 7.22 (d,  $J$  = 8.9 Hz, 1H), 6.88 (d,  $J$  = 8.9 Hz, 1H), 6.72 (dd,  $J$  = 11.8, 1.4 Hz, 1H), 6.15-6.06 (m, 1H), 3.97 (s, 3H), 1.88 (dd,  $J$  = 7.2, 1.7 Hz, 3H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$ (ppm): 152.9, 141.5, 131.2, 122.6, 121.4, 107.6, 56.8, 14.9; MS(ESI):  $[M+Na]^+$  (m/z, 222); Anal. Calcd for  $C_9H_{10}BrNO_2$ : C, 44.29; H, 4.13; N, 5.74. Found: C, 44.02; H, 3.98; N, 5.60.

**2-Chloro-3-methoxy-6-*p*-tolylpyridine *N*-oxide**

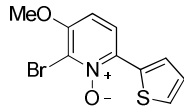


**3jn**

Pale white solid, m.p.151-156 °C;  $R_f$  = 0.42 (petroleum ether/ethyl acetate = 2:1).

IR ( $cm^{-1}$ , KBr): 3105, 3060, 2998, 2920, 1546, 1529, 1472, 1433, 1353, 1309, 1233, 1090, 808;  $^1H$  NMR (400MHz,  $CDCl_3$ )  $\delta$ (ppm): 7.66(d,  $J$  = 7.9Hz, 2H), 7.33- 7.27(m, 3H), 6.98(d,  $J$  = 8.8 Hz, 1H), 4.00 (s, 3H), 2.41(s, 3H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$ (ppm): 153.4, 144.5, 139.6, 134.6, 129.4, 129.3, 128.9, 123.1 109.2, 57.0, 21.4; MS(ESI):  $[M+H]^+$  (m/z, 250),  $[2M+H]^+$  (m/z, 499); Anal. Calcd for  $C_{13}H_{13}ClNO_2$ : C, 62.53; H, 4.84; N, 5.61. Found: C, 62.12; H, 4.23; N, 5.84.

**2-Bromo-3-methoxy-6-(thiophen-2-yl)pyridine *N*-oxide**

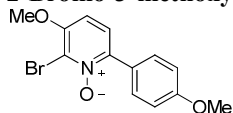


**3ke**

Pale yellow solid, m.p. 172-173 °C;  $R_f$  = 0.43 (petroleum ether/ethyl acetate = 1:1).

IR ( $cm^{-1}$ , KBr): 3048, 2998, 2867, 1539, 1520, 1486, 1430, 1357, 1308, 1262, 1229, 1086, 803, 659;  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$ (ppm): 7.85 (d,  $J$  = 7.8 Hz, 1H), 7.74 (s, 1H), 7.52 (s, 1H), 7.27-7.19 (m, 1H), 6.97 (d,  $J$  = 7.8 Hz, 1H), 4.00 (s, 3H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$ (ppm): 163.5, 145.9, 140.8, 132.6, 130.8, 128.8, 126.5, 125.9, 125.2, 121.6, 52.9; MS(ESI):  $[M+H]^+$  (m/z, 285); Anal. Calcd for  $C_{10}H_8BrNO_2S$ : C, 41.97; H, 2.82; N, 4.89. Found: C, 41.93; H, 2.79; N, 4.96.

### 2-Bromo-3-methoxy-6-(4-methoxyphenyl)pyridine *N*-oxide

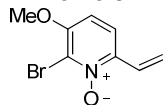


**3kg**

Pale yellow solid, m.p. 141-142 °C;  $R_f$  = 0.42 (petroleum ether/ethyl acetate = 2:1).

IR (cm<sup>-1</sup>, KBr): 2935, 2908, 1623, 1552, 1455, 1429, 1286, 1248, 1226, 1155, 1113, 1068, 1057, 923, 855, 811; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 7.73 (d,  $J$  = 8.7 Hz, 2H), 7.35 (d,  $J$  = 8.9 Hz, 1H), 6.97 (d,  $J$  = 8.7 Hz, 2H), 6.94 (d,  $J$  = 8.9 Hz, 1H), 4.00 (s, 3H), 3.96 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 160.4, 157.9, 154.8, 144.1, 130.9, 126.9, 124.8, 123.8, 119.0, 113.6, 106.5, 57.0, 55.4; MS(ESI): [M+H]<sup>+</sup> (m/z, 312); Anal. Calcd for C<sub>8</sub>H<sub>8</sub>BrNO<sub>2</sub>: C, 50.34; H, 3.90; N, 4.52. Found: C, 50.52; H, 3.70; N, 4.77.

### 2-Bromo-3-methoxy-6-vinylpyridine *N*-oxide

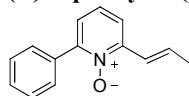


**3kl**

Pale yellow liquid,  $R_f$  = 0.31 (ethyl acetate).

IR (cm<sup>-1</sup>, KBr): 3105, 3011, 2987, 1560, 1469, 1442, 1359, 1298, 1257, 1087, 733; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 7.41 (d,  $J$  = 9.0 Hz, 1H), 7.36-7.26 (m, 1H), 6.81 (d,  $J$  = 9.0 Hz, 1H), 5.95 (d,  $J$  = 17.9 Hz, 1H), 5.55 (d,  $J$  = 11.4 Hz, 1H), 3.97 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 128.2, 120.2, 119.1, 107.9; MS(ESI): [M+H]<sup>+</sup> (m/z, 230); Anal. Calcd for C<sub>8</sub>H<sub>8</sub>BrNO<sub>2</sub>: C, 41.77; H, 3.50; N, 6.09. Found: C, 41.98; H, 3.3; N, 6.17.

### (*E*)-2-phenyl-6-(prop-1-enyl)pyridine *N*-oxide

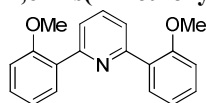


**4am**

Pale yellow solid, m.p. 83-84 °C;  $R_f$  = 0.52 (ethyl acetate).

IR (cm<sup>-1</sup>, KBr): 3027, 2971, 2942, 1553, 1474, 1443, 1372, 1266, 1245, 1218, 1156, 859, 838, 766; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 7.86-7.76 (m, 2H), 7.45 (m, 3H), 7.36-7.32 (m, 2H), 7.28 (d,  $J$  = 7.5 Hz, 1H), 6.82 (dd,  $J$  = 11.8, 1.5 Hz, 1H), 6.22-6.14 (m, 1H), 1.95 (dd,  $J$  = 7.2, 1.7 Hz, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 149.7, 147.8, 133.2, 131.8, 129.4, 129.3, 128.1, 125.5, 125.3, 124.3, 122.5, 15.0; MS(ESI): [M+Na]<sup>+</sup> (m/z, 234), [2M+Na]<sup>+</sup> (m/z, 445); Anal. Calcd for C<sub>14</sub>H<sub>13</sub>NO: C, 79.59; H, 6.20; N, 6.63. Found: C, 79.30; H, 6.02; N, 6.42.

### 2,6-Bis(2-methoxyphenyl)pyridine<sup>[9]</sup>

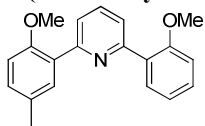


**4kk**

Pale yellow solid, m.p. 118-120 °C;  $R_f$  = 0.36 (petroleum ether/ethyl acetate = 5:1).

IR (cm<sup>-1</sup>, KBr): 2998, 2973, 2876, 1655, 1599, 1587, 1513, 1485, 1437, 1375, 1298, 1233, 1147, 1123, 1055, 937, 843, 712; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 8.06 (s, 1H), 7.87 (d,  $J$  = 7.9 Hz, 2H), 7.82 (d,  $J$  = 7.6 Hz, 2H), 7.47 (t,  $J$  = 7.9 Hz, 2H), 7.14 (t,  $J$  = 7.5 Hz, 2H), 7.06 (d,  $J$  = 8.3 Hz, 2H), 3.93 (s, 6H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  (ppm): 157.2, 154.1, 131.6, 130.9, 123.8, 121.2, 111.6, 55.8.

### 2-(2-Methoxy-5-methylphenyl)-6-(2-methoxyphenyl)pyridine

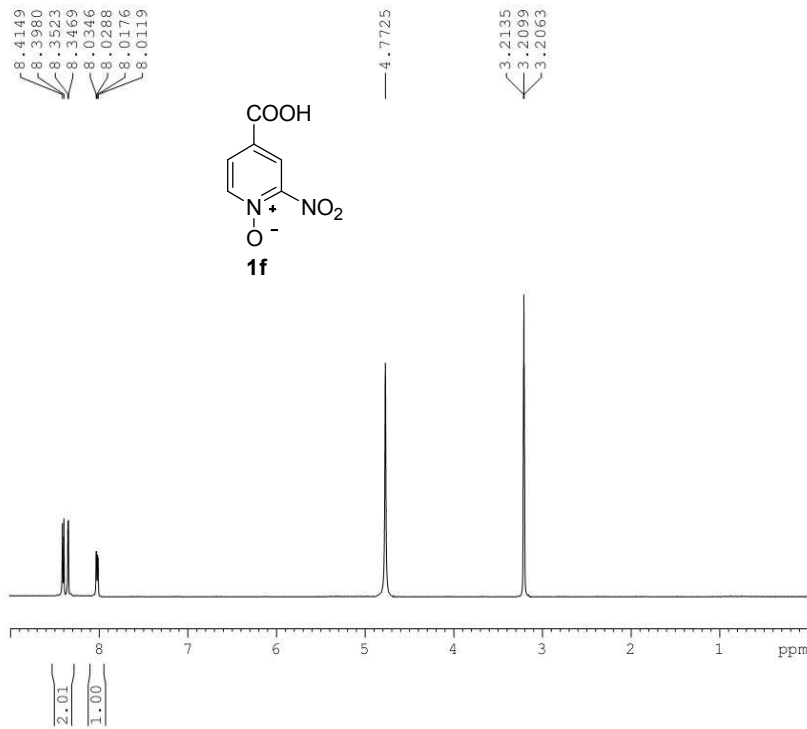


**4ko**

Pale yellow solid, m.p. 87-89 °C;  $R_f$  = 0.38 (petroleum ether/ethyl acetate = 5:1). IR ( $\text{cm}^{-1}$ , KBr): 2987, 2956, 2895, 1612, 1598, 1563, 1526, 1485, 1433, 1369, 1313, 1276, 1154, 1112, 1028, 857, 763;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 7.92 (dd,  $J$  = 7.6, 1.5 Hz, 1H), 7.76-7.68 (m, 4H), 7.38-7.34 (m, 1H), 7.15 (dd,  $J$  = 8.3 Hz,  $J$  = 1.5 Hz, 1H), 7.09 (t,  $J$  = 7.6 Hz, 1H), 7.01 (d,  $J$  = 8.3 Hz, 1H), 6.90 (d,  $J$  = 8.3 Hz, 1H), 3.88 (s, 3H), 3.84 (s, 3H), 2.35 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  (ppm): 157.1, 155.5, 155.4, 155.1, 135.1, 131.9, 130.2, 130.0, 129.6, 129.3, 123.1, 123.0, 121.0, 111.5, 111.3, 55.8, 55.6, 20.5; MS (ESI):  $[\text{M}+\text{H}]^+$  (m/z, 306); Anal. Calcd for  $\text{C}_{20}\text{H}_{19}\text{NO}_2$ : C, 78.66; H, 6.27; N, 4.59. Found: C, 78.75; H, 6.13; N, 4.67.

### References

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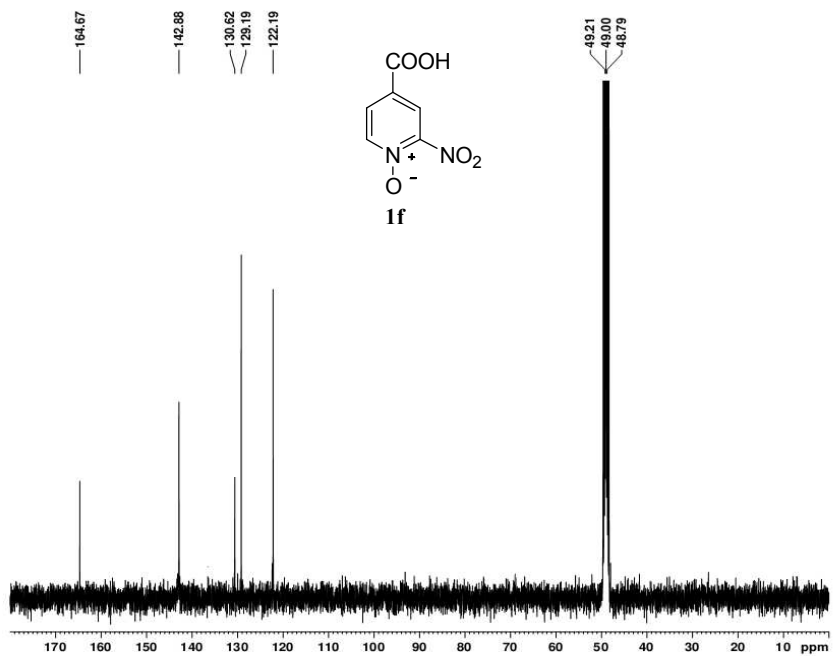


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PROCNO       1
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PULPROG      zg30
TD           65536
SOLVENT      MeOD
NS           16
DS           2
SWH          8223.685 Hz
FIDRES       0.125483 Hz
AQ           3.9846387 sec
RG           203
DW           60.800 usec
DE           6.50 usec
TE           297.6 K
D1           1.0000000 sec
TD0          1
  
```

```

===== CHANNEL f1 =====
NUC1          1H
P1            13.80 usec
PL1           -1.00 dB
PL1W         13.18669796 W
SF01         400.1724712 MHz
SI            32768
SF           400.1700414 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
FC            1.00
  
```



```

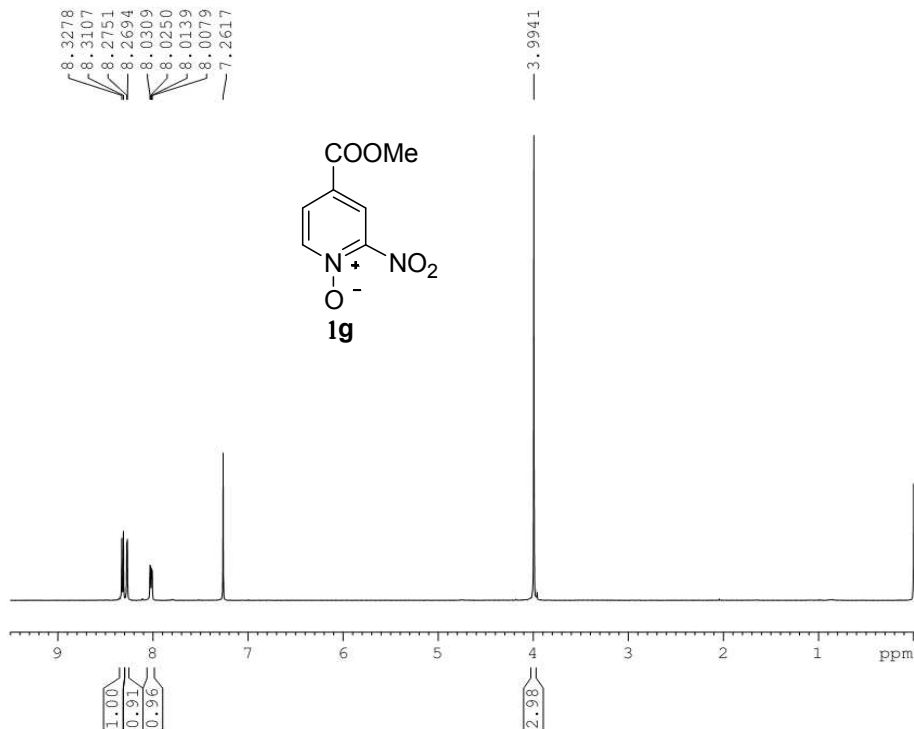
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EXPNO         1
PROCNO       1
Date_        20120416
Time         19.42
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PROBHD       5 mm PABBO BB-
PULPROG      zgpg30
TD           65536
SOLVENT      MeOD
NS           1000
DS           4
SWH          24038.461 Hz
FIDRES       0.366798 Hz
AQ           1.3631988 sec
RG           203
DW           20.800 usec
DE           6.50 usec
TE           301.8 K
D1           2.0000000 sec
D11          0.0300000 sec
TD0          1
  
```

```

===== CHANNEL f1 =====
NUC1          13C
P1             8.50 usec
PL1            -2.00 dB
PL1W          57.32743073 W
SF01         100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2      waltz16
NUC2          1H
PCPD2        80.00 usec
PL2           -1.00 dB
PL12         14.26 dB
PL13         14.46 dB
PL2W         13.18669796 W
PL12W        0.39276794 W
PL13W        0.37509048 W
SF02         400.1716007 MHz
SI            32768
SF           100.6226841 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

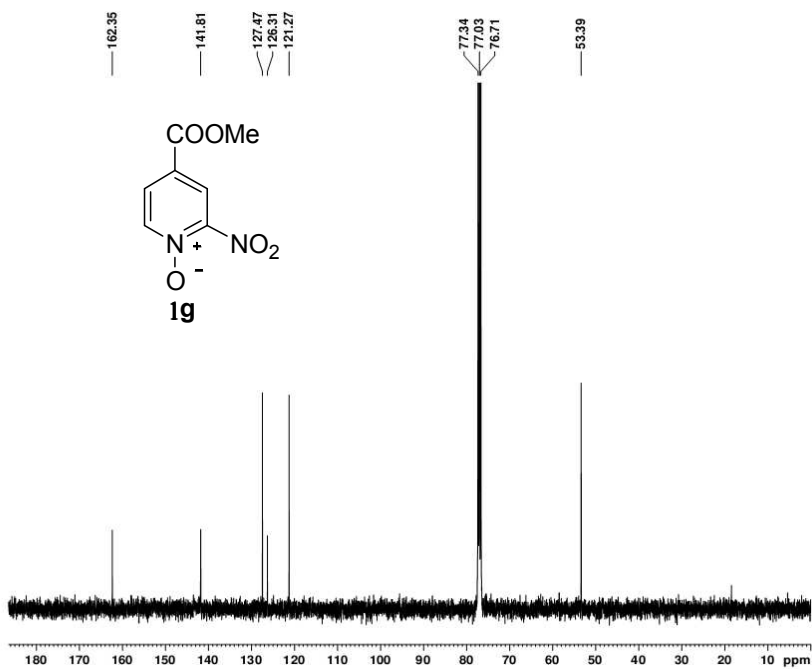


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EXPNO         1
PROCNO        1
Date_         20120416
Time          21.13
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            16
DS            2
SWH           8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9846387 sec
RG            203
DW            60.800 usec
DE            6.50 usec
TE            299.4 K
D1            1.00000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          1H
P1            13.80 usec
PL1           -1.00 dB
PL1W          13.18669796 W
SFO1          400.1724712 MHz
SI            32768
SF            400.1700027 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

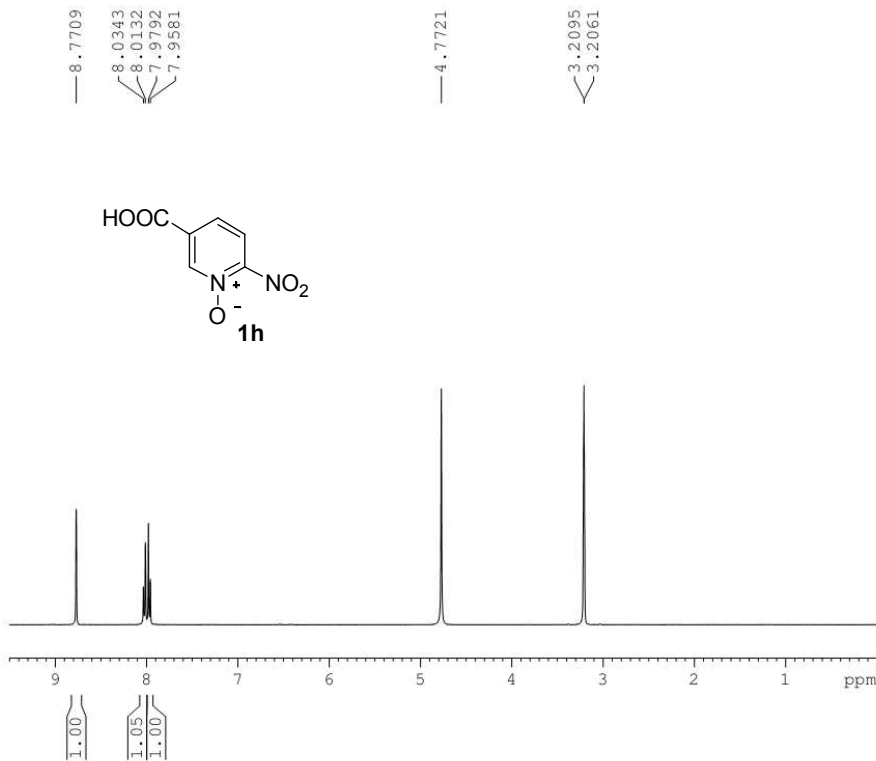
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EXPNO         1
PROCNO        1
Date_         20120417
Time          22.12
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            4
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            203
DW            20.800 usec
DE            6.50 usec
TE            300.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          13C
P1            8.50 usec
PL1           -2.00 dB
PL1W          57.32743073 W
SFO1          100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CFDPRG2      waltz16
NUC2          1H
PCPD2        80.00 usec
PL2           -1.00 dB
PL12         14.26 dB
PL13         14.46 dB
PL2W         13.18669796 W
PL12W        0.39276794 W
PL13W        0.37509048 W
SFO2          400.1716007 MHz
SI            32768
SF            100.6228211 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

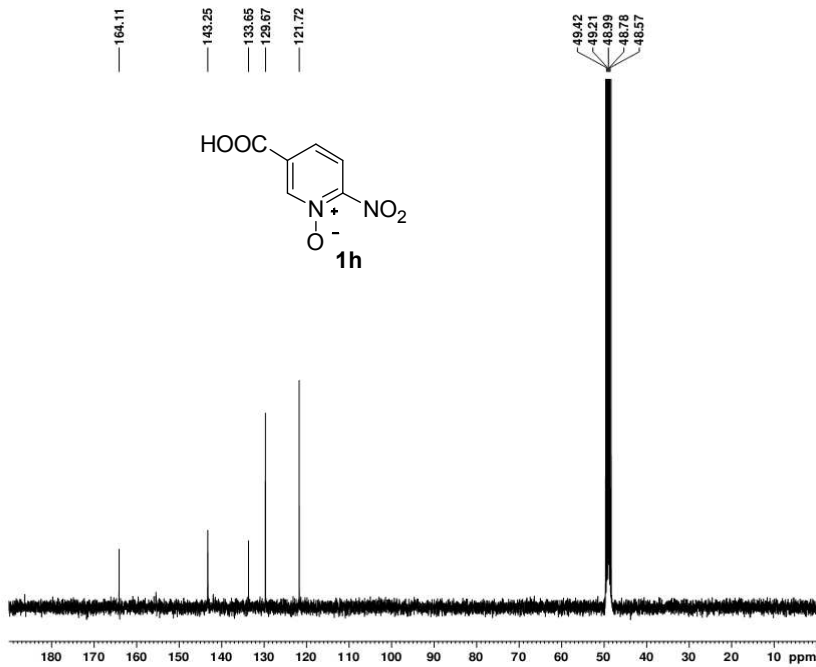


```

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EXPNO         1
PROCNO        1
Date_         20120416
Time         10.20
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       MeOD
NS            16
DS            2
SWH           8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9846387 sec
RG            203
DW            60.800 usec
DE            6.50 usec
TE            297.6 K
D1            1.00000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          1H
P1            13.80 usec
PL1           -1.00 dB
PL1W          13.18669796 W
SFO1          400.1724712 MHz
SI            32768
SF            400.1700415 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

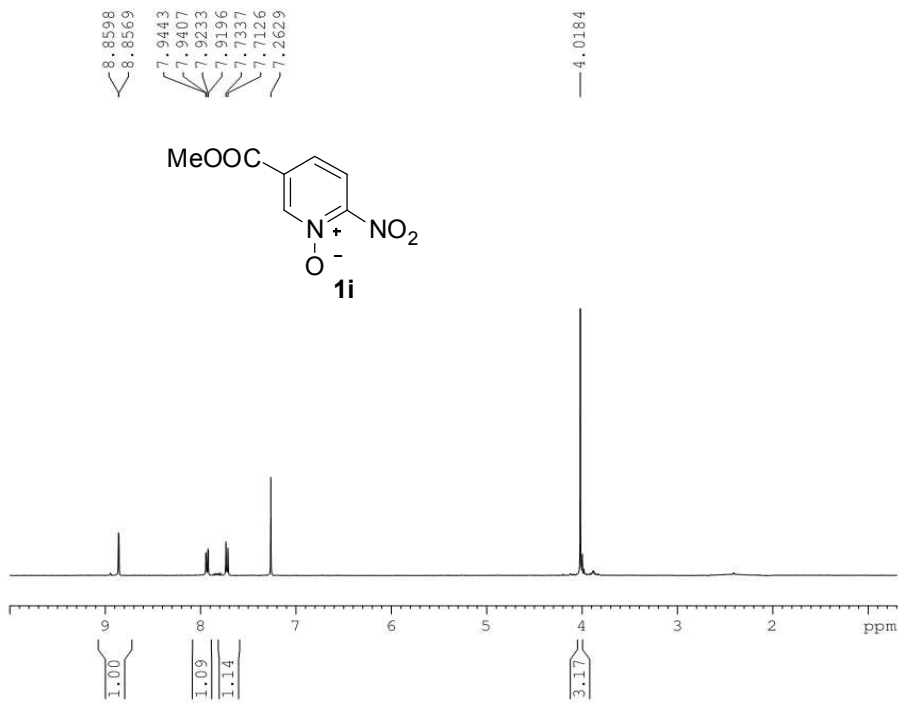
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EXPNO         1
PROCNO        1
Date_         20120416
Time         14.26
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       MeOD
NS            1000
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            203
DW            20.800 usec
DE            6.50 usec
TE            302.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          13C
P1            8.50 usec
PL1           -2.00 dB
PL1W          57.32743073 W
SFO1          100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -1.00 dB
PL12          14.26 dB
PL13          14.46 dB
PL2W          13.18669796 W
PL12W         0.39276794 W
PL13W         0.37509048 W
SFO2          400.1716007 MHz
SI            32768
SF            100.6226841 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
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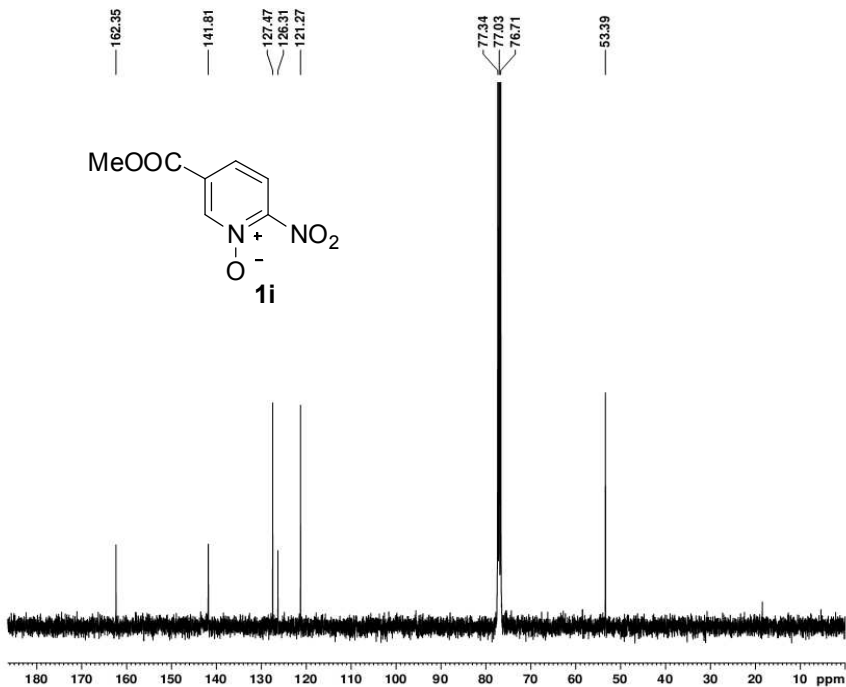


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NAME          ZS-5-ZJ
EXPNO         1
PROCNO        1
Date_         20120418
Time         11.54
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            16
DS            2
SWH           8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9846387 sec
RG            203
DW            60.800 usec
DE            6.50 usec
TE            298.9 K
D1            1.00000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          1H
P1            13.80 usec
PL1           -1.00 dB
PL1W          13.18669796 W
SF01          400.1724712 MHz
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WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
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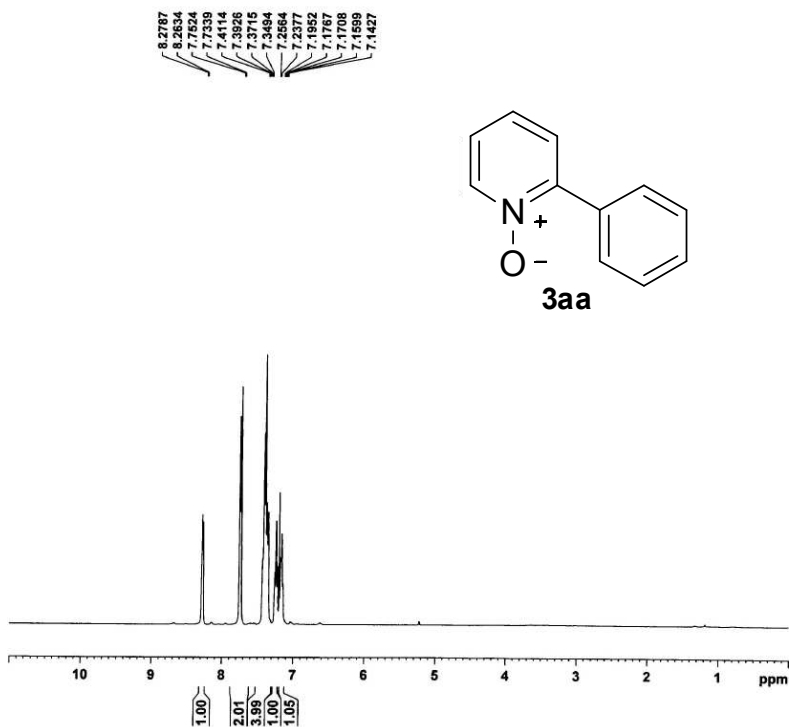
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EXPNO         1
PROCNO        1
Date_         20120417
Time         22.12
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            3000
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            203
DW            20.800 usec
DE            6.50 usec
TE            300.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          13C
P1            8.50 usec
PL1           -2.00 dB
PL1W          57.32743073 W
SF01          100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -1.00 dB
PL12          14.26 dB
PL13          14.46 dB
PL2W          13.18669796 W
PL12W         0.39276794 W
PL13W         0.37509048 W
SF02          400.1716007 MHz
SI            32768
SF            100.6228211 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```



```

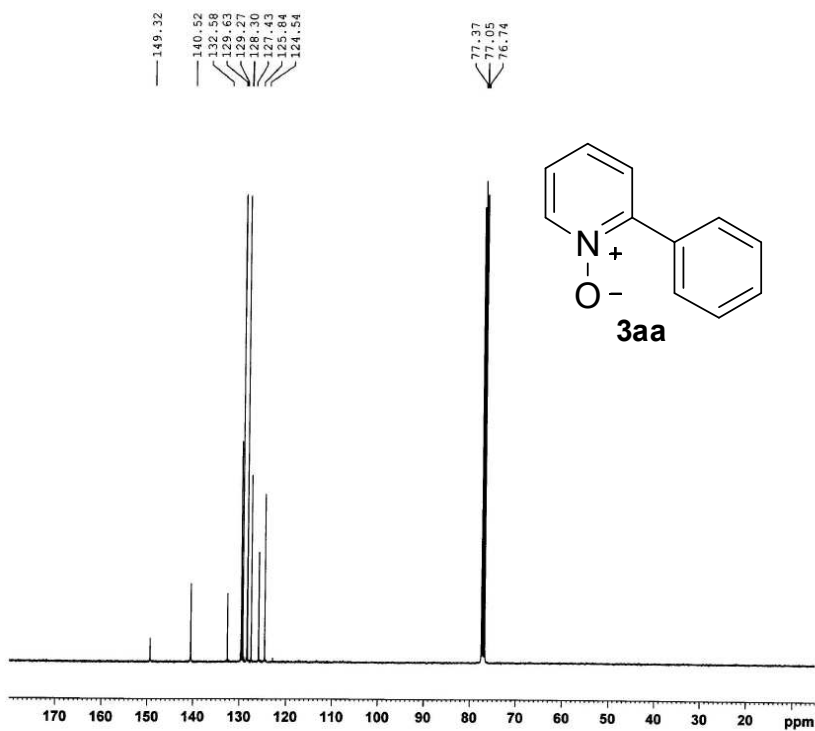
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PROCNO    1
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Time      14.11
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PULPROG   zg30
TD        65536
SOLVENT   CDCl3
NS        16
DS        2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846397 sec
RG        203
DW        60.800 usec
DE        6.50 usec
TE        295.5 K
D1        1.00000000 sec
TDO       1

```

```

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W     13.18669796 W
SF01     400.1724712 MHz
SI        32768
SF        400.1700288 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00

```



```

NAME      ZF6-14-c-C13
EXPNO     1
PROCNO    1
Date_     20081030
Time      4.35
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS        6000
DS        4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG        203
DW        20.800 usec
DE        6.50 usec
TE        300.0 K
D1        2.00000000 sec
D11       0.03000000 sec
TDO       1

```

```

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W     57.32743073 W
SF01     100.6328888 MHz

```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12     14.26 dB
PL13     14.46 dB
PL2W     13.18669796 W
PL12W    0.39276794 W
PL13W    0.37509048 W
SF02     400.1716007 MHz
SI        32768
SF        100.6228270 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40

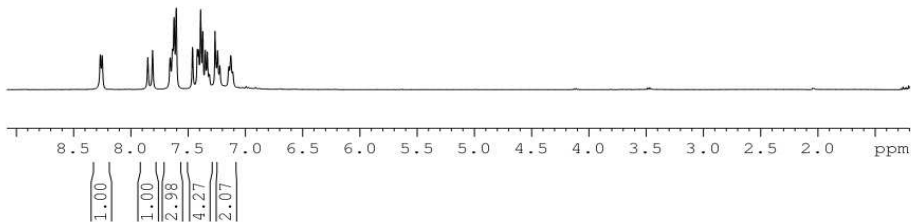
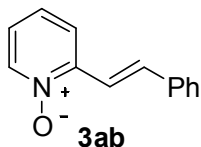
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7.1113



```

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PROCNO    1
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Time      10.33
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PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ         3.9846387 sec
RG         203
DW         60.800 usec
DE         6.50 usec
TE         297.2 K
D1         1.00000000 sec
D11        1
TDO        1
  
```



```

===== CHANNEL f1 =====
NUC1      1H
P1         13.80 usec
PL1        -1.00 dB
PL1W      13.18669796 W
SF01      400.1724712 MHz
SI         32768
SF         400.1700016 MHz
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SSB         0
LB          0.30 Hz
GB          0
PC          1.00
  
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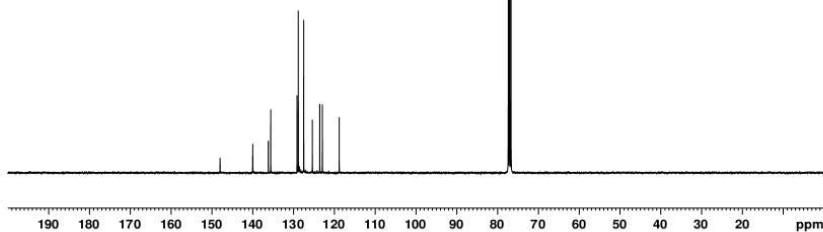
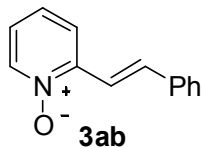
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77.04  
76.73



```

NAME      ZS-4-43-Cl3
EXPNO     1
PROCNO    1
Date_     20110914
Time      14.21
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         3305
DS         4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ         1.3631988 sec
RG         203
DW         20.800 usec
DE         6.50 usec
TE         300.1 K
D1         2.00000000 sec
D11        0.03000000 sec
TDO        1
  
```

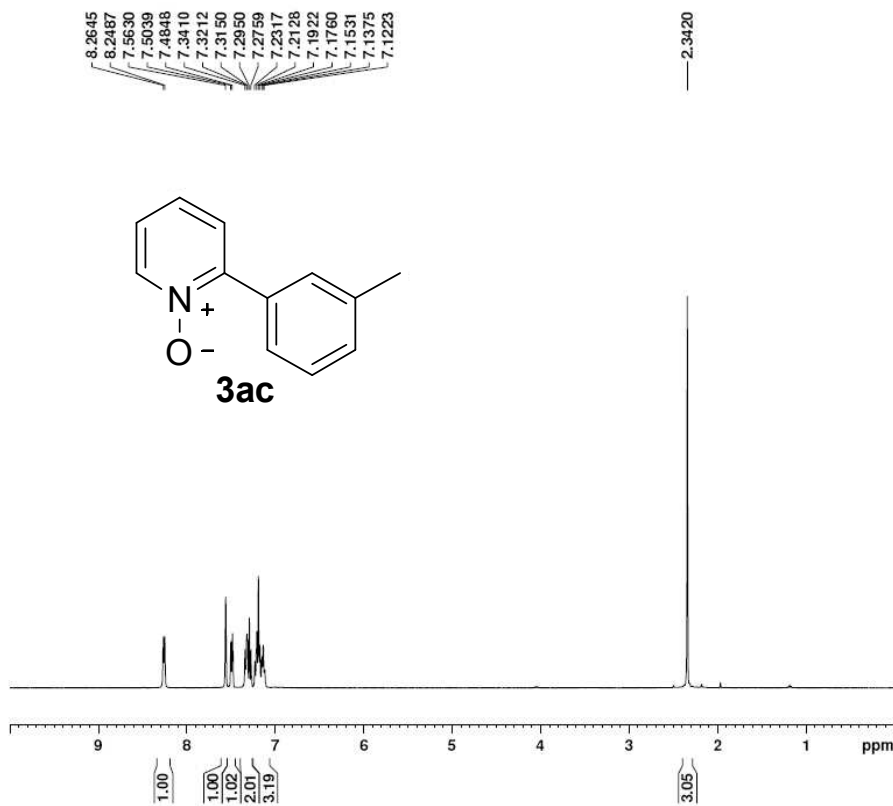


```

===== CHANNEL f1 =====
NUC1      13C
P1         8.50 usec
PL1        -2.00 dB
PL1W      57.32743073 W
SF01      100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CFDPGRG2  waltz16
NUC2      1H
PCPD2     80.00 usec
PL2        -1.00 dB
PL12      14.26 dB
PL13      14.46 dB
PL2W      13.18669796 W
PL12W     0.39276794 W
PL13W     0.37509048 W
SF02      400.1716007 MHz
SI         32768
SF         100.6228233 MHz
WDW        EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
  
```

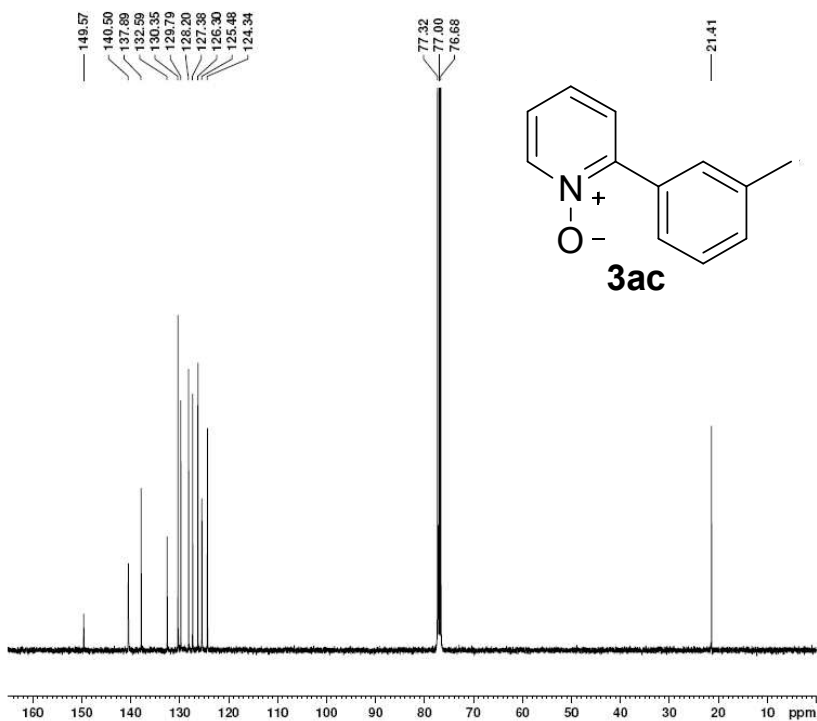


```

NAME          ZF9-26-2
EXPNO         1
PROCNO        1
Date_         20090724
Time          14.19
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            16
DS            2
SWH           8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9846387 sec
RG            203
DW            60.800 usec
DE            6.50 usec
TE            301.3 K
D1            1.00000000 sec
D11           1
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          1H
P1            14.20 usec
PL1           -1.00 dB
PL1W          13.18669796 W
SFO1          400.1724712 MHz
SI            32768
SF            400.1700306 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

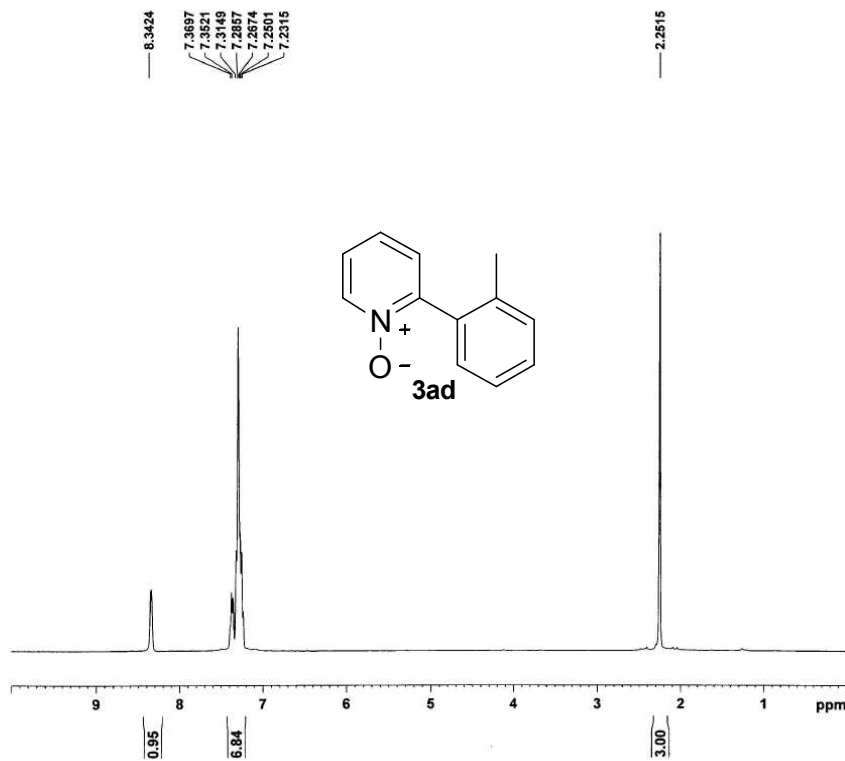
NAME          ZF9-26-2-cl3
EXPNO         1
PROCNO        1
Date_         20090724
Time          17.46
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       cdcl3
NS            3408
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631398 sec
RG            203
DW            20.800 usec
DE            6.50 usec
TE            303.1 K
D1            2.00000000 sec
D11           0.03000000 sec
D10           1
  
```

```

===== CHANNEL f1 =====
NUC1          13C
P1            8.70 usec
PL1           -2.00 dB
PL1W          57.32743073 W
SFO1          100.6328888 MHz
  
```

```

===== CHANNEL F2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -1.00 dB
PL12          14.02 dB
PL13          14.46 dB
PL2W          13.18669796 W
PL12W         0.41508400 W
PL13W         0.37509048 W
SFO2          400.1716007 MHz
SI            32768
SF            100.6228270 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

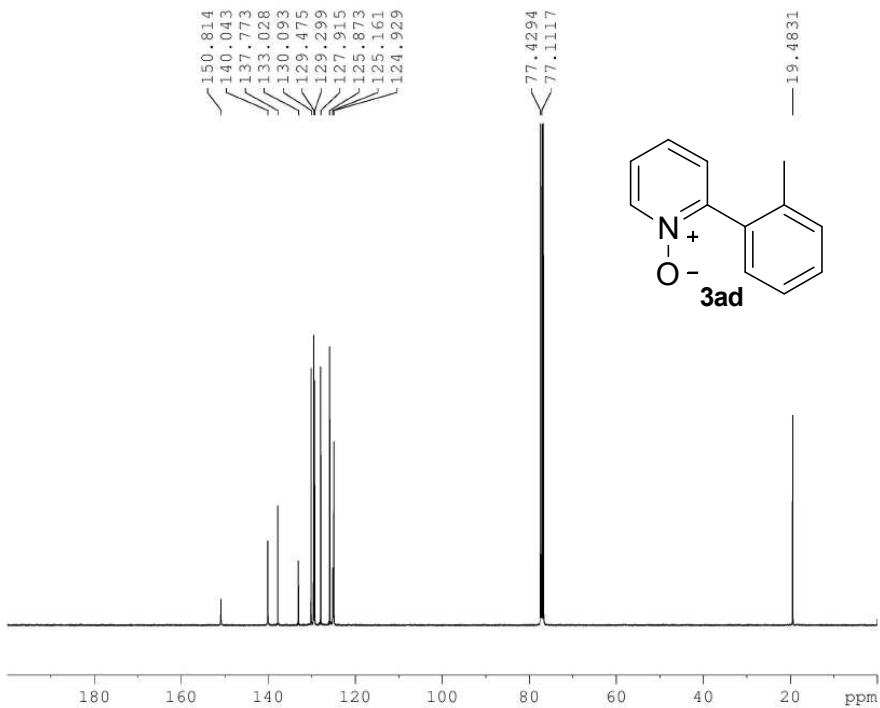


```

NAME      ZF9-30-2
EXPNO     1
PROCNO    1
Date_     20090805
Time      10.32
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   cdcl3
NS        16
DS        2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        161
DW        60.800 usec
DE        6.50 usec
TE        302.0 K
D1        1.00000000 sec
TD0       1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        14.20 usec
PL1       -1.00 dB
PL1W      13.18669796 W
SF01      400.1724712 MHz
SI        32768
SF        400.1700000 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```



```

NAME      ZF9-30-2-C13
EXPNO     1
PROCNO    1
Date_     20121015
Time      22.06
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   cdcl3
NS        10398
DS        4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG        203
DW        20.800 usec
DE        6.50 usec
TE        299.0 K
D1        2.00000000 sec
D11       0.03000000 sec
TD0       1
  
```

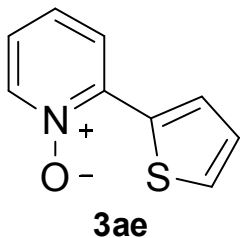
```

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SF01      100.6328888 MHz
  
```

```

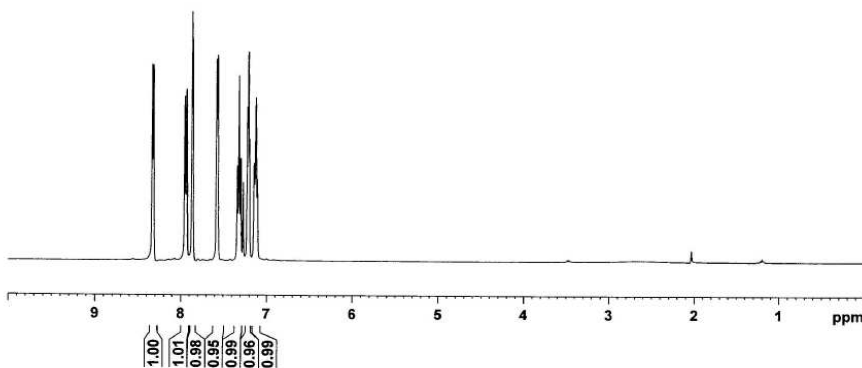
===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12     14.26 dB
PL13     14.46 dB
PL2W     13.18669796 W
PL12W    0.39276794 W
PL13W    0.37509048 W
SF02     400.1716007 MHz
SI        32768
SF        100.6228254 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```

8.3316  
8.3163  
7.9485  
7.9278  
7.8626  
7.8551  
7.5738  
7.5528  
7.3345  
7.3142  
7.2954  
7.2658  
7.2182  
7.2077  
7.2054  
7.1956  
7.1496  
7.1371  
7.1229  
7.1080



```

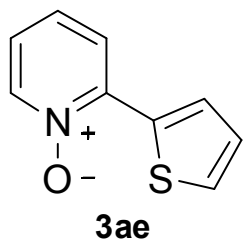
NAME          ZF9-34
EXPNO         1
PROCNO        1
Date_         20090805
Time          10.51
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            16
DS            2
SWH           8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9846387 sec
RG            203
DW            60.800 usec
DE            6.50 usec
TE            301.7 K
D1            1.0000000 sec
TD0           1
  
```



```

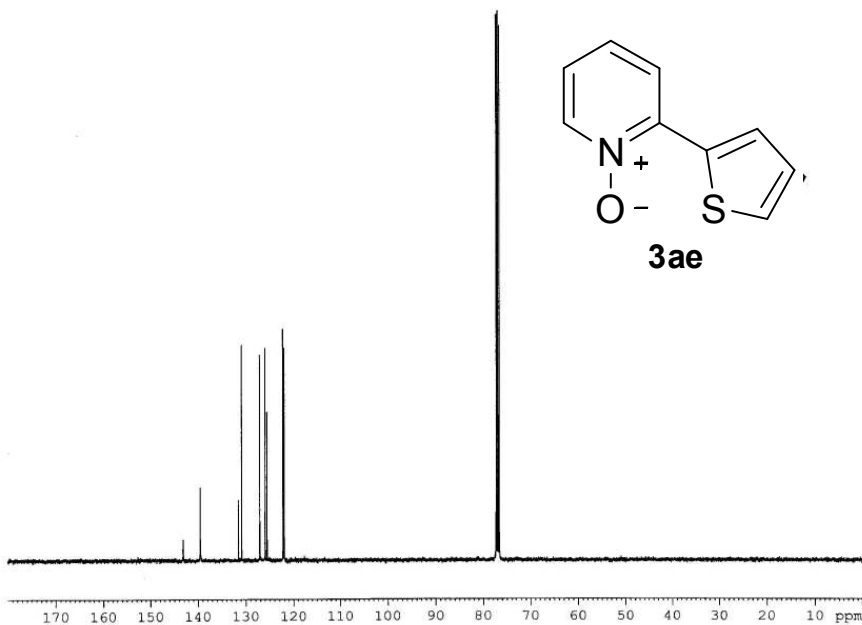
===== CHANNEL f1 =====
NUC1          1H
F1            14.20 usec
PL1           -1.00 dB
PL1W          13.18669796 W
SFO1          400.1724712 MHz
SI            32768
SF            400.1700000 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```

143.18  
139.57  
131.58  
130.88  
127.11  
126.03  
125.62  
122.26  
122.05



```

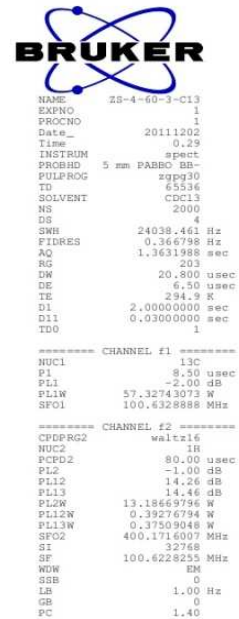
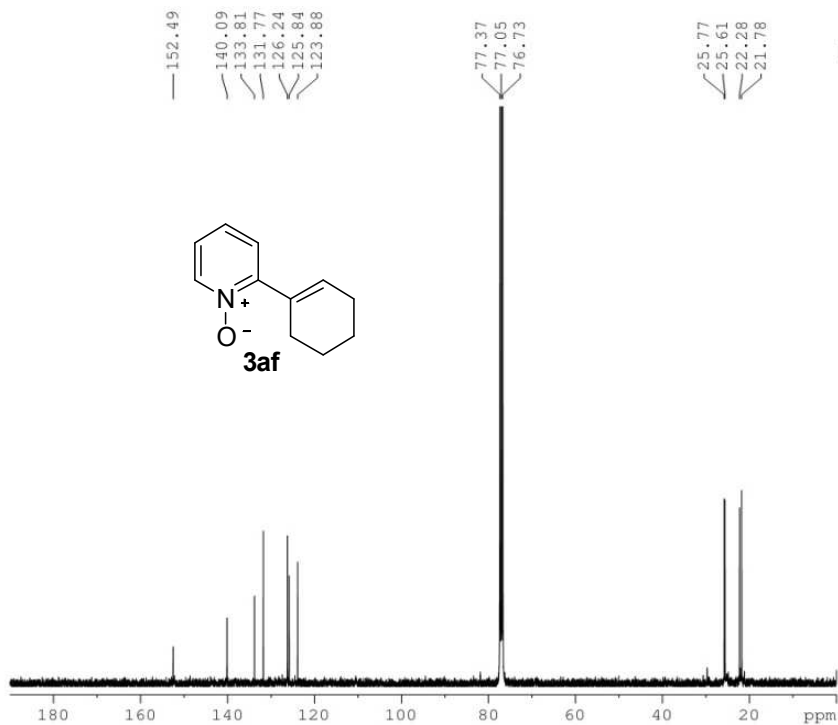
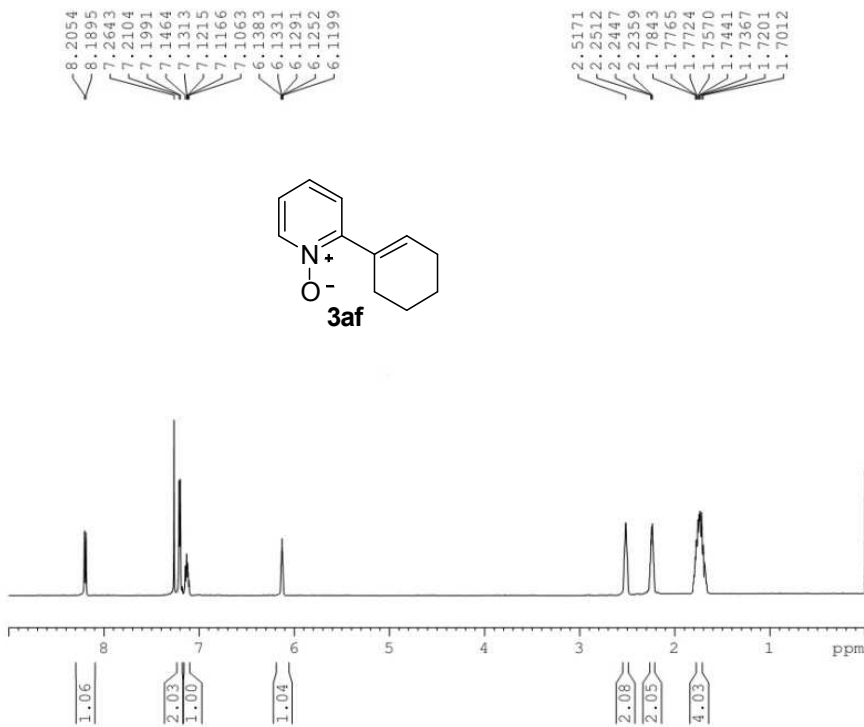
NAME          ZF9-34-C13
EXPNO         1
PROCNO        1
Date_         20090806
Time          15.42
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            1501
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            203
DW            20.800 usec
DE            6.50 usec
TE            307.5 K
D1            2.0000000 sec
D11           0.0300000 sec
TD0           1
  
```



```

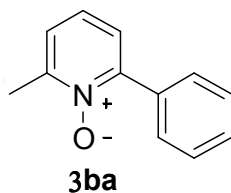
===== CHANNEL f1 =====
NUC1          13C
F1            8.70 usec
PL1           -2.00 dB
PL1W          57.32743073 W
SFO1          100.6328888 MHz

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -1.00 dB
PL12          14.02 dB
PL13          14.46 dB
PL2W          13.18669796 W
PL12W         0.41508400 W
PL13W         0.37509048 W
SFO2          400.1716007 MHz
SI            32768
SF            100.6228270 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```



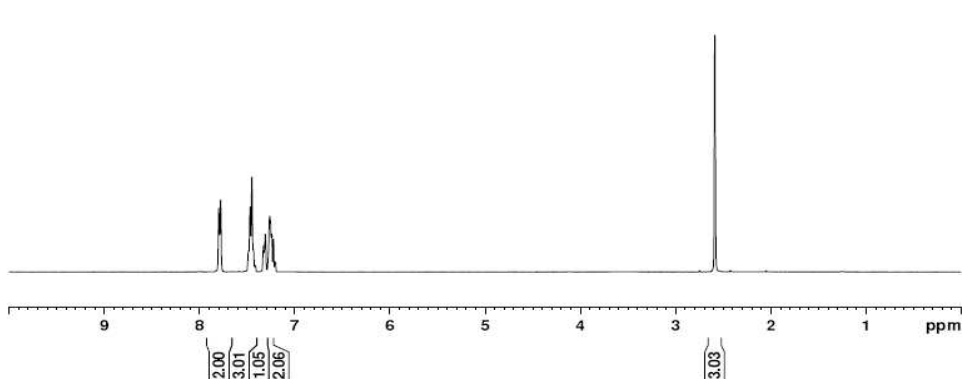
7.7978  
7.7801  
7.4849  
7.4697  
7.4516  
7.4346  
7.4173  
7.3297  
7.3114  
7.2635  
7.2579  
7.2430  
7.2238  
7.2049

2.5880



```

NAME          ZF6-39-3
EXPNO         1
PROCNO        1
Date_         20090218
Time          8.36
INSTRUM       spect
PROBHD        5 mm DABBO BB-
PULPROG       zg30
ID            65536
SOLVENT       CDCl3
NS            16
DS            2
SWH           8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9846387 sec
RG            391
DW            60.800 usec
DE            6.50 usec
TE            287.1 K
D1            1.00000000 sec
D10           1
  
```



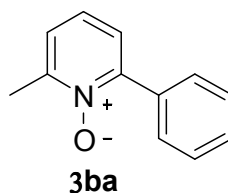
```

===== CHANNEL f1 =====
NUC1          1H
P1            13.80 usec
PL1           -1.00 dB
PL1W          13.18669796 W
SFO1          400.1724712 MHz
SI            32768
SF            400.1700000 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```

149.85  
149.47  
133.27  
129.41  
129.28  
128.10  
125.13  
124.99  
124.94

77.34  
77.03  
76.71

18.55



```

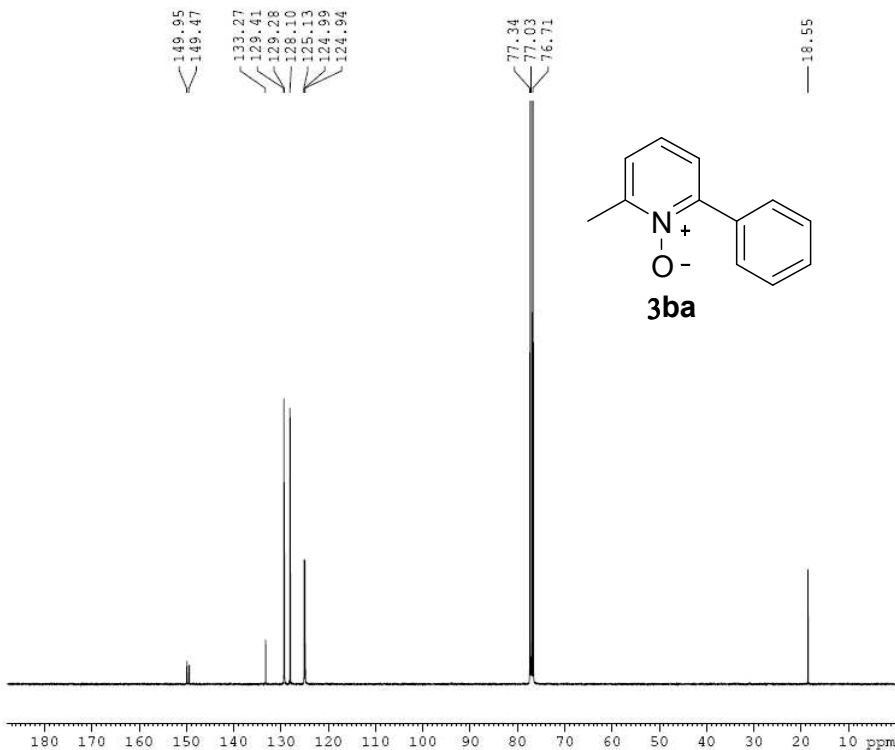
NAME          ZF6-39-3-13
EXPNO         1
PROCNO        1
Date_         20090218
Time          17.14
INSTRUM       spect
PROBHD        5 mm DABBO BB-
PULPROG       zgpg30
ID            65536
SOLVENT       CDCl3
NS            8000
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            203
DW            20.800 usec
DE            6.50 usec
TE            290.0 K
D1            2.00000000 sec
D11           0.03000000 sec
D10           1
  
```

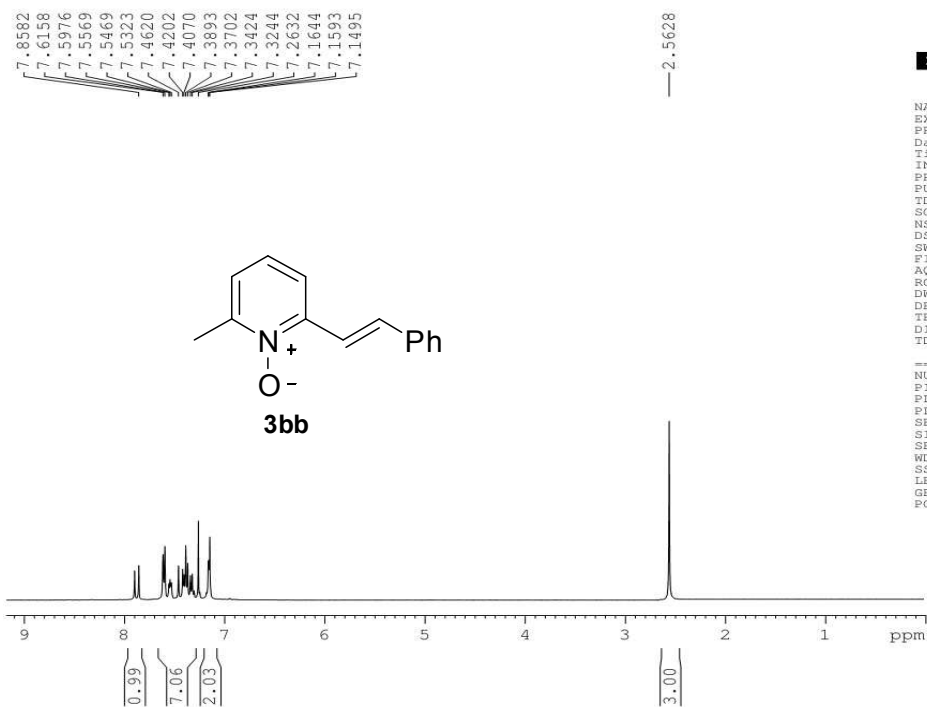
```

===== CHANNEL f1 =====
NUC1          13C
P1            9.50 usec
PL1           -2.00 dB
PL1W          57.32743073 W
SFO1          100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -1.00 dB
PL12          14.26 dB
PL13          14.46 dB
PL2W          13.18669796 W
PL12W         0.39276794 W
PL13W         0.37509048 W
SFO2          400.1716007 MHz
SI            32768
SF            100.6228270 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```



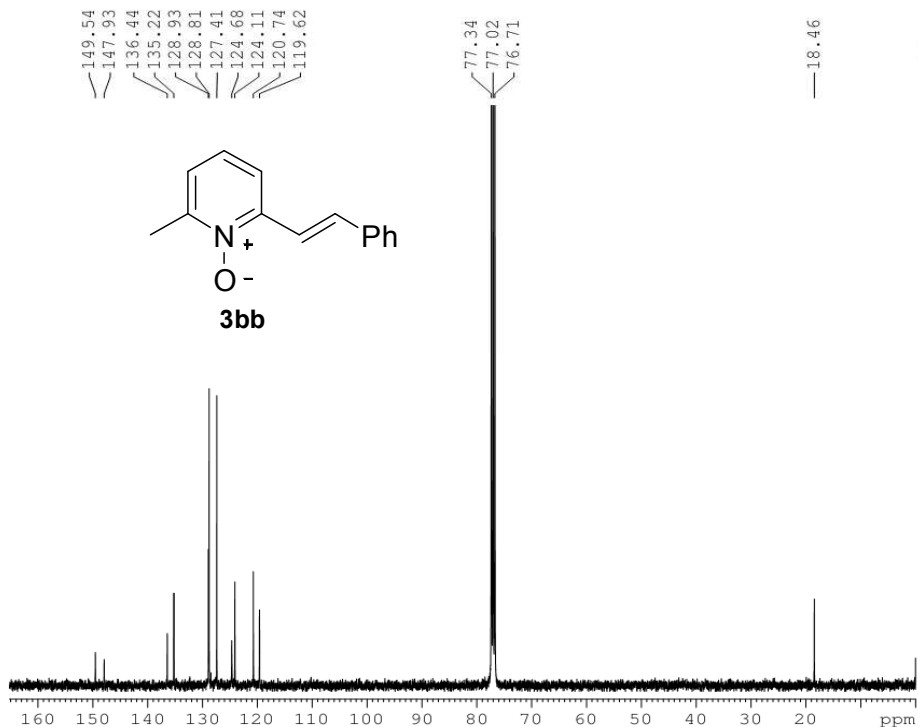


```

NAME      ZS-4-44-1
EXPNO     1
PROCNO    1
Date_     2011128
Time      17.07
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         203
DW         60.800 usec
DE         6.50 usec
TE         294.5 K
D1         1.0000000 sec
D11        1
TDO        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W      13.18669796 W
SFO1      400.1724712 MHz
SI        32768
SF        400.1700022 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```



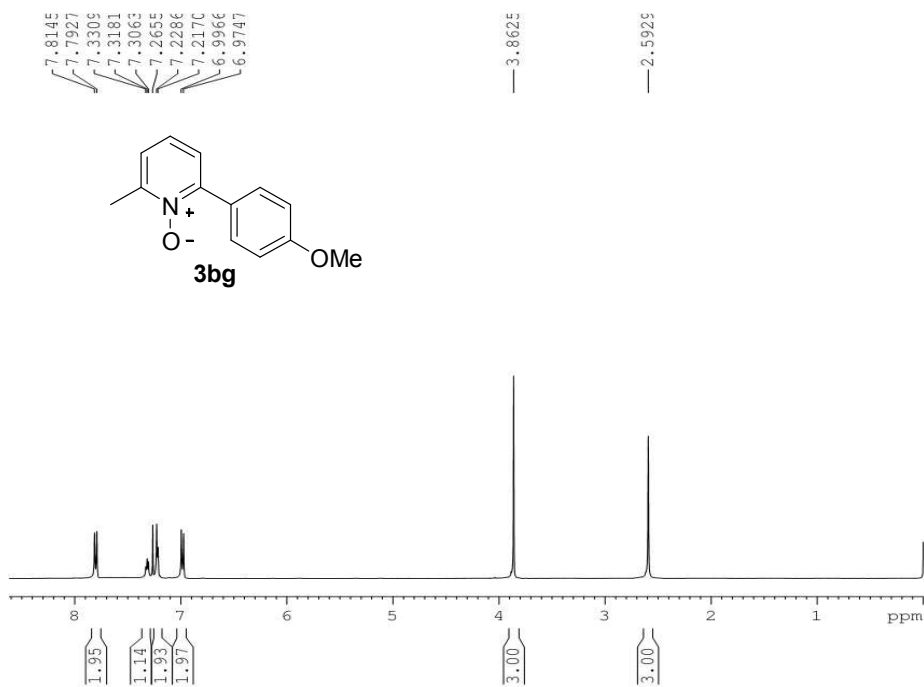
```

NAME      ZS-4-44-1-C13
EXPNO     1
PROCNO    1
Date_     20111201
Time      14.26
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         3295
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         203
DW         20.800 usec
DE         6.50 usec
TE         297.3 K
D1         2.0000000 sec
D11        0.0300000 sec
TDO        1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1         8.50 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SFO1      100.6328888 MHz

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12      14.26 dB
PL13      14.46 dB
PL2W      13.18669796 W
PL12W     0.39276794 W
PL13W     0.37509048 W
SFO2      400.1716007 MHz
SI        32768
SF        100.6228245 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```

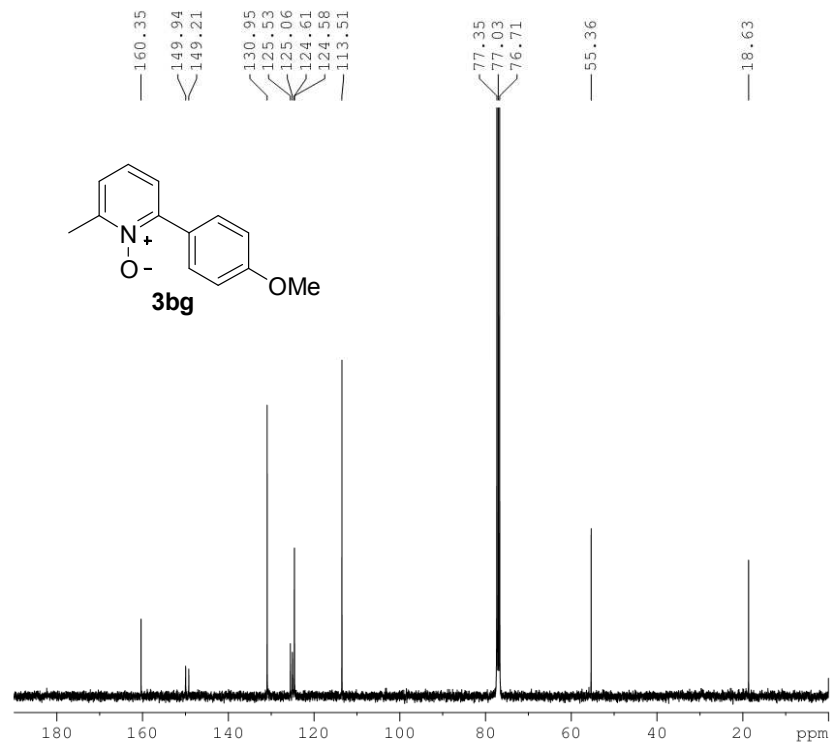


```

NAME      ZS-4-45-1
EXPNO    1
PROCNO   1
Date_    20111129
Time     11.45
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zg30
TD       65536
SOLVENT  CDCl3
NS       16
DS       2
SWH      8223.685 Hz
FIDRES   0.125483 Hz
AQ       3.9846387 sec
RG       203
DW       60.800 usec
DE       6.50 usec
TE       292.6 K
D1       1.0000000 sec
TDO      1
  
```

```

----- CHANNEL f1 -----
NUC1     1H
P1       13.80 usec
PL1      -1.00 dB
PL1W    13.18669796 W
SF01    400.1724712 MHz
SI       32768
SF       400.1700014 MHz
WDW      EM
SSB      0
LB       0.30 Hz
GB       0
PC       1.00
  
```



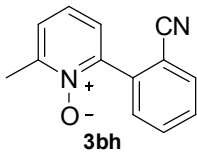
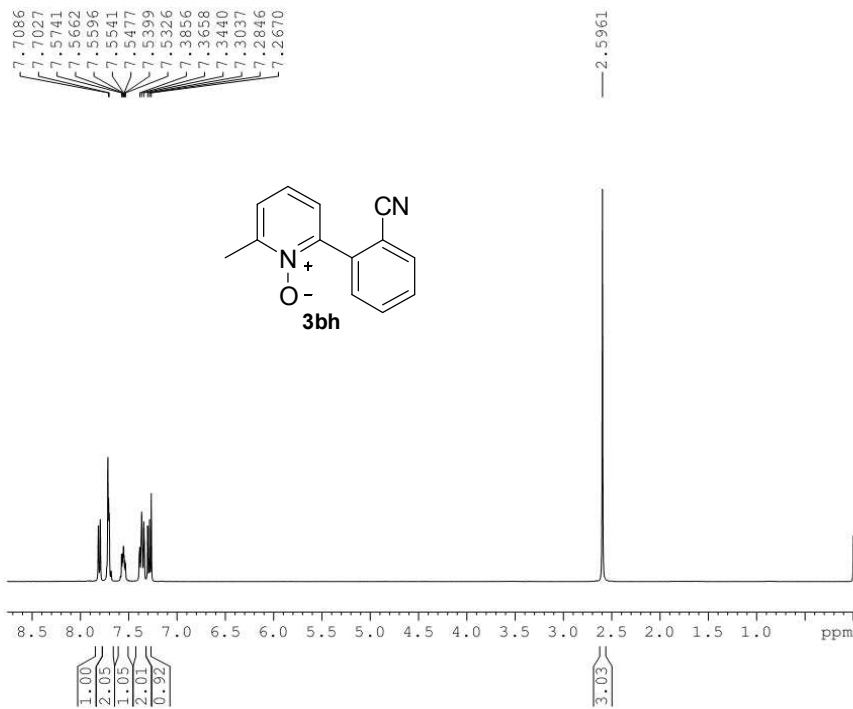
```

NAME      ZS-4-45-1-C13
EXPNO    1
PROCNO   1
Date_    20111130
Time     19.24
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       2000
DS       4
SWH      24038.461 Hz
FIDRES   0.366798 Hz
AQ       1.3631988 sec
RG       203
DW       20.800 usec
DE       6.50 usec
TE       295.5 K
D1       2.0000000 sec
D11      0.0300000 sec
TDO      1
  
```

```

----- CHANNEL f1 -----
NUC1     13C
P1       8.50 usec
PL1      -2.00 dB
PL1W    57.32743073 W
SF01    100.6328888 MHz

===== CHANNEL f2 =====
CPDPRG2  waltz16
NUC2     1H
PCPD2    80.00 usec
PL2      -1.00 dB
PL12    14.26 dB
PL13    14.46 dB
PL2W    13.18669796 W
PL12W   0.39276794 W
PL13W   0.37509048 W
SF02    400.1716007 MHz
SI       32768
SF       100.6228261 MHz
WDW      EM
SSB      0
LB       1.00 Hz
GB       0
PC       1.40
  
```

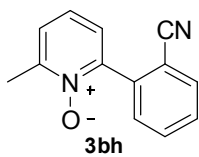
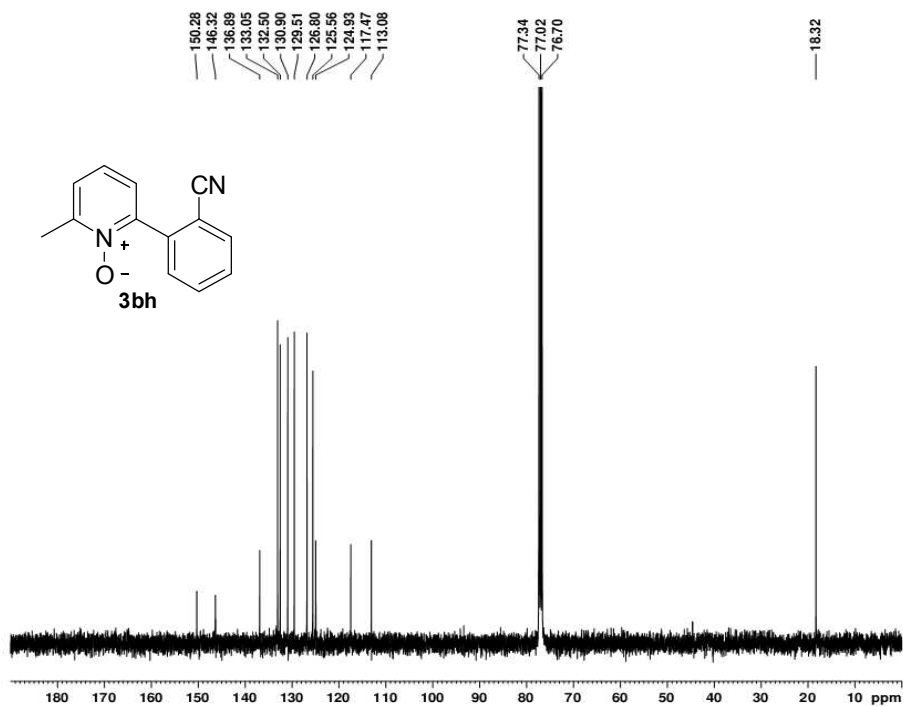


```

NAME          ZS-5-23
EXPNO         1
PROCNO       1
Date_        20120228
Time         9.34
INSTRUM      spect
PROBHD       5 mm PABBO BB-
PULPROG      zg30
TD           65536
SOLVENT      CDCl3
NS           16
DS           2
SWH          8223.685 Hz
FIDRES       0.125483 Hz
AQ           3.9846387 sec
RG           203
DM           60.800 usec
DE           6.50 usec
TE           291.9 K
D1           1.0000000 sec
TD0          1
  
```

```

===== CHANNEL f1 =====
NUC1          1H
P1            13.80 usec
PL1           -1.00 dB
PL1W          13.18669796 W
SFO1          400.1724712 MHz
SI            32768
SF            400.1700007 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

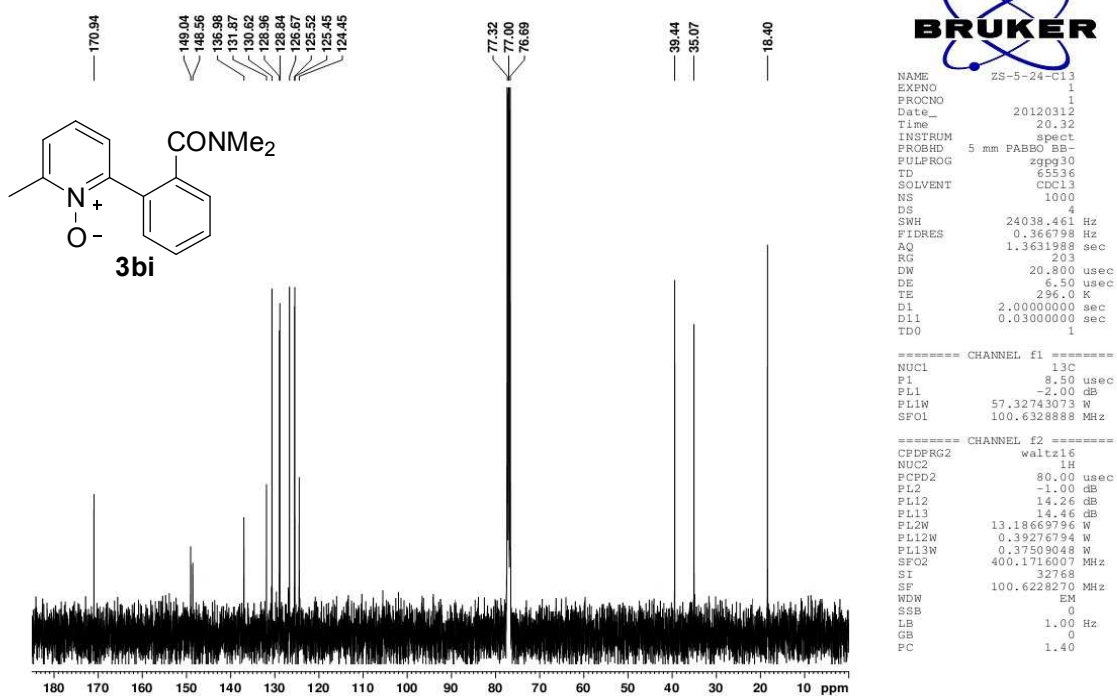
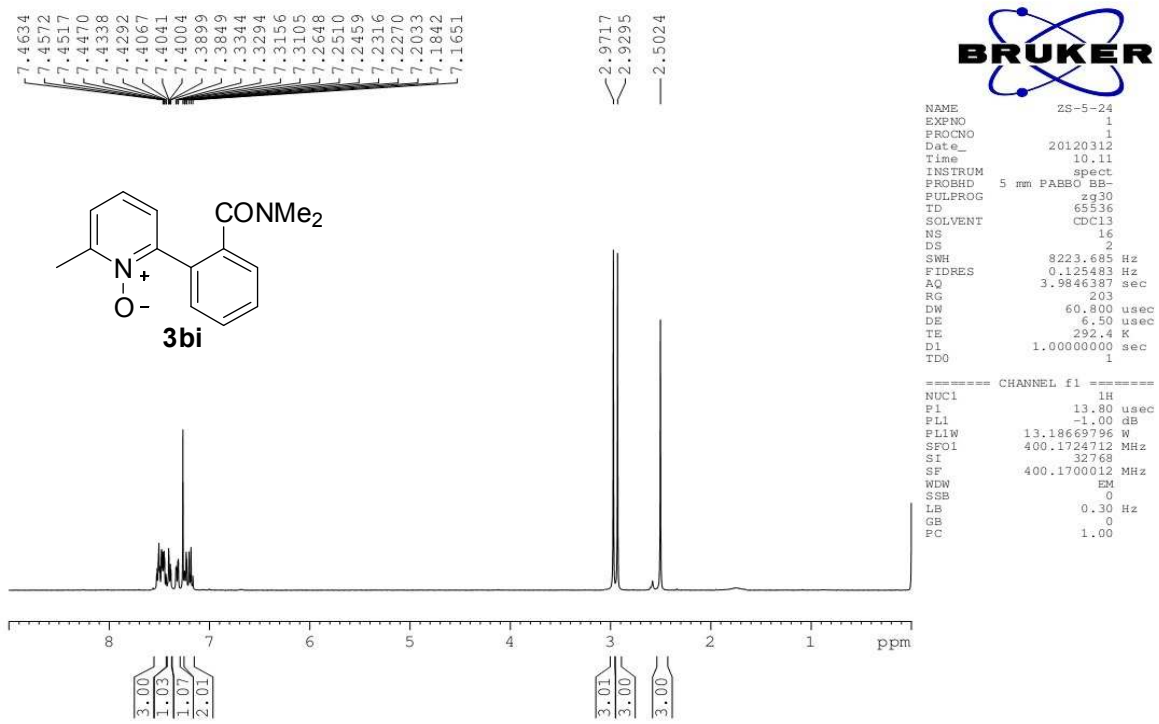
NAME          ZS-5-23-Cl3
EXPNO         1
PROCNO       1
Date_        20120304
Time         23.48
INSTRUM      spect
PROBHD       5 mm PABBO BB-
PULPROG      zgpg30
TD           65536
SOLVENT      CDCl3
NS           1500
DS           4
SWH          24038.461 Hz
FIDRES       0.366798 Hz
AQ           1.3631988 sec
RG           203
DM           20.800 usec
DE           6.50 usec
TE           300.0 K
D1           2.0000000 sec
D11          0.0300000 sec
TD0          1
  
```

```

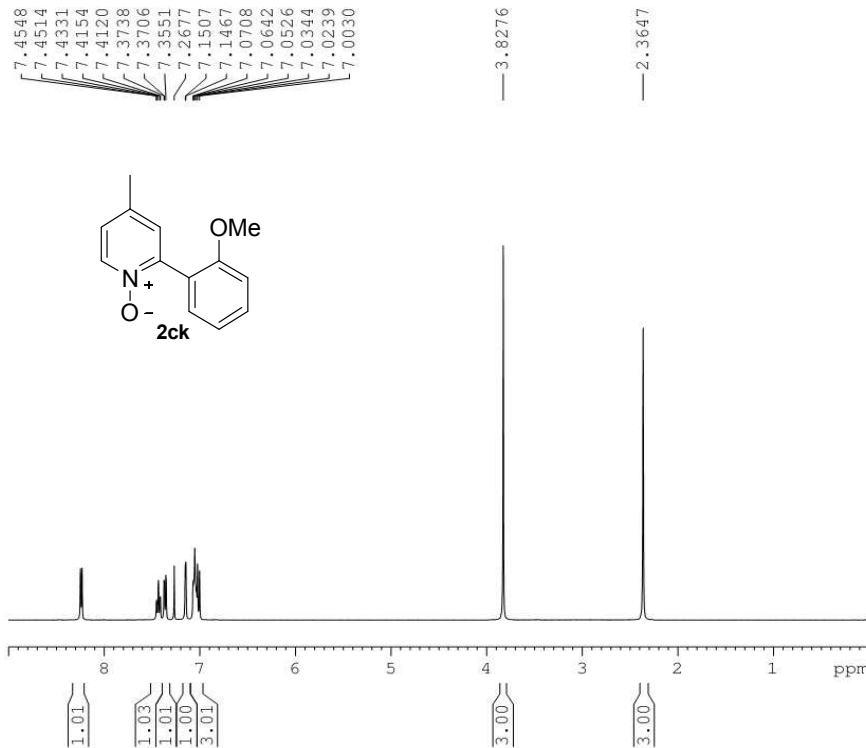
===== CHANNEL f1 =====
NUC1          13C
P1            8.50 usec
PL1           -2.00 dB
PL1W          57.32743073 W
SFO1          100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2      waltz16
NUC2          1H
PCPD2        80.00 usec
PL2           -1.00 dB
PL12         14.26 dB
PL13         14.46 dB
PL2W         13.18669796 W
PL12W        0.39276794 W
PL13W        0.37509048 W
SFO2         400.1716007 MHz
SI            32768
SF            100.6228270 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```





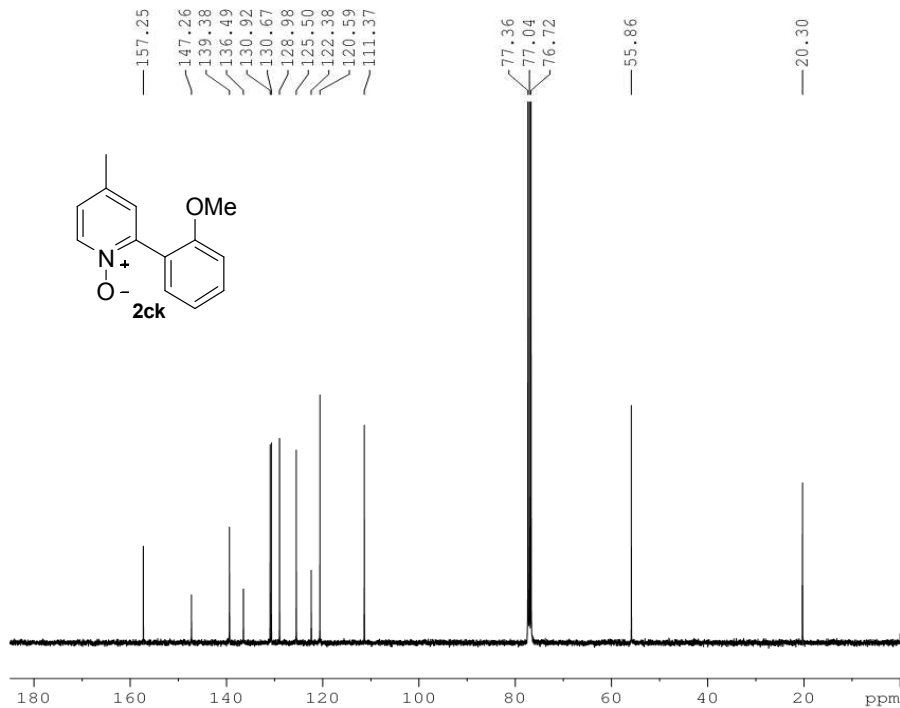


```

NAME      ZS-5-4
EXPNO     1
PROCNO    1
Date_     20111202
Time      11.10
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   CDC13
NS        16
DS        2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        181
DW        60.800 usec
DE        6.50 usec
TE        291.0 K
D1        1.00000000 sec
TD0       1
  
```

```

----- CHANNEL f1 -----
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W     13.18669796 W
SFO1     400.1724712 MHz
SI        32768
SF        400.1700005 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```



```

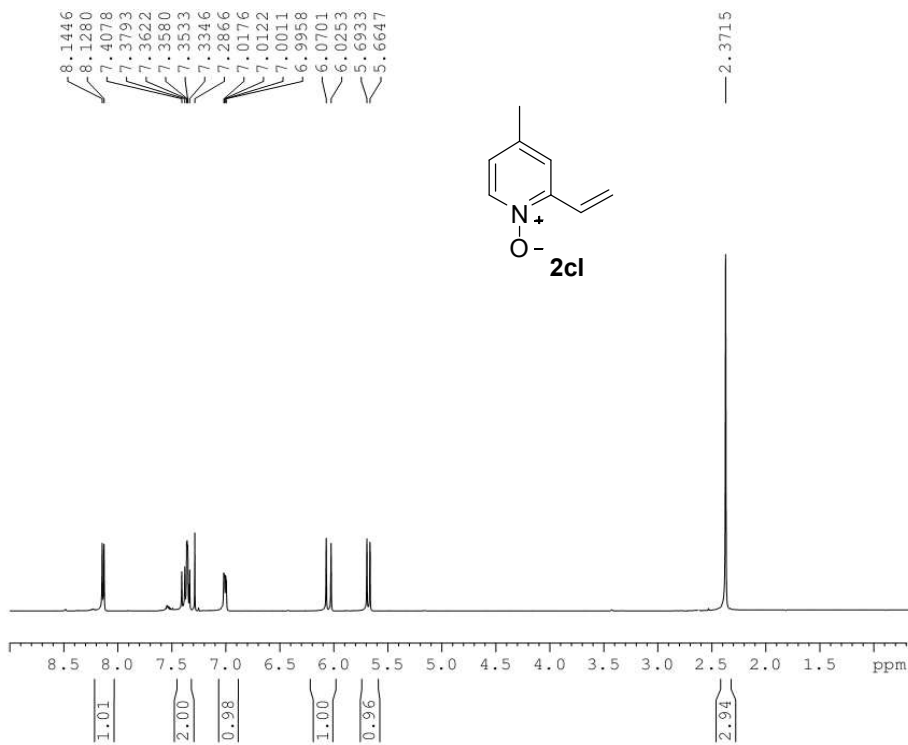
NAME      ZS-5-4-C13
EXPNO     1
PROCNO    1
Date_     20111204
Time      20.28
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDC13
NS        3992
DS        4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG        203
DW        20.800 usec
DE        6.50 usec
TE        295.2 K
D1        2.00000000 sec
D11       0.03000000 sec
TD0       1
  
```

```

----- CHANNEL f1 -----
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W     57.32743073 W
SFO1     100.6328888 MHz
  
```

```

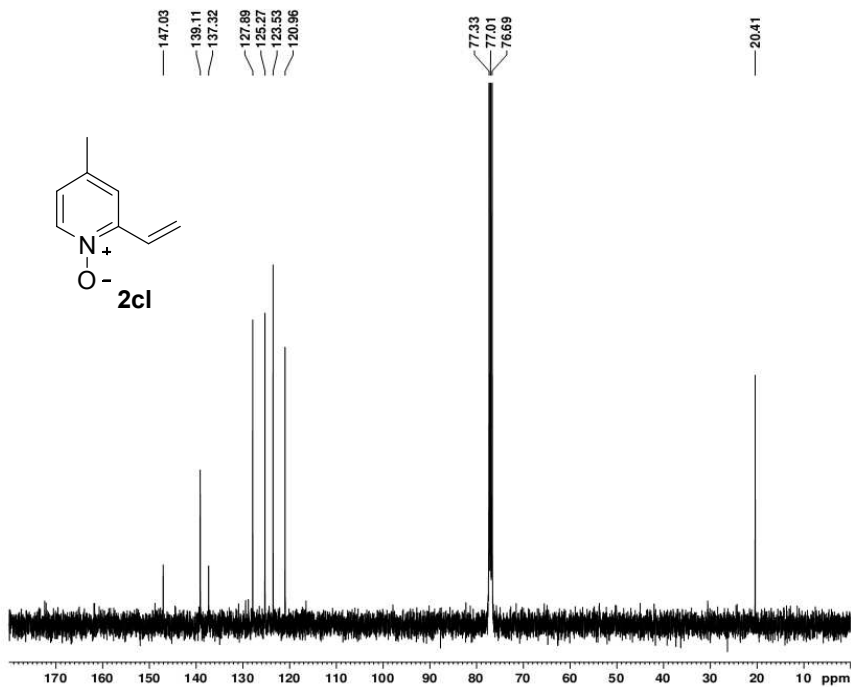
----- CHANNEL f2 -----
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12     14.26 dB
PL13     14.46 dB
PL2W     13.18669796 W
PL12W    0.39276794 W
PL13W    0.37509048 W
SFO2     400.1716007 MHz
SI        32768
SF        100.6228248 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```



```

NAME      ZS-5-29
EXPNO     1
PROCNO    1
Date_     20120322
Time      9.02
INSTRUM   spect
PROBHD    5 mm PASEI 1H/
PULPROG   zg30
ID        65536
SOLVENT   CDCl3
NS        16
DS        2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        181
DW        60.800 usec
DE        6.50 usec
TE        300.0 K
D1        1.00000000 sec
TD0       1

===== CHANNEL f1 =====
NUC1      1H
P1        6.80 usec
PL1       -1.10 dB
PL1W      13.49385548 W
SF01      400.1724712 MHz
SI        32768
SF        400.1699924 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```

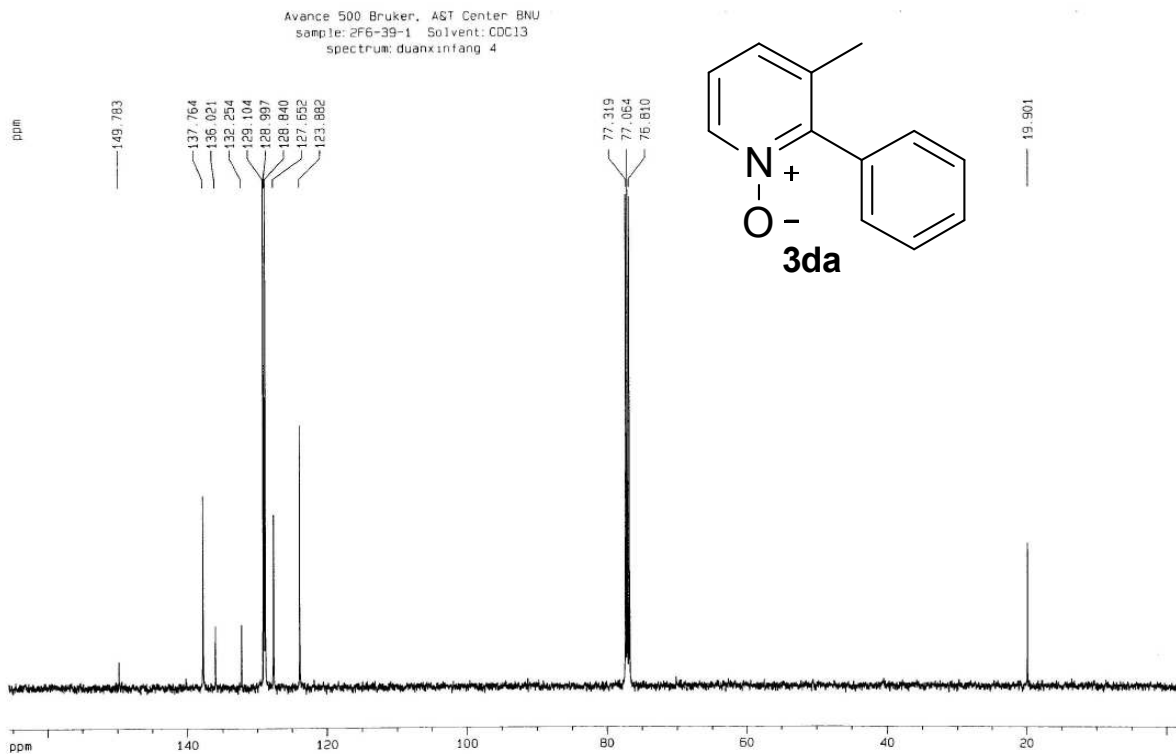
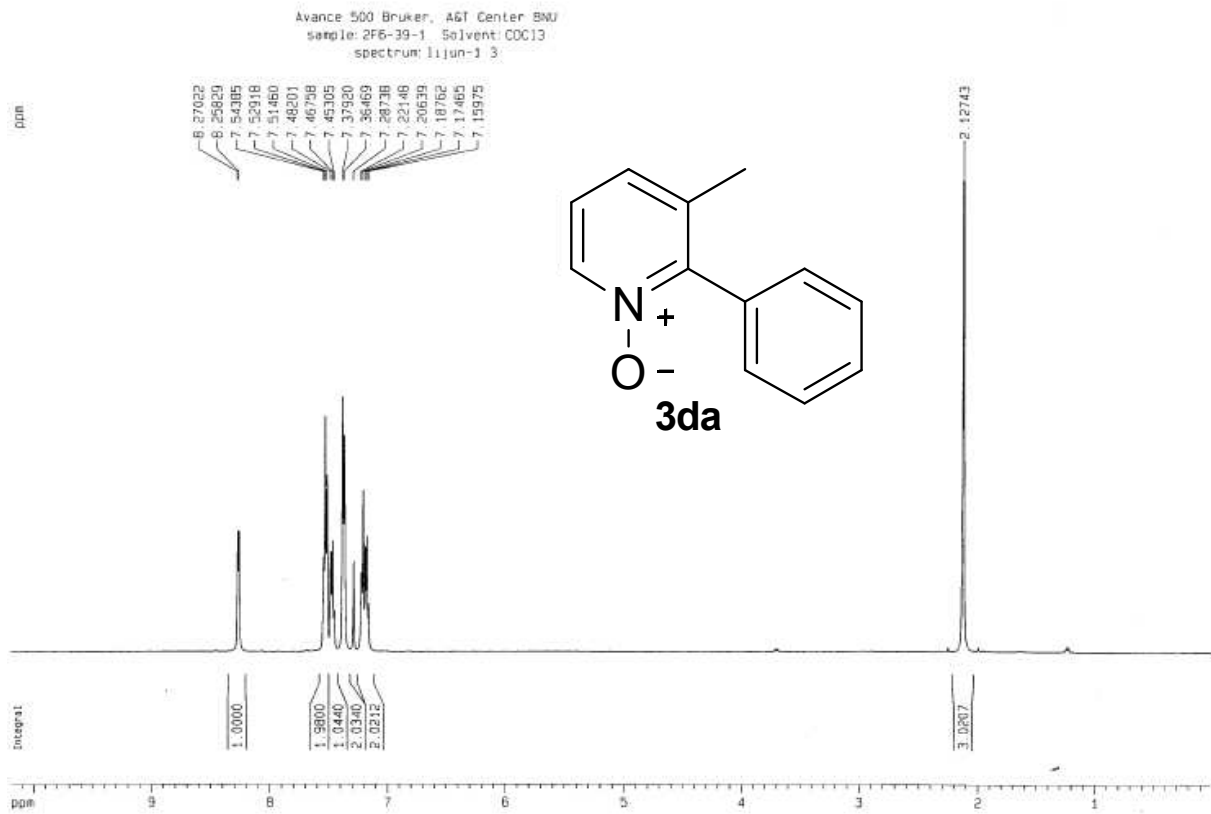


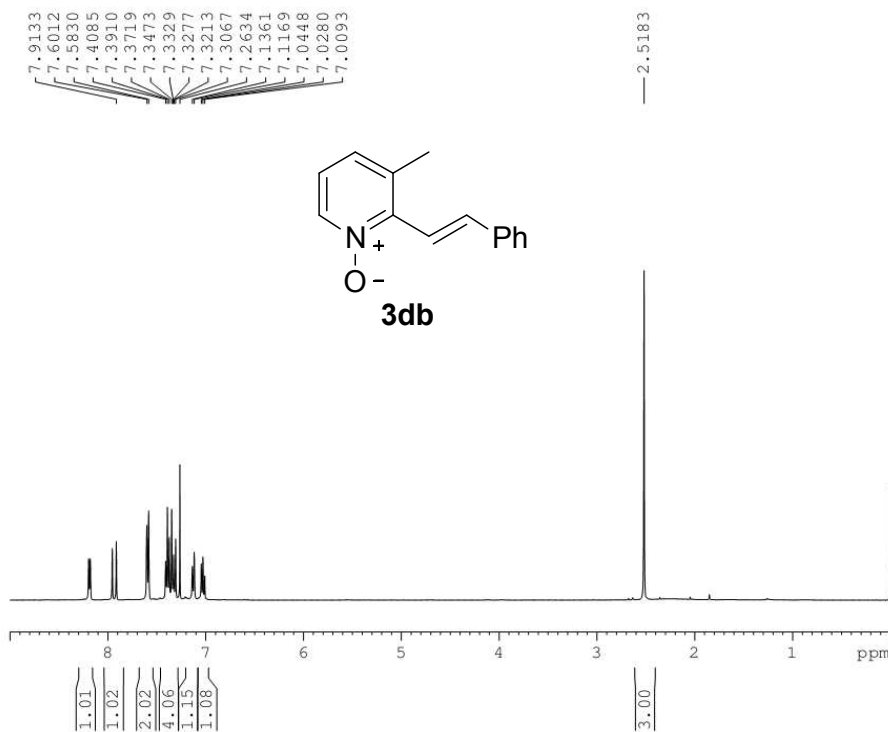
```

NAME      ZS-5-29-Cl3
EXPNO     1
PROCNO    1
Date_     20120405
Time      12.30
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
ID        65536
SOLVENT   CDCl3
NS        1000
DS        4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG        203
DW        20.800 usec
DE        6.50 usec
TE        297.1 K
D1        2.00000000 sec
D11       0.03000000 sec
TD0       1

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SF01      100.6328888 MHz

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12      14.26 dB
PL13      14.46 dB
PL2W      13.18669796 W
PL12W     0.39276794 W
PL13W     0.37509048 W
SF02      400.1716007 MHz
SI        32768
SF        100.6228270 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```



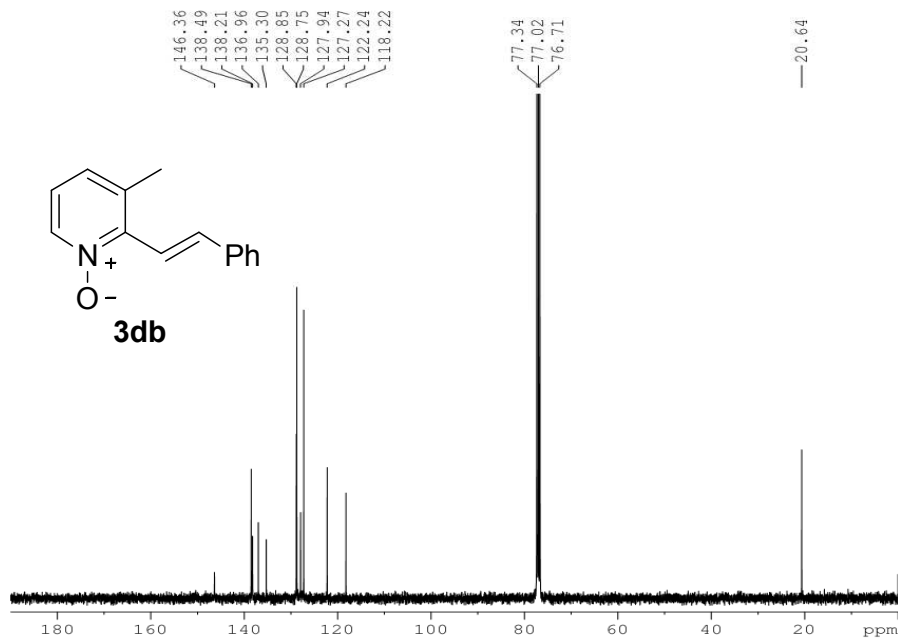


```

NAME      ZS-4-58-1
EXPNO     1
PROCNO    1
Date_     20111128
Time      17.12
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         203
DW         60.800 usec
DE         6.50 usec
TE         294.4 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W      13.18669796 W
SF01      400.1724712 MHz
SI        32768
SF        400.1700022 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

```



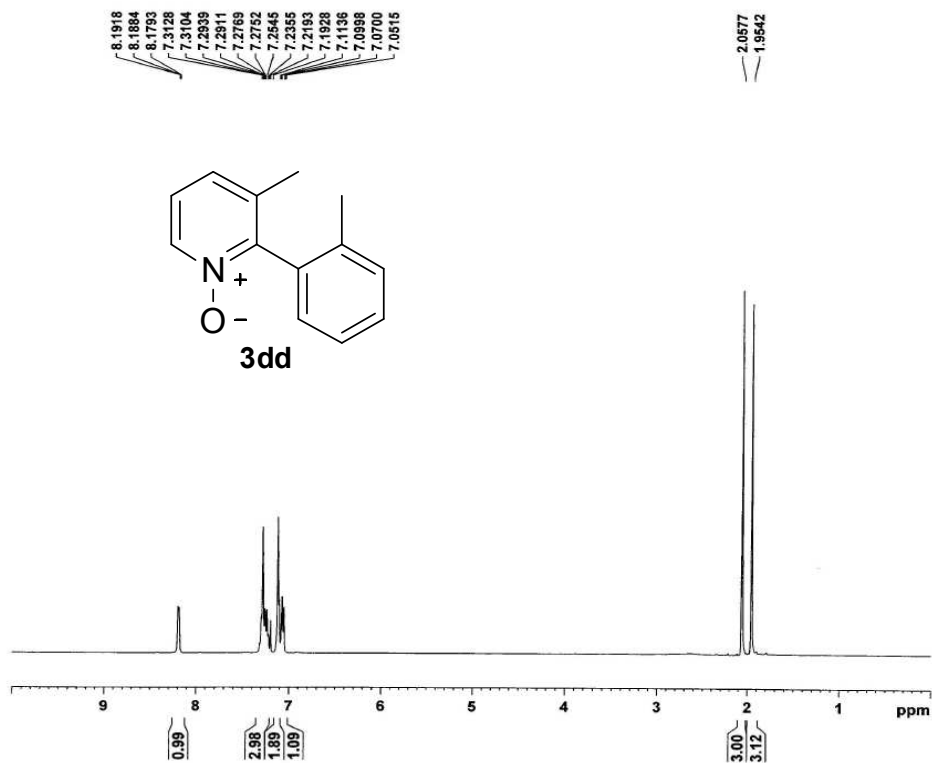
```

NAME      ZS-4-58-1-c13
EXPNO     1
PROCNO    1
Date_     20111130
Time      21.23
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         2000
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         203
DW         20.800 usec
DE         6.50 usec
TE         295.6 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SF01      100.6228888 MHz

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12      14.26 dB
PL13      14.46 dB
PL2W      13.18669796 W
PL12W     0.38276794 W
PL13W     0.37509048 W
SF02      400.1716007 MHz
SI        32768
SF        100.6228260 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

```

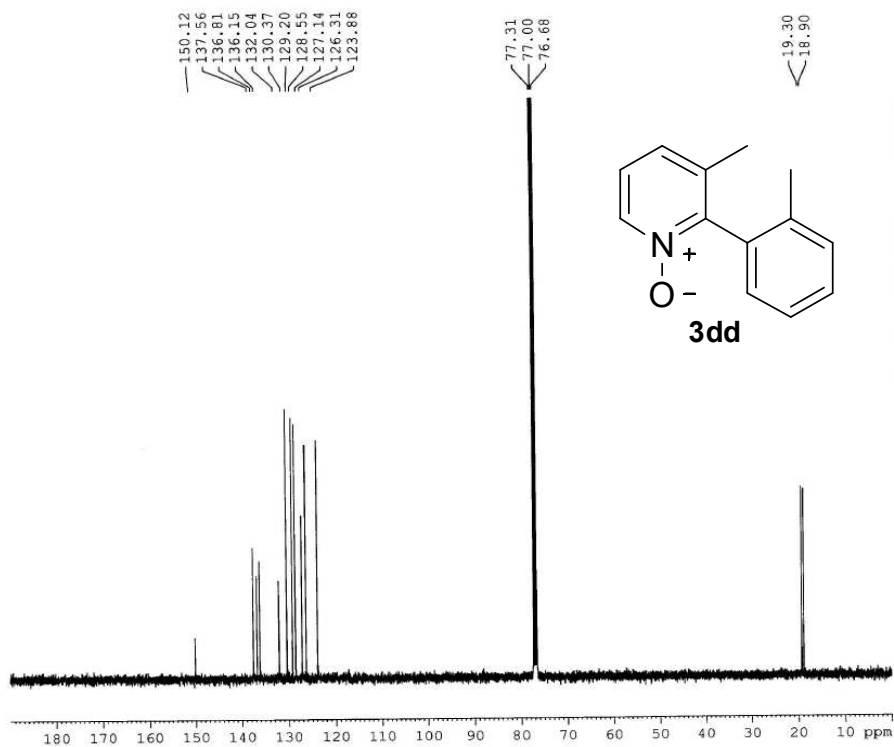


```

NAME          ZF9-29
EXPNO         1
PROCNO        1
Date_         20090805
Time_         10.56
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            16
DS            2
SWH           8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9646387 sec
RG            203
DW            60.800 usec
DE            6.50 usec
TE            301.7 K
D1            1.00000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          1H
P1            14.20 usec
PL1           -1.00 dB
PL1W          13.18669796 W
SFO1          400.1724712 MHz
SI            32768
SF            400.1700298 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

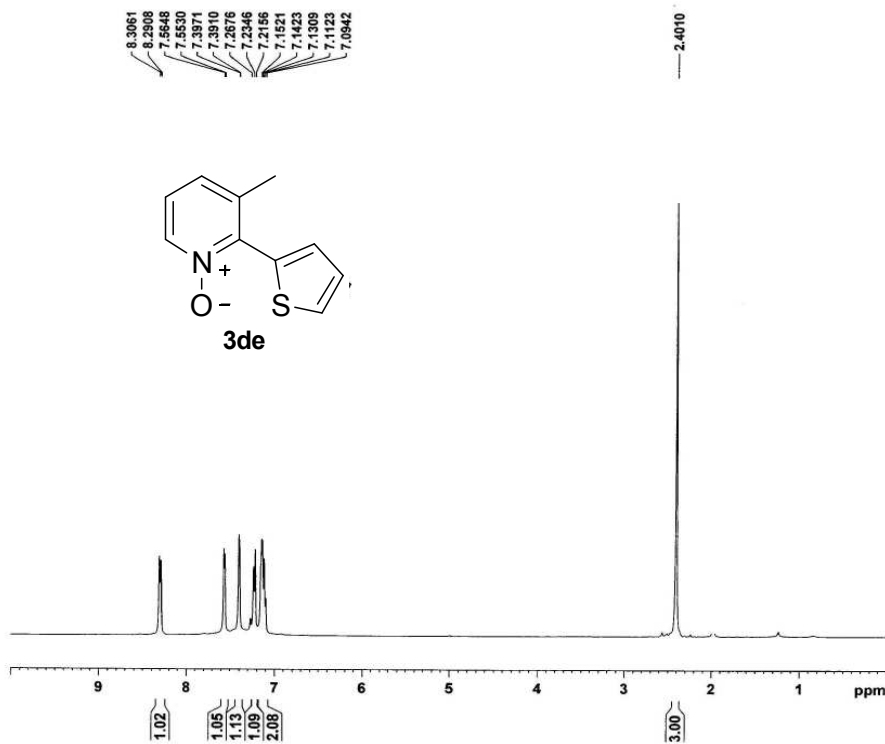
NAME          ZF9-29-C13
EXPNO         1
PROCNO        1
Date_         20090805
Time_         21.22
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            830
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            203
DW            20.800 usec
DE            6.50 usec
TE            305.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          13C
P1            8.70 usec
PL1           -2.00 dB
PL1W          57.32743073 W
SFO1          100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -1.00 dB
PL12          14.02 dB
PL13          14.46 dB
PL2W          13.18669796 W
PL12W         0.41508400 W
PL13W         0.37509048 W
SFO2          400.1716007 MHz
SI            32768
SF            100.6228270 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

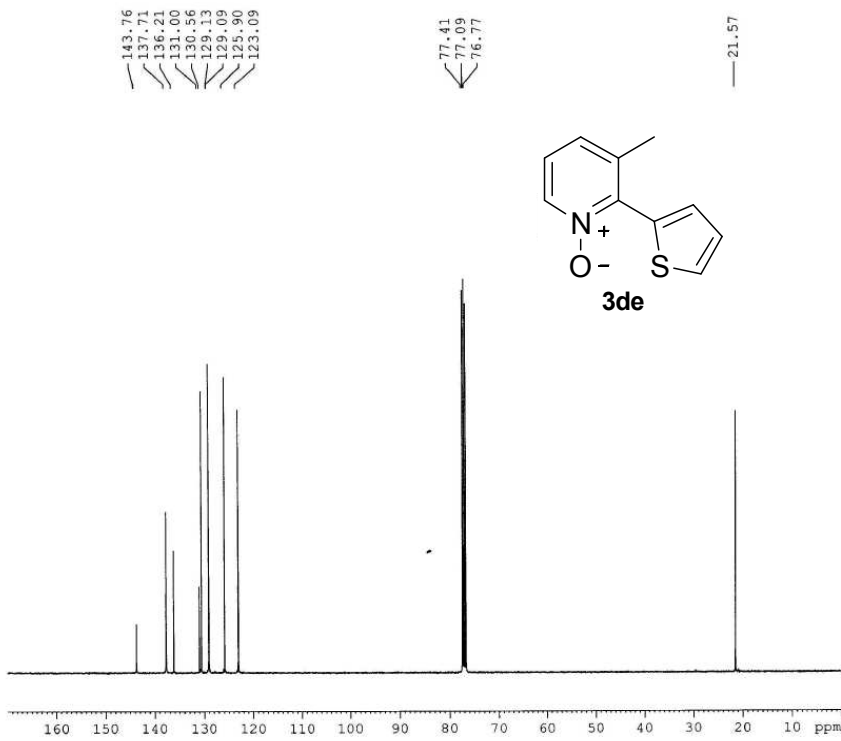


```

NAME          ZF9-33
EXPNO         1
PROCNO        1
Date_         20090805
Time_         15.42
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            16
DS            2
SWH           8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9846397 sec
RG            101
DW            60.800 usec
DE            6.50 usec
TE            300.1 K
D1            1.0000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          1H
P1            14.20 usec
PL1           -1.00 dB
PL1W          13.18669796 W
SFO1          400.1724712 MHz
SI            32768
SF            400.1700000 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

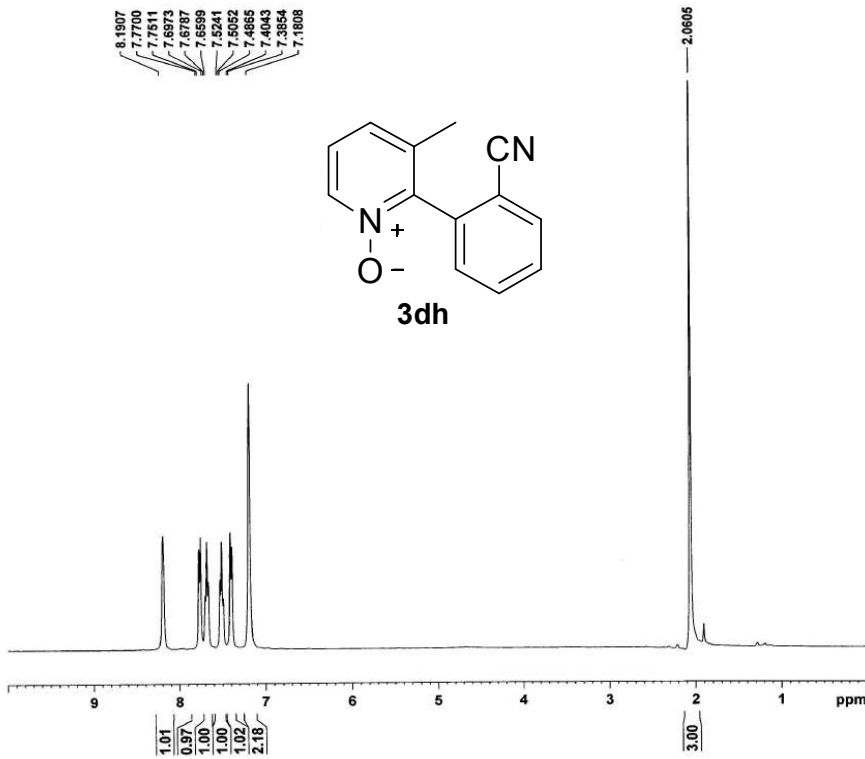
NAME          ZF9-33-C13
EXPNO         1
PROCNO        1
Date_         20090806
Time_         2.24
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            4
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            203
DW            20.800 usec
DE            6.50 usec
TE            305.6 K
D1            2.0000000 sec
D11           0.0300000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          13C
P1            8.70 usec
PL1           -2.00 dB
PL1W          57.32743073 W
SFO1          100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -1.00 dB
PL12          14.02 dB
PL13          14.46 dB
PL2W          13.18669796 W
PL12W         0.41508400 W
PL13W         0.37509048 W
SFO2          400.1716007 MHz
SI            32768
SF            100.6228270 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

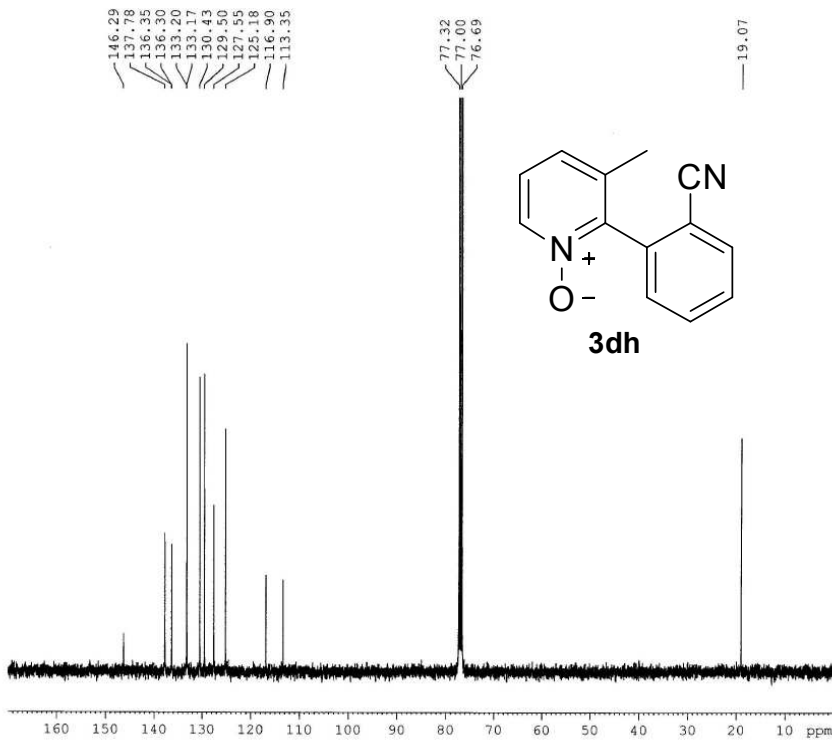


```

NAME      ZF9-38-2
EXPNO     1
PROCNO    1
Date_     20090807
Time      16.14
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         203
DW         60.800 usec
DE         6.50 usec
TE         301.4 K
D1         1.0000000 sec
D11        0
TDO        1
  
```

```

----- CHANNEL f1 -----
NUC1      1H
P1        14.20 usec
PL1       -1.00 dB
PL1W      13.18669796 W
SF01      400.1724712 MHz
SI        32768
SF        400.1700278 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```



```

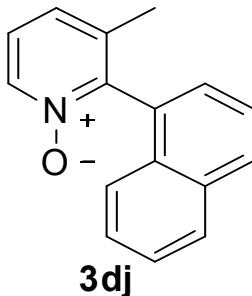
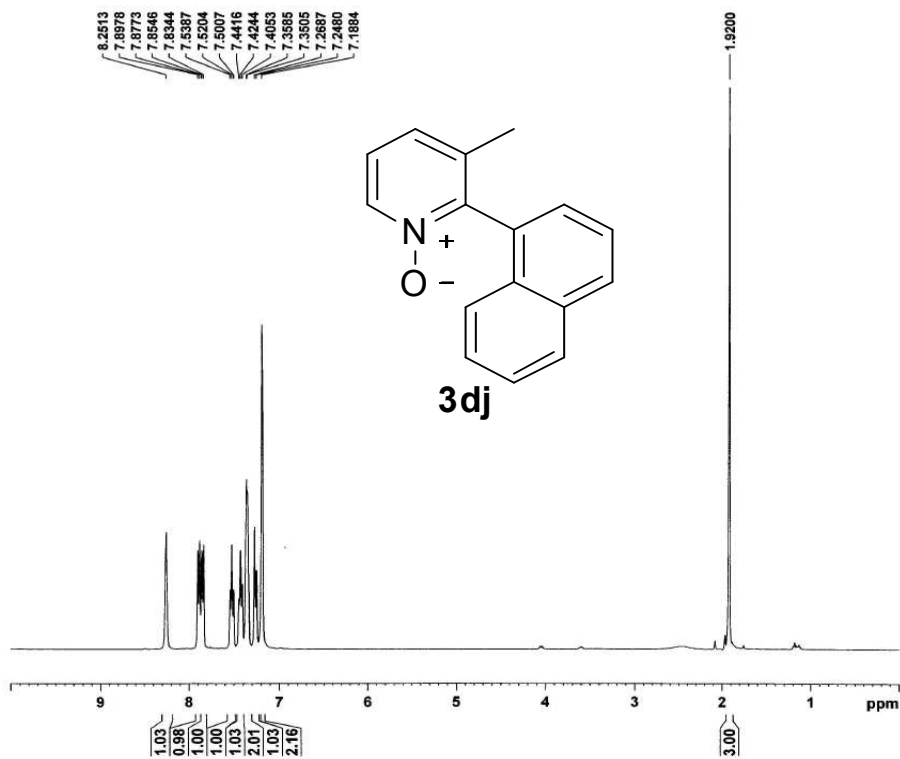
NAME      ZF9-38-2-c13
EXPNO     1
PROCNO    1
Date_     20090807
Time      16.44
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         862
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         203
DW         20.800 usec
DE         6.50 usec
TE         304.0 K
D1         2.0000000 sec
D11        0.0300000 sec
D12        0
TDO        1
  
```

```

----- CHANNEL f1 -----
NUC1      13C
P1        8.70 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SF01      100.6328888 MHz
  
```

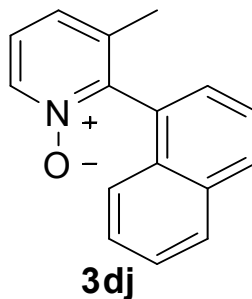
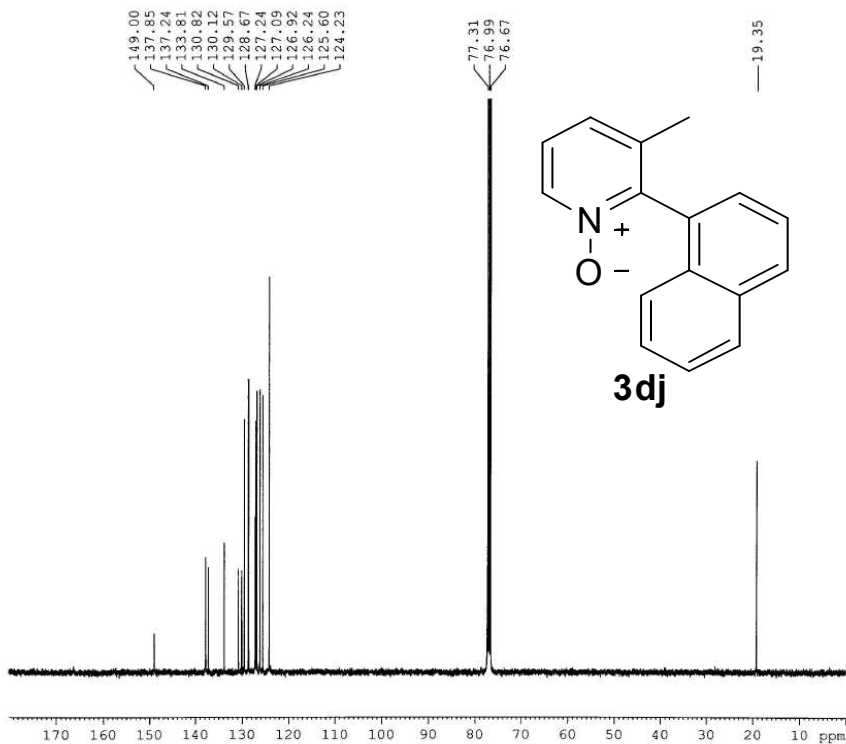
```

----- CHANNEL f2 -----
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12      14.02 dB
PL13      14.46 dB
PL2W      13.18669796 W
PL12W     0.43508400 W
PL13W     0.37509045 W
SF02      400.1716007 MHz
SI        32768
SF        100.6228270 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```



NAME ZF9-31  
EXPNO 1  
PROCNO 1  
Date\_ 20090805  
Time 10.46  
INSTRUM spect  
PROBHD 5 mm PABBO BB-  
PULPROG zg30  
TD 65536  
SOLVENT CDCl3  
NS 16  
DS 2  
SWH 8223.685 Hz  
FIDRES 0.125483 Hz  
AQ 3.9846387 sec  
RG 203  
DW 60.800 usec  
DE 6.50 usec  
TE 301.8 K  
D1 1.0000000 sec  
TDO 1

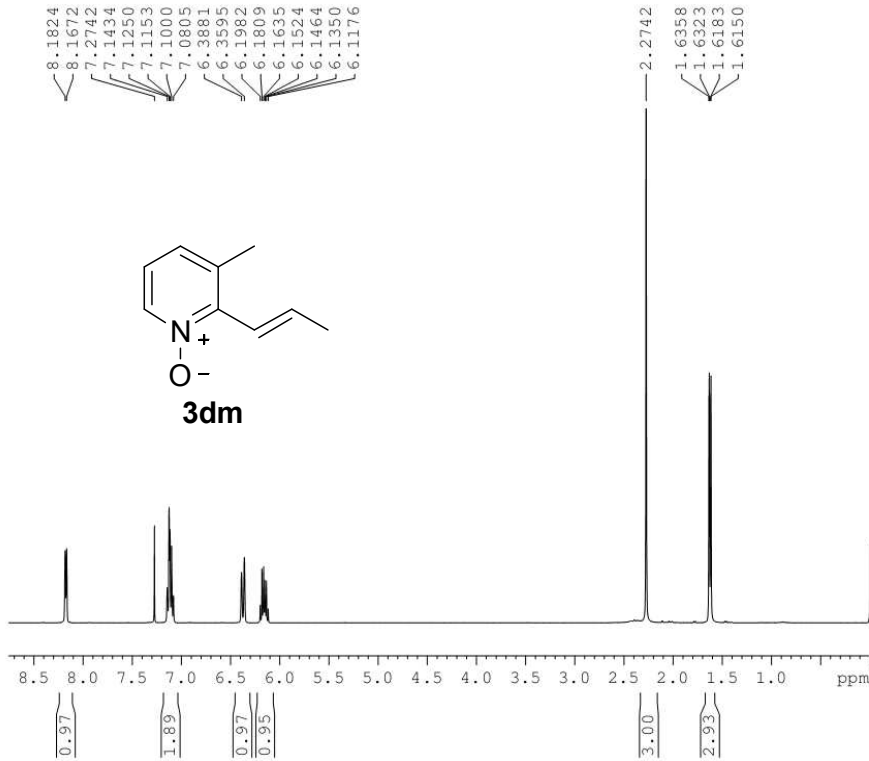
===== CHANNEL f1 =====  
NUC1 1H  
P1 14.20 usec  
PL1 -1.00 dB  
PLLW 13.18669796 W  
SFO1 400.1724712 MHz  
SI 32768  
SF 400.1700332 MHz  
WDW EM  
SSB 0  
LB 0.30 Hz  
GB 0  
FC 1.00



NAME ZF9-31-C13  
EXPNO 1  
PROCNO 1  
Date\_ 20090806  
Time 21.19  
INSTRUM spect  
PROBHD 5 mm PABBO BB-  
PULPROG zgpg30  
TD 65536  
SOLVENT CDCl3  
NS 4000  
DS 0  
SWH 24038.461 Hz  
FIDRES 0.366798 Hz  
AQ 1.3631988 sec  
RG 203  
DW 20.800 usec  
DE 6.50 usec  
TE 306.3 K  
D1 2.0000000 sec  
D11 0.0300000 sec  
TDO 1

===== CHANNEL f1 =====  
NUC1 13C  
P1 8.70 usec  
PL1 -2.00 dB  
PLLW 57.32743073 W  
SFO1 100.628888 MHz

===== CHANNEL f2 =====  
CPDPRG2 waltz16  
NUC2 1H  
PCPD2 80.00 usec  
PL2 -1.00 dB  
PL12 14.02 dB  
PL13 14.46 dB  
PL2W 13.18669796 W  
PL12W 0.41508400 W  
PL13W 0.37509048 W  
SFO2 400.1716007 MHz  
SI 32768  
SF 100.6282270 MHz  
WDW EM  
SSB 0  
LB 1.00 Hz  
GB 0  
FC 1.40

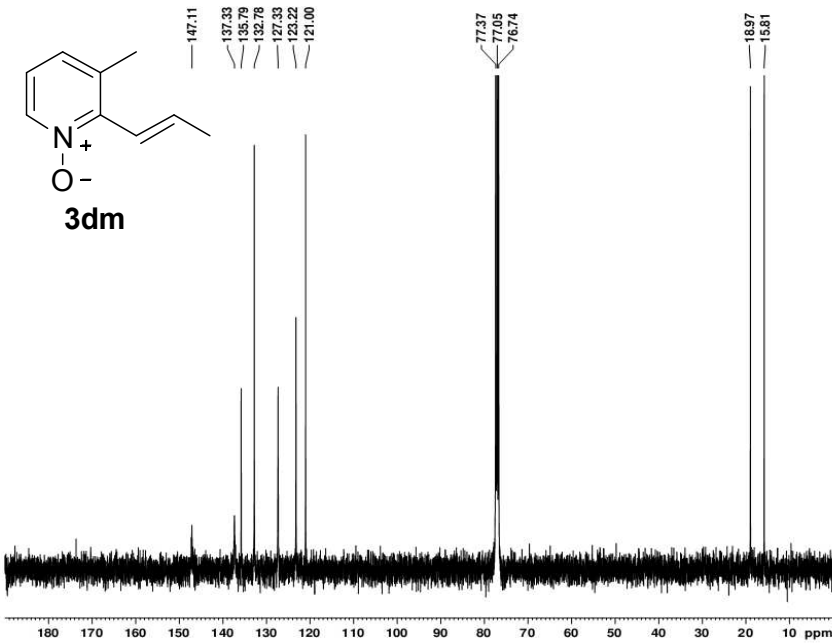


```

NAME      ZS-4-56
EXPNO     1
PROCNO    1
Date_     20111018
Time      17.07
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ         3.9846387 sec
RG         203
DW         60.800 usec
DE         6.50 usec
TE         298.5 K
D1         1.00000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W      13.18669796 W
SFO1      400.1724712 MHz
SI        32768
SF        400.1699979 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB         0
PC         1.00
  
```



```

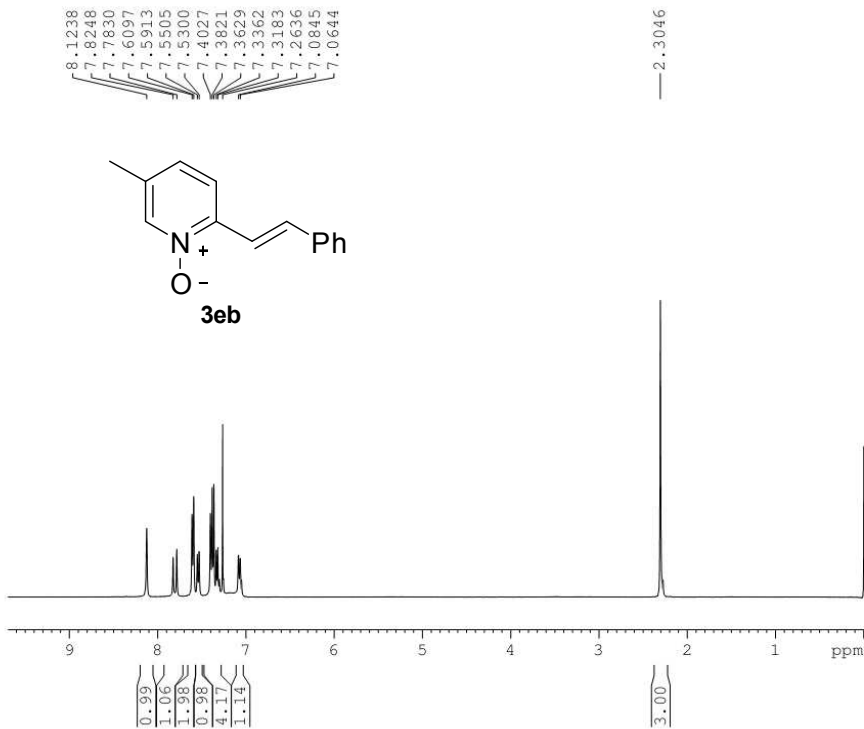
NAME      ZS-4-56-Cl3
EXPNO     1
PROCNO    1
Date_     20111020
Time      18.26
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         2023
DS         4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ         1.3631988 sec
RG         203
DW         20.800 usec
DE         6.50 usec
TE         300.5 K
D1         2.00000000 sec
D11       0.03000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1         8.50 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SFO1      100.6288888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12      14.26 dB
PL13      14.46 dB
PL12W     13.18669796 W
PL13W     0.39276794 W
SFO2      400.1716007 MHz
SI        32768
SF        100.628218 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB         0
PC         1.40
  
```

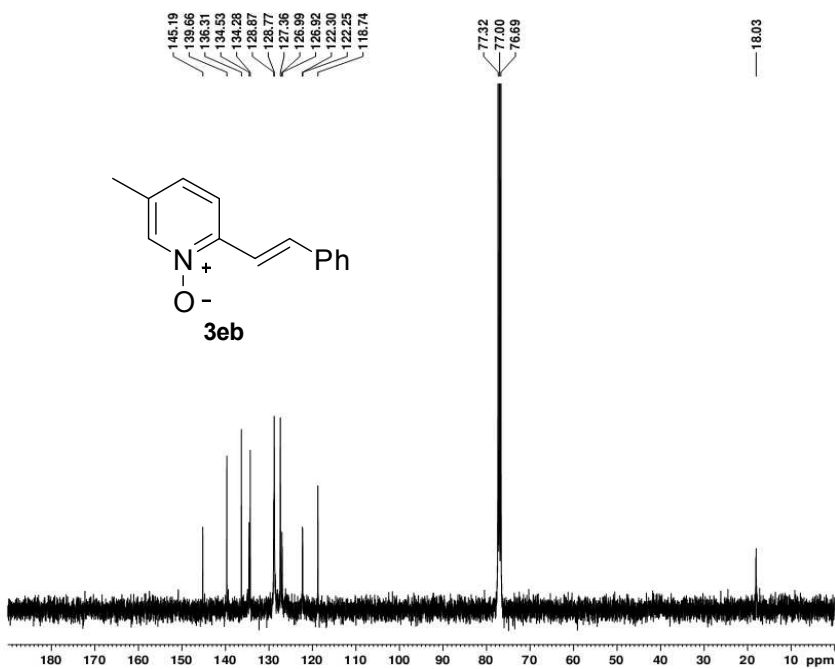


```

NAME      ZS-4-28-3
EXPNO    1
PROCNO   1
Date_    20120316
Time     10.00
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zg30
TD        65536
SOLVENT  CDCl3
NS        16
DS        2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        203
DW        60.800 usec
DE        6.50 usec
TE        293.9 K
D1        1.00000000 sec
TD0       1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W      13.18669796 W
SFO1      400.1724712 MHz
SI        32768
SF        400.1700016 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```



```

NAME      ZS-4-28-2-C13
EXPNO    1
PROCNO   1
Date_    20110726
Time     14.03
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        1586
DS        4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG        203
DW        20.800 usec
DE        6.50 usec
TE        301.4 K
D1        2.00000000 sec
D11      0.03000000 sec
TD0       1
  
```

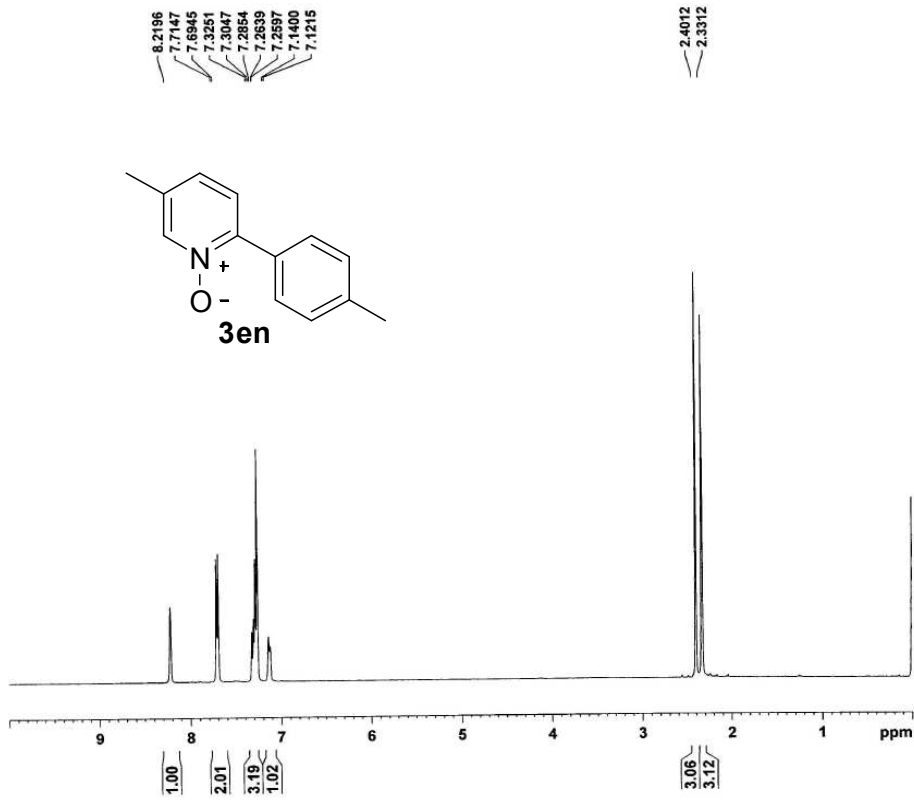
```

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SFO1      100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2  waltz16
NUC2      1H
PCPD2    80.00 usec
PL2       -1.00 dB
PL12     14.26 dB
PL13     14.46 dB
PL2W     13.18669796 W
PL12W    0.39276794 W
PL13W    0.37509048 W
SFO2     400.1716007 MHz
SI        32768
SF       100.6228270 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```



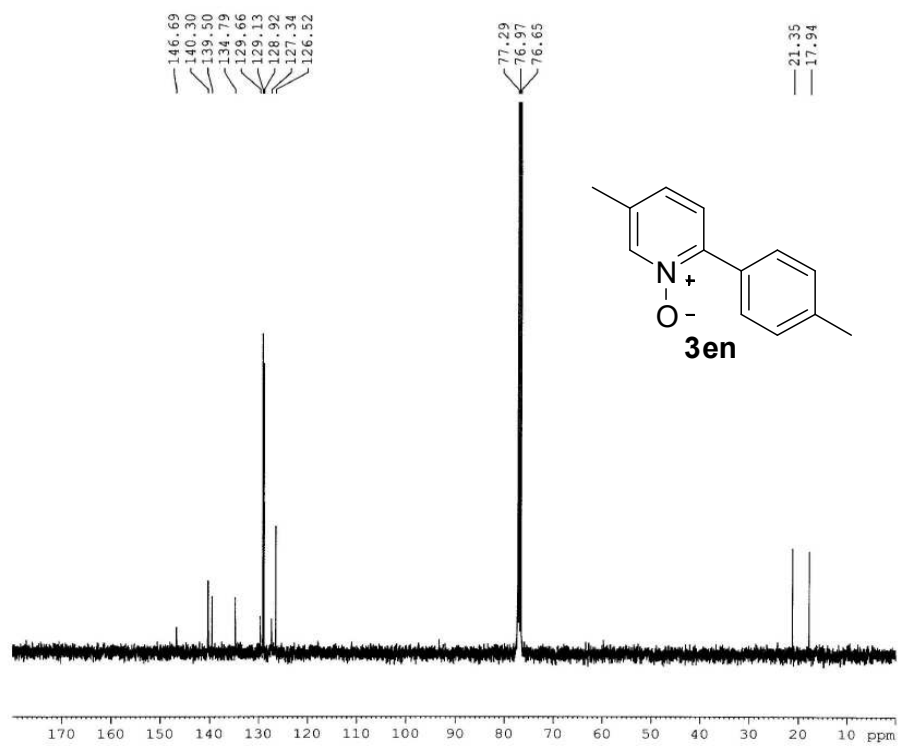


```

NAME      ZF9-23-B
EXPNO    1
PROCNO   1
Date_    20090720
Time     14.47
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zg30
TD       65536
SOLVENT  CDCl3
NS       16
DS       2
SWH      8223.685 Hz
FIDRES   0.125483 Hz
AQ       3.9846387 sec
RG       203
DW       60.800 usec
DE       6.50 usec
TE       301.8 K
D1       1.00000000 sec
TD0      1

===== CHANNEL f1 =====
NUC1     1H
P1       14.20 usec
PL1      -1.00 dB
PL1W     13.18669796 W
SFO1     400.1724712 MHz
SI       32768
SF       400.1700029 MHz
WDW      EM
SSB      0
LB       0.30 Hz
GB       0
PC       1.00

```



```

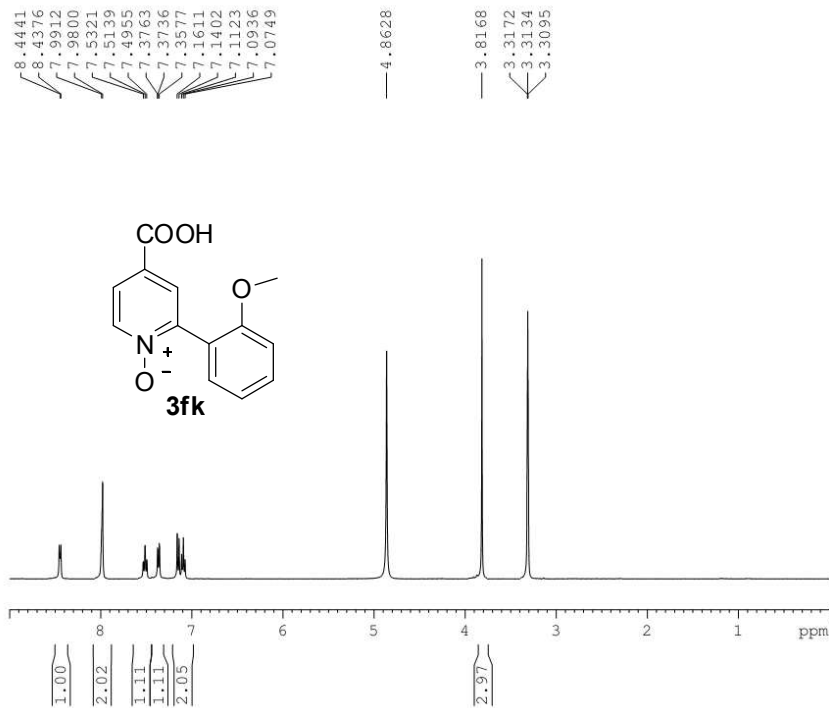
NAME      ZF9-23-B-C13
EXPNO    1
PROCNO   1
Date_    20090720
Time     14.55
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       1434
DS       4
SWH      24038.461 Hz
FIDRES   0.366798 Hz
AQ       1.3631988 sec
RG       202
DW       20.800 usec
DE       6.50 usec
TE       302.2 K
D1       2.00000000 sec
D11      0.03000000 sec
TD0      1

===== CHANNEL f1 =====
NUC1     13C
P1       8.70 usec
PL1      -2.00 dB
PL1W     57.32743073 W
SFO1     100.6328888 MHz

===== CHANNEL f2 =====
CPDPRG2  waltz16
NUC2     1H
PCPD2    80.00 usec
FL2      -1.00 dB
PLI2     14.02 dB
PLI3     14.46 dB
PL2W     13.18669796 W
PLI2W    0.41508400 W
FLI3W    0.37509048 W
SFO2     400.1716007 MHz
SI       32768
SF       100.6228270 MHz
WDW      EM
SSB      0
LB       1.00 Hz
GB       0
PC       1.40

```



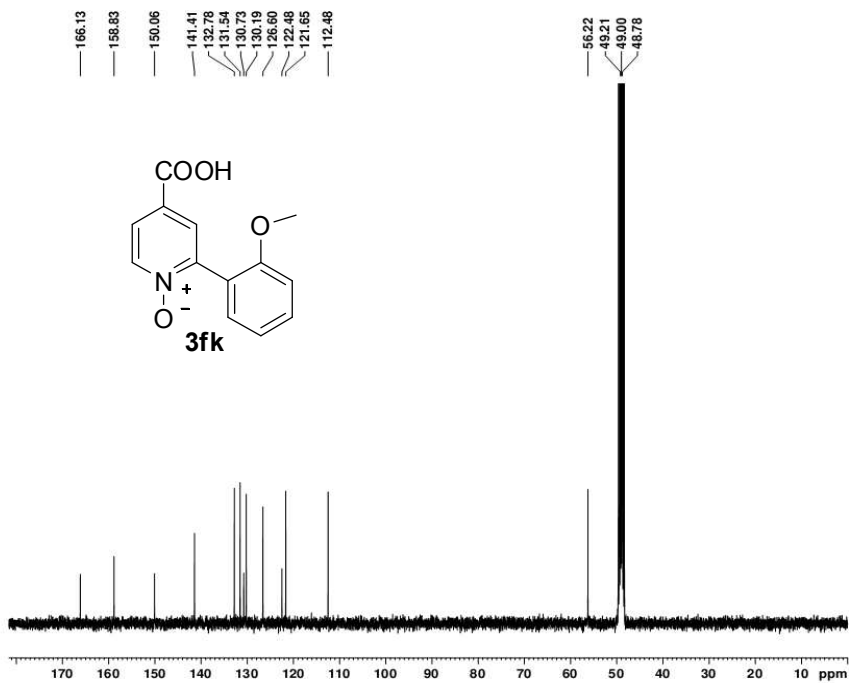


```

NAME      ZS-5-30-1
EXPNO     1
PROCNO    1
Date_     20120409
Time      14.54
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   MeOD
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9946387 sec
RG         203
DW         60.800 usec
DE         6.50 usec
TE         298.4 K
D1         1.00000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W      13.18669796 W
SFO1      400.1724712 MHz
SI         32768
SF         400.1700000 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
  
```



```

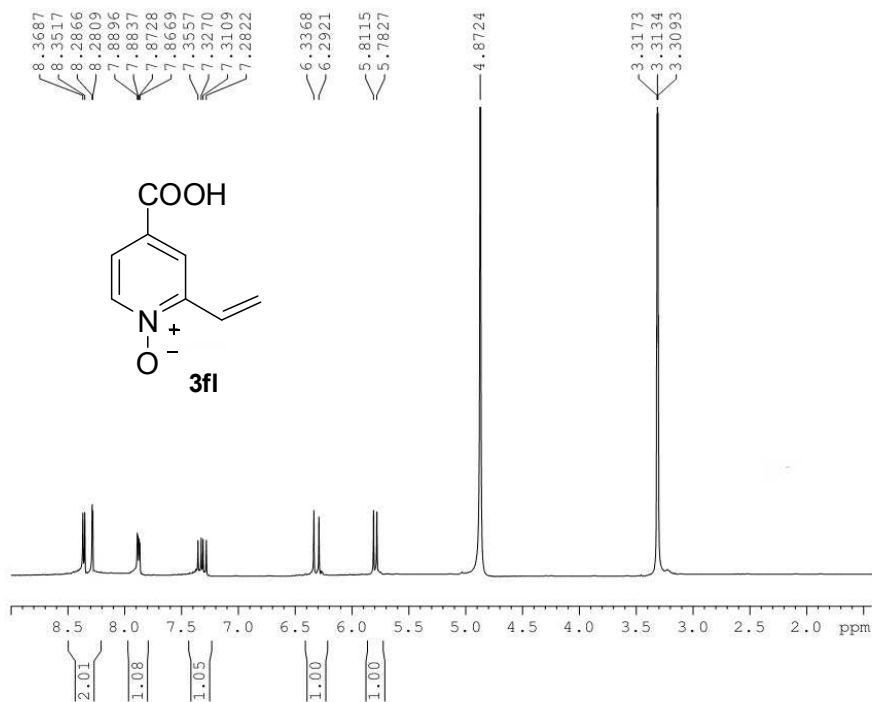
NAME      ZS-5-30-1-C13
EXPNO     1
PROCNO    1
Date_     20120409
Time      21.19
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   MeOD
NS         2330
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         203
DW         20.800 usec
DE         6.50 usec
TE         300.3 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1         8.50 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SFO1      100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12      14.26 dB
PL13      14.46 dB
PL2W      13.18669796 W
PL12W     0.39276794 W
PL13W     0.37509048 W
SFO2      400.1716007 MHz
SI         32768
SF         100.6226841 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```

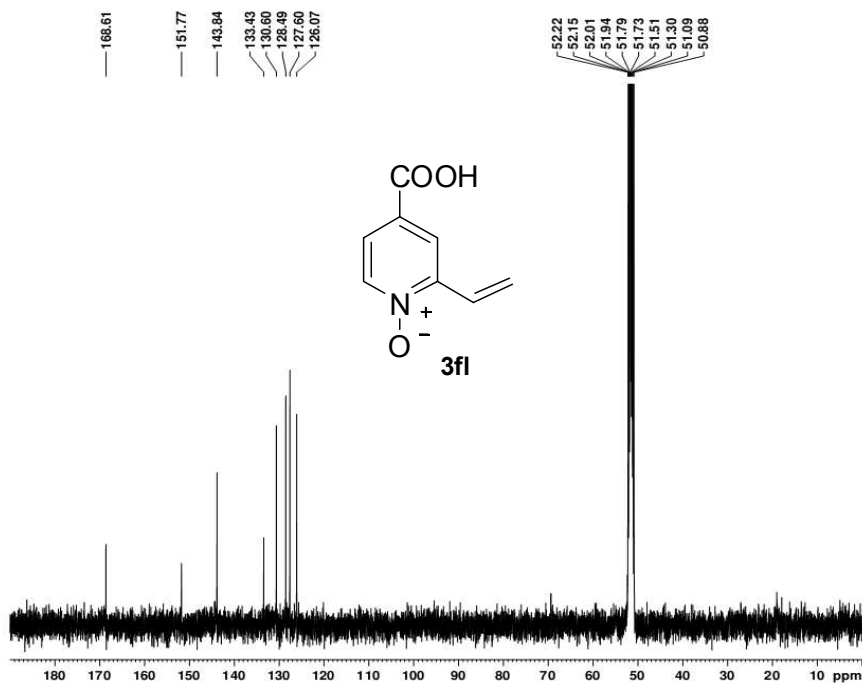


```

NAME      ZS-5-39
EXPNO    1
PROCNO   1
Date_    20120409
Time     15.03
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zg30
TD        65536
SOLVENT  MeOD
NS        16
DS        2
SWH       8223.68 Hz
FIDRES   0.125483 Hz
AQ        3.9846387 sec
RG        203
DW        60.800 usec
DE        6.50 usec
TE        298.3 K
D1        1.00000000 sec
TD0       1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PLLW      13.18669796 W
SF01      400.1724712 MHz
SI        32768
SF        400.1700000 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```



```

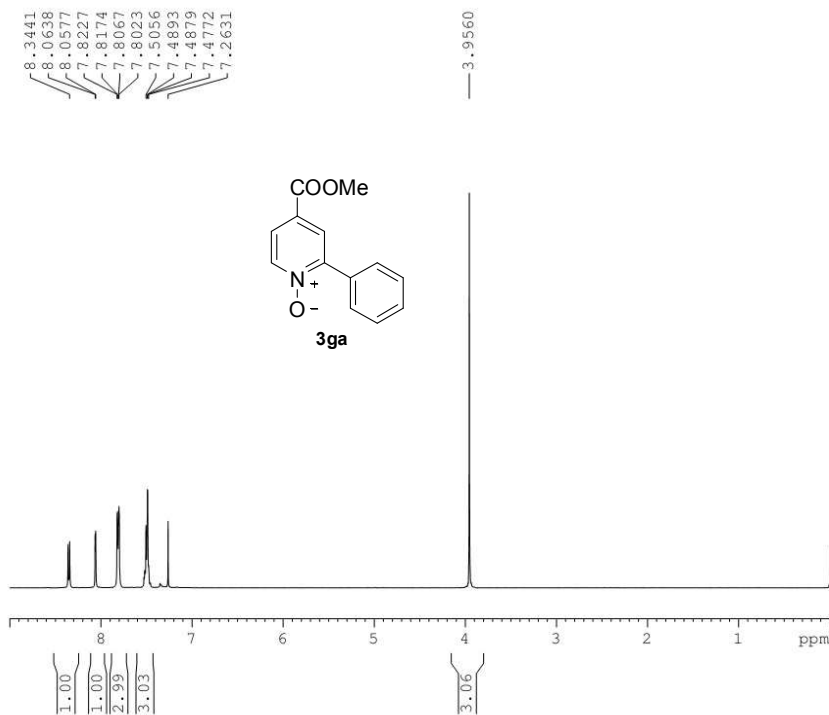
NAME      ZS-5-39-c13
EXPNO    1
PROCNO   1
Date_    20120414
Time     15.57
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        6000
DS        4
SWH       24038.461 Hz
FIDRES   0.366798 Hz
AQ        1.3631988 sec
RG        203
DW        20.800 usec
DE        6.50 usec
TE        302.5 K
D1        2.00000000 sec
D11       0.03000000 sec
TD0       1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SF01      100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
=====
CPCPRG2  wait z16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12      14.26 dB
PL13      14.46 dB
PL2W      13.18669796 W
PL12W     0.39276794 W
PL13W     0.37509048 W
SF02      400.1716007 MHz
SI        32768
SF        100.6228270 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```

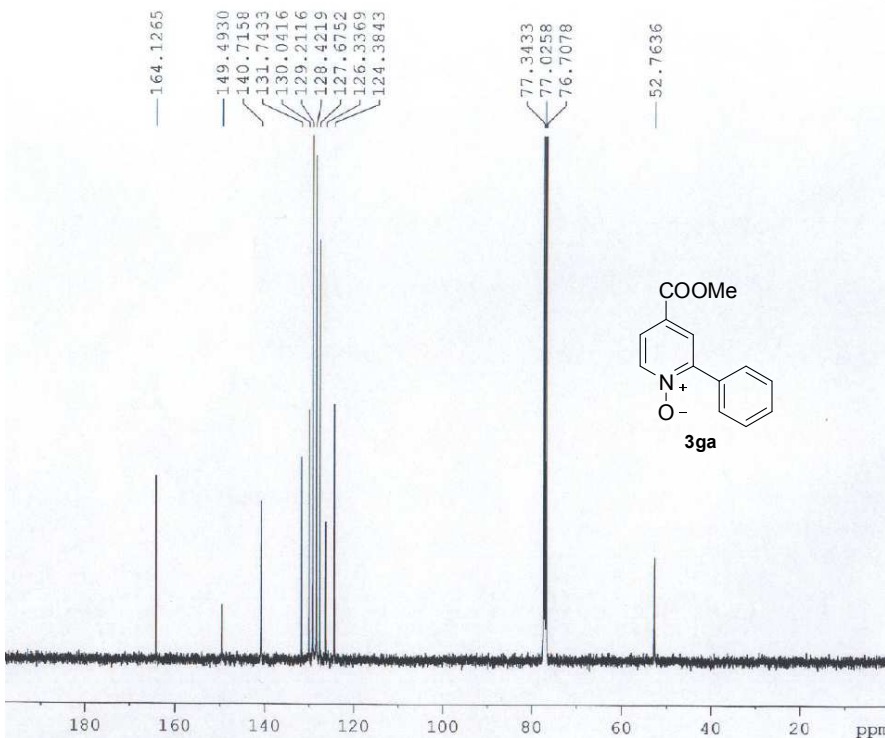


```

NAME      ZS-3-56
EXPNO     1
PROCNO    1
Date_     20110304
Time      14.48
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         203
DM         60.800 usec
DE         6.50 usec
TE         296.8 K
D1         1.0000000 sec
D11        1
D10        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1         14.20 usec
PL1        -1.00 dB
PL1W       13.18669796 W
SFO1       400.1724712 MHz
SI         32768
SF         400.1700021 MHz
WDW        EM
SSB         0
LB         0.30 Hz
GB         0
PC         1.00
  
```



```

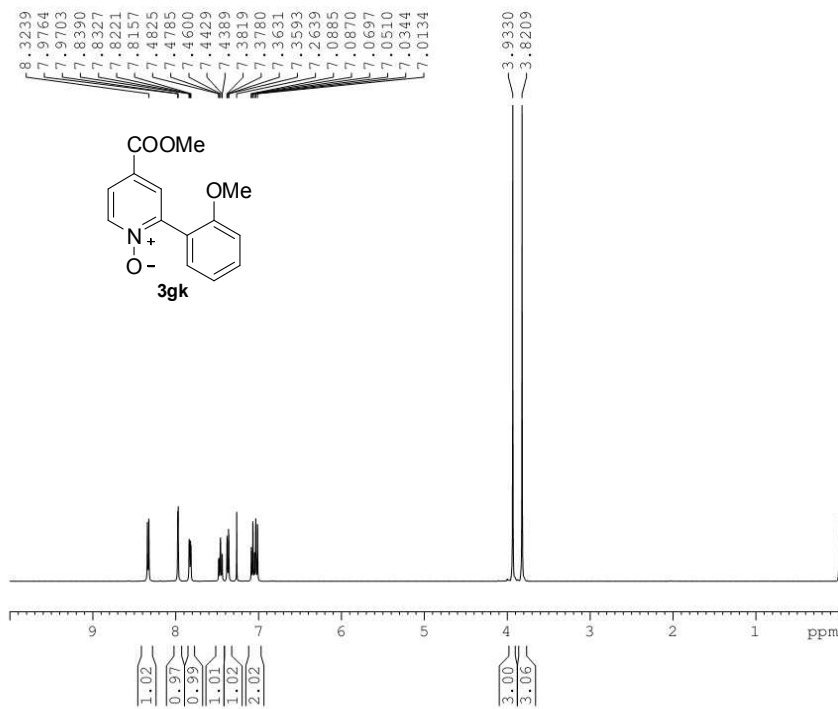
NAME      ZS-3-56-C13
EXPNO     1
PROCNO    1
Date_     20110307
Time      3.37
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         3800
DS         4
SWH        24039.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         203
DM         20.800 usec
DE         6.50 usec
TE         300.0 K
D1         2.0000000 sec
D11        0.0300000 sec
D10        1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1         9.70 usec
PL1        -2.00 dB
PL1W       57.32743073 W
SFO1       100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
ECFP2     80.00 usec
PL2        -1.00 dB
PL12       14.02 dB
PL13       14.46 dB
PL2W       13.18669796 W
PL12W      0.41509400 W
PL13W      0.37509048 W
SFO2       400.1716007 MHz
SI         32768
SF         100.6228270 MHz
WDW        EM
SSB         0
LB         1.00 Hz
GB         0
PC         1.40
  
```

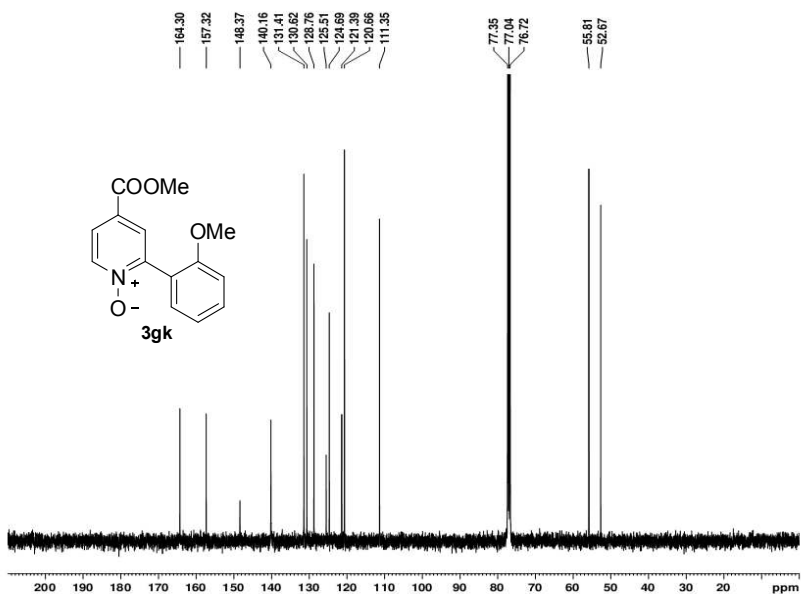


```

NAME          ZS-5-46
EXPNO         1
PROCNO        1
Date_         20120420
Time          10.54
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            16
DS            2
SWH           8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9846387 sec
RG            181
DE            60.800 usec
TE            297.2 K
D1            1.00000000 sec
TDO           1
  
```

```

===== CHANNEL f1 =====
NUC1          1H
P1            13.80 usec
PL1           -1.00 dB
PL1W          13.18669796 W
SF01          400.1724712 MHz
SI            32768
SF            400.1700019 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

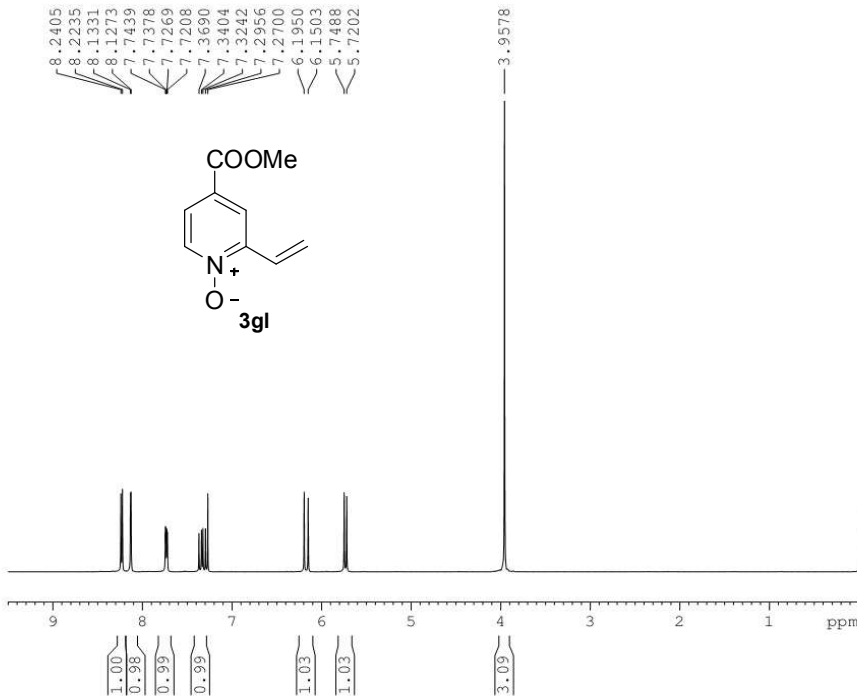
NAME          ZS-5-46-C13
EXPNO         1
PROCNO        1
Date_         20120423
Time          14.08
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            1200
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            203
DE            20.800 usec
TE            299.1 K
D1            2.00000000 sec
D11           0.03000000 sec
TDO           1
  
```

```

===== CHANNEL f1 =====
NUC1          13C
P1            8.50 usec
PL1           -2.00 dB
PL1W          57.32743073 W
SF01          100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -1.00 dB
PL2W          14.26 dB
PL13          14.46 dB
PL2W          13.18669796 W
PL12W         0.39276794 W
PL13W         0.37508048 W
SF02          400.1716007 MHz
SI            32768
SF            100.6228246 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

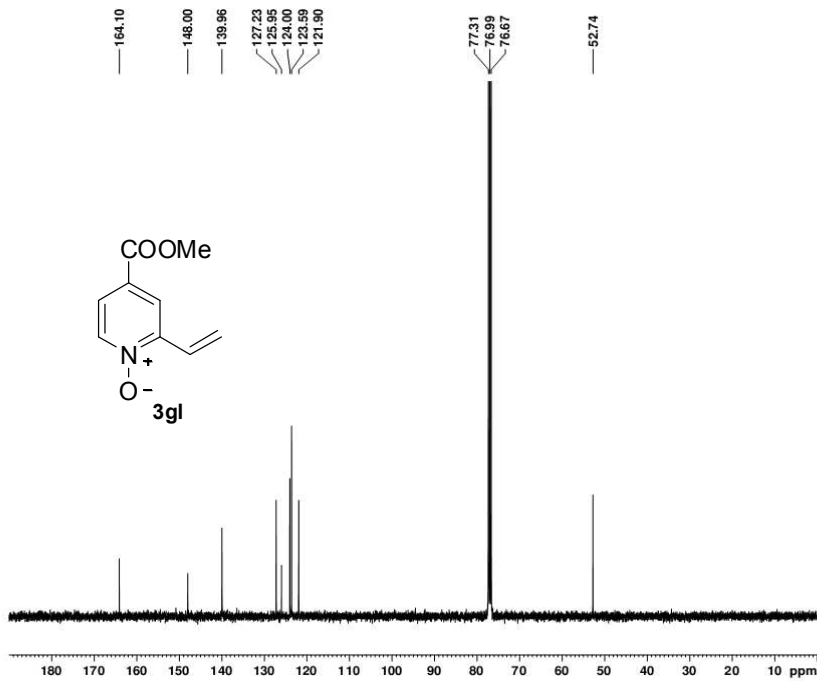


```

NAME      ZS-5-50
EXPNO     1
PROCNO    1
Date_     20120424
Time      14.46
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   CDCl3
NS         16
DS         2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG         203
DW        60.800 usec
DE        6.50 usec
TE        296.6 K
D1        1.0000000 sec
D10       1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W      13.18669796 W
SFO1      400.1724712 MHz
SI        32768
SF        400.1699995 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB         0
PC         1.00
  
```



```

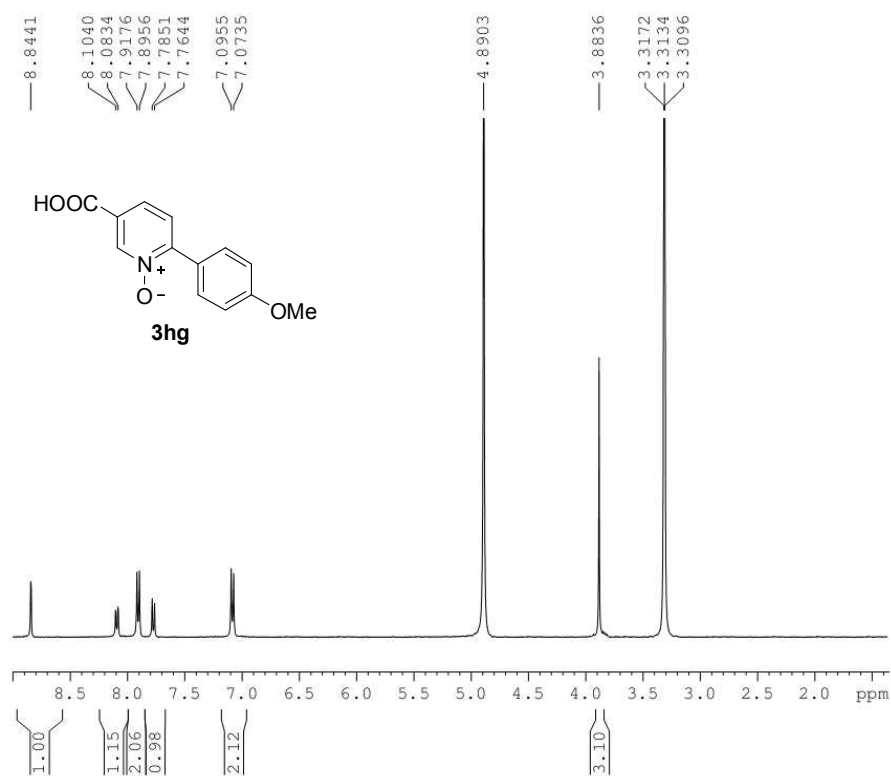
NAME      ZS-5-50-c13
EXPNO     1
PROCNO    1
Date_     20120425
Time      16.56
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS         1000
DS         4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG         203
DW        20.800 usec
DE        6.50 usec
TE        300.0 K
D1        2.0000000 sec
D11       0.0300000 sec
D10       1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SFO1      100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12      14.26 dB
PL13      14.46 dB
PL1W      13.18669796 W
PL2W      0.39276794 W
PL13W     0.37509048 W
SFO2      400.1716007 MHz
SI        32768
SF        100.6228270 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB         0
PC         1.40
  
```

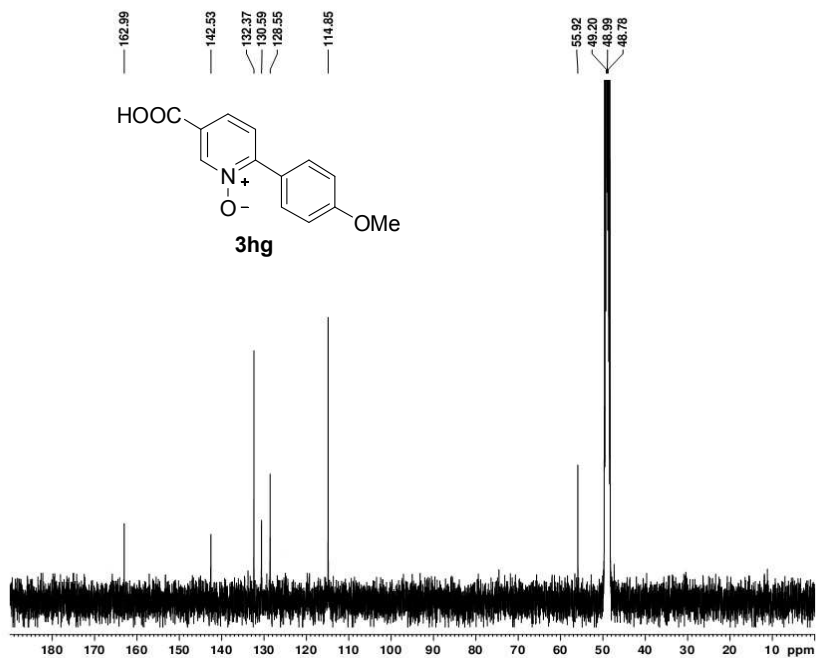


```

NAME      ZS-5-35
EXPNO     1
PROCNO    1
Date_     20120405
Time      10.17
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   MeOD
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ          3.9846387 sec
RG          203
DW          60.800 usec
DE          6.50 usec
TE          294.7 K
D1          1.0000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1         13.80 usec
PL1        -1.00 dB
PLLW       13.18669796 W
SF01       400.1724712 MHz
SI         32768
SF         400.1700000 MHz
WDW        EM
SSB         0
LB          0.30 Hz
GB          0
PC          1.00
  
```



```

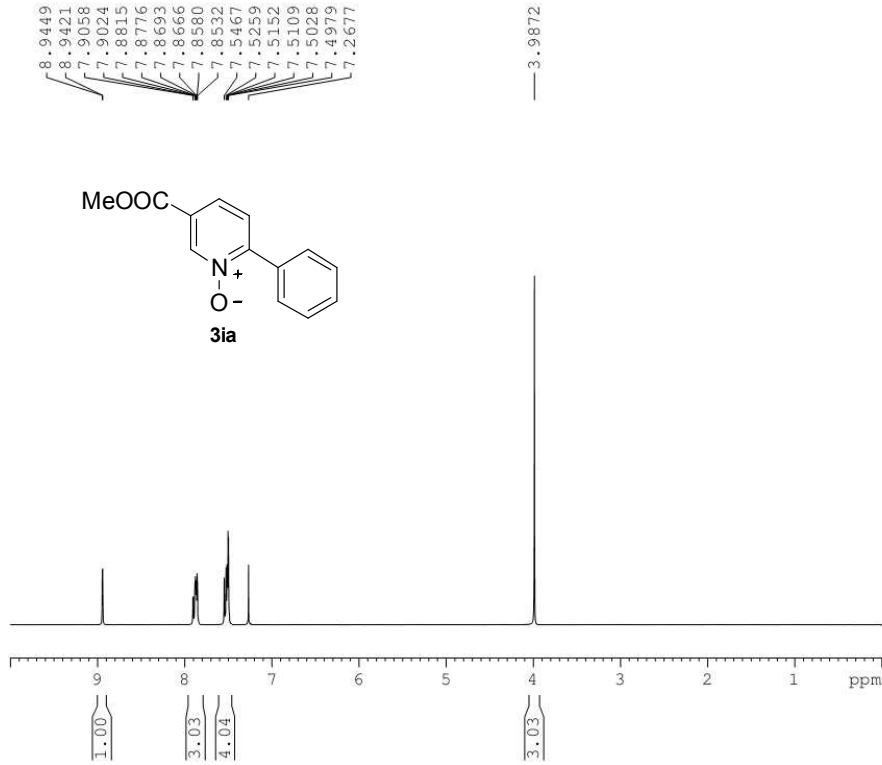
NAME      ZS-5-35-C13
EXPNO     1
PROCNO    1
Date_     20120408
Time      13.16
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   MeOD
NS         4000
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ          1.3631988 sec
RG          203
DW          20.800 usec
DE          6.50 usec
TE          300.0 K
D1          2.0000000 sec
D11        0.0300000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1         8.50 usec
PL1        -2.00 dB
PLLW       57.32743073 W
SF01       100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2        -1.00 dB
PL12       14.26 dB
PL13       14.46 dB
PL2W       13.18669796 W
PL12W      0.39276794 W
PL13W      0.37509048 W
SF02       400.1716007 MHz
SI         32768
SF         100.6226841 MHz
WDW        EM
SSB         0
LB          1.00 Hz
GB          0
PC          1.40
  
```

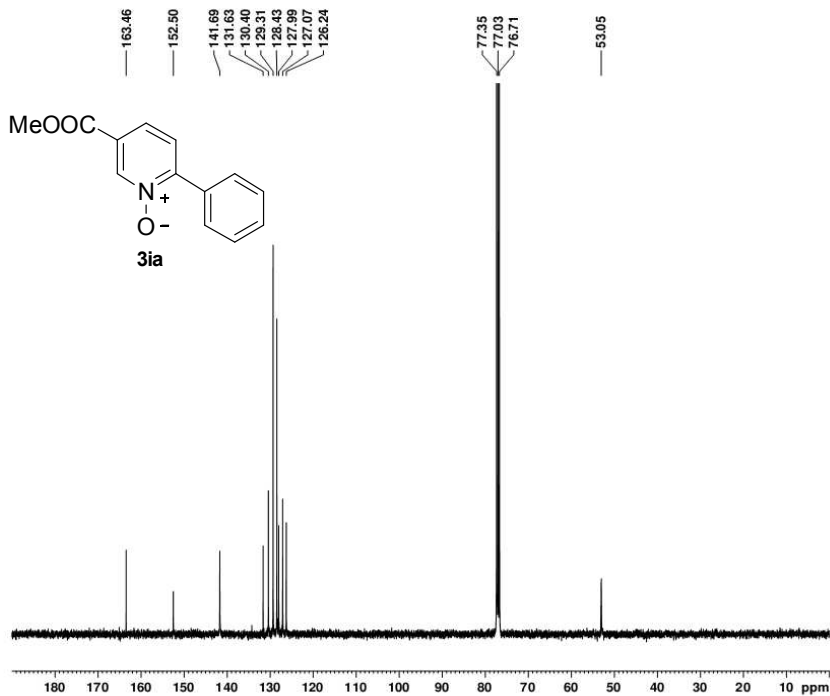


```

NAME      ZS1-4-2
EXPNO     1
PROCNO    1
Date_     20100419
Time      9.29
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         203
DW         60.800 usec
DE         6.50 usec
TE         292.2 K
D1         1.0000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1         14.20 usec
PL1        -1.00 dB
PL1W      13.18669796 W
SFO1      400.1724712 MHz
SI         32768
SF         400.1700000 MHz
WDW        EM
SSB         0
LB         0.30 Hz
GB         0
PC         1.00
  
```



```

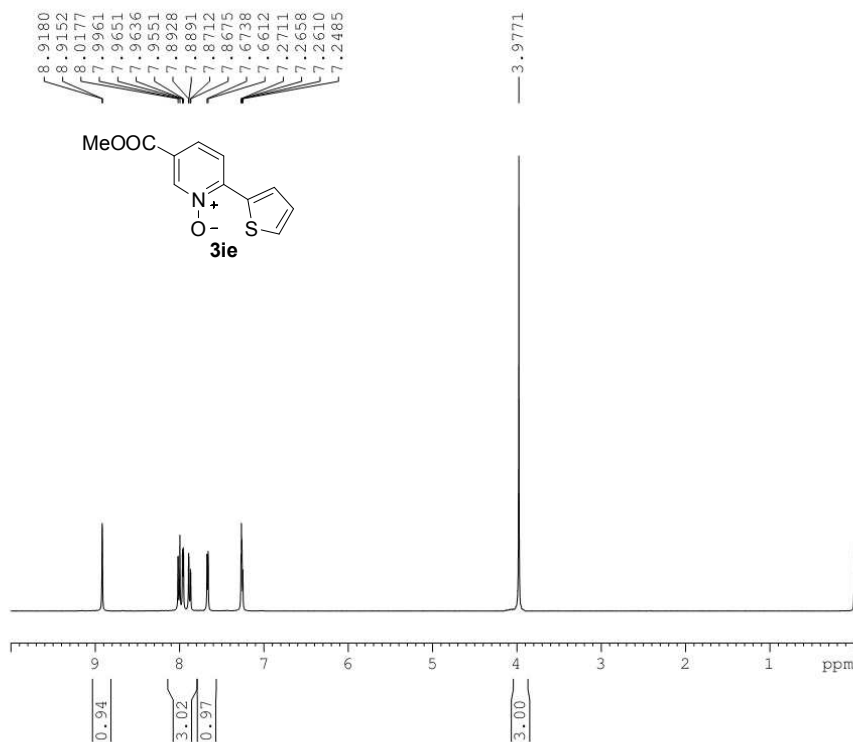
NAME      ZF2s1-4-2-Cl3
EXPNO     1
PROCNO    1
Date_     20100420
Time      1.15
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         2400
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         203
DW         20.800 usec
DE         6.50 usec
TE         293.9 K
D1         2.0000000 sec
D11        0.0300000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1         8.70 usec
PL1        -2.00 dB
PL1W      57.32743073 W
SFO1      100.6328888 MHz
  
```

```

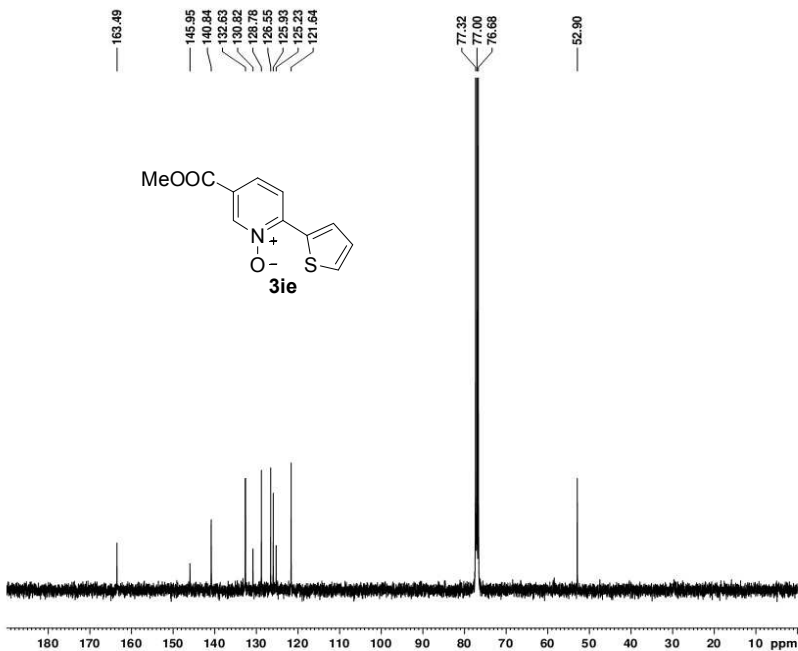
===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2        -1.00 dB
PL12      14.02 dB
PL13      14.46 dB
PL2W      13.18669796 W
PL12W     0.41508400 W
PL13W     0.37509048 W
SFO2      400.1716007 MHz
SI         32768
SF         100.6228270 MHz
WDW        EM
SSB         0
LB         1.00 Hz
GB         0
PC         1.40
  
```



```

NAME      ZS-5-52
EXPNO     1
PROCNO    1
Date_     20120502
Time      10.43
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         203
DW         60.800 usec
DE         6.50 usec
TE         298.3 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         13.80 usec
PL1        -1.00 dB
PL1W       13.18669796 W
SFO1       400.1724712 MHz
SI         32768
SF         400.1700011 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
  
```

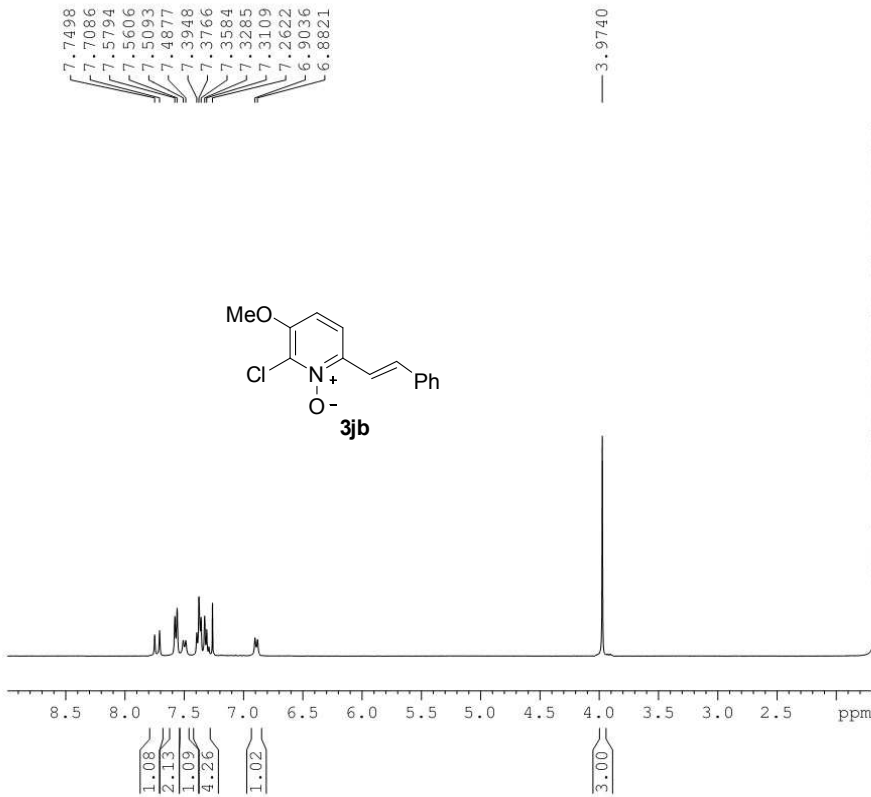


```

NAME      ZS-5-52-013
EXPNO     2
PROCNO    1
Date_     20120508
Time      7.56
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         813
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         203
DW         20.800 usec
DE         6.50 usec
TE         300.0 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       13C
P1         8.50 usec
PL1        -2.00 dB
PL1W       57.32743073 W
SFO1       100.6328888 MHz

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     80.00 usec
PL2        -1.00 dB
PL12       14.26 dB
PL13       14.46 dB
PL2W       13.18669796 W
PL12W     0.33276794 W
PL13W     0.37509048 W
SFO2       400.1716007 MHz
SI         32768
SF         100.6228270 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```

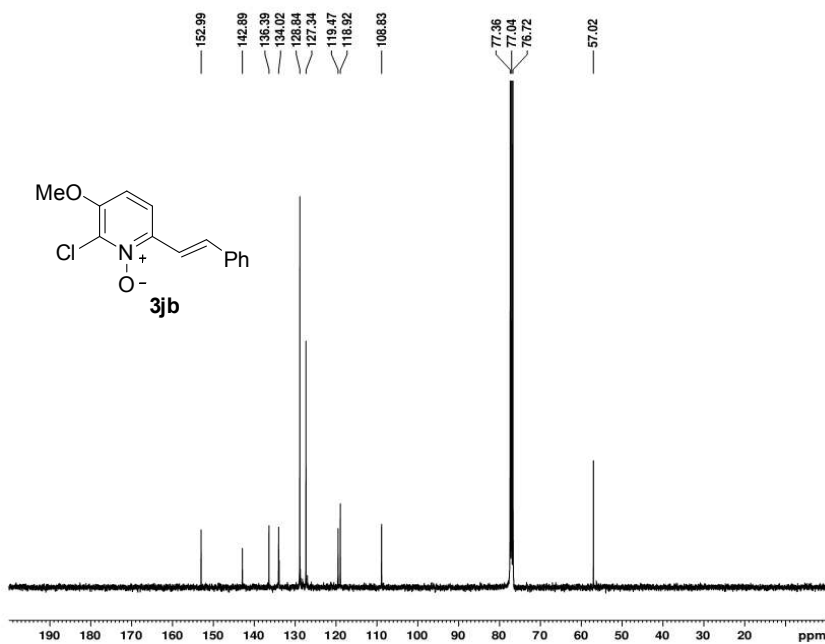


```

NAME      ZS-4-32
EXPNO     1
PROCNO    1
Date_     20110727
Time      15.45
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD        65536
SOLVENT   CDCl3
NS        16
DS        2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG        203
DW        60.800 usec
DE        6.50 usec
TE        300.3 K
D1        1.00000000 sec
TD0       1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W     13.18669796 W
SFO1     400.1724712 MHz
SI        32768
SF        400.1700027 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```



```

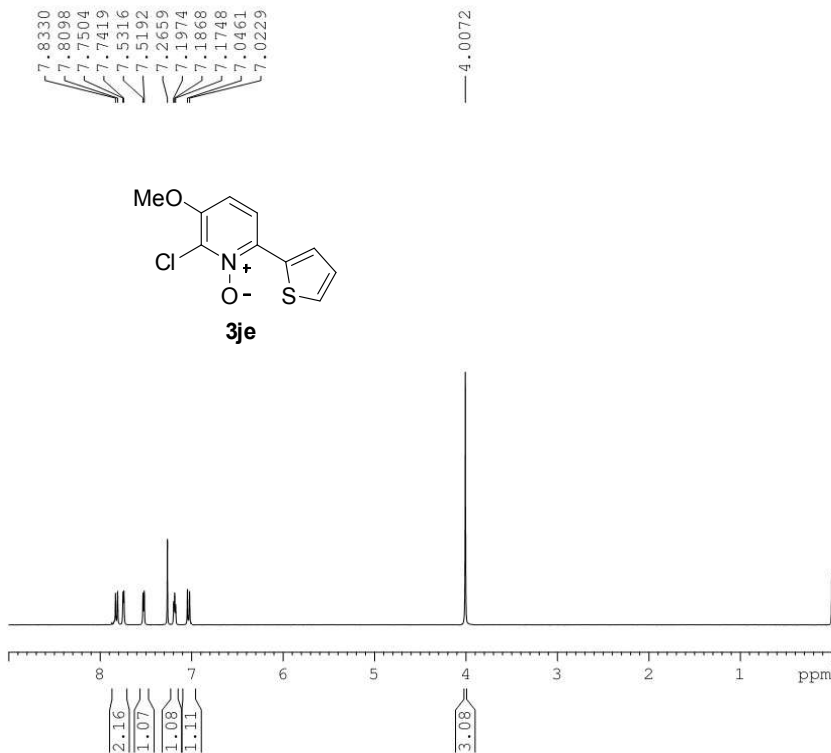
NAME      ZS-4-32-Cl13
EXPNO     1
PROCNO    1
Date_     20110915
Time      4.07
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD        65536
SOLVENT   CDCl3
NS        6000
DS        4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG        203
DW        20.800 usec
DE        6.50 usec
TE        302.1 K
D1        2.00000000 sec
D11       0.03000000 sec
TD0       1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W     57.32743073 W
SFO1     100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12     14.26 dB
PL13     14.46 dB
PL2W     13.18669796 W
PL12W    0.39276794 W
PL13W    0.37509048 W
SFO2     400.1716007 MHz
SI        32768
SF        100.6228229 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```

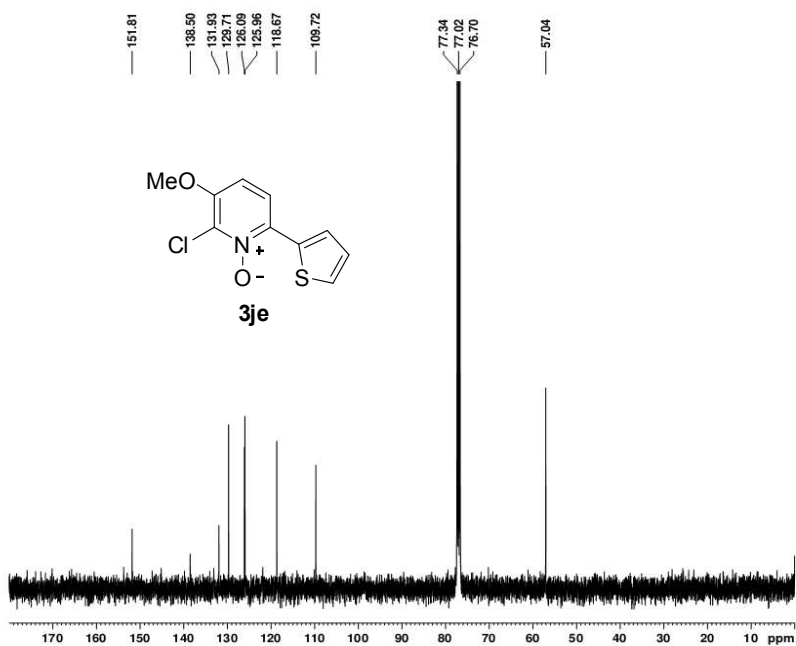


```

NAME      ZS-5-18
EXPNO     1
PROCNO    1
Date_     20120111
Time      9.24
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDC13
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         203
DW         60.800 usec
DE         6.50 usec
TE         289.0 K
D1         1.00000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W      13.18669796 W
SFO1      400.1724712 MHz
SI         32768
SF         400.1700011 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
  
```



```

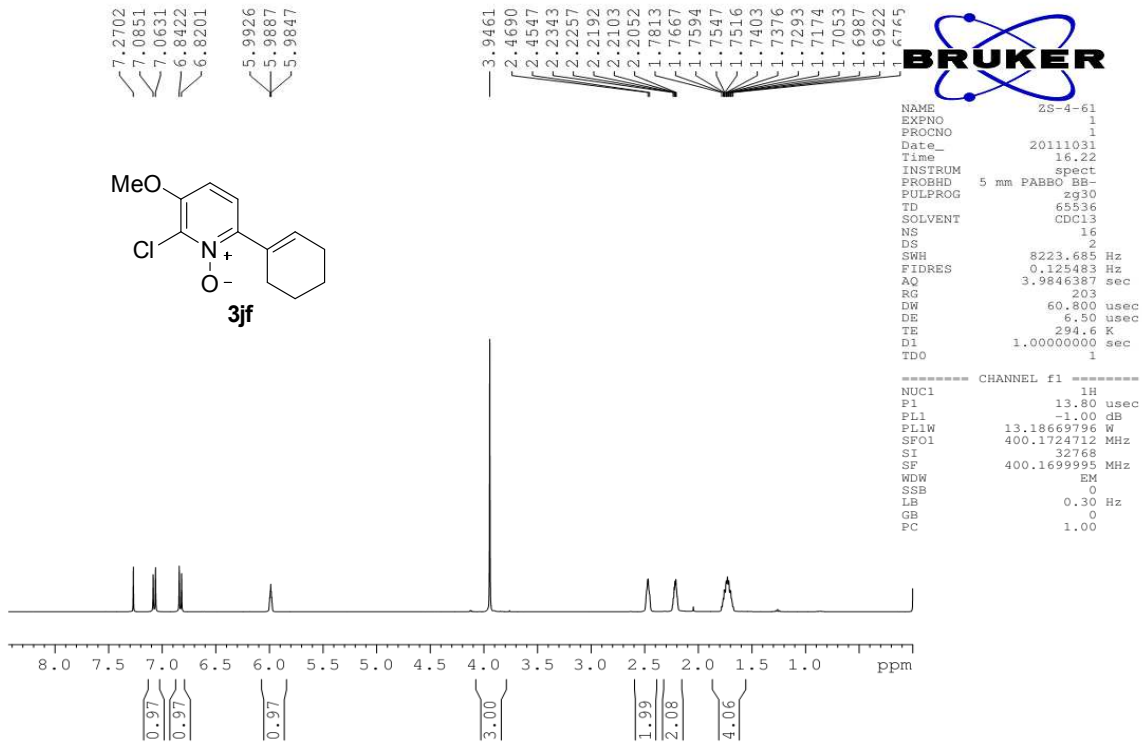
NAME      ZS-5-18-C13
EXPNO     1
PROCNO    1
Date_     20120112
Time      8.37
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDC13
NS         1108
DS         4
SWH        24039.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         203
DW         20.800 usec
DE         6.50 usec
TE         300.0 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SFO1      100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12      14.26 dB
PL13      14.46 dB
PL2W      13.18669796 W
PL12W     0.39276794 W
PL13W     0.37509048 W
SFO2      400.1716007 MHz
SI         32768
SF         100.6228276 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```

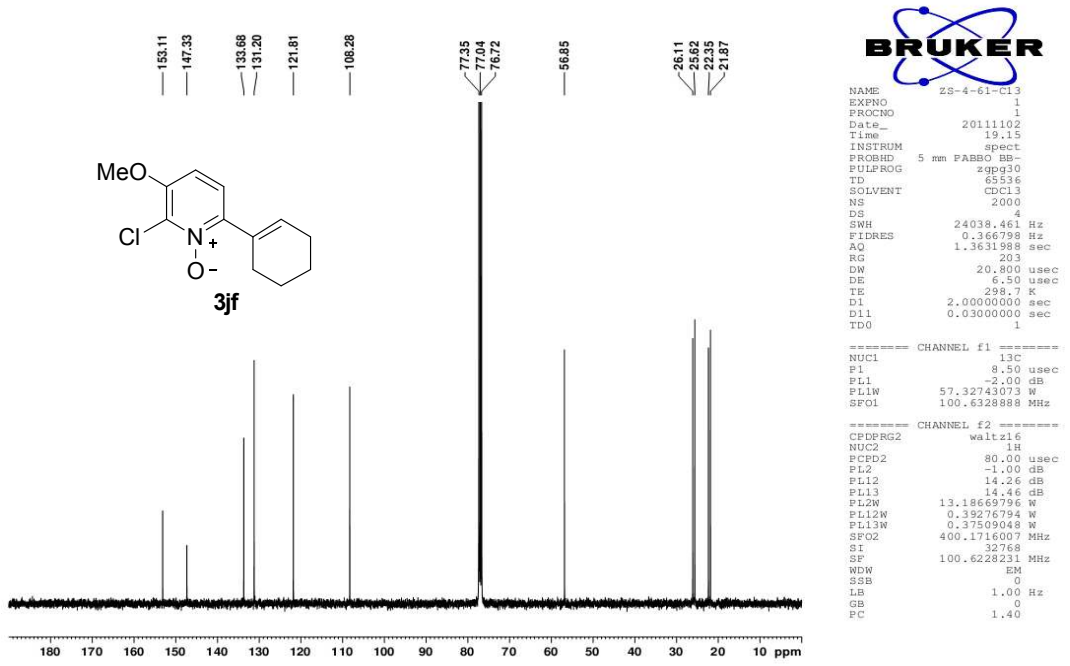


```

NAME      ZS-4-61
EXPNO     1
PROCNO    1
Date_     20111031
Time      16.22
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH       8223.685 Hz
FIDRES    0.125483 Hz
AQ        3.9846387 sec
RG         203
DE        60.800 usec
TE        294.6 K
D1        1.00000000 sec
TDO       1

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W     13.18669796 W
SFO1     400.1724712 MHz
SI        32768
SF        400.1699995 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB         0
PC         1.00

```



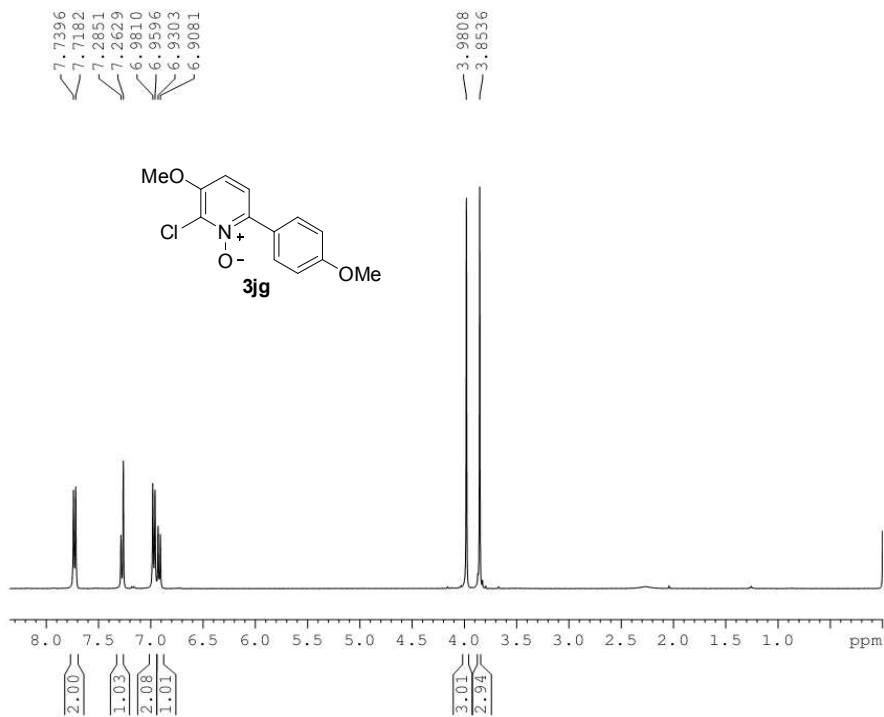
```

NAME      ZS-4-Cl-Cl3
EXPNO     1
PROCNO    1
Date_     20111102
Time      19.15
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         2000
DS         4
SWH       24038.461 Hz
FIDRES    0.366798 Hz
AQ        1.3631988 sec
RG         203
DE        20.800 usec
TE        298.7 K
D1        2.00000000 sec
D11       0.03000000 sec
TDO       1

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W     57.32743073 W
SFO1     100.6328888 MHz

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12     14.26 dB
PL13     14.46 dB
PL2W     13.18669796 W
PL12W    0.39276794 W
PL13W    0.37509048 W
SFO2     400.1716007 MHz
SI        32768
SF        100.6228231 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB         0
PC         1.40

```

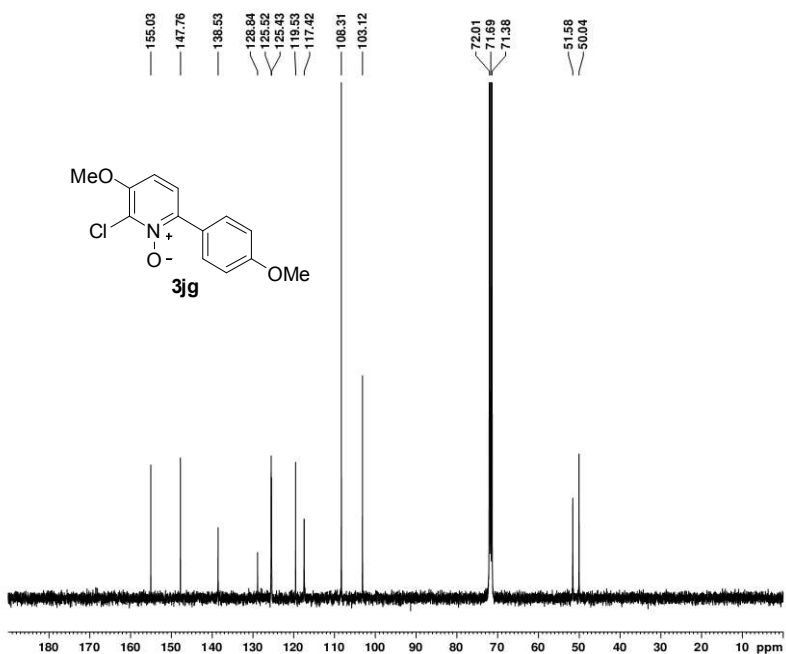


```

NAME          ZS-4-41
EXPNO         1
PROCNO        1
Date_         20110906
Time         16.18
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            16
DS            2
SWH           8223.685 Hz
FIDRES       0.125483 Hz
AQ           3.9846387 sec
RG           203
DW           60.800 usec
DE           6.50 usec
TE           299.7 K
D1           1.00000000 sec
TD0          1
  
```

```

===== CHANNEL f1 =====
NUC1          1H
P1            13.80 usec
PL1           -1.00 dB
PL1W         13.18669796 W
SFOL         400.1724712 MHz
SI           32768
SF           400.1700023 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

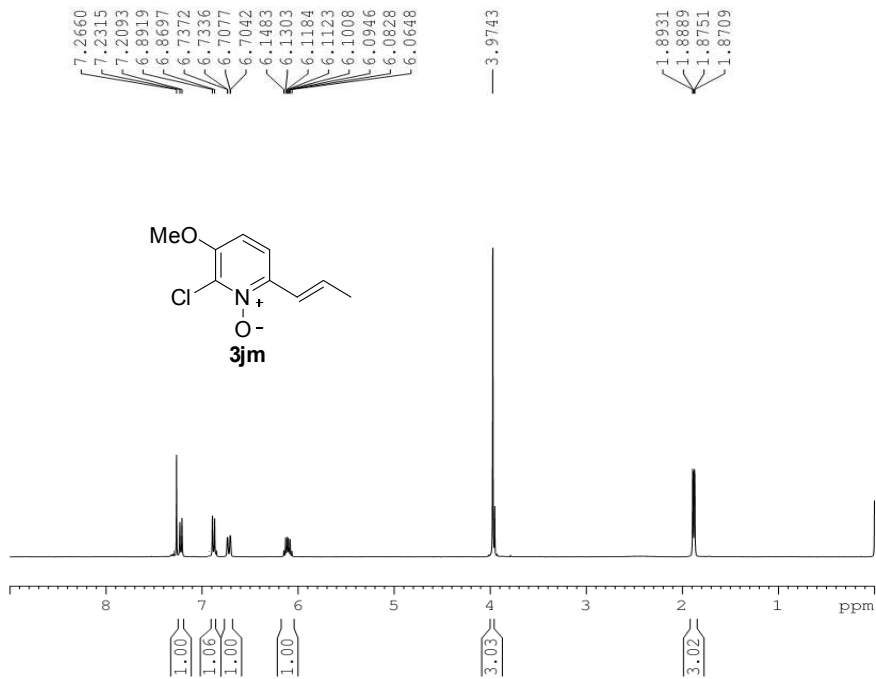
NAME          ZS-4-41-cl3
EXPNO         1
PROCNO        1
Date_         20110907
Time         20.21
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CD3CN_SPE
NS            3493
DS            4
SWH           24038.461 Hz
FIDRES       0.366798 Hz
AQ           1.3631988 sec
RG           203
DW           20.800 usec
DE           6.50 usec
TE           299.9 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0          1
  
```

```

===== CHANNEL f1 =====
NUC1          13C
P1            8.50 usec
PL1           -2.00 dB
PL1W         57.32743073 W
SFOL         100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -1.00 dB
PL12         14.26 dB
PL13         14.46 dB
PL2W         13.18669796 W
PL12W        0.39276794 W
PL13W        0.37509048 W
SF02         400.1716007 MHz
SI           32768
SF           100.6228270 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

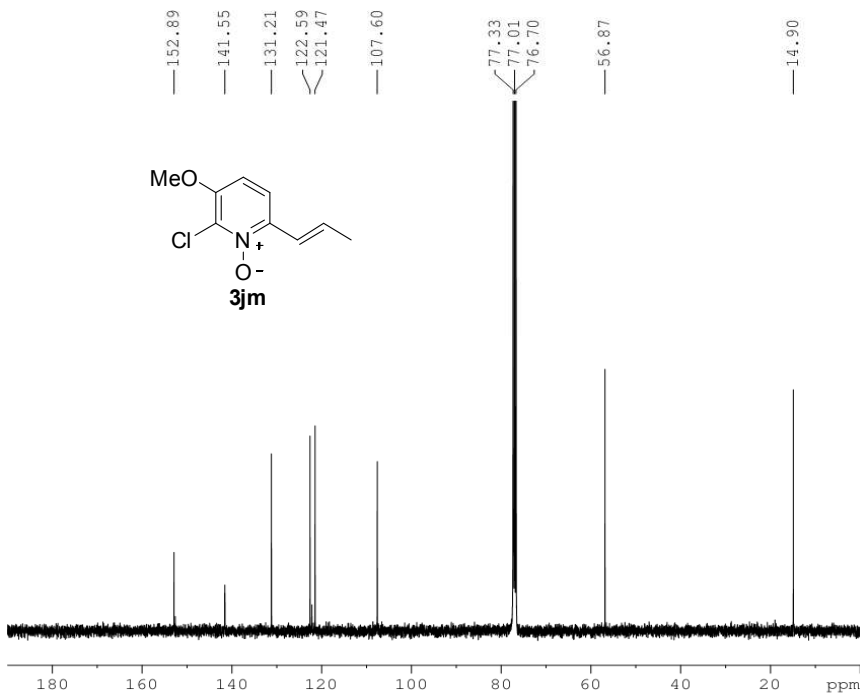


```

NAME      ZS-5-14-1
EXPNO    1
PROCNO   1
Date_    20120106
Time     10.45
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zg30
TD       65536
SOLVENT  CDCl3
NS       16
DS       2
SWH      8223.685 Hz
FIDRES   0.125483 Hz
AQ       3.9846387 sec
RG       203
DW       60.800 usec
DE       6.50 usec
TE       295.3 K
D1       1.00000000 sec
TD0      1

===== CHANNEL f1 =====
NUC1     1H
P1       13.80 usec
PL1     -1.00 dB
PL1W    13.18669796 W
SFO1    400.1724712 MHz
SI       32768
SF       400.1700009 MHz
WDW      EM
SSB      0
LB       0.30 Hz
GB       0
PC       1.00

```



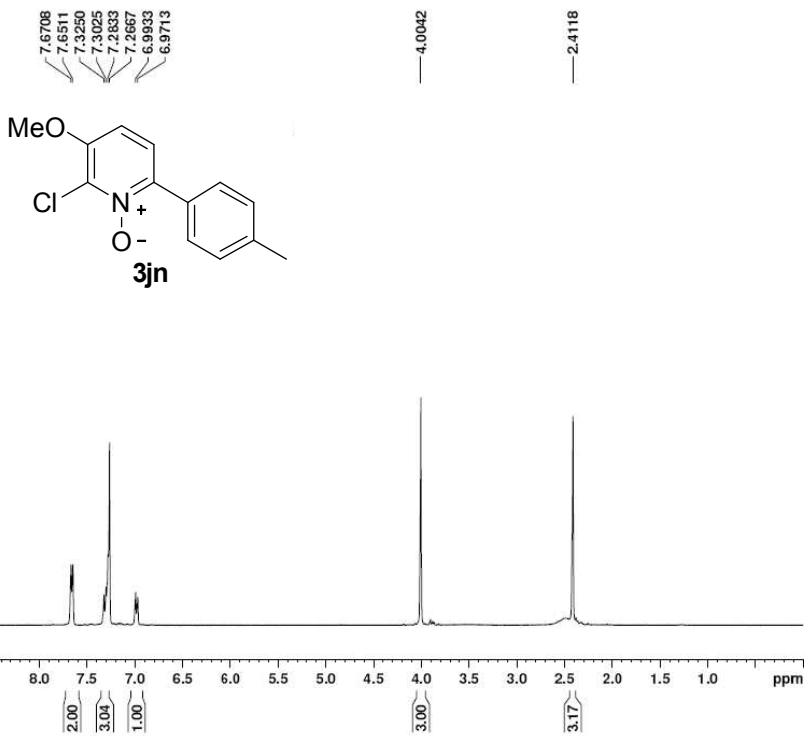
```

NAME      ZS-5-14-C13
EXPNO    1
PROCNO   1
Date_    20120106
Time     2.33
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       4000
DS       4
SWH      24038.46 Hz
FIDRES   0.366798 Hz
AQ       1.3631988 sec
RG       203
DW       20.800 usec
DE       6.50 usec
TE       295.4 K
D1       2.00000000 sec
D11      0.03000000 sec
TD0      1

===== CHANNEL f1 =====
NUC1     13C
P1       8.50 usec
PL1     -2.00 dB
PL1W    57.32743073 W
SFO1    100.6328888 MHz

===== CHANNEL f2 =====
CPDPRG2  waltz16
NUC2     1H
PCPD2    80.00 usec
PL2     -1.00 dB
PL12    14.26 dB
PL13    14.46 dB
PL2W    13.18669796 W
PL12W   0.39276794 W
PL13W   0.37509048 W
SFO2    400.1716007 MHz
SI       32768
SF       100.6228270 MHz
WDW      EM
SSB      0
LB       1.00 Hz
GB       0
PC       1.40

```

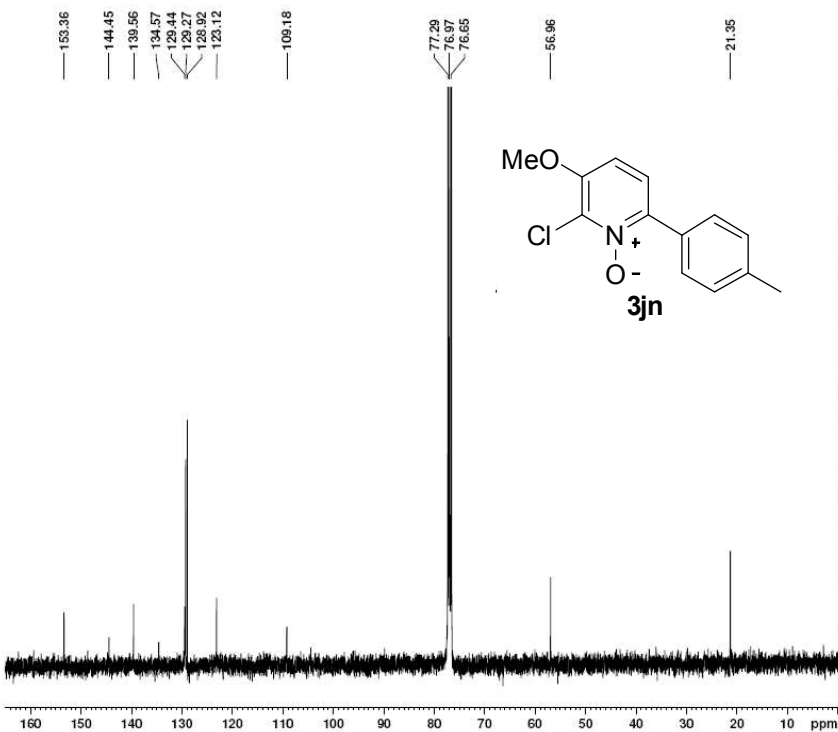


```

NAME          ZF9-42-2
EXPNO         1
PROCNO        1
Date_         20090824
Time          8.59
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            16
DS            2
SWH           8223.685 Hz
FIDRES        0.125483 Hz
AQ            3.9846387 sec
RG            203
DE            60.800 usec
DW            6.50 usec
TE            300.0 K
D1            1.00000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          1H
P1            14.20 usec
PL1           -1.00 dB
PLLW          13.18669796 W
SFO1          400.1724712 MHz
SI            32768
SF            400.1700000 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```



```

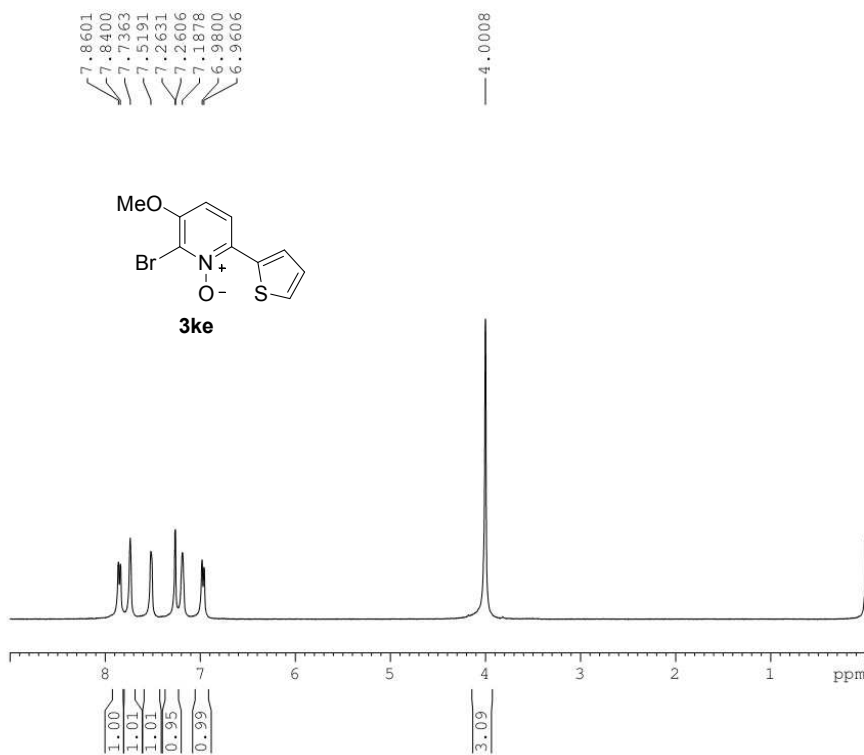
NAME          ZF9-42-2-c13
EXPNO         1
PROCNO        1
Date_         20090824
Time          11.21
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            3608
DS            4
SWH           24038.461 Hz
FIDRES        0.366798 Hz
AQ            1.3631988 sec
RG            203
DE            20.800 usec
DW            6.50 usec
TE            301.3 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
  
```

```

===== CHANNEL f1 =====
NUC1          13C
P1            8.70 usec
PL1           -2.00 dB
PLLW          57.32743073 W
SFO1          100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           -1.00 dB
PL12          14.02 dB
PL13          14.46 dB
PL2W          13.18669796 W
PL12W         0.4509400 W
PL13W         0.37509048 W
SFO2          400.1716007 MHz
SI            32768
SF            100.6228270 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

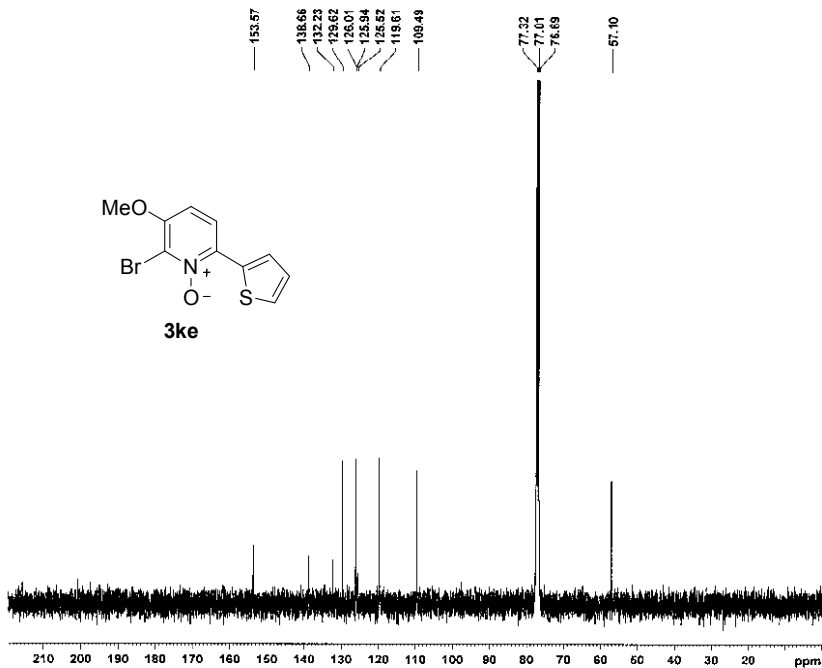


```

NAME      ZS-5-36
EXPNO     1
PROCNO    1
Date_     20120405
Time      10.22
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         203
DM         60.800 usec
DE         6.50 usec
TE         294.7 K
D1         1.00000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W      13.18669796 W
SFO1      400.1724712 MHz
SI        32768
SF        400.1700021 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```



```

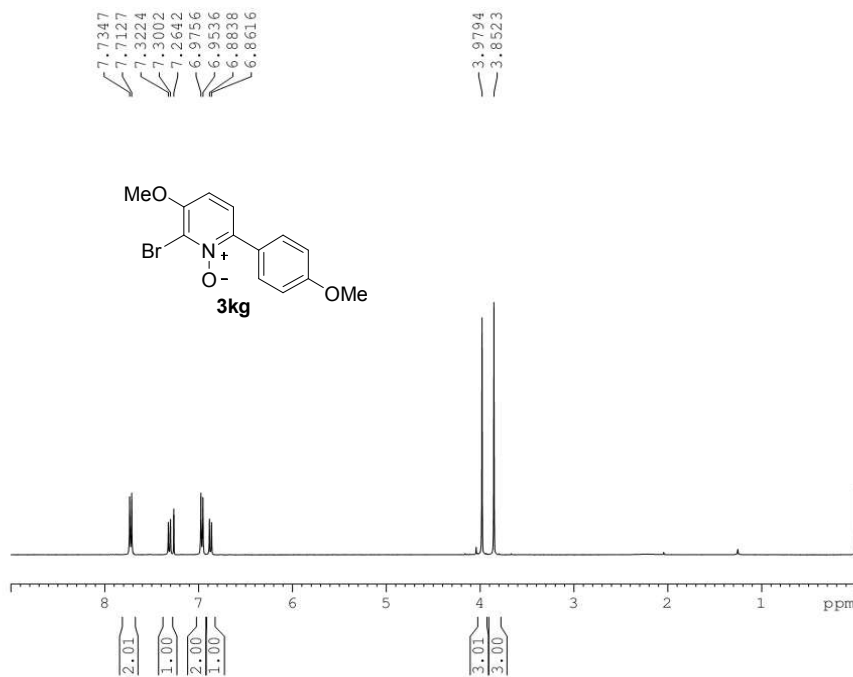
NAME      ZS 5 36 C13
EXPNO     1
PROCNO    1
Date_     20120405
Time      6.51
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         1600
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         203
DM         20.800 usec
DE         6.50 usec
TE         300.0 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -1.00 dB
PL1W      97.32743073 W
SFO1      100.6229270 MHz
  
```

```

===== CHANNEL f2 =====
(PULPROG) wa+rr16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.50 dB
PL2W      14.76 dB
PL13      14.46 dB
PL2W      13.18669796 W
PL13W     0.35276736 W
SFO2      400.1716007 MHz
SI        32768
SF        100.6229270 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```



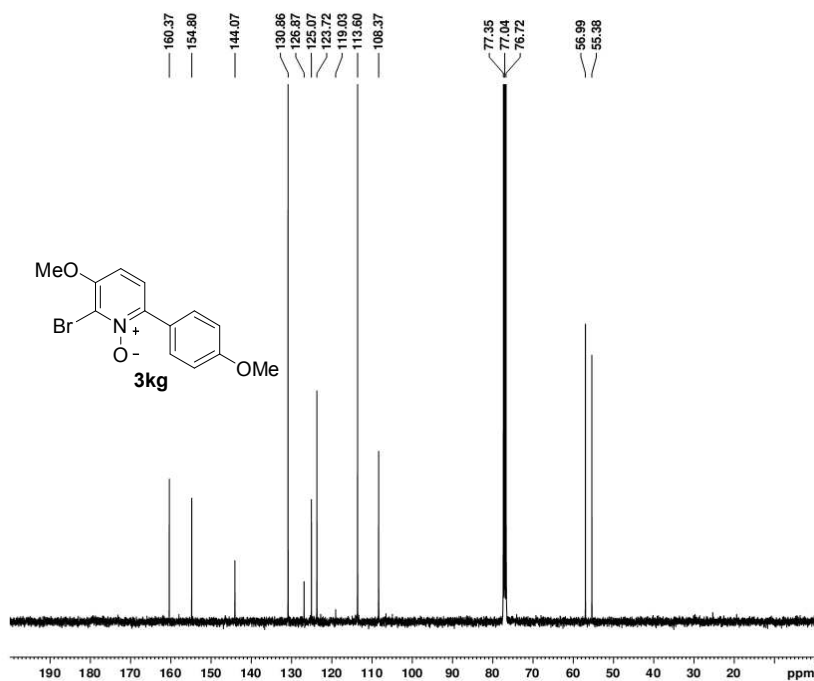
**BRUKER**

```

NAME      ZS-5-31-1
EXPNO    1
PROCNO   1
Date_    20120521
Time     16.30
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zg30
TD       65536
SOLVENT  CDCl3
NS       16
DS       2
SWH      8223.685 Hz
FIDRES   0.125493 Hz
AQ       3.9846387 sec
RG       203
DW       60.800 usec
DE       6.50 usec
TE       298.3 K
D1       1.00000000 sec
TDO      1
  
```

```

===== CHANNEL f1 =====
NUC1     1H
P1       13.80 usec
PL1      -1.00 dB
PL1W    13.18669796 W
SF01     400.1724712 MHz
SI       32768
SF       400.1700019 MHz
WDW      EM
SSB      0
LB       0.30 Hz
GB       0
PC       1.00
  
```



**BRUKER**

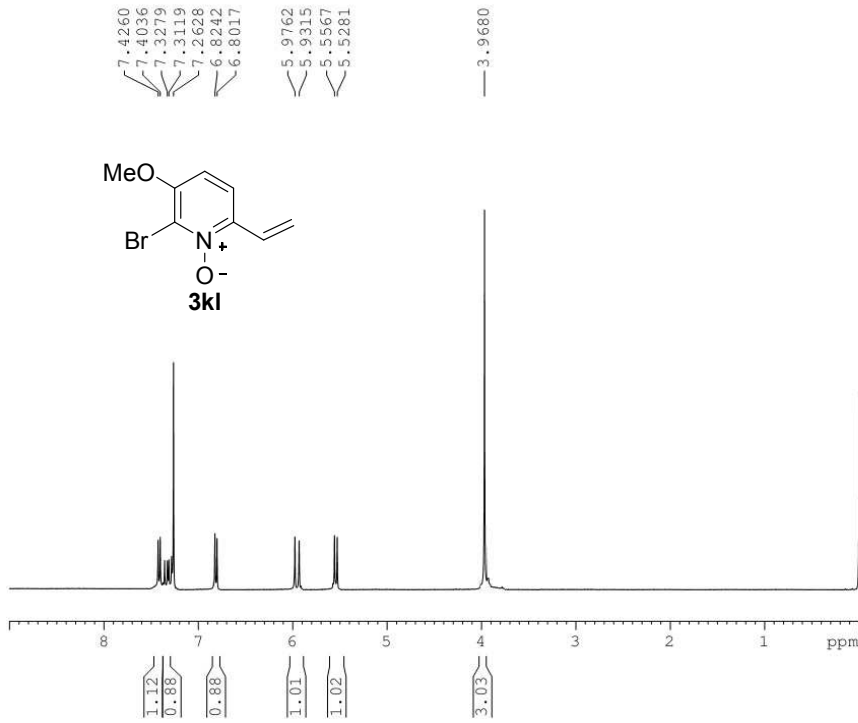
```

NAME      ZS-5-31-1-cl3
EXPNO    1
PROCNO   1
Date_    20120522
Time     14.12
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       3276
DS       4
SWH      24038.461 Hz
FIDRES   0.366798 Hz
AQ       1.3631988 sec
RG       203
DW       20.800 usec
DE       6.50 usec
TE       300.7 K
D1       2.00000000 sec
D11      0.03000000 sec
TDO      1
  
```

```

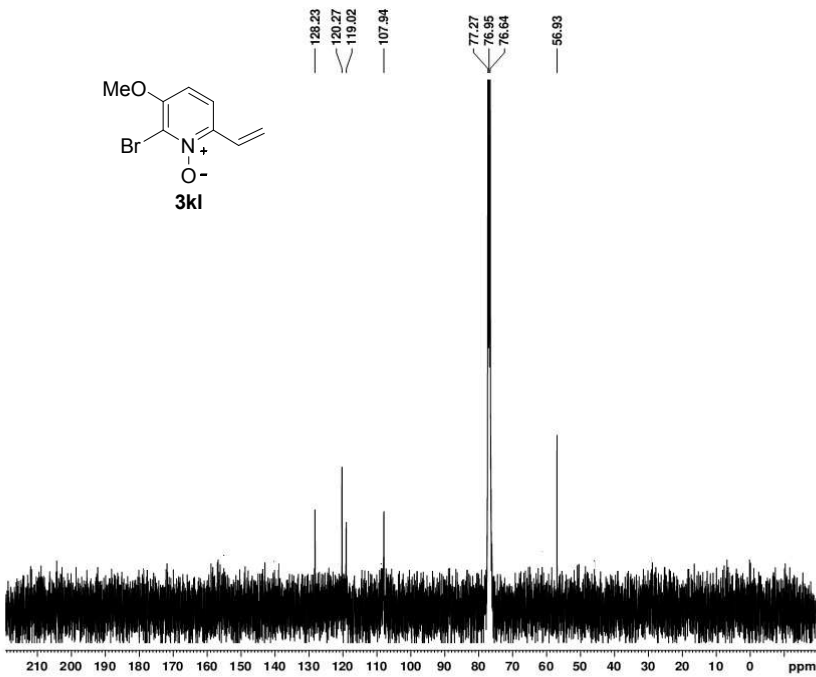
===== CHANNEL f1 =====
NUC1     13C
P1       8.50 usec
PL1      -2.00 dB
PL1W    57.32743073 W
SF01     100.6328888 MHz

===== CHANNEL f2 =====
CPDPRG2  waltz16
NUC2     1H
PCPD2   80.00 usec
PL2      -1.00 dB
PLI2    14.26 dB
PLI3    14.46 dB
PLI4    14.46 dB
PL2W    13.18669796 W
PLI2W   0.39276794 W
PLI3W   0.37509048 W
SF02     400.1716007 MHz
SI       32768
SF       100.6228230 MHz
WDW      EM
SSB      0
LB       1.00 Hz
GB       0
PC       1.40
  
```



NAME ZS-5-38  
 EXPNO 1  
 PROCNO 1  
 Date\_ 20120406  
 Time 15.52  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB-  
 PULPROG zg30  
 ID 65536  
 SOLVENT CDCl3  
 NS 16  
 DS 2  
 SWH 8223.685 Hz  
 FIDRES 0.125483 Hz  
 AQ 3.9846387 sec  
 RG 203  
 DW 60.800 usec  
 DE 6.50 usec  
 TE 297.1 K  
 D1 1.00000000 sec  
 TD0 1

===== CHANNEL f1 =====  
 NUC1 1H  
 P1 13.80 usec  
 PL1 -1.00 dB  
 PL1W 13.18669796 W  
 SF01 400.1724712 MHz  
 SI 32768  
 SF 400.1700024 MHz  
 WDW EM  
 SSB 0  
 LB 0.30 Hz  
 GB 0  
 PC 1.00



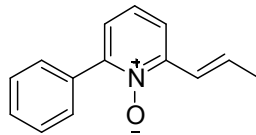
NAME ZS-5-38-C13  
 EXPNO 1  
 PROCNO 1  
 Date\_ 20120407  
 Time 18.13  
 INSTRUM spect  
 PROBHD 5 mm PABBO BB-  
 PULPROG zgpg30  
 ID 65536  
 SOLVENT CDCl3  
 NS 1000  
 DS 4  
 SWH 24038.461 Hz  
 FIDRES 0.366798 Hz  
 AQ 1.3631988 sec  
 RG 203  
 DW 20.800 usec  
 DE 6.50 usec  
 TE 309.8 K  
 D1 2.00000000 sec  
 D11 0.03000000 sec  
 TD0 1

===== CHANNEL f1 =====  
 NUC1 13C  
 P1 8.50 usec  
 PL1 -2.00 dB  
 PL1W 57.32743073 W  
 SF01 100.6328888 MHz

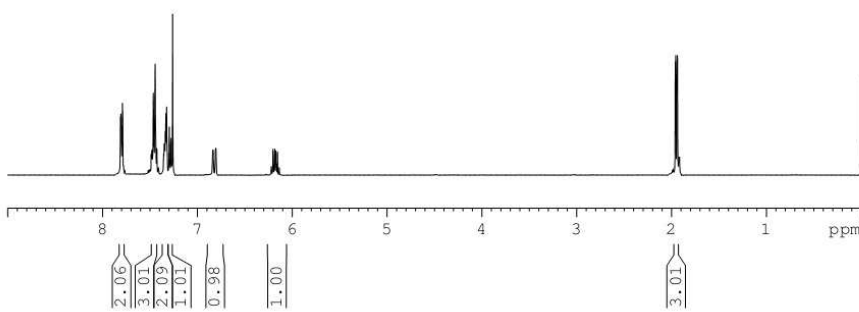
===== CHANNEL f2 =====  
 CFPFRG2 waltz16  
 NUC2 1H  
 PCPD2 80.00 usec  
 PL2 -1.00 dB  
 PL12 14.26 dB  
 PL13 14.46 dB  
 PL2W 13.18669796 W  
 PL12W 0.39276794 W  
 PL13W 0.37509048 W  
 SF02 400.1716007 MHz  
 SI 32768  
 SF 100.6228270 MHz  
 WDW EM  
 SSB 0  
 LB 1.00 Hz  
 GB 0  
 PC 1.40

7.8059  
7.7902  
7.7869  
7.4799  
7.4646  
7.4451  
7.4279  
7.3554  
7.3493  
7.3444  
7.3378  
7.3317  
7.3239  
7.2959  
7.2771  
7.2611

1.9599  
1.9555  
1.9418  
1.9375



4am

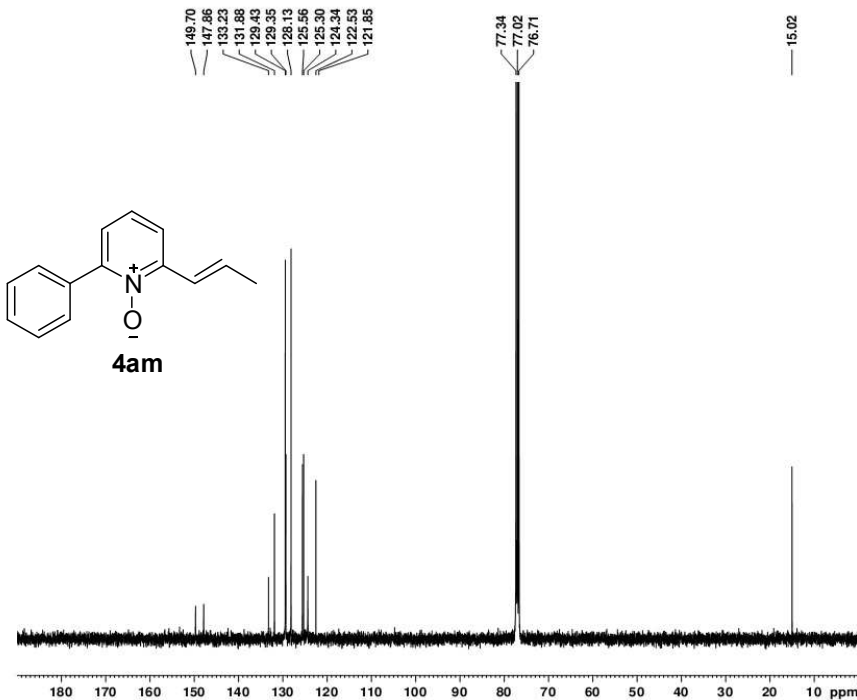


```

NAME      ZS-4-53
EXPNO     1
PROCNO    1
Date_     20110927
Time      16.11
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDC13
NS         16
DS         2
SWH        8223.685 Hz
FIDRES     0.125483 Hz
AQ         3.9846387 sec
RG         203
DW         60.800 usec
DE         6.50 usec
TE         298.1 K
D1         1.00000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        13.80 usec
PL1       -1.00 dB
PL1W      13.18669796 W
SF01      400.1724712 MHz
SI        32768
SF        400.1700032 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```



4am



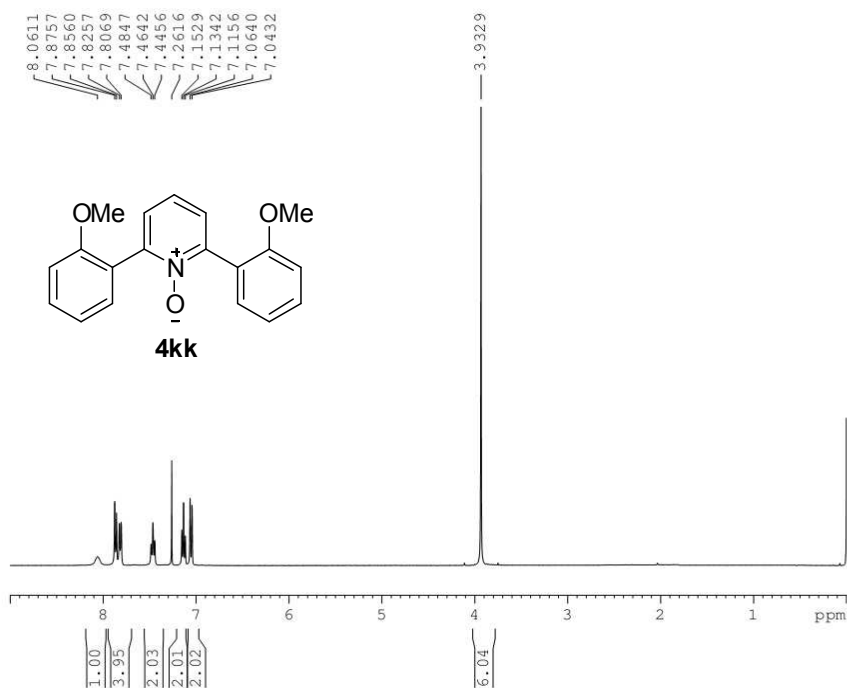
```

NAME      ZS-4-53-C13
EXPNO     1
PROCNO    1
Date_     20110930
Time      13.54
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDC13
NS         2836
DS         4
SWH        24038.461 Hz
FIDRES     0.366798 Hz
AQ         1.3631988 sec
RG         203
DW         20.800 usec
DE         6.50 usec
TE         299.7 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        8.50 usec
PL1       -2.00 dB
PL1W      57.32743073 W
SF01      100.6328888 MHz

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       -1.00 dB
PL12      14.26 dB
PL13      14.46 dB
PL2W      13.18669796 W
PL12W     0.39276794 W
PL13W     0.37509048 W
SF02      400.1716007 MHz
SI        32768
SF        100.6228231 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40
  
```

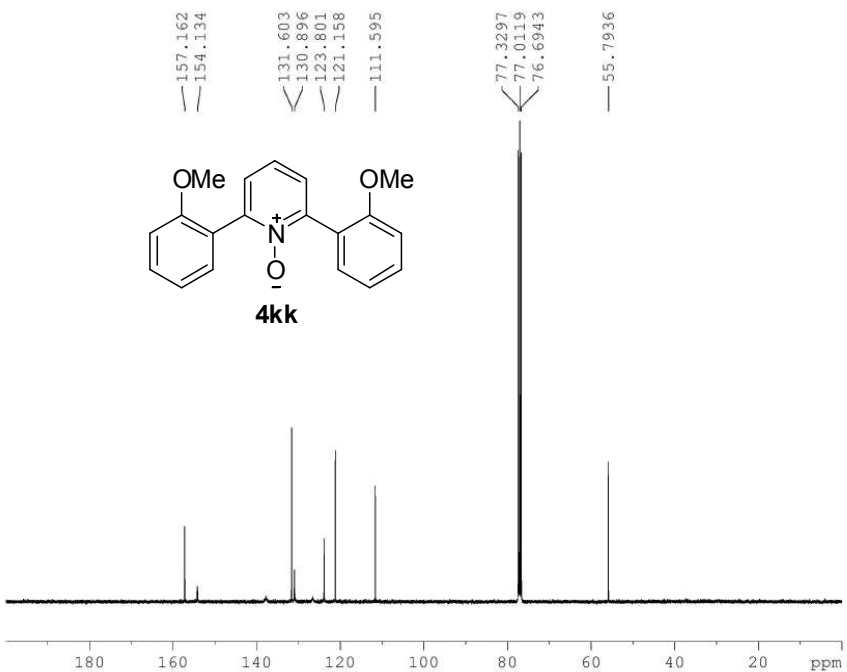


```

NAME      ZS-5-22-0
EXPNO    1
PROCNO   1
Date_    20120507
Time     11.10
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zg30
TD        65536
SOLVENT  CDCl3
NS        16
DS        2
SWH      8223.685 Hz
FIDRES   0.125483 Hz
AQ       3.9846387 sec
RG        181
DW       60.800 usec
DE       6.50 usec
TE       297.4 K
D1       1.0000000 sec
D11      1
TDO      1
  
```

```

===== CHANNEL f1 =====
NUC1     1H
P1       13.80 usec
PL1      -1.00 dB
PL1W     13.18669796 W
SFO1     400.1724712 MHz
SI        32768
SF       400.1700029 MHz
WDW      EM
SSB      0
LB       0.30 Hz
GB       0
PC       1.00
  
```



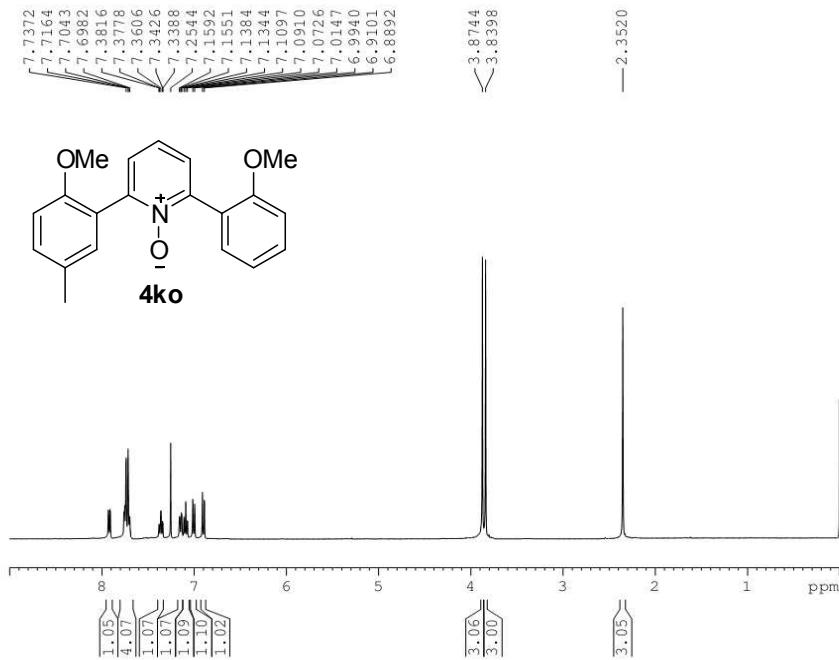
```

NAME      ZS-5-22-0-C13
EXPNO    1
PROCNO   1
Date_    20121014
Time     12.47
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        2206
DS        4
SWH      24038.461 Hz
FIDRES   0.366798 Hz
AQ       1.3631988 sec
RG        203
DW       20.800 usec
DE       6.50 usec
TE       300.5 K
D1       2.0000000 sec
D11      0.0300000 sec
TDO      1
  
```

```

===== CHANNEL f1 =====
NUC1     13C
P1       8.50 usec
PL1      -2.00 dB
PL1W     57.32743073 W
SFO1     100.6320000 MHz

===== CHANNEL f2 =====
CPDPRG2  waltz16
NUC2     1H
PCPD2    80.00 usec
PL2      -1.00 dB
PL12     14.26 dB
PL13     14.46 dB
PL2W     13.18669796 W
PL12W    0.39276794 W
PL13W    0.37509048 W
SFO2     400.1716007 MHz
SI        32768
SF       100.6228270 MHz
WDW      EM
SSB      0
LB       1.00 Hz
GB       0
PC       1.40
  
```

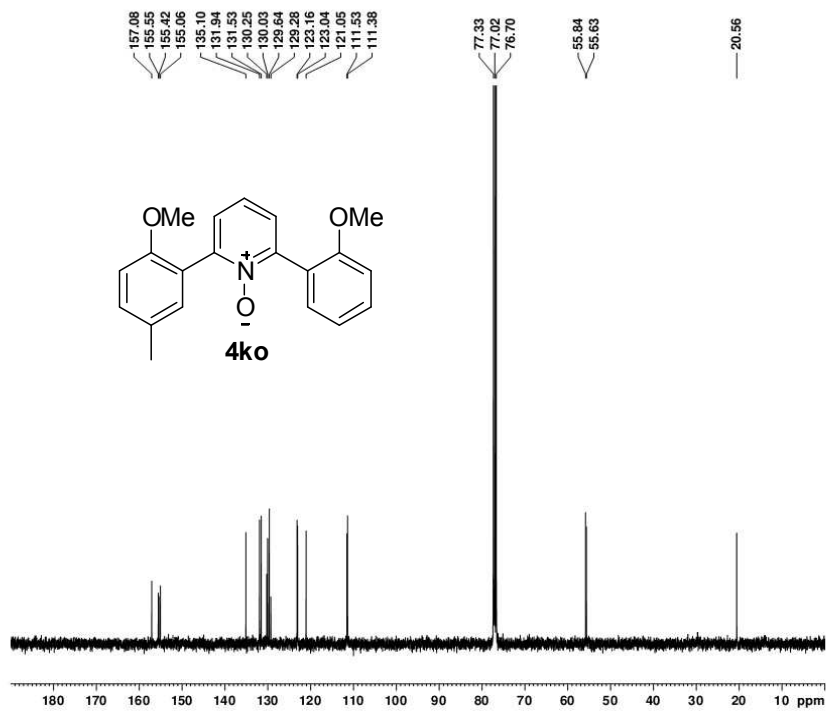


```

NAME      ZS-5-21-0
EXPNO    1
PROCNO   1
Date_    20120507
Time     11.16
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zg30
TD       65536
SOLVENT  CDCl3
NS       16
DS       2
SWH      8223.685 Hz
FIDRES   0.125483 Hz
AQ       3.9846387 sec
RG       181
DW       60.800 usec
DE       6.50 usec
TE       297.5 K
D1       1.0000000 sec
TDO      1
  
```

```

===== CHANNEL f1 =====
NUC1     1H
P1       13.80 usec
PL1     -1.00 dB
PL1W    13.18669796 W
SFO1    400.1724712 MHz
SI       32768
SF      400.1700058 MHz
WDW      EM
SSB      0
LB       0.30 Hz
GB       0
PC       1.00
  
```



```

NAME      ZS-5-21-0-C13
EXPNO    1
PROCNO   1
Date_    20120508
Time     5.47
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       1000
DS       4
SWH      24038.461 Hz
FIDRES   0.366798 Hz
AQ       1.3631988 sec
RG       203
DW       20.800 usec
DE       6.50 usec
TE       300.0 K
D1       2.0000000 sec
D11      0.0300000 sec
TDO      1
  
```

```

===== CHANNEL f1 =====
NUC1     13C
P1       8.50 usec
PL1     -2.00 dB
PL1W    57.32743073 W
SFO1    100.6328888 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2  waltz16
NUC2     1H
PCPD2    80.00 usec
PL2     -1.00 dB
PL12    14.26 dB
PL13    14.46 dB
PL1W    13.18669796 W
PL12W   0.39276794 W
PL13W   0.37509048 W
SFO2    400.1716007 MHz
SI       32768
SF      100.6228261 MHz
WDW      EM
SSB      0
LB       1.00 Hz
GB       0
PC       1.40
  
```