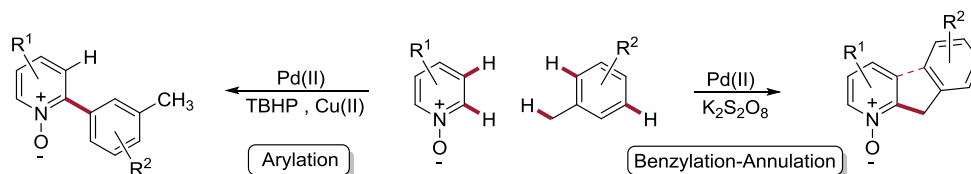


Palladium-Catalyzed Regioselective Benzylolation-Annulation of Pyridine *N*-oxides with Toluene Derivatives via Multiple C-H Bond Activations: Benzylolation versus Arylation



Ebrahim Kianmehr,^{*,†} Nasser Faghih,[†] and Khalid Mohammed Khan[‡]

[†]School of Chemistry, College of Science, University of Tehran, Tehran 1417614411, Iran

[‡]H. E. J. Research Institute of Chemistry, International Center for Chemical and Biological Sciences, University of Karachi, Karachi 75270, Pakistan

kianmehr@khayam.ut.ac.ir.

Supporting Information

Contents

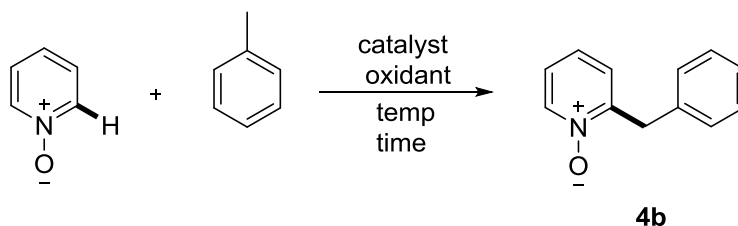
1. General Information.....	S2
2. Optimizations of the Reaction Conditions.....	S3
3. Experimental Procedures.....	S5
4. Characterization of the Products.....	S6
5. References.....	S13
6. Spectral Data.....	S14

1. General Information

Solvents, Palladium acetate (98%), $K_2S_2O_8$, $Cu(OAc)_2 \cdot H_2O$, pyridine and toluene derivatives were purchased from Merck. Other reagents were purchased from commercial distributors and used without further purification. Analytical thin layer chromatography (TLC) was performed on precoated silica gel 60 F254 plates. The products were purified by preparative column chromatography on silica gel (0.063-0.200 mm; Merck). 1H and ^{13}C -NMR Spectra: were recorded on Bruker DRX -600, 500, 400 and 300-Advance instrument in $CDCl_3$; δ in ppm, J in Hz. High resolution mass spectra were obtained with a Kratos Concept IIH mass spectrometer.

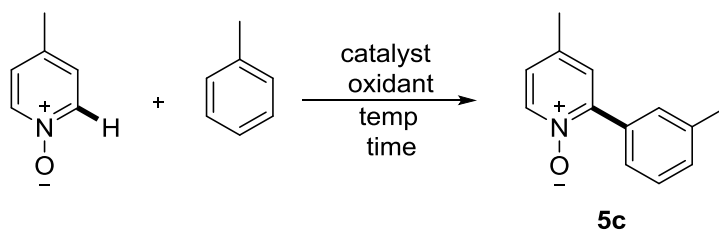
2. Optimization of the Reaction Conditions

2.1. Benzylation of pyridine *N*-oxides



entry	Catalyst (mol %)	Oxidant (equiv)	temp (°C)	time (h)	yield (%)
1	Pd(OAc) ₂ (3)	Na ₂ S ₂ O ₈ (1)	120	18	63
2	Pd(OAc) ₂ (3)	(NH ₄) ₂ S ₂ O ₈ (1)	120	18	52
3	Pd(OAc) ₂ (3)	TBHP (1)	120	18	trace
4	Pd(OAc) ₂ (3)	K ₂ S ₂ O ₈ (1)	120	18	75
5	Pd(OAc) ₂ (3)	Ag ₂ CO ₃ (0.75)	120	18	0
6	Pd(OAc) ₂ (3)	DDQ (0.75)	120	18	0
7	Pd(OAc)₂ (3)	K₂S₂O₈ (0.75)	120	18	83
8	Pd(OAc) ₂ (3)	K ₂ S ₂ O ₈ (0.75)	100	18	56
9	Pd(OAc) ₂ (3)	K ₂ S ₂ O ₈ (0.75)	80	18	21
10	Pd(OAc) ₂ (10)	K ₂ S ₂ O ₈ (0.75)	120	18	81
11	Pd(OAc) ₂ (3)	K ₂ S ₂ O ₈ (0.75)	140	18	62
12	-	K ₂ S ₂ O ₈ (0.75)	120	18	0
13	Pd(OAc) ₂ (3)	K ₂ S ₂ O ₈ (0.75)	120	8	61
14	Pd(Cl) ₂ (3)	K ₂ S ₂ O ₈ (0.75)	120	18	42
15	CuCl ₂ (3)	K ₂ S ₂ O ₈ (0.75)	120	18	14
16	CuCl ₂ (10)	K ₂ S ₂ O ₈ (0.75)	120	18	28
17	CuBr ₂ (10)	K ₂ S ₂ O ₈ (0.75)	120	18	38
18	Cu ₂ O (10)	K ₂ S ₂ O ₈ (0.75)	120	18	41
19	Cu(OAc) ₂ (10)	K ₂ S ₂ O ₈ (0.75)	120	18	22
20	PdCl ₂ (COD) (3)	K ₂ S ₂ O ₈ (0.75)	120	18	51
21	FeCl ₃ (3)	K ₂ S ₂ O ₈ (0.75)	120	18	trace
22	NiBr ₂ (3)	K ₂ S ₂ O ₈ (0.75)	120	18	0
23	[Ru(<i>p</i> -cymene)Cl ₂] ₂ (3)	K ₂ S ₂ O ₈ (0.75)	120	18	0
24	Pd(OAc) ₂ (3)	-	120	18	0

2.2. Arylation of pyridine N-oxides

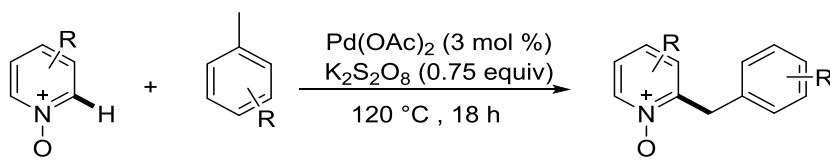


entry	Catalyst (mol %)	Oxidant (equiv)	Co-oxidant (equiv)	temp (°C)	time (h)	yield (%)
1	Pd(OAc) ₂ (3)	K ₂ S ₂ O ₈ (0.75)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	0
2	Pd(OAc) ₂ (3)	Na ₂ S ₂ O ₈ (1)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	0
3	Pd(OAc) ₂ (3)	(NH ₄) ₂ S ₂ O ₈ (1)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	0
4	Pd(OAc) ₂ (3)	TBHP (1)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	46
5	Pd(OAc)₂ (3)	TBHP (2)	Cu(OAc)₂·H₂O (0.5)	120	18	87
6	Pd(OAc) ₂ (3)	TBHP (2)	-	120	18	49
7	Pd(OAc) ₂ (3)	DTBP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	66
8	Pd(OAc) ₂ (10)	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	73
9	-	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	0
10	Pd(OAc) ₂ (3)	-	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	12 ^a
11	Pd(OAc) ₂ (3)	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (1)	120	18	85
12	Pd(Cl) ₂ (3)	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	72
13	Pd(OAc) ₂ (3)	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	8	53
14	Pd(OAc) ₂ (3)	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	24	86
15	Pd(OAc) ₂ (3)	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	80	18	23
16	Pd(OAc) ₂ (3)	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	140	18	71
17	Pd(OAc) ₂ (3)	TBHP (2)	CuCl ₂ (0.5)	120	18	64
18	Pd(OAc) ₂ (3)	TBHP (2)	CuBr ₂ (0.5)	120	18	61
19	PdCl ₂ (COD)	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	76
20	FeCl ₃ (3)	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	trace
21	NiBr ₂ (3)	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	0
22	[Ru(p-cymene)Cl ₂] ₂ (3)	TBHP (2)	Cu(OAc) ₂ ·H ₂ O (0.5)	120	18	0

^a A mixture of products was obtained.

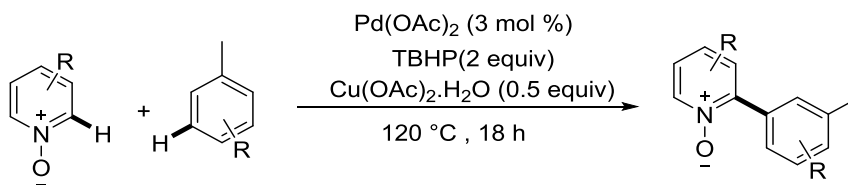
3.Experimental Procedure:

3.1 Benzylation of pyridine *N*-oxides



A 10 mL microvawe vial was charged with pyridine *N*-oxides (1 equiv), K₂S₂O₈ (0.75 equiv), Pd(OAc)₂ (3 mol %) and toluene derivatives (20 equiv). The vial was then sealed and immersed in an oil bath, which was preheated at 120 °C, for 18 h. After this time the reaction mixture was cooled to room temperature and then diluted with DCM and filtered. The residue was purified by using column chromatography (n-hexane/EtOAc, 1/4) yielded the desire products.

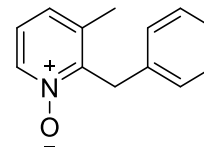
3.2. Arylation of pyridine *N*-oxides



A 10 mL microvawe vial was charged with pyridine *N*-oxides (1 equiv), TBHP (2 equiv), Pd(OAc)₂ (3 mol %) and Cu(OAc)₂.H₂O (0.5 equiv) and toluene derivateies (20 equiv). The reaction was allowed to stir at 120 °C for 18 h. the reaction was then filtered over celite and purified by column chromatography (n-hexane/EtOAc, 1/4).

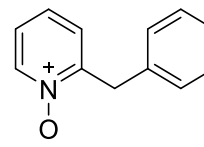
4. Characterization of the Products

2-Benzyl-3-methylpyridine *N*-oxide (**4a**)¹



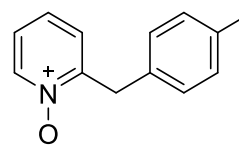
The general procedure was followed using 3-methylpyridine *N*-oxide (1 mmol, 109 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and toluene (2.1 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4a** (133 mg, 67% yield) as a yellow oil; ¹HNMR (500 MHz, , CDCl₃) δ 9.07 (d, *J* = 6.0 Hz, 1H), 7.87 (d, *J* = 8.0 Hz, 1H), 7.57 (t, *J* = 7.0 Hz, 1H), 7.30 (t, *J* = 7.5 Hz, 2H), 7.26 (d, *J* = 6.5 Hz, 1H), 7.20 (d, *J* = 7.5 Hz, 2H), 4.56 (s, 2H), 2.51 (s, 3H); ¹³CNMR (125 MHz, CDCl₃) δ 152.1, 140.9, 138.9, 138.5, 133.5, 129.2, 128.5, 127.7, 124.5, 33.5, 19.3; HRMS (EI) *m/z* calculated for C₁₃H₁₃NO (M⁺): 199.0997. found: 199.0988.

2-Benzylpyridine *N*-oxide (**4b**)



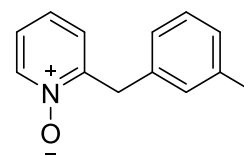
The general procedure was followed using pyridine *N*-oxide (1 mmol, 95 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and toluene (2.1 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4b** (153 mg, 83% yield) as a yellow oil; ¹HNMR (400 MHz, , CDCl₃) δ 9.06 (d, *J* = 4.8 Hz, 1H), 7.82 (t, *J* = 9.2 Hz, 2H), 7.58 (m, 1H), 7.46 (m, 1H), 7.38 (m, 2H), 7.32 (d, *J* = 7.2 Hz, 1H), 7.26 (d, *J* = 6.8 Hz, 1H), 4.49 (s, 2H); ¹³CNMR (100 MHz, CDCl₃) δ 140.5, 138.3, 129.7, 129.4, 128.9, 128.1, 127.7, 125.9, 124.9, 36.6; HRMS (EI) *m/z* calculated for C₁₂H₁₁NO (M⁺): 185.0841. found: 185.0834.

2-(4-Methylbenzyl)pyridine *N*-oxide (**4c**)



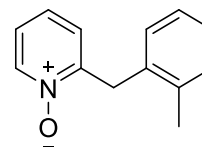
The general procedure was followed using pyridine *N*-oxide (1 mmol, 95 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and p-Xylene (2.4 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4c** (121 mg, 61% yield) as a yellow oil; ¹HNMR (500 MHz, , CDCl₃) δ 8.25 (m, 1H), 7.14-7.10 (m, 6H), 6.91 (m, 1H), 4.20 (s, 2H), 2.33 (s, 3H); ¹³CNMR (125 MHz, CDCl₃) δ 139.3, 129.5, 125.7, 125.4, 123.4, 36.1, 21.3; HRMS (EI) *m/z* calculated for C₁₃H₁₃NO (M⁺): 199.0997. found: 199.0993.

2-(3-Methylbenzyl)pyridine *N*-oxide (4d)



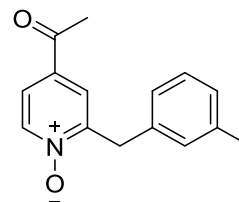
The general procedure was followed using pyridine *N*-oxide (1 mmol, 95 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and *m*-Xylene (2.4 mL, 20 mmol). Purification by column chromatography (silica gel, *n*-hexan/ EtOAc 1:4) gave the final product **4d** (149 mg, 75% yield) as a pale yellow oil; ¹HNMR (600 MHz, CDCl₃) δ 8.93 (m, 1H), 7.73-7.39 (m, 3H), 7.26 (t, *J* = 7.2 Hz, 1H), 7.13 (d, *J* = 7.2 Hz, 1H), 7.08 (s, 1H), 7.05 (d, *J* = 7.2 Hz, 1H), 4.41 (s, 2H), 2.34 (s, 3H); ¹³CNMR (150 MHz, CDCl₃) δ 154.4, 140.5, 139.3, 138.4, 133.1, 130.5, 129.3, 128.9, 127.9, 124.9, 36.6, 29.7, 21.3; HRMS (EI) *m/z* calculated for C₁₃H₁₃NO (M⁺): 199.0997. found: 199.1002.

2-(2-Methylbenzyl)pyridine *N*-oxide (4e)



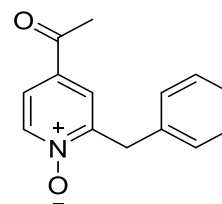
The general procedure was followed using pyridine *N*-oxide (1 mmol, 95 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and *o*-Xylene (2.4 mL, 20 mmol). Purification by column chromatography (silica gel, *n*-hexan/ EtOAc 1:4) gave the final product **4e** (155 mg, 78% yield) as a brown oil; ¹HNMR (300 MHz, CDCl₃) δ 8.94 (m, 1H), 7.75-7.42 (m, 3H), 7.27 (m, 1H), 7.15 (t, *J* = 5.7 Hz, 2H), 7.04 (d, *J* = 9 Hz, 1H), 4.42 (s, 2H), 2.33 (s, 3H); ¹³CNMR (75 MHz, CDCl₃) δ 140.4, 130.5, 130.1, 129.6, 129.2, 128.7, 128.2, 126.7, 124.6, 36.5, 21.3; HRMS (EI) *m/z* calculated for C₁₃H₁₃NO (M⁺): 199.0997. found: 199.0996.

4-Acetyl-2-(3-methylbenzyl)pyridine *N*-oxide (4f)



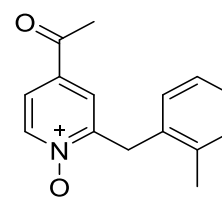
The general procedure was followed using 4-acetylpyridine *N*-oxide (1 mmol, 137 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and *m*-Xylene (2.4 mL, 20 mmol). Purification by column chromatography (silica gel, *n*-hexan/ EtOAc 1:4) gave the final product **4f** (151 mg, 63% yield) as a pale brown oil; ¹HNMR (500 MHz, CDCl₃) δ 8.26 (d, *J* = 6.5 Hz, 1H), 7.62 (dd, *J* = 7.0 Hz & *J* = 2.5 Hz, 1H), 7.50 (d, *J* = 2.5 Hz, 1H), 7.22 (d, *J* = 7.5 Hz, 1H), 7.09-7.05 (m, 3H), 4.18 (s, 2H), 2.46 (s, 3H), 2.32 (s, 3H); ¹³CNMR (125 MHz, CDCl₃) δ 194.1, 152.3, 139.6, 138.6, 135.5, 131.9, 130.2, 128.8, 128.1, 126.4, 124.7, 122.3, 36.4, 26.2, 21.4; HRMS (EI) *m/z* calculated for C₁₅H₁₅NO₂ (M⁺): 241.1103. found: 241.1090.

4-Acetyl-2-benzylpyridine N-oxide (4g)



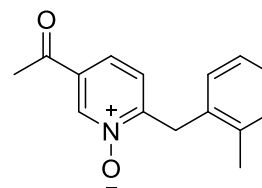
The general procedure was followed using 4-acetylpyridine N-oxide (1 mmol, 137 mg), $K_2S_2O_8$ (202 mg, 0.75 mmol), $Pd(OAc)_2$ (6 mg, 3 mol %) and toluene (2.1 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4g** (152 mg, 67% yield) as a brown oil; 1H NMR (300 MHz, $CDCl_3$) δ 8.29 (d, J = 6.6 Hz, 1H), 7.63 (d, J = 6.5 Hz, 1H), 7.50 (s, 1H), 7.37-7.24 (m, 5H), 4.23 (s, 2H), 2.46 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 192.8, 129.5, 129.1, 127.5, 125.1, 122.6, 36.7, 26.4; HRMS (EI) m/z calculated for $C_{14}H_{13}NO_2$ (M^+): 227.0946. found: 227.0945.

4-Acetyl-2-(2-methylbenzyl)pyridine N-oxide (4h)



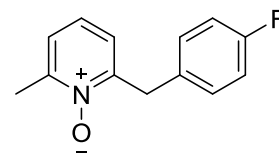
The general procedure was followed using 4-acetylpyridine N-oxide (1 mmol, 137 mg), $K_2S_2O_8$ (202 mg, 0.75 mmol), $Pd(OAc)_2$ (6 mg, 3 mol %) and o-Xylene (2.4 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4h** (144 mg, 60% yield) as a yellow oil; 1H NMR (400 MHz, $CDCl_3$) δ 8.29 (d, J = 5.6 Hz, 1H), 7.90 (m, 1H), 7.64 (m, 1H), 7.51 (s, 1H), 7.15 (m, 2H), 7.07 (t, J = 10.2 Hz, 1H), 4.19 (s, 2H), 2.46 (s, 3H), 2.33 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 194.7, 139.8, 134.2, 130.2, 130.1, 129.4, 129.1, 128.9, 128.2, 126.5, 124.9, 122.4, 36.4, 26.2, 21.3; HRMS (EI) m/z calculated for $C_{15}H_{15}NO_2$ (M^+): 241.1103. found: 241.1104.

5-Acetyl-2-(2-methylbenzyl)pyridine N-oxide (4i)



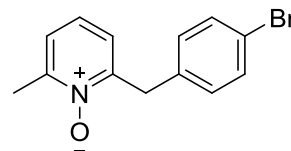
The general procedure was followed using 3-acetylpyridine N-oxide (1 mmol, 137 mg), $K_2S_2O_8$ (202 mg, 0.75 mmol), $Pd(OAc)_2$ (6 mg, 3 mol %) and o-Xylene (2.4 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4i** (187 mg, 78% yield) as a yellow oil; 1H NMR (600 MHz, $CDCl_3$) δ 9.44 (s, 1H), 8.17 (d, J = 7.5 Hz, 1H), 7.34 (d, J = 7.9 Hz, 1H), 7.28 (m, 1H), 7.18 (d, J = 7.7 Hz, 1H), 7.14 (t, J = 6.6 Hz, 1H), 7.05 (t, J = 7.9 Hz, 1H), 4.44 (s, 2H), 2.65 (s, 3H), 2.34 (d, J = 5.2 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 184.1, 155.8, 140.4, 131.8, 125.4, 116.7, 113.0, 111.7, 102.7, 55.3, 46.3, 28.9, 28.1, 21.6, 13.7; HRMS (EI) m/z calculated for $C_{15}H_{15}NO_2$ (M^+): 241.1103. found: 241.1101.

2-(4-Fluorobenzyl)-6-methylpyridine *N*-oxide (4j)



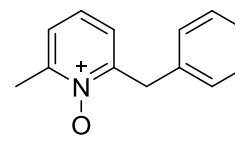
The general procedure was followed using 2-methylpyridine *N*-oxide (1 mmol, 109 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and p-Fluorotoluene (2.2 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4j** (115 mg, 53% yield) as a pale brown oil; ¹HNMR (500 MHz, , CDCl₃) δ 7.26 (m, 2H) 7.19 (d, *J* = 6.8 Hz, 1H) 7.14 (t, *J* = 7.6 Hz, 1H), 7.02 (td, *J* = 8.6 Hz & *J* = 2.0 Hz, 2H), 6.87 (d, *J* = 7.7 Hz, 1H) 4.28 (s, 2H), 2.61 (s, 3H); ¹³CNMR (125 MHz, CDCl₃) δ 160.9 (d, *J* = 245.1 Hz), 151.9, 141.0, 132.8, 131.6 (d, *J* = 7.8 Hz), 124.6, 123.7, 116 (d, *J* = 21.1 Hz), 36.7, 18.7; MS(EI) *m/z* (relative intensity) 217 (M⁺, 16), 200 (50), 182 (45), 155 (70), 105 (62), 77 (100). Anal. Calcd. for C₁₃H₁₂FNO: C, 71.86; H, 5.57; N, 6.45. Found: C, 71.93; H, 5.59; N, 6.44.

2-(4-Bromobenzyl)-6-methylpyridine *N*-oxide (4k)



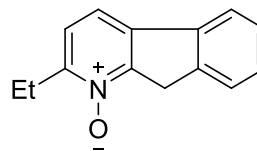
The general procedure was followed using 2-methylpyridine *N*-oxide (1 mmol, 109 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and p-Bromotoluene (2.4 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4k** (130 mg, 47% yield) as a brown oil; ¹HNMR (500 MHz, , CDCl₃) δ 7.45 (d, *J* = 8.3 Hz, 2H), 7.19 (m, 3H), 7.09 (t, *J* = 7.7 Hz, 1H) 6.88 (d, *J* = 7.6 Hz, 1H), 4.23 (s, 2H), 2.56 (s, 3H); ¹³CNMR (125 MHz, CDCl₃) δ 155.0, 149.8, 141.2, 133.9, 132.8, 131.2, 130.0, 116.1, 37.6, 18.9; MS(EI) *m/z* (relative intensity) 277 (M⁺, 8), 200 (12), 181 (37), 97 (62), 69 (100), 55 (95). Anal. Calcd. for C₁₃H₁₂BrNO: C, 56.32; H, 4.37; N, 5.06. Found: C, 56.28; H, 4.35; N, 5.08.

2-Benzyl-6-methylpyridine *N*-oxide (4l)



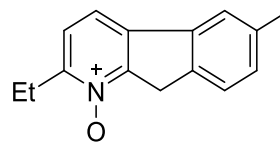
The general procedure was followed using 2-methylpyridine *N*-oxide (1 mmol, 109 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and toluene (2.1 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4l** (123 mg, 62% yield) as a yellow oil; ¹HNMR (500 MHz, , CDCl₃) δ 7.34 (t, *J* = 7.5 Hz, 2H), 7.26 (m, 3H), 7.15 (d, *J* = 6.6 Hz, 1H), 7.07 (t, *J* = 7.7 Hz, 1H) 6.82 (d, *J* = 7.3 Hz, 1H), 4.29 (s, 2H), 2.57 (s, 3H); ¹³CNMR (125 MHz, CDCl₃) δ 152.3, 149.4, 137.2, 130.2, 129.2, 127.3, 124.5, 123.8, 37.4, 18.8; MS(EI) *m/z* (relative intensity) 199 (M⁺, 8), 182 (16), 111 (33), 97 (41), 69 (62), 43 (100). Anal. Calcd. for C₁₃H₁₃NO: C, 78.35; H, 6.58; N, 7.03. Found: C, 78.44; H, 6.57; N, 7.05.

2-Ethyl-9H-indeno[2,1-b]pyridine *N*-oxide (4m)



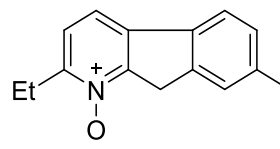
The general procedure was followed using 2-ethylpyridine *N*-oxide (1 mmol, 123 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and toluene (2.1 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4m** (139 mg, 66% yield) as a brown oil; ¹HNMR (400 MHz, , CDCl₃) δ 7.34 (d, *J* = 7.2 Hz, 2H) 7.27 (m, 3H), 6.89 (d, *J* = 7.6 Hz, 1H), 4.38 (s, 2H), 3.09 (q, *J* = 7.2 Hz, 2H), 1.33 (t, *J* = 7.2 Hz, 3H); ¹³CNMR (100 MHz, CDCl₃) δ 129.9, 129.1, 127.5, 124.3, 123.1, 37.3, 24.7, 11.1; HRMS (EI) *m/z* calculated for C₁₄H₁₃NO (M⁺): 211.9831. found: 211..9864.

2-Ethyl-6-methyl-9H-indeno[2,1-b]pyridine *N*-oxide (4n)



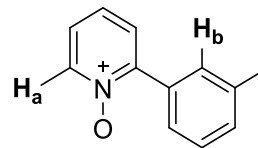
The general procedure was followed using 2-ethylpyridine *N*-oxide (1 mmol, 123 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and p-Xylene (2.4 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4n** (164 mg, 73% yield) as a pale brown oil; ¹HNMR (500 MHz, , CDCl₃) δ 7.14 (m, 2H) 7.09 (dd, *J* = 7.5 Hz & *J* = 1.5 Hz, 1H) 7.05 (m, 1H), 6.78 (dd, *J* = 7.5 Hz & *J* = 1.0 Hz, 1H) 4.21 (s, 2H), 2.98 (q, *J* = 7.5 Hz, 2H), 2.32 (s, 3H), 1.30 (t, *J* = 7.5 Hz, 3H); ¹³CNMR (125 MHz, CDCl₃) δ 153.5, 152.1, 136.4, 133.6, 129.6, 129.4, 124.6, 122.9, 121.6, 36.6, 24.0, 21.1, 10.7; HRMS (EI) *m/z* calculated for C₁₅H₁₅NO (M⁺): 225.1154. found: 225.1150.

2-Ethyl-7-methyl-9H-indeno[2,1-b]pyridine *N*-oxide (4o)



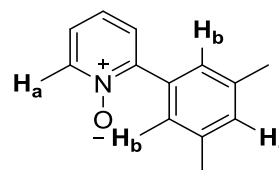
The general procedure was followed using 2-ethylpyridine *N*-oxide (1 mmol, 123 mg), K₂S₂O₈ (202 mg, 0.75 mmol), Pd(OAc)₂ (6 mg, 3 mol %) and m-Xylene (2.4 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **4o** (146 mg, 65% yield) as a dark yellow oil; ¹HNMR (600 MHz, , CDCl₃) δ 7.22 (m, 1H) 7.13 (s, 1H) 7.06 (m, 2H), 6.81 (m, 1H) 4.25 (s, 2H), 3.01 (q, *J* = 7.2 Hz, 2H), 2.32 (s, 3H), 1.31 (t, *J* = 7.5 Hz, 3H); ¹³CNMR (150 MHz, CDCl₃) δ 138.8, 138.2, 134.8, 134.1, 130.6, 128.9, 128.3, 128.2, 126.8, 124.3, 123.1, 37.1, 24.6, 21.2, 11.0; HRMS (EI) *m/z* calculated for C₁₅H₁₅NO (M⁺): 225.1152. found: 225.1154.

2-(*m*-Tolyl)pyridine *N*-oxide (5a)



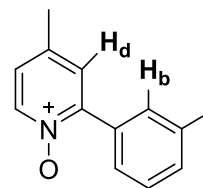
The general procedure was followed using pyridine *N*-oxide (1 mmol, 95 mg), TBHP (180 mg, 2 mmol), Pd(OAc)₂ (6 mg, 3 mol %), Cu(OAc)₂·H₂O (99 mg, 0.5 mmol) and toluene (2.1 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **5a** (151 mg, 82% yield) as a brown oil; ¹HNMR (500 MHz, , DMSO-d₆) δ 8.28 (m, 1H, H_a), 7.69 (d, *J* = 8.1 Hz, 1H), 7.58 (s, 1H, H_b), 7.54 (t, *J* = 7.4 Hz, 1H), 7.34 (m, 2H), 7.23 (m, 2H), 2.32 (s, 3H); ¹³CNMR (75 MHz, CDCl₃) δ 140.4, 138.1, 134.2, 130.8, 129.7, 129.2, 129.1, 128.3, 128.23, 126.5, 124.4, 21.47; HRMS (EI) *m/z* calculated for C₁₂H₁₁N₁O₁ (M⁺): 185.0841, found: 185.0827.

2-(3,5-Dimethylphenyl)pyridine *N*-oxide (5b)²



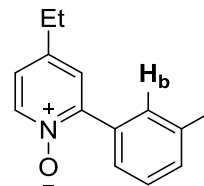
The general procedure was followed using pyridine *N*-oxide (1 mmol, 95 mg), TBHP (180 mg, 2 mmol), Pd(OAc)₂ (6 mg, 3 mol %), Cu(OAc)₂·H₂O (99 mg, 0.5 mmol) and *m*-Xylene (2.4 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **5b** (161 mg, 81% yield) as a pale yellow oil; ¹HNMR (500 MHz, , CDCl₃) δ 8.32 (d, *J* = 6.4 Hz, 1H, H_a), 7.39 (s, 2H, H_b), 7.73 (t, *J* = 7.3 Hz, 1H), 7.21 (m, 1H), 7.12 (m, 1H), 7.08 (s, 1H, H_c), 2.36 (s, 6H); ¹³CNMR (125 MHz, CDCl₃) δ 150.2, 140.9, 137.9, 132.9, 131.7, 127.8, 127.3, 126.3, 124.7, 21.7 ; HRMS (EI) *m/z* calculated for C₁₃H₁₃N₁O₁ (M⁺): 199.0997, found: 199.1012.

4-Methyl-2-(*m*-tolyl)pyridine *N*-oxide (5c)



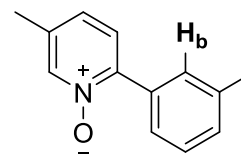
The general procedure was followed using 4-methylpyridine *N*-oxide (1 mmol, 109 mg), TBHP (180 mg, 2 mmol), Pd(OAc)₂ (6 mg, 3 mol %), Cu(OAc)₂·H₂O (99 mg, 0.5 mmol) and toluene (2.1 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **5c** (173 mg, 87% yield) as a pale brown oil; ¹HNMR (500 MHz, , CDCl₃) δ 8.20 (dd, *J* = 6.6 Hz & *J* = 2.7 Hz, 1H), 7.70 (d, *J* = 8.1 Hz, 1H), 7.61 (s, 1H, H_b), 7.35 (t, *J* = 7.6 Hz, 1H), 7.26 (m, 1H), 7.20 (s, 1H, H_d), 7.01 (t, *J* = 7.2 Hz, 1H), 2.39 (s, 3H), 2.36 (s, 3H); ¹³CNMR (100 MHz, CDCl₃) δ 140.2, 131.2, 130.1, 129.6, 129.2, 128.6, 128.5, 128.4, 126.7, 125.6, 125.4, 21.5, 21.4; HRMS (EI) *m/z* calculated for C₁₃H₁₃N₁O₁ (M⁺): 199.0997, found: 199.1000.

4-Ethyl-2-(*m*-tolyl)pyridine *N*-oxide (5d)



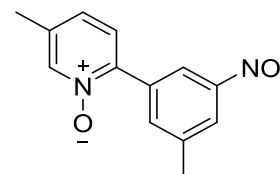
The general procedure was followed using 4-ethylpyridine *N*-oxide (1 mmol, 123 mg), TBHP (180 mg, 2 mmol), Pd(OAc)₂ (6 mg, 3 mol %), Cu(OAc)₂·H₂O (99 mg, 0.5 mmol) and toluene (2.1 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **5d** (181 mg, 85% yield) as a yellow oil; ¹HNMR (500 MHz, , CDCl₃) δ 8.23 (dd, *J* = 6.5 & *J* = 2.5 Hz, 1H), 7.70 (d, *J* = 8.0 Hz, 1H), 7.61 (s, 1H, H_b), 7.36 (t, *J* = 7.5 Hz, 1H), 7.26 (m, 1H), 7.22 (t, *J* = 2.5 Hz, 1H), 7.02 (td, *J* = 6.5 Hz & *J* = 2.5 Hz, 1H), 2.64 (q, *J* = 7.5 Hz, 2H), 2.40 (s, 3H), 1.26 (td, *J* = 7.0 Hz & *J* = 1.5 Hz, 3H); ¹³CNMR (125 MHz, CDCl₃) δ 143.0, 139.9, 130.2, 129.8, 129.1, 128.9, 128.2, 126.7, 126.3, 123.9, 123.7, 27.46, 21.46, 14.27; HRMS (EI) *m/z* calculated for C₁₄H₁₅N₁O₁ (M⁺): 213.1154, found: 213.1168.

5-Methyl-2-(*m*-tolyl)pyridine *N*-oxide (5e)



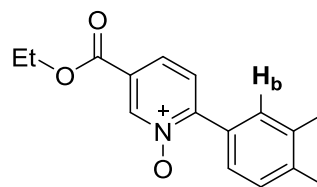
The general procedure was followed using 3-methylpyridine *N*-oxide (1 mmol, 109 mg), TBHP (180 mg, 2 mmol), Pd(OAc)₂ (6 mg, 3 mol %), Cu(OAc)₂·H₂O (99 mg, 0.5 mmol) and toluene (2.1 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **5e** (137 mg, 69% yield) as a brown oil; ¹HNMR (500 MHz, , CDCl₃) δ 8.18 (s, 1H), 7.69 (d, *J* = 8.1 Hz, 1H), 7.61 (s, 1H, H_b), 7.34 (t, *J* = 7.6 Hz, 1H), 7.29 (dd, *J* = 8.0 & *J* = 2.9 Hz, 1H), 7.09 (d, *J* = 7.2 Hz, 1H), 2.40 (s, 3H), 2.32 (s, 3H); ¹³CNMR (100 MHz, CDCl₃) δ 148.9, 140.6, 137.2, 132.3, 130.4, 130.1, 129.6, 128.5, 128.4, 128.2, 127.1, 21.4, 18.3; HRMS (EI) *m/z* calculated for C₁₃H₁₃N₁O₁ (M⁺): 199.0997, found: 199.1014.

5-Methyl-2-(3-methyl-5-nitrophenyl)pyridine *N*-oxide (5f)



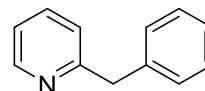
The general procedure was followed using 3-methylpyridine *N*-oxide (1 mmol, 109 mg), TBHP (180 mg, 2 mmol), Pd(OAc)₂ (6 mg, 3 mol %), Cu(OAc)₂·H₂O (99 mg, 0.5 mmol) and *m*-Nitrotoluene (2.3 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/ EtOAc 1:4) gave the final product **5f** (151 mg, 62% yield) as a yellow oil; ¹HNMR (600 MHz, , CDCl₃) δ 8.37 (s, 1H), 8.19 (s, 1H), 8.08 (s, 1H, H_b), 8.05 (s, 1H), 7.34 (d, *J* = 8.4 Hz, 1H), 7.16 (d, *J* = 8.4 Hz, 1H), 2.50 (s, 1H), 2.35 (s, 1H); ¹³CNMR (150 MHz, CDCl₃) δ 148.2, 144.3, 140.3, 136.3, 133.8, 130.8, 127.3, 126.5, 124.6, 121.6, 21.4, 18.1; HRMS (EI) *m/z* calculated for C₁₃H₁₂N₂O₃ (M⁺): 244.0848, found: 244.0828.

2-(3,4-Dimethylphenyl)-5-(ethoxycarbonyl)pyridine N-oxide (5g)



The general procedure was followed using 3-(ethoxycarbonyl)pyridine N-oxide (1 mmol, 167 mg), TBHP (180 mg, 2 mmol), Pd(OAc)₂ (6 mg, 3 mol %), Cu(OAc)₂·H₂O (99 mg, 0.5 mmol) and o-Xylene (2.4 mL, 20 mmol). Purification by column chromatography (silica gel, n-hexan/EtOAc 1:4) gave the final product **5g** (165 mg, 61% yield) as a dark brown oil; ¹HNMR (500 MHz, CDCl₃) δ 8.91 (s, 1H), 7.85 (dd, *J* = 8.2 & *J* = 1.9 Hz, 1H), 7.65 (s, 1H, H_b), 7.55 (dd, *J* = 6.7 & *J* = 1.1 Hz, 1H), 7.47 (d, *J* = 8.2 Hz, 1H), 7.24 (d, *J* = 7.2 Hz, 1H), 4.43 (q, *J* = 7.1 Hz, 2H), 2.31 (s, 3H), 2.32 (s, 3H), 1.40 (t, *J* = 7.1 Hz, 3H); ¹³CNMR (150 MHz, CDCl₃) δ 163.8, 141.2, 139.2, 134.3, 130.5, 128.3, 127.2, 119.6, 111.7, 61.2, 29.6, 21.2, 14.2; HRMS (EI) *m/z* calculated for C₁₆H₁₅N₁O₃ (M-2H)²⁺: 269.1052, found: 269.1057.

2-Benzylpyridine (6)^{3, 4}

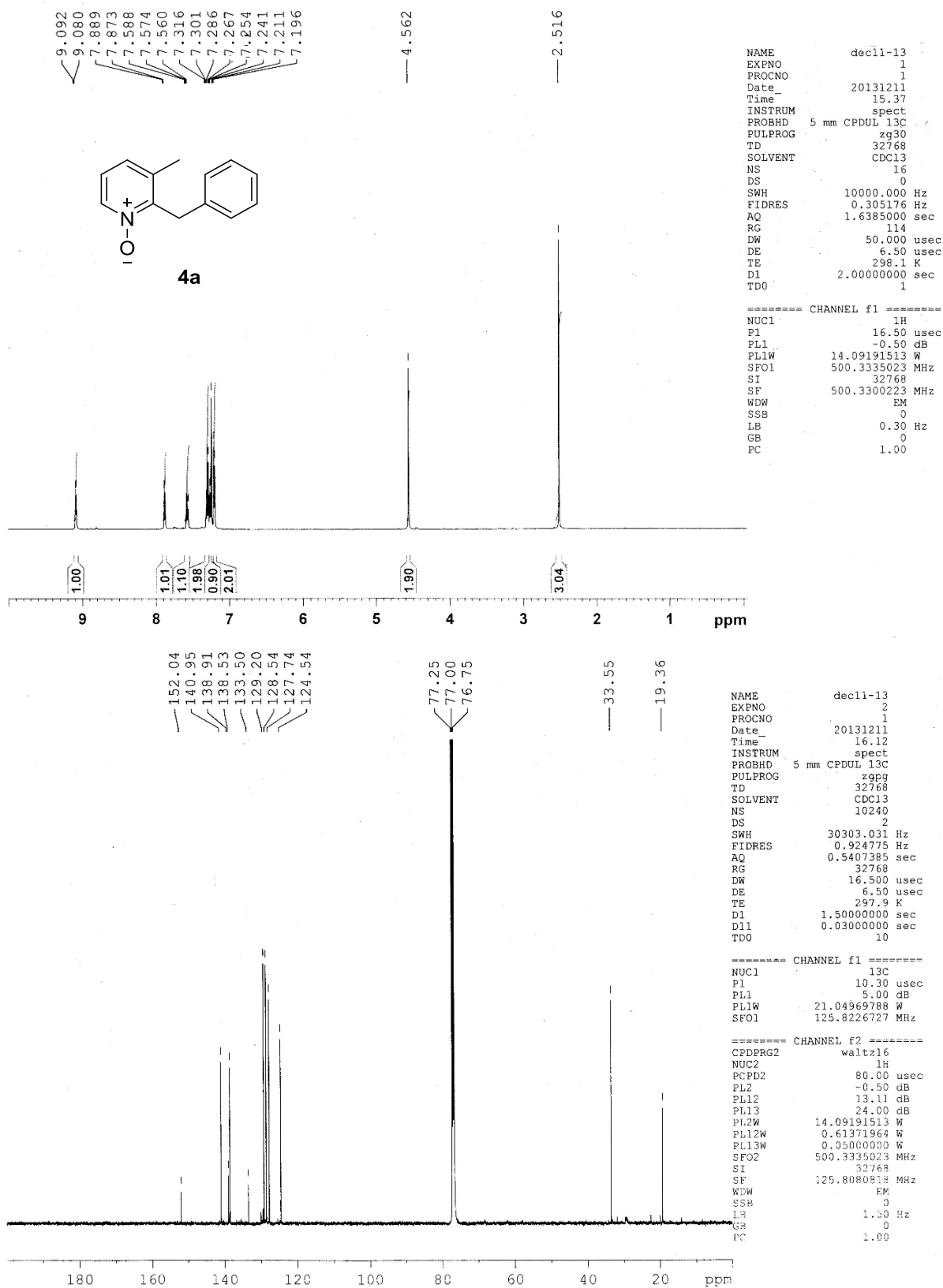


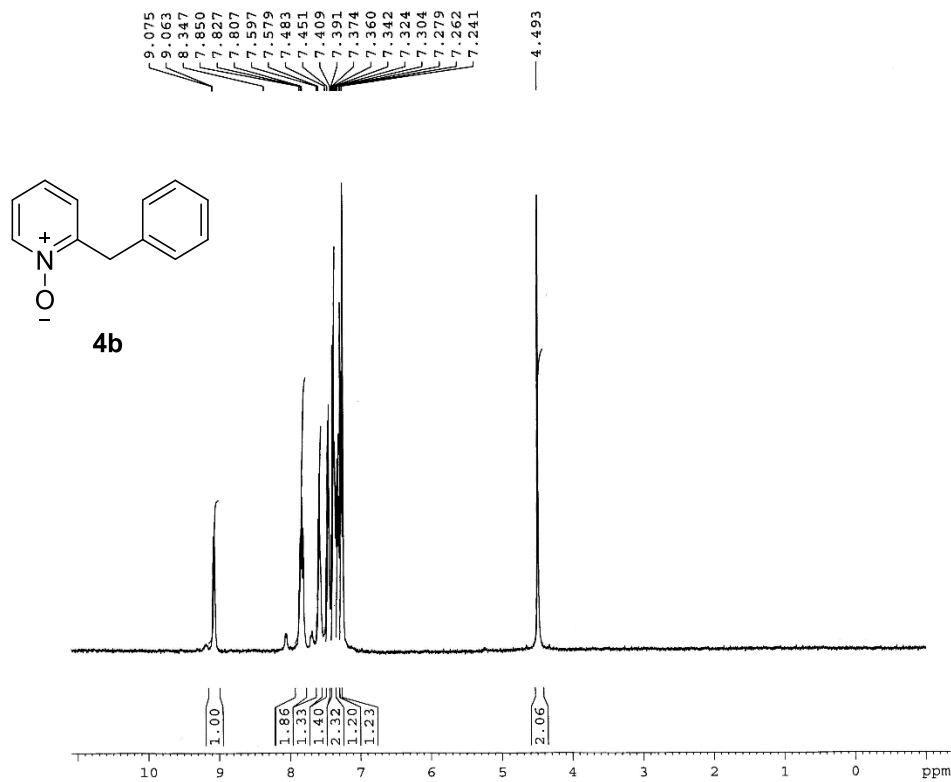
Colorless oil; ¹HNMR (400 MHz, CDCl₃) δ 8.54 (s, 2H), 7.56 (td, *J* = 7.6 Hz & *J* = 1.6 Hz, 1H), 7.31-7.19 (m, 5H), 7.11-7.08 (m, 2H), 4.16 (s, 2H); ¹³CNMR (100 MHz, CDCl₃) δ 160.8, 149.1, 139.3, 136.6, 129.0, 128.5, 126.3, 123.1, 121.2, 44.5; HRMS (EI) *m/z* calculated for C₁₂H₁₁N (M⁺): 169.0891. found: 169.0886.

5. References

- (1) Mai, W.; Yuan, J.; Li, Z.; Yang, L.; Xiao, Y.; Mao, P.; Qu, L. *Synlett* **2012**, 23, 938.
- (2) (a) Ackermann, L.; Fenner, S. *Chem. Commun.* **2011**, 47, 430–432. (b) Campeau, L.-C.; Rousseaux, S.; Fagnou, K. *J. Am. Chem. Soc.* **2005**, 127, 18020.
- (3) Shang, R.; Yang, Z.-W.; Wang, Y.; Zhang, S.-L.; Liu, L. *J. Am. Chem. Soc.* **2010**, 132, 14391.
- (4) Niwa, T.; Yorimitsu, H.; Oshima, K. *Angew. Chem. Int. Ed. Engl.* **2007**, 46, 2643.

6. Spectral Data





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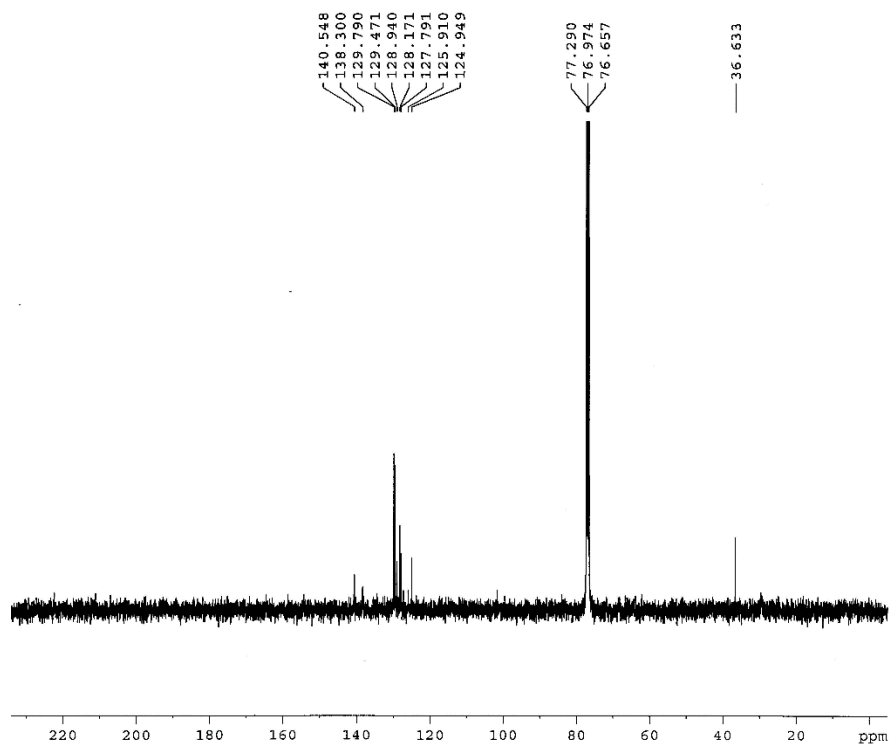
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PROCNO    1
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Time      12.31
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PULPROG   zg30
TD         32768
SOLVENT   CDCl3
NS         128
DS         0
SWH        8012.820 Hz
FIDRES     0.244532 Hz
AQ         2.0447731 sec
RG         2048
DW         62.400 usec
DE         6.50 usec
TE         300.0 K
D1         2.00000000 sec
TD0        1

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P1         10.20 usec
PL1        0.00 dB
SFO1      400.1332010 MHz
SI         16384
SF         400.1300172 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

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```

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EXPNO     2
PROCNO    1
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Time      13.10
INSTRUM   spect
PROBHD    5 mm DUL 13C-1
PULPROG   zgpg
TD         32768
SOLVENT   CDCl3
NS         18432
DS         2
SWH        24154.590 Hz
FIDRES     0.737140 Hz
AQ         0.6783476 sec
RG         32768
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DE         6.50 usec
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D1         1.50000000 sec
D11        0.03000000 sec
TD0        18

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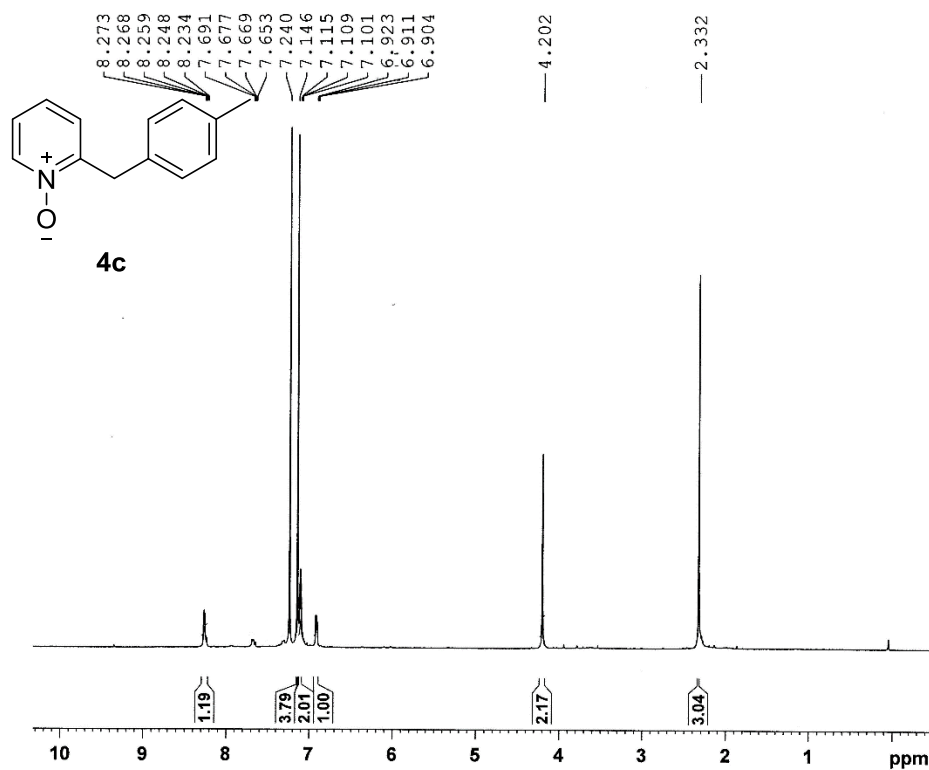
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NUC1      13C
P1         8.10 usec
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SFO1      100.6243395 MHz

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CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2        0.00 dB
PL12       20.00 dB
PL13       22.00 dB
SFO2      400.1324008 MHz
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SF         100.6127707 MHz
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SSB        0
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GB         0
PC         1.00

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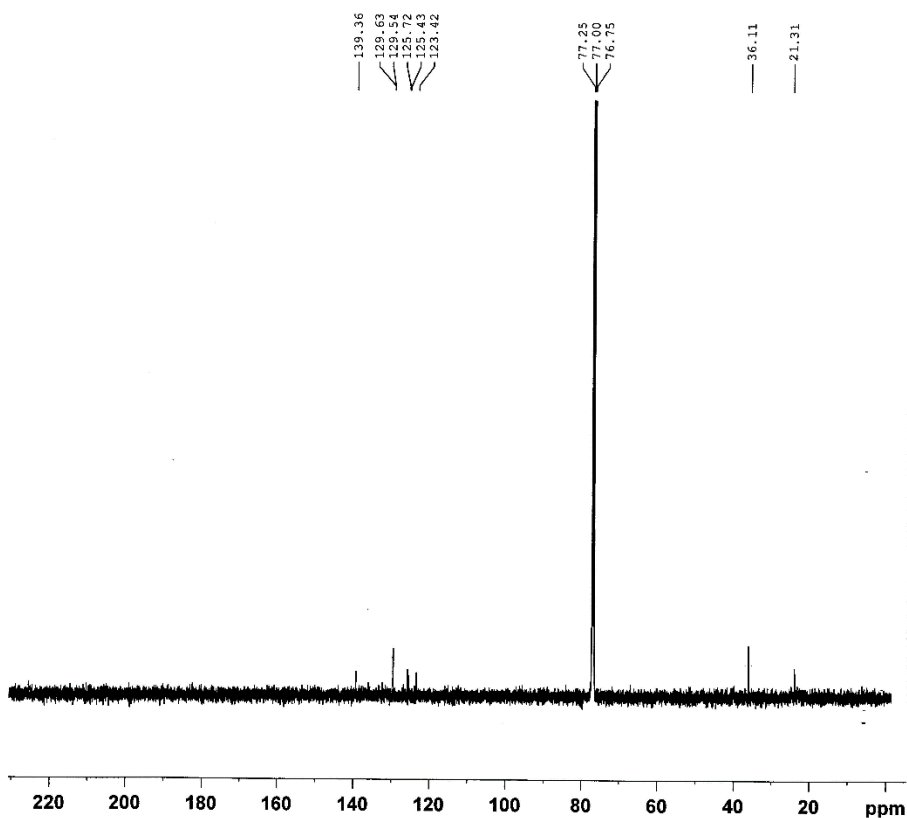
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SOLVENT   CDCl3
NS         128
DS         0
SWH        10330.578 Hz
FIDRES     0.315264 Hz
AQ         1.5860696 sec
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DE         6.50 usec
TE         300.0 K
D1         2.00000000 sec
D10        1

```

```

===== CHANNEL f1 =====
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P1         8.00 usec
PL1        -1.00 dB
SFO1      500.1335009 MHz
SI         32768
SF         500.1300232 MHz
WDW        EM
SSB         0
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GB          0
PC          1.00

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```

NAME      mar15-14
EXPNO     2
PROCNO    1
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Time      15.02
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PROBHD    5 mm BBI 1H/D-
PULPROG   zgpg
TD        32768
SOLVENT   CDCl3
NS         18432
DS         4
SWH        29498.525 Hz
FIDRES     0.900224 Hz
AQ         0.5554845 sec
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D11        0.03000000 sec
D10        18

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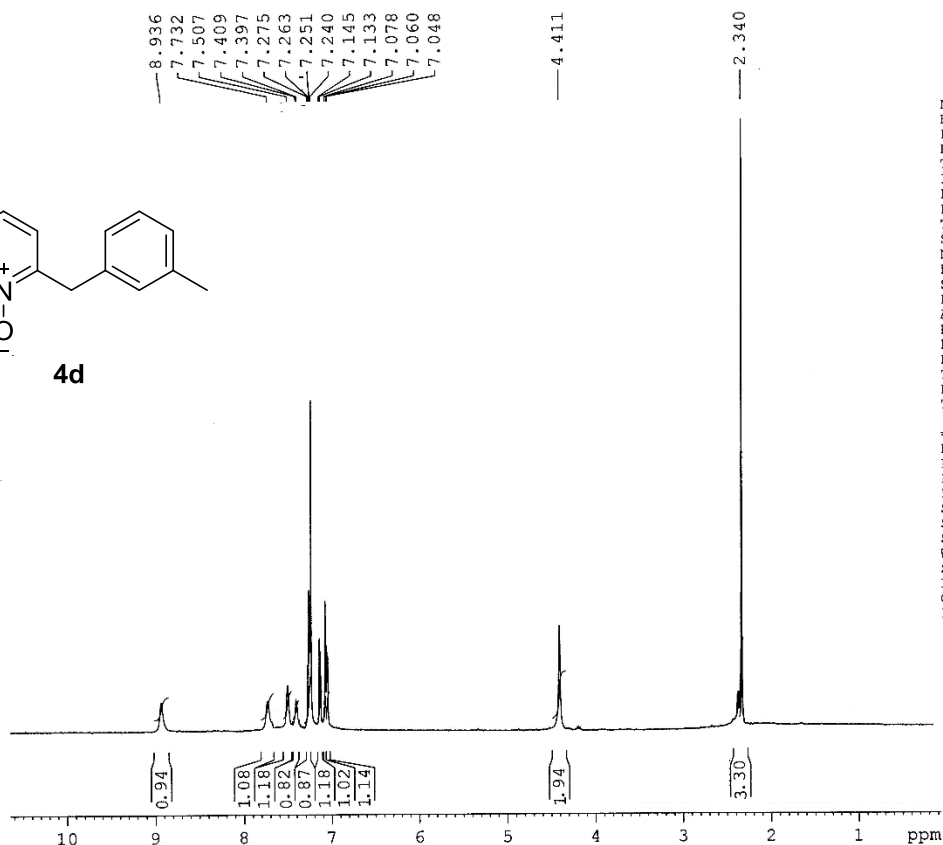
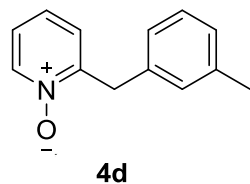
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CPDPRG2   waltz16
NUC2      1H
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PL2        -1.00 dB
PL12       19.20 dB
PL13       22.00 dB
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SI         32768
SF        125.7577906 MHz
WDW        EM
SSB         0
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GB          0
PC          1.00

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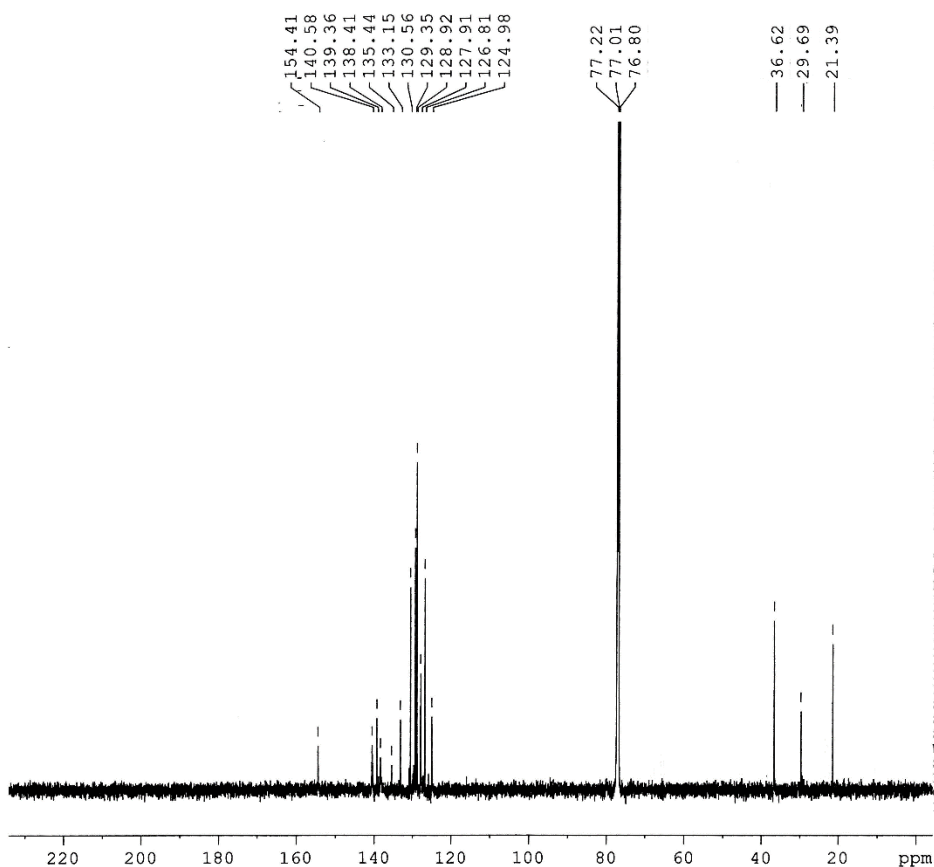



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PROCNO    1
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TD         32768
SOLVENT   CDCl3
NS         16
DS         0
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FIDRES    0.293438 Hz
AQ         1.7040380 sec
RG         8
DW         52.000 usec
DE         6.50 usec
TE         298.0 K
D1         2.00000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1         8.00 usec
PL1        3.31 dB
PL1W       6.79873323 W
SFO1      600.0345002 MHz
SI         32768
SF         600.0300262 MHz
WDW        EM
SSB        0
LB         0.50 Hz
GB         0
PC         1.40
  
```



```

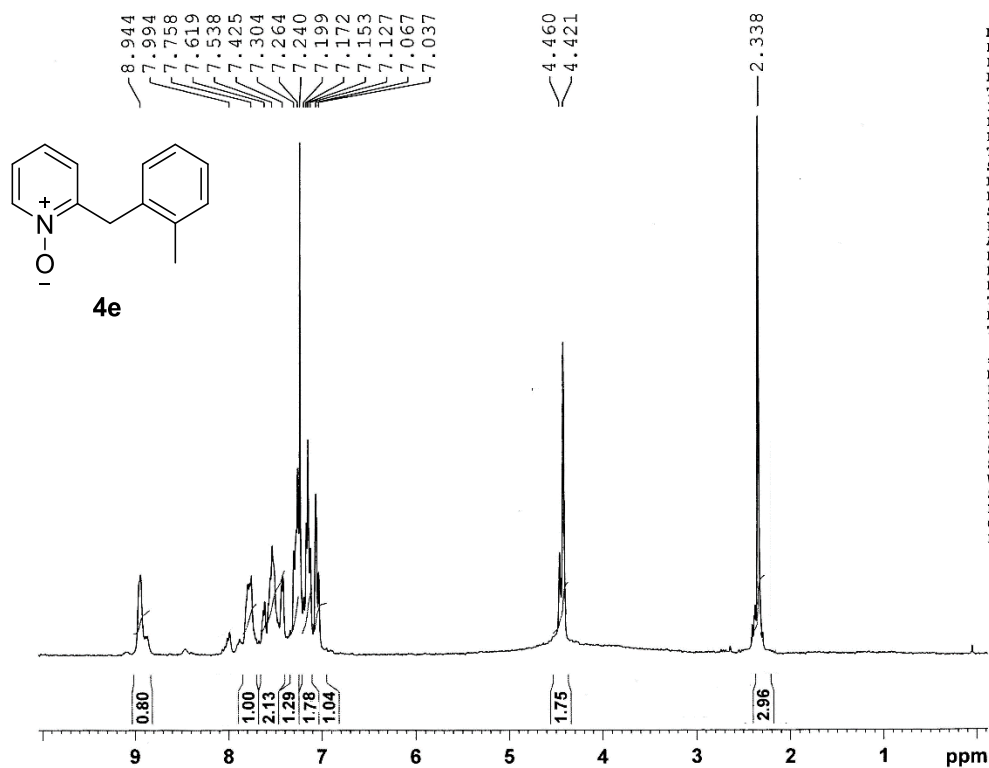
NAME      mar20-14
EXPNO     4
PROCNO    1
Date_     20140320
Time      17.26
INSTRUM   spect
PROBHD    5 mm CPTCI 1H-
PULPROG   zgpg
TD         32768
SOLVENT   CDCl3
NS         12288
DS         4
SWH       35971.223 Hz
FIDRES    1.097755 Hz
AQ         0.4555391 sec
RG         32768
DW         13.900 usec
DE         6.50 usec
TE         298.0 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        12
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        12.70 usec
PL1       -1.81 dB
PL1W      81.92915344 W
SFO1     150.8950149 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2        3.31 dB
PL12       23.31 dB
PL13       22.50 dB
PL2W       6.79873323 W
PL12W      0.06798734 W
PL13W      0.08192718 W
SFO2      600.0336002 MHz
SI         16384
SF         150.8776659 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.00
  
```



```

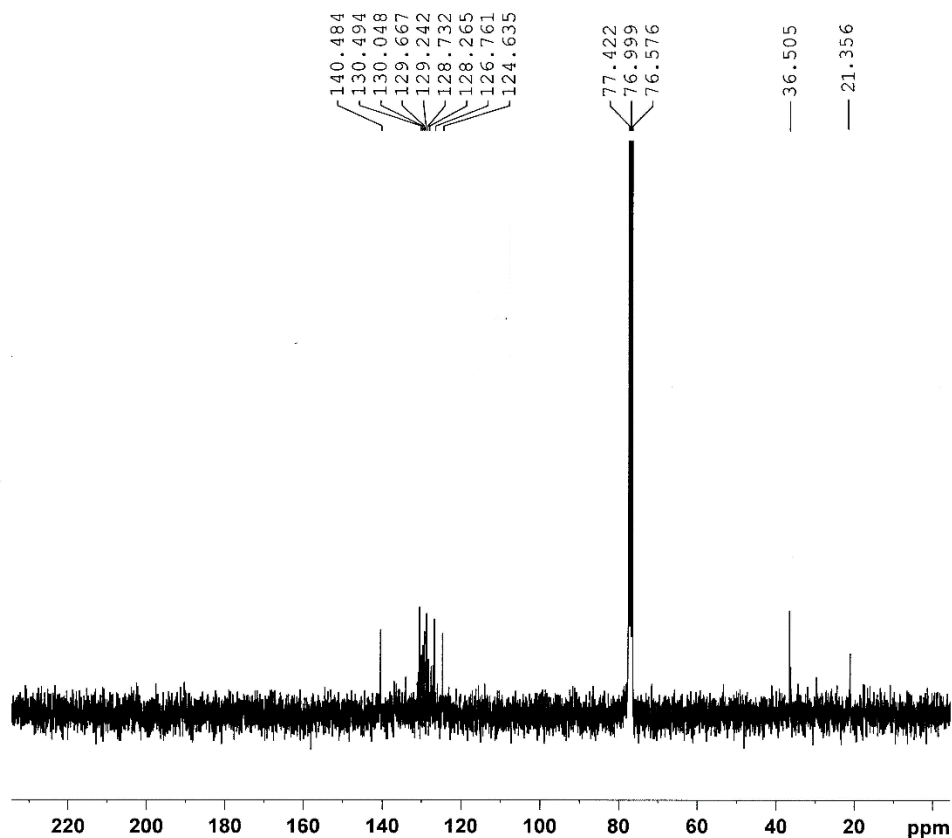
NAME      mar16-14
EXPNO     1
PROCNO    1
Date_     20140316
Time      14.14
INSTRUM   Spect
PROBHD    5 mm BBO BB-1H
PULPROG   zg30
TD         32768
SOLVENT   CDCl3
NS         128
DS         0
SWH        6009.615 Hz
FIDRES     0.183399 Hz
AQ         2.7263477 sec
RG         203
DW         83.200 usec
DE         6.50 usec
TE         300.0 K
D1         1.50000000 sec
D11        1
TD0        1

```

```

===== CHANNEL f1 =====
NUC1       1H
P1         12.50 usec
PL1        0.00 dB
PL1W       13.16228485 W
SFO1       300.1324010 MHz
SI         16384
SF         300.1300119 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         4.00

```



```

NAME      mar16-14
EXPNO     2
PROCNO    1
Date_     20140316
Time      14.57
INSTRUM   Spect
PROBHD    5 mm BBO BB-1H
PULPROG   zgpg30
TD         32768
SOLVENT   CDCl3
NS         18432
DS         2
SWH        18028.846 Hz
FIDRES     0.550197 Hz
AQ         0.9088159 sec
RG         22.6
DW         27.733 usec
DE         6.50 usec
TE         300.0 K
D1         1.50000000 sec
D11        0.03000000 sec
TD0        18

```

```

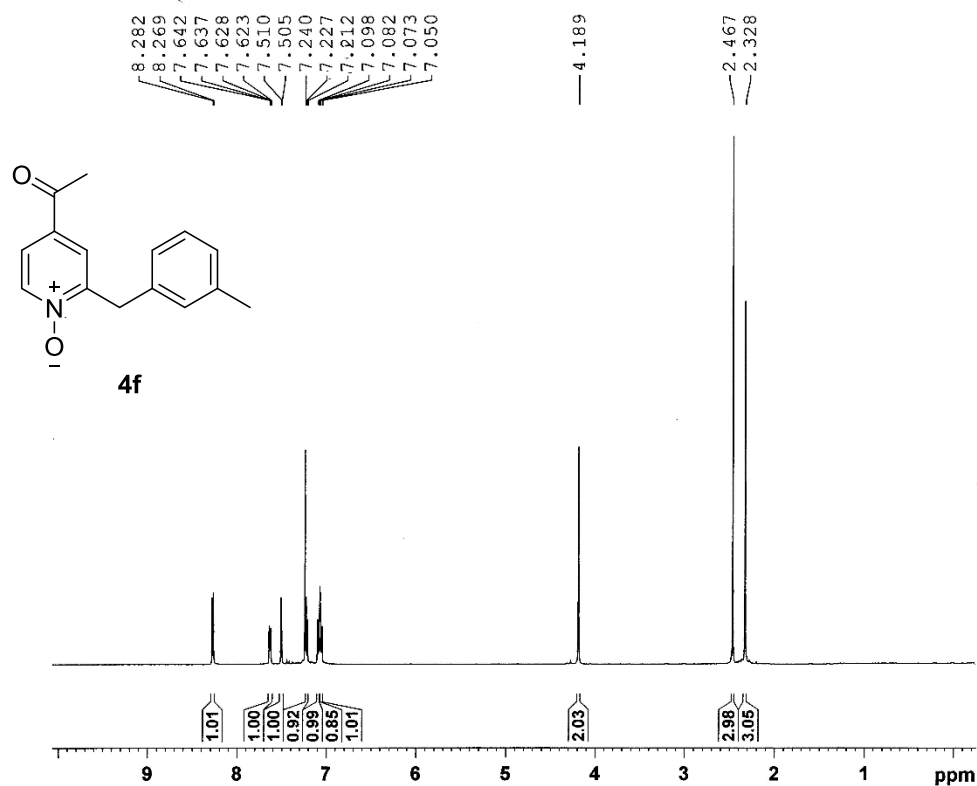
===== CHANNEL f1 =====
NUC1       13C
P1         12.00 usec
PL1        0.00 dB
PL1W       28.88669395 W
SFO1       75.4764278 MHz

```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2      80.00 usec
PL2        0.00 dB
PL12       16.12 dB
PL13       17.00 dB
PL12W      13.16228485 W
PL12W      0.32161123 W
PL13W      0.26262212 W
SFO2       300.1315007 MHz
SI         16384
SF         75.4677488 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

```



```

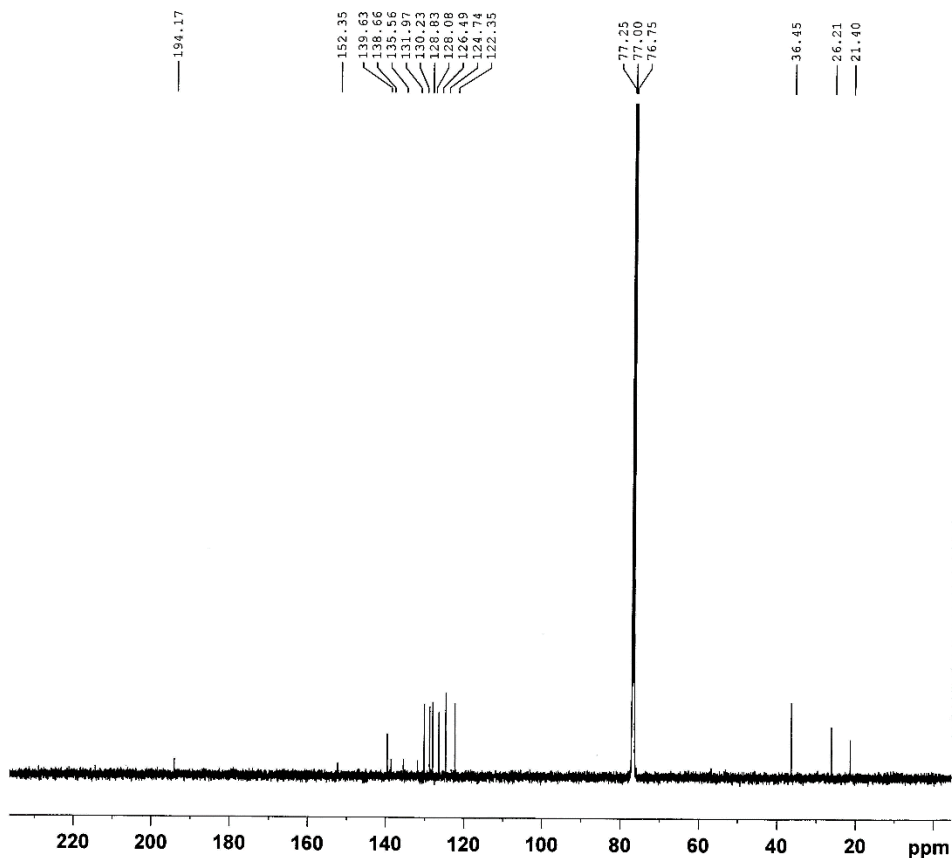
NAME      mar16-14
EXPNO     1
PROCNO    1
Date_     20140316
Time      14.37
INSTRUM   spect
PROBHD    5 mm PABBI 1H/
PULPROG   zg30
TD         32768
SOLVENT   CDCl3
NS         128
DS         0
SWH        10000.000 Hz
FIDRES     0.305176 Hz
AQ         1.6385000 sec
RG         574.7
DW         50.000 usec
DE         6.50 usec
TE         300.0 K
D1         2.00000000 sec
TD0        1

```

```

===== CHANNEL f1 =====
NUC1      1H
P1        7.05 usec
PL1       5.00 dB
SFO1      500.2340018 MHz
SI        32768
SF        500.2300196 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00

```



```

NAME      mar16-14
EXPNO     2
PROCNO    1
Date_     20140316
Time      15.22
INSTRUM   spect
PROBHD    5 mm PABBI 1H/
PULPROG   zgpg
TD         32768
SOLVENT   CDCl3
NS         18432
DS         4
SWH        30303.031 Hz
FIDRES     0.924775 Hz
AQ         0.5407385 sec
RG         32768
DW         16.500 usec
DE         6.50 usec
TE         300.0 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        18

```

```

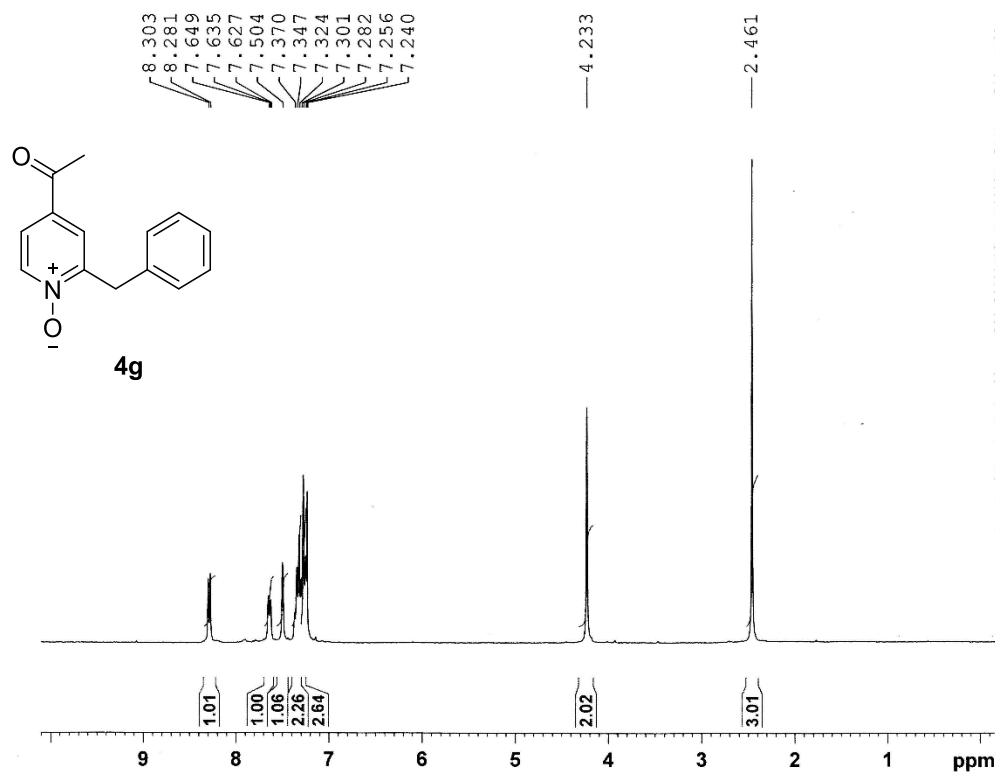
===== CHANNEL f1 =====
NUC1      13C
P1        12.63 usec
PL1       -3.00 dB
SFO1      125.7975248 MHz

```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       4.79 dB
PL12      24.79 dB
PL13      26.00 dB
SFO2      500.2330014 MHz
SI        32768
SF        125.7829337 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40

```



```

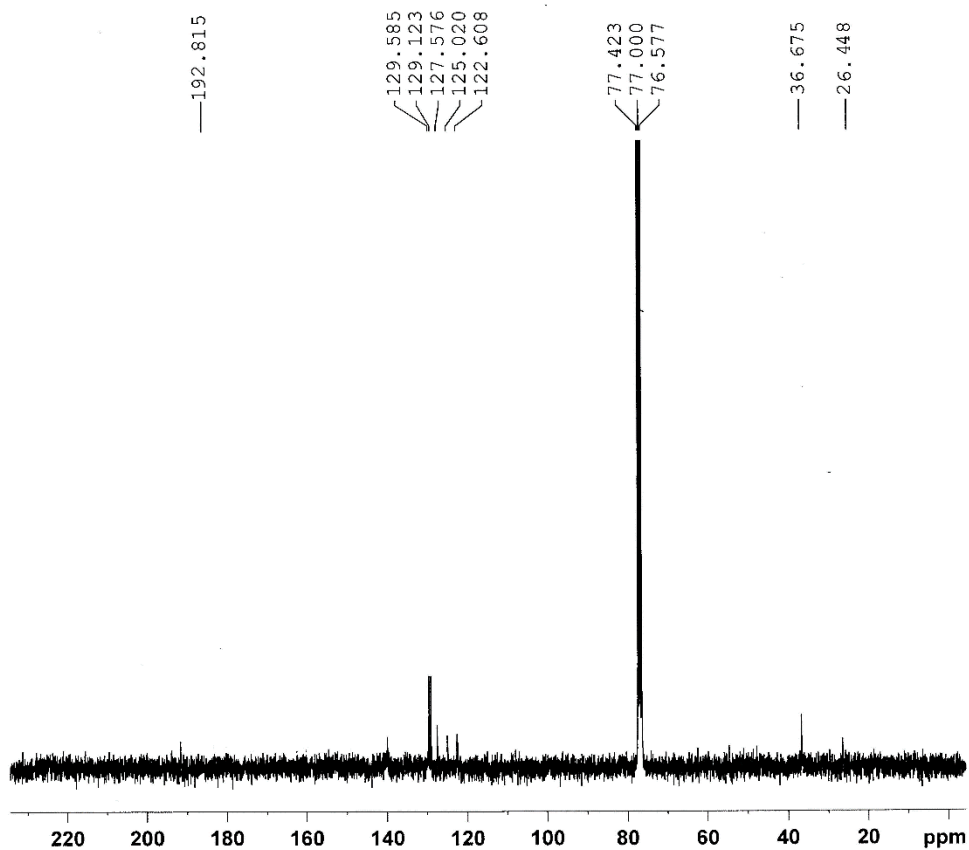
NAME      mar18-14
EXPNO     4
PROCNO    1
Date_     20140318
Time      16.39
INSTRUM   Spect
PROBHD    5 mm BBO BB-1H
PULPROG   zg30
TD         32768
SOLVENT   CDCl3
NS         128
DS         0
SWH        6009.615 Hz
FIDRES     0.183399 Hz
AQ         2.7263477 sec
RG         203
DW         83.200 usec
DE         6.50 usec
TE         300.0 K
D1         1.50000000 sec
TD0        1

```

```

===== CHANNEL f1 =====
NUC1      1H
P1         12.50 usec
PL1        0.00 dB
PL1W      13.16228485 W
SFO1      300.1324010 MHz
SI         16384
SF         300.1300120 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         4.00

```



```

NAME      mar18-14
EXPNO     5
PROCNO    1
Date_     20140318
Time      17.22
INSTRUM   Spect
PROBHD    5 mm BBO BB-1H
PULPROG   zgpg30
TD         32768
SOLVENT   CDCl3
NS         23221
DS         2
SWH        18028.846 Hz
FIDRES     0.550197 Hz
AQ         0.9088159 sec
RG         22.6
DW         27.733 usec
DE         6.50 usec
TE         300.0 K
D1         1.50000000 sec
D11        0.03000000 sec
TD0        40

```

```

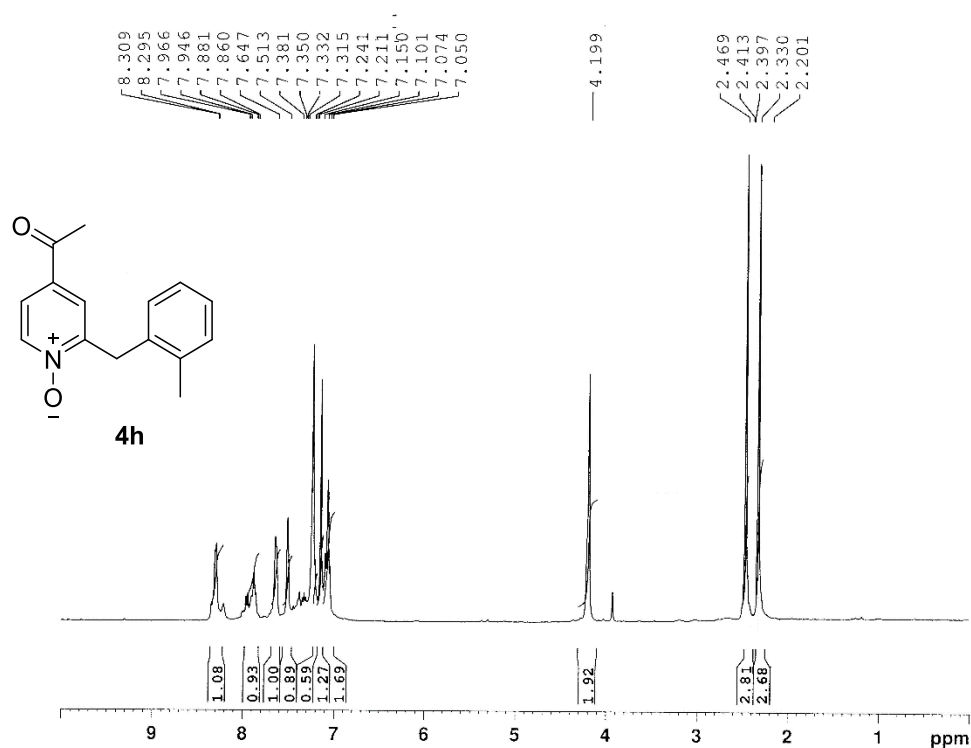
===== CHANNEL f1 =====
NUC1      13C
P1         12.00 usec
PL1        0.00 dB
PL1W      28.88669395 W
SFO1      75.4764278 MHz

```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2        0.00 dB
PL12       16.12 dB
PL13       17.00 dB
PL2W      13.16228485 W
PL12W     0.32161123 W
PL13W     0.26262212 W
SFO2      300.1315007 MHz
SI         16384
SF         75.4677488 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

```

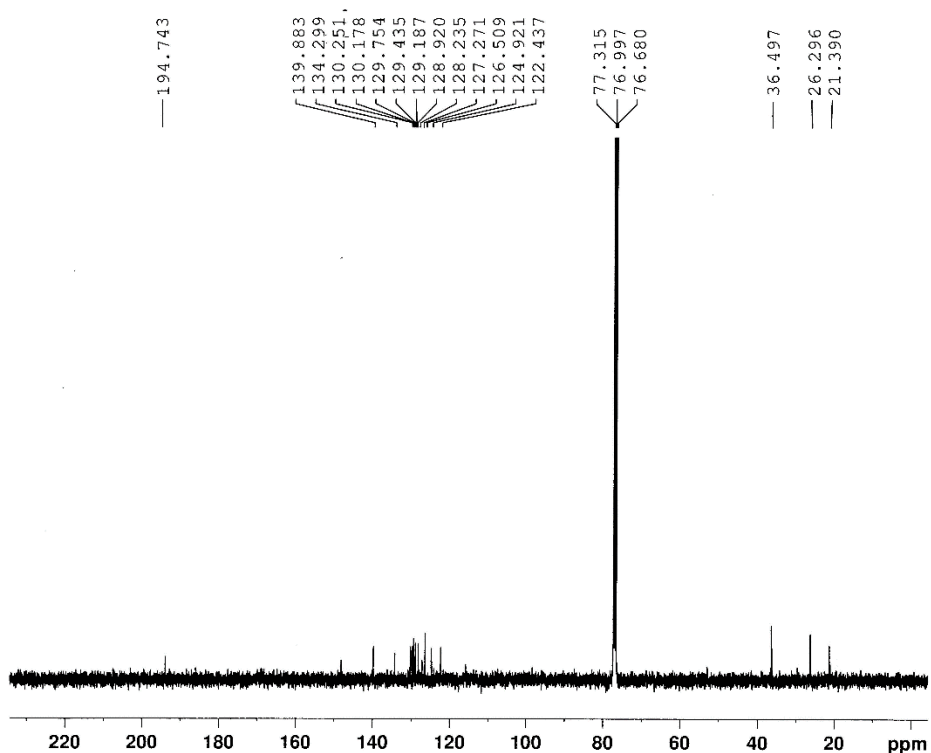


Current Data Parameters
NAME mar-18-13
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140318
Time 15.41
INSTRUM spect
PROBHD 5 mm SEI 1H/D-
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 128
DS 0
SWH 8012.820 Hz
FIDRES 0.244532 Hz
AQ 2.0447233 sec
RG 202.75
DW 62.400 usec
DE 6.50 usec
TE 300.4 K
D1 2.0000000 sec
TDC 1

===== CHANNEL f1 =====
SFO1 400.3331626 MHz
NUC1 1H
P1 6.70 usec
PLW1 20.0000000 W

F2 - Processing parameters
SI 32768
SF 400.3300176 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.00



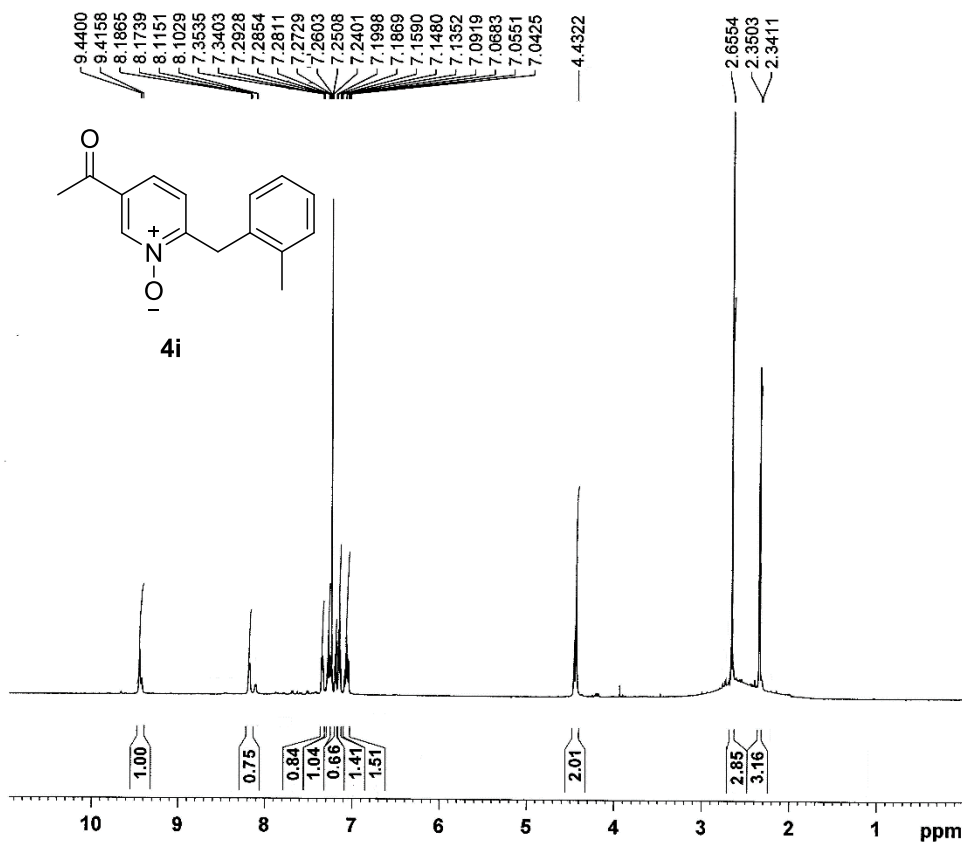
Current Data Parameters
NAME mar-18-13
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters
Date_ 20140318
Time 16.32
INSTRUM spect
PROBHD 5 mm SEI 1H/D-
PULPROG zgpg2
TD 65536
SOLVENT CDCl3
NS 21134
DS 4
SWH 24038.461 Hz
FIDRES 0.366798 Hz
AQ 1.3631488 sec
RG 202.75
DW 20.800 usec
DE 6.50 usec
TE 300.7 K
D1 1.5000000 sec
D11 0.0300000 sec
TDO 22

===== CHANNEL f1 =====
SFO1 100.6746353 MHz
NUC1 13C
P1 11.00 usec
PLW1 150.0000000 W

===== CHANNEL f2 =====
SFO2 400.3316013 MHz
NUC2 1H
CPDPRG[2] waltz16
PCPD2 90.00 usec
PLW2 20.0000000 W
PLW12 0.11417000 W
PLW13 0.09248000 W

F2 - Processing parameters
SI 32768
SF 100.6630600 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

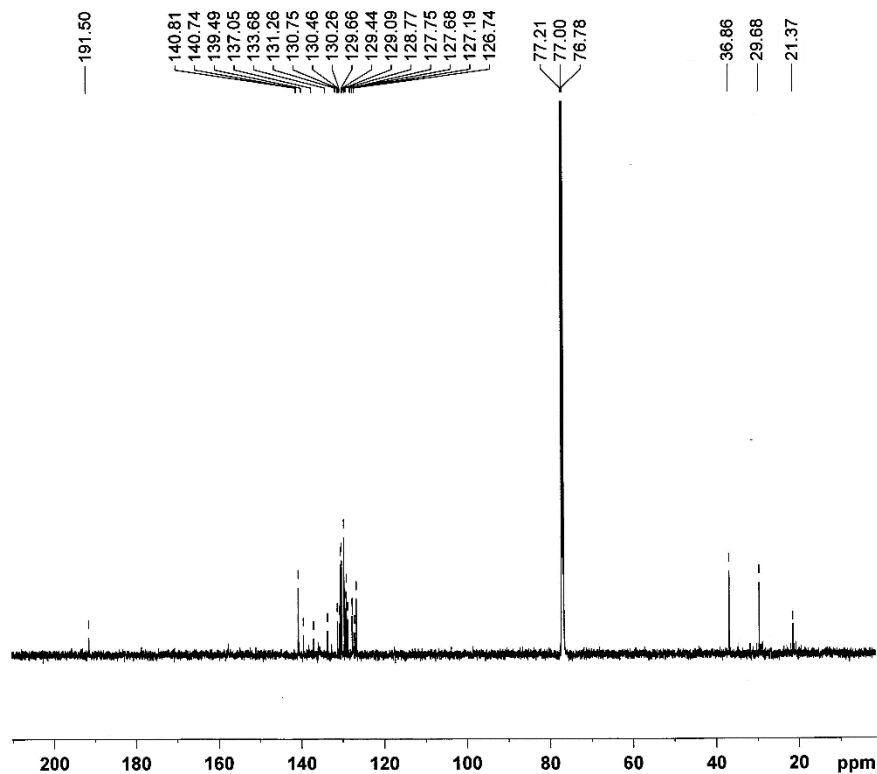


```

NAME      aug06-14
EXPNO     2
PROCNO    1
Date_     20140806
Time      16.01
INSTRUM   spect
PROBHD    5 mm CPTCI 1H-
PULPROG   zg30
TD         32768
SOLVENT   CDCl3
NS         32
DS         0
SWH        12019.230 Hz
FIDRES     0.366798 Hz
AQ         1.3632404 sec
RG         16
DW         41.600 usec
DE         6.50 usec
TE         298.0 K
D1         1.50000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1      1H
P1        7.20 usec
PL1       3.30 dB
PL1W      9.16420078 W
SFO1      600.2354021 MHz
SI        16384
SF        600.2300246 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
  
```



```

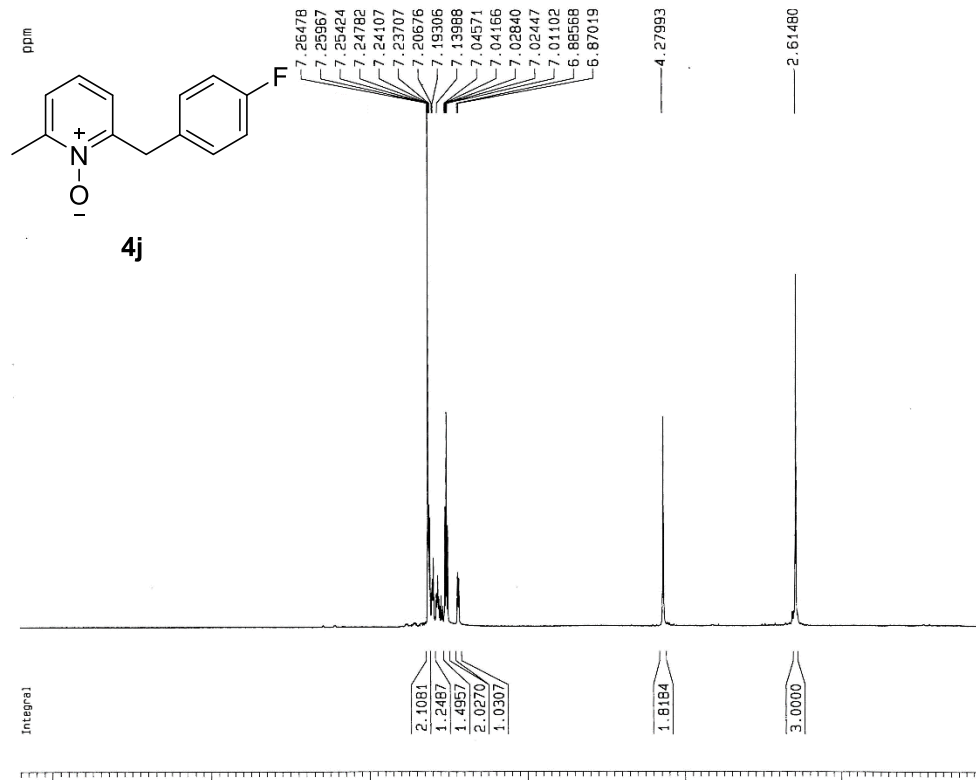
NAME      aug06-14
EXPNO     3
PROCNO    1
Date_     20140806
Time      16.41
INSTRUM   spect
PROBHD    5 mm CPTCI 1H-
PULPROG   zgpg
TD         32768
SOLVENT   CDCl3
NS         12288
DS         2
SWH        35971.223 Hz
FIDRES     1.097755 Hz
AQ         0.4555391 sec
RG         32768
DW         13.900 usec
DE         6.50 usec
TE         298.0 K
D1         1.50000000 sec
D11        0.03000000 sec
TD0        12
  
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        15.40 usec
PL1       1.00 dB
PL1W      83.60149384 W
SFO1      150.9453107 MHz
  
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     65.00 usec
PL2       3.30 dB
PL12      22.96 dB
PL13      27.00 dB
PL2W      9.16420078 W
PL12W     0.12182553 W
PL13W     0.03909260 W
SFO2      600.2336014 MHz
SI        16384
SF        150.9279578 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.00
  
```



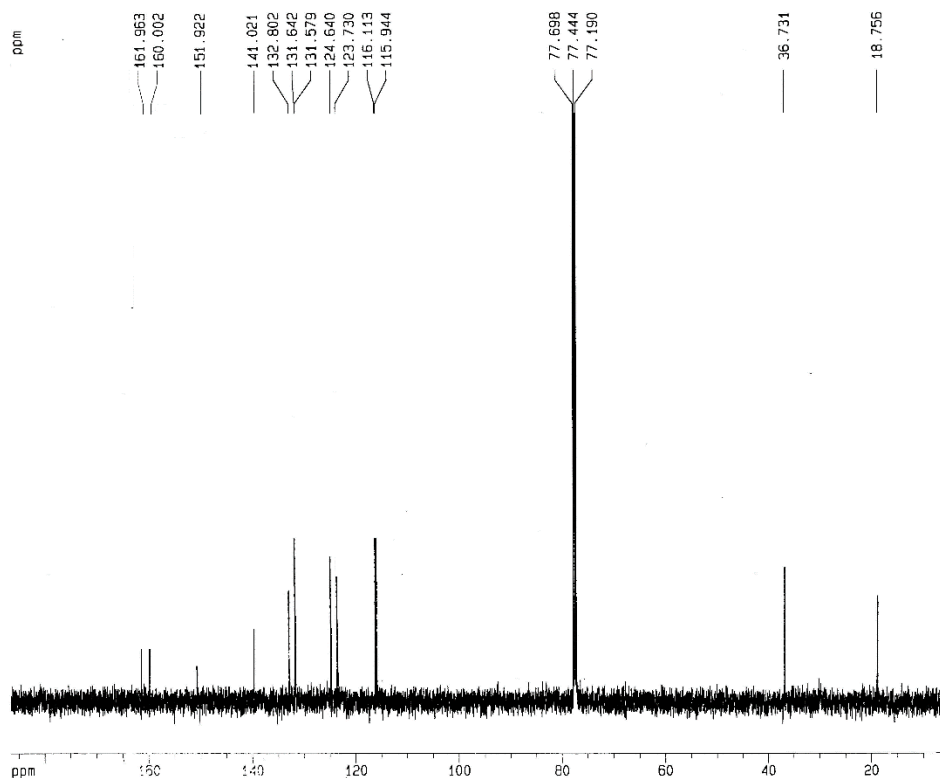
Current Data Parameters
NAME Saeednia
EXPNO 4
PROCNO 1

F2 - Acquisition Parameters
Date_ 20141018
Time 11.06
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 16
DS 0
SWH 10000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6385000 sec
RG 645.1
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 5.00000000 sec
MCREST 0.00000000 sec
MCWPK 0.01500000 sec

===== CHANNEL f1 =====
NUC1 1H
P1 10.50 usec
PL1 -3.00 dB
SFO1 500.1330885 MHz

F2 - Processing parameters
SI 32768
SF 500.1300231 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

1D NMR plot parameters
CX 20.00 cm
CY 12.66 cm
F1P 12.411 ppm
F1 6206.95 Hz
F2P 0.157 ppm
F2 78.63 Hz
PPMCM 0.61267 ppm/cm
HZCM 305.41592 Hz/cm



Current Data Parameters
NAME Saeednia
EXPNO 20
PROCNO 1

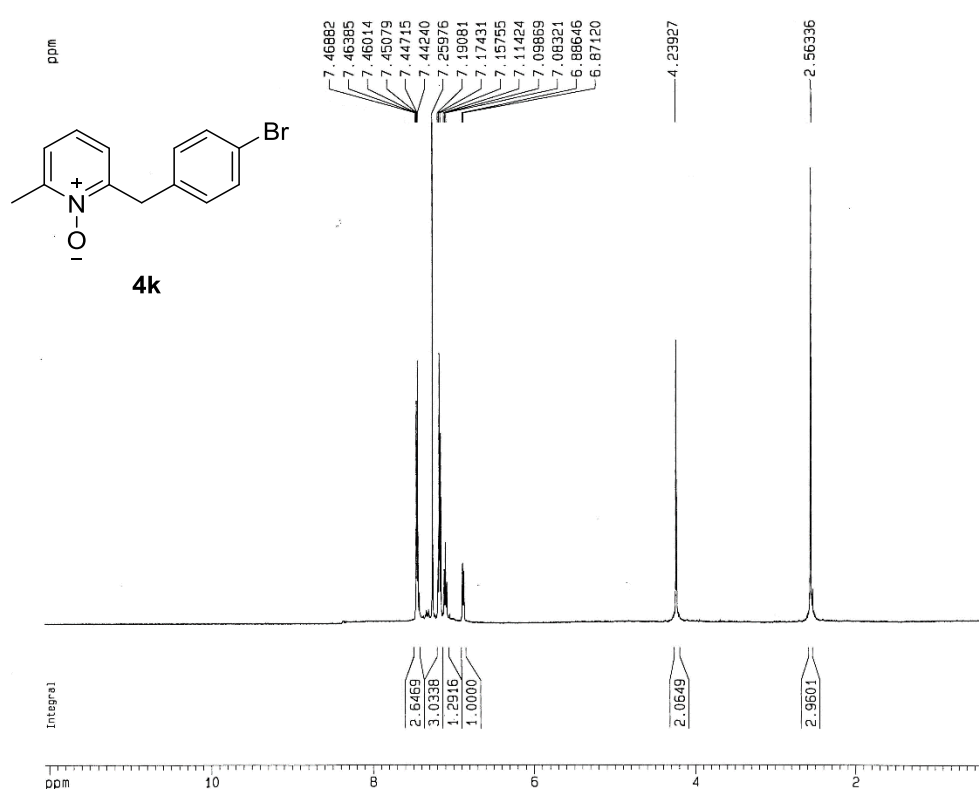
F2 - Acquisition Parameters
Date_ 20141025
Time 16.01
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zgpg30
TD 32768
SOLVENT CDCl3
NS 430
DS 4
SWH 30030.029 Hz
FIDRES 0.916444 Hz
AQ 0.5456539 sec
RG 3849.1
DW 16.650 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
MCREST 0.00000000 sec
MCWPK 0.01500000 sec

===== CHANNEL f1 =====
NUC1 13C
P1 16.00 usec
PL1 -3.00 dB
SFO1 125.7703643 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 usec
PL2 0.00 dB
PL12 15.50 dB
PL13 15.50 dB
SFO2 500.1320005 MHz

F2 - Processing parameters
SI 32768
SF 125.7577390 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

1D NMR plot parameters
CX 20.00 cm
CY 29.70 cm
F1P 188.507 ppm
F1 23454.72 Hz
F2P 4.771 ppm
F2 600.01 Hz
PPMCM 9.06680 ppm/cm
HZCM 1142.73560 Hz/cm



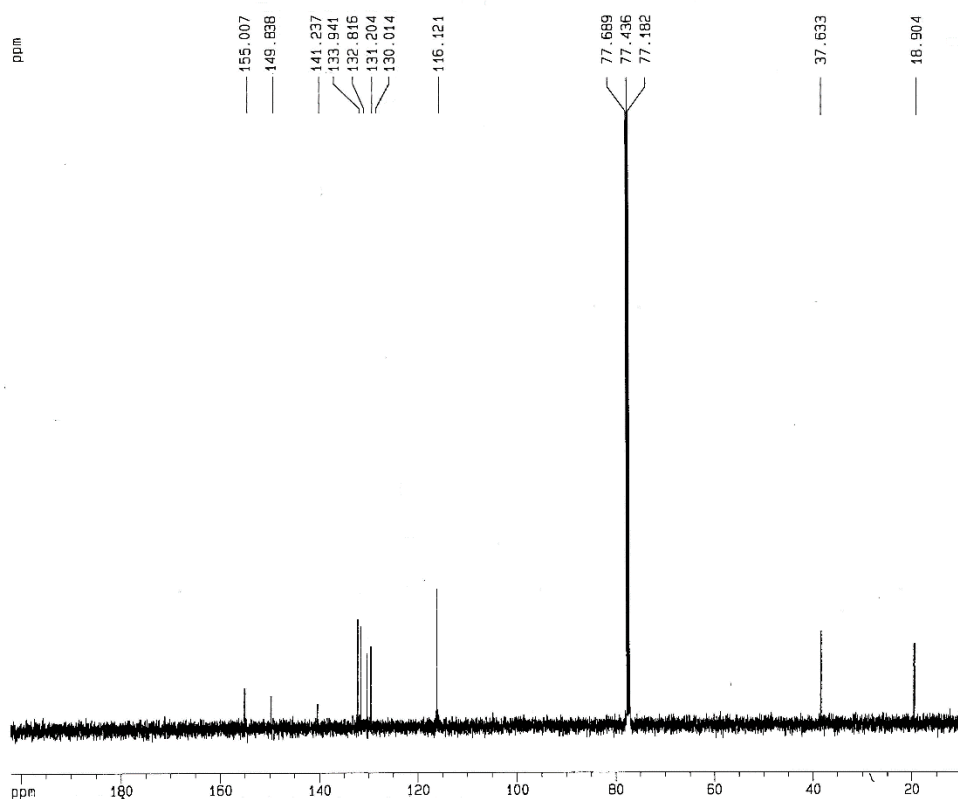
Current Data Parameters
NAME Seedria
EXPNO 5
PROCNO 1

F2 - Acquisition Parameters
Date_ 20141018
Time 11.14
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 32768
SOLVENT CDC13
NS 16
DS 0
SWH 10000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6385000 sec
RG 574.7
OW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 5.00000000 sec
MCREST 0.00000000 sec
MCWRR 0.01500000 sec

===== CHANNEL f1 =====
NUC1 1H
P1 10.50 usec
PL1 -3.00 dB
SFO1 500.1330885 MHz

F2 - Processing parameters
SI 32768
SF 500.1300231 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

1D NMR plot parameters
CX 20.00 cm
CY 18.38 cm
F1P 12.057 ppm
F1 6029.96 Hz
F2P 0.334 ppm
F2 167.13 Hz
PPMCM 0.58613 ppm/cm
HZCM 293.14160 Hz/cm



Current Data Parameters
NAME Fag1
EXPNO 22
PROCNO 1

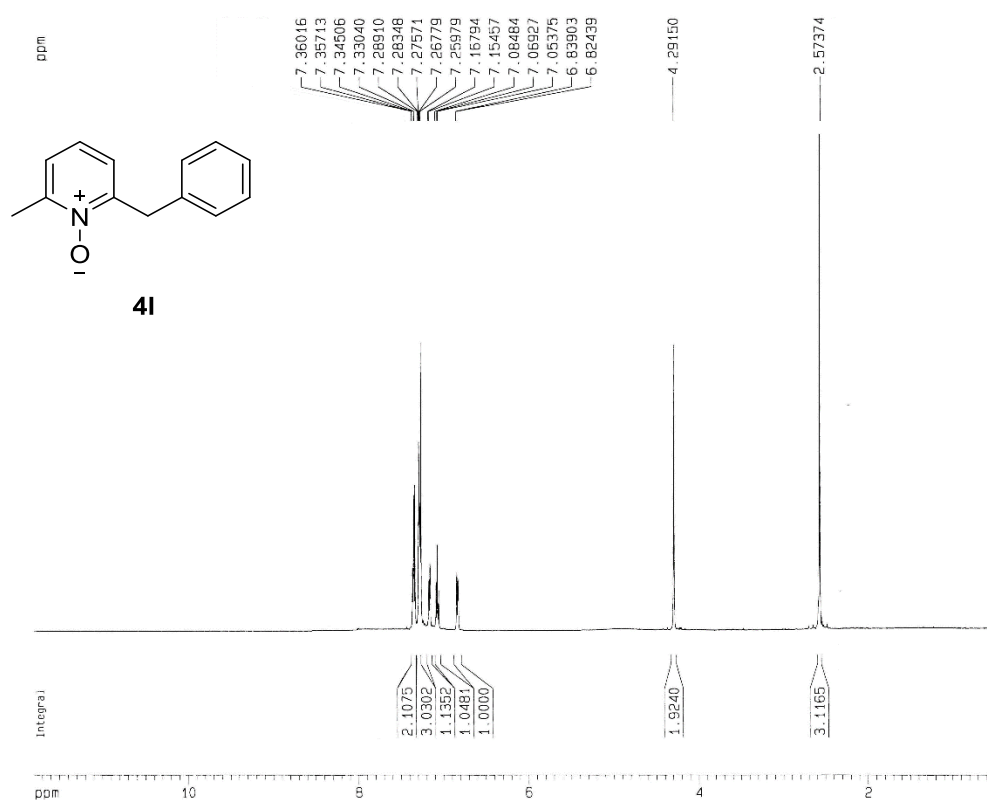
F2 - Acquisition Parameters
Date_ 20141101
Time 16.46
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zgpg30
TD 32768
SOLVENT CDC13
NS 454
DS 4
SWH 30030.029 Hz
FIDRES 0.815444 Hz
AQ 0.5455539 sec
RG 6502
OW 16.650 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
MCREST 0.00000000 sec
MCWRR 0.01500000 sec

===== CHANNEL f1 =====
NUC1 13C
P1 16.00 usec
PL1 -3.00 dB
SFO1 125.7703643 MHz

===== CHANNEL f2 =====
CPOPRG2 waltz16
NUC2 1H
PCPD2 70.00 usec
PL2 0.00 dB
PL12 15.50 dB
PL13 15.50 dB
SFO2 500.1320005 MHz

F2 - Processing parameters
SI 32768
SF 125.7577390 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

1D NMR plot parameters
CX 20.00 cm
CY 18.71 cm
F1P 202.092 ppm
F1 25414.64 Hz
F2P 9.733 ppm
F2 1098.28 Hz
PPMCM 9.66793 ppm/cm
HZCM 1215.81750 Hz/cm



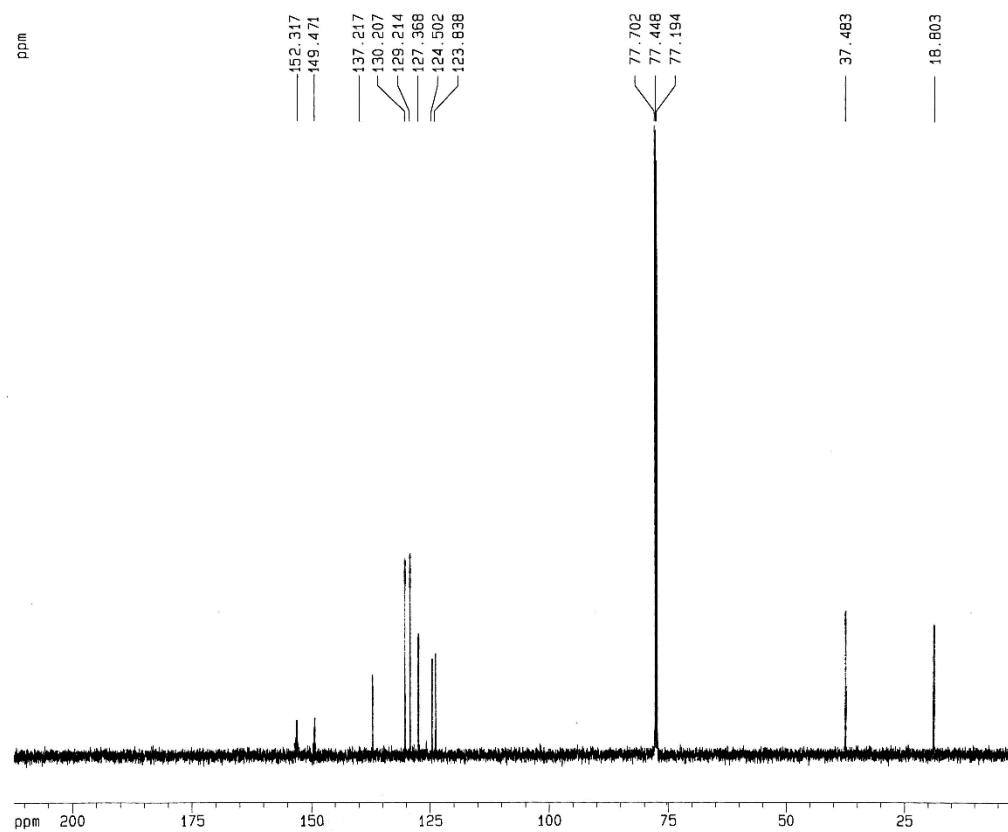
Current Data Parameters
NAME Saeednia
EXPNO 2
PROCNO 1

F2 - Acquisition Parameters
Date_ 20141018
Time 10.45
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 8
DS 0
SWH 10000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6385000 sec
RG 362
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 5.0000000 sec
MCREST 0.0000000 sec
MCWPK 0.0150000 sec

===== CHANNEL f1 =====
NUC1 1H
P1 10.50 usec
PL1 -3.00 dB
SFO1 500.1330885 MHz

F2 - Processing parameters
SI 32768
SF 500.1300231 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

1D NMR plot parameters
CX 20.00 cm
CY 10.28 cm
F1P 11.791 ppm
F1 5697.22 Hz
F2P 0.533 ppm
F2 266.68 Hz
PPMCM 0.56291 ppm/cm
HZCM 261.52655 Hz/cm



Current Data Parameters
NAME Saeednia
EXPNO 3
PROCNO 1

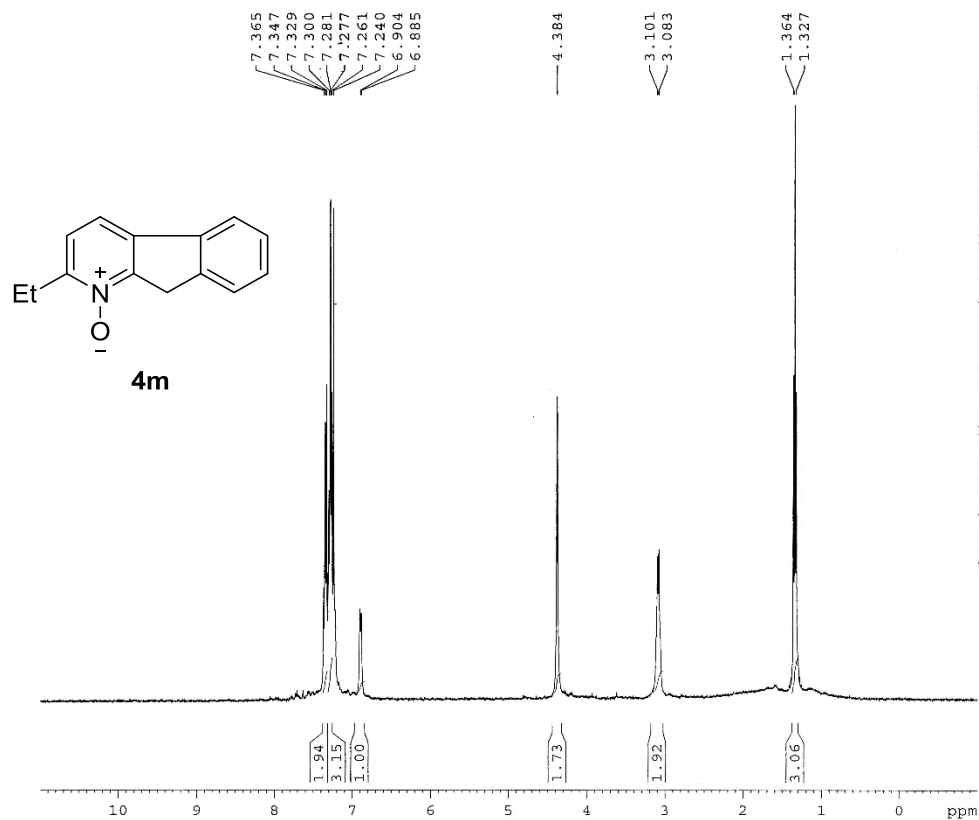
F2 - Acquisition Parameters
Date_ 20141018
Time 10.49
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zgpg30
TD 32768
SOLVENT CDCl3
NS 320
DS 4
SWH 30030.029 Hz
FIDRES 0.916444 Hz
AQ 0.5456539 sec
RG 6502
DW 16.650 usec
DE 6.50 usec
TE 298.0 K
D1 2.0000000 sec
d11 0.0300000 sec
DELTA 1.89999998 sec
MCREST 0.0000000 sec
MCWPK 0.0150000 sec

===== CHANNEL f1 =====
NUC1 13C
P1 16.00 usec
PL1 -3.00 dB
SFO1 125.7703643 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 usec
PL2 0.00 dB
PL12 15.50 dB
PL13 15.50 dB
SFO2 500.1320005 MHz

F2 - Processing parameters
SI 32768
SF 125.7577390 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

1D NMR plot parameters
CX 20.00 cm
CY 12.50 cm
F1P 212.130 ppm
F1 26676.97 Hz
F2P 2.130 ppm
F2 267.81 Hz
PPMCM 10.50001 ppm/cm
HZCM 1320.45764 Hz/cm



```

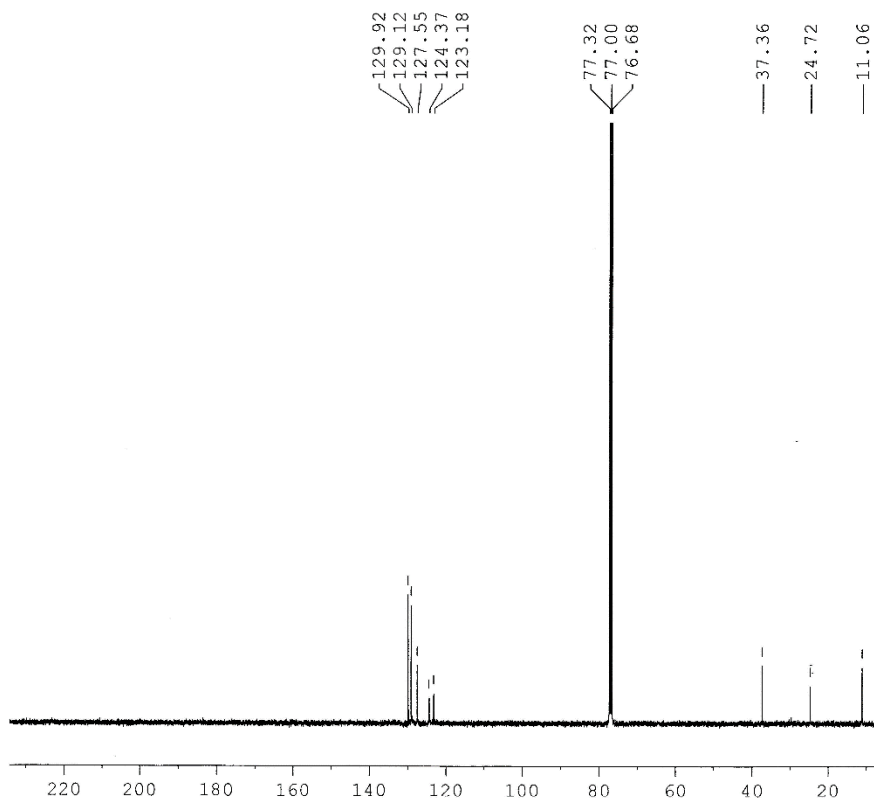
NAME      oct23-13
EXPNO     1
PROCNO    1
Date_     20131023
Time      9.14
INSTRUM   spect
PROBHD    5 mm DUL 13C-1
PULPROG   zg30
TD         32768
SOLVENT   CDCl3
NS         32
DS         0
SWH        8012.820 Hz
FIDRES     0.244532 Hz
AQ         2.0447731 sec
RG         2048
DW         62.400 usec
DE         6.50 usec
TE         300.0 K
D1         2.00000000 sec
TD0        1

```

```

===== CHANNEL f1 =====
NUC1      1H
P1        10.20 usec
PL1       0.00 dB
SFO1      400.1332010 MHz
SI        16384
SF        400.1300172 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00

```



```

Current Data Parameters
NAME      mar14-14
EXPNO     2
PROCNO    1

F2 - Acquisition Parameters
Date_     20140314
Time      15.25
INSTRUM   spect
PROBHD    5 mm PABBO BB/
PULPROG   zgpg
TD         32768
SOLVENT   CDCl3
NS         17408
DS         4
SWH        24038.461 Hz
FIDRES     0.733596 Hz
AQ         0.6816244 sec
RG         196.51
DW         20.800 usec
DE         6.50 usec
TE         301.1 K
D1         1.50000000 sec
D11        0.03000000 sec
TD0        17

```

```

===== CHANNEL f1 =====
NUC1      13C
P1        10.20 usec
PLW1      70.00000000 W
SFO1      100.6494874 MHz

```

```

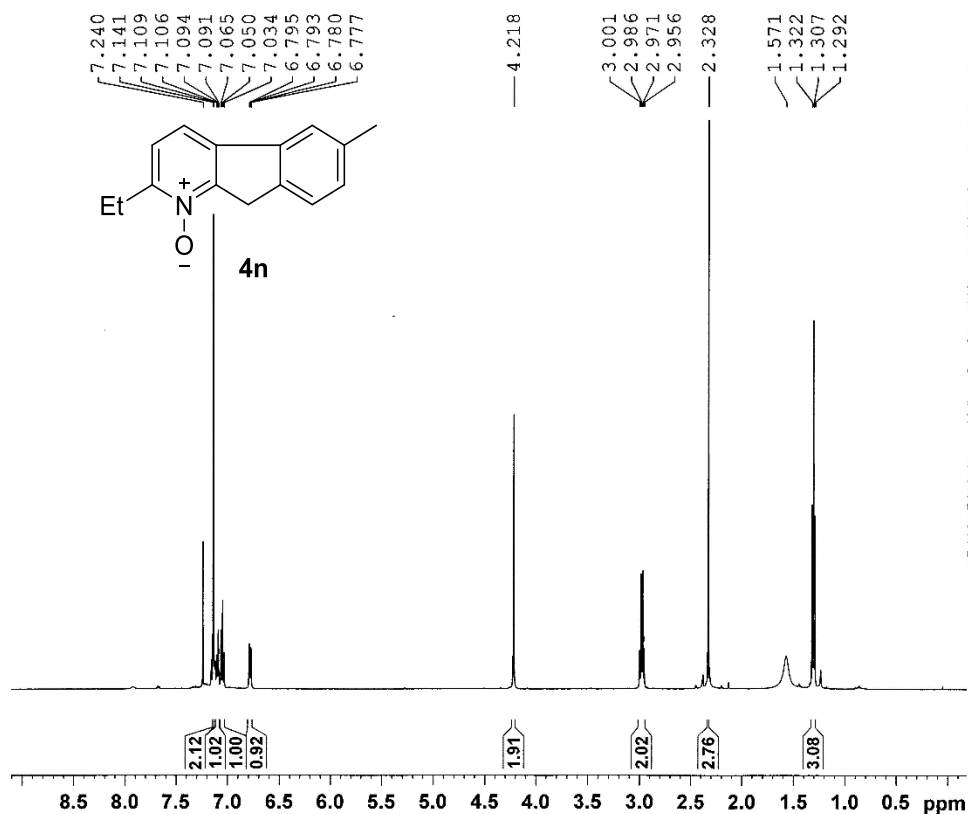
===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     90.00 usec
PLW2      17.00000000 W
PLW12     0.19746999 W
PLW13     0.15995000 W
SFO2      400.2316009 MHz

```

```

F2 - Processing parameters
SI        32768
SF        100.6379152 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40

```



```

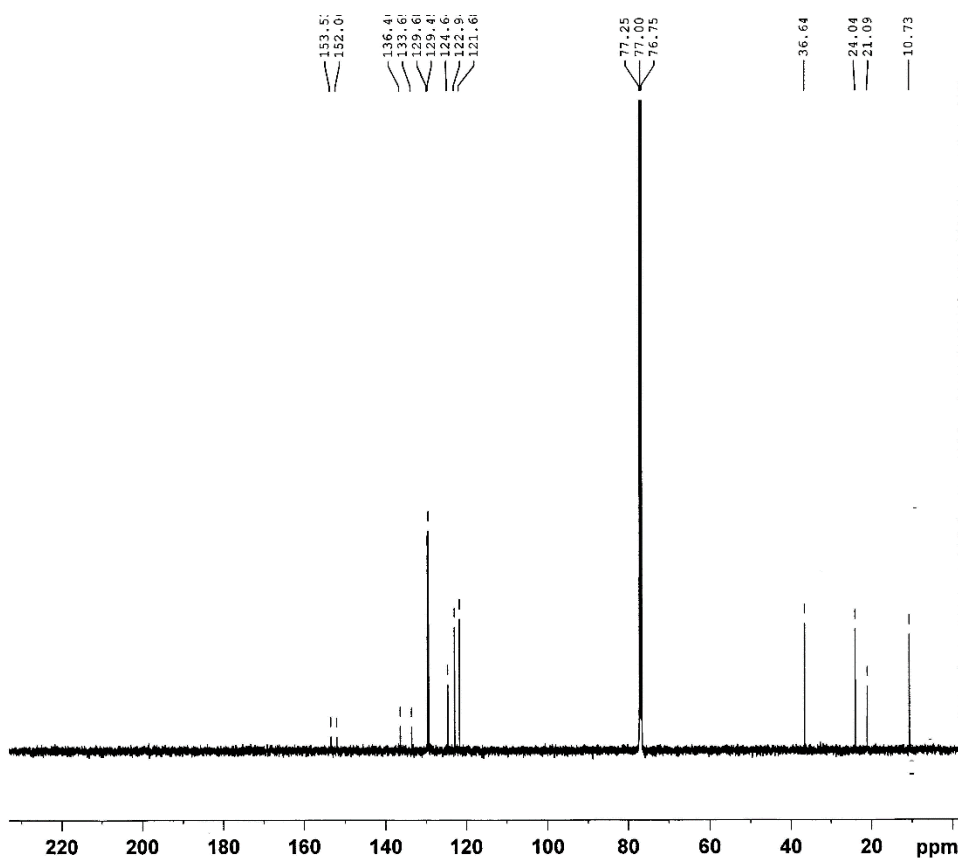
NAME      mar14-14
EXPNO     1
PROCNO    1
Date_     20140314
Time      15.58
INSTRUM   spect
PROBHD    5 mm BBI 1H/D-
PULPROG   zg30
TD         32768
SOLVENT   CDCl3
NS         128
DS         0
SWH        10330.578 Hz
FIDRES     0.315264 Hz
AQ         1.5860696 sec
RG         456.1
DW         48.400 usec
DE         6.50 usec
TE         300.0 K
D1         2.00000000 sec
TD0        1

```

```

===== CHANNEL f1 =====
NUC1       1H
P1         8.00 usec
PL1        -1.00 dB
SFO1       500.1335009 MHz
SI         32768
SF         500.1300232 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

```



```

NAME      mar14-14
EXPNO     2
PROCNO    1
Date_     20140314
Time      16.46
INSTRUM   spect
PROBHD    5 mm BBI 1H/D-
PULPROG   zgpg
TD         32768
SOLVENT   CDCl3
NS         16384
DS         4
SWH        29498.525 Hz
FIDRES     0.900224 Hz
AQ         0.5554845 sec
RG         32768
DW         16.950 usec
DE         6.50 usec
TE         300.0 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        16

```

```

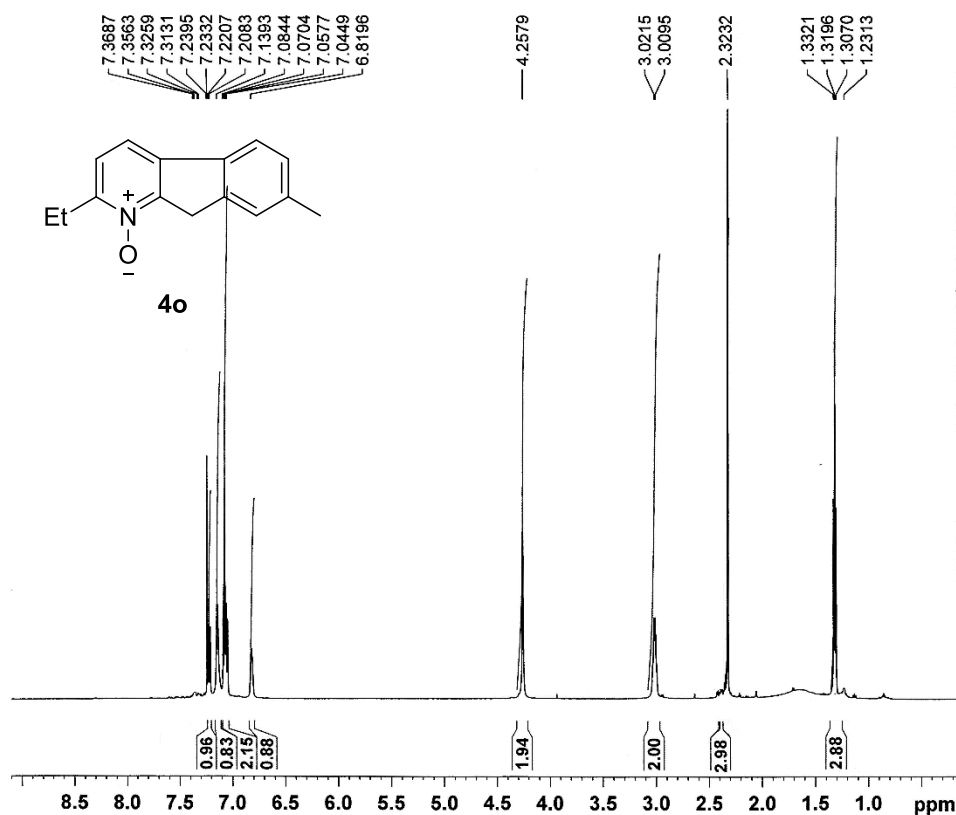
===== CHANNEL f1 =====
NUC1       13C
P1         12.00 usec
PL1        -3.00 dB
SFO1       125.7723529 MHz

```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     80.00 usec
PL2        -1.00 dB
PL12       19.20 dB
PL13       22.00 dB
SFO2       500.1325007 MHz
SI         32768
SF         125.7577908 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.00

```



```

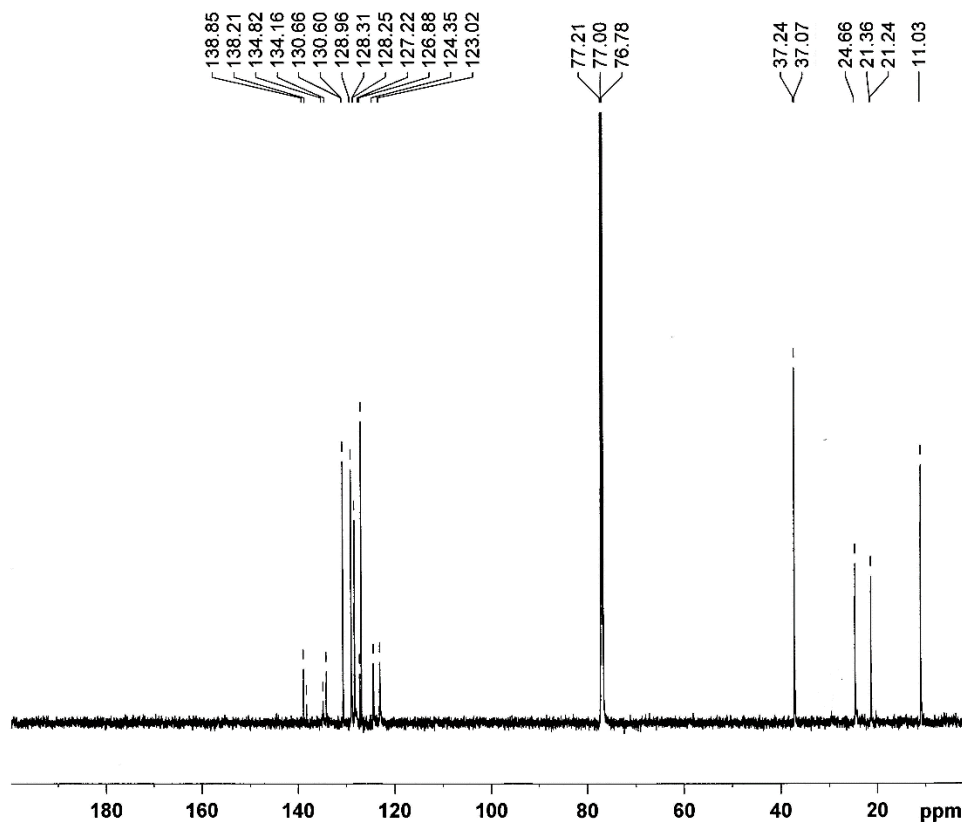
NAME      mar18-14
EXPNO     1
PROCNO    1
Date_     20140318
Time      16.35
INSTRUM   spect
PROBHD    5 mm CPTCI 1H-
PULPROG   zg30
TD         32768
SOLVENT   CDCl3
NS         16
DS         0
SWH        12019.230 Hz
FIDRES     0.366798 Hz
AQ         1.3632404 sec
RG         16
DW         41.600 usec
DE         6.50 usec
TE         298.0 K
D1         2.00000000 sec
TD0        1

```

```

===== CHANNEL f1 =====
NUC1      1H
P1        7.20 usec
PL1       3.30 dB
PL1W      9.16420078 W
SFO1      600.2354021 MHz
SI        16384
SF        600.2300250 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00

```



```

NAME      mar18-14
EXPNO     2
PROCNO    1
Date_     20140318
Time      17.10
INSTRUM   spect
PROBHD    5 mm CPTCI 1H-
PULPROG   zgpg
TD         32768
SOLVENT   CDCl3
NS         12288
DS         2
SWH        35971.223 Hz
FIDRES     1.097755 Hz
AQ         0.4555391 sec
RG         32768
DW         13.900 usec
DE         6.50 usec
TE         298.0 K
D1         1.50000000 sec
D11        0.03000000 sec
TD0        12

```

```

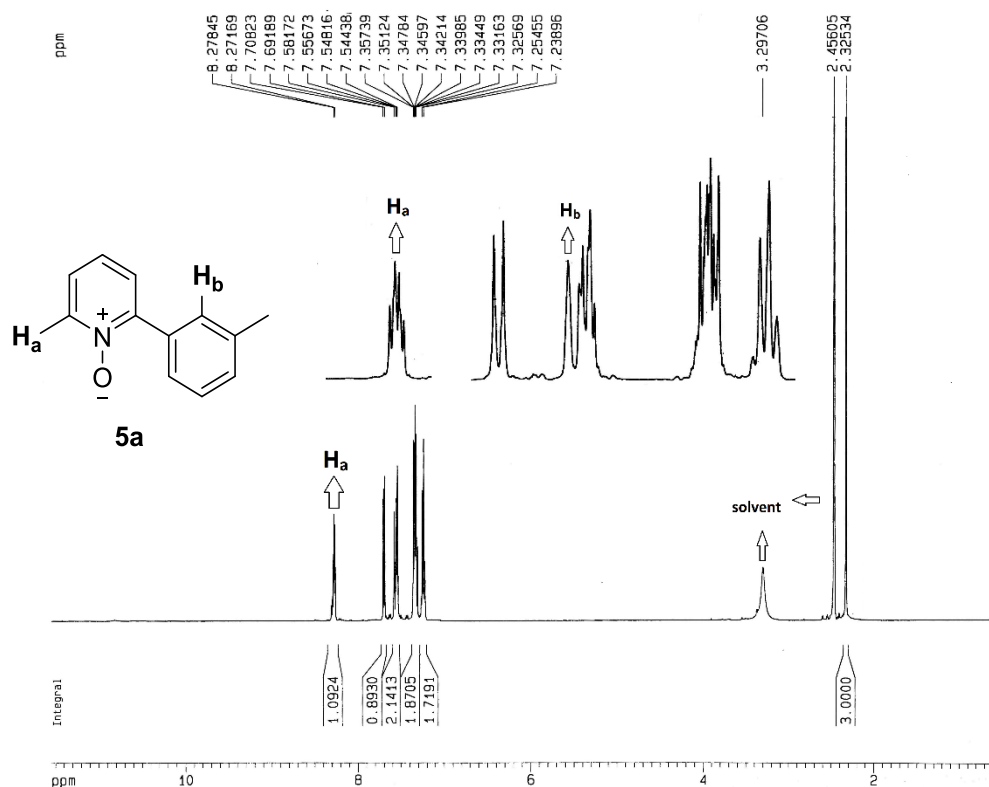
===== CHANNEL f1 =====
NUC1      13C
P1        15.40 usec
PL1       1.00 dB
PL1W      83.60149384 W
SFO1      150.9453107 MHz

```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     65.00 usec
PL2       3.30 dB
PL12      22.06 dB
PL13      27.00 dB
PL2W      9.16420078 W
PL12W     0.12192553 W
PL13W     0.03909260 W
SFO2      600.2356014 MHz
SI        16384
SF        150.9279579 MHz
WDW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.00

```



Current Data Parameters

NAME	Saeednia
EXPNO	39
PROCNO	1

F2 - Acquisition Parameters

Date_	20141216
Time	8.52
INSTRUM	spect
PROBHD	5 mm QNP 1H/13
PULPROG	zg30
TD	32768
SOLVENT	CDCl3
NS	16
DS	0
SWH	10000.000 Hz
FIDRES	0.305176 Hz
AQ	1.6385000 sec
RG	256
DW	50.000 usec
DE	6.50 usec
TE	298.0 K
D1	5.00000000 sec
MCREST	0.00000000 sec
MCWRK	0.01500000 sec

----- CHANNEL f1 -----

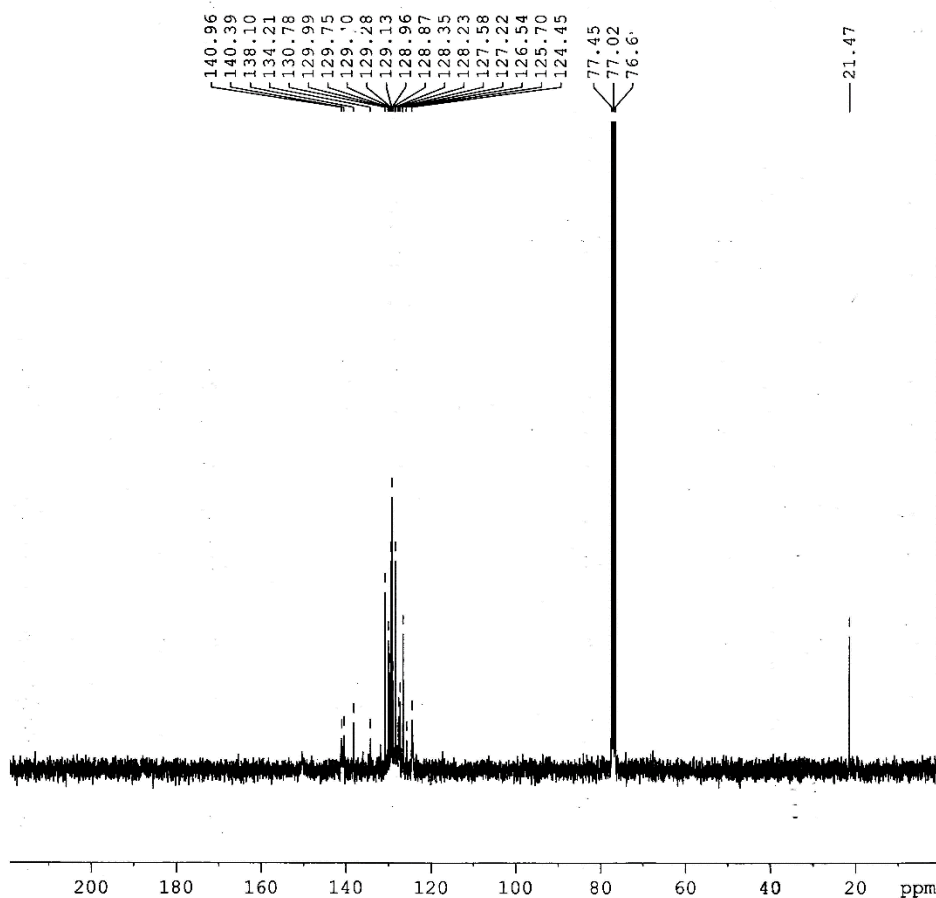
NUC1	1H
P1	10.50 usec
PL1	-3.00 dB
SFO1	500.1330885 MHz

F2 - Processing parameters

S1	32768
SF	500.1300231 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

1D NMR plot parameters

CX	20.00 cm
CY	18.38 cm
F1P	11.548 ppm
F1	5775.53 Hz
F2P	0.533 ppm
F2	266.68 Hz
PPMCM	0.55074 ppm/cm
HZCM	275.44250 Hz/cm



NAME mar15-14

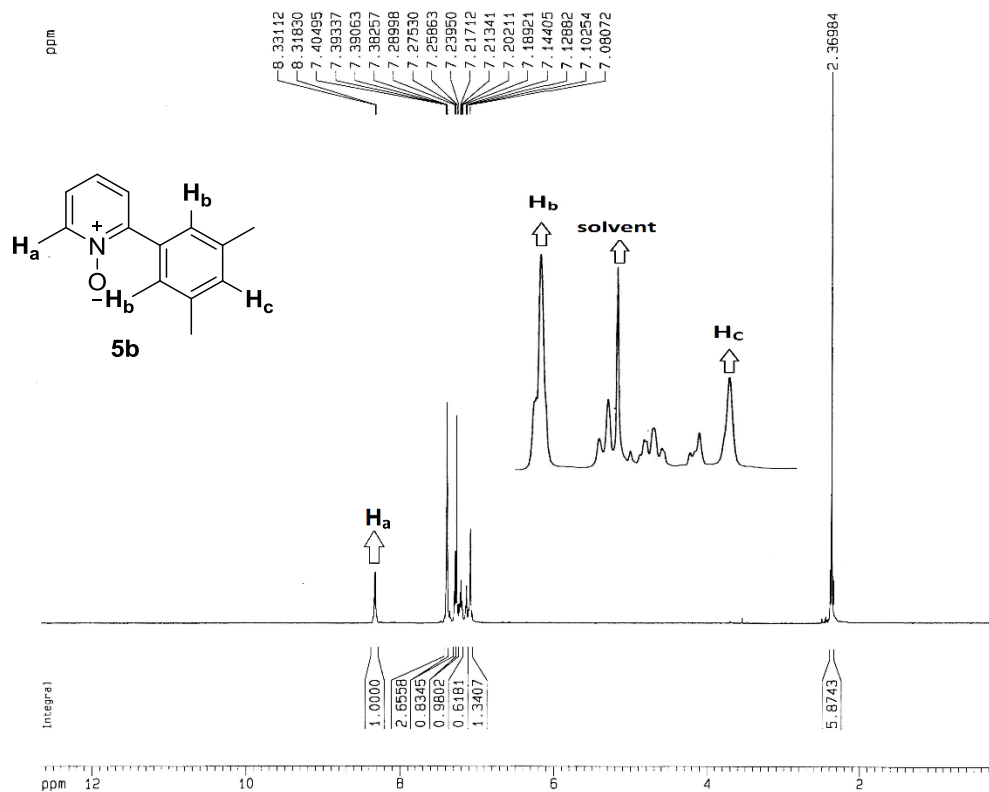
EXPNO	2
PROCNO	1
Date_	20140316
Time	12.33
INSTRUM	spect
PROBHD	5 mm DUL 13C-1
PULPROG	zgpg
TD	32768
SOLVENT	CDCl3
NS	14336
DS	2
SWH	18115.941 Hz
FIDRES	0.552855 Hz
AQ	0.9044468 sec
RG	32768
DW	27.600 usec
DE	6.50 usec
TE	300.0 K
D1	1.50000000 sec
D11	0.03000000 sec
TD0	20

----- CHANNEL f1 -----

NUC1	13C
P1	8.00 usec
PL1	0.00 dB
SFO1	75.4764278 MHz

----- CHANNEL f2 -----

CPDPRG2	waltz16
NUC2	1H
PCPD2	100.00 usec
PL2	-3.00 dB
PL12	19.73 dB
PL13	23.00 dB
SFO2	300.1315007 MHz
SI	16384
SF	75.4677475 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.00



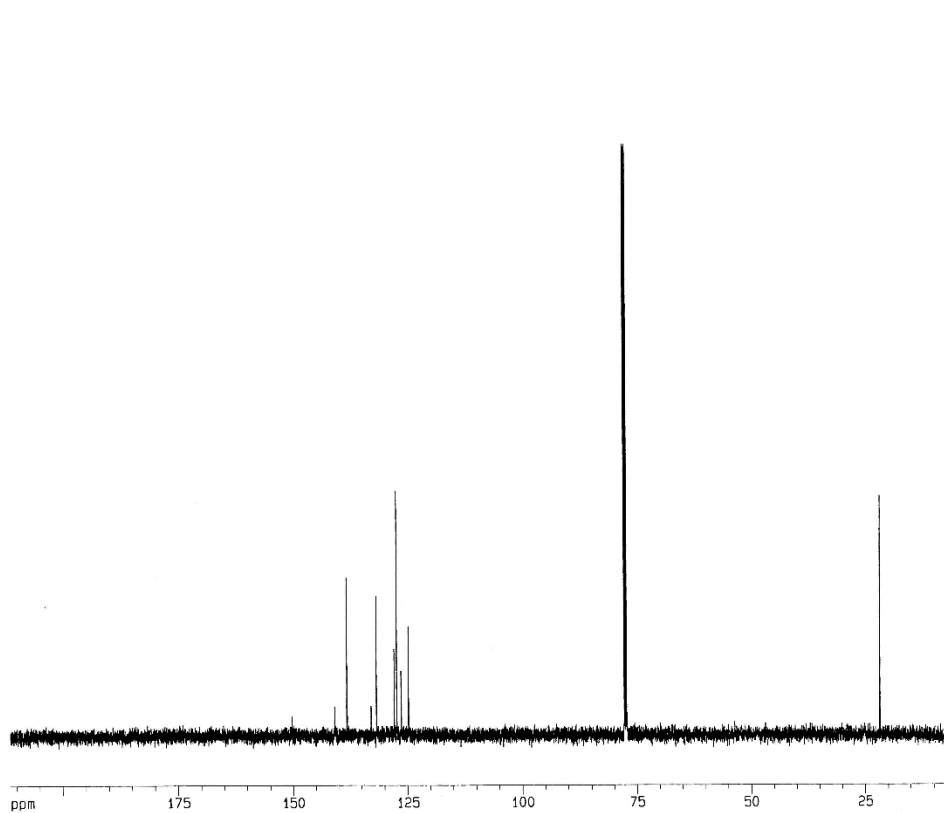
Current Data Parameters
NAME Seesdia
EXPNO 29
PROCNO 1

F2 - Acquisition Parameters
Date_ 20141206
Time 9.36
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 8
DS 0
SWH 10000.000 Hz
FIDRES 0.305176 Hz
AQ 1.6385000 sec
RG 406.4
DW 50.000 usec
DE 6.50 usec
TE 298.0 K
D1 5.00000000 sec
MCREST 0.00000000 sec
MCWRK 0.01500000 sec

===== CHANNEL f1 =====
NUC1 1H
P1 10.50 usec
PL1 -3.00 dB
SFO1 500.1330885 MHz

F2 - Processing parameters
SI 32768
SF 500.1300231 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

1D NMR plot parameters
CX 20.00 cm
CY 18.38 cm
F1P 12.658 ppm
F1 6330.44 Hz
F2P 0.204 ppm
F2 101.99 Hz
PPMCM 0.62268 ppm/cm
HZCM 311.42242 Hz/cm



Current Data Parameters
NAME Seesdia
EXPNO 33
PROCNO 1

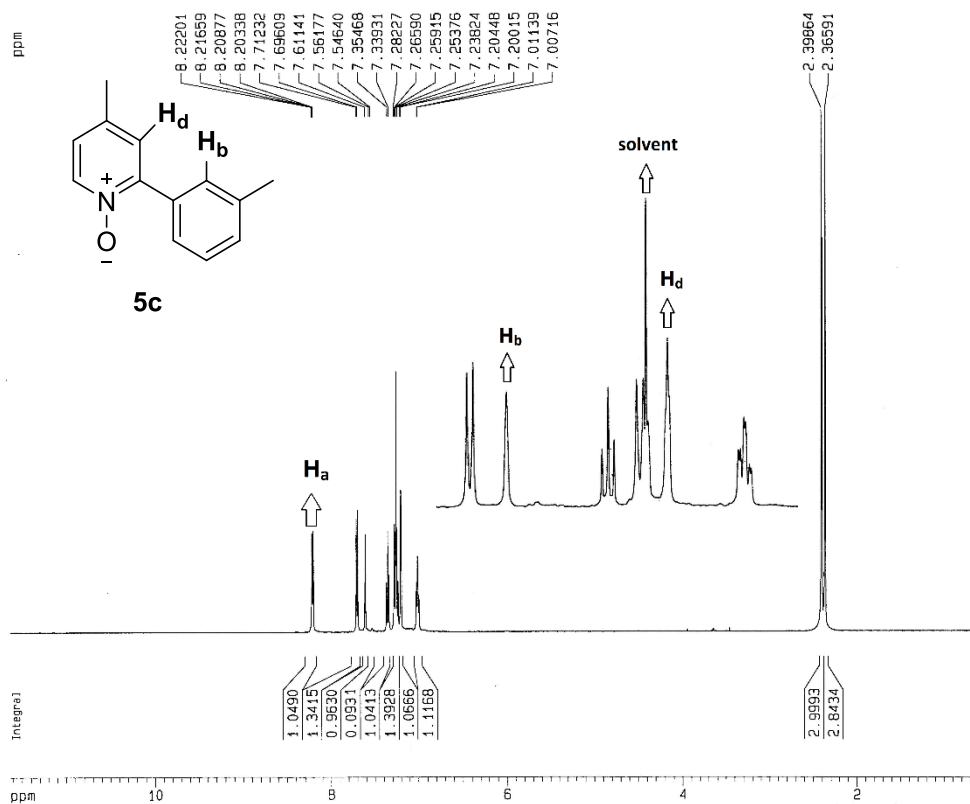
F2 - Acquisition Parameters
Date_ 20141214
Time 16.35
INSTRUM spect
PROBHD 5 mm QNP 1H/13
PULPROG zg30
TD 32768
SOLVENT CDCl3
NS 174
DS 4
SWH 30030.029 Hz
FIDRES 0.516444 Hz
AQ 0.5456339 sec
RG 6502
DW 16.650 usec
DE 6.50 usec
TE 298.0 K
D1 2.00000000 sec
d11 0.03000000 sec
DELTA 1.89999998 sec
MCREST 0.00000000 sec
MCWRK 0.01500000 sec

===== CHANNEL f1 =====
NUC1 13C
P1 15.00 usec
PL1 -3.00 dB
SFO1 125.7703643 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 70.00 usec
PL2 0.00 dB
PL12 15.50 dB
PL13 15.50 dB
SFO2 500.1320005 MHz

F2 - Processing parameters
SI 32768
SF 125.7577390 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

1D NMR plot parameters
CX 20.00 cm
CY 13.20 cm
F1P 211.337 ppm
F1 26577.31 Hz
F2P 6.356 ppm
F2 799.32 Hz
PPMCM 10.24307 ppm/cm
HZCM 1288.69941 Hz/cm



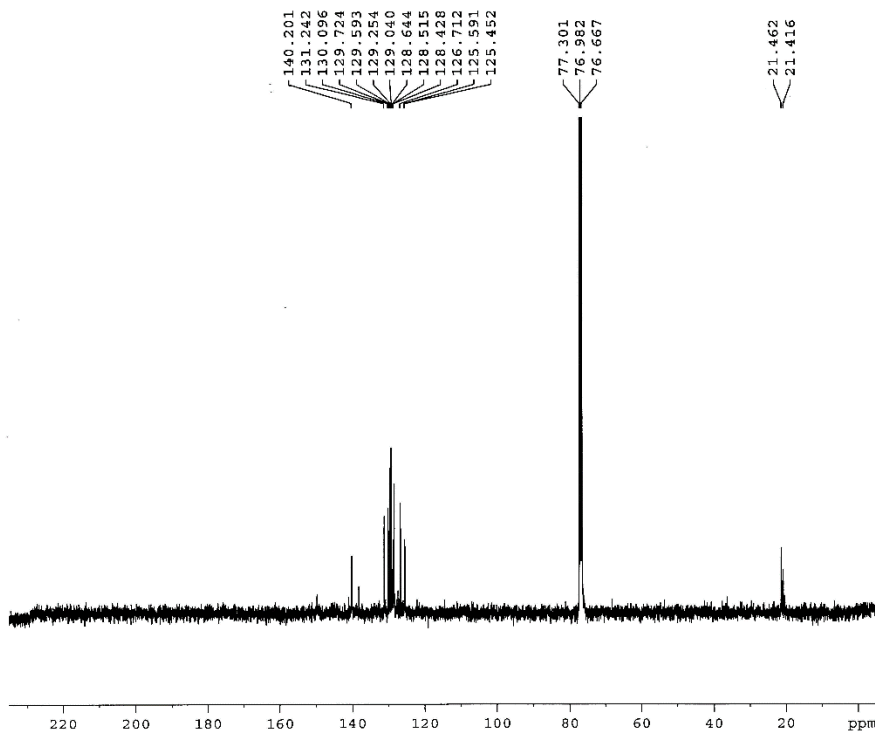
Current Data Parameters
 NAME Seednia
 EXPNO 35
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20141215
 Time 14.30
 INSTRUM spect
 PROBHD 5 mm QNP 1H/13
 PULPROG zg30
 TD 32768
 SOLVENT CDCl3
 NS 8
 DS 0
 SWH 10000.000 Hz
 FIDRES 0.305176 Hz
 AQ 1.6385000 sec
 RG 362
 DW 50.000 usec
 DE 6.50 usec
 TE 298.0 K
 D1 5.00000000 sec
 MCREST 0.00000000 sec
 MCWRK 0.01500000 sec

===== CHANNEL f1 =====
 NUC1 1H
 P1 10.50 usec
 PL1 -3.00 dB
 SFO1 500.1330885 MHz

F2 - Processing parameters
 SI 32768
 SF 500.1300231 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

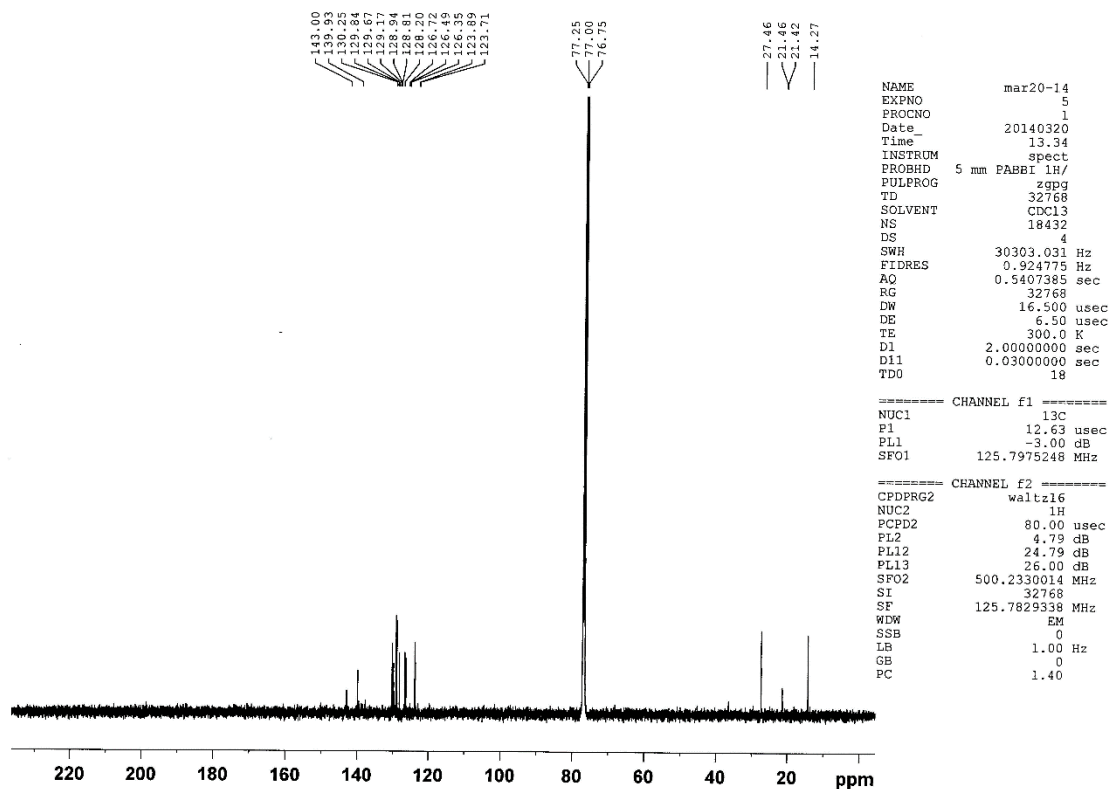
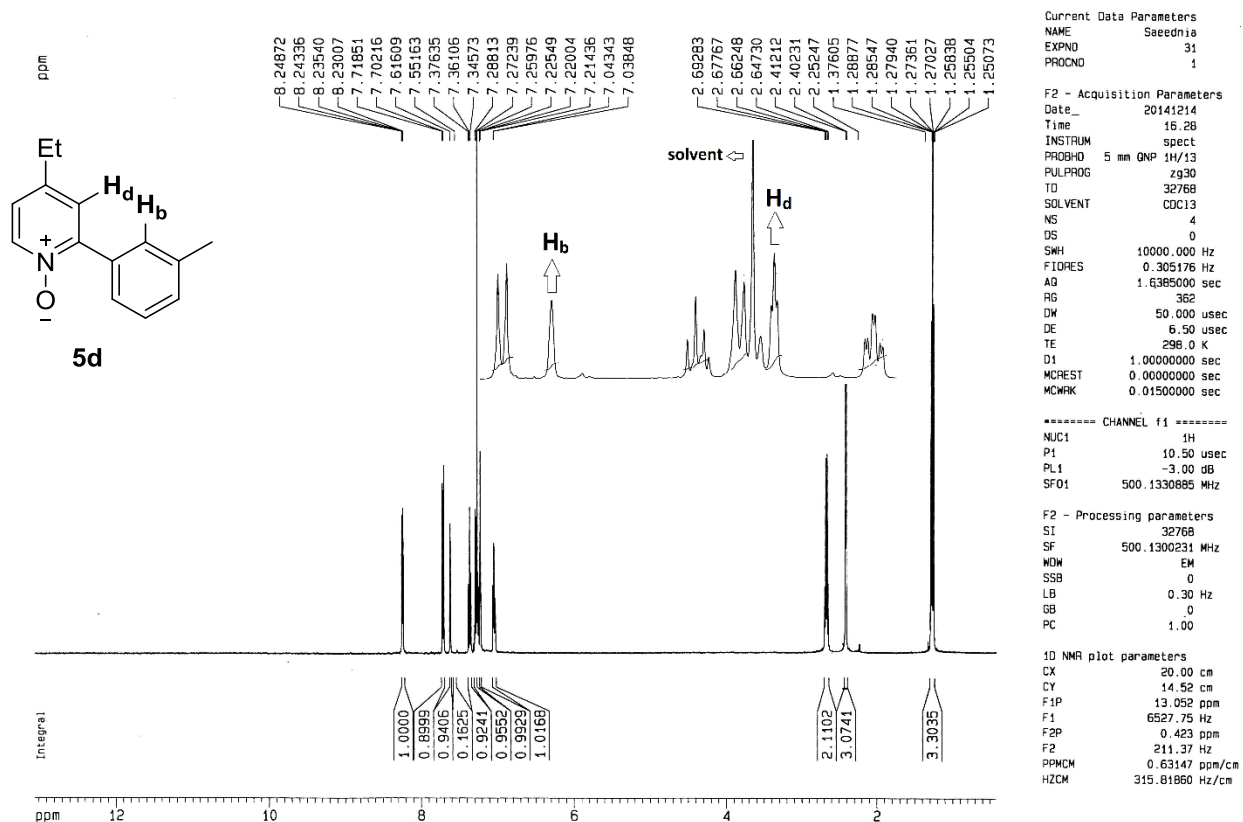
1D NMR plot parameters
 CX 20.00 cm
 CY 12.18 cm
 F1P 11.637 ppm
 F1 5819.76 Hz
 F2P 0.600 ppm
 F2 299.87 Hz
 PPMCM 0.55185 ppm/c
 HZCM 275.99557 Hz/cm

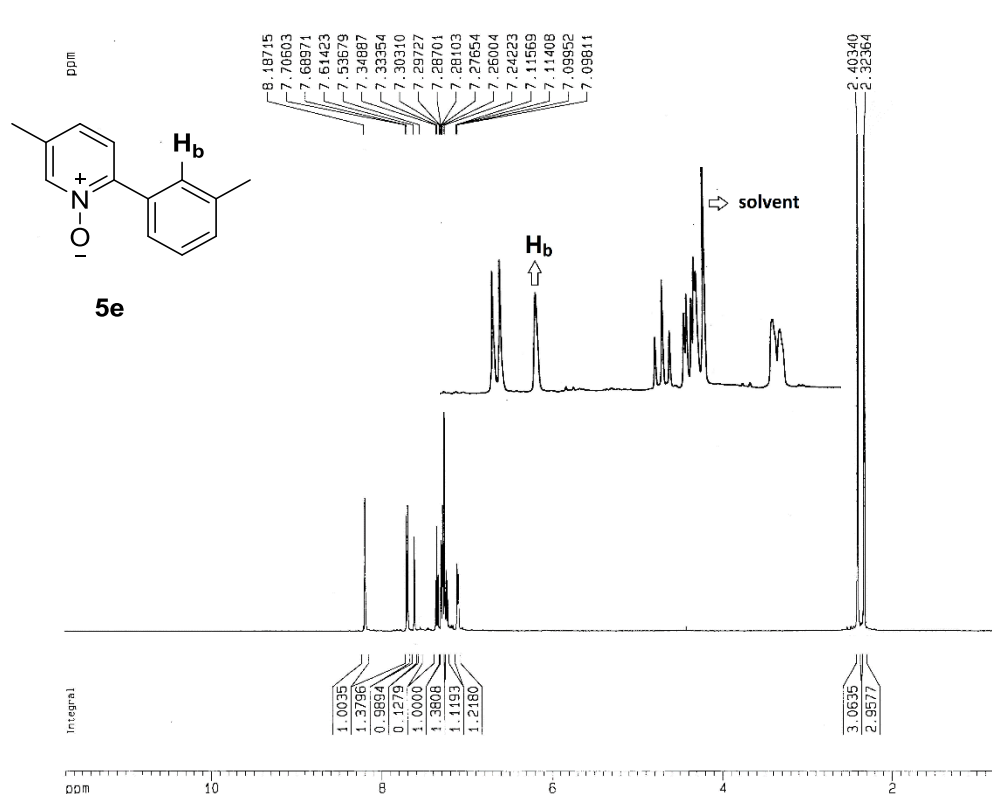


NAME mar15-14
 EXPNO 2
 PROCNO 1
 Date_ 20140315
 Time 10.37
 INSTRUM spect
 PROBHD 5 mm DUL 13C-1
 PULPROG zgpg30
 TD 32768
 SOLVENT CDCl3
 NS 20480
 DS 2
 SWH 24154.590 Hz
 FIDRES 0.737140 Hz
 AQ 0.6783476 sec
 RG 32768
 DW 20.700 usec
 DE 6.50 usec
 TE 300.0 K
 D1 1.50000000 sec
 D11 0.03000000 sec
 TD0 20

===== CHANNEL f1 =====
 NUC1 13C
 P1 8.10 usec
 PL1 7.00 dB
 SFO1 100.6243395 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 F2P2 80.00 usec
 PL2 0.00 dB
 PL12 20.00 dB
 PL13 22.00 dB
 SFO2 400.1324008 MHz
 SI 16384
 SF 100.6127707 MHz
 WDW EM
 SSB 0
 LB 1.50 Hz
 GB 0
 PC 1.00





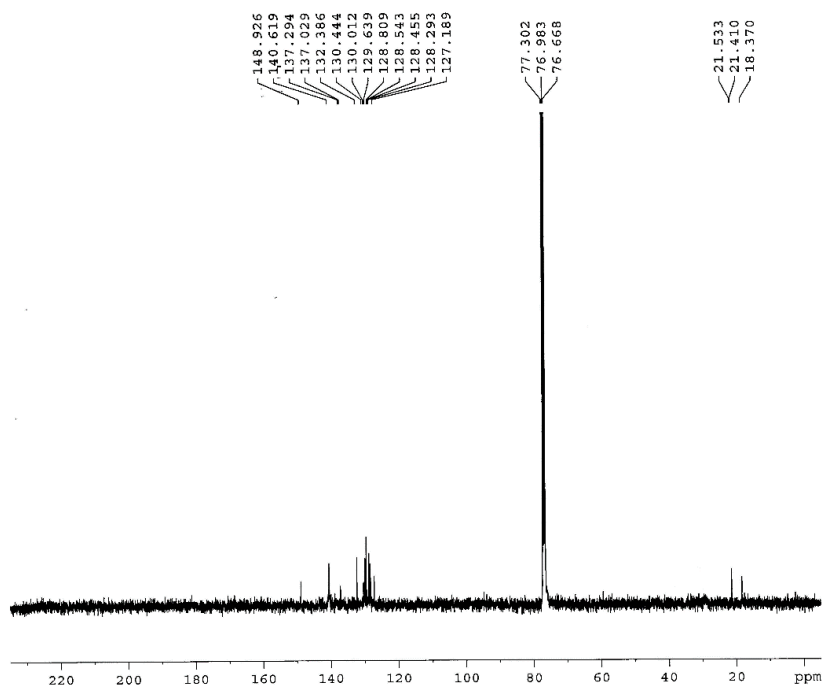
Current Data Parameters
 NAME Saeednia
 EXPNO 34
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20141214
 Time 16.46
 INSTRUM spect
 PROBHD 5 mm QNP 1H/13
 PULPROG zg30
 TO 32768
 SOLVENT CDCl3
 NS 8
 DS 0
 SWH 10000.000 Hz
 FIDRES 0.305176 Hz
 AQ 1.6385000 sec
 RG 362
 DW 50.000 usec
 DE 6.50 usec
 TE 298.0 K
 D1 1.00000000 sec
 MCREST 0.00000000 sec
 MCWRR 0.01500000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 10.50 usec
 PL1 -3.00 dB
 SFO1 500.1330885 MHz

F2 - Processing parameters
 SI 32768
 SF 500.1300231 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

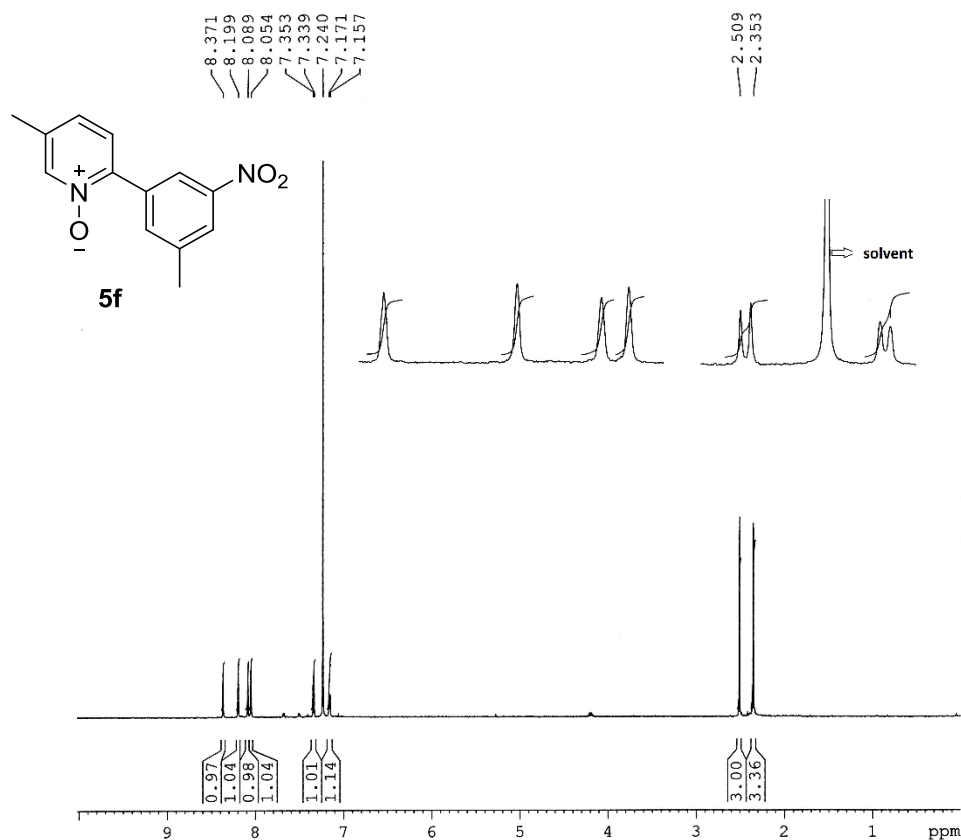
1D NMR plot parameters
 CX 20.00 cm
 CY 11.24 cm
 F1P 11.703 ppm
 F1 5852.97 Hz
 F2P 0.754 ppm
 F2 377.30 Hz
 PPMCM 0.54742 ppm/cm
 HZCM 273.78317 Hz/cm



NAME mar21-14
 EXPNO 12
 PROCNO 1
 Date_ 20140321
 Time 11.49
 INSTRUM spect
 PROBHD 5 mm DUL 13C-1
 PULPROG zgpg
 TD 32768
 SOLVENT CDCl3
 NS 32768
 DS 2
 SWH 24154.590 Hz
 FIDRES 0.737140 Hz
 AQ 0.6783476 sec
 RG 32768
 DW 20.700 usec
 DE 6.50 usec
 TE 300.0 K
 D1 1.50000000 sec
 D11 0.03000000 sec
 TD0 32

***** CHANNEL f1 *****
 NUC1 13C
 P1 8.10 usec
 PL1 7.00 dB
 SFO1 100.6243395 MHz

***** CHANNEL f2 *****
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 0.00 dB
 PL12 20.00 dB
 PL13 22.00 dB
 SFO2 400.1324008 MHz
 SI 16384
 SF 100.6127707 MHz
 WDW EM
 SSB 0
 LB 1.50 Hz
 GB 0
 PC 1.00



```

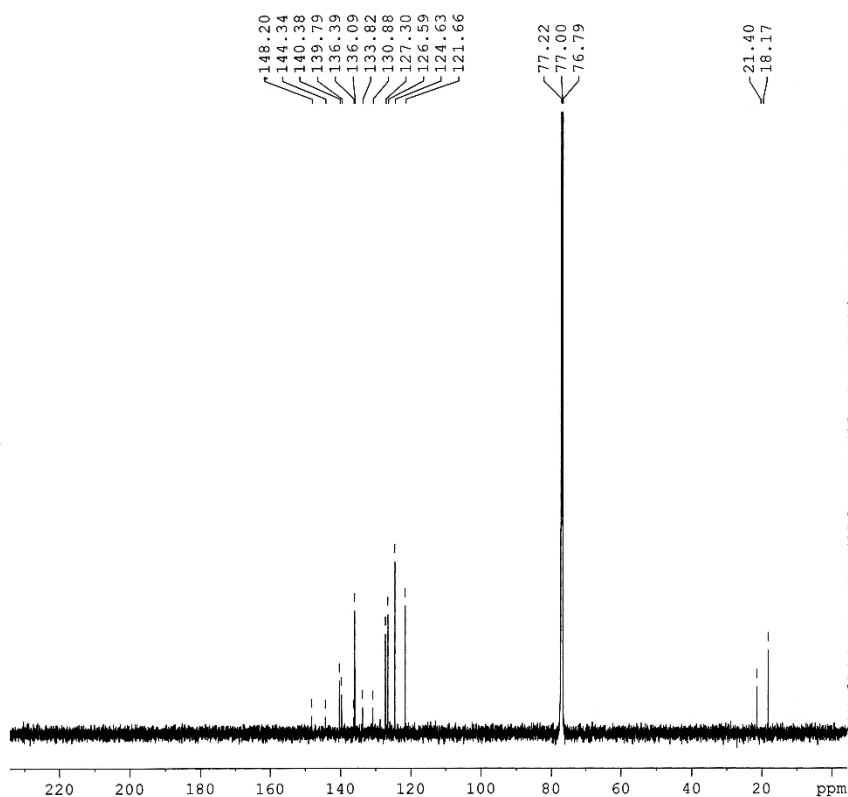
NAME      mar16-14
EXPNO     1
PROCNO    1
Date_     20140316
Time      14.47
INSTRUM   spect
PROBHD    5 mm CPTCI 1H-
PULPROG   zg30
TD         32768
SOLVENT   CDCl3
NS         16
DS         0
SWH        9615.385 Hz
FIDRES     0.293438 Hz
AQ         1.7040380 sec
RG         9
DW         52.000 usec
DE         6.50 usec
TE         298.0 K
D1         1.50000000 sec
D11        1
TD0        1

```

```

===== CHANNEL f1 =====
NUC1       1H
P1         8.00 usec
PL1        3.31 dB
PL1W       6.79873323 W
SFO1       600.0345002 MHz
SI         32768
SF         600.0300262 MHz
WDW        EM
SSB        0
LB         0.50 Hz
GB         0
PC         1.40

```



```

NAME      mar16-14
EXPNO     2
PROCNO    1
Date_     20140316
Time      14.52
INSTRUM   spect
PROBHD    5 mm CPTCI 1H-
PULPROG   zgpg
TD         32768
SOLVENT   CDCl3
NS         12288
DS         4
SWH        35971.223 Hz
FIDRES     1.097755 Hz
AQ         0.4555391 sec
RG         32768
DW         13.900 usec
DE         6.50 usec
TE         298.0 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        12

```

```

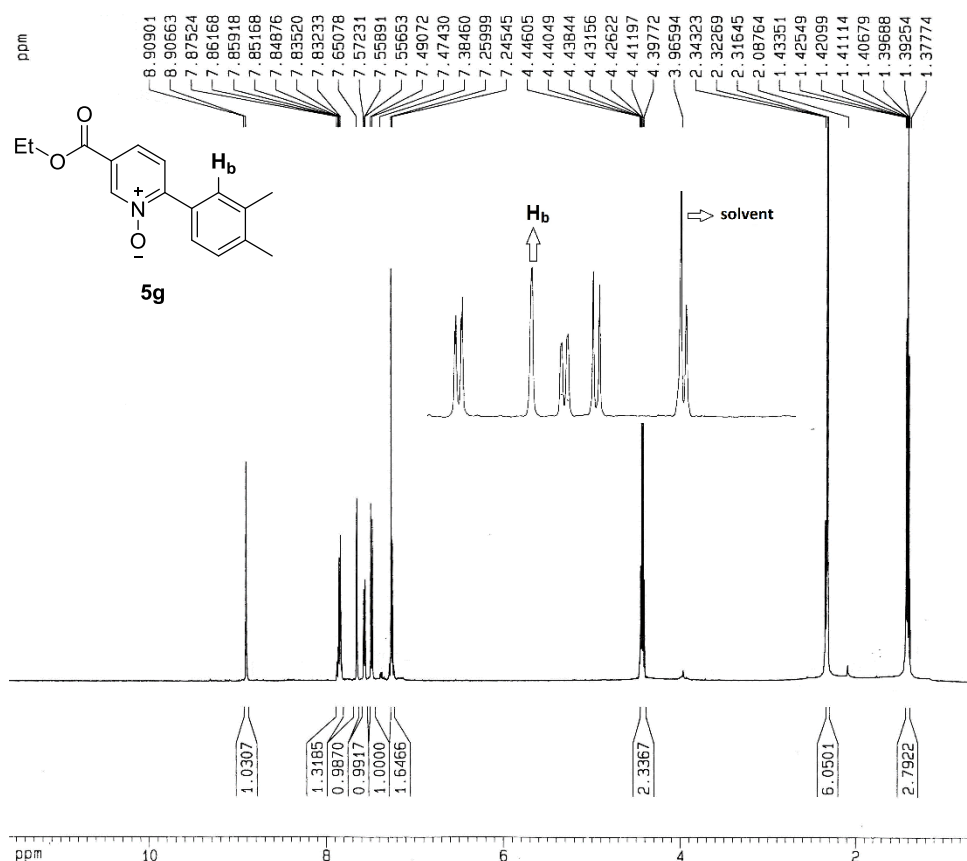
===== CHANNEL f1 =====
NUC1       13C
P1         12.70 usec
PL1        -1.81 dB
PL1W       81.92915344 W
SFO1       150.8950149 MHz

```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     80.00 usec
PL2        3.31 dB
PL12       23.31 dB
PL13       22.50 dB
PL2W       6.79873323 W
PL12W      0.06798734 W
PL13W      0.08192718 W
SFO2       600.0336002 MHz
SI         16384
SF         150.8776659 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.00

```



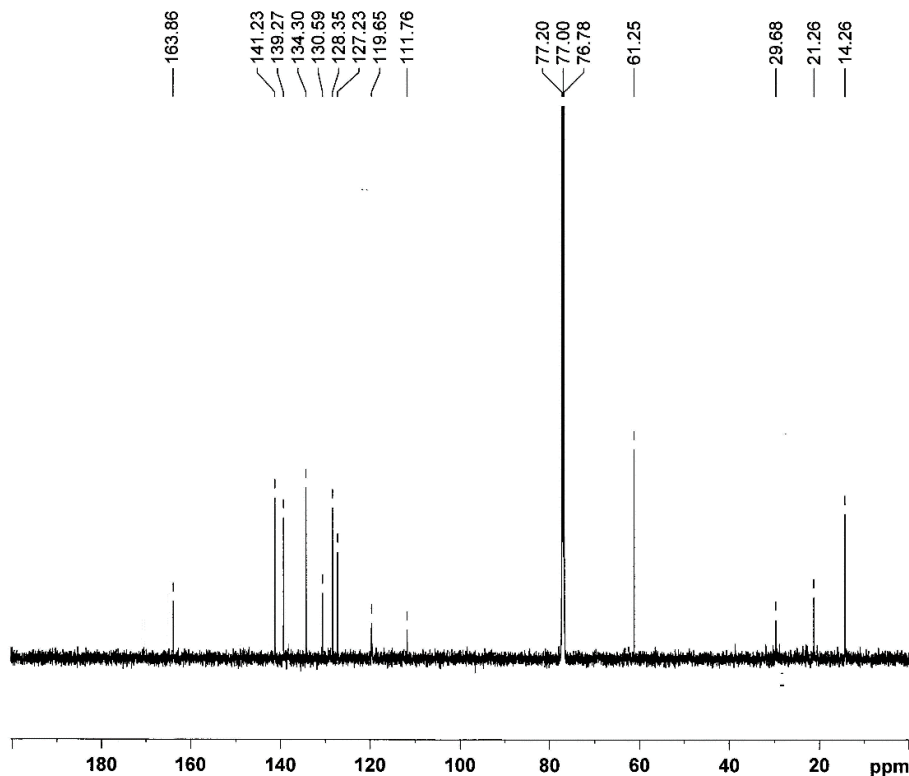
Current Data Parameters
 NAME Seednia
 EXPNO 38
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20141215
 Time 14.44
 INSTRUM spect
 PROBHD 5 mm QNP 1H/13
 PULPROG zg30
 TD 32768
 SOLVENT CDCl3
 NS 8
 DS 0
 SWH 10000.000 Hz
 FIDRES 0.305176 Hz
 AQ 1.6385000 sec
 RG 362
 DW 50.000 usec
 DE 6.50 usec
 TE 298.0 K
 D1 5.00000000 sec
 MCREST 0.00000000 sec
 MCWRR 0.01500000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 10.50 usec
 PL1 -3.00 dB
 SFO1 500.1330885 MHz

F2 - Processing parameters
 SI 32768
 SF 500.1300231 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 18.38 cm
 F1P 12.389 ppm
 F1 6195.89 Hz
 F2P 0.622 ppm
 F2 310.93 Hz
 PPMCM 0.58834 ppm/cm
 HZCM 294.24780 Hz/cm



NAME aug07-14
 EXPNO 2
 PROCNO 20140908
 Date_ 12.42
 Time 12.42
 INSTRUM spect
 PROBHD 5 mm CPTCI 1H-
 PULPROG zgpg
 TD 32768
 SOLVENT CDCl3
 NS 6309
 DS 2
 SWH 35971.223 Hz
 FIDRES 1.097755 Hz
 AQ 0.4555391 sec
 RG 32768
 DW 13.900 usec
 DE 6.50 usec
 TE 298.0 K
 D1 1.50000000 sec
 D11 0.03000000 sec
 TDO 16

***** CHANNEL f1 *****
 NUC1 13C
 P1 15.40 usec
 PL1 1.00 dB
 PL1W 83.60149384 W
 SFO1 150.9453107 MHz

***** CHANNEL f2 *****
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 65.00 usec
 PL2 3.30 dB
 PL12 22.06 dB
 PL13 27.00 dB
 PL2W 9.16420078 W
 PL12W 0.12192553 W
 PL13W 0.03909260 W
 SFO2 600.2336014 MHz
 SI 16384
 SF 150.9279578 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.00