Supporting Information

for

Cobalt-catalyzed *peri*-selective alkoxylation of 1-naphthylamine derivatives

Jiao-Na Han, Cong Du, Xinju Zhu, Zheng-Long Wang, Yue Zhu, Zhao-Yang Chu, Jun-Long Niu* and Mao-Ping Song*

Address: College of Chemistry and Molecular Engineering, Zhengzhou University, Zhengzhou 450001, People's Republic of China

Email: Jun-Long Niu* - niujunlong@zzu.edu.cn; Mao-Ping Song* - mpsong@zzu.edu.cn

*Corresponding author

Experimental details and characterization data of new compounds, and X-ray crystal structure details for 3aa.

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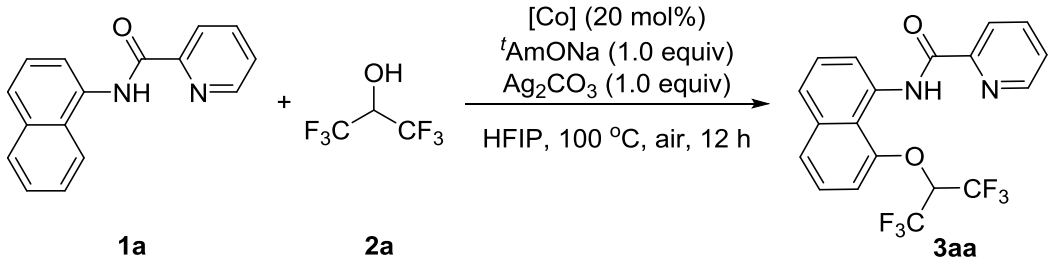
General information

Unless otherwise mentioned, all materials were commercially available and used without further purification. All the procedures were completed under the ambient air. ^{1}H NMR, ^{13}C NMR and ^{19}F NMR spectra were recorded at 400 (or 600) MHz, 101 (or 151) MHz or 376 MHz, respectively on a Bruker DPX instrument using Me_4Si as an internal standard. Chemical shift multiplicities are represented as follows: (s = singlet, d = doublet, t = triplet, q = quadruple,p = quintuple, m = multiplet, td = tripletdoublet, dt = doublet triplet,dd = double doublet, dq = doublet quadruple). Melting points were measured on a WC-1 instrument and uncorrected. New compounds for HRMS were tested on a Waters Q-Tof Micro MS/MS System ESI spectrometer. All the naphthylamine substrates were synthesized according to literature procedures [1,2].[D_1]-**1a** was prepared according to the literature [3].

Experimental section

1. Optimization of reaction conditions

Table S1. Optimization of catalysts.[a]



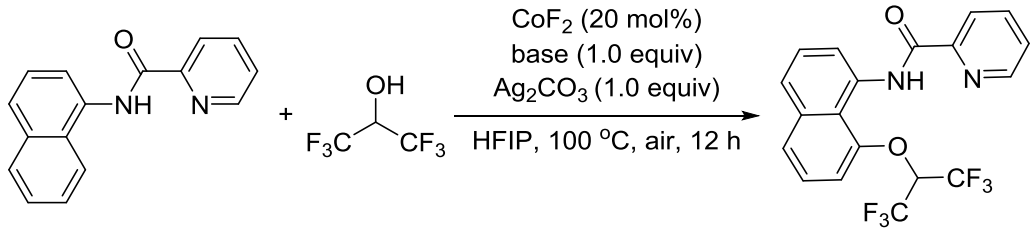
1a **2a** **3aa**

Entry	Catalyst	Yield (%)
1	$Co(OAc)_2{\cdot}4H_2O$	60
2	$Co(acac)_2$	34
3	$Co(acac)_3$	36
4	$CoCO_3{\cdot}H_2O$	n.r.
5	CoO	n.r.
6	$Co(pph_3)Cl_2$	66
7	CoF_3	60
8	$CoSO_4{\cdot}H_2O$	trace
9	$Co(OOCC_6H_5)_2$	63
10	CoF_2	71
11	$CoCl_2{\cdot}6H_2O$	57
12	$CoC_2O_4{\cdot}4H_2O$	56
13	$Co(NH_3)_6Cl_3$	53

14	$CoBr_2 \cdot 6H_2O$	65

[a]Reaction conditions:**1a** (0.2 mmol), **2a** (1.0 mL), Co Catalyst (20 mol %), Ag_2CO_3 (1.0 equiv), Cs_2CO_3 (1.0 equiv), 100 °C, air, 12 h. Isolated yield. HFIP = hexafluoroisopropanol. n.r. = no reaction.

Table S2. Optimization of base/acid.[a]

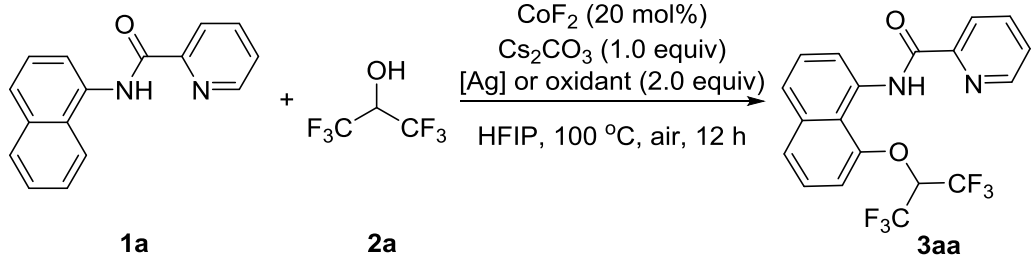


1a **2a** **3aa**

Entry	Base	Yield(%)
1	DBU	66
2	Et_3N	46
3	CH_3ONa	72
4	^{t}AmONa	71
5	EtONa	70
6	^{t}BuONa	65
7	CsOAc	8
8	NaOAc	12
9	Li_2CO_3	24
10	Na_2CO_3	58
11	K_2CO_3	67
12	Cs_2CO_3	82

[a]Reaction conditions:**1a** (0.2 mmol), **2a** (1.0 mL), CoF_2 (20 mol %), Ag_2CO_3(1.0 equiv), base (1.0 equiv), 100 °C, air, 12 h. Isolated yield.

Table S3. Optimization of oxidants.[a]



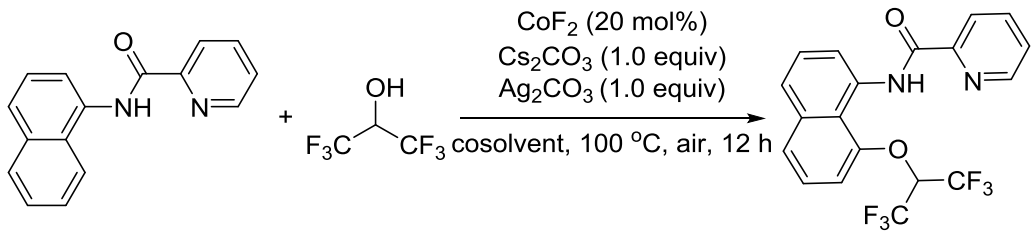
1a **2a** **3aa**

Entry	Oxidant	Yield(%)
1	$AgNO_3$	11
2	$NaIO_4$	trace
3	Ag_2CO_3	82
4	NMO	7
5	$K_2S_2O_8$	n.r.
6	$PhI(OAc)_2$	n.r.

7	Ag_2SO_4	trace
8	Ag_2O	32
9	AgTFA	trace
10	AgOAc	trace
11	$Mn(OAc)_2{\cdot}4H_2O$	trace
12	$Mn(acac)_2$	n.r.
13	$Mn(acac)_3$	n,r,

[a]Reaction conditions: **1a** (0.2 mmol), **2a** (1.0 mL),CoF_2 (20 mol %), oxidant (2.0 equiv), Cs_2CO_3(1.0 equiv), 100 ^oC, air, 12 h. Isolated yield.

Table S4. Optimization of cosolvents.[a]

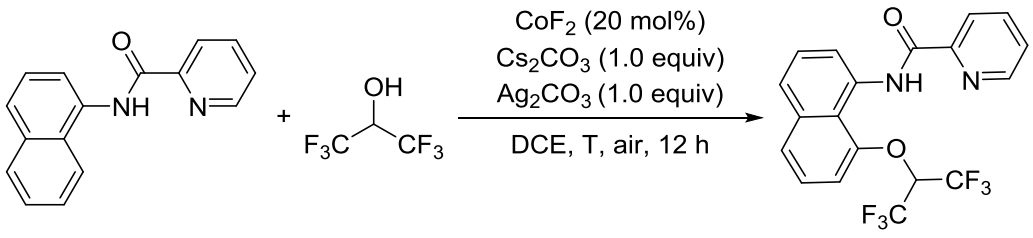


1a **2a** **3aa**

Entry	cosolvent	Yield(%)
1	DCE	84
2	$PhCF_3$	80
3	dioxane	15
4	PhMe	61
5	CH_3CN	19
6	THF	trace
7	PhF	77
8	TCP	75
9	PhOMe	79
10	acetone	22

[a]Reaction conditions:**1a** (0.2 mmol),**2a** (1.0 mL), CoF_2 (20 mol %), Ag_2CO_3 (1.0 equiv), Cs_2CO_3(1.0 equiv), cosolvent (1.0 mL), 100 ^oC, air, 12 h. Isolated yield.DCE = 1,2-dichloroethane. TCP = 1, 2, 3-Trichloropropane

Table S5. Optimization of temperature.[a]



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

Entry	temperature	Yield (%)
1	60	trace

2	70	5
3	80	37
4	90	48
5	100	84
6	110	75
7	120	63

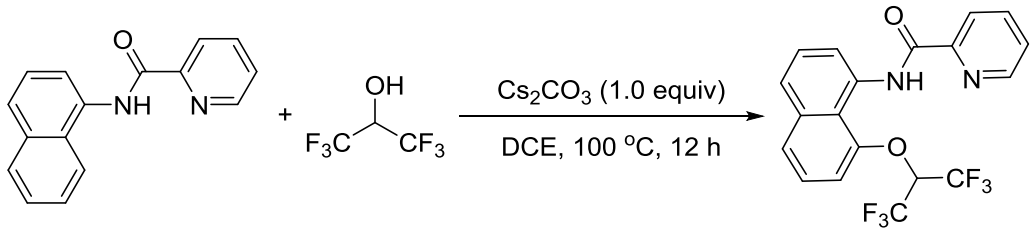
[a]Reaction conditions:**1a** (0.2 mmol), CoF_2 (20 mol %), Ag_2CO_3 (1.0 equiv), Cs_2CO_3 (1.0 equiv), HFIP (1.0 mL), DCE (1.0 mL), temperature, air, 12 h. Isolated yield.

2. General procedure for the synthesis of 3

A 15 mL oven-dried screw cap tube equipped with a magnetic stir bar was filled with **1** (0.20 mmol), Ag_2CO_3 (55.2 mg, 0.20 mmol), Cs_2CO_3 (65.0 mg, 0.20 mmol,), CoF_2 (3.8 mg, 20 mol %), **2** (1.0 mL) and DCE (1.0 mL). The reaction was stirred at 100 ^oC for 12 h and then cooled down to room temperature. The resulting mixture was diluted with 25 mL of dichloromethane, and filtered through a celite pad. The reaction solution was detected by TLC, and concentrated in vacuum. The product was purified bypreparative TLC on silica gel (petroleum ether/EtOAc) to afford the target product **3**.

3. Control experimentsand mechanistic studies

Control experiments



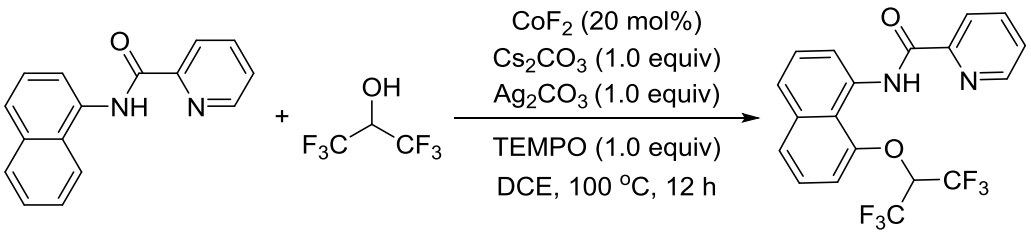
1a **2a** **3aa**

Entry	Catalyst	oxidant	atmosphere	Yield (%)
1	CoF_2	--	Ar	n.r.
2	CoF_2	--	air	29
3	CoF_2	--	O_2	51
4	--	Ag_2CO_3	air	n.r.
5	CoF_3	Ag_2CO_3	Ar	67
6[b]	CoF_3	--	Ar	12
7[c]	CoF_2	Ag_2CO_3	air	n.r.
8[d]	CoF_2	Ag_2CO_3	air	39
9[e]	CoF_2	Ag_2CO_3	air	23

[a]Reaction conditions: **1a** (0.2 mmol), **2a** (1.0 mL), Co salts (20 mol %),

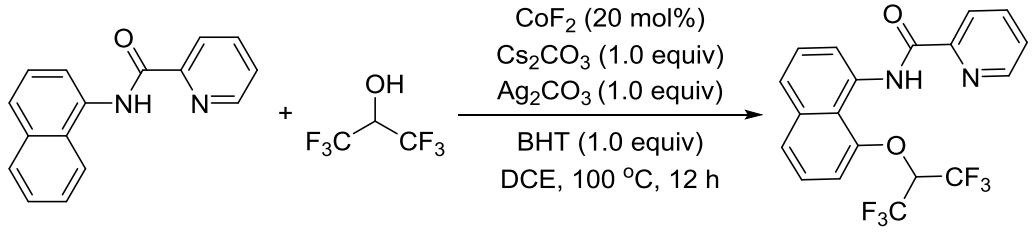
Ag_2CO_3(1.0 equiv), Cs_2CO_3(1.0 equiv), DCE (1.0 mL), 100 ^oC, air, 12 h. Isolated yield.[b]CoF_3 (1.0 equiv).[c]BQ (1.0 equiv) was added. [d]TEMPO (1.0 equiv) was added. [e]BHT (1.0 equiv) was added.

Reaction of radicals trapping



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

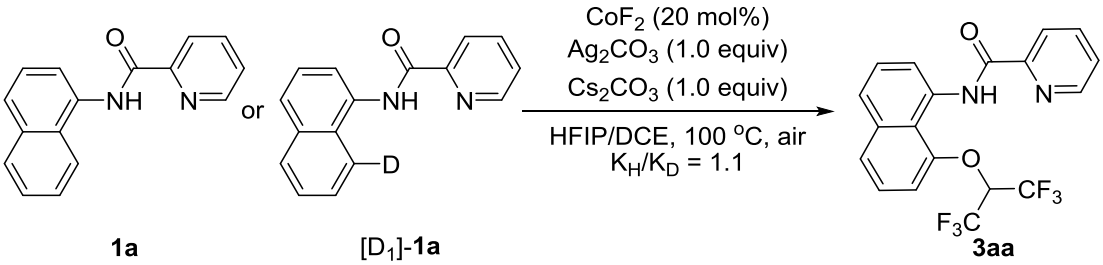
A 15 mL oven-dried screw cap tube equipped with a magnetic stir bar was filled with **1a** (49.6 mg, 0.20 mmol), Ag_2CO_3 (55.2 mg, 0.20 mmol), Cs_2CO_3 (65.0 mg, 0.20 mmol,), CoF_2 (3.8 mg, 20 mol %),TEMPO (1.0 equiv), HFIP (1.0 mL) and DCE (1.0 mL). Then the reaction was stirred in an oil bath at 100 ^oC for 12 h and cooled down to room temperature. The resulting mixture was diluted with 25 mL of dichloromethane, and filtered through a celite pad. The reaction solution was detected by TLC, and concentrated in vacuum. The product was purified bypreparative TLC on silica gel (petroleum ether/EtOAc = 5:1)to afford the target product **3aa** in 39% yield.



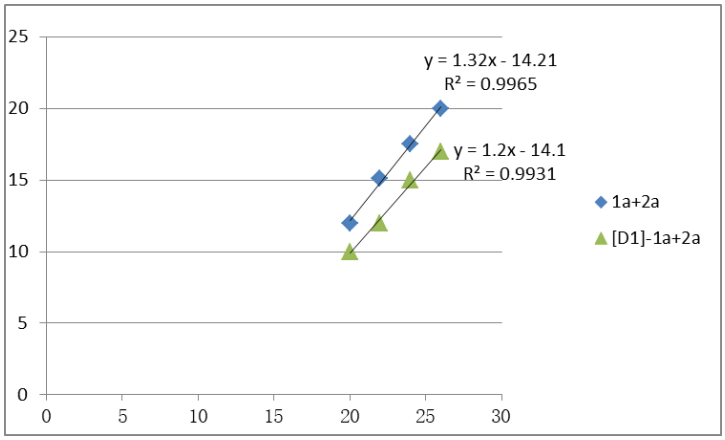
1a **2a** **3aa**

A 15 mL oven-dried screw cap tube equipped with a magnetic stir bar was filled with **1a** (49.6 mg, 0.20 mmol), Ag_2CO_3 (55.2 mg, 0.20 mmol), Cs_2CO_3 (65.0 mg, 0.20 mmol,), CoF_2 (3.8 mg, 20 mol %), BHT (1.0 equiv), HFIP (1.0 mL) and DCE (1.0 mL). Then the reaction was stirred in an oil bath at 100 ^oC for 12 h and cooled down to room temperature. The resulting mixture was diluted with 25 mL of dichloromethane, and filtered through a celite pad. The reaction solution was detected by TLC, and concentrated in vacuum. The product was purified by preparative TLC on silica gel (petroleum ether/EtOAc = 5:1) to afford the target product **3aa** in 23% yield.

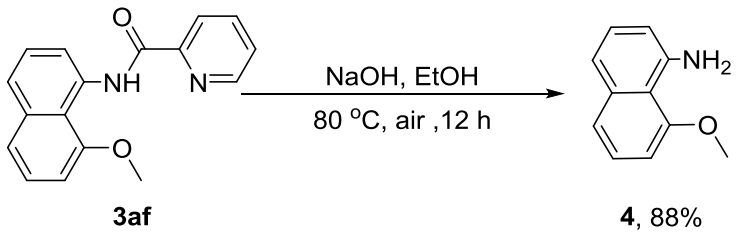
4. Kinetic isotope effect measurements



A 15 mL oven-dried screw captube was equipped with a magnetic stir bar and charged with **1a** (49.6 mg, 0.2 mmol) or [D_1]-**1a** (49.9 mg, 0.2 mmol), **2a** (1.0 mL), Ag_2CO_3 (55.2 mg, 0.20 mmol), Cs_2CO_3 (65.0 mg, 0.20 mmol,), CoF_2 (3.8 mg, 20 mol %) and DCE (1.0 mL). Then the tubes were heated at 100 ^oC for 20, 22, 24, 26 minutes and quenched separately with 1mL dichloromethane. Next, the reaction mixture was diluted with 25 mL dichloromethane and filtered through a celite pad. The solvent was removed in vacuum and ^1H NMR was taken separately using 0.1 mmol anisole (10.8 mg) as the internal standard. The KIE was determined as $k_H/k_D \approx 1.1$.

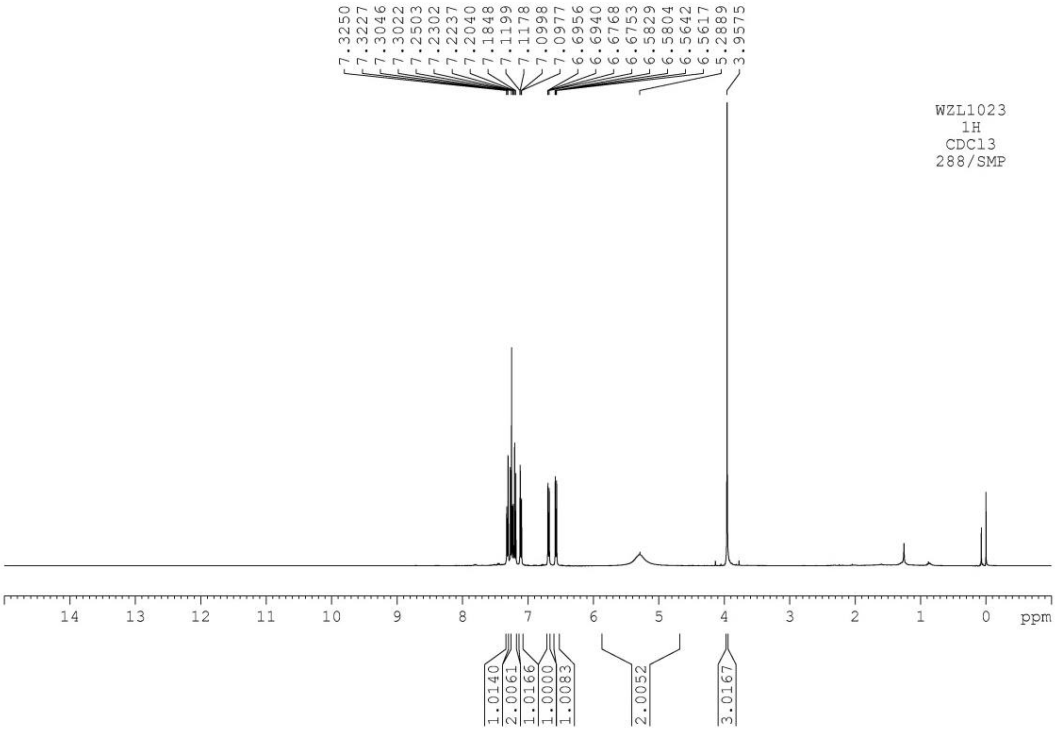


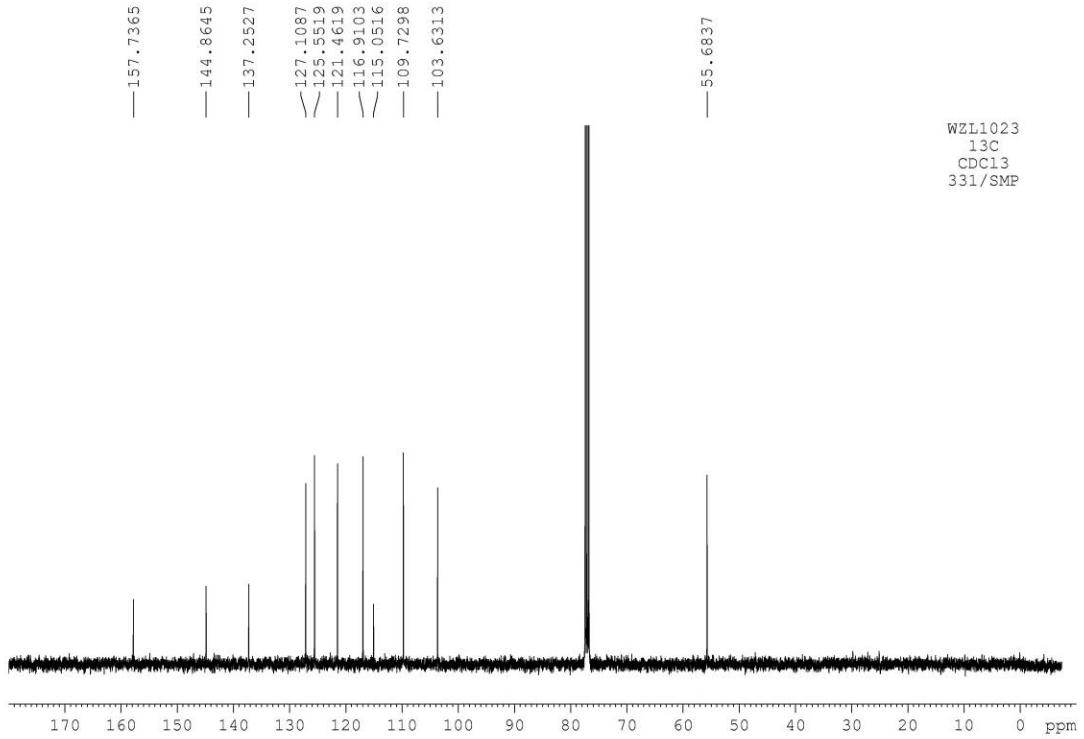
5. Removal of directing group



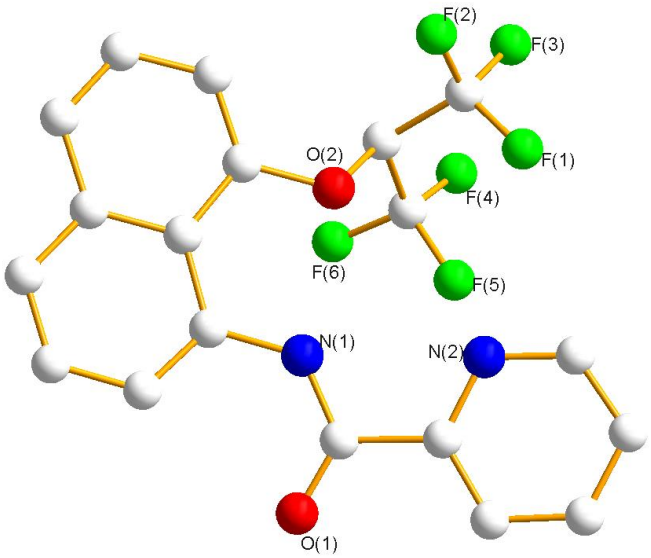
A 15 mL oven-dried screw cap tube was equipped with a magnetic stir bar and charged with **3af** (13.9 mg, 0.05 mmol), NaOH (40.0 mg, 1 mmol, 20 equiv) and MeOH (0.5 mL). Then the reaction was stirred in an oil bath at 100 ^oC for 12 h. After completion, the resulting mixture was cooled to room temperature, quenched with 5 mL H_2O, then treated with HCl (2.0 mol/L) until pH = 5. Next, the reaction mixture was diluted with dichloromethane

(10 ml × 2). The organic layer was collected and dried over Na_2SO_4. After concentration in vacuum, the residue was purified by preparative TLC on silica gel and the product was isolated in 88%. ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.35-7.28 (m, 1H), 7.28-7.16 (m, 2H), 7.15-7.08 (m, 1H), 6.69 (dd, J = 7.5, 0.7 Hz, 1H), 6.57 (dd, J = 7.5, 1.1 Hz, 1H), 3.96 (s, 9H).^{13}C NMR (101 MHz, $CDCl_3$): δ 157.7, 144.9, 137.3, 127.1, 125.6, 121.5, 116.9, 115.1, 109.7, 103.6, 55.7.





6. X-ray crystal structure details for 3aa



Chemical formula	$C_{19}H_{12}F_6N_2O_2$
Formula weight	414.31 g/mol
Temperature	293(2) K

Wavelength	1.54184Å	
Crystal system	orthorhombic	
Space group	Pbca	
Unit cell dimensions	*a* = 7.3762(3)Å	α = 90°
	b = 17.5081(5) Å	β = 90°
	c = 28.0730(11) Å	γ = 90°
Volume	3625.4(2) $Å^3$	
Z	8	
Density (calculated)	1.518 g/cm^3	
Absorption coefficient	1.249 mm^{-1}	
F(000)	1680.0	

Data collection and structure refinement for compound 3aa.

Theta range for datacollection	10.104 to 134.16^o
Index ranges	-8 ≤ h ≤ 6, -13 ≤ k ≤ 20, -21 ≤ l ≤ 33
Reflections collected	8287
Independent reflections	3240 [R(int) = 0.0291]
Absorption correction	Multi-Scan
Structure solution technique	direct methods
Structure solution program	SHELX,VERSION 2014/7

Reference:

1. Bai, P.; Sun, S.; Li, Z.; Qiao, H.; Su, X.; Yang, F.; Wu, Y.*J. Org. Chem.***2017**, *82*, 12119-12127.
2. Li, Z.; Sun, S.; Qiao, H.; Yang, F.; Zhu, Y.; Kang, J.; Wu, Y. J. *Org. Lett.* **2016**, *18*, 4594-4597.
3. Huang, L.; Li, Q.; Wang, C.; Qi, C. *J. Org. Chem.***2013**, *78*, 3030-3038.

Characterization of products

***N*-(8-(Hexafluoropropan-2-yl)oxy)naphthalen-1-yl)picolinamide (3aa)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (5:1) as an eluent R_f = 0.41; light yellow solid (69.6 mg, 84%), mp 153-158^{o}C. ^{1}H NMR(400 MHz, CDCl3): δ 11.85 (s, 1H), 8.92 (dd, *J* = 7.7, 1.2 Hz, 1H), 8.65 (d, *J* = 4.5 Hz, 1H), 8.31 (d, *J* = 7.8 Hz, 1H), 7.91-7.87 (m, 1H), 7.66-7.55 (m, 3H), 7.47-7.44 (m, 1H), 7.41 (t, *J* = 11.9 Hz, 1H), 7.12 (d, *J* =11.6 Hz, 1H), 5.24-5.15 (m, 1H). ^{13}C NMR (101 MHz, CDCl3): δ 162.8, 154.9, 150.2, 147.9, 137.2, 136.6, 133.4, 127.4, 126.2, 125.9, 125.2, 124.3, 122.3, 120.9 (dq, J_{C-F} = 284.7, 2.9Hz), 119.2, 117.8, 116.7, 78.1 (p, J_{C-F} = 34.0Hz). HRMS (positive ESI) Calcd. ^{19}F NMR (376 MHz, $CDCl_3$): δ -72.46. For $C_{19}H_{12}F_6N_2O_2$ (M + H) 415.0881, Found: 415.0881.

***N*-(5-Bromo-8-(hexafluoropropan-2-yl)oxy)naphthalen-1-yl)picolinamide (3ba)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (5:1) as an eluent R_f = 0.50; white solid (86.8 mg, 88%), mp 152-156^{o}C.^{1}H NMR (400 MHz, $CDCl_3$): δ 11.82 (s, 1H), 8.97 (dd, *J* = 7.9, 1.0 Hz, 1H), 8.61 (d, *J* = 4.4 Hz, 1H), 8.31 (dt, *J* = 7.8, 1.0 Hz, 1H), 8.10 (dd, *J* = 8.5, 1.0 Hz, 1H), 7.93-7.88 (m, 1H), 7.75-7.68 (m, 2H), 7.49-7.46 (m, 1H), 7.00 (d, *J* = 8.4 Hz, 1H), 5.15-5.06 (m, 1H). ^{13}C NMR (101 MHz, CDCl3): δ 162.8, 154.7, 150.0, 147.9, 137.3, 134.2, 133.8, 129.3, 128.9, 126.4, 123.8, 122.4, 120.8 (dq, J_{C-F} = 285.3, 3.8 Hz), 120.3, 119.4, 119.0, 111.1, 78.5 (p, J_{C-F} = 33.7 Hz).^{19}F NMR (376 MHz, $CDCl_3$): δ -72.42. HRMS (positive ESI) Calcd. For $C_{19}H_{11}BrF_6N_2O_2$ (M + H) 492.9986, Found: 492.9986.

***N*-(4-Bromo-8-(hexafluoropropan-2-yl)oxy)naphthalen-1-yl)picolinamide (3ca):** purified by analytical TLC on silica gel with petroleum ether/EtOAc (5:1) as an eluent R_f = 0.47; white solid (84.8 mg, 86%), mp 122-126 ^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$): δ 11.88 (s, 1H), 8.82 (d, *J* = 8.6 Hz, 1H), 8.60 (d, *J* = 4.4 Hz, 1H), 8.29 (dt, *J* = 7.8, 0.9 Hz, 1H), 8.15 (dd, *J* = 8.6, 0.9 Hz, 1H), 7.91-7.86 (m, 2H), 7.57-7.42 (m, 2H), 7.22-7.21 (d, *J* = 8.6, 1H), 5.20-5.11 (m,1H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.8, 155.1, 150.0, 147.9, 137.4, 134.2, 133.5, 131.6, 126.5, 126.4, 125.3, 122.4, 120.7(dq, J_{C-F} = 284.8, 2.8 Hz), 119.3, 119.2, 117.6, 112.0, 78.7 (p, J_{C-F} = 34.6 Hz).^{19}F NMR (376 MHz, $CDCl_3$): δ -72.44. HRMS (positive ESI) Calcd. For $C_{19}H_{11}BrF_6N_2O_2$ (M + H) 492.9986, Found: 492.9985.

***N*-(4-Nitro-8-(hexafluoropropan-2-yl)oxy)naphthalen-1-yl)picolinamide (3da):** purified by analytical TLC on silica gel with petroleum ether/EtOAc (5:1) as an eluent R_f = 0.40; yellow solid (58.8 mg, 64%), mp 176-178^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$): δ 12.30 (s, 1H), 9.15 (d, *J* = 8.9 Hz, 1H), 8.62 (d, *J* = 4.4 Hz, 1H), 8.48 (dd, *J* = 8.8, 0.7 Hz, 1H), 8.33 (dd, *J* = 8.3, 5.3 Hz, 2H), 7.96-7.91 (m, 1H), 7. 68 (t, *J* = 8.0, Hz 1H), 7.54-7.52 (m, 1H), 7.31 (d, *J* = 7.9 Hz, 1H), 5.21-5.07 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 163.3, 155.4, 149.3, 148.1, 142.2, 139.3, 137.6, 128.7, 128.5, 126.9, 126.6, 122.7, 120.8, 120.7(dq, J_{C-F} = 284.5, 2.7 Hz),117.8, 115.9, 112.8, 79.1 (p, J_{C-F} = 34.1 Hz).^{19}F NMR (376 MHz,

$CDCl_3$): δ -72.35. HRMS (positive ESI) Calcd. For $C_{19}H_{11}F_6N_3O_2$ (M + K) 498.0291, Found: 498.0287.

***N*-(4-Benzenesulfonyl-8-(hexafluoropropan-2-yl)oxy)naphthalen-1-yl)picolinamide (3ea):**purified by analytical TLC on silica gel with petroleum ether/EtOAc (1:1) as an eluent R_f = 0.53; white solid (67.6 mg, 61%), mp 184-188^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$): δ 12.23 (s, 1H), 9.18 (d, *J* = 8.6 Hz, 1H), 8.64-8.52 (m, 3H), 8.30(d, *J* = 7.8 Hz, 1H), 7.95-7.89 (m, 3H), 7.56-7.46 (m, 5H), 7.21 (d, *J* = 7.8, 1H), 5.16-5.06 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 163.3, 155.5, 149.4, 148.0, 141.7, 139.7, 137.5, 133.1, 132.5, 131.8, 130.3, 129.2, 127.8, 127.4, 126.8, 122.6, 121.9, 120.7 (dq, J_{C-F} = 284.5, 2.7 Hz), 118.2, 116.2, 112.3, 78.8 (p, J_{C-F} = 34.3 Hz).^{19}F NMR (376 MHz, $CDCl_3$): δ -72.35. HRMS (positive ESI) Calcd. For $C_{25}H_{16}F_6N_2O_4S$ (M + H) 555.0813, Found: 555.0813.

***N*-(4-Benzenesulfonyl-5-bromo-8-(hexafluoropropan-2-yl)oxy)naphthalen-1-yl)picolinamide (3fa):** purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.29; white solid (59.5 mg, 47%), mp 232-236 ^{o}C.^{1}H NMR (400 MHz, CDCl3): δ 12.00 (s, 1H), 9.54 (d, J = 1.8 Hz, 1H), 8.77 (d, J = 1.8 Hz, 1H), 8.58 (d, J = 4.5 Hz, 1H), 8.30 (d, J = 7.8 Hz, 1H), 8.15-8.12 (m, 2H), 7.92 (td, J = 7.7, 1.7 Hz, 1H), 7.86 (d, J = 8.4 Hz, 1H), 7.63-7.53 (m, 3H), 7.51-7.48 (m, 1H), 7.15 (d, J = 8.5 Hz, 1H), 5.12-5.06 (m, 1H).^{13}C NMR (101 MHz, $CDCl_3$): δ 163.0, 154.5, 149.4, 148.0, 141.8, 140.8, 137.5, 136.0, 133.7, 133.6, 131.1, 129.5, 128.2, 126.7, 123.3, 122.6, 120.9 (dq, J_{C-F} = 284.7, 2.3 Hz), 120.8, 120.4, 116.0, 114.0, 78.7(p, J_{C-F} = 34.3 Hz).^{19}F NMR (376 MHz, $CDCl_3$): δ-72.31.HRMS (positive ESI) Calcd. For $C_{25}H_{15}BrF_6N_2O_4S$ (M + H) 632.9918, Found: 632.9913.

***N*-(5-*tert*-Butylmethylcarbamate-8-(hexafluoropropan-2-yl)oxy)naphthalen-1-yl)picolinamide (3ga):** purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.60; white solid (43.9mg, 33%), mp 157-161^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$): δ 11.85 (s, 1H), 8.91 (dd, *J* = 7.8, 0.9 Hz, 1H), 8.62 (d, *J* = 4.3 Hz, 1H), 8.30 (d, *J* = 7.8 Hz, 1H), 7.92-7.88 (m, 1H), 7.77 (d, *J* = 8.0 Hz, 1H), 7.68 (d, *J* = 7.9 Hz, 1H), 7.58 (t, *J* = 8.2 Hz, 1H), 7.49-7.45 (m, 1H), 7.09 (d, *J* = 8.6 Hz, 1H), 6.81 (s, 1H), 5.12-5.04 (m, 1H), 1.55 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.8, 153.7, 152.0, 150.2, 148.0, 137.3, 134.0, 130.3, 127.7, 126.3, 122.4,121.1(dq, J_{C-F} = 286.1, 3.5 Hz), 119.4, 118.2, 116.8, 111.0, 81.0,78.8(p, J_{C-F} = 33.8 Hz), 28.4.^{19}F NMR (376 MHz, $CDCl_3$): δ -72.52. HRMS (positive ESI) Calcd. For $C_{24}H_{21}F_6N_3O_4$ (M + H) 530.1515, Found: 530.1509.

***N*-(7-Methoxy-8-(hexafluoropropan-2-yl)oxy)naphthalen-1-yl)picolinamide (3ha):** purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.36; light yellow solid (72.0 mg, 81%), mp 155-157^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$): δ 11.76 (s, 1H), 8.89 (dd, *J* = 7.8, 1.1 Hz, 1H), 8.62 (d, *J* = 4.3 Hz, 1H), 8.31 (dt, *J* = 7.8, 1.0 Hz, 1H), 7.90-7.86 (m, 1H), 7.69 (d, *J* = 9.1 Hz, 1H), 7.55 (dd, *J* = 8.1, 0.8 Hz, 1H), 7.46-7.41 (m, 2H), 7.30 (d, *J* = 9.0 Hz, 1H), 5.38-5.30 (m, 1H), 4.03 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.7,

150.4, 148.0, 146.8, 140.3, 137.2, 132.6, 131.0, 127.3, 126.1, 125.0, 124.2, 122.2, 121.2 (dq, J_{C-F} = 285.2, 2.8 Hz), 120.1, 119.5, 114.4, 76.4 (p, J_{C-F} = 33.8 Hz), 57.1.^{19}F NMR (376 MHz, $CDCl_3$): δ -71.97. HRMS (positive ESI) Calcd. For $C_{20}H_{14}F_6N_2O_3$ (M + H) 445.0987, Found: 445.0982.

***N*-(8-(2,2,2-Trifluoroethoxy)naphthalen-1-yl)picolinamide (3ab)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (5:1) as an eluent R_f = 0.31; light yellow solid (52.6mg, 76%), mp 200-203 ^oC.^{1}H NMR (400 MHz, $CDCl_3$): δ 12.50 (s, 1H), 28.94 (d, *J* = 7.6 Hz, 1H), 8.66 (d, *J* = 4.6 Hz, 1H), 8.34 (d, *J* = 7.8 Hz, 1H), 7.92 (td, *J* = 7.7, 1.5 Hz, 1H), 7.62-7.48 (m, 4H), 7.40 (t, *J* = 8.0 Hz, 1H), 7.07 (d, *J* = 7.7 Hz, 1H), 4.77 (q, *J* = 8.4 Hz, 2H).^{13}C NMR (101 MHz, $CDCl_3$): δ 162.8, 154.8, 150.7, 148.1, 137.5, 136.5, 134.1, 127.1, 126.2, 125.4, 124.5, 124.2, 123.4 (q, J_{C-F} = 285.3 Hz) 122.1, 118.1, 117.3, 109.8, 36.2(q, J_{C-F} = 36.3 Hz). ^{19}F NMR (376 MHz, $CDCl_3$): δ -72.83. HRMS (positive ESI) Calcd. For $C_{18}H_{13}F_3N_2O_3$ (M + H) 347.1007, Found: 347.1008.

***N*-(8-(3-Fluoropropoxy)naphthalen-1-yl)picolinamide (3ac)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (1:1) as an eluent R_f = 0.65; brown solid (50.0mg, 77%), mp 103-105 ^oC. ^{1}H NMR (400 MHz, $CDCl_3$): δ 12.59 (s, 1H), 8.99 (dd, *J* = 7.7, 1.3 Hz, 1H), 8.63-8.61 (m, 1H), 8.37 (dt, *J* = 7.9, 1.0 Hz, 1H), 7.91 (td, *J* = 7.7, 1.7 Hz, 1H), 7.59-7.56 (m, 1H), 7.53-7.45 (m, 3H) 7.35 (t, *J* = 7.9 Hz, 1H), 6.95 (d, *J* = 7.3 Hz, 1H), 4.71 (t, *J* = 5.8 Hz, 1H), 4.59 (t, *J* = 5.8 Hz, 1H), 4.47 (t, *J* = 6.1 Hz, 2H), 2.60-2.56 (m, 1H), 2.52-2.48 (m, 1H).^{13}C NMR (101 MHz, $CDCl_3$): δ 162.6, 155.3, 151.0, 147.7, 137.6, 136.5, 134.8, 126.7, 126.2, 125.6, 124.1, 122.9, 122.3, 117.4, 117.0, 106.8, 80.9(d, J_{C-F} = 164.8Hz), 65.4(d, J_{C-F} = 5.4Hz), 29.9(d, J_{C-F} = 20.2Hz).^{19}F NMR (376 MHz, $CDCl_3$): δ -72.83. HRMS (positive ESI) Calcd. For $C_{19}H_{16}FN_2O_2$ (M + H) 325.1352, Found: 325.1347.

***N*-(8-(2,2,3,3-Tetrafluoropropoxy)naphthalen-1-yl)picolinamide (3ad)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.44; light green solid (50.0mg, 66%), mp 133-136^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$): δ 12.18 (s, 1H), 8.91 (dd, *J* = 7.7, 1.2 Hz, 1H), 8.64 (d, *J* = 4.5 Hz, 1H), 8.34 (td, *J* = 7.8, 0.9 Hz, 1H), 7.91 (td, *J* = 7.7, 1.7 Hz, 1H), 7.62-7.59 (m, 1H), 7.62-7.59 (m, 1H), 7.57-7.46 (m, 3H), 7.37 (t, *J* = 8.0 Hz, 1H), 7.05 (d, *J* = 7.7 Hz, 1H), 6.23 (tt, *J* = 52.9, 4.5 Hz, 1H), 4.76 (t, *J* = 12.8 Hz, 2H).^{13}C NMR (101 MHz, $CDCl_3$): δ 162.6, 154.7, 150.5, 148.1 137.6, 136.5, 133.9, 126.9, 126.4, 125.4, 124.4, 124.2 122.7, 117.2 (tt, J_{C-F} = 34.3, 250.3Hz) 118.4, 117.3,111.7(tt, J_{C-F} = 34.3, 250.3Hz), 109.1, 67.2 (d, J_{C-F} = 28.9 Hz).^{19}F NMR (376 MHz, $CDCl_3$): δ-123.15, -138.46. HRMS (positive ESI) Calcd. For $C_{19}H_{14}F_4N_2O_2$ (M + H) 379.1070, Found: 379.1064.

***N*-(8-(2,2,3,3,4,4,4-Heptafluorobutoxy)naphthalen-1-yl)picolinamide (3ae)**:purified by analytical TLC on silica gel with petroleum ether/EtOAc (5:1) as an eluent R_f = 0.38; white solid (65.2mg, 73%), mp 130-134^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$): δ 12.49 (s, 1H), 8.94 (dd, *J* = 7.7, 1.3 Hz, 1H), 8.60 (d, *J* = 4.3 Hz, 1H), 8.33 (dt, *J* = 7.8, 1.0 Hz, 1H), 7.91 (td, *J* = 7.7, 1.7 Hz, 1H), 7.61-7.51 (m, 3H), 7.49-7.46 (m, 1H), 7.38 (t, *J* = 8.1 Hz, 1H), 7.07 (d, *J* = 7.7

Hz, 1H), 4.92 (t, *J* = 14.7 Hz, 2H).^{13}C NMR (151 MHz, CDCl3): δ 161.6, 154.0, 149.7, 146.9, 136.5, 135.5, 133.1, 126.1, 125.2, 124.4, 123.6, 123.2, 121.6, 117.5 (t, *J* = 43.7 Hz), 117.1, 115.5 (q, *J* = 37.3 Hz), 116.4, 112.8 (t, *J* = 260.6, 31.0 Hz), 109.1, 66.4 (t, *J* = 23.4 Hz).^{19}F NMR (376 MHz, $CDCl_3$): δ -119.68,-119.74, -127.67. HRMS (positive ESI) Calcd. For $C_{20}H_{13}F_7N_2O_2$ (M + H) 447.0944, Found: 447.0938.

***N*-(8-Methoxynaphthalen-1-yl)picolinamide (3af)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.30; light yellow solid (30.1mg, 54%), mp 176-182^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$): δ13.20 (s, 1H), 9.00 (dd, *J* = 7.6, 1.4 Hz, 1H), 8.71-8.69 (m, 1H), 8.35 (dt, *J* = 7.9, 0.9 Hz, 1H), 7.91 (td, *J* = 7.7, 1.7 Hz, 1H), 7.57-7.55 (m, 1H), 7.53-7.44 (m, 3H), 7.37 (t, *J* = 8.0 Hz 1H), 6.91 (dd, *J* = 7.6, 0.7 Hz, 1H), 4.20 (s, 3H).^{13}C NMR (101 MHz, $CDCl_3$): δ 162.4, 156.3, 151.2, 148.1, 137.5, 136.4, 135.2, 126.8, 126.1, 125.6, 123.7, 122.6, 122.1, 116.6, 116.6, 105.7, 56.2.HRMS (positive ESI) Calcd. For $C_{17}H_{14}N_2O_2$ (M + H) 279.1134, Found: 279.1128

***N*-(8-Ethoxynaphthalen-1-yl)picolinamide (3ag):**purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.39; white solid (46.8mg, 80%), mp 105-111^{o}C.^{1}H NMR (400 MHz, $CDCl_3$): δ 12.75 (s, 1H), 9.01 (dd, *J* = 7.7, 1.3 Hz, 1H), 8.63-8.61(m, 1H), 8.34 (dt, *J* = 7.9, 0.9 Hz, 1H), 7.88 (td, *J* = 7.7, 1.7 Hz, 1H), 7.57-7.55 (m, 1H), 7.52-7.40 (m, 3H), 7.33 (t, *J* = 8.0 Hz 1H), 6.90 (d, *J* = 7.4 Hz, 1H), 4.35 (q, *J* = 7.0 Hz, 2H), 1.68 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.8, 155.6, 151.1, 147.7, 137.4, 136.5, 135.0, 126.6, 126.1, 125.6, 124.0, 122.7, 121.9, 117.2, 117.0, 106.8, 65.4, 15.1.HRMS (positive ESI) Calcd. For $C_{18}H_{16}N_2O_2$ (M + H) 293.1290, Found: 293.1285.

***N*-(8-Propoxynaphthalen-1-yl)picolinamide (3ah)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.43; white solid (40.4mg, 66%), mp 82-84^{o}C ^{1}H NMR (400 MHz, $CDCl_3$): δ 12.74 (s, 1H), 8.99 (dd, *J* = 7.7, 1.2 Hz, 1H), 8.66-8.64 (m, 1H), 8.35 (d, *J* = 7.8 Hz, 1H), 7.92 (td, *J* = 7.7, 1.7 Hz, 1H), 7.58-7.56 (m, 1H), 7.52-7.46 (m, 2H), 7.45-7.43 (m, 1H), 7.35(t, *J* = 8.0 Hz, 1H), 6.93 (d, *J* = 7.8 Hz, 1H), 4.30 (t, *J* = 6.7 Hz, 2H), 2.20-2.11 (m, 2H), 1.04 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.8, 155.7, 151.2, 147.6, 137.4, 136.5, 135.0, 126.6, 126.1, 125.6, 124.0, 122.8, 121.8, 117.2, 117.1, 106.8, 71.5, 22.3, 10.8.HRMS (positive ESI) Calcd. For $C_{19}H_{18}N_2O_2$ (M + H) 307.1447, Found: 307.1441.

***N*-(8-Butoxynaphthalen-1-yl)picolinamide (3ai)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.55; white solid (53.8mg, 84%), mp 109-111^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$): δ 12.72 (s, 1H), 8.98 (dd, *J* = 7.7, 1.2 Hz, 1H), 8.68-8.65 (m, 1H), 8.36 (d, *J* = 7.8 Hz, 1H), 7.92 (td, *J* = 7.7, 1.7 Hz, 1H), 7.58-7.56 (m, 1H), 7.52-7.47 (m, 2H), 7.45-7.43 (m, 1H), 7.35 (t, *J* = 8.0 Hz, 1H),6.94 (d, *J* = 7.1 Hz, 1H), 4.33 (t, *J* = 6.9 Hz, 2H), 2.14-2.07 (m, 2H), 1.53-1.43 (m, 2H), 0.92 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.8, 155.7, 151.2, 147.7, 137.4, 136.5, 135.0, 126.6, 126.1, 125.6, 124.0, 122.8, 121.8, 117.2, 117.1, 106.8, 69.7, 31.0, 19.3,

13.9.HRMS (positive ESI) Calcd. For $C_{20}H_{20}N_2O_2$ (M + H) 321.1603, Found: 321.1598.

***N*-(8-(Pentyloxy)naphthalen-1-yl)picolinamide (3aj)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.51; white solid (52.2mg, 78%), mp 106-110^{o}C.^{1}H NMR (400 MHz, $CDCl_3$): δ 12.72 (s, 1H), 8.98 (dd, *J* = 7.8, 1.3 Hz, 1H), 8.65-8.64 (m, 1H), 8.36 (dt, *J* = 7.9, 0.9 Hz, 1H), 7.91 (td, *J* = 7.8, 1.7 Hz, 1H), 7.58-7.56 (m, 1H), 7.52-7.46 (m, 2H), 7.44-7.42 (m, 1H), 7.34 (t, *J* = 8.0 Hz, 1H), 6.92 (d, *J* = 7.1 Hz, 1H), 4.31 (t, *J* = 7.0 Hz, 2H), 2.15-2.08 (m, 2H), 1.45-1.27 (m, 4H), 0.85 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.8, 155.7, 151.2, 147.6, 137.4, 136.5, 135.0, 126.6, 126.1, 125.6, 124.0, 122.8, 121.8, 117.2, 117.1, 106.8, 77.4, 77.1, 76.7, 70.0, 28.8, 28.3, 22.5, 14.1.HRMS (positive ESI) Calcd. For $C_{21}H_{22}N_2O_2$ (M + H) 335.1760, Found: 335.1754.

***N*-(8-(Hexyloxy)naphthalen-1-yl)picolinamide (3ak)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.57;brownsolid (55.8mg, 80%), mp 78-81^{o}C.^{1}H NMR (400 MHz, $CDCl_3$): δ 12.72 (s, 1H), 8.98 (dd, *J* = 7.7, 1.2 Hz, 1H), 8.66-8.65 (m, 1H), 8.36 (d, *J* = 7.8 Hz, 1H), 7.91 (td, *J* = 7.7, 1.7 Hz, 1H), 7.58-7.56 (m, 1H), 7.52-7.46 (m, 1H) 7.44-7.42 (m, 1H) 7.37-7.33 (m, 1H) 6.92 (d, *J* = 7.2 Hz, 1H), 4.31 (t, *J* = 7.0 Hz, 2H), 2.14-2.07 (m, 2H), 1.46-1.39 (m, 2H), 1.31-1.17 (m, 4H), 0.82 (t, *J* = 7.2, 4.9 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.8, 155.7, 151.2, 147.7, 137.4, 136.5, 135.0, 126.6, 126.1, 125.6, 124.0, 122.8, 121.8, 117.2, 117.1, 106.8, 70.0, 31.6, 29.0, 25.8, 22.6, 14.0.HRMS (positive ESI) Calcd. For $C_{22}H_{24}N_2O_2$ (M + H) 349.1916, Found: 349.1911.

***N*-(8-Isobutoxynaphthalen-1-yl)picolinamide (3al)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (5:1) as an eluent R_f = 0.55; slight yellow solid (57.0mg, 89%),mp 81-84 ^{o}C.^{1}H NMR (400 MHz, $CDCl_3$): δ 12.72 (s, 1H), 8.99 (dd, *J* = 7.7, 1.3 Hz, 1H), 8.63-8.61 (m, 1H), 8.36 (dt, *J* = 7.9, 1.0 Hz, 1H), 7.91 (td, *J* = 7.7, 1.7 Hz, 1H), 7.58-7.56 (m, 1H), 7.53-7.42 (m, 3H), 7.35 (t, *J* = 7.9 Hz, 1H), 6.91 (d, *J* = 7.6 Hz, 1H), 4.09 (d, *J* = 7.1Hz, 2H), 2.69-2.56 (m, 1H), 1.03 (d, *J* = 6.6 Hz, 6H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.8, 155.7, 151.2, 147.6, 137.4, 136.5, 135.0, 126.6, 126.1, 125.6, 124.1, 122.8, 121.8, 117.3, 117.1, 106.8, 76.4, 27.3, 19.6.HRMS (positive ESI) Calcd. For $C_{20}H_{20}N_2O_2$ (M + H) 321.1603, Found: 321.1598.

***N*-(8-(2-Methylbutoxy)naphthalen-1-yl)picolinamide (3am)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.57;slight yellow oil (44.1mg, 66%).^{1}H NMR (400 MHz, $CDCl_3$): δ 12.71 (s, 1H), 8.98 (dd, *J* = 7.7, 1.3 Hz, 1H), 8.65-8.63 (m, 1H), 8.37-8.35 (m, 1H), 7.91 (td, *J* = 7.7, 1.7 Hz, 1H), 7.59-7.56 (m, 1H), 7.53-7.43 (m, 3H), 7.35 (t, *J* = 7.9 Hz, 1H), 6.92 (d, *J* = 7.1 Hz, 1H), 4.25-4.21 (m, 1H), 4.08-4.04 (m, 1H), 2.50-2.37 (m, 1H), 1.63-1.53 (m, 1H), 1.32-1.20 (m, 1H), 1.00 (d, *J* = 6.6 Hz, 3H), 0.91 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.8, 155.8, 151.2, 147.7, 137.4, 136.5, 135.0, 126.6, 126.1, 125.6, 124.1, 122.8, 121.8,

117.3, 117.1, 106.8, 75.2, 33.5, 26.3, 16.6, 11.1.HRMS (positive ESI) Calcd. For $C_{17}H_{14}N_2O_2$ (M + H) 335.1760, Found: 335.1756.

***N*-(8-(Isopentyloxy)naphthalen-1-yl)picolinamide (3an)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.52;white solid (54.8mg, 82%), mp 101-104 ^oC.^1H NMR (400 MHz, $CDCl_3$): δ 12.69 (s, 1H), 8.98 (dd, *J* = 7.7, 1.2 Hz, 1H), 8.69-8.67(m, 1H), 8.36 (d, *J* = 7.9 Hz, 1H), 7.92 (td, *J* = 7.7, 1.7 Hz, 1H), 7.58-7.53(m, 1H), 7.52-7.47(m, 2H), 7.45-7.42 (m, 1H), 7.36 (t, *J* = 7.9 Hz, 1H), 6.94 (d, *J* = 7.2 Hz, 1H), 4.35 (t, *J* = 7.3 Hz, 2H), 2.04 (q, *J* = 7.3 Hz 2H), 1.79 (p, *J* = 6.7 Hz, 1H), 0.94 (d, *J* = 6.6 Hz, 6H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.8, 155.7, 151.2, 147.7, 137.5, 136.5, 135.0, 126.6, 126.1, 125.6, 124.0, 122.8, 121.8, 117.2, 117.1, 106.8, 68.6, 37.6, 25.4, 22.7.HRMS (positive ESI) Calcd. For $C_{21}H_{22}N_2O_2$ (M + H) 335.1760, Found: 335.1754.

***N*-(8-(Cyclopropylmethoxy)naphthalen-1-yl)picolinamide (3ao)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent Rf = 0.45;gray solid (28.7mg, 45%), mp 102-105^oC.^1H NMR (400 MHz, $CDCl_3$): δ 12.95 (s, 1H), 8.98 (dd, *J* = 7.7, 1.3 Hz, 1H), 8.56-8.54(m, 1H), 8.37-8.33 (m, 1H), 7.90 (td, *J* = 7.7, 1.7 Hz, 1H), 7.58-7.56(m, 1H), 7.52-7.49(m, 1H), 7.46-7.43 (m, 2H), 7.34 (dd, *J* = 14.1, 6.1 Hz, 1H), 6.94 (dd, *J* = 7.7, 0.7 Hz, 1H), 4.20 (d, *J* = 7.1 Hz, 2H), 1.65-1.56 (m, 1H), 0.59-0.54 (m, 2H), 0.42-0.37 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.7, 155.6, 151.3, 147.6, 137.4, 136.5, 135.1, 126.6, 126.1, 125.6, 124.0, 122.8, 121.9, 117.3, 117.1, 107.5, 74.8, 10.3, 3.9.HRMS (positive ESI) Calcd. For $C_{20}H_{18}N_2O_2$ (M + H) 319.1447, Found: 319.1441.

***N*-(8-(Cyclohexylmethoxy)naphthalen-1-yl)picolinamide (3ap)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.59;light yellow solid (33.2mg, 46%), mp 99-101^oC.^1H NMR (400 MHz, $CDCl_3$): δ 12.74 (s, 1H), 8.97 (dd, *J* = 7.7, 1.2 Hz, 1H), 8.72-8.70 (m, 1H), 8.36 (d, *J* = 7.8 Hz, 1H), 7.92 (td, *J* = 7.7, 1.7 Hz, 1H), 7.58-7.56 (m, 1H) 7.52-7.47 (m, 2H), 7.44-7.42 (m, 1H), 7.35 (t, *J* = 7.9 Hz, 1H), 6.91 (d, *J* = 7.2 Hz, 1H), 4.14 (d, *J* = 6.9 Hz, 2H), 2.34-2.28 (m, 1H), 1.92-1.90 (m, 2H), 1.66-1.63 (m, 3H), 1.18-0.91 (m, 5H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.7, 155.8, 151.3, 147.9, 137.5, 136.5, 135.0, 126.6, 126.0, 125.6, 124.0, 122.8, 121.7, 117.1, 106.9, 77.4, 77.1, 76.7, 75.5, 36.2, 30.0, 26.4, 25.5.HRMS (positive ESI) Calcd. For $C_{23}H_{24}N_2O_2$ (M + H) 361.1916, Found: 361.1911.

N-(8-(Adamantanylmethoxy)naphthalen-1-yl)picolinamide (3aq): purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent Rf = 0.57; white solid (46.2mg, 56%), mp 166-175 ^oC. 1H NMR (400 MHz, CDCl3): δ 12.41 (s, 1H), 8.89 (dd, J = 7.7, 1.2 Hz, 1H), 8.67-8.65 (m, 1H), 8.36 (d, J = 7.8 Hz, 1H), 7.91 (td, J = 7.7, 1.7 Hz, 1H), 7.58-7.56 (m, 1H), 7.51-7.46 (m, 2H), 7.44-7.41 (m, 1H), 7.34 (t, J = 7.9 Hz, 1H), 7.04 (d, J = 7.2 Hz, 1H), 4.08 (s, 2H), 1.89 (s, 3H), 1.67-1.66 (m, 7H), 1.62 (s, 2H), 1.48 (d, J = 11.5 Hz, 3H). 13C NMR (101 MHz, CDCl3): δ 162.9, 155.1, 151.2, 147.7, 137.4, 136.7, 135.1, 126.5, 126.1, 125.7, 124.1, 122.9, 121.7, 117.8, 117.2, 108.2, 76.7,

38.3, 20.0, 19.2, 14.0. HRMS (positive ESI) Calcd. For C27H28N2O2 (M + H) 413.2229, Found: 413.2224.

***N*-(8-(3-Methoxypropoxy)naphthalen-1-yl)picolinamide (3ar)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (1:1) as an eluent R_f = 0. 38;white solid (45.7mg, 68%), mp 136-139^{o}C.^{1}H NMR (400 MHz, $CDCl_3$): δ 12.69 (s, 1H), 8.99 (dd, *J* = 7.7, 1.2 Hz, 1H), 8.68-8.67 (m, 1H), 8.36 (d, *J* = 7.8 Hz, 1H), 7.92 (td, *J* = 7.7, 1.7 Hz, 1H), 7.58-7.56 (m, 1H), 7.53-7.46 (m, 2H), 7.45-7.42 (m, 1H) 7.36 (t, *J* = 7.9 Hz, 1H), 6.96 (d, *J* = 7.2 Hz, 1H), 4.44 (t, *J* = 6.3 Hz, 2H), 3.54 (t, *J* = 6.2 Hz, 2H), 3.23 (s, 3H), 2.42 (p, *J* = 6.2 Hz, 2H).^{13}C NMR (101 MHz, $CDCl_3$): δ 162.7, 155.6, 151.1, 147.8, 137.5, 136.5, 134.9, 126.6, 126.1, 125.7, 124.1, 122.8, 122.0, 117.3, 117.0, 106.9, 69.5, 66.8, 58.7, 29.3.HRMS (positive ESI) Calcd. For $C_{20}H_{20}N_2O_2$ (M + H) 337.1552, Found: 337.1547.

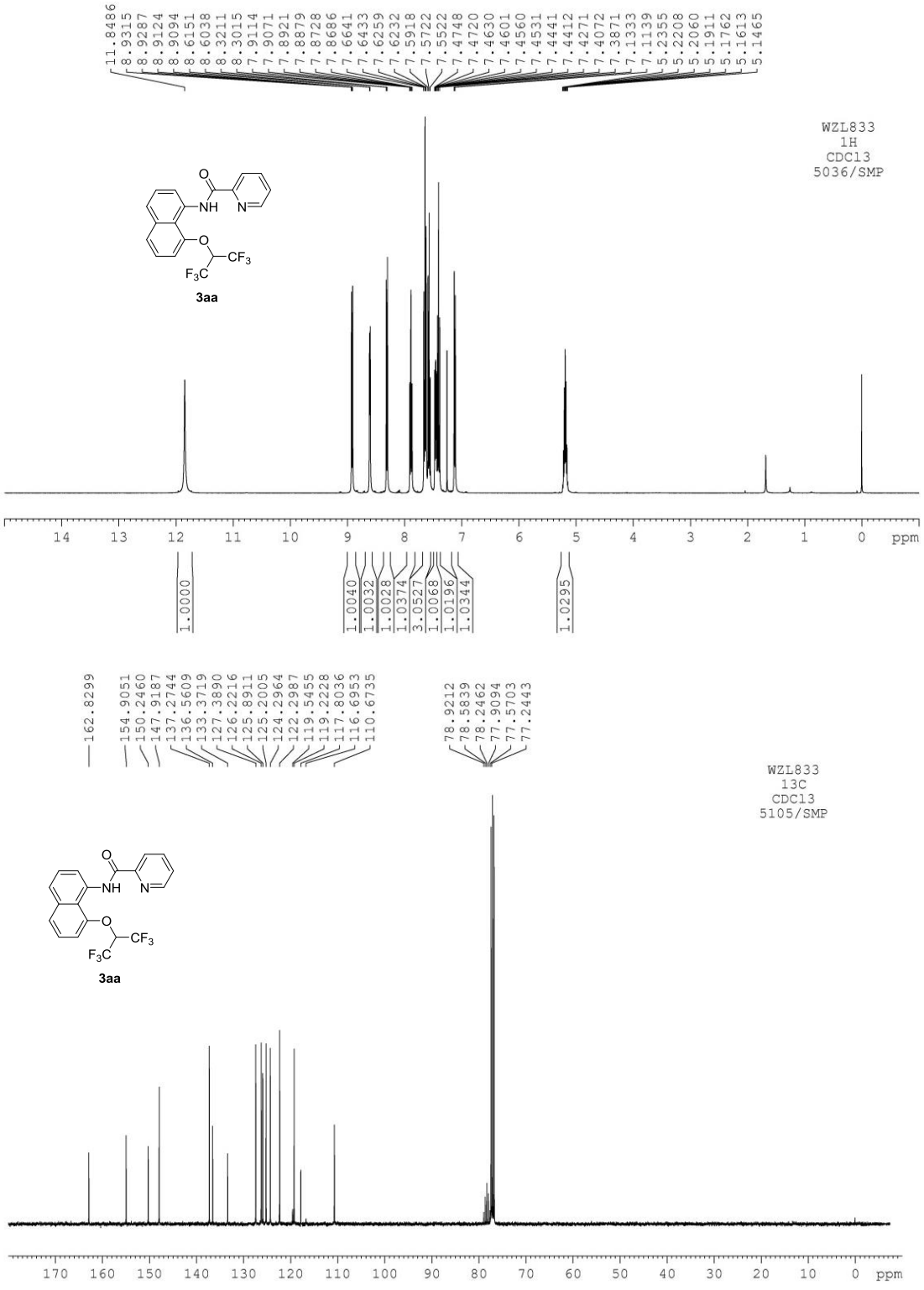
***N*-(8-((4-Bromobenzyl)oxy)naphthalen-1-yl)picolinamide (3as)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.40;white solid (60.7mg, 70%), mp 127-131 ^{o}C.^{1}H NMR (400 MHz, $CDCl_3$): δ 12.93 (s, 1H), 8.93 (dd, *J* = 7.5, 1.4 Hz, 1H), 8.27 (dd, *J* = 7.8, 0.9 Hz, 1H), 8.15-8.13(m, 1H), 7.83 (td, *J* = 7.7, 1.7 Hz, 1H), 7.55-7.45 (m, 2H), 7.41-7.39 (m, 1H), 7.35-7.30 (m, 5H), 7.24-7.22(m, 1H), 6.82 (d, *J* = 7.1 Hz, 1H), 5.39 (s, 2H).^{13}C NMR (101 MHz, $CDCl_3$): δ 162.5, 154.9, 150.7, 147.8, 137.4, 136.5, 135.7, 134.9, 131.7, 129.2, 126.8, 126.0, 125.5, 124.0, 122.5, 122.1, 117.2, 117.1, 108.0, 70.8.HRMS (positive ESI) Calcd. For $C_{23}H_{17}BrN_2O_2$ (M + H) 433.0552, Found: 433.0546.

***N*-(8-Isopropoxynaphthalen-1-yl)picolinamide (3at)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.48;light yellow solid (35.5mg, 58%), mp 81-83^{o}C.^{1}H NMR (400 MHz, $CDCl_3$) δ 12.71 (s, 1H), 9.01 (dd, *J* = 7.7, 1.3 Hz, 1H), 8.68-8.67(m, 1H), 8.36 (dt, *J* = 7.9, 1.0 Hz, 1H), 7.90 (td, *J* = 7.7, 1.7 Hz, 1H), 7.58-7.56(m, 1H), 7.52-7.46(m, 2H), 7.43-7.42 (m, 1H) 7.35 (t, *J* = 7.9 Hz, 1H), 6.98 (d, *J* = 7.6 Hz, 1H), 4.96-4.86 (m, 1H), 1.59 (d, *J* = 6.1 Hz, 6H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.9, 154.7, 151.2, 147.7, 137.4, 136.6, 135.1, 126.5, 126.1, 125.7, 124.1, 122.8, 121.8, 117.8, 117.1, 108.5, 72.9, 22.0.HRMS (positive ESI) Calcd. For $C_{19}H_{18}N_2O_2$ (M + H) 307.1447, Found: 307.1441.

***N*-(8-(*sec*-Butoxy)naphthalen-1-yl)picolinimidamide(3au)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.53;yellow oil (41.7mg, 65%).^{1}H NMR (400 MHz, $CDCl_3$): δ 12.72 (s, 1H), 9.01 (dd, *J* = 7.7, 1.3 Hz, 1H), 8.67-8.65 (m, 1H), 8.36 (dt, *J* = 7.9, 1.0 Hz, 1H), 7.91 (td, *J* = 7.7, 1.7 Hz, 1H), 7.58-7.56 (m, 1H), 7.53-7.46 (m, 2H), 7.44-7.42 (m, 1H), 7.35 (t, *J* = 7.9 Hz, 1H), 6.98 (d, *J* = 7.6 Hz, 1H), 4.710-4.62 (m, 1H), 2.25-2.13 (m, 1H), 1.90-1.79 (m, 1H), 1.54 (d, *J* = 6.1 Hz, 3H), 1.02 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.9, 155.1, 151.2, 147.6, 137.4, 136.7, 135.1, 126.5, 126.1, 125.7, 124.1, 122.8, 121.7, 117.8, 117.2, 108.3, 78.3, 29.0, 19.6, 10.4.HRMS (positive ESI) Calcd. For $C_{20}H_{20}N_2O_2$ (M + H) 321.1603, Found: 321.1598.

***N*-(8-(Pentan-2-yloxy)naphthalen-1-yl)picolinamide (3av)**: purified by analytical TLC on silica gel with petroleum ether/EtOAc (3:1) as an eluent R_f = 0.55;light yellow oil (59.5mg, 89%). ^{1}H NMR (400 MHz, $CDCl_3$): δ 12.71 (s, 1H), 9.01 (dd, *J* = 7.7, 1.3 Hz, 1H), 8.69 -8.67 (m, 1H), 8.36 (dt, *J* = 7.9, 1.0 Hz, 1H), 7.91 (td, *J* = 7.7, 1.7 Hz, 1H), 7.58-7.56 (dm, 1H), 7.53-7.46 (m, 2H), 7.44-7.42 (m, 1H), 7.35 (t, *J* = 7.9 Hz, 1H), 6.97 (d, *J* = 7.6 Hz, 1H), 4.77-4.70 (m, 1H), 2.27-2.16 (m, 1H), 1.80-1.70 (m, 1H), 1.53 (d, *J* = 6.1 Hz, 3H), 1.51-1.38 (m, 2H), 0.88 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$): δ 162.9, 155.1, 151.2, 147.7, 137.4, 136.7, 135.1, 126.5, 126.1, 125.7, 124.1, 122.9, 121.7, 117.8, 117.2, 108.2, 76.7, 38.3, 20.0, 19.2, 14.0. HRMS (positive ESI) Calcd. For C21H22N2O2 (M + H) 335.1760, Found: 335.1754.

NMR spectra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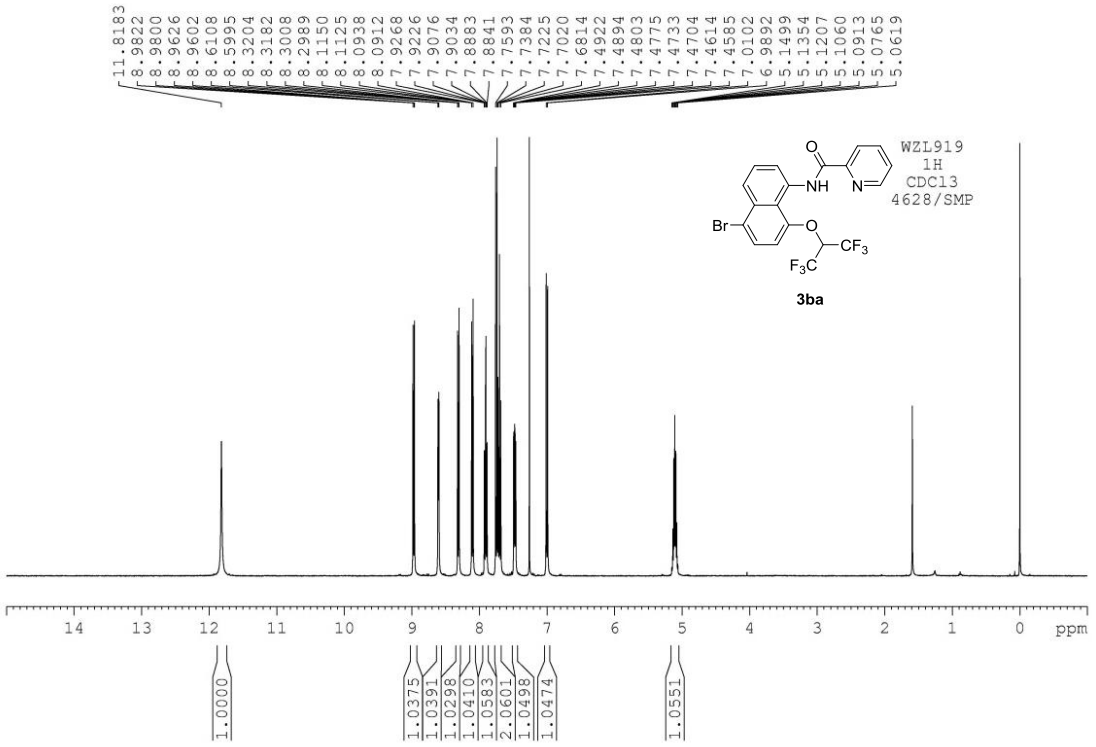
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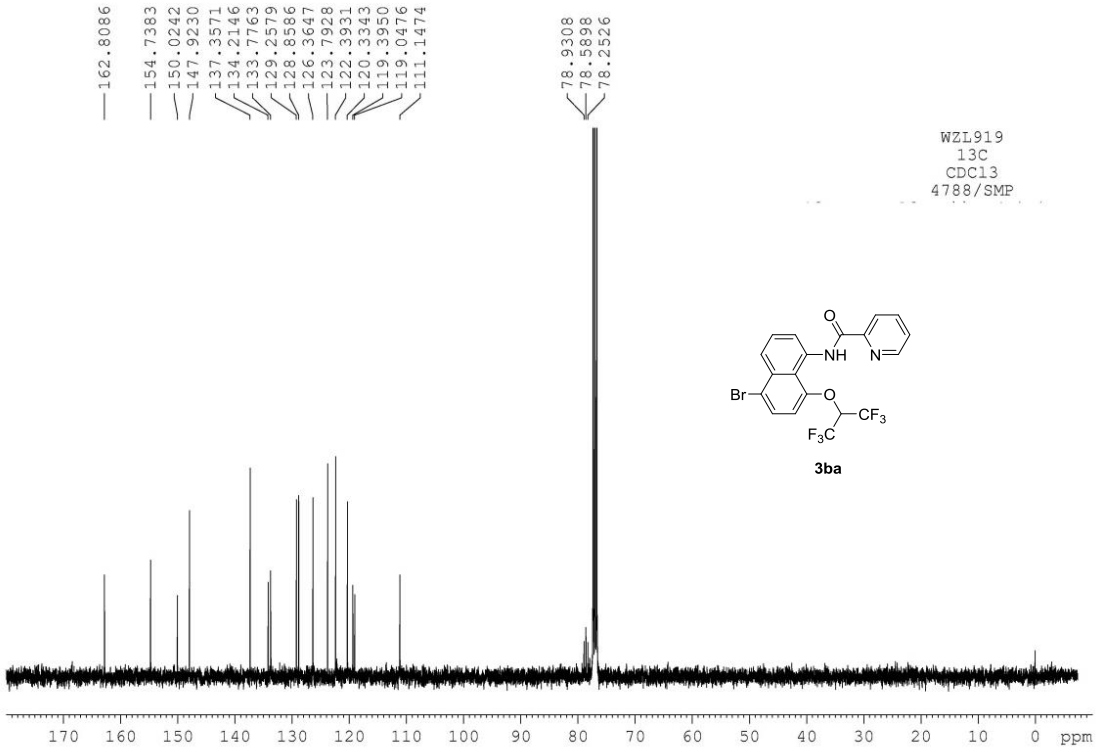
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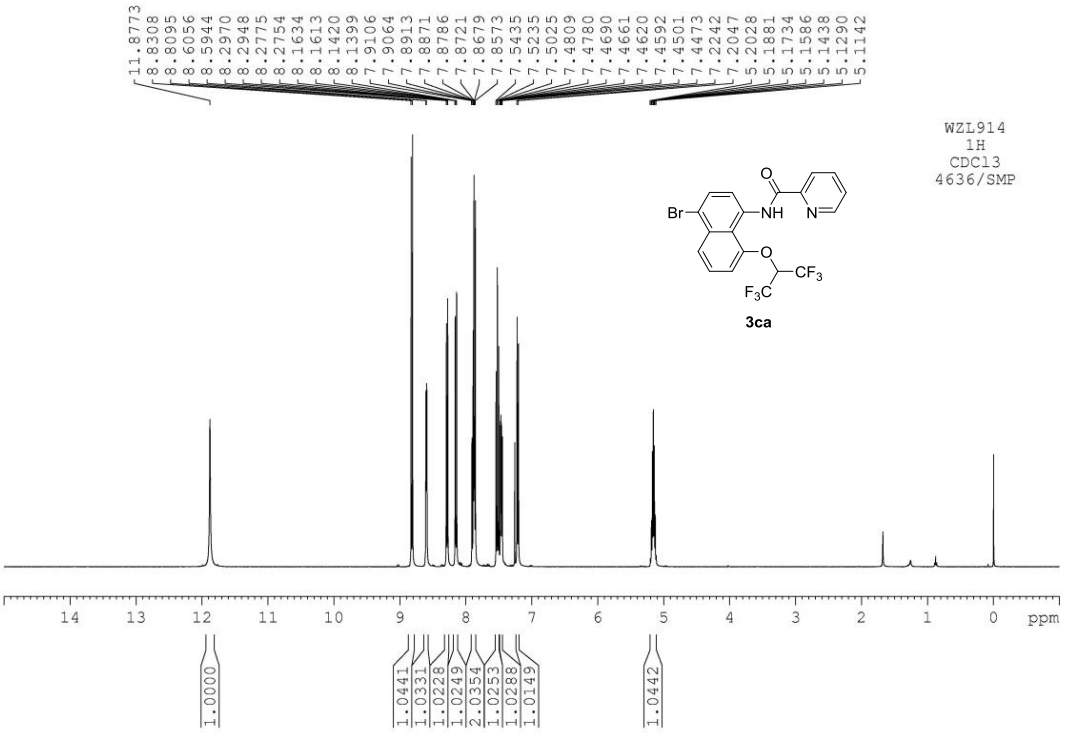
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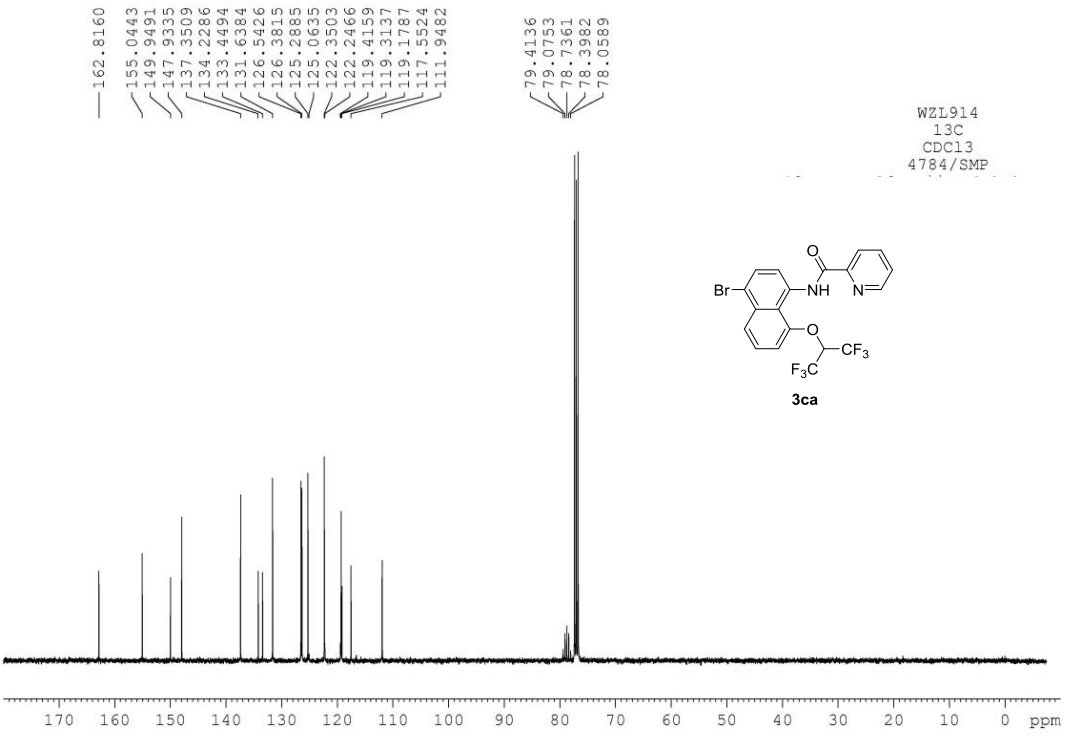
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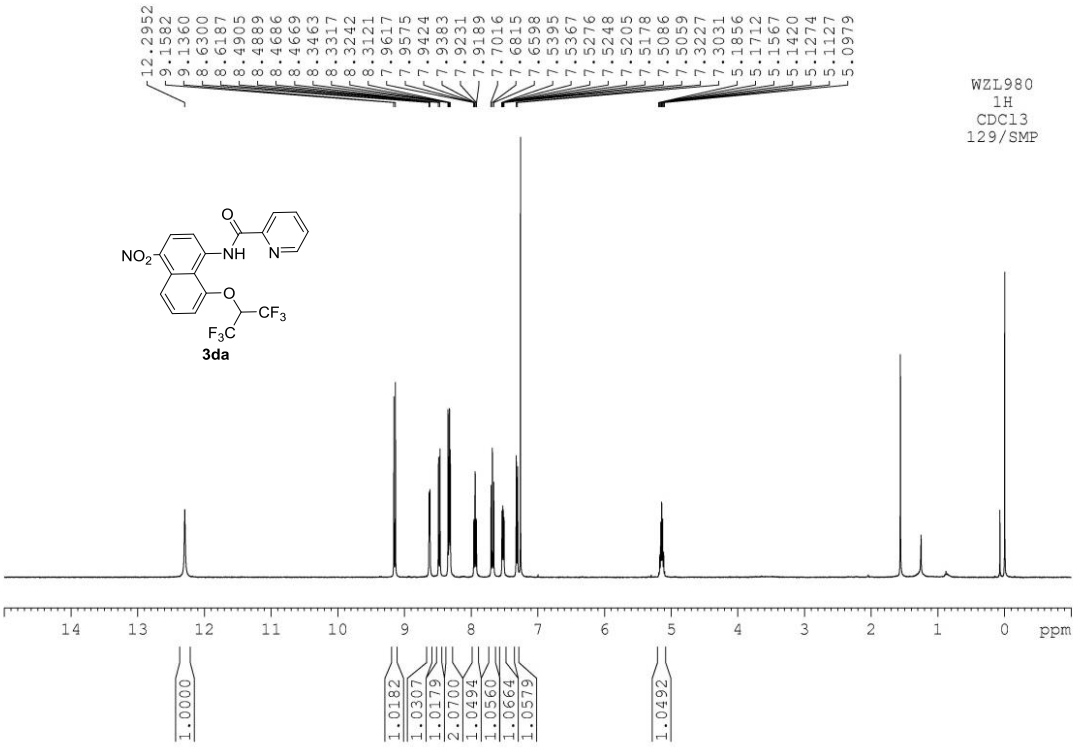
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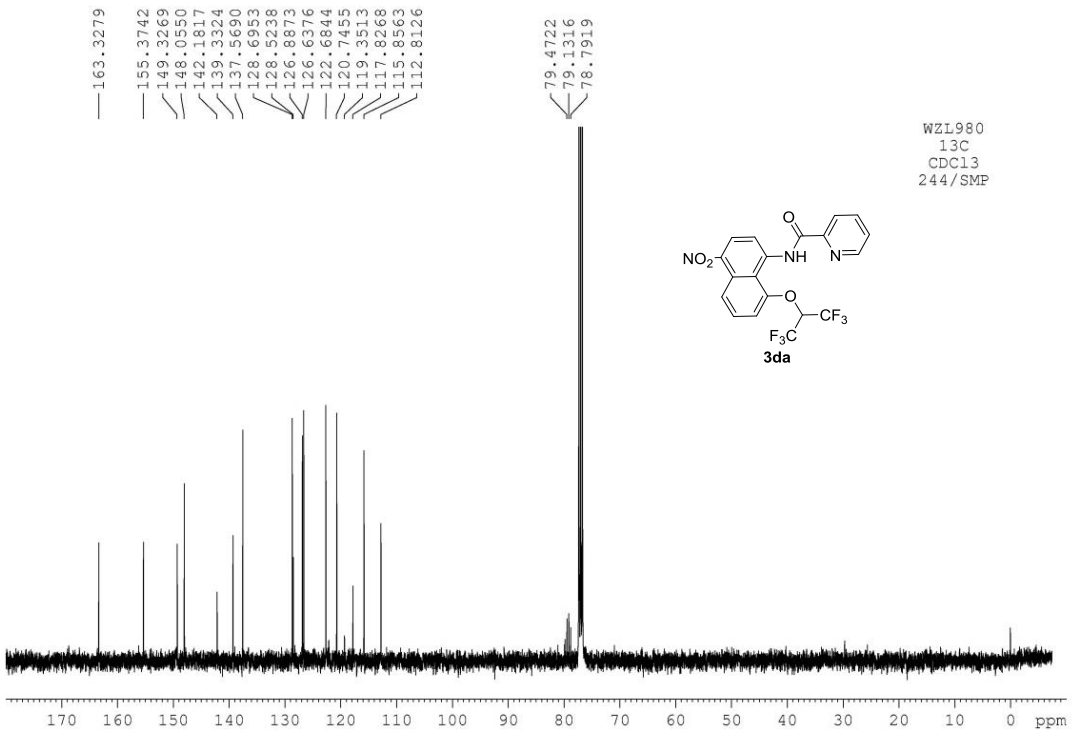
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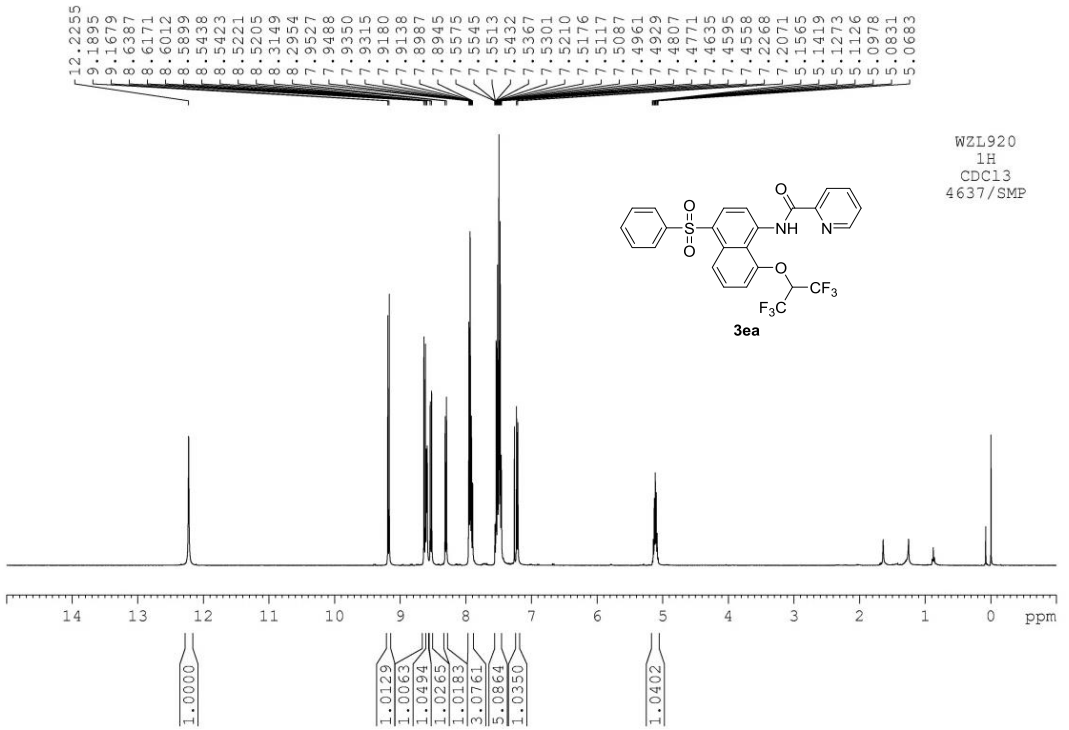
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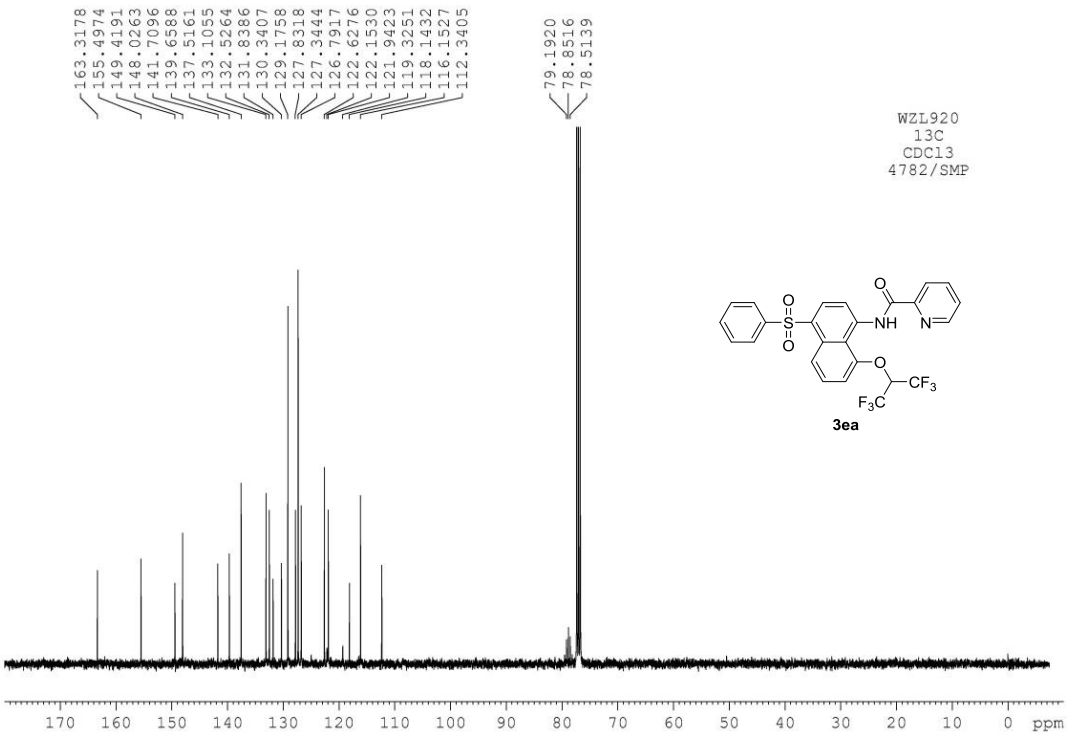
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3ea
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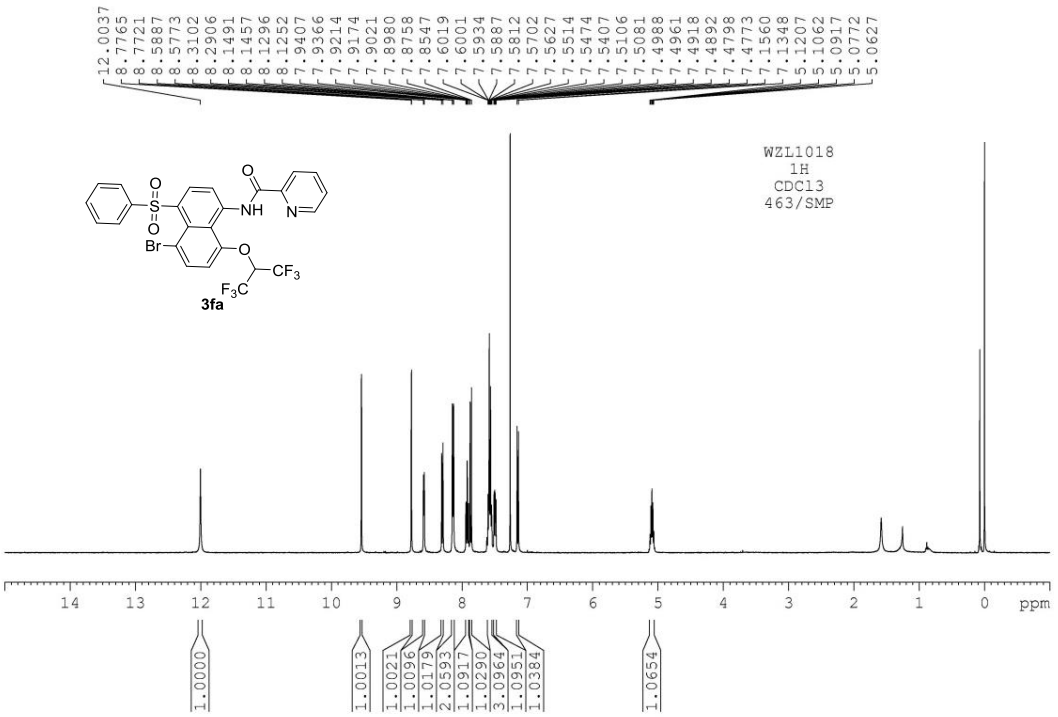
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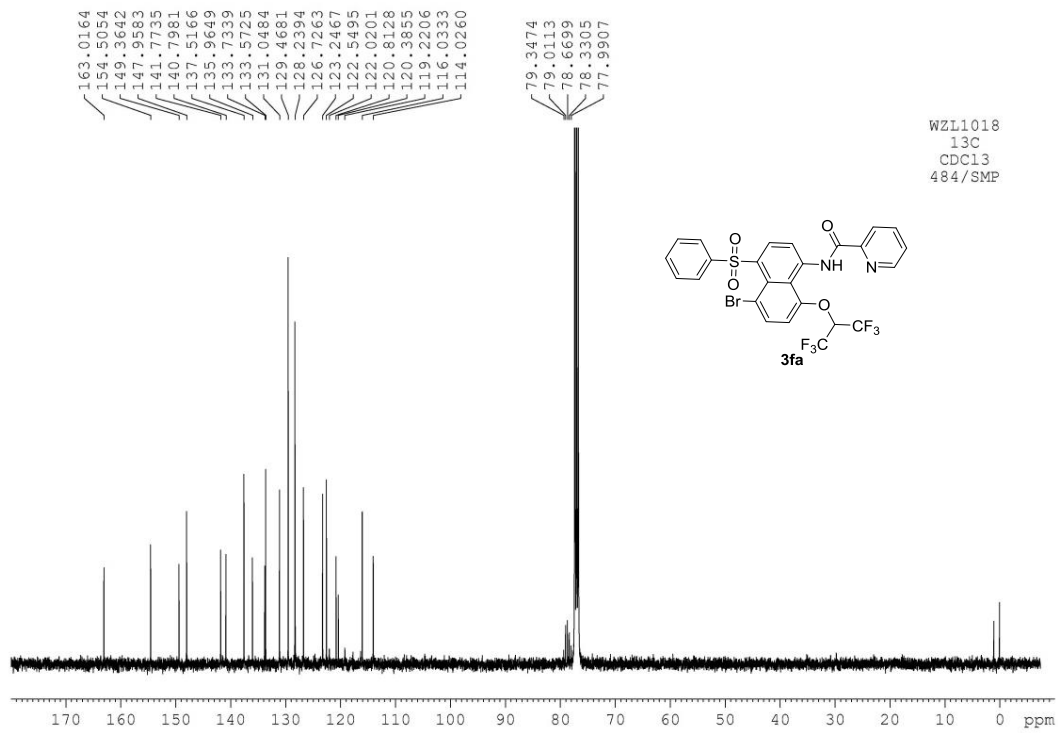
8.7765
8.7721
8.5887
8.5773
8.3102
8.2906
8.1491
8.1457
8.1296
8.1252
7.9407
7.9366
7.9214
7.9174
7.9021
7.8980
7.8758
7.8547
7.6019
7.6001
7.5934
7.5887
7.5812
7.5702
7.5627
7.5514
7.5474
7.5407
7.5106
7.5081
7.4988
7.4961
7.4918
7.4892
7.4798
7.4773
7.1560
7.1348
5.1207
5.1062
5.0917
5.0772
5.0627
WZL1018
1H
CDCl3
463/SMP
3fa
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
1.0000
1.0013
1.0021
1.0096
1.0179
2.0593
1.0917
1.0290
3.0964
1.0951
1.0384
1.0654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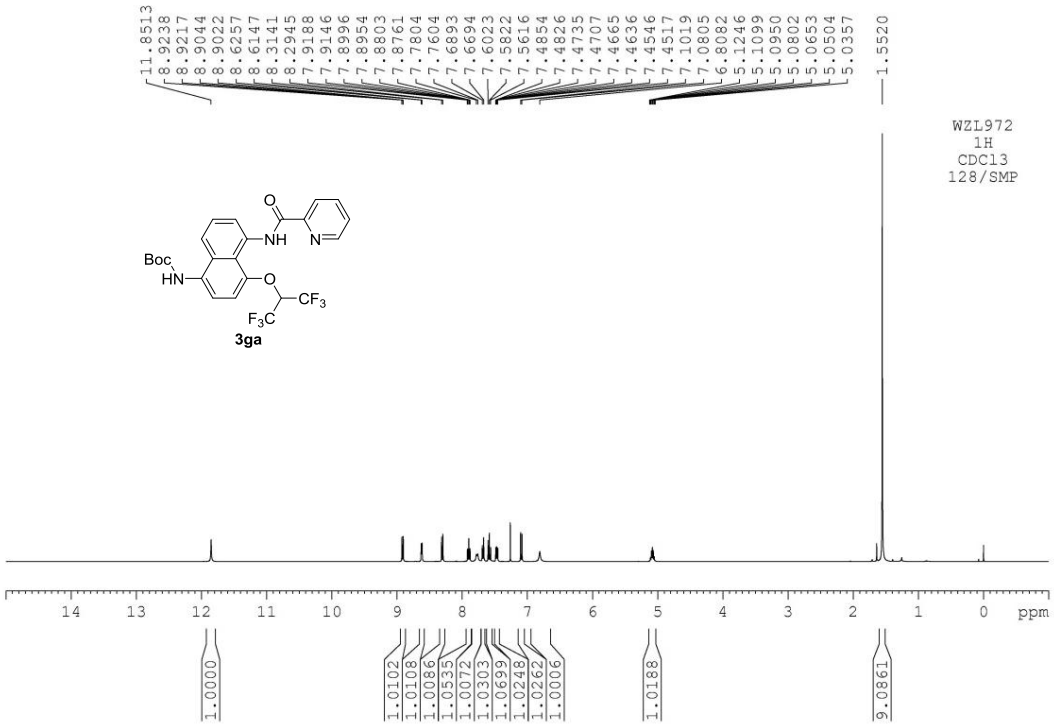
154.5054
149.3642
147.9583
141.7735
140.7981
137.5166
135.9649
133.7339
133.5725
131.0484
129.4681
128.2394
126.7263
123.2467
122.5495
122.0201
120.8128
120.3555
119.2206
116.0333
114.0260
79.3474
79.0113
78.6699
78.3305
77.9907
WZL1018
13C
CDCl3
484/SMP
3fa
170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm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8.9044
8.9022
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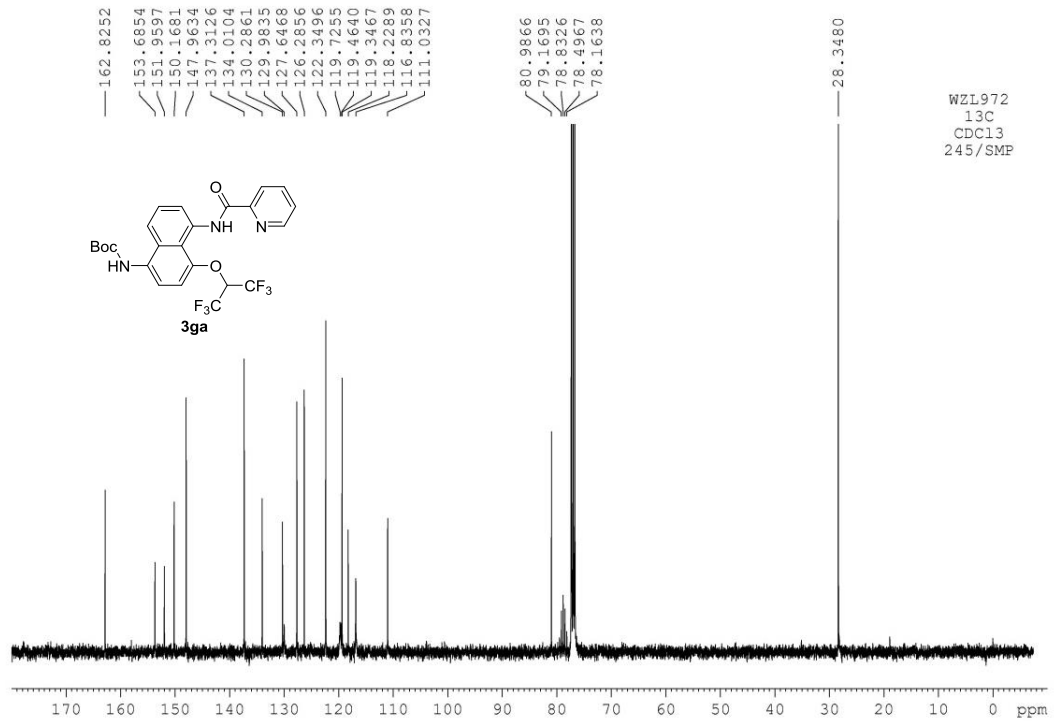
8.6147
8.3141
8.2945
7.9188
7.9146
7.8996
7.8954
7.8803
7.8761
7.7804
7.7604
7.6893
7.6694
7.6023
7.5822
7.5616
7.4854
7.4826
7.4735
7.4707
7.4665
7.4636
7.4546
7.4517
7.1019
7.0805
6.8082
5.1246
5.1099
5.0950
5.0802
5.0653
5.0504
5.0357
1.5520
WZL972
1H
CDCl3
128/SMP
Boc
HN
NH
N
O
O
CF3
F3C
3ga
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
ppm
1.0000
1.0102
1.0108
1.0086
1.0535
1.0072
1.0303
1.0699
1.0248
1.0262
1.0006
1.0188
9.0861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153.6854
151.9597
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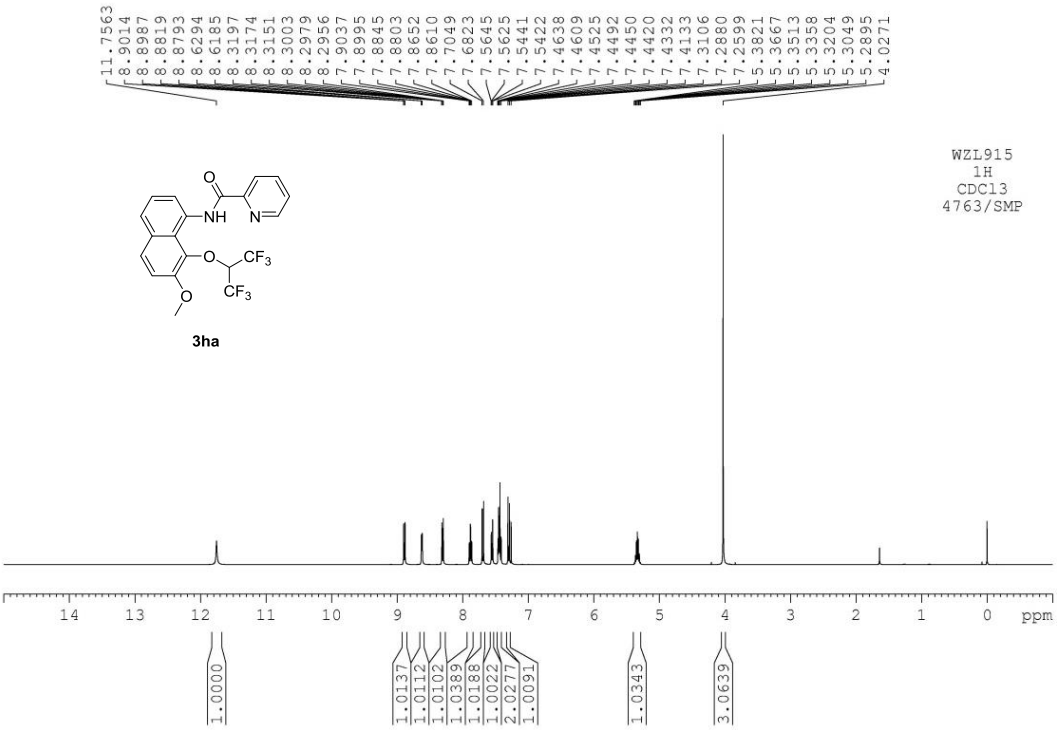
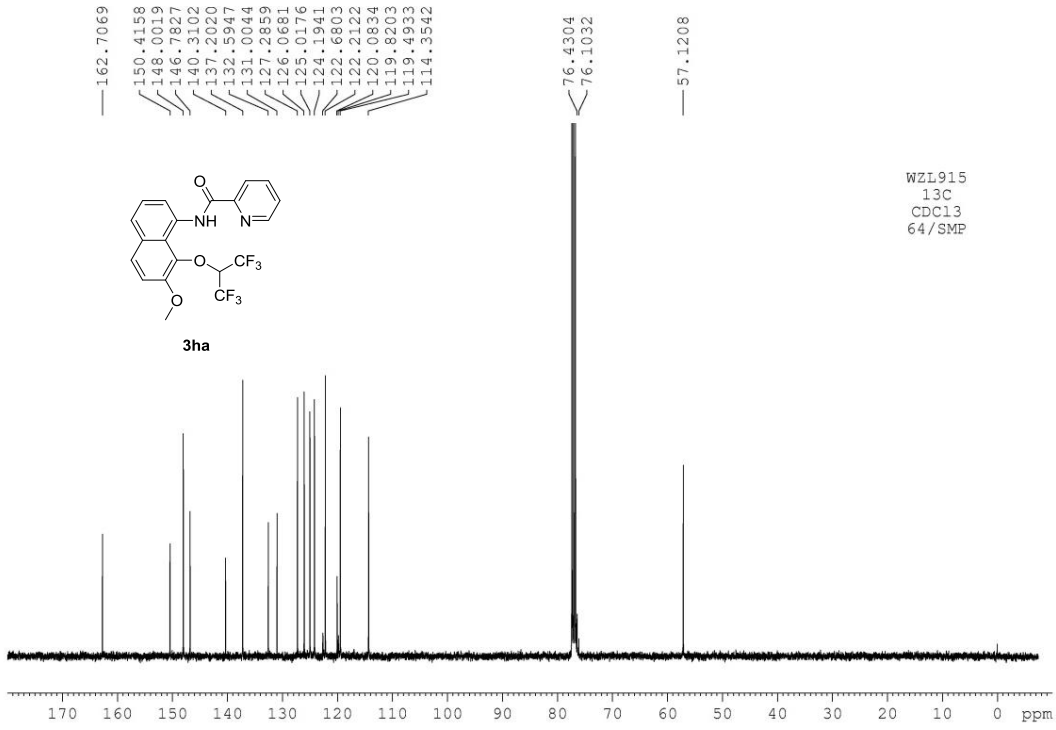
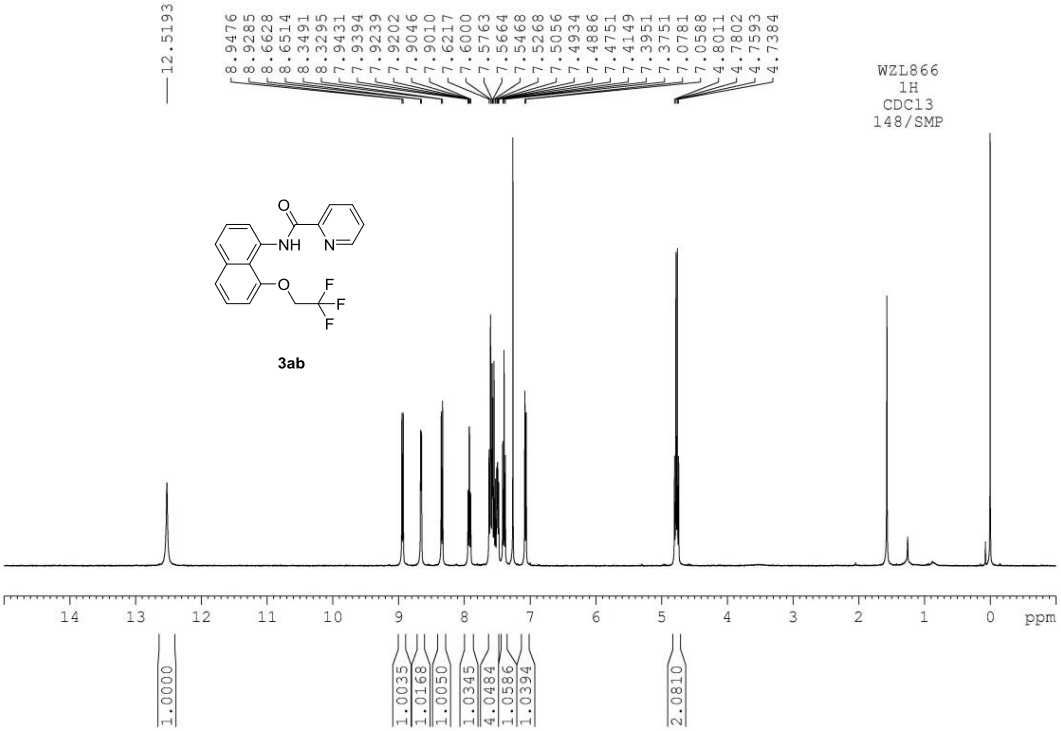
147.9634
137.3126
134.0104
130.2861
129.9835
127.6468
126.2856
122.3496
119.7255
119.4640
119.3467
118.2289
116.8358
111.0327
80.9866
79.1695
78.8326
78.4967
78.1638
28.3480
WZL972
13C
CDCl3
245/SMP
Boc
HN
NH
N
O
O
CF3
F3C
3ga
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm


11.7563
8.9014
8.8987
8.8819
8.8793
8.6294
8.6185
8.3197
8.3174
8.3151
8.3003
8.2979
8.2956
7.9037
7.8995
7.8845
7.8803
7.8652
7.8610
7.7049
7.6823
7.5645
7.5625
7.5441
7.5422
7.4638
7.4609
7.4525
7.4492
7.4450
7.4420
7.4332
7.4133
7.3106
7.2880
7.2599
5.3821
5.3667
5.3513
5.3358
5.3204
5.3049
5.2895
4.0271
WZL915
1H
CDCl3
4763/SMP
3ha
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
1.0000
1.0137
1.0112
1.0102
1.0389
1.0188
1.0022
2.0277
1.0091
1.0343
3.0639


162.7069
150.4158
148.0019
146.7827
140.3102
137.2020
132.5947
131.0044
127.2859
126.0681
125.0176
124.1941
122.6803
122.2122
120.0834
119.8203
119.4933
114.3542
76.4304
76.1032
57.1208
WZL915
13C
CDCl3
64/SMP
3ha
170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm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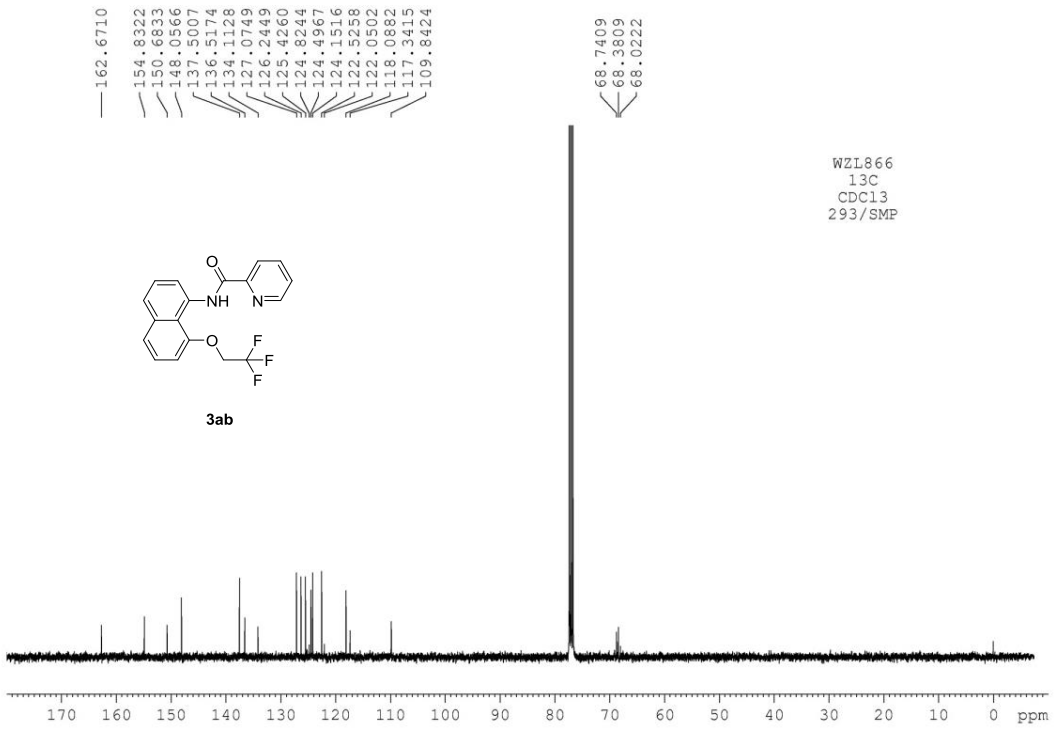
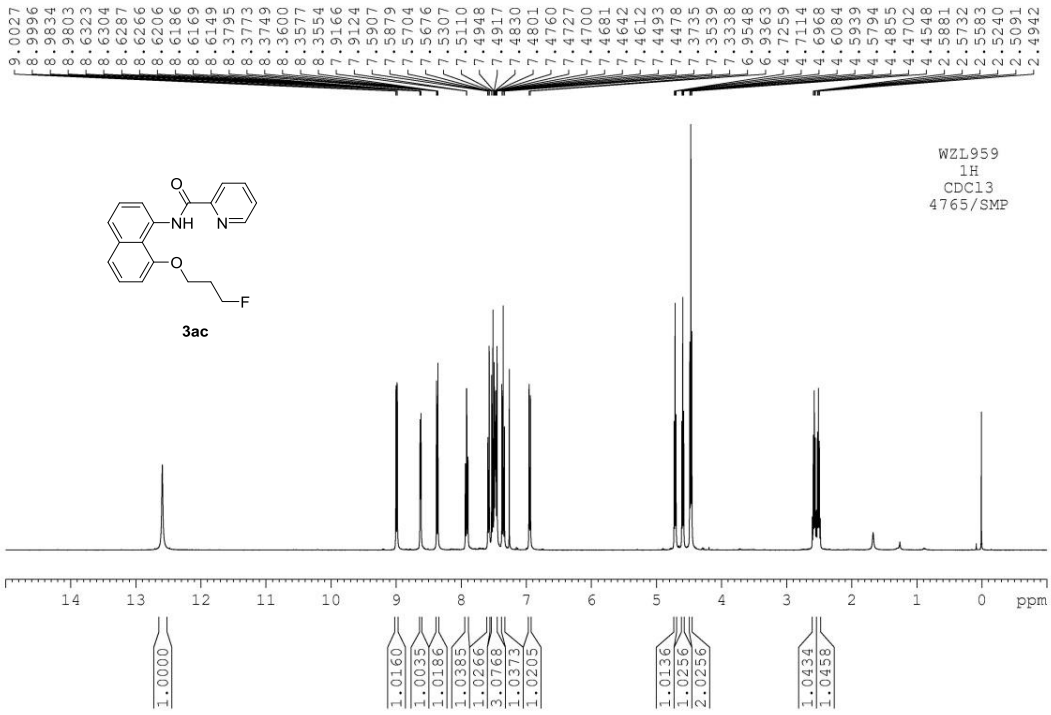
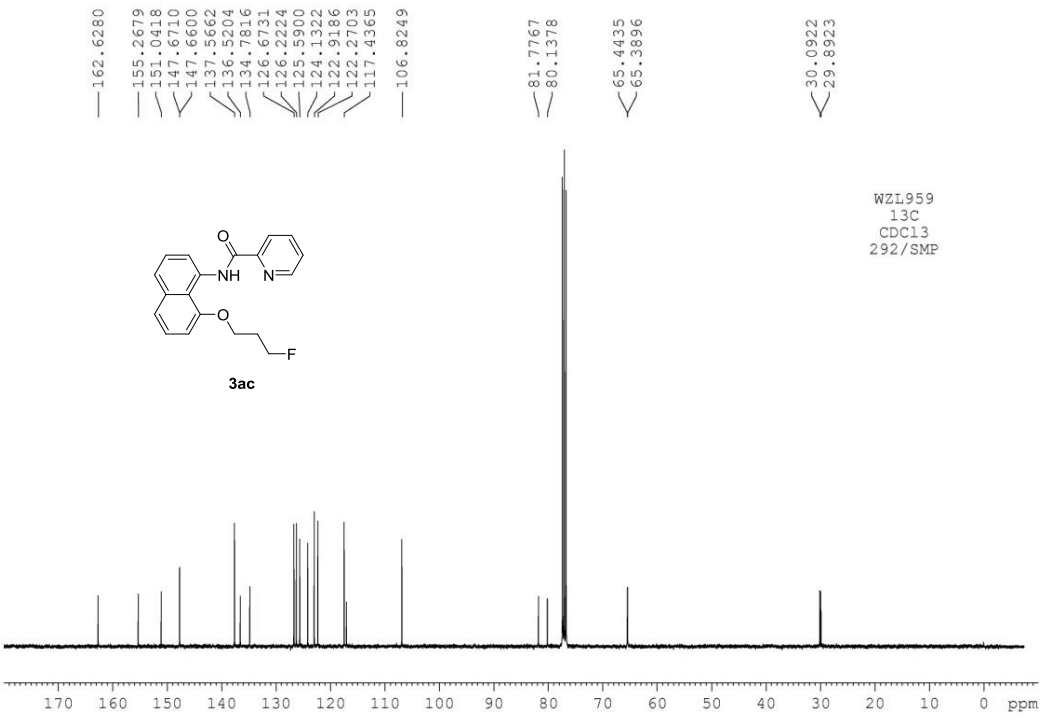
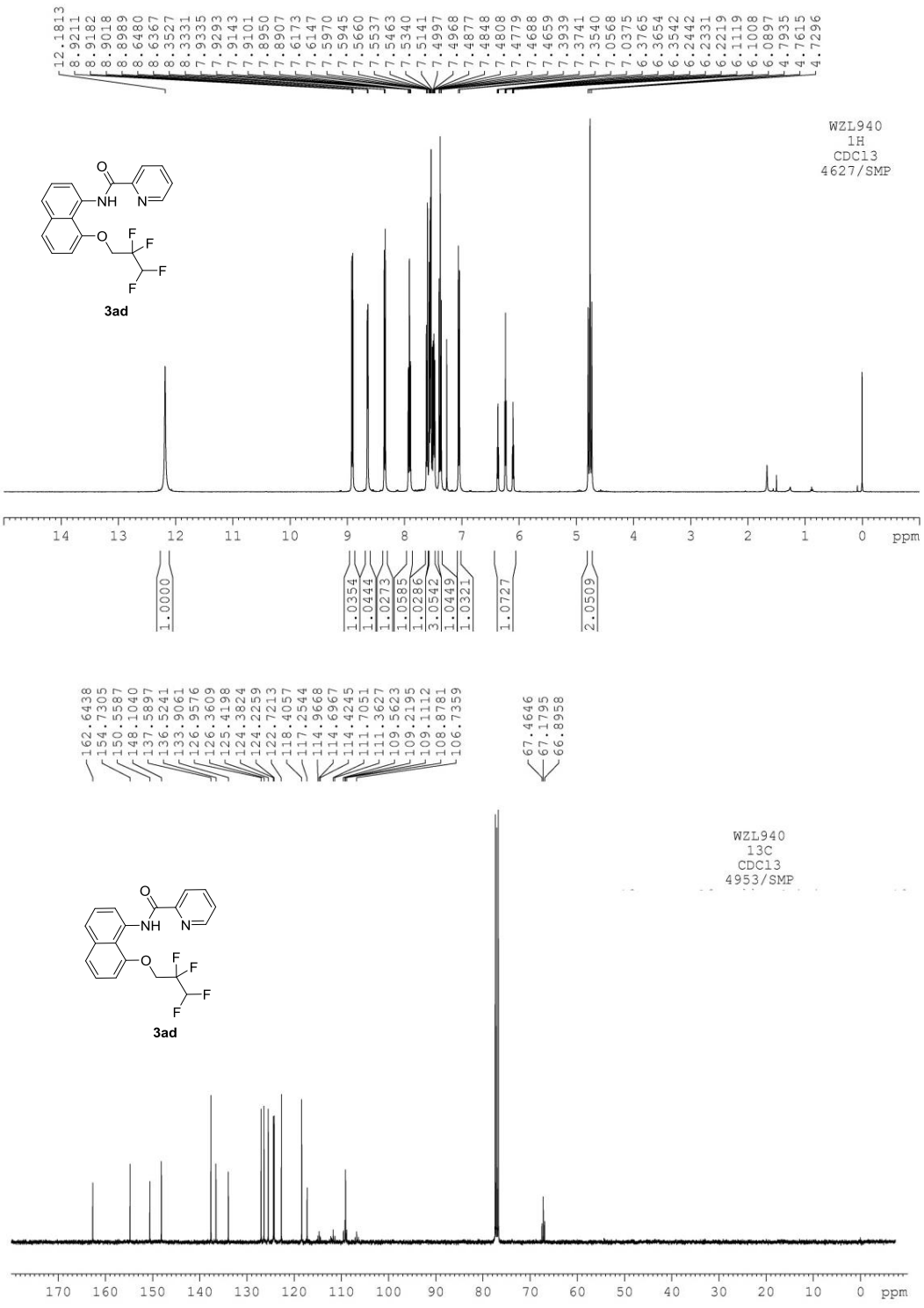
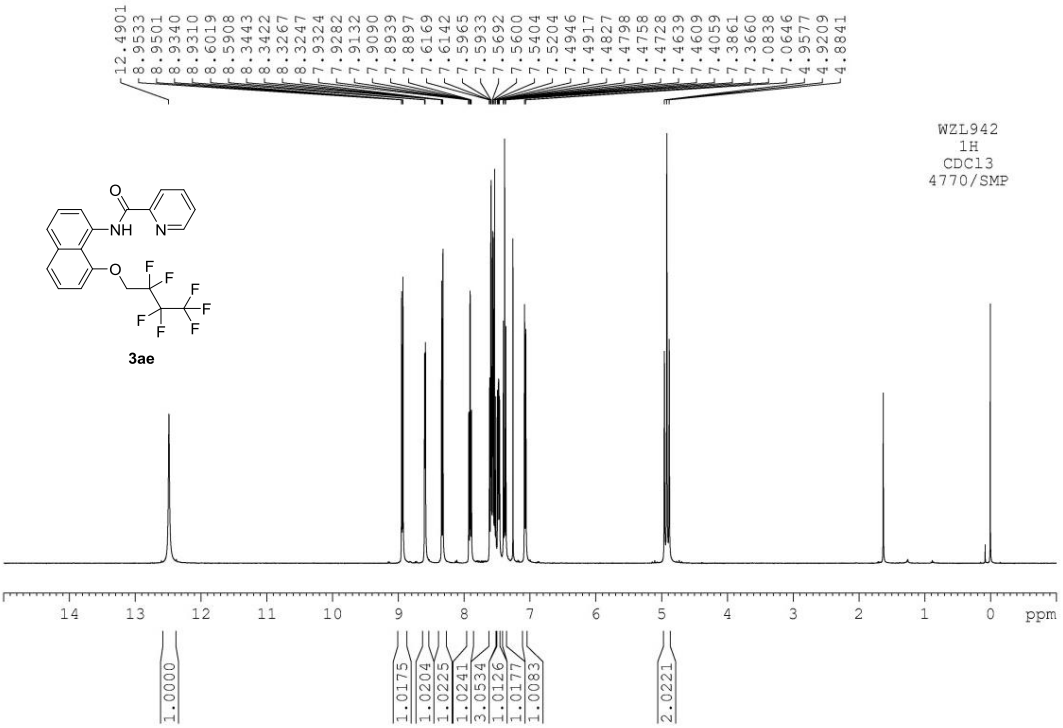
8.9476
8.9285
8.6628
8.6514
8.3491
8.3295
7.9431
7.9394
7.9239
7.9202
7.9046
7.9010
7.6217
7.6000
7.5763
7.5664
7.5468
7.5268
7.5056
7.4934
7.4886
7.4751
7.4149
7.3951
7.3751
7.0781
7.0588
4.8011
4.7802
4.7593
4.7384
WZL866
1H
CDCl3
148/SMP
NH
N
O
F
F
F
3ab
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
ppm
1.0000
1.0035
1.0168
1.0050
1.0345
4.0484
1.0586
1.0394
2.0810


162.6710
154.8322
150.6833
148.0566
137.5007
136.5174
134.1128
127.0749
126.2449
125.4260
124.8244
124.4967
124.1516
122.5258
122.0502
118.0882
117.3415
109.8424
68.7409
68.3809
68.0222
WZL866
13C
CDCl3
293/SMP
NH
N
O
F
F
F
3ab
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm


WZL959
1H
CDCl3
4765/SMP
3ac


WZL959
13C
CDCl3
292/SMP
3ac


12.1813
8.9211
8.9182
8.9018
8.8989
8.6480
8.6367
8.3527
8.3331
7.9335
7.9293
7.9143
7.9101
7.8950
7.8907
7.6173
7.6147
7.5970
7.5945
7.5660
7.5537
7.5463
7.5340
7.5141
7.4997
7.4968
7.4877
7.4848
7.4808
7.4779
7.4688
7.4659
7.3939
7.3741
7.3540
7.0568
7.0375
6.3765
6.3654
6.3542
6.2442
6.2331
6.2219
6.1119
6.1008
6.0897
4.7935
4.7615
4.7296
WZL940
1H
CDCl3
4627/SMP
3ad
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
1.0000
1.0354
1.0444
1.0273
1.0585
1.0286
3.0542
1.0449
1.0321
1.0727
2.0509
162.6438
154.7305
150.5587
148.1040
137.5897
136.5241
133.9061
126.9576
126.3609
125.4198
124.3824
124.2259
122.7213
118.4057
117.2544
114.9668
114.6967
114.4245
111.7051
111.3627
109.5623
109.2195
109.1112
108.8781
106.7359
67.4646
67.1795
66.8958
WZL940
13C
CDCl3
4953/SMP
3ad
170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm


12.4901
8.9533
8.9501
8.9340
8.9310
8.6019
8.5908
8.3443
8.3422
8.3267
8.3247
7.9324
7.9282
7.9132
7.9090
7.8939
7.8897
7.6169
7.6142
7.5965
7.5933
7.5692
7.5600
7.5404
7.5204
7.4946
7.4917
7.4827
7.4798
7.4758
7.4728
7.4639
7.4609
7.4059
7.3861
7.3660
7.0838
7.0646
4.9577
4.9209
4.8841
WZL942
1H
CDCl3
4770/SMP
3ae
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
1.0000
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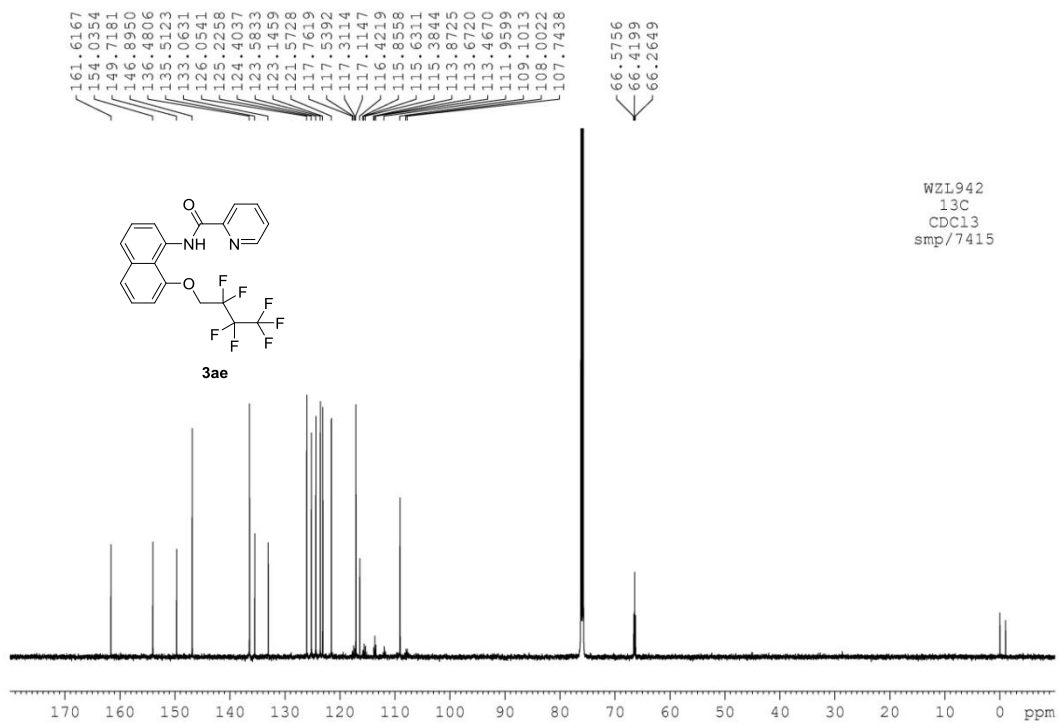
1.0204
1.0225
1.0241
3.0534
1.0126
1.0177
1.0083
2.0221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154.0354
149.7181
146.8950
136.4806
135.5123
133.0631
126.0541
125.2258
124.4037
123.5833
123.1459
121.5728
117.7619
117.5392
117.3114
117.1147
116.4219
115.8558
115.6311
115.3844
113.8725
113.6720
113.4670
111.9599
109.1013
108.0022
107.7438
66.5756
66.4199
66.2649
WZL942
13C
CDCl3
smp/7415
3ae
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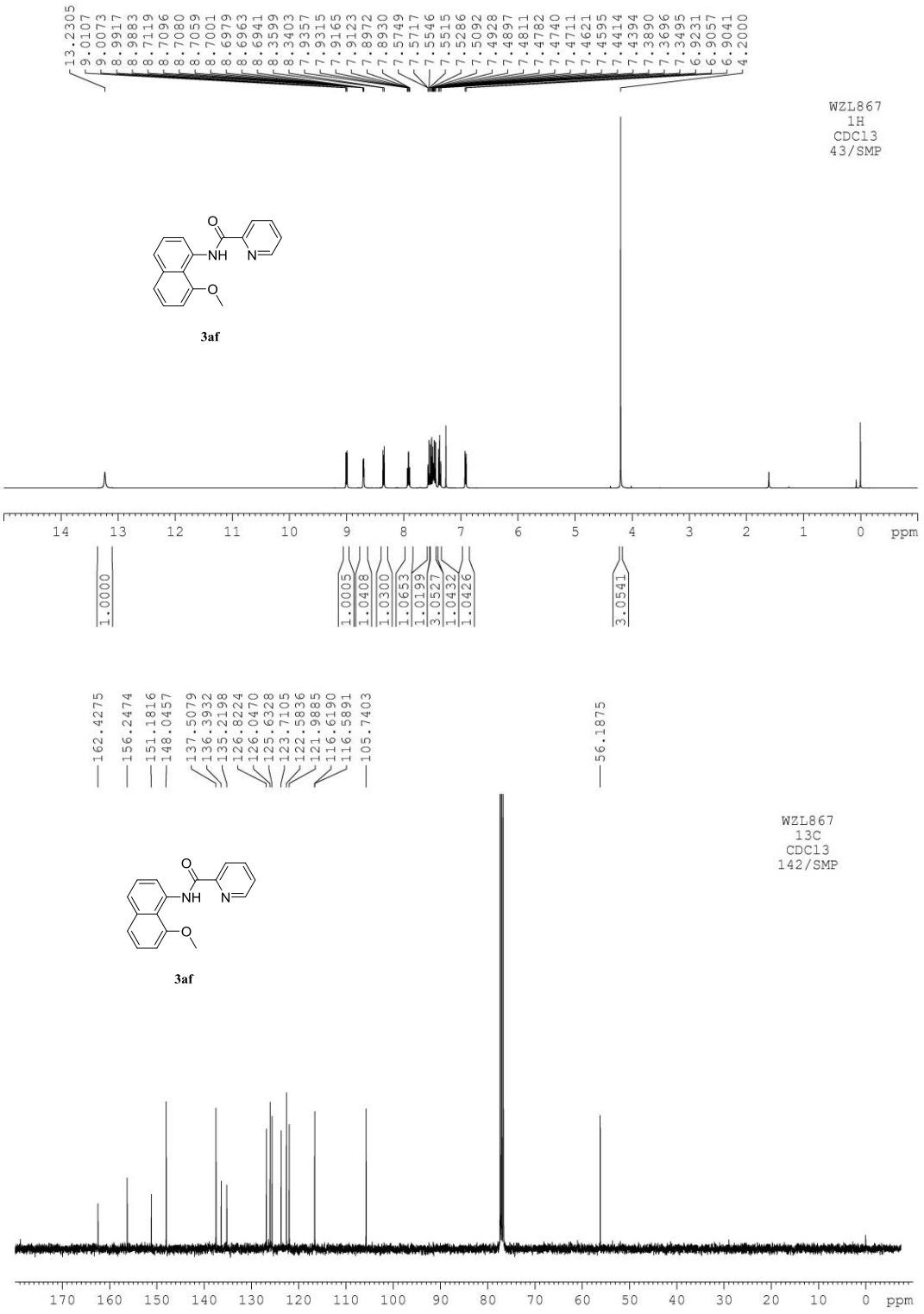
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9.0073
8.9917
8.9883
8.7119
8.7096
8.7080
8.7059
8.7001
8.6979
8.6963
8.6941
8.3599
8.3403
7.9357
7.9315
7.9165
7.9123
7.8872
7.8930
7.5749
7.5717
7.5546
7.5515
7.5286
7.5092
7.4928
7.4897
7.4811
7.4782
7.4740
7.4711
7.4621
7.4595
7.4414
7.4394
7.3890
7.3696
7.3495
6.9231
6.9057
6.9041
4.2000
WZL867
1H
CDCl3
43/SMP
3af
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
1.0000
1.0005
1.0408
1.0300
1.0653
1.0199
3.0527
1.0432
1.0426
3.0541
162.4275
156.2474
151.1816
148.0457
137.5079
136.3932
135.2198
126.8224
126.0470
125.6328
123.7105
122.5836
121.9885
116.6190
116.5891
105.7403
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WZL867
13C
CDCl3
142/SMP
3af
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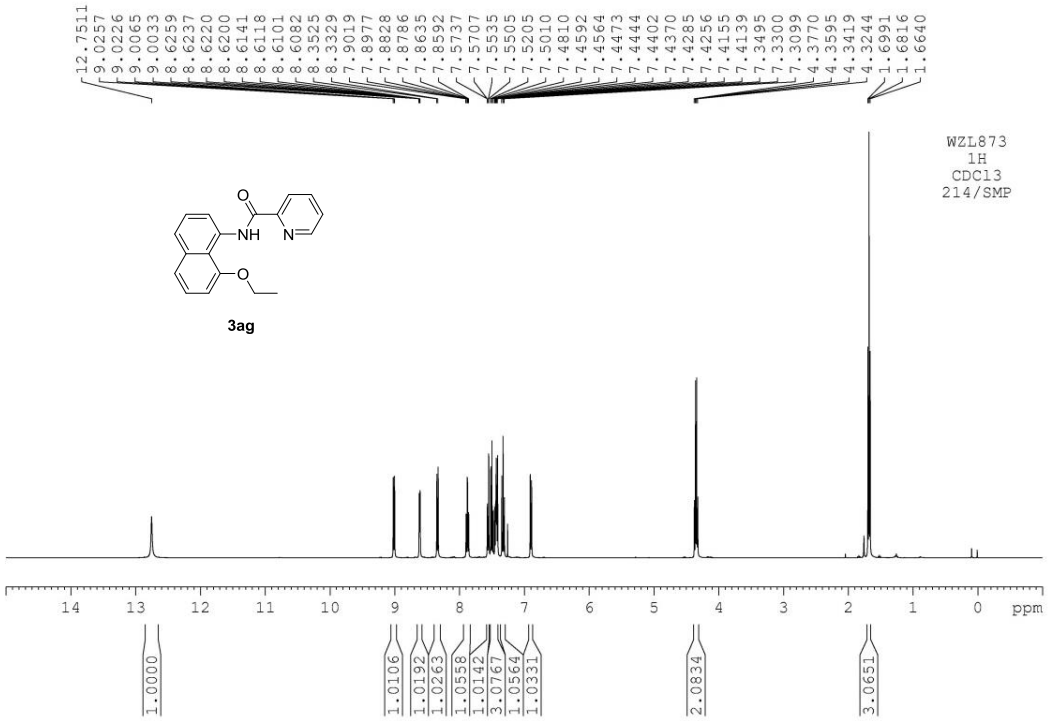
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9.0226
9.0065
9.0033
8.6259
8.6237
8.6220
8.6200
8.6141
8.6118
8.6101
8.6082
8.3525
8.3329
7.9019
7.8977
7.8828
7.8786
7.8635
7.8592
7.5737
7.5707
7.5535
7.5505
7.5205
7.5010
7.4810
7.4592
7.4564
7.4473
7.4444
7.4402
7.4370
7.4285
7.4256
7.4155
7.4139
7.3495
7.3300
7.3099
4.3770
4.3595
4.3419
4.3244
1.6991
1.6816
1.6640
WZL873
1H
CDCl3
214/SMP
NH
N
O
O
3ag
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
ppm
1.0000
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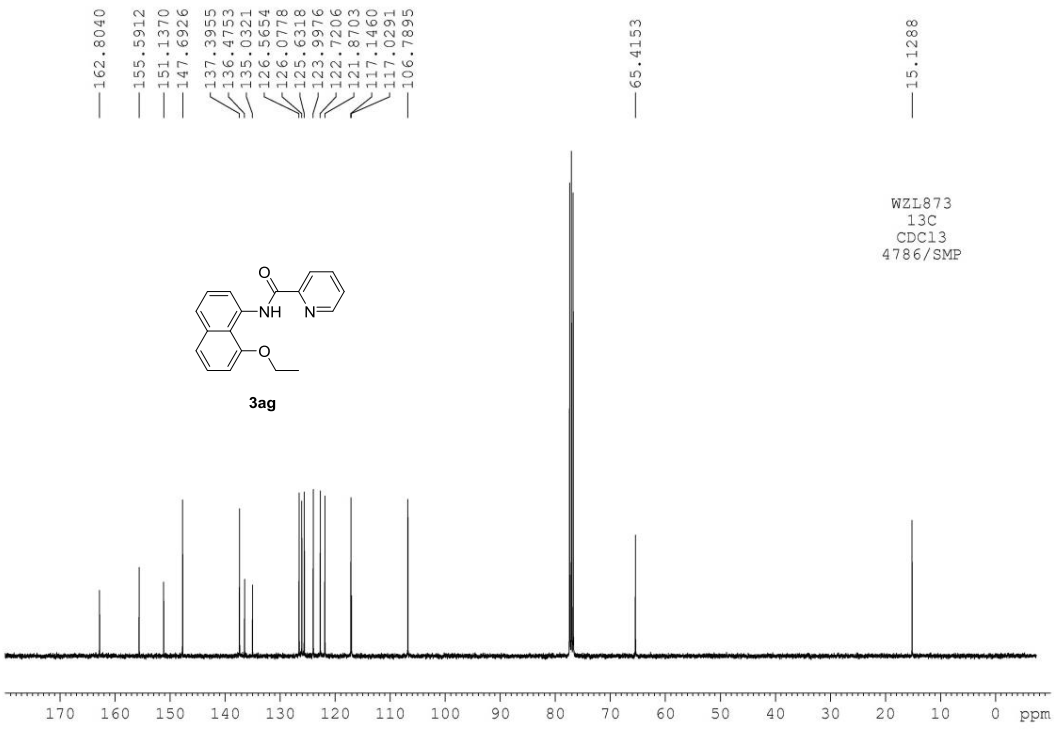
1.0263
1.0558
1.0142
3.0767
1.0564
1.0331
2.0834
3.0651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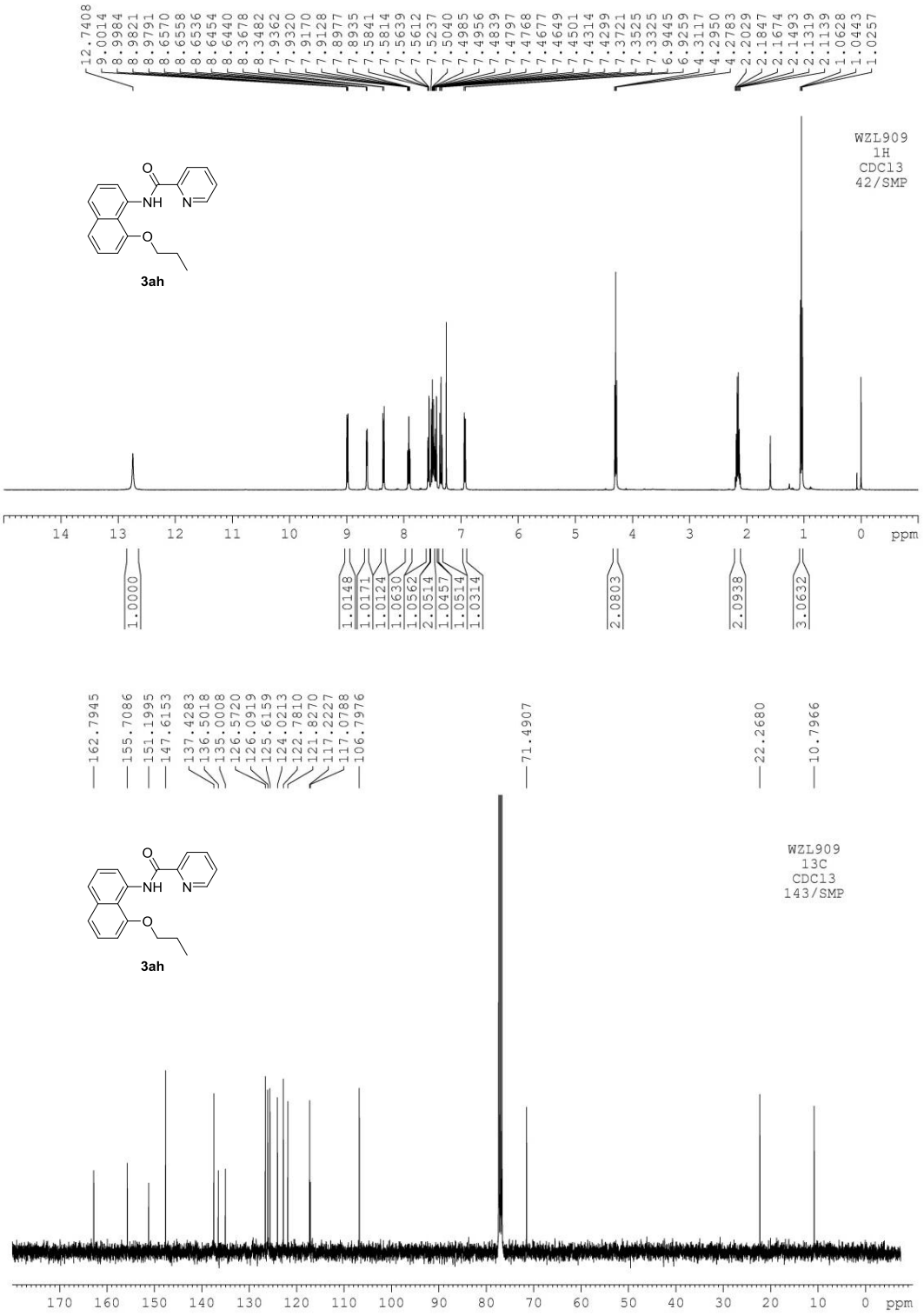
155.5912
151.1370
147.6926
137.3955
136.4753
135.0321
126.5654
126.0778
125.6318
123.9976
122.7206
121.8703
117.1460
117.0291
106.7895
65.4153
15.1288
WZL873
13C
CDCl3
4786/SMP
NH
N
O
O
3ag
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm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9.0014
8.9984
8.9821
8.9791
8.6570
8.6558
8.6536
8.6454
8.6440
8.3678
8.3482
7.9362
7.9320
7.9170
7.9128
7.8977
7.8935
7.5841
7.5814
7.5639
7.5612
7.5237
7.5040
7.4985
7.4956
7.4839
7.4797
7.4768
7.4677
7.4649
7.4501
7.4314
7.4299
7.3721
7.3525
7.3325
6.9445
6.9259
4.3117
4.2950
4.2783
2.2029
2.1847
2.1674
2.1493
2.1319
2.1139
1.0628
1.0443
1.0257
WZL909
1H
CDCl3
42/SMP
3ah
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
1.0000
1.0148
1.0171
1.0124
1.0630
1.0562
2.0514
1.0457
1.0514
1.0314
2.0803
2.0938
3.0632
162.7945
155.7086
151.1995
147.6153
137.4283
136.5018
135.0008
126.5720
126.0919
125.6159
124.0213
122.7810
121.8270
117.2227
117.0788
106.7976
71.4907
22.2680
10.7966
WZL909
13C
CDCl3
143/SMP
3ah
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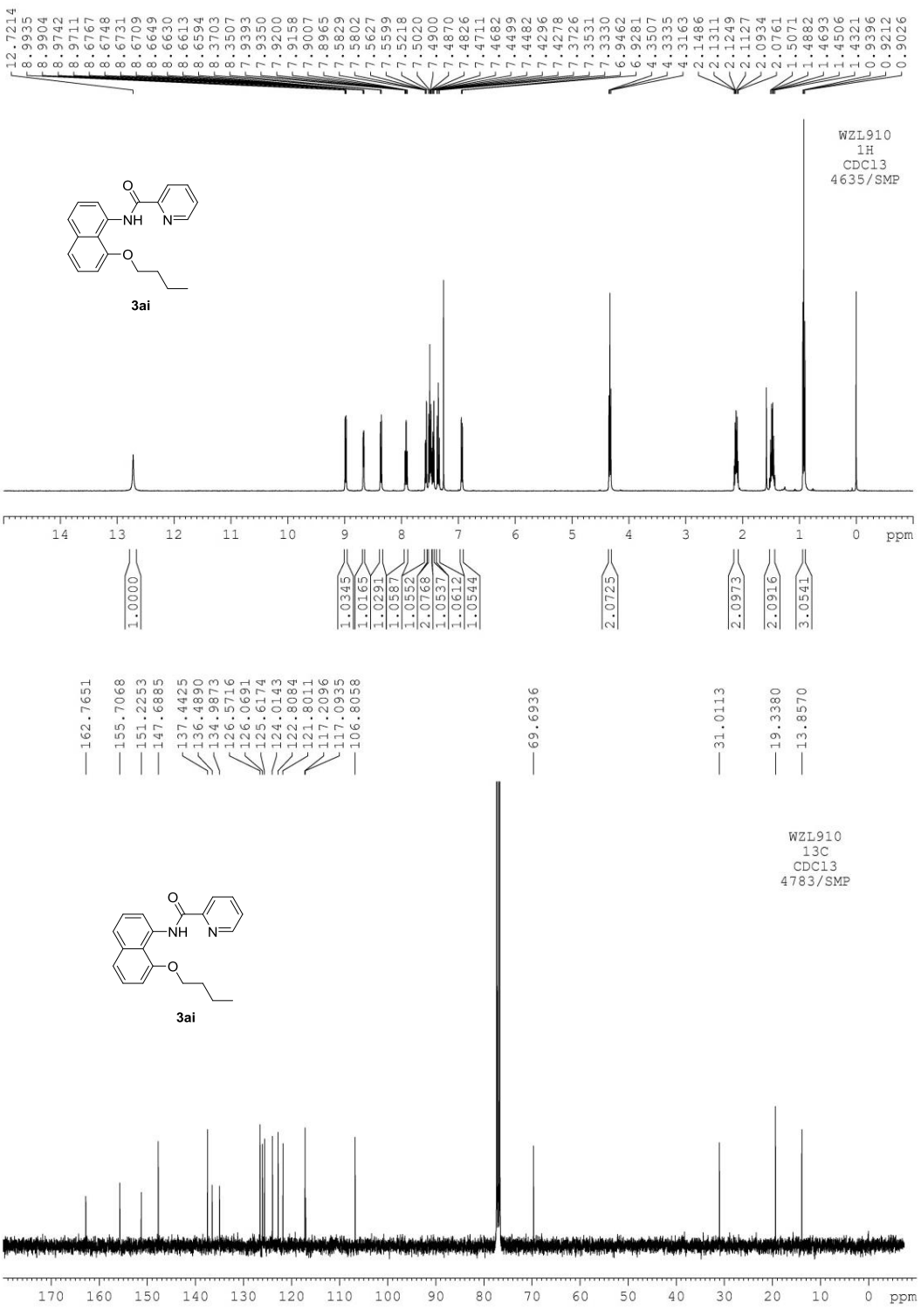
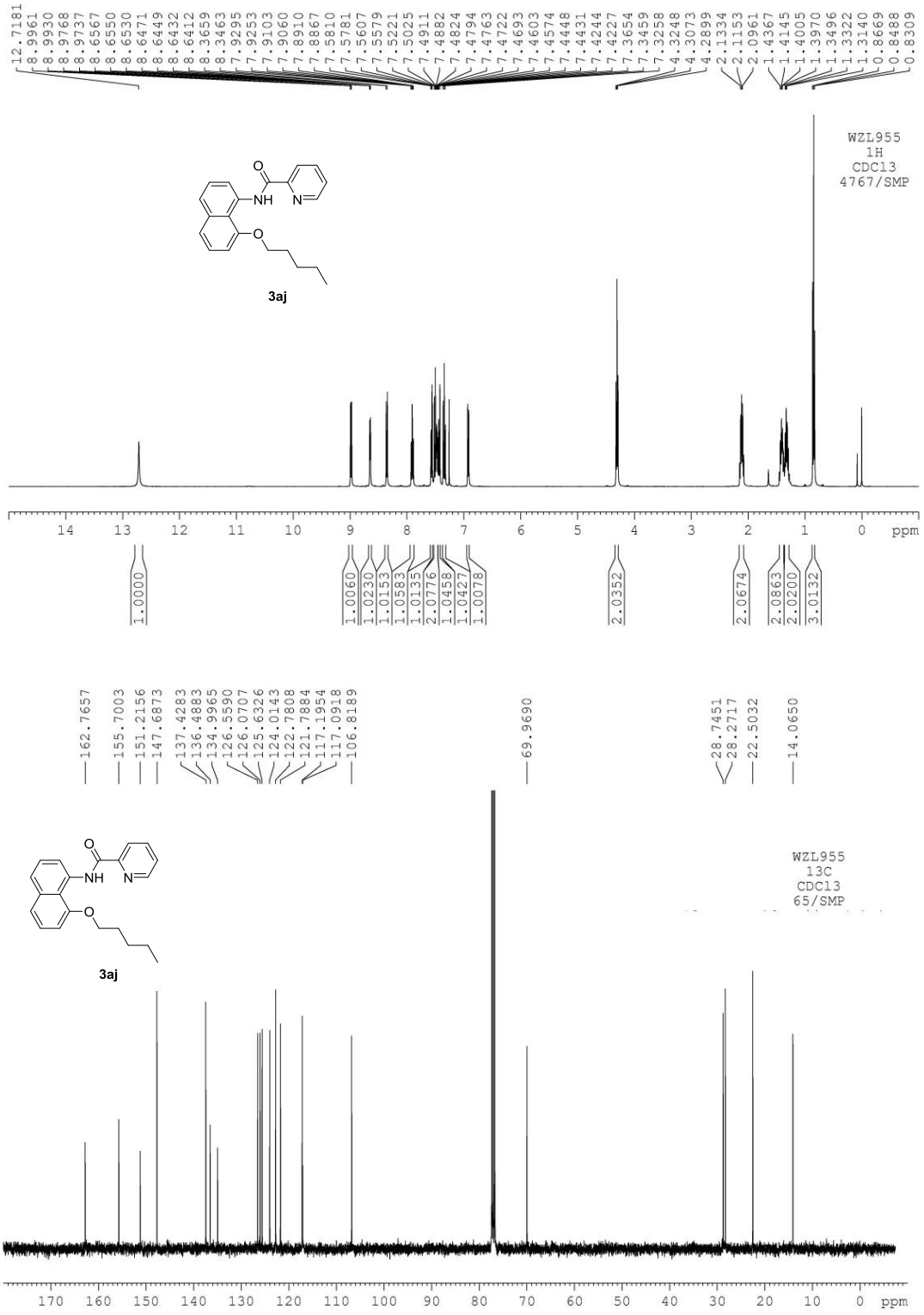
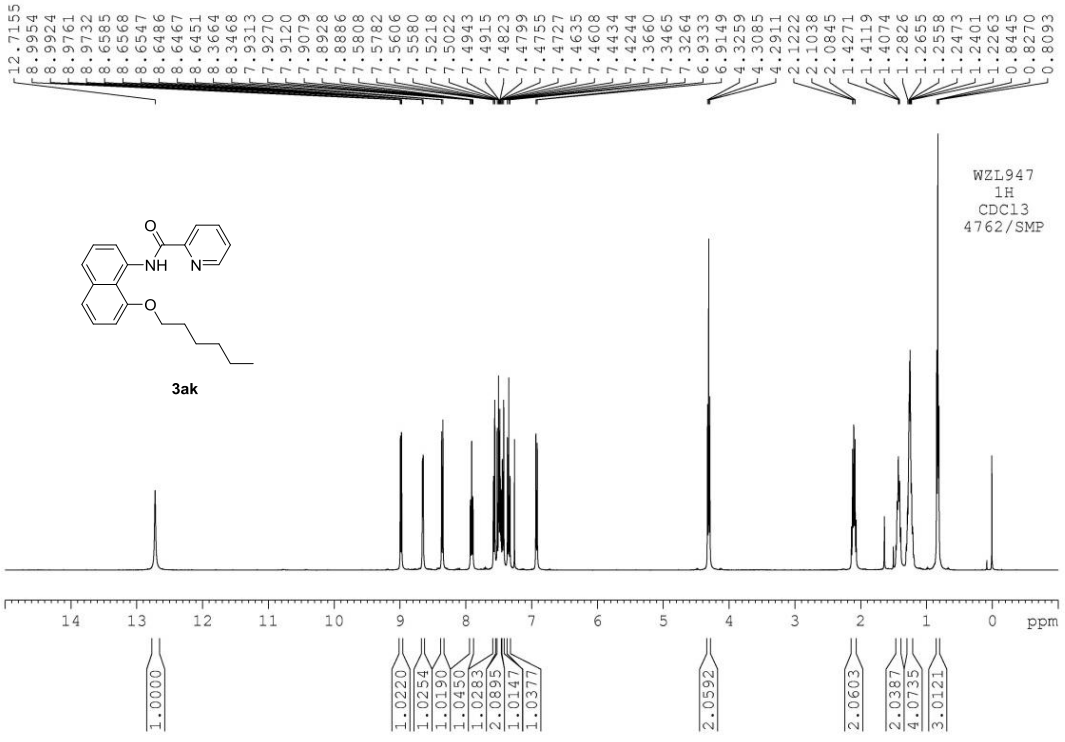

WZL910
1H
CDCl3
4635/SMP
3ai
WZL910
13C
CDCl3
4783/SMP
3ai


WZL955
1H
CDCl3
4767/SMP
3aj
WZL955
13C
CDCl3
65/SMP
3aj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8.9924
8.9761
8.9732
8.6585
8.6568
8.6547
8.6486
8.6467
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8.3468
7.9313
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7.9079
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7.5808
7.5782
7.5606
7.5580
7.5218
7.5022
7.4943
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7.4823
7.4799
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7.4727
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7.4608
7.4434
7.4244
7.3660
7.3465
7.3264
6.9333
6.9149
4.3259
4.3085
4.2911
2.1222
2.1038
2.0845
1.4271
1.4119
1.4074
1.2826
1.2655
1.2558
1.2473
1.2401
1.2263
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0.8270
0.8093
WZL947
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CDCl3
4762/SMP
NH
N
O
O
3ak
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
ppm
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1.0254
1.0190
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1.0377
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2.0603
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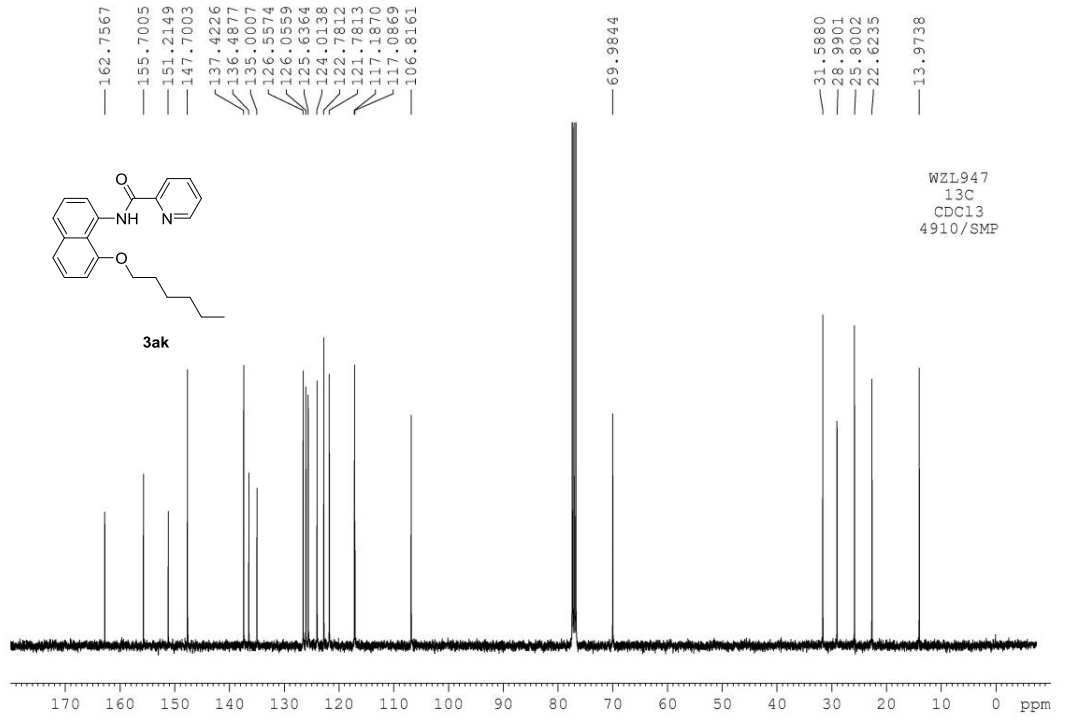
3.0121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122.7812
121.7813
117.1870
117.0869
106.8161
69.9844
31.5880
28.9901
25.8002
22.6235
13.9738
WZL947
13C
CDCl3
4910/SMP
NH
N
O
O
3ak
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160
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140
130
120
110
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60
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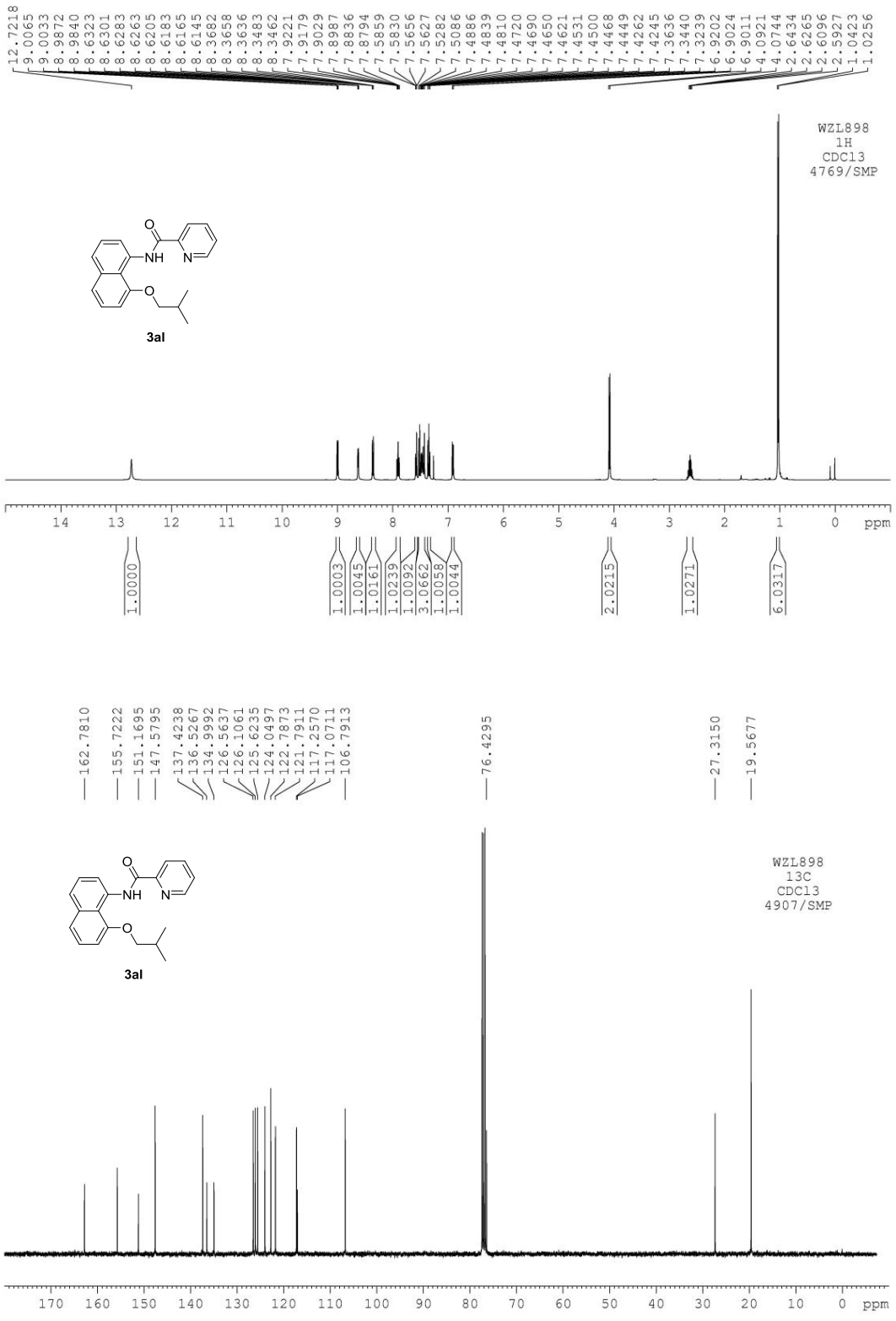
ppm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8.6145
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8.3636
8.3483
8.3462
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7.9029
7.8987
7.8836
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7.5859
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7.5627
7.5282
7.5086
7.4886
7.4839
7.4810
7.4720
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7.4650
7.4621
7.4531
7.4500
7.4468
7.4449
7.4262
7.4245
7.3636
7.3440
7.3239
6.9202
6.9024
6.9011
4.0921
4.0744
2.6434
2.6265
2.6096
2.5927
1.0423
1.0256
WZL898
1H
CDCl3
4769/SMP
3al
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
1.0000
1.0003
1.0045
1.0161
1.0239
1.0092
3.0662
1.0058
1.0044
2.0215
1.0271
6.0317
162.7810
155.7222
151.1695
147.5795
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126.5637
126.1061
125.6235
124.0497
122.7873
121.7911
117.2570
117.0711
106.7913
76.4295
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CDCl3
4907/SMP
3al
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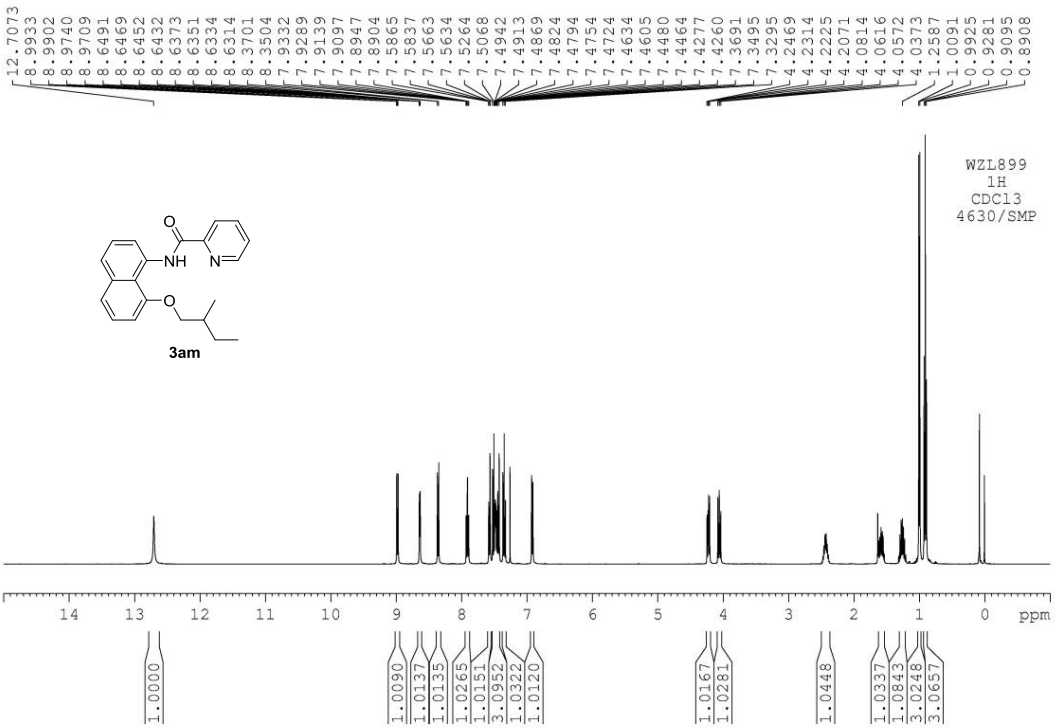
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8.6334
8.6314
8.3701
8.3504
7.9332
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7.9139
7.9097
7.8947
7.8904
7.5865
7.5837
7.5663
7.5634
7.5264
7.5068
7.4942
7.4913
7.4869
7.4824
7.4794
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7.4605
7.4480
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7.4277
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7.3691
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4.2469
4.2314
4.2225
4.2071
4.0814
4.0616
4.0572
4.0373
1.2587
1.0091
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0.9281
0.9095
0.8908
WZL899
1H
CDCl3
4630/SMP
NH
N
O
O
3am
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
ppm
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1.0135
1.0265
1.0151
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1.0120
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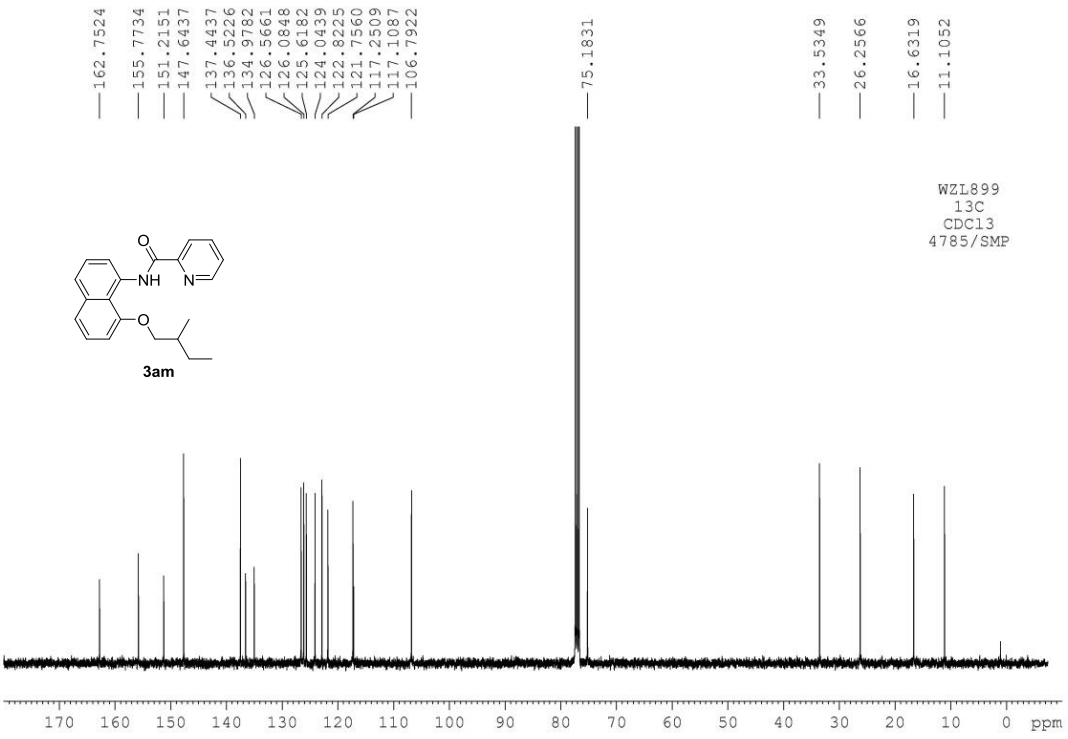
3.0657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124.0439
122.8225
121.7560
117.2509
117.1087
106.7922
75.1831
33.5349
26.2566
16.6319
11.1052
WZL899
13C
CDCl3
4785/SMP
NH
N
O
O
3am
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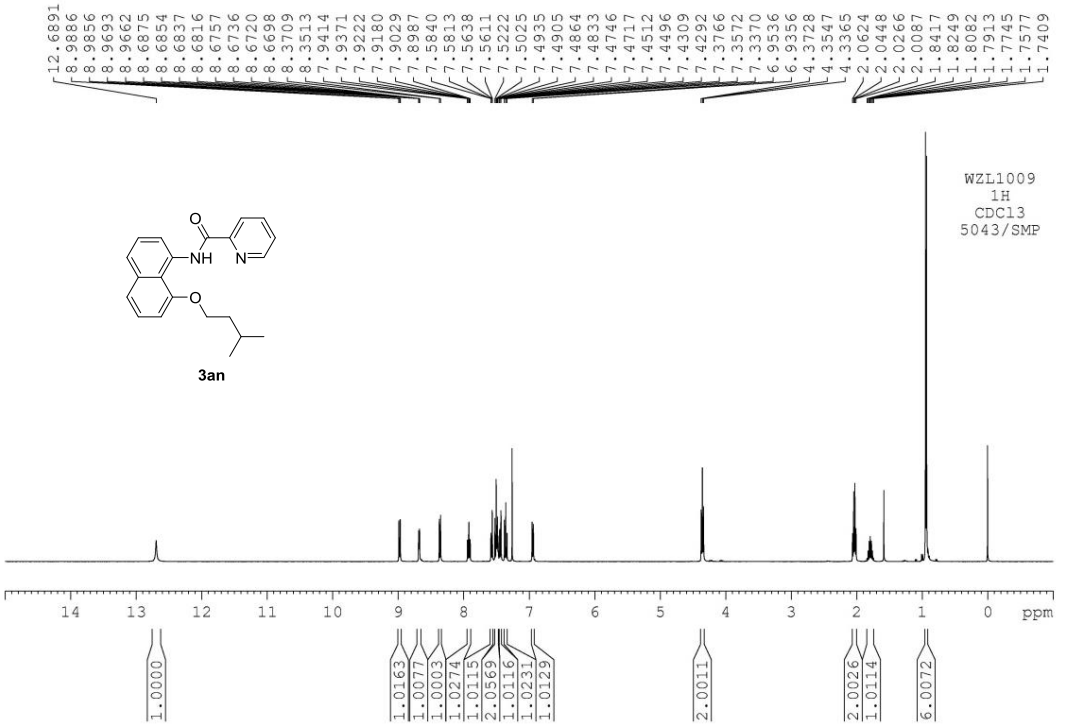
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm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8.6736
8.6720
8.6698
8.3709
8.3513
7.9414
7.9371
7.9222
7.9180
7.9029
7.8987
7.5840
7.5813
7.5638
7.5611
7.5222
7.5025
7.4935
7.4905
7.4864
7.4833
7.4746
7.4717
7.4512
7.4496
7.4309
7.4292
7.3766
7.3572
7.3370
6.9536
6.9356
4.3728
4.3547
4.3365
2.0624
2.0448
2.0266
2.0087
1.8417
1.8249
1.8082
1.7913
1.7745
1.7577
1.7409
WZL1009
1H
CDCl3
5043/SMP
3an
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
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1.0163
1.0077
1.0003
1.0274
1.0115
2.0569
1.0116
1.0231
1.0129
2.0011
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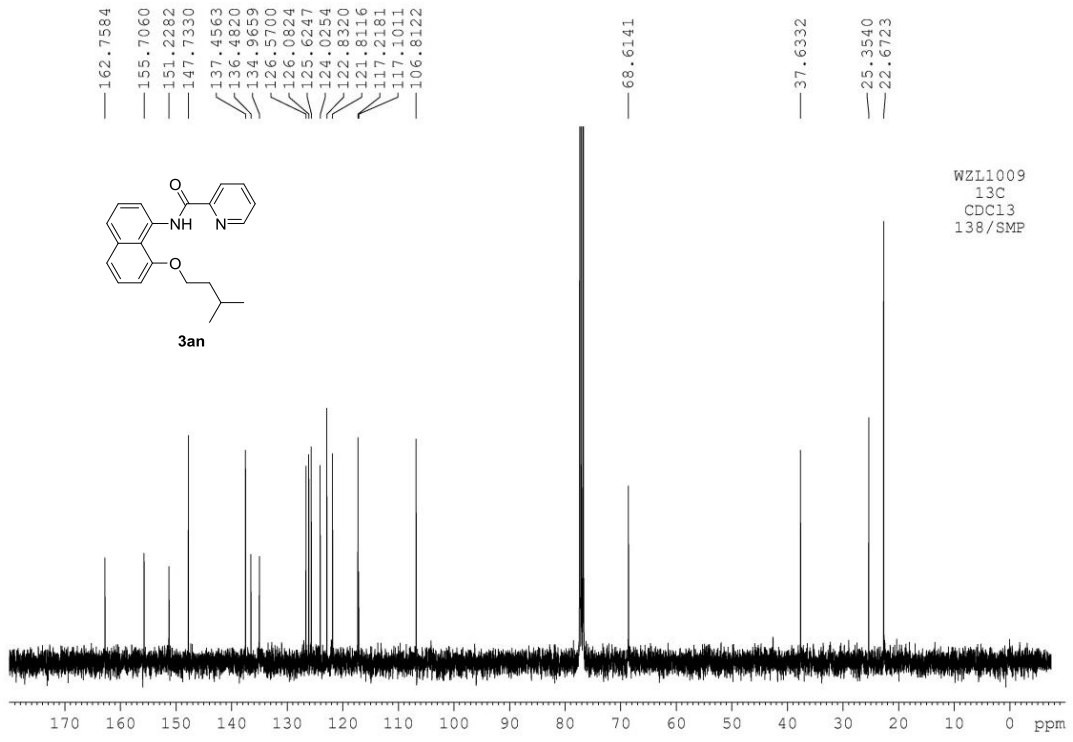
1.0114
6.0072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124.0254
122.8320
121.8116
117.2181
117.1011
106.8122
68.6141
37.6332
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WZL1009
13C
CDCl3
138/SMP
3an
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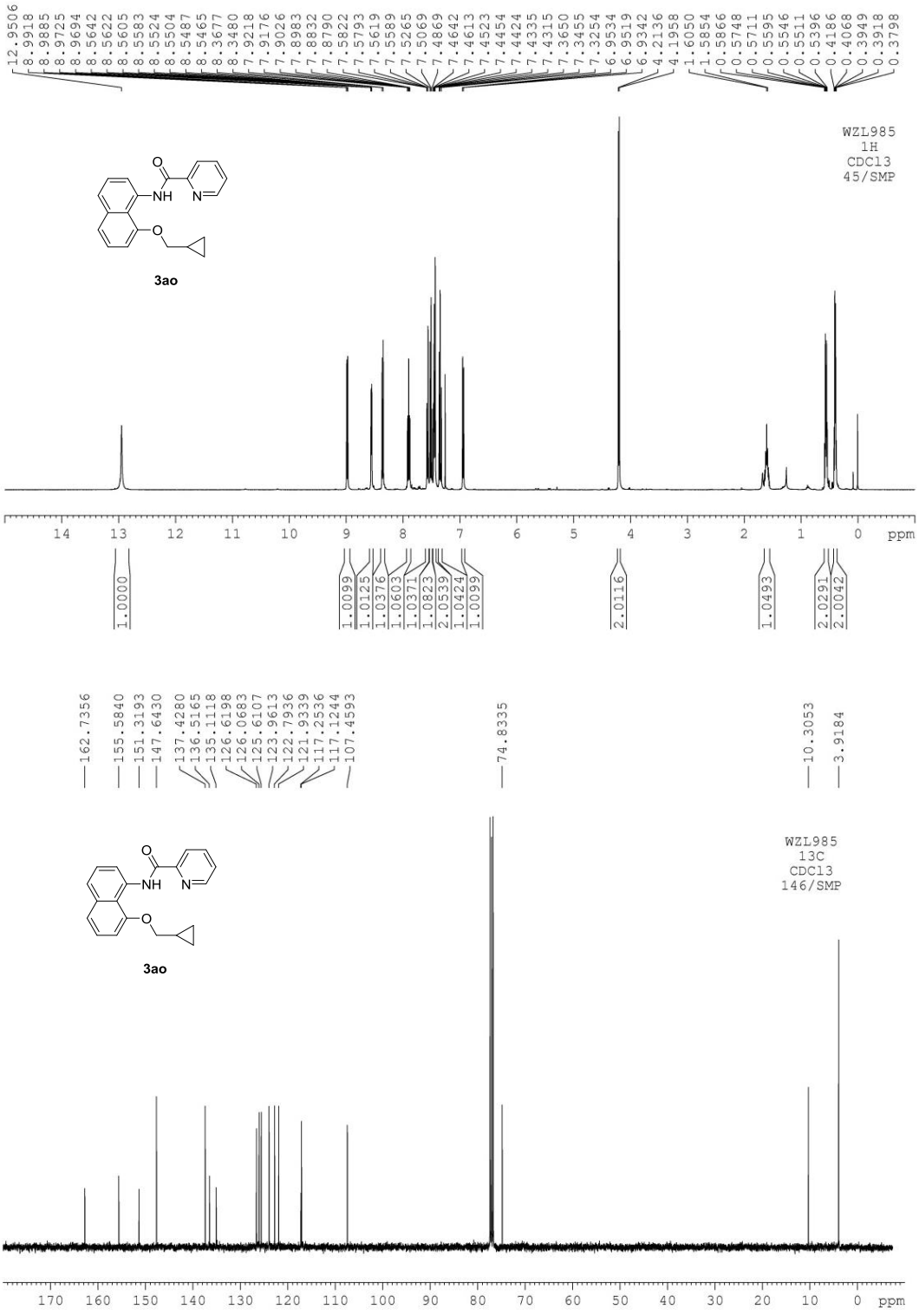
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8.5465
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7.3650
7.3455
7.3254
6.9534
6.9519
6.9342
4.2136
4.1958
1.6050
1.5854
0.5866
0.5748
0.5711
0.5595
0.5546
0.5511
0.5396
0.4186
0.4068
0.3949
0.3918
0.3798
WZL985
1H
CDCl3
45/SMP
3ao
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
1.0000
1.0099
1.0125
1.0376
1.0603
1.0371
1.0823
2.0539
1.0424
1.0099
2.0116
1.0493
2.0291
2.0042
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136.5165
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122.7936
121.9339
117.2536
117.1244
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13C
CDCl3
146/SMP
3ao
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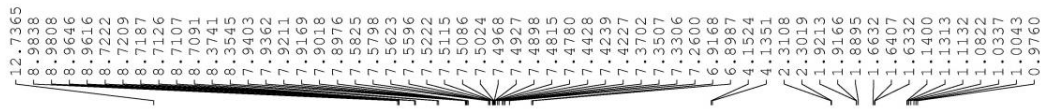
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8.3741
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7.9362
7.9211
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7.5798
7.5623
7.5596
7.5222
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7.4927
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7.4815
7.4780
7.4428
7.4239
7.4227
7.3702
7.3507
7.3306
7.2600
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4.1524
4.1351
2.3108
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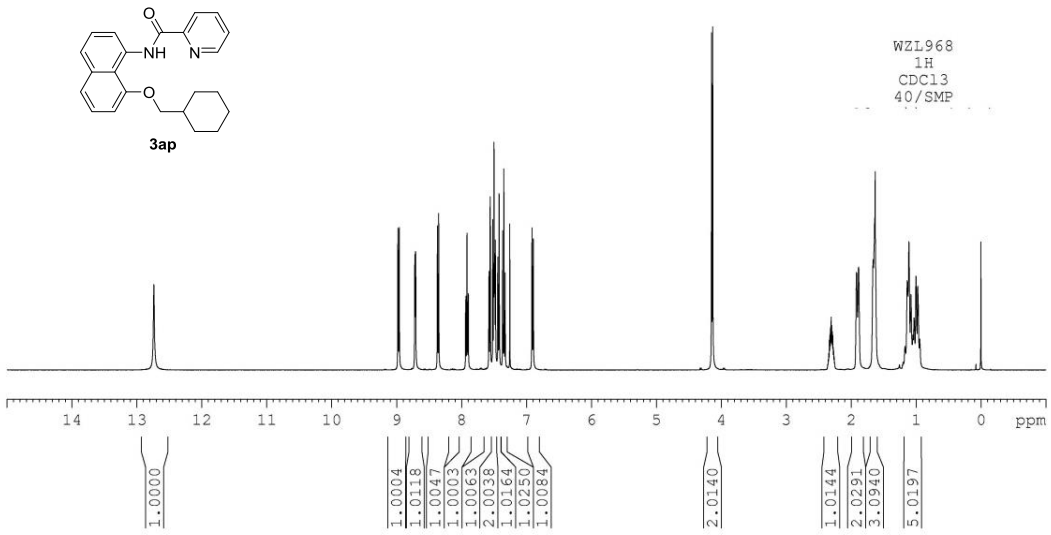
1.0043
0.9760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NH
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O
3ap
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1H
CDCl3
40/SMP
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
ppm
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1.0004
1.0118
1.0047
1.0003
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1.0144
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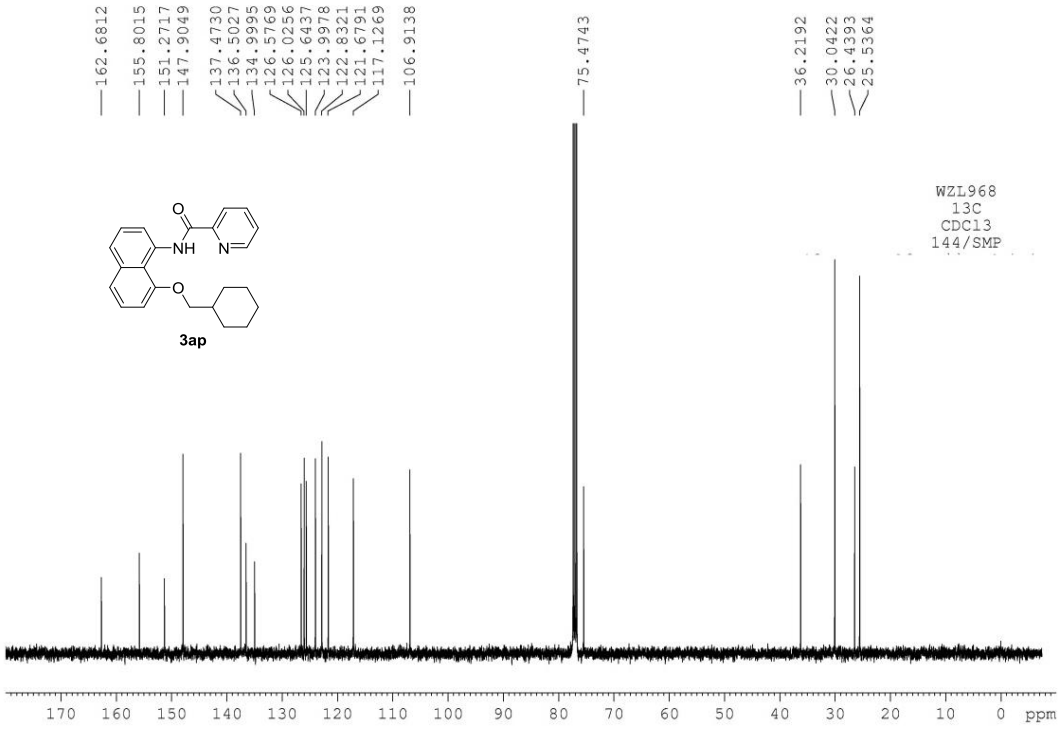
5.0197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123.9978
122.8321
121.6791
117.1269
106.9138
75.4743
36.2192
30.0422
26.4393
25.5364
O
NH
N
O
3ap
WZL968
13C
CDCl3
144/SMP
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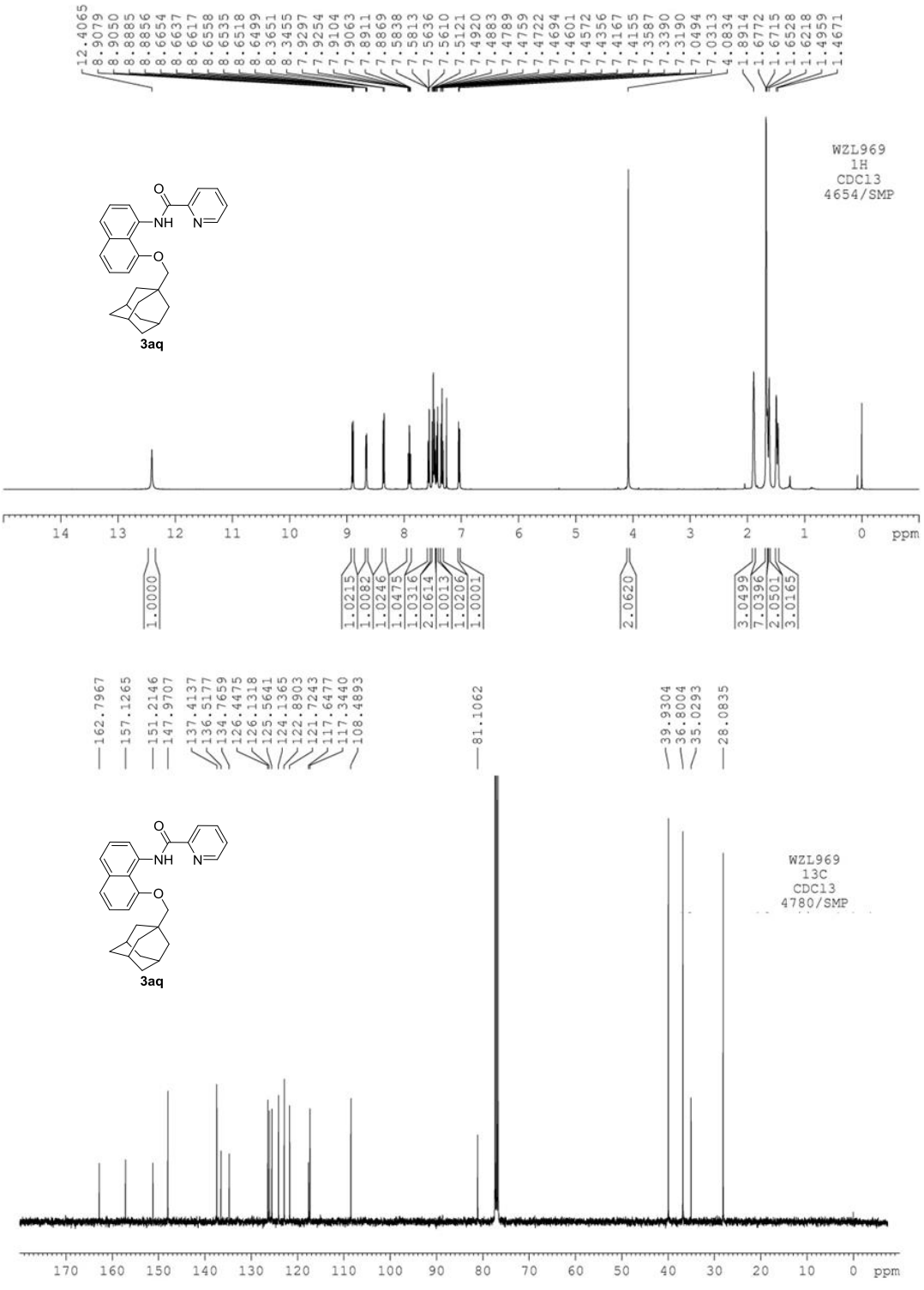
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm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8.3651
8.3455
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7.9104
7.9063
7.8911
7.8869
7.5838
7.5813
7.5636
7.5610
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7.4759
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7.4694
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7.4356
7.4167
7.4155
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7.3390
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7.0494
7.0313
4.0834
1.8914
1.6772
1.6715
1.6528
1.6218
1.4959
1.4671
WZL969
1H
CDCl3
4654/SMP
3aq
ppm
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1.0082
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1.0316
2.0614
1.0013
1.0206
1.0001
2.0620
3.0499
7.0396
2.0501
3.0165
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157.1265
151.2146
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126.1318
125.5641
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13C
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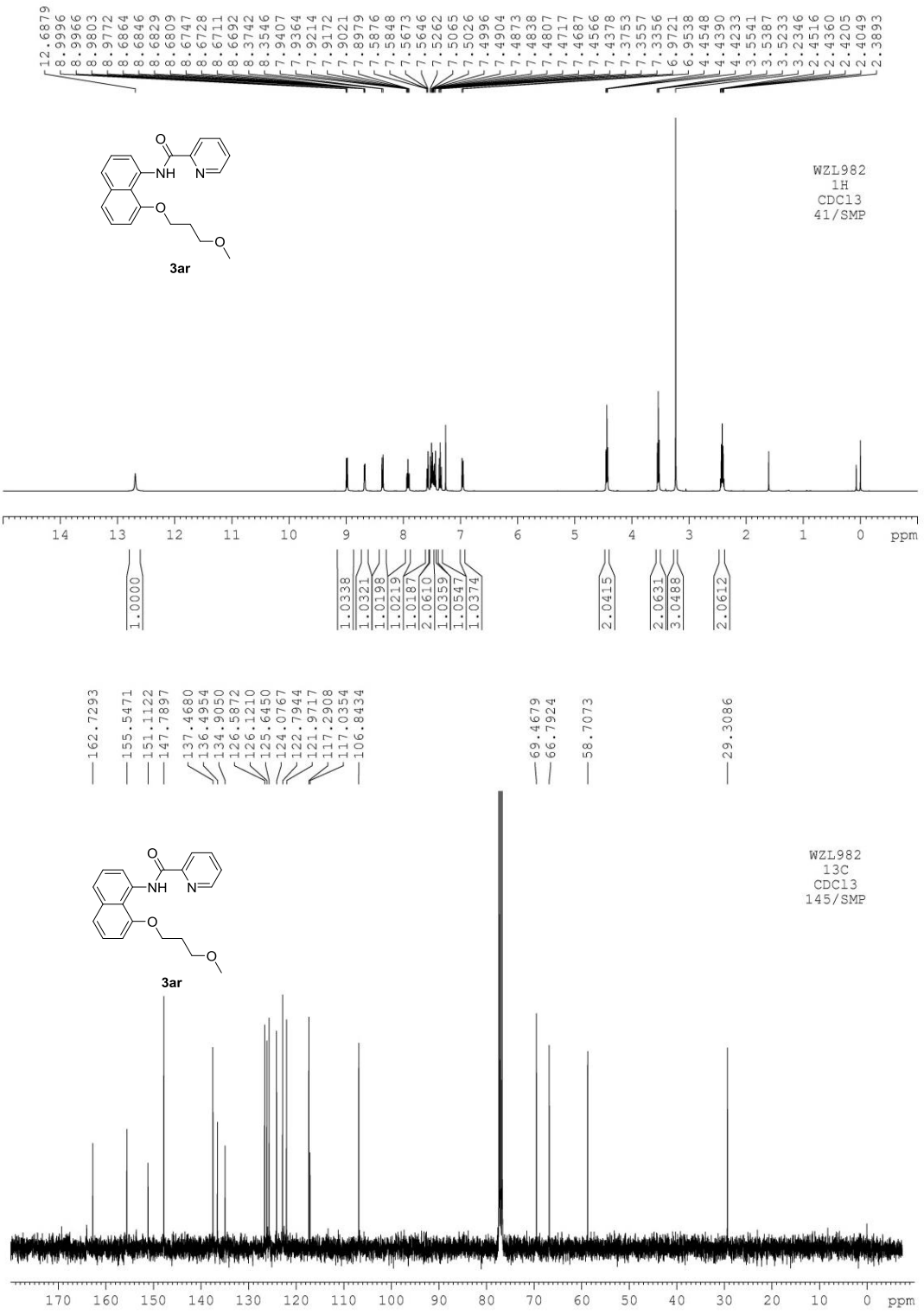
4780/SMP
3aq
ppm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8.6711
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7.4717
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7.4566
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6.9538
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4.4390
4.4233
3.5541
3.5387
3.5233
3.2346
2.4516
2.4360
2.4205
2.4049
2.3893
NH
N
O
O
O
3ar
WZL982
1H
CDCl3
41/SMP
ppm
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1.0219
1.0187
2.0610
1.0359
1.0547
1.0374
2.0415
2.0631
3.0488
2.0612
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134.9050
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125.6450
124.0767
122.7944
121.9717
117.2908
117.0354
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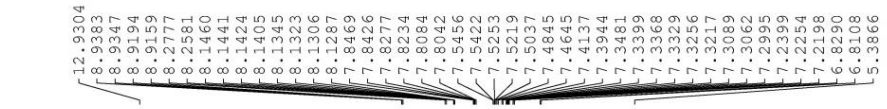
69.4679
66.7924
58.7073
29.3086
WZL982
13C
CDCl3
145/SMP
ppm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8.1345
8.1323
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7.8042
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7.5253
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7.4845
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7.3256
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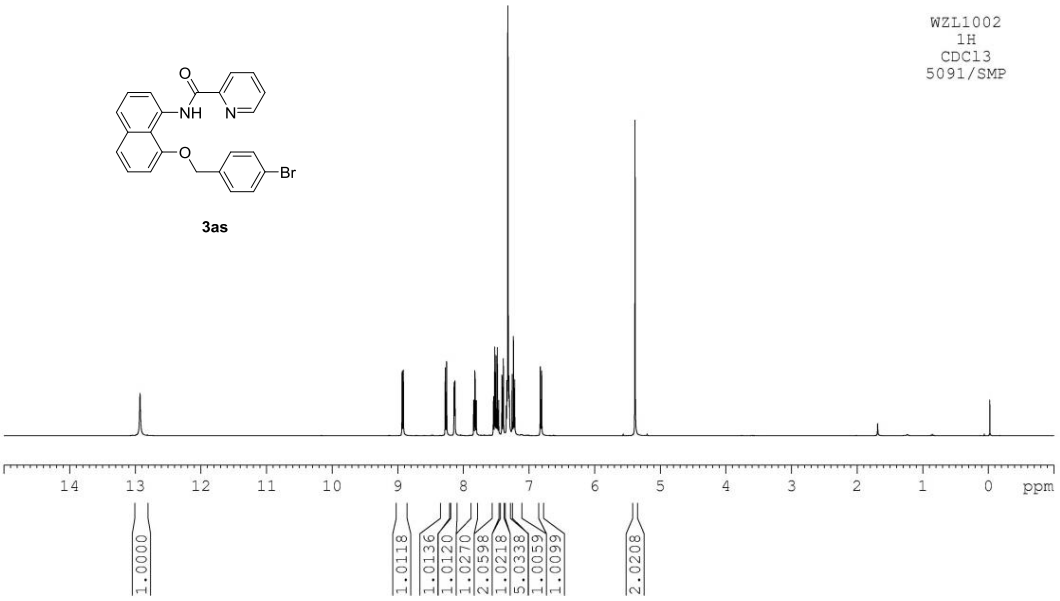
5.3866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N
O
Br
3as
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13
12
11
10
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8
7
6
5
4
3
2
1
0
ppm
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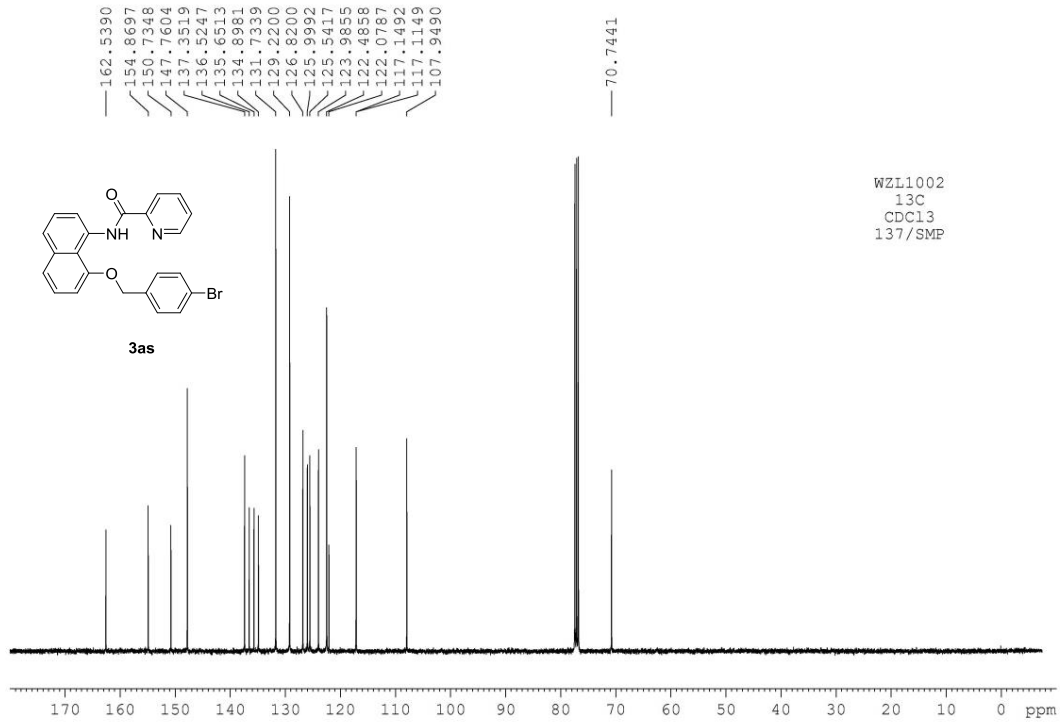
5.0338
1.0059
1.0099
2.0208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125.9992
125.5417
123.9855
122.4858
122.0787
117.1492
117.1149
107.9490
70.7441
WZL1002
13C
CDCl3
137/SMP
O
NH
N
O
Br
3as
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140
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120
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100
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80
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60
50
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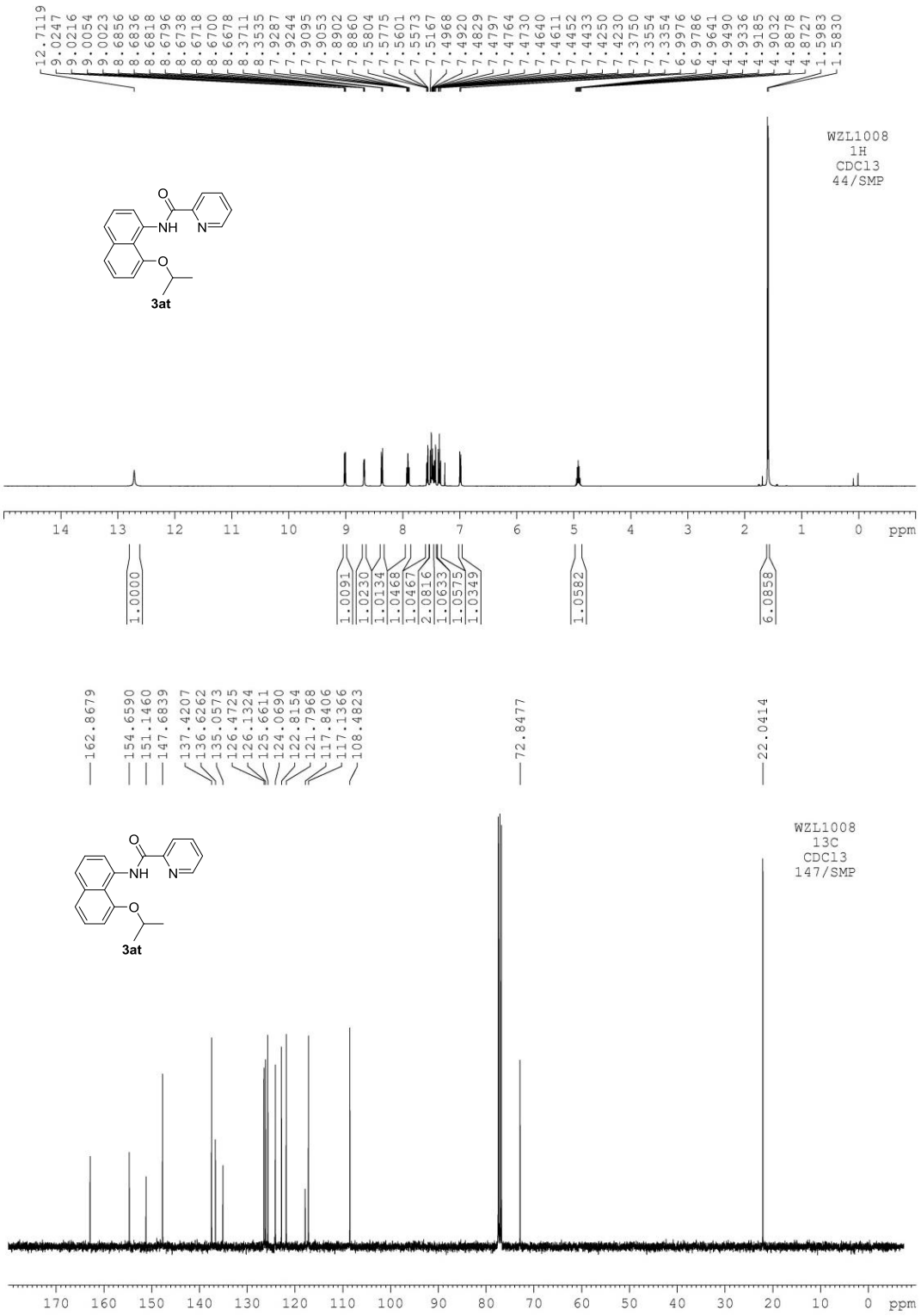
20
10
0
ppm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1H
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3at
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13C
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3at
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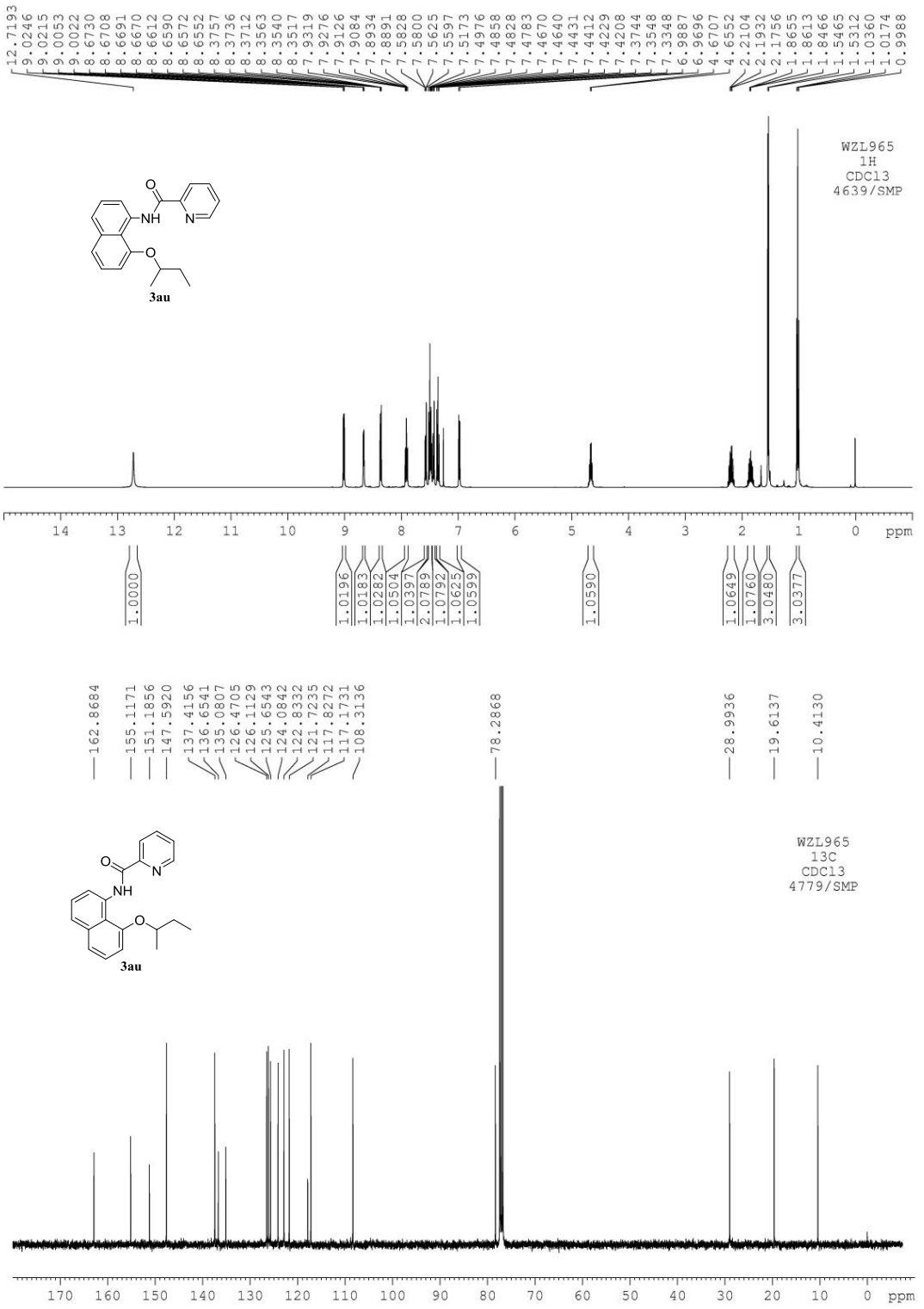
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WZL965
1H
CDCl3
4639/SMP
3au
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
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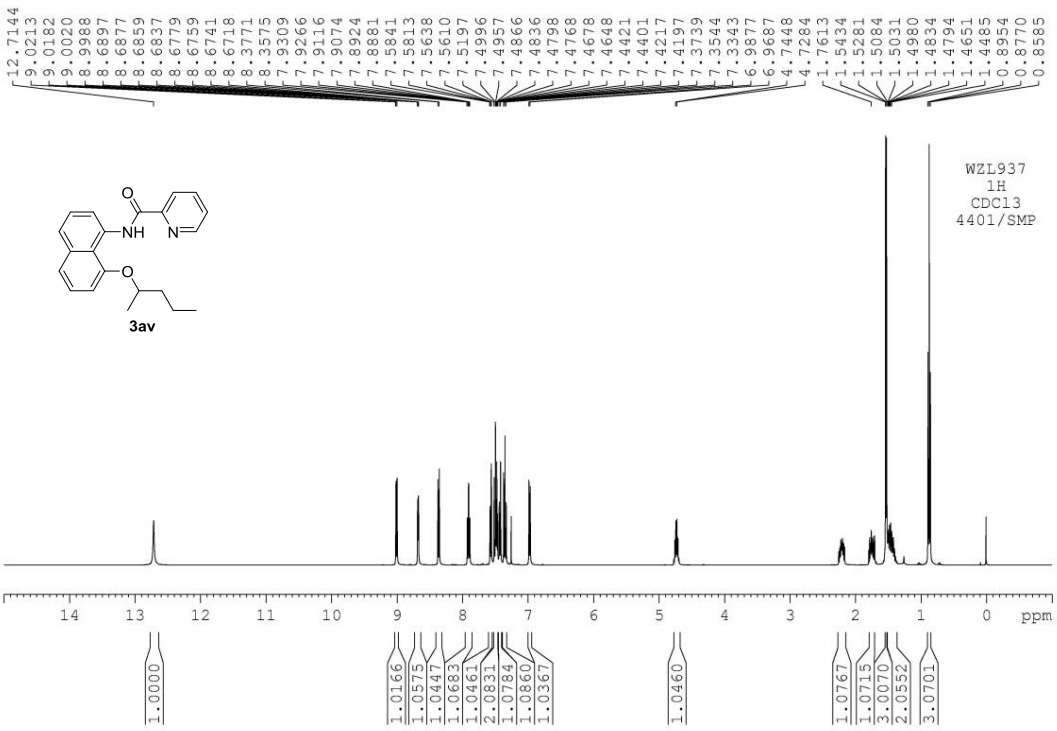
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1H
CDCl3
4401/SMP
NH
N
O
O
3av
14
13
12
11
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9
8
7
6
5
4
3
2
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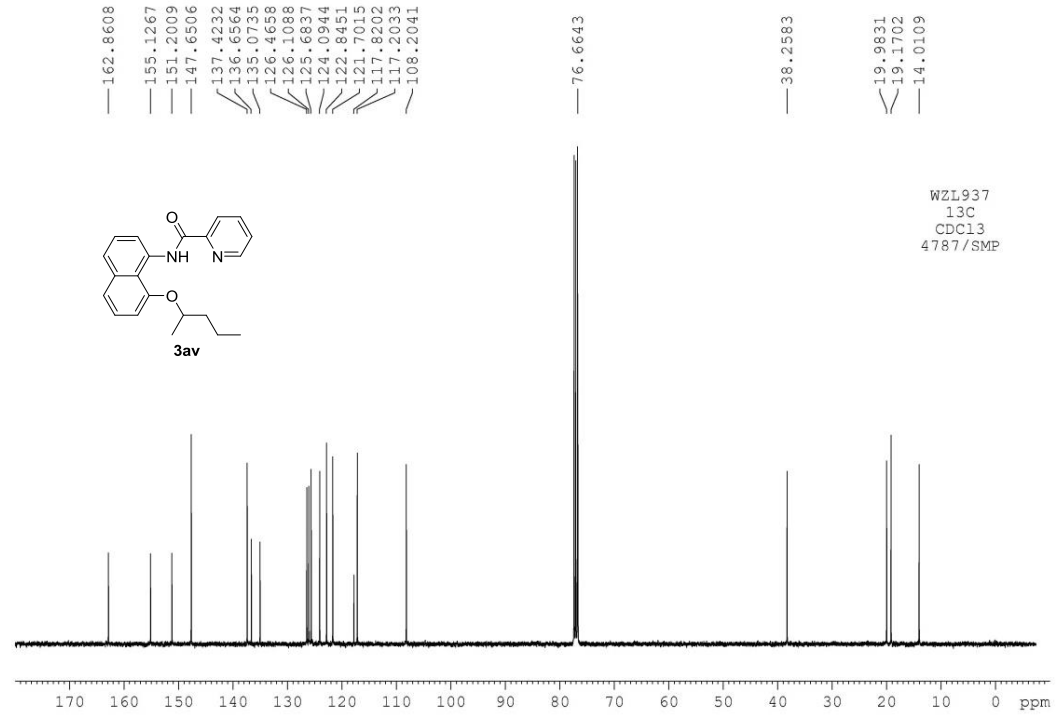
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WZL937
13C
CDCl3
4787/SMP
NH
N
O
O
3av
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
ppm