Protecting group controlled selectivity switch in distal C–H arylation of α-naphthoic acids

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Supporting Information

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1. General considerations:

1a. Reagent information: Unless otherwise stated, all reactions were carried out under air atmosphere in screw cap reaction tubes. All chemicals are commercially available and purchased from Sigma Aldrich, Alfa-Aesar, TCI and Spectrochem. Palladium (II) acetate was purchased from Alfa-Aesar. All the solvents were bought from Merck, TCI and Spectrochem insure sealed bottle and were used as received. For column chromatography, silica gel (100–200 mesh) from SRL Co. and neutral alumina from Merck was used. A gradient elution using petroleum-ether and ethyl acetate was performed, based on Merck aluminium TLC sheets (silica gel $60F_{254}$).

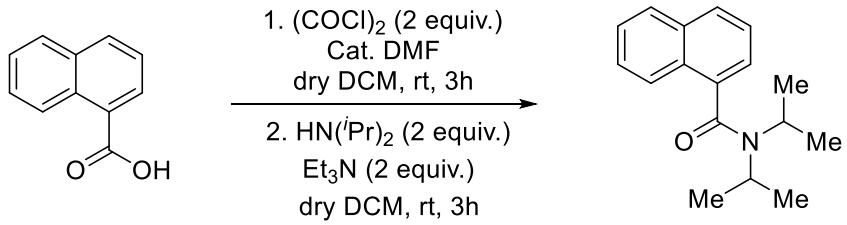
1b. Analytical Information: All isolated compounds were characterized by ^{1}H NMR, ^{13}C NMR spectroscopy, gas chromatography (GC), high resolution mass spectrometry (HRMS), infrared spectroscopy (IR), etc. Copies of the ^{1}H NMR, ^{13}C NMR can be found in the Supporting Information. Unless otherwise stated, all Nuclear Magnetic Resonance spectra were recorded on a Bruker xxx MHz and xxx MHz instrument. All ^{1}H NMR experiments were reported in units, parts per million (ppm), and were measured relative to the signals for residual chloroform (7.26 ppm) in the deuterated solvent, unless otherwise stated. All ^{13}C NMR spectra were reported in ppm relative to deuterochloroform (77.23 ppm), unless otherwise stated, and all were obtained with ^{1}H decoupling. NMR of the crude reaction mixtures were performed by using 1,3,5-trimethoxybenzene as the internal standard. All GCMS analysis was done by Agilent 7890A GC system connected with 5975C inert XL EI/CI MSD (with triple axis detector). High-resolution mass spectra (HRMS) were recorded on a Q-TOF micromass (YA-105) mass spectrometer and a Bruker Maxis Impact (282001.00081) in ESI mode. X-ray crystallography was recorded at Department of Chemistry, IIT Bombay.

1.c. Description of Reaction Tube:

Pictorial description of reaction tube for *meta*-olefination: Fisherbrand Disposable Borosilicate Glass Tubes (16*125mm) with Threaded End (Fisher Scientific Order No. 1495935A) [left]; Kimble Black Phenolic Screw Thread Closures with Open Tops (Fisher Scientific Order No. 033407E);Thermo Scientific National PTFE/Silicone Septa for Sample Screw Thread Caps (Fisher Scientific Order No. 03394A).

2. Experimental Section:

General procedure A: Synthesis of α-naphthamide



A 50 mL round-bottom flask was charged with 1-naphthoic acid (861 mg, 5 mmol), dry DCM (15 mL). The reaction mixture was cooled to 0 °C and stirred for 10 minutes. Then $(COCl)_2$ (0.56 mL, 1.3 equiv.) was added dropwise to the reaction mixture. After that catalytic amount of dry DMF was added and stirred at room temperature for 3 h. The resulting mixture was concentrated under reduced pressure to afford acid chloride quantitatively which was used directly without further purification for the next step. To a solution of diisopropylamine (0.92 mL, 1.3 equiv.) and Et_3N (1.05 mL, 1.5 equiv.) in dry DCM (15 mL), acid chloride (1.0 equiv.) was added dropwise at 0 °C and the reaction mixture was stirred at room temperature for 12 h. Then water (40 mL) was added and aqueous layer was extracted with DCM (3 x 30 mL). The combined organic layer was washed with saturated aqueous $NaHCO_3$ (30 mL) solution followed by water (30 mL). After that, the organic layer was dried over Na_2SO_4 and concentrated under reduced pressure. The crude mass was purified by silica gel column chromatography (10% ethyl acetate in hexane as eluent) to give *N*,*N*-diisopropyl-1-naphthamide (1.18 g, 95%) as white solid. Spectral data are in accordance with the reported data

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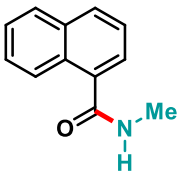

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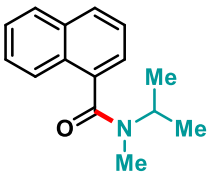

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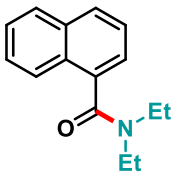

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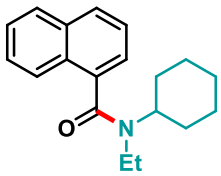

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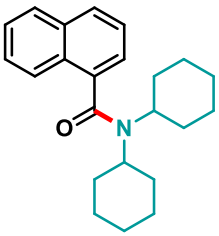

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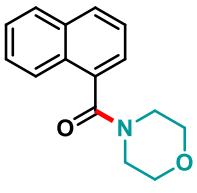

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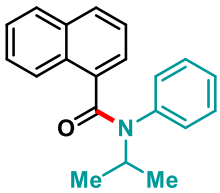

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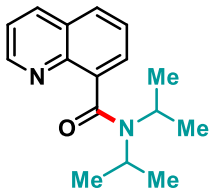

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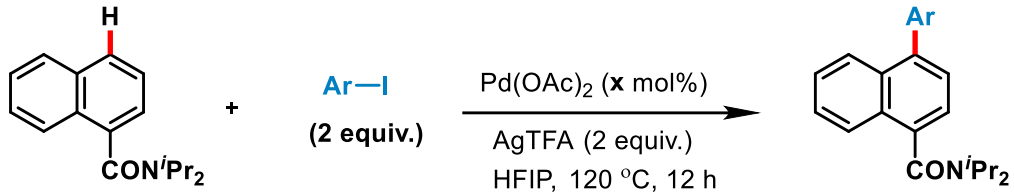
Optimization details of *p*-arylation of *α*-naphthamide

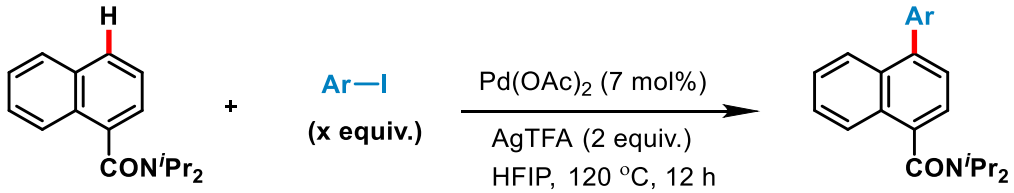
Table S1: Catalyst loading



Entry	Pd(OAc)$_2$ (mol%)	Yield (%)[a]	Selectivity
1.	0	nd	-
2.	0.5	nd	-
3.	1	Trace	-
4.	2	11%	exclusive
5.	3	25%	exclusive
6.	4	29%	exclusive
7.	5	33%	exclusive
8.	6	49%	exclusive
9.	7	52%	exclusive
10.	8	53%	exclusive
11.	9	59%	exclusive
12.	10	65%	exclusive
13.	15	61%	exclusive
14.	20	59%	exclusive

[a]yield and selectivity are based on 1H NMR of the crude reaction mixture using 1,3,5-trimethoxybenzene as internal standard

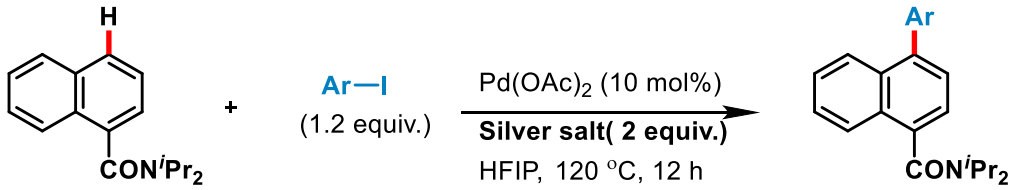
Table S2: Aryl iodide loading



Entry	Aryl iodide (mol%)	Yield (%)[a]	Selectivity
1.	1	65%	exclusive
2.	1.2	73%	exclusive
3.	1.5	70%	exclusive
4.	1.8	67%	exclusive
5.	2	61%	exclusive

[a]yield and selectivity are based on 1H NMR of the crude reaction mixture using 1,3,5-trimethoxybenzene as internal standard

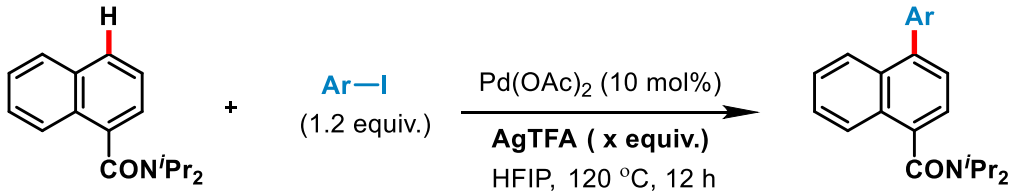
Table S3: Silver salt optimization



Entry	Silver salt	Yield (%)[a]	Selectivity
1.	Ag_2CO_3	nd	-
2.	AgOAc	nd	-
3.	**AgTFA**	**73%**	**exclusive**
4.	Ag_2O	12%	exclusive
5.	$AgNO_2$	trace	-
6.	$AgNO_3$	trace	-
7.	$AgPF_6$	23%	exclusive
8.	$AgOT_f$	51%	exclusive
9.	$AgSbF_6$	26%	exclusive
10.	$AgBF_4$	37%	exclusive
11.	Ag_3PO_4	45%	exclusive

[a]yield and selectivity are based on 1H NMR of the crude reaction mixture using 1,3,5-trimethoxybenzene as internal standard

Table S4: Silver salt loading:

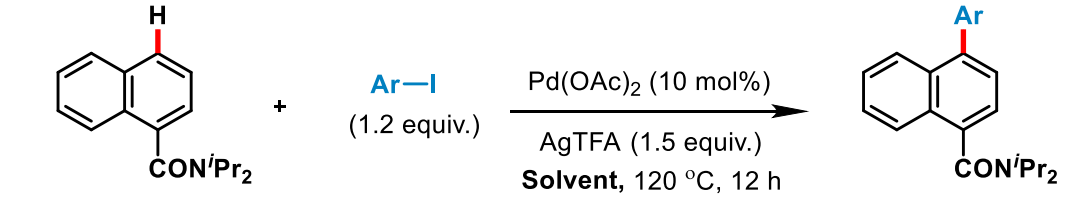


Entry	AgTFA(equiv.)	Yield (%)[a]	Selectivity
1.	0	-	-
2.	0.2	30%	exclusive
3.	0.5	45%	exclusive
4.	0.8	51%	exclusive
5.	1.0	64%	exclusive
6.	1.2	74%	exclusive
7.	1.5	89%	exclusive

8.	1.7	77%	exclusive
9.	2	79%	exclusive

[a]yield and selectivity are based on 1H NMR of the crude reaction mixture using 1,3,5-trimethoxybenzene as internal standard

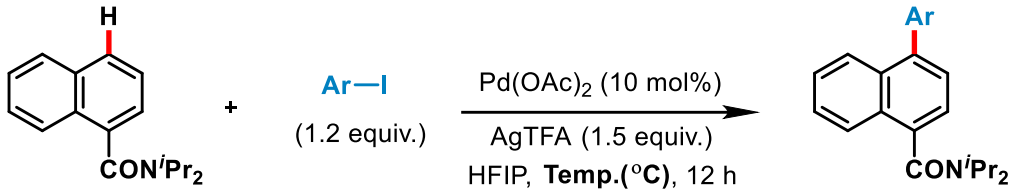
Table S5: Solvent optimization



Entry	Solvent(1 ml)	Yield (%)[a]	Selecvity
1.	DCE	23%	exclusive
2.	DCM	26%	exclusive
3.	TFT	45%	exclusive
4.	TFE	65%	exclusive
5.	Chlorobenzene	31%	exclusive
6.	Toluene	nd	-
7.	Isopropanol	nd	-
8.	Methanol	nd	-
9.	Ethanol	nd	-
10.	HFIP	89%	exclusive
11.	Acetonitrile	nd	-
12.	Fluorobenzene	12%	exclusive
13.	CCl4	20%	exclusive
14.	THF	nd	-
15.	Diethylether	35%	exclusive
16.	TBME	17%	exclusive
17.	1,4-dioxane	45%	exclusive
18.	Isoamyl alcohol	nd	-

[a]yield and selectivity are based on 1H NMR of the crude reaction mixture using 1,3,5-trimethoxybenzene as internal standard

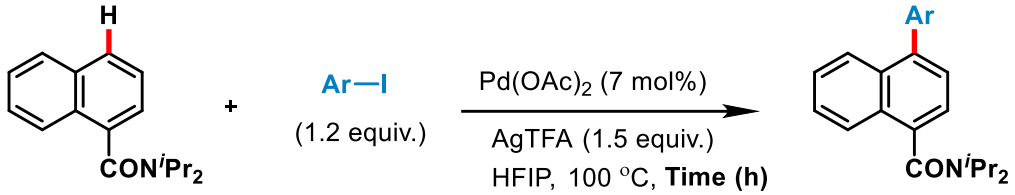
Table S6: Temperature optimization



Entry	Temperature(°C)	Yield (%)[a]	Selectivity
1.	rt	nd	exclusive
2.	40	nd	exclusive
3.	50	20%	exclusive
4.	60	49%	exclusive
5.	70	55%	exclusive
6.	80	69%	exclusive
7.	90	81%	exclusive
8.	100	95%	exclusive
9.	120	89%	exclusive
10.	130	84%	exclusive
11.	140	85%	exclusive

[a]yield and selectivity are based on 1H NMR of the crude reaction mixture using 1,3,5-trimethoxybenzene as internal standard

Table S7: Time optimization

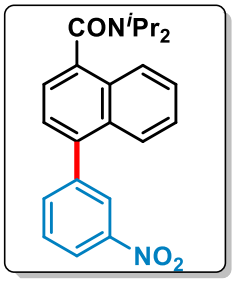


Entry	Time (h)	Yield (%)[a]	Selectivity
1.	2	45%	exclusive
2.	4	50%	exclusive
3.	6	52%	exclusive
4.	8	55%	exclusive
5.	10	69%	exclusive
6.	12	71%	exclusive
7.	14	76%	exclusive
8.	16	81%	exclusive
9.	18	83%	exclusive
10.	20	89%	exclusive
11.	24	95%	exclusive

[a]yield and selectivity are based on 1H NMR of the crude reaction mixture using 1,3,5-trimethoxybenzene as internal standard

General procedure B for *para*-arylation of α-naphthamide: An oven-dried screw cap reaction tube was charged with a magnetic stir-bar, $Pd(OAc)_2$ (10 mol% 2.24 mg for 0.2 mmol), AgTFA (1.5 equiv., 33mg), α-naphthamide (0.1 mmol, 25.5 mg) and aryl iodide (1.2 equiv., 0.12 mmol). Then 1 mL of HFIP was added. The reaction mixture was stirred vigorously on a preheated oil bath at 120 °C along. The reaction was carried out for 12 h and the reaction mixture was diluted with EtOAc and filtered through a celite pad. The desired arylation product was isolated by column chromatography using silica gel (100-200 mesh size) and petroleum ether/ethyl acetate as the eluent.

Characterization of *p*-arylated α-naphthamide



N,N-diisopropyl-4-(3-nitrophenyl)-1-naphthamide: Compound **3a** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

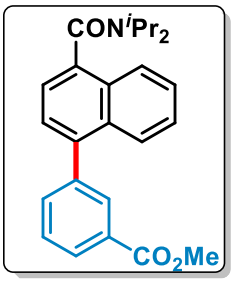
Physical State: White solid.

Yield: 73%

^{1}H NMR (400 MHz, CDCl3) δ 8.38 (s, 1H), 8.32 (d, J = 8.2 Hz, 1H), 7.95 (d, J = 8.3 Hz, 1H), 7.83 (d, J = 7.5 Hz, 1H), 7.77 (d, J = 8.4 Hz, 1H), 7.68 (t, J = 7.9 Hz, 1H), 7.56 (t, J = 7.5 Hz, 1H), 7.53 – 7.46 (m, 1H), 7.41 (q, J = 7.2 Hz, 2H), 3.71 (dt, J = 13.8, 6.8 Hz, 1H), 3.63 (dd, J = 13.6, 6.8 Hz, 1H), 1.75 (d, J = 6.8 Hz, 3H), 1.68 (d, J = 6.5 Hz, 5H), 1.14 (d, J = 6.6 Hz, 3H), 1.10 (d, J = 6.7 Hz, 3H).

^{13}C NMR (126 MHz, CDCl3) δ 169.70 (s), 148.30 (s), 142.03 (s), 137.73 (s), 137.38 (s), 136.15 (s), 131.33 (s), 129.92 (s), 129.33 (s), 127.14 (s), 126.97 (s), 126.68 (s), 125.51 (d, J = 3.2 Hz), 124.83 (s), 122.45 (s), 121.53 (s), 77.25 (s), 77.00 (s), 76.75 (s), 51.21 (s), 46.12 (s), 21.01 – 20.55 (m).

HRMS (*m/z*): $[M+Na^+]$ calcd for $C_{23}H_{24}N_2NaO_3$: 399.45; found, 399.1679
TLC: R_f = 0.4 (80:20 petroleum ether:EtOAc).

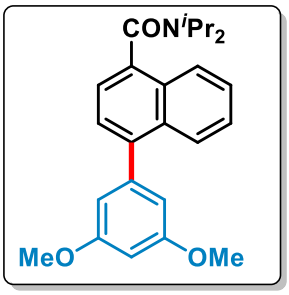


Methyl 3-(4-(diisopropylcarbamoyl)naphthalen-1-yl)benzoate: Compound **3b** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 81%

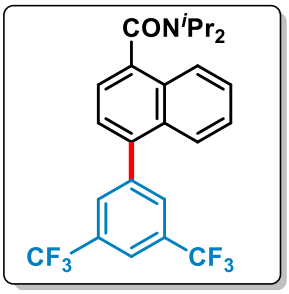
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.17 (s, 1H), 8.12 (d, *J* = 7.8 Hz, 1H), 7.92 (d, *J* = 8.3 Hz, 1H), 7.82 (d, *J* = 8.5 Hz, 1H), 7.68 (d, *J* = 7.6 Hz, 1H), 7.58 (t, *J* = 7.7 Hz, 1H), 7.53 (t, *J* = 7.5 Hz, 1H), 7.49 – 7.42 (m, 1H), 7.39 (dd, *J* = 15.8, 7.1 Hz, 2H), 3.94 (s, 3H), 3.76 – 3.67 (m, 1H), 3.67 – 3.58 (m, *J* = 13.4, 6.8 Hz, 1H), 1.74 (d, *J* = 6.8 Hz, 4H), 1.67 (d, *J* = 6.8 Hz, 3H), 1.13 (d, *J* = 6.6 Hz, 3H), 1.08 (t, *J* = 8.4 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.05 (s), 166.99 (s), 140.62 (s), 139.34 (s), 136.57 (s), 134.50 (s), 131.61 (s), 131.02 (s), 130.30 (s), 129.85 (s), 128.63 (s), 128.43 (s), 126.68 (d, *J* = 2.6 Hz), 126.46 (s), 126.04 (s), 125.28 (s), 121.57 (s), 77.25 (s), 77.15 – 76.89 (m), 76.75 (s), 52.21 (s), 51.18 (s), 46.07 (s), 29.67 (s), 20.96 – 20.54 (m).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{25}H_{28}NO_3$: 399.20; found, 390.2069
TLC: R_f = 0.35 (80:20 petroleum ether:EtOAc).



4-(3,5-dimethoxyphenyl)-N,N-diisopropyl-1-naphthamide: Compound **3c** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 65%
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.97 (d, *J* = 8.5 Hz, 1H), 7.90 (d, *J* = 8.3 Hz, 1H), 7.51 (t, *J* = 7.5 Hz, 1H), 7.44 (t, *J* = 7.6 Hz, 1H), 7.41 (d, *J* = 7.1 Hz, 1H), 7.34 (d, *J* = 7.1 Hz, 1H), 6.64 (s, 2H), 6.55 (s, 1H), 3.84 (s, 6H), 3.74 (dt, *J* = 13.2, 6.6 Hz, 1H), 3.67 – 3.58 (m, 1H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.67 (d, *J* = 6.8 Hz, 3H), 1.12 (t, *J* = 7.1 Hz, 3H), 1.09 (d, *J* = 6.6 Hz, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.10 (s), 160.56 (s), 142.41 (s), 140.41 (s), 136.36 (s), 131.73 (s), 129.84 (s), 126.65 – 126.30 (m), 125.95 (s), 125.18 (s), 121.49 (s), 108.19 (s), 99.57 (s), 55.44 (s), 51.11 (s), 46.02 (s), 20.92 (s), 20.72 (d, *J* = 7.2 Hz).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{25}H_{30}NO_3$: 392.2224; found, 392.2220
TLC: R*f* = 0.05 (80:20 petroleum ether:EtOAc).

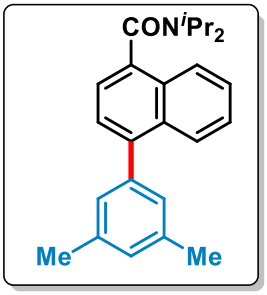


4-(3,5-bis(trifluoromethyl)phenyl)-N,N-diisopropyl-1-naphthamide: Compound **3d** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 65%
^{1}H NMR (400 MHz, CDCl$_3$) δ 8.00 – 7.93 (m, 4H), 7.70 (d, *J* = 7.8 Hz, 1H), 7.58 (t, 1H), 7.53 (t, *J* = 11.1, 4.1 Hz, 1H), 7.46 – 7.38 (m, 2H), 3.66 (ddd, *J* = 20.6, 13.6, 6.8 Hz, 2H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.68 (d, *J* = 6.9 Hz, 4H), 1.13 (d, *J* = 6.7 Hz, 3H), 1.09 (d, *J* = 6.7 Hz, 3H).

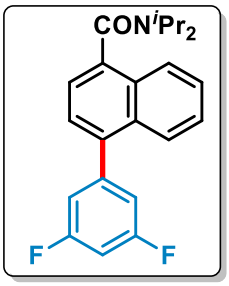
^{13}C NMR (101 MHz, CDCl$_3$) δ 169.57 (s), 142.45 (s), 137.71 (s), 137.11 (s), 131.23 (s), 130.14 (s), 129.93 (s), 127.41 (s), 127.10 (s), 126.83 (s), 125.61 (s), 125.22 (s), 121.50 (s), 51.22 (s), 46.15 (s), 21.20 – 20.53 (m).

^{19}F NMR (471 MHz, CDCl$_3$) δ -62.69 (s).

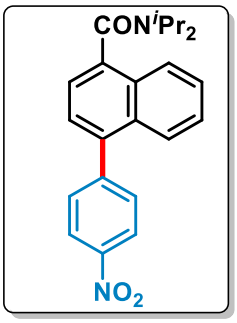
HRMS (*m/z*): [M+H$^+$] calcd for $C_{25}H_{24}F_6NO$: 468.1716; found, 468.1719
TLC: R*f* = 0.02 (80:20 petroleum ether:EtOAc).



4-(3,5-dimethylphenyl)-N,N-diisopropyl-1-naphthamide: Compound **3e** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 57%
^{1}H NMR (500 MHz, CDCl$_3$) δ 7.92 (dd, *J* = 15.8, 8.4 Hz, 4H), 7.51 (t, *J* = 7.5 Hz, 2H), 7.44 (t, *J* = 7.6 Hz, 2H), 7.41 – 7.32 (m, 4H), 7.11 (s, 4H), 7.08 (s, 2H), 3.78 – 3.68 (m, 2H), 3.63 (dq, *J* = 13.5, 6.7 Hz, 2H), 2.41 (s, 12H), 1.74 (dd, *J* = 14.9, 6.4 Hz, 6H), 1.68 (d, *J* = 6.8 Hz, 7H), 1.09 (dt, *J* = 18.8, 9.4 Hz, 12H).
^{13}C NMR (126 MHz, CDCl$_3$) δ 170.24 (s), 140.77 (s), 140.27 (s), 137.76 (s), 136.00 (s), 131.86 (s), 129.85 (s), 128.97 (s), 127.83 (s), 126.57 (s), 126.39 (s), 126.17 (d, *J* = 16.1 Hz), 125.14 (s), 121.56 (s), 51.10 (s), 46.00 (s), 21.34 (s), 20.74 (dd, *J* = 19.3, 11.2 Hz).
HRMS (*m/z*): [M+Na+] calcd for $C_{25}H_{29}NNaO$: 382.2142; found, 382.2141
TLC: R*f* = 0.05 (80:20 petroleum ether:EtOAc).

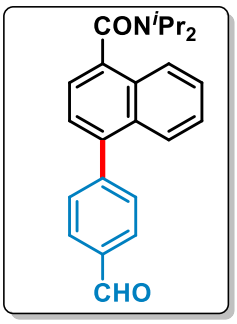


4-(3,5-difluorophenyl)-N,N-diisopropyl-1-naphthamide: Compound **3f** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 88%
^{1}H NMR (500 MHz, CDCl$_3$) δ 7.92 (d, *J* = 8.3 Hz, 1H), 7.85 (d, *J* = 7.7 Hz, 1H), 7.54 (t, *J* = 7.3 Hz, 1H), 7.49 (t, *J* = 7.6 Hz, 1H), 7.37 (q, *J* = 7.2 Hz, 2H), 7.03 (dd, *J* = 8.0, 2.0 Hz, 2H), 6.90 (td, *J* = 9.0, 2.2 Hz, 1H), 3.75 – 3.67 (m, *J* = 13.4, 6.7 Hz, 1H), 3.67 – 3.58 (m, *J* = 14.1, 7.0 Hz, 1H), 1.74 (d, *J* = 6.7 Hz, 3H), 1.67 (d, *J* = 6.8 Hz, 3H), 1.12 (t, *J* = 6.8 Hz, 3H), 1.09 (d, *J* = 6.7 Hz, 3H).
^{13}C NMR (126 MHz, CDCl$_3$) δ 169.76 (s), 163.85 (s), 137.18 (s), 131.26 (s), 129.88 (s), 126.89 (d, *J* = 10.4 Hz), 126.26 (s), 125.73 (s), 125.41 (s), 121.44 (s), 113.07 (d, *J* = 24.8 Hz), 112.93 – 112.65 (m), 102.89 (s), 51.16 (s), 46.09 (s), 20.90 (s), 20.90 – 20.56 (m).
^{19}F NMR (471 MHz, CDCl$_3$) δ -109.97 (s).
HRMS (*m/z*): [M+H+] calcd for $C_{23}H_{24}F_2NO$: 368.1781; found, 368.1783
TLC: R*f* = 0.05 (80:20 petroleum ether:EtOAc).



N,N-diisopropyl-4-(4-nitrophenyl)-1-naphthamide: Compound **3g** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid .
Yield: 95%
^{1}H NMR (500 MHz, CDCl$_3$) δ 8.35 (dd, J = 16.3, 8.7 Hz, 1H), 7.94 (d, J = 8.3 Hz, 1H), 7.79 (d, J = 8.5 Hz, 1H), 7.67 (d, J = 8.5 Hz, 1H), 7.56 (q, J = 7.4 Hz, 1H), 7.49 (dd, J = 13.2, 6.0 Hz, 1H), 7.44 – 7.36 (m, 1H), 3.72 (dq, J = 13.4, 6.7 Hz, 1H), 3.63 (dq, J = 13.5, 6.8 Hz, 1H), 1.75 (d, J = 6.8 Hz, 2H), 1.67 (d, J = 6.8 Hz, 2H), 1.14 (d, J = 6.7 Hz, 2H), 1.10 (d, J = 6.7 Hz, 2H).

^{13}C NMR (126 MHz, CDCl$_3$) δ 169.67 (s), 147.23 (s), 137.75 (d, J = 61.8 Hz), 131.18 (s), 130.93 (s), 129.92 (s), 127.14 (s), 127.00 (s), 126.52 (s), 125.55 (d, J = 7.6 Hz), 123.62 (s), 121.50 (s), 51.21 (s), 46.14 (s), 20.88 (s), 20.71 (s), 20.65 (s).
HRMS (*m/z*): [M+Na$^+$] calcd for $C_{23}H_{24}N_2NaO_3$: 399.45; found, 399.1679
TLC: R$_f$ = 0.4 (80:20 petroleum ether:EtOAc).



4-(4-formylphenyl)-N,N-diisopropyl-1-naphthamide: Compound **3h** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow solid .

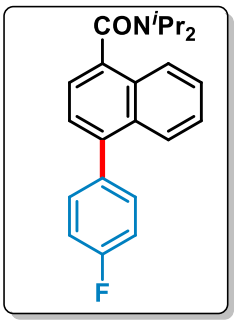
Yield: 75%

^{1}H NMR (500 MHz, $CDCl_3$) δ 10.13 (s, 1H), 8.02 (d, *J* = 7.9 Hz, 2H), 7.95 – 7.92 (m, *J* = 8.2 Hz, 1H), 7.84 (d, *J* = 8.4 Hz, 1H), 7.68 (d, *J* = 7.9 Hz, 2H), 7.55 (t, 1H), 7.47 (t, 1H), 7.40 (dd, *J* = 16.8, 7.2 Hz, 2H), 3.78 – 3.68 (m, 1H), 3.67 – 3.60 (m, *J* = 13.5, 6.8 Hz, 1H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.68 (d, *J* = 6.8 Hz, 4H), 1.14 (d, *J* = 6.7 Hz, 3H), 1.10 (d, *J* = 6.8 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 191.99 (s), 169.85 (s), 146.83 (s), 139.05 (s), 137.11 (s), 135.42 (s), 131.34 (s), 130.77 (s), 129.84 (d, *J* = 20.9 Hz), 129.63 – 129.52 (m), 126.86 (d, *J* = 5.6 Hz), 126.41 (s), 125.89 (s), 125.42 (s), 121.54 (s), 51.19 (s), 46.11 (s), 21.13 – 20.92 (m), 20.92 – 20.49 (m).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{24}H_{26}NO_2$: 360.1919; found, 399.1924

TLC: R_f = 0.3 (80:20 petroleum ether:EtOAc).



4-(4-fluorophenyl)-N,N-diisopropyl-1-naphthamide: Compound **3i** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

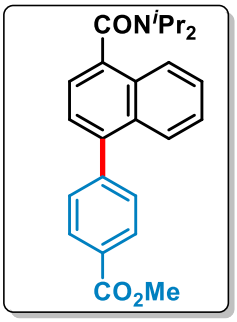
Physical State: White solid.

Yield: 69%

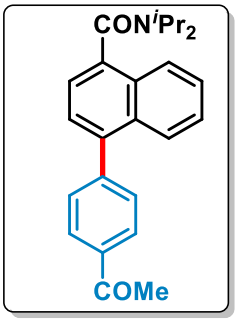
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.91 (t, *J* = 12.8 Hz, 8H), 7.86 (d, *J* = 8.4 Hz, 10H), 7.54 – 7.49 (m, 9H), 7.46 (dd, *J* = 17.8, 9.8 Hz, 25H), 7.41 – 7.33 (m, 16H), 7.18 (t, *J* = 8.6 Hz, 15H), 3.78 – 3.70 (m, 8H), 3.66 – 3.59 (m, 11H), 1.75 (d, *J* = 6.8 Hz, 24H), 1.68 (d, *J* = 6.9 Hz, 23H), 1.13 (d, *J* = 6.6 Hz, 24H), 1.09 (d, *J* = 6.7 Hz, 27H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.04 (s), 139.36 (s), 136.31 (d, *J* = 13.2 Hz), 131.80 (s), 131.53 (d, *J* = 7.9 Hz), 129.88 (s), 128.22 (s), 126.71 – 126.02 (m), 125.26 (s), 124.86 (s), 121.54 (s), 115.28 (s), 115.11 (s), 77.25 (s), 77.12 – 76.90 (m), 76.75 (s), 51.11 (s), 46.02 (s), 21.00 – 20.48 (m).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{23}H_{25}FNO$: 350.1875; found, 3350.1878
TLC: R_f = 0.05 (80:20 petroleum ether:EtOAc).



Methyl 4-(4-(diisopropylcarbamoyl)naphthalen-1-yl)benzoate: Compound **3j** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 71%
^{1}H NMR (400 MHz, CDCl3) δ 8.17 (d, J = 8.1 Hz, 1H), 7.92 (d, J = 8.2 Hz, 1H), 7.85 (d, J = 8.4 Hz, 1H), 7.57 (t, J = 6.4 Hz, 1H), 7.52 (d, J = 7.9 Hz, 1H), 7.49 – 7.43 (t, 1H), 7.39 (q, J = 7.1 Hz, 1H), 3.98 (s, 1H), 3.73 (m, J = 13.3, 6.6 Hz, 1H), 3.63 (m, J = 13.4, 6.7 Hz, 1H), 1.75 (d, J = 6.8 Hz, 1H), 1.67 (d, J = 6.8 Hz, 2H), 1.13 (d, J = 6.6 Hz, 1H), 1.09 (d, J = 6.6 Hz, 1H).
^{13}C NMR (101 MHz, CDCl3) δ 169.94 (s), 166.99 (s), 145.17 (s), 139.37 (s), 136.87 (s), 131.46 (s), 130.11 (s), 129.91 (s), 129.60 (s), 129.20 (s), 126.73 (s), 126.34 (s), 126.03 (s), 125.36 (s), 121.54 (s), 52.21 (s), 51.16 (s), 46.08 (s), 20.90 (s), 20.74 (s), 20.68 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{25}H_{28}NO_3$: 399.20; found, 390.2069
TLC: R_f = 0.35 (80:20 petroleum ether:EtOAc).

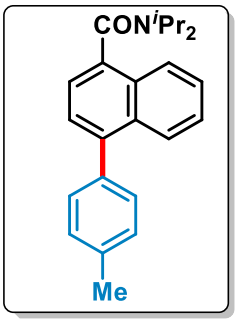


4-(4-acetylphenyl)-N,N-diisopropyl-1-naphthamide: Compound **3k** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid .
Yield: 89%
^{1}H NMR (400 MHz, CDCl$_3$) δ 8.09 (d, *J* = 8.2 Hz, 1H), 7.93 (d, *J* = 8.2 Hz, 1H), 7.85 (d, *J* = 8.4 Hz, 1H), 7.60 (d, *J* = 8.1 Hz, 1H), 7.54 (t, *J* = 7.2 Hz, 1H), 7.46 (t, *J* = 7.3 Hz, 1H), 7.39 (q, *J* = 7.2 Hz, 1H), 3.78 – 3.68 (m, 1H), 3.63 (dt, *J* = 13.5, 6.8 Hz, 1H), 2.69 (s, 1H), 1.75 (d, *J* = 6.8 Hz, 1H), 1.67 (d, *J* = 6.8 Hz, 2H), 1.13 (d, *J* = 6.6 Hz, 1H), 1.09 (d, *J* = 6.7 Hz, 1H).

^{13}C NMR (101 MHz, CDCl$_3$) δ 197.84 (s), 169.91 (s), 145.38 (s), 139.26 (s), 136.93 (s), 136.12 (s), 131.43 (s), 130.31 (s), 129.92 (s), 128.38 (s), 126.76 (s), 126.33 (s), 125.99 (s), 125.38 (s), 121.55 (s), 51.17 (s), 46.09 (s), 26.71 (s), 20.90 (s), 20.74 (s), 20.68 (s).

HRMS (*m/z*): [M+Na$^+$] calcd for $C_{23}H_{24}N_2NaO_3$: 399.1679; found, 399.1679

TLC: R_f = 0.4 (80:20 petroleum ether:EtOAc).



N,N-diisopropyl-4-(p-tolyl)-1-naphthamide: Compound **3l** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow liquid.

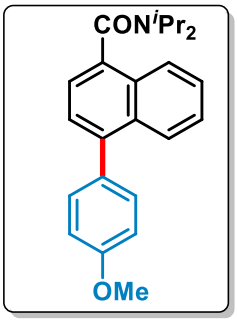
Yield: 65%

^{1}H NMR (400 MHz, CDCl3) δ 7.93 (d, J = 8.5 Hz, 1H), 7.89 (t, J = 7.8 Hz, 1H), 7.50 (t, J = 7.5 Hz, 1H), 7.46 – 7.41 (m, 1H), 7.38 (t, J = 8.2 Hz, 4H), 7.32 (t, J = 8.0 Hz, 3H), 3.80 – 3.70 (m, 1H), 3.66 – 3.58 (m, J = 13.7, 6.8 Hz, 1H), 2.46 (s, 3H), 1.75 (d, J = 6.8 Hz, 3H), 1.66 (d, 4H), 1.12 (d, J = 6.7 Hz, 3H), 1.08 (d, J = 6.6 Hz, 3H).

^{13}C NMR (101 MHz, CDCl3) δ 170.29 (s), 140.56 (s), 137.44 (s), 137.12 (s), 135.93 (s), 131.92 (s), 129.92 (s), 128.99 (s), 126.36 (dd, J = 21.2, 4.5 Hz), 125.18 (s), 121.66 (s), 51.14 (s), 46.06 (s), 29.68 (s), 21.23 (s), 21.02 – 20.52 (m).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{24}H_{27}NO$: 346.2126; found, 346.2128

TLC: R_f = 0.4 (80:20 petroleum ether:EtOAc).



N,N-diisopropyl-4-(4-methoxyphenyl)-1-naphthamide: Compound **3m** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: white solid.

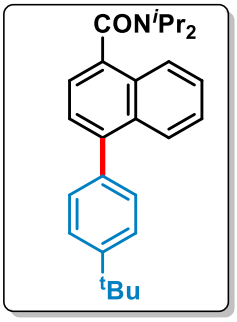
Yield: 59%

^{1}H NMR (500 MHz, CDCl$_3$) δ 7.93 (dd, *J* = 16.5, 8.4 Hz, 2H), 7.51 (t, *J* = 7.4 Hz, 1H), 7.43 (dd, *J* = 11.4, 8.3 Hz, 3H), 7.40 – 7.33 (m, 2H), 7.04 (d, *J* = 8.6 Hz, 2H), 3.89 (s, 3H), 3.80 – 3.72 (m, 1H), 3.63 (dq, *J* = 13.6, 6.7 Hz, 1H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.68 (d, *J* = 6.8 Hz, 3H), 1.12 (d, *J* = 6.6 Hz, 3H), 1.09 (d, *J* = 6.7 Hz, 3H).

^{13}C NMR (126 MHz, CDCl$_3$) δ 170.25 (s), 159.02 (s), 140.16 (s), 135.86 (s), 132.68 (s), 131.97 (s), 131.07 (s), 129.92 (s), 126.41 (d, *J* = 3.0 Hz), 126.24 (s), 125.16 (s), 121.61 (s), 113.71 (s), 77.25 (s), 77.00 (s), 76.75 (s), 55.31 (s), 51.10 (s), 45.99 (s), 20.72 (dd, *J* = 18.8, 11.7 Hz).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{24}H_{28}NO_2$: 364.21; found, 364.2186

TLC: R*f* = 0.2 (80:20 petroleum ether:EtOAc).



4-(4-(tert-butyl)phenyl)-N,N-diisopropyl-1-naphthamide: Compound **3n** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: yellowish liquid.

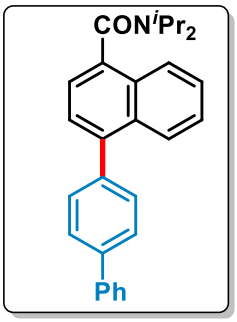
Yield: 81%

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.98 (d, *J* = 8.5 Hz, 1H), 7.91 (d, *J* = 8.3 Hz, 1H), 7.59 (dt, *J* = 14.9, 7.2 Hz, 3H), 7.52 (d, *J* = 8.1 Hz, 3H), 7.44 (t, *J* = 5.8 Hz, 2H), 3.76 (dq, *J* = 13.2, 6.6 Hz, 1H), 3.61 (dt, *J* = 13.8, 6.9 Hz, 1H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.67 (d, *J* = 6.1 Hz, 3H), 1.42 (s, 9H), 1.13 (d, *J* = 6.6 Hz, 3H), 1.09 (d, *J* = 6.5, 2.7 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.23 (s), 150.27 (s), 140.47 (s), 137.35 (s), 135.98 (s), 131.88 (s), 129.91 (s), 129.67 (s), 129.36 (s), 127.80 (s), 127.52 (s), 126.56 (s), 126.40 (s), 126.25 (d, *J* = 7.1 Hz), 125.18 (s), 122.37 (s), 121.61 (s), 51.09 (s), 46.03 (d, *J* = 11.7 Hz), 34.60 (s), 31.41 (s), 20.92 (s), 20.73 (s), 20.67 (d, *J* = 3.5 Hz).

HRMS (*m/z*): [M+Na^+] calcd for $C_{27}H_{33}NNaO$: 410.2455; found, 410.2454

TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



4-([1,1'-biphenyl]-4-yl)-N,N-diisopropyl-1-naphthamide: Compound **3o** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: White solid.

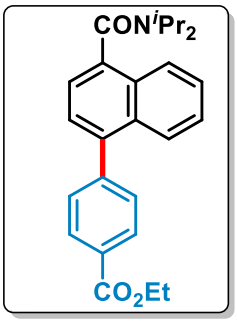
Yield: 73%

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.03 – 7.98 (m, *J* = 8.4 Hz, 1H), 7.94 (d, *J* = 8.3 Hz, 1H), 7.74 (d, *J* = 8.1 Hz, 2H), 7.70 (d, *J* = 7.4 Hz, 2H), 7.58 (d, *J* = 8.0 Hz, 2H), 7.56 – 7.44 (m, 5H), 7.39 (t, *J* = 6.8 Hz, 2H), 3.82 – 3.72 (m, *J* = 13.2, 6.6 Hz, 1H), 3.72 – 3.59 (m, 1H), 1.75 (d, *J* = 10.5 Hz, 3H), 1.69 (d, *J* = 6.8 Hz, 3H), 1.14 (d, *J* = 6.6 Hz, 3H), 1.10 (d, *J* = 6.7 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.14 (s), 140.26 (s), 140.08 (s), 139.35 (s), 136.31 (s), 131.80 (s), 130.47 (s), 129.95 (s), 128.84 (s), 127.40 (s), 127.11 (s), 127.01 (s), 126.54 (s), 126.42 (d, *J* = 4.3 Hz), 126.33 (s), 125.26 (s), 51.13 (s), 46.03 (s), 20.92 (s), 20.75 (s), 20.69 (s).

HRMS (*m/z*): [M+Na^+] calcd for $C_{29}H_{30}NO$: 408.2327; found, 408.2322

TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



Ethyl 4-(4-(diisopropylcarbamoyl)naphthalen-1-yl)benzoate: Compound **3p** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

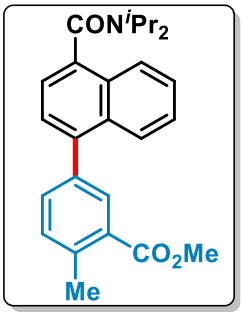
Physical State: White solid.

Yield: 82%

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.16 (dd, *J* = 14.3, 6.7 Hz, 2H), 7.93 (t, *J* = 7.1 Hz, 1H), 7.84 (t, *J* = 7.2 Hz, 1H), 7.56 (t, *J* = 6.2 Hz, 2H), 7.55 – 7.50 (m, 1H), 7.48 – 7.43 (m, 1H), 7.39 (q, *J* = 7.2 Hz, 2H), 4.48 – 4.40 (m, 2H), 3.80 – 3.67 (m, 1H), 3.63 (dt, *J* = 13.6, 6.7 Hz, 1H), 1.74 (d, *J* = 6.8 Hz, 3H), 1.66 (t, *J* = 7.2 Hz, 4H), 1.43 (td, *J* = 7.1, 4.7 Hz, 3H), 1.13 (d, *J* = 6.7 Hz, 3H), 1.08 (t, *J* = 7.1 Hz, 3H).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{26}H_{30}NO_3$: 404.22; found, 404.2218

TLC: R_f = 0.3 (80:20 petroleum ether:EtOAc).



Methyl 5-(4-(diisopropylcarbamoyl)naphthalen-1-yl)-2-methylbenzoate: Compound **3q** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: White solid.

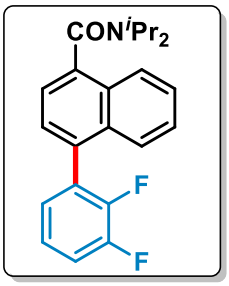
Yield: 65%

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.04 (s, 1H), 7.91 (d, *J* = 8.2 Hz, 1H), 7.85 (d, *J* = 8.4 Hz, 1H), 7.52 (t, *J* = 6.2 Hz, 2H), 7.45 (t, 1H), 7.37 (t, 3H), 3.89 (s, 3H), 2.70 (s, 3H), 1.74 (d, *J* = 6.6 Hz, 3H), 1.67 (d, *J* = 6.8 Hz, 3H), 1.12 (d, *J* = 6.5 Hz, 3H), 1.08 (d, *J* = 6.6 Hz, 3H).

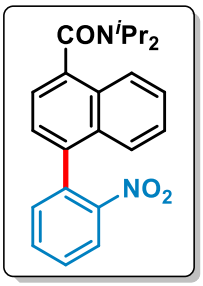
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.15 (s), 167.93 (s), 139.40 (s), 137.90 (s), 133.44 (s), 131.96 (s), 131.74 (d, *J* = 3.3 Hz), 129.87 (s), 129.59 (s), 126.61 (d, *J* = 3.7 Hz), 126.39 (s), 126.16 (s), 125.26 (s), 121.65 (s), 114.05 (s), 51.91 (s), 51.19 (s), 46.11 (s), 29.64 (s), 22.67 (s), 21.47 (s), 20.88 (s), 20.75 (s), 20.67 (s).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{26}H_{30}NO_3$: 404.2216; found, 404.2220

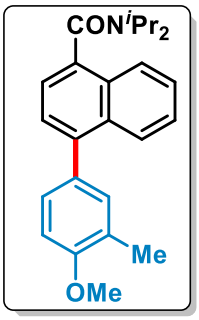
TLC: R_f = 0.25 (80:20 petroleum ether:EtOAc).



4-(2,3-difluorophenyl)-N,N-diisopropyl-1-naphthamide: Compound **3r** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 69%
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.90 – 7.77 (m, 3H), 7.54 – 7.40 (m, 3H), 7.32 (d, *J* = 6.9 Hz, 1H), 7.26 (m, 2H), 3.66 – 3.55 (m, *J* = 19.0, 6.4 Hz, 2H), 1.73 (d, *J* = 6.7 Hz, 3H), 1.65 (d, *J* = 6.0 Hz, 3H), 1.08 (d, *J* = 6.6 Hz, 3H), 1.04 (d, *J* = 6.6 Hz, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.12 (s), 136.68 (s), 133.52 (s), 129.57 (s), 129.38 (s), 128.22 (d, *J* = 10.0 Hz), 127.54 (s), 126.66 (s), 126.31 (s), 125.33 (d, *J* = 15.7 Hz), 124.90 (s), 122.10 (s), 51.07 (s), 46.01 (s), 20.73 (dd, *J* = 19.0, 10.4 Hz).
^{19}F NMR (471 MHz, $CDCl_3$) δ -109.97 (s).
HRMS (*m/z*): [M+H+] calcd for $C_{23}H_{24}F_2NO$: 368.1781; found, 368.1783
TLC: R*f* = 0.05 (80:20 petroleum ether:EtOAc).



N,N-diisopropyl-4-(2-nitrophenyl)-1-naphthamide: Compound **3s** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: yellowish liquid.
Yield: 72%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.10 (d, *J* = 8.3 Hz, 1H), 7.91 (d, *J* = 8.3 Hz, 1H), 7.71 (q, *J* = 7.3 Hz, 1H), 7.62 (t, *J* = 7.6 Hz, 1H), 7.51 (dd, *J* = 5.6, 3.4 Hz, 1H), 7.47 – 7.39 (m, 3H), 7.37 – 7.30 (m, 2H), 3.76 (dq, *J* = 13.2, 6.7 Hz, 1H), 3.65 (dt, *J* = 21.5, 7.4 Hz, 1H), 1.74 (d, *J* = 6.8 Hz, 3H), 1.67 (d, *J* = 6.8 Hz, 3H), 1.12 (dd, *J* = 15.6, 6.8 Hz, 5H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 169.84 (s), 149.48 (s), 137.09 (s), 135.89 (s), 135.06 (s), 133.24 (s), 132.82 (s), 131.72 (s), 129.61 (s), 128.83 (s), 126.98 (s), 126.81 (s), 125.86 – 125.23 (m), 124.28 (s), 121.40 (s), 51.24 (s), 46.05 (s), 20.97 (s), 20.83 – 20.55 (m).
HRMS (*m/z*): [M+Na^+] calcd for $C_{23}H_{24}N_2NaO_3$: 399.1679; found, 399.1679
TLC: R_f = 0.4 (80:20 petroleum ether:EtOAc).



N,N-diisopropyl-4-(4-methoxy-3-methylphenyl)-1-naphthamide: Compound **3t** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: White solid.

Yield: 79%

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.95 (t, *J* = 9.3 Hz, 1H), 7.89 (d, *J* = 8.3 Hz, 1H), 7.53 – 7.47 (m, 1H), 7.43 (dd, *J* = 16.0, 8.6 Hz, 1H), 7.35 (dd, *J* = 18.5, 7.1 Hz, 2H), 7.28 (t, *J* = 8.2 Hz, 2H), 6.95 (d, *J* = 8.0 Hz, 1H), 3.92 (s, 3H), 3.74 (dt, *J* = 13.3, 6.7 Hz, 1H), 3.66 – 3.57 (m, 1H), 2.30 (s, 3H), 1.74 (d, *J* = 6.8 Hz, 3H), 1.67 (d, *J* = 6.8 Hz, 3H), 1.12 (d, *J* = 6.6 Hz, 3H), 1.08 (d, *J* = 6.7 Hz, 3H).

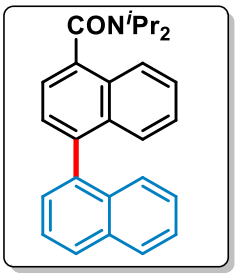
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.31 (s), 157.23 (s), 140.43 (s), 135.78 (s), 132.32 (s), 132.04 (s), 129.94 (s), 128.35 (s), 126.68 – 126.09 (m), 125.17 (s), 121.64 (s), 109.66 (s), 77.25 (s), 77.14 – 76.90 (m), 76.75 (s), 55.42 (s), 51.11 (s), 46.01 (s), 20.76 (dd, *J* = 19.2, 11.4 Hz), 16.31 (s).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{27}H_{27}NO_3$: xxxx; found, xxxxxxx

TLC: R_f = 0.25 (80:20 petroleum ether:EtOAc).

HRMS (*m/z*): [M+Na$^+$] calcd for $C_{25}H_{29}NNaO_2$: 398.2087; found, 398.2087

TLC: R_f = 0.25 (80:20 petroleum ether:EtOAc).



N,N-diisopropyl-[1,1'-binaphthalene]-4-carboxamide: Compound **3u** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: White solid.

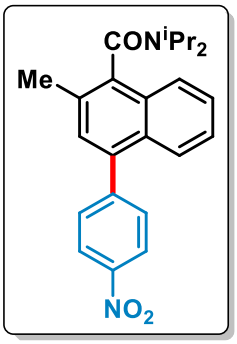
Yield: 69% (*p*:others 4:1)

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.95 (t, *J* = 10.2 Hz, 2H), 7.59 (t, *J* = 7.6 Hz, 1H), 7.54 – 7.41 (m, 5H), 7.37 (dd, *J* = 16.4, 7.9 Hz, 1H), 7.32 – 7.28 (m, 1H), 3.94 – 3.78 (m, 1H), 3.73 – 3.57 (m, 1H), 1.78 (d, *J* = 6.8 Hz, 2H), 1.71 (d, *J* = 6.8 Hz, 2H), 1.22 – 1.11 (m, 4H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.20 (s), 138.76 (s), 138.05 (s), 136.50 (s), 133.48 (d, *J* = 4.6 Hz), 129.68 (s), 128.03 (d, *J* = 3.8 Hz), 127.57 (s), 127.19 (s), 126.91 (d, *J* = 5.0 Hz), 126.60 (d, *J* = 11.3 Hz), 126.43 – 126.22 (m), 126.13 (s), 125.92 (s), 125.78 (s), 125.47 (s), 125.16 (d, *J* = 4.8 Hz), 121.61 (d, *J* = 5.0 Hz), 51.18 (d, *J* = 7.4 Hz), 46.07 (s), 21.08 (s), 20.96 (s), 20.81 (s), 20.72 (d, *J* = 3.1 Hz).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{27}H_{28}NO$: 382.21; found, 382.2176

TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



N,N-diisopropyl-2-methyl-4-(4-nitrophenyl)-1-naphthamide: Compound **3v** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellowish liquid.

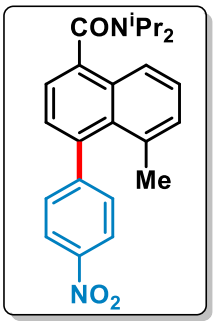
Yield: 67% (*p*:others 4:1)

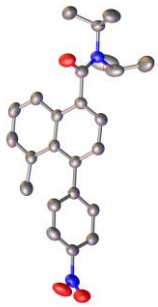
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.35 (d, *J* = 6.2 Hz, 2H), 7.83 (d, *J* = 8.3 Hz, 1H), 7.73 (d, *J* = 8.2 Hz, 1H), 7.66 (d, 2H), 7.52 (t, 1H), 7.41 (t, 1H), 7.26 (s, 1H), 3.69 – 3.55 (m, 2H), 2.50 (s, 2H), 1.79 (d, *J* = 6.8 Hz, 4H), 1.71 (d, *J* = 6.8 Hz, 3H), 1.15 (d, *J* = 5.9 Hz, 3H), 1.05 (d, *J* = 6.6, 2.4 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 169.34 (s), 147.28 (d, *J* = 11.2 Hz), 137.50 (s), 135.39 (s), 130.91 (s), 130.20 (d, *J* = 6.7 Hz), 129.75 (s), 129.48 (s), 126.88 (s), 126.16 (s), 125.25 (d, *J* = 19.4 Hz), 123.58 (s), 51.25 (s), 46.26 (s), 21.14 (d, *J* = 17.4 Hz), 20.65 (d, *J* = 16.3 Hz).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{24}H_{27}N_2O_3$: 391.1977; found, 391.1977

TLC: R_f = 0.01 (80:20 petroleum ether:EtOAc).





N,N-diisopropyl-5-methyl-4-(4-nitrophenyl)-1-naphthamide: Compound **3w** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

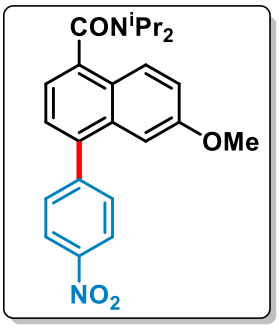
Physical State: White solid.

Yield: 71%

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.40 – 8.24 (m, 3H), 7.82 (t, *J* = 8.0 Hz, 1H), 7.61 – 7.56 (m, 1H), 7.51 – 7.39 (m, 2H), 7.33 – 7.22 (m, 3H), 3.70 – 3.60 (m, 2H), 2.01 (s, 3H), 1.74 (d, 3H), 1.67 (d, 3H), 1.11 (dd, *J* = 11.3, 6.7 Hz, 6H).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{24}H_{27}N_2O_3$: 391.1977; found, 391.1977

TLC: R_f = 0.01 (80:20 petroleum ether:EtOAc).



N,N-diisopropyl-6-methoxy-4-(4-nitrophenyl)-1-naphthamide: Compound **3x** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: White solid.

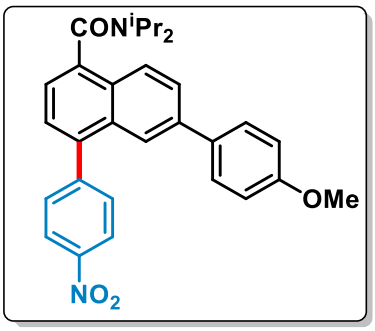
Yield: 65%

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.37 (d, *J* = 8.4 Hz, 1H), 7.84 (d, *J* = 9.1 Hz, 1H), 7.69 (d, *J* = 8.4 Hz, 1H), 7.36 (d, *J* = 7.1 Hz, 1H), 7.23 (dd, *J* = 14.3, 4.8 Hz, 1H), 7.08 (d, *J* = 1.9 Hz, 1H), 3.76 (s, 1H), 3.69 (dd, *J* = 13.3, 6.6 Hz, 1H), 3.62 (dt, *J* = 13.5, 6.7 Hz, 1H), 1.73 (d, *J* = 6.7 Hz, 2H), 1.66 (d, *J* = 6.7 Hz, 2H), 1.13 (d, *J* = 6.6 Hz, 1H), 1.08 (d, *J* = 6.6 Hz, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 169.75 (s), 158.41 (s), 147.63 (s), 147.20 (s), 137.37 (s), 136.66 (s), 132.52 (s), 130.73 (s), 127.17 (d, *J* = 12.9 Hz), 125.30 (s), 123.73 (s), 119.29 (s), 104.16 (s), 77.25 (s), 77.11 – 76.88 (m), 76.75 (s), 55.23 (s), 51.16 (s), 46.08 (s), 20.88 (s), 20.67 (d, *J* = 4.6 Hz).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{24}H_{27}N_2O_4$: 407.1926; found, 407.1927

TLC: R_f = 0.4 (80:20 petroleum ether:EtOAc).



N,N-diisopropyl-6-methoxy-4-(4-nitrophenyl)-1-naphthamide: Compound **3y** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: yellowish solid.

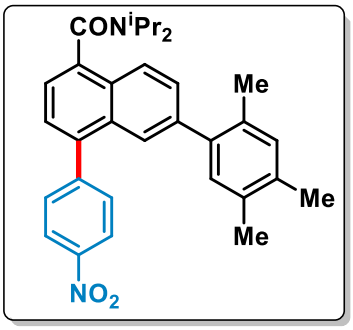
Yield: 75%

^{1}H NMR (400 MHz, CDCl3) δ 8.37 (d, J = 8.4 Hz, 1H), 7.84 (d, J = 9.1 Hz, 1H), 7.69 (d, J = 8.4 Hz, 1H), 7.36 (d, J = 7.1 Hz, 1H), 7.23 (dd, J = 14.3, 4.8 Hz, 1H), 7.08 (d, J = 1.9 Hz, 1H), 3.76 (s, 1H), 3.69 (dd, J = 13.3, 6.6 Hz, 1H), 3.62 (dt, J = 13.5, 6.7 Hz, 1H), 1.73 (d, J = 6.7 Hz, 2H), 1.66 (d, J = 6.7 Hz, 2H), 1.13 (d, J = 6.6 Hz, 1H), 1.08 (d, J = 6.6 Hz, 2H).

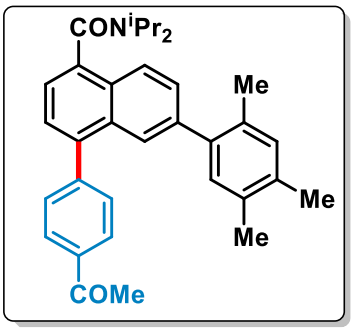
^{13}C NMR (126 MHz, CDCl3) δ 169.75 (s), 158.41 (s), 147.63 (s), 147.20 (s), 137.37 (s), 136.66 (s), 132.52 (s), 130.73 (s), 127.17 (d, J = 12.9 Hz), 125.30 (s), 123.73 (s), 119.29 (s), 104.16 (s), 77.25 (s), 77.11 – 76.88 (m), 76.75 (s), 55.23 (s), 51.16 (s), 46.08 (s), 20.88 (s), 20.67 (d, J = 4.6 Hz).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{30}H_{31}N_2O_4$: 482.2239; found, 482.2239

TLC: Rf = 0.4 (80:20 petroleum ether:EtOAc).

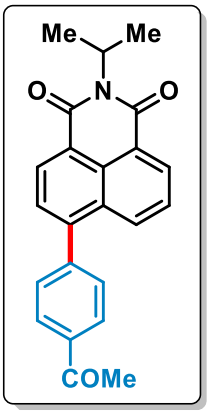


N,N-diisopropyl-4-(4-nitrophenyl)-6-(2,4,5-trimethylphenyl)-1-naphthamide: Compound **3z** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: yellowish solid.
Yield: 79%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.33 (d, *J* = 8.6 Hz, 2H), 7.96 (d, *J* = 8.6 Hz, 1H), 7.71 – 7.65 (m, 3H), 7.55 (dt, *J* = 11.3, 5.6 Hz, 1H), 7.41 (dd, *J* = 16.9, 7.2 Hz, 2H), 7.05 (s, 1H), 6.99 (s, 1H), 3.79 (tt, *J* = 14.9, 7.5 Hz, 1H), 3.71 – 3.60 (m, 1H), 2.26 (s, 3H), 2.24 (s, 3H), 2.19 (s, 3H), 1.77 (d, *J* = 6.8 Hz, 3H), 1.69 (d, *J* = 6.8 Hz, 3H), 1.16 (dd, *J* = 13.0, 6.7 Hz, 6H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 169.77 (s), 147.22 (d, *J* = 5.0 Hz), 140.81 (s), 138.64 (s), 138.03 (s), 137.28 (s), 136.08 (s), 134.03 (s), 132.48 (s), 131.86 (s), 131.20 – 130.74 (m), 129.00 (s), 128.60 (s), 126.75 (s), 125.47 (s), 125.11 (s), 123.62 (s), 121.24 (s), 51.27 (s), 46.18 (s), 20.98 (s), 20.70 (d, *J* = 3.2 Hz), 19.83 (s), 19.23 (d, *J* = 12.7 Hz).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{32}H_{35}N_2O_3$: 495.2603; found, 495.2606
TLC: Rf = 0.2 (80:20 petroleum ether:EtOAc).

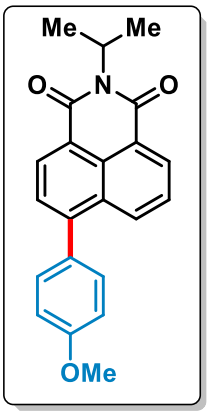


4-(4-acetylphenyl)-N,N-diisopropyl-6-(2,4,5-trimethylphenyl)-1-naphthamide: Compound **3aa** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 81%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.07 (t, *J* = 11.8 Hz, 2H), 7.94 (t, *J* = 11.2 Hz, 1H), 7.75 (d, *J* = 1.3 Hz, 1H), 7.60 (d, *J* = 8.2 Hz, 2H), 7.53 (dd, *J* = 8.6, 1.6 Hz, 1H), 7.40 (dd, *J* = 22.3, 7.2 Hz, 2H), 7.04 (d, *J* = 10.1 Hz, 1H), 7.01 (d, *J* = 11.5 Hz, 1H), 3.88 – 3.78 (m, 1H), 3.65 (dq, *J* = 13.5, 6.7 Hz, 1H), 2.66 (s, 3H), 2.26 (s, 3H), 2.24 (s, 3H), 2.19 (s, 3H), 1.77 (d, *J* = 6.8 Hz, 3H), 1.69 (t, *J* = 6.5 Hz, 3H), 1.16 (dd, *J* = 12.5, 6.7 Hz, 6H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 197.82 (s), 169.97 (s), 145.35 (s), 140.34 (s), 139.28 (s), 138.87 (s), 136.70 (s), 135.94 (d, *J* = 16.3 Hz), 133.93 (s), 132.55 (s), 131.78 (s), 131.33 (s), 131.07 (s), 130.25 (s), 128.66 (d, *J* = 15.4 Hz), 128.37 (s), 126.55 (s), 125.90 (s), 124.99 (s), 121.28 (s), 51.21 (s), 46.10 (s), 26.67 (s), 20.98 (s), 20.71 (d, *J* = 3.2 Hz), 19.84 (s), 19.21 (d, *J* = 12.8 Hz).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{34}H_{38}NO_2$: 492.2858; found, 492.2858

TLC: Rf = 0.4 (80:20 petroleum ether:EtOAc).

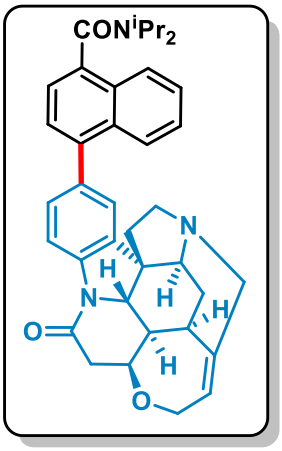


6-(4-acetylphenyl)-2-isopropyl-1H-benzo[de]isoquinoline-1,3(2H)-dione: Compound **3ab** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: yellowish solid.
Yield: 69%
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.62 (dd, *J* = 9.6, 4.1 Hz, 2H), 8.15 (dd, *J* = 13.6, 4.7 Hz, 3H), 7.70 (t, *J* = 7.7 Hz, 2H), 7.61 (d, *J* = 8.3 Hz, 2H), 5.46 (hept, *J* = 7.0 Hz, 1H), 2.70 (s, 3H), 1.64 – 1.61 (m, 6H).
^{13}C NMR (101 MHz, $CDCl_3$) δ 197.49 (s), 164.44 (s), 164.24 (s), 145.05 (s), 143.61 (s), 136.92 (s), 131.68 (s), 131.14 (s), 130.50 (s), 130.16 (s), 129.65 (s), 128.64 (d, *J* = 5.9 Hz), 127.75 (s), 127.16 (s), 123.61 (s), 123.00 (s), 45.36 (s), 26.72 (s), 19.77 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{23}H_{20}NO_3$: 358.1958; found, 358.1958
TLC: Rf = 0.2 (80:20 petroleum ether:EtOAc).

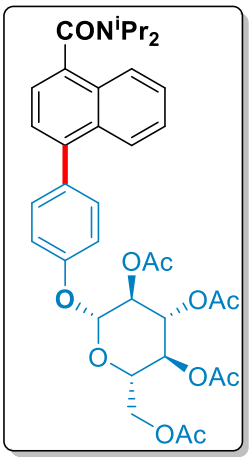


2-isopropyl-6-(4-methoxyphenyl)-1H-benzo[de]isoquinoline-1,3(2H)-dione: Compound **3ac** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale green solid.
Yield: 65%
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.60 (d, *J* = 7.5 Hz, 2H), 8.27 (dd, *J* = 8.5, 0.9 Hz, 1H), 7.71 – 7.64 (m, 2H), 7.47 – 7.41 (m, 2H), 7.11 – 7.05 (m, 2H), 5.46 (hept, *J* = 6.9 Hz, 1H), 3.91 (s, 3H), 1.62 (d, *J* = 6.9 Hz, 6H).
^{13}C NMR (101 MHz, $CDCl_3$) δ 164.58 (d, *J* = 19.3 Hz), 159.90 (s), 146.33 (s), 132.36 (s), 131.07 (t, *J* = 13.1 Hz), 130.69 (s), 130.05 (s), 128.79 (s), 127.72 (s), 126.66 (s), 123.46 (s), 121.94 (s), 114.15 (s), 55.43 (s), 45.22 (s), 19.78 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{22}H_{20}NO_3$: 346.1398; found, 346.1399

TLC: Rf = 0.2 (80:20 petroleum ether:EtOAc).

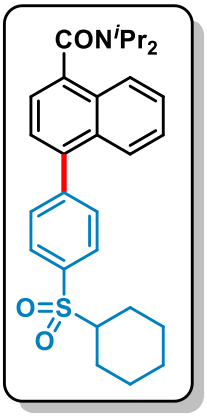


N,N-diisopropyl-4-((4aR,4a1R,5aS,8aR,8a1S,15aS)-14-oxo-2,4a,4a1,5,5a,7,8,8a1,15,15a-decahydro-14H-4,6-methanoindolo[3,2,1-ij]oxepino[2,3,4-de]pyrrolo[2,3-h]quinolin-10-yl)-1- naphthamide: Compound **3ad** was prepared by general proceure B
Eluent: Dichloromethane/Methanol (90:10, v/v).
Physical State: pale yellowish liquid.
Yield: 58%
^{1}H NMR (500 MHz, DMSO) δ 8.37 (s, 5H), 8.16 (s, 16H), 7.73 (d, J = 8.5 Hz, 17H), 7.69 – 7.61 (m, 24H), 6.45 (s, 21H), 5.91 – 5.82 (m, 36H), 4.62 (s, 17H), 4.44 – 4.34 (m, 44H), 4.18 (ddd, J = 24.2, 14.7, 5.7 Hz, 72H), 4.07 – 3.94 (m, 49H), 3.00 – 2.88 (m, 27H), 2.68 (dd, J = 30.5, 15.8 Hz, 52H), 2.40 – 2.28 (m, 32H), 2.23 (dd, J = 13.4, 5.6 Hz, 23H), 1.73 (d, J = 15.6 Hz, 20H), 1.62 (d, J = 6.6 Hz, 15H), 1.57 – 1.47 (m, 37H), 1.30 – 1.17 (m, 42H), 1.06 (dd, J = 15.7, 5.1 Hz, 14H), 0.89 – 0.82 (m, 18H).
^{13}C NMR (126 MHz, DMSO) δ 169.07 (s), 158.90 – 158.51 (m), 158.45 (s), 158.08 (d, J = 31.0 Hz), 141.49 (s), 138.17 (s), 136.59 (s), 132.20 (s), 131.84 (s), 120.85 (s), 118.47 (s), 117.38 (s), 116.08 (s), 113.70 (s), 87.35 (s), 79.34 (d, J = 6.4 Hz), 79.10 (s), 78.84 (s), 75.49 (s), 72.90 (s), 69.37 (s), 63.26 (s), 60.37 (s), 58.45 (s), 58.19 (s), 52.16 (s), 45.83 (s), 38.43 (s), 28.88 (s), 24.90 (s).
HRMS (*m/z*): [M+H+] calcd for $C_{38}H_{42}N_3O_3$: 588.3222; found, 588.3221
TLC: R*f* = 0.1 (90:10 Dichloromethane/Methanol).

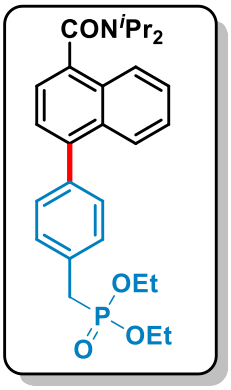


(2S,3S,4R,5S,6R)-2-(acetoxymethyl)-6-(4-(4-(diisopropylcarbamoyl)naphthalen-1 yl)phenoxy)tetrahydro-2H-pyran-3,4,5-triyl triacetate: Compound **3ae** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).

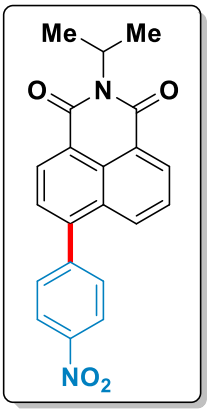
Physical State: White solid.
Yield: 63%
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.88 (t, *J* = 7.5 Hz, 2H), 7.50 (t, *J* = 7.6 Hz, 1H), 7.44 (d, *J* = 7.7 Hz, 1H), 7.41 (d, *J* = 8.4 Hz, 1H), 7.37 – 7.31 (m, 2H), 7.11 (d, *J* = 8.5 Hz, 2H), 5.37 – 5.27 (m, 3H), 5.24 – 5.16 (m, 2H), 4.36 – 4.28 (m, *J* = 12.1, 5.0 Hz, 1H), 4.23 – 4.17 (m, 1H), 3.96 – 3.89 (m, *J* = 9.7, 5.3, 2.3 Hz, 1H), 3.76 – 3.68 (m, 1H), 3.64 – 3.57 (m, *J* = 13.5, 6.7 Hz, 1H), 2.10 (s, 3H), 2.08 (s, 3H), 2.05 (d, *J* = 3.4 Hz, 6H), 1.73 (d, *J* = 6.8 Hz, 3H), 1.65 (d, *J* = 6.8 Hz, 3H), 1.11 (d, *J* = 6.6 Hz, 3H), 1.07 (d, *J* = 6.7 Hz, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.56 (s), 170.23 (s), 170.17 (s), 169.40 (s), 169.32 (s), 156.19 (s), 139.67 (s), 136.08 (s), 135.39 (s), 131.80 (s), 131.17 (s), 129.85 (s), 126.53 (s), 126.32 (d, *J* = 23.5 Hz), 125.17 (s), 121.56 (s), 116.64 (s), 98.94 (s), 89.95 (s), 72.70 (s), 72.03 (s), 71.15 (s), 68.27 (s), 61.95 (s), 51.15 (s), 46.04 (s), 21.03 – 20.89 (m), 20.89 – 20.41 (m).
HRMS (*m/z*): [M+K^+] calcd for $C_{37}H_{43}KNO_{10}$: 700.2512; found, 700.2519
TLC: Rf = 0.2 (60:40 petroleum ether:EtOAc).



4-(4-(cyclohexylsulfonyl)phenyl)-N,N-diisopropyl-1-naphthamide: Compound **3af** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: pale yellowish liquid.
Yield: 59%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.00 (d, *J* = 8.3 Hz, 2H), 7.92 (d, *J* = 7.2 Hz, 1H), 7.80 (d, *J* = 6.7 Hz, 1H), 7.62 (d, *J* = 6.5 Hz, 2H), 7.55 (t, *J* = 7.6 Hz, 1H), 7.47 (t, 1H), 7.43 – 7.35 (m, 2H), 3.76 – 3.67 (m, *J* = 13.1, 6.4 Hz, 1H), 3.67 – 3.59 (m, *J* = 13.7, 6.7 Hz, 1H), 3.32 – 3.22 (m, 1H), 1.90 – 1.82 (m, *J* = 12.3 Hz, 2H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.69 (d, *J* = 6.2 Hz, 1H), 1.67 (d, *J* = 6.8 Hz, 3H), 1.55 (d, *J* = 4.0 Hz, 1H), 1.29 – 1.22 (m, *J* = 13.7 Hz, 5H), 1.12 (d, *J* = 7.2 Hz, 3H), 1.09 (d, *J* = 6.7 Hz, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 169.82 (s), 144.75 (s), 140.52 (s), 138.61 (s), 137.14 (s), 131.36 (s), 130.67 (s), 129.92 (s), 126.91 (t, *J* = 4.6 Hz), 126.50 (s), 125.77 (s), 125.44 (s), 121.53 (s), 52.78 (s), 51.19 (s), 46.12 (s), 34.09 (s), 25.15 (s), 24.66 (s), 21.25 – 20.57 (m).
HRMS (*m/z*): [M+H^+] calcd for $C_{29}H_{36}NO_3S$: 478.2371; found, 478.2374
TLC: Rf = 0.2 (60:40 petroleum ether:EtOAc).

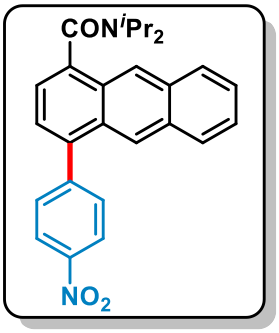


diethyl (4-(4-(diisopropylcarbamoyl)naphthalen-1-yl)benzyl)phosphonate: Compound **3ag** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: pale yellowish liquid.
Yield: 65%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.00 – 7.82 (m, 2H), 7.67 (dd, *J* = 22.0, 7.8 Hz, 1H), 7.59 – 7.51 (m, 1H), 7.51 – 7.43 (m, 4H), 7.36 (ddd, *J* = 24.6, 18.0, 7.4 Hz, 2H), 4.18 – 4.04 (m, 4H), 3.76 (ddd, *J* = 20.9, 10.7, 5.9 Hz, 1H), 3.68 – 3.61 (m, 1H), 3.25 (dd, *J* = 30.2, 12.8 Hz, 2H), 1.76 (t, *J* = 5.8 Hz, 3H), 1.69 (d, *J* = 6.8 Hz, 3H), 1.36 – 1.28 (m, 7H), 1.12 (dt, *J* = 21.7, 7.0 Hz, 5H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.21 (s), 140.09 (s), 138.98 (d, *J* = 4.0 Hz), 136.23 (s), 130.29 (dd, *J* = 15.3, 4.8 Hz), 129.99 – 129.64 (m), 128.82 (s), 126.62 – 126.26 (m), 125.24 (s), 122.55 (d, *J* = 5.0 Hz), 121.62 (s), 62.28 (d, *J* = 6.8 Hz), 51.17 (s), 46.07 (s), 34.08 (s), 32.98 (s), 20.93 (s), 20.84 – 20.51 (m), 16.42 (d, *J* = 6.0 Hz).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{28}H_{37}NO_4P$: 482.2415; found, 482.2417
TLC: Rf = 0.5 (10:90 petroleum ether:EtOAc).

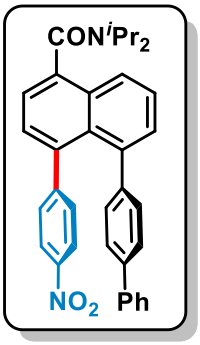


2-isopropyl-6-(4-nitrophenyl)-1H-benzo[de]isoquinoline-1,3(2H)-dione: Compound **3ah** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 65%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.65 (dd, *J* = 7.2, 5.8 Hz, 2H), 8.42 (d, *J* = 8.7 Hz, 2H), 8.10 (d, *J* = 8.4, 0.7 Hz, 1H), 7.74 (t, *J* = 8.3, 7.4 Hz, 1H), 7.72 – 7.67 (m, 3H), 5.51 – 5.41 (m, 1H), 1.62 (d, *J* = 7.0 Hz, 6H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 164.30 (s), 164.09 (s), 147.87 (s), 145.46 (s), 143.56 (s), 131.24 (d, *J* = 19.6 Hz), 130.83 (s), 130.42 (s), 129.41 (s), 128.63 (s), 127.88 (s), 127.53 (s), 123.91 (s), 123.71 (s), 123.52 (s), 45.44 (s), 19.76 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{21}H_{17}N_2O_3$: 361.1143; found, 361.1146

TLC: Rf = 0.3 (80:20 petroleum ether:EtOAc).

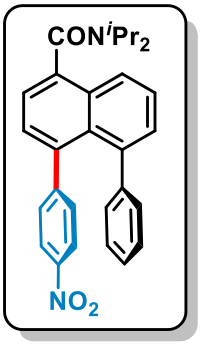


N,N-diisopropyl-4-(4-nitrophenyl)anthracene-1-carboxamide: Compound **3ai** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 81%
^{1}H NMR (400 MHz, CDCl$_3$) δ 8.51 (s, 1H), 8.42 (d, *J* = 8.8 Hz, 2H), 8.33 (s, 1H), 8.02 – 7.97 (m, *J* = 7.9 Hz, 1H), 7.87 (d, *J* = 7.8 Hz, 1H), 7.77 (d, *J* = 8.7 Hz, 2H), 7.54 – 7.45 (m, 2H), 7.39 (s, 2H), 3.83 – 3.74 (m, *J* = 13.3, 6.7 Hz, 1H), 3.68 (dq, *J* = 13.5, 6.7 Hz, 1H), 1.85 (d, *J* = 6.8 Hz, 3H), 1.72 (d, *J* = 6.8 Hz, 3H), 1.17 (d, *J* = 7.6 Hz, 3H), 1.09 (d, *J* = 6.7 Hz, 3H).
^{13}C NMR (101 MHz, CDCl$_3$) δ 169.74 (s), 147.40 (s), 138.10 (s), 137.61 (s), 132.03 (s), 131.79 (s), 130.98 (s), 129.43 (s), 128.25 (s), 128.05 (s), 126.33 (d, *J* = 3.6 Hz), 125.82 (s), 124.73 (s), 124.48 (s), 123.78 (s), 120.80 (s), 51.25 (s), 46.20 (s), 20.81 (t, *J* = 11.2 Hz).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{27}H_{27}N_2O_3$: 427.2027; found, 427.2016
TLC: Rf = 0.4 (80:20 petroleum ether:EtOAc).

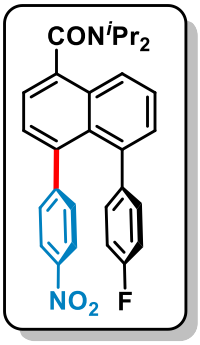


5-([1,1'-biphenyl]-4-yl)-N,N-diisopropyl-4-(4-nitrophenyl)-1-naphthamide: Compound **3aj** was prepared by
general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Yellowish solid.
Yield: 64%
^{1}H NMR (500 MHz, CDCl$_3$) δ 8.04 – 7.99 (m, *J* = 7.5 Hz, 1H), 7.80 (d, *J* = 8.9 Hz, 2H), 7.69 – 7.62 (m, 1H), 7.54 (d, *J* = 6.2 Hz, 1H), 7.46 – 7.36 (m, 4H), 7.36 – 7.29 (m, 3H), 7.14 (t, *J* = 9.6 Hz, 4H), 7.06 (d, *J* = 7.4 Hz, 1H), 7.00 (d, *J* = 7.2 Hz, 1H), 3.84 – 3.75 (m, *J* = 13.3, 6.6 Hz, 1H), 3.72 – 3.63 (m, *J* = 13.6, 6.8 Hz, 1H), 1.78 (d, *J* = 6.8 Hz, 3H), 1.70 (d, *J* = 6.8 Hz, 3H), 1.16 (dt, *J* = 20.5, 10.2 Hz, 6H).
^{13}C NMR (101 MHz, CDCl$_3$) δ 169.87 (s), 149.84 (s), 145.65 (s), 141.48 (s), 140.62 (s), 139.92 (d, *J* = 4.1 Hz), 138.19 (d, *J* = 8.0 Hz), 131.48 (d, *J* = 4.0 Hz), 130.48 (d, *J* = 22.2 Hz),

130.29 (s), 129.54 (s), 128.77 (s), 127.35 (s), 127.03 – 126.27 (m), 125.50 (s), 122.34 (d, *J* = 15.2 Hz), 121.39 (s), 51.30 (s), 46.21 (s), 20.99 (s), 20.89 – 20.56 (m).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{35}H_{33}N_2O_3$: 529.2446 found, 529.2450
TLC: Rf = 0.2 (80:20 petroleum ether:EtOAc).



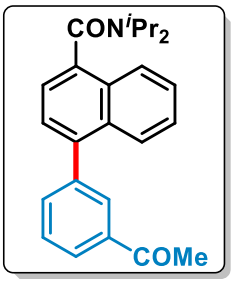
N,N-diisopropyl-4-(4-nitrophenyl)-5-phenyl-1-naphthamide: Compound **3ak** was prepared by
general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 71%
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.99 (d, 1H), 7.77 (d, 2H), 7.62 (t, 1H), 7.47 (d, 1H), 7.43 – 7.34 (m, 2H), 7.11 (dd, *J* = 12.7, 9.2 Hz, 2H), 7.02 – 6.90 (m, 4H), 3.81 – 3.74 (m, *J* = 13.4, 6.7 Hz, 1H), 3.70 – 3.62 (m, *J* = 13.6, 6.8 Hz, 1H), 1.77 (d, *J* = 6.0 Hz, 3H), 1.69 (d, *J* = 6.8 Hz, 3H), 1.14 (t, 6H).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{29}H_{29}N_2O_3$: 453.2133; found, 453.2115
TLC: R_f = 0.01 (80:20 petroleum ether:EtOAc).



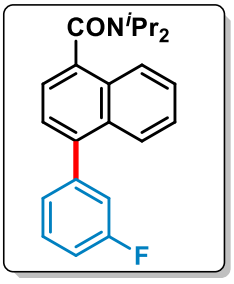
5-(4-fluorophenyl)-N,N-diisopropyl-4-(4-nitrophenyl)-1-naphthamide: Compound **3al** was prepared by
general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 78%
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.99 (d, *J* = 8.9, 4.4 Hz, 1H), 7.84 (d, *J* = 9.8 Hz, 2H), 7.62 (t, *J* = 8.3, 7.2 Hz, 1H), 7.44 (d, *J* = 7.1, 1.2 Hz, 1H), 7.42 – 7.35 (m, 2H), 7.12 (dd, *J* = 11.6, 9.7 Hz, 2H), 7.01 – 6.93 (m, 1H), 6.94 – 6.86 (m, *J* = 8.1, 5.0 Hz, 1H), 6.71 – 6.62 (m, *J* = 11.8, 7.4, 4.8 Hz, 2H), 3.81 – 3.72 (m, 1H), 3.70 – 3.61 (m, *J* = 13.5, 6.8 Hz, 1H), 1.76 (d, *J* = 7.1 Hz, 3H), 1.69 (d, *J* = 6.8 Hz, 3H), 1.16 (t, *J* = 7.2 Hz, 6H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 169.75 (s), 162.50 (s), 160.53 (s), 149.73 (s), 145.75 (s), 139.10 (s), 138.66 (d, *J* = 3.5 Hz), 138.05 (d, *J* = 14.3 Hz), 131.84 – 131.39 (m), 131.24 (d, *J* = 7.8 Hz), 130.63 – 130.53 (m), 130.53 – 130.15 (m), 129.40 (s), 126.43 (s), 125.55 (s), 122.51

(s), 122.33 (s), 121.40 (s), 114.57 (d, *J* = 15.1 Hz), 114.34 (s), 51.28 (s), 46.19 (s), 20.94 (s), 20.84 – 20.54 (m).
^{19}F NMR (471 MHz, CDCl$_3$) δ -115.33 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{29}H_{28}FN_2O_3$: 471.2039; found, 471.2042
TLC: R_f = 0.4 (80:20 petroleum ether:EtOAc).

Boronic acis substrate scope

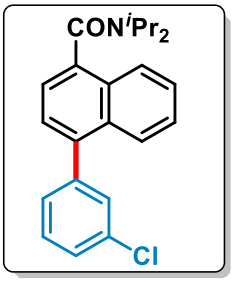


4-(3-acetylphenyl)-N,N-diisopropyl-1-naphthamide: Compound **6a** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 60%
^{1}H NMR (500 MHz, CDCl3) δ 8.07 (s, 1H), 8.04 (d, J = 7.8 Hz, 1H), 7.93 (d, J = 8.4 Hz, 1H), 7.81 (d, J = 8.5 Hz, 1H), 7.70 (d, J = 7.5 Hz, 1H), 7.60 (t, J = 7.7 Hz, 1H), 7.53 (t, J = 7.4 Hz, 1H), 7.46 (t, J = 7.6 Hz, 1H), 7.39 (dd, J = 15.6, 7.1 Hz, 2H), 3.77 – 3.68 (m, 1H), 3.63 (dt, J = 13.6, 6.9 Hz, 1H), 2.66 (s, 3H), 1.74 (t, J = 11.7 Hz, 3H), 1.67 (t, J = 8.7 Hz, 3H), 1.12 (dd, J = 9.8, 4.9 Hz, 3H), 1.08 (t, J = 8.8 Hz, 3H).
^{13}C NMR (126 MHz, CDCl$_3$) δ 198.07 (s), 169.97 (s), 140.87 (s), 139.35 (s), 137.26 (s), 136.75 (s), 134.66 (s), 131.65 (s), 129.88 (d, *J* = 6.4 Hz), 128.64 (s), 127.36 (s), 126.73 (d, *J* = 4.1 Hz), 126.47 (s), 125.97 (s), 125.36 (s), 121.56 (s), 51.17 (s), 46.08 (s), 26.78 (s), 21.00 – 20.53 (m).
HRMS (*m/z*): [M+Na$^+$] calcd for $C_{23}H_{24}N_2NaO_3$: 399.1679; found, 399.1679
TLC: R_f = 0.2 (80:20 petroleum ether:EtOAc).

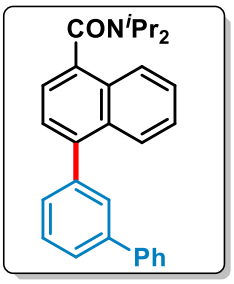


4-(3-fluorophenyl)-N,N-diisopropyl-1-naphthamide: Compound **6b** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 73%
^{1}H NMR (500 MHz, CDCl$_3$) δ 7.92 (t, *J* = 7.7 Hz, 1H), 7.88 (d, *J* = 8.5 Hz, 1H), 7.52 (q, *J* = 7.2 Hz, 1H), 7.44 (dt, *J* = 15.5, 7.8 Hz, 2H), 7.41 – 7.33 (m, 2H), 7.26 (s, 1H), 7.21 (d, *J* = 9.6 Hz, 1H), 7.14 (td, *J* = 8.5, 2.0 Hz, 1H), 3.79 – 3.68 (m, 1H), 3.63 (dp, *J* = 13.6, 6.7 Hz, 1H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.66 (t, *J* = 13.5 Hz, 3H), 1.12 (t, *J* = 6.8 Hz, 3H), 1.08 (t, *J* = 11.7 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 169.96 (s), 163.64 (s), 161.68 (s), 142.56 (d, *J* = 7.6 Hz), 139.13 (s), 136.72 (s), 131.56 (s), 130.00 – 129.64 (m), 126.64 (s), 126.28 (s), 126.06 (s), 125.79 (d, *J* = 2.8 Hz), 125.31 (s), 121.52 (s), 117.08 (s), 116.91 (s), 114.38 (s), 114.21 (s), 51.12 (s), 46.05 (s), 20.74 (dd, *J* = 18.2, 11.6 Hz).
^{19}F NMR (471 MHz, $CDCl_3$) δ -113.35 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{23}H_{25}FNO$: 350.1875; found, 3350.1878
TLC: R_f = 0.05 (80:20 petroleum ether:EtOAc).

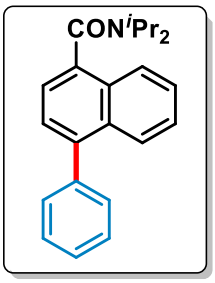


4-(3-chlorophenyl)-N,N-diisopropyl-1-naphthamide: Compound **6c** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 53%
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.92 (t, *J* = 7.3 Hz, 1H), 7.85 (t, *J* = 5.8 Hz, 1H), 7.55 – 7.51 (m, 1H), 7.50 – 7.45 (m, 2H), 7.44 – 7.40 (m, 2H), 7.40 – 7.34 (m, 3H), 3.75 – 3.68 (m, 1H), 3.64 (td, *J* = 13.6, 6.8 Hz, 1H), 1.74 (t, *J* = 7.4 Hz, 3H), 1.67 (d, *J* = 6.9 Hz, 3H), 1.13 (t, *J* = 5.8 Hz, 3H), 1.08 (d, *J* = 6.7 Hz, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 169.96 (s), 142.12 (s), 138.93 (s), 136.68 (s), 134.15 (s), 131.52 (s), 129.99 (s), 129.83 (s), 129.53 (s), 128.23 (s), 127.53 (s), 126.68 (s), 126.33 (s), 126.01 (s), 125.26 (s), 121.49 (s), 51.14 (s), 46.05 (s), 20.70 (dd, *J* = 18.6, 10.7 Hz).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{23}H_{25}ClNO$: 366.1621; found, 366.1619
TLC: R_f = 0.2 (80:20 petroleum ether:EtOAc).



4-([1,1'-biphenyl]-3-yl)-N,N-diisopropyl-1-naphthamide: Compound **6d** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: White solid.
Yield: 62%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.00 (d, *J* = 8.5 Hz, 1H), 7.95 (d, *J* = 8.3 Hz, 1H), 7.74 (d, *J* = 11.6 Hz, 1H), 7.68 (dd, *J* = 8.8, 7.9 Hz, 3H), 7.55 (ddd, *J* = 22.9, 11.5, 4.6 Hz, 2H), 7.52 – 7.43 (m, 5H), 7.42 – 7.34 (m, 2H), 3.82 – 3.71 (m, 1H), 3.70 – 3.59 (m, 1H), 1.77 (t, *J* = 6.7 Hz, 3H), 1.70 (d, *J* = 6.8 Hz, 3H), 1.12 (dt, *J* = 13.1, 6.5 Hz, 6H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.14 (s), 141.18 (s), 140.83 (s), 140.37 (s), 136.28 (s), 131.79 (s), 129.88 (s), 128.81 (t, *J* = 12.4 Hz), 127.40 (s), 127.18 (s), 126.43 (dd, *J* = 18.1, 8.4 Hz), 126.13 (s), 125.20 (s), 121.58 (s), 51.13 (s), 46.02 (s), 20.72 (dd, *J* = 18.9, 11.6 Hz).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{29}H_{30}NO$: 408.2320; found, 408.2322

TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



N,N-diisopropyl-4-phenyl-1-naphthamide: Compound **6e** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: White solid.

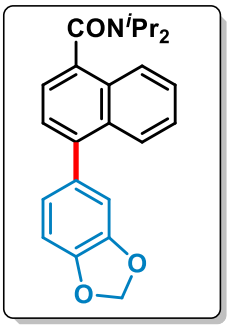
Yield: 49%

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.92 (d, *J* = 9.5 Hz, 2H), 7.54 – 7.47 (m, 5H), 7.47 – 7.42 (m, *J* = 7.3, 5.2, 2.2 Hz, 2H), 7.39 (dd, *J* = 19.3, 7.1 Hz, 2H), 3.80 – 3.71 (m, *J* = 13.3, 6.7 Hz, 1H), 3.66 – 3.59 (m, *J* = 13.7, 6.8 Hz, 1H), 1.75 (d, *J* = 9.9, 5.8 Hz, 3H), 1.68 (d, *J* = 6.8 Hz, 3H), 1.13 (d, *J* = 6.7 Hz, 3H), 1.09 (d, *J* = 5.3 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.17 (s), 140.41 (d, *J* = 18.1 Hz), 136.18 (s), 131.77 (s), 129.93 (d, *J* = 17.6 Hz), 128.25 (s), 127.36 (s), 126.37 (dd, *J* = 14.8, 10.2 Hz), 125.17 (s), 121.57 (s), 51.11 (s), 46.00 (s), 20.90 (s), 20.73 (dd, *J* = 18.9, 12.0 Hz).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{23}H_{26}NO$: 332.1970; found, 332.1972

TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



4-(benzo[d][1,3]dioxol-5-yl)-N,N-diisopropyl-1-naphthamide: Compound **6f** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: White solid.

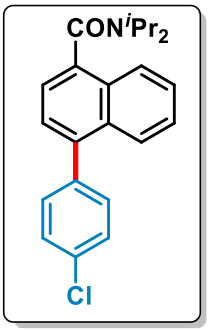
Yield: 47%

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.95 (d, *J* = 8.4 Hz, 1H), 7.89 (d, *J* = 8.2 Hz, 1H), 7.50 (tt, *J* = 11.6, 5.8 Hz, 1H), 7.47 – 7.41 (m, 1H), 7.35 (dd, *J* = 18.4, 7.2 Hz, 2H), 6.97 (s, 1H), 6.96 – 6.91 (m, 2H), 6.04 (s, 2H), 3.79 – 3.67 (m, 1H), 3.68 – 3.57 (m, 1H), 1.73 (t, *J* = 10.0 Hz, 3H), 1.67 (d, *J* = 6.8 Hz, 3H), 1.15 – 1.04 (m, 6H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.15 (s), 147.48 (s), 146.97 (s), 140.05 (s), 136.07 (s), 134.16 (s), 131.91 (s), 129.88 (s), 126.35 (t, *J* = 14.8 Hz), 125.17 (s), 123.41 (s), 121.53 (s), 110.54 (s), 108.21 (s), 101.12 (s), 51.10 (s), 46.00 (s), 20.87 (s), 20.77 – 20.53 (m).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{24}H_{26}NO_3$: 376.1834; found,376.1836

TLC: R_f = 0.2 (80:20 petroleum ether:EtOAc).



4-(4-chlorophenyl)-N,N-diisopropyl-1-naphthamide: Compound **6g** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: White solid.

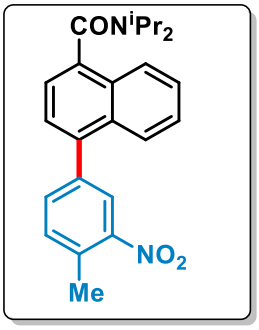
Yield: 51%

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.91 (d, *J* = 8.3 Hz, 1H), 7.85 (d, *J* = 8.4 Hz, 1H), 7.55 – 7.51 (m, 1H), 7.49 – 7.45 (m, 3H), 7.42 (d, *J* = 8.4 Hz, 2H), 7.38 – 7.34 (m, 2H), 3.73 (dp, *J* = 13.3, 6.6 Hz, 1H), 3.68 – 3.57 (m, 1H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.67 (t, *J* = 6.4 Hz, 3H), 1.12 (d, *J* = 6.7 Hz, 3H), 1.09 (d, *J* = 6.7 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.04 (s), 139.18 (s), 138.75 (s), 136.51 (s), 133.50 (s), 131.62 (s), 131.31 (s), 129.88 (s), 128.50 (s), 126.64 (d, *J* = 5.3 Hz), 126.30 (s), 126.06 (s), 125.28 (s), 121.55 (s), 51.16 (s), 46.07 (s), 21.06 – 20.50 (m).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{23}H_{25}ClNO$: 366.1621; found, 366.1619

TLC: R_f = 0.2 (80:20 petroleum ether:EtOAc).



N,N-diisopropyl-4-(4-methyl-3-nitrophenyl)-1-naphthamide: Compound **6h** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: White solid.

Yield: 57%

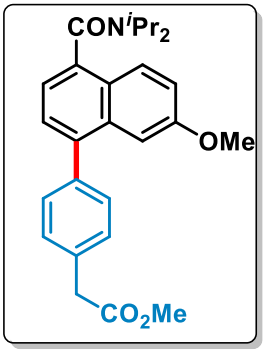
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.12 (s, 1H), 7.93 (d, *J* = 8.2 Hz, 1H), 7.81 (d, *J* = 8.3 Hz, 1H), 7.64 (d, *J* = 7.6 Hz, 1H), 7.55 (t, *J* = 7.4 Hz, 1H), 7.48 (t, *J* = 7.4 Hz, 2H), 7.39 (q, *J* = 7.0 Hz, 2H), 3.70 (dt, *J* = 11.6, 5.7 Hz, 1H), 3.63 (dt, *J* = 13.0, 6.5 Hz, 1H), 2.71 (s, 3H), 1.75 (d, *J* = 6.6 Hz, 3H), 1.67 (d, *J* = 6.6 Hz, 3H), 1.13 (d, *J* = 6.5 Hz, 3H), 1.09 (d, *J* = 6.5 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 169.78 (s), 149.20 (s), 139.47 (s), 137.67 (s), 137.16 (s), 134.49 (s), 132.71 (d, *J* = 19.8 Hz), 131.40 (s), 129.91 (s), 126.95 (d, *J* = 16.0 Hz), 126.57 (s), 125.87 (s), 125.54 (d, *J* = 17.5 Hz), 121.53 (s), 51.19 (s), 46.09 (s), 21.10 – 20.55 (m), 20.25 (s).

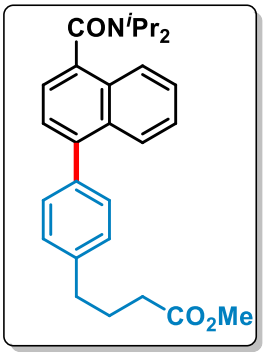
HRMS (*m/z*): [M+H$^+$] calcd for $C_{26}H_{30}NO_3$: 404.22; found, 404.2218

TLC: R_f = 0.3 (80:20 petroleum ether:EtOAc).

Bromo substrate scope:

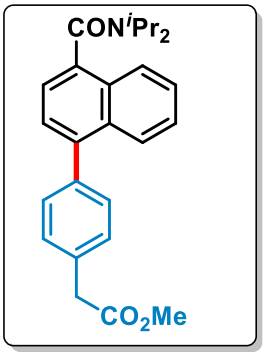


Methyl 2-(4-(4-(diisopropylcarbamoyl)-7-methoxynaphthalen-1-yl)phenyl)acetate: Compound **7a** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: yellowish liquid.
Yield:61%
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.84 (d, *J* = 9.1 Hz, 1H), 7.50 (d, *J* = 8.0 Hz, 2H), 7.43 (d, 2H), 7.36 (d, *J* = 7.2 Hz, 1H), 7.26 (s, 1H), 7.23 (d, *J* = 7.2 Hz, 1H), 7.21 (d, *J* = 9.1, 2.6 Hz, 1H), 3.79 (s, 3H), 3.78 (s, 3H), 3.76 (s, 2H), 3.73 (dd, *J* = 11.3, 6.9 Hz, 1H), 3.66 – 3.59 (m, *J* = 13.6, 6.8 Hz, 1H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.68 (d, *J* = 6.8 Hz, 4H), 1.15 (d, *J* = 6.6 Hz, 3H), 1.10 (d, *J* = 6.7 Hz, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 172.07 (s), 170.29 (s), 157.93 (s), 139.52 (s), 138.81 (s), 136.11 (s), 133.06 (d, *J* = 4.4 Hz), 130.04 (s), 129.32 (s), 127.07 (s), 126.83 (s), 125.33 (s), 119.41 (s), 118.81 (s), 105.01 (s), 55.24 (s), 52.14 (s), 51.11 (s), 46.01 (s), 40.90 (s), 20.92 (s), 20.76 – 20.44 (m).
HRMS (*m/z*): [M+K^+] calcd for $C_{27}H_{31}KNO_4$: 472.1895; found, 472.1885
TLC: R_f = 0.2 (80:20 petroleum ether:EtOAc).

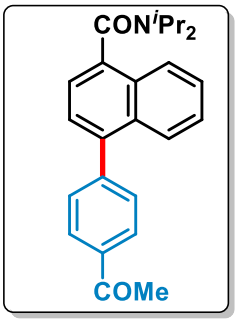


Methyl 4-(4-(4-(diisopropylcarbamoyl)naphthalen-1-yl)phenyl)butanoate: Compound **7b**
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: yellowish liquid.
Yield: 59%
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.91 (t, *J* = 8.1 Hz, 2H), 7.51 (t, 1H), 7.47 – 7.33 (m, 5H), 7.31 (d, *J* = 8.0 Hz, 2H), 3.80 – 3.71 (m, 1H), 3.70 (s, 3H), 3.66 – 3.58 (m, *J* = 13.6 Hz, 1H), 2.76 (t, *J* = 7.6 Hz, 2H), 2.41 (t, *J* = 7.1 Hz, 2H), 2.11 – 2.01 (m, 2H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.67 (d, *J* = 6.8 Hz, 3H), 1.12 (d, *J* = 6.7 Hz, 3H), 1.09 (d, *J* = 6.6 Hz, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 173.96 (s), 170.24 (s), 140.58 (s), 140.41 (s), 138.08 (s), 136.07 (s), 131.87 (s), 129.99 (d, *J* = 17.6 Hz), 128.41 (s), 126.56 – 126.13 (m), 125.19 (s), 121.62 (s), 51.57 (s), 51.13 (s), 46.03 (s), 34.89 (s), 33.47 (s), 29.68 (s), 26.48 (s), 20.92 (s), 20.78 – 20.58 (m).
HRMS (*m/z*): [M+Na^+] calcd for $C_{28}H_{33}NNaO_4$: 436.2270; found, 436.2271

TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



Methyl 2-(4-(4-(diisopropylcarbamoyl)naphthalen-1-yl)phenyl)acetate: Compound **7c** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: yellowish liquid.
Yield: 63%
^{1}H NMR (500 MHz, $CDCl_3$) δ 7.95 – 7.85 (m, 2H), 7.51 (t, *J* = 7.5 Hz, 1H), 7.48 – 7.39 (m, 5H), 7.35 (dt, *J* = 14.4, 6.7 Hz, 2H), 3.84 – 3.67 (m, 6H), 3.67 – 3.59 (m, 1H), 1.75 (d, *J* = 6.7 Hz, 3H), 1.66 (d, *J* = 9.7 Hz, 3H), 1.13 (d, 3H), 1.08 (d, *J* = 9.8 Hz, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 172.07 (s), 170.29 (s), 157.93 (s), 139.52 (s), 138.81 (s), 136.11 (s), 133.06 (d, *J* = 4.4 Hz), 130.04 (s), 129.32 (s), 127.07 (s), 126.83 (s), 125.33 (s), 119.41 (s), 118.81 (s), 105.01 (s), 55.24 (s), 52.14 (s), 51.11 (s), 46.01 (s), 40.90 (s), 20.92 (s), 20.76 – 20.44 (m).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{26}H_{30}NO_3$: 404.2181; found, 404.2178
TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).

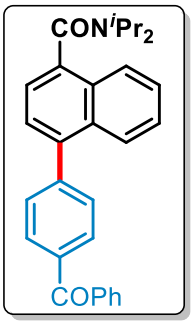


4-(4-acetylphenyl)-N,N-diisopropyl-1-naphthamide: Compound **7d** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid .
Yield: 65%
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09 (d, *J* = 8.2 Hz, 1H), 7.93 (d, *J* = 8.2 Hz, 1H), 7.85 (d, *J* = 8.4 Hz, 1H), 7.60 (d, *J* = 8.1 Hz, 1H), 7.54 (t, *J* = 7.2 Hz, 1H), 7.46 (t, *J* = 7.3 Hz, 1H), 7.39 (q, *J* = 7.2 Hz, 1H), 3.78 – 3.68 (m, 1H), 3.63 (dt, *J* = 13.5, 6.8 Hz, 1H), 2.69 (s, 1H), 1.75 (d, *J* = 6.8 Hz, 1H), 1.67 (d, *J* = 6.8 Hz, 2H), 1.13 (d, *J* = 6.6 Hz, 1H), 1.09 (d, *J* = 6.7 Hz, 1H).

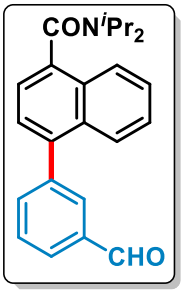
^{13}C NMR (101 MHz, $CDCl_3$) δ 197.84 (s), 169.91 (s), 145.38 (s), 139.26 (s), 136.93 (s), 136.12 (s), 131.43 (s), 130.31 (s), 129.92 (s), 128.38 (s), 126.76 (s), 126.33 (s), 125.99 (s), 125.38 (s), 121.55 (s), 51.17 (s), 46.09 (s), 26.71 (s), 20.90 (s), 20.74 (s), 20.68 (s).

HRMS (*m/z*): [M+Na$^+$] calcd for $C_{23}H_{24}N_2NaO_3$: 399.1679; found, 399.1679

TLC: R_f = 0.4 (80:20 petroleum ether:EtOAc).

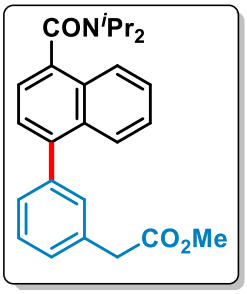


4-(4-benzoylphenyl)-N,N-diisopropyl-1-naphthamide: Compound **7e** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: yellowish liquid.
Yield: 59%
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.04 – 7.84 (m, 6H), 7.63 (dd, *J* = 7.8, 6.0 Hz, 3H), 7.57 – 7.46 (m, 4H), 7.42 (dd, *J* = 20.6, 7.2 Hz, 2H), 3.79 – 3.67 (m, 1H), 3.69 – 3.59 (m, *J* = 13.5, 6.8 Hz, 1H), 1.77 – 1.74 (d, *J* = 6.8 Hz, 3H), 1.68 (d, *J* = 6.8 Hz, 3H), 1.09 (dd, 6H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 196.45 (s), 169.96 (s), 144.75 (s), 139.36 (s), 137.63 (s), 136.89 (s), 136.57 (s), 132.50 (s), 131.49 (s), 130.05 (dd, *J* = 17.3, 11.5 Hz), 128.36 (s), 126.77 (s), 126.40 (s), 126.07 (s), 125.37 (s), 121.58 (s), 51.19 (s), 46.10 (s), 20.91 (s), 20.71 (d, *J* = 7.6 Hz).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{30}H_{30}NO_2$: 436.2270; found, 436.2271
TLC: R_f = 0.2 (80:20 petroleum ether:EtOAc).



4-(3-formylphenyl)-N,N-diisopropyl-1-naphthamide: Compound **7f** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: yellowish liquid.
Yield: 57%
^{1}H NMR (400 MHz, $CDCl_3$) δ 10.12 (s, 1H), 8.01 (s, 1H), 7.97 (d, *J* = 7.7 Hz, 1H), 7.93 (d, *J* = 8.2 Hz, 1H), 7.81 (d, *J* = 8.3 Hz, 1H), 7.77 (d, *J* = 7.5 Hz, 1H), 7.68 (t, *J* = 7.6 Hz, 1H), 7.54 (t, 1H), 7.47 (t, 1H), 7.40 (dd, *J* = 14.1, 7.1 Hz, 2H), 3.77 – 3.67 (m, 1H), 3.68 – 3.59 (m, *J* = 13.7, 6.9 Hz, 1H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.68 (d, *J* = 6.8 Hz, 3H), 1.12 (d, *J* = 6.7 Hz, 3H), 1.09 (d, *J* = 6.6 Hz, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 192.18 (s), 136.61 (s), 136.01 (s), 131.58 (s), 131.29 (s), 129.09 (s), 128.66 (s), 126.82 (d, *J* = 7.4 Hz), 126.52 (s), 125.87 (s), 125.38 (d, *J* = 13.0 Hz), 121.62 (s), 51.19 (s), 46.13 (s), 21.18 – 20.54 (m).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{24}H_{26}NO_2$: 360.1919; found, 399.1924

TLC: R_f = 0.3 (80:20 petroleum ether:EtOAc).



methyl 2-(3-(4-(diisopropylcarbamoyl)naphthalen-1-yl)phenyl)acetate: Compound **7g** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow liquid.

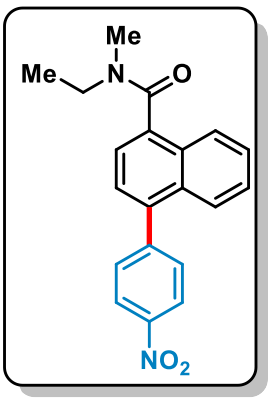
Yield: 53%

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.90 (t, *J* = 8.2 Hz, 2H), 7.51 (t, *J* = 7.6 Hz, 1H), 7.48 – 7.43 (m, 2H), 7.40 (d, *J* = 8.2 Hz, 3H), 7.35 (d, *J* = 6.9 Hz, 2H), 3.79 – 3.66 (m, 6H), 3.62 (dt, *J* = 13.6, 6.9 Hz, 1H), 1.75 (d, *J* = 6.8 Hz, 3H), 1.67 (d, *J* = 6.8 Hz, 3H), 1.16 – 1.10 (m, 3H), 1.08 (d, *J* = 6.7 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 172.07 (s), 170.29 (s), 157.93 (s), 139.52 (s), 138.81 (s), 136.11 (s), 133.06 (d, *J* = 4.4 Hz), 130.04 (s), 129.32 (s), 127.07 (s), 126.83 (s), 125.33 (s), 119.41 (s), 118.81 (s), 105.01 (s), 55.24 (s), 52.14 (s), 51.11 (s), 46.01 (s), 40.90 (s), 20.92 (s), 20.76 – 20.44 (m).

HRMS (*m/z*): [M+Na^+] calcd for $C_{28}H_{33}NNaO_4$: 436.2270; found, 436.2271

TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



N-ethyl-N-methyl-4-(4-nitrophenyl)-1-naphthamide: Compound **8a** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow solid .

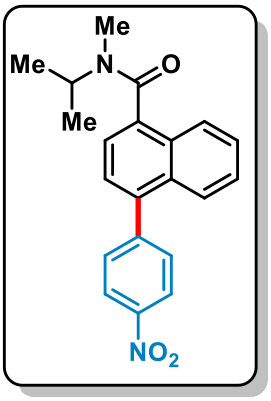
Yield: 73%

^{1}H NMR (500 MHz, DMSO) δ 8.95 (d, *J* = 8.6 Hz, 3H), 8.38 (dd, *J* = 19.4, 8.8 Hz, 8H), 8.31 (s, 2H), 8.21 (d, *J* = 7.4 Hz, 3H), 8.08 (d, *J* = 8.9 Hz, 2H), 7.79 (t, *J* = 9.1 Hz, 9H), 7.74 – 7.68 (m, 3H), 7.63 – 7.55 (m, 6H), 3.38 (dd, *J* = 11.9, 4.9 Hz, 9H), 1.21 – 1.14 (m, 4H), 1.09 (t, *J* = 7.0 Hz, 9H).

^{13}C NMR (126 MHz, DMSO) δ 168.96 (s), 147.60 (s), 146.76 (s), 142.19 (s), 131.63 (s), 131.37 (d, *J* = 18.2 Hz), 129.46 (s), 129.19 (s), 128.15 (s), 127.51 (s), 126.68 (s), 126.52 (s), 126.09 (s), 124.71 (s), 124.17 (s), 79.64 (s), 65.39 (s), 15.63 (s).

HRMS (*m/z*): [M+H^+] calcd for $C_{20}H_{19}N_2O_3$: 335.1351; found, 335.1361

TLC: R_f = 0.1 (60:40 petroleum ether:EtOAc).



N-isopropyl-N-methyl-4-(4-nitrophenyl)-1-naphthamide: Compound **8b** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow solid .

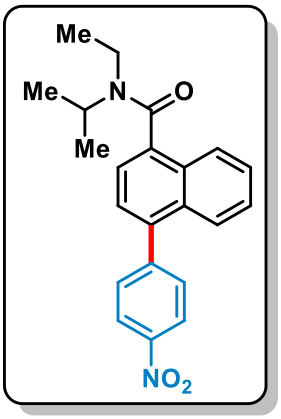
Yield: 79%

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.35 (dd, *J* = 8.8, 1.5 Hz, 2H), 7.91 – 7.82 (m, 1H), 7.78 (d, *J* = 8.5 Hz, 1H), 7.70 – 7.62 (m, 2H), 7.59 – 7.52 (m, 1H), 7.51 – 7.47 (m, 1H), 7.46 – 7.40 (m, 2H), 3.90 – 3.63 (m, *J* = 6.6 Hz, 1H), 3.12 (s, 3H), 1.19 – 1.05 (m, 6H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.07 (s), 147.29 (s), 147.08 (s), 131.16 (s), 130.88 (s), 129.97 (s), 127.37 – 127.01 (m), 126.44 (d, *J* = 6.5 Hz), 125.80 – 125.42 (m), 125.18 (s), 123.62 (s), 122.85 (s), 122.23 (s), 49.93 (s), 25.71 (s), 20.61 (s), 20.20 (s).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{21}H_{21}N_2O_3$: 349.1507; found, 349.1510

TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



N-ethyl-N-isopropyl-4-(4-nitrophenyl)-1-naphthamide: Compound **8c** was prepared by general proceure B

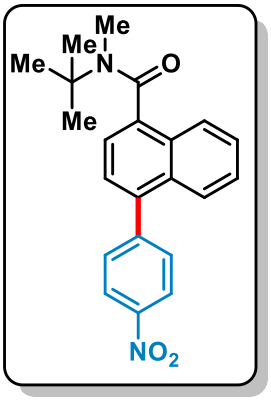
Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow solid .

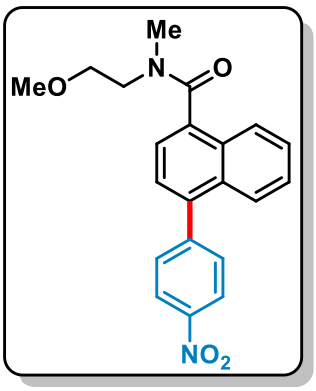
Yield: 73%

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.36 (d, 8H), 7.89 (dd, *J* = 25.4, 8.3 Hz, 4H), 7.79 (d, *J* = 8.5 Hz, 4H), 7.66 (d, *J* = 8.5 Hz, 8H), 7.56 (t, 4H), 7.51 – 7.46 (m, 5H), 7.45 – 7.39 (m, 7H), 3.88 – 3.72 (m, *J* = 6.6 Hz, 3H), 3.71 – 3.60 (m, *J* = 14.0, 7.0 Hz, 3H), 3.58 – 3.45 (m, 3H), 1.45 (t, *J* = 13.5, 6.5 Hz, 11H), 1.14 (d, *J* = 6.9 Hz, 9H), 1.11 (d, *J* = 6.7 Hz, 9H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 169.64 (s), 147.17 (d, *J* = 16.6 Hz), 138.28 (s), 136.44 (s), 131.10 (s), 130.86 (s), 129.98 (s), 127.10 (d, *J* = 11.4 Hz), 126.42 (s), 125.58 (s), 125.35 (s), 123.57 (s), 122.10 (s), 50.40 (s), 35.40 (s), 21.32 (s), 21.12 (s), 14.86 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{22}H_{23}N_2O_3$:363.1664; found, 363.1675
TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).

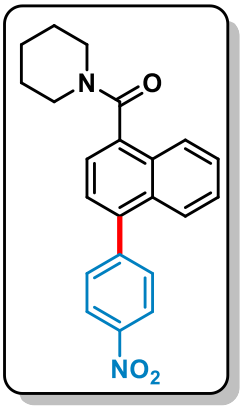


N-(tert-butyl)-N-methyl-4-(4-nitrophenyl)-1-naphthamide: Compound **8d** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid .
Yield: 85%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.37 (d, *J* = 8.4, 2.9 Hz, 2H), 7.94 (d, *J* = 8.7 Hz, 1H), 7.78 (d, *J* = 8.5 Hz, 1H), 7.66 (d, *J* = 8.9, 2.2 Hz, 2H), 7.57 (t, *J* = 7.6 Hz, 1H), 7.52 – 7.47 (m, 1H), 7.47 – 7.39 (m, *J* = 11.5, 5.4 Hz, 2H), 2.83 (s, 3H), 1.65 (s, 9H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 171.25 (s), 147.25 (s), 138.23 (s), 131.05 (d, *J* = 29.0 Hz), 130.71 – 130.66 (m), 129.69 (s), 127.10 (d, *J* = 18.6 Hz), 126.60 (s), 125.66 (s), 125.36 (s), 123.62 (s), 122.65 (s), 57.25 (s), 28.17 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{22}H_{23}N_2O_3$:363.1664; found, 363.1675
TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).

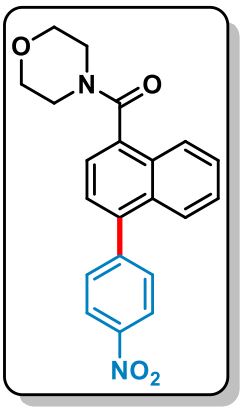


N-(2-methoxyethyl)-N-methyl-4-(4-nitrophenyl)-1-naphthamide: Compound **8e** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow liquid .
Yield: 87%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.37 (d, 8H), 7.92 (d, *J* = 21.1, 8.3 Hz, 4H), 7.78 (t, *J* = 7.8 Hz, 4H), 7.66 (d, *J* = 8.6 Hz, 8H), 7.60 – 7.53 (m, 4H), 7.52 – 7.46 (m, *J* = 12.3, 6.8, 1.5 Hz, 8H),

7.45 – 7.39 (m, *J* = 8.4, 7.3 Hz, 4H), 3.88 – 3.68 (m, *J* = 22.0 Hz, 2H), 3.48 (s, 2H), 3.43 – 3.36 (m, *J* = 4.7 Hz, 2H), 3.34 – 3.16 (m, 2H), 2.93 (s, 2H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.52 (s), 147.30 (s), 147.09 (s), 138.71 (s), 135.81 (s), 135.45 (s), 131.09 (d, *J* = 7.7 Hz), 130.89 (s), 130.06 (s), 129.71 (s), 127.36 – 126.95 (m), 126.41 (s), 126.25 (s), 125.60 (dd, *J* = 21.9, 12.2 Hz), 123.55 (d, *J* = 16.0 Hz), 123.10 (s), 70.59 (s), 58.86 (s), 47.06 (s), 38.25 (s).
HRMS (*m/z*): [M+Na^+] calcd for $C_{21}H_{21}N_2O_4$: 365.1457; found, 365.1462
TLC: R_f = 0.1 (60:40 petroleum ether:EtOAc).

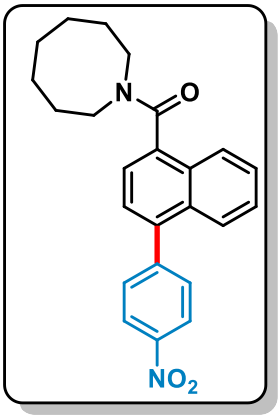


(4-(4-nitrophenyl)naphthalen-1-yl)(piperidin-1-yl)methanone: Compound **8f** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow liquid .
Yield: 85%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.36 (t, *J* = 6.7 Hz, 2H), 7.93 (d, *J* = 8.3 Hz, 1H), 7.78 (d, *J* = 8.6 Hz, 1H), 7.65 (d, *J* = 8.6 Hz, 2H), 7.57 (t, *J* = 7.2 Hz, 1H), 7.50 (t, *J* = 10.9, 3.6 Hz, 1H), 7.47 (d, *J* = 7.2 Hz, 1H), 7.42 (d, *J* = 7.2 Hz, 1H), 3.97 – 3.84 (m, 2H), 3.26 – 3.18 (m, 2H), 1.82 – 1.74 (m, 2H), 1.74 – 1.67 (m, *J* = 11.2, 5.6 Hz, 2H), 1.46 (tt, *J* = 14.0, 6.9 Hz, 2H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 168.78 (s), 147.31 (s), 147.11 (s), 138.61 (s), 135.73 (s), 131.11 (s), 130.88 (s), 129.96 (s), 128.31 (s), 127.17 (d, *J* = 2.1 Hz), 126.40 (s), 125.60 (d, *J* = 13.2 Hz), 124.35 (s), 123.63 (s), 122.76 (s), 48.36 (s), 42.73 (s), 26.72 (s), 25.80 (s), 24.51 (s).
HRMS (*m/z*): [M+H^+] calcd for $C_{22}H_{21}N_2O_3$: 361.1508; found, 361.1511
TLC: R_f = 0.1 (60:40 petroleum ether:EtOAc).

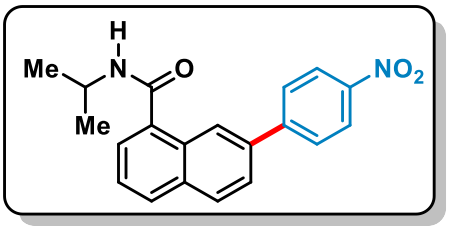


Morpholino(4-(4-nitrophenyl)naphthalen-1-yl)methanone: Compound **8g** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow liquid.

Yield: 96%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.35 (d, *J* = 12.5, 5.4 Hz, 2H), 7.93 (d, *J* = 12.3 Hz, 1H), 7.79 (d, *J* = 8.4 Hz, 1H), 7.64 (d, *J* = 8.6 Hz, 2H), 7.60 (t, 1H), 7.55 – 7.47 (m, *J* = 7.2, 6.4, 2.3 Hz, 2H), 7.44 (d, *J* = 7.2 Hz, 1H), 4.08 – 4.01 (m, *J* = 12.8, 4.5 Hz, 1H), 3.96 – 3.81 (m, *J* = 16.2, 9.4, 4.9 Hz, 3H), 3.63 – 3.50 (m, 2H), 3.35 – 3.22 (m, 2H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 169.02 (s), 147.34 (s), 146.82 (s), 139.10 (s), 134.47 (s), 131.09 (s), 130.82 (s), 129.86 (s), 128.28 (s), 127.37 (d, *J* = 13.6 Hz), 126.31 (s), 125.80 (s), 125.18 (s), 124.31 (s), 123.63 (s), 123.21 (s), 66.97 (d, *J* = 14.0 Hz), 47.60 (s), 42.19 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{21}H_{19}N_2O_4$: 363.1301; found, 363.1310
TLC: R_f = 0.1 (50:50 petroleum ether:EtOAc).

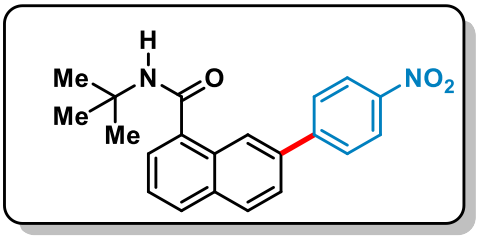


azocan-1-yl(4-(4-nitrophenyl)naphthalen-1-yl)methanone: Compound **8h** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow liquid.
Yield: 75%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.35 (t, *J* = 7.8 Hz, 2H), 7.91 (d, *J* = 8.4 Hz, 1H), 7.78 (d, *J* = 8.4 Hz, 1H), 7.65 (d, *J* = 8.4 Hz, 2H), 7.57 (t, *J* = 7.5 Hz, 1H), 7.48 (dd, *J* = 14.7, 7.3 Hz, 2H), 7.42 (d, *J* = 7.2 Hz, 1H), 4.01 – 3.88 (m, 1H), 3.82 – 3.71 (m, 1H), 3.38 – 3.19 (m, 2H), 2.07 – 1.82 (m, *J* = 22.7, 17.3, 4.3 Hz, 3H), 1.80 – 1.61 (m, 4H), 1.55 (s, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.27 (s), 147.25 (s), 147.09 (s), 138.44 (s), 136.21 (s), 131.09 (s), 130.86 (s), 129.84 (s), 128.28 (s), 127.13 (d, *J* = 2.3 Hz), 126.32 (s), 125.58 (d, *J* = 4.1 Hz), 124.30 (s), 123.58 (s), 122.74 (s), 49.45 (s), 45.73 (s), 29.28 (s), 27.90 (s), 27.53 (s), 26.40 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{24}H_{25}N_2O_3$: 398.1820; found, 398.1825
TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).

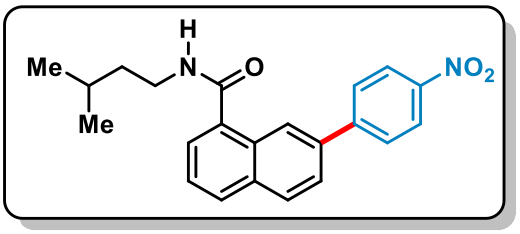


N-isopropyl-7-(4-nitrophenyl)-1-naphthamide: Compound **9a** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid.
Yield: 75%

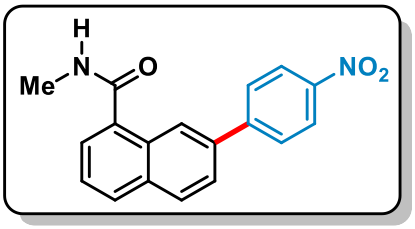
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.67 (s, 1H), 8.35 (d, *J* = 8.8 Hz, 2H), 8.01 (d, *J* = 6.1 Hz, 1H), 7.98 (d, *J* = 7.1 Hz, 1H), 7.90 (d, *J* = 8.8 Hz, 2H), 7.81 (d, *J* = 8.5, 1.7 Hz, 1H), 7.66 (t, *J* = 6.7 Hz, 2H), 7.54 (t, 1H), 5.94 (d, *J* = 7.8 Hz, 1H), 4.48 – 4.44 (m, 1H), 1.36 (d, 6H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 168.47 (s), 147.38 (s), 147.18 (s), 137.12 (s), 135.13 (s), 133.48 (s), 130.89 (d, *J* = 13.5 Hz), 130.35 (s), 129.33 (s), 128.20 (s), 125.75 – 125.40 (m), 124.60 (s), 124.16 (s), 123.64 (d, *J* = 3.5 Hz), 42.10 (s), 22.89 (s).
HRMS (*m/z*): [M+Na^+] calcd for $C_{20}H_{19}N_2O_3$: 335.1335; found, 335.1337
TLC: R_f = 0.1 (70:30 petroleum ether:EtOAc).



N-(tert-butyl)-7-(4-nitrophenyl)-1-naphthamide: Compound **9b** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid.
Yield: 87%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.59 (s, 1H), 8.33 (d, *J* = 8.7 Hz, 2H), 7.98 (d, *J* = 8.5 Hz, 1H), 7.94 (d, *J* = 8.1 Hz, 1H), 7.86 (d, *J* = 8.7 Hz, 2H), 7.77 (d, *J* = 8.4 Hz, 1H), 7.61 (d, *J* = 7.9 Hz, 1H), 7.50 (t, 1H), 5.88 (s, 1H), 1.55 (s, 9H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 168.84 (s), 147.47 (s), 147.17 (s), 137.04 (s), 136.17 (s), 133.45 (s), 130.28 (s), 129.98 (s), 129.31 (s), 128.15 (s), 125.71 (s), 125.43 (s), 125.23 (s), 124.52 (s), 124.20 (s), 52.21 (s), 28.92 (s).
HRMS (*m/z*): [M+H^+] $C_{21}H_{21}N_2O_3$: 349.1547; found, 349.1551.
TLC: R_f = 0.2 (60:40 petroleum ether:EtOAc).



N-isopentyl-7-(4-nitrophenyl)-1-naphthamide: Compound **9c** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid.
Yield: 65%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.65 (s, 1H), 8.32 (d, *J* = 8.8 Hz, 2H), 7.99 (d, *J* = 8.5 Hz, 1H), 7.96 (d, *J* = 8.3 Hz, 1H), 7.87 (d, *J* = 8.8 Hz, 2H), 7.79 (d, *J* = 8.5, 1.8 Hz, 1H), 7.64 (t, *J* = 6.8, 3.8 Hz, 1H), 7.51 (t, *J* = 8.0, 7.2 Hz, 1H), 6.02 (s, 1H), 3.61 – 3.56 (m, 2H), 1.78 – 1.72 (m, 1H), 1.58 – 1.54 (m, 2H), 0.99 (d, *J* = 6.6 Hz, 6H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 169.21 (s), 147.50 – 147.41 (m), 147.27 (d, *J* = 22.2 Hz), 137.16 (s), 135.09 (s), 133.49 (s), 130.38 (d, *J* = 4.7 Hz), 129.32 (s), 128.23 (s), 125.59 (d, *J* = 16.2 Hz), 124.66 (s), 124.13 (s), 38.50 (d, *J* = 11.6 Hz), 25.99 (s), 22.48 (s).
HRMS (*m/z*): [M+H^+] calcd for $C_{22}H_{23}N_2O_3$: 363.1610; found, 362.1607
TLC: R_f = 0.1 (70:30 petroleum ether:EtOAc).



N-methyl-7-(4-nitrophenyl)-1-naphthamide: Compound **9d** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: white solid.

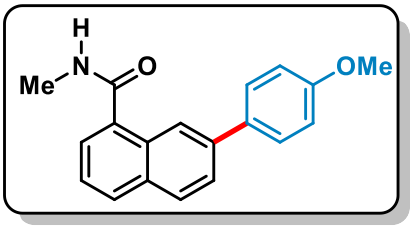
Yield: 73%

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.67 (s, 1H), 8.33 (d, 2H), 7.98 (t, *J* = 10.6, 6.4 Hz, 2H), 7.88 (d, 2H), 7.79 (d, *J* = 8.5, 1.8 Hz, 1H), 7.66 (d, *J* = 7.1, 1.1 Hz, 1H), 7.52 (d, 1H), 6.08 (s, 1H), 3.13 (d, *J* = 4.9 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 169.91 (s), 147.39 (s), 137.26 (s), 134.85 (s), 133.54 (s), 130.54 (s), 129.33 (s), 128.30 (s), 127.09 (s), 126.42 (s), 125.63 (s), 125.58 (s), 125.44 (s), 124.84 (s), 124.75 (s), 124.15 (s), 26.96 (s).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{18}H_{15}N_2O_3$: 307.1025; found, 307.1030

TLC: R_f = 0.1 (50:50 petroleum ether:EtOAc).



7-(4-methoxyphenyl)-N-methyl-1-naphthamide: Compound **9e** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow solid.

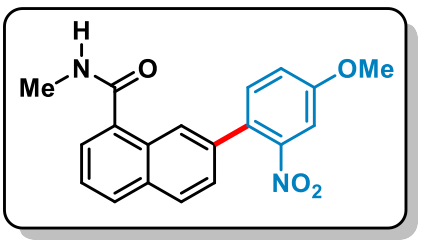
Yield: 51%

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.95 (d, *J* = 8.1 Hz, 1H), 7.86 (d, *J* = 8.1 Hz, 1H), 7.62 (d, *J* = 6.9 Hz, 1H), 7.53 (t, *J* = 7.6 Hz, 1H), 7.48 (t, *J* = 7.6 Hz, 1H), 7.43 (d, *J* = 7.0 Hz, 1H), 7.31 (d, *J* = 13.9 Hz, 2H), 6.96 (d, *J* = 8.2 Hz, 2H), 5.32 (d, *J* = 26.1 Hz, 1H), 3.86 (s, 3H), 2.35 (d, *J* = 7.3 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 170.86 (s), 158.72 (s), 139.09 (s), 135.44 (s), 134.91 (d, *J* = 6.5 Hz), 130.83 (s), 130.60 (s), 130.13 (s), 128.02 (d, *J* = 4.8 Hz), 125.74 (s), 124.97 (s), 113.50 (s), 55.33 (s), 26.28 (s).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{19}H_{18}NO_2$: 292.1259; found, 292.1257

TLC: R_f = 0.1 (60:40 petroleum ether:EtOAc).



7-(4-methoxy-2-nitrophenyl)-N-methyl-1-naphthamide: Compound **9f** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow solid.

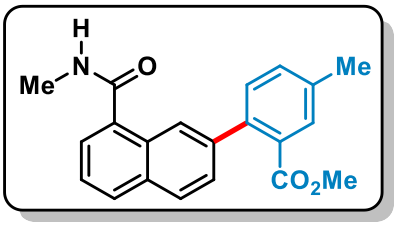
Yield: 83%

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.24 (s, 1H), 7.93 (d, *J* = 8.3 Hz, 1H), 7.87 (d, *J* = 8.4 Hz, 1H), 7.63 (d, *J* = 7.0 Hz, 1H), 7.47 (t, *J* = 7.9 Hz, 2H), 7.44 (d, *J* = 2.6 Hz, 1H), 7.41 (d, *J* = 8.4, 1.6 Hz, 1H), 7.18 (d, 1H), 6.07 (s, 1H), 3.92 (s, 3H), 3.07 (d, *J* = 6.5 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.04 (s), 159.32 (s), 136.13 (s), 134.67 (s), 133.34 (s), 132.88 (s), 130.38 (s), 130.08 (s), 128.56 (d, *J* = 4.8 Hz), 126.67 (s), 125.52 (s), 125.25 (s), 124.62 (s), 118.91 (s), 109.26 (s), 55.97 (s), 26.86 (s).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{19}H_{17}N_2O_4$: 337.1119; found, 337.1121

TLC: R_f = 0.1 (60:40 petroleum ether:EtOAc).



Methyl 5-methyl-2-(8-(methylcarbamoyl)naphthalen-2-yl)benzoate: Compound **9g** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow solid.

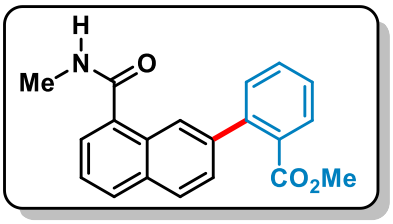
Yield: 63%

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.95 (d, *J* = 8.2, 1.0 Hz, 1H), 7.86 (d, *J* = 8.2, 0.9 Hz, 1H), 7.73 – 7.65 (m, 2H), 7.50 (t, *J* = 8.0, 7.3 Hz, 1H), 7.45 (t, *J* = 11.7, 5.8 Hz, 1H), 7.33 (d, *J* = 7.8, 1.0 Hz, 1H), 7.14 (d, *J* = 12.1 Hz, 2H), 6.29 (s, 1H), 3.67 (s, 3H), 2.43 (d, *J* = 8.7 Hz, 3H), 2.14 (d, *J* = 4.8 Hz, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.75 (s), 139.64 (s), 137.82 (s), 137.00 (s), 135.27 (s), 134.64 (s), 132.13 (s), 131.27 (s), 130.72 (s), 129.84 (t, *J* = 10.9 Hz), 128.45 (s), 127.54 (s), 125.28 (d, *J* = 16.3 Hz), 52.26 (s), 25.96 (s), 20.95 (s).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{21}H_{20}NO_3$: 334.1361; found, 334.1364

TLC: R_f = 0.1 (70:30 petroleum ether:EtOAc).



Methyl 2-(8-(methylcarbamoyl)naphthalen-2-yl)benzoate: Compound **9h** was prepared by general proceure B

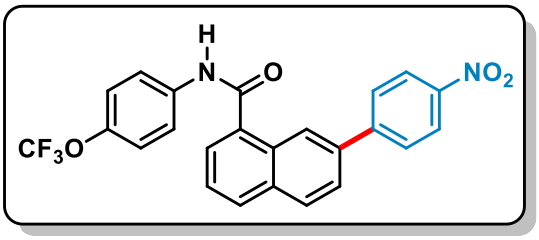
Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow solid.

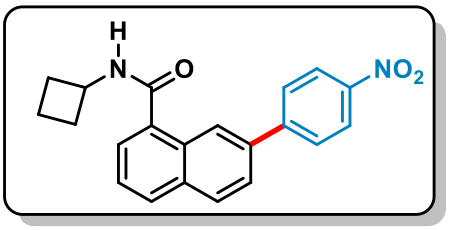
Yield: 86%

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.97 (d, 1H), 7.88 (t, *J* = 6.8 Hz, 2H), 7.70 (d, *J* = 6.8 Hz, 1H), 7.55 – 7.50 (m, 2H), 7.48 (t, 1H), 7.41 (td, *J* = 7.7, 1.0 Hz, 1H), 7.28 (d, *J* = 6.4 Hz, 1H), 7.18 (d, 1H), 6.29 (s, 1H), 3.69 (s, 3H), 2.13 (d, *J* = 4.8 Hz, 3H).

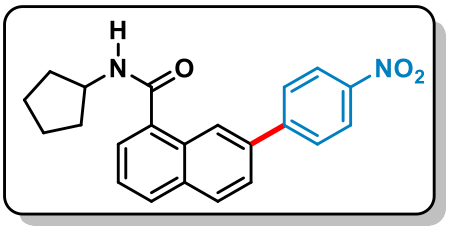
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.67 (s), 142.45 (s), 137.85 (s), 135.27 (s), 134.66 (s), 131.44 (d, *J* = 3.9 Hz), 130.78 (s), 130.12 (s), 129.86 (s), 129.28 (s), 128.62 (d, *J* = 11.0 Hz), 127.42 (s), 127.23 (s), 125.34 (d, *J* = 6.0 Hz), 52.35 (s), 25.92 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{20}H_{18}NO_3$: 321.1237; found, 320.1232
TLC: R_f = 0.1 (70:30 petroleum ether:EtOAc).



7-(4-nitrophenyl)-N-(4-(trifluoromethoxy)phenyl)-1-naphthamide: Compound **9i** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid.
Yield: 64%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.69 (s, 1H), 8.30 (d, *J* = 8.7 Hz, 2H), 8.03 (dd, *J* = 8.4, 4.4 Hz, 2H), 7.88 – 7.83 (m, 3H), 7.83 – 7.80 (m, 2H), 7.73 (d, *J* = 8.5 Hz, 2H), 7.60 – 7.54 (m, 1H), 7.27 (d, *J* = 4.6 Hz, 1H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 167.22 (s), 147.20 (d, *J* = 16.8 Hz), 137.68 (s), 136.47 (s), 133.60 (s), 131.35 (s), 130.35 (s), 129.50 (s), 128.29 (s), 125.90 (d, *J* = 4.0 Hz), 125.56 (s), 124.36 (s), 124.16 (s), 122.00 (s), 121.32 (s).
^{19}F NMR (471 MHz, $CDCl_3$) δ -58.08 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{24}H_{16}F_3N_2O_3$: 453.1017; found, 453.1020
TLC: R_f = 0.05 (80:20 petroleum ether:EtOAc).



N-cyclobutyl-7-(4-nitrophenyl)-1-naphthamide: Compound **9j** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow liquid.
Yield: 76%
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.64 (s, 1H), 8.32 (d, *J* = 8.8 Hz, 2H), 7.98 (d, *J* = 8.5 Hz, 1H), 7.95 (d, *J* = 8.3 Hz, 1H), 7.86 (d, *J* = 8.8 Hz, 2H), 7.78 (d, *J* = 8.5, 1.7 Hz, 1H), 7.64 (d, 2H), 7.52 – 7.48 (m, 1H), 6.24 (d, *J* = 7.7 Hz, 1H), 4.78 – 4.67 (m, 1H), 2.54 – 2.49 (m, 2H), 2.03 – 1.97 (m, 2H), 1.83 – 1.78 (m, 2H).
HRMS (*m/z*): [M+Na$^+$] calcd for $C_{21}H_{19}N_2O_3$: 347.1351; found, 347.1349
TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



N-cyclopentyl-7-(4-nitrophenyl)-1-naphthamide: Compound **9k** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow solid.

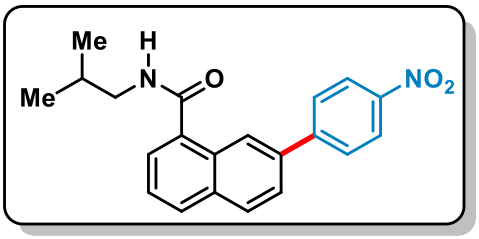
Yield: 71%

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.65 (s, 1H), 8.33 (d, *J* = 8.7 Hz, 2H), 7.98 (d, *J* = 8.5 Hz, 1H), 7.96 (d, *J* = 8.2 Hz, 1H), 7.87 (d, *J* = 8.7 Hz, 2H), 7.78 (d, *J* = 8.5, 1.6 Hz, 1H), 7.64 (d, *J* = 6.9 Hz, 1H), 7.51 (t, 1H), 6.02 (s, 1H), 4.59 – 4.49 (m, 1H), 2.26 – 2.11 (m, *J* = 12.5, 6.0 Hz, 2H), 1.82 – 1.65 (m, *J* = 24.3, 12.4 Hz, 5H), 1.59 – 1.52 (m, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 168.87 (s), 147.37 (s), 147.19 (s), 137.13 (s), 135.11 (s), 133.49 (s), 130.36 (s), 129.33 (s), 128.21 (s), 125.80 – 125.40 (m), 124.63 (s), 124.16 (s), 51.82 (s), 33.32 (s), 23.78 (s).

HRMS (*m/z*): [M+H$^+$] calcd for $C_{22}H_{21}N_2O_3$: 361.1306; found, 331.1307

TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



N-isobutyl-7-(4-nitrophenyl)-1-naphthamide: Compound **9l** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).

Physical State: Pale yellow solid.

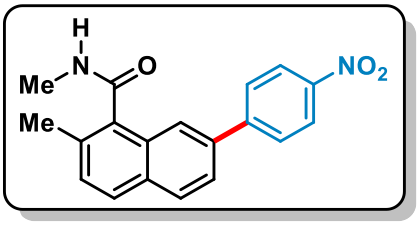
Yield:

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.65 (s, 1H), 8.32 (d, *J* = 8.8 Hz, 2H), 7.98 (dd, *J* = 12.2, 8.4 Hz, 2H), 7.87 (d, *J* = 8.8 Hz, 2H), 7.79 (d, *J* = 8.5, 1.7 Hz, 1H), 7.67 (d, *J* = 6.2 Hz, 1H), 7.52 (t, 1H), 6.12 (s, 1H), 3.40 (t, *J* = 6.5 Hz, 2H), 2.03 – 1.91 (m, 1H), 1.08 – 1.00 (m, 6H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 169.33 (s), 147.35 (s), 147.19 (s), 137.18 (s), 135.19 (s), 133.50 (s), 130.40 (d, *J* = 5.4 Hz), 129.33 (s), 128.22 (s), 125.76 – 125.33 (m), 124.67 (s), 124.15 (s), 47.39 (s), 28.71 (s), 20.19 (s).

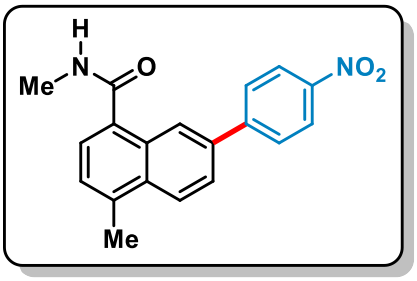
HRMS (*m/z*): [M+H$^+$] calcd for $C_{21}H_{21}N_2O_3$: 349.1510; found, 349.1512

TLC: R_f = 0.1 (60:40 petroleum ether:EtOAc).

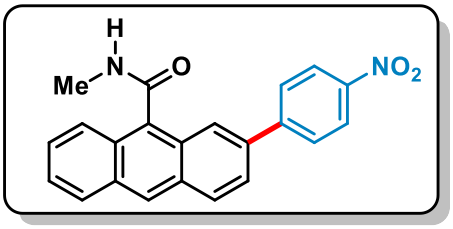


N,2-dimethyl-7-(4-nitrophenyl)-1-naphthamide: Compound **9m** was prepared by general proceure B

Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid.
Yield:
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.31 (d, *J* = 8.8 Hz, 2H), 8.01 (s, 1H), 7.91 (d, *J* = 8.5 Hz, 1H), 7.83 – 7.79 (m, 3H), 7.68 (d, *J* = 8.5, 1.7 Hz, 1H), 7.35 (d, *J* = 8.4 Hz, 1H), 5.91 (d, *J* = 4.4 Hz, 1H), 3.14 (d, 3H), 2.52 (s, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.26 (s), 147.45 (s), 147.14 (s), 137.09 (s), 134.41 (s), 133.11 (s), 131.45 (s), 130.28 (s), 129.38 (s), 129.02 (s), 128.67 (s), 128.19 (s), 124.61 (s), 124.12 (s), 123.57 (s), 26.69 (s), 19.68 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{19}H_{17}N_2O_3$: 321.1193; found, 321.1197
TLC: R_f = 0.1 (60:40 petroleum ether:EtOAc).

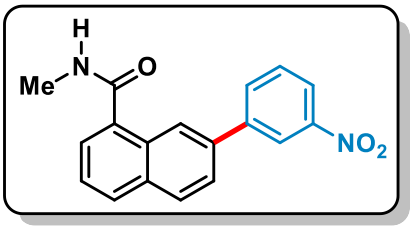


N,4-dimethyl-7-(4-nitrophenyl)-1-naphthamide: Compound **9n** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid.
Yield:
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.71 (s, 1H), 8.32 (d, 2H), 8.14 (d, *J* = 8.8 Hz, 1H), 7.89 (d, 2H), 7.82 (d, *J* = 8.8, 1.9 Hz, 1H), 7.55 (d, 1H), 7.34 (d, *J* = 7.2 Hz, 1H), 3.11 (d, *J* = 4.9 Hz, 3H), 2.75 (s, 3H).
^{13}C NMR (126 MHz, $CDCl_3$) δ 170.15 (s), 147.32 (s), 137.47 (s), 136.69 (s), 133.16 (s), 132.68 (s), 130.55 (s), 128.22 (s), 126.29 (s), 125.46 (d, *J* = 1.9 Hz), 125.26 (d, *J* = 3.6 Hz), 124.13 (s), 26.95 (s), 19.73 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{19}H_{17}N_2O_3$: 321.1193; found, 321.1197
TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



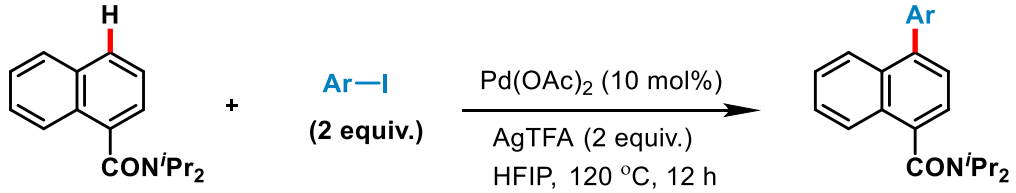
N-methyl-2-(4-nitrophenyl)anthracene-9-carboxamide: Compound **9o** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid.
Yield:
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.46 (s, 1H), 8.33 (d, 2H), 8.23 (s, 1H), 8.08 (d, *J* = 8.5 Hz, 1H), 8.05 – 7.96 (m, 2H), 7.86 (d, 3H), 7.70 (d, 1H), 7.58 – 7.46 (m, 3H), 6.35 (s, 1H), 3.25 (d, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 169.93 (s), 147.36 – 147.07 (m), 136.52 (s), 132.74 (s), 131.63 (s), 130.38 (s), 129.94 (s), 129.72 (s), 128.34 – 128.04 (m), 127.82 (s), 127.63 (s), 127.36 (s), 127.16 (s), 126.05 (s), 125.10 (s), 124.66 (s), 124.11 (d, *J* = 14.5 Hz), 38.33 (s), 34.91 (s), 26.99 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{22}H_{17}N_2O_3$: 357.11 found, 357.1192
TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).



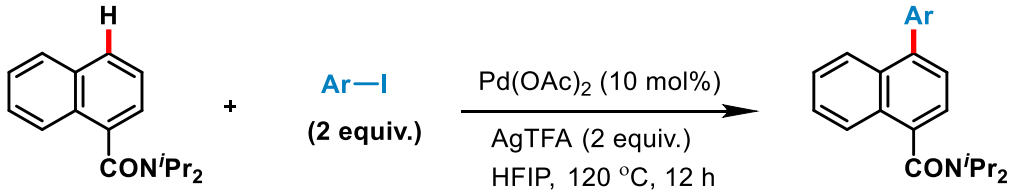
N-methyl-7-(3-nitrophenyl)-1-naphthamide: Compound **9p** was prepared by general proceure B
Eluent: petroleum ether/ethyl acetate (80/20, v/v).
Physical State: Pale yellow solid.
Yield:
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.62 (s, 1H), 8.55 (s, 1H), 8.23 (d, *J* = 7.1 Hz, 1H), 8.07 (d, *J* = 7.7 Hz, 1H), 7.98 (dd, *J* = 13.2, 8.5 Hz, 2H), 7.80 (d, 1H), 7.66 (d, *J* = 7.8 Hz, 2H), 7.51 (t, *J* = 7.0 Hz, 1H), 6.08 (s, 1H), 3.13 (d, *J* = 4.9 Hz, 3H).
^{13}C NMR (101 MHz, $CDCl_3$) δ 169.96 (s), 137.26 (s), 134.75 (s), 133.69 (s), 133.34 (s), 130.53 (s), 129.81 (s), 129.36 (s), 127.82 (s), 125.62 (s), 125.42 (s), 124.26 (s), 122.31 (d, *J* = 7.7 Hz), 26.97 (s).
HRMS (*m/z*): [M+H$^+$] calcd for $C_{18}H_{15}N_2O_3$: 307.1025; found, 307.1021
TLC: R_f = 0.1 (80:20 petroleum ether:EtOAc).

Kinetic Studies:



Procedure: In screw cap reaction tubes with previously placed stir bars were charged with *α*-naphthamide (0.05 mmol, 12.76 mg), palladium (II) acetate (10 mol%, 0.005 mmol, 1.12 mg).

Rate and order determination:



Let the rate of the reaction is as follows-

So, Rate = k. $[naphthamide]^x[aryliodide]^y[AgTFA]^z$ -(1)

Substrate : Aryl iodide (1:2)

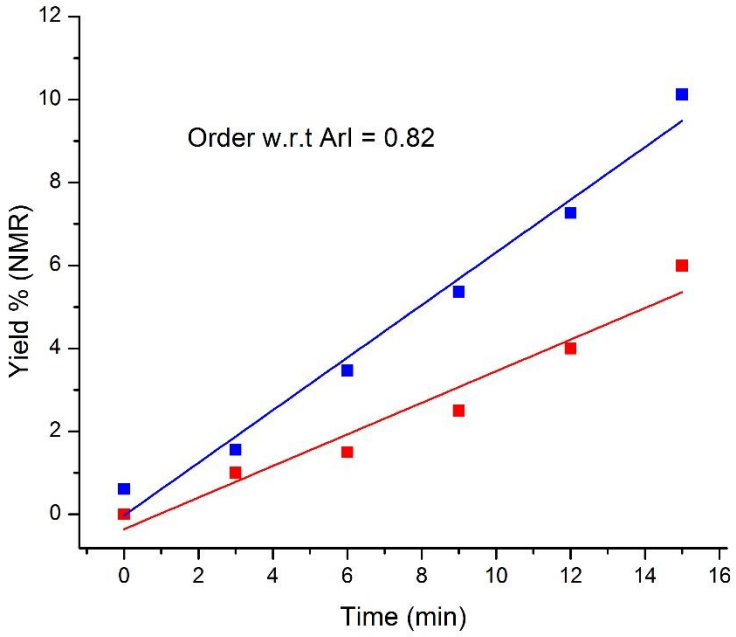
No.	Substrate mmol	Aryl iodide (2 eqv.) mmol	$Pd(OAc)_2$ (mol%)	AgTFA (equiv.)
Run I	0.05	0.1	10	1.5

Sr. No.	Time (min)	Yield (%)
1.	0	0
2.	3	1
3.	6	3
4.	9	5
5.	12	7
6.	15	10

Substrate : Aryl iodide (1:1)

No.	Substrate mmol	Aryl iodide (1 eqv.) mmol	$Pd(OAc)_2$ (mol%)	AgTFA (equiv.)
Run II	0.05	0.05	10	1.5

Sr. No.	Time (min)	Yield (%)
1.	0	0
2.	3	1
3.	6	1.5
4.	9	2.5
5.	12	4
6.	15	6



For run 1, initial rate = $Rate_1$

So, $Rate_1 = k. [naphthamide]^x[aryliodide]^y[AgTFA]^z$

Or, $0.667 (mmol^{-1}.min^{-1}) = [0.05]^x[0.1]^y[0.1]^z$ -(2)

For run 2, initial rate = $Rate_2$

So, $Rate_2 = k. [naphthamide]^x[aryliodide]^y[AgTFA]^z$

Or, $0.38 (mmol^{-1}.min^{-1}) = [0.1]^x[0.1]^y[0.1]^z$ -(3)

From eq. (2) and (3) we get,

$Rate_2/Rate_1 = [0.1/ 0.05]^x$

Or, $x = [\log (Rate_2) – \log (Rate_1)] / [\log (0.1) – \log (0.05)]$

Or, $x = [\log(0.667) – \log(0.381)] / [\log(0.1) – \log(0.05)]$

Or, $x = 0.82$

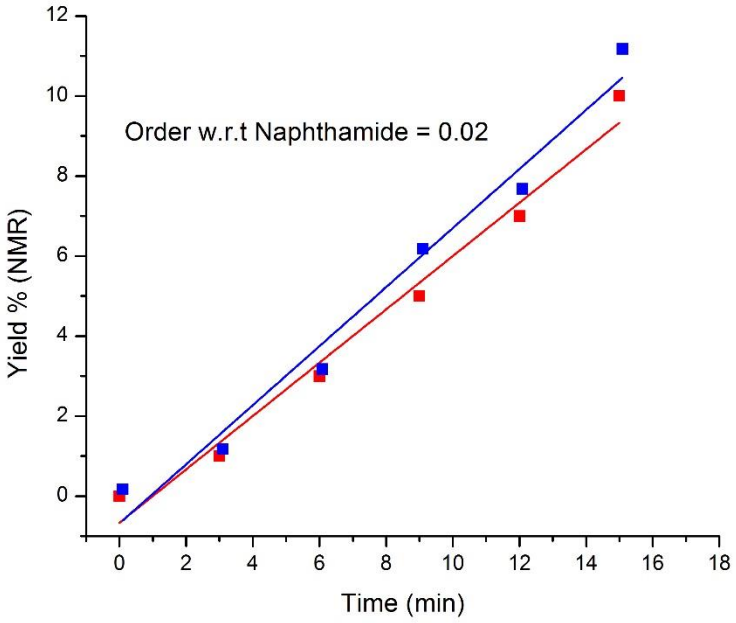
So, order w.r.t naphthamide is 0.82

Substrate : Aryl iodide (1.5:2)

No.	**Substrate mmol**	**Aryl iodide (2 eqv.) mmol**	**$Pd(OAc)_2$ (mol%)**	**AgTFA (equiv.)**
Run III	0.075	0.01	10	1.5

Sr. No.	**Time (min)**	**Yield (%)**
1.	0	0

2.	3	1
3.	6	3
4.	9	6
5.	12	7.5
6.	15	11



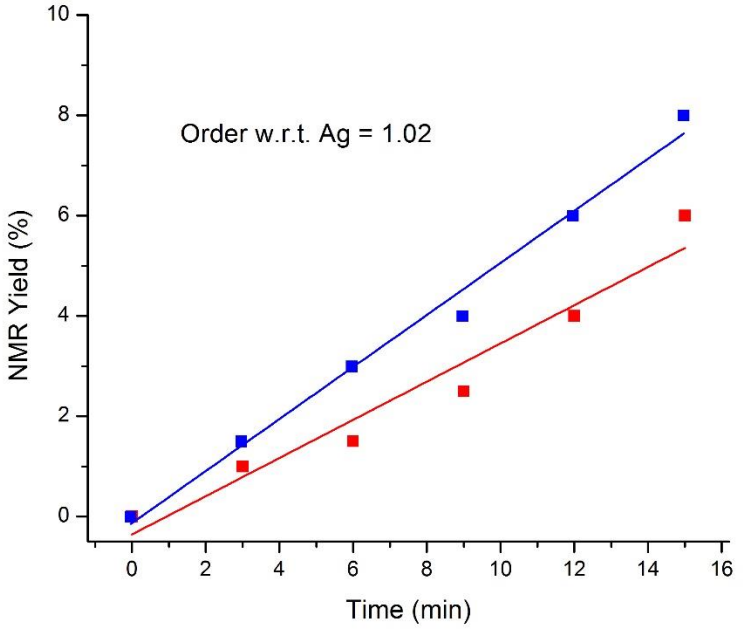
Using similar approach mentioned above, we obtain

$$y = [\log(0.7381) - \log(0.667)] / [\log(0.075) - \log(0.05)] = 0.02$$

So, order w.r.t ArI is 0.02

No.	**Substrate mmol**	**Aryl iodide (1 eqv.) mmol**	**$Pd(OAc)_2$ (mol%)**	**AgTFA (equiv.)**
Run II	0.05	0.05	10	2

Sr. No.	**Time (min)**	**Yield (%)**
1.	0	0
2.	3	1.5
3.	6	3
4.	9	4
5.	12	6
6.	15	8



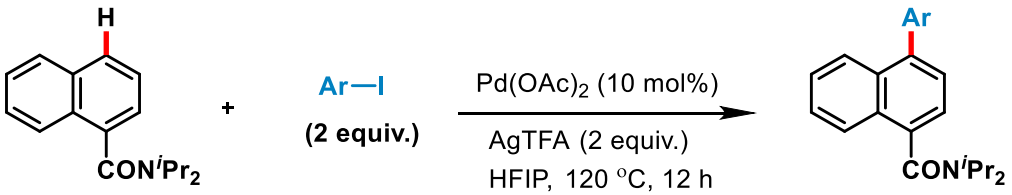
Using similar approach mentioned above, we obtain

$$z = [\log(0.519) - \log(0.38)] / [\log(0.1) - \log(0.075)] = 1.02$$

So, order w.r.t AgTFA is 1.02

Order determination w.r.to palladium salt

Order of the catalyst is determined by using normalized time scale method.[1] Two sets of reactions were carried out with different concentration of the catalyst used.



No.	Substrate mmol	Aryl iodide (2 eqv.) mmol	$Pd(OAc)_2$ (mol%)	AgTFA (equiv.)
Run I	0.05	0.1	5 mol%	1.5
Run II	0.05	0.1	10 mol%	1.5

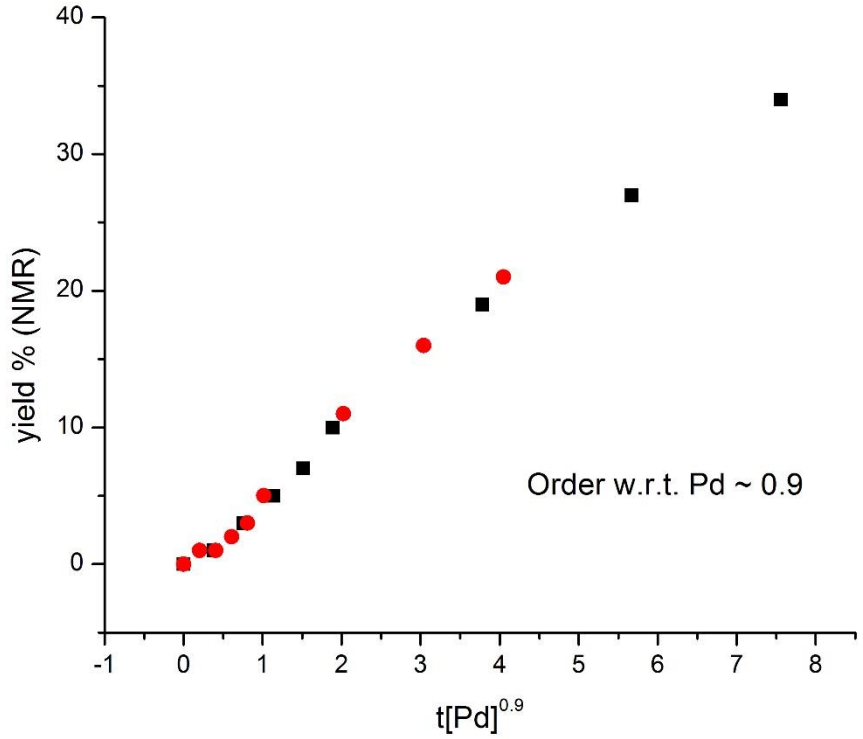
Run I: (5 mol% palladium acetate)

Sr. No.	Time (min)	Yield (%)

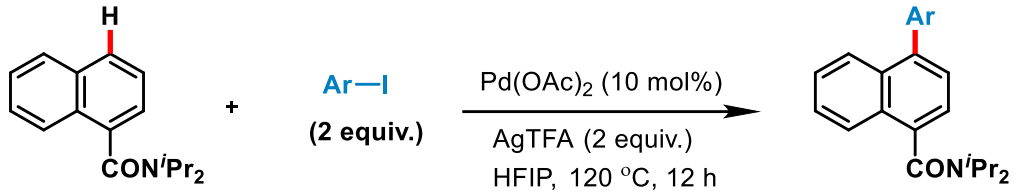
1.	0	0
2.	3	1
3.	6	1
4.	9	2
5.	12	3
6.	15	5
7.	30	11
8.	45	16
9.	60	21

Run II: (10 mol% palladium acetate)

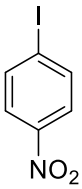
Sr. No.	Time (min)	Yield (%)
1.	0	0
2.	3	1
3.	6	3
4.	9	5
5.	12	7
6.	15	10
7.	30	19
8.	45	27
9.	60	34



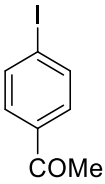
Hammett plot:



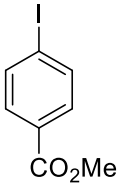
Rate with respect to different substrates are determined and plotted against reported sigma values.



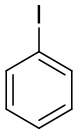
Sr. No.	Time (min)	Yield (%)
1.	0	0
2.	15	15
3.	30	22
4.	45	34
5.	60	42



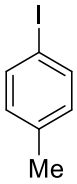
Sr. No.	Time (min)	Yield (%)
1.	0	0
2.	15	8
3.	30	14
4.	45	21
5.	60	30



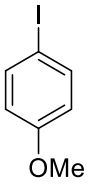
Sr. No.	Time (min)	Yield (%)
1.	0	0
2.	15	5
3.	30	12
4.	45	18
5.	60	25



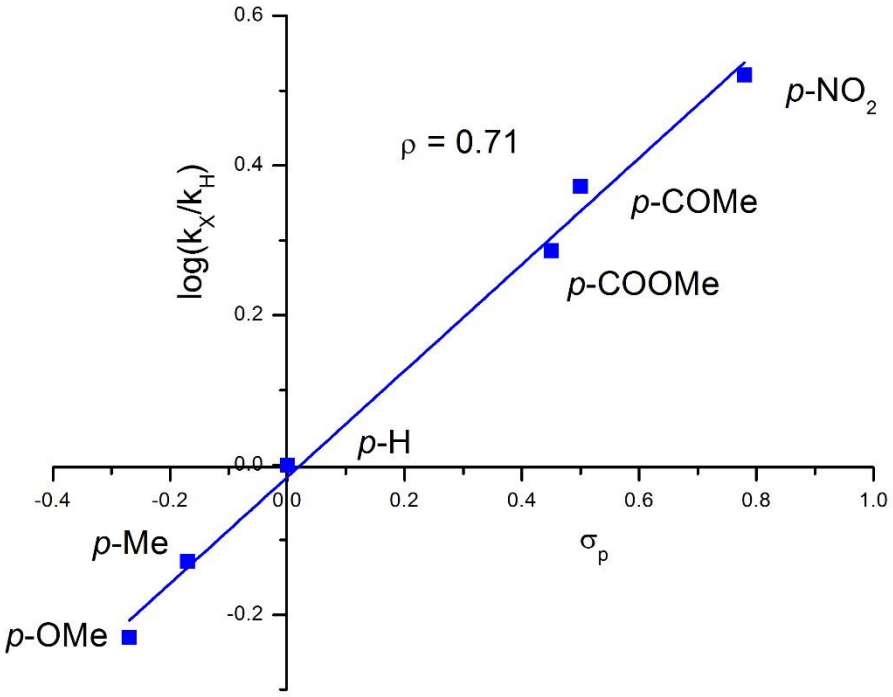
Sr. No.	Time (min)	Yield (%)
1.	0	0
2.	15	2
3.	30	5
4.	45	9
5.	60	12



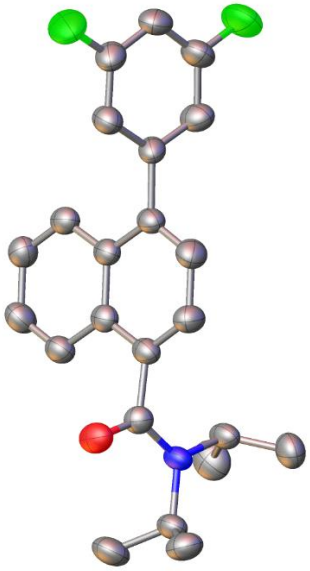
Sr. No.	Time (min)	Yield (%)
1.	0	0
2.	15	1
3.	30	3
4.	45	6
5.	60	9



Sr. No.	Time (min)	Yield (%)
1.	0	0
2.	15	1
3.	30	3
4.	45	5
5.	60	7

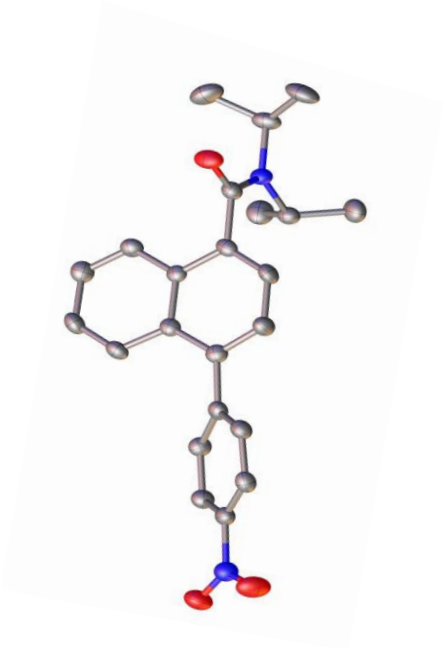

0.6
0.4
0.2
0.0
-0.2
-0.4
-0.2
0.0
0.2
0.4
0.6
0.8
1.0
log(k_X/k_H)
σ_p
ρ = 0.71
p-NO2
p-COMe
p-COOMe
p-H
p-Me
p-OMe

Crystal Information:



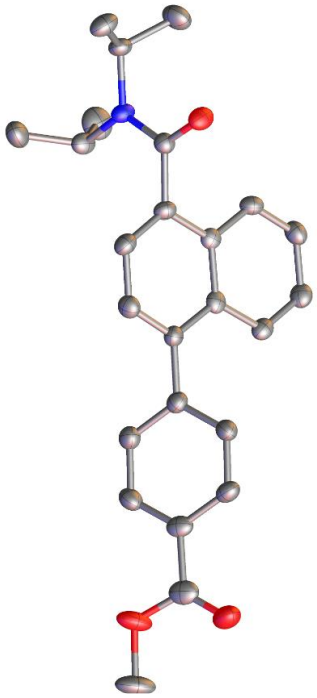
Crystal Data of 3f CCDC 2132423:

Crystal data and structure refinement for $C_{23}H_{23}F_2NO$	
Identification code	**3f**
Formula	$C_{23}H_{23}F_2NO$
Formula weight(g/mol)	367.42
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	17.568(2)
b/Å	7.5840(6)
c/Å	16.119(2)
α/°	90
β/°	112.022(14)
γ/°	90
Volume/Å^3	1991.0(4)
Z	9
P_{calc}g/cm^3	1.226
μ/mm^{-1}	0.087
F(000)	776.0
Crystal size/mm^3	0.084 x 0.096 x 0.2
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	2.501 to 33.707
Goodness-of-fit on F^2	0.950
R indices (all data)	R1 = 0.0968, wR2 = 0.3276
Largest diff. peak and hole/ e Å^{-3}	0.310 and -0.342



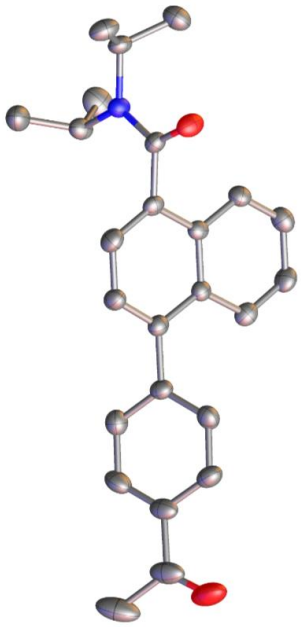
Crystal Data of 3g CCDC 2132428:

Crystal data and structure refinement for $C_{23}H_{24}N_2O_3$	
Identification code	**3g**
Formula	$C_{23}H_{24}N_2O_3$
Formula weight(g/mol)	376.44
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	16.1993(13)
b/Å	7.6086(5)
c/Å	16.2787(12)
α/°	90
β/°	105.218(8)
γ/°	90
Volume/Å^3	1936.0(3)
Z	8
P_{calc}g/cm^3	1.291
μ/mm^{-1}	0.086
F(000)	800.0
Crystal size/mm^3	0.07 x 0.08 x 0.12
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	2.579 to 24.999
Goodness-of-fit on F^2	1.053
R indices (all data)	R1 = 0.0663, wR2 = 0.1762
Largest diff. peak and hole/ e Å^{-3}	0.260 and -0.280



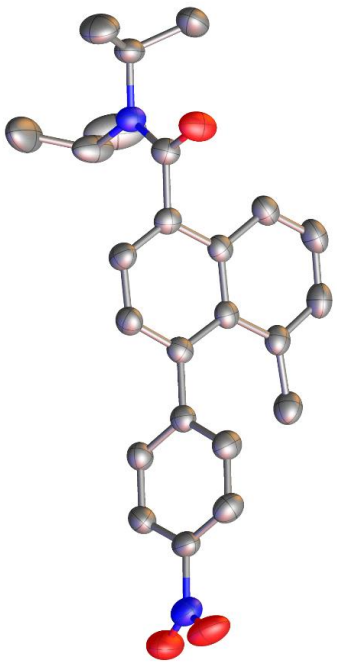
Crystal Data of 3j CCDC 2132440:

Crystal data and structure refinement for $C_{25}H_{27}NO_3$	
Identification code	**3j**
Formula	$C_{25}H_{27}NO_3$
Formula weight(g/mol)	389.48
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	18.0220(18)
b/Å	7.3120(6)
c/Å	16.2331(14)
α/°	90
β/°	101.134(9)
γ/°	90
Volume/Å^3	2098.9(3)
Z	9
P_{calc}g/cm^3	1.232
μ/mm^{-1}	0.080
F(000)	832.0
Crystal size/mm^3	0.062 x 0.078 x 0.08
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	2.304 to 24.998
Goodness-of-fit on F^2	1.060
R indices (all data)	R1 = 0.0703, wR2 = 0.2087
Largest diff. peak and hole/ e Å^{-3}	0.381 and -0.394



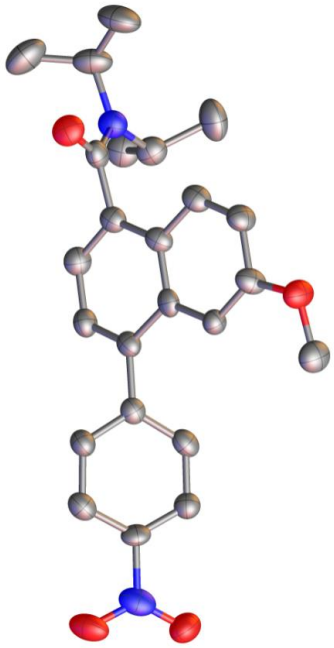
Crystal Data of 3k CCDC 2132436:

Crystal data and structure refinement for $C_{25}H_{27}NO_2$	
Identification code	**3k**
Formula	$C_{25}H_{27}NO_2$
Formula weight(g/mol)	373.48
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	17.8628(16)
b/Å	7.3882(5)
c/Å	16.1222(14)
α/°	90
β/°	104.518(9)
γ/°	90
Volume/Å^3	2059.8
Z	9
P_{calc}g/cm^3	1.204
μ/mm^{-1}	0.076
F(000)	800.0
Crystal size/mm^3	0.04 x 0.062 x 0.075
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	2.356 to 25.000
Goodness-of-fit on F^2	0.952
R indices (all data)	R1 = 0.0756, wR2 = 0.2949
Largest diff. peak and hole/ e Å^{-3}	0.381 and -0.407



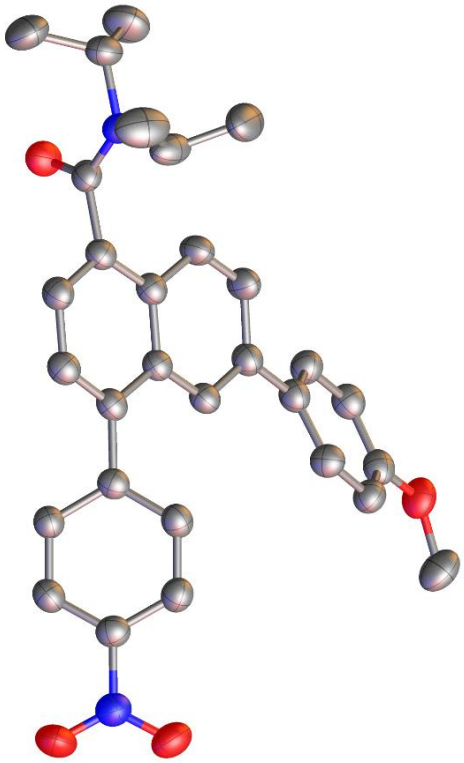
Crystal Data of 3w CCDC 2132456:

Crystal data and structure refinement for $C_{24}H_{26}N_2O_3$	
Identification code	**3w**
Formula	$C_{24}H_{26}N_2O_3$
Formula weight(g/mol)	390.47
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	12.9978(6)
b/Å	11.4277(6)
c/Å	14.5839(7)
α/°	90
β/°	93.368(4)
γ/°	90
Volume/Å^3	2162.48(18)
Z	9
P_{calc}g/cm^3	1.199
μ/mm^{-1}	0.079
F(000)	832.0
Crystal size/mm^3	0.05 x 0.06 x 0.08
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	2.3530 to 25.7420
Goodness-of-fit on F^2	1.001
R indices (all data)	R1 = 0.0836, wR2 = 0.2129
Largest diff. peak and hole/ e Å^{-3}	0.201 and -0.256



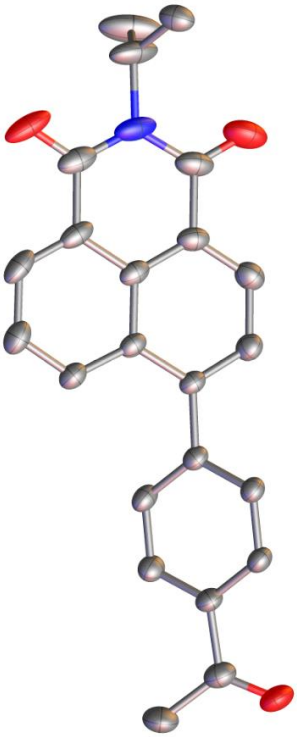
Crystal Data of 3x CCDC 2133312:

Crystal data and structure refinement for $C_{24}H_{26}N_2O_4$	
Identification code	**3x**
Formula	$C_{24}H_{26}N_2O_4$
Formula weight(g/mol)	406.47
Temperature/K	150 K
Crystal system	Orthorhombic
Space group	P 21 21 2
a/Å	15.2362(7)
b/Å	18.0958(7)
c/Å	7.8354(4)
α/°	90
β/°	90
γ/°	90
Volume/Å^3	2160.31(17)
Z	9
P_{calc}g/cm^3	1.250
μ/mm^{-1}	0.692
F(000)	864.0
Crystal size/mm^3	0.05 x 0.06 x 0.083
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	3.793 to 72.729
Goodness-of-fit on F^2	1.015
R indices (all data)	R1 = 0.0786, wR2 = 0.2273
Largest diff. peak and hole/ e Å^{-3}	0.330 and -0.295



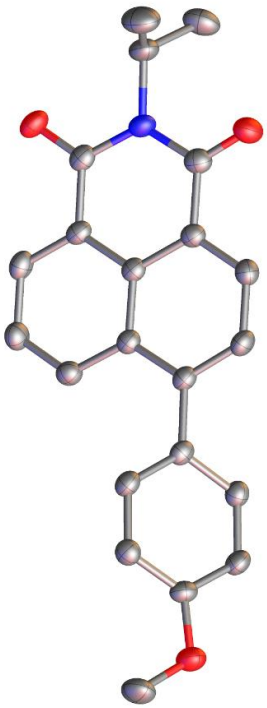
Crystal Data of 3y CCDC 2132453:

Crystal data and structure refinement for $C_{30}H_{30}N_2O_4$	
Identification code	**3y**
Formula	$C_{30}H_{30}N_2O_4$
Formula weight(g/mol)	482.56
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	7.8353(2)
b/Å	22.0684(5)
c/Å	14.7710(4)
α/°	90
β/°	91.815(3)
γ/°	90
Volume/Å^3	2552.81(11)
Z	4
P_{calc}g/cm^3	1.256
μ/mm^{-1}	0.670
F(000)	1024.0
Crystal size/mm^3	0.062 x 0.096 x 0.115
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	3.602 to 72.760
Goodness-of-fit on F^2	1.036
R indices (all data)	R1 = 0.0774, wR2 = 0.2767
Largest diff. peak and hole/ e Å^{-3}	0.481 and -0.436



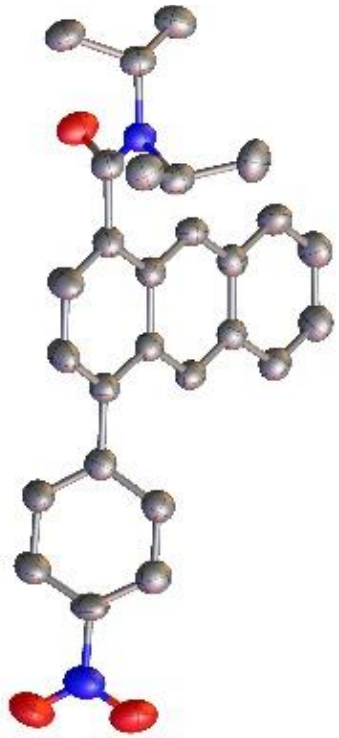
Crystal Data of 3ab CCDC 2132457:

Crystal data and structure refinement for $C_{23}H_{19}NO_3$	
Identification code	**3ab**
Formula	$C_{23}H_{19}NO_3$
Formula weight(g/mol)	357.39
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	13.1577(5)
b/Å	7.4286(3)
c/Å	18.3838(7)
α/°	90
β/°	99.340(4)
γ/°	90
Volume/Å^3	1773.07(12)
Z	8
P_{calc}g/cm^3	1.339
μ/mm^{-1}	0.089
F(000)	752.0
Crystal size/mm^3	0.09 x 0.11 x 0.12
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	2.245 to 33.861
Goodness-of-fit on F^2	1.069
R indices (all data)	R1 = 0.0933, wR2 = 0.2713
Largest diff. peak and hole/ e Å^{-3}	1.170 and -0.853



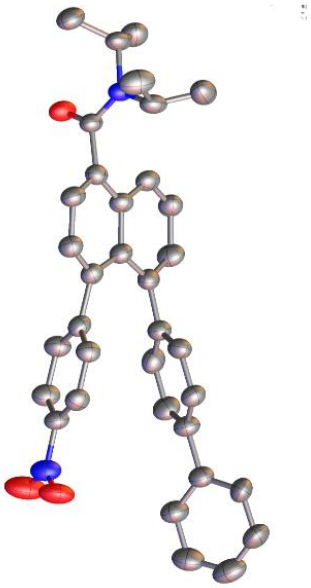
Crystal Data of 3ac CCDC 2132378:

Crystal data and structure refinement for $C_{22}H_{19}NO_3$	
Identification code	**3ac**
Formula	$C_{22}H_{19}NO_3$
Formula weight(g/mol)	345.38
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	13.5870(8)
b/Å	7.5797(4)
c/Å	17.5157(11)
α/°	90
β/°	105.850(7)
γ/°	90
Volume/Å^3	1735.28(18)
Z	7
P_{calc}g/cm^3	1.322
μ/mm^{-1}	0.088
F(000)	728.0
Crystal size/mm^3	0.06 x 0.08 x 0.09
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	2.3960 to 29.3530
Goodness-of-fit on F^2	1.012
R indices (all data)	R1 = 0.0790, wR2 = 0.1797
Largest diff. peak and hole/ e Å^{-3}	0.240 and -0.294



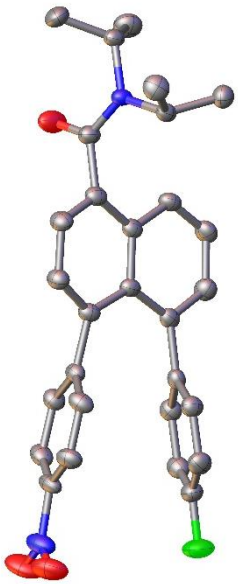
Crystal Data of 3ai CCDC 2132449:

Crystal data and structure refinement for $C_{27}H_{26}N_2O_3$	
Identification code	**3ai**
Formula	$C_{27}H_{26}N_2O_3$
Formula weight(g/mol)	426.50
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	26.1989(19)
b/Å	11.0262(9)
c/Å	8.0030(7)
α/°	90
β/°	92.355(7)
γ/°	90
Volume/Å^3	2309.9(3)
Z	10
P_{calc}g/cm^3	1.226
μ/mm^{-1}	0.080
F(000)	904.0
Crystal size/mm^3	0.09 x 0.1 x 0.12
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	2.004 to 33.998
Goodness-of-fit on F^2	0.969
R indices (all data)	R1 = 0.0819, wR2 = 0.2440
Largest diff. peak and hole/ e Å^{-3}	0.229 and -0.260



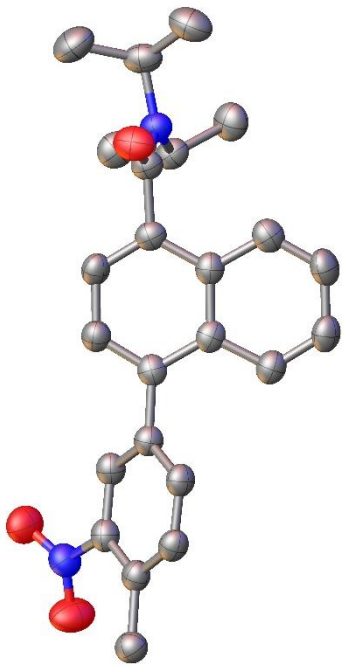
Crystal Data of 3aj CCDC 2132455:

Crystal data and structure refinement for $C_{35}H_{32}N_2O_3$	
Identification code	**3aj**
Formula	$C_{35}H_{32}N_2O_3$
Formula weight(g/mol)	528.63
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	13.2962(5)
b/Å	15.7733(7)
c/Å	27.5418(11)
α/°	90
β/°	98.192(4)
γ/°	90
Volume/Å^3	5717.3(4)
Z	25
P_{calc}g/cm^3	1.228
μ/mm^{-1}	0.619
F(000)	2240.0
Crystal size/mm^3	0.02 x 0.04 x 0.13
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	3.237 to 72.965
Goodness-of-fit on F^2	0.988
R indices (all data)	R1 = 0.1050, wR2 = 0.3908
Largest diff. peak and hole/ e Å^{-3}	0.533 and -0.472



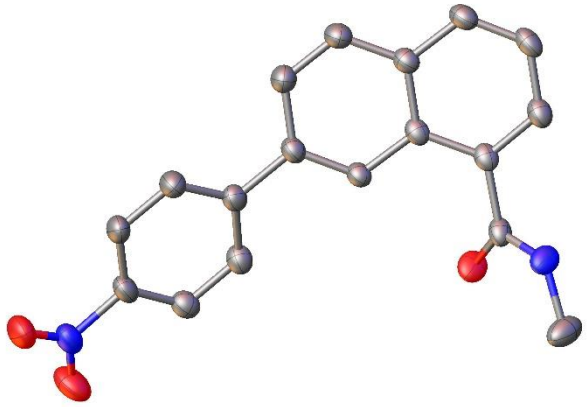
Crystal Data of 3al CCDC 2133315:

Crystal data and structure refinement for $C_{29}H_{27}FN_2O_3$	
Identification code	**3al**
Formula	$C_{29}H_{27}FN_2O_3$
Formula weight(g/mol)	470.53
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	7.1271(4)
b/Å	24.7374(15)
c/Å	13.8207(9)
α/°	90
β/°	101.066(6)
γ/°	90
Volume/Å^3	2391.4(3)
Z	10
P_{calc}g/cm^3	1.307
μ/mm^{-1}	0.090
F(000)	992.0
Crystal size/mm^3	0.045 x 0.058 x 0.09
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	1.646 to 32.937
Goodness-of-fit on F^2	1.030
R indices (all data)	R1 = 0.0741, wR2 = 0.1790
Largest diff. peak and hole/ e Å^{-3}	0.396 and -0.310



Crystal Data of 6h CCDC 2133344:

Crystal data and structure refinement for $C_{24}H_{26}N_2O_3$	
Identification code	**6h**
Formula	$C_{24}H_{26}N_2O_3$
Formula weight(g/mol)	390.47
Temperature/K	150 K
Crystal system	Orthorhombic
Space group	P b c a
a/Å	7.72750(10)
b/Å	22.4337(4)
c/Å	24.2544(5)
$\alpha/^o$	90
$\beta/^o$	90
$\gamma/^o$	90
Volume/$Å^3$	4204.66(13)
Z	18
$P_{calc}g/cm^3$	1.234
μ/mm^{-1}	0.653
F(000)	1664.0
Crystal size/mm^3	0.08 x 0.092 x 0.099
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/^{o}	3.941 to 72.708
Goodness-of-fit on F^2	1.074
R indices (all data)	R1 = 0.0693, wR2 = 0.2512
Largest diff. peak and hole/ e $Å^{-3}$	0.431 and -0.491



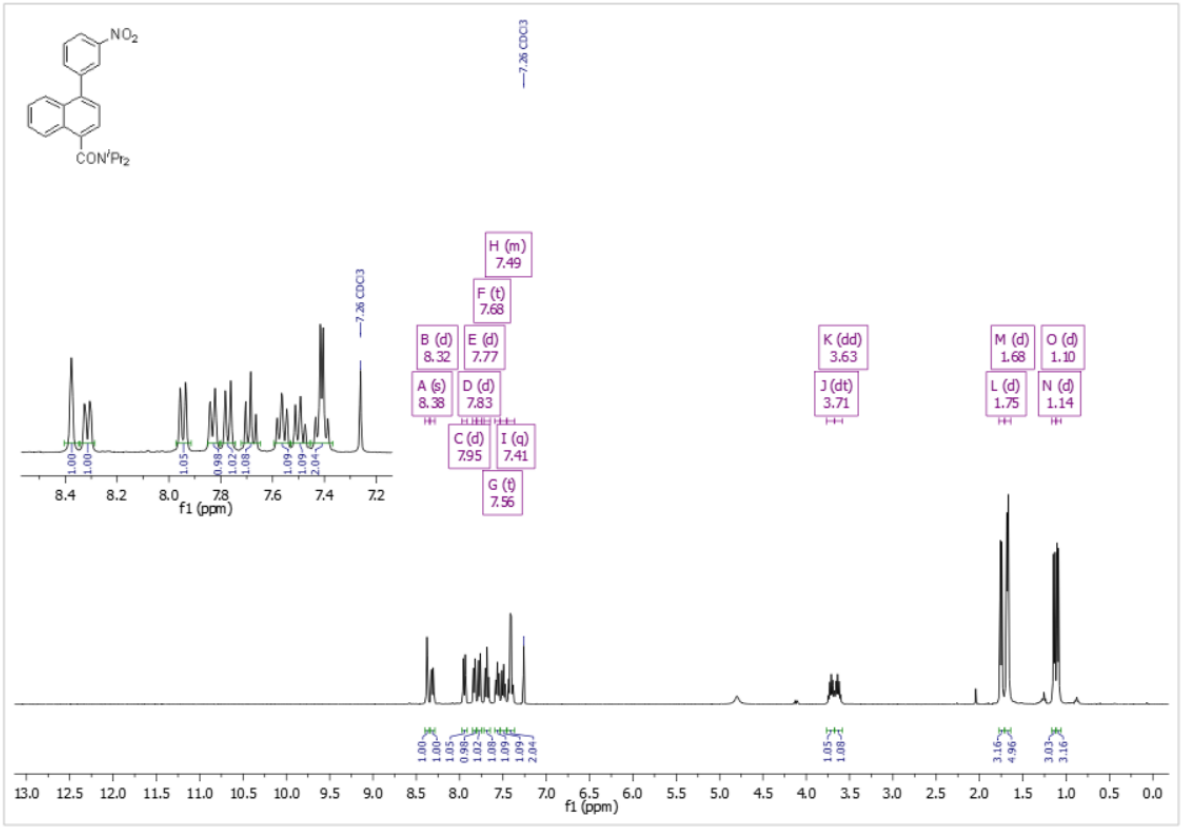
Crystal Data of 9d CCDC 2133343:

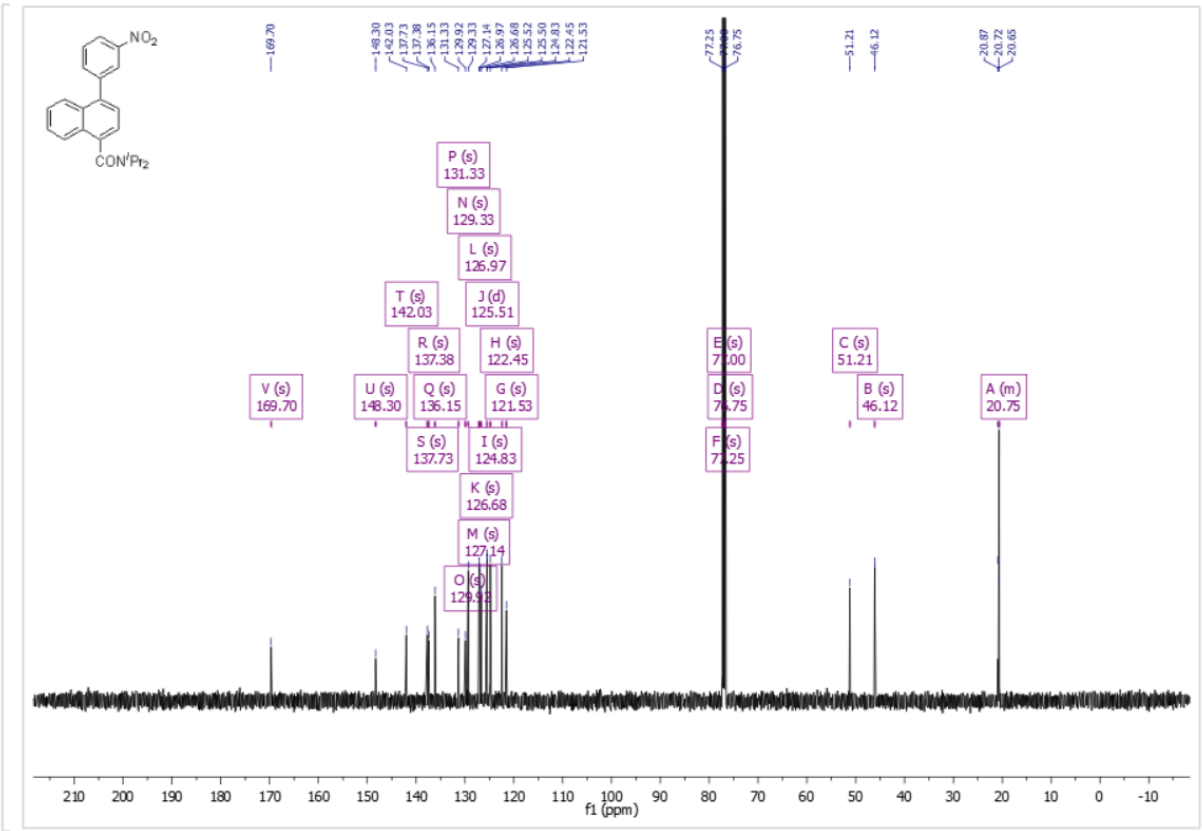
Crystal data and structure refinement for $C_{18}H_{14}N_2O_3$	
Identification code	**9d**
Formula	$C_{18}H_{14}N_2O_3$
Formula weight(g/mol)	306.31
Temperature/K	150 K
Crystal system	Monoclinic
Space group	P 1 21/c 1
a/Å	4.9733(2)
b/Å	15.3701(6)
c/Å	19.3784(9)
α/°	90
β/°	92.471(4)
γ/°	90
Volume/Å^3	1479.91(11)
Z	6
P_{calc}g/cm^3	1.375
μ/mm^{-1}	0.095
F(000)	640.0
Crystal size/mm^3	0.05 x 0.06 x 0.12
Radiation	MoKα (λ = 0.71073)
2Θ range for data collection/°	1.6820 to 24.8970
Goodness-of-fit on F^2	1.034
R indices (all data)	R1 = 0.0756, wR2 = 0.1836
Largest diff. peak and hole/ e Å^{-3}	0.316 and -0.257

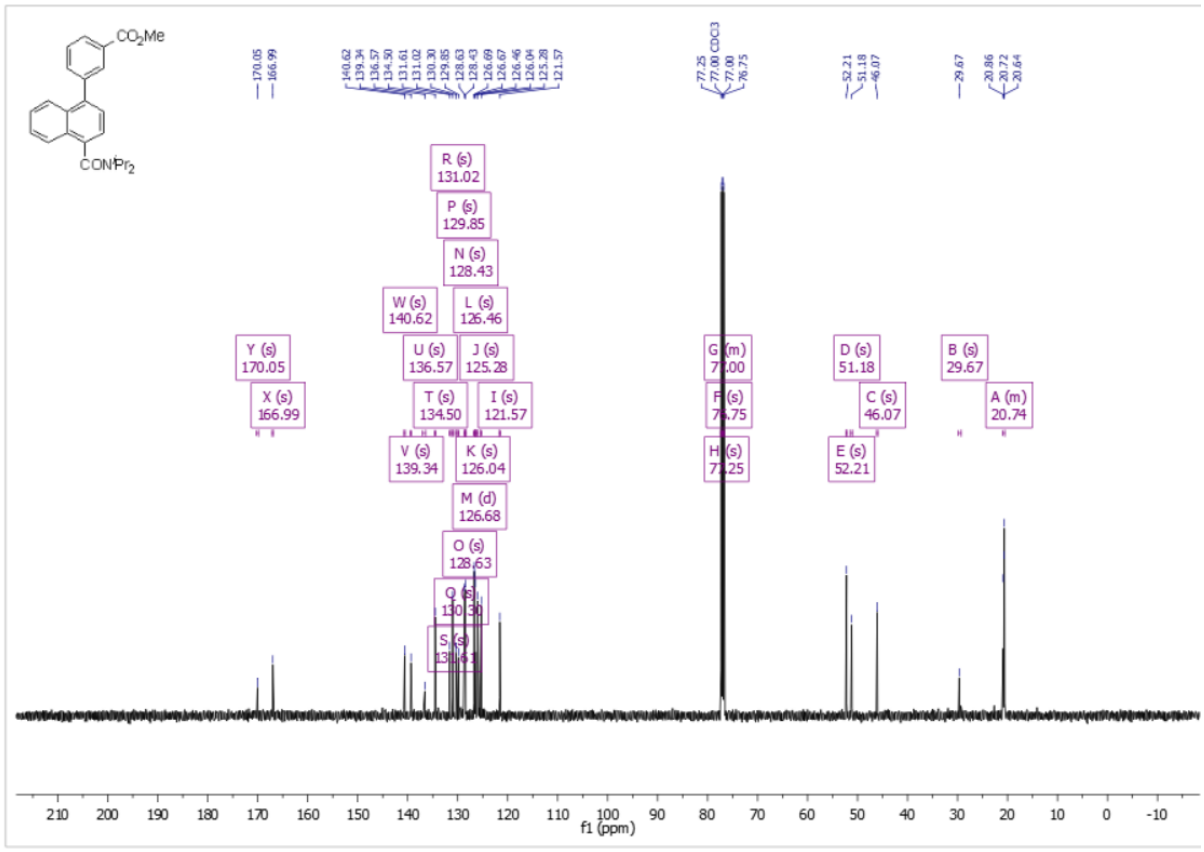
Reference:

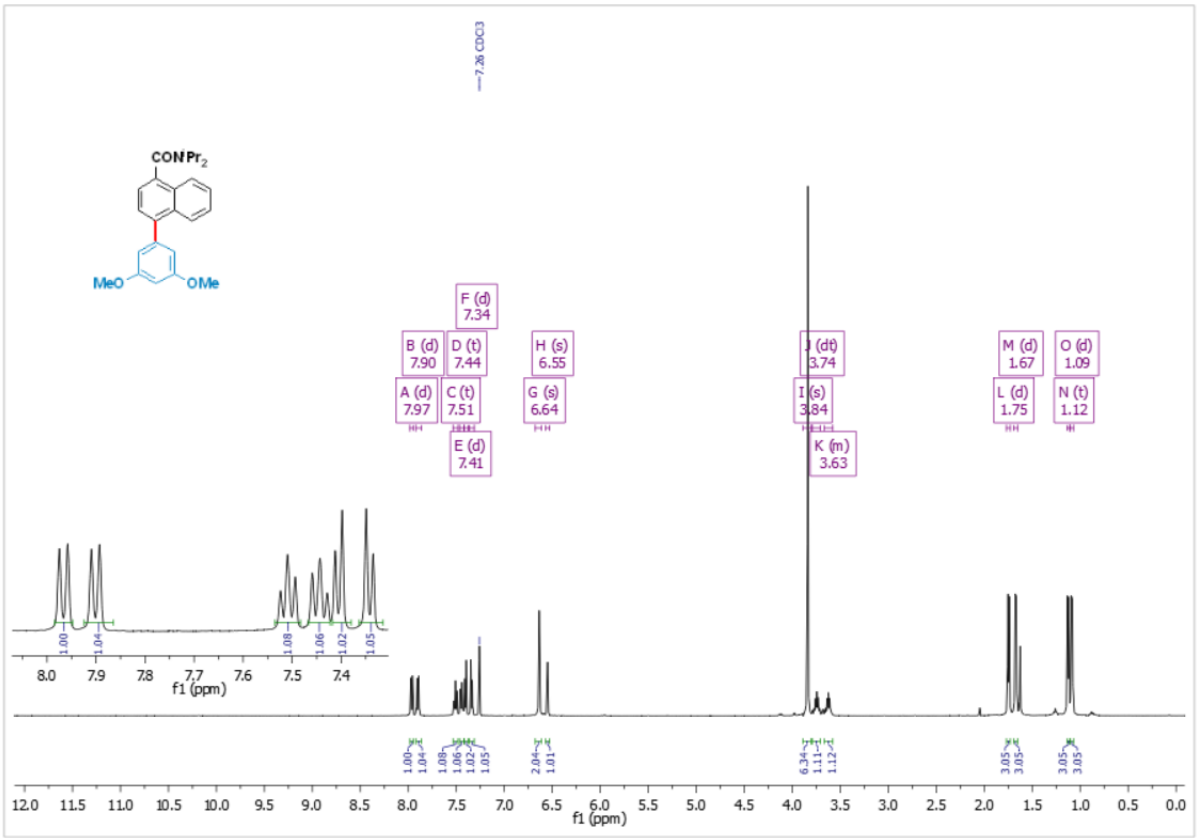
1. Burés, J. *Angew. Chem. Int. Ed*. **55**, 2028 (**2016)**

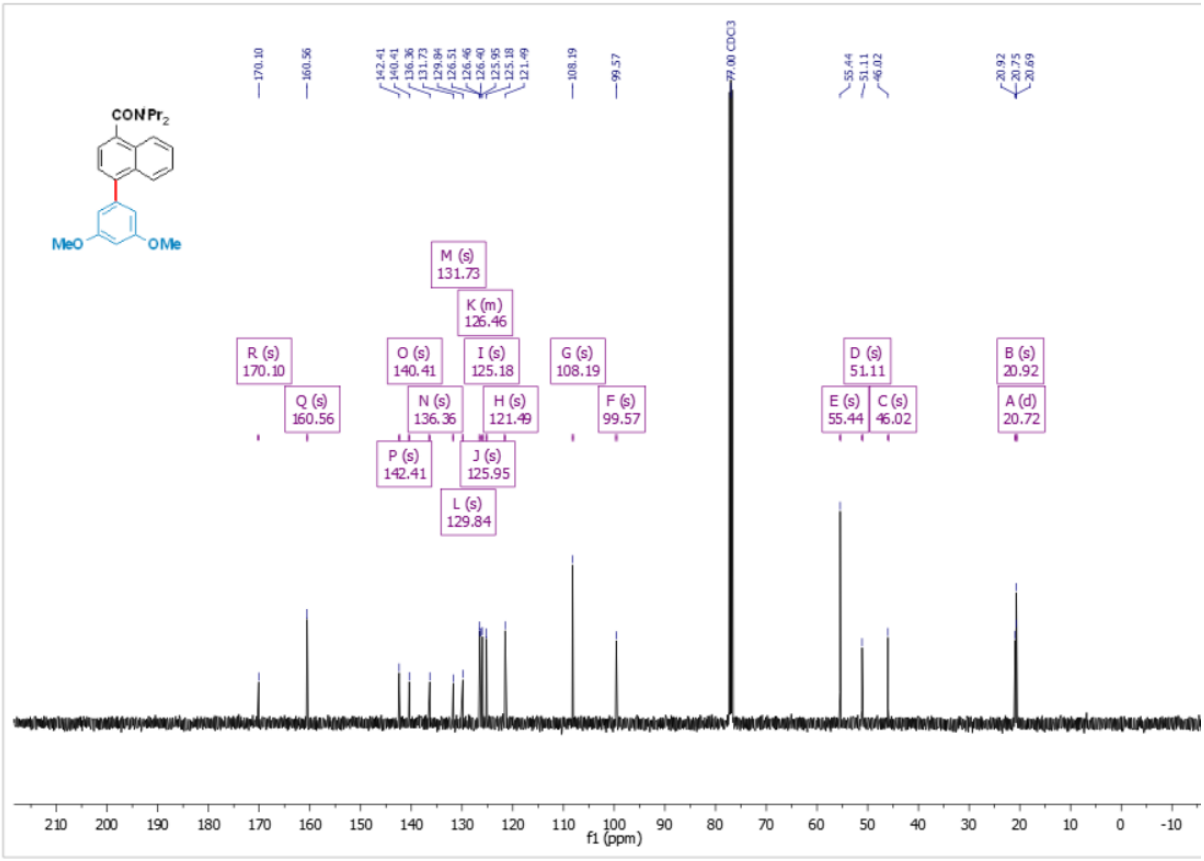
NMR Spectra of

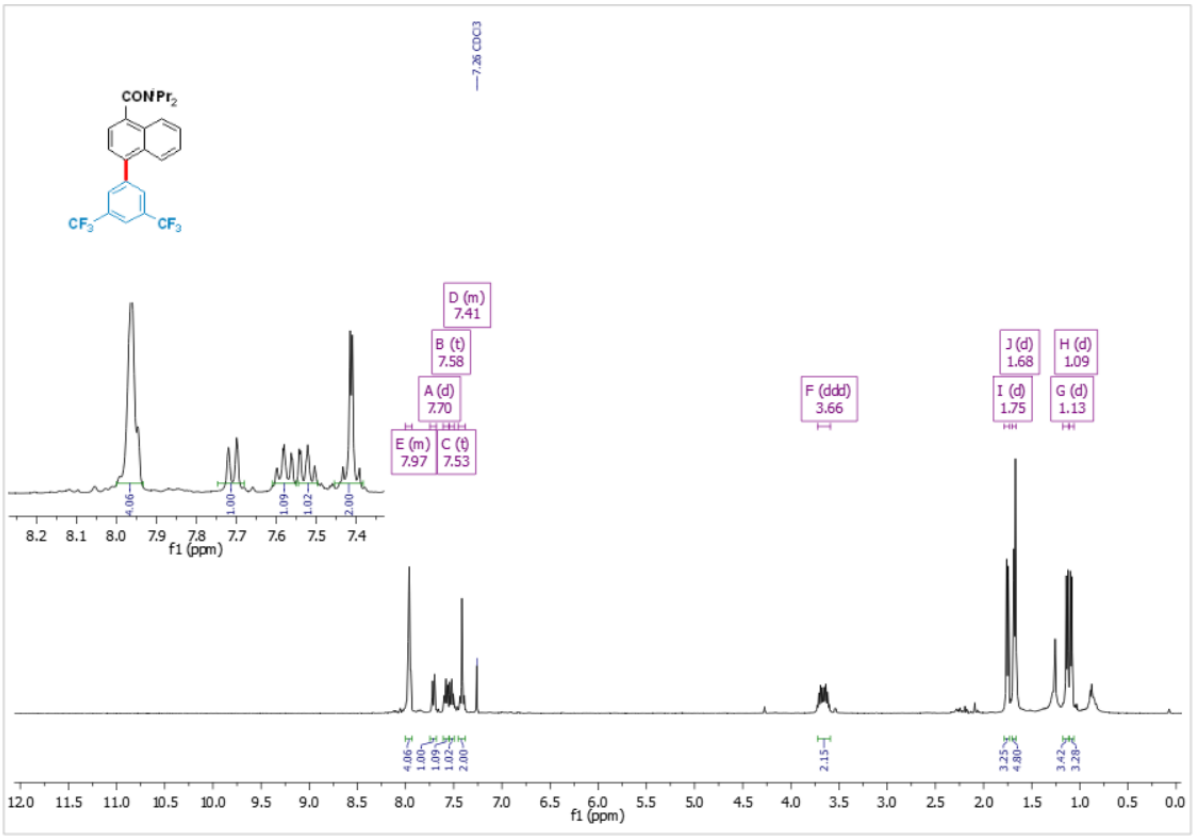


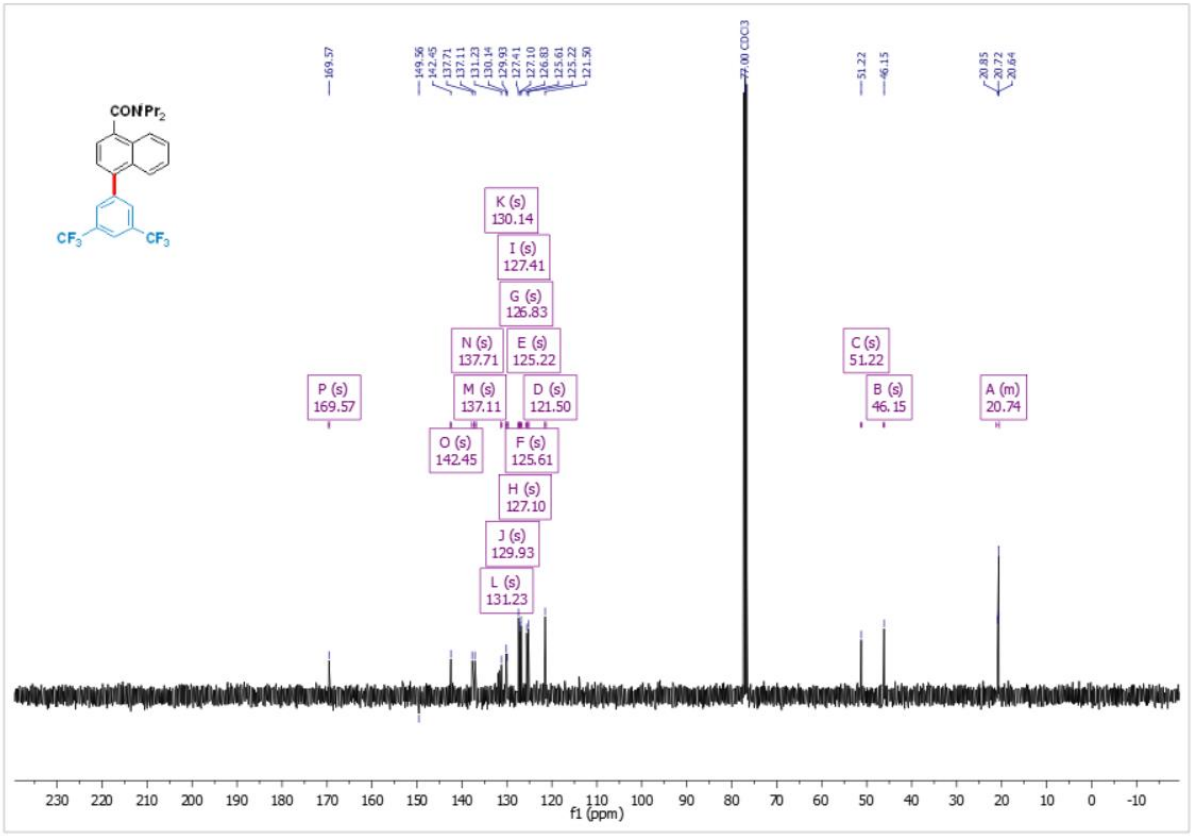


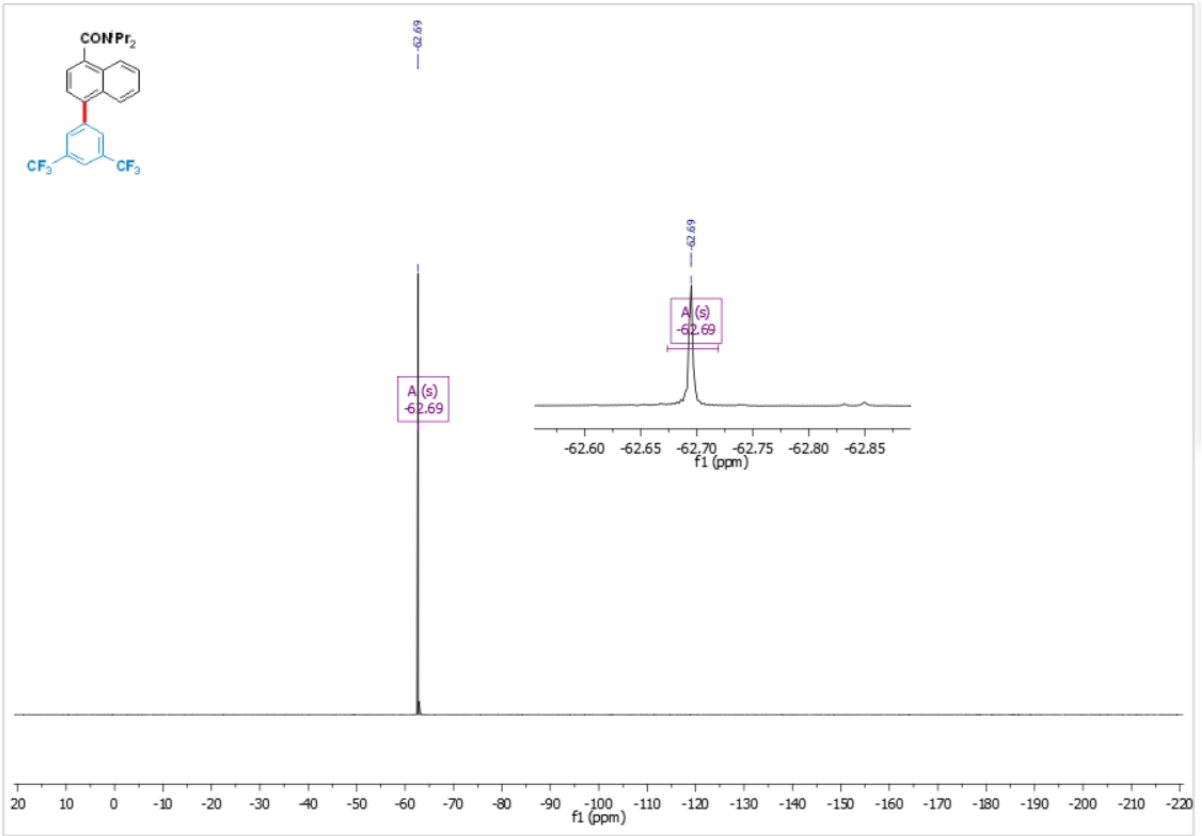

CO2Me
CONiPr2
R (s) 131.02
P (s) 129.85
N (s) 128.43
W (s) 140.62
L (s) 126.46
Y (s) 170.05
U (s) 136.57
J (s) 125.28
G (m) 77.00
D (s) 51.18
B (s) 29.67
X (s) 166.99
T (s) 134.50
I (s) 121.57
F (s) 76.75
C (s) 46.07
A (m) 20.74
V (s) 139.34
K (s) 126.04
H (s) 77.25
E (s) 52.21
M (d) 126.68
O (s) 128.63
f1 (ppm)

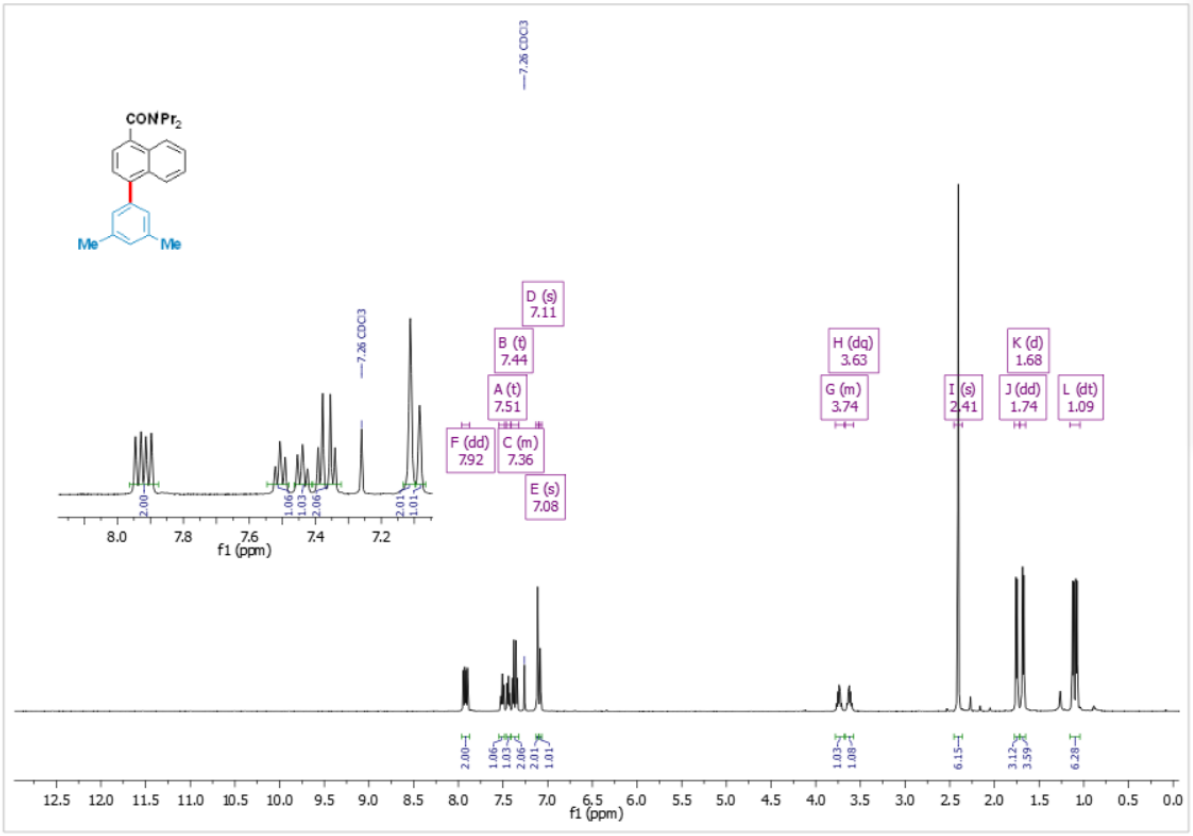

CONiPr2
MeO
OMe
F (d) 7.34
B (d) 7.90
D (t) 7.44
H (s) 6.55
J (dt) 3.74
M (d) 1.67
O (d) 1.09
A (d) 7.97
C (t) 7.51
G (s) 6.64
I (s) 3.84
L (d) 1.75
N (t) 1.12
E (d) 7.41
K (m) 3.63
f1 (ppm)

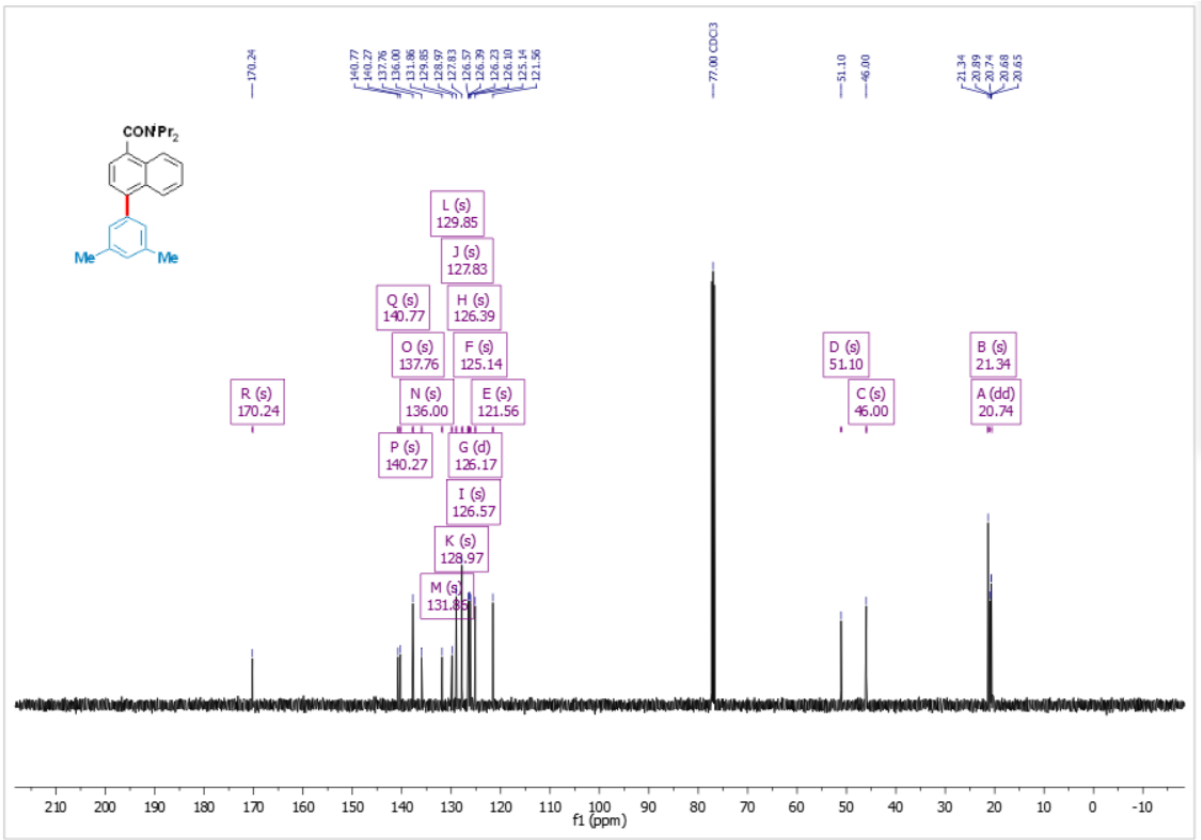

CONPr2
MeO
OMe
170.10
160.56
142.41
140.41
136.36
131.73
129.84
126.51
126.46
126.40
125.95
125.18
121.49
108.19
99.57
77.00 CDCl3
55.44
51.11
46.02
20.92
20.75
20.69
M (s) 131.73
K (m) 126.46
R (s) 170.10
Q (s) 160.56
O (s) 140.41
I (s) 125.18
G (s) 108.19
D (s) 51.11
B (s) 20.92
N (s) 136.36
H (s) 121.49
F (s) 99.57
E (s) 55.44
C (s) 46.02
A (d) 20.72
P (s) 142.41
J (s) 125.95
L (s) 129.84
f1 (ppm)

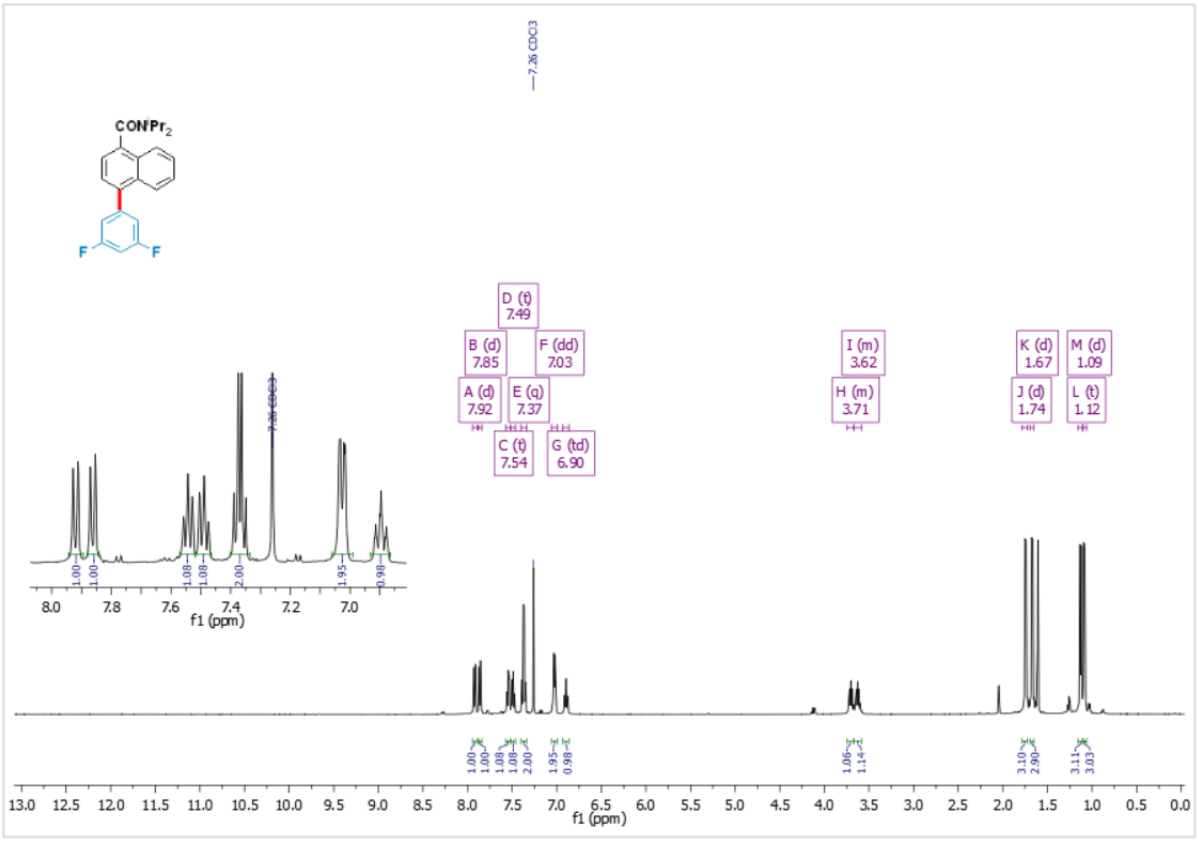

CONPr2
CF3
CF3
7.26 CDCl3
D (m) 7.41
B (t) 7.58
A (d) 7.70
E (m) 7.97
C (t) 7.53
F (ddd) 3.66
J (d) 1.68
H (d) 1.09
I (d) 1.75
G (d) 1.13
4.06
1.00
1.09
1.02
2.00
2.15
3.25
4.80
3.42
3.28
f1 (ppm)

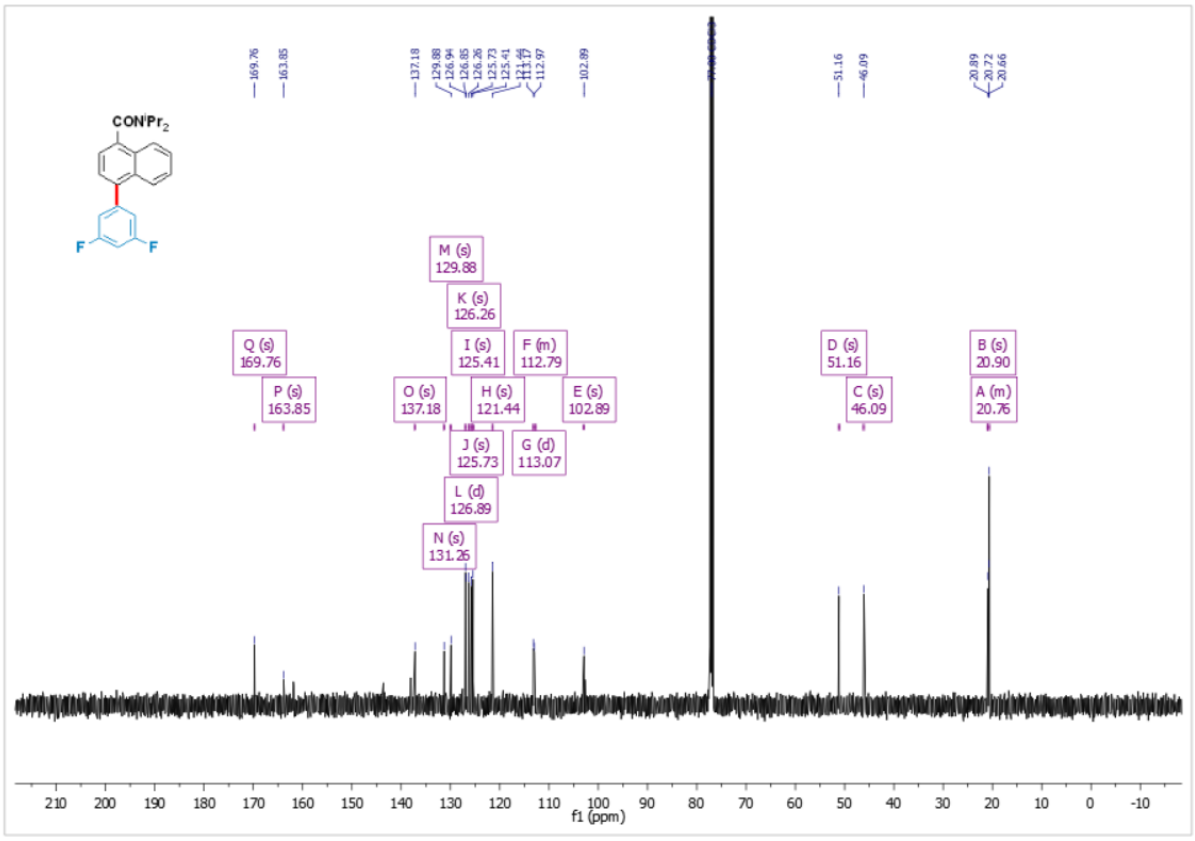

CONPr2
CF3
CF3
169.57
149.56
142.45
137.71
137.11
131.23
130.14
129.93
127.41
127.10
126.83
125.61
125.22
121.50
77.00 CDCl3
51.22
46.15
20.85
20.72
20.64
K (s) 130.14
I (s) 127.41
G (s) 126.83
N (s) 137.71
E (s) 125.22
C (s) 51.22
P (s) 169.57
M (s) 137.11
D (s) 121.50
B (s) 46.15
A (m) 20.74
O (s) 142.45
F (s) 125.61
H (s) 127.10
J (s) 129.93
L (s) 131.23
f1 (ppm)

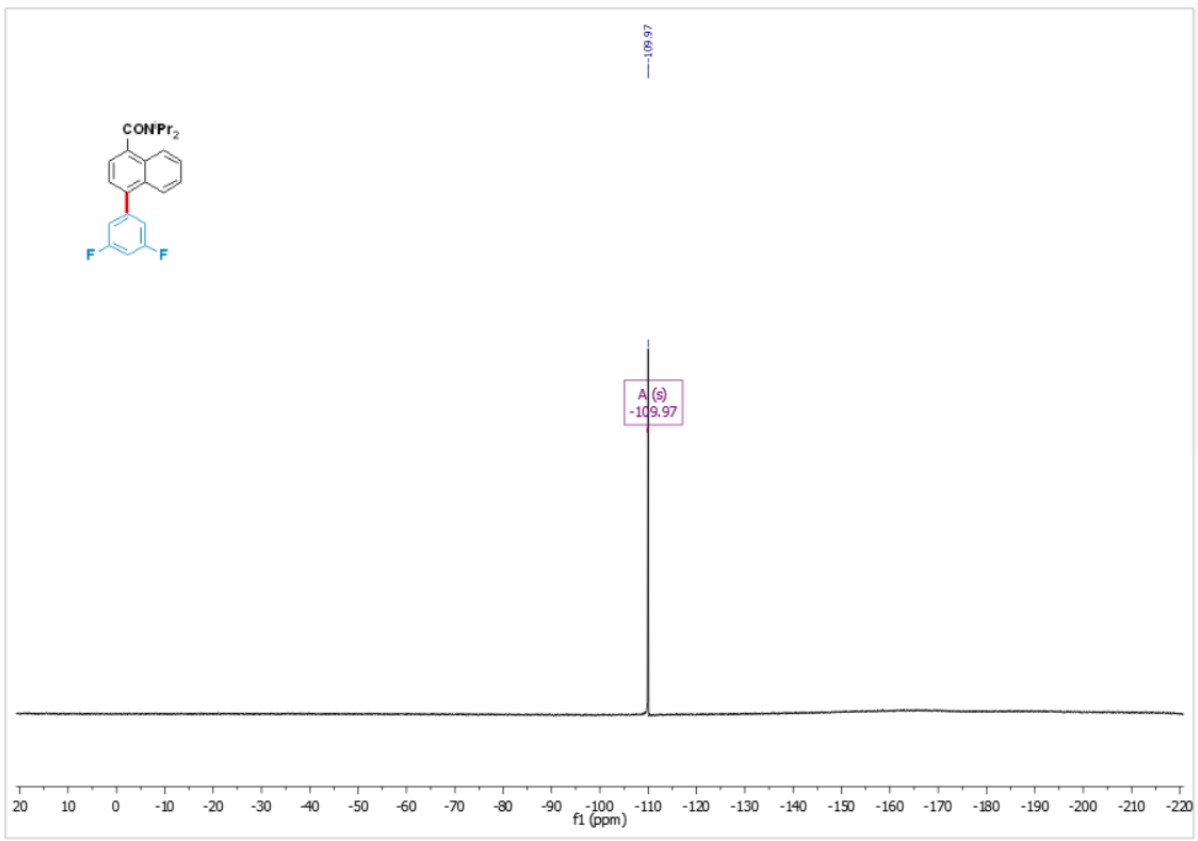

CONPr2
CF3
CF3
-62.69
A (s) -62.69
A (s) -62.69
f1 (ppm)

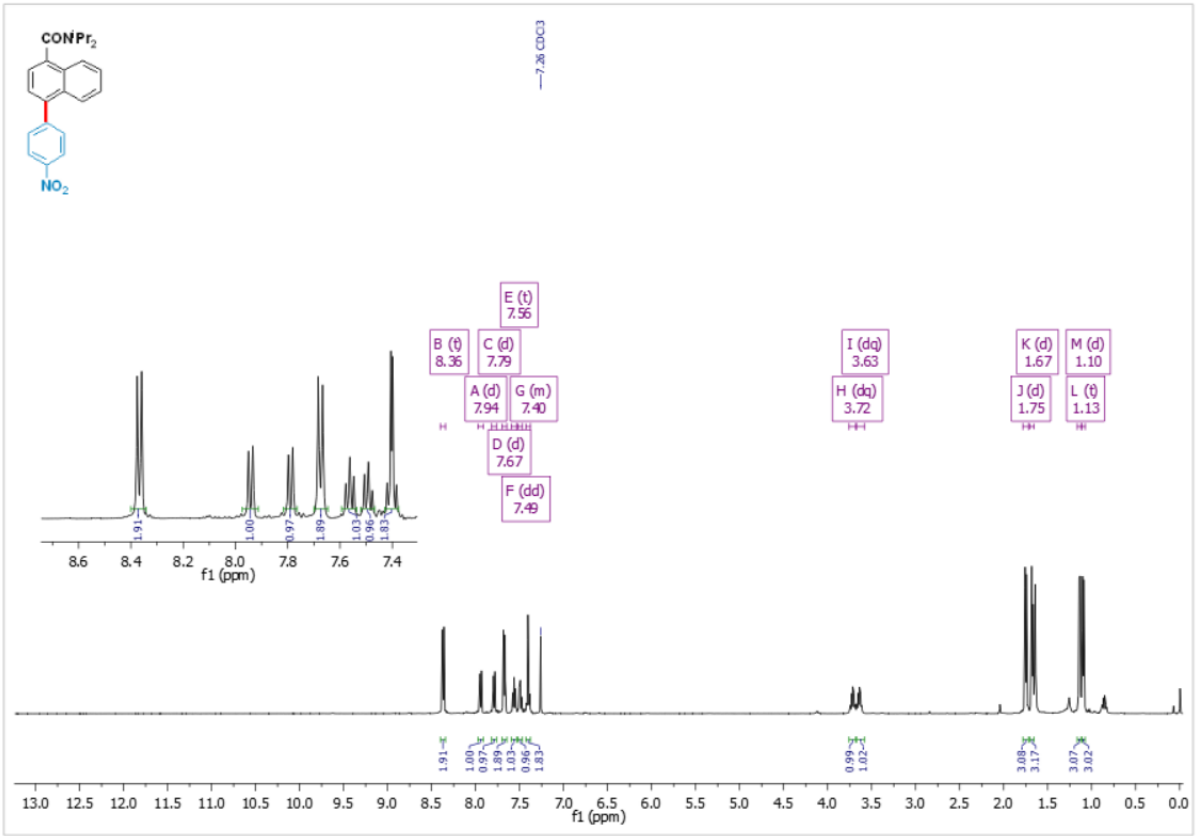

CONPr2
Me
Me
7.26 CDCl3
D (s) 7.11
B (t) 7.44
A (t) 7.51
F (dd) 7.92
C (m) 7.36
E (s) 7.08
H (dq) 3.63
G (m) 3.74
I (s) 2.41
K (d) 1.68
J (dd) 1.74
L (dt) 1.09
f1 (ppm)

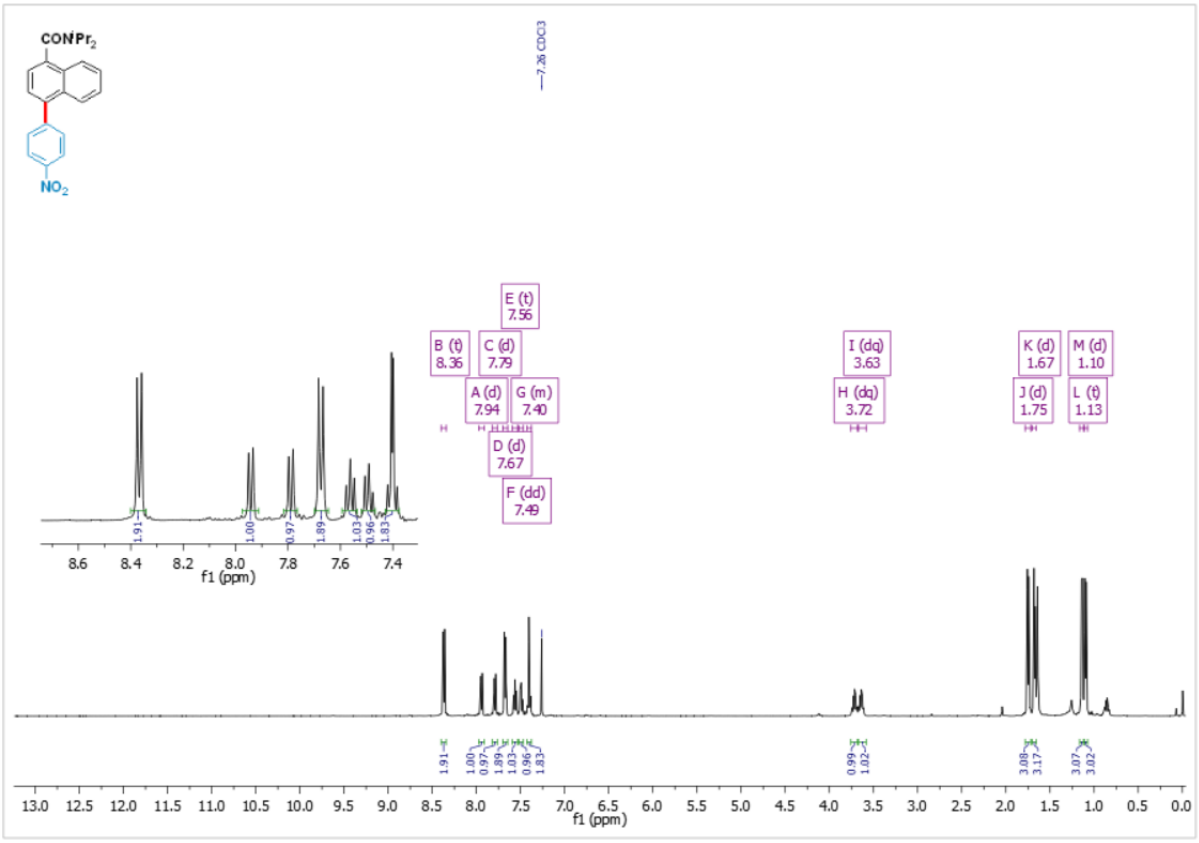

CONPr2
Me
Me
77.00 CDCl3
L (s) 129.85
J (s) 127.83
Q (s) 140.77
H (s) 126.39
O (s) 137.76
F (s) 125.14
R (s) 170.24
N (s) 136.00
E (s) 121.56
P (s) 140.27
G (d) 126.17
I (s) 126.57
K (s) 128.97
D (s) 51.10
C (s) 46.00
B (s) 21.34
A (dd) 20.74
f1 (ppm)

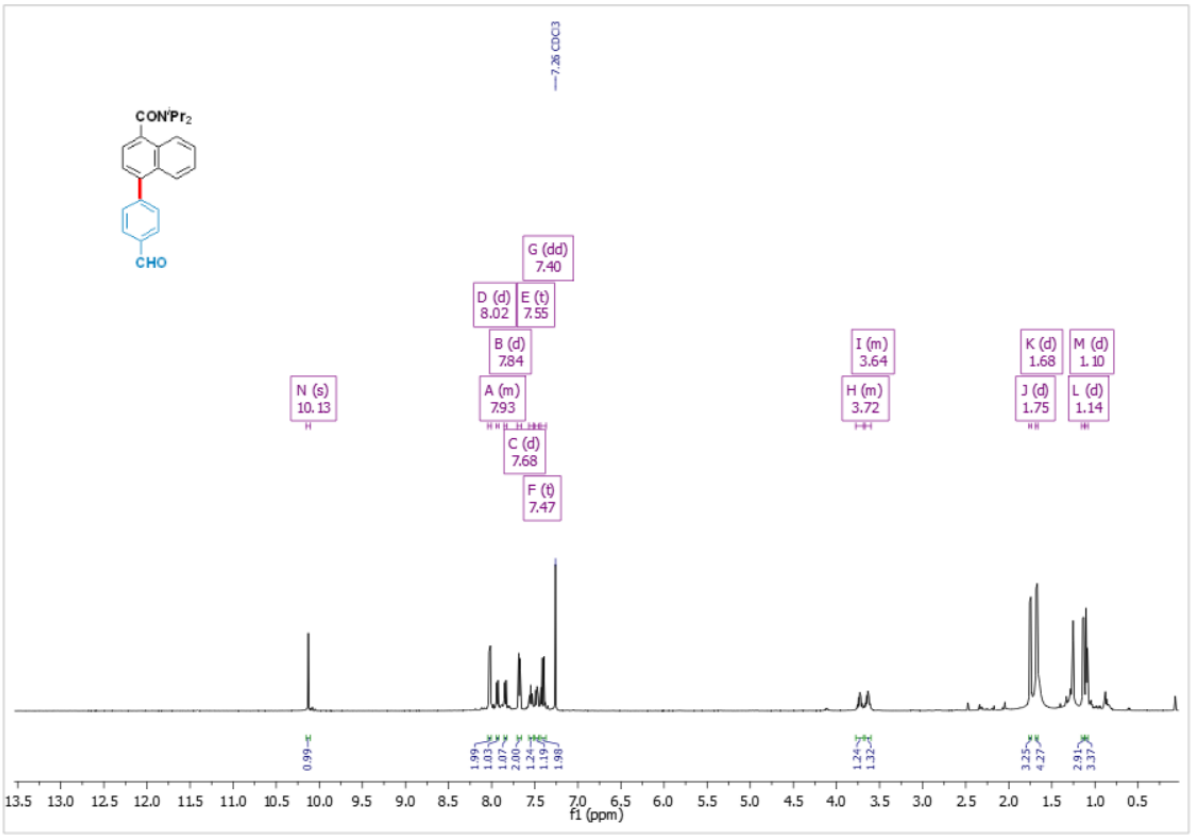

CONiPr2
F
F
7.26 CDCl3
D (t) 7.49
B (d) 7.85
F (dd) 7.03
A (d) 7.92
E (q) 7.37
C (t) 7.54
G (td) 6.90
I (m) 3.62
H (m) 3.71
K (d) 1.67
M (d) 1.09
J (d) 1.74
L (t) 1.12
f1 (ppm)

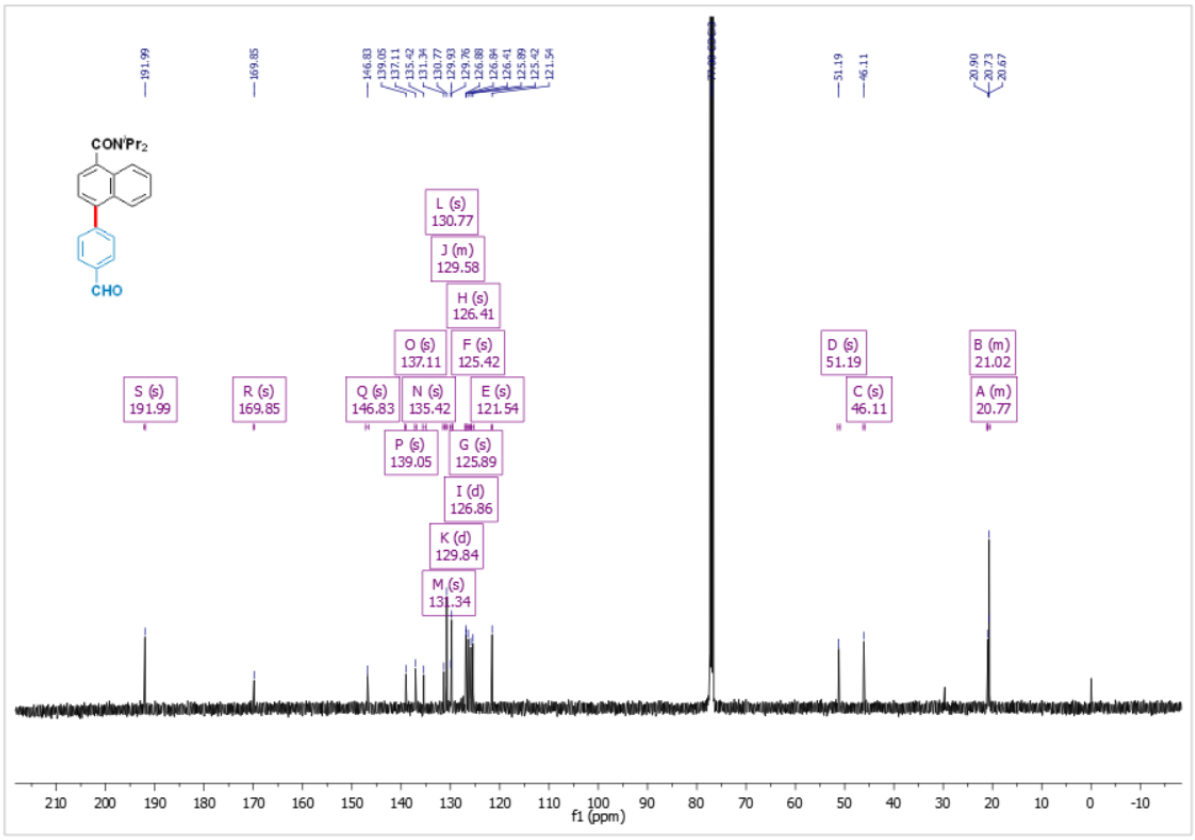

CONiPr2
F
F
M (s) 129.88
K (s) 126.26
Q (s) 169.76
I (s) 125.41
F (m) 112.79
D (s) 51.16
B (s) 20.90
P (s) 163.85
O (s) 137.18
H (s) 121.44
E (s) 102.89
C (s) 46.09
A (m) 20.76
J (s) 125.73
G (d) 113.07
L (d) 126.89
N (s) 131.26
f1 (ppm)

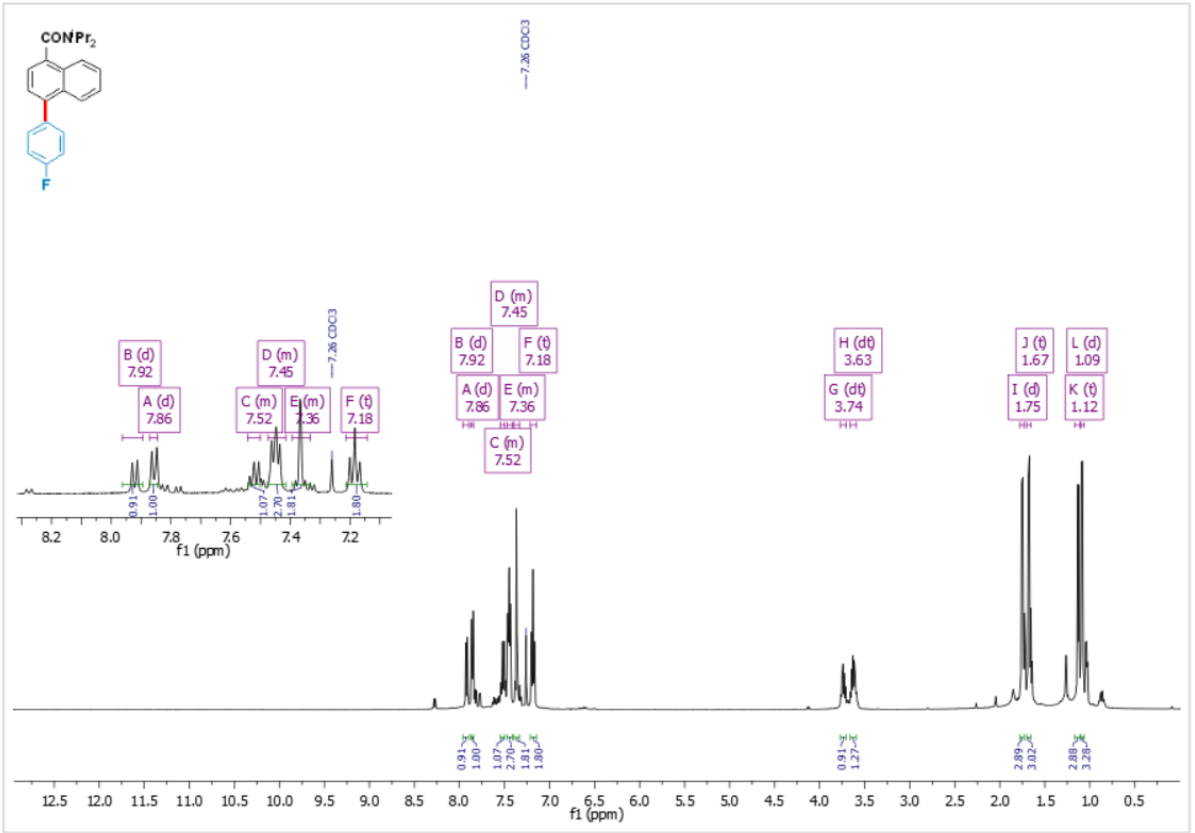

CONPr2
F
F
-109.97
A (s)
-109.97
f1 (ppm)

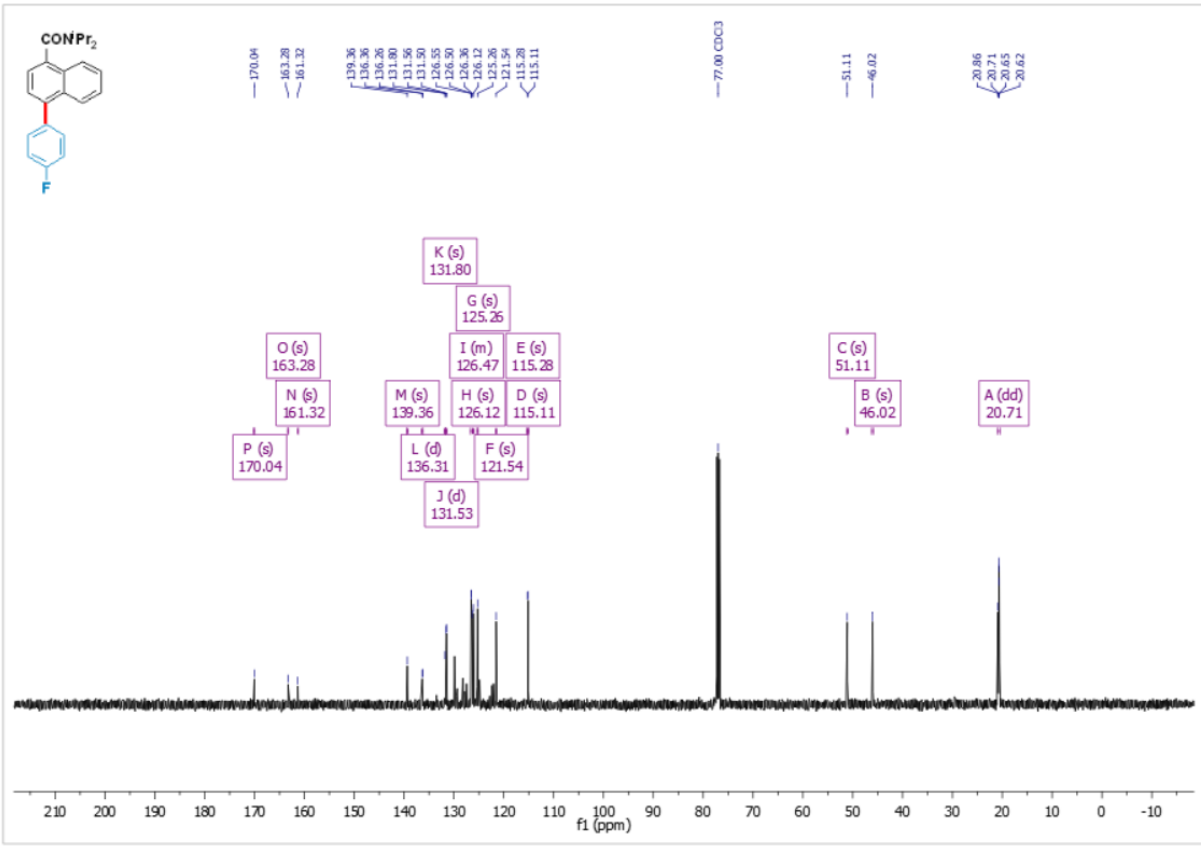

CONPr2
NO2
7.26 CDCl3
E (t) 7.56
B (t) 8.36
C (d) 7.79
A (d) 7.94
G (m) 7.40
D (d) 7.67
F (dd) 7.49
I (dq) 3.63
H (dq) 3.72
K (d) 1.67
M (d) 1.10
J (d) 1.75
L (t) 1.13
f1 (ppm)

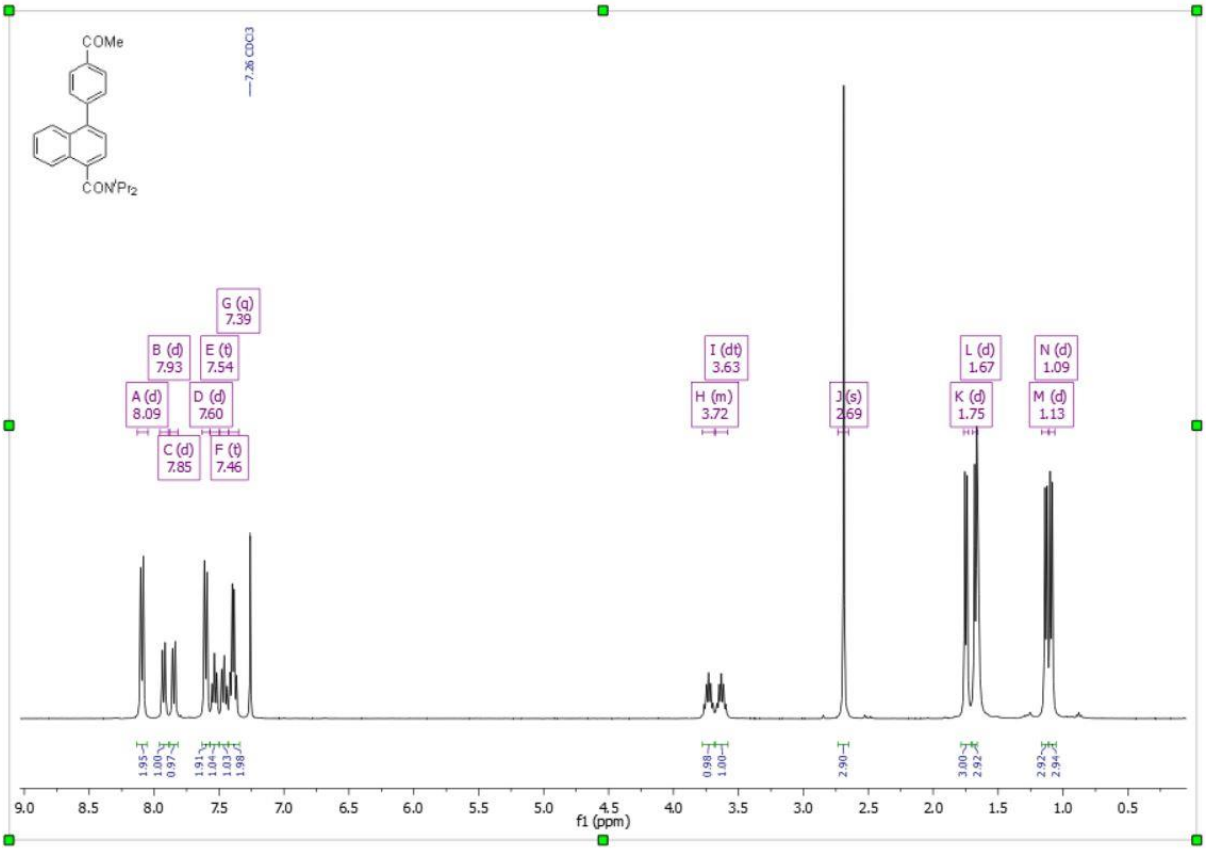

CONiPr2
NO2
7.26 CDCl3
E (t) 7.56
B (t) 8.36
C (d) 7.79
A (d) 7.94
G (m) 7.40
D (d) 7.67
F (dd) 7.49
I (dq) 3.63
H (dq) 3.72
K (d) 1.67
J (d) 1.75
M (d) 1.10
L (t) 1.13
f1 (ppm)

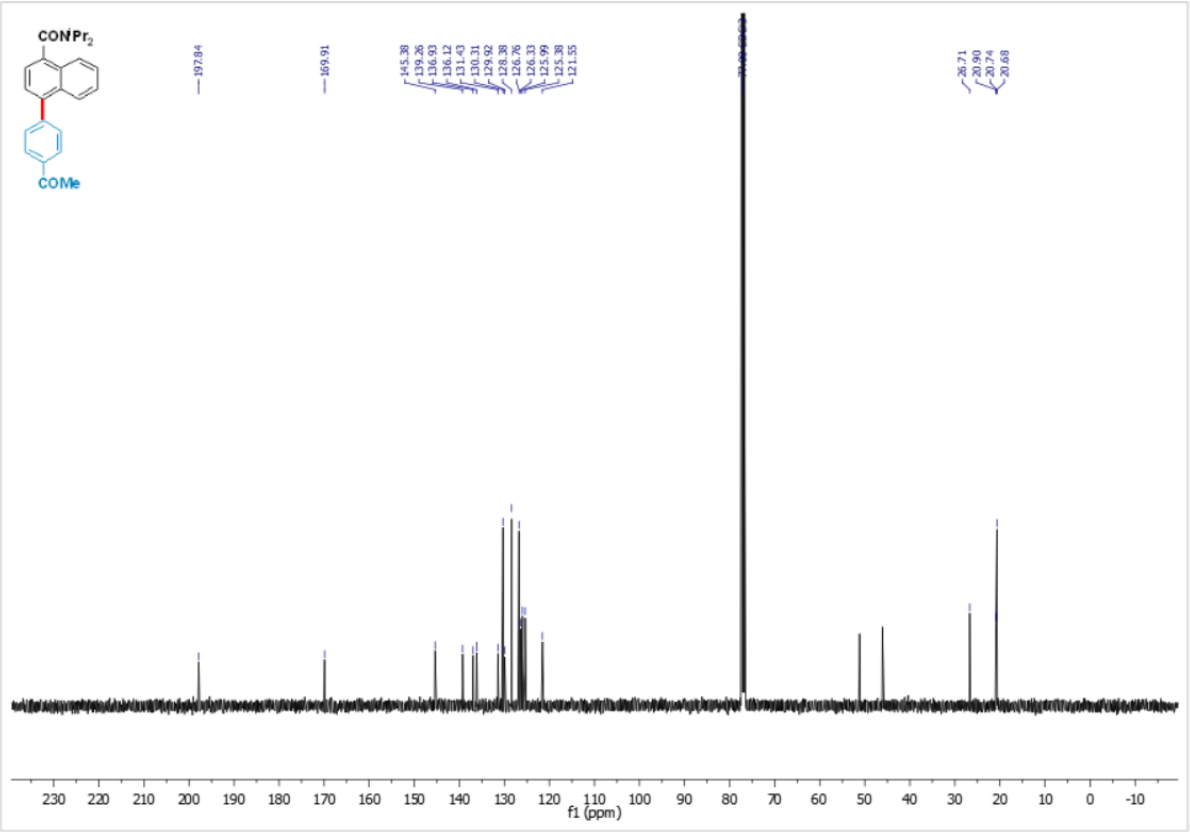

CONiPr2
CHO
7.26 CDCl3
G (dd) 7.40
D (d) 8.02
E (t) 7.55
B (d) 7.84
A (m) 7.93
C (d) 7.68
F (t) 7.47
N (s) 10.13
I (m) 3.64
H (m) 3.72
K (d) 1.68
J (d) 1.75
M (d) 1.10
L (d) 1.14
f1 (ppm)


CONiPr2
CHO
S (s) 191.99
R (s) 169.85
Q (s) 146.83
N (s) 135.42
E (s) 121.54
P (s) 139.05
G (s) 125.89
I (d) 126.86
K (d) 129.84
M (s) 131.34
O (s) 137.11
F (s) 125.42
L (s) 130.77
J (m) 129.58
H (s) 126.41
D (s) 51.19
C (s) 46.11
B (m) 21.02
A (m) 20.77
f1 (ppm)


CONiPr2
F
7.26 CDCl3
B (d) 7.92
A (d) 7.86
D (m) 7.45
C (m) 7.52
E (m) 7.36
F (t) 7.18
H (dt) 3.63
G (dt) 3.74
J (t) 1.67
I (d) 1.75
L (d) 1.09
K (t) 1.12
f1 (ppm)


CONPr2
F
170.04
163.28
161.32
139.36
136.36
136.26
131.80
131.56
131.50
126.55
126.50
126.36
126.12
125.26
121.54
115.28
115.11
77.00 CDCl3
51.11
46.02
20.86
20.71
20.65
20.62
K (s) 131.80
G (s) 125.26
O (s) 163.28
I (m) 126.47
E (s) 115.28
C (s) 51.11
N (s) 161.32
M (s) 139.36
H (s) 126.12
D (s) 115.11
B (s) 46.02
A (dd) 20.71
P (s) 170.04
L (d) 136.31
F (s) 121.54
J (d) 131.53
f1 (ppm)


COMe
CONPr2
7.26 CDCl3
G (q) 7.39
B (d) 7.93
E (t) 7.54
A (d) 8.09
D (d) 7.60
C (d) 7.85
F (t) 7.46
I (dt) 3.63
H (m) 3.72
J (s) 2.69
L (d) 1.67
N (d) 1.09
K (d) 1.75
M (d) 1.13
1.95
1.00
0.97
1.91
1.04
1.03
1.98
0.98
1.00
2.90
3.00
2.92
2.92
2.94
f1 (ppm)


CONiPr2
COMe
197.84
169.91
145.38
139.26
136.93
136.12
131.43
130.31
129.92
128.38
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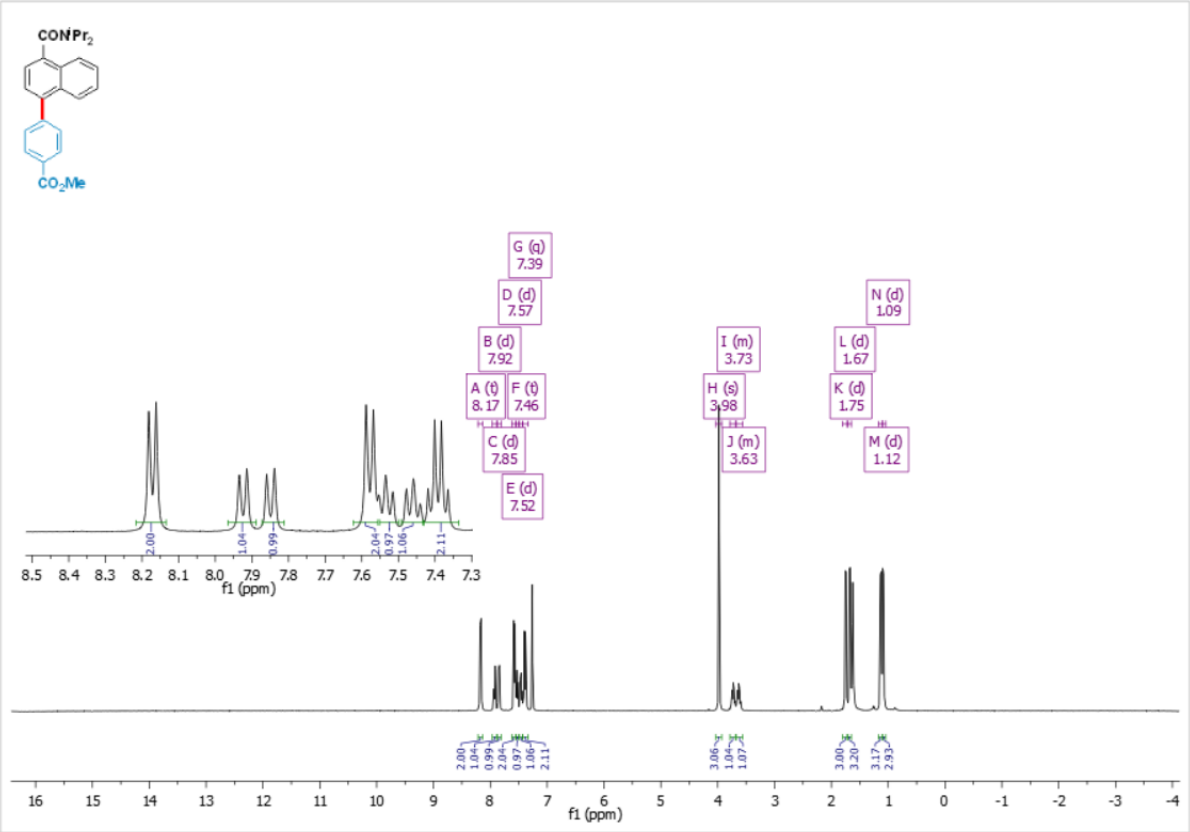
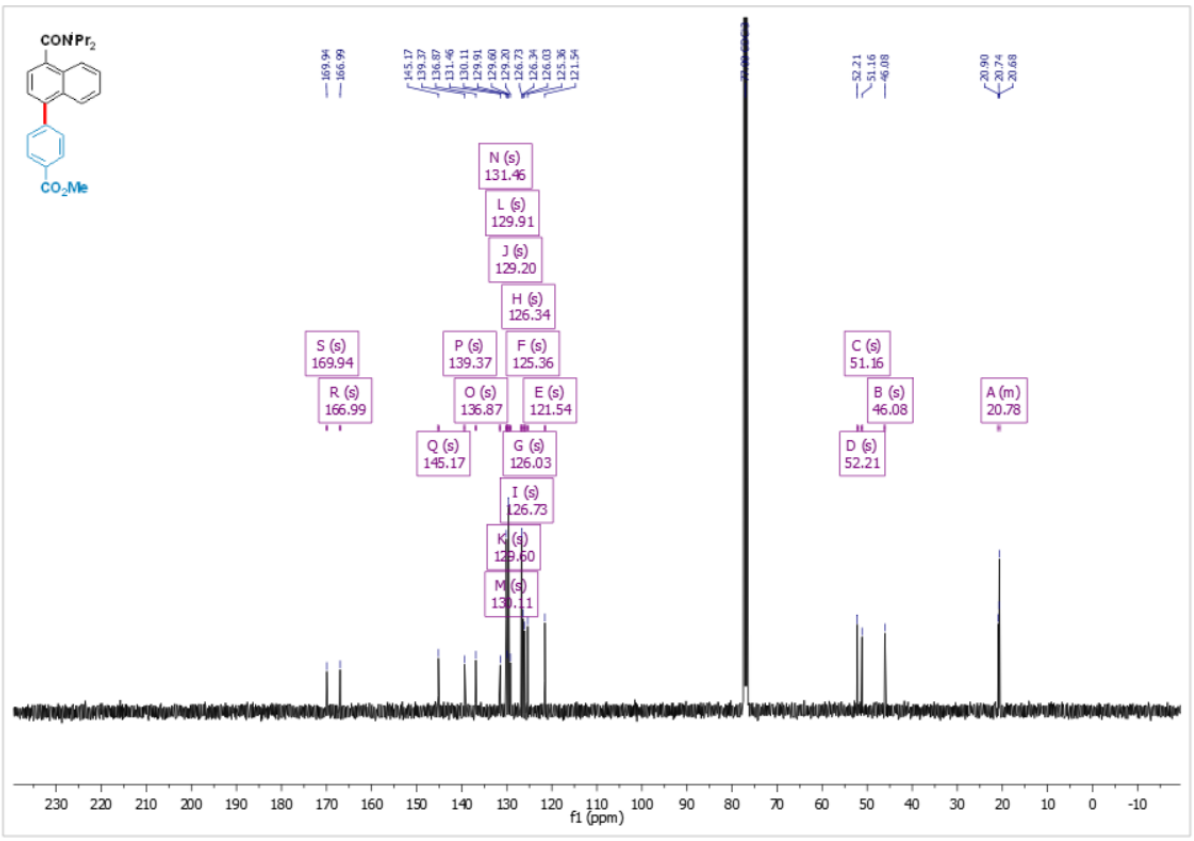
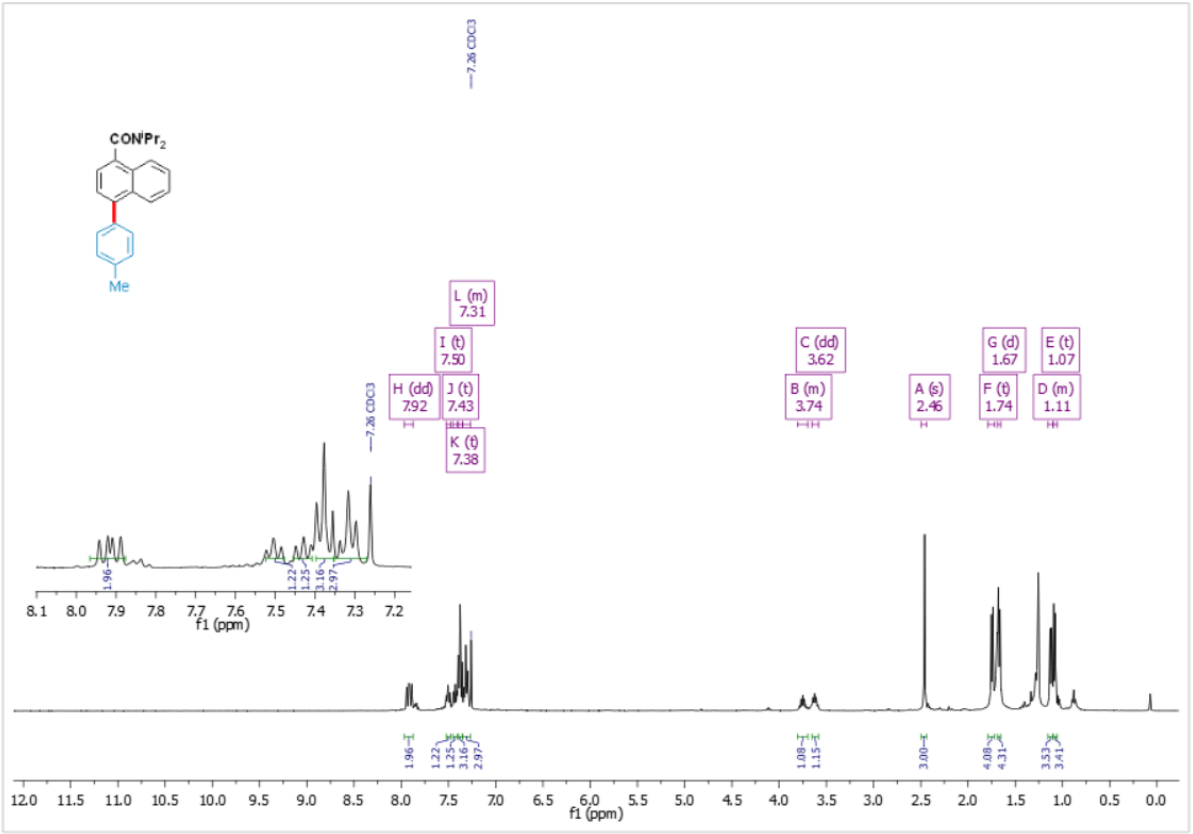
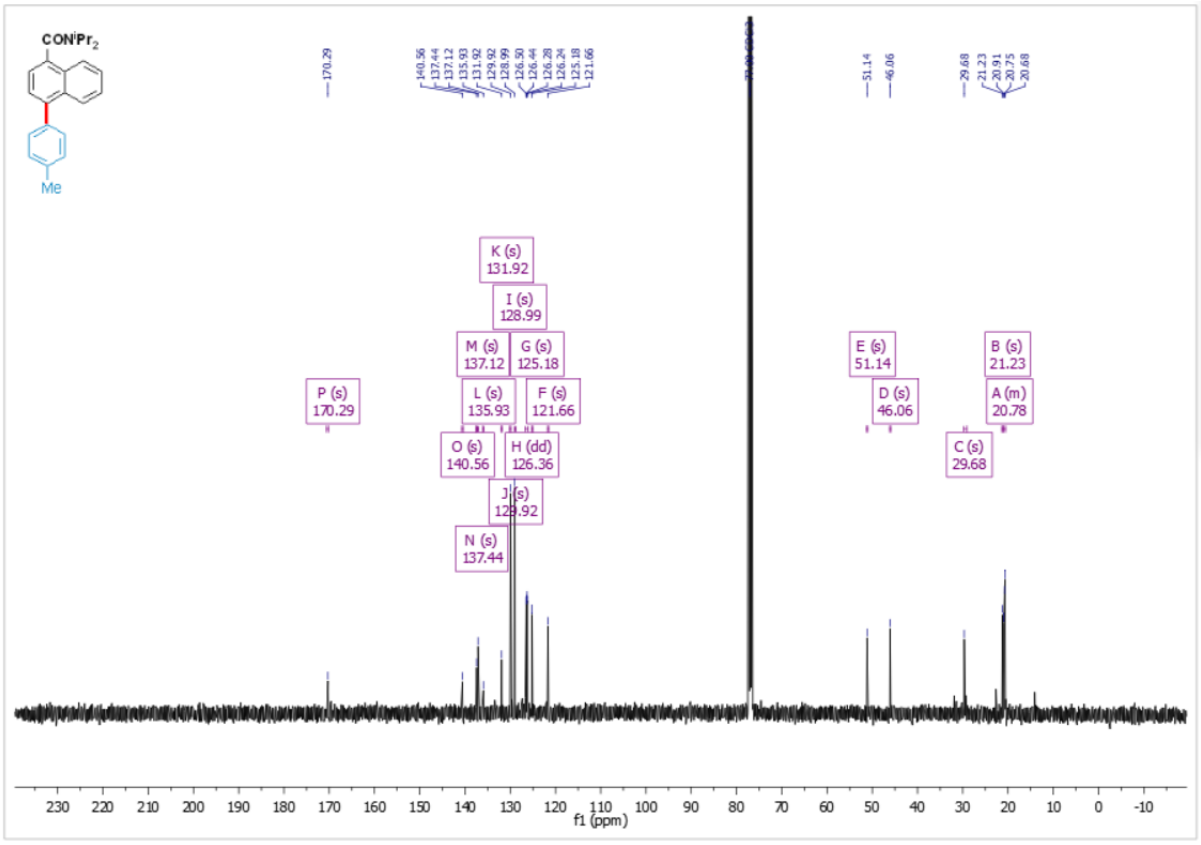
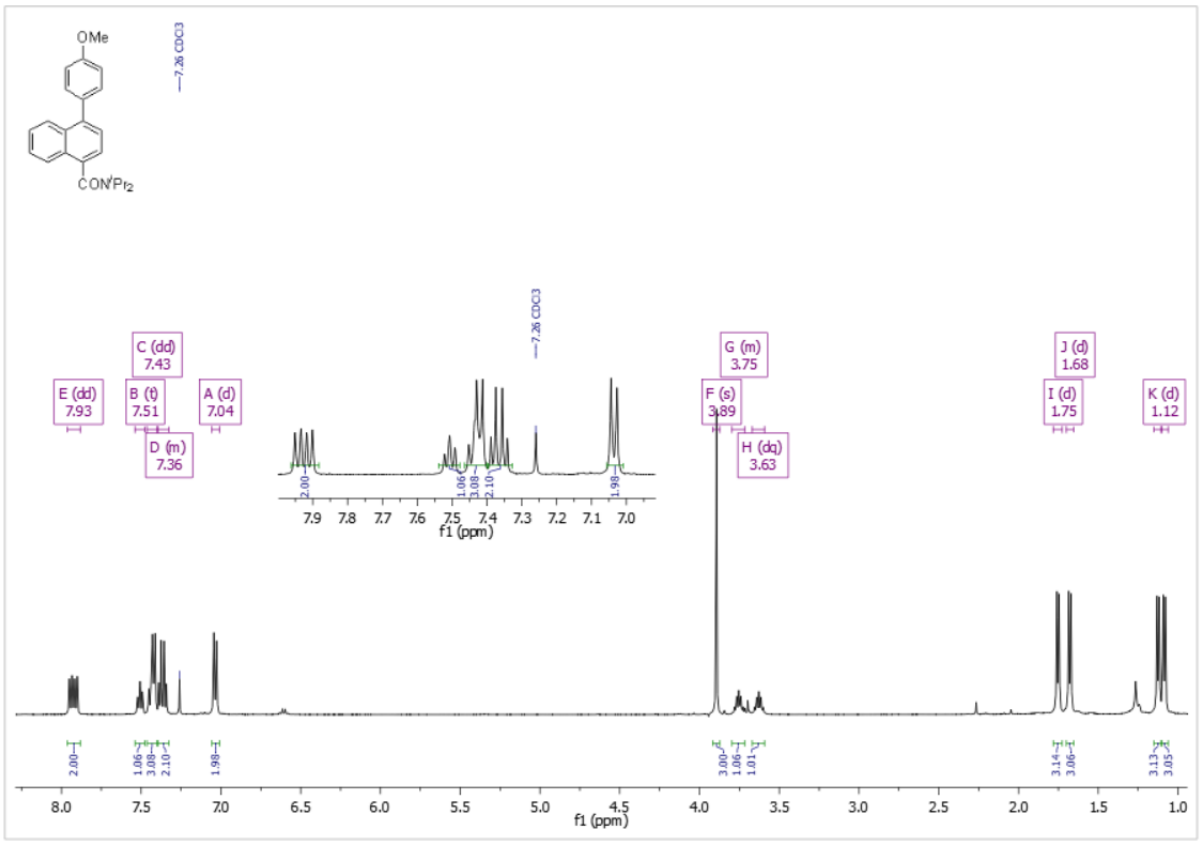
126.33
125.99
125.38
121.55
26.71
20.90
20.74
20.68
f1 (ppm)

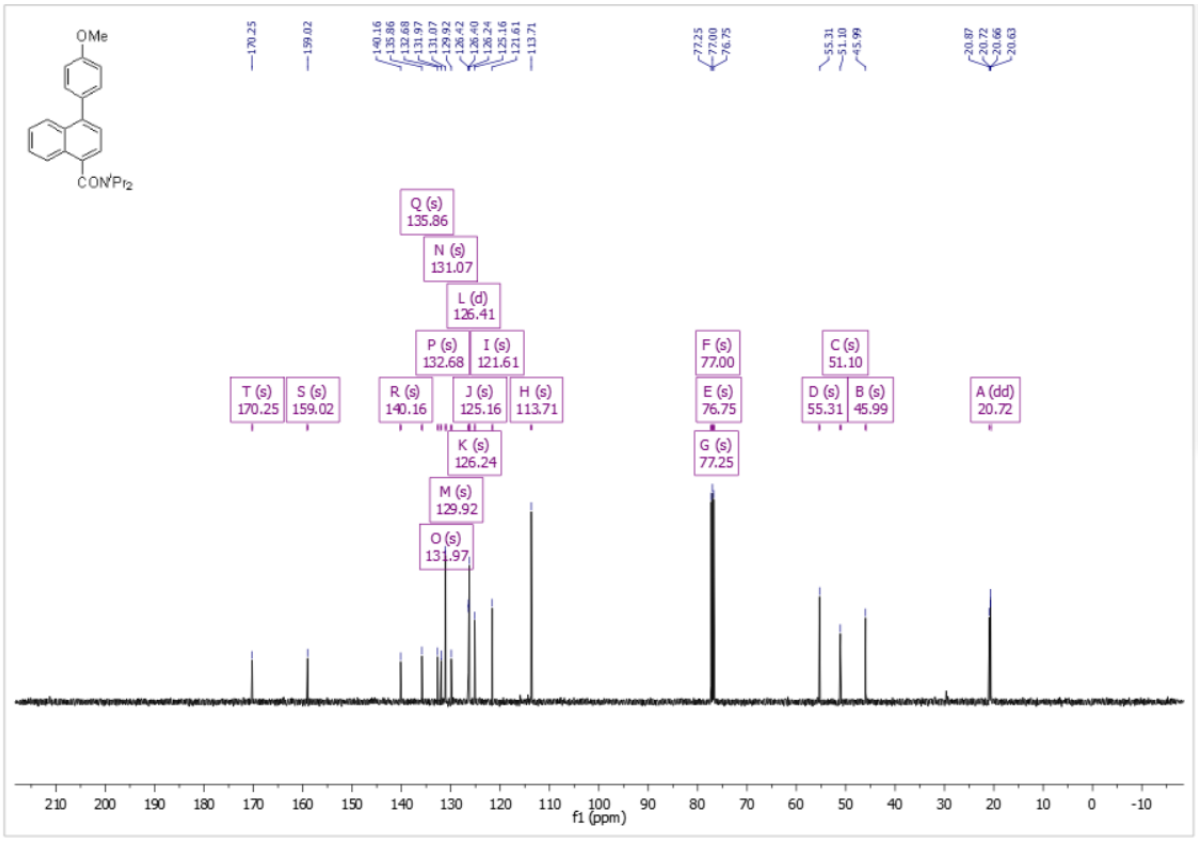

CONiPr2
CO2Me
G (q) 7.39
D (d) 7.57
B (d) 7.92
A (t) 8.17
F (t) 7.46
C (d) 7.85
E (d) 7.52
I (m) 3.73
H (s) 3.98
J (m) 3.63
N (d) 1.09
L (d) 1.67
K (d) 1.75
M (d) 1.12
f1 (ppm)

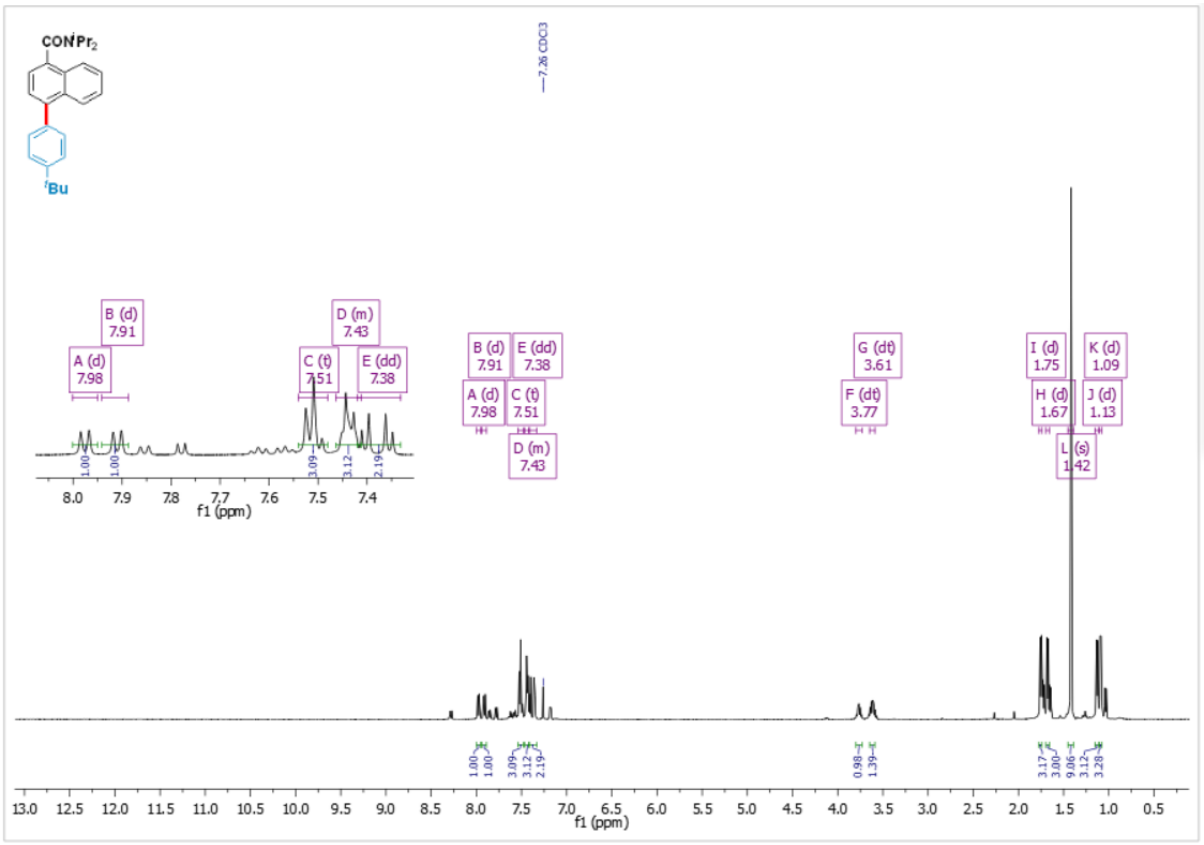

CONiPr2
CO2Me
N (s) 131.46
L (s) 129.91
J (s) 129.20
H (s) 126.34
S (s) 169.94
P (s) 139.37
F (s) 125.36
C (s) 51.16
R (s) 166.99
O (s) 136.87
E (s) 121.54
B (s) 46.08
A (m) 20.78
Q (s) 145.17
G (s) 126.03
D (s) 52.21
I (s) 126.73
K (s) 129.60
M (s) 130.11
f1 (ppm)

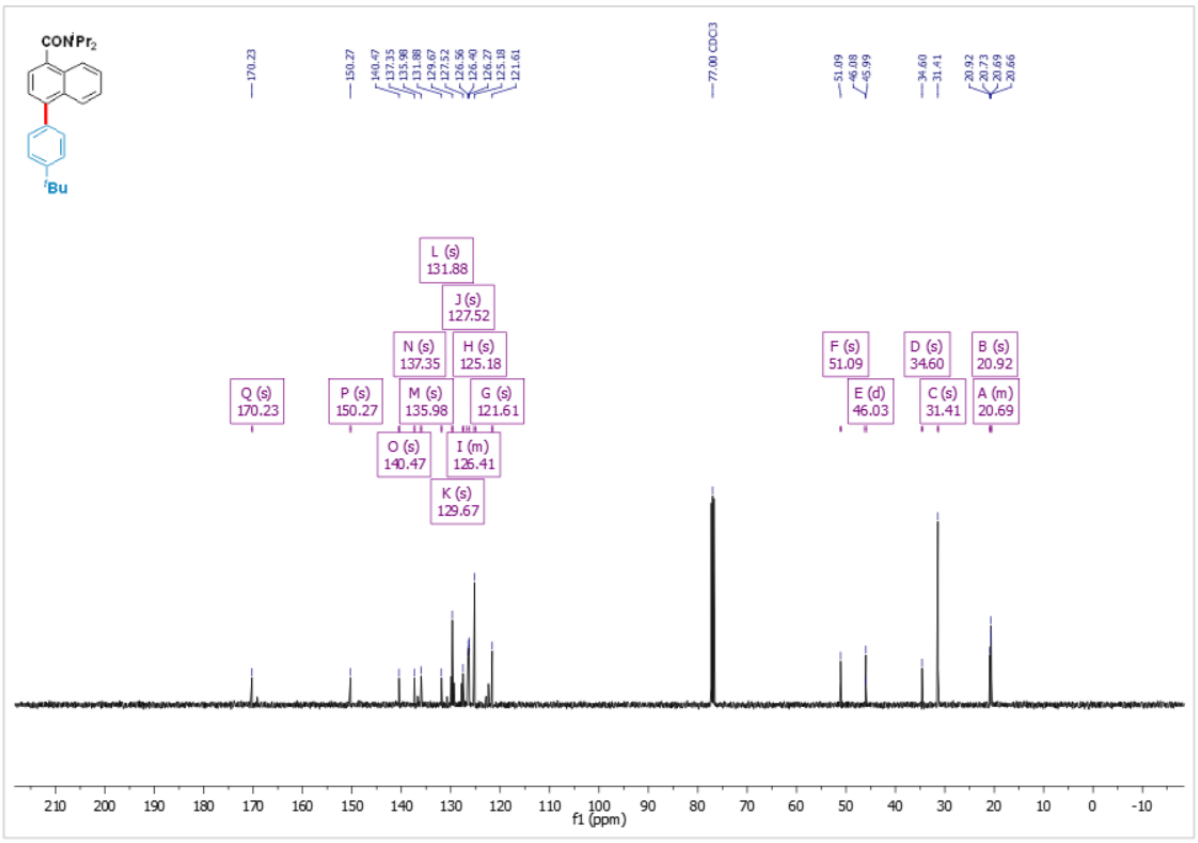

7.26 CDCl3
CONiPr2
Me
L (m) 7.31
I (t) 7.50
H (dd) 7.92
J (t) 7.43
K (t) 7.38
C (dd) 3.62
B (m) 3.74
A (s) 2.46
G (d) 1.67
E (t) 1.07
F (t) 1.74
D (m) 1.11
f1 (ppm)

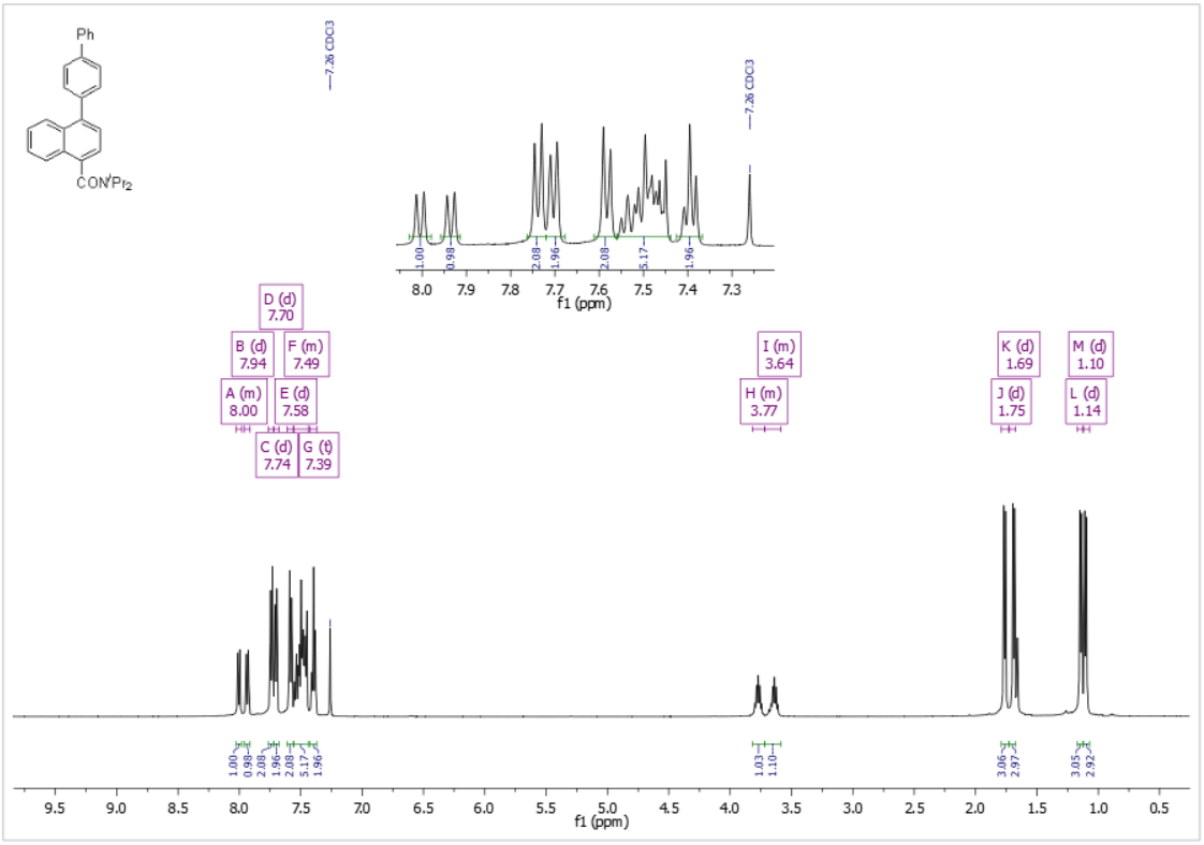

CONiPr2
Me
170.29
140.56
137.44
137.12
135.93
131.92
129.92
128.99
126.50
126.44
126.28
126.24
125.18
121.66
51.14
46.06
29.68
21.23
20.91
20.75
20.68
K (s) 131.92
I (s) 128.99
M (s) 137.12
G (s) 125.18
P (s) 170.29
L (s) 135.93
F (s) 121.66
O (s) 140.56
H (dd) 126.36
J (s) 129.92
N (s) 137.44
E (s) 51.14
D (s) 46.06
B (s) 21.23
A (m) 20.78
C (s) 29.68
f1 (ppm)

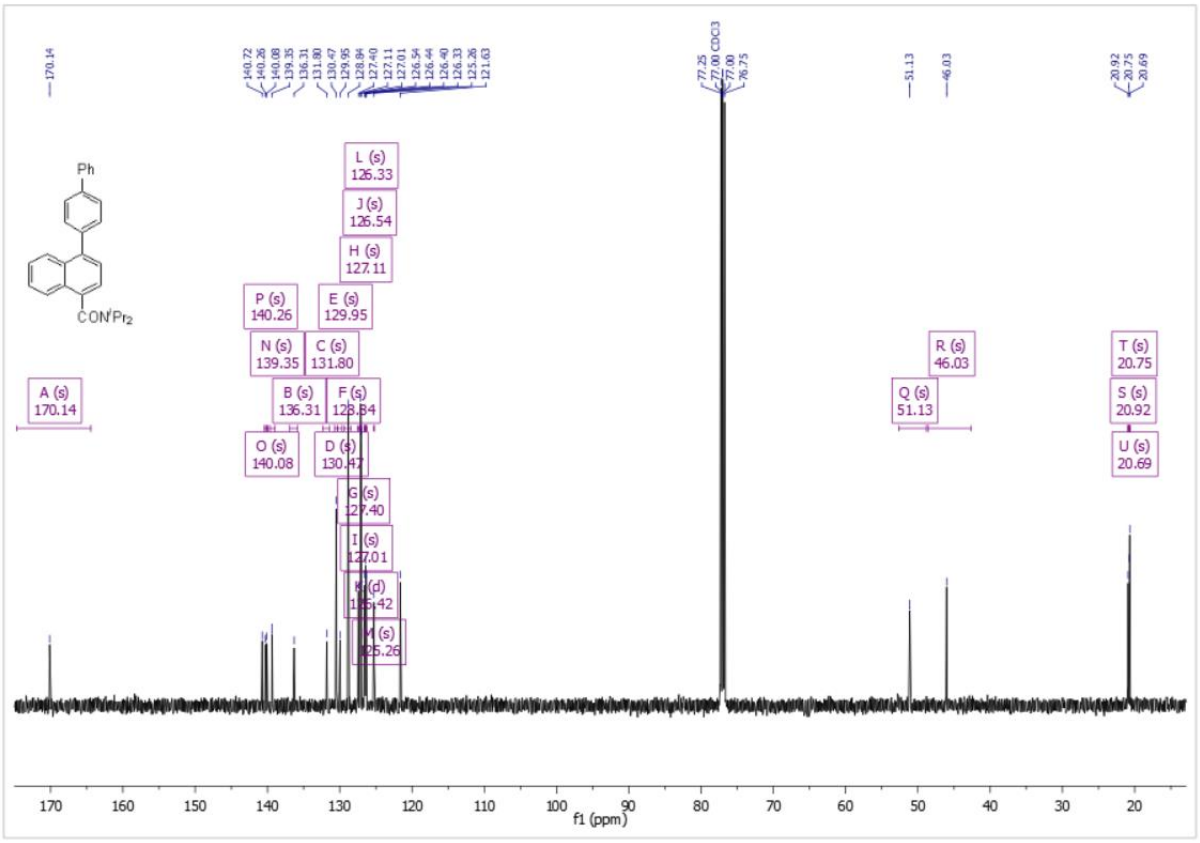

OMe
CONiPr2
7.26 CDCl3
E (dd) 7.93
C (dd) 7.43
B (t) 7.51
A (d) 7.04
D (m) 7.36
G (m) 3.75
F (s) 3.89
H (dq) 3.63
J (d) 1.68
I (d) 1.75
K (d) 1.12
f1 (ppm)

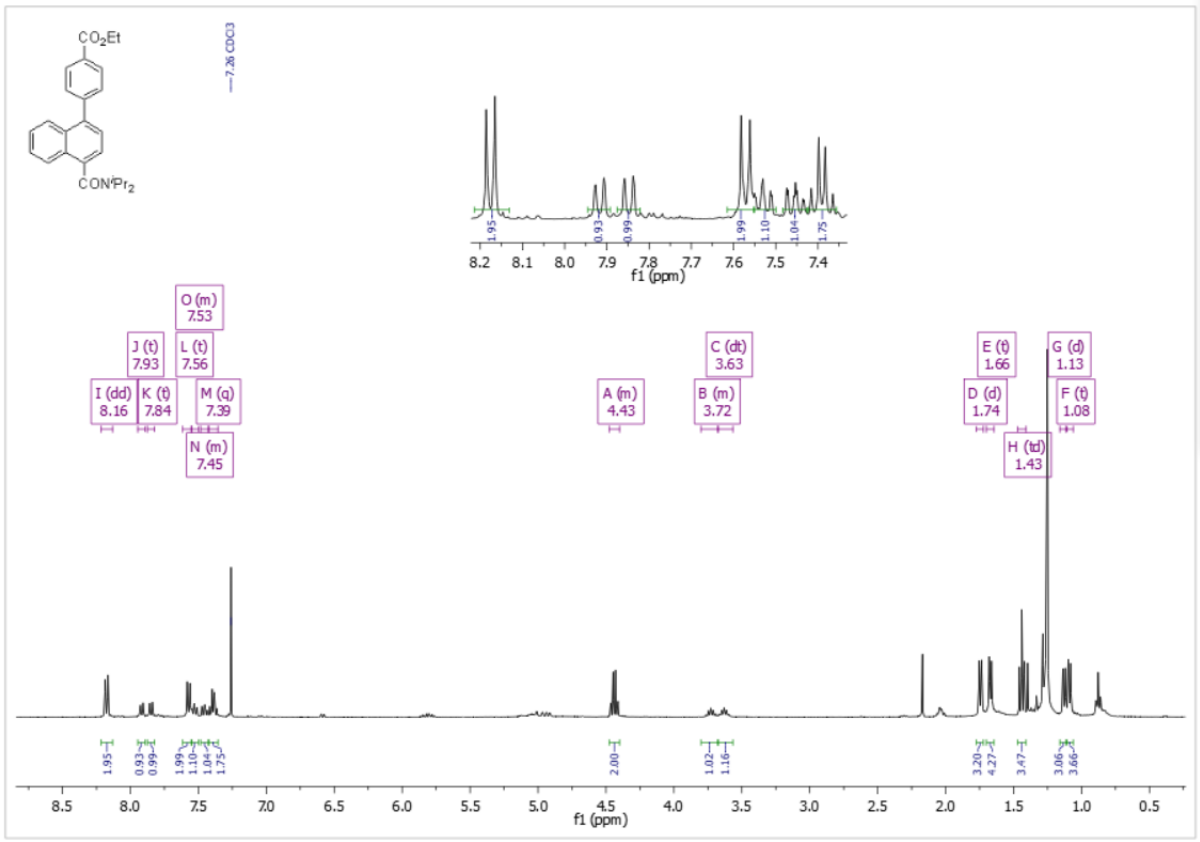

OMe
CONiPr2
Q (s) 135.86
N (s) 131.07
L (d) 126.41
P (s) 132.68
I (s) 121.61
F (s) 77.00
C (s) 51.10
T (s) 170.25
S (s) 159.02
R (s) 140.16
J (s) 125.16
H (s) 113.71
E (s) 76.75
D (s) 55.31
B (s) 45.99
A (dd) 20.72
K (s) 126.24
G (s) 77.25
M (s) 129.92
O (s) 131.97
f1 (ppm)

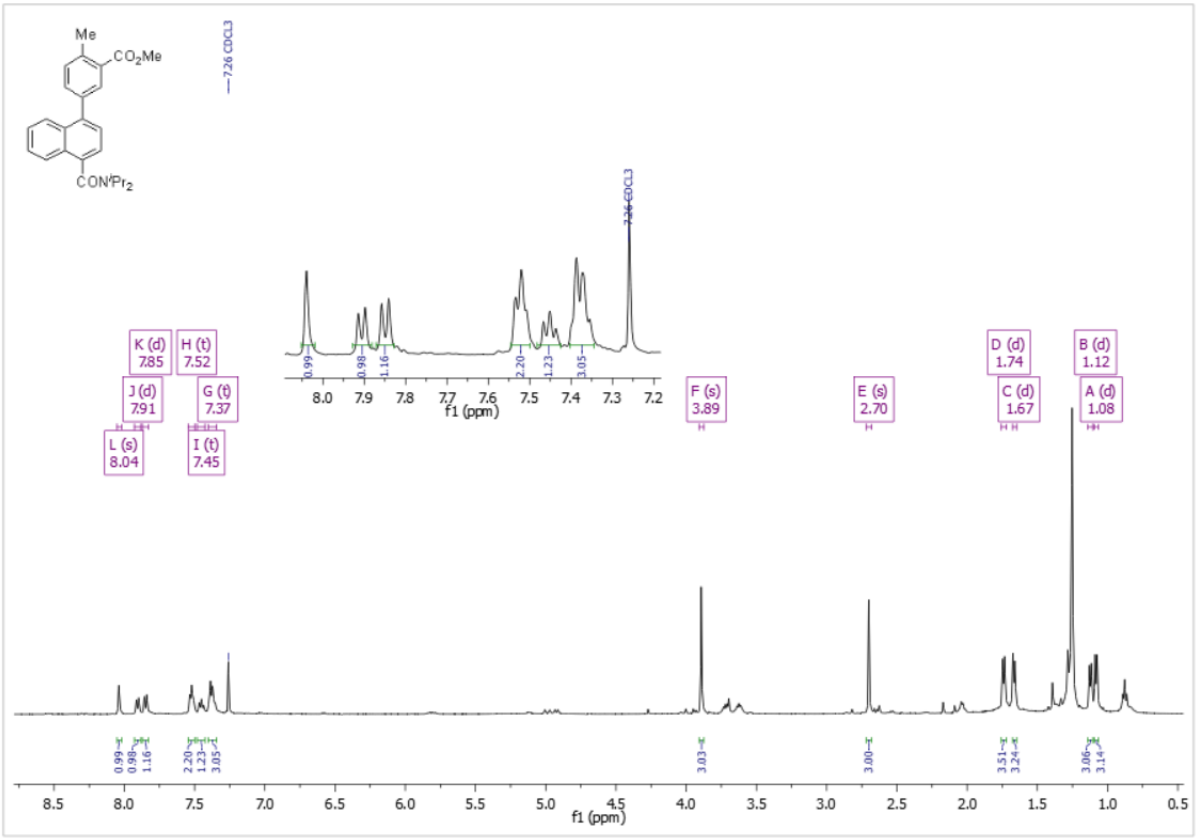

CONiPr2
tBu
7.26 CDCl3
B (d) 7.91
A (d) 7.98
D (m) 7.43
C (t) 7.51
E (dd) 7.38
G (dt) 3.61
F (dt) 3.77
I (d) 1.75
K (d) 1.09
H (d) 1.67
J (d) 1.13
L (s) 1.42
f1 (ppm)

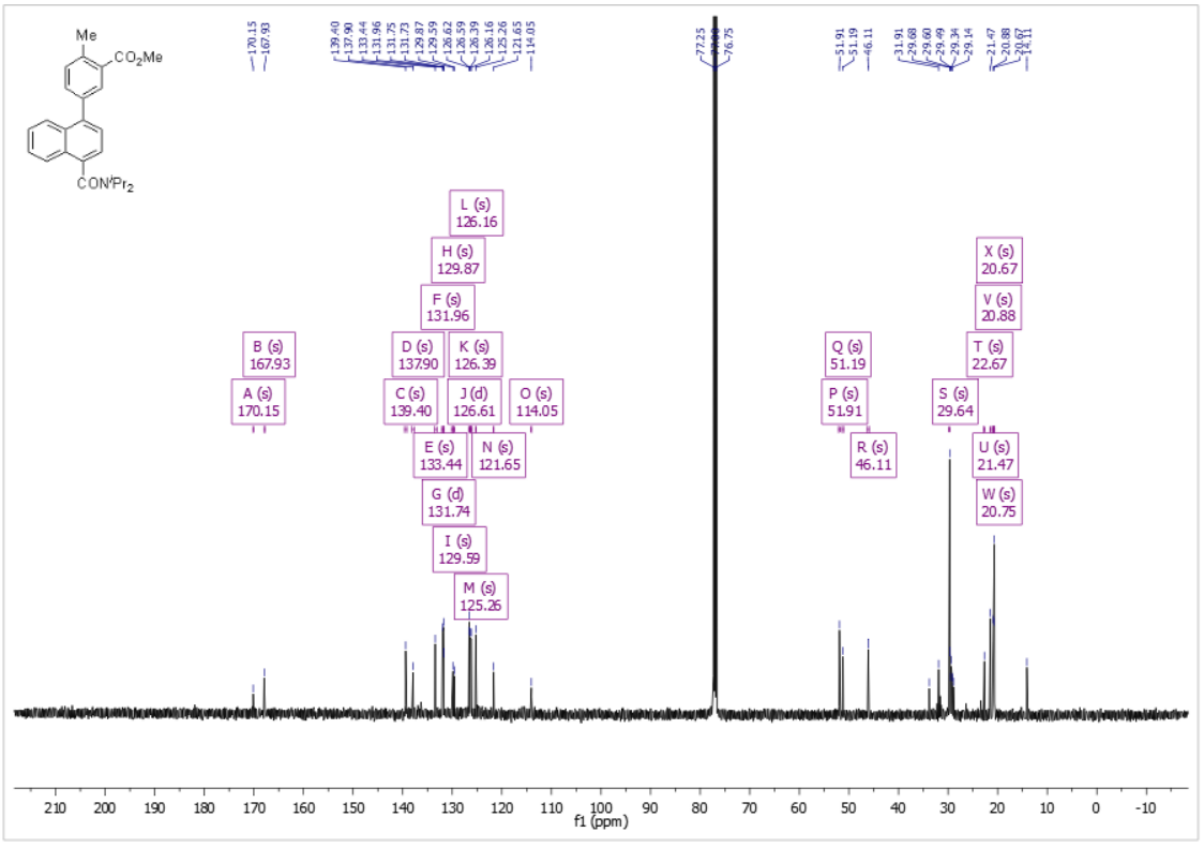

CONiPr2
tBu
170.23
150.27
140.47
137.35
135.98
131.88
129.67
127.52
126.56
126.40
126.27
125.18
121.61
77.00 CDCl3
51.09
46.08
45.99
34.60
31.41
20.92
20.73
20.69
20.66
L (s) 131.88
J (s) 127.52
N (s) 137.35
H (s) 125.18
Q (s) 170.23
P (s) 150.27
M (s) 135.98
G (s) 121.61
O (s) 140.47
I (m) 126.41
K (s) 129.67
F (s) 51.09
D (s) 34.60
B (s) 20.92
E (d) 46.03
C (s) 31.41
A (m) 20.69
f1 (ppm)

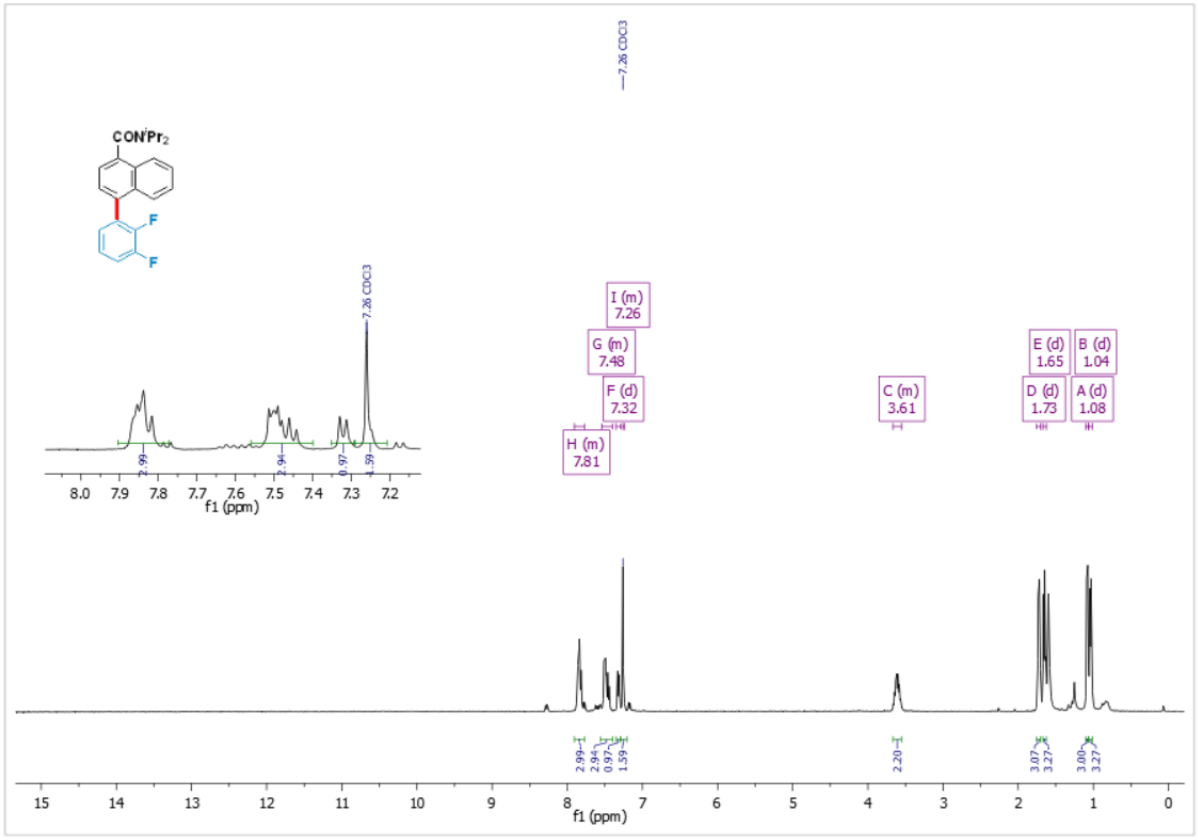

Ph
CONiPr2
7.26 CDCl3
7.26 CDCl3
D (d) 7.70
B (d) 7.94
F (m) 7.49
A (m) 8.00
E (d) 7.58
C (d) 7.74
G (t) 7.39
I (m) 3.64
H (m) 3.77
K (d) 1.69
J (d) 1.75
M (d) 1.10
L (d) 1.14
f1 (ppm)

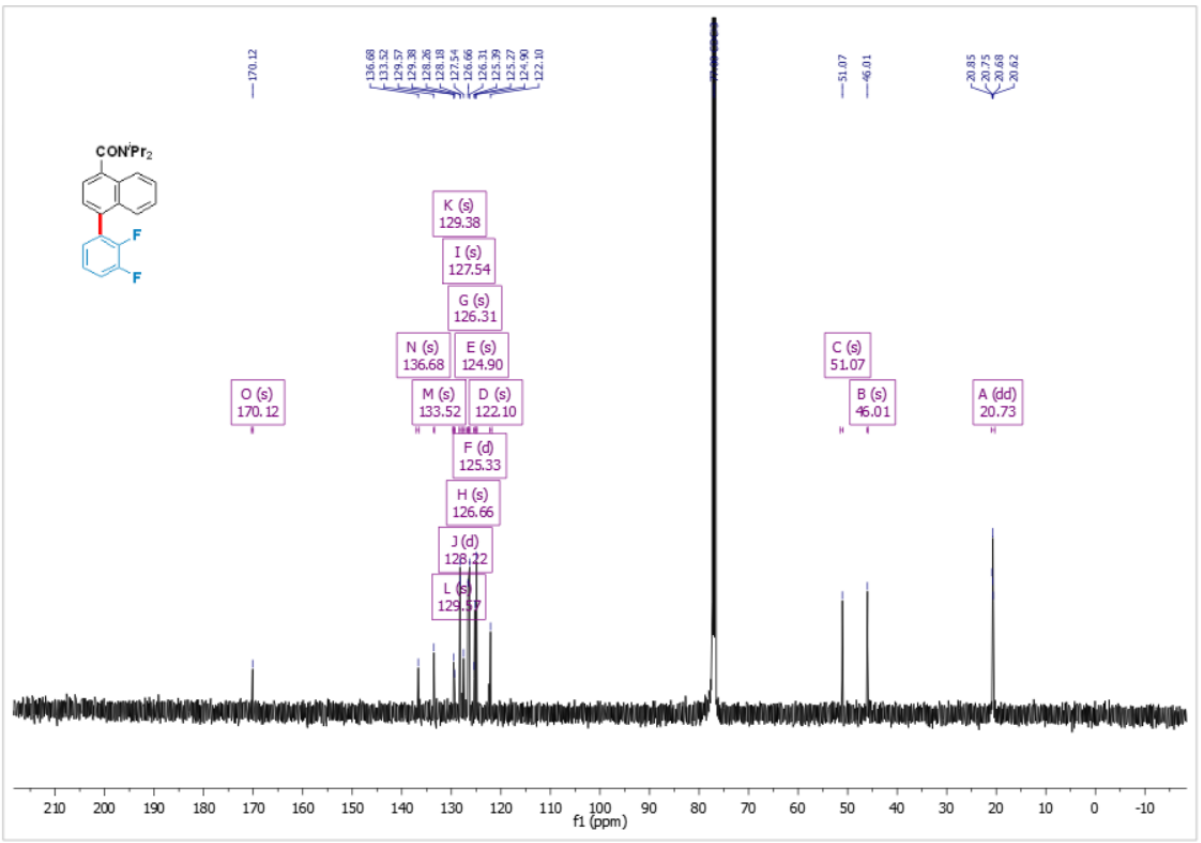

Ph
CON^{i}Pr$_2$
A (s) 170.14
B (s) 136.31
C (s) 131.80
D (s) 130.47
E (s) 129.95
F (s) 128.84
G (s) 127.40
H (s) 127.11
I (s) 127.01
J (s) 126.54
K (d) 126.42
L (s) 126.33
M (s) 125.26
N (s) 139.35
O (s) 140.08
P (s) 140.26
Q (s) 51.13
R (s) 46.03
S (s) 20.92
T (s) 20.75
U (s) 20.69
f1 (ppm)

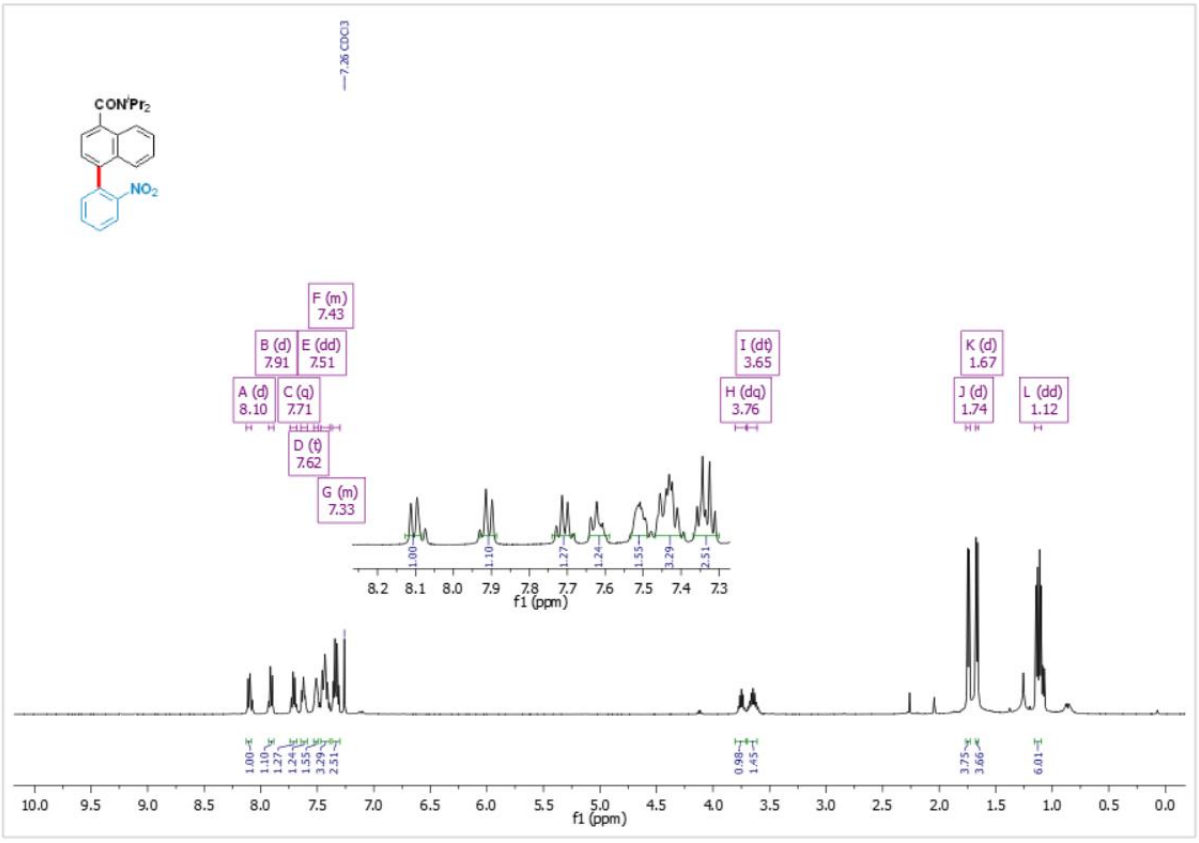

CO$_2$Et
CON^{i}Pr$_2$
7.26 CDCl3
I (dd) 8.16
J (t) 7.93
K (t) 7.84
L (t) 7.56
M (q) 7.39
N (m) 7.45
O (m) 7.53
A (m) 4.43
B (m) 3.72
C (dt) 3.63
D (d) 1.74
E (t) 1.66
F (t) 1.08
G (d) 1.13
H (td) 1.43
f1 (ppm)

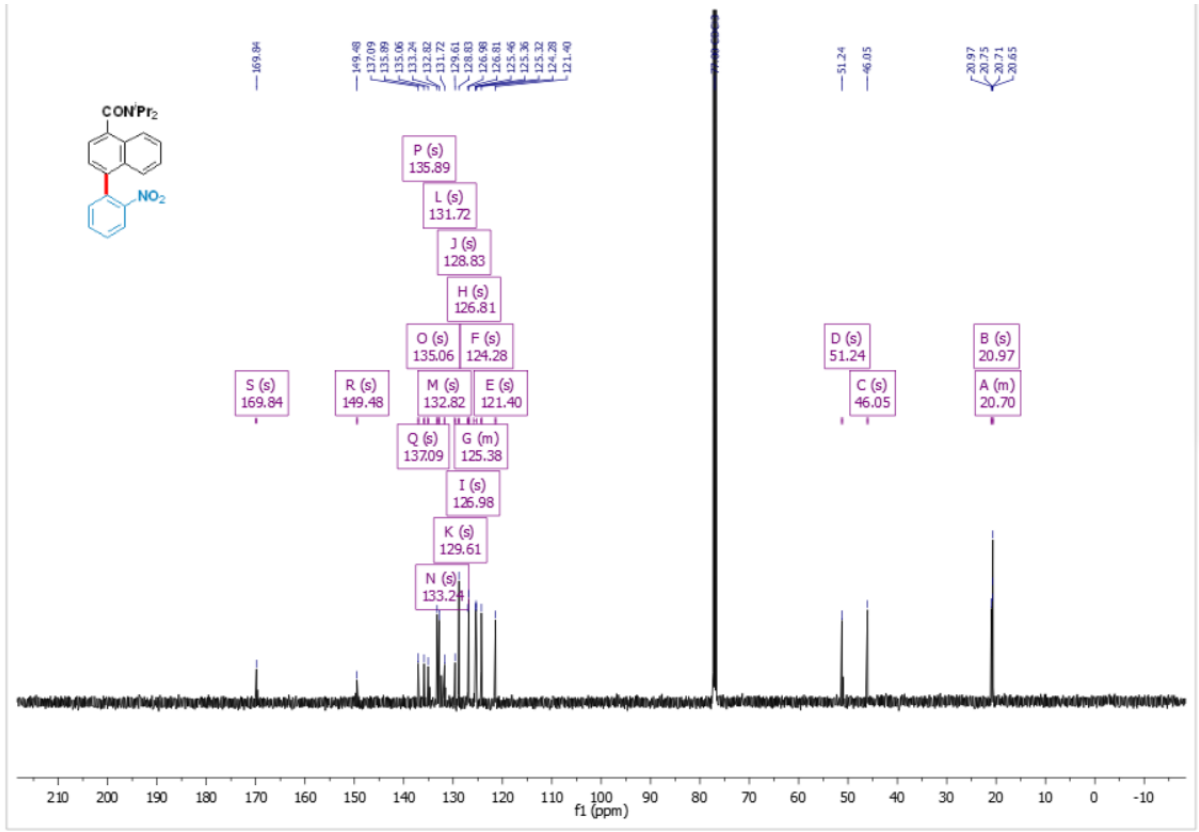

Me
CO2Me
CONiPr2
7.26 CDCl3
K (d) 7.85
H (t) 7.52
J (d) 7.91
G (t) 7.37
L (s) 8.04
I (t) 7.45
F (s) 3.89
E (s) 2.70
D (d) 1.74
C (d) 1.67
B (d) 1.12
A (d) 1.08
f1 (ppm)

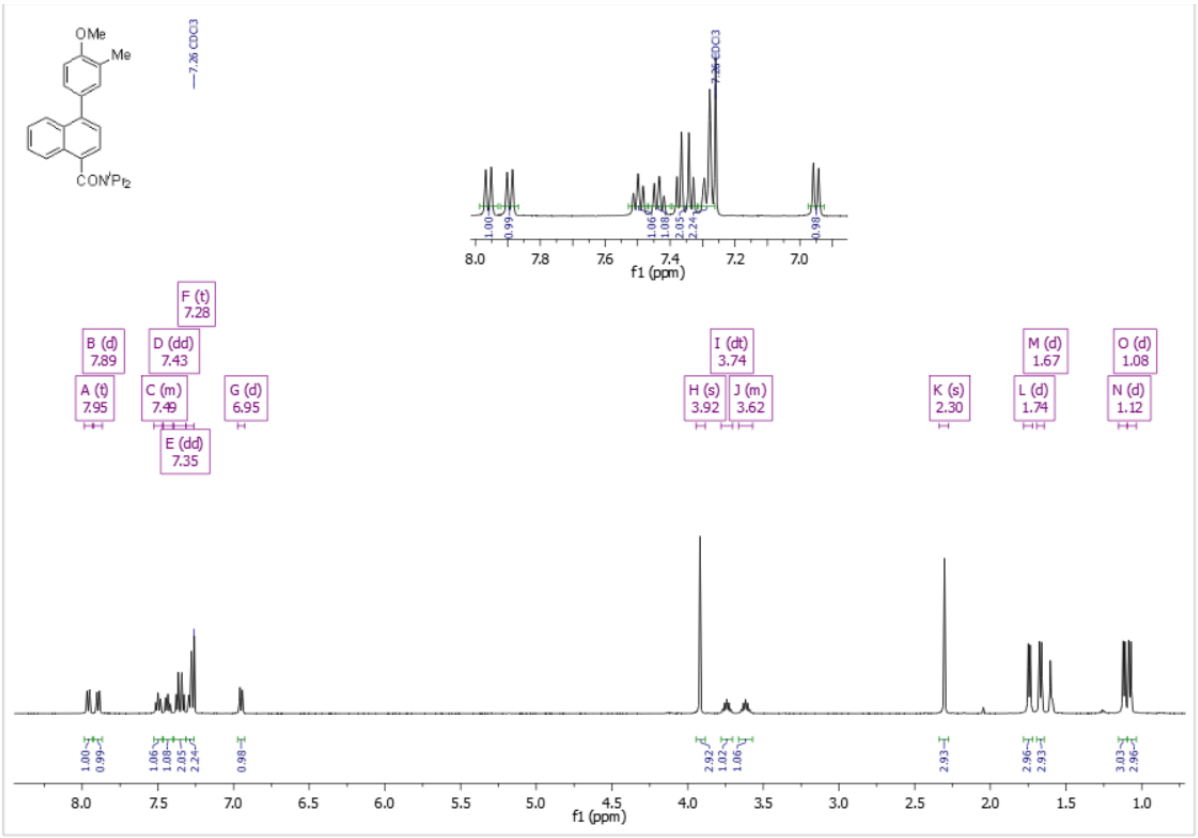

Me
CO2Me
CONiPr2
L (s) 126.16
H (s) 129.87
F (s) 131.96
B (s) 167.93
D (s) 137.90
K (s) 126.39
A (s) 170.15
C (s) 139.40
J (d) 126.61
O (s) 114.05
E (s) 133.44
N (s) 121.65
G (d) 131.74
I (s) 129.59
M (s) 125.26
Q (s) 51.19
P (s) 51.91
R (s) 46.11
X (s) 20.67
V (s) 20.88
T (s) 22.67
S (s) 29.64
U (s) 21.47
W (s) 20.75
f1 (ppm)

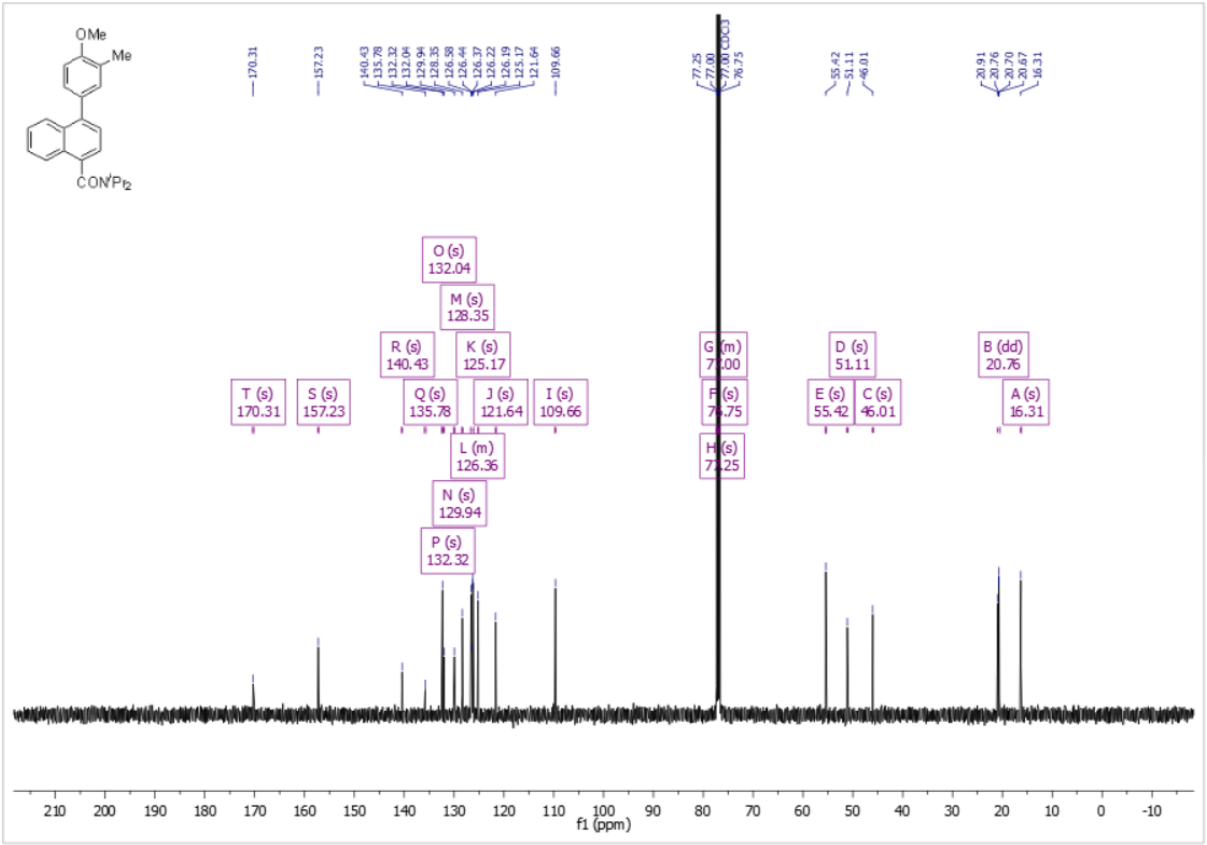

CONiPr2
F
F
7.26 CDCl3
I (m) 7.26
G (m) 7.48
F (d) 7.32
H (m) 7.81
C (m) 3.61
E (d) 1.65
B (d) 1.04
D (d) 1.73
A (d) 1.08
f1 (ppm)

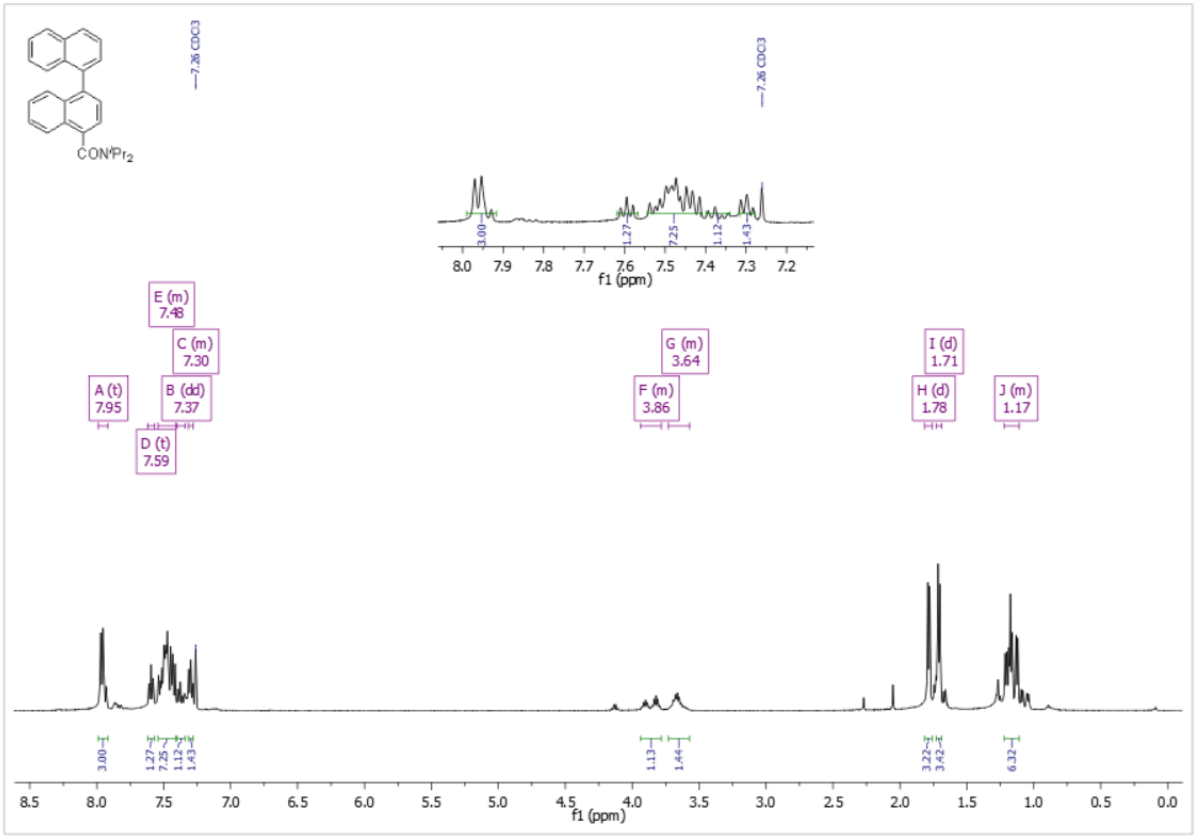

CONiPr2
F
F
K (s) 129.38
I (s) 127.54
G (s) 126.31
N (s) 136.68
E (s) 124.90
O (s) 170.12
M (s) 133.52
D (s) 122.10
F (d) 125.33
H (s) 126.66
J (d) 128.22
L (s) 129.57
C (s) 51.07
B (s) 46.01
A (dd) 20.73
f1 (ppm)

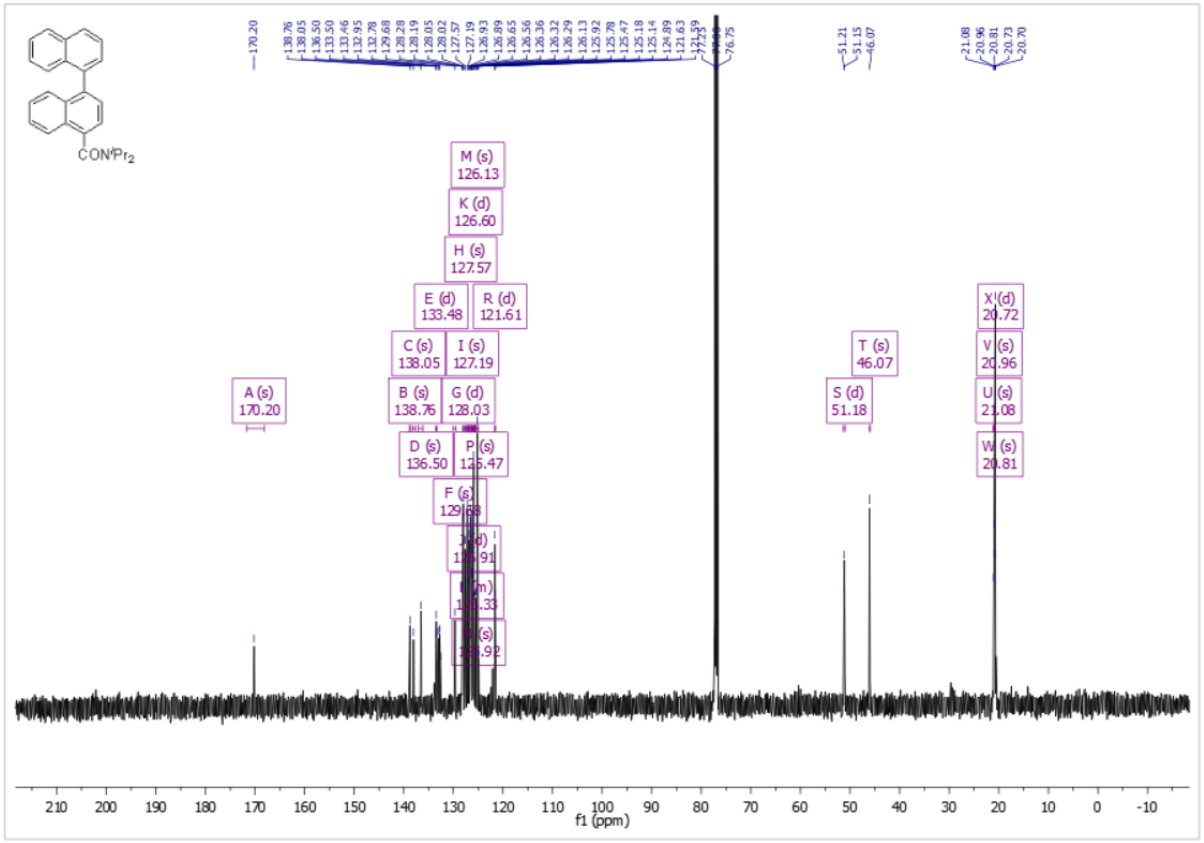

CONiPr2
NO2
7.26 CDCl3
F (m) 7.43
B (d) 7.91
E (dd) 7.51
A (d) 8.10
C (q) 7.71
D (t) 7.62
G (m) 7.33
I (dt) 3.65
H (dq) 3.76
K (d) 1.67
J (d) 1.74
L (dd) 1.12
f1 (ppm)

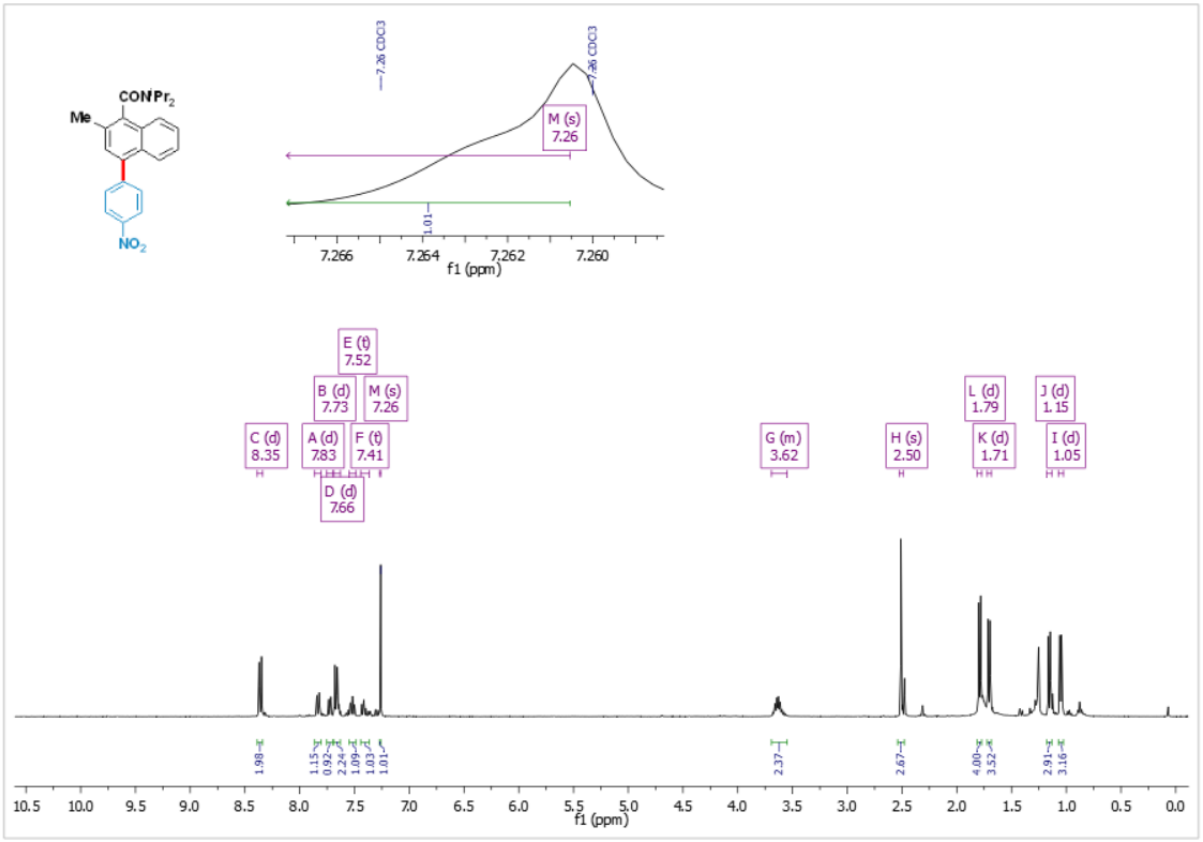

CONiPr2
NO2
P (s) 135.89
L (s) 131.72
J (s) 128.83
H (s) 126.81
O (s) 135.06
F (s) 124.28
S (s) 169.84
R (s) 149.48
M (s) 132.82
E (s) 121.40
Q (s) 137.09
G (m) 125.38
I (s) 126.98
K (s) 129.61
N (s) 133.24
D (s) 51.24
C (s) 46.05
B (s) 20.97
A (m) 20.70
f1 (ppm)

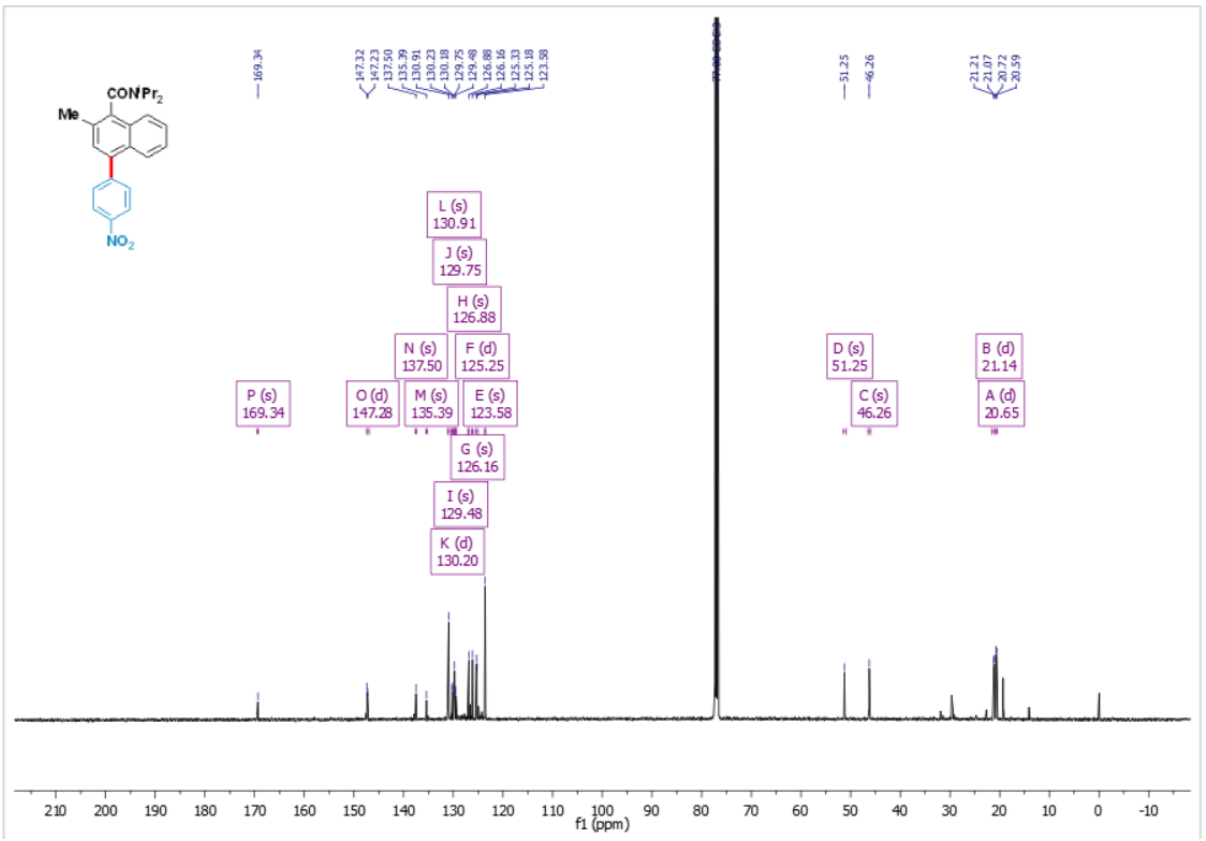

OMe
Me
CONiPr2
7.26 CDCl3
F (t) 7.28
B (d) 7.89
D (dd) 7.43
I (dt) 3.74
M (d) 1.67
O (d) 1.08
A (t) 7.95
C (m) 7.49
G (d) 6.95
H (s) 3.92
J (m) 3.62
K (s) 2.30
L (d) 1.74
N (d) 1.12
E (dd) 7.35
f1 (ppm)

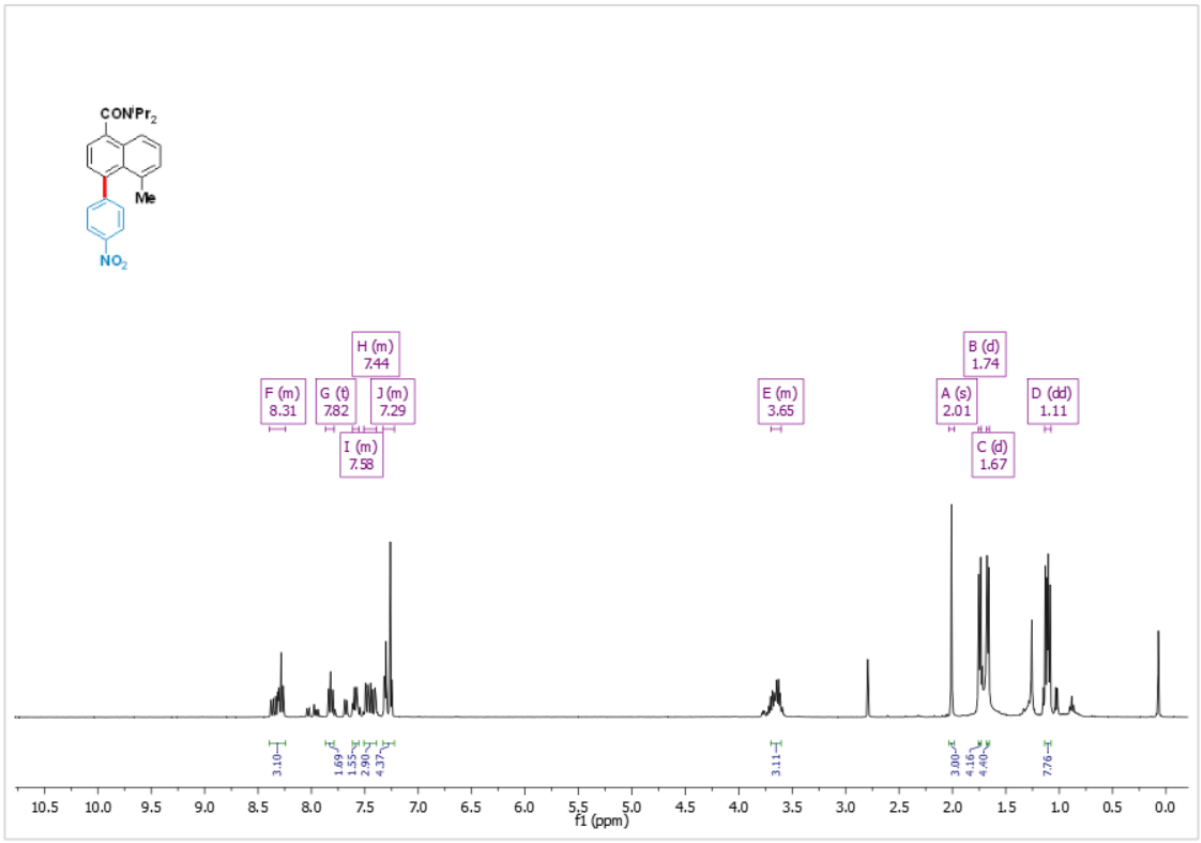

OMe
Me
CONiPr2
O (s) 132.04
M (s) 128.35
R (s) 140.43
K (s) 125.17
G (m) 77.00
D (s) 51.11
B (dd) 20.76
T (s) 170.31
S (s) 157.23
Q (s) 135.78
J (s) 121.64
I (s) 109.66
F (s) 76.75
E (s) 55.42
C (s) 46.01
A (s) 16.31
L (m) 126.36
H (s) 77.25
N (s) 129.94
P (s) 132.32
f1 (ppm)

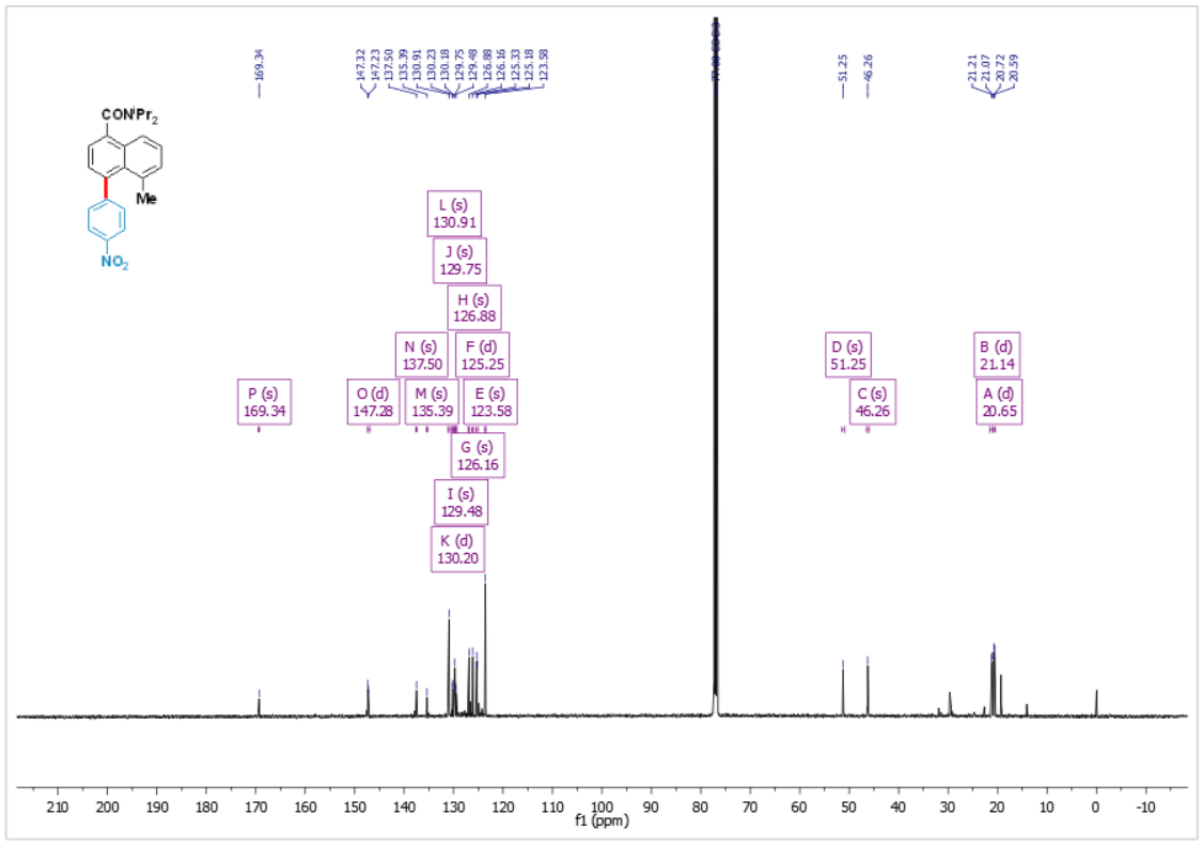

CON^{i}Pr$_2$
7.26 CDCl3
E (m) 7.48
C (m) 7.30
A (t) 7.95
B (dd) 7.37
D (t) 7.59
G (m) 3.64
F (m) 3.86
I (d) 1.71
H (d) 1.78
J (m) 1.17
f1 (ppm)

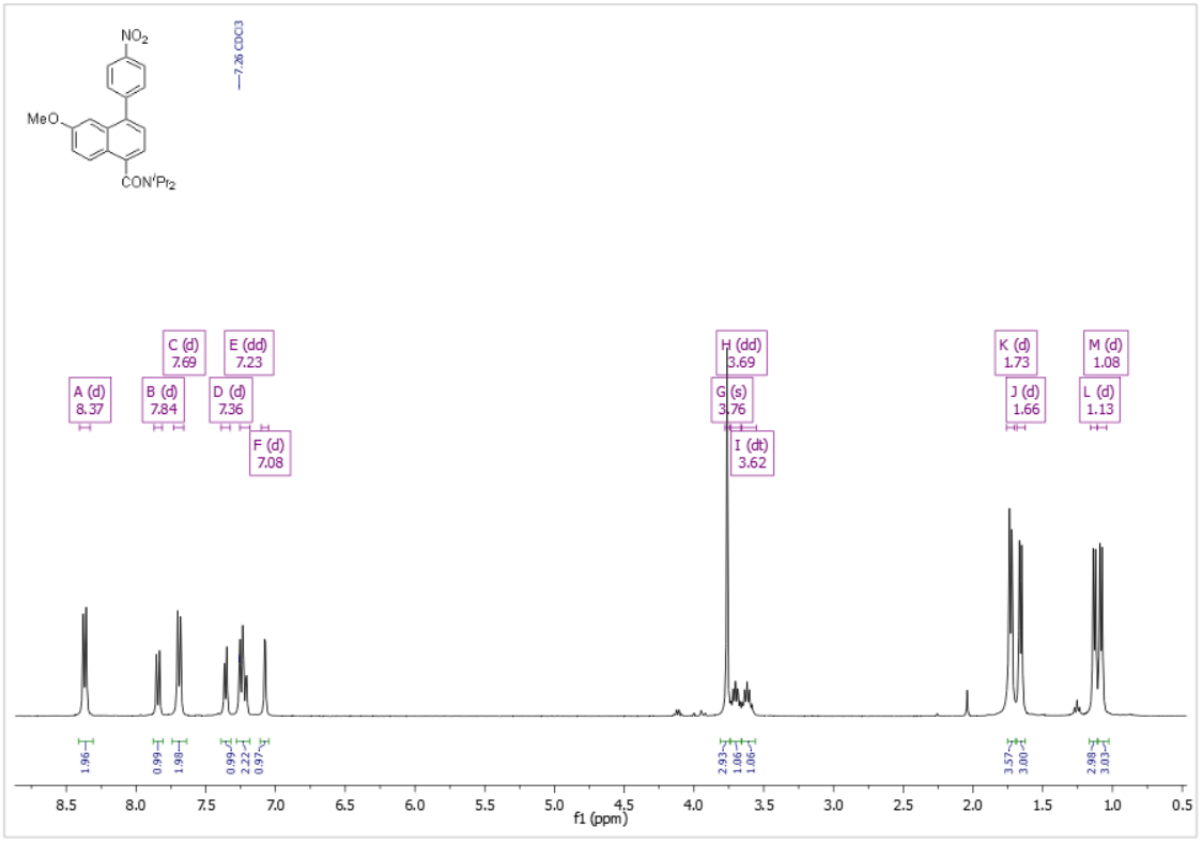

CON^{i}Pr$_2$
M (s) 126.13
K (d) 126.60
H (s) 127.57
E (d) 133.48
R (d) 121.61
C (s) 138.05
I (s) 127.19
A (s) 170.20
B (s) 138.76
G (d) 128.03
D (s) 136.50
P (s) 125.47
T (s) 46.07
S (d) 51.18
X (d) 20.72
V (s) 20.96
U (s) 21.08
W (s) 20.81
f1 (ppm)

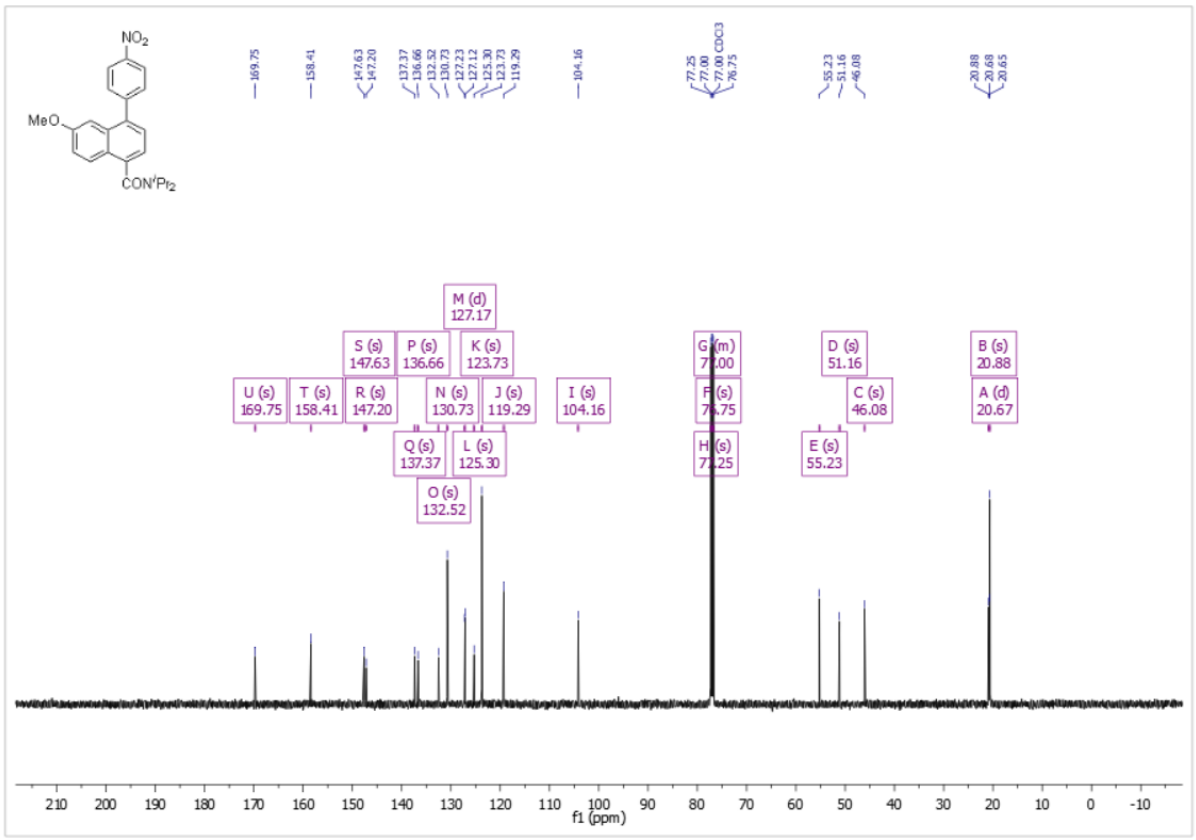

CONPr2
Me
NO2
7.26 CDCl3
M (s) 7.26
1.01
7.266
7.264
7.262
7.260
f1 (ppm)
E (t) 7.52
B (d) 7.73
M (s) 7.26
C (d) 8.35
A (d) 7.83
F (t) 7.41
D (d) 7.66
G (m) 3.62
H (s) 2.50
L (d) 1.79
K (d) 1.71
J (d) 1.15
I (d) 1.05
1.98
1.15
0.92
2.24
1.09
1.03
1.01
2.37
2.67
4.00
3.52
2.91
3.16
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

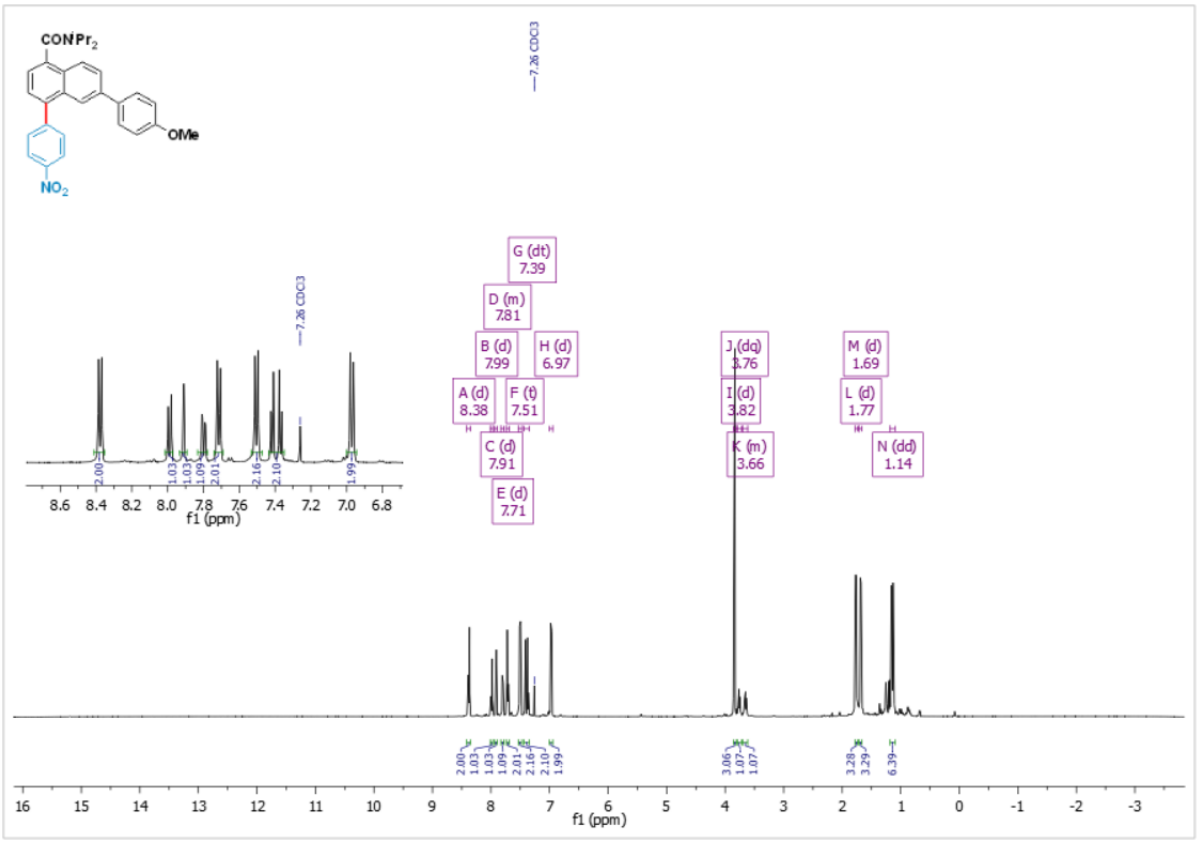

CONPr2
Me
NO2
169.34
147.32
147.23
137.50
135.39
130.91
130.23
130.18
129.75
129.48
126.88
126.16
125.33
125.18
123.58
51.25
46.26
21.21
21.07
20.72
20.59
L (s) 130.91
J (s) 129.75
H (s) 126.88
N (s) 137.50
F (d) 125.25
D (s) 51.25
B (d) 21.14
P (s) 169.34
O (d) 147.28
M (s) 135.39
E (s) 123.58
C (s) 46.26
A (d) 20.65
G (s) 126.16
I (s) 129.48
K (d) 130.20
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

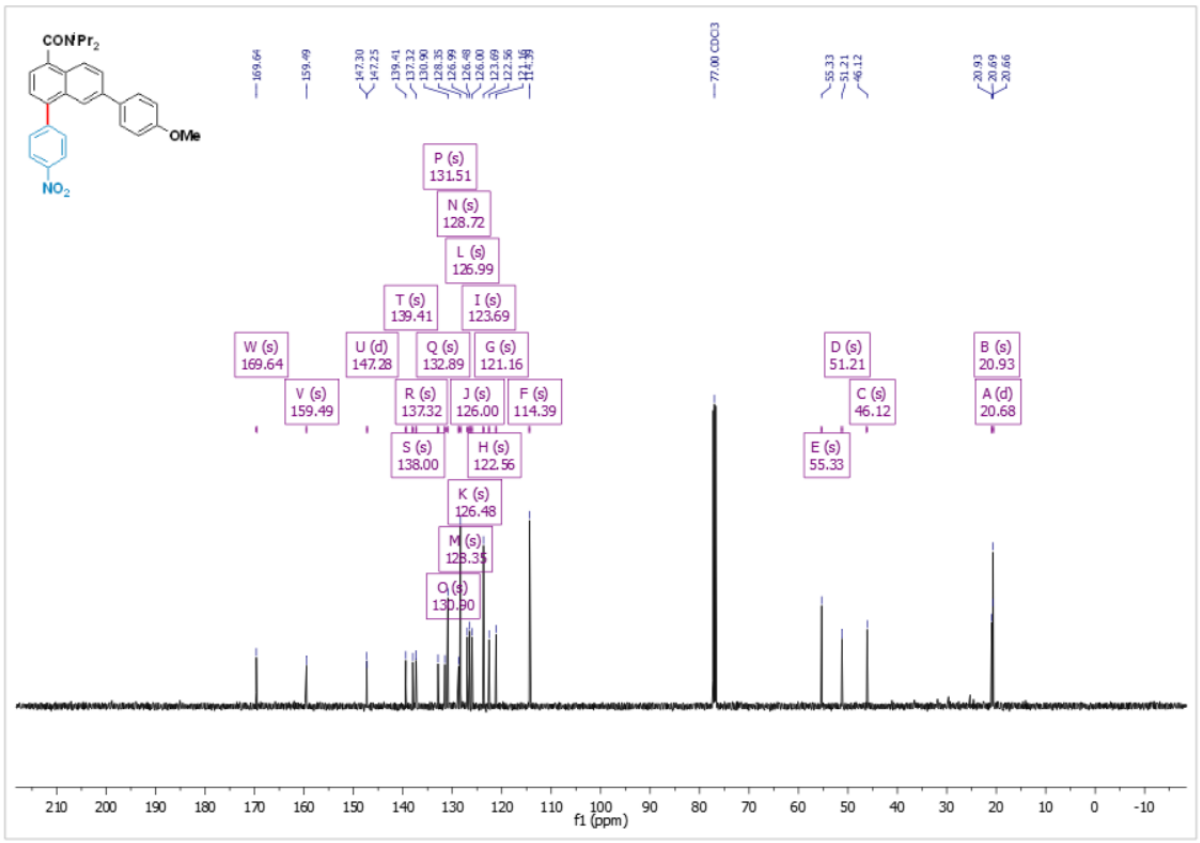

CONiPr2
Me
NO2
H (m) 7.44
F (m) 8.31
G (t) 7.82
J (m) 7.29
I (m) 7.58
E (m) 3.65
B (d) 1.74
A (s) 2.01
D (dd) 1.11
C (d) 1.67
f1 (ppm)

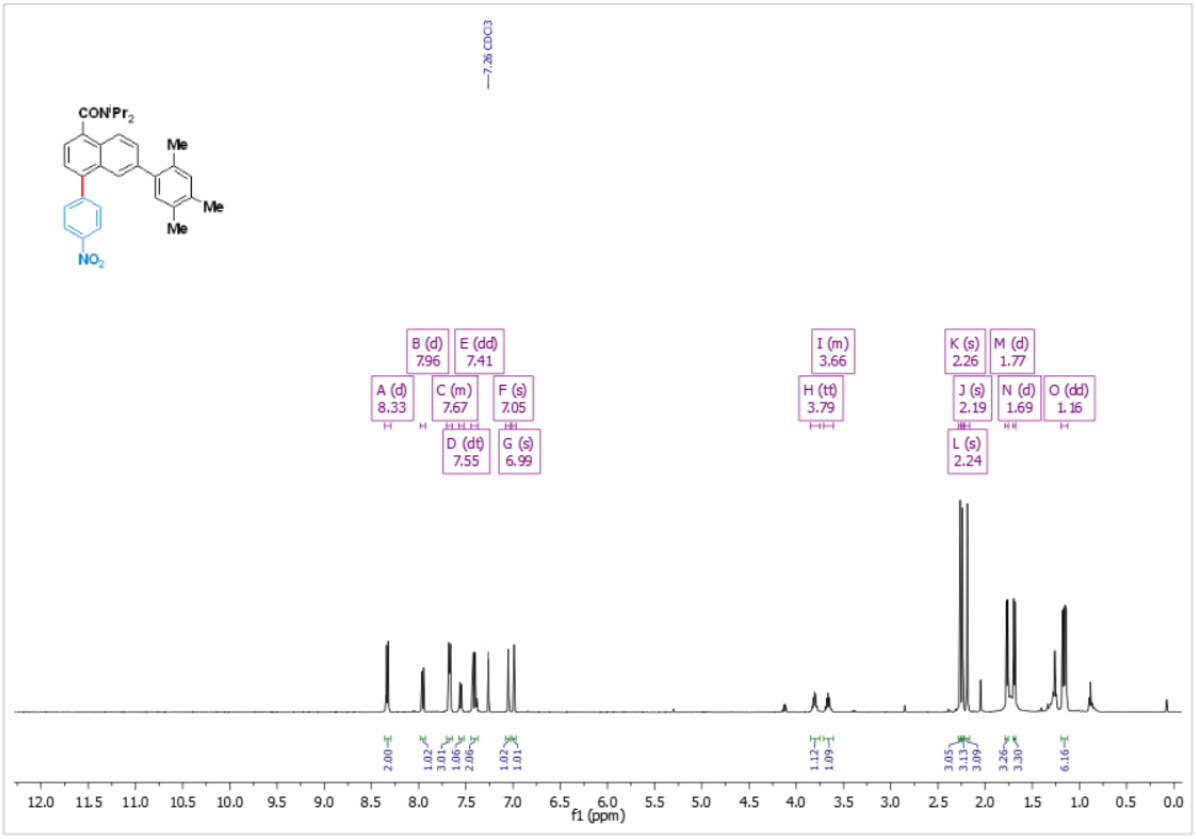

CONiPr2
Me
NO2
L (s) 130.91
J (s) 129.75
H (s) 126.88
N (s) 137.50
F (d) 125.25
P (s) 169.34
O (d) 147.28
M (s) 135.39
E (s) 123.58
G (s) 126.16
I (s) 129.48
K (d) 130.20
D (s) 51.25
C (s) 46.26
B (d) 21.14
A (d) 20.65
f1 (ppm)

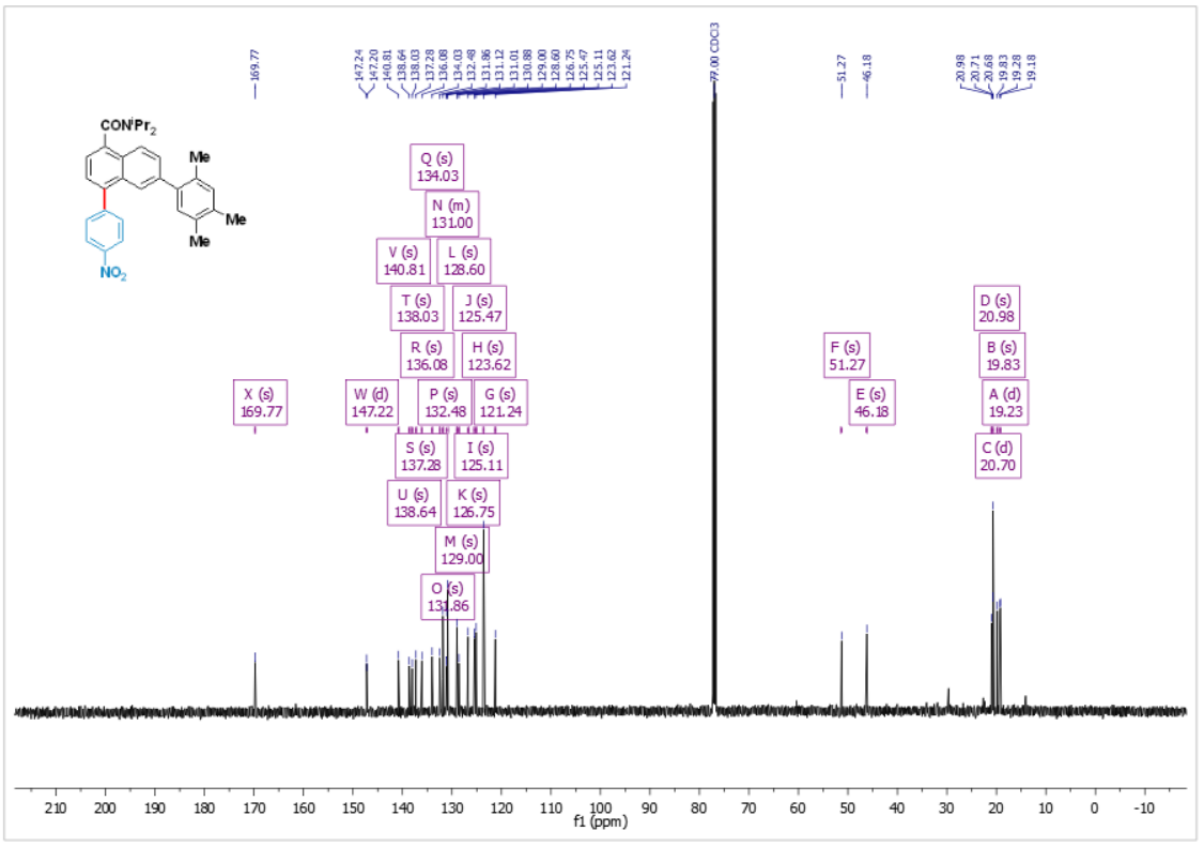

NO2
MeO
CON^{i}Pr2
7.26 CDCl3
A (d) 8.37
B (d) 7.84
C (d) 7.69
D (d) 7.36
E (dd) 7.23
F (d) 7.08
G (s) 3.76
H (dd) 3.69
I (dt) 3.62
J (d) 1.66
K (d) 1.73
L (d) 1.13
M (d) 1.08
f1 (ppm)

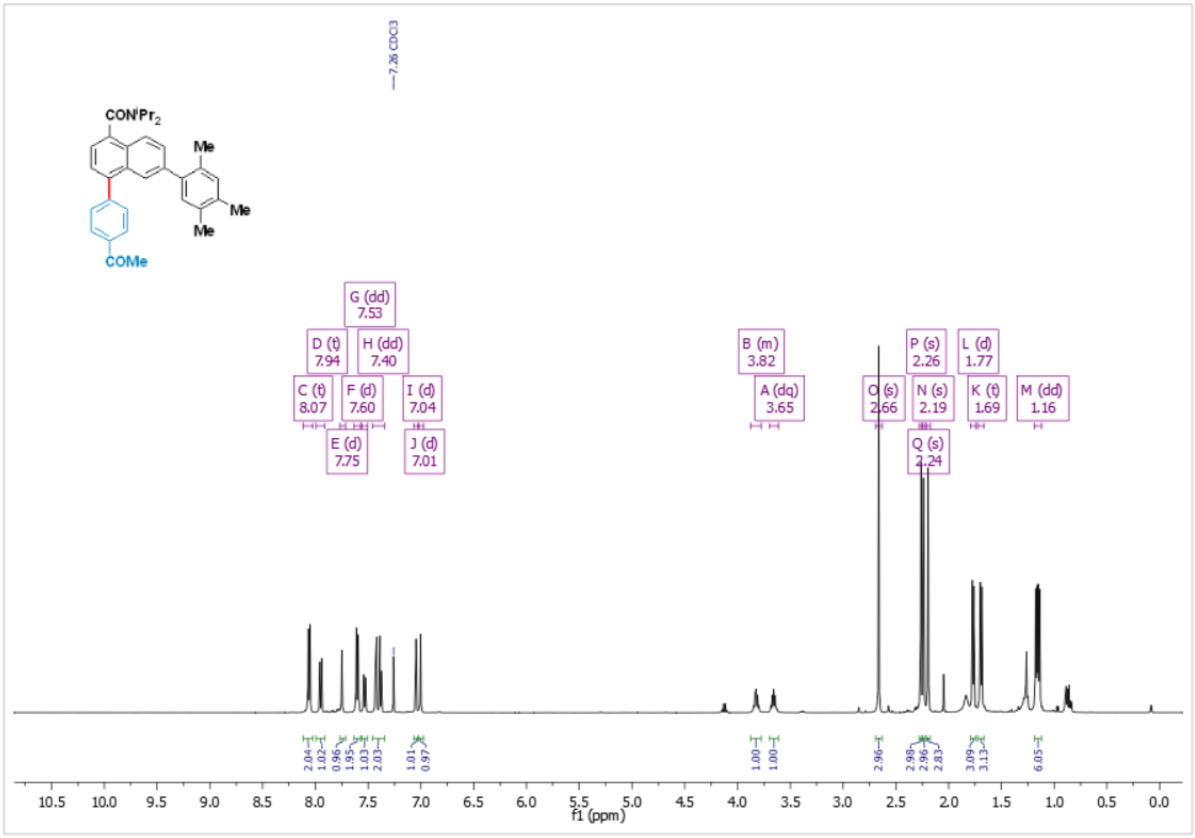

NO2
MeO
CON^{i}Pr2
77.25
77.00
77.00 CDCl3
76.75
M (d) 127.17
S (s) 147.63
P (s) 136.66
K (s) 123.73
U (s) 169.75
T (s) 158.41
R (s) 147.20
N (s) 130.73
J (s) 119.29
I (s) 104.16
Q (s) 137.37
L (s) 125.30
O (s) 132.52
G (m) 77.00
F (s) 76.75
H (s) 77.25
D (s) 51.16
C (s) 46.08
E (s) 55.23
B (s) 20.88
A (d) 20.67
f1 (ppm)

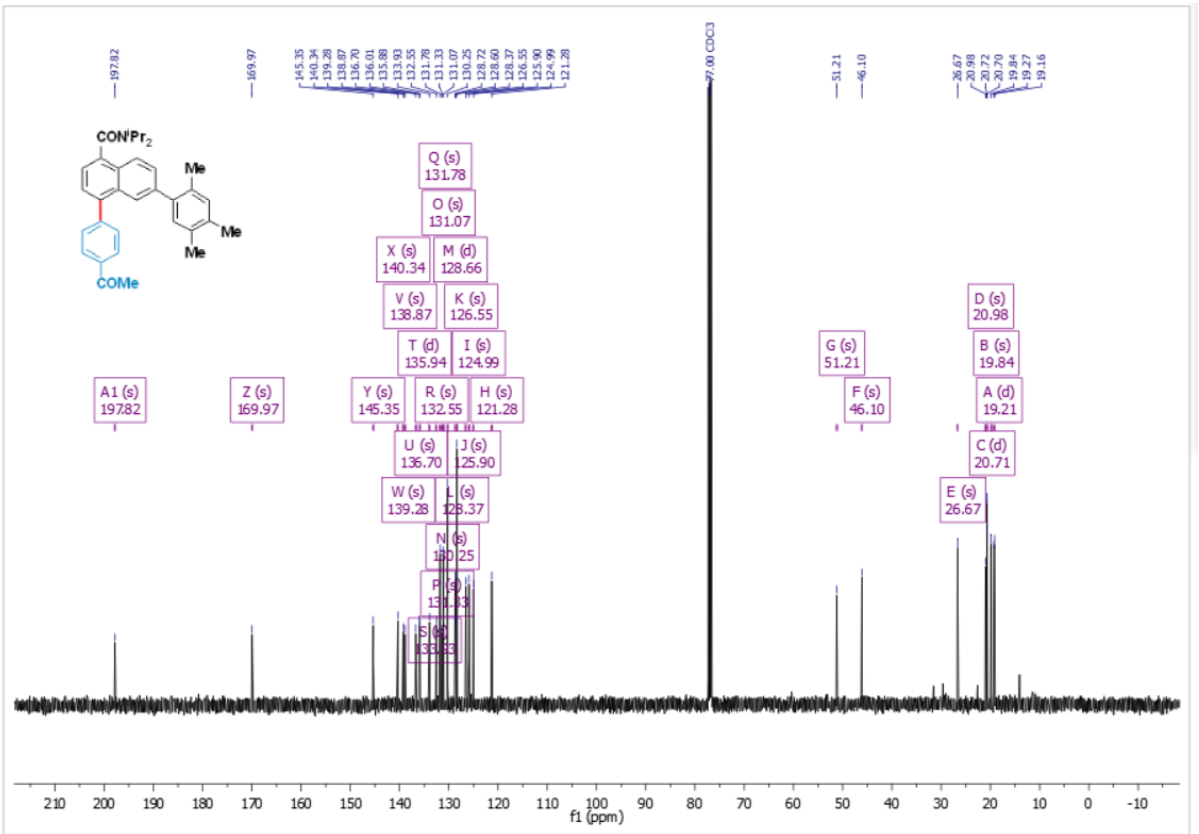

CONPr2
OMe
NO2
7.26 CDCl3
G (dt) 7.39
D (m) 7.81
B (d) 7.99
H (d) 6.97
A (d) 8.38
F (t) 7.51
C (d) 7.91
E (d) 7.71
J (dq) 3.76
I (d) 3.82
K (m) 3.66
M (d) 1.69
L (d) 1.77
N (dd) 1.14
f1 (ppm)

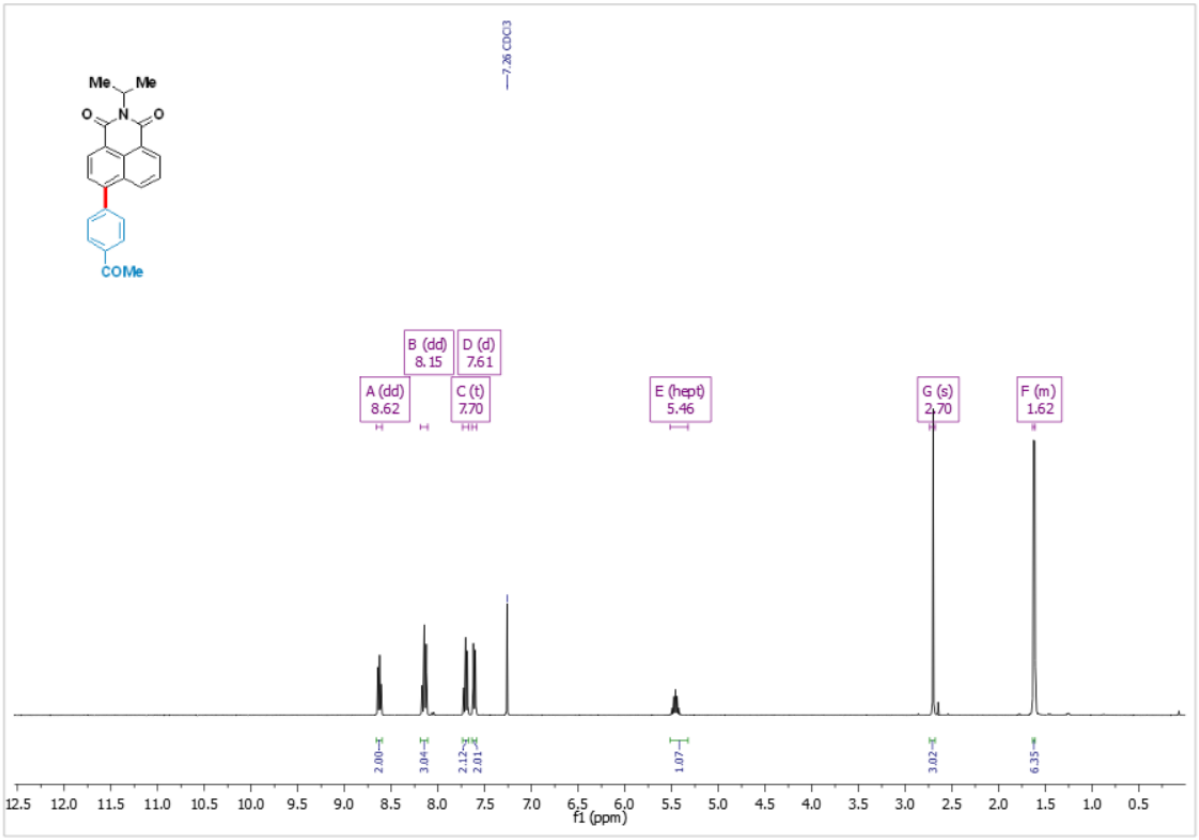

CONPr2
OMe
NO2
77.00 CDCl3
P (s) 131.51
N (s) 128.72
L (s) 126.99
T (s) 139.41
I (s) 123.69
W (s) 169.64
U (d) 147.28
Q (s) 132.89
G (s) 121.16
V (s) 159.49
R (s) 137.32
J (s) 126.00
F (s) 114.39
S (s) 138.00
H (s) 122.56
K (s) 126.48
M (s) 128.35
O (s) 130.90
D (s) 51.21
C (s) 46.12
E (s) 55.33
B (s) 20.93
A (d) 20.68
f1 (ppm)

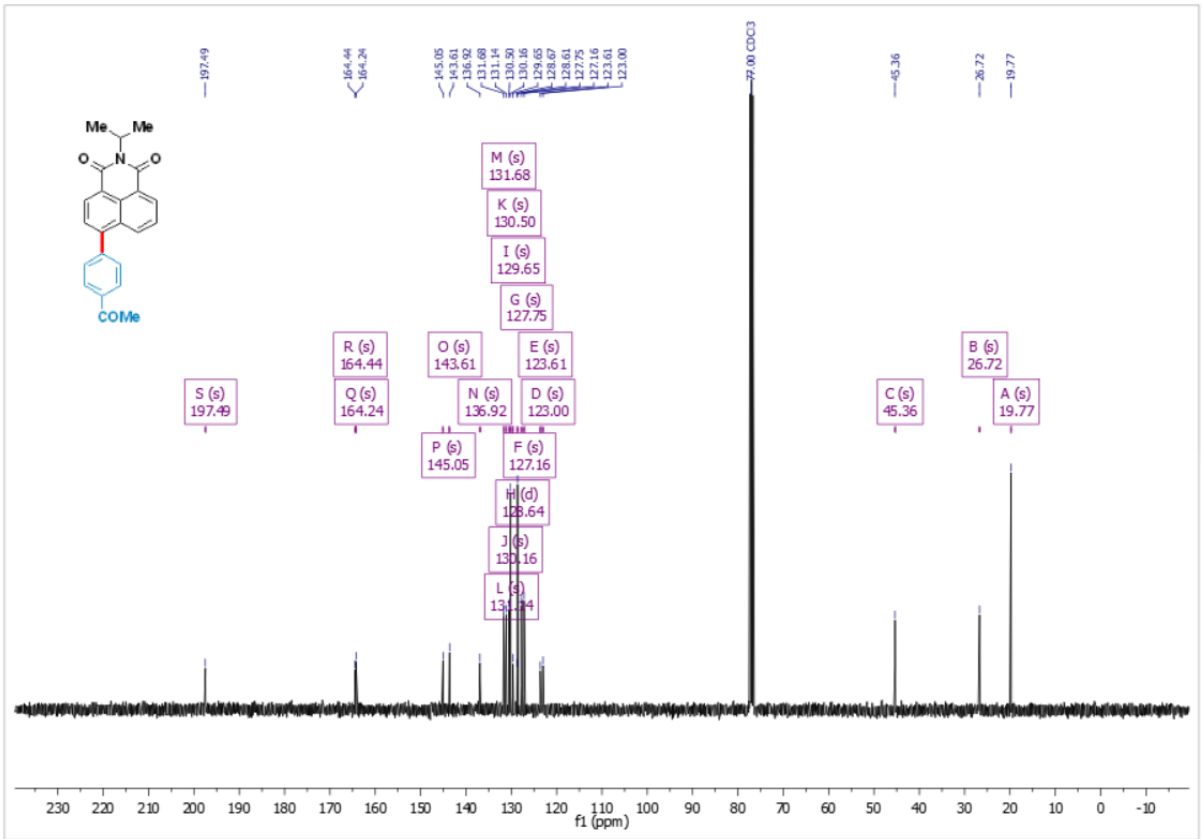

7.26 CDCl3
CONiPr2
Me
Me
Me
NO2
B (d) 7.96
E (dd) 7.41
A (d) 8.33
C (m) 7.67
F (s) 7.05
D (dt) 7.55
G (s) 6.99
I (m) 3.66
H (tt) 3.79
K (s) 2.26
M (d) 1.77
J (s) 2.19
N (d) 1.69
O (dd) 1.16
L (s) 2.24
2.00
1.02
3.01
1.06
2.06
1.02
1.01
1.12
1.09
3.05
3.13
3.09
3.26
3.30
6.16
12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

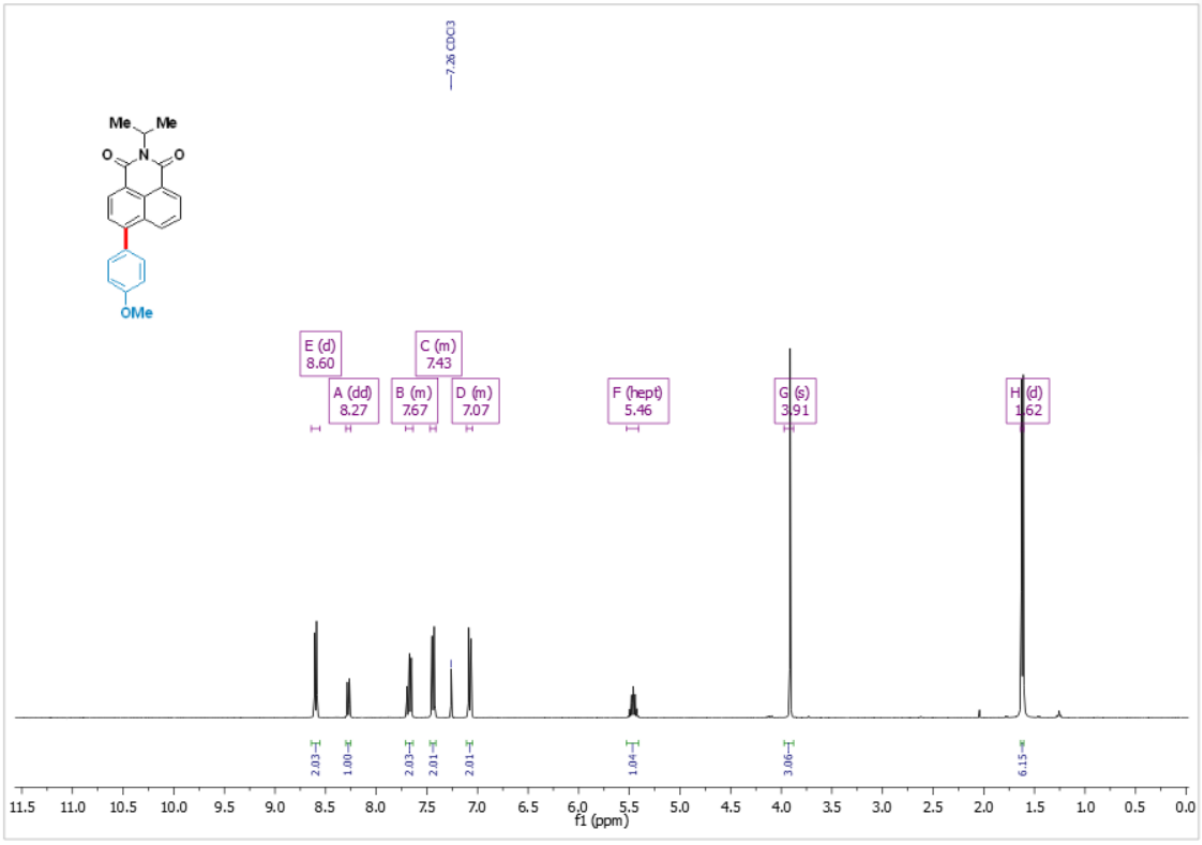

169.77
147.24
147.20
140.81
138.64
138.03
137.28
136.08
134.03
132.48
131.86
131.12
131.01
130.88
129.00
128.60
126.75
125.47
125.11
123.62
121.24
77.00 CDCl3
51.27
46.18
20.98
20.71
20.68
19.83
19.28
19.18
CONiPr2
Me
Me
Me
NO2
Q (s) 134.03
N (m) 131.00
V (s) 140.81
L (s) 128.60
T (s) 138.03
J (s) 125.47
R (s) 136.08
H (s) 123.62
X (s) 169.77
W (d) 147.22
P (s) 132.48
G (s) 121.24
S (s) 137.28
I (s) 125.11
U (s) 138.64
K (s) 126.75
M (s) 129.00
O (s) 131.86
F (s) 51.27
E (s) 46.18
D (s) 20.98
B (s) 19.83
A (d) 19.23
C (d) 20.70
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

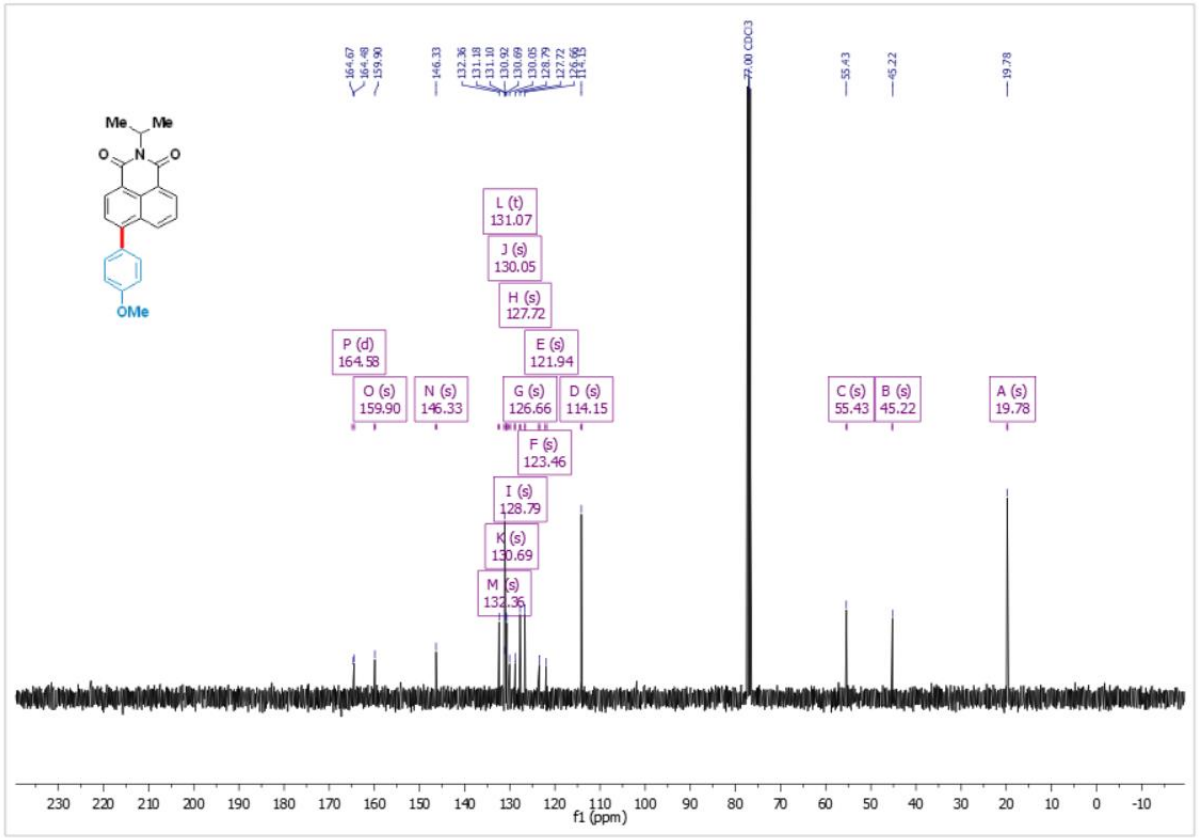

CONiPr2
Me
Me
Me
COMe
7.26 CDCl3
G (dd) 7.53
D (t) 7.94
H (dd) 7.40
C (t) 8.07
F (d) 7.60
I (d) 7.04
E (d) 7.75
J (d) 7.01
B (m) 3.82
A (dq) 3.65
P (s) 2.26
L (d) 1.77
O (s) 2.66
N (s) 2.19
K (t) 1.69
M (dd) 1.16
Q (s) 2.24
f1 (ppm)

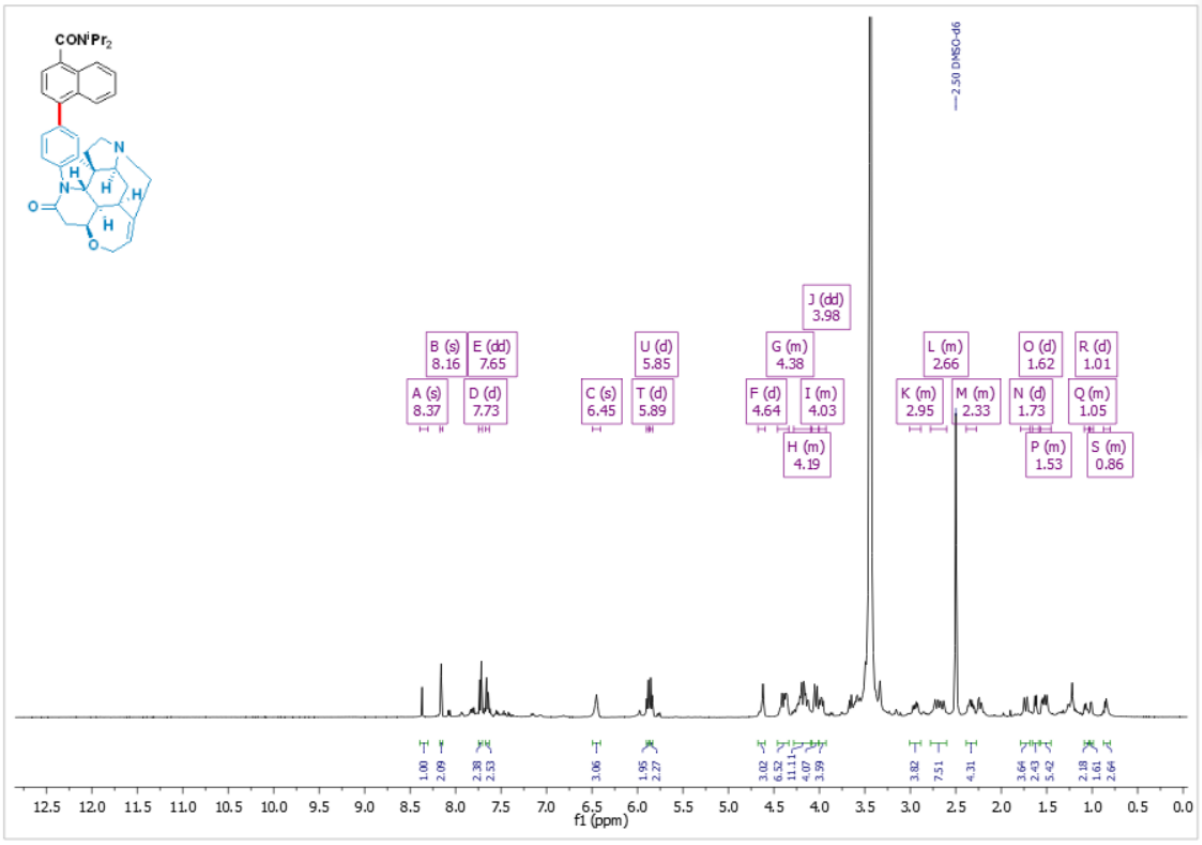

CONiPr2
Me
Me
Me
COMe
77.00 CDCl3
Q (s) 131.78
O (s) 131.07
X (s) 140.34
M (d) 128.66
V (s) 138.87
K (s) 126.55
T (d) 135.94
I (s) 124.99
A1 (s) 197.82
Z (s) 169.97
Y (s) 145.35
R (s) 132.55
H (s) 121.28
U (s) 136.70
J (s) 125.90
W (s) 139.28
L (s) 128.37
N (s) 130.25
G (s) 51.21
F (s) 46.10
D (s) 20.98
B (s) 19.84
A (d) 19.21
C (d) 20.71
E (s) 26.67
f1 (ppm)

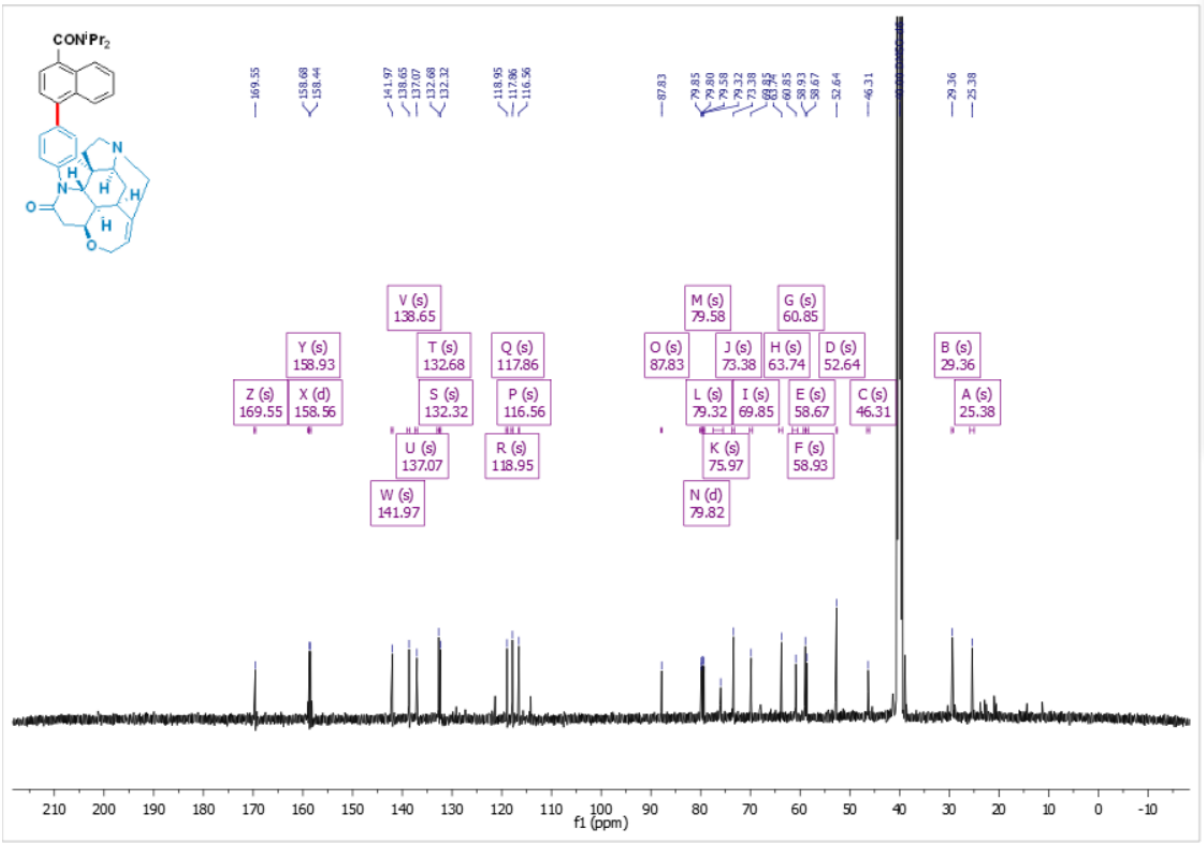

Me
Me
O
N
O
COMe
7.26 CDCl3
B (dd)
8.15
D (d)
7.61
A (dd)
8.62
C (t)
7.70
E (hept)
5.46
G (s)
2.70
F (m)
1.62
2.00
3.04
2.12
2.01
1.07
3.02
6.35
f1 (ppm)

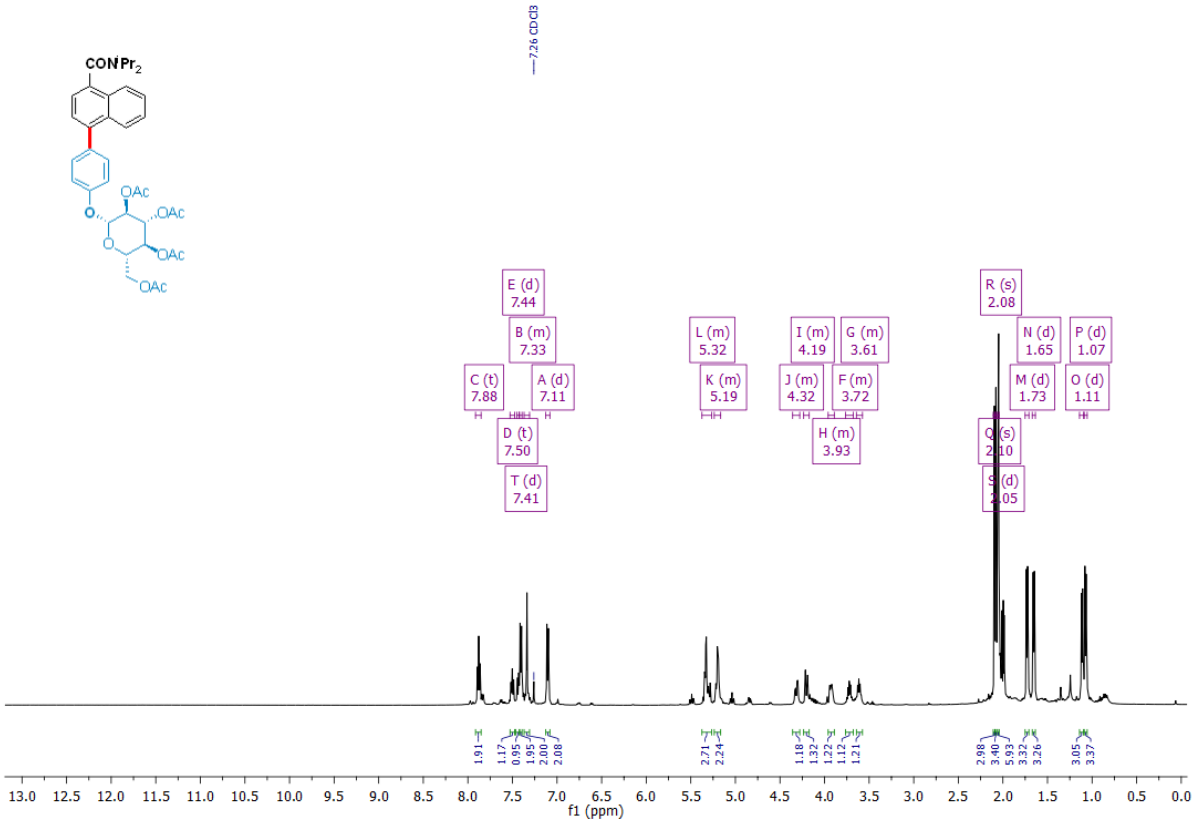

Me
Me
O
N
O
COMe
197.49
164.44
164.24
145.05
143.61
136.92
131.68
131.14
130.50
130.16
129.65
128.67
128.61
127.75
127.16
123.61
123.00
77.00 CDCl3
45.36
26.72
19.77
M (s)
131.68
K (s)
130.50
I (s)
129.65
G (s)
127.75
R (s)
164.44
O (s)
143.61
E (s)
123.61
B (s)
26.72
S (s)
197.49
Q (s)
164.24
N (s)
136.92
D (s)
123.00
C (s)
45.36
A (s)
19.77
P (s)
145.05
F (s)
127.16
H (d)
128.64
J (s)
130.16
L (s)
131.14
f1 (ppm)

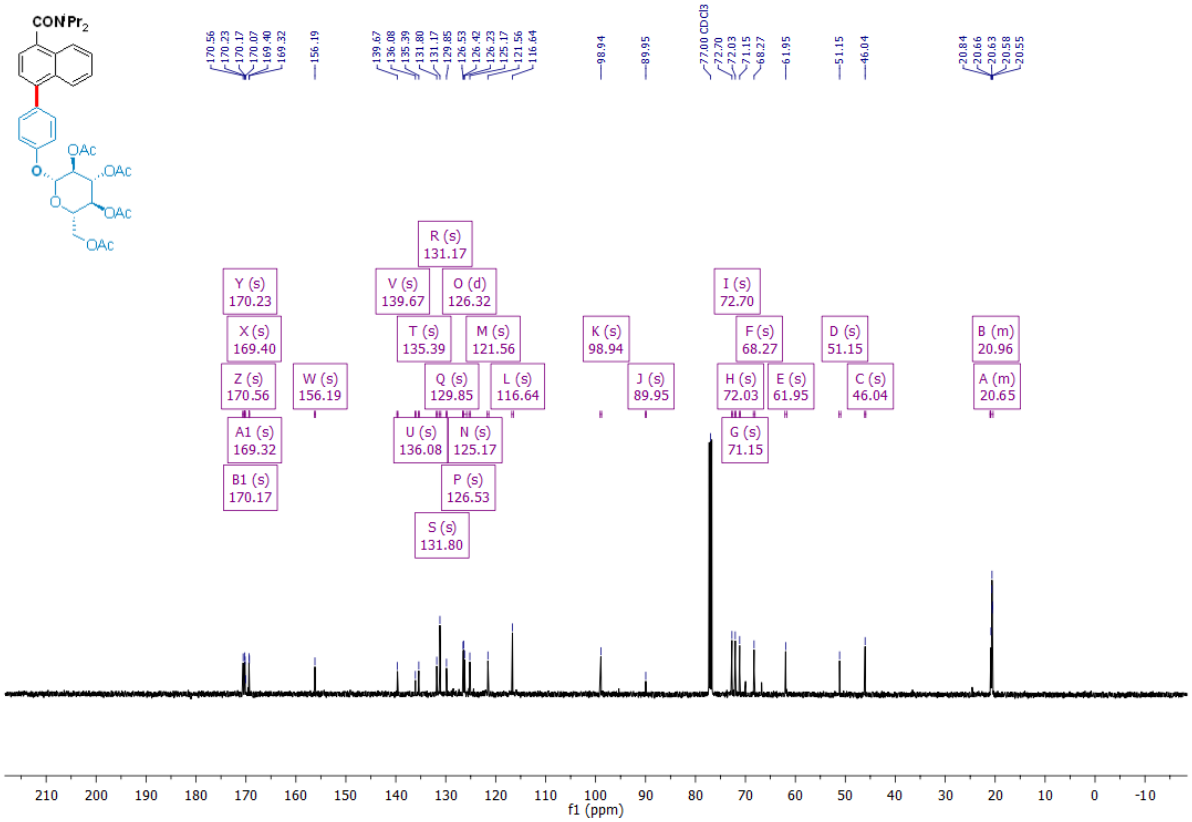

7.26 CDCl3
Me
Me
O
N
O
O
OMe
E (d) 8.60
A (dd) 8.27
C (m) 7.43
B (m) 7.67
D (m) 7.07
F (hept) 5.46
G (s) 3.91
H (d) 1.62
2.03
1.00
2.03
2.01
2.01
1.04
3.06
6.15
11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

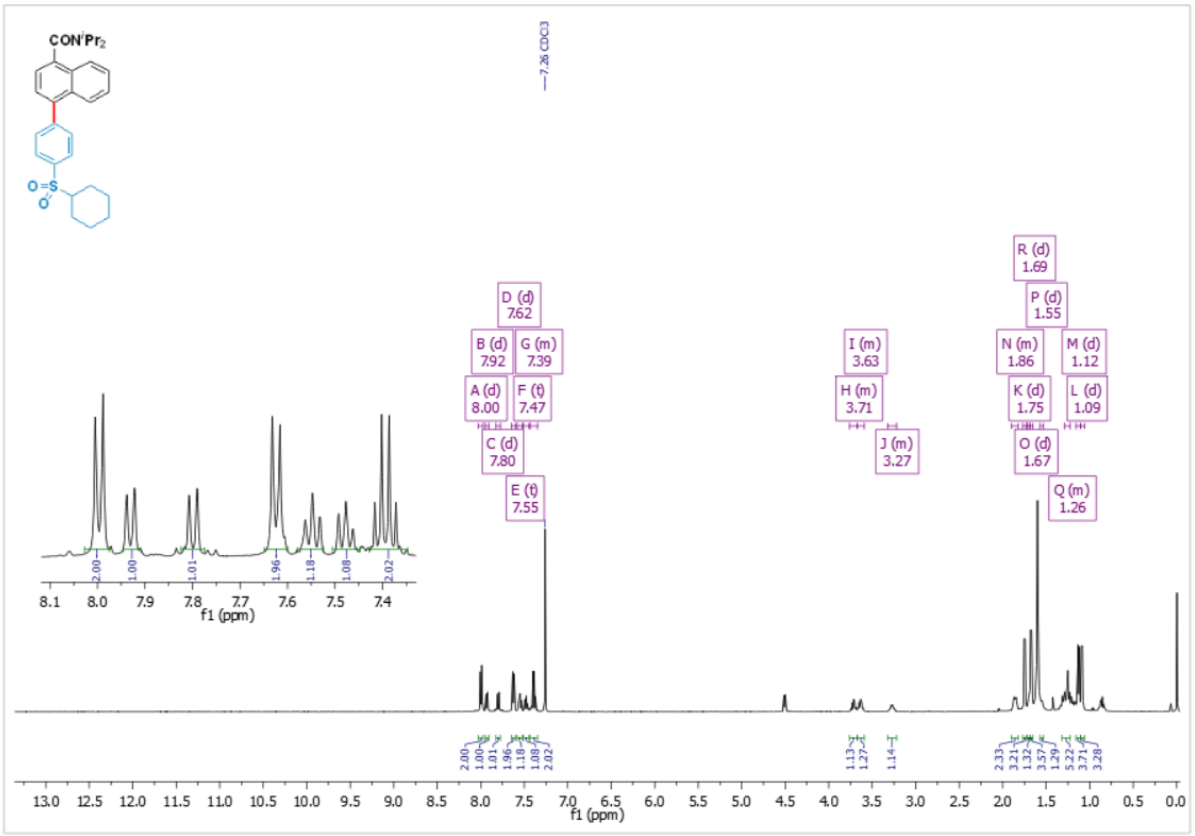

164.67
164.48
159.90
146.33
132.36
131.18
131.10
130.92
130.69
130.05
128.79
127.72
126.66
114.15
77.00 CDCl3
55.43
45.22
19.78
Me
Me
O
N
O
O
OMe
L (t) 131.07
J (s) 130.05
H (s) 127.72
E (s) 121.94
P (d) 164.58
O (s) 159.90
N (s) 146.33
G (s) 126.66
D (s) 114.15
F (s) 123.46
I (s) 128.79
K (s) 130.69
M (s) 132.36
C (s) 55.43
B (s) 45.22
A (s) 19.78
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

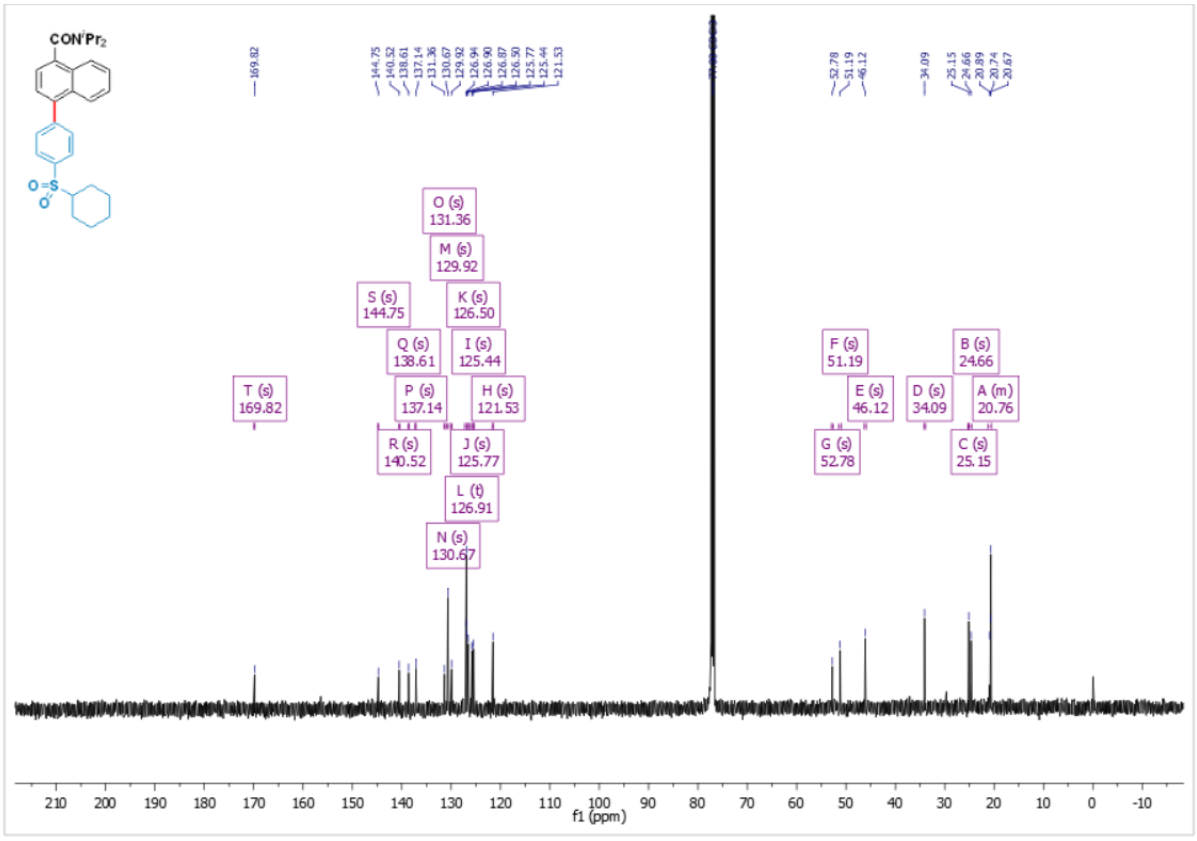

CONiPr2
B (s) 8.16
E (dd) 7.65
A (s) 8.37
D (d) 7.73
C (s) 6.45
U (d) 5.85
T (d) 5.89
J (dd) 3.98
G (m) 4.38
F (d) 4.64
I (m) 4.03
H (m) 4.19
L (m) 2.66
K (m) 2.95
M (m) 2.33
O (d) 1.62
N (d) 1.73
R (d) 1.01
Q (m) 1.05
P (m) 1.53
S (m) 0.86
2.50 DMSO-d6
f1 (ppm)

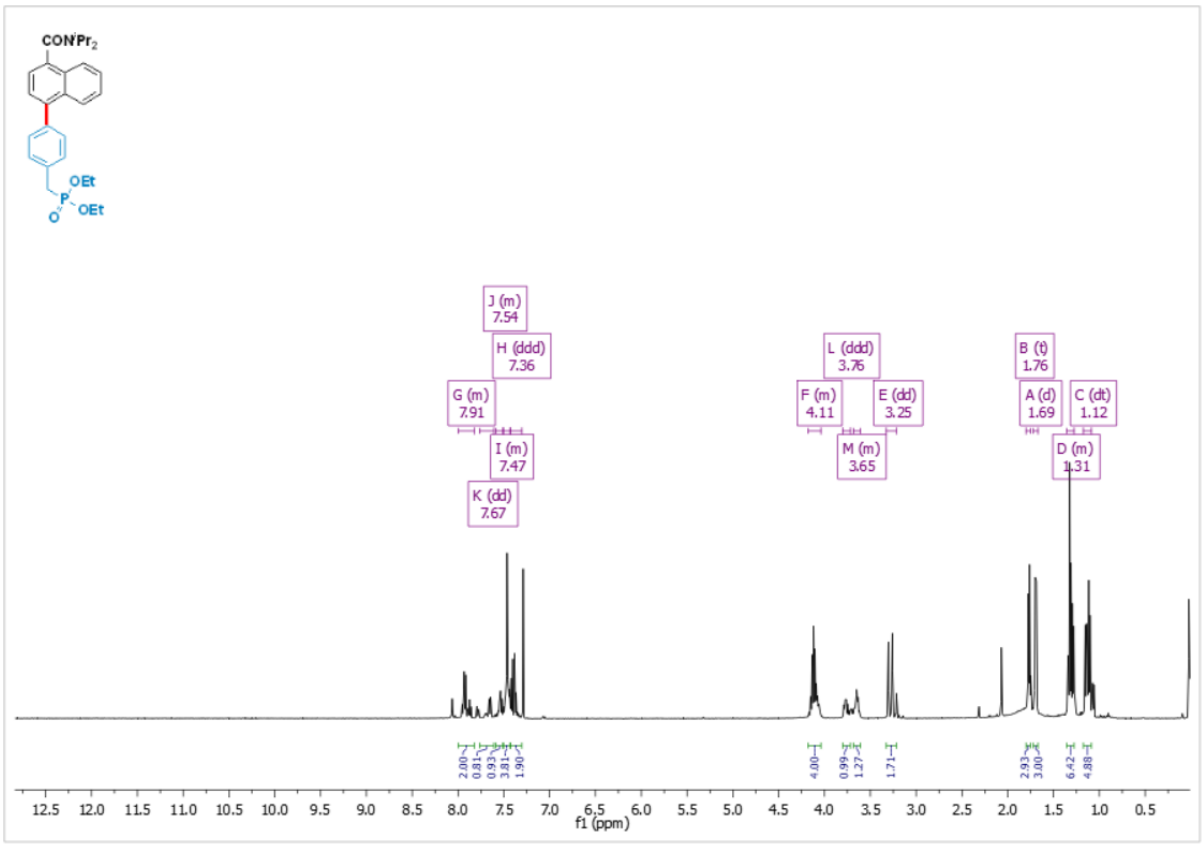

CONiPr2
V (s) 138.65
Y (s) 158.93
T (s) 132.68
Q (s) 117.86
Z (s) 169.55
X (d) 158.56
S (s) 132.32
P (s) 116.56
U (s) 137.07
R (s) 118.95
W (s) 141.97
M (s) 79.58
G (s) 60.85
O (s) 87.83
J (s) 73.38
H (s) 63.74
D (s) 52.64
B (s) 29.36
L (s) 79.32
I (s) 69.85
E (s) 58.67
C (s) 46.31
A (s) 25.38
K (s) 75.97
F (s) 58.93
N (d) 79.82
f1 (ppm)

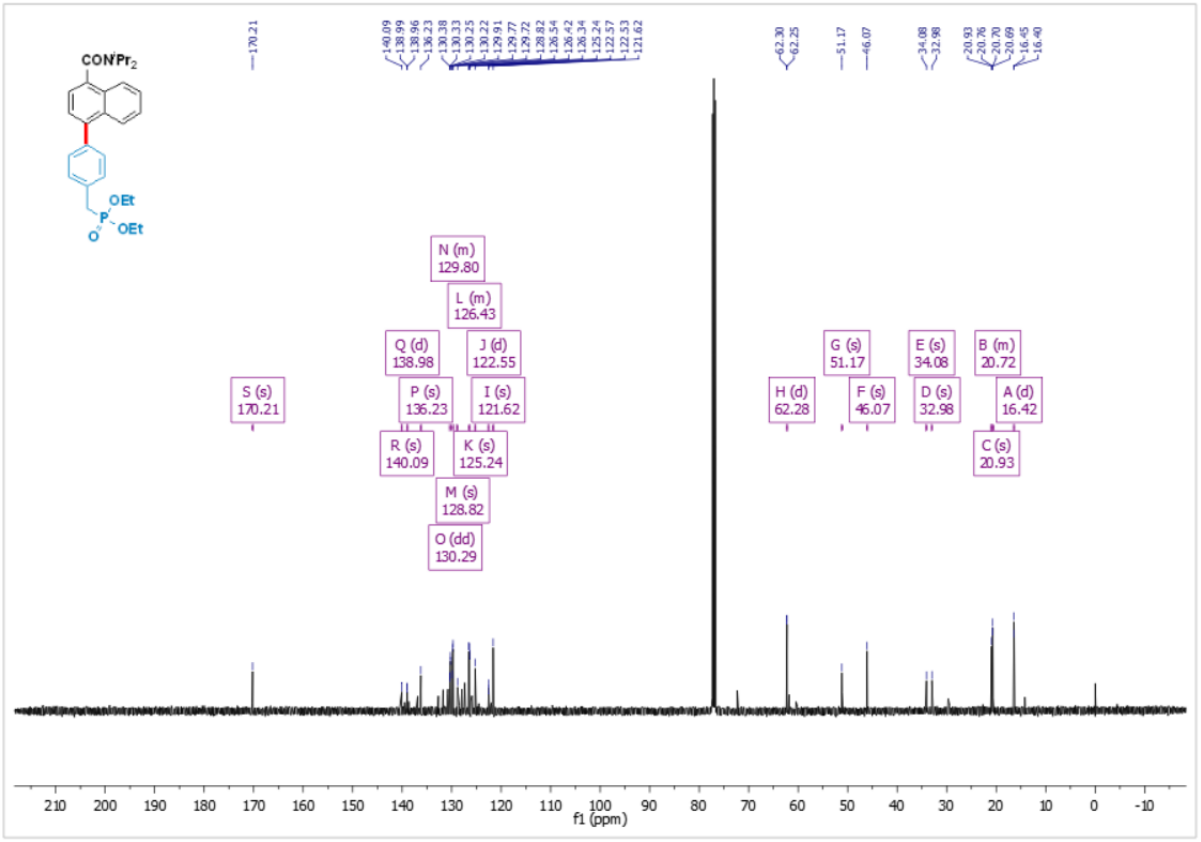

CONPr2
OAc
OAc
OAc
OAc
7.26 CDCl3
E (d) 7.44
B (m) 7.33
C (t) 7.88
A (d) 7.11
D (t) 7.50
T (d) 7.41
L (m) 5.32
K (m) 5.19
I (m) 4.19
G (m) 3.61
J (m) 4.32
F (m) 3.72
H (m) 3.93
R (s) 2.08
N (d) 1.65
P (d) 1.07
M (d) 1.73
O (d) 1.11
Q (s) 2.10
S (d) 2.05
1.91 1.17 0.95 1.95 2.00 2.08
2.71 2.24
1.18 1.32 1.22 1.12 1.21
2.98 3.40 5.93 3.32 3.26
3.05 3.37
13.0 12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

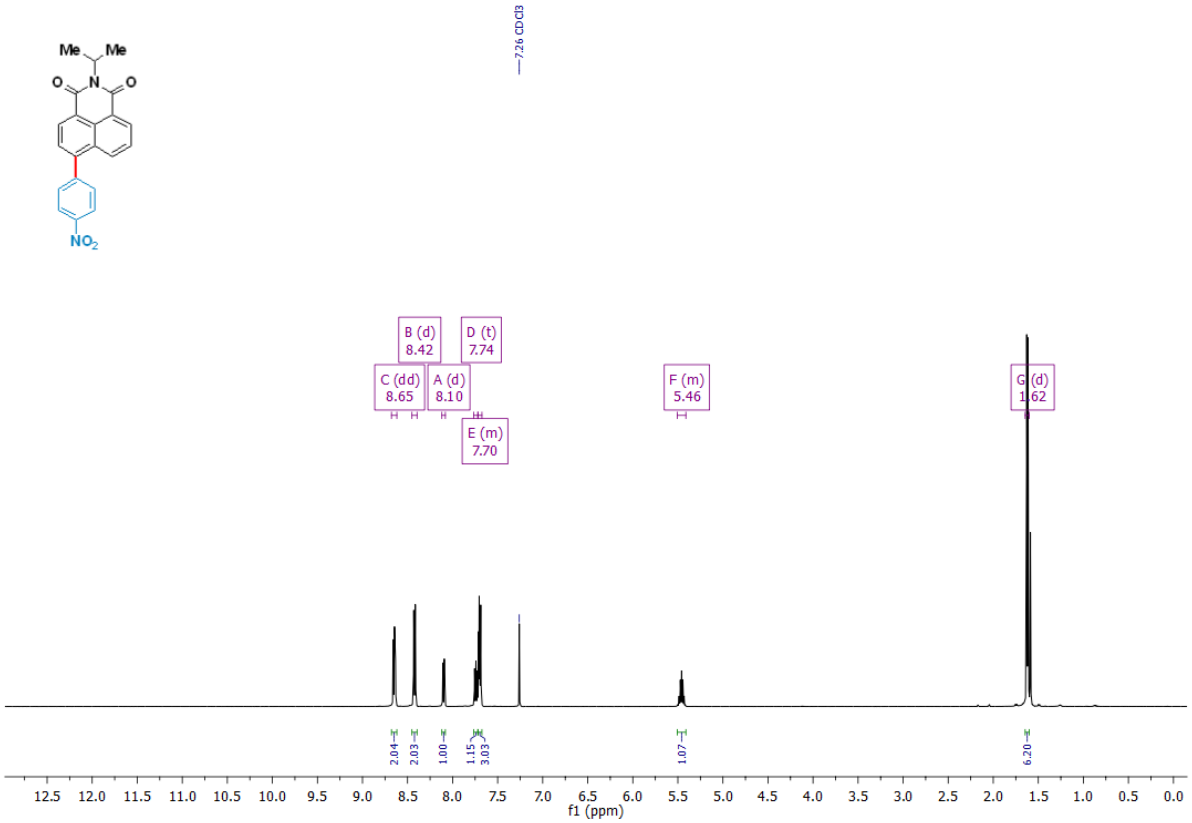

CONPr2
OAc
OAc
OAc
OAc
170.56 170.23 170.17 170.07 169.40 169.32
156.19
139.67 136.08 135.39 131.80 131.17 129.85 126.53 126.42 126.23 125.17 121.56 116.64
98.94
89.95
77.00 CDCl3
72.70 72.03 71.15 68.27
61.95
51.15
46.04
20.84 20.66 20.63 20.58 20.55
R (s) 131.17
Y (s) 170.23
V (s) 139.67
O (d) 126.32
I (s) 72.70
X (s) 169.40
T (s) 135.39
M (s) 121.56
K (s) 98.94
F (s) 68.27
D (s) 51.15
B (m) 20.96
Z (s) 170.56
W (s) 156.19
Q (s) 129.85
L (s) 116.64
J (s) 89.95
H (s) 72.03
E (s) 61.95
C (s) 46.04
A (m) 20.65
A1 (s) 169.32
U (s) 136.08
N (s) 125.17
G (s) 71.15
B1 (s) 170.17
P (s) 126.53
S (s) 131.80
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

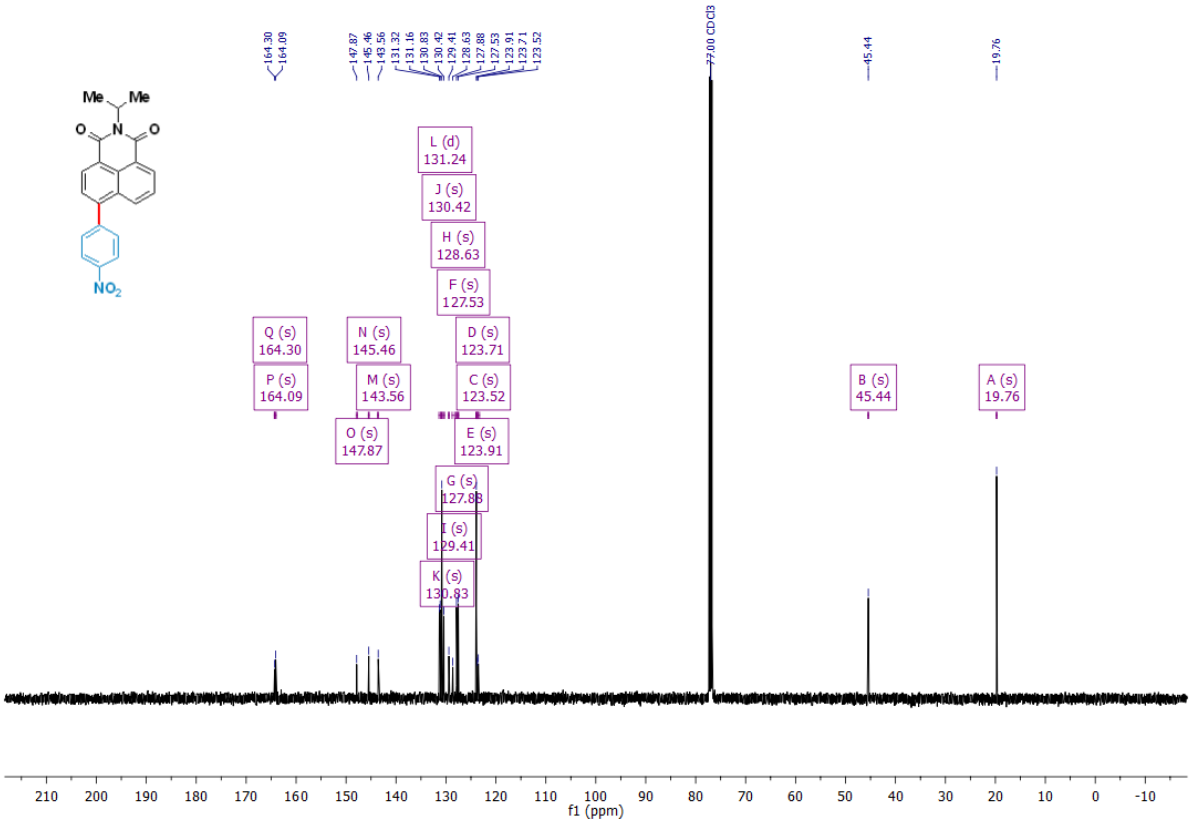

CON^{i}Pr$_2$
7.26 CDCl3
D (d) 7.62
B (d) 7.92
G (m) 7.39
A (d) 8.00
F (t) 7.47
C (d) 7.80
E (t) 7.55
I (m) 3.63
H (m) 3.71
J (m) 3.27
R (d) 1.69
P (d) 1.55
N (m) 1.86
M (d) 1.12
K (d) 1.75
L (d) 1.09
O (d) 1.67
Q (m) 1.26
f1 (ppm)

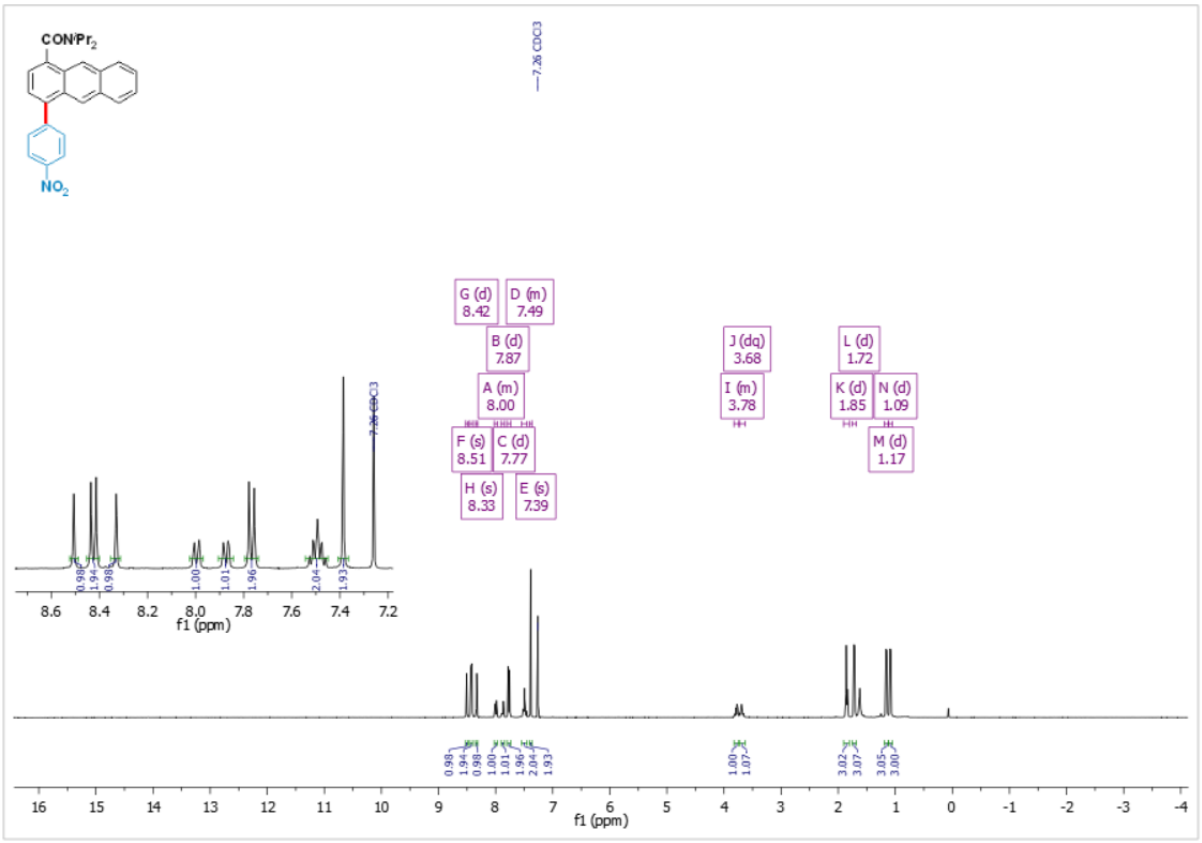

CON^{i}Pr$_2$
O (s) 131.36
M (s) 129.92
S (s) 144.75
K (s) 126.50
Q (s) 138.61
I (s) 125.44
T (s) 169.82
P (s) 137.14
H (s) 121.53
R (s) 140.52
J (s) 125.77
L (t) 126.91
N (s) 130.67
F (s) 51.19
B (s) 24.66
E (s) 46.12
D (s) 34.09
A (m) 20.76
G (s) 52.78
C (s) 25.15
f1 (ppm)

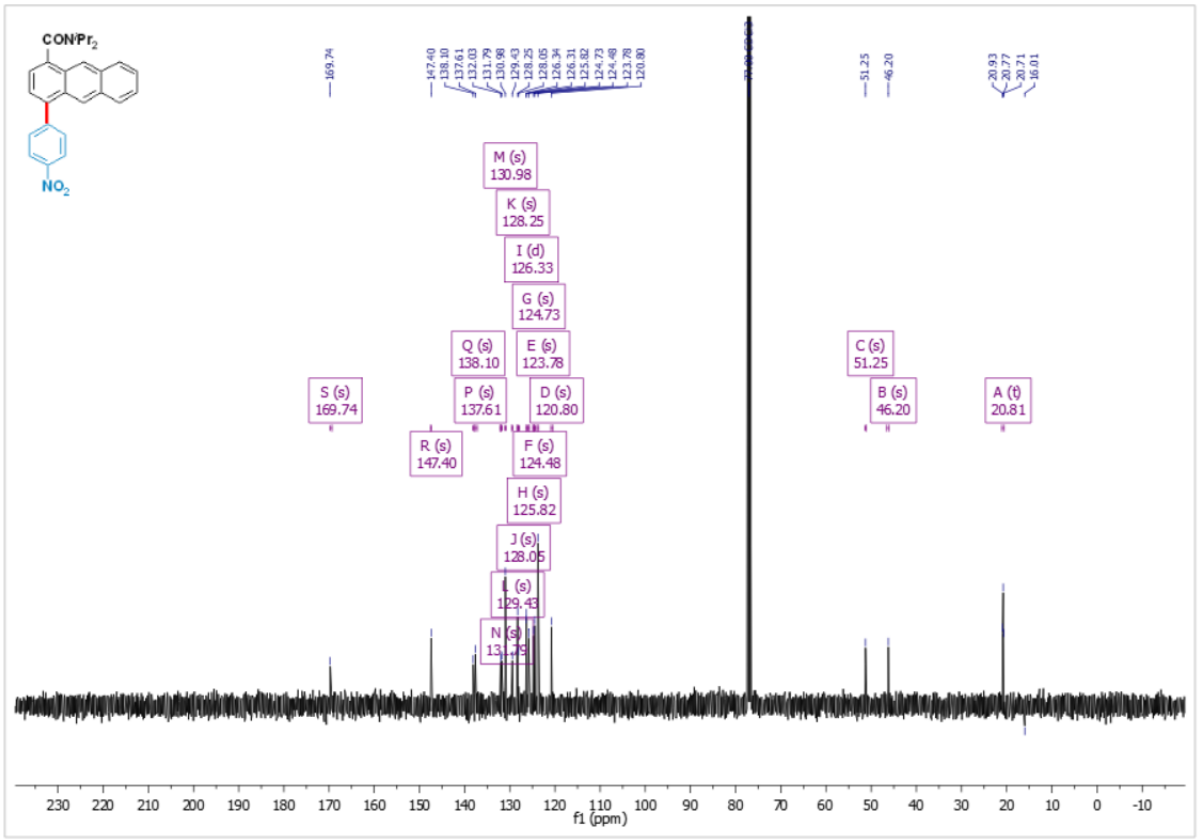

CONiPr2
OEt
OEt
J (m) 7.54
H (ddd) 7.36
G (m) 7.91
I (m) 7.47
K (dd) 7.67
L (ddd) 3.76
F (m) 4.11
E (dd) 3.25
M (m) 3.65
B (t) 1.76
A (d) 1.69
C (dt) 1.12
D (m) 1.31
f1 (ppm)

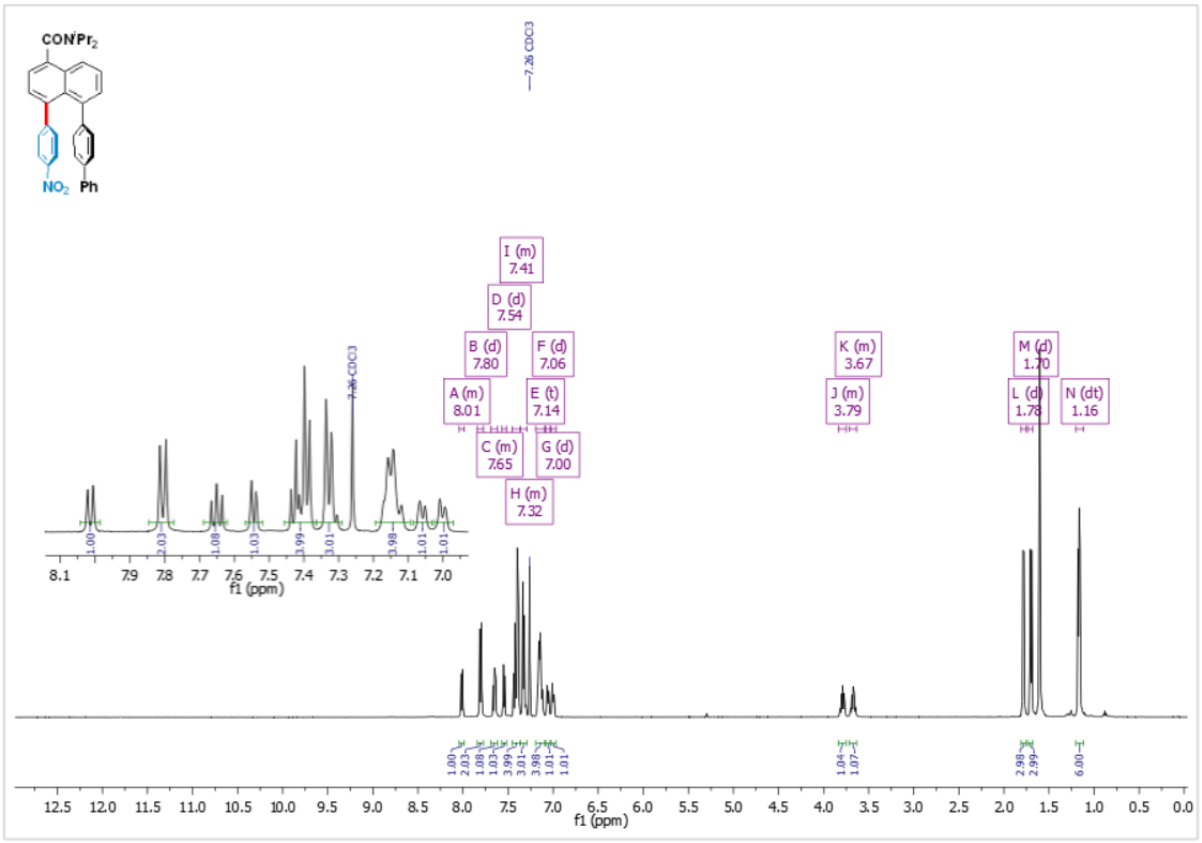

CONiPr2
OEt
OEt
N (m) 129.80
L (m) 126.43
Q (d) 138.98
J (d) 122.55
S (s) 170.21
P (s) 136.23
I (s) 121.62
R (s) 140.09
K (s) 125.24
M (s) 128.82
O (dd) 130.29
G (s) 51.17
E (s) 34.08
B (m) 20.72
H (d) 62.28
F (s) 46.07
D (s) 32.98
A (d) 16.42
C (s) 20.93
f1 (ppm)

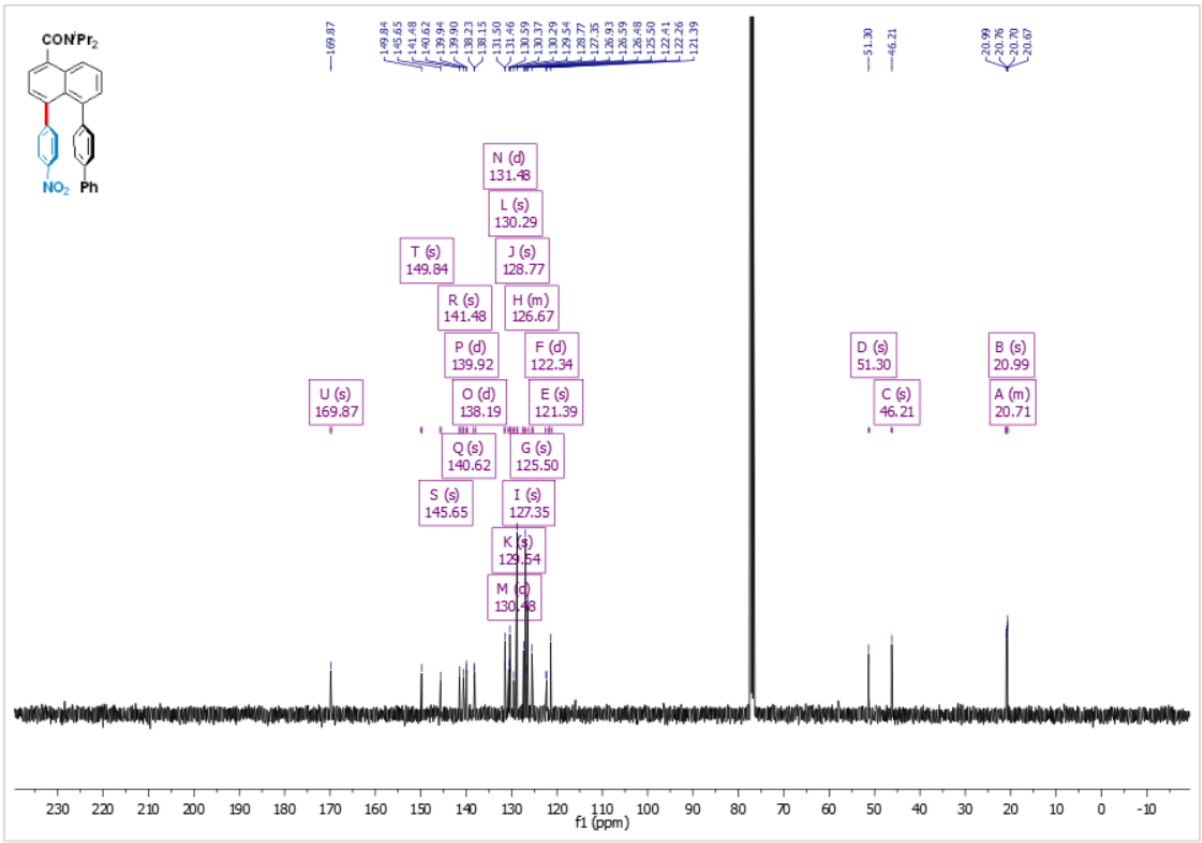

Me
Me
O
N
O
NO2
7.26 CDCl3
B (d) 8.42
D (t) 7.74
C (dd) 8.65
A (d) 8.10
E (m) 7.70
F (m) 5.46
G (d) 1.62
2.04
2.03
1.00
1.15
3.03
1.07
6.20
f1 (ppm)

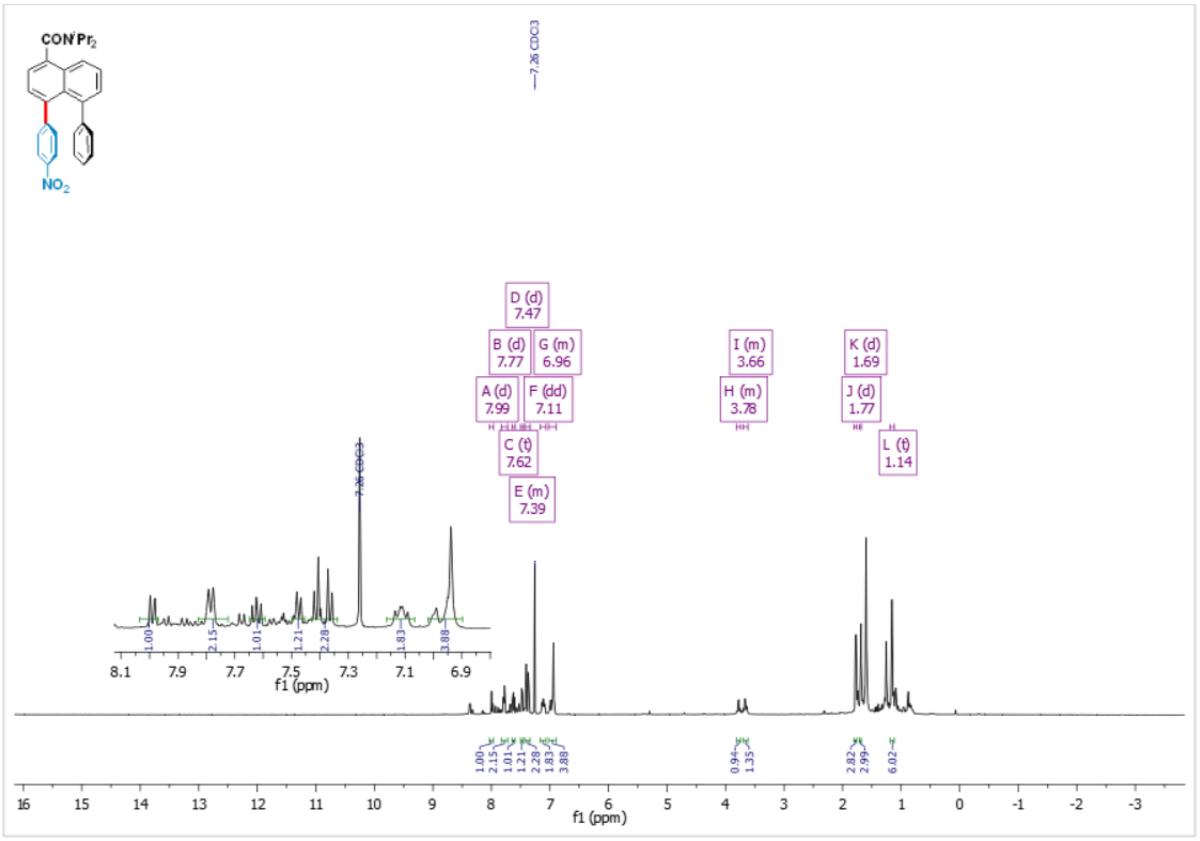

Me
Me
O
N
O
NO2
164.30
164.09
147.87
145.46
143.56
131.32
131.16
130.83
130.42
129.41
128.63
127.88
127.53
123.91
123.71
123.52
77.00 CDCl3
45.44
19.76
L (d) 131.24
J (s) 130.42
H (s) 128.63
F (s) 127.53
Q (s) 164.30
N (s) 145.46
D (s) 123.71
P (s) 164.09
M (s) 143.56
C (s) 123.52
O (s) 147.87
E (s) 123.91
G (s) 127.88
I (s) 129.41
K (s) 130.83
B (s) 45.44
A (s) 19.76
f1 (ppm)

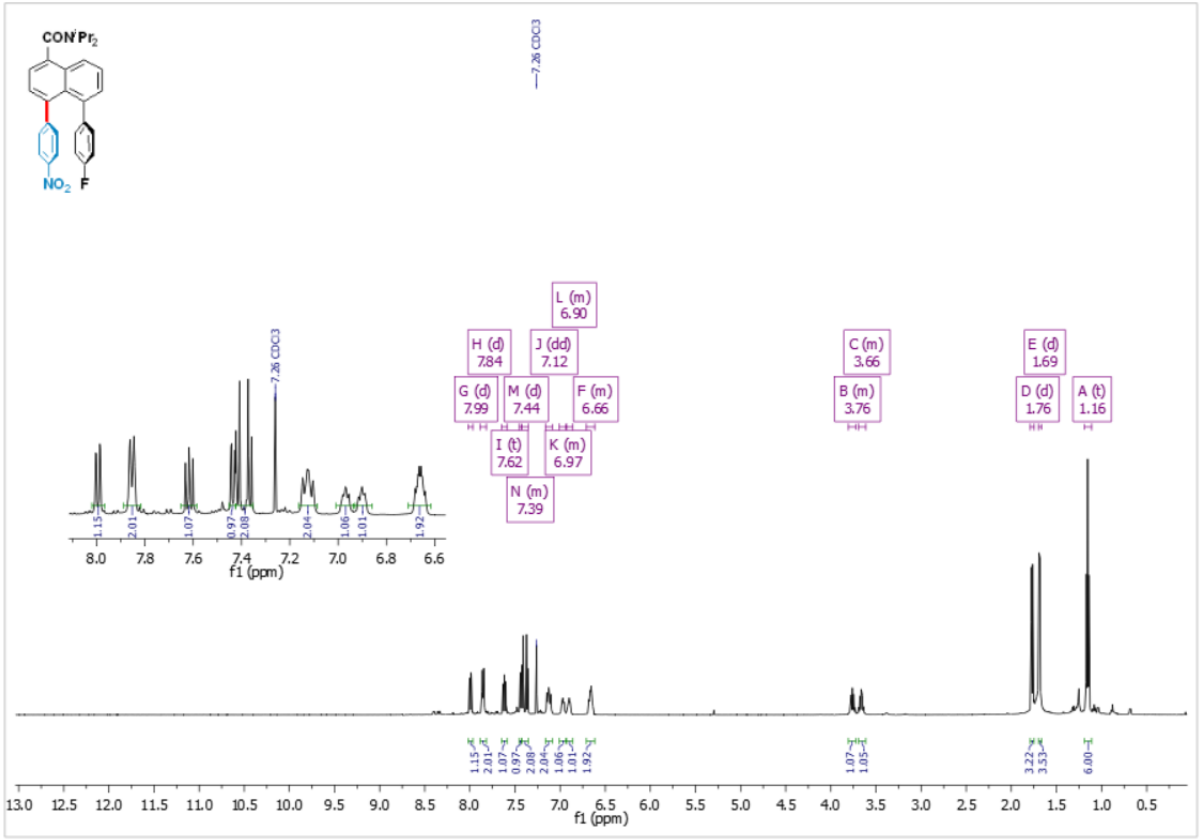

CONiPr2
NO2
7.26 CDCl3
G (d) 8.42
D (m) 7.49
B (d) 7.87
A (m) 8.00
F (s) 8.51
C (d) 7.77
H (s) 8.33
E (s) 7.39
J (dq) 3.68
I (m) 3.78
L (d) 1.72
K (d) 1.85
N (d) 1.09
M (d) 1.17
f1 (ppm)

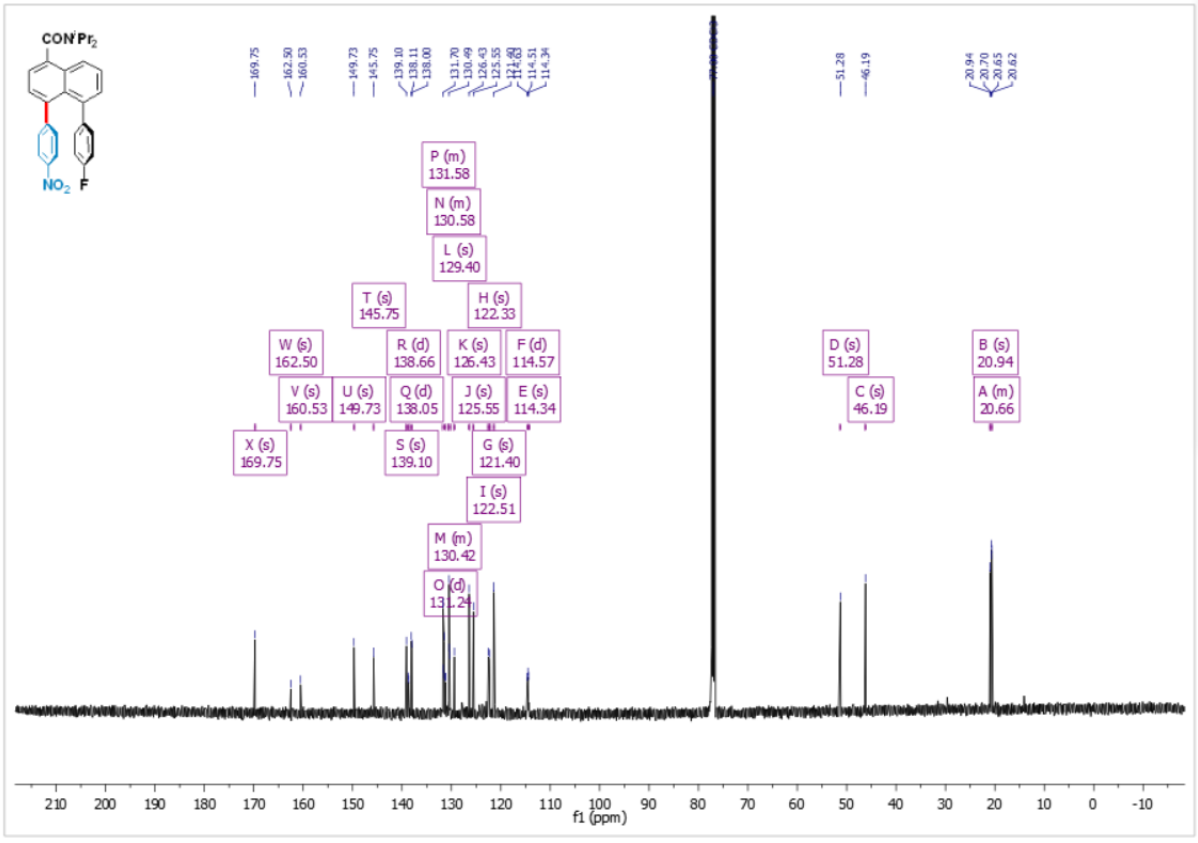

CONiPr2
NO2
169.74
147.40
138.10
137.61
132.03
131.79
130.98
129.43
128.25
128.05
126.34
126.31
125.82
124.73
124.48
123.78
120.80
51.25
46.20
20.93
20.77
20.71
16.01
M (s) 130.98
K (s) 128.25
I (d) 126.33
G (s) 124.73
Q (s) 138.10
E (s) 123.78
C (s) 51.25
S (s) 169.74
P (s) 137.61
D (s) 120.80
B (s) 46.20
A (t) 20.81
R (s) 147.40
F (s) 124.48
H (s) 125.82
J (s) 128.05
L (s) 129.43
N (s) 131.79
f1 (ppm)

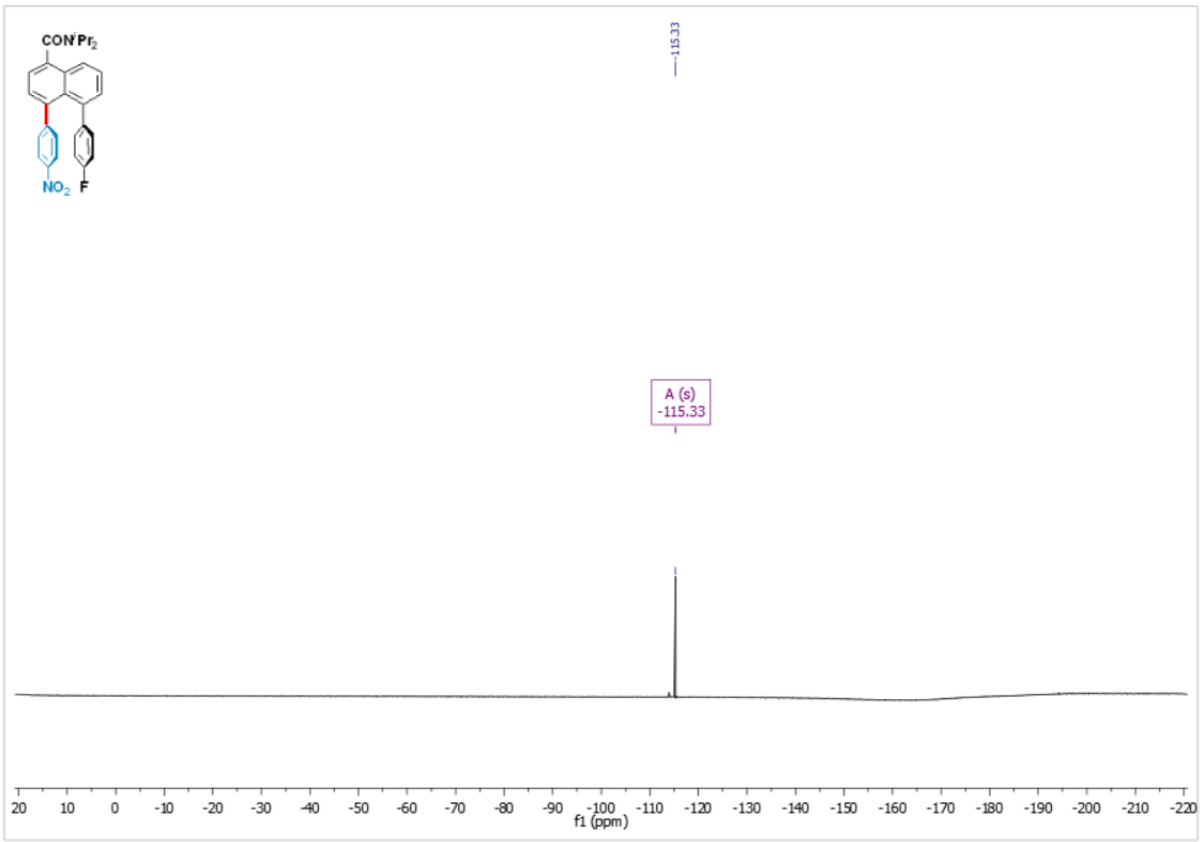

CONiPr2
NO2
Ph
I (m) 7.41
D (d) 7.54
B (d) 7.80
F (d) 7.06
A (m) 8.01
E (t) 7.14
C (m) 7.65
G (d) 7.00
H (m) 7.32
K (m) 3.67
J (m) 3.79
M (d) 1.70
L (d) 1.78
N (dt) 1.16
f1 (ppm)

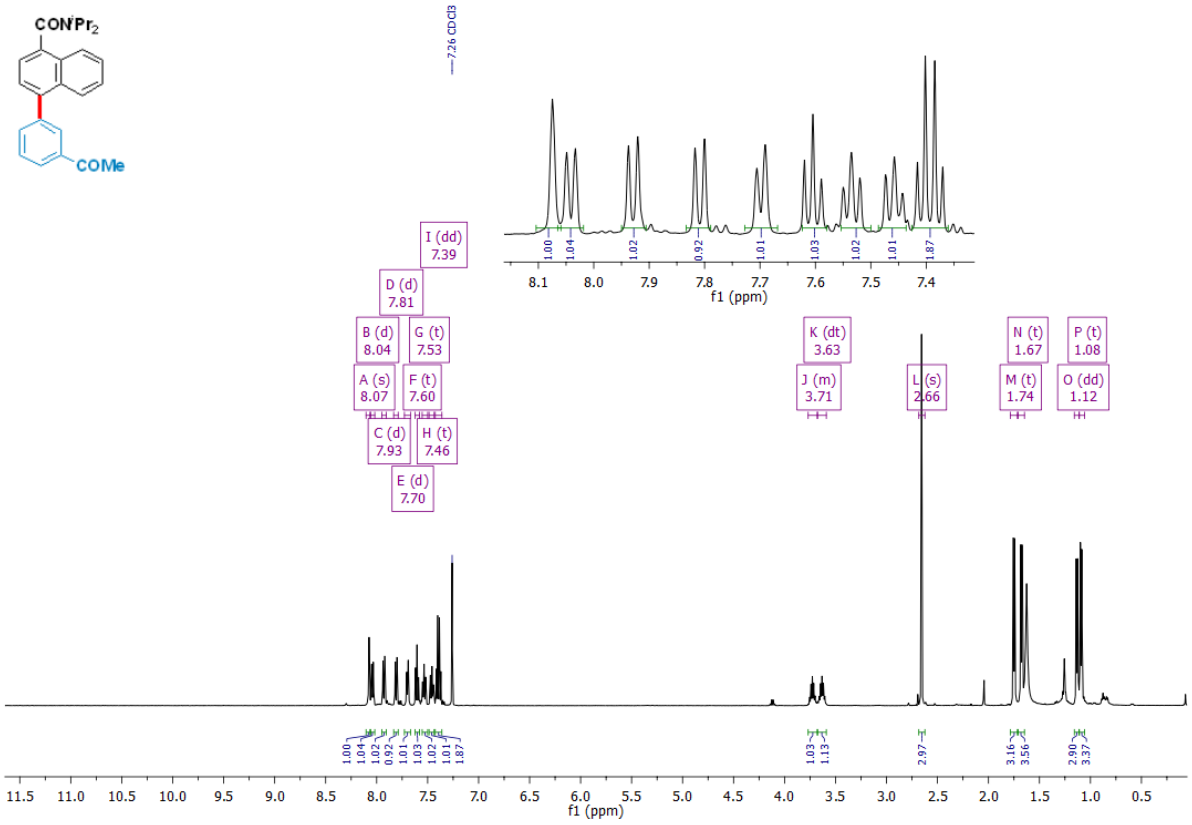

CONiPr2
NO2
Ph
N (d) 131.48
L (s) 130.29
T (s) 149.84
J (s) 128.77
R (s) 141.48
H (m) 126.67
P (d) 139.92
F (d) 122.34
U (s) 169.87
O (d) 138.19
E (s) 121.39
Q (s) 140.62
G (s) 125.50
S (s) 145.65
I (s) 127.35
K (s) 129.54
M (d) 130.48
D (s) 51.30
C (s) 46.21
B (s) 20.99
A (m) 20.71
f1 (ppm)

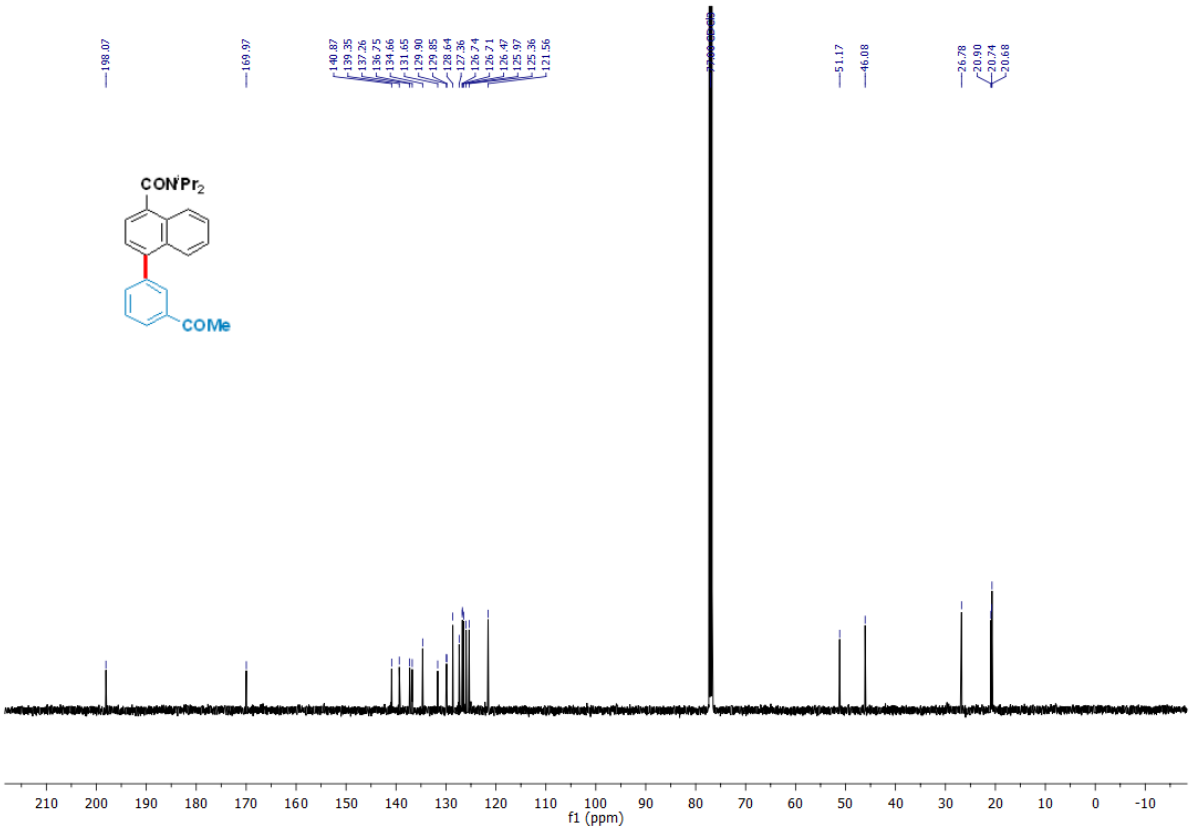

CONiPr2
NO2
7.26 CDCl3
D (d) 7.47
B (d) 7.77
G (m) 6.96
A (d) 7.99
F (dd) 7.11
C (t) 7.62
E (m) 7.39
I (m) 3.66
H (m) 3.78
K (d) 1.69
J (d) 1.77
L (t) 1.14
f1 (ppm)

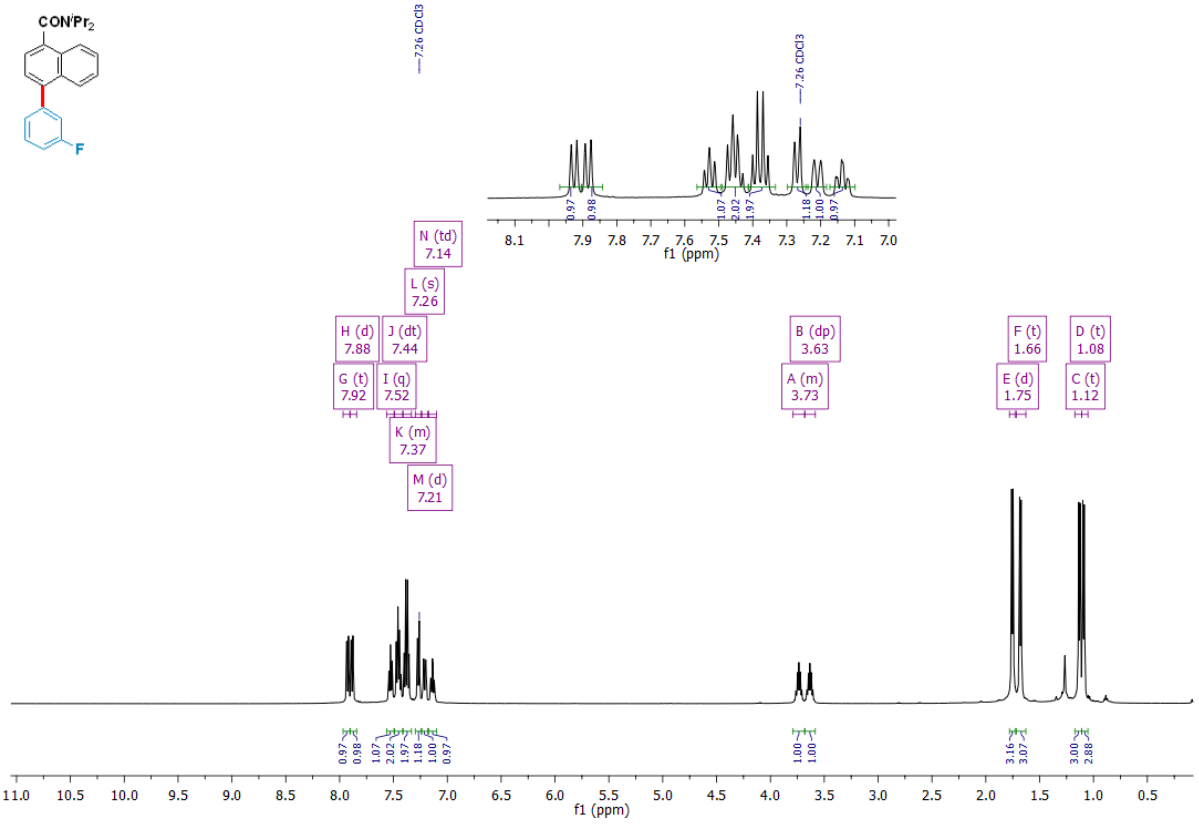

CONiPr2
NO2
F
7.26 CDCl3
L (m) 6.90
H (d) 7.84
J (dd) 7.12
G (d) 7.99
M (d) 7.44
F (m) 6.66
I (t) 7.62
K (m) 6.97
N (m) 7.39
C (m) 3.66
B (m) 3.76
E (d) 1.69
D (d) 1.76
A (t) 1.16
f1 (ppm)

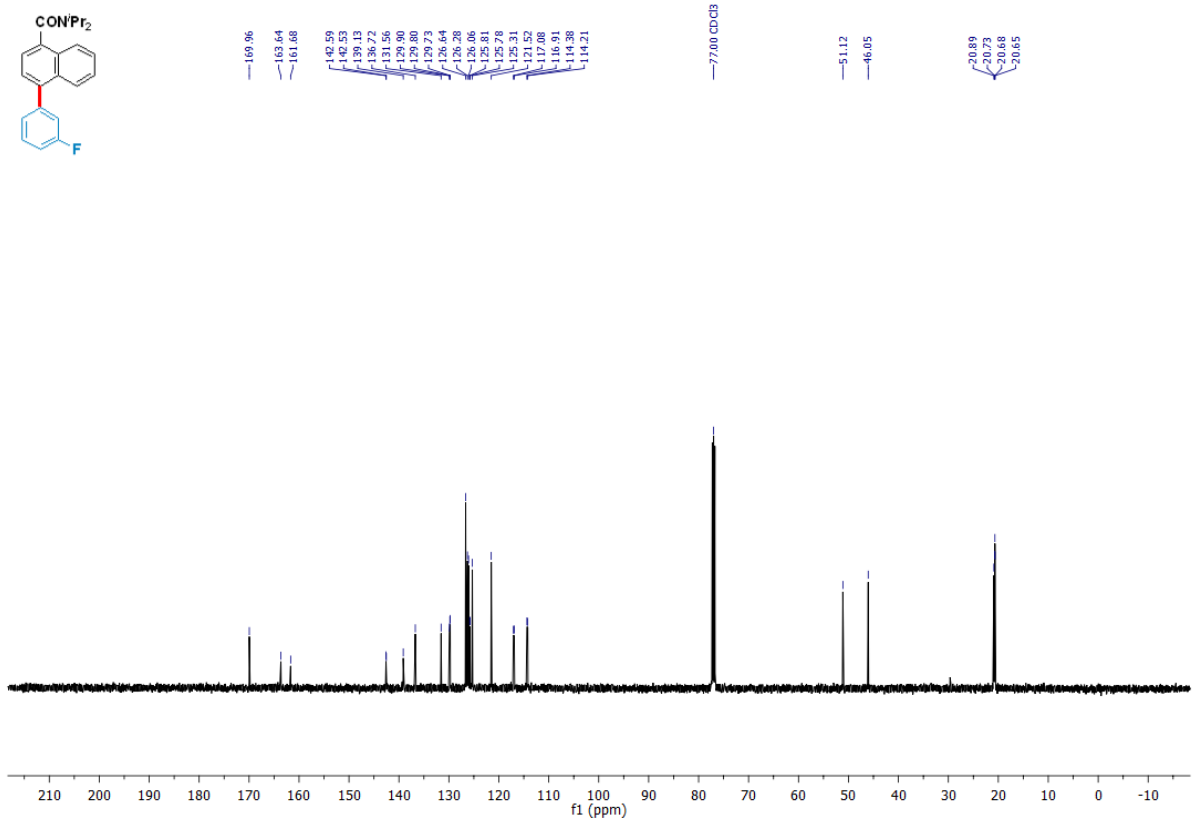

CONiPr2
NO2
F
169.75
162.50
160.53
149.73
145.75
139.10
138.11
138.00
131.70
130.49
126.43
125.55
114.51
114.34
51.28
46.19
20.94
20.70
20.65
20.62
P (m) 131.58
N (m) 130.58
L (s) 129.40
T (s) 145.75
H (s) 122.33
W (s) 162.50
R (d) 138.66
K (s) 126.43
F (d) 114.57
V (s) 160.53
U (s) 149.73
Q (d) 138.05
J (s) 125.55
E (s) 114.34
X (s) 169.75
S (s) 139.10
G (s) 121.40
I (s) 122.51
M (m) 130.42
O (d) 131.24
D (s) 51.28
C (s) 46.19
B (s) 20.94
A (m) 20.66
f1 (ppm)

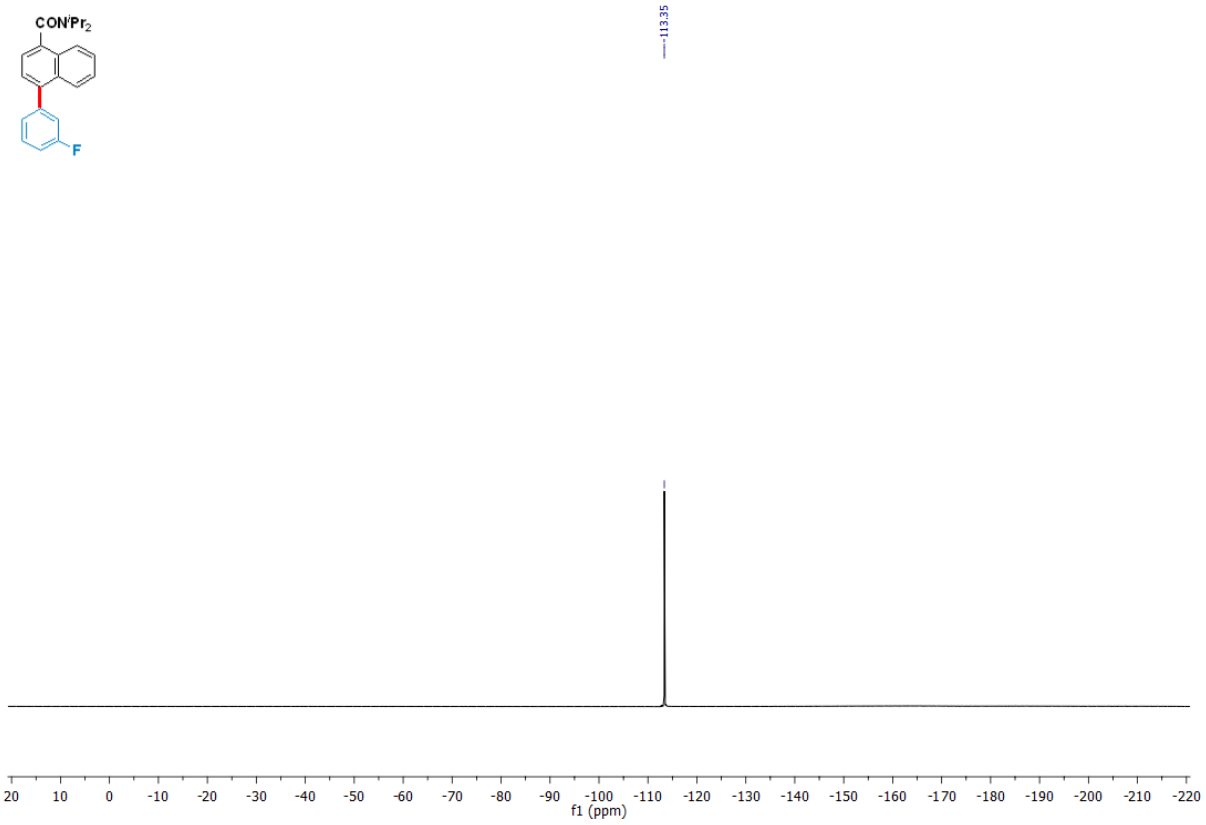

CONiPr2
NO2
F
-115.33
A (s) -115.33
f1 (ppm)

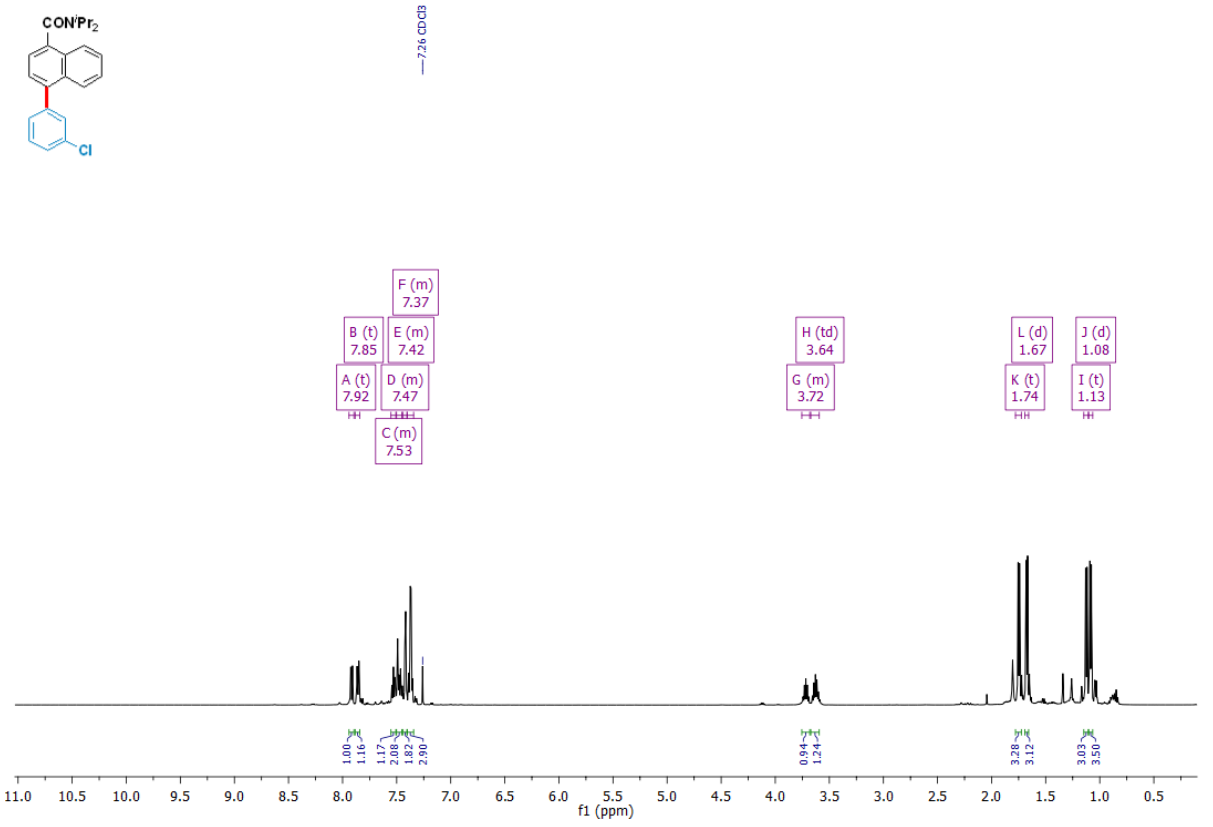

CONiPr2
COMe
7.26 CDCl3
I (dd) 7.39
D (d) 7.81
B (d) 8.04
G (t) 7.53
A (s) 8.07
F (t) 7.60
C (d) 7.93
H (t) 7.46
E (d) 7.70
K (dt) 3.63
J (m) 3.71
L (s) 2.66
N (t) 1.67
M (t) 1.74
P (t) 1.08
O (dd) 1.12
f1 (ppm)

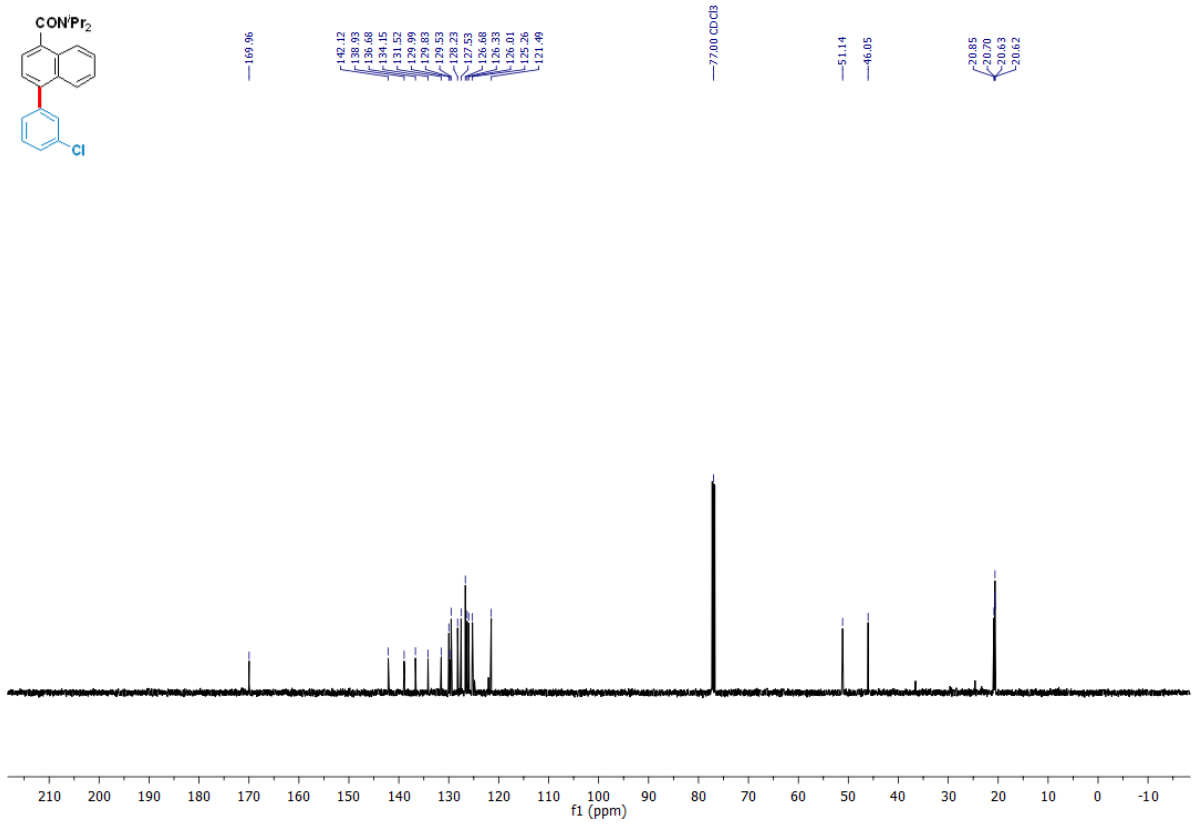

198.07
169.97
140.87
139.35
137.26
136.75
134.66
131.65
129.90
129.85
128.64
127.36
126.74
126.71
126.47
125.97
125.36
121.56
51.17
46.08
26.78
20.90
20.74
20.68
CONiPr2
COMe
f1 (ppm)

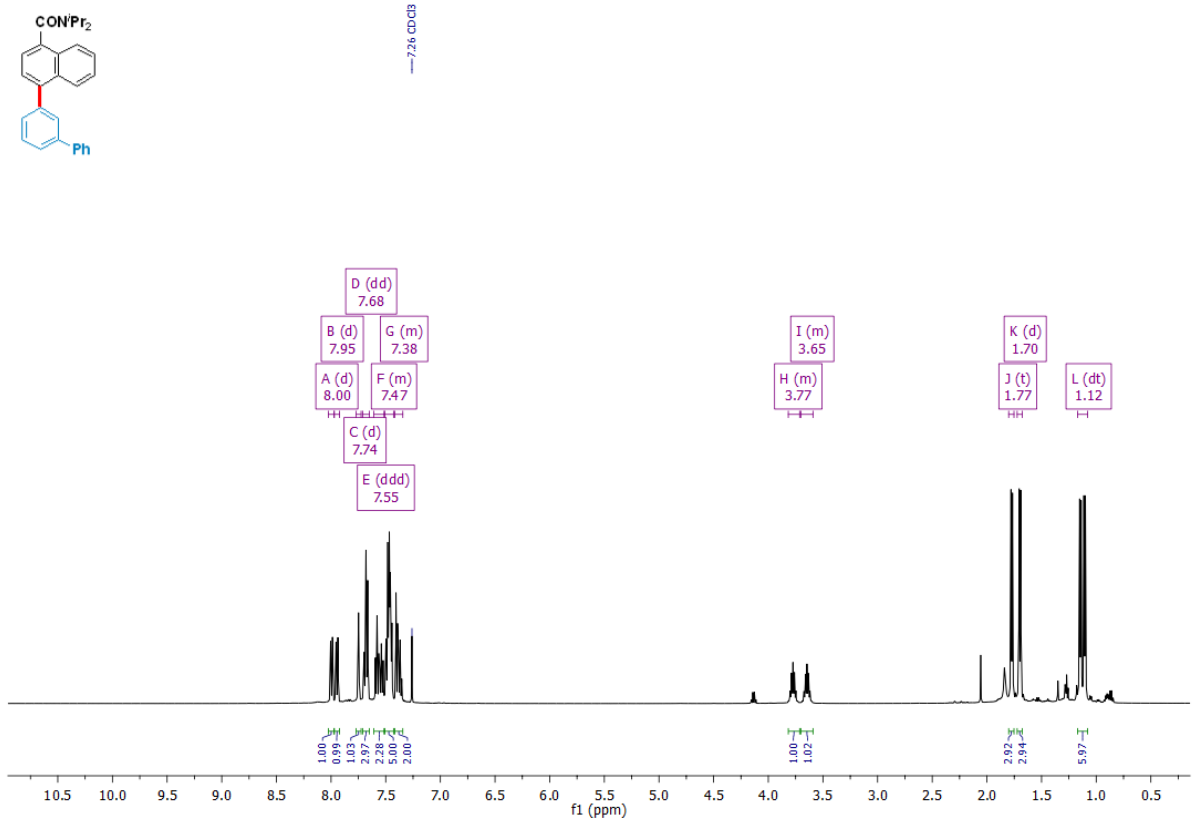

CONiPr2
F
7.26 CDCl3
N (td) 7.14
L (s) 7.26
H (d) 7.88
J (dt) 7.44
G (t) 7.92
I (q) 7.52
K (m) 7.37
M (d) 7.21
B (dp) 3.63
A (m) 3.73
F (t) 1.66
E (d) 1.75
D (t) 1.08
C (t) 1.12
f1 (ppm)

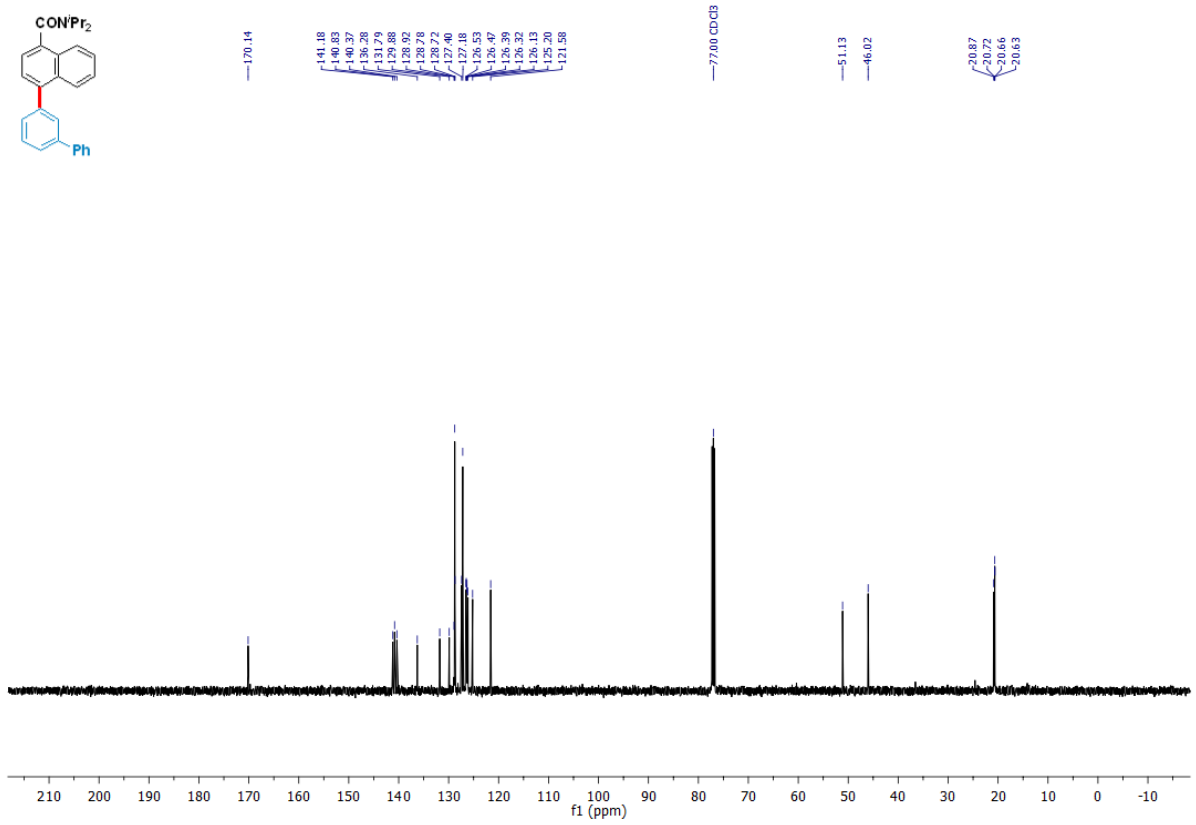

CONiPr2
F
169.96
163.64
161.68
142.59
142.53
139.13
136.72
131.56
129.90
129.80
129.73
126.64
126.28
126.06
125.81
125.78
125.31
121.52
117.08
116.91
114.38
114.21
77.00 CDCl3
51.12
46.05
20.89
20.73
20.68
20.65
f1 (ppm)

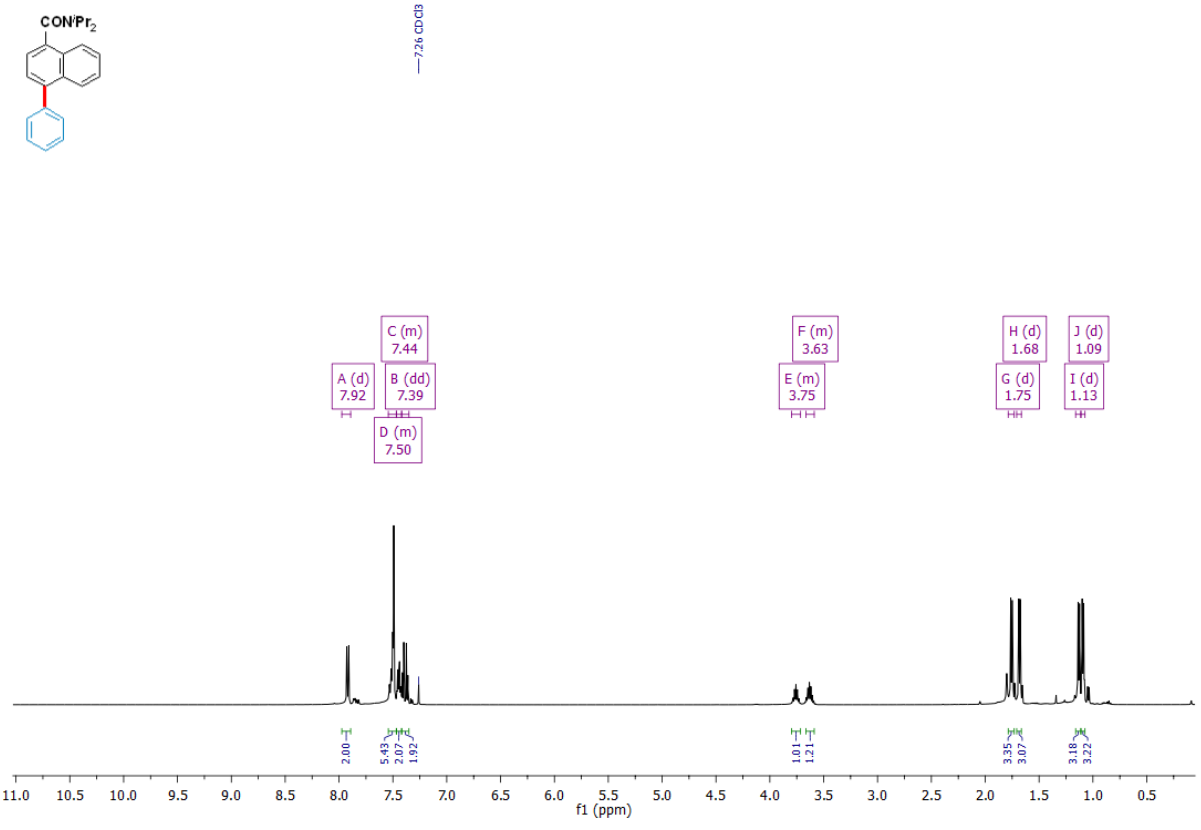

CONiPr2
F
-113.35
20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220
f1 (ppm)

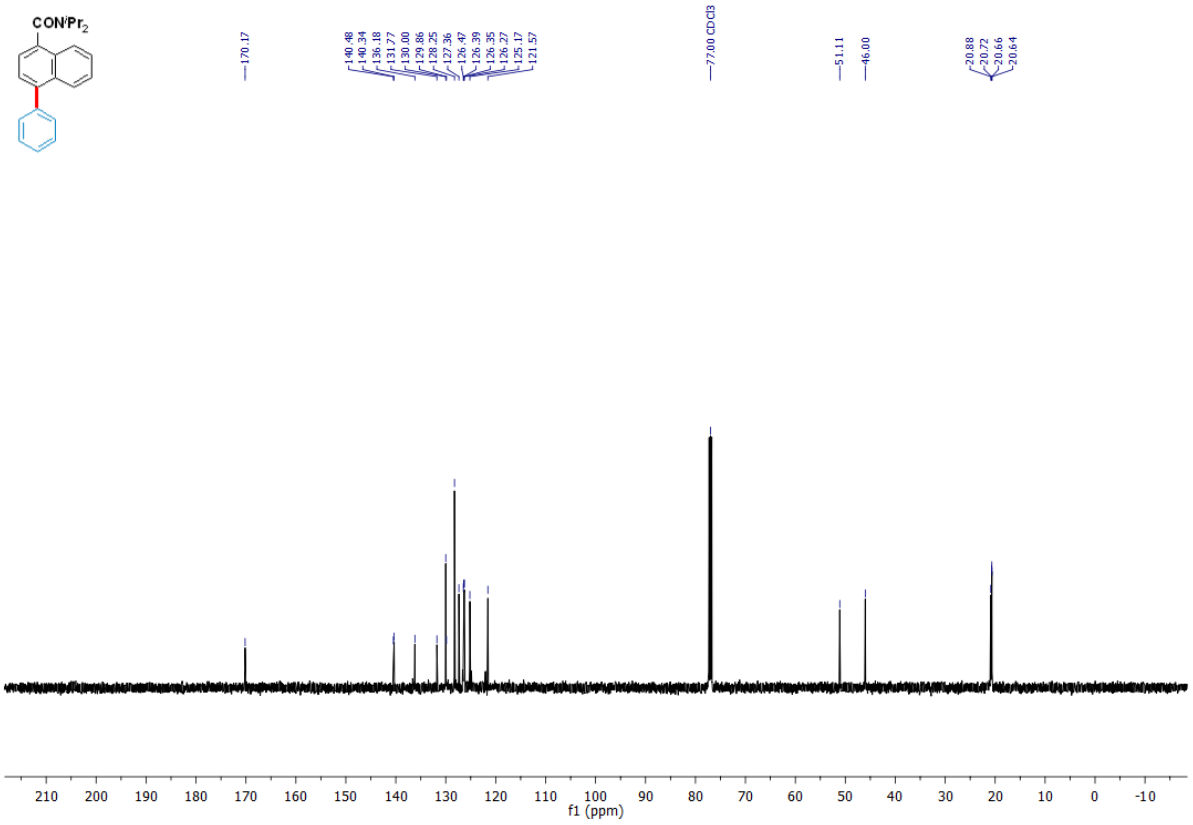

CONiPr2
Cl
7.26 CDCl3
F (m) 7.37
B (t) 7.85
E (m) 7.42
A (t) 7.92
D (m) 7.47
C (m) 7.53
H (td) 3.64
G (m) 3.72
L (d) 1.67
J (d) 1.08
K (t) 1.74
I (t) 1.13
1.00 1.16 1.17 2.08 1.82 2.90 0.94 1.24 3.28 3.12 3.03 3.50
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

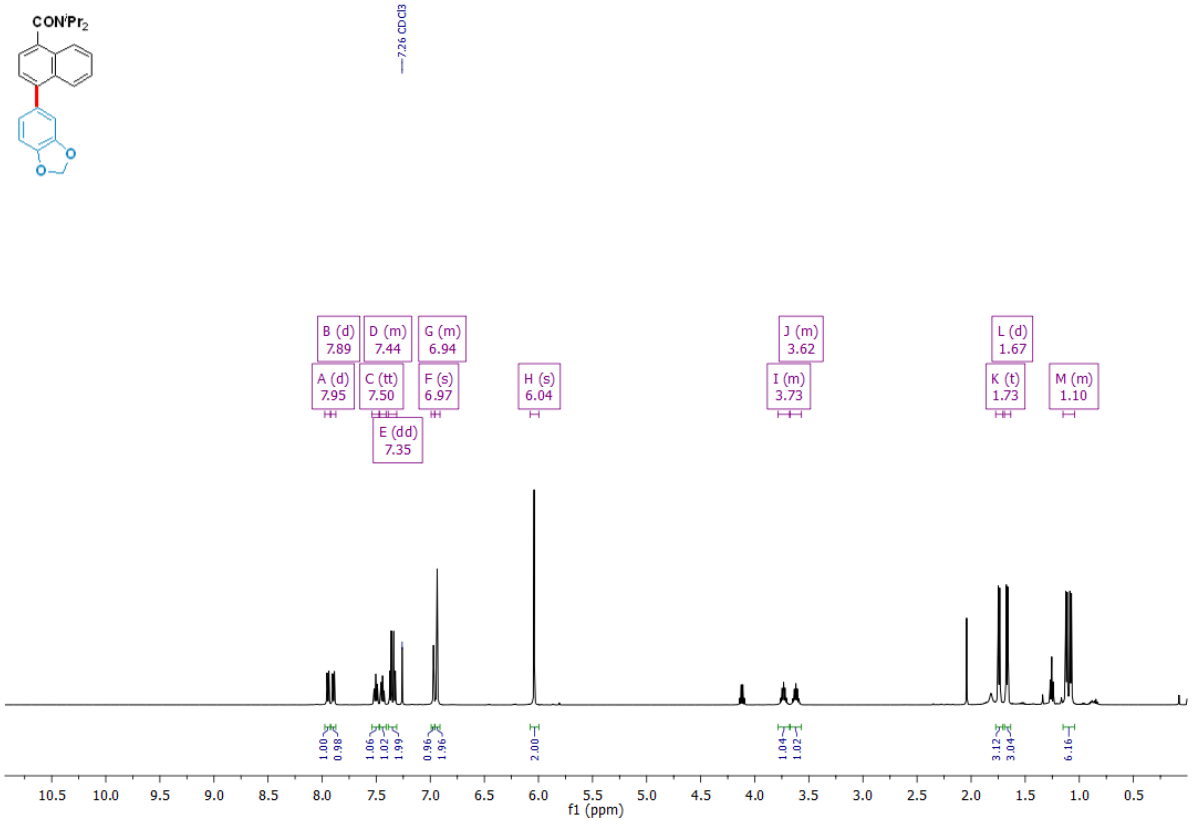

CONiPr2
Cl
169.96
142.12
138.93
136.68
134.15
131.52
129.99
129.83
129.53
128.23
127.53
126.68
126.33
126.01
125.26
121.49
77.00 CDCl3
51.14
46.05
20.85
20.70
20.63
20.62
f1 (ppm)

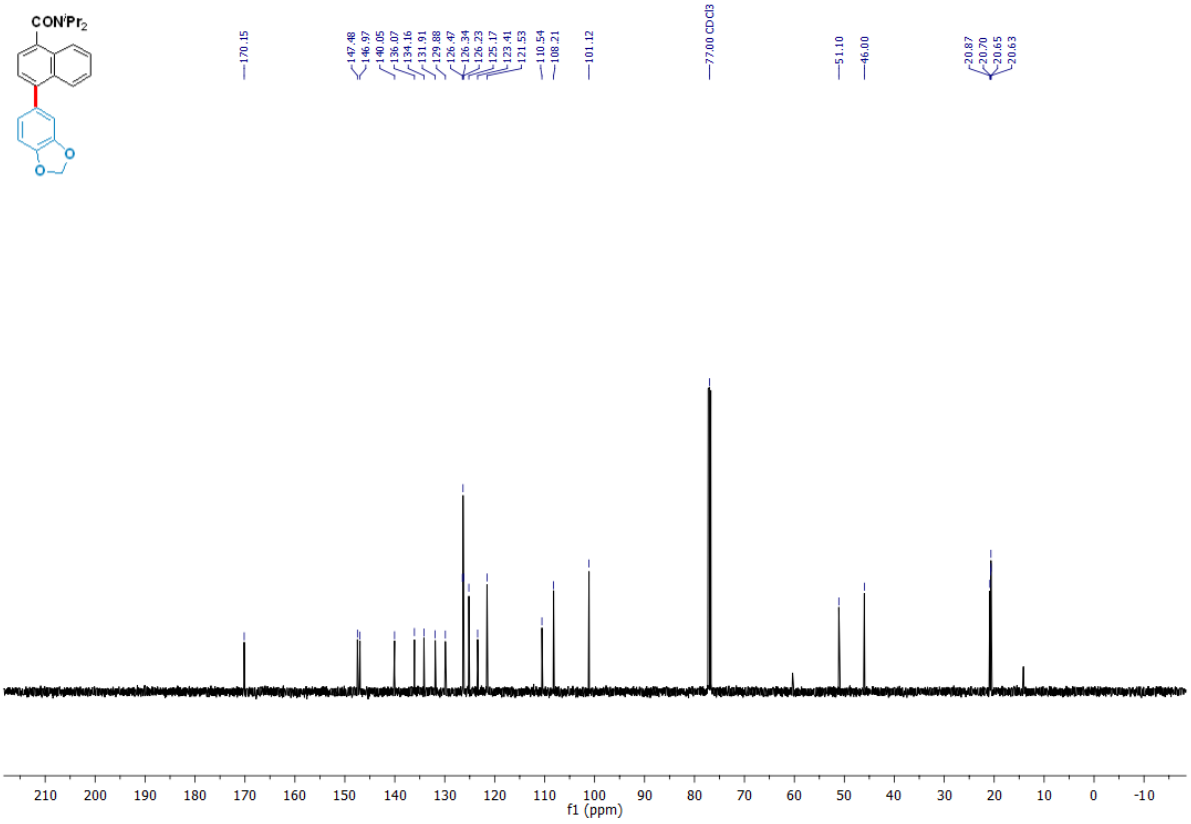

CONiPr2
Ph
7.26 CDCl3
D (dd) 7.68
B (d) 7.95
G (m) 7.38
A (d) 8.00
F (m) 7.47
C (d) 7.74
E (ddd) 7.55
I (m) 3.65
H (m) 3.77
K (d) 1.70
J (t) 1.77
L (dt) 1.12
1.00
0.99
1.03
2.97
2.28
5.60
2.00
1.00
1.02
2.92
2.94
5.97
f1 (ppm)

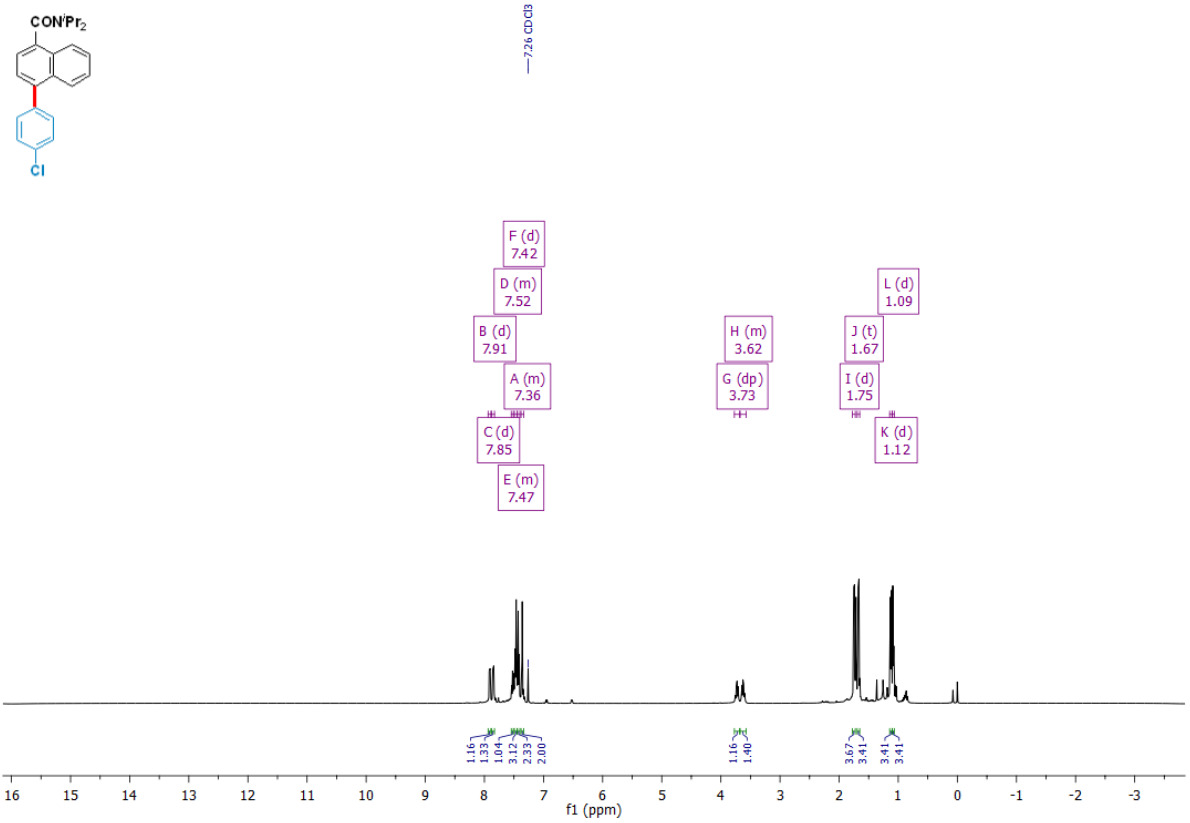

CONiPr2
Ph
170.14
141.18
140.83
140.37
136.28
131.79
129.88
128.92
128.78
128.72
127.40
127.18
126.53
126.47
126.39
126.32
126.13
125.20
121.58
77.00 CDCl3
51.13
46.02
20.87
20.72
20.66
20.63
f1 (ppm)

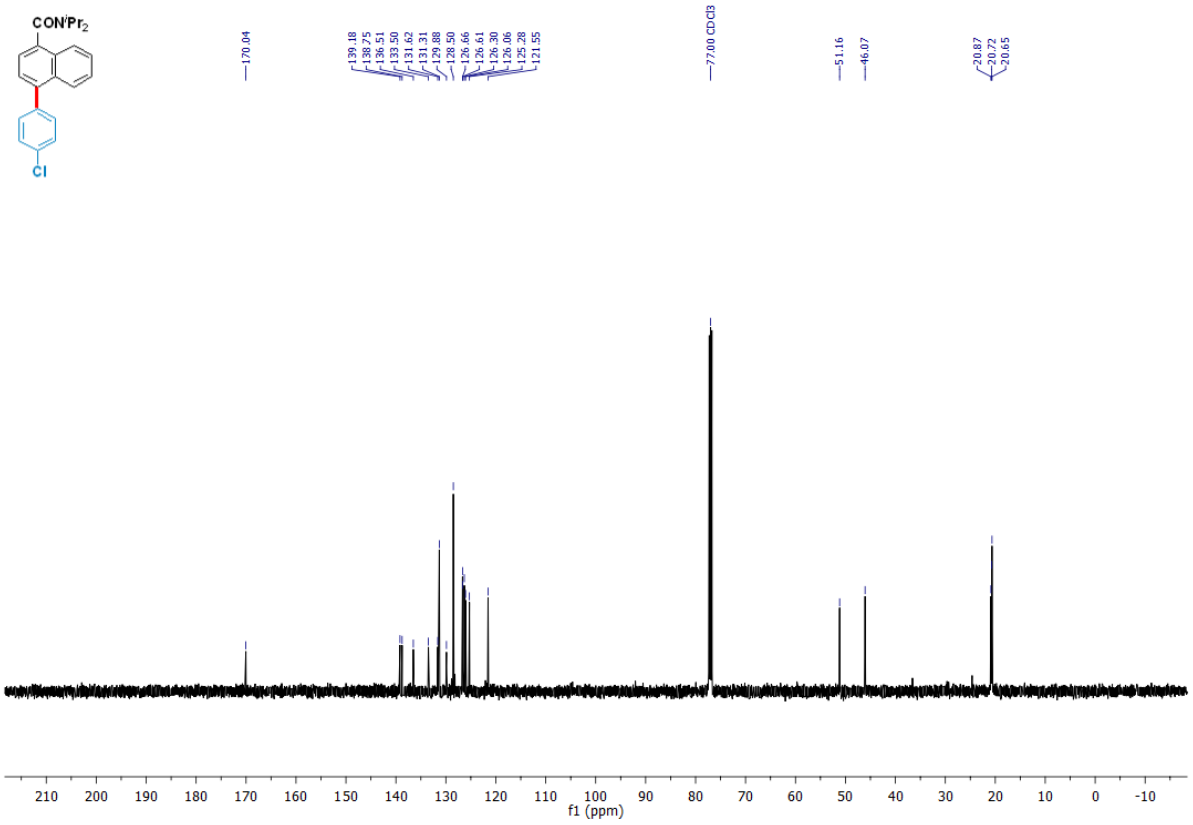

CONiPr2
7.26 CDCl3
A (d) 7.92
B (dd) 7.39
C (m) 7.44
D (m) 7.50
E (m) 3.75
F (m) 3.63
G (d) 1.75
H (d) 1.68
I (d) 1.13
J (d) 1.09
2.00
5.43
2.07
1.92
1.01
1.21
3.35
3.07
3.18
3.22
f1 (ppm)

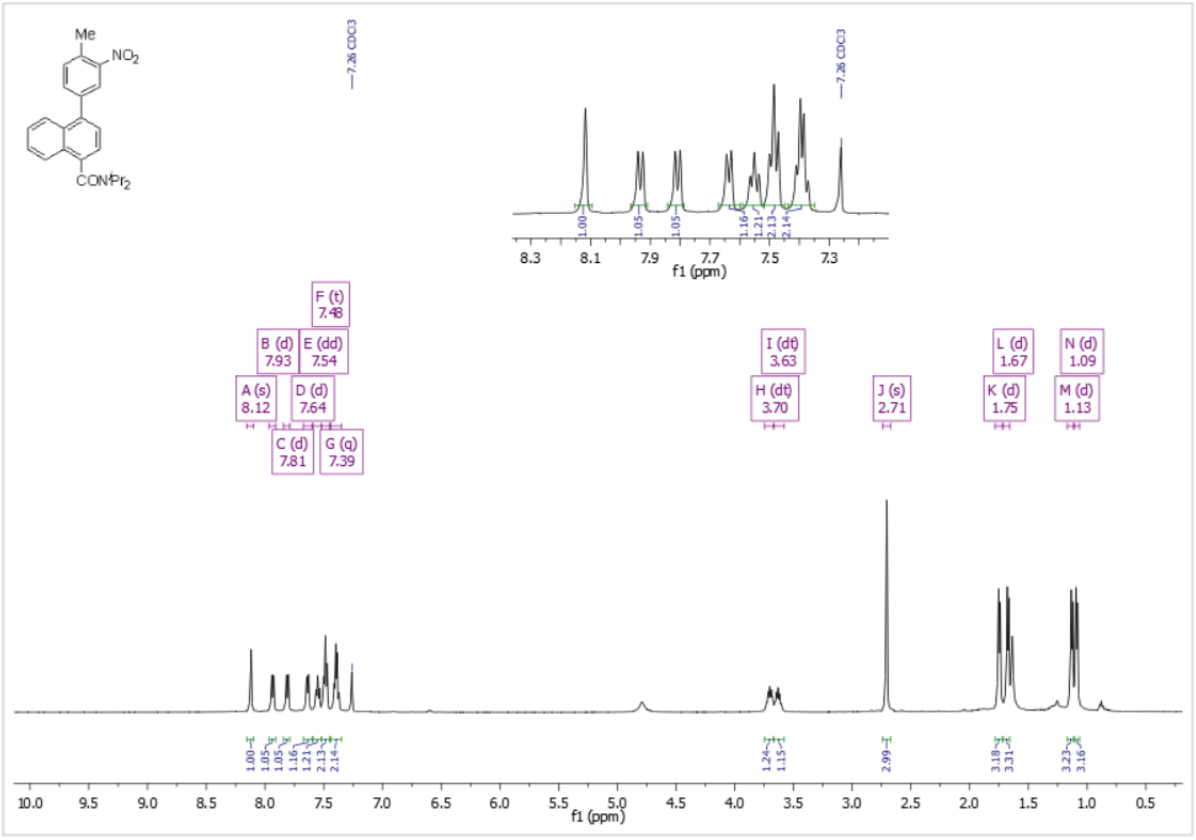

CON^{i}Pr$_2$
170.17
140.48
140.34
136.18
131.77
130.00
129.86
128.25
127.36
126.47
126.39
126.35
126.27
125.17
121.57
77.00 CDCl3
51.11
46.00
20.88
20.72
20.66
20.64
f1 (ppm)

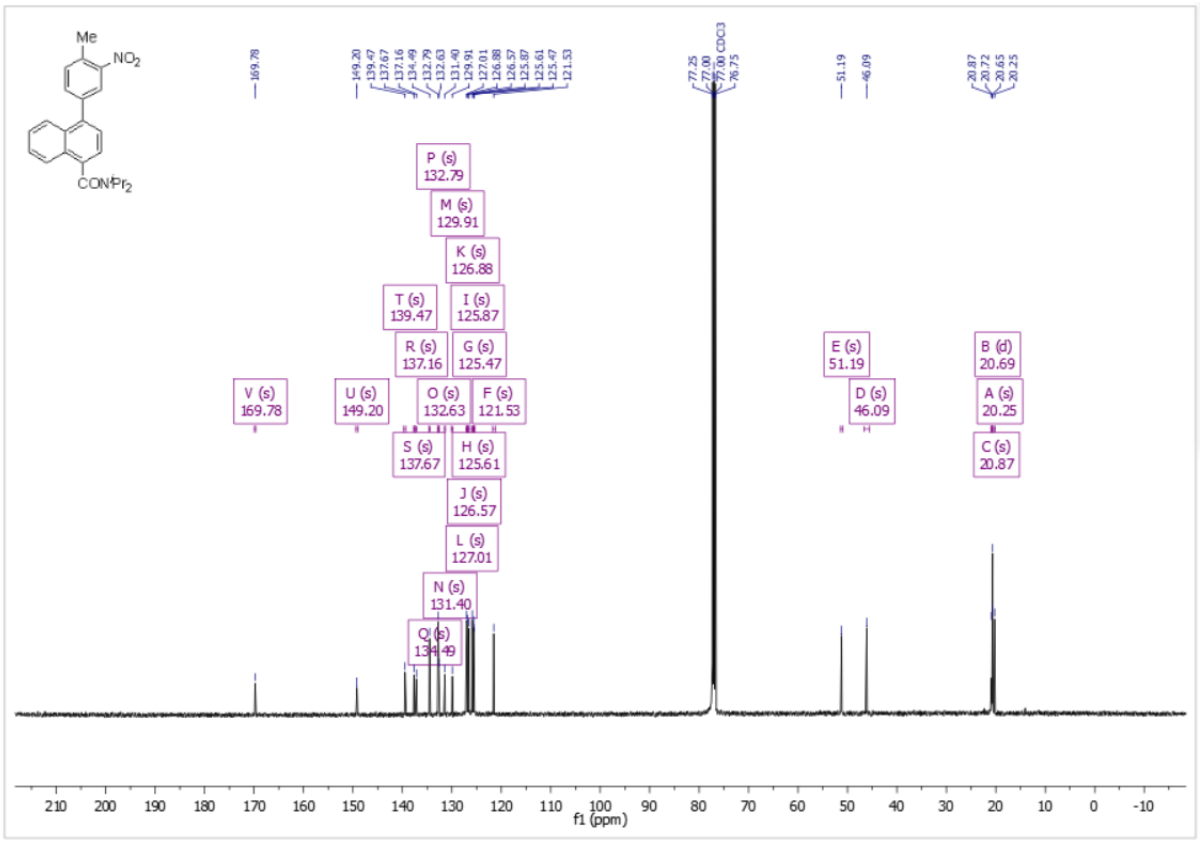

CON^{i}Pr$_2$
7.26 CDCl3
B (d) 7.89
D (m) 7.44
G (m) 6.94
A (d) 7.95
C (tt) 7.50
F (s) 6.97
E (dd) 7.35
H (s) 6.04
J (m) 3.62
I (m) 3.73
L (d) 1.67
K (t) 1.73
M (m) 1.10
1.00
0.98
1.06
1.02
1.99
0.96
1.96
2.00
1.04
1.02
3.12
3.04
6.16
f1 (ppm)

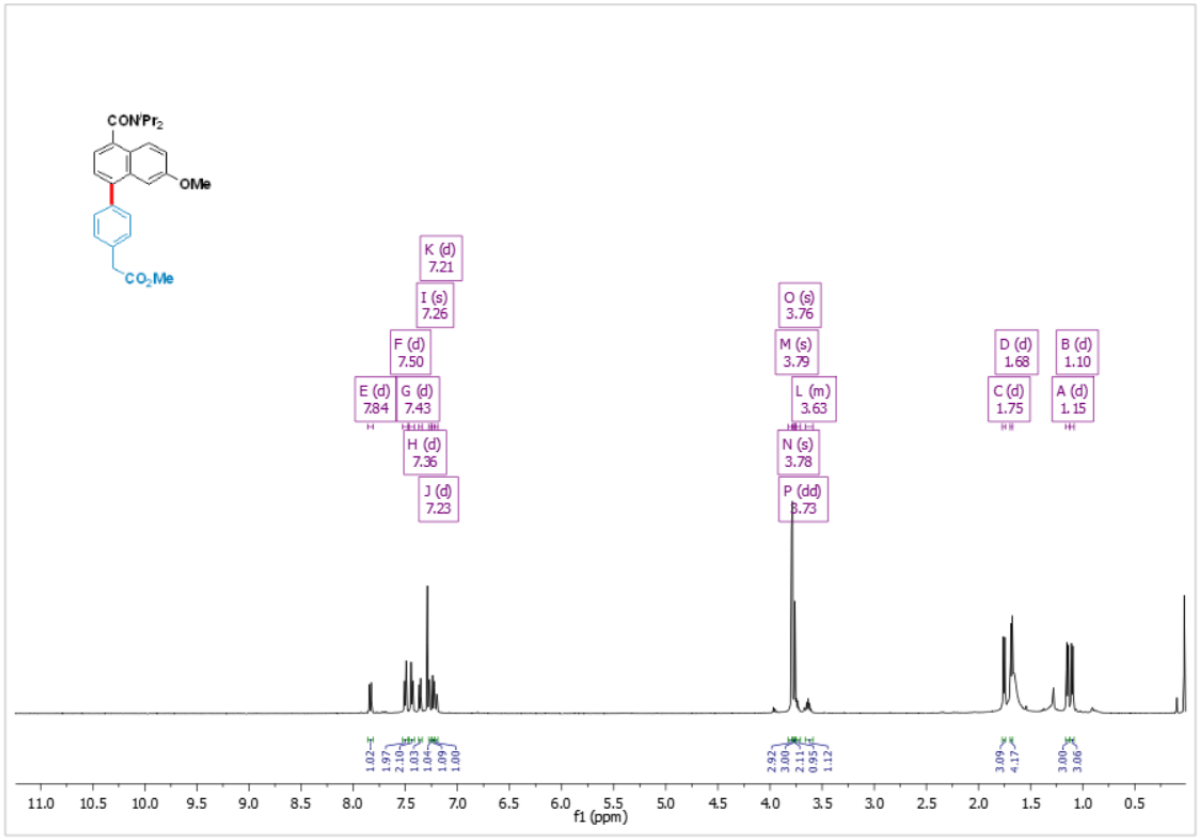

CONiPr2
170.15
147.48
146.97
140.05
136.07
134.16
131.91
129.88
126.47
126.34
126.23
125.17
123.41
121.53
110.54
108.21
101.12
77.00 CDCl3
51.10
46.00
20.87
20.70
20.65
20.63
f1 (ppm)

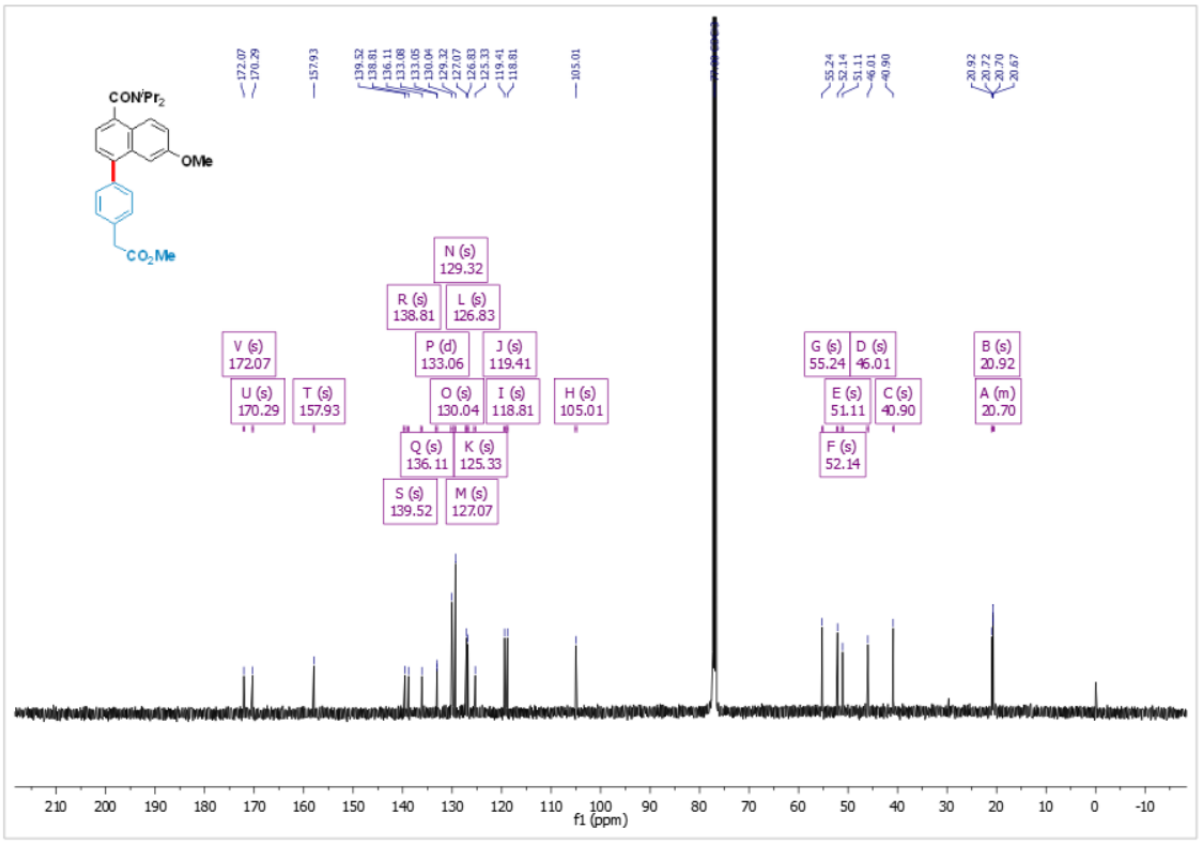

CONiPr2
Cl
7.26 CDCl3
F (d) 7.42
D (m) 7.52
B (d) 7.91
A (m) 7.36
C (d) 7.85
E (m) 7.47
H (m) 3.62
G (dp) 3.73
L (d) 1.09
J (t) 1.67
I (d) 1.75
K (d) 1.12
1.16
1.33
1.04
3.12
2.33
2.00
1.16
1.40
3.67
3.41
3.41
3.41
f1 (ppm)

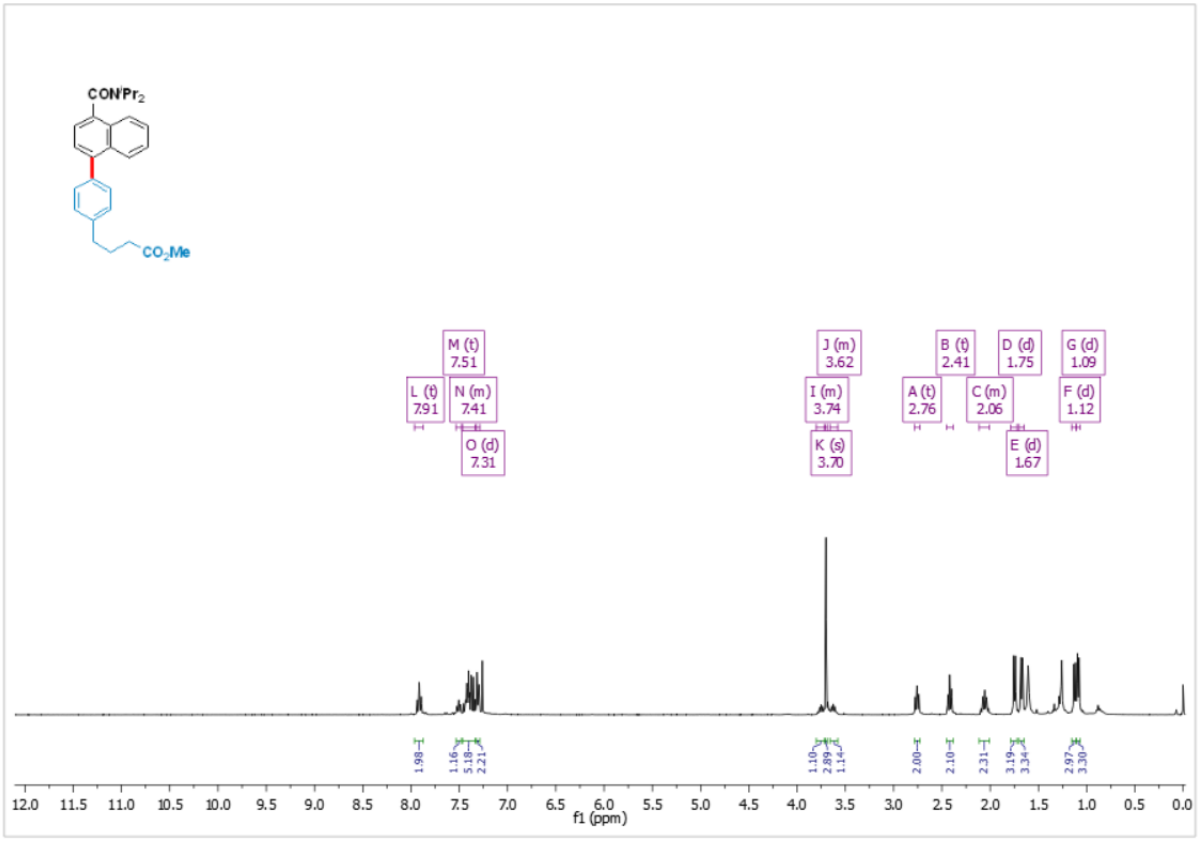

CONiPr2
Cl
170.04
139.18
138.75
136.51
133.50
131.62
131.31
129.88
128.50
126.66
126.61
126.30
126.06
125.28
121.55
77.00 CDCl3
51.16
46.07
20.87
20.72
20.65
f1 (ppm)

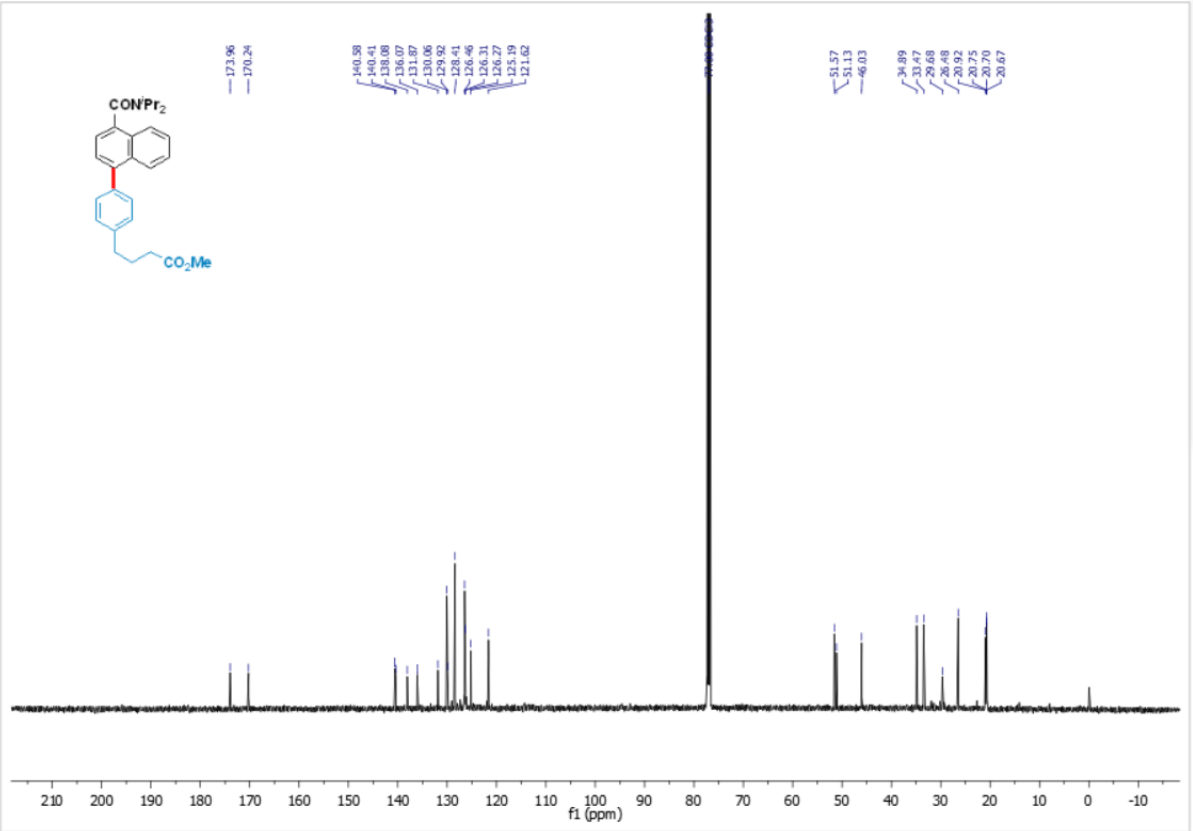

Me
NO2
CONiPr2
7.26 CDCl3
f1 (ppm)
F (t) 7.48
B (d) 7.93
E (dd) 7.54
A (s) 8.12
D (d) 7.64
C (d) 7.81
G (q) 7.39
I (dt) 3.63
H (dt) 3.70
J (s) 2.71
L (d) 1.67
K (d) 1.75
N (d) 1.09
M (d) 1.13

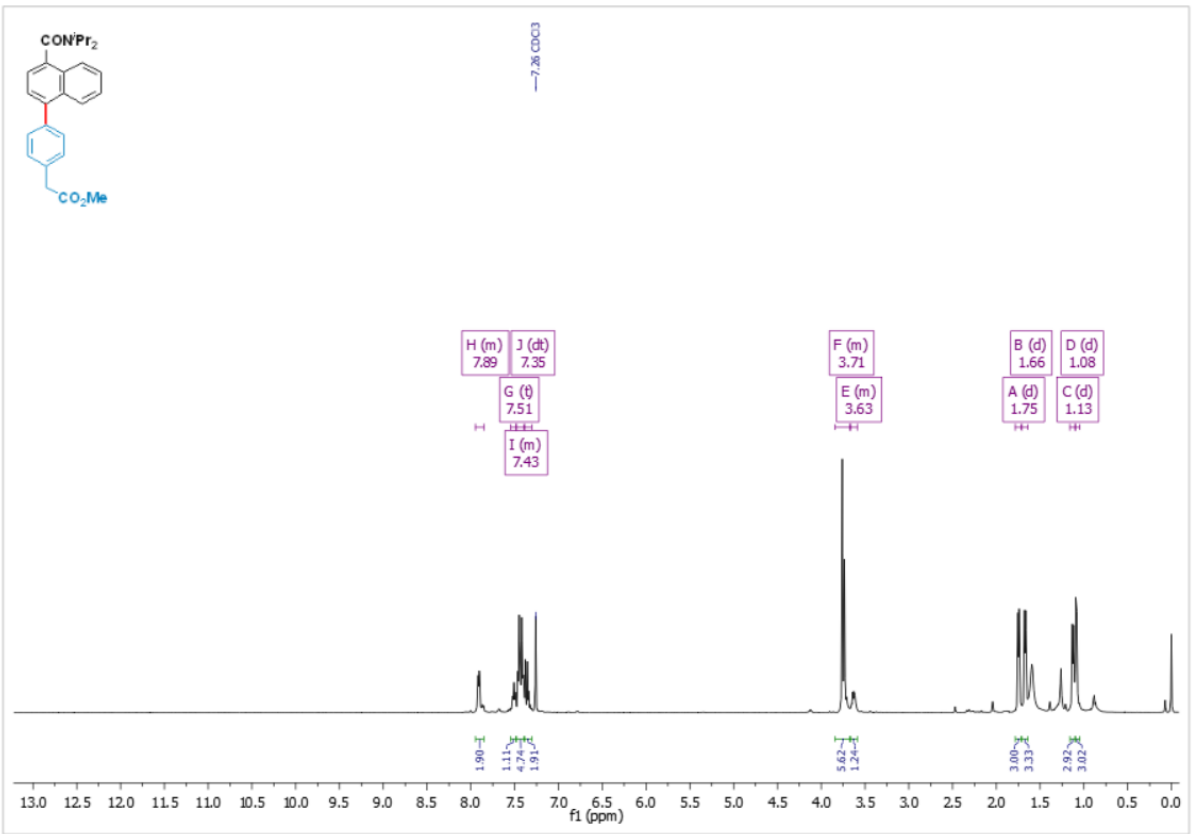

Me
NO2
CONiPr2
169.78
149.20
139.47
137.67
137.16
134.49
132.79
132.63
131.40
129.91
127.01
126.88
126.57
125.87
125.61
125.47
121.53
77.25
77.00
77.00 CDCl3
76.75
51.19
46.09
20.87
20.72
20.65
20.25
P (s) 132.79
M (s) 129.91
K (s) 126.88
T (s) 139.47
I (s) 125.87
R (s) 137.16
G (s) 125.47
V (s) 169.78
U (s) 149.20
O (s) 132.63
F (s) 121.53
S (s) 137.67
H (s) 125.61
J (s) 126.57
L (s) 127.01
N (s) 131.40
Q (s) 134.49
E (s) 51.19
D (s) 46.09
B (d) 20.69
A (s) 20.25
C (s) 20.87
f1 (ppm)

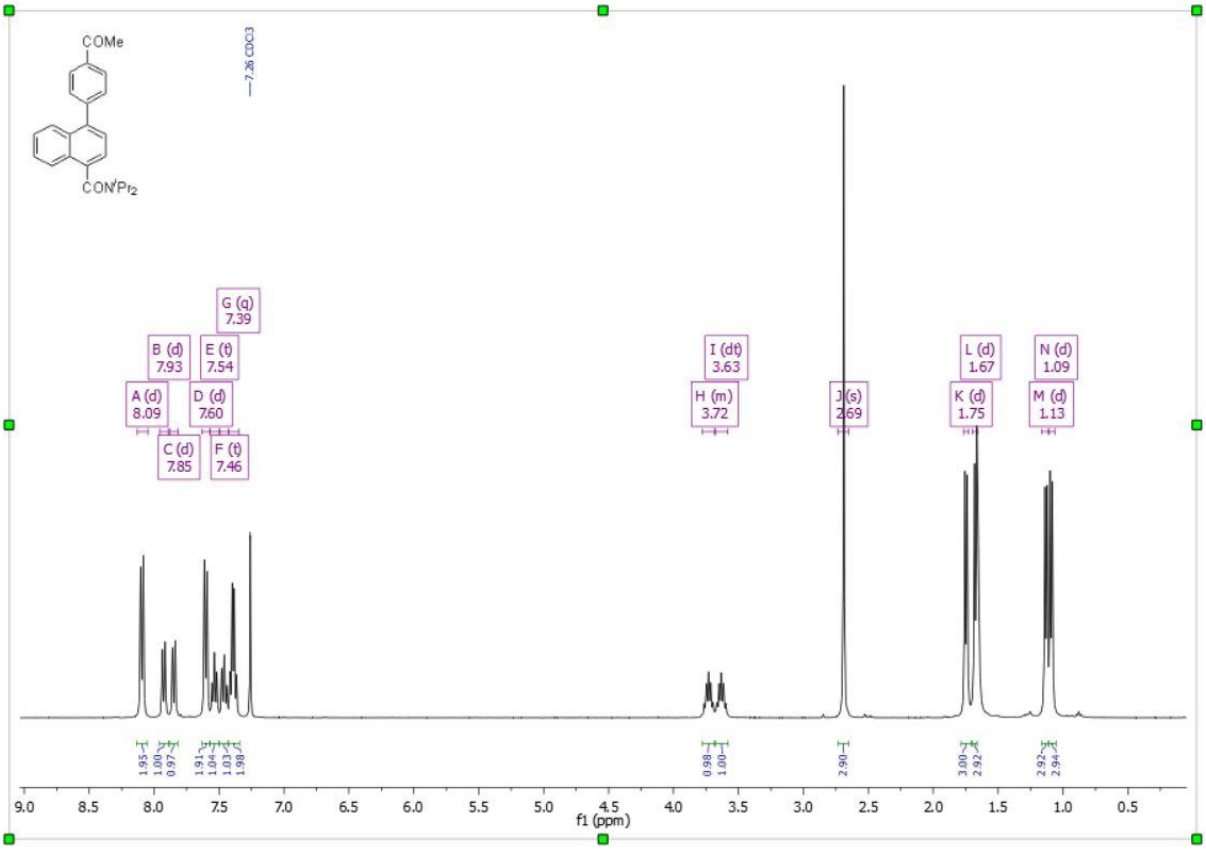

CONiPr2
OMe
CO2Me
K (d) 7.21
I (s) 7.26
F (d) 7.50
E (d) 7.84
G (d) 7.43
H (d) 7.36
J (d) 7.23
O (s) 3.76
M (s) 3.79
L (m) 3.63
N (s) 3.78
P (dd) 3.73
D (d) 1.68
B (d) 1.10
C (d) 1.75
A (d) 1.15
f1 (ppm)

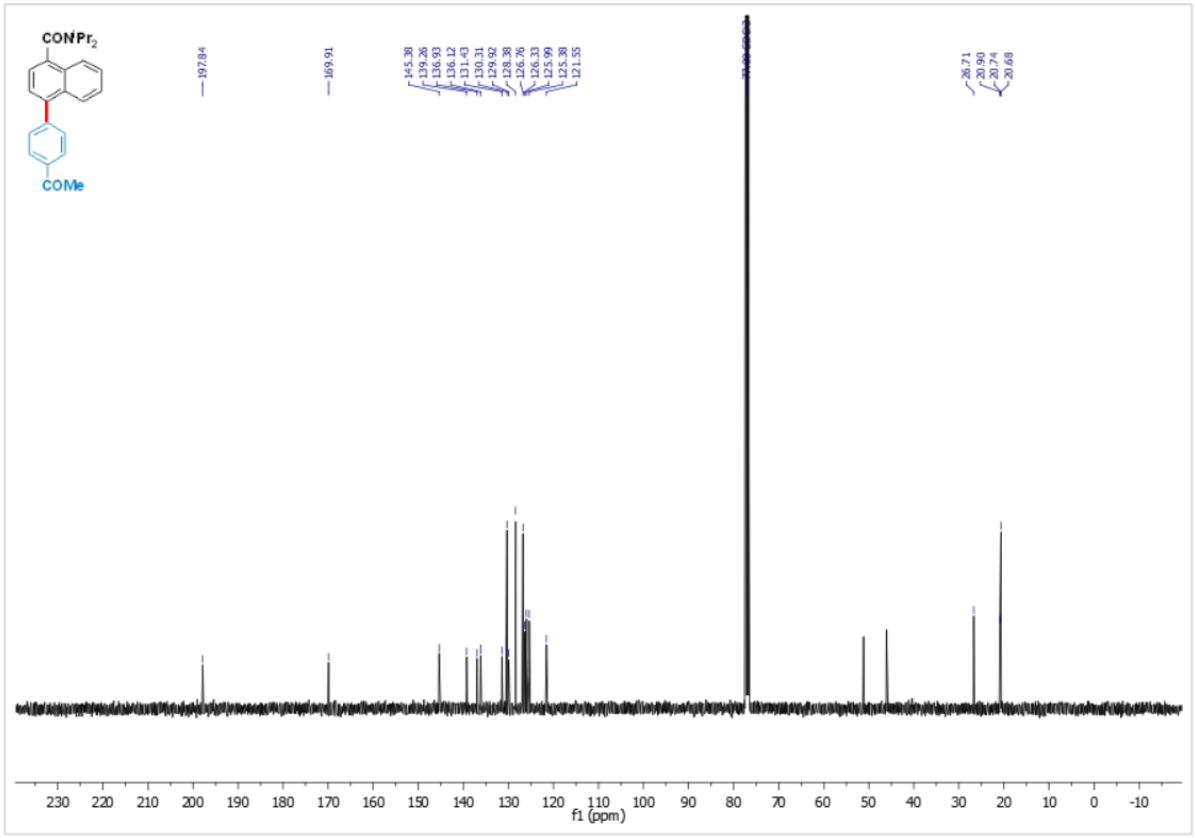

CONiPr2
OMe
CO2Me
N (s) 129.32
R (s) 138.81
L (s) 126.83
P (d) 133.06
J (s) 119.41
V (s) 172.07
U (s) 170.29
T (s) 157.93
O (s) 130.04
I (s) 118.81
H (s) 105.01
Q (s) 136.11
K (s) 125.33
S (s) 139.52
M (s) 127.07
G (s) 55.24
D (s) 46.01
E (s) 51.11
C (s) 40.90
F (s) 52.14
B (s) 20.92
A (m) 20.70
f1 (ppm)

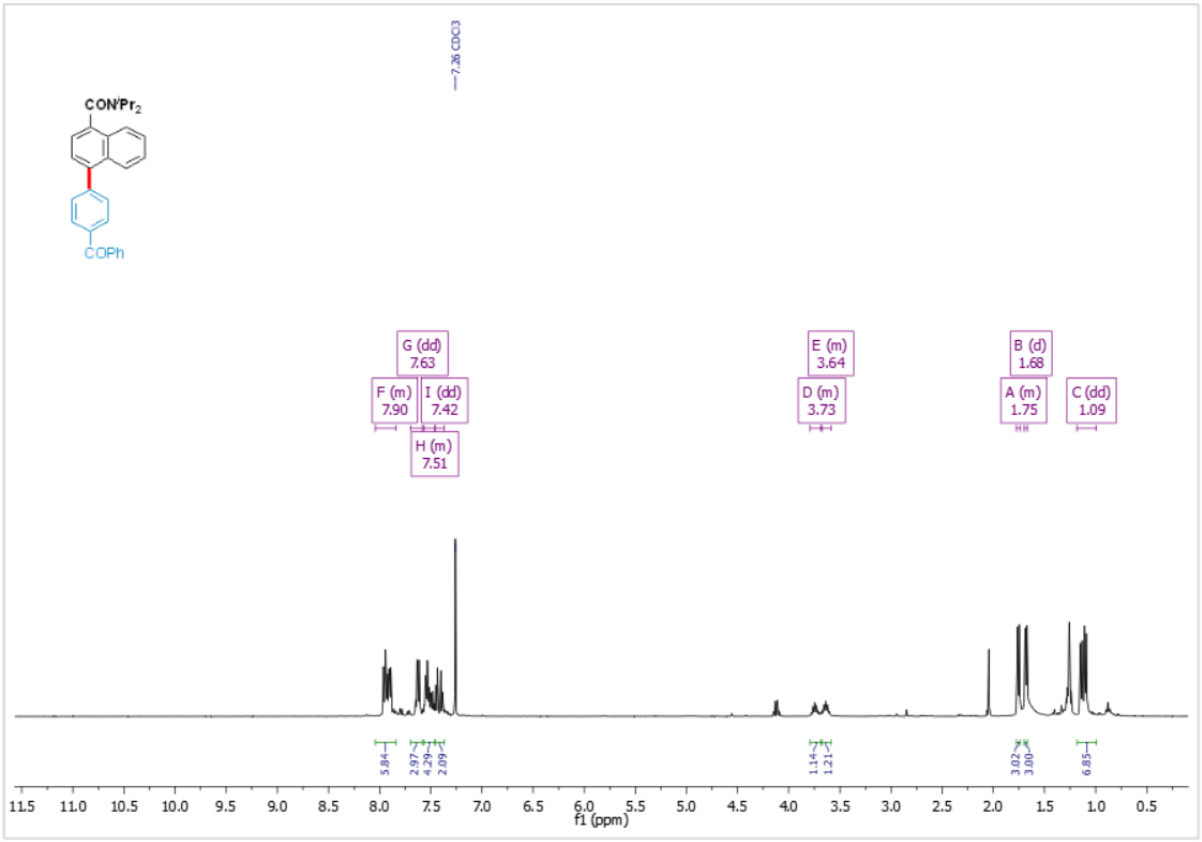

CONiPr2
CO2Me
M (t) 7.51
L (t) 7.91
N (m) 7.41
O (d) 7.31
J (m) 3.62
I (m) 3.74
K (s) 3.70
B (t) 2.41
A (t) 2.76
D (d) 1.75
C (m) 2.06
E (d) 1.67
G (d) 1.09
F (d) 1.12
f1 (ppm)

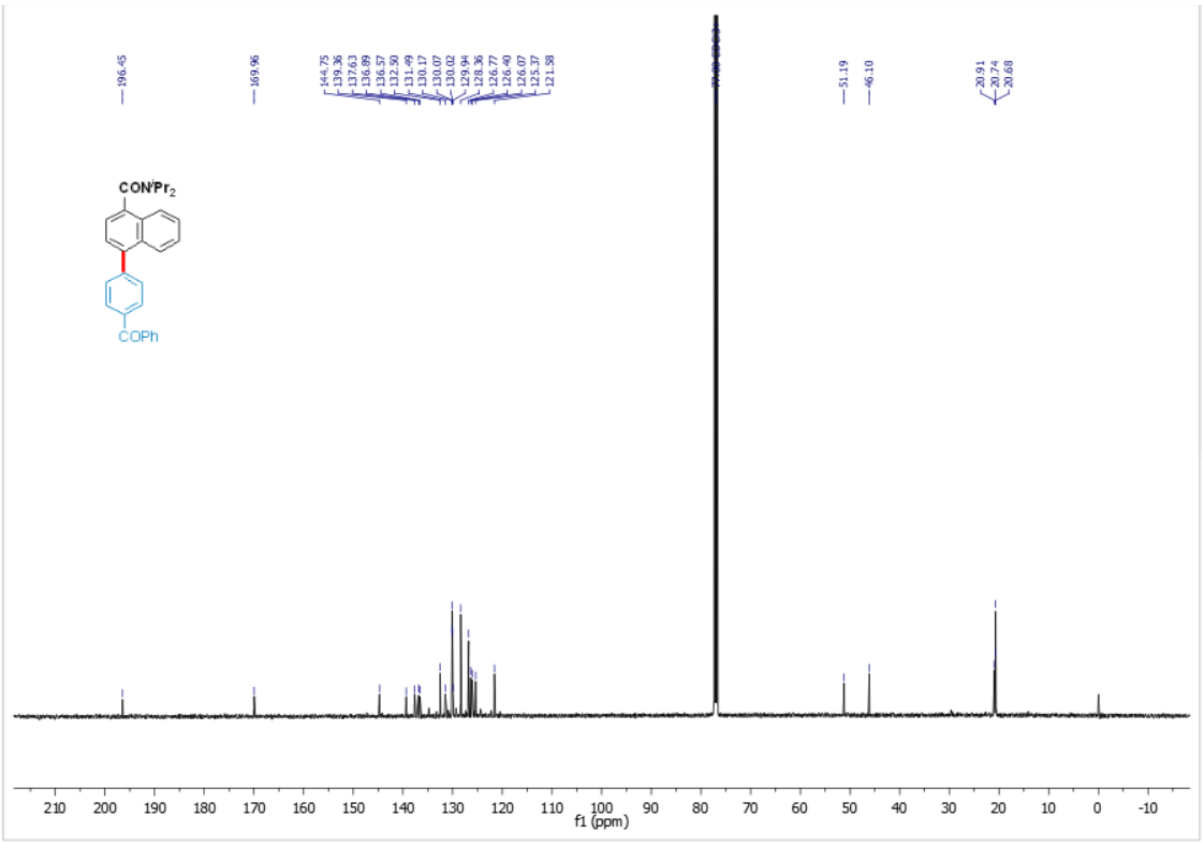

CONiPr2
CO2Me
173.96
170.24
140.58
140.41
138.08
136.07
131.87
130.06
129.92
128.41
126.46
126.31
126.27
125.19
121.62
51.57
51.13
46.03
34.89
33.47
29.68
26.48
20.92
20.75
20.70
20.67
f1 (ppm)

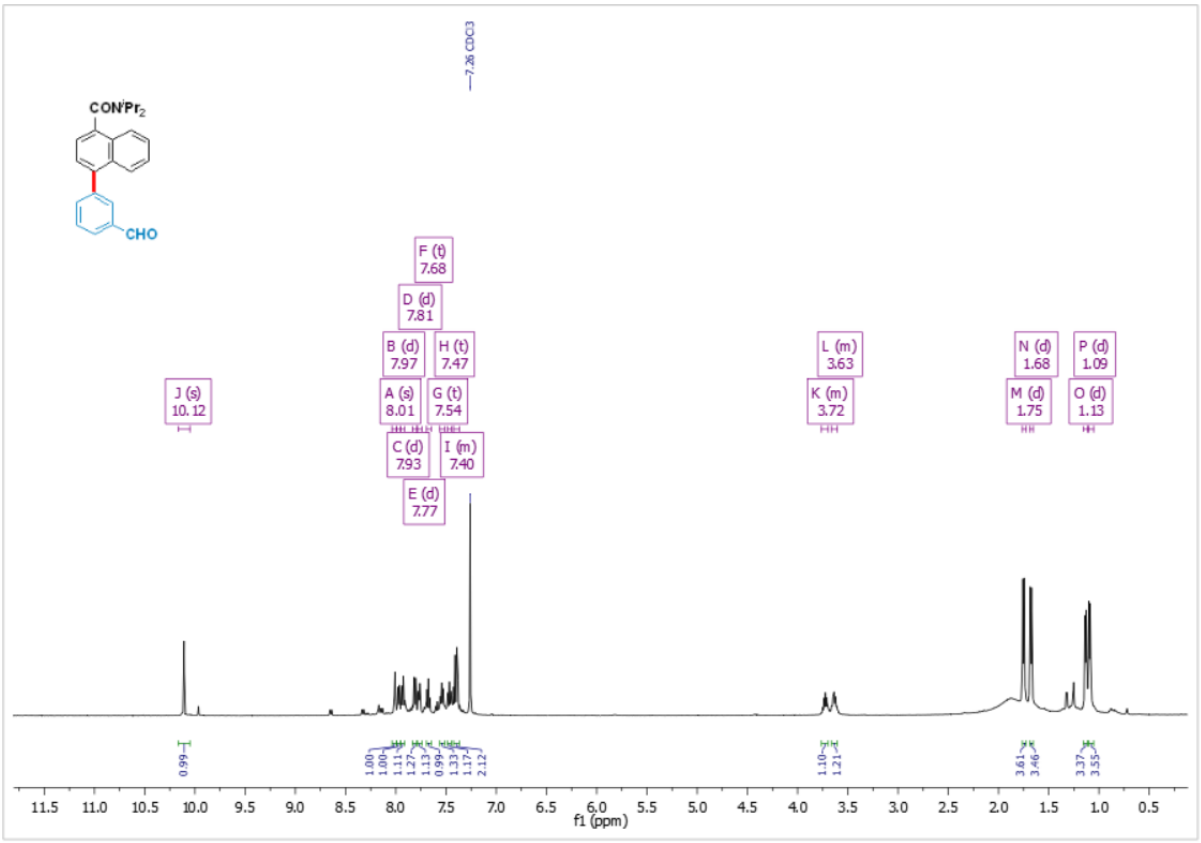

CONiPr2
CO2Me
7.26 CDCl3
H (m) 7.89
J (dt) 7.35
G (t) 7.51
I (m) 7.43
F (m) 3.71
E (m) 3.63
B (d) 1.66
D (d) 1.08
A (d) 1.75
C (d) 1.13
1.90
1.11
4.74
1.91
5.62
1.24
3.00
3.33
2.92
3.02
f1 (ppm)

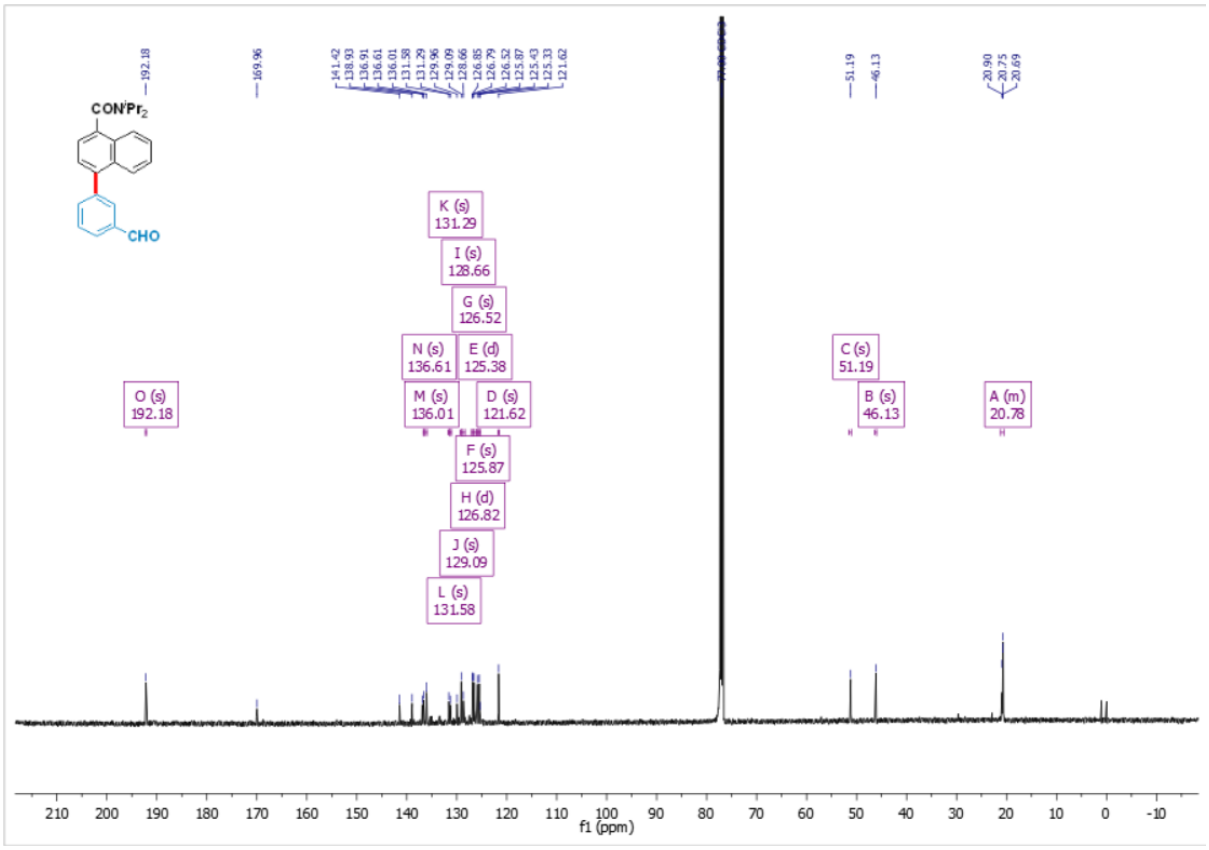

COMe
CONiPr2
7.26 CDCl3
G (q) 7.39
B (d) 7.93
E (t) 7.54
A (d) 8.09
D (d) 7.60
C (d) 7.85
F (t) 7.46
I (dt) 3.63
H (m) 3.72
J (s) 2.69
L (d) 1.67
K (d) 1.75
N (d) 1.09
M (d) 1.13
1.95
1.00
0.97
1.91
1.04
1.03
1.98
0.98
1.00
2.90
3.00
2.92
2.92
2.94
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

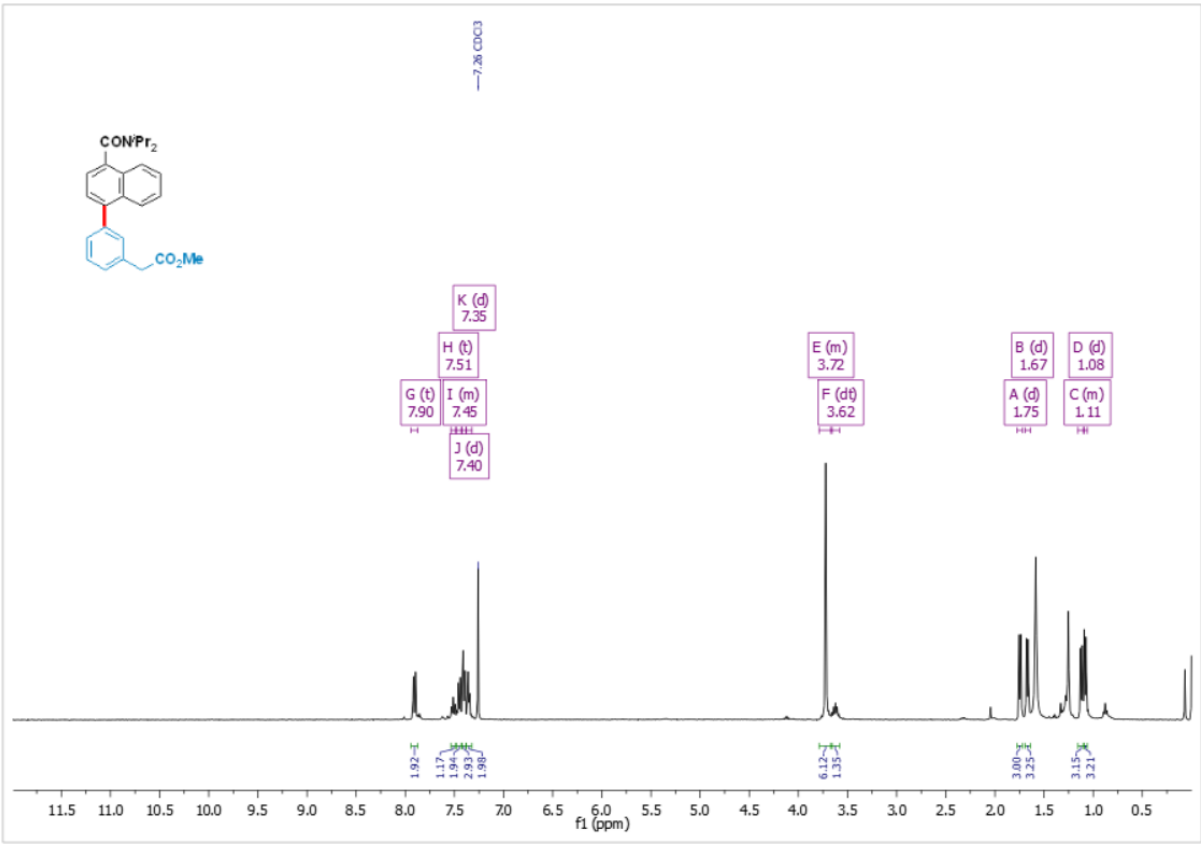

CONiPr2
COMe
197.84
169.91
145.38
139.26
136.93
136.12
131.43
130.31
129.92
128.38
126.76
126.33
125.99
125.38
121.55
26.71
20.90
20.74
20.68
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

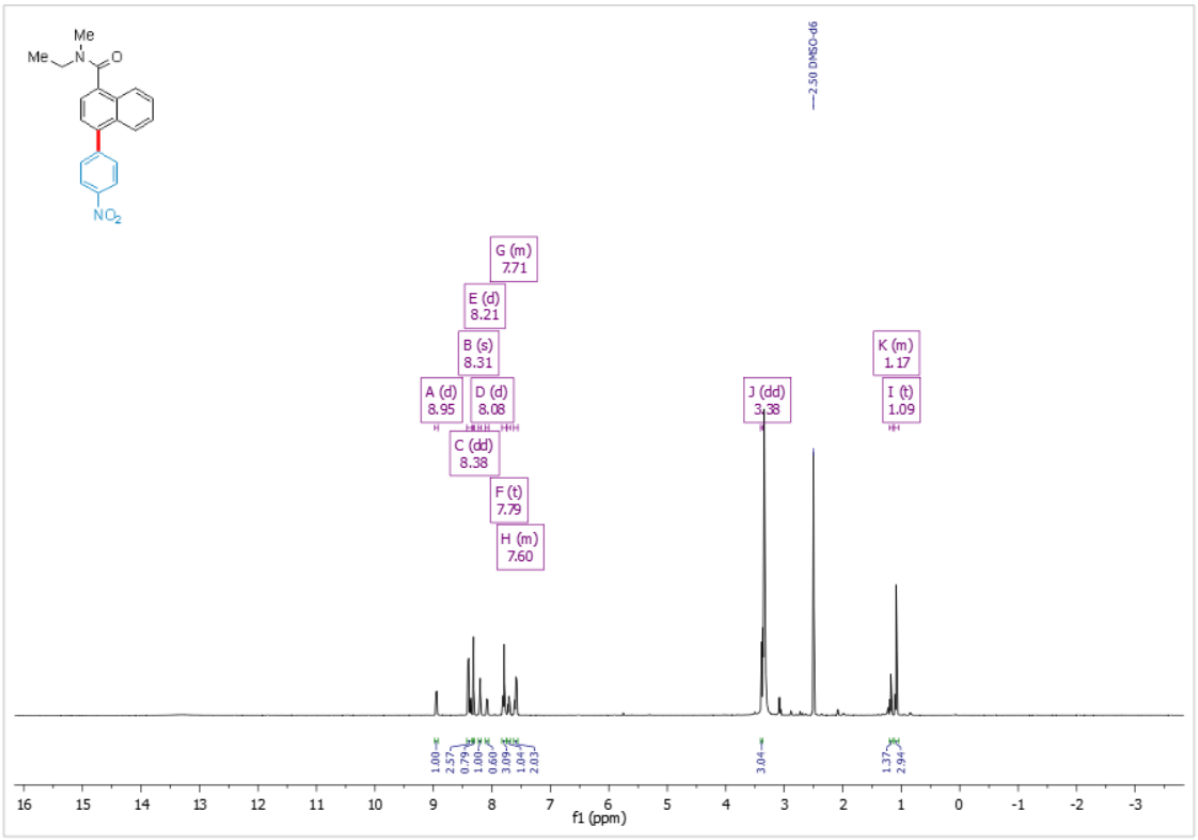

CONiPr2
COPh
7.26 CDCl3
G (dd) 7.63
F (m) 7.90
I (dd) 7.42
H (m) 7.51
E (m) 3.64
D (m) 3.73
B (d) 1.68
A (m) 1.75
C (dd) 1.09
5.84
2.97
4.29
2.09
1.14
1.21
3.02
3.00
6.85
f1 (ppm)

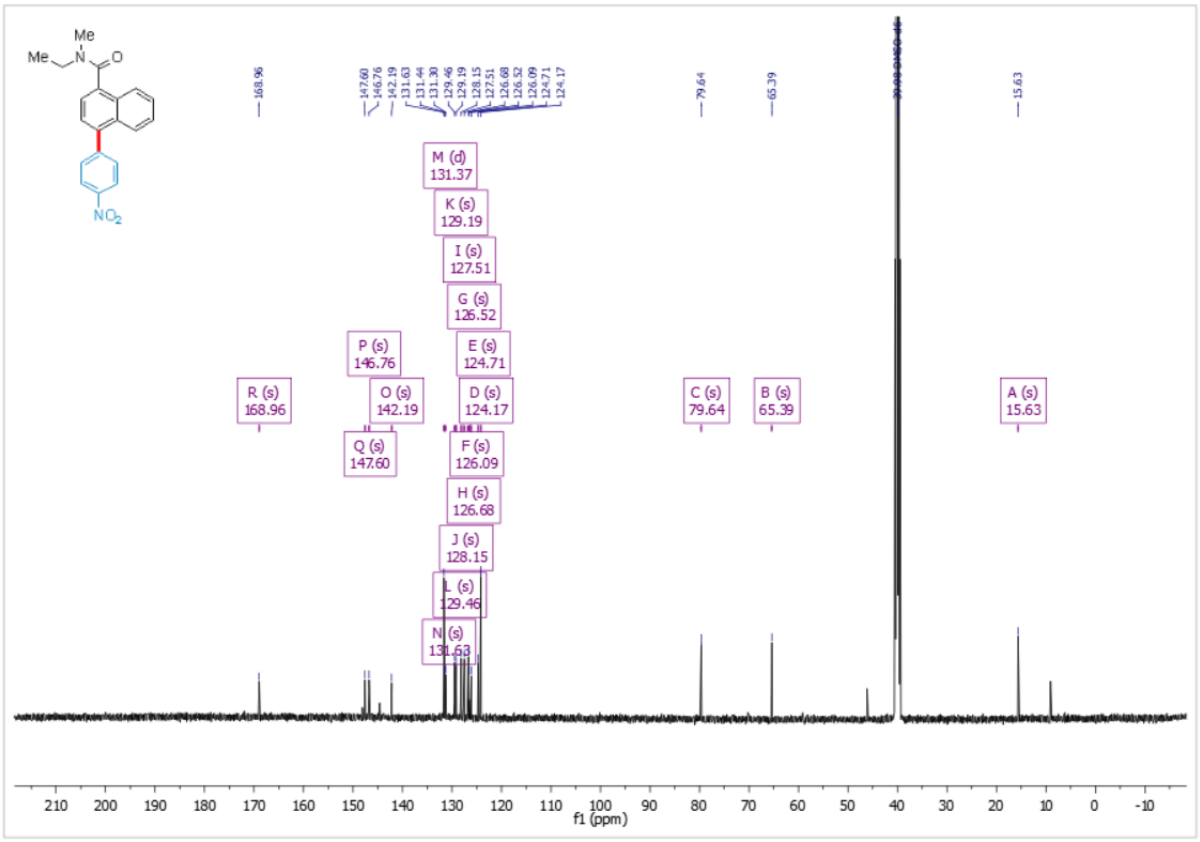

196.45
169.96
144.75
139.36
137.63
136.89
136.57
132.50
131.49
130.17
130.07
130.02
129.94
128.36
126.77
126.49
126.07
125.37
121.58
51.19
46.10
20.91
20.74
20.68
CONiPr2
COPh
f1 (ppm)

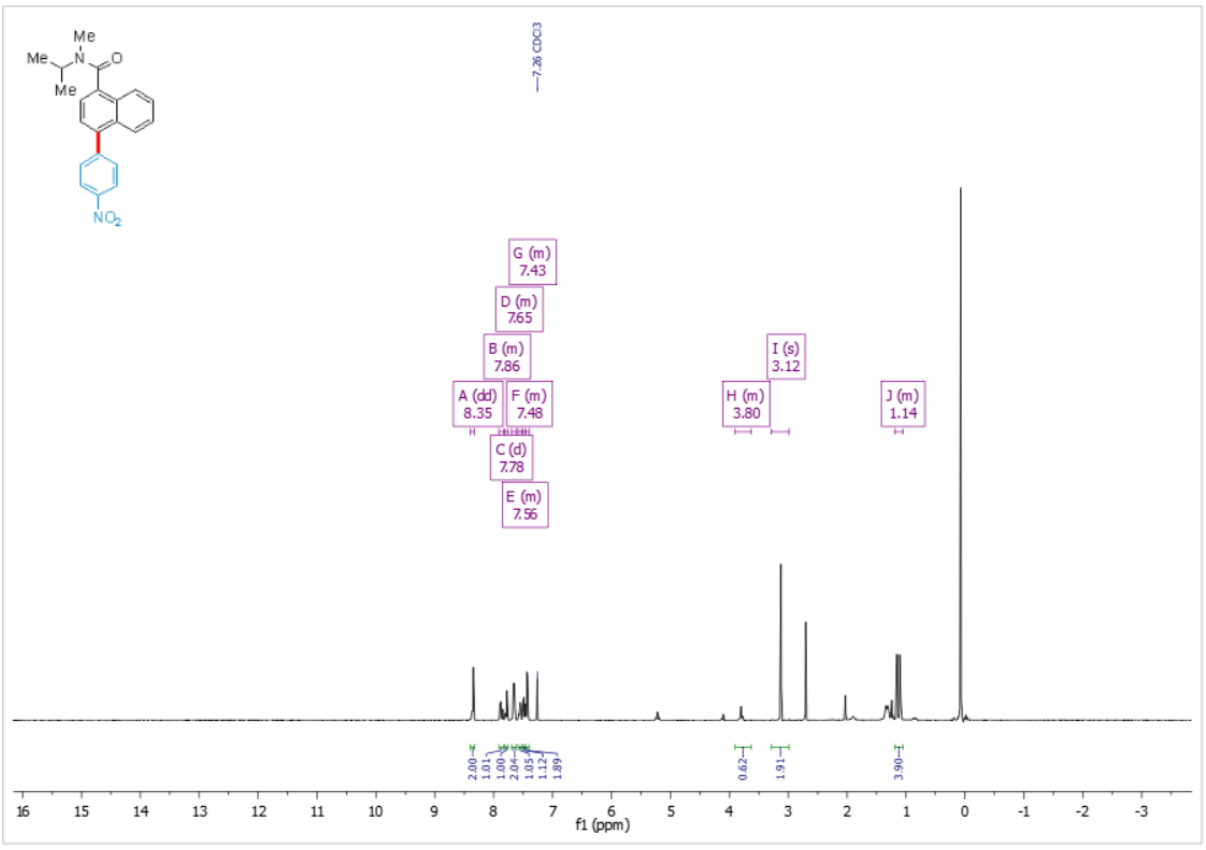

CON^{i}Pr$_2$
CHO
F (t) 7.68
D (d) 7.81
B (d) 7.97
H (t) 7.47
A (s) 8.01
G (t) 7.54
C (d) 7.93
I (m) 7.40
E (d) 7.77
J (s) 10.12
L (m) 3.63
K (m) 3.72
N (d) 1.68
M (d) 1.75
P (d) 1.09
O (d) 1.13
f1 (ppm)

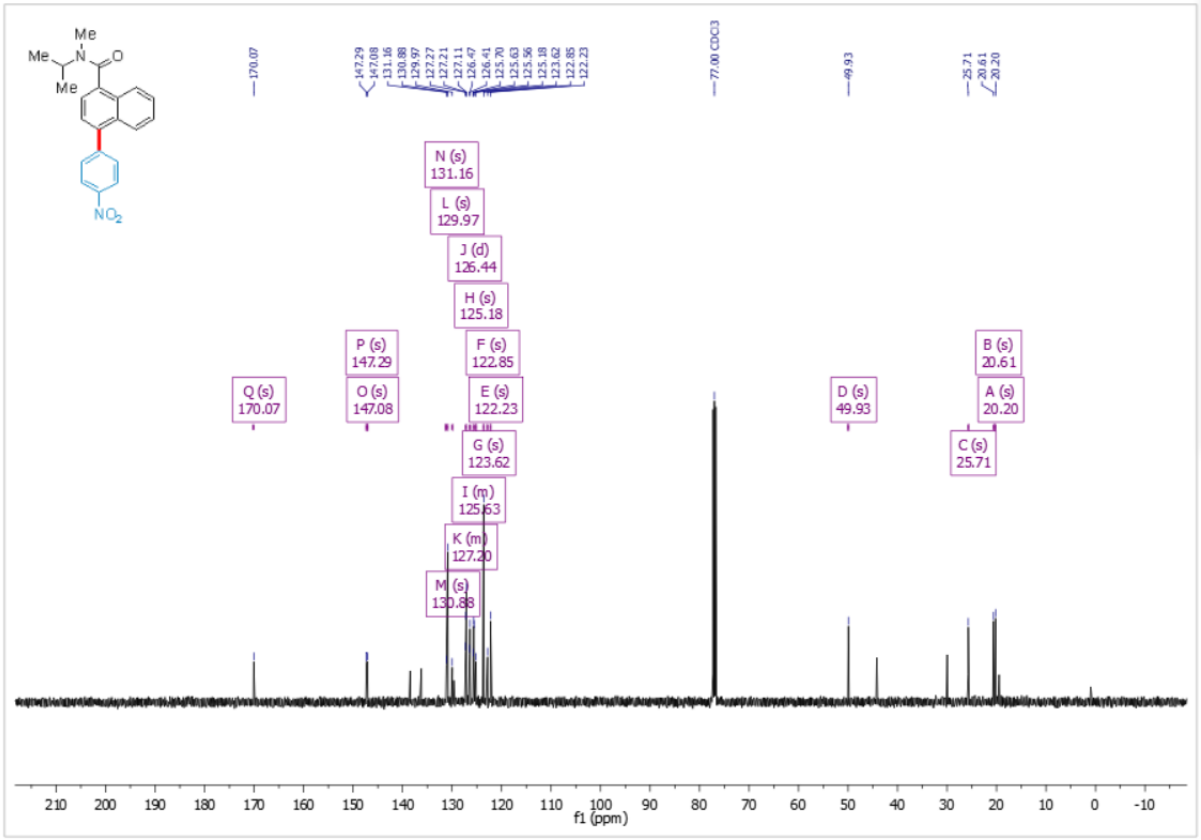

CON^{i}Pr$_2$
CHO
K (s) 131.29
I (s) 128.66
G (s) 126.52
N (s) 136.61
E (d) 125.38
M (s) 136.01
D (s) 121.62
F (s) 125.87
H (d) 126.82
J (s) 129.09
L (s) 131.58
O (s) 192.18
C (s) 51.19
B (s) 46.13
A (m) 20.78
f1 (ppm)

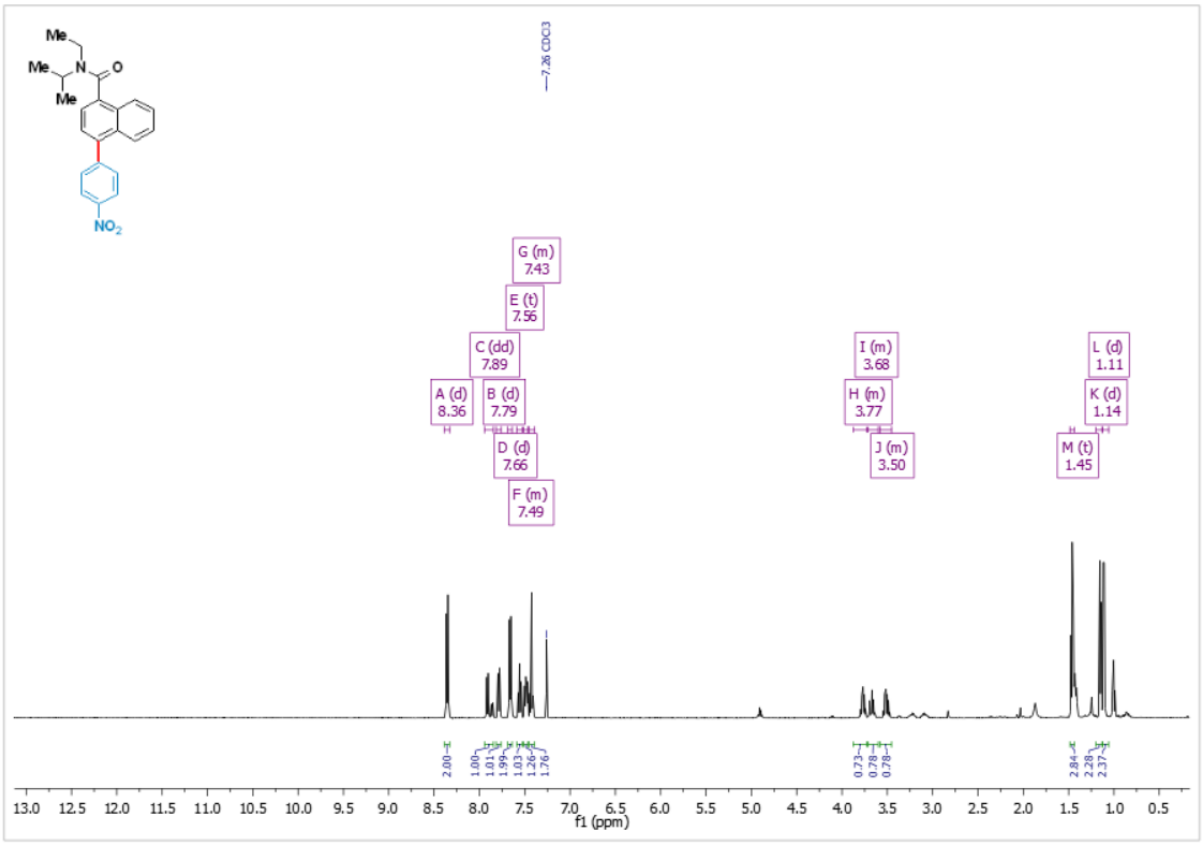

CON^{i}Pr$_2$
CO$_2$Me
7.26 CDCl3
K (d) 7.35
H (t) 7.51
G (t) 7.90
I (m) 7.45
J (d) 7.40
E (m) 3.72
F (dt) 3.62
B (d) 1.67
A (d) 1.75
D (d) 1.08
C (m) 1.11
1.92
1.17
1.94
2.93
1.98
6.12
1.35
3.00
3.25
3.15
3.21
f1 (ppm)

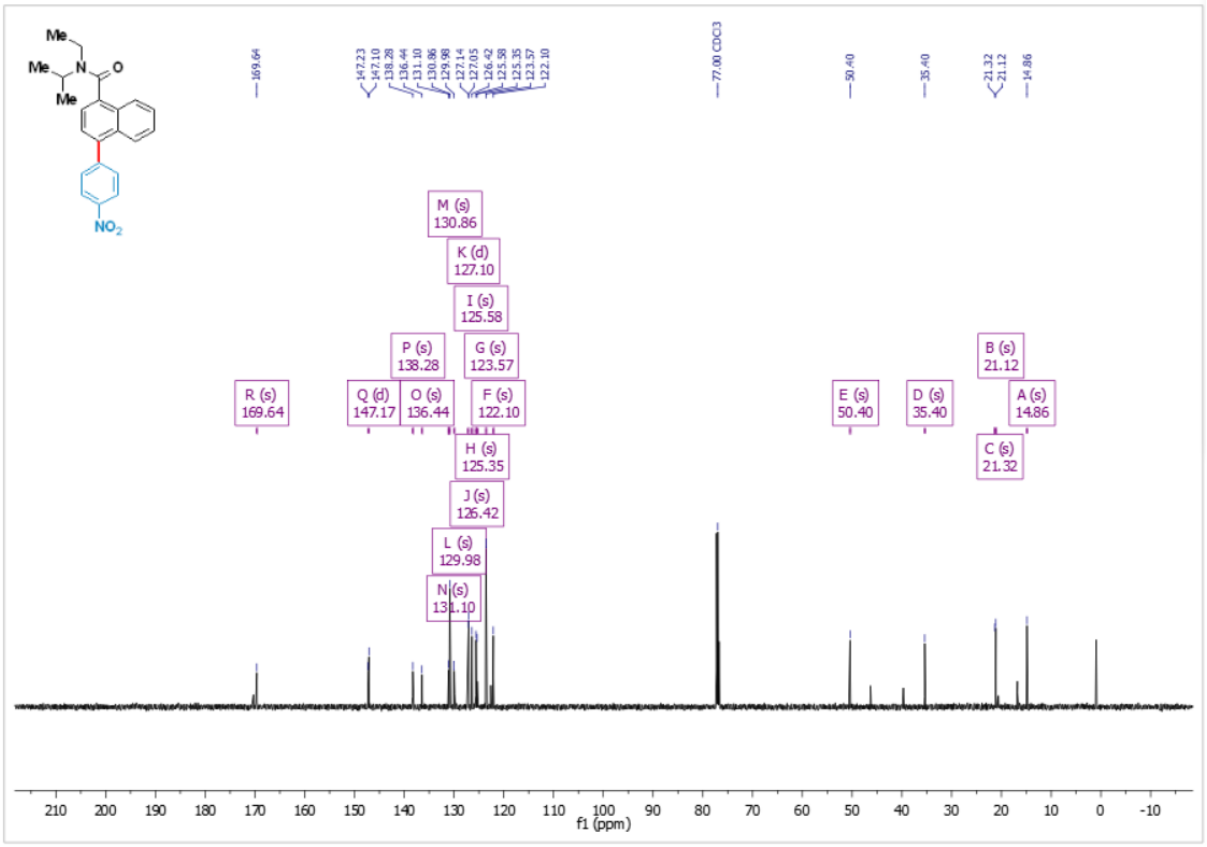

Me
Me
N
O
NO$_2$
2.50 DMSO-d6
G (m) 7.71
E (d) 8.21
B (s) 8.31
A (d) 8.95
D (d) 8.08
C (dd) 8.38
F (t) 7.79
H (m) 7.60
J (dd) 3.38
K (m) 1.17
I (t) 1.09
1.00
2.57
0.79
1.00
0.60
3.09
1.04
2.03
3.04
1.37
2.94
f1 (ppm)

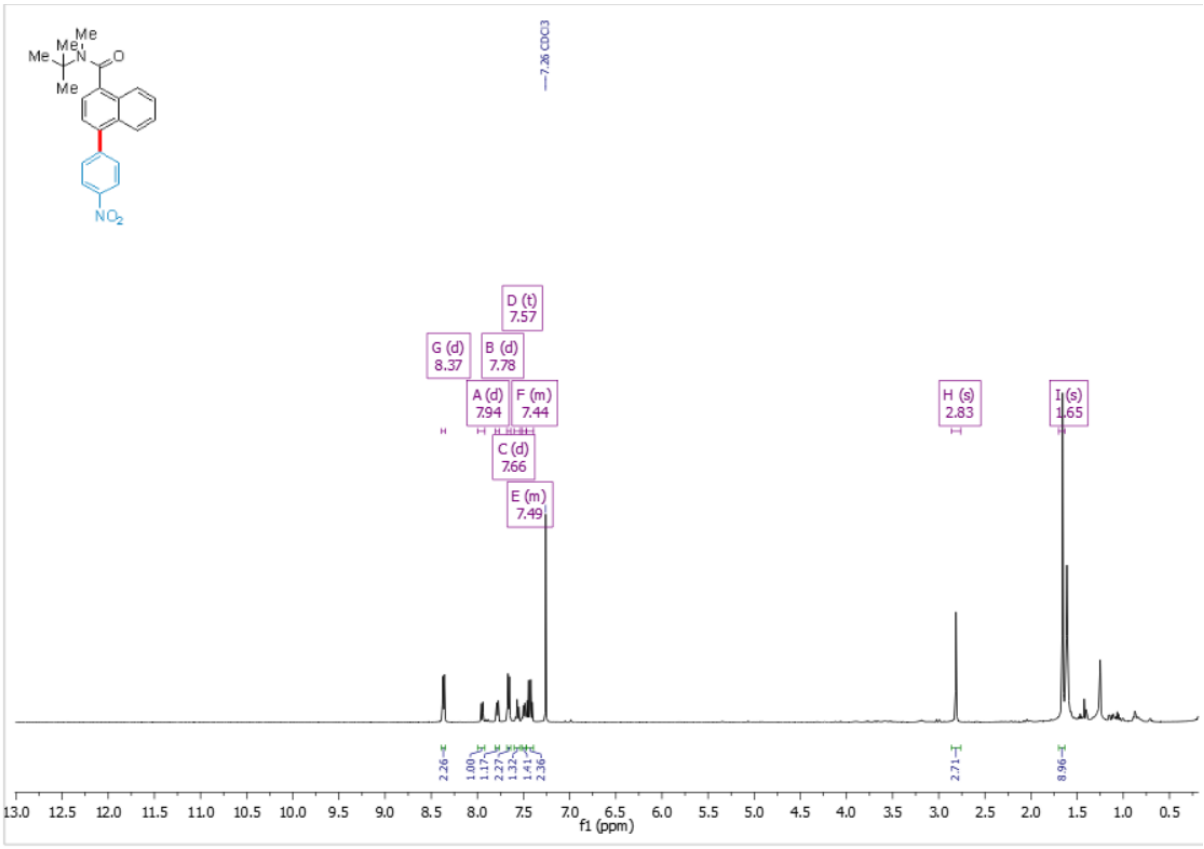

Me
Me
N
O
NO2
168.96
147.60
146.76
142.19
131.63
131.44
131.30
129.46
129.19
128.15
127.51
126.68
126.52
126.09
124.71
124.17
79.64
65.39
15.63
M (d) 131.37
K (s) 129.19
I (s) 127.51
G (s) 126.52
P (s) 146.76
E (s) 124.71
R (s) 168.96
O (s) 142.19
D (s) 124.17
C (s) 79.64
B (s) 65.39
A (s) 15.63
Q (s) 147.60
F (s) 126.09
H (s) 126.68
J (s) 128.15
L (s) 129.46
N (s) 131.63
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

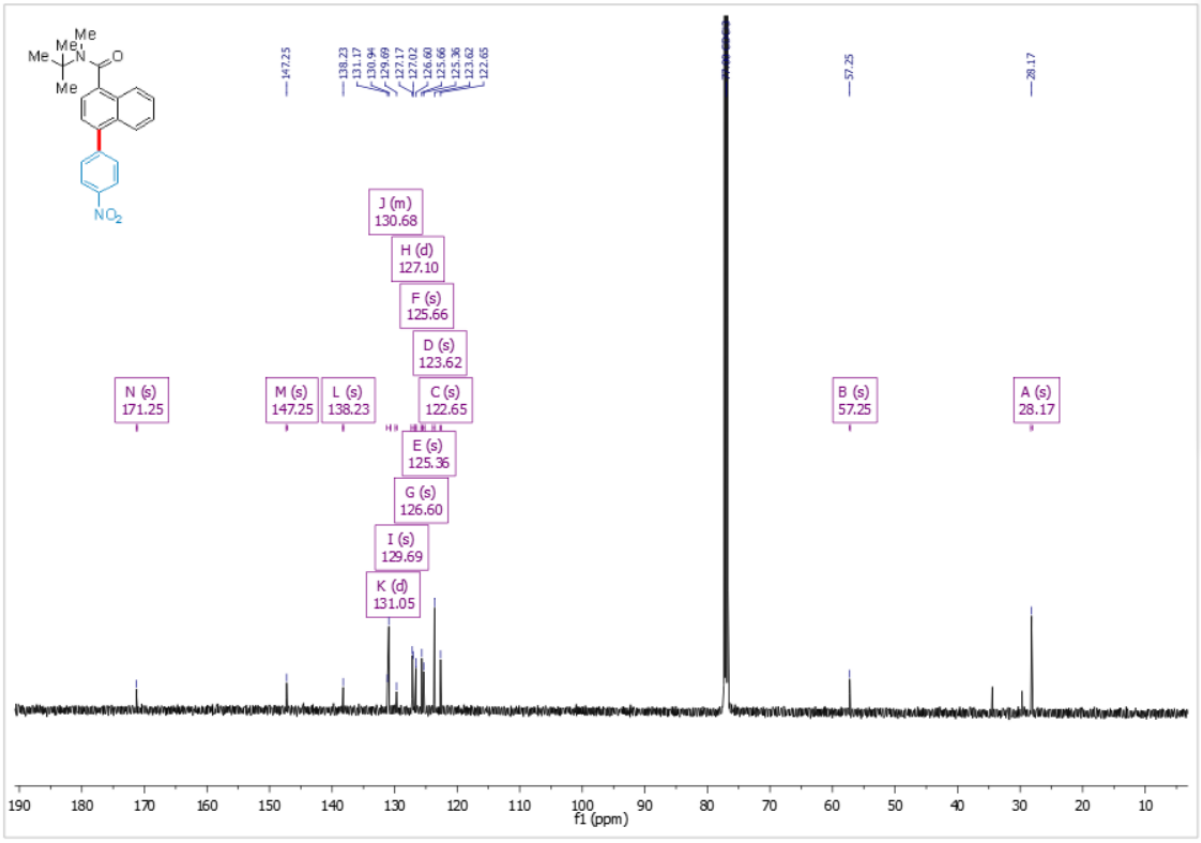

Me
Me
N
O
Me
NO2
7.26 CDCl3
G (m) 7.43
D (m) 7.65
B (m) 7.86
A (dd) 8.35
F (m) 7.48
C (d) 7.78
E (m) 7.56
I (s) 3.12
H (m) 3.80
J (m) 1.14
2.00
1.01
1.00
2.04
1.05
1.12
1.89
0.62
1.91
3.90
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 -1 -2 -3
f1 (ppm)

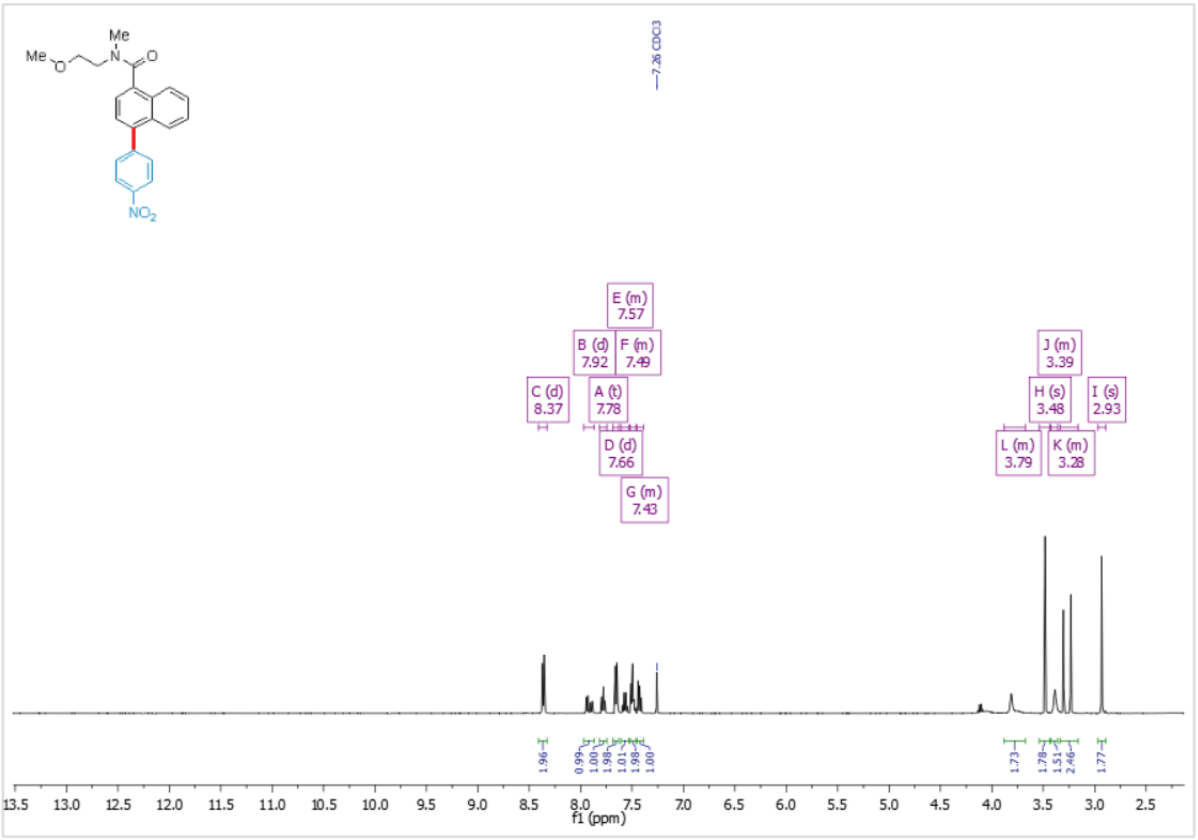

Me
Me
N
O
Me
NO2
170.07
147.29
147.08
131.16
130.88
129.97
127.27
127.21
127.11
126.47
126.41
125.70
125.63
125.56
125.18
123.62
122.85
122.23
77.00 CDCl3
49.93
25.71
20.61
20.20
N (s) 131.16
L (s) 129.97
J (d) 126.44
H (s) 125.18
P (s) 147.29
F (s) 122.85
B (s) 20.61
Q (s) 170.07
O (s) 147.08
E (s) 122.23
D (s) 49.93
A (s) 20.20
G (s) 123.62
C (s) 25.71
I (m) 125.63
K (m) 127.20
M (s) 130.88
f1 (ppm)

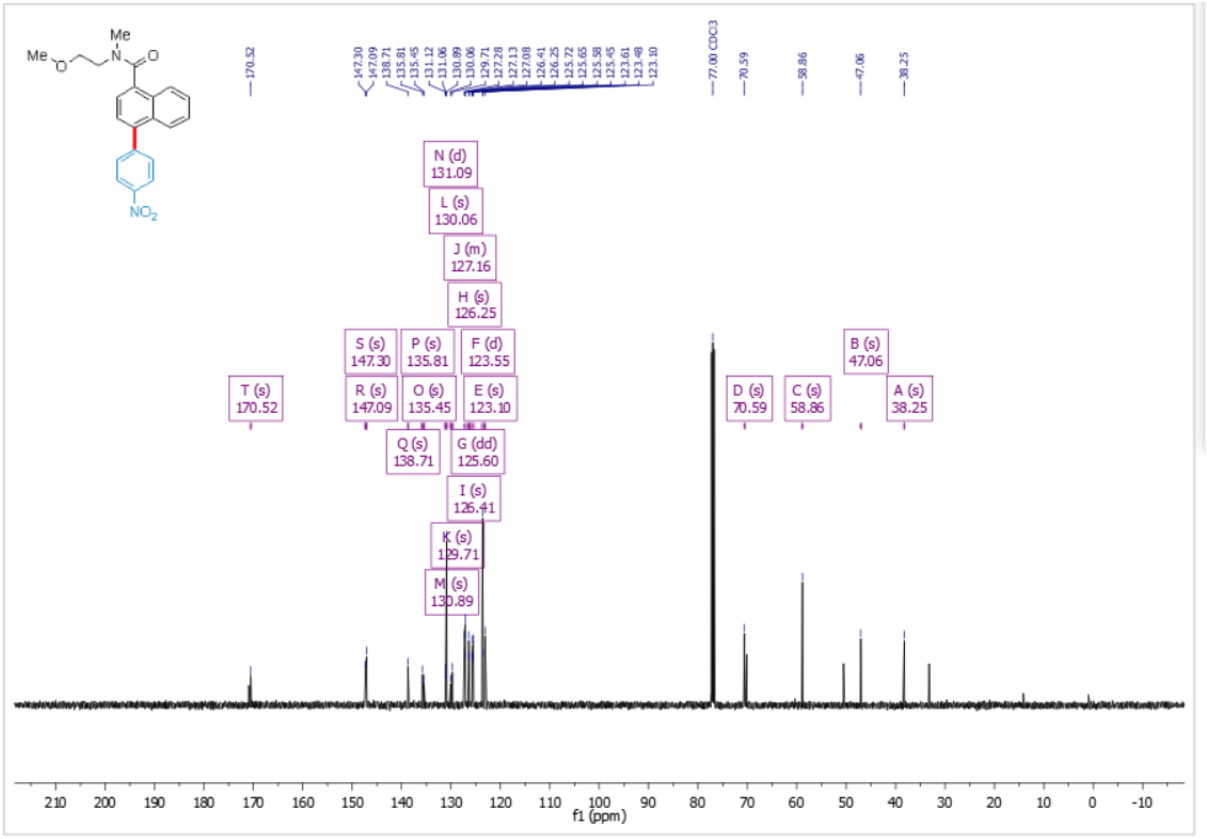

Me
Me
N
O
Me
NO2
7.26 CDCl3
G (m) 7.43
E (t) 7.56
C (dd) 7.89
A (d) 8.36
B (d) 7.79
D (d) 7.66
F (m) 7.49
I (m) 3.68
H (m) 3.77
J (m) 3.50
L (d) 1.11
K (d) 1.14
M (t) 1.45
2.00
1.00
1.01
1.99
1.03
1.26
1.76
0.73
0.78
0.78
2.84
2.28
2.37
f1 (ppm)

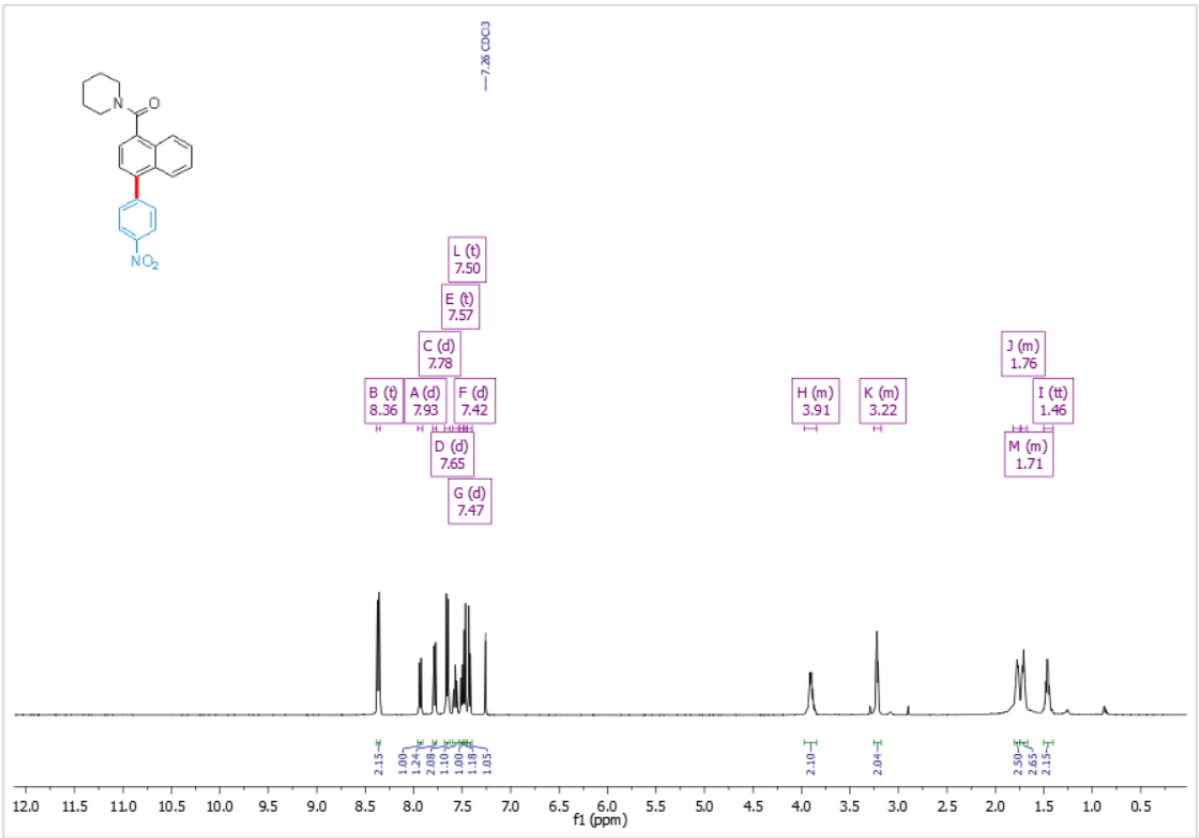

Me
Me
N
O
Me
NO2
169.64
147.23
147.10
138.28
136.44
131.10
130.86
129.98
127.14
127.05
126.42
125.58
125.35
123.57
122.10
77.00 CDCl3
50.40
35.40
21.32
21.12
14.86
M (s) 130.86
K (d) 127.10
I (s) 125.58
P (s) 138.28
G (s) 123.57
B (s) 21.12
R (s) 169.64
Q (d) 147.17
O (s) 136.44
F (s) 122.10
E (s) 50.40
D (s) 35.40
A (s) 14.86
H (s) 125.35
C (s) 21.32
J (s) 126.42
L (s) 129.98
N (s) 131.10
f1 (ppm)

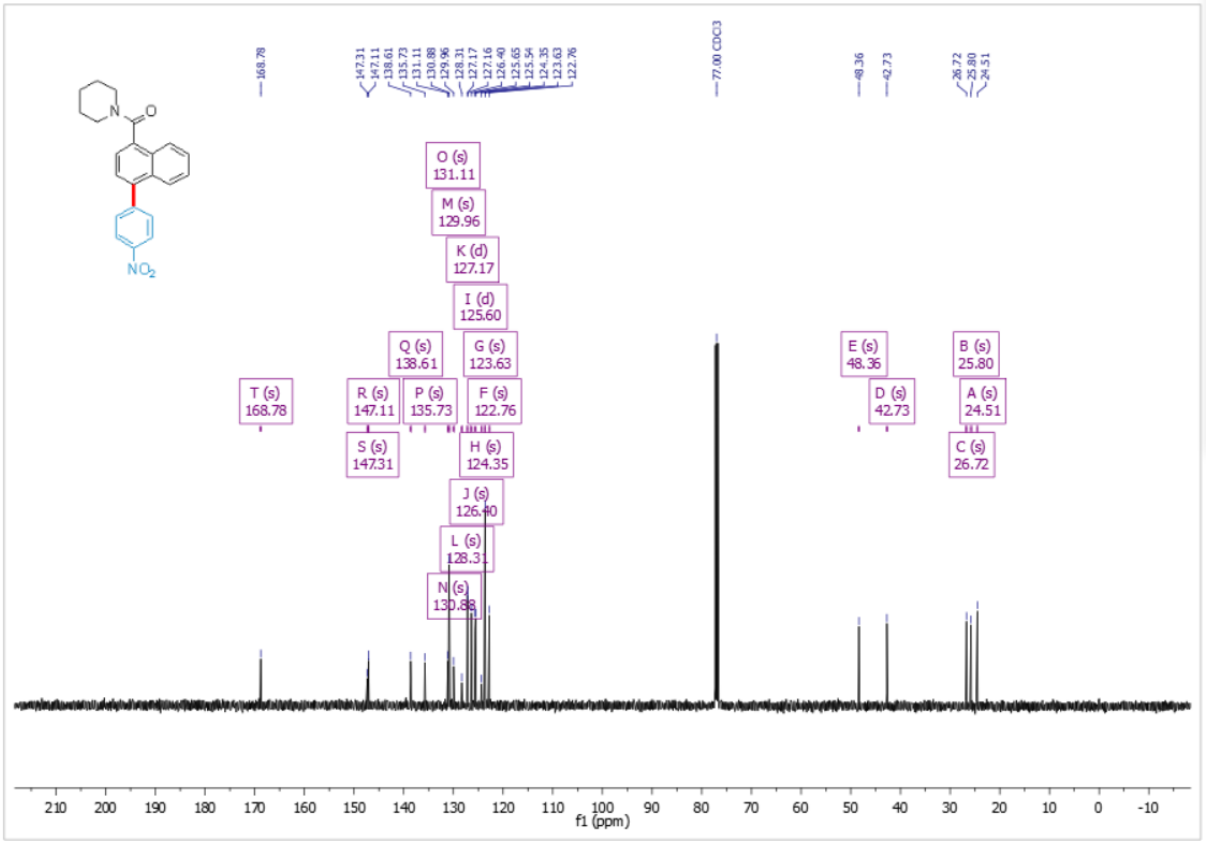

Me
Me
N
O
Me
NO2
7.26 CDCl3
D (t) 7.57
G (d) 8.37
B (d) 7.78
A (d) 7.94
F (m) 7.44
H (s) 2.83
I (s) 1.65
C (d) 7.66
E (m) 7.49
2.26
1.00
1.17
2.27
1.32
1.41
2.36
2.71
8.96
f1 (ppm)

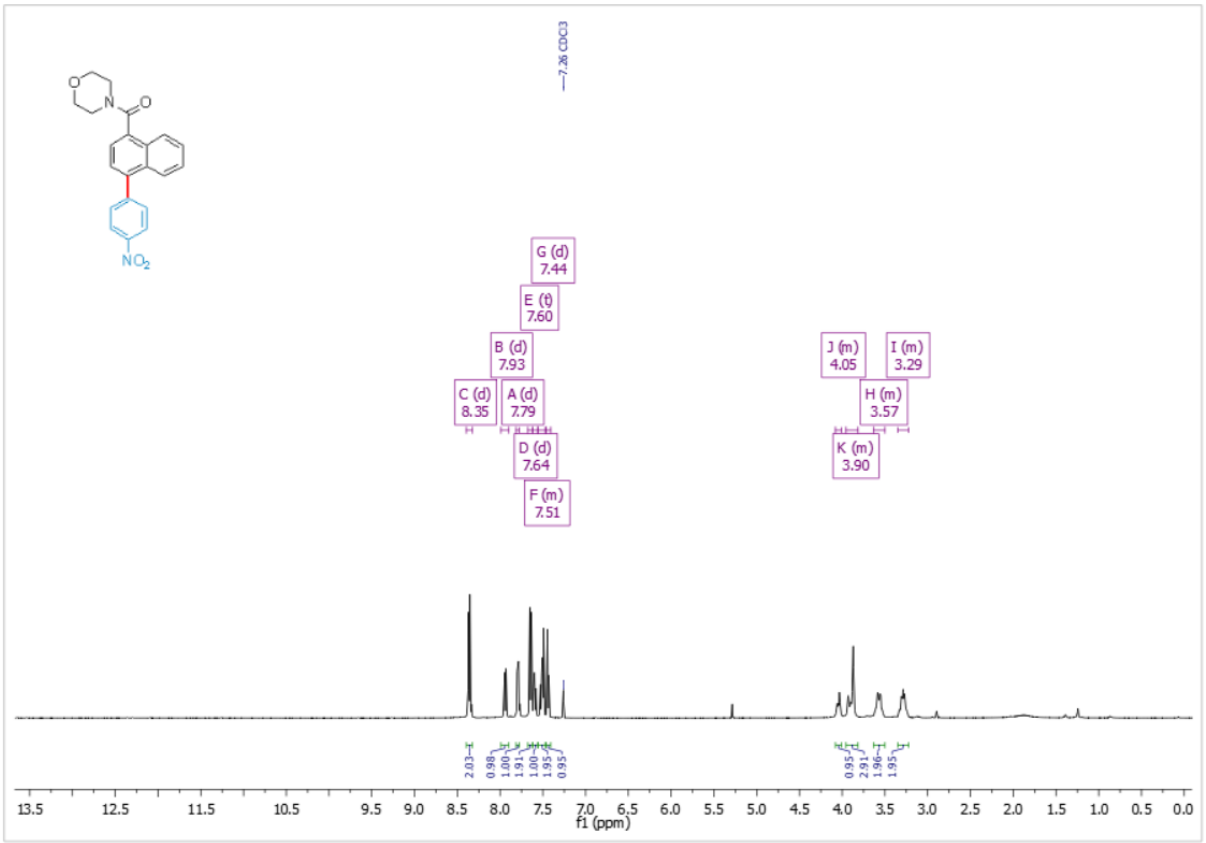

Me
Me
N
O
Me
NO2
147.25
138.23
131.17
130.94
129.69
127.17
127.02
126.60
125.66
125.36
123.62
122.65
57.25
28.17
J (m) 130.68
H (d) 127.10
F (s) 125.66
D (s) 123.62
N (s) 171.25
M (s) 147.25
L (s) 138.23
C (s) 122.65
B (s) 57.25
A (s) 28.17
E (s) 125.36
G (s) 126.60
I (s) 129.69
K (d) 131.05
f1 (ppm)

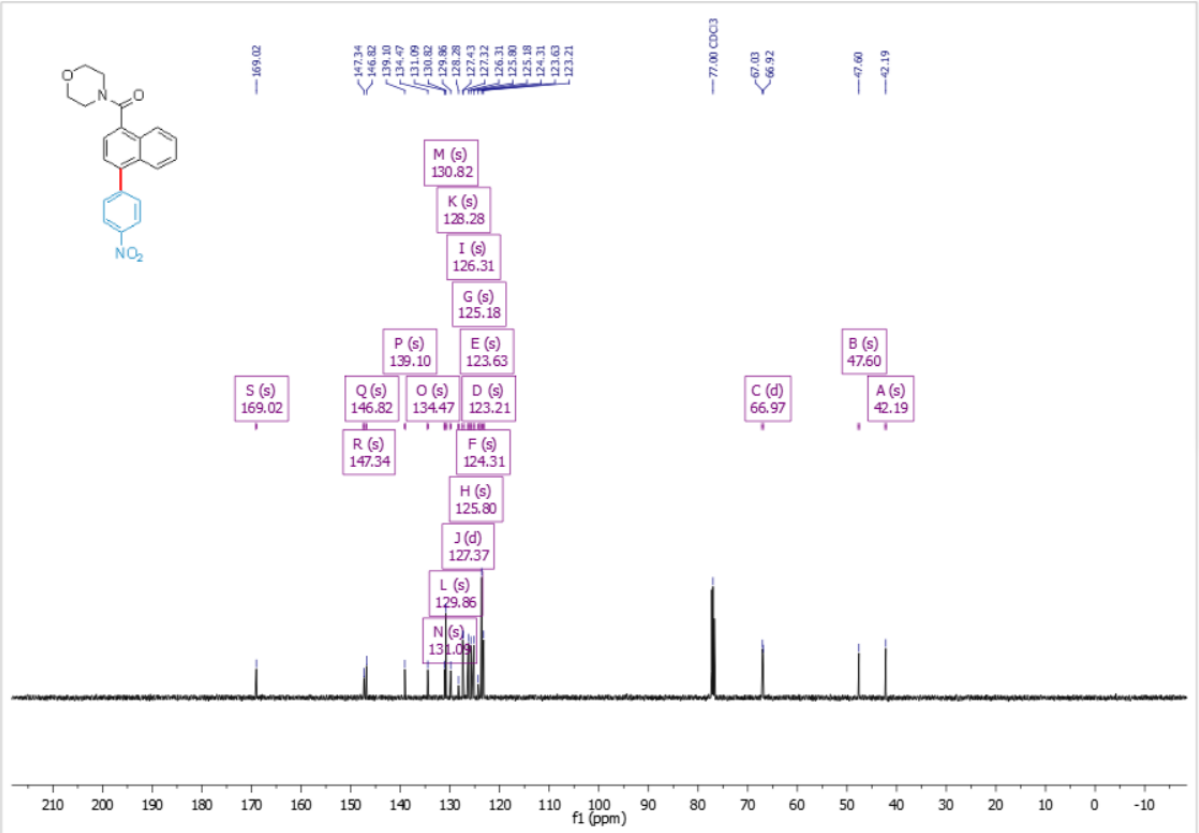

Me
N
O
Me
O
NO2
7.26 CDCl3
E (m) 7.57
B (d) 7.92
F (m) 7.49
C (d) 8.37
A (t) 7.78
D (d) 7.66
G (m) 7.43
J (m) 3.39
H (s) 3.48
I (s) 2.93
L (m) 3.79
K (m) 3.28
1.96
0.99
1.00
1.98
1.01
1.98
1.00
1.73
1.78
1.51
2.46
1.77
f1 (ppm)

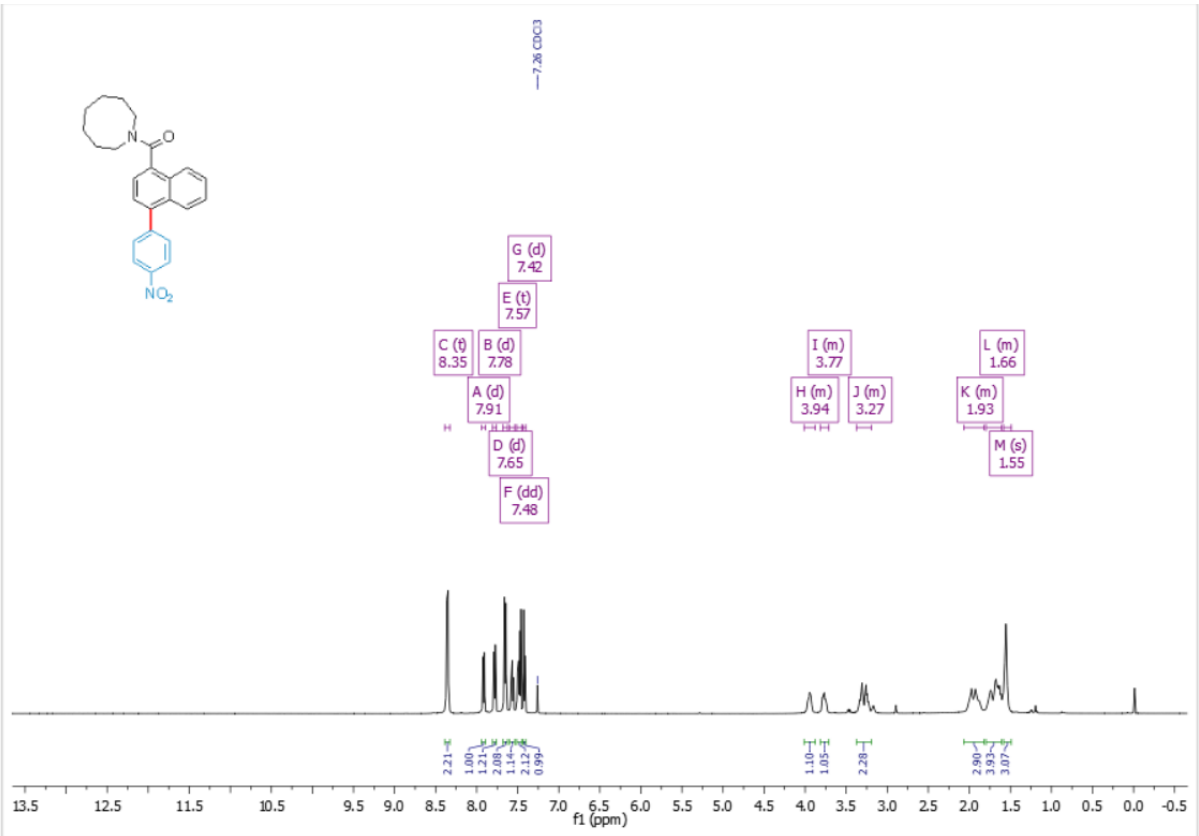

Me
Me
O
N
O
NO2
170.52
147.30
147.09
138.71
135.81
135.45
131.12
131.06
130.89
130.06
129.71
127.28
127.13
127.08
126.41
126.25
125.72
125.65
125.58
125.45
123.61
123.48
123.10
77.00 CDCl3
70.59
58.86
47.06
38.25
N (d) 131.09
L (s) 130.06
J (m) 127.16
H (s) 126.25
S (s) 147.30
P (s) 135.81
F (d) 123.55
B (s) 47.06
T (s) 170.52
R (s) 147.09
O (s) 135.45
E (s) 123.10
D (s) 70.59
C (s) 58.86
A (s) 38.25
Q (s) 138.71
G (dd) 125.60
I (s) 126.41
K (s) 129.71
M (s) 130.89
f1 (ppm)

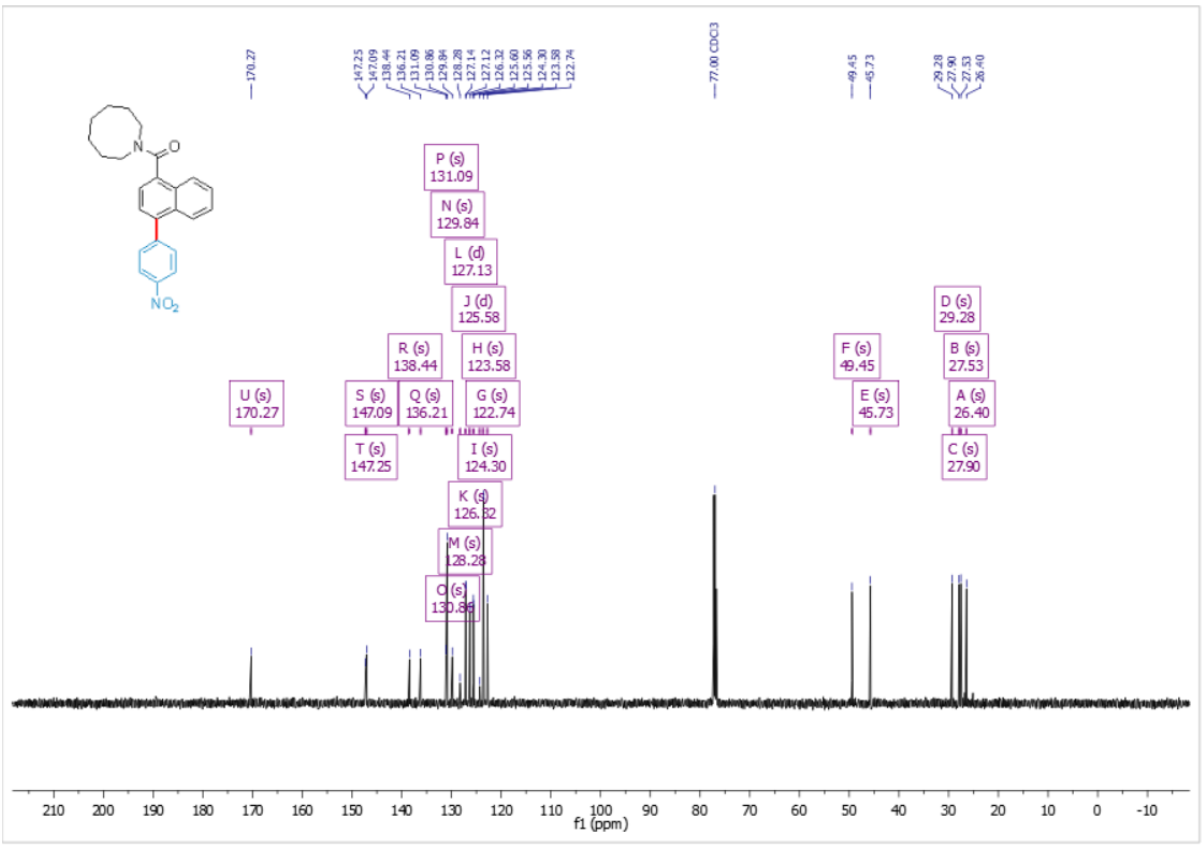

7.26 CDCl3
N
O
NO2
L (t) 7.50
E (t) 7.57
C (d) 7.78
B (t) 8.36
A (d) 7.93
F (d) 7.42
D (d) 7.65
G (d) 7.47
H (m) 3.91
K (m) 3.22
J (m) 1.76
I (tt) 1.46
M (m) 1.71
2.15
1.00
1.24
2.08
1.10
1.00
1.18
1.05
2.10
2.04
2.50
2.65
2.15
f1 (ppm)

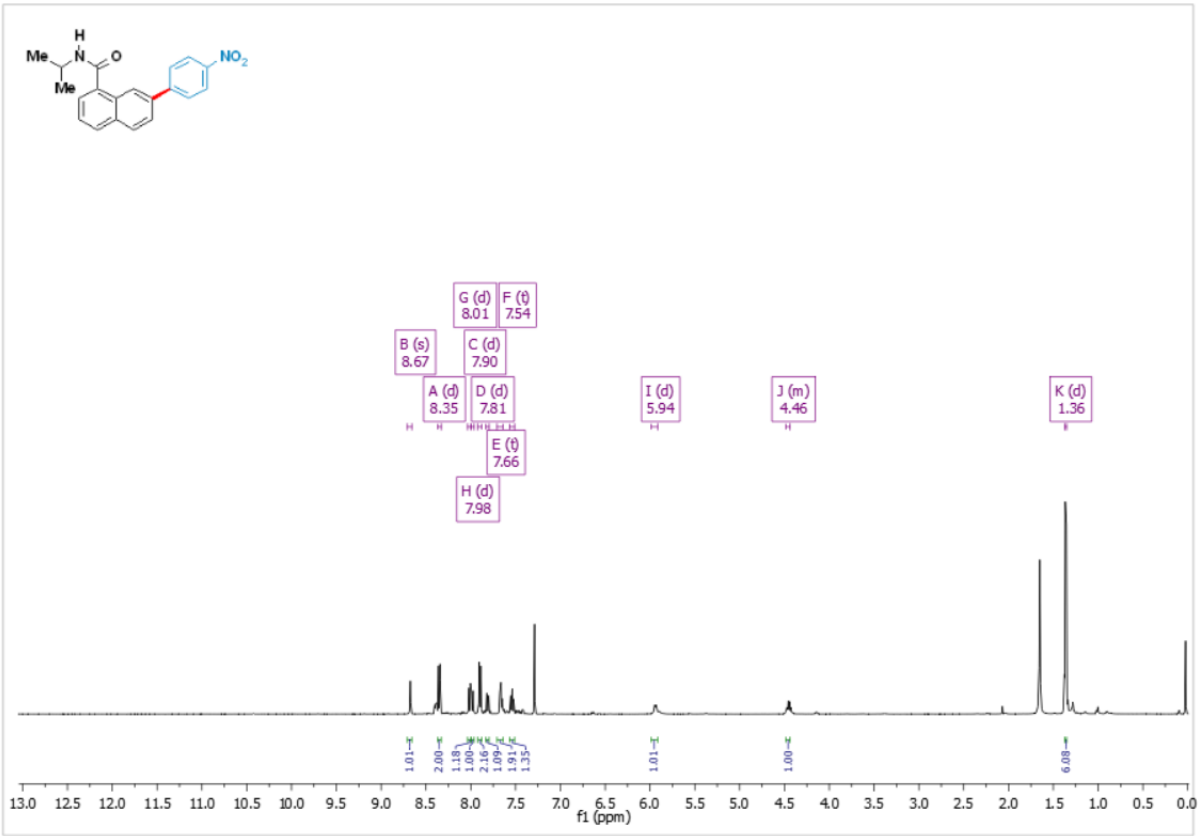

O (s) 131.11
M (s) 129.96
K (d) 127.17
I (d) 125.60
Q (s) 138.61
G (s) 123.63
T (s) 168.78
R (s) 147.11
P (s) 135.73
F (s) 122.76
S (s) 147.31
H (s) 124.35
J (s) 126.40
L (s) 128.31
N (s) 130.88
E (s) 48.36
D (s) 42.73
B (s) 25.80
A (s) 24.51
C (s) 26.72
f1 (ppm)

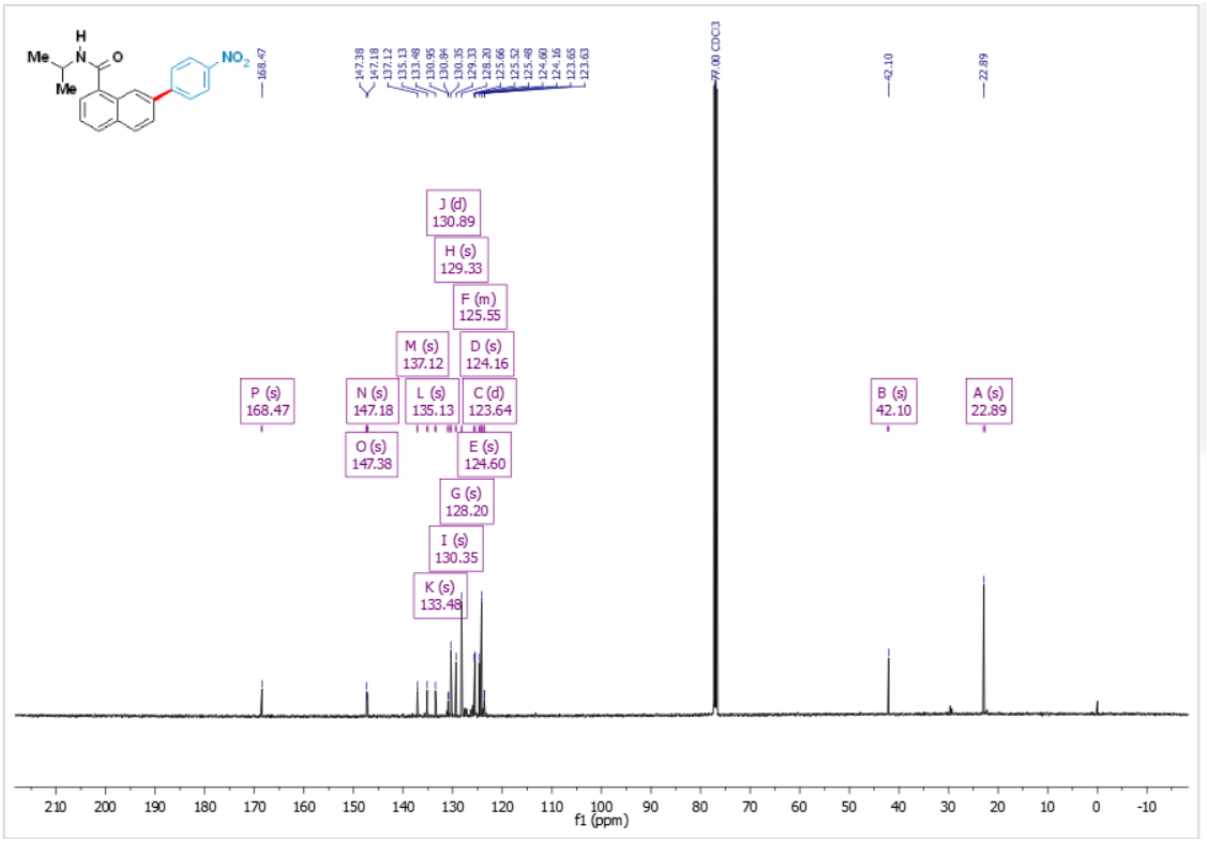

G (d) 7.44
E (t) 7.60
B (d) 7.93
C (d) 8.35
A (d) 7.79
D (d) 7.64
F (m) 7.51
J (m) 4.05
I (m) 3.29
H (m) 3.57
K (m) 3.90
f1 (ppm)

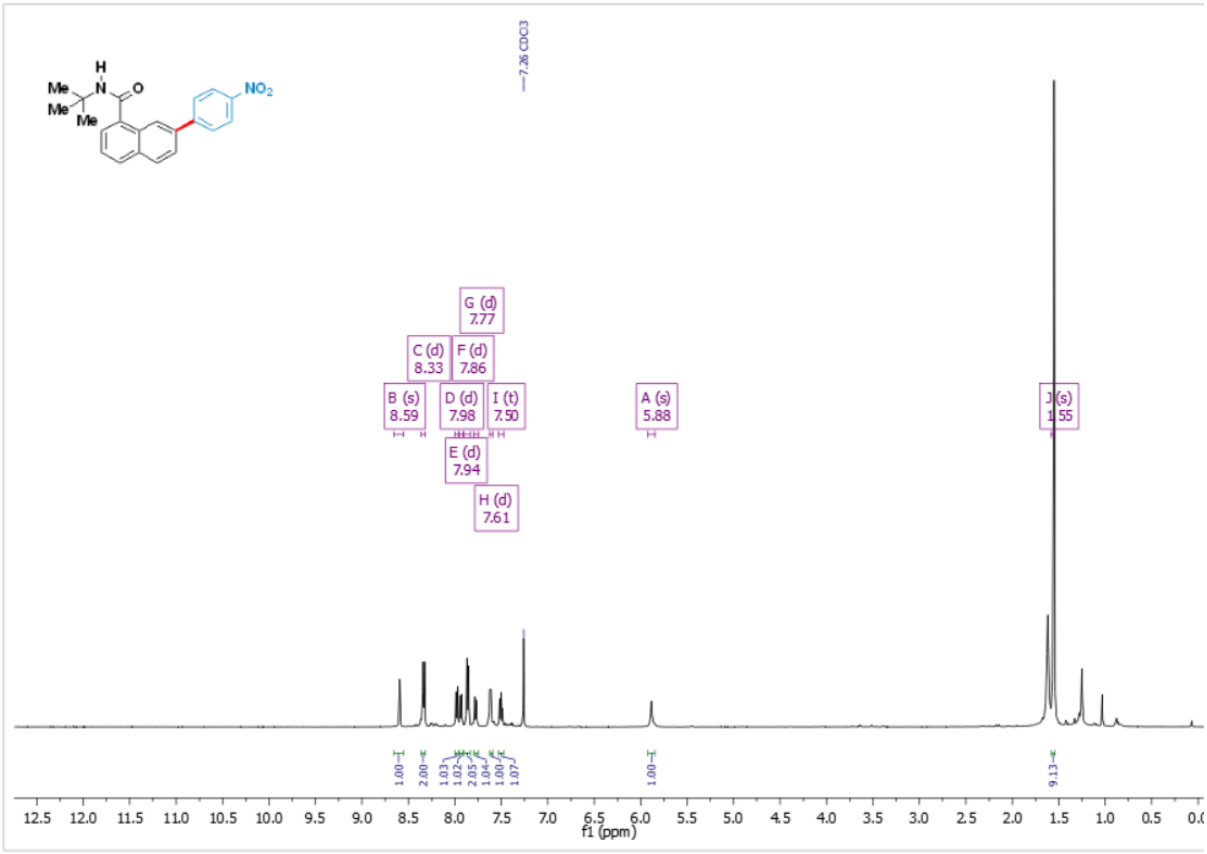

169.02
147.34
146.82
139.10
134.47
131.09
130.82
129.86
128.28
127.43
127.32
126.31
125.80
125.18
124.31
123.63
123.21
77.00 CDCl3
67.03
66.92
47.60
42.19
M (s) 130.82
K (s) 128.28
I (s) 126.31
G (s) 125.18
P (s) 139.10
E (s) 123.63
B (s) 47.60
S (s) 169.02
Q (s) 146.82
O (s) 134.47
D (s) 123.21
C (d) 66.97
A (s) 42.19
R (s) 147.34
F (s) 124.31
H (s) 125.80
J (d) 127.37
L (s) 129.86
N (s) 131.09
NO2
f1 (ppm)

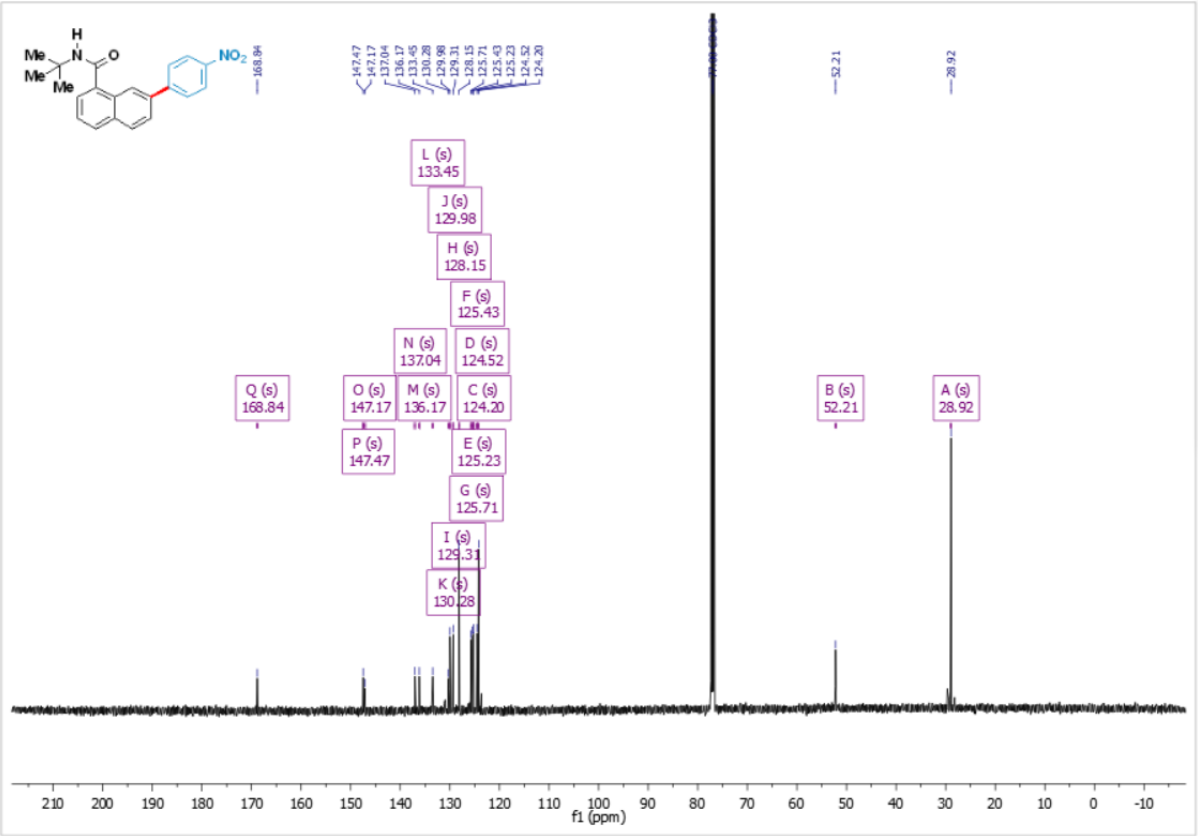

7.26 CDCl3
G (d) 7.42
E (t) 7.57
C (t) 8.35
B (d) 7.78
A (d) 7.91
D (d) 7.65
F (dd) 7.48
I (m) 3.77
H (m) 3.94
J (m) 3.27
L (m) 1.66
K (m) 1.93
M (s) 1.55
NO2
f1 (ppm)

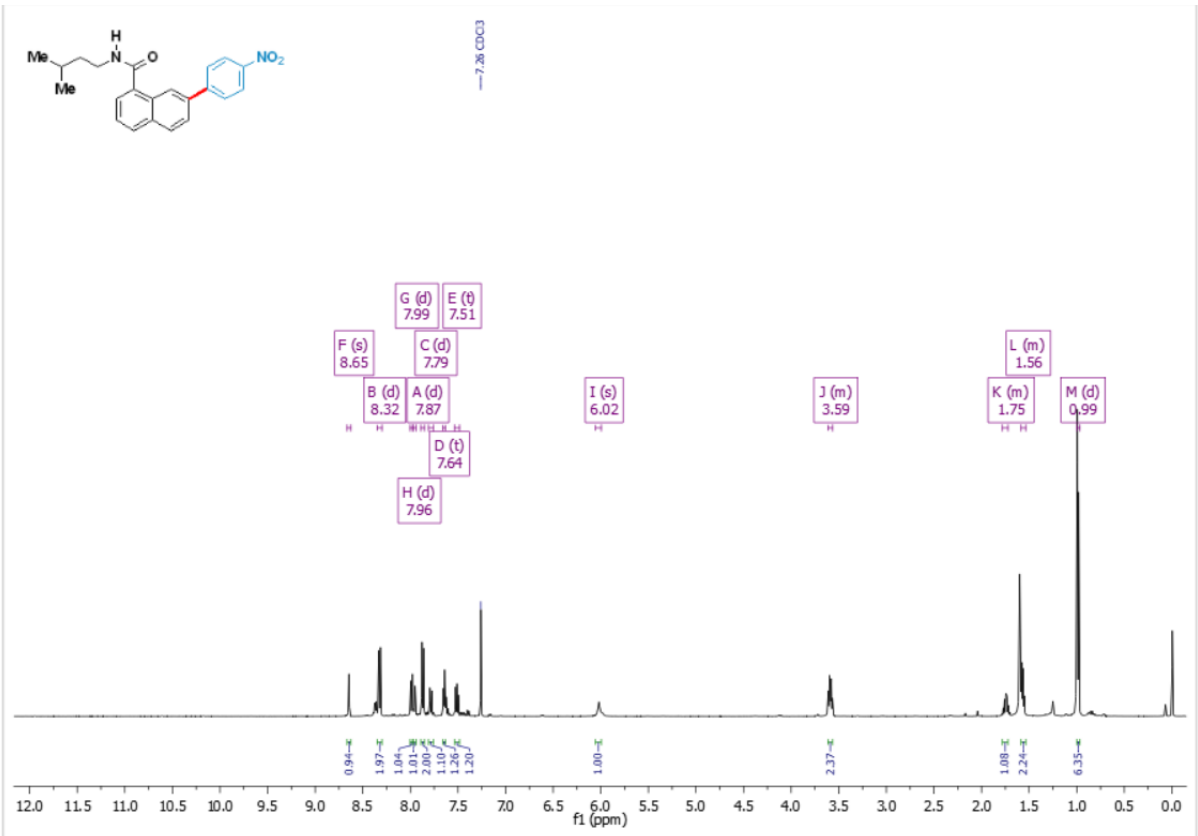

P (s) 131.09
N (s) 129.84
L (d) 127.13
J (d) 125.58
R (s) 138.44
H (s) 123.58
U (s) 170.27
S (s) 147.09
Q (s) 136.21
G (s) 122.74
T (s) 147.25
I (s) 124.30
K (s) 126.32
M (s) 128.28
O (s) 130.86
F (s) 49.45
E (s) 45.73
D (s) 29.28
B (s) 27.53
A (s) 26.40
C (s) 27.90
f1 (ppm)

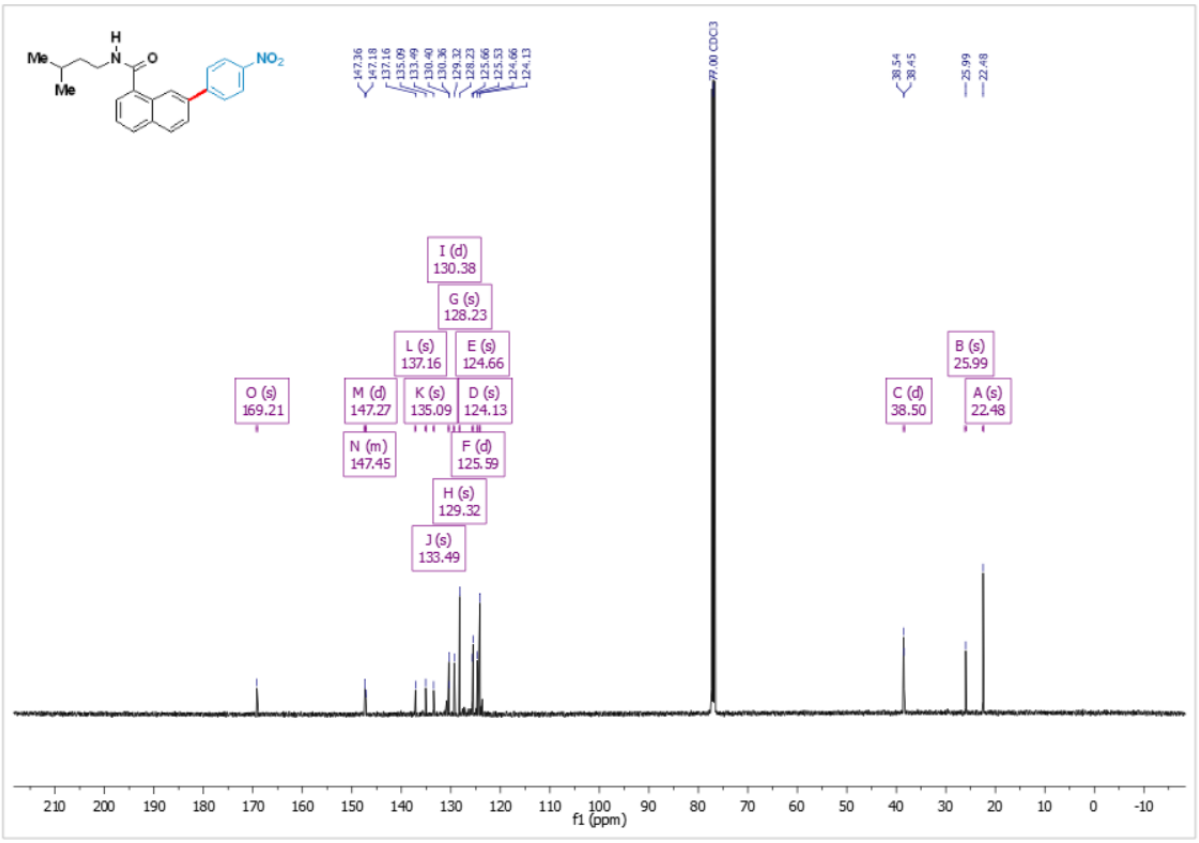

G (d) 8.01
F (t) 7.54
B (s) 8.67
C (d) 7.90
A (d) 8.35
D (d) 7.81
E (t) 7.66
H (d) 7.98
I (d) 5.94
J (m) 4.46
K (d) 1.36
f1 (ppm)

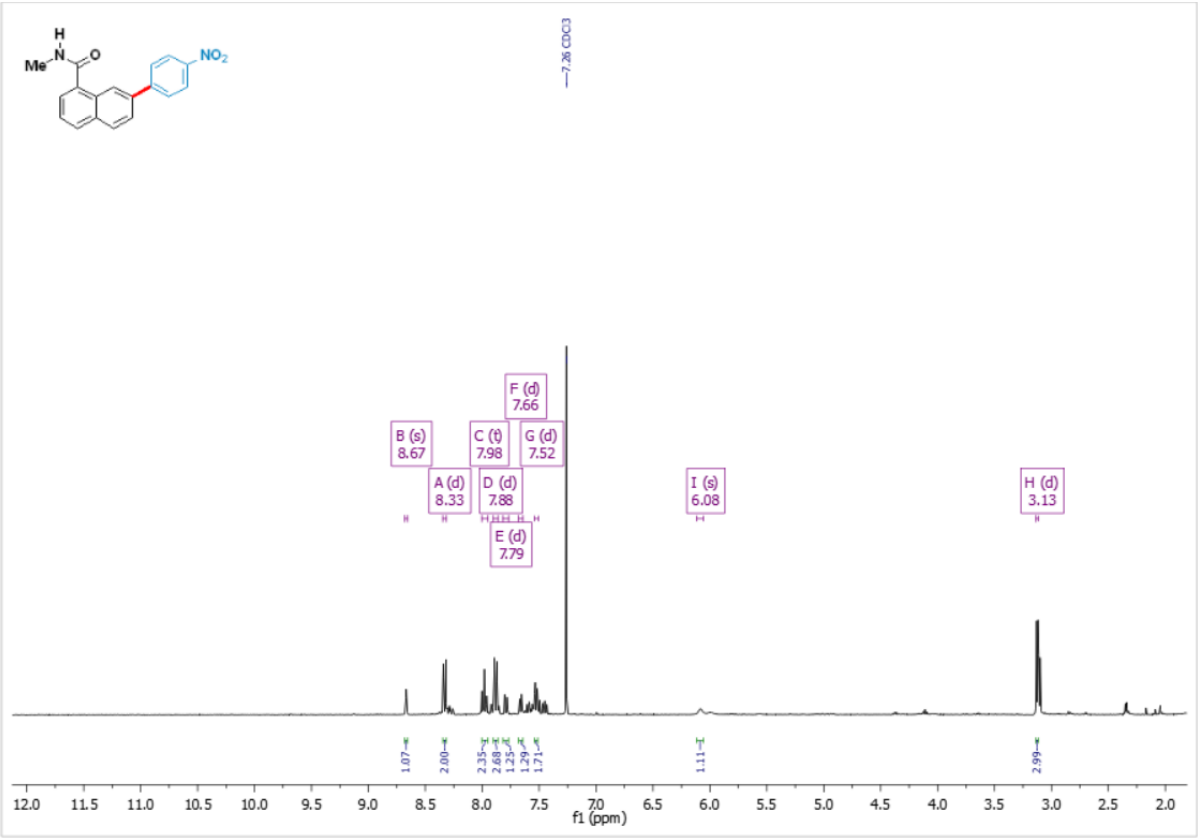

J (d) 130.89
H (s) 129.33
F (m) 125.55
M (s) 137.12
D (s) 124.16
P (s) 168.47
N (s) 147.18
L (s) 135.13
C (d) 123.64
B (s) 42.10
A (s) 22.89
O (s) 147.38
E (s) 124.60
G (s) 128.20
I (s) 130.35
K (s) 133.48
f1 (ppm)

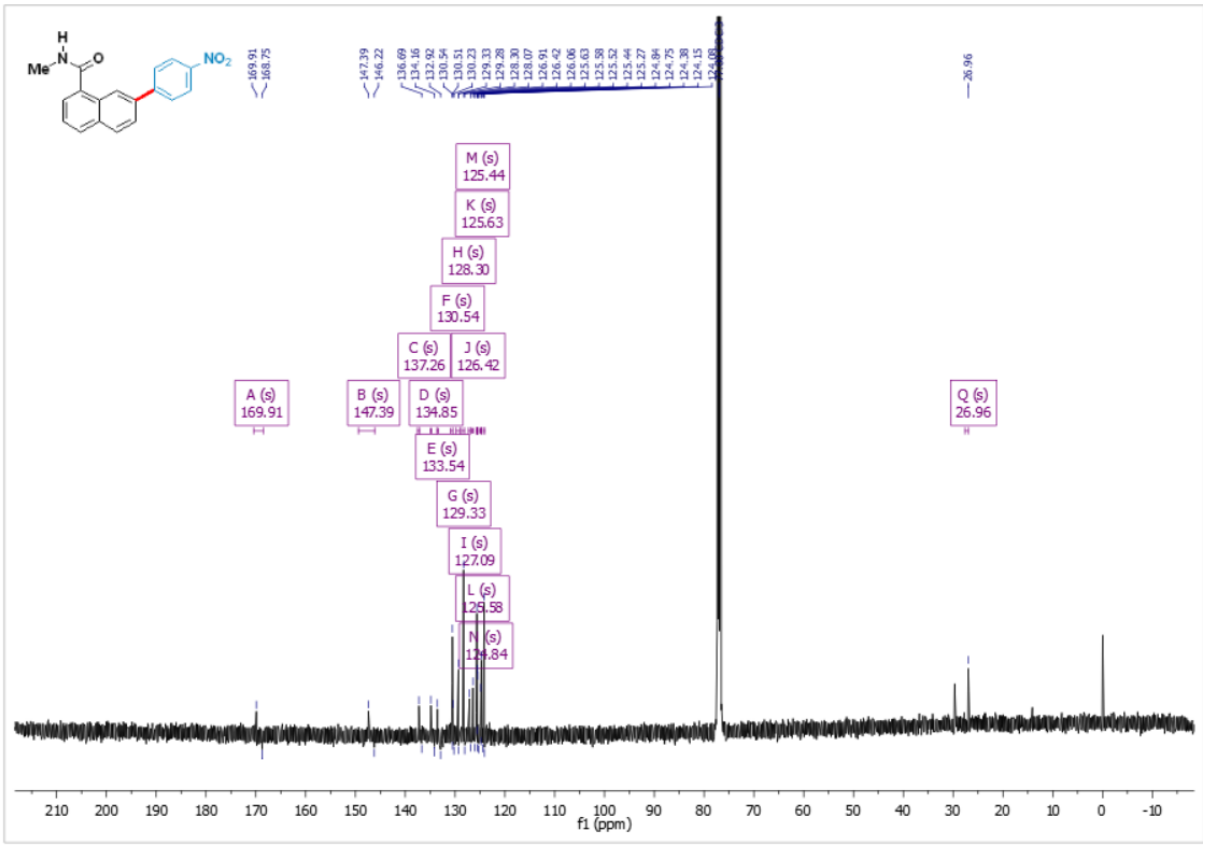

G (d) 7.77
C (d) 8.33
F (d) 7.86
B (s) 8.59
D (d) 7.98
I (t) 7.50
A (s) 5.88
J (s) 1.55
E (d) 7.94
H (d) 7.61
f1 (ppm)

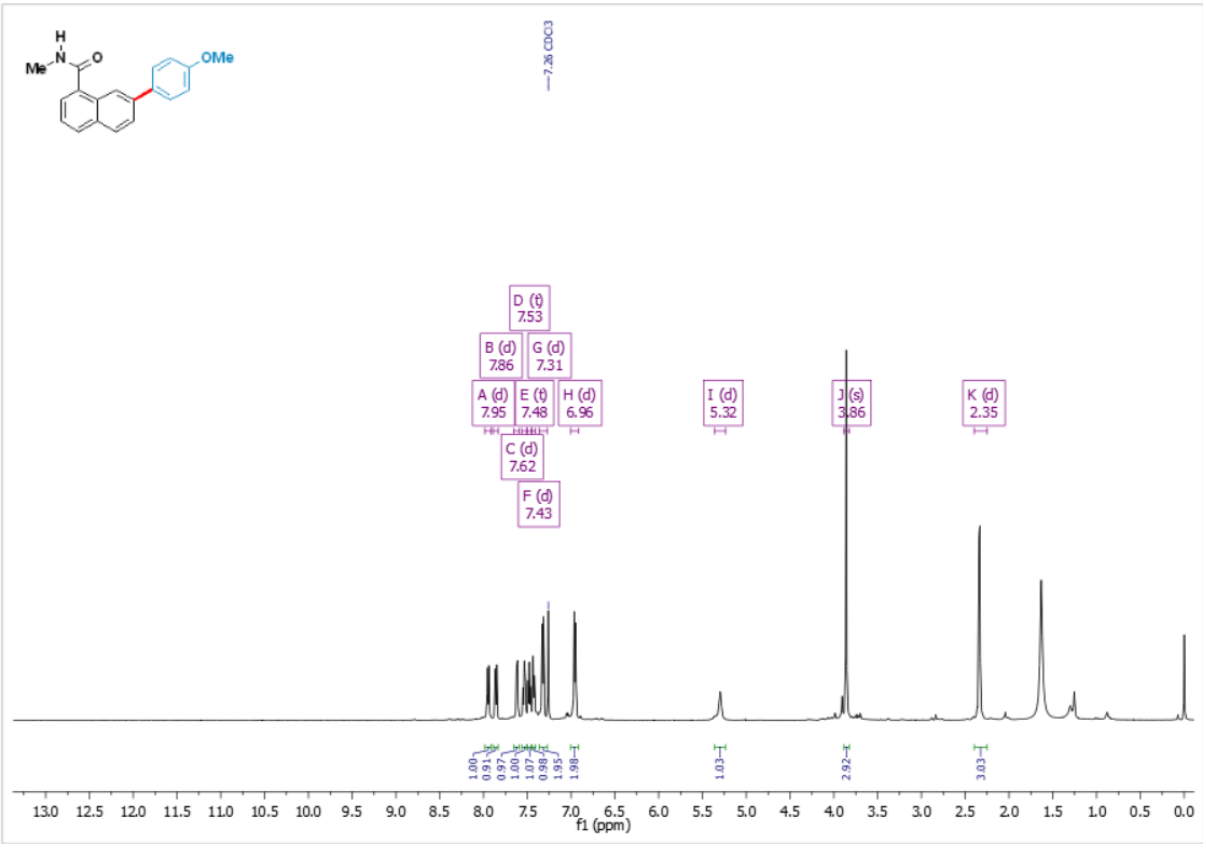

Me
Me
Me
H
N
O
NO2
168.84
147.47
147.17
137.04
136.17
133.45
130.28
129.98
129.31
128.15
125.71
125.43
125.23
124.52
124.20
52.21
28.92
L (s) 133.45
J (s) 129.98
H (s) 128.15
F (s) 125.43
N (s) 137.04
D (s) 124.52
Q (s) 168.84
O (s) 147.17
M (s) 136.17
C (s) 124.20
B (s) 52.21
A (s) 28.92
P (s) 147.47
E (s) 125.23
G (s) 125.71
I (s) 129.31
K (s) 130.28
f1 (ppm)

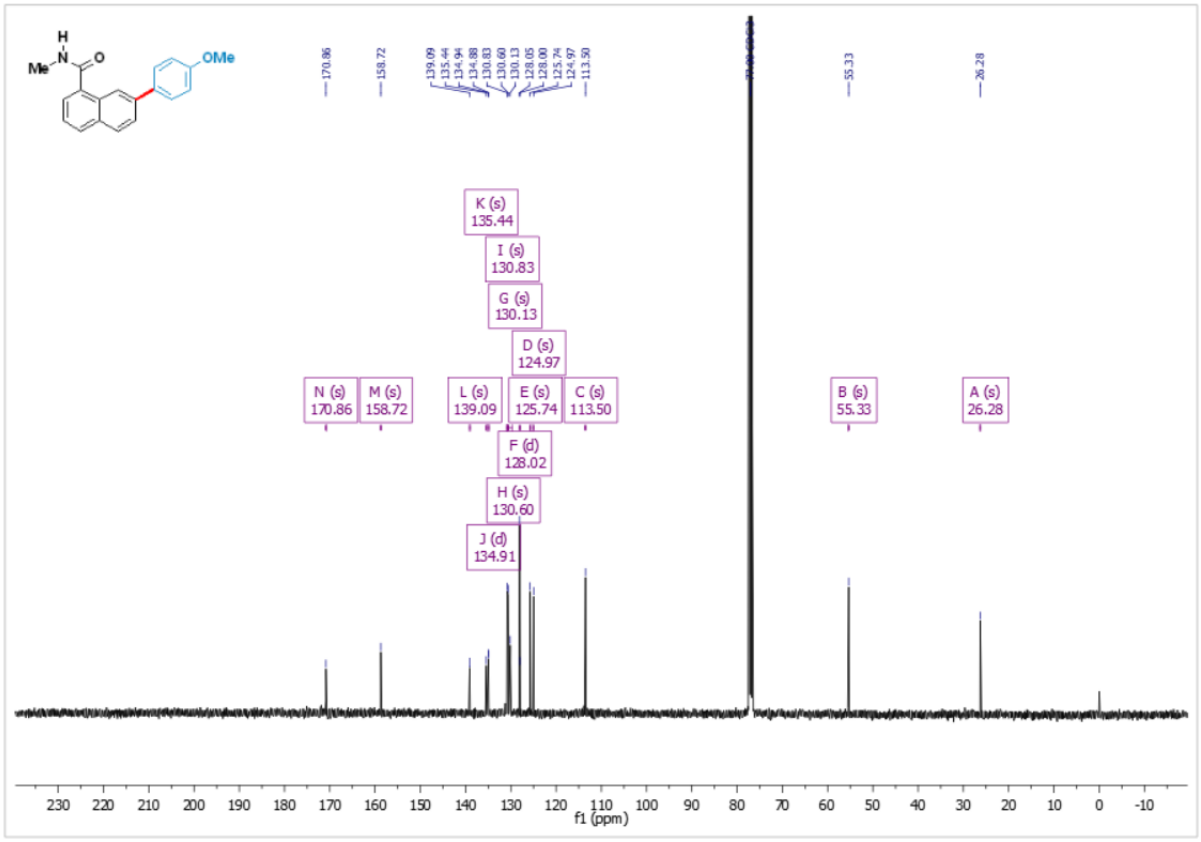

Me
Me
H
N
O
NO2
7.26 CDCl3
G (d) 7.99
E (t) 7.51
F (s) 8.65
C (d) 7.79
B (d) 8.32
A (d) 7.87
D (t) 7.64
H (d) 7.96
I (s) 6.02
J (m) 3.59
L (m) 1.56
K (m) 1.75
M (d) 0.99
0.94
1.97
1.04
1.01
2.00
1.10
1.26
1.20
1.00
2.37
1.08
2.24
6.35
f1 (ppm)

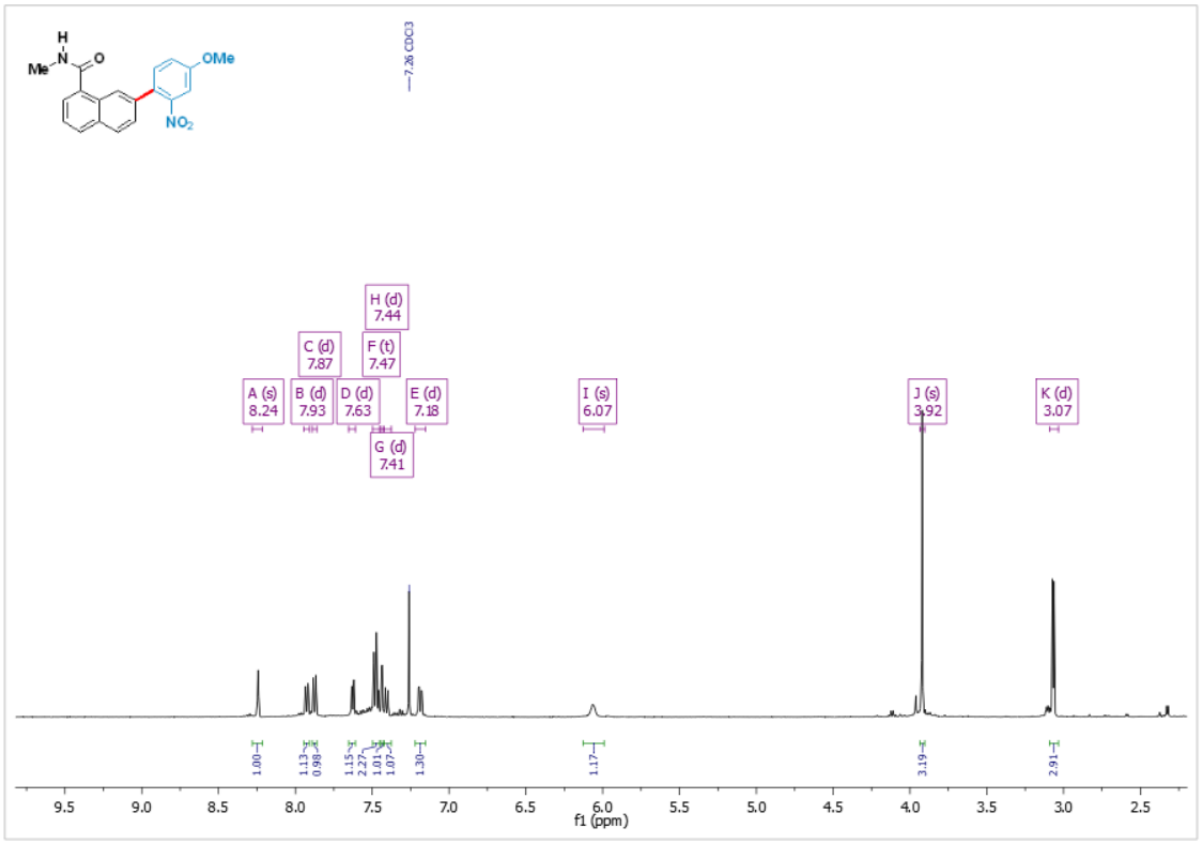

Me
Me
H
N
O
NO2
147.36
147.18
137.16
135.09
133.49
130.40
130.36
129.32
128.23
125.66
125.53
124.66
124.13
77.00 CDCl3
38.54
38.45
25.99
22.48
I (d) 130.38
G (s) 128.23
L (s) 137.16
E (s) 124.66
B (s) 25.99
O (s) 169.21
M (d) 147.27
K (s) 135.09
D (s) 124.13
C (d) 38.50
A (s) 22.48
N (m) 147.45
F (d) 125.59
H (s) 129.32
J (s) 133.49
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

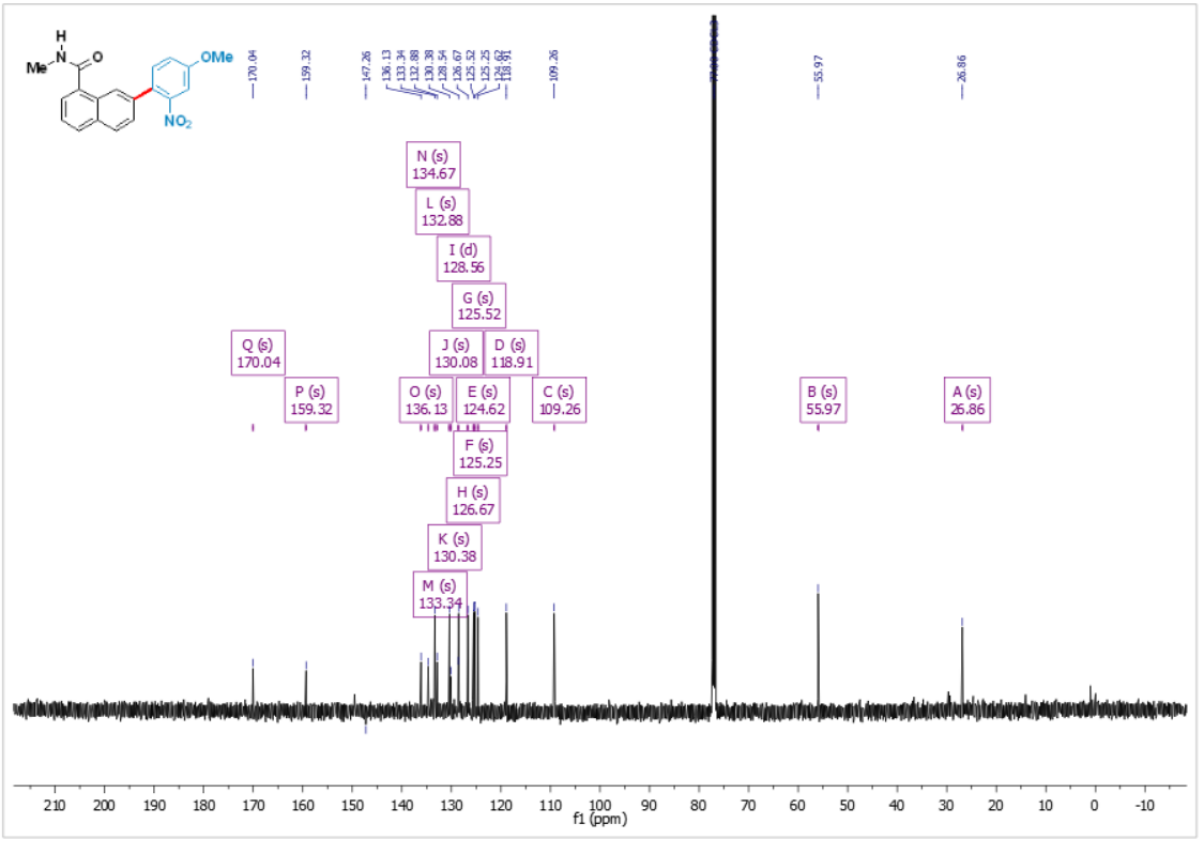

Me
H
N
O
NO2
7.26 CDCl3
F (d) 7.66
B (s) 8.67
C (t) 7.98
G (d) 7.52
A (d) 8.33
D (d) 7.88
I (s) 6.08
H (d) 3.13
E (d) 7.79
1.07
2.00
2.35
2.68
1.25
1.29
1.71
1.11
2.99
12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0
f1 (ppm)

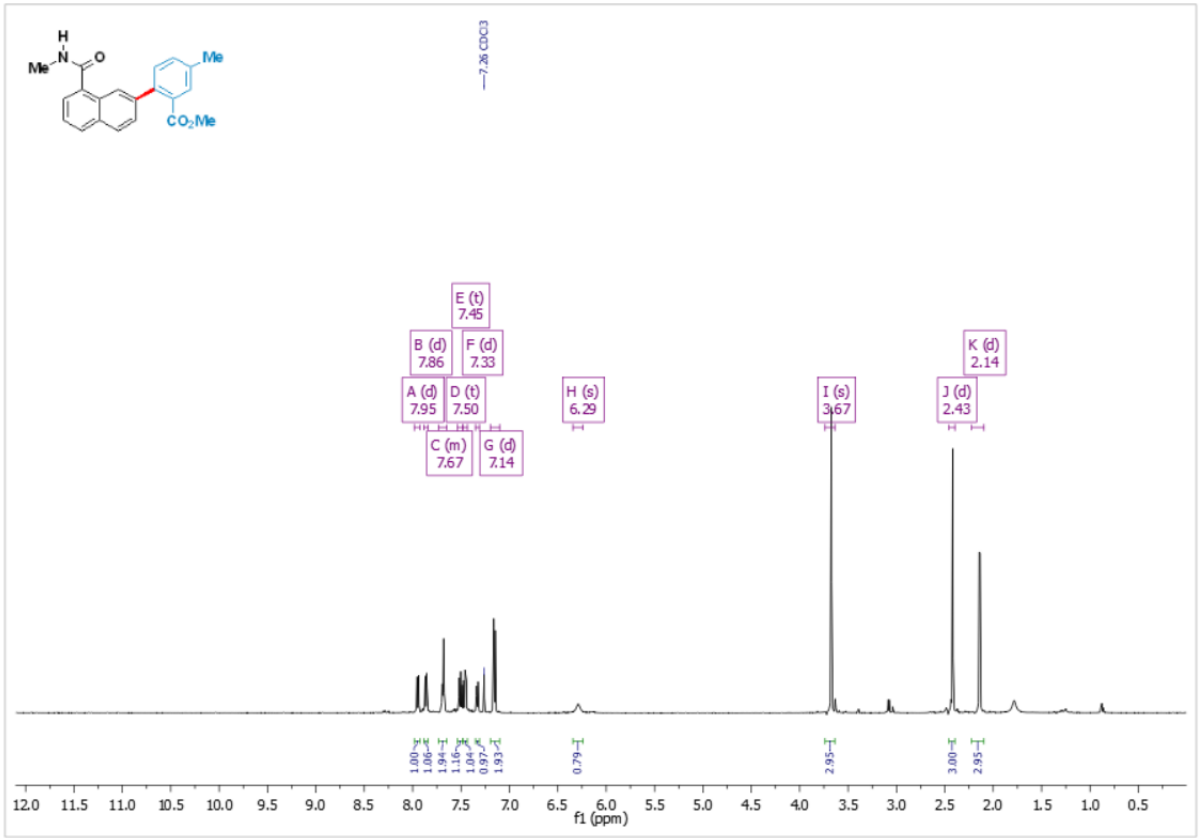

NO2
Me
H
N
O
M (s) 125.44
K (s) 125.63
H (s) 128.30
F (s) 130.54
C (s) 137.26
J (s) 126.42
A (s) 169.91
B (s) 147.39
D (s) 134.85
E (s) 133.54
G (s) 129.33
I (s) 127.09
L (s) 125.58
N (s) 124.84
Q (s) 26.96
f1 (ppm)

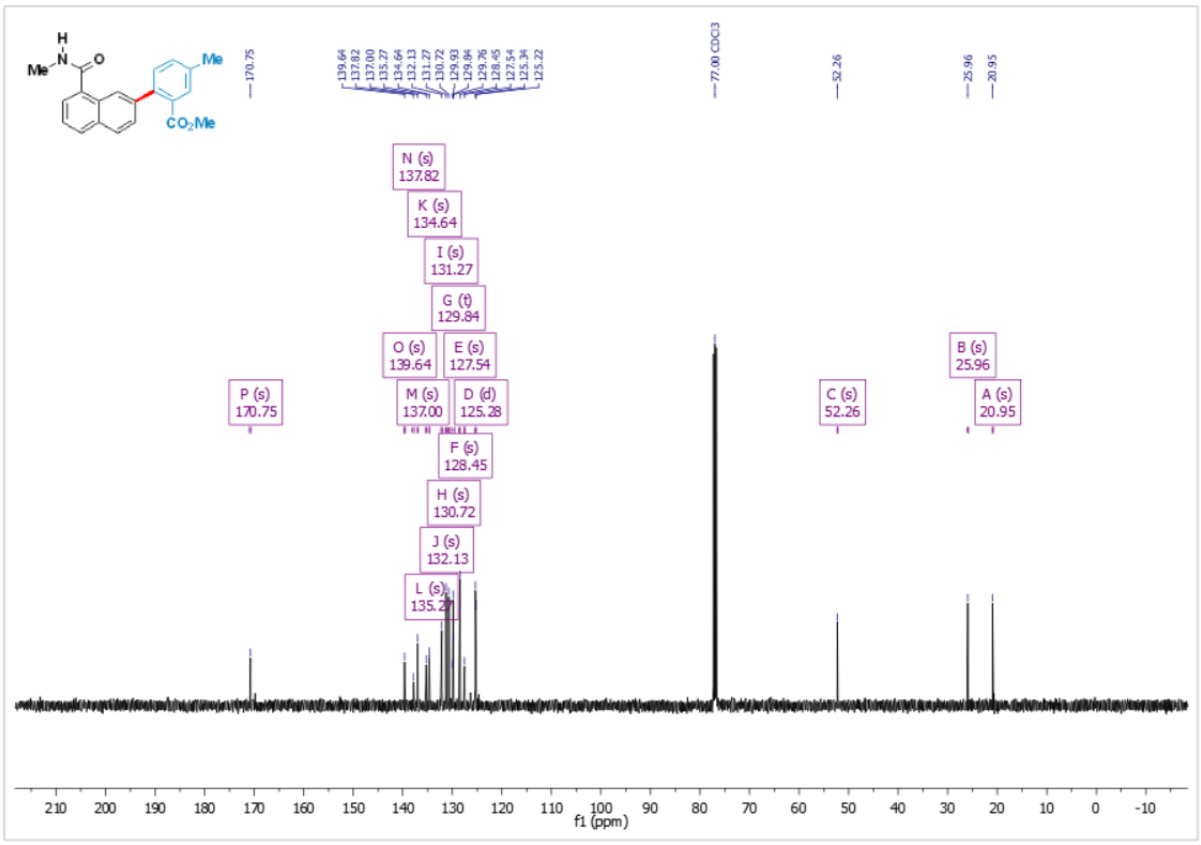

OMe
Me
H
N
O
7.26 CDCl3
D (t) 7.53
B (d) 7.86
G (d) 7.31
A (d) 7.95
E (t) 7.48
H (d) 6.96
C (d) 7.62
F (d) 7.43
I (d) 5.32
J (s) 3.86
K (d) 2.35
f1 (ppm)

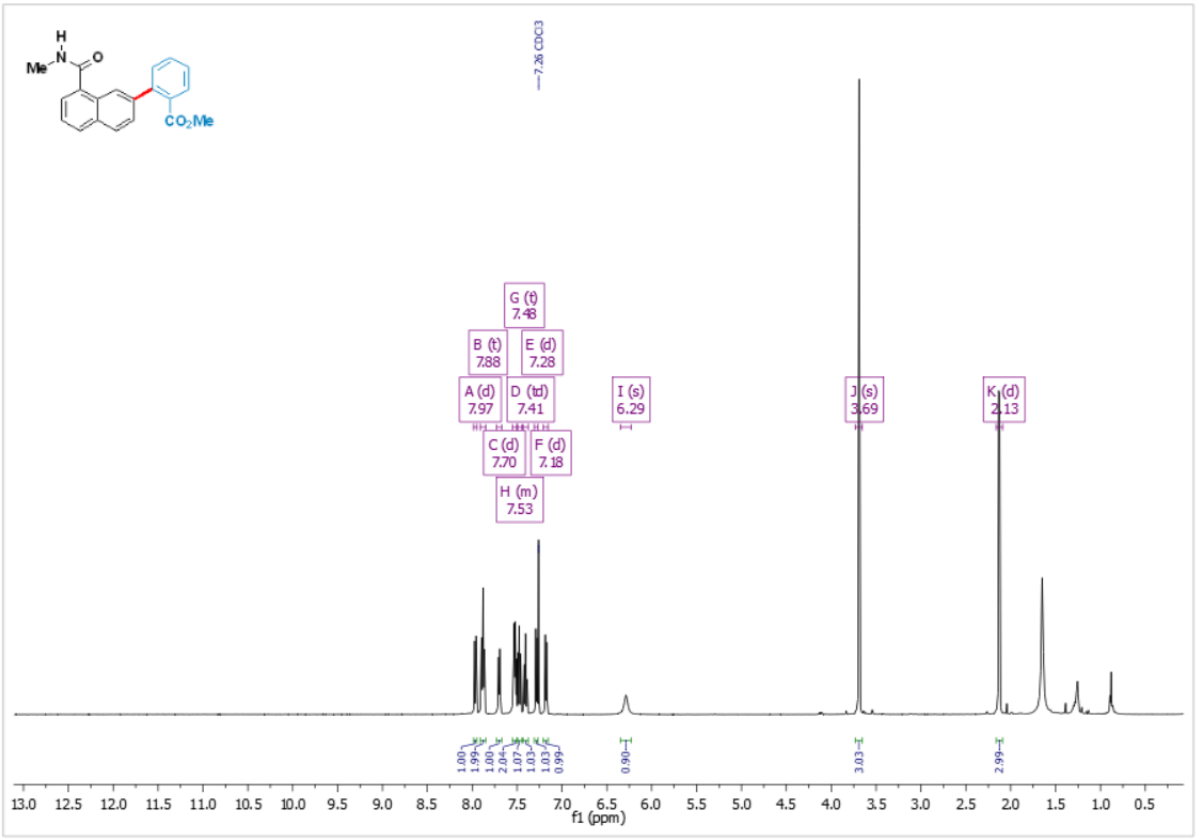

OMe
170.86
158.72
139.09
135.44
134.94
134.88
130.83
130.60
130.13
128.05
128.00
125.74
124.97
113.50
55.33
26.28
K (s) 135.44
I (s) 130.83
G (s) 130.13
D (s) 124.97
N (s) 170.86
M (s) 158.72
L (s) 139.09
E (s) 125.74
C (s) 113.50
B (s) 55.33
A (s) 26.28
F (d) 128.02
H (s) 130.60
J (d) 134.91
f1 (ppm)

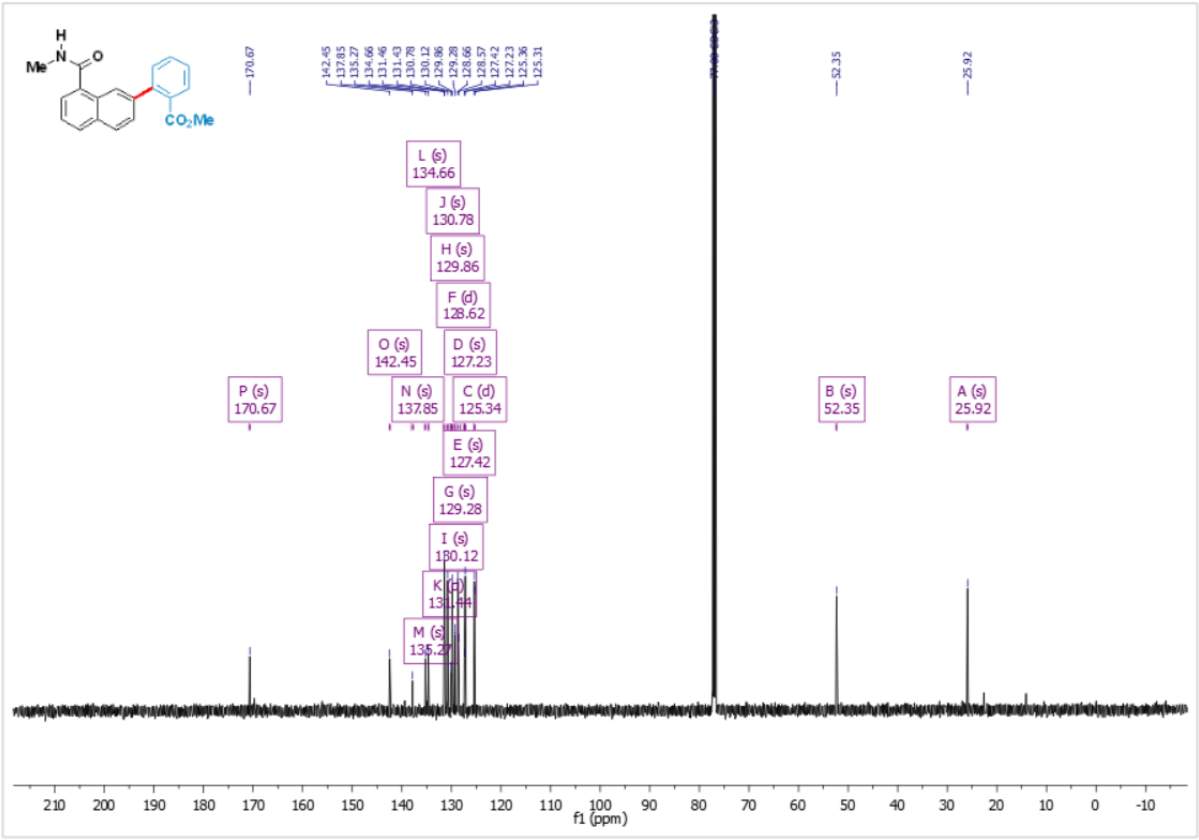

OMe
NO2
7.26 CDCl3
H (d) 7.44
C (d) 7.87
F (t) 7.47
A (s) 8.24
B (d) 7.93
D (d) 7.63
E (d) 7.18
I (s) 6.07
J (s) 3.92
K (d) 3.07
G (d) 7.41
1.00
1.13
0.98
1.15
2.27
1.01
1.07
1.30
1.17
3.19
2.91
f1 (ppm)

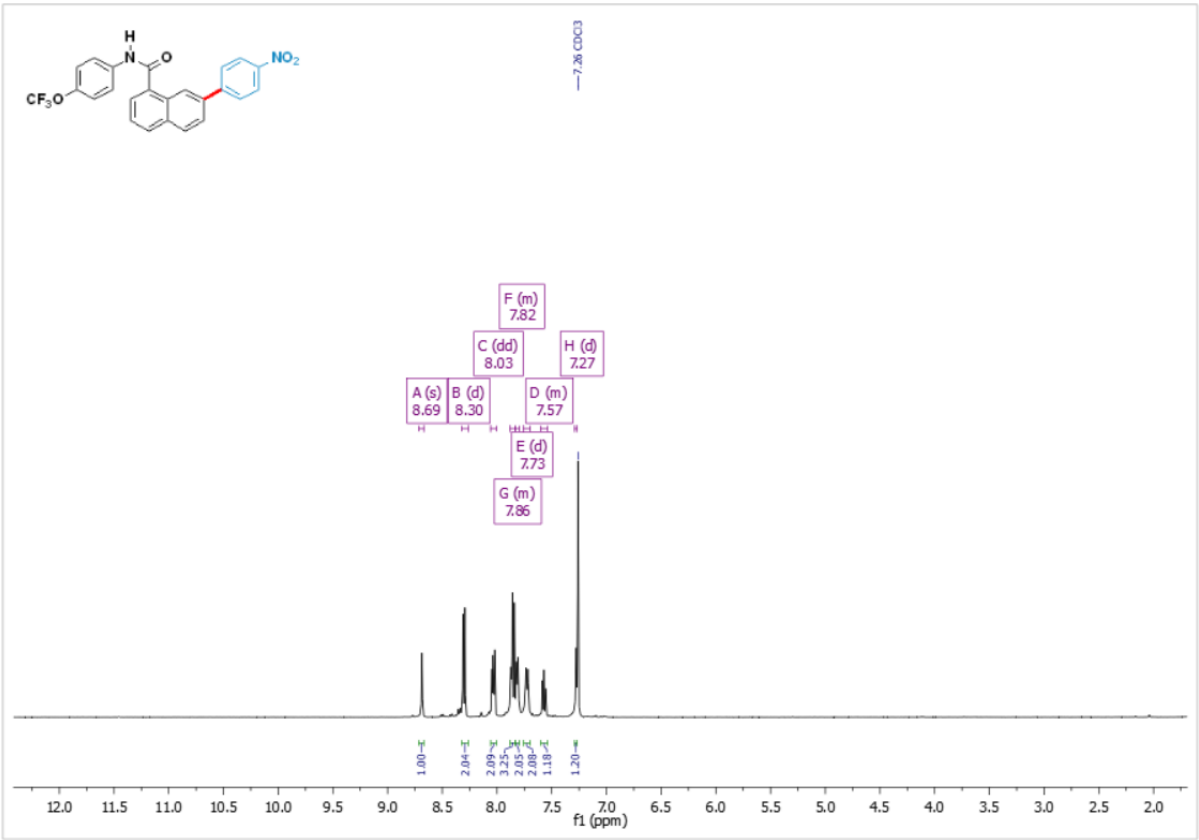

OMe
NO2
N (s) 134.67
L (s) 132.88
I (d) 128.56
G (s) 125.52
Q (s) 170.04
J (s) 130.08
D (s) 118.91
P (s) 159.32
O (s) 136.13
E (s) 124.62
C (s) 109.26
B (s) 55.97
A (s) 26.86
F (s) 125.25
H (s) 126.67
K (s) 130.38
M (s) 133.34
f1 (ppm)

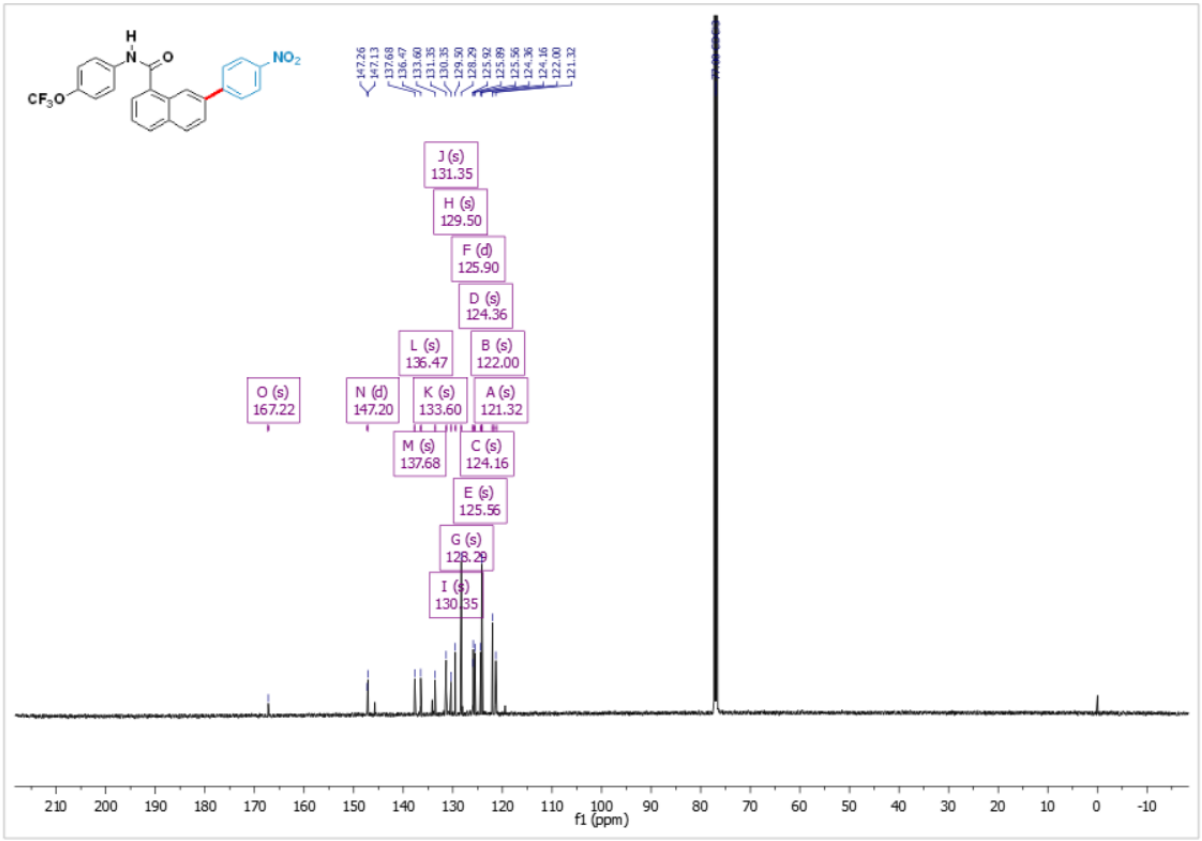

Me
CO2Me
7.26 CDCl3
E (t) 7.45
B (d) 7.86
F (d) 7.33
A (d) 7.95
D (t) 7.50
H (s) 6.29
I (s) 3.67
K (d) 2.14
J (d) 2.43
C (m) 7.67
G (d) 7.14
f1 (ppm)

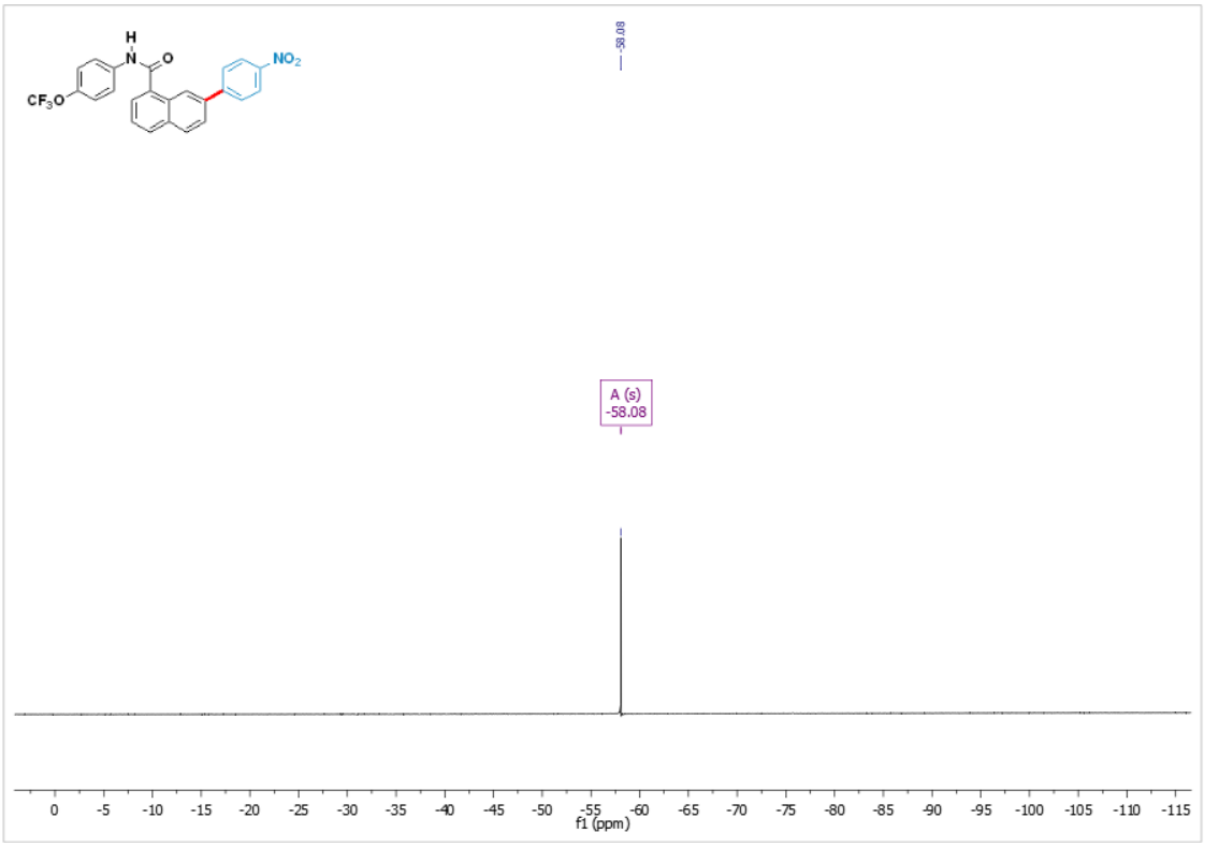

N (s) 137.82
K (s) 134.64
I (s) 131.27
G (t) 129.84
O (s) 139.64
E (s) 127.54
M (s) 137.00
D (d) 125.28
F (s) 128.45
H (s) 130.72
J (s) 132.13
L (s) 135.27
P (s) 170.75
C (s) 52.26
B (s) 25.96
A (s) 20.95
f1 (ppm)

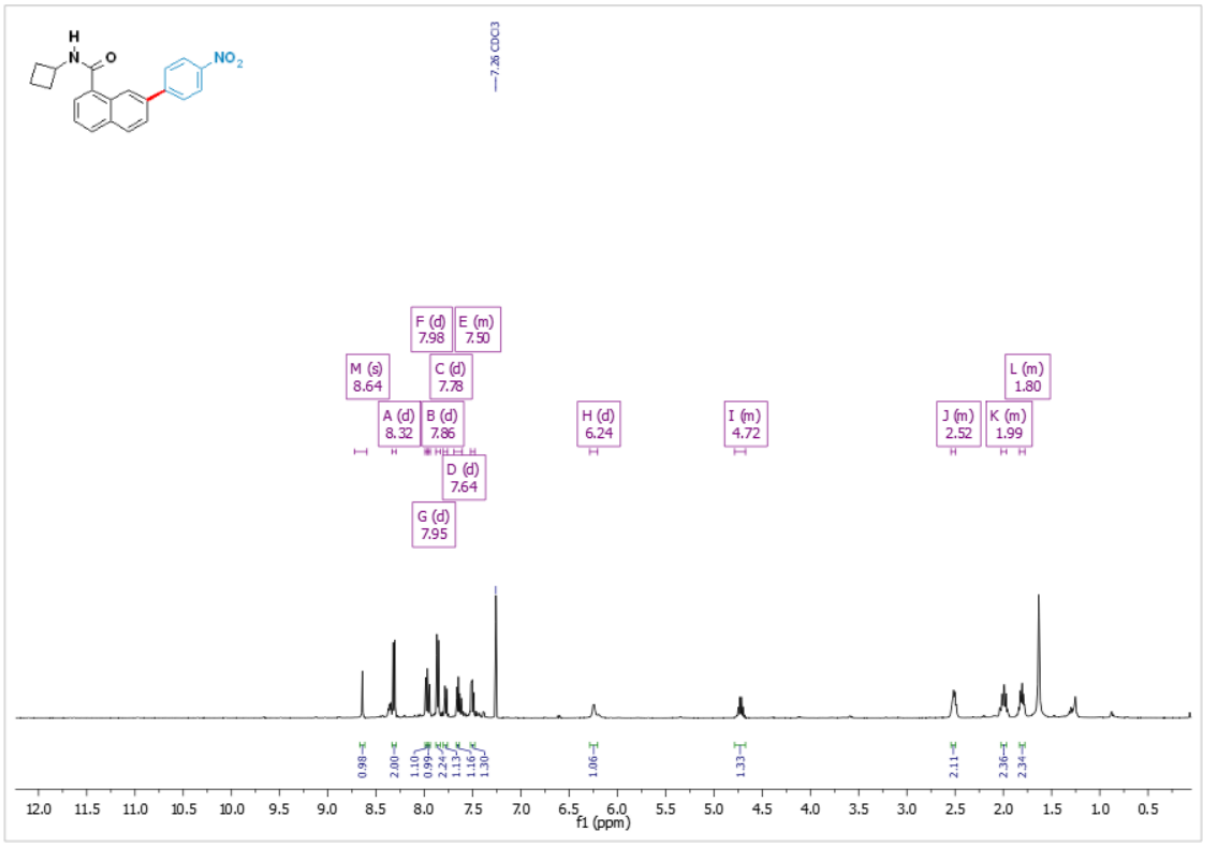

G (t) 7.48
B (t) 7.88
E (d) 7.28
A (d) 7.97
D (td) 7.41
I (s) 6.29
J (s) 3.69
K (d) 2.13
C (d) 7.70
F (d) 7.18
H (m) 7.53
f1 (ppm)

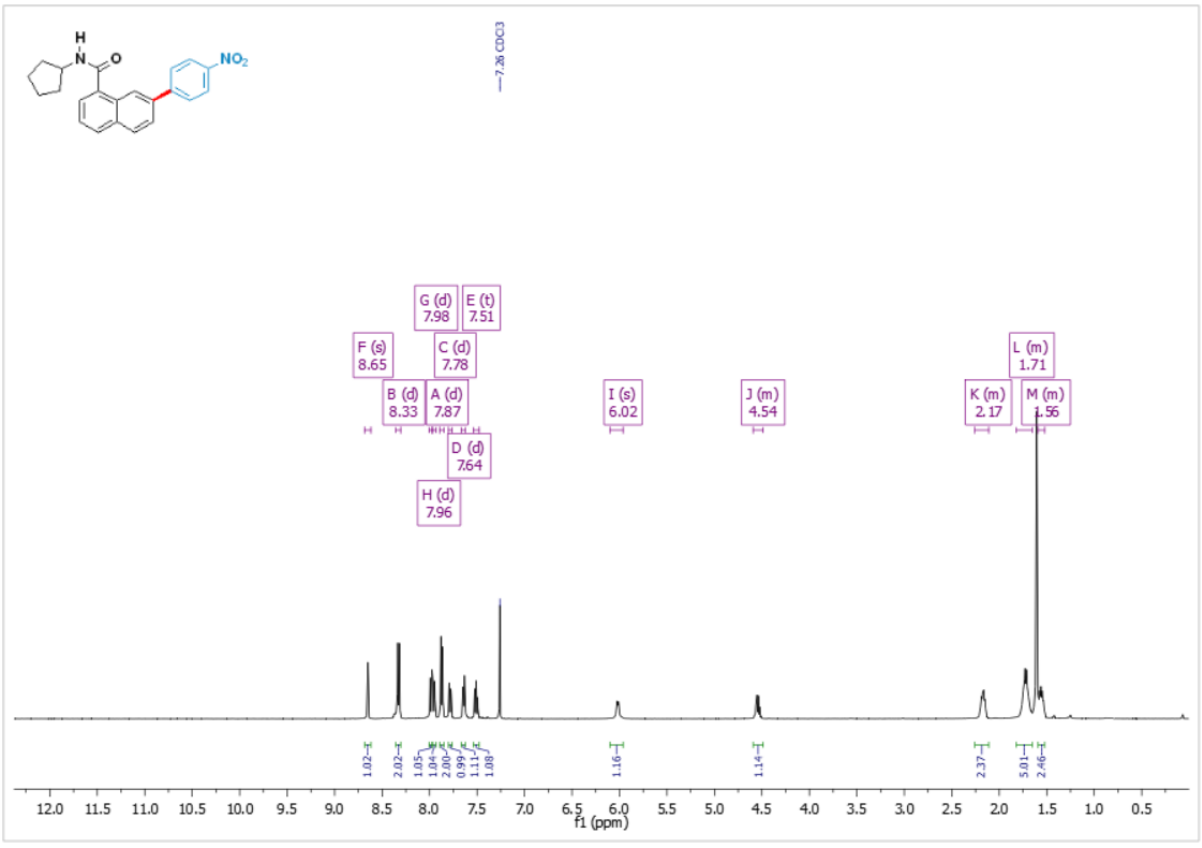

Me
H
N
O
CO2Me
170.67
142.45
137.85
135.27
134.66
131.46
131.43
130.78
130.12
129.86
129.28
128.66
128.57
127.42
127.23
125.36
125.31
52.35
25.92
L (s) 134.66
J (s) 130.78
H (s) 129.86
F (d) 128.62
O (s) 142.45
D (s) 127.23
P (s) 170.67
N (s) 137.85
C (d) 125.34
B (s) 52.35
A (s) 25.92
E (s) 127.42
G (s) 129.28
I (s) 130.12
K (d) 131.44
M (s) 135.27
f1 (ppm)

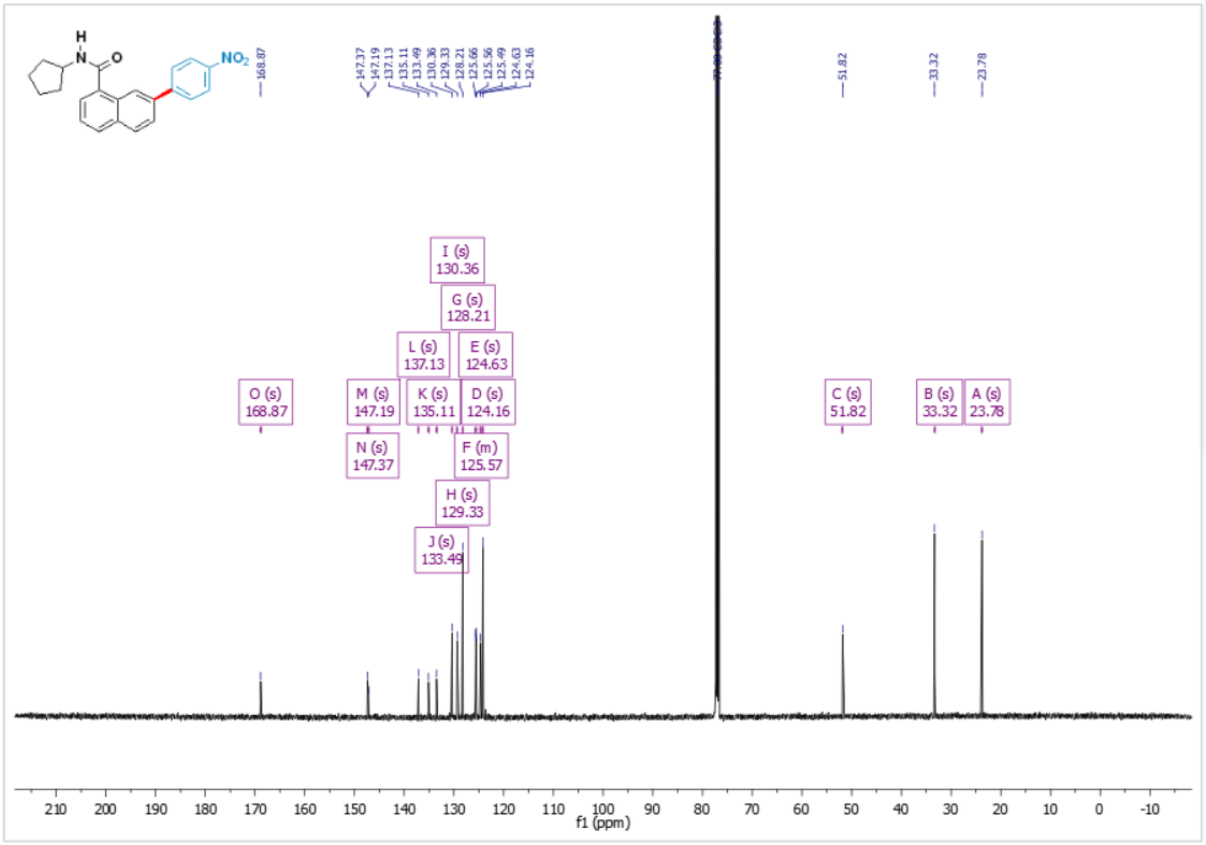

CF3O
H
N
O
NO2
7.26 CDCl3
F (m) 7.82
C (dd) 8.03
H (d) 7.27
A (s) 8.69
B (d) 8.30
D (m) 7.57
E (d) 7.73
G (m) 7.86
1.00
2.04
2.09
3.25
2.03
2.03
1.18
1.20
f1 (ppm)

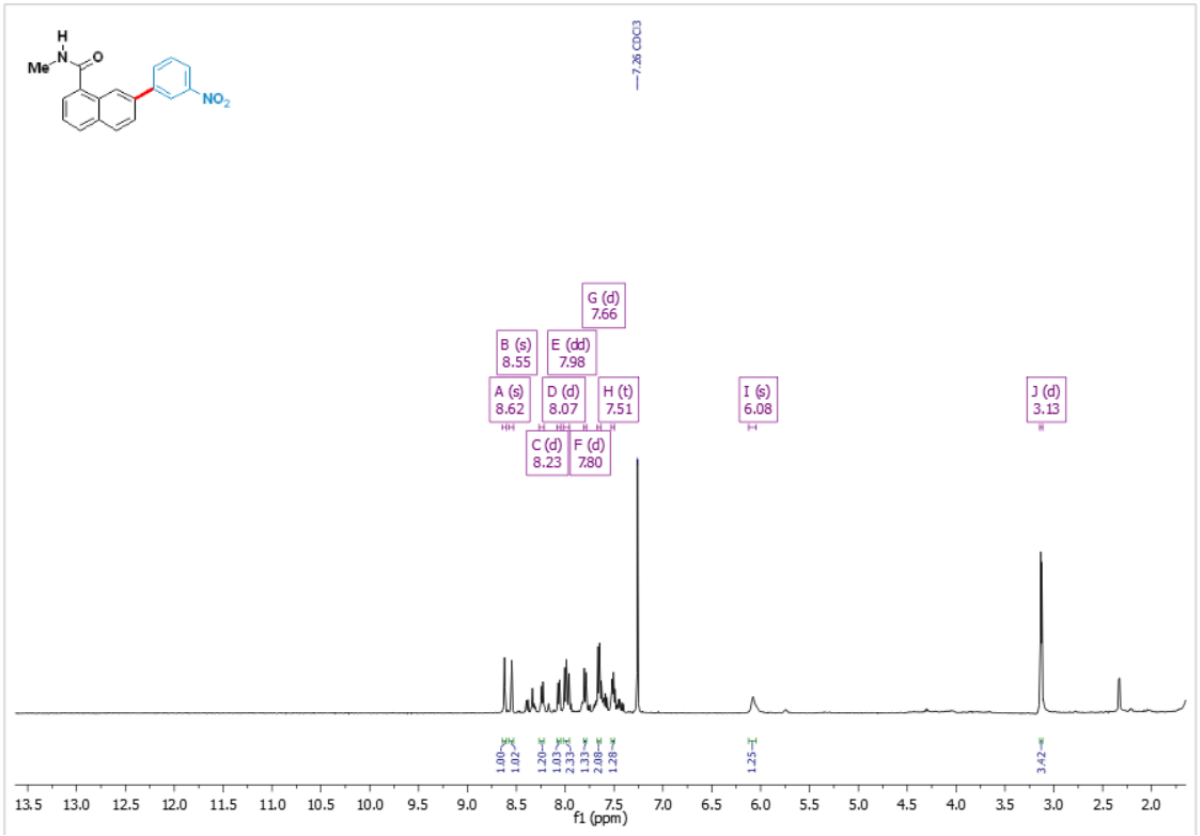

J (s)
131.35
H (s)
129.50
F (d)
125.90
D (s)
124.36
L (s)
136.47
B (s)
122.00
O (s)
167.22
N (d)
147.20
K (s)
133.60
A (s)
121.32
M (s)
137.68
C (s)
124.16
E (s)
125.56
G (s)
128.29
I (s)
130.35
f1 (ppm)

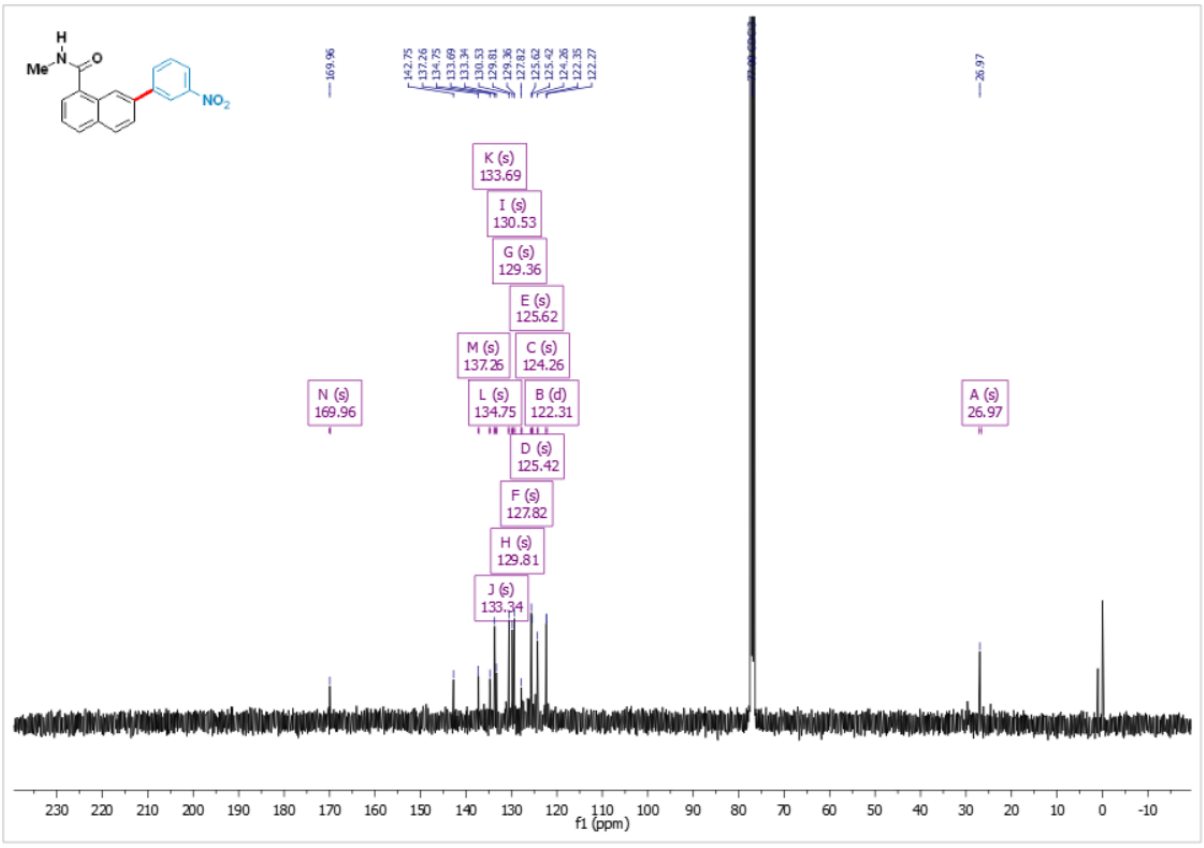

A (s)
-58.08
f1 (ppm)

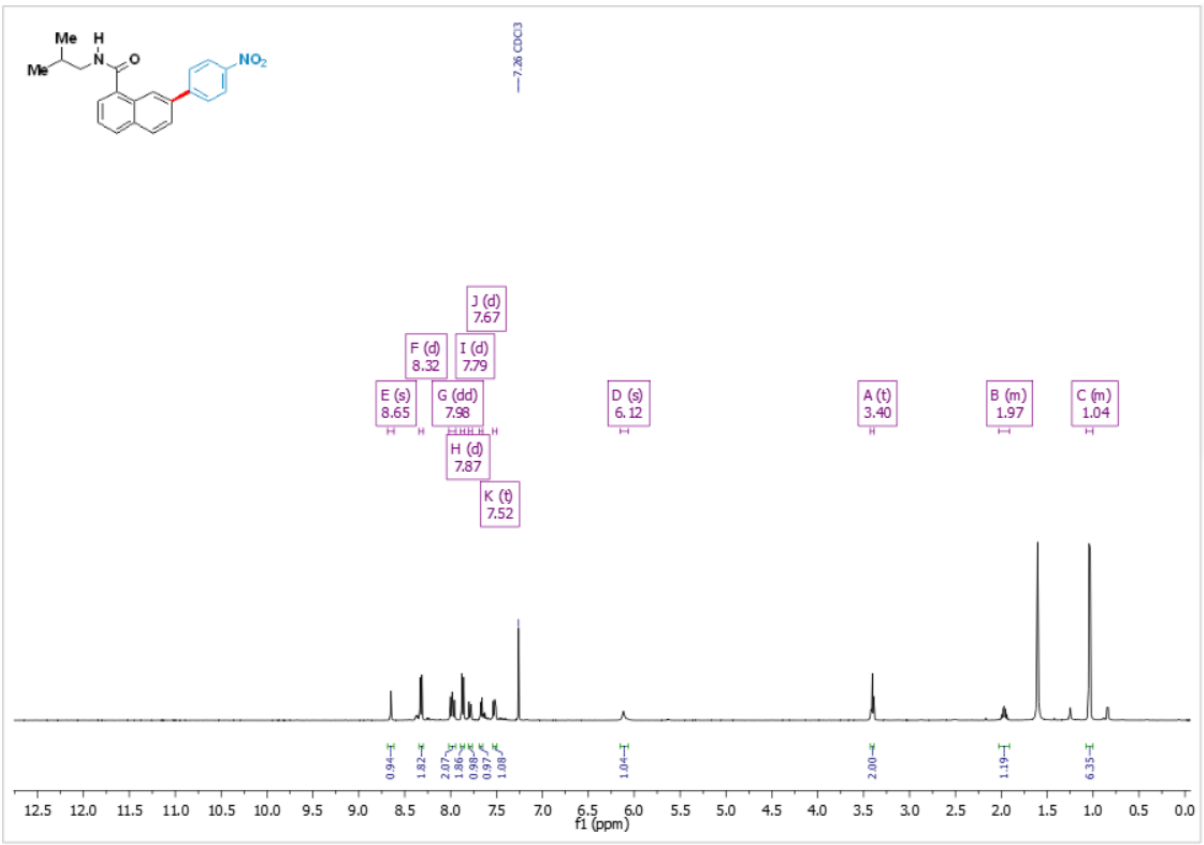

NO2
7.26 CDCl3
F (d) 7.98
E (m) 7.50
M (s) 8.64
C (d) 7.78
L (m) 1.80
A (d) 8.32
B (d) 7.86
H (d) 6.24
I (m) 4.72
J (m) 2.52
K (m) 1.99
D (d) 7.64
G (d) 7.95
f1 (ppm)

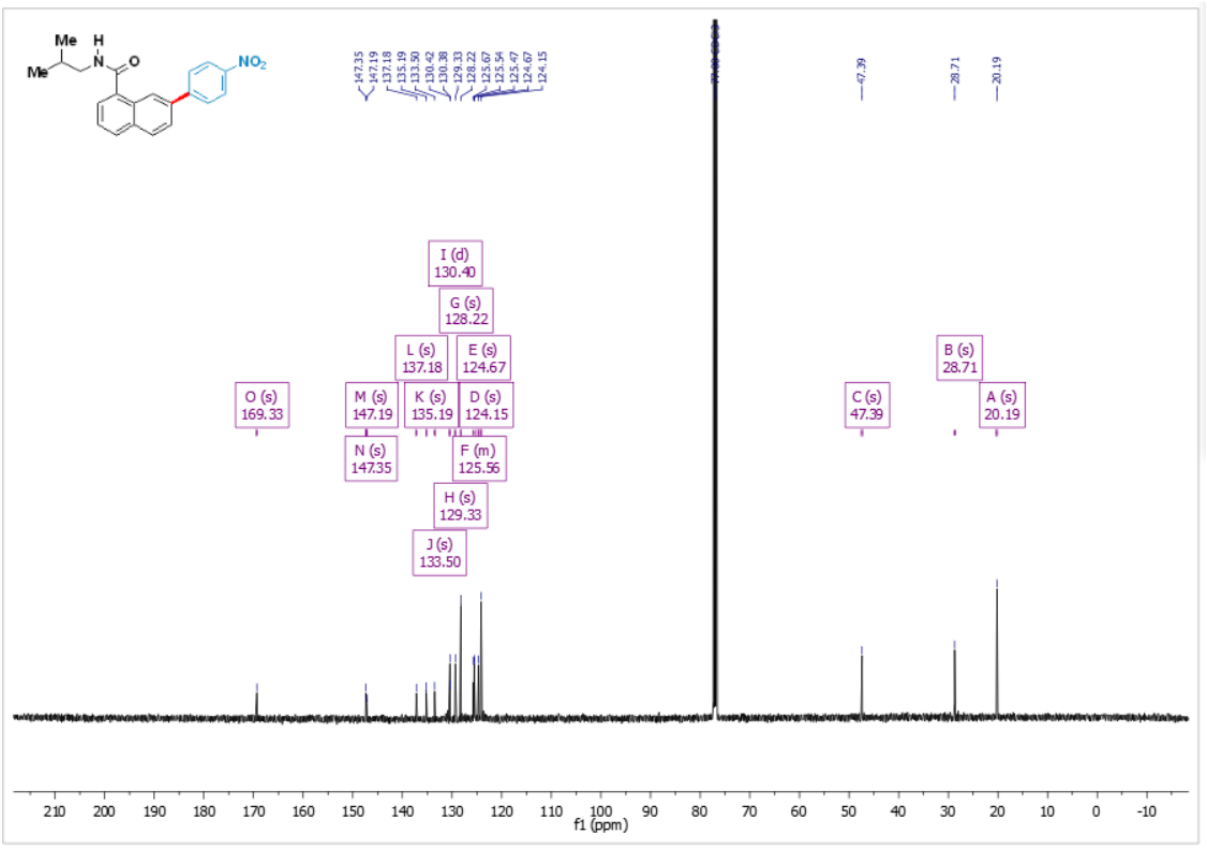

NO2
7.26 CDCl3
G (d) 7.98
E (t) 7.51
F (s) 8.65
C (d) 7.78
L (m) 1.71
B (d) 8.33
A (d) 7.87
I (s) 6.02
J (m) 4.54
K (m) 2.17
M (m) 1.56
D (d) 7.64
H (d) 7.96
f1 (ppm)

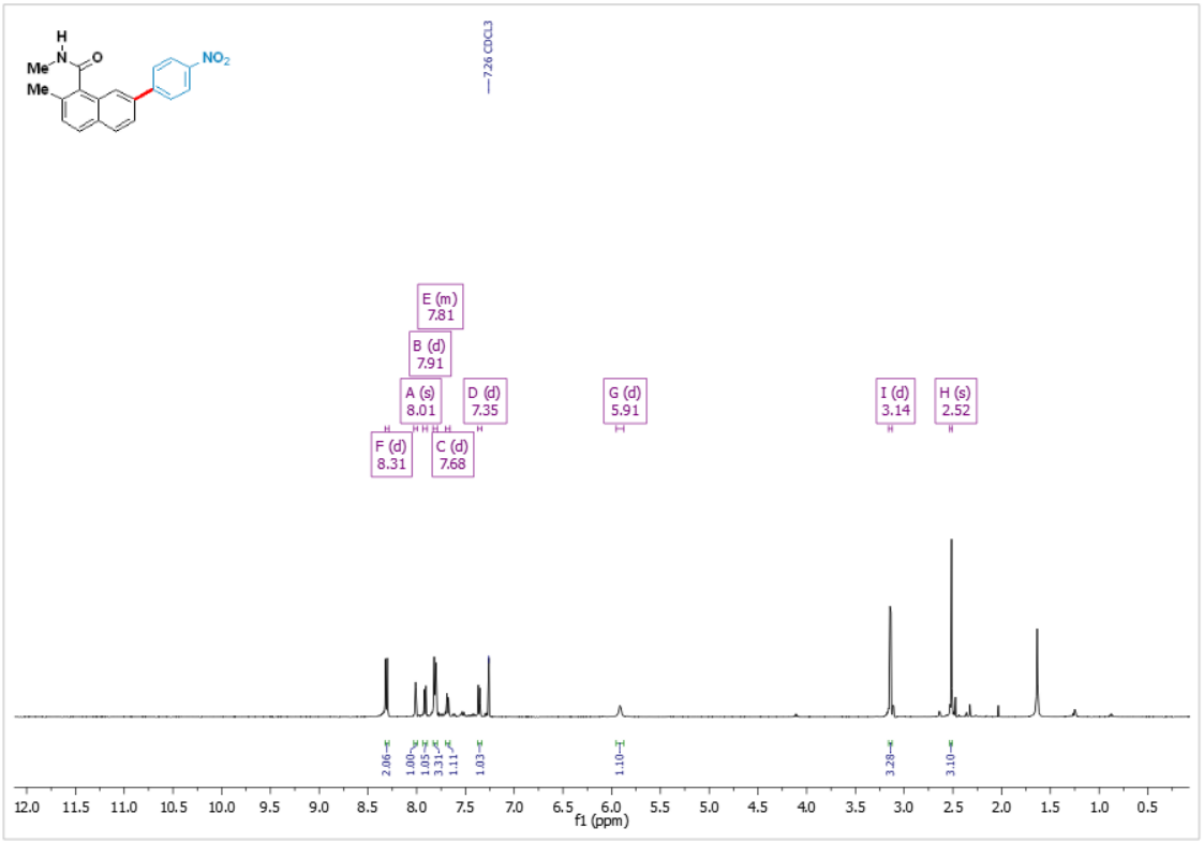

I (s) 130.36
G (s) 128.21
L (s) 137.13
E (s) 124.63
O (s) 168.87
M (s) 147.19
K (s) 135.11
D (s) 124.16
C (s) 51.82
B (s) 33.32
A (s) 23.78
N (s) 147.37
F (m) 125.57
H (s) 129.33
J (s) 133.49
f1 (ppm)

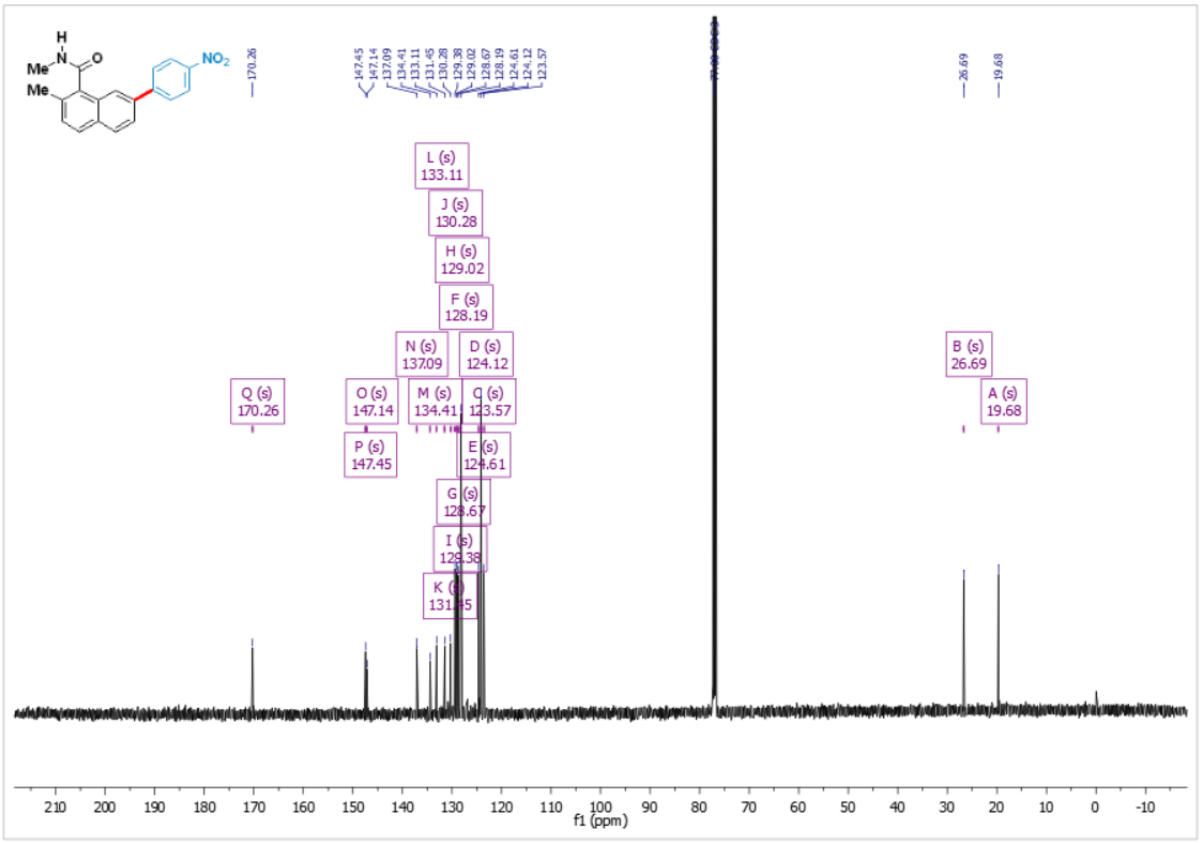

7.26 CDCl3
G (d) 7.66
B (s) 8.55
E (dd) 7.98
A (s) 8.62
D (d) 8.07
H (t) 7.51
I (s) 6.08
J (d) 3.13
C (d) 8.23
F (d) 7.80
f1 (ppm)

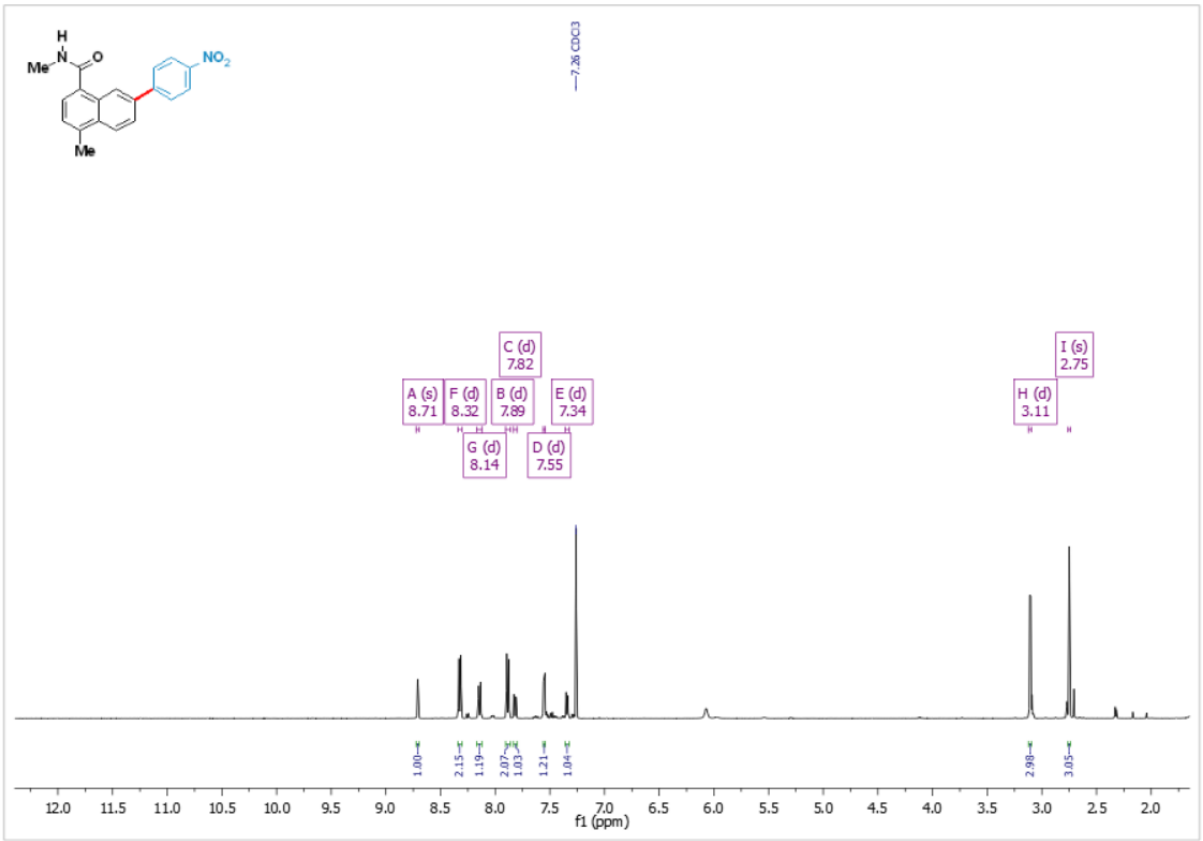

Me
H
N
O
NO2
169.96
142.75
137.26
134.75
133.69
133.34
130.53
129.81
129.36
127.82
125.62
125.42
124.26
122.35
122.27
26.97
K (s) 133.69
I (s) 130.53
G (s) 129.36
E (s) 125.62
M (s) 137.26
C (s) 124.26
N (s) 169.96
L (s) 134.75
B (d) 122.31
A (s) 26.97
D (s) 125.42
F (s) 127.82
H (s) 129.81
J (s) 133.34
f1 (ppm)

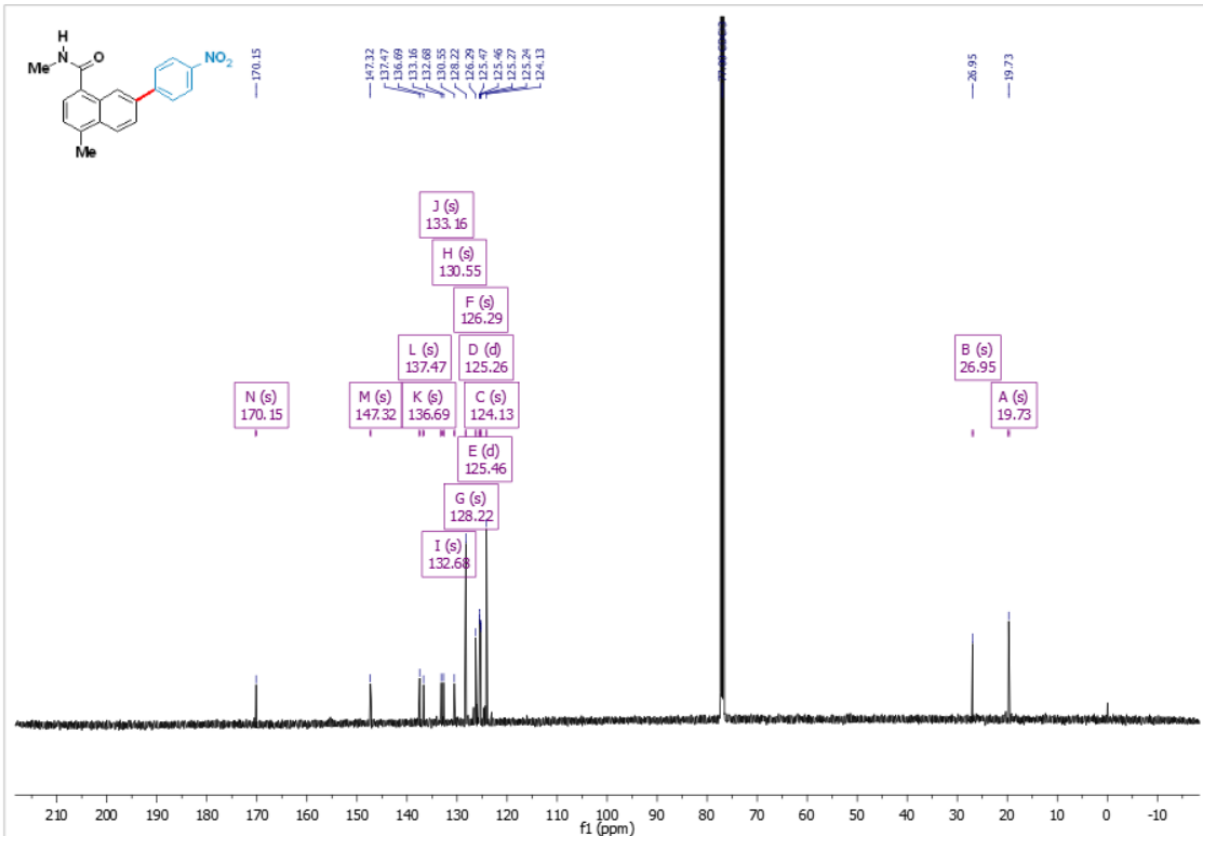

Me
H
N
O
Me
NO2
7.26 CDCl3
J (d) 7.67
F (d) 8.32
I (d) 7.79
E (s) 8.65
G (dd) 7.98
D (s) 6.12
A (t) 3.40
B (m) 1.97
C (m) 1.04
H (d) 7.87
K (t) 7.52
0.94
1.82
2.07
1.86
0.98
0.97
1.08
1.04
2.00
1.19
6.35
f1 (ppm)

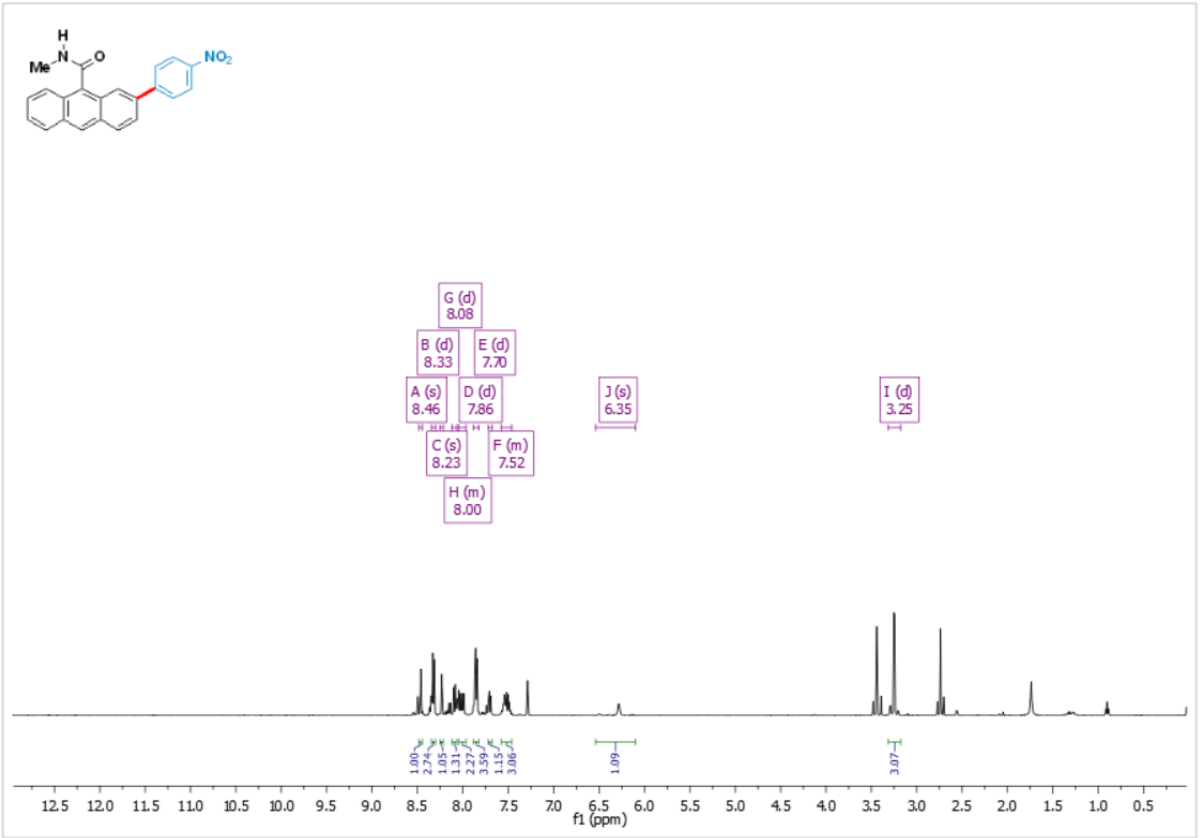

Me
H
N
O
Me
NO2
147.35
147.19
137.18
135.19
133.50
130.42
130.38
129.33
128.22
125.67
125.54
125.47
124.67
124.15
47.39
28.71
20.19
I (d) 130.40
G (s) 128.22
L (s) 137.18
E (s) 124.67
B (s) 28.71
O (s) 169.33
M (s) 147.19
K (s) 135.19
D (s) 124.15
C (s) 47.39
A (s) 20.19
N (s) 147.35
F (m) 125.56
H (s) 129.33
J (s) 133.50
f1 (ppm)

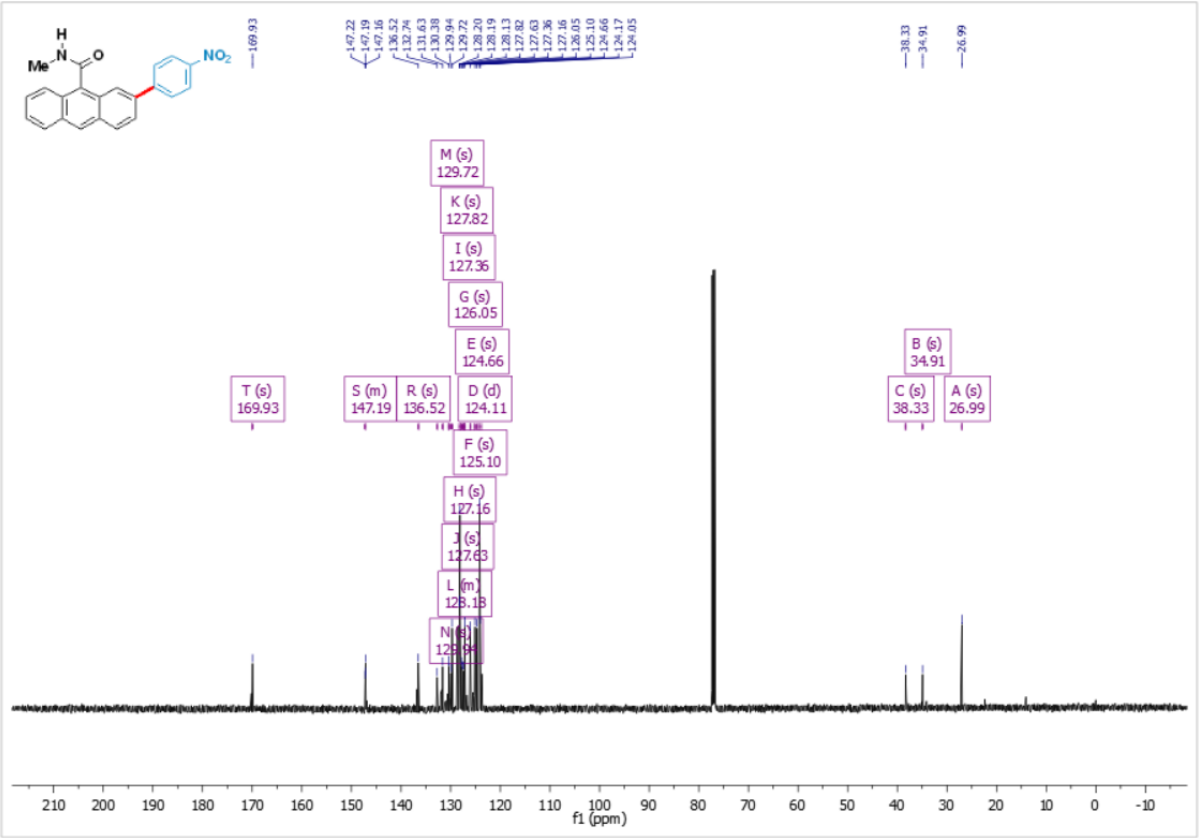

H
N
O
Me
Me
NO2
7.26 CDCl3
E (m) 7.81
B (d) 7.91
A (s) 8.01
D (d) 7.35
G (d) 5.91
I (d) 3.14
H (s) 2.52
F (d) 8.31
C (d) 7.68
2.06
1.00
1.05
3.31
1.11
1.03
1.10
3.28
3.10
f1 (ppm)


Me
H
N
O
Me
NO2
170.26
147.45
147.14
137.09
134.41
133.11
131.45
130.28
129.38
129.02
128.67
128.19
124.61
124.12
123.57
26.69
19.68
L (s) 133.11
J (s) 130.28
H (s) 129.02
F (s) 128.19
N (s) 137.09
D (s) 124.12
B (s) 26.69
Q (s) 170.26
O (s) 147.14
M (s) 134.41
Q (s) 123.57
A (s) 19.68
P (s) 147.45
E (s) 124.61
G (s) 128.67
I (s) 129.38
K (s) 131.45
f1 (ppm)


Me
H
N
O
NO2
Me
7.26 CDCl3
C (d) 7.82
A (s) 8.71
F (d) 8.32
B (d) 7.89
E (d) 7.34
G (d) 8.14
D (d) 7.55
I (s) 2.75
H (d) 3.11
1.00
2.15
1.19
2.07
1.03
1.21
1.04
2.98
3.05
f1 (ppm)


J (s) 133.16
H (s) 130.55
F (s) 126.29
L (s) 137.47
D (d) 125.26
N (s) 170.15
M (s) 147.32
K (s) 136.69
C (s) 124.13
B (s) 26.95
A (s) 19.73
E (d) 125.46
G (s) 128.22
I (s) 132.68
f1 (ppm)


G (d) 8.08
B (d) 8.33
E (d) 7.70
A (s) 8.46
D (d) 7.86
J (s) 6.35
I (d) 3.25
C (s) 8.23
F (m) 7.52
H (m) 8.00
f1 (ppm)


Me
H
N
O
NO2
169.93
147.22
147.19
147.16
136.52
132.24
131.63
130.38
129.94
129.72
128.20
128.19
128.13
127.82
127.63
127.36
127.16
126.05
125.10
124.66
124.17
124.05
38.33
34.91
26.99
M (s) 129.72
K (s) 127.82
I (s) 127.36
G (s) 126.05
E (s) 124.66
B (s) 34.91
T (s) 169.93
S (m) 147.19
R (s) 136.52
D (d) 124.11
C (s) 38.33
A (s) 26.99
F (s) 125.10
H (s) 127.16
J (s) 127.63
L (m) 128.13
N (s) 129.94
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)