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Metal-free α-arylation of α-fluoro-α-nitroacetamides employing diaryliodonium salts

SUPPORTING INFORMATION

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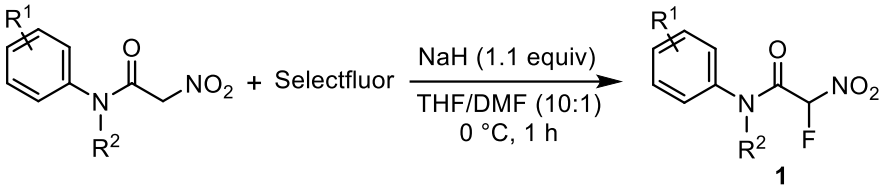
General experimental information

Unless otherwise specified, all reactions were performed under air atmosphere in oven dried round-bottom flasks. The reactions were monitored by TLC visualized by UV (254 nm) and/or with iodine. Column chromatography was performed on 100-200 mesh silica gel using the gradient system ethyl acetate-hexane. NMR data were recorded at Bruker AV 400 MHz in $CDCl_3$ using as internal standards the residual $CHCl_3$ signal for ^1H NMR (δ = 7.26 ppm) and the deuterated solvent signal for ^{13}C NMR (δ = 77.16 ppm). Coupling constants are given in Hertz (Hz) and the classical abbreviations are used to describe the signal multiplicities. Melting points were measured with a Büchi B-540 apparatus and are uncorrected. High resolution mass spectra were obtained using Q-TOF mass spectrometer. All commercially available reagents were used as received. α-nitroacetamides [1] **(1a-1x),** α-cyanoacetamides[2] (**4a-4p**) and diaryliodonium salts (**2a-2w)** were prepared by following a literature procedure.[3]

1. S, Mo, P. Huang and J. Xu, *Org. Biomol. Chem*., 2014, **12**, 4192−4200.
2. H. Hao, J. Mingyan, X. Lijun, H. Gang, Z. Cuirong, Z. Lixia, Z. Shunguang, Z. Meihui and G. Ping, *Chem. Res. Chin. Univ.* 2015, **31**, 746−755.
3. S. K. Sundalam, A. Nilova, T. L. Seidl and D. R. Stuart, *Angew. Chem., Int. Ed*. 2016, **55**, 8431−8434.

Procedures

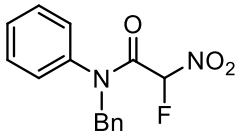
General procedure for the synthesis of α-fluoro-α-nitroacetamides 1



To a solution of α-nitroacetamide (1.50 mmol) in THF (20 mL) was added NaH (1.65 mmol) at 0 °C. The resulting mixture was stirred at the same temperature for 30 min. Then selectfluor (1.5 mmol) solution in DMF (2 mL) was added dropwise to the mixture at 0 °C, and the reaction mixture was stirred to room temperature for 1 h. The reaction mixture was quenched by addition of water (10 mL) and the mixture was extracted with ethyl acetate (25 mL×3). The organic layer was dried over Na_2SO_4 and evaporated under reduced pressure. The residue was purified using column chromatography (100-200 mesh silica gel) using ethyl acetate /hexane as the eluent to afford the desired α-fluoro-α-nitroacetamide **1** (40-76% yield) and the side product α,α-difluoronitroacetamide in traces. The same strategy was followed for the synthesis of α-cyano-α-fluoroacetamides **4**.

Characterization data of compounds 1a and 4h

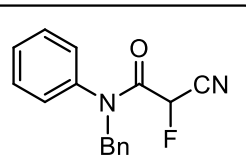
Compound 1a: *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide



$C_{15}H_{13}FN_2O_3$
MW: 288.27

White solid, 259 mg, 60%; **Mp** 72-74 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 159.1 (d, J_{C-F} = 22.3 Hz, C), 138.8 (C), 135.2 (C), 130.4 (CH), 130.4 (CH), 129.9 (CH), 129.1 (CH), 129.1 (CH), 128.8 (CH), 128.8 (CH), 128.6 (CH), 128.6 (CH), 128.3 (CH), 100.7 (d, J_{C-F} = 243.5 Hz, CH), 54.3 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.44-7.40 (m, 3H), 7.31-7.28 (m, 3H), 7.19-7.17 (m, 2H), 7.13-7.11 (m, 2H), 5.86 (d, J = 48.8 Hz, 1H), 4.96 (s, 2H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -145.5 (s). **HRMS** for $C_{15}H_{14}FN_2O_3^+$: calcd. $[M+H]^+$: 289.0983, found: 289.0982.

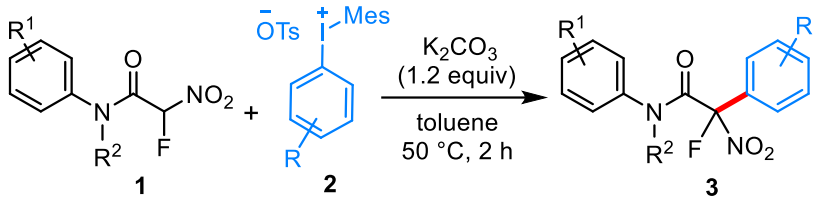
Compound 4h: *N*-benzyl-2-cyano-2-fluoro-*N*-phenylacetamide



$C_{16}H_{13}FN_2O$
MW: 268.29

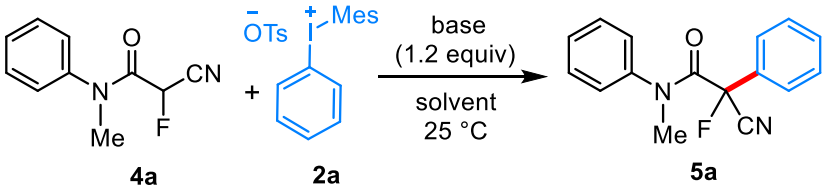
Colorless liquid, 185 mg, 46%; **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 159.8 (d, J_{C-F} = 22.6 Hz, C), 138.2 (C), 135.4 (C), 130.4 (CH), 130.4 (CH), 130.0 (CH), 129.3 (CH), 129.3 (CH), 128.8 (CH), 128.8 (CH), 128.8 (CH), 128.8 (CH), 128.3 (CH), 112.6 (d, J_{C-F} = 30.8 Hz, C), 74.5 (d, J_{C-F} = 189.8 Hz, CH), 54.5 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.44-7.38 (m, 3H), 7.30-7.27 (m, 3H), 7.19-7.17 (m, 2H), 7.06-7.04 (m, 2H), 5.36 (d, J = 46.8 Hz, 1H), 4.97 (d, J = 14.4 Hz, 1H), 4.88 (d, J = 14.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -189.0 (s). **HRMS** for $C_{16}H_{14}FN_2O^+$: calcd. $[M+H]^+$: 269.1085, found: 269.1085.

General procedure for the α-arylation of α-fluoro-α-nitroacetamides



To an oven-dried round bottom flask were added α-fluoro-α-nitroacetamide **1** (0.20 mmol), aryl(mesityl)iodonium salt **2** (0.22 mmol), K_2CO_3 (0.24 mmol) under open air respectively and dissolved in toluene (2.0 mL). The reaction mixture was allowed to stir at 50 °C for 2 h. After the completion of reaction, as indicated by TLC, the reaction mixture was extracted using ethyl acetate (3 × 10 mL) and washed with saturated brine solution. The organic layer was dried over anhydrous Na_2SO_4 and evaporated under reduced pressure. The residue was purified using column chromatography (100-200 mesh silica gel) using ethylacetate/hexane as the eluent to afford the product **3**.

Optimization of the Reaction Conditions for α-arylation of α-cyano-α-fluoroacetamides 4



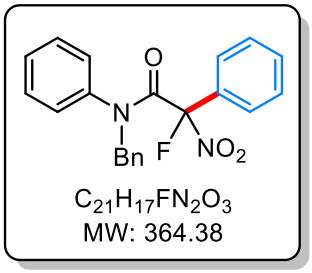
entry	base (1.2 equiv)	solvent	temperature (°C)	time (h)	yield (%)
1	K_2CO_3	toluene	50	6	37
2	*t*-BuOK	toluene	50	6	40
3	*t*-BuOK	DCM	25	6	54
4	***t*-BuOK**	**THF**	**25**	**0.5**	**70**
5	*t*-BuOK	dioxane	25	6	NR
6	*t*-BuOK	TBME	25	6	42
7	K_2CO_3	THF	25	6	36
8	Na_2CO_3	THF	25	6	NR
9	KOH	THF	25	6	50
10	NaH	THF	25	6	47

General procedure for the α-arylation of α-cyano-α-fluoroacetamides

To an oven-dried round bottom flask were added α-cyano-α-fluoroacetamide **4** (0.20 mmol) and aryl(mesityl)iodonium salt **2** (0.22 mmol), which were then dissolved in THF (2.0 mL). Subsequently, *t*-BuOK (0.24 mmol) was added portionwise. The reaction mixture was allowed

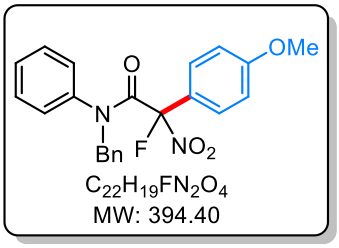
to stir at 25 °C for 0.5 h. After the completion of reaction, as indicated by TLC, the reaction mixture was extracted using ethyl acetate (3 × 10 mL) and washed with saturated brine solution. Finally, the organic layer dried over anhydrous Na_2SO_4 and evaporated under reduced pressure. The residue was purified using column chromatography (100-200 mesh silica gel) using ethylacetate/hexane as the eluent to afford the product **5**.

Compound 3a: *N*-benzyl-2-fluoro-2-nitro-*N*,2-diphenylacetamide



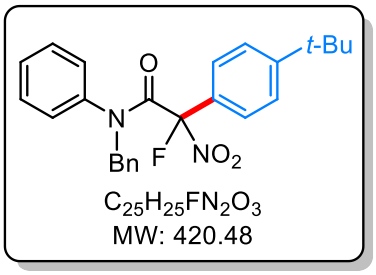
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3a** (62 mg, 85%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 97-99 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.8 (d, J_{C-F} = 21.5 Hz, C), 138.5 (C), 135.7 (C), 131.2 (CH), 130.4 (d, J_{C-F} = 21.6 Hz, C), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 128.8 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.4 (CH), 128.4 (CH), 128.2 (CH), 126.3 (d, J_{C-F} = 8.8 Hz, CH), 126.3 (d, J_{C-F} = 8.8 Hz, CH), 116.2 (d, J_{C-F} = 255.3 Hz, C), 56.1 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.42-6.27 (m, 15H), 4.95 (d, *J* = 14.0 Hz, 1H), 4.89 (d, *J* = 14.4 Hz, 1H). **^{19}F NMR** (376 MHz,, δ ppm/$CDCl_3$): -122.6 (s). **HRMS** for $C_{21}H_{21}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 382.1561, found: 382.1552.

Compound 3b: *N*-benzyl-2-fluoro-2-(4-methoxyphenyl)-2-nitro-*N*-phenylacetamide



Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with mesityl(4-methoxyphenyl)iodonium 4-methylbenzenesulfonate **2b** (115 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 3 h followed by column chromatography afforded the product **3b** (55 mg, 70%) as white solid. **R_f**(Ethyl acetate/Hexane: 10/90) = 0.30. **Mp** 95-97 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 161.8 (C), 161.0 (d, J_{C-F} = 16.8 Hz, C), 138.7 (C), 135.7 (C), 129.3 (CH), 129.3 (CH), 129.2 (CH), 129.2 (CH), 128.8 (CH), 128.8 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.1 (CH), 128.0 (d, J_{C-F} = 7.1 Hz, CH), 128.0 (d, J_{C-F} = 7.1 Hz, CH), 122.4 (d, J_{C-F} = 17.4 Hz, C), 116.5 (d, J_{C-F} = 204.8 Hz, C), 113.9 (CH), 113.9 (CH), 56.1 (CH_2), 55.5 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.31-7.15 (m, 11H), 6.82-6.40 (m, 3H), 4.94 (d, *J* = 13.6 Hz, 1H), 4.83 (d, *J* = 14.0 Hz, 1H), 3.80 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.2 (s). **HRMS** for $C_{22}H_{23}FN_3O_4^+$: calcd. $[M+NH_4]^+$: 412.1667, found: 412.1669.

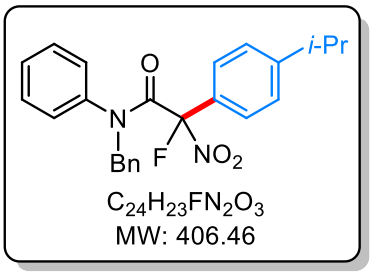
Compound 3c: *N*-benzyl-2-(4-(*t*-butyl)phenyl)-2-fluoro-2-nitro-*N*-phenylacetamide



$C_{25}H_{25}FN_2O_3$
MW: 420.48

Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with (4-(*t*-butyl)phenyl)(mesityl)iodonium 4-methylbenzenesulfonate **2c** (121 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3c** (67 mg, 80%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 120-122 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 161.0 (d, J_{C-F} = 21.5 Hz, C), 154.6 (C), 138.6 (C), 135.8 (C), 129.4 (CH), 129.4 (CH), 129.3 (CH), 129.3 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.6 (CH), 128.6 (CH), 128.1 (CH), 127.5 (d, J_{C-F} = 22.0 Hz, C), 126.1 (d, J_{C-F} = 8.6 Hz, CH), 126.1 (d, J_{C-F} = 8.6 Hz, CH), 125.4 (CH), 125.4 (CH), 116.2 (d, J_{C-F} = 253.5 Hz, C), 56.1 (CH_2), 35.0 (C), 31.2 (CH_3), 31.2 (CH_3), 31.2 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.30 (s, 4H), 7.26-7.24 (m, 3H), 7.17-7.03 (m, 7H), 4.90 (d, *J* = 11.2 Hz, 1H), 4.85 (d, *J* = 11.2 Hz, 1H), 1.29 (s, 9H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -126.8 (s). **HRMS** for $C_{25}H_{29}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 438.2187, found: 438.2178.

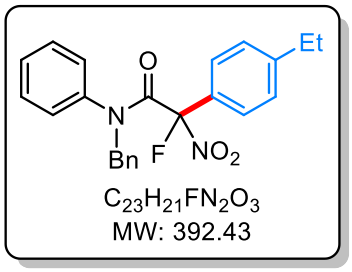
Compound 3d: *N*-benzyl-2-fluoro-2-(4-*i*-propylphenyl)-2-nitro-*N*-phenylacetamide



$C_{24}H_{23}FN_2O_3$
MW: 406.46

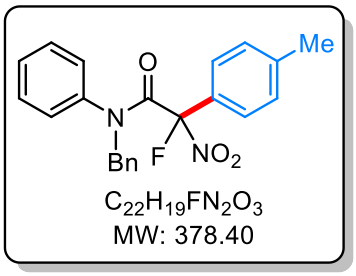
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with (4-*i*-propylphenyl)(mesityl)iodonium 4-methylbenzenesulfonate **2d** (118 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3d** (53 mg, 65%) as pale yellow solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.45. **Mp** 108-110 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 161.0 (d, J_{C-F} = 21.6 Hz, C), 152.4 (C), 138.6 (C), 135.8 (C), 129.4 (CH), 129.4 (CH), 129.3 (CH), 129.3 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.6 (CH), 128.1 (CH), 127.8 (d, J_{C-F} = 21.5 Hz, C), 126.5 (CH), 126.5 (CH), 126.3 (d, J_{C-F} = 8.7 Hz, CH), 126.3 (d, J_{C-F} = 8.7 Hz, CH), 116.3 (d, J_{C-F} = 254.8 Hz, C), 56.1 (CH_2), 34.1 (CH), 23.9 (CH_3), 23.8 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.28-7.24 (m, 5H), 7.15-6.40 (m, 9H), 4.88 (s, 2H), 2.89 (s, 1H), 1.22 (s, 6H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.1 (s). **HRMS** for $C_{24}H_{23}FN_2NaO_3^+$: calcd. $[M+Na]^+$: 429.1585, found: 429.1577.

Compound 3e: *N*-benzyl-2-(4-ethylphenyl)-2-fluoro-2-nitro-*N*-phenylacetamide



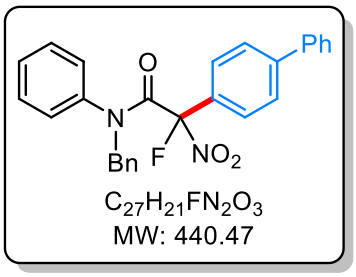
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with mesityl(4-ethylphenyl)iodonium 4-methylbenzenesulfonate **2e** (115 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product (4-ethylphenyl)(mesityl)iodonium 4-methylbenzenesulfonate **3e** (72 mg, 92%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.45. **Mp** 101-103 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 161.0 (d, J_{C-F} = 21.4 Hz, C), 147.8 (C), 138.6 (C), 135.7 (C), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.1 (CH), 127.9 (CH), 127.9 (CH), 127.7 (d, J_{C-F} = 21.3 Hz, C), 126.3 (d, J_{C-F} = 8.5 Hz, CH), 126.3 (d, J_{C-F} = 8.5 Hz, CH), 116.4 (d, J_{C-F} = 254.6 Hz, C), 56.1 (CH_2), 28.8 (CH_2), 15.4 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.28-7.22 (m, 5H), 7.17-6.31 (m, 9H), 4.89 (d, *J* = 11.2 Hz, 1H), 4.84 (d, *J* = 11.2 Hz, 1H), 2.62 (q, *J* = 6.0 Hz, 2H), 1.20 (t, *J* = 6.4 Hz, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -127.1 (s). **HRMS** for $C_{23}H_{25}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 410.1874, found: 410.1863.

Compound 3f: *N*-benzyl-2-fluoro-2-nitro-*N*-phenyl-2-(p-tolyl)acetamide



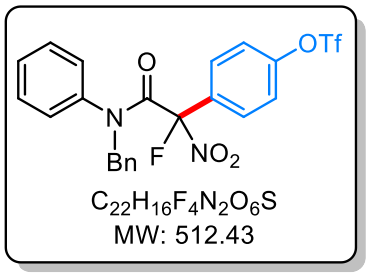
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with mesityl(p-tolyl)iodonium 4-methylbenzenesulfonate **2f** (112 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3f** (72 mg, 95%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.45. **Mp** 99-101 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.9 (d, J_{C-F} = 17.0 Hz, C), 141.6 (C), 138.7 (C), 135.8 (C), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.1 (CH), 129.1 (CH), 128.8 (CH), 128.8 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.1 (CH), 127.6 (d, J_{C-F} = 17.3 Hz, C), 126.3 (d, J_{C-F} = 6.8 Hz, CH), 126.3 (d, J_{C-F} = 6.8 Hz, CH), 116.5 (d, J_{C-F} = 204.0 Hz, C), 56.1 (CH_2), 21.4 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.28-7.24 (m, 5H), 7.20-7.10 (m, 9H), 4.94 (d, *J* = 11.2 Hz, 1H), 4.83 (d, *J* = 11.6 Hz, 1H), 2.35 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.6 (s). **HRMS** for $C_{22}H_{23}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 396.1718, found: 396.1707.

Compound 3g: 2-([1,1'-biphenyl]-4-yl)-*N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide



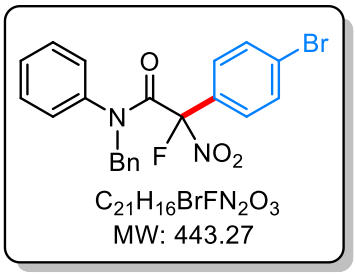
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with [1,1'-biphenyl]-4-yl(mesityl)iodonium 4-methylbenzenesulfonate **2g** (126 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3g** (83 mg, 94%) as white solid. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 132-134 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.8 (d, $J_{C\text{-}F}$ = 21.3 Hz, C), 144.0 (C), 139.7 (C), 138.5 (d, $J_{C\text{-}F}$ = 2.5 Hz, C), 135.7 (C), 129.4 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.1 (CH), 129.1 (CH), 129.1 (CH), 128.8 (C), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.3 (CH), 128.2 (CH), 127.3 (CH), 127.3 (CH), 127.0 (CH), 127.0 (CH), 126.8 (d, $J_{C\text{-}F}$ = 8.5 Hz, CH), 126.8 (d, $J_{C\text{-}F}$ = 8.5 Hz, CH), 116.2 (d, $J_{C\text{-}F}$ = 255.7 Hz, C), 56.1 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.55-7.50 (m, 4H), 7.45-7.42 (m, 4H), 7.36 (t, *J* = 1.5 Hz, 1H), 7.26-6.33 (m, 10H), 4.92 (d, *J* = 11.2 Hz, 1H), 4.86 (d, *J* = 11.2 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.3 (s). **HRMS** for $C_{27}H_{25}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 458.1874, found: 458.1874.

Compound 3h: 4-(2-(benzyl(phenyl)amino)-1-fluoro-1-nitro-2-oxoethyl)phenyl trifluoromethanesulfonate



Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with mesityl(4-(((trifluoromethyl)sulfonyl)oxy)phenyl)iodonium 4-methylbenzenesulfonate **2h** (141 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3h** (93 mg, 91%) as white solid. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 79-81 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.2 (d, $J_{C\text{-}F}$ = 21.4 Hz, C), 151.1 (C), 138.0 (d, $J_{C\text{-}F}$ = 2.1 Hz, C), 135.4 (C), 130.7 (d, $J_{C\text{-}F}$ = 22.2 Hz, C), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.1 (CH), 129.1 (CH), 129.1 (CH), 128.8 (CH), 128.8 (CH), 128.7 (CH), 128.6 (CH), 128.4 (CH), 121.5 (CH), 121.5 (CH), 118.8 (q, $J_{C\text{-}F}$ = 318.9 Hz, CH), 114.8 (d, $J_{C\text{-}F}$ = 256.6 Hz, C), 56.3 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.53 (d, *J* = 2.2 Hz, 2H), 7.31-7.02 (m, 11H), 6.26 (s, 1H), 4.97 (d, *J* = 14.0 Hz, 1H), 4.86 (d, *J* = 13.6 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -72.7 (s), -121.6 (s). **HRMS** for $C_{22}H_{20}F_4N_3O_6S^+$: calcd. $[M+NH_4]^+$: 530.1003, found: 530.0989.

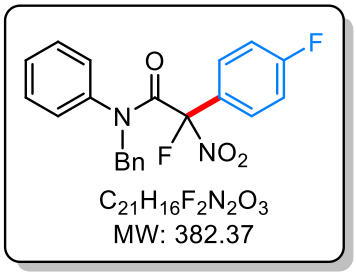
Compound 3i: *N*-benzyl-2-(4-bromophenyl)-2-fluoro-2-nitro-*N*-phenylacetamide



$C_{21}H_{16}BrFN_2O_3$
MW: 443.27

Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with (4-bromophenyl)(mesityl)iodonium 4-methylbenzenesulfonate **2i** (126 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3i** (58 mg, 65%) as white solid. **R*f*** (Ethyl acetate/Hexane: 10/90) = 0.45. **Mp** 101-103 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.4 (d, J_{C-F} = 17.0 Hz, C), 138.3 (d, J_{C-F} = 2.0 Hz, C), 135.5 (C), 131.7 (CH), 131.7 (CH), 129.5 (C), 129.3 (CH), 129.3 (CH), 129.3 (CH), 128.9 (CH), 128.9 (CH), 128.9 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.3 (CH), 127.9 (d, J_{C-F} = 7.0 Hz, CH), 127.9 (d, J_{C-F} = 7.0 Hz, CH), 126.0 (C), 115.6 (d, J_{C-F} = 205.2 Hz, C), 56.2 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.47 (d, *J* = 7.6 Hz, 2H), 7.29-7.22 (m, 7H), 7.18-7.14 (m, 5H), 4.93 (d, *J* = 14.0 Hz, 1H), 4.85 (d, *J* = 14.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.6 (s). **HRMS** for $C_{21}H_{20}BrFN_3O_3^+$: calcd. $[M+NH_4]^+$: 460.0667, found: 460.0667.

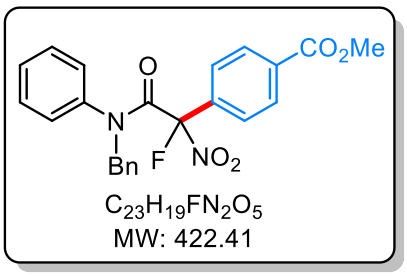
Compound 3j: *N*-benzyl-2-fluoro-2-(4-fluorophenyl)-2-nitro-*N*-phenylacetamide



$C_{21}H_{16}F_2N_2O_3$
MW: 382.37

Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with (4-fluorophenyl)(mesityl)iodonium 4-methylbenzenesulfonate **2j** (113 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3j** (45 mg, 59%) as white solid. **R*f*** (Ethyl acetate/Hexane: 10/90) = 0.50. **Mp** 119-121 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 164.3 (d, J_{C-F} = 250.9 Hz, C), 160.6 (d, J_{C-F} = 21.3 Hz, C), 138.4 (d, J_{C-F} = 2.6 Hz, C), 135.5 (C), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 128.9 (CH), 128.9 (CH), 128.8 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.6 (CH), 128.2 (CH), 126.4 (dd, J_{C-F} = 21.8 Hz, 3.2 Hz, C), 115.6 (d, J_{C-F} = 2.2 Hz, CH), 115.6 (d, J_{C-F} = 2.2 Hz, CH), 115.6 (d, J_{C-F} = 255.9 Hz, C), 56.1 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.44-7.41 (m, 2H), 7.31-7.17 (m, 7H), 7.03 (t, *J* = 8.4 Hz, 3H), 6.23 (s, 2H), 4.95 (d, *J* = 14.0 Hz, 1H), 4.95 (d, *J* = 14.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -108.3 (s), -121.9 (s). **HRMS** for $C_{21}H_{20}F_2N_3O_3^+$: calcd. $[M+NH_4]^+$: 400.1467 found: 400.1464.

Compound 3k: methyl 4-(2-(benzyl(phenyl)amino)-1-fluoro-1-nitro-2-oxoethyl)benzoate

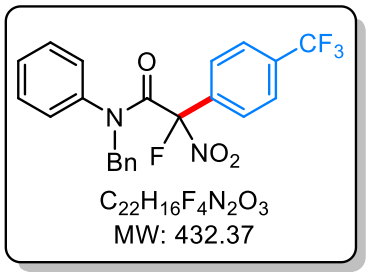


$C_{23}H_{19}FN_2O_5$
MW: 422.41

Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with mesityl(4-(methoxycarbonyl)phenyl)iodonium 4-methylbenzenesulfonate **2k** (122 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded

the product **3k** (58 mg, 69%) as yellow solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.50. **Mp** 77-79 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.1 (C), 160.3 (d, J_{C-F} = 16.9 Hz, C), 138.2 (C), 135.5 (C), 134.6 (d, J_{C-F} = 17.6 Hz, C), 132.7 (C), 129.5 (CH), 129.5 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.0 (CH), 129.0 (CH), 128.9 (CH), 128.7 (CH), 128.7 (CH), 128.3 (CH), 126.5 (d, J_{C-F} = 7.0 Hz, CH), 126.5 (d, J_{C-F} = 7.0 Hz, CH), 115.6 (d, J_{C-F} = 205.1 Hz, C), 56.2 (CH_2), 52.6 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.97 (d, *J* = 2.1 Hz, 2H), 7.47 (d, *J* = 2.2 Hz, 2H), 7.28-7.18 (m, 5H), 7.17-6.99 (m, 5H), 4.93 (d, *J* = 14.0 Hz, 1H), 4.84 (d, *J* = 14.0 Hz, 1H), 3.93 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.3 (s). **HRMS** for $C_{23}H_{23}FN_3O_5^+$: calcd. $[M+NH_4]^+$: 440.1616, found: 440.1614.

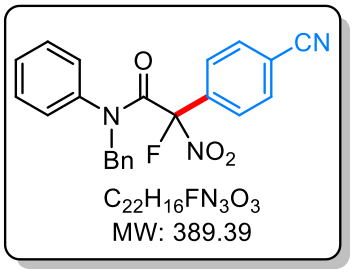
Compound 3l: *N*-benzyl-2-fluoro-2-nitro-*N*-phenyl-2-(4-(trifluoromethyl)phenyl)acetamide



$C_{22}H_{16}F_4N_2O_3$
MW: 432.37

Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with mesityl(4-(trifluoromethyl)phenyl)iodonium 4-methylbenzenesulfonate **2l** (124 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3l** (46 mg, 53%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.45. **Mp** 105-107 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.2 (d, J_{C-F} = 21.2 Hz, C), 138.1 (d, J_{C-F} = 2.4 Hz, C), 135.4 (C), 134.0 (d, J_{C-F} = 21.4 Hz, C), 133.2 (q, J_{C-F} = 32.8 Hz, C), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.0 (CH), 129.0 (CH), 129.0 (CH), 128.8 (CH), 128.8 (CH), 128.3 (CH), 126.9 (d, J_{C-F} = 9.0 Hz, CH), 126.9 (d, J_{C-F} = 9.0 Hz, CH), 125.4 (d, J_{C-F} = 5.5 Hz, CH), 125.4 (d, J_{C-F} = 5.5 Hz, CH), 123.5 (q, J_{C-F} = 271.0 Hz, C), 115.0 (d, J_{C-F} = 257.1 Hz, C), 56.2 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.63-7.58 (m, 4H), 7.33-7.01 (m, 9H), 6.31 (s, 1H), 4.94 (s, 2H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -63.1 (s), -122.1 (s). **HRMS** for $C_{22}H_{20}F_4N_3O_3^+$: calcd. $[M+NH_4]^+$: 450.1435, found: 450.1434.

Compound 3m: *N*-benzyl-2-(4-cyanophenyl)-2-fluoro-2-nitro-*N*-phenylacetamide

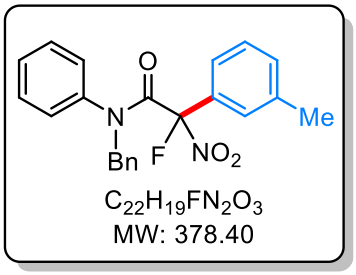


$C_{22}H_{16}FN_3O_3$
MW: 389.39

Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with (4-cyanophenyl)(mesityl)iodonium 4-methylbenzenesulfonate **2m** (114 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3m** (67 mg, 86%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.25. **Mp** 120-122 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 159.9 (d, J_{C-F} = 16.9 Hz, C), 138.0 (C), 135.3 (C), 134.7 (d, J_{C-F} = 18.0 Hz, C), 132.0 (CH), 132.0 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.2 (CH), 129.2 (CH), 129.2 (CH), 128.8 (CH), 128.8 (CH), 128.4 (CH), 127.2 (d, J_{C-F} = 7.2 Hz, CH), 127.2 (d, J_{C-F} = 7.2 Hz, CH), 117.6 (C), 115.1 (C), 114.7 (d, J_{C-F} = 207.7 Hz, C), 56.3 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.63 (d, *J* = 8.4 Hz, 1H), 7.56 (d, *J* = 8.4 Hz, 1H), 7.43-7.02 (m, 9H), 6.28 (s,

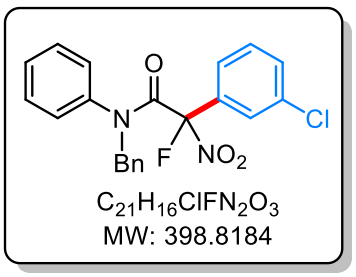
1H), 4.90 (s, 2H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.4 (s). **HRMS** for $C_{22}H_{20}FN_4O_3^+$: calcd. $[M+NH_4]^+$: 407.1514, found: 407.1511.

Compound 3n: *N*-benzyl-2-fluoro-2-nitro-*N*-phenyl-2-(*m*-tolyl)acetamide



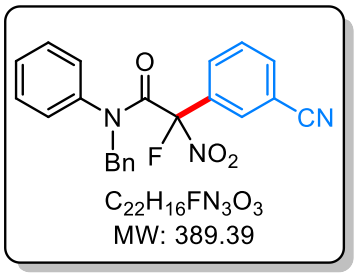
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with mesityl(m-tolyl)iodonium 4-methylbenzenesulfonate **2n** (112 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3n** (72 mg, 95%) as pale yellow viscous liquid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.40. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.9 (d, J_{C-F} = 21.4 Hz, C), 138.5 (d, J_{C-F} = 2.6 Hz, C), 138.3 (d, J_{C-F} = 1.9 Hz, C), 135.7 (C), 131.9 (CH), 130.3 (d, J_{C-F} = 21.4 Hz, C), 129.4 (CH), 129.4 (CH), 129.3 (CH), 129.3 (CH), 128.6 (CH), 128.6 (CH), 128.6 (CH), 128.6 (CH), 128.6 (CH), 128.3 (CH), 128.1 (CH), 126.8 (d, J_{C-F} = 8.6 Hz, CH), 123.4 (d, J_{C-F} = 8.7 Hz, CH), 116.3 (d, J_{C-F} = 255.3 Hz, C), 56.1 (CH_2), 21.4 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.29-7.28 (m, 3H), 7.24-6.17 (m, 11H), 4.97 (d, *J* = 11.2 Hz, 1H), 4.84 (d, *J* = 10.8 Hz, 1H), 2.30 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.3 (s). **HRMS** for $C_{22}H_{23}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 396.1718, found: 396.1718.

Compound 3o: *N*-benzyl-2-(3-chlorophenyl)-2-fluoro-2-nitro-*N*-phenylacetamide



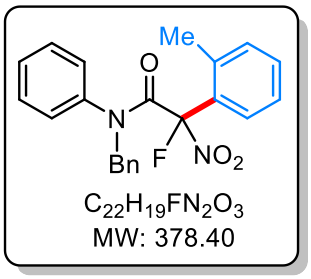
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with (3-chlorophenyl)(mesityl)iodonium 4-methylbenzenesulfonate **2o** (116 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3o** (72 mg, 90%) as pale yellow viscous liquid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.40. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.3 (d, J_{C-F} = 21.2 Hz, C), 138.1 (d, J_{C-F} = 2.5 Hz, C), 135.5 (C), 134.6 (d, J_{C-F} = 2.2 Hz, C), 132.1 (d, J_{C-F} = 21.9 Hz, C), 131.3 (CH), 129.7 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 128.9 (CH), 128.9 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.2 (CH), 126.5 (d, J_{C-F} = 9.5 Hz, CH), 124.6 (d, J_{C-F} = 8.4 Hz, CH), 115.0 (d, J_{C-F} = 256.8 Hz, C), 56.1 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.40-7.38 (m, 1H), 7.34-7.33 (m, 2H), 7.29-7.21 (m, 5H), 7.17-7.00 (m, 5H), 6.23 (s, 1H), 4.91 (d, *J* = 11.2 Hz, 1H), 4.88 (d, *J* = 11.2 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.0 (s). **HRMS** for $C_{21}H_{20}ClFN_3O_3^+$: calcd. $[M+NH_4]^+$: 416.1172, found: 416.1168.

Compound 3p: *N*-benzyl-2-(3-cyanophenyl)-2-fluoro-2-nitro-*N*-phenylacetamide



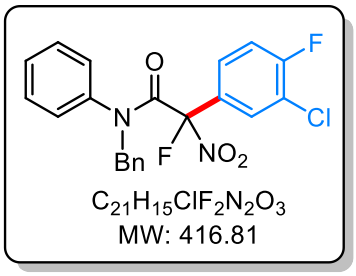
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with (3-cyanophenyl)(mesityl)iodonium 4-methylbenzenesulfonate **2p** (114 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3p** (56 mg, 72%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.25. **Mp** 98-100 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 159.9 (d, $J_{C\text{-}F}$ = 16.9 Hz, C), 138.0 (C), 135.3 (C), 134.5 (CH), 132.0 (d, $J_{C\text{-}F}$ = 18.0 Hz, C), 130.8 (d, $J_{C\text{-}F}$ = 6.8 Hz, CH), 129.9 (d, $J_{C\text{-}F}$ = 7.9 Hz, CH), 130.0 (CH), 130.0 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.2 (CH), 129.2 (CH), 128.8 (CH), 128.8 (CH), 128.8 (CH), 128.4 (CH), 117.5 (C), 114.3 (d, $J_{C\text{-}F}$ = 205.0 Hz, C), 113.0 (d, $J_{C\text{-}F}$ = 1.6 Hz, C), 56.3 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.71-7.46 (m, 4H), 7.26-6.99 (m, 9H), 6.26 (s, 1H), 4.87 (s, 2H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.6 (s). **HRMS** for $C_{22}H_{20}FN_4O_3^+$: calcd. $[M+NH_4]^+$: 407.1514, found: 407.1515.

Compound 3q: *N*-benzyl-2-fluoro-2-nitro-*N*-phenyl-2-(*o*-tolyl)acetamide



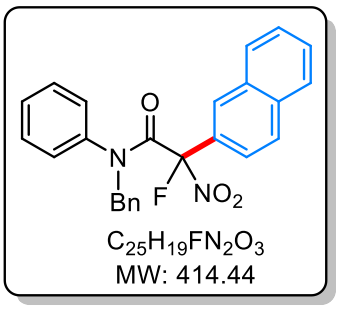
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with mesityl(o-tolyl)iodonium 4-methylbenzenesulfonate **2q** (112 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3q** (26 mg, 35%) as colorless liquid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 66-68 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.9 (d, $J_{C\text{-}F}$ = 22.1 Hz, C), 138.7 (d, $J_{C\text{-}F}$ = 2.7 Hz, C), 137.3 (C), 135.6 (C), 132.4 (CH), 131.1 (CH), 129.6 (CH), 129.6 (CH), 129.3 (d, $J_{C\text{-}F}$ = 20.0 Hz, C), 129.1 (CH), 129.1 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.6 (CH), 128.6 (CH), 128.3 (CH), 127.9 (d, $J_{C\text{-}F}$ = 9.4 Hz, CH), 125.8 (CH), 118.4 (d, $J_{C\text{-}F}$ = 254.7 Hz, C), 56.2 (CH_2), 20.5 (d, $J_{C\text{-}F}$ = 6.1 Hz, CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.34-7.26 (m, 4H), 7.23-7.20 (m, 3H), 7.16 (t, *J* = 7.2 Hz, 1H), 7.11-7.04 (m, 4H), 6.76 (s, 2H), 5.02 (d, *J* = 14.0 Hz, 1H), 4.86 (d, *J* = 14.0 Hz, 1H), 2.16 (d, *J* = 4.0 Hz, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -113.6 (s). **HRMS** for $C_{22}H_{23}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 396.1718, found: 396.1709.

Compound 3r: *N*-benzyl-2-(3-chloro-4-fluorophenyl)-2-fluoro-2-nitro-*N*-phenylacetamide



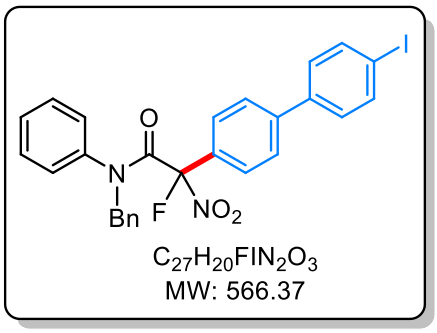
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with (3-chloro-4-fluorophenyl)(mesityl)iodonium 4-methylbenzenesulfonate **2r** (120 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3r** (52 mg, 62%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.25. **Mp** 95-97 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.2 (d, J_{C-F} = 16.7 Hz, C), 159.8 (d, J_{C-F} = 202.7 Hz, C), 138.2 (C), 135.4 (C), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.2 (CH), 129.2 (CH), 129.1 (CH), 129.1 (CH), 128.8 (CH), 128.8 (CH), 128.8 (CH), 128.3 (CH), 127.4 (dd, J_{C-F} = 18.2 Hz, 3.1 Hz, C), 126.8 (d, J_{C-F} = 6.7 Hz, CH), 121.8 (d, J_{C-F} = 14.8 Hz, C), 116.8 (d, J_{C-F} = 17.6 Hz, CH), 114.5 (d, J_{C-F} = 205.8 Hz, C), 56.2 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.45-7.42 (m, 1H), 7.37-7.34 (m, 1H), 7.29-7.24 (m, 5H), 7.17-7.08 (m, 5H), 6.28 (s, 1H), 4.91 (d, *J* = 14.0 Hz, 1H), 4.87 (d, *J* = 14.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -110.3 (s), -121.5 (s). **HRMS** for $C_{21}H_{19}ClF_2N_3O_3^+$: calcd. $[M+NH_4]^+$: 434.1078, found: 434.1077.

Compound 3t: *N*-benzyl-2-fluoro-2-(naphthalen-2-yl)-2-nitro-*N*-phenylacetamide



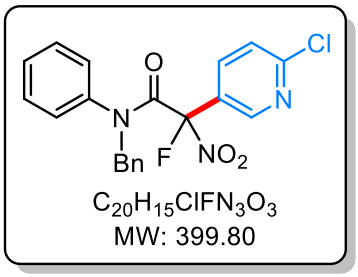
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with mesityl(naphthalen-2-yl)iodonium 4-methylbenzenesulfonate **2t** (120 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3t** (62 mg, 75%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.35. **Mp** 129-131 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.8 (d, J_{C-F} = 17.0 Hz, C), 138.6 (C), 135.7 (C), 134.2 (C), 132.2 (C), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 128.9 (CH), 128.9 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.7 (CH), 128.4 (CH), 128.2 (CH), 128.1 (CH), 127.8 (CH), 127.6 (C), 127.1 (CH), 126.8 (d, J_{C-F} = 7.7 Hz, CH), 122.7 (d, J_{C-F} = 6.1 Hz, CH), 116.4 (d, J_{C-F} = 204.7 Hz, C), 56.1 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.84-7.72 (m, 4H), 7.57-7.50 (m, 3H), 7.26-6.08 (m, 10H), 4.97 (d, *J* = 14.0 Hz, 1H), 4.85 (d, *J* = 14.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.0 (s). **HRMS** for $C_{25}H_{23}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 432.1718, found: 432.1715.

Compound 3u: *N*-benzyl-2-fluoro-2-(4'-iodo-[1,1'-biphenyl]-4-yl)-2-nitro-*N*-phenyl-acetamide



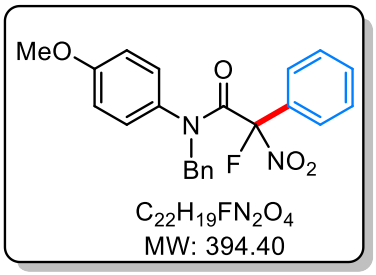
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with (4'-iodo-[1,1'-biphenyl]-4-yl)(mesityl)iodonium 4-methylbenzenesulfonate **2u** (153 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3u** (68 mg, 60%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.45. **Mp** 125-127 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.7 (d, J_{C-F} = 21.1 Hz, C), 142.9 (C), 139.3 (C), 138.5 (d, J_{C-F} = 2.7 Hz, C), 138.2 (CH), 138.2 (CH), 135.6 (C), 129.7 (d, J_{C-F} = 21.8 Hz, C), 129.4 (CH), 129.4 (CH), 129.4 (CH), 129.4 (CH), 129.1 (CH), 129.1 (CH), 128.9 (CH), 128.9 (CH), 128.8 (CH), 128.7 (CH), 128.7 (CH), 128.2 (CH), 127.0 (d, J_{C-F} = 8.6 Hz, CH), 127.0 (d, J_{C-F} = 8.6 Hz, CH), 126.8 (CH), 126.8 (CH), 116.0 (d, J_{C-F} = 255.5 Hz, C), 94.3 (C), 56.2 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.77 (d, *J* = 1.6 Hz, 2H), 7.48-7.44 (m, 4H), 7.28-7.23 (m, 5H), 7.21-6.32 (m, 7H), 4.92 (d, *J* = 11.2 Hz, 1H), 4.85 (d, *J* = 11.2 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.3 (s). **HRMS** for $C_{27}H_{20}FIN_2NaO_3^+$: calcd. $[M+Na]^+$: 589.0395, found: 589.0386.

Compound 3v: *N*-benzyl-2-(6-chloropyridin-3-yl)-2-fluoro-2-nitro-*N*-phenylacetamide



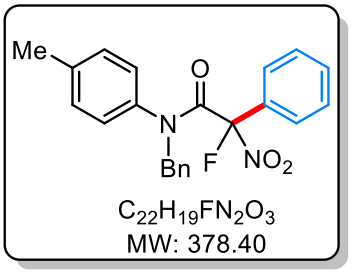
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-phenylacetamide **1a** (58 mg, 0.20 mmol) with (6-chloropyridin-3-yl)(mesityl)iodonium 4-methylbenzenesulfonate **2v** (117 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3v** (70 mg, 87%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.30. **Mp** 102-104 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 159.7 (d, J_{C-F} = 21.1 Hz, C), 154.4 (C), 147.5 (d, J_{C-F} = 10.2 Hz, CH), 137.9 (C), 136.9 (d, J_{C-F} = 8.0 Hz, CH), 135.2 (C), 129.4 (CH), 129.4 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 128.8 (CH), 128.8 (CH), 128.4 (CH), 125.8 (d, J_{C-F} = 22.1 Hz, C), 123.9 (CH), 113.9 (d, J_{C-F} = 258.1 Hz, C), 56.3 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.40 (s, 1H), 7.72 (d, *J* = 2.1 Hz, 1H), 7.29-7.12 (m, 10H), 6.38 (s, 1H), 4.89 (d, *J* = 14.0 Hz, 1H), 4.84 (d, *J* = 14.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -123.9 (s). **HRMS** for $C_{20}H_{16}ClFN_3O_3^+$: calcd. $[M+H]^+$: 400.0859, found: 400.0861.

Compound 3w: *N*-benzyl-2-fluoro-*N*-(4-methoxyphenyl)-2-nitro-2-phenylacetamide



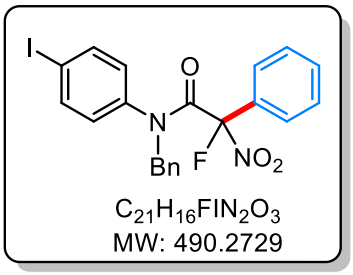
Following the general procedure, treatment of *N*-benzyl-2-fluoro-*N*-(4-methoxyphenyl)-2-nitroacetamide **1b** (64 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3w** (75 mg, 95%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.30. **Mp** 64-66 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 161.0 (d, J_{C-F} = 20.7 Hz, C), 159.4 (C), 135.8 (C), 131.1 (CH), 130.8 (C), 130.5 (CH), 130.5 (CH), 130.5 (d, J_{C-F} = 21.6 Hz, C), 129.3 (CH), 129.3 (CH), 128.6 (CH), 128.6 (CH), 128.3 (CH), 128.3 (CH), 128.1 (CH), 126.2 (d, J_{C-F} = 8.7 Hz, CH), 126.2 (d, J_{C-F} = 8.7 Hz, CH), 116.2 (d, J_{C-F} = 255.6 Hz, C), 113.8 (CH), 113.8 (CH), 56.1 (CH_2), 55.4 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.44-7.40 (m, 3H), 7.35-7.31 (m, 2H), 7.29-7.27 (m, 3H), 7.19-7.17 (m, 2H), 6.75-6.04 (m, 4H), 4.89 (d, *J* = 14.0 Hz, 1H), 4.84 (d, *J* = 13.6 Hz, 1H), 3.72 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.5 (s). **HRMS** for $C_{22}H_{23}FN_3O_4^+$: calcd. $[M+NH_4]^+$: 412.1667, found: 412.1663.

Compound 3x: *N*-benzyl-2-fluoro-2-nitro-2-phenyl-*N*-(p-tolyl)acetamide



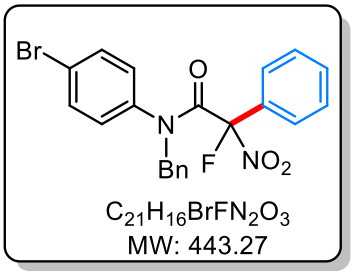
Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-(*p*-tolyl)acetamide **1c** (60 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3x** (61 mg, 80%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.35. **Mp** 58-60 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.9 (d, J_{C-F} = 21.1 Hz, C), 138.7 (C), 135.8 (C), 135.8 (C), 131.1 (CH), 130.5 (d, J_{C-F} = 21.8 Hz, C), 129.4 (CH), 129.4 (CH), 129.3 (CH), 129.3 (CH), 129.0 (CH), 129.0 (CH), 128.6 (CH), 128.6 (CH), 128.3 (CH), 128.3 (CH), 128.1 (CH), 126.3 (d, J_{C-F} = 8.8 Hz, CH), 126.3 (d, J_{C-F} = 8.8 Hz, CH), 116.2 (d, J_{C-F} = 255.8 Hz, C), 56.1 (CH_2), 21.1 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.37 (d, *J* = 6.0 Hz, 3H), 7.29-7.23 (m, 5H), 7.14-6.10 (m, 6H), 4.87 (d, *J* = 11.2 Hz, 1H), 4.81 (d, *J* = 11.2 Hz, 1H), 2.22 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.5 (s). **HRMS** for $C_{22}H_{23}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 396.1718, found: 396.1717.

Compound 3y: *N*-benzyl-2-fluoro-*N*-(4-iodophenyl)-2-nitro-2-phenylacetamide



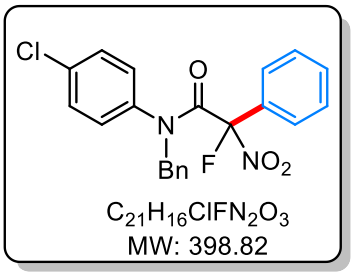
Following the general procedure, treatment of *N*-benzyl-2-fluoro-*N*-(4-iodophenyl)-2-nitroacetamide **1d** (83 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3y** (93 mg, 95%) as white solid. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.30. **Mp** 100-102 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.6 (d, $J_{C\text{-}F}$ = 21.4 Hz, C), 138.2 (C), 138.1 (CH), 138.1 (CH), 135.3 (C), 131.4 (CH), 131.2 (CH), 131.2 (CH), 130.2 (d, $J_{C\text{-}F}$ = 21.6 Hz, C), 129.3 (CH), 129.3 (CH), 128.8 (CH), 128.8 (CH), 128.6 (CH), 128.6 (CH), 128.4 (CH), 126.3 (d, $J_{C\text{-}F}$ = 8.7 Hz, CH), 126.3 (d, $J_{C\text{-}F}$ = 8.7 Hz, CH), 116.0 (d, $J_{C\text{-}F}$ = 254.9 Hz, C), 94.6 (C), 56.0 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.46-7.38 (m, 5H), 7.36-7.25 (m, 5H), 7.15 (s, 2H), 6.38 (s, 2H), 4.88 (d, *J* = 11.2 Hz, 1H), 4.83 (d, *J* = 11.2 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.7 (s). **HRMS** for $C_{21}H_{20}FIN_3O_3^+$: calcd. $[M+NH_4]^+$: 508.0528, found: 508.0518.

Compound 3z: *N*-benzyl-*N*-(4-bromophenyl)-2-fluoro-2-nitro-2-phenylacetamide



Following the general procedure, treatment of *N*-benzyl-*N*-(4-bromophenyl)-2-fluoro-2-nitroacetamide **1e** (53 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3z** (76 mg, 86%) as white solid. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.35. **Mp** 65-67 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.6 (d, $J_{C\text{-}F}$ = 21.4 Hz, C), 137.4 (C), 135.3 (C), 132.0 (CH), 132.0 (CH), 131.4 (CH), 131.0 (CH), 131.0 (CH), 130.2 (d, $J_{C\text{-}F}$ = 21.6 Hz, C), 129.3 (CH), 129.3 (CH), 128.8 (CH), 128.8 (CH), 128.6 (CH), 128.6 (CH), 128.4 (CH), 126.2 (d, $J_{C\text{-}F}$ = 8.7 Hz, CH), 126.2 (d, $J_{C\text{-}F}$ = 8.7 Hz, CH), 122.9 (C), 116.0 (d, $J_{C\text{-}F}$ = 254.8 Hz, C), 55.9 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.47-7.43 (m, 1H), 7.41-7.39 (m, 2H), 7.37-7.33 (m, 2H), 7.29-7.28 (m, 3H), 7.17-7.11 (m, 6H), 4.90 (d, *J* = 14.0 Hz, 1H), 4.84 (d, *J* = 14.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.8 (s). **HRMS** for $C_{21}H_{17}BrFN_2O_3^+$: calcd. $[M+H]^+$: 443.0401, found: 443.0395.

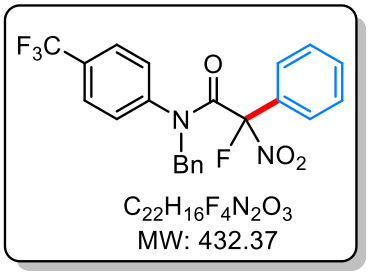
Compound 3aa: *N*-benzyl-*N*-(4-chlorophenyl)-2-fluoro-2-nitro-2-phenylacetamide



$C_{21}H_{16}ClFN_2O_3$
MW: 398.82

Following the general procedure, treatment of *N*-benzyl-*N*-(4-chlorophenyl)-2-fluoro-2-nitroacetamide **1f** (53 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3aa** (56 mg, 70%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.30. **Mp** 72-74 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.7 (d, J_{C-F} = 21.4 Hz, C), 136.9 (C), 135.3 (C), 134.8 (C), 131.4 (CH), 130.7 (CH), 130.7 (CH), 130.2 (d, J_{C-F} = 21.6 Hz, C), 129.3 (CH), 129.3 (CH), 129.0 (CH), 129.0 (CH), 128.8 (CH), 128.8 (CH), 128.5 (CH), 128.5 (CH), 128.4 (CH), 126.2 (d, J_{C-F} = 8.8 Hz, CH), 126.2 (d, J_{C-F} = 8.8 Hz, CH), 116.0 (d, J_{C-F} = 254.9 Hz, C), 56.0 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.46-7.39 (m, 3H), 7.36-7.32 (m, 2H), 7.29-6.78 (m, 8H), 6.20 (s, 1H), 4.90 (d, *J* = 14.0 Hz, 1H), 4.84 (d, *J* = 13.6 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.8 (s). **HRMS** for $C_{21}H_{17}ClFN_2O_3^+$: calcd. $[M+H]^+$: 399.0906, found: 399.0908.

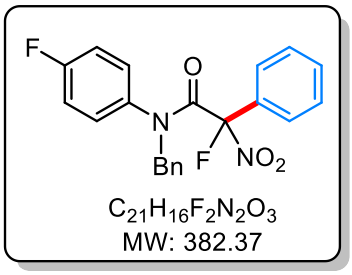
Compound 3ab: *N*-benzyl-2-fluoro-2-nitro-2-phenyl-*N*-(4-(trifluoromethyl) phenyl) acetamide



$C_{22}H_{16}F_4N_2O_3$
MW: 432.37

Following the general procedure, treatment of *N*-benzyl-2-fluoro-2-nitro-*N*-(4-(trifluoromethyl)phenyl)acetamide **1g** (71 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3ab** (86 mg, 75%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 67-69 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.6 (d, J_{C-F} = 21.8 Hz, C), 141.7 (C), 135.1 (C), 131.5 (CH), 130.9 (d, J_{C-F} = 32.6 Hz, C), 130.2 (C), 130.0 (CH), 130.0 (CH), 129.3 (CH), 129.3 (CH), 128.9 (CH), 128.9 (CH), 128.7 (CH), 128.7 (CH), 128.5 (CH), 126.2 (d, J_{C-F} = 8.7 Hz, CH), 126.2 (d, J_{C-F} = 8.7 Hz, CH), 126.0 (CH), 126.0 (CH), 123.5 (d, J_{C-F} = 270.9 Hz, C), 115.9 (d, J_{C-F} = 254.1 Hz, C), 56.0 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.45 (t, *J* = 7.0 Hz, 2H), 7.38-7.33 (m, 5H), 7.31-7.28 (m, 3H), 7.16-7.14 (m, 2H), 6.73 (s, 2H), 4.91 (s, 2H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -62.8 (s), -122.8 (s). **HRMS** for $C_{22}H_{20}F_4N_3O_3^+$: calcd. $[M+NH_4]^+$: 450.1435, found: 450.1447.

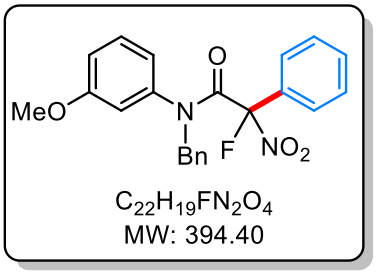
Compound 3ac: *N*-benzyl-2-fluoro-*N*-(4-fluorophenyl)-2-nitro-2-phenylacetamide



$C_{21}H_{16}F_2N_2O_3$
MW: 382.37

Following the general procedure, treatment of *N*-benzyl-2-fluoro-*N*-(4-fluorophenyl)-2-nitroacetamide **1h** (61 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3ac** (68 mg, 89%) as yellow viscous liquid. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 102-104 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.6 (d, $J_{C\text{-}F}$ = 248.4 Hz, C), 160.8 (d, $J_{C\text{-}F}$ = 21.4 Hz, C), 135.4 (C), 134.3 (C), 131.3 (CH), 131.3 (CH), 131.3 (CH), 130.3 (d, $J_{C\text{-}F}$ = 21.5 Hz, C), 129.4 (CH), 129.4 (CH), 128.8 (CH), 128.8 (CH), 128.5 (CH), 128.5 (CH), 128.3 (CH), 126.2 (d, $J_{C\text{-}F}$ = 8.8 Hz, CH), 126.2 (d, $J_{C\text{-}F}$ = 8.8 Hz, CH), 115.7 (CH), 115.7 (CH), 116.1 (d, $J_{C\text{-}F}$ = 254.6 Hz, C), 56.1 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.46-7.38 (m, 3H), 7.36-7.32 (m, 2H), 7.29-7.27 (m, 3H), 7.17-7.14 (m, 2H), 6.73-6.08 (m, 4H), 4.91 (d, *J* = 14.0 Hz, 1H), 4.84 (d, *J* = 14.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -111.6 (s), -122.8 (s). **HRMS** for $C_{21}H_{16}F_2N_2NaO_3^+$: calcd. $[M+Na]^+$: 405.1021, found: 405.1016.

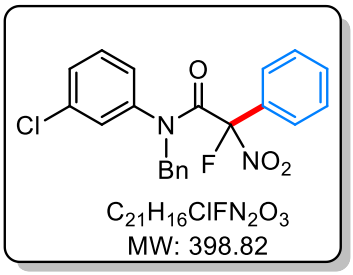
Compound 3ad: *N*-benzyl-2-fluoro-*N*-(3-methoxyphenyl)-2-nitro-2-phenylacetamide



$C_{22}H_{19}FN_2O_4$
MW: 394.40

Following the general procedure, treatment of *N*-benzyl-2-fluoro-*N*-(3-methoxyphenyl)-2-nitroacetamide **1i** (64 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3ad** (53 mg, 67%) as yellow viscous liquid. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.25. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.7 (d, $J_{C\text{-}F}$ = 21.5 Hz, C), 159.6 (C), 139.5 (C), 135.8 (C), 131.2 (CH), 130.5 (d, $J_{C\text{-}F}$ = 21.5 Hz, C), 129.4 (CH), 129.4 (CH), 129.4 (CH), 128.7 (CH), 128.7 (CH), 128.4 (CH), 128.4 (CH), 128.2 (CH), 126.4 (d, $J_{C\text{-}F}$ = 8.7 Hz, CH), 126.4 (d, $J_{C\text{-}F}$ = 8.7 Hz, CH), 121.5 (CH), 116.2 (d, $J_{C\text{-}F}$ = 256.0 Hz, C), 115.2 (CH), 114.3 (CH), 56.0 (CH_2), 55.2 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.45-7.41 (m, 3H), 7.34 (d, *J* = 7.6 Hz, 2H), 7.29-7.26 (m, 4H), 7.20-7.18 (m, 2H), 6.99 (s, 1H), 6.74 (dd, *J* = 2.1 Hz, 0.6 Hz, 2H), 7.93 (d, *J* = 14.0 Hz, 1H), 4.85 (d, *J* = 14.0 Hz, 1H), 3.45 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.8 (s). **HRMS** for $C_{22}H_{23}FN_3O_4^+$: calcd. $[M+NH_4]^+$: 412.1667, found: 412.1661.

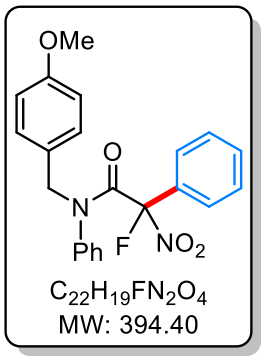
Compound 3ae: *N*-benzyl-*N*-(3-chlorophenyl)-2-fluoro-2-nitro-2-phenylacetamide



$C_{21}H_{16}ClFN_2O_3$
MW: 398.82

Following the general procedure, treatment of *N*-benzyl-*N*-(3-chlorophenyl)-2-fluoro-2-nitroacetamide **1j** (65 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3ae** (48 mg, 60%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.35. **Mp** 89-91 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.7 (d, J_{C-F} = 18.6 Hz, C), 139.6 (C), 135.2 (C), 134.2 (C), 131.5 (CH), 130.2 (d, J_{C-F} = 27.4 Hz, C), 129.7 (CH), 129.7 (CH), 129.1 (CH), 129.1 (CH), 128.8 (CH), 128.8 (CH), 128.8 (CH), 128.6 (CH), 128.6 (CH), 128.4 (CH), 127.8 (CH), 126.2 (d, J_{C-F} = 8.7 Hz, CH), 126.2 (d, J_{C-F} = 8.7 Hz, CH), 116.1 (d, J_{C-F} = 255.0 Hz, C), 56.0 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.47-7.33 (m, 5H), 7.29-7.26 (m, 3H), 7.19-6.17 (m, 6H), 4.88 (s, 2H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -123.3 (s). **HRMS** for $C_{21}H_{20}ClFN_3O_3^+$: calcd. $[M+NH_4]^+$: 416.1172, found: 416.1162.

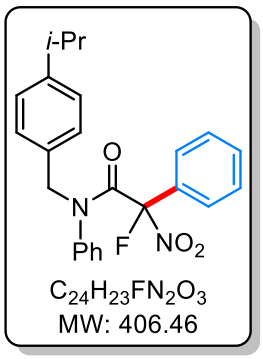
Compound 3af: 2-fluoro-*N*-(4-methoxybenzyl)-2-nitro-*N*,2-diphenylacetamide



$C_{22}H_{19}FN_2O_4$
MW: 394.40

Following the general procedure, treatment of 2-fluoro-*N*-(4-methoxybenzyl)-2-nitro-*N*-phenylacetamide **1k** (64 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3af** (64 mg, 81%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.25. **Mp** 96-98 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.6 (d, J_{C-F} = 16.9 Hz, C), 159.5 (C), 138.4 (C), 131.1 (CH), 130.8 (CH), 130.8 (CH), 130.4 (d, J_{C-F} = 17.2 Hz, C), 129.4 (CH), 129.4 (CH), 128.7 (CH), 128.6 (CH), 128.6 (CH), 128.4 (CH), 128.4 (CH), 127.8 (C), 126.2 (d, J_{C-F} = 6.9 Hz, CH), 126.2 (d, J_{C-F} = 6.9 Hz, CH), 116.2 (d, J_{C-F} = 204.2 Hz, C), 114.0 (CH), 114.0 (CH), 55.5 (CH_2), 55.3 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.43-7.36 (m, 3H), 7.33-7.29 (m, 2H), 7.19 (t, *J* = 7.2 Hz, 2H), 7.09-6.98 (m, 4H), 6.79 (d, *J* = 8.4 Hz, 2H), 6.18 (s, 1H), 4.88 (d, *J* = 13.6 Hz, 1H), 4.79 (d, *J* = 14.0 Hz, 1H), 3.78 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.6 (s). **HRMS** for $C_{22}H_{23}FN_3O_4^+$: calcd. $[M+NH_4]^+$: 412.1667, found: 412.1664.

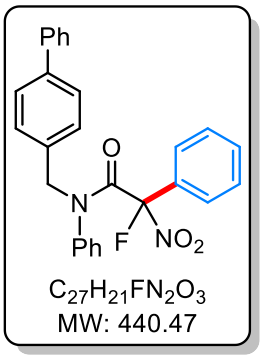
Compound 3ag: 2-fluoro-*N*-(4-isopropylbenzyl)-2-nitro-*N*,2-diphenylacetamide



$C_{24}H_{23}FN_2O_3$
MW: 406.46

Following the general procedure, treatment of 2-fluoro-*N*-(4-*i*-propylbenzyl)-2-nitro-*N*-phenylacetamide **1l** (66 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3ag** (72 mg, 89%) as yellow liquid. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.40. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.7 (d, J_{C-F} = 21.1 Hz, C), 148.8 (C), 138.6 (C), 132.9 (C), 131.1 (CH), 130.5 (d, J_{C-F} = 21.4 Hz, C), 129.4 (CH), 129.4 (CH), 129.3 (CH), 129.3 (CH), 128.8 (CH), 128.6 (CH), 128.6 (CH), 128.4 (CH), 128.4 (CH), 126.7 (CH), 126.7 (CH), 126.3 (d, J_{C-F} = 8.7 Hz, CH), 126.3 (d, J_{C-F} = 8.7 Hz, CH), 116.2 (d, J_{C-F} = 255.3 Hz, C), 55.9 (CH_2), 33.9 (CH), 24.0 (CH_3), 24.0 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.45-7.39 (m, 4H), 7.32 (t, *J* = 7.8 Hz, 2H), 7.20 (t, *J* = 7.6 Hz, 2H), 7.16-6.11 (m, 6H), 4.89 (d, *J* = 14.0 Hz, 1H), 4.85 (d, *J* = 14.0 Hz, 1H), 2.93-2.86 (m, 1H), 1.24 (d, *J* = 6.8 Hz, 6H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.5 (s). **HRMS** for $C_{24}H_{27}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 424.2031, found: 424.2025.

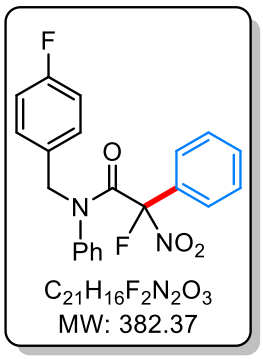
Compound 3ah: *N*-([1,1'-biphenyl]-4-ylmethyl)-2-fluoro-2-nitro-*N*,2-diphenylacetamide



$C_{27}H_{21}FN_2O_3$
MW: 440.47

Following the general procedure, treatment of *N*-([1,1'-biphenyl]-4-ylmethyl)-2-fluoro-2-nitro-*N*-phenylacetamide **1m** (73 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3ah** (79 mg, 90%) as white solid. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 92-94 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.8 (d, J_{C-F} = 21.1 Hz, C), 141.0 (C), 140.6 (C), 138.6 (C), 134.7 (C), 131.2 (CH), 130.4 (d, J_{C-F} = 21.3 Hz, C), 129.8 (CH), 129.8 (CH), 129.4 (CH), 129.4 (CH), 128.9 (CH), 128.9 (CH), 128.9 (CH), 128.9 (CH), 128.7 (CH), 128.4 (CH), 128.4 (CH), 127.6 (CH), 127.3 (CH), 127.3 (CH), 127.1 (CH), 127.1 (CH), 126.3 (d, J_{C-F} = 8.8 Hz, CH), 126.3 (d, J_{C-F} = 8.8 Hz, CH), 116.1 (d, J_{C-F} = 255.6 Hz, C), 55.9 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.63 (d, *J* = 7.6 Hz, 2H), 7.57 (d, *J* = 7.6 Hz, 2H), 7.51-7.45 (m, 5H), 7.42-7.36 (m, 3H), 7.30-7.13 (m, 6H), 6.39 (s, 1H), 5.02 (d, *J* = 14.0 Hz, 1H), 4.96 (d, *J* = 14.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.6 (s). **HRMS** for $C_{27}H_{25}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 458.1874, found: 458.1875.

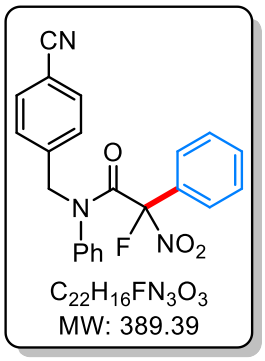
Compound 3ai: 2-fluoro-*N*-(4-fluorobenzyl)-2-nitro-*N*,2-diphenylacetamide



$C_{21}H_{16}F_2N_2O_3$
MW: 382.37

Following the general procedure, treatment of 2-fluoro-*N*-(4-fluorobenzyl)-2-nitro-*N*-phenylacetamide **1n** (61 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3ai** (57 mg, 75%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.45. **Mp** 102-104 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.7 (d, $J_{C\text{-}F}$ = 245.5 Hz, C), 160.8 (d, $J_{C\text{-}F}$ = 21.4 Hz, C), 138.3 (C), 131.6 (d, $J_{C\text{-}F}$ = 3.3 Hz, C), 131.3 (CH), 131.3 (CH), 131.2 (CH), 130.3 (d, $J_{C\text{-}F}$ = 21.8 Hz, C), 129.4 (CH), 129.4 (CH), 128.9 (CH), 128.8 (CH), 128.8 (CH), 128.5 (CH), 128.5 (CH), 126.3 (d, $J_{C\text{-}F}$ = 8.8 Hz, CH), 126.3 (d, $J_{C\text{-}F}$ = 8.8 Hz, CH), 116.1 (d, $J_{C\text{-}F}$ = 255.0 Hz, C), 115.7 (CH), 115.5 (CH), 55.4 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.45-7.40 (m, 1H), 7.38-7.36 (m, 2H), 7.34-7.19 (m, 4H), 7.16-7.13 (m, 3H), 6.99-6.93 (m, 3H), 6.18 (s, 1H), 4.89 (d, *J* = 14.0 Hz, 1H), 4.82 (d, *J* = 14.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -113.7 (s), -122.8 (s). **HRMS** for $C_{21}H_{20}F_2N_3O_3^+$: calcd. $[M+NH_4]^+$: 400.1467, found: 400.1466.

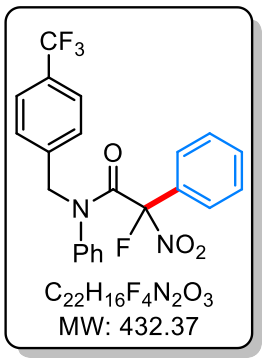
Compound 3aj: *N*-(4-cyanobenzyl)-2-fluoro-2-nitro-*N*,2-diphenylacetamide



$C_{22}H_{16}FN_3O_3$
MW: 389.39

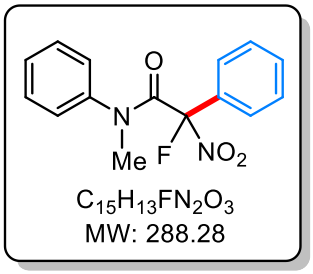
Following the general procedure, treatment of *N*-(4-cyanobenzyl)-2-fluoro-2-nitro-*N*-phenylacetamide **1o** (63 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3aj** (65 mg, 84%) as colorless liquid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.20. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 161.1 (d, $J_{C\text{-}F}$ = 21.5 Hz, C), 140.9 (C), 138.3 (C), 132.5 (CH), 132.5 (CH), 131.4 (CH), 130.0 (d, $J_{C\text{-}F}$ = 21.6 Hz, C), 129.8 (CH), 129.8 (CH), 129.2 (CH), 129.1 (CH), 129.1 (CH), 129.0 (CH), 129.0 (CH), 128.5 (CH), 128.5 (CH), 126.2 (d, $J_{C\text{-}F}$ = 8.8 Hz, CH), 126.2 (d, $J_{C\text{-}F}$ = 8.8 Hz, CH), 118.6 (C), 115.8 (d, $J_{C\text{-}F}$ = 255.2 Hz, C), 112.2 (C), 55.8 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.77 (d, *J* = 8.0 Hz, 2H), 7.46-7.42 (m, 1H), 7.39-7.35 (m, 3H), 7.33-7.30 (m, 3H), 7.23 (t, *J* = 8.4 Hz, 1H), 7.11-6.34 (m, 4H), 4.95 (d, *J* = 14.4 Hz, 1H), 4.90 (d, *J* = 14.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.9 (s). **HRMS** for $C_{22}H_{20}FN_4O_3^+$: calcd. $[M+NH_4]^+$: 407.1514, found: 407.1508.

Compound 3ak: 2-fluoro-2-nitro-*N*,2-diphenyl-*N*-(4-(trifluoromethyl)benzyl)acetamide



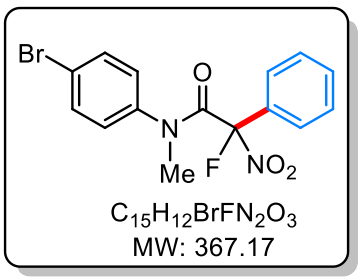
Following the general procedure, treatment of 2-fluoro-2-nitro-*N*-phenyl-*N*-(4-(trifluoromethyl)benzyl)acetamide **1p** (71 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromat- ography afforded the product **3ak** (68 mg, 79%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 67-69 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 161.1 (d, J_{C-F} = 21.6 Hz, C), 139.6 (C), 138.4 (C), 131.3 (CH), 130.4 (d, J_{C-F} = 27.4 Hz, C), 130.2 (d, J_{C-F} = 16.6 Hz, C), 129.5 (CH), 129.5 (CH), 129.1 (CH), 129.1 (CH), 129.1 (CH), 129.0 (CH), 129.0 (CH), 128.5 (CH), 128.5 (CH), 126.2 (d, J_{C-F} = 8.8 Hz, CH), 126.2 (d, J_{C-F} = 8.8 Hz, CH), 125.7 (d, J_{C-F} = 3.8 Hz, CH), 125.7 (d, J_{C-F} = 3.8 Hz, CH), 124.1 (q, J_{C-F} = 270.6 Hz, C), 116.0 (d, J_{C-F} = 255.2 Hz, C), 55.7 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.55 (d, J = 7.6 Hz, 2H), 7.46-7.38 (m, 3H), 7.33 (t, J = 7.8 Hz, 4H), 7.23 (t, J = 6.8 Hz, 1H), 7.18-7.31 (m, 4H), 4.95 (s, 2H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -62.6 (s), -122.8 (s). **HRMS** for $C_{22}H_{20}F_4N_3O_3^+$: calcd. $[M+Na]^+$: 455.0989, found: 450.0987.

Compound 3al: 2-fluoro-*N*-methyl-2-nitro-*N*,2-diphenylacetamide



Following the general procedure, treatment of 2-fluoro-*N*-methyl-2-nitro-*N*-phenylacetamide **1q** (42 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3al** (50 mg, 87%) as brown oil. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.35. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.8 (d, J_{C-F} = 21.5 Hz, C), 140.5 (C), 131.2 (CH), 130.5 (d, J_{C-F} = 21.6 Hz, C), 129.2 (CH), 129.2 (CH), 128.7 (CH), 128.5 (CH), 128.5 (CH), 128.2 (CH), 128.2 (CH), 126.3 (d, J_{C-F} = 8.7 Hz, CH), 126.3 (d, J_{C-F} = 8.7 Hz, CH), 116.1 (d, J_{C-F} = 255.1 Hz, C), 40.4 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.73-7.39 (m, 4H), 7.33 (t, J = 7.2 Hz, 2H), 7.26-7.17 (m, 2H), 6.85 (s, 2H), 3.34 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.4 (s). **HRMS** for $C_{15}H_{13}FN_2NaO_3^+$: calcd. $[M+Na]^+$: 311.0802, found: 311.0794.

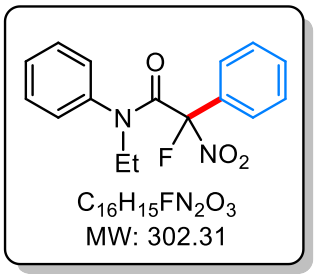
Compound 3am: 2-(4-bromophenyl)-2-fluoro-*N*-methyl-2-nitro-*N*-phenylacetamide



Following the general procedure, treatment of *N*-(4-bromophenyl)-2-fluoro-*N*-methyl-2-nitroacetamide **1r** (58 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3am** (59 mg, 81%) as white solid. **R_f** (Ethyl

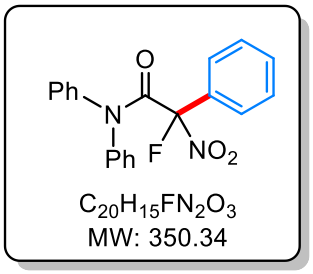
acetate/Hexane: 10/90) = 0.35. **Mp** 76-78 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.6 (d, J_{C-F} = 21.5 Hz, C), 139.5 (C), 132.4 (CH), 132.4 (CH), 131.4 (CH), 130.2 (d, J_{C-F} = 20.9 Hz, C), 129.9 (CH), 129.9 (CH), 128.6 (CH), 128.6 (CH), 126.3 (d, J_{C-F} = 8.7 Hz, CH), 126.3 (d, J_{C-F} = 8.7 Hz, CH), 122.7 (C), 116.0 (d, J_{C-F} = 254.1 Hz, C), 40.3 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.55-7.45 (m, 2H), 7.41-7.29 (m, 5H), 6.72 (s, 2H), 3.31 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.6 (s). **HRMS** for $C_{15}H_{13}BrFN_2O_3^+$: calcd. $[M+H]^+$: 367.0088, found: 367.0077.

Compound 3an: *N*-ethyl-2-fluoro-2-nitro-*N*,2-diphenylacetamide



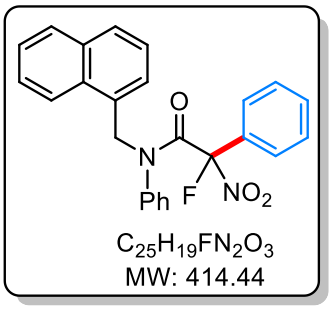
Following the general procedure, treatment of *N*-ethyl-2-fluoro-2-nitro-*N*-phenylacetamide **1s** (45 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3an** (56 mg, 92%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.35. **Mp** 80-82 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.2 (d, J_{C-F} = 21.2 Hz, C), 138.6 (d, J_{C-F} = 2.5 Hz, C), 131.1 (CH), 130.5 (d, J_{C-F} = 21.6 Hz, C), 129.2 (CH), 129.2 (CH), 128.9 (CH), 128.9 (CH), 128.6 (CH), 128.4 (CH), 128.4 (CH), 126.2 (d, J_{C-F} = 8.7 Hz, CH), 126.2 (d, J_{C-F} = 8.7 Hz, CH), 116.2 (d, J_{C-F} = 255.1 Hz, C), 47.5 (CH_2), 12.3 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.73-7.31 (m, 6H), 7.24-6.49 (m, 4H), 3.82-3.73 (m, 2H), 1.16 (t, *J* = 7.2 Hz, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.6 (s). **HRMS** for $C_{16}H_{15}FN_2NaO_3^+$: calcd. $[M+Na]^+$: 325.0959, found: 325.0959.

Compound 3ao: *N*-ethyl-2-fluoro-2-nitro-*N*,2-diphenylacetamide



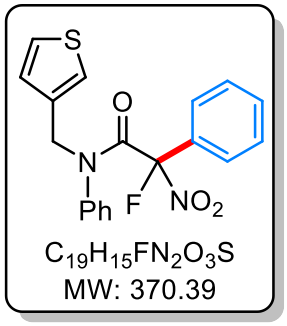
Following the general procedure, treatment of 2-fluoro-2-nitro-*N*,*N*-diphenylacetamide **1t** (55 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3ao** (53 mg, 75%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.25. **Mp** 140-142 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.1 (d, J_{C-F} = 21.9 Hz, C), 131.4 (C), 131.4 (C), 130.4 (d, J_{C-F} = 21.3 Hz, C), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 128.6 (CH), 128.6 (CH), 128.6 (CH), 128.6 (CH), 126.4 (d, J_{C-F} = 8.8 Hz, CH), 126.4 (d, J_{C-F} = 8.8 Hz, CH), 126.4 (d, J_{C-F} = 8.8 Hz, CH), 126.4 (d, J_{C-F} = 8.8 Hz, CH), 116.2 (d, J_{C-F} = 255.6 Hz, C). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.52-7.46 (m, 3H), 7.39 (t, *J* = 7.6 Hz, 2H), 7.33-7.01 (m, 10H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.7 (s). **HRMS** for $C_{20}H_{19}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 368.1405, found: 368.1398.

Compound 3ap: 2-fluoro-*N*-(naphthalen-1-ylmethyl)-2-nitro-*N*,2-diphenylacetamide



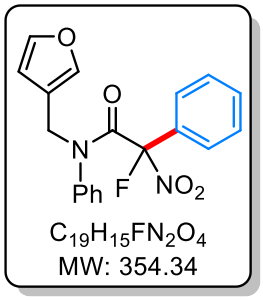
Following the general procedure, treatment of 2-fluoro-*N*-(naphthalen-1-ylmethyl)-2-nitro-*N*-phenylacetamide **1u** (68 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3ap** (47 mg, 57%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.30. **Mp** 104-106 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.5 (d, J_{C-F} = 21.1 Hz, C), 137.5 (C), 133.8 (C), 131.8 (C), 131.2 (CH), 130.8 (C), 130.4 (d, J_{C-F} = 21.7 Hz, C), 129.5 (CH), 129.5 (CH), 129.3 (CH), 129.2 (CH), 128.9 (CH), 128.6 (CH), 128.5 (CH), 128.4 (CH), 128.4 (CH), 126.9 (CH), 126.3 (d, J_{C-F} = 8.7 Hz, CH), 126.3 (d, J_{C-F} = 8.7 Hz, CH), 126.2 (CH), 125.0 (CH), 123.9 (CH), 116.3 (d, J_{C-F} = 256.1 Hz, C), 53.2 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.07 (d, *J* = 8.4 Hz, 1H), 7.84 (d, *J* = 8.0 Hz, 1H), 7.73 (d, *J* = 8.0 Hz, 1H), 7.58-7.50 (m, 2H), 7.39-7.36 (m, 3H), 7.28-7.24 (m, 2H), 7.18 (t, *J* = 7.6 Hz, 1H), 7.08 (t, *J* = 7.2 Hz, 1H), 6.94-5.92 (m, 4H), 5.92 (s, 1H), 5.56 (d, *J* = 14.0 Hz, 1H), 5.28 (d, *J* = 14.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.8 (s). **HRMS** for $C_{25}H_{23}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 432.1718, found: 432.1717.

Compound 3aq: 2-fluoro-2-nitro-*N*,2-diphenyl-*N*-(thiophen-3-ylmethyl)acetamide



Following the general procedure, treatment of 2-fluoro-2-nitro-*N*-phenyl-*N*-(thiophen-3-ylmethyl)acetamide **1v** (59 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3aq** (47 mg, 63%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.50. **Mp** 113-115 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.6 (d, J_{C-F} = 17.2 Hz, C), 138.5 (C), 136.0 (C), 131.2 (CH), 130.4 (d, J_{C-F} = 17.2 Hz, C), 129.2 (CH), 129.2 (CH), 128.8 (CH), 128.8 (CH), 128.7 (CH), 128.4 (CH), 128.4 (CH), 128.3 (CH), 126.3 (CH), 126.3 (CH), 126.2 (CH), 125.0 (CH), 116.1 (d, J_{C-F} = 204.1 Hz, C), 50.9 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.40 (t, *J* = 7.2 Hz, 1H), 7.36 (d, *J* = 8.0 Hz, 2H), 7.31-7.24 (m, 3H), 7.20 (t, *J* = 7.2 Hz, 1H), 7.01-6.61 (m, 5H), 6.18 (s, 1H), 4.91 (d, *J* = 14.0 Hz, 1H), 4.80 (d, *J* = 14.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.7 (s). **HRMS** for $C_{19}H_{19}FN_3O_3S^+$: calcd. $[M+NH_4]^+$: 388.1126, found: 388.1122.

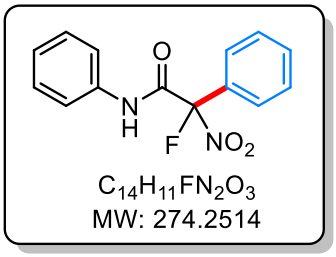
Compound 3ar: 2-fluoro-*N*-(furan-3-ylmethyl)-2-nitro-*N*,2-diphenylacetamide



$C_{19}H_{15}FN_2O_4$
MW: 354.34

Following the general procedure, treatment of 2-fluoro-*N*-(furan-3-ylmethyl)-2-nitro-*N*-phenylacetamide **1w** (56 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3ar** (48 mg, 68%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.30. **Mp** 81-83 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.6 (d, J_{C-F} = 17.0 Hz, C), 143.5 (CH), 141.9 (CH), 138.5 (C), 131.2 (CH), 130.4 (d, J_{C-F} = 17.1 Hz, C), 129.2 (CH), 129.2 (CH), 128.9 (CH), 128.9 (CH), 128.8 (CH), 128.4 (CH), 128.4 (CH), 126.3 (d, J_{C-F} = 7.0 Hz, CH), 126.3 (d, J_{C-F} = 7.0 Hz, CH), 119.6 (C), 116.1 (d, J_{C-F} = 204.3 Hz, C), 111.1 (CH), 47.0 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.45-7.36 (m, 5H), 7.32 (t, *J* = 7.6 Hz, 2H), 7.22 (t, *J* = 7.2 Hz, 2H), 7.08 (s, 2H), 6.36 (s, 2H), 4.77 (d, *J* = 14.4 Hz, 1H), 4.64 (d, *J* = 14.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -122.8 (s). **HRMS** for $C_{19}H_{19}FN_3O_4^+$: calcd. $[M+NH_4]^+$: 372.1354, found: 372.1346.

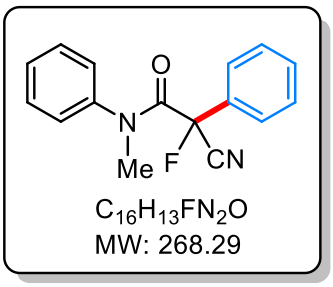
Compound 3as: 2-fluoro-2-nitro-*N*,2-diphenylacetamide



$C_{14}H_{11}FN_2O_3$
MW: 274.2514

Following the general procedure, treatment of 2-fluoro-2-nitro-*N*-phenylacetamide **1x** (40 mg, 0.20 mmol) with **2a** (109 mg, 0.22 mmol) in the presence of K_2CO_3 (33 mg, 0.24 mmol) in toluene (2 mL) at 50 °C for 2 h followed by column chromatography afforded the product **3as** (13 mg, 23%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 111-113 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 158.2 (d, J_{C-F} = 22.6 Hz, C), 135.7 (C), 132.1 (CH), 129.5 (CH), 129.5 (CH), 129.3 (C), 129.1 (CH), 129.1 (CH), 126.9 (d, J_{C-F} = 8.4 Hz, CH), 126.9 (d, J_{C-F} = 8.4 Hz, CH), 126.3 (CH), 120.5 (CH), 120.5 (CH), 113.8 (d, J_{C-F} = 248.4 Hz, C). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.06 (s, 1H), 7.84 (d, *J* = 7.2 Hz, 2H), 7.59-7.50 (m, 5H), 7.38 (d, *J* = 7.6 Hz, 2H), 7.22 (d, *J* = 7.6 Hz, 1H). **^{19}F NMR** (376 MHz δ ppm/$CDCl_3$): -124.3 (s). **HRMS** for $C_{14}H_{15}FN_3O_3^+$: calcd. $[M+NH_4]^+$: 292.1092, found: 292.1089.

Compound 5a: 2-cyano-2-fluoro-*N*-methyl-*N*,2-diphenylacetamide

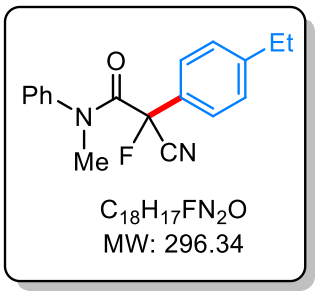


$C_{16}H_{13}FN_2O$
MW: 268.29

Following the general procedure, treatment of 2-cyano-2-fluoro-*N*-methyl-*N*-phenylacetamide **4a** (38 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5a** (38 mg, 70%) as yellow oil. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.25. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.1 (d, J_{C-F} = 23.7 Hz, C), 140.4 (C), 133.0 (d, J_{C-F} = 23.2 Hz, C), 130.6 (CH), 129.3 (CH), 129.3 (CH), 129.0 (CH), 129.0 (CH), 128.8 (CH), 128.5 (CH), 128.5 (CH), 125.2 (d, J_{C-F} = 5.5 Hz, CH),

125.2 (d, J_{C-F} = 5.5 Hz, CH), 114.9 (d, J_{C-F} = 34.6 Hz, C), 89.9 (d, J_{C-F} = 197.8 Hz, C), 40.7 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.41 (t, *J* = 7.2 Hz, 1H), 7.33 (t, *J* = 7.2 Hz, 2H), 7.30-7.25 (m, 3H), 7.20 (t, *J* = 7.6 Hz, 2H), 6.81 (s, 2H), 3.30 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -137.5 (s). **HRMS** for $C_{16}H_{14}FN_2O^+$: calcd. $[M+H]^+$: 269.1085, found: 269.1083.

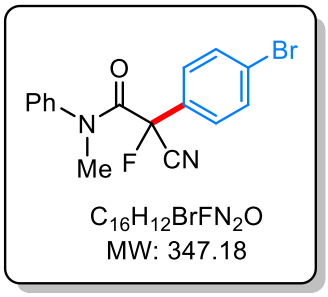
Compound 5b: 2-cyano-2-(4-ethylphenyl)-2-fluoro-*N*-methyl-*N*-phenylacetamide



$C_{18}H_{17}FN_2O$
MW: 296.34

Following the general procedure, treatment of 2-cyano-*N*-methyl-2-fluoro-*N*-phenylacetamide **4a** (38 mg, 0.20 mmol) with (4-ethylphenyl)(mesityl)iodonium 4-methylbenzenesulfonate **2e** (115 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5b** (36 mg, 61%) as colorless oil. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.40. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.3 (d, J_{C-F} = 24.2 Hz, C), 147.3 (C), 140.5 (C), 130.4 (d, J_{C-F} = 18.7 Hz, CH), 129.3 (CH), 129.3 (CH), 128.7 (CH), 128.6 (CH), 128.6 (CH), 128.6 (CH), 128.6 (CH), 125.5 (d, J_{C-F} = 5.3 Hz, CH), 125.5 (d, J_{C-F} = 5.3 Hz, CH), 115.0 (d, J_{C-F} = 34.5 Hz, C), 89.8 (d, J_{C-F} = 196.7 Hz, C), 40.7 (CH_2), 28.7 (CH_3), 15.5 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.31-7.26 (m, 1H), 7.22-7.17 (m, 6H), 6.83 (s, 2H), 3.31 (s, 3H), 2.67 (q, *J* = 7.6 Hz, 2H), 1.24 (t, *J* = 7.6 Hz, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -135.5 (s). **HRMS** for $C_{18}H_{18}FN_2O^+$: calcd. $[M+H]^+$: 297.1398, found: 297.1400.

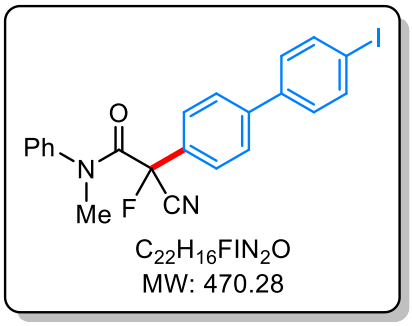
Compound 5c: 2-(4-bromophenyl)-2-cyano-2-fluoro-*N*-methyl-*N*-phenylacetamide



$C_{16}H_{12}BrFN_2O$
MW: 347.18

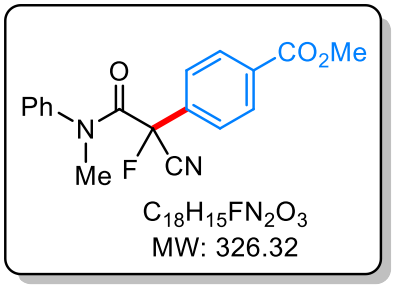
Following the general procedure, treatment of 2-cyano-*N*-methyl-2-fluoro-*N*-phenylacetamide **4a** (38 mg, 0.20 mmol) with (4-bromophenyl)(mesityl)iodonium 4-methylbenzenesulfonate **2i** (126 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5c** (51 mg, 73%) as colorless oil. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.40. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 161.7 (d, J_{C-F} = 23.5 Hz, C), 140.3 (C), 132.1 (C), 132.3 (CH), 132.3 (CH), 129.5 (CH), 129.5 (CH), 129.0 (CH), 128.5 (CH), 128.5 (CH), 126.9 (d, J_{C-F} = 5.8 Hz, CH), 126.9 (d, J_{C-F} = 5.8 Hz, CH), 125.2 (C), 114.5 (d, J_{C-F} = 34.4 Hz, C), 89.5 (d, J_{C-F} = 200.1 Hz, C), 40.8 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.48 (d, *J* = 8.0 Hz, 2H), 7.35-7.30 (m, 1H), 7.25 (t, *J* = 7.2 Hz, 2H), 7.01 (d, *J* = 8.0 Hz, 2H), 6.86 (d, *J* = 7.2 Hz, 2H), 3.31 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -138.8 (s). **HRMS** for $C_{16}H_{13}BrFN_2O^+$: calcd. $[M+H]^+$: 347.0190, found: 347.0188.

Compound 5d: 2-cyano-2-fluoro-2-(4'-iodo-[1,1'-biphenyl]-4-yl)-*N*-methyl-*N*-phenyl-acetamide



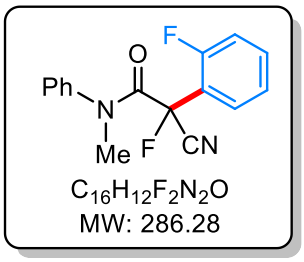
Following the general procedure, treatment of 2-cyano-2-fluoro-*N*-methyl-*N*-phenylacetamide **4a** (38 mg, 0.20 mmol) with (4'-iodo-[1,1'-biphenyl]-4-yl)(mesityl)iodonium 4-methylbenzenesulfonate **2u** (153 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5d** (48 mg, 51%) as colorless solid. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.20. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.0 (d, $J_{C\text{-}F}$ = 23.7 Hz, C), 142.4 (C), 140.5 (C), 139.2 (C), 138.2 (CH), 138.2 (CH), 132.3 (d, $J_{C\text{-}F}$ = 22.2 Hz, C), 129.4 (CH), 129.4 (CH), 129.0 (CH), 129.0 (CH), 128.9 (CH), 128.5 (CH), 128.5 (CH), 127.4 (CH), 127.4 (CH), 125.9 (d, $J_{C\text{-}F}$ = 5.6 Hz, CH), 125.9 (d, $J_{C\text{-}F}$ = 5.6 Hz, CH), 114.9 (d, $J_{C\text{-}F}$ = 34.6 Hz, C), 94.2 (C), 89.7 (d, $J_{C\text{-}F}$ = 199.0 Hz, C), 40.8 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.80 (d, *J* = 7.6 Hz, 2H), 7.59-7.46 (m, 3H), 7.36-7.24 (m, 6H), 6.90 (s, 2H), 3.34 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -137.6 (s). **HRMS** for $C_{22}H_{17}FIN_2O^+$: calcd. $[M+H]^+$: 471.0364, found: 471.0361.

Compound 5e: methyl 4-(1-cyano-1-fluoro-2-(methyl(phenyl)amino)-2-oxoethyl)benzoate



Following the general procedure, treatment of 2-cyano-2-fluoro-*N*-methyl-*N*-phenylacetamide **4a** (38 mg, 0.20 mmol) with mesityl(4-(methoxycarbonyl)phenyl)iodonium 4-methylbenzenesulfonate **2k** (122 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5e** (42 mg, 64%) as yellow oil. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.20. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.0 (C), 161.6 (d, $J_{C\text{-}F}$ = 22.9 Hz, C), 140.1 (C), 137.3 (d, $J_{C\text{-}F}$ = 22.4 Hz, C), 132.1 (C), 130.1 (CH), 130.1 (CH), 129.4 (CH), 129.4 (CH), 129.0 (CH), 128.4 (CH), 128.4 (CH), 125.2 (d, $J_{C\text{-}F}$ = 6.0 Hz, CH), 125.2 (d, $J_{C\text{-}F}$ = 6.0 Hz, CH), 114.5 (d, $J_{C\text{-}F}$ = 34.2 Hz, C), 89.8 (d, $J_{C\text{-}F}$ = 199.7 Hz, C), 52.5 (CH_3), 40.7 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.93 (d, *J* = 8.0 Hz, 2H), 7.27-7.21 (m, 3H), 7.15 (t, *J* = 8.0 Hz, 2H), 6.76 (s, 2H), 3.87 (s, 3H), 3.24 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -140.6 (s). **HRMS** for $C_{18}H_{16}FN_2O_3^+$: calcd. $[M+H]^+$: 327.1139, found: 327.1142.

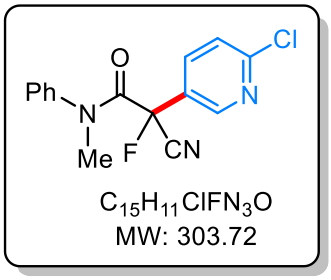
Compound 5f: 2-cyano-2-fluoro-2-(2-fluorophenyl)-*N*-methyl-*N*-phenylacetamide



$C_{16}H_{12}F_2N_2O$
MW: 286.28

Following the general procedure, treatment of 2-cyano-2-fluoro-*N*-methyl-*N*-phenylacetamide **4a** (38 mg, 0.20 mmol) with (2-fluorophenyl)(mesityl)iodonium 4-methylbenzenesulfonate **2w** (113 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5f** (37 mg, 65%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.25. **Mp** 64-66 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 160.9 (d, $J_{C\text{-}F}$ = 24.0 Hz, C), 159.5 (d, $J_{C\text{-}F}$ = 24.0 Hz, C), 140.6 (C), 132.6 (d, $J_{C\text{-}F}$ = 8.2 Hz, C), 129.5 (CH), 129.5 (CH), 129.5 (CH), 128.8 (CH), 128.2 (CH), 128.2 (CH), 127.8 (CH), 124.6 (CH), 116.4 (d, $J_{C\text{-}F}$ = 19.8 Hz, CH), 114.0 (d, $J_{C\text{-}F}$ = 33.5 Hz, C), 87.3 (d, $J_{C\text{-}F}$ = 196.3 Hz, C), 40.8 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.40-7.34 (m, 1H), 7.25-7.18 (m, 3H), 7.11-7.0 (m, 5H), 3.37 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -112.5 (s), -137.6 (s). **HRMS** for $C_{16}H_{13}F_2N_2O^+$: calcd. $[M+H]^+$: 287.0990, found: 287.0987.

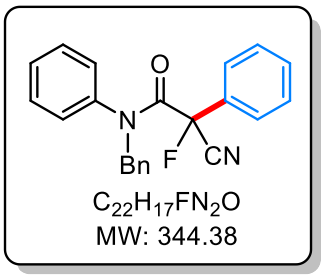
Compound 5g: 2-(6-chloropyridin-3-yl)-2-cyano-2-fluoro-*N*-methyl-*N*-phenylacetamide



$C_{15}H_{11}ClFN_3O$
MW: 303.72

Following the general procedure, treatment of 2-cyano-2-fluoro-*N*-methyl-*N*-phenylacetamide **4a** (38 mg, 0.20 mmol) with (6-chloropyridin-3-yl)(mesityl)iodonium 4-methylbenzenesulfonate **2v** (117 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5g** (33 mg, 55%) as colorless oil. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.20. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 161.0 (d, $J_{C\text{-}F}$ = 18.4 Hz, C), 153.9 (C), 146.6 (d, $J_{C\text{-}F}$ = 5.4 Hz, CH), 140.1 (C), 135.9 (C), 129.8 (CH), 129.8 (CH), 129.8 (CH), 129.5 (CH), 128.3 (CH), 128.3 (CH), 124.5 (CH), 114.0 (d, $J_{C\text{-}F}$ = 27.1 Hz, C), 88.0 (d, $J_{C\text{-}F}$ = 161.2 Hz, C), 40.9 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.22 (s, 1H), 7.62 (d, J = 7.6 Hz, 1H), 7.40-7.30 (m, 4H), 6.95 (d, J = 7.6 Hz, 2H), 3.33 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -141.5 (s). **HRMS** for $C_{15}H_{12}ClFN_3O^+$: calcd. $[M+H]^+$: 304.0647, found: 304.0644.

Compound 5h: *N*-benzyl-2-cyano-2-fluoro-*N*,2-diphenylacetamide

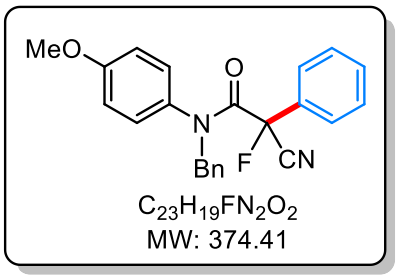


$C_{22}H_{17}FN_2O$
MW: 344.38

Following the general procedure, treatment of *N*-benzyl-2-cyano-2-fluoro-*N*-phenylacetamide **4b** (53 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromato- graphy afforded the product **5h** (43 mg, 62%) as yellow oil. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.35. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.1 (d, $J_{C\text{-}F}$ = 23.7 Hz, C), 138.2 (C), 135.7 (C), 132.9 (d, $J_{C\text{-}F}$ = 22.6 Hz, C), 130.6 (CH), 129.7 (CH), 129.7 (CH), 129.2 (CH), 129.2 (CH), 129.0 (CH), 129.0 (CH), 128.8 (CH), 128.8 (CH), 128.8

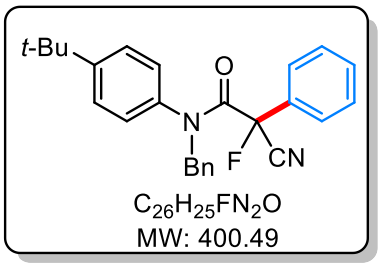
(CH), 128.6 (CH), 128.6 (CH), 128.1 (CH), 125.2 (d, J_{C-F} = 5.6 Hz, CH), 125.2 (d, J_{C-F} = 5.6 Hz, CH), 114.9 (d, J_{C-F} = 34.9 Hz, C), 89.9 (d, J_{C-F} = 197.3 Hz, C), 56.2 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.36 (t, *J* = 7.2 Hz, 1H), 7.28 (t, *J* = 7.6 Hz, 2H), 7.24-7.18 (m, 6H), 7.13-7.10 (m, 2H), 7.05 (t, *J* = 8.0 Hz, 2H), 6.51 (d, *J* = 7.6 Hz, 2H), 4.88 (d, *J* = 14.0 Hz, 1H), 4.83 (d, *J* = 13.6 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -136.7 (s). **HRMS** for $C_{22}H_{18}FN_2O^+$: calcd. $[M+H]^+$: 345.1398, found: 345.1398.

Compound 5i: *N*-benzyl-2-cyano-2-fluoro-*N*-(4-methoxyphenyl)-2-phenylacetamide



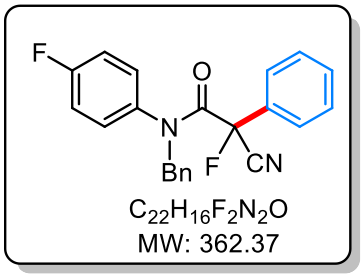
Following the general procedure, treatment of *N*-benzyl-2-cyano-2-fluoro-*N*-(4-methoxyphenyl)acetamide **4c** (60 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5i** (54 mg, 72%) as yellow oil. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.20. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.3 (d, J_{C-F} = 24.4 Hz, C), 159.7 (C), 135.9 (C), 133.0 (d, J_{C-F} = 22.7 Hz, C), 131.2 (CH), 131.2 (CH), 130.6 (C), 130.6 (CH), 129.3 (CH), 129.3 (CH), 129.0 (CH), 129.0 (CH), 128.6 (CH), 128.6 (CH), 128.1 (CH), 125.4 (d, J_{C-F} = 5.2 Hz, CH), 125.4 (d, J_{C-F} = 5.2 Hz, CH), 114.9 (d, J_{C-F} = 35.0 Hz, C), 113.9 (CH), 113.9 (CH), 89.6 (d, J_{C-F} = 195.5 Hz, C), 56.3 (CH_2), 56.3 (CH_2), 55.5 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.36 (t, *J* = 6.8 Hz, 1H), 7.28 (t, *J* = 7.6 Hz, 2H), 7.23-7.20 (m, 5H), 7.12-7.09 (m, 2H), 6.51-6.23 (m, 4H), 4.83 (d, *J* = 14.0 Hz, 1H), 4.77 (d, *J* = 14.0 Hz, 1H), 3.71 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -134.4 (s). **HRMS** for $C_{23}H_{20}FN_2O_2^+$: calcd. $[M+H]^+$: 375.1503, found: 375.1505.

Compound 5j: *N*-benzyl-*N*-(4-(tert-butyl)phenyl)-2-cyano-2-fluoro-2-phenylacetamide



Following the general procedure, treatment of *N*-benzyl-*N*-(4-(*t*-butyl)phenyl)-2-cyano-2-fluoroacetamide **4d** (65 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5j** (66 mg, 83%) as yellow oil. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.35. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.3 (d, J_{C-F} = 24.4 Hz, C), 152.1 (C), 136.0 (C), 135.5 (C), 133.0 (d, J_{C-F} = 22.7 Hz, C), 130.4 (CH), 129.3 (CH), 129.3 (CH), 129.2 (CH), 129.2 (CH), 128.9 (CH), 128.9 (CH), 128.6 (CH), 128.6 (CH), 128.0 (CH), 125.7 (CH), 125.7 (CH), 125.2 (d, J_{C-F} = 5.4 Hz, CH), 125.2 (d, J_{C-F} = 5.4 Hz, CH), 114.9 (d, J_{C-F} = 34.6 Hz, C), 89.8 (d, J_{C-F} = 195.7 Hz, C), 56.2 (CH_2), 34.7 (C), 31.3 (CH_3), 31.3 (CH_3), 31.3 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.28 (t, *J* = 7.2 Hz, 1H), 7.19-7.16 (m, 5H), 7.11-7.07 (m, 4H), 6.97 (d, *J* = 8.4 Hz, 2H), 6.40 (s, 2H), 4.78 (s, 2H), 1.18 (s, 9H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -135.0 (s). **HRMS** for $C_{26}H_{26}FN_2O^+$: calcd. $[M+H]^+$: 401.2024, found: 401.2023.

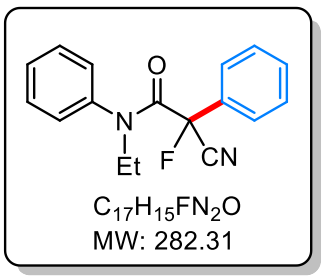
Compound 5k: *N*-benzyl-2-cyano-2-fluoro-*N*-(4-fluorophenyl)-2-phenylacetamide



$C_{22}H_{16}F_2N_2O$
MW: 362.37

Following the general procedure, treatment of *N*-benzyl-2-cyano-2-fluoro-*N*-(4-fluorophenyl)acetamide **4e** (53 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5k** (54 mg, 74%) as colorless oil. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.30. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.4 (d, $J_{C\text{-}F}$ = 248.5 Hz, C), 162.1 (d, $J_{C\text{-}F}$ = 23.8 Hz, C), 135.5 (C), 134.1 (C), 132.8 (d, $J_{C\text{-}F}$ = 22.8 Hz, C), 131.8 (d, $J_{C\text{-}F}$ = 8.8 Hz, CH), 131.8 (d, $J_{C\text{-}F}$ = 8.8 Hz, CH), 130.7 (d, $J_{C\text{-}F}$ = 2.1 Hz, CH), 129.3 (CH), 129.3 (CH), 129.2 (CH), 129.2 (CH), 128.7 (CH), 128.7 (CH), 128.3 (CH), 125.1 (d, $J_{C\text{-}F}$ = 5.5 Hz, CH), 125.1 (d, $J_{C\text{-}F}$ = 5.5 Hz, CH), 115.8 (d, $J_{C\text{-}F}$ = 22.7 Hz, CH), 115.8 (d, $J_{C\text{-}F}$ = 22.7 Hz, CH), 114.8 (d, $J_{C\text{-}F}$ = 35.0 Hz, C), 89.9 (d, $J_{C\text{-}F}$ = 197.1 Hz, C), 56.3 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.36 (t, *J* = 7.2 Hz, 1H), 7.28 (t, *J* = 7.6 Hz, 2H), 7.24-7.18 (m, 5H), 7.13-7.10 (m, 2H), 7.05 (t, *J* = 8.0 Hz, 2H), 6.46 (d, *J* = 7.6 Hz, 2H), 4.88 (d, *J* = 14.0 Hz, 1H), 4.83 (d, *J* = 13.6 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -111.3 (s), -137.0 (s). **HRMS** for $C_{22}H_{17}F_2N_2O^+$: calcd. $[M+H]^+$: 363.1303, found: 363.1316.

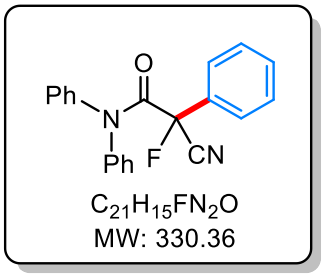
Compound 5l: 2-cyano-*N*-ethyl-2-fluoro-*N*,2-diphenylacetamide



$C_{17}H_{15}FN_2O$
MW: 282.31

Following the general procedure, treatment of 2-cyano-2-fluoro-*N*-ethyl-*N*-phenylacetamide **4f** (53 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5l** (37 mg, 66%) as brown oil. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/96) = 0.30. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 161.5 (d, $J_{C\text{-}F}$ = 23.1 Hz, C), 138.6 (C), 133.2 (d, $J_{C\text{-}F}$ = 22.8 Hz, C), 130.5 (CH), 129.6 (CH), 129.6 (CH), 129.1 (CH), 129.1 (CH), 129.0 (CH), 129.0 (CH), 128.8 (CH), 125.2 (d, $J_{C\text{-}F}$ = 5.5 Hz, CH), 125.2 (d, $J_{C\text{-}F}$ = 5.5 Hz, CH), 115.0 (d, $J_{C\text{-}F}$ = 34.8 Hz, C), 89.9 (d, $J_{C\text{-}F}$ = 197.6 Hz, C), 47.7 (CH_2), 12.4 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.39 (t, *J* = 7.2 Hz, 1H), 7.33-7.21 (m, 5H), 7.60 (t, *J* = 7.6 Hz, 2H), 6.73 (d, *J* = 8.0 Hz, 2H), 3.77-3.68 (m, 2H), 1.10 (t, *J* = 7.2 Hz, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -137.3 (s). **HRMS** for $C_{17}H_{16}FN_2O^+$: calcd. $[M+H]^+$: 283.1241, found: 283.1243.

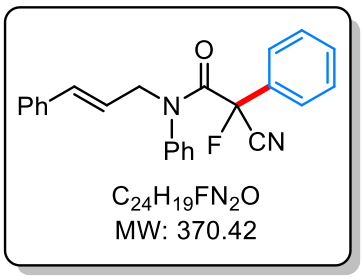
Compound 5m: 2-cyano-2-fluoro-*N*,*N*,2-triphenylacetamide



$C_{21}H_{15}FN_2O$
MW: 330.36

Following the general procedure, treatment of 2-cyano-2-fluoro-*N*,*N*-diphenylacetamide **4g** (51 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5m** (44 mg, 66%) as white solid. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.25. **Mp** 114-116 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.3 (d, $J_{C\text{-}F}$ = 24.1 Hz, C), 140.4 (C), 133.0 (d, $J_{C\text{-}F}$ = 22.7 Hz, C), 130.7 (d, $J_{C\text{-}F}$ = 2.1 Hz, CH), 130.7 (d, $J_{C\text{-}F}$ = 2.1 Hz, CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.3 (CH), 129.2 (CH), 129.2 (CH), 129.2 (CH), 128.2 (C), 128.2 (C), 125.3 (d, $J_{C\text{-}F}$ = 5.5 Hz, CH), 125.3 (d, $J_{C\text{-}F}$ = 5.5 Hz, CH), 125.3 (d, $J_{C\text{-}F}$ = 5.5 Hz, CH), 114.9 (d, $J_{C\text{-}F}$ = 34.6 Hz, C), 90.0 (d, $J_{C\text{-}F}$ = 198.1 Hz, C). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.42-7.04 (m, 15H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -136.2 (s). **HRMS** for $C_{21}H_{16}FN_2O^+$: calcd. $[M+H]^+$: 331.1241, found: 331.1230.

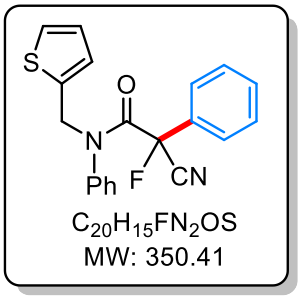
Compound 5n: *N*-cinnamyl-2-cyano-2-fluoro-*N*,2-diphenylacetamide



$C_{24}H_{19}FN_2O$
MW: 370.42

Following the general procedure, treatment of *N*-cinnamyl-2-cyano-2-fluoro-*N*-phenylacetamide **4h** (59 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5n** (54 mg, 73%) as yellow oil. $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.25. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 161.9 (d, $J_{C\text{-}F}$ = 23.8 Hz, C), 138.6 (C), 136.4 (C), 135.2 (CH), 133.0 (d, $J_{C\text{-}F}$ = 22.4 Hz, C), 130.6 (CH), 129.7 (CH), 129.7 (CH), 129.1 (CH), 129.1 (CH), 129.1 (CH), 129.1 (CH), 129.0 (CH), 128.7 (CH), 128.7 (CH), 128.2 (CH), 126.6 (CH), 126.6 (CH), 125.3 (d, $J_{C\text{-}F}$ = 5.6 Hz, CH), 125.3 (d, $J_{C\text{-}F}$ = 5.6 Hz, CH), 122.1 (CH), 114.9 (d, $J_{C\text{-}F}$ = 34.7 Hz, C), 89.9 (d, $J_{C\text{-}F}$ = 197.7 Hz, C), 55.1 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.39 (t, J = 7.2 Hz, 1H), 7.33-7.20 (m, 10H), 7.15 (t, J = 7.6 Hz, 2H), 6.76 (d, J = 8.0 Hz, 2H), 6.35 (d, J = 16.0 Hz, 1H), 6.23-6.16 (m, 1H), 4.41 (d, J = 6.8 Hz, 2H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -137.5 (s). **HRMS** for $C_{24}H_{20}FN_2O^+$: calcd. $[M+H]^+$: 371.1554, found: 371.1550.

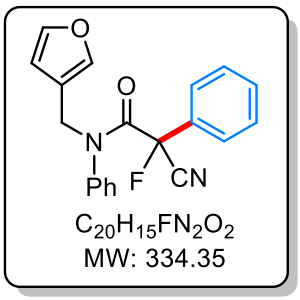
Compound 5o: 2-cyano-2-fluoro-*N*,2-diphenyl-*N*-(thiophen-2-ylmethyl)acetamide



$C_{20}H_{15}FN_2OS$
MW: 350.41

Following the general procedure, treatment of 2-cyano-2-fluoro-*N*-phenyl-*N*-(thiophen-2-ylmethyl)acetamide **4i** (55 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5o** (50 mg, 72%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.30. **Mp** 99-101 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.0 (d, J_{C-F} = 19.3 Hz, C), 138.2 (C), 137.4 (C), 132.9 (d, J_{C-F} = 18.1 Hz, C), 130.6 (CH), 129.7 (CH), 129.7 (CH), 129.1 (CH), 129.0 (CH), 129.0 (CH), 129.0 (CH), 129.0 (CH), 128.5 (CH), 126.6 (d, J_{C-F} = 6.5 Hz, CH), 126.6 (d, J_{C-F} = 6.5 Hz, CH), 125.3 (d, J_{C-F} = 4.4 Hz, CH), 125.3 (d, J_{C-F} = 4.4 Hz, CH), 114.8 (d, J_{C-F} = 27.9 Hz, C), 89.7 (d, J_{C-F} = 158.6 Hz, C), 50.9 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.35 (t, *J* = 7.2 Hz, 1H), 7.26 (t, *J* = 7.6 Hz, 2H), 7.22-7.18 (m, 4H), 7.08 (t, *J* = 7.6 Hz, 2H), 6.83-6.81 (m, 1H), 6.71 (d, *J* = 3.6 Hz, 1H), 6.54 (d, *J* = 8.0 Hz, 2H), 4.96 (s, 2H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -137.0 (s). **HRMS** for $C_{20}H_{16}FN_2OS^+$: calcd. $[M+H]^+$: 351.0962, found: 351.0959.

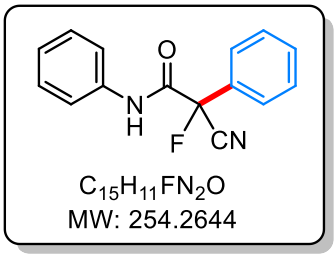
Compound 5p: 2-cyano-2-fluoro-*N*-(furan-3-ylmethyl)-*N*,2-diphenylacetamide



$C_{20}H_{15}FN_2O_2$
MW: 334.35

Following the general procedure, treatment of 2-cyano-2-fluoro-*N*-(furan-3-ylmethyl)-*N*-phenylacetamide **4j** (53 mg, 0.20 mmol) with mesityl(phenyl)iodonium 4-methylbenzenesulfonate **2a** (109 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5p** (51 mg, 76%) as yellow oil. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.25. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 162.0 (d, J_{C-F} = 24.0 Hz, C), 143.4 (CH), 141.8 (CH), 138.3 (C), 132.9 (d, J_{C-F} = 22.8 Hz, C), 130.6 (CH), 129.6 (CH), 129.6 (CH), 129.0 (CH), 129.0 (CH), 128.9 (CH), 128.9 (CH), 128.9 (CH), 125.2 (d, J_{C-F} = 5.5 Hz, CH), 125.2 (d, J_{C-F} = 5.5 Hz, CH), 119.6 (C), 114.9 (d, J_{C-F} = 34.9 Hz, C), 111.0 (CH), 89.8 (d, J_{C-F} = 197.4 Hz, C), 47.2 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.37 (t, *J* = 7.2 Hz, 1H), 7.32-7.17 (m, 7H), 7.10 (t, *J* = 8.0 Hz, 2H), 6.58 (d, *J* = 8.0 Hz, 2H), 6.30 (s, 1H), 4.65 (s, 2H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -137.1 (s). **HRMS** for $C_{20}H_{16}FN_2O_2^+$: calcd. $[M+H]^+$: 335.1190, found: 335.1195.

Compound 5q: 2-cyano-2-fluoro-*N*,2-diphenylacetamide



$C_{15}H_{11}FN_2O$
MW: 254.2644

Following the general procedure, treatment of 2-cyano-2-fluoro-*N*-phenylacetamide **4k** (36 mg, 0.20 mmol) with **2a** (109 mg, 0.22 mmol) in the presence of *t*-BuOK (27 mg, 0.24 mmol) in THF (2 mL) at 25 °C for 30 min followed by column chromatography afforded the product **5q** (15 mg, 30%) as white solid. **R_f** (Ethyl acetate/Hexane: 10/90) = 0.30. **Mp** 124-126 °C. **^{13}C NMR** (100

MHz, δ ppm/$CDCl_3$): 160.6 (d, J_{C-F} = 22.2 Hz, C), 135.8 (C), 132.0 (d, J_{C-F} = 22.2 Hz, C), 131.4 (CH), 129.5 (CH), 129.5 (CH), 129.5 (CH), 129.5 (CH), 126.2 (CH), 125.8 (d, J_{C-F} = 5.7 Hz, CH), 125.8 (d, J_{C-F} = 5.7 Hz, CH), 120.4 (CH), 120.4 (CH), 114.4 (d, J_{C-F} = 33.4 Hz, C), 89.6 (d, J_{C-F} = 200.0 Hz, C). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.10 (s, 1H), 7.71-7.68 (m, 2H), 7.57 (d, *J* = 7.6 Hz, 2H), 7.53-7.48 (m, 3H), 7.38 (d, *J* = 7.6 Hz, 2H), 7.22 (t, *J* = 7.6 Hz, 1H). **^{19}F NMR** (376 MHz δ ppm/$CDCl_3$): -142.8 (s). **HRMS** for $C_{15}H_{12}FN_2O^+$: calcd. $[M+H]^+$: 255.0928, found: 255.0925.

X-Ray Data Collection and Structure Refinement Details for compound 3am:

A good quality colorless single crystal of size 0.38 x 0.21 x 0.10 mm, was selected under a polarizing microscope and was mounted on a glass fiber for data collection. Single crystal X-ray data for compound **3am** were collected on the Rigaku Kappa 3 circle diffractometer equipped with the AFC12 goniometer and enhanced sensitivity (HG) Saturn724+ CCD detector in the 4x4 bin mode using the monochromated Mo-Kα radiation generated from the microfocus sealed tube MicroMax-003 X-ray generator equipped with specially designed confocal multilayer optics. Data collection was performed using ω-scans of 0.5° steps at 293(2) K. Cell determination, data collection and data reduction was performed using the Rigaku CrystalClear-SM Expert 2.1 b24 software.[1] Asymmetric unit contains four molecules of compound **3am** along with two water molecules. Structure solution and refinement were performed by using SHELXTL-NT.[2] Refinement of coordinates and anisotropic thermal parameters of non-hydrogen atoms were carried out by the full-matrix least-squares method. The hydrogen atoms attached to carbon atoms were generated with idealized geometries and isotropically refined using a riding model.

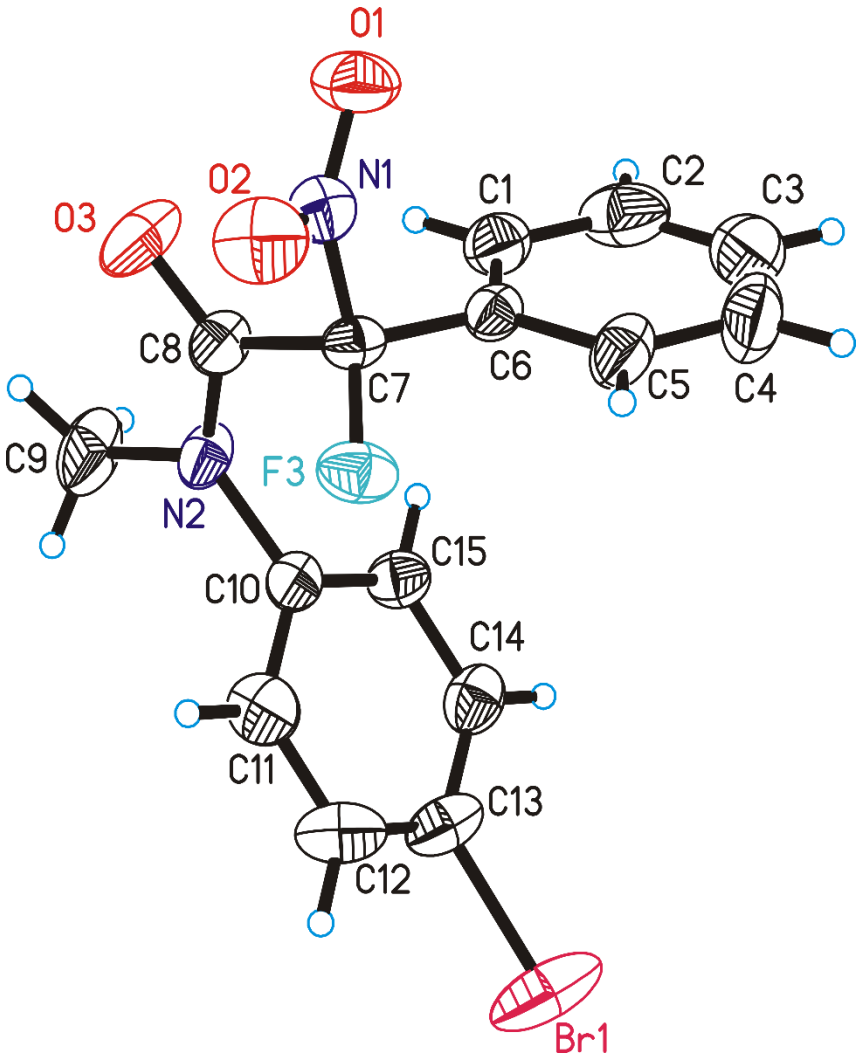
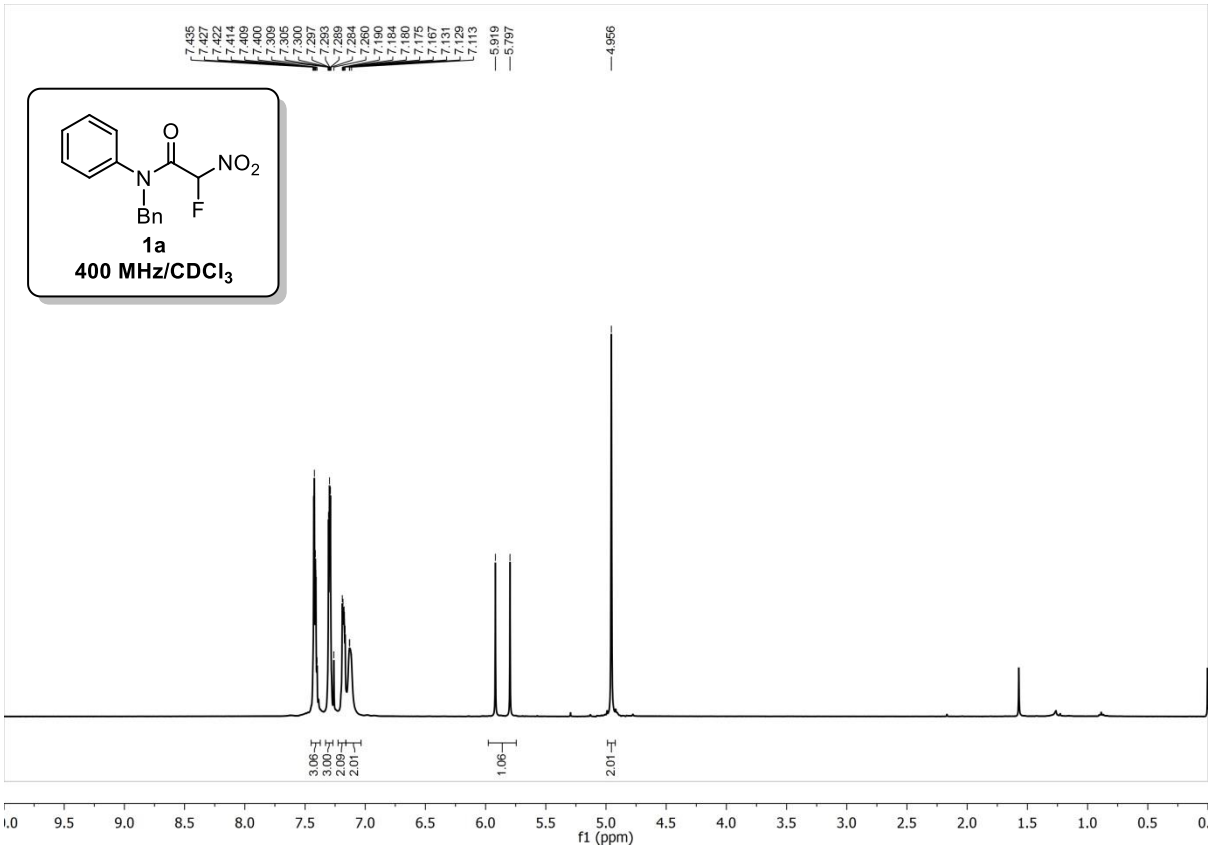


Figure S1. ORTEP diagram drawn with 30% ellipsoid probability for non-H atoms of the crystal structure of compound **3am** determined at 293 K.

Table S1 Crystal data and structure refinement details for **3am**.

Compound	**3am**
Empirical formula	$C_{15}\,H_{12}\,Br\,F\,N_2\,O_3$
Formula weight	367.18
Crystal System	Monoclinic
Space group	$P\,2_1/c$
a (Å)	15.548(5)
b (Å)	24.427(7)
c (Å)	8.266(2)
α (°)	90.00
β (°)	91.708(5)
γ (°)	90.00
V (Å^3)	3138.0(16)
Z	8
D_c (g/cm^3)	1.554
F_{000}	1472
μ (mm^{-1})	2.643
θ_{max} (°)	25.36
Total reflections	20516
Unique reflections	5599
Reflections [$I > 2\sigma(I)$]	2836
Parameters	399
R_{int}	0.0655
Goodness-of-fit	1.004
R [$F^2 > 2\sigma(F^2)$]	0.0562
wR (F^2, all data)	0.1405
CCDC No.	1940141

1. CrystalClear 2.1, Rigaku Corporation, Tokyo, Japan
2. Sheldrick, G. M. *Acta Crystallogr., Sect. A* **2008**, *64*, 112–122.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7.409
7.400
7.309
7.305
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7.293
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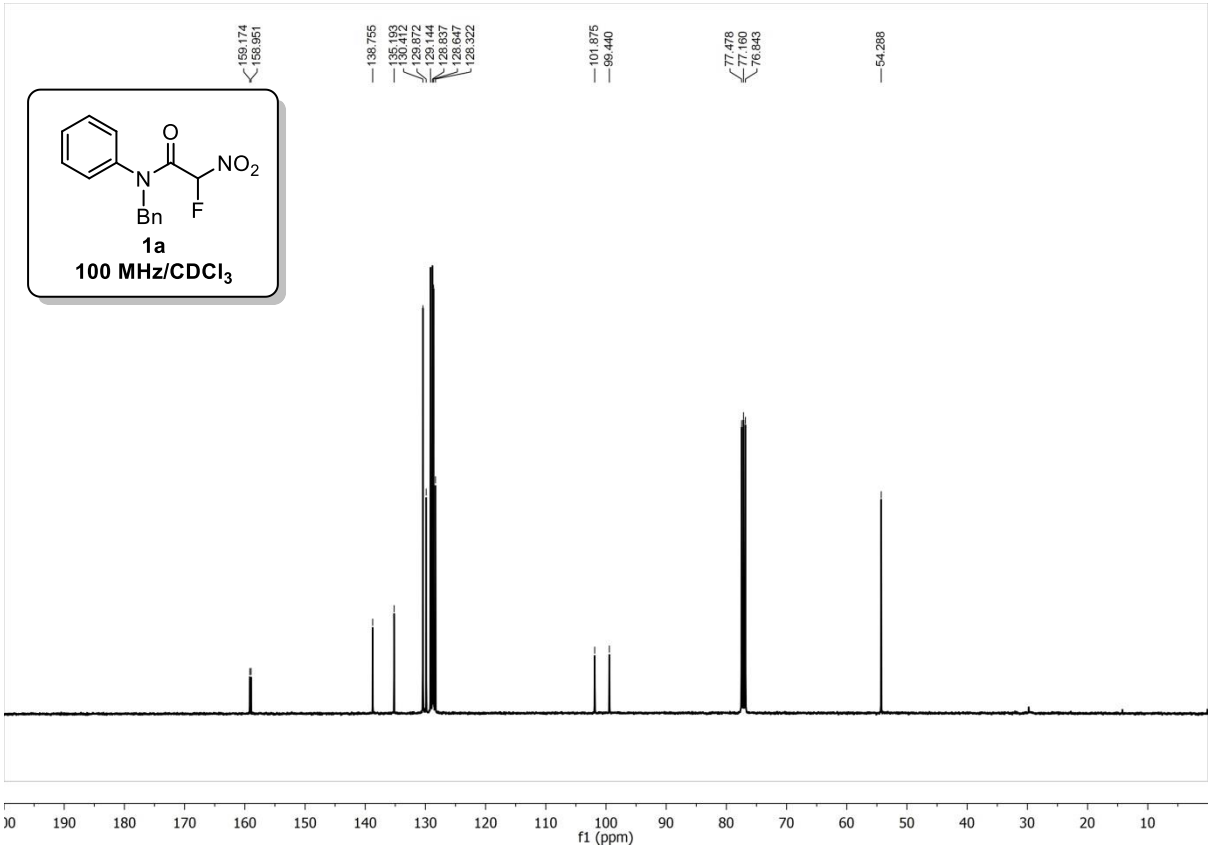
7.260
7.190
7.184
7.180
7.175
7.167
7.131
7.129
7.113
5.919
5.797
4.956
O
N
NO2
Bn
F
1a
400 MHz/CDCl3
3.06
3.00
2.09
2.01
1.06
2.01
f1 (ppm)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77.160
76.843
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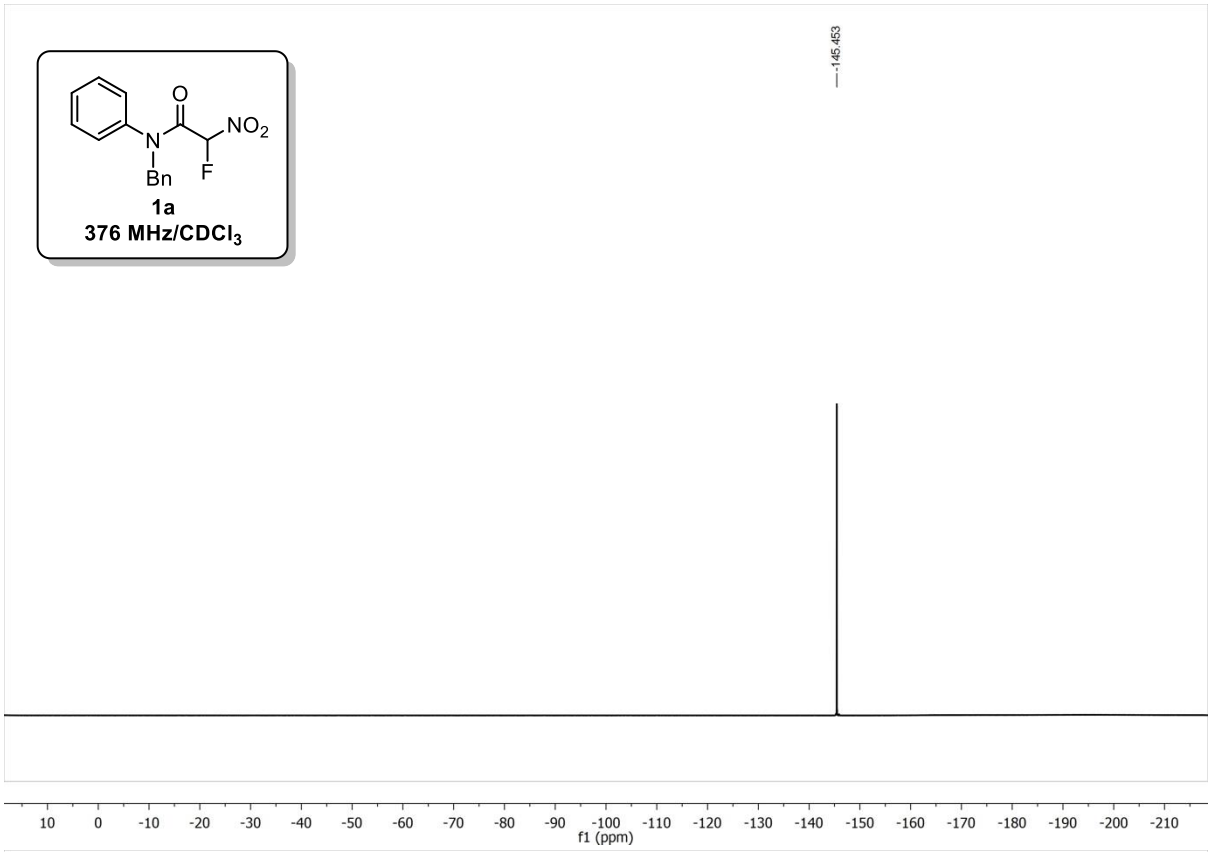
NO2
Bn
F
1a
100 MHz/CDCl3
f1 (ppm)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NO2
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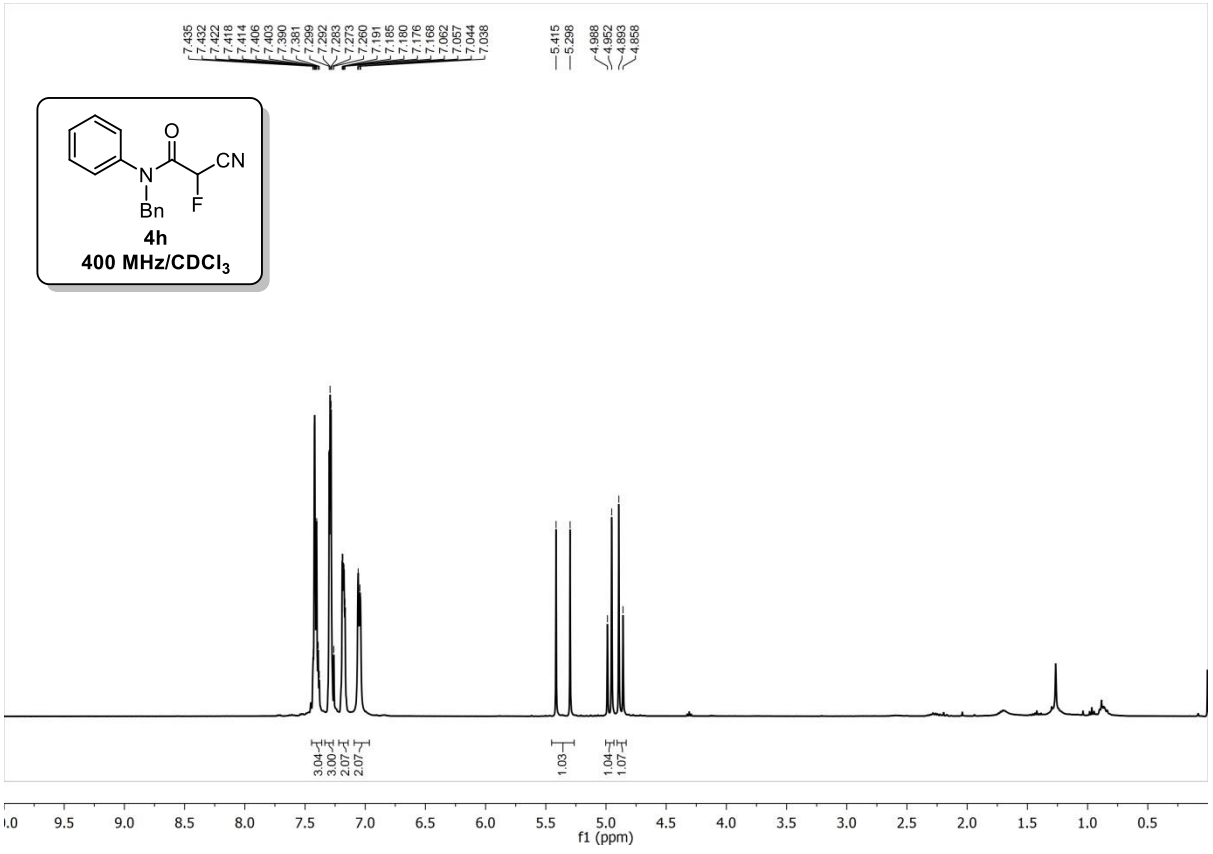
f1 (ppm)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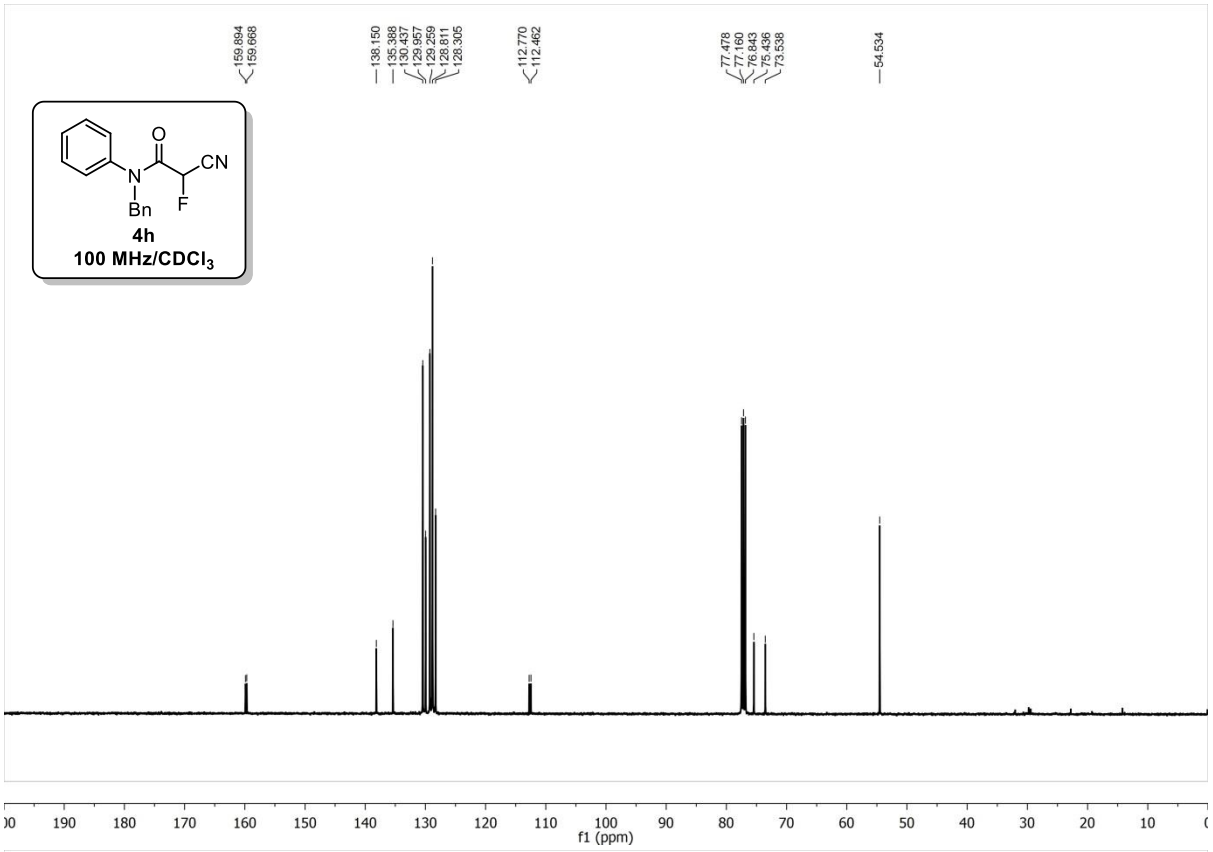
7.260
7.191
7.185
7.180
7.176
7.168
7.062
7.057
7.044
7.038
5.415
5.298
4.988
4.952
4.893
4.858
O
CN
N
Bn
F
4h
400 MHz/CDCl3
3.04
3.00
2.07
2.07
1.03
1.04
1.07
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)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73.538
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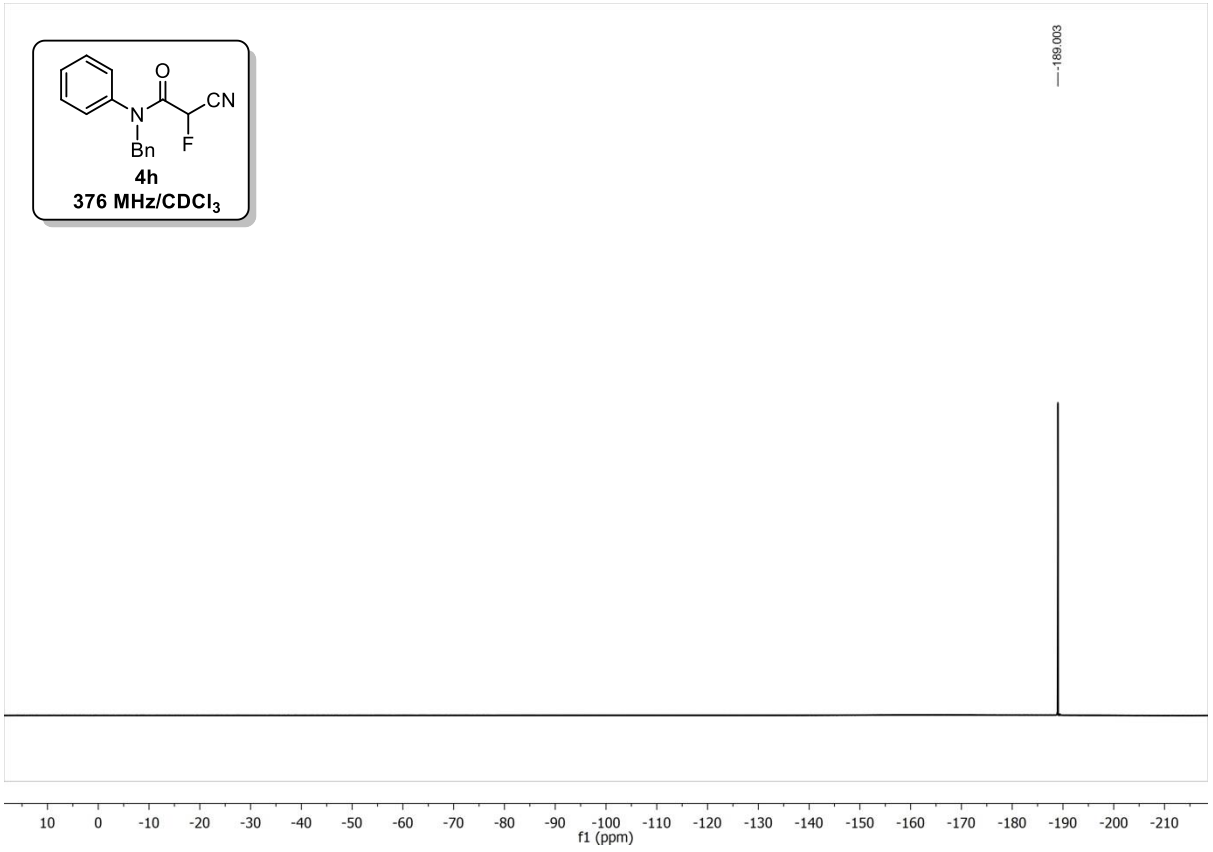
N
F
Bn
4h
100 MHz/CDCl3
f1 (ppm)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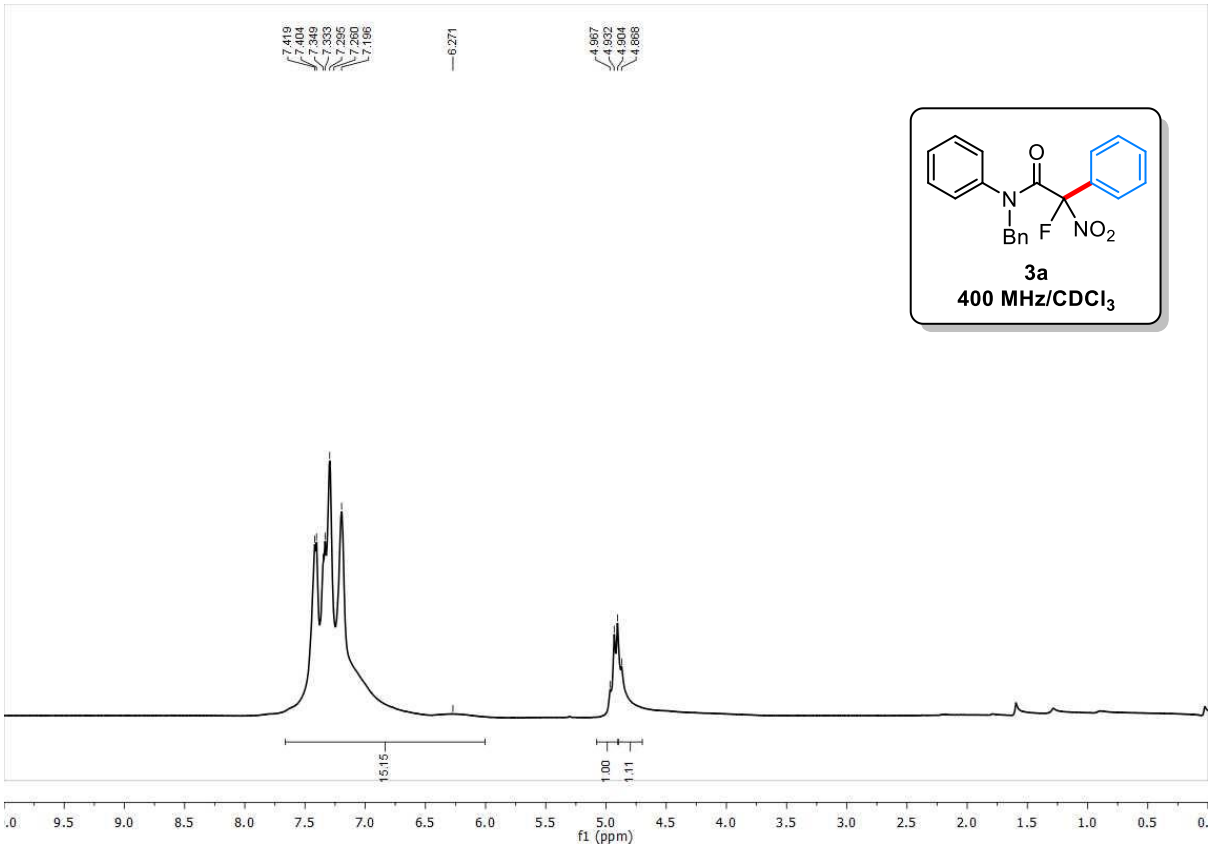
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Bn
F
NO2
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400 MHz/CDCl3
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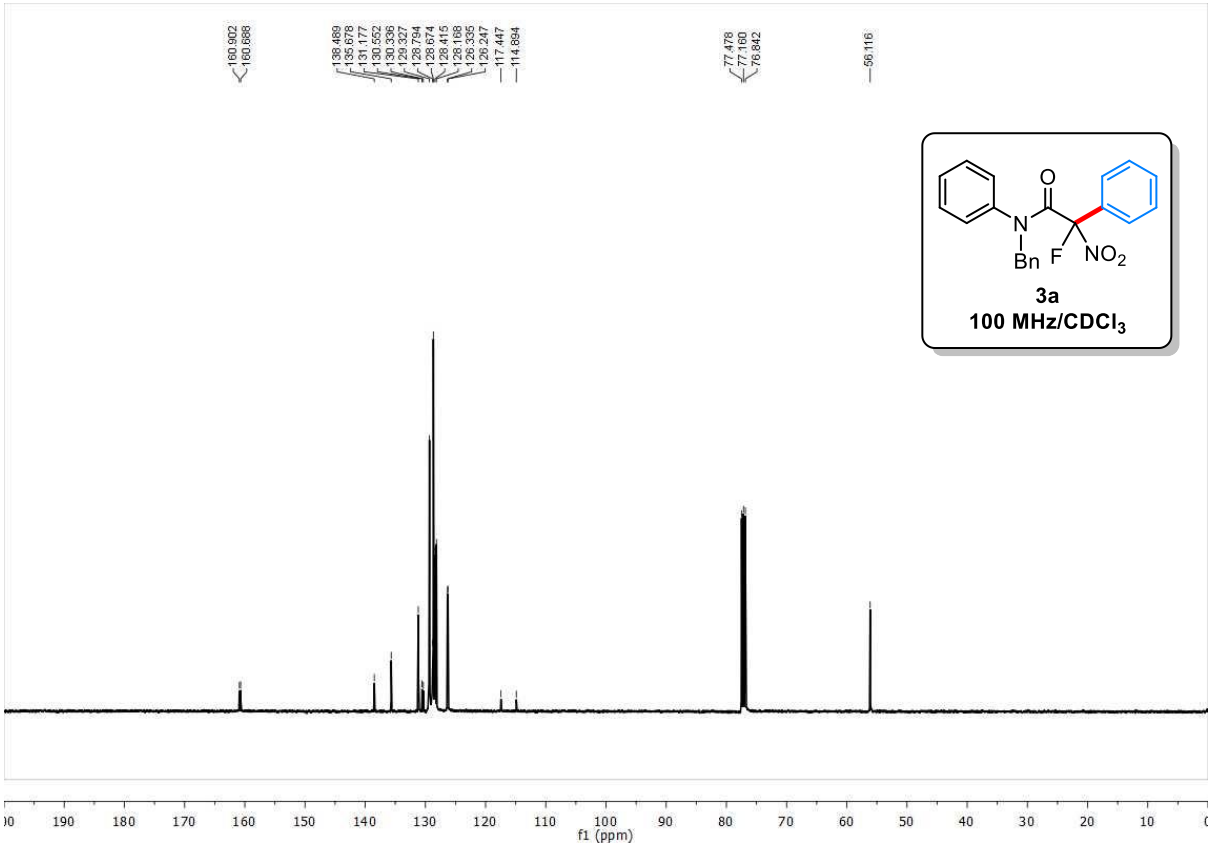
1.11
f1 (ppm)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128.415
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126.335
126.247
117.447
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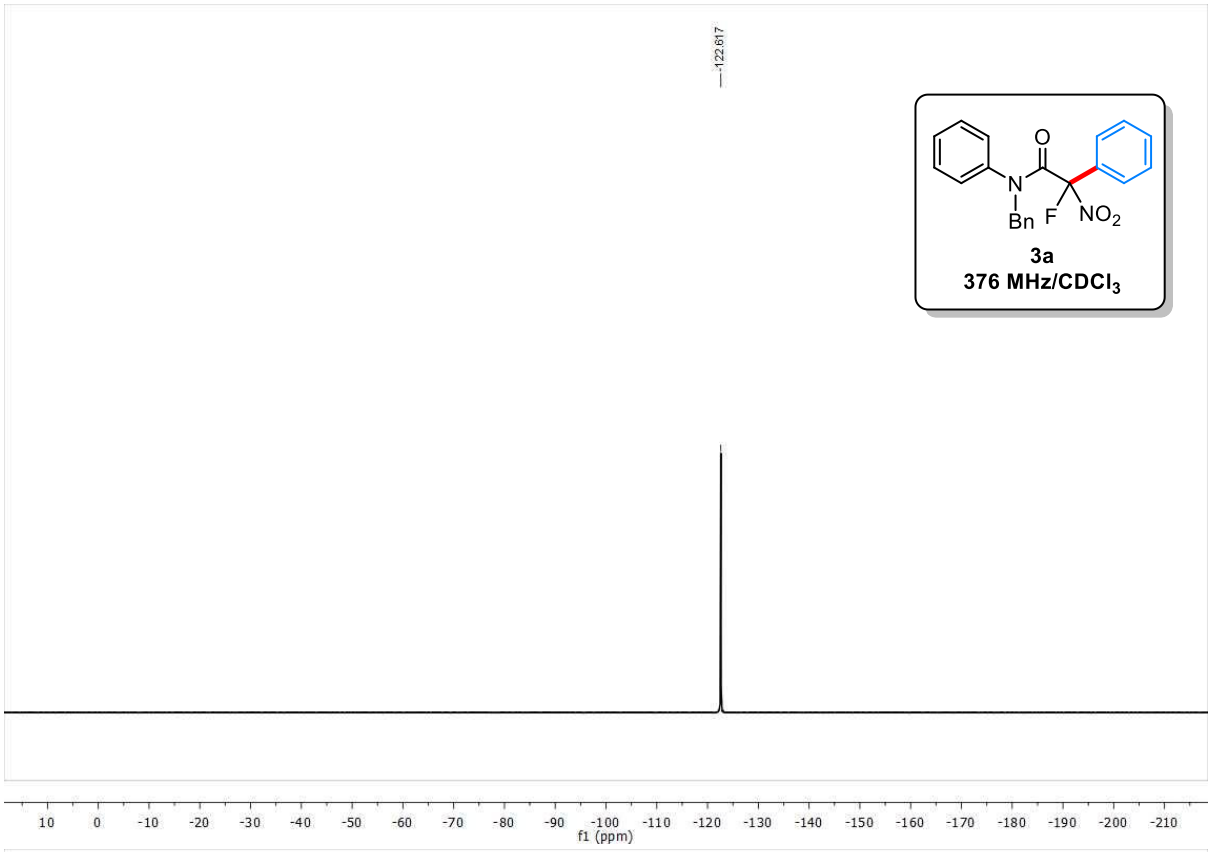
Bn
F
NO2
3a
100 MHz/CDCl3
f1 (ppm)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F
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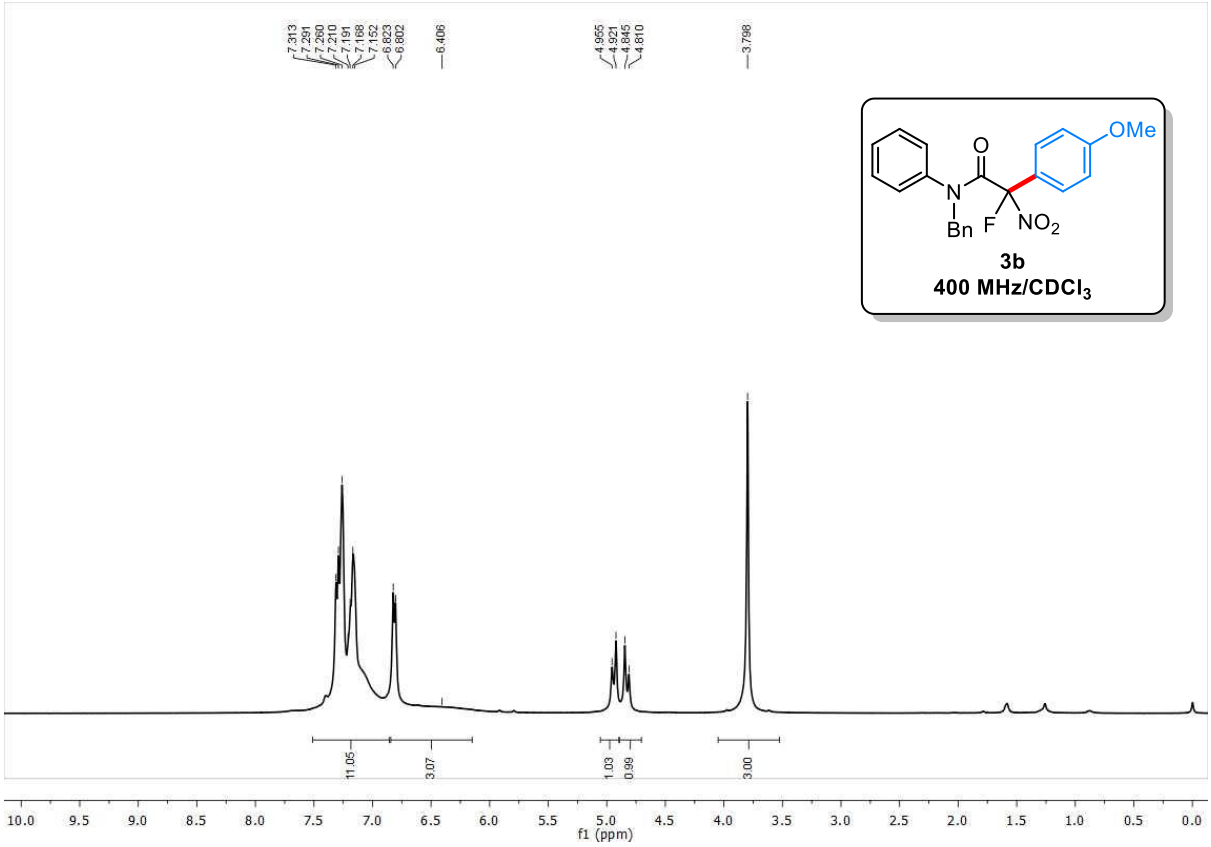
f1 (ppm)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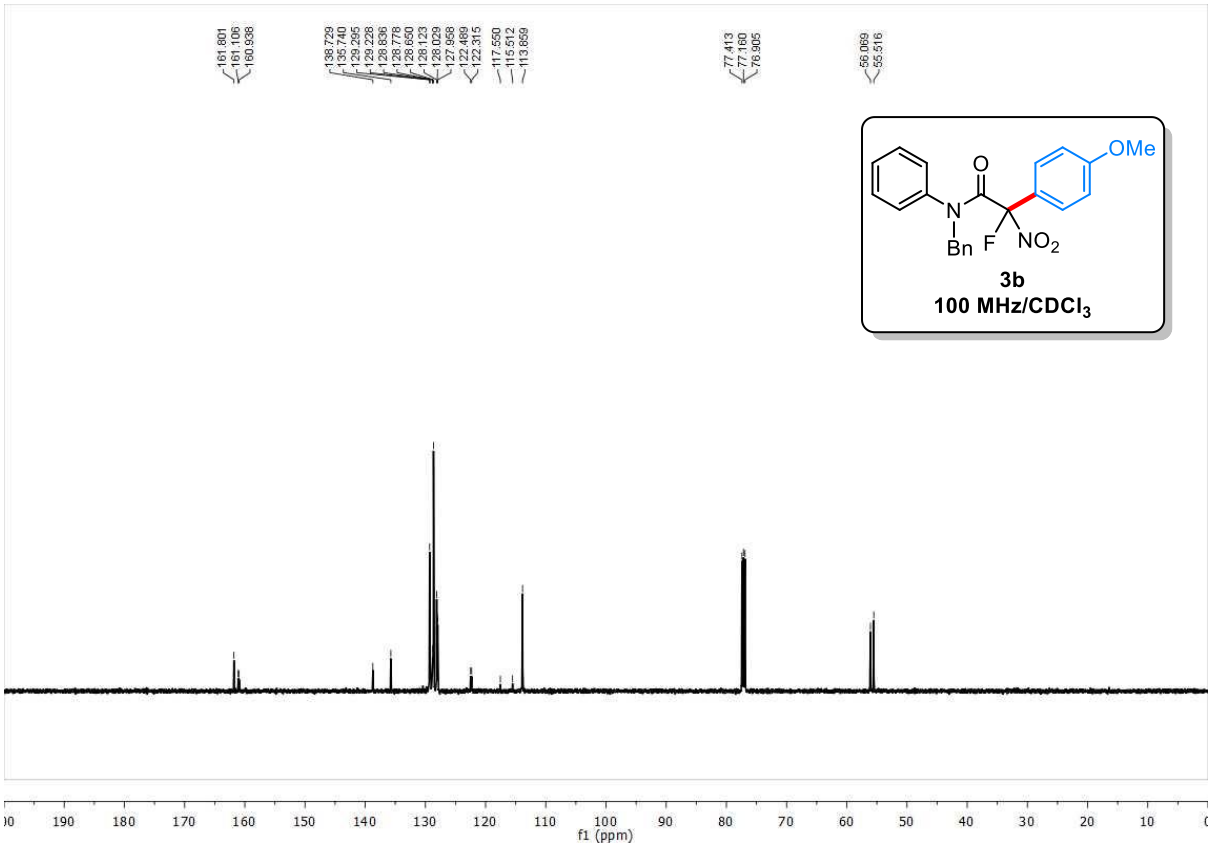
4.810
3.798
OMe
O
N
Bn
F
NO2
3b
400 MHz/CDCl3
11.05
3.07
1.03
0.99
3.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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122.489
122.315
117.550
115.512
113.859
77.413
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F
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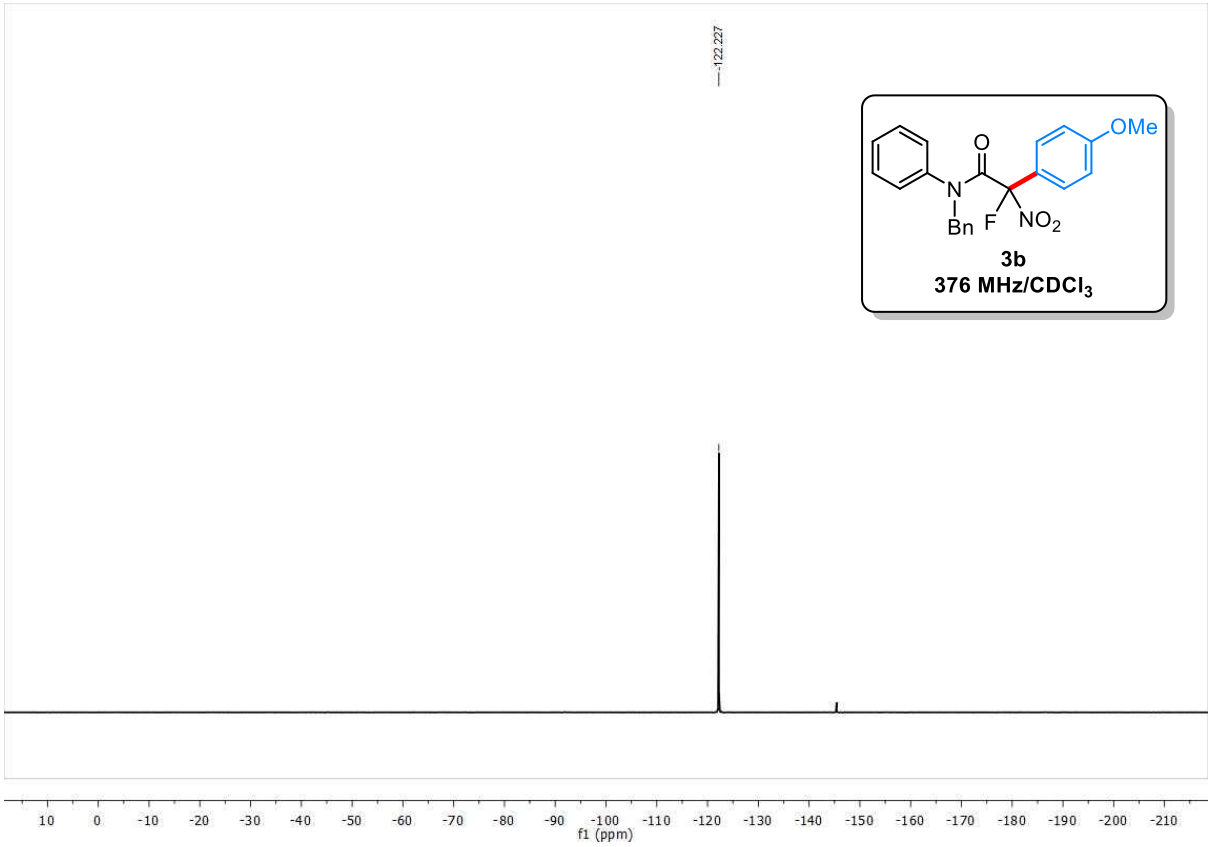
f1 (ppm)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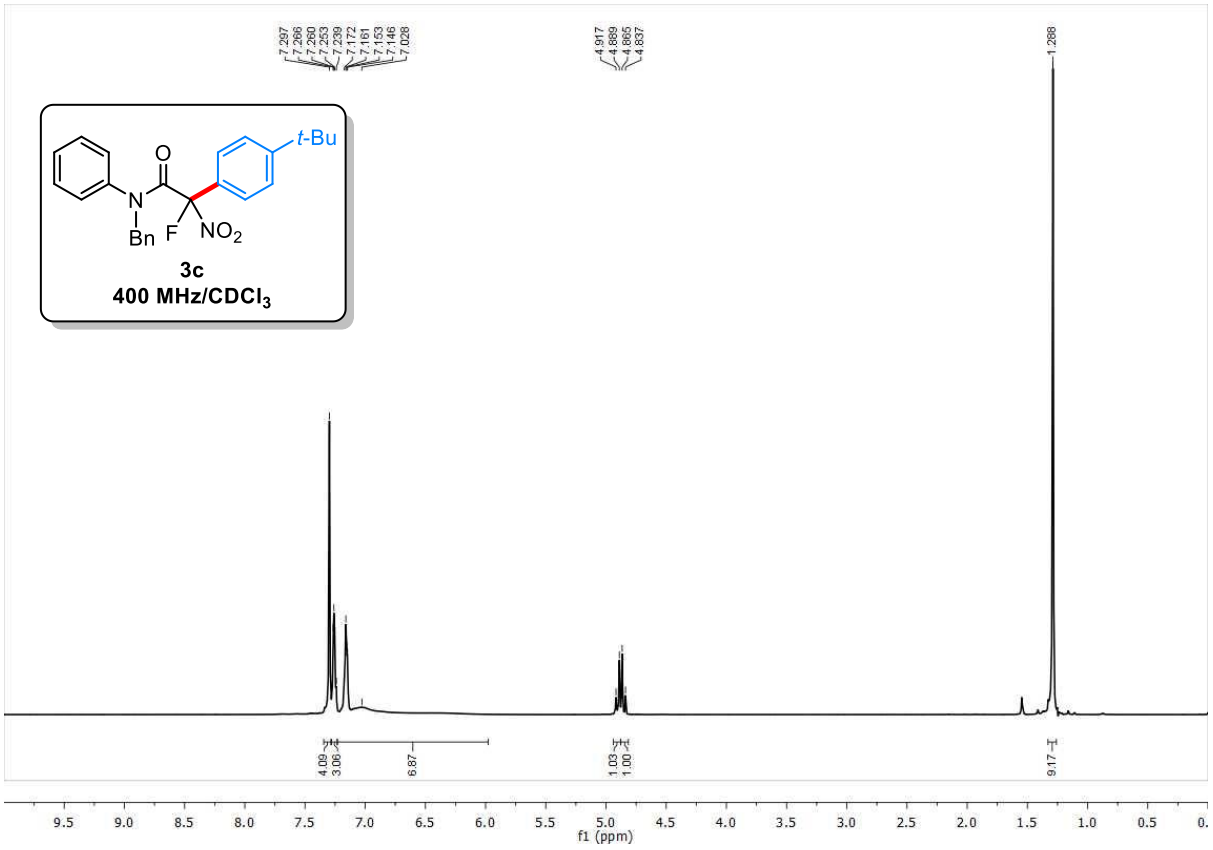
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1.288
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O
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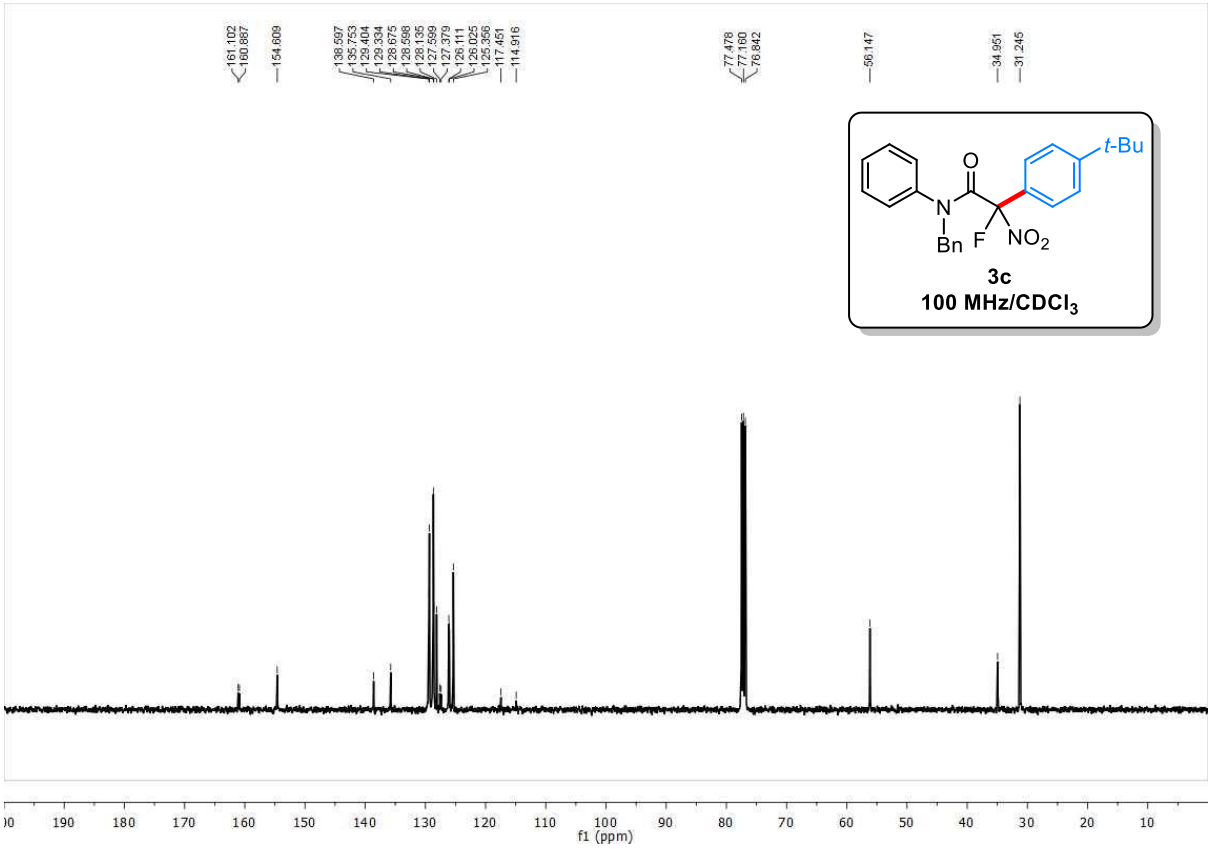
f1 (ppm)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114.916
77.478
77.160
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O
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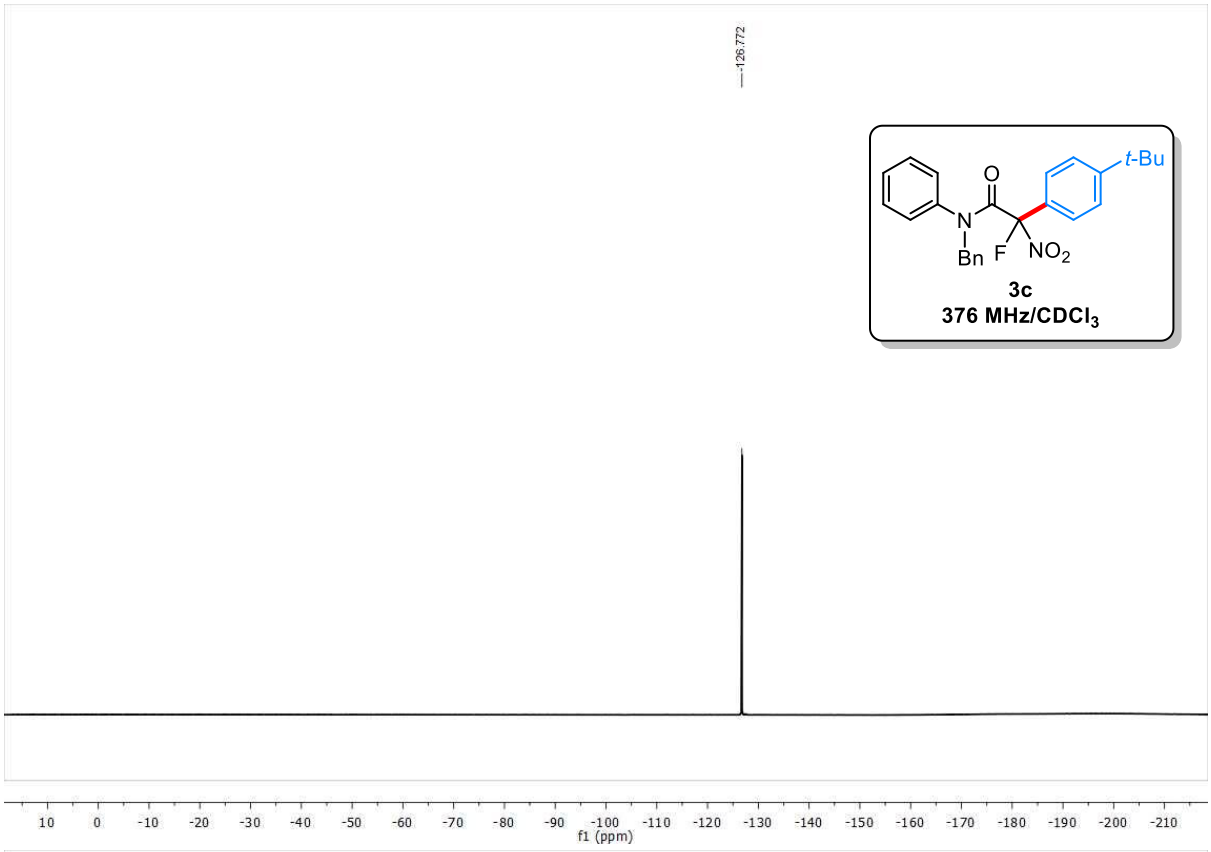
Bn
F
NO2
3c
100 MHz/CDCl3
f1 (ppm)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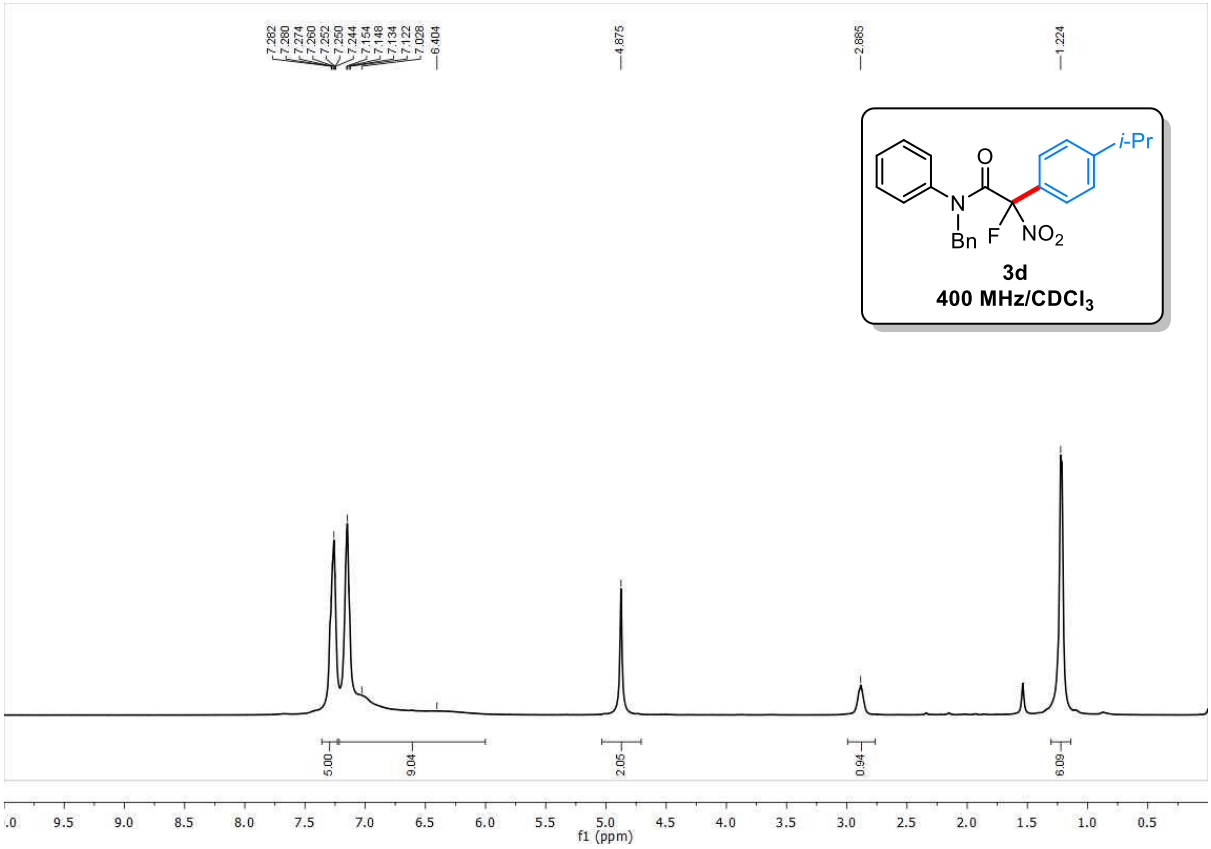
f1 (ppm)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N
Bn
F
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3d
400 MHz/CDCl3
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9.04
2.05
0.94
6.09
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
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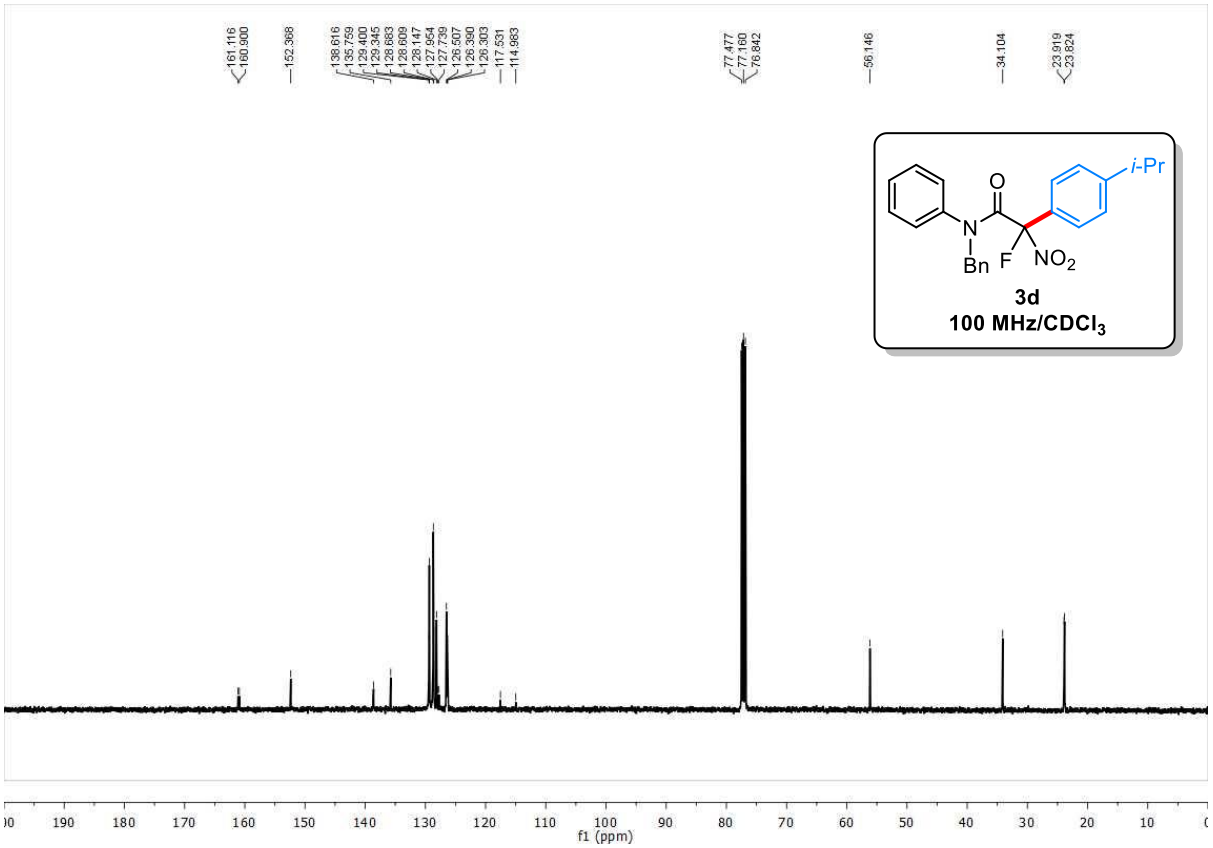
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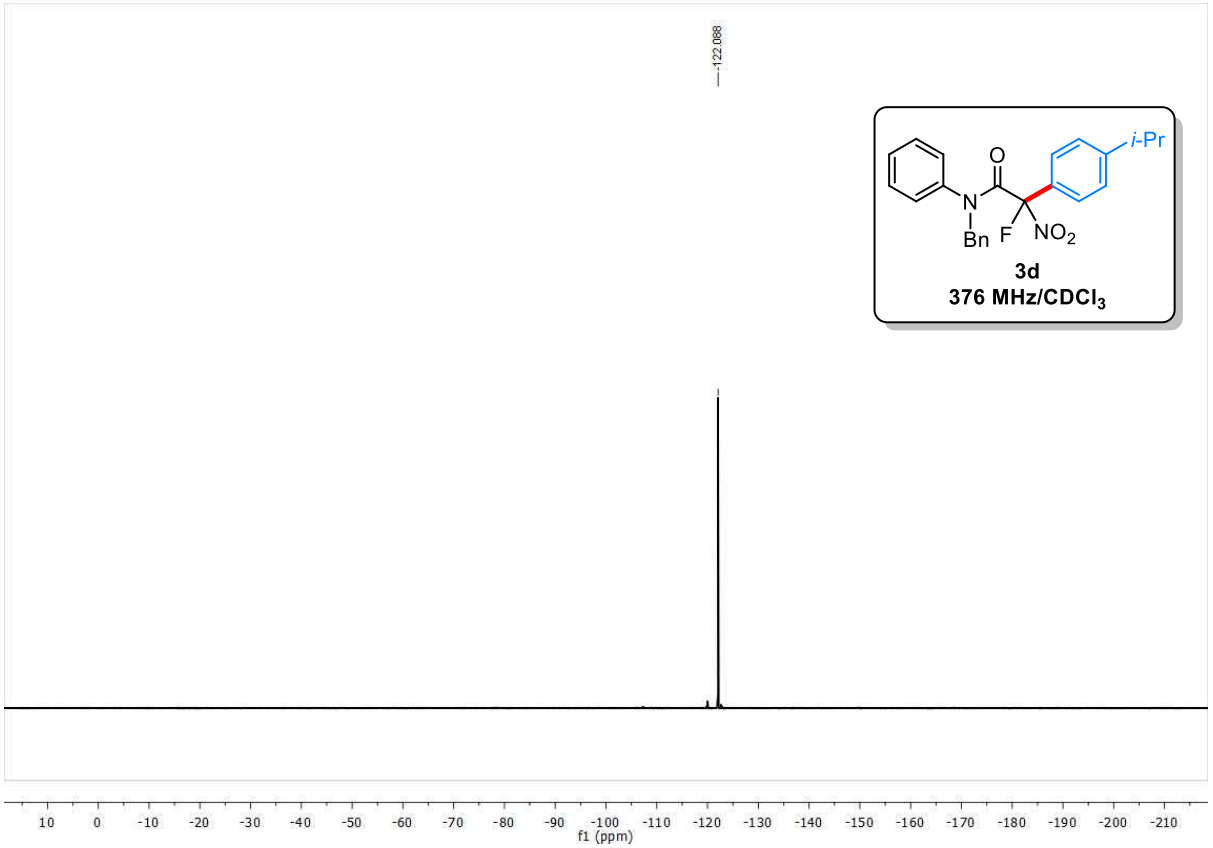
129.400
129.345
128.683
128.609
128.147
127.954
127.739
126.607
126.380
126.303
117.531
114.963
77.477
77.160
76.842
56.146
34.104
23.919
23.824
i-Pr
O
N
Bn
F
NO2
3d
100 MHz/CDCl3
f1 (ppm)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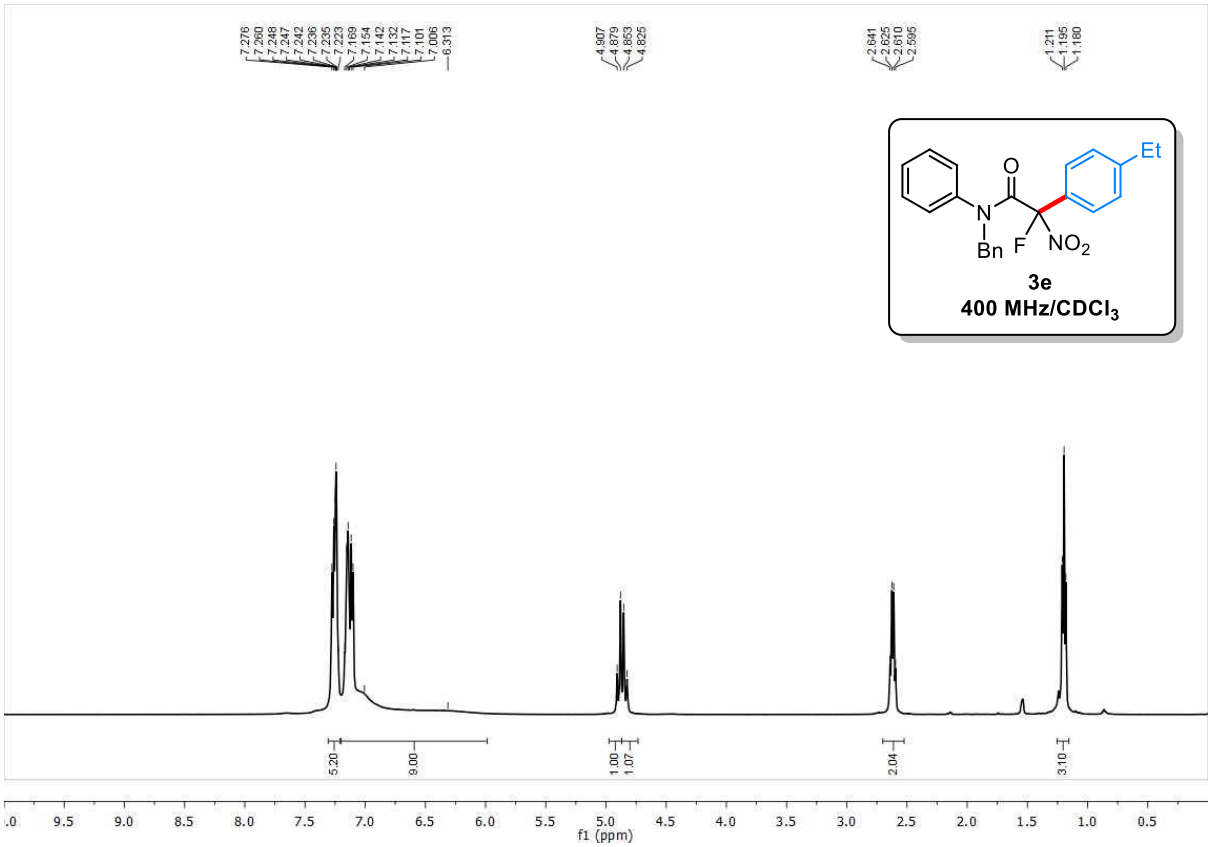
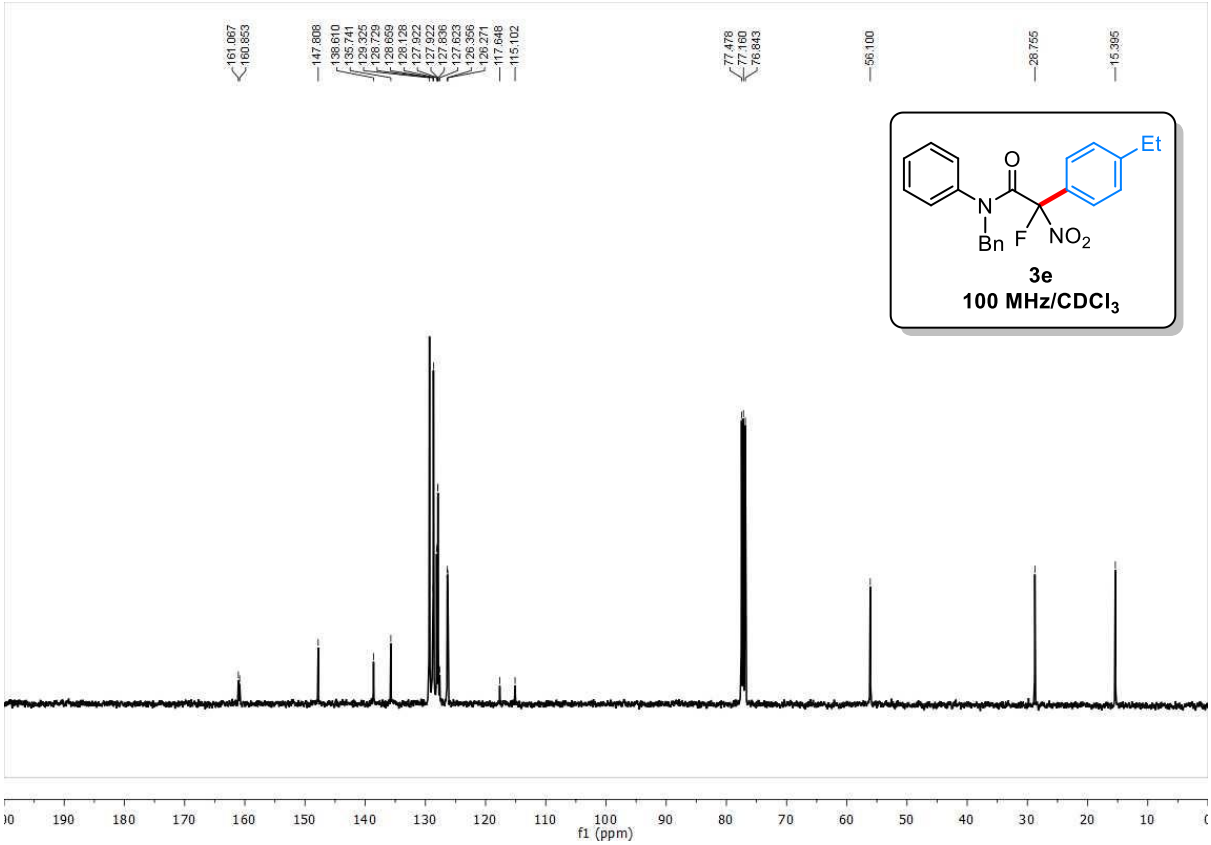
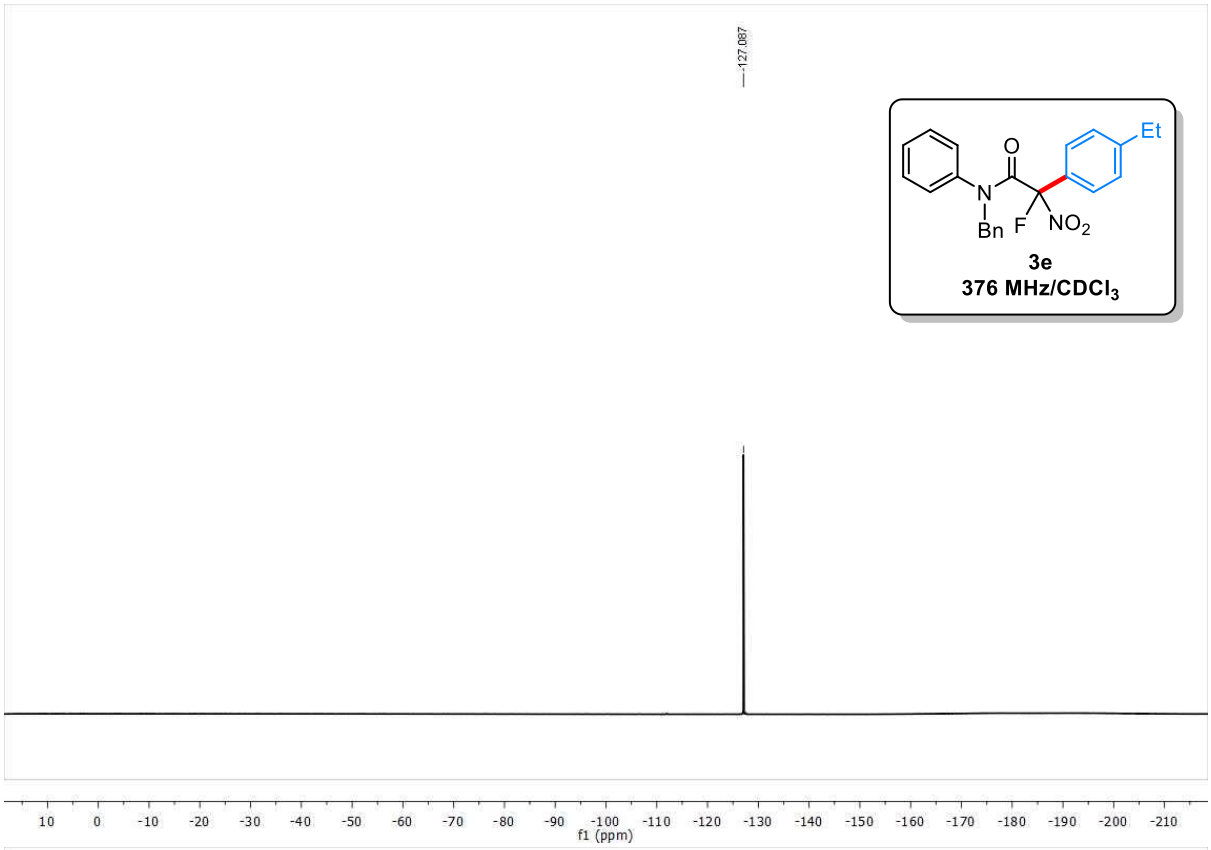
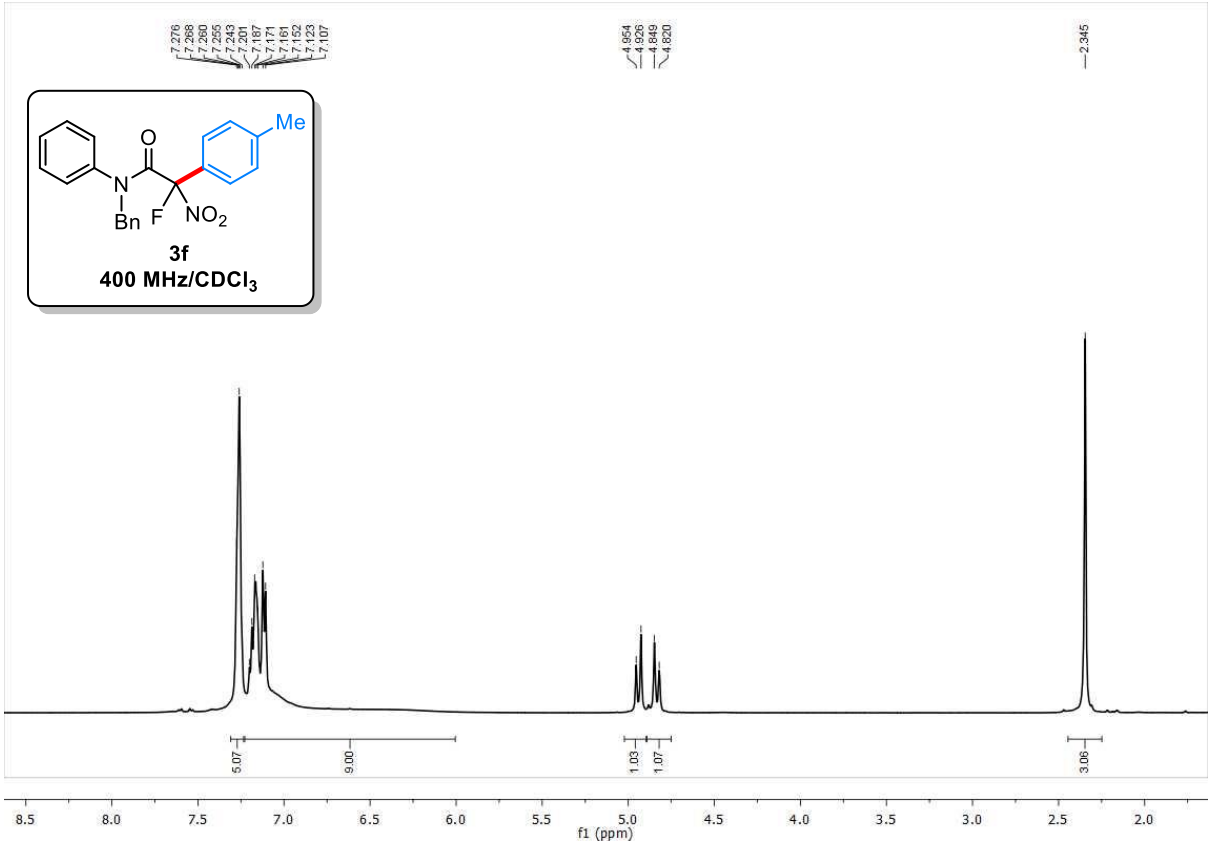
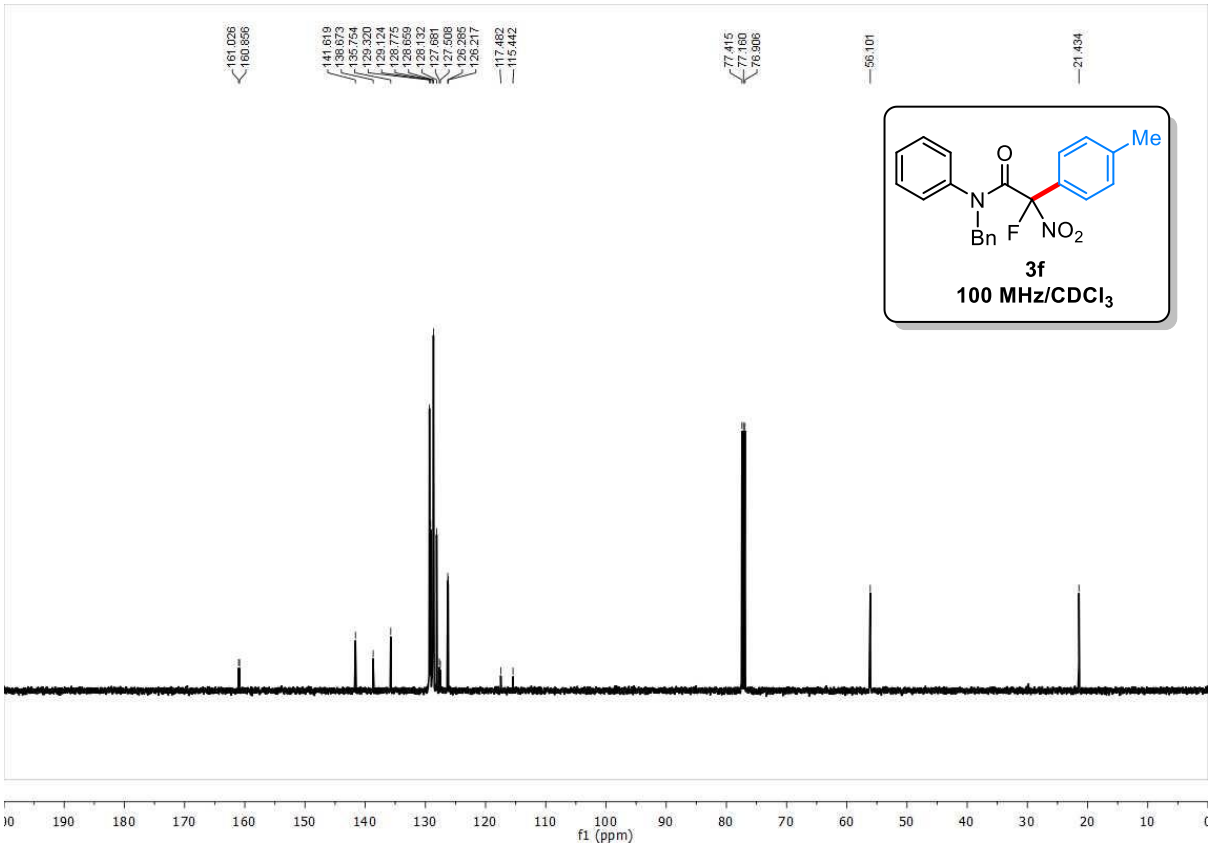
N
Bn
F
NO2
3d
376 MHz/CDCl3
f1 (ppm)


7.276
7.260
7.248
7.247
7.242
7.236
7.235
7.223
7.169
7.154
7.142
7.132
7.117
7.101
7.006
6.313
4.907
4.879
4.863
4.825
2.641
2.625
2.610
2.595
1.211
1.195
1.180
Et
O
N
Bn
F
NO2
3e
400 MHz/CDCl3
5.20
9.00
1.00
1.07
2.04
3.10
f1 (ppm)


161.067
160.853
147.808
136.610
135.741
129.325
128.729
128.659
128.128
127.922
127.922
127.836
127.623
126.396
120.271
117.648
115.102
77.478
77.160
76.843
56.100
28.755
15.395
Et
O
N
Bn
F
NO2
3e
100 MHz/CDCl3
f1 (ppm)


-127.087
Et
O
N
Bn
F
NO2
3e
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)


7.276
7.268
7.260
7.255
7.243
7.201
7.187
7.171
7.161
7.152
7.123
7.107
4.954
4.926
4.849
4.820
2.345
Me
O
N
Bn
F
NO2
3f
400 MHz/CDCl3
5.07
9.00
1.03
1.07
3.06
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)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160.856
141.619
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129.124
128.775
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128.132
127.681
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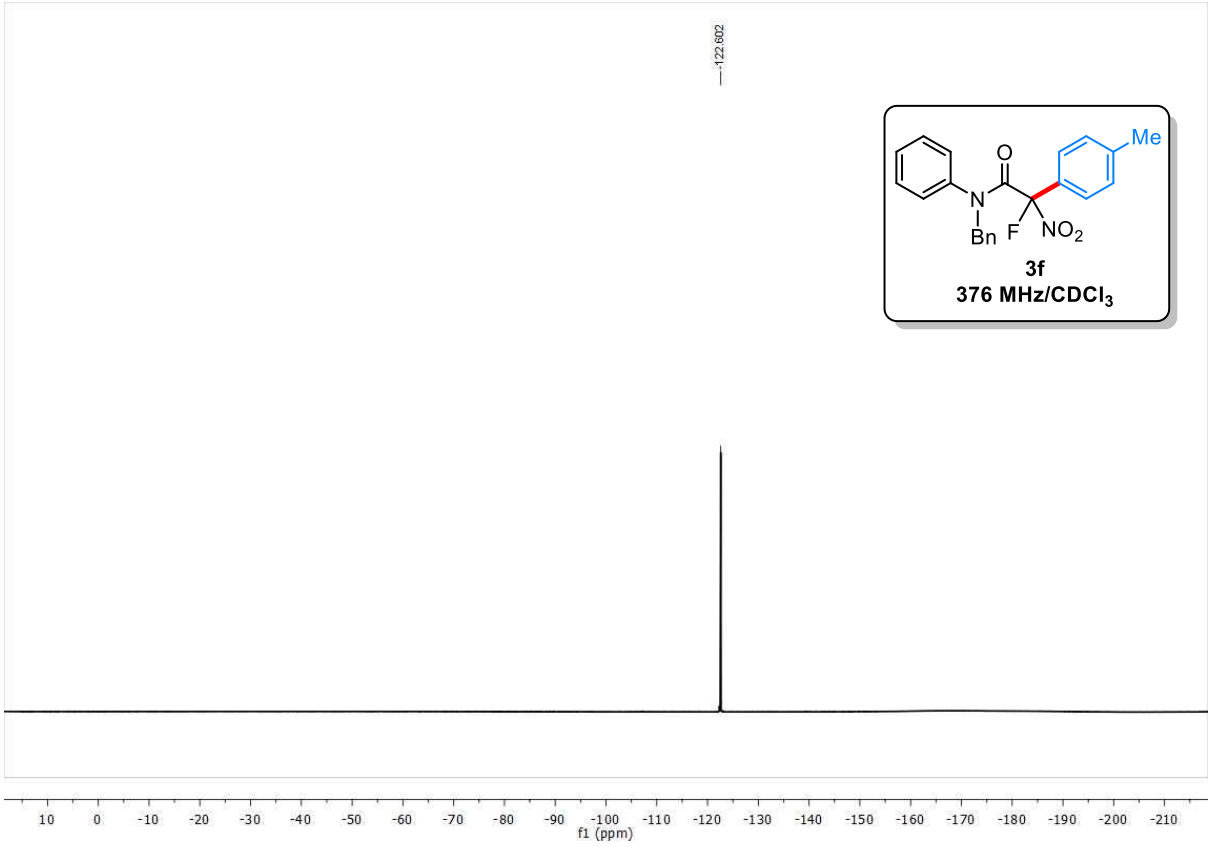
126.285
126.217
117.462
115.442
77.415
77.160
76.906
56.101
21.434
Me
O
N
Bn
F
NO2
3f
100 MHz/CDCl3
f1 (ppm)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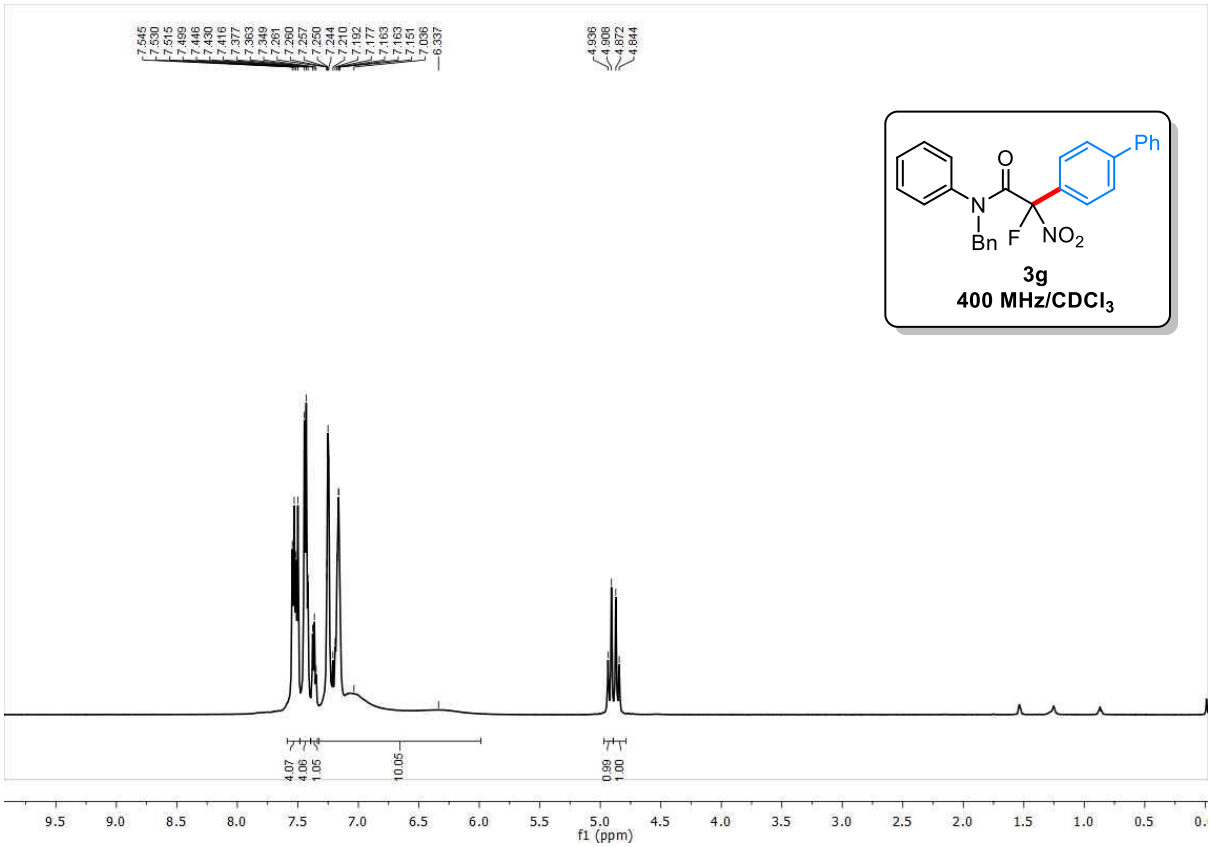
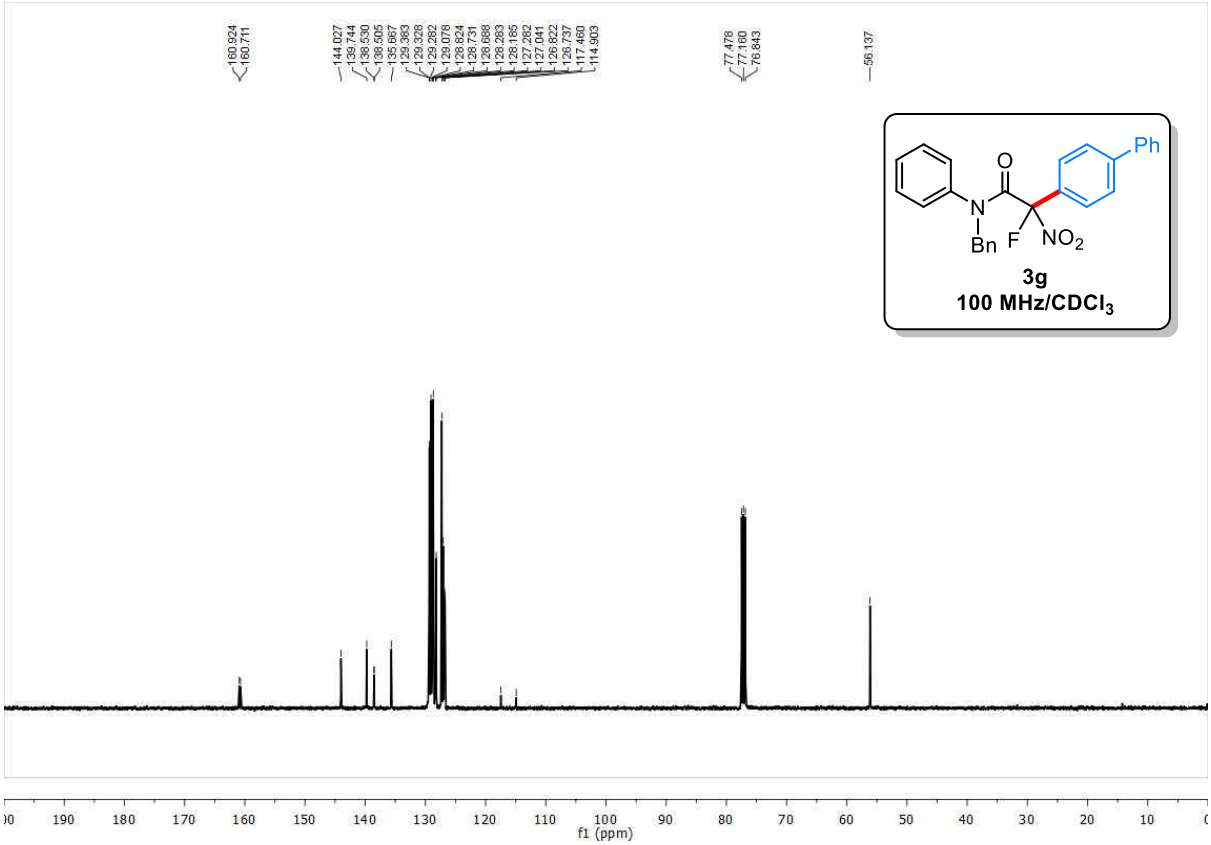
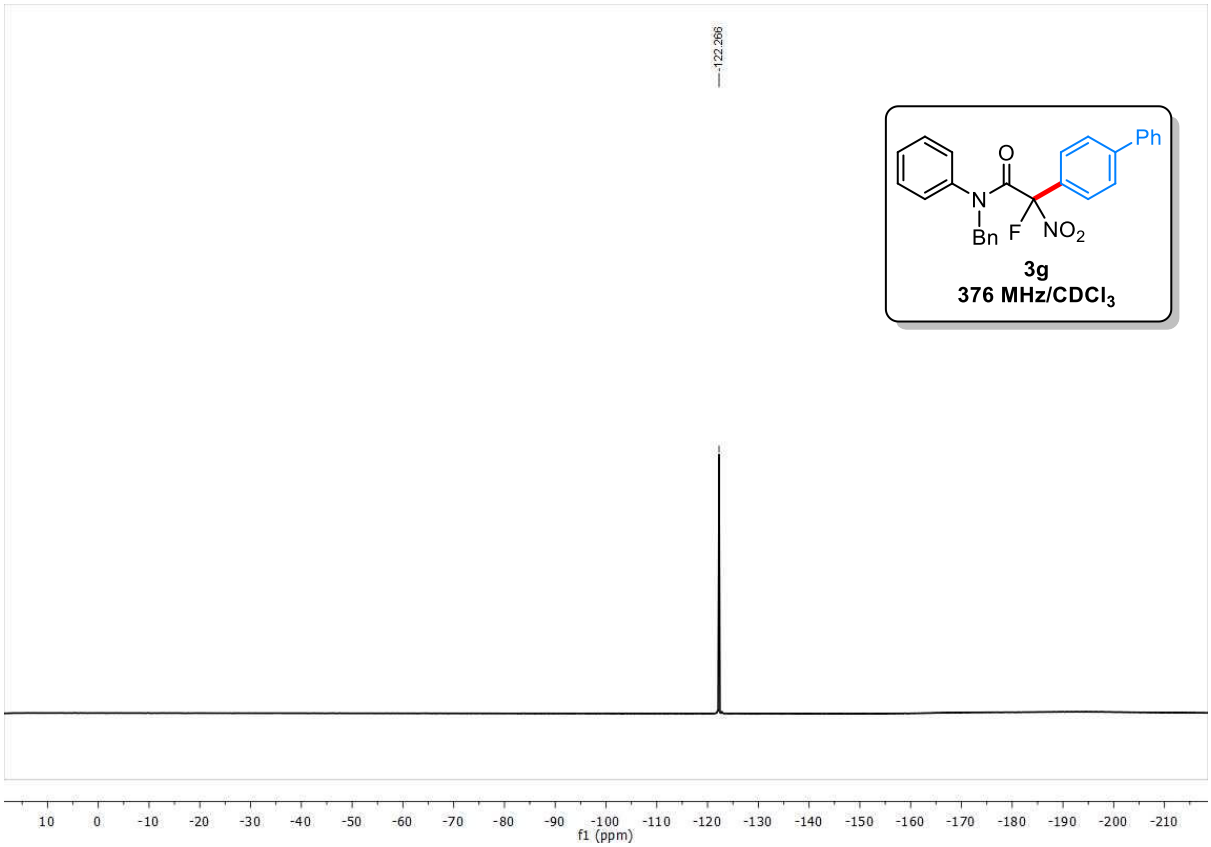
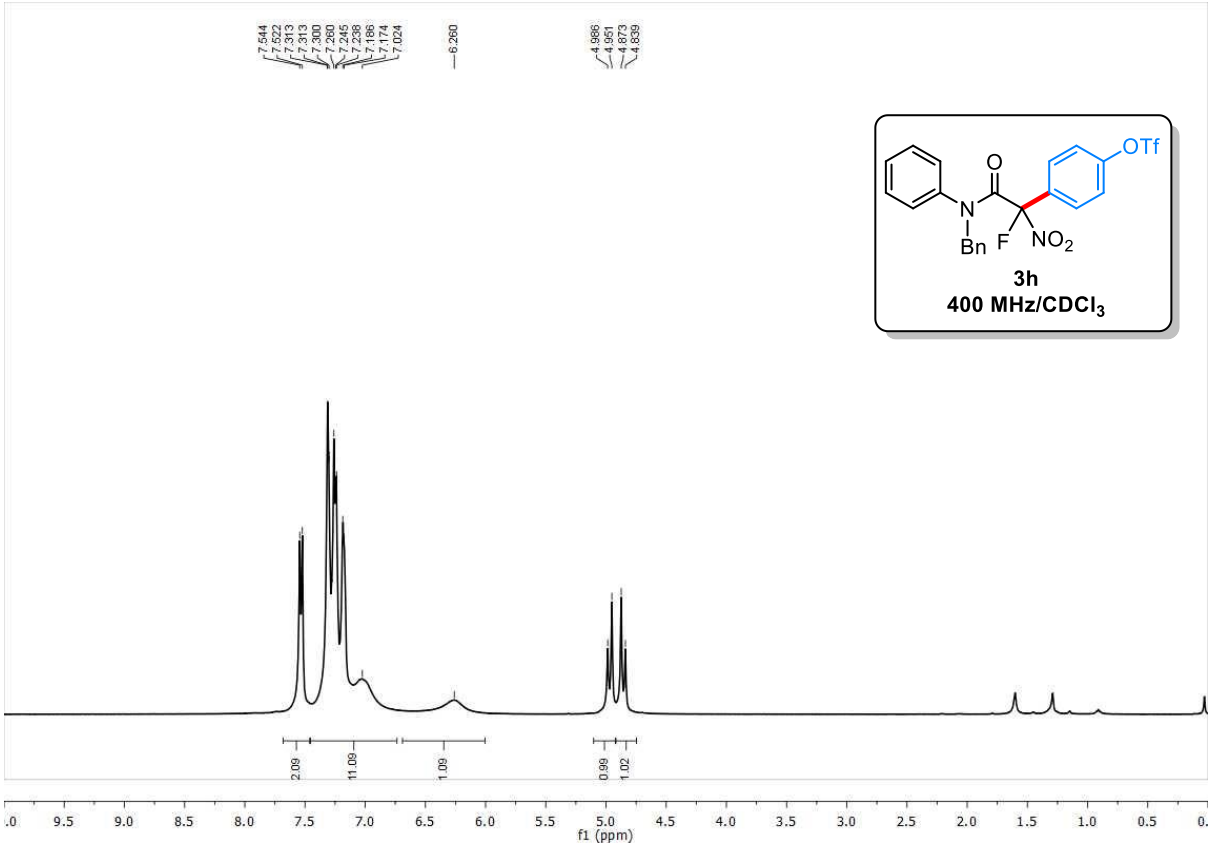
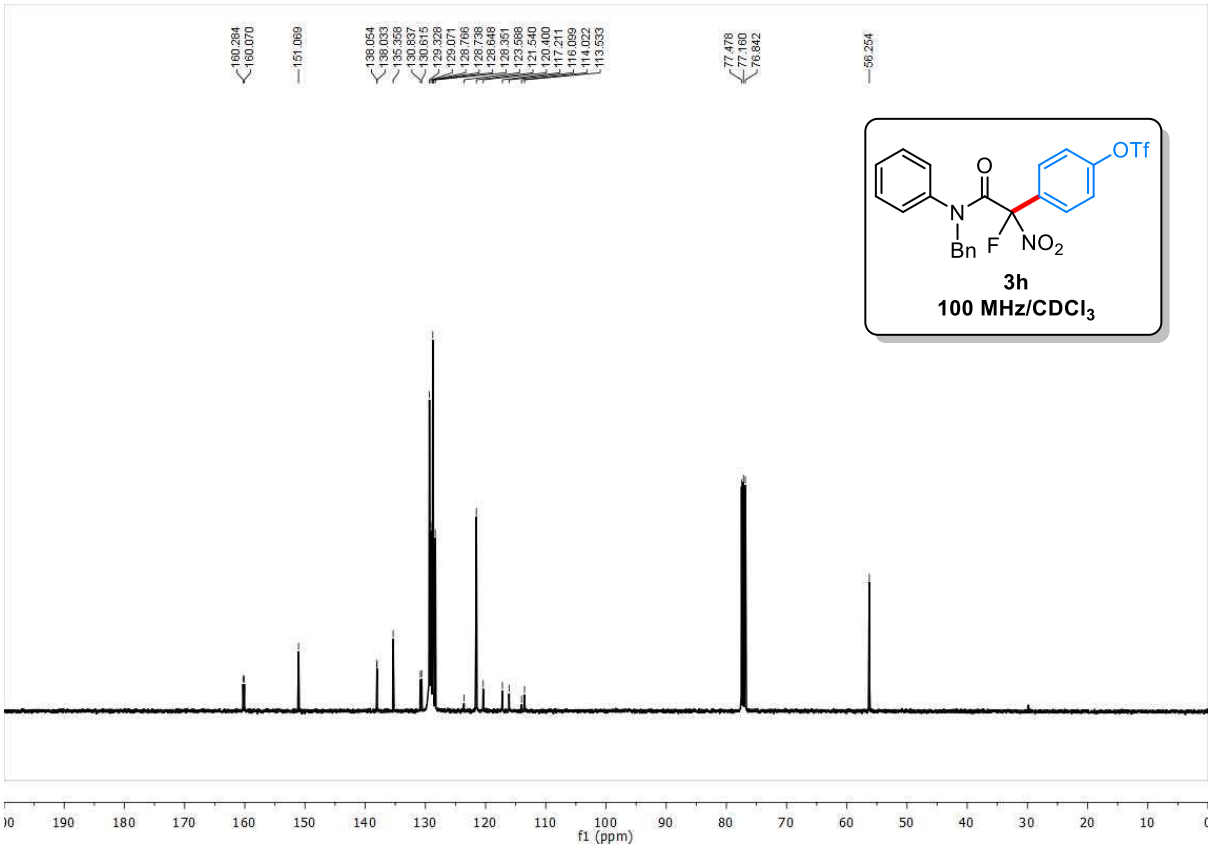
Me
O
N
Bn
F
NO2
3f
376 MHz/CDCl3
f1 (ppm)

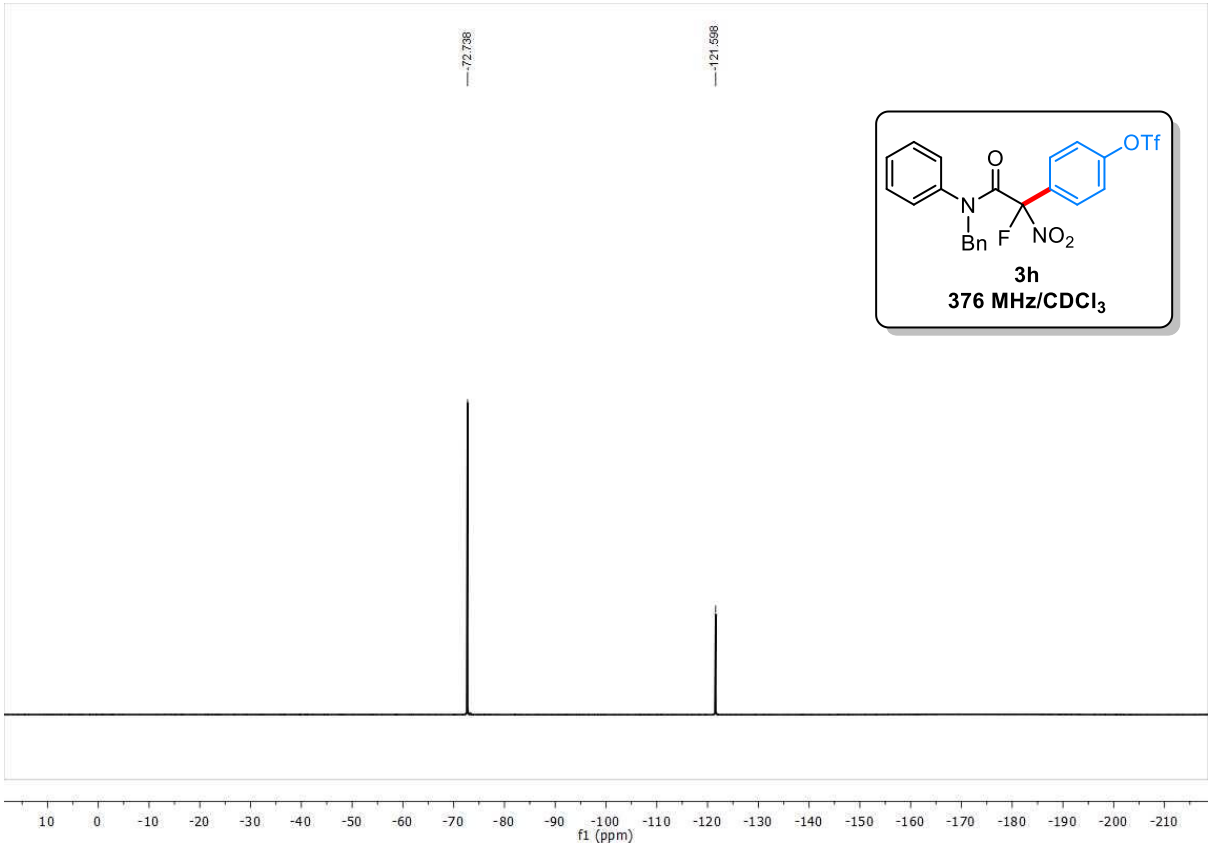

7.545
7.530
7.515
7.499
7.446
7.430
7.416
7.377
7.363
7.349
7.261
7.260
7.257
7.230
7.244
7.210
7.192
7.177
7.163
7.163
7.151
7.036
6.337
4.936
4.908
4.872
4.844
Ph
O
N
Bn
F
NO2
3g
400 MHz/CDCl3
4.07
4.06
1.05
10.05
0.99
1.00
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

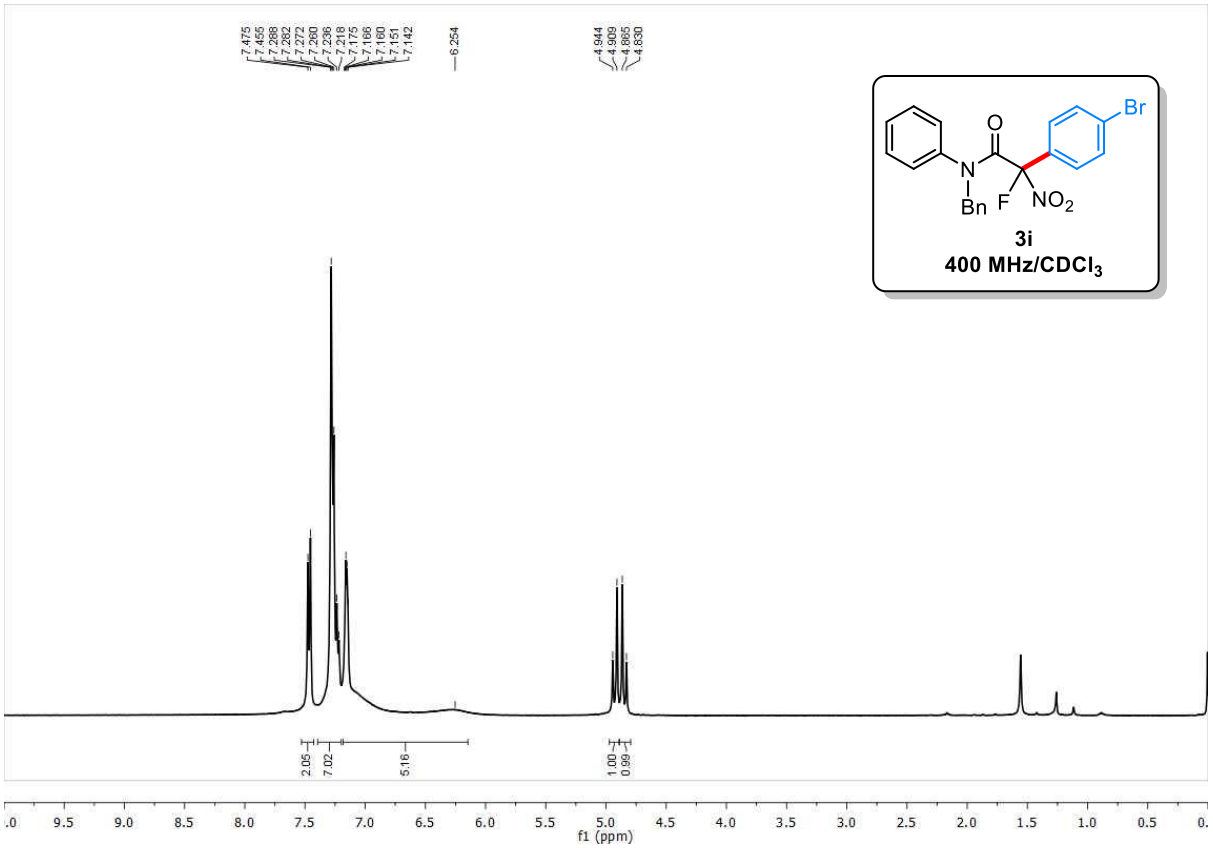

160.924
160.711
144.027
139.744
138.530
138.505
135.667
129.383
129.328
129.282
129.078
128.824
128.731
128.688
128.283
128.165
127.282
127.041
126.822
126.737
117.460
114.903
77.478
77.160
76.843
56.137
Ph
O
N
Bn
F
NO2
3g
100 MHz/CDCl3
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

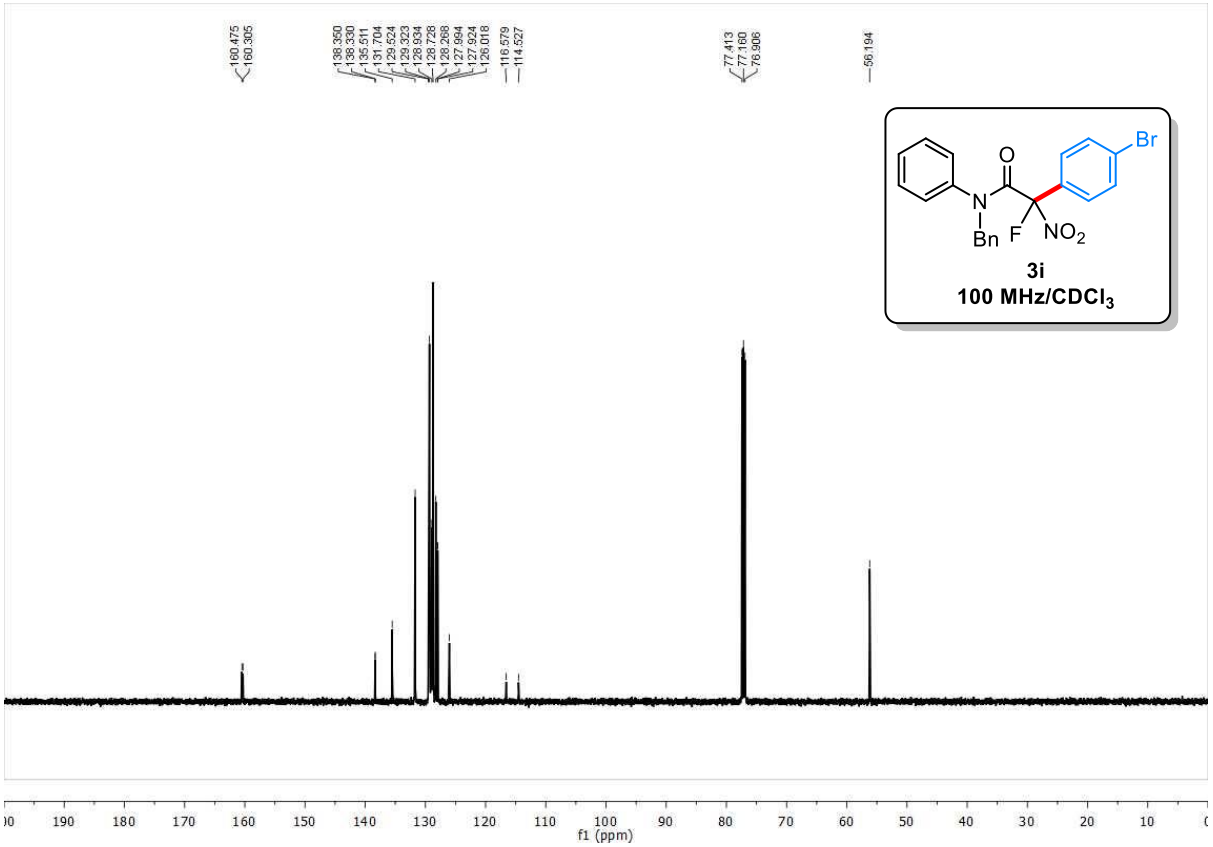

-122.266
Ph
O
N
Bn
F
NO2
3g
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

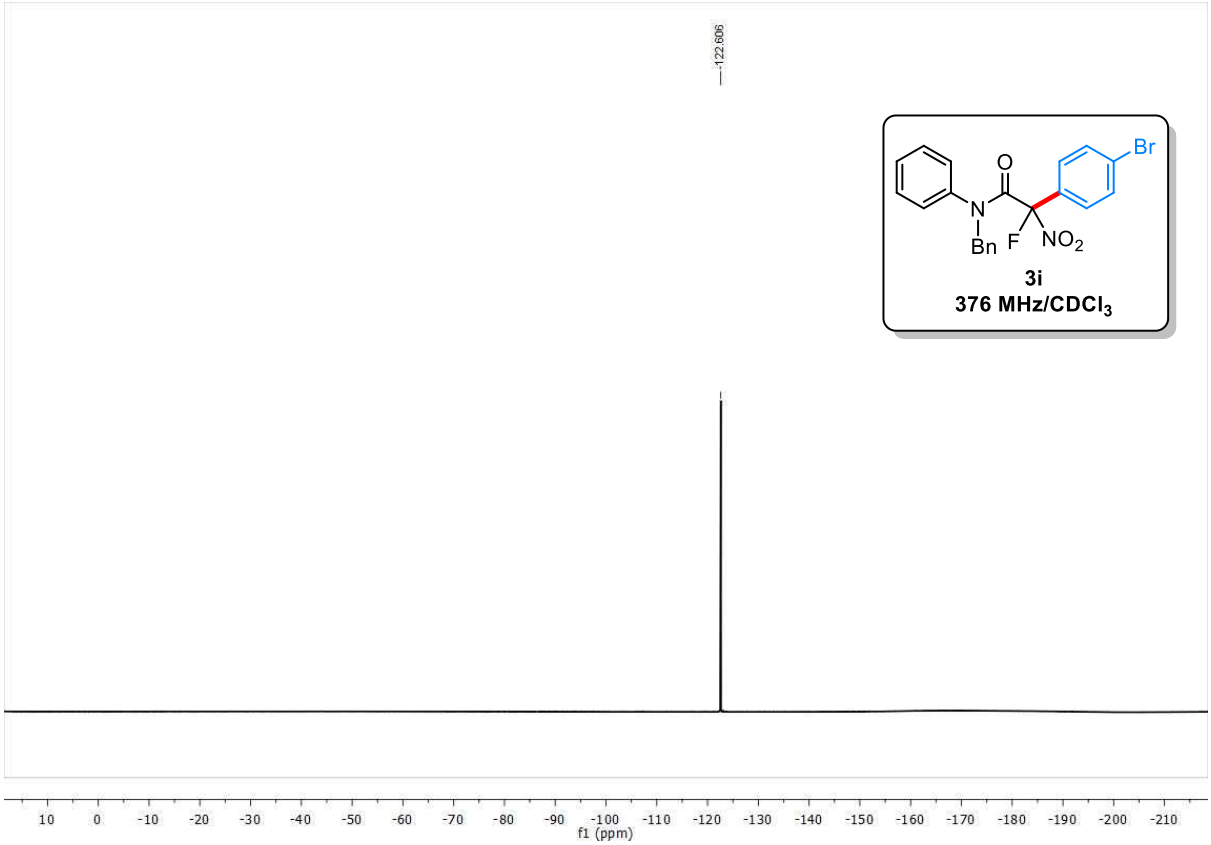

7.544
7.522
7.313
7.313
7.300
7.300
7.245
7.238
7.186
7.174
7.024
6.260
4.986
4.951
4.873
4.839
OTf
O
N
Bn
F
NO2
3h
400 MHz/CDCl3
2.09
11.09
1.00
0.99
1.02
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

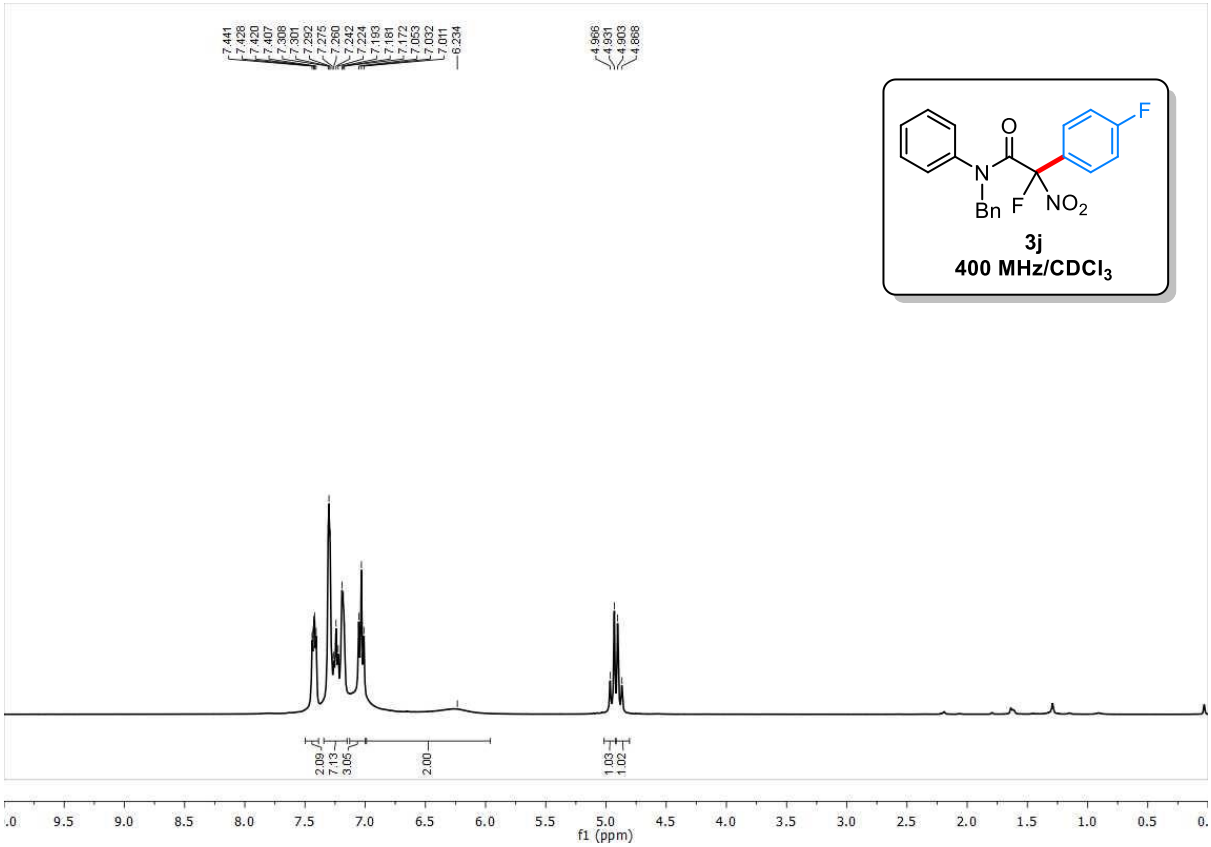

160.284
160.070
151.069
138.054
136.033
135.358
130.837
130.615
129.328
129.071
128.766
128.738
128.648
128.351
123.588
121.540
120.400
117.211
116.099
114.022
113.533
77.478
77.160
76.842
56.254
OTf
O
N
Bn
F
NO2
3h
100 MHz/CDCl3
f1 (ppm)

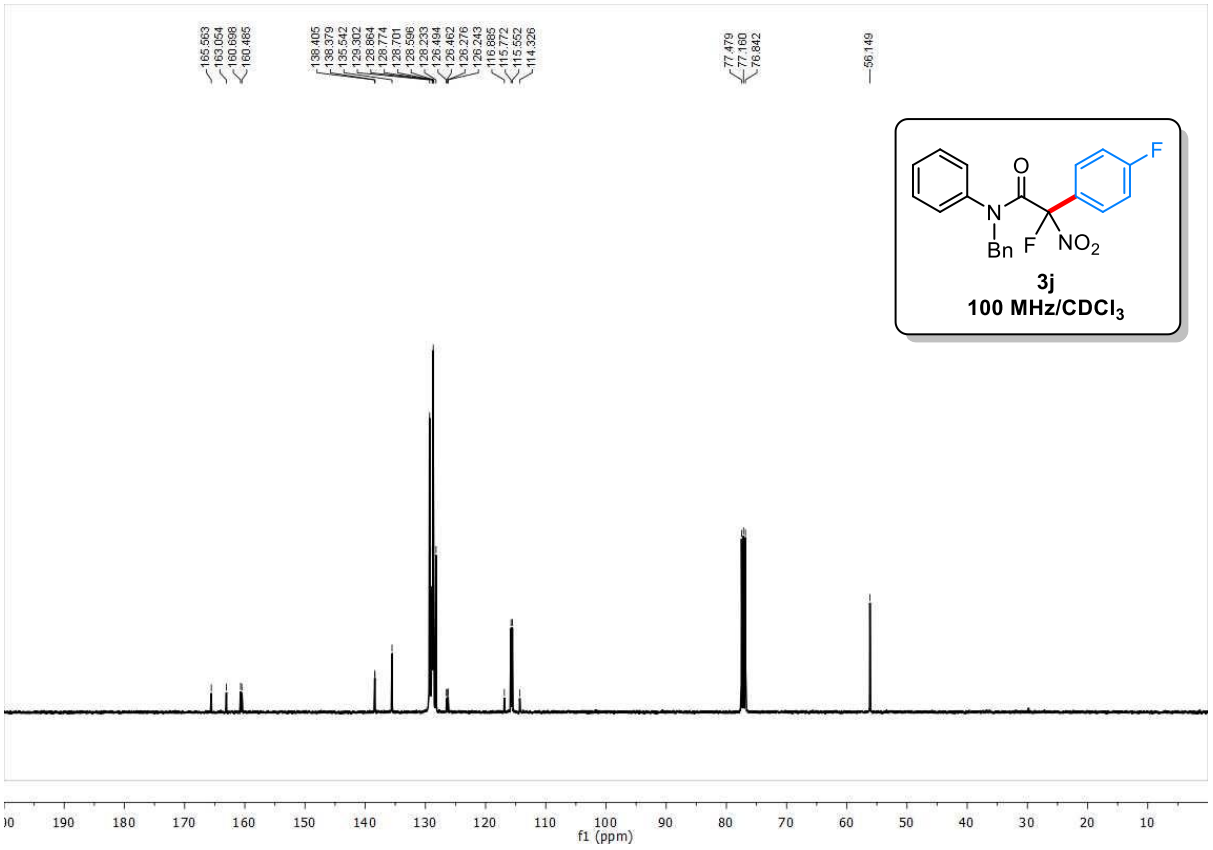

-72.738
-121.598
OTf
O
N
Bn
F
NO2
3h
376 MHz/CDCl3
f1 (ppm)


7.475
7.455
7.288
7.282
7.272
7.260
7.236
7.218
7.175
7.166
7.160
7.151
7.142
6.254
4.944
4.909
4.885
4.630
Br
O
N
Bn
F
NO2
3i
400 MHz/CDCl3
2.05
7.02
5.16
1.00
0.99
f1 (ppm)


160.475
160.305
138.350
138.330
135.511
131.704
129.524
129.323
128.934
128.728
128.268
127.994
127.924
126.018
116.579
114.527
77.413
77.160
76.906
58.194
Br
O
N
Bn
F
NO2
3i
100 MHz/CDCl3
f1 (ppm)


-122.606
Br
O
N
Bn
F
NO2
3i
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)


7.441
7.428
7.420
7.407
7.308
7.301
7.292
7.275
7.260
7.242
7.224
7.193
7.181
7.172
7.053
7.032
7.011
6.234
4.966
4.931
4.903
4.868
F
O
N
Bn
F
NO2
3j
400 MHz/CDCl3
2.09
7.13
3.05
2.00
1.03
1.02
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)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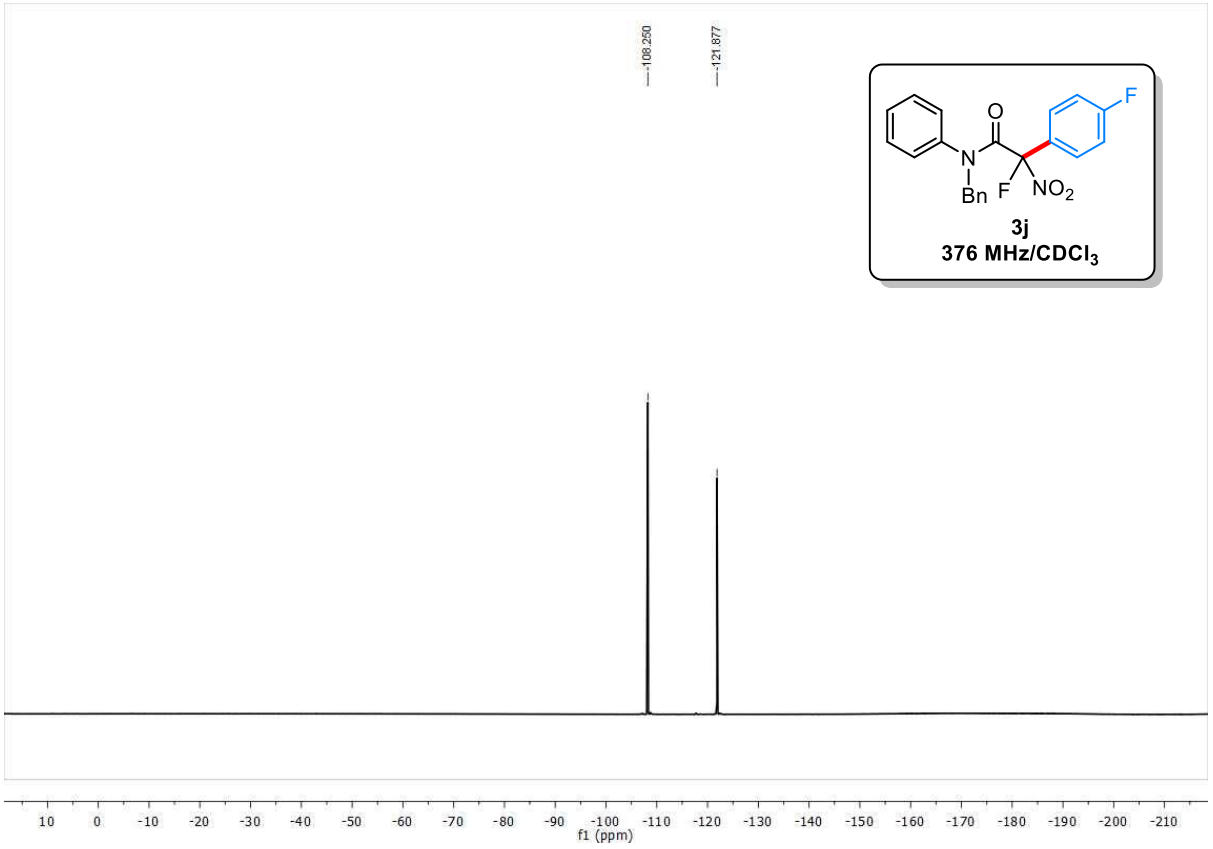
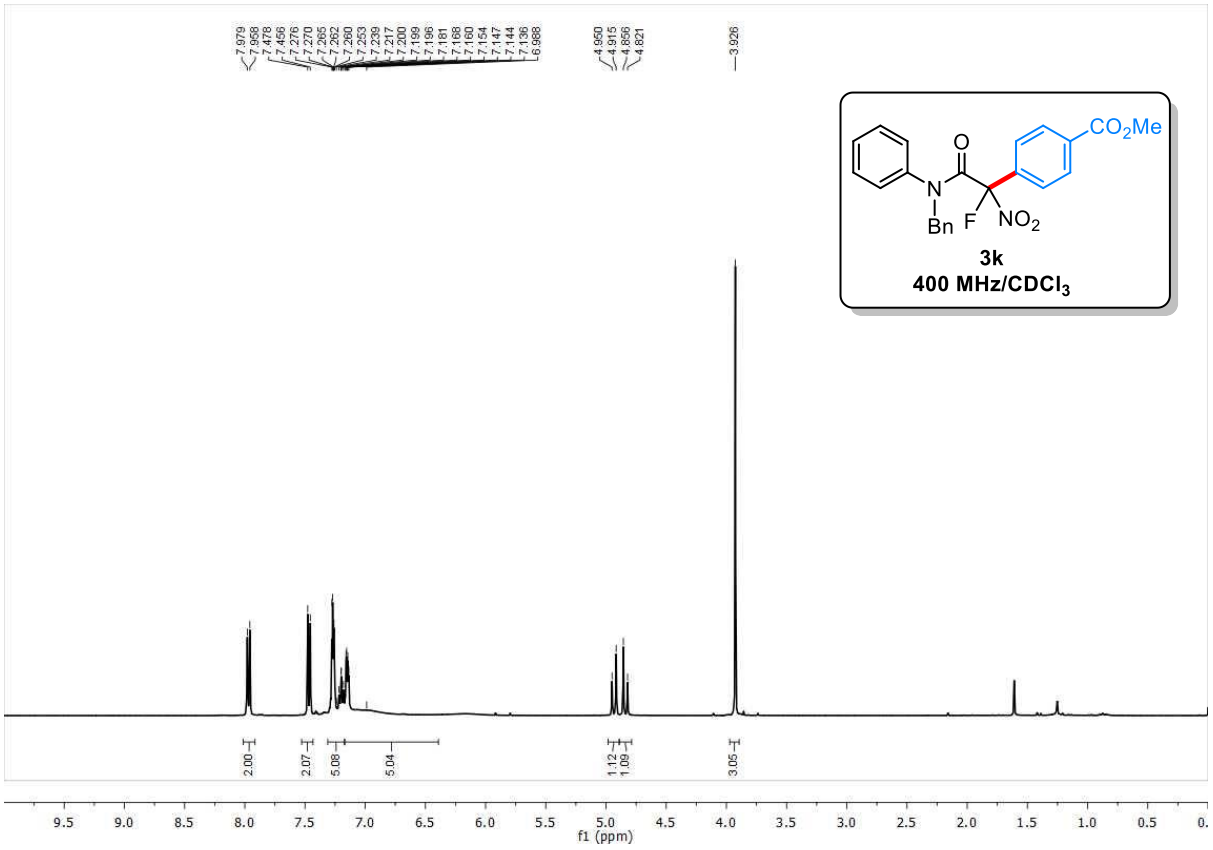
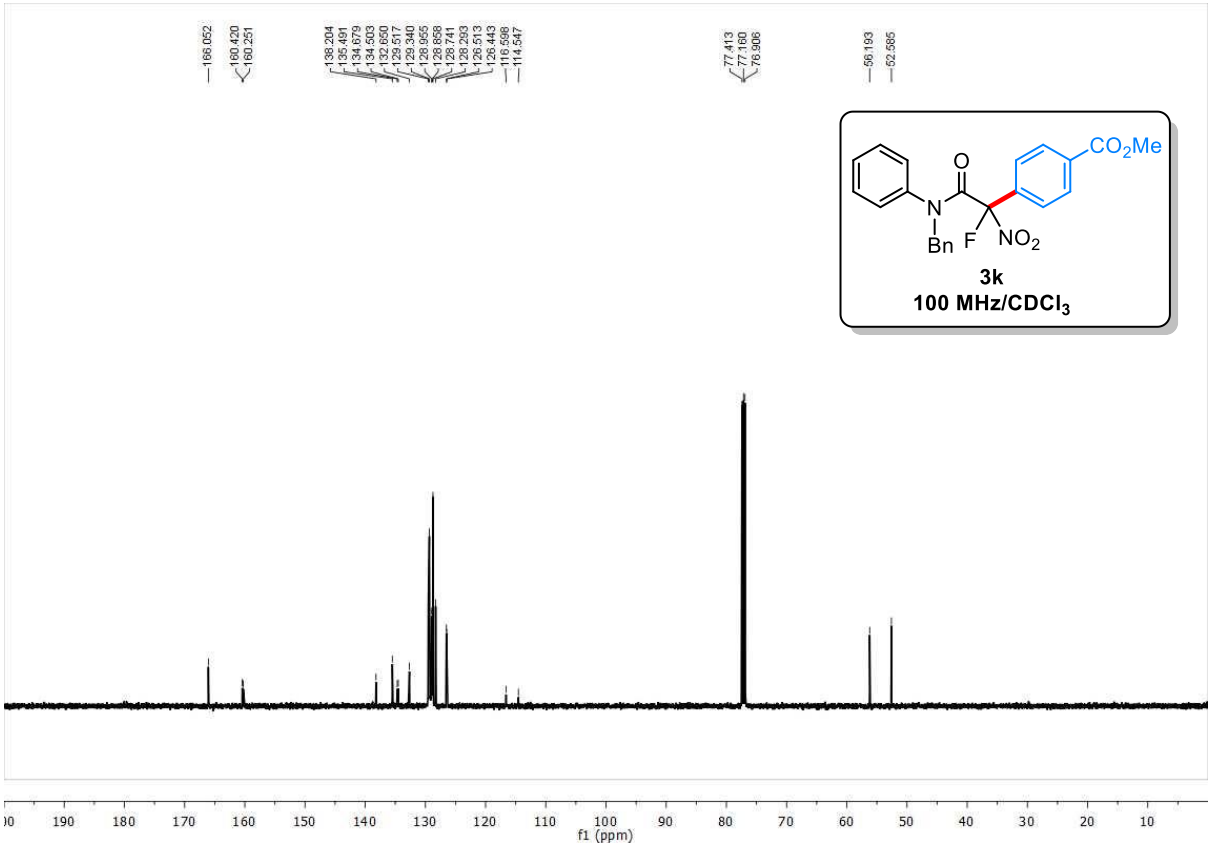
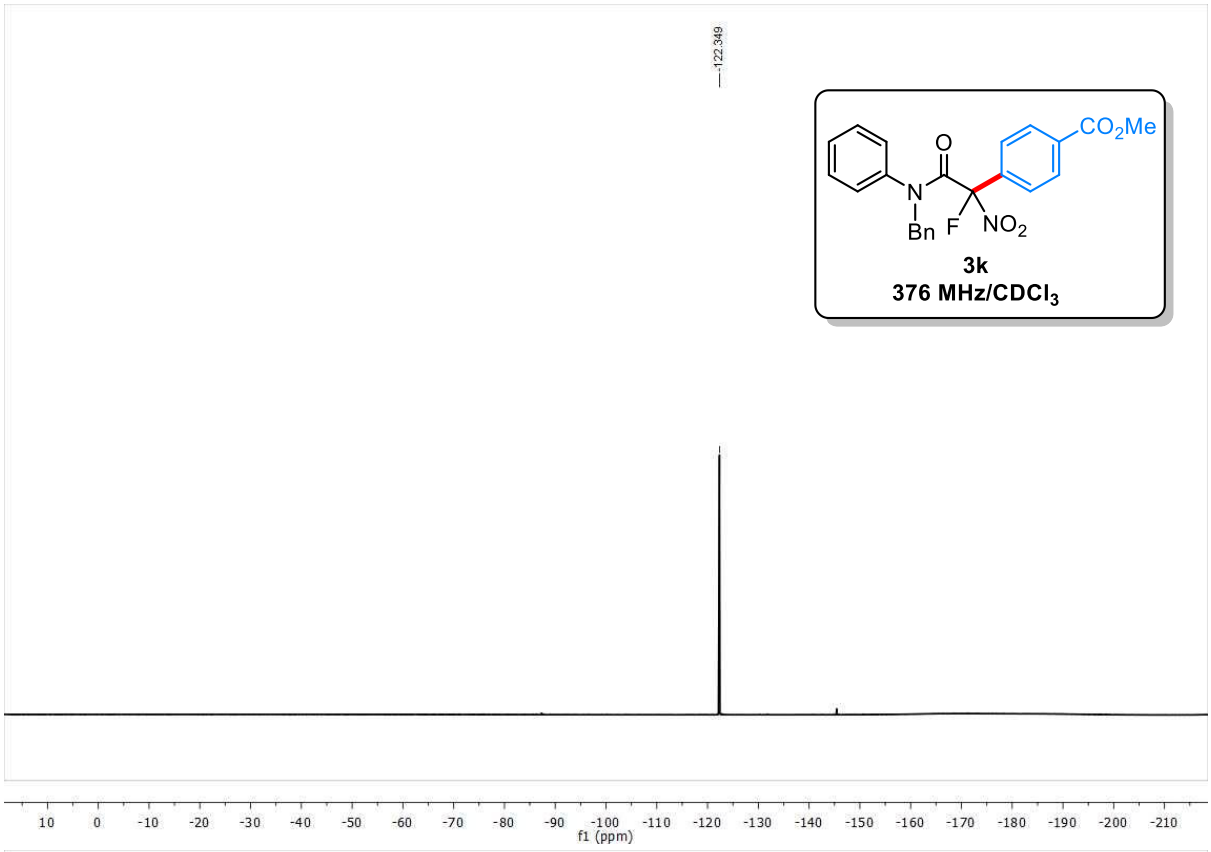
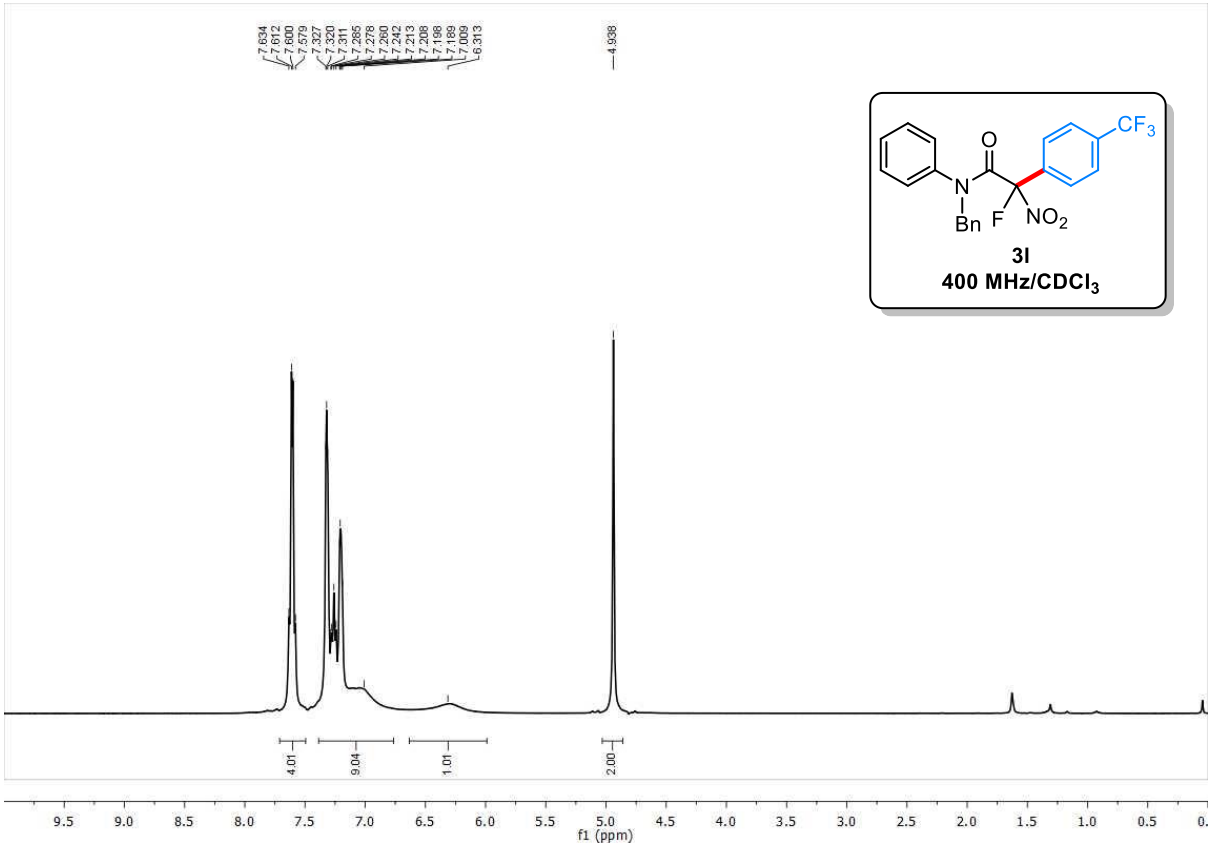
163.054
160.698
160.465
138.405
138.379
135.542
129.302
128.884
128.774
128.701
128.596
128.233
126.494
126.462
126.276
126.243
116.885
115.772
115.552
114.326
77.479
77.160
76.842
56.149
F
O
N
Bn
F
NO2
3j
100 MHz/CDCl3
f1 (ppm)


-108.250
-121.877
F
O
N
Bn
F
NO2
3j
376 MHz/CDCl3
f1 (ppm)


7.979
7.958
7.478
7.456
7.276
7.270
7.265
7.262
7.260
7.253
7.239
7.217
7.200
7.199
7.196
7.161
7.158
7.150
7.154
7.147
7.144
7.136
6.988
4.950
4.915
4.896
4.621
3.926
2.00
2.07
5.08
5.04
1.12
1.09
3.05
f1 (ppm)
CO2Me
N
O
Bn
F
NO2
3k
400 MHz/CDCl3


166.052
160.420
160.251
138.204
135.491
134.679
134.503
132.650
129.517
129.340
128.955
128.858
128.741
128.293
126.513
126.443
116.598
114.547
77.413
77.160
76.906
56.193
52.585
f1 (ppm)
CO2Me
N
O
Bn
F
NO2
3k
100 MHz/CDCl3


-122.349
CO2Me
O
N
Bn
F
NO2
3k
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)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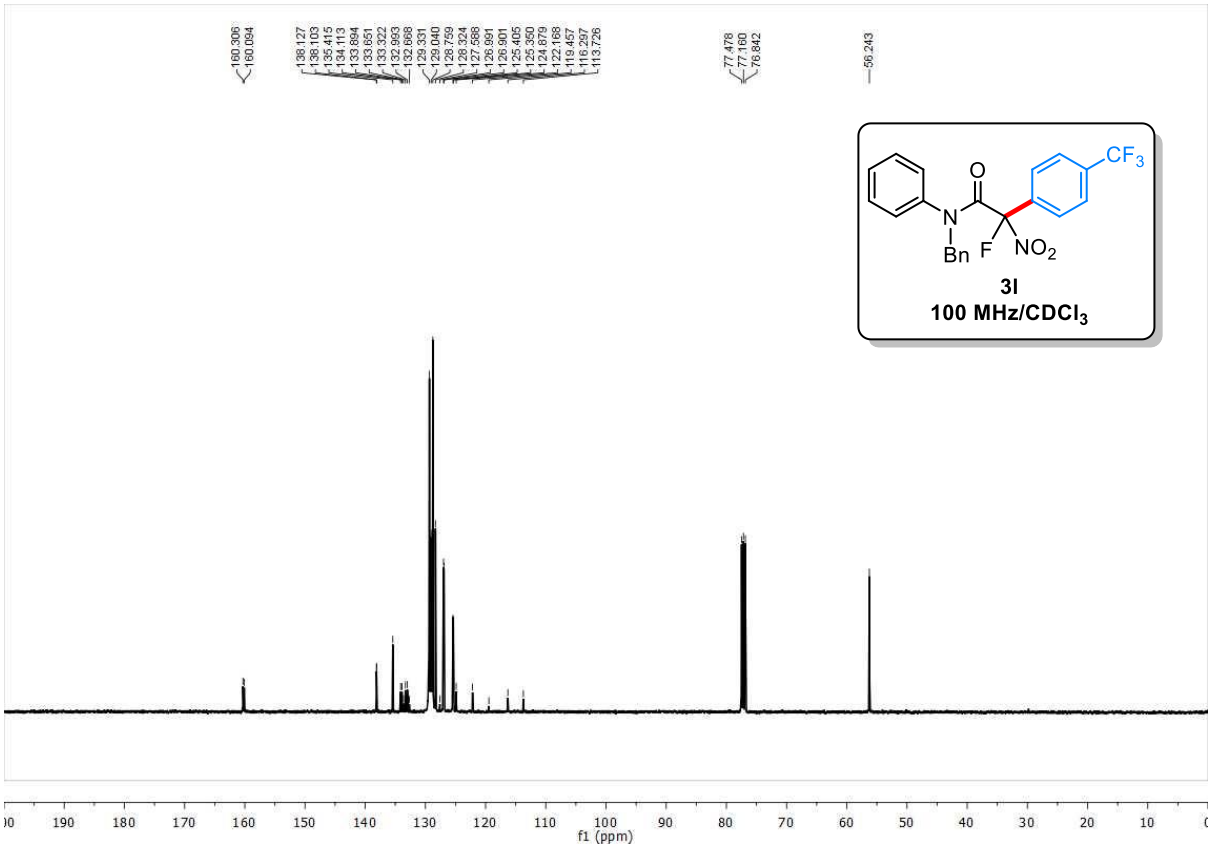
7.579
7.327
7.320
7.311
7.285
7.278
7.260
7.242
7.213
7.208
7.198
7.189
7.009
6.313
4.938
CF3
O
N
Bn
F
NO2
3l
400 MHz/CDCl3
4.01
9.04
1.01
2.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.
f1 (ppm)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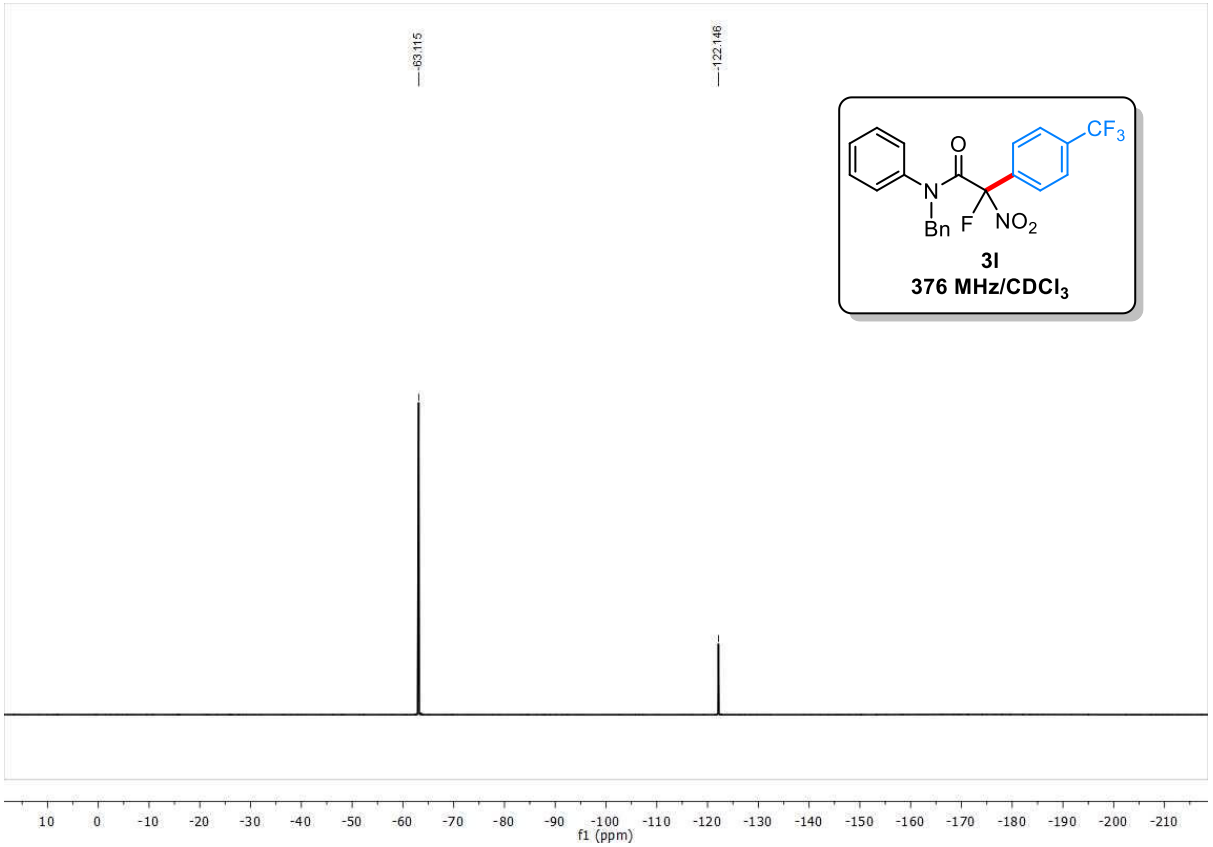
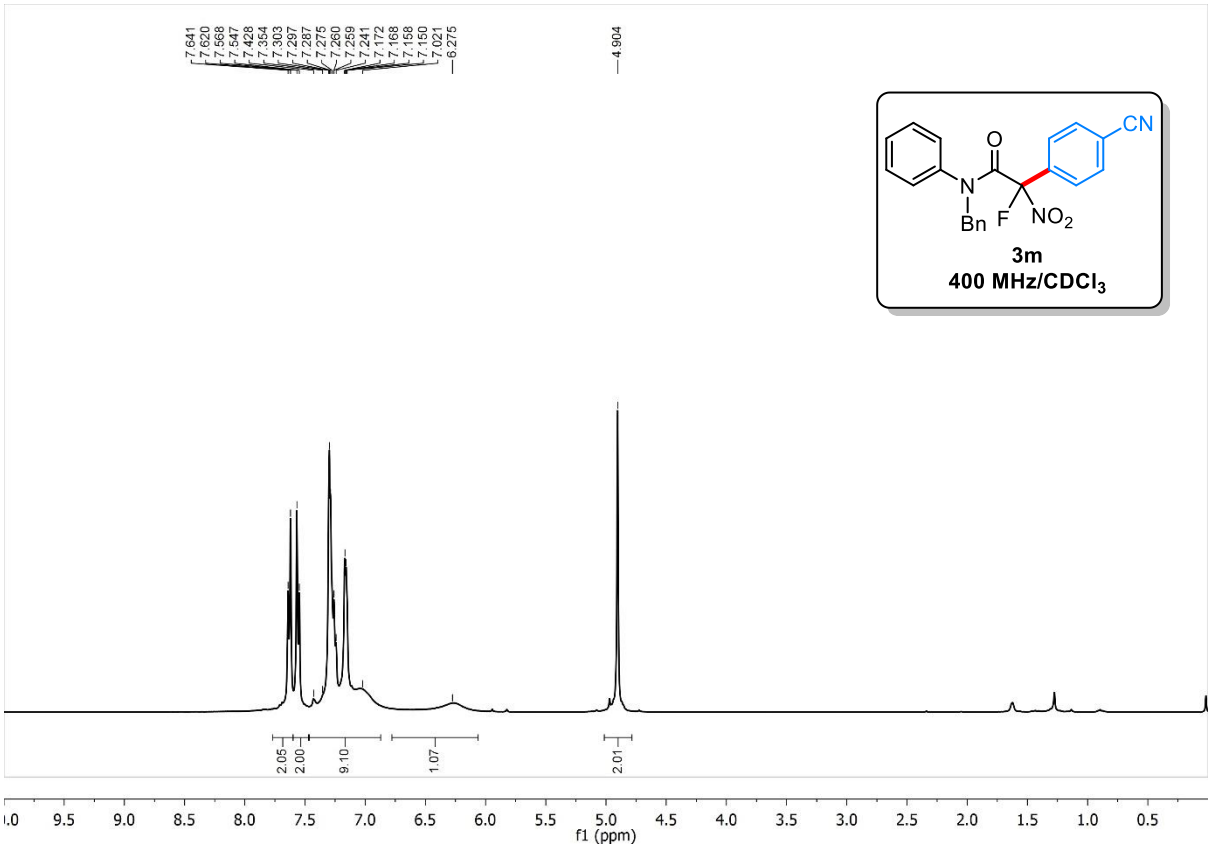
160.094
138.127
138.103
135.415
134.113
133.894
133.651
133.322
132.993
132.688
129.331
129.040
128.759
128.324
127.588
126.991
126.901
125.405
125.360
124.879
122.168
119.457
116.297
113.726
77.478
77.160
76.842
56.243
CF3
O
N
Bn
F
NO2
3l
100 MHz/CDCl3
f1 (ppm)


-63.115
-122.146
CF3
O
N
Bn
F
NO2
3l
376 MHz/CDCl3
f1 (ppm)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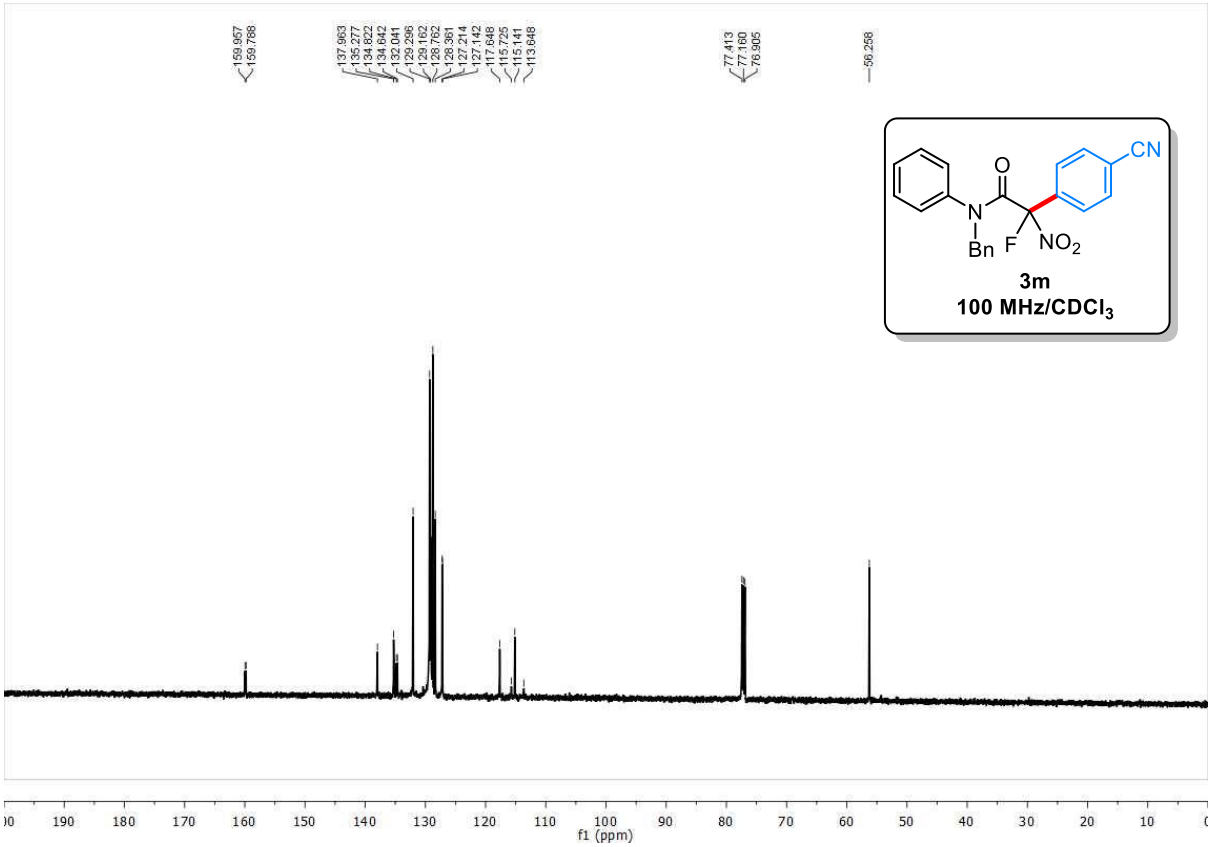
7.547
7.428
7.354
7.303
7.297
7.287
7.275
7.260
7.259
7.241
7.172
7.168
7.158
7.150
7.021
6.275
4.904
CN
O
N
Bn
F
NO2
3m
400 MHz/CDCl3
2.05
2.00
9.10
1.07
2.01
f1 (ppm)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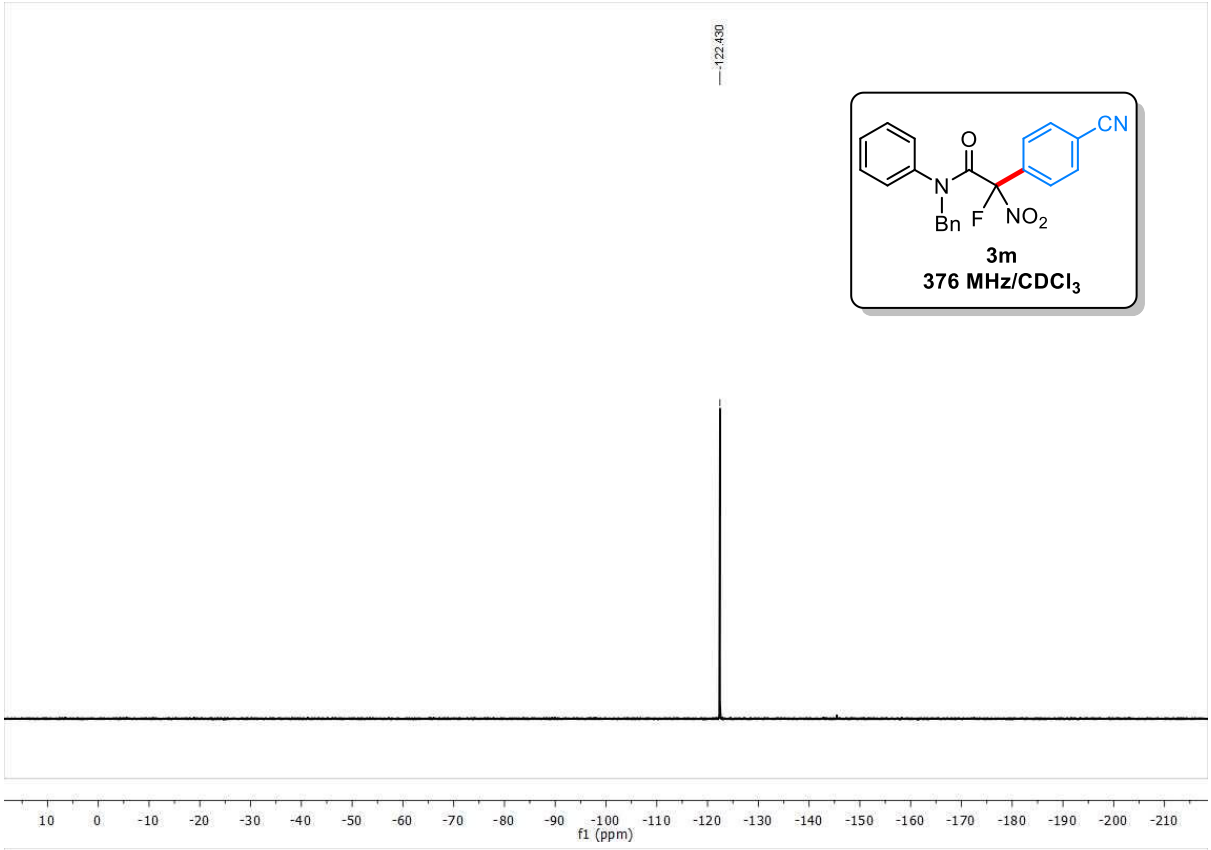
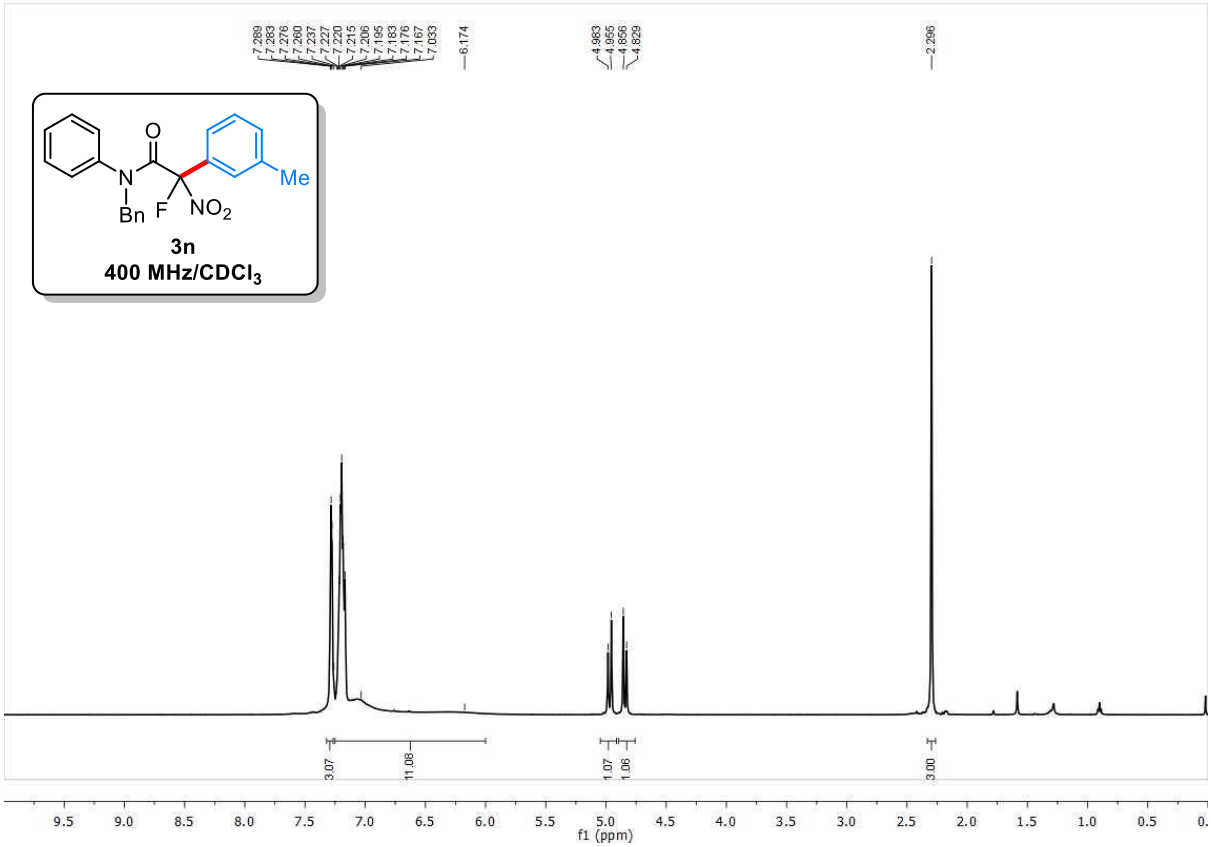
159.788
137.963
135.277
134.822
134.642
132.041
129.296
129.162
128.762
128.361
127.214
127.142
117.648
115.725
115.141
113.648
77.413
77.160
76.905
56.258
CN
O
N
Bn
F
NO2
3m
100 MHz/CDCl3
f1 (ppm)


-122.430
CN
O
N
Bn
F
NO2
3m
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)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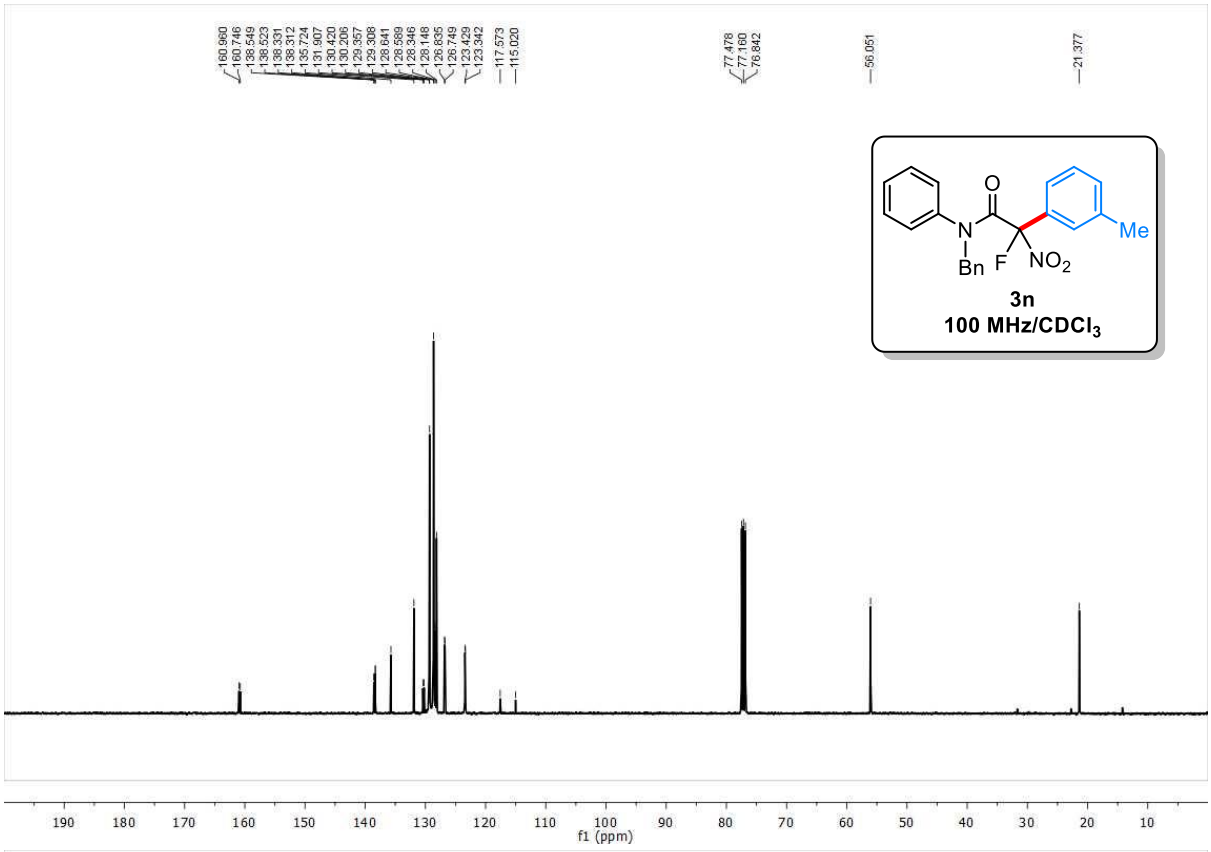
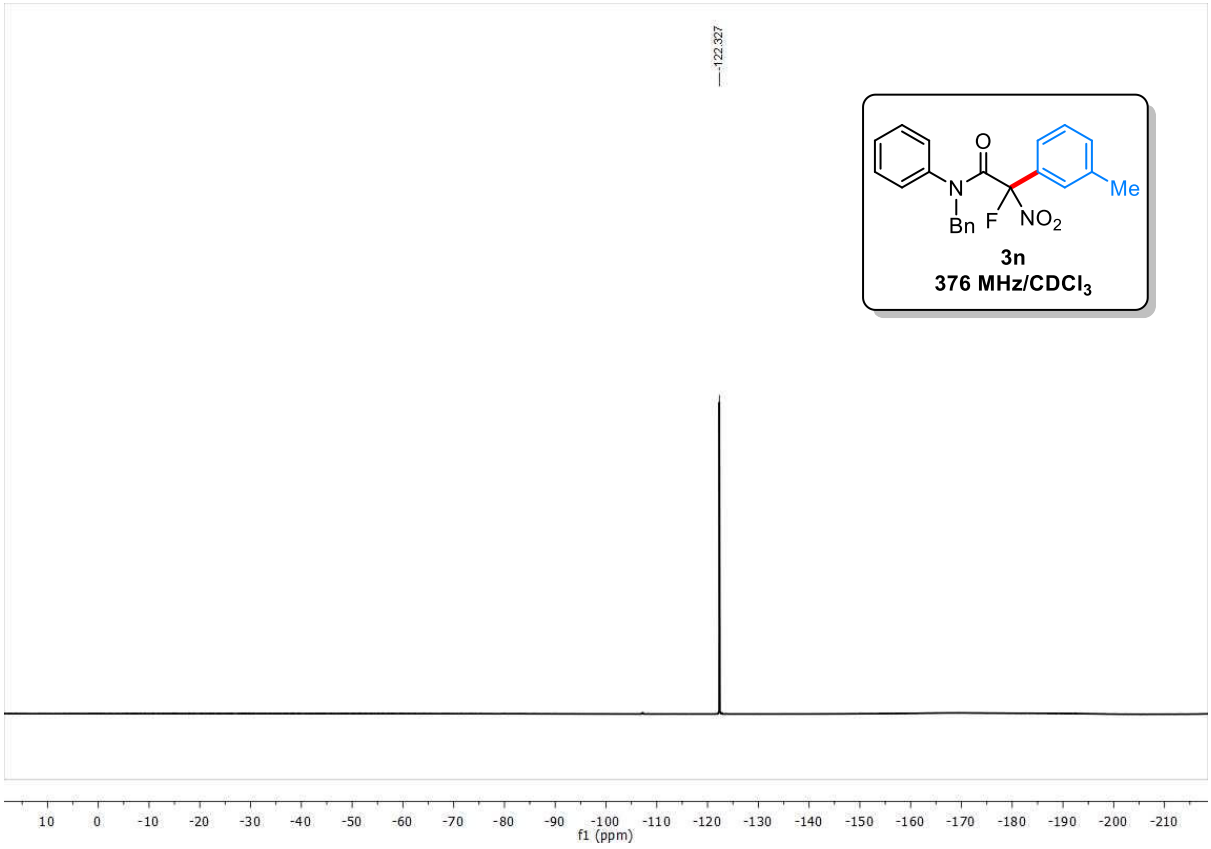
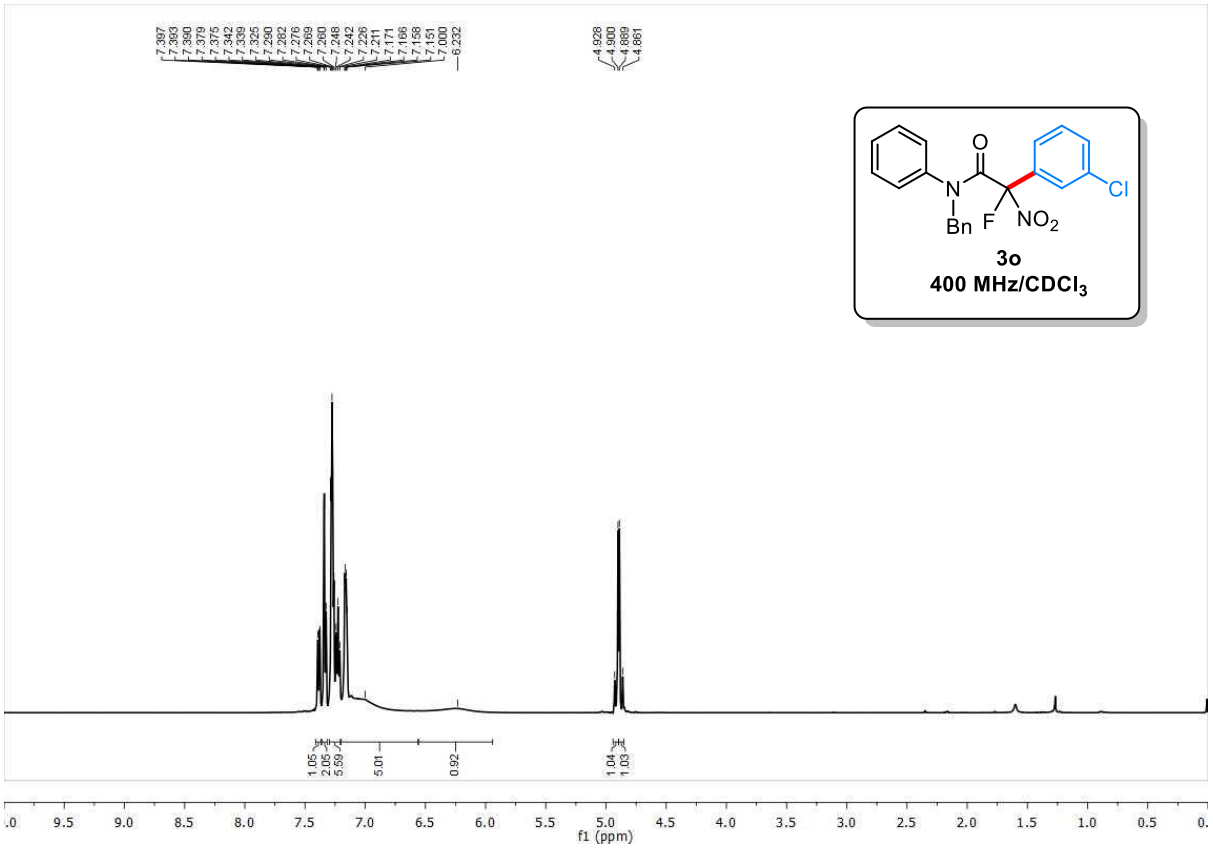
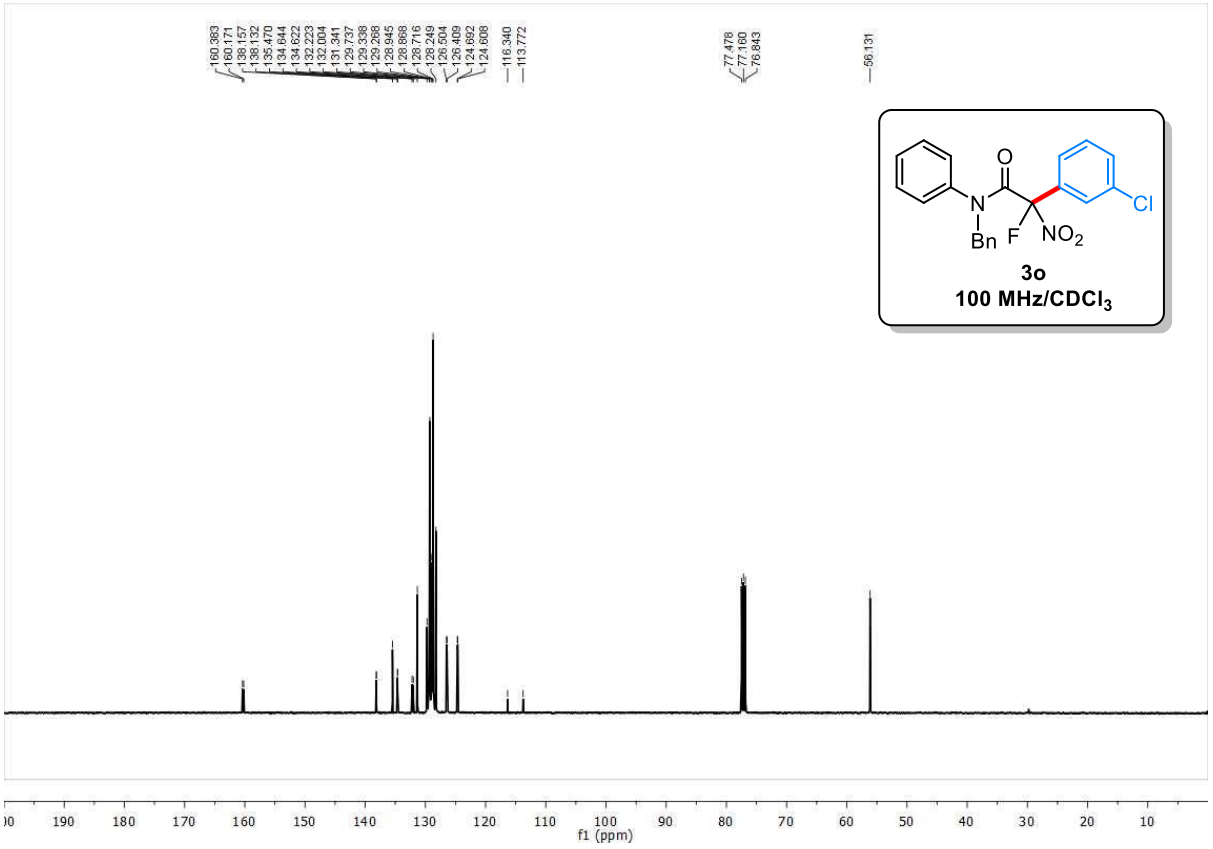
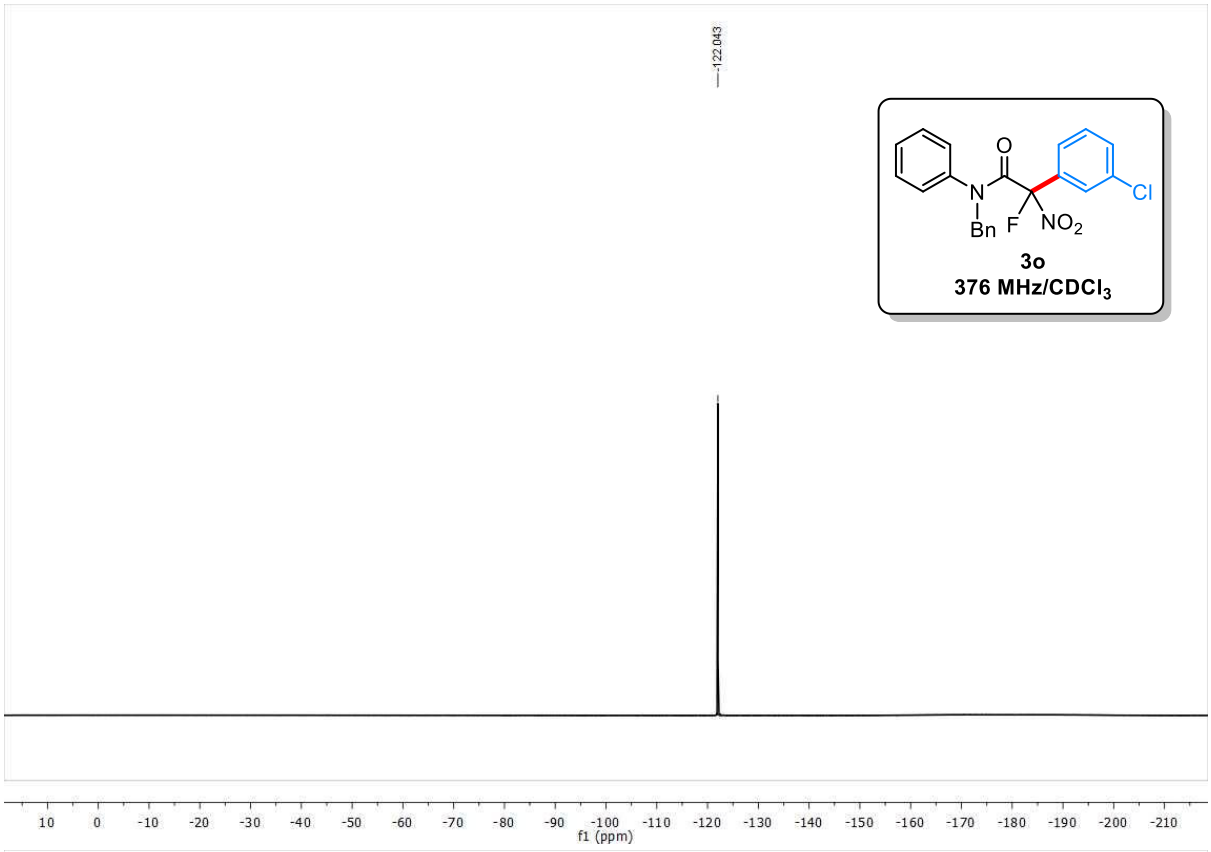
7.276
7.260
7.237
7.227
7.220
7.215
7.206
7.195
7.183
7.176
7.167
7.033
6.174
4.983
4.965
4.866
4.829
2.296
O
N
Bn
F
NO2
Me
3n
400 MHz/CDCl3
3.07
11.08
1.07
1.06
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.
f1 (ppm)

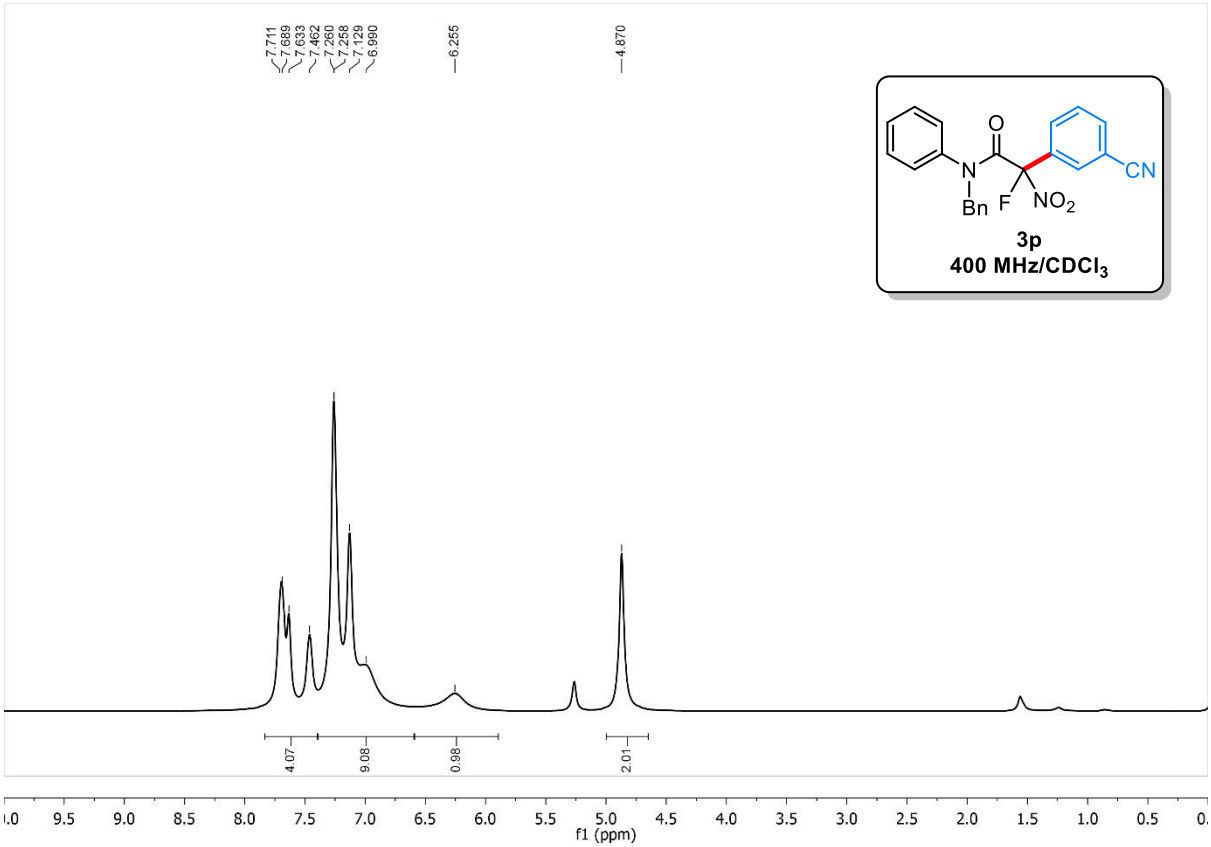

160.980
160.746
136.549
136.523
136.331
136.312
135.724
131.907
130.420
130.295
129.357
129.308
128.841
128.599
128.346
128.148
126.835
126.749
123.429
123.342
117.573
115.020
77.478
77.160
76.842
56.051
21.377
Me
O
N
Bn
F
NO2
3n
100 MHz/CDCl3
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

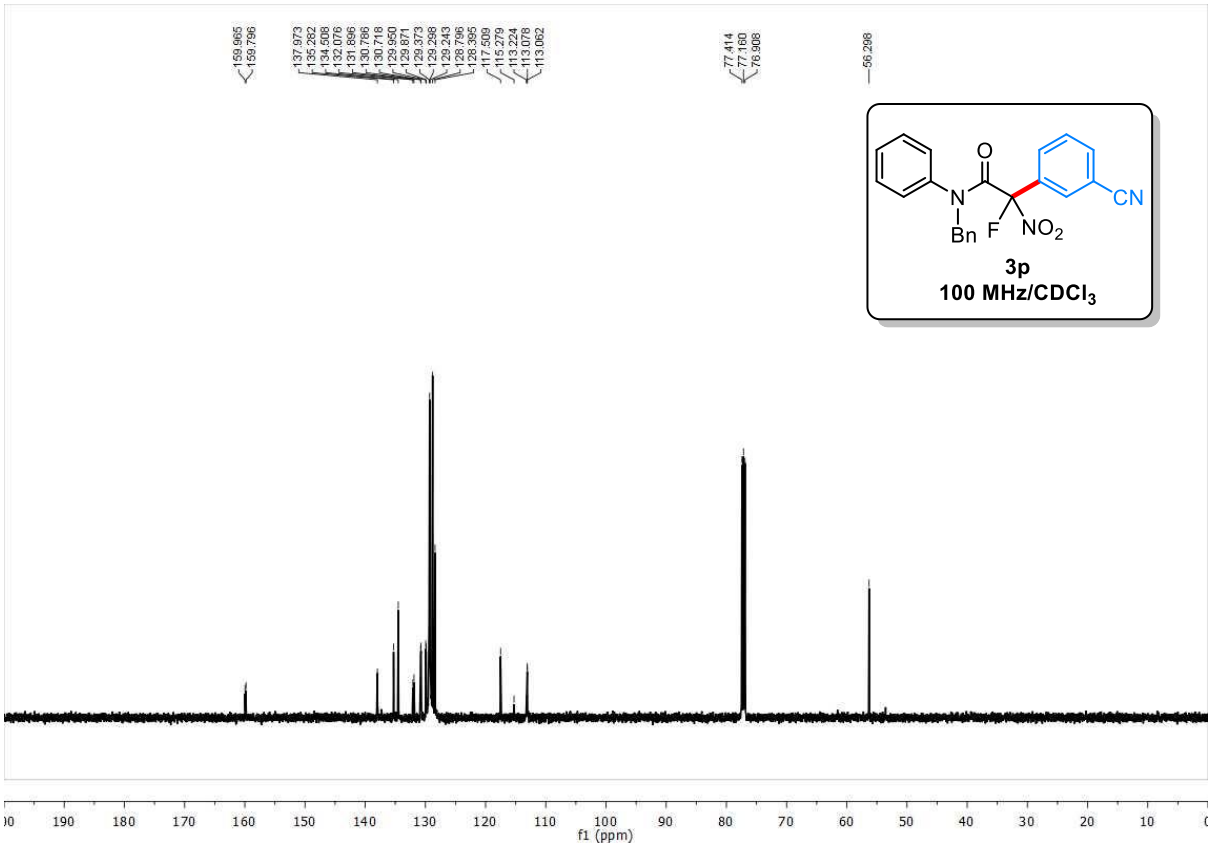

-122.327
Me
O
N
Bn
F
NO2
3n
376 MHz/CDCl3
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

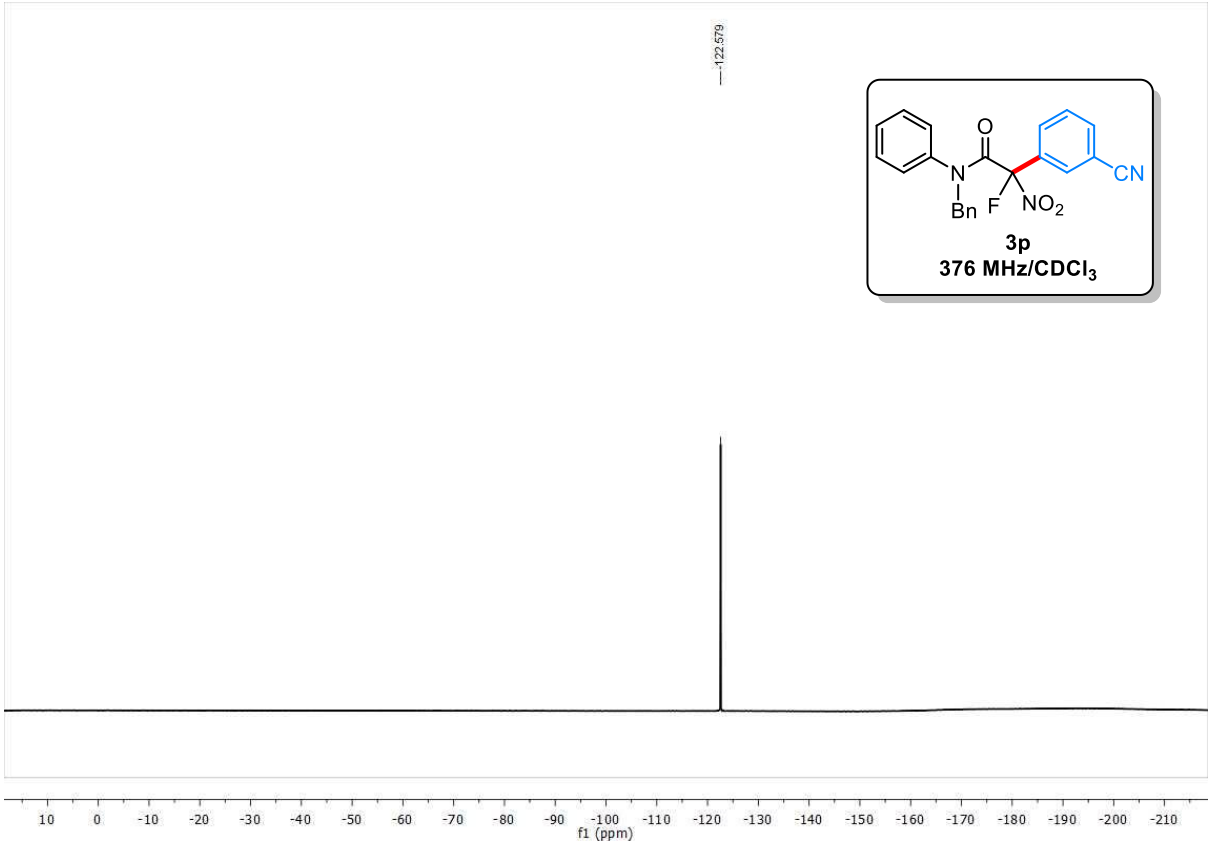

7.397
7.393
7.390
7.379
7.375
7.342
7.339
7.325
7.290
7.282
7.276
7.269
7.260
7.248
7.242
7.226
7.211
7.171
7.166
7.158
7.151
7.000
6.232
4.928
4.900
4.889
4.861
1.05
2.05
5.59
5.01
0.92
1.04
1.03
f1 (ppm)
3o
400 MHz/CDCl3

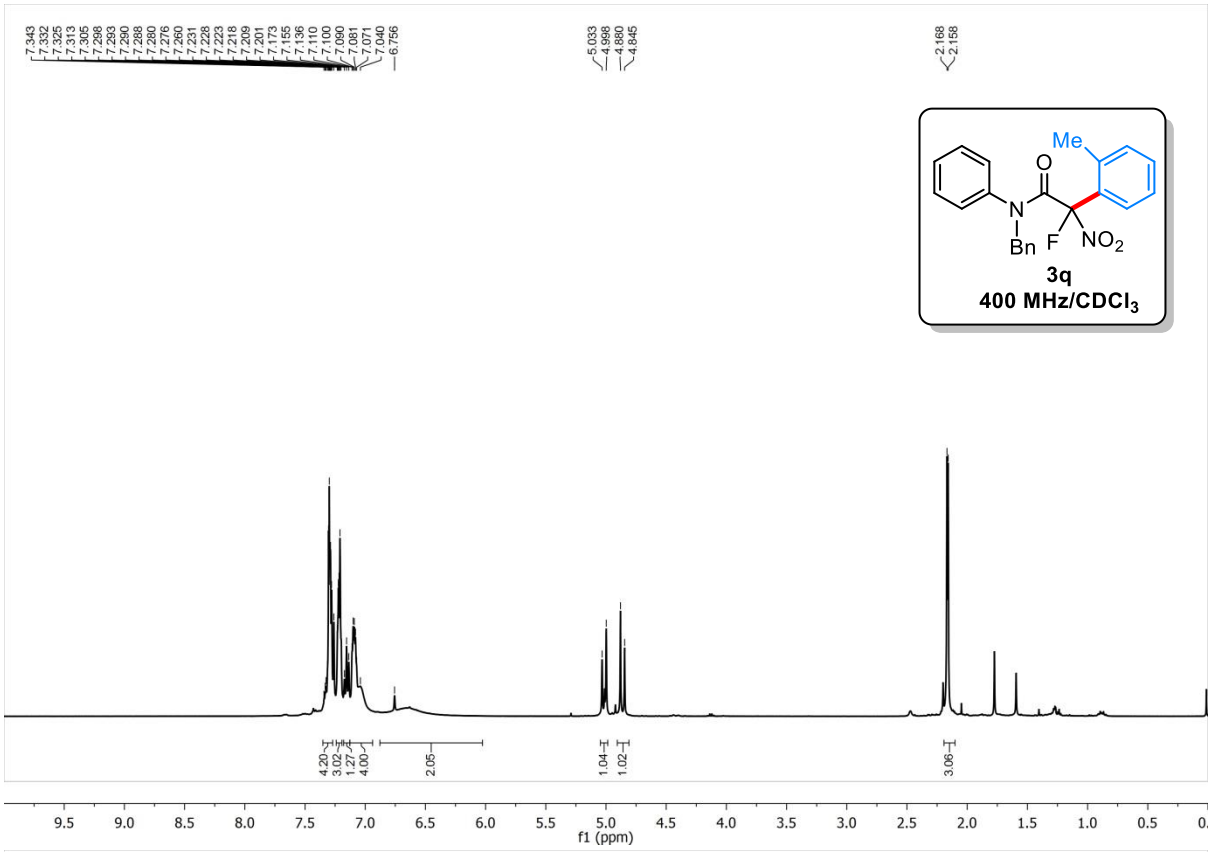

160.383
160.171
138.157
138.132
135.470
134.644
134.622
132.223
132.004
131.341
129.737
129.338
129.268
128.945
128.868
128.716
128.249
126.504
126.409
124.692
124.668
116.340
113.772
77.478
77.160
76.843
58.131
f1 (ppm)
3o
100 MHz/CDCl3

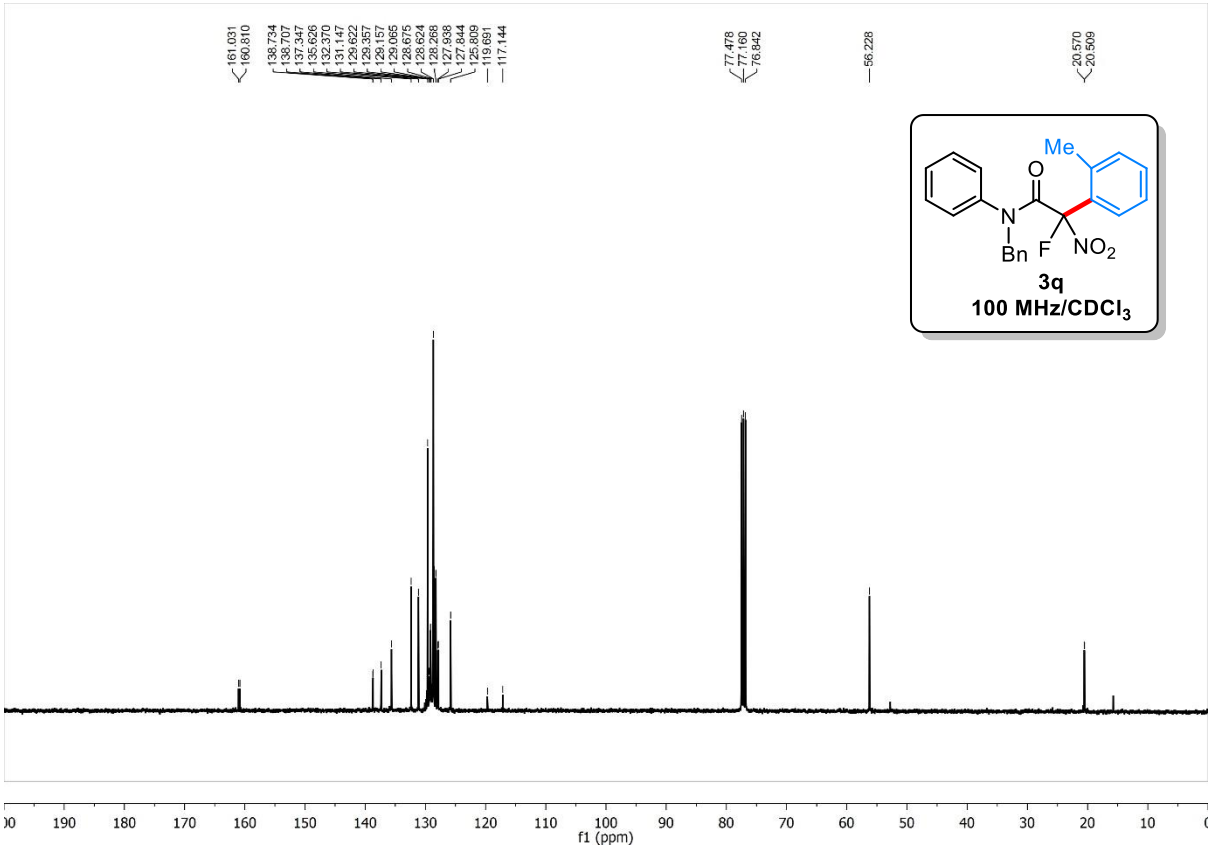

-122.043
O
N
Bn
F
NO2
Cl
3o
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

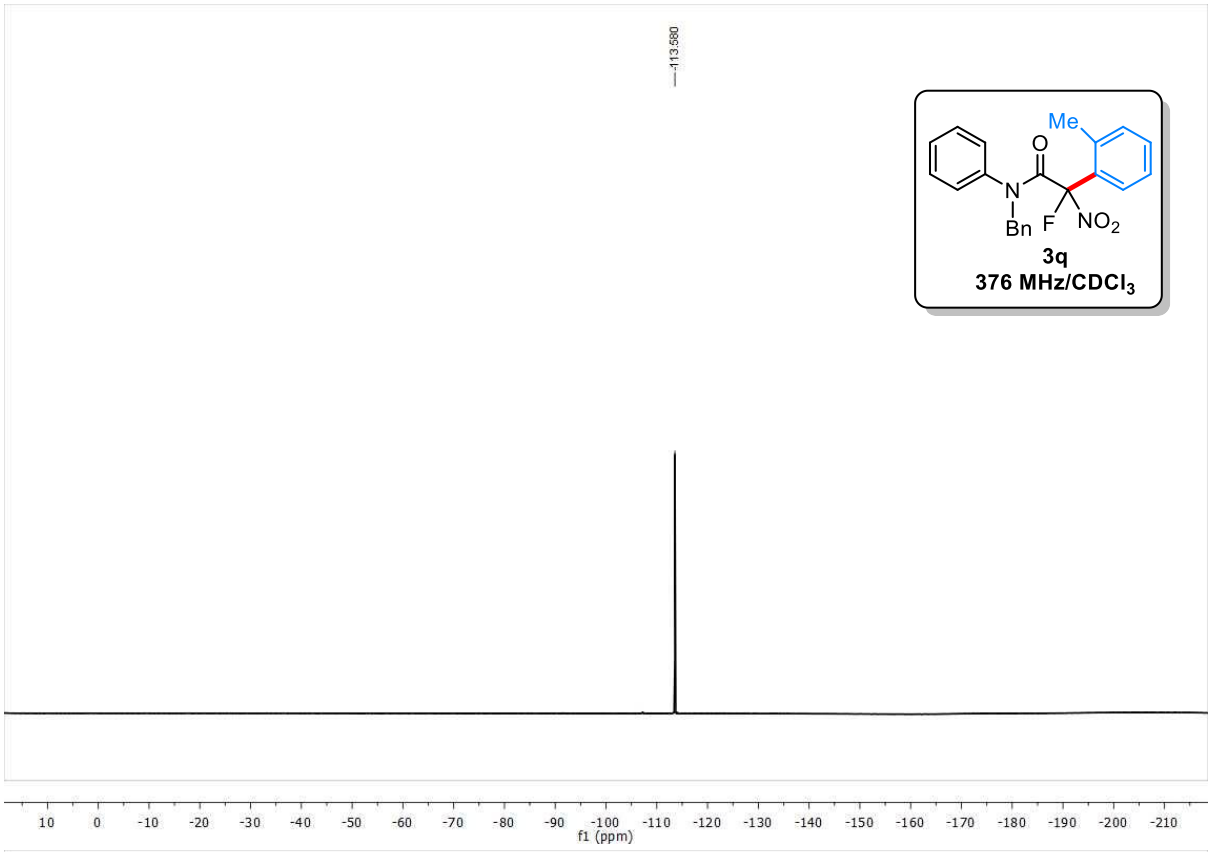

7.711
7.689
7.633
7.462
7.260
7.258
7.229
6.990
6.255
4.870
O
N
Bn
F
NO2
CN
3p
400 MHz/CDCl3
4.07
9.08
0.98
2.01
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

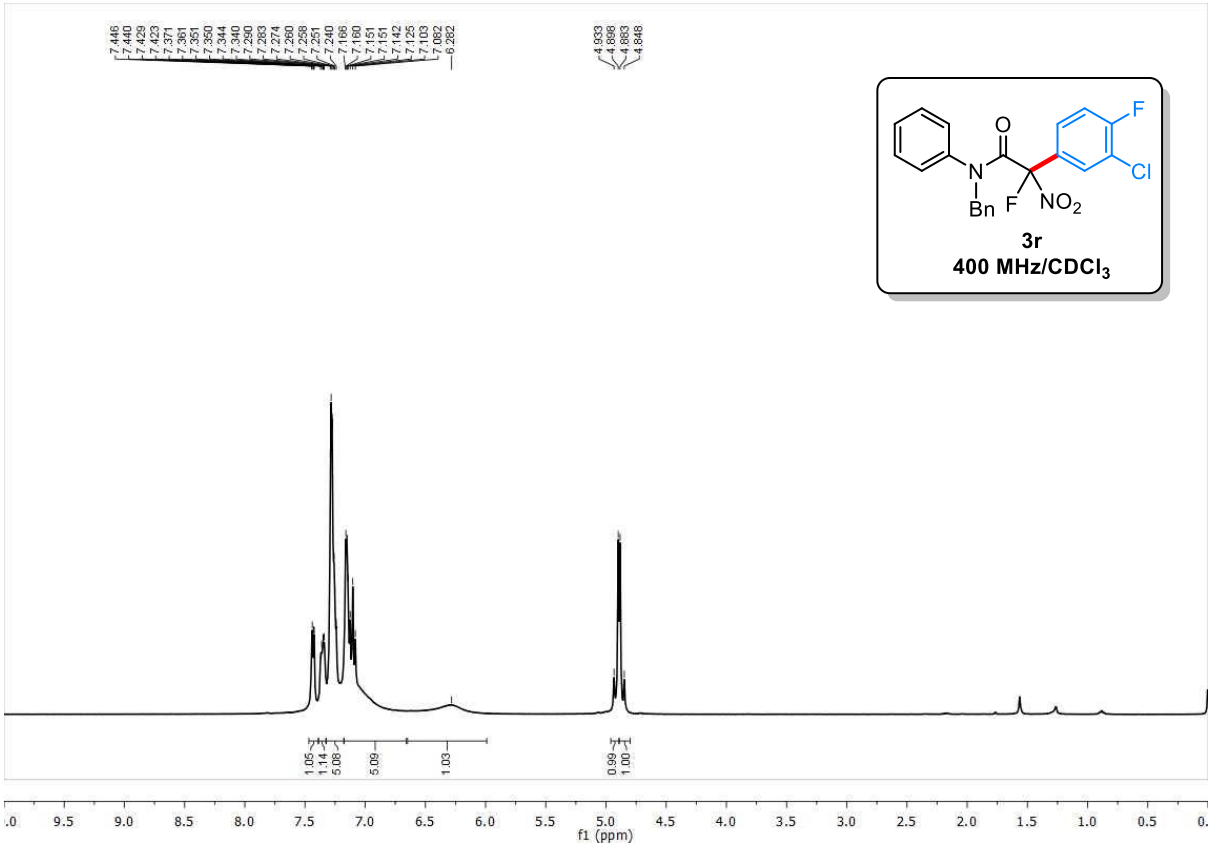

159.965
159.796
137.973
135.282
134.508
132.076
131.896
130.786
130.718
129.950
129.871
129.373
129.298
129.243
128.796
128.395
117.509
115.279
113.224
113.078
113.062
77.414
77.160
76.908
56.298
O
N
Bn
F
NO2
CN
3p
100 MHz/CDCl3
f1 (ppm)

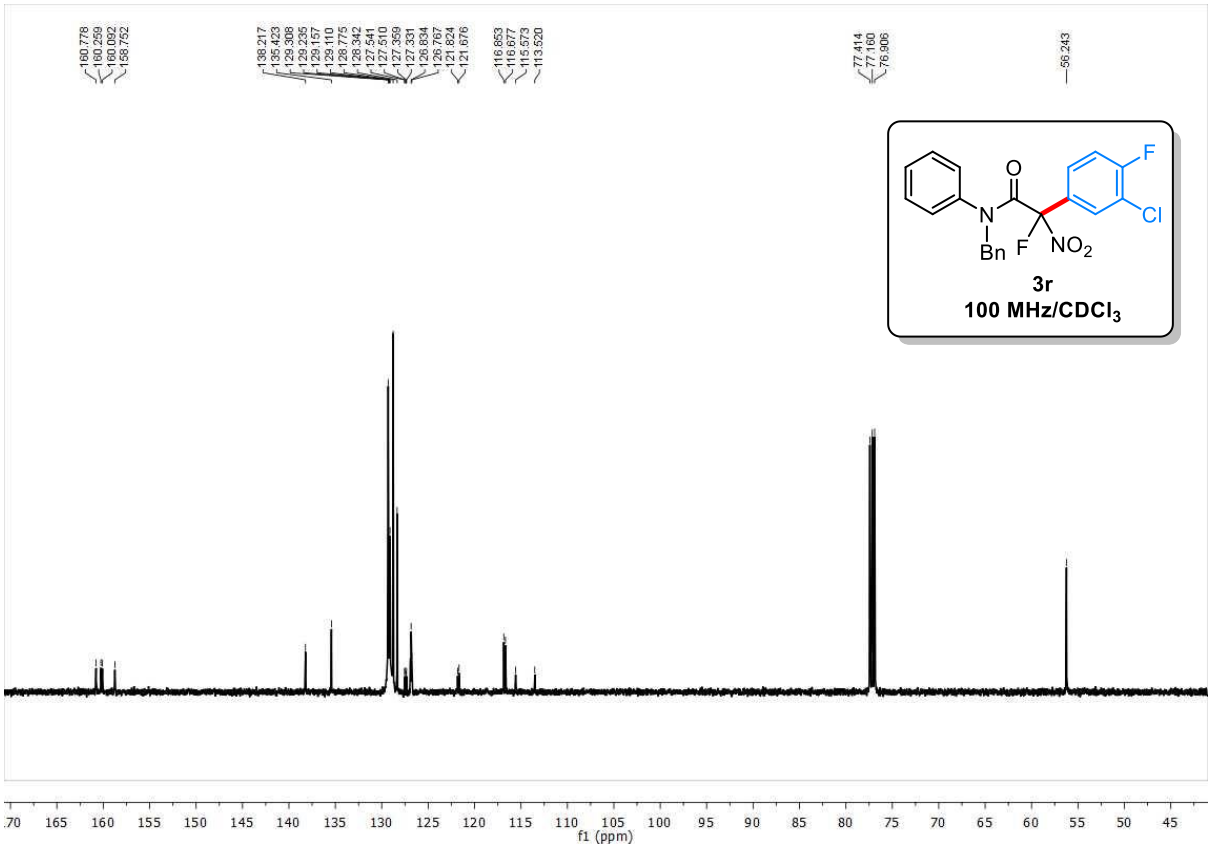

122.579
O
N
Bn
F
NO2
CN
3p
376 MHz/CDCl3
f1 (ppm)

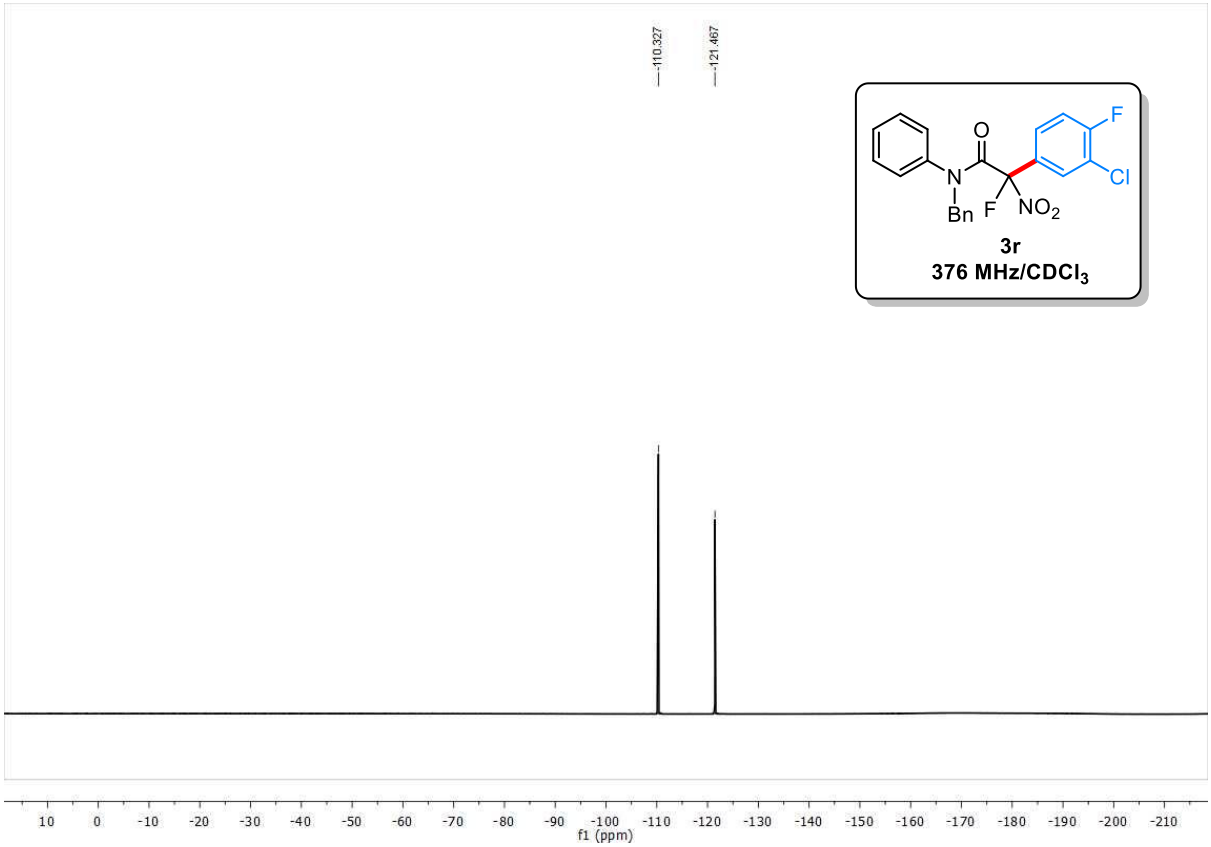

7.343
7.332
7.325
7.313
7.305
7.298
7.293
7.290
7.288
7.280
7.276
7.260
7.231
7.228
7.223
7.218
7.209
7.201
7.173
7.155
7.136
7.110
7.100
7.090
7.081
7.071
7.040
6.756
5.033
4.998
4.880
4.845
2.168
2.158
Me
O
N
Bn
F
NO2
3q
400 MHz/CDCl3
4.20
3.02
1.27
4.00
2.05
1.04
1.02
3.06
9.5 9.0 8.5 8.0 7.5 7.0 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)

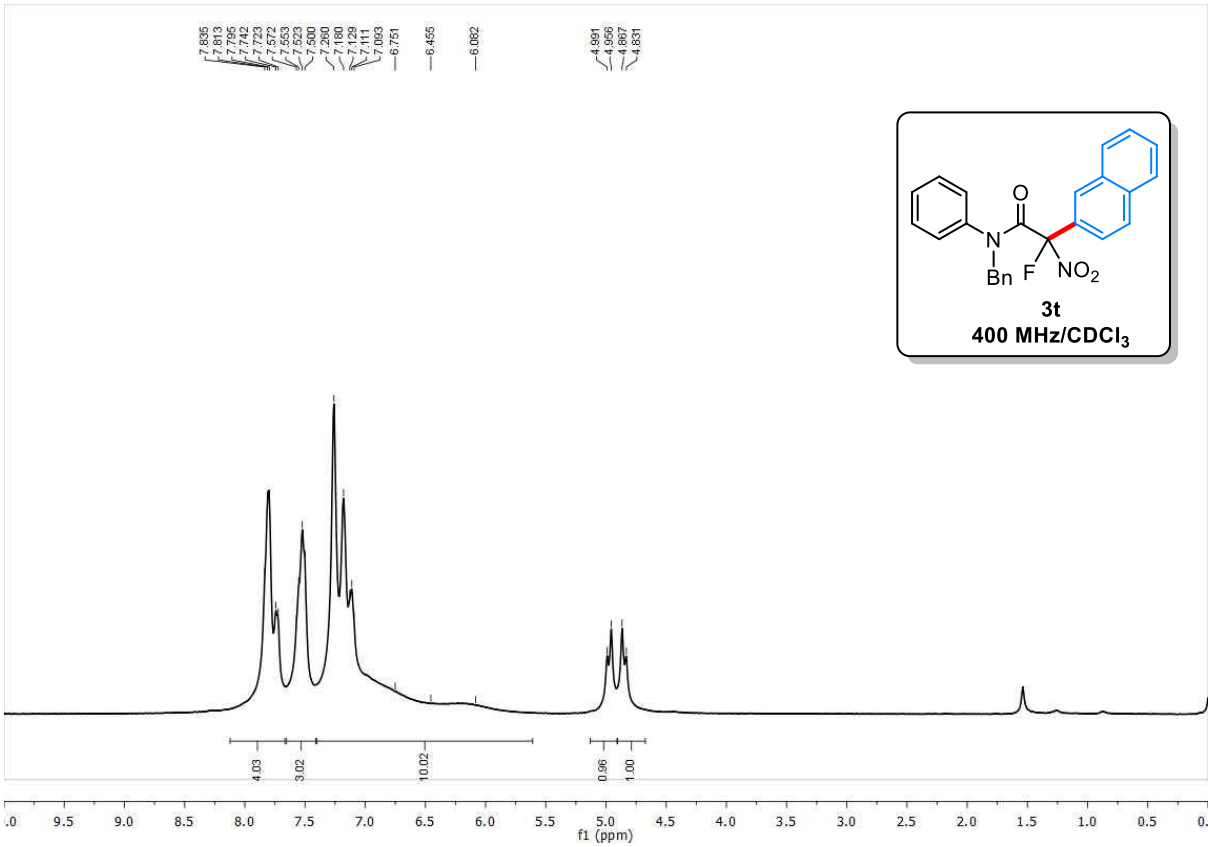

161.031
160.810
138.734
138.707
137.347
135.626
132.370
131.147
129.622
129.357
129.157
129.065
128.675
128.624
128.268
127.938
127.844
125.809
119.691
117.144
77.478
77.160
76.842
56.228
20.570
20.509
Me
O
N
Bn
F
NO2
3q
100 MHz/CDCl3
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

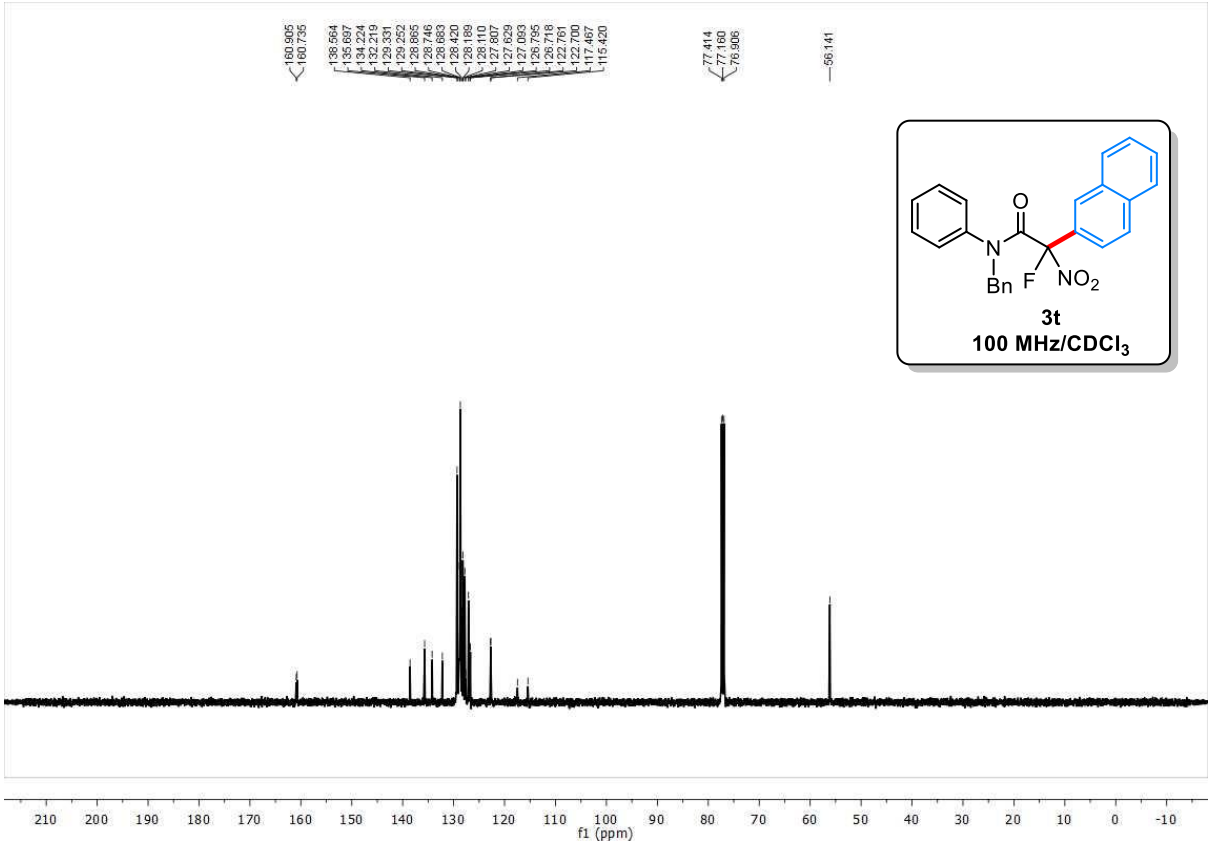

-113.580
Me
O
N
Bn
F
NO2
3q
376 MHz/CDCl3
f1 (ppm)

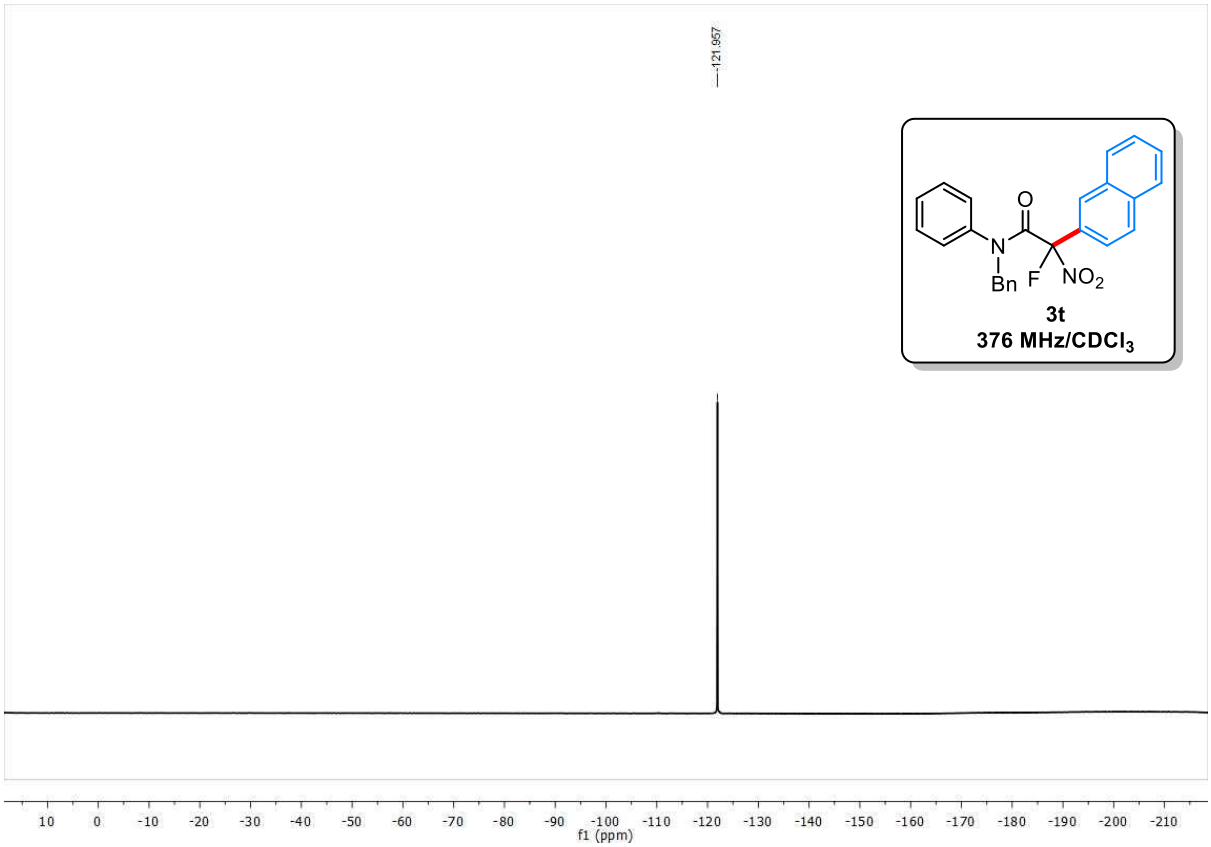

7.446
7.440
7.429
7.423
7.371
7.361
7.351
7.350
7.344
7.340
7.290
7.283
7.274
7.260
7.256
7.251
7.240
7.199
7.180
7.151
7.142
7.125
7.103
7.082
6.282
4.933
4.898
4.863
4.848
F
Cl
O
N
Bn
F
NO2
3r
400 MHz/CDCl3
1.05
1.14
5.08
5.09
1.03
0.99
1.00
f1 (ppm)

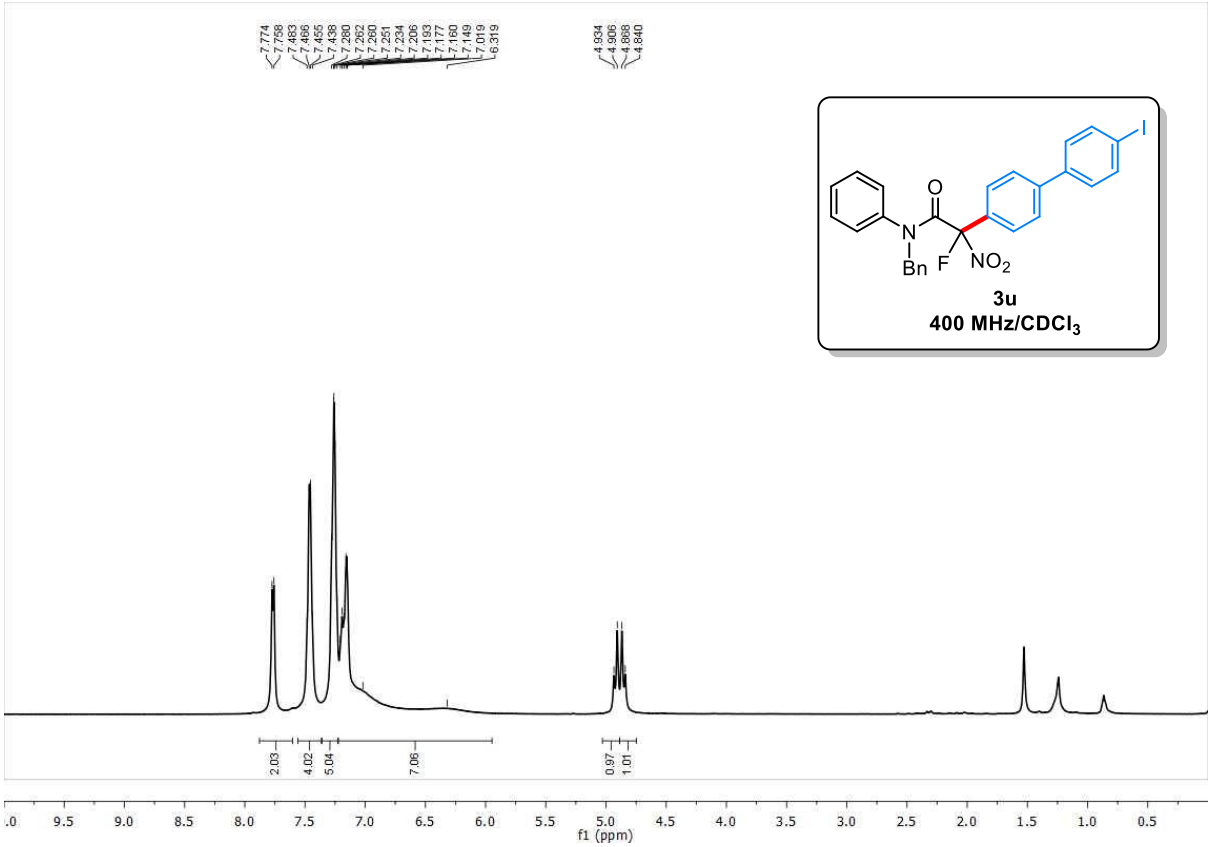

160.778
160.259
160.092
158.752
138.217
135.423
129.308
129.235
129.157
129.110
128.775
128.342
127.541
127.510
127.359
127.331
126.834
126.767
121.824
121.676
116.853
116.677
115.573
113.520
77.414
77.160
76.906
56.243
F
Cl
O
N
Bn
F
NO2
3r
100 MHz/CDCl3
f1 (ppm)

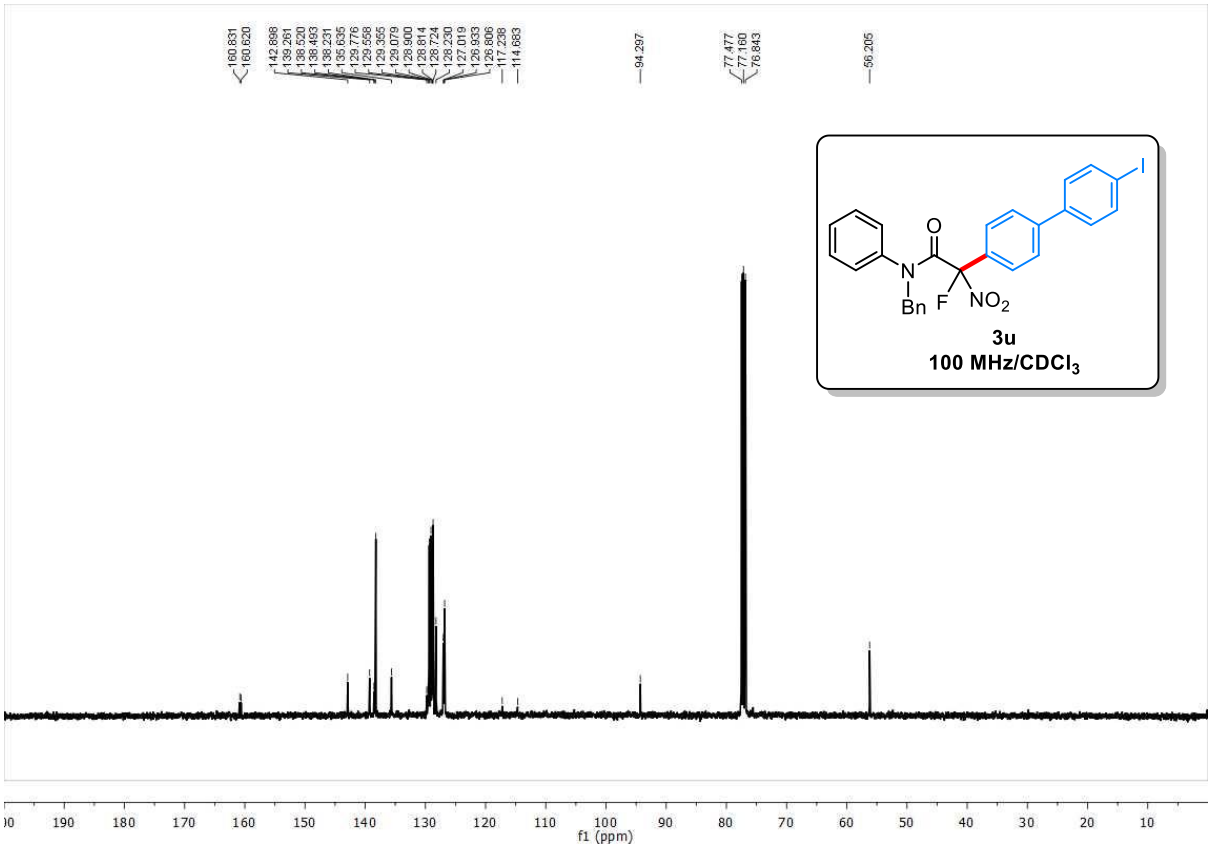

-110.327
-121.467
F
Cl
O
N
Bn
F
NO2
3r
376 MHz/CDCl3
f1 (ppm)

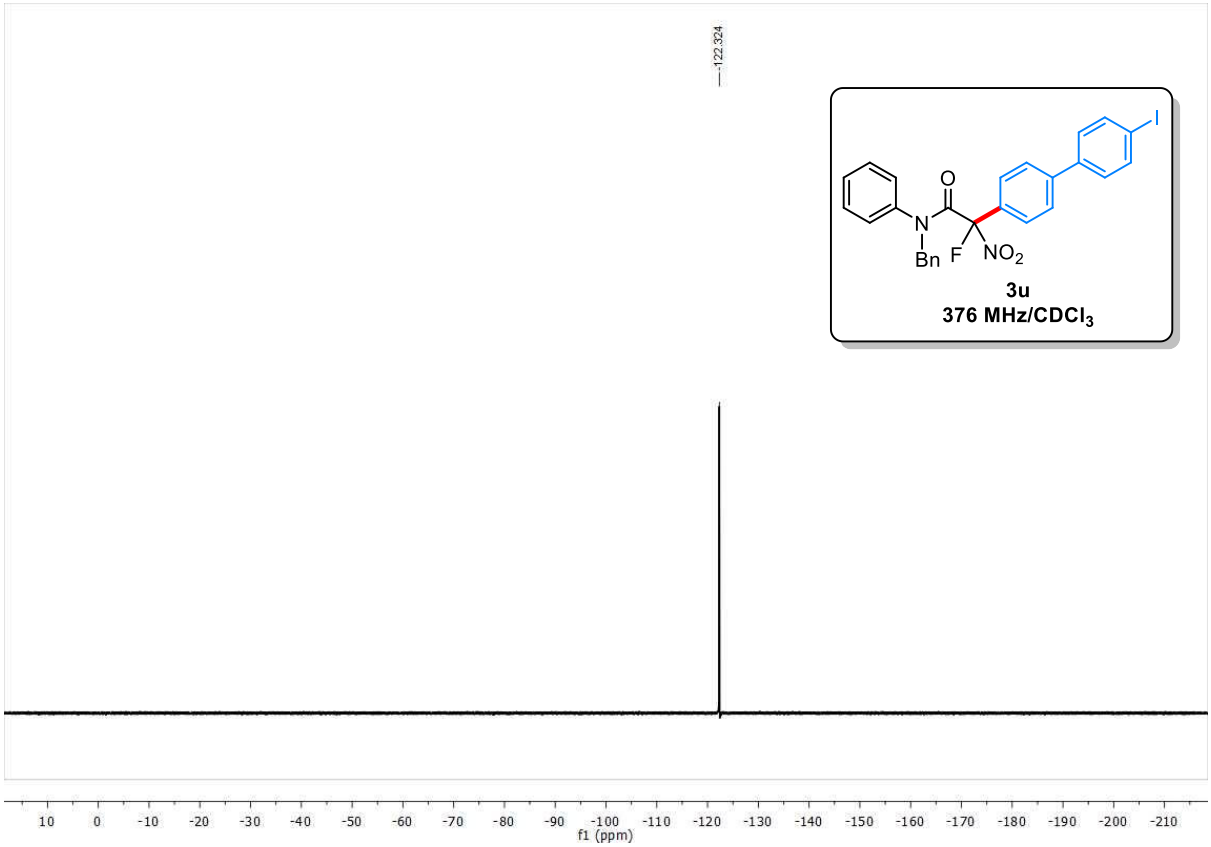

7.835
7.813
7.795
7.742
7.723
7.572
7.553
7.523
7.500
7.260
7.180
7.129
7.111
7.083
6.751
6.455
6.062
4.991
4.956
4.867
4.831
O
N
Bn
F
NO2
3t
400 MHz/CDCl3
4.03
3.02
10.02
0.96
1.00
f1 (ppm)

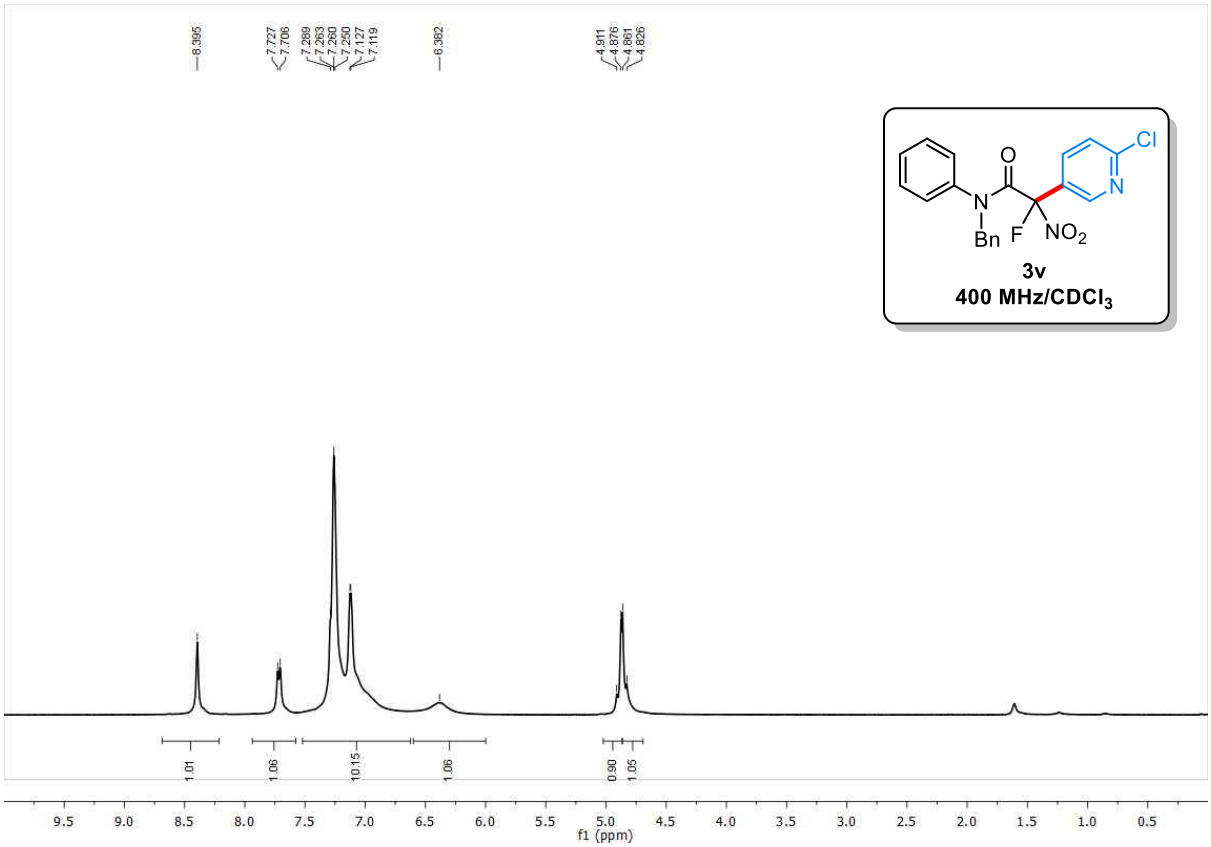

160.905
160.735
138.564
135.697
134.224
132.219
129.331
129.252
128.865
128.746
128.683
128.420
128.189
128.110
127.807
127.629
127.093
126.795
126.718
122.761
122.700
117.467
115.420
77.414
77.160
76.906
56.141
O
N
Bn
F
NO2
3t
100 MHz/CDCl3
f1 (ppm)

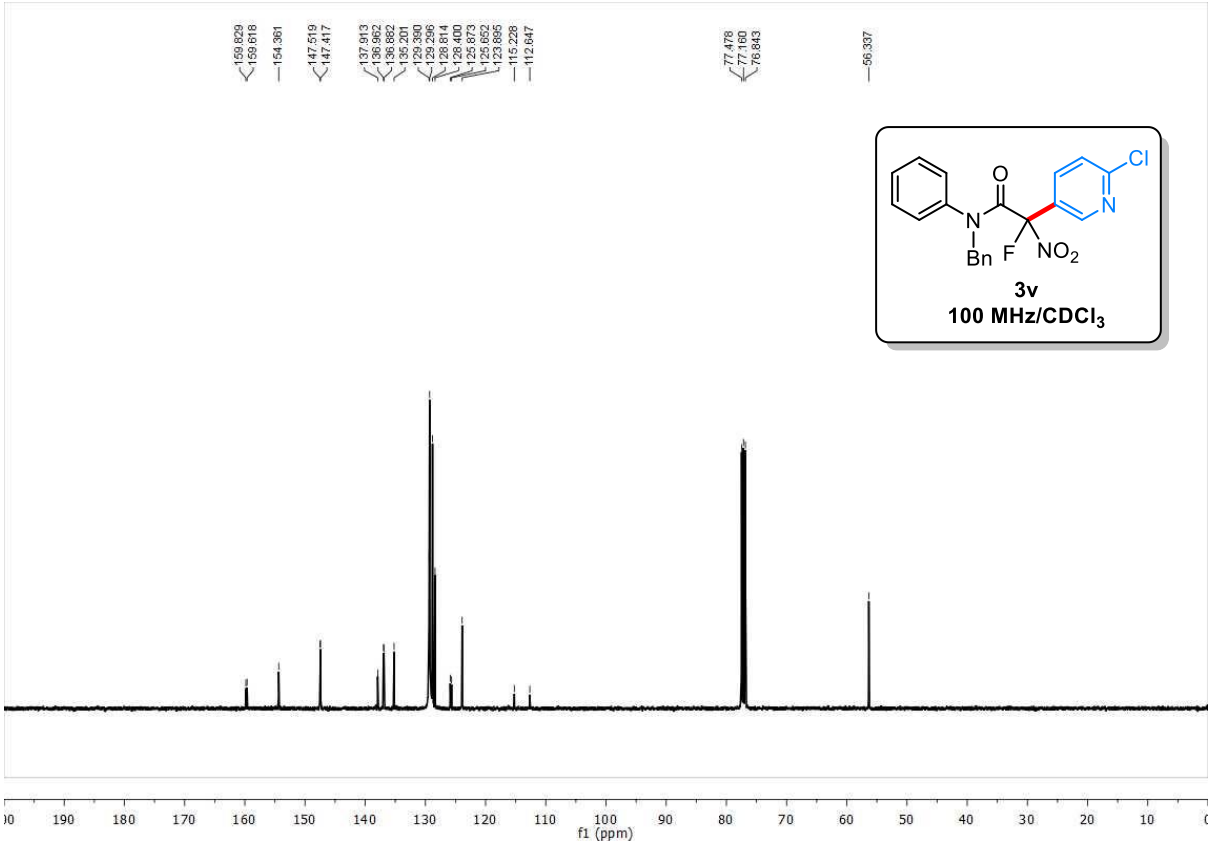

-121.957
3t
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

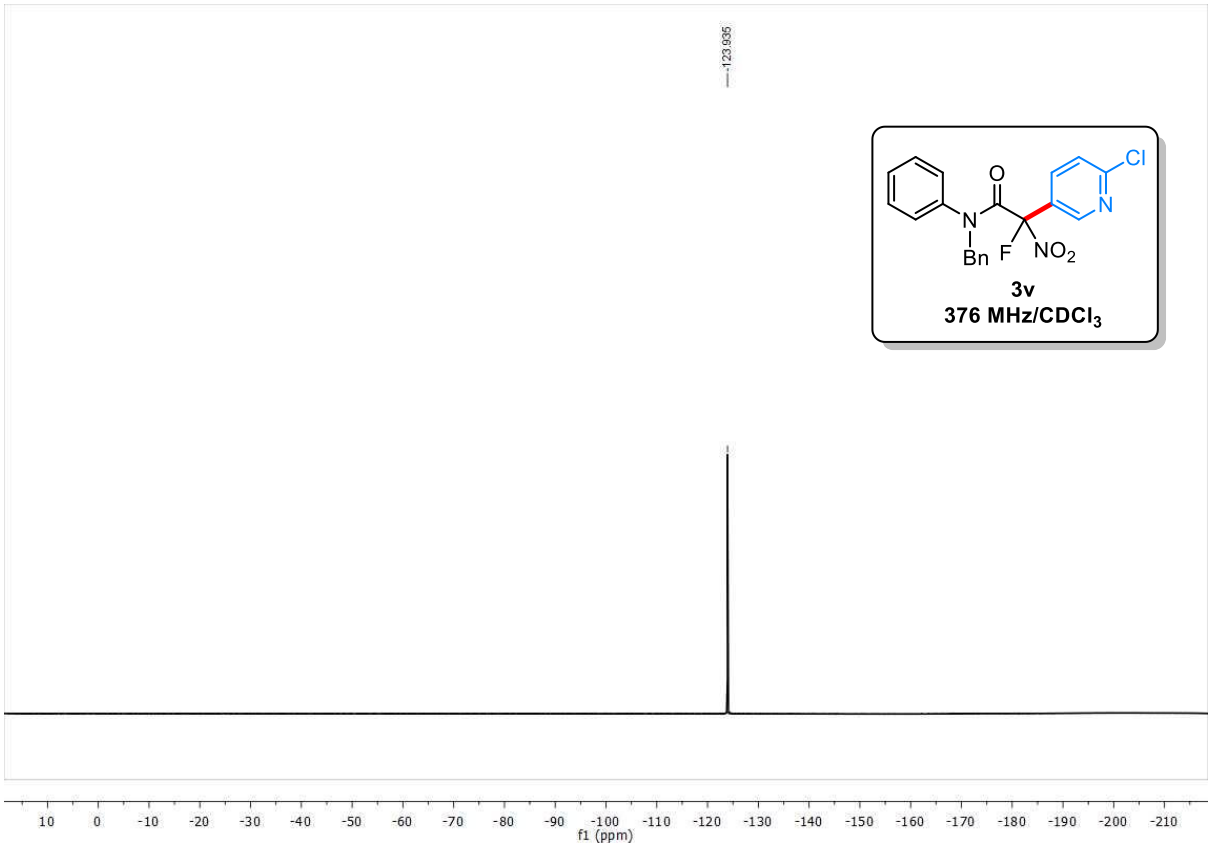

7.774
7.758
7.483
7.466
7.455
7.438
7.280
7.262
7.260
7.251
7.234
7.206
7.193
7.177
7.160
7.149
7.019
6.319
4.934
4.906
4.868
4.840
3u
400 MHz/CDCl3
2.03
4.02
5.04
7.06
0.97
1.01
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

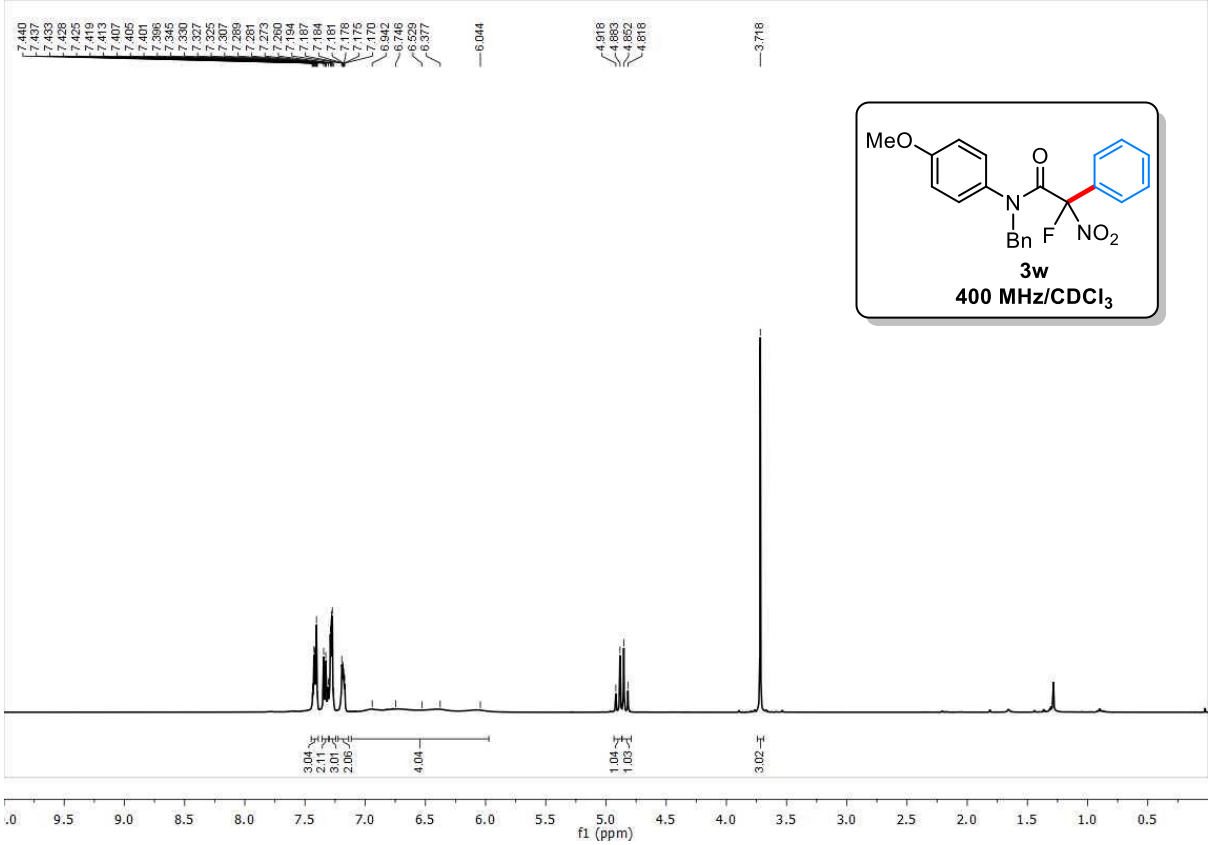

160.831
160.620
142.898
139.261
138.520
138.493
138.231
135.635
129.776
129.558
129.355
129.079
128.900
128.814
128.724
128.230
127.019
126.933
126.806
117.238
114.683
94.297
77.477
77.160
76.843
56.205
O
N
Bn
F
NO2
I
3u
100 MHz/CDCl3
f1 (ppm)


122.324
O
N
Bn
F
NO2
I
3u
376 MHz/CDCl3
f1 (ppm)


8.395
7.727
7.706
7.289
7.263
7.260
7.250
7.127
7.119
6.382
4.911
4.876
4.861
4.826
Cl
O
N
Bn
F
NO2
3v
400 MHz/CDCl3
1.01
1.06
10.15
1.06
0.90
1.05
f1 (ppm)


159.829
159.618
154.361
147.519
147.417
137.913
136.962
136.882
135.201
129.390
129.296
128.814
128.400
125.873
125.652
123.895
115.228
112.647
77.478
77.160
76.843
56.337
Cl
O
N
Bn
F
NO2
3v
100 MHz/CDCl3
f1 (ppm)


-123.935
Cl
O
N
Bn F NO2
3v
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)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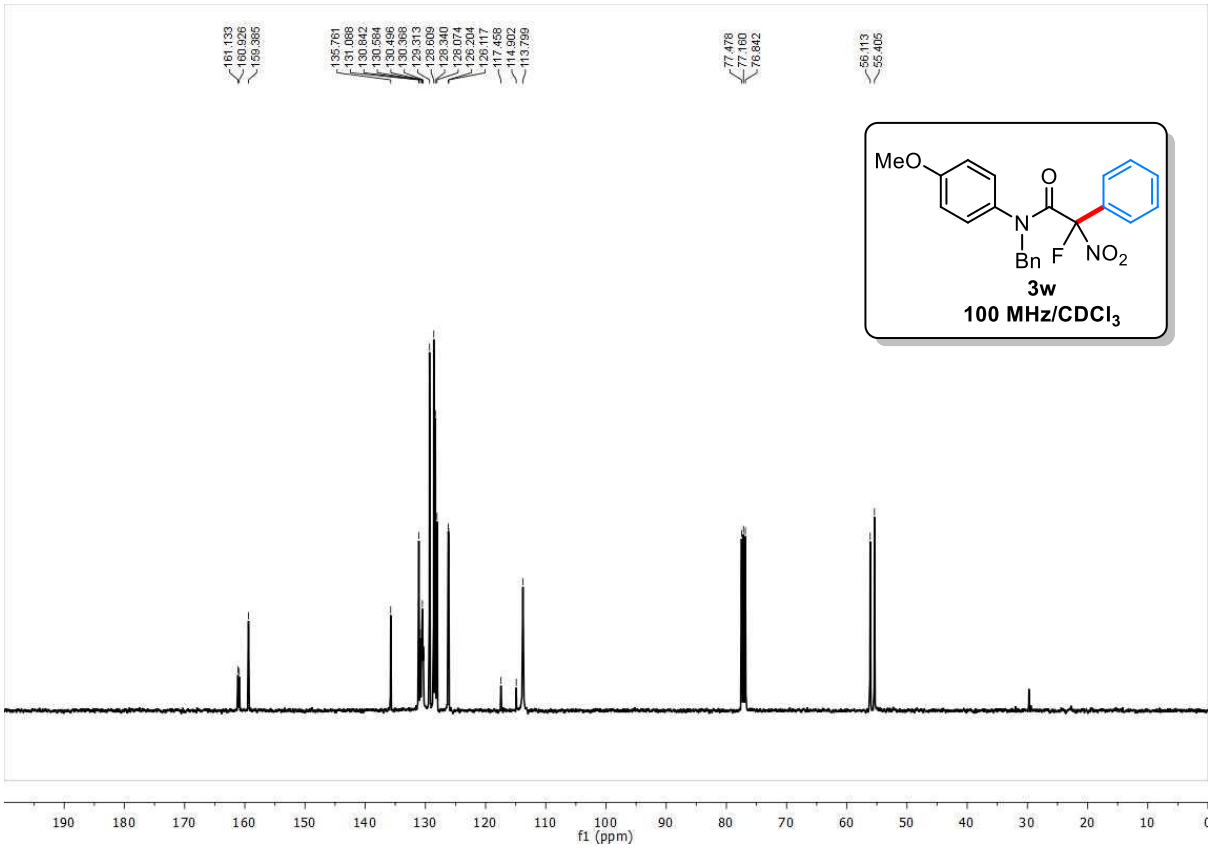
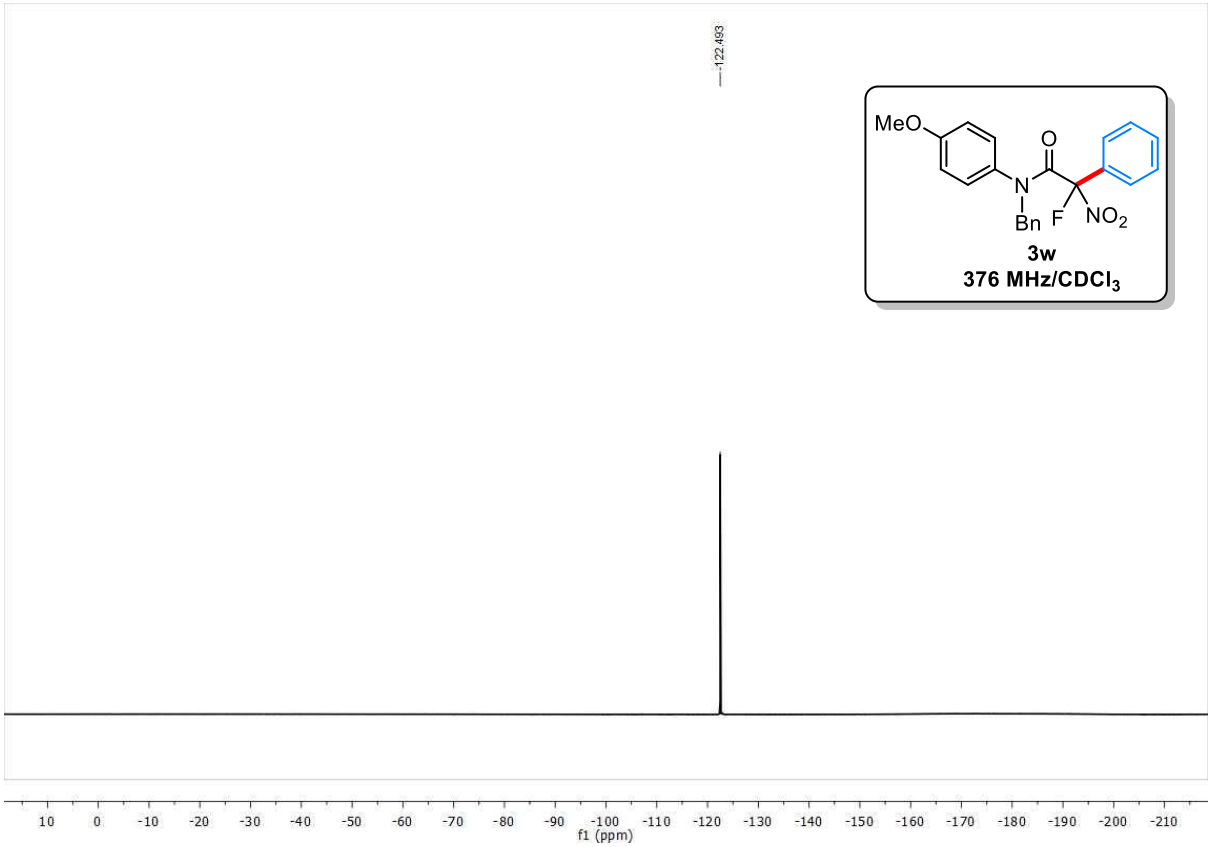
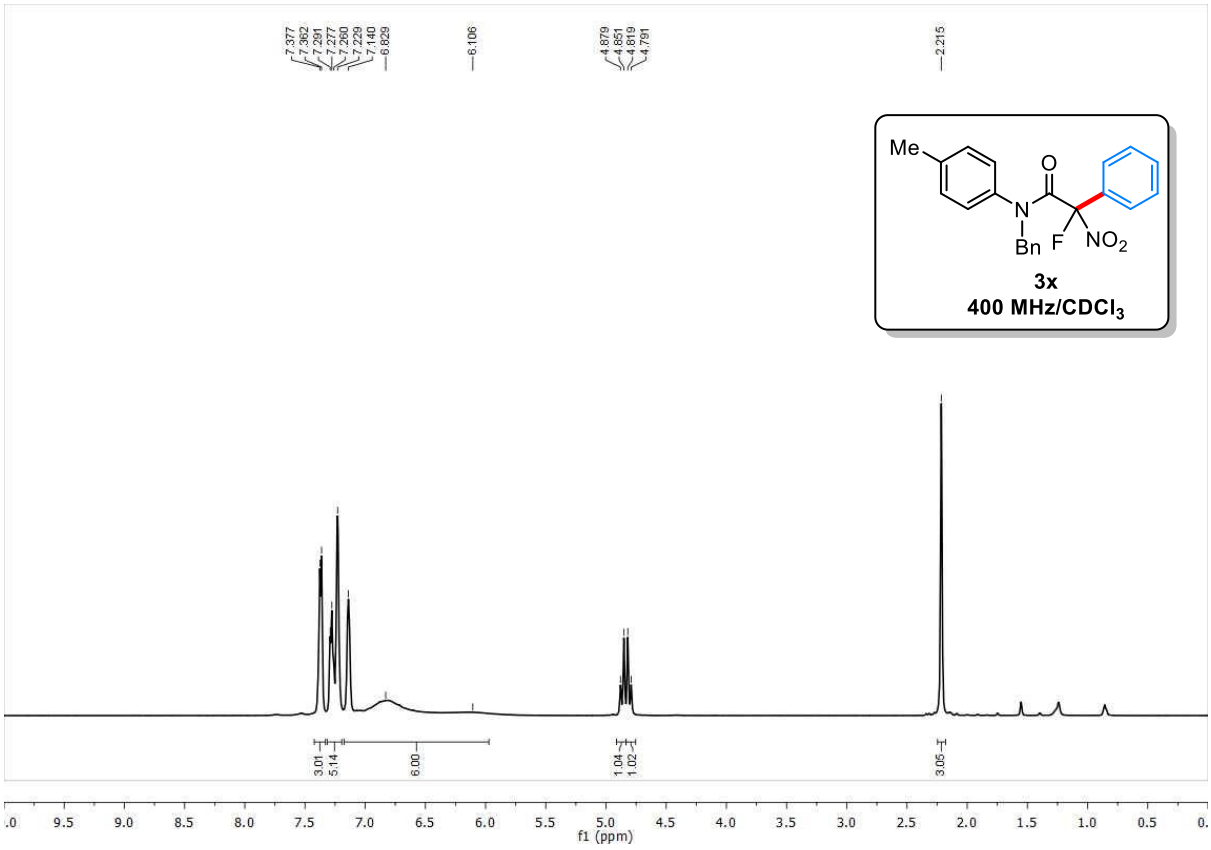
7.425
7.419
7.413
7.407
7.405
7.401
7.396
7.345
7.330
7.327
7.325
7.307
7.289
7.281
7.273
7.260
7.194
7.187
7.184
7.181
7.178
7.175
7.170
6.942
6.746
6.529
6.377
6.044
4.918
4.883
4.862
4.818
3.718
MeO
O
N
Bn F NO2
3w
400 MHz/CDCl3
3.04
2.11
3.01
2.06
4.04
1.04
1.03
3.02
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)


161.133
160.926
159.385
135.761
131.088
130.842
130.584
130.496
130.368
129.313
128.609
128.340
128.074
126.204
126.117
117.458
114.902
113.799
77.478
77.160
76.842
56.113
55.405
MeO
O
N
Bn
F
NO2
3w
100 MHz/CDCl3
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


-122.493
MeO
O
N
Bn
F
NO2
3w
376 MHz/CDCl3
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)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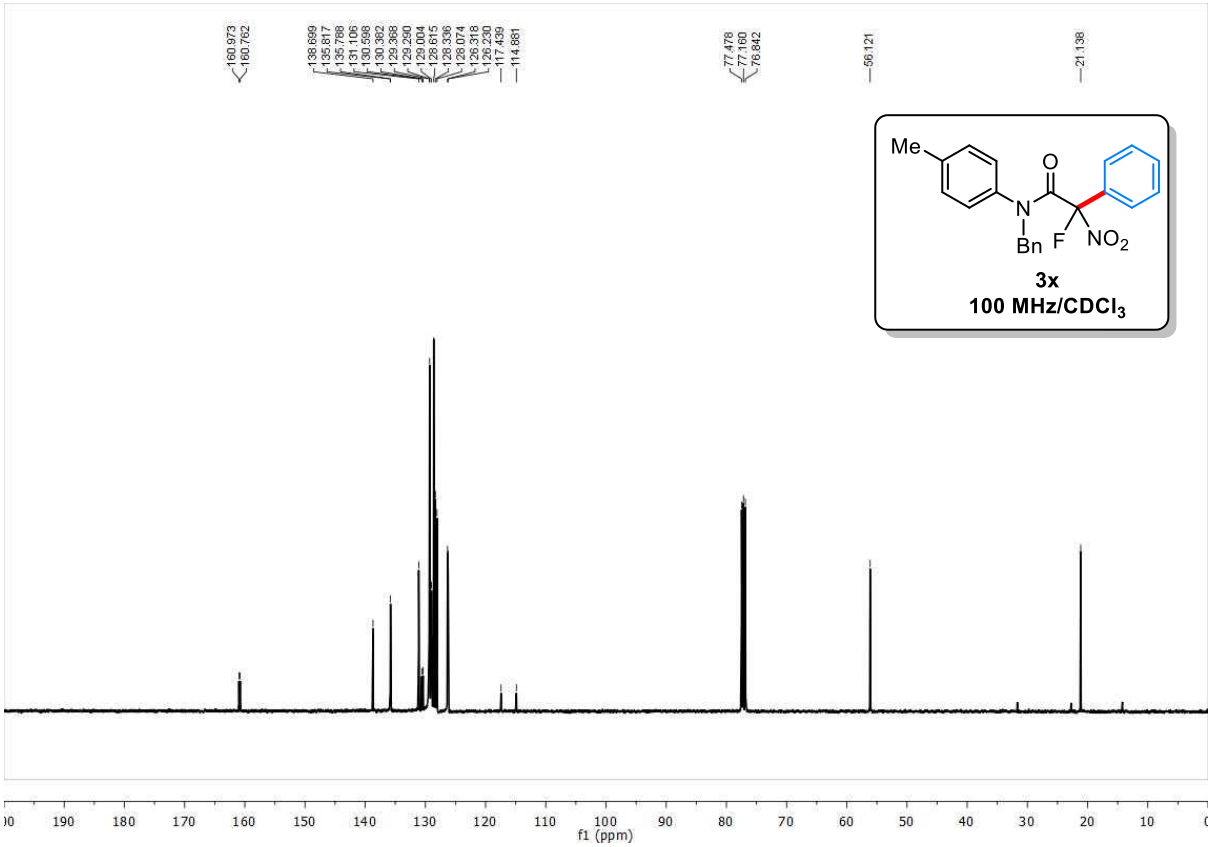
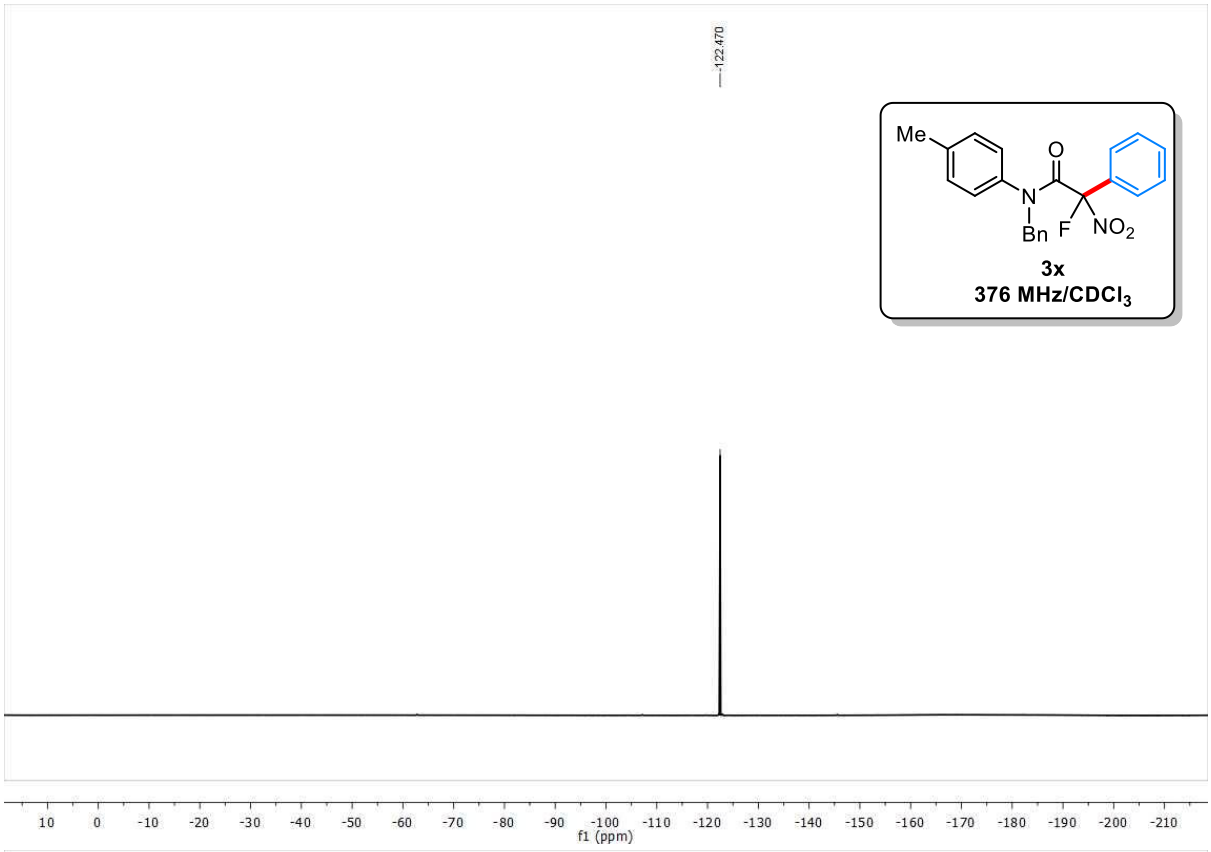
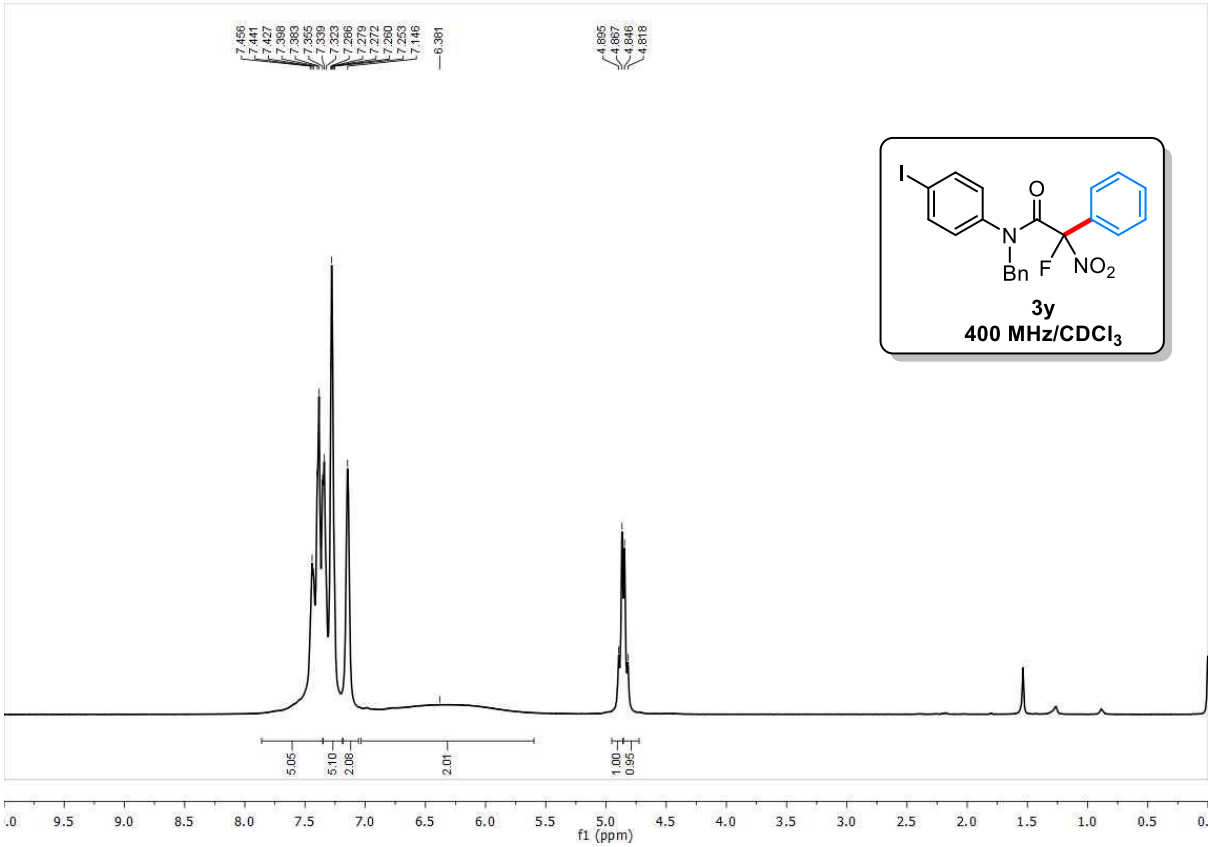
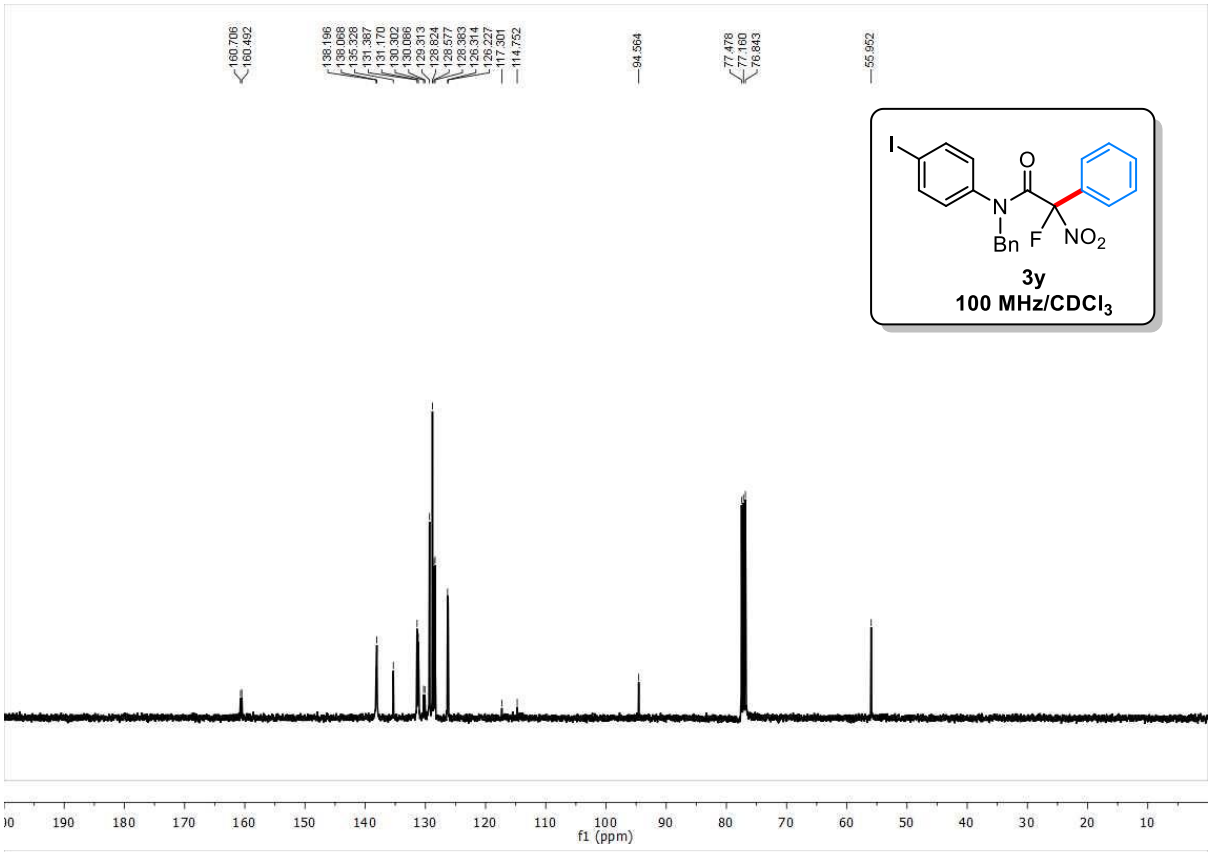
7.362
7.291
7.277
7.260
7.229
7.140
6.829
6.106
4.879
4.851
4.819
4.791
2.215
Me
O
N
Bn
F
NO2
3x
400 MHz/CDCl3
3.01
5.14
6.00
1.04
1.02
3.05
f1 (ppm)


160.973
160.762
138.699
135.817
135.788
131.106
130.598
130.382
129.368
129.290
129.004
128.615
128.336
128.074
126.318
126.230
117.439
114.881
77.478
77.160
76.842
56.121
21.138
Me
O
N
Bn
F
NO2
3x
100 MHz/CDCl3
f1 (ppm)


-122.470
Me
O
N
Bn
F
NO2
3x
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)


7.456
7.441
7.427
7.398
7.383
7.355
7.339
7.323
7.286
7.279
7.272
7.260
7.253
7.146
6.381
4.895
4.867
4.846
4.818
I
O
N
Bn
F
NO2
3y
400 MHz/CDCl3
5.05
5.10
2.08
2.01
1.00
0.95
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)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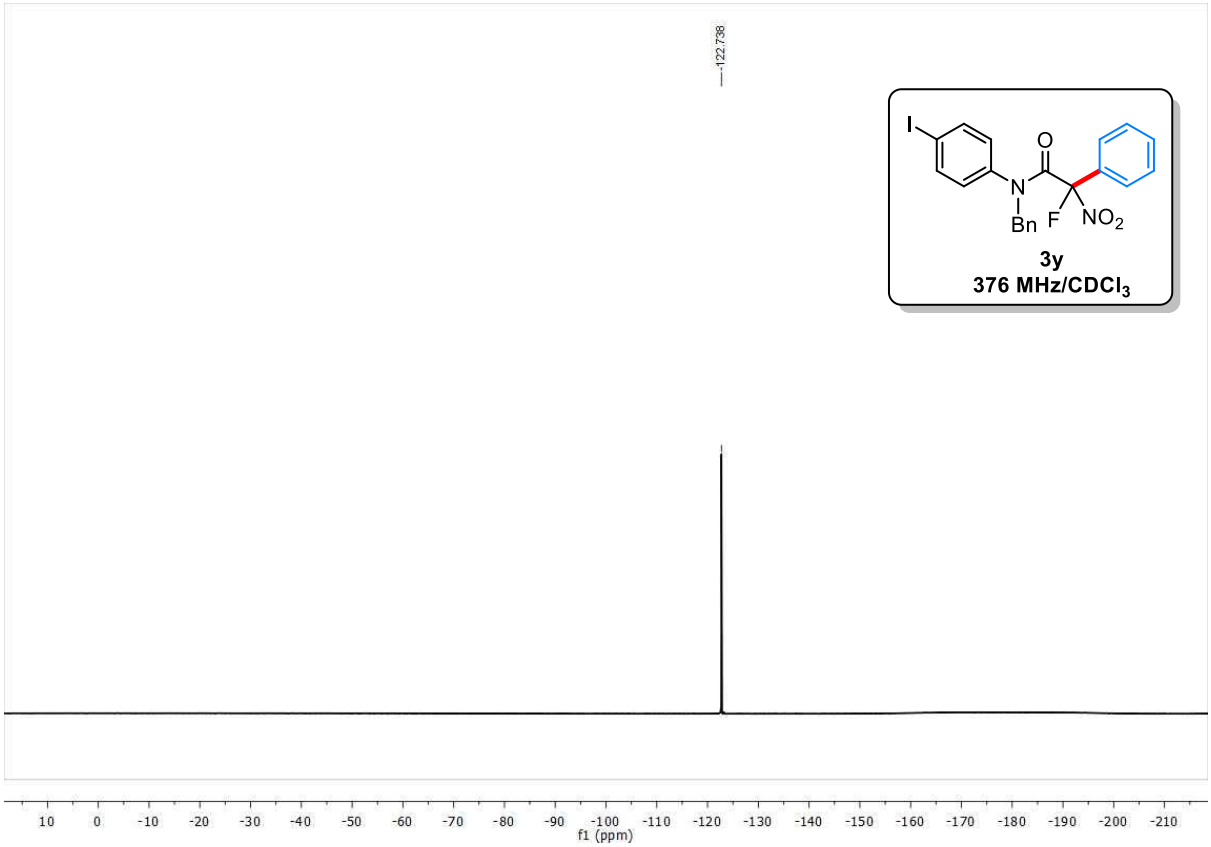
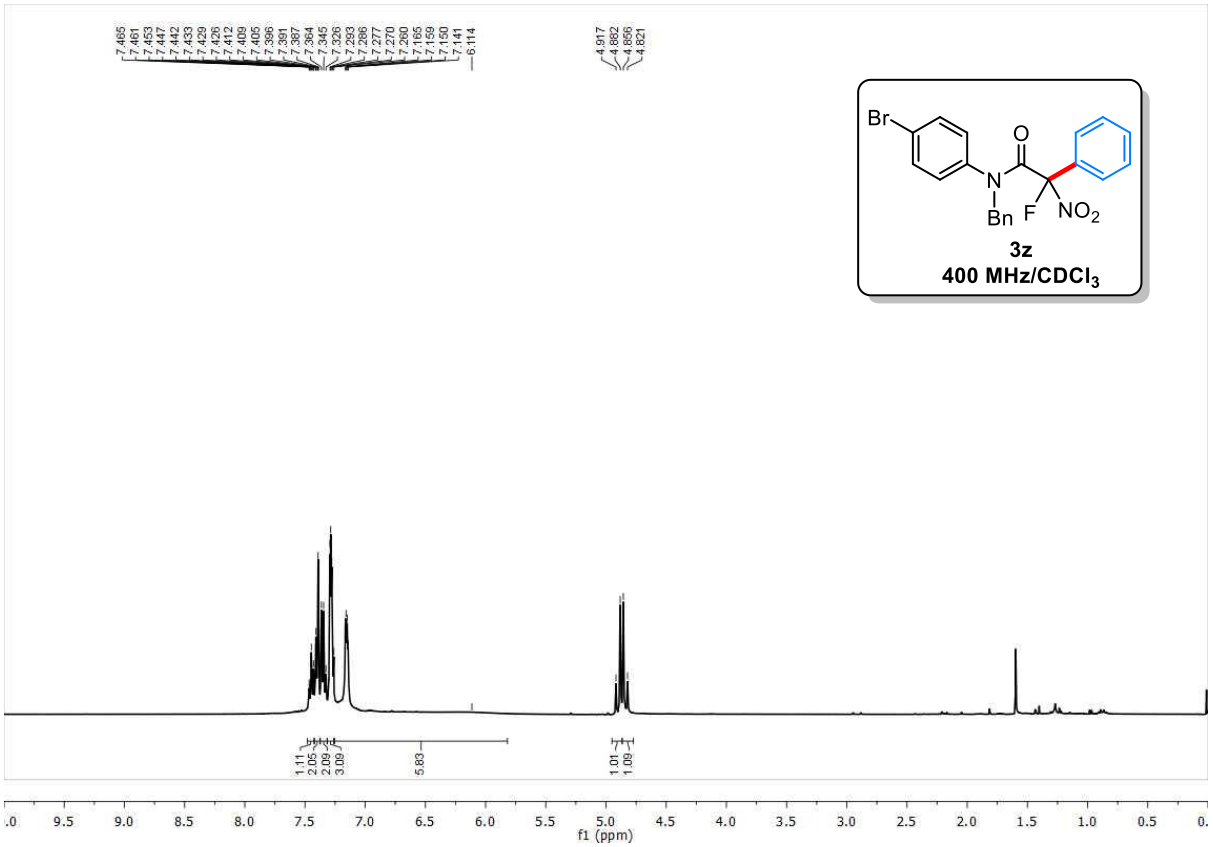
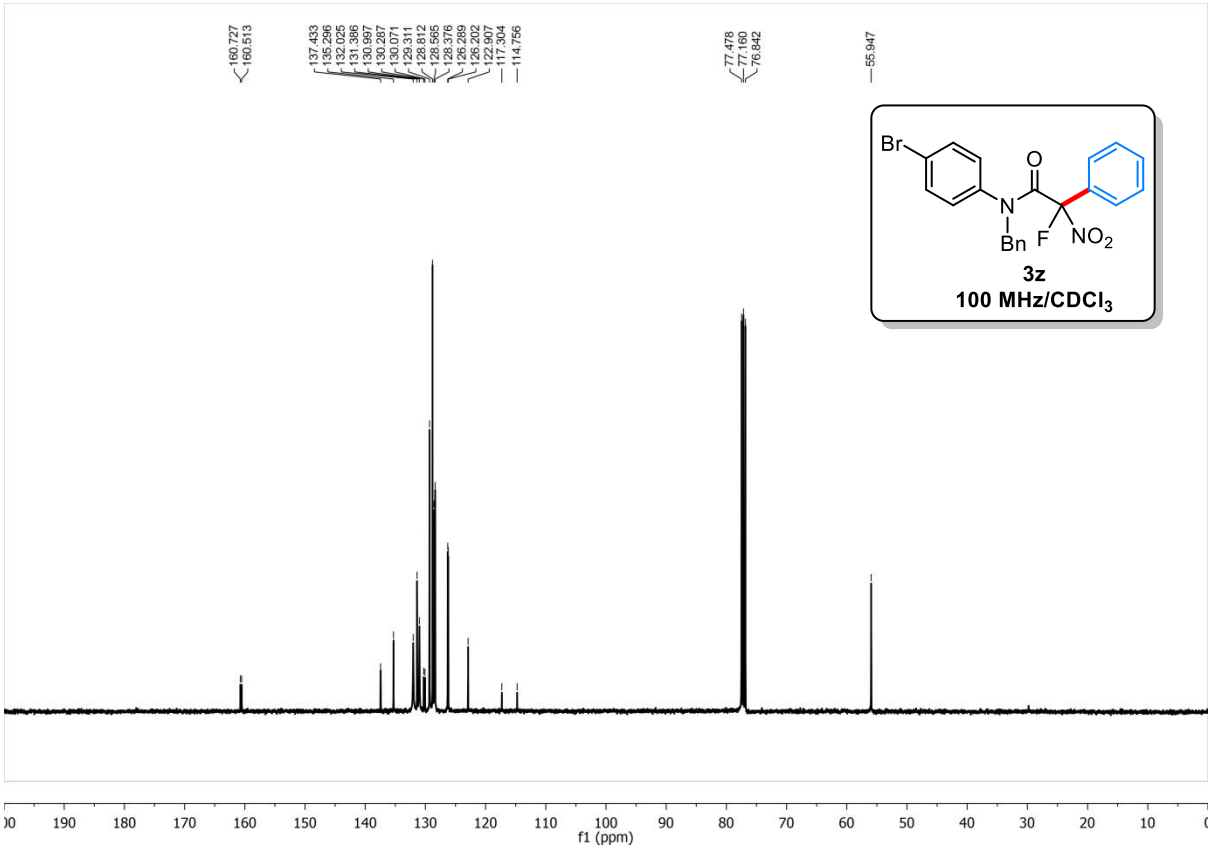
160.452
138.196
136.068
135.328
131.387
131.170
130.302
130.086
129.313
128.824
128.577
128.383
126.314
126.227
117.301
114.752
94.564
77.478
77.160
76.843
55.952
I
O
N
Bn
F
NO2
3y
100 MHz/CDCl3
f1 (ppm)


-122.738
I
O
N
Bn
F
NO2
3y
376 MHz/CDCl3
f1 (ppm)


7.465
7.461
7.453
7.447
7.442
7.433
7.429
7.426
7.412
7.409
7.405
7.396
7.391
7.387
7.364
7.345
7.326
7.293
7.286
7.277
7.270
7.260
7.165
7.159
7.150
7.141
6.114
4.917
4.882
4.866
4.821
1.11
2.05
2.09
3.09
5.83
1.01
1.09
Br
O
N
Bn
F
NO2
3z
400 MHz/CDCl3
f1 (ppm)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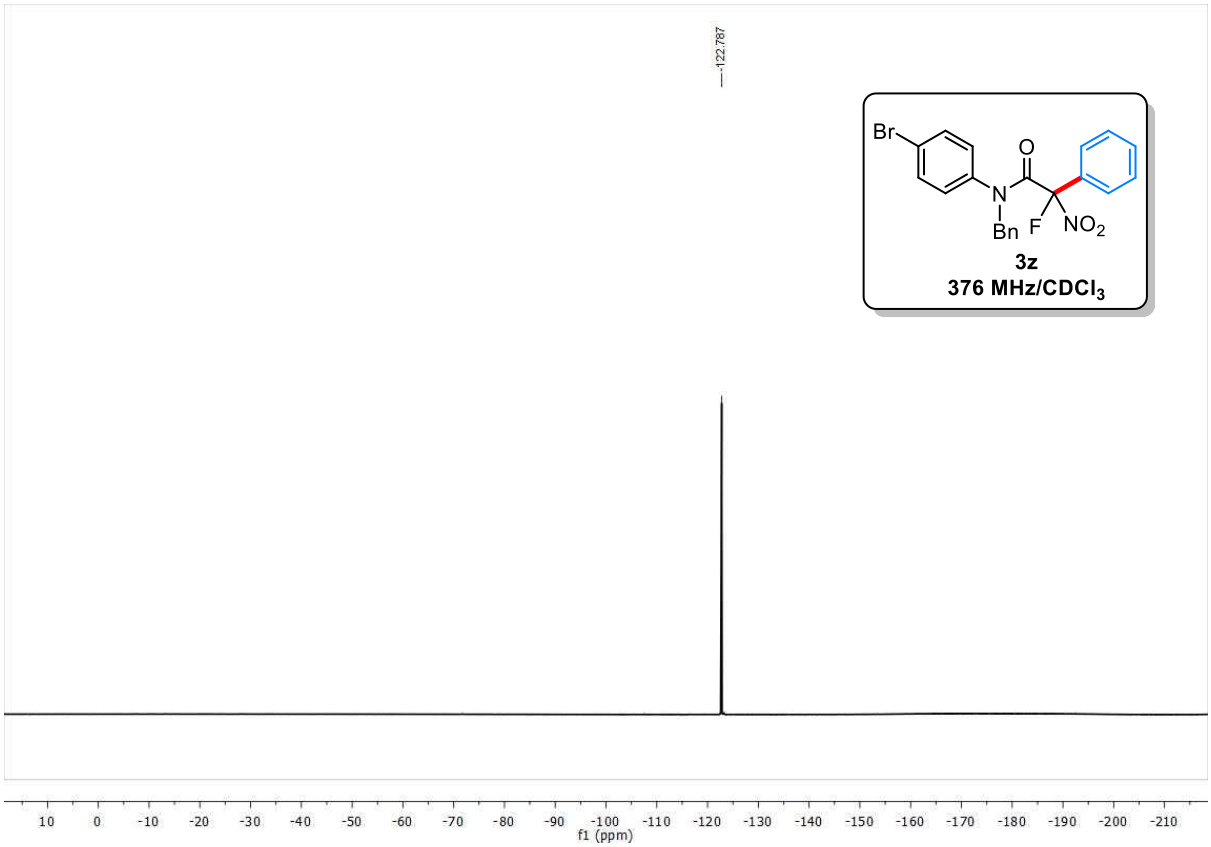
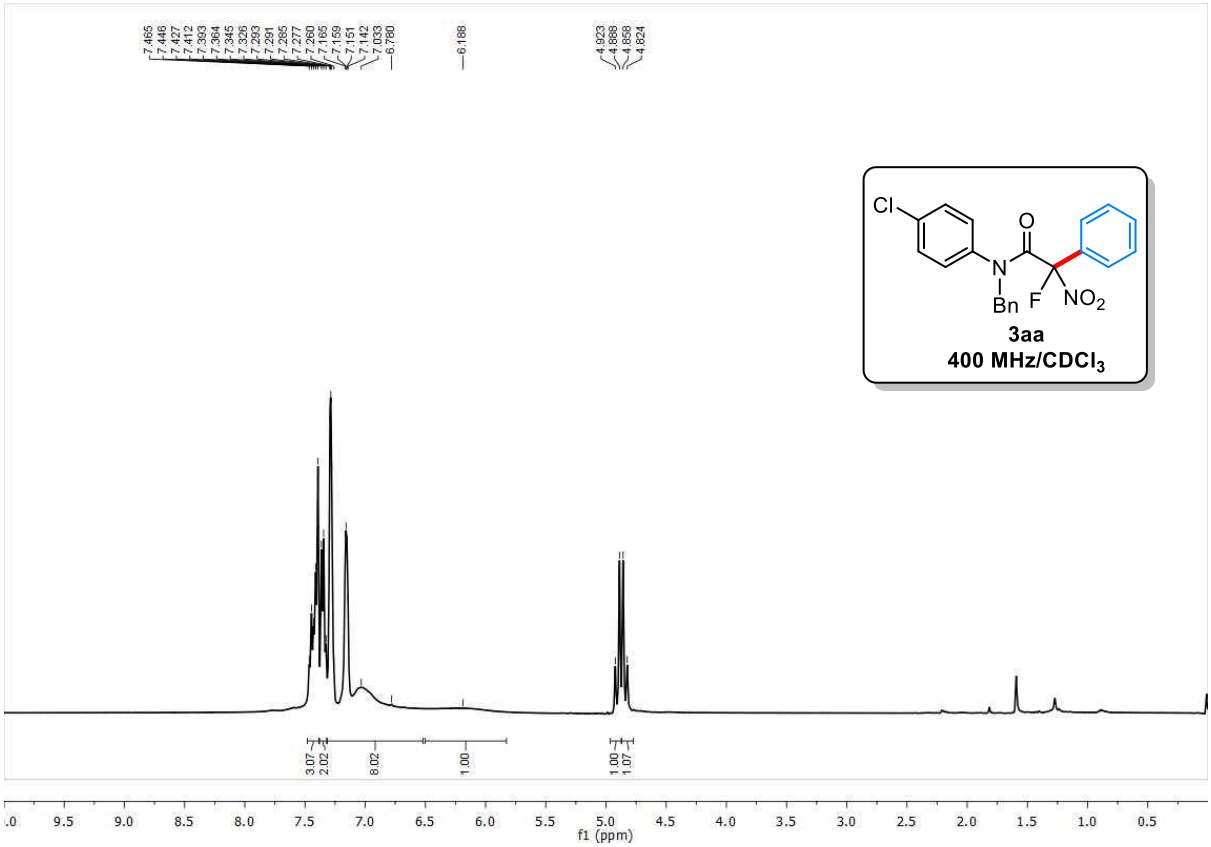
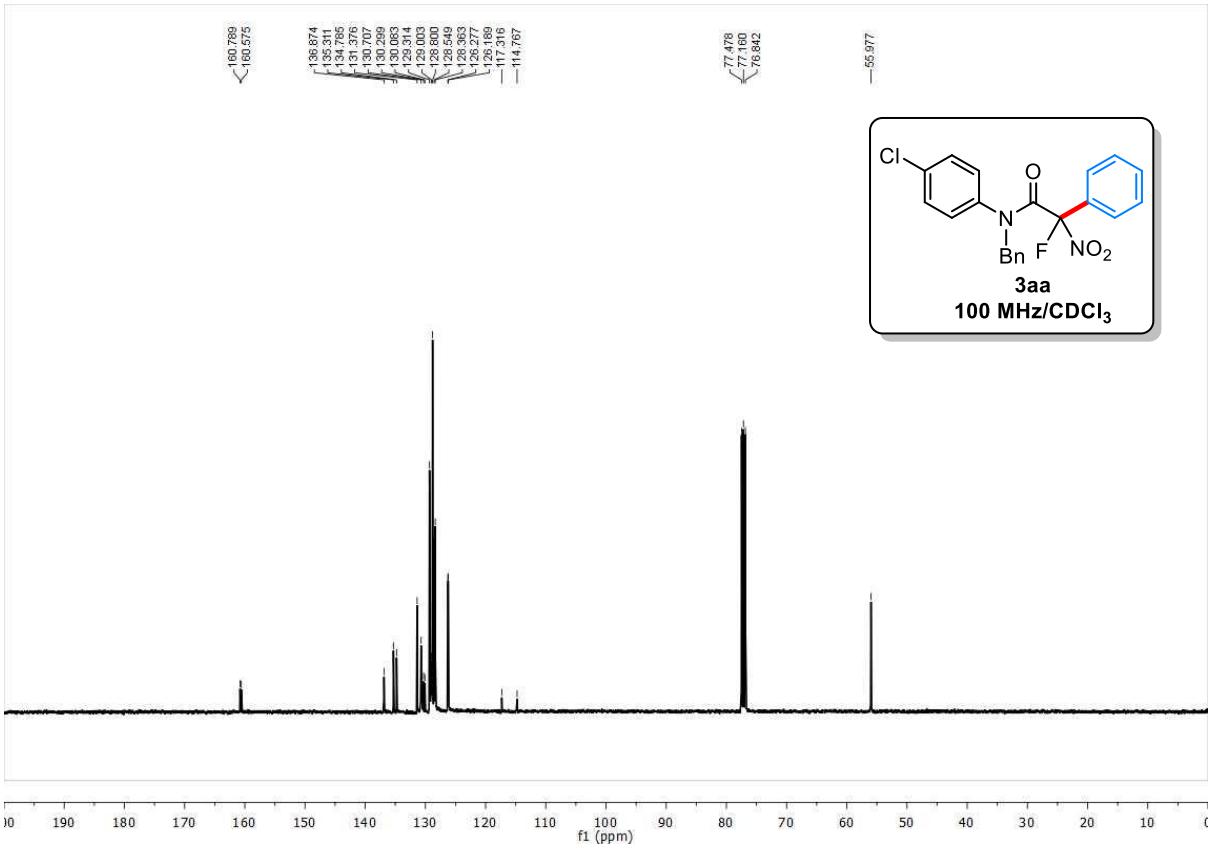
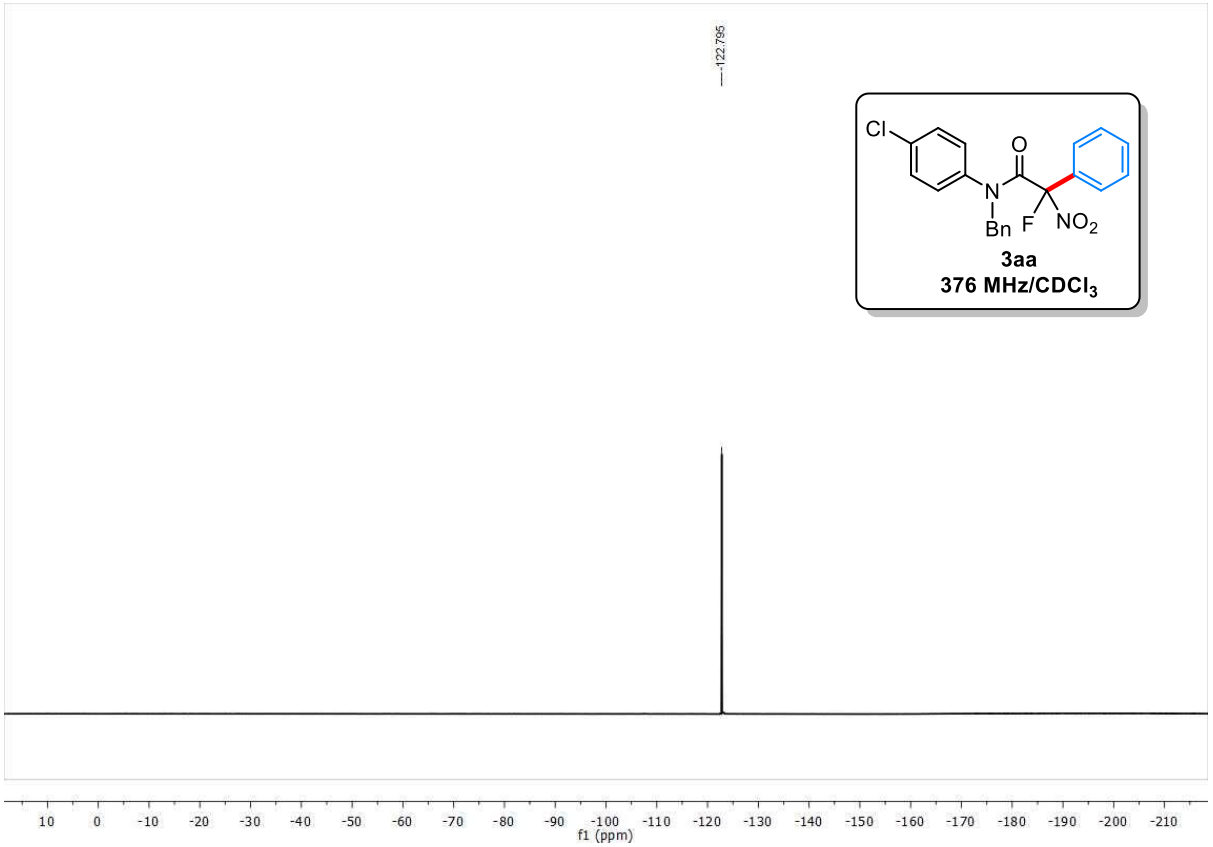
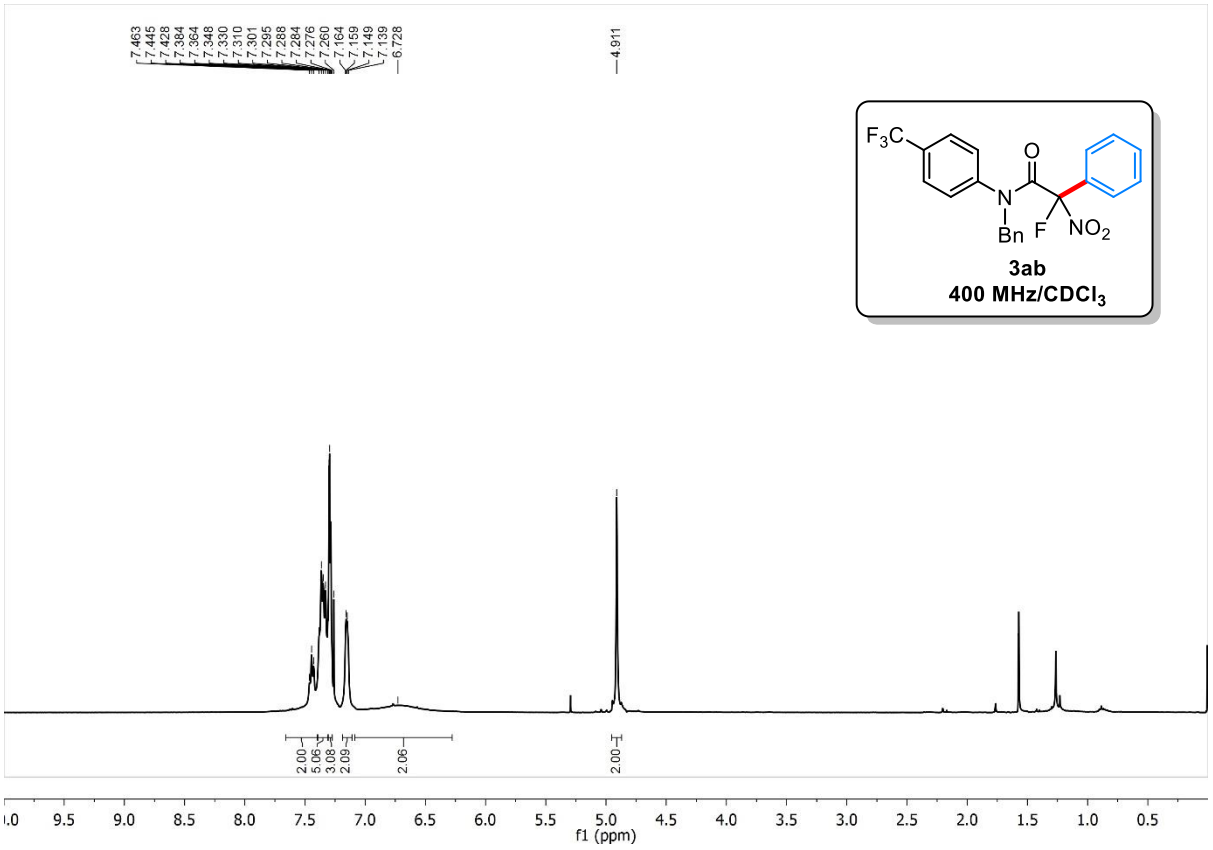
160.513
137.433
135.296
132.025
131.386
130.997
130.287
130.071
129.311
128.812
128.565
128.376
126.289
126.202
122.907
117.304
114.756
77.478
77.160
76.842
55.947
Br
O
N
Bn
F
NO2
3z
100 MHz/CDCl3
f1 (ppm)

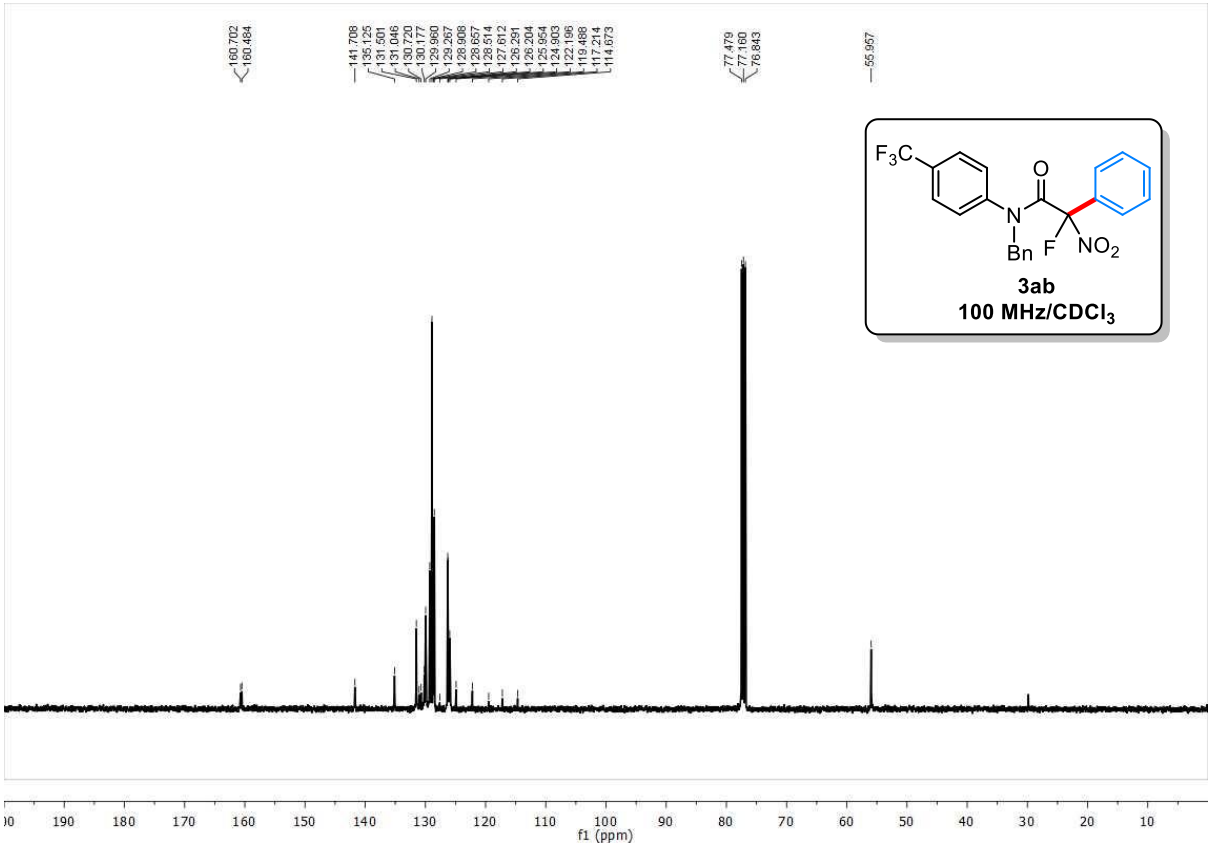

122.787
Br
O
N
Bn
F
NO2
3z
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

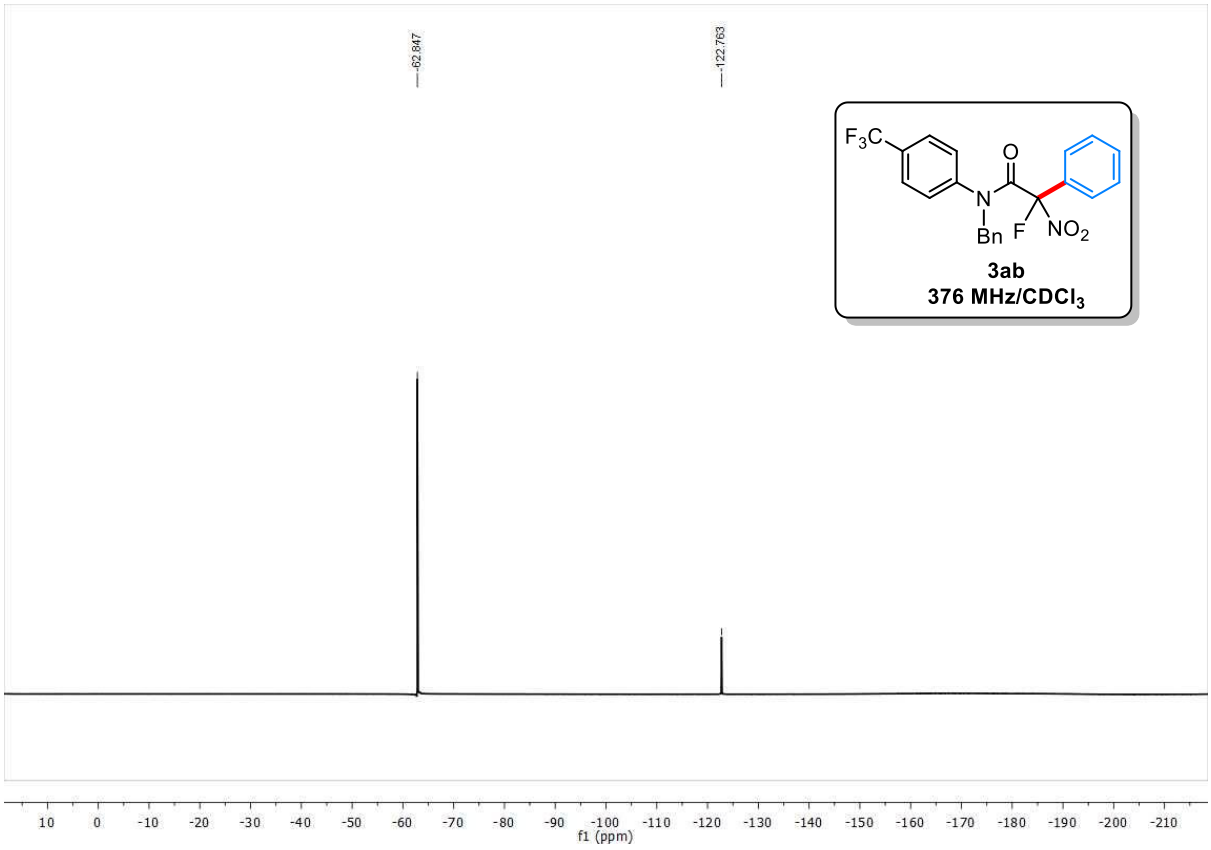

7.465
7.446
7.427
7.412
7.393
7.364
7.345
7.326
7.293
7.291
7.285
7.277
7.260
7.165
7.159
7.151
7.142
7.033
6.780
6.188
4.923
4.888
4.858
4.824
Cl
O
N
Bn
F
NO2
3aa
400 MHz/CDCl3
3.07
2.02
8.02
1.00
1.00
1.07
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

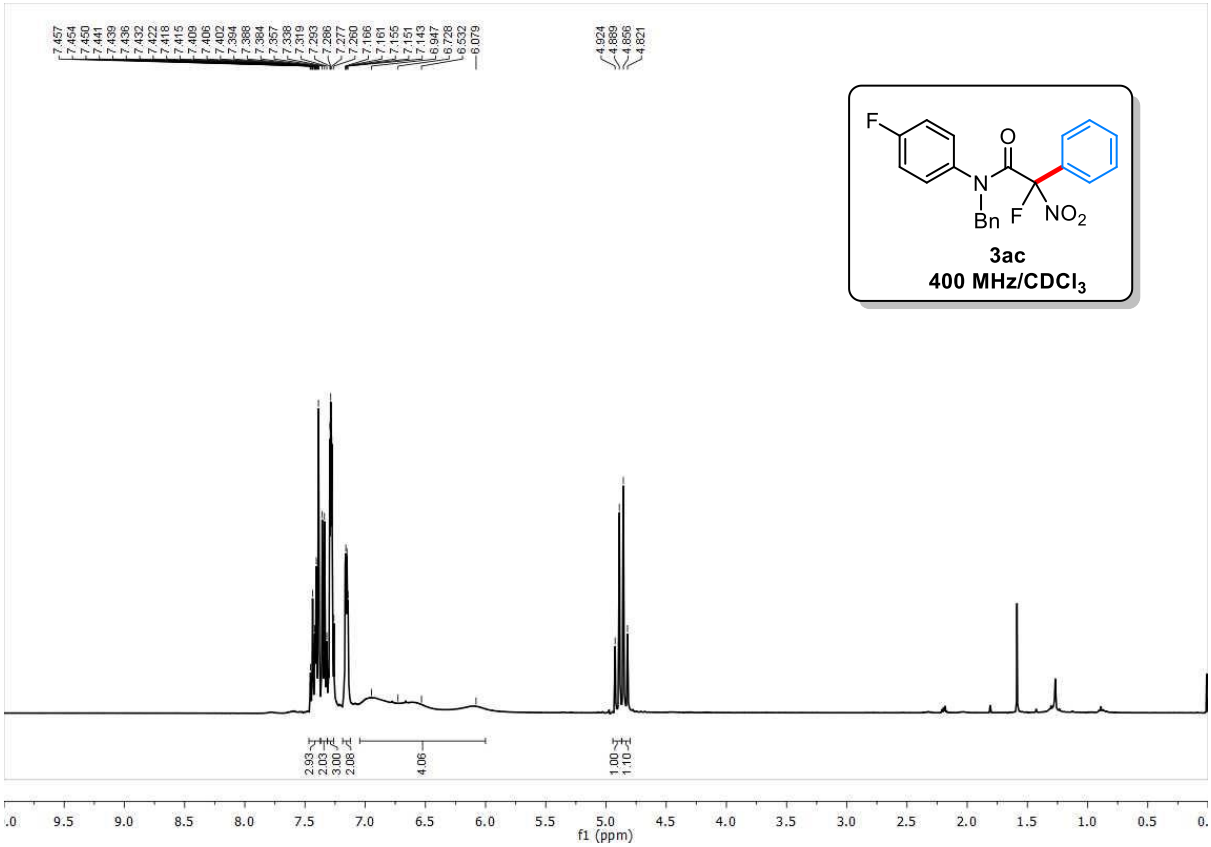

160.789
160.575
136.874
135.311
134.785
131.376
130.707
130.299
130.083
129.314
129.003
128.800
128.549
128.363
126.277
126.189
117.316
114.767
77.478
77.160
76.842
55.977
Cl
O
N
Bn
F
NO2
3aa
100 MHz/CDCl3
f1 (ppm)


-122.795
Cl
O
N
Bn
F
NO2
3aa
376 MHz/CDCl3
f1 (ppm)


7.463
7.445
7.428
7.384
7.364
7.348
7.330
7.310
7.301
7.295
7.288
7.284
7.276
7.260
7.164
7.159
7.149
7.139
6.728
4.911
F3C
O
N
Bn
F
NO2
3ab
400 MHz/CDCl3
2.00
5.06
3.08
2.09
2.06
2.00
f1 (ppm)


160.702
160.484
141.708
135.125
131.501
131.046
130.720
130.177
129.960
129.267
128.908
128.657
128.514
127.612
126.291
126.204
125.954
124.903
122.196
119.466
117.274
114.673
77.479
77.160
76.843
55.957
F3C
O
N
Bn
F
NO2
3ab
100 MHz/CDCl3
f1 (ppm)


-62.847
-122.763
F3C
O
N
Bn
F
NO2
3ab
376 MHz/CDCl3
f1 (ppm)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7.454
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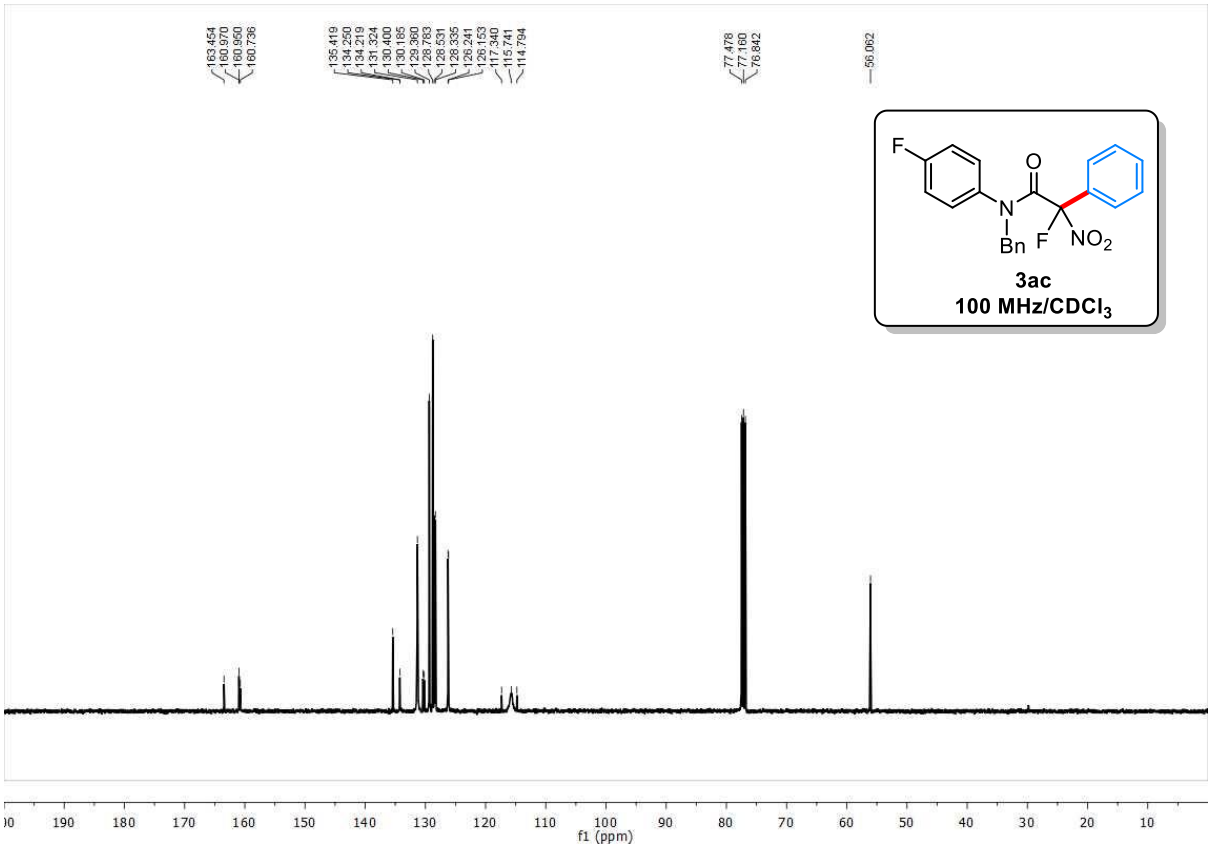
7.441
7.439
7.436
7.432
7.422
7.418
7.415
7.409
7.406
7.402
7.394
7.388
7.384
7.367
7.338
7.319
7.293
7.286
7.277
7.260
7.166
7.161
7.155
7.151
7.143
6.947
6.728
6.532
6.079
4.924
4.889
4.856
4.821
F
O
N
Bn
F
NO2
3ac
400 MHz/CDCl3
2.93
2.03
3.00
2.08
4.06
1.00
1.10
f1 (ppm)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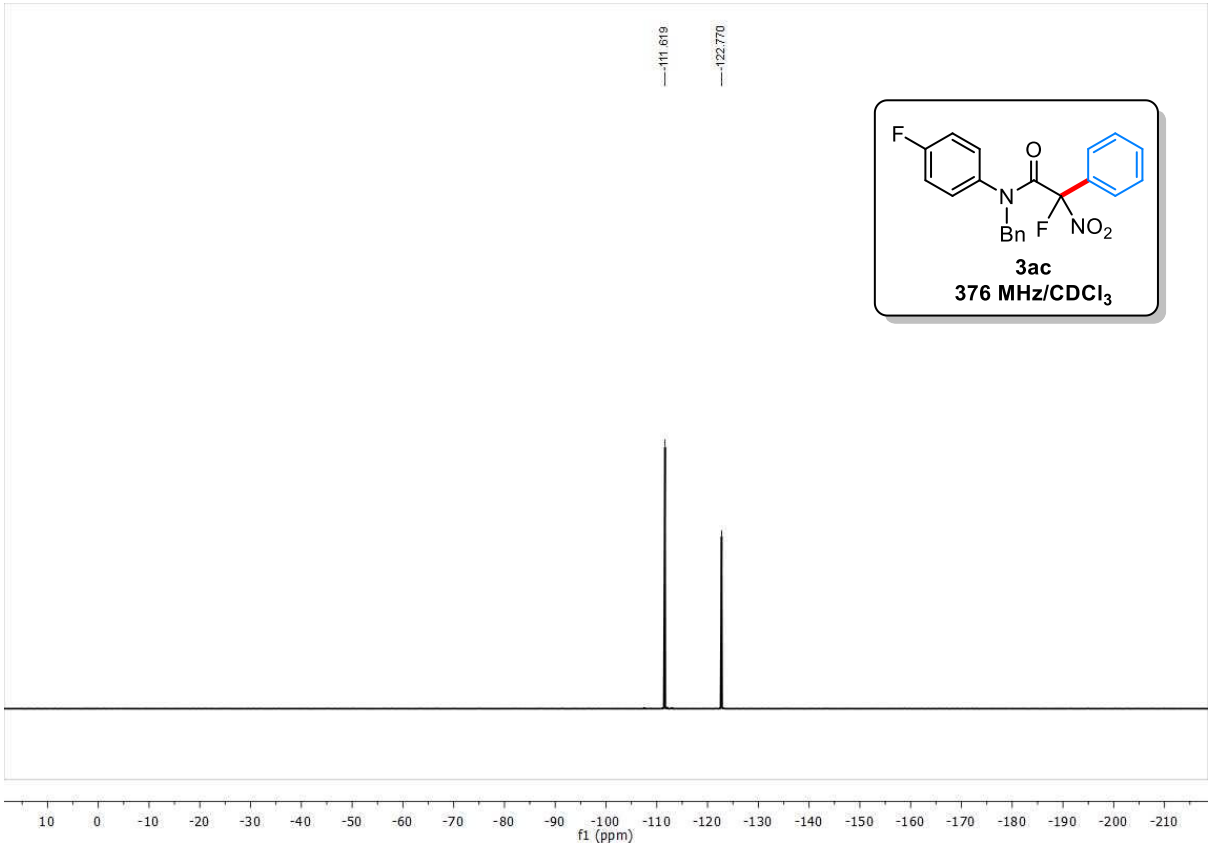
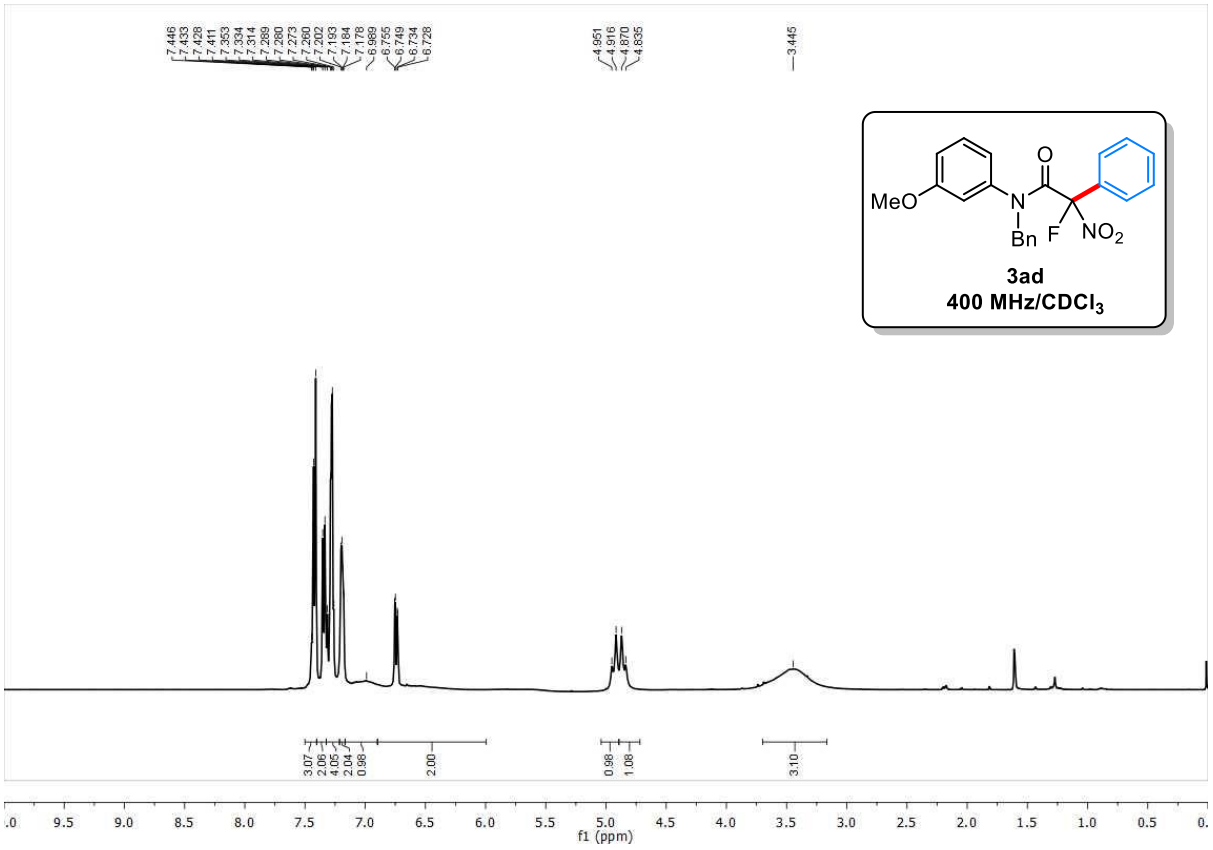
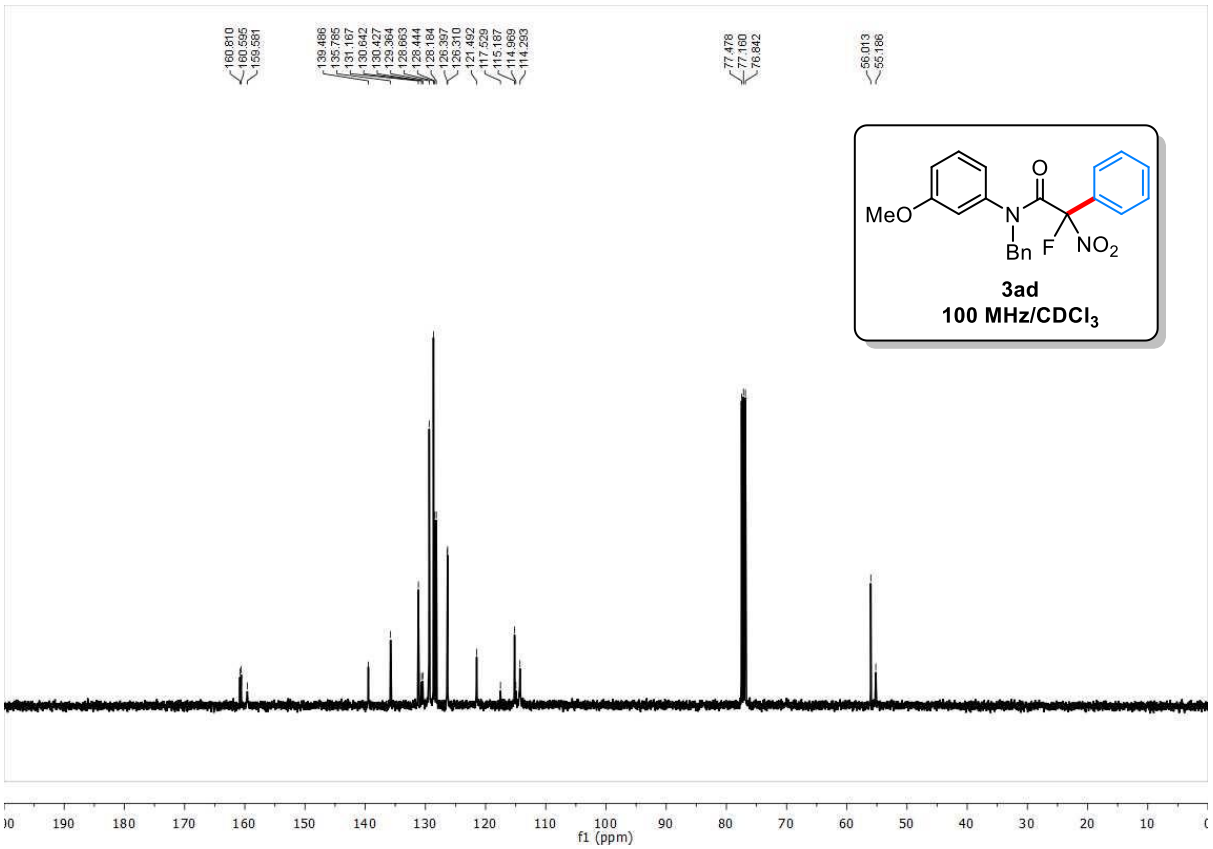
160.970
160.950
160.736
135.419
134.250
134.219
131.324
130.400
130.165
129.980
129.793
128.531
128.335
126.241
126.153
117.340
115.741
114.794
77.478
77.160
76.842
56.062
F
O
N
Bn
F
NO2
3ac
100 MHz/CDCl3
f1 (ppm)


-111.619
-122.770
F
O
N
Bn
F
NO2
3ac
376 MHz/CDCl3
f1 (ppm)


7.446
7.433
7.428
7.411
7.353
7.334
7.314
7.289
7.280
7.273
7.260
7.202
7.193
7.184
7.178
6.968
6.755
6.749
6.734
6.728
4.951
4.916
4.870
4.835
3.445
MeO
N
O
Bn
F
NO2
3ad
400 MHz/CDCl3
3.07
2.06
4.05
2.04
0.98
2.00
0.98
1.08
3.10
f1 (ppm)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160.595
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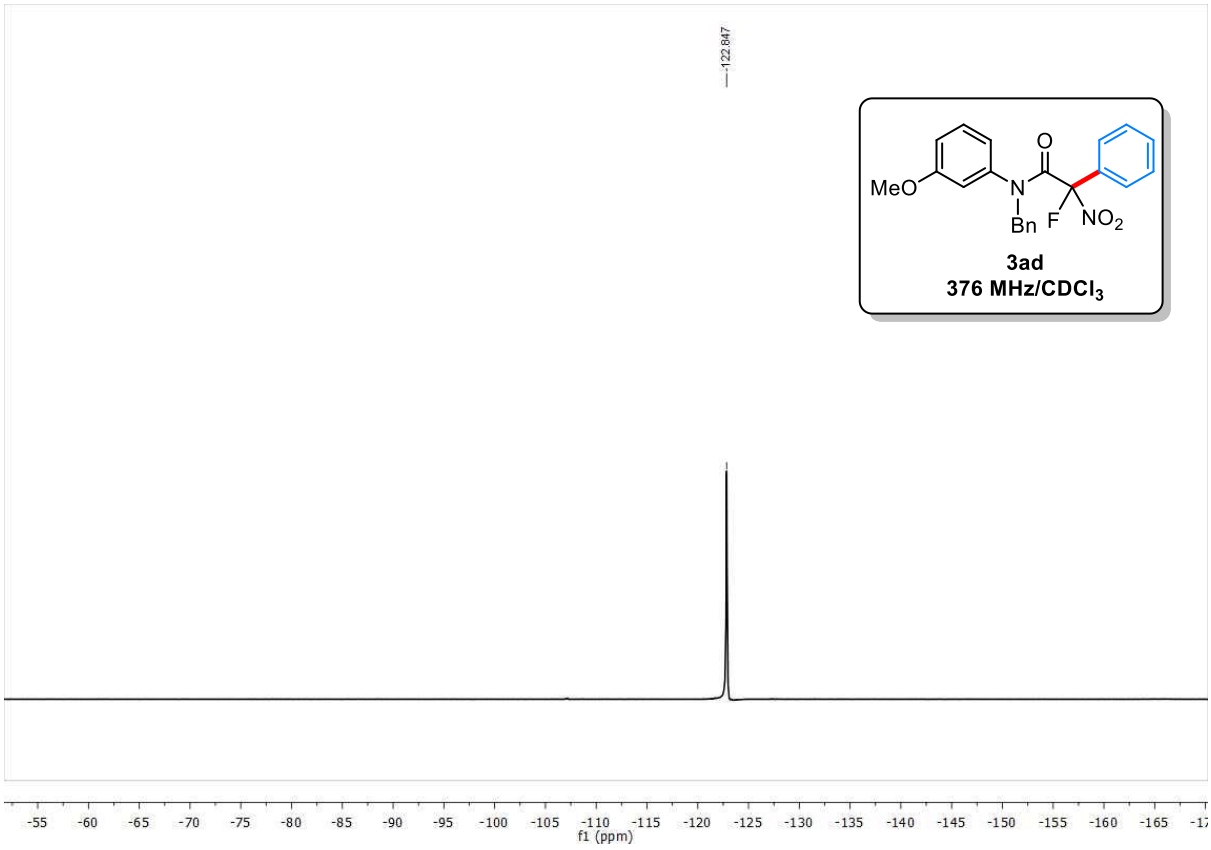
139.486
135.785
131.167
130.642
130.427
129.364
128.663
128.444
128.184
126.397
126.310
121.492
117.259
115.167
114.969
114.293
77.478
77.160
76.842
56.013
55.186
MeO
N
O
Bn
F
NO2
3ad
100 MHz/CDCl3
f1 (ppm)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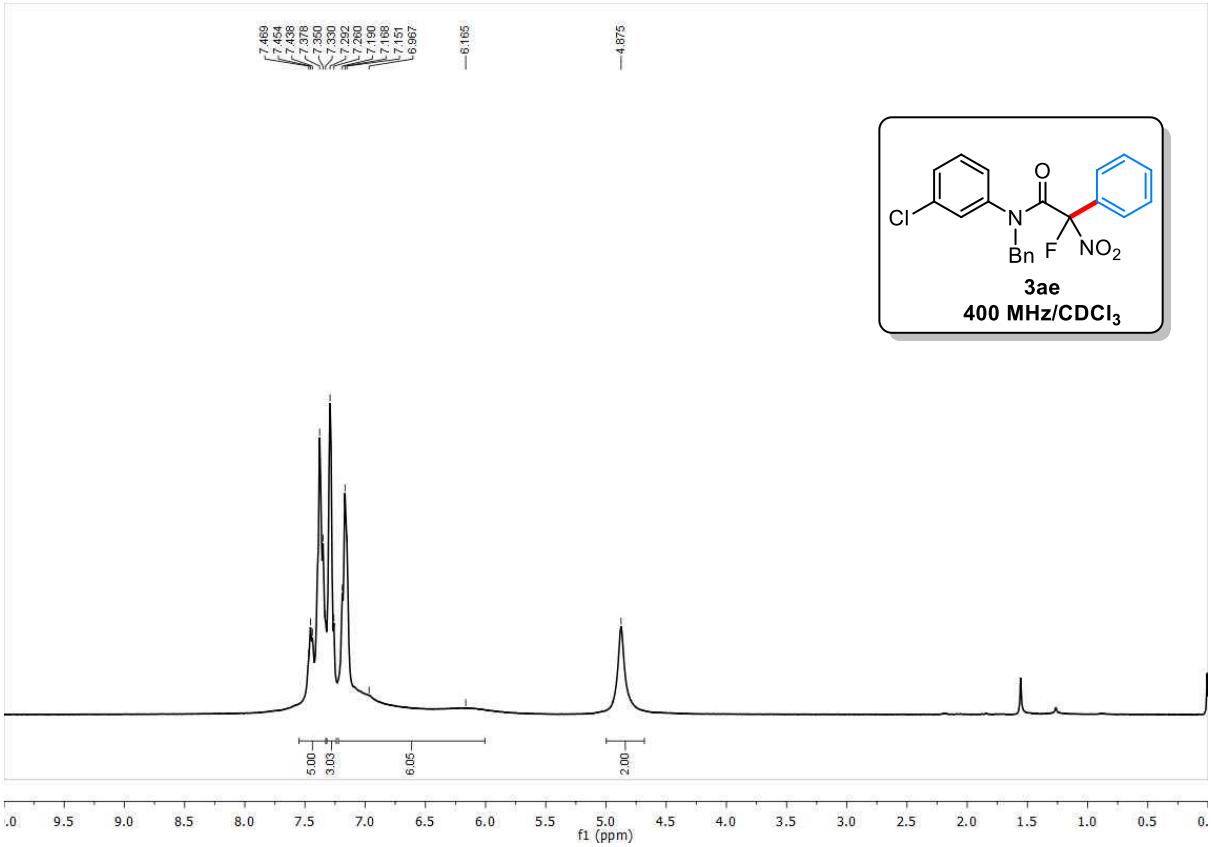
MeO
O
N
Bn
F
NO2
3ad
376 MHz/CDCl3
f1 (ppm)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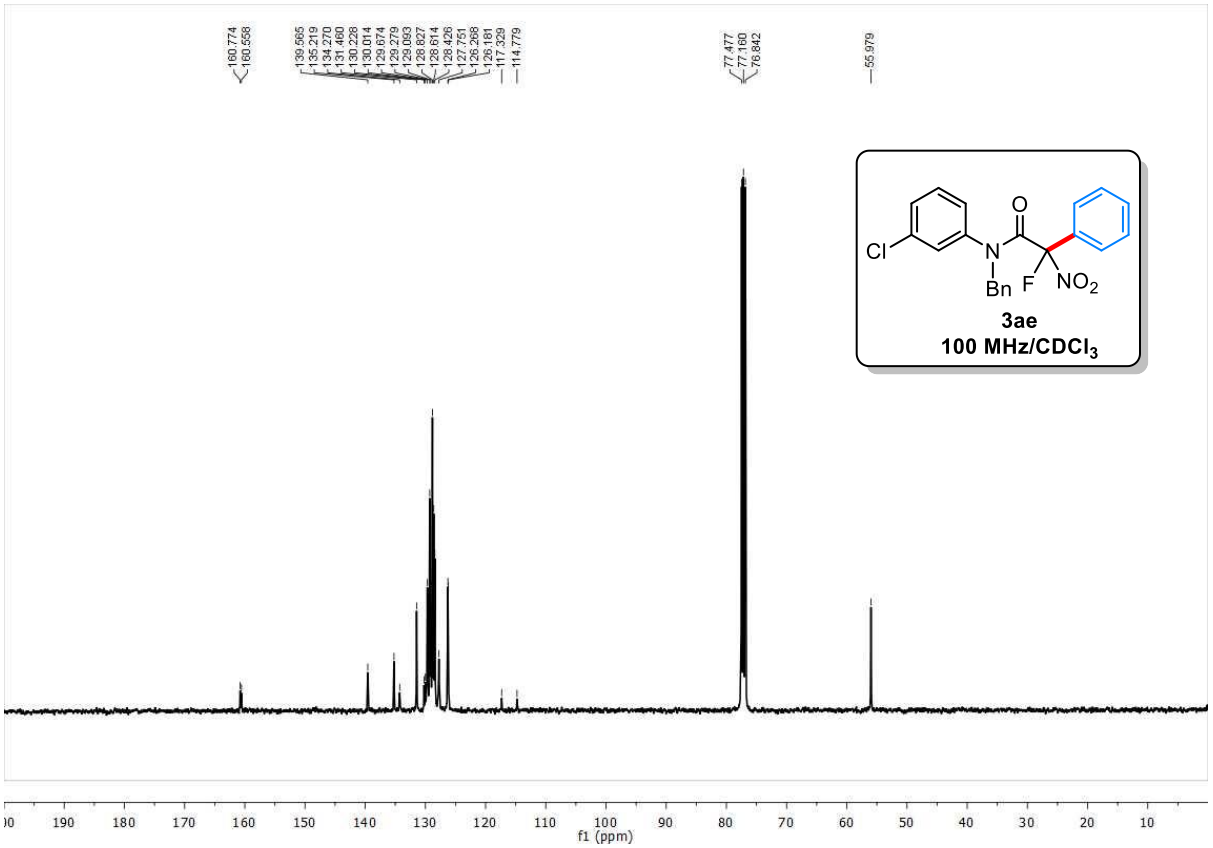
7.438
7.378
7.360
7.330
7.292
7.280
7.196
7.188
7.151
6.967
6.165
4.875
Cl
O
N
Bn
F
NO2
3ae
400 MHz/CDCl3
5.00
3.03
6.05
2.00
f1 (ppm)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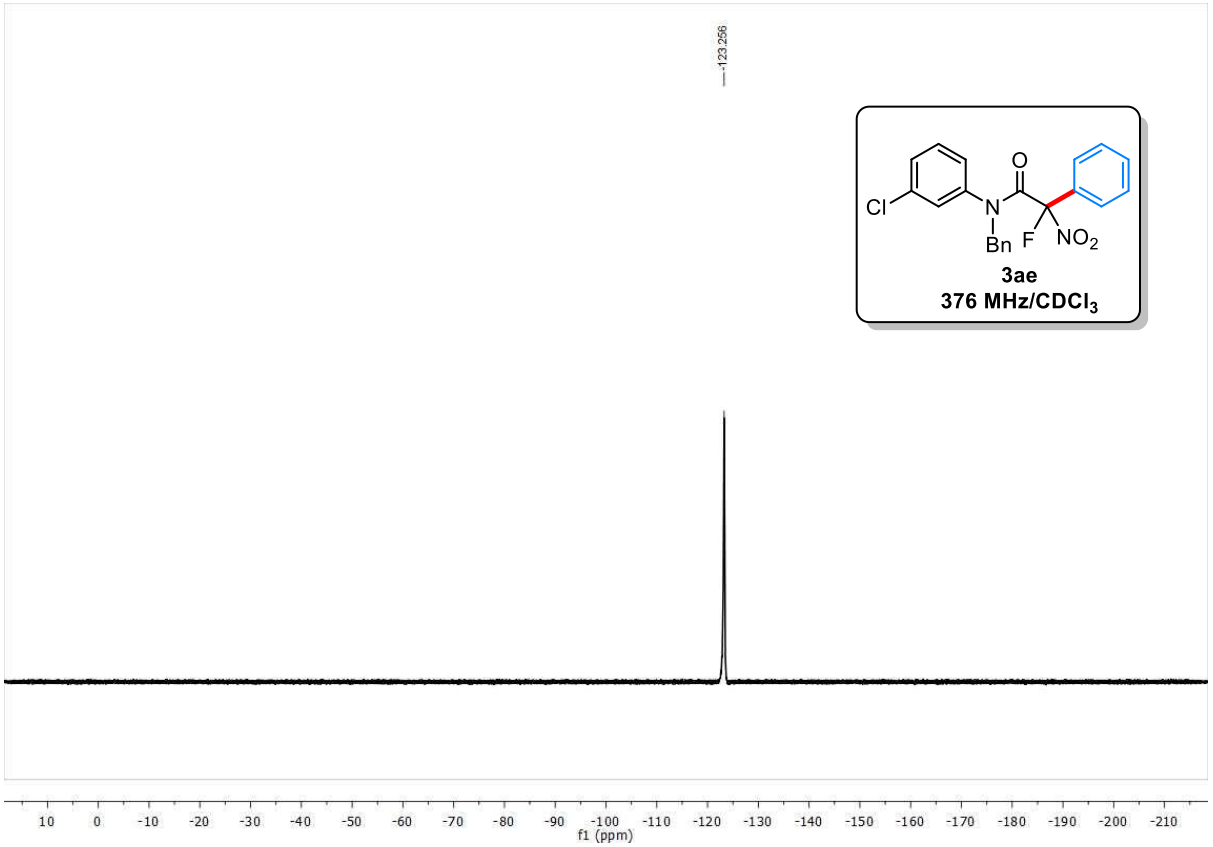
135.219
134.270
131.460
130.228
130.014
129.674
129.279
129.093
128.827
128.614
128.426
127.751
126.268
126.181
117.329
114.779
77.477
77.160
76.842
55.979
Cl
N
O
Bn
F
NO2
3ae
100 MHz/CDCl3
f1 (ppm)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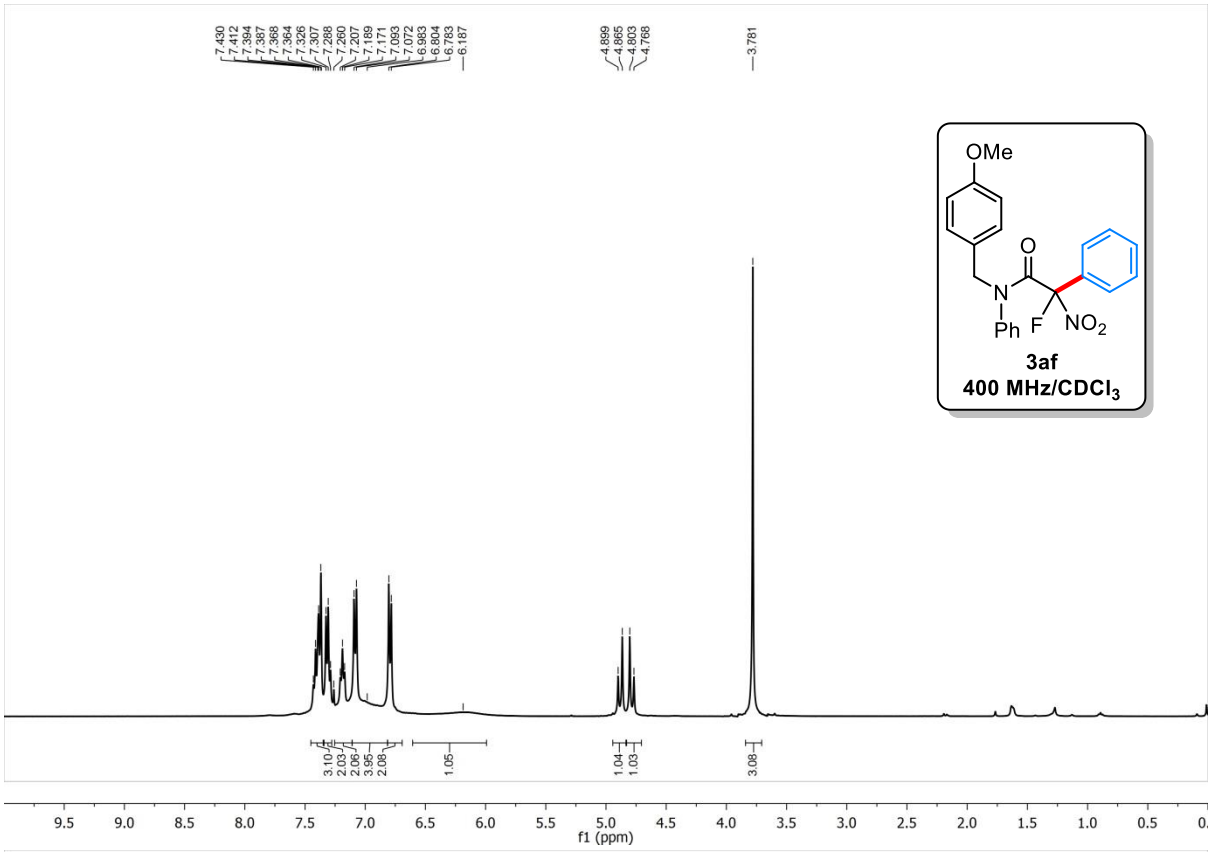
O
Bn
F
NO2
3ae
376 MHz/CDCl3
f1 (ppm)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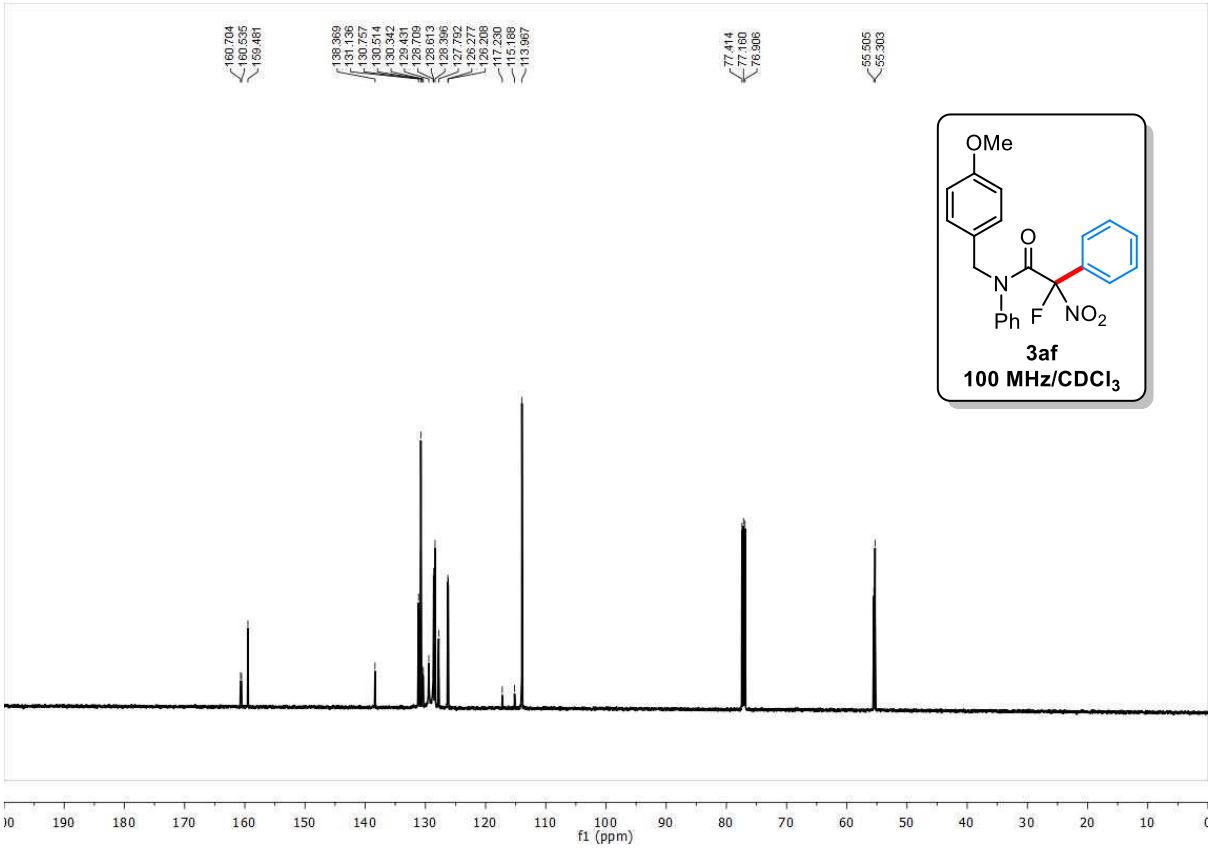
7.412
7.394
7.387
7.368
7.364
7.326
7.307
7.288
7.260
7.207
7.189
7.171
7.093
7.072
6.983
6.804
6.783
6.187
4.899
4.885
4.803
4.768
3.781
OMe
O
N
Ph
F
NO2
3af
400 MHz/CDCl3
3.10
2.03
2.06
3.95
2.08
1.05
1.04
1.03
3.08
f1 (ppm)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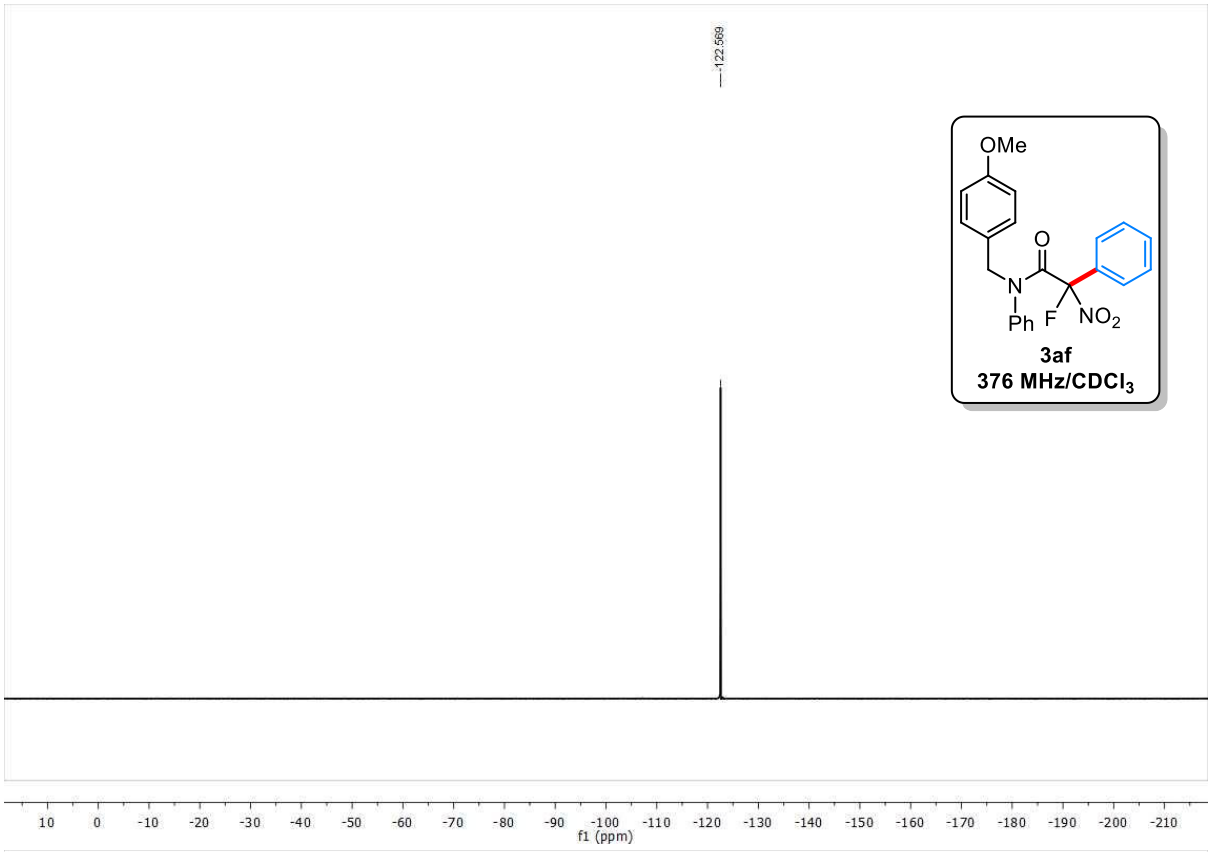
160.535
159.481
138.369
131.136
130.757
130.514
130.342
129.431
128.709
128.613
128.396
127.792
126.277
126.208
117.230
115.188
113.967
77.414
77.160
76.906
55.505
55.303
OMe
O
N
Ph
F
NO2
3af
100 MHz/CDCl3
f1 (ppm)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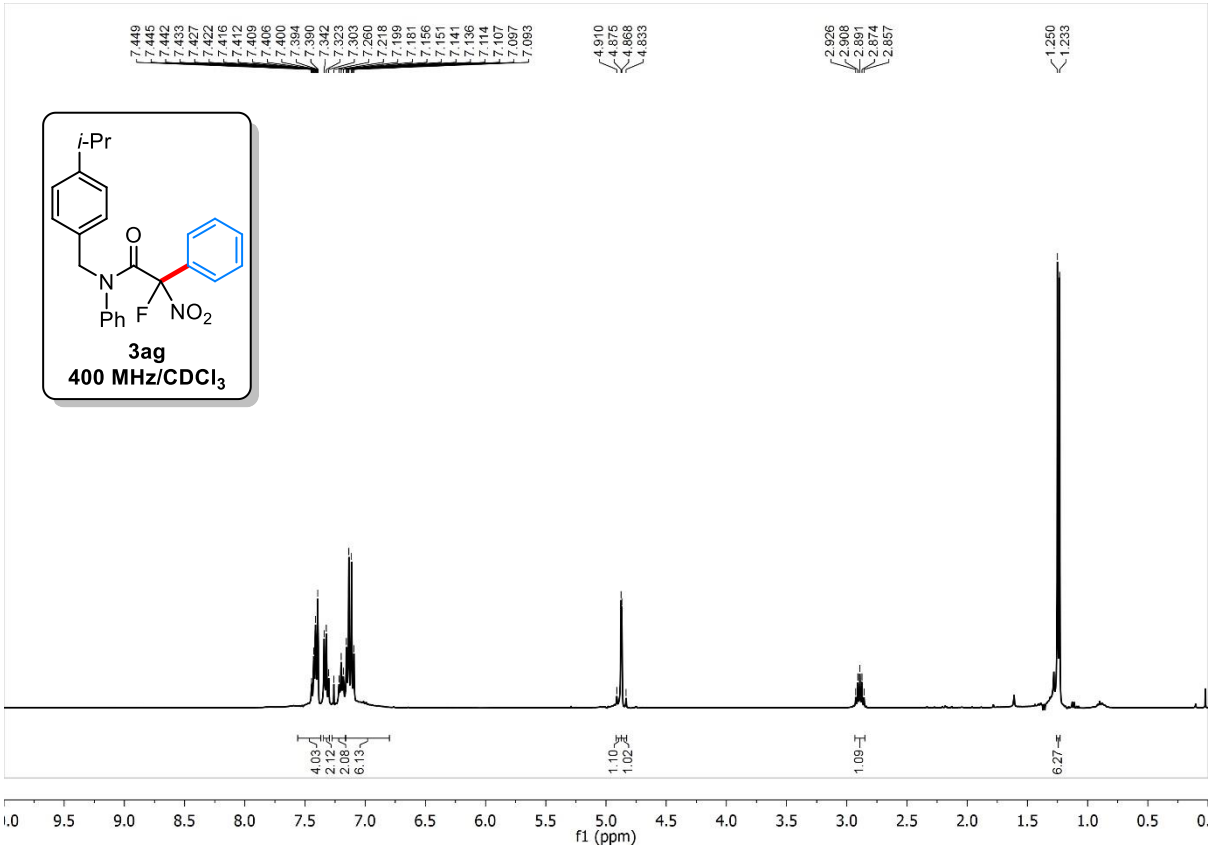
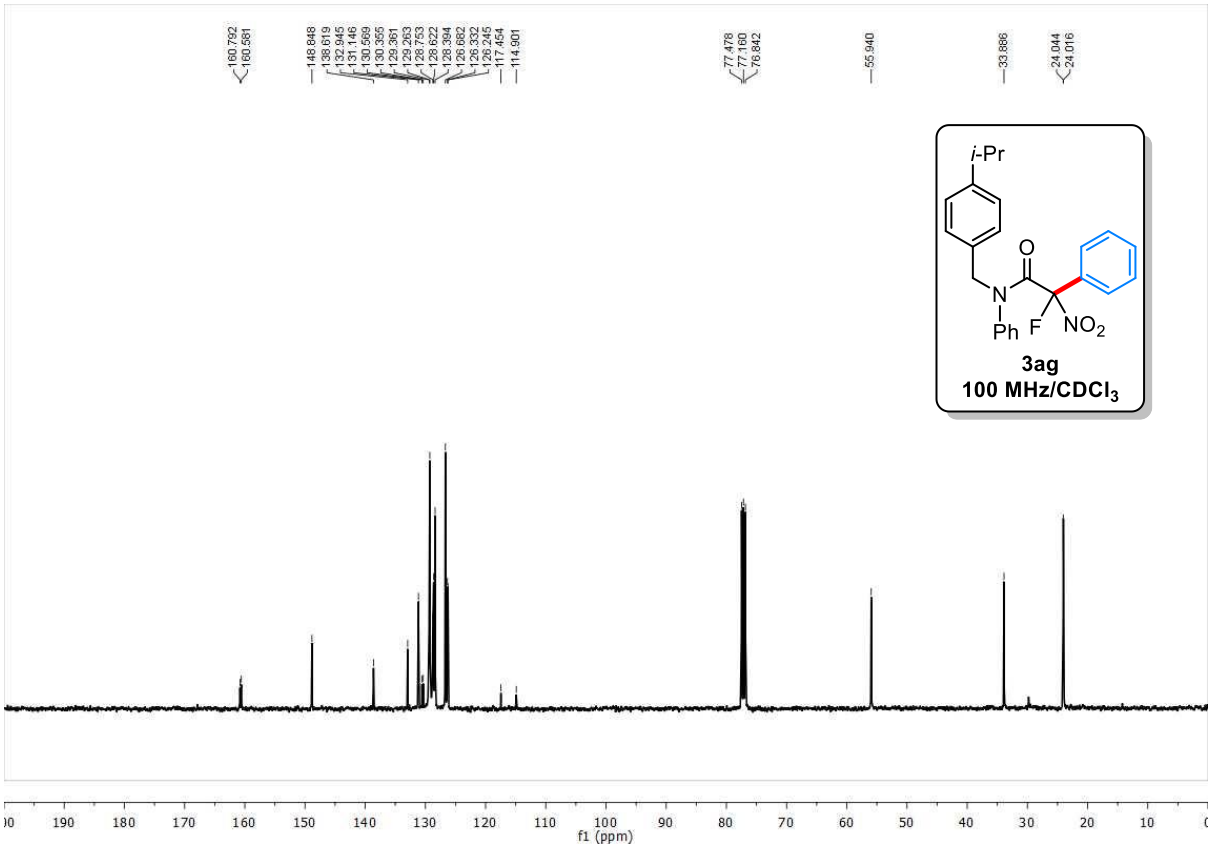
OMe
O
N
Ph
F
NO2
3af
376 MHz/CDCl3
f1 (ppm)


7.449
7.445
7.442
7.433
7.427
7.422
7.416
7.412
7.409
7.406
7.400
7.394
7.390
7.342
7.323
7.303
7.260
7.218
7.199
7.181
7.156
7.151
7.141
7.136
7.114
7.107
7.097
7.093
4.910
4.875
4.868
4.833
2.926
2.908
2.891
2.874
2.857
1.250
1.233
i-Pr
O
N
Ph
F
NO2
3ag
400 MHz/CDCl3
4.03
2.12
2.08
6.13
1.10
1.02
1.09
6.27
f1 (ppm)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131.146
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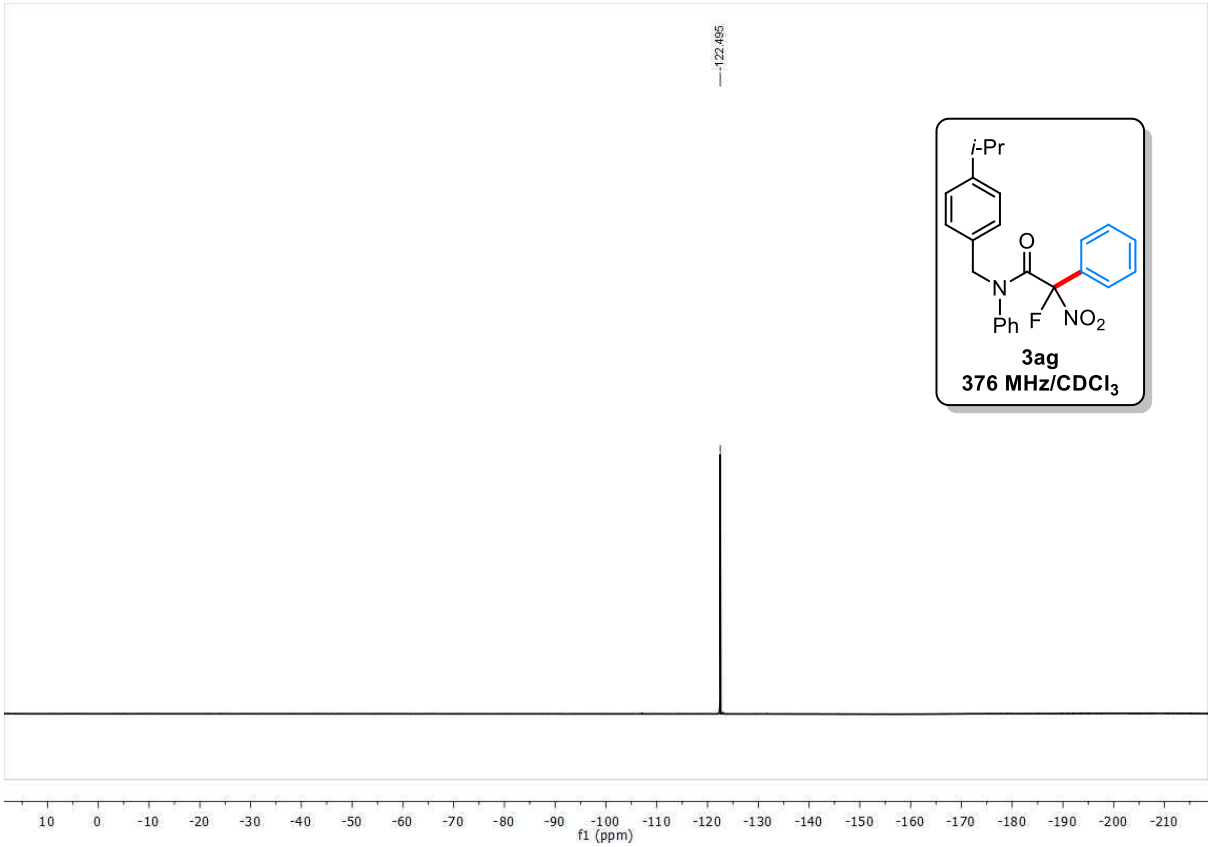
130.355
129.361
129.263
128.753
128.622
128.394
126.682
126.332
126.245
117.454
114.901
77.478
77.160
76.842
55.940
33.886
24.044
24.016
i-Pr
O
N
Ph
F
NO2
3ag
100 MHz/CDCl3
f1 (ppm)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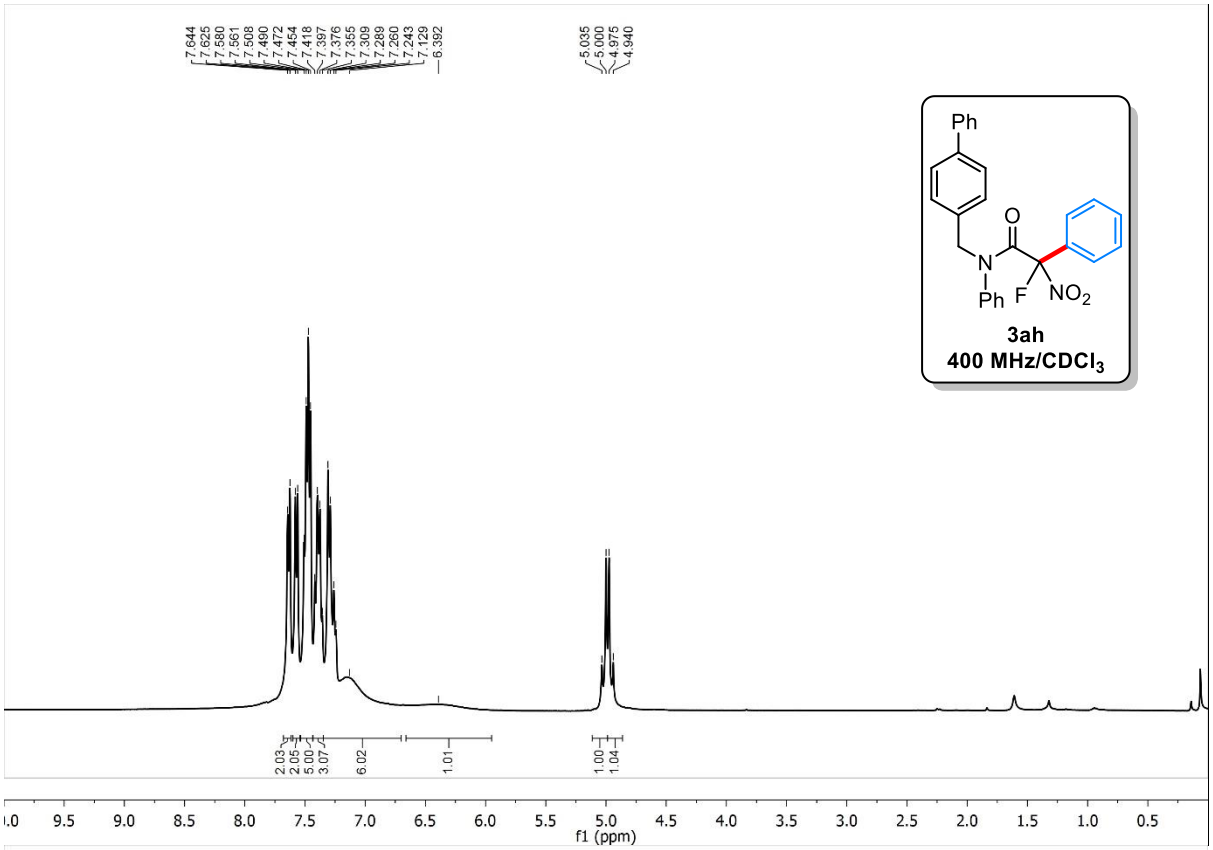
i-Pr
O
N
Ph
F
NO2
3ag
376 MHz/CDCl3
f1 (ppm)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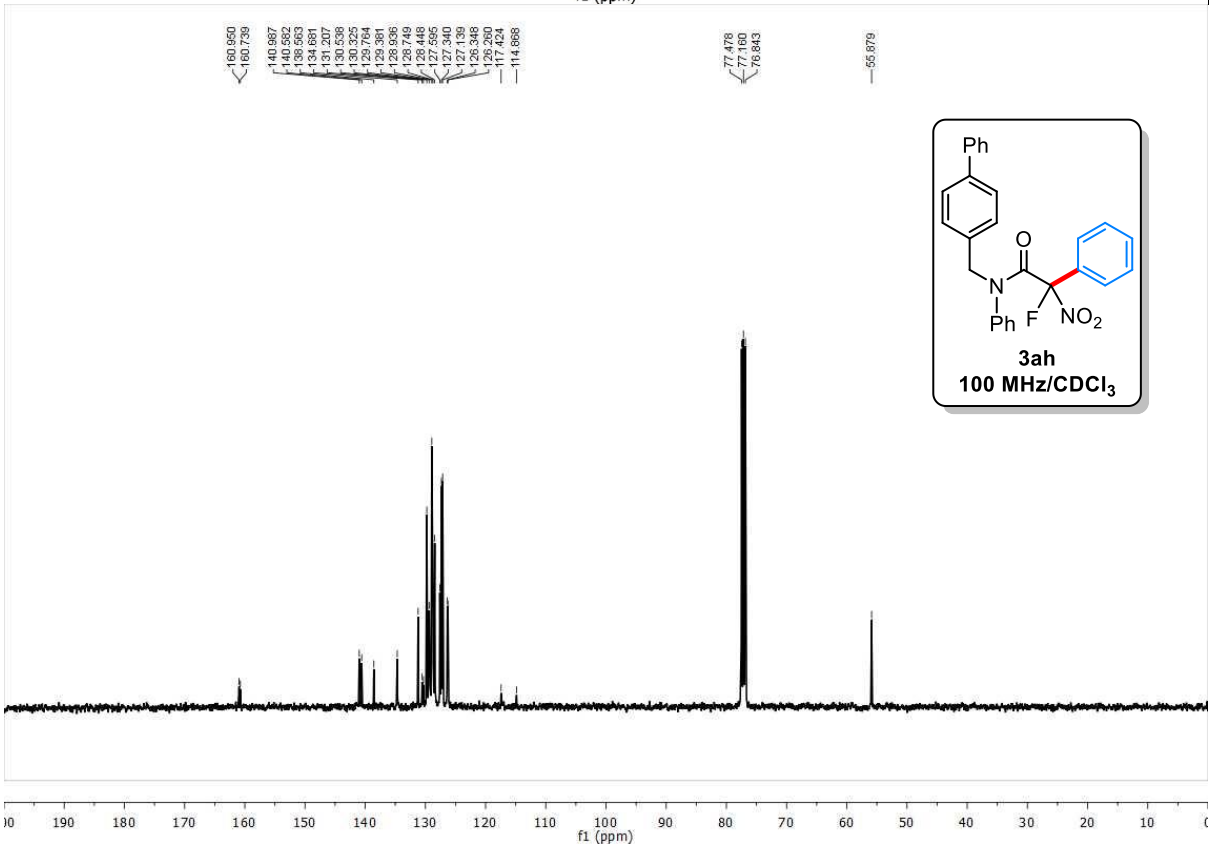
7.625
7.580
7.561
7.508
7.490
7.472
7.454
7.418
7.397
7.376
7.355
7.309
7.289
7.260
7.243
7.129
6.392
5.035
5.000
4.975
4.940
Ph
O
N
Ph
F
NO2
3ah
400 MHz/CDCl3
2.03
2.05
5.00
3.07
6.02
1.01
1.00
1.04
f1 (ppm)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140.987
140.582
136.563
134.681
131.207
130.538
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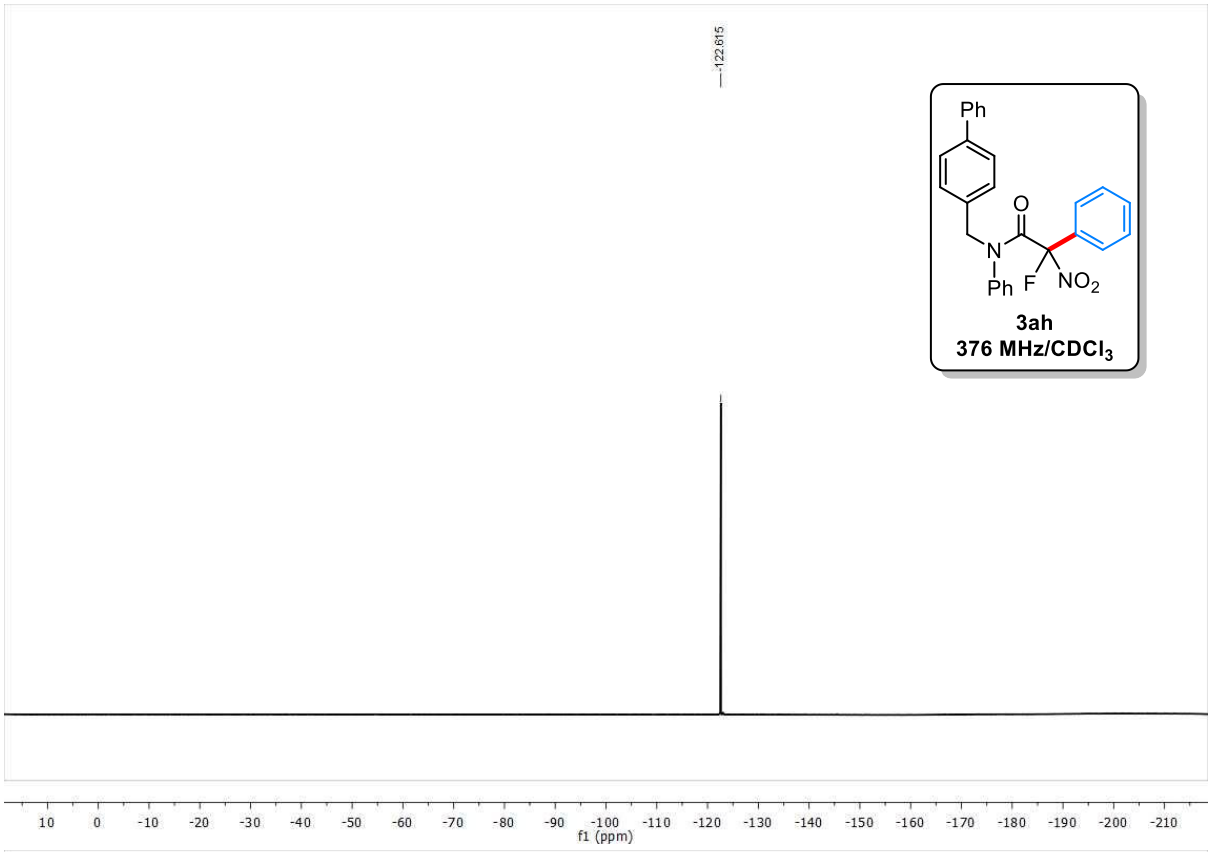
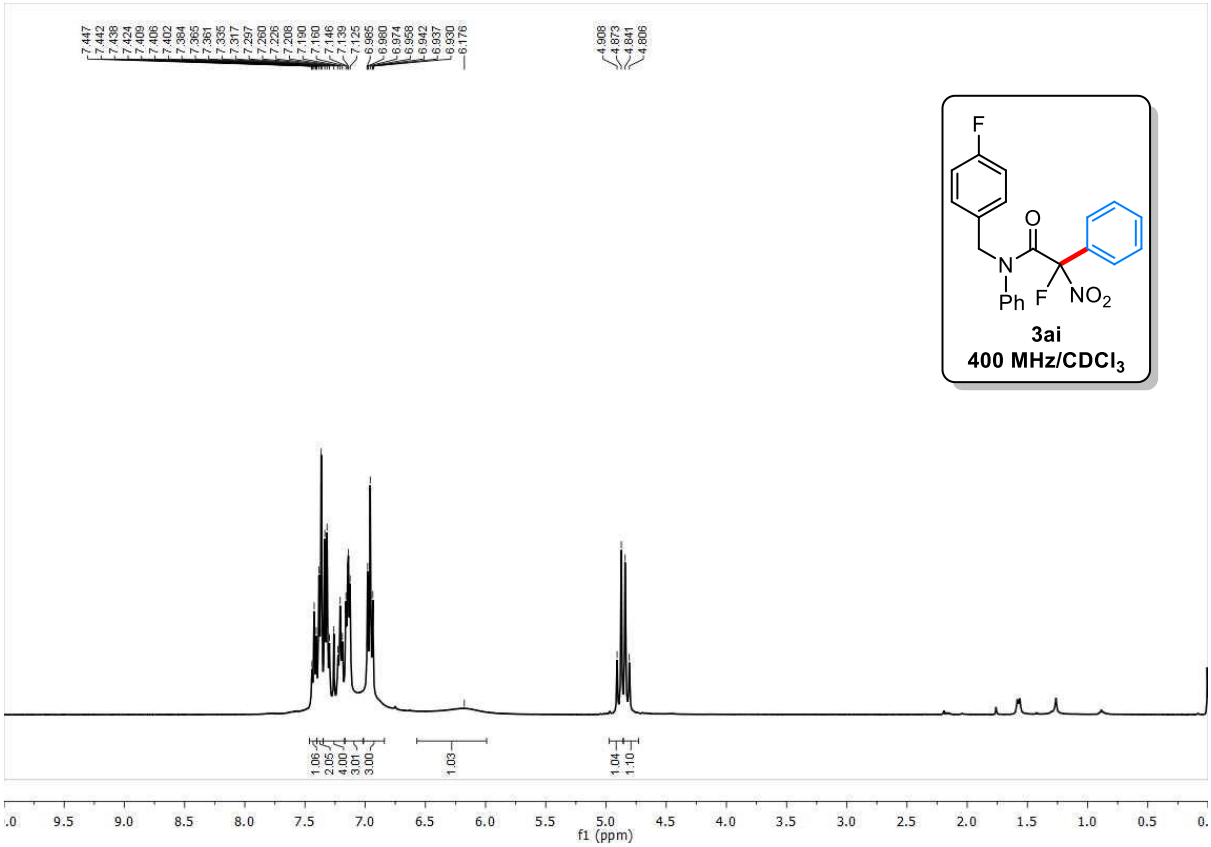
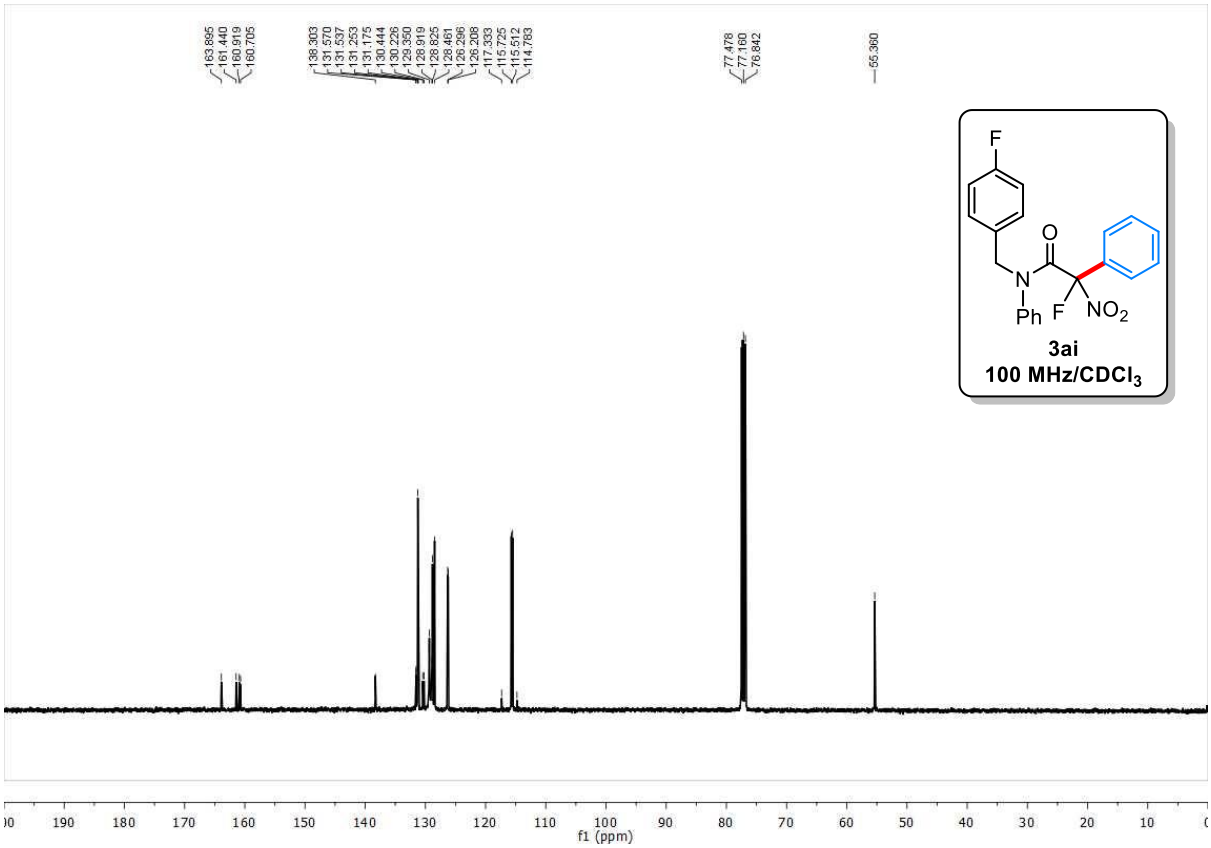
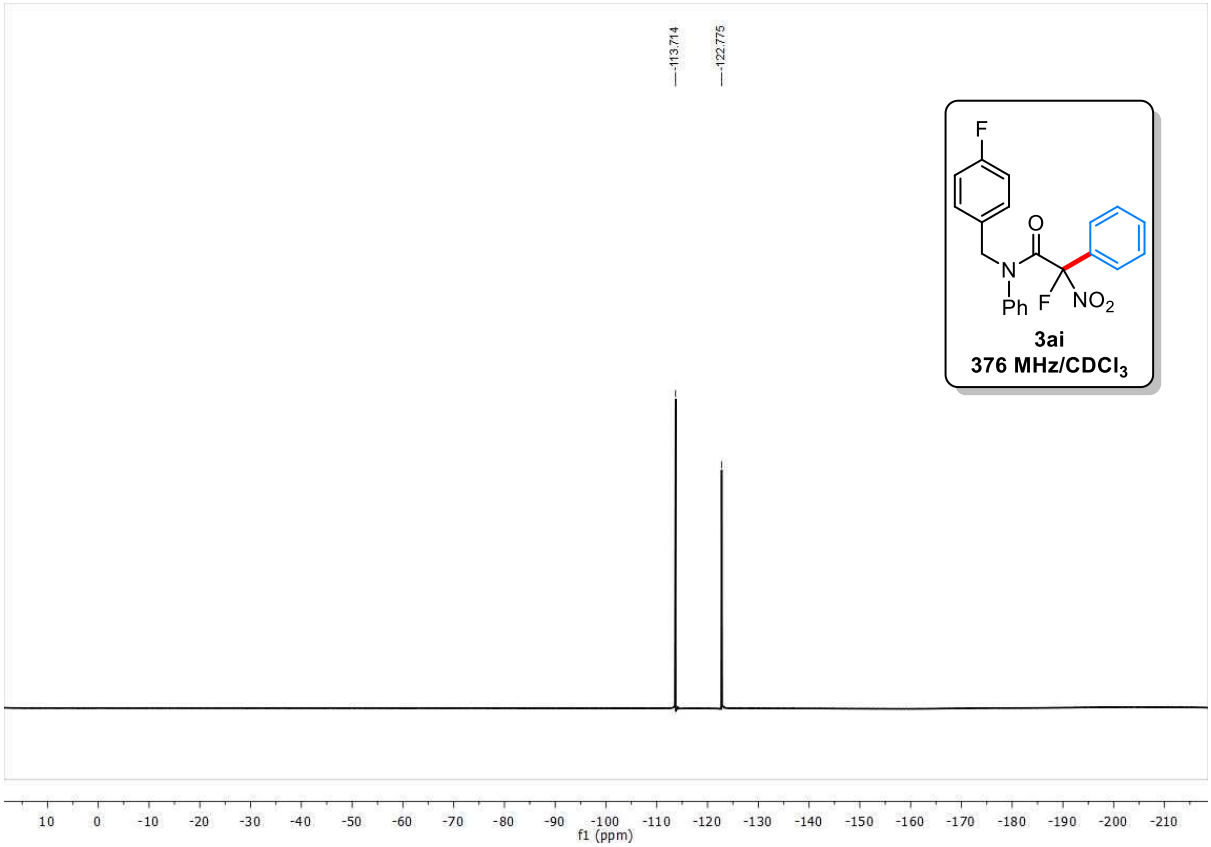
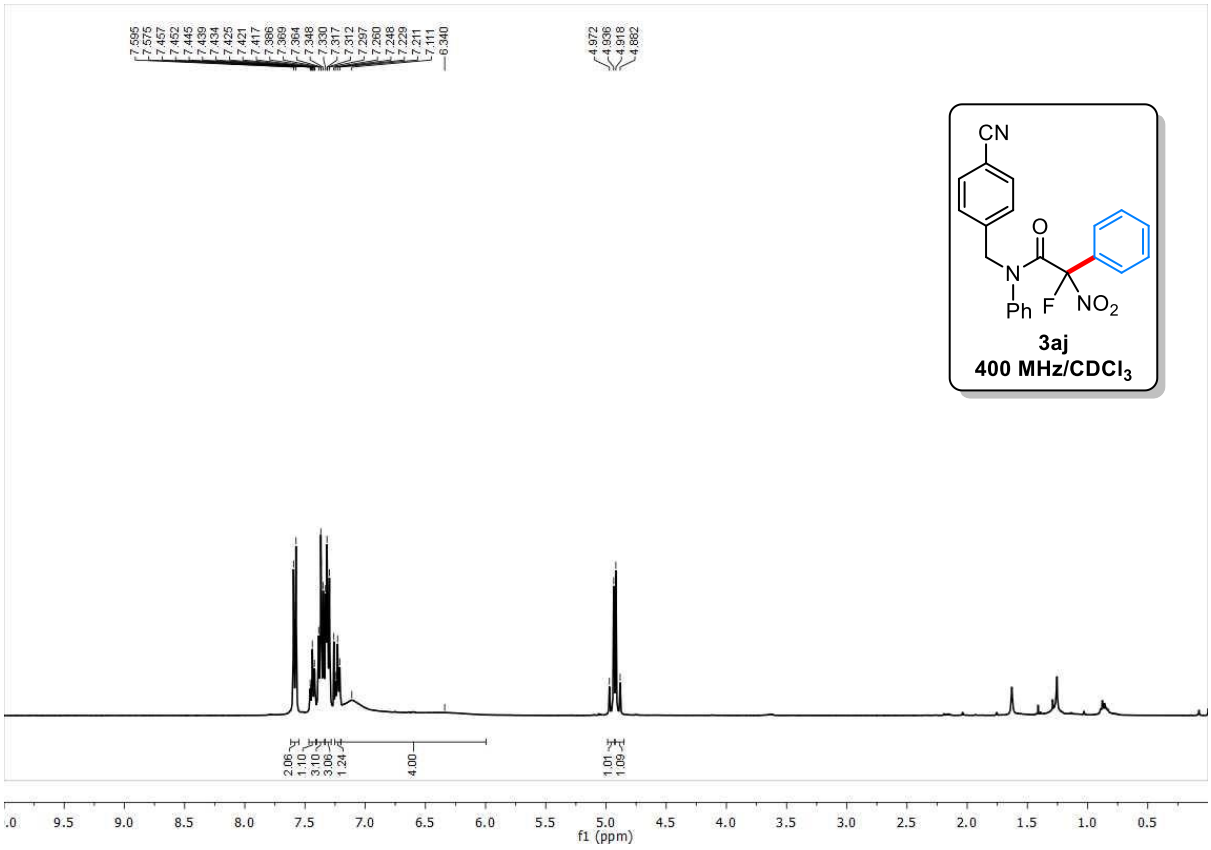
129.784
129.381
128.936
128.749
128.448
127.595
127.340
127.139
126.348
126.200
117.424
114.868
77.478
77.160
76.843
55.879
Ph
O
N
Ph
F
NO2
3ah
100 MHz/CDCl3
f1 (ppm)

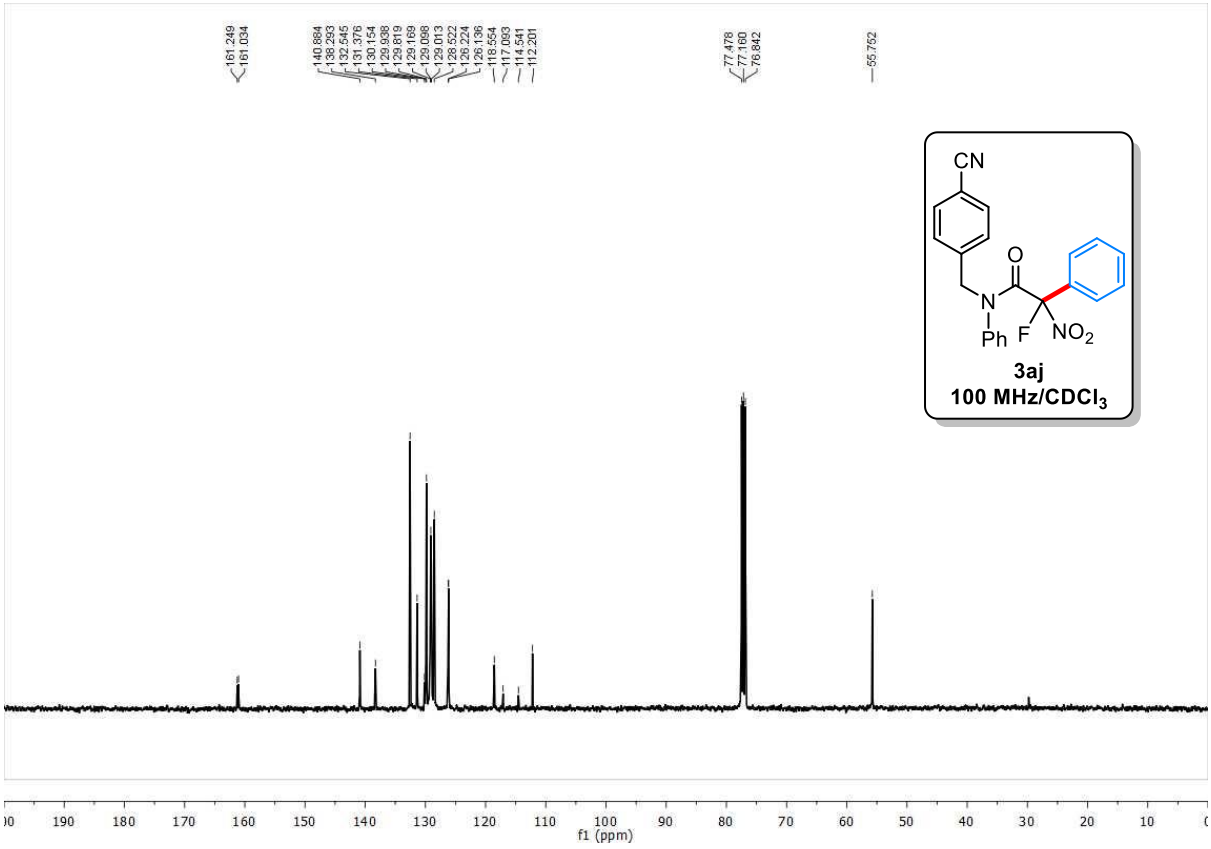

-122.615
Ph
O
N
Ph
F
NO2
3ah
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

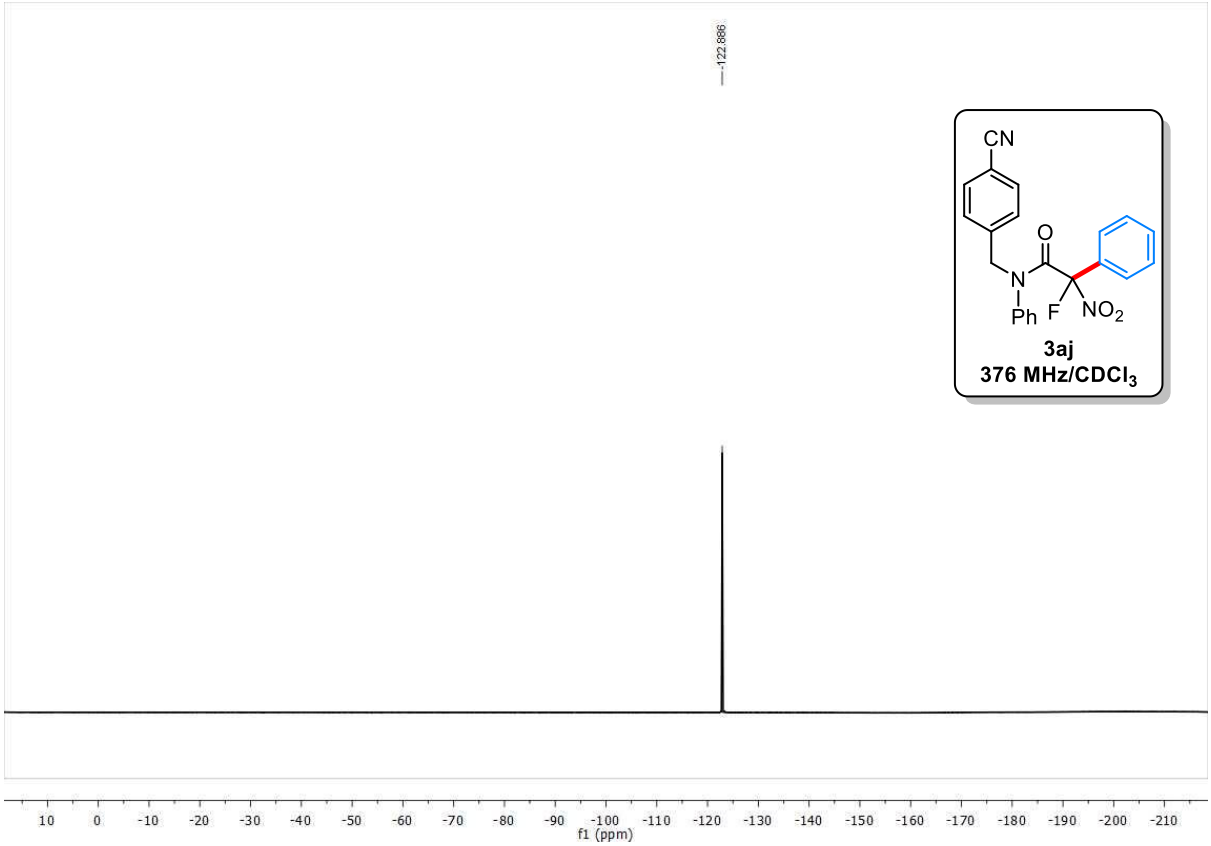

7.447
7.442
7.438
7.424
7.409
7.406
7.402
7.384
7.365
7.361
7.335
7.317
7.297
7.260
7.226
7.208
7.160
7.146
7.139
7.125
6.985
6.980
6.974
6.958
6.942
6.937
6.930
6.176
4.908
4.873
4.841
4.806
F
O
N
Ph
F
NO2
3ai
400 MHz/CDCl3
1.06
2.05
4.00
3.01
3.00
1.03
1.04
1.10
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

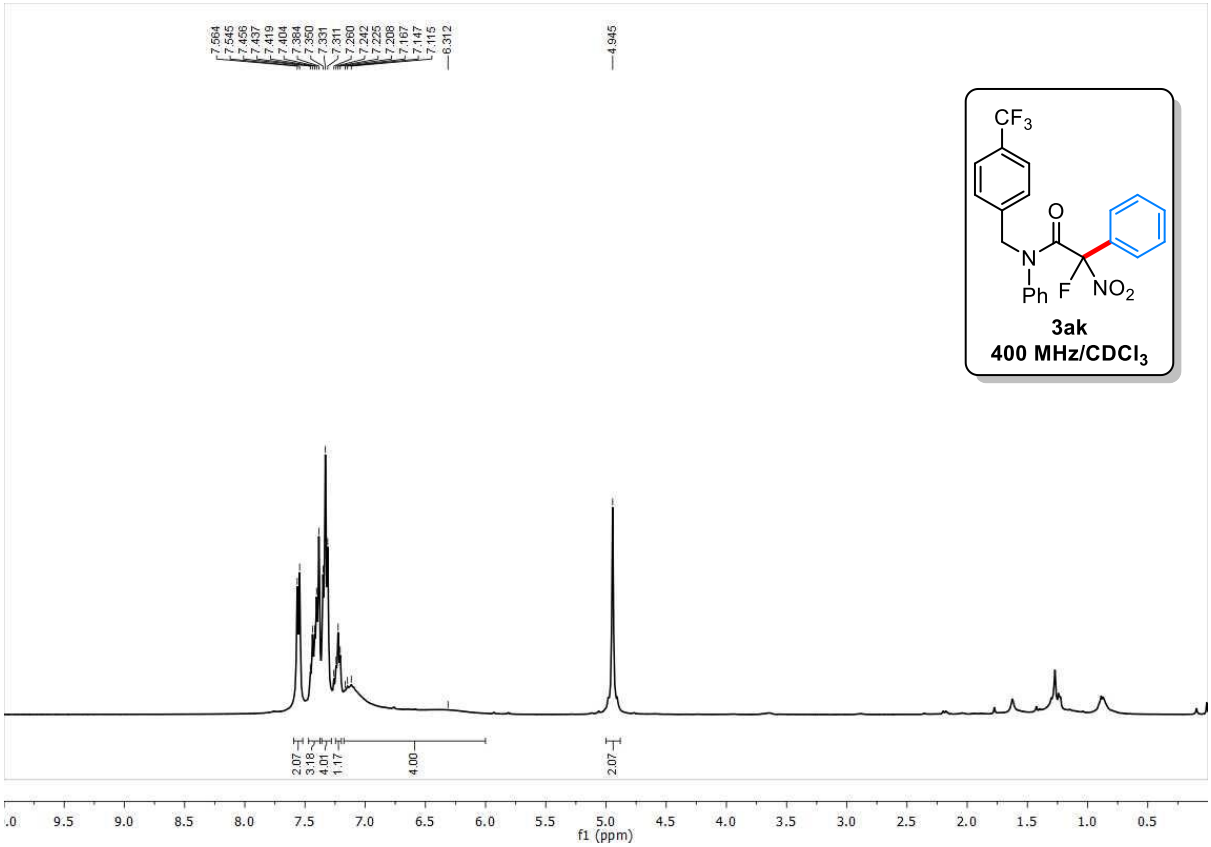

163.895
161.440
160.919
160.705
138.303
131.570
131.537
131.253
131.175
130.444
130.226
129.350
128.919
128.825
128.461
126.296
126.208
117.333
115.725
115.512
114.783
77.478
77.160
76.842
55.360
F
O
N
Ph
F
NO2
3ai
100 MHz/CDCl3
f1 (ppm)


-113.714
-122.775
F
O
N
Ph
F
NO2
3ai
376 MHz/CDCl3
f1 (ppm)


7.595
7.575
7.457
7.452
7.445
7.439
7.434
7.425
7.421
7.417
7.386
7.369
7.364
7.348
7.330
7.317
7.312
7.297
7.260
7.248
7.229
7.211
7.111
6.340
4.972
4.936
4.918
4.882
CN
O
N
Ph
F
NO2
3aj
400 MHz/CDCl3
2.06
1.10
3.10
3.06
1.24
4.00
1.01
1.09
f1 (ppm)


161.249
161.034
140.884
138.293
132.545
131.376
130.154
129.938
129.819
129.169
129.098
129.013
128.522
126.224
126.136
118.554
117.093
114.541
112.201
77.478
77.160
76.842
55.752
CN
O
N
Ph
F
NO2
3aj
100 MHz/CDCl3
f1 (ppm)


122.886
CN
O
N
Ph
F
NO2
3aj
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)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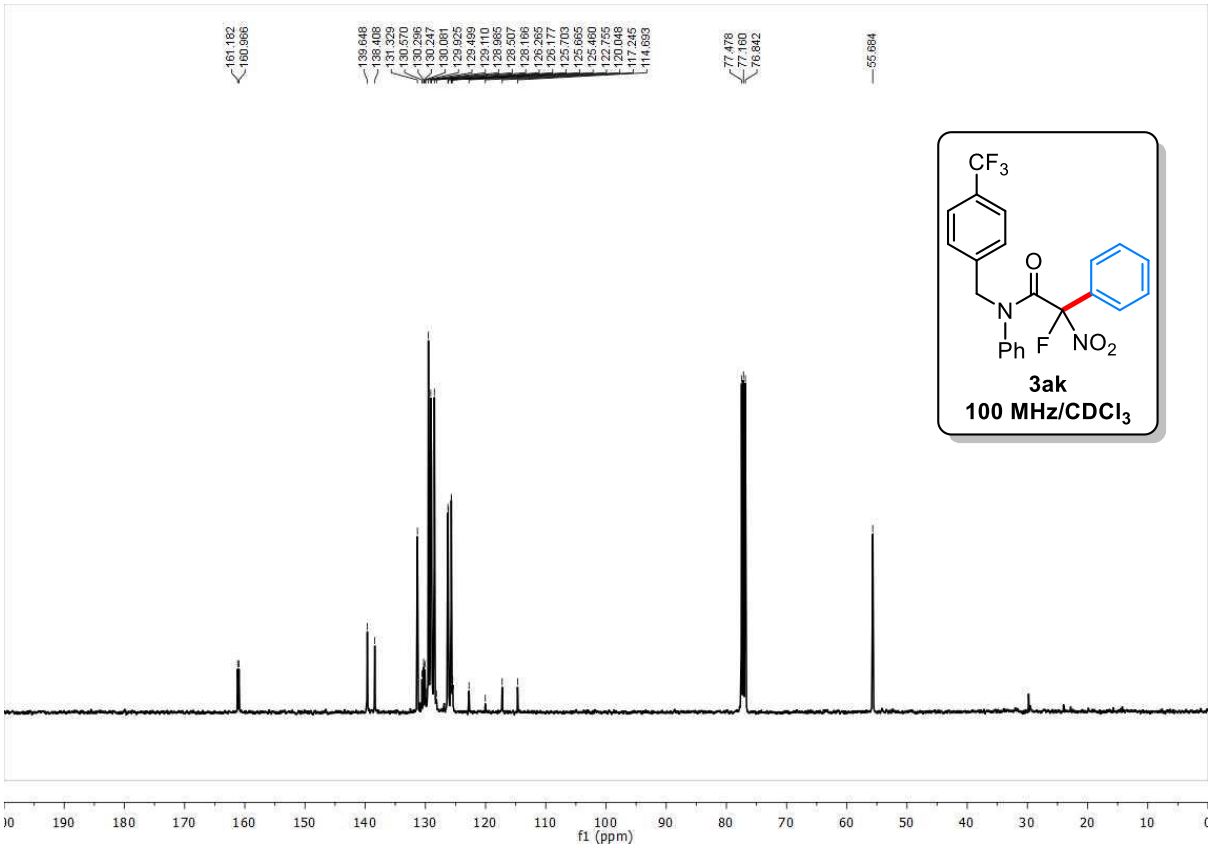
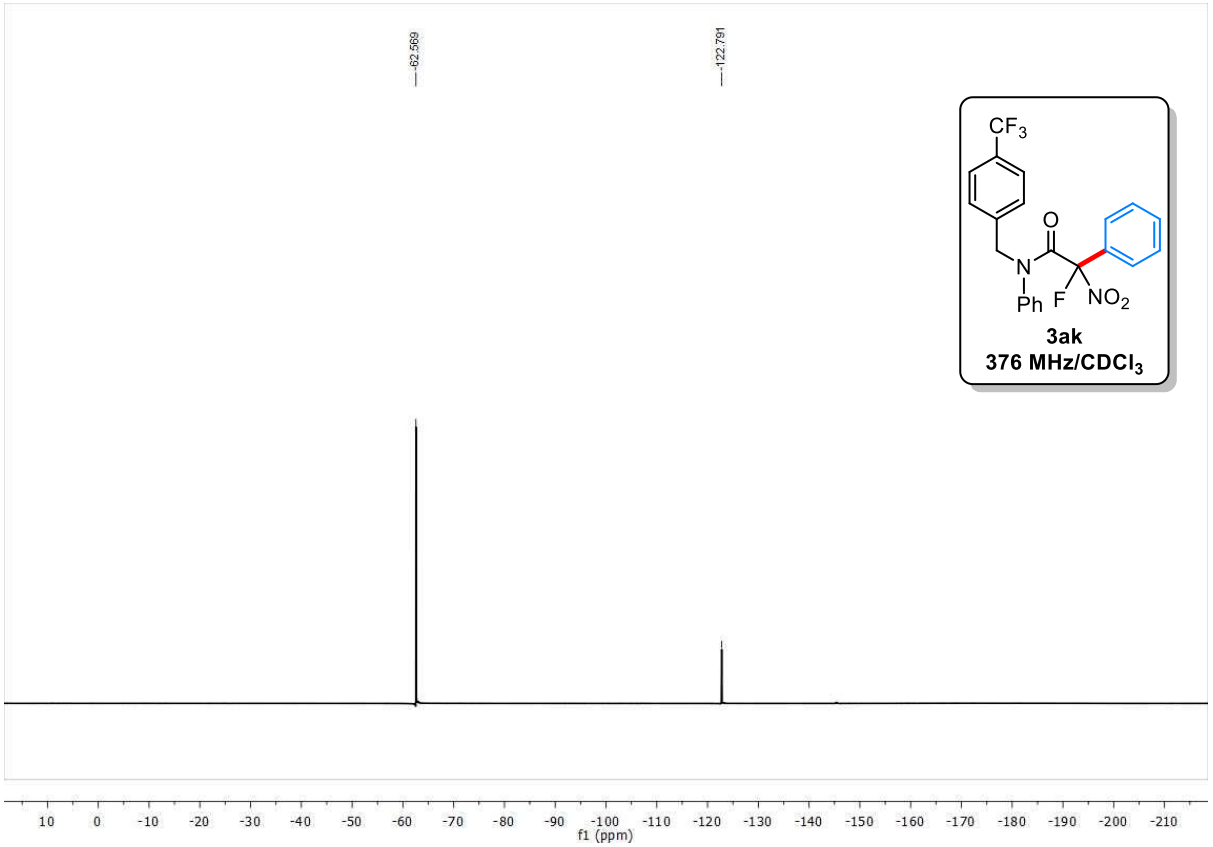
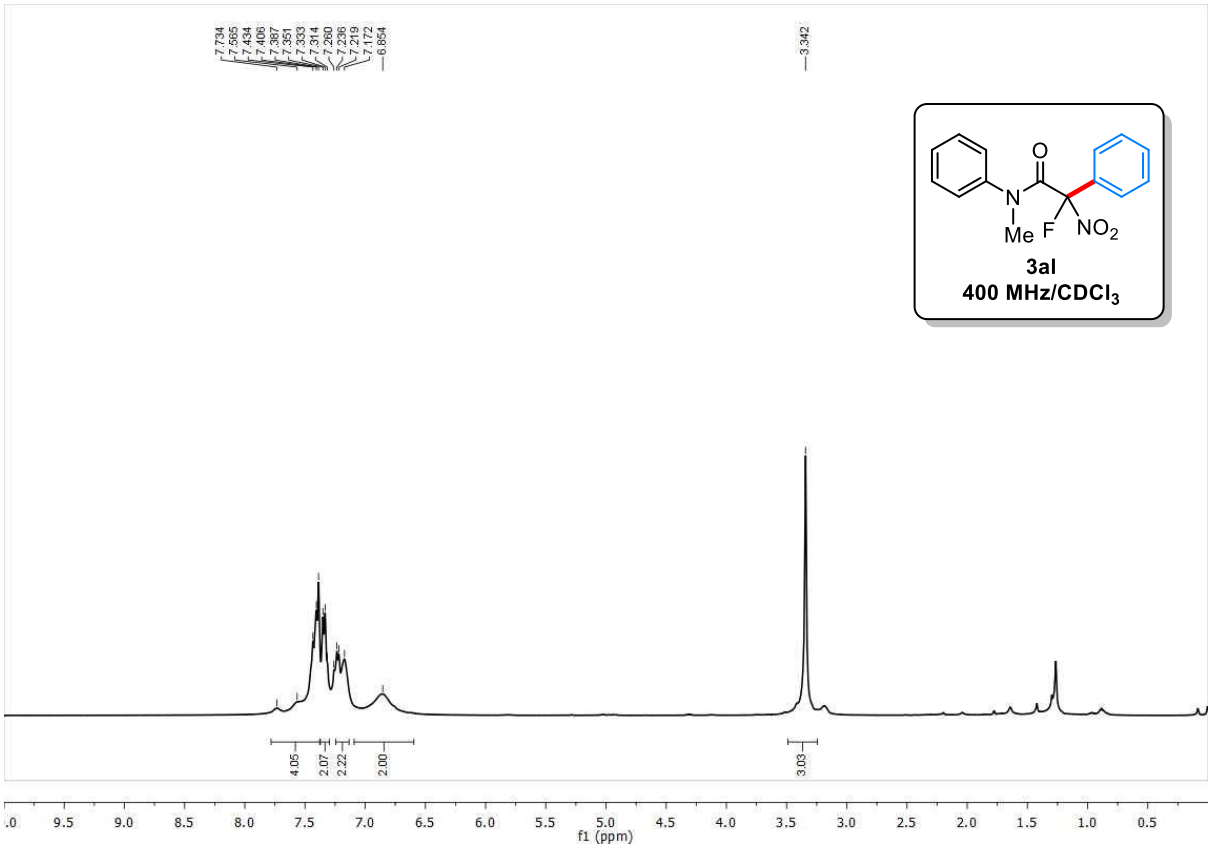
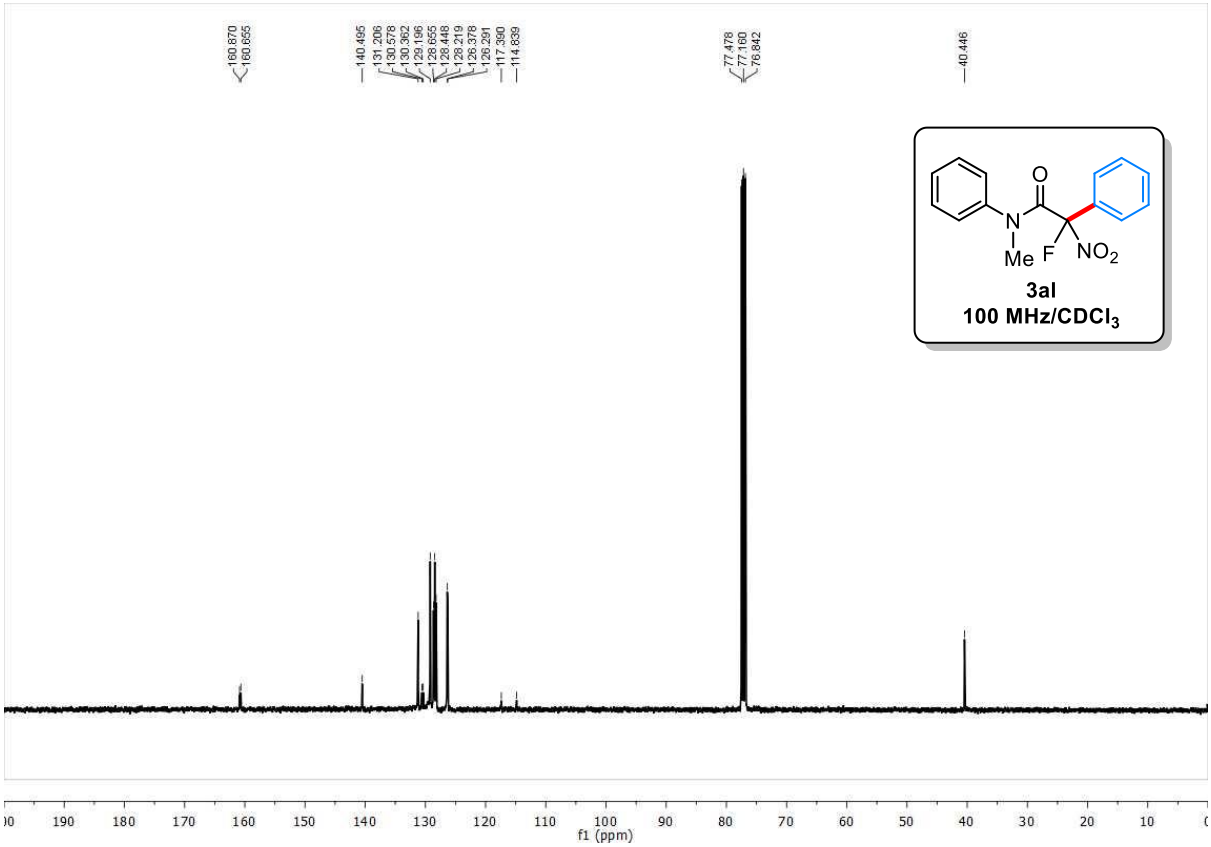
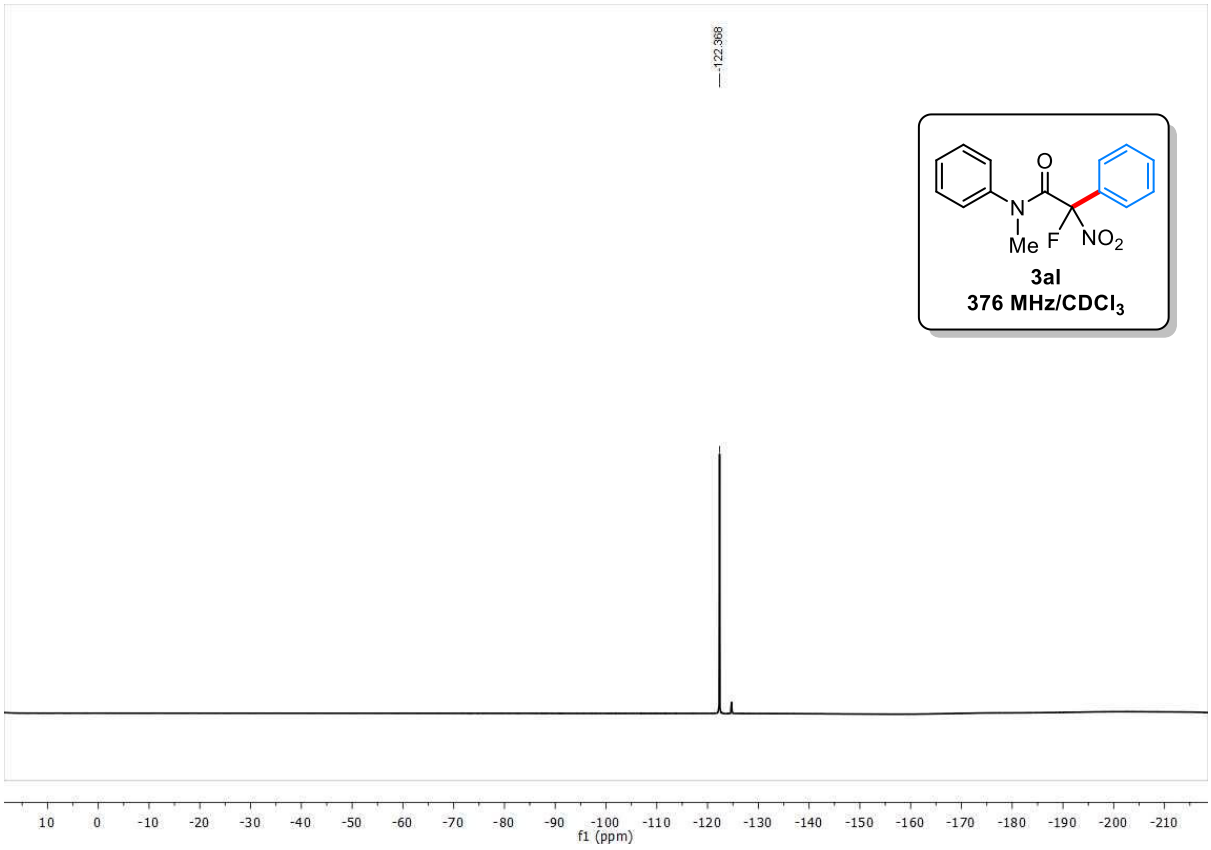
7.545
7.456
7.437
7.419
7.404
7.384
7.350
7.331
7.311
7.260
7.242
7.225
7.208
7.167
7.147
7.115
6.312
4.945
CF3
O
N
Ph
F
NO2
3ak
400 MHz/CDCl3
2.07
3.18
4.01
1.17
4.00
2.07
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)


161.182
160.966
139.648
138.408
131.329
130.570
130.296
130.247
130.061
129.925
129.499
129.110
128.965
128.507
128.198
126.295
126.177
125.703
125.665
125.490
122.755
120.048
117.245
114.693
77.478
77.160
76.842
55.684
CF3
O
N
Ph
F
NO2
3ak
100 MHz/CDCl3
f1 (ppm)


-62.569
-122.791
CF3
O
N
Ph
F
NO2
3ak
376 MHz/CDCl3
f1 (ppm)


7.734
7.585
7.434
7.406
7.387
7.351
7.333
7.314
7.290
7.236
7.219
7.172
6.854
3.342
4.05
2.07
2.22
2.00
3.03
f1 (ppm)
3al
400 MHz/CDCl3


160.870
160.655
140.495
131.206
130.578
130.362
129.196
128.655
128.448
128.219
126.378
126.291
117.390
114.839
77.478
77.160
76.842
40.446
f1 (ppm)
3al
100 MHz/CDCl3


-122.368
3al
376 MHz/CDCl3
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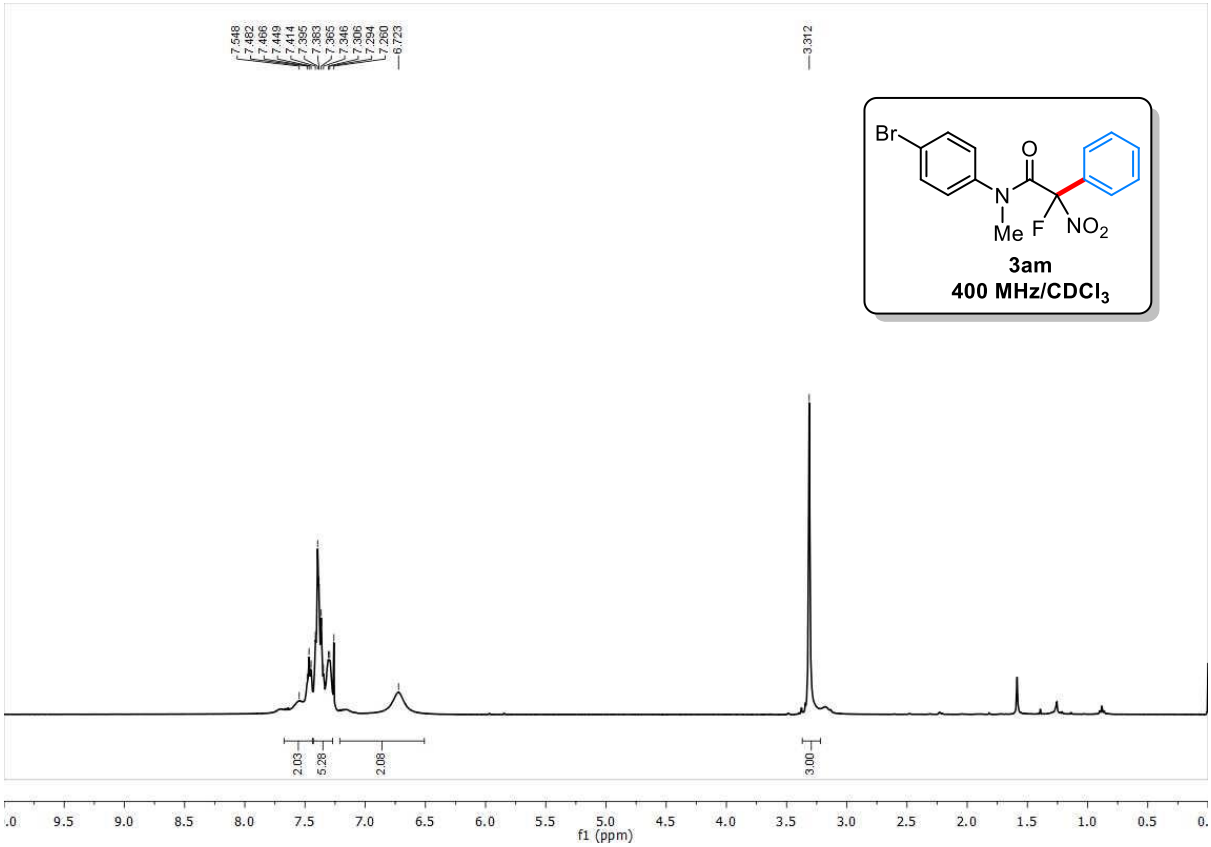
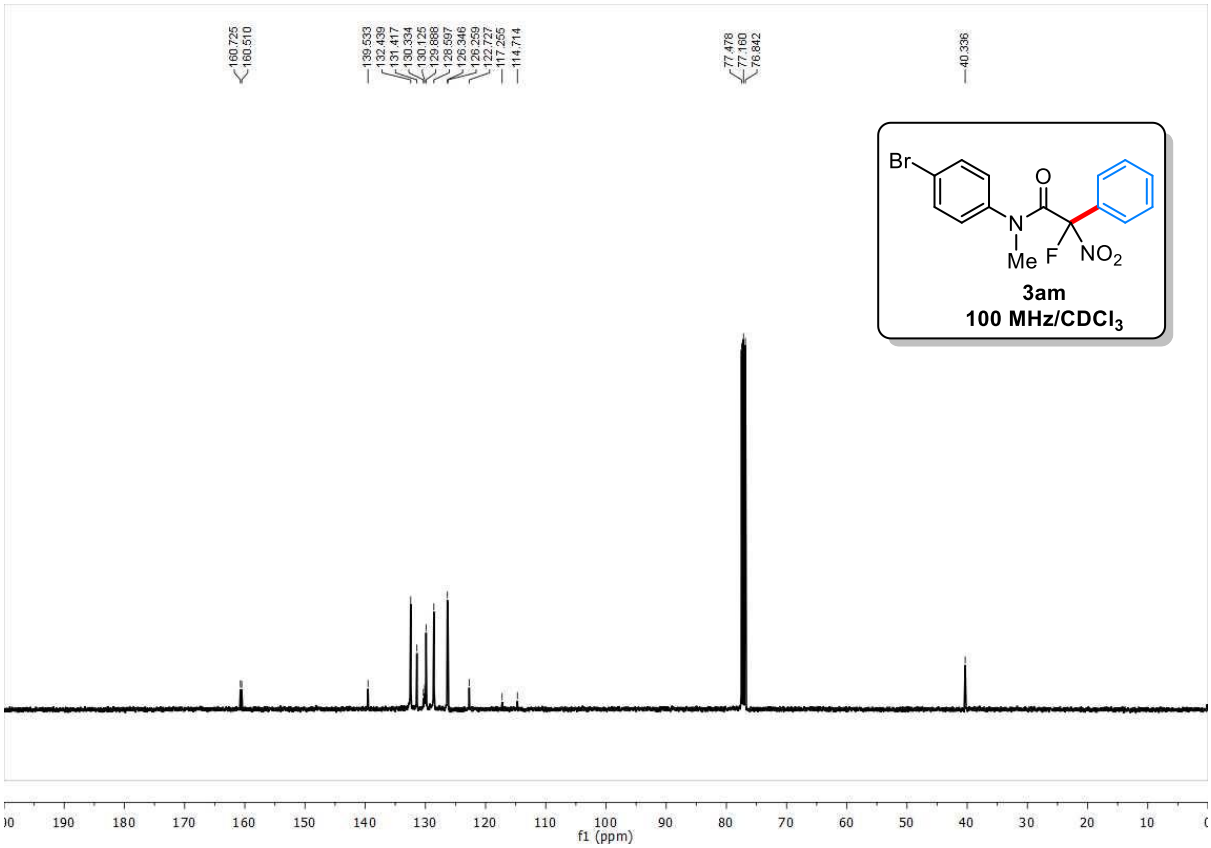
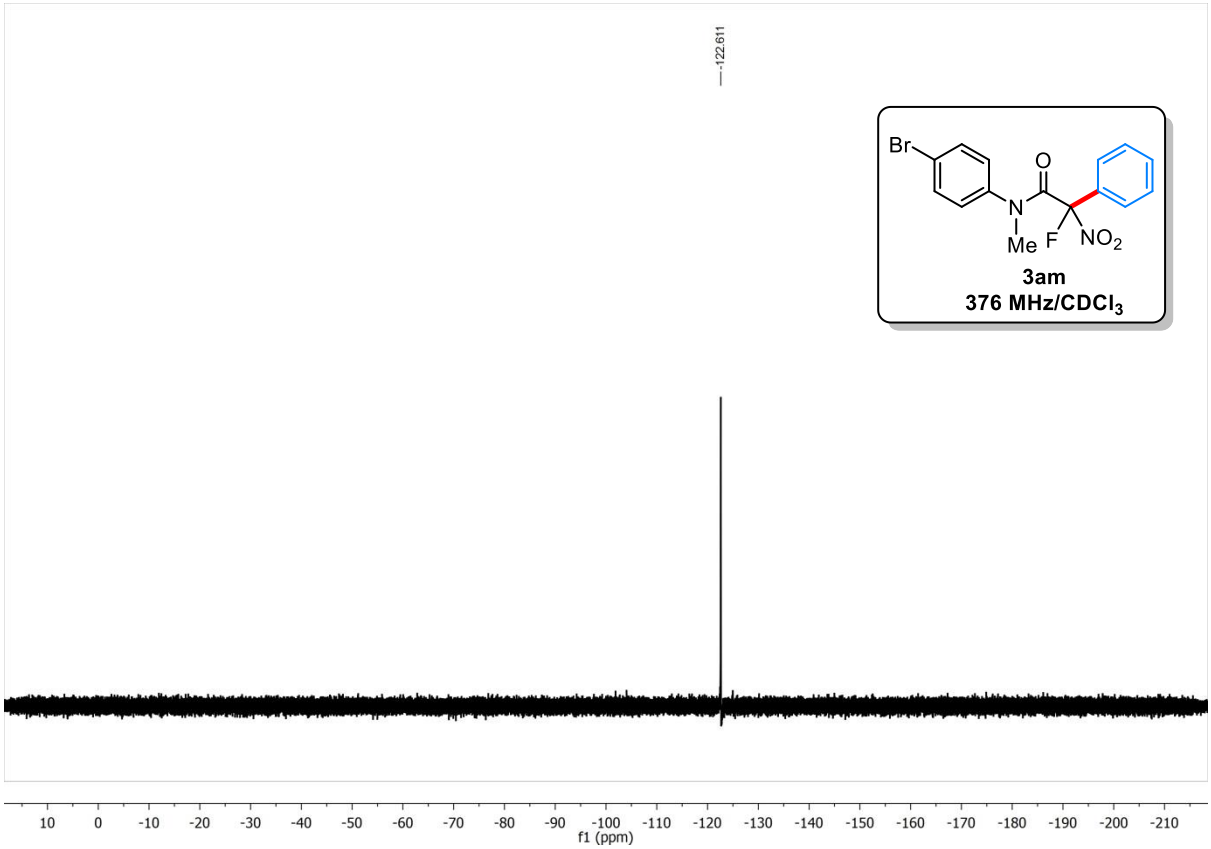
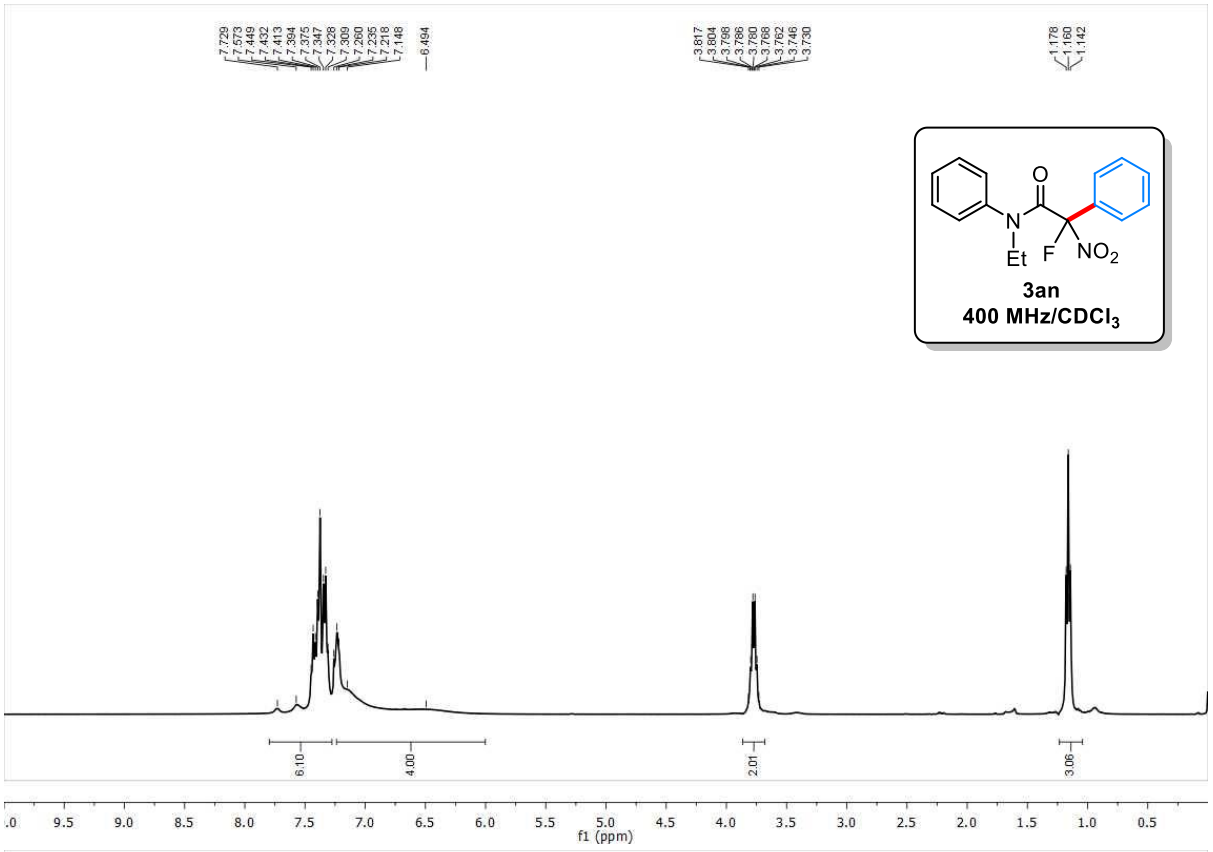
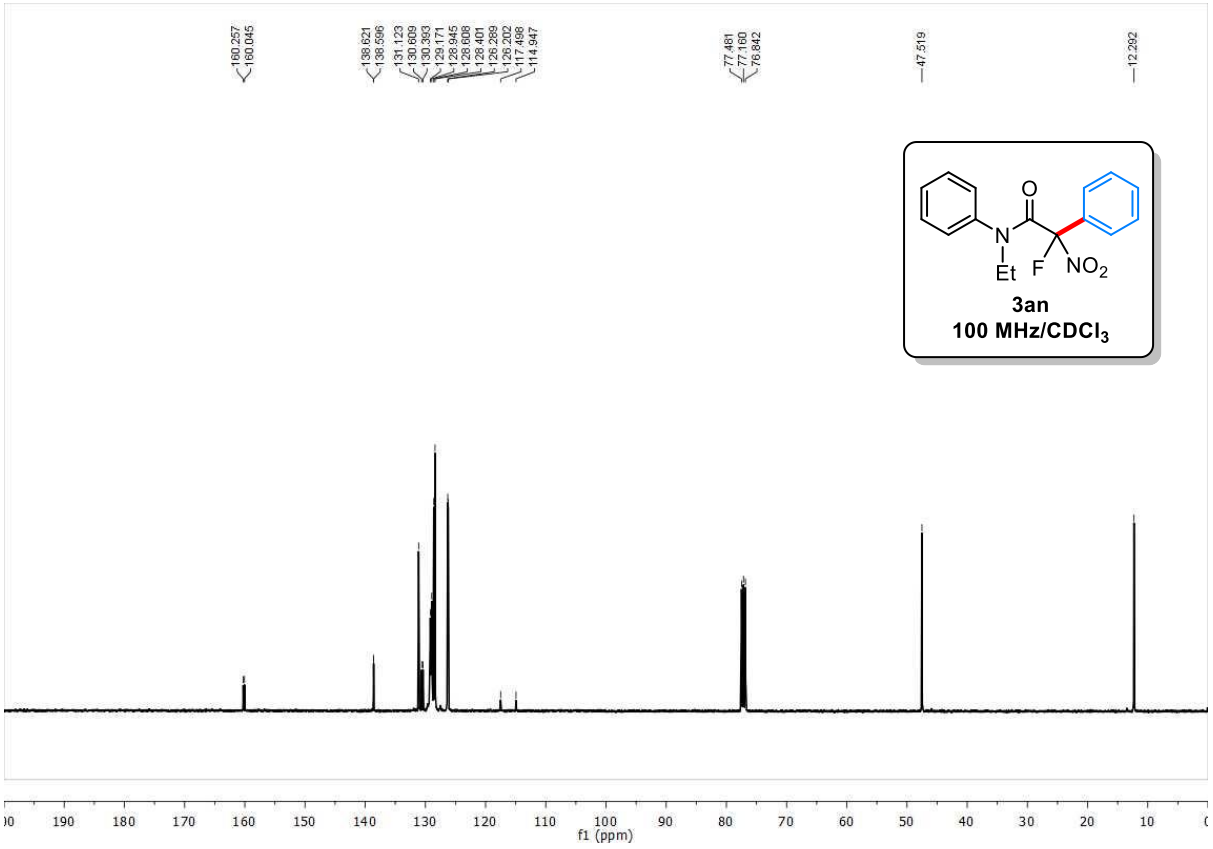
f1 (ppm)


7.548
7.482
7.466
7.449
7.414
7.395
7.383
7.365
7.346
7.306
7.294
7.260
6.723
3.312
3am
400 MHz/CDCl3
2.03
5.28
2.08
3.00
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)


160.725
160.510
139.533
132.439
131.417
130.334
130.125
129.888
128.597
126.346
126.259
122.727
117.255
114.714
77.478
77.160
76.842
40.336
Br
O
N
Me
F
NO2
3am
100 MHz/CDCl3
f1 (ppm)


-122.611
Br
O
N
Me
F
NO2
3am
376 MHz/CDCl3
f1 (ppm)


7.729
7.573
7.449
7.432
7.413
7.394
7.375
7.347
7.328
7.309
7.200
7.235
7.218
7.148
6.494
3.817
3.804
3.798
3.786
3.780
3.768
3.762
3.746
3.730
1.178
1.160
1.142
O
N
Et
F
NO2
3an
400 MHz/CDCl3
6.10
4.00
2.01
3.06
f1 (ppm)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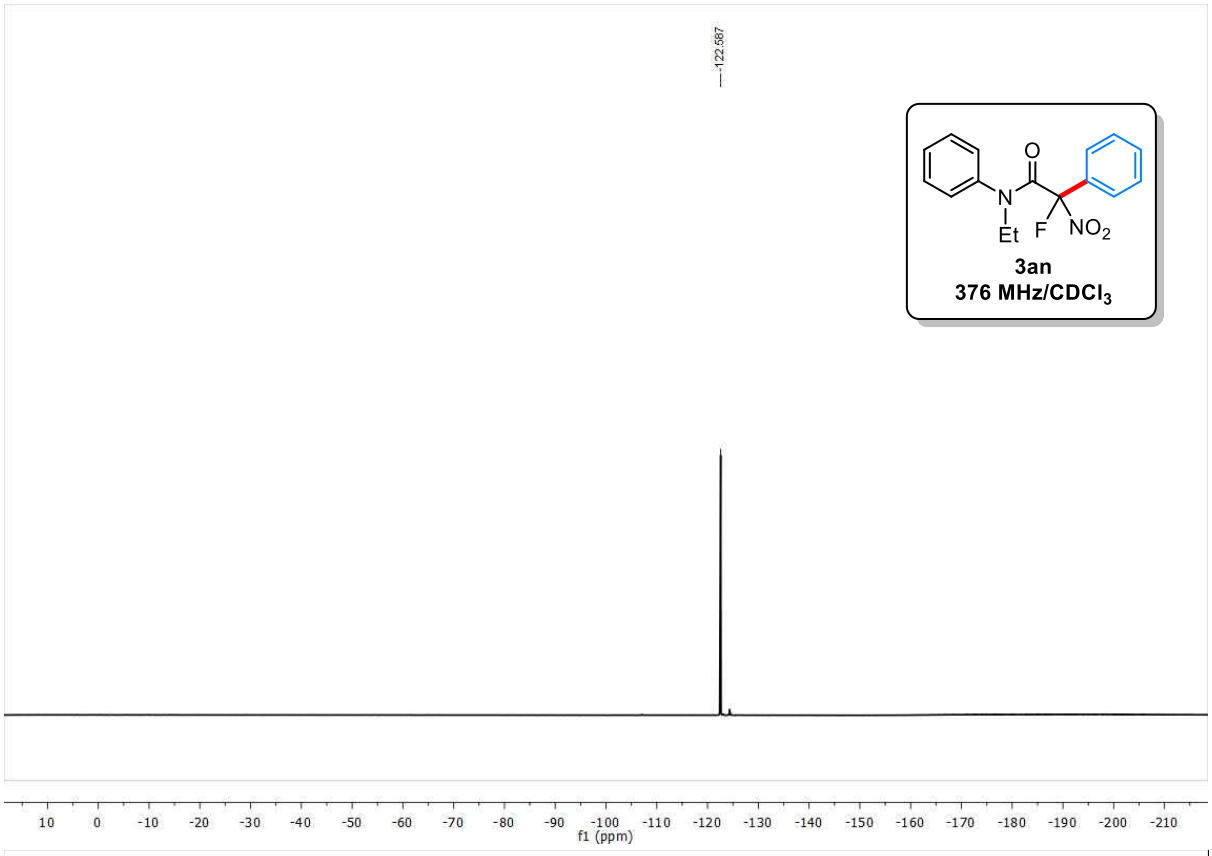
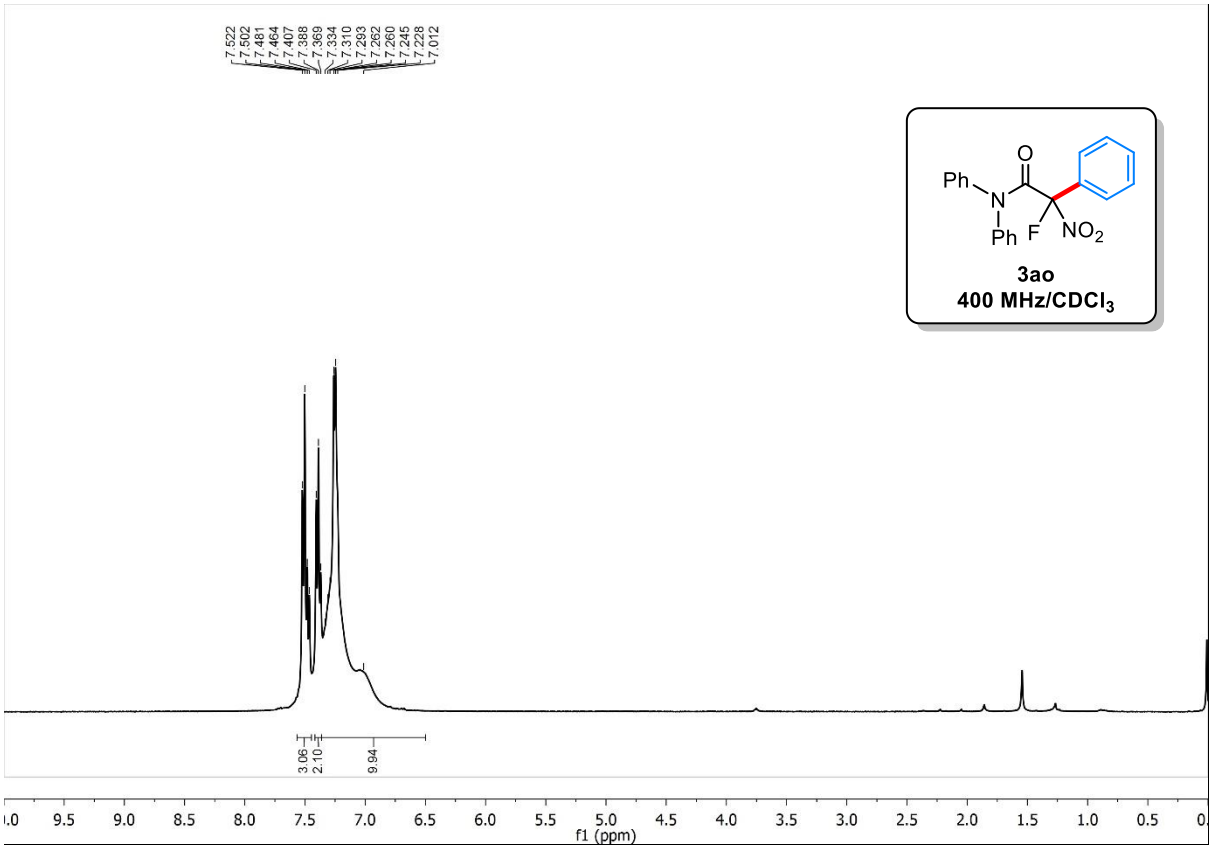
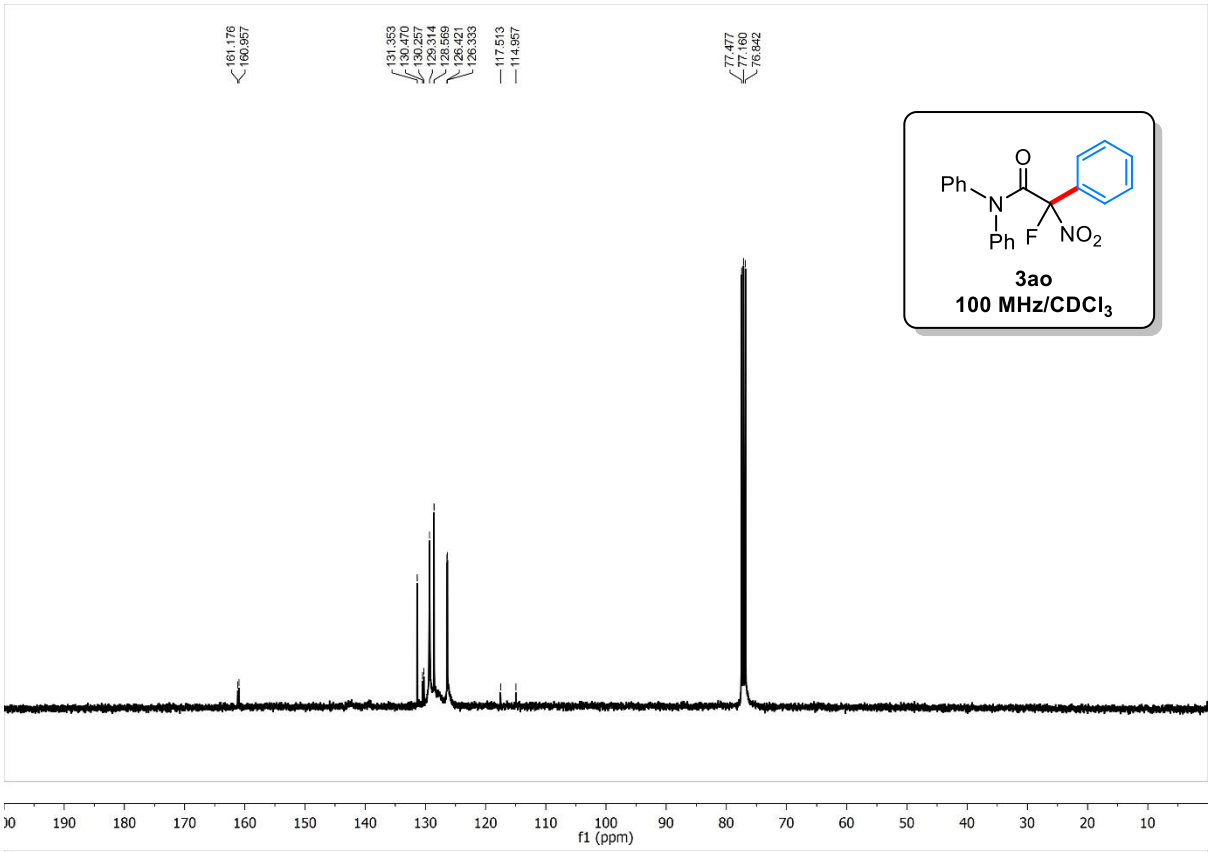
160.045
138.621
138.596
131.123
130.609
130.393
129.171
128.945
128.608
128.401
126.289
126.202
117.498
114.947
77.481
77.160
76.842
47.519
12.292
O
N
Et
F
NO2
3an
100 MHz/CDCl3
f1 (ppm)


-122.587
O
N
Et
F
NO2
3an
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)


7.522
7.502
7.481
7.464
7.407
7.388
7.369
7.334
7.310
7.293
7.262
7.260
7.245
7.228
7.012
O
Ph
N
Ph
F
NO2
3ao
400 MHz/CDCl3
3.06
2.10
9.94
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)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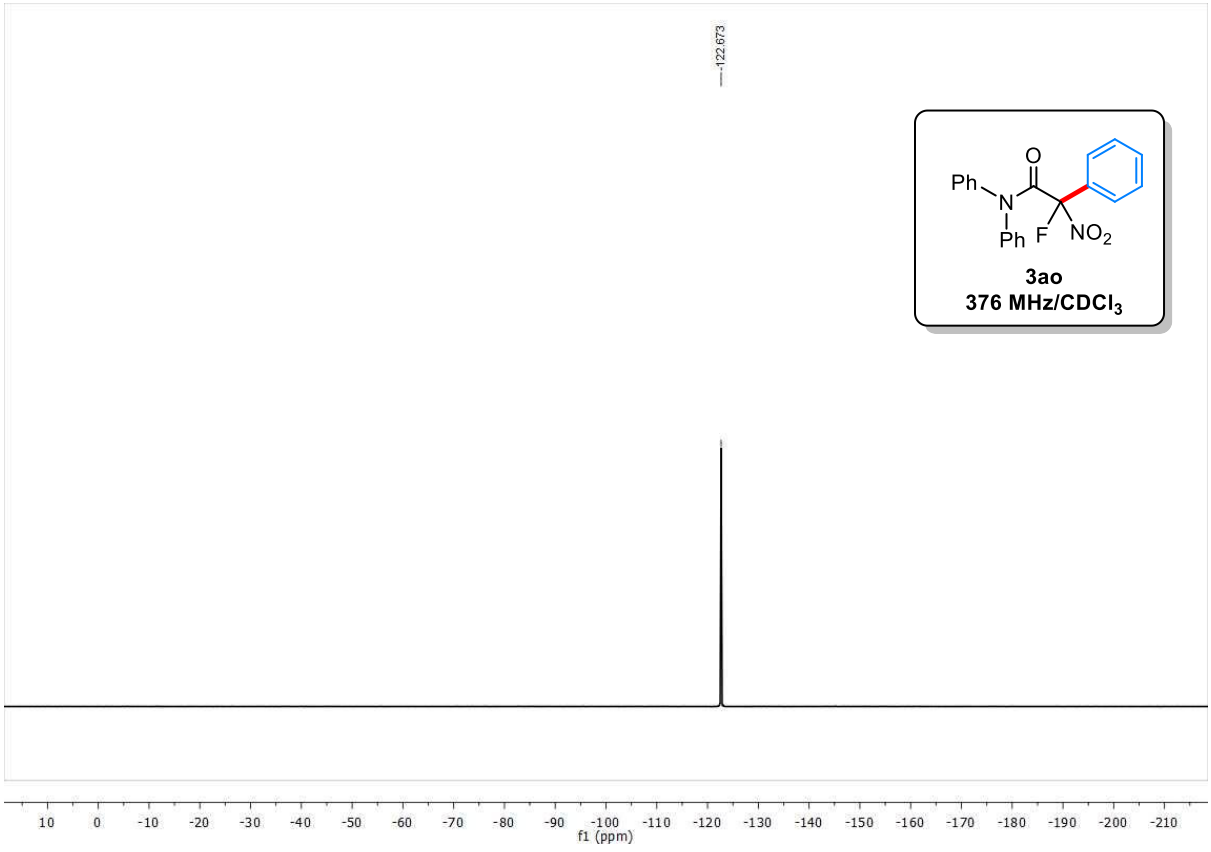
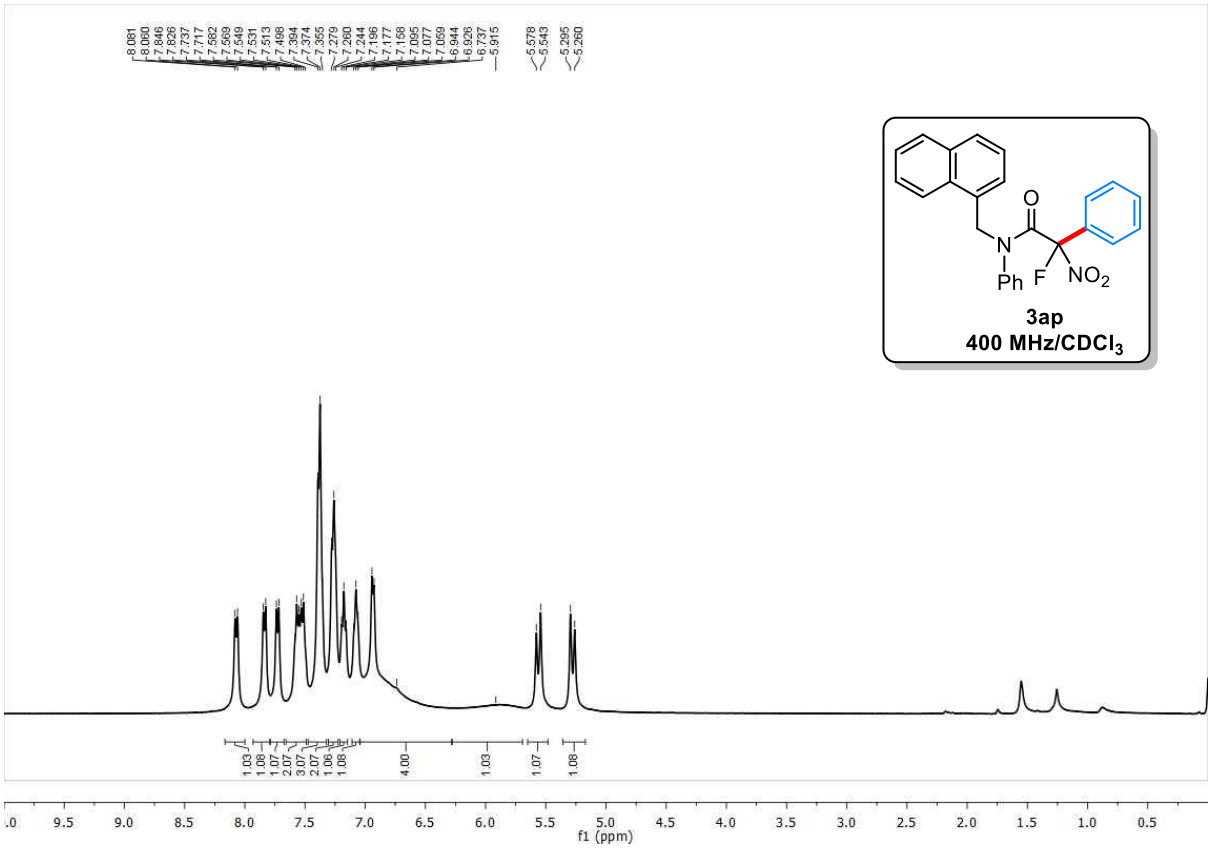
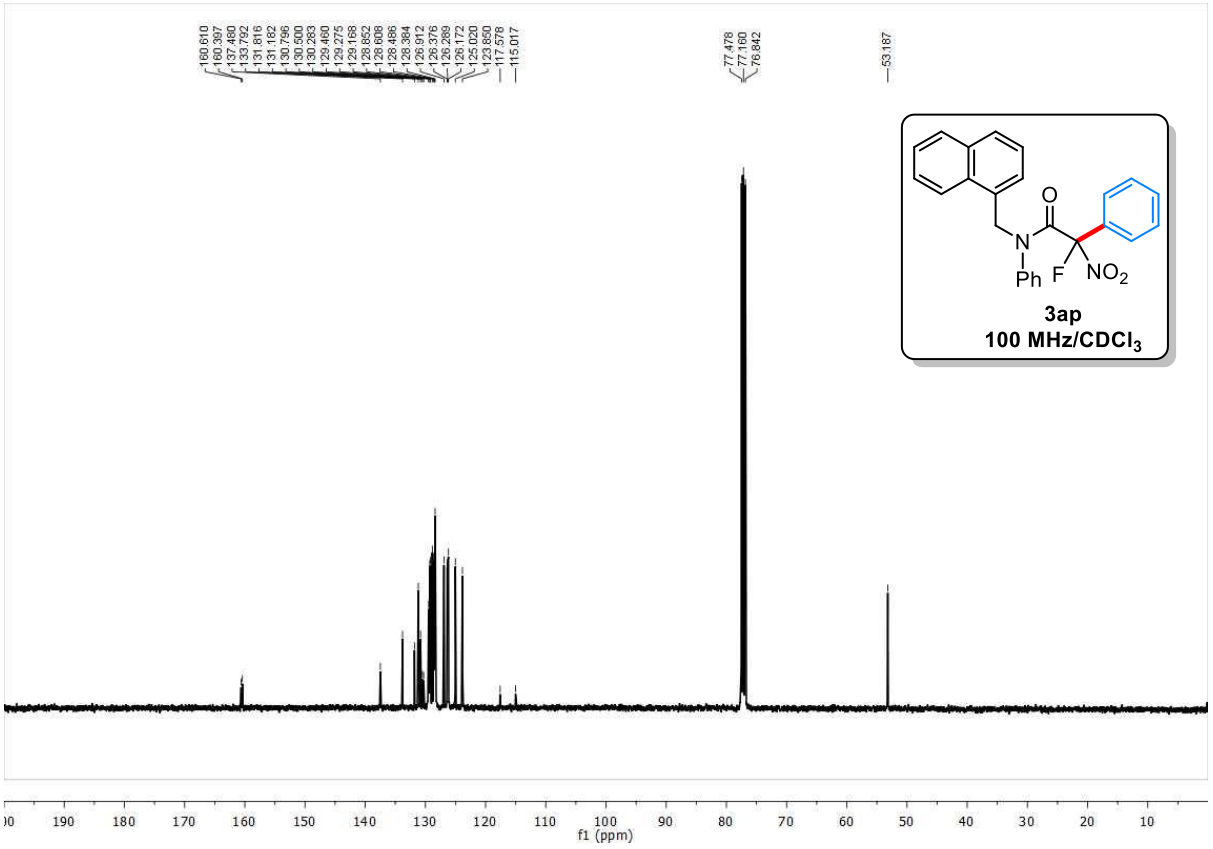
160.957
131.353
130.470
130.257
129.314
128.569
126.421
126.333
117.513
114.957
77.477
77.160
76.842
Ph
N
Ph
O
F
NO2
3ao
100 MHz/CDCl3
f1 (ppm)


-122.673
Ph
N
Ph
O
F
NO2
3ao
376 MHz/CDCl3
f1 (ppm)


8.081
8.060
7.846
7.826
7.737
7.717
7.582
7.569
7.549
7.531
7.513
7.498
7.384
7.374
7.355
7.279
7.260
7.244
7.196
7.177
7.158
7.095
7.077
7.059
6.944
6.926
6.737
5.915
5.578
5.543
5.295
5.260
1.03
1.08
1.07
2.07
3.07
2.07
1.06
1.08
4.00
1.03
1.07
1.08
O
N
Ph
F
NO2
3ap
400 MHz/CDCl3
f1 (ppm)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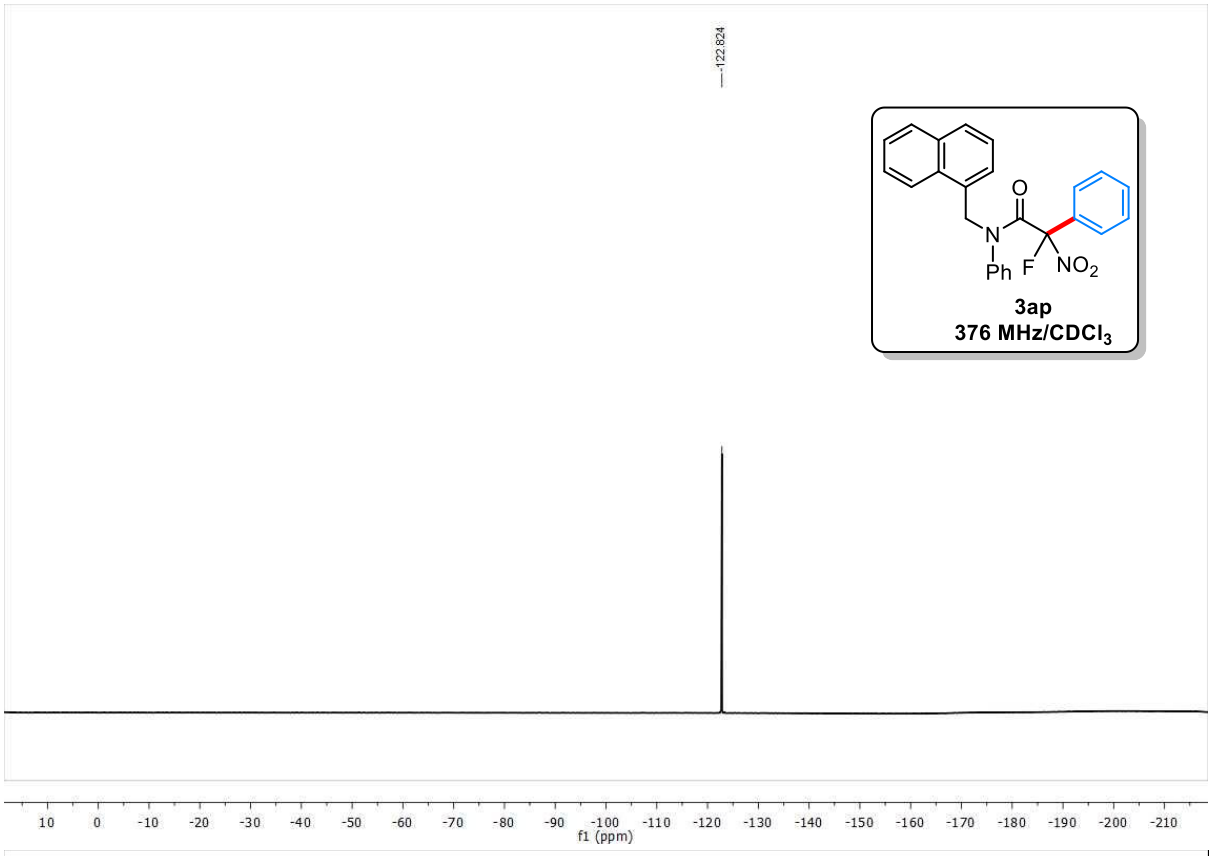
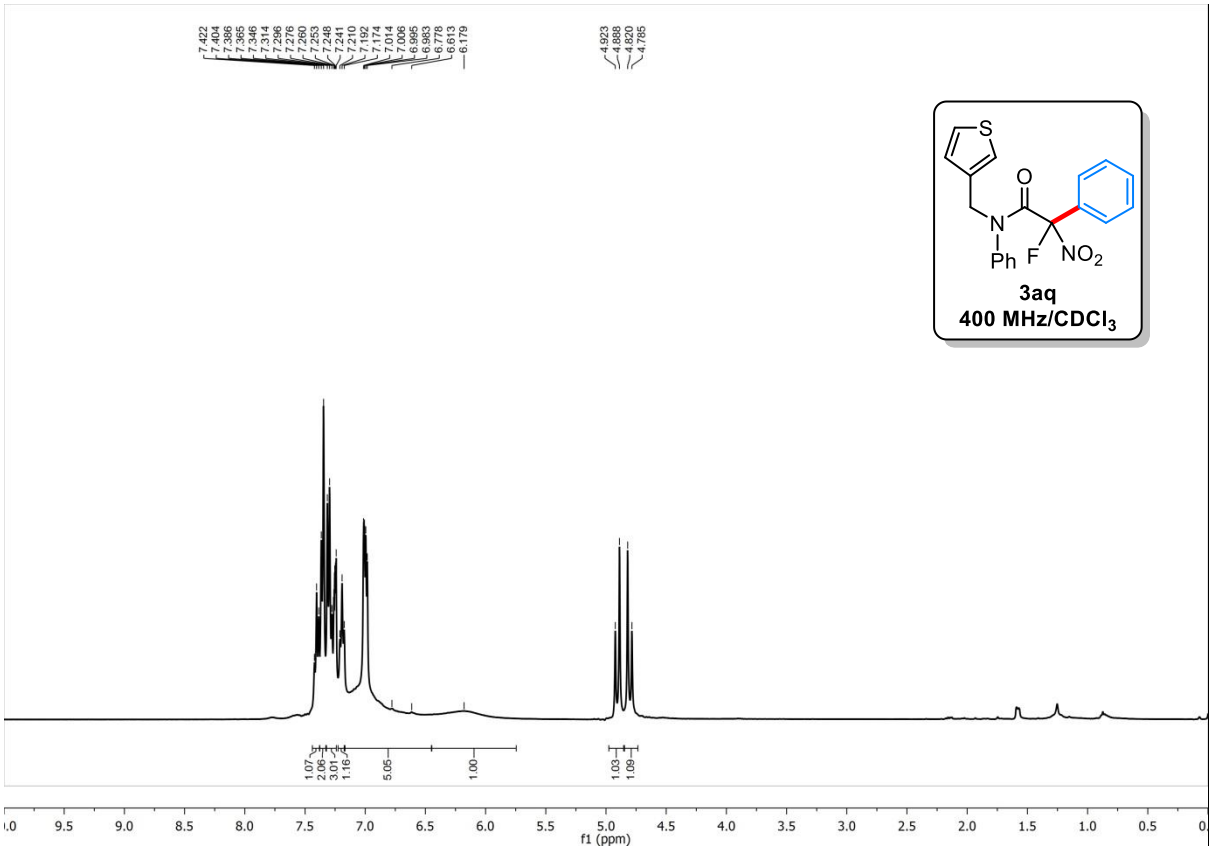
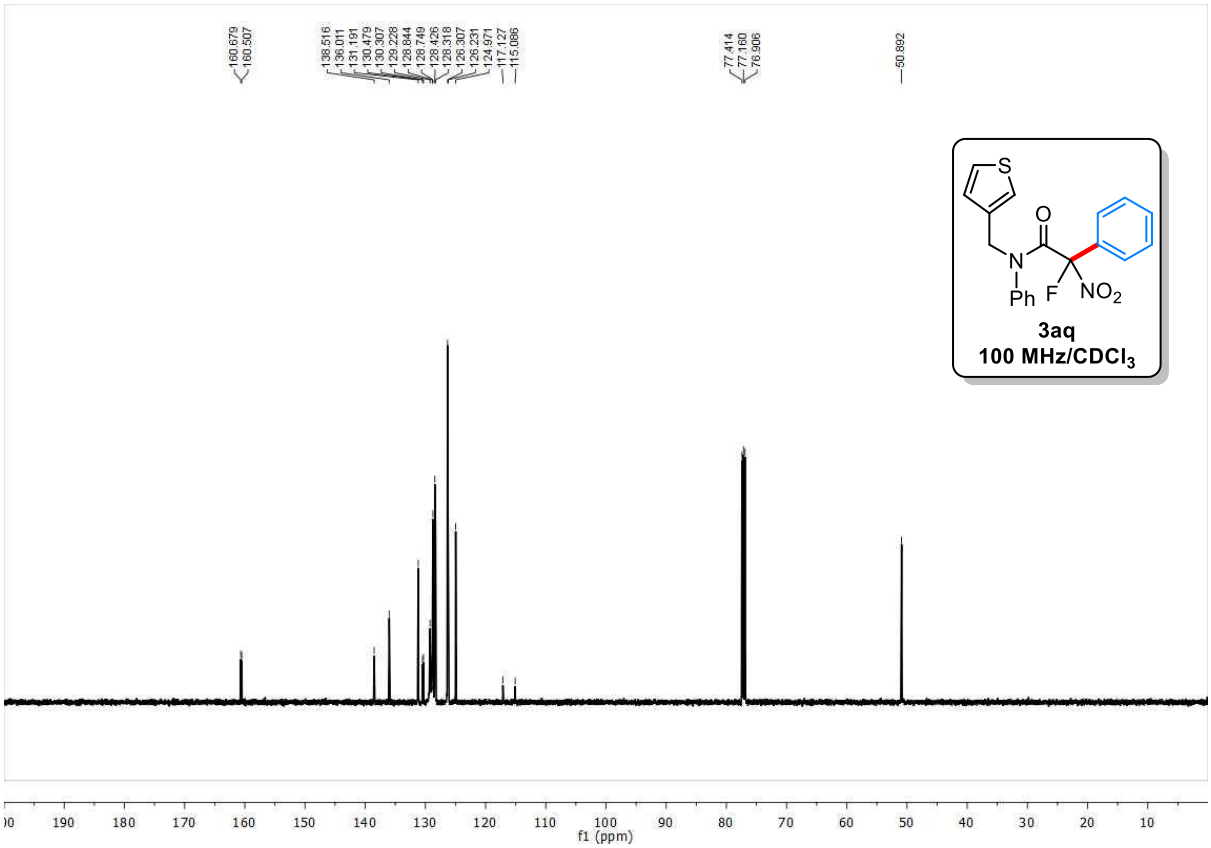
160.397
137.480
133.792
131.816
131.182
130.796
130.500
130.283
129.460
129.275
129.168
128.852
128.606
128.486
128.384
126.912
126.376
126.289
126.172
125.020
123.850
117.578
115.017
77.478
77.160
76.842
53.187
O
N
Ph
F
NO2
3ap
100 MHz/CDCl3
f1 (ppm)


122.824
O
N
Ph
F
NO2
3ap
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)


7.422
7.404
7.386
7.365
7.346
7.314
7.296
7.216
7.260
7.255
7.248
7.241
7.210
7.192
7.174
7.014
7.006
6.985
6.983
6.778
6.613
6.179
4.923
4.888
4.820
4.785
S
O
N
Ph
F
NO2
3aq
400 MHz/CDCl3
1.07
2.06
3.01
1.16
5.05
1.00
1.03
1.09
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)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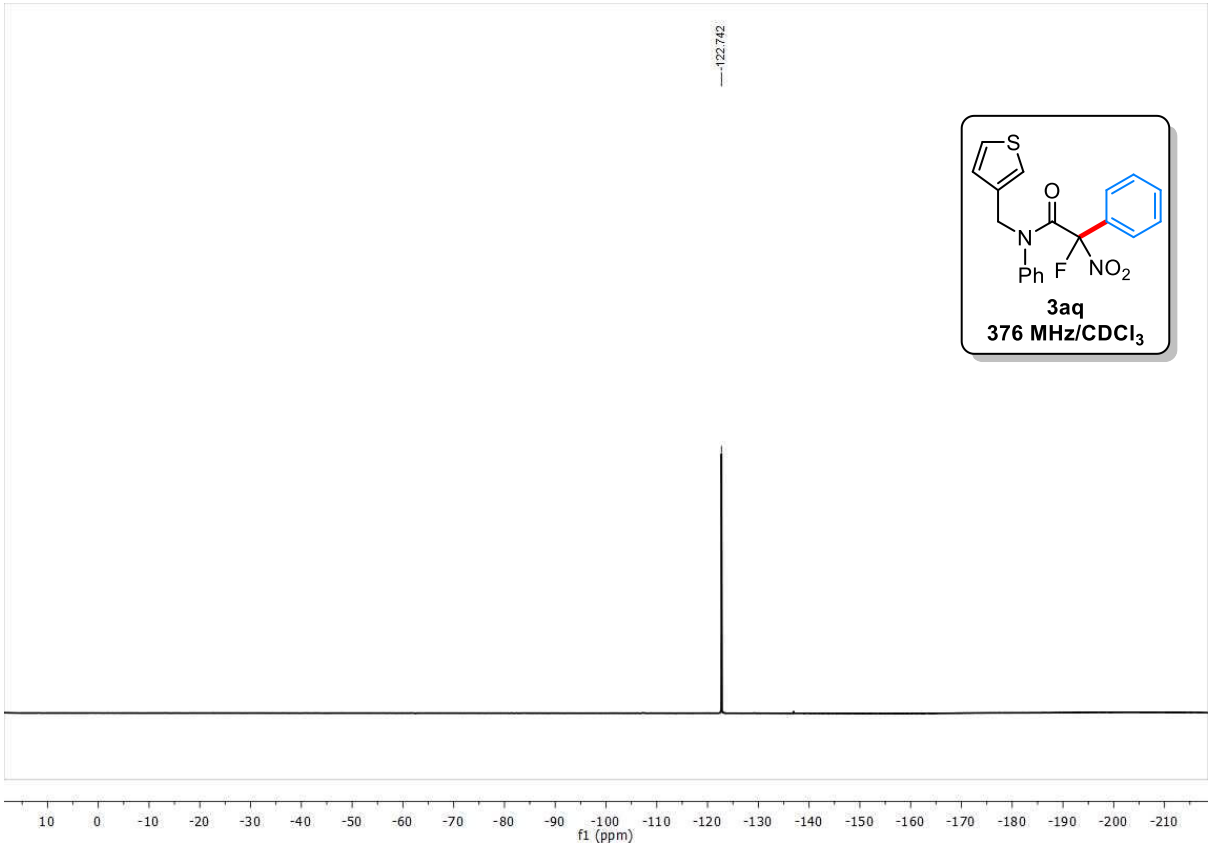
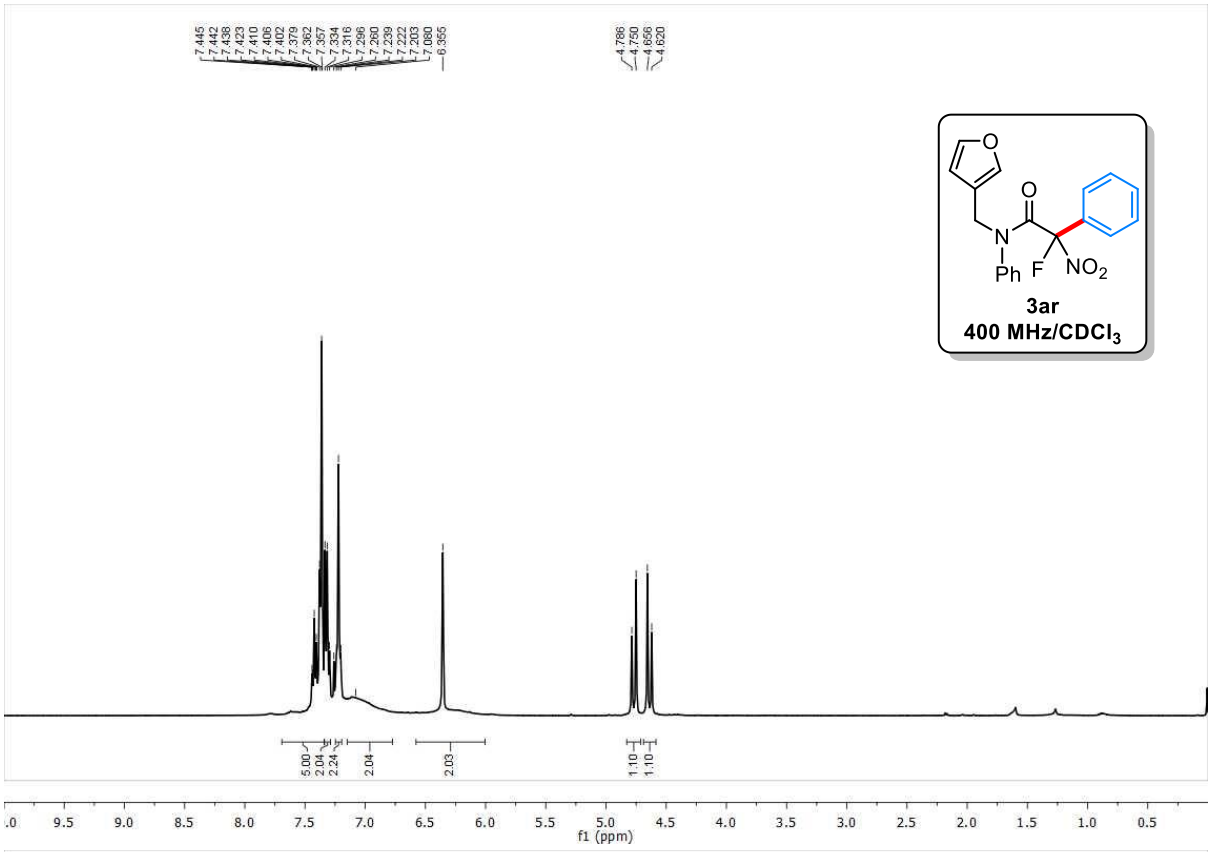
130.479
130.307
129.228
128.844
128.749
128.426
128.318
126.307
126.231
124.971
117.127
115.086
77.414
77.160
76.906
50.892
3aq
100 MHz/CDCl3
f1 (ppm)


-122.742
3aq
376 MHz/CDCl3
f1 (ppm)


7.445
7.442
7.438
7.423
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7.406
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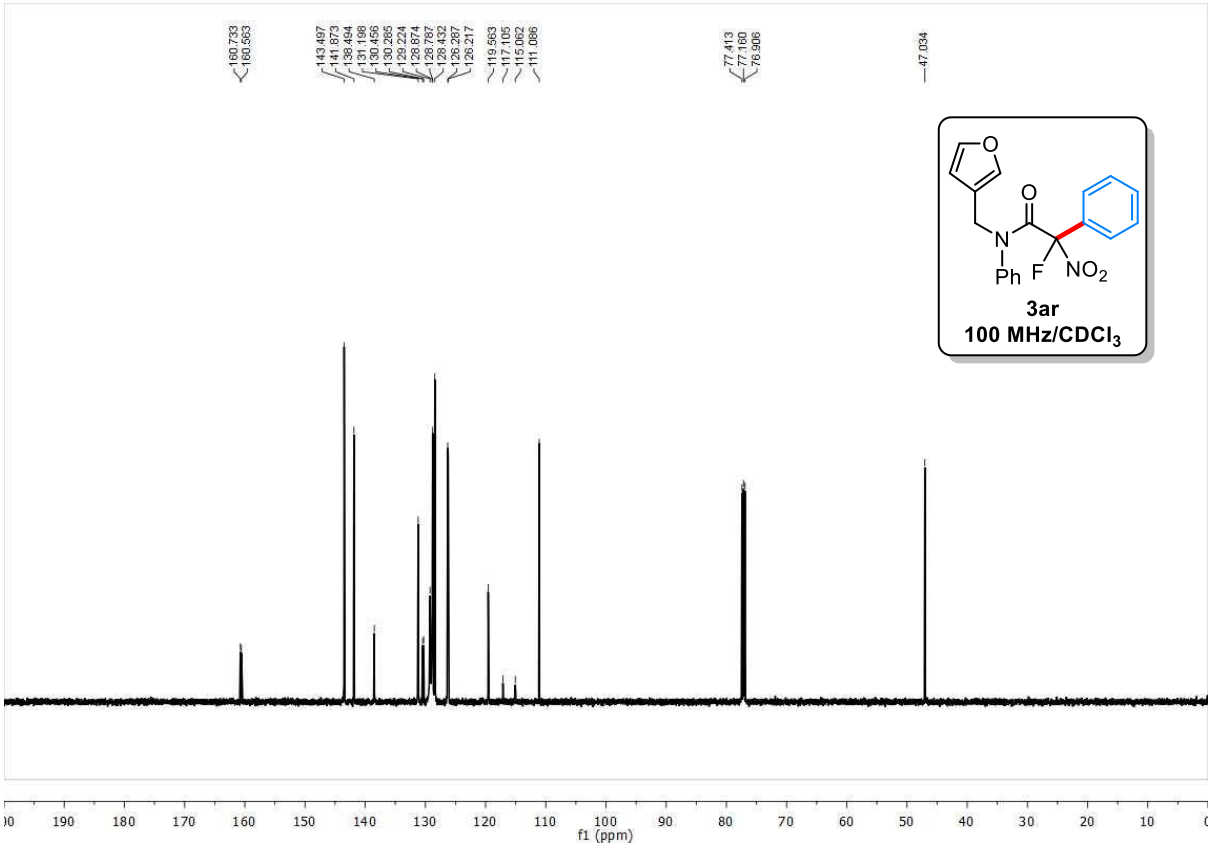
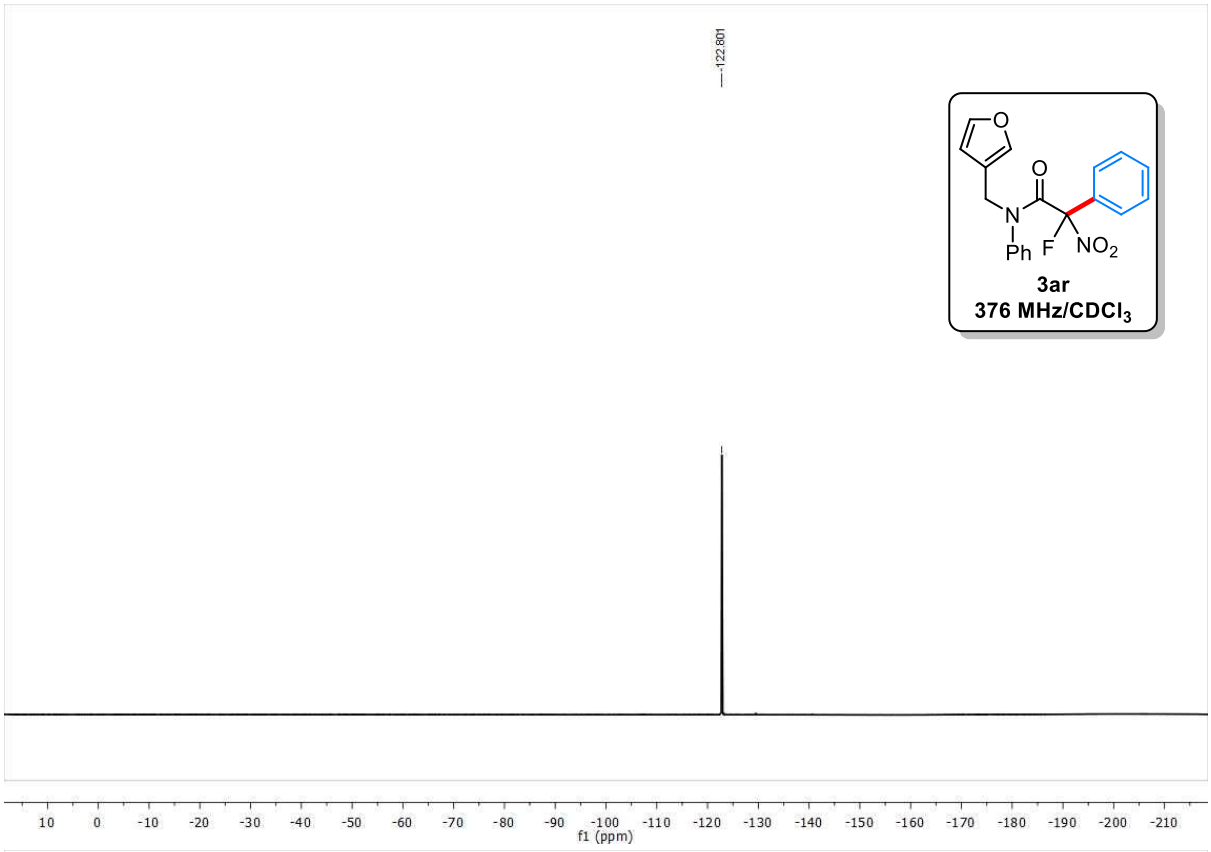
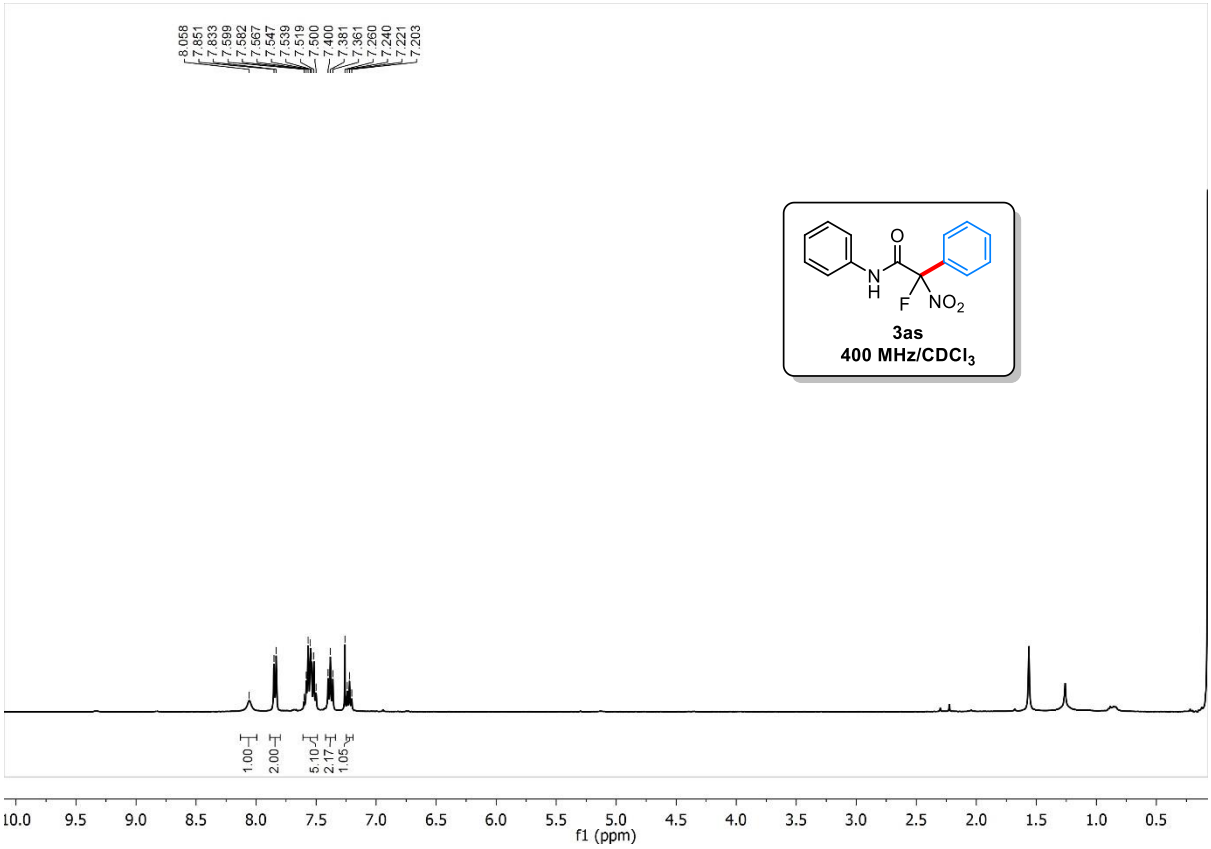
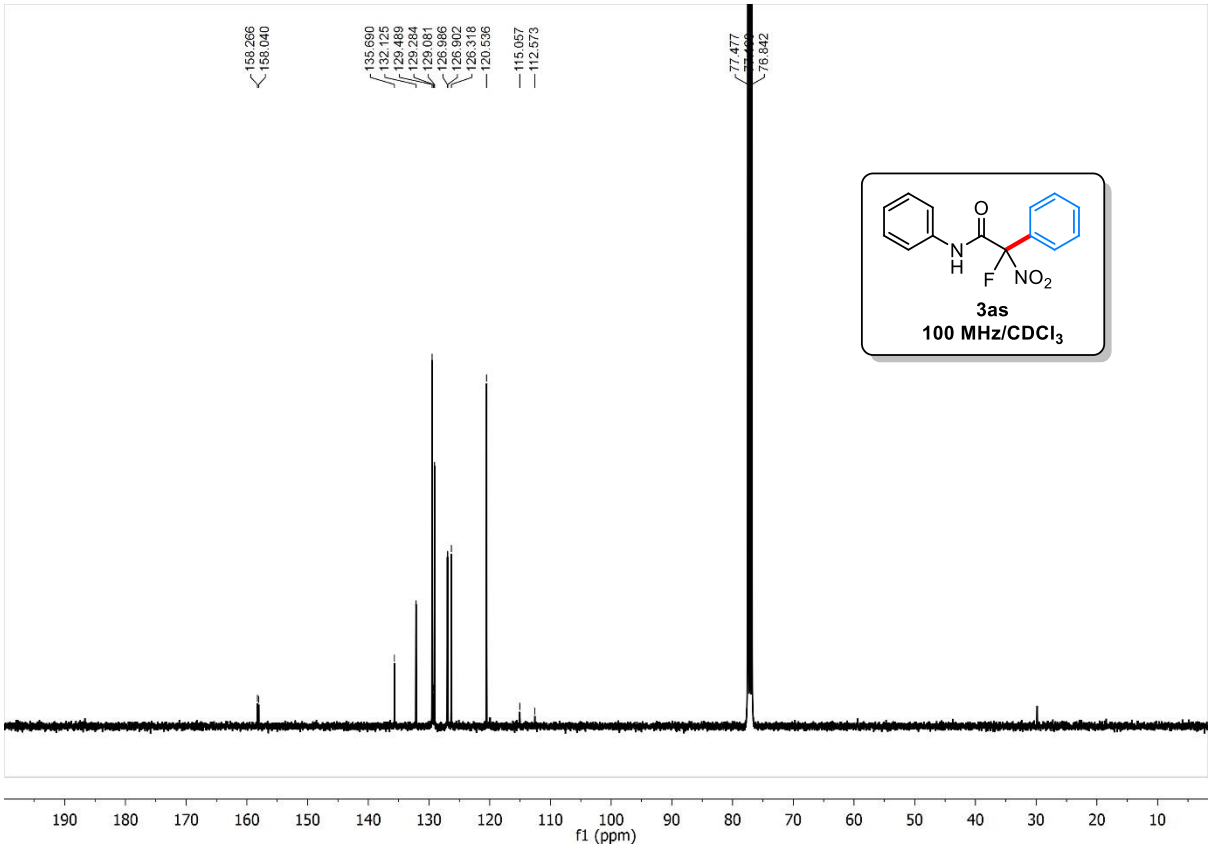
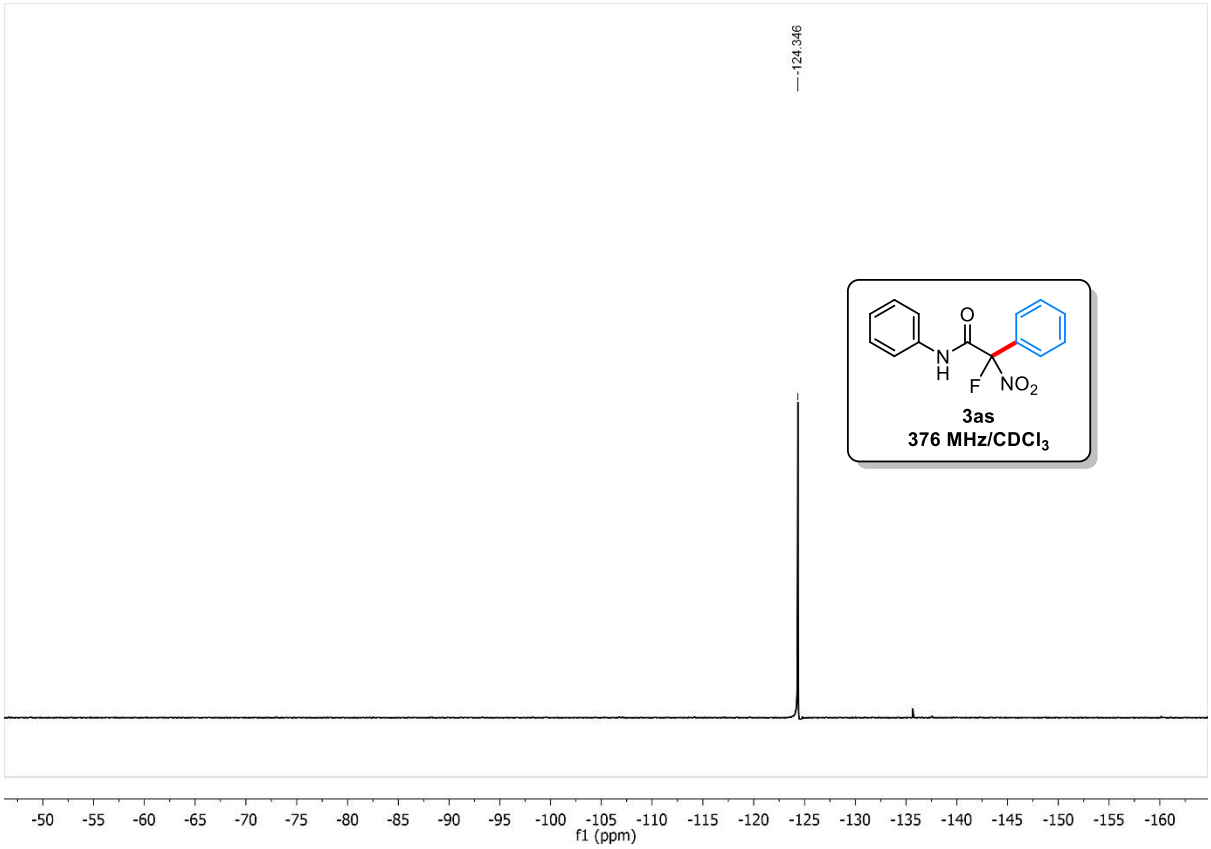
7.379
7.362
7.357
7.334
7.316
7.296
7.260
7.239
7.222
7.203
7.090
6.955
4.786
4.750
4.656
4.620
O
N
Ph
F
NO2
3ar
400 MHz/CDCl3
5.00
2.04
2.24
2.04
2.03
1.10
1.10
f1 (ppm)

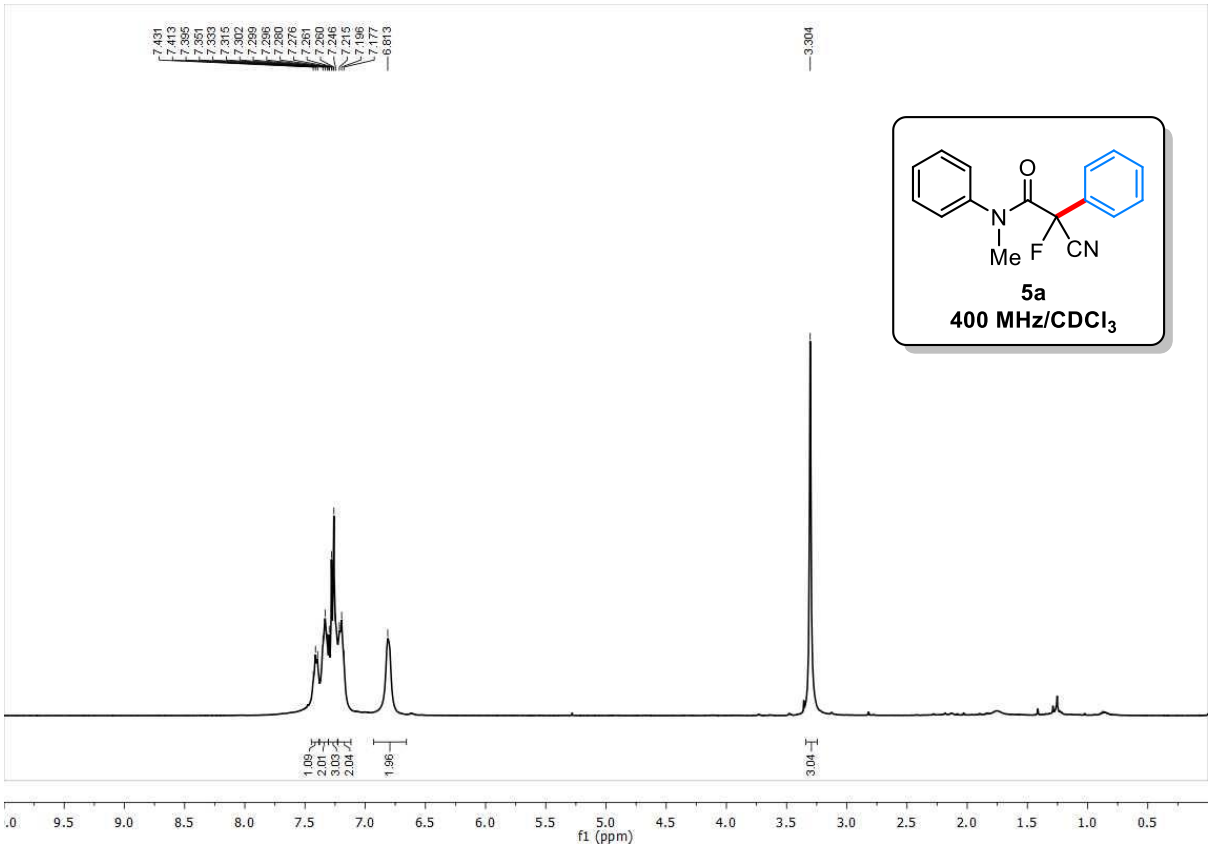

160.733
160.563
143.497
141.873
138.494
131.198
130.456
130.285
129.224
128.674
128.767
128.432
128.282
126.217
119.563
117.105
115.062
111.086
77.413
77.160
76.906
47.034
O
N
Ph
F
NO2
3ar
100 MHz/CDCl3
f1 (ppm)

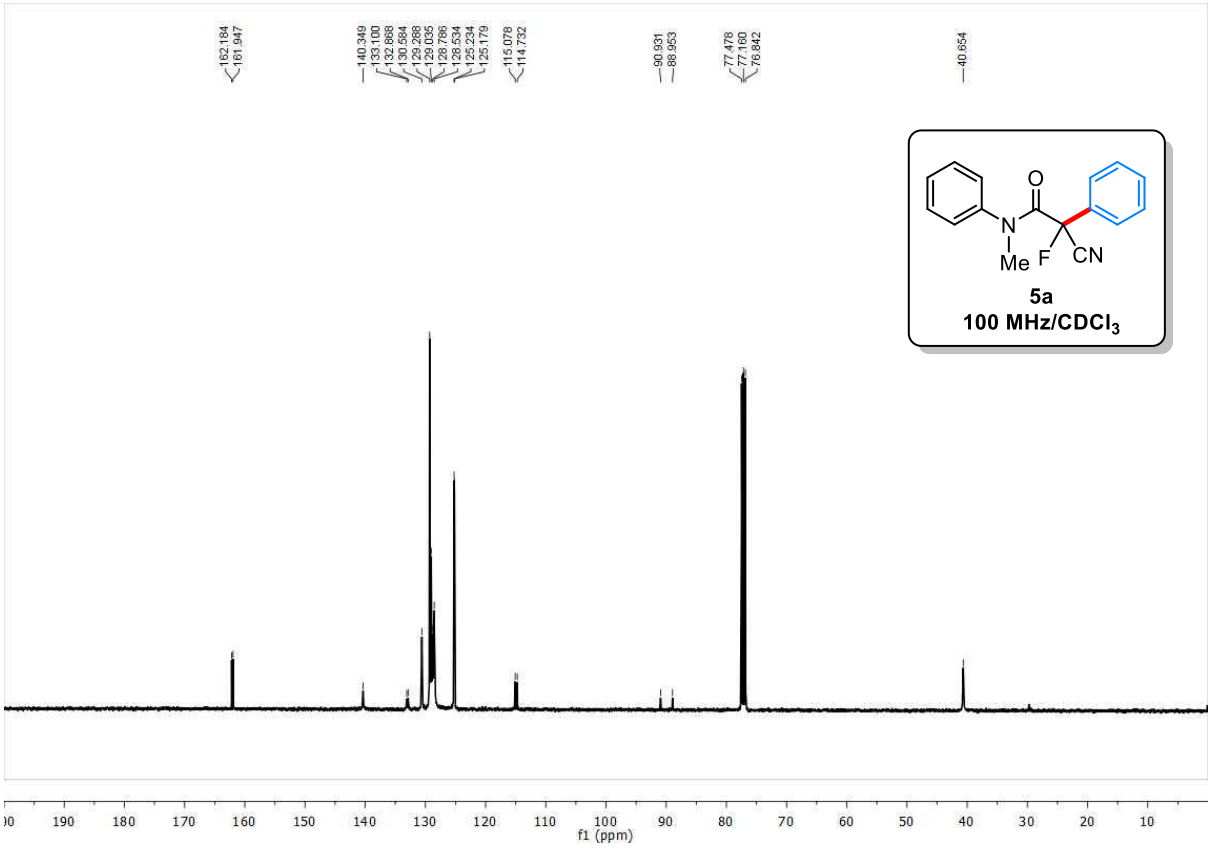

-122.801
3ar
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

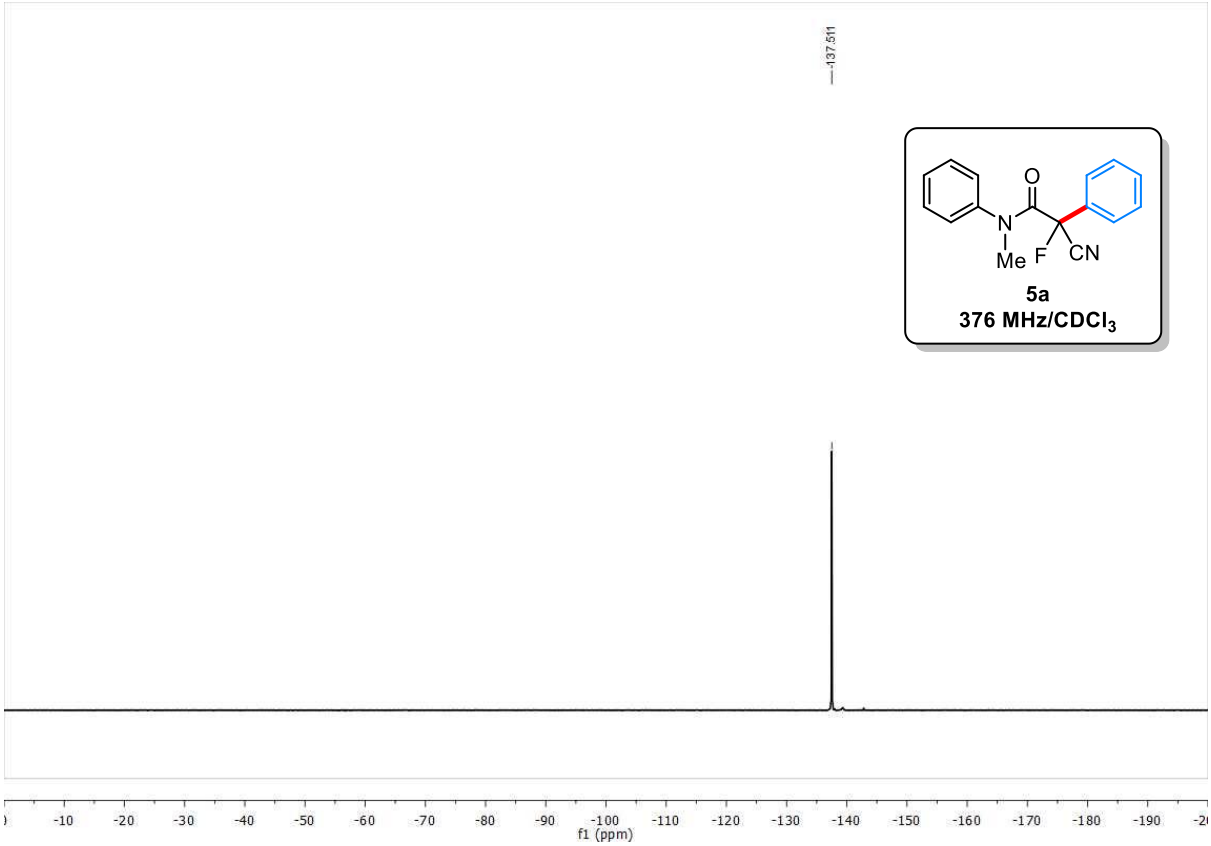

8.058
7.851
7.833
7.599
7.582
7.567
7.547
7.539
7.519
7.500
7.400
7.381
7.361
7.260
7.240
7.221
7.203
3as
400 MHz/CDCl3
1.00
2.00
5.10
2.17
1.05
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

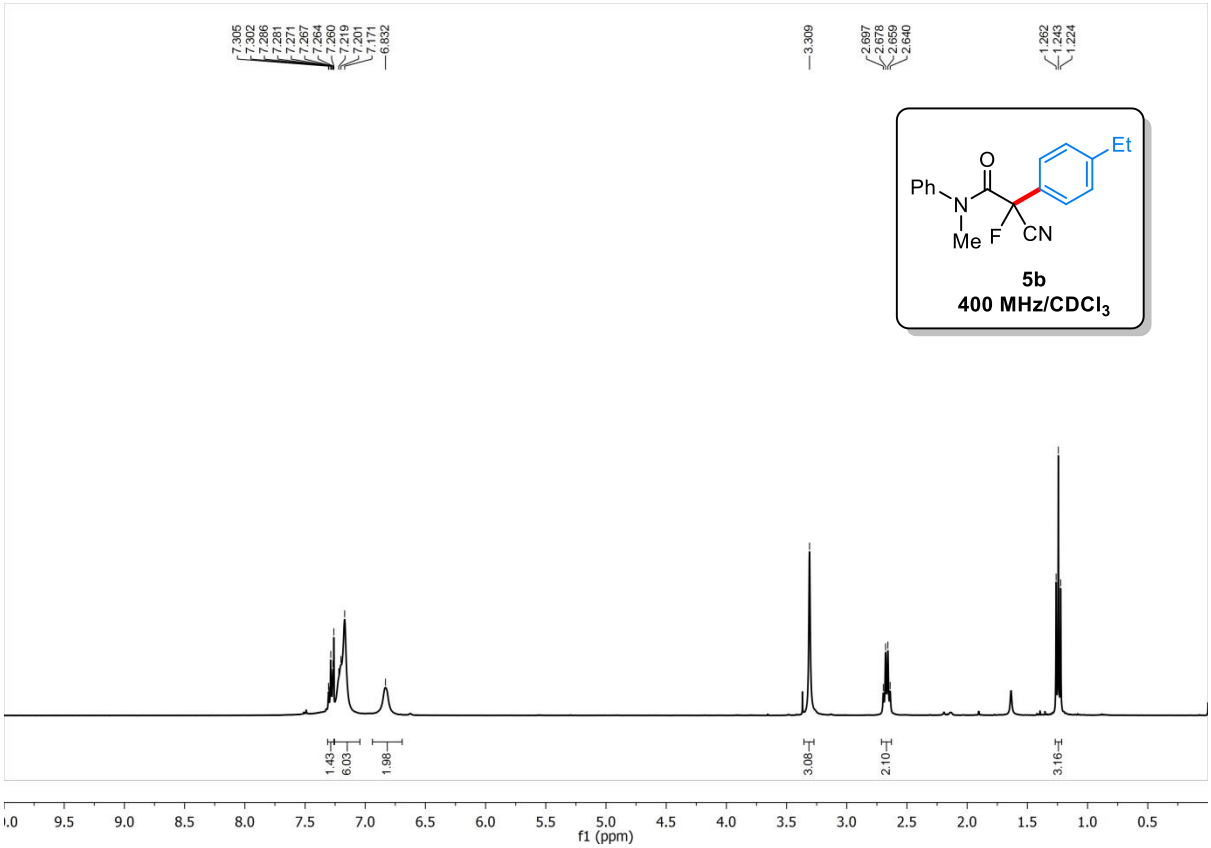

158.266
158.040
135.690
132.125
129.489
129.284
129.081
126.986
126.902
126.318
120.536
115.057
112.573
77.477
76.842
3as
100 MHz/CDCl3
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

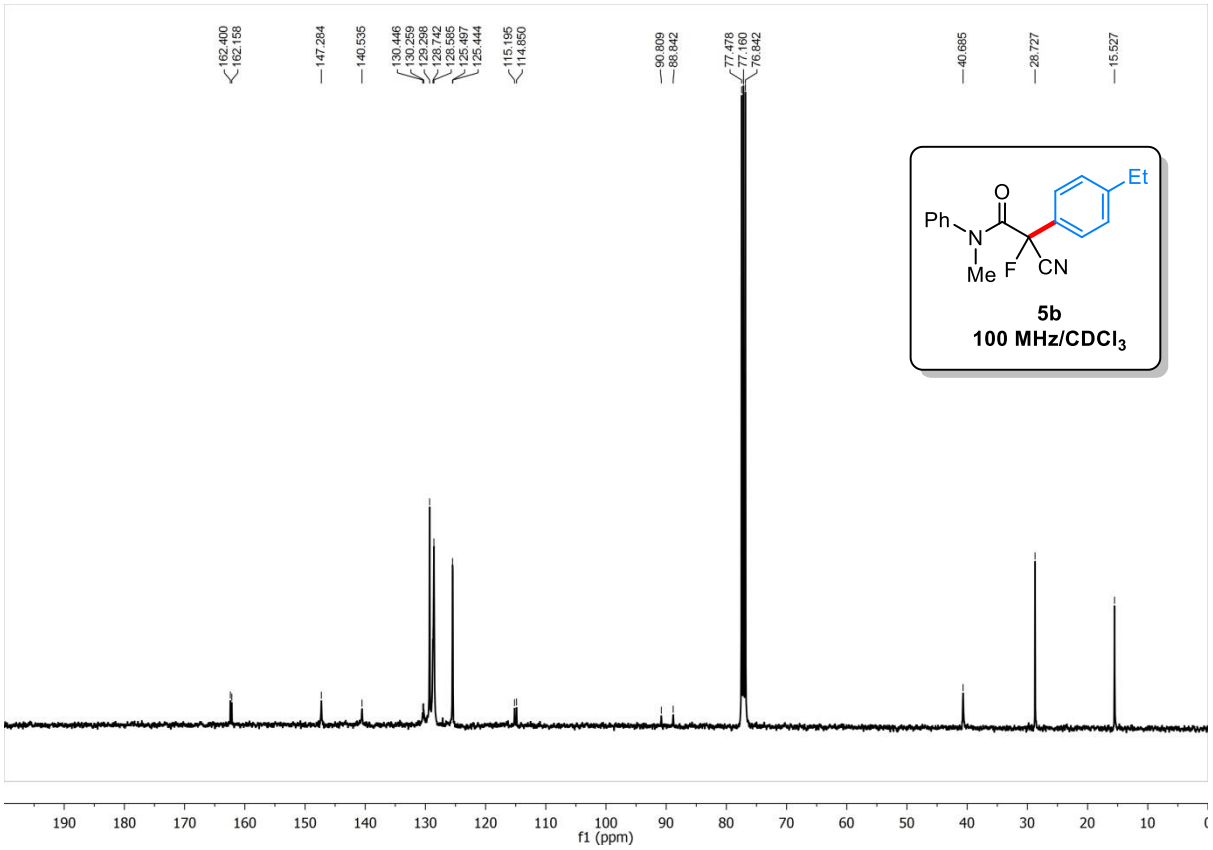

-124.346
3as
376 MHz/CDCl3
-50 -55 -60 -65 -70 -75 -80 -85 -90 -95 -100 -105 -110 -115 -120 -125 -130 -135 -140 -145 -150 -155 -160
f1 (ppm)

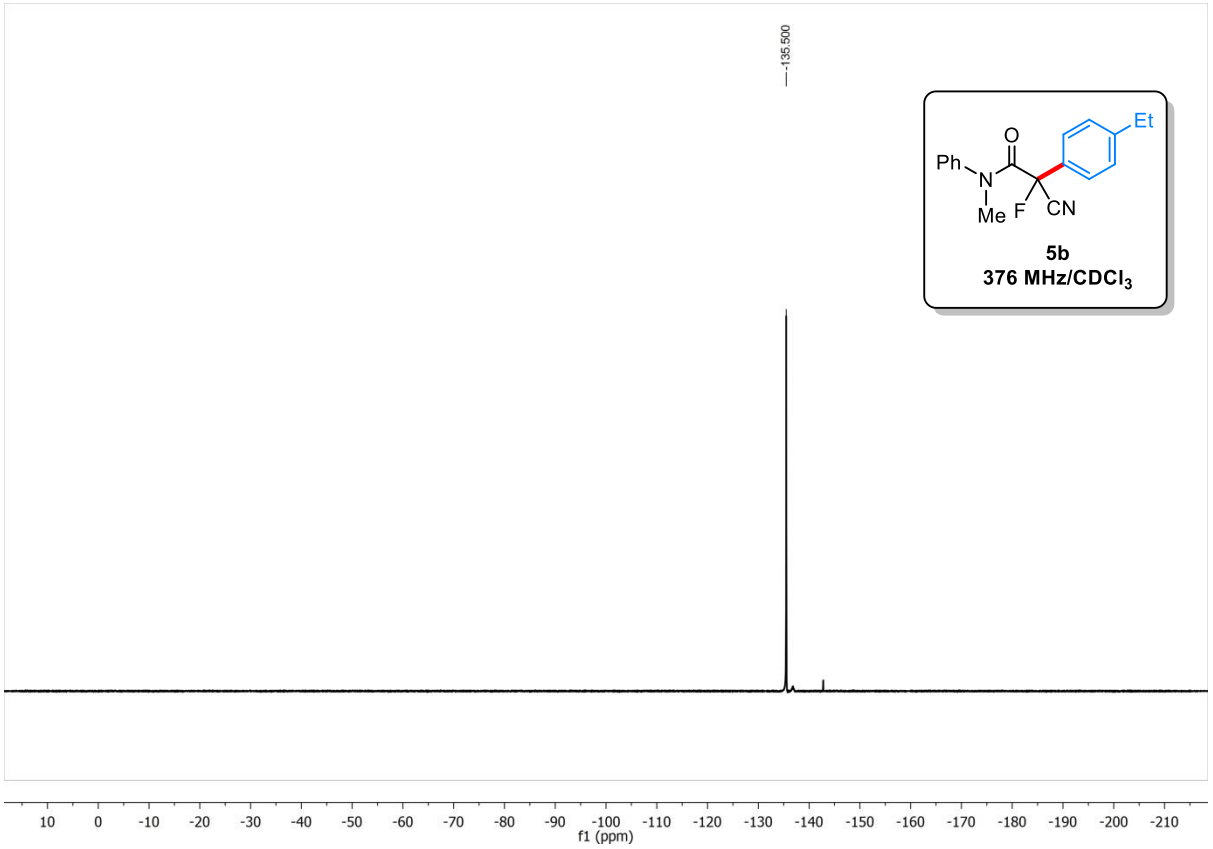

7.431
7.413
7.395
7.351
7.333
7.315
7.302
7.299
7.296
7.280
7.276
7.261
7.260
7.246
7.215
7.196
7.177
6.813
3.304
1.09
2.01
3.03
2.04
1.96
3.04
f1 (ppm)
5a
400 MHz/CDCl3

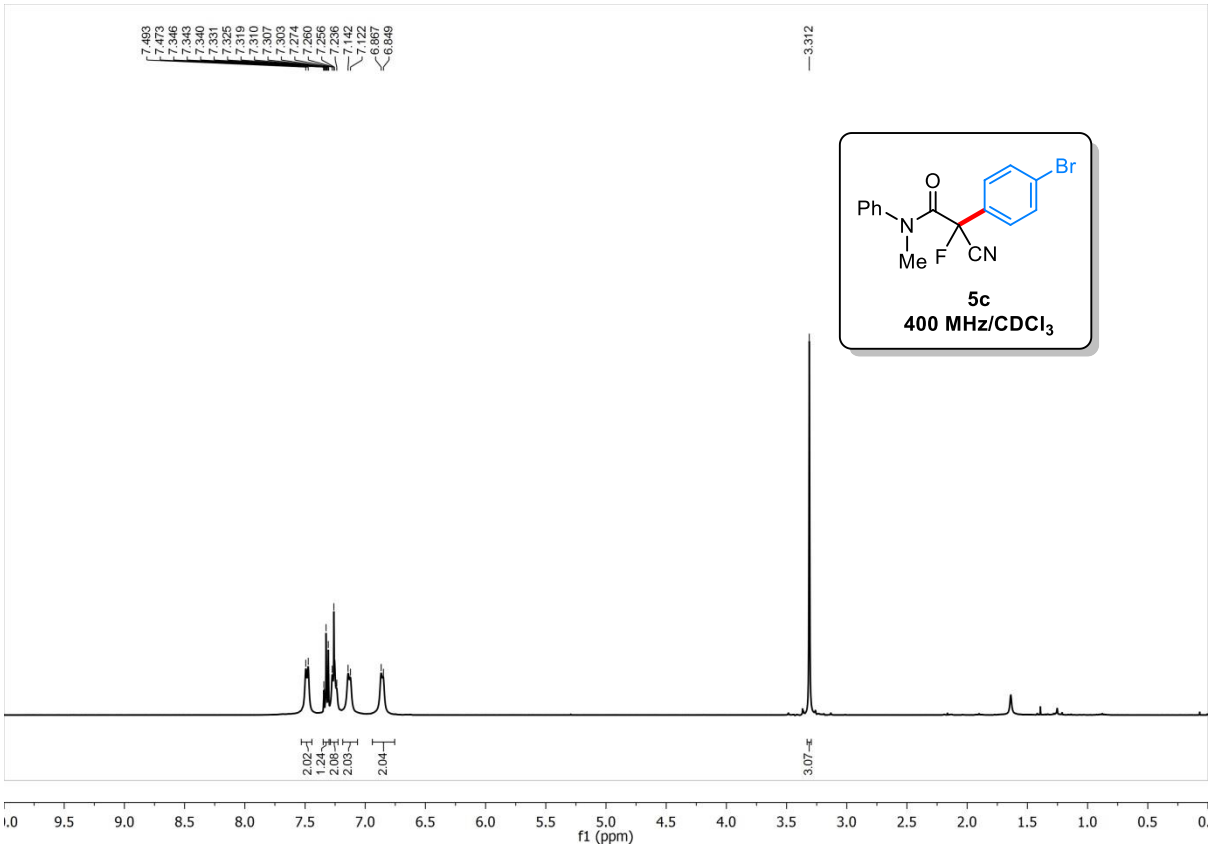

162.184
161.947
140.349
133.100
132.868
130.584
129.268
129.035
128.786
128.534
125.234
125.179
115.078
114.732
90.931
88.953
77.478
77.160
76.842
40.654
f1 (ppm)
5a
100 MHz/CDCl3

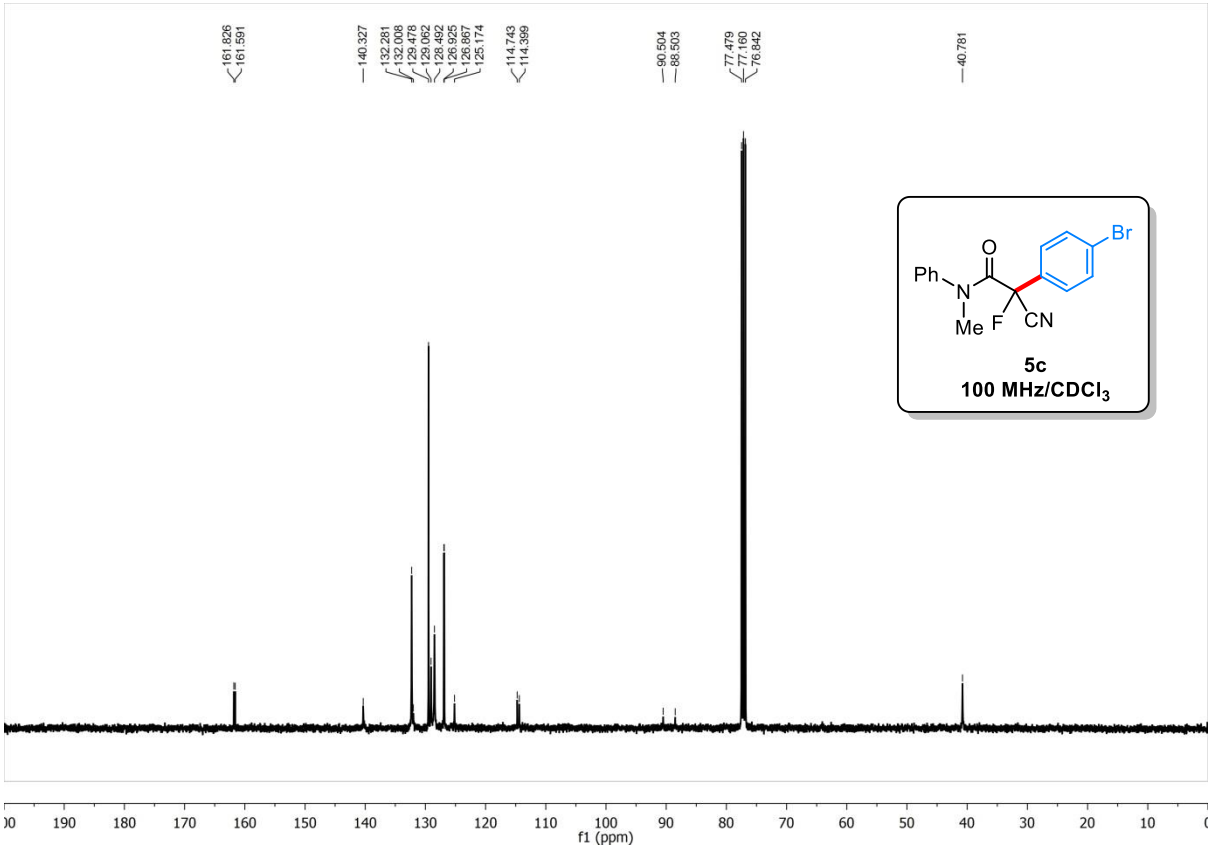

-137.511
O
N
Me
F
CN
5a
376 MHz/CDCl3
f1 (ppm)

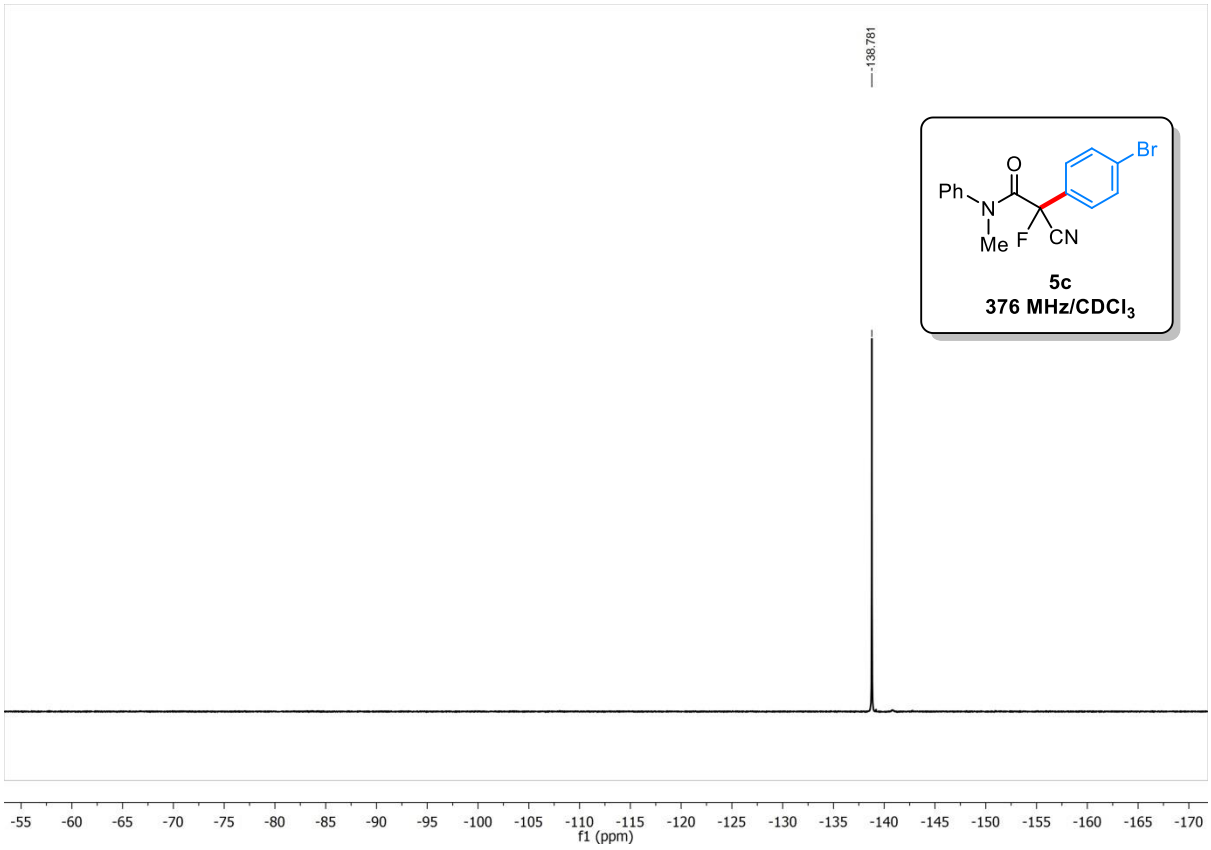

7.305
7.302
7.286
7.281
7.271
7.267
7.264
7.260
7.219
7.201
7.171
6.832
3.309
2.697
2.678
2.659
2.640
1.262
1.243
1.224
O
Ph
N
Me
F
CN
Et
5b
400 MHz/CDCl3
1.43
6.03
1.98
3.08
2.10
3.16
f1 (ppm)

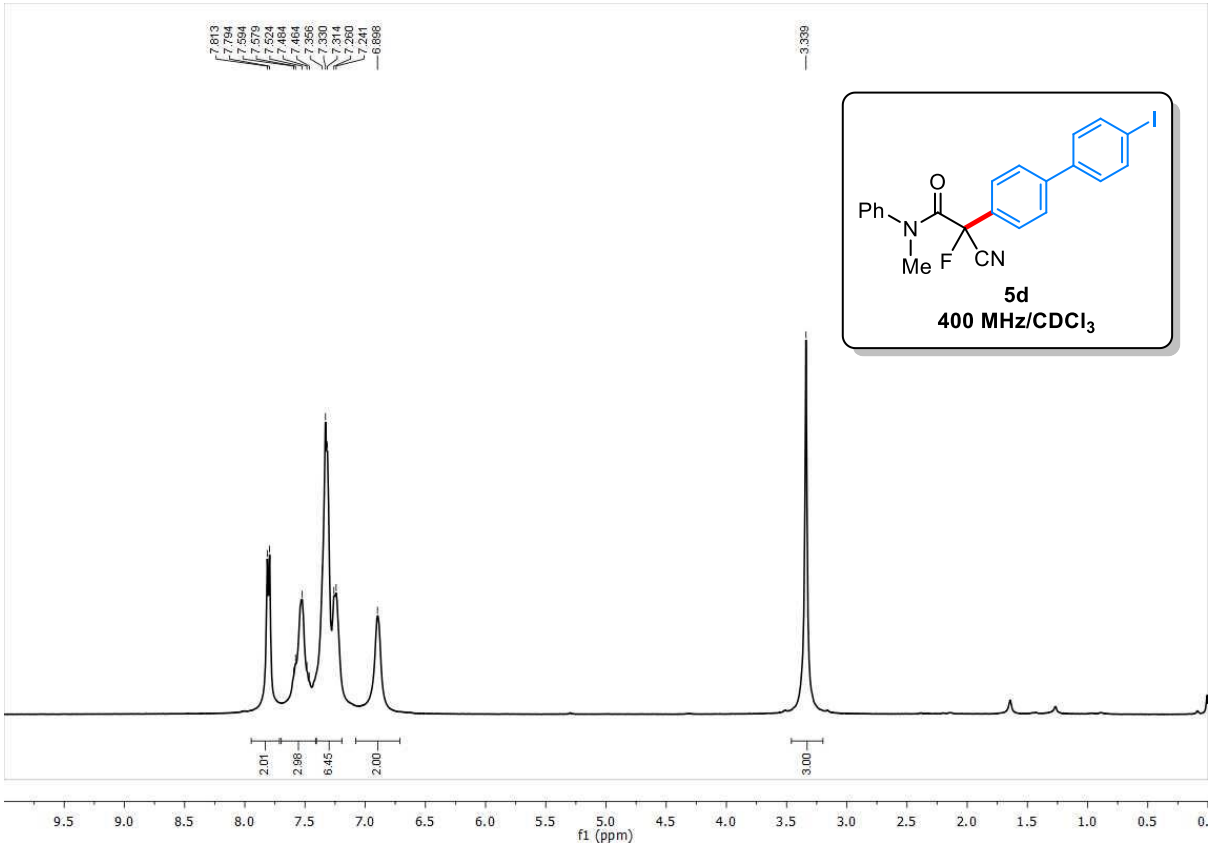

162.400
162.158
147.284
140.535
130.446
130.259
129.298
128.742
128.585
125.497
125.444
115.195
114.850
90.809
88.842
77.478
77.160
76.842
40.685
28.727
15.527
Et
O
Ph
N
Me
F
CN
5b
100 MHz/CDCl3
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

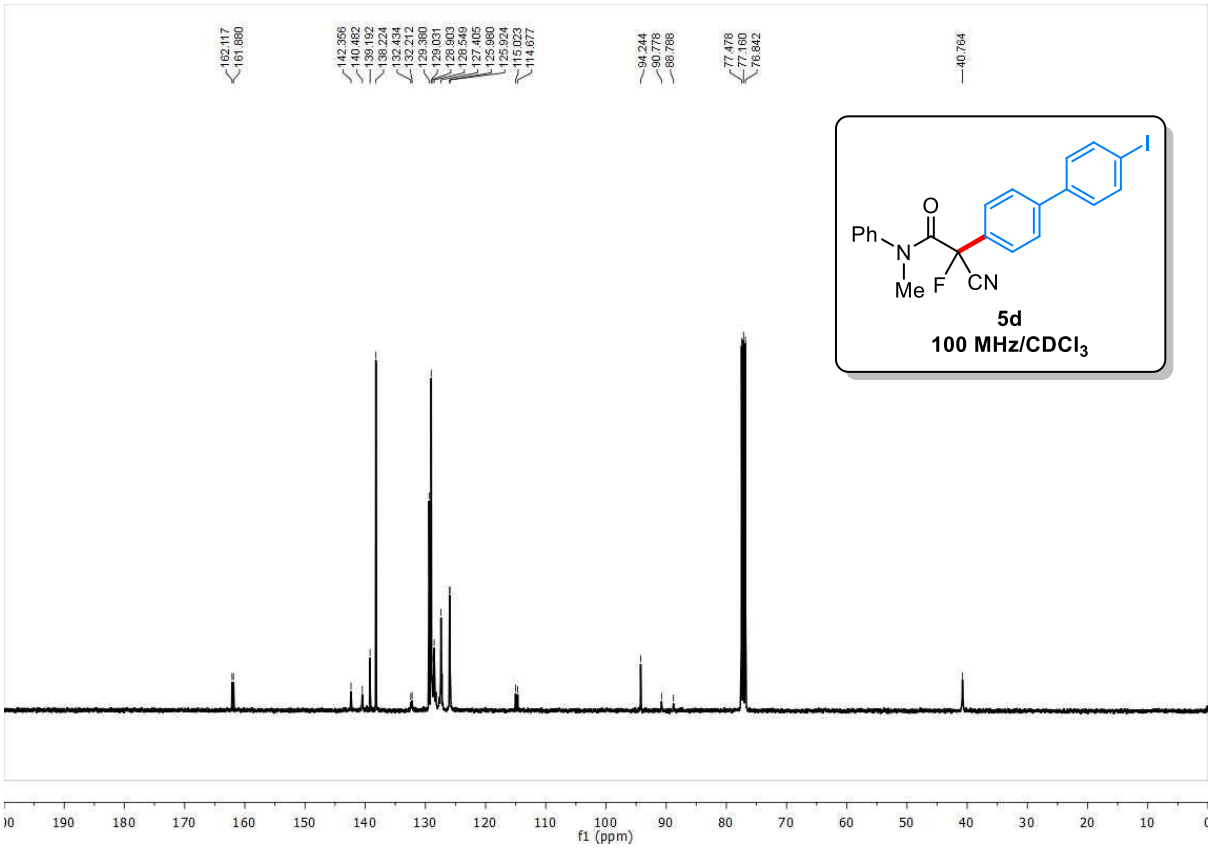

-135.500
Et
O
Ph
N
Me
F
CN
5b
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

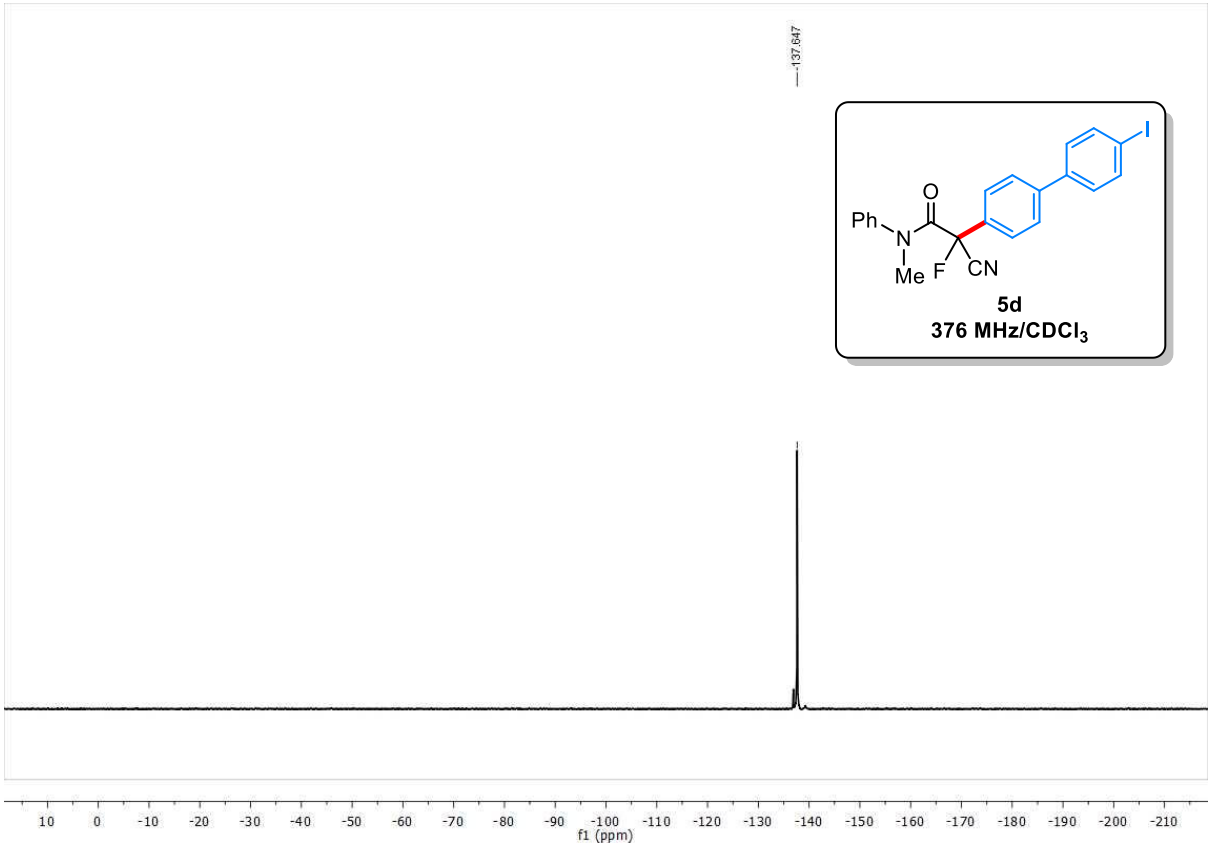

7.493
7.473
7.346
7.343
7.340
7.331
7.325
7.319
7.310
7.307
7.303
7.274
7.260
7.256
7.236
7.142
7.122
6.867
6.849
3.312
Ph
N
Me
O
F
CN
Br
5c
400 MHz/CDCl3
2.02
1.24
2.08
2.03
2.04
3.07
f1 (ppm)

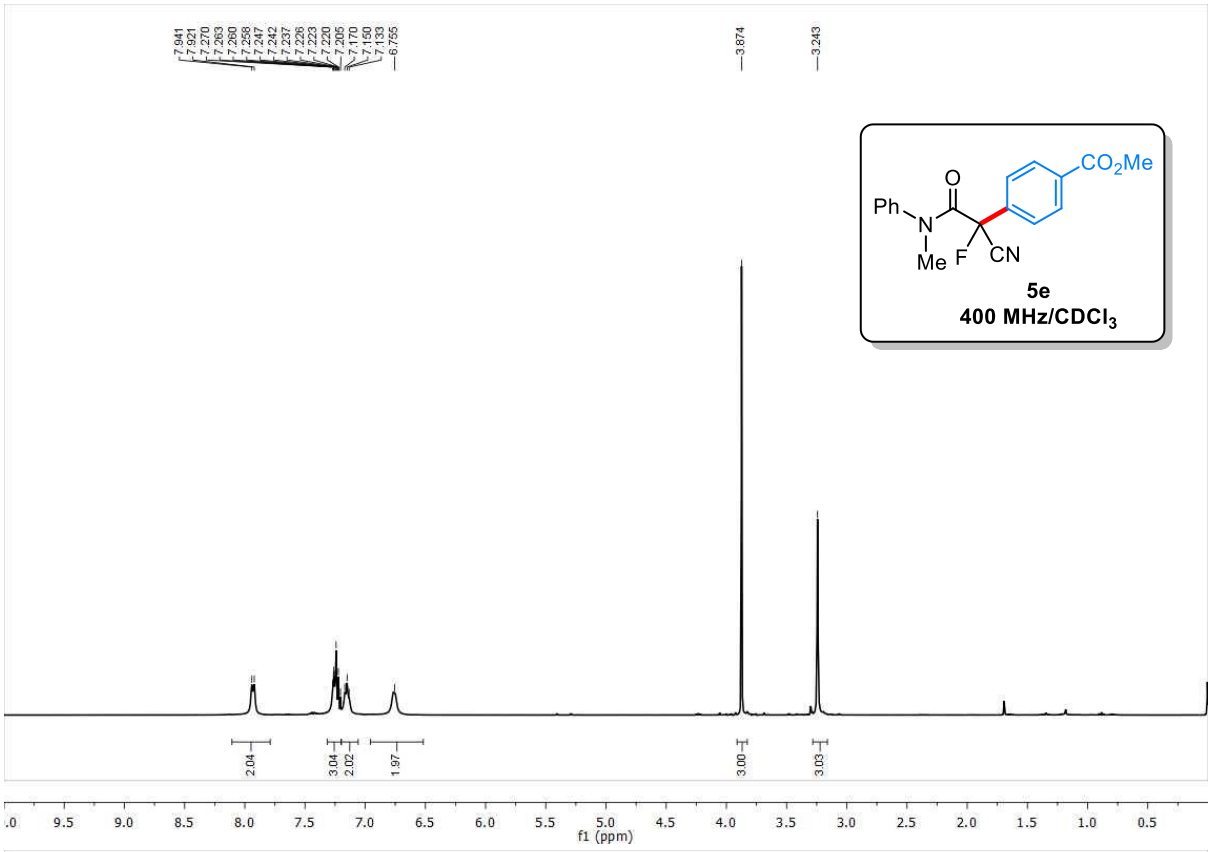

161.826
161.591
140.327
132.281
132.008
129.478
129.062
128.492
126.925
126.867
125.174
114.743
114.396
90.504
88.503
77.479
77.160
76.842
40.781
Ph
N
Me
O
F
CN
Br
5c
100 MHz/CDCl3
f1 (ppm)

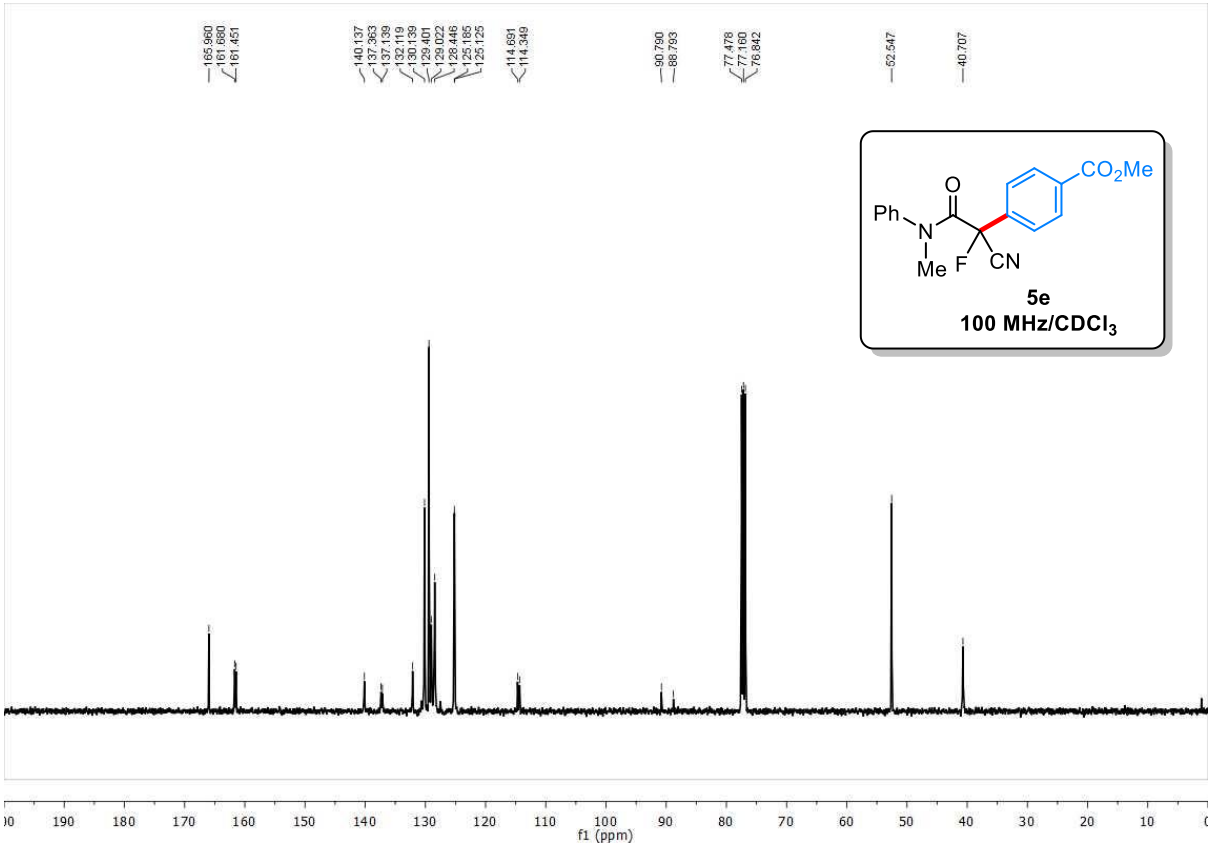

-138.781
Br
O
Ph
N
Me
F
CN
5c
376 MHz/CDCl3
-55 -60 -65 -70 -75 -80 -85 -90 -95 -100 -105 -110 -115 -120 -125 -130 -135 -140 -145 -150 -155 -160 -165 -170
f1 (ppm)

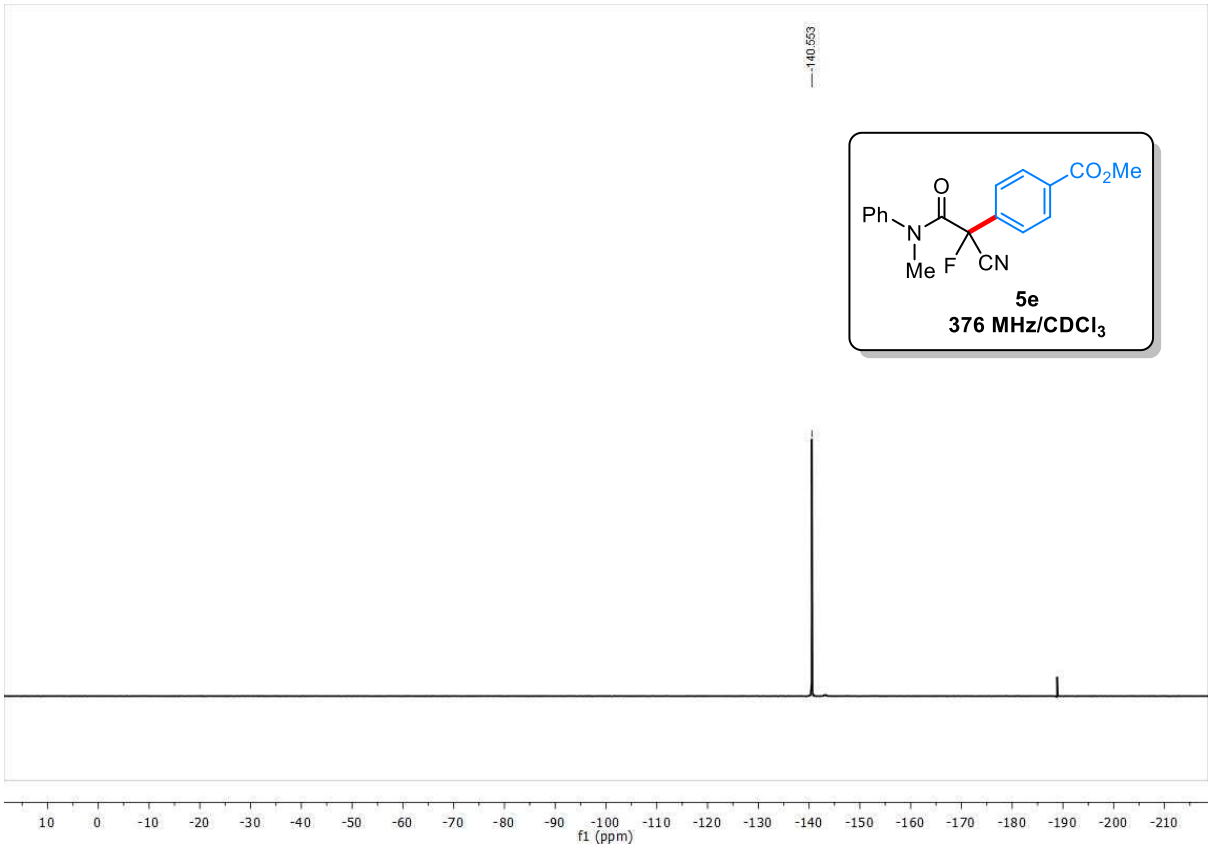

7.813
7.794
7.594
7.579
7.524
7.484
7.464
7.356
7.330
7.314
7.260
7.241
6.898
3.339
I
O
Ph
N
Me
F
CN
5d
400 MHz/CDCl3
2.01
2.98
6.45
2.00
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.
f1 (ppm)

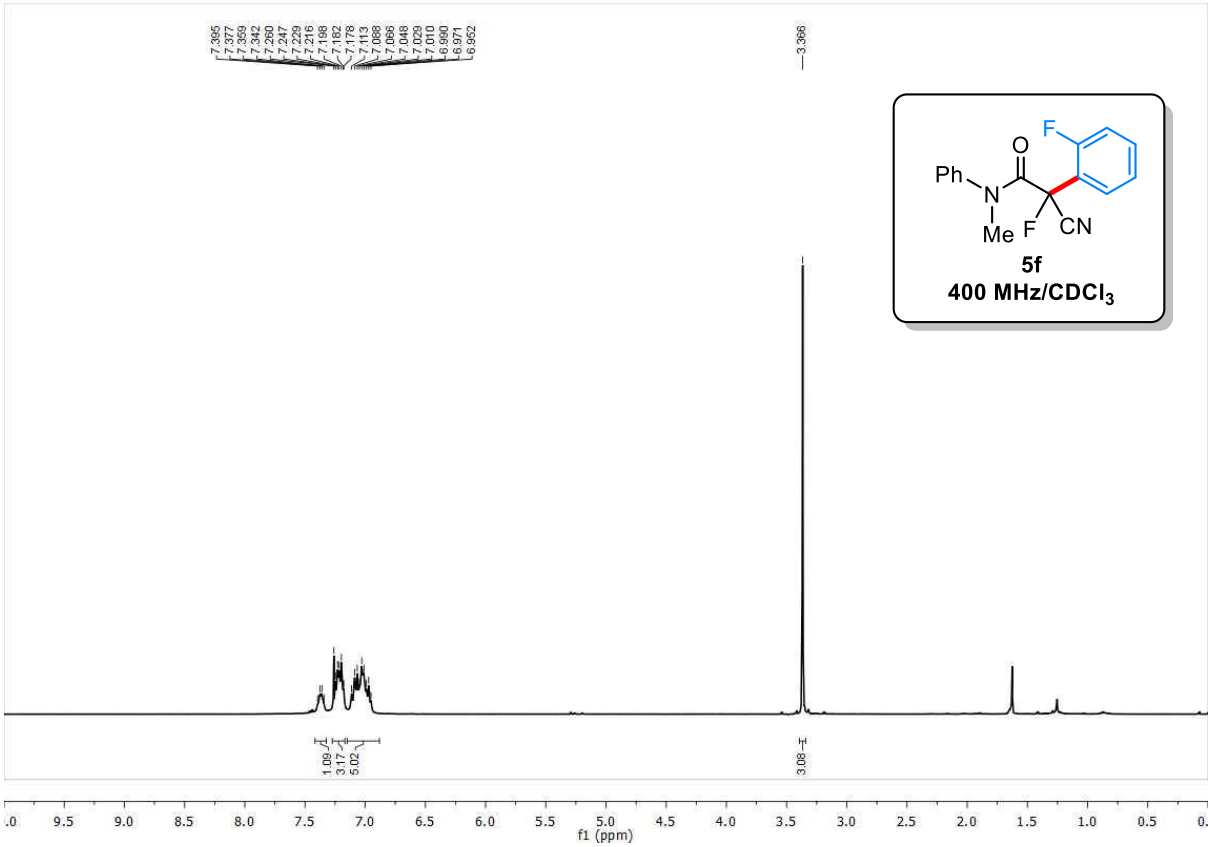

162.117
161.880
142.356
140.482
139.192
138.224
132.434
132.212
129.380
129.031
128.903
128.549
127.405
125.980
125.924
115.023
114.677
94.244
90.778
88.788
77.478
77.160
76.842
40.764
Ph
N
Me
O
F
CN
I
5d
100 MHz/CDCl3
f1 (ppm)

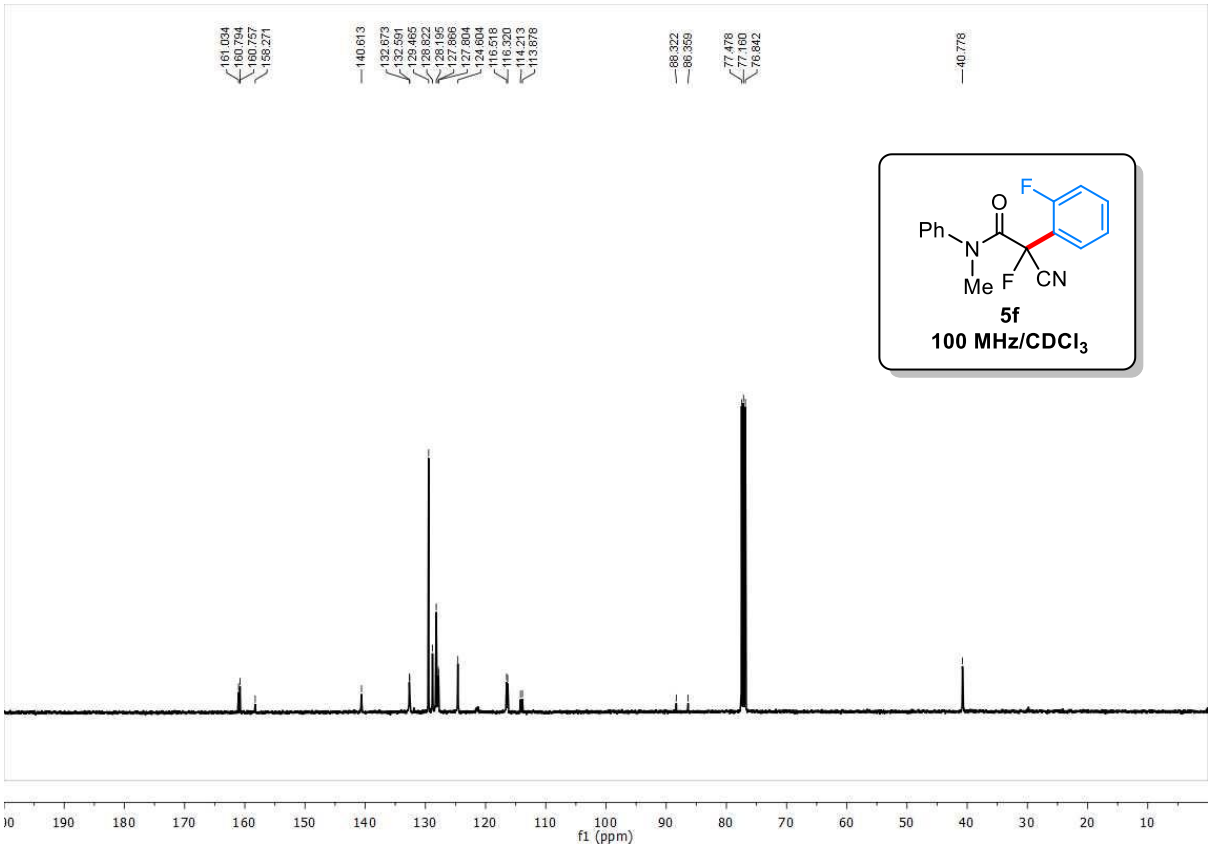

137.647
Ph
N
Me
O
F
CN
I
5d
376 MHz/CDCl3
f1 (ppm)

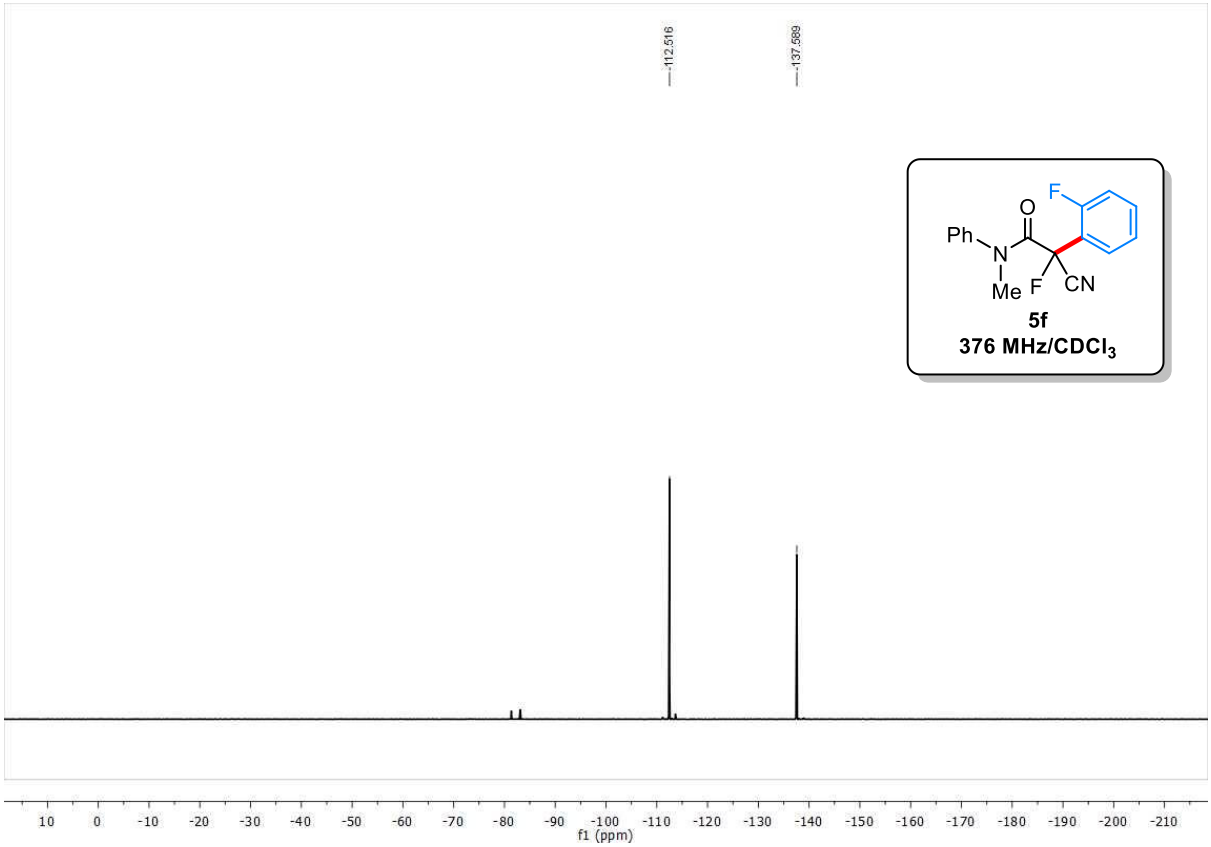

7.941
7.921
7.270
7.263
7.260
7.256
7.247
7.242
7.237
7.226
7.223
7.220
7.205
7.170
7.150
7.133
6.755
3.874
3.243
2.04
3.04
2.02
1.97
3.00
3.03
f1 (ppm)
Ph
N
Me
O
F
CN
CO2Me
5e
400 MHz/CDCl3

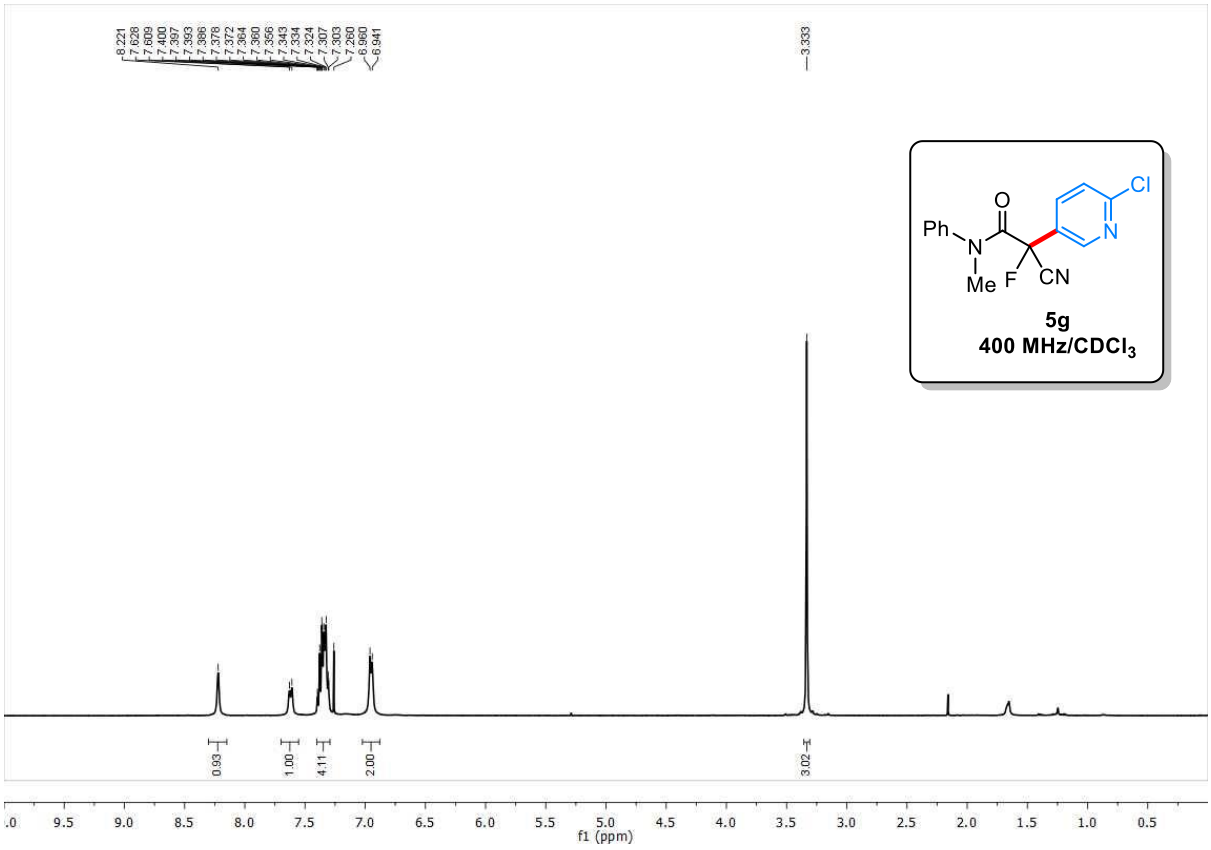

165.960
161.680
161.451
140.137
137.363
137.169
132.119
130.139
129.401
129.022
128.446
125.185
125.125
114.691
114.349
90.790
88.793
77.478
77.160
76.842
52.547
40.707
f1 (ppm)
Ph
N
Me
O
F
CN
CO2Me
5e
100 MHz/CDCl3

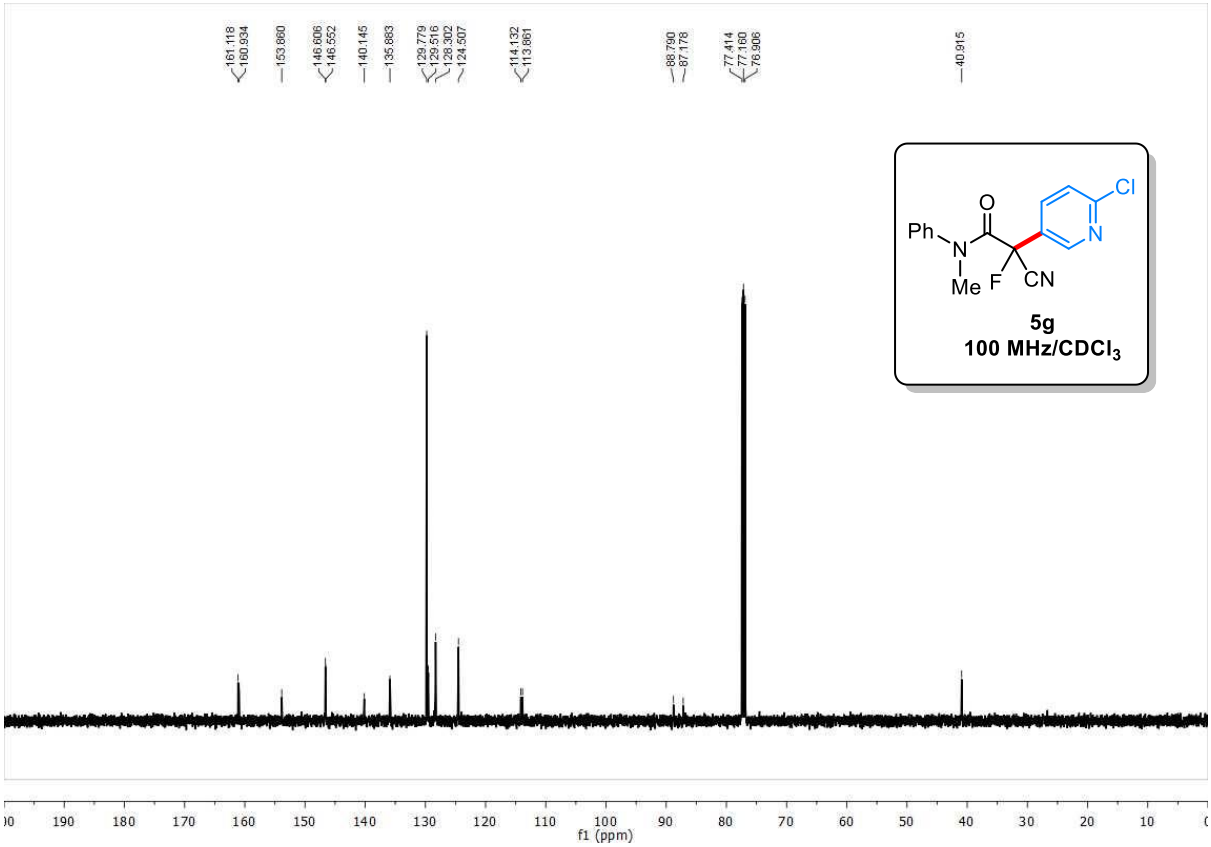

-140.553
CO2Me
O
Ph
N
Me
F
CN
5e
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

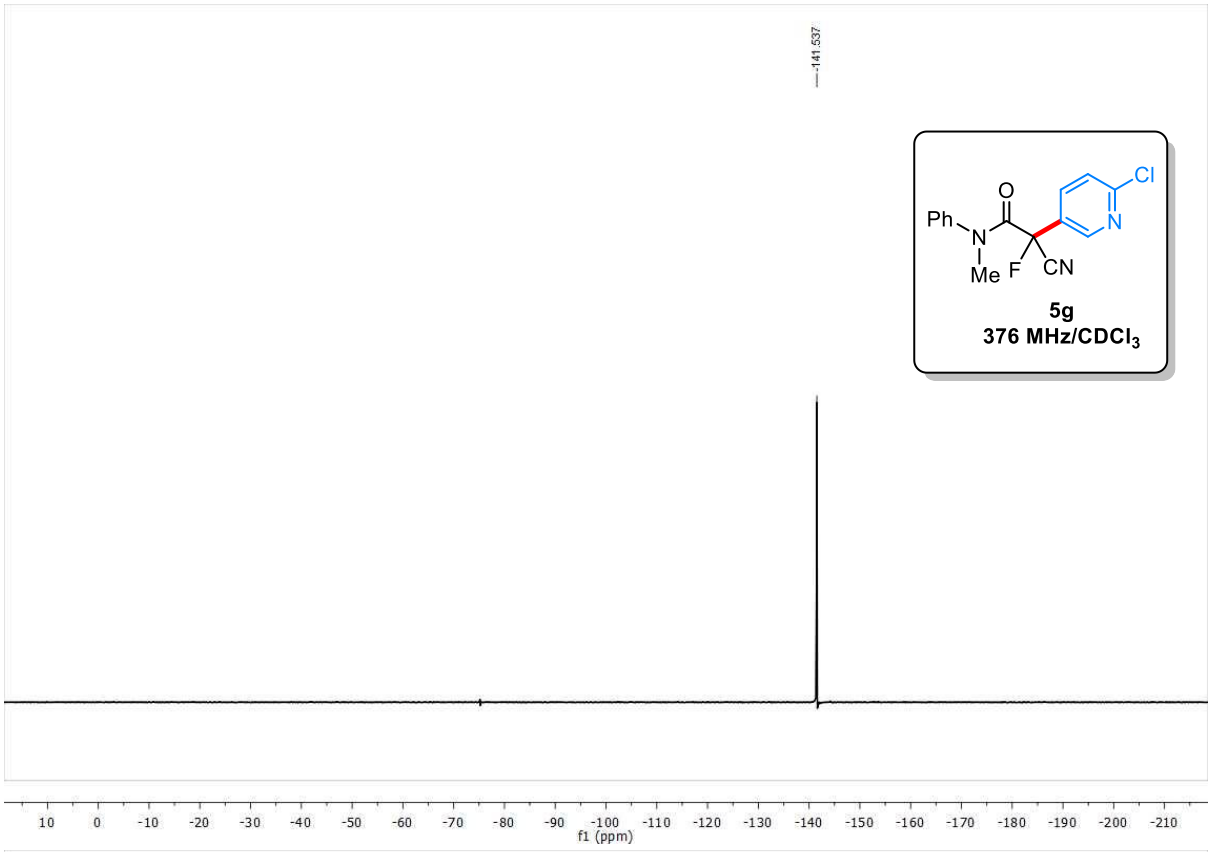

7.395
7.377
7.359
7.342
7.260
7.247
7.229
7.216
7.198
7.182
7.178
7.113
7.088
7.066
7.048
7.029
7.010
6.990
6.971
6.952
-3.366
F
O
Ph
N
Me
F
CN
5f
400 MHz/CDCl3
1.09
3.17
5.02
3.08
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

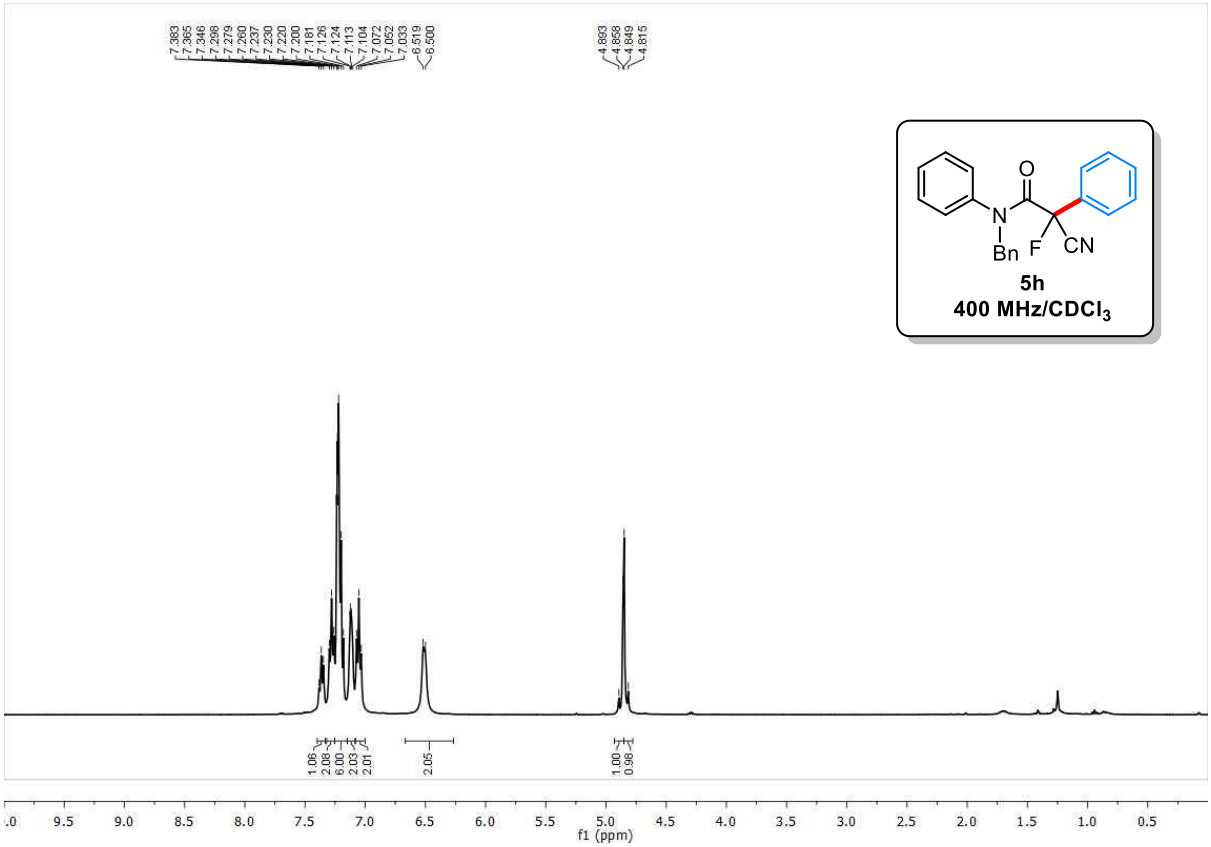

161.034
160.794
160.757
158.271
140.613
132.673
132.591
129.465
128.822
128.195
127.866
127.804
124.604
116.518
116.320
114.213
113.878
88.322
86.359
77.478
77.160
76.842
40.778
F
O
Ph
N
Me
F
CN
5f
100 MHz/CDCl3
f1 (ppm)

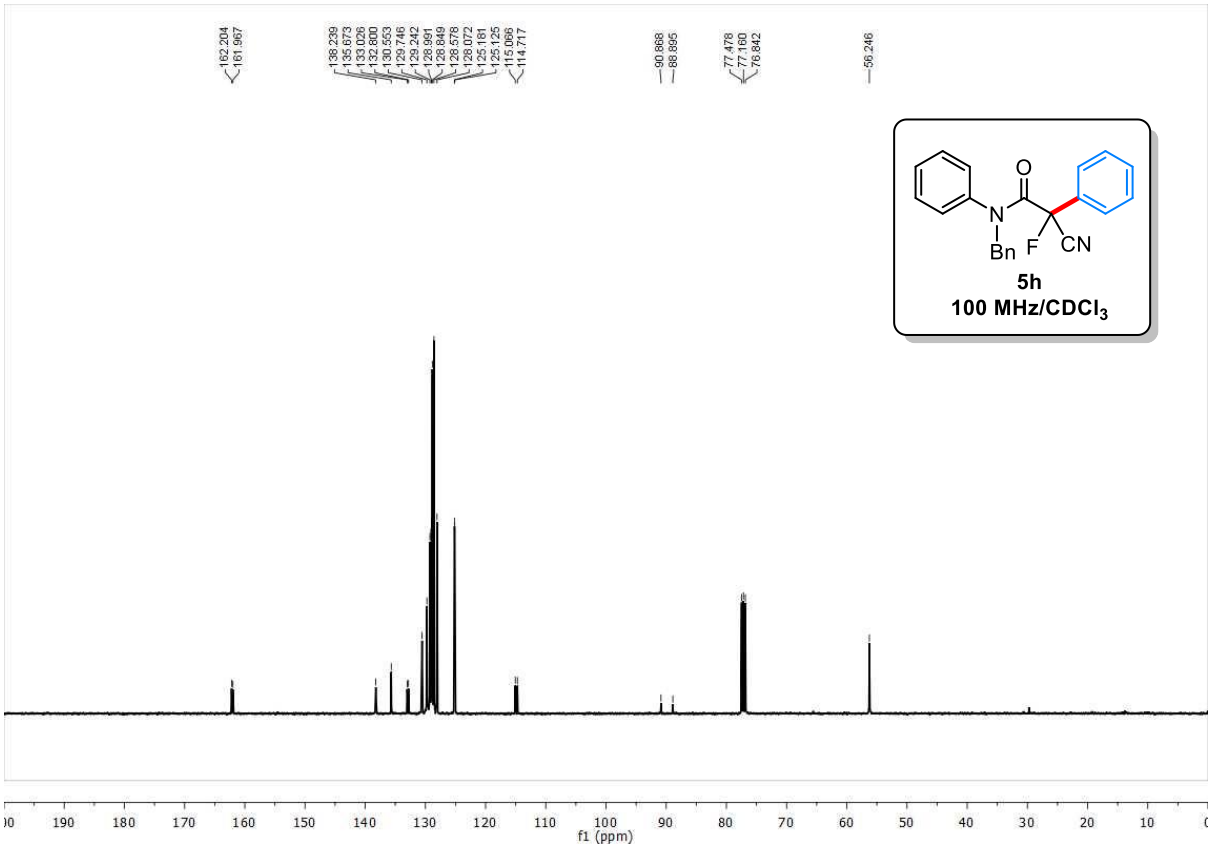

112.516
137.589
F
O
Ph
N
Me
F
CN
5f
376 MHz/CDCl3
f1 (ppm)

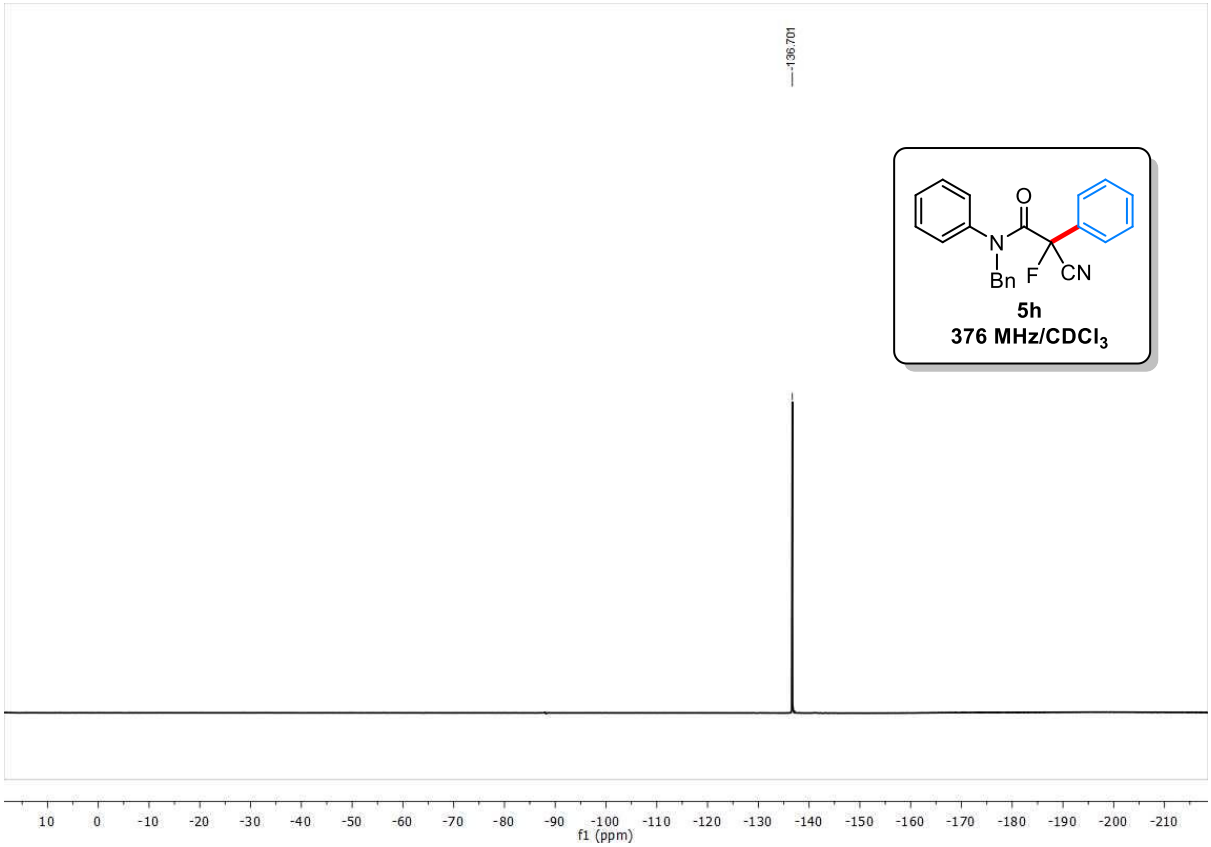

8.221
7.628
7.609
7.400
7.397
7.393
7.386
7.378
7.372
7.364
7.360
7.356
7.343
7.334
7.324
7.307
7.303
7.260
6.960
6.941
3.333
0.93
1.00
4.11
2.00
3.02
Ph
N
Me
O
F
CN
Cl
N
5g
400 MHz/CDCl3
f1 (ppm)

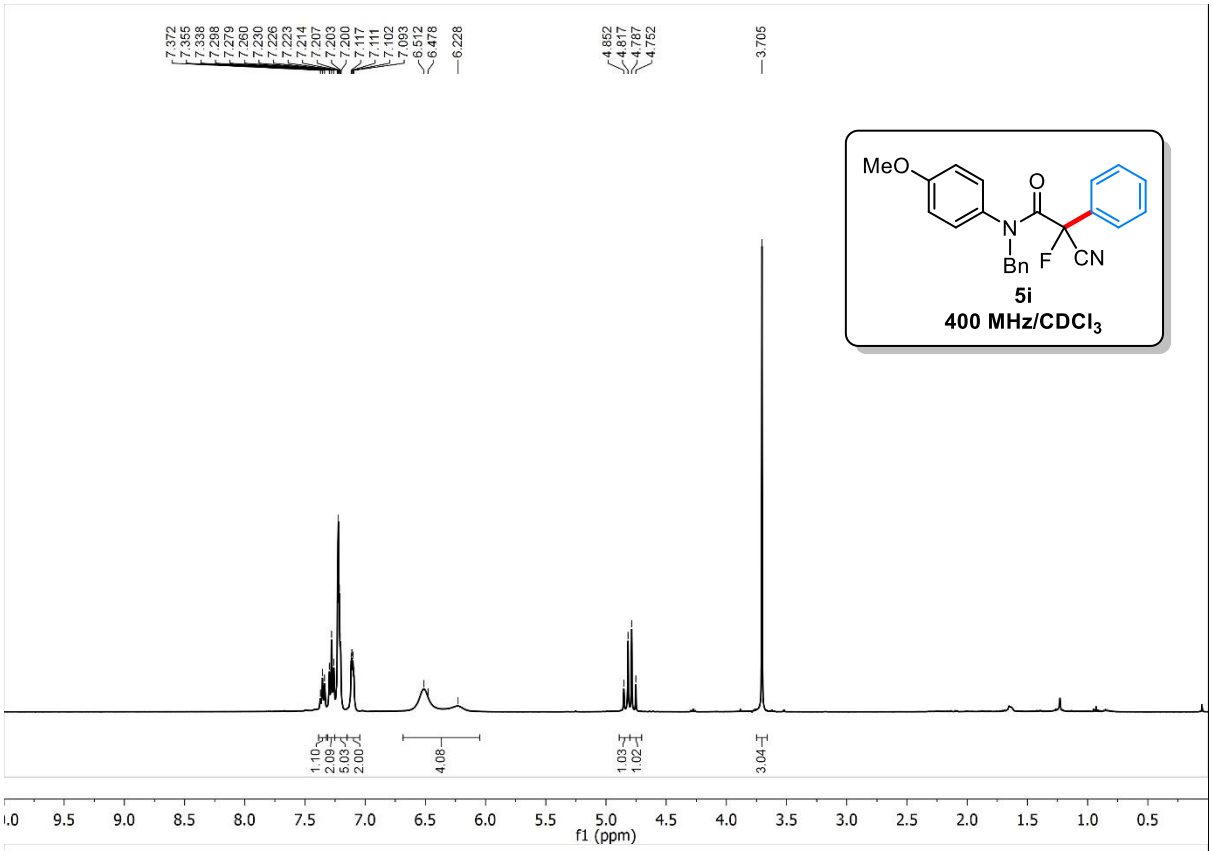

161.118
160.934
153.860
146.606
146.552
140.145
135.883
129.779
129.516
128.302
124.507
114.132
113.861
88.790
87.178
77.414
77.160
76.906
40.915
Ph
N
Me
O
F
CN
Cl
N
5g
100 MHz/CDCl3
f1 (ppm)

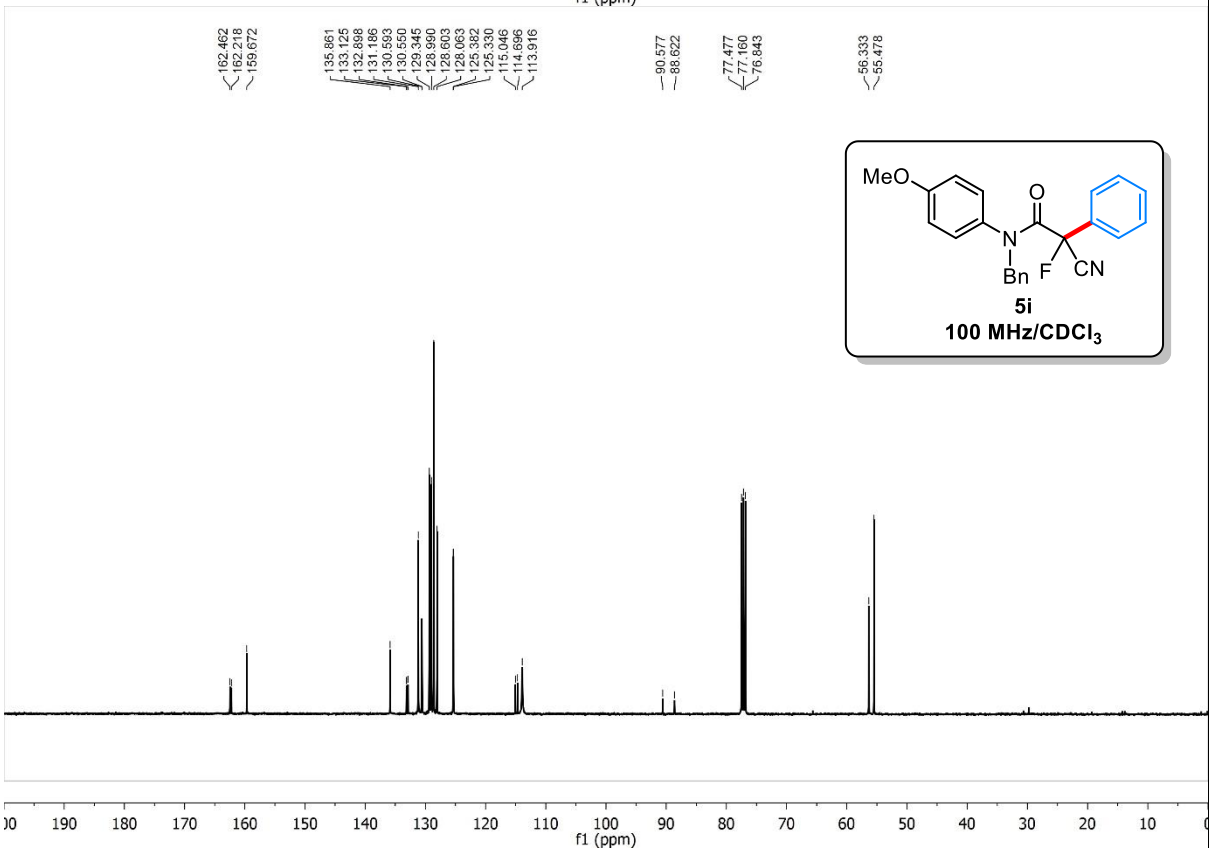

141.537
Ph
N
Me
O
F
CN
Cl
N
5g
376 MHz/CDCl3
f1 (ppm)

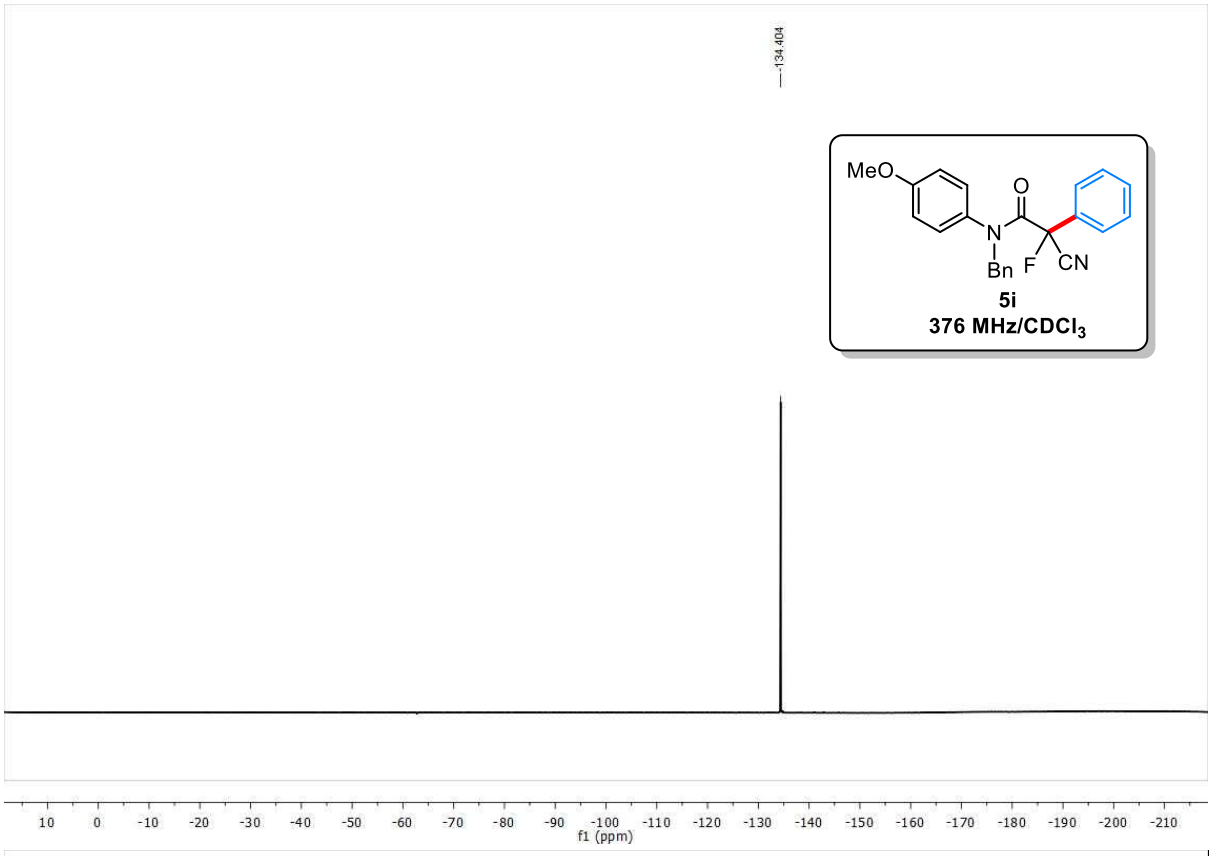

7.383
7.365
7.346
7.298
7.279
7.260
7.237
7.230
7.220
7.200
7.181
7.126
7.124
7.113
7.104
7.072
7.052
7.033
6.519
6.500
4.893
4.858
4.849
4.815
N
Bn
O
F
CN
5h
400 MHz/CDCl3
1.06
2.08
6.00
2.03
2.01
2.05
1.00
0.98
f1 (ppm)

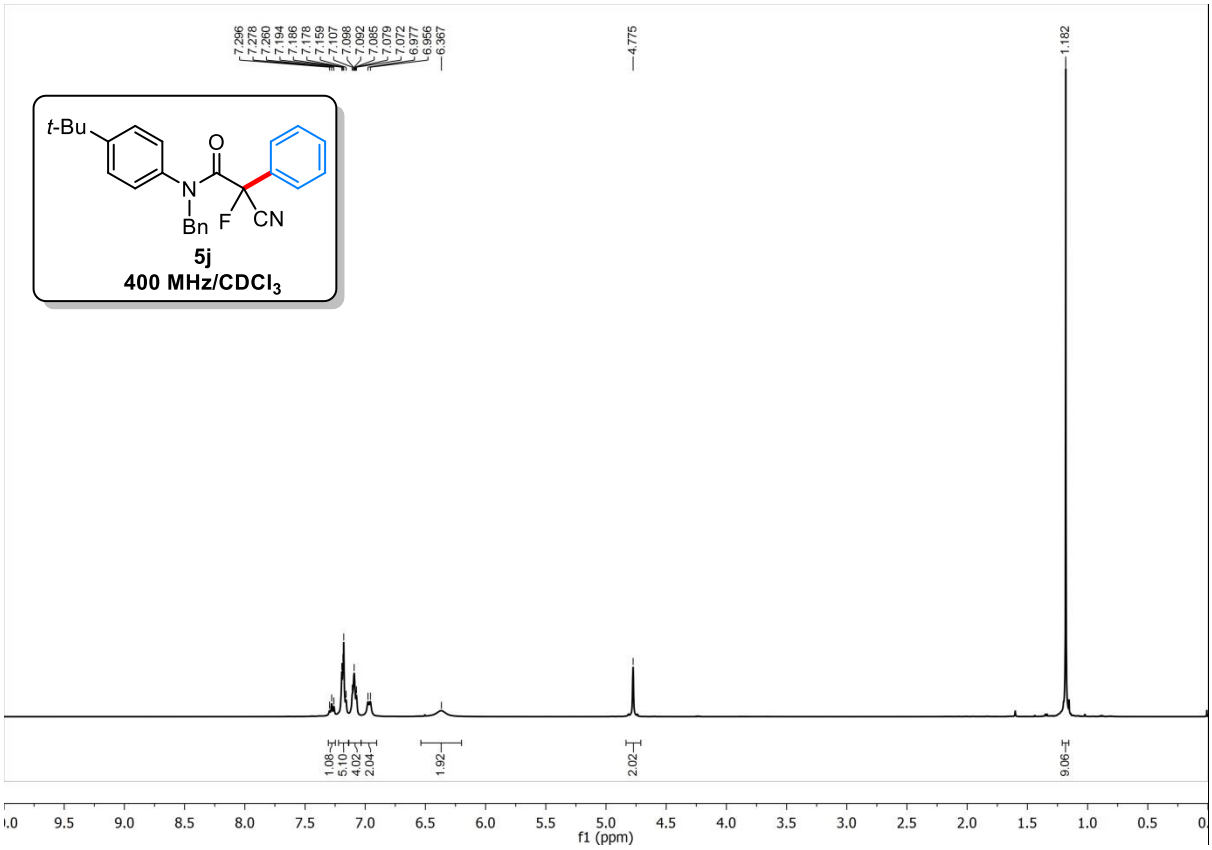

162.204
161.967
138.239
135.673
133.026
132.800
130.553
129.746
129.242
128.941
128.849
128.578
128.072
125.191
125.125
115.066
114.717
90.868
88.895
77.478
77.160
76.842
56.246
O
N
Bn
F
CN
5h
100 MHz/CDCl3
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

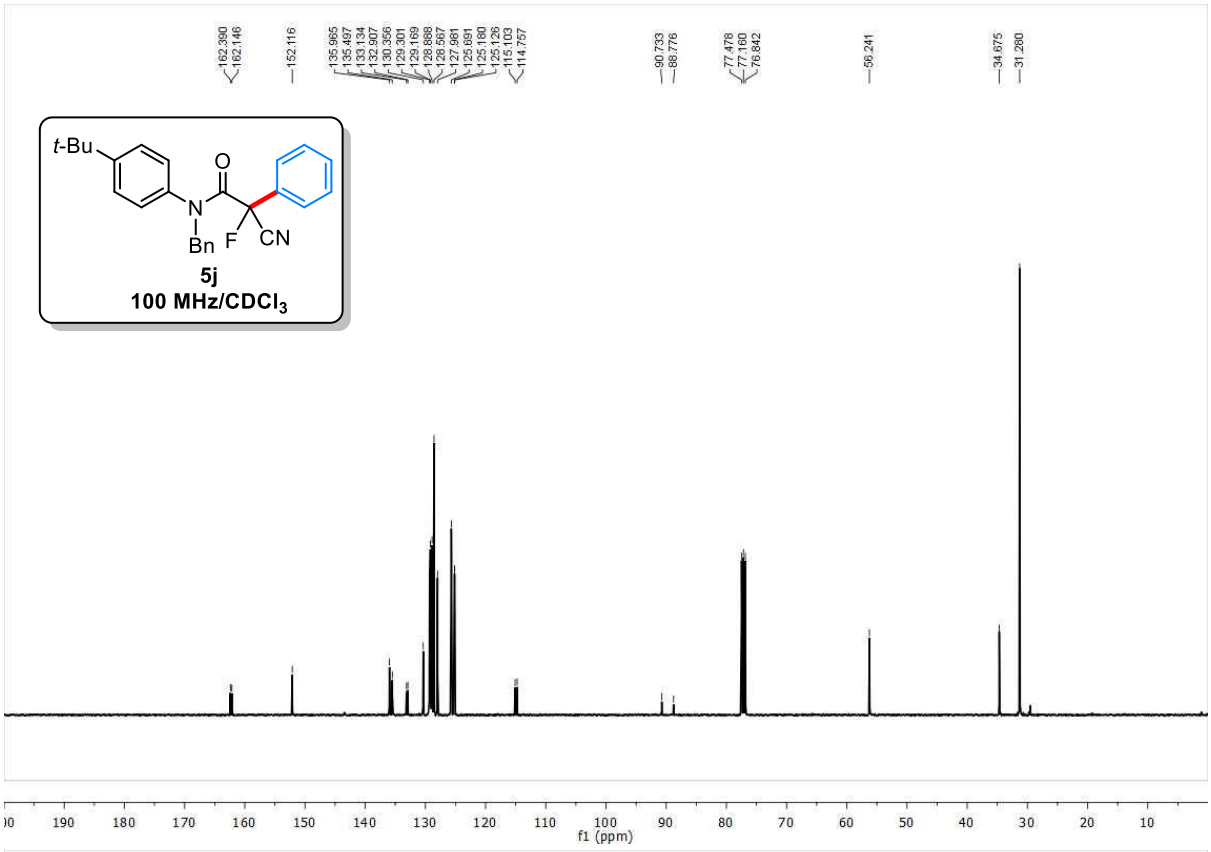

-136.701
O
N
Bn
F
CN
5h
376 MHz/CDCl3
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

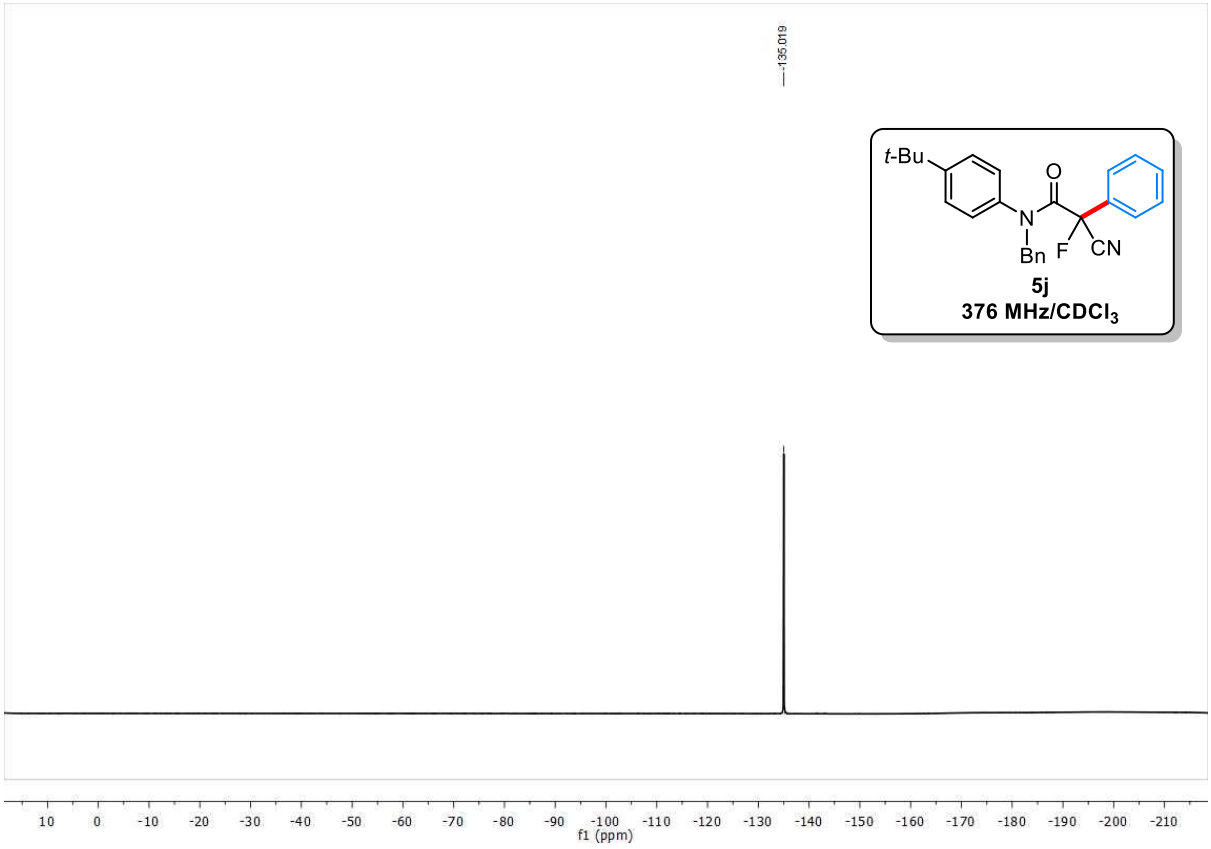

7.372
7.355
7.338
7.298
7.279
7.260
7.230
7.226
7.223
7.214
7.207
7.203
7.200
7.117
7.111
7.102
7.093
6.512
6.478
6.228
4.852
4.817
4.787
4.752
3.705
MeO
O
N
Bn
F
CN
5i
400 MHz/CDCl3
1.10
2.09
5.03
2.00
4.08
1.03
1.02
3.04
f1 (ppm)

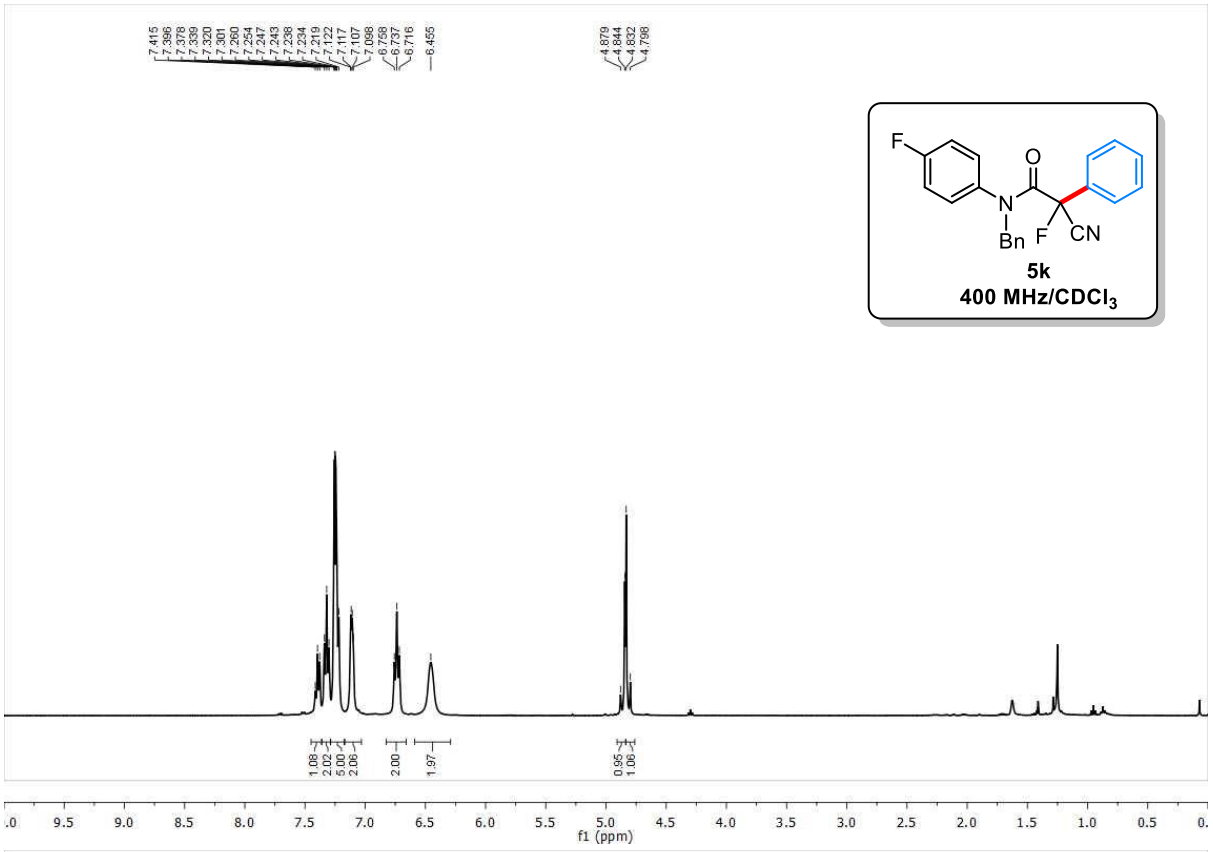

162.462
162.218
159.672
135.861
133.125
132.898
131.186
130.593
130.550
129.345
128.990
128.603
128.063
125.382
125.330
115.046
114.696
113.916
90.577
88.622
77.477
77.160
76.843
56.333
55.478
MeO
O
N
Bn
F
CN
5i
100 MHz/CDCl3
f1 (ppm)

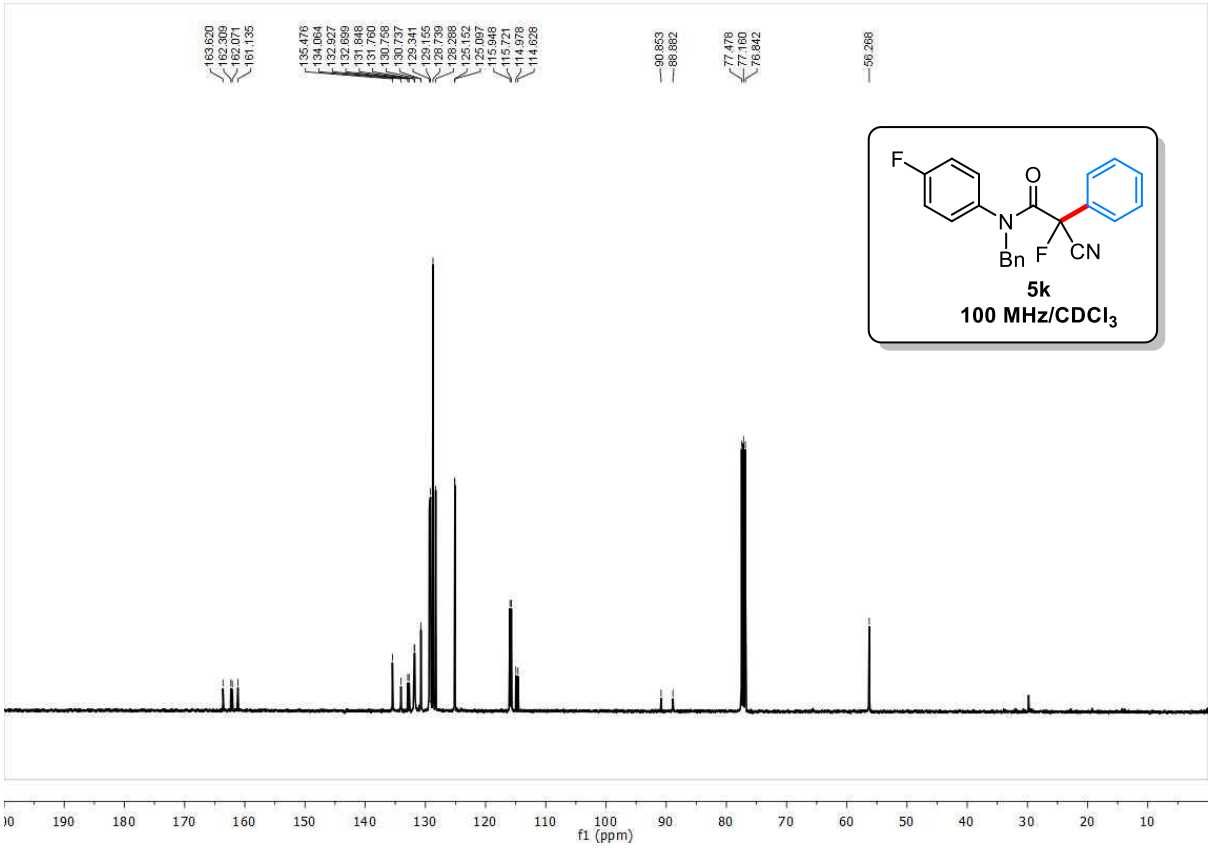

-134.404
MeO
O
N
Bn
F
CN
5i
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

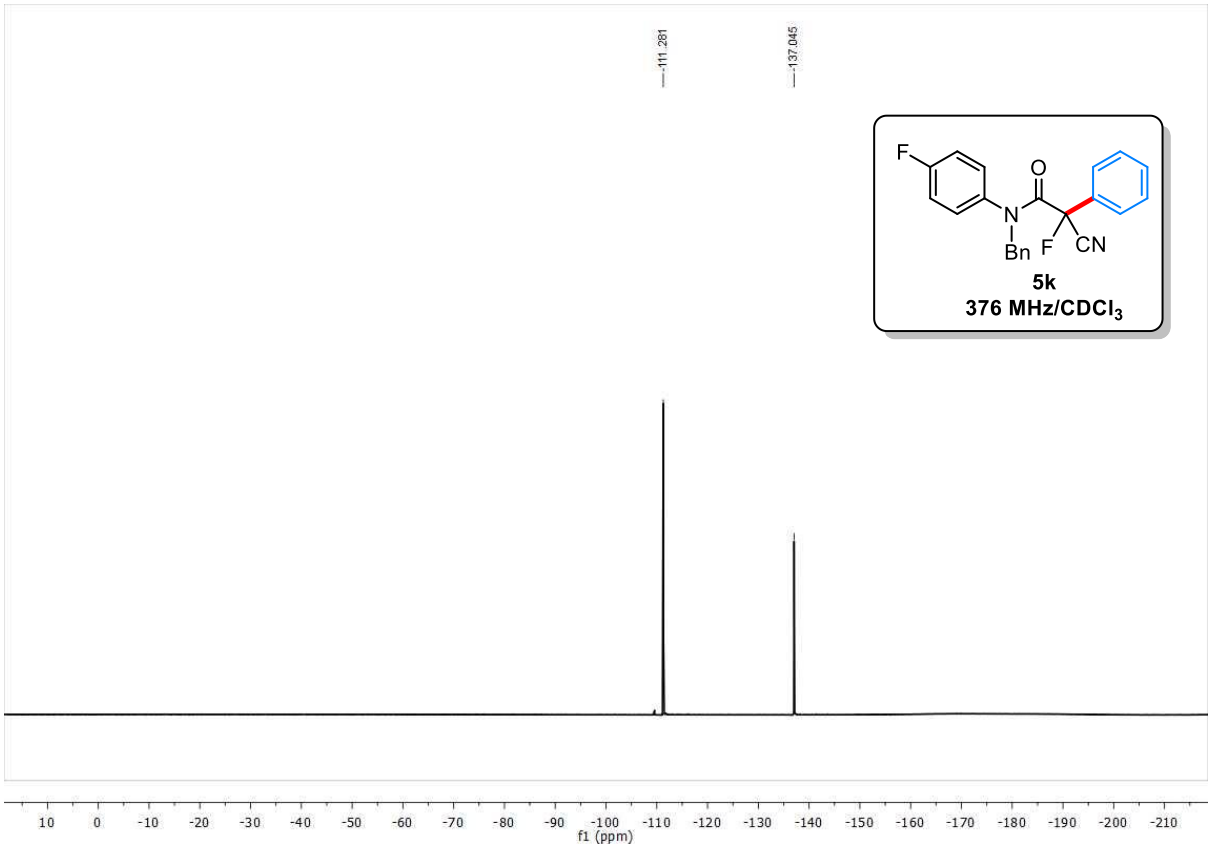

7.296
7.278
7.260
7.194
7.186
7.178
7.159
7.107
7.098
7.092
7.085
7.079
7.072
7.077
6.956
6.367
4.775
1.182
t-Bu
O
N
Bn
F
CN
5j
400 MHz/CDCl3
1.08
5.10
4.02
2.04
1.92
2.02
9.06
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

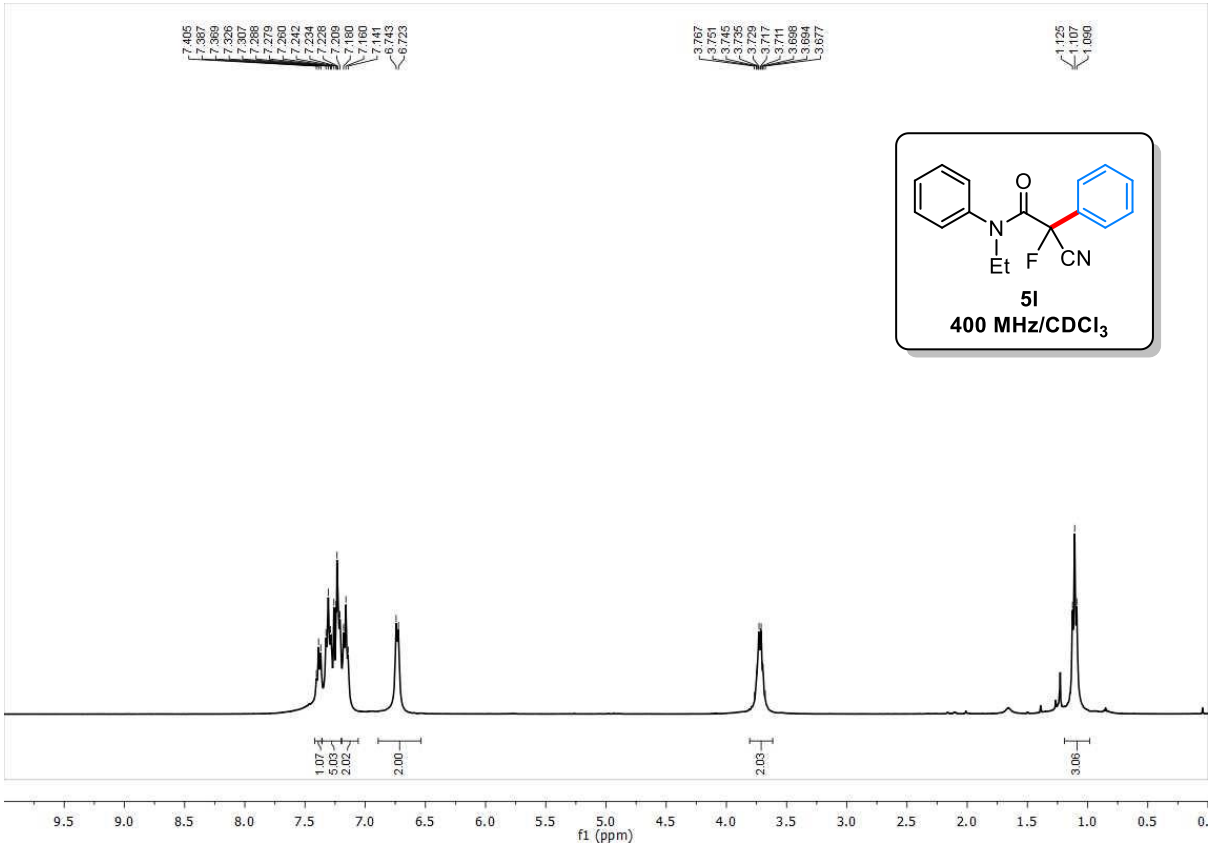

162.390
162.146
152.116
135.965
135.497
133.134
132.907
130.396
129.301
129.169
128.868
128.667
127.981
125.691
125.180
125.126
115.103
114.757
90.733
88.776
77.478
77.160
76.842
56.241
34.675
31.260
t-Bu
O
N
Bn
F
CN
5j
100 MHz/CDCl3
f1 (ppm)

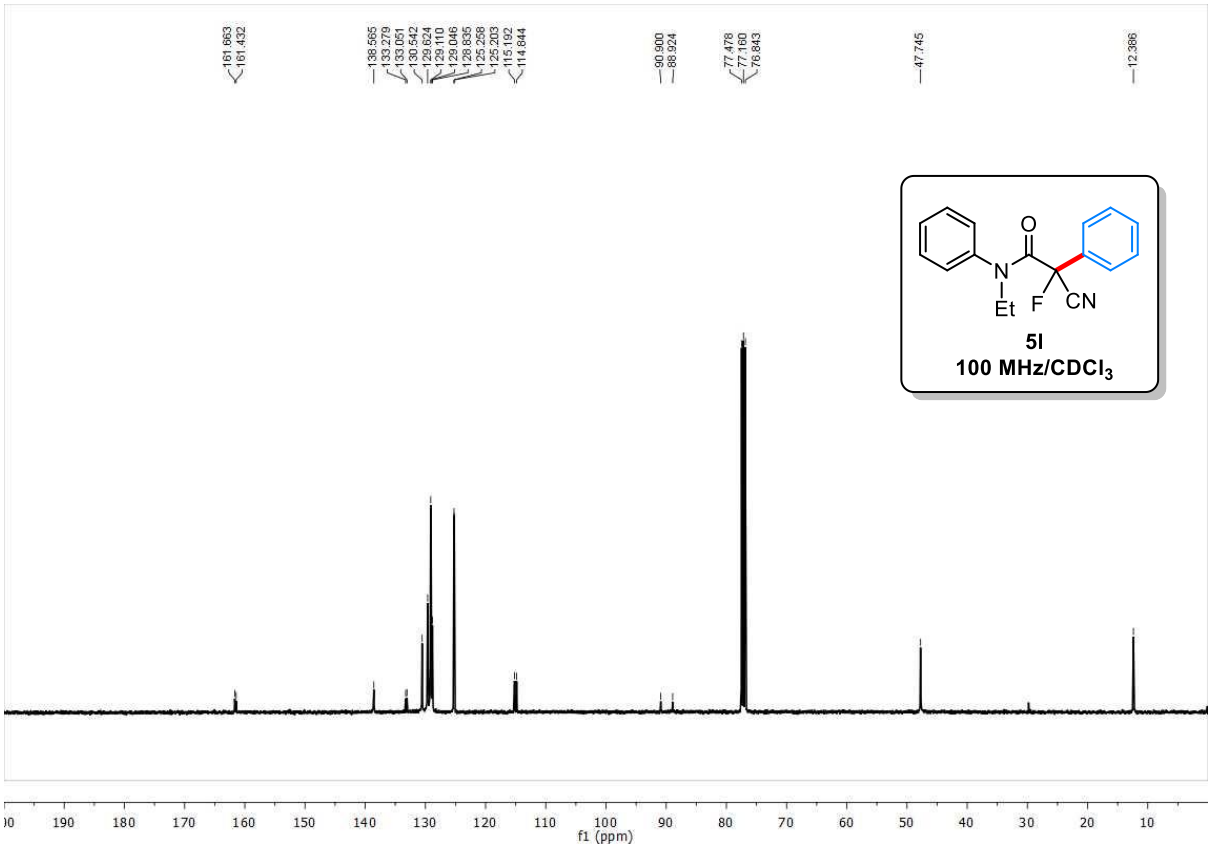

-135.019
t-Bu
O
N
Bn
F
CN
5j
376 MHz/CDCl3
f1 (ppm)

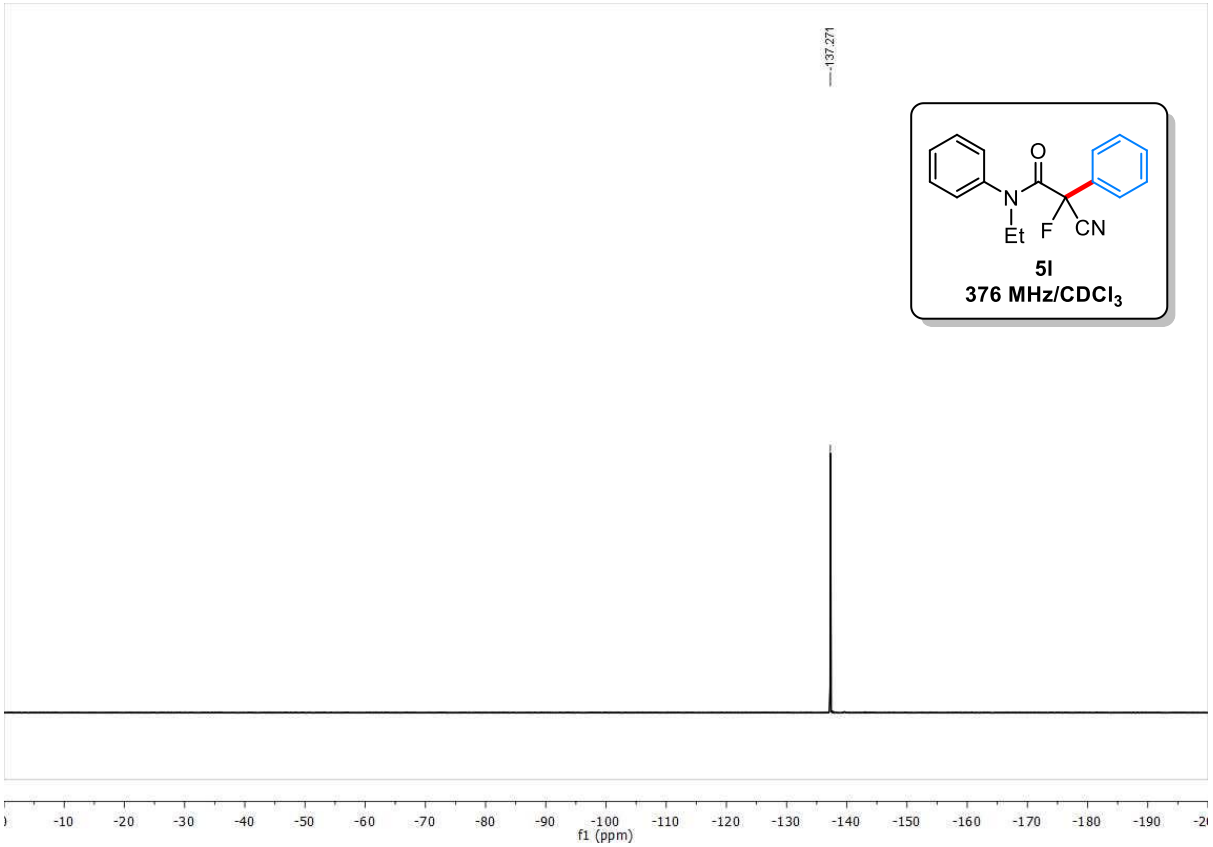

7.415
7.396
7.378
7.339
7.320
7.301
7.260
7.254
7.247
7.243
7.238
7.224
7.219
7.122
7.117
7.107
7.098
6.758
6.737
6.716
6.455
4.879
4.844
4.832
4.798
F
O
N
Bn
F
CN
5k
400 MHz/CDCl3
1.08
2.02
5.00
2.06
2.00
1.97
0.95
1.06
f1 (ppm)

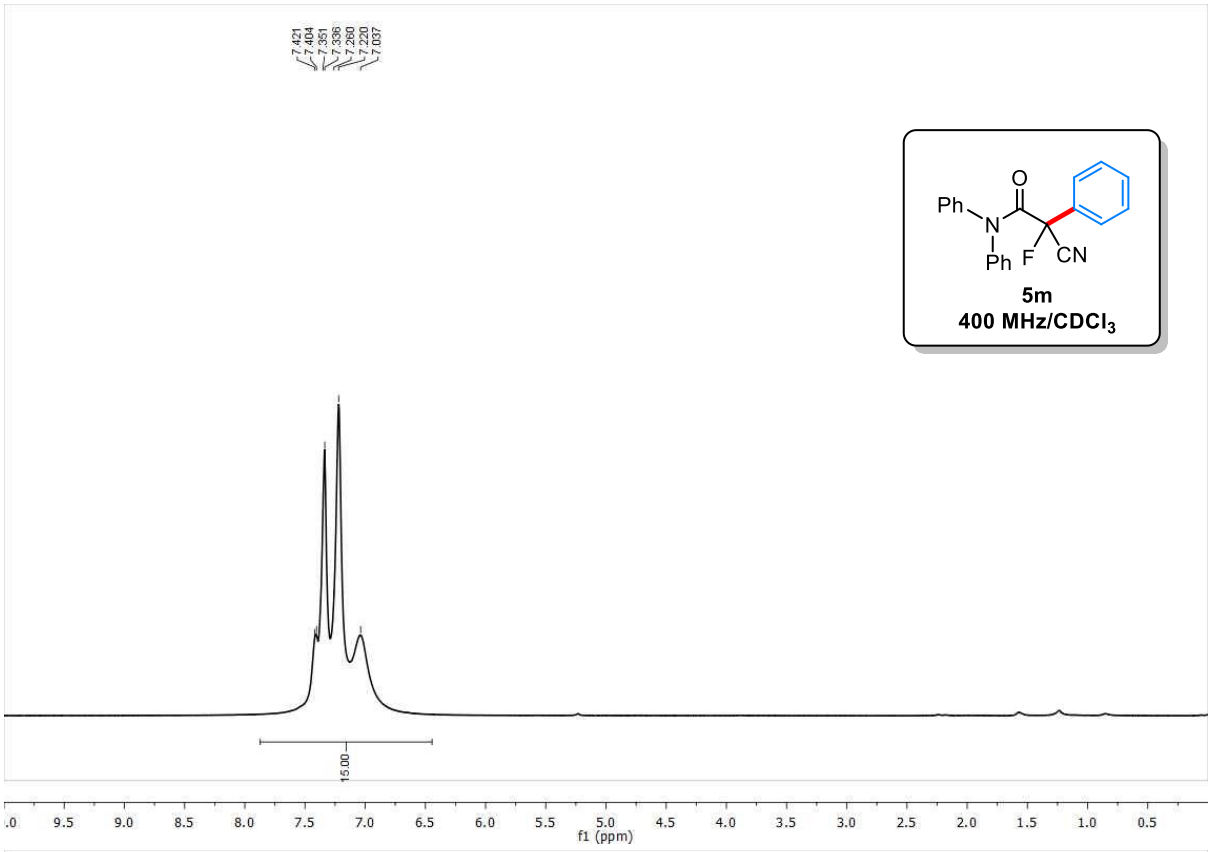

163.620
162.309
162.071
161.135
135.476
134.064
132.927
132.699
131.848
131.798
130.758
130.737
129.341
129.155
128.739
128.288
125.152
125.097
115.948
115.721
114.978
114.628
90.853
88.882
77.478
77.160
76.842
56.268
F
O
N
Bn
F
CN
5k
100 MHz/CDCl3
f1 (ppm)

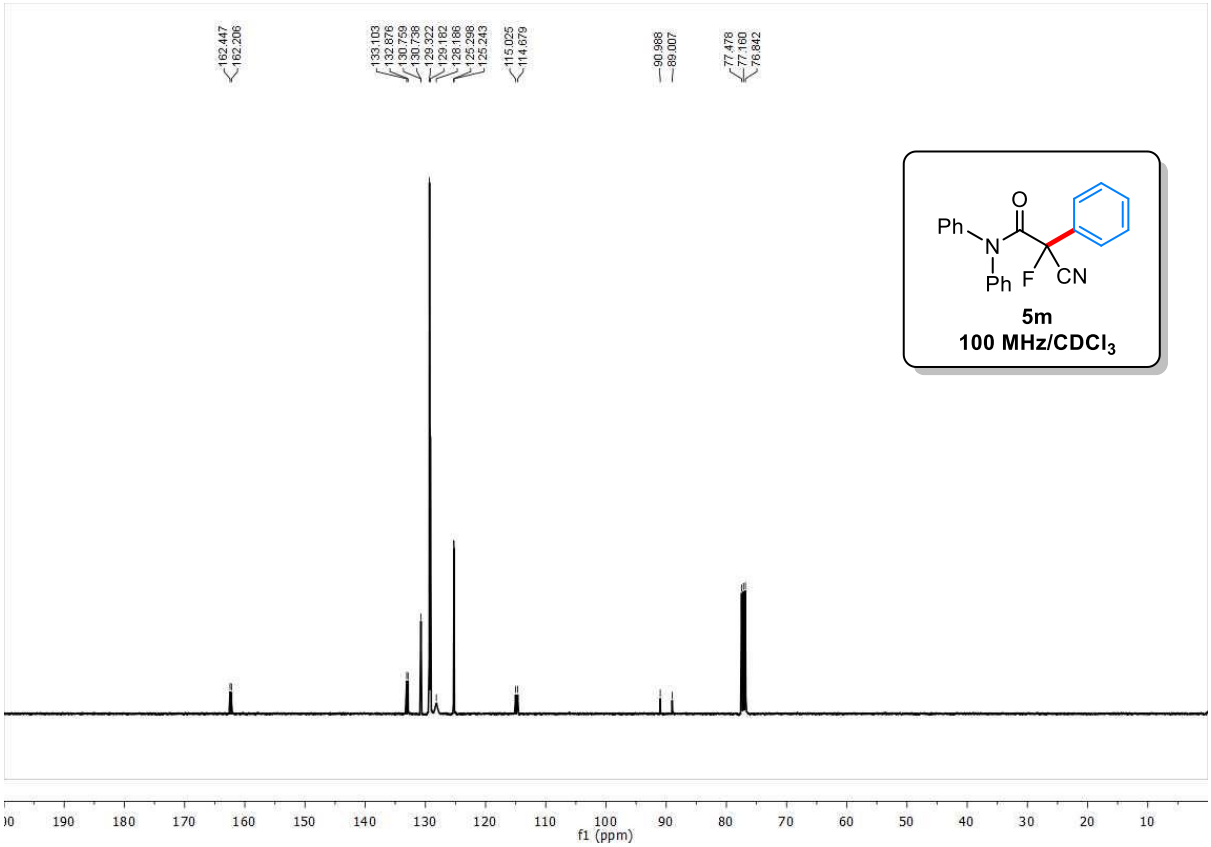

-111.261
-137.045
F
O
N
Bn
F
CN
5k
376 MHz/CDCl3
f1 (ppm)

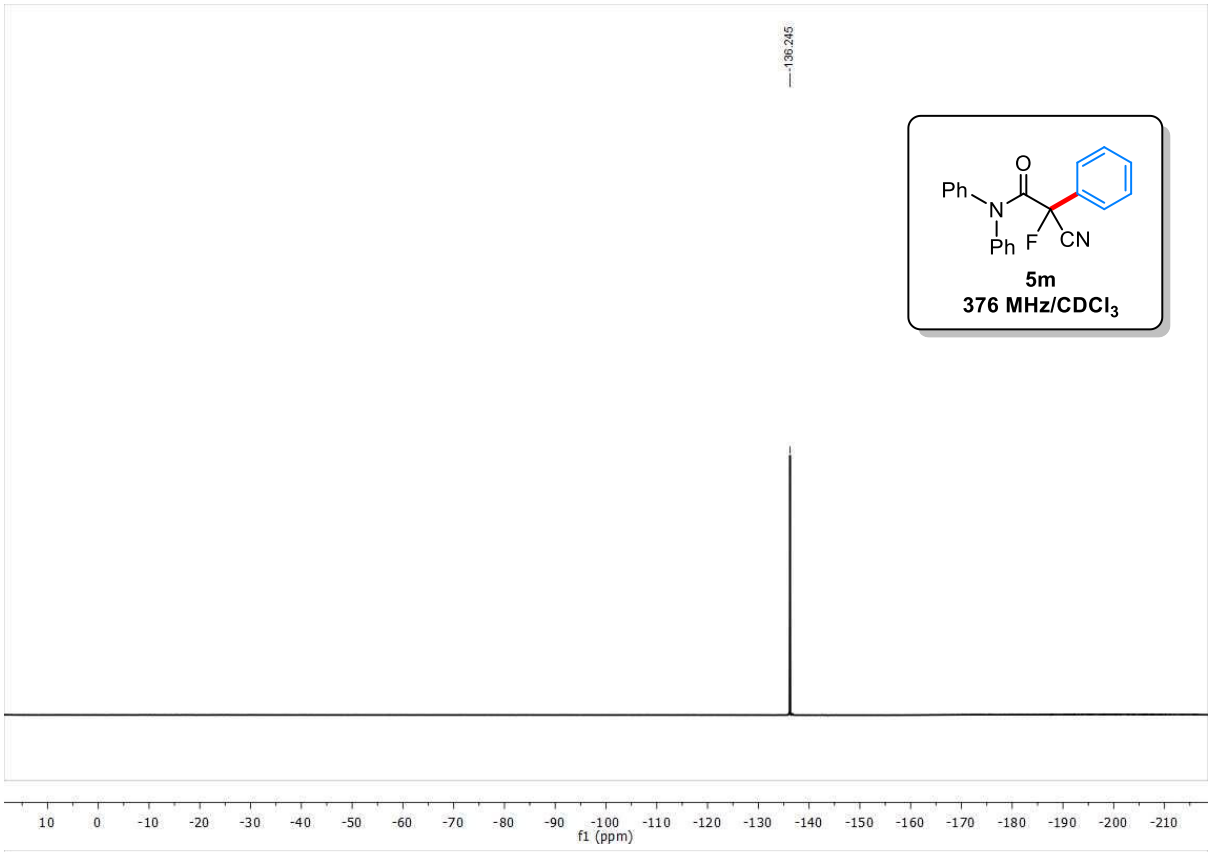

7.405
7.387
7.369
7.326
7.307
7.288
7.279
7.260
7.242
7.234
7.228
7.209
7.180
7.160
7.141
6.743
6.723
3.767
3.751
3.745
3.735
3.729
3.717
3.711
3.698
3.684
3.677
1.125
1.107
1.090
O
N
Et
F
CN
5l
400 MHz/CDCl3
1.07
5.03
2.02
2.00
2.03
3.06
f1 (ppm)

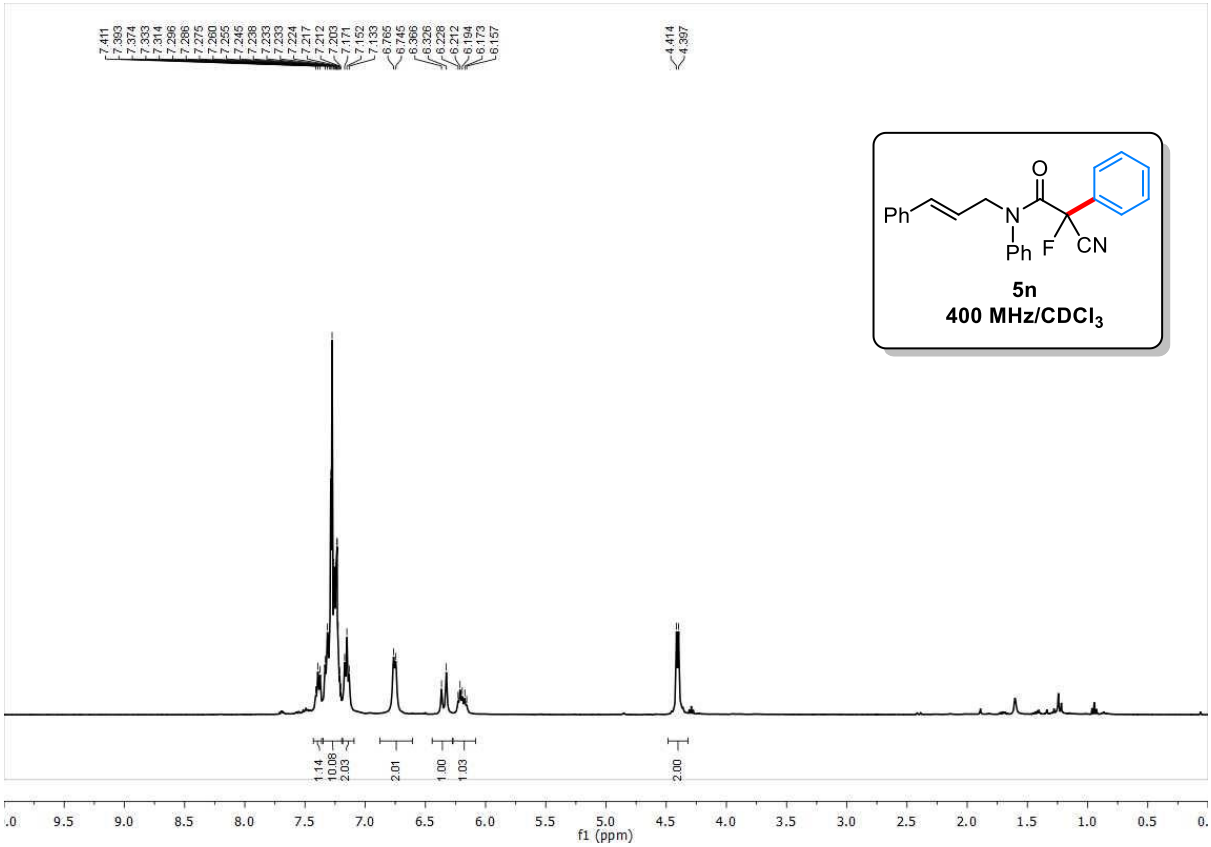

161.663
161.432
138.565
133.279
133.051
130.542
129.624
129.110
129.046
126.835
125.258
125.203
115.192
114.844
90.900
88.924
77.478
77.160
76.843
47.745
12.386
O
N
Et
F
CN
5l
100 MHz/CDCl3
f1 (ppm)

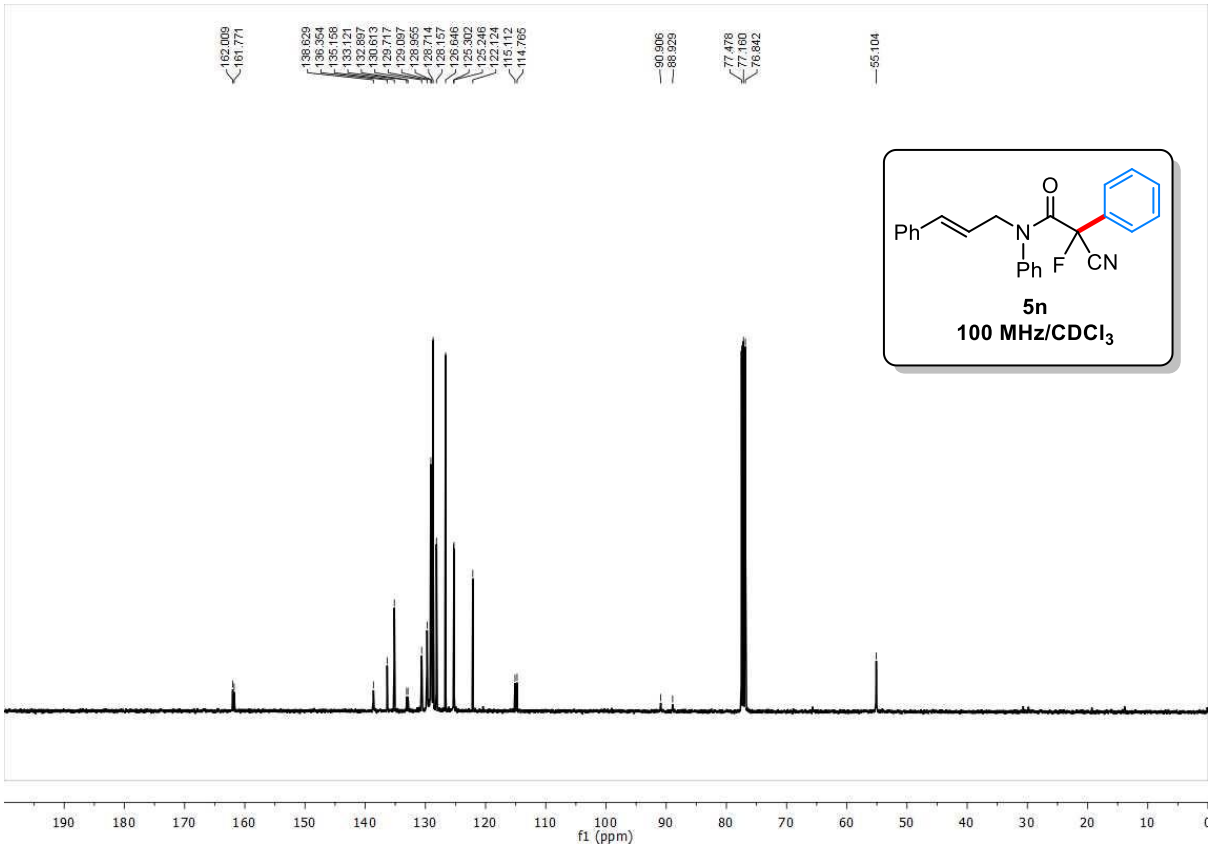

137.271
O
N
Et
F
CN
5l
376 MHz/CDCl3
f1 (ppm)

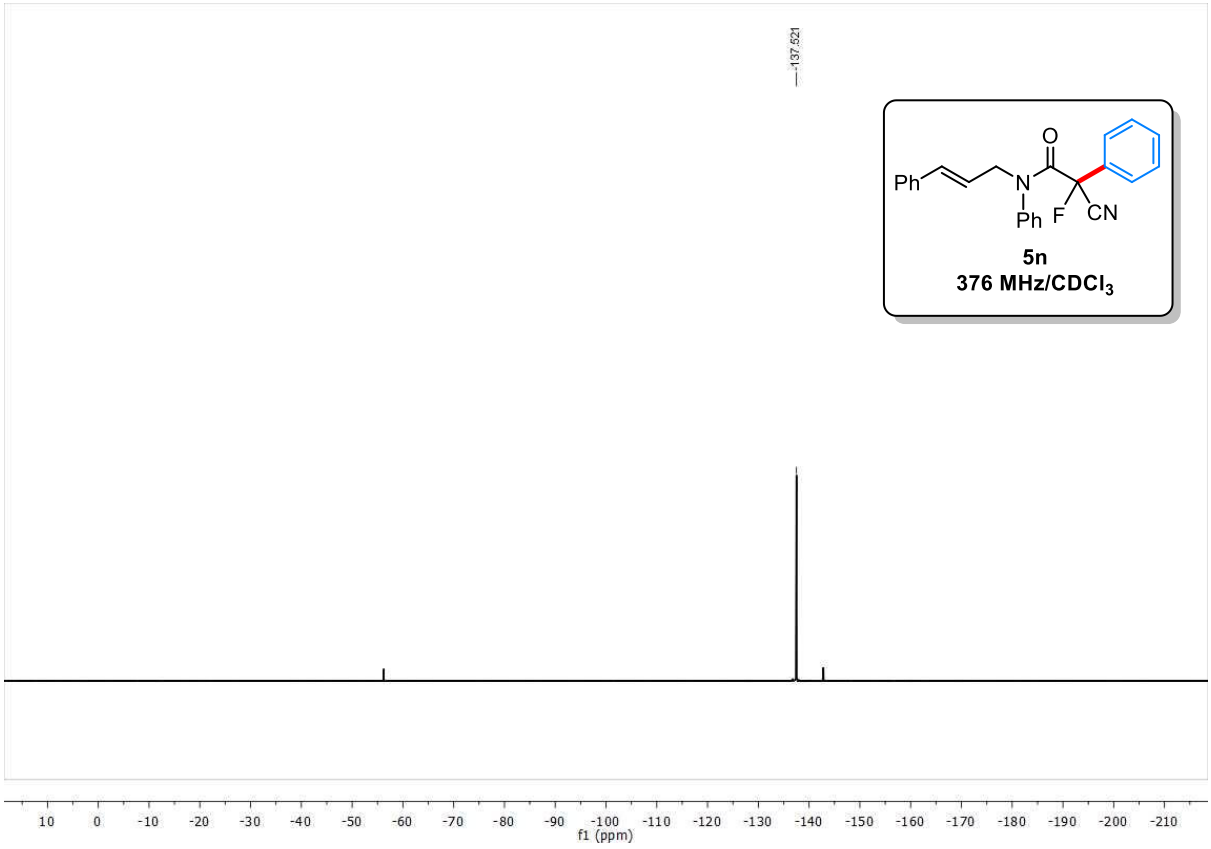

7.421
7.404
7.351
7.336
7.260
7.220
7.037
Ph
N
Ph
O
F
CN
5m
400 MHz/CDCl3
15.00
f1 (ppm)

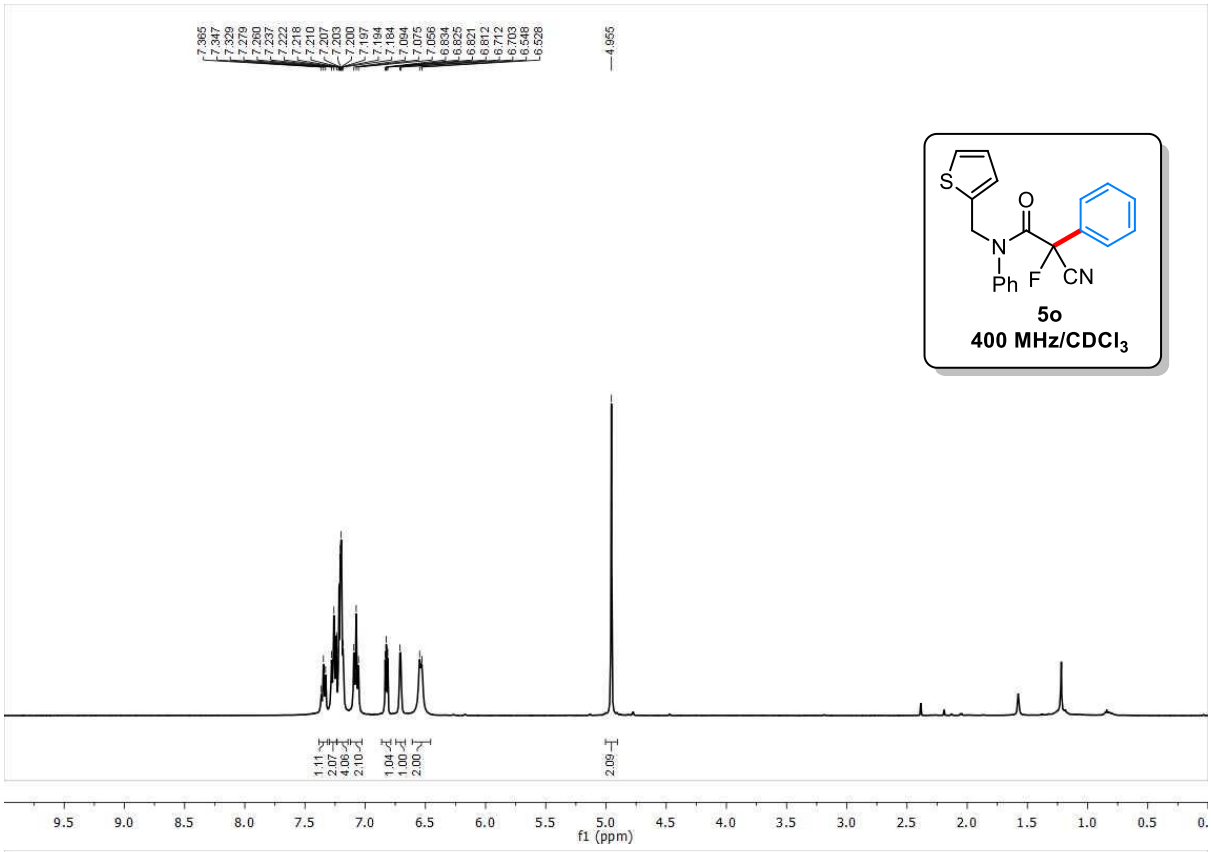

162.447
162.206
133.103
132.878
130.759
130.736
129.322
129.162
128.198
125.298
125.243
115.025
114.679
90.988
89.007
77.478
77.160
76.842
Ph
N
Ph
O
F
CN
5m
100 MHz/CDCl3
f1 (ppm)

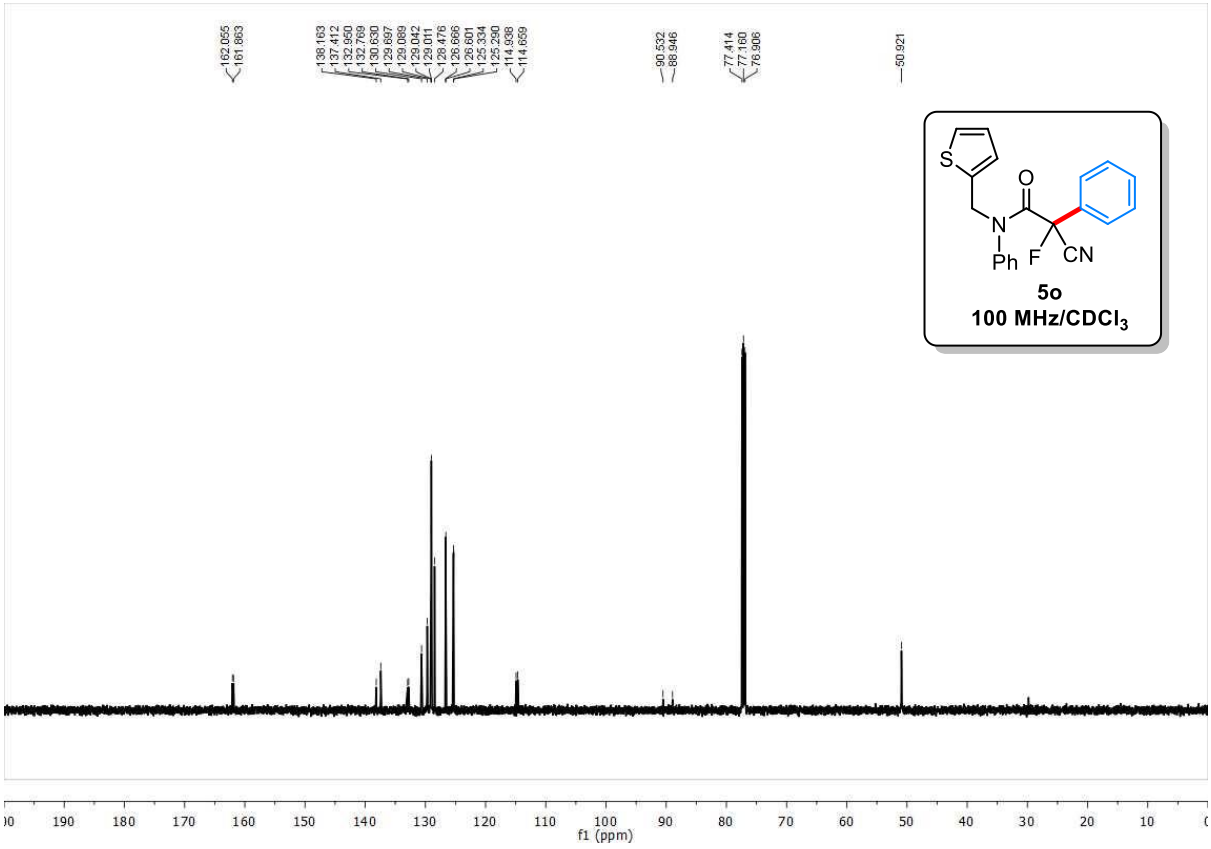

-136.245
Ph
N
Ph
O
F
CN
5m
376 MHz/CDCl3
f1 (ppm)

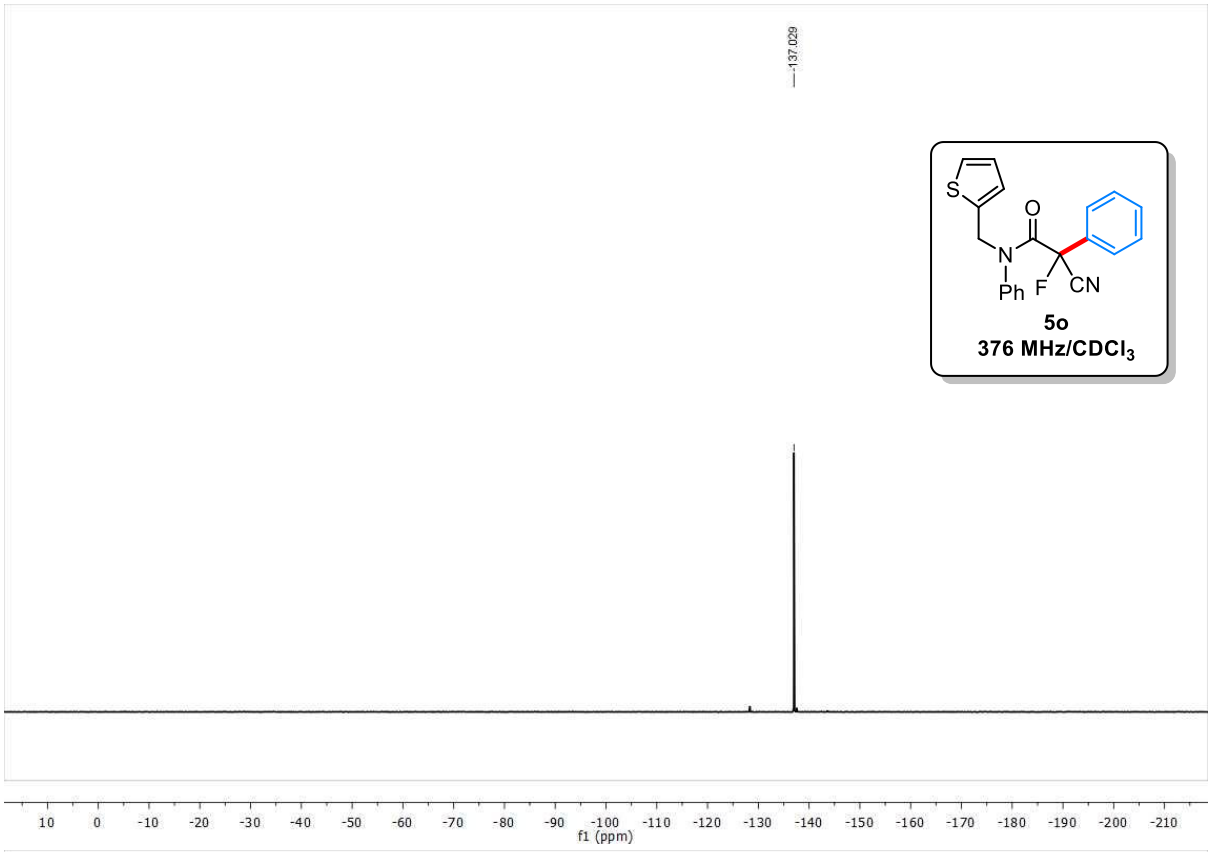

7.411
7.393
7.374
7.333
7.314
7.296
7.286
7.275
7.260
7.255
7.245
7.238
7.233
7.233
7.224
7.217
7.212
7.203
7.171
7.152
7.133
6.765
6.745
6.366
6.328
6.228
6.212
6.194
6.173
6.157
4.414
4.397
Ph
N
Ph
O
F
CN
5n
400 MHz/CDCl3
1.14
10.08
2.03
2.01
1.00
1.03
2.00
f1 (ppm)

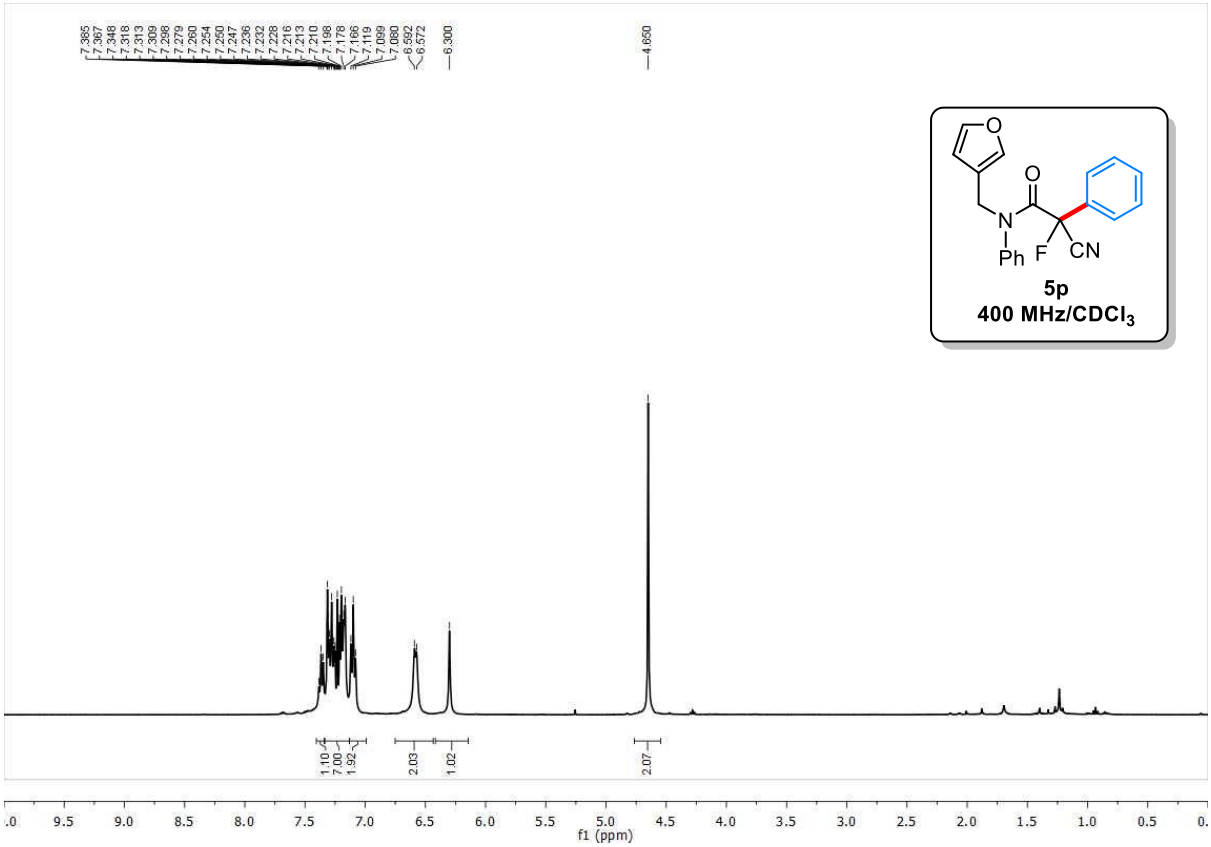

162.009
161.771
136.629
136.354
135.158
133.121
132.897
130.613
129.717
129.097
128.955
128.714
128.157
126.646
125.302
125.246
122.124
115.112
114.765
90.906
88.929
77.478
77.160
76.842
55.104
Ph
N
Ph
F
CN
O
5n
100 MHz/CDCl3
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

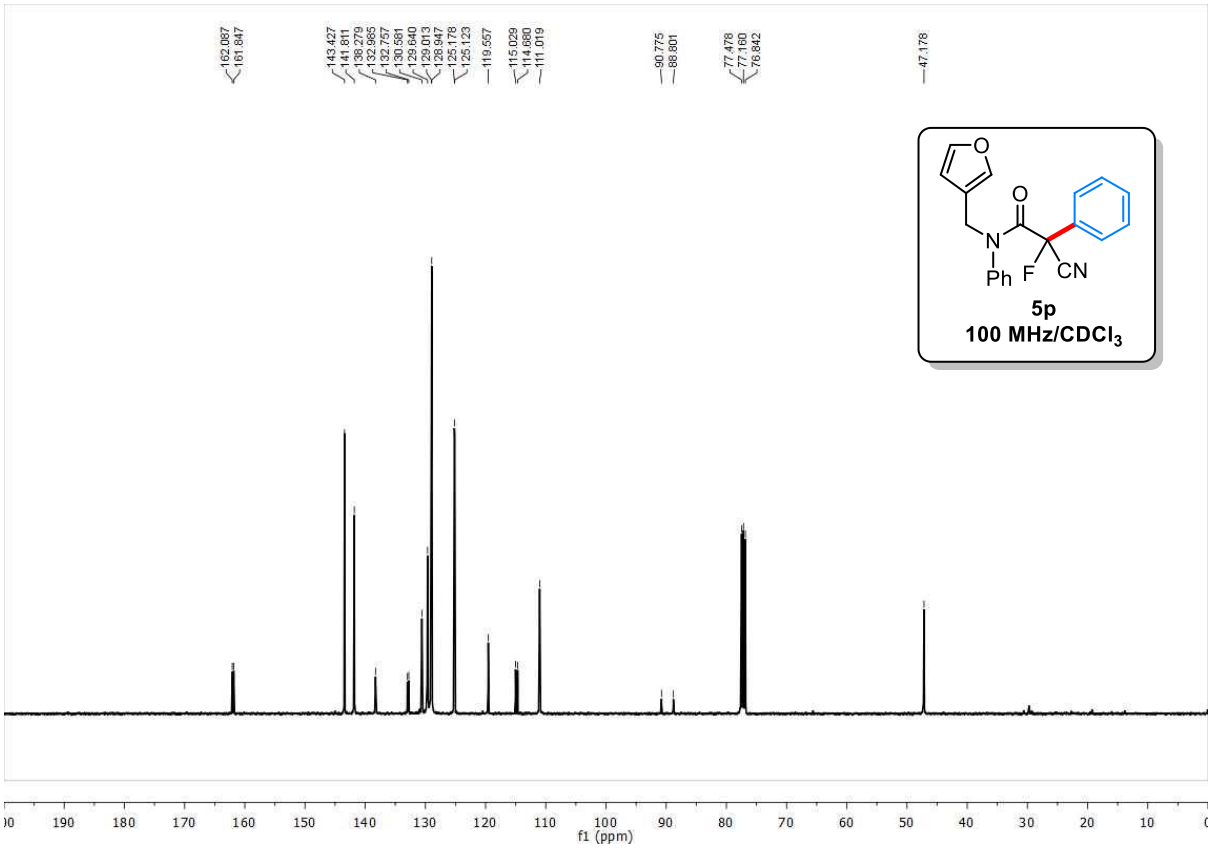

137.621
Ph
N
Ph
F
CN
O
5n
376 MHz/CDCl3
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

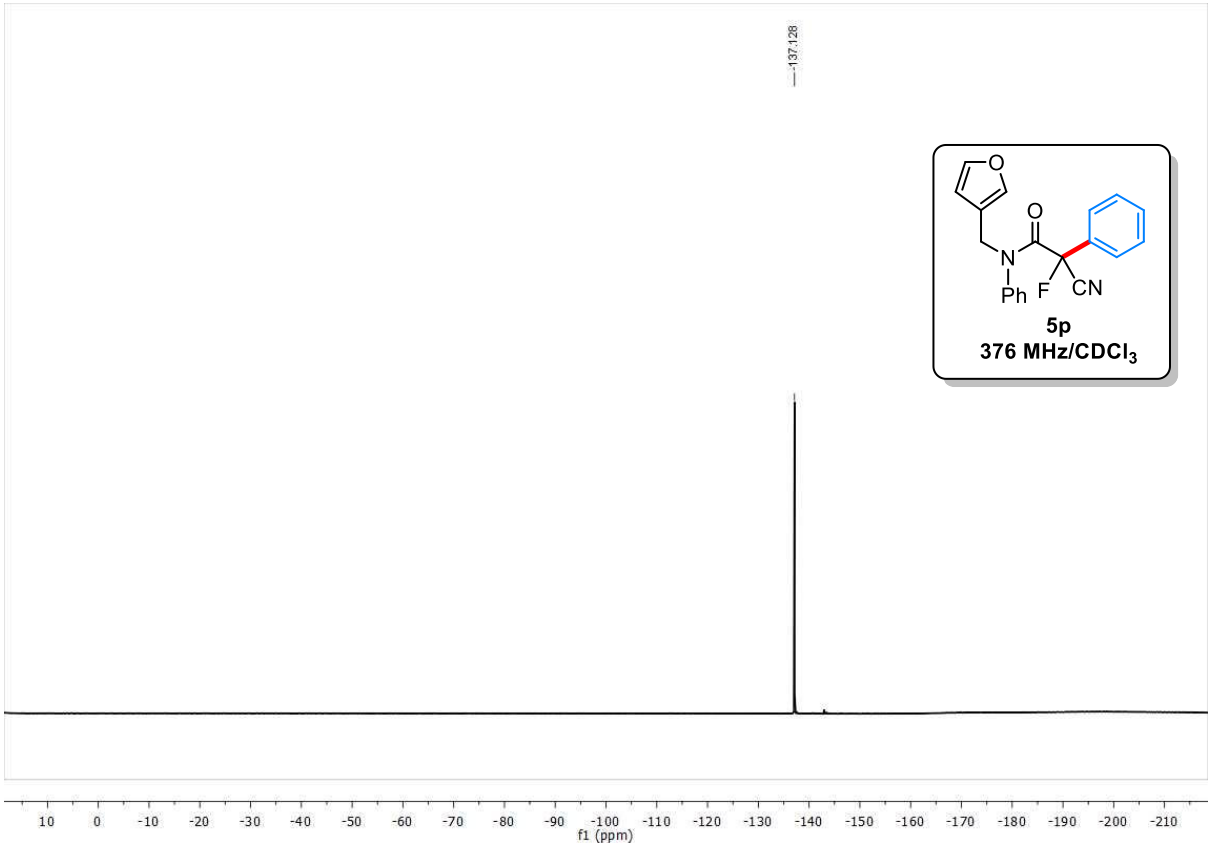

7.365
7.347
7.329
7.279
7.260
7.237
7.222
7.218
7.210
7.207
7.203
7.200
7.197
7.194
7.184
7.094
7.075
7.056
6.834
6.825
6.821
6.812
6.712
6.703
6.648
6.528
4.955
1.11
2.07
4.08
2.10
1.04
1.00
2.00
2.09
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)
S
O
N
Ph
F
CN
5o
400 MHz/CDCl3

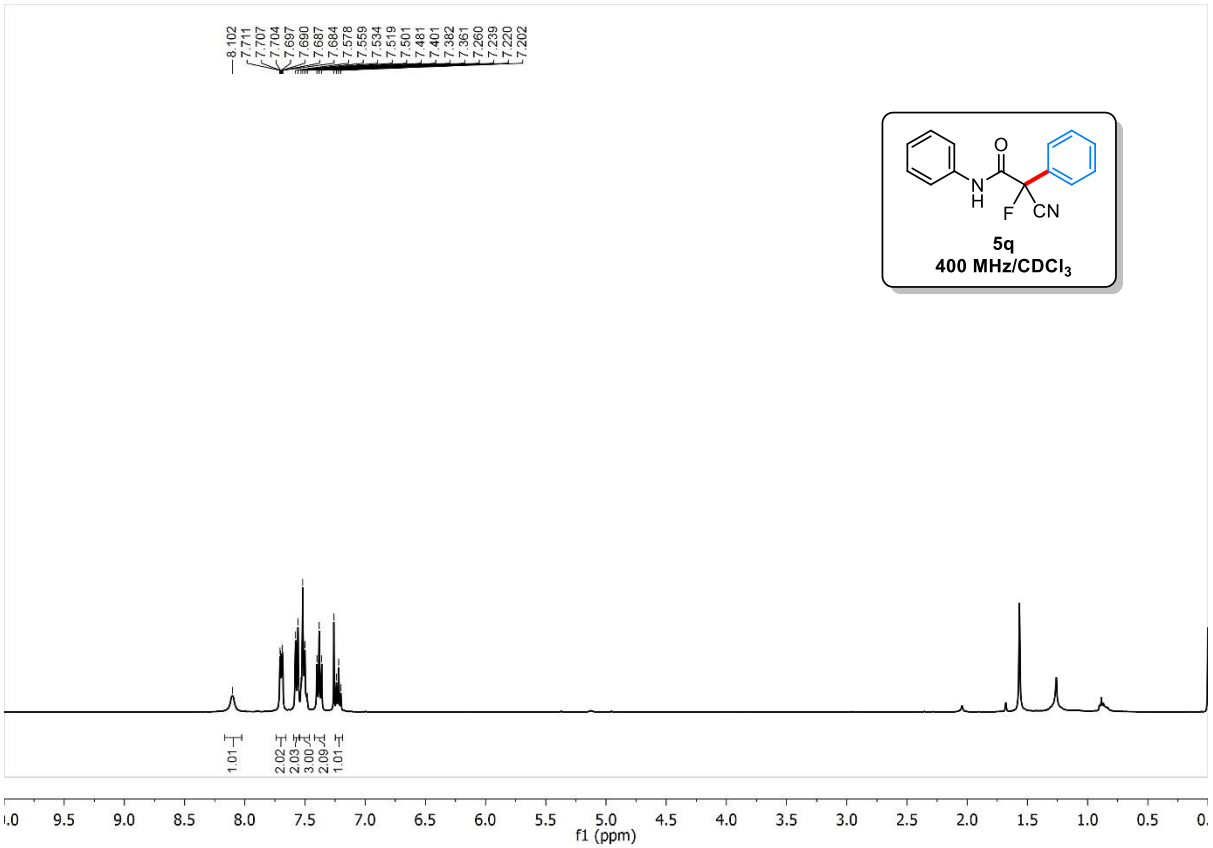

162.055
161.863
138.163
137.412
132.950
132.769
130.630
129.697
129.089
129.042
128.911
128.776
128.666
128.601
125.334
125.290
114.938
114.659
90.532
88.946
77.414
77.160
76.906
50.921
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)
S
O
N
Ph
F
CN
5o
100 MHz/CDCl3

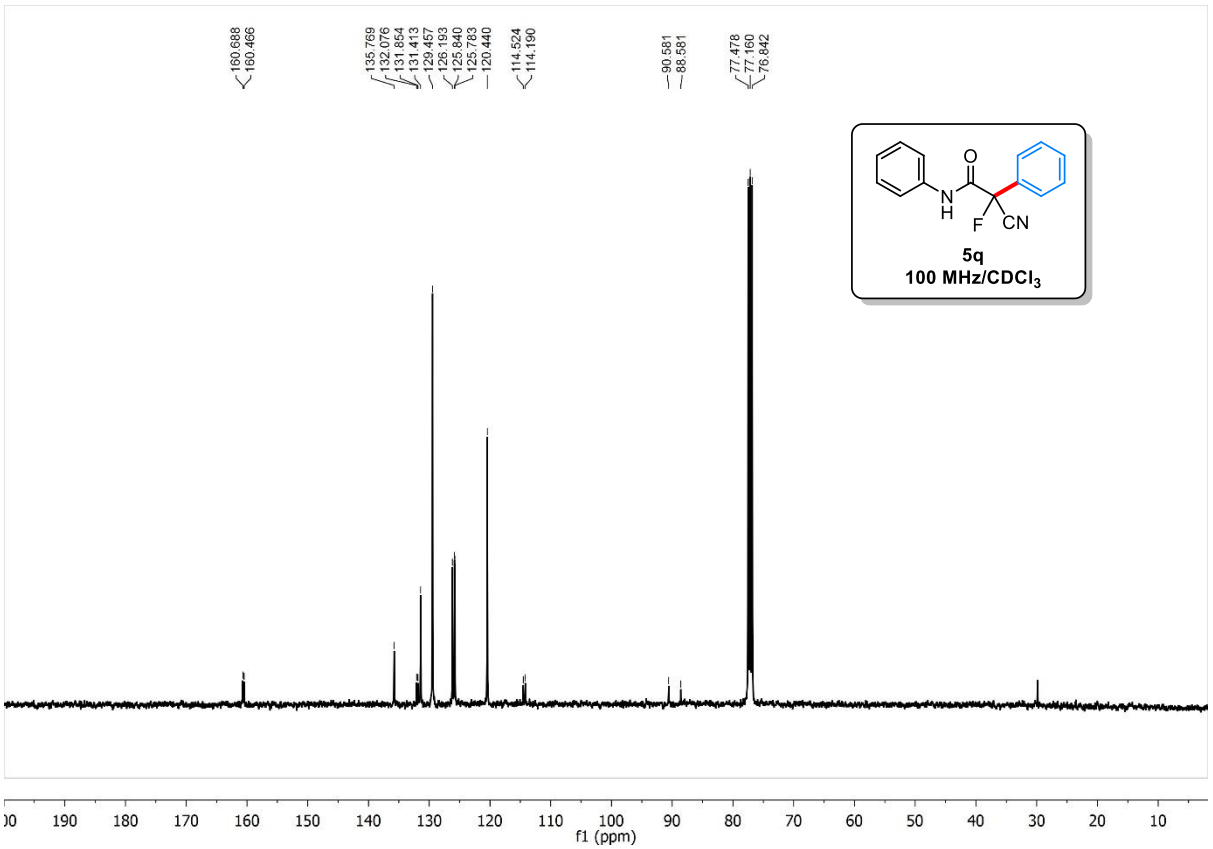

-137.029
S
O
N
Ph
F
CN
5o
376 MHz/CDCl3
f1 (ppm)

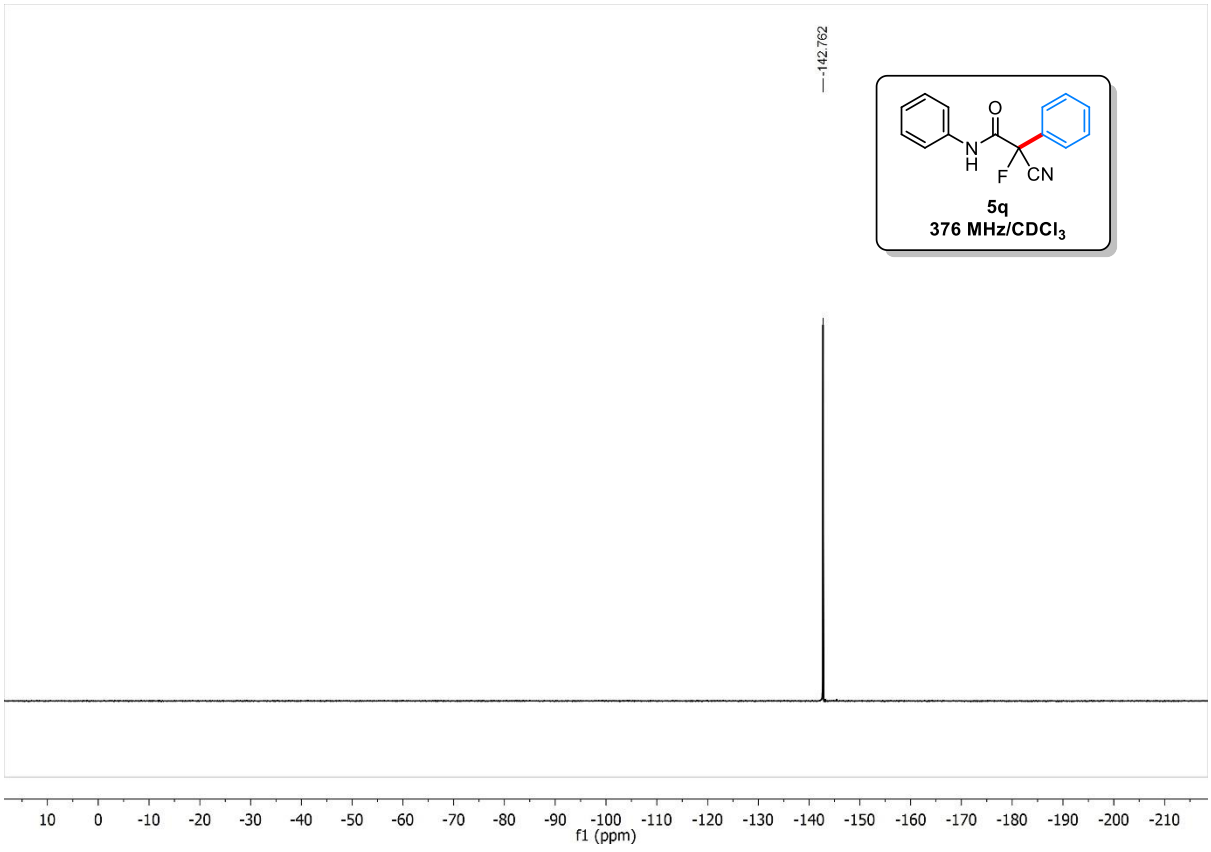

7.385
7.367
7.348
7.318
7.313
7.309
7.298
7.279
7.260
7.254
7.250
7.247
7.236
7.232
7.228
7.216
7.213
7.210
7.198
7.178
7.166
7.119
7.099
7.080
6.592
6.572
6.300
4.650
O
N
Ph
F
CN
5p
400 MHz/CDCl3
1.10
7.00
1.92
2.03
1.02
2.07
f1 (ppm)


162.087
161.847
143.427
141.811
138.279
132.995
132.757
130.581
129.640
129.013
128.947
125.178
125.123
119.557
115.029
114.880
111.019
90.775
88.801
77.478
77.160
76.842
47.178
O
O
N
Ph
F
CN
5p
100 MHz/CDCl3
f1 (ppm)


137.128
O
O
N
Ph
F
CN
5p
376 MHz/CDCl3
f1 (ppm)


8.102
7.711
7.707
7.704
7.697
7.690
7.687
7.684
7.578
7.559
7.534
7.519
7.501
7.481
7.401
7.382
7.361
7.260
7.239
7.220
7.202
1.01
2.02
2.03
3.00
2.09
1.01
f1 (ppm)
5q
400 MHz/CDCl3


160.688
160.466
135.769
132.076
131.854
131.413
129.457
128.193
125.840
125.783
120.440
114.524
114.190
90.581
88.581
77.478
77.160
76.842
f1 (ppm)
5q
100 MHz/CDCl3


-142.762
O
N
H
F
CN
5q
376 MHz/CDCl3
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)