Electronic Supplementary Information

Substrate-controlled product divergence in the reaction of α–fluoro–β-ketoamides with arynes

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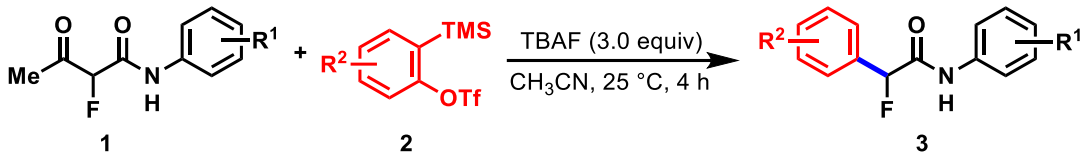
General experimental information

All reactions were performed under an 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 ethyl acetate-hexane gradient system. 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 were uncorrected. High-resolution mass spectra were obtained using Q-TOF mass spectrometer. All commercially available reagents were used as received. The primary and secondary α-fluoro-β-ketoamides (**1a**-**1v** & **5a**-**5h**) were synthesized from the corresponding primary and secondary amines[1] following the literature procedure.[2] 2-(Trimethylsilyl)phenyltrifluoromethanesulfonate (**2a**) and other aryne precursors were synthesized following the literature procedure (**2b**-**2i**).[3]

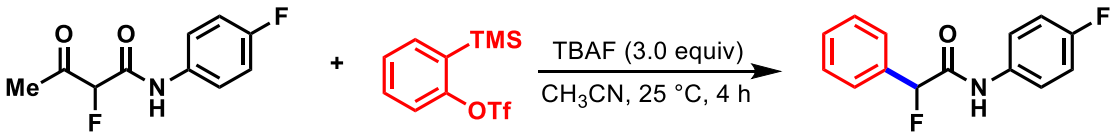
1. S. W. Youn and Kim, Y. H. Pd(II)/Ag(I)-promoted one-pot synthesis of cyclic ureas from (hetero)aromatic amines and isocyanates. *Org. Lett.,* 2016, **18**, 6140–6143.
2. (a) B. Miriyala and J. S. Williamson, An efficient and rapid synthesis of β-carboxamide derivatives using 2,2-dimethyl-2H,4H-1,3-dioxin-4-ones by microwave irradiation. *Tetrahedron Lett.,* 2003, **44**, 7957–7959. (b) J. Bi, Z. Zhang, Q. Liu and G. Zhang, Catalyst-Free and Highly Selective Electrophilic Mono-Fluorination of Acetoacetamides: Facile and Efficient Preparation of 2-Fluoroacetoacetamides in PEG-400. *Green Chem.,* 2012, **14**, 1159-1162.
3. (a) X. Yang and G. C. Tsui, Copper-mediated trifluoromethylation–allylation of arynes. *Org. Lett.* 2018, **20**, 1179–1182. (b) K. Nogi, T. Fujihara, J. Terao and Y. Tsuji, Y. Cobalt- and Nickel-catalyzed carboxylation of alkenyl and sterically hindered aryl triflates utilizing CO_2. *J. Org. Chem.* **2015**, *80*, 11618–11623.

General procedure for the synthesis of α-Fluoro-α-arylacetomides 3



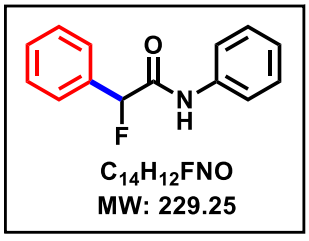
An oven-dried round bottom flask charged with 2-fluoro-3-oxo-*N*-phenylbutanamide **1** (0.20 mmol) was sealed, evacuated, and backfilled with nitrogen. Subsequently, Freshly distilled CH_3CN (2.0 mL), 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2** (0.30 mmol), and TBAF (0.60 mmol) were added, and the reaction mixture was stirred at 25 °C for 4 h. After the completion of the reaction, as indicated by TLC, the solvent was evaporated, and the crude reaction mixture was extracted using ethyl acetate (15 × 3 mL) and water (15 mL). The organic layer was washed with brine, dried over anhydrous 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 product **3**.

Gram scale synthesis of α-Fluoro-α-arylacetomide 3g



An oven-dried round bottom flask charged with 2-fluoro-3-oxo-*N*-phenylbutanamide **1g** (1.5 g, 7.05 mmol) was sealed, evacuated, and backfilled with nitrogen. Subsequently, freshly distilled CH_3CN (10.0 mL), 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (3.2 g, 10.6 mmol), and TBAF (21.1 mmol) were added, and the reaction mixture was stirred at 25 °C for 4 h. After the completion of the reaction, as indicated by TLC, the solvent was evaporated, and the crude reaction mixture was extracted using ethyl acetate (150 × 3 mL) and water (150 mL). The organic layer was washed with brine, dried over anhydrous 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 product **3g** as white solid (1.17 g, 67%).

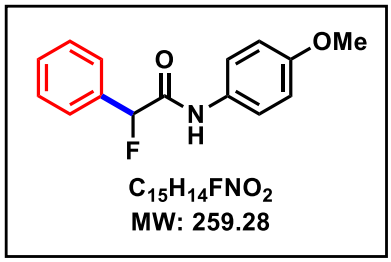
Compound 3a: 2-Fluoro-*N*,2-diphenylacetamide



Following the general procedure, the treatment of 2-fluoro-3-oxo-*N*-phenylbutanamide **1a** (39 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3a** as white solid (33 mg, 72%). $\mathbf{R}_f$(Ethyl acetate/Hexane: 10/90) = 0.35.

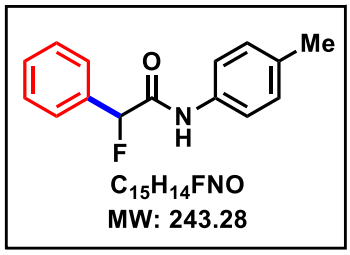
Mp 104-106 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.5 (d, J_{C-F} = 20.5 Hz, C), 136.7 (C), 134.5 (d, J_{C-F} = 19.0 Hz, C), 129.7 (d, J_{C-F} = 2.4 Hz, CH), 129.2 (CH), 129.2 (CH), 128.9 (CH), 128.9 (CH), 126.8 (d, J_{C-F} = 6.5 Hz, CH), 126.8 (d, J_{C-F} = 6.5 Hz, CH), 125.2 (CH), 120.2 (CH), 120.2 (CH), 92.0 (d, J_{C-F} = 188.3 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.16 (s, 1H), 7.62-7.60 (m, 1H), 7.59-7.58 (m, 1H), 7.55-7.50 (m, 2H), 7.46-7.40 (m, 3H), 7.38-7.33 (m, 2H), 7.19-7.14 (m, 1H), 5.90 (d, J = 48.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -175.2 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{14}H_{13}FNO$ 230.0976; found 230.0980.

Compound 3b: 2-Fluoro-*N*-(4-methoxyphenyl)-2-phenylacetamide



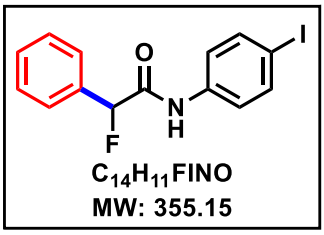
Following the general procedure, treatment of 2-fluoro-*N*-(4-methoxyphenyl)-3-oxobutanamide **1b** (45 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3b** as white solid (36 mg, 70%). **R_f** (Ethyl acetate/Hexane: 20/80) = 0.37. **Mp** 104-106 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 167.2 (d, J_{C-F} = 16.7 Hz, C), 157.9 (C), 135.3 (d, J_{C-F} = 15.3 Hz, C), 130.4 (C), 130.2 (d, J_{C-F} = 2.2 Hz, CH), 129.4 (CH), 129.4 (CH), 127.3 (d, J_{C-F} = 5.5 Hz, CH), 127.3 (d, J_{C-F} = 5.5 Hz, CH), 122.4 (CH), 122.4 (CH), 114.8 (CH), 114.8 (CH), 92.0 (d, J_{C-F} = 151.9 Hz, CH), 55.4 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.10 (s, 1H), 7.53-7.47 (m, 4H), 7.50-7.40 (m, 3H), 6.90-6.86 (m, 2H), 5.88 (d, J = 48.4 Hz, 1H), 3.80 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -175.3 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{15}H_{15}FNO_2$ 260.1081; found 260.1078.

Compound 3c: 2-Fluoro-2-phenyl-*N*-(*p*-tolyl)acetamide



Following the general procedure, treatment of 2-fluoro-3-oxo-*N*-(*p*-tolyl)butanamide **1c** (42 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3c** as brown solid (33 mg, 68%). **R_f** (Ethyl acetate/Hexane: 10/90) = 0.37. **Mp** 126-128 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.4 (d, J_{C-F} = 20.6 Hz, C), 134.9 (C), 134.7 (d, J_{C-F} = 19.1 Hz, C), 134.2 (C), 129.7 (CH), 129.7 (CH), 129.7 (d, J_{C-F} = 2.7 Hz, CH), 128.9 (CH), 128.9 (CH), 126.8 (d, J_{C-F} = 6.5 Hz, CH), 126.8 (d, J_{C-F} = 6.5 Hz, CH), 120.2 (CH), 120.2 (CH), 92.0 (d, J_{C-F} = 188.2 Hz, CH), 21.0 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.16 (s, 1H), 7.54-7.51 (m, 2H), 7.50-7.45 (m, 2H), 7.45-7.40 (m, 3H), 7.15 (d, J = 8.4 Hz, 2H), 5.86 (d, J = 48.4 Hz, 1H), 2.33 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -175.2 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{15}H_{15}FNO$ 244.1132; found 244.1128.

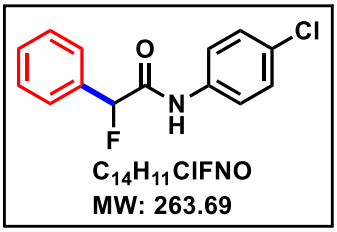
Compound 3d: 2-Fluoro-*N*-(4-iodophenyl)-2-phenylacetamide



$C_{14}H_{11}FINO$
MW: 355.15

Following the general procedure, treatment of 2-fluoro-*N*-(4-iodophenyl)-3-oxobutanamide **1d** (64 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3d** as white solid (49 mg, 69%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.37. **Mp** 144-146 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.6 (d, $J_{C\text{-}F}$ = 16.7 Hz, C), 138.2 (CH), 138.2 (CH), 136.6 (C), 134.3 (d, $J_{C\text{-}F}$ = 15.4 Hz, C), 129.8 (d, $J_{C\text{-}F}$ = 1.0 Hz, CH), 129.0 (CH), 129.0 (CH), 126.7 (d, $J_{C\text{-}F}$ = 5.2 Hz, CH), 126.7 (d, $J_{C\text{-}F}$ = 5.2 Hz, CH), 122.0 (CH), 122.0 (CH), 92.0 (d, $J_{C\text{-}F}$ = 150.6 Hz, CH), 88.6 (C). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.17 (s, 1H), 7.66-7.63 (m, 2H), 7.52-7.47 (m, 2H), 7.44-7.40 (m, 3H), 7.40-7.36 (m, 2H), 5.88 (d, J = 48.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -175.8 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{14}H_{12}FINO$ 355.9942; found 355.9943.

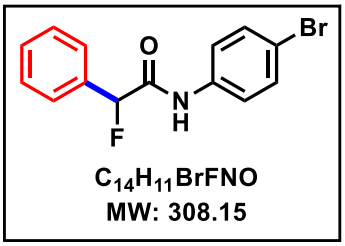
Compound 3e: *N*-(4-chlorophenyl)-2-fluoro-2-phenylacetamide



$C_{14}H_{11}ClFNO$
MW: 263.69

Following the general procedure, treatment of *N*-(4-chlorophenyl)-2-fluoro-3-oxobutanamide **1e** (46 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3e** as white solid (32 mg, 61%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 20/80) = 0.50. **Mp** 133-135 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.6 (d, $J_{C\text{-}F}$ = 20.8 Hz, C), 135.3 (C), 134.4 (d, $J_{C\text{-}F}$ = 19.1 Hz, C), 130.3 (C), 129.8 (CH), 129.3 (CH), 129.3 (CH), 129.0 (CH), 129.0 (CH), 126.7 (d, $J_{C\text{-}F}$ = 6.4 Hz, CH), 126.7 (d, $J_{C\text{-}F}$ = 6.4 Hz, CH), 121.4 (CH), 121.4 (CH), 92.0 (d, $J_{C\text{-}F}$ = 188.4 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.16 (s, 1H), 7.57-7.53 (m, 2H), 7.52-7.48 (m, 2H), 7.45-7.40 (m, 3H), 7.33-7.29 (m, 2H), 5.90 (d, J = 48.8 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -175.9 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{14}H_{12}ClFNO$ 264.0586; found 264.0588.

Compound 3f: *N*-(4-bromophenyl)-2-fluoro-2-phenylacetamide

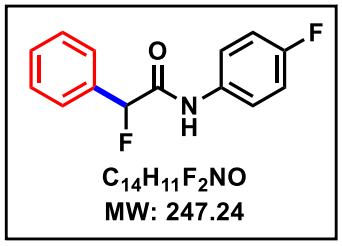


$C_{14}H_{11}BrFNO$
MW: 308.15

Following the general procedure, the treatment of *N*-(4-bromophenyl)-2-fluoro-3-oxobutanamide **1f** (55 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3f** as white solid (37 mg, 60%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 20/80) = 0.50. **Mp** 160-162 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.6 (d, $J_{C\text{-}F}$ = 20.8 Hz, C), 135.8 (C), 134.3 (d, $J_{C\text{-}F}$ = 19.1 Hz, C), 132.3 (CH), 132.3 (CH), 129.8 (CH), 129.0 (CH), 129.0 (CH), 126.7 (d, $J_{C\text{-}F}$ = 6.4 Hz, CH), 126.7 (d, $J_{C\text{-}F}$ = 6.4 Hz, CH), 121.7 (CH), 121.7 (CH), 118.0 (C), 92.0 (d, $J_{C\text{-}F}$ = 188.4 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.19 (s,

1H), 7.54-7.48 (m, 4H), 7.47-7.46 (m, 2H), 7.45-7.40 (m, 3H), 5.89 (d, *J* = 48.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -175.8 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{14}H_{12}BrFNO$ 308.0081; found 308.0084.

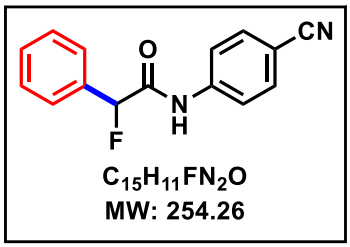
Compound 3g: 2-Fluoro-*N*-(4-fluorophenyl)-2-phenylacetamide



$C_{14}H_{11}F_2NO$
MW: 247.24

Following the general procedure, the treatment of 2-fluoro-*N*-(4-fluorophenyl)-3-oxobutanamide **1g** (43 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3g** as white solid (39 mg, 79%). **R_f** (Ethyl acetate/Hexane: 20/80) = 0.47. **Mp** 134-136 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.6 (d, J_{C-F} = 16.5 Hz, C), 160.0 (d, J_{C-F} = 194.3 Hz, C), 134.5 (d, J_{C-F} = 14.9 Hz, C), 132.8 (C), 129.8 (CH), 129.0 (CH), 129.0 (CH), 126.7 (d, J_{C-F} = 5.2 Hz, CH), 126.7 (d, J_{C-F} = 5.2 Hz, CH), 122.0 (d, J_{C-F} = 6.4 Hz, CH), 122.0 (d, J_{C-F} = 6.4 Hz, CH), 116.0 (d, J_{C-F} = 18.0 Hz, CH), 116.0 (d, J_{C-F} = 18.0 Hz, CH), 92.0 (d, J_{C-F} = 150.4 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.18 (s, 1H), 7.58-7.53 (m, 2H), 7.53-7.48 (m, 2H), 7.45-7.40 (m, 3H), 7.06-7.0 (m, 2H), 5.89 (d, *J* = 48.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -116.9 (s), -175.8 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{14}H_{12}F_2NO$ 248.0881; found 248.0883.

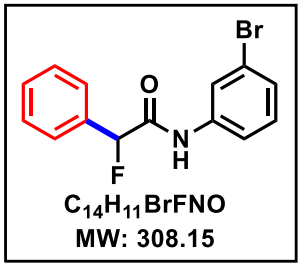
Compound 3h: *N*-(4-cyanophenyl)-2-fluoro-2-phenylacetamide



$C_{15}H_{11}FN_2O$
MW: 254.26

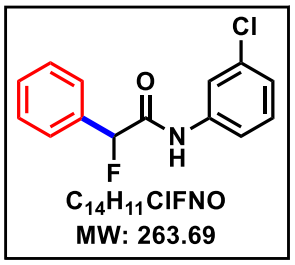
Following the general procedure, the treatment of *N*-(4-cyanophenyl)-2-fluoro-3-oxobutanamide **1h** (44 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3h** as white solid (34 mg, 67%). **R_f** (Ethyl acetate/Hexane: 20/80) = 0.50. **Mp** 175-177 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 169.0 (d, J_{C-F} = 21.2 Hz, C), 140.7 (C), 134.0 (d, J_{C-F} = 19.2 Hz, C), 133.5 (CH), 133.5 (CH), 130.0 (d, J_{C-F} = 2.2 Hz, CH), 129.0 (CH), 129.0 (CH), 126.6 (d, J_{C-F} = 6.6 Hz, CH), 126.6 (d, J_{C-F} = 6.6 Hz, CH), 120.1 (CH), 120.1 (CH), 118.7 (C), 108.3 (C), 92.0 (d, J_{C-F} = 188.6 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.38 (s, 1H), 7.76-7.72 (m, 2H), 7.65-7.61 (m, 2H), 7.51-7.48 (m, 2H), 7.45-7.41 (m, 3H), 5.92 (d, *J* = 48.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -176.3 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{15}H_{12}FN_2O$ 255.0928; found 255.0936.

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



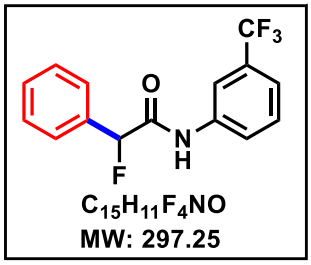
Following the general procedure, the treatment of *N*-(3-bromophenyl)-2-fluoro-3-oxobutanamide **1i** (55 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3i** as white solid (45 mg, 73%). $\mathbf{R_f}$(Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 77-79 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.7 (d, $J_{C\text{-}F}$ = 20.8 Hz, C), 138.0 (C), 134.3 (d, $J_{C\text{-}F}$ = 19.1 Hz, C), 130.5 (CH), 129.9 (CH), 129.0 (CH), 129.0 (CH), 128.3 (CH), 126.7 (d, $J_{C\text{-}F}$ = 6.5 Hz, CH), 126.7 (d, $J_{C\text{-}F}$ = 6.5 Hz, CH), 123.1 (CH), 123.0 (C), 118.6 (CH), 92.0 (d, $J_{C\text{-}F}$ = 188.4 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.10 (s, 1H), 7.87 (t, J = 2.0 Hz, 1H), 7.53-7.47 (m, 3H), 7.46-7.41 (m, 3H), 7.31-7.28 (m, 1H), 7.20 (t, J = 8.0 Hz, 1H), 5.90 (d, J = 48.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -176.2 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{14}H_{12}BrFNO$ 308.0081; found 308.0084.

Compound 3j: *N*-(3-chlorophenyl)-2-fluoro-2-phenylacetamide



Following the general procedure, the treatment of *N*-(3-chlorophenyl)-2-fluoro-3-oxobutanamide **1j** (46 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded product **3j** as white solid (34 mg, 65%). $\mathbf{R_f}$(Ethyl acetate/Hexane: 10/90) = 0.37. **Mp** 74-76 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.7 (d, $J_{C\text{-}F}$ = 20.9 Hz, C), 137.9 (C), 135.0 (C), 134.3 (d, $J_{C\text{-}F}$ = 19.2 Hz, C), 130.2 (CH), 129.8 (d, $J_{C\text{-}F}$ = 2.3 Hz, CH), 129.0 (CH), 129.0 (CH), 126.7 (d, $J_{C\text{-}F}$ = 6.6 Hz, CH), 126.7 (d, $J_{C\text{-}F}$ = 6.6 Hz, CH), 125.3 (CH), 120.3 (CH), 118.1 (CH), 92.0 (d, $J_{C\text{-}F}$ = 188.4 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.21 (s, 1H), 7.73 (t, J = 2.0 Hz, 1H), 7.51-7.48 (m, 2H), 7.45-7.40 (m, 4H), 7.26 (t, J = 8.0 Hz, 1H), 7.15-7.12 (m, 1H), 5.89 (d, J = 48.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -175.9 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{14}H_{12}ClFNO$ 264.0586; found 264.0586.

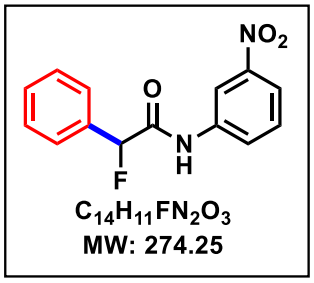
Compound 3k: 2-Fluoro-2-phenyl-*N*-(3-(trifluoromethyl)phenyl)acetamide



Following the general procedure, the treatment of 2-fluoro-3-oxo-*N*-(3-(trifluoromethyl)phenyl)butanamide **1k** (53 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3k** as yellow liquid (36 mg, 60%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.45. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 167.0 (d, $J_{C\text{-}F}$ = 16.8 Hz, C), 137.3 (C), 134.2 (d, $J_{C\text{-}F}$ = 15.2 Hz, C), 131.7 (q, $J_{C\text{-}F}$ = 25.7 Hz, C), 129.9 (CH), 129.8 (CH), 129.0 (CH), 129.0 (CH), 126.7 (d, $J_{C\text{-}F}$ = 5.2 Hz, CH), 126.7 (d, $J_{C\text{-}F}$ = 5.2 Hz, CH), 123.8 (q, $J_{C\text{-}F}$ = 216.8

Hz, C), 123.2 (CH), 121.8 (q, J_{C-F} = 2.9 Hz, CH), 117.0 (d, J_{C-F} = 2.8 Hz, CH), 92.0 (d, J_{C-F} = 150.5 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.27 (s, 1H), 7.90 (s, 1H), 7.80 (d, *J* = 8.0 Hz, 1H), 7.53-7.50 (m, 2H), 7.49-7.40 (m, 5H), 5.92 (d, *J* = 48.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -62.8 (s), -176.6 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{15}H_{12}F_4NO$ 298.0850; found 298.0851.

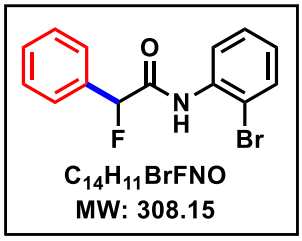
Compound 3l: 2-Fluoro-*N*-(3-nitrophenyl)-2-phenylacetamide



$C_{14}H_{11}FN_2O_3$
MW: 274.25

Following the general procedure, the treatment of 2-fluoro-*N*-(3-nitrophenyl)-3-oxobutanamide **1l** (48 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3l** as white solid (35 mg, 63%). **R_f** (Ethyl acetate/Hexane: 20/80) = 0.32. **Mp** 117-119 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 167.1 (d, J_{C-F} = 21.3 Hz, C), 148.7 (C), 137.9 (C), 134.0 (d, J_{C-F} = 19.2 Hz, C), 130.1 (CH), 130.0 (d, J_{C-F} = 2.3 Hz, CH), 129.0 (CH), 129.0 (CH), 126.6 (d, J_{C-F} = 6.6 Hz, CH), 126.6 (d, J_{C-F} = 6.6 Hz, CH), 125.8 (CH), 119.8 (CH), 115.1 (CH), 92.0 (d, J_{C-F} = 188.5 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.50 (s, 1H), 8.38 (s, 1H), 8.14-7.95 (m, 2H), 7.67-7.40 (m, 6H), 5.94 (d, *J* = 48.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -176.8 (s). **HRMS** (ESI) m/z: $[M-H]^-$ Calcd for $C_{14}H_{10}FN_2O_3$ 273.0681; found 273.0675

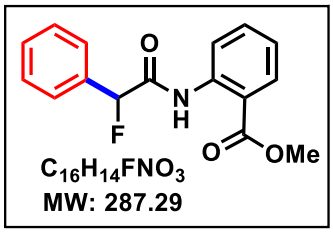
Compound 3m: *N*-(2-bromophenyl)-2-fluoro-2-phenylacetamide



$C_{14}H_{11}BrFNO$
MW: 308.15

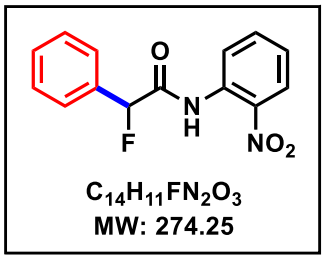
Following the general procedure, the treatment of *N*-(2-bromophenyl)-2-fluoro-3-oxobutanamide **1m** (55 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3m** as yellow solid (36 mg, 58%). **R_f** (Ethyl acetate/Hexane: 5/95) = 0.37. **Mp** 66-68 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.7 (d, J_{C-F} = 21.1 Hz, C), 134.8 (C), 134.5 (d, J_{C-F} = 19.3 Hz, C), 132.6 (CH), 129.8 (CH), 129.0 (CH), 129.0 (CH), 128.6 (CH), 126.8 (d, J_{C-F} = 6.5 Hz, CH), 126.8 (d, J_{C-F} = 6.5 Hz, CH), 126.1 (CH), 122.0 (CH), 114.0 (C), 92.1 (d, J_{C-F} = 189.0 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.78 (s, 1H), 8.36 (dd, *J* = 8.4 Hz, 1.2 Hz, 1H), 7.59-7.53 (m, 3H), 7.46-7.40 (m, 3H), 7.32 (t, *J* = 7.2 Hz, 1H), 7.03 (dd, *J* = 7.6 Hz, 1.2 Hz, 1H), 5.92 (d, *J* = 48.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -176.3 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{14}H_{12}BrFNO$ 308.0081; found 308.0070.

Compound 3n: Methyl 2-(2-fluoro-2-phenylacetamido)benzoate



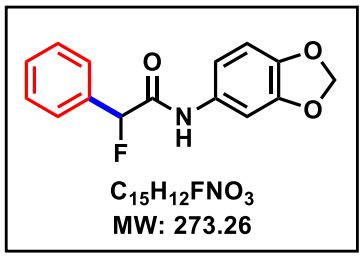
Following the general procedure, the treatment of methyl 2-(2-fluoro-3-oxobutanamido)benzoate **1n** (51 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3n** as brown solid (38 mg, 67%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.40. **Mp** 83-85 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 168.5 (C), 167.6 (d, $J_{C\text{-}F}$ = 21.3 Hz, C), 140.4 (C), 134.9 (d, $J_{C\text{-}F}$ = 19.6 Hz, C), 134.8 (CH), 131.1 (CH), 129.5 (d, $J_{C\text{-}F}$ = 2.1 Hz, CH), 128.8 (CH), 128.8 (CH), 126.6 (d, $J_{C\text{-}F}$ = 6.7 Hz,CH), 126.6 (d, $J_{C\text{-}F}$ = 6.7 Hz, CH), 123.5 (CH), 120.6 (CH), 116.0 (C), 92.0 (d, $J_{C\text{-}F}$ = 190.2 Hz, CH), 52.7 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 12.05 (s, 1H), 8.72 (dd, J = 8.4 Hz, 0.8 Hz, 1H), 8.07 (dd, J = 8.0 Hz, 1.6 Hz, 1H), 7.58-7.52 (m, 3H), 7.44-7.37 (m, 3H), 7.16-7.12 (m, 1H), 5.90 (d, J = 48.0 Hz, 1H), 3.98 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -178.1 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{16}H_{15}FNO_3$ 288.1030; found 288.1022.

Compound 3o: 2-Fluoro-*N*-(2-nitrophenyl)-2-phenylacetamide



Following the general procedure, the treatment of 2-fluoro-*N*-(2-nitrophenyl)-3-oxobutanamide **1o** (48 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3o** as white solid (40 mg, 71%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 10/90) = 0.35. **Mp** 93-95 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 167.8 (d, $J_{C\text{-}F}$ = 21.7 Hz, C), 137.0 (C), 136.1 (CH), 134.3 (d, $J_{C\text{-}F}$ = 19.7 Hz, C), 133.8 (C), 129.9 (d, $J_{C\text{-}F}$ = 2.0 Hz, CH), 129.0 (CH), 129.0 (CH), 126.5 (d, $J_{C\text{-}F}$ = 6.8 Hz, CH), 126.5 (d, $J_{C\text{-}F}$ = 6.8 Hz, CH), 126.1 (CH), 124.3 (CH), 122.3 (CH), 91.9 (d, $J_{C\text{-}F}$ = 190.4 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 11.34 (s, 1H), 8.78 (dd, J = 8.8 Hz, 1.2 Hz, 1H), 8.27 (dd, J = 8.4 Hz, 1.6Hz, 1H), 7.69-7.64 (m, 1H), 7.56-7.53 (m, 2H), 7.46-7.41 (m, 3H), 7.27-7.23 (m, 1H), 5.93 (d, J = 48.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -178.8 (s). **HRMS** (ESI) m/z: $[M-H]^-$ Calcd for $C_{14}H_{10}FN_2O_3$ 273.0681; found 273.0677.

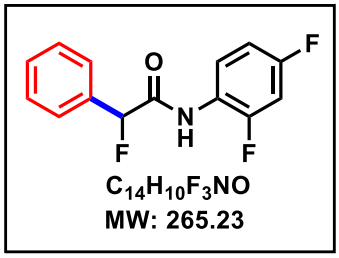
Compound 3p: *N*-(benzo[*d*][1,3]dioxol-5-yl)-2-fluoro-2-phenylacetamide



Following the general procedure, the treatment of *N*-(benzo[*d*][1,3]dioxol-5-yl)-2-fluoro-3-oxobutanamide **1p** (48 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3p** as grey solid (35 mg, 64%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 20/80) = 0.40. **Mp** 104-106 °C. **^{13}C NMR**

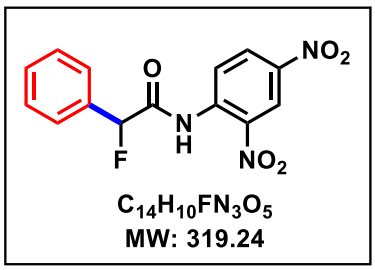
(100 MHz, δ ppm/$CDCl_3$): 166.4 (d, J_{C-F} = 20.8 Hz, C), 148.0 (C), 144.9 (C), 134.6 (d, J_{C-F} = 19.1 Hz, C), 130.9 (C), 129.7 (CH), 128.9 (CH), 128.9 (CH), 126.8 (d, J_{C-F} = 6.4 Hz, CH), 126.8 (d, J_{C-F} = 6.4 Hz, CH), 113.5 (CH), 108.3 (CH), 102.9 (CH), 101.5 (CH_2), 91.9 (d, J_{C-F} = 188.2 Hz, CH). **^{1}H NMR** (400 0MHz, δ ppm/$CDCl_3$): 8.10 (s, 1H), 7.52-7.48 (m, 2H), 7.45-7.41 (m, 3H), 7.29 (d, *J* = 2.0 Hz, 1H), 6.88 (dd, *J* = 8.4 Hz, 2.0 Hz, 1H), 6.76 (d, *J* = 8.4 Hz, 1H), 5.95 (s, 2H), 5.87 (d, *J* = 48.8 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -175.5 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{15}H_{13}FNO_3$ 274.0874; found 274.0868.

Compound 3q: *N*-(2,4-difluorophenyl)-2-fluoro-2-phenylacetamide



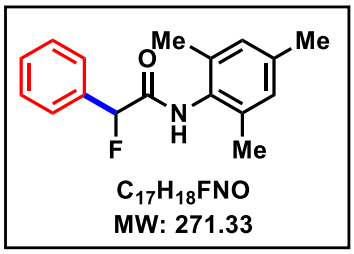
Following the general procedure, the treatment of *N*-(2,4-difluorophenyl)-2-fluoro-3-oxobutanamide **1q** (46 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3q** as yellow solid (33 mg, 63%). **R_f** (Ethyl acetate/Hexane: 15/85) = 0.50. **Mp** 77-79 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.7 (d, J_{C-F} = 17.0 Hz, C), 159.2 (dd, J_{C-F} = 196.4 Hz, 9.1 Hz, C), 153.0 (dd, J_{C-F} = 196.4 Hz, 9.4 Hz, C), 134.3 (d, J_{C-F} = 15.3 Hz, C), 129.8 (d, J_{C-F} = 1.7 Hz, CH), 129.0 (CH), 129.0 (CH), 126.7 (d, J_{C-F} = 5.3 Hz, CH), 126.7 (d, J_{C-F} = 5.3 Hz, CH), 123.1 (dd, J_{C-F} = 7.2 Hz, 1.0 Hz, CH), 121.6 (dd, J_{C-F} = 7.9 Hz, 2.9 Hz, C), 111.5 (dd, J_{C-F} = 17.4 Hz, 3.0 Hz, CH), 103.9 (dd, J_{C-F} = 21.3 Hz, 18.4 Hz, CH), 92.0 (d, J_{C-F} = 150.6 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.32 (s, 1H), 8.29-8.23 (m, 1H), 7.54-7.50 (m, 2H), 7.47-7.41 (m, 3H), 6.94-6.85 (m, 2H), 5.92 (d, *J* = 48.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -113.7 (d, J_{F-F} = 4.9 Hz), -125.6 (d, J_{F-F} = 5.3 Hz), -176.5 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{14}H_{11}F_3NO$ 266.0787; found 266.0777.

Compound 3r: *N*-(2,4-dinitrophenyl)-2-fluoro-2-phenylacetamide



Following the general procedure, the treatment of *N*-(2,4-dinitrophenyl)-2-fluoro-3-oxobutanamide **1r** (57 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3r** as yellow solid (31 mg, 49%). **R_f** (Ethyl acetate/Hexane: 15/85) = 0.47. **Mp** 111-113 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 168.3 (d, J_{C-F} = 22.1 Hz, C), 142.6 (C), 138.7 (C), 135.9 (C), 133.5 (d, J_{C-F} = 19.8 Hz, C), 130.3 (CH), 130.2 (d, J_{C-F} = 1.9 Hz, CH), 129.2 (CH), 129.2 (CH), 126.3 (d, J_{C-F} = 7.0 Hz, CH), 126.3 (d, J_{C-F} = 7.0 Hz, CH), 122.6 (CH), 122.2 (CH), 91.8 (d, J_{C-F} = 190.6 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 11.62 (s, 1H), 9.17 (d, *J* = 2.8 Hz, 1H), 9.09 (d, *J* = 9.6 Hz, 1H), 8.49 (dd, *J* = 9.6 Hz, 2.8 Hz, 1H), 7.54-7.52 (m, 2H), 7.49-7.44 (m, 3H), 5.99 (d, *J* = 48.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -179.9 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{14}H_{11}FN_3O_5$ 320.0677; found 320.0679.

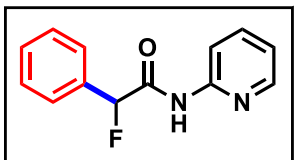
Compound 3s: 2-Fluoro-*N*-mesityl-2-phenylacetamide



$C_{17}H_{18}FNO$
MW: 271.33

Following the general procedure, the treatment of 2-fluoro-*N*-mesityl-3-oxobutanamide **1s** (47 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3s** as white solid (36 mg, 66%). **R_f** (Ethyl acetate/Hexane: 20/80) = 0.45. **Mp** 128-130 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 167.1 (d, $J_{C\text{-}F}$ = 21.4 Hz, C), 137.4 (C), 135.2 (C), 135.2 (C), 135.0 (d, $J_{C\text{-}F}$ = 19.2 Hz, C), 129.7 (C), 129.5 (d, $J_{C\text{-}F}$ = 2.2 Hz, CH), 129.1 (CH), 129.1 (CH), 128.8 (CH), 128.8 (CH), 126.5 (d, $J_{C\text{-}F}$ = 6.6 Hz, CH), 126.5 (d, $J_{C\text{-}F}$ = 6.6 Hz, CH), 93.5 (d, $J_{C\text{-}F}$ = 187.0 Hz, CH), 21.0 (CH_3), 18.3 (CH_3), 18.3 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.71 (s, 1H), 7.58-7.55 (m, 2H), 7.46-7.41 (m, 3H), 6.90 (s, 2H), 5.96 (d, J = 48.4 Hz, 1H), 2.28 (s, 3H), 2.14 (s, 6H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -176.8 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{19}FNO$ 272.1445; found: 272.1440.

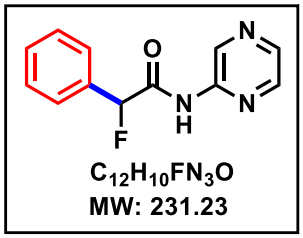
Compound 3t: 2-Fluoro-2-phenyl-*N*-(pyridin-2-yl)acetamide



$C_{13}H_{11}FN_2O$
MW: 230.24

Following the general procedure, the treatment of 2-fluoro-3-oxo-*N*-(pyridin-2-yl)butanamide **1t** (39 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3t** as brown solid (25 mg, 54%). **R_f** (Ethyl acetate/Hexane: 10/90) = 0.22. **Mp** 104-106 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 167.2 (d, $J_{C\text{-}F}$ = 21.8 Hz, C), 150.4 (C), 148.1 (CH), 138.6 (CH), 134.4 (d, $J_{C\text{-}F}$ = 19.4 Hz, C), 129.7 (d, $J_{C\text{-}F}$ = 2.2 Hz, CH), 128.9 (CH), 128.9 (CH), 126.6 (d, $J_{C\text{-}F}$ = 6.6 Hz, CH), 126.6 (d, $J_{C\text{-}F}$ = 6.6 Hz, CH), 120.7 (CH), 114.3 (CH), 91.7 (d, $J_{C\text{-}F}$ = 189.3 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.9 (s, 1H), 8.32 (s, 1H), 8.22 (d, J = 8.0 Hz, 1H), 7.73-7.68 (m, 1H), 7.53-7.50 (m, 2H), 7.40-7.39 (m, 3H), 7.10-7.06 (m, 1H), 5.90 (d, J = 48.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -177.4 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{13}H_{12}FN_2O$ 231.0928; found 231.0925.

Compound 3u: 2-Fluoro-2-phenyl-*N*-(pyrazin-2-yl)acetamide

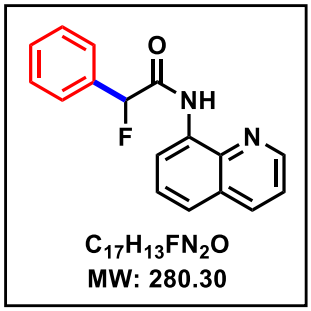


$C_{12}H_{10}FN_3O$
MW: 231.23

Following the general procedure, the treatment of 2-fluoro-3-oxo-*N*-(pyrazin-2-yl)butanamide **1u** (39 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3u** as yellow solid (21 mg, 46%). **R_f** (Ethyl acetate/Hexane: 30/70) = 0.32. **Mp** 116-118 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 167.2 (d, $J_{C\text{-}F}$ = 22.2 Hz, C), 147.2 (C), 142.4 (CH), 141.2 (CH), 137.2 (CH), 134.0 (d, $J_{C\text{-}F}$ = 19.4 Hz, C), 130.0 (d, $J_{C\text{-}F}$ = 2.1 Hz, CH), 129.0 (CH), 129.0 (CH), 126.6 (d, $J_{C\text{-}F}$ = 6.7 Hz, CH), 126.6 (d, $J_{C\text{-}F}$ = 6.7 Hz, CH), 91.7 (d, $J_{C\text{-}F}$ = 189.3 Hz,

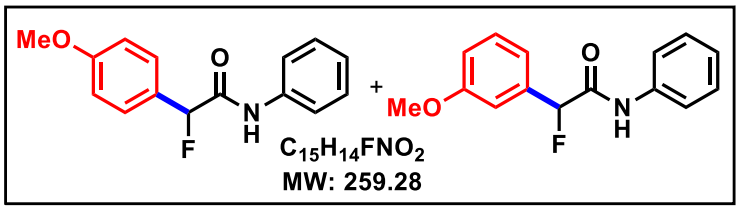
CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 9.55 (s, 1H), 8.84 (s, 1H), 8.40 (d, *J* = 2.0 Hz, 1H), 8.30 (s, 1H), 7.52-7.49 (m, 2H), 7.45-7.41 (m, 3H), 5.95 (d, *J* = 48.0 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -177.5 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{12}H_{11}FN_3O$ 232.0881; found 232.0881.

Compound 3v: 2-Fluoro-2-phenyl-*N*-(quinolin-8-yl)acetamide



Following the general procedure, the treatment of 2-fluoro-3-oxo-*N*-(quinolin-8-yl)butanamide **1v** (49 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (90 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3v** as white solid (32 mg, 58%). **R_f** (Ethyl acetate/Hexane: 10/90) = 0.35. **Mp** 91-33 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 167.0 (d, J_{C-F} = 17.0 Hz, C), 148.8 (CH), 138.9 (C), 136.4 (CH), 135.1 (d, J_{C-F} = 15.5 Hz, C), 133.6 (C), 129.6 (CH), 128.9 (CH), 128.9 (CH), 128.1 (C), 127.2 (CH), 126.8 (d, J_{C-F} = 5.1 Hz, CH), 126.8 (d, J_{C-F} = 5.1 Hz, CH), 122.6 (CH), 122.0 (CH), 117.0 (CH), 92.2 (d, J_{C-F} = 151.3 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 10.88 (s, 1H), 8.88 (dd, *J* = 4.4 Hz, 1.6 Hz, 1H), 8.80 (dd, *J* = 6.8 Hz, 2.4 Hz, 1H), 8.16 (dd, *J* = 8.0 Hz, 1.6 Hz, 1H), 7.65-7.60 (m, 2H), 7.57-7.51 (m, 2H), 7.49-7.46 (m, 1H), 7.45-7.38 (m, 3H), 6.01 (d, *J* = 48.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -176.4 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{14}FN_2O$ 281.1085; found 281.1080.

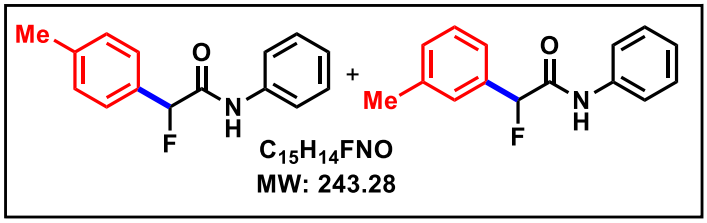
Compound 3w and 3w': 2-Fluoro-2-(4-methoxyphenyl)-*N*-phenylacetamide and 2-fluoro-2-(3-methoxyphenyl)-*N*-phenylacetamide



Following the general procedure, the treatment of 2-fluoro-3-oxo-*N*-phenylbutanamide **1a** (39 mg, 0.20 mmol) with 4-methoxy-2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2b** (98 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3w** and **3w'** as a 1:1 mixture of regioisomers as white solid (32 mg, 61%). Compound **3w**: **R_f** (Ethyl acetate/Hexane: 20/80) = 0.40. **Mp** 75-77 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.4 (d, J_{C-F} = 20.4 Hz, C), 160.0 (C), 136.7 (C), 136.0 (d, J_{C-F} = 19.2 Hz, C), 130.0 (CH), 129.3 (CH), 129.3 (CH), 125.2 (CH), 120.2 (CH), 120.2 (CH), 118.9 (d, J_{C-F} = 6.8 Hz, CH), 115.4 (d, J_{C-F} = 1.8 Hz, CH), 112.3 (d, J_{C-F} = 7.0 Hz, CH), 91.9 (d, J_{C-F} = 189.1 Hz, CH), 55.5 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.14 (s, 1H), 7.61-7.59 (m, 1H), 7.58-7.56 (m, 1H), 7.37-7.31 (m, 3H), 7.16 (t, *J* = 7.6 Hz, 1H), 7.11 (d, *J* = 7.6 Hz, 1H), 7.05 (s, 1H), 6.95-6.93 (m, 1H), 5.86 (d, *J* = 48.4 Hz, 1H), 3.82 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -176.2 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{15}H_{15}FNO_2$ 260.1081; found 260.1085. Compound **3w'**: **R_f** (Ethyl acetate/Hexane: 20/80) = 0.37. **Mp** 94-96 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.8 (d, J_{C-F} = 21.3 Hz, C), 160.8 (d, J_{C-F} = 2.6 Hz, C), 136.8 (C), 129.3 (CH), 129.3 (CH), 128.8 (d, J_{C-F} = 5.4 Hz, CH), 128.8 (d, J_{C-F} = 5.4

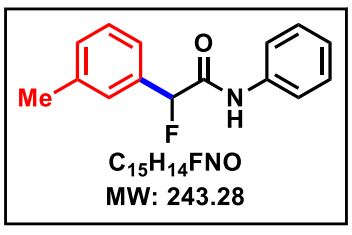
Hz, CH), 126.7 (d, J_{C-F} = 19.6 Hz, C), 125.2 (CH), 120.1 (CH), 120.1 (CH), 114.4 (CH), 114.4 (CH), 92.0 (d, J_{C-F} = 187.0 Hz, CH), 55.5 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.19 (s, 1H), 7.62-7.59 (m, 2H), 7.45-7.41 (m, 2H), 7.38-7.34 (m, 2H), 7.19-7.14 (m, 1H), 6.95-6.91 (m, 2H), 5.84 (d, *J* = 49.2 Hz, 1H), 3.82 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -169.4 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{15}H_{15}FNO_2$ 260.1081; found 260.1086.

Compound 3x and 3x': 2-Fluoro-*N*-phenyl-2-(*p*-tolyl)acetamide and 2-fluoro-*N*-phenyl-2-(*m*-tolyl)acetamide



Following the general procedure, the treatment of 2-fluoro-3-oxo-*N*-phenylbutanamide **1a** (39 mg, 0.20 mmol) with 4-methyl-2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2c** (94 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3x** and **3x'** as a 1:1 mixture of regioisomers as white solid (33 mg, 68%). Compound **3x**: **R_f** (Ethyl acetate/Hexane: 20/80) = 0.50. **Mp** 74-76 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.7 (d, J_{C-F} = 20.4 Hz, C), 139.8 (C), 136.8 (C), 134.5 (d, J_{C-F} = 19.1 Hz, C), 129.6 (CH), 129.6 (CH), 129.2 (CH), 129.2 (CH), 128.8 (CH), 128.8 (CH), 125.1 (CH), 120.1 (CH), 120.1 (CH), 92.1 (d, J_{C-F} = 188.2 Hz, CH), 21.5 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.20 (s, 1H), 7.61 (s, 1H), 7.59 (s, 1H), 7.41-7.30 (m, 5H), 7.23 (d, 6.8 Hz, 1H), 7.16 (t, *J* = 7.6 Hz, 1H), 5.86 (d, *J* = 48.8 Hz, 1H), 2.38 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -174.5 (s). Compound **3x'**: **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$,): 166.6 (d, J_{C-F} = 20.6 Hz, C), 138.7 (C), 136.8 (C), 134.5 (d, J_{C-F} = 19.1 Hz, C), 130.5 (CH), 129.2 (CH), 129.2 (CH), 127.5 (d, 6.2 Hz, CH), 127.0 (d, 6.0 Hz, CH), 125.1 (CH), 123.9 (d, 6.4 Hz, CH), 120.1 (CH), 120.1 (CH), 92.0 (d, J_{C-F} = 187.8 Hz, CH), 21.4 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.2 (s, 1H), 7.61 (s, 1H), 7.59 (s, 1H), 7.41-7.30 (m, 5H), 7.23 (d, 6.8 Hz, 1H), 7.16 (t, *J* = 7.6 Hz, 1H), 5.86 (d, *J* = 48.8 Hz, 1H), 2.38 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -172.9 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{15}H_{15}FNO$ 244.1132**;** found 244.1134

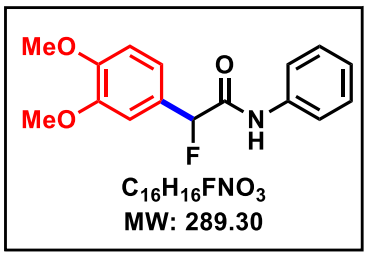
Compound 3y: 2-Fluoro-*N*-phenyl-2-(*m*-tolyl)acetamide



Following the general procedure, the treatment of 2-fluoro-3-oxo-*N*-phenylbutanamide **1a** (39 mg, 0.20 mmol) with 3-methyl-2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2d** (94 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3y** as white solid (34 mg, 70%). **R_f** (Ethyl acetate/Hexane: 20/80) = 0.50. **Mp** 102-104 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.6 (d, J_{C-F} = 20.7 Hz, C), 138.7 (C), 136.8 (C), 134.5 (d, J_{C-F} = 18.8 Hz, C), 130.5 (d, J_{C-F} = 2.4 Hz, CH), 129.4 (CH), 129.4 (CH), 128.8 (CH), 127.5 (d, J_{C-F} = 6.3 Hz, CH), 125.1 (CH), 123.9 (d, J_{C-F} = 6.5 Hz, CH), 120.1 (CH), 120.1 (CH), 92.1 (d, J_{C-F} = 188.0 Hz, CH), 21.5 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.21 (s, 1H), 7.62 (s, 1H), 7.60 (s, 1H), 7.38-7.31 (m, 5H), 7.24-7.21 (m,

1H), 7.17 (t, *J* = 7.6 Hz, 1H), 5.86 (d, *J* = 48.4 Hz, 1H), 2.38 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -174.5 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{15}H_{15}FNO$ 244.1132; found 244.1135.

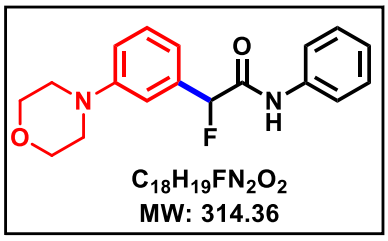
Compound 3z: 2-(3,4-Dimethoxyphenyl)-2-fluoro-*N*-phenylacetamide



$C_{16}H_{16}FNO_3$
MW: 289.30

Following the general procedure, the treatment of 2-fluoro-3-oxo-*N*-phenylbutanamide **1a** (39 mg, 0.20 mmol) with 4,5-dimethoxy-2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2e** (107 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3z** as white solid (35 mg, 61%). **R_f** (Ethyl acetate/Hexane: 20/80) = 0.22. **Mp** 115-117 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.7 (d, J_{C-F} = 21.4 Hz, C), 150.3 (d, J_{C-F} = 2.6 Hz, C), 149.3 (C), 136.8 (C), 129.2 (CH), 129.2 (CH), 127.0 (d, J_{C-F} = 19.6 Hz, C), 125.1 (CH), 120.1 (CH), 120.1 (CH), 120.0 (d, J_{C-F} = 6.8 Hz, CH), 111.3 (CH), 110.1 (d, J_{C-F} = 5.5 Hz, CH), 92.0 (d, J_{C-F} = 187.7 Hz, CH), 56.0 (CH_3), 56.0 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.20 (s, 1H), 7.61 (s, 1H), 7.59 (s, 1H), 7.35 (t, *J* = 8.0 Hz, 2H), 7.16 (t, *J* = 7.2 Hz, 1H), 7.06 (d, *J* = 8.0 Hz, 1H), 7.0 (s, 1H), 6.88 (d, *J* = 8.4 Hz, 1H), 5.83 (d, *J* = 48.4 Hz, 1H), 3.88 (s, 6H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -171.0 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{16}H_{17}FNO_3$ 290.1187; found 290.1180.

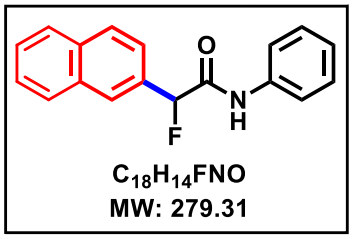
Compound 3aa: 2-fluoro-2-(3-morpholinophenyl)-N-phenylacetamide



$C_{18}H_{19}FN_2O_2$
MW: 314.36

Following the general procedure, the treatment of 2-fluoro-3-oxo-*N*-phenylbutanamide **1a** (39 mg, 0.20 mmol) with 3-morpholino-2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2f** (115 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3aa** as white solid (34 mg, 54%). **R_f** (Ethyl acetate/Hexane: 20/80) = 0.20. **Mp** 138-140 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.6 (d, J_{C-F} = 20.6 Hz, C), 151.7 (C), 136.8 (C), 135.6 (d, J_{C-F} = 19.1 Hz, C), 129.8 (CH), 129.3 (CH), 129.3 (CH), 125.2 (CH), 120.1 (CH), 120.1 (CH), 117.8 (d, J_{C-F} = 7.0 Hz, CH), 116.8 (d, J_{C-F} = 2.2 Hz, C), 113.8 (d, J_{C-F} = 6.9 Hz, CH), 92.2 (d, J_{C-F} = 188.8 Hz, CH), 67.0 (CH_2), 67.0 (CH_2), 49.2 (CH_2), 49.2 (CH_2). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.13 (s, 1H), 7.60 (d, *J* = 7.6 Hz, 2H), 7.40-7.30 (m, 3H), 7.16 (t, *J* = 7.2 Hz, 1H), 7.05-7.0 (m, 2H), 6.96-6.91 (m, 1H), 5.85 (d, *J* = 48.4 Hz, 1H), 3.85 (t, *J* = 4.4 Hz, 4H), 3.18 (t, *J* = 3.6 Hz, 4H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -176.2 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{20}FN_2O_2$ 315.1503; found 315.1501.

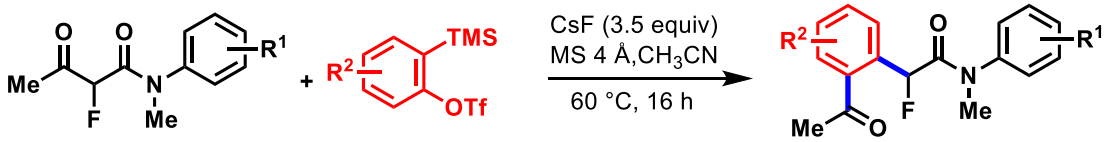
Compound 3ab: 2-fluoro-2-(naphthalen-2-yl)-*N*-phenylacetamide



$C_{18}H_{14}FNO$
MW: 279.31

Following the general procedure, the treatment of 2-fluoro-3-oxo-*N*-phenylbutanamide **1a** (39 mg, 0.20 mmol) with 1-(trimethylsilyl)-2-naphthyl trifluoromethanesulfonate **2g** (104 mg, 0.30 mmol) in the presence of TBAF (0.60 mL, 0.60 mmol) in CH_3CN (2 mL) at 25 °C for 4 h followed by column chromatography afforded the product **3ab** as white solid (37 mg, 67% yield). $\mathbf{R_f}$(Ethyl acetate/Hexane: 20/80) = 0.40. **Mp** 143-145 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 166.5 (d, $J_{C\text{-}F}$ = 20.7 Hz, C), 136.8 (C), 133.8 (d, $J_{C\text{-}F}$ = 1.8 Hz, C), 133.1 (C), 131.8 (d, $J_{C\text{-}F}$ = 18.9 Hz, C), 129.3 (CH), 129.3 (CH), 128.9 (CH), 128.5 (CH), 127.9 (CH), 127.1 (CH), 126.8 (d, $J_{C\text{-}F}$ = 8.0 Hz, CH), 126.8 (CH), 125.2 (CH), 123.6 (d, $J_{C\text{-}F}$ = 5.4 Hz, CH), 120.2 (CH), 120.2 (CH), 92.2 (d, $J_{C\text{-}F}$ = 188.5 Hz, CH). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.26 (s, 1H), 8.0 (s, 1H), 7.91-7.83 (m, 3H), 7.65 (m, 3H), 7.55-7.50 (m, 2H), 7.36 (t, *J* = 8.0 Hz, 2H), 7.17 (t, *J* = 7.6 Hz, 1H), 6.07 (d, *J* = 48.4 Hz, 1H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -174.9 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{15}FNO$ 280.1132; found 280.1142.

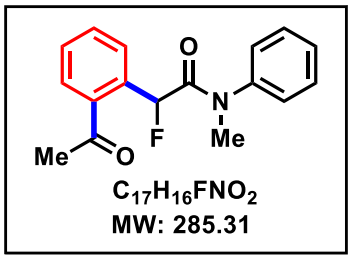
General procedure for the insertion reaction of *N*-methyl-α-fluoro-β-ketoamides 5



5 **2** **6**

An oven-dried round bottom flask charged with 2-fluoro-*N*-methyl-3-oxo-*N*-phenylbutanamide **5** (0.20 mmol) and MS 4 Å (100 mg) was sealed, evacuated, and backfilled with nitrogen. Subsequently, freshly distilled CH_3CN (2.0 mL), 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2** (0.50 mmol), and CsF (0.70 mmol) were added, and the reaction mixture was stirred at 60°C for 16 h. After the completion of the reaction, as indicated by TLC, the solvent was evaporated, and the crude reaction mixture was extracted using ethyl acetate (3 × 15 mL) and water (15 mL). The organic layer was washed with brine, dried over anhydrous 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 product **6**.

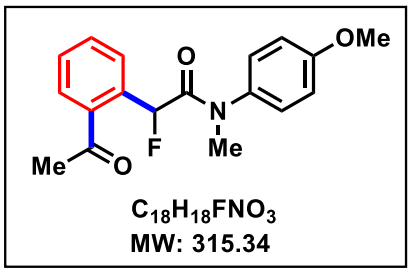
Compound 6a: 2-(2-Acetylphenyl)-2-fluoro-*N*-methyl-*N*-phenylacetamide



$C_{17}H_{16}FNO_2$
MW: 285.31

Following the general procedure, the treatment of 2-fluoro-*N*-methyl-3-oxo-*N*-phenylbutanamide **5a** (42 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (149 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) and MS 4 Å (100 mg) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6a** as white solid (41 mg, 72%). **R_f** (Ethyl acetate/Hexane: 30/70) = 0.27. **Mp** 117-119 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 200.0 (C), 167.0 (d, J_{C-F} = 21.6 Hz, C), 143.1 (C), 137.3 (d, J_{C-F} = 19.0 Hz, C), 134.5 (C), 133.0 (CH), 130.3 (CH), 129.5 (CH), 129.5 (CH), 128.3 (CH), 128.3 (CH), 128.2 (CH), 128.1 (CH), 126.8 (d, J_{C-F} = 18.1 Hz, CH), 87.5 (d, J_{C-F} = 173.1 Hz, CH), 37.8 (CH_3), 28.0 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.85 (d, J = 7.6 Hz, 1H), 7.76 (d, 7.6 Hz, 1H), 7.62-7.57 (m, 3H), 7.48-7.42 (m, 3H), 7.39-7.35 (m, 1H), 6.33 (d, J = 47.6 Hz, 1H), 3.34 (s, 3H), 2.55 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -179.9 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{17}FNO_2$ 286.1238; found 286.1239.

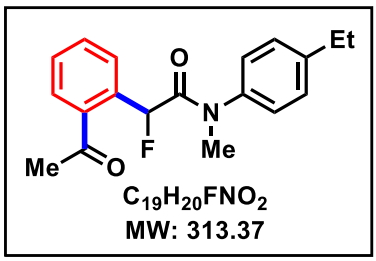
Compound 6b: 2-(2-Acetylphenyl)-2-fluoro-*N*-(4-methoxyphenyl)-*N*-methylacetamide



$C_{18}H_{18}FNO_3$
MW: 315.34

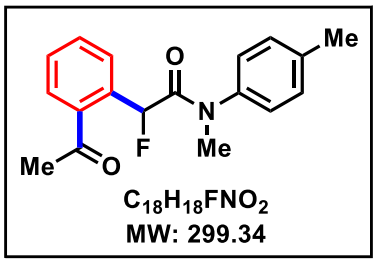
Following the general procedure, the treatment of 2-fluoro-*N*-(4-methoxyphenyl)-*N*-methyl-3-oxobutanamide **5b** (48 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (149 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) and MS 4 Å (100 mg) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6b** as white solid (38 mg, 60%). **R_f**(Ethyl acetate/Hexane: 30/70) = 0.22. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 200.0 (C), 167.3 (d, J_{C-F} = 21.4 Hz, C), 159.2 (C), 137.4 (d, J_{C-F} = 19.0 Hz, C), 135.8 (C), 134.6 (d, J_{C-F} = 2.9 Hz, C), 132.9 (d, J_{C-F} = 2.1 Hz, CH), 130.2 (CH), 129.4 (CH), 129.4 (CH), 128.0 (CH), 126.8 (d, J_{C-F} = 18.0 Hz, CH), 114.6 (CH), 114.6 (CH), 87.6 (d, J_{C-F} = 172.9 Hz, CH), 55.5 (CH_3), 38.0 (CH_3), 28.1 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.83 (d, J = 7.6 Hz, 1H), 7.75 (d, J = 8.0 Hz, 1H), 7.60 (t, J = 7.6 Hz, 1H), 7.50 (s, 1H), 7.47 (s, 1H), 7.42 (t, J = 7.6 Hz, 1H), 6.96 (s, 1H), 6.94 (s, 1H), 6.32 (d, J = 47.6 Hz, 1H), 3.82 (s, 3H), 3.29 (d, J = 2.0 Hz, 3H), 2.53 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -180.0 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{19}FNO_3$ 316.1343; found 316.1346.

Compound 6c: 2-(2-Acetylphenyl)-*N*-(4-ethylphenyl)-2-fluoro-*N*-methylacetamide



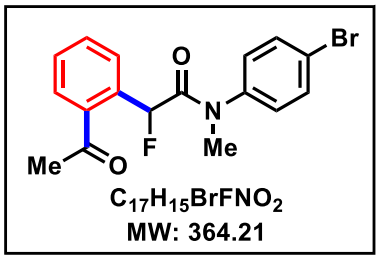
Following the general procedure, the treatment of *N*-(4-ethylphenyl)-2-fluoro-*N*-methyl-3-oxobutanamide **5c** (47 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (149 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) and MS 4 Å (100 mg) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6c** as yellow liquid (40 mg, 63%). **R_f** (Ethyl acetate/Hexane: 30/70) = 0.27. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 200.0 (C), 167.1 (d, J_{C-F} = 21.5 Hz, C), 144.2 (C), 140.6 (C), 137.4 (d, J_{C-F} = 18.9 Hz, C), 134.6 (d, J_{C-F} = 2.9 Hz, C), 132.9 (d, J_{C-F} = 2.1 Hz, CH), 130.2 (CH), 128.9 (CH), 128.9 (CH), 128.1 (CH), 128.0 (CH), 128.0 (CH), 126.8 (d, J_{C-F} = 18.2 Hz, CH), 87.5 (d, J_{C-F} = 173.0 Hz, CH), 37.8 (CH_3), 28.5 (CH_3), 28.1 (CH_2), 15.4 (CH_3),. **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.84 (d, *J* = 8.0 Hz, 1H), 7.76 (d, *J* = 7.6 Hz, 1H), 7.60 (t, *J* = 8.0 Hz, 1H), 7.48 (d, *J* = 8.0 Hz, 2H), 7.43 (t, *J* = 7.2 Hz, 1H), 7.28 (d, *J* = 8.0 Hz, 2H), 6.34 (d, *J* = 47.6 Hz, 1H), 3.32 (d, *J* = 1.6 Hz, 3H), 2.7 (q, *J* = 7.6 Hz, 2H), 2.54 (s, 3H), 1.27 (t, *J* = 7.6 Hz, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -179.8 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{19}H_{21}FNO_2$ 314.1551; found 314.1551.

Compound 6d: 2-(2-Acetylphenyl)-2-fluoro-*N*-methyl-*N*-(*p*-tolyl)acetamide



Following the general procedure, the treatment of 2-fluoro-*N*-methyl-3-oxo-*N*-(*p*-tolyl)butanamide **5d** (45 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (149 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) and MS 4 Å (100 mg) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6d** as white solid (41 mg, 69%). **R_f** (Ethyl acetate/Hexane: 30/70) = 0.27. **Mp** 111-113 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 200.0 (C), 167.1 (d, J_{C-F} = 21.5 Hz, C), 140.5 (C), 138.0 (C), 137.4 (d, J_{C-F} = 19.1 Hz, C), 134.6 (d, J_{C-F} = 2.9 Hz, C), 133.0 (d, J_{C-F} = 2.1 Hz, CH), 130.2 (CH), 130.1 (CH), 130.1 (CH), 128.1 (CH), 128.0 (CH), 128.0 (CH), 126.8 (d, J_{C-F} = 18.1 Hz, CH), 87.8 (d, J_{C-F} = 173.0 Hz, CH), 38.0 (CH_3), 28.1 (CH_3), 21.2 (CH_3),. **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.84 (d, *J* = 7.6 Hz, 1H), 7.76 (d, *J* = 7.6 Hz, 1H), 7.60 (t, *J* = 7.6 Hz, 1H), 7.47-7.41 (m, 3H), 7.25 (d, *J* = 7.6 Hz, 2H), 6.34 (d, *J* = 47.2 Hz, 1H), 3.31 (s, 3H), 2.53 (s, 3H), 2.39 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -180.0 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{19}FNO_2$ 300.1394; found 300.1395.

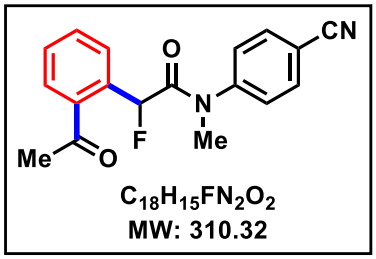
Compound 6e: 2-(2-Acetylphenyl)-*N*-(4-bromophenyl)-2-fluoro-*N*-methylacetamide



$C_{17}H_{15}BrFNO_2$
MW: 364.21

Following the general procedure, the treatment of *N*-(4-bromophenyl)-2-fluoro-*N*-methyl-3-oxobutanamide **5e** (58 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (149 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) and MS 4 Å (100 mg) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6e** as white solid (44 mg, 61%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 30/70) = 0.27. **Mp** 120-122 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 200.1 (C), 166.9 (d, $J_{C\text{-}F}$ = 21.1 Hz, C), 142.2 (C), 137.3 (d, $J_{C\text{-}F}$ = 18.7 Hz, C), 134.3 (d, $J_{C\text{-}F}$ = 2.9 Hz, C), 133.1 (d, $J_{C\text{-}F}$ = 2.2 Hz, CH), 132.8 (CH), 132.8 (CH), 130.5 (CH), 130.1 (CH), 130.1 (CH), 128.3 (CH), 126.7 (d, $J_{C\text{-}F}$ = 18.8 Hz, CH), 122.1 (C), 88.7 (d, $J_{C\text{-}F}$ = 172.9 Hz, CH), 37.8 (CH_3), 28.0 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.88 (d, *J* = 7.6 Hz, 1H), 7.75 (d, *J* = 7.6 Hz, 1H), 7.64-7.58 (m, 3H), 7.50-7.43 (m, 3H), 6.28 (d, *J* = 47.2 Hz, 1H), 3.30 (s, 3H), 2.58 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -180.3 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{16}BrFNO_2$ 364.0343; found 364.0347.

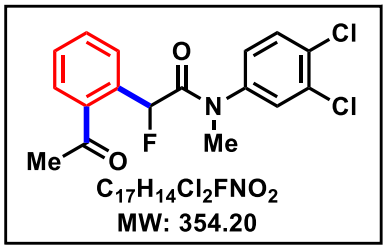
Compound 6f: 2-(2-Acetylphenyl)-*N*-(4-cyanophenyl)-2-fluoro-*N*-methylacetamide



$C_{18}H_{15}FN_2O_2$
MW: 310.32

Following the general procedure, the treatment of *N*-(4-cyanophenyl)-2-fluoro-*N*-methyl-3-oxobutanamide **5f** (47 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (149 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) and MS 4 Å (100 mg) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6f** as white solid (37 mg, 59%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 30/70) = 0.20. **Mp** 145-147 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 200.3 (C), 166.6 (d, $J_{C\text{-}F}$ = 23.1 Hz, C), 147.4 (C), 137.1 (d, $J_{C\text{-}F}$ = 18.8 Hz, C), 134.0 (d, $J_{C\text{-}F}$ = 2.7 Hz, C), 133.5 (CH), 133.5 (CH), 133.3 (d, $J_{C\text{-}F}$ = 2.4 Hz, CH), 130.7 (CH), 129.1 (CH), 128.7 (CH), 128.4 (CH), 126.5 (d, $J_{C\text{-}F}$ = 19.1 Hz, CH), 118.3 (C), 111.8 (C), 87.8 (d, $J_{C\text{-}F}$ = 174.4 Hz, CH), 38.7 (CH_3), 28.0 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.91 (d, *J* = 7.6 Hz, 1H), 7.80-7.72 (m, 5H), 7.65 (t, *J* = 7.6 Hz, 1H), 7.48 (t, *J* = 7.6 Hz, 1H), 6.28 (d, *J* = 41.6 Hz, 1H), 3.39 (s, 3H), 2.57 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -180.3 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{16}FN_2O_2$ 311.1190; found 311.1193.

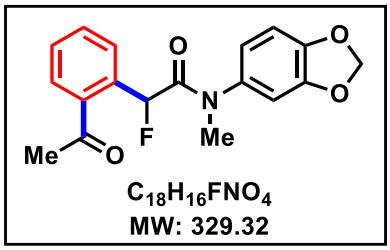
Compound 6g: 2-(2-Acetylphenyl)-*N*-(3,4-dichlorophenyl)-2-fluoro-*N*-methylacetamide



$C_{17}H_{14}Cl_2FNO_2$
MW: 354.20

Following the general procedure, the treatment of *N*-(3,4-dichlorophenyl)-2-fluoro-*N*-methyl-3-oxobutanamide **5g** (56 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (149 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) and MS 4 Å (100 mg) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6g** as white solid (45 mg, 64%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 30/70) = 0.32. **Mp** 126-128 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 200.0 (C), 166.7 (d, $J_{C\text{-}F}$ = 20.3 Hz, C), 142.6 (C), 137.0 (d, $J_{C\text{-}F}$ = 19.0 Hz, C), 134.2 (d, $J_{C\text{-}F}$ = 2.6 Hz, C), 133.3 (C), 133.2 (d, $J_{C\text{-}F}$ = 2.2 Hz, CH), 132.5 (C), 131.2 (CH), 130.5 (CH), 130.5 (CH), 128.4 (CH), 127.9 (CH), 126.6 (d, $J_{C\text{-}F}$ = 18.8 Hz, CH), 87.7 (d, $J_{C\text{-}F}$ = 173.0 Hz, CH), 37.8 (CH_3), 27.9 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.90 (d, *J* = 7.2 Hz, 1H), 7.77-7.71 (m, 2H), 7.63 (t, *J* = 7.6 Hz, 1H), 7.55-7.44 (m, 3H), 6.29 (d, *J* = 47.6 Hz, 1H), 3.30 (s, 3H), 2.56 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -180.6 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{17}H_{15}Cl_2FNO_2$ 354.0458; found 354.0461.

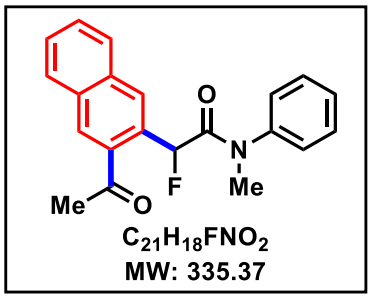
Compound 6h: 2-(2-Acetylphenyl)-*N*-(benzo[*d*][1,3]dioxol-5-yl)-2-fluoro-*N*-methylacetamide



$C_{18}H_{16}FNO_4$
MW: 329.32

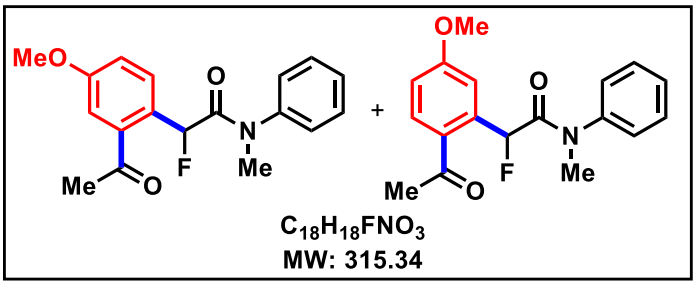
Following the general procedure, the treatment of *N*(benzo[*d*][1,3]dioxol-5-yl)-2-fluoro-*N*-methyl-3-oxobutanamide **5h** (51 mg, 0.20 mmol) with 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (149 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) and MS 4 Å (100 mg) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6h** as white solid (43 mg, 65%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 30/70) = 0.22. **Mp** 110-112 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 201.0 (C), 168.3 (d, $J_{C\text{-}F}$ = 21.3 Hz, C), 149.1 (C), 148.4 (C), 138.4 (d, $J_{C\text{-}F}$ = 19.0 Hz, C), 137.9 (C), 135.5 (d, $J_{C\text{-}F}$ = 2.8 Hz, C), 134.0 (CH), 131.3 (CH), 129.1 (CH), 127.8 (d, $J_{C\text{-}F}$ = 16.5 Hz, CH), 123.0 (CH), 110.3 (CH), 109.4 (CH), 102.8 (CH_2), 88.6 (d, $J_{C\text{-}F}$ = 173.0 Hz, CH), 39.0 (CH_3), 29.0 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.86 (d, *J* = 7.6 Hz, 1H), 7.76 (d, *J* = 7.6 Hz, 1H), 7.61 (t, *J* = 7.6 Hz, 1H), 7.44 (t, *J* = 7.6 Hz, 1H), 7.07 (m, 2H), 6.84 (d, *J* = 8.4 Hz, 1H), 6.38 (d, *J* = 47.2 Hz, 1H), 6.01 (s, 2H), 3.28 (s, 3H), 2.55 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -180.2 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{17}FNO_4$ 330.1136; found 330.1139.

Compound 6i: 2-(3-Acetylnaphthalen-2-yl)-2-fluoro-*N*-methyl-*N*-phenylacetamide



Following the general procedure, the treatment of 2-fluoro-*N*-methyl-3-oxo-*N*-phenylbutanamide **5a** (42 mg, 0.20 mmol) with 3-(trimethylsilyl)naphthalen-2-yl trifluoromethanesulfonate **2h** (174 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) and MS 4 Å (100 mg) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6i** as brown solid (39 mg, 58%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 30/70) = 0.32. **Mp** 149-152 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 199.9 (C), 167.4 (d, $J_{C\text{-}F}$ = 21.4 Hz, C), 143.2 (C), 134.9 (d, $J_{C\text{-}F}$ = 2.1 Hz, C), 132.9 (d, $J_{C\text{-}F}$ = 18.3 Hz, C), 132.7 (d, $J_{C\text{-}F}$ = 2.7 Hz, C), 132.5 (CH), 131.9 (C), 129.5 (CH), 129.5 (CH), 129.0 (CH), 128.9 (CH), 128.4 (CH), 128.3 (CH), 128.3 (CH), 128.1 (CH), 127.3 (CH), 126.4 (d, $J_{C\text{-}F}$ = 18.5 Hz, CH), 87.7 (d, $J_{C\text{-}F}$ = 173.7 Hz, CH), 37.9 (CH_3), 27.9 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.38 (s, 1H), 8.16 (s, 1H), 7.91 (d, *J* = 8.4 Hz, 1H), 7.88 (d, *J* = 8.0 Hz, 1H), 7.64-7.58 (m, 3H), 7.55 (t, *J* = 8.4 Hz, 1H), 7.48 (t, *J* = 7.2 Hz, 2H), 7.39 (t, *J* = 7.1 Hz, 1H), 6.49 (d, *J* = 47.2 Hz, 1H), 3.36 (s, 3H), 2.67 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -179.3 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{21}H_{19}FNO_2$ 336.1394; found 336.1389.

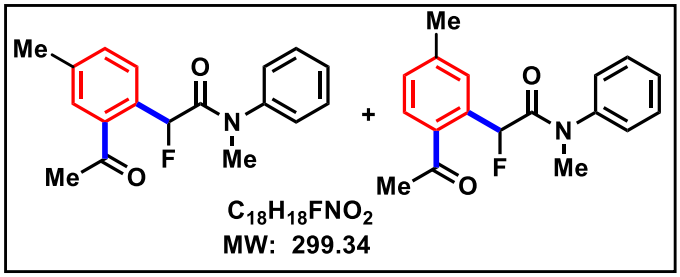
Compound 6j and 6j': 2-(2-Acetyl-4-methoxyphenyl)-2-fluoro-*N*-methyl-*N*-phenylacetamide and 2-(2-acetyl-5-methoxyphenyl)-2-fluoro-*N*-methyl-*N*-phenylacetamide



Following the general procedure, the treatment of 2-fluoro-*N*-methyl-3-oxo-*N*-phenylbutanamide **5a** (42 mg, 0.20 mmol) with 4-methoxy-2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2b** (164 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) and MS 4 Å (100 mg) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6j** and **6j'** as a separable 1:1 mixture of regioisomers as white solid (39 mg, 61%). $\mathbf{R_f}$ (Ethyl acetate/Hexane: 30/70) = 0.25. Compound **6j**: **Mp** 102-104 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 199.8 (C), 167.4 (d, $J_{C\text{-}F}$ = 17.4 Hz, C), 159.3 (C), 143.0 (C), 136.2 (C), 129.5 (CH), 129.5 (CH), 128.7 (CH), 128.6 (C), 128.2 (CH), 128.2 (CH), 128.1 (CH), 117.0 (CH), 116.8 (CH), 87.0 (d, $J_{C\text{-}F}$ = 137.8 Hz, CH), 55.7 (CH_3), 37.9 (CH_3), 28.2 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.67 (d, 8.8 Hz, 1H), 7.49-7.47 (m, 2H), 7.43 (t, 7.6 Hz, 2H), 7.37-7.33 (m, 1H), 7.30 (s, 1H), 7.12-7.10 (m, 1H), 6.26 (d, *J* = 48.4 Hz, 1H), 3.85 (s, 3H), 3.32 (s, 3H), 2.48 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -177.7 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{19}FNO_3$ 316.1343**;** found 316.1338**.** Compound **6j'**: $\mathbf{R_f}$ (Ethyl acetate/Hexane: 30/70) = 0.22. **Mp** 110-112 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$,): 198.2 (C), 166.8 (d, $J_{C\text{-}F}$ = 21.3 Hz, C), 163.3 (d, $J_{C\text{-}F}$ = 2.6 Hz, C), 143.3 (C), 140.6 (d, $J_{C\text{-}F}$ = 18.1 Hz, C), 133.1 (CH), 129.5 (CH), 129.5 (CH), 128.3 (CH), 128.3 (CH), 128.1 (CH), 127.3 (d, $J_{C\text{-}F}$ = 2.3 Hz, C), 113.1 (CH), 112.1 (d, $J_{C\text{-}F}$ = 20.8 Hz, CH),

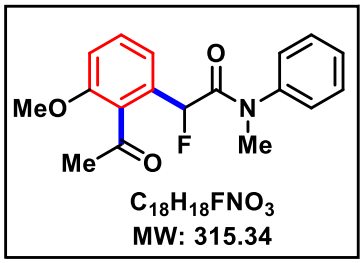
87.9 (d, J_{C-F} = 174.0 Hz, CH), 55.6 (CH_3), 37.8 (CH_3), 27.7 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.83 (d, 8.8 Hz, 1H), 7.64-7.62 (m, 2H), 7.48-7.44 (m, 2H), 7.39-7.35 (m, 1H), 7.27 (s, 1H), 6.90-6.86 (m, 1H), 6.33 (d, J = 47.6 Hz, 1H), 3.90 (s, 3H), 3.33 (s, 3H), 2.50 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -179.7 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{19}FNO_3$ 316.1343**;** found 316.1338.

Compound 6k and 6k': 2-(2-acetyl-4-methylphenyl)-2-fluoro-N-methyl-N-phenylacetamide and 2-(2-acetyl-5-methylphenyl)-2-fluoro-N-methyl-N-phenylacetamide



Following the general procedure, the treatment of 2-fluoro-*N*-methyl-3-oxo-*N*-phenylbutanamide **5a** (42 mg, 0.20 mmol) with 4-methyl-2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2c** (156 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6k** and **6k'** as an inseparable mixture of regioisomers in 1:1 ratio as white solid (39 mg, 65%). **R_f** (Ethyl acetate/Hexane: 30/70) = 0.34. **Mp** 117-119 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$, representative peaks of **6k**): 200.1 (C), 167.2 (d, J_{C-F} = 21.8 Hz, C), 143.9 (C), 143.1 (C), 137.4 (d, J_{C-F} = 18.5 Hz, C), 134.6 (d, J_{C-F} = 2.9 Hz, C), 133.6 (CH), 130.7 (CH), 129.5 (CH), 129.5 (CH), 128.3 (CH), 128.3 (CH), 128.1 (CH), 127.5 (d, J_{C-F} = 18.0 Hz, CH), 87.7 (d, J_{C-F} = 172.8 Hz, CH), 37.8 (CH_3), 28.1 (CH_3), 21.9 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.75 (d, J = 8.0 Hz, 1H), 7.65-7.60 (m, 3H), 7.59-7.53 (m, 4H), 6.32 (d, 47.6 Hz, 1H), 3.33 (s, 3H), 2.52 (s, 3H), 2.42 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -179.6 (s). **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$, representative peaks of **6k'**): 199.5 (C), 167.1 (d, J_{C-F} = 21.5 Hz, C), 143.2 (C), 138.0 (C), 134.7 (d, J_{C-F} = 19.4 Hz, C), 131.9 (d, J_{C-F} = 2.5 Hz, C), 131.0 (CH), 128.7 (CH), 129.4 (CH), 129.4 (CH), 128.3 (CH), 128.3 (CH), 128.1 (CH), 126.9 (d, J_{C-F} = 17.2 Hz, CH), 87.5 (d, J_{C-F} = 172.4 Hz, CH), 37.8 (CH_3), 27.9 (CH_3), 21.2 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.48-7.42 (m, 4H), 7.41-7.34 (m, 3H), 7.22 (d, J = 8.0 Hz, 1H), 6.29 (d, 47.2 Hz, 1H), 3.33 (s, 3H), 2.51 (s, 3H), 2.41 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -179.9 (s).**HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{19}FNO_2$ 300.1394; found 300.1399.

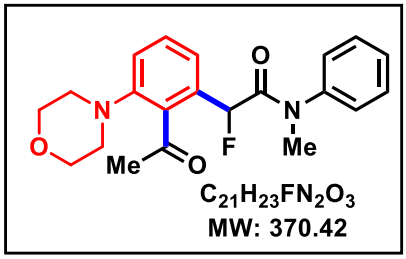
Compound 6l: 2-(2-acetyl-3-methoxyphenyl)-2-fluoro-*N*-methyl-N-phenylacetamide



Following the general procedure, the treatment of 2-fluoro-*N*-methyl-3-oxo-*N*-phenylbutanamide **5a** (42 mg, 0.20 mmol) with 3-methoxy-2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2i** (164 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6l** as colourless liquid (35 mg, 56%). **R_f** (Ethyl acetate/Hexane: 40/60) = 0.37. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 203.6 (C), 167.1 (d, J_{C-F} = 22.3 Hz, C), 157.3 (C), 142.5 (C), 134.9 (d, J_{C-F} = 20.0 Hz, C), 131.4 (CH), 129.8

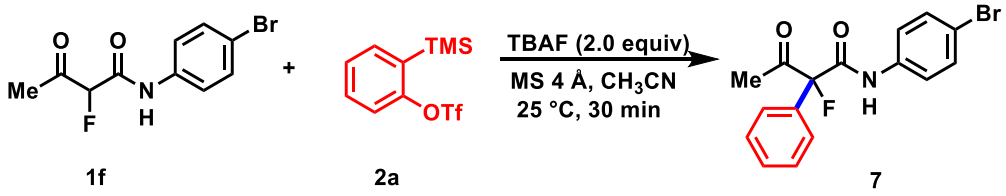
(CH), 129.8 (CH), 129.0 (C), 128.4 (CH), 128.0 (CH), 128.0 (CH), 119.5 (d, $J_{C\text{-}F}$ = 11.9 Hz, CH), 111.9 (CH), 86.2 (d, $J_{C\text{-}F}$ = 174.7 Hz, CH), 55.9 (CH_3), 38.1 (CH_3), 32.3 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.42-7.33 (m, 4H), 7.29-7.27 (m, 2H), 7.18 (d, *J* = 8.0 Hz, 1H), 6.95 (d, *J* = 8.0 Hz, 1H), 5.91 (d, *J* = 47.2 Hz, 1H), 3.80 (s, 3H), 3.32 (s, 3H), 2.38 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -175.2 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{18}H_{19}FNO_3$ 316.1343; found 316.1346.

Compound 6m: 2-(2-acetyl-3-morpholinophenyl)-2-fluoro-*N*-methyl-*N*-phenylacetamide



Following the general procedure, the treatment of 2-fluoro-*N*-methyl-3-oxo-*N*-phenylbutanamide **5a** (42 mg, 0.20 mmol) with 3-morpholino-2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2f** (192 mg, 0.50 mmol) in the presence of CsF (106 mg, 0.70 mmol) in CH_3CN (2 mL) at 60 °C for 16 h followed by column chromatography afforded the product **6m** as as white solid (39 mg, 52%). **R_f** (Ethyl acetate/Hexane: 30/70) = 0.20. **Mp** 178-180 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 206.3 (C), 167.1 (d, $J_{C\text{-}F}$ = 22.8 Hz, C), 150.1 (C), 142.1 (C), 137.0 (C), 132.8 (d, $J_{C\text{-}F}$ = 21.2 Hz, C), 130.5 (CH), 129.8 (CH), 129.8 (CH), 128.5 (CH), 127.8 (CH), 123.1 (d, $J_{C\text{-}F}$ = 9.0 Hz, CH), 123.1 (d, $J_{C\text{-}F}$ = 9.0 Hz, CH), 120.7 (CH), 85.6 (d, $J_{C\text{-}F}$ = 175.4 Hz, CH), 67.2 (CH_2), 67.2 (CH_2), 55.5 (CH_2), 55.5 (CH_2), 38.1 (CH_3), 31.7 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 7.42-7.29 (m, 5H), 7.17-7.10 (m, 3H), 5.82 (d, *J* = 47.6 Hz, 1H), 3.74 (t, *J* = 4.0 Hz, 4H), 3.31 (s, 3H), 2.87 (t, *J* = 4.0 Hz, 4H), 2.40 (s, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -173.8 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{21}H_{24}FN_2O_3$ 371.1765; found 371.1783.

Procedure for the synthesis of 2-fluoro-3-oxo-*N*,2-diphenylbutanamide 7



An oven-dried round bottom flask charged with *N*-(4-bromophenyl)-2-fluoro-3-oxobutanamide **1f** (0.20 mmol) and MS 4 Å (100 mg) was sealed, evacuated, and backfilled with nitrogen. Subsequently, Freshly distilled CH_3CN (2.0 mL), 2-(trimethylsilyl)phenyl trifluoromethanesulfonate **2a** (0.30 mmol), and TBAF (0.40 mmol) were added, and the reaction mixture was stirred at 25 °C for 30 min. After the completion of the reaction, as indicated by TLC, the solvent was evaporated off, and the crude reaction mixture was purified using flash column chromatography (100-200 mesh silica gel) using ethyl acetate/hexane as the eluent to afford the product **7** as white solid. **R_f** (Ethyl acetate/Hexane: 20/80) = 0.37. **Mp** 126-128 °C. **^{13}C NMR** (100 MHz, δ ppm/$CDCl_3$): 200.4 (d, $J_{C\text{-}F}$ = 21.4 Hz, C), 163.0 (d, $J_{C\text{-}F}$ = 17.4 Hz, C), 135.7 (C), 133.2 (d, $J_{C\text{-}F}$ = 17.2 Hz, C), 132.3 (CH), 132.3 (CH), 130.0 (d, $J_{C\text{-}F}$ = 1.4 Hz, CH), 129.1 (CH), 129.1 (CH), 125.5 (d, $J_{C\text{-}F}$ = 6.5 Hz, CH), 125.5 (d, $J_{C\text{-}F}$ = 6.5 Hz, CH), 121.8 (CH), 121.8 (CH), 118.2

(C), 99.8 (d, J_{C-F} = 158.8 Hz, C), 26.4 (CH_3). **^{1}H NMR** (400 MHz, δ ppm/$CDCl_3$): 8.14 (s, 1H), 7.65-7.61 (m, 2H), 7.50-7.45 (m, 4H), 7.45-7.39 (m, 3H), 2.39 (d, J = 3.6 Hz, 3H). **^{19}F NMR** (376 MHz, δ ppm/$CDCl_3$): -115.9 (s). **HRMS** (ESI) m/z: $[M+H]^+$ Calcd for $C_{16}H_{14}BrFNO_2$ 350.0186; found 350.0188.

X-Ray Data Collection and Structure Refinement Details for compound 6f:

A good quality single crystal of size 0.26 x 0.17 x 0.11 mm, was selected under a polarizing microscope and was mounted on a glass fiber for data collection. Single crystal X-ray data for compound **6f** were collected on the Bruker APEX-II CCD area-detector at 272(2) K. Data collection was performed using ω-scans of at 272(2) K by Bruker APEX2. Cell determination, and data reduction was performed using the Bruker SAINT software. Structure solution and refinement were performed by using SHELX-97. 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.

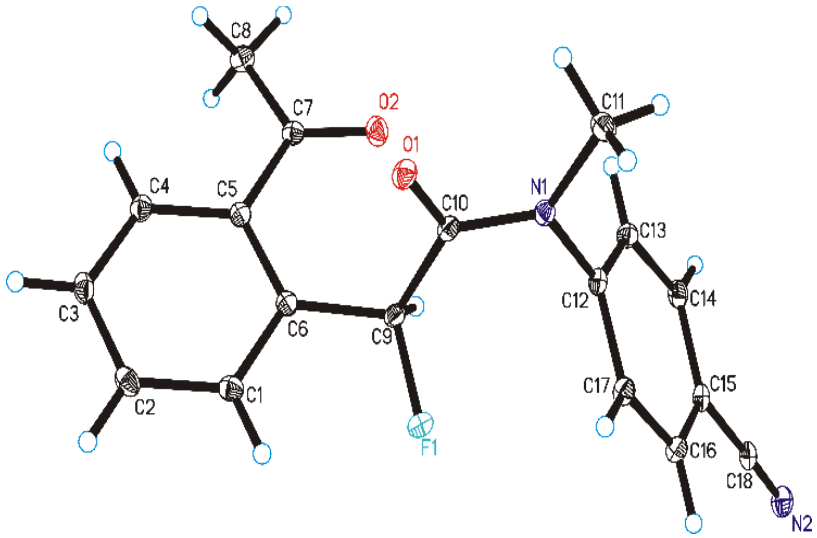
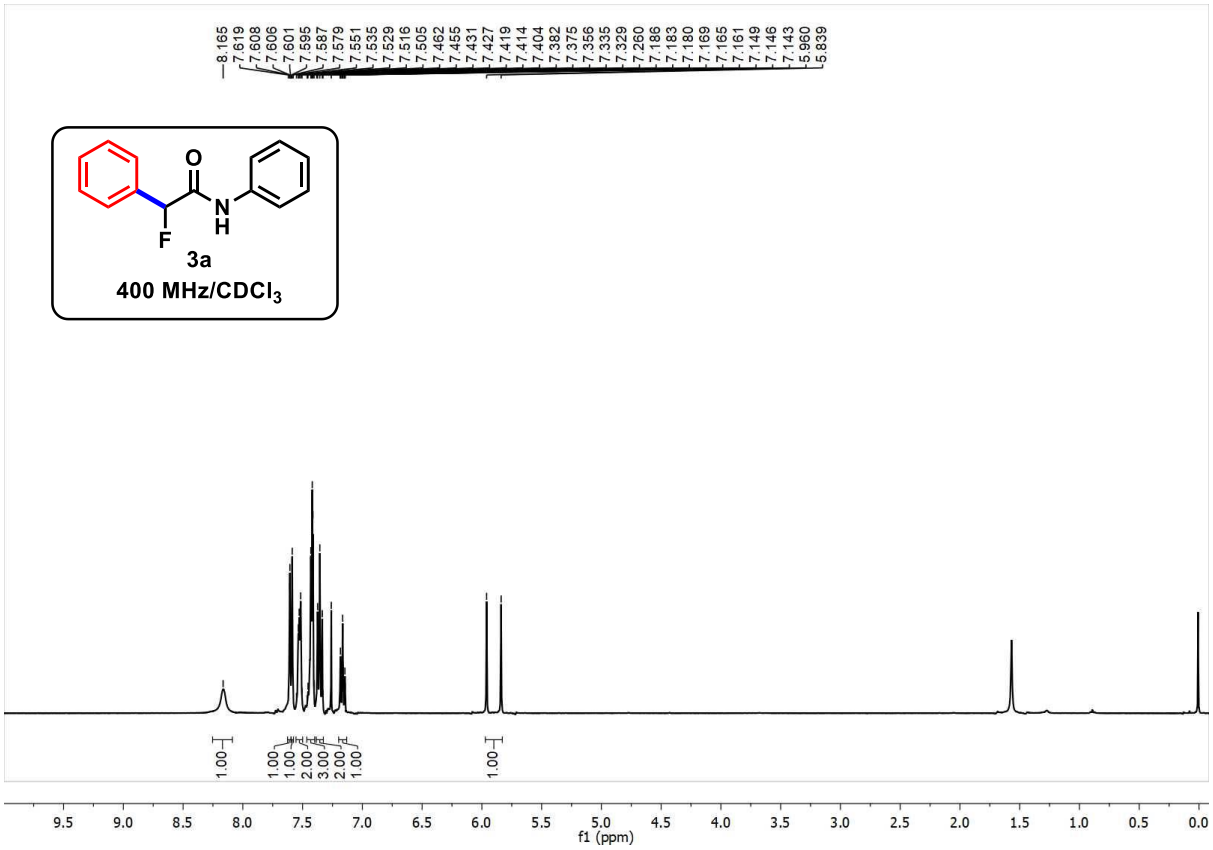


Figure 1 ORTEP diagram drawn with 30% ellipsoid probability for non-H atoms of the crystal structure of compound **6f** determined at 273K.

Crystallization: The compound **6f** (5mg) was dissolved in a 1 mL mixture of *n*-hexane/DCM (1:1) and placed in a cabinet to evaporate slowly. After two days, **6f** was obtained as white crystals.

Table 1 Crystal data and structure refinement details for **6f**.

Compound	**6f**
Empirical formula	$C_{18}\ H_{15}\ F\ N_2\ O_2$
Formula weight	310.32
Crystal System	Monoclinic
Space group	$P\ 2_1/c$
a (Å)	7.912(2)
b (Å)	13.614(3)
c (Å)	14.075(4)
α (°)	90.00
β (°)	101.443(8)
γ (°)	90.00
V (Å^3)	1485.9(7)
Z	4
D_c (g/cm^3)	1.387
F_{000}	648
μ (mm^{-1})	0.100
θ_{max} (°)	28.32
Total reflections	22134
Unique reflections	3677
Reflections [$I > 2\sigma(I)$]	3093
Parameters	210
R_{int}	0.0504
Goodness-of-fit	1.059
R [$F^2 > 2\sigma(F^2)$]	0.0441
wR (F^2, all data)	0.1033
CCDC No.	2024815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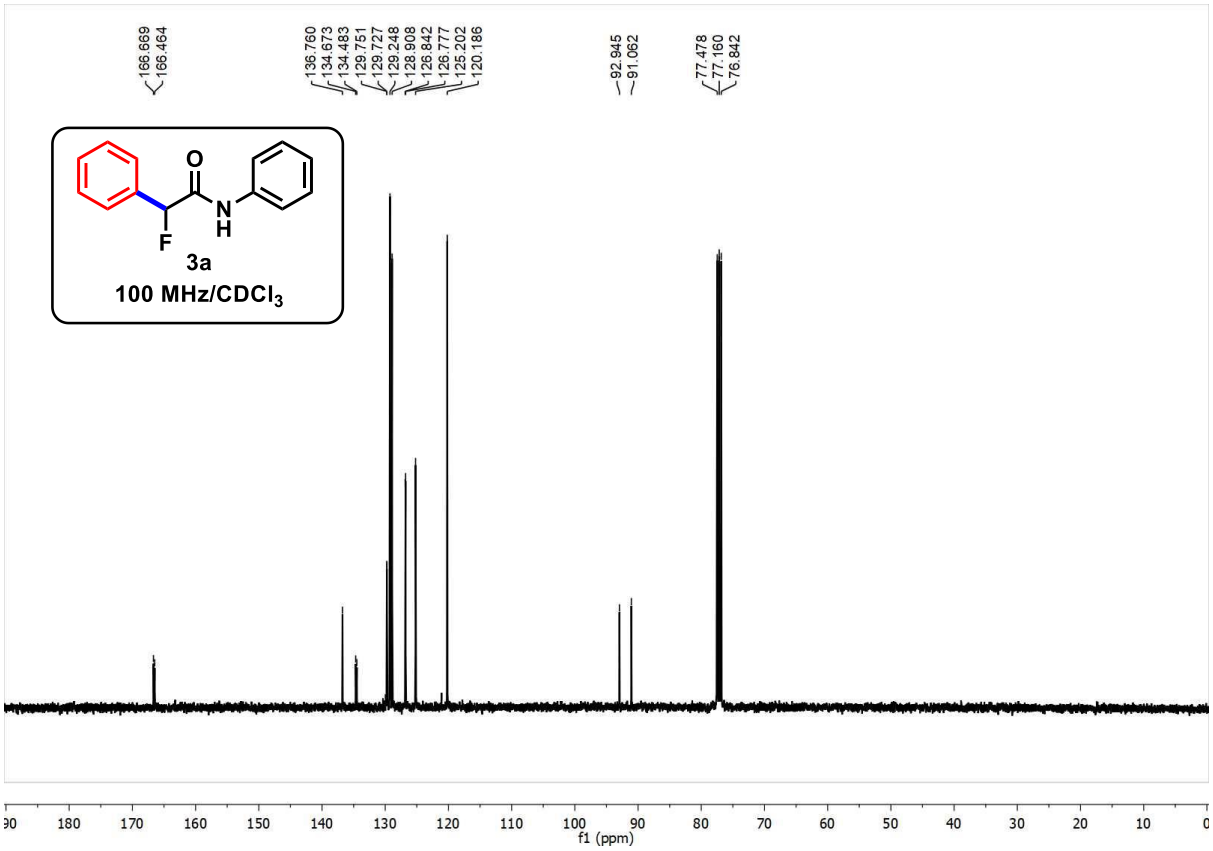
7.462
7.455
7.431
7.427
7.419
7.414
7.404
7.382
7.375
7.356
7.335
7.329
7.260
7.186
7.183
7.180
7.169
7.165
7.161
7.149
7.146
7.143
5.960
5.839
O
N
H
F
3a
400 MHz/CDCl3
1.00
1.00
1.00
2.00
3.00
2.00
1.00
1.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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92.945
91.062
77.478
77.160
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N
H
F
3a
100 MHz/CDCl3
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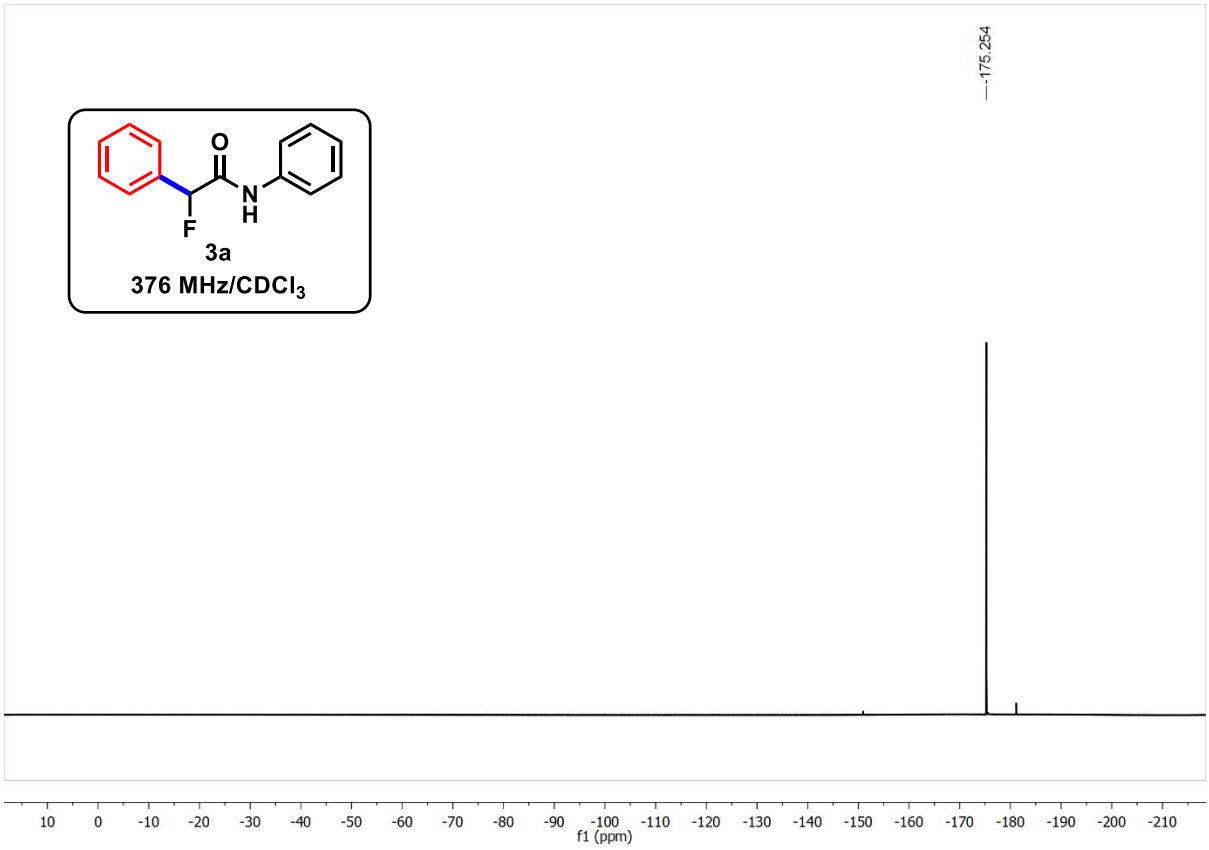
f1 (ppm)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376 MHz/CDCl3
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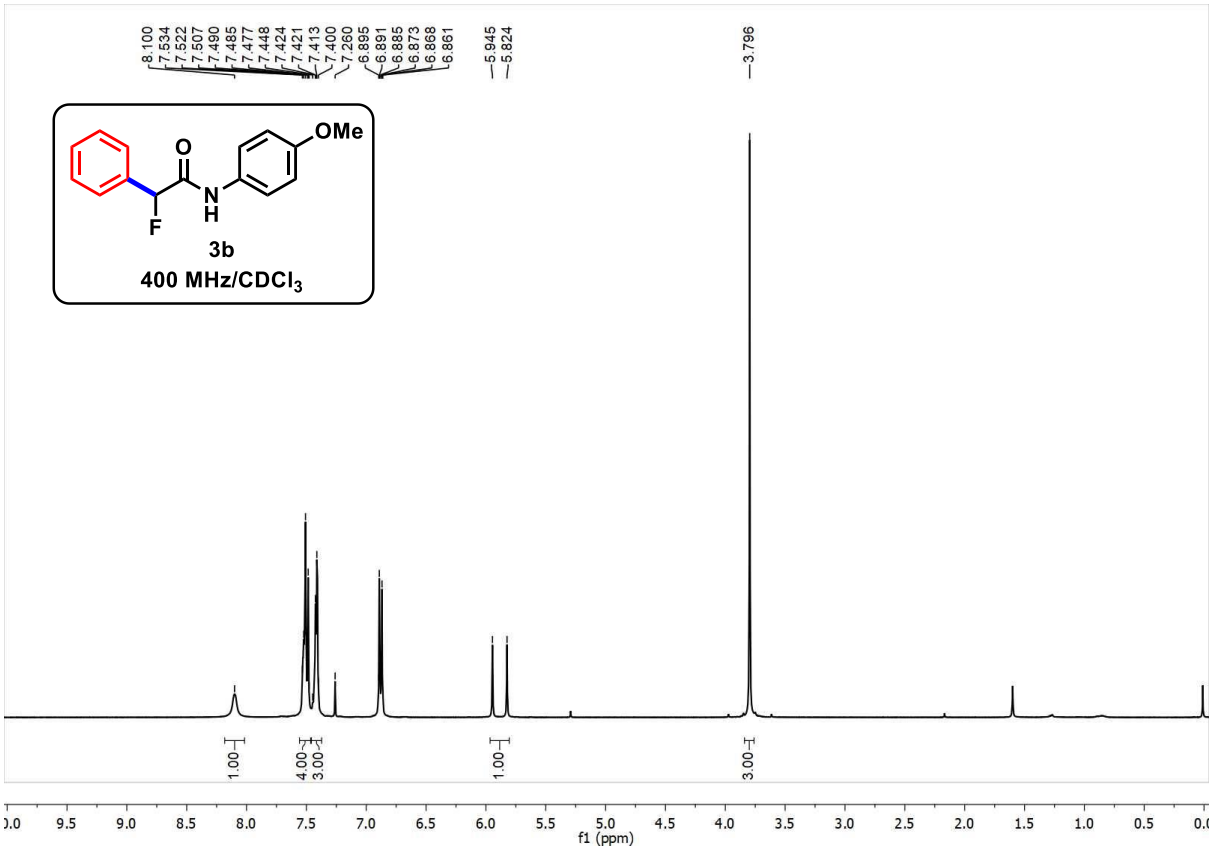
f1 (ppm)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6.895
6.891
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6.873
6.868
6.861
5.945
5.824
3.796
OMe
O
N
H
F
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400 MHz/CDCl3
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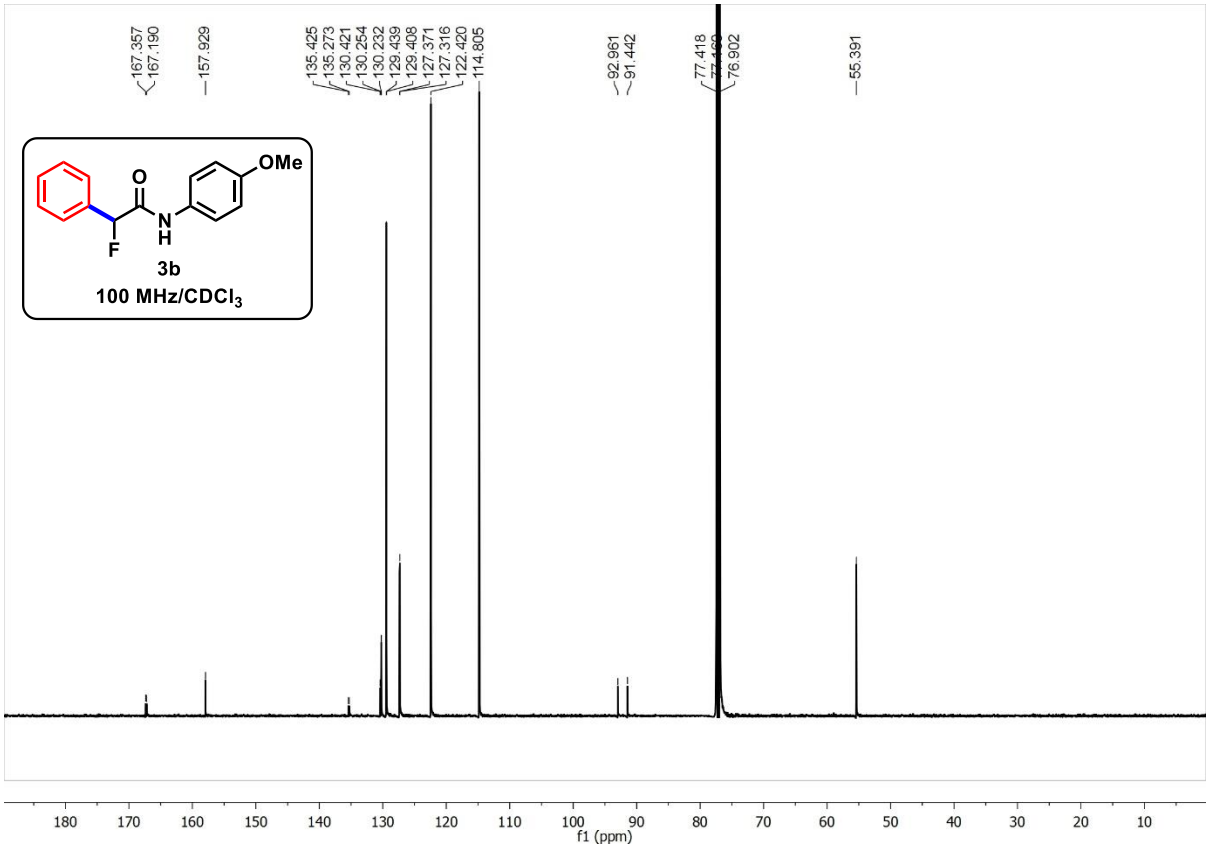
4.00
3.00
1.00
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)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114.805
92.961
91.442
77.418
76.902
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OMe
O
N
H
F
3b
100 MHz/CDCl3
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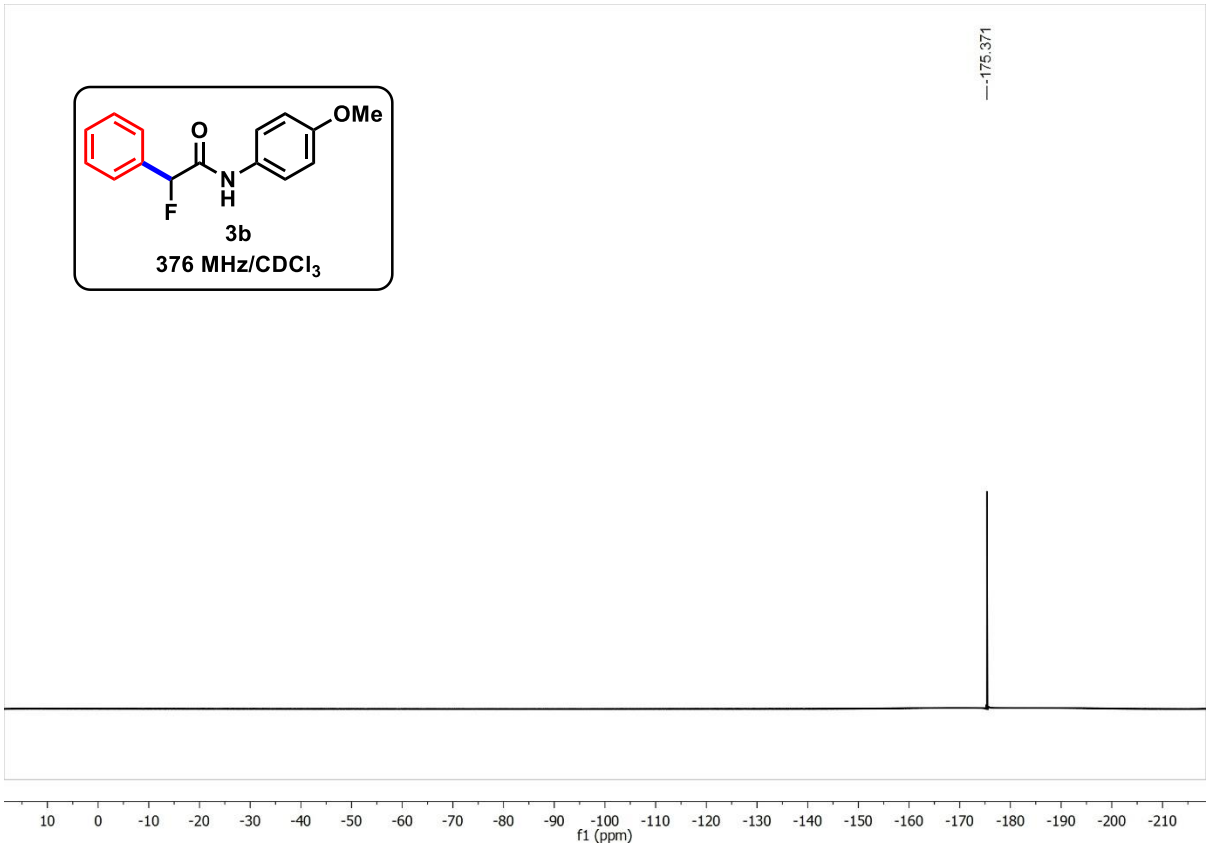
f1 (ppm)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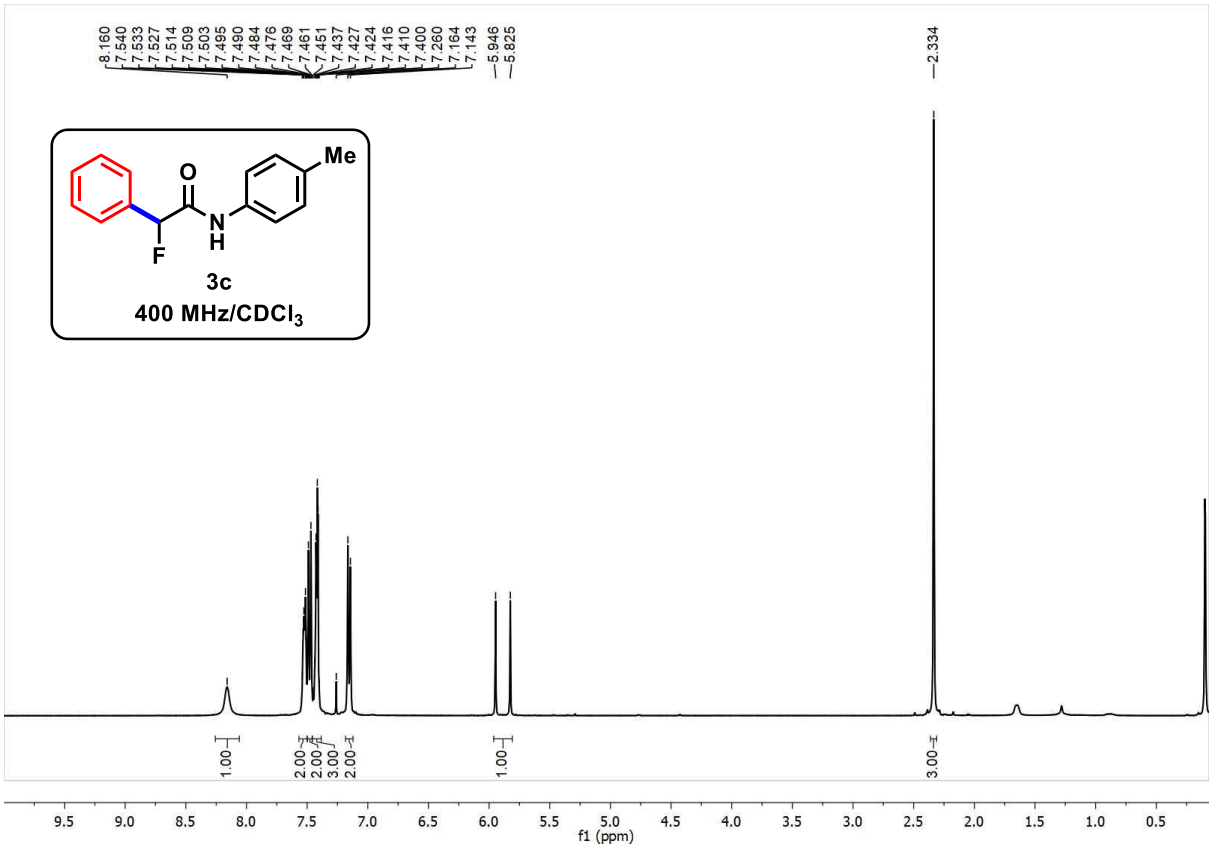
f1 (ppm)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7.437
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2.00
1.00
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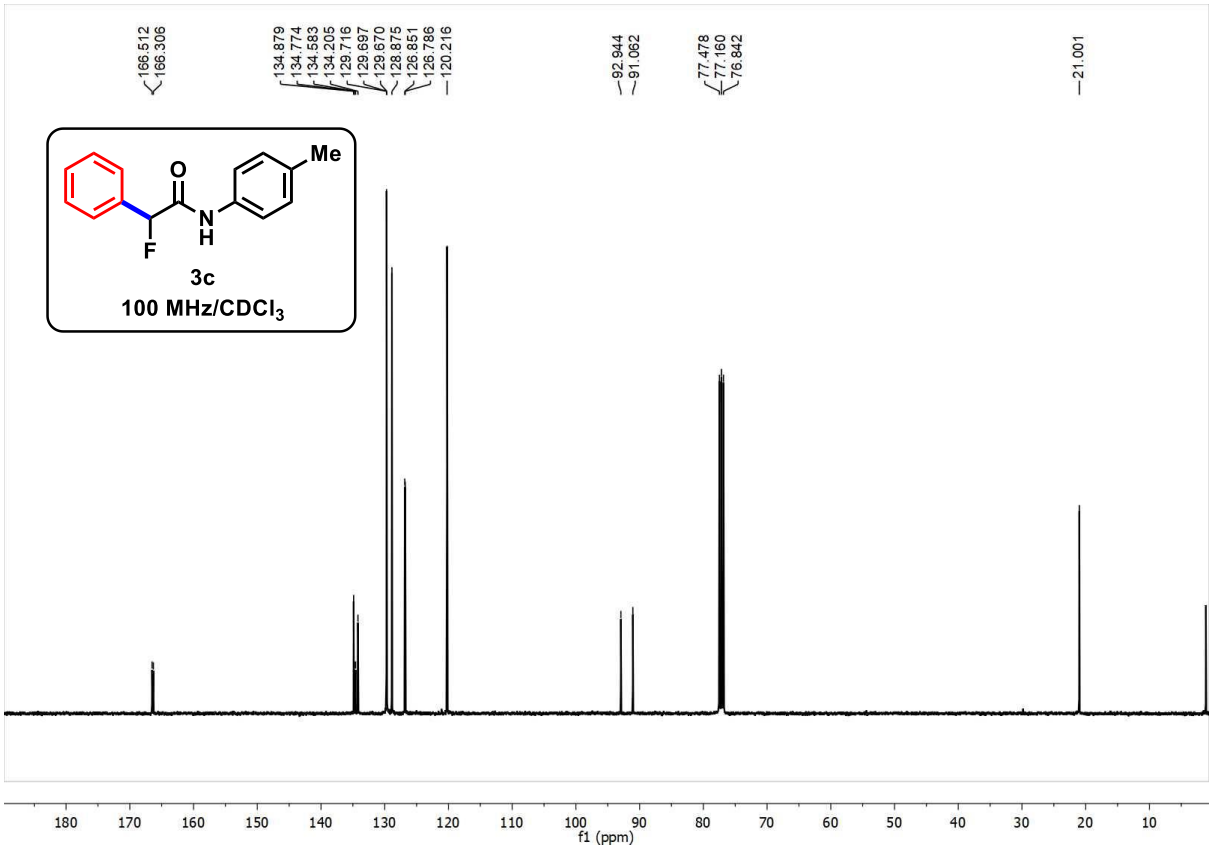
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92.944
91.062
77.478
77.160
76.842
21.001
Me
O
N
H
F
3c
100 MHz/CDCl3
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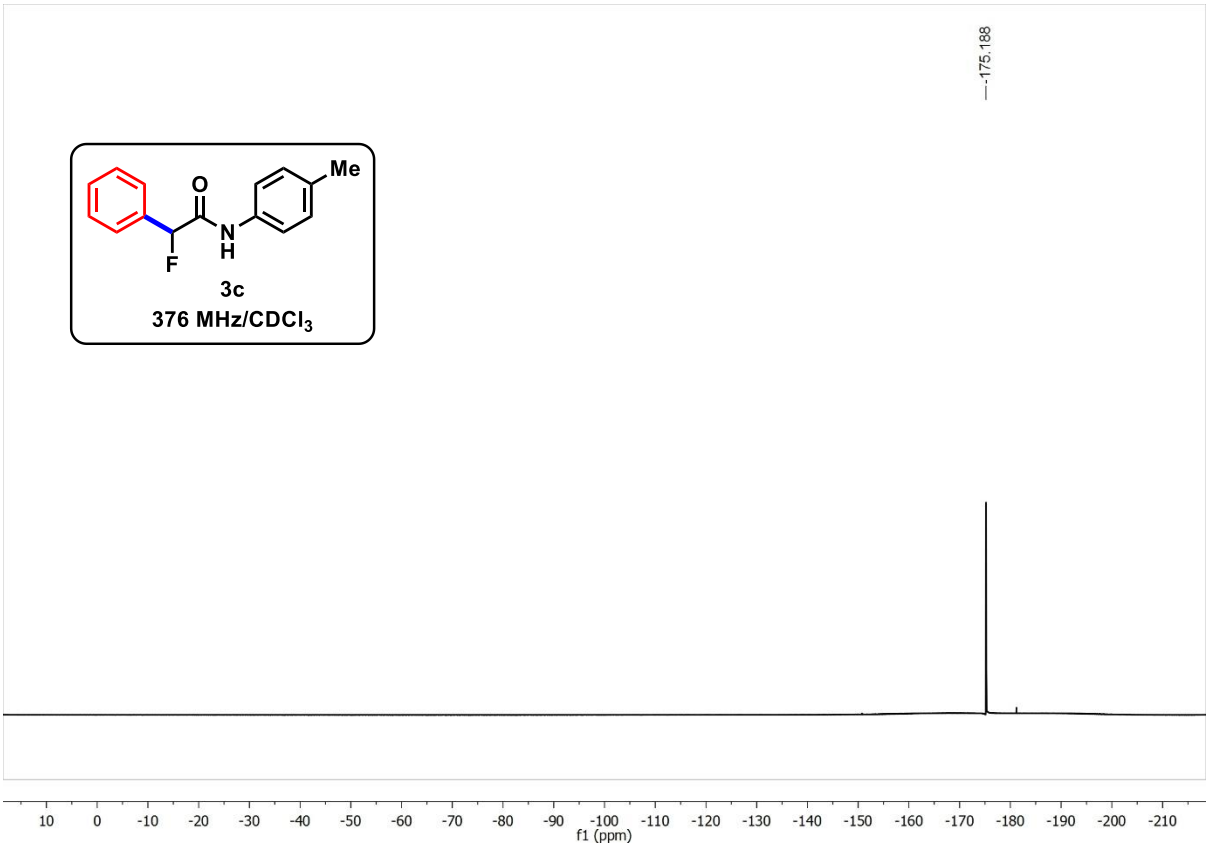
f1 (ppm)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Me
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F
3c
376 MHz/CDCl3
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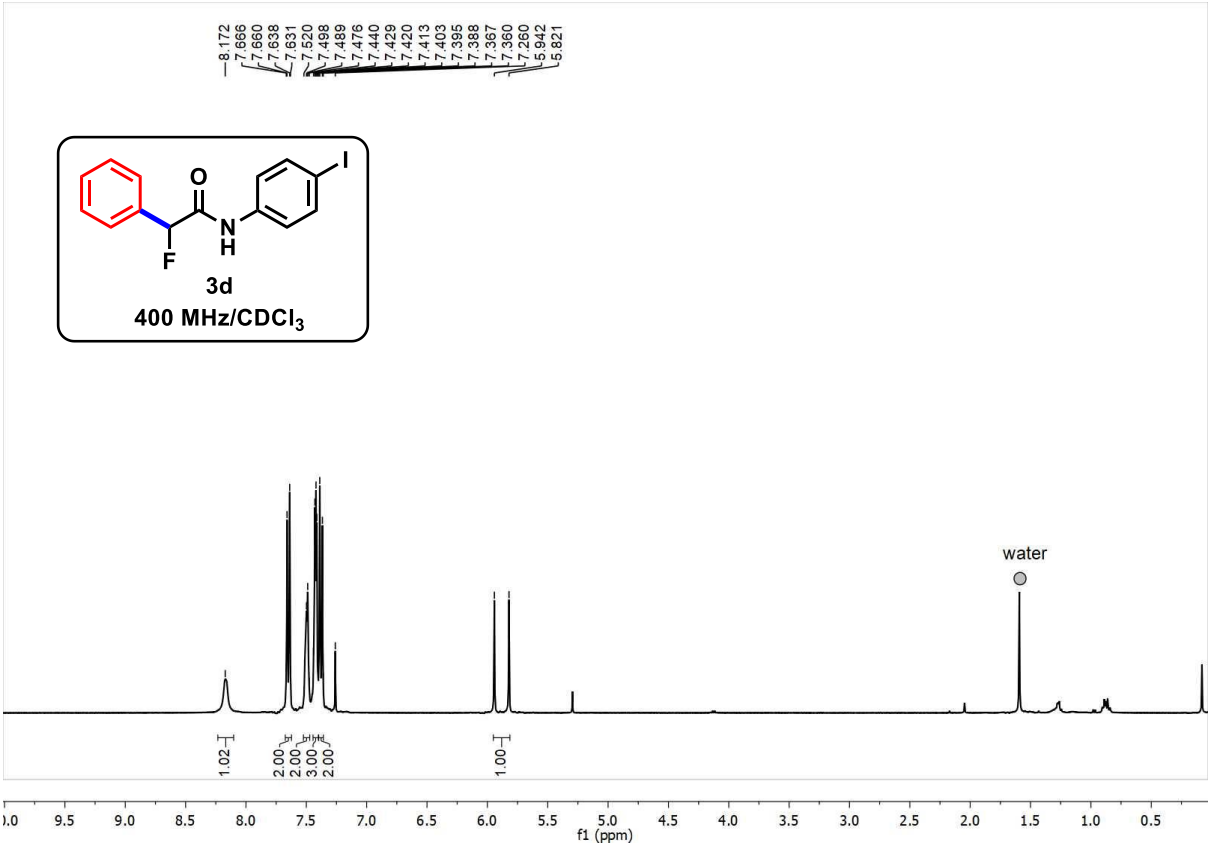
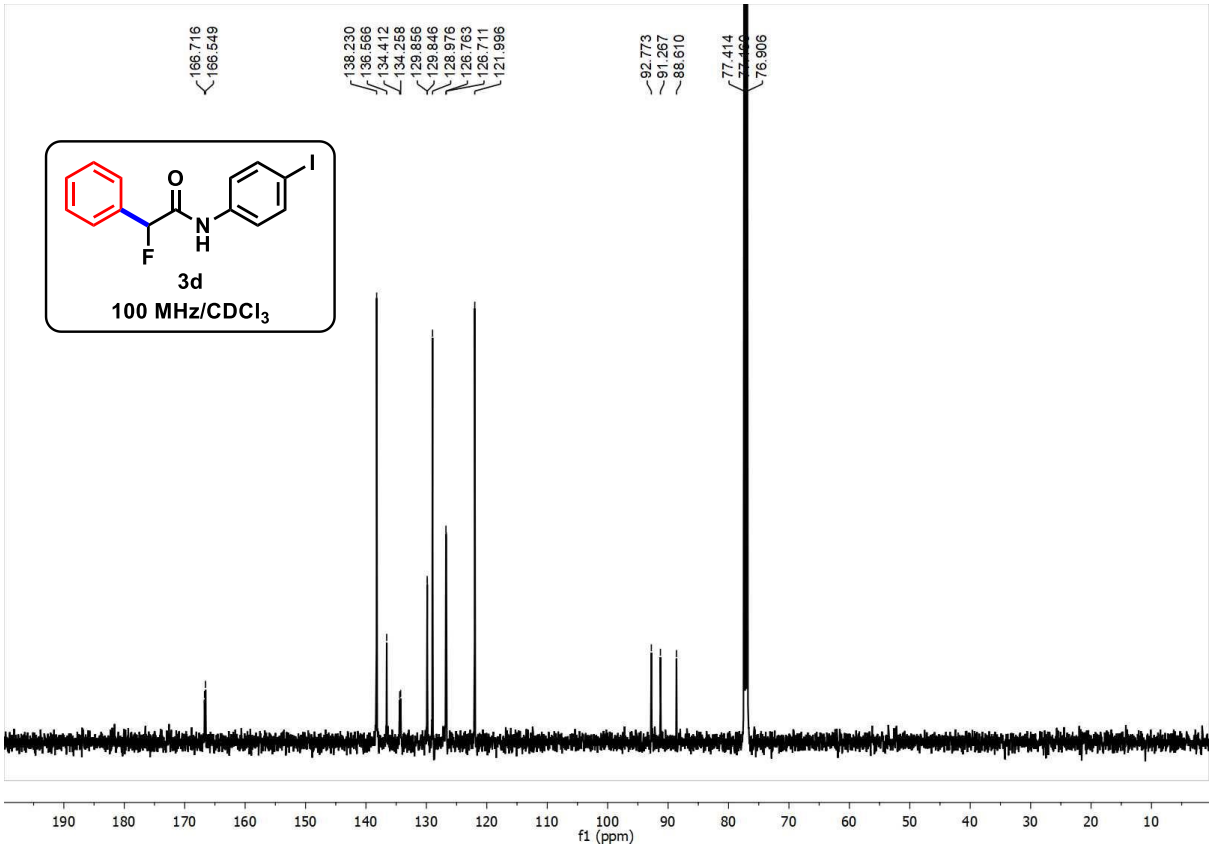
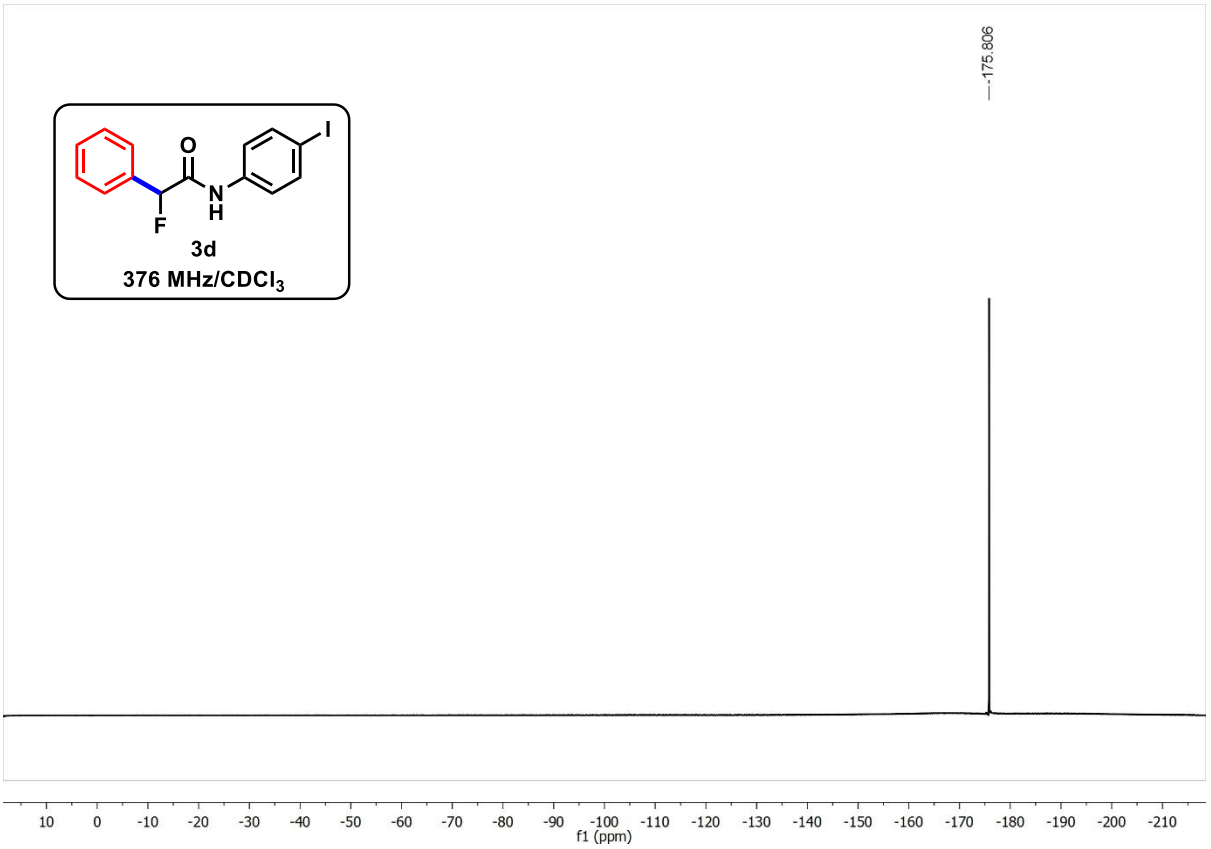
f1 (ppm)


8.172
7.666
7.660
7.638
7.631
7.520
7.498
7.489
7.476
7.440
7.429
7.420
7.413
7.403
7.395
7.388
7.367
7.360
7.260
5.942
5.821
I
O
N
H
F
3d
400 MHz/CDCl3
water
1.02
2.00
2.00
3.00
2.00
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)


166.716
166.549
138.230
136.566
134.412
134.258
129.856
129.846
128.976
126.763
126.711
121.996
92.773
91.267
88.610
77.414
77.160
76.906
O
N
H
F
I
3d
100 MHz/CDCl3
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)


-175.806
O
N
H
F
I
3d
376 MHz/CDCl3
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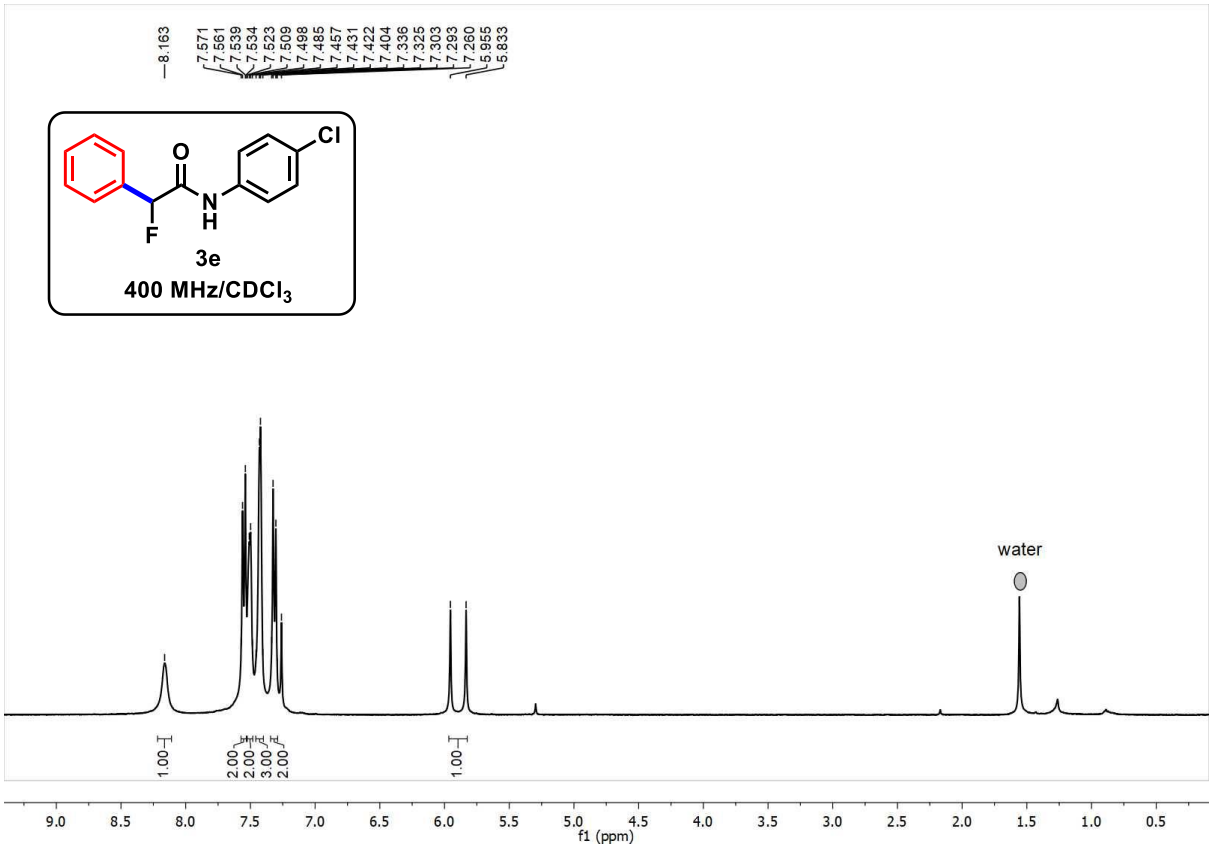
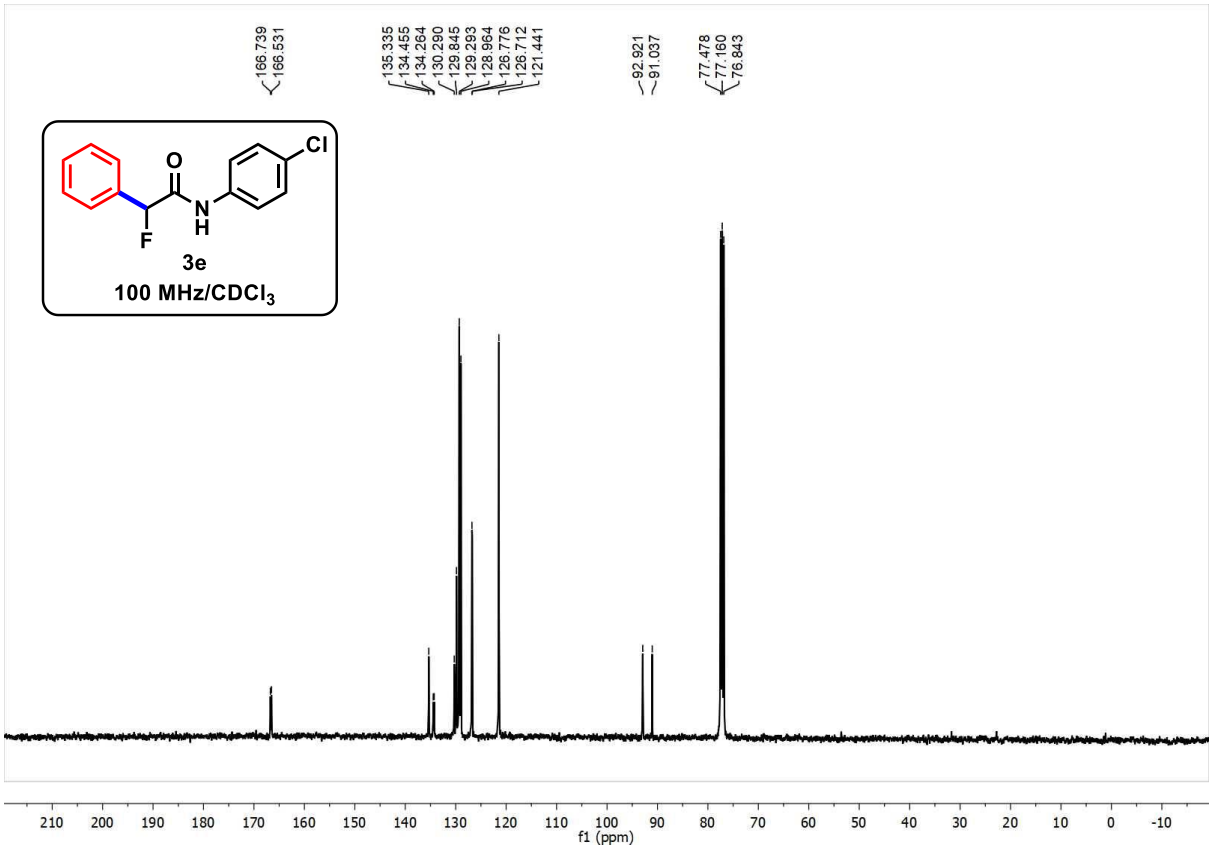
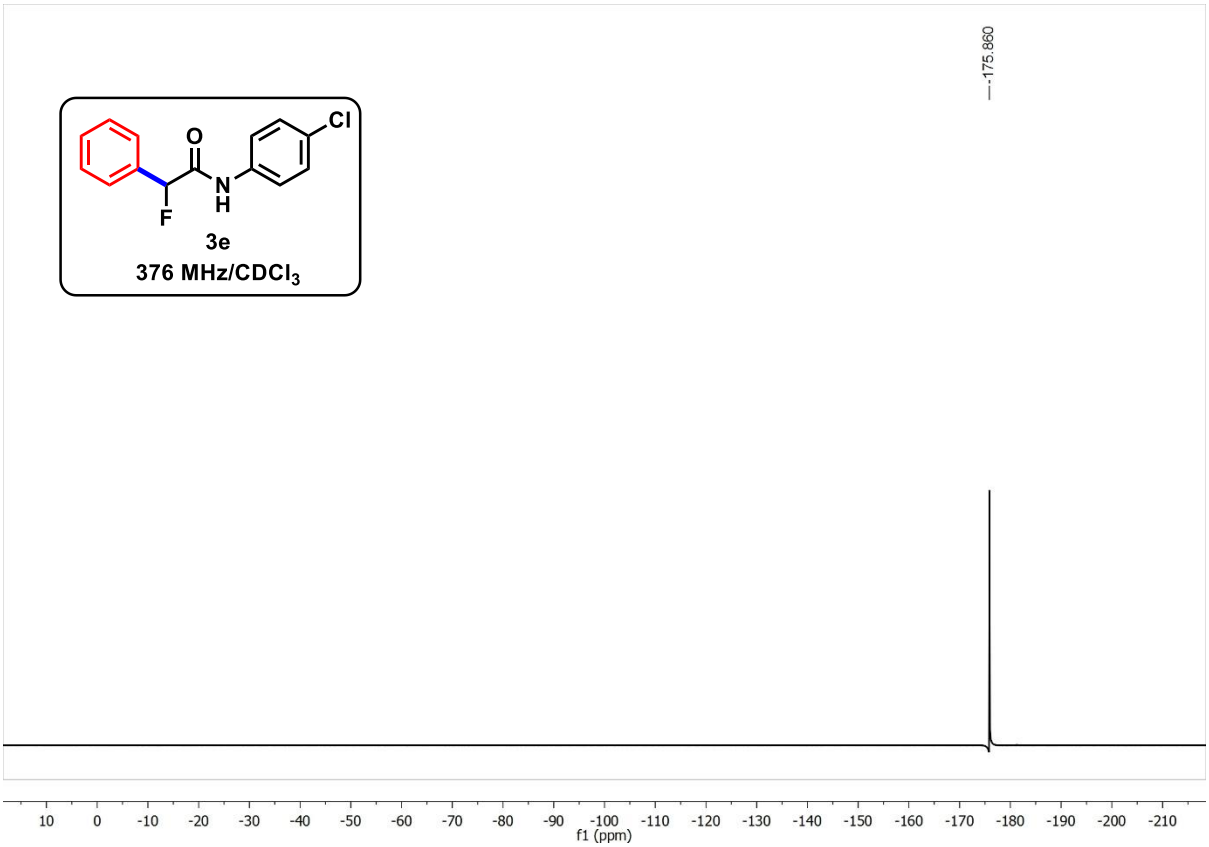
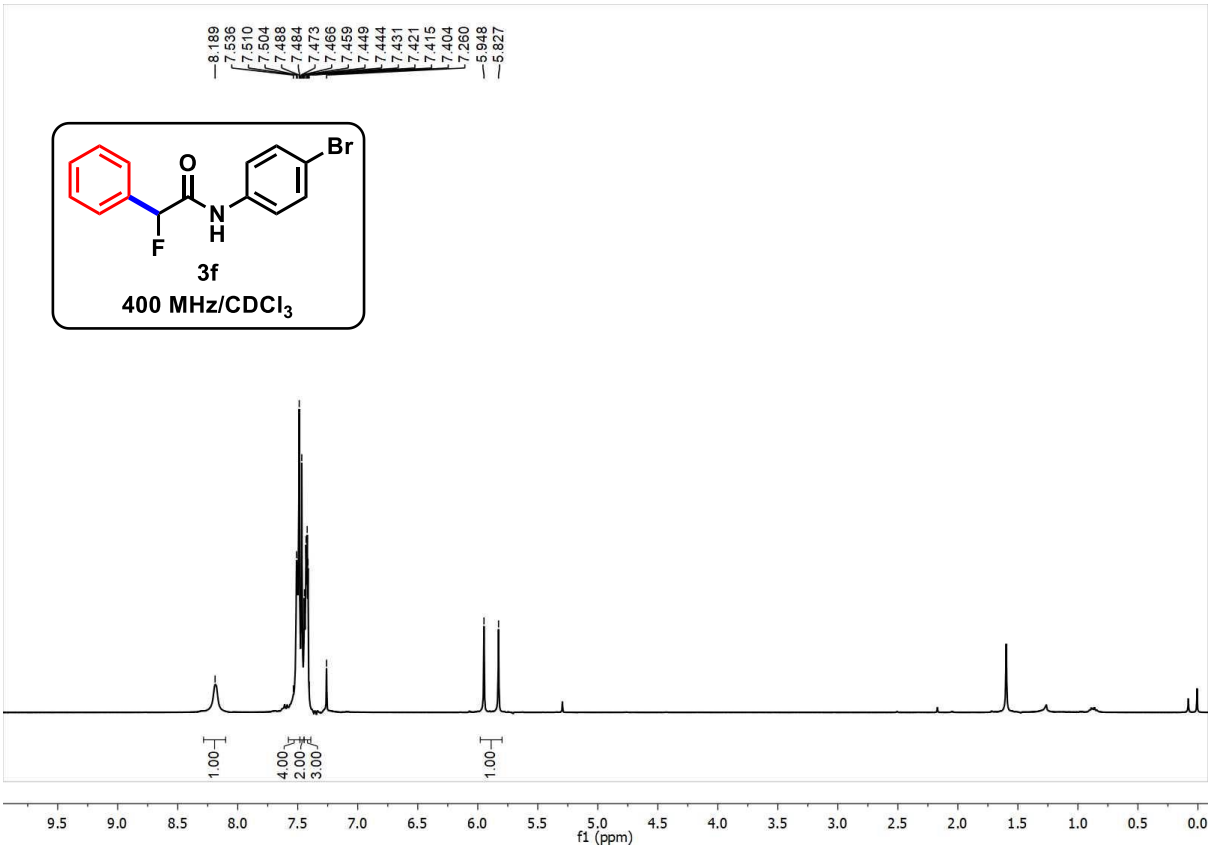
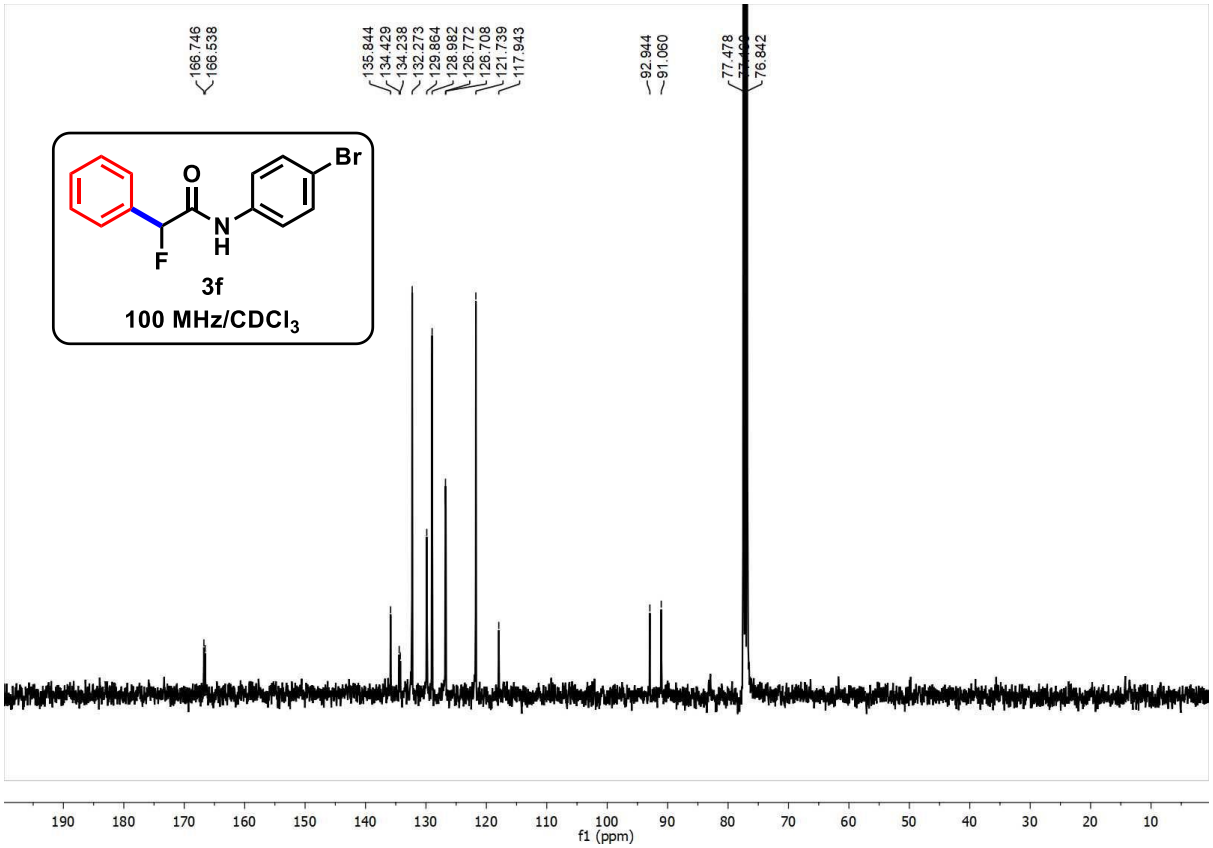
f1 (ppm)

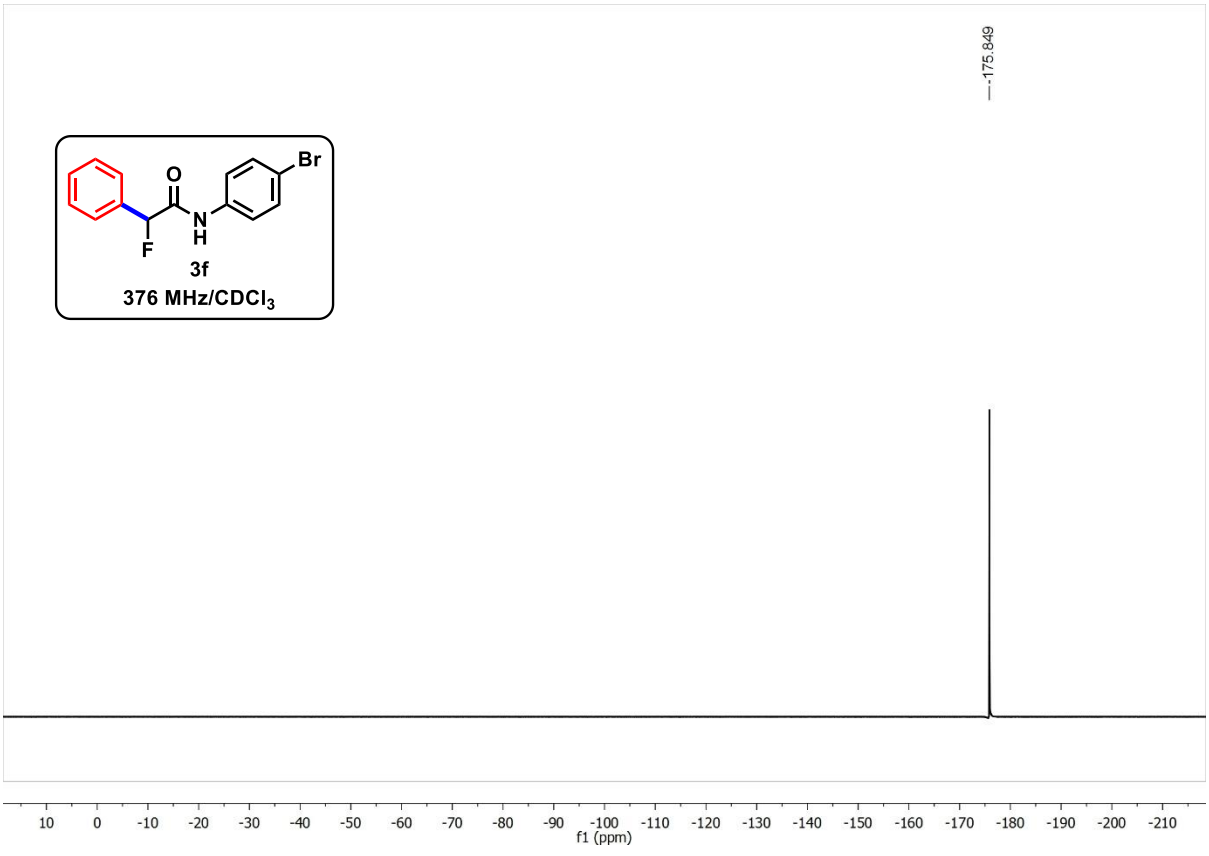

8.163
7.571
7.561
7.539
7.534
7.523
7.509
7.498
7.485
7.457
7.431
7.422
7.404
7.336
7.325
7.303
7.293
7.260
5.955
5.833
Cl
O
N
H
F
3e
400 MHz/CDCl3
water
1.00
2.00
2.00
3.00
2.00
1.00
f1 (ppm)

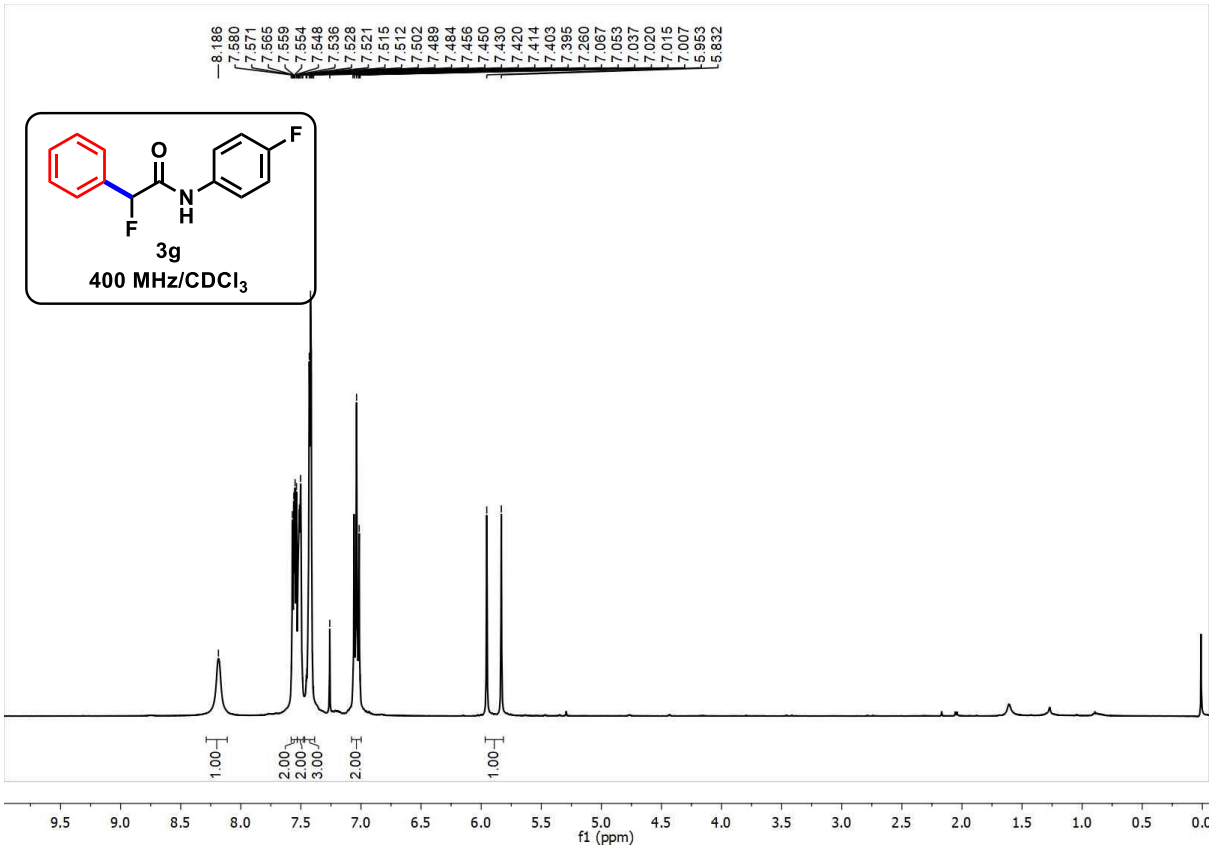

166.739
166.531
135.335
134.455
134.264
130.290
129.845
129.293
128.964
126.776
126.712
121.441
92.921
91.037
77.478
77.160
76.843
Cl
O
N
H
F
3e
100 MHz/CDCl3
f1 (ppm)

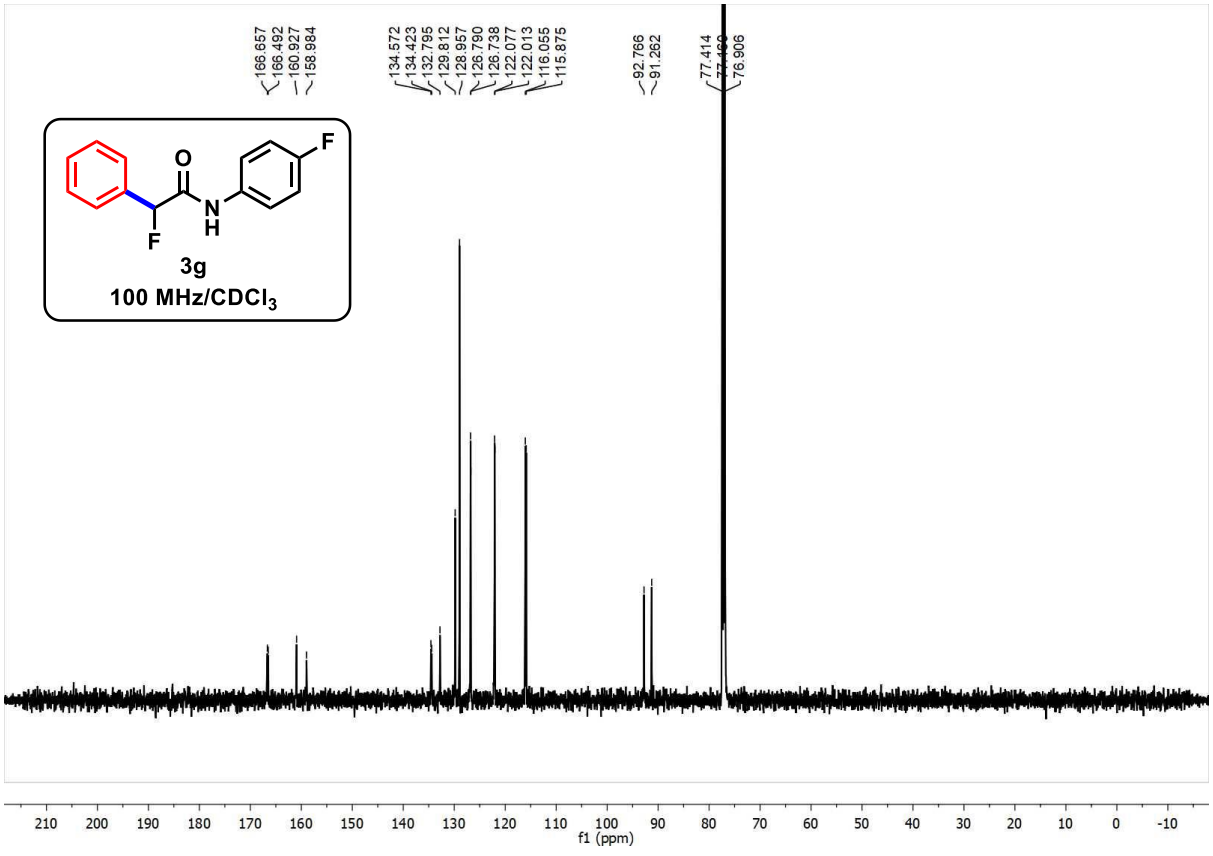

-175.860
Cl
O
N
H
F
3e
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

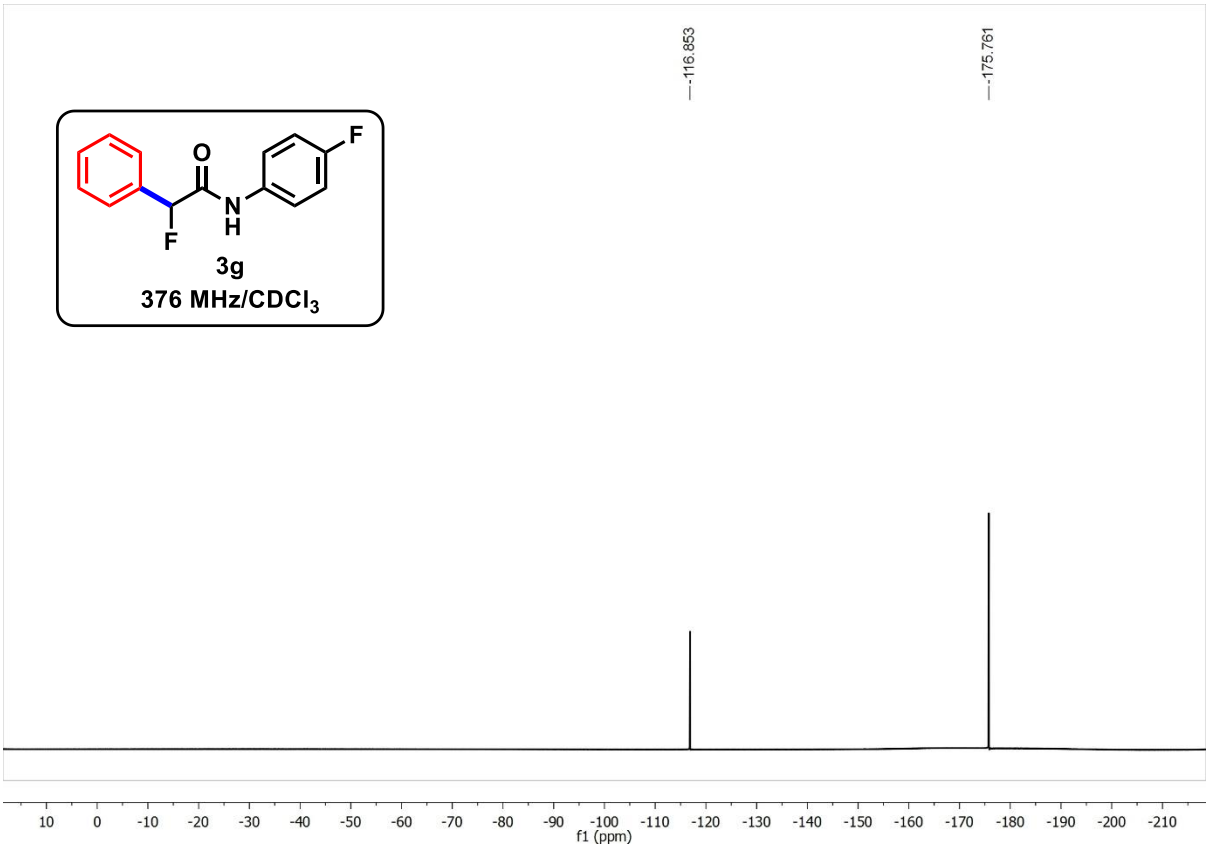

8.189
7.536
7.510
7.504
7.488
7.484
7.473
7.466
7.459
7.449
7.444
7.431
7.421
7.415
7.404
7.260
5.948
5.827
Br
O
N
H
F
3f
400 MHz/CDCl3
1.00
4.00
2.00
3.00
1.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

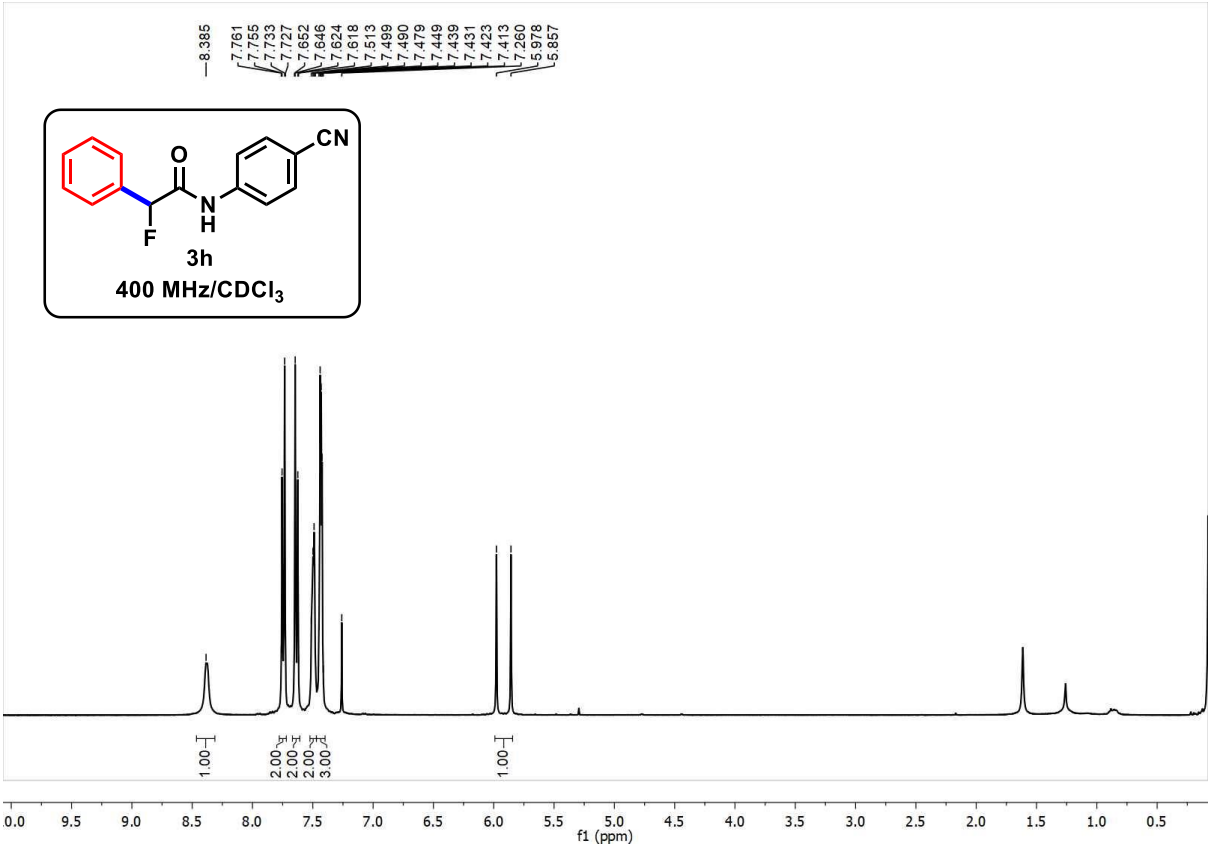

166.746
166.538
135.844
134.429
134.238
132.273
129.864
128.982
126.772
126.708
121.739
117.943
92.944
91.060
77.478
76.842
Br
O
N
H
F
3f
100 MHz/CDCl3
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

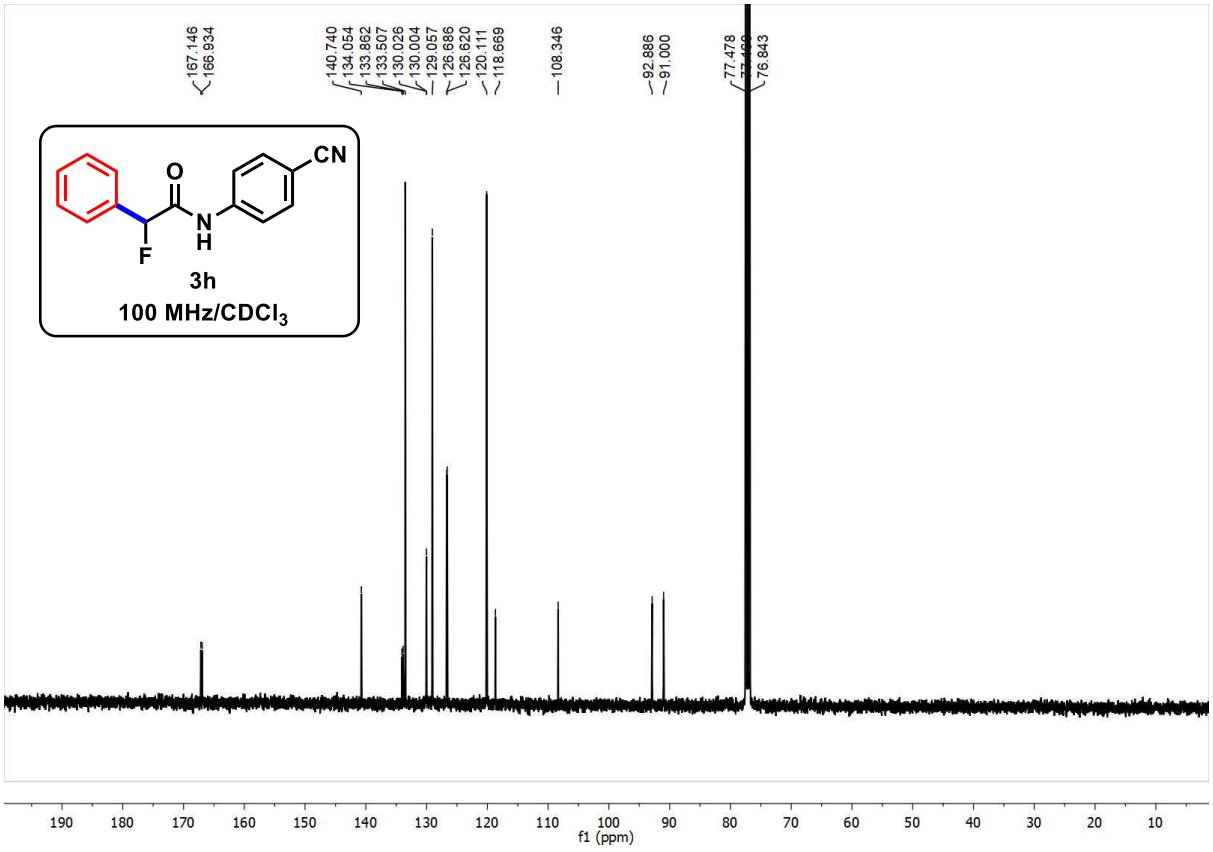

-175.849
Br
O
N
H
F
3f
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

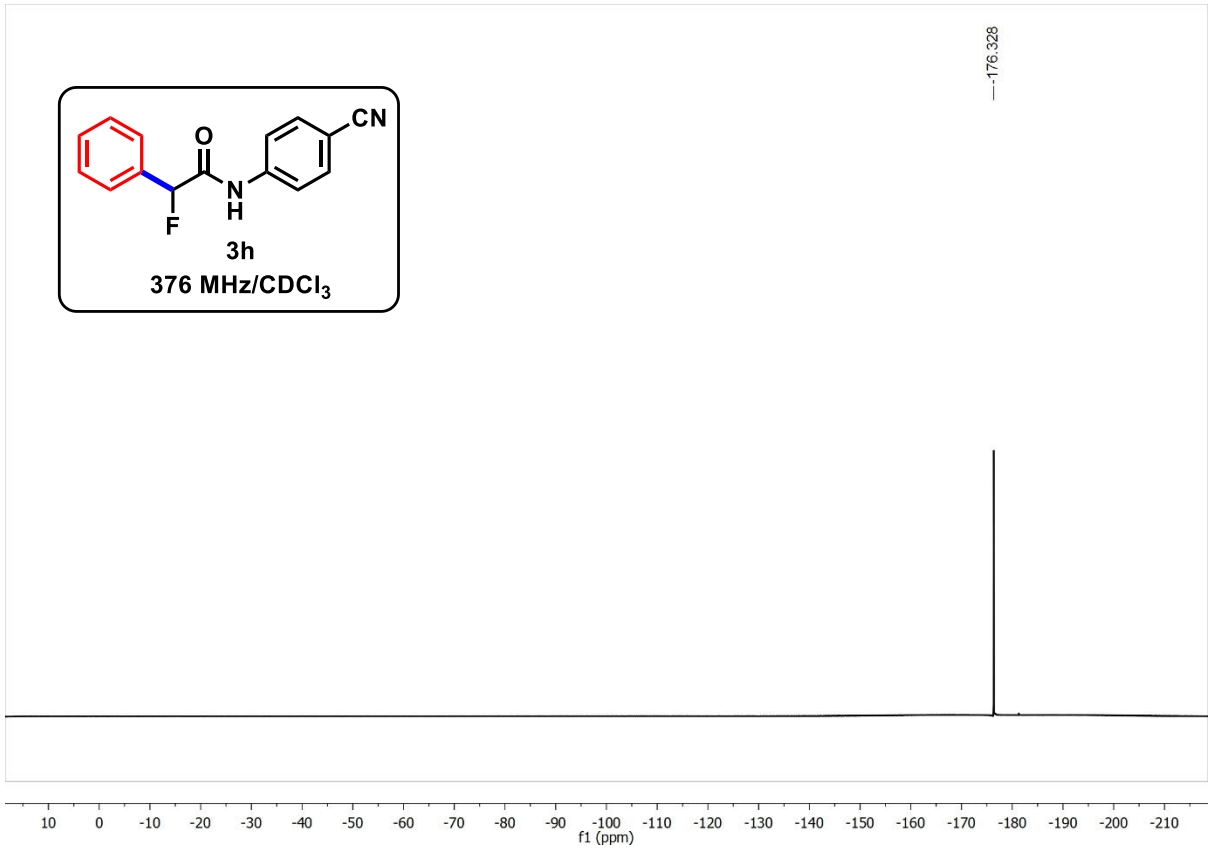

8.186
7.580
7.571
7.565
7.559
7.554
7.548
7.536
7.528
7.521
7.515
7.512
7.502
7.489
7.484
7.456
7.450
7.430
7.420
7.414
7.403
7.395
7.260
7.067
7.053
7.037
7.020
7.015
7.007
5.953
5.832
O
N
H
F
F
3g
400 MHz/CDCl3
1.00
2.00
2.00
3.00
2.00
1.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

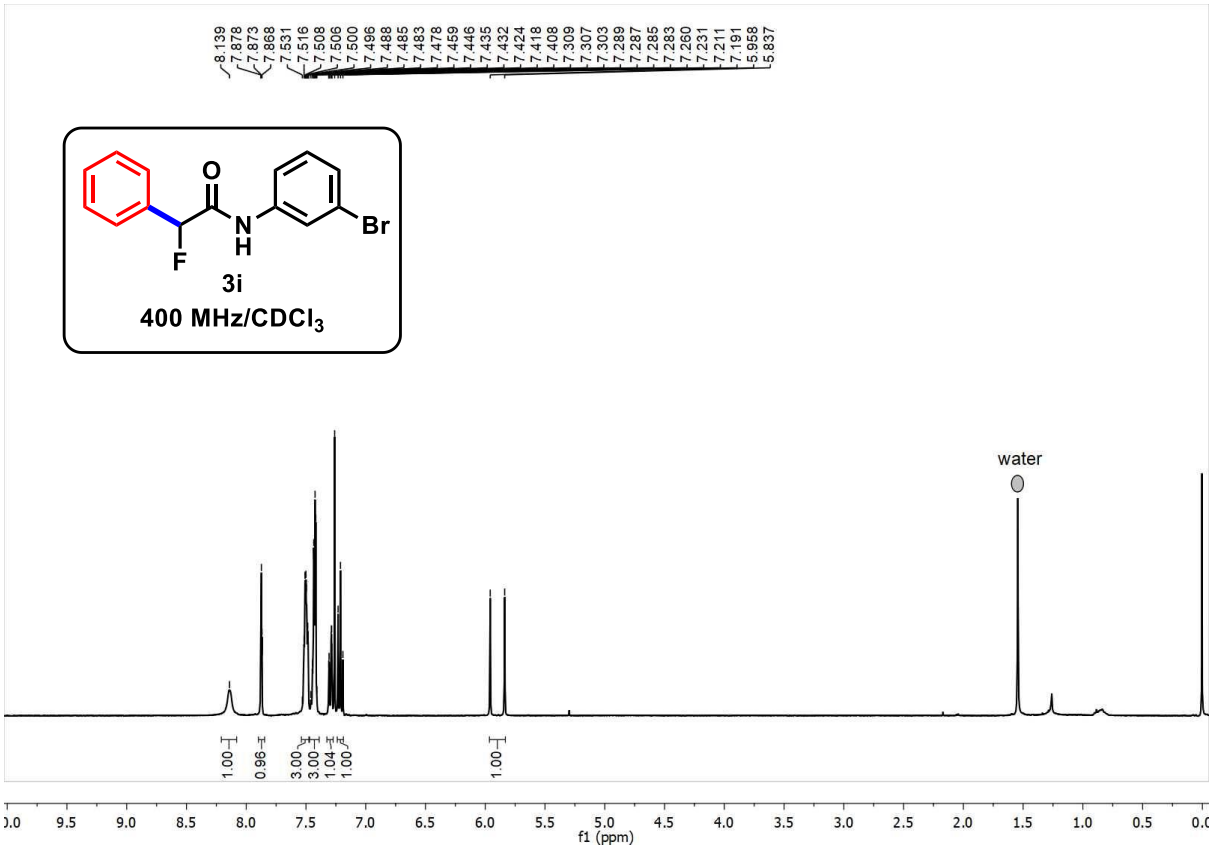

166.657
166.492
160.927
158.984
134.572
134.423
132.795
129.812
128.957
126.790
126.738
122.077
122.013
116.055
115.875
92.766
91.262
77.414
77.160
76.906
O
N
H
F
F
3g
100 MHz/CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

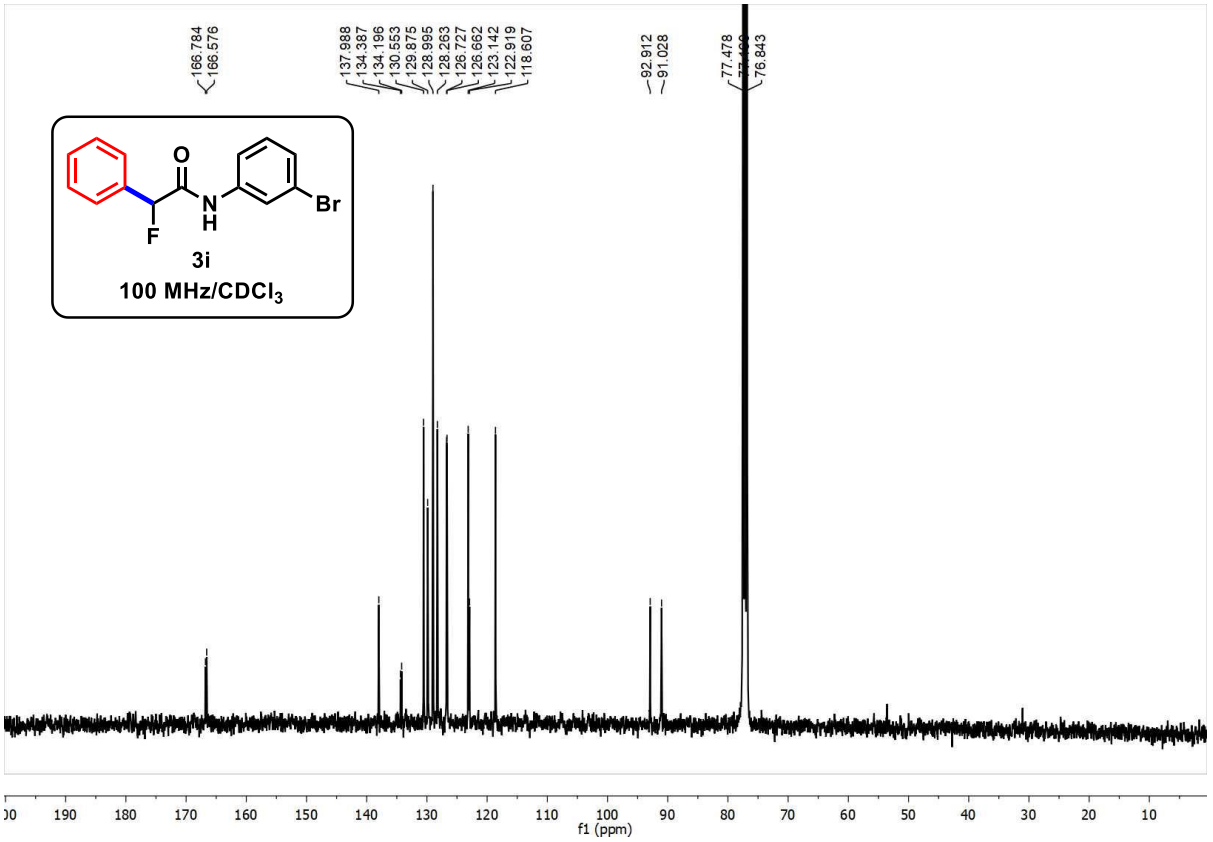

-116.853
-175.761
F
O
N
H
F
3g
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

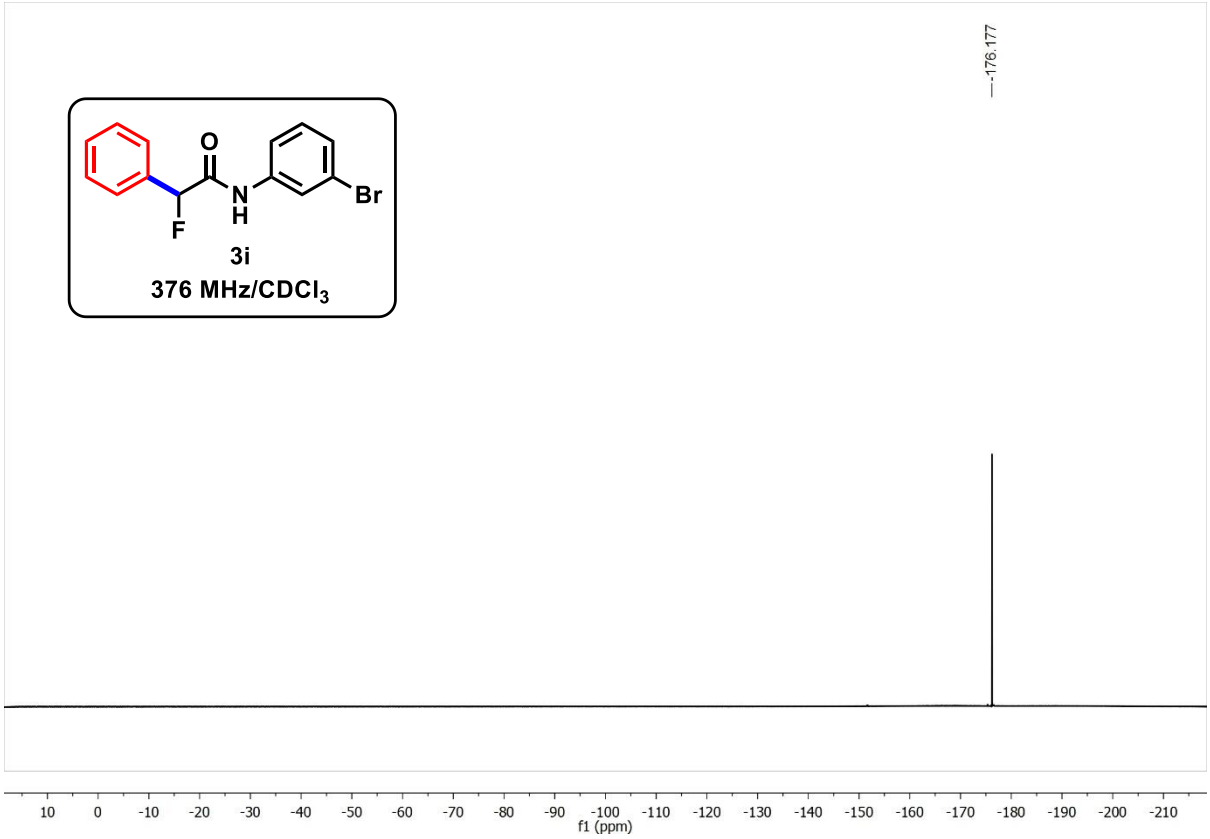

8.385
7.761
7.755
7.733
7.727
7.652
7.646
7.624
7.618
7.513
7.499
7.490
7.479
7.449
7.439
7.431
7.423
7.413
7.260
5.978
5.857
CN
O
N
H
F
3h
400 MHz/CDCl3
1.00
2.00
2.00
3.00
1.00
0.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)


167.146
166.934
140.740
134.054
133.862
133.507
130.026
130.004
129.057
126.686
126.620
120.111
118.669
108.346
92.886
91.000
77.478
76.843
CN
O
N
H
F
3h
100 MHz/CDCl3
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)


-176.328
CN
O
N
H
F
3h
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)


8.139
7.878
7.873
7.868
7.531
7.516
7.508
7.506
7.500
7.496
7.488
7.485
7.483
7.478
7.459
7.446
7.435
7.432
7.424
7.418
7.408
7.309
7.307
7.303
7.289
7.287
7.285
7.283
7.260
7.231
7.211
7.191
5.958
5.837
O
N
H
F
Br
3i
400 MHz/CDCl3
water
1.00
0.96
3.00
3.00
1.04
1.00
1.00
f1 (ppm)


166.784
166.576
137.988
134.387
134.196
130.553
129.875
128.995
128.263
126.727
126.662
123.142
122.919
118.607
92.912
91.028
77.478
76.843
O
N
H
F
Br
3i
100 MHz/CDCl3
f1 (ppm)


-176.177
O
N
H
F
Br
3i
376 MHz/CDCl3
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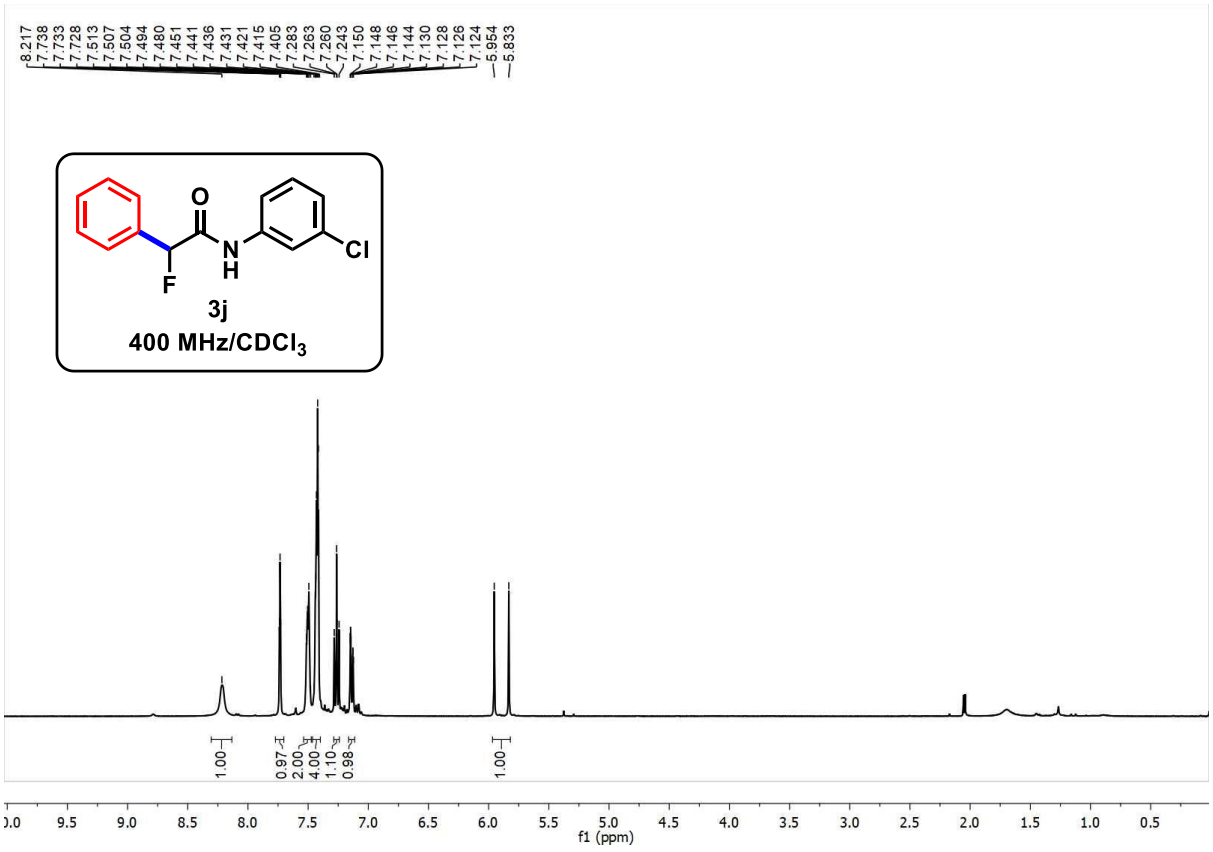
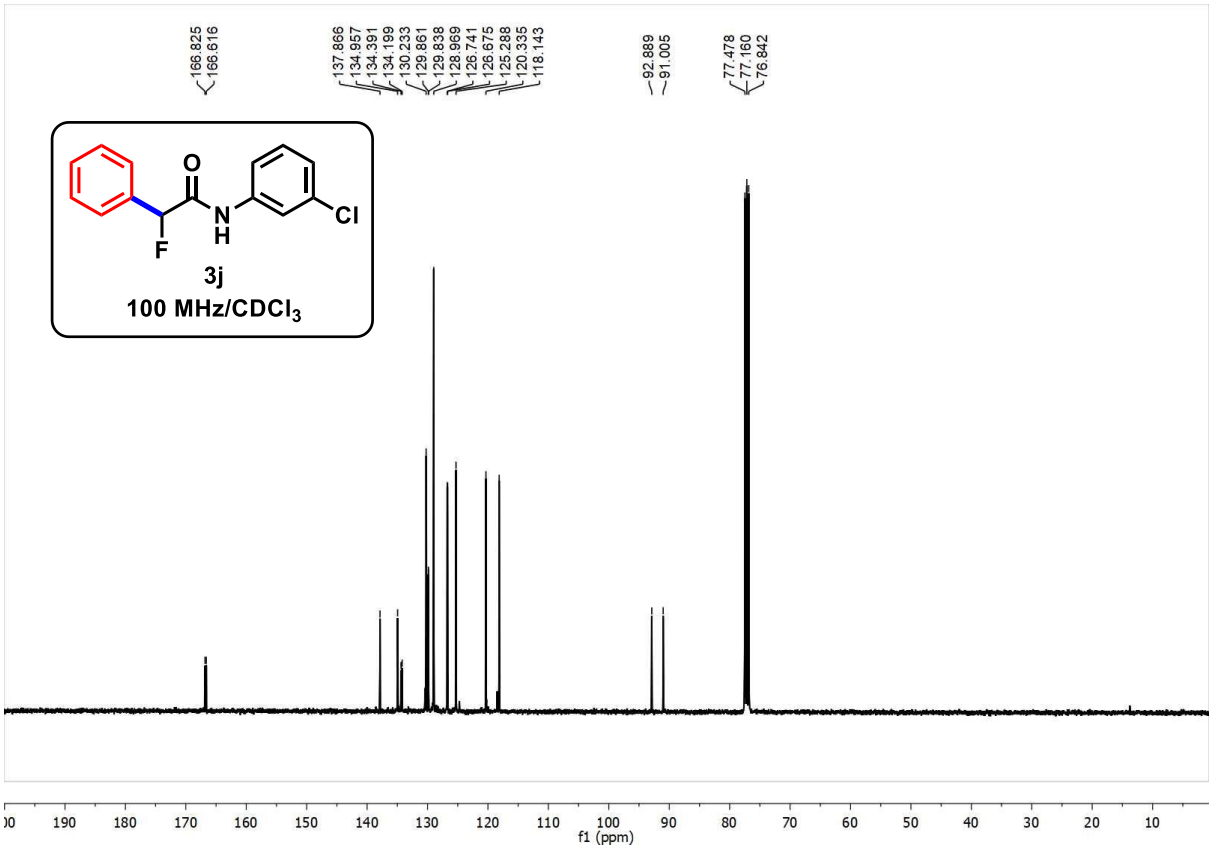
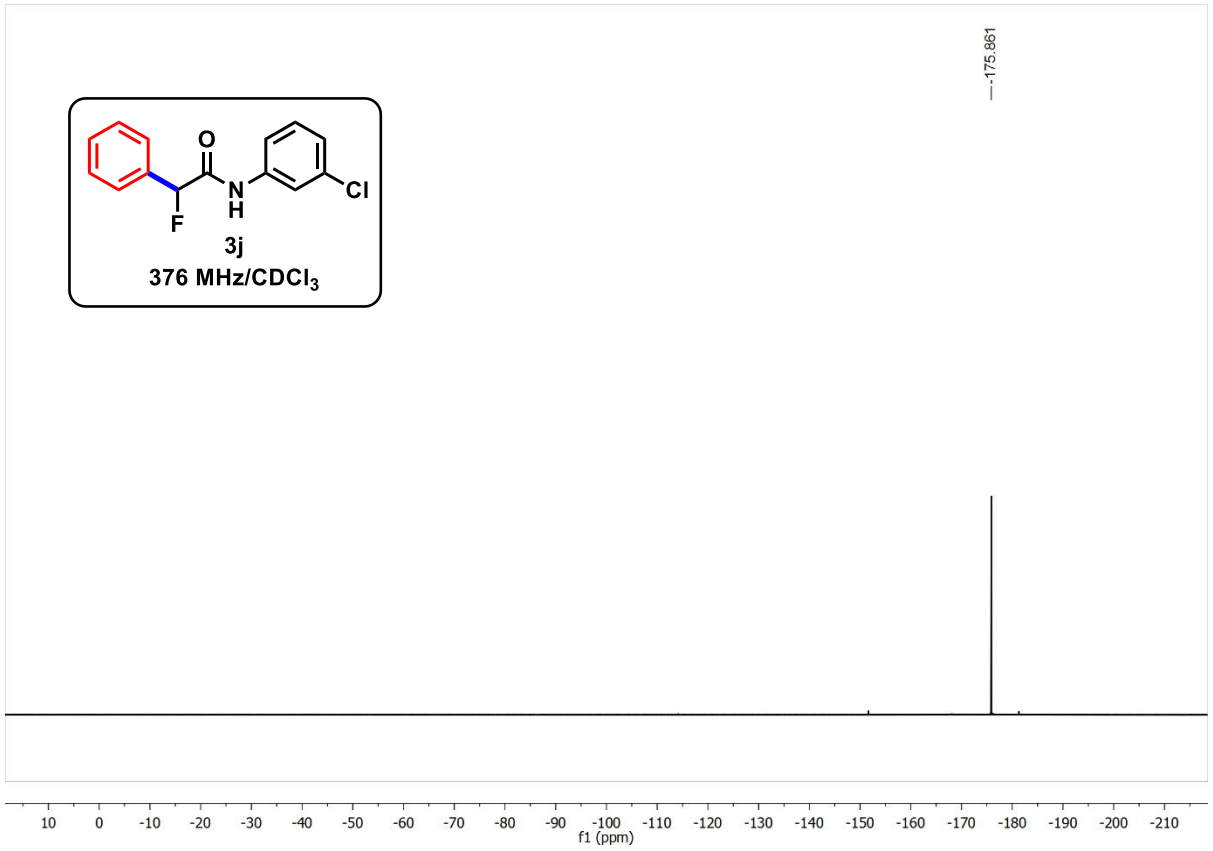
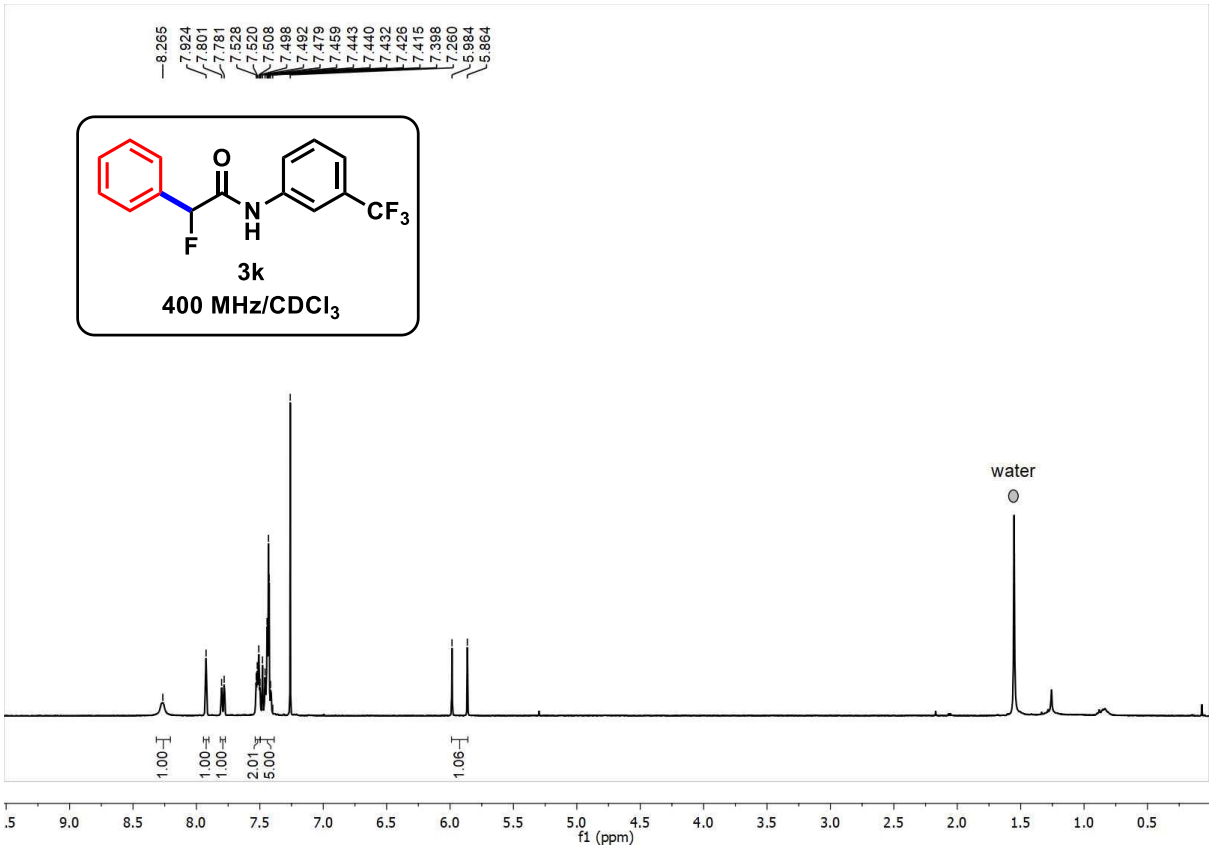
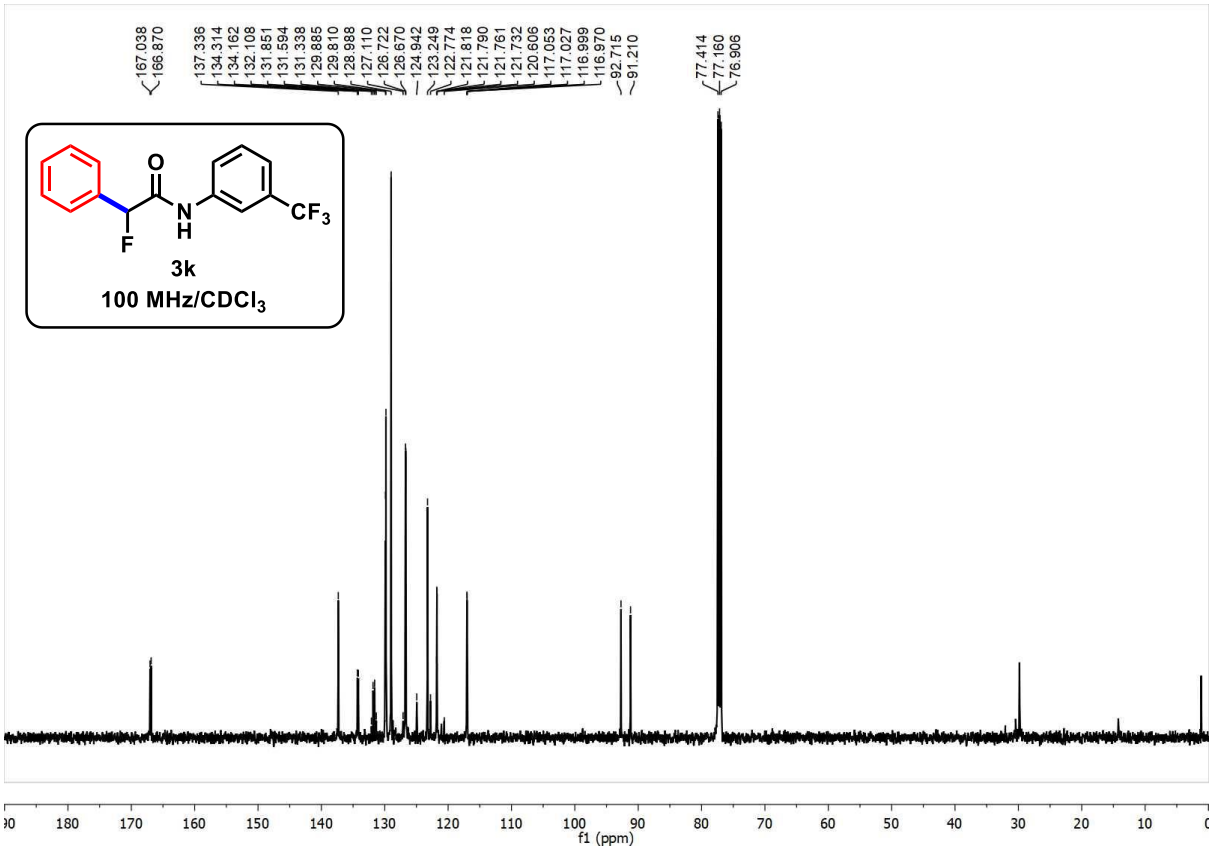
f1 (ppm)

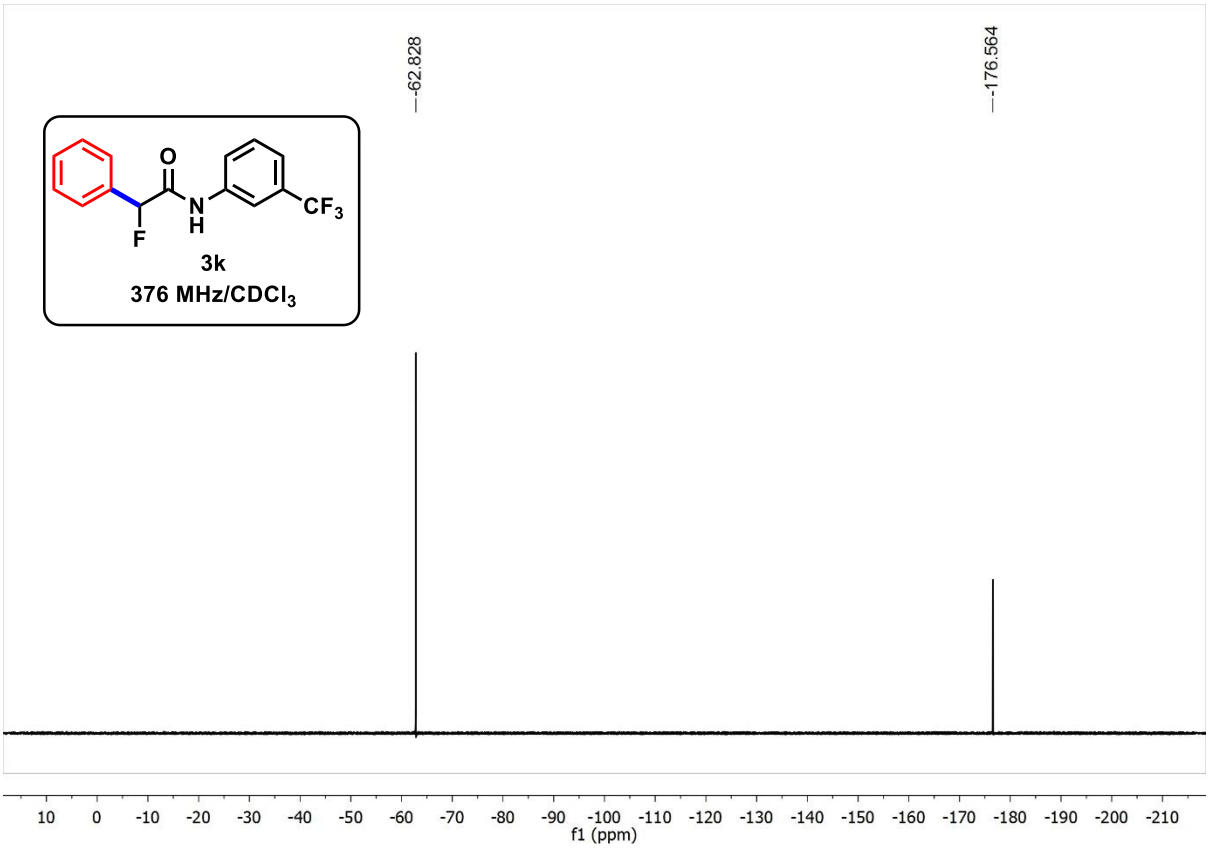

8.217
7.738
7.733
7.728
7.513
7.507
7.504
7.494
7.480
7.451
7.441
7.436
7.431
7.421
7.415
7.405
7.283
7.263
7.260
7.243
7.150
7.148
7.146
7.144
7.130
7.128
7.126
7.124
5.954
5.833
O
N
H
F
Cl
3j
400 MHz/CDCl3
1.00
0.97
2.00
4.00
1.10
0.98
1.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

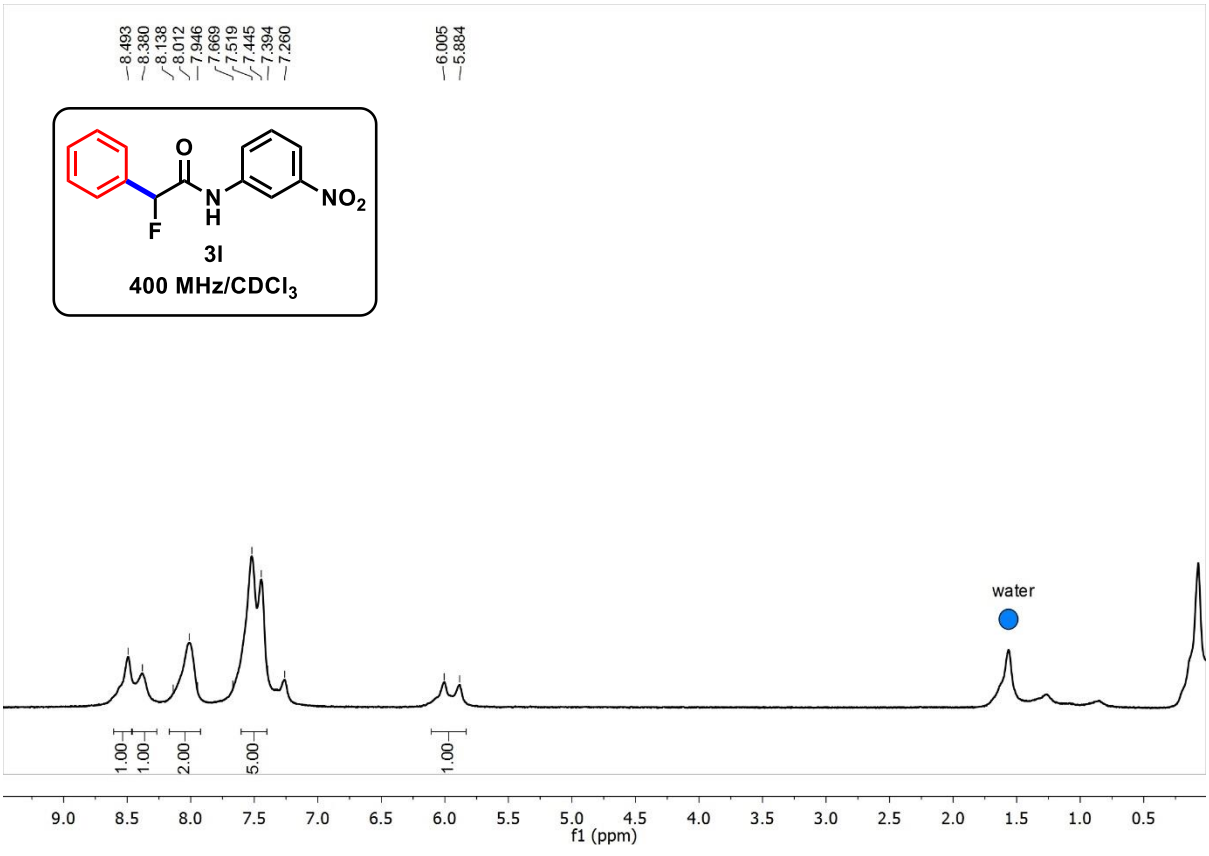

166.825
166.616
137.866
134.957
134.391
134.199
130.233
129.861
129.838
128.969
126.741
126.675
125.288
120.335
118.143
92.889
91.005
77.478
77.160
76.842
O
N
H
F
Cl
3j
100 MHz/CDCl3
f1 (ppm)

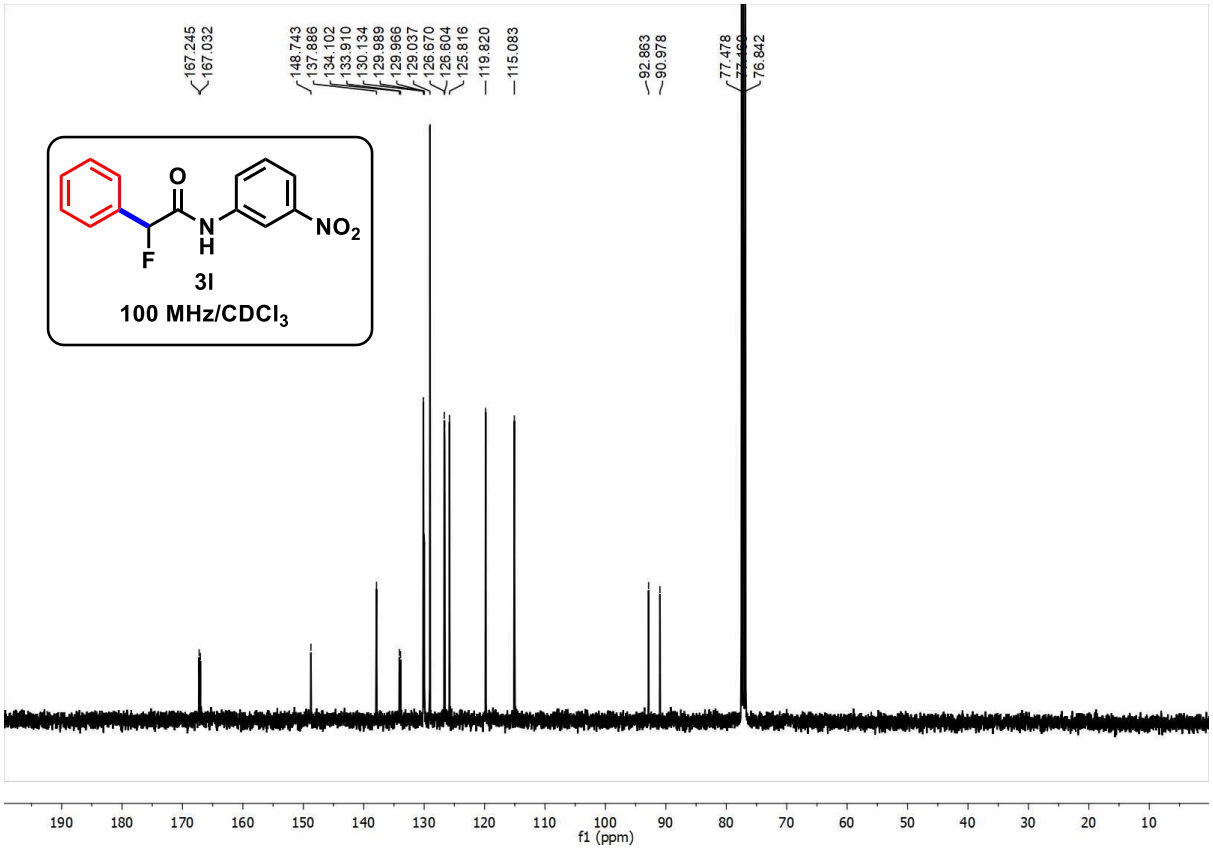

-175.861
O
N
H
F
Cl
3j
376 MHz/CDCl3
f1 (ppm)

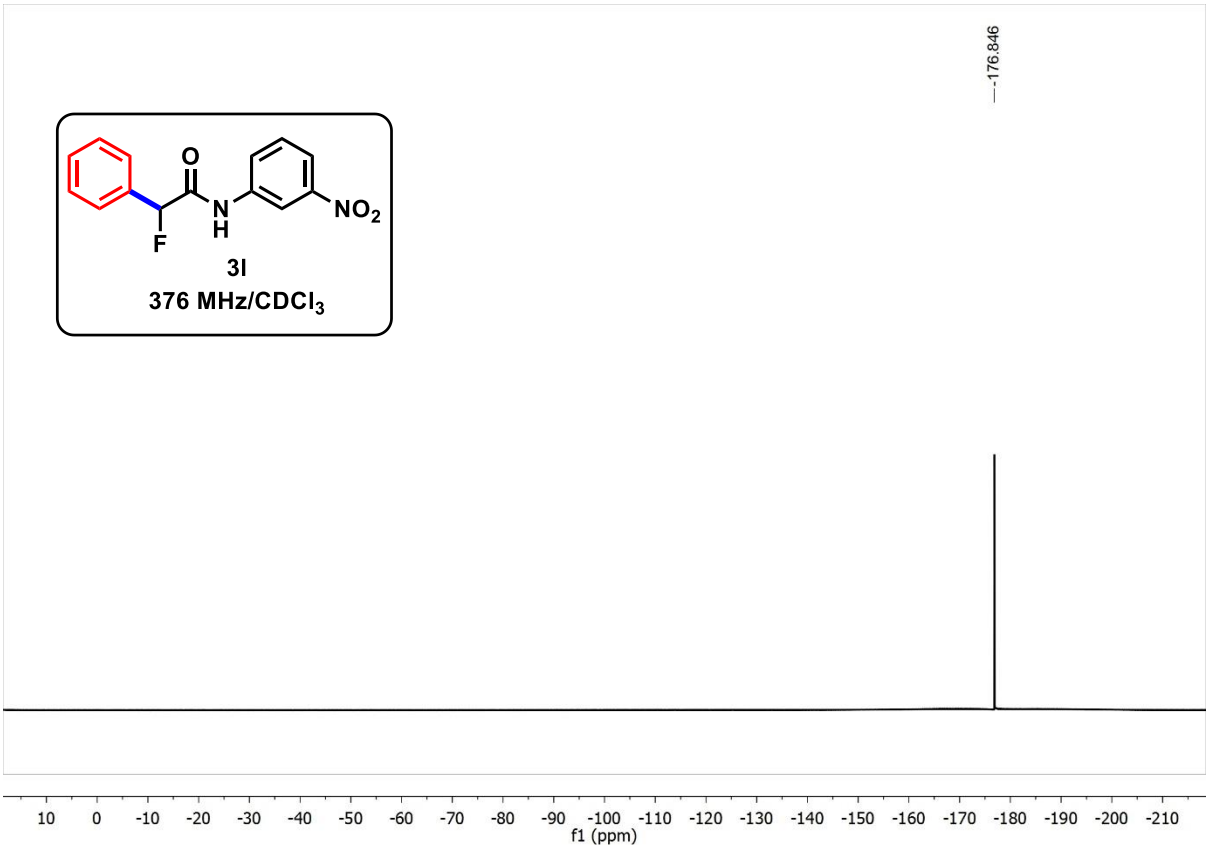

8.265
7.924
7.801
7.781
7.528
7.520
7.508
7.498
7.492
7.479
7.459
7.443
7.440
7.432
7.426
7.415
7.398
7.260
5.984
5.864
O
N
H
F
CF3
3k
400 MHz/CDCl3
water
1.00
1.00
1.00
2.01
5.00
1.06
f1 (ppm)

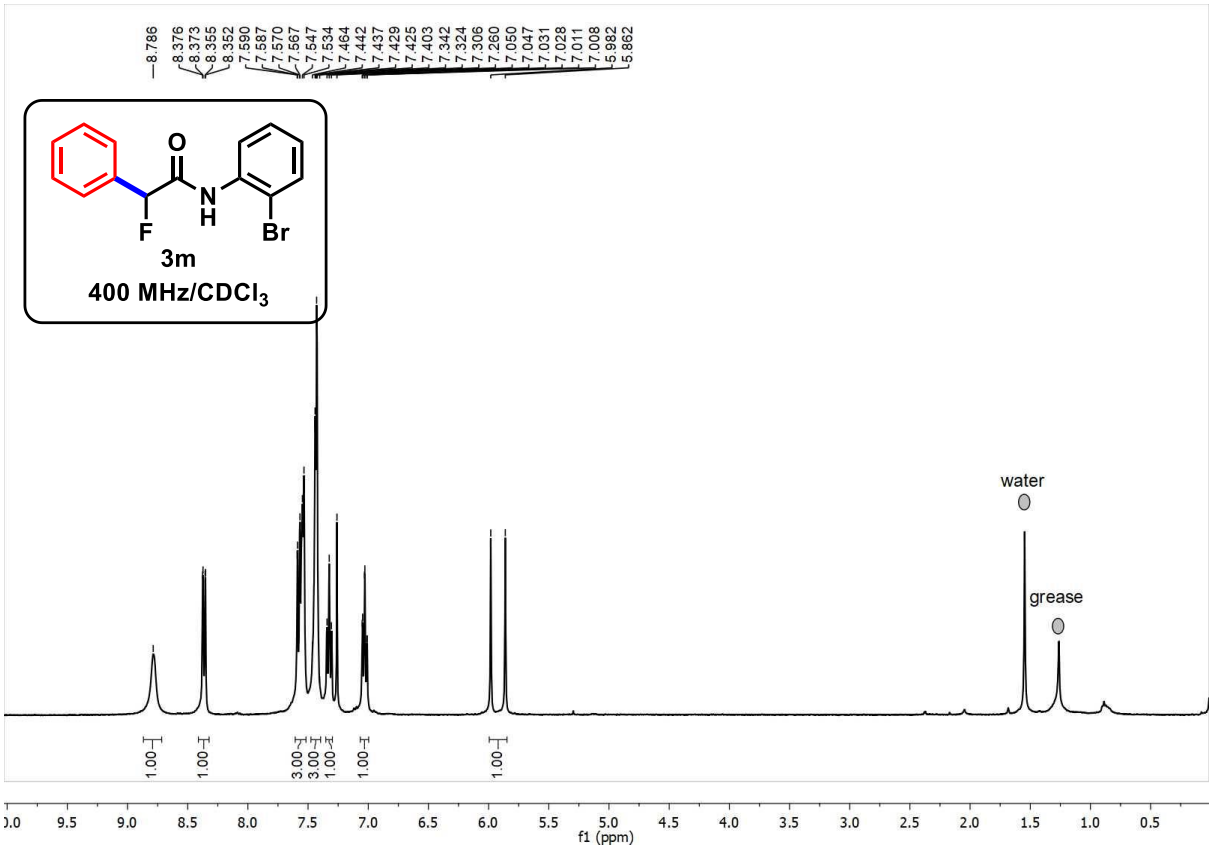

167.038
166.870
137.336
134.314
134.162
132.108
131.851
131.594
131.338
129.885
129.810
128.988
127.110
126.722
126.670
124.942
123.249
122.774
121.818
121.790
121.761
121.732
120.606
117.053
117.027
116.999
116.970
92.715
91.210
77.414
77.160
76.906
O
N
H
F
CF3
3k
100 MHz/CDCl3
f1 (ppm)

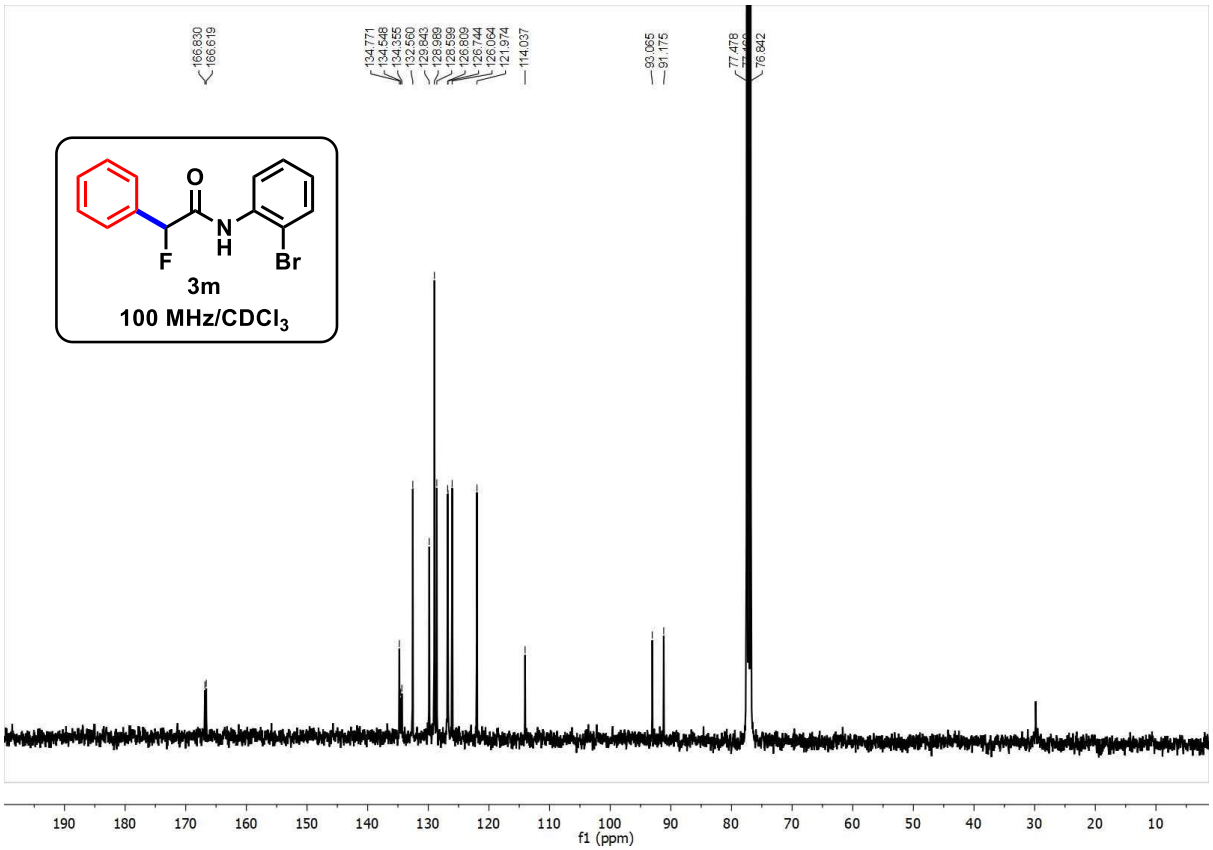

-62.828
-176.564
O
N
H
F
CF3
3k
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

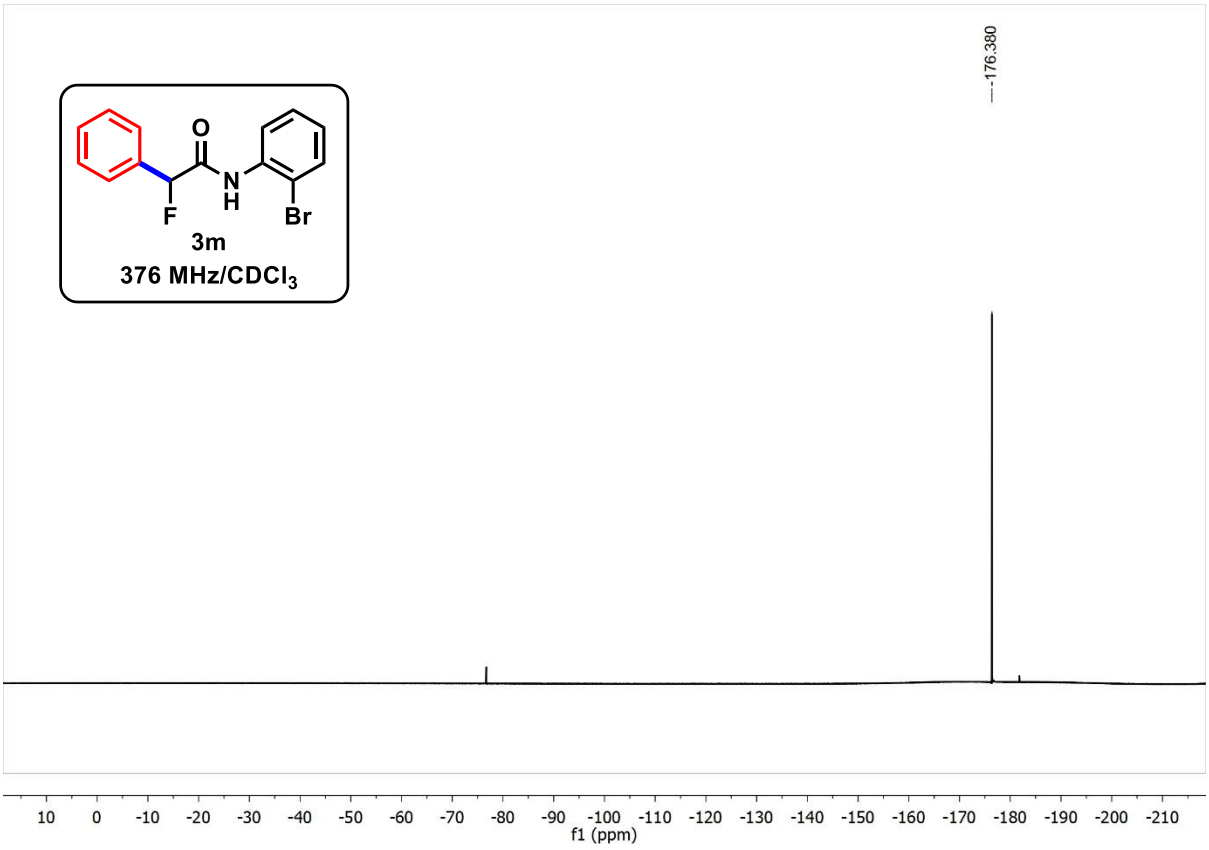

8.493
8.380
8.138
8.012
7.946
7.669
7.519
7.445
7.394
7.260
6.005
5.884
O
N
H
F
NO2
3l
400 MHz/CDCl3
water
1.00
1.00
2.00
5.00
1.00
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

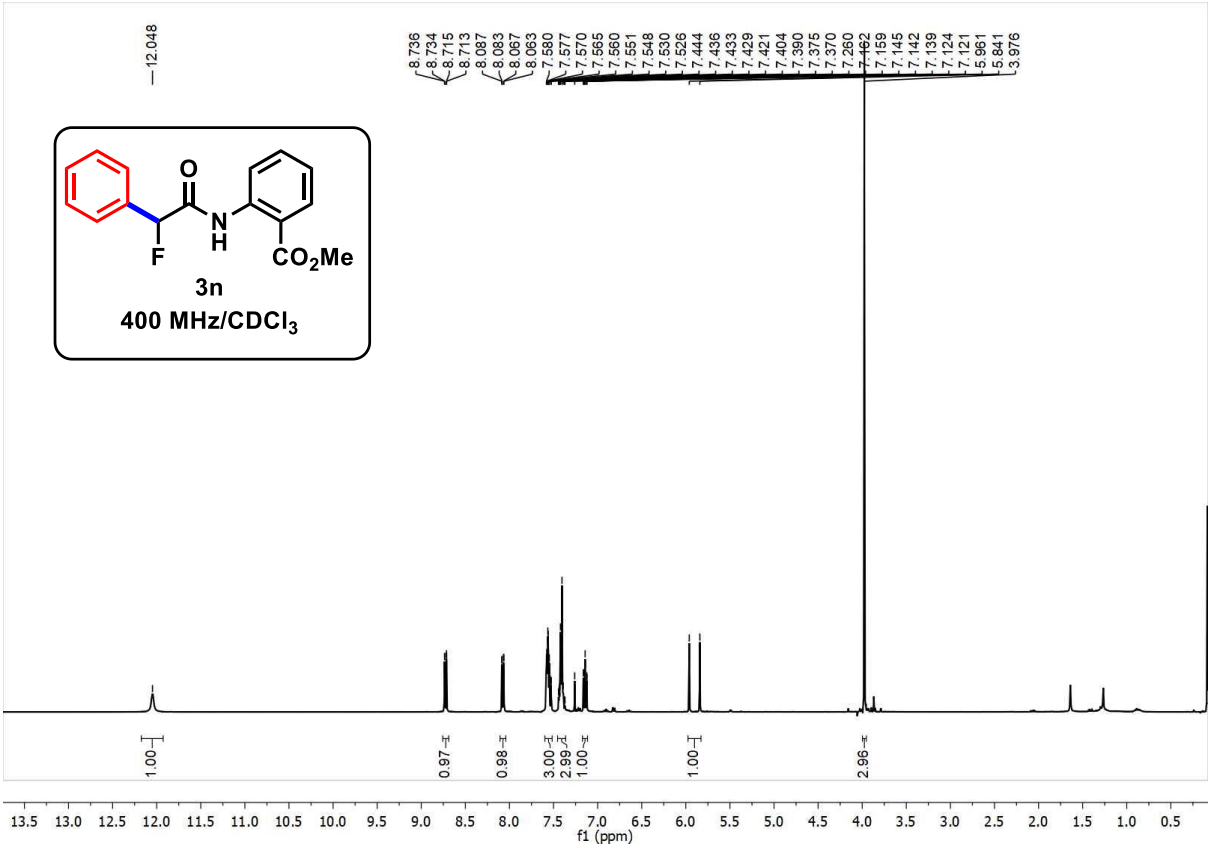

167.245
167.032
148.743
137.886
134.102
133.910
130.134
129.989
129.966
129.037
126.670
126.604
125.816
119.820
115.083
92.863
90.978
77.478
76.842
O
N
H
F
NO2
3l
100 MHz/CDCl3
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

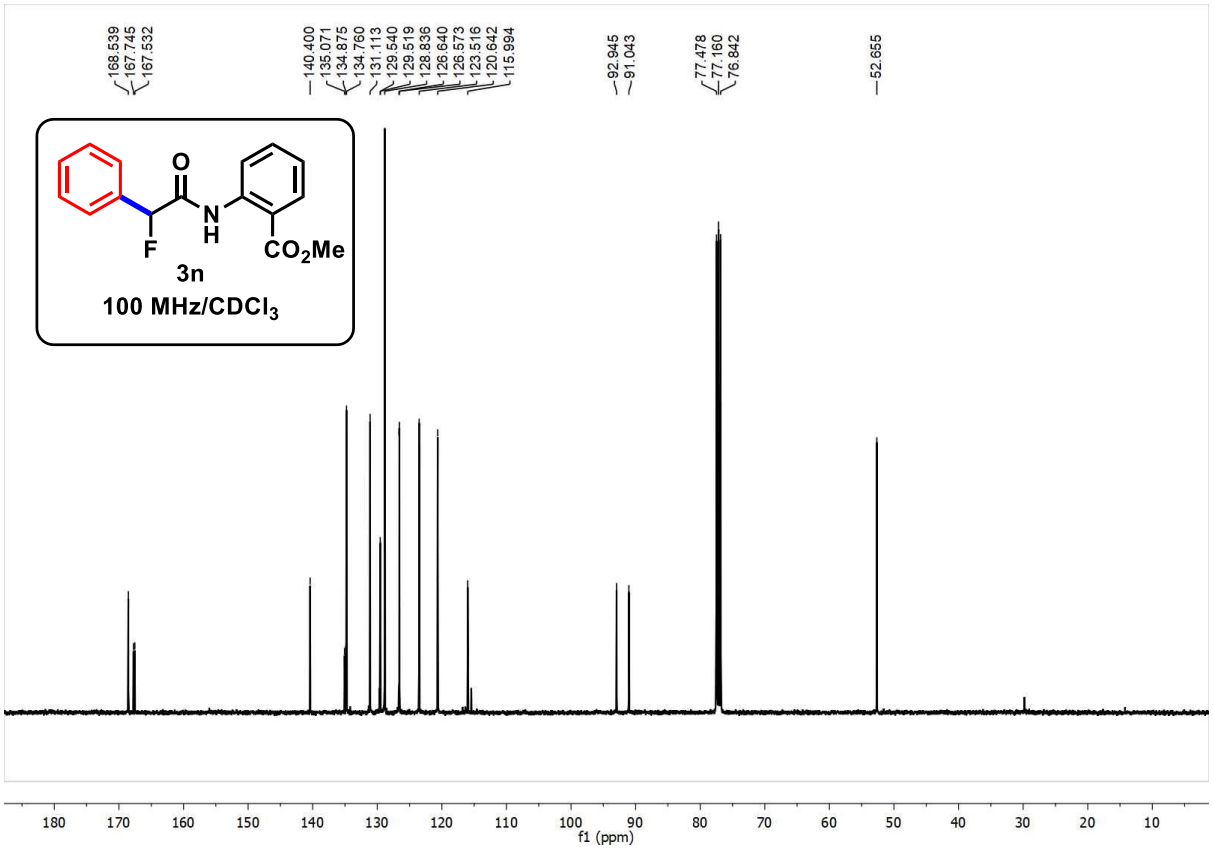

-176.846
O
N
H
F
NO2
3l
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

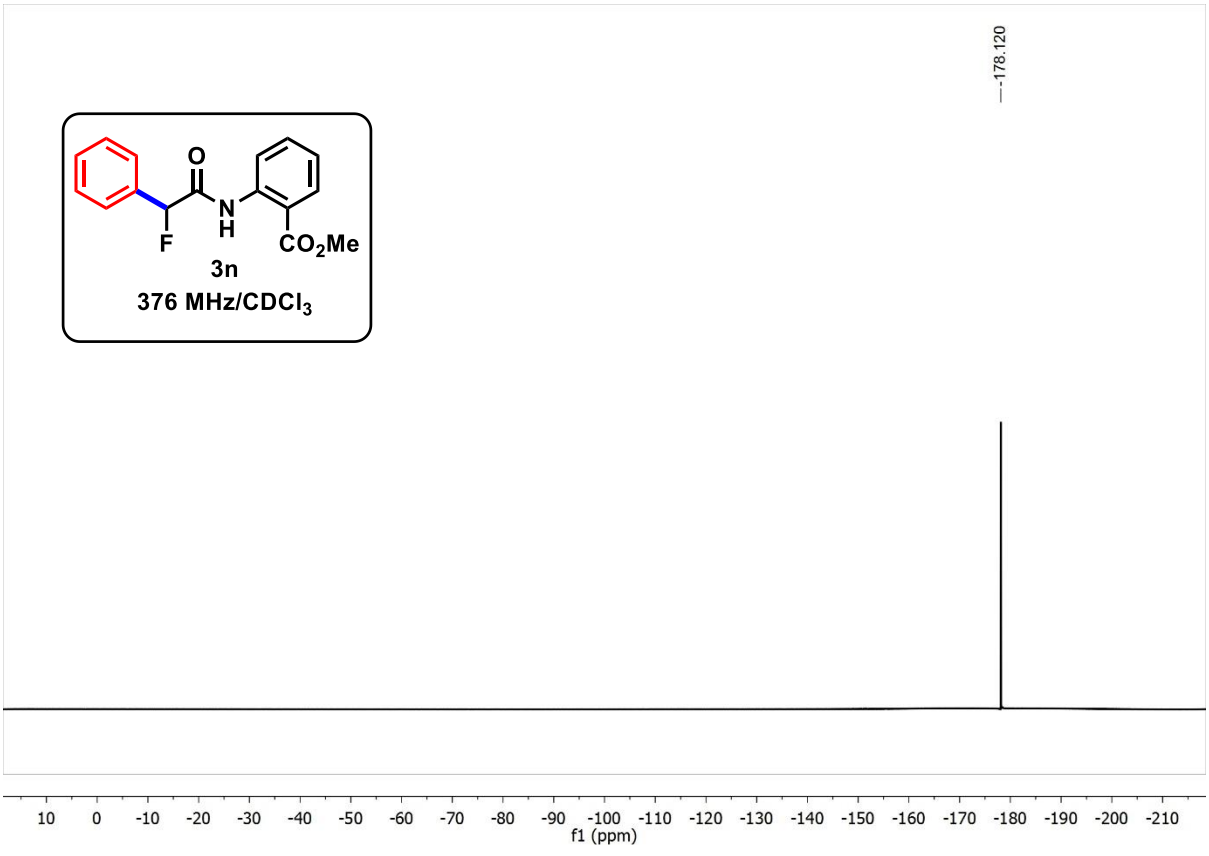

8.786
8.376
8.373
8.355
8.352
7.590
7.587
7.570
7.567
7.547
7.534
7.464
7.442
7.437
7.429
7.425
7.403
7.342
7.324
7.306
7.260
7.050
7.047
7.031
7.028
7.011
7.008
5.982
5.862
O
N
H
F
Br
3m
400 MHz/CDCl3
water
grease
1.00
1.00
3.00
3.00
1.00
1.00
1.00
f1 (ppm)

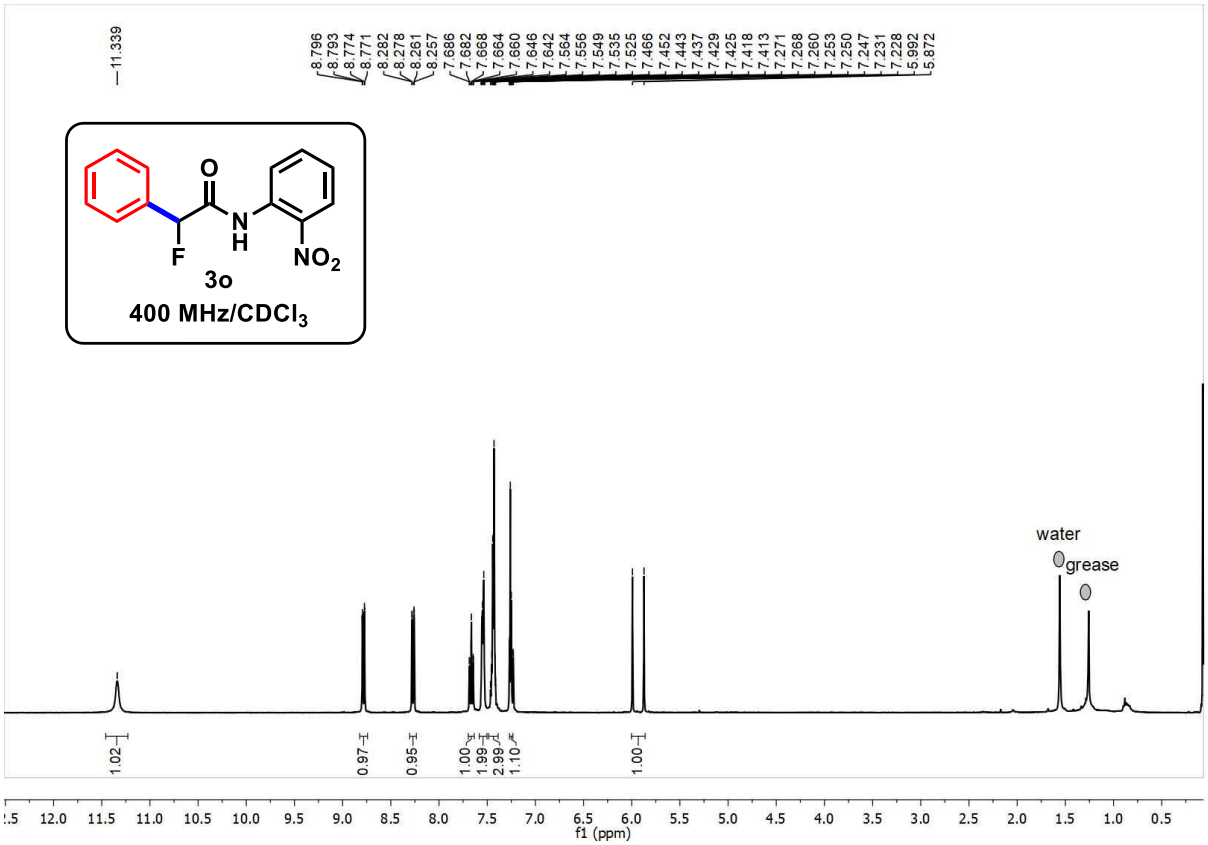

166.830
166.619
134.771
134.548
134.355
132.560
129.843
128.989
128.599
126.809
126.744
126.064
121.974
114.037
90.065
91.175
77.478
76.842
O
N
H
F
Br
3m
100 MHz/CDCl3
f1 (ppm)

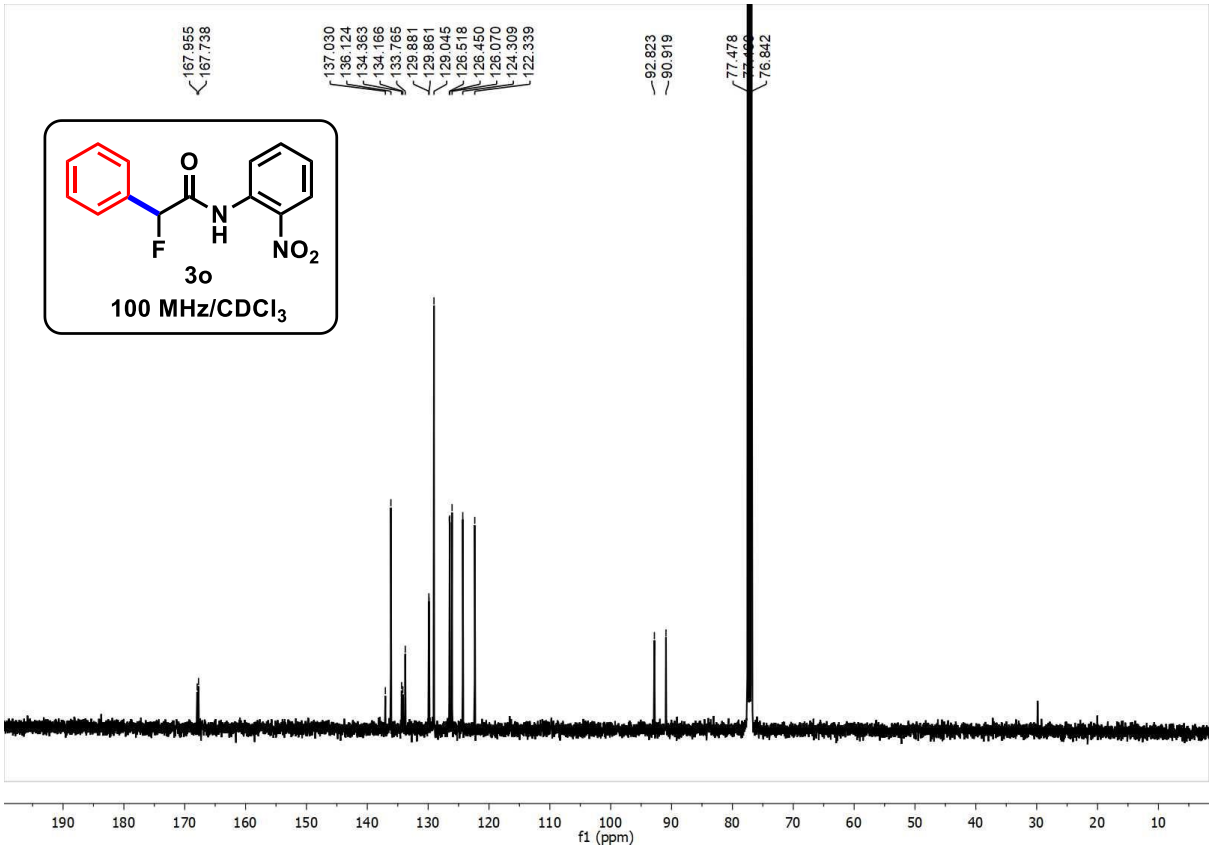

-176.380
3m
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

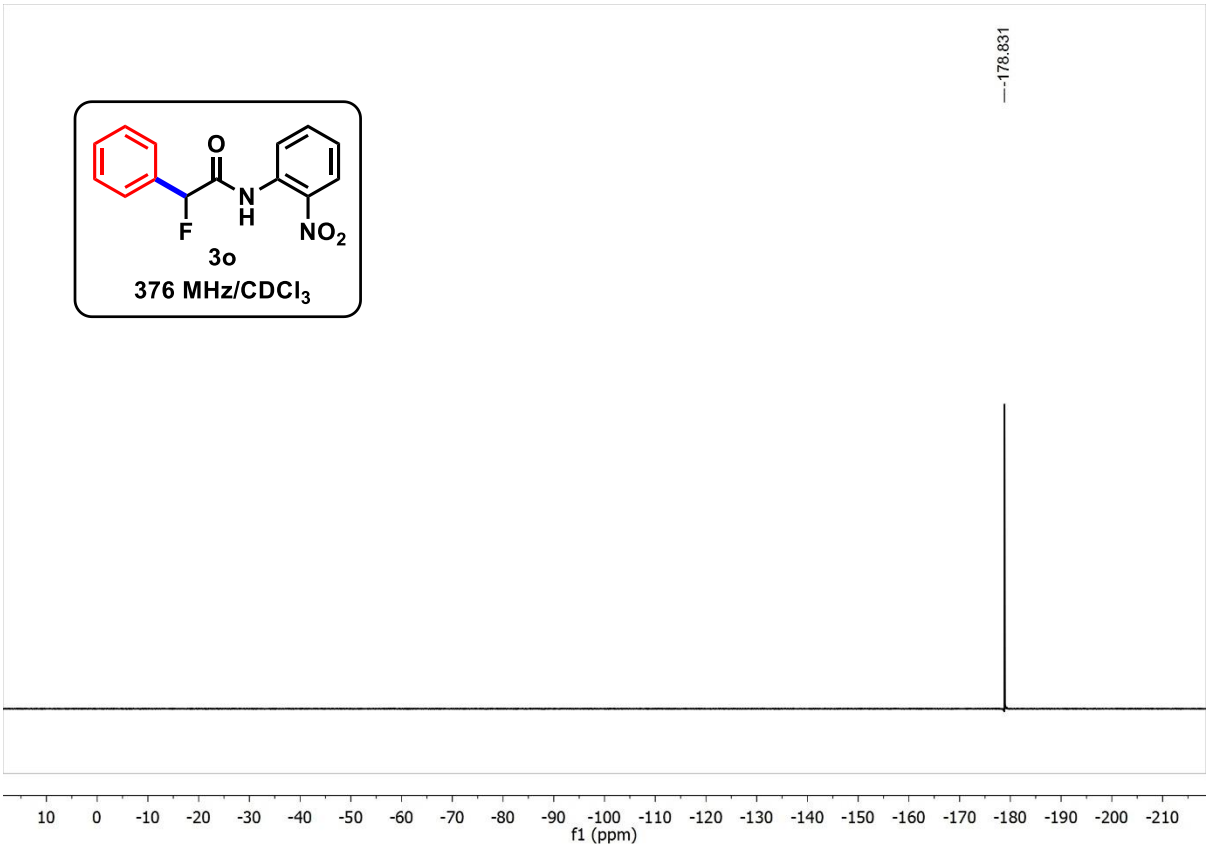

12.048
8.736
8.734
8.715
8.713
8.087
8.083
8.067
8.063
7.580
7.577
7.570
7.565
7.560
7.551
7.548
7.530
7.526
7.444
7.436
7.433
7.429
7.421
7.404
7.390
7.375
7.370
7.260
7.162
7.159
7.145
7.142
7.139
7.124
7.121
5.961
5.841
3.976
3n
400 MHz/CDCl3
1.00
0.97
0.98
3.00
2.99
1.00
1.00
2.96
13.5 13.0 12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

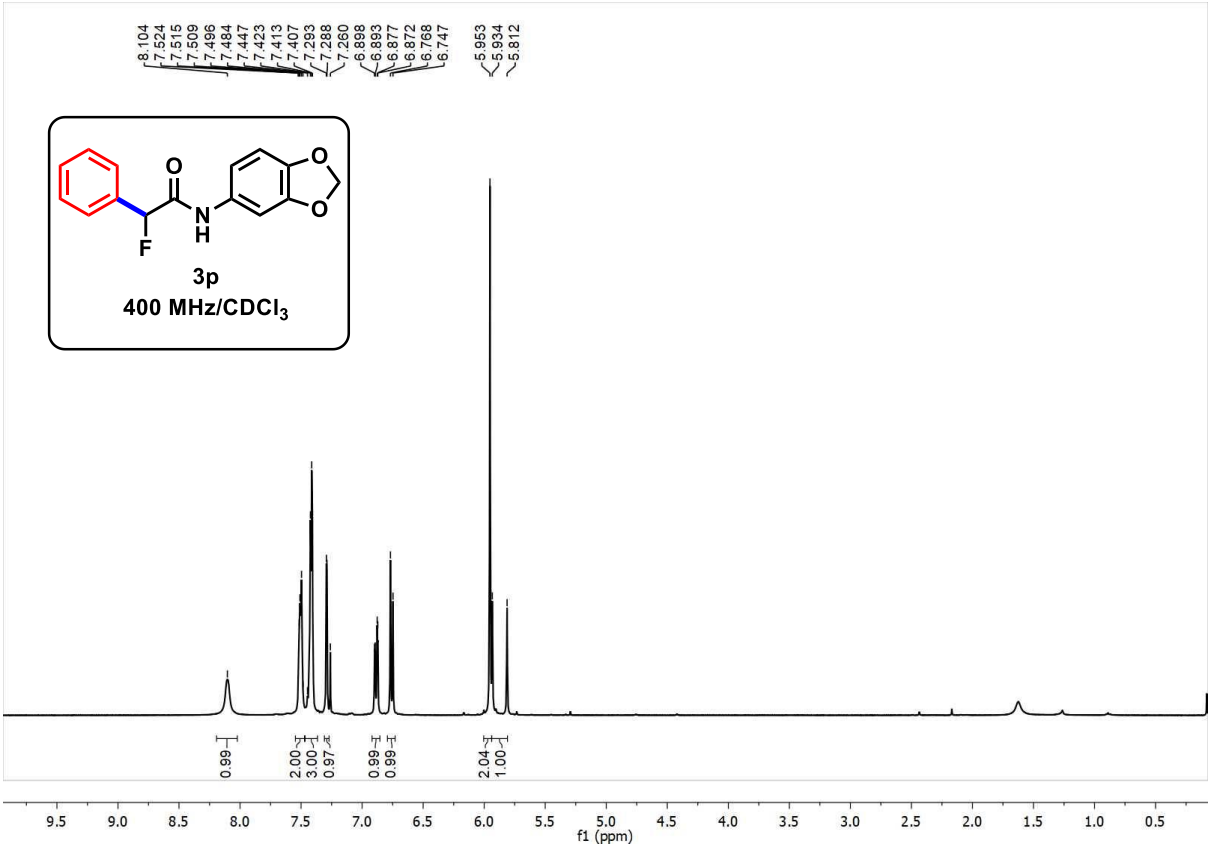

168.539
167.745
167.532
140.400
135.071
134.875
134.760
131.113
129.540
129.519
128.836
126.640
126.573
123.516
120.642
115.994
92.945
91.043
77.478
77.160
76.842
52.655
O
N
H
F
CO2Me
3n
100 MHz/CDCl3
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

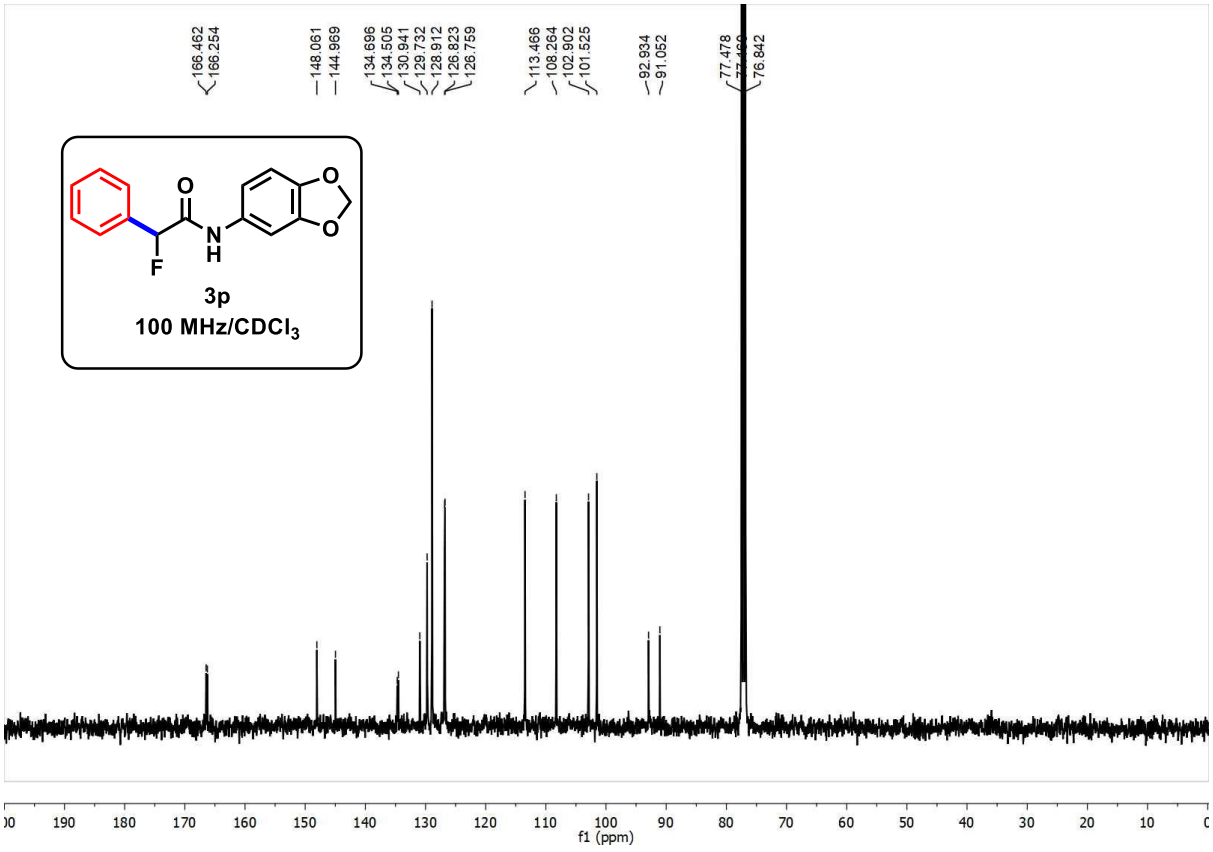

178.120
O
N
H
F
CO2Me
3n
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

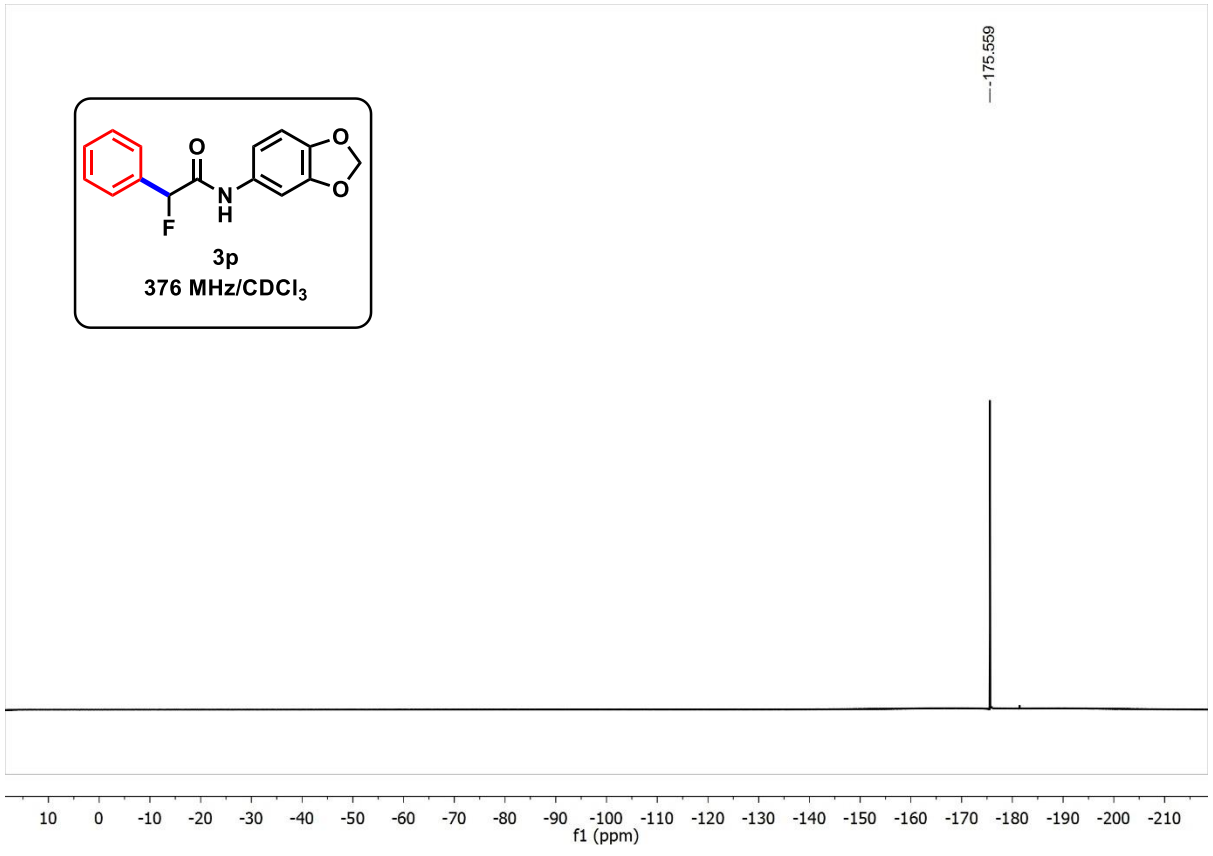

11.339
8.796
8.793
8.774
8.771
8.282
8.278
8.261
8.257
7.686
7.682
7.668
7.664
7.660
7.646
7.642
7.564
7.556
7.549
7.535
7.525
7.466
7.452
7.443
7.437
7.429
7.425
7.418
7.413
7.271
7.268
7.260
7.253
7.250
7.247
7.231
7.228
5.992
5.872
O
N
H
F
NO2
3o
400 MHz/CDCl3
water
grease
1.02
0.97
0.95
1.00
1.99
2.99
1.10
1.00
f1 (ppm)

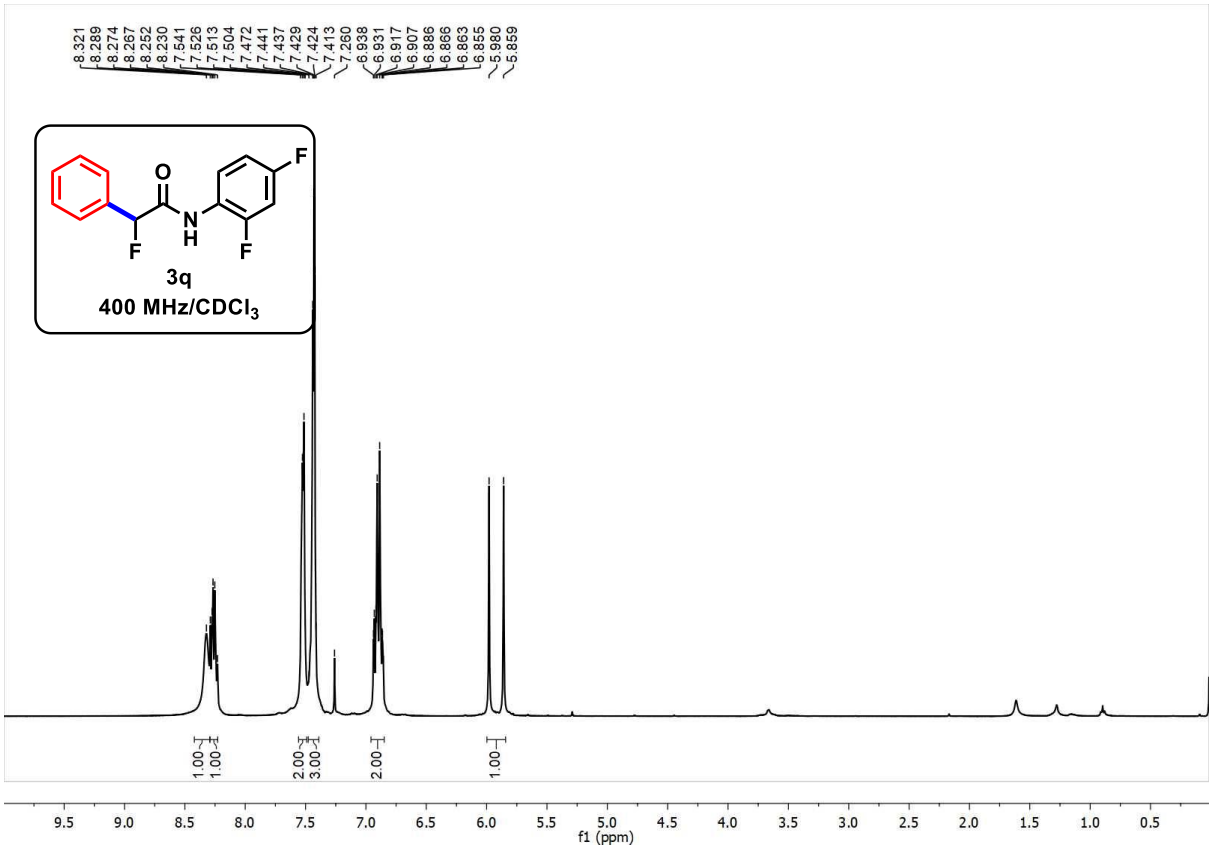

167.955
167.738
137.030
136.124
134.363
134.166
133.765
129.881
129.045
126.518
126.450
126.070
124.309
122.339
92.823
90.919
77.478
76.842
O
N
H
F
NO2
3o
100 MHz/CDCl3
f1 (ppm)

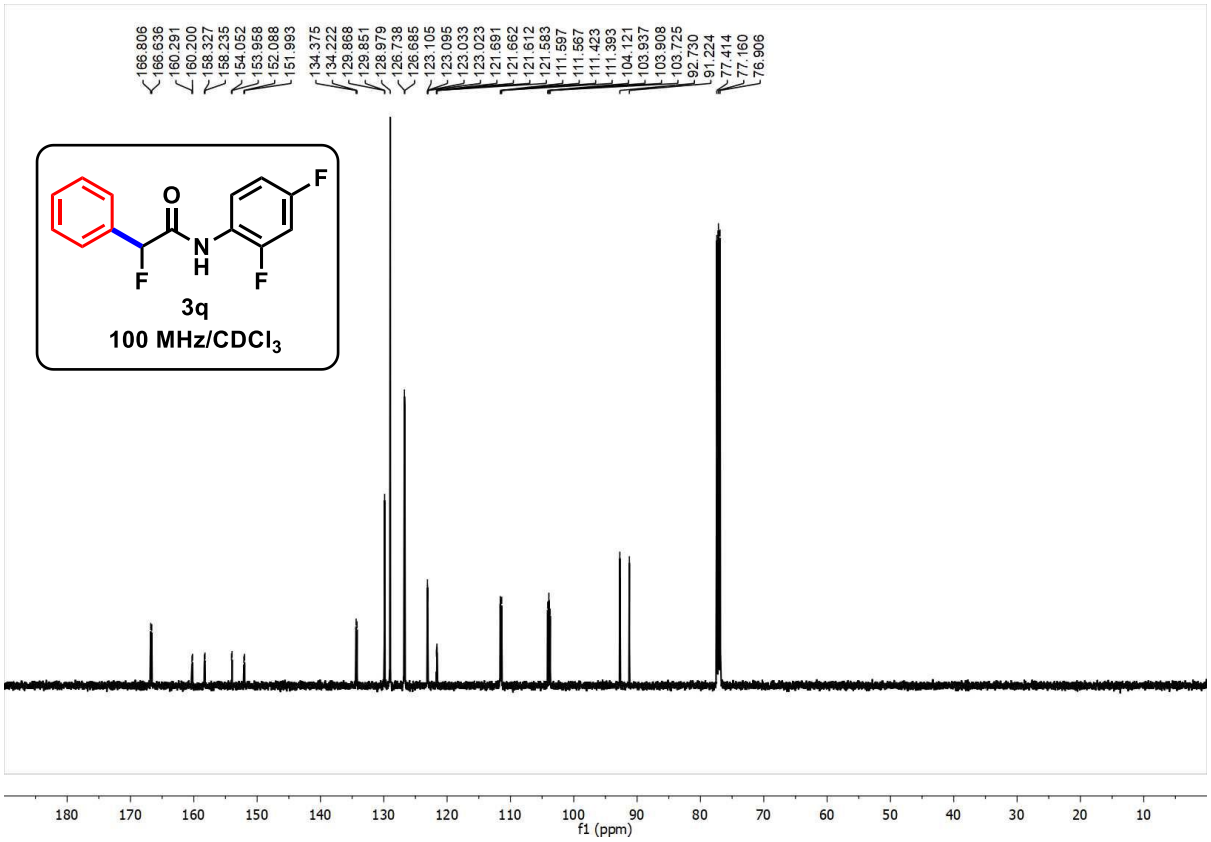

-178.831
3o
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

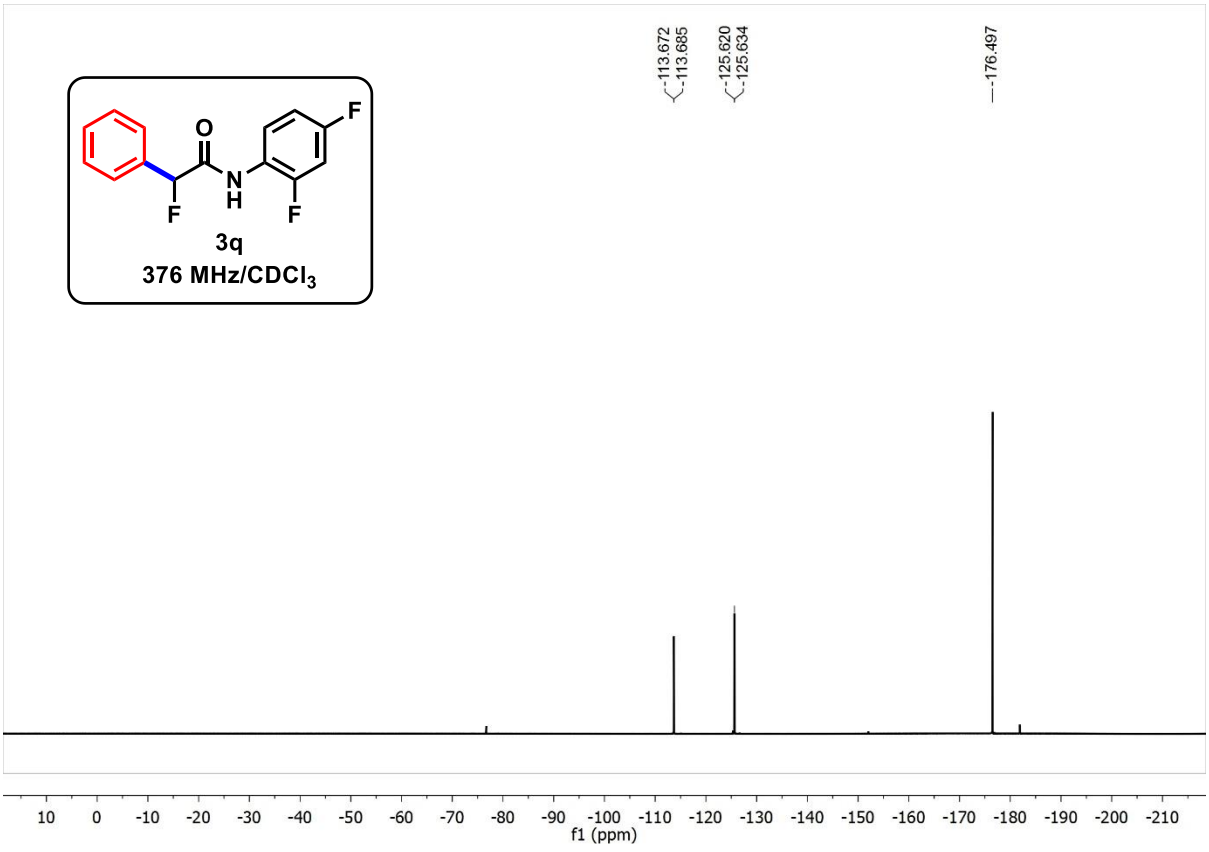

8.104
7.524
7.515
7.509
7.496
7.484
7.447
7.423
7.413
7.407
7.293
7.288
7.260
6.898
6.893
6.877
6.872
6.768
6.747
5.953
5.934
5.812
3p
400 MHz/CDCl3
0.99
2.00
3.00
0.97
0.99
0.99
2.04
1.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

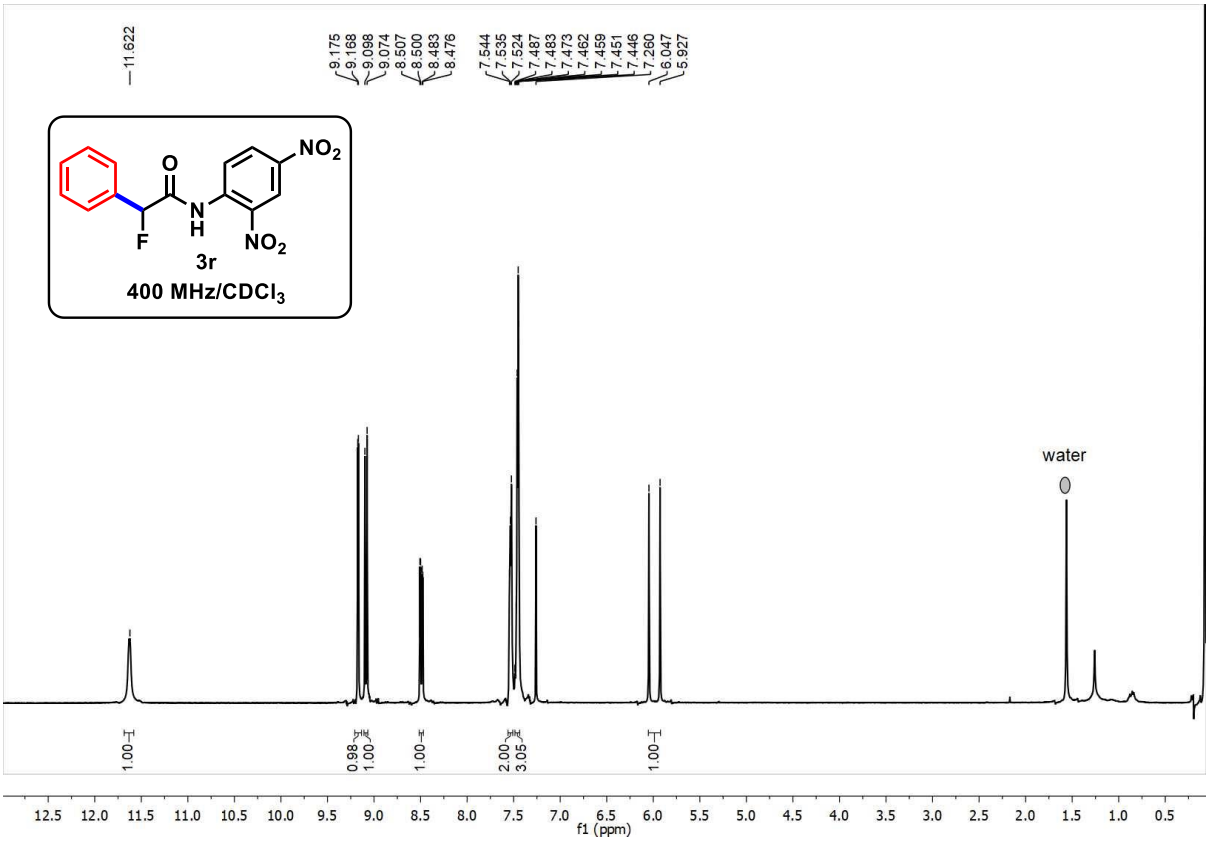

166.462
166.254
148.061
144.969
134.696
134.505
130.941
129.732
128.912
126.823
126.759
113.466
108.264
102.902
101.525
92.934
91.052
77.478
76.842
O
O
N
H
O
F
3p
100 MHz/CDCl3
f1 (ppm)

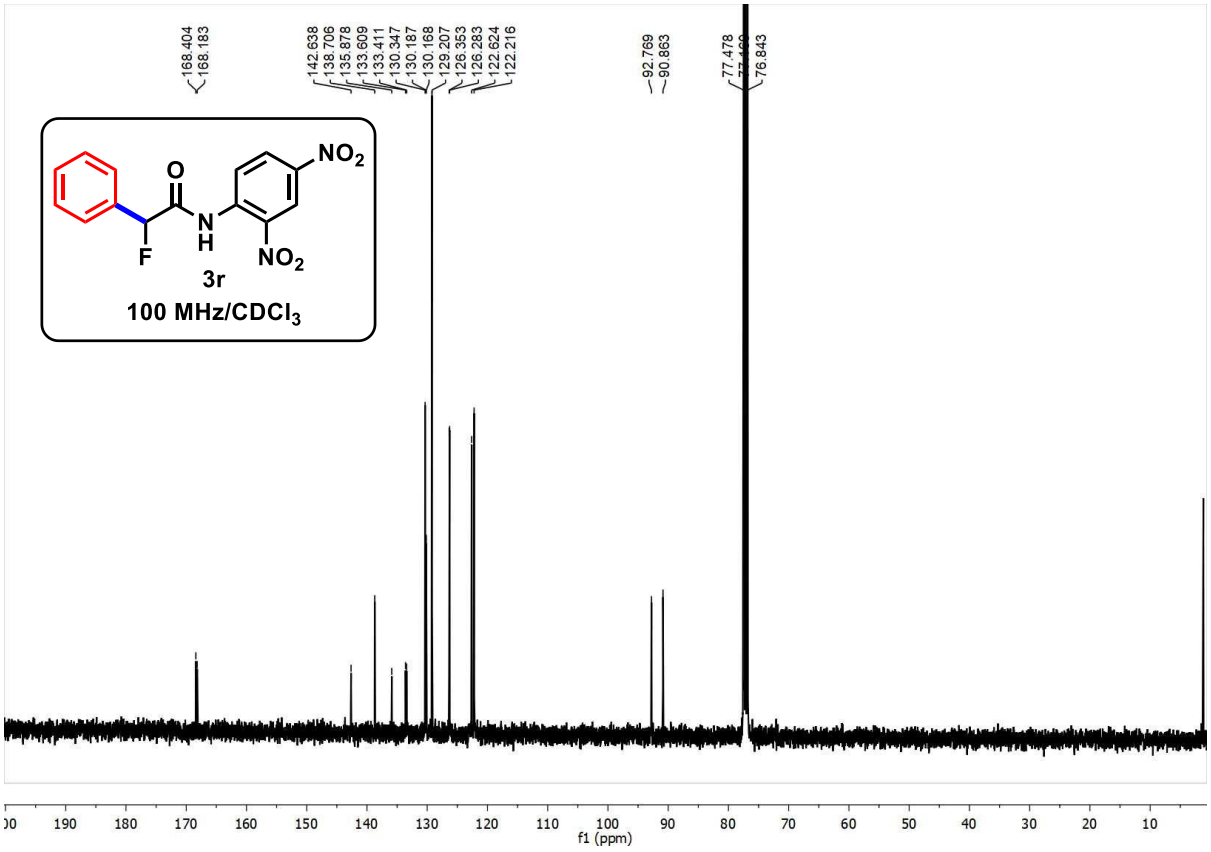

-175.559
O
O
N
H
O
F
3p
376 MHz/CDCl3
f1 (ppm)

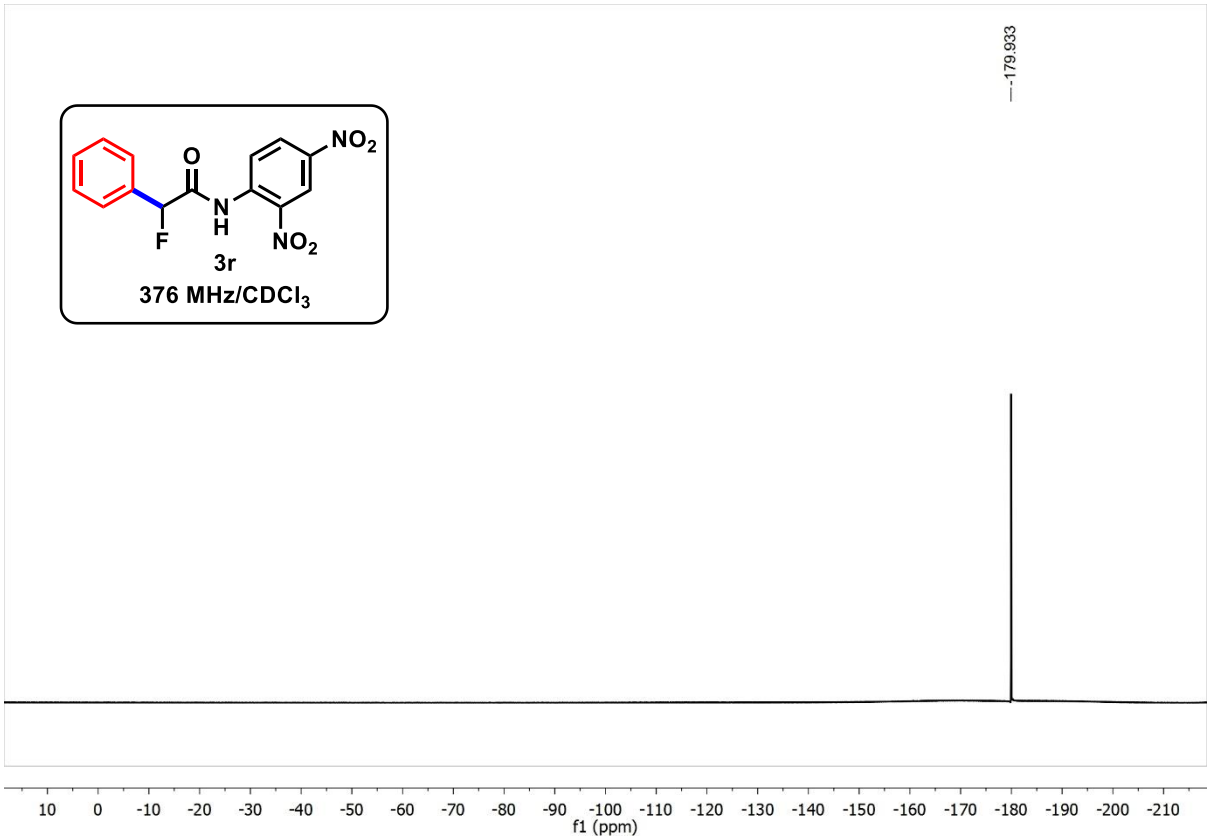

8.321
8.289
8.274
8.267
8.252
8.230
7.541
7.526
7.513
7.504
7.472
7.441
7.437
7.429
7.424
7.413
7.260
6.938
6.931
6.917
6.907
6.886
6.866
6.863
6.855
5.980
5.859
3q
400 MHz/CDCl3
1.00
1.00
2.00
3.00
2.00
1.00
f1 (ppm)

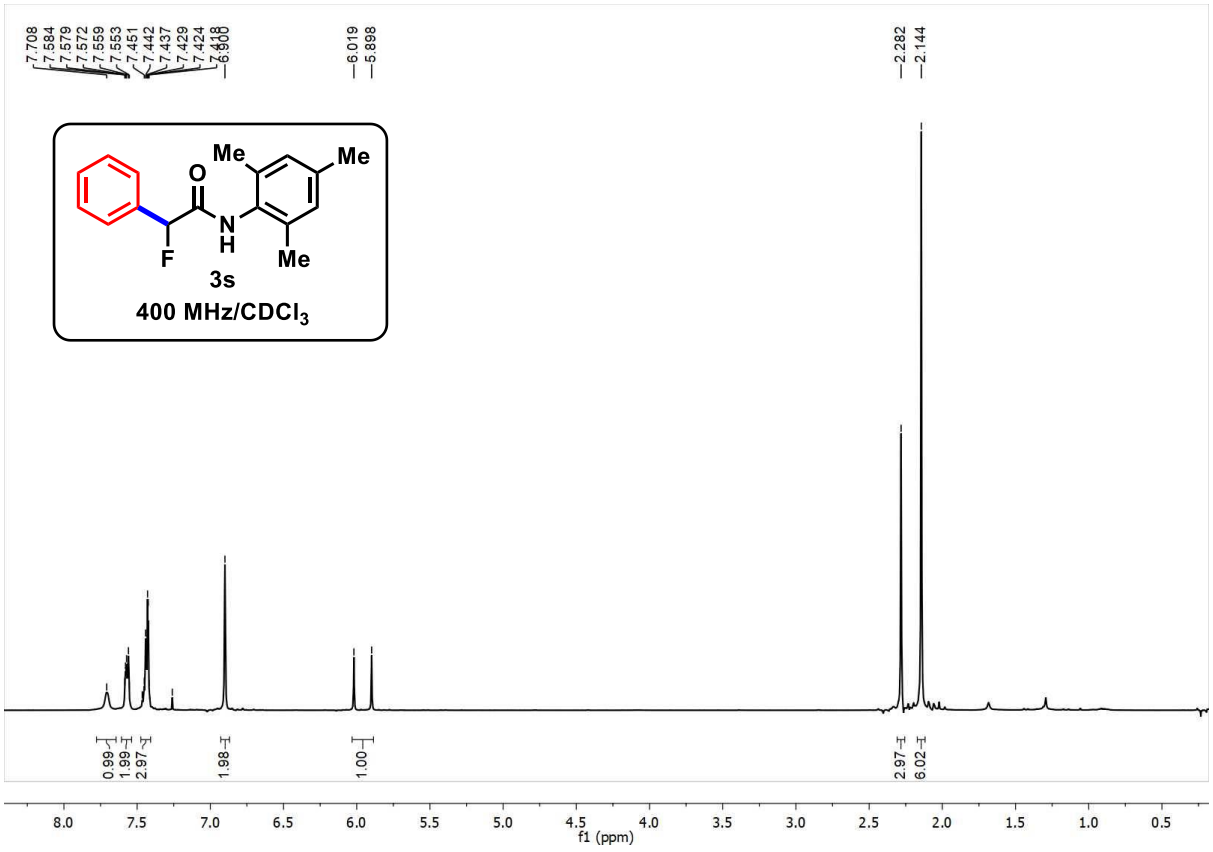

166.806
166.636
160.291
160.200
158.327
158.235
154.052
153.958
152.088
151.993
134.375
134.222
129.868
129.851
128.979
126.738
126.685
123.105
123.095
123.033
123.023
121.691
121.662
121.612
121.583
111.597
111.567
111.423
111.393
104.121
103.937
103.908
103.725
92.730
91.224
77.414
77.160
76.906
3q
100 MHz/CDCl3
f1 (ppm)

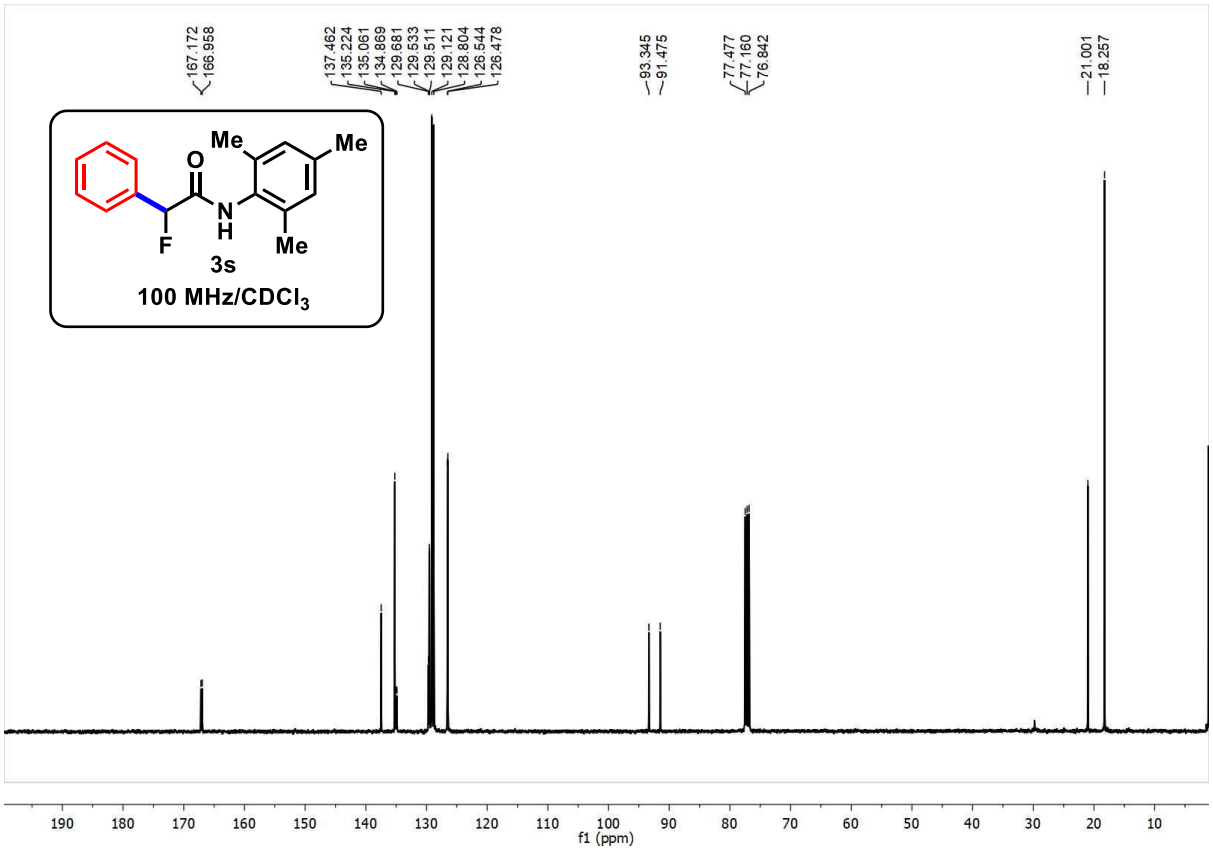

-113.672
-113.685
-125.620
-125.634
-176.497
3q
376 MHz/CDCl3
f1 (ppm)

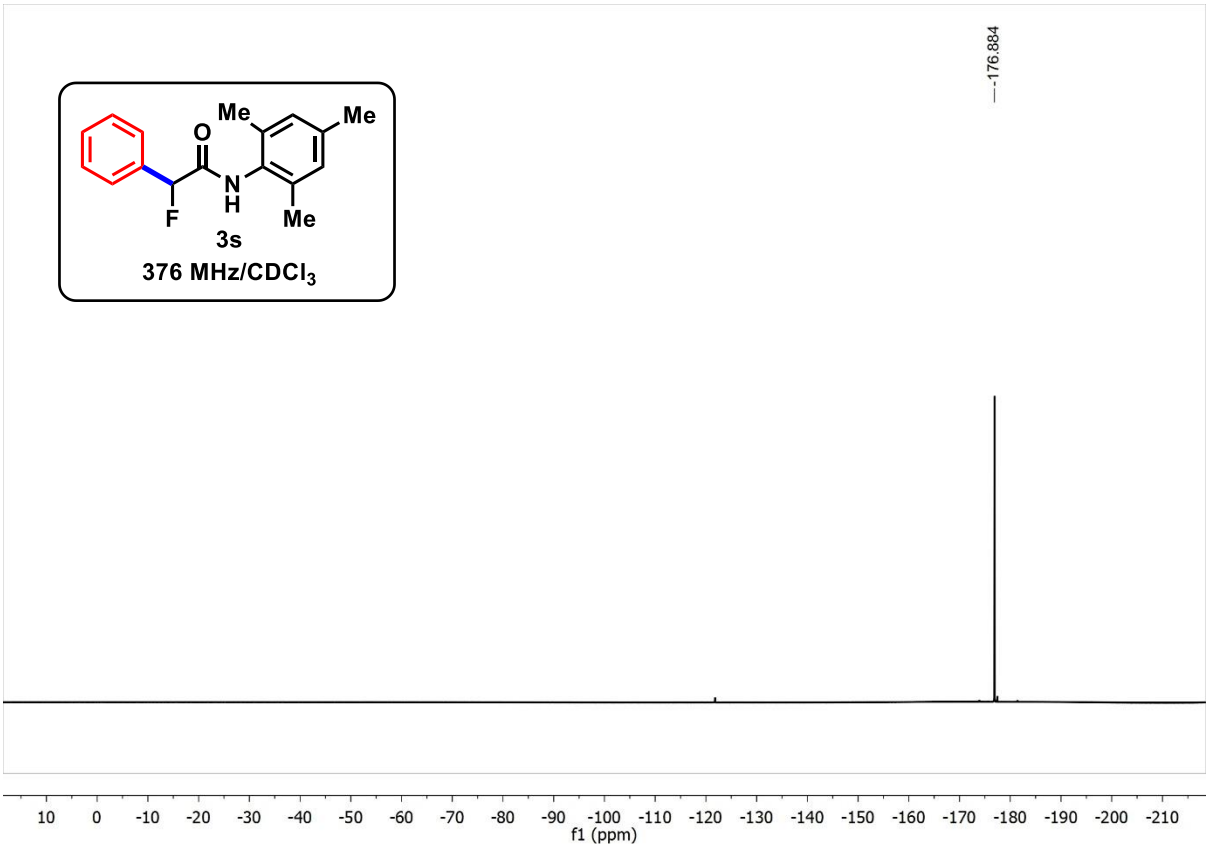

11.622
9.175
9.168
9.098
9.074
8.507
8.500
8.483
8.476
7.544
7.535
7.524
7.487
7.483
7.473
7.462
7.459
7.451
7.446
7.260
6.047
5.927
water
3r
400 MHz/CDCl3
f1 (ppm)

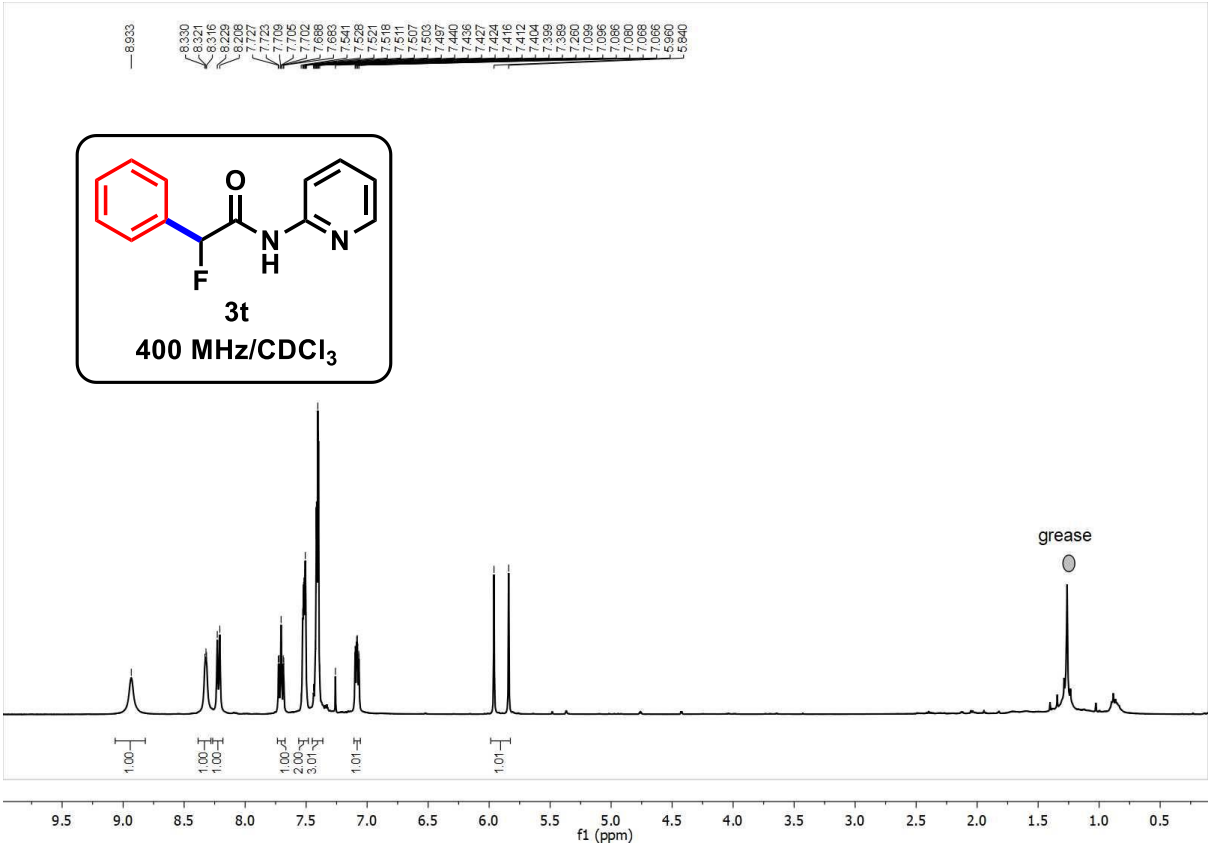

168.404
168.183
142.638
138.706
135.878
133.609
133.411
130.347
130.187
130.168
129.207
126.353
126.283
122.624
122.216
92.769
90.863
77.478
76.843
O
N
H
F
NO2
NO2
3r
100 MHz/CDCl3
f1 (ppm)

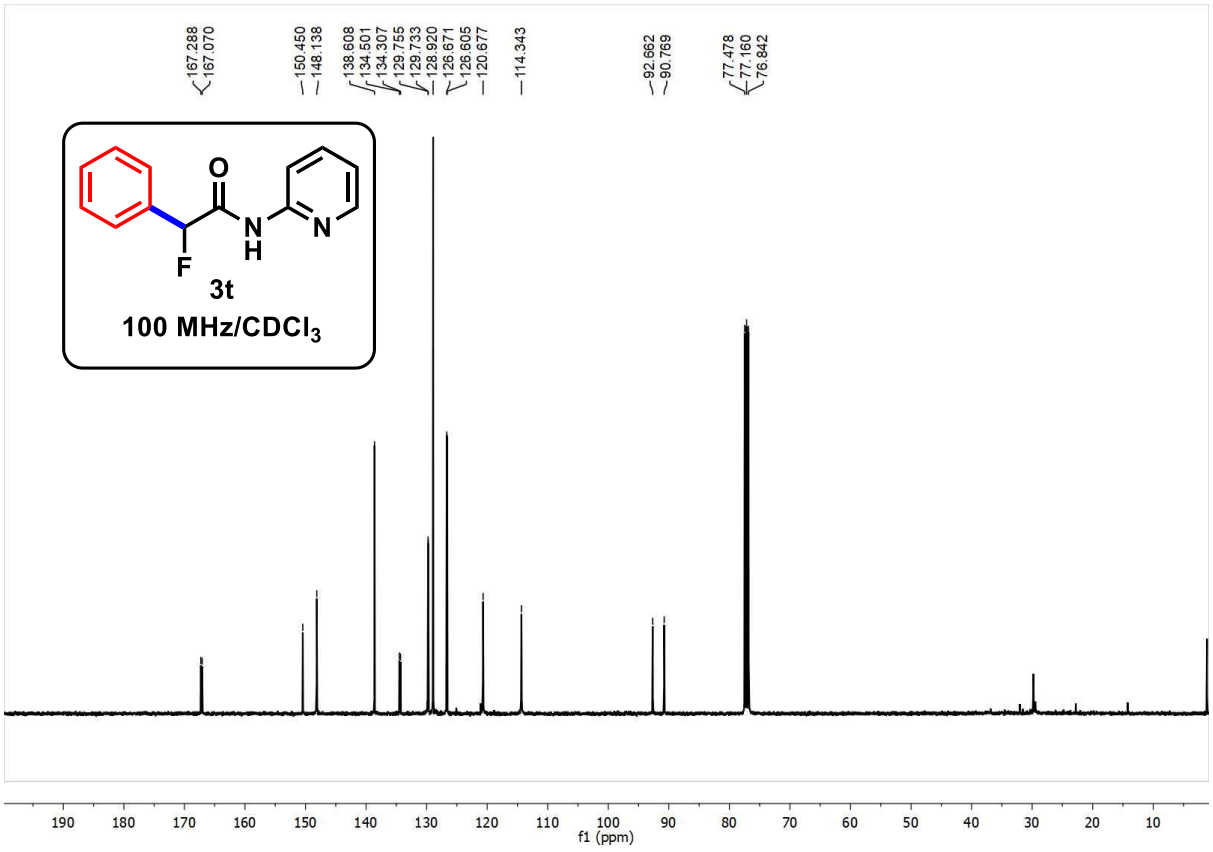

-179.933
O
N
H
F
NO2
NO2
3r
376 MHz/CDCl3
f1 (ppm)

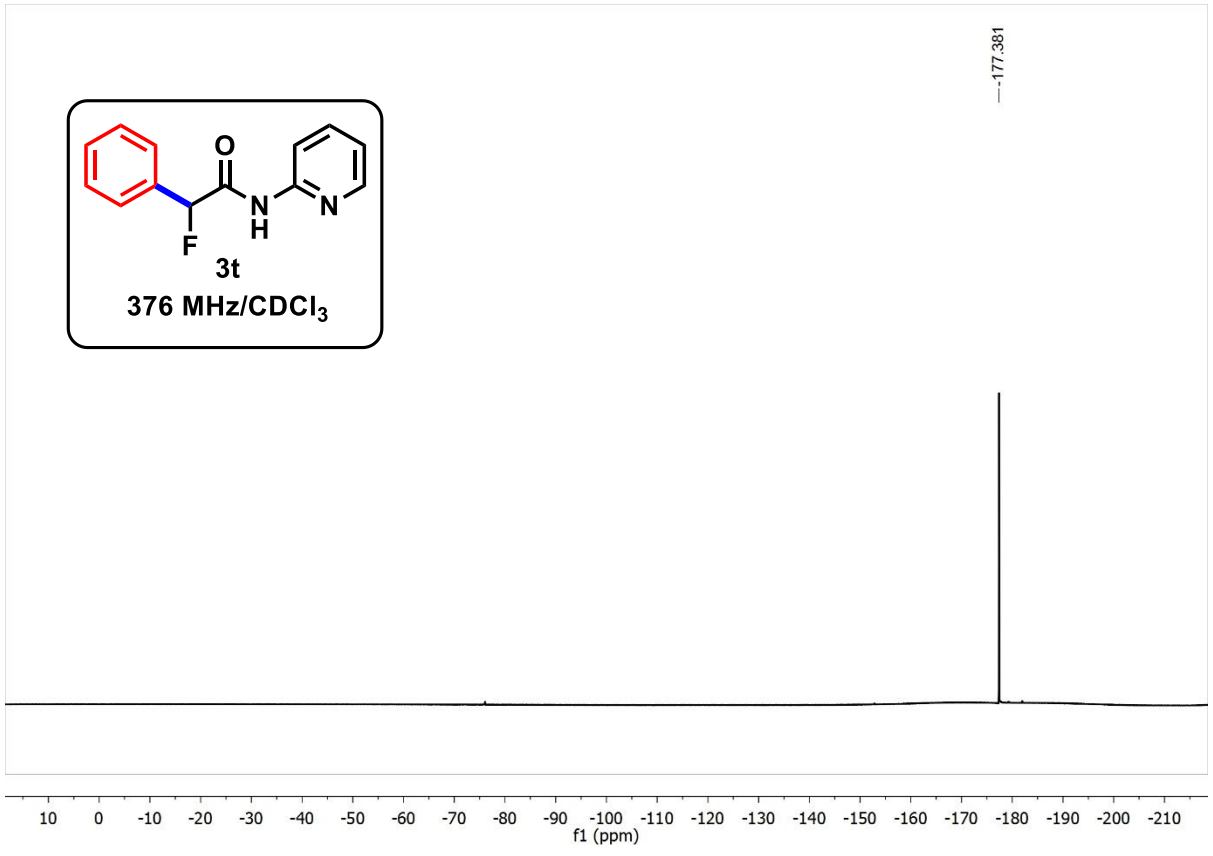

7.708
7.584
7.579
7.572
7.559
7.553
7.451
7.442
7.437
7.429
7.424
7.418
7.400
6.019
5.898
2.282
2.144
Me
Me
O
N
H
F
Me
3s
400 MHz/CDCl3
0.99
1.99
2.97
1.98
1.00
2.97
6.02
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

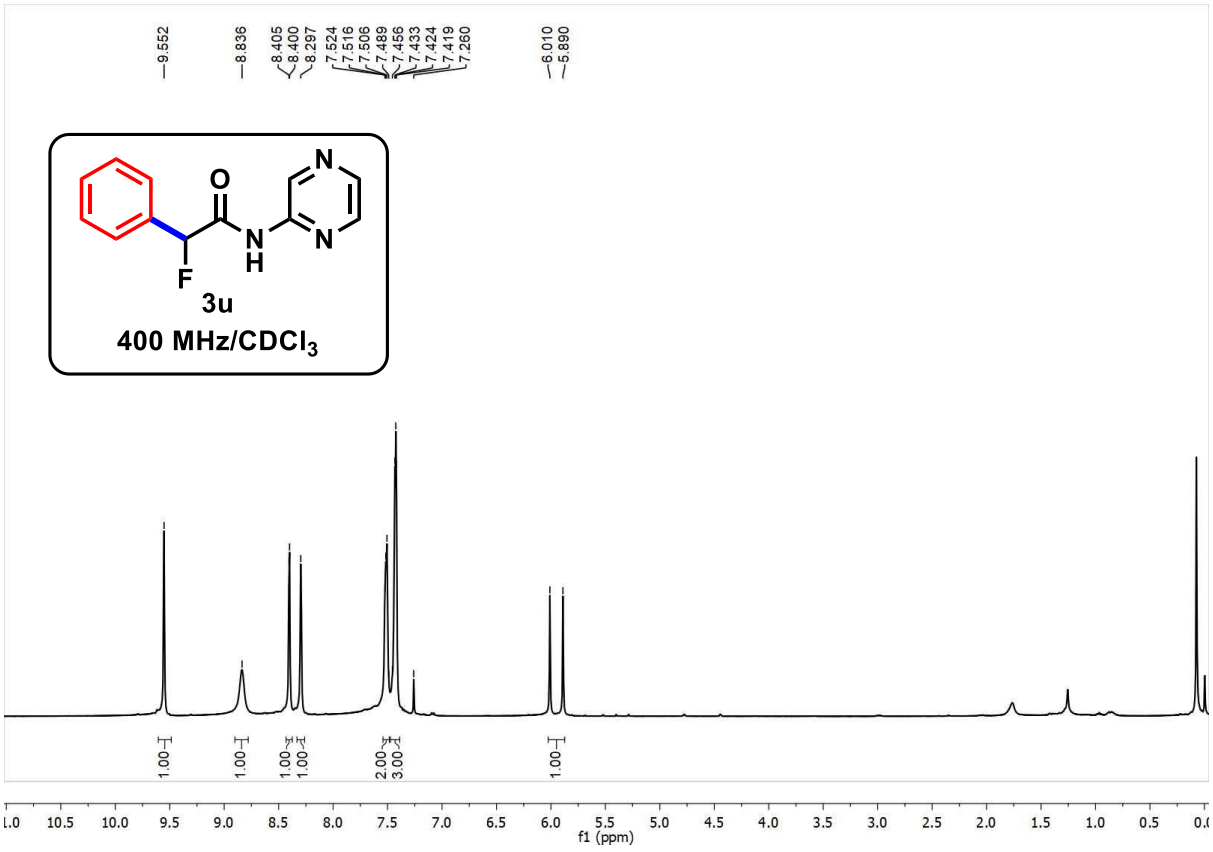

167.172
166.958
137.462
135.224
135.061
134.869
129.681
129.533
129.511
129.121
128.804
126.544
126.478
93.345
91.475
77.477
77.160
76.842
21.001
18.257
Me
Me
O
N
H
F
Me
3s
100 MHz/CDCl3
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

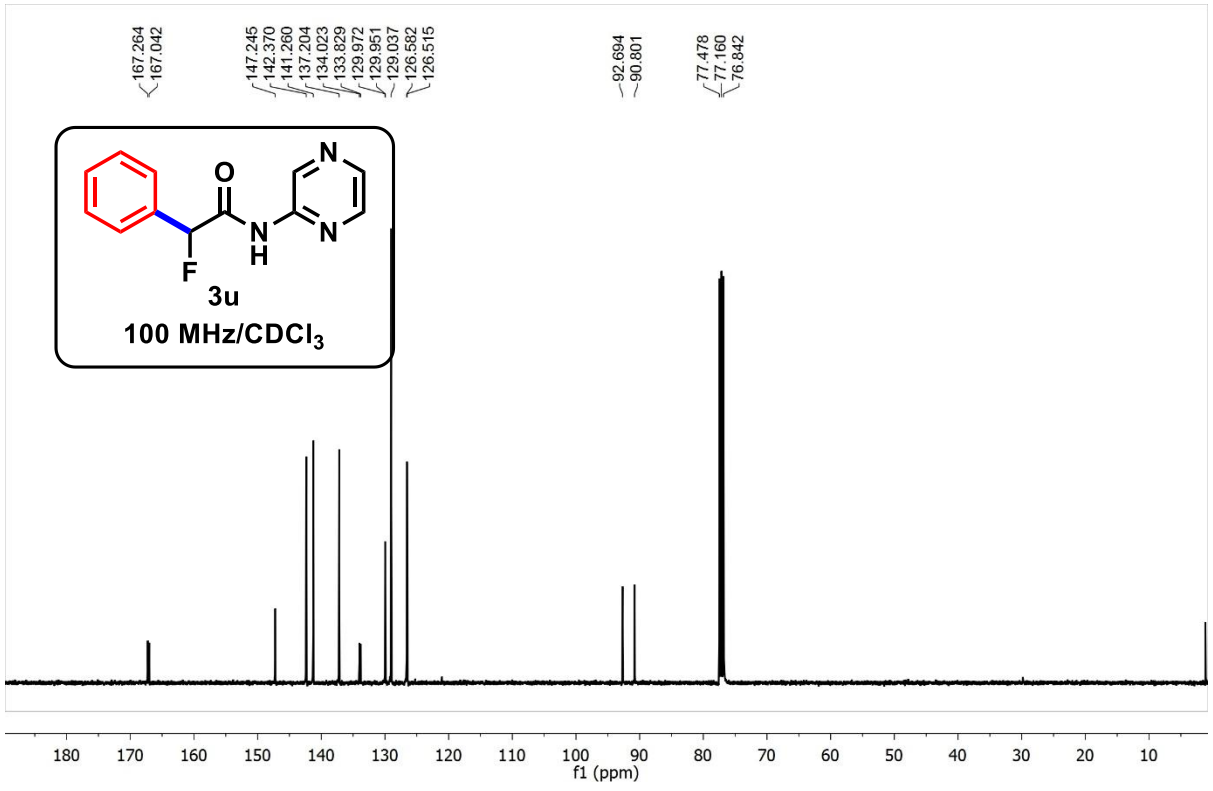

Me
Me
O
N
H
F
Me
3s
376 MHz/CDCl3
-176.884
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)


8.933
8.330
8.321
8.316
8.229
8.208
7.727
7.723
7.709
7.705
7.702
7.688
7.683
7.541
7.528
7.521
7.518
7.511
7.507
7.503
7.497
7.440
7.436
7.427
7.424
7.416
7.412
7.404
7.399
7.389
7.260
7.099
7.096
7.086
7.080
7.068
7.066
5.960
5.840
O
N
H
N
F
3t
400 MHz/CDCl3
grease
1.00
1.00
1.00
1.00
2.00
3.01
1.01
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)


167.288
167.070
150.450
148.138
138.608
134.501
134.307
129.755
129.733
128.920
126.671
126.605
120.677
114.343
92.662
90.769
77.478
77.160
76.842
O
N
H
N
F
3t
100 MHz/CDCl3
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)


-177.381
O
N
H
N
F
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)


9.552
8.836
8.405
8.400
8.297
7.524
7.516
7.506
7.489
7.456
7.433
7.424
7.419
7.260
6.010
5.890
3u
400 MHz/CDCl3
1.00
1.00
1.00
1.00
2.00
3.00
1.00
f1 (ppm)


167.264
167.042
147.245
142.370
141.260
137.204
134.023
133.829
129.972
129.951
129.037
126.582
126.515
92.694
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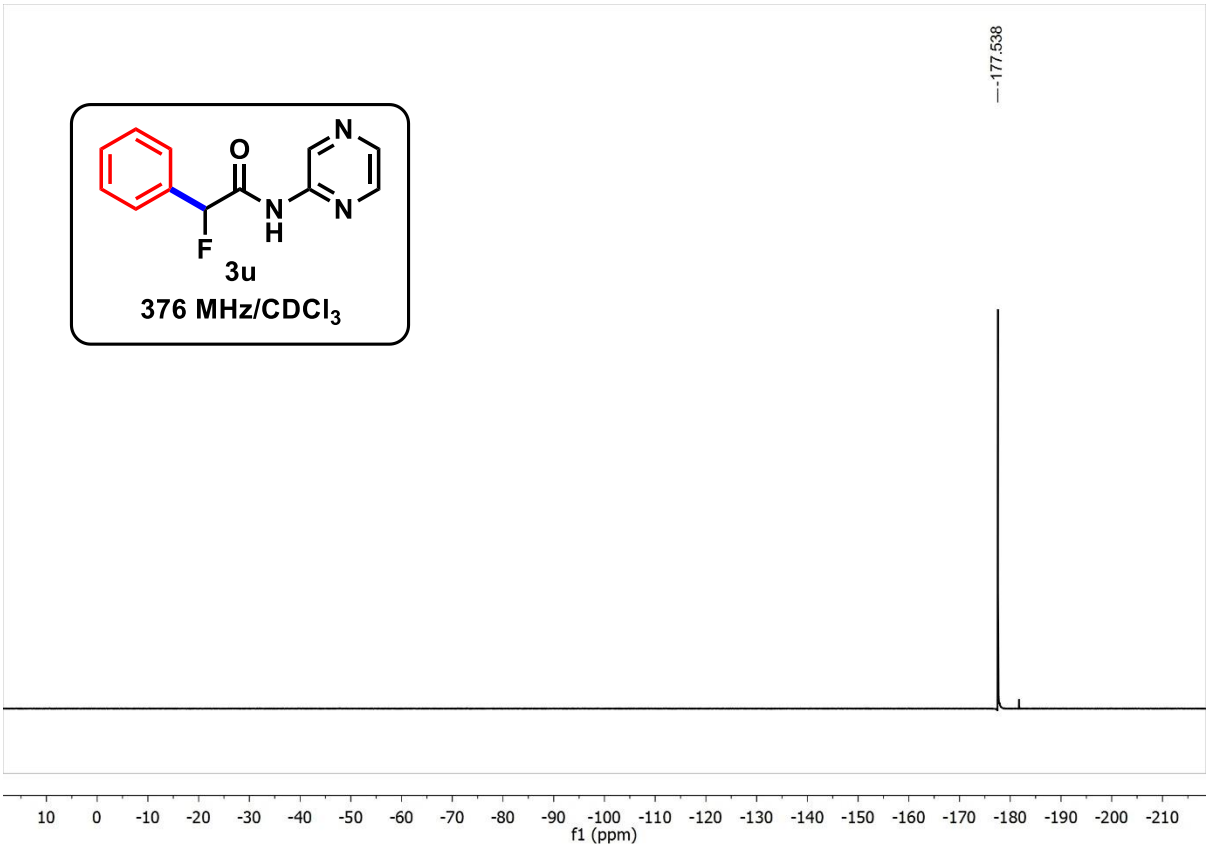
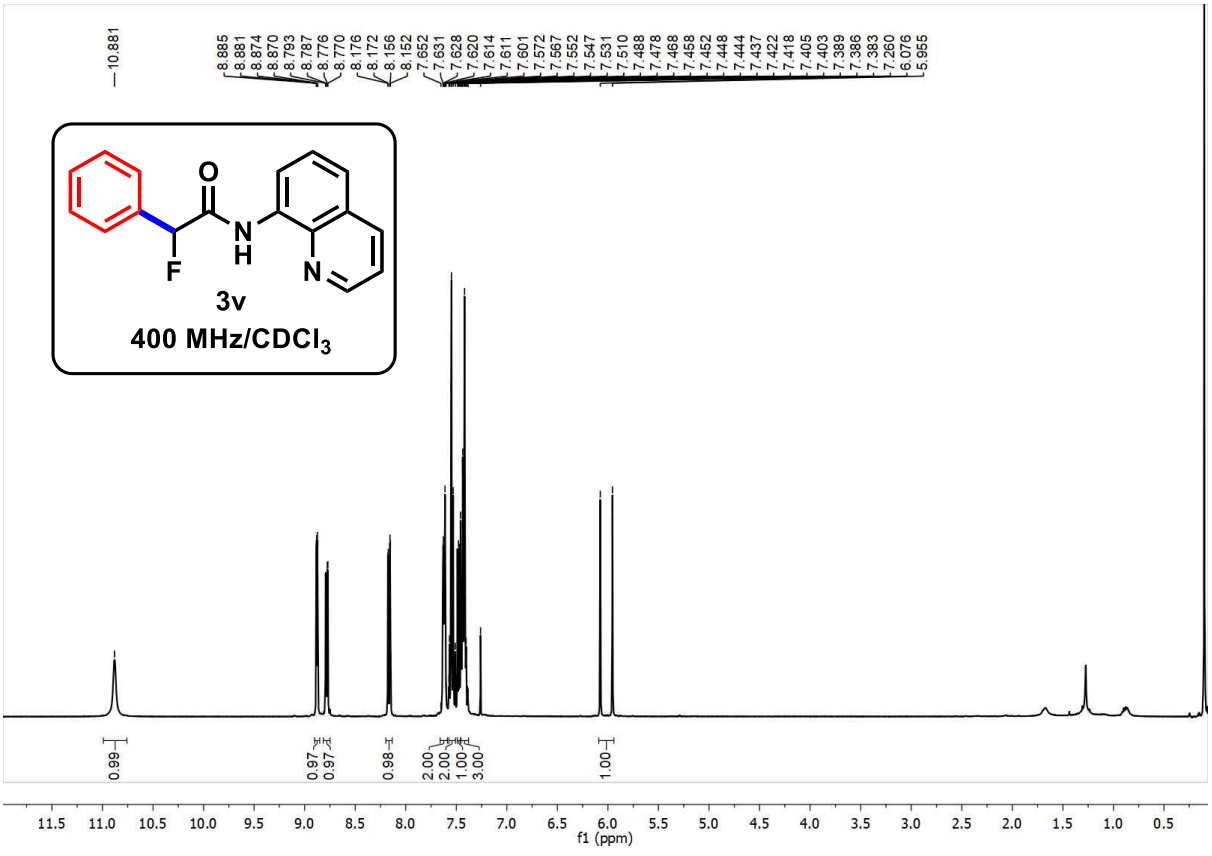
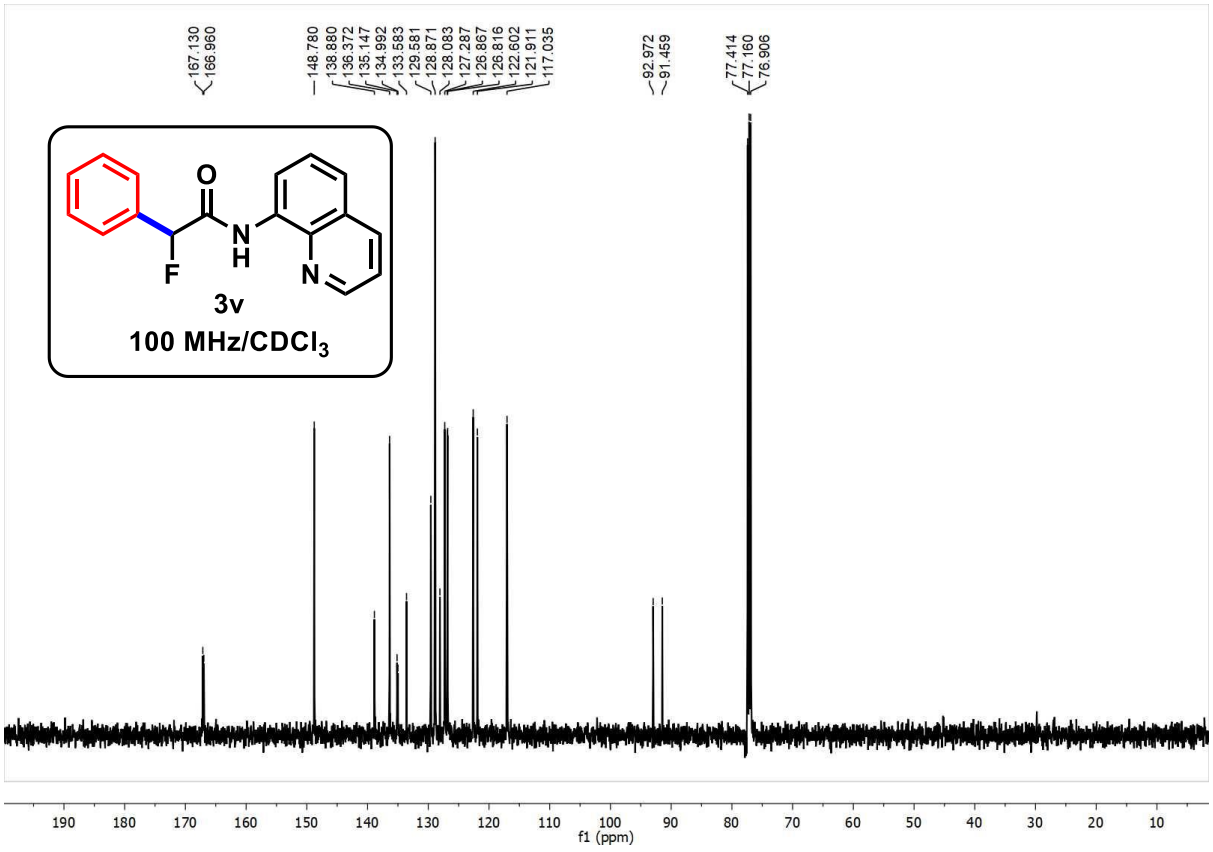
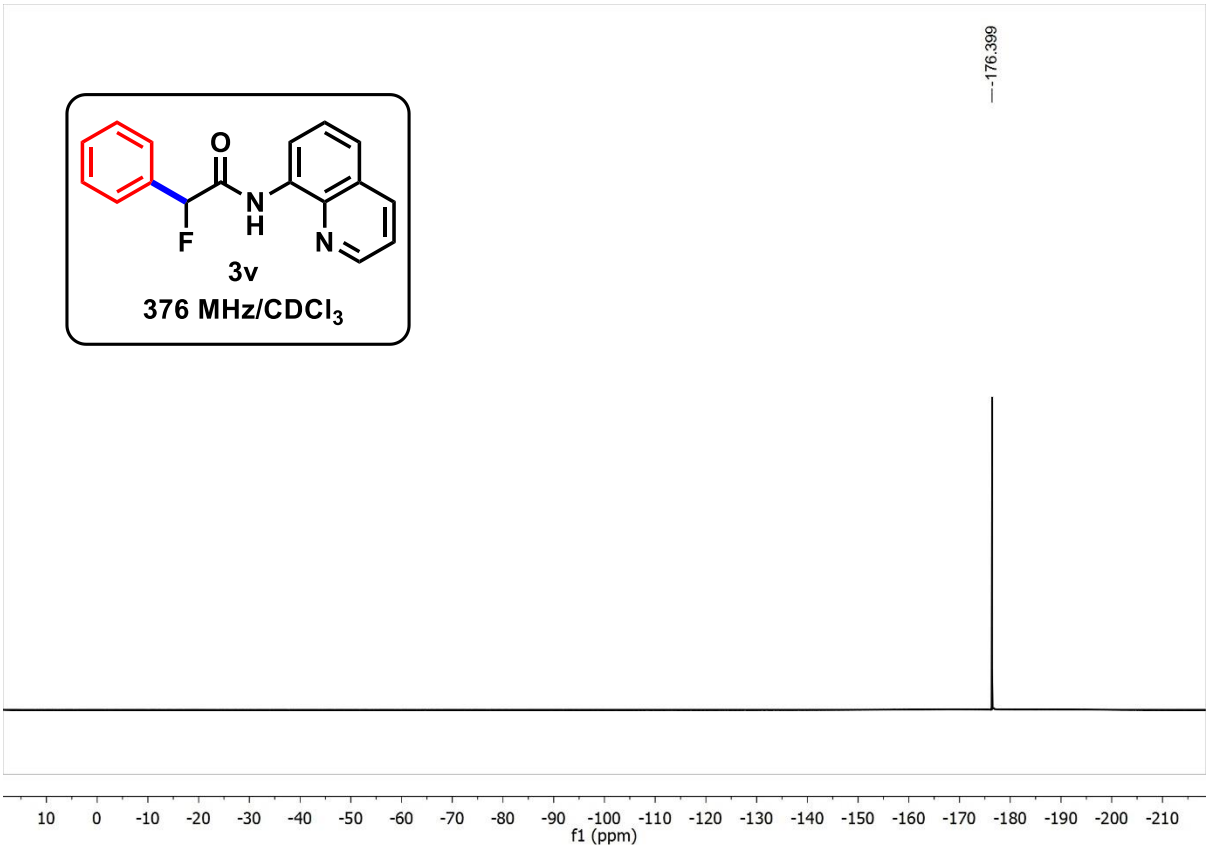
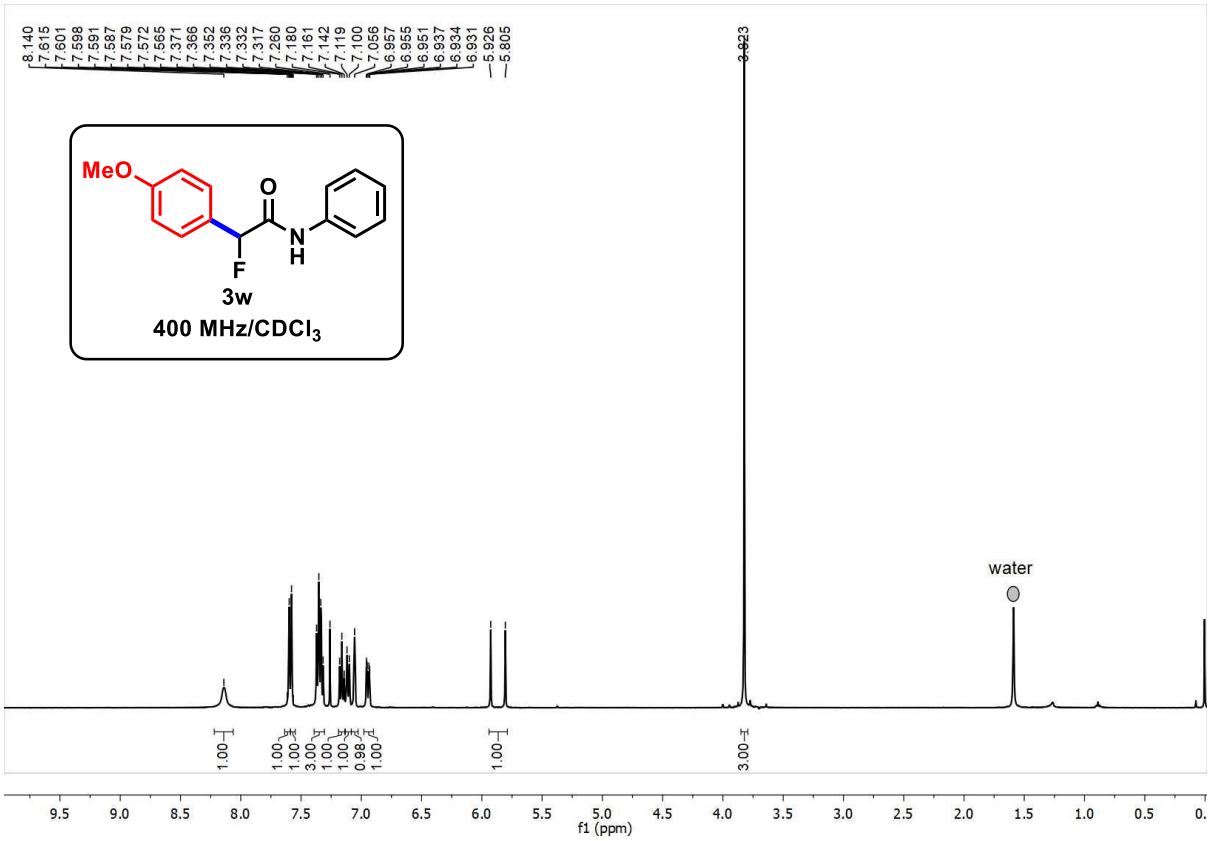
77.478
77.160
76.842
3u
100 MHz/CDCl3
f1 (ppm)

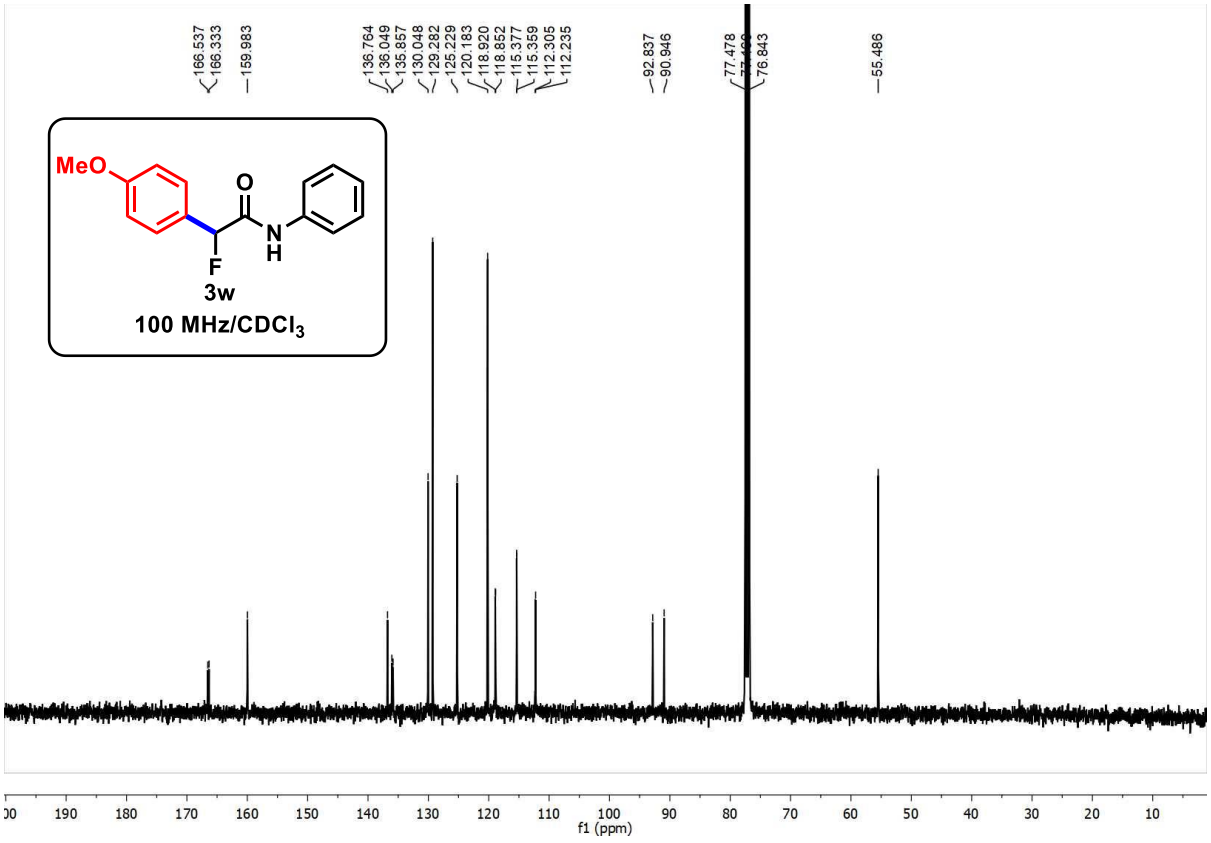

-177.538
3u
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

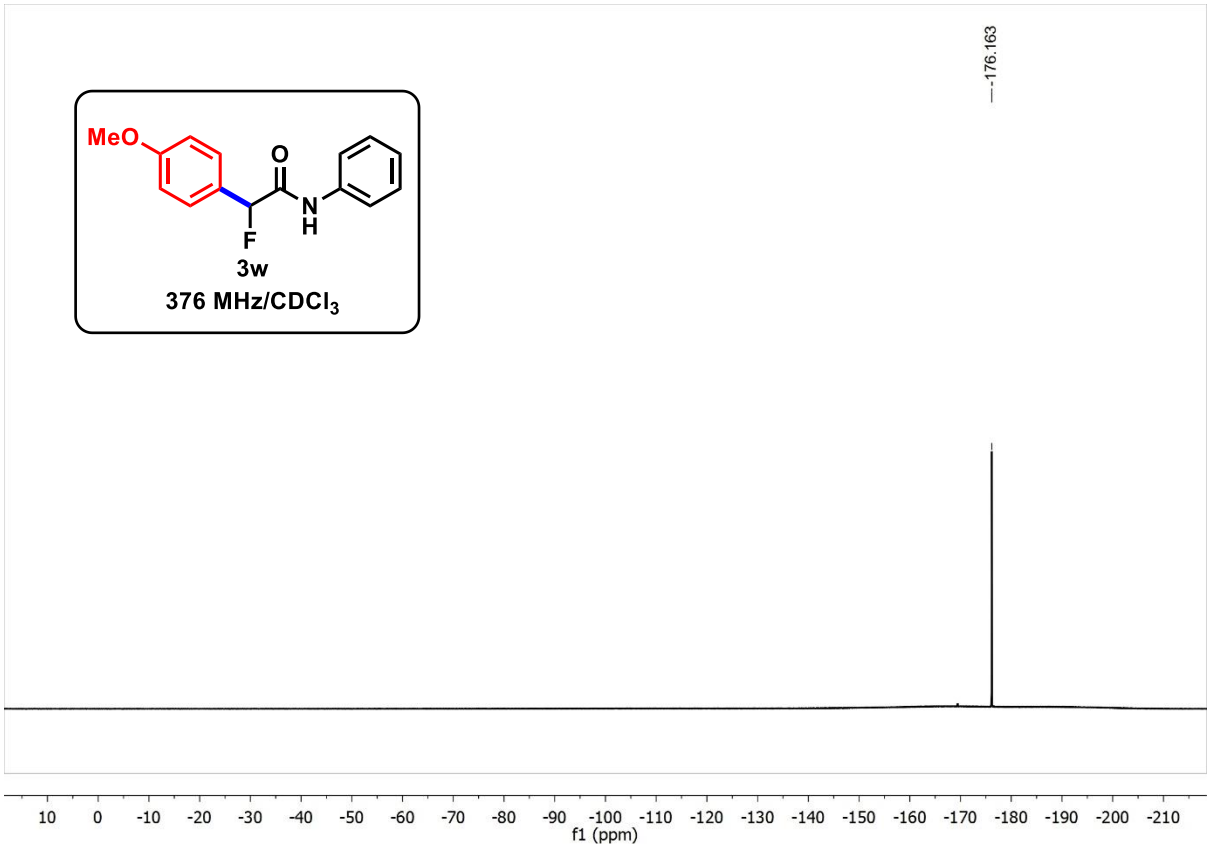

10.881
8.885 8.881 8.874 8.870 8.793 8.787 8.776 8.770 8.176 8.172 8.156 8.152 7.652 7.631 7.628 7.620 7.614 7.611 7.601 7.572 7.567 7.552 7.547 7.531 7.510 7.488 7.478 7.468 7.458 7.452 7.448 7.444 7.437 7.422 7.418 7.405 7.403 7.389 7.386 7.383 7.260 6.076 5.955
3v
400 MHz/CDCl3
0.99 0.97 0.97 0.98 2.00 2.00 1.00 3.00 1.00
11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

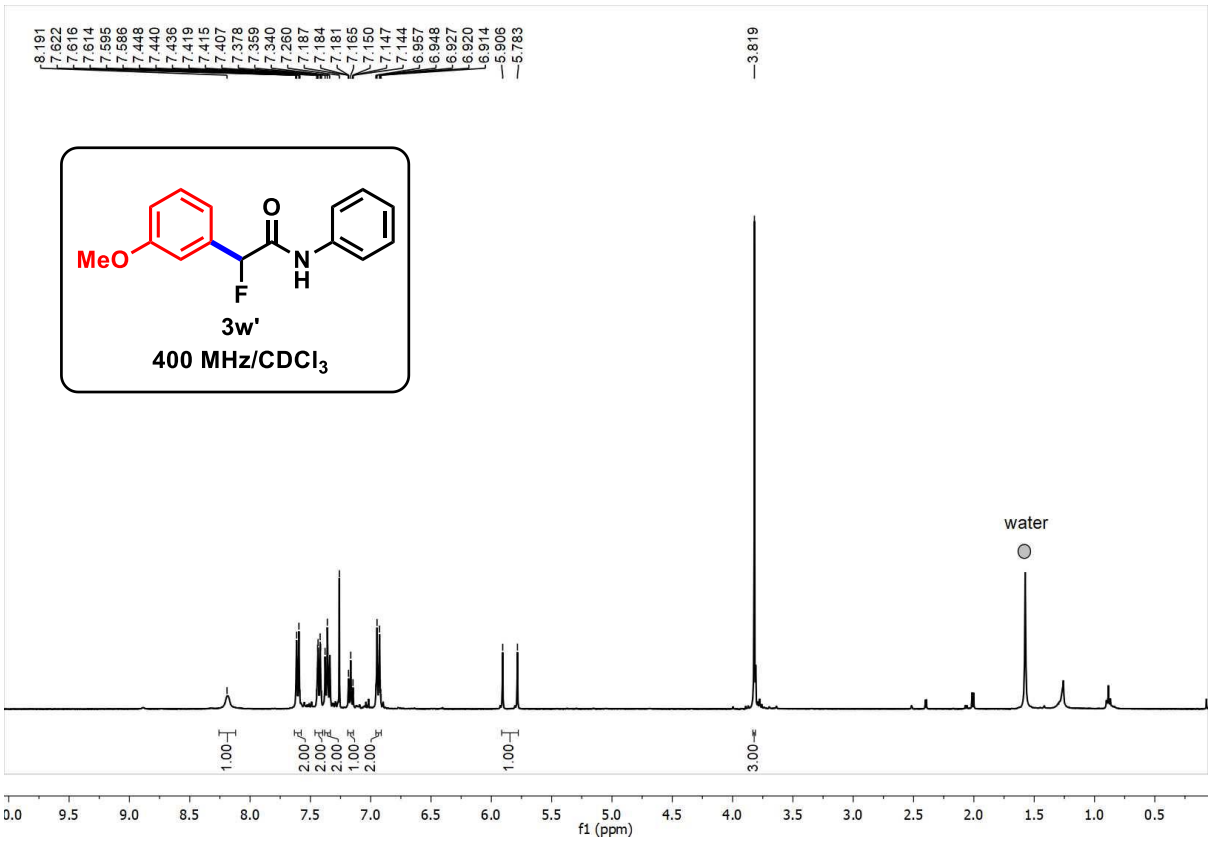

167.130
166.960
148.780
138.880
136.372
135.147
134.992
133.583
129.581
128.871
128.083
127.287
126.867
126.816
122.602
121.911
117.035
92.972
91.459
77.414
77.160
76.906
O
N
H
F
N
3v
100 MHz/CDCl3
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

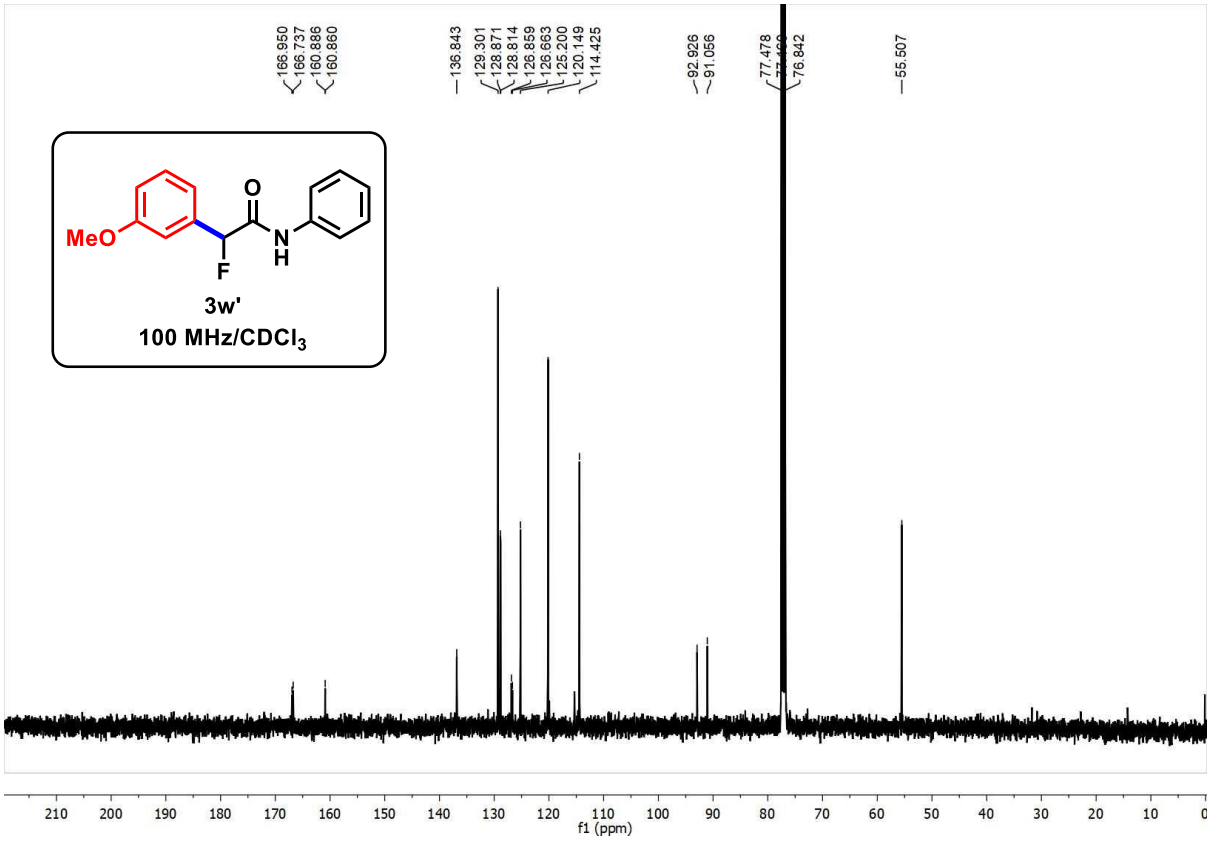

-176.399
O
N
H
F
N
3v
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

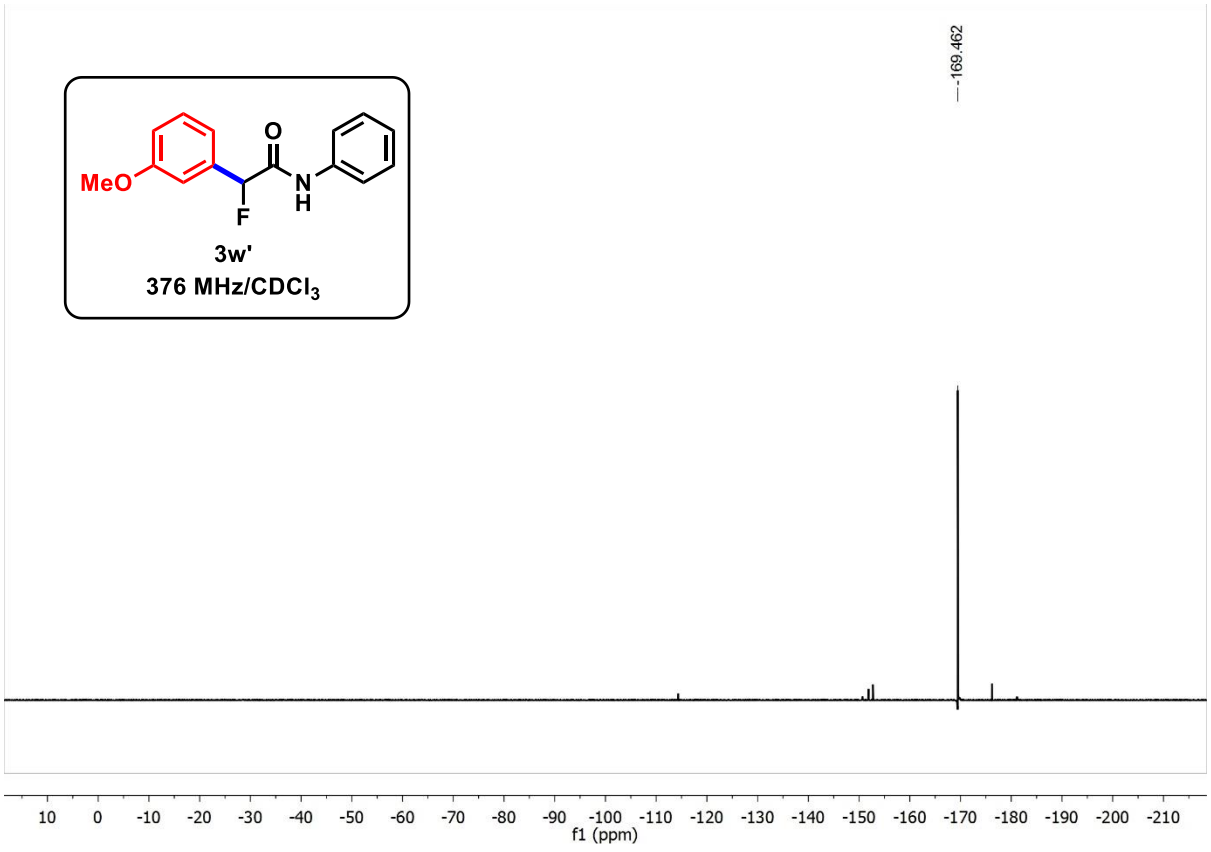

8.140
7.615
7.601
7.598
7.591
7.587
7.579
7.572
7.565
7.371
7.366
7.352
7.336
7.332
7.317
7.280
7.180
7.161
7.142
7.119
7.100
7.056
6.957
6.955
6.951
6.937
6.934
6.931
5.926
5.805
3.923
MeO
O
N
H
F
3w
400 MHz/CDCl3
water
1.00
1.00
1.00
3.00
1.00
1.00
0.98
1.00
1.00
3.00
f1 (ppm)

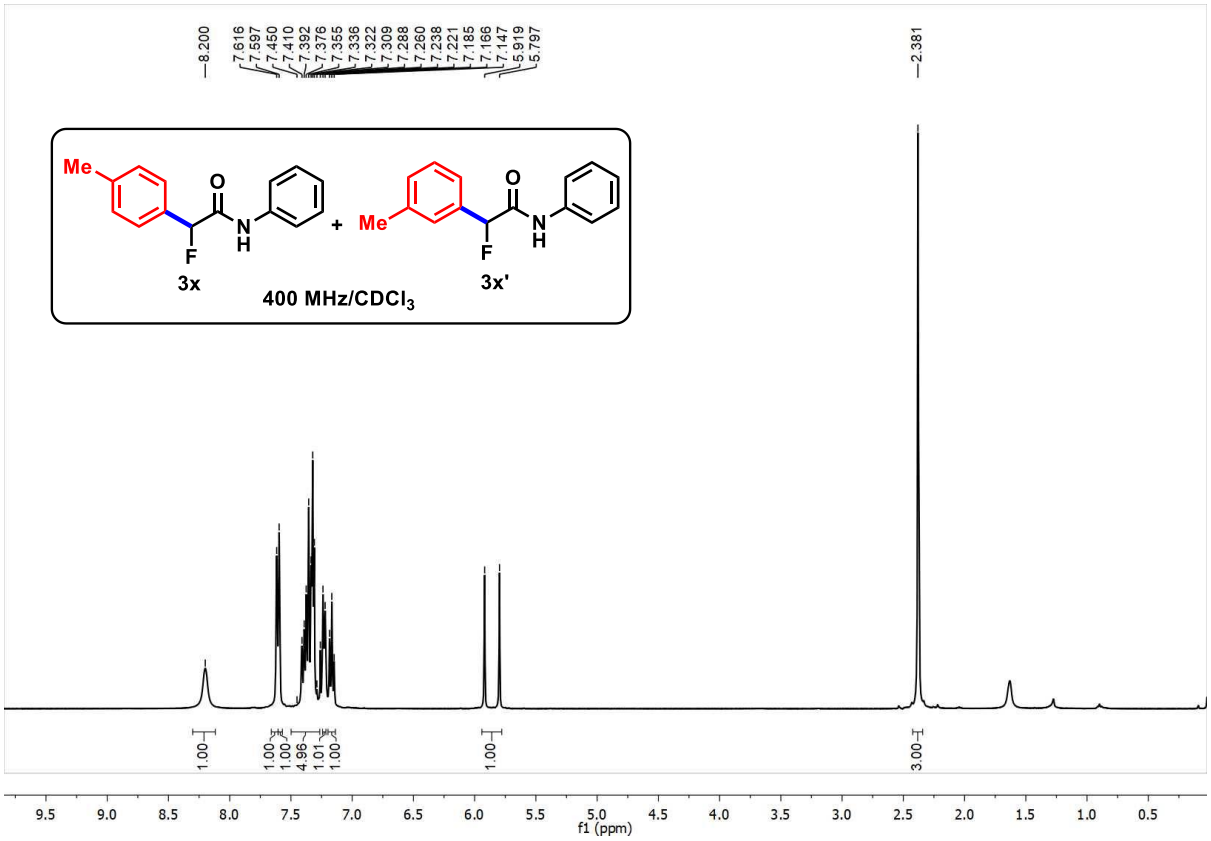

166.537
166.333
159.983
136.764
136.049
135.857
130.048
129.282
125.229
120.183
118.920
118.852
115.377
115.359
112.305
112.235
92.837
90.946
77.478
76.843
55.486
MeO
O
N
H
F
3w
100 MHz/CDCl3
f1 (ppm)

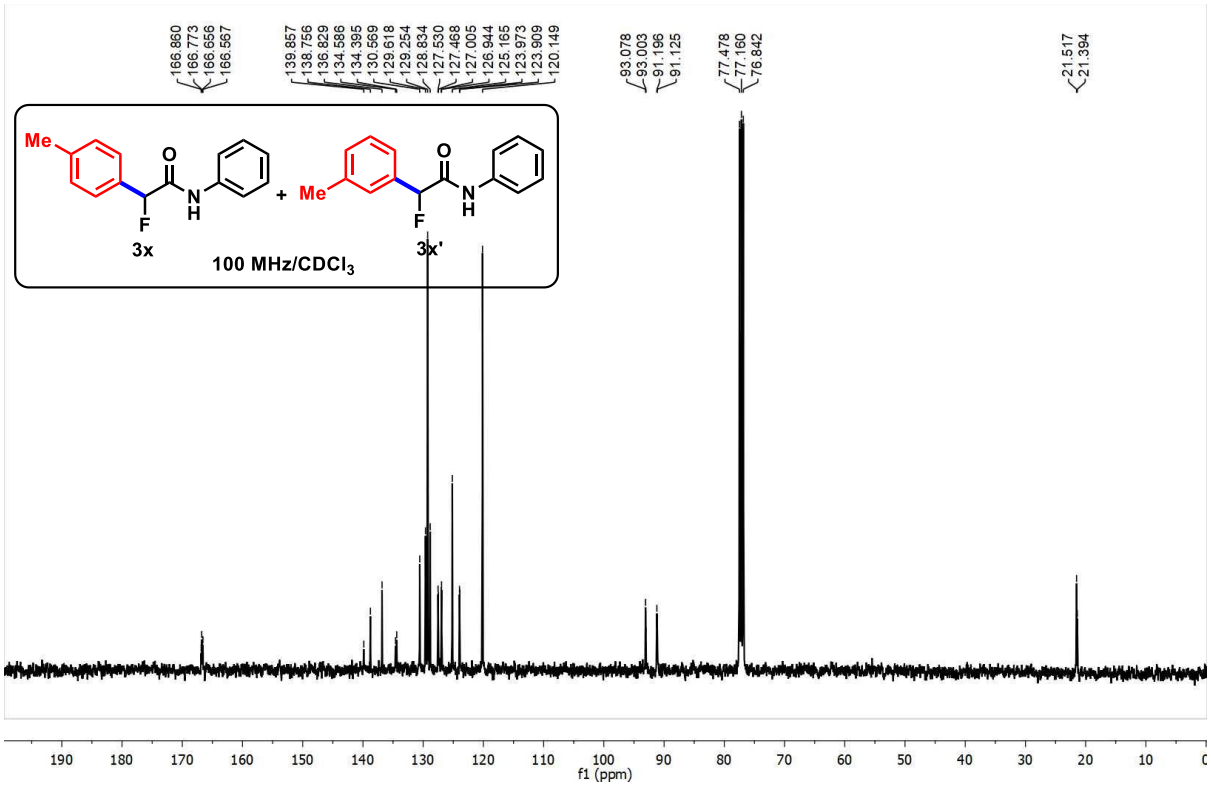

MeO
O
N
H
F
3w
376 MHz/CDCl3
-176.163
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

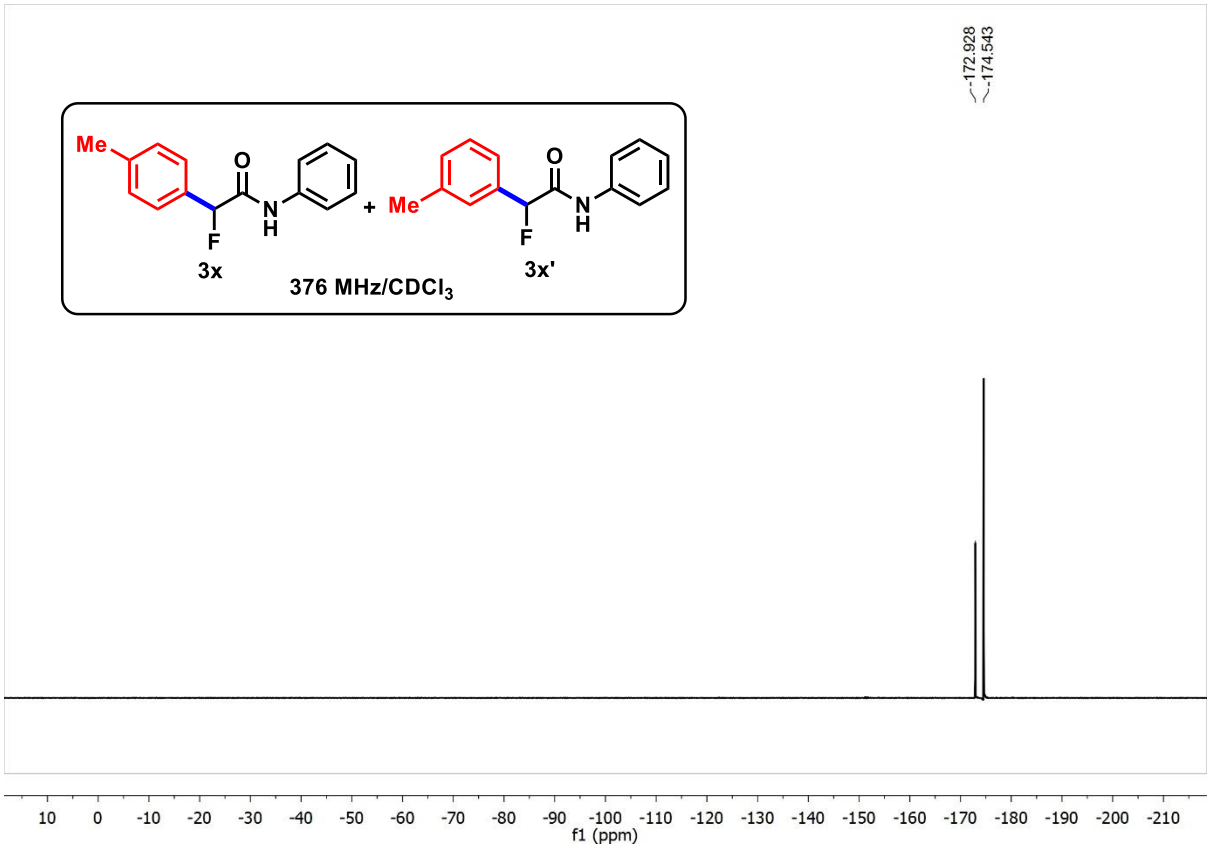

8.191
7.622
7.616
7.614
7.595
7.586
7.448
7.440
7.436
7.419
7.415
7.407
7.378
7.359
7.340
7.260
7.187
7.184
7.181
7.165
7.150
7.147
7.144
6.957
6.948
6.927
6.920
6.914
5.906
5.783
3.819
MeO
O
N
H
F
3w'
400 MHz/CDCl3
water
1.00
2.00
2.00
2.00
1.00
2.00
1.00
3.00
0.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

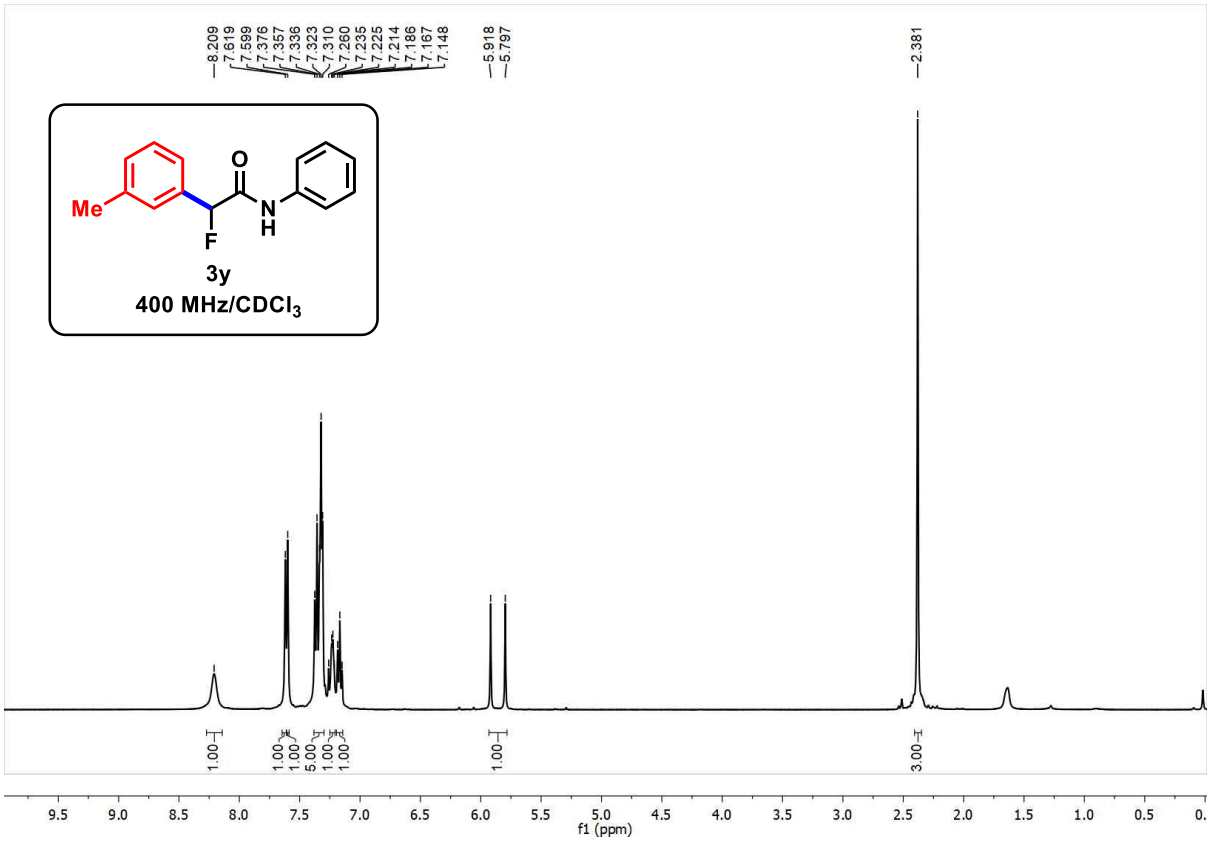

166.950
166.737
160.886
160.860
136.843
129.301
128.871
128.814
126.859
126.663
125.200
120.149
114.425
92.926
91.056
77.478
76.842
55.507
MeO
O
N
H
F
3w'
100 MHz/CDCl3
f1 (ppm)

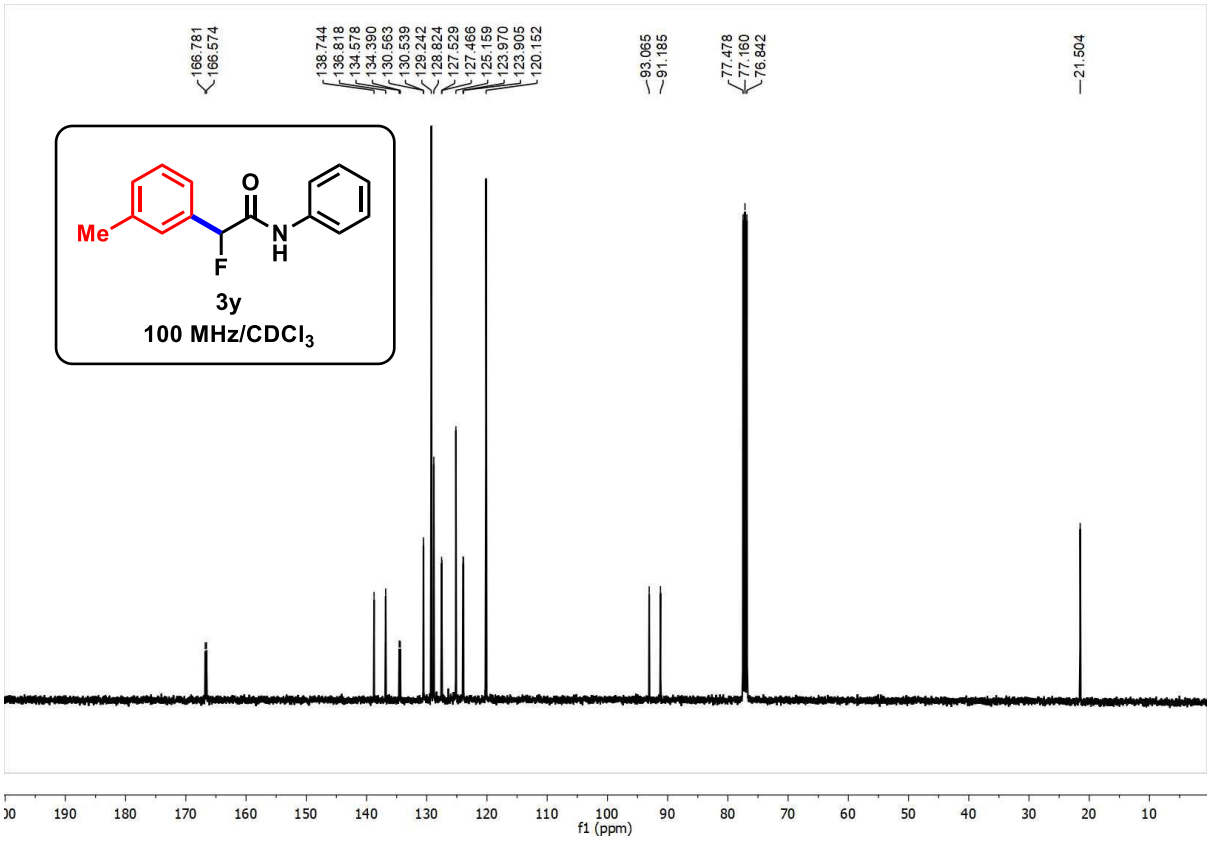

169.462
MeO
O
N
H
F
3w'
376 MHz/CDCl3
f1 (ppm)

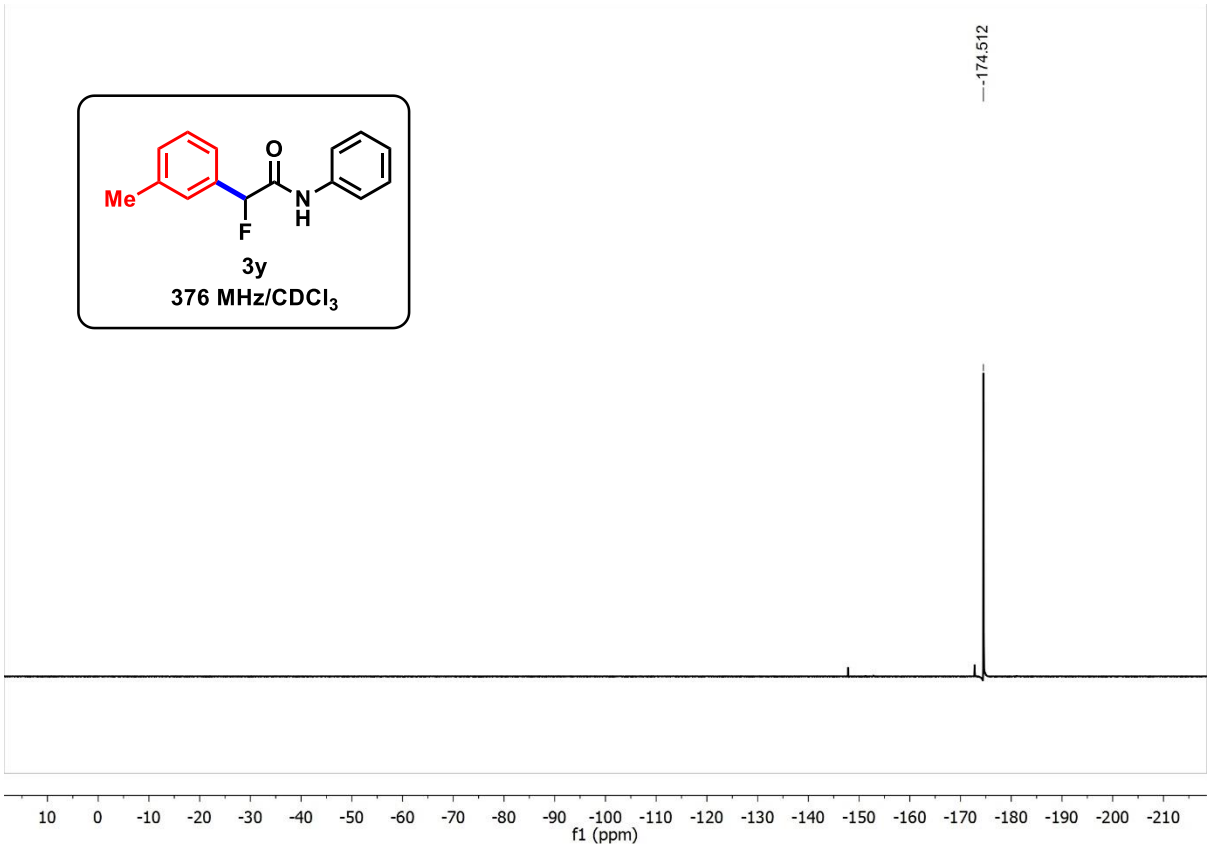

8.200
7.616
7.597
7.450
7.410
7.392
7.376
7.355
7.336
7.322
7.309
7.288
7.260
7.238
7.221
7.185
7.166
7.147
5.919
5.797
2.381
Me
O
N
H
F
3x
+
Me
O
N
H
F
3x'
400 MHz/CDCl3
1.00
1.00
1.00
4.96
1.01
1.00
1.00
3.00
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

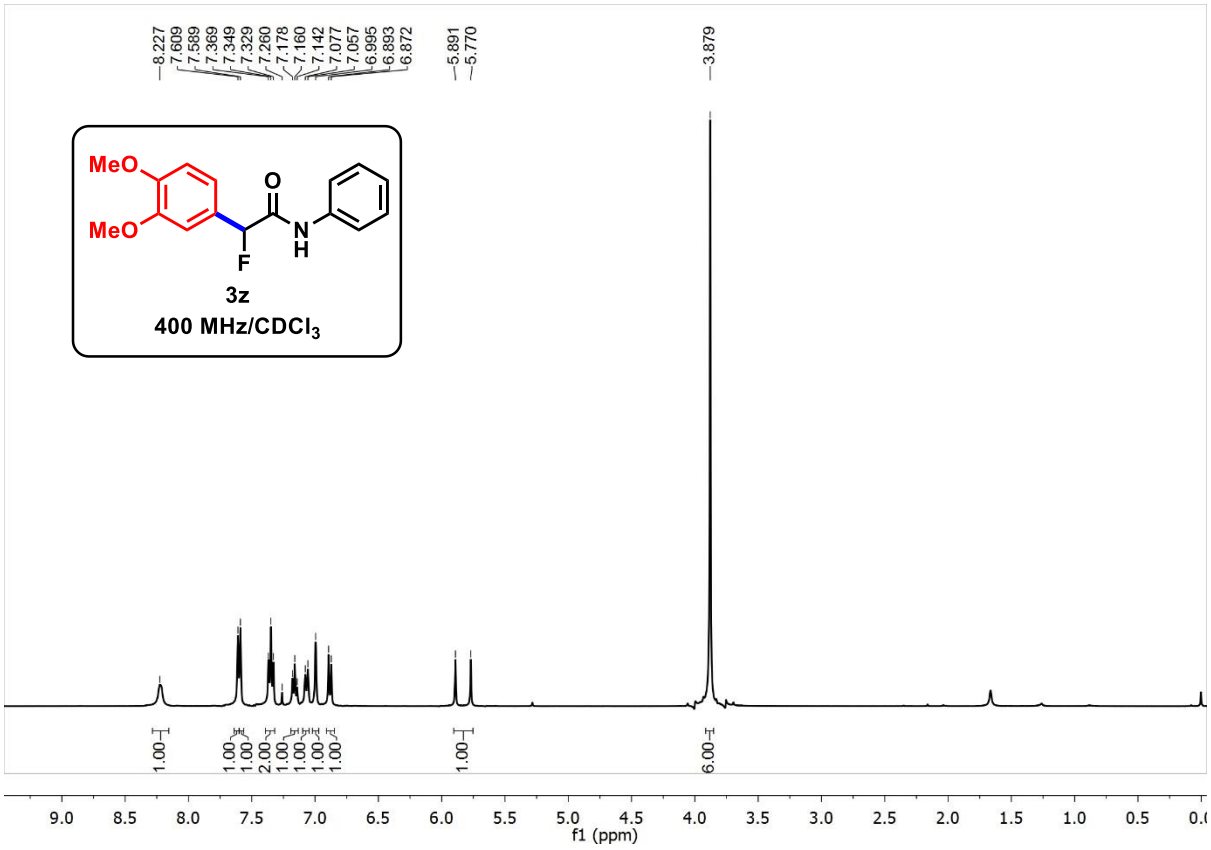

166.860
166.773
166.656
166.567
139.857
138.756
136.829
134.586
134.395
130.589
129.618
129.254
128.834
127.530
127.468
127.005
126.944
125.165
123.973
123.909
120.149
93.078
93.003
91.196
91.125
77.478
77.160
76.842
21.517
21.394
Me
O
N
H
F
3x
+
Me
O
N
H
F
3x'
100 MHz/CDCl3
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

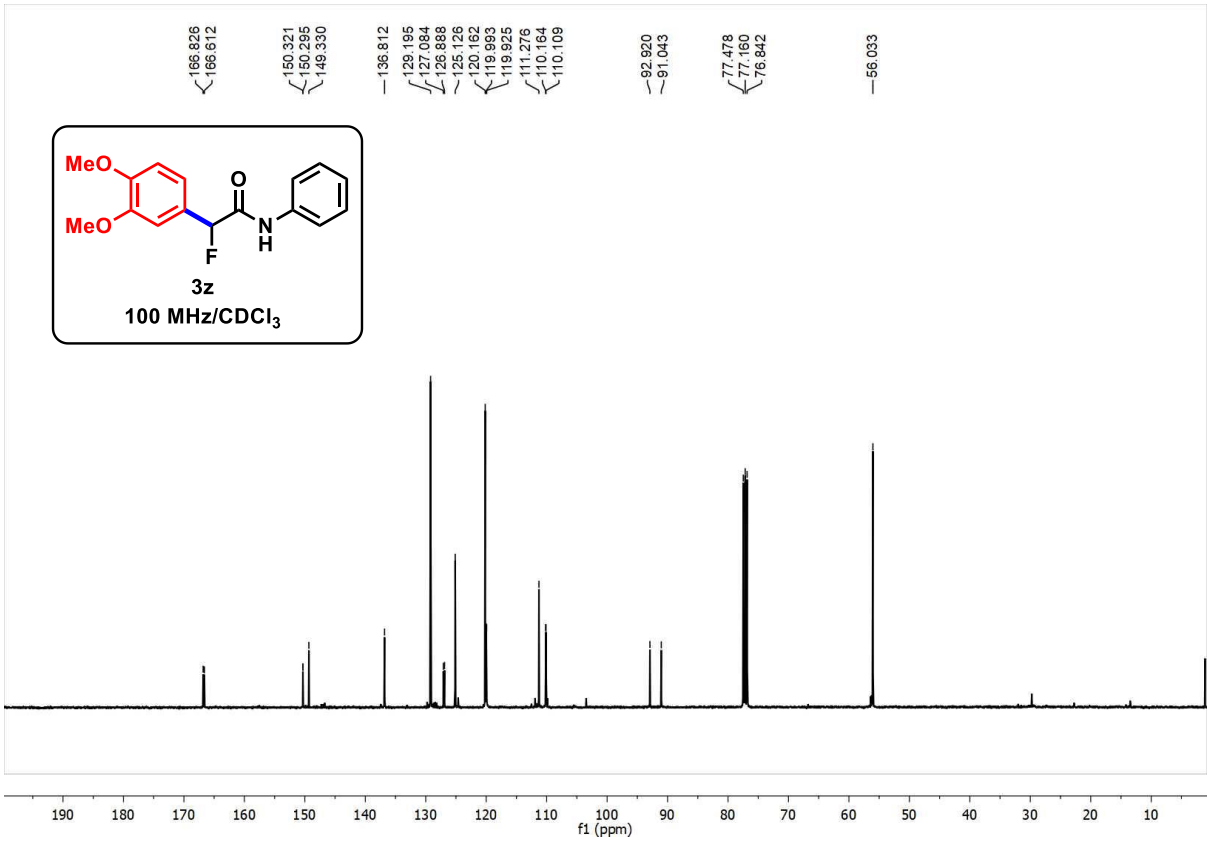

-172.928
-174.543
Me
O
N
H
F
3x
+
Me
O
N
H
F
3x'
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

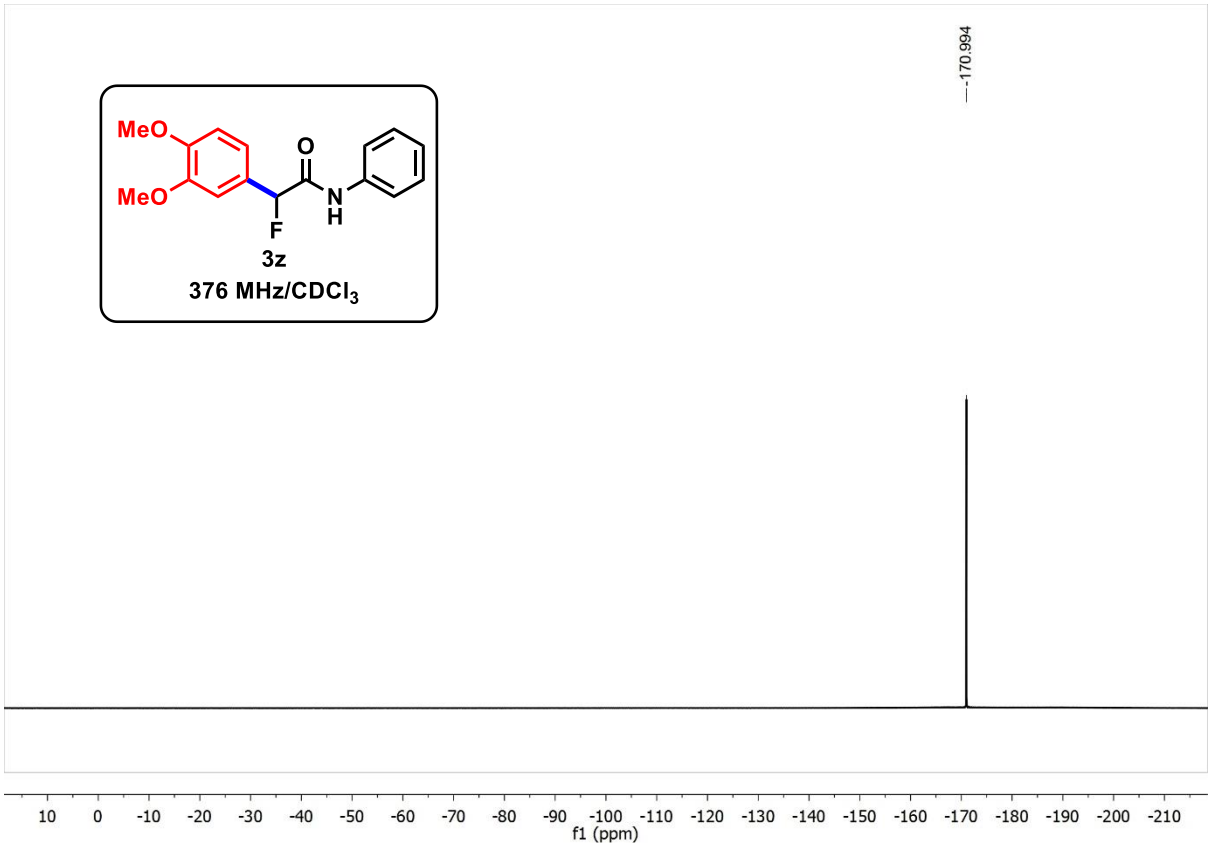

8.209
7.619
7.599
7.376
7.357
7.336
7.323
7.310
7.260
7.235
7.225
7.214
7.186
7.167
7.148
5.918
5.797
2.381
Me
O
N
H
F
3y
400 MHz/CDCl3
1.00
1.00
1.00
5.00
1.00
1.00
1.00
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.
f1 (ppm)

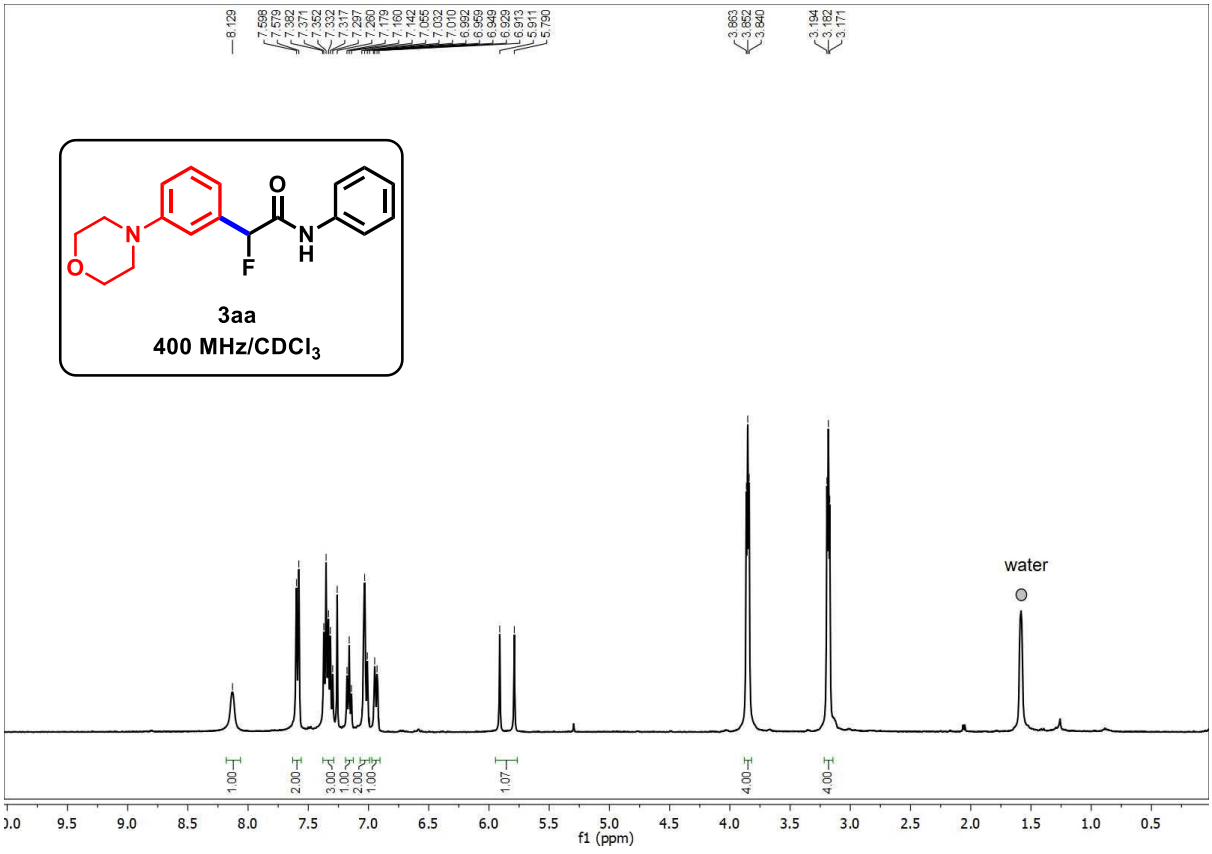

166.781
166.574
138.744
136.818
134.578
134.390
130.563
130.539
129.242
128.824
127.529
127.466
125.159
123.970
123.905
120.152
93.065
91.185
77.478
77.160
76.842
21.504
Me
O
N
H
F
3y
100 MHz/CDCl3
f1 (ppm)

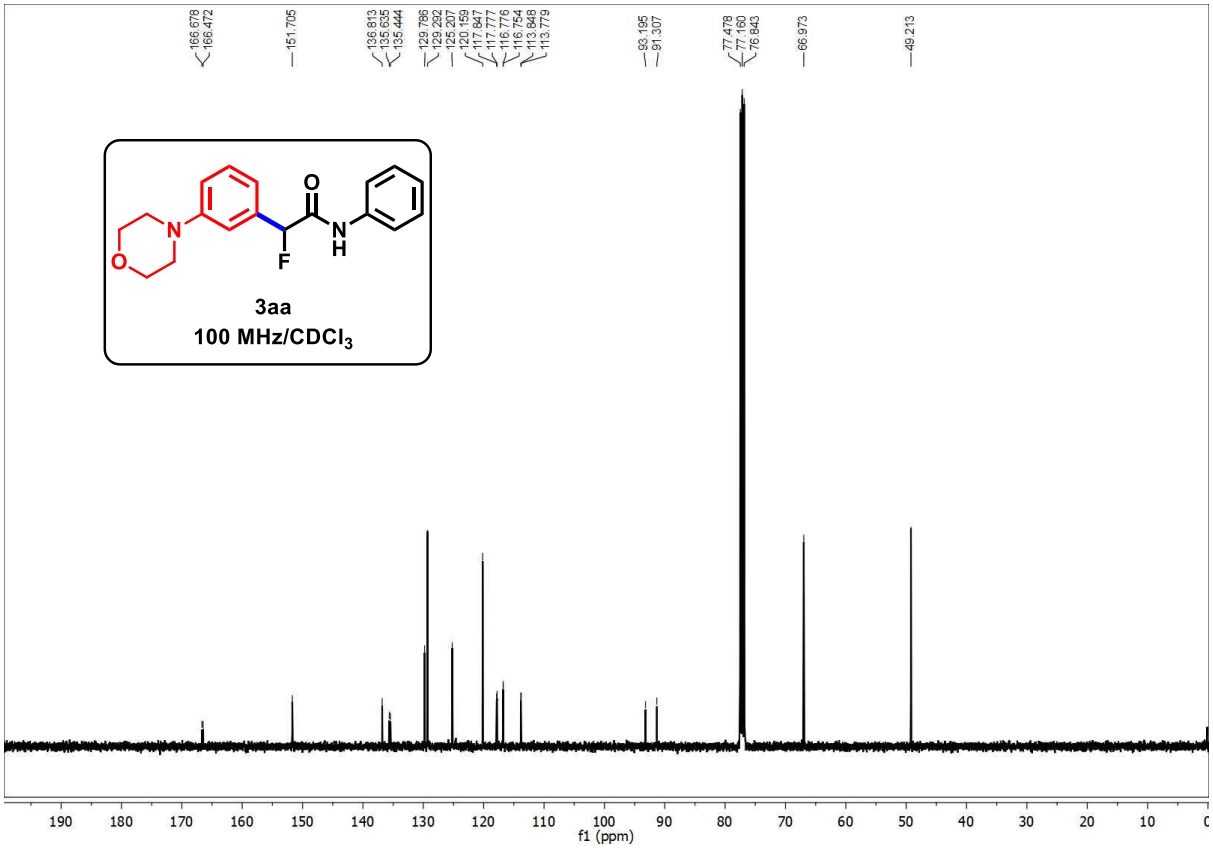

-174.512
Me
O
N
H
F
3y
376 MHz/CDCl3
f1 (ppm)

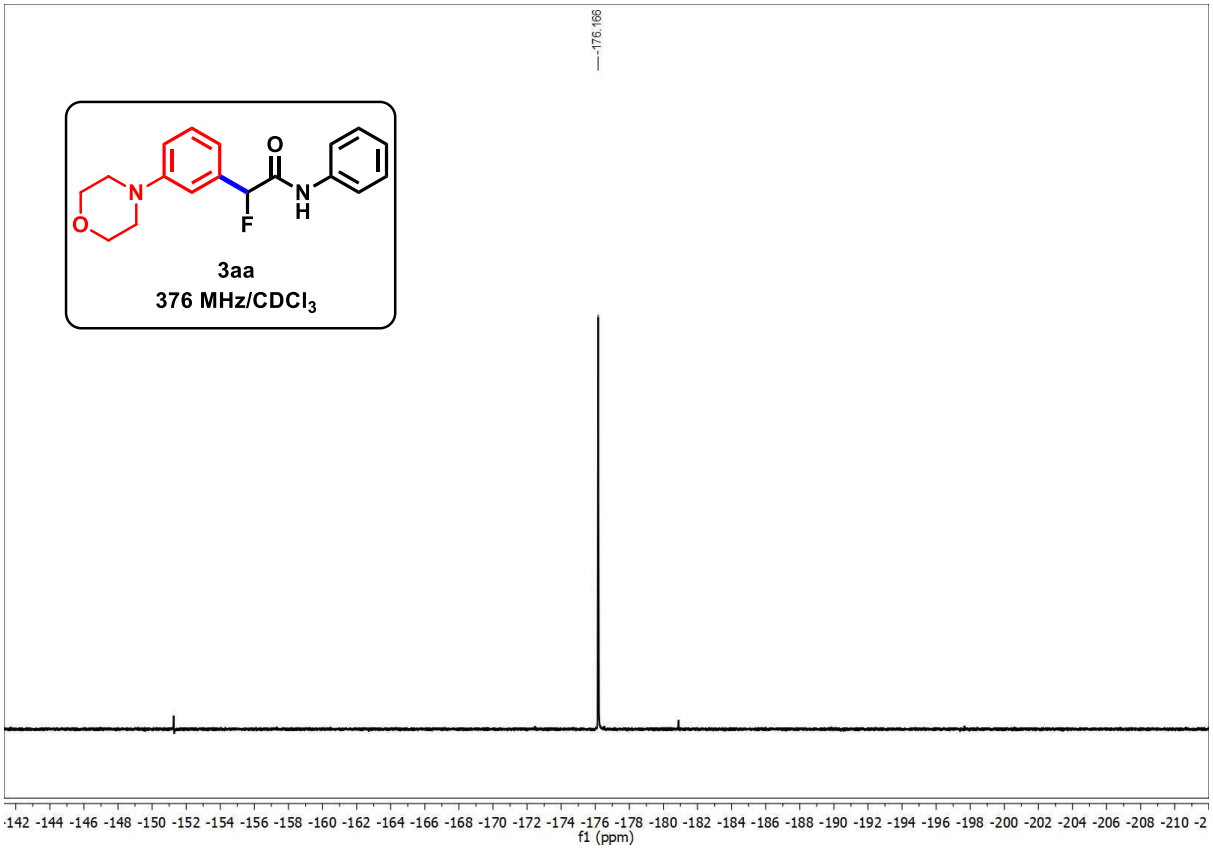

8.227
7.609
7.589
7.369
7.349
7.329
7.260
7.178
7.160
7.142
7.077
7.057
6.995
6.893
6.872
5.891
5.770
3.879
MeO
MeO
O
N
H
F
3z
400 MHz/CDCl3
1.00
1.00
1.00
2.00
1.00
1.00
1.00
1.00
6.00
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

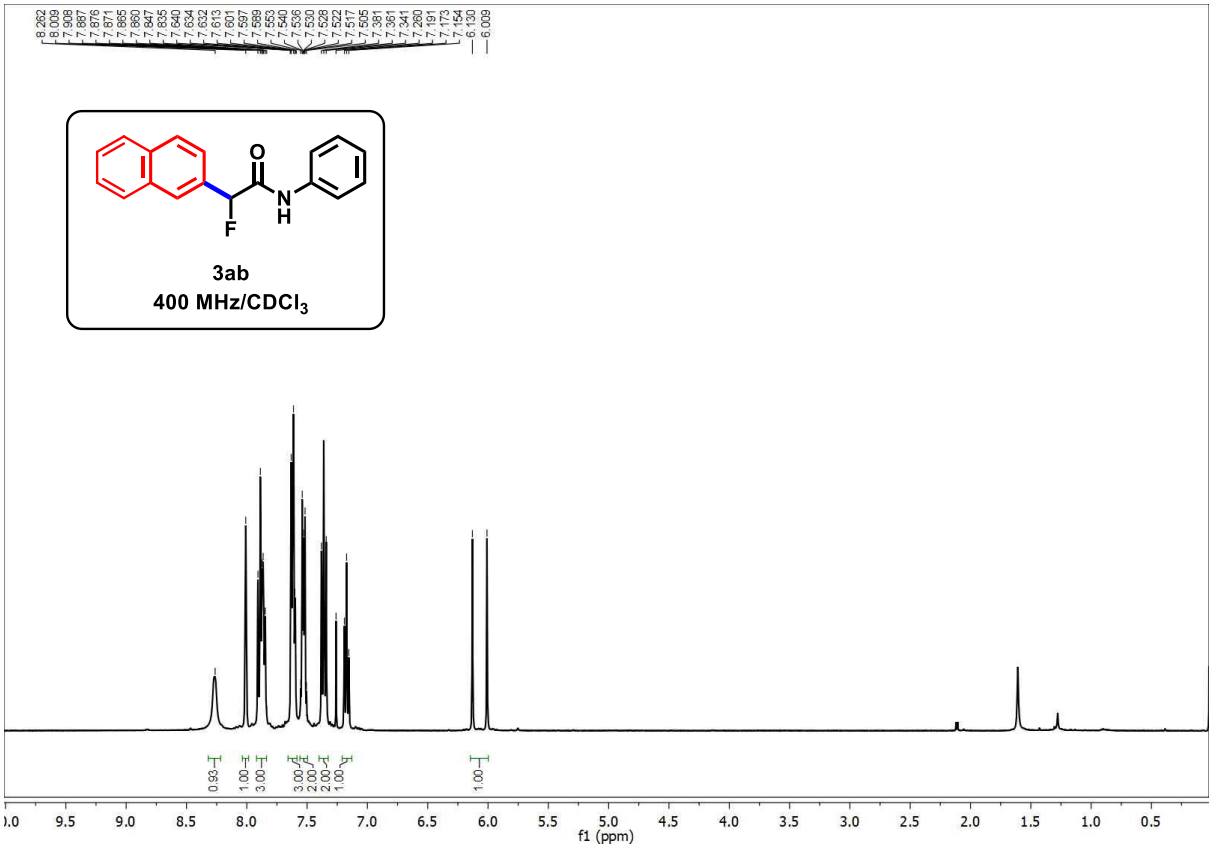

166.826
166.612
150.321
150.295
149.330
136.812
129.195
127.084
126.888
125.126
120.162
119.993
119.925
111.276
110.164
110.109
92.920
91.043
77.478
77.160
76.842
56.033
MeO
MeO
O
N
H
F
3z
100 MHz/CDCl3
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

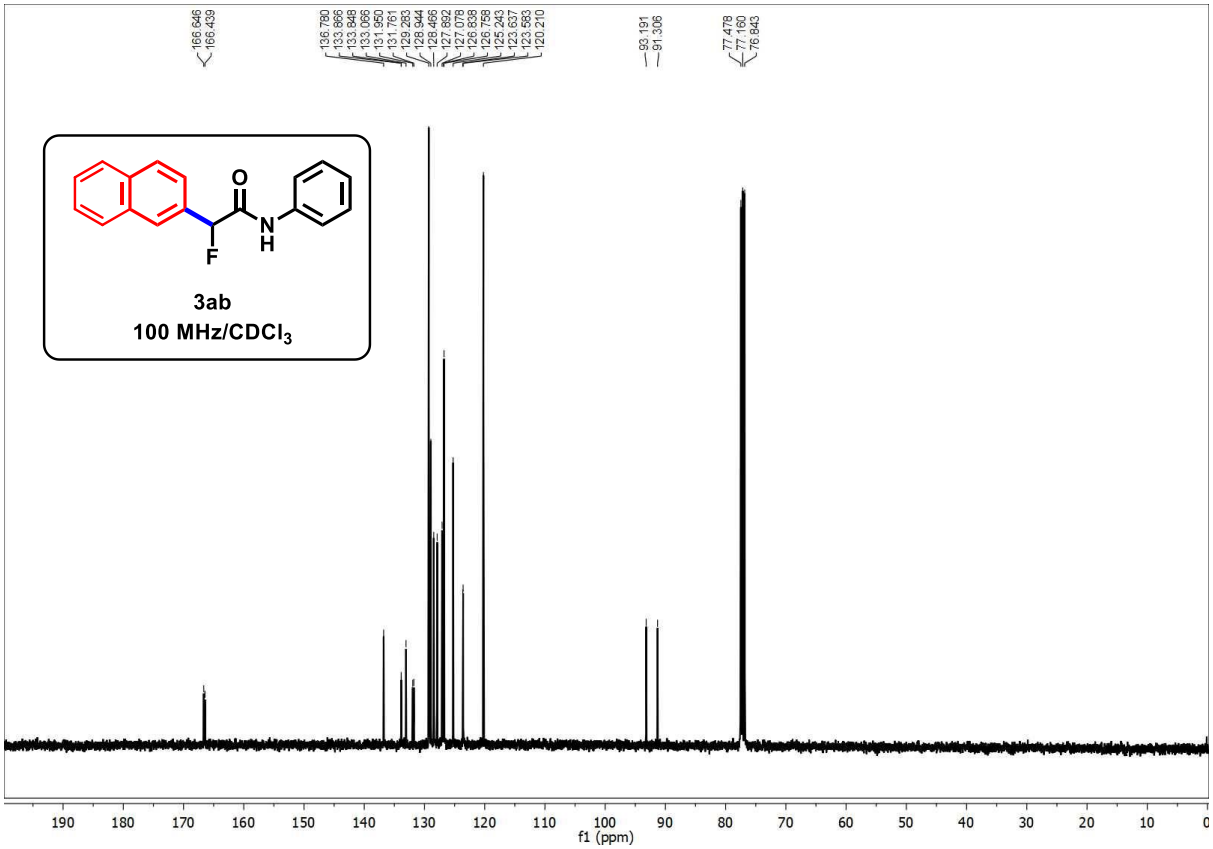

MeO
MeO
O
N
H
F
3z
376 MHz/CDCl3
-170.994
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

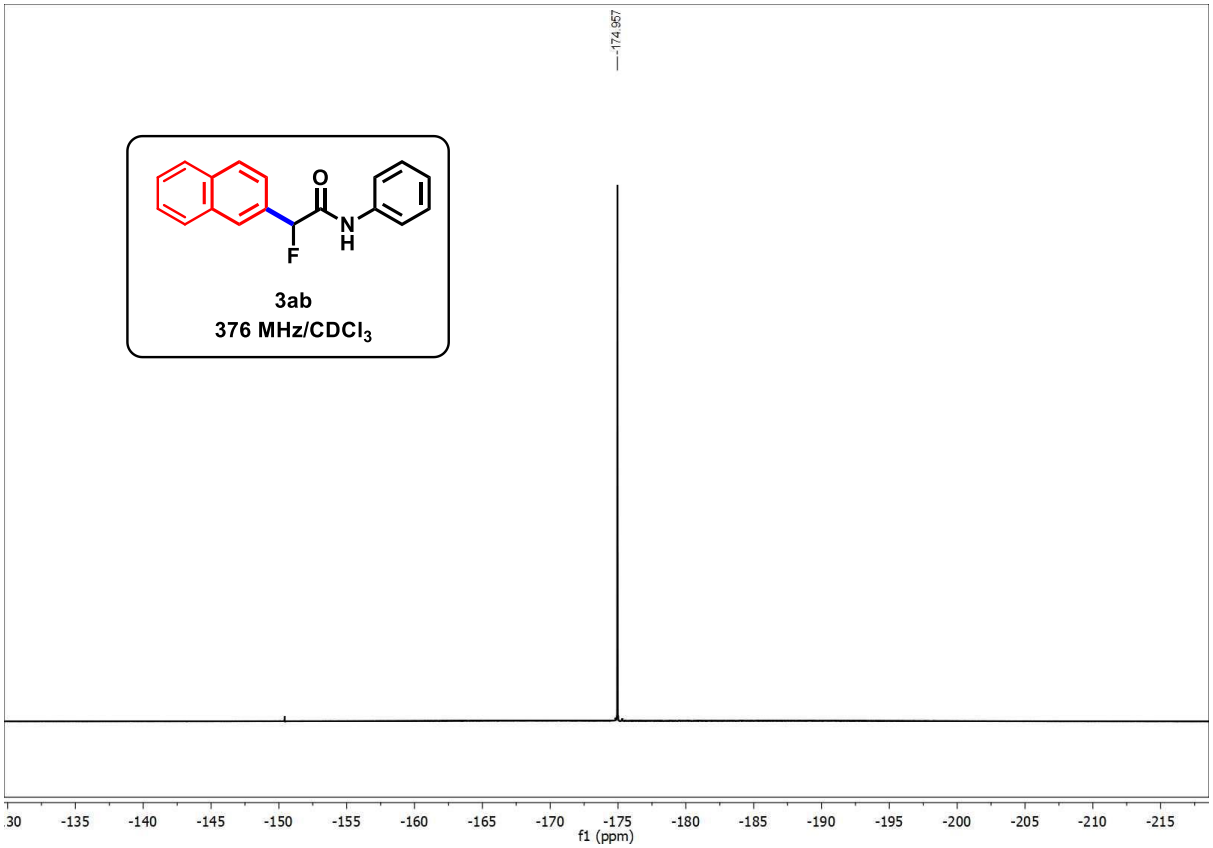

8.129
7.598
7.579
7.382
7.371
7.352
7.332
7.317
7.297
7.280
7.179
7.160
7.142
7.055
7.032
7.010
6.992
6.959
6.949
6.929
6.913
5.911
5.790
3.863
3.852
3.840
3.194
3.182
3.171
O
N
H
F
N
O
3aa
400 MHz/CDCl3
water
1.00
2.00
3.00
1.00
2.00
1.00
1.07
4.00
4.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

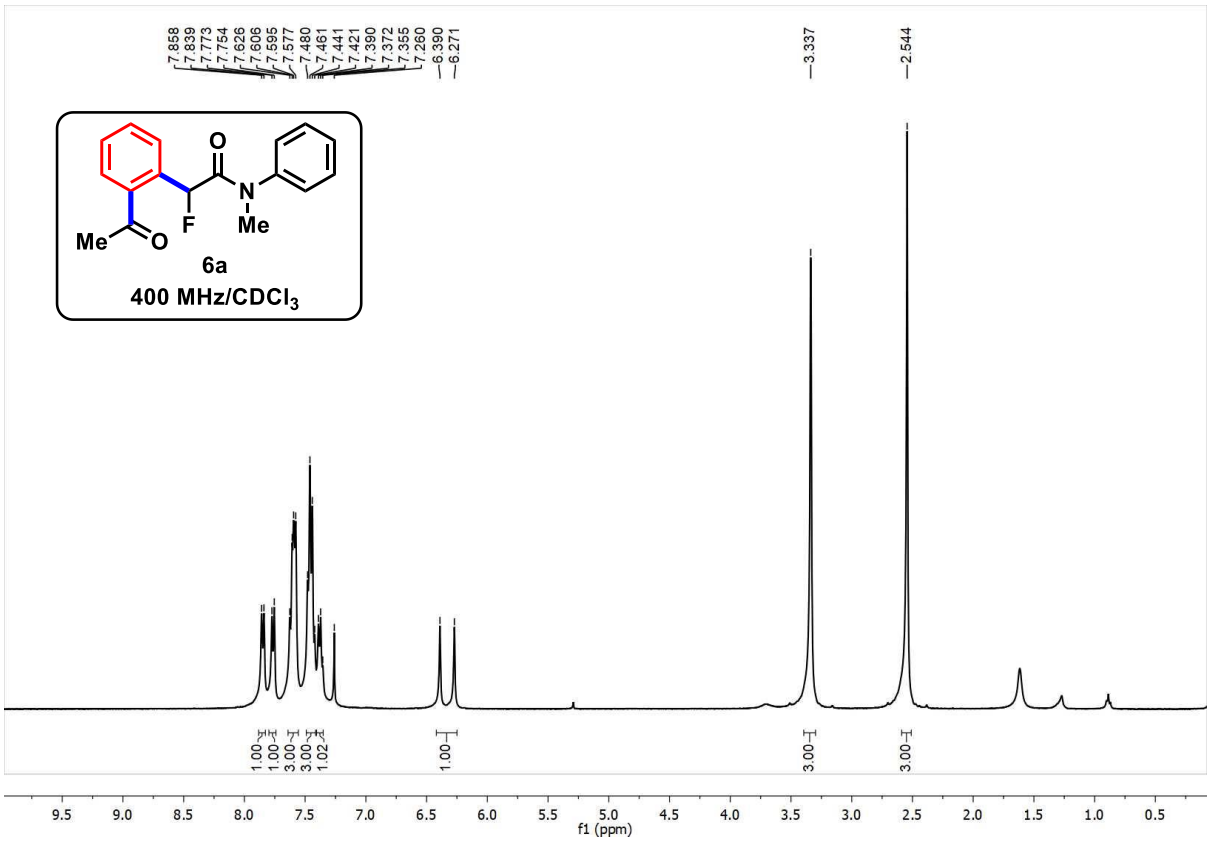

166.678
166.472
151.705
136.813
135.635
135.444
129.786
129.292
125.207
120.159
117.847
117.777
116.776
116.754
113.848
113.779
93.195
91.307
77.478
77.160
76.843
66.973
49.213
O
N
H
F
O
N
3aa
100 MHz/CDCl3
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

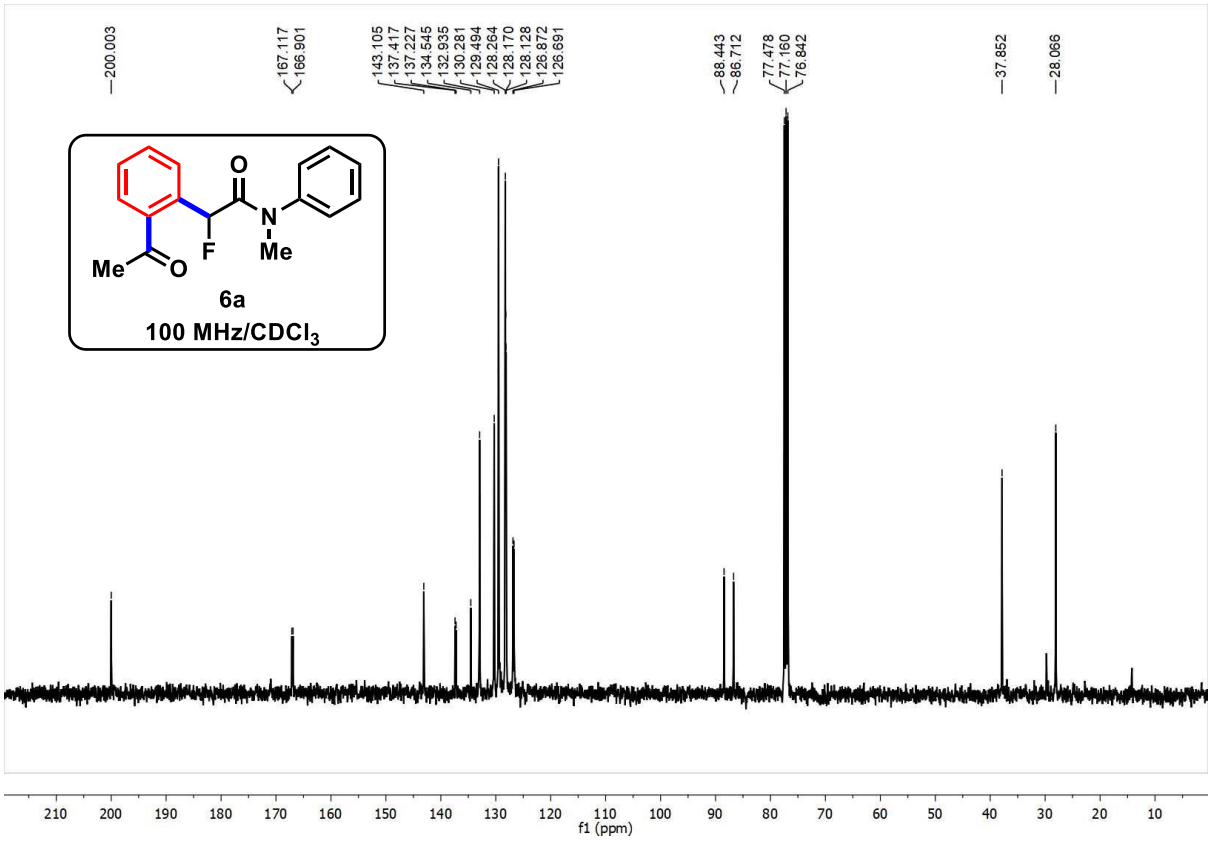

176.166
O
N
H
F
O
N
3aa
376 MHz/CDCl3
-142 -144 -146 -148 -150 -152 -154 -156 -158 -160 -162 -164 -166 -168 -170 -172 -174 -176 -178 -180 -182 -184 -186 -188 -190 -192 -194 -196 -198 -200 -202 -204 -206 -208 -210 -2
f1 (ppm)

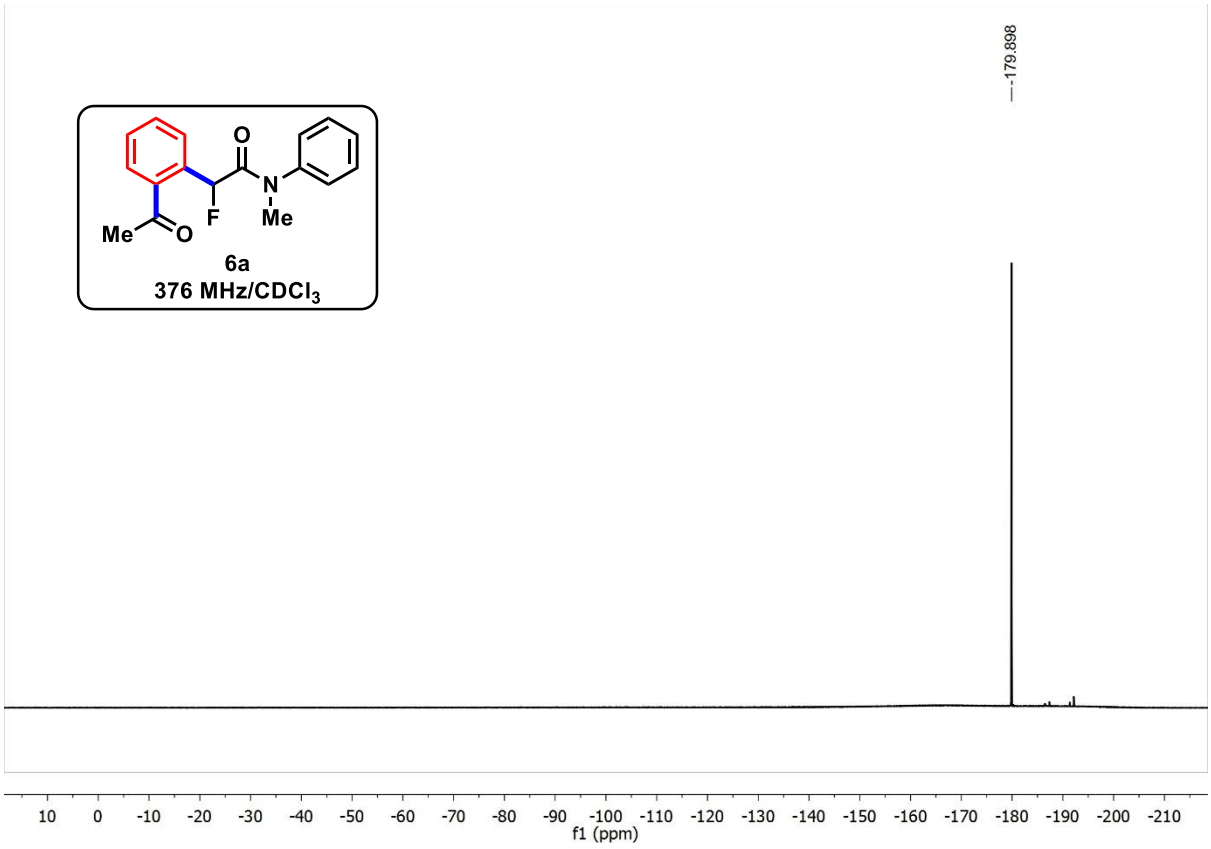

3ab
400 MHz/CDCl3
f1 (ppm)

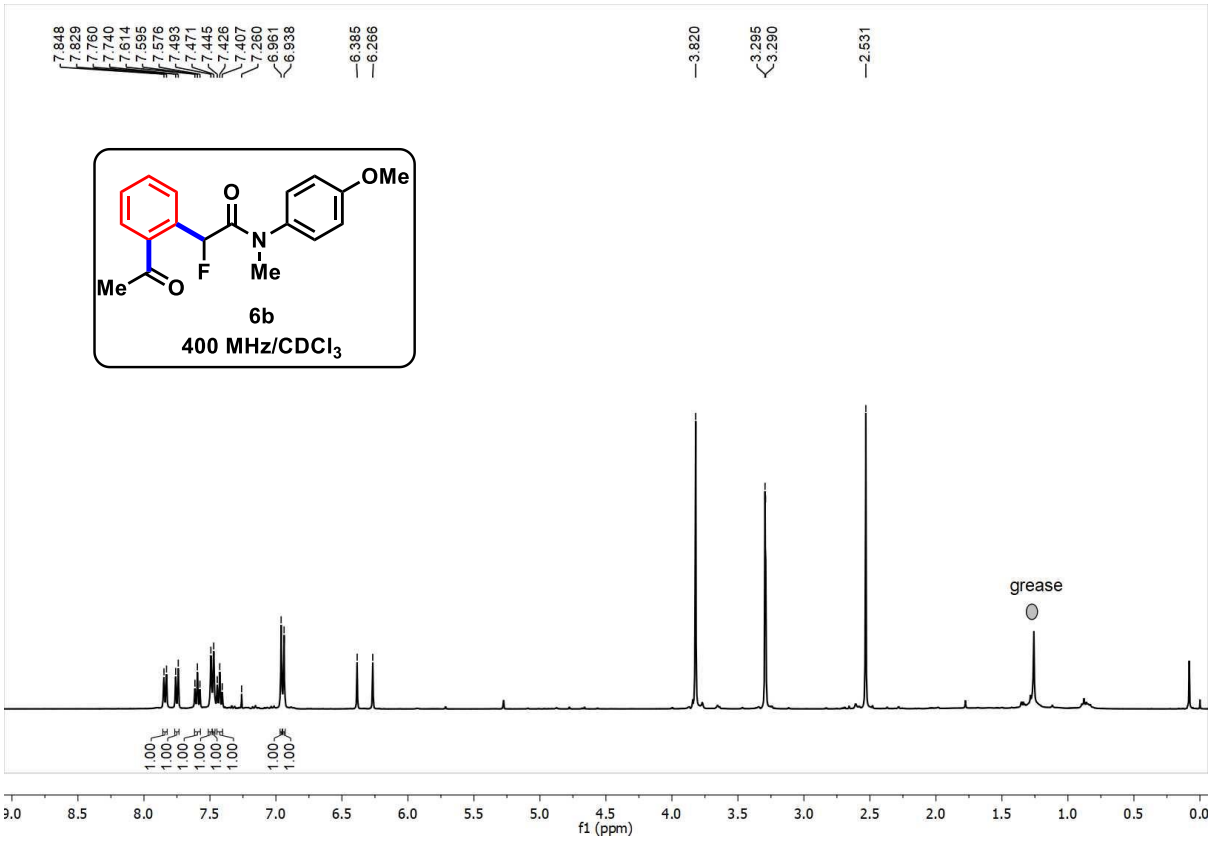

3ab
100 MHz/CDCl3
f1 (ppm)

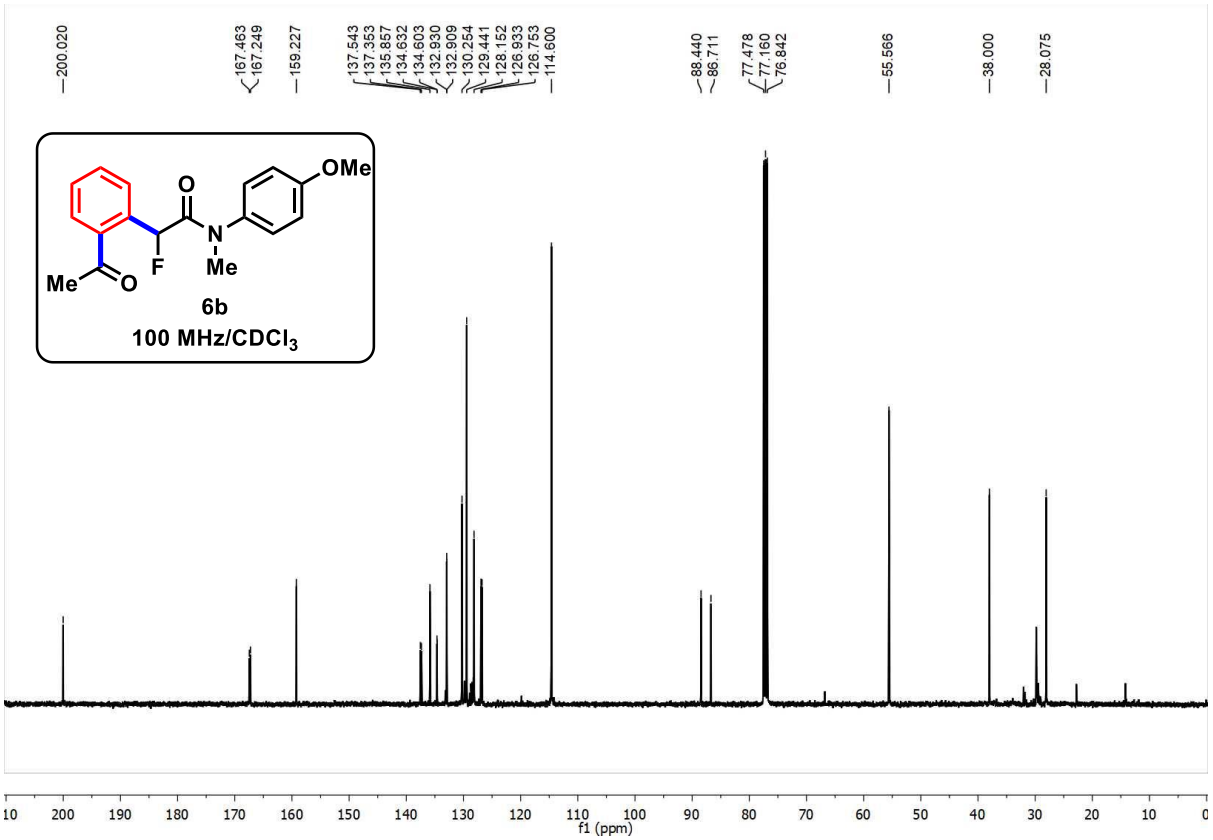

-174.957
3ab
376 MHz/CDCl3
f1 (ppm)

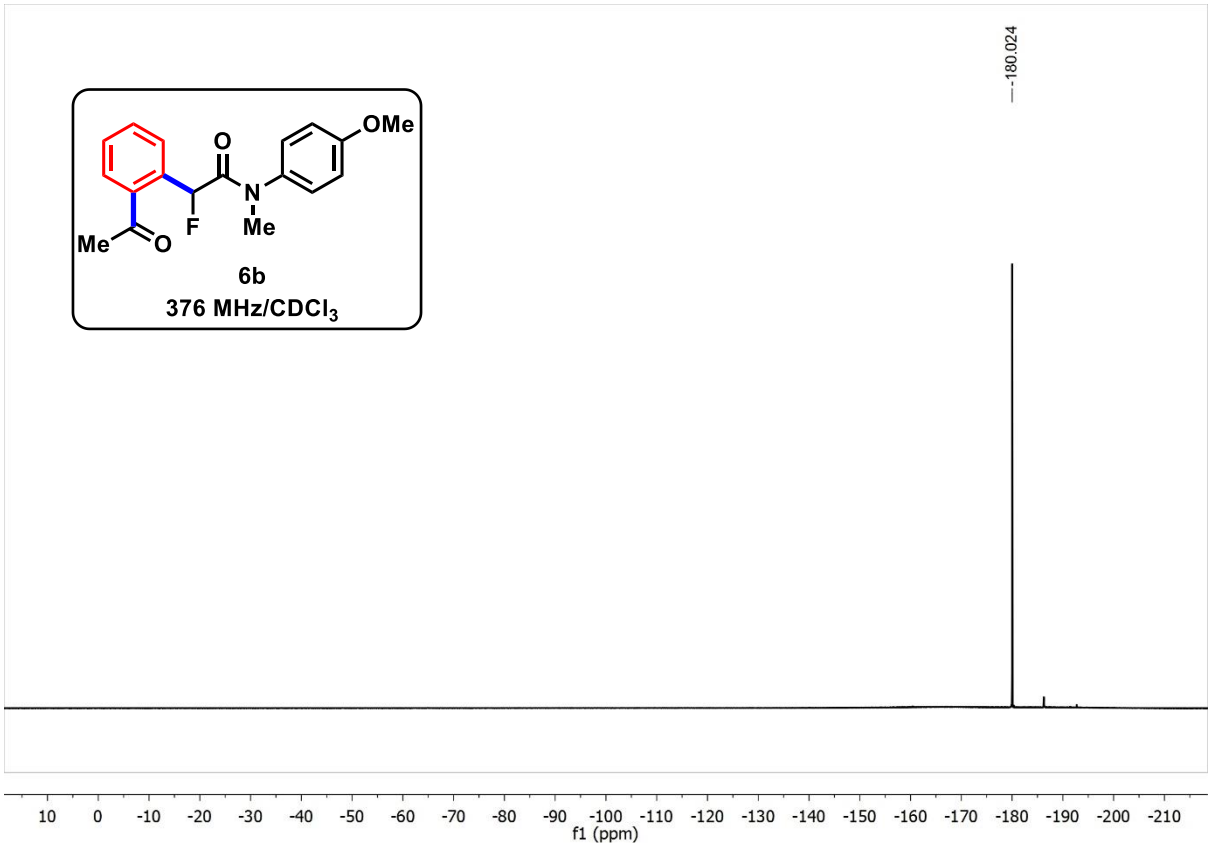

7.858
7.839
7.773
7.754
7.626
7.606
7.595
7.577
7.480
7.461
7.441
7.421
7.390
7.372
7.355
7.260
6.390
6.271
3.337
2.544
6a
400 MHz/CDCl3
f1 (ppm)

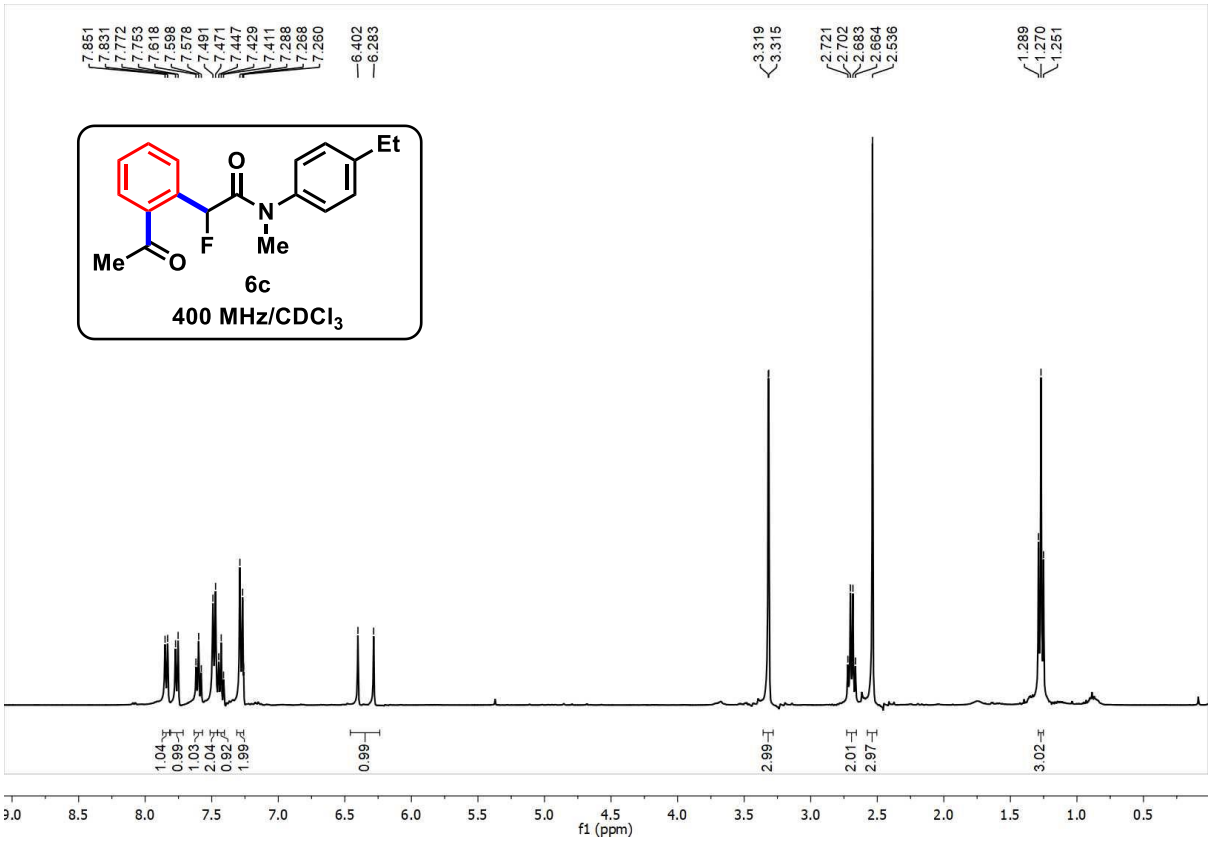

200.003
167.117
166.901
143.105
137.417
137.227
134.545
132.935
130.281
129.494
128.264
128.170
128.128
126.872
126.691
88.443
86.712
77.478
77.160
76.842
37.852
28.066
O
N
F
Me
Me
O
6a
100 MHz/CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

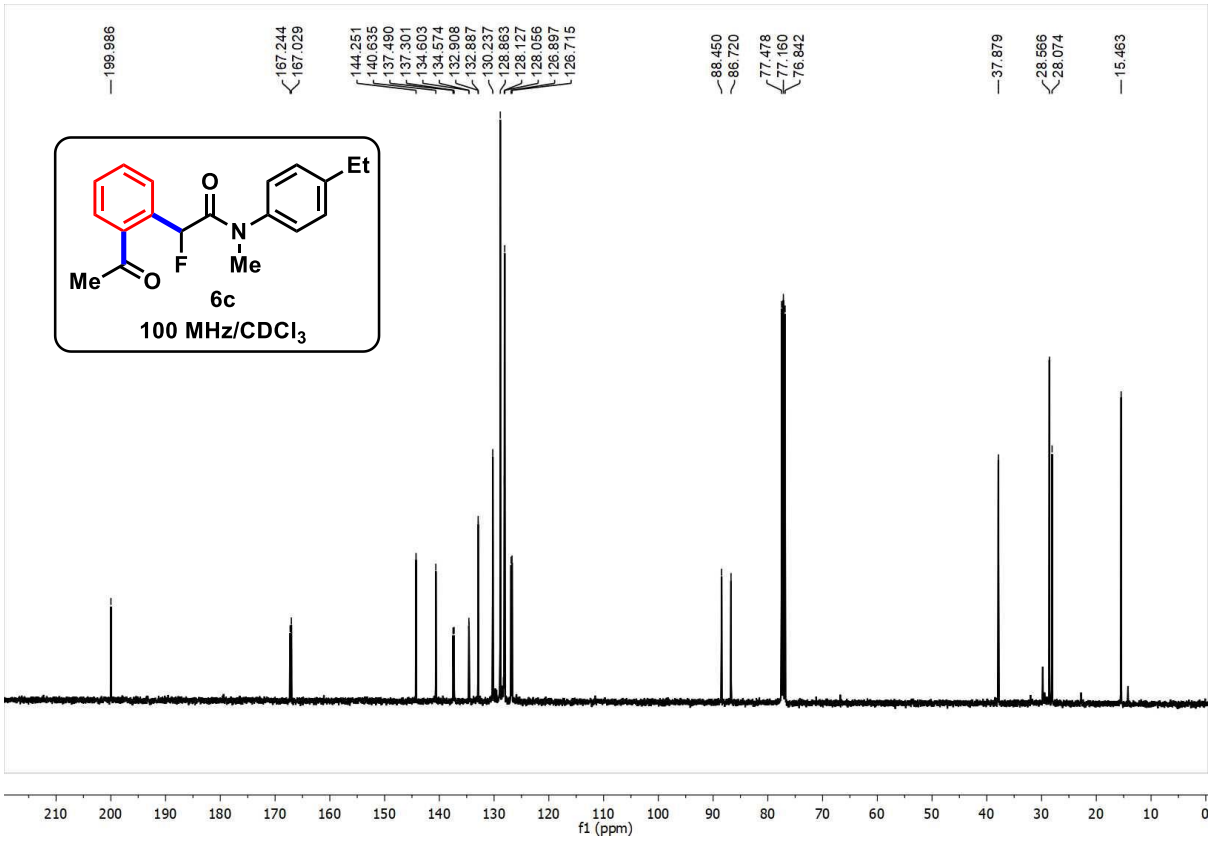

179.898
O
N
F
Me
Me
O
6a
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

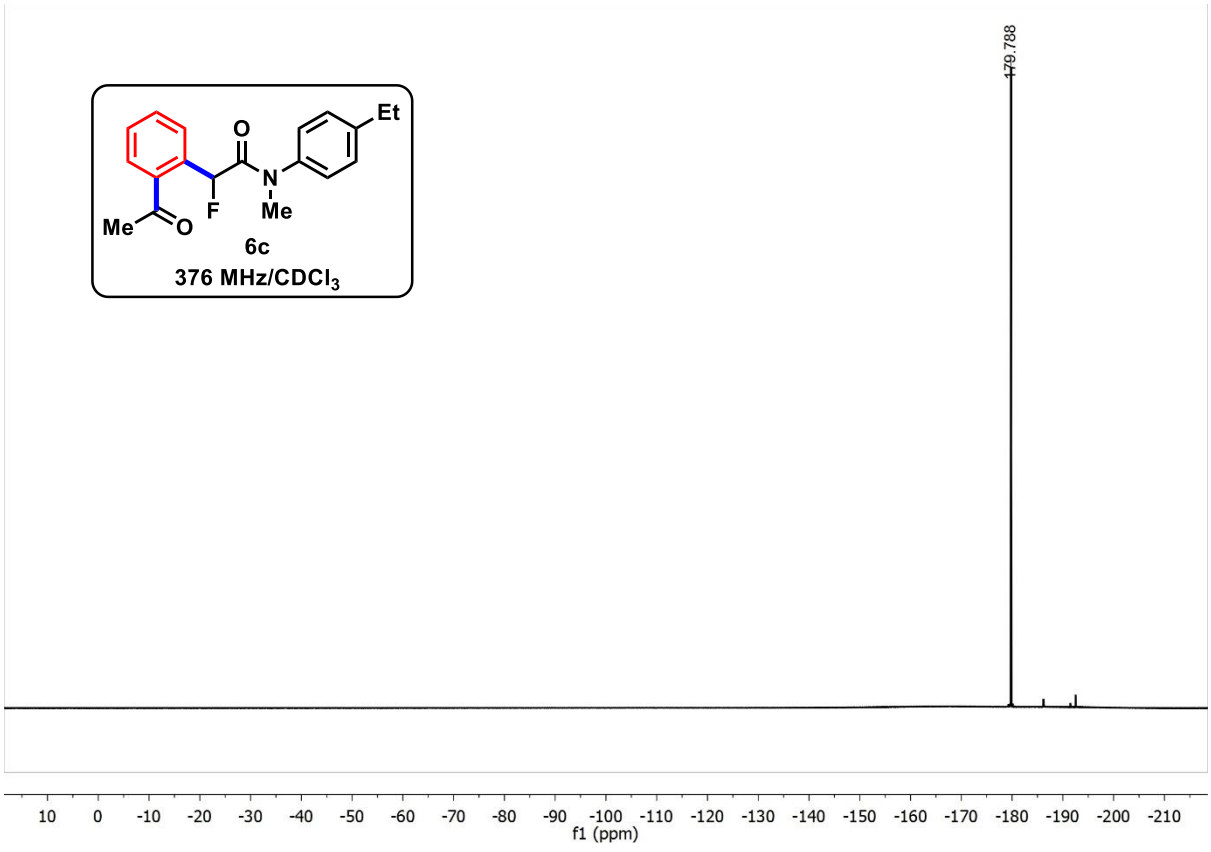

7.848
7.829
7.760
7.740
7.614
7.595
7.576
7.493
7.471
7.445
7.426
7.407
7.260
6.961
6.938
6.385
6.266
3.820
3.295
3.290
2.531
OMe
O
N
F
Me
Me
O
6b
400 MHz/CDCl3
grease
1.00
1.00
1.00
1.00
1.00
1.00
1.00
1.00
f1 (ppm)

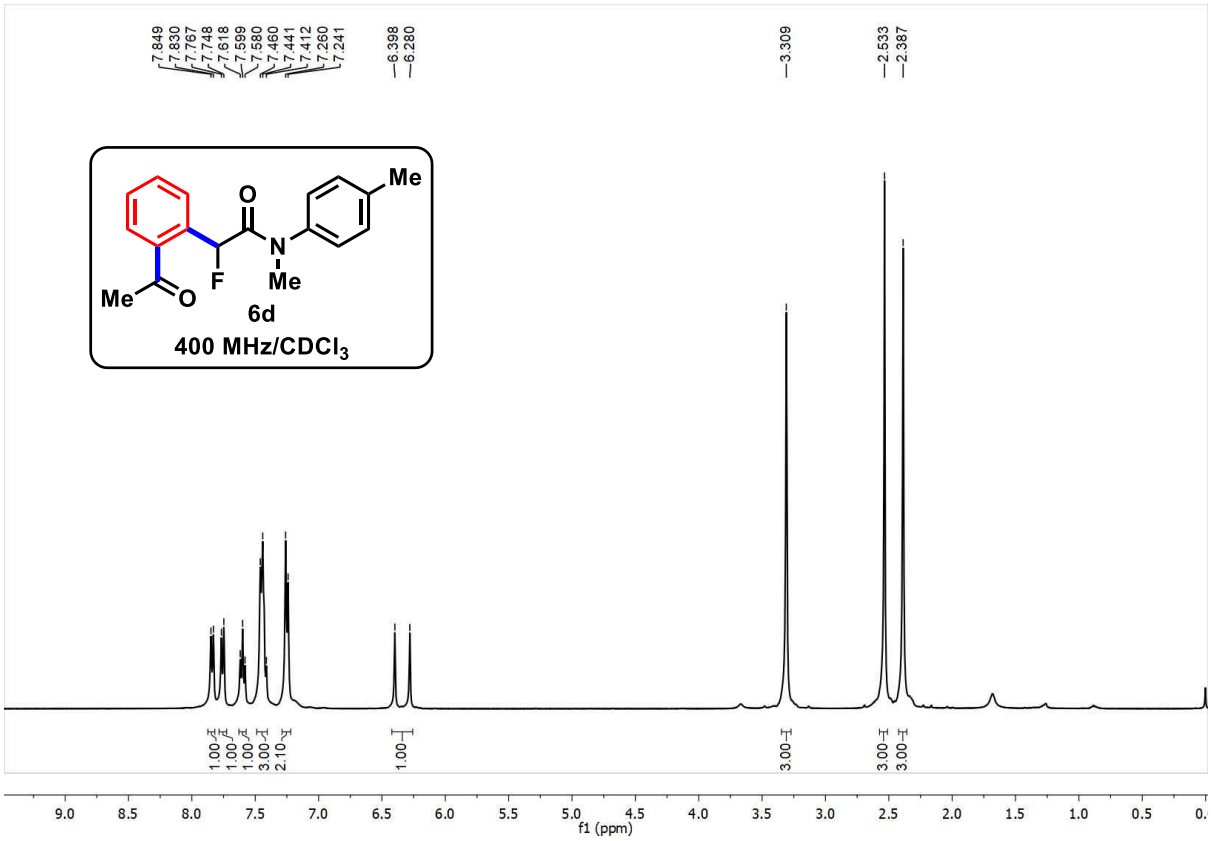

200.020
167.463
167.249
159.227
137.543
137.353
135.857
134.632
134.603
132.930
132.909
130.254
129.441
128.152
126.933
126.753
114.600
88.440
86.711
77.478
77.160
76.842
55.566
38.000
28.075
OMe
O
N
F
Me
Me
O
6b
100 MHz/CDCl3
f1 (ppm)

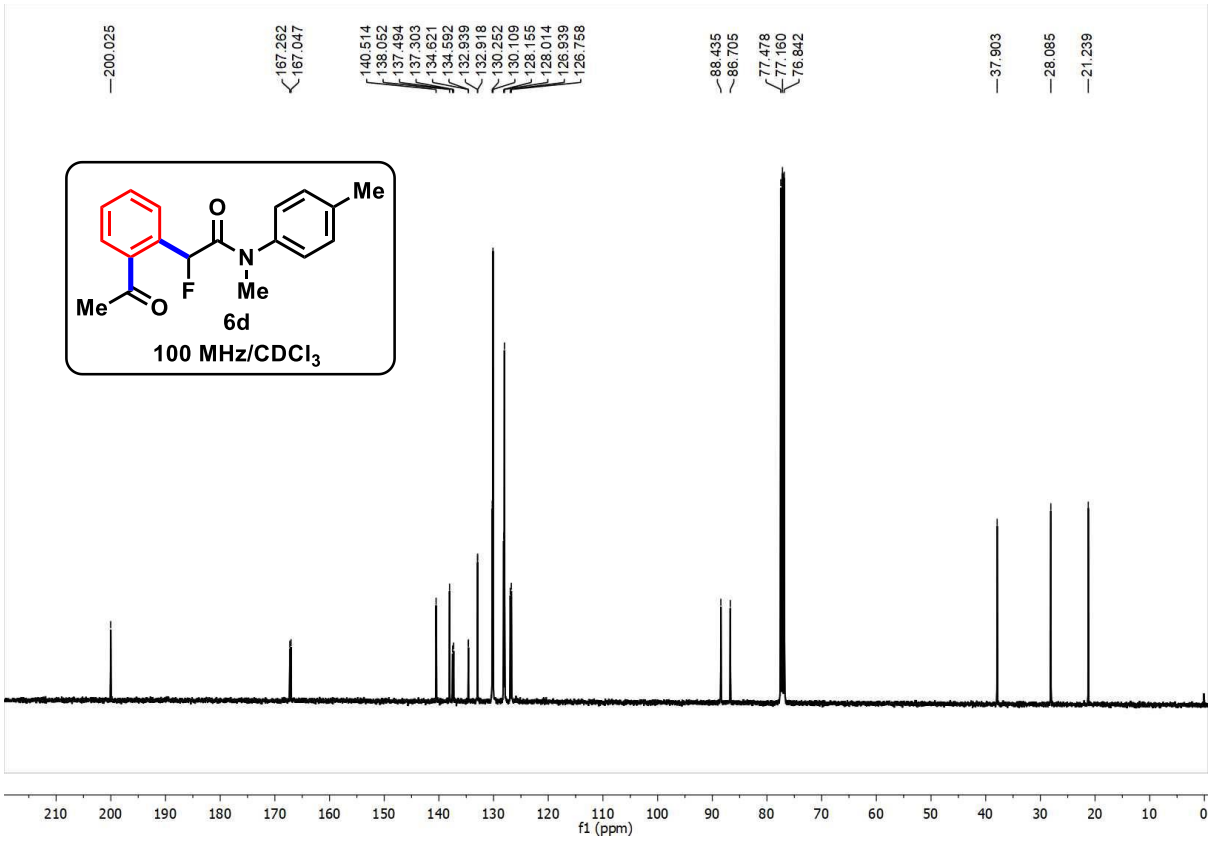

OMe
O
N
F
Me
Me
O
6b
376 MHz/CDCl3
-180.024
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

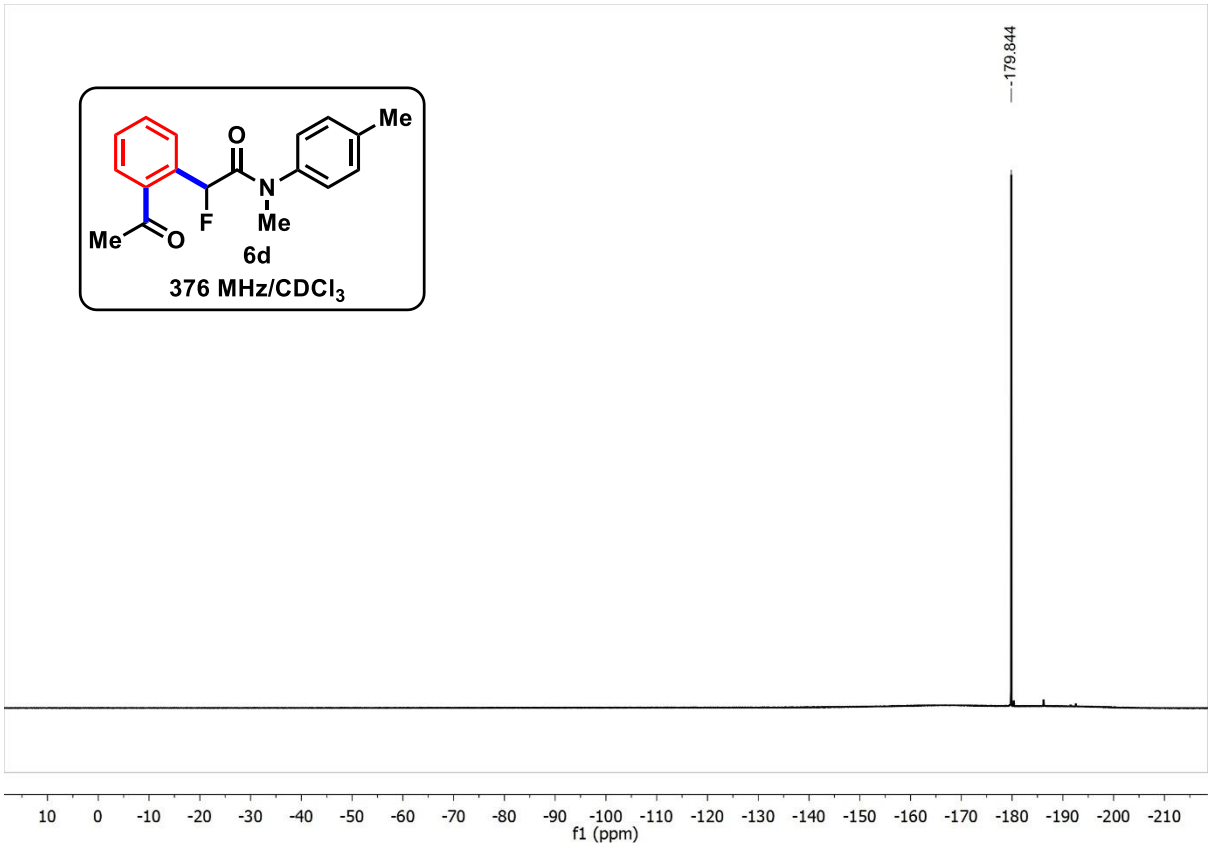

7.851
7.831
7.772
7.753
7.618
7.598
7.578
7.491
7.471
7.447
7.429
7.411
7.288
7.268
7.260
6.402
6.283
3.319
3.315
2.721
2.702
2.683
2.664
2.536
1.289
1.270
1.251
Et
O
N
F
Me
Me
O
6c
400 MHz/CDCl3
1.04
0.99
1.03
2.04
0.92
1.99
0.99
2.99
2.01
2.97
3.02
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

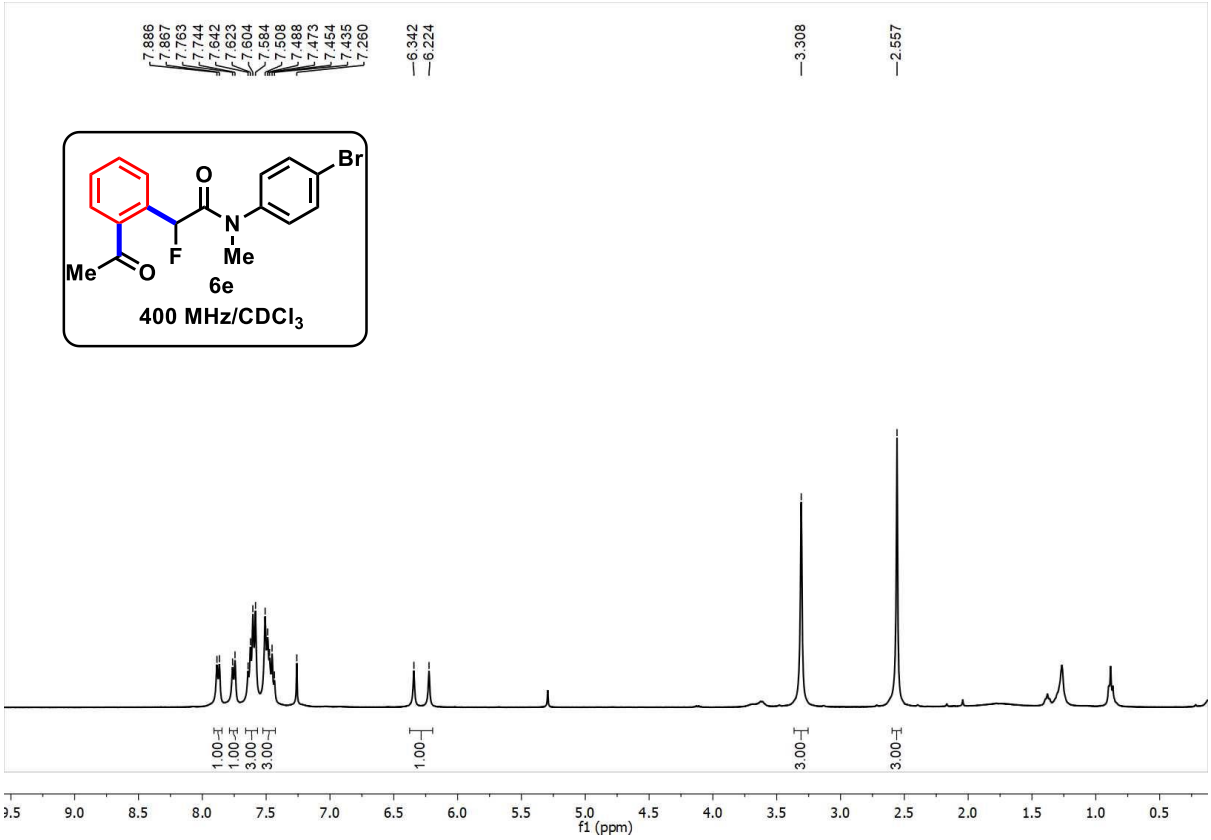

199.986
167.244
167.029
144.251
140.635
137.490
137.301
134.603
134.574
132.908
132.887
130.237
128.863
128.127
128.056
126.897
126.715
88.450
86.720
77.478
77.160
76.842
37.879
28.566
28.074
15.463
Et
O
N
Me
F
Me
O
6c
100 MHz/CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

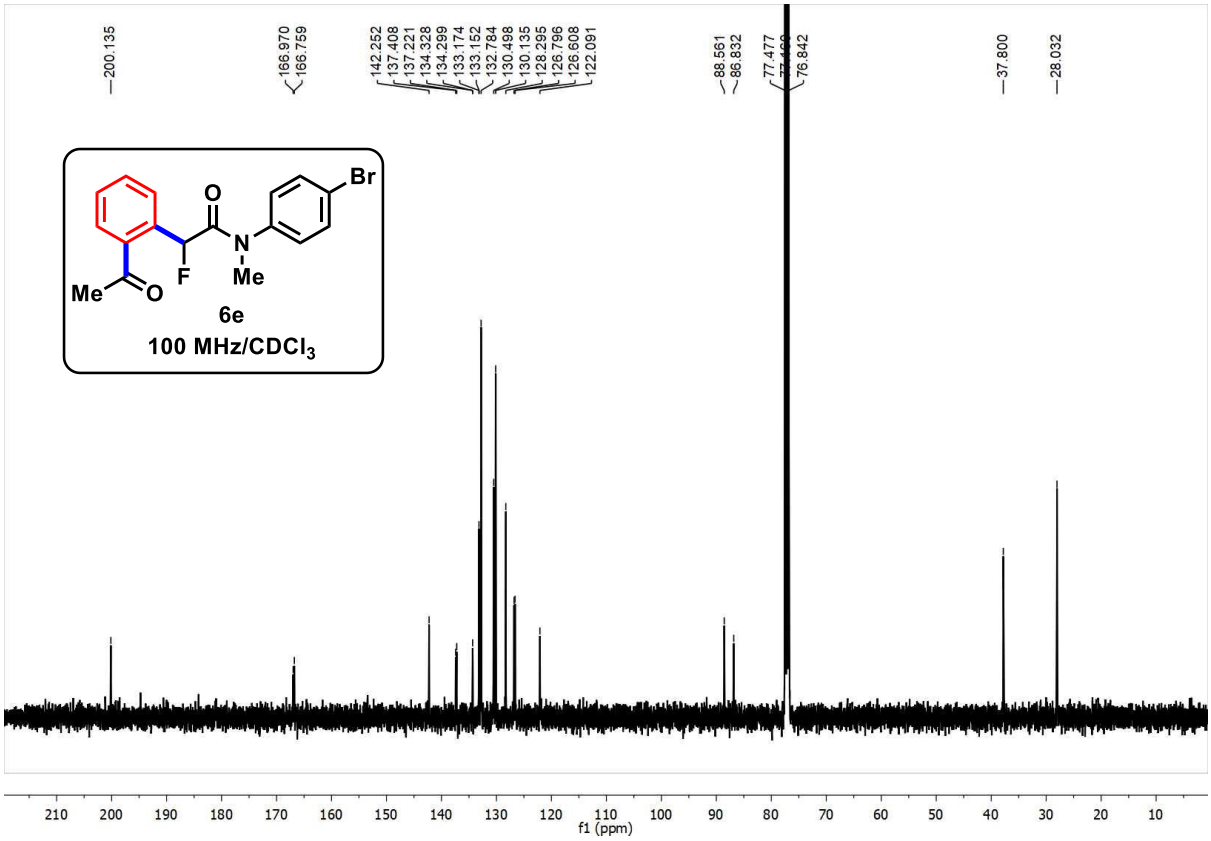

179.788
Et
O
N
Me
F
Me
O
6c
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

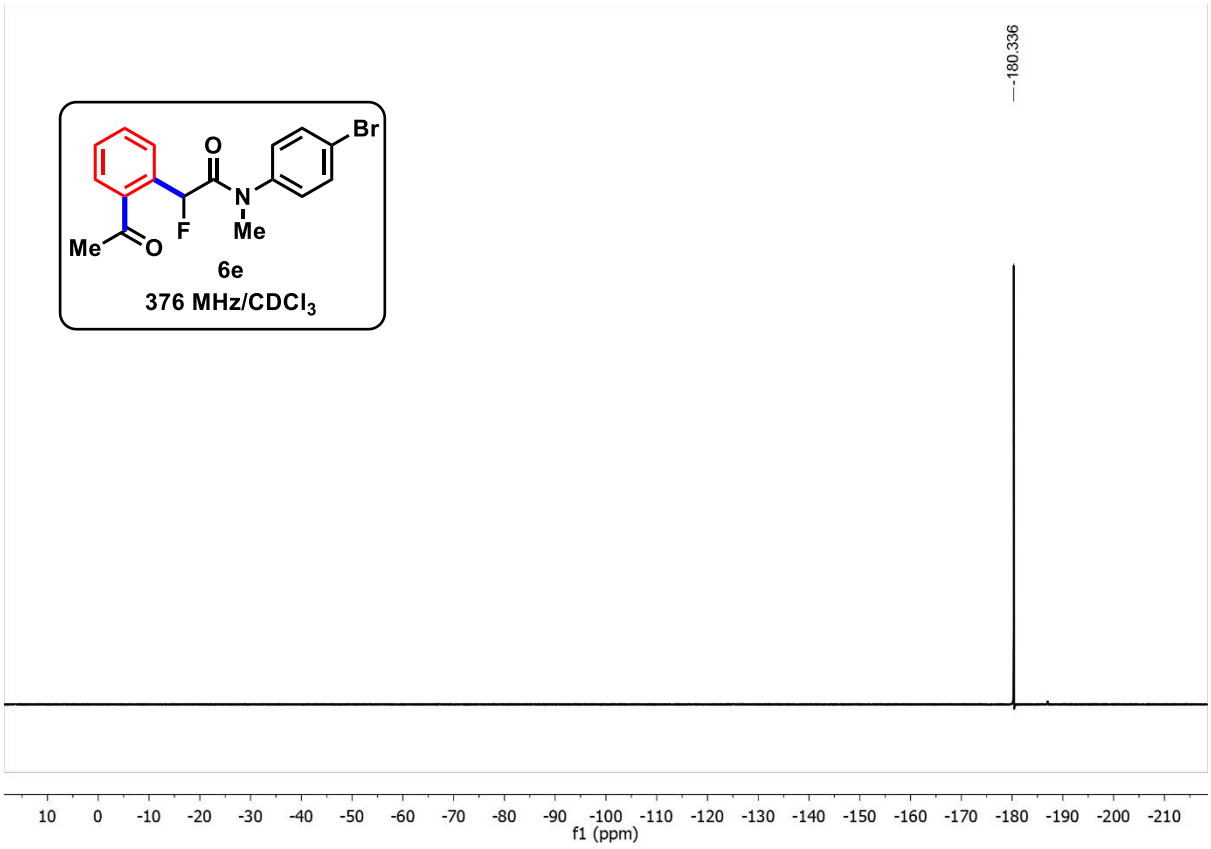

7.849
7.830
7.767
7.748
7.618
7.599
7.580
7.460
7.441
7.412
7.260
7.241
6.398
6.280
3.309
2.533
2.387
Me
O
N
F
Me
Me
O
6d
400 MHz/CDCl3
1.00
1.00
1.00
3.00
2.10
1.00
3.00
3.00
3.00
f1 (ppm)

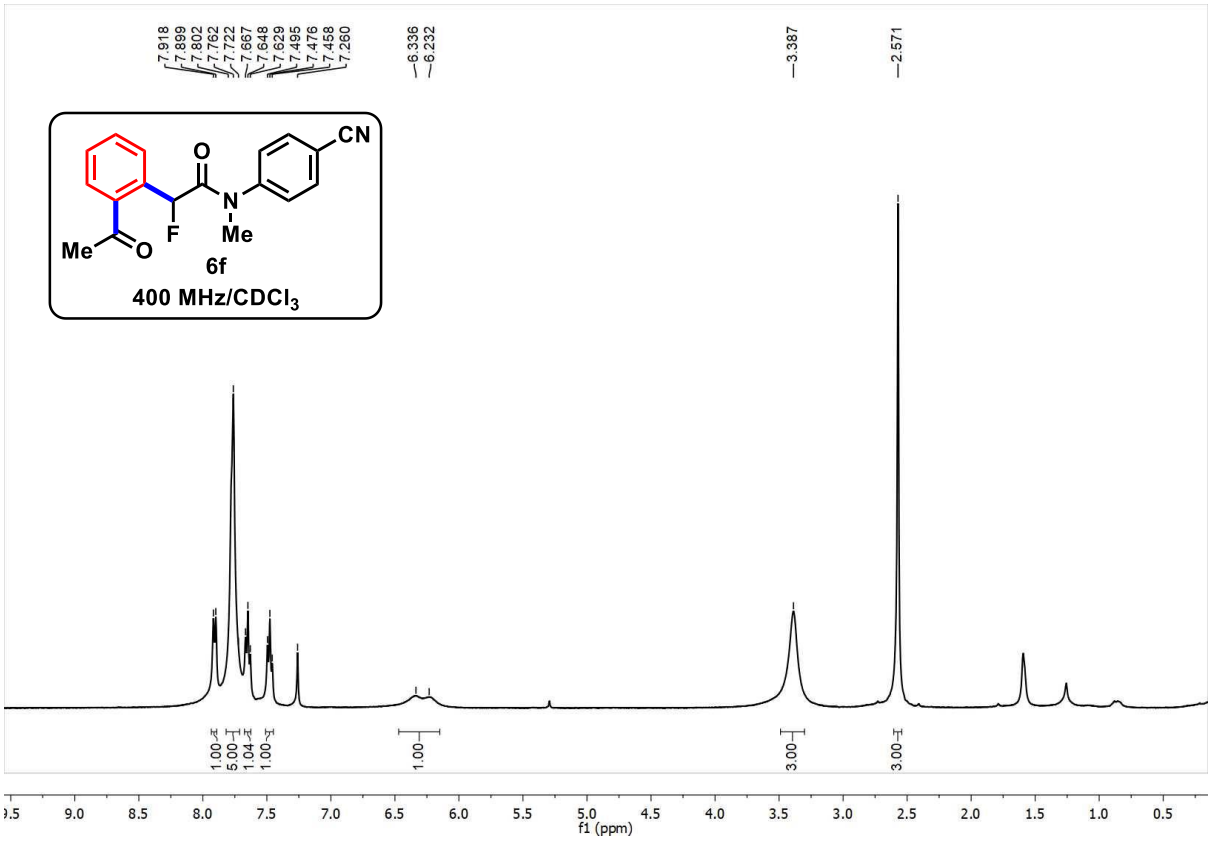

200.025
167.262
167.047
140.514
138.052
137.494
137.303
134.621
134.592
132.939
132.918
130.252
130.109
128.155
128.014
126.939
126.758
88.435
86.705
77.478
77.160
76.842
37.903
28.085
21.239
Me
O
N
F
Me
Me
O
6d
100 MHz/CDCl3
f1 (ppm)

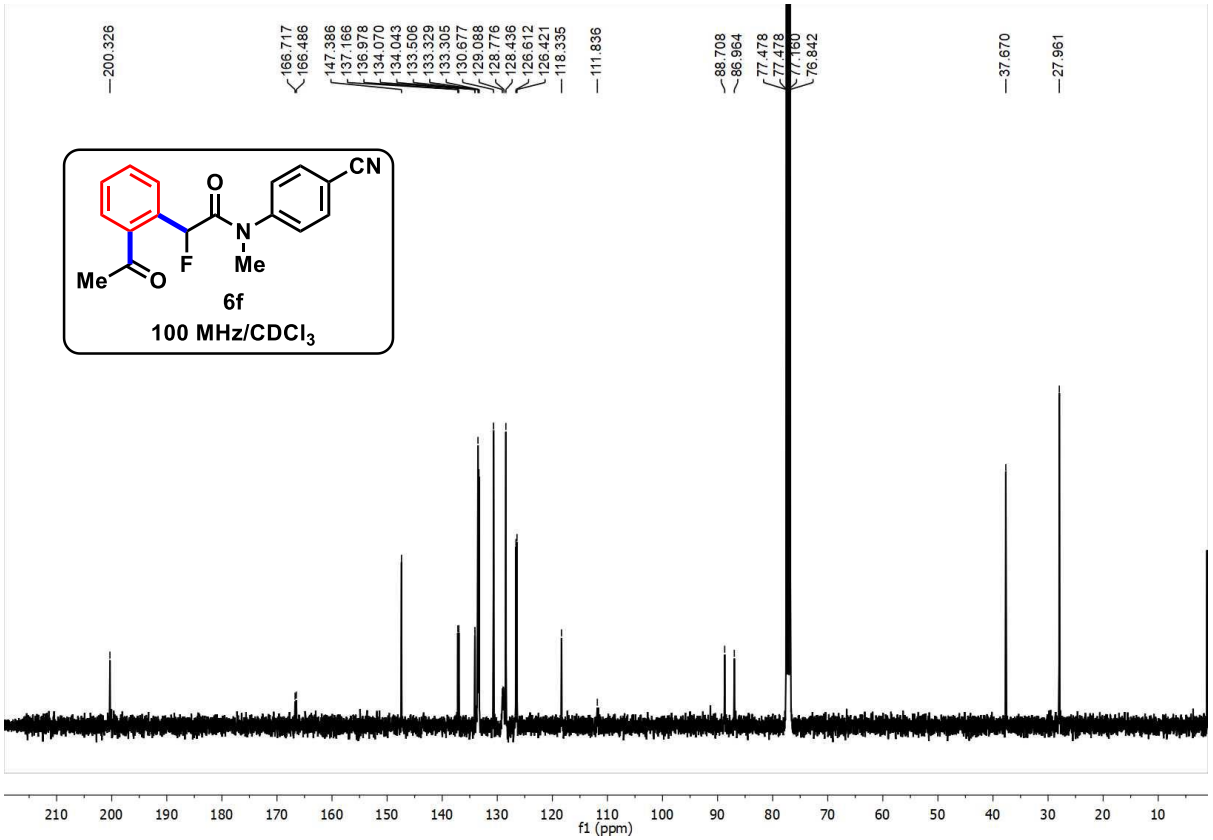

-179.844
Me
O
N
Me
F
Me
O
6d
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

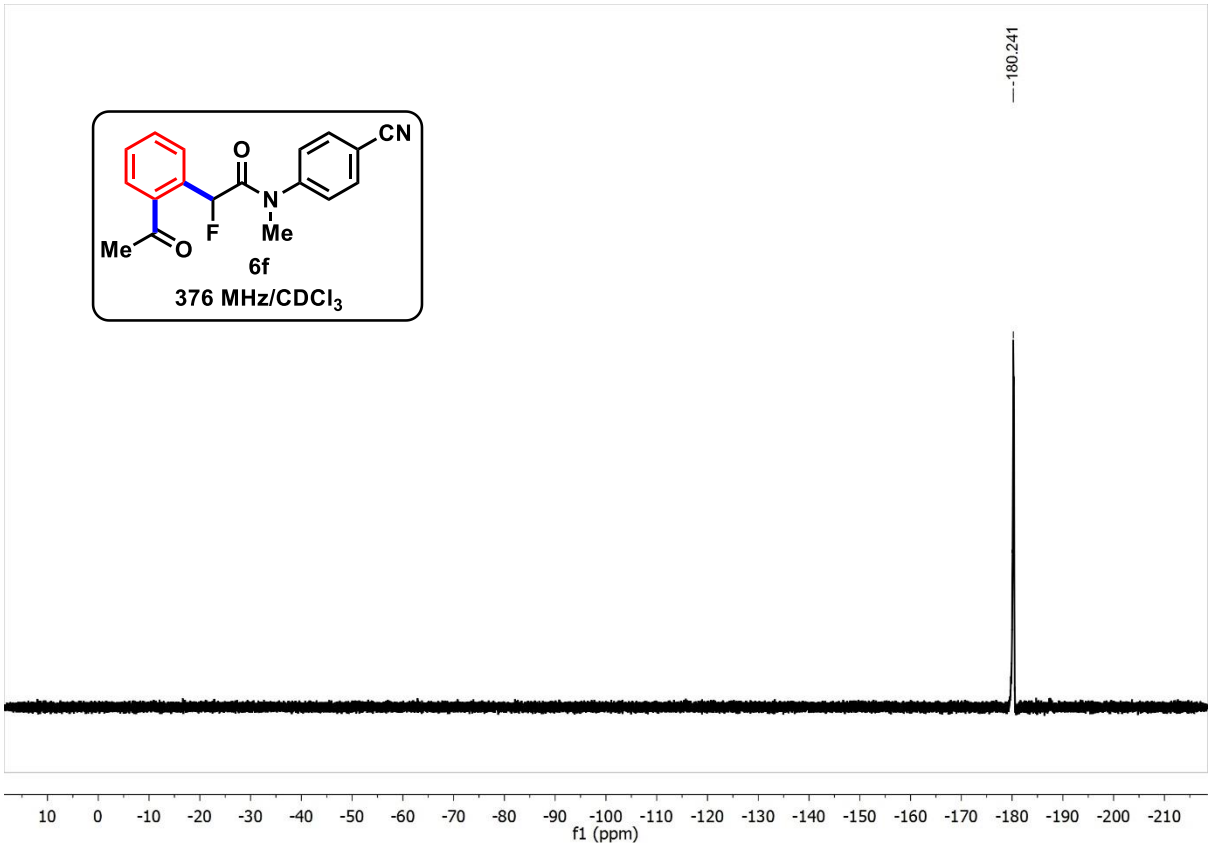

7.886
7.867
7.763
7.744
7.642
7.623
7.604
7.584
7.508
7.488
7.473
7.454
7.435
7.260
6.342
6.224
3.308
2.557
Br
O
N
Me
F
Me
O
6e
400 MHz/CDCl3
1.00
1.00
3.00
3.00
1.00
3.00
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

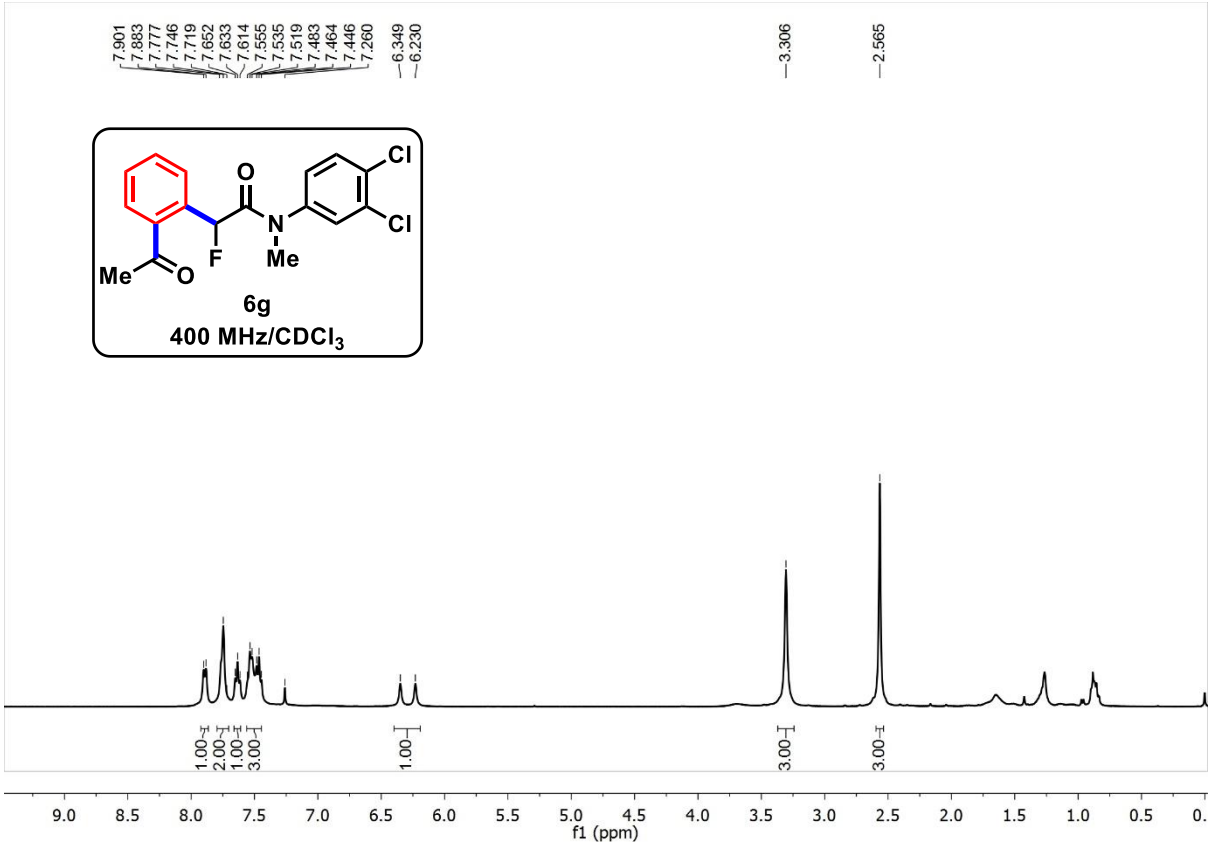

200.135
166.970
166.759
142.252
137.408
137.221
134.328
134.299
133.174
133.152
132.784
130.498
130.135
128.295
126.796
126.608
122.091
88.561
86.832
77.477
76.842
37.800
28.032
Br
O
N
F
Me
Me
O
6e
100 MHz/CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

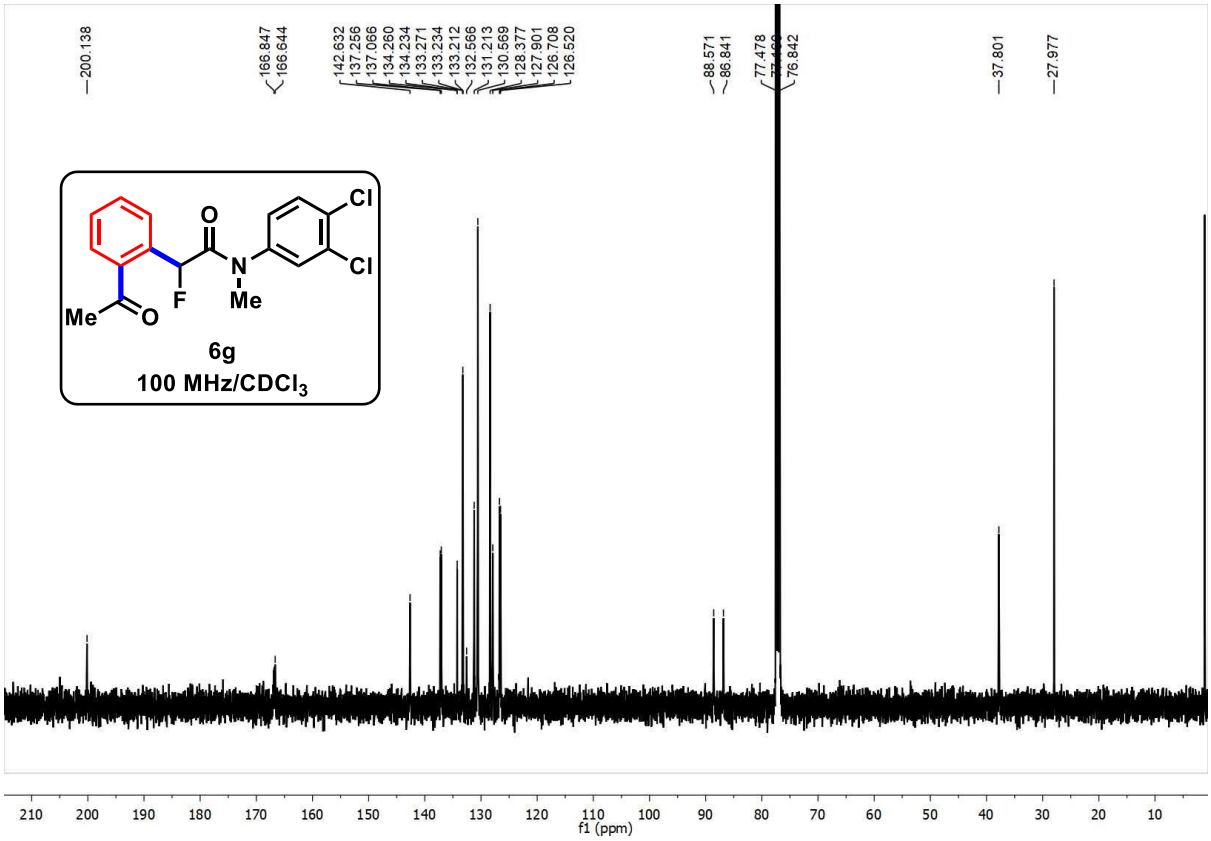

-180.336
Br
O
N
F
Me
Me
O
6e
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

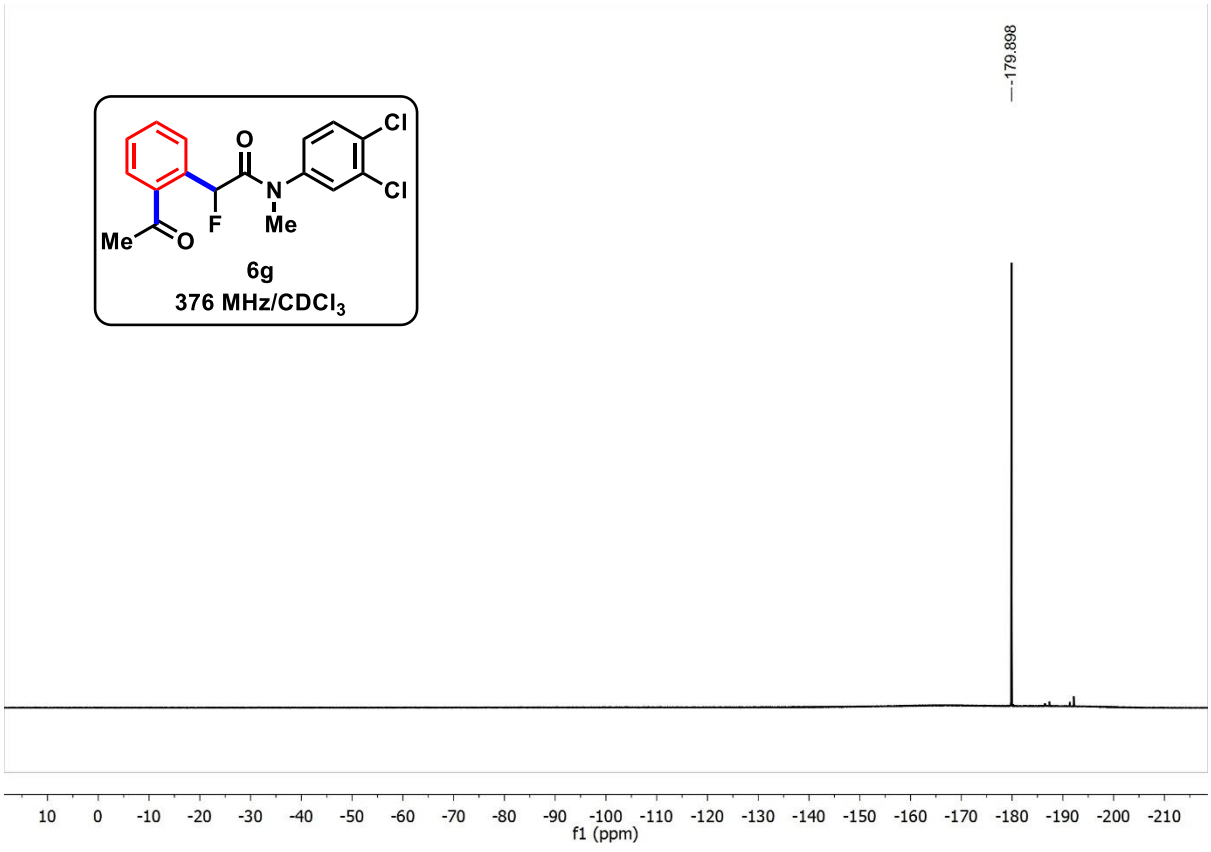

7.918
7.899
7.802
7.762
7.722
7.667
7.648
7.629
7.495
7.476
7.458
7.260
6.336
6.232
3.387
2.571
CN
O
N
F
Me
Me
O
6f
400 MHz/CDCl3
1.00
5.00
1.04
1.00
1.00
3.00
3.00
f1 (ppm)

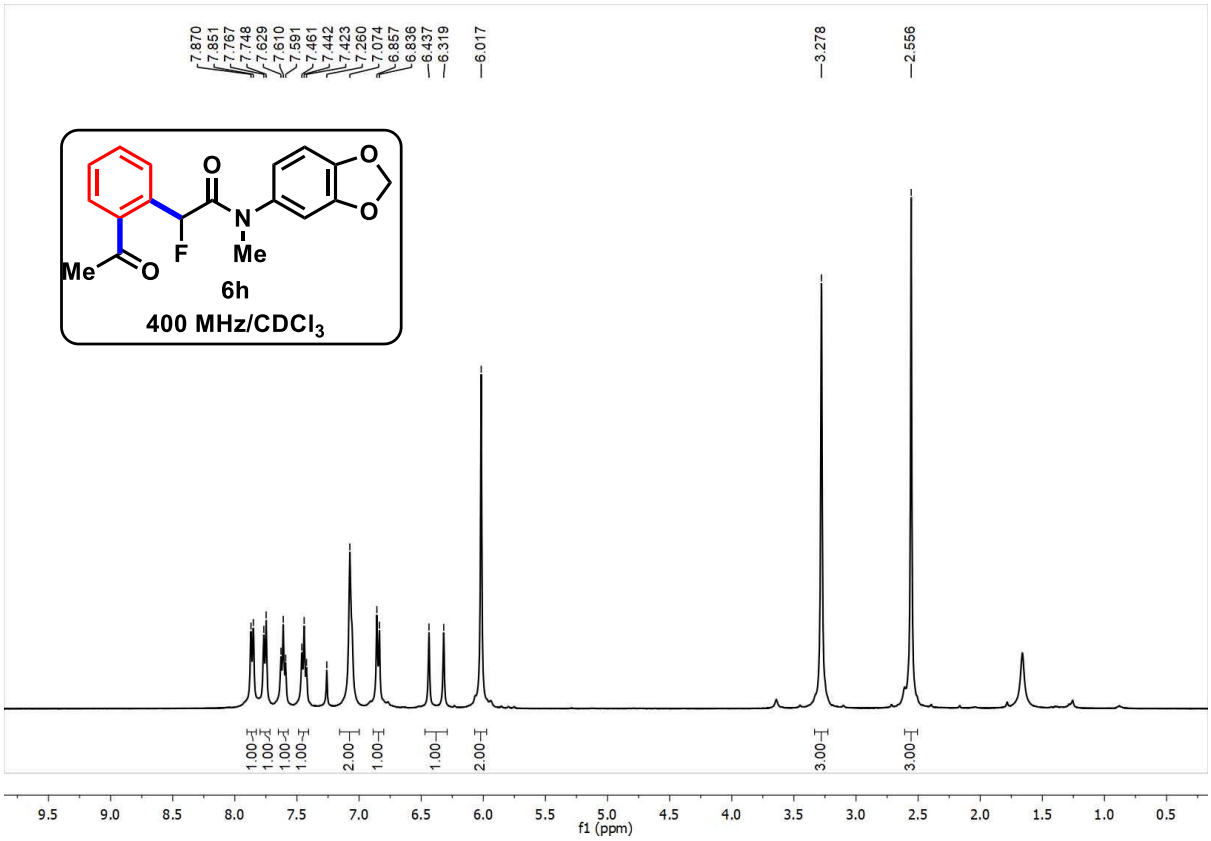

200.326
166.717
166.486
147.386
137.166
136.978
134.070
134.043
133.506
133.329
133.305
130.677
129.088
128.776
128.436
126.612
126.421
118.335
111.836
88.708
86.964
77.478
77.478
77.160
76.842
37.670
27.961
CN
O
N
F
Me
Me
O
6f
100 MHz/CDCl3
f1 (ppm)

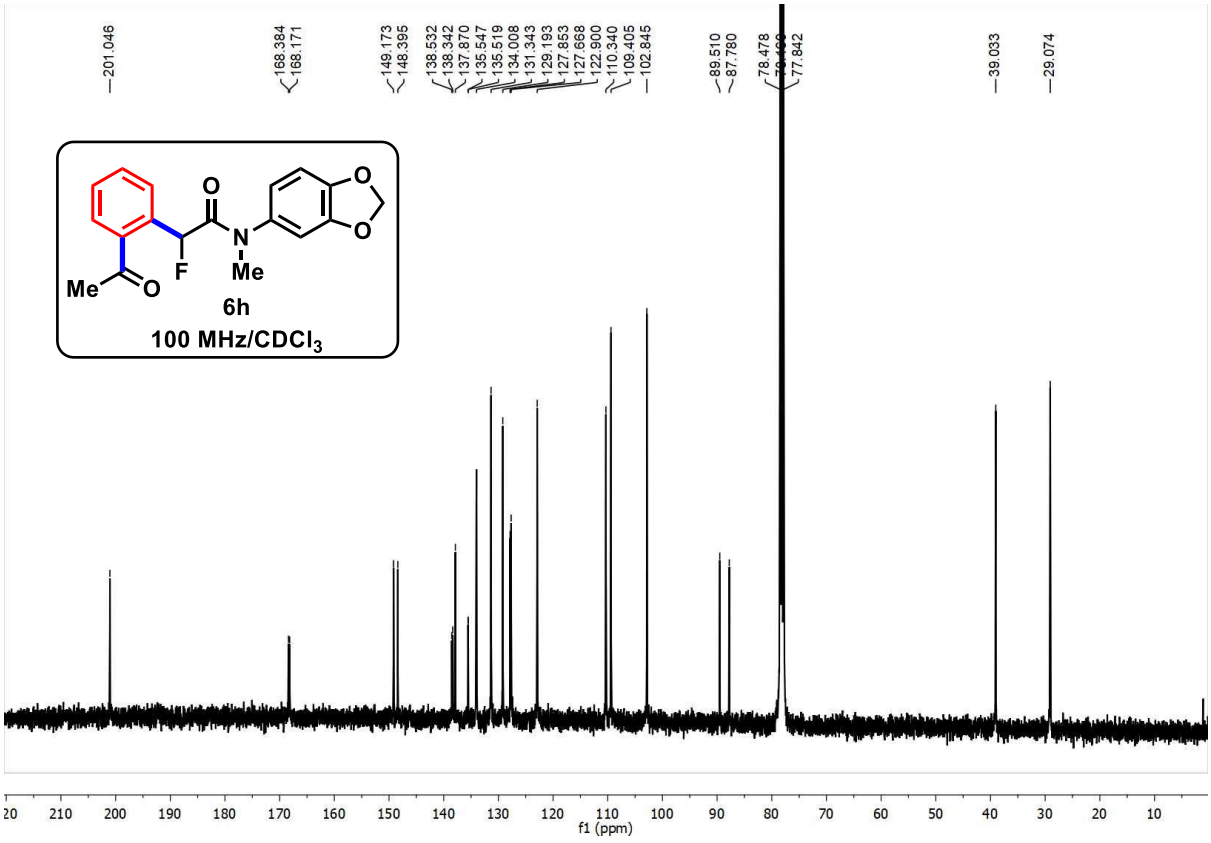

-180.241
CN
O
N
Me
F
Me
Me
O
6f
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

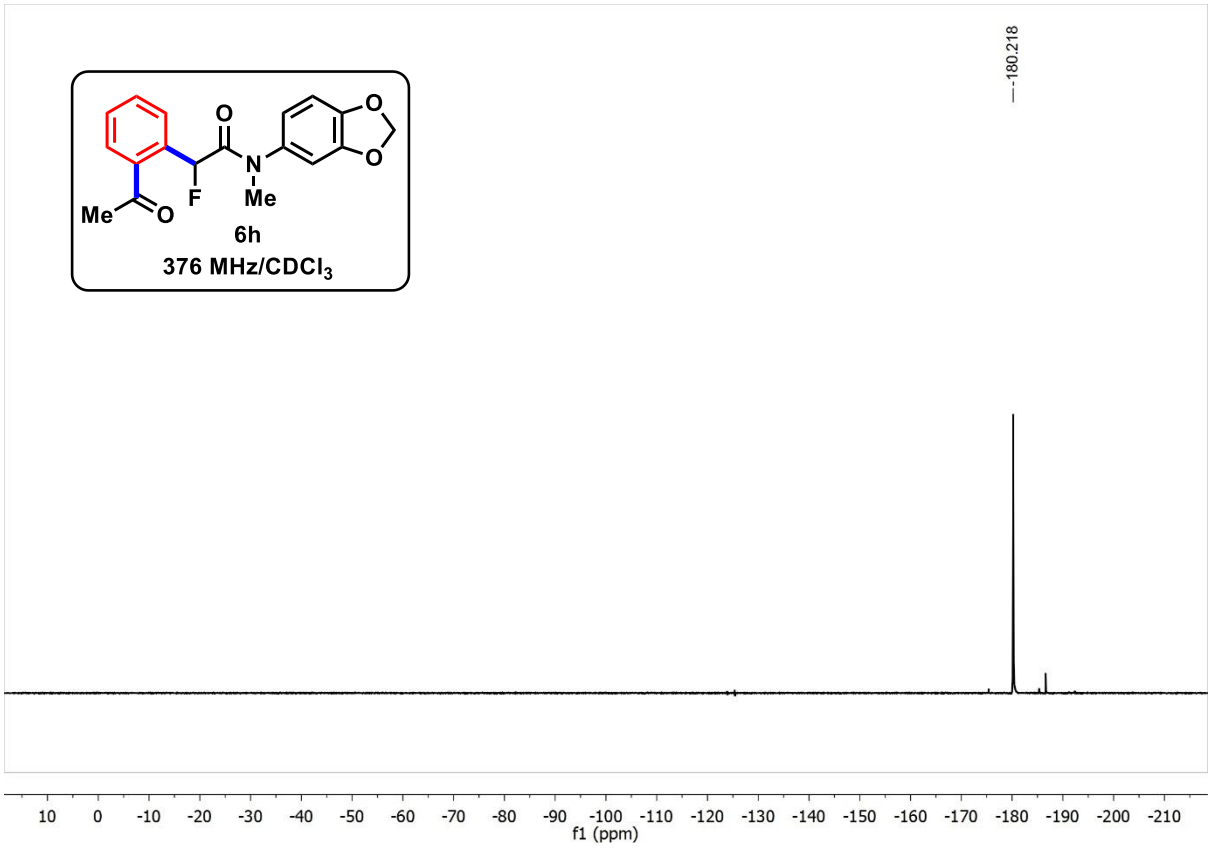

7.901
7.883
7.777
7.746
7.719
7.652
7.633
7.614
7.555
7.535
7.519
7.483
7.464
7.446
7.260
6.349
6.230
3.306
2.565
Cl
Cl
O
N
Me
F
Me
Me
O
6g
400 MHz/CDCl3
1.00
2.00
1.00
3.00
1.00
3.00
3.00
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.
f1 (ppm)

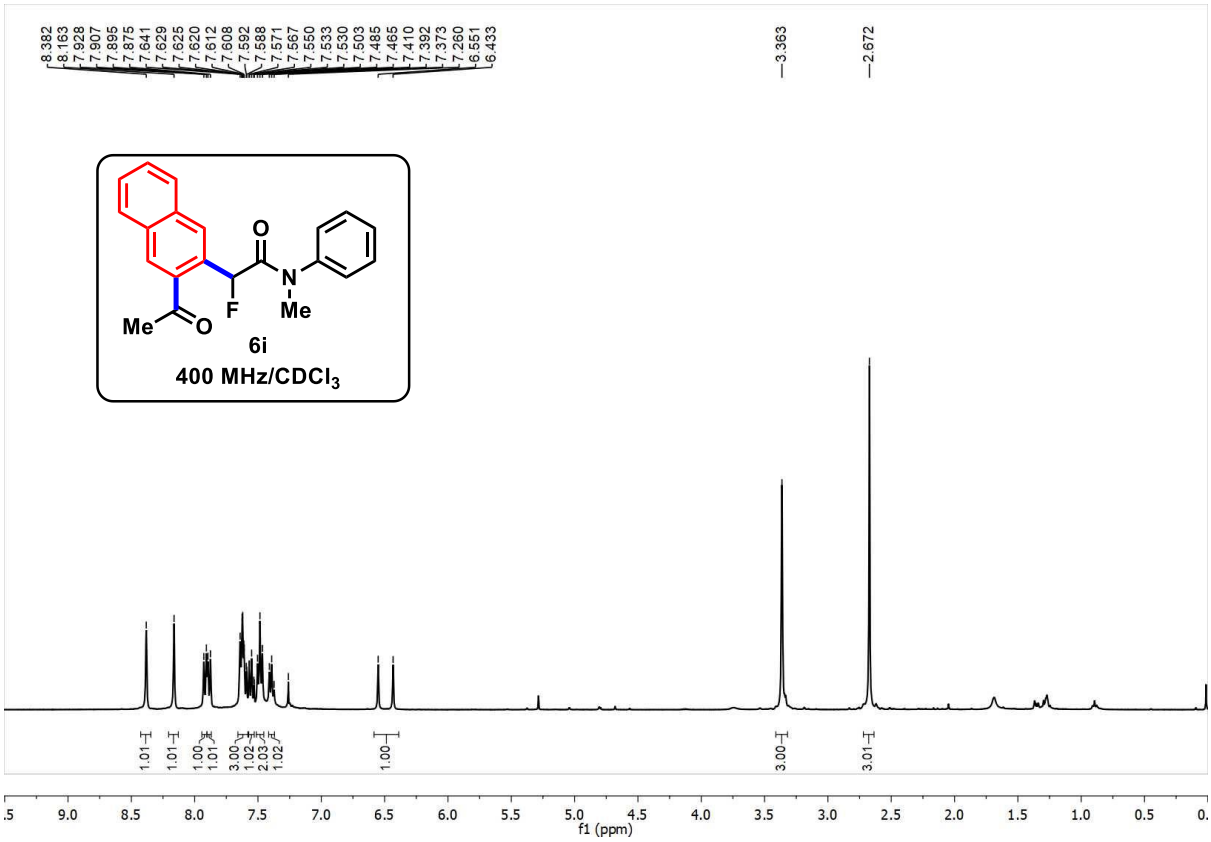

200.138
166.847
166.644
142.632
137.256
137.066
134.260
134.234
133.271
133.234
133.212
132.566
131.213
130.569
128.377
127.901
126.708
126.520
88.571
86.841
77.478
76.842
37.801
27.977
Cl
Cl
O
N
F
Me
Me
O
6g
100 MHz/CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)

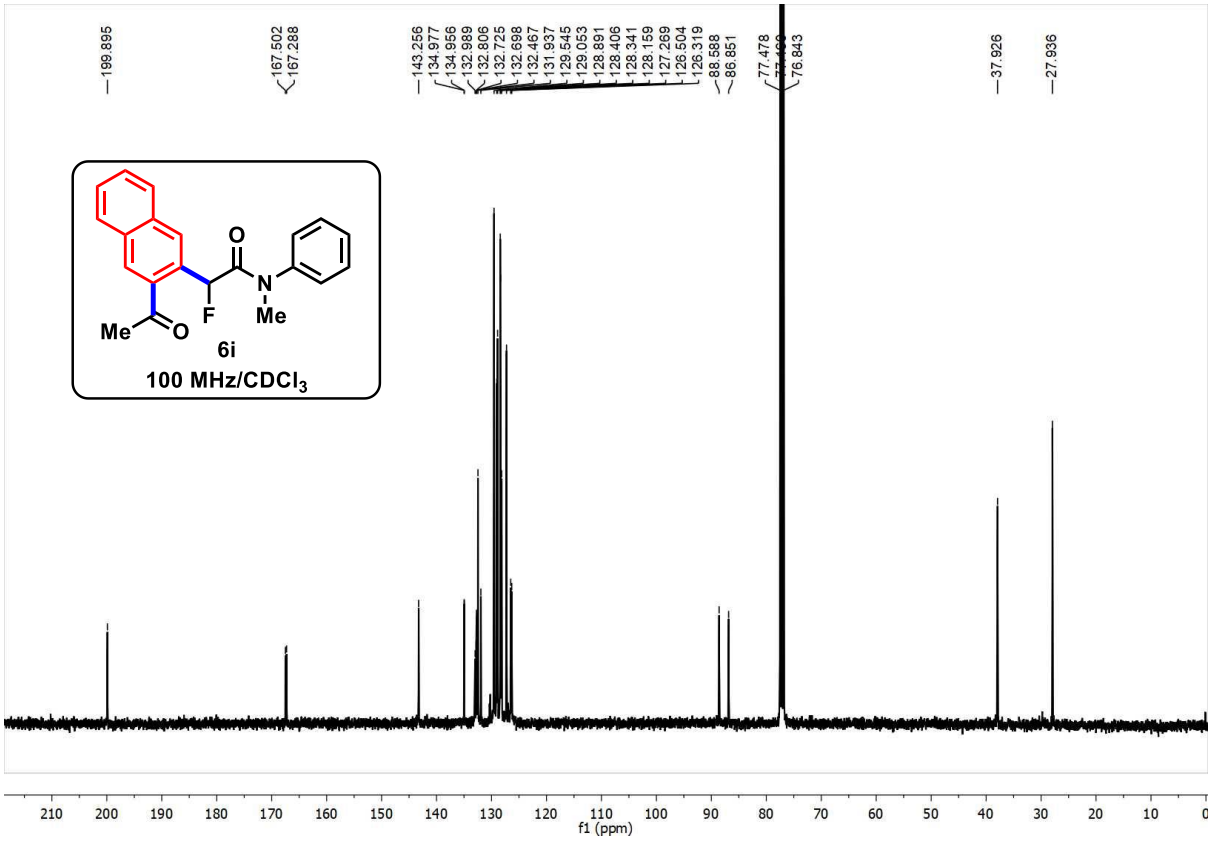

179.898
Cl
Cl
O
N
F
Me
Me
O
6g
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

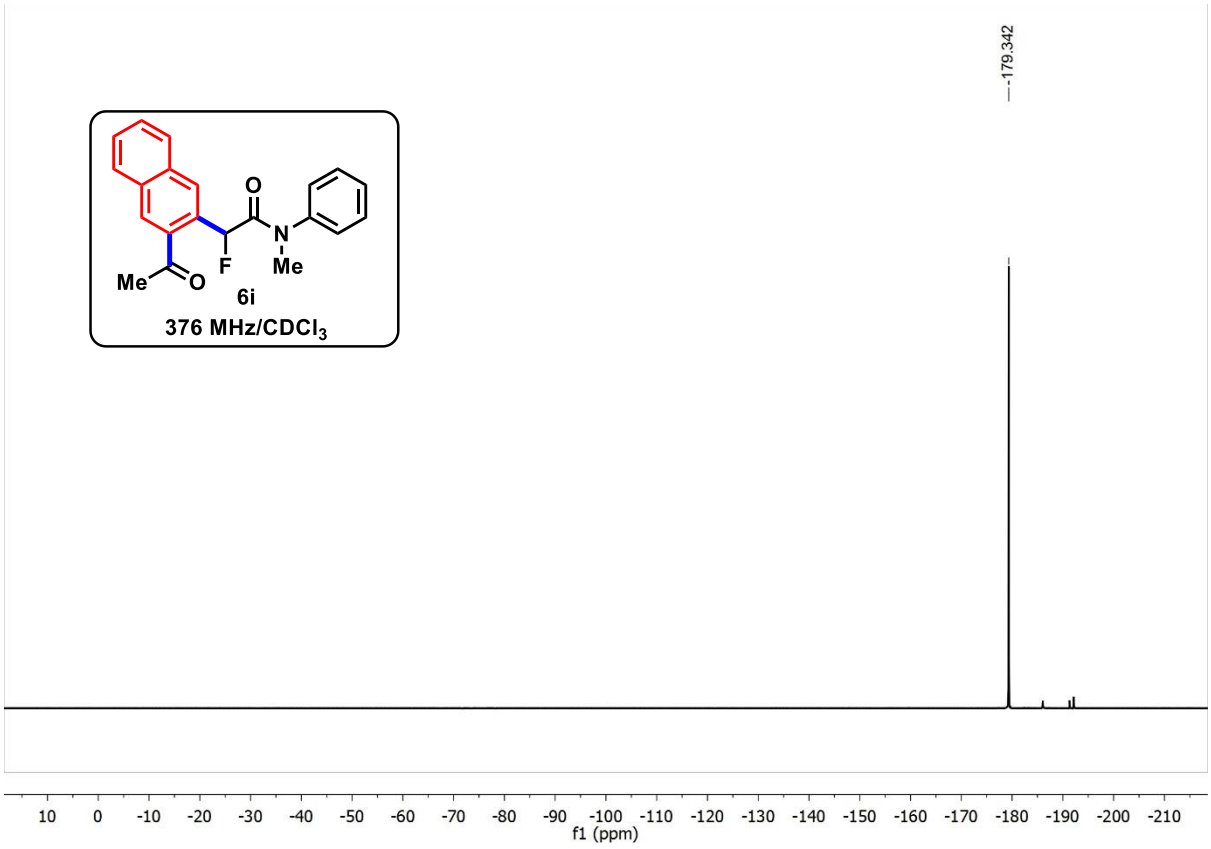

7.870
7.851
7.767
7.748
7.629
7.610
7.591
7.461
7.442
7.423
7.260
7.074
6.857
6.836
6.437
6.319
6.017
3.278
2.556
1.00
1.00
1.00
1.00
2.00
1.00
1.00
2.00
3.00
3.00
O
O
O
N
F
Me
Me
O
6h
400 MHz/CDCl3
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

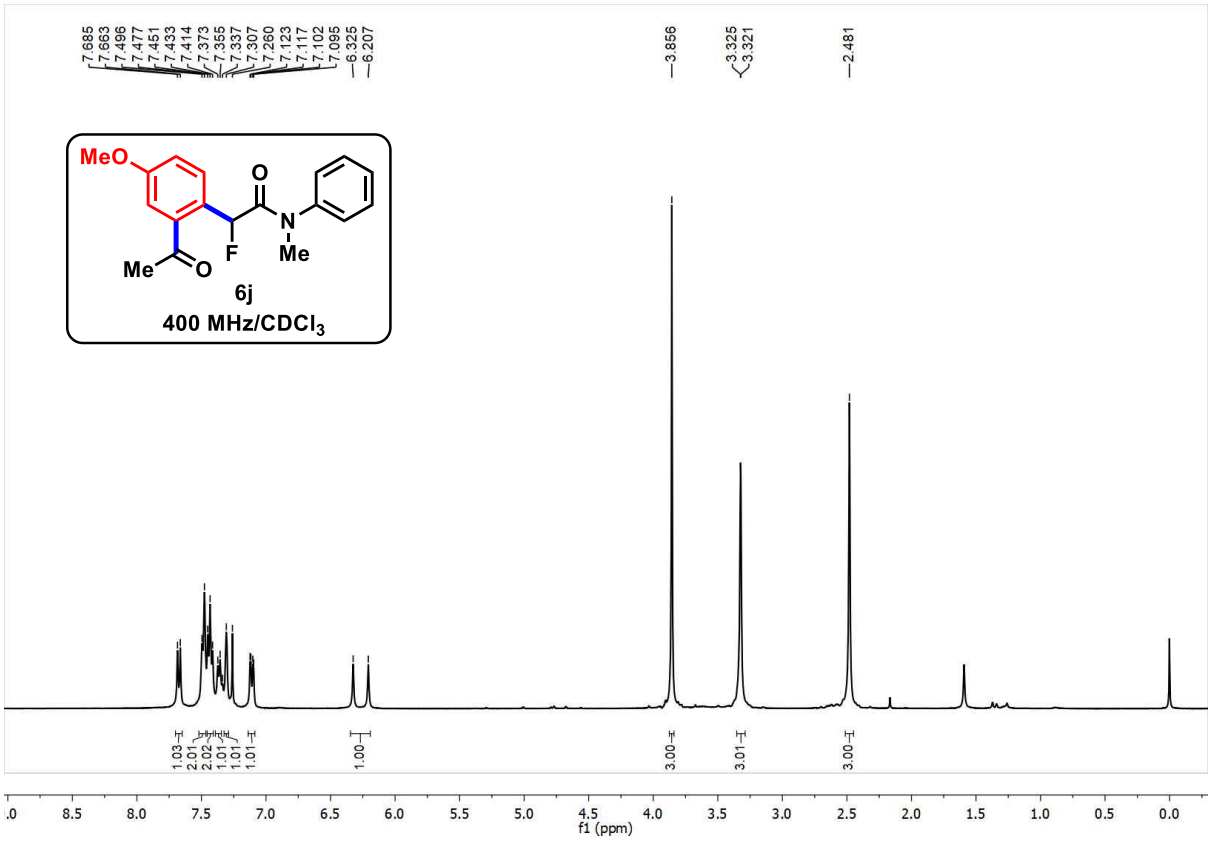

201.046
168.384
168.171
149.173
148.395
138.532
138.342
137.870
135.547
135.519
134.008
131.343
129.193
127.853
127.668
122.900
110.340
109.405
102.845
89.510
87.780
78.478
77.842
39.033
29.074
O
O
O
N
F
Me
Me
O
6h
100 MHz/CDCl3
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

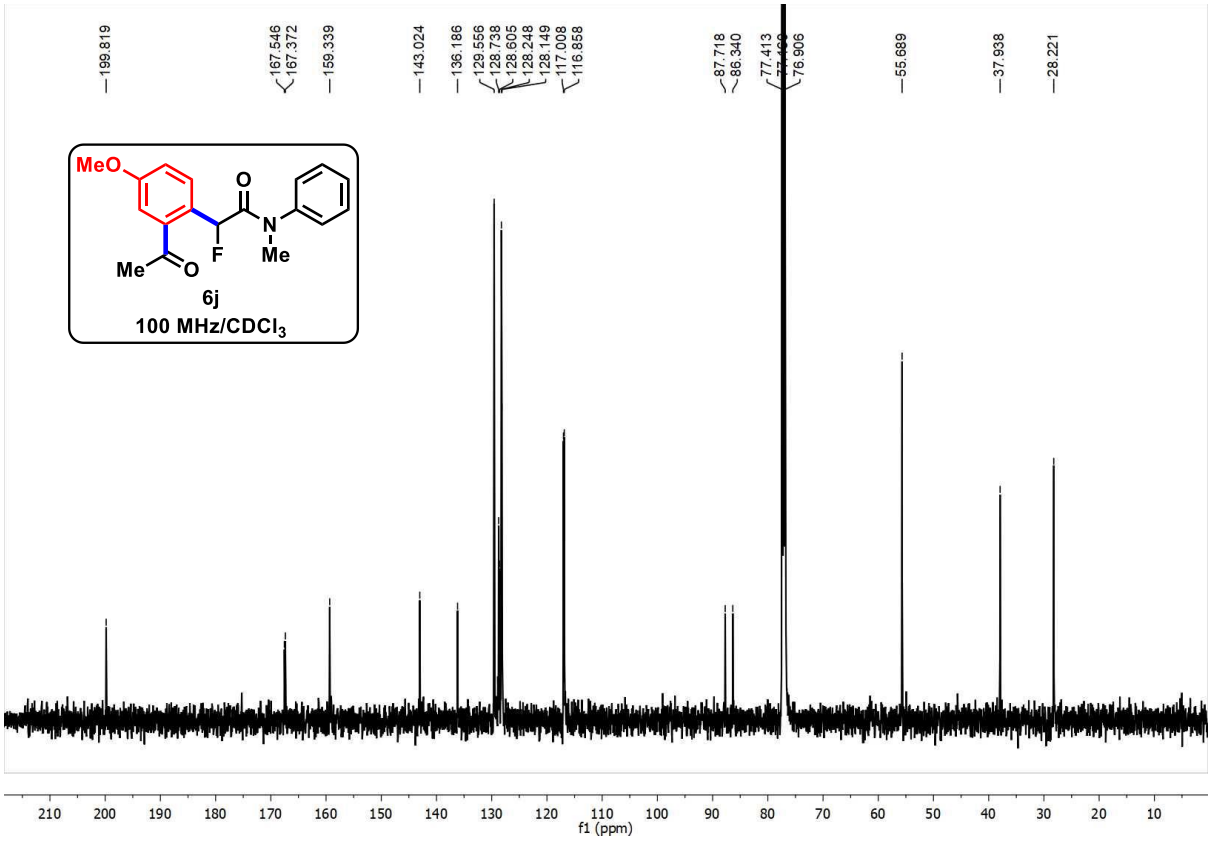

-180.218
O
O
O
N
F
Me
Me
O
6h
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

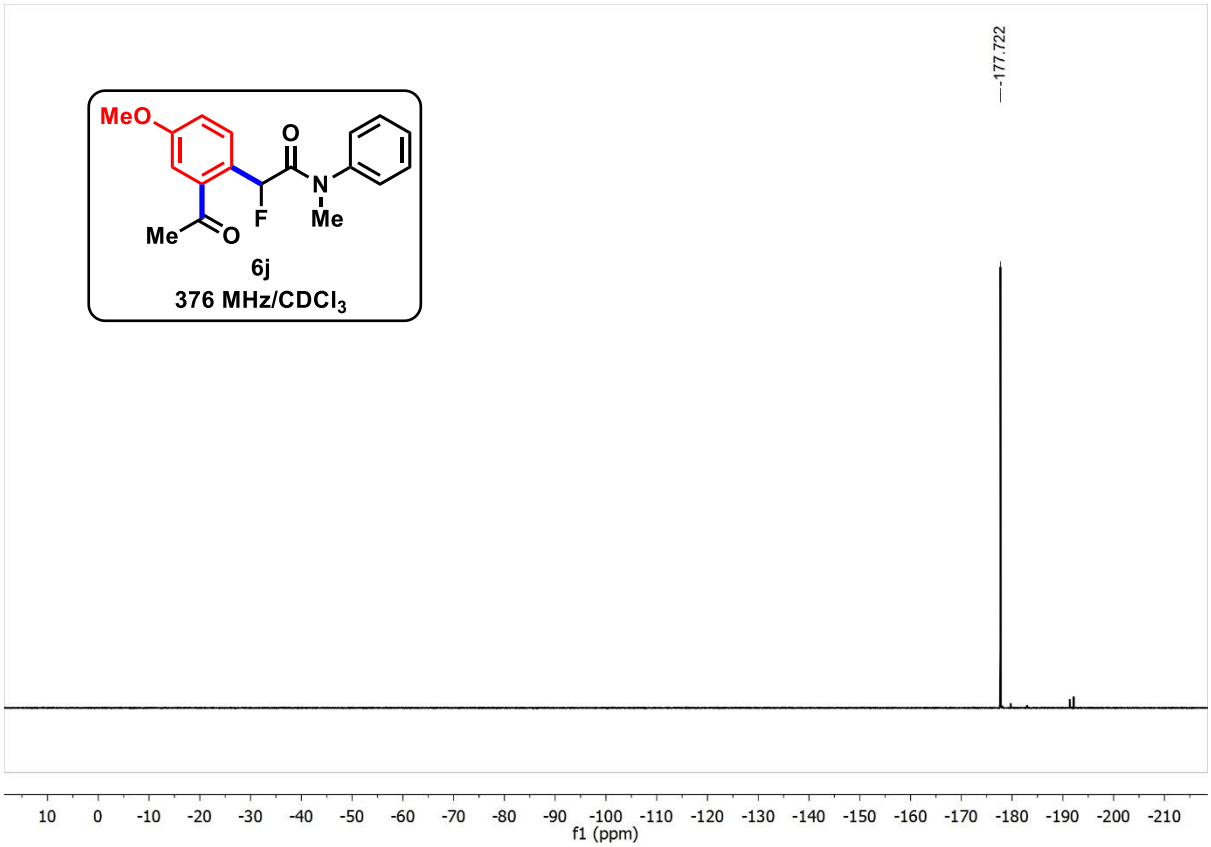

8.382
8.163
7.928
7.907
7.895
7.875
7.641
7.629
7.625
7.620
7.612
7.608
7.592
7.588
7.571
7.567
7.550
7.533
7.530
7.503
7.485
7.465
7.410
7.392
7.373
7.260
6.551
6.433
3.363
2.672
O
N
F
Me
Me
O
6i
400 MHz/CDCl3
1.01
1.01
1.00
1.01
3.00
1.02
2.03
1.02
1.00
3.00
3.01
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5
f1 (ppm)

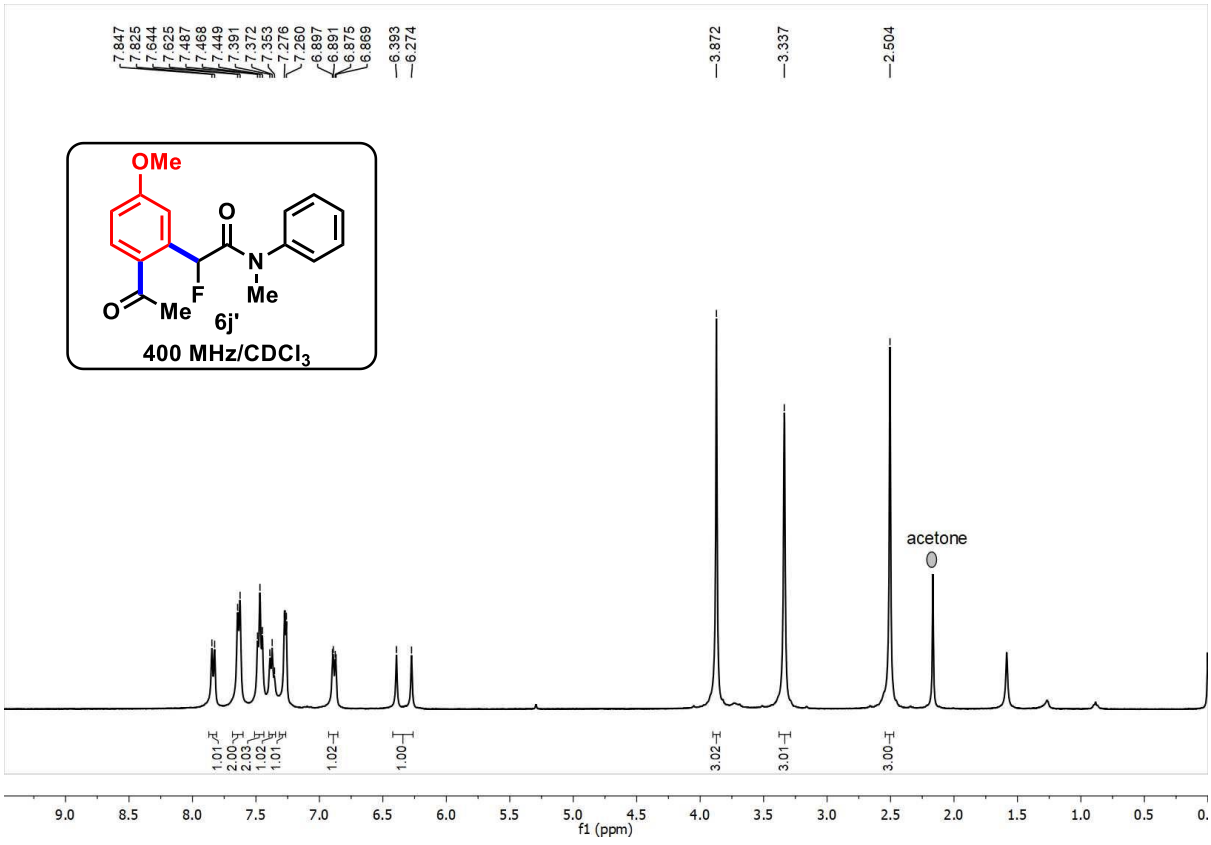

199.895
167.502
167.288
143.256
134.977
134.956
132.989
132.806
132.725
132.698
132.467
131.937
129.545
129.053
128.891
128.406
128.341
128.159
127.269
126.504
126.319
88.588
86.851
77.478
76.843
37.926
27.936
O
N
F
Me
Me
O
6i
100 MHz/CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

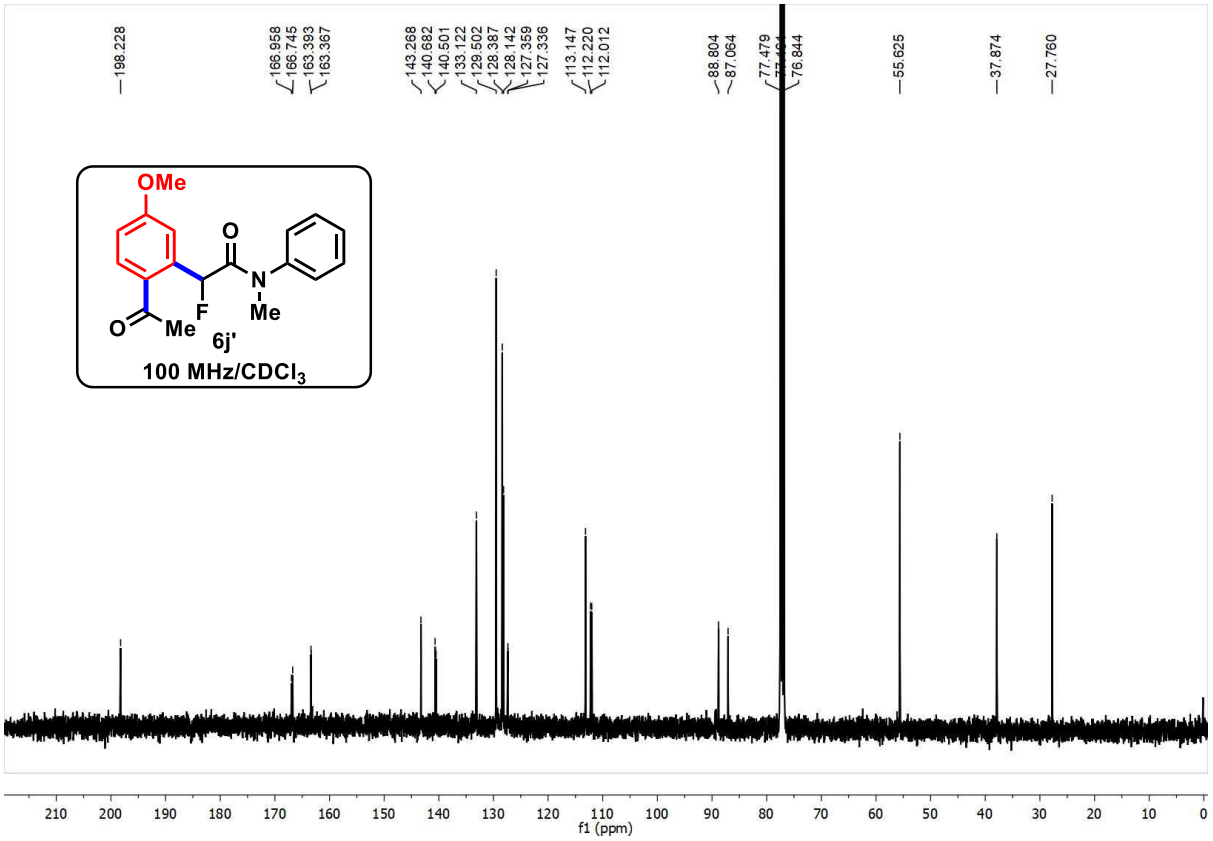

179.342
O
N
F
Me
Me
O
6i
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

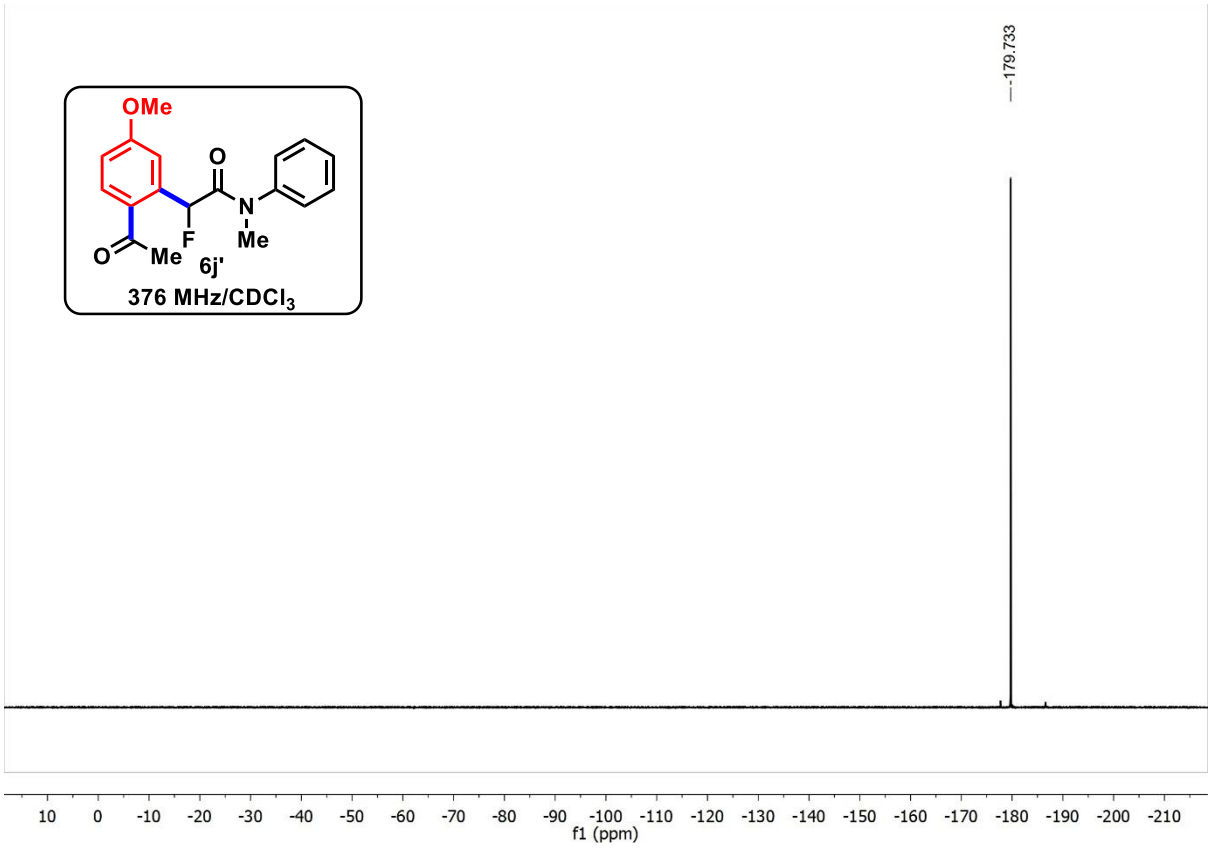

7.685
7.663
7.496
7.477
7.451
7.433
7.414
7.373
7.355
7.337
7.307
7.260
7.123
7.117
7.102
7.095
6.325
6.207
3.856
3.325
3.321
2.481
MeO
O
N
F
Me
Me
O
6j
400 MHz/CDCl3
1.03
2.01
2.02
1.01
1.01
1.01
1.00
3.00
3.01
3.00
f1 (ppm)

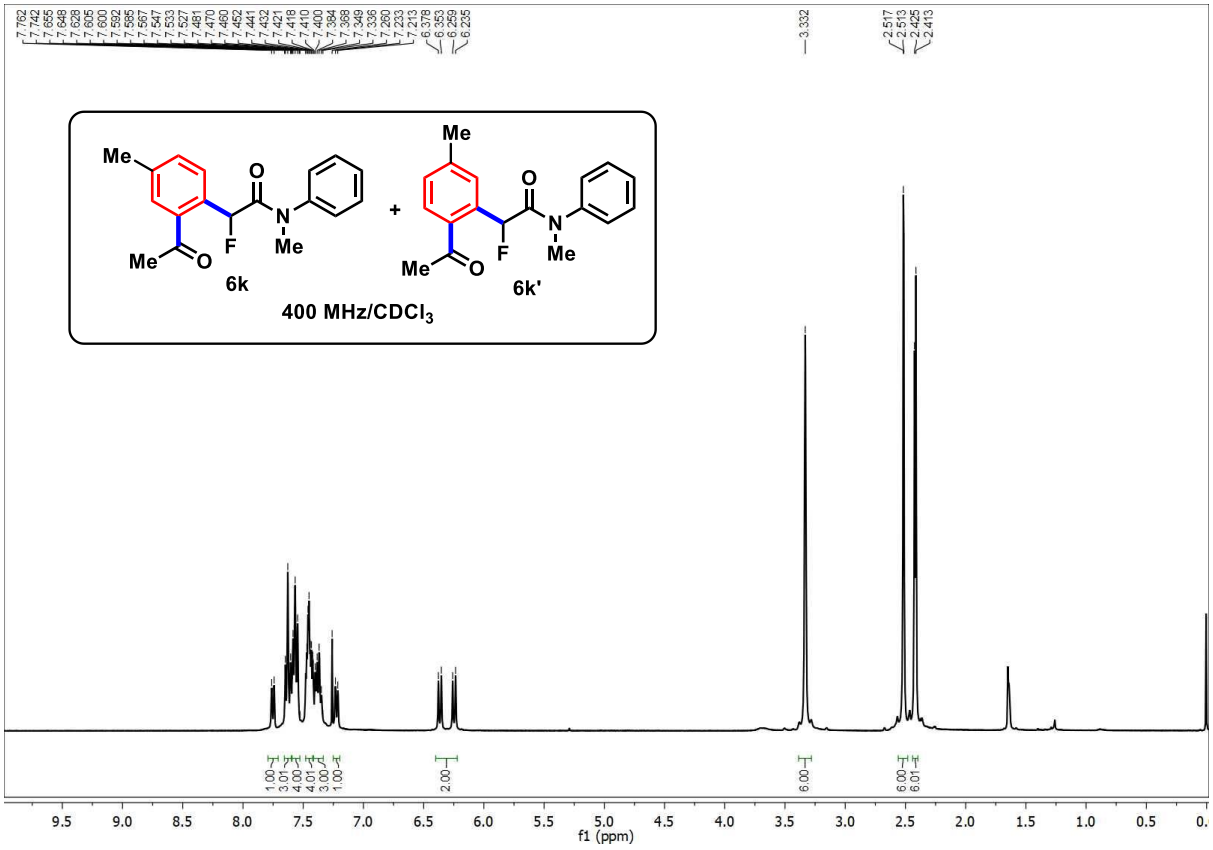

199.819
167.546
167.372
159.339
143.024
136.186
129.556
128.738
128.605
128.248
128.149
117.008
116.858
87.718
86.340
77.413
76.906
55.689
37.938
28.221
MeO
O
N
F
Me
Me
O
6j
100 MHz/CDCl3
f1 (ppm)

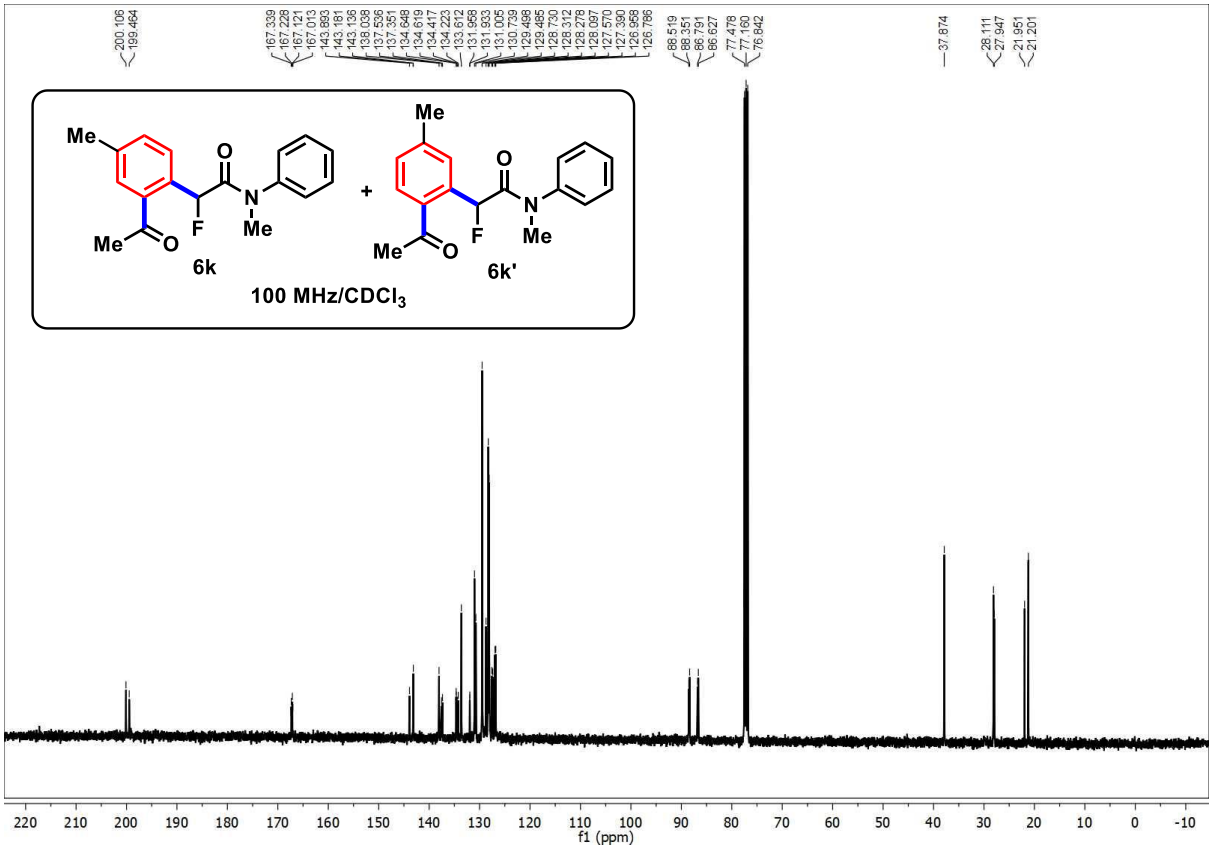

MeO
O
N
F
Me
Me
O
6j
376 MHz/CDCl3
-177.722
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

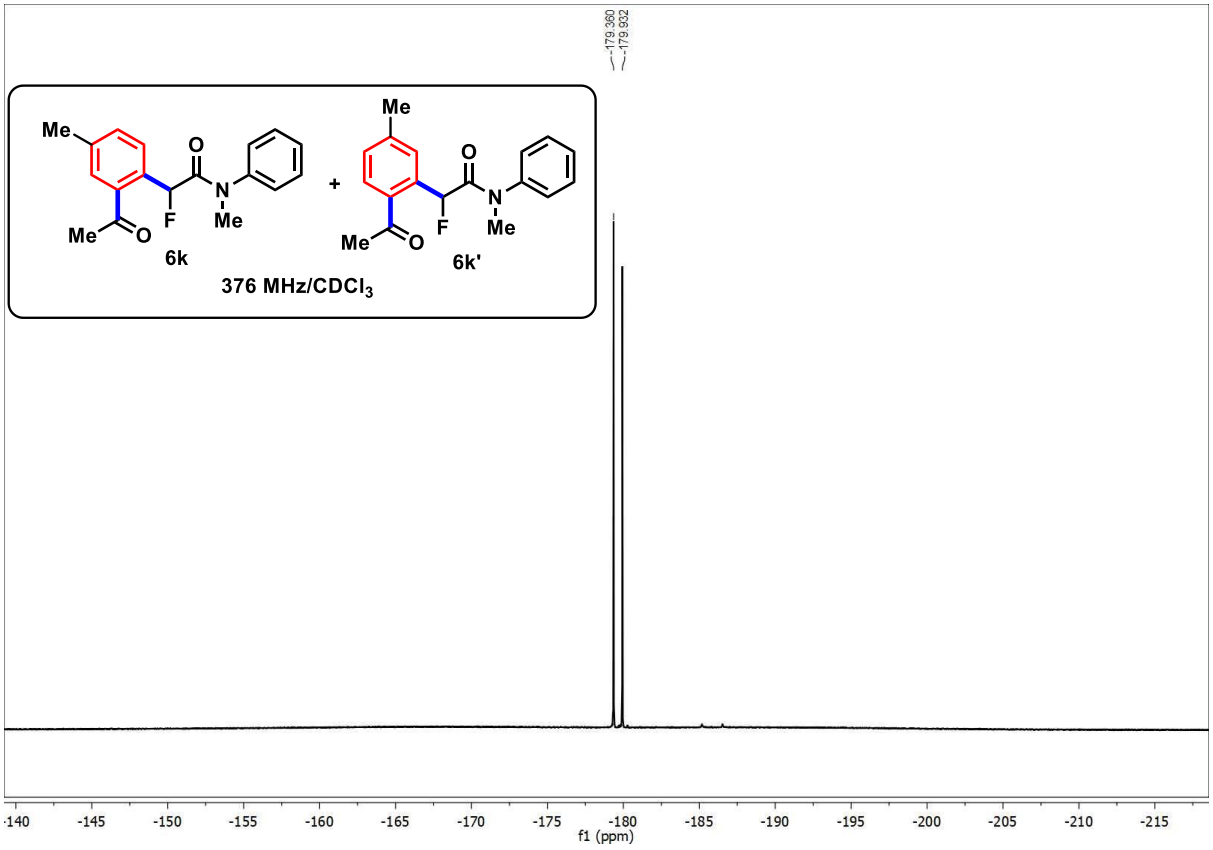

7.847
7.825
7.644
7.625
7.487
7.468
7.449
7.391
7.372
7.353
7.276
7.260
6.897
6.891
6.875
6.869
6.393
6.274
3.872
3.337
2.504
OMe
O
N
F
Me
O
Me
6j'
400 MHz/CDCl3
acetone
1.01
2.00
2.03
1.02
1.01
1.02
1.00
3.02
3.01
3.00
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.
f1 (ppm)

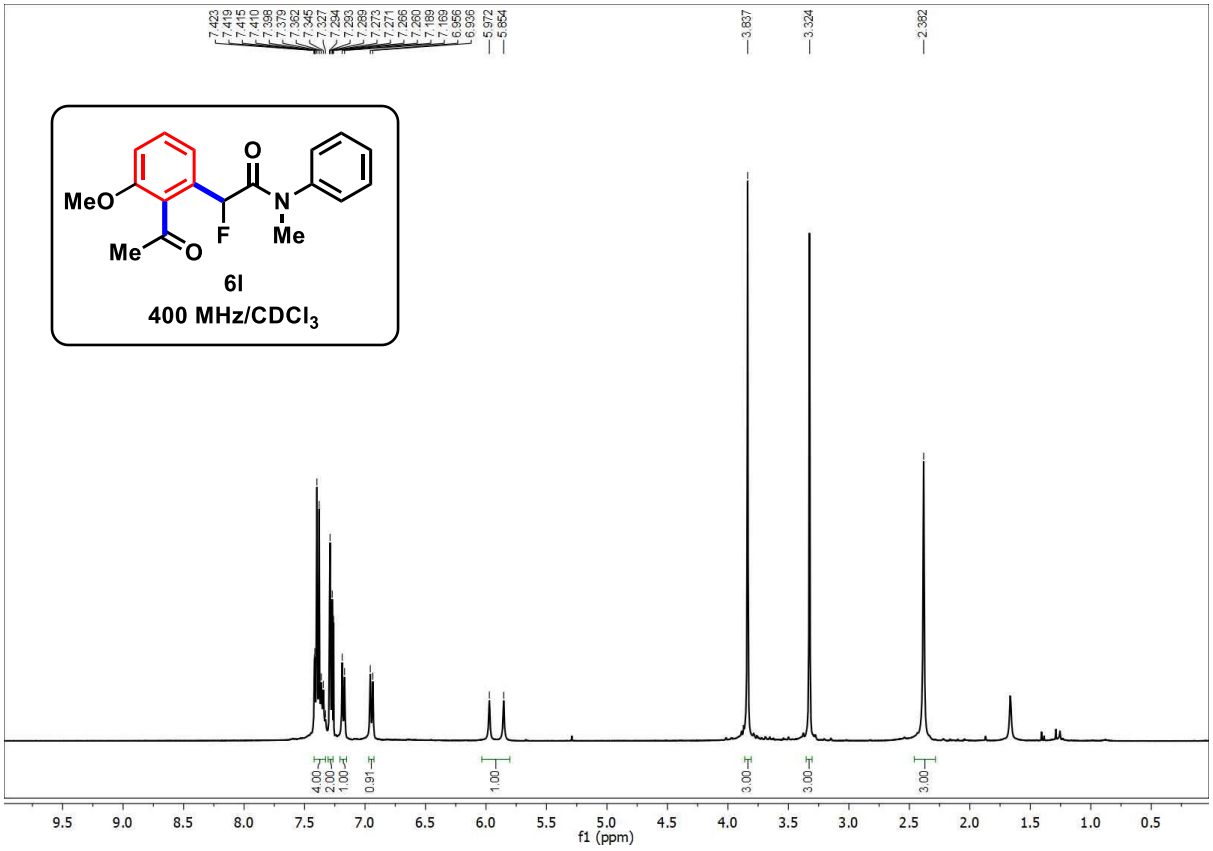

198.228
166.958
166.745
163.393
163.367
143.268
140.682
140.501
133.122
129.502
128.387
128.142
127.359
127.336
113.147
112.220
112.012
88.804
87.064
77.479
76.844
55.625
37.874
27.760
OMe
O
N
F
Me
O
Me
6j'
100 MHz/CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

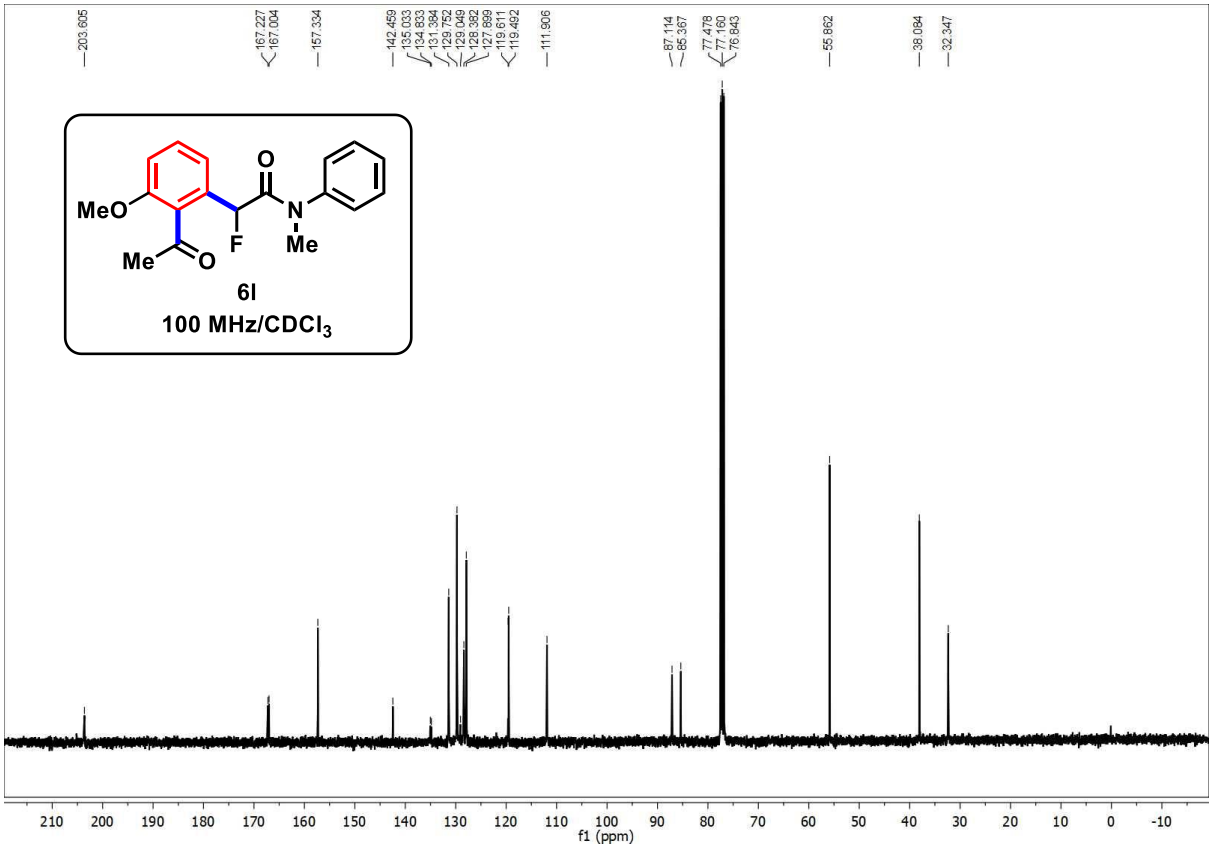

179.733
OMe
O
N
F
Me
O
Me
6j'
376 MHz/CDCl3
10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210
f1 (ppm)

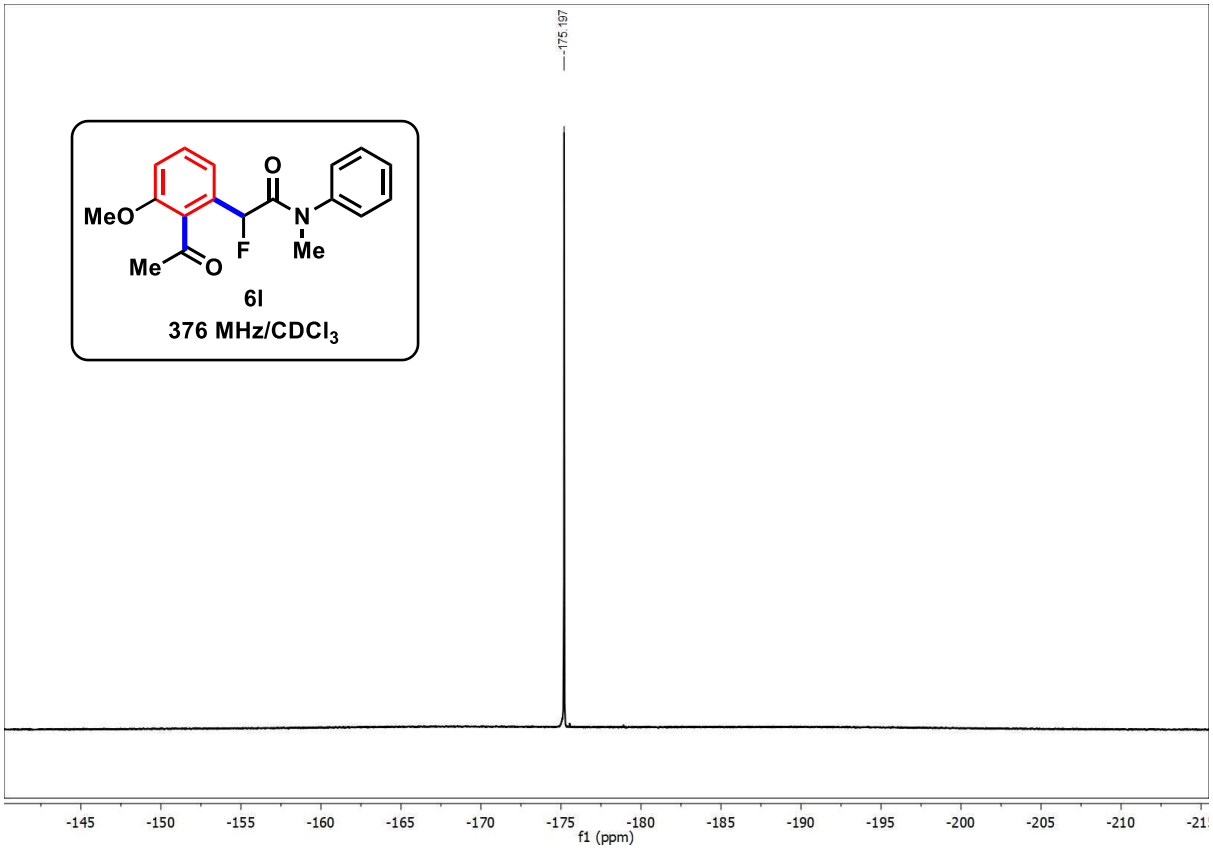

Me
O
F
N
Me
Me
O
6k
+
Me
O
F
N
Me
Me
O
6k'
400 MHz/CDCl3
f1 (ppm)

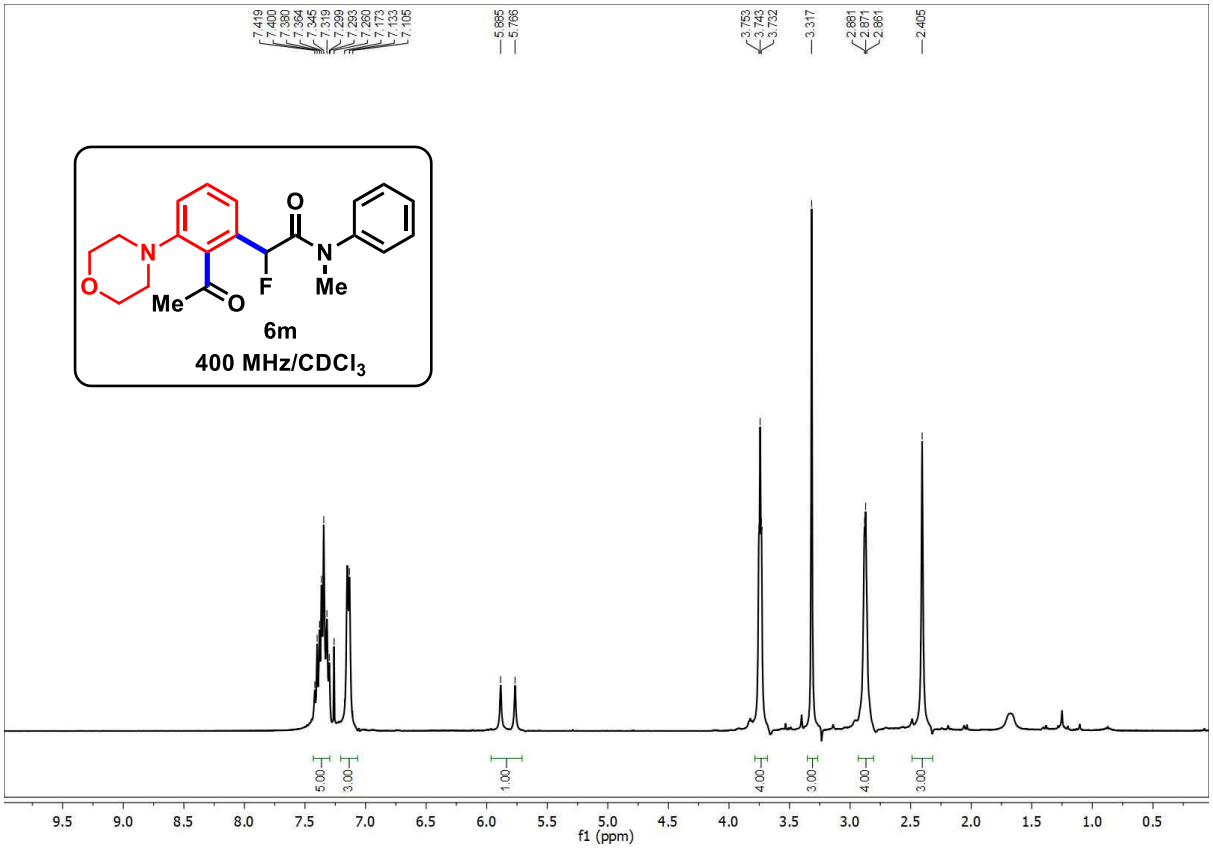

Me
O
F
N
Me
Me
O
6k
+
Me
O
F
N
Me
Me
O
6k'
100 MHz/CDCl3
f1 (ppm)

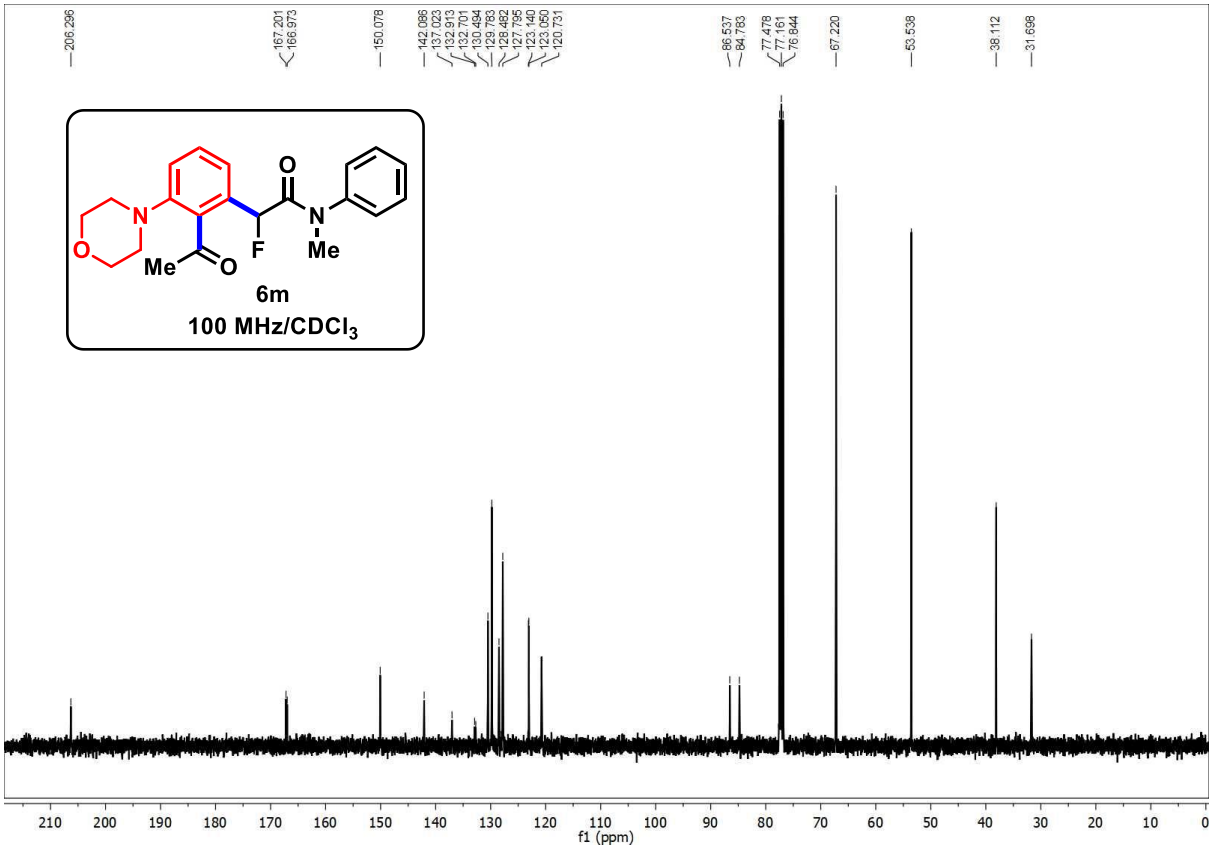

-179.360
-179.932
Me
O
N
Me
F
Me
Me
O
6k
+
Me
O
N
Me
F
Me
O
6k'
376 MHz/CDCl3
-140
-145
-150
-155
-160
-165
-170
-175
-180
-185
-190
-195
-200
-205
-210
-215
f1 (ppm)

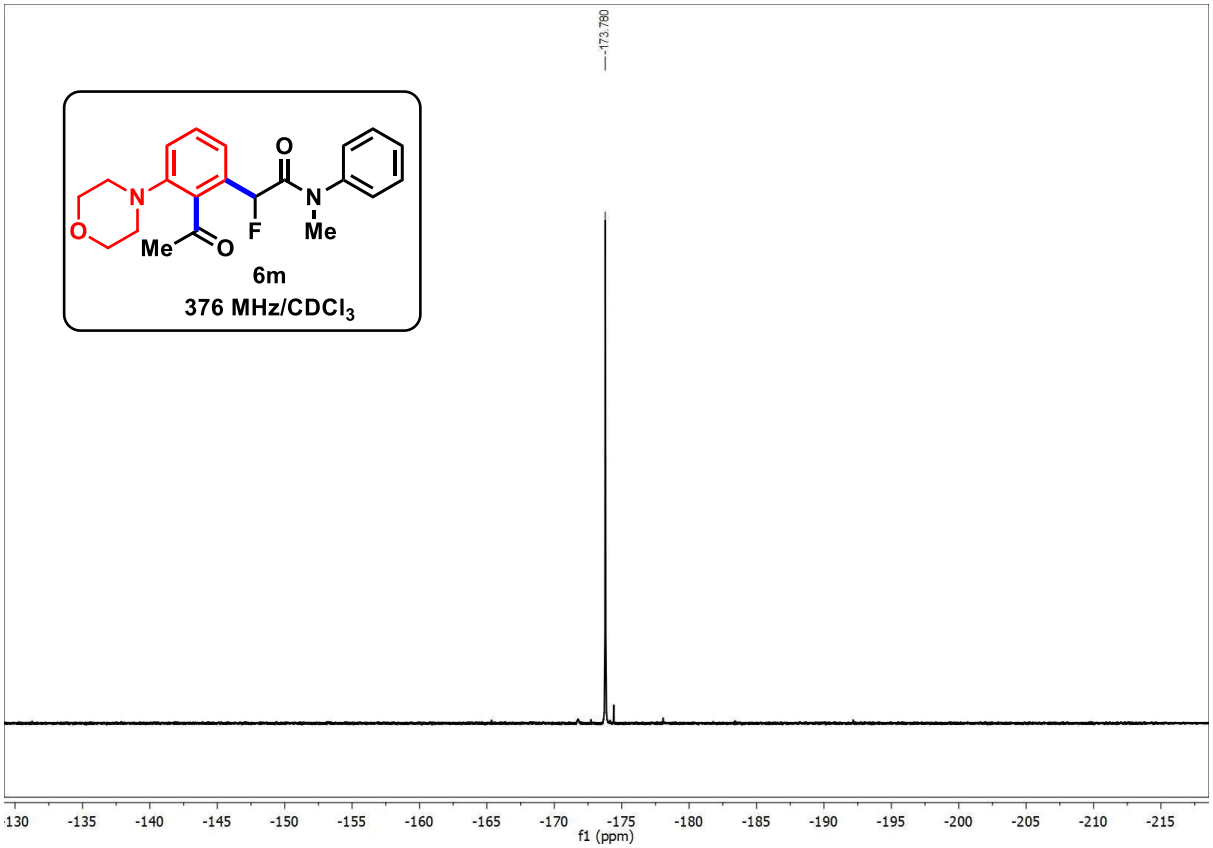

7.423
7.419
7.415
7.410
7.398
7.379
7.362
7.345
7.327
7.294
7.293
7.289
7.273
7.271
7.266
7.260
7.169
7.163
6.956
5.972
5.854
3.837
3.324
2.382
MeO
O
N
Me
F
Me
Me
O
6l
400 MHz/CDCl3
4.00
2.00
1.00
0.91
1.00
3.00
3.00
3.00
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

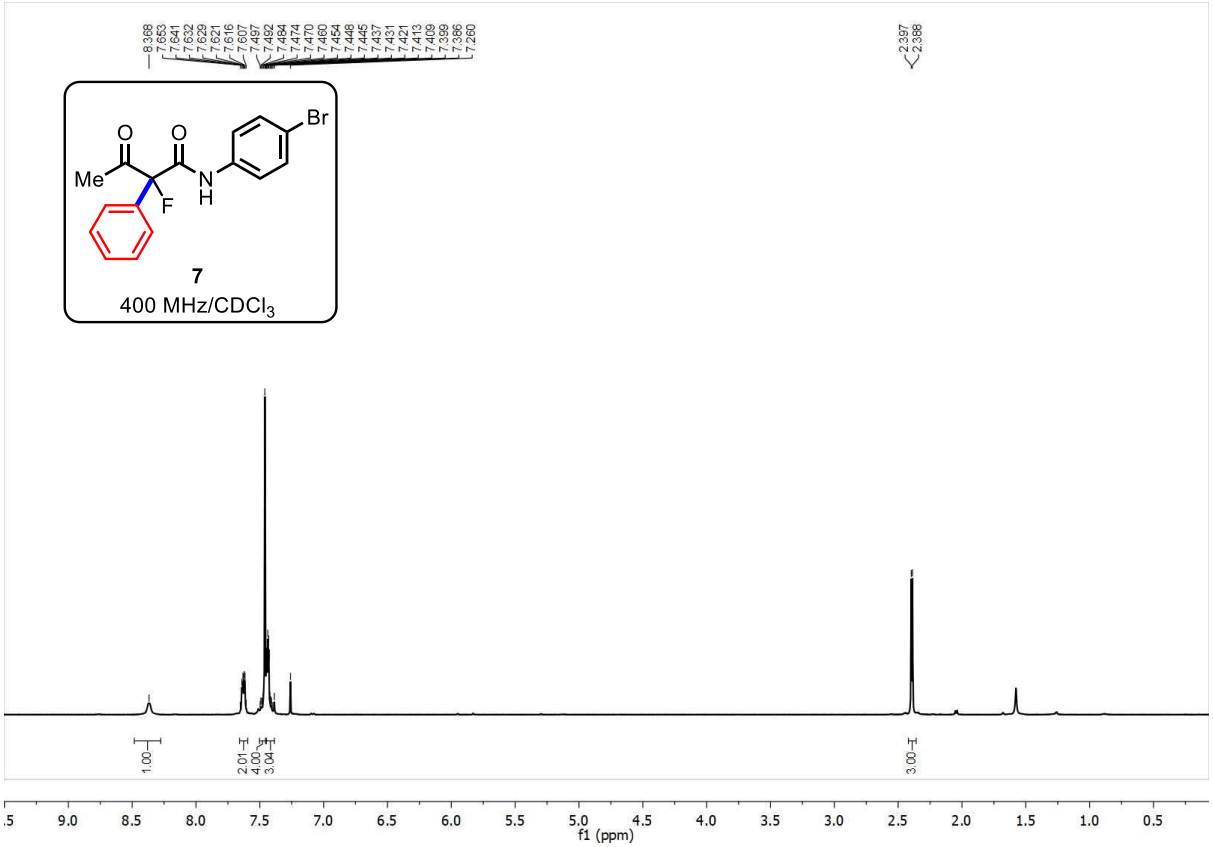

203.605
167.227
167.004
157.334
142.459
135.033
134.833
131.384
129.752
129.049
128.382
127.869
119.611
119.492
111.906
87.114
85.367
77.478
77.160
76.843
55.862
38.084
32.347
MeO
Me
O
F
N
Me
O
6l
100 MHz/CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

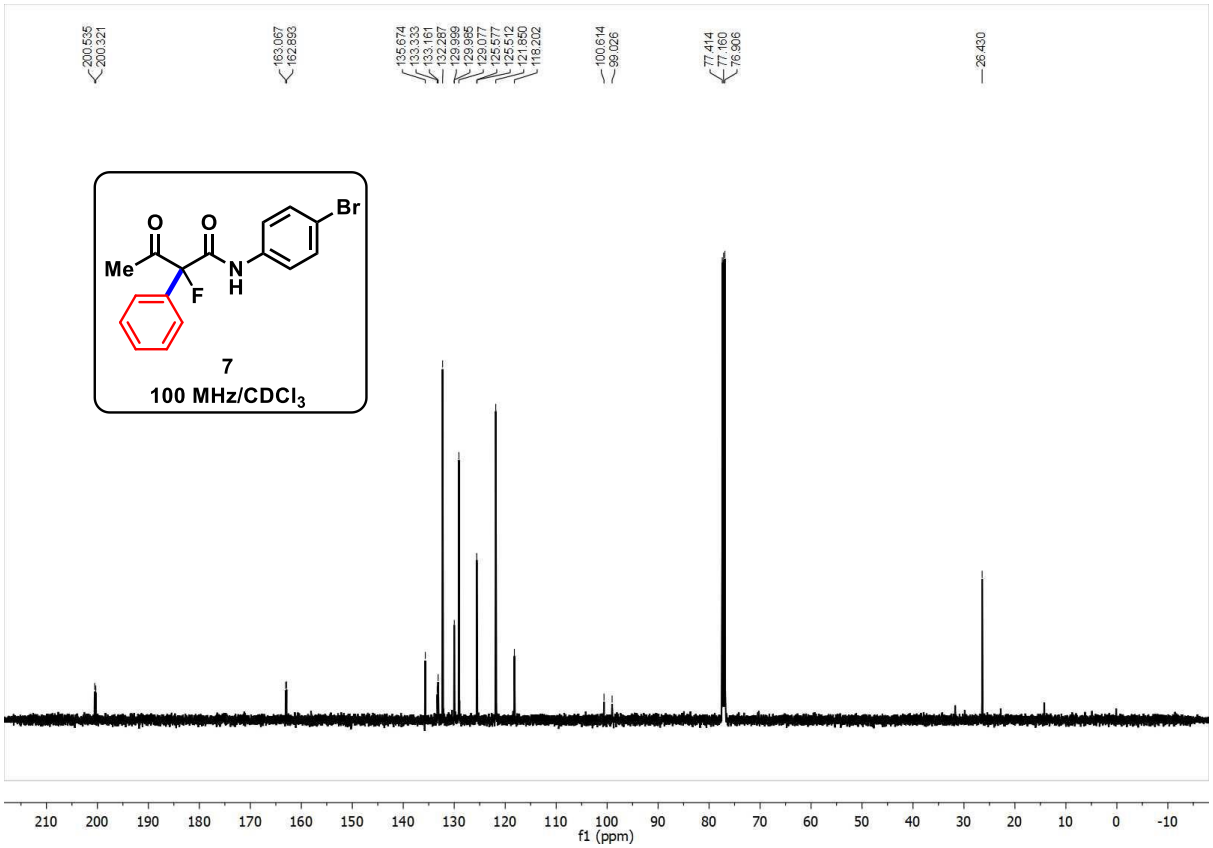

175.197
MeO
Me
O
F
N
Me
O
6l
376 MHz/CDCl3
-145 -150 -155 -160 -165 -170 -175 -180 -185 -190 -195 -200 -205 -210
f1 (ppm)

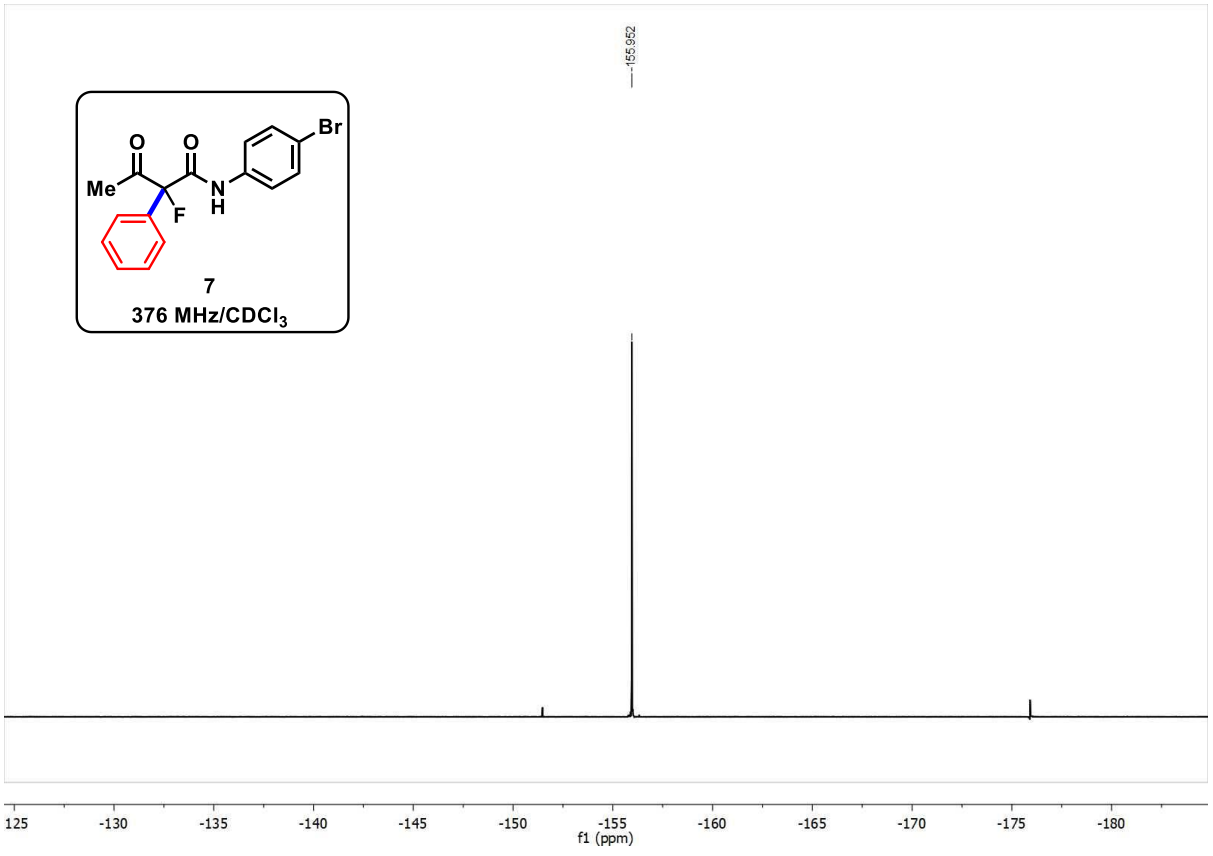

6m
400 MHz/CDCl3
f1 (ppm)


6m
100 MHz/CDCl3
f1 (ppm)


-173.780
O
N
O
F
N
Me
Me
O
6m
376 MHz/CDCl3
-130 -135 -140 -145 -150 -155 -160 -165 -170 -175 -180 -185 -190 -195 -200 -205 -210 -215
f1 (ppm)


8.368
7.653
7.641
7.632
7.629
7.621
7.616
7.607
7.497
7.492
7.484
7.474
7.470
7.460
7.454
7.448
7.445
7.437
7.431
7.421
7.413
7.409
7.399
7.386
7.260
2.397
2.388
O
O
Br
Me
N
H
F
7
400 MHz/CDCl3
1.00
2.01
4.00
3.04
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)


200.535
200.321
163.067
162.893
135.674
133.333
133.161
132.287
129.699
129.985
129.077
125.577
125.512
121.850
118.202
100.614
99.026
77.414
77.160
76.906
26.430
O
O
Me
F
N
H
Br
7
100 MHz/CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


-155.952
O
O
Me
F
N
H
Br
7
376 MHz/CDCl3
125 -130 -135 -140 -145 -150 -155 -160 -165 -170 -175 -180
f1 (ppm)