Supporting Information

Facial Access to 2,2-Difluoro-2,3-dihydrofuran Skeleton without Extra Additive: DMF-Promoted Difluorocarbene Formation of $ClCF_2CO_2Na$

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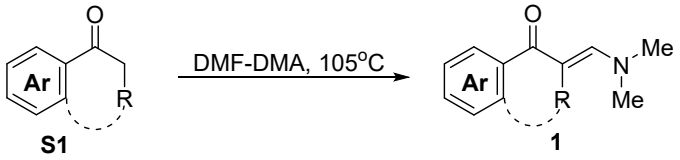
General Information

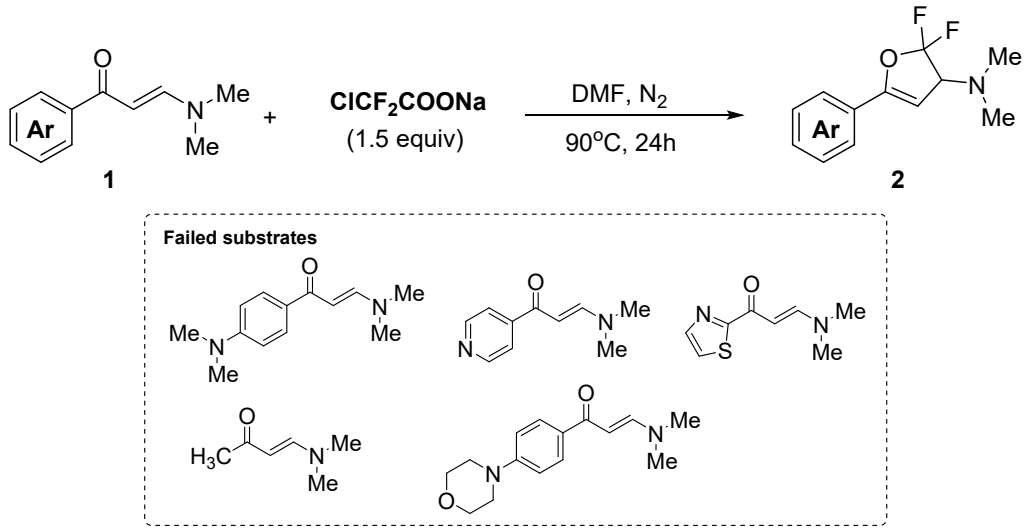
^{1}H, ^{13}C NMR and ^{19}F spectra were recorded on BRUKER DRX-400 spectrometer. Chemical shifts are reported relative to the residual solvent signal. The chemical shifts are referenced to signals at 7.26 and 77.0 ppm, respectively. Multiplicity was indicated as follows: s (singlet), d (doublet), t (triplet), q (quartet), m (multiplet), td (triplet of doublets), dt (doublet of triplets), ddd (doublet of doublet of doublets). The data of HRMS were carried out on a high-resolution mass spectrometer (LCMS-IT-TOF). Melting points were determined with Büchi Melting Point B-545 instrument. TLC was performed by using commercially prepared 200-300 mesh silica gel plates and visualization effected at 254 nm. Unless stated otherwise, all reagents and solvents were purchased from commercial suppliers and used without further purification. Previously reported compounds were synthesized according to literature procedures. Synthetic methods and spectral data were consistent with the methods and data reported in the literatures.

General Procedure for the Synthesis of Enaminones 1



Synthesis of 1: In a 100 mL round-bottom flask, aryl methyl ketone **S1** (5 mmol), DMF-DMA (10 mL) were successively added, the mixture was stirred at 105 °C. The reaction was stopped when **S1** disappeared. Then the reaction cooled to room temperature and evaporated in vacuo to an oil, which crystallizesd with the addition of hexane to give the product **1**.

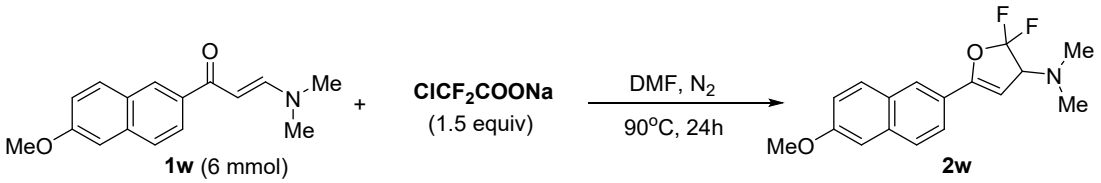
General Procedure for the Synthesis of Products 2



To a 20 mL sealed tube with magnetic stirrer bar, $ClCF_2COONa$ (0.30 mmol), enaminone **1 (**0.20 mmol**)** and DMF (2.0 mL), were successively added and vigorously stirred together at 90 °C for 24 hours. After the reaction was finished, the mixture was cooled to room temperature. The reaction was diluted with EtOAc (20 mL) and washed with NH_4Cl aq (3 × 15 mL). The ethyl

acetate layer was washed with brine (10 mL) and dried over anhydrous Na_2SO_4. The solvent was removed under vacuum. The crude product was purified by flash column chromatography (eluting with petroleum ether/ethyl acetate) on silica gel to afford product **2**.

Gram synthesis of 2,2-Difluoro-2,3-dihydrofuran 2w



1w (6 mmol) **2w**

To a 100 mL sealed tube with magnetic stirrer bar, $ClCF_2COONa$ (9.0 mmol), enaminone **1w (**6 mmol**)** and DMF (25 mL), were successively added and vigorously stirred together at 90 °C for 24 hours. After the reaction was finished, the mixture was cooled to room temperature. The reaction was diluted with EtOAc (150 mL) and washed with NH_4Cl aq (3 × 60 mL). The ethyl acetate layer was washed with brine (60 mL) and dried over anhydrous Na_2SO_4. The solvent was removed under vacuum. The crude product was purified by flash column chromatography (eluting with petroleum ether/ethyl acetate) on silica gel to afford product **2w** 1.18 g, 65% yield.

X-ray Crystallographic Data of Compound 2f

The X-ray crystallographic structure for **2f**. ORTEP representation with 50% probability thermal ellipsoids. Crystal data have been deposited to CCDC number 2190192.

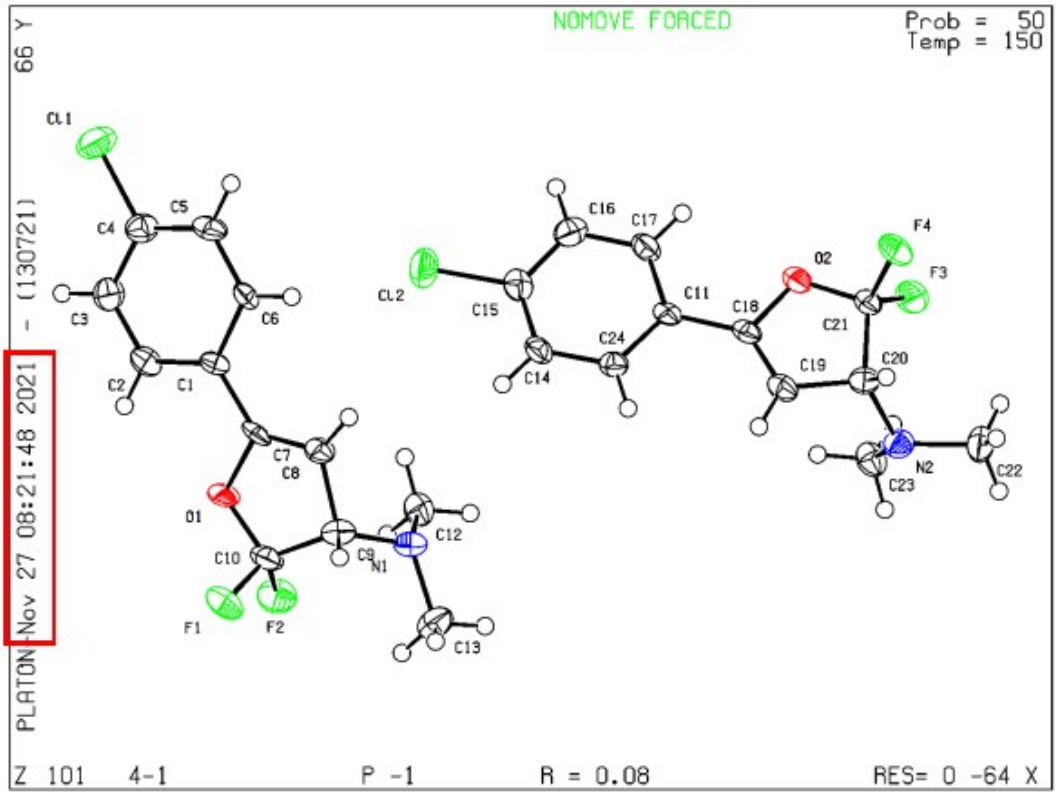


Table S1 Crystal data and structure refinements for **2f**

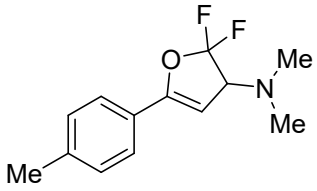
Identification code	**2f**
Empirical formula	$C_{12}H_{12}ClF_2NO$
Formula weight	259.68
Temperature/K	150.00(10)
Crystal system	triclinic
Space group	P-1
a/Å	8.8005(12)
b/Å	11.8789(16)
c/Å	12.2138(17)
α/°	90.098(11)
β/°	97.747(11)
γ/°	110.017(13)
Volume/Å^3	1187.2(3)
Z	4
ρ_{calc}g/cm^3	1.453
μ/mm^{-1}	0.330
F(000)	536.0
Crystal size/mm^3	0.14 × 0.12 × 0.11
Radiation	Mo Kα (λ = 0.71073)
2Θ range for data collection/°	4.842 to 49.996
Index ranges	-10 ≤ h ≤ 10, -14 ≤ k ≤ 14, -14 ≤ l ≤ 14
Reflections collected	4184
Independent reflections	4184 [R_{int} = ?, R_{sigma} = 0.0776]
Data/restraints/parameters	4184/0/312
Goodness-of-fit on F^2	1.048
Final R indexes [I>=2σ (I)]	R_1 = 0.0787, wR_2 = 0.2200
Final R indexes [all data]	R_1 = 0.1003, wR_2 = 0.2424
Largest diff. peak/hole / e Å^{-3}	1.14/-0.69

The Antiproliferative Activity of 2,2-Difluoro-2,3-dihydrofuran Products

The compounds were evaluated for their in vitro cytotoxicity against the human cancer cell lines Hela, MCF7, and HepG2 by 3-(4,5-dimethylthiazol-2-yl)-2,5 -diphenyltetrazolium Bromide (MTT) assay. The cancer cell lines were purchased from American Type Culture Collection (ATCC). Hela cells, MCF7 cells, and HepG2 cells were grown in DMEM medium. The medium for all cell lines were supplemented with 10% fetal bovine serum (FBS, Invitrogen, Carlsbad, CA) and 1% penicillin-streptomycin (Life Technologies, USA) and maintained in a humidified incubator at 37^{o}C adjusted to 5% CO_2. Cells were seeded into 96-well plates at a density of 5000 cells/well. On the next day, medium containing the new compounds at different concentrations was added into per well for at least three cell doublings and incubated at 37°C for another 48 h, with 5-

Fluorouracil (FU) as the positive control. At the indicated time, the culture medium was replaced with 100 μL medium containing 10% MTT solution (5 mg/mL in PBS) and further incubated for 4 h. The absorbance was detected with a microplate reader at a wavelength of 570 nm. The IC_{50} values were calculated by plotting the percentage viability versus concentration on a logarithmic graph and reading of the concentration at which 50% of cells remained viable relative to the control. Each experiment was repeated at least three times to obtain the mean values.

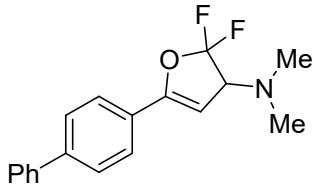
Characterization Data for All Products



2,2-difluoro-*N, N*-dimethyl-5-(*p*-tolyl)-2,3-dihydrofuran-3-amine (2a)[1]

Yellow solid, m.p. = 71-73 ºC (40.6 mg, 85% yield).

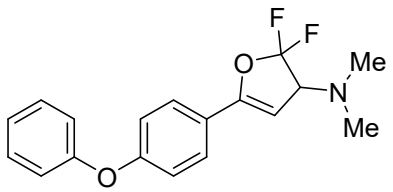
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.49 (d, *J* = 8.2 Hz, 2H), 7.20 (d, *J* = 8.0 Hz, 2H), 5.48 (t, *J* = 2.4 Hz, 1H), 4.14 (ddd, *J* = 15.1, 7.2, 2.6 Hz, 1H), 2.48 (s, 6H), 2.37 (s, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 154.50 (d, *J* = 3.7 Hz), 140.15, 131.22 (dd, *J* = 273.8, 271.1 Hz), 129.26, 125.47, 125.28, 96.38 (d, *J* = 3.0 Hz), 71.04 (dd, *J* = 34.6, 18.9 Hz), 41.13 (d, *J* = 2.9 Hz), 21.44. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.29 (d, *J* = 150.6 Hz), -83.92 (d, *J* = 150.8 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{15}F_2NO$, $[M+H]^+$: 240.1200, found, 240.1193.



5-([1,1'-biphenyl]-4-yl)-2,2-difluoro-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2b)

Yellow solid, m.p. = 133-135 ºC (54.1 mg, 90% yield).

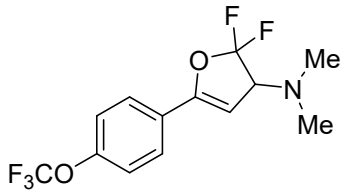
^{1}H NMR (400 MHz, Chloroform-d) δ 7.66 (s, 2H), 7.64 – 7.59 (m, 4H), 7.46 (d, J = 7.2 Hz, 2H), 7.38 (d, J = 7.3 Hz, 1H), 5.58 (t, J = 2.4 Hz, 1H), 4.17 (ddd, *J* = 15.0, 7.3, 2.6 Hz, 1H), 2.50 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 154.15 (d, *J* = 3.8 Hz), 142.69, 140.16, 131.22 (dd, *J* = 274.0, 271.4 Hz), 128.92, 127.84, 127.25, 127.08, 125.81, 97.47 (d, *J* = 2.9 Hz), 71.09 (dd, *J* = 34.5, 19.0 Hz), 41.19 (d, *J* = 2.8 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.26 (d, *J* = 150.7 Hz), -83.80 (d, *J* = 150.6 Hz). HRMS-ESI (m/z): calcd for $C_{18}H_{17}F_2NO$, $[M+H]^+$: 302.1356, found, 302.1345 .



2,2-difluoro-*N, N*-dimethyl-5-(4-phenoxyphenyl)-2,3-dihydrofuran-3-amine (2c)

Dark yellow solid, m.p. = 56-58 ºC (51.3 mg, 81% yield).

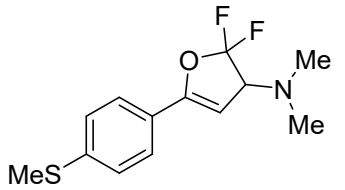
^{1}H NMR (400 MHz, Chloroform-d) δ 7.56 (d, J = 8.5 Hz, 2H), 7.36 (t, J = 7.9 Hz, 2H), 7.15 (t, J = 7.4 Hz, 1H), 7.01 (dd, J = 13.7, 8.3 Hz, 4H), 5.45 (t, *J* = 2.4 Hz, 1H), 4.14 (ddd, *J* = 15.0, 7.1, 2.4 Hz, 1H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 158.97, 156.29, 153.90 (d, *J* = 3.8 Hz), 131.20 (dd, *J* = 274.0, 271.3 Hz), 129.94, 127.07, 124.02, 123.03, 119.49, 118.33, 96.24 (d, *J* = 2.6 Hz), 71.08 (dd, *J* = 34.5, 18.9 Hz), 41.13 (d, *J* = 2.8 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.28 (d, *J* = 150.7 Hz), -83.90 (d, *J* = 150.8 Hz). HRMS-ESI (m/z): calcd for $C_{18}H_{17}F_2NO_2$, $[M+H]^+$: 318.1306, found, 318.1283.



2,2-difluoro-*N, N*-dimethyl-5-(4-(trifluoromethoxy)phenyl)-2,3-dihydrofuran-3-amine (2d)

Yellow oil, (44.4 mg, 72% yield).

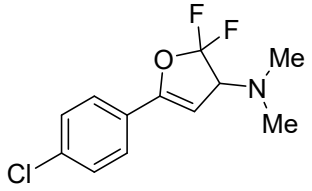
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.64 (d, *J* = 8.6 Hz, 2H), 7.24 (d, *J* = 8.4 Hz, 2H), 5.56 (s, 1H), 4.16 (ddd, *J* = 14.9, 7.4, 2.4 Hz, 1H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 153.02 (d, *J* = 3.8 Hz), 150.14 (d, *J* = 1.7 Hz), 131.12 (dd, *J* = 274.8, 271.8 Hz), 126.96, 126.87, 120.95, 120.37 (q, *J* = 258.0 Hz), 98.26 (d, *J* = 2.7 Hz), 71.08 (dd, *J* = 34.4, 19.0 Hz), 41.12 (d, *J* = 2.3 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -57.86, -61.47 (d, *J* = 150.5 Hz), -83.78 (d, *J* = 150.5 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{12}F_5NO_2$, $[M+H]^+$: 310.0866, found, 310.0851.



2,2-difluoro-*N, N*-dimethyl-5-(4-(methylthio)phenyl)-2,3-dihydrofuran-3-amine (2e)

Yellow solid, m.p. = 88-90 °C (40.1 mg, 74% yield).

^{1}H NMR (400 MHz, Chloroform-d) δ 7.50 (d, J = 8.4 Hz, 2H), 7.23 (d, J = 8.4 Hz, 2H), 5.49 (t, J = 2.0 Hz, 1H), 4.13 (ddd, J = 15.1, 7.3, 2.8 Hz, 1H), 2.49 (s, 3H), 2.47 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 153.98 (d, J = 3.6 Hz), 141.30, 131.18 (dd, J = 274.1, 271.1 Hz), 125.85, 125.64, 124.71, 96.67 (d, J = 3.2 Hz), 71.06 (dd, J = 34.5, 19.0 Hz), 41.14 (d, J = 2.9 Hz), 15.27. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.36 (d, *J* = 150.7 Hz), -83.82 (d, *J* = 150.7 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{15}F_2NOS$, $[M+H]^+$: 272.0921, found, 272.0922.

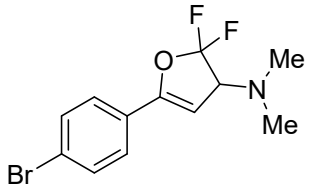


5-(4-chlorophenyl)-2,2-difluoro-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2f) [1]

Dark yellow solid, m.p. = 58-60 °C (35.2 mg, 68% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.53 (d, *J* = 8.5 Hz, 2H), 7.37 (d, *J* = 8.6 Hz, 2H), 5.54 (q, *J* = 2.8 Hz, 1H), 4.15 (dd, *J* = 14.9, 7.4 Hz, 1H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 153.29 (d, *J* = 3.8 Hz), 135.86, 131.11 (dd, *J* = 274.5, 271.8 Hz), 128.87, 126.67, 126.63, 97.98 (d,

J = 3.1 Hz), 71.05 (dd, *J* = 34.4, 19.0 Hz), 41.15 (d, *J* = 2.7 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.35 (d, *J* = 150.6 Hz), -83.68 (d, *J* = 152.1 Hz). HRMS-ESI (m/z): calcd for $C_{12}H_{12}ClF_2NO$, $[M+H]^+$: 260.0654, found, 260.0641 .



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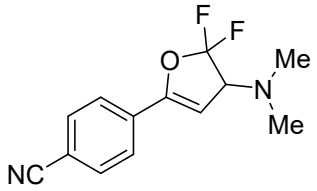
5-(4-bromophenyl)-2,2-difluoro-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2g) [1]

Yellow solid, m.p. = 53-55 °C (43.1 mg, 71% yield).

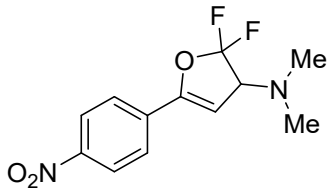
1H NMR (400 MHz, Chloroform-d) δ 7.53 (d, J = 8.3 Hz, 2H), 7.46 (d, J = 8.3 Hz, 2H), 5.56 (s, 1H), 4.14 (ddd, J = 14.9, 7.4, 2.2 Hz, 1H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 153.35 (d, *J* = 3.8 Hz), 131.82, 131.10 (dd, *J* = 274.7, 271.7 Hz), 127.11, 126.83, 124.16, 98.13 (d, *J* = 2.7 Hz), 71.07 (dd, *J* = 34.5, 19.0 Hz), 41.16 (d, *J* = 2.3 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.38 (d, *J* = 150.5 Hz), -83.66 (d, *J* = 150.5 Hz). HRMS-ESI (m/z): calcd for $C_{12}H_{12}BrF_2NO$, $[M+H]^+$: 304.0149, found, 304.0155.



4-(4-(dimethylamino)-5,5-difluoro-4,5-dihydrofuran-2-yl)benzonitrile (2h) [1]

Yellow solid, m.p. = 48-50 °C (26.5 mg, 53% yield).

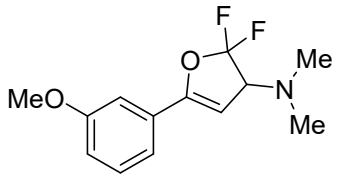
^{1}H NMR (400 MHz, Chloroform-d) δ 7.70 (s, 4H), 5.74 (s, 1H), 4.19 (dd, J = 14.7, 7.7 Hz, 1H), 2.49 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ152.39 (d, *J* = 3.9 Hz), 130.99 (d, *J* = 3.7 Hz), 132.41, 132.19 (d, *J* = 3.1 Hz), 125.84, 118.26, 113.28, 101.27 (d, *J* = 2.9 Hz), 71.07 (dd, *J* = 34.4, 19.1 Hz), 41.24 (d, *J* = 2.4 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.47 (d, *J* = 150.2 Hz), -83.38 (d, *J* = 150.2 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{12}F_2N_2O$, $[M+H]^+$: 251.0996, found, 251.1015.



2,2-difluoro-*N, N*-dimethyl-5-(4-nitrophenyl)-2,3-dihydrofuran-3-amine (2i) [1]

Yellow solid, m.p. = 81-83 °C (24.3 mg, 45% yield).

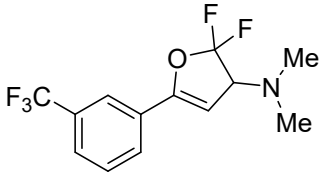
^{1}H NMR (400 MHz, Chloroform-d) δ 8.27 (d, J = 8.5 Hz, 2H), 7.77 (d, J = 8.5 Hz, 2H), 5.81 (s, 1H), 4.21 (ddd, J = 15.1, 7.9, 2.8 Hz, 1H), 2.50 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 152.14 (d, *J* = 3.8 Hz), 148.33, 133.89, 130.98 (dd, *J* = 275.9, 272.4 Hz), 126.15, 123.94, 102.05 (d, *J* = 3.3 Hz), 71.13 (dd, *J* = 34.3, 19.1 Hz), 41.26 (d, *J* = 2.9 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.48 (d, *J* = 150.1 Hz), -83.27 (d, *J* = 149.9 Hz). HRMS-ESI (m/z): calcd for $C_{12}H_{12}F_2N_2O_3$, $[M+H]^+$: 271.0894, found, 271.0873.



2,2-difluoro-5-(3-methoxyphenyl)-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2j) [1]

Yellow oil, (37.7 mg, 74% yield).

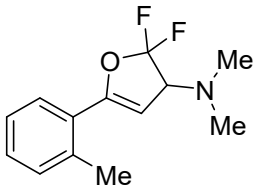
^{1}H NMR (400 MHz, Chloroform-d) δ 7.30 (t, J = 7.8 Hz, 1H), 7.20 (d, J = 7.6 Hz, 1H), 7.12 (s, 1H), 6.93 (d, J = 8.1 Hz, 1H), 5.54 (s, 1H), 4.14 (dd, J = 15.0, 7.3 Hz, 1H), 3.84 (s, 3H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 159.71, 154.17 (d, *J* = 3.6 Hz), 131.16 (dd, *J* = 274.1, 271.4 Hz), 129.65, 129.51, 117.82, 115.90, 110.50, 97.77 (d, *J* = 3.0 Hz), 71.03 (dd, *J* = 34.5, 19.0 Hz), 55.37, 41.16 (d, *J* = 2.8 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.32 (d, *J* = 150.7 Hz), -83.82 (d, *J* = 150.7 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{15}F_2NO_2$, $[M+H]^+$: 256.1149, found, 256.1130.



2,2-difluoro-*N, N*-dimethyl-5-(3-(trifluoromethyl)phenyl)-2,3-dihydrofuran-3-amine (2k)

Yellow oil, (32.8 mg, 56% yield).

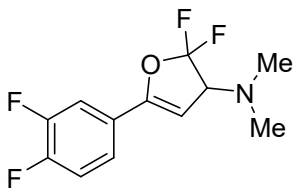
1H NMR (400 MHz, Chloroform-d) δ 7.85 (s, 1H), 7.78 (d, J = 7.9 Hz, 1H), 7.65 (d, J = 7.8 Hz, 1H), 7.53 (t, J = 7.8 Hz, 1H), 5.67 (s, 1H), 4.19 (dd, *J* = 14.6, 7.2 Hz, 1H), 2.49 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 152.83 (d, *J* = 3.7 Hz), 131.23 (q, *J* = 32.5 Hz), 131.03, 129.19, 129.01, 128.45, 126.44 (q, *J* = 3.6 Hz), 122.18 (q, *J* = 3.8 Hz), 99.20 (d, J = 2.8 Hz), 71.05 (dd, *J* = 34.4, 19.0 Hz), 41.17 (d, *J* = 2.8 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.49 (d, *J* = 150.5 Hz), -62.93, -83.65 (d, *J* = 150.4 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{12}F_5NO$, $[M+H]^+$: 294.0917, found, 294.0902.



2,2-difluoro-*N, N*-dimethyl-5-(*o*-tolyl)-2,3-dihydrofuran-3-amine (2l) [1]

Yellow oil, (27.7 mg, 58% yield).

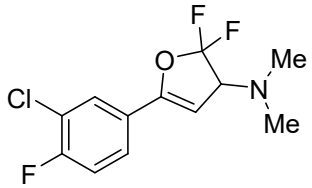
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.57 – 7.53 (m, 1H), 7.32 – 7.27 (m, 1H), 7.24 (t, *J* = 5.9 Hz, 2H), 5.35 (t, *J* = 2.1 Hz, 1H), 4.16 (ddd, *J* = 15.2, 7.2, 2.6 Hz, 1H), 2.52 (s, 6H), 2.46 (s, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 154.60 (d, *J* = 3.6 Hz), 136.70, δ 133.43 – 128.01 (m), 131.08, 129.70, 128.20, 128.03, 125.93, 101.68 (d, *J* = 2.7 Hz), 71.07 (dd, *J* = 34.7, 18.9 Hz), 41.15 (d, *J* = 2.8 Hz), 21.46. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.71 (d, *J* = 151.7 Hz), -84.94 (d, *J* = 151.6 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{15}F_2NO$, $[M+H]^+$: 240.1200, found, 240.1193 .



5-(3,4-difluorophenyl)-2,2-difluoro-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2m)

Yellow oil, (31.8 mg, 61% yield).

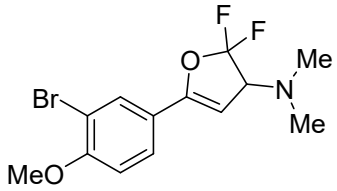
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.44 – 7.33 (m, 2H), 7.19 (q, *J* = 8.7 Hz, 1H), 5.53 (s, 1H), 4.16 (dd, *J* = 14.8, 7.4 Hz, 1H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 152.04 (dd, *J* = 89.2, 12.9 Hz), 152.30 – 152.15 (m),149.55 (dd, *J* = 85.5, 13.0 Hz), 131.02 (dd, *J* = 275.1, 272.1 Hz), 125.31 (dd, *J* = 6.6, 4.0 Hz), 121.81 (dd, *J* = 6.7, 3.8 Hz), 117.68 (d, *J* = 17.9 Hz), 114.65 (d, *J* = 19.4 Hz), 98.37, 71.08 (dd, *J* = 34.3, 19.0 Hz), 41.12 (d, *J* = 2.3 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.51 (d, *J* = 150.9 Hz), -83.67 (d, *J* = 150.5 Hz), -134.64 (d, *J* = 21.0 Hz), -136.62 (d, *J* = 21.0 Hz). HRMS-ESI (m/z): calcd for $C_{12}H_{11}F_4NO$, $[M+H]^+$: 262.0855, found, 262.0841 .



5-(3-chloro-4-fluorophenyl)-2,2-difluoro-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2n)

Yellow oil, (36.0 mg, 65% yield).

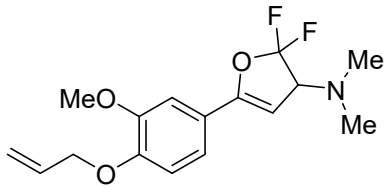
^{1}H NMR (400 MHz, Chloroform-d) δ 7.65 (d, J = 5.2 Hz, 1H), 7.48 (s, 1H), 7.17 (t, J = 8.6 Hz, 1H), 5.53 (s, 1H), 4.15 (dd, J = 14.3, 6.9 Hz, 1H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 158.84 (d, *J* = 253.1 Hz), 152.10 (d, *J* = 3.0 Hz), 131.04 (dd, *J* = 275.2, 272.2 Hz), 127.80, 125.53 (d, *J* = 3.9 Hz), 125.32 (d, *J* = 7.6 Hz), 121.67 (d, *J* = 18.4 Hz), 116.91 (d, *J* = 21.8 Hz), 98.39, 71.08 (dd, *J* = 34.3, 19.0 Hz), 41.17. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.50 (d, *J* = 150.2 Hz), -83.67 (d, *J* = 150.3 Hz), -112.41. HRMS-ESI (m/z): calcd for $C_{12}H_{11}ClF_3NO$, $[M+H]^+$: 278.0560, found, 278.0512 .



5-(3-bromo-4-methoxyphenyl)-2,2-difluoro-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2o)

Yellow oil, (45.4 mg, 68% yield).

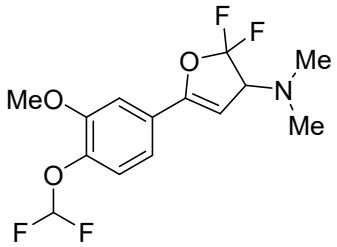
^{1}H NMR (400 MHz, Chloroform-d) δ 7.79 (s, 1H), 7.52 (d, J = 8.5 Hz, 1H), 6.90 (d, J = 8.6 Hz, 1H), 5.43 (s, 1H), 4.14 (ddd, J = 15.1, 7.2, 2.1 Hz, 1H), 3.92 (s, 3H), 2.47 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 157.04, 152.78 (d, *J* = 3.8 Hz), 131.10 (dd, *J* = 274.3, 271.5 Hz), 130.39, 125.83, 122.17, 111.92, 111.56, 96.45 (d, *J* = 2.6 Hz), 71.07 (dd, *J* = 34.5, 19.0 Hz), 56.37, 41.14 (d, *J* = 2.2 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.43 (d, *J* = 150.5 Hz), -83.84 (d, *J* = 150.5 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{14}BrF_2NO_2$, $[M+H]^+$: 334.0254, found, 334.0259 .



5-(4-(allyloxy)-3-methoxyphenyl)-2,2-difluoro-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2p)

Brown oil, (47.8 mg, 77% yield).

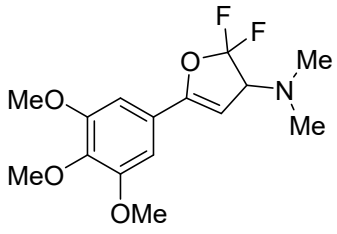
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.17 (d, *J* = 8.4 Hz, 1H), 7.09 (s, 1H), 6.87 (d, *J* = 8.3 Hz, 1H), 6.07 (ddt, *J* = 17.0, 10.2, 5.3 Hz, 1H), 5.40 (d, *J* = 11.9 Hz, 2H), 5.30 (d, *J* = 10.4 Hz, 1H), 4.64 (d, *J* = 4.7 Hz, 2H), 4.15 (dd, *J* = 14.9, 6.9 Hz, 1H), 3.91 (s, 3H), 2.49 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 154.20 (d, *J* = 3.8 Hz), 149.47, 149.33, 131.16 (dd, *J* = 273.7, 271.3 Hz), 132.79, 121.30, 118.46, 118.31, 112.92, 108.58, 95.58 (d, *J* = 2.5 Hz), 71.06 (dd, *J* = 34.6, 18.9 Hz), 69.78, 56.02, 41.08 (d, *J* = 2.4 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.26 (d, *J* = 150.8 Hz), -83.88 (d, *J* = 150.8 Hz). HRMS-ESI (m/z): calcd for $C_{15}H_{17}F_2NO_3$, $[M+H]^+$: 298.1255, found, 298.1252.



5-(4-(difluoromethoxy)-3-methoxyphenyl)-2,2-difluoro-*N,N*-dimethyl-2,3-dihydrofuran-3-amine (2q)

Dark yellow oil, (42.3 mg, 66% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.19 (d, *J* = 4.2 Hz, 3H), 6.58 (t, *J* = 74.8 Hz, 1H), 5.54 (t, *J* = 2.4 Hz, 1H), 4.16 (ddd, *J* = 15.0, 7.4, 2.7 Hz, 1H), 3.93 (s, 3H), 2.49 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 153.32 (d, *J* = 3.8 Hz), 151.12, 141.03 (t, *J* = 3.1 Hz), 131.09 (dd, *J* = 274.6, 271.8 Hz), 126.73, 122.25, 118.29, 115.88 (t, *J* = 260.8 Hz), 109.60, 97.95 (d, *J* = 3.1 Hz), 71.08 (dd, *J* = 34.5, 19.0 Hz), 56.14, 41.15 (d, *J* = 2.8 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.39 (d, *J* = 150.5 Hz), -81.71, -83.73 (d, *J* = 150.5 Hz). HRMS-ESI (m/z): calcd for $C_{14}H_{15}F_4NO_3$, $[M+H]^+$: 322.1066, found, 322.1094.

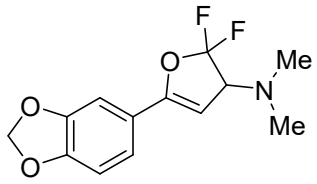


2,2-difluoro-*N, N*-dimethyl-5-(3,4,5-trimethoxyphenyl)-2,3-dihydrofuran-3-amine (2r)

Yellow solid, m.p. = 83-85 °C (52.2 mg, 83% yield).

^{1}H NMR (400 MHz, Chloroform-d) δ 6.82 (s, 2H), 5.47 (s, 1H), 4.14 (ddd, *J* = 15.1, 7.3, 2.7 Hz, 1H), 3.89 (s, 6H), 3.87 (s, 3H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 154.09 (d, *J* = 3.8 Hz), 153.34, 139.72, 131.11 (dd, *J* = 274.1, 271.5 Hz), 123.63, 102.69, 96.89 (d, *J* = 2.7 Hz),

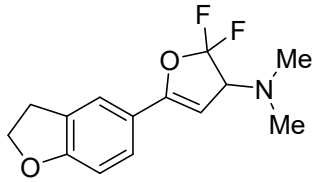
71.08 (dd, *J* = 34.6, 18.9 Hz), 60.95, 56.25, 41.14 (d, *J* = 2.8 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.33 (d, *J* = 150.6 Hz), -83.82 (d, *J* = 150.6 Hz). HRMS-ESI (m/z): calcd for $C_{15}H_{19}F_2NO_4$, $[M+H]^+$: 316.1360, found, 316.1351 .



5-(benzo[d][1,3]dioxol-5-yl)-2,2-difluoro-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2s)

Dark yellow oil, (41.9 mg, 78% yield).

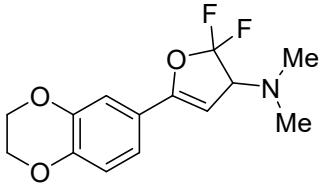
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.13 (d, *J* = 8.1 Hz, 1H), 7.04 (d, *J* = 2.2 Hz, 1H), 6.81 (d, *J* = 8.1 Hz, 1H), 6.00 – 5.97 (m, 2H), 5.39 – 5.36 (m, 1H), 4.12 (dd, *J* = 14.9, 7.1 Hz, 1H), 2.47 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 153.99 (d, *J* = 3.7 Hz), 149.05, 147.93, 131.12 (dd, *J* = 273.9, 2 71.1 Hz), 122.31, 119.90, 108.35, 105.63, 101.49, 95.78 (d, *J* = 3.1 Hz), 71.02 (dd, *J* = 34.5, 18.9 Hz), 41.07 (d, *J* = 2.9 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.35 (d, *J* = 150.9 Hz), -83.90 (d, *J* = 150.8 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{13}F_2NO_3$, $[M+H]^+$: 270.0942, found, 270.0944 .



5-(2,3-dihydrobenzofuran-5-yl)-2,2-difluoro-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2t)

Yellow solid, m.p. = 60-62 ºC (38.4 mg, 72% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.44 (s, 1H), 7.39 (d, *J* = 8.4 Hz, 1H), 6.78 (d, *J* = 8.4 Hz, 1H), 5.35 (s, 1H), 4.61 (t, *J* = 8.7 Hz, 2H), 4.13 (dd, *J* = 14.8, 5.7 Hz, 1H), 3.22 (t, *J* = 8.7 Hz, 2H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 161.65, 154.56 (d, *J* = 3.7 Hz), 131.18 (dd, *J* = 273.4, 271.0 Hz), 94.59 (d, *J* = 2.5 Hz), 127.60, 126.03, 122.24, 120.85, 109.37, 94.59 (d, *J* = 2.5 Hz), 71.04 (dd, *J* = 34.6, 18.9 Hz), 41.04 (d, *J* = 2.6 Hz), 29.33. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.28 (d, *J* = 150.9 Hz), -84.05 (d, *J* = 151.0 Hz). HRMS-ESI (m/z): calcd for $C_{14}H_{15}F_2NO_2$, $[M+H]^+$: 268.1149, found, 268.1140.

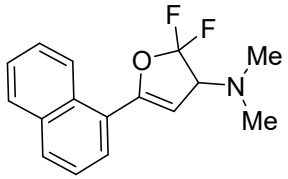


5-(2,3-dihydrobenzo[b][1,4]dioxin-6-yl)-2,2-difluoro-*N,N*-dimethyl-2,3-dihydrofuran-3-amine (2u)

Yellow oil, (37.3 mg, 66% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.10 (d, *J* = 9.0 Hz, 2H), 6.86 (d, *J* = 8.2 Hz, 1H), 5.38 (d, *J* = 2.7 Hz, 1H), 4.27 (s, 4H), 4.12 (ddd, *J* = 14.9, 7.1, 2.8 Hz, 1H), 2.47 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 153.96 (d, *J* = 3.8 Hz), 145.13, 143.50, 131.15 (dd, *J* = 273.6, 271.1 Hz), 121.73, 118.87, 117.46, 114.53, 95.72 (d, *J* = 2.9 Hz), 71.04 (dd, *J* = 34.6, 18.9 Hz), 64.51, 64.25,

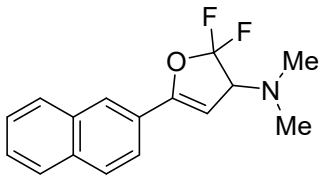
41.08 (d, *J* = 2.4 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.34 (d, *J* = 151.0 Hz), -84.00 (d, *J* = 150.7 Hz). HRMS-ESI (m/z): calcd for $C_{14}H_{15}F_2NO_3$, $[M+H]^+$: 284.1098, found, 284.1093.



2,2-difluoro-*N, N*-dimethyl-5-(naphthalen-1-yl)-2,3-dihydrofuran-3-amine (2v) [1]

Dark yellow oil, (35.7 mg, 65% yield).

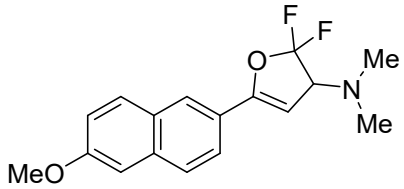
^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.28 (d, *J* = 8.3 Hz, 1H), 7.88 (t, *J* = 8.8 Hz, 2H), 7.71 (d, *J* = 7.1 Hz, 1H), 7.57 – 7.51 (m, 2H), 7.46 (d, *J* = 7.8 Hz, 1H), 5.54 (t, *J* = 2.4 Hz, 1H), 4.23 (ddd, *J* = 15.3, 7.1, 2.6 Hz, 1H), 2.57 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 154.69 (d, *J* = 3.7 Hz), 133.66, 131.06 (dd, *J* = 274.0, 271.3 Hz), 130.70, 130.54, 128.67, 127.13, 127.07, 126.36, 126.27, 124.95, δ 102.70 (d, *J* = 2.8 Hz), 71.08 (dd, *J* = 34.6, 18.8 Hz), 41.35 (d, *J* = 2.5 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.57 (d, *J* = 151.1 Hz), -84.57 (d, *J* = 151.1 Hz). HRMS-ESI (m/z): calcd for $C_{16}H_{15}F_2NO$, $[M+H]^+$: 276.1200, found, 276.1200 .



2,2-difluoro-*N, N*-dimethyl-5-(naphthalen-2-yl)-2,3-dihydrofuran-3-amine (2w) [1]

Yellow solid, m.p. = 57-59 °C (41.8 mg, 76% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.08 (s, 1H), 7.83 (dd, *J* = 12.5, 5.6 Hz, 3H), 7.65 – 7.59 (m, 1H), 7.50 (dd, *J* = 6.1, 3.2 Hz, 2H), 5.65 (s, 1H), 4.20 (ddd, *J* = 15.2, 7.5, 3.0 Hz, 1H), 2.51 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 154.37 (d, *J* = 3.7 Hz), 133.84, 132.95, 131.28 (dd, *J* = 274.0, 271.3 Hz).128.67, 128.38, 127.75, 127.16, 126.80, 125.33, 125.16, 122.36, 98.10 (d, *J* = 2.7 Hz), 71.16 (dd, *J* = 34.5, 18.9 Hz), 41.22 (d, *J* = 2.4 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.18 (d, *J* = 150.6 Hz), -83.60 (d, *J* = 150.6 Hz). HRMS-ESI (m/z): calcd for $C_{16}H_{15}F_2NO$, $[M+H]^+$: 276.1200, found, 276.1200.

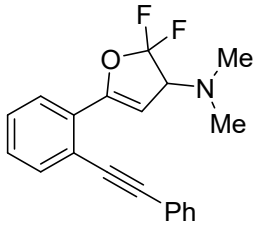


2,2-difluoro-5-(6-methoxynaphthalen-2-yl)-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2x)

Yellow solid, m.p. = 113-115 °C (50.0 mg, 82% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.02 (s, 1H), 7.74 (dd, *J* = 15.6, 8.8 Hz, 2H), 7.60 (dd, *J* = 8.6, 1.6 Hz, 1H), 7.17 (dd, *J* = 8.9, 2.5 Hz, 1H), 7.13 (d, *J* = 2.3 Hz, 1H), 5.60 (t, *J* = 2.3 Hz, 1H), 4.20 (ddd, *J* = 15.0, 7.2, 2.6 Hz, 1H), 3.93 (s, 3H), 2.51 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 158.68, 154.52 (d, *J* = 3.7 Hz), 135.23, 131.28 (dd, *J* = 274.0, 271.2 Hz), 130.17, 128.30, 127.16, 124.96, 123.23, 122.97, 119.55, 105.89, 96.98 (d, *J* = 2.6 Hz), 71.12 (dd, *J* = 34.5, 18.9 Hz), 55.35, 41.18 (d, *J* = 2.5 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.19 (d, *J* = 150.8 Hz),

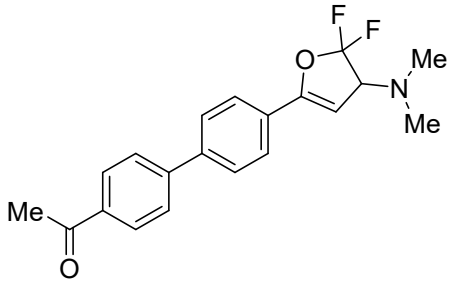
-83.74 (d, J = 150.8 Hz). HRMS-ESI (m/z): calcd for $C_{17}H_{17}F_2NO_2$, $[M+H]^+$: 306.1306, found, 306.1308 .



2,2-difluoro-*N, N*-dimethyl-5-(2-(phenylethynyl)phenyl)-2,3-dihydrofuran-3-amine (2y)

Brown oil, (37.0 mg, 57% yield).

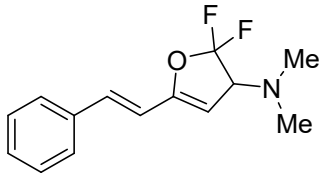
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.61 – 7.55 (m, 1H), 7.54 – 7.48 (m, 1H), 7.40 (dd, J = 7.2, 2.3 Hz, 2H), 7.30 – 7.22 (m, 5H), 6.24 – 6.17 (m, 1H), 4.09 (ddd, J = 15.0, 7.5, 2.6 Hz, 1H), 2.38 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 152.16 (d, J = 3.7 Hz), 133.89, 131.45, 130.65 (dd, J = 273.0, 270.0 Hz), 129.09, 129.00, 128.78, 128.54, 128.46, 126.98, 122.81, 120.71, 102.63 (d, J = 2.9 Hz), 95.13, 88.46, 71.47 (dd, J = 34.5, 19.1 Hz), 41.26. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.81 (d, J = 151.2 Hz), -84.37. HRMS-ESI (m/z): calcd for $C_{13}H_{15}F_2NO$, $[M+H]^+$: 326.1356, found, 326.1343.



1-(4'-(4-(dimethylamino)-5,5-difluoro-4,5-dihydrofuran-2-yl)-[1,1'-biphenyl]-4-yl)ethan-1-one (2z)

Light yellow solid, m.p. = 145-147 °C (48.7 mg, 71% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.04 (d, J = 8.0 Hz, 2H), 7.68 (dd, J = 8.8, 5.1 Hz, 6H), 5.63 (s, 1H), 4.18 (ddd, J = 15.1, 7.4, 2.6 Hz, 1H), 2.64 (s, 3H), 2.50 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 197.66, 153.85 (d, J = 3.7 Hz), 144.59, 141.22, 136.23, 131.16 (dd, J = 274.3, 271.4 Hz), 129.01, 127.96, 127.41, 127.17, 125.94, 98.07 (d, J = 3.0 Hz), 71.07 (dd, J = 34.5, 19.0 Hz), 41.19 (d, J = 2.7 Hz), 26.70. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.26 (d, J = 150.5 Hz), -83.71 (d, J = 150.6 Hz). HRMS-ESI (m/z): calcd for $C_{20}H_{19}F_2NO_2$, $[M+H]^+$: 344.1462, found, 344.1464.

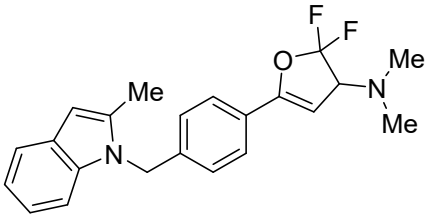


(E)-2,2-difluoro-*N, N*-dimethyl-5-styryl-2,3-dihydrofuran-3-amine (2aa)

Dark yellow solid, m.p. = 46-48 °C (32.0 mg, 63% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.46 – 7.43 (m, 2H), 7.38 – 7.33 (m, 2H), 7.32 – 7.28 (m, 1H), 7.01 (d, J = 16.1 Hz, 1H), 6.55 (d, J = 16.1 Hz, 1H), 5.21 (t, J = 2.3 Hz, 1H), 4.09 (ddd, J = 14.7, 7.3, 2.9 Hz, 1H), 2.47 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 153.56 (d, J = 3.8 Hz),

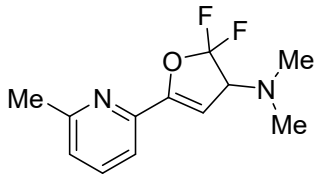
135.66, 131.19 (dd, *J* = 274.2, 271.2 Hz), 133.63, 128.83, 128.79, 127.03, 114.76, 101.93 (d, *J* = 2.7 Hz), 70.92 (dd, *J* = 34.3, 19.1 Hz), 41.17 (d, *J* = 2.4 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.39 (d, *J* = 150.1 Hz), -83.47 (d, *J* = 150.0 Hz). HRMS-ESI (m/z): calcd for $C_{14}H_{15}F_2NO$, $[M+H]^+$: 252.1200, found, 252.1136.



2,2-difluoro-*N*,*N*-dimethyl-5-(4-((2-methyl-1H-indol-1-yl)methyl)phenyl)-2,3-dihydrofuran-3-amine (2ab)

Yellow solid, m.p. = 86-88 °C (45.6 mg, 62% yield).

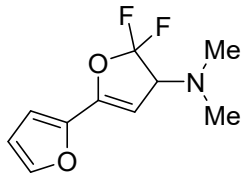
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.60 – 7.53 (m, 1H), 7.49 (d, *J* = 8.2 Hz, 2H), 7.20 – 7.13 (m, 1H), 7.09 (qd, *J* = 6.9, 3.9 Hz, 2H), 6.98 (d, *J* = 8.2 Hz, 2H), 6.34 (s, 1H), 5.48 (t, *J* = 2.3 Hz, 1H), 5.32 (s, 2H), 4.11 (ddd, *J* = 15.0, 7.2, 2.6 Hz, 1H), 2.45 (s, 6H), 2.36 (s, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 153.94 (d, *J* = 3.7 Hz), 139.89, 137.06, 136.54, 131.13 (dd, *J* = 274.2, 271.4 Hz), 128.20, 127.33, 126.22, 125.81, 120.91, 119.84, 119.69, 109.06, 100.73, 97.42, 70.99 (dd, *J* = 34.5, 18.9 Hz), 46.22, 41.15, 12.76. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.30 (d, *J* = 150.7 Hz), -83.90 (d, *J* = 150.8 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{15}F_2NO$, $[M+H]^+$: 369.1778, found, 369.1775.



2,2-difluoro-*N, N*-dimethyl-5-(6-methylpyridin-2-yl)-2,3-dihydrofuran-3-amine (2ac)

Dark yellow oil, (32.1 mg, 67% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.62 (t, *J* = 7.8 Hz, 1H), 7.38 (d, *J* = 7.9 Hz, 1H), 7.14 (d, *J* = 7.8 Hz, 1H), 6.06 (s, 1H), 4.20 – 4.14 (m, 1H), 2.57 (s, 3H), 2.49 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 158.84, 153.72 (d, *J* = 3.3 Hz), 146.33, 136.84, 131.32 (dd, *J* = 274.9, 271.1 Hz), 124.03, 117.42, 100.93 (d, *J* = 3.1 Hz), 71.14 (dd, *J* = 34.4, 18.9 Hz), 41.43 (d, *J* = 2.5 Hz), 24.57. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.47 (d, *J* = 150.3 Hz), -82.92 (d, *J* = 150.5 Hz). HRMS-ESI (m/z): calcd for $C_{12}H_{14}F_2N_2O$, $[M+H]^+$: 241.1152, found, 241.1159 .

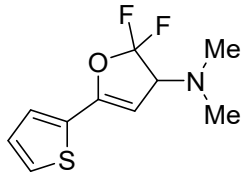


5,5-difluoro-*N, N*-dimethyl-4,5-dihydro-[2,2'-bifuran]-4-amine (2ad)

Brown oil, (30.5 mg, 71% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.47 (s, 1H), 6.62 (s, 1H), 6.47 (s, 1H), 5.45 (s, 1H), 4.14 (dd, *J* = 14.6, 6.9 Hz, 1H), 2.47 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 146.17 (d, *J* = 4.8 Hz), 144.08, 143.91, 131.15 (dd, *J* = 274.7, 272.5 Hz), 111.46, 110.05, 96.44 (d, *J* = 2.9 Hz),

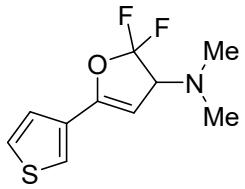
70.78 (dd, *J* = 34.3, 18.8 Hz), 41.13 (d, *J* = 2.9 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.89 (d, *J* = 150.0 Hz), -83.91 (d, *J* = 149.9 Hz). HRMS-ESI (m/z): calcd for $C_{10}H_{11}F_2NO_2$, $[M+H]^+$: 216.0836, found, 216.0852.



2,2-difluoro-*N, N*-dimethyl-5-(thiophen-2-yl)-2,3-dihydrofuran-3-amine (2ae) [1]

Dark yellow oil, (31.4 mg, 68% yield).

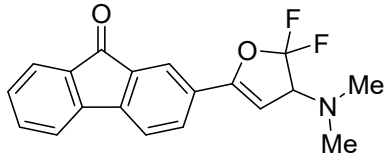
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.36 (d, *J* = 5.0 Hz, 1H), 7.33 (d, *J* = 3.7 Hz, 1H), 7.05 (t, *J* = 4.1 Hz, 1H), 5.38 (s, 1H), 4.17 – 4.11 (m, 1H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 149.54 (d, *J* = 4.3 Hz), 131.03 (dd, *J* = 274.8, 272.3 Hz), 130.92, 127.65, 127.25, 126.65, 96.54 (d, *J* = 3.1 Hz), 71.12 (dd, *J* = 34.5, 18.8 Hz), 41.12 (d, *J* = 2.7 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.59 (d, *J* = 150.1 Hz), -83.84 (d, *J* = 149.9 Hz). HRMS-ESI (m/z): calcd for $C_{10}H_{11}F_2NOS$, $[M+H]^+$: 232.0608, found, 232.0617 .



2,2-difluoro-*N, N*-dimethyl-5-(thiophen-3-yl)-2,3-dihydrofuran-3-amine (2af)

Dark yellow oil, (32.8 mg, 71% yield).

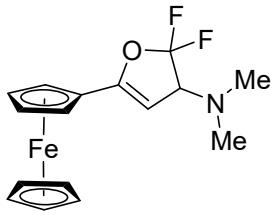
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.57 (s, 1H), 7.36 – 7.33 (m, 1H), 7.26 – 7.23 (m, 1H), 5.36 (s, 1H), 4.14 (dd, *J* = 14.5, 6.7 Hz, 1H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 150.80 (d, *J* = 4.0 Hz), 131.11 (dd, *J* = 274.4, 271.6 Hz)., 130.12, 126.75, 124.75, 124.20, 96.75 (d, *J* = 3.1 Hz), 70.96 (dd, *J* = 34.5, 19.0 Hz), 41.10 (d, *J* = 2.9 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.50 (d, *J* = 150.5 Hz), -83.91 (d, *J* = 150.0 Hz). HRMS-ESI (m/z): calcd for $C_{10}H_{11}F_2NOS$, $[M+H]^+$: 232.0608, found, 232.0617.



2-(4-(dimethylamino)-5,5-difluoro-4,5-dihydrofuran-2-yl)-9H-fluoren-9-one (2ag)

Light yellow solid, m.p. = 114-116 °C (42.5 mg, 65% yield).

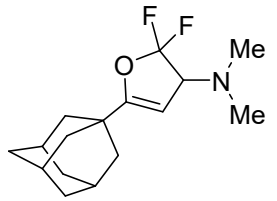
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.85 (s, 1H), 7.69 (dd, *J* = 14.4, 7.6 Hz, 2H), 7.57 – 7.47 (m, 3H), 7.32 (t, *J* = 7.1 Hz, 1H), 5.63 (s, 1H), 4.17 (dd, *J* = 14.8, 7.2 Hz, 1H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 192.95, 153.26 (d, *J* = 3.7 Hz), 145.29, 143.77, 135.01, 134.47, 134.39, 131.06 (dd, *J* = 274.6, 271.6 Hz), 131.33, 129.65, 129.04, 124.58, 121.32, 120.80, 120.48, 98.56 (d, *J* = 3.0 Hz), 71.08 (dd, *J* = 34.5, 19.0 Hz), 41.24 (d, *J* = 2.1 Hz). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.47 (d, *J* = 150.5 Hz), -83.59 (d, *J* = 150.5 Hz). HRMS-ESI (m/z): calcd for $C_{19}H_{15}F_2NO_2$, $[M+H]^+$: 328.1149, found, 328.1139.



2,2-difluoro-*N, N*-dimethyl-5-ferrocenyl-2,3-dihydrofuran-3-amine (2ah)

Dark purple solid, m.p. = 76-78 °C (53.9 mg, 81% yield).

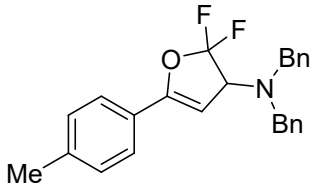
^{1}H NMR (400 MHz, Chloroform-*d*) δ 5.10 (s, 1H), 4.53 (d, *J* = 12.9 Hz, 2H), 4.31 (s, 2H), 4.19 (s, 5H), 3.98 (d, *J* = 12.2 Hz, 1H), 2.48 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 155.80 (d, *J* = 4.2 Hz), 133.91 – 128.45 (m), 94.67, 72.43, 70.93 (dd, *J* = 34.0, 18.4 Hz), 69.69, 66.63 (d, *J* = 7.9 Hz), 41.04. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.35 (d, *J* = 151.0 Hz), -84.85 (d, *J* = 150.7 Hz). HRMS-ESI (m/z): calcd for $C_{16}H_{17}F_2FeNO$, $[M+H]^+$: 334.0706, found, 334.0671 .



5-((1r,3R,5S)-adamantan-1-yl)-2,2-difluoro-*N, N*-dimethyl-2,3-dihydrofuran-3-amine (2ai)

Light yellow oil, (41.3 mg, 73% yield).

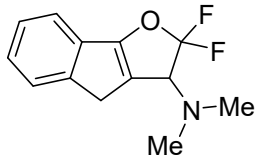
^{1}H NMR (400 MHz, Chloroform-*d*) δ 4.73 (t, *J* = 2.4 Hz, 1H), 3.86 (ddd, *J* = 15.1, 6.6, 2.4 Hz, 1H), 2.40 (s, 6H), 2.01 (t, *J* = 3.2 Hz, 3H), 1.77 (q, *J* = 12.9, 11.4 Hz, 12H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 166.01 (d, *J* = 2.6 Hz), 131.23 (dd, *J* = 272.9, 270.2 Hz), 94.43 (d, *J* = 2.5 Hz), 70.23 (dd, *J* = 35.1, 19.0 Hz), 40.96 (d, *J* = 2.7 Hz), 39.11, 36.60, 34.17, 27.75. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.83 (d, *J* = 150.8 Hz), -85.47 (d, *J* = 151.0 Hz). HRMS-ESI (m/z): calcd for $C_{16}H_{23}F_2NO$, $[M+H]^+$: 284.1826, found, 284.1886.



***N, N*-dibenzyl-2,2-difluoro-5-(p-tolyl)-2,3-dihydrofuran-3-amine (2aj)**

Light yellow solid, m.p. = 83-85 °C (56.3 mg, 72% yield).

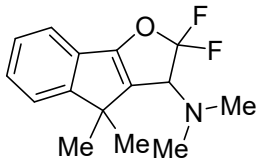
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.43 (d, *J* = 8.0 Hz, 2H), 7.40 – 7.21 (m, 10H), 7.16 (d, *J* = 8.0 Hz, 2H), 5.43 (s, 1H), 4.36 (ddd, *J* = 14.6, 8.4, 2.2 Hz, 1H), 3.97 – 3.72 (m, 4H), 2.34 (s, 3H). ^{13}C NMR (101 MHz, Chloroform-d) δ 154.54 (d, *J* = 3.5 Hz), 140.09, 139.44, 131.72 (t, *J* = 273.0 Hz), 129.25, 128.74, 128.38, 127.17, 125.52, 125.23, 97.38 (d, *J* = 3.4 Hz), 66.10 (dd, *J* = 34.4, 19.2 Hz), 54.38, 21.45. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.98 (d, *J* = 150.5 Hz), -80.43 (d, *J* = 150.3 Hz). HRMS-ESI (m/z): calcd for $C_{25}H_{23}F_2NO$, $[M+H]^+$: 392.1826, found, 392.1830.



2,2-difluoro-*N, N*-dimethyl-3,4-dihydro-2H-indeno[1,2-b]furan-3-amine (2ak)

Dark yellow oil, (32.2 mg, 68% yield).

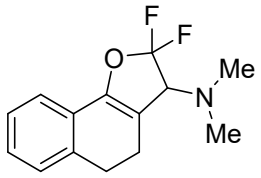
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.39 (d, *J* = 7.2 Hz, 1H), 7.31 (d, *J* = 7.1 Hz, 1H), 7.26 (t, *J* = 7.1 Hz, 1H), 7.23 – 7.19 (m, 1H), 4.26 (dd, *J* = 13.8, 7.1 Hz, 1H), 3.31 (s, 2H), 2.41 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 159.34 (d, *J* = 4.4 Hz), 146.04, 136.28 (dd, *J* = 285.4, 282.5 Hz), 132.14, 126.83, 126.44, 124.97, 118.25, 117.39 (dd, *J* = 3.8, 1.7 Hz), 70.86 (dd, *J* = 33.4, 18.9 Hz), 41.00, 31.91. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -58.28 (d, *J* = 145.0 Hz), -77.21 (d, *J* = 145.1 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{13}F_2NO$, $[M+H]^+$: 238.1043, found, 238.1038.



2,2-difluoro-*N, N*,4,4-tetramethyl-3,4-dihydro-2H-indeno[1,2-b]furan-3-amine (2al)

Dark yellow solid, m.p. = 128-130 °C (22.2 mg, 42% yield).

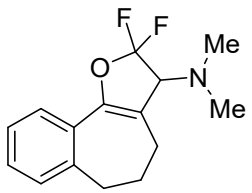
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.40 – 7.34 (m, 1H), 7.33 – 7.26 (m, 3H), 4.24 (dd, *J* = 14.1, 7.4 Hz, 1H), 2.60 – 2.40 (m, 6H), 1.45 (s, 3H), 1.36 (s, 3H). ^{19}F NMR (377 MHz, Chloroform-*d*) δ -56.81 (d, *J* = 144.1 Hz), -76.82 (d, *J* = 144.1 Hz). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 156.92, 156.42 (d, *J* = 4.7 Hz), 136.34 (t, *J* = 286.1 Hz), 130.21, 126.89, 126.77, 121.84, 118.34, 70.15 (dd, *J* = 32.0, 19.0 Hz), 44.14, 40.70, 24.70, 24.04. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -56.81 (d, *J* = 144.1 Hz), -76.82 (d, *J* = 144.1 Hz). HRMS-ESI (m/z): calcd for $C_{13}H_{15}F_2NO$, $[M+H]^+$: 266.1356, found, 266.1349.



2,2-difluoro-*N, N*-dimethyl-2,3,4,5-tetrahydronaphtho[1,2-b]furan-3-amine (2am)

Dark yellow oil, (26.1 mg, 52% yield).

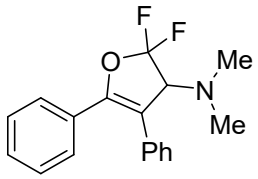
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.32 (dd, *J* = 5.9, 3.0 Hz, 1H), 7.25 – 7.22 (m, 2H), 7.20 – 7.16 (m, 1H), 4.09 (dd, *J* = 14.0, 7.8 Hz, 1H), 2.99 (t, *J* = 8.1 Hz, 2H), 2.52 (s, 6H), 2.47 – 2.42 (m, 2H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 149.46 (d, *J* = 4.0 Hz), 136.41, 132.57 (dd, *J* = 277.7, 276.0 Hz), 128.80, 127.72, 126.61, 125.65, 121.09, 110.14 (dd, *J* = 3.4, 1.3 Hz), 72.32 (dd, *J* = 33.2, 19.0 Hz), 40.49 (d, *J* = 3.0 Hz), 27.87, 20.35. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -59.83 (d, *J* = 149.3 Hz), -81.87 (d, *J* = 149.8 Hz). HRMS-ESI (m/z): calcd for $C_{14}H_{15}F_2NO$, $[M+H]^+$: 252.1200, found, 252.1234.



2,2-difluoro-*N, N*-dimethyl-3,4,5,6-tetrahydro-2H-benzo[6,7]cyclohepta[1,2-b]furan-3-amine (2an)

Light yellow oil, (23.8 mg, 45% yield).

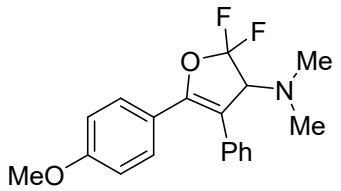
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.69 – 7.65 (m, 1H), 7.25 – 7.20 (m, 2H), 7.15 – 7.10 (m, 1H), 3.99 (dd, *J* = 14.0, 7.3 Hz, 1H), 2.92 – 2.80 (m, 2H), 2.53 (s, 6H), 2.38 (dt, *J* = 18.2, 6.5 Hz, 2H), 2.01 – 1.88 (m, 2H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 146.49 (d, *J* = 3.0 Hz), 141.56, 130.58 (t, *J* = 271.3 Hz), 129.25, 128.88, 127.91, 126.82, 126.22, 115.10, 74.33 (dd, *J* = 33.4, 19.2 Hz), 40.08 (d, *J* = 3.0 Hz), 35.90, 27.67, 24.57. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -59.40 (d, *J* = 151.5 Hz), -84.06 (d, *J* = 153.5 Hz). HRMS-ESI (m/z): calcd for $C_{15}H_{17}F_2NO$, $[M+H]^+$: 266.1356, found, 266.1384.



2,2-difluoro-*N, N*-dimethyl-4,5-diphenyl-2,3-dihydrofuran-3-amine (2ao)

Light yellow oil, (43.9 mg, 73% yield).

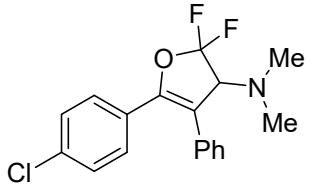
^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 7.45 (d, *J* = 7.7 Hz, 2H), 7.31 (m, 8H), 4.35 (dd, *J* = 13.6, 5.7 Hz, 1H), 2.54 (s, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ (ppm) 148.90, 132.83, 130.24 (dd, *J* = 275.1, 272.7 Hz), 129.70, 128.93, 128.68, 128.61, 128.29, 127.77, 127.71, 113.26, 73.64 (dd, *J* = 33.9, 18.9 Hz), 40.14. ^{19}F NMR (377 MHz, $CDCl_3$) δ (ppm) -59.95 (d, *J* = 149.7 Hz), -85.95 (d, *J* = 149.7 Hz). HRMS-ESI (m/z): calcd for $C_{18}H_{17}F_2NO$, $[M+H]^+$: 302.1356, found, 302.1343 .



2,2-difluoro-5-(4-methoxyphenyl)-*N, N*-dimethyl-4-phenyl-2,3-dihydrofuran-3-amine(2ap)

Light yellow oil, (53.6 mg, 81% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.42 – 7.36 (m, 4H), 7.26 (d, *J* = 10.3 Hz, 3H), 6.78 (d, *J* = 8.5 Hz, 2H), 4.31 (dd, *J* = 13.6, 5.6 Hz, 1H), 3.78 (s, 3H), 2.53 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-d) δ 160.58, 148.85 (d, *J* = 2.9 Hz), 133.21, 130.27 (dd, *J* = 275.2, 272.3 Hz), 129.30, 128.67, 128.57, 127.48, 121.36, 113.70, 111.45, 73.65 (dd, *J* = 33.7, 18.9 Hz), 55.28, 40.11. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -59.92 (d, *J* = 149.6 Hz), -86.07 (d, *J* = 149.6 Hz). HRMS-ESI (m/z): calcd for $C_{19}H_{19}F_2NO_2$, $[M+H]^+$: 332.1462, found, 332.1476.

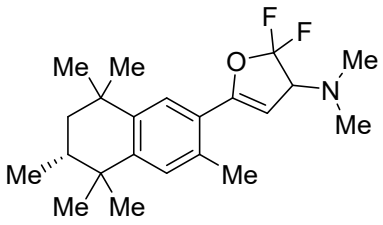


5-(4-chlorophenyl)-2,2-difluoro-*N, N*-dimethyl-4-phenyl-2,3-dihydrofuran-3-amine (2aq)

Light yellow oil, (44.2 mg, 66% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.38 (d, *J* = 8.0 Hz, 2H), 7.35 – 7.28 (m, 5H), 7.23 (d, *J* = 7.8 Hz, 2H), 4.33 (dd, *J* = 13.7, 5.9 Hz, 1H), 2.52 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 147.72 (d, *J* = 3.1 Hz), 135.59, 132.54, 130.15 (dd, *J* = 274.8, 272.3 Hz), 129.04, 128.75, 128.65, 128.60, 127.96, 127.36, 113.98, 73.72 (dd, *J* = 33.7, 18.9 Hz), 40.18. ^{19}F NMR (377 MHz,

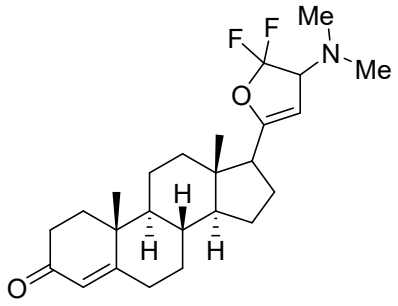
Chloroform-*d*) δ -60.02 (d, *J* = 149.5 Hz), -85.77 (d, *J* = 149.5 Hz). HRMS-ESI (m/z): calcd for $C_{18}H_{16}ClF_2NO$, $[M+H]^+$: 336.0967, found, 336.0971.



2,2-difluoro-5-((R)-3,5,5,6,8,8-hexamethyl-5,6,7,8-tetrahydronaphthalen-2-yl)-N,N-dimethyl-2,3-dihydrofuran-3-amine (2ar)

Yellow solid, m.p. = 71-73 °C (39.9 mg, 55% yield).

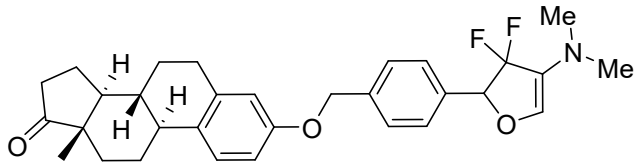
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.48 (s, 1H), 7.20 (s, 1H), 5.30 (t, *J* = 2.3 Hz, 1H), 4.14 (ddt, *J* = 14.8, 7.3, 1.6 Hz, 1H), 2.50 (s, 6H), 2.41 (s, 3H), 1.87 (ddd, *J* = 12.9, 6.7, 2.5 Hz, 1H), 1.64 (d, *J* = 13.3 Hz, 1H), 1.40 – 1.36 (m, 1H), 1.33 – 1.29 (m, 6H), 1.26 (d, *J* = 2.0 Hz, 3H), 1.06 (s, 3H), 0.99 (d, *J* = 6.8 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) 154.71 (d, *J* = 3.6 Hz), 147.94, 142.63, 133.49 – 128.04 (m), 133.42, 129.76, 126.28, 125.35, 100.93, 71.18 (dd, *J* = 34.7, 18.9 Hz), 43.57, 41.20, 37.73, 34.46, 34.11, 32.38 (d, *J* = 2.4 Hz), 31.97, 28.47, 24.84, 21.44, 16.83. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.54 (dd, *J* = 151.5, 10.4 Hz), -84.94 (dd, *J* = 151.4, 16.8 Hz). HRMS-ESI (m/z): calcd for $C_{22}H_{31}F_2NO$, $[M+H]^+$: 364.2452, found, 364.2417.



(8S,9S,10R,13S,14S)-17-(4-(dimethylamino)-5,5-difluoro-4,5-dihydrofuran-2-yl)-10,13-dimethyl-1,2,6,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-3H-cyclopenta[a]phenanthren-3-one (2as)

Yellow solid, m.p. = 62-64 °C (51.9 mg, 62% yield).

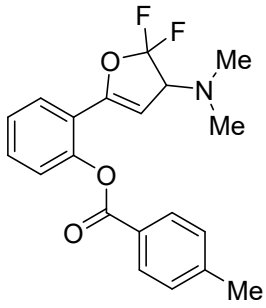
^{1}H NMR (400 MHz, Chloroform-*d*) δ 5.73 (s, 1H), 4.88 (s, 1H), 4.02 – 3.83 (m, 1H), 2.43 (d, *J* = 6.2 Hz, 6H), 2.40 – 2.33 (m, 2H), 2.32 – 2.19 (m, 2H), 2.05 (tt, *J* = 13.0, 3.4 Hz, 2H), 1.88 (ddt, *J* = 13.0, 9.3, 5.9 Hz, 2H), 1.75 (dddd, *J* = 23.0, 18.4, 11.0, 5.7 Hz, 3H), 1.62 – 1.49 (m, 2H), 1.47 – 1.38 (m, 1H), 1.27 (tdd, *J* = 13.3, 8.3, 4.0 Hz, 3H), 1.19 (s, 3H), 1.13 – 0.92 (m, 3H), 0.70 (d, *J* = 27.8 Hz, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 199.57, 171.12, 159.28, 123.90, 98.80 (d, *J* = 2.7 Hz), 98.63 (d, *J* = 2.2 Hz), 70.58 (m), 55.13, 55.10, 53.78, 53.76, 49.22, 49.12, 43.67, 43.64, 41.13, 40.93, 38.63, 38.05, 37.97, 35.80, 35.70, 33.95, 32.81, 31.92, 24.32, 23.85, 20.86, 17.37, 13.13, 12.91. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.10 (dd, *J* = 151.8, 55.7 Hz), -84.16 (dd, *J* = 521.5, 151.8 Hz). HRMS-ESI (m/z): calcd for $C_{25}H_{35}F_2NO_2$, $[M+H]^+$: 420.2714, found, 420.2693.



(8R,9S,13S,14S)-3-((4-(4-(dimethylamino)-3,3-difluoro-2,3-dihydrofuran-2-yl)benzyl)oxy)-13-methyl-6,7,8,9,11,12,13,14,15,16-decahydro-17H-cyclopenta[a]phenanthren-17-one (2at)

Yellow solid, m.p. = 144-146 °C (45.6 mg, 45% yield).

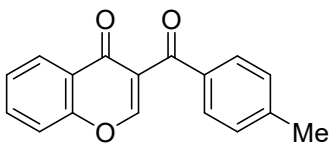
^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.61 (d, *J* = 8.0 Hz, 2H), 7.45 (d, *J* = 8.0 Hz, 2H), 7.20 (d, *J* = 8.6 Hz, 1H), 6.79 – 6.74 (m, 1H), 6.71 (s, 1H), 5.55 (s, 1H), 5.06 (s, 2H), 4.15 (ddd, *J* = 15.0, 7.3, 2.7 Hz, 1H), 2.89 (dd, *J* = 10.4, 4.5 Hz, 2H), 2.48 (s, 6H), 2.42 – 2.35 (m, 1H), 2.24 (t, *J* = 10.3 Hz, 1H), 2.17 – 1.94 (m, 4H), 1.61 – 1.38 (m, 6H), 1.27 (d, *J* = 12.1 Hz, 1H), 0.90 (s, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 220.96, 156.58, 154.08 (d, *J* = 3.7 Hz), 139.31, 137.90, 132.55, 131.17 (dd, *J* = 274.1, 271.4 Hz), 127.71, 127.39, 126.42, 125.56, 114.93, 112.36, 97.51 (d, *J* = 3.0 Hz), 71.03 (dd, *J* = 34.5, 19.0 Hz), 69.39, 50.41, 48.02, 43.99, 41.18 (d, *J* = 3.0 Hz), 38.33, 35.89, 31.59, 29.67, 26.53, 25.92, 21.60, 13.87. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.27 (d, *J* = 150.9 Hz), -83.79 (d, *J* = 150.7 Hz). HRMS-ESI (m/z): calcd for $C_{31}H_{35}F_2NO_3$, $[M+H]^+$: 508.2663, found, 508.2688.



2-(4-(dimethylamino)-5,5-difluoro-4,5-dihydrofuran-2-yl)phenyl 4-methylbenzoate (4b)

Yellow oil, (30.8 mg, 43% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.10 (d, *J* = 8.2 Hz, 2H), 7.79 – 7.71 (m, 1H), 7.49 – 7.42 (m, 1H), 7.40 – 7.30 (m, 3H), 7.28 – 7.20 (m, 1H), 5.65 – 5.51 (m, 1H), 4.04 (ddd, *J* = 15.0, 7.6, 2.9 Hz, 1H), 2.46 (s, 3H), 2.35 (s, 6H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 164.57, 150.13 (d, *J* = 3.8 Hz), 148.57, 144.96, 133.21 – 127.68 (m), 130.64, 130.27, 129.57, 128.24, 126.25, 126.16, 123.50, 121.65, 102.48 (d, *J* = 2.7 Hz), 71.05 (dd, *J* = 34.4, 18.9 Hz), 40.98, 21.80. ^{19}F NMR (377 MHz, Chloroform-*d*) δ -61.88 (d, *J* = 151.2 Hz), -84.74 (d, *J* = 151.2 Hz). HRMS-ESI (m/z): calcd for $C_{20}H_{19}F_2NO_3$, $[M+H]^+$: 360.1411, found, 360.1436.

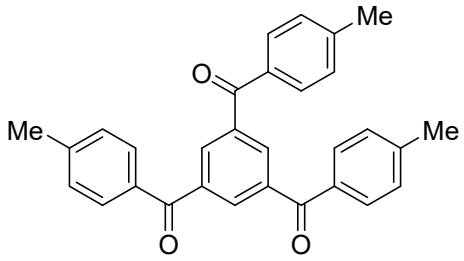


3-(4-methylbenzoyl)-4H-chromen-4-one (5b)[2]

White solid, m.p. = 126-128 °C (22.7 mg, 37% yield).

^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.33 – 8.23 (m, 2H), 7.80 – 7.75 (m, 2H), 7.74 – 7.69 (m, 1H), 7.56 – 7.51 (m, 1H), 7.50 – 7.44 (m, 1H), 7.28 – 7.23 (m, 2H), 2.42 (s, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 191.40, 174.76, 158.35, 156.08, 144.52, 134.64, 134.34, 129.78, 129.16,

126.49, 126.06, 125.39, 125.00, 118.30, 21.80.



benzene-1,3,5-triyltris(p-tolylmethanone) (6)[3]

Yellow solid, m.p. = 152-154 °C.

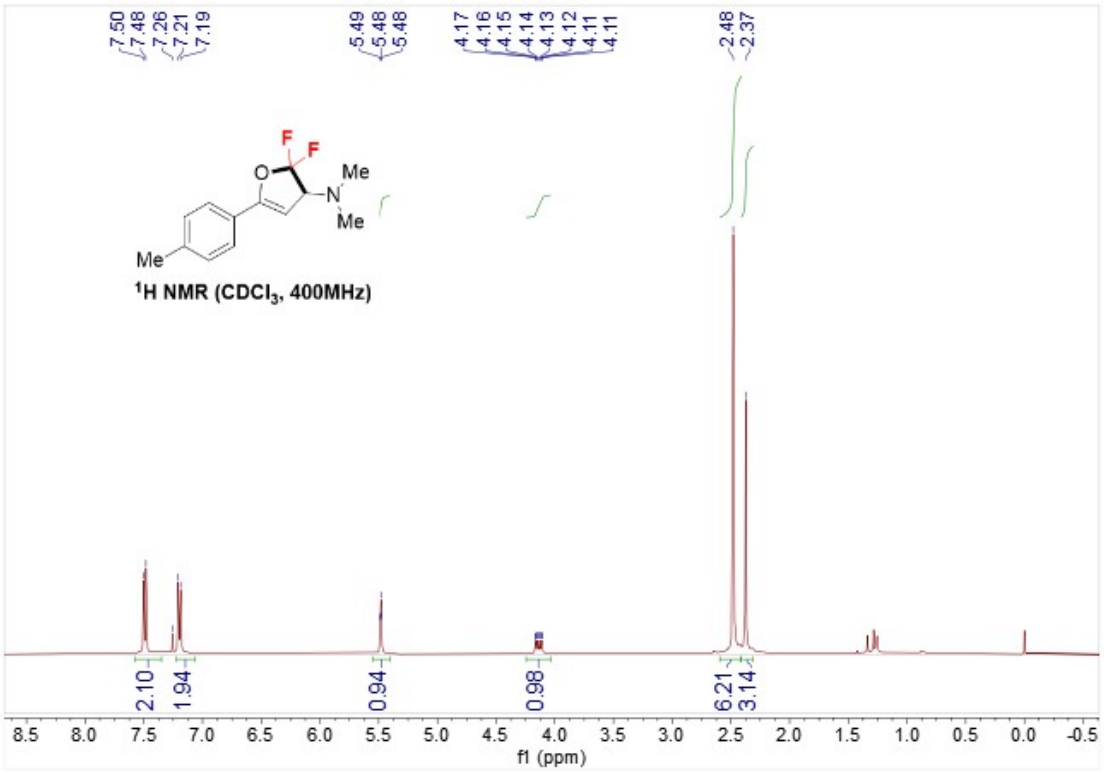
^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.34 (s, 3H), 7.76 (d, *J* = 8.1 Hz, 6H), 7.30 (d, *J* = 8.1 Hz, 6H), 2.44 (s, 9H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 194.76, 144.24, 138.45, 133.86, 133.71, 130.35, 129.35, 21.75.

References

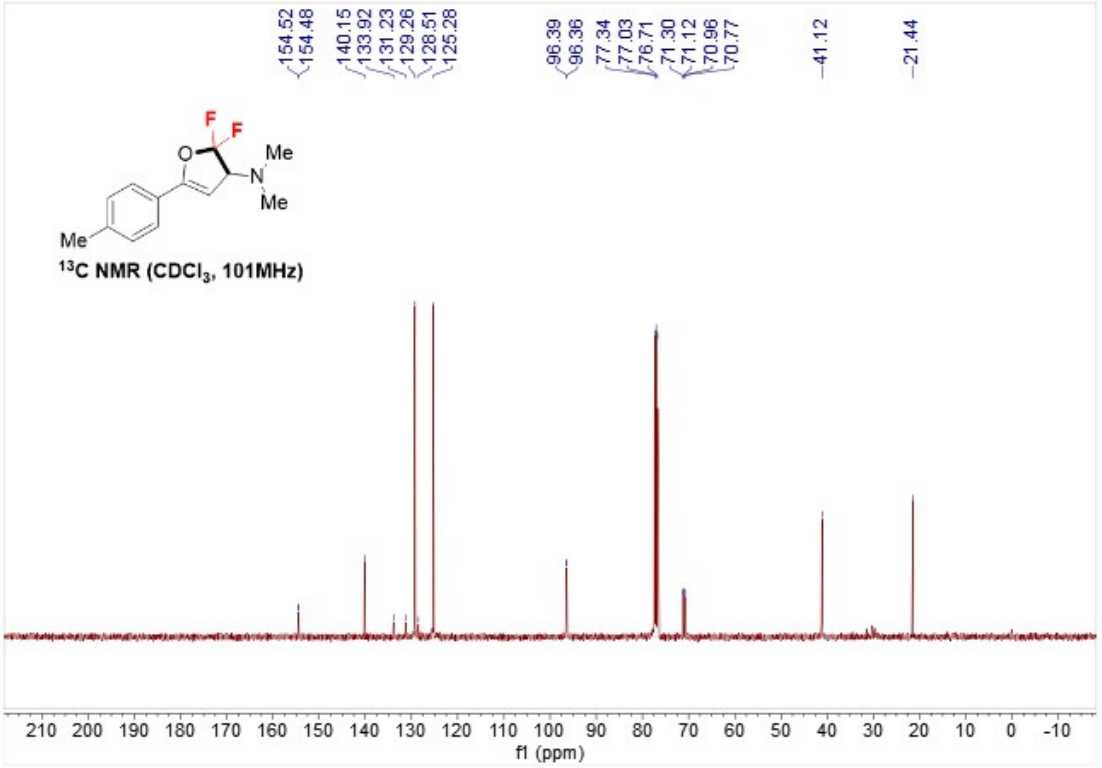
1. J. Ying, T. Liu, Y. Liu, J.-P. Wan, *Org. Lett.* **2022**, *24*, 2404-2408.
2. S. Mkrtchyan, V. O. Iaroshenko, *Eur. J. Org. Chem.* **2018**, *2018*, 6867-6875.
3. J.-P. Wang, Y. Lin, K. Hu, Y. Liu, *RSC Adv.* **2014**, *4*, 20499-20505.

NMR Spectra for All Compounds

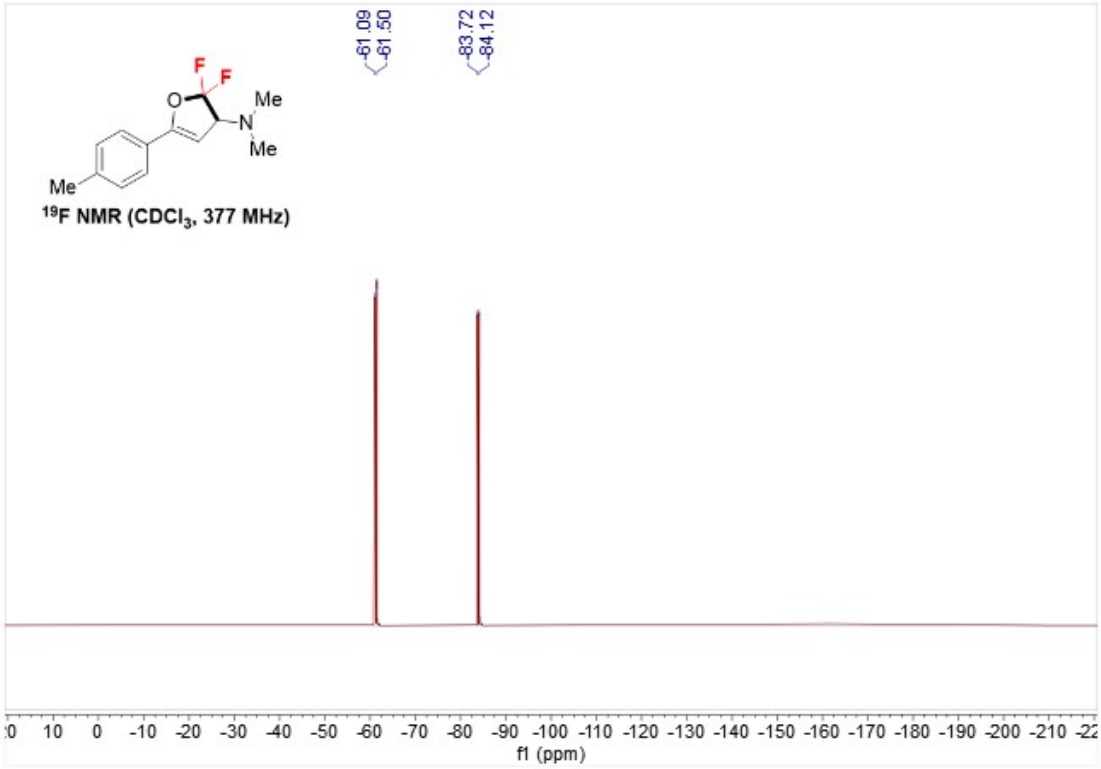
^{1}H NMR of compound 2a



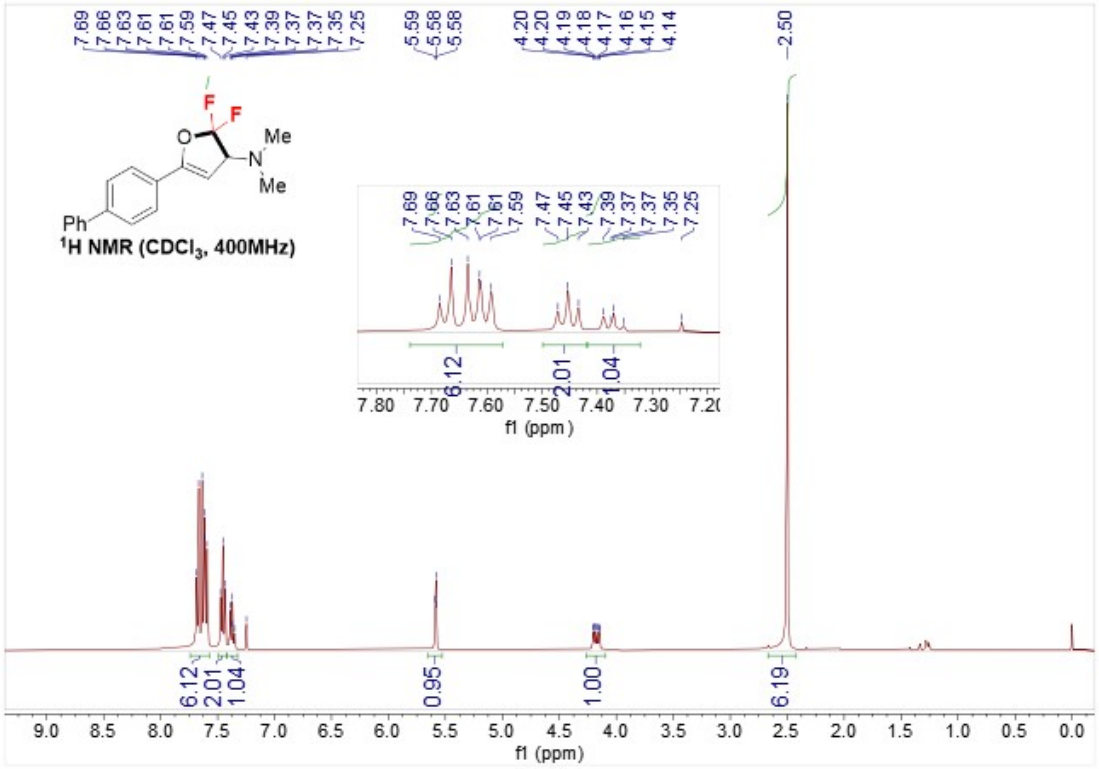
^{13}C NMR of compound 2a



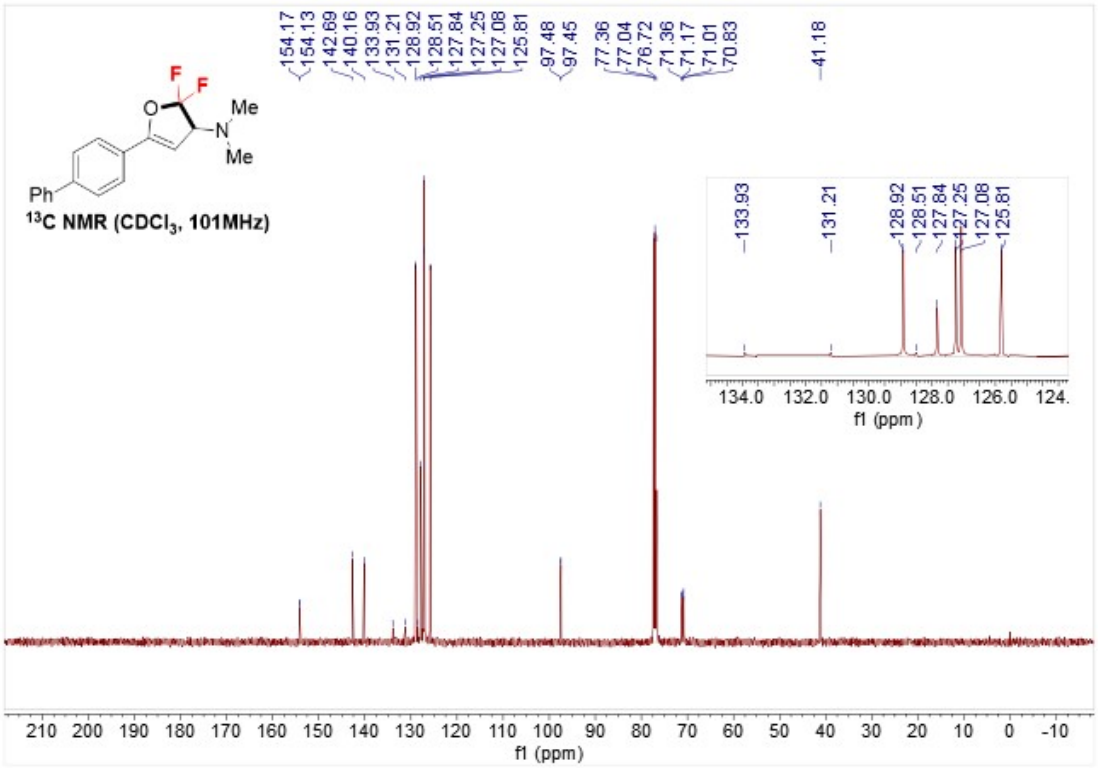
^{19}F NMR of compound 2a



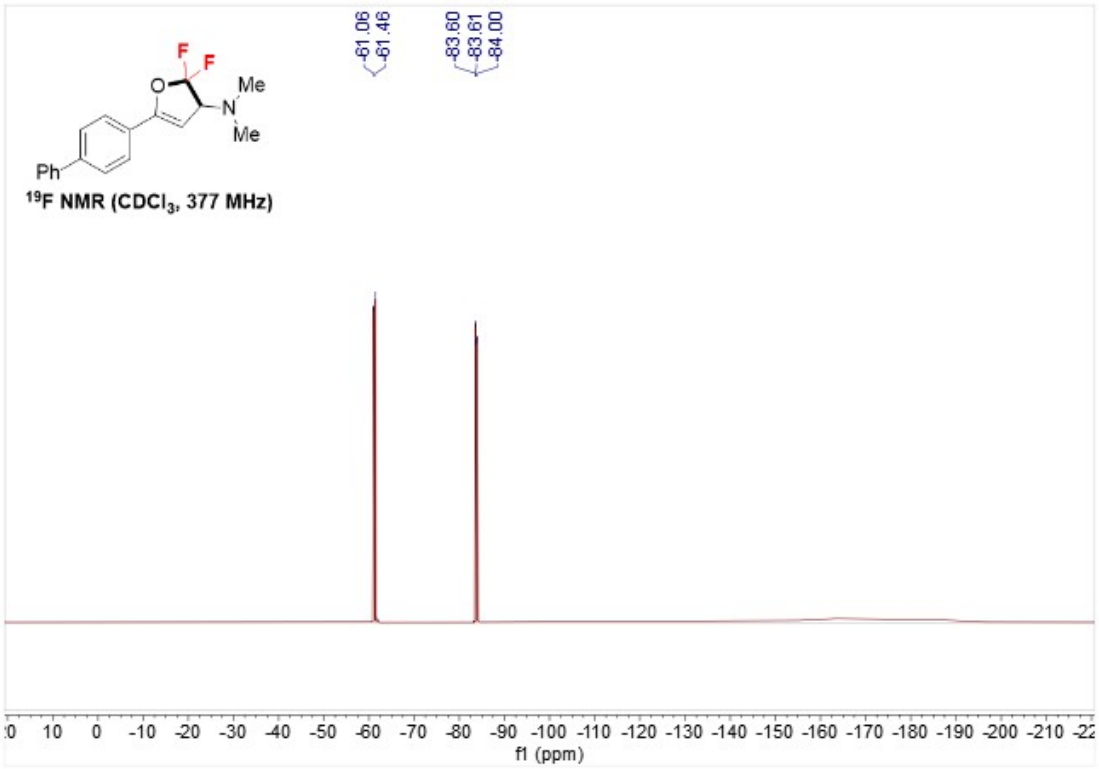
^{1}H NMR of compound 2b



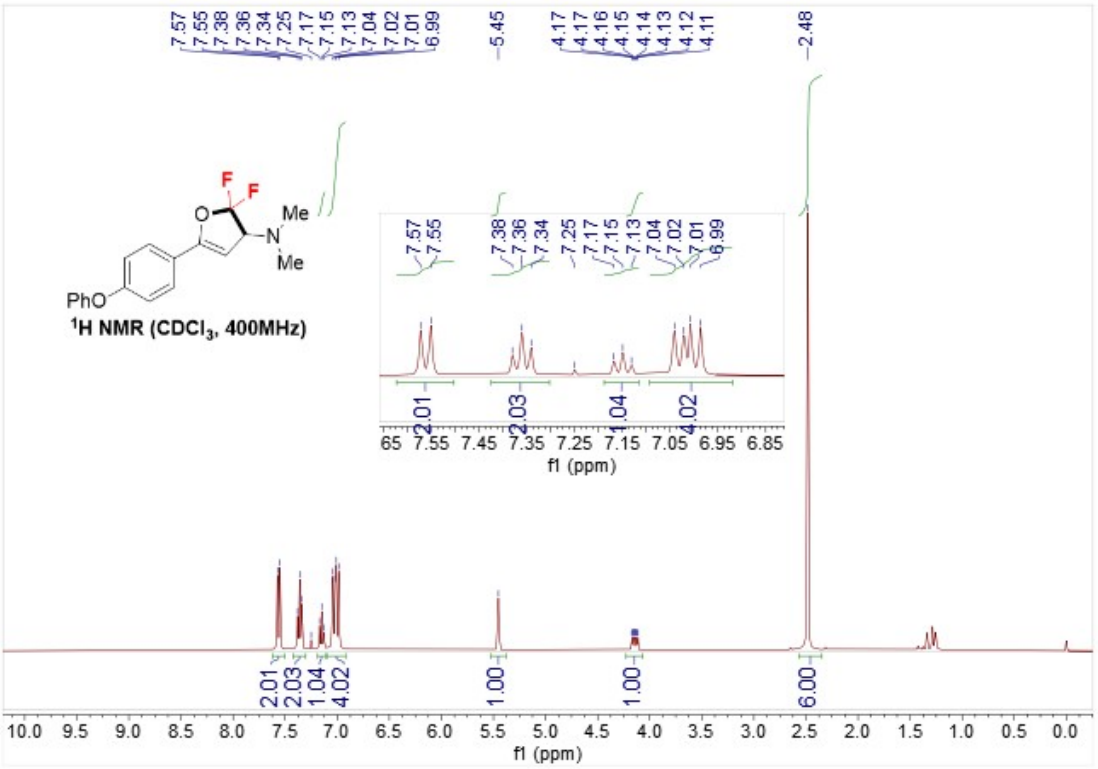
^{13}C NMR of compound 2b



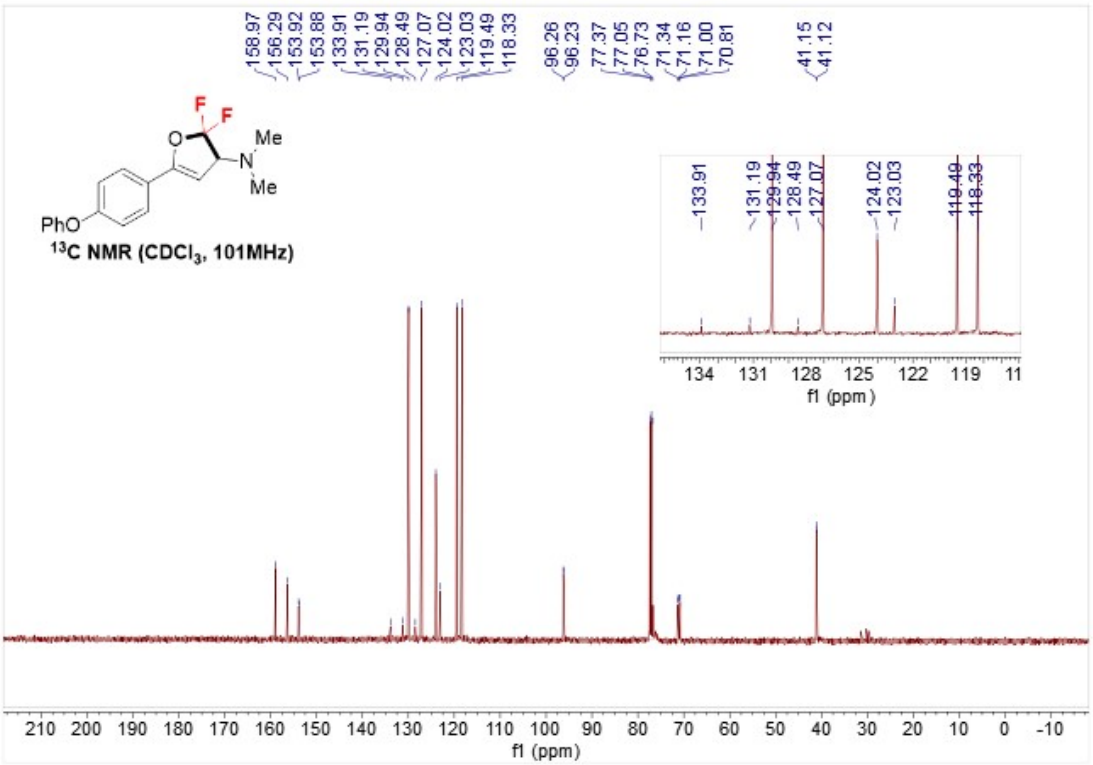
^{19}F NMR of compound 2b



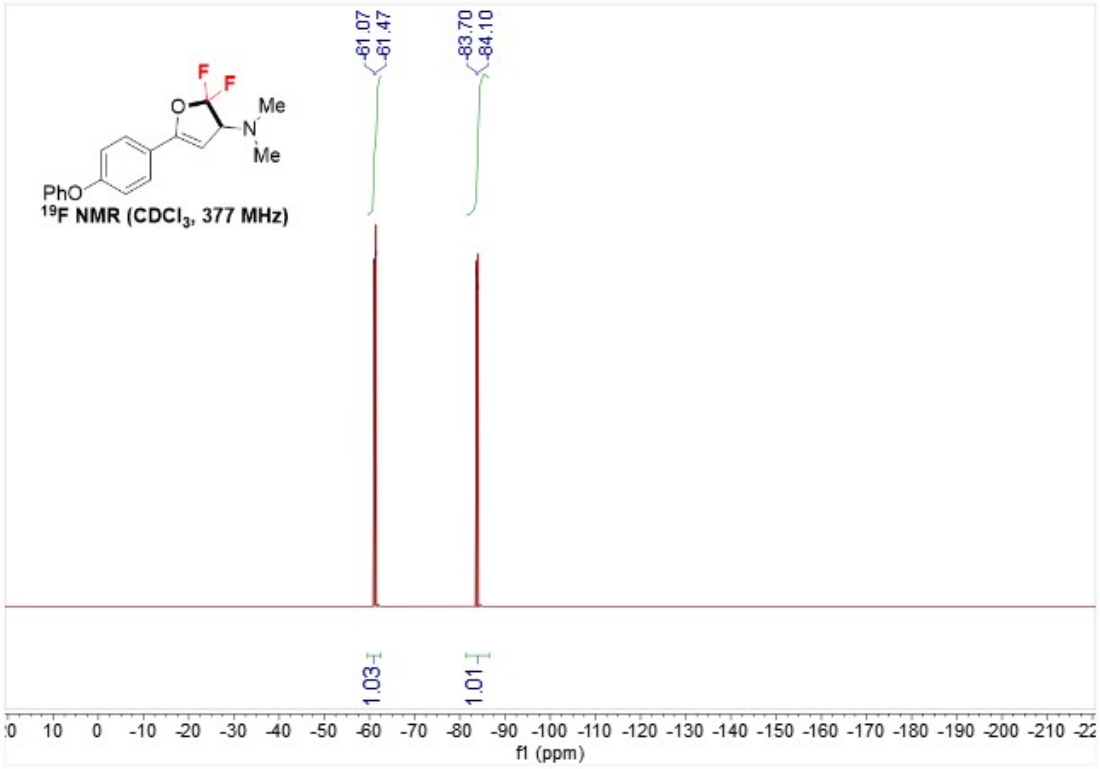
^{1}H NMR of compound 2c



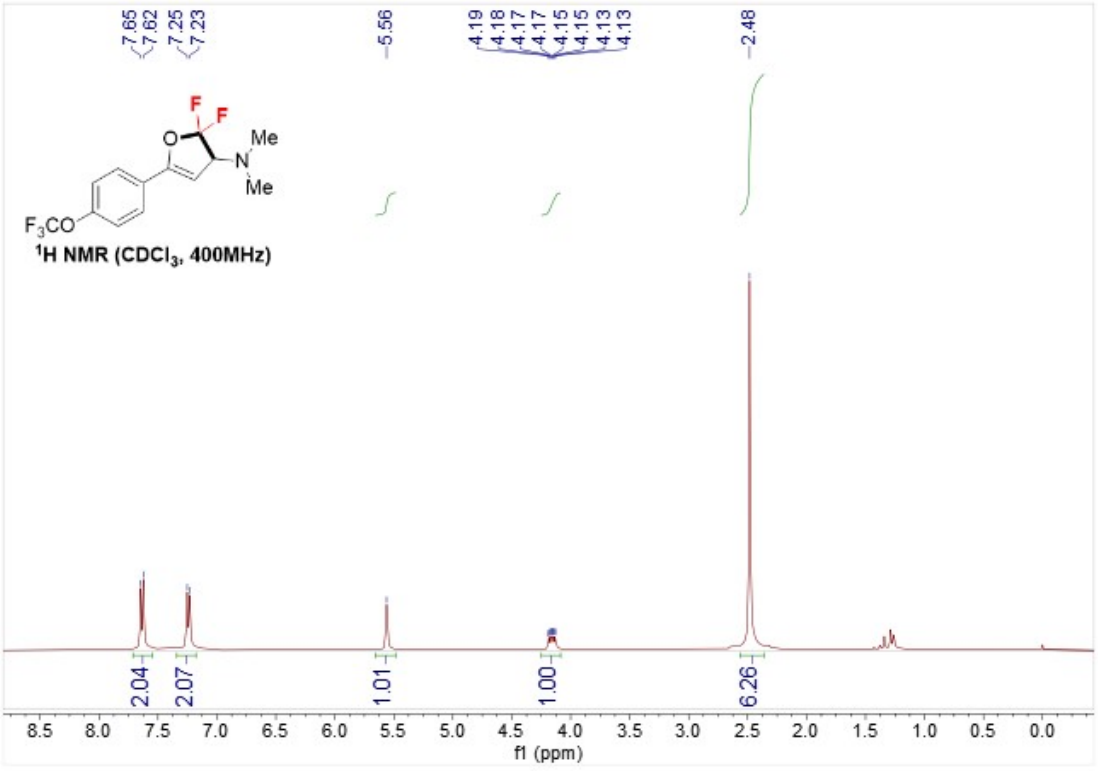
^{13}C NMR of compound 2c



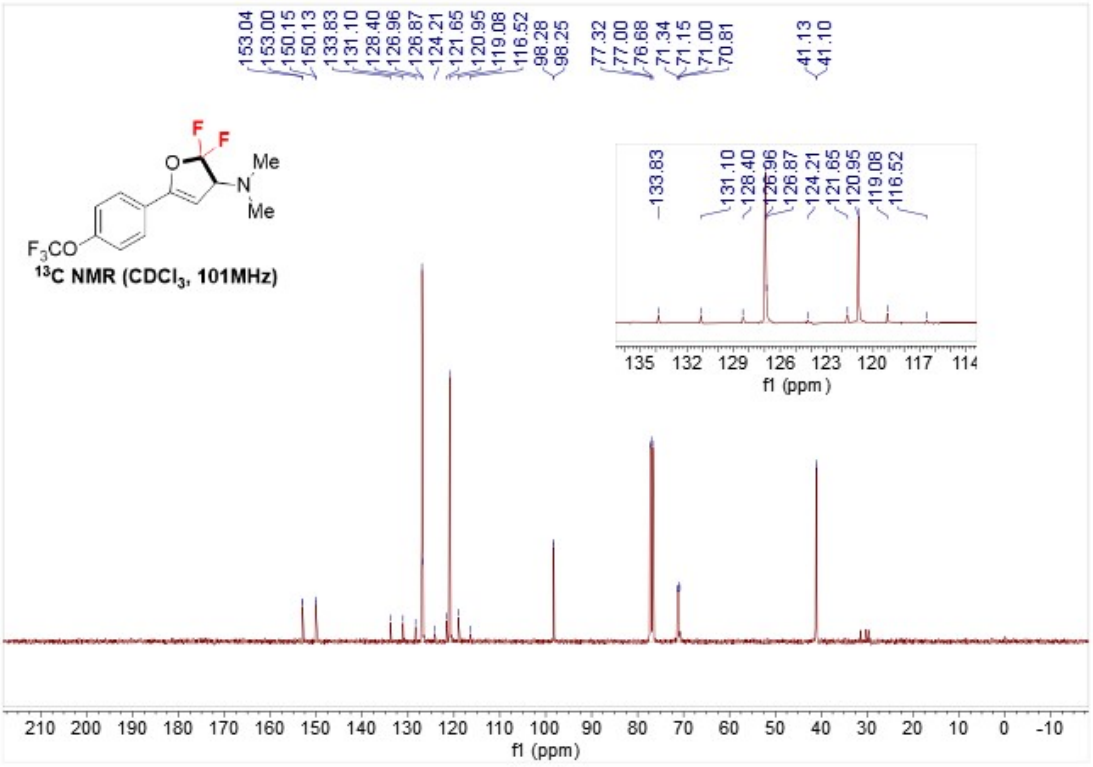
^{19}F NMR of compound 2c



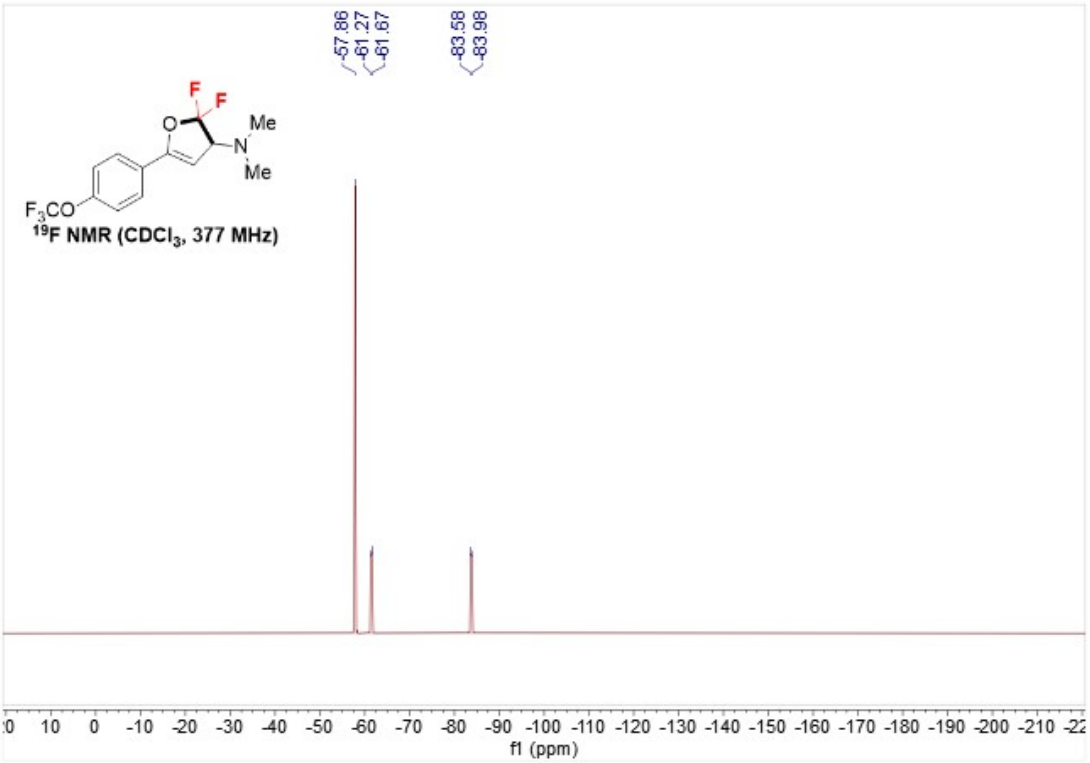
^{1}H NMR of compound 2d



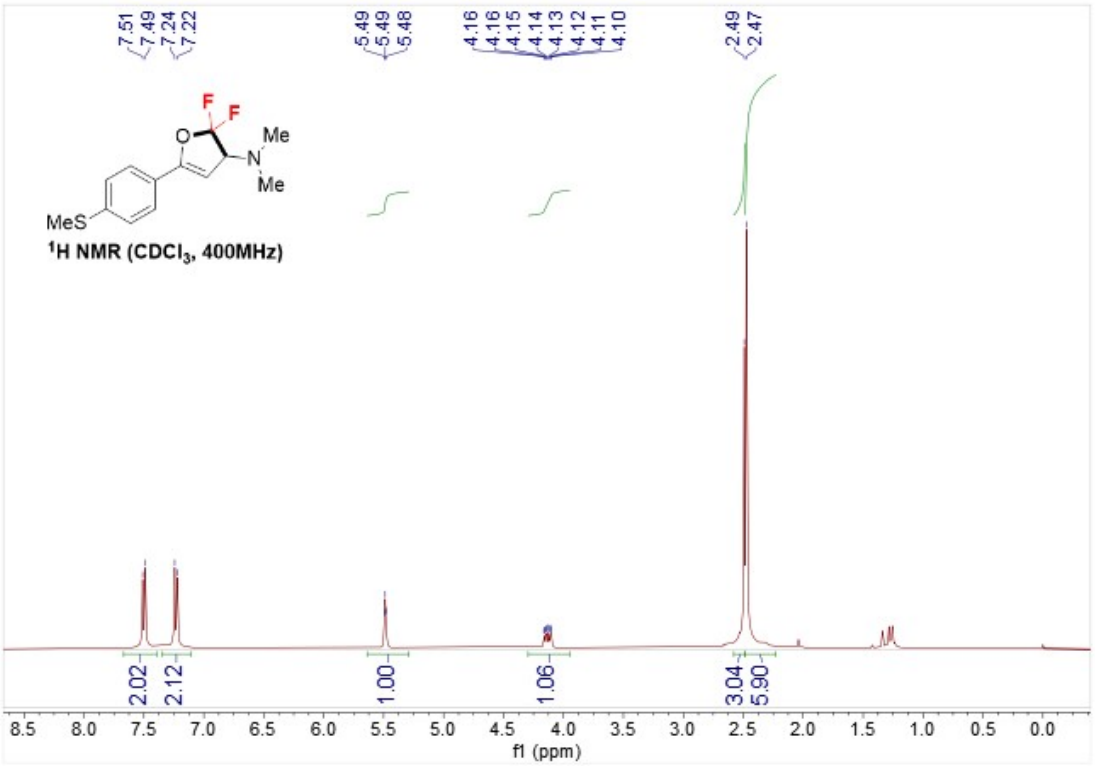
^{13}C NMR of compound 2d



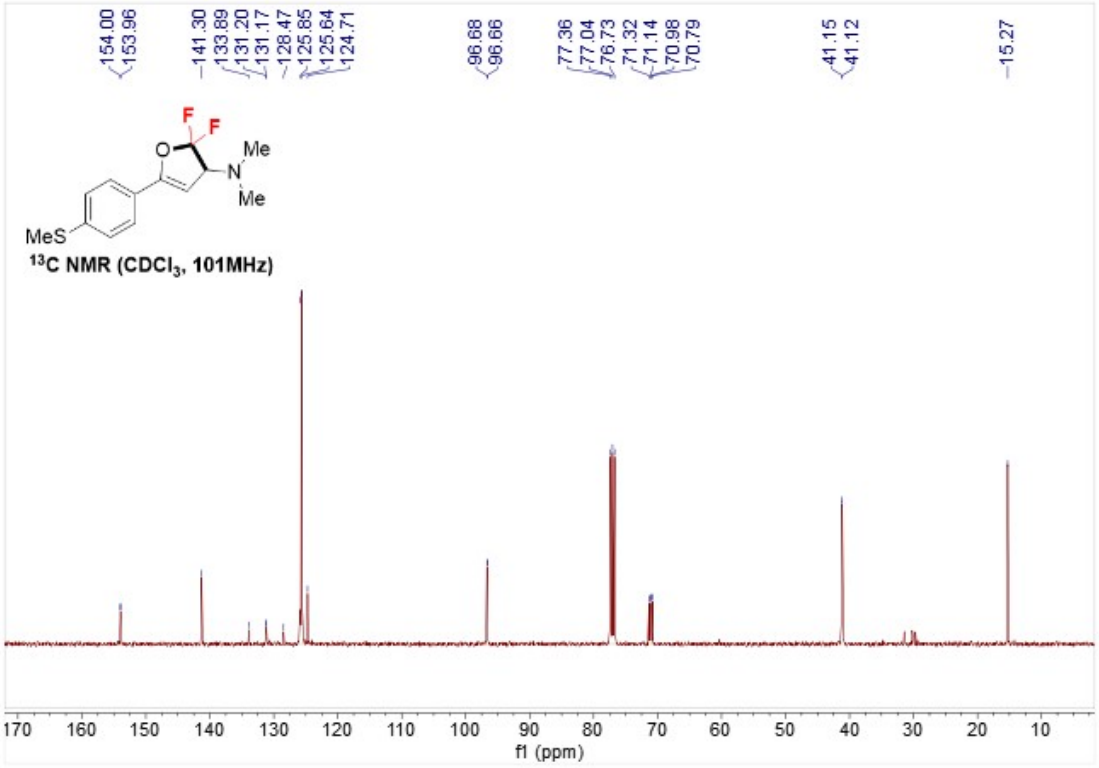
^{19}F NMR of compound 2d



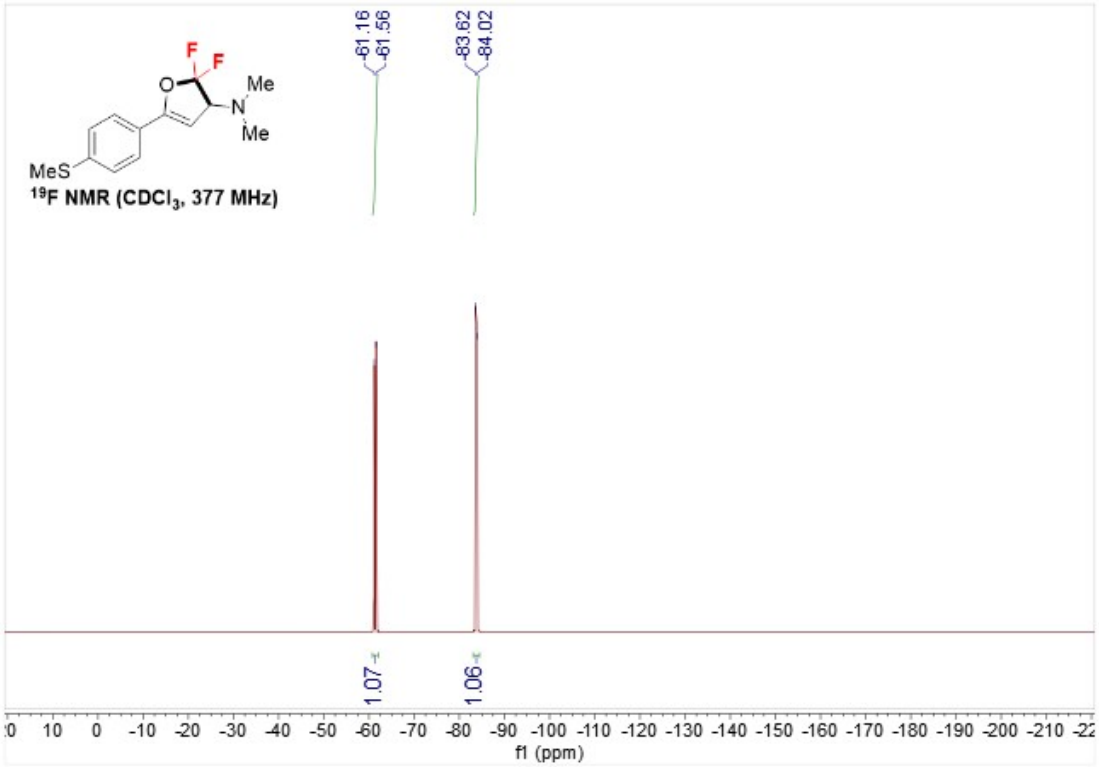
^{1}H NMR of compound 2e



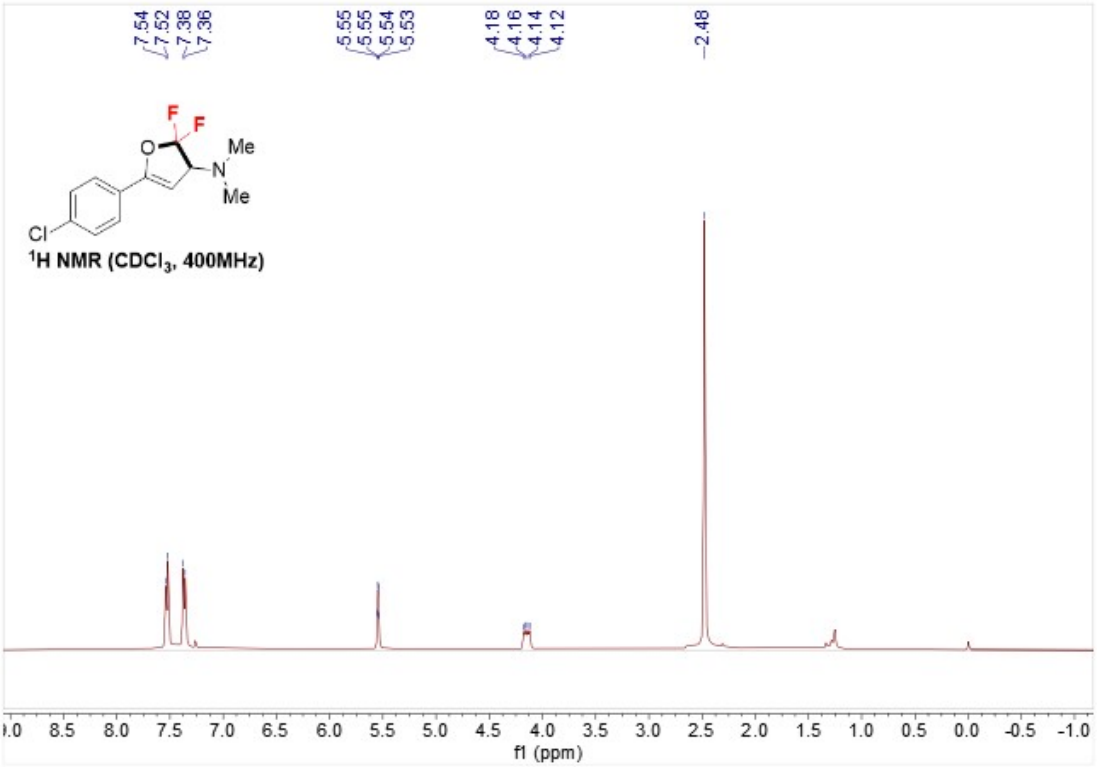
^{13}C NMR of compound 2e



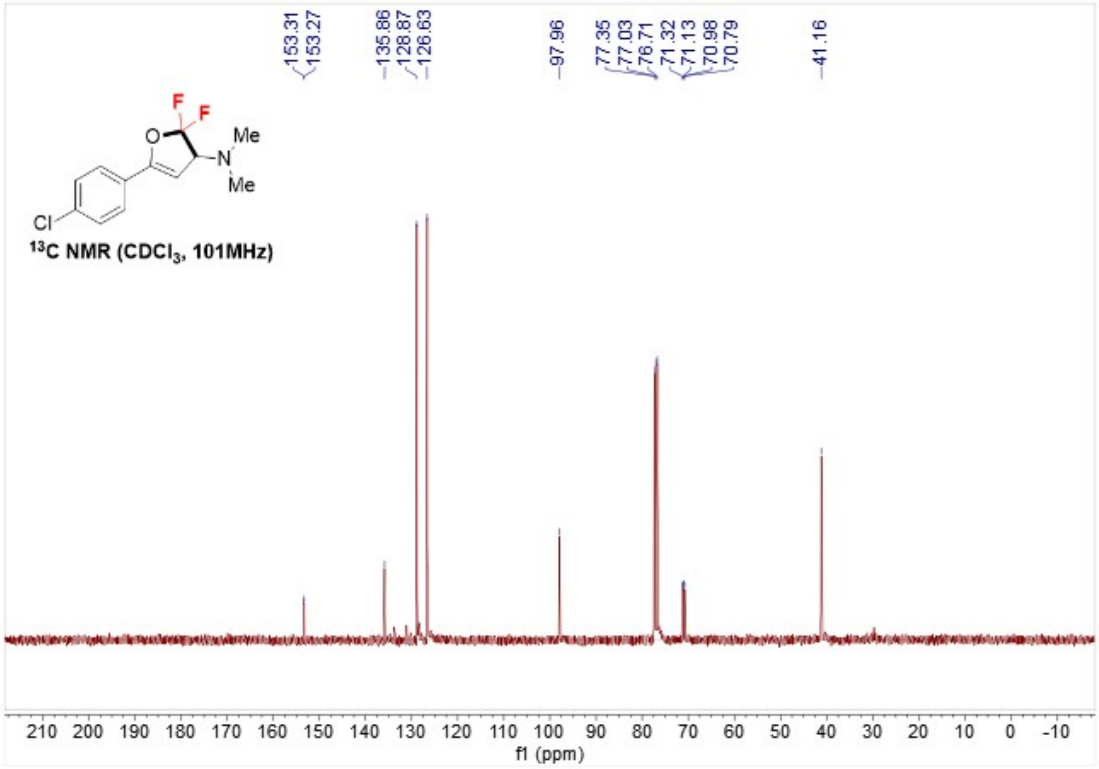
^{19}F NMR of compound 2e



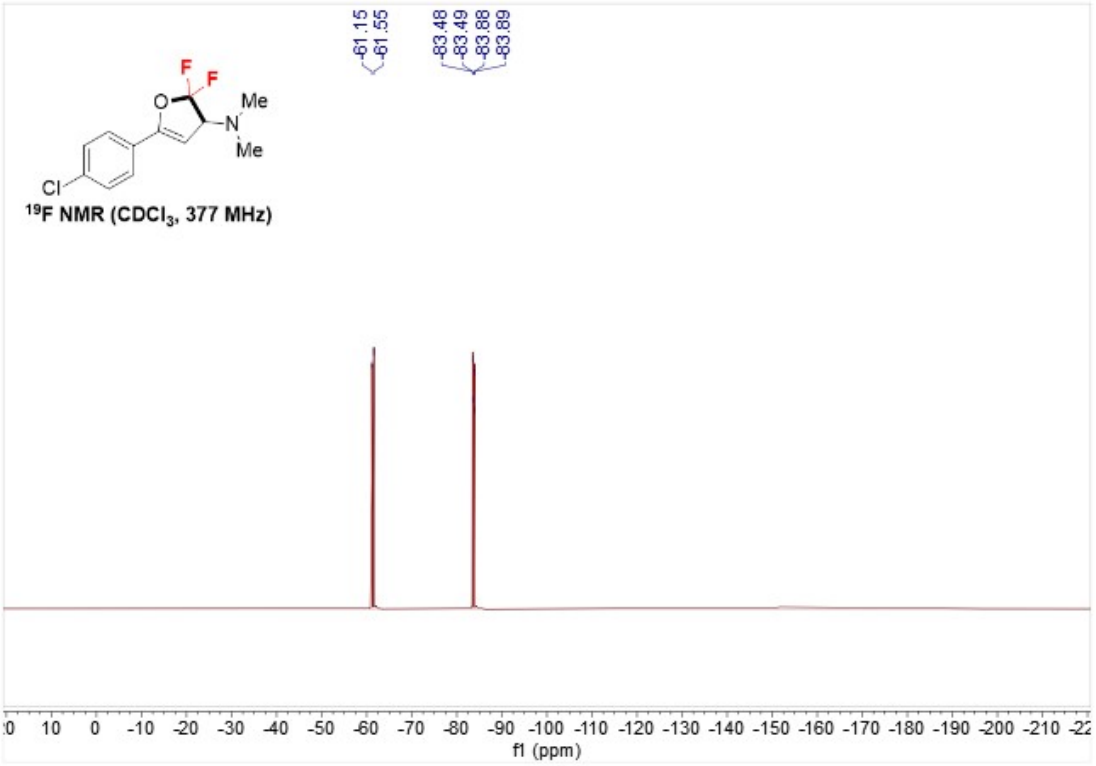
^{1}H NMR of compound 2f



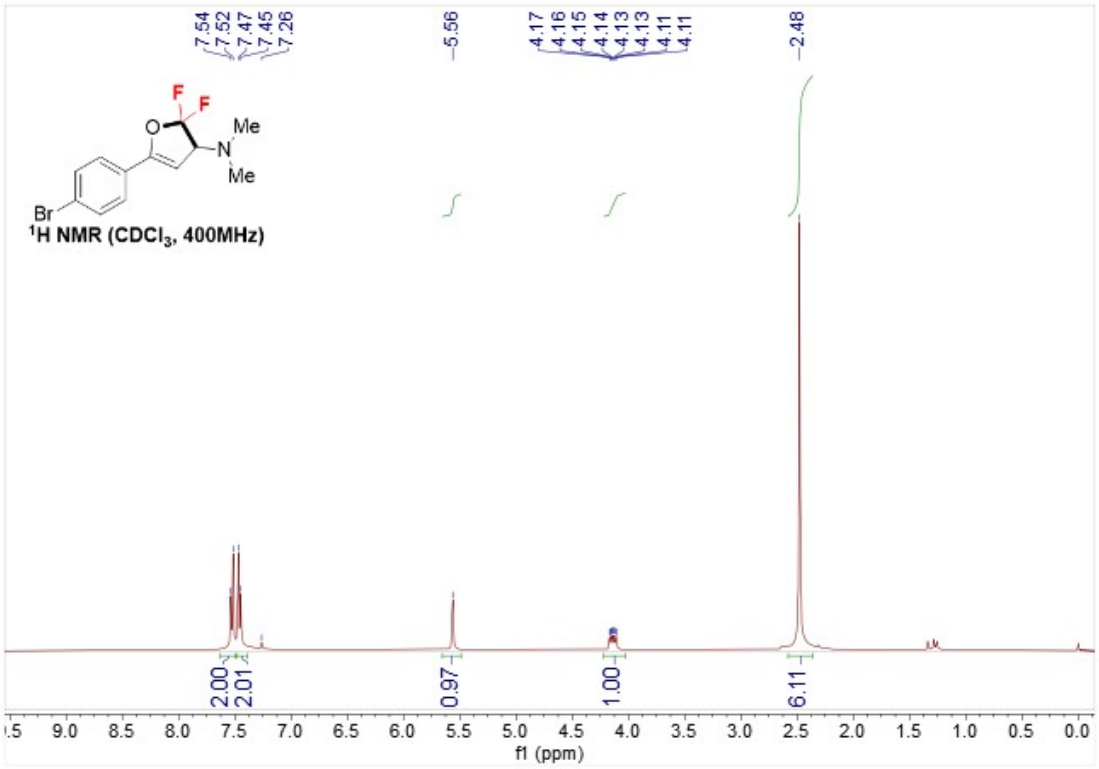
^{13}C NMR of compound 2f



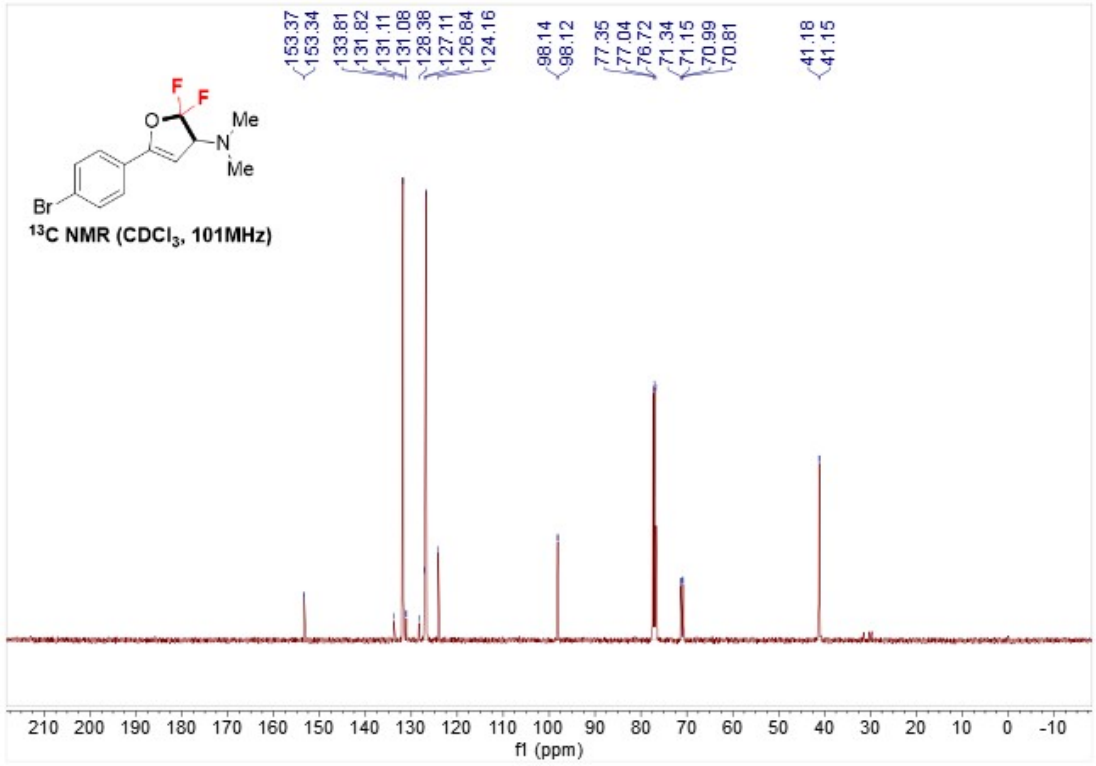
^{19}F NMR of compound 2f



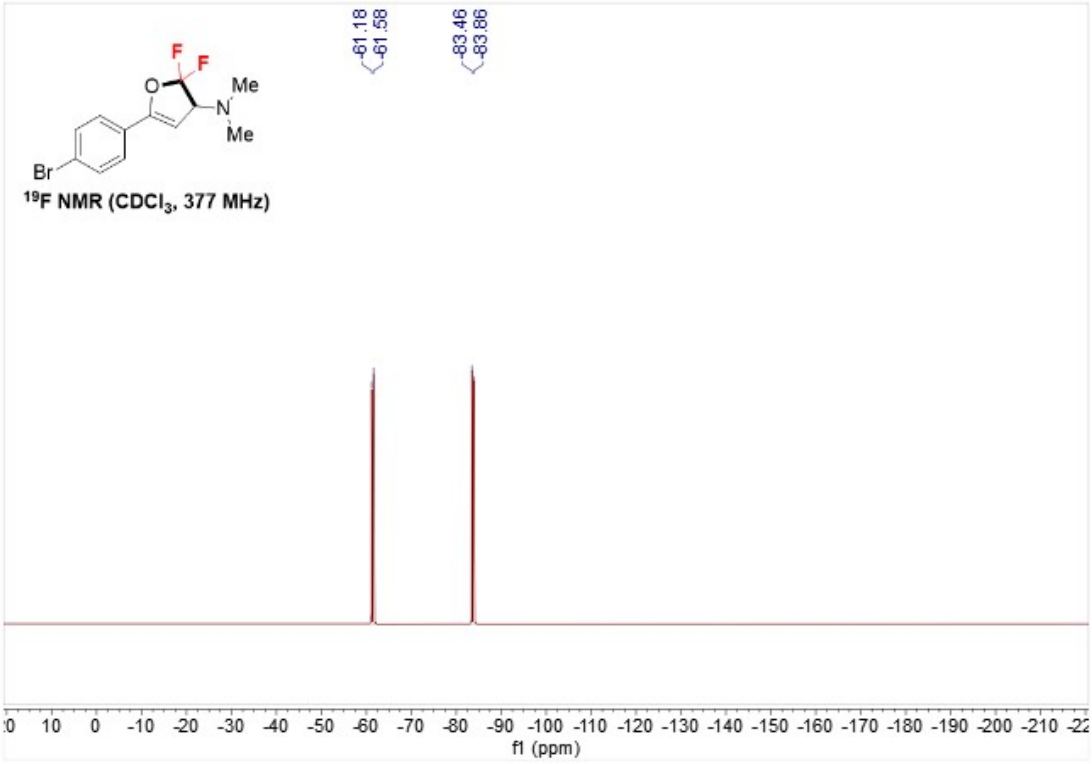
^{1}H NMR of compound 2g



^{13}C NMR of compound 2g



^{19}F NMR of compound 2g



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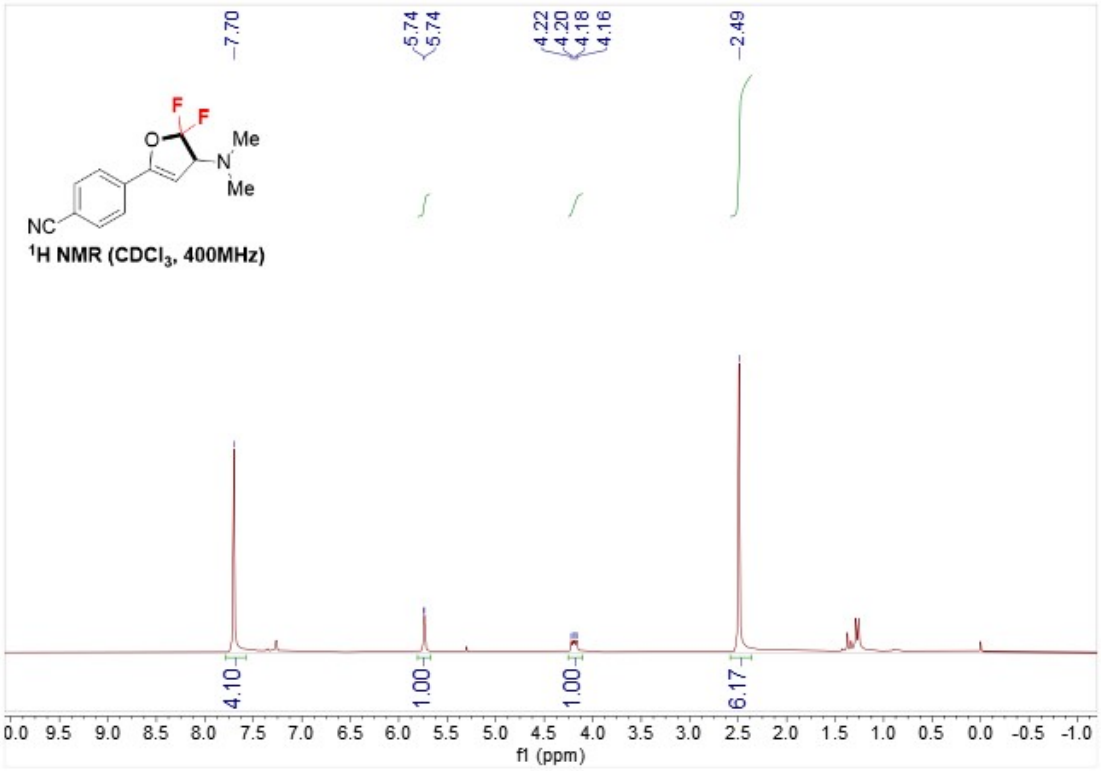

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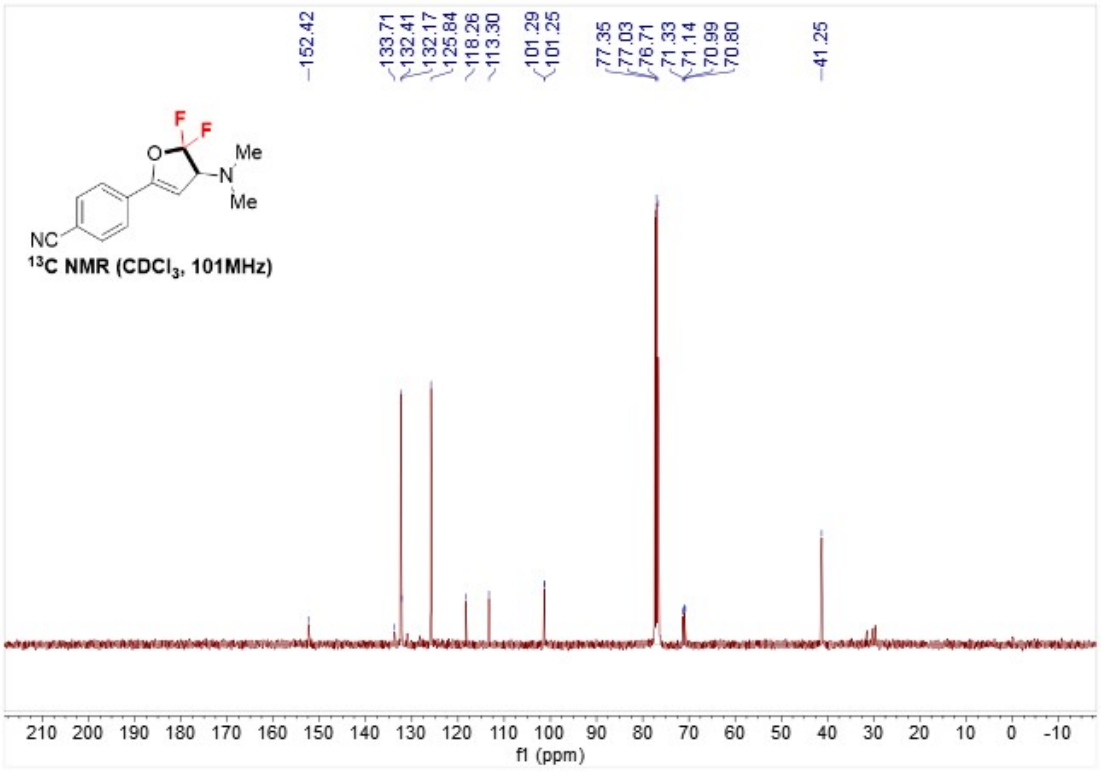

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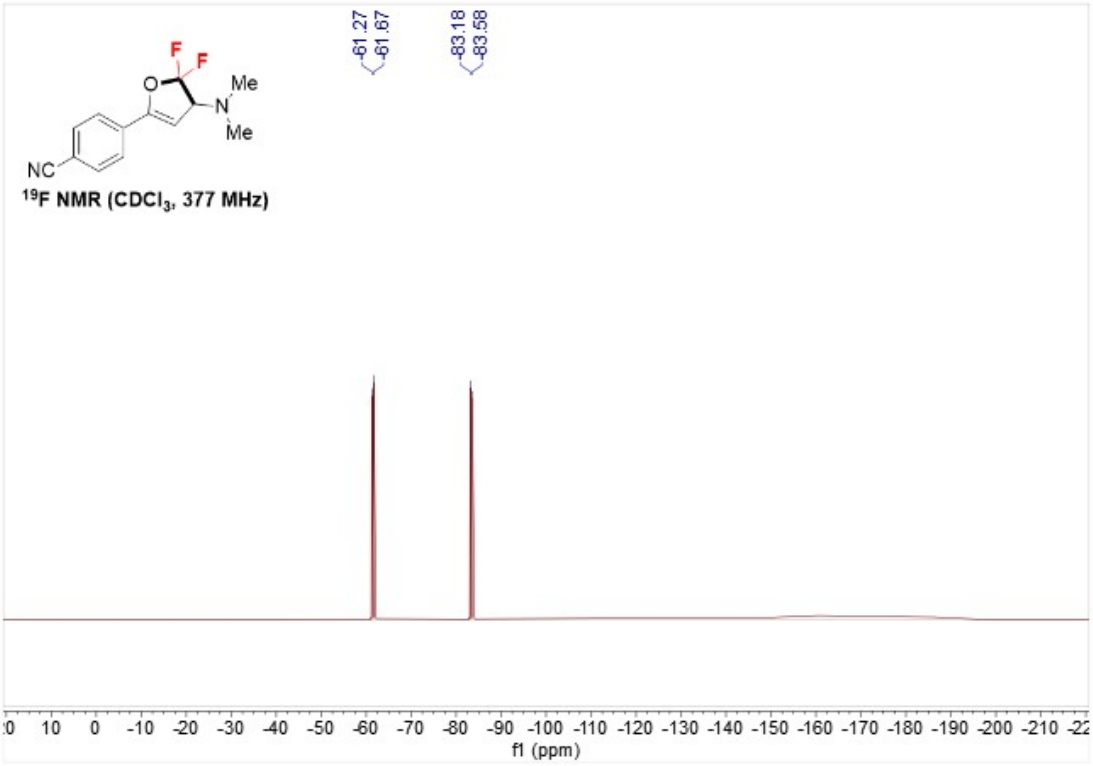

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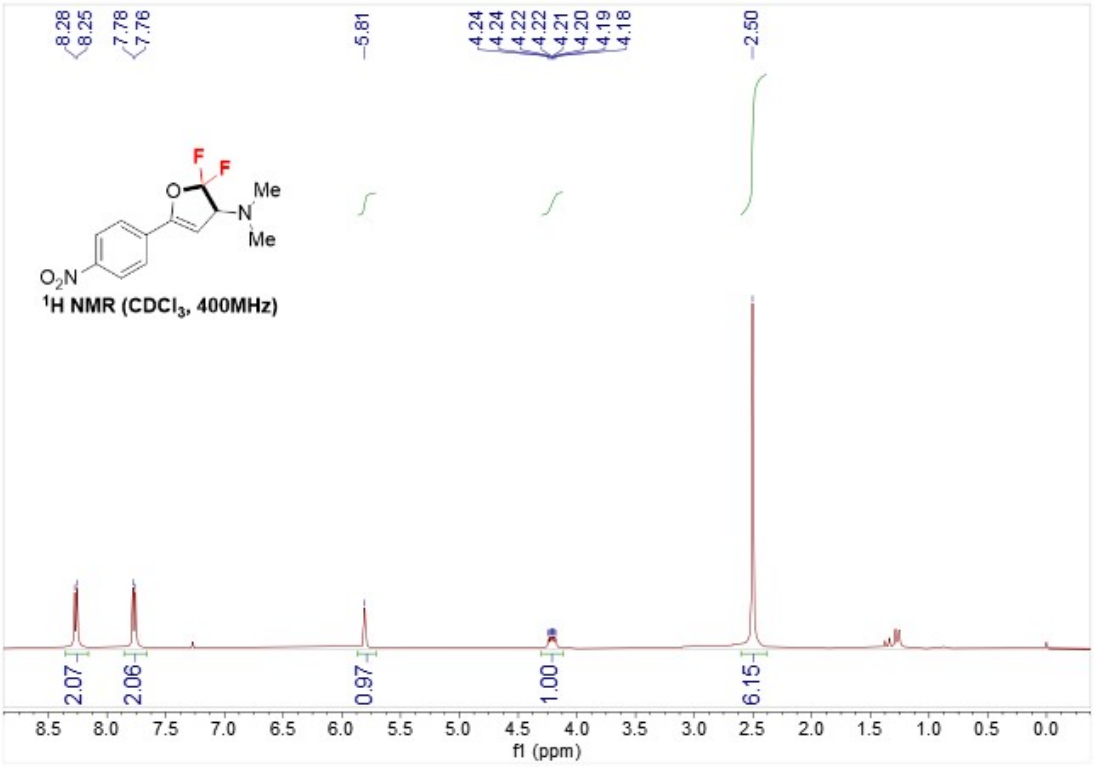

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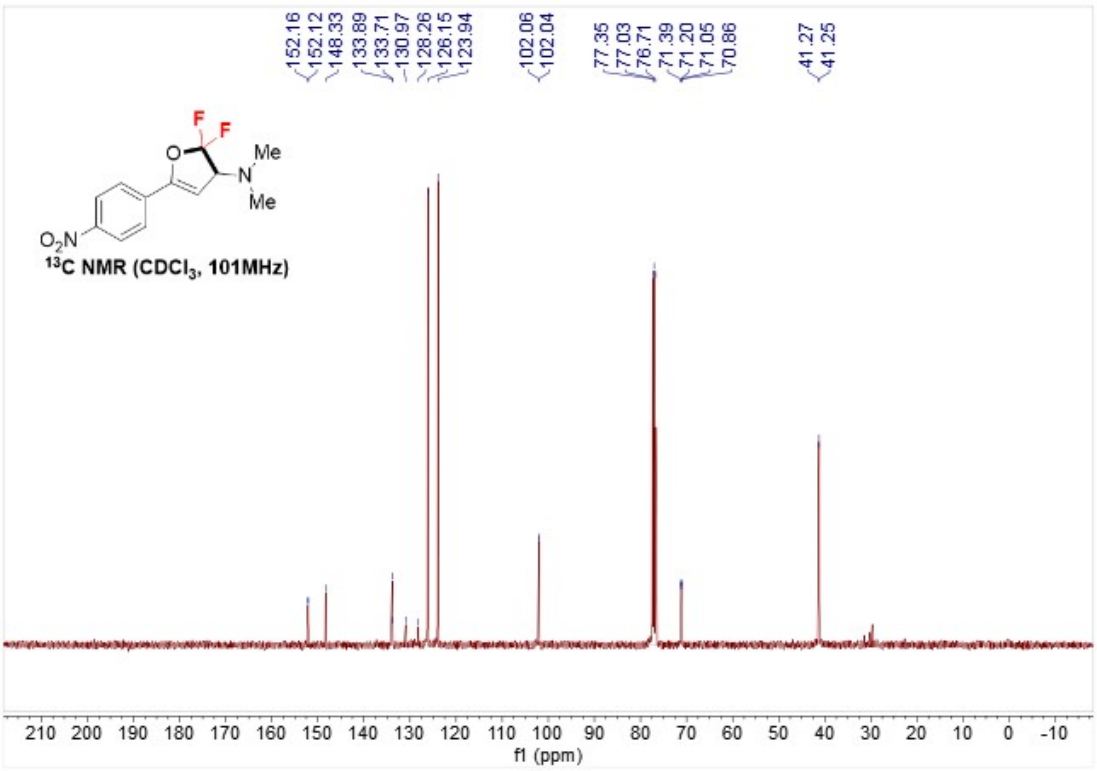

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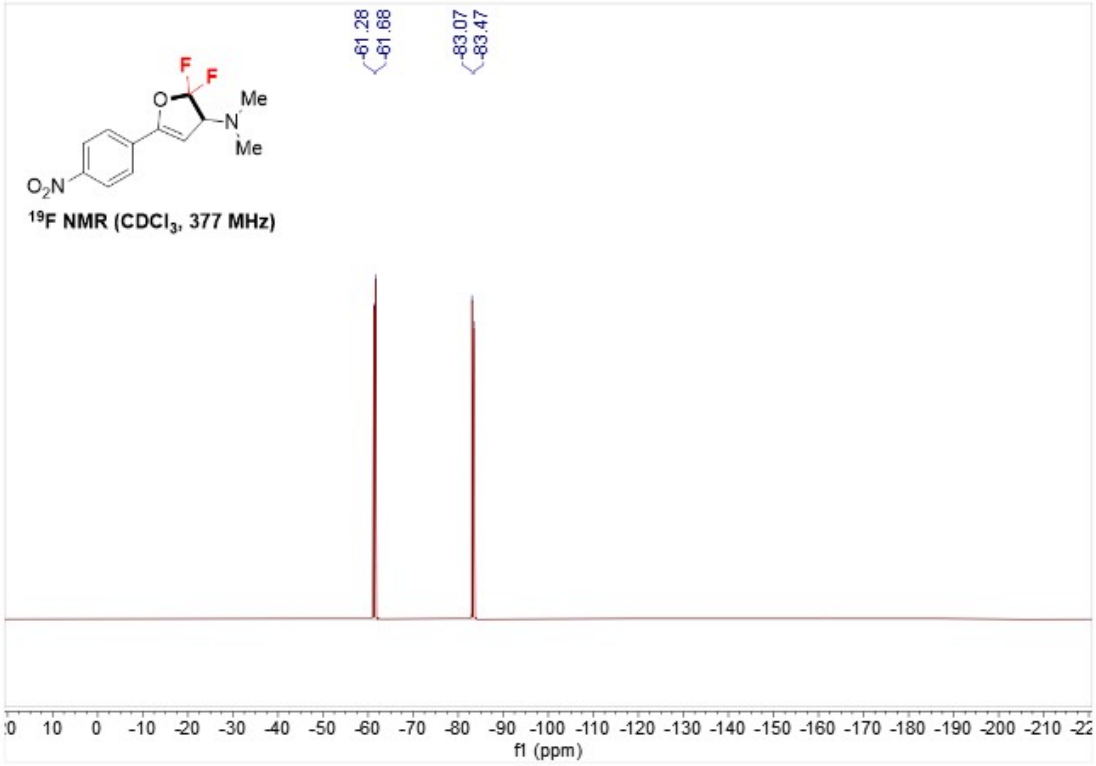

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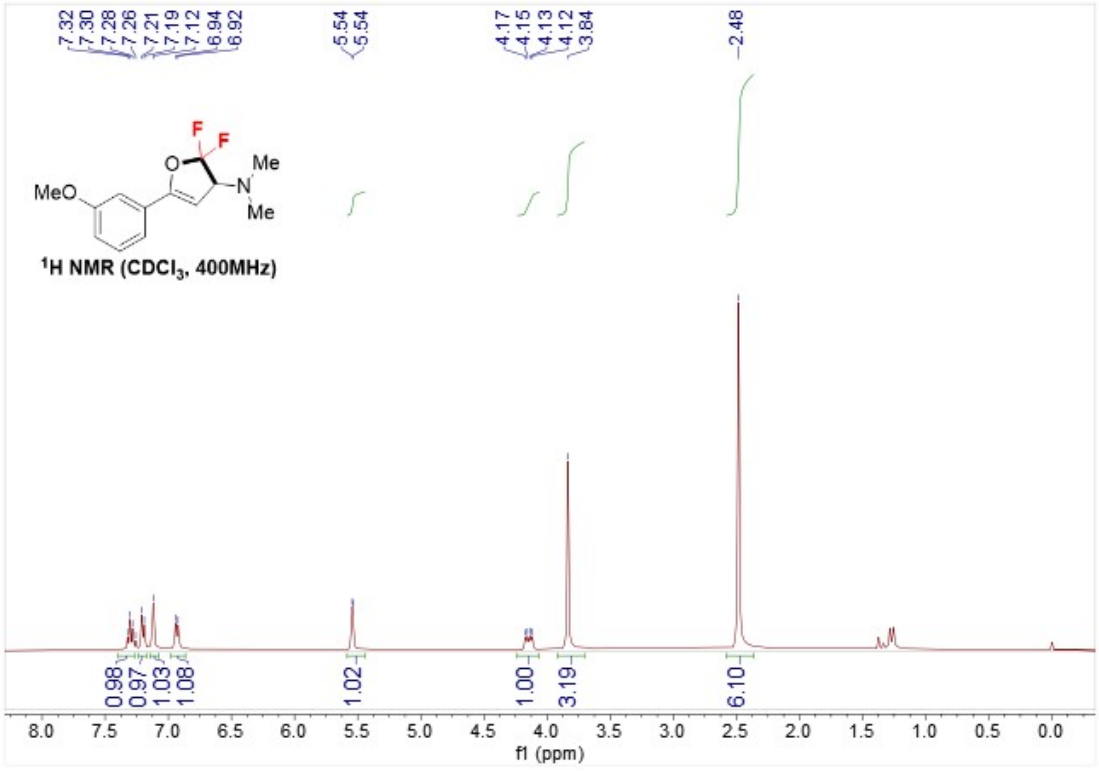

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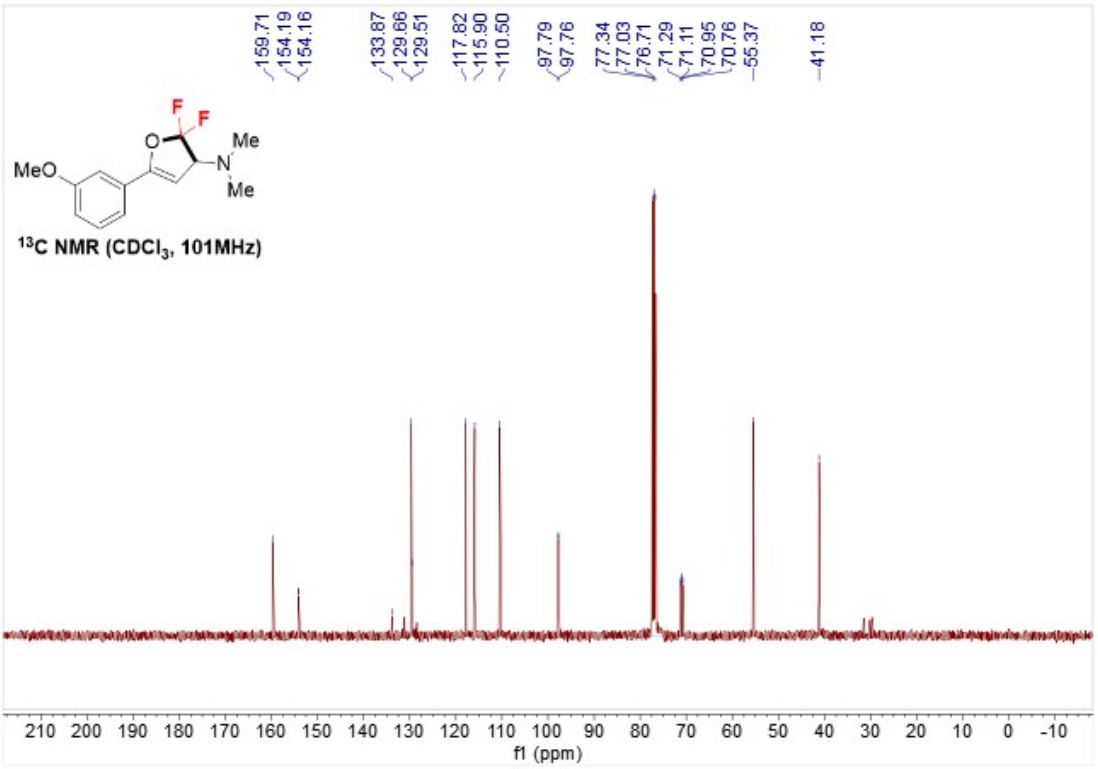

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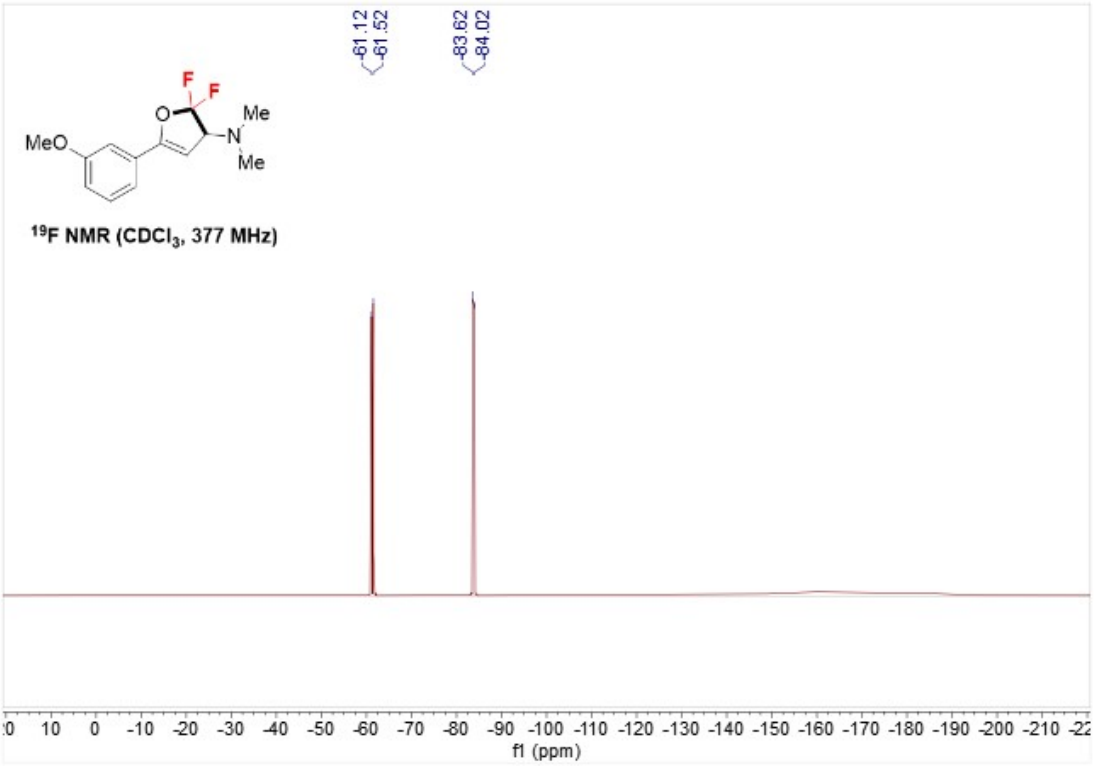

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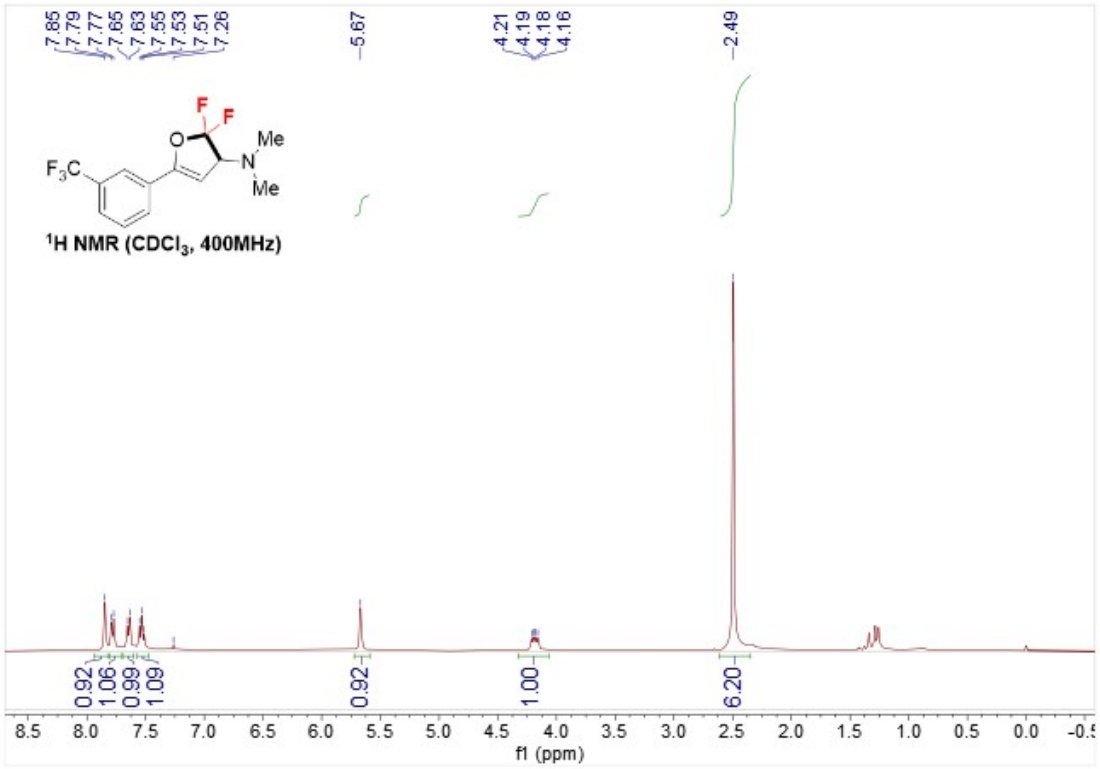

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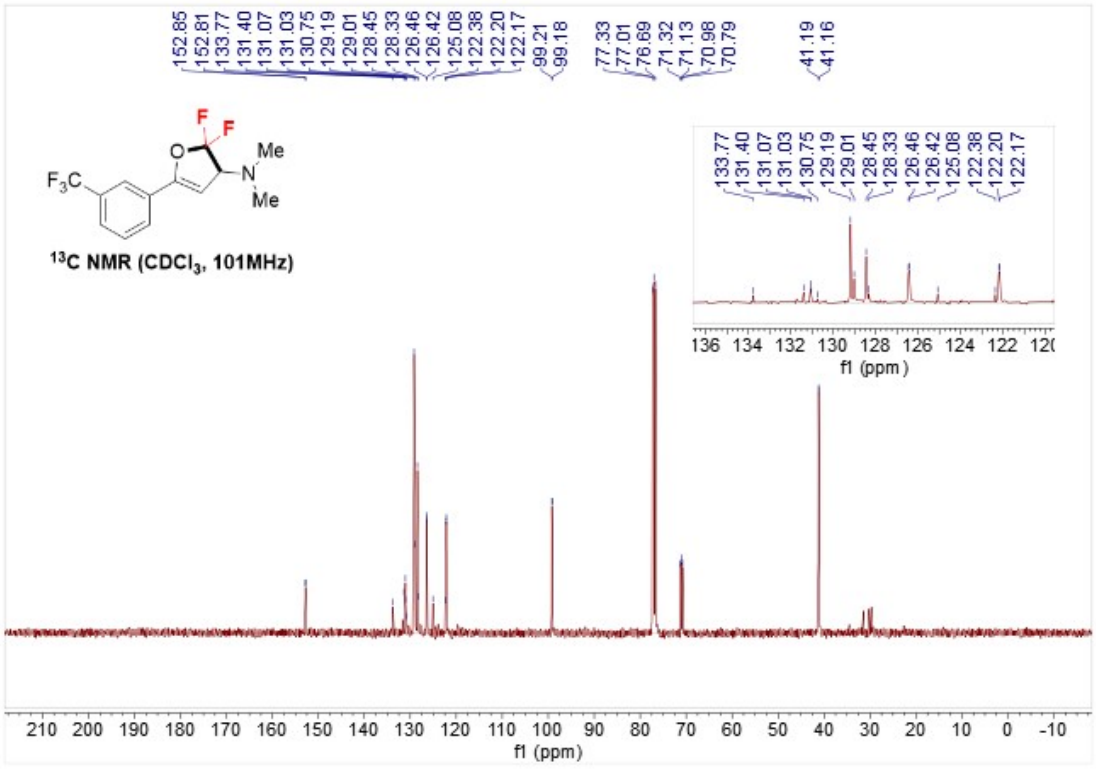

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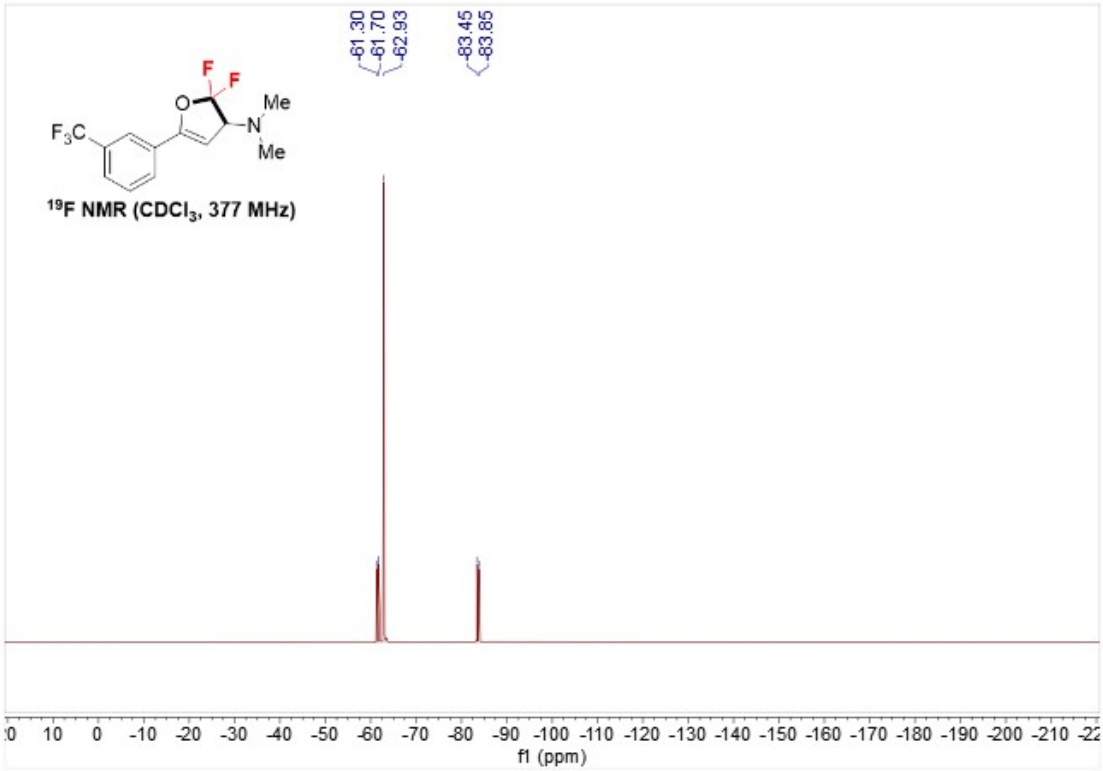

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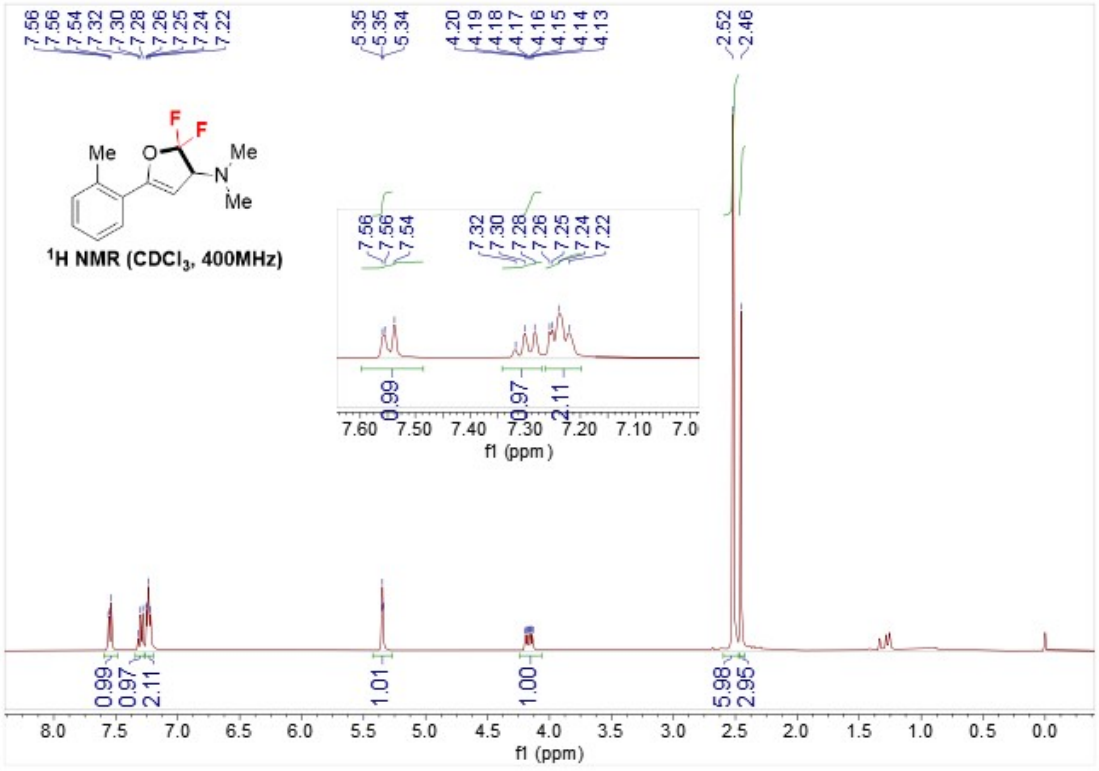

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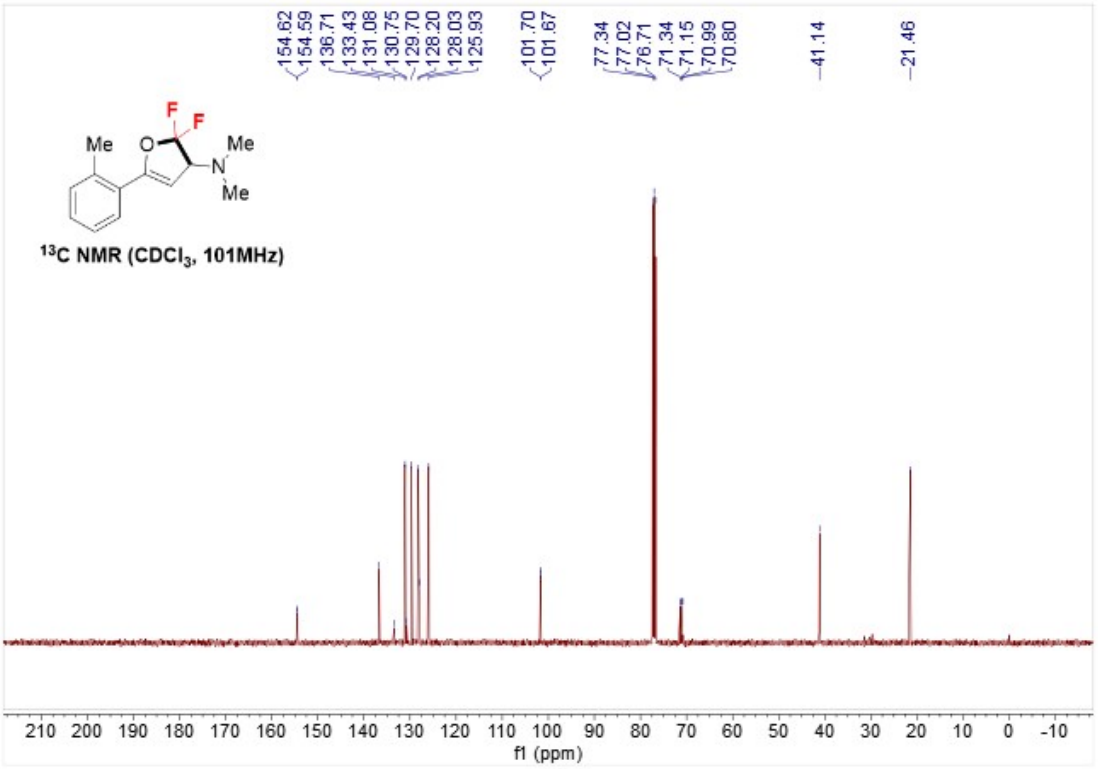

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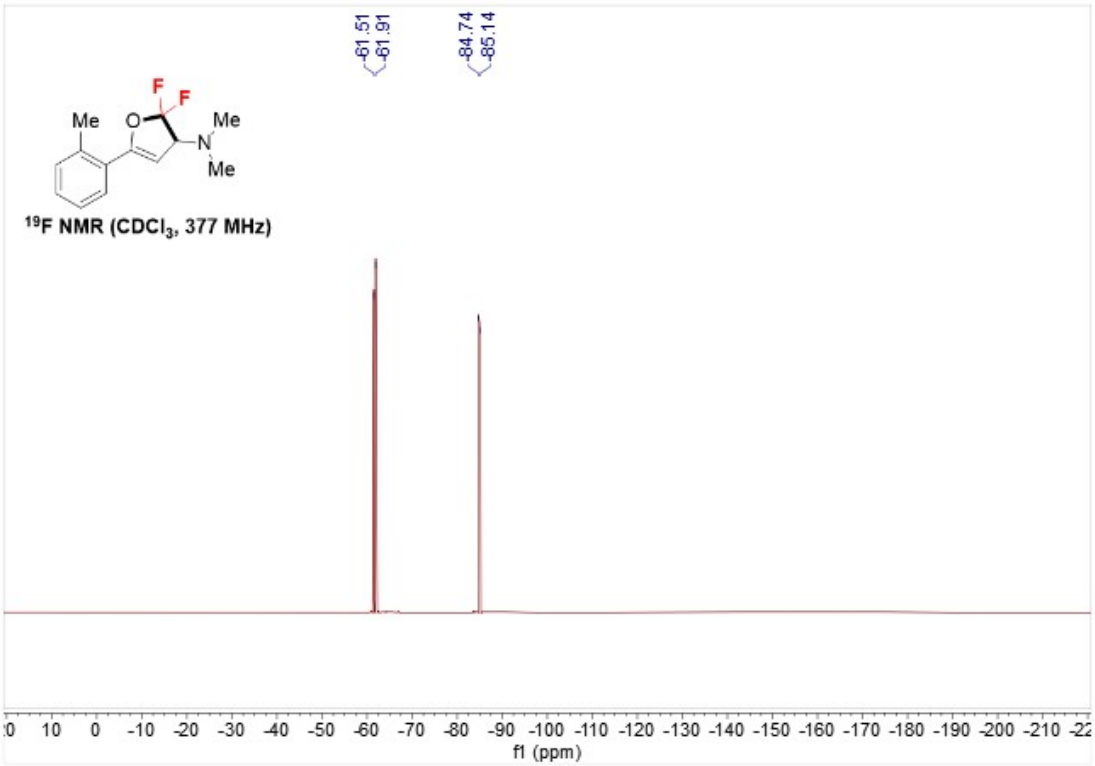

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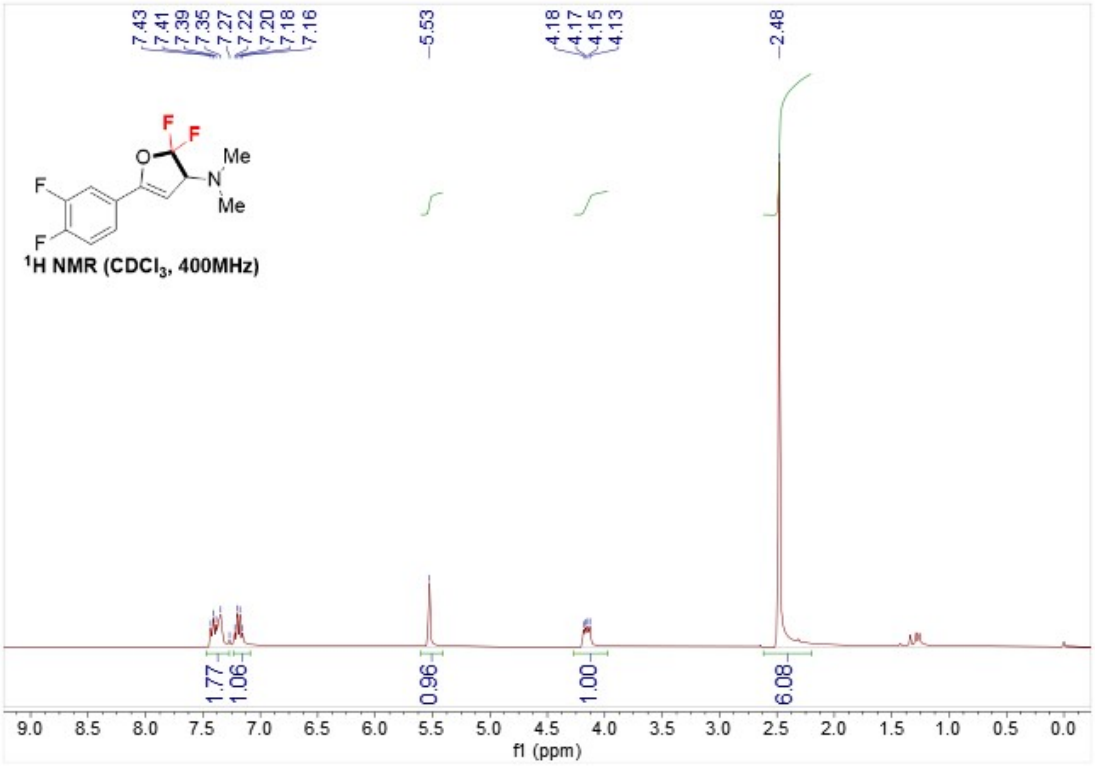

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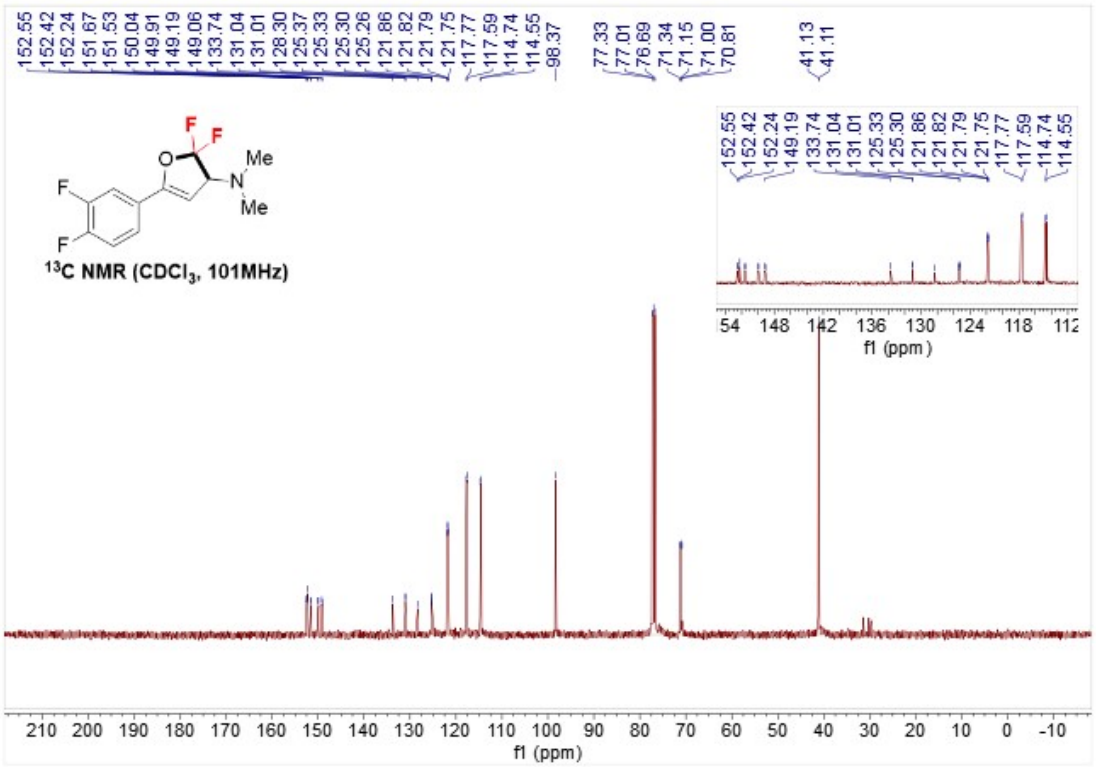

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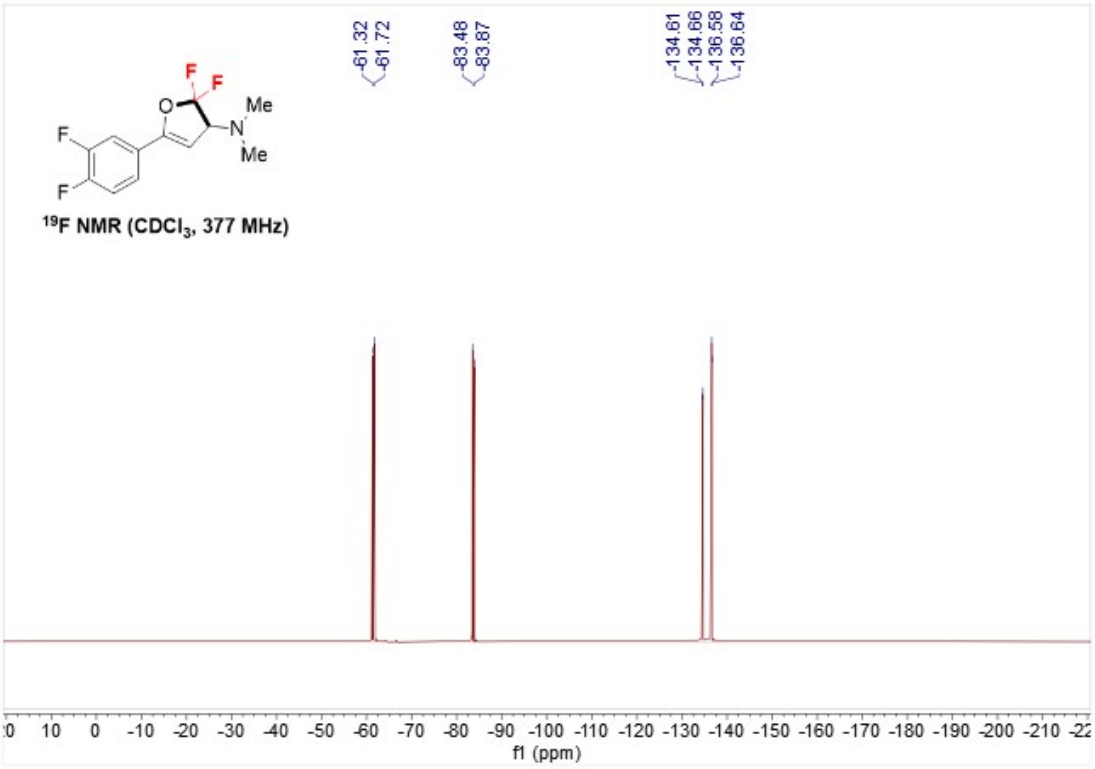

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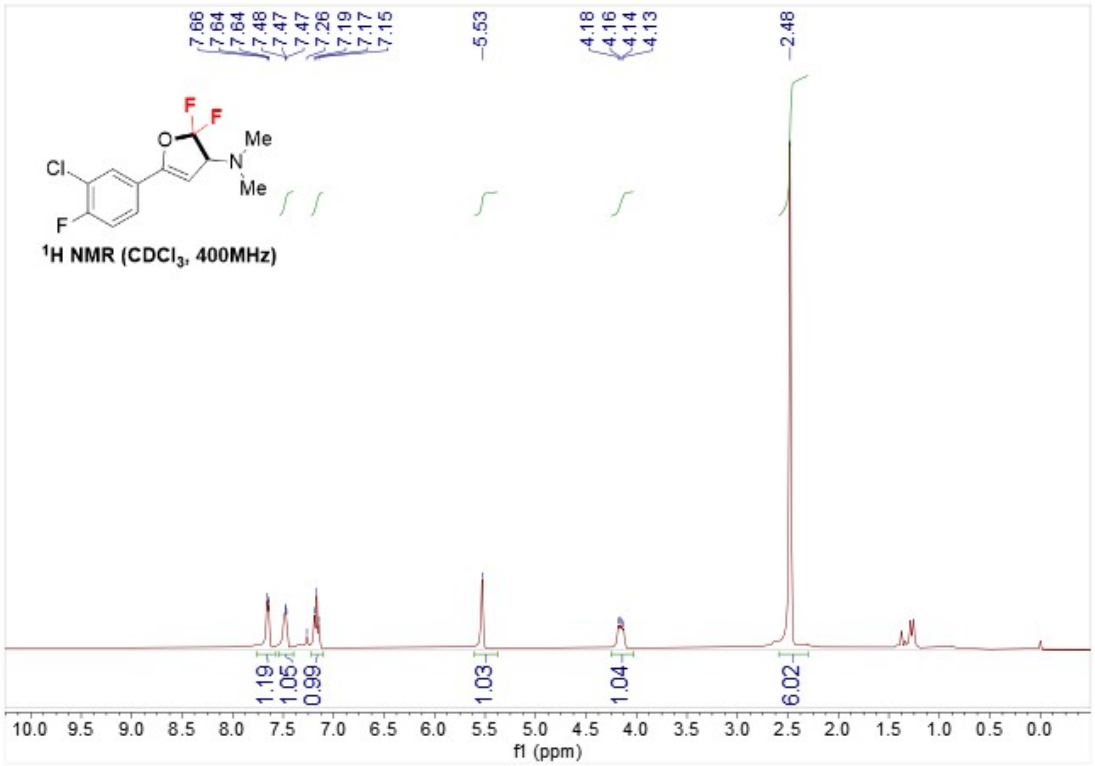

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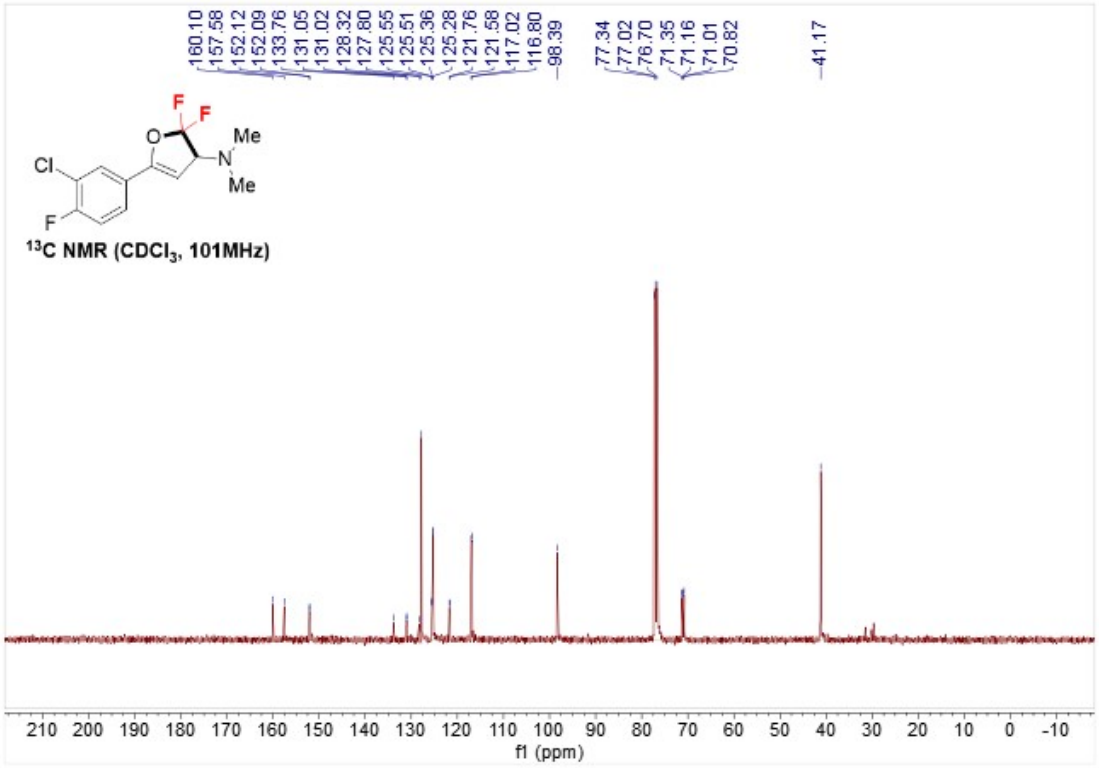

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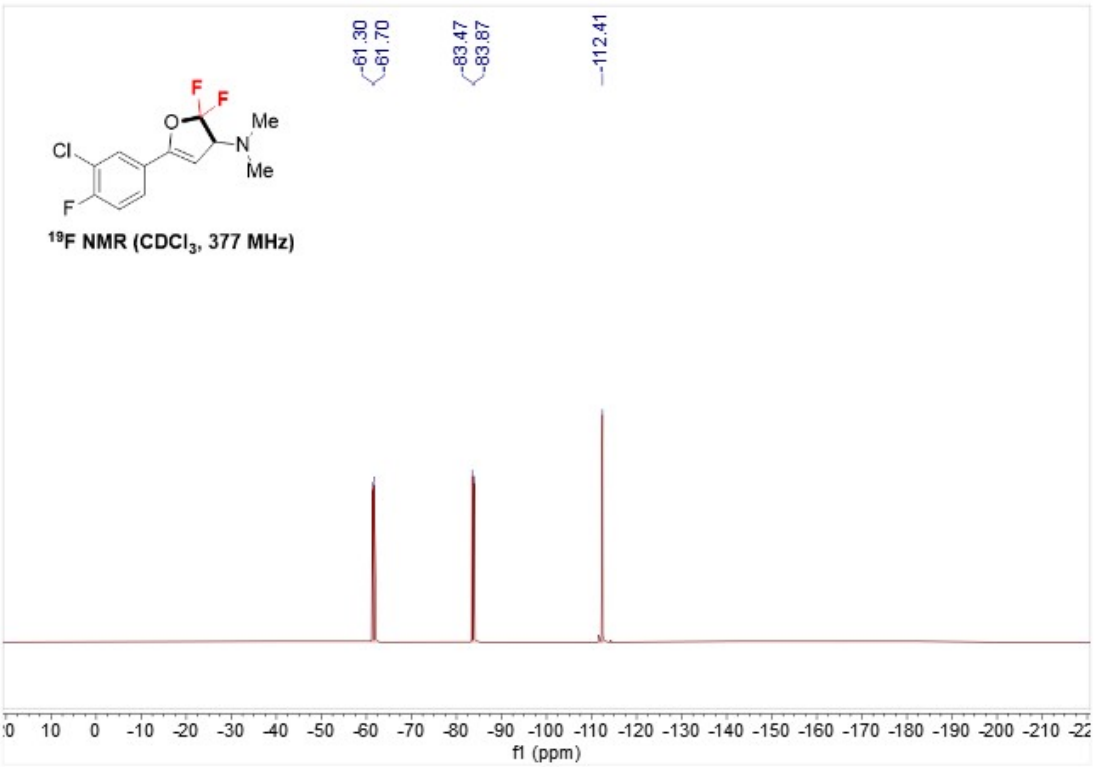

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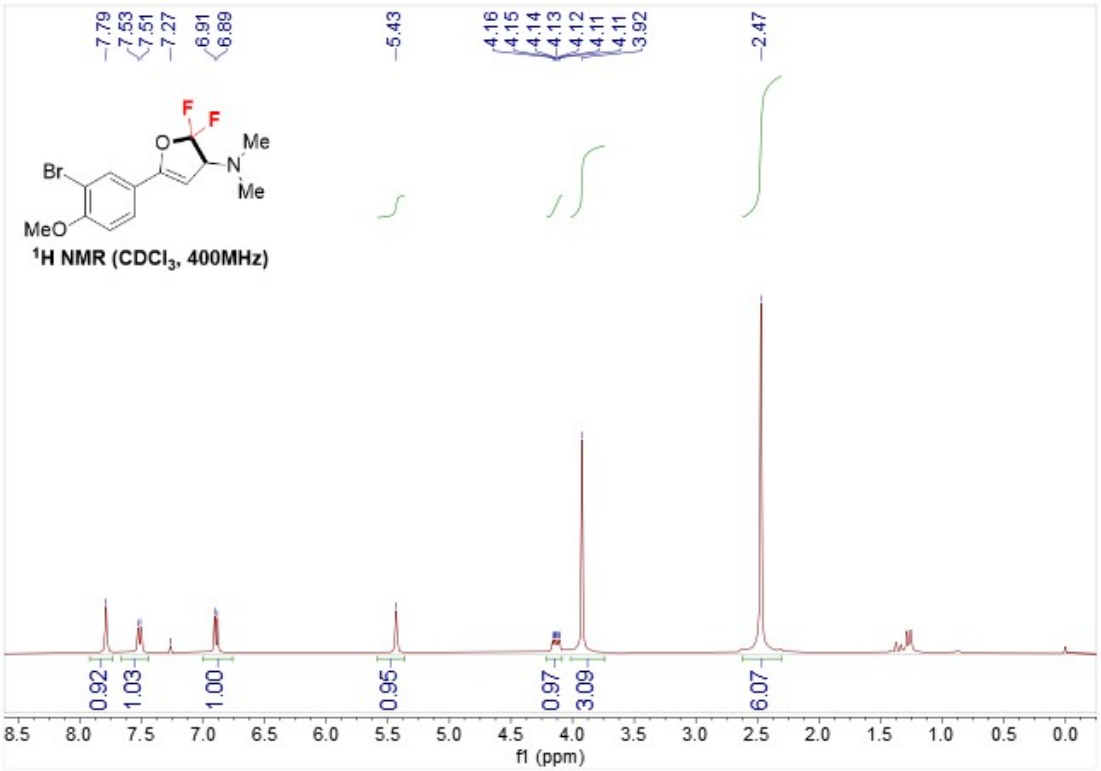

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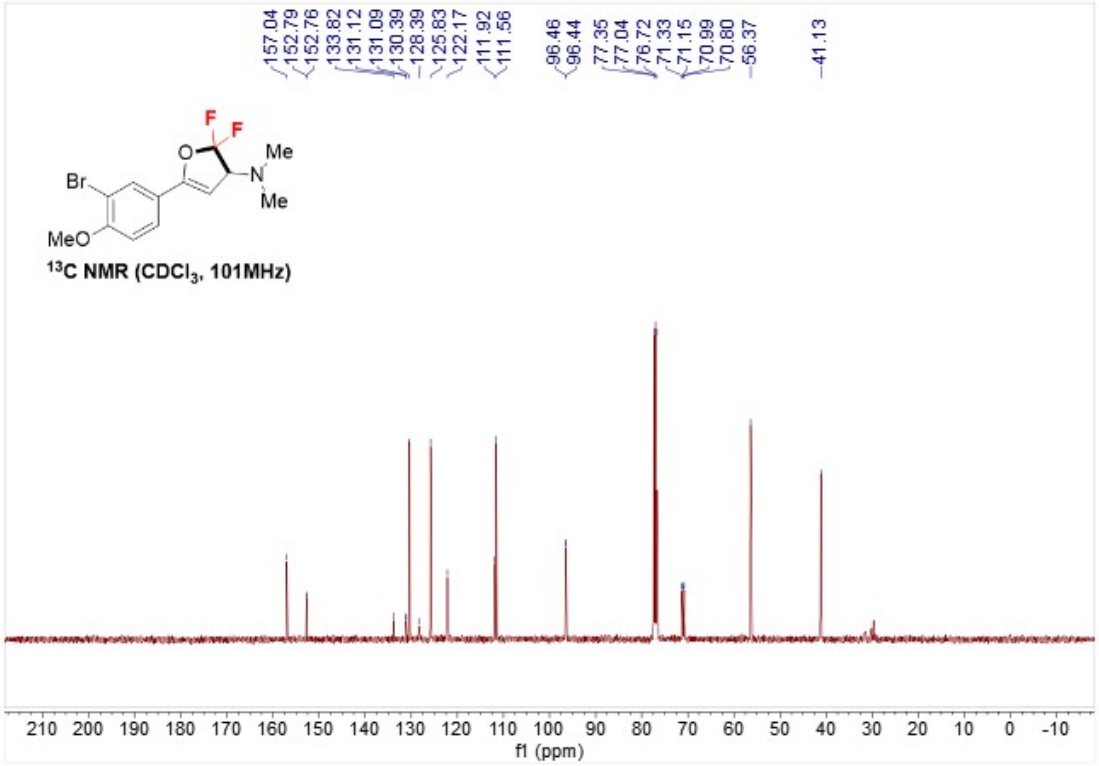

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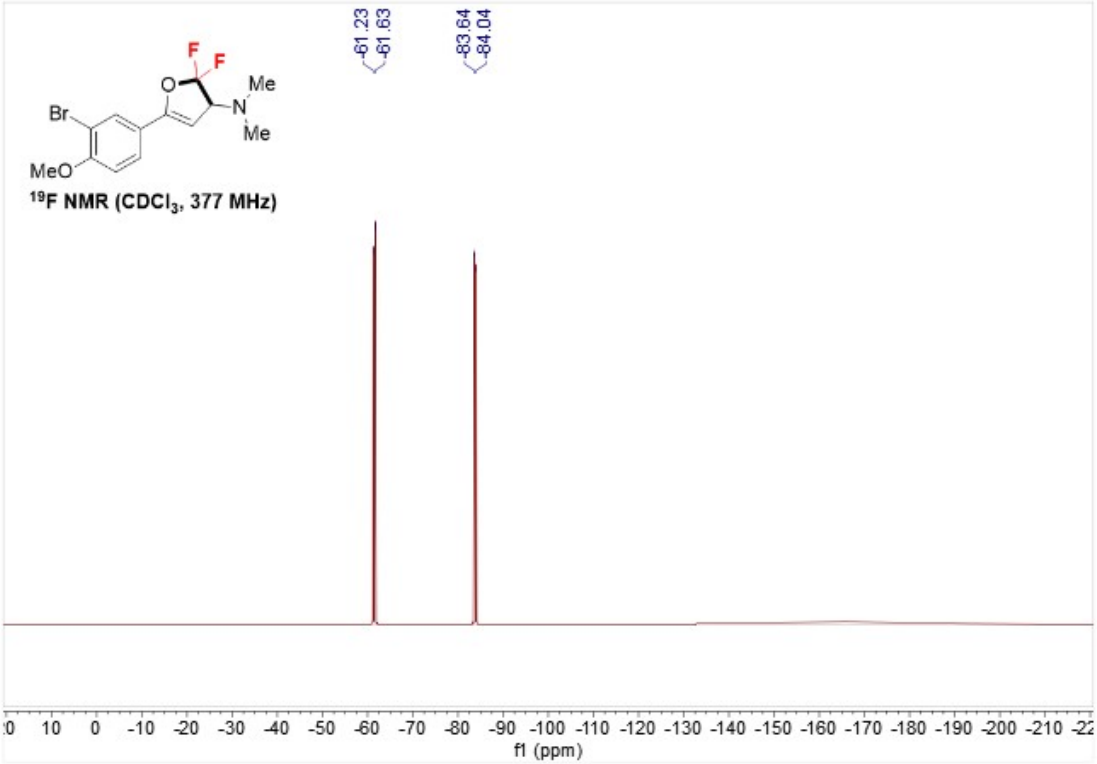

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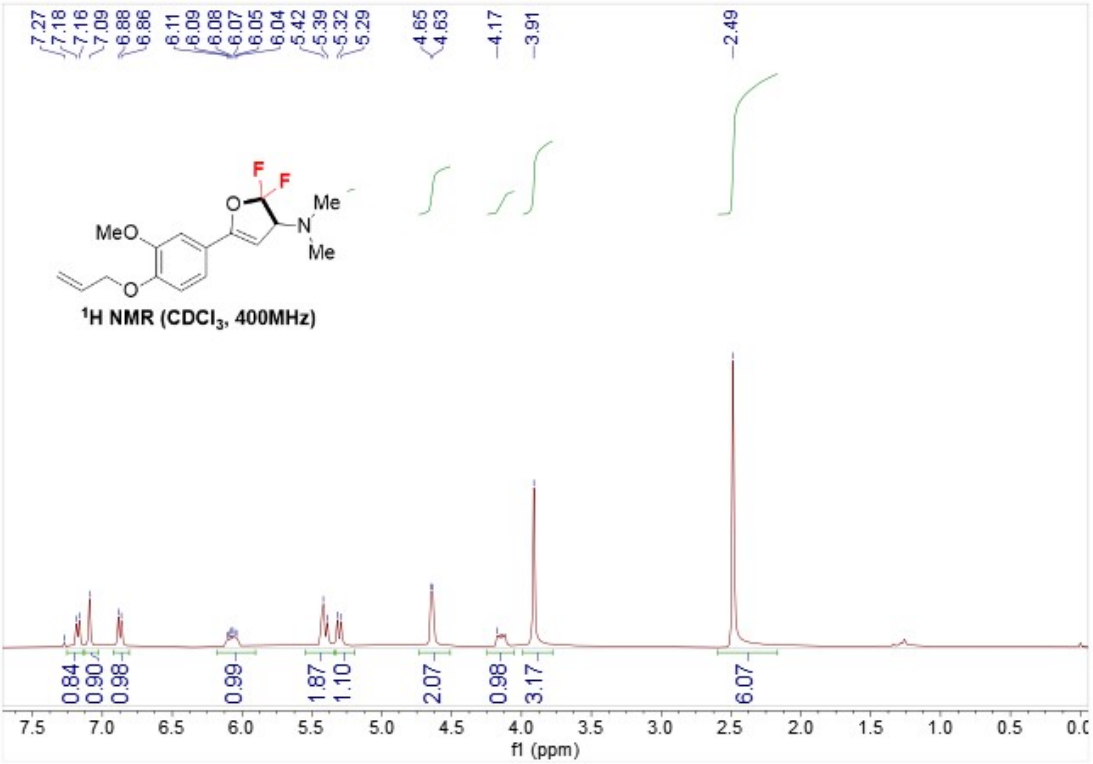

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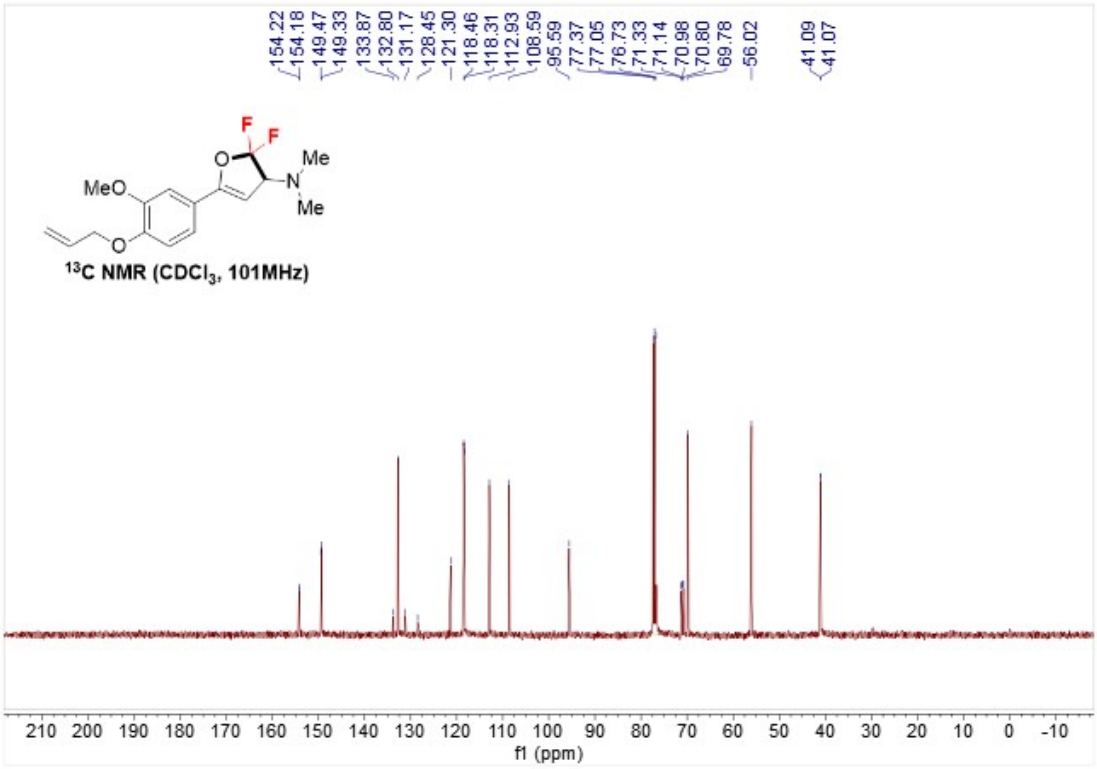

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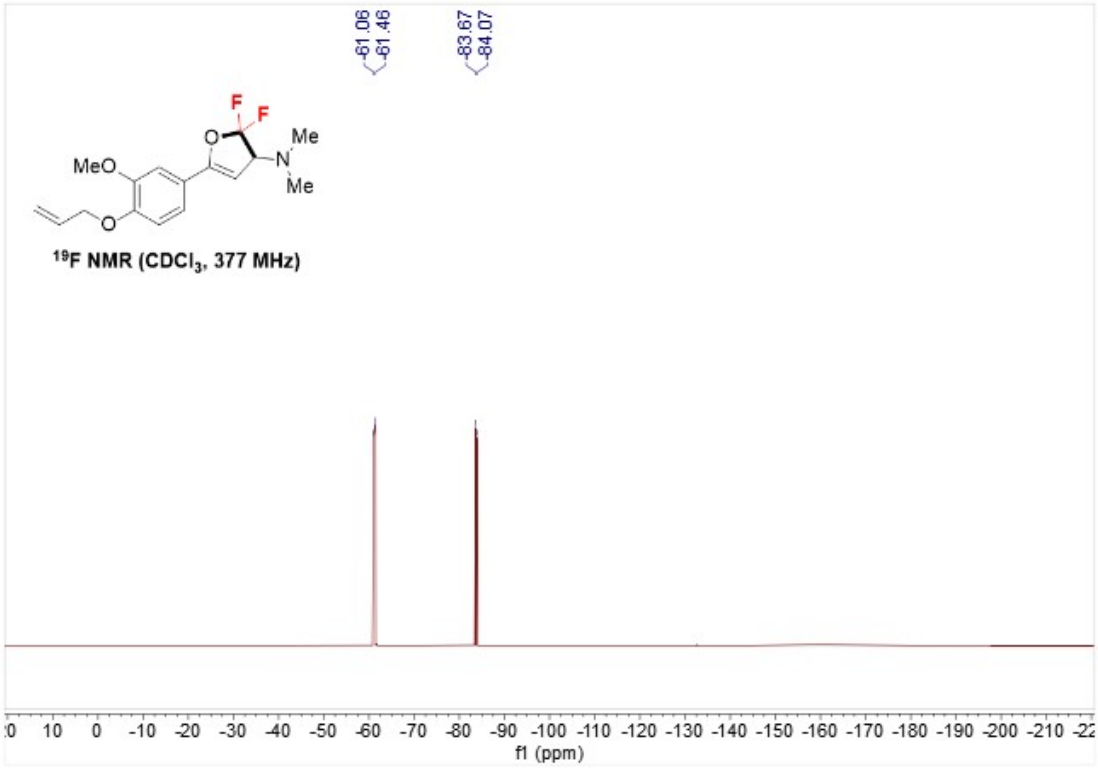

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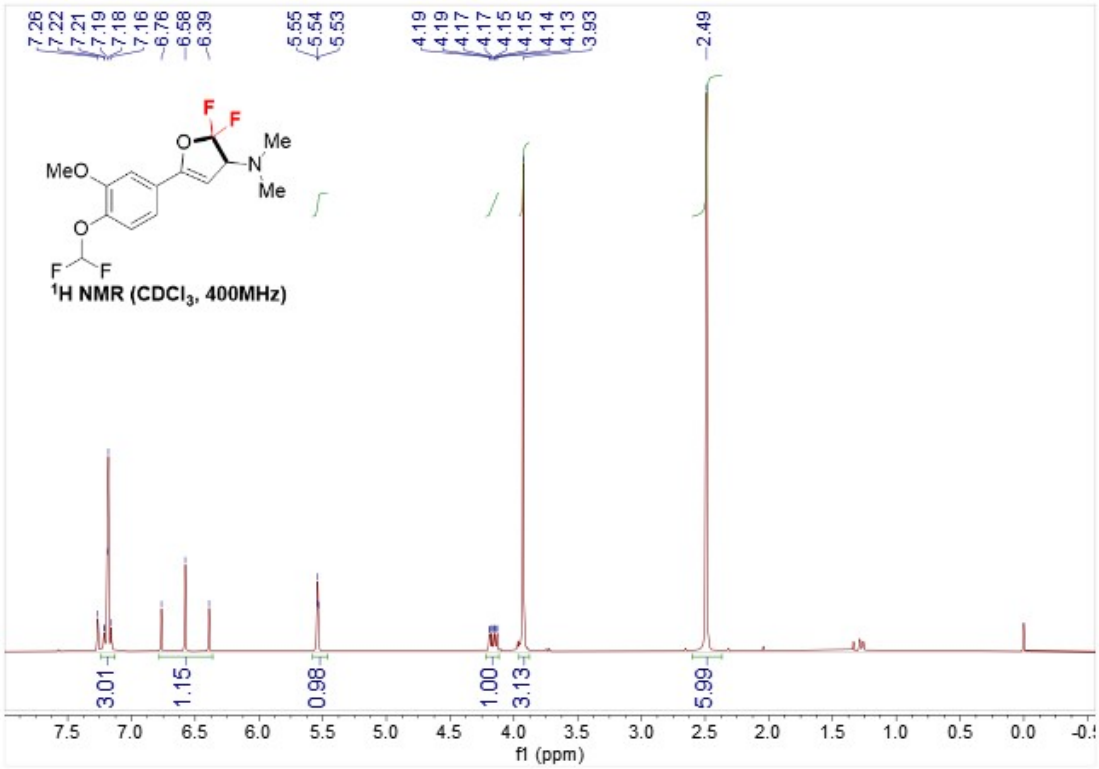

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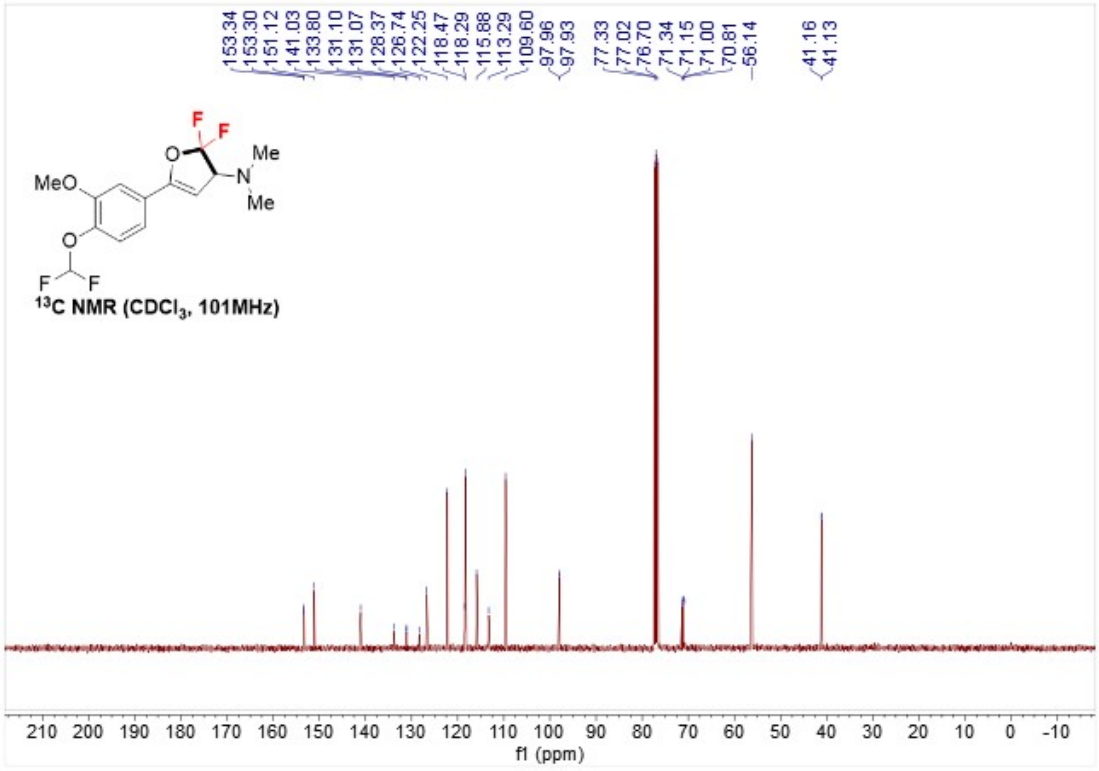

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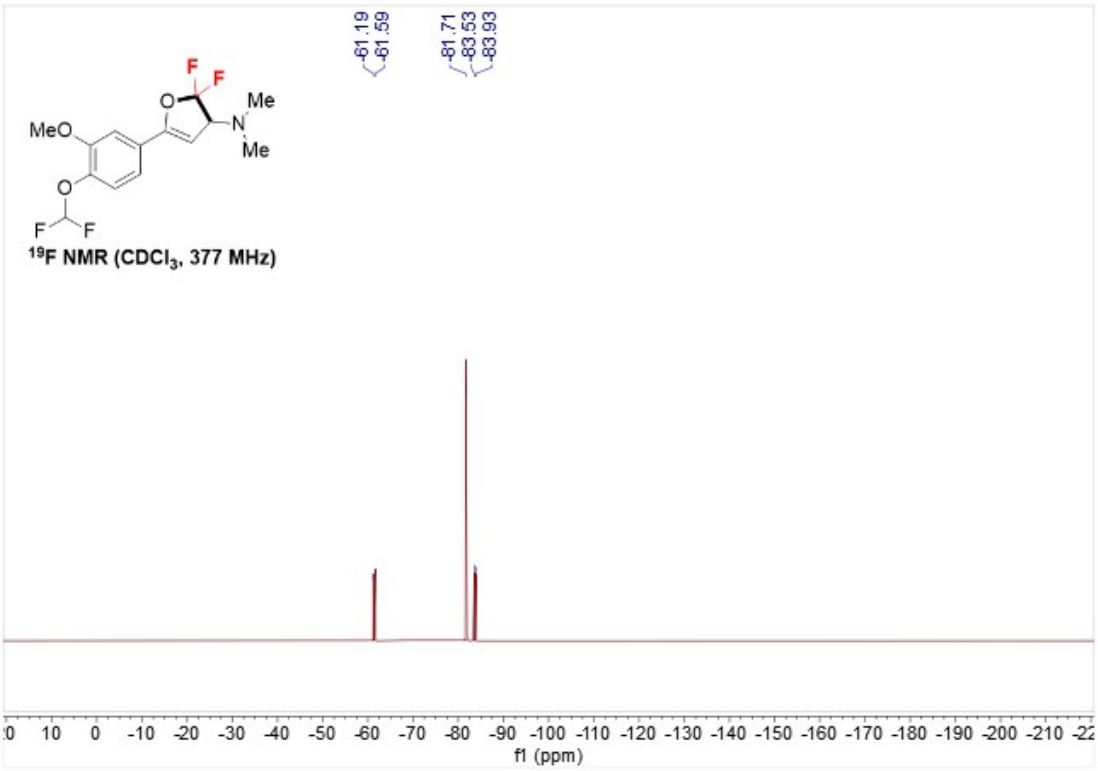

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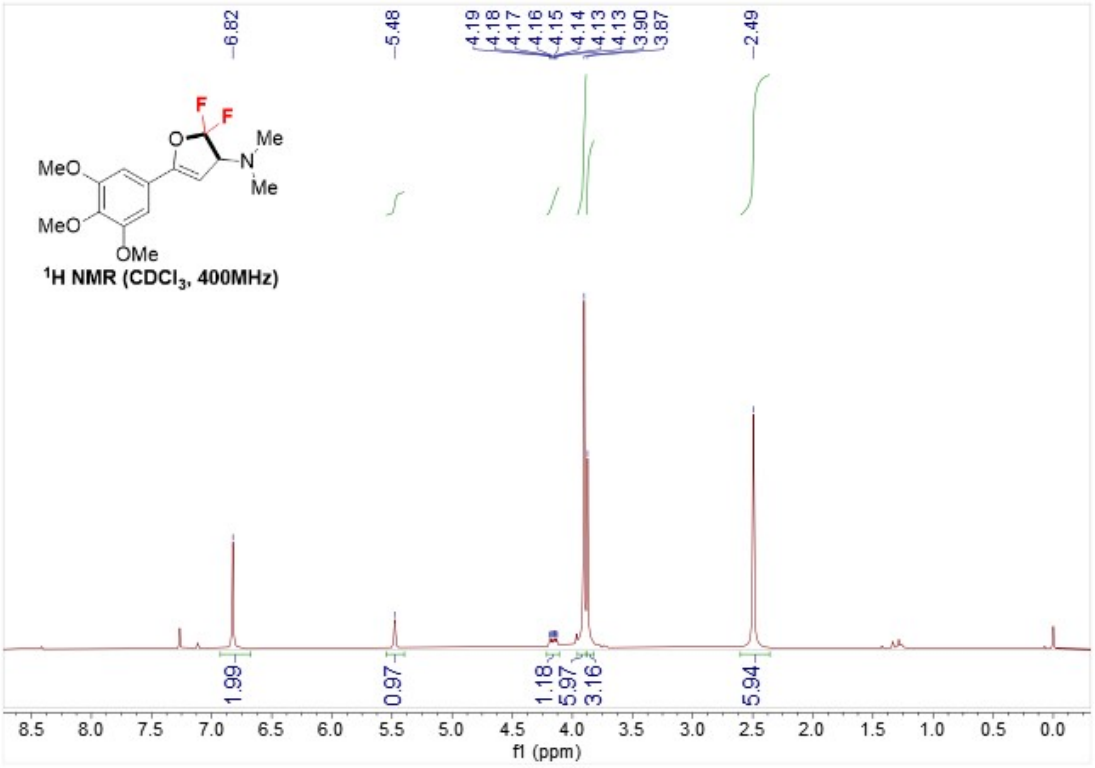

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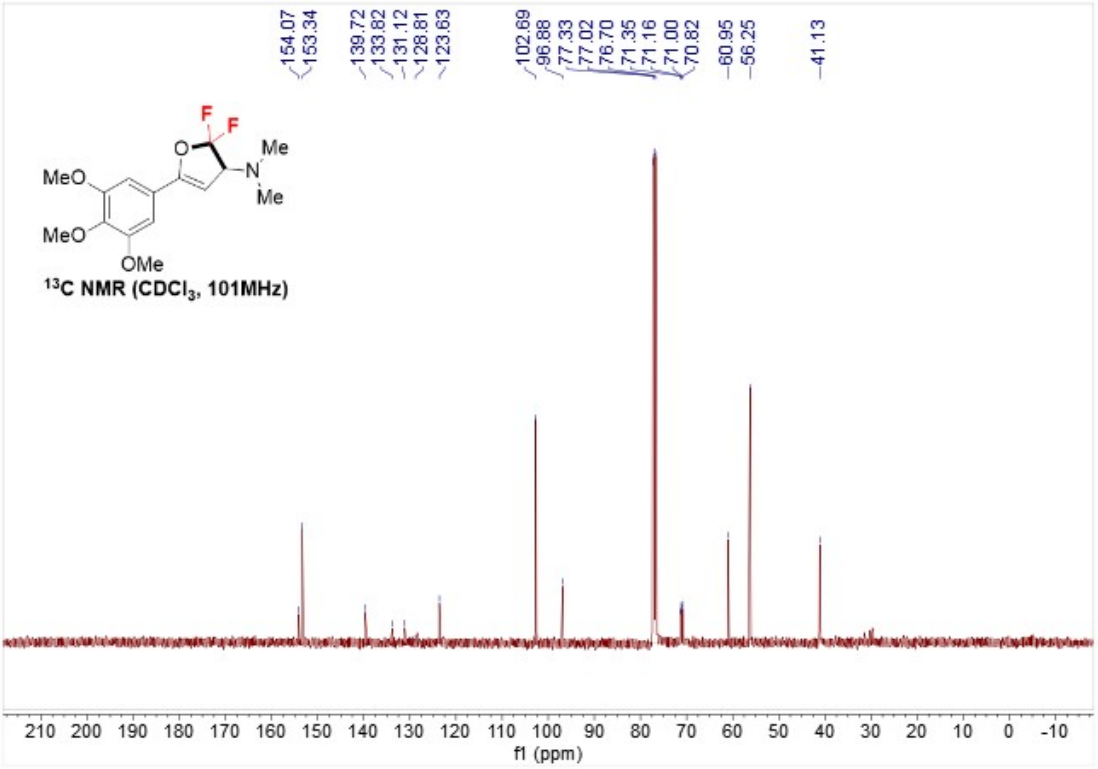

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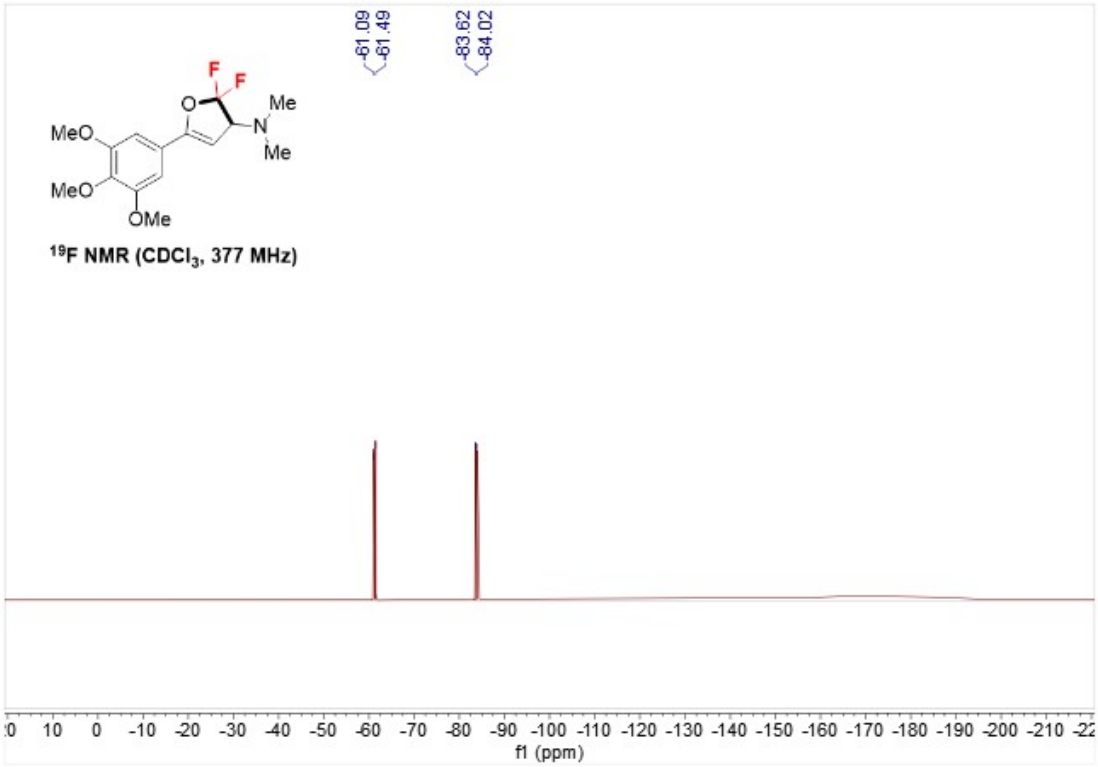

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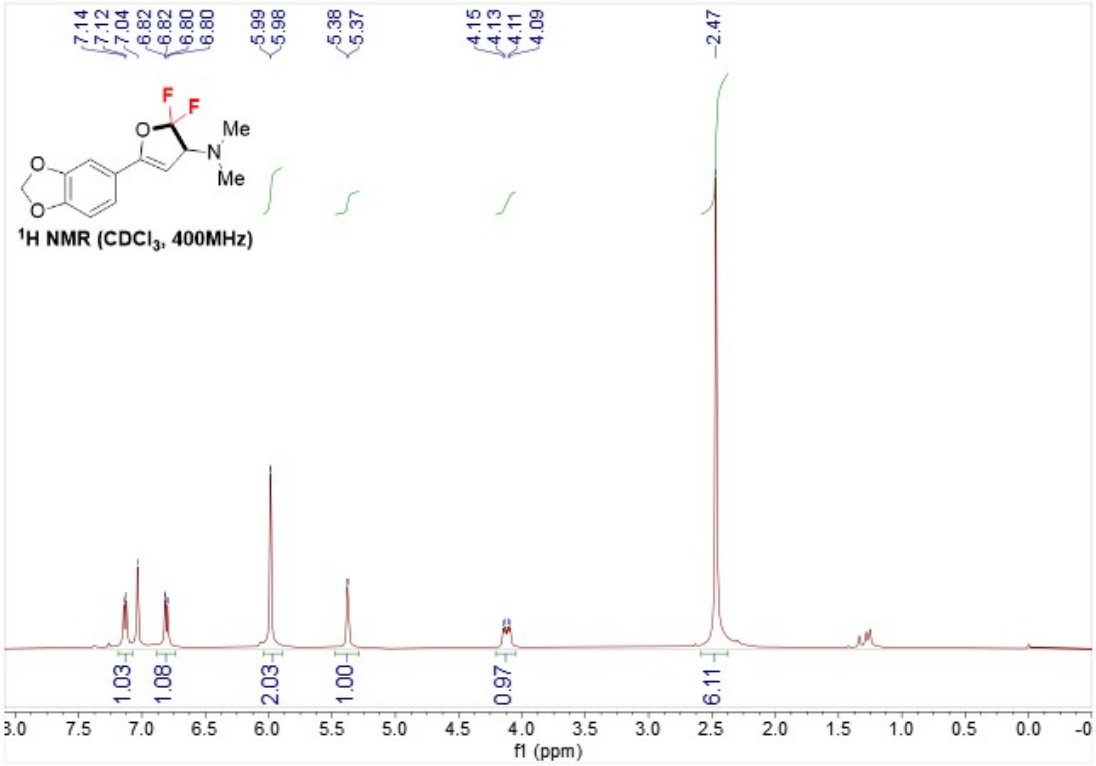

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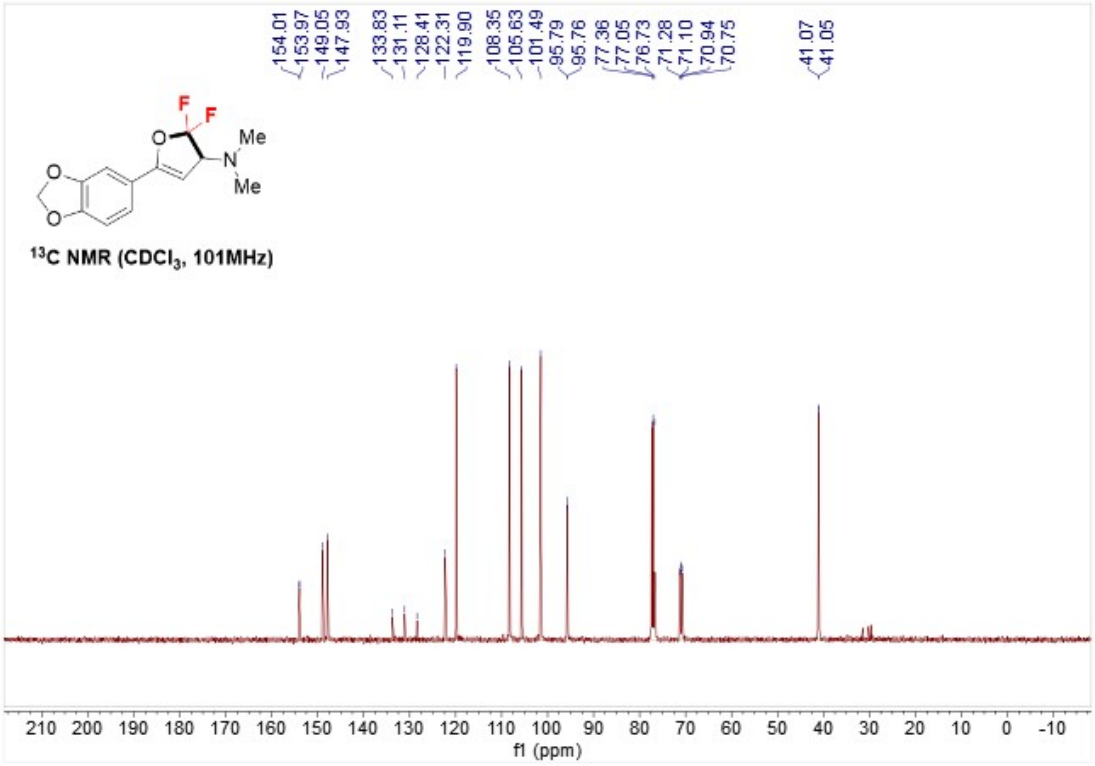

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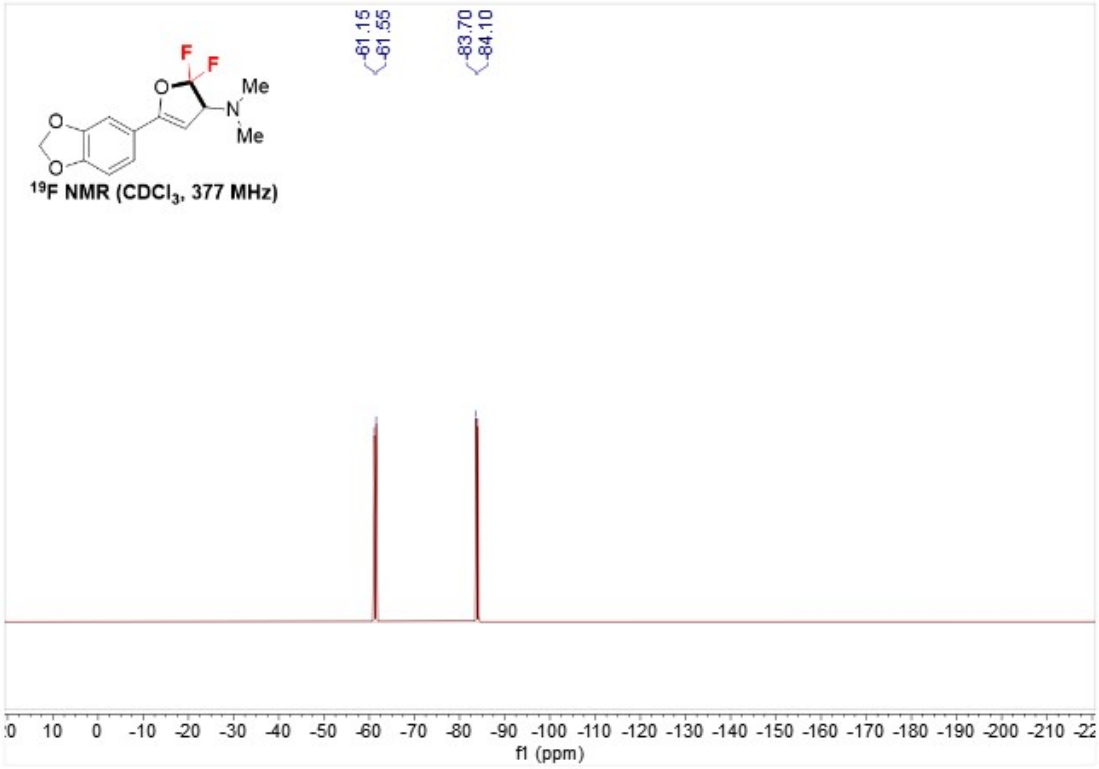

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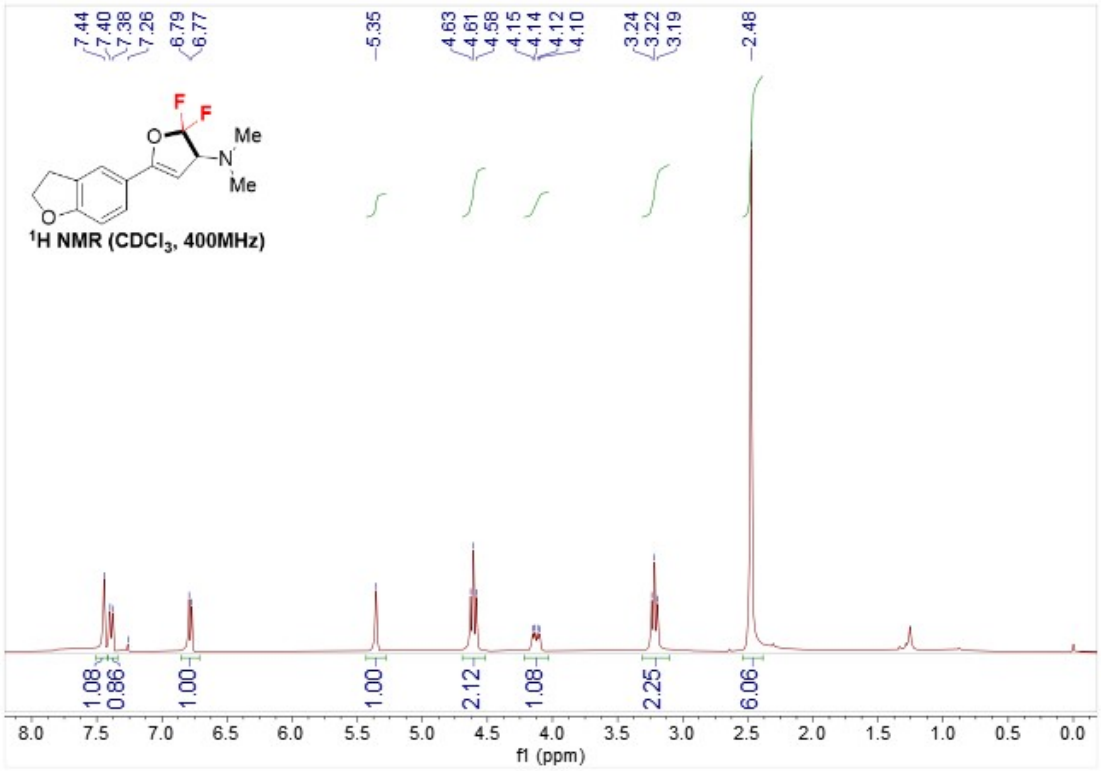

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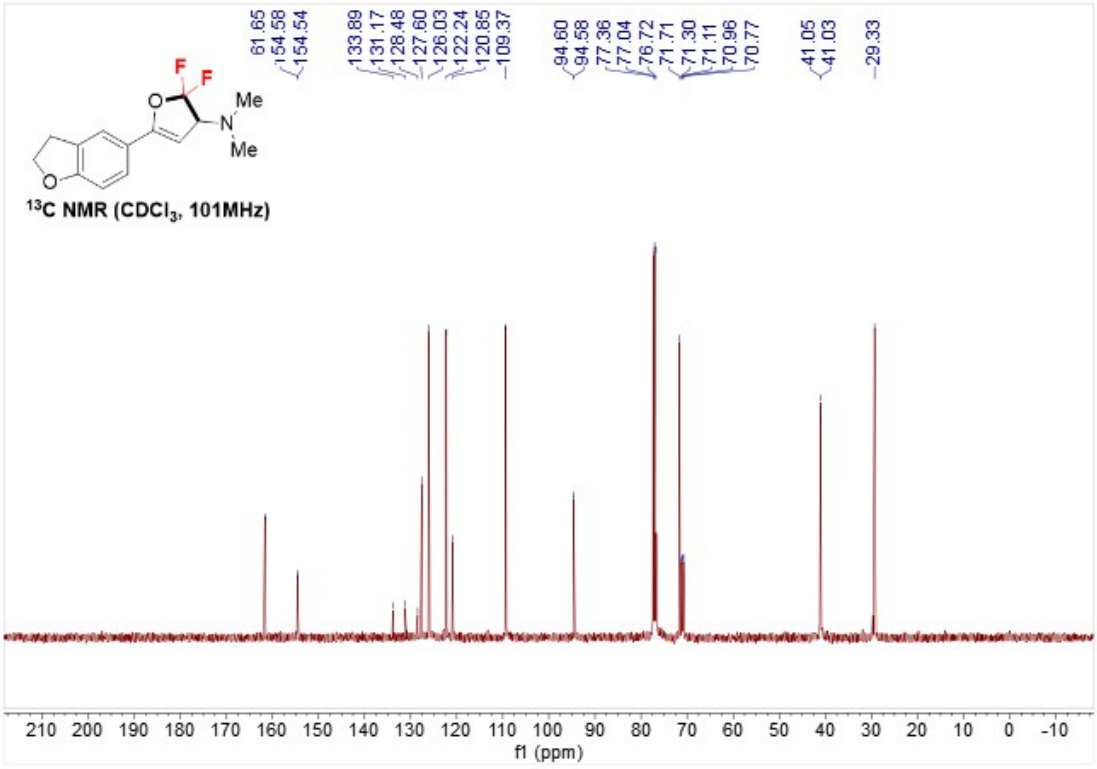

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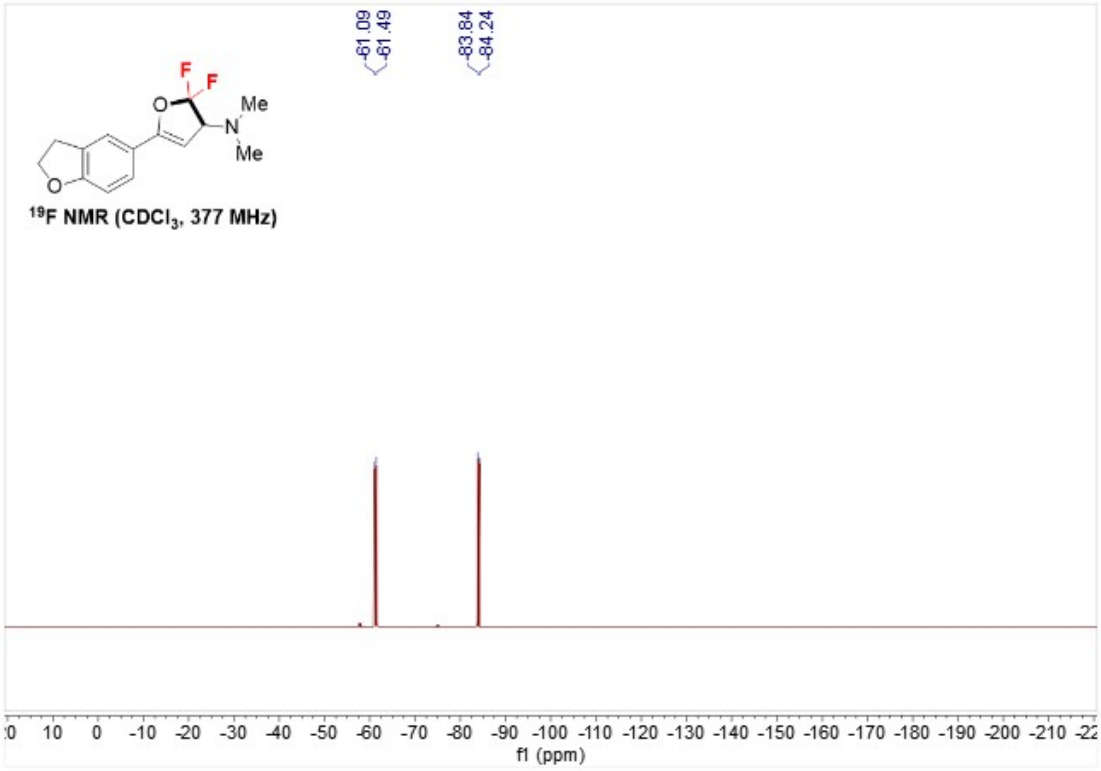

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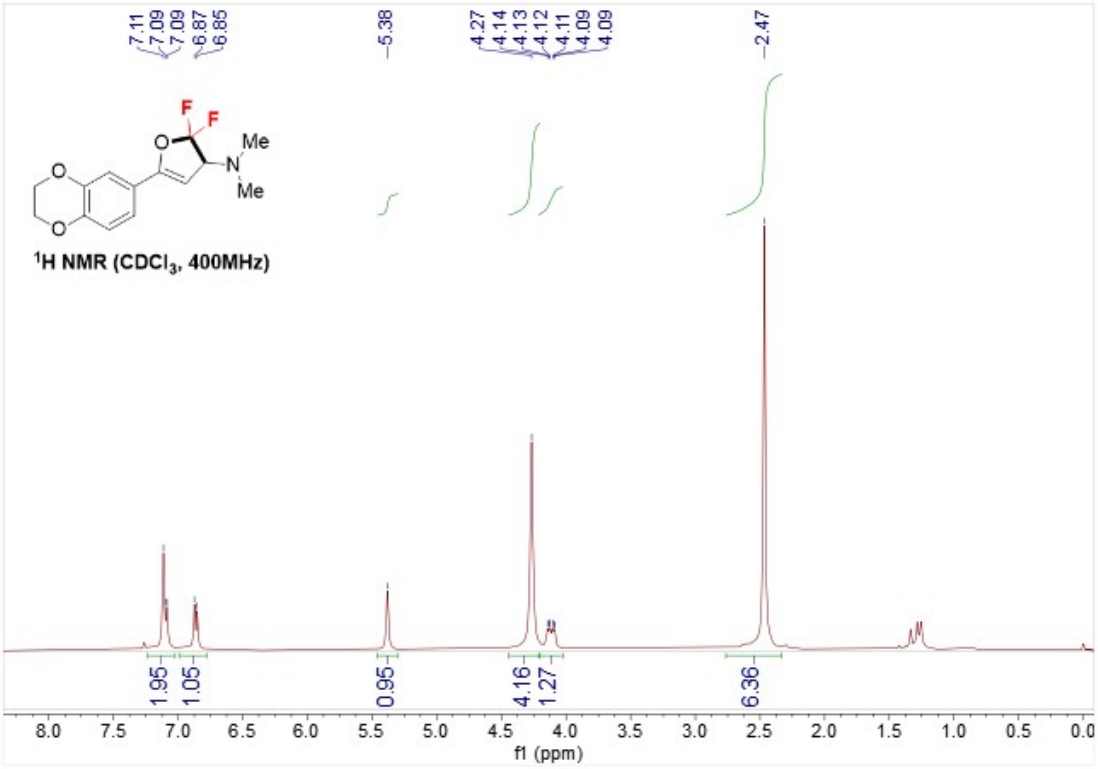

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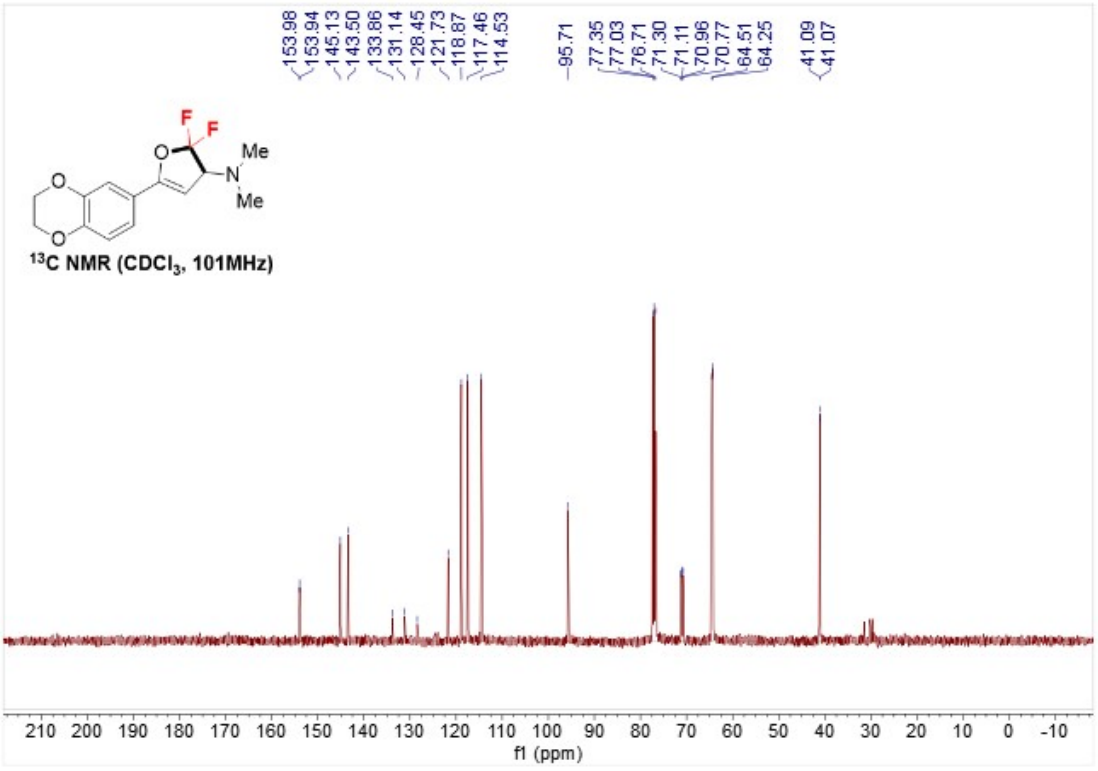

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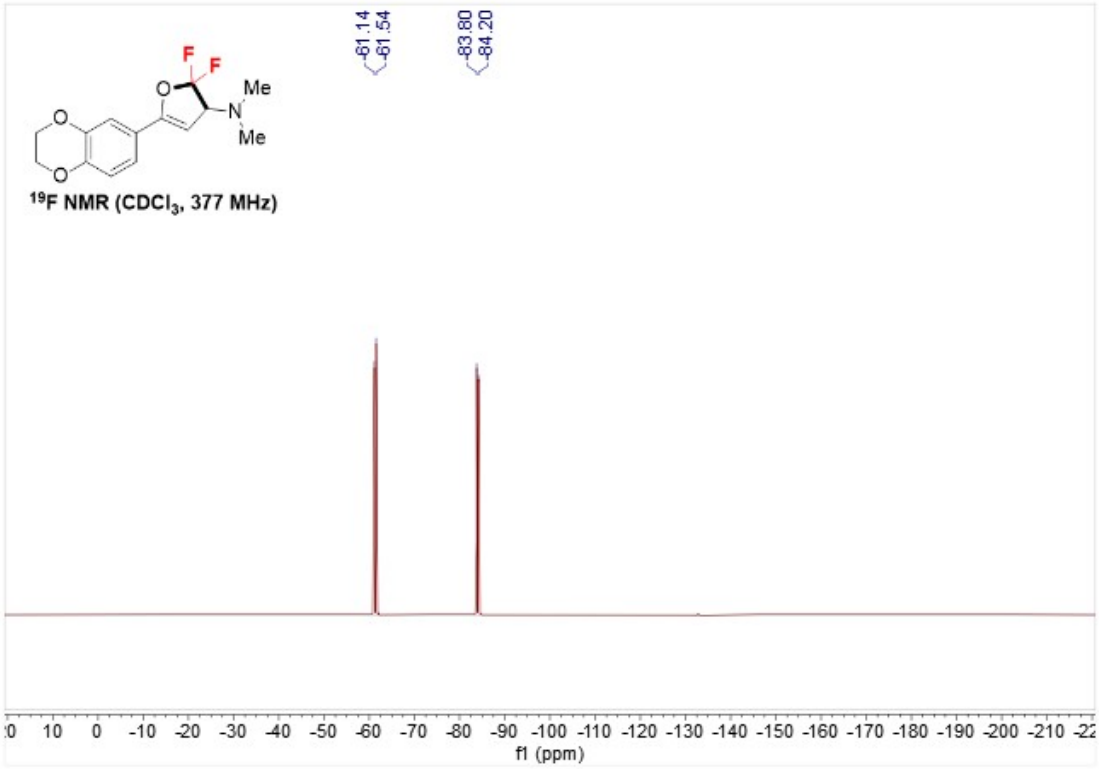

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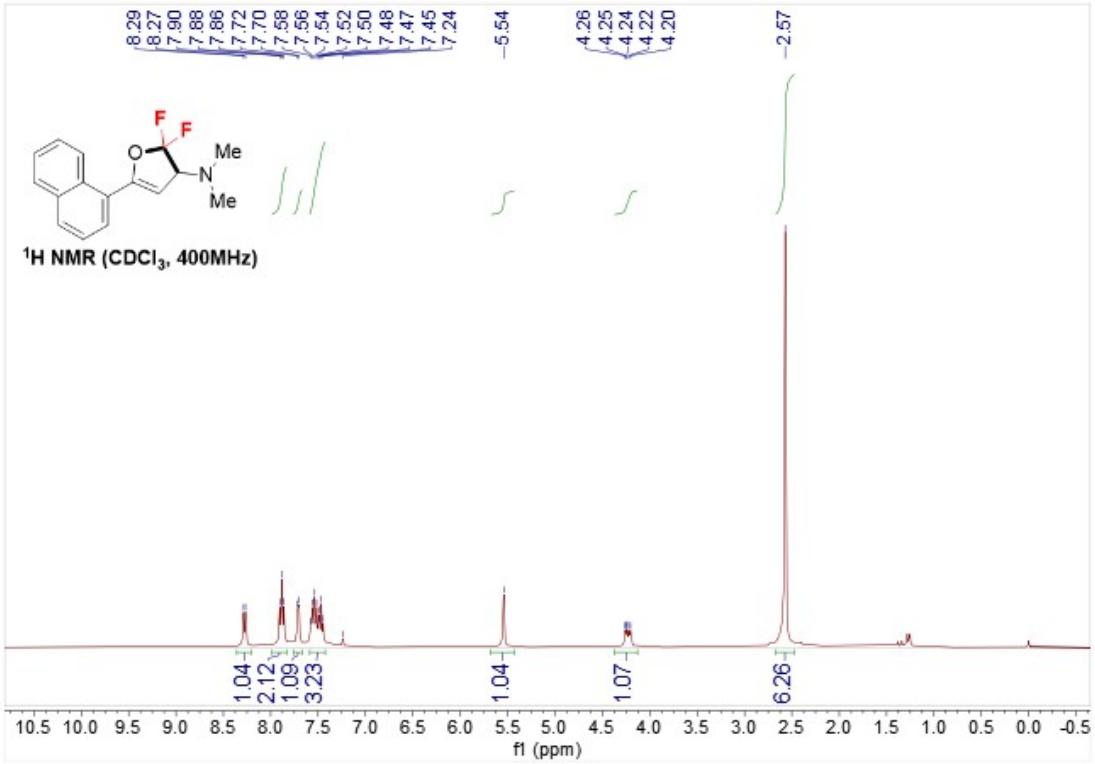

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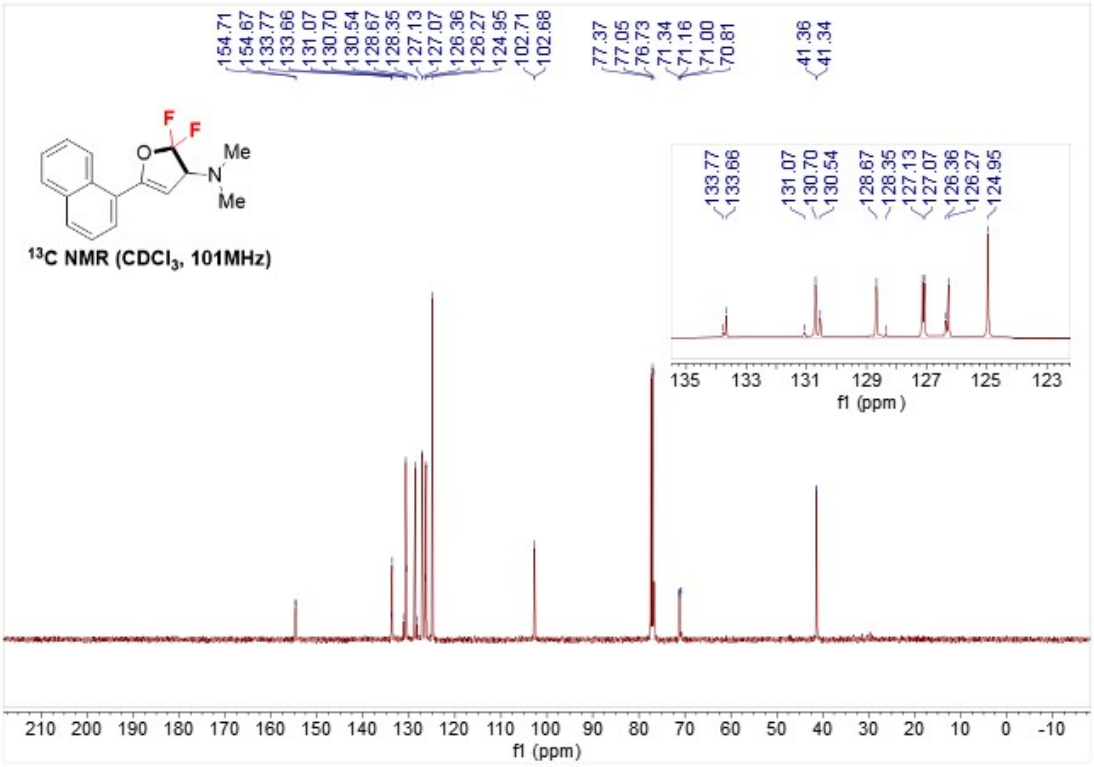

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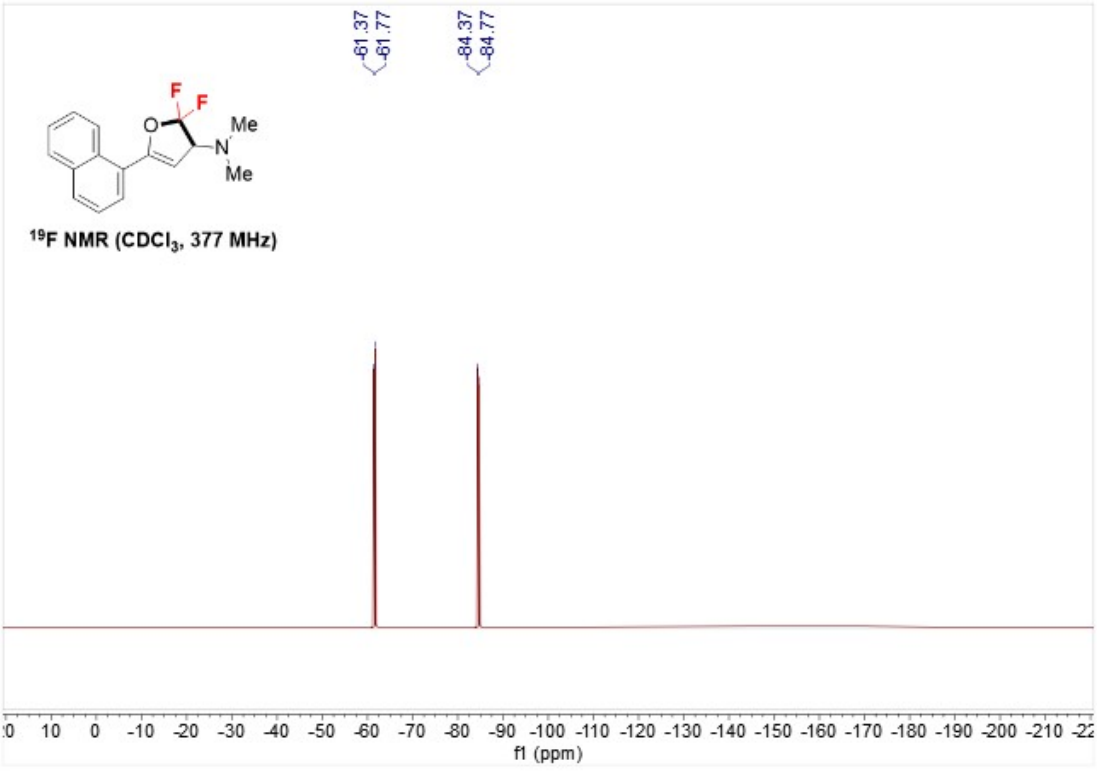

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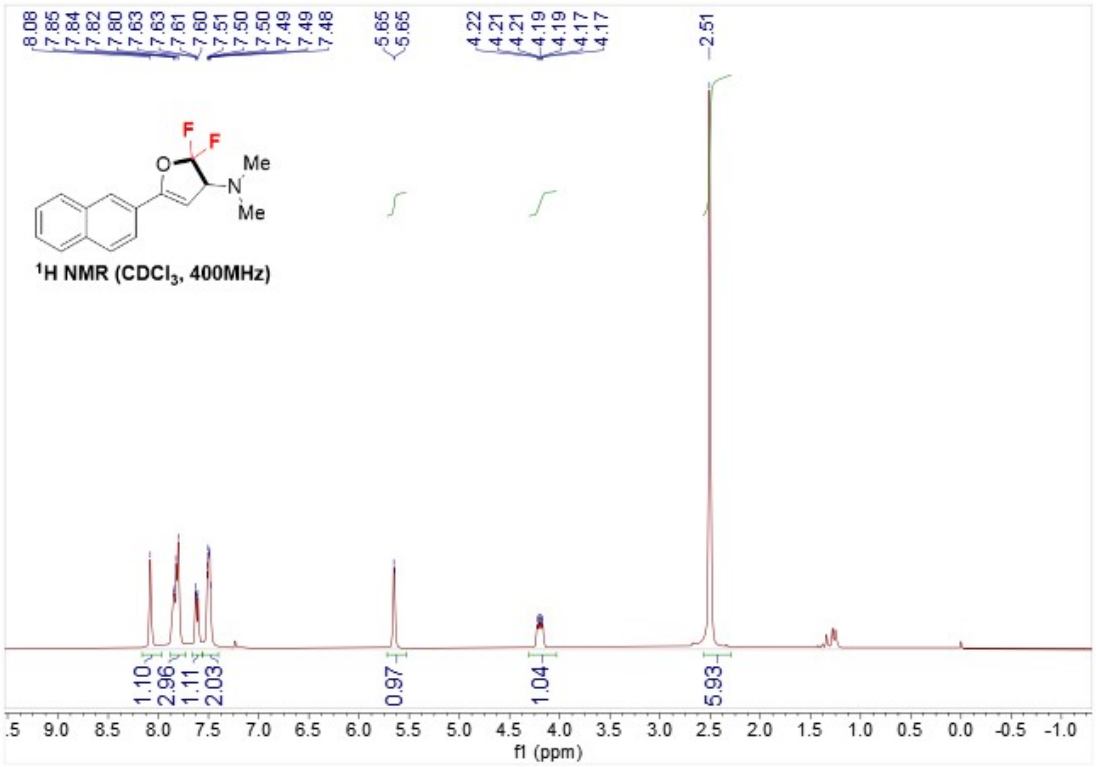

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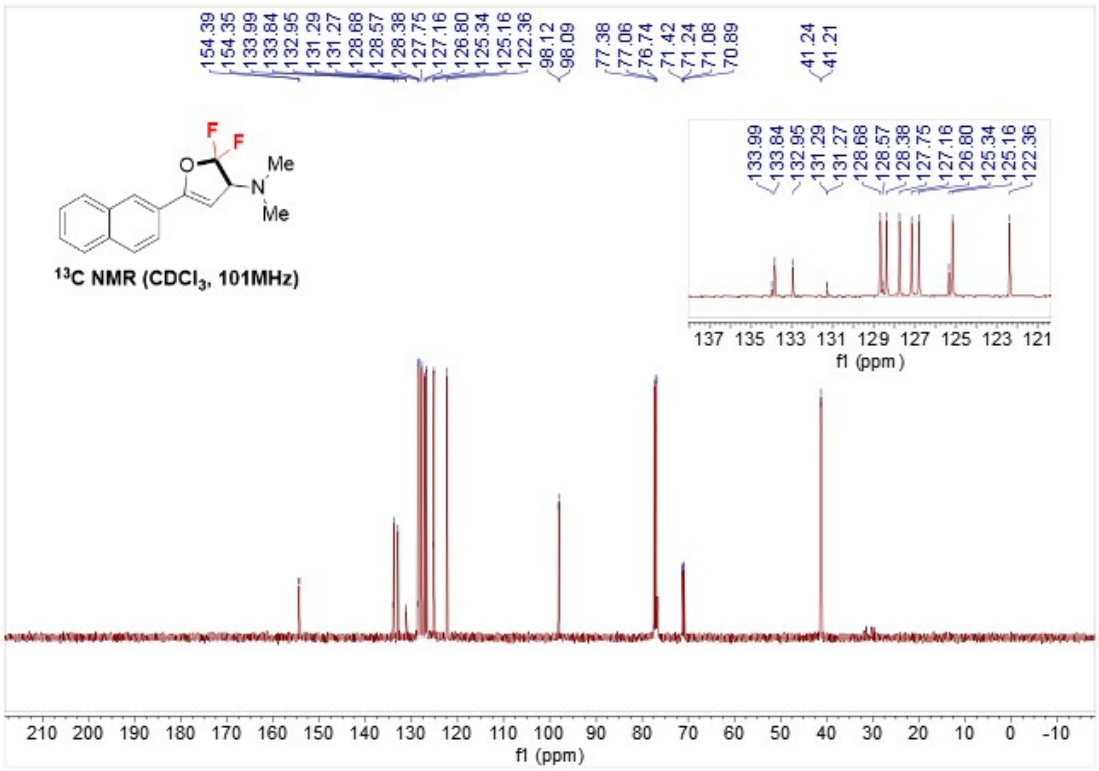

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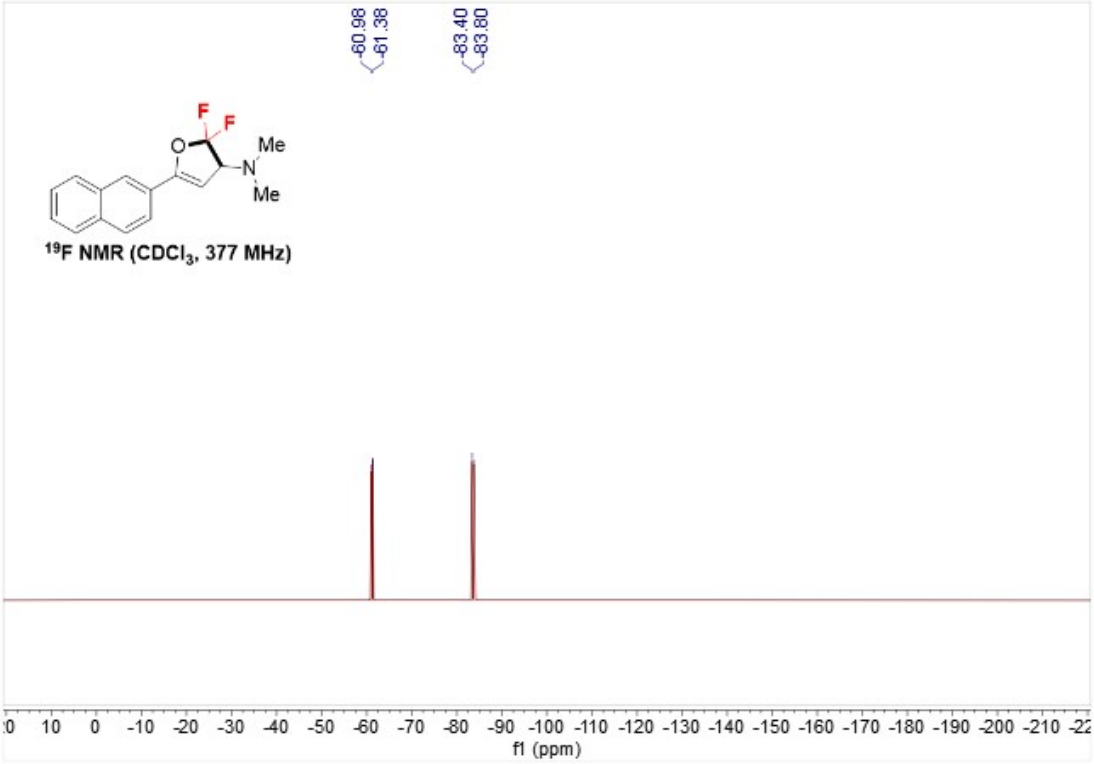

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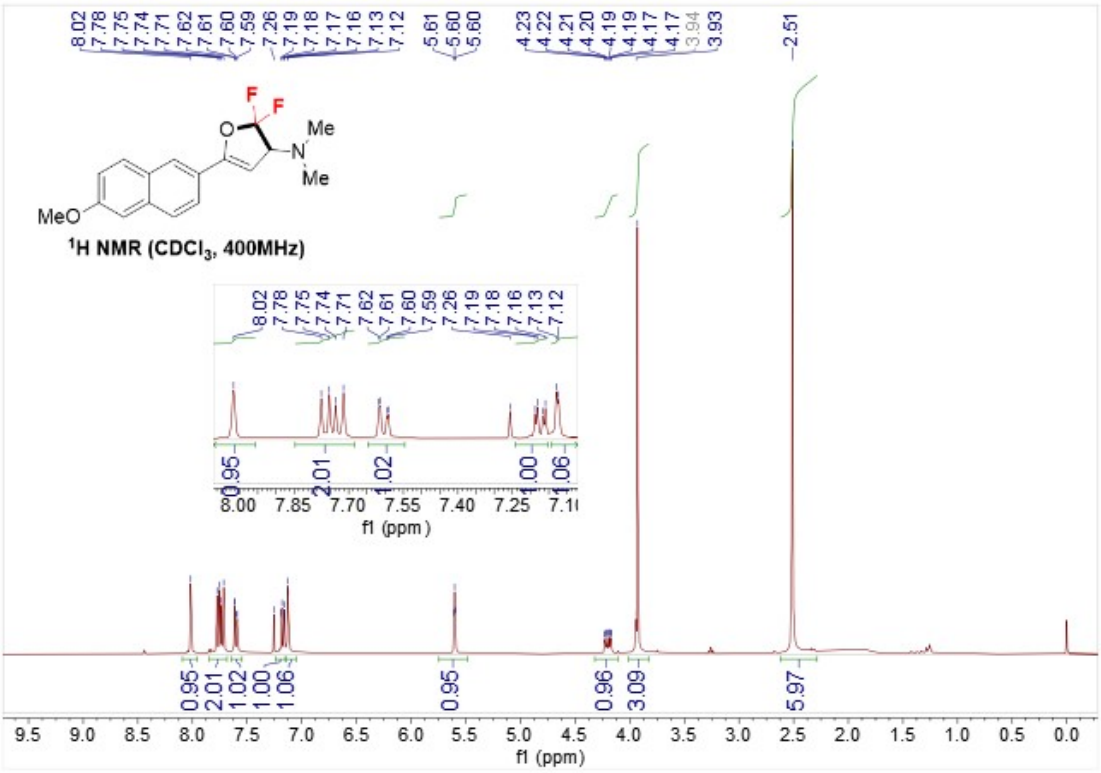

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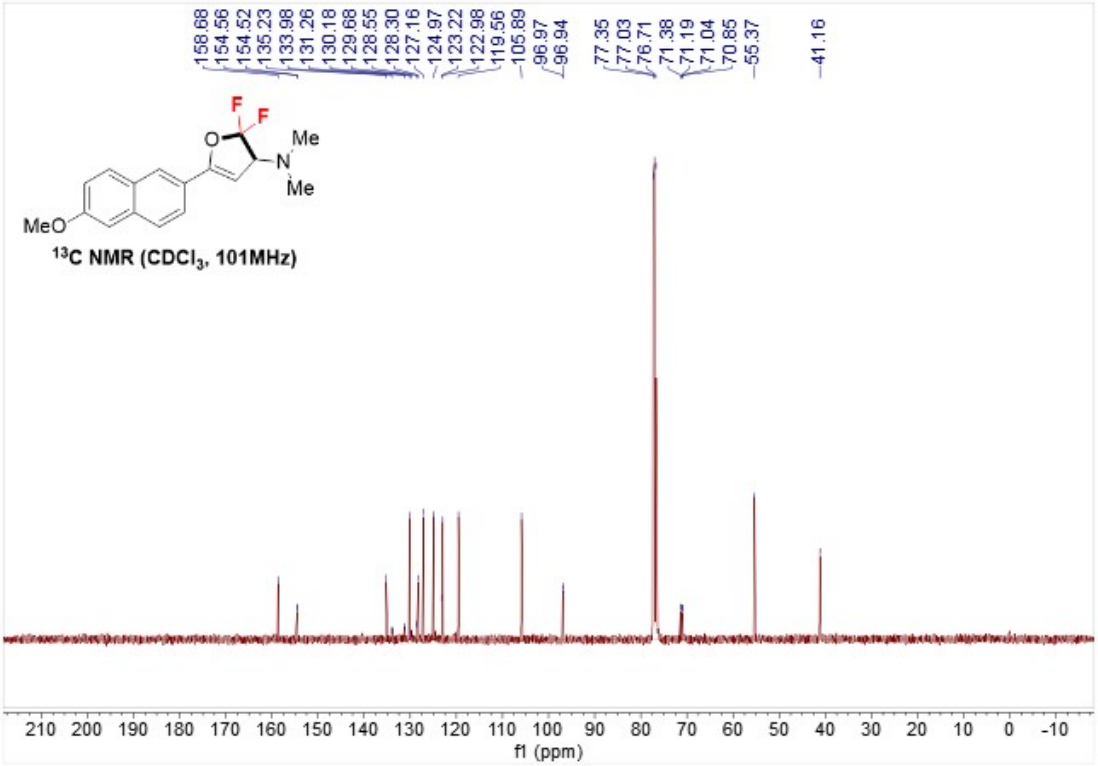

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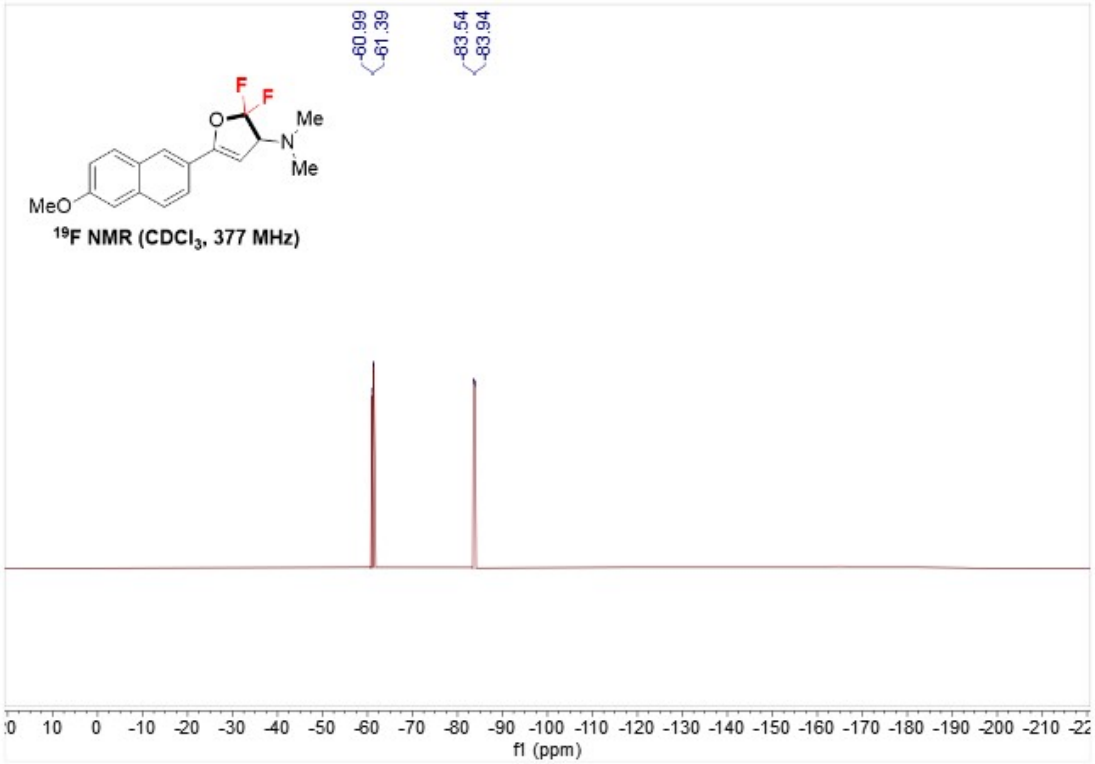

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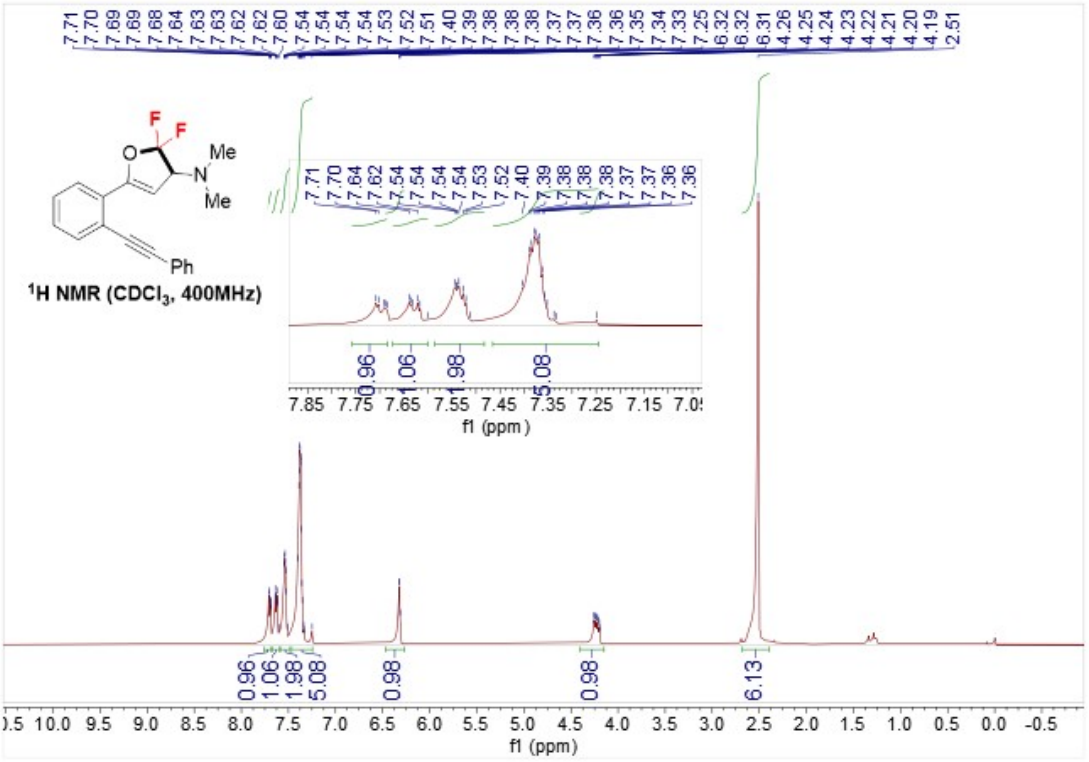

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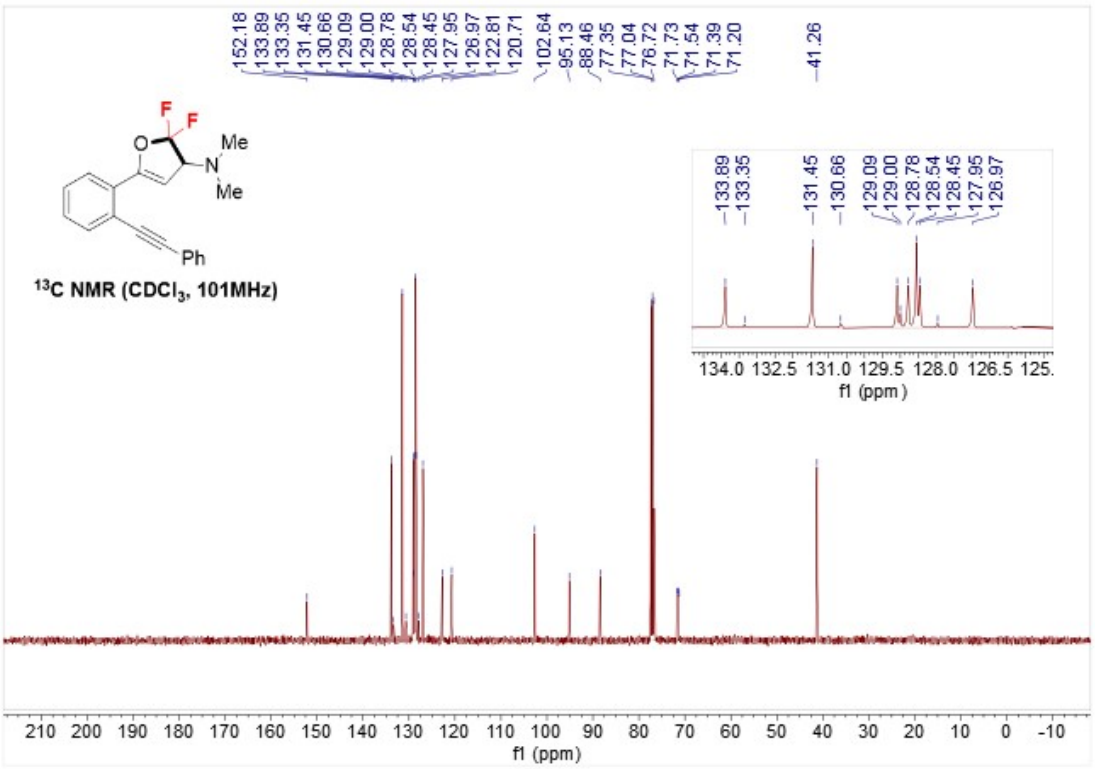
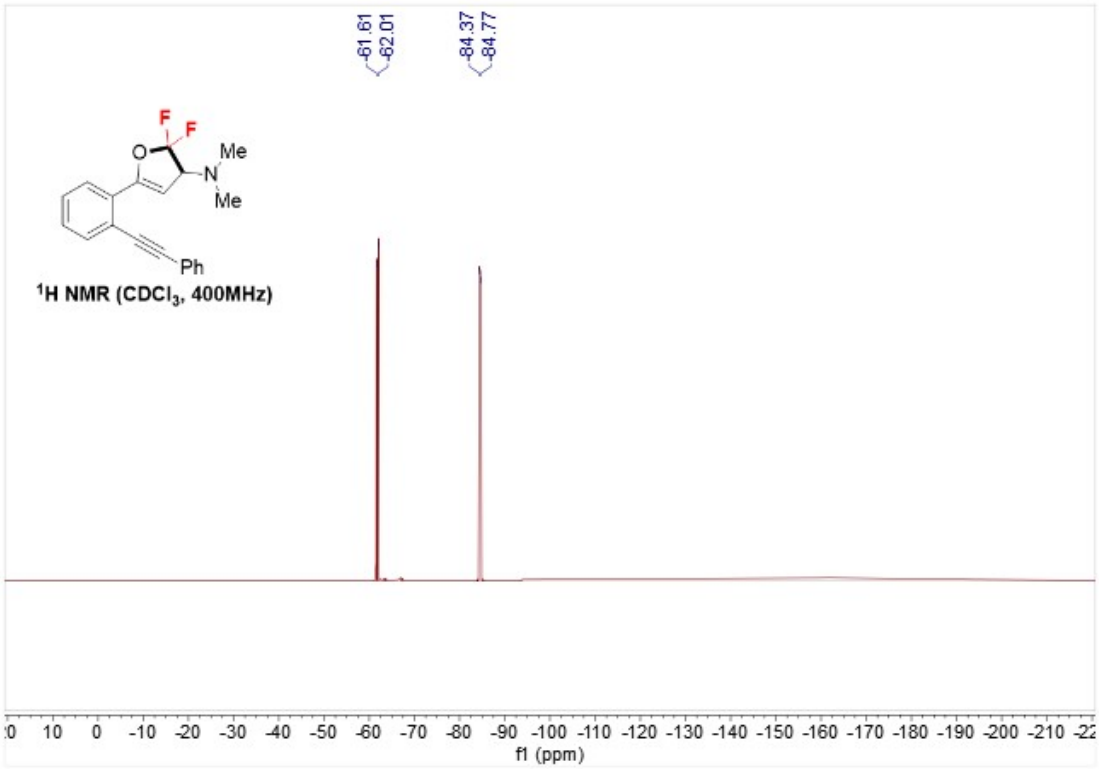
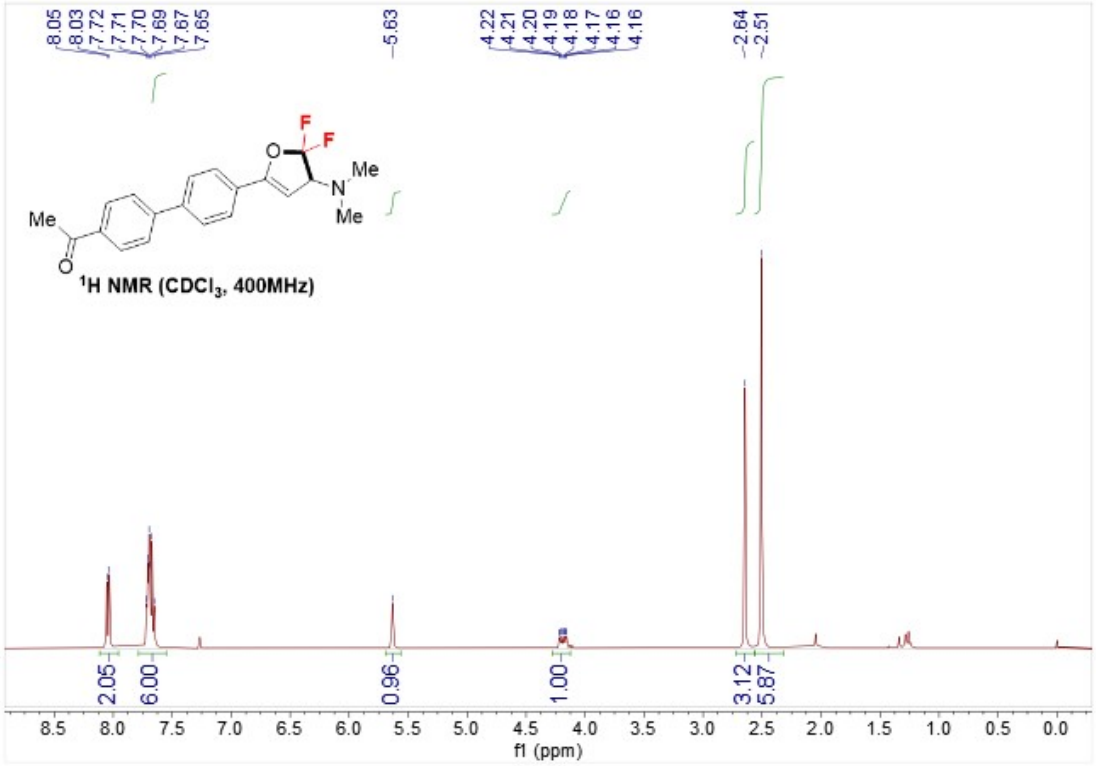


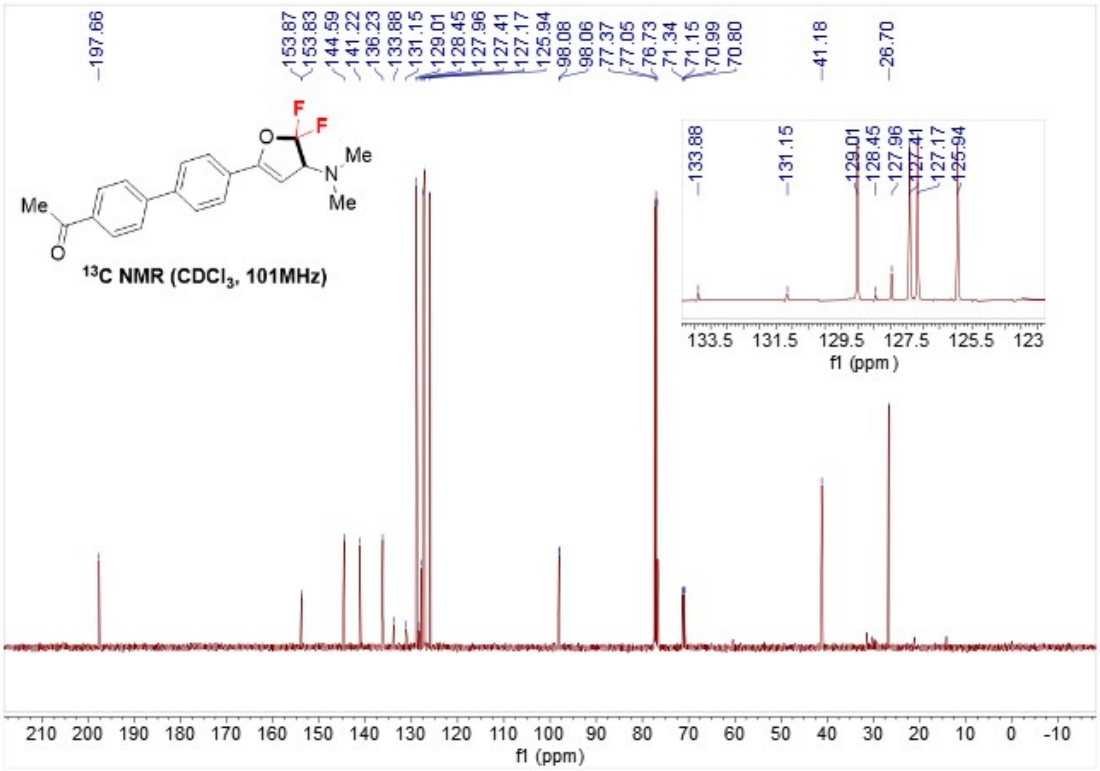
^{19}F NMR of compound 2y



^{1}H NMR of compound 2z



^{13}C NMR of compound 2z



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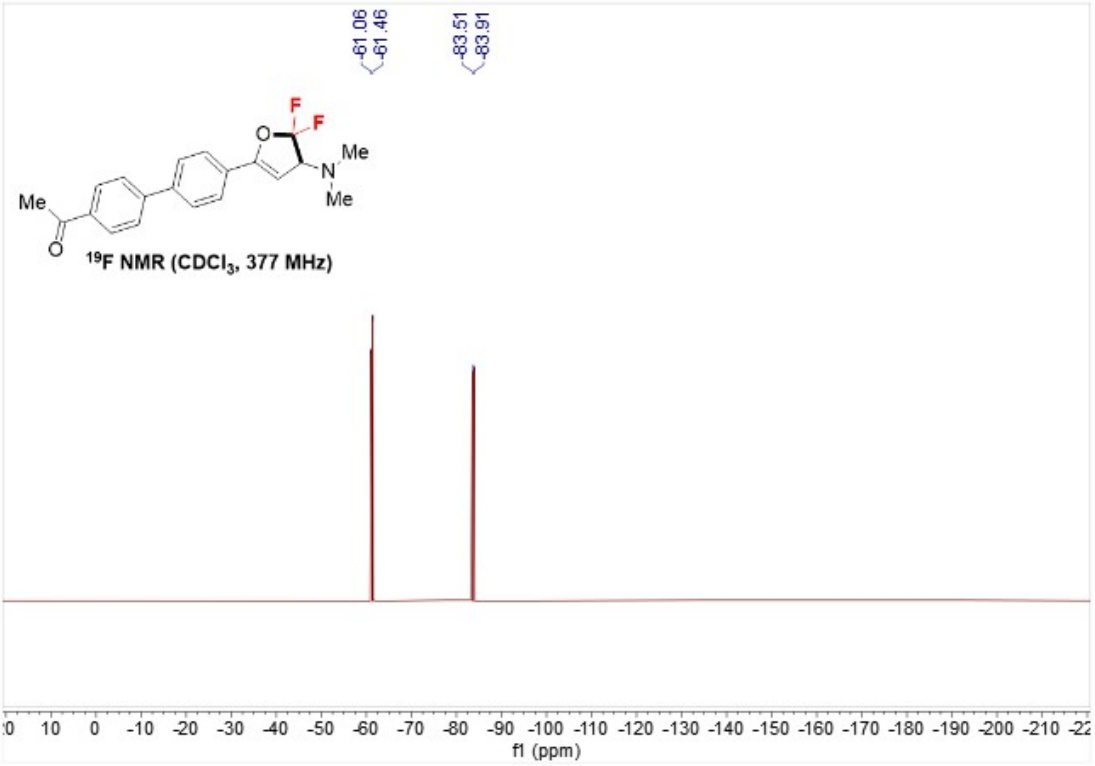
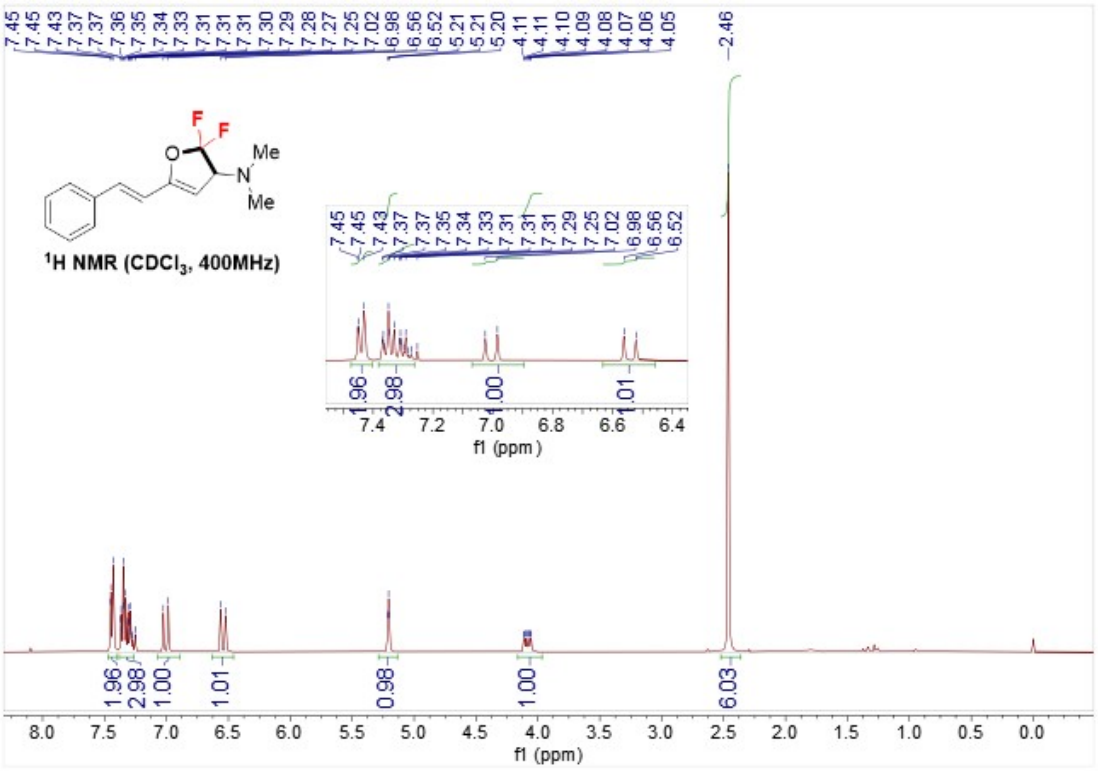


^{1}H NMR of compound 2aa



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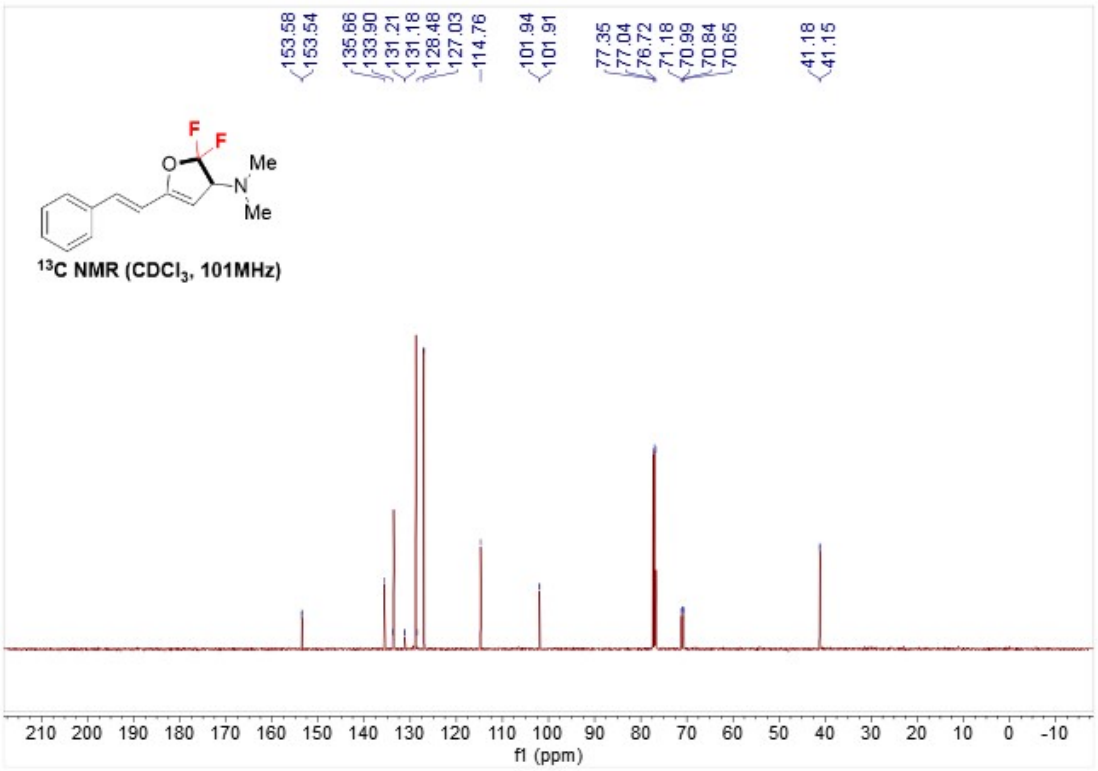

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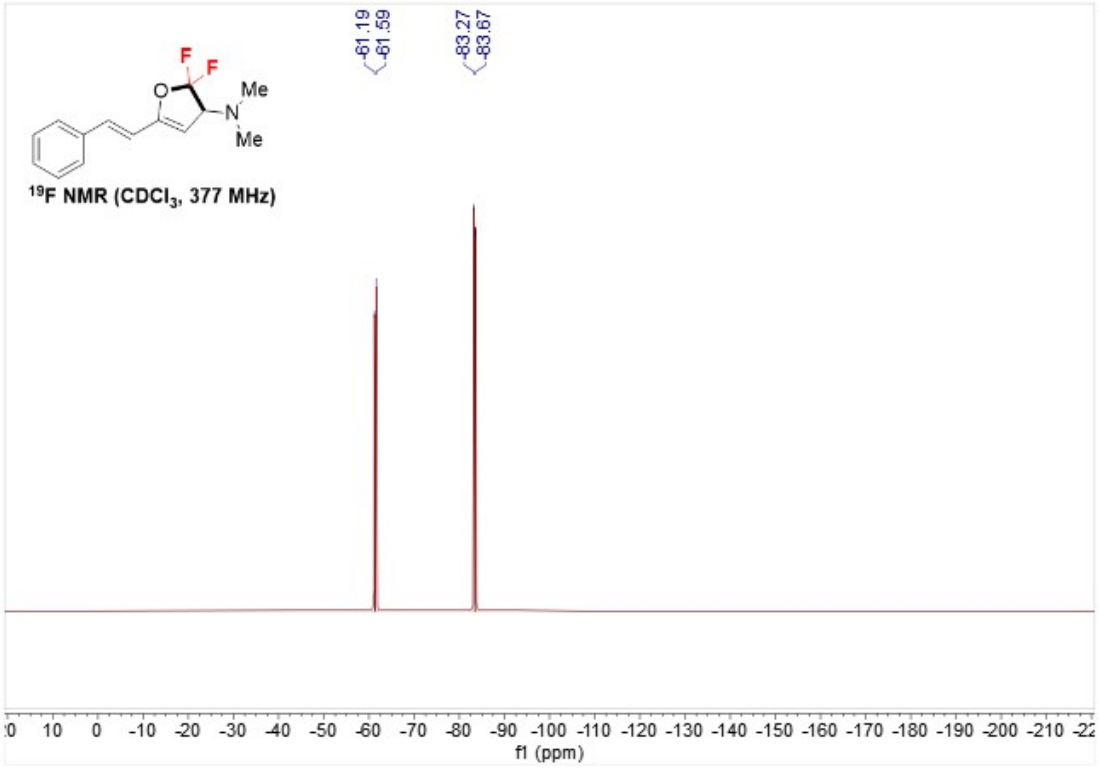

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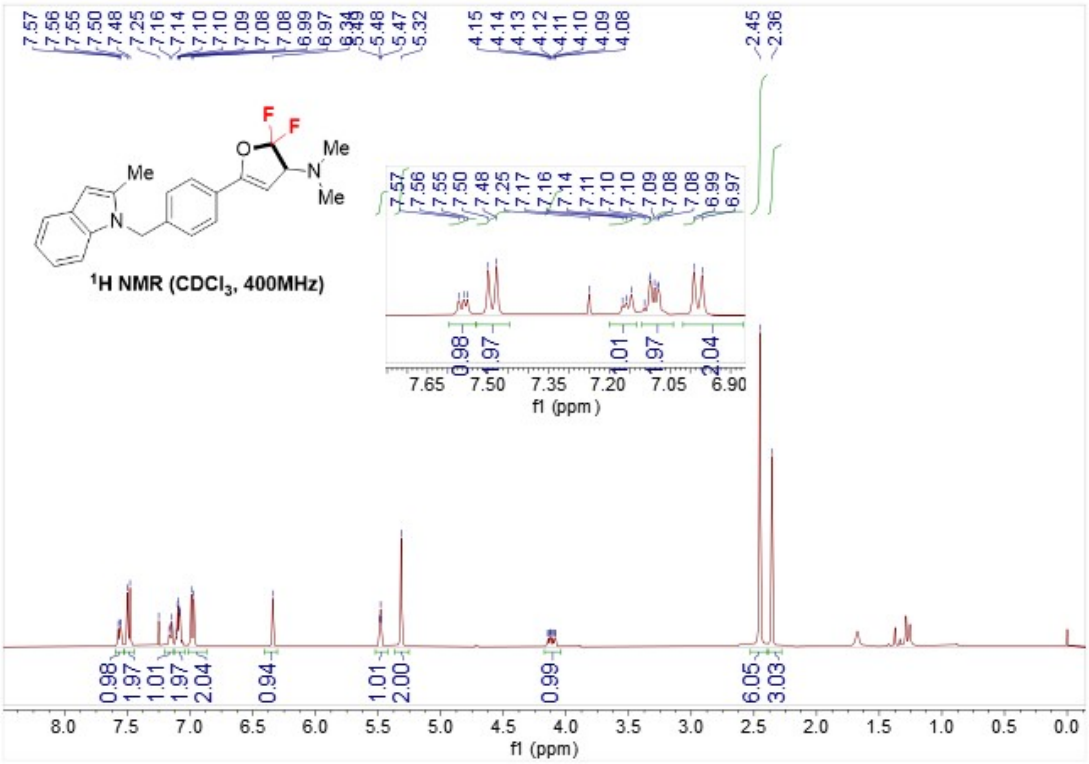

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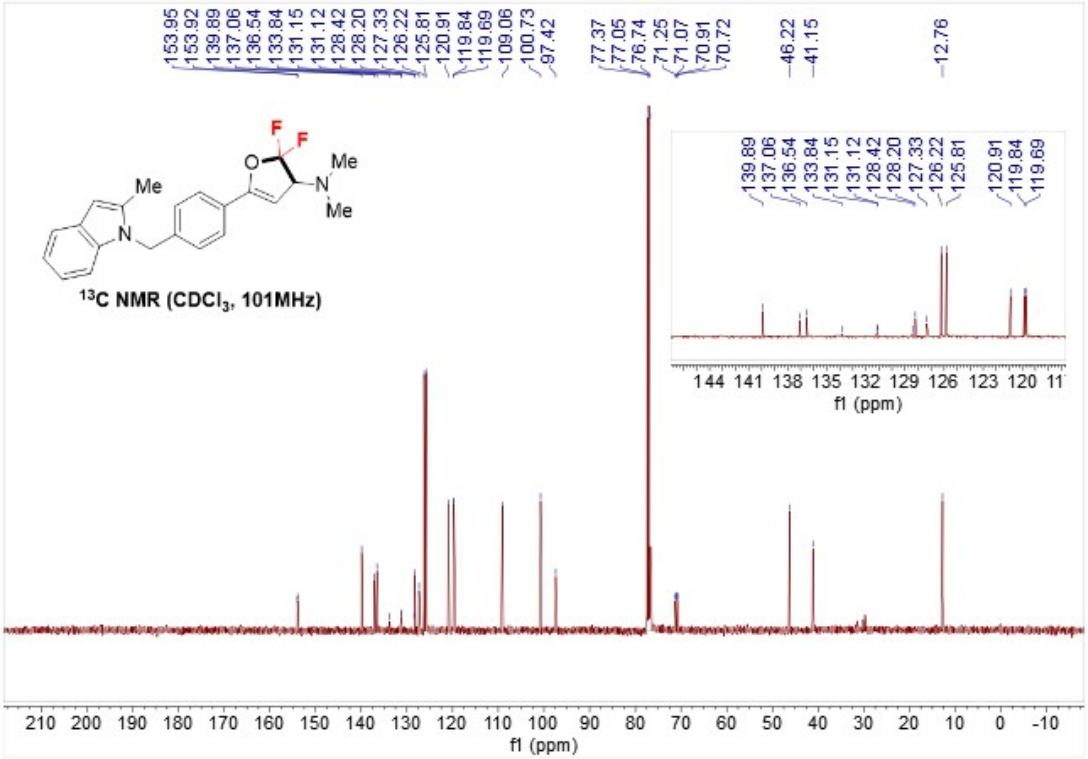

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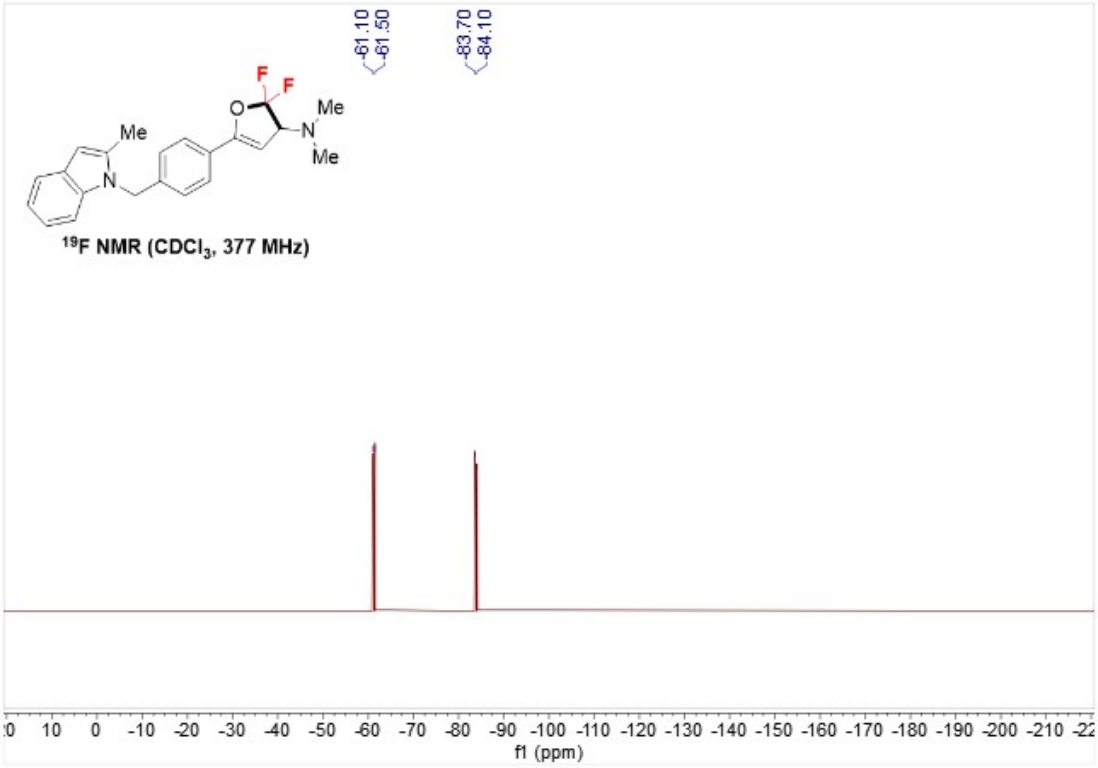

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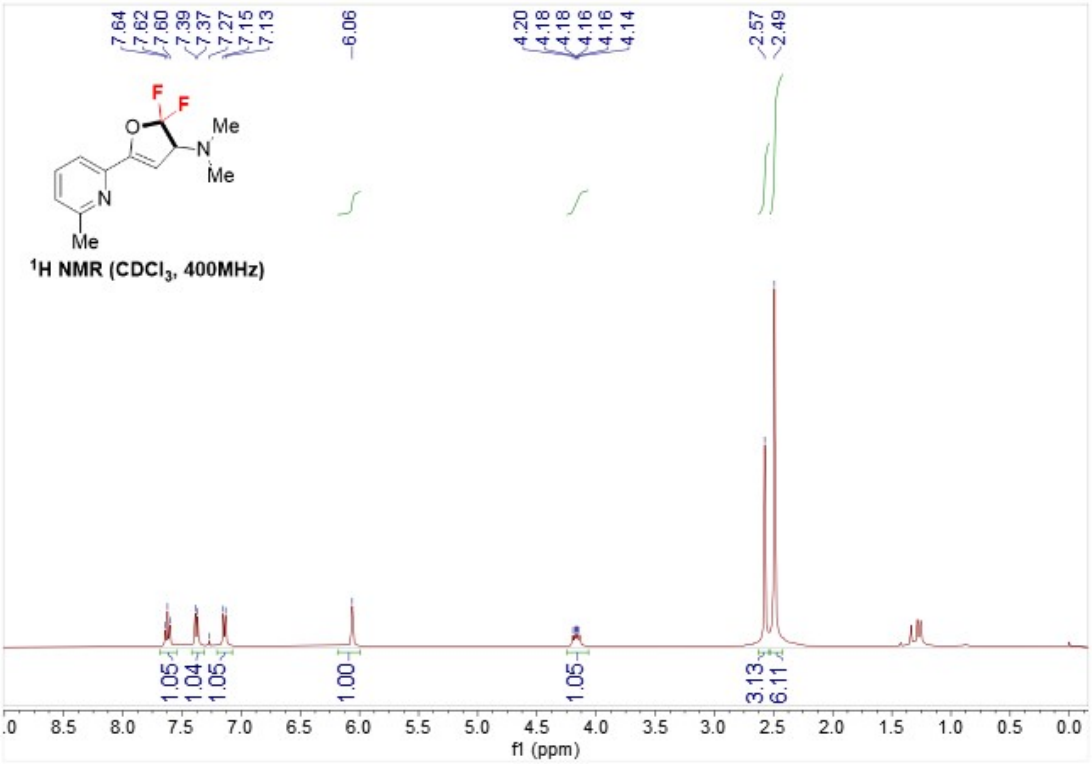

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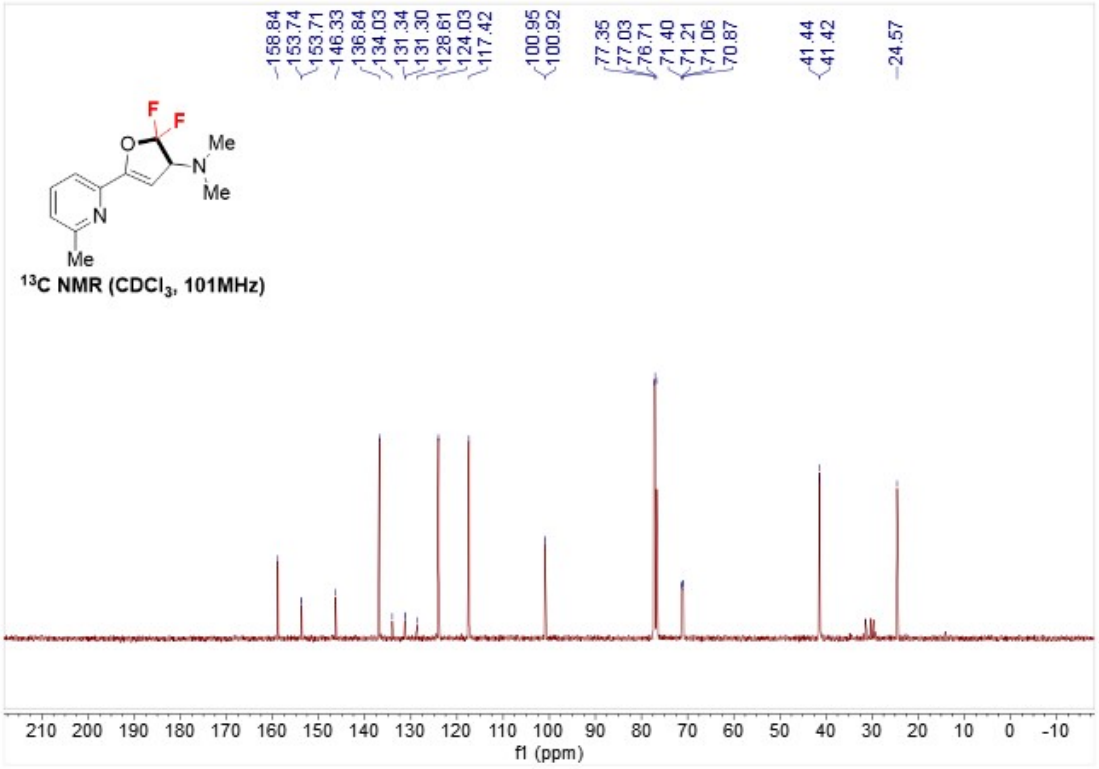

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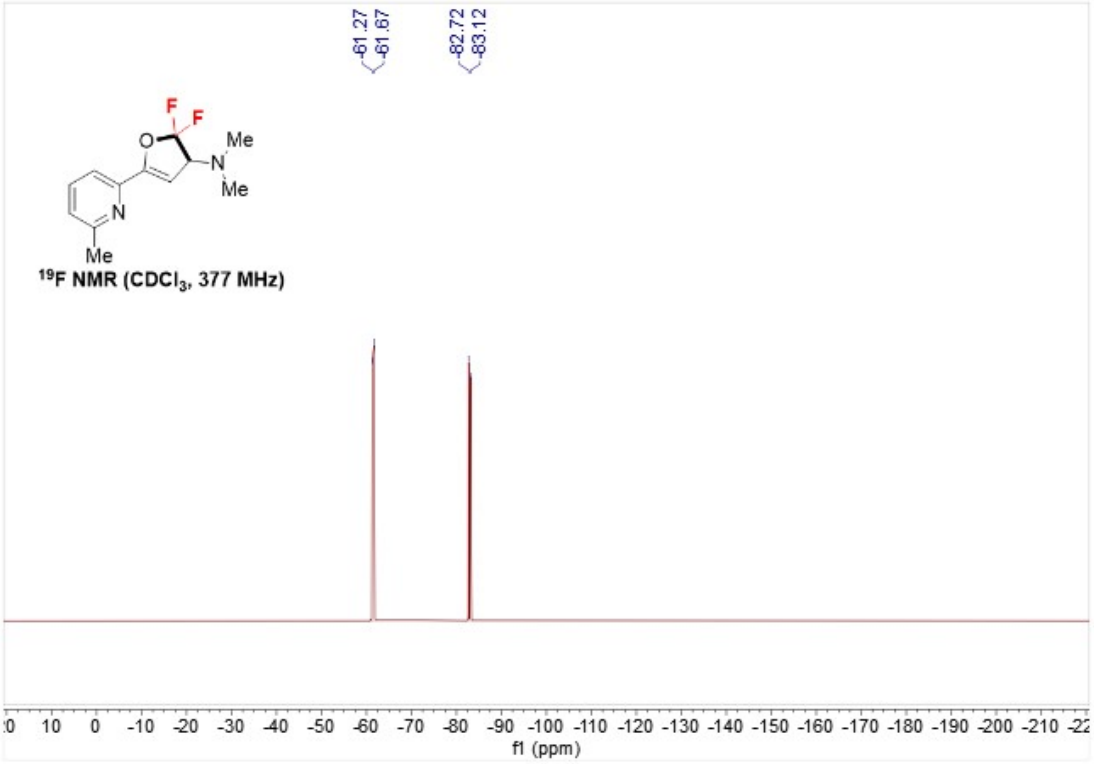

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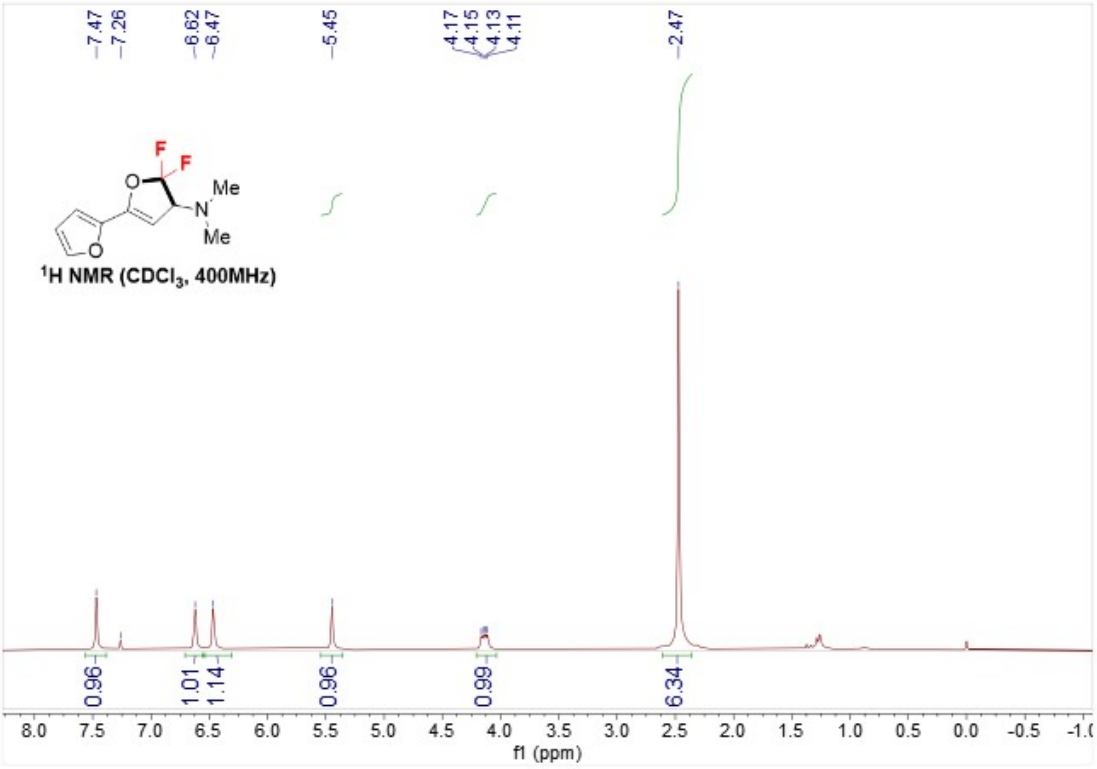

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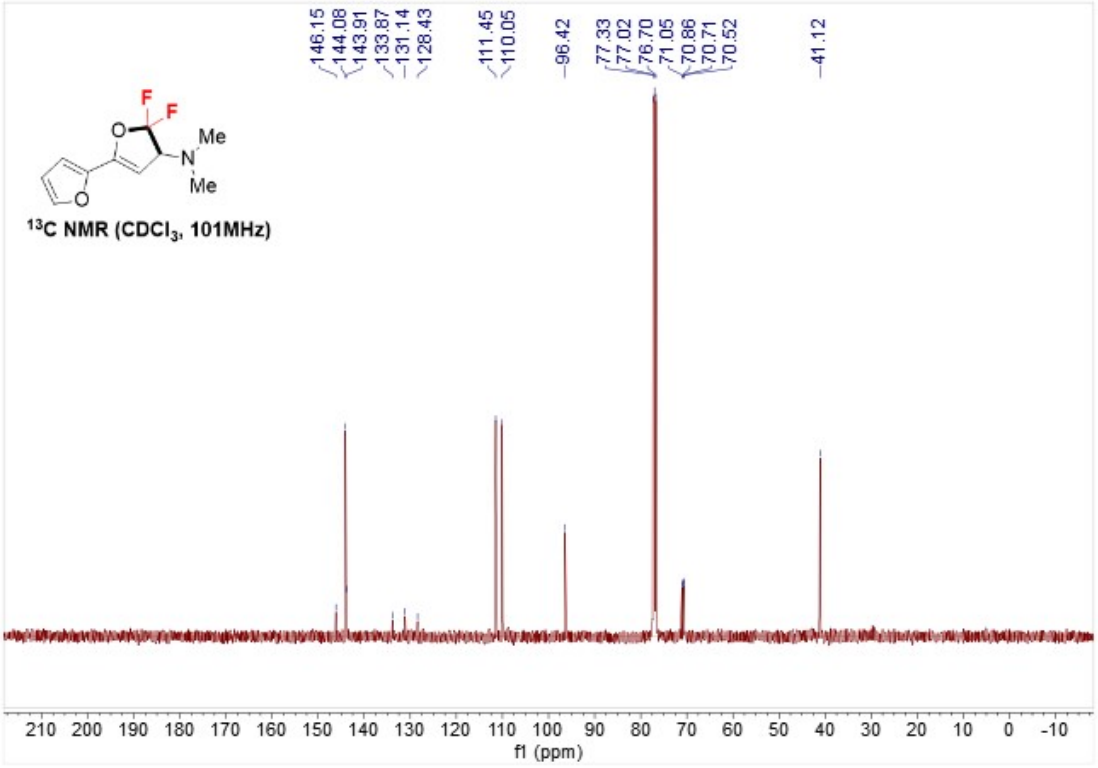

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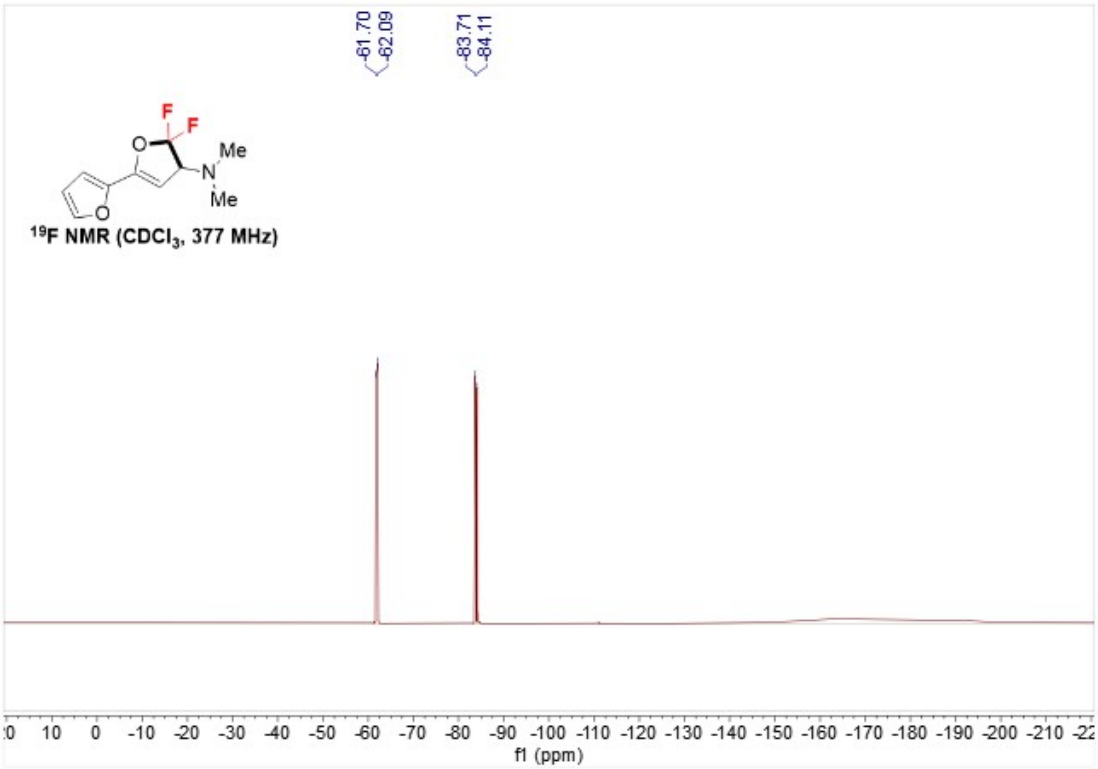

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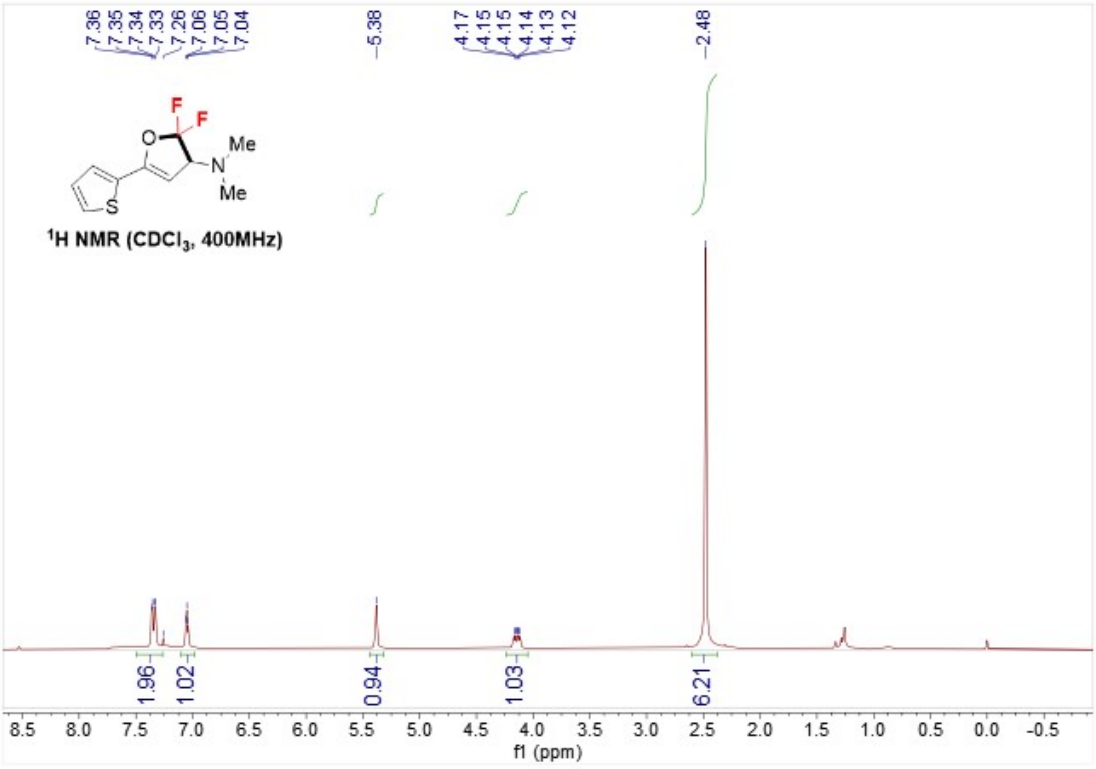

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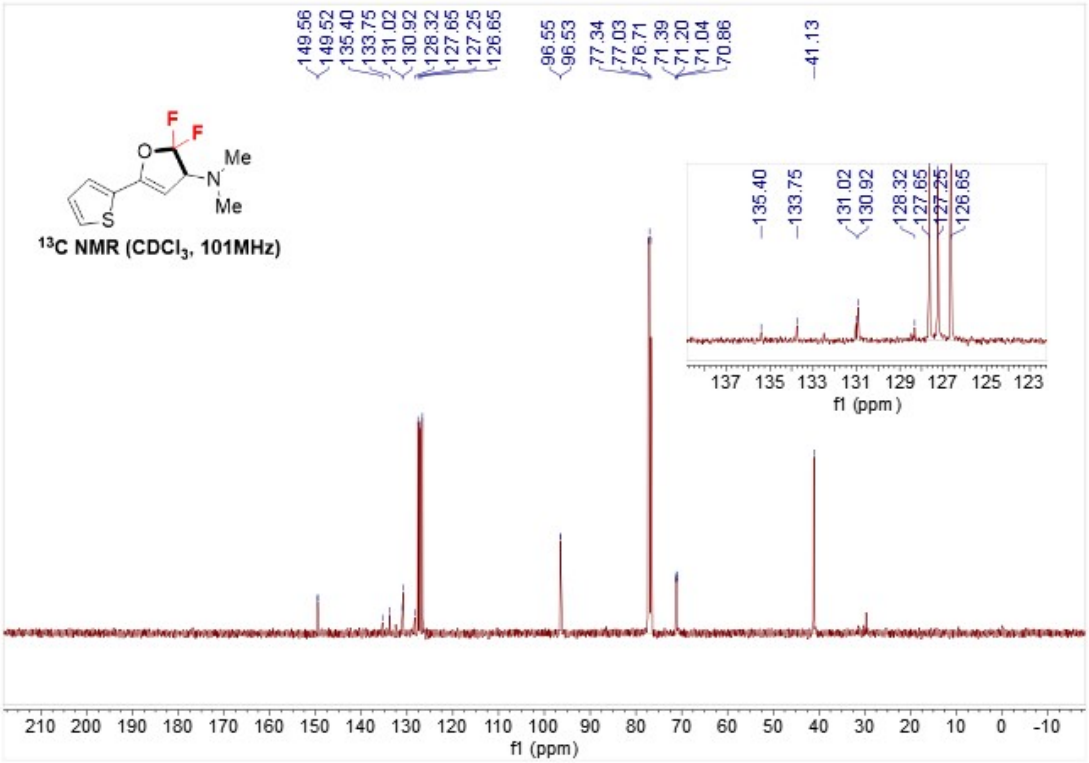

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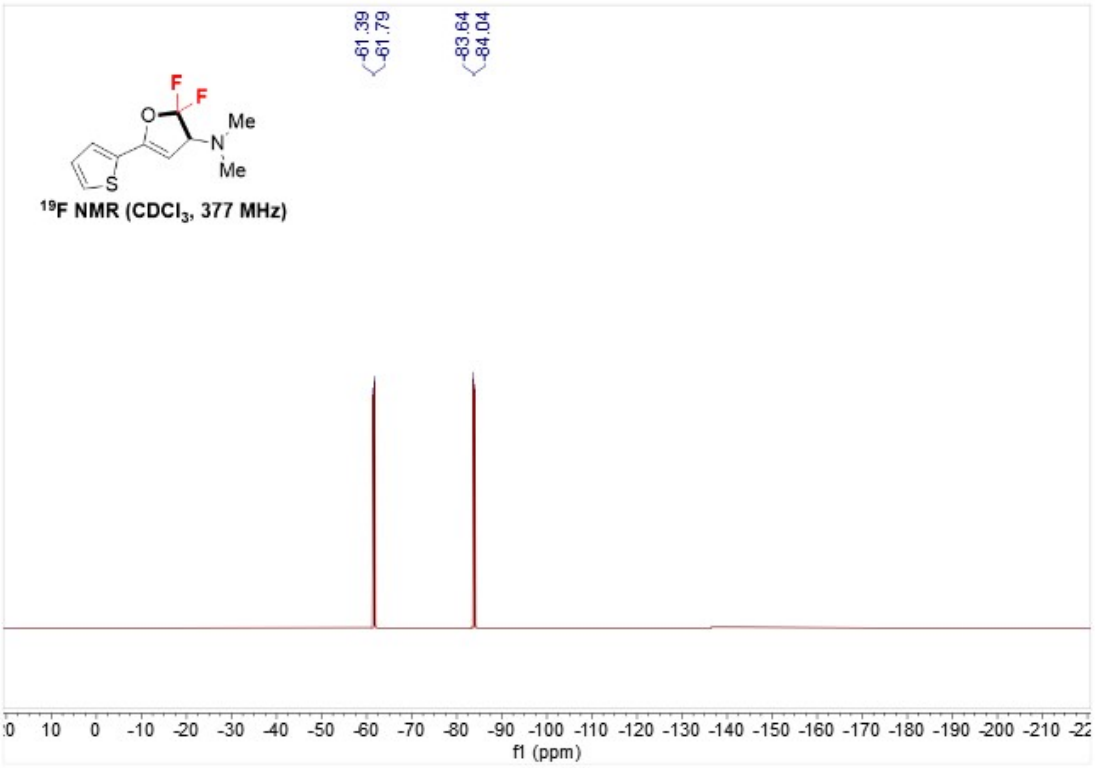

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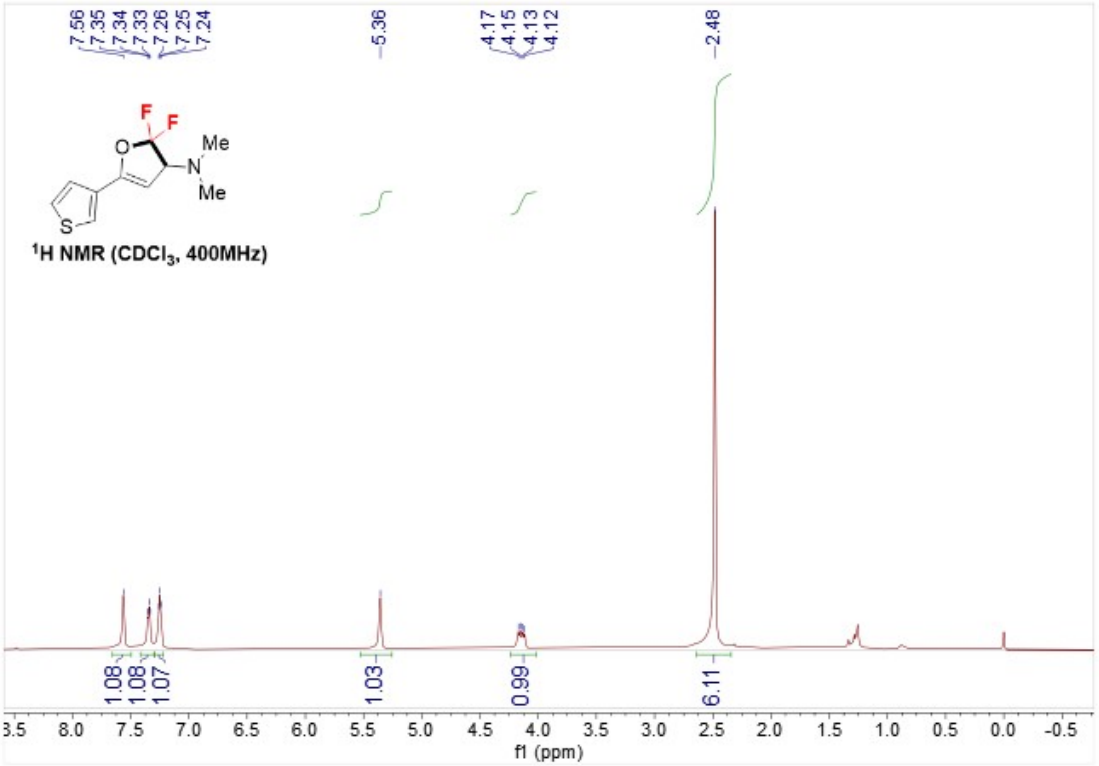

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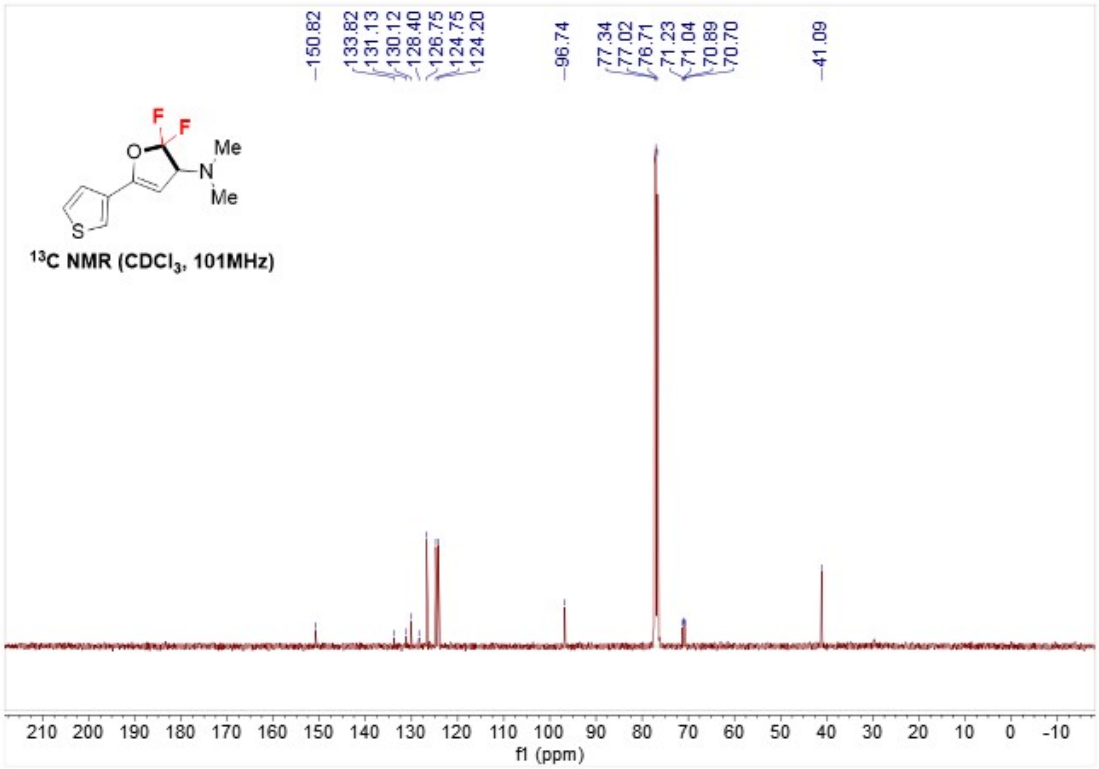

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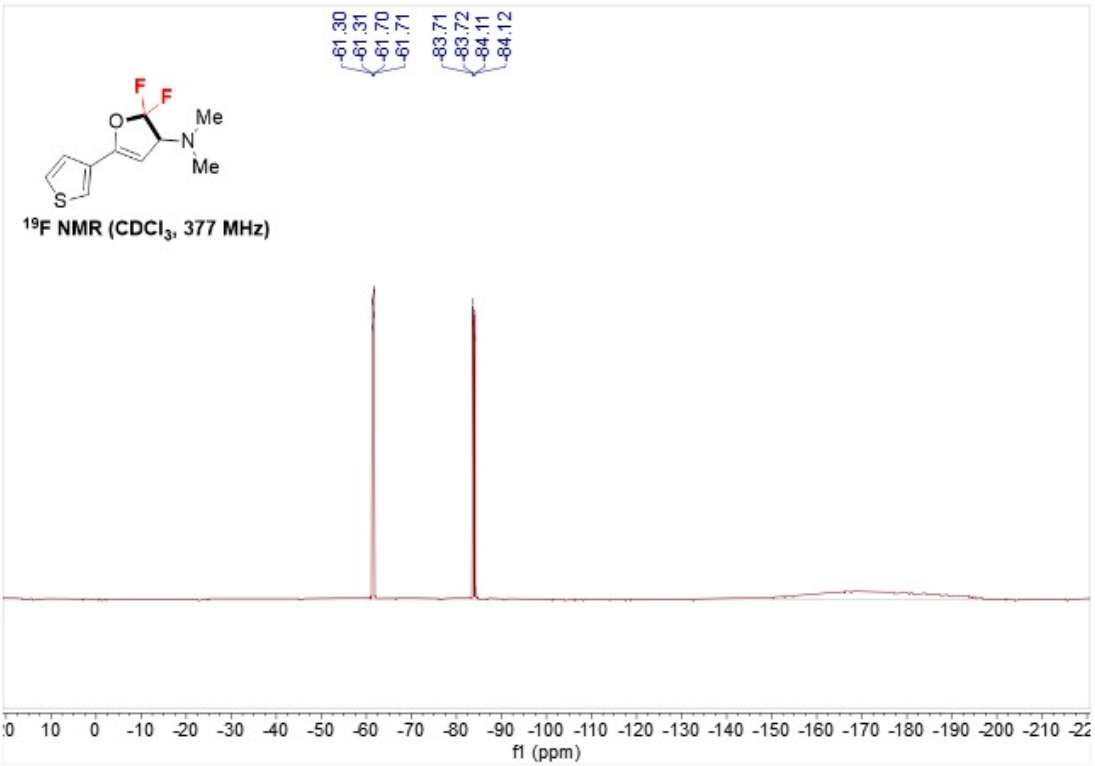

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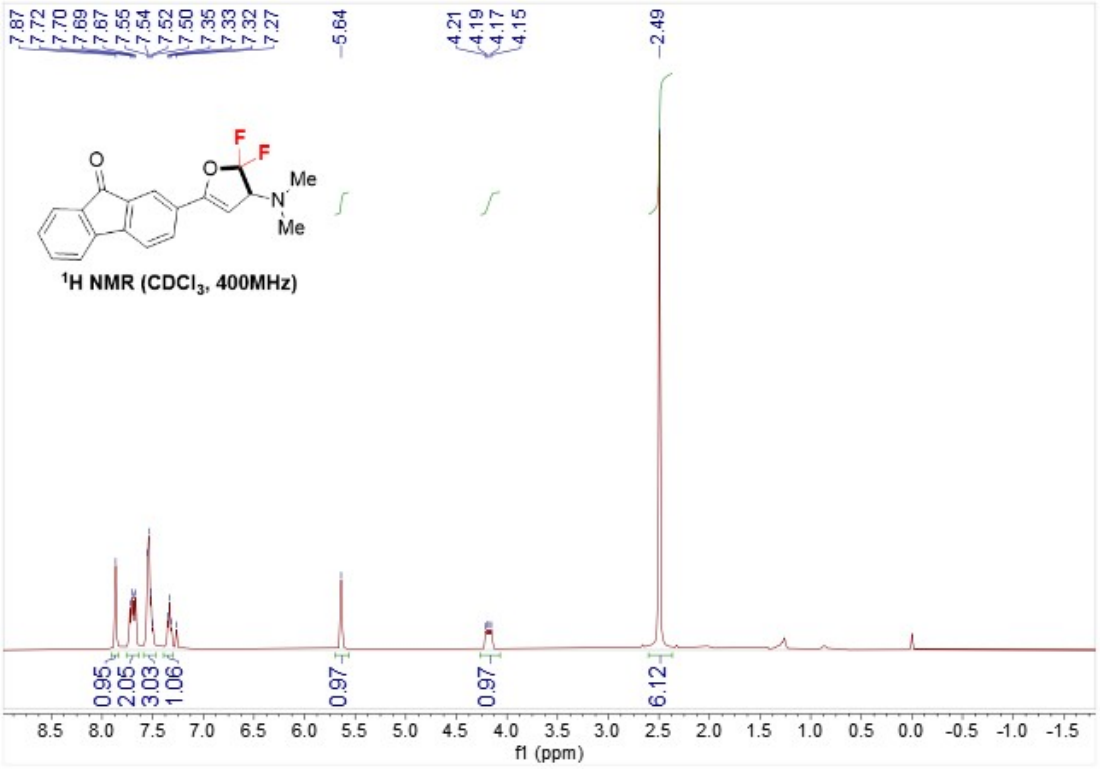

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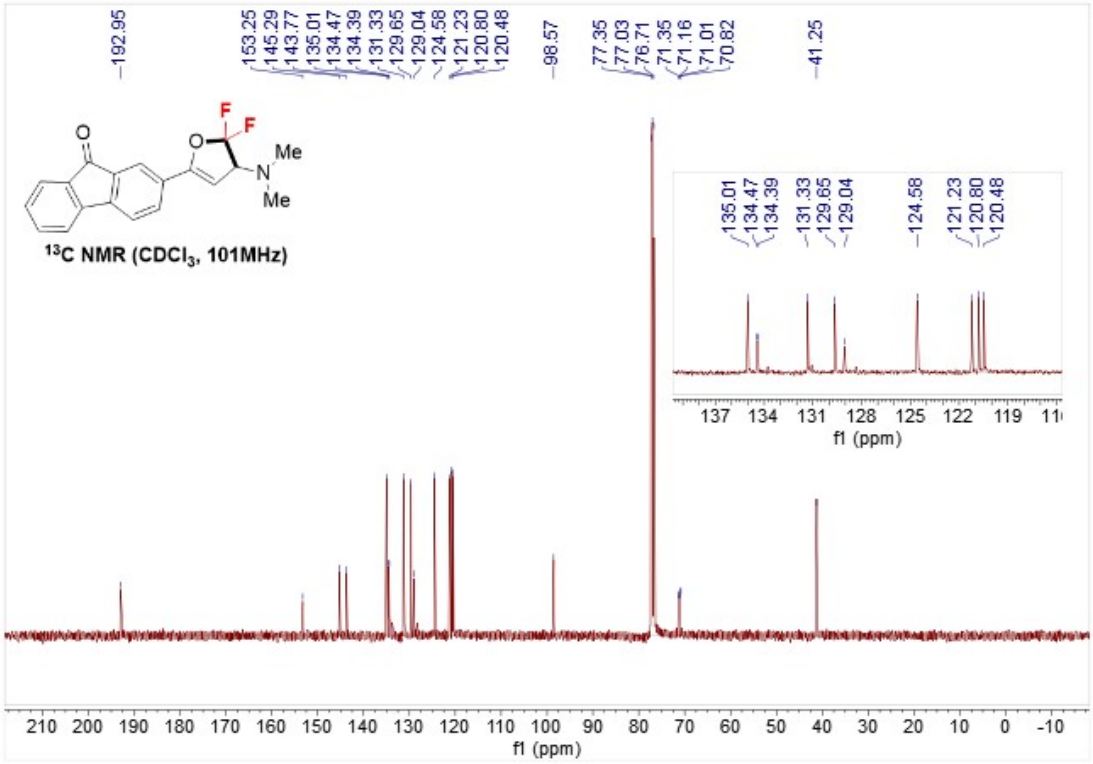

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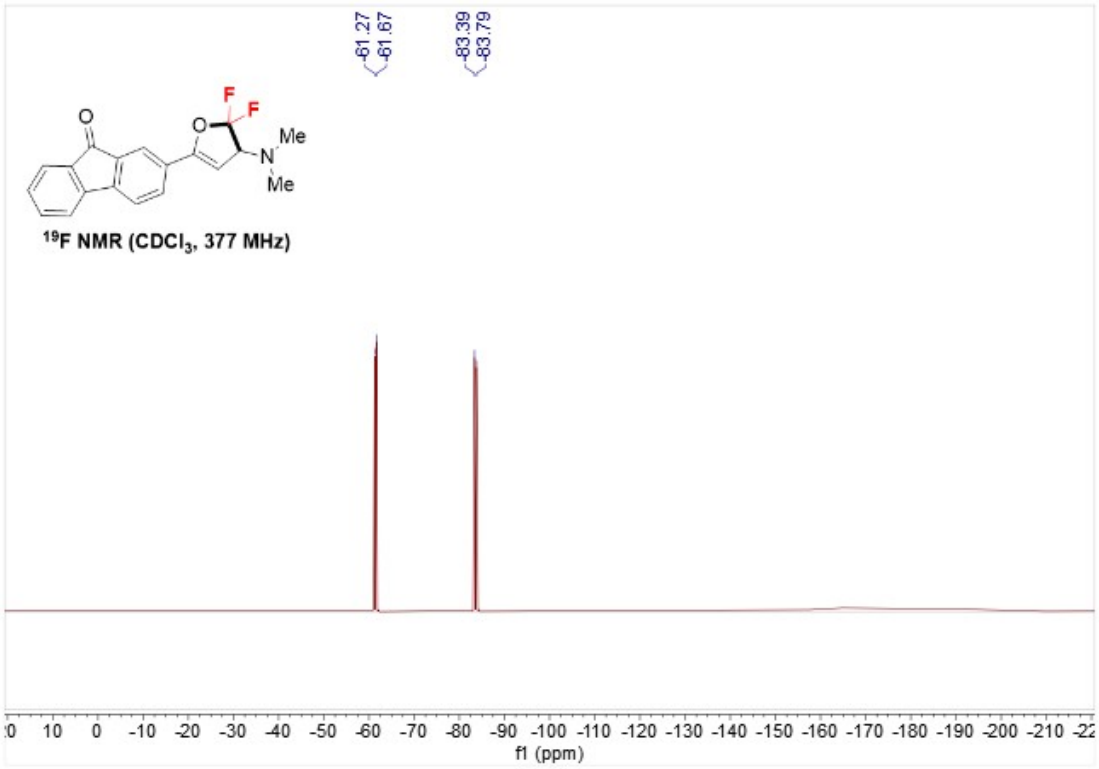

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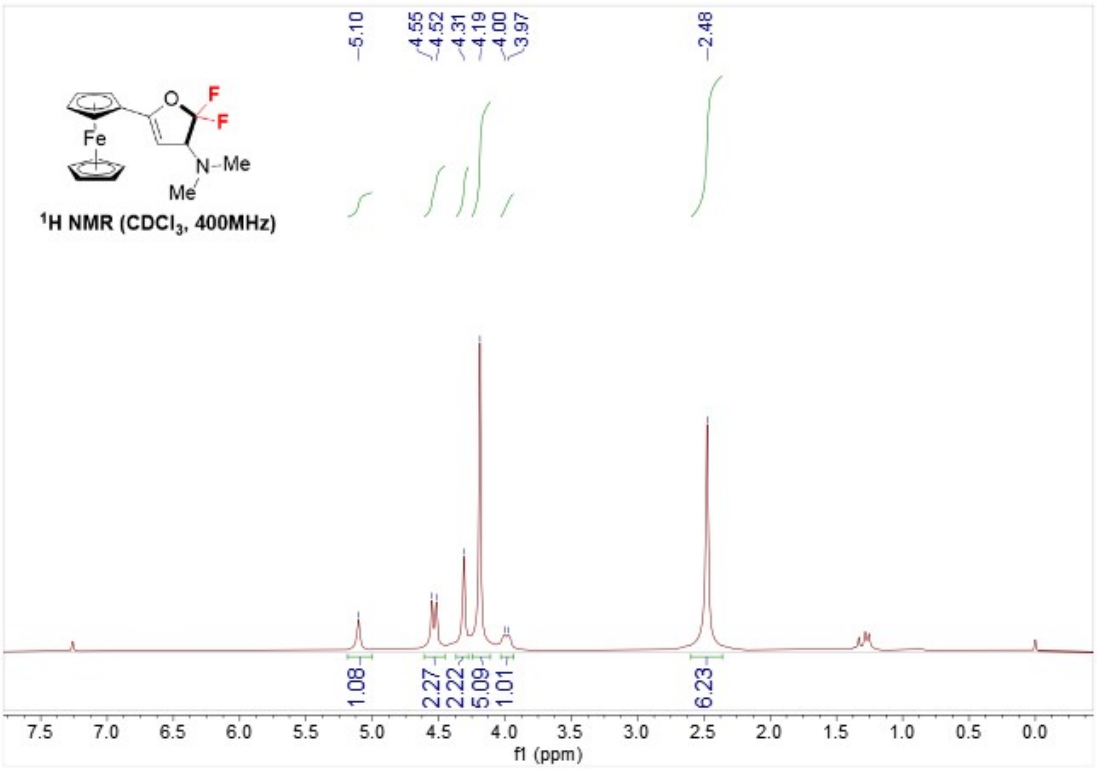

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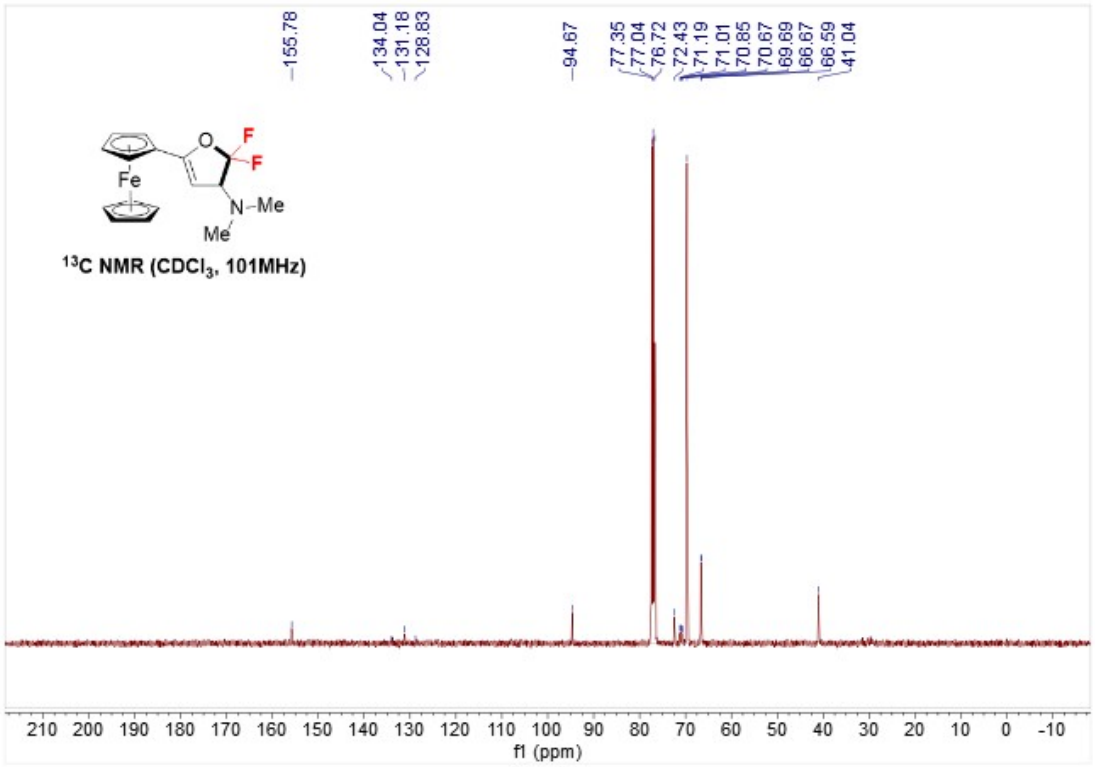

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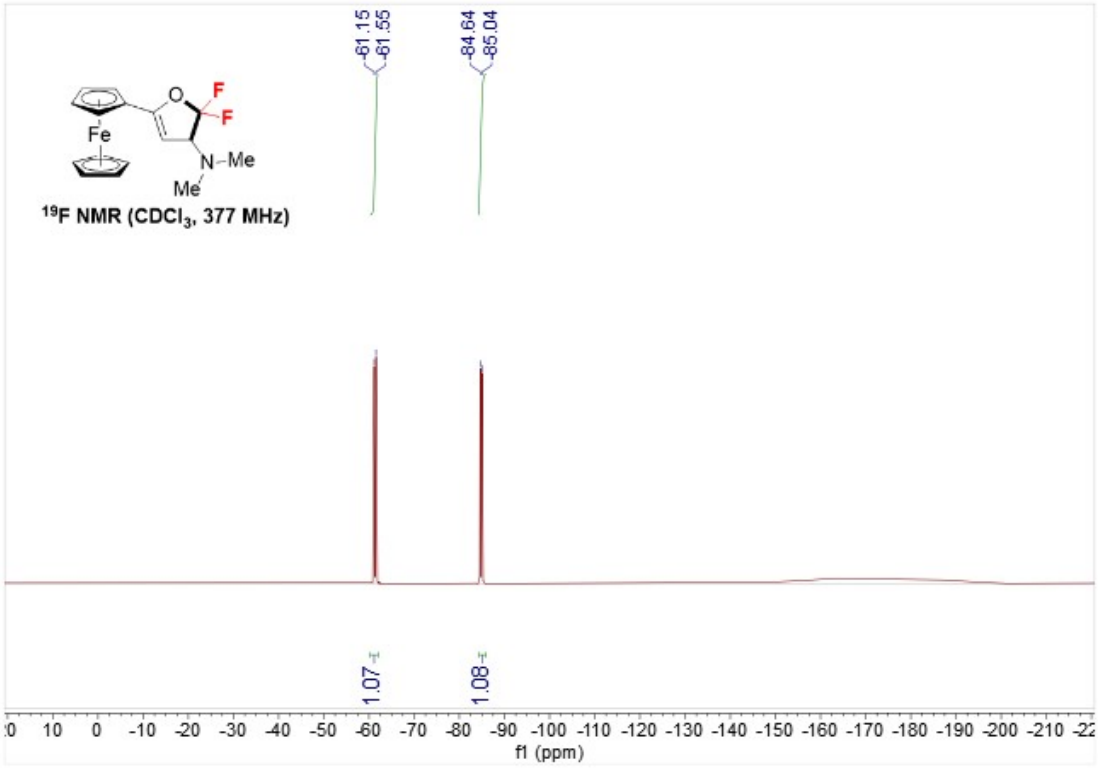

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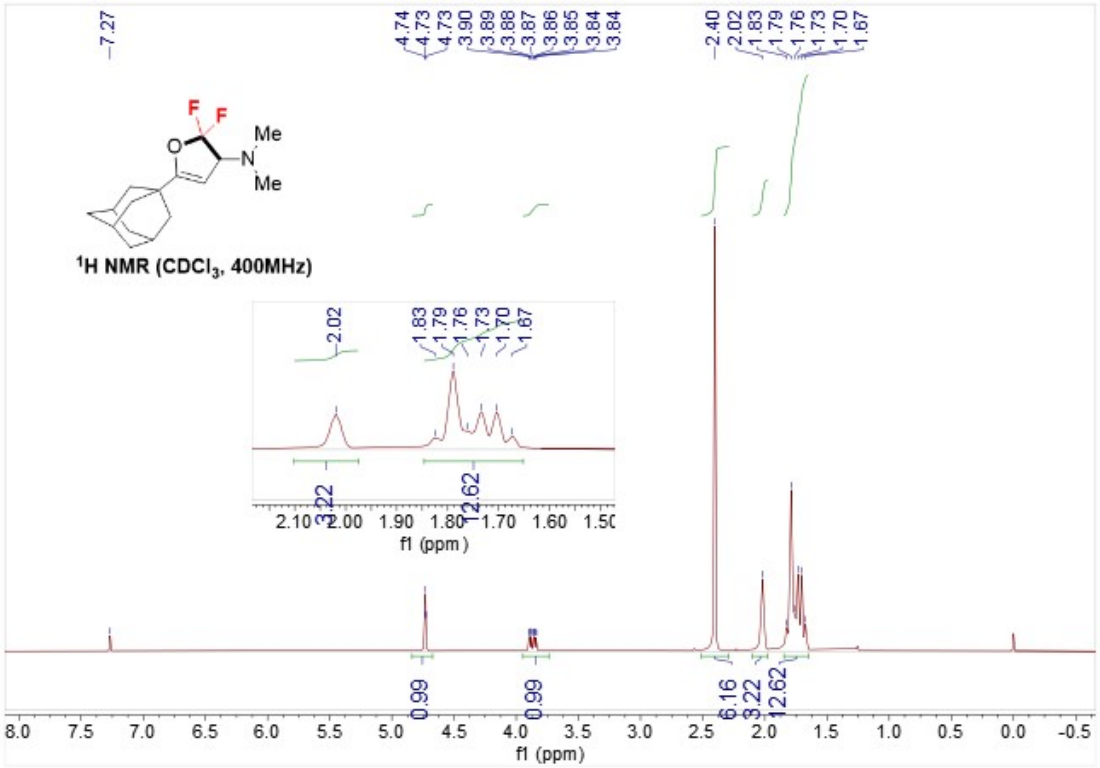

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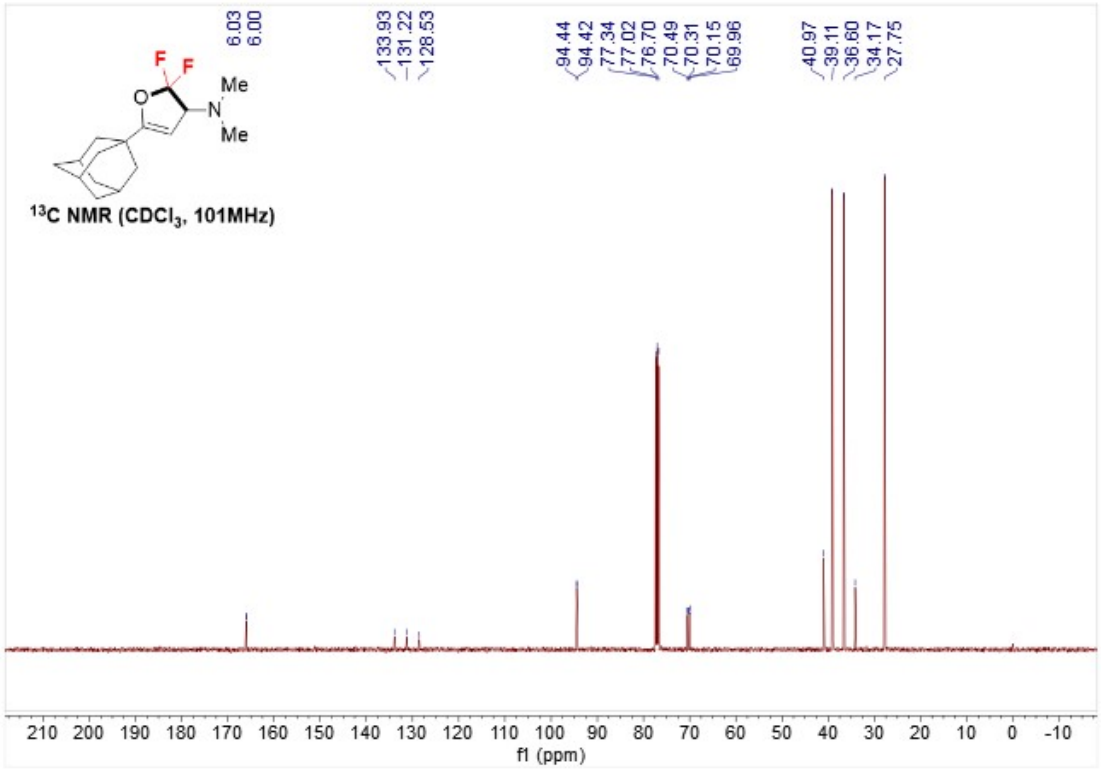

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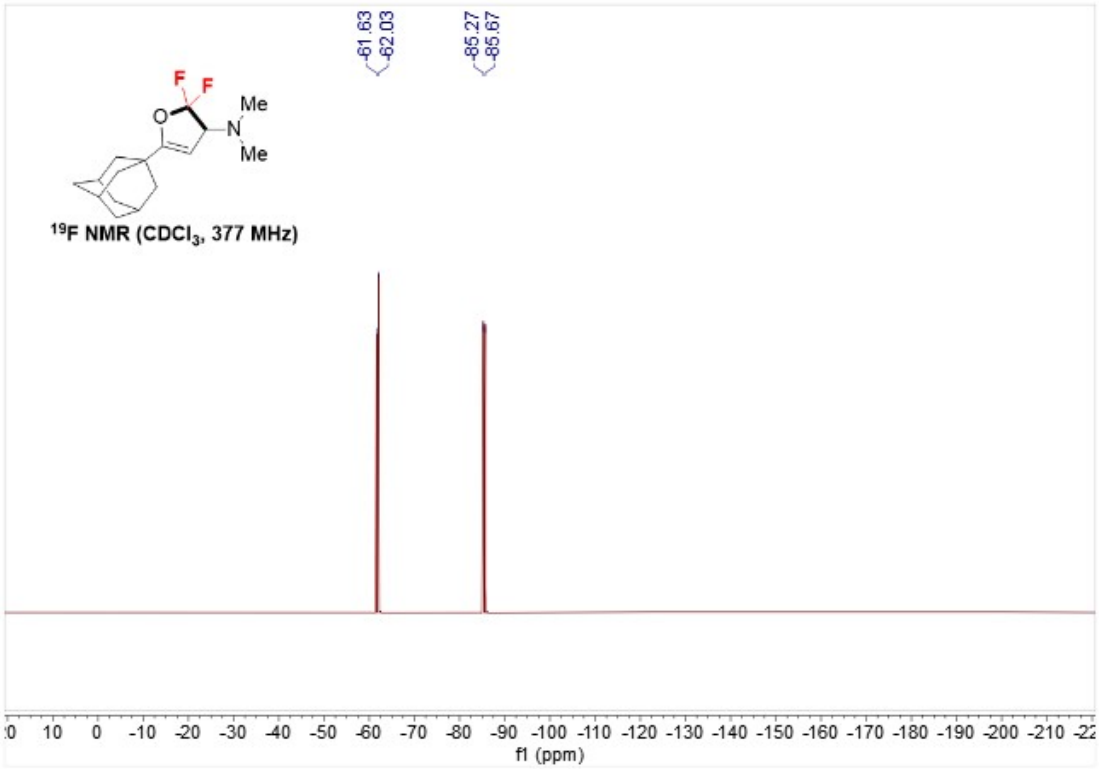

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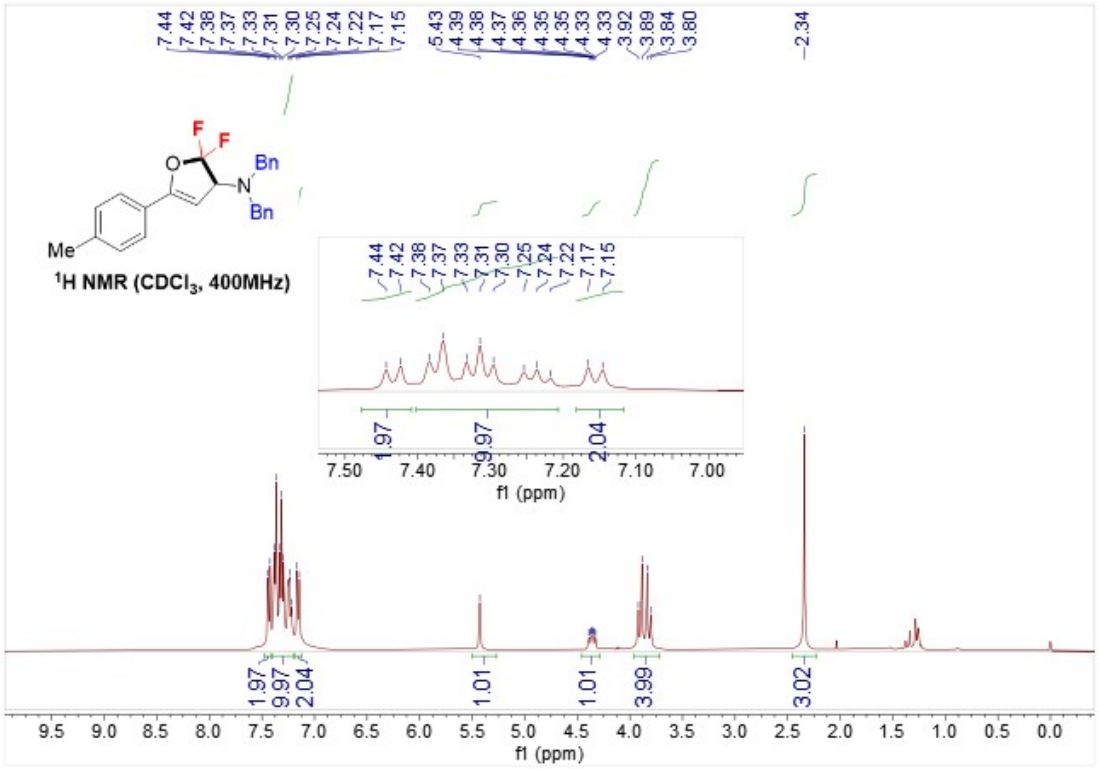

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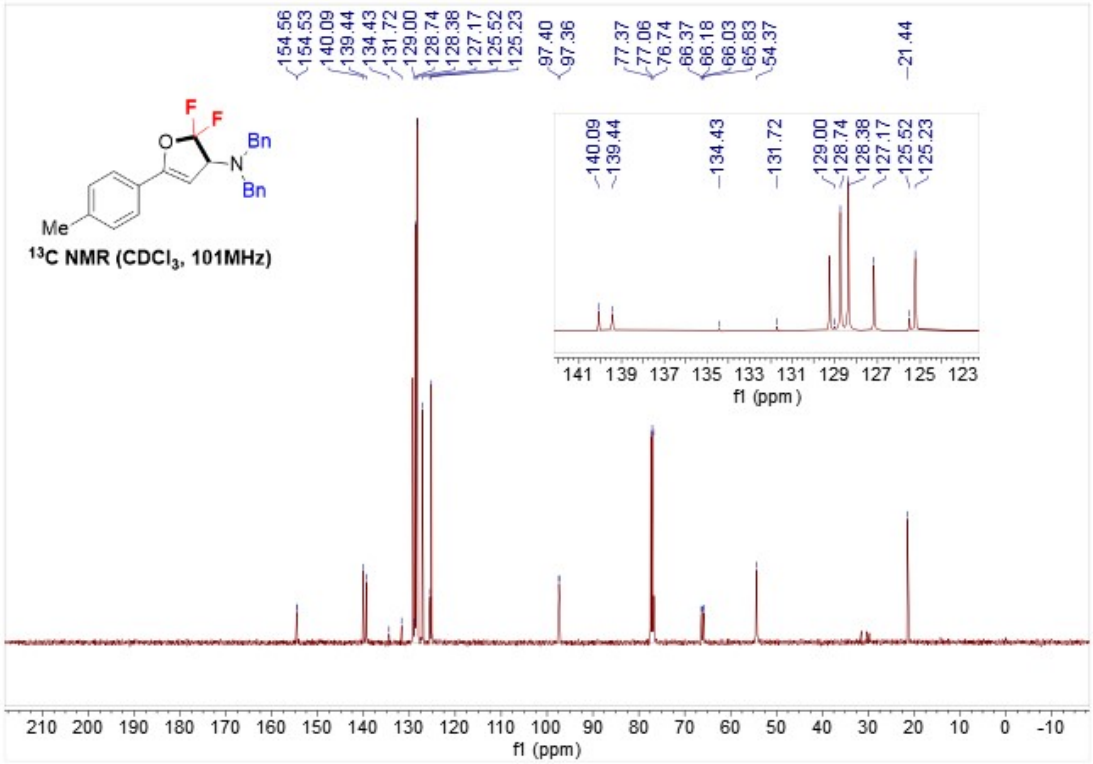

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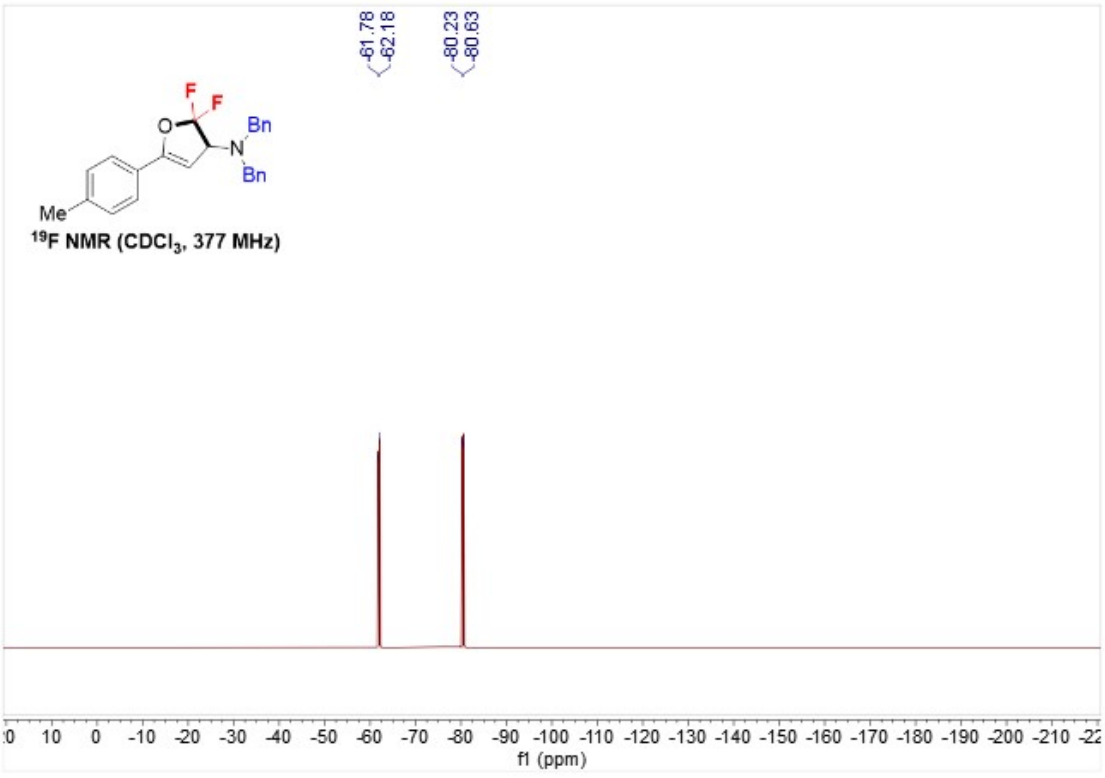

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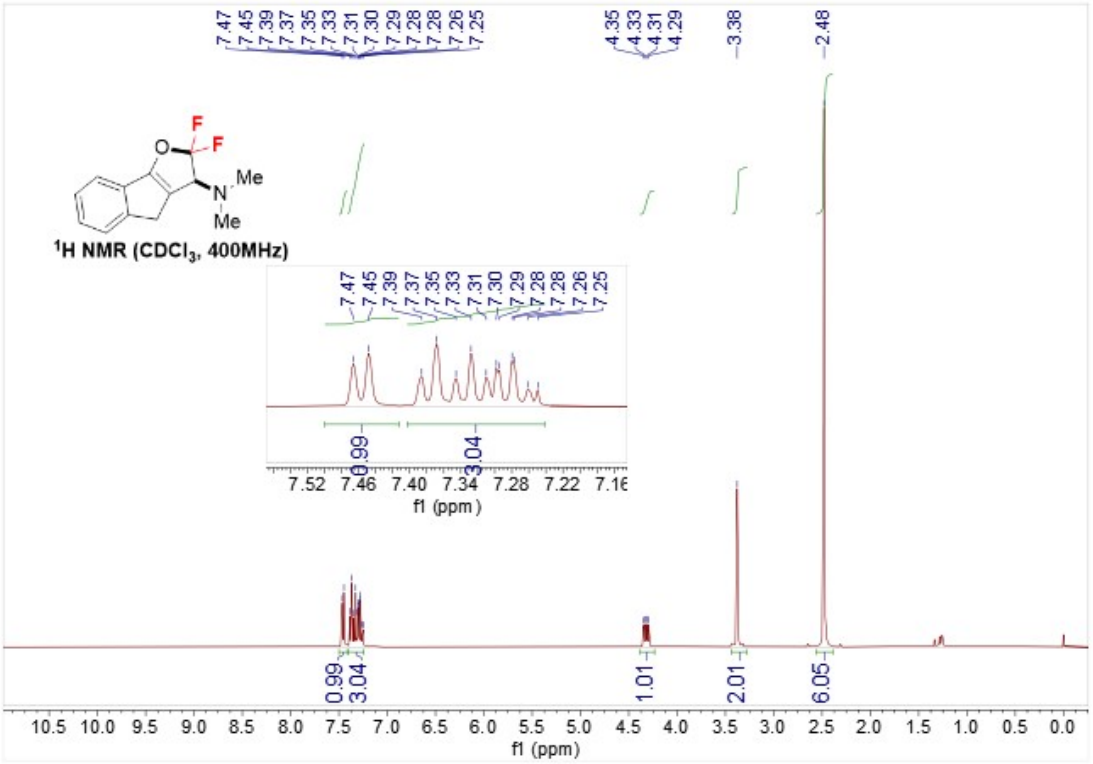

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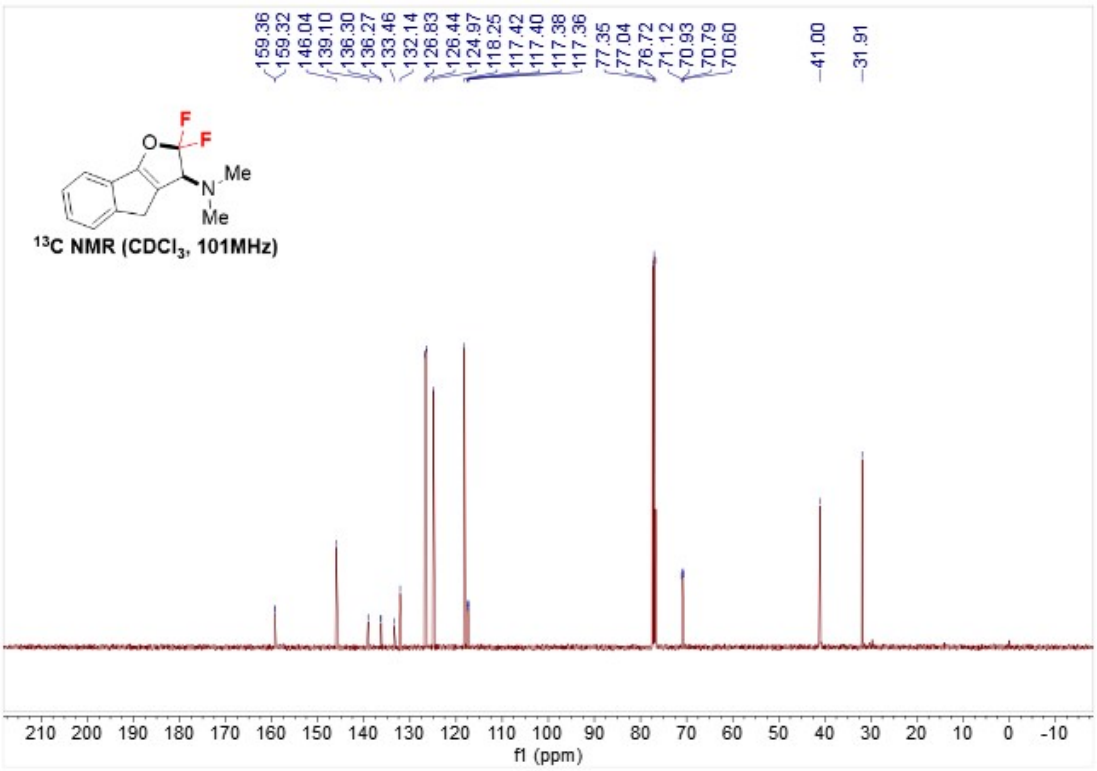

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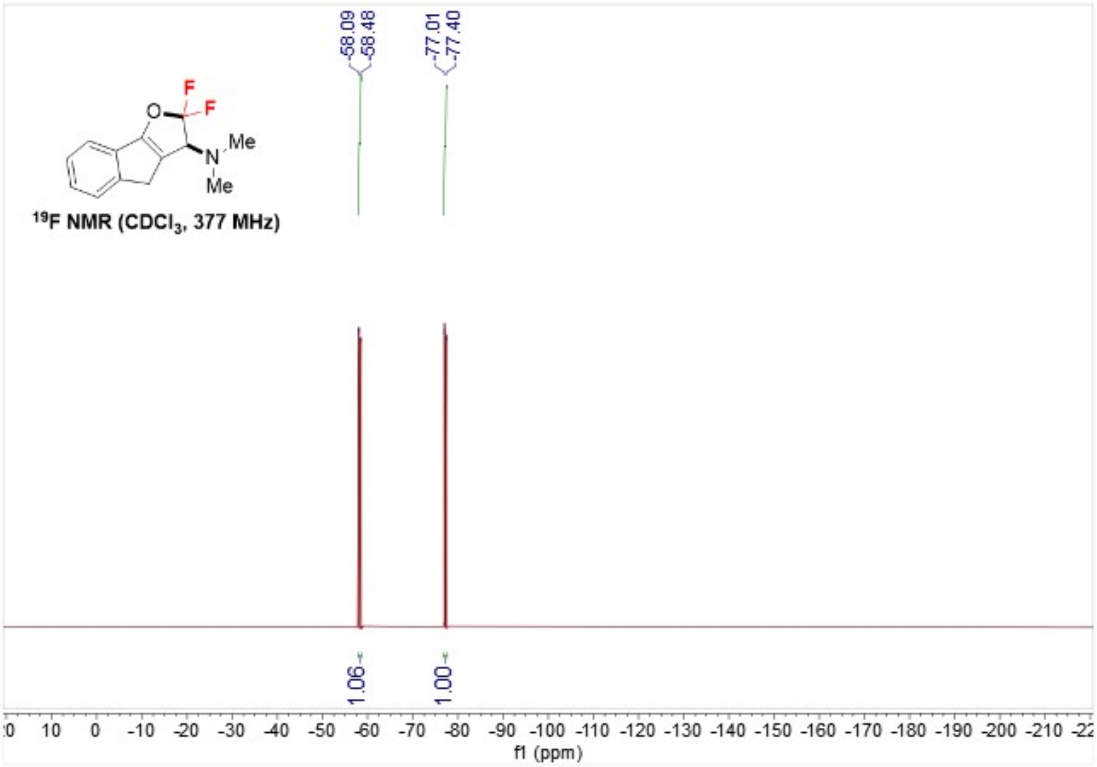

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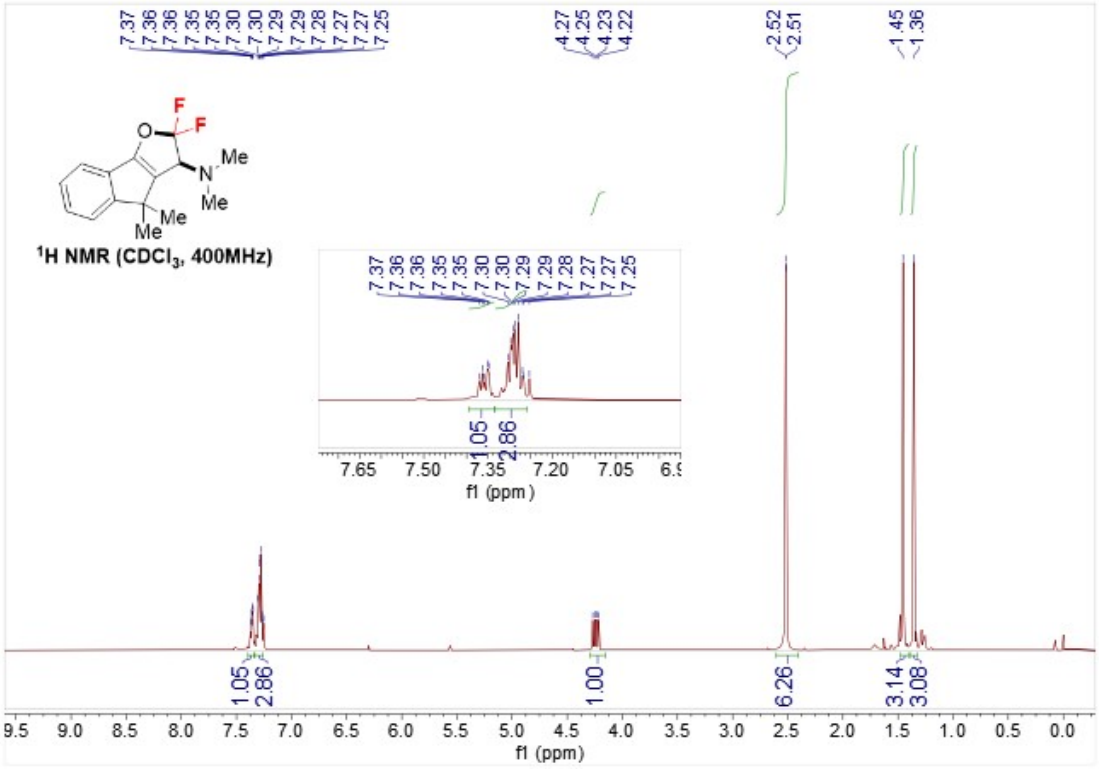

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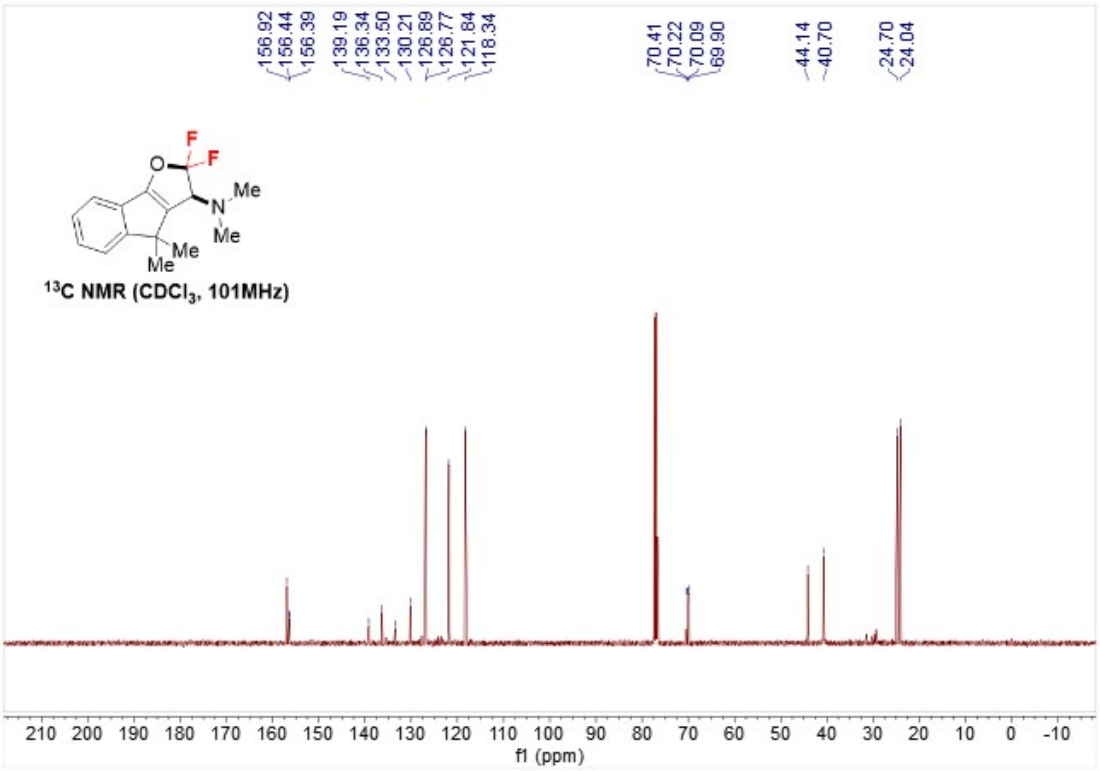
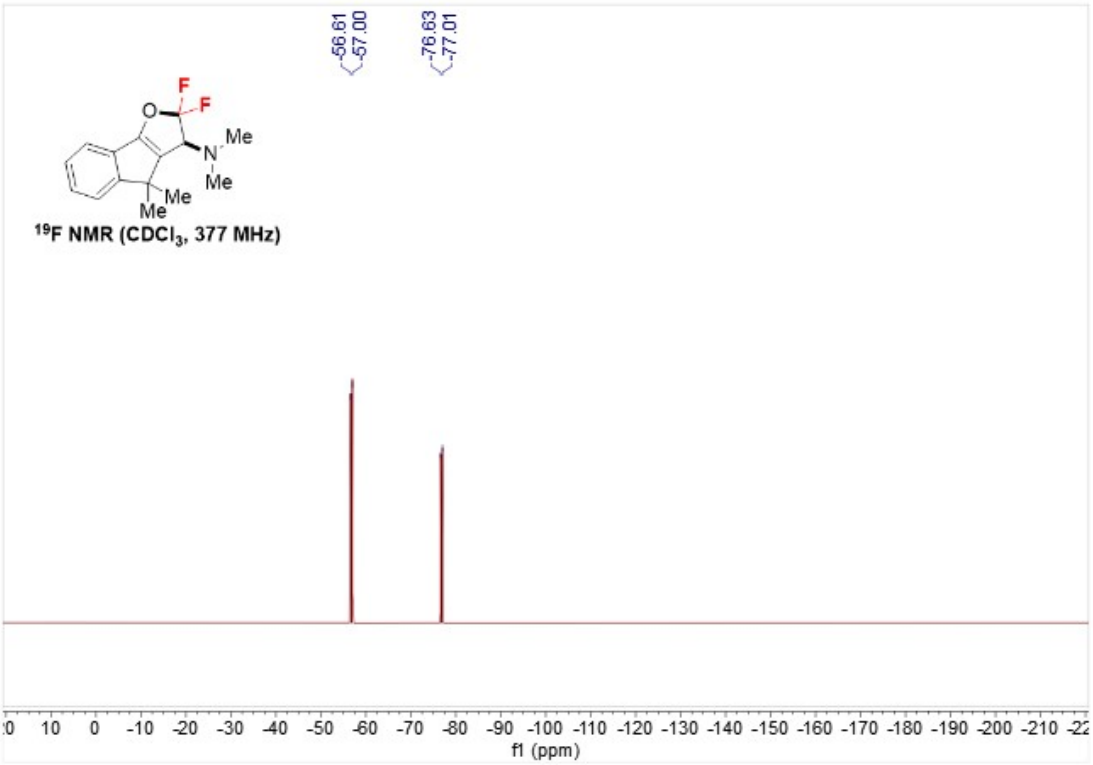


^{19}F NMR of compound 2al



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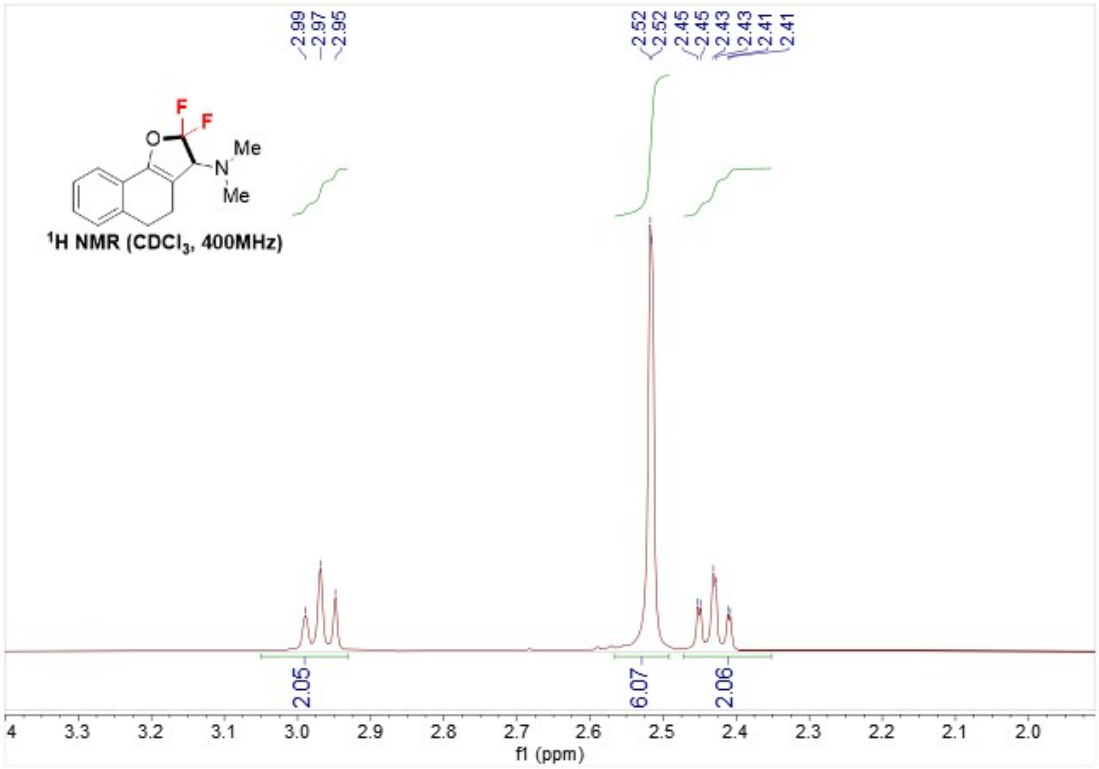

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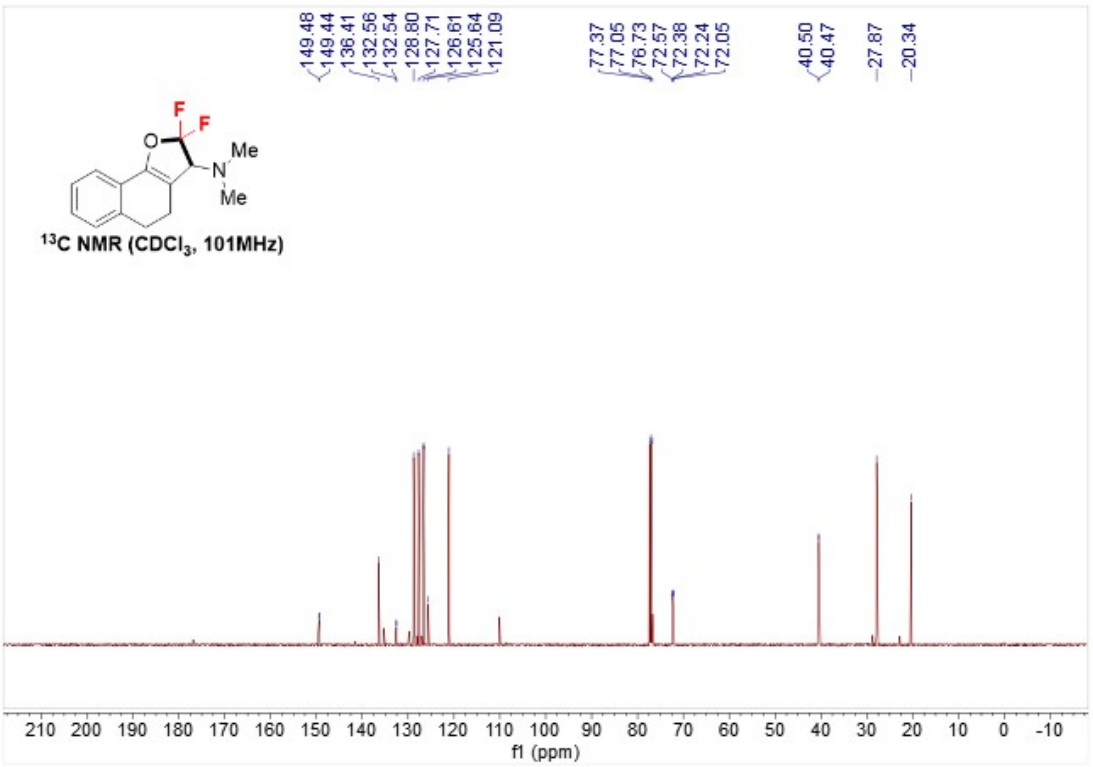

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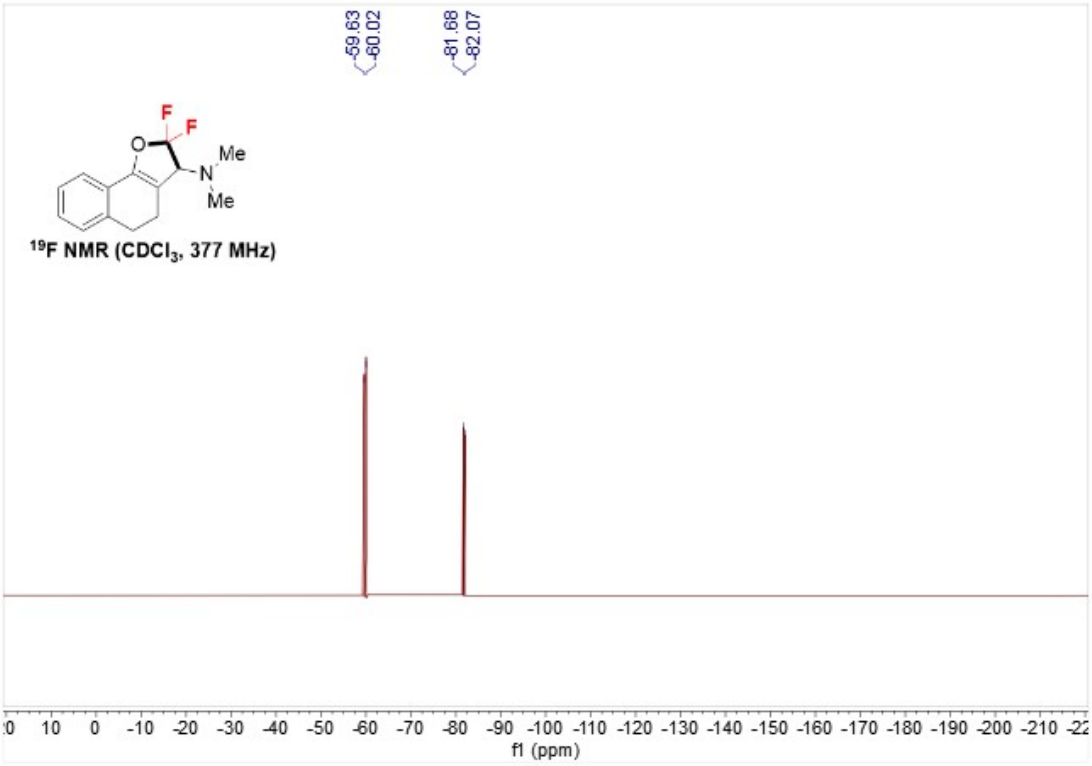

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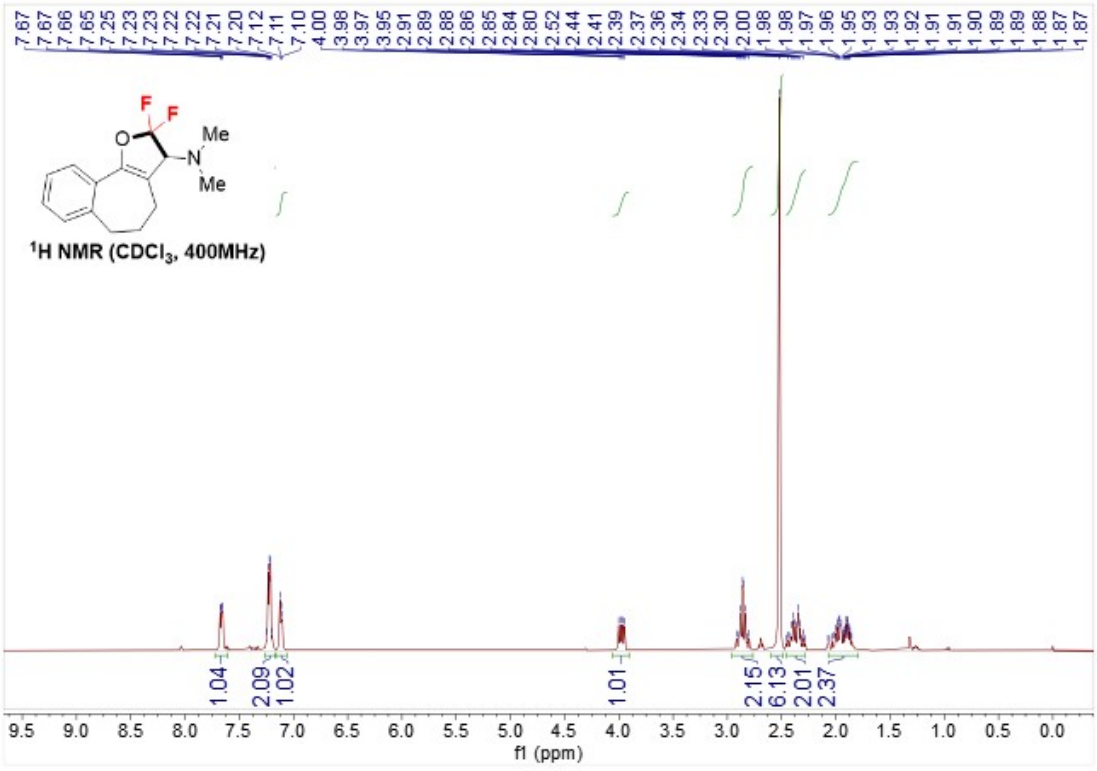

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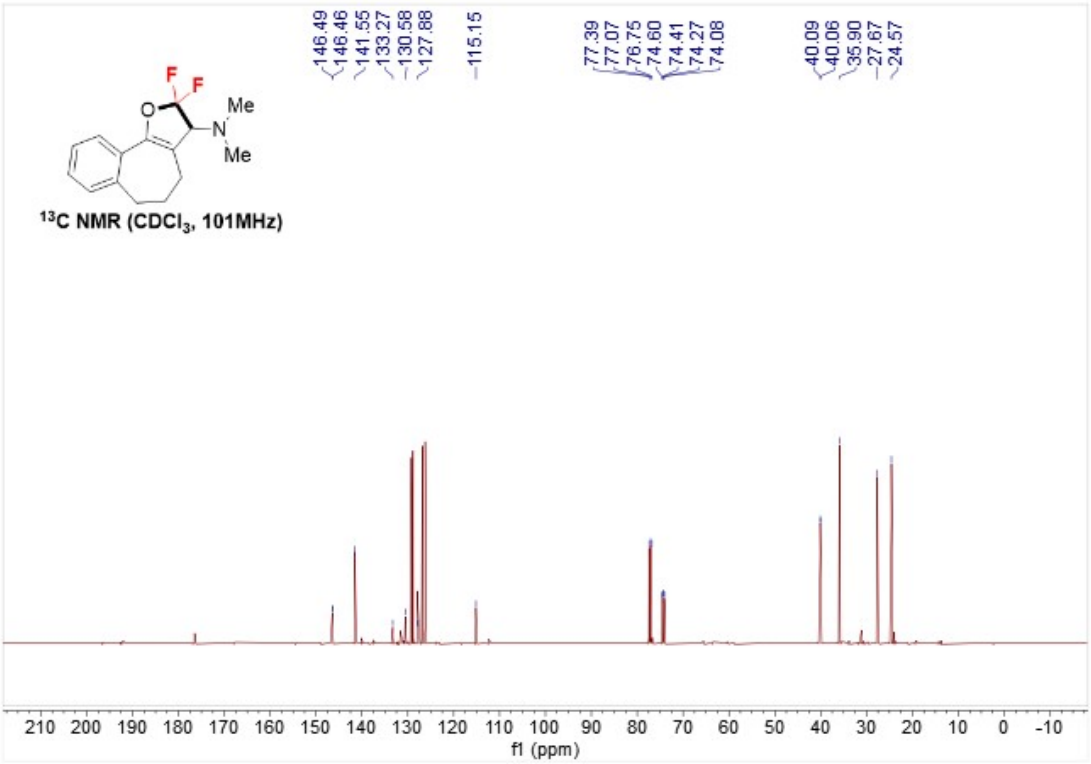

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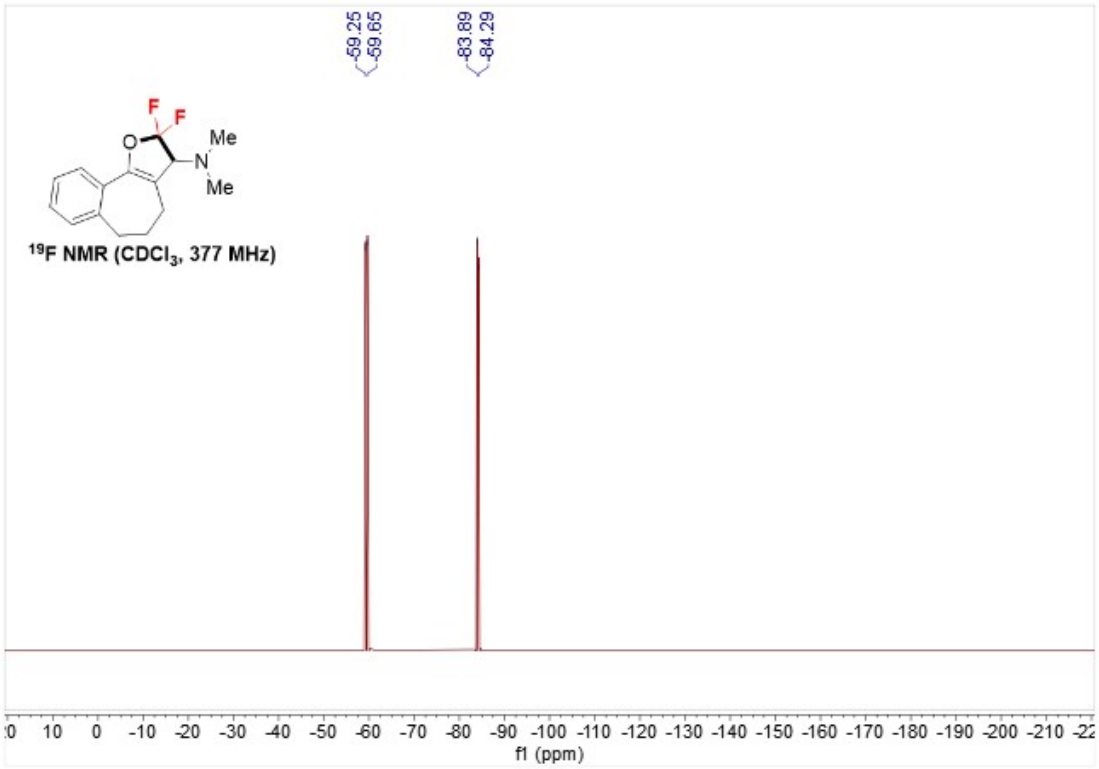

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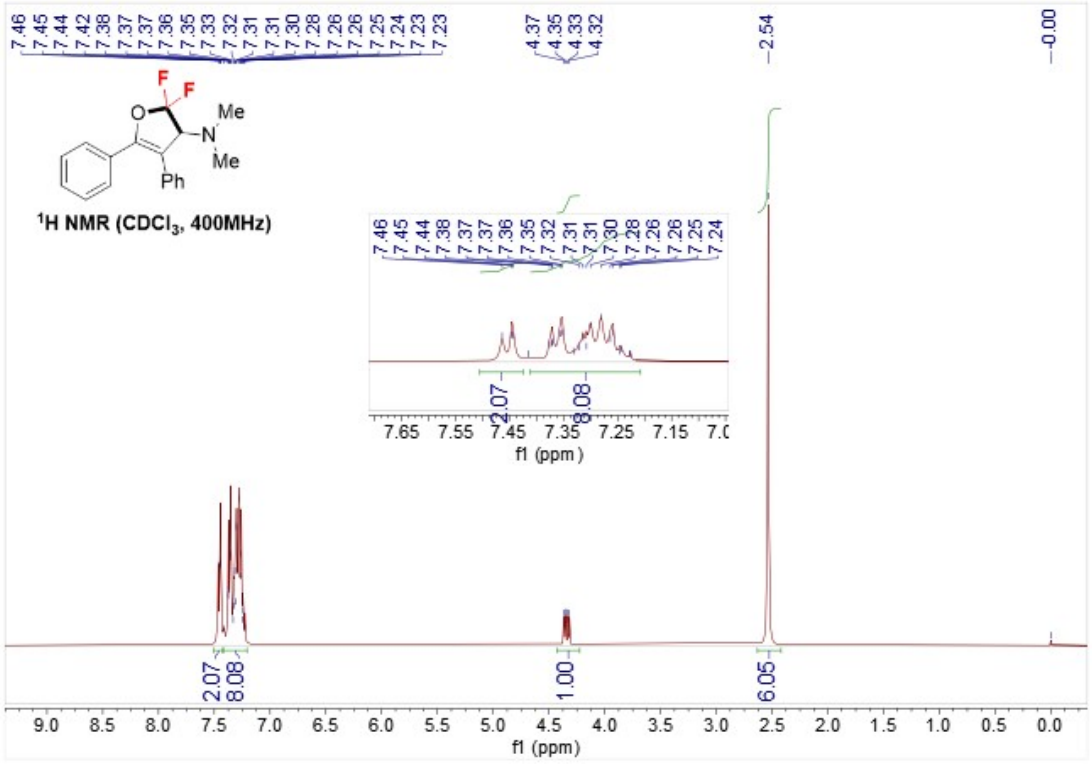

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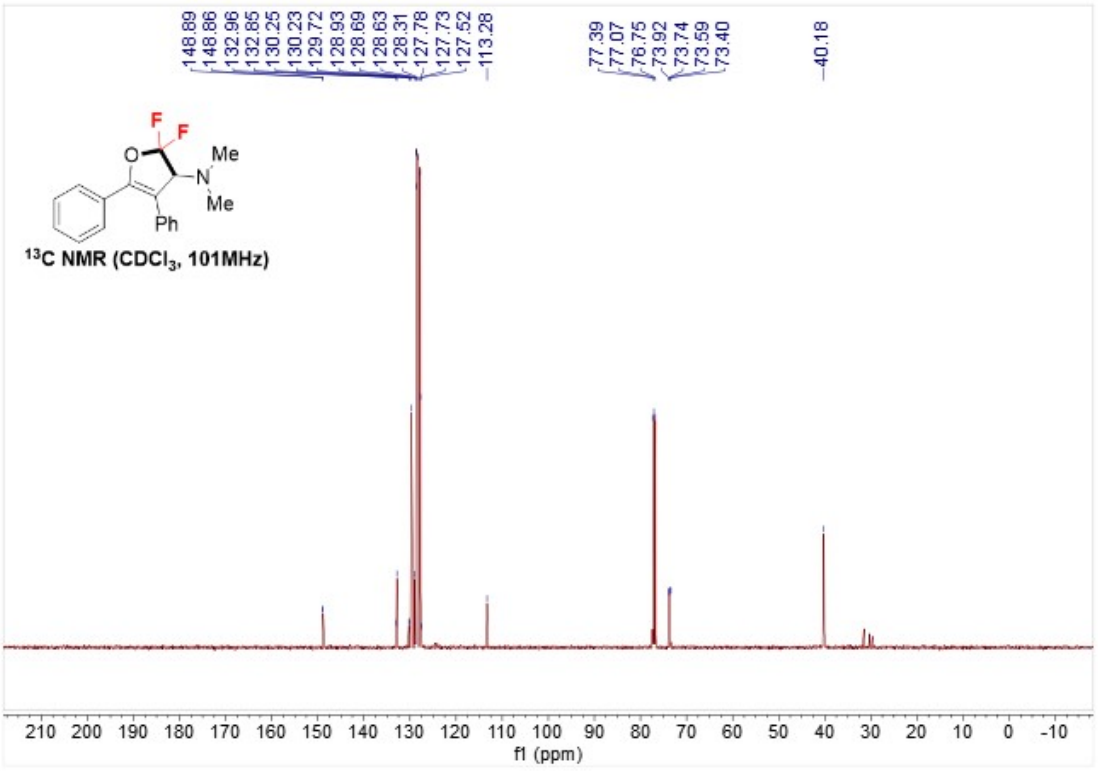

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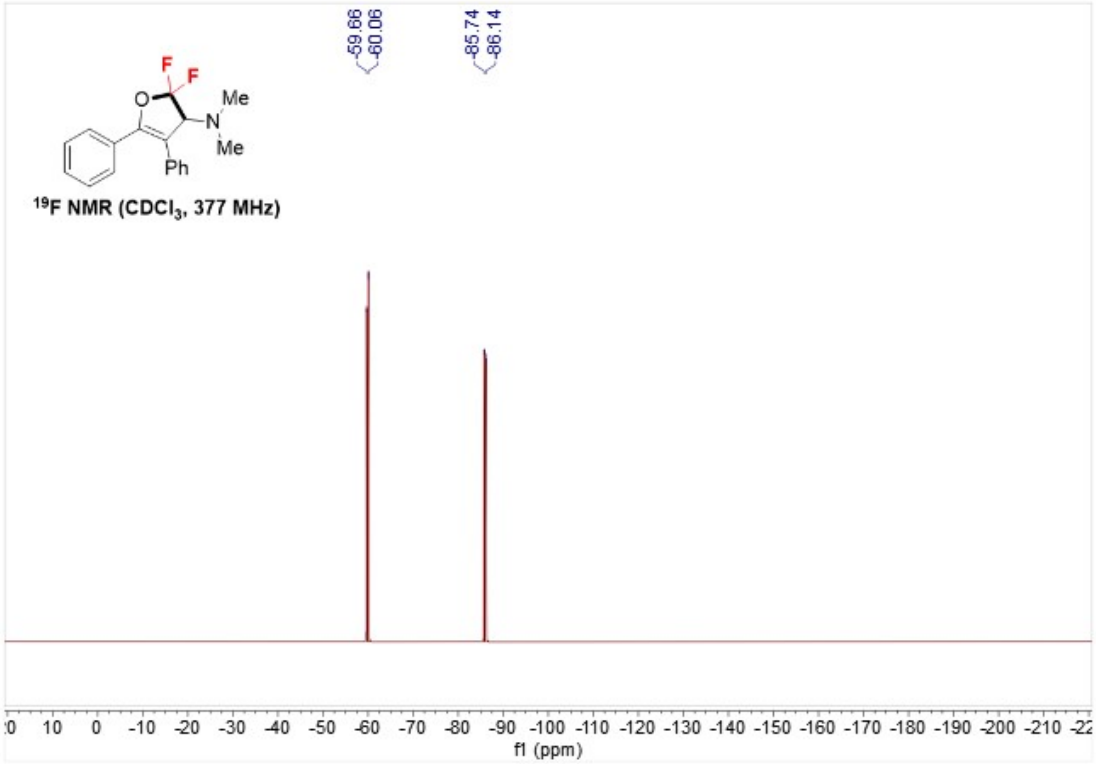

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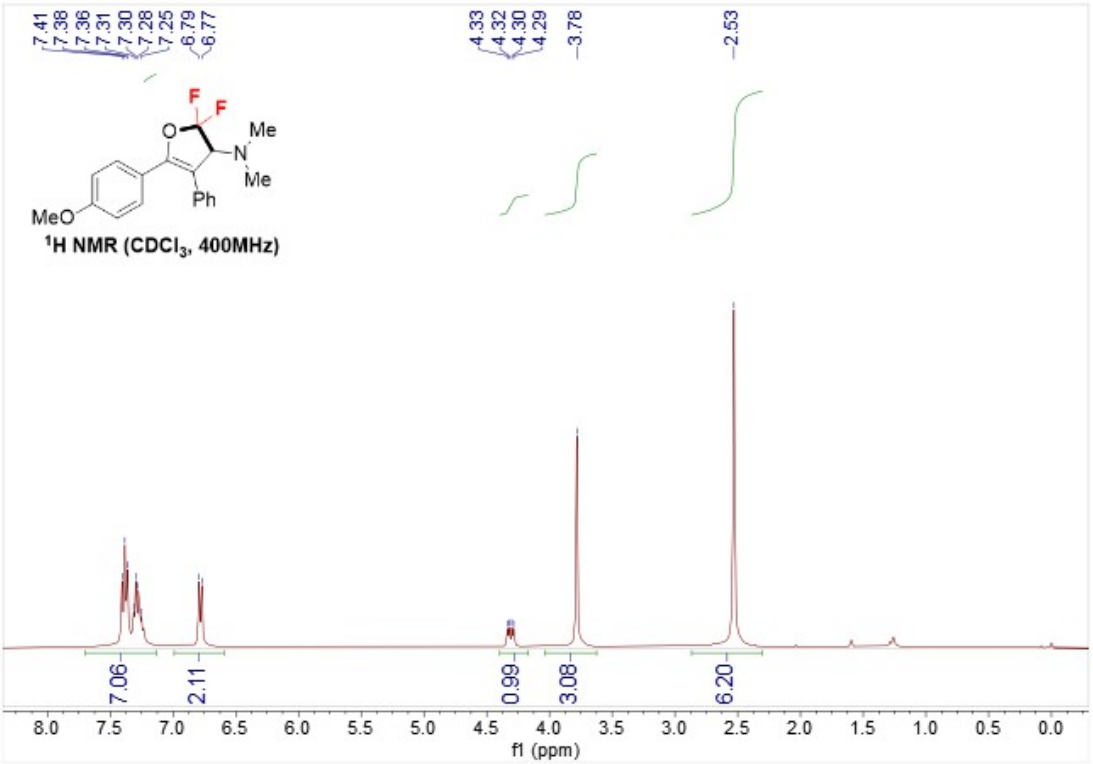

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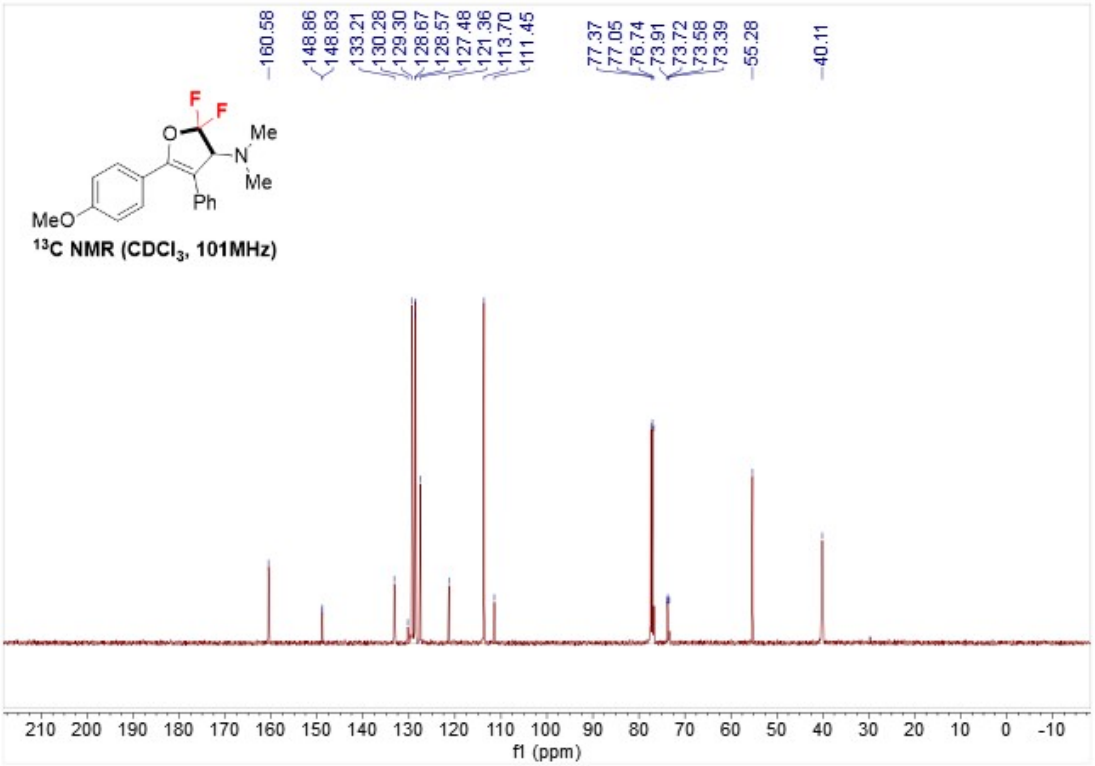

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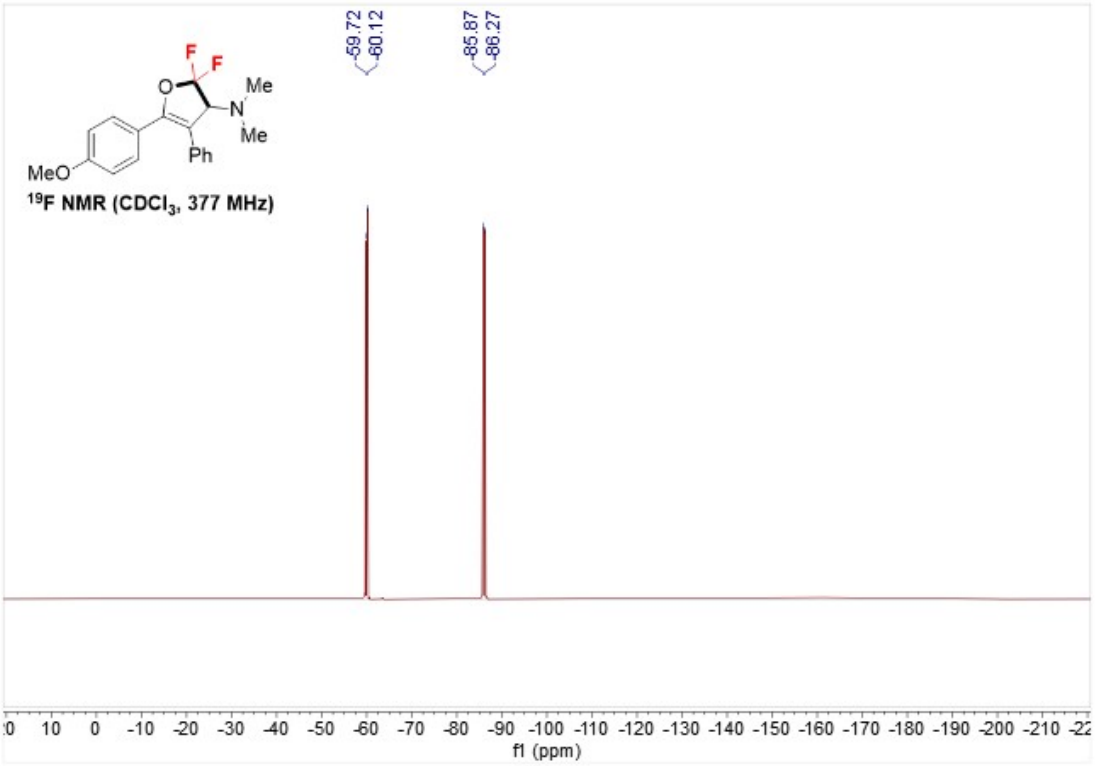

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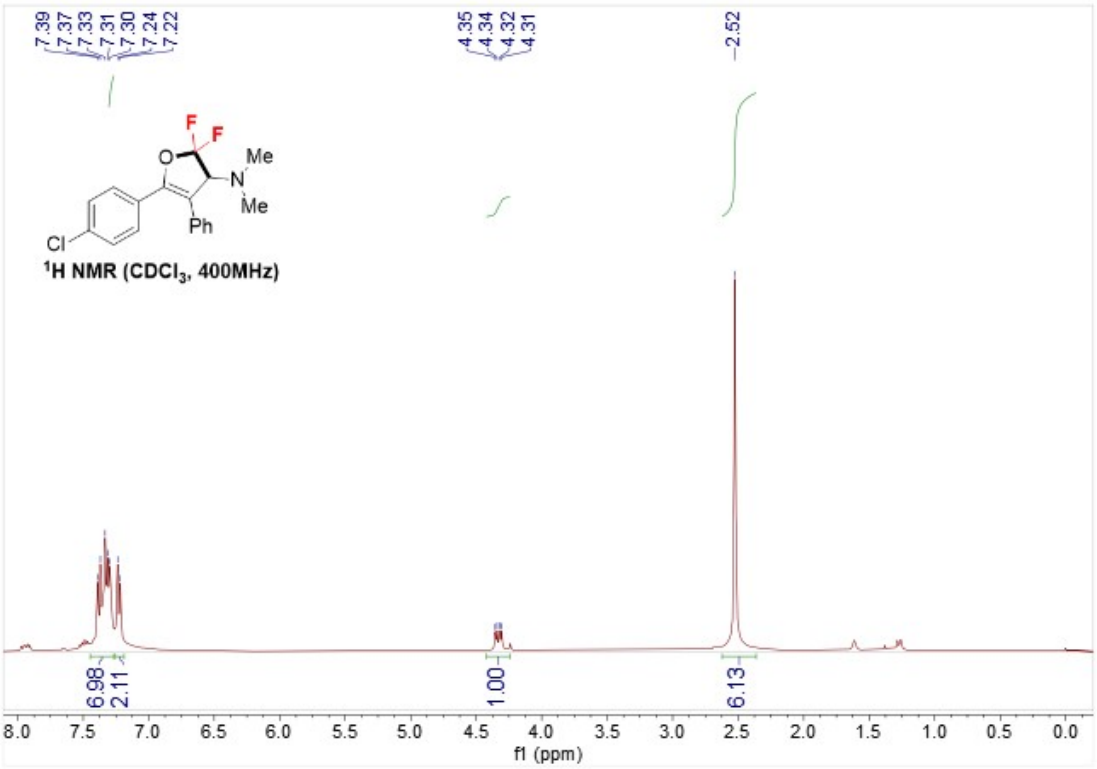

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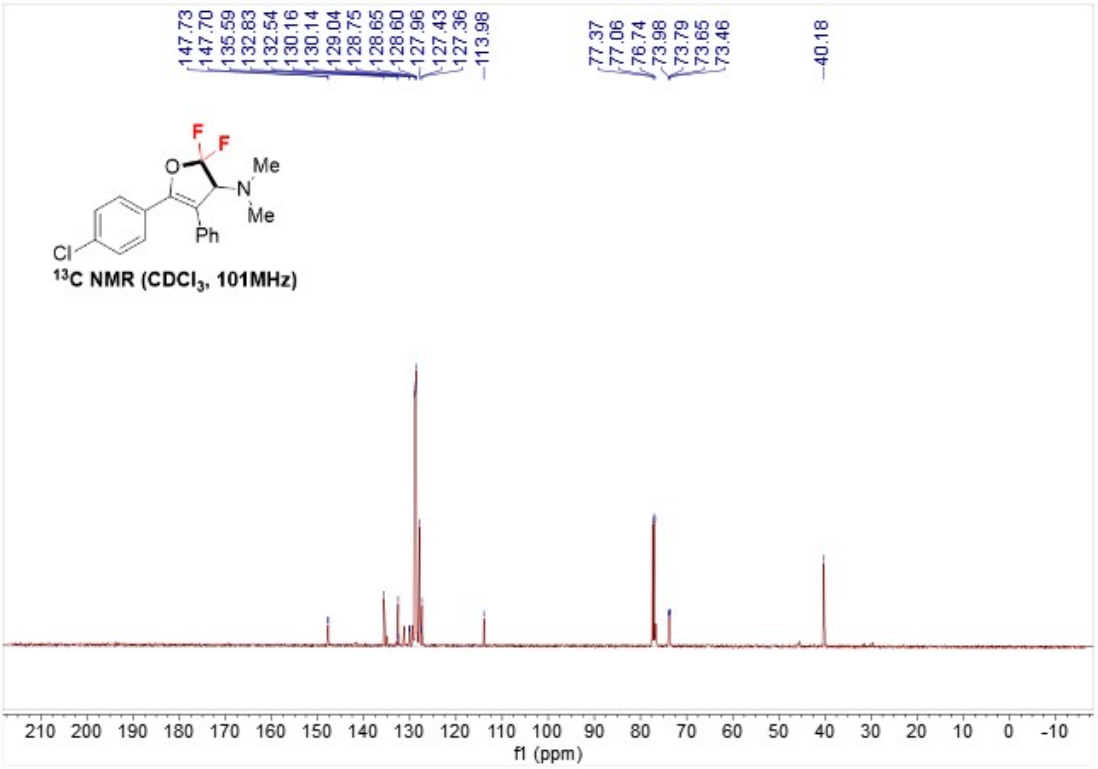

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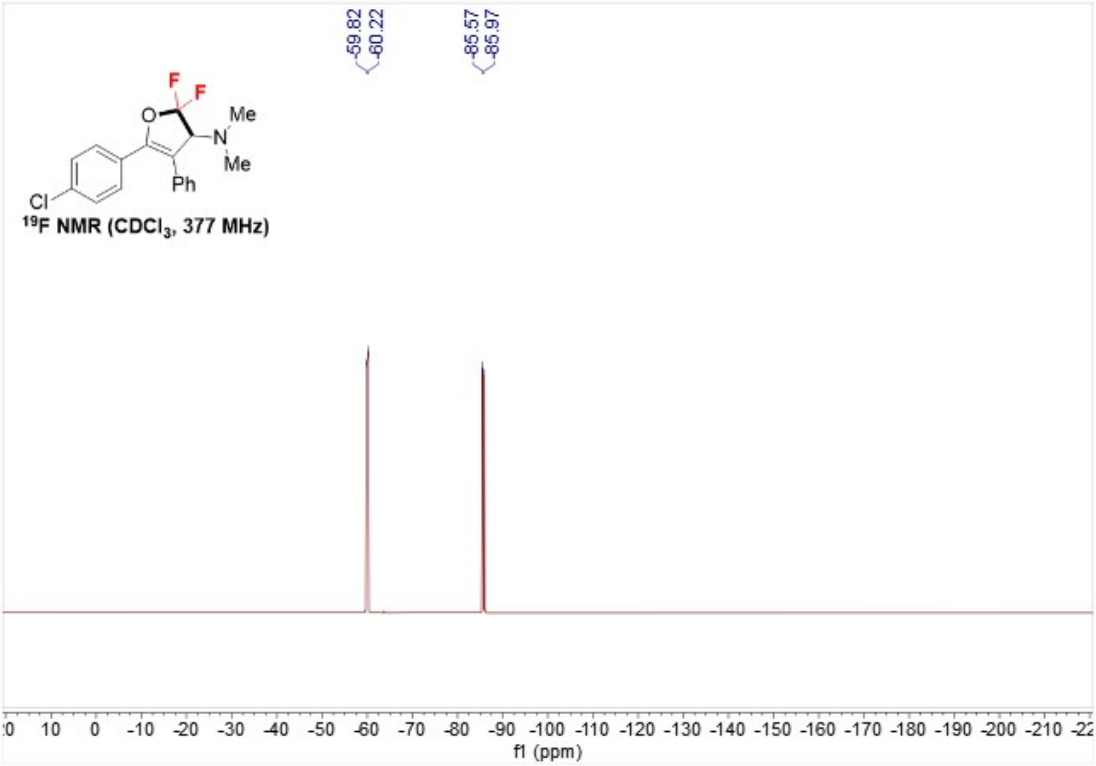

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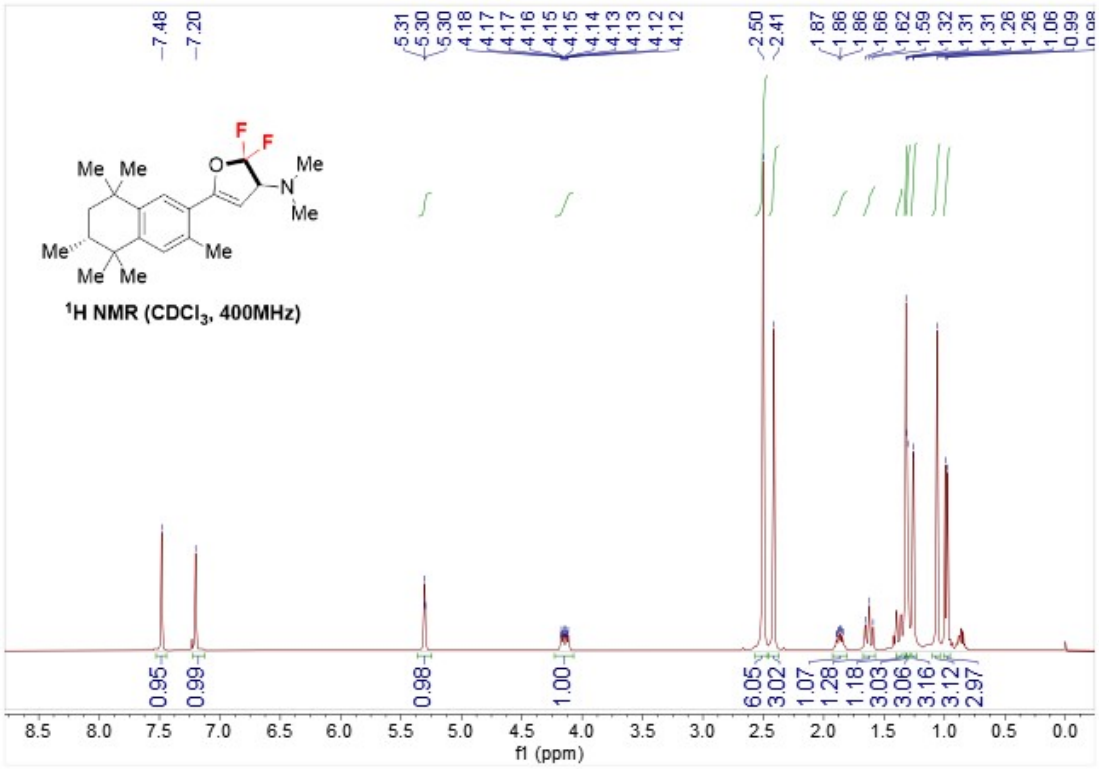
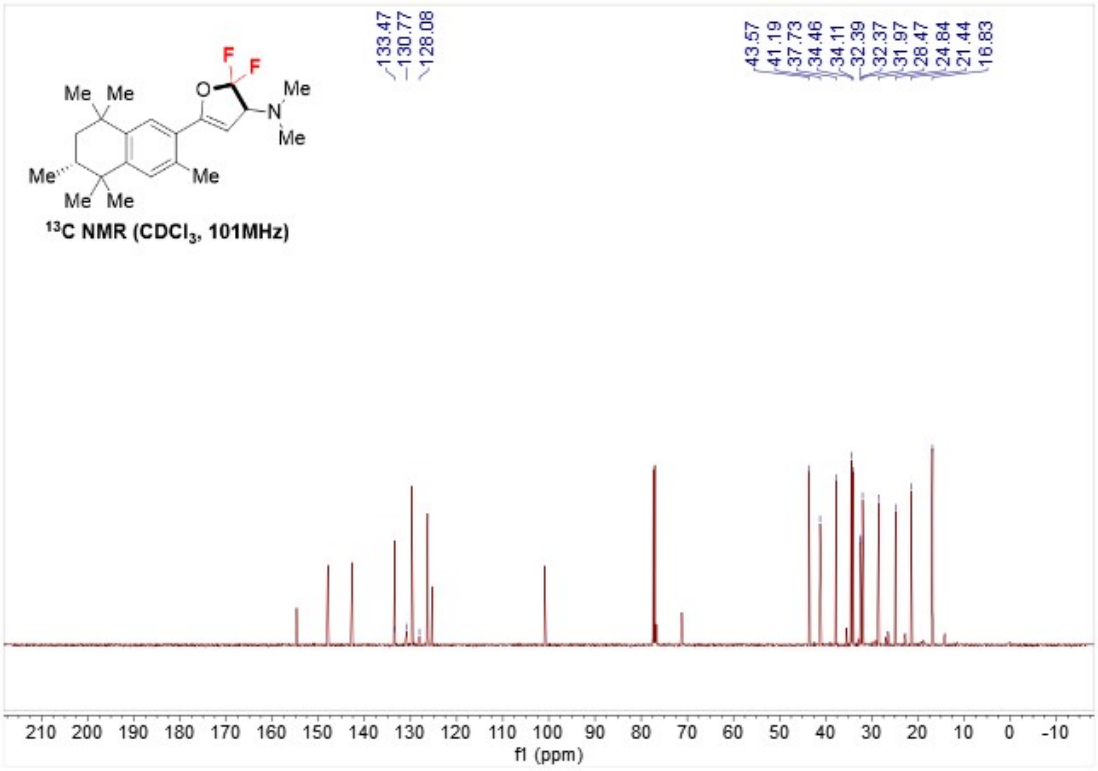
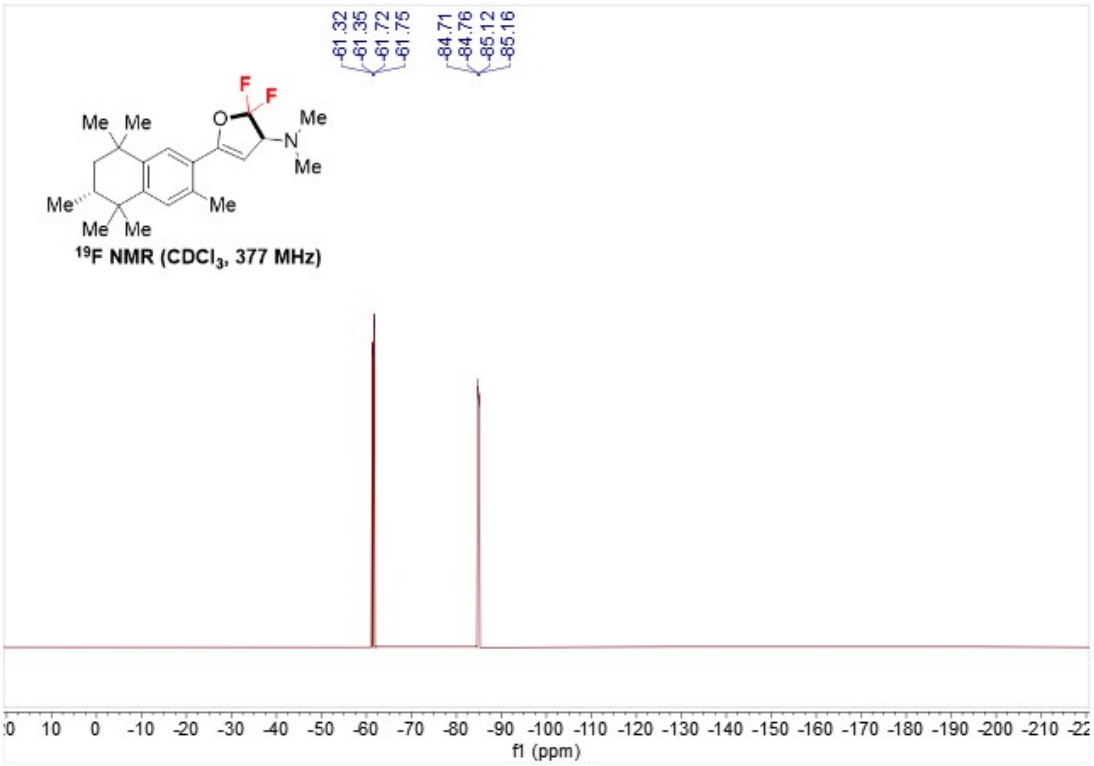


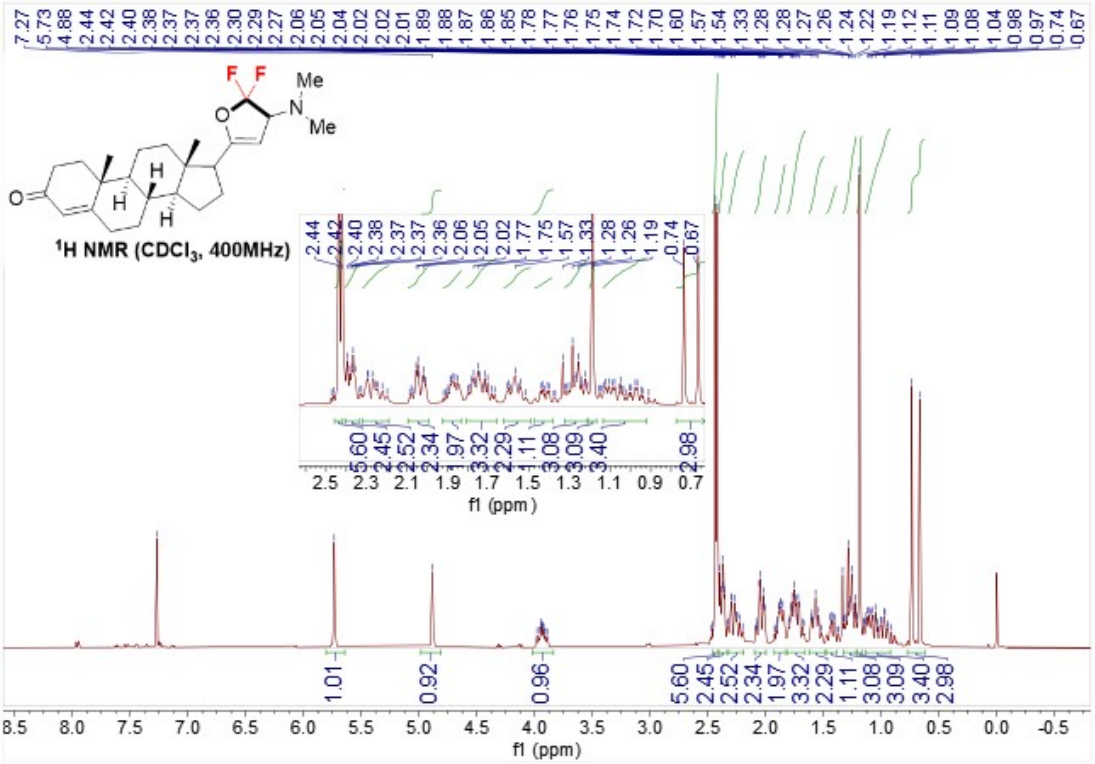
^{13}C NMR of compound 2ar



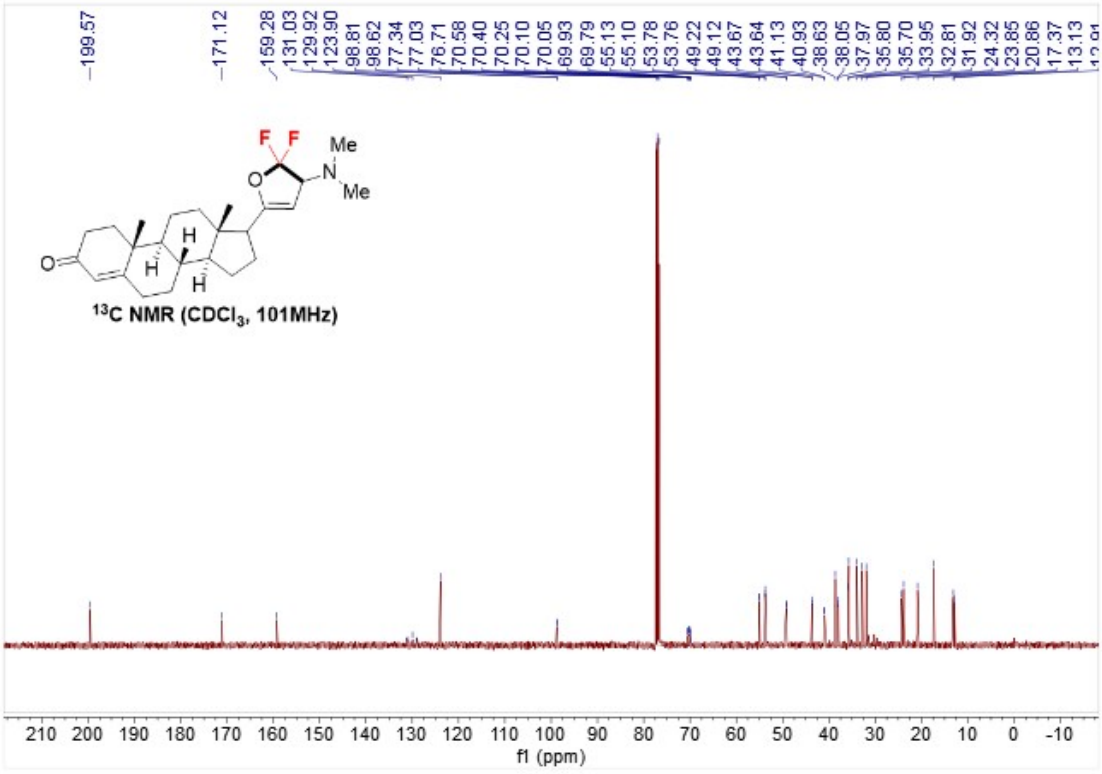
^{19}F NMR of compound 2ar



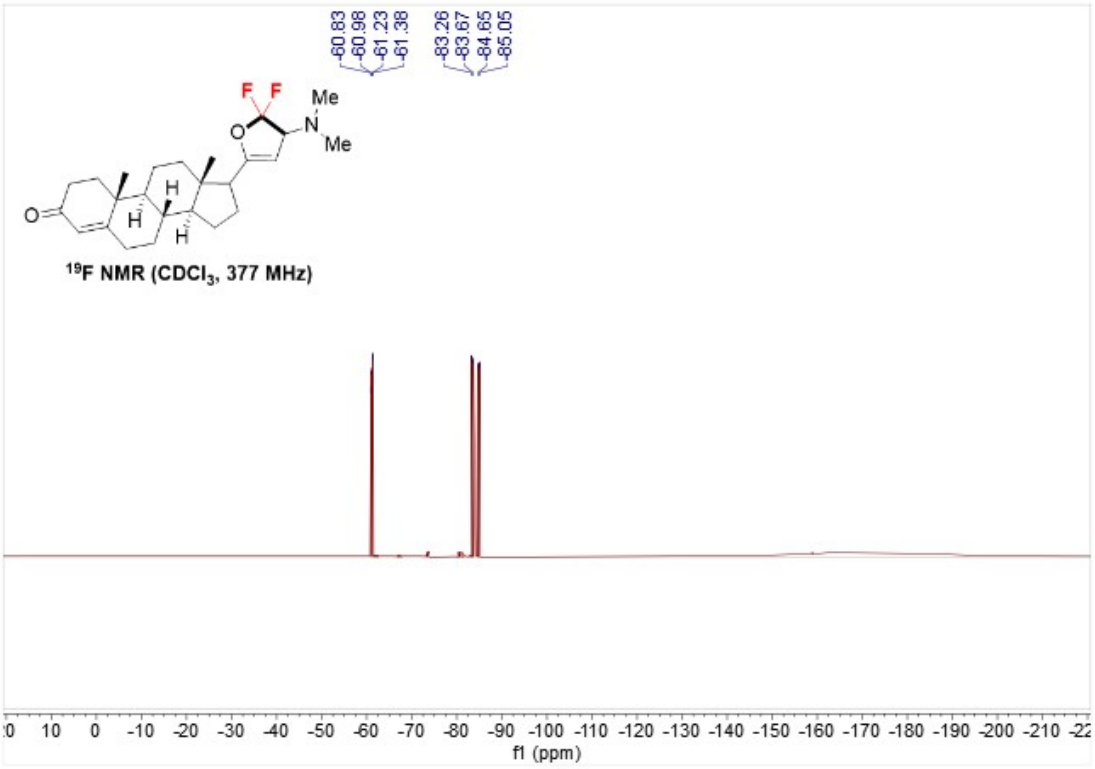
^{1}H NMR of compound 2as



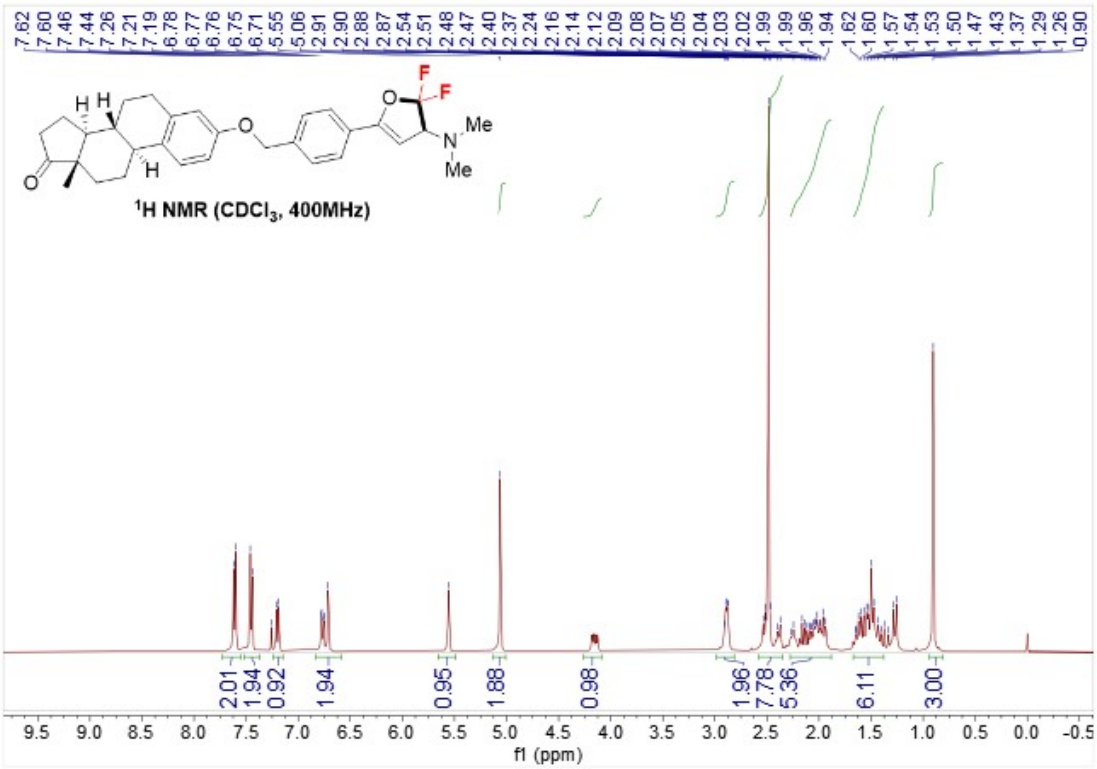
^{13}C NMR of compound 2as



^{19}F NMR of compound 2as



^{1}H NMR of compound 2at



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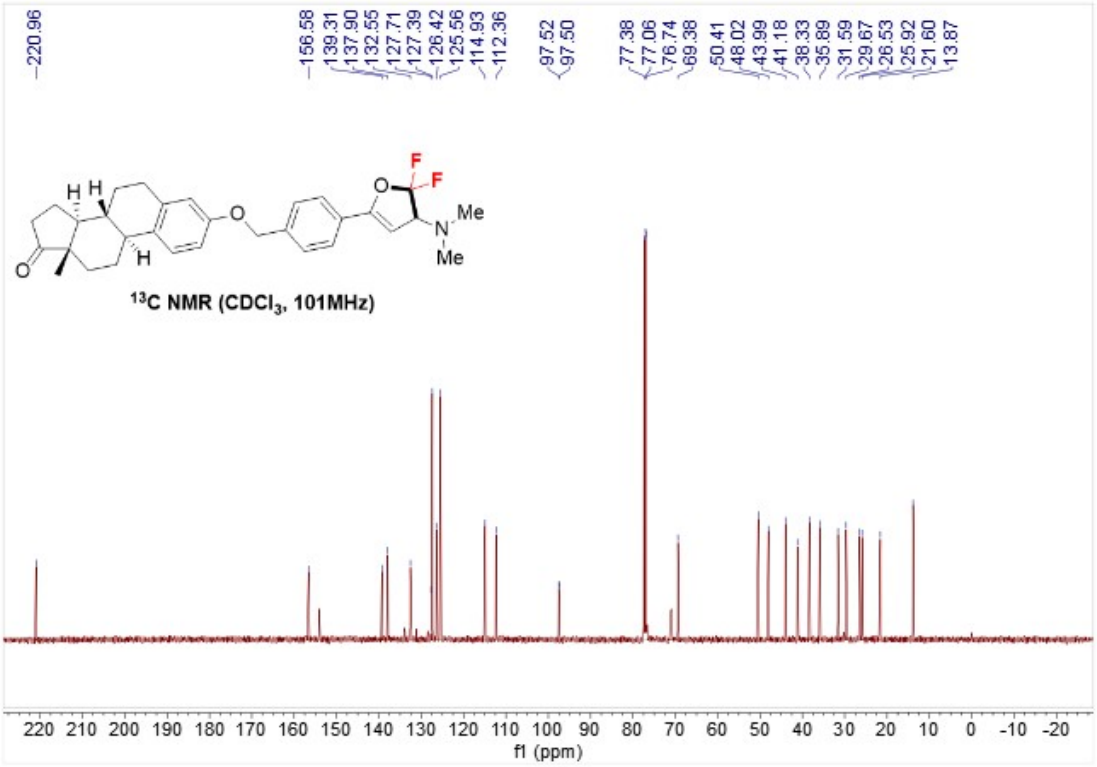
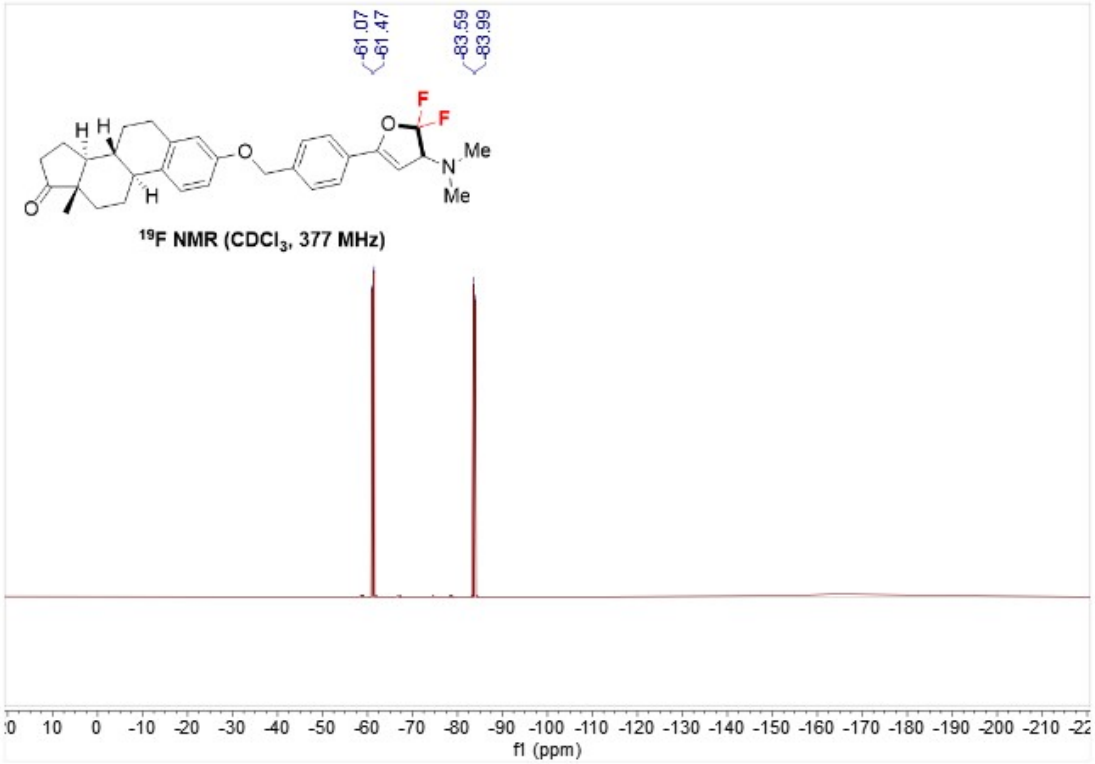
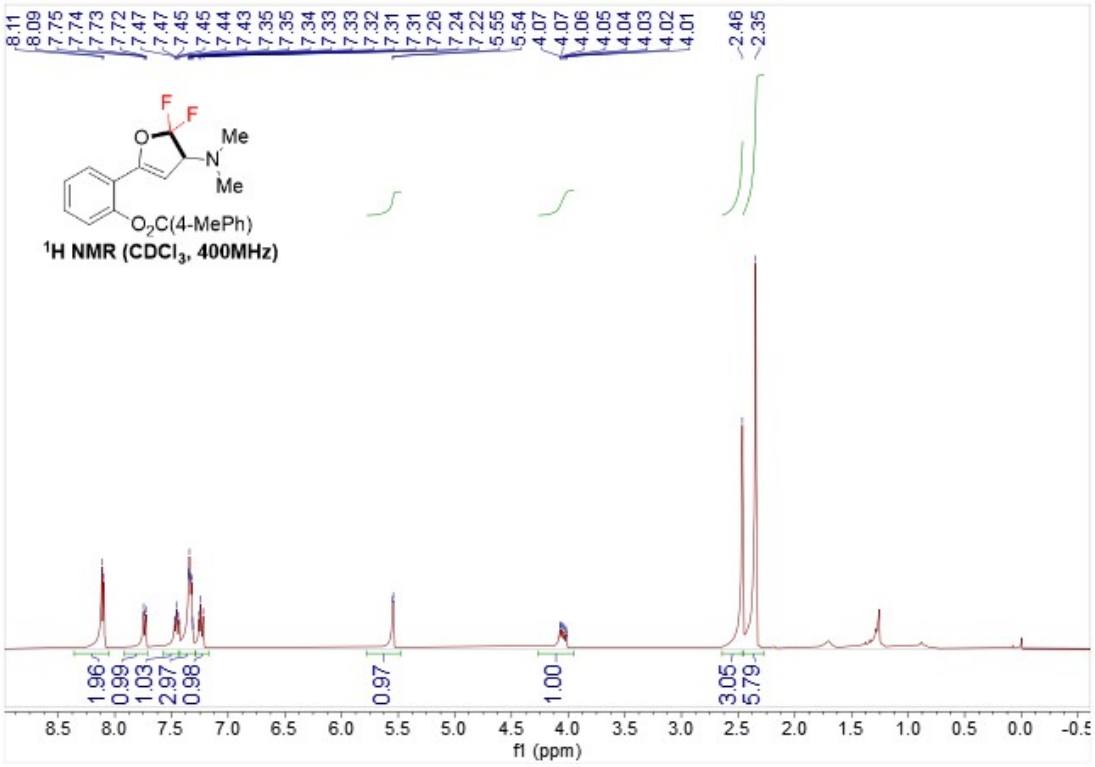


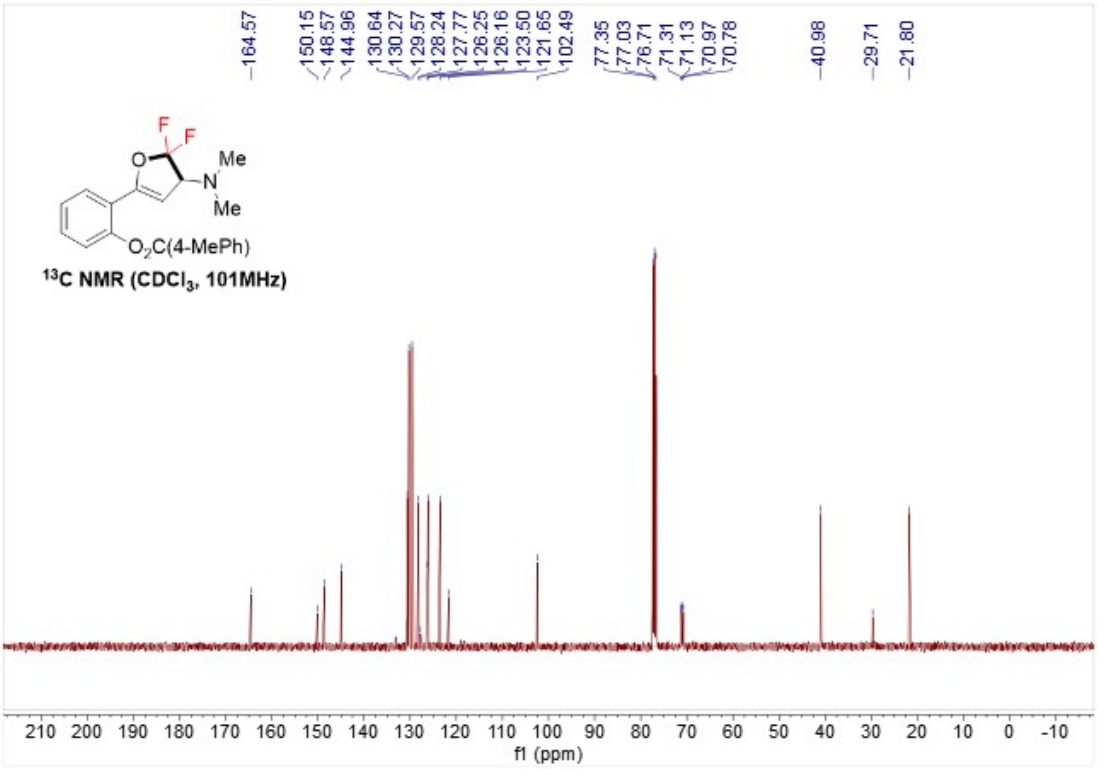
^{19}F NMR of compound 2at



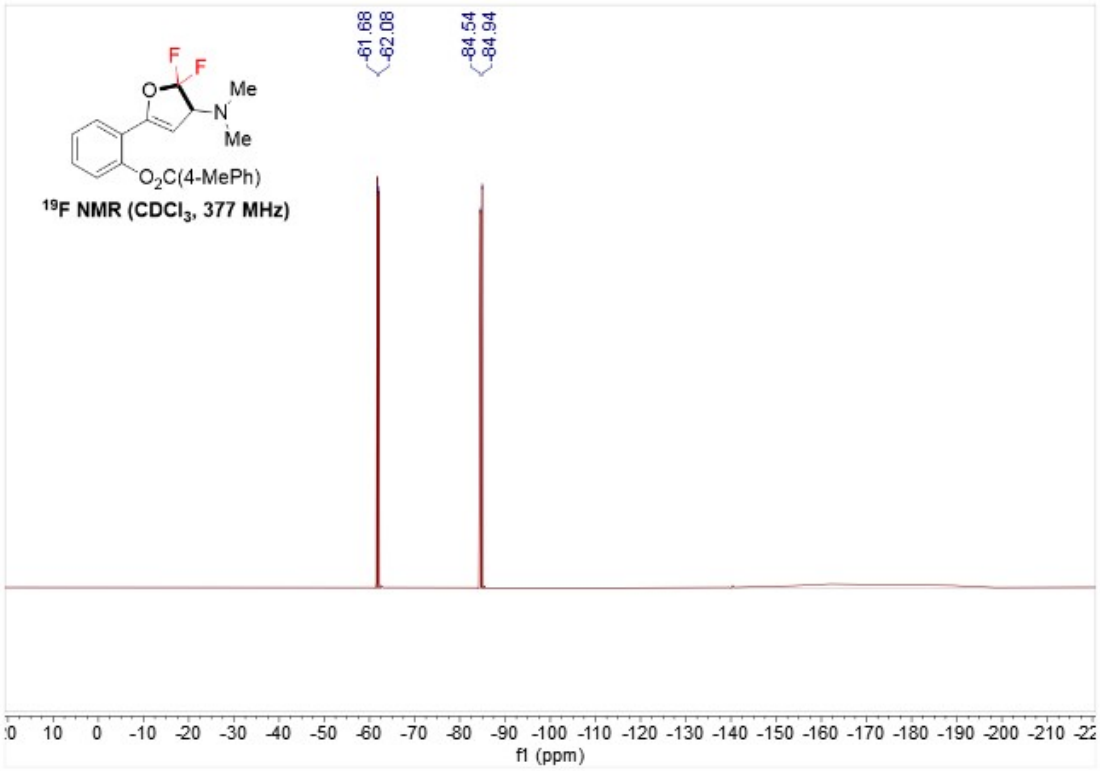
^{1}H NMR of compound 4b



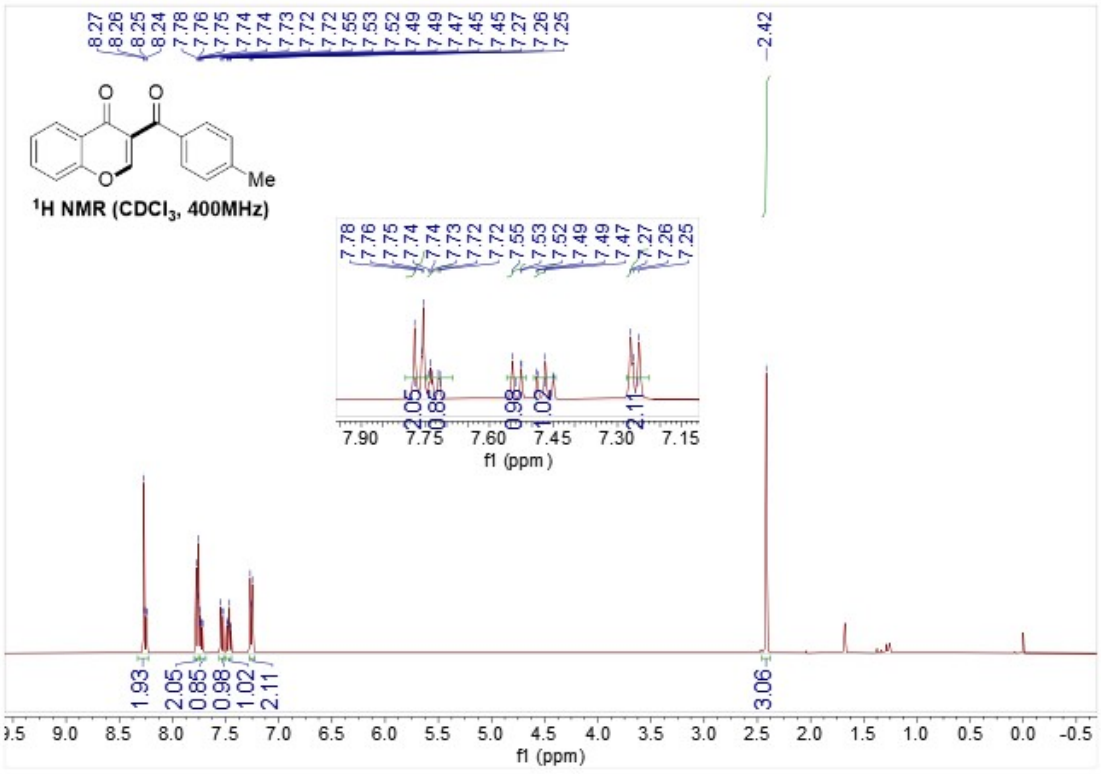
^{13}C NMR of compound 4b



^{19}F NMR of compound 4b



^{1}H NMR of compound 5b



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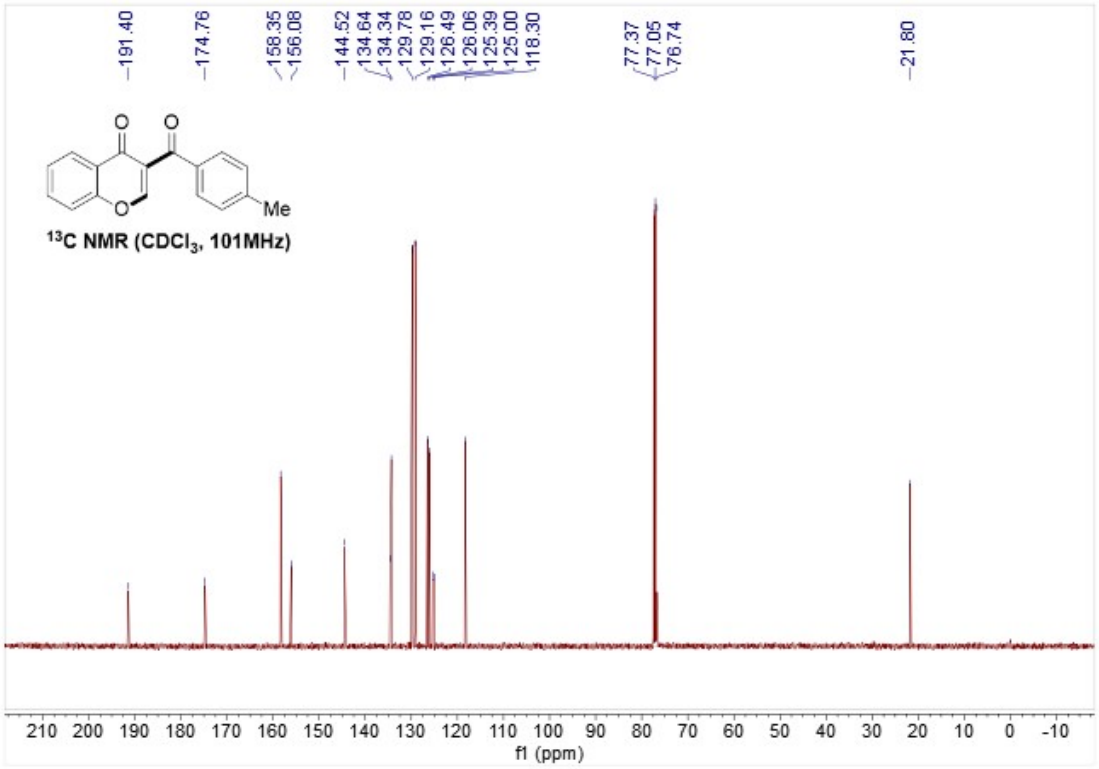
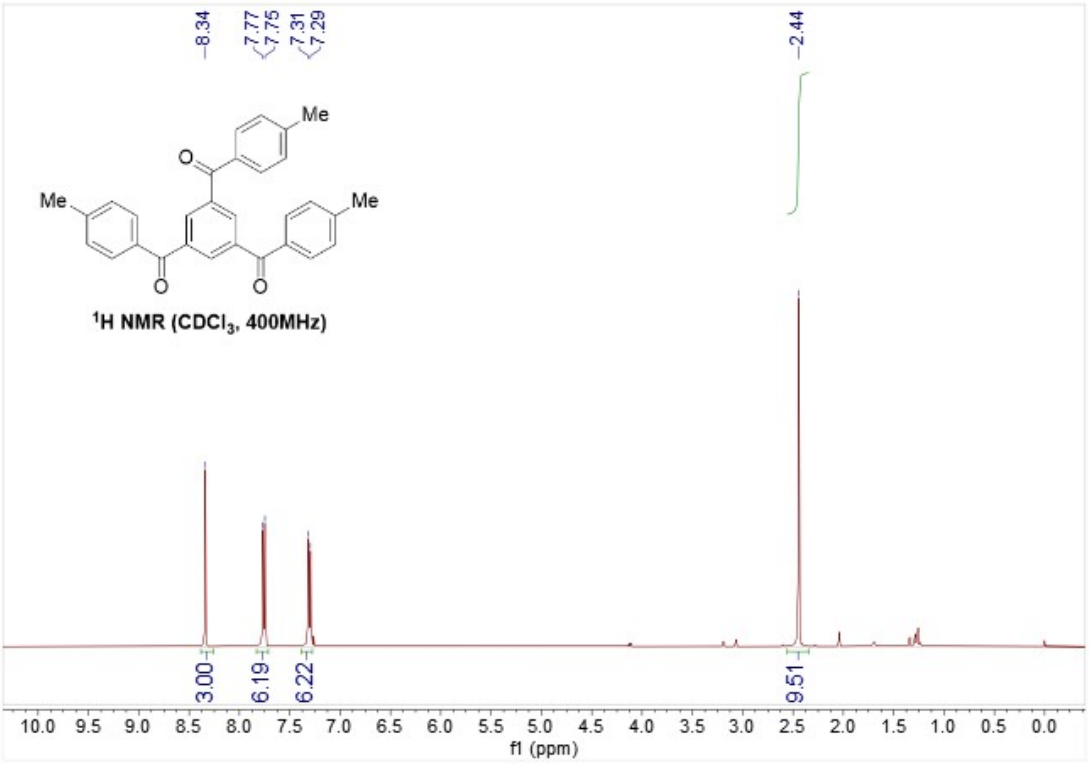


^{1}H NMR of compound 6



^{13}C NMR of compound 6