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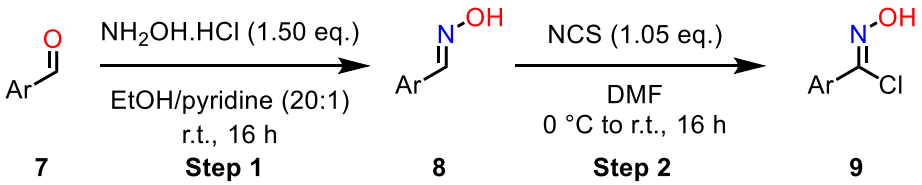
General Methods

The petroleum ether used refers to the fraction with 40-60 °C boiling point. Commercial solvents and reagents were used as supplied. Unless otherwise stated, all reactions were monitored by TLC on Polygram® SIL/G_{25} plates and visualized using UV light and stained using basic $KMnO_4$. ^1H, ^{13}C and ^{19}F NMR spectra were recorded on either a Bruker Ascend™ 400 (400 MHz), Bruker AV-400, Ultrashield™ 500 PLUS (500 MHz) or a Bruker AV-600 instrument as dilute solutions in the stipulated solvent. All chemical shifts (δ) are reported in parts per million (ppm) with ^1H and ^{13}C NMR referenced to solvent signals [^1H NMR: $CDCl_3$ (7.27), DMSO-d_6 (2.50); ^{13}C NMR: $CDCl_3$ (77.16), DMSO-d_6 (39.52)]. Coupling constants (*J*) are reported in Hertz (Hz) and recorded after averaging. The multiplicity of the ^1H NMR signals are designated by one of the following abbreviations: s=singlet, d=doublet, t=triplet, q=quartet, hept=heptet, m=multiplet, br=broad signal. Infra-red spectra were recorded using an Agilent Cary 660 FT-IR spectrophotometer in ATR mode, with the peaks recorded as ν_{max} (cm^{-1}). HRMS were obtained using an Agilent 6530 accurate-mass Q-TOF LC/MS in electrospray ionization (ESI) mode, a Waters I-Class LC equipped with a Waters BEH C18 column using a water/acetonitrile/formic acid gradient and ionized in APCI negative mode on a Waters G2-XS TOF or on a Xevo G2-S in Atmospheric Solids Analysis Probe (ASAP) mode. LC/MS data was collected using at Agilent 1200 infinity series quaternary LC using a Waters XTerra MS C18 Column (3.5 µm 4.6 x 100 mm) together with a Thermo Scientific™ *MSQ Plus*™ Mass Detector in atmospheric pressure chemical ionization (APCI) mode. GC-MS data was recorded on an Agilent 7890A GC system with an Agilent 5975C Inert MSD system in electron ionization (EI) mode. Flash column chromatography was performed using a Biotage® Isolera™ on Biotage® KP-Sil SNAP cartridges. Melting points data were collected using a Gallenkamp melting point apparatus.

General procedures for the synthesis of 9, 3b, 3c, 14, 18, 19, 22, 26, 3k, 3k and 5

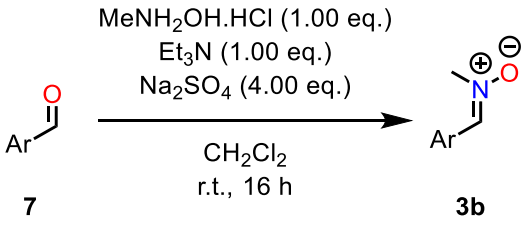
Synthesis of imidoyl chlorides 9



Step 1: Aldoximes **8** were synthesized by the dehydrative condensation of aldehydes **7** with NH_2OH.[1] A typical procedure: To a solution of $NH_2OH.HCl$ (1.50 eq.), in EtOH (1.00 mL/mmol), and pyridine (50.0 µL/mmol) was added the required aldehyde **7** (1.00 eq.) and stirred at room temperature for 16 h. The solvent was removed under reduced pressure and the residue extracted into ethyl acetate (5.00 mL/mmol), washed with H_2O (2 x 5.00 mL/mmol), dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure to obtain the analytically pure product.

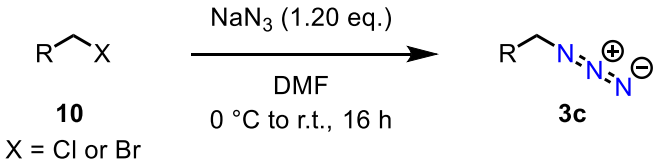
Step 2: Imidoyl chlorides **9** were synthesized through the chlorination of aldoximes **8** with *N*-chlorosuccinimide (NCS).[2] A typical procedure: To a solution of the required aldoxime **8** (1.00 eq.) in DMF (3.00 mL/mmol) stirring at 0 °C was added NCS (1.05 eq.) portion wise over 10 min. The reaction was then removed from the cold bath and stirred at room temperature for 16 h. The reaction mixture was extracted into EtOAc (5.00 mL/mmol), washed with brine (2 x 5.00 mL/mmol) and H_2O (3 x 5.00 mL/mmol), dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure to obtain the analytically pure product.

Synthesis of nitrones 3b



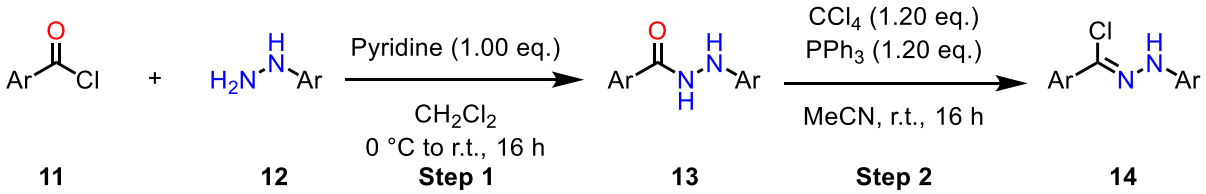
Nitrones **3b** were synthesized by the dehydrative condensation of aldehydes **7** with $MeNH_2OH$.[3] A typical procedure: To a mixture of the required aldehyde **7** (1.00 eq.), $MeNH_2OH.HCl$ (1.00 eq.) and Na_2SO_4 (4.00 eq.) in CH_2Cl_2 (10.0 mL/mmol) was added Et_3N (1.00 eq.) and stirred at room temperature for 16 h. The solids were then removed by vacuum filtration and the solvent from the filtrate was removed under reduced pressure to obtain the analytically pure product.

Synthesis of alkyl azides 3c



Azides **3c** were synthesized through the substitution reaction of alkyl halides **10** with NaN_3.[4] A typical procedure: To a solution of the required alkyl halide **10** (1.00 eq.) in DMF (3.00 mL/mmol) stirring at 0 °C was added NaN_3 (1.20 eq.) portion wise over 10 min. The reaction was then removed from the cold bath and stirred at room temperature for 16 h. The reaction mixture was extracted into EtOAc (5.00 mL/mmol), washed with brine (2 x 5.00 mL/mmol) and H_2O (3 x 5.00 mL/mmol), dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure to obtain the analytically pure product.

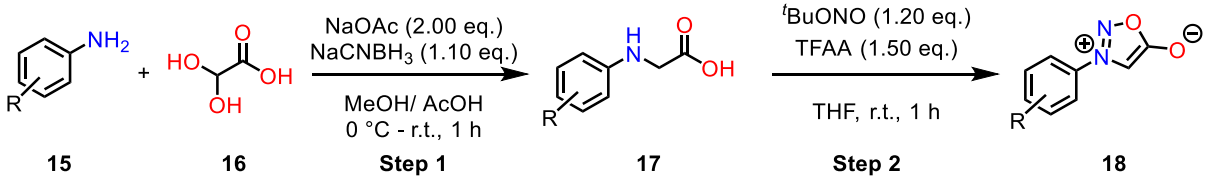
Synthesis of hydrazonoyl chlorides 14



Step 1: Acylhydrazines **13** were synthesized through the coupling of acyl chlorides **11** and hydrazines **12**.[5] A typical procedure: To a solution of the required hydrazine **12** (1.00 eq.) in CH_2Cl_2 (1.00 mL/mmol) at 0 °C was added pyridine (1.00 eq.) dropwise. To the reaction mixture was then added a solution of the required acyl chloride **11** (1.00 eq.) in CH_2Cl_2 (250 µL/mmol) dropwise and stirred at room temperature for 16 h. The reaction mixture was extracted into CH_2Cl_2 (5.00 mL/mmol), washed with brine (5.00 mL/mmol) and H_2O (5.00 mL/mmol), dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure. The crude mixture was then purified by flash column chromatography to obtain the analytically pure product.

Step 2: Hydrazonoyl chlorides **14** were synthesized through the chlorination of acylhydrazines **13** with carbon tetrachloride and triphenylphosphine.[5] A typical procedure: To a solution of the required acylhydrazine **13** (1.00 eq.) in MeCN (2.00 mL/mmol) was added carbon tetrachloride (1.20 eq.) and triphenylphosphine (1.20 eq.) and stirred at room temperature for 16 h. The solvent was removed under reduced pressure and the crude mixture was then purified by flash column chromatography to obtain the analytically pure product.

Synthesis of Sydnones 18



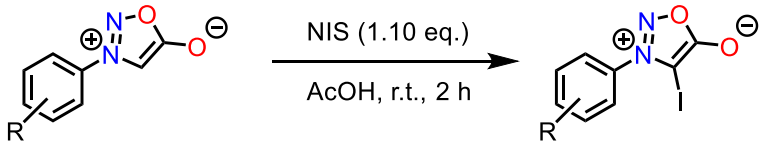
15 **16** **Step 1** **17** **Step 2** **18**

Sydnones **18** were synthesised from the corresponding aniline **15**, *via* a sequential reductive amination and cyclization reaction.[6] A typical procedure:

Step 1: To a solution of the required aniline **15** (1.00 eq.) in MeOH (1.00 mL/mmol) and glacial acetic acid (4.00 eq.) at 0 °C was added sodium acetate (2.00 eq.), glyoxylic acid monohydrate (1.50 eq.) and $NaCNBH_3$ (1.10 eq.) sequentially. The solution was stirred for 1 h, slowly warming to room temperature. The reaction mixture was then filtered through a short pad of silica gel and washed with 1.00% glacial acetic acid in EtOAc (80.0 mL). The solution was then washed with brine (3 x 80.0 mL), dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure to yield the crude carboxylic acid **17**, which was used without further purification.

Step 2: The crude carboxylic **17** was dissolved in THF (2.00 mL/mmol) and ^tBuONO (1.20 eq.) was added. The mixture was stirred at room temperature for 30 min, then TFAA (1.50 eq.) was added, and the resultant mixture stirred at room temperature for 1 h. The reaction was quenched with $NaHCO_3$ (sat. aq.) (10.0 mL/mmol) and extracted with EtOAc (10.0 mL/mmol). The organic layer was dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure. The crude product was purified by recrystallization (EtOH) to obtain the analytically pure product.

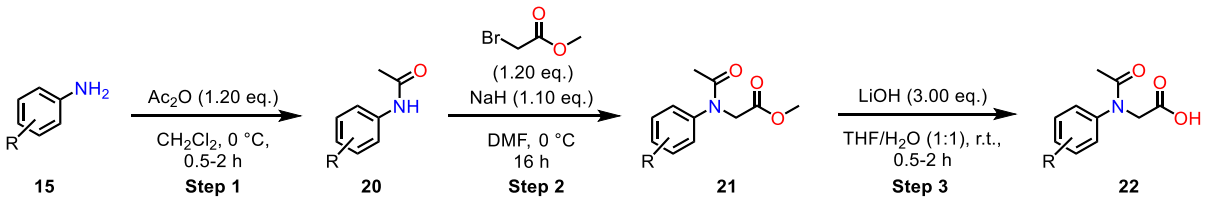
Synthesis of iodosydnones 19



18 **19**

Iodosydnones **19** were synthesized by the iodination of Sydnones **18** with *N*-iodosuccinimide.[7] A typical procedure: To a suspension of the required Sydnone **18** (1.00 eq.) in AcOH (2.00 mL/ mmol) at room temperature was added *N*-iodosuccinimide (NIS) (1.10 eq.), and stirred at room temperature for 2 h. The reaction mixture was diluted with water (40.0 mL/ mmol) and the precipitate formed filtered under vacuum and dried to obtain the analytically pure product.

Synthesis of substituted *N*-acetyl-*N*-arylglycines 22



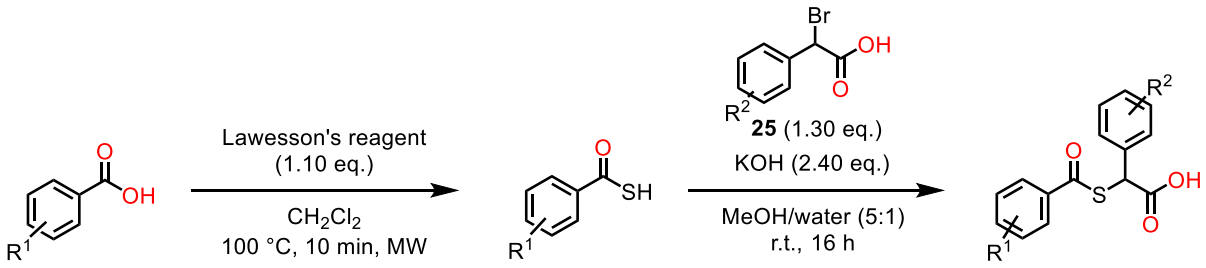
N-Acetyl-*N*-arylglycines **22** were synthesized from the corresponding aniline **15**, *via* sequential acetylation, alkylation and hydrolysis reactions.[8–10] A typical procedure:

Step 1:[8] To a solution of the required aniline **15** (1.00 eq.) in CH_2Cl_2 (1.00 mL/mmol) at 0 °C was added acetic anhydride (1.20 eq.). The reaction was stirred at room temperature for 0.5-2 h and the reaction mixture was then extracted with CH_2Cl_2 (5.00 mL/ mmol) and washed with $NaHCO_3$ (sat. aq.) (5.00 mL/mmol). The organic layer was dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure to obtain the analytically pure product.

Step 2:[9] To a solution of the required *N*-acetylaniline **20** (1.00 eq.) in anhydrous DMF (1.00 mL/mmol) at 0 °C was added sodium hydride (1.10 eq., 60% in mineral oil) in one portion. The reaction mixture was stirred at 0 °C for 0.5 h, then methyl bromoacetate (1.20 eq.) was added, and the reaction stirred at room temperature for a further 16 h. The reaction mixture was diluted with water (5.00 mL/mmol) and extracted into EtOAc (10.0 mL/mmol). The organic layer was washed with H_2O (5 x 5.00 mL/mmol) and brine (5.00 mL/mmol), dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure. The crude product was purified by flash column chromatography to obtain the analytically pure product.

Step 3:[10] To a solution of the required methyl *N*-acetyl-*N*-arylglycinate **21** (1.00 eq.) in THF (2.00 mL/mmol) and water (2.00 mL/mmol) at room temperature was added lithium hydroxide (3.00 eq.). The reaction was stirred at room temperature for 0.5-2 h, and then the solvent was removed under reduced pressure. The crude mixture was suspended in water (10.0 mL/mmol) and acidified with conc. HCl. The precipitate formed was collected by filtration under vacuum to obtain the analytically pure product.

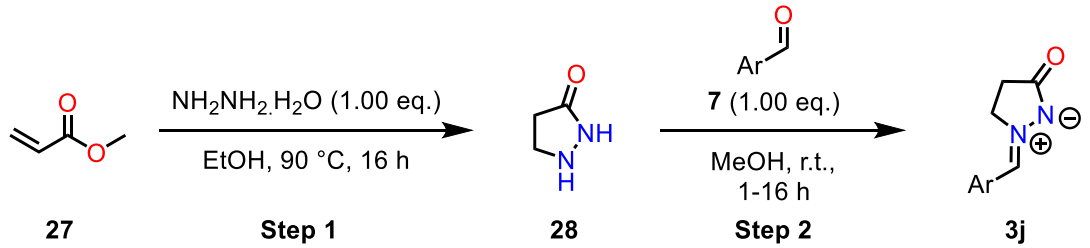
Synthesis of 2-(benzoylthio)-2-arylacetic acids 26



Step 1: Thiobenzoic acids **24** were synthesized by reaction of benzoic acids **23** with Lawesson's reagent.[11] A typical procedure: To a solution of the required benzoic acid **23** (1.00 eq.), in CH_2Cl_2 (3.50 mL/mmol) was added Lawesson's reagent (1.10 eq.), the reaction vial was sealed and irradiated with microwaves at 100 °C for 10 min. The reaction mixture was extracted into CH_2Cl_2 (10.0 mL/mmol), washed with H_2O (2 x 10.0 mL/mmol), dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure. The crude mixture was purified by flash column chromatography (0-10% EtOAc in petroleum ether) to obtain analytically pure product.

Step 2: 2-(Benzoylthio)-2-arylacetic acids **26** were synthesized by reaction of thiobenzoic acids **24** with bromo-2-arylacetic acids **25** under basic conditions.[12] A typical procedure: To a solution of KOH (3.50 eq.) in methanol (5.40 mL/mmol), and water (540 µL/mmol) was added the required thiobenzoic acid **24** (1.00 eq.) and the required bromo-2-arylacetic acid **25** (1.30 eq.), and stirred at room temperature for 16 h. The solvent was removed under reduced pressure and extracted into CH_2Cl_2 (15.0 mL/mmol), washed with 1M HCl (2 x 10.0 mL/mmol), dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure. The crude mixture was purified by flash column chromatography (40-80% EtOAc in petroleum ether) to obtain the analytically pure product.

Synthesis of azomethine imines 3j



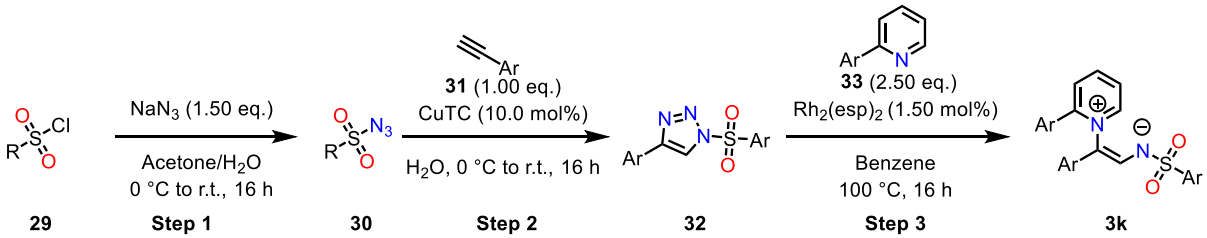
Azomethine imines **3j** were synthesized by the dehydrative condensation of the freshly prepared pyrazolidin-3-one **28** with benzaldehydes **7**.[13] A typical procedure:

Step 1: To a solution of $NH_2NH_2.H_2O$ (1.00 eq.) in EtOH (1.50 mL/mmol) at 0 °C. was added methyl acrylate **27** (1.10 eq.) at 0 °C. The reaction was stirred at room temperature for 10 min and then at 90 °C for a further 16 h.

The solvent was removed under reduced pressure and the crude pyrazolidin-3-one **28** was used directly without further purification.

Step 2: The crude pyrazolidin-3-one **28** was dissolved in MeOH (1.00 mL/mmol) and the required aldehyde **7** (1.00 eq.) added at room temperature. The reaction mixture was stirred for 1-16 h, and the resultant precipitate collected by filtration under vacuum and washed with Et_2O (10.0 mL/ mmol) to obtain the analytically pure product.

Synthesis of azomethine ylides 3k

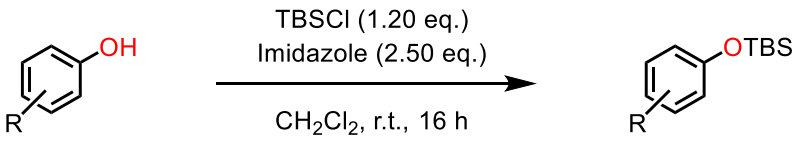


Step 1: Sulfonyl azides **30** were synthesized by the substitution reaction of sulfonyl chlorides **29** with sodium azide.[14] A typical procedure: To a solution of the required sulfonyl chloride **29** (1.00 eq.) in acetone (1.50 mL/mmol) and H_2O (400 µL/mmol) at 0 °C was added sodium azide portion wise over 10 min. The reaction was then stirred at room temperature for 16 h and the solvent was then removed under reduced pressure. The crude mixture was extracted into EtOAc (5.00 mL/mmol), washed with brine (5.00 mL/mmol) and H_2O (2 x 5.00 mL/mmol), dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure to obtain the analytically pure product.

Step 2: 1-Sulfonyltriazoles **32** were synthesized through a copper catalyzed azide-alkyne cycloaddition between sulfonyl azides **30** and alkynes **31**.[15] A typical procedure: To a suspension of the required alkyne **31** (1.00 eq.) and copper(I) thiophene-2-carboxylate (CuTC, 10.0 mol%) in H_2O (5.00 mL/mmol) at 0 °C, was added the required sulfonyl azide **30** (1.00 eq.) portion wise over 10 min. The reaction mixture was then stirred at room temperature for 16 h and extracted into EtOAc (5.00 mL/mmol), washed with NH_4Cl (sat. aq.) (5.00 mL/mmol) and H_2O (5.00 mL/mmol), dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure. The crude mixture was purified by flash column chromatography to obtain the analytically pure product.

Step 3: Azomethine ylides **3k** were synthesized from the $Rh_2(esp)_2$ catalyzed reaction of 1-sulfonyltriazoles **32** and the pyridines **33**.[16] A typical procedure: To a solution of the required 1-sulfonyltriazole **32** (1.00 eq.) and $Rh_2(esp)_2$ (1.50 mol%) in benzene (10.0 mL/mmol) at room temperature was added the required pyridine **33** (2.50 eq.). The reaction was stirred at 100 °C for 16 h and the solvent was then removed under reduced pressure. The crude mixture was purified by flash column chromatography (0-10% MeOH in CH_2Cl_2) to obtain the analytically pure product.

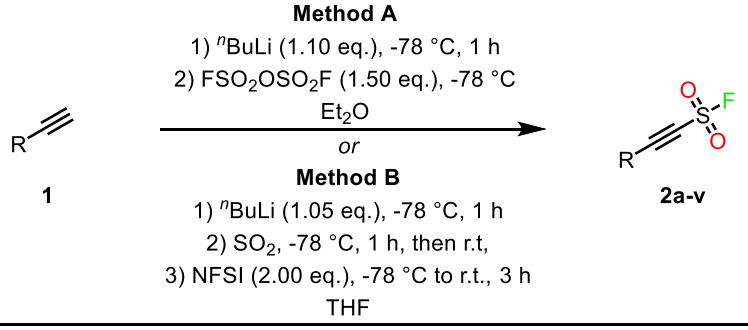
Synthesis of aryl silyl ethers 5



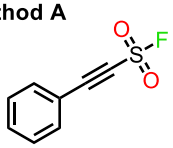
34 **5**

Aryl silyl ethers **5** were synthesised by the *tert*-butyldimethylsilyl (TBS) protection of phenols **34** with *tert*-butyldimethylsilyl chloride (TBSCl).[17] A typical procedure: To a solution of phenol **34** (1.00 eq.) and TBSCl (1.20 eq.) in CH_2Cl_2 (4.00 mL/mmol) was added imidazole (2.50 eq.) and was stirred at room temperature for 16 h. The reaction mixture was extracted into EtOAc (5.00 mL/mmol), washed with 1N NaOH (5.00 mL/mmol) and H_2O (5.00 mL/mmol), dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure. The crude mixture was purified by flash column chromatography to obtain the analytically pure product.

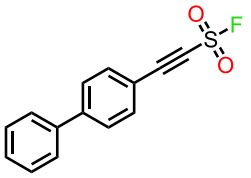
Synthesis and experimental data for 2-Substituted-Alkynyl-1-Sulfonyl Fluorides (SASFs) 2a-2v



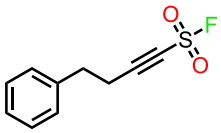
Method A



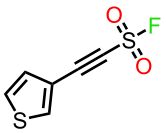
2a
780 mg
85%



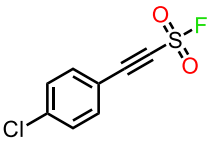
2b
274 mg
70%



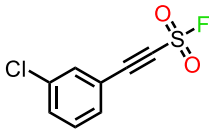
2c
187 mg
88%



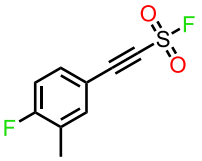
2d
168 mg
88%



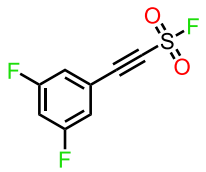
2e
322 mg
81%



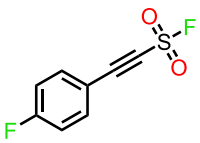
2f
344 mg
79%



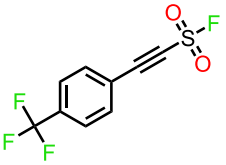
2g
131 mg
61%



2h
980 mg
81%

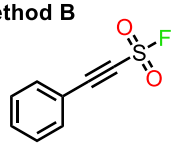


2i
360 mg
77%

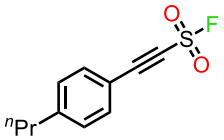


2j
1.43 g
71%

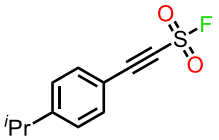
Method B



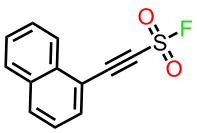
2a
10.6 g
58%, 100 mmol



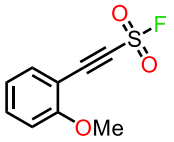
2k
1.31 g
58%



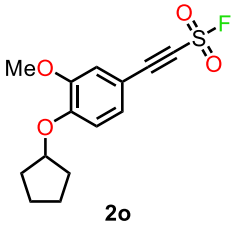
2l
1.48 g
66%



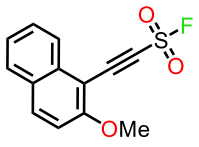
2m
1.40 g
60%



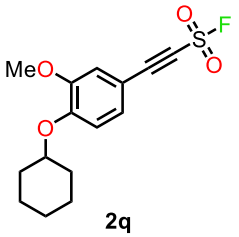
2n
1.24 g
58%



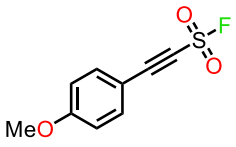
2o
2.03 g
69%



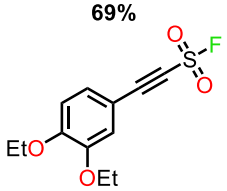
2p
1.54 g
58%



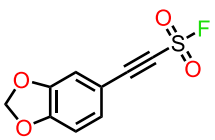
2q
2.07 g
66%



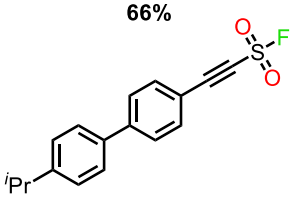
2r
1.26 g
59%



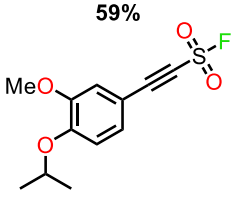
2s
1.84 g
68%



2t
1.21 g
60%



2u
1.40 g
54%



2v
1.95 g
72%

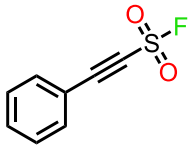
General Procedure A

To a solution of the required terminal alkyne **1a-1j** (1.00 mmol) in diethyl ether (5.00 mL) at -78 °C was added ^{n}BuLi (1.05 eq.) dropwise. The resulting mixture was stirred at -78 °C for 0.5 h before the addition of fluorosulfonic anhydride (1.50 mmol, 1.50 eq.). After stirring at -78 °C for 0.5 h, the reaction was warmed to room temperature and the solvent was then removed under reduced pressure. The crude mixture was then purified by flash column chromatography (5% EtOAc in hexanes) to obtain the analytically pure product.

General Procedure B

To a solution of the required terminal alkyne **1a**, **1k**-**1v** (10.0 mmol) in anhydrous THF (10.0 mL) at -78 °C was added ^{n}BuLi (1.05 eq.) dropwise and stirred at -78 °C for 1 h. To the cooled reaction mixture was added a balloon of SO_2 by cannula, first bubbled through conc. H_2SO_4 (20.0 mL) and stirred at -78 °C for 1 h. The reaction mixture was warmed to room temperature and the remaining SO_2 removed by vacuum, purging with argon. The reaction mixture was then diluted with anhydrous THF (20.0 mL), cooled to -78 °C and *N*-fluorobenzenesulfonimide (6.30 g, 20.0 mmol) was added in one portion and removed from the cold bath, and stirred at room temperature for 3 h. The mixture was then filtered, the solvent removed under reduced pressure, redissolved in the minimum amount of diethyl ether, triturated with petroleum ether (50.0 mL), the solid removed by filtration and removal of the filtrate solvent under reduced pressure. The crude mixture was purified by flash column chromatography to obtain the analytically pure product.

2-Phenylethyne-1-sulfonyl fluoride (2a)



Method A

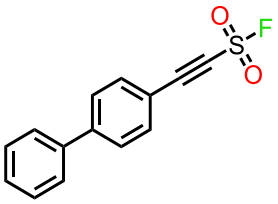
Following general procedure A (5.00 mmol of the required alkyne), the title compound was isolated as a yellow oil (780 mg, 85%).**^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.70 – 7.67 (m, 2H), 7.64 – 7.60 (m, 1H), 7.51 – 7.47 (m, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 133.6, 133.2, 129.2, 95.4 (d, *J* = 8.1 Hz), 77.0 (d, *J* = 60.9 Hz); **^{19}F NMR** (471 MHz, $CDCl_3$) δ = 74.8; **HRMS** (ASAP): calculated for $C_8H_6FO_2S$ [M+H]: m/z = 185.0072, m/z found 185.0069; **IR** ν_{max} (ATR)/cm^{-1}: 3069, 2192, 1422, 1249, 1203, 870.

Method B

Following general procedure B (100 mmol of the required alkyne), the title compound was isolated after purification by flash column chromatography (petroleum ether) as a yellow oil (10.6 g, 58%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.70 – 7.67 (m, 2H), 7.64 – 7.60 (m, 1H), 7.51 – 7.47 (m, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 133.6, 133.2, 129.2, 95.4 (d, *J* = 8.1 Hz), 77.0 (d, *J* = 60.9 Hz); **^{19}F NMR** (471 MHz, $CDCl_3$) δ = 74.8; **HRMS** (ASAP): calculated

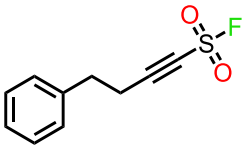
for $C_8H_6FO_2S$ [M+H]: m/z = 185.0072, m/z found 185.0069; **IR** ν_{max} (ATR)/cm^{-1}: 3069, 2192, 1422, 1249, 1203, 870.

1,1'-Biphenylethynyl sulfonyl fluoride (2b)



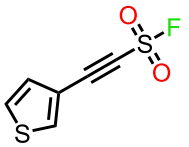
Following general procedure A (1.50 mmol of the required alkyne), the title compound was isolated as a pale yellow solid (274 mg, 70%). **m.p.** 92.4 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.75 (appt. d, *J* = 8.1 Hz, 2H), 7.70 (appt. d, *J* = 7.6 Hz, 2H), 7.61 (appt. d, *J* = 7.6 Hz, 2H), 7.50 (appt. t, *J* = 7.2 Hz, 2H), 7.48 – 7.40 (m, 1H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 146.0, 139.3, 134.1, 129.3, 128.9, 127.8, 127.4, 114.5, 95.8 (d, *J* = 8.1 Hz), 77.5 (d, *J* = 60.8 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.3; **GC-MS** (EI) calculated for $C_{14}H_9FO_2S$ $[M]^+$: calculated m/z = 260.03, m/z found 259.9.

4-Phenylbut-1-ynyl sulfonyl fluoride (2c)



Following general procedure A (1.00 mmol of the required alkyne), the title compound was isolated as a yellow oil (187 mg, 89%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.40 – 7.32 (m, 2H), 7.32 – 7.26 (m, 1H), 7.24 – 7.18 (m, 2H), 2.97 (t, *J* = 7.3 Hz, 2H), 2.80 (td, *J* = 7.3, 2.1, 2H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 138.3, 129.0, 128.4, 127.4, 98.8 (d, *J* = 7.8 Hz), 70.6 (d, *J* = 60.1 Hz), 32.9, 21.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.5; **HRMS** (APCI): calculated for $C_{10}H_8FO_2S$ $[M-H]^-$: m/z = 211.0229, m/z found 211.0231.

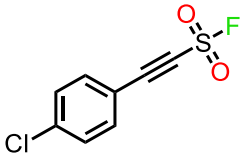
(Thiophen-3-yl)ethynyl sulfonyl fluoride (2d)



Following general procedure A (1.00 mmol of the required alkyne), the title compound was isolated as a yellow oil (168 mg, 88%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.00 (dd, *J* = 3.1, 1.6 Hz, 1H), 7.51 – 7.36 (m, 1H), 7.32 (dd, *J* = 5.2,

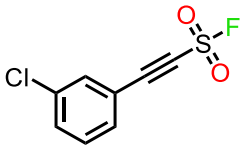
1.6 Hz, 1H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 137.5, 130.0, 127.4, 115.3, 91.3 (d, *J* = 8.2 Hz), 77.1 (d, *J* = 61.0 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.3; **HRMS** (APCI): calculated for $C_7H_4FO_4S_2$ $[M+CH_2O_2]^-$: m/z = 234.9535, m/z found 234.9532.

4-Chlorophenylethynyl sulfonyl fluoride (2e)



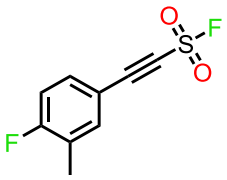
Following general procedure A (1.80 mmol of the required alkyne), the title compound was isolated as a yellow solid (322 mg, 81%). **m.p.** 78.6 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.62 (appt. d, *J* = 8.2 Hz, 2H), 7.47 (appt. d, *J* = 8.2 Hz, 2H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 140.0, 134.7, 129.8, 114.4, 94.0 (d, *J* = 8.2 Hz), 77.8 (d, *J* = 61.3 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.4; **HRMS** (APCI): calculated for $C_9H_5ClFO_4S$ $[M+CH_2O_2]^-$: m/z = 262.9581, m/z found 262.9576.

3-Chlorophenylethynyl sulfonyl fluoride (2f)



Following general procedure A (2.00 mmol of the required alkyne), the title compound was isolated as a yellow oil (344 mg, 79%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.67 (t, *J* = 1.8 Hz, 1H), 7.63 – 7.53 (m, 2H), 7.43 (t, *J* = 7.9 Hz, 1H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 135.3, 133.5, 133.1, 131.6, 130.5, 117.7, 93.1 (d, *J* = 8.1 Hz), 77.7 (d, *J* = 61.5 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.4; **HRMS** (APCI): calculated for $C_9H_5ClFO_4S$ $[M+CH_2O_2]^-$: m/z = 262.9581, m/z found 262.9578.

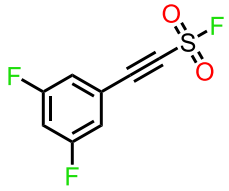
4-Fluoro-3-methylphenylethynyl sulfonyl fluoride (2g)



Following general procedure A (1.00 mmol of the required alkyne), the title compound was isolated as a yellow oil (131 mg, 61%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.66 – 7.46 (m, 2H), 7.11 (t, *J* = 8.8 Hz, 1H), 2.32 (d, *J* = 2.1 Hz, 3H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 164.2 (d, *J* = 256.2 Hz), 137.1 (d, *J* = 6.7 Hz), 133.5 (d, *J* = 9.4 Hz), 127.1 (d, *J* = 18.6

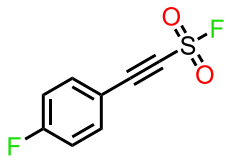
Hz), 116.5 (d, *J* = 24.0 Hz), 111.8 (d, *J* = 4.1 Hz), 95.0 (d, *J* = 8.2 Hz), 76.5 (d, *J* = 1.7 Hz), 14.5 (d, *J* = 3.4 Hz) ; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.3, -106.4; **HRMS** (APCI): calculated for $C_{10}H_7F_2O_4S$ $[M+CH_2O_2]^-$: m/z = 261.0033, m/z found 261.0034.

3,5-Difluoro-phenylethynyl sulfonyl fluoride (2h)



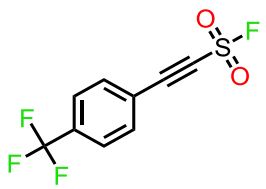
Following general procedure A (5.50 mmol of the required alkyne), the title compound was isolated as a pale yellow solid (980 mg, 81%). **m.p.** 48.8 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.24 – 7.20 (m, 2H), 7.09 (td, *J* = 8.6, 2.1 Hz, 1H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 162.9 (dd, *J* = 253.3, 12.7 Hz), 118.6 (t, *J* = 11.5 Hz), 116.7 (dd, *J* = 21.7, 6.6 Hz), 109.7 (t, *J* = 25.0 Hz), 91.4 (dt, *J* = 8.1, 4.0 Hz), 78.0 (d, *J* = 62.0 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.5, -106.5; **HRMS** (APCI): calculated for $C_8H_3F_3O_2S$ $[M]^-$: m/z = 219.9806, m/z found 219.9813.

4-Fluorophenylethynyl sulfonyl fluoride (2i)



Following general procedure A (2.30 mmol of the required alkyne), the title compound was isolated as a yellow oil (360 mg, 77%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.78 – 7.64 (m, 2H), 7.23 – 7.13 (m, 2H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 165.4 (d, *J* = 257.8 Hz), 136.2 (d, *J* = 9.5 Hz), 117.0 (d, *J* = 22.6 Hz), 112.2 (d, *J* = 3.5 Hz), 94.4 (d, *J* = 8.2 Hz), 77.0 (dd, *J* = 60.9, 1.6 Hz).; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.3, -101.9; **GC-MS** (EI) calculated for $C_8H_4F_4O_2S$ $[M]^+$: Calculated m/z = 201.99, m/z found: 202.0

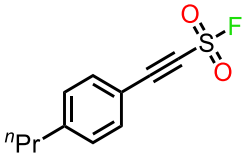
4-Trifluoromethylphenylethynyl sulfonyl fluoride (2j)



Following general procedure A (8.00 mmol of required alkyne), the title compound was isolated as a yellow solid (1.43 g, 71%). **m.p.** 74.6 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.82 (appt. d, *J* = 8.1 Hz, 2H), 7.75 (appt. d, *J* = 8.1 Hz,

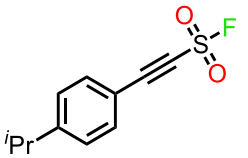
2H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 134.6 (q, *J* = 33.4 Hz), 133.9, 126.2 (q, *J* = 3.6 Hz), 123.3 (q, *J* = 273.0 Hz), 119.8, 92.6 (d, *J* = 8.2 Hz), 78.4 (d, *J* = 61.7 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.5, -64.0; **HRMS** (APCI): calculated for $C_9H_4F_4O_2S$ $[M]^-$: m/z = 251.9869, HRMS found: 251.9868.

2-(4-Propylphenyl)ethyne-1-sulfonyl fluoride (2k)



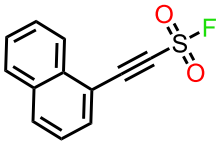
Following general procedure B, the title compound was isolated after purification by flash column chromatography (petroleum ether) as a yellow oil (1.31 g, 58%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.60 (appt. d, *J* = 8.4 Hz, 2H), 7.29 (appt. d, *J* = 8.5 Hz, 2H), 2.70 – 2.61 (m, 2H), 1.74 – 1.60 (m, 2H), 0.96 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 149.1, 133.6, 129.4, 113.1, 96.4 (d, *J* = 8.1 Hz), 76.7 (d, *J* = 60.4 Hz), 38.4, 24.2, 13.8. **^{19}F NMR** (471 MHz, $CDCl_3$) δ 74.8; **HRMS** (ASAP): calculated for $C_{11}H_{12}FO_2S$ [M+H]: m/z = 227.0542, m/z found 227.0540; **IR** ν_{max} (ATR)/cm^{-1}: 2964, 2874, 2187, 1605, 1422, 1206, 875, 785.

2-(4-Isopropylphenyl)ethyne-1-sulfonyl fluoride (2l)



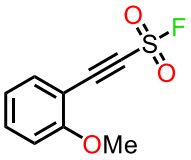
Following general procedure B, the title compound was isolated after purification by flash column chromatography (petroleum ether) as a yellow oil (1.48 g, 66%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.61 (appt. d, *J* = 8.3 Hz, 2H), 7.34 (appt. d, *J* = 8.0 Hz, 2H), 2.98 (hept, *J* = 6.9 Hz, 1H), 1.28 (d, *J* = 6.9 Hz, 7H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 155.1, 133.8, 127.5, 113.2, 96.4 (d, *J* = 8.0 Hz), 76.4, 34.7, 23.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.8; **HRMS** (ASAP): calculated for $C_{11}H_{12}FO_2S$ [M+H]: m/z = 227.0542, m/z found 227.0544; **IR** ν_{max} (ATR)/cm^{-1}: 2967, 2875, 2187, 1605, 1422, 1206, 874, 790.

2-(Naphthalen-1-yl)ethyne-1-sulfonyl fluoride (2m)



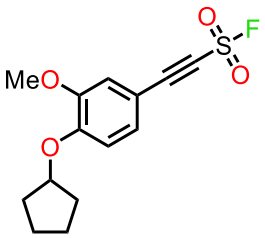
Following general procedure B, the title compound was isolated after purification by flash column chromatography (0-2% EtOAc in petroleum ether) as a brown solid (1.40 g, 60%). **m.p.** 39 - 40 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 8.21 – 8.18 (m, 1H), 8.11 (appt. d, *J* = 8.3 Hz, 1H), 7.98 (dd, *J* = 7.2, 1.2 Hz, 1H), 7.97 – 7.94 (m, 1H), 7.74 – 7.70 (m, 1H), 7.66 – 7.62 (m, 1H), 7.55 (dd, *J* = 8.3, 7.2 Hz, 1H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 134.8, 134.1, 133.5, 133.0, 129.1, 128.9, 127.8, 125.2, 125.1, 113.4, 94.8 (d, *J* = 8.2 Hz), 81.3 (d, *J* = 60.9 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 75.2; **HRMS** (ASAP): calculated for $C_{12}H_8FO_2S$ [M+H]: m/z = 234.0151, m/z found 234.0153; **IR** ν_{max} (ATR)/cm^{-1}: 3060, 2182, 1416, 1202, 891, 797, 767.

2-(2-Methoxyphenyl)ethyne-1-sulfonyl fluoride (2n)



Following general procedure B, the title compound was isolated after purification by flash column chromatography (0-4% Et_2O in petroleum ether) as a low melting yellow solid (1.24 g, 58%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.59 – 7.53 (m, 2H), 7.02 (td, *J* = 7.6, 0.8 Hz, 1H), 6.97 (d, *J* = 8.4 Hz, 1H), 3.94 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 162.9, 135.3, 135.0, 121.0, 111.3, 105.4, 93.8 (d, *J* = 8.1 Hz), 80.4 (d, *J* = 60.4 Hz), 56.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 74.7; **HRMS** (ASAP): calculated for $C_9H_8FO_3S$ [M+H]: m/z = 214.0100, m/z found 214.0098; **IR** ν_{max} (ATR)/cm^{-1}: 2950, 2844, 2187, 1598, 1491, 1418, 1267, 1200, 1020, 880, 791, 752.

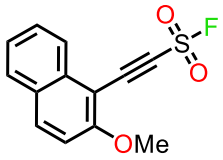
2-(4-(Cyclopentyloxy)-3-methoxyphenyl)ethyne-1-sulfonyl fluoride (2o)



Following general procedure B, the title compound was isolated after purification by flash column chromatography (0-5% EtOAc in petroleum ether) as a yellow solid (2.03 g, 69%). **m.p.** 59 - 61 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.30 (dd, *J* = 8.4, 1.8 Hz, 1H), 7.09 (d, *J* = 1.8 Hz, 1H), 6.89 (d, *J* = 8.4 Hz, 1H), 4.87 – 4.82 (m, 1H),

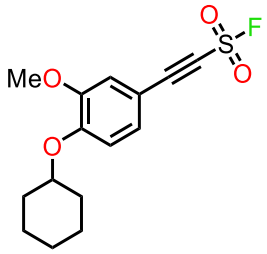
3.88 (s, 3H), 2.04 – 1.96 (m, 2H), 1.95 – 1.81 (m, 4H), 1.70 – 1.61 (m, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 152.7, 149.9, 128.4, 115.7, 113.9, 106.7, 97.7 (d, *J* = 8.1 Hz), 81.0, 76.2 (d, *J* = 60.3 Hz), 56.3, 33.0, 24.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.8; **HRMS** (ASAP): calculated for $C_{14}H_{16}FO_4S$ [M+H]: m/z = 299.0753, m/z found 299.0754; **IR** ν_{max} (ATR)/cm^{-1}: 2966, 2952, 2170, 1592, 1507, 1415, 1212, 1054, 1025, 962, 799, 766.

2-(2-Methoxynaphthalen-1-yl)ethyne-1-sulfonyl fluoride (2p)



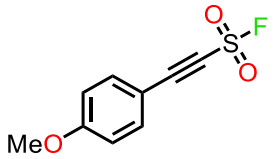
Following general procedure B, the title compound was isolated after purification by flash column chromatography (0-5% EtOAc in petroleum ether) as a yellow solid (1.54 g, 58%). **m.p.** 100 - 101 °C (decomposed); **^{1}H NMR** (500 MHz, $CDCl_3$) δ 8.07 – 8.02 (m, 2H), 7.86 – 7.83 (m, 1H), 7.67 – 7.62 (m, 1H), 7.49 – 7.44 (m, 1H), 7.27 (d, *J* = 9.2 Hz, 1H), 4.08 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 164.0, 136.1, 134.7, 129.6, 128.9, 128.1, 125.4, 124.0, 112.0, 98.6, 93.9 (d, *J* = 8.2 Hz), 85.6 (d, *J* = 60.1 Hz), 56.8; **^{19}F NMR** (471 MHz, $CDCl_3$) δ = 75.2; **HRMS** (ASAP): calculated for $C_{13}H_{10}FO_3S$ [M+H]: m/z = 265.0335, m/z found 265.0335; **IR** ν_{max} (ATR)/cm^{-1}: 2928, 2854, 2167, 1589, 1508, 1408, 1263, 1214, 1187, 1098, 1056, 788, 753.

2-(4-(Cyclohexyloxy)-3-methoxyphenyl)ethyne-1-sulfonyl fluoride (2q)



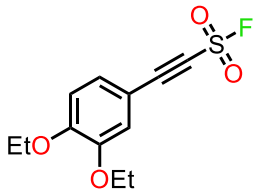
Following general procedure B, the title compound was isolated after purification by flash column chromatography (0-5% EtOAc in petroleum ether) as a yellow solid (2.07 g, 66%). **m.p.** 51 - 52 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.29 (dd, *J* = 8.4, 1.9 Hz, 1H), 7.10 (d, *J* = 1.9 Hz, 1H), 6.92 (d, *J* = 8.5 Hz, 1H), 4.39 – 4.30 (m, 1H), 3.89 (s, 3H), 2.09 – 1.99 (m, 2H), 1.90 – 1.81 (m, 2H), 1.67 – 1.58 (m, 3H), 1.45 – 1.29 (m, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 152.3, 150.2, 128.4, 116.0, 114.2, 106.9, 97.6 (d, *J* = 8.1 Hz), 77.2, 76.2 (d, *J* = 60.3 Hz), 56.4, 31.7, 25.5, 24.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.8; **HRMS** (ASAP): calculated for $C_{15}H_{18}FO_4S$ [M+H]: m/z = 313.0910, m/z found 313.0910; **IR** ν_{max} (ATR)/cm^{-1}: 3091, 2939, 2857, 2162, 1590, 1507, 1414, 1275, 1245, 1212, 1141, 960, 815.

2-(4-Methoxyphenyl)ethyne-1-sulfonyl fluoride (2r)



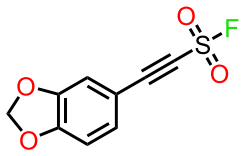
Following general procedure B, the title compound was isolated after purification by flash column chromatography (0-2% EtOAc in petroleum ether) as a yellow solid (1.26 g, 59%). **m.p.** 41 - 43 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.63 (d, *J* = 9.0 Hz, 2H), 6.97 (d, *J* = 9.0 Hz, 2H), 3.89 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 163.5, 135.8, 115.0, 107.5, 97.1 (d, *J* = 8.1 Hz), 76.6 (d, *J* = 60.4 Hz), 55.8; **^{19}F NMR** (471 MHz, $CDCl_3$) δ = 74.8; **HRMS** (ASAP): calculated for $C_9H_8FO_3S$ [M+H]: m/z = 214.0100, m/z found 214.0096; **IR** ν_{max} (ATR)/cm^{-1}: 2930, 2851, 2184, 1602, 1510, 1418, 1254, 1205, 1172, 877, 795.

2-(3,4-Diethoxyphenyl)ethyne-1-sulfonyl fluoride (2s)



Following general procedure B, the title compound was isolated after purification by flash column chromatography (0-4% EtOAc in petroleum ether) as a beige solid (1.84 g, 68%). **m.p.** 53 - 54 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.30 (dd, *J* = 8.4, 1.9 Hz, 1H), 7.10 (d, *J* = 1.9 Hz, 1H), 6.89 (d, *J* = 8.4 Hz, 1H), 4.17 (q, *J* = 7.0 Hz, 2H), 4.11 (q, *J* = 7.0 Hz, 2H), 1.49 (appt. q, *J* = 7.0 Hz, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 153.5, 148.8, 128.5, 116.9, 112.6, 107.1, 97.6 (d, *J* = 8.1 Hz), 76.2 (d, *J* = 60.4 Hz), 65.0, 64.9, 14.7, 14.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 74.8; **HRMS** (ASAP): calculated for $C_{12}H_{14}FO_4S$ [M+H]: m/z = 273.0597, m/z found 273.0597; **IR** ν_{max} (ATR)/cm^{-1}: 2978, 2934, 2167, 1592, 1514, 1409, 1247, 1209, 1138, 1039, 806.

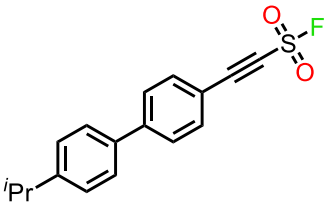
2-(Benzo[d][1,3]dioxol-5-yl)ethyne-1-sulfonyl fluoride (2t)



Following general procedure B, the title compound was isolated after purification by flash column chromatography (0-4% EtOAc in petroleum ether) as a brown solid (1.21 g, 60%). **m.p.** 82 - 84 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.27 (dd, *J* = 8.1, 1.6 Hz, 1H), 7.05 (d, *J* = 1.6 Hz, 1H), 6.89 (d, *J* = 8.1 Hz, 1H), 6.10 (s, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 152.2, 148.2, 130.4, 112.5, 109.4, 108.7, 102.5, 96.5 (d, *J* = 8.1 Hz), 76.0 (d, *J* = 60.7 Hz); **^{19}F**

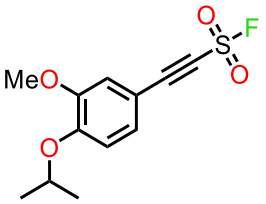
NMR (376 MHz, $CDCl_3$) δ = 74.8; **HRMS** (ASAP): calculated for $C_9H_6FO_4S$ [M+H]: m/z = 228.9971, m/z found 228.9962; **IR** ν_{max} (ATR)/cm^{-1}: 2928, 2181, 1614, 1477, 1417, 1256, 1201, 1035, 828, 775.

2-(4'-Isopropyl-[1,1'-biphenyl]-4-yl)ethyne-1-sulfonyl fluoride (2u)



Following general procedure B, the title compound was isolated after purification by flash column chromatography (petroleum ether) as a yellow solid (1.40 g, 54%). **m.p.** 82 - 83 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.74 (appt. d, *J* = 8.6 Hz, 2H), 7.70 (appt. d, *J* = 8.6 Hz, 2H), 7.55 (appt. d, *J* = 8.2 Hz, 2H), 7.31 (appt. d, *J* = 8.3 Hz, 2H), 2.69 – 2.64 (m, 2H), 1.75 – 1.66 (m, 2H), 0.99 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 146.0, 143.9, 136.6, 134.1, 129.4, 127.5, 127.2, 114.1, 96.0 (d, *J* = 8.1 Hz), 77.7, 37.9, 24.6, 14.0; **^{19}F NMR** (470 MHz, $CDCl_3$) δ = 74.9; **HRMS** (ASAP): calculated for $C_{17}H_{16}FO_2S$ [M+H]: m/z = 303.0855, m/z found 303.0854; **IR** ν_{max} (ATR)/cm^{-1}: 2954, 2870, 2187, 1599, 1418, 1204, 878, 781.

2-(4-Isopropoxy-3-methoxyphenyl)ethyne-1-sulfonyl fluoride (2v)

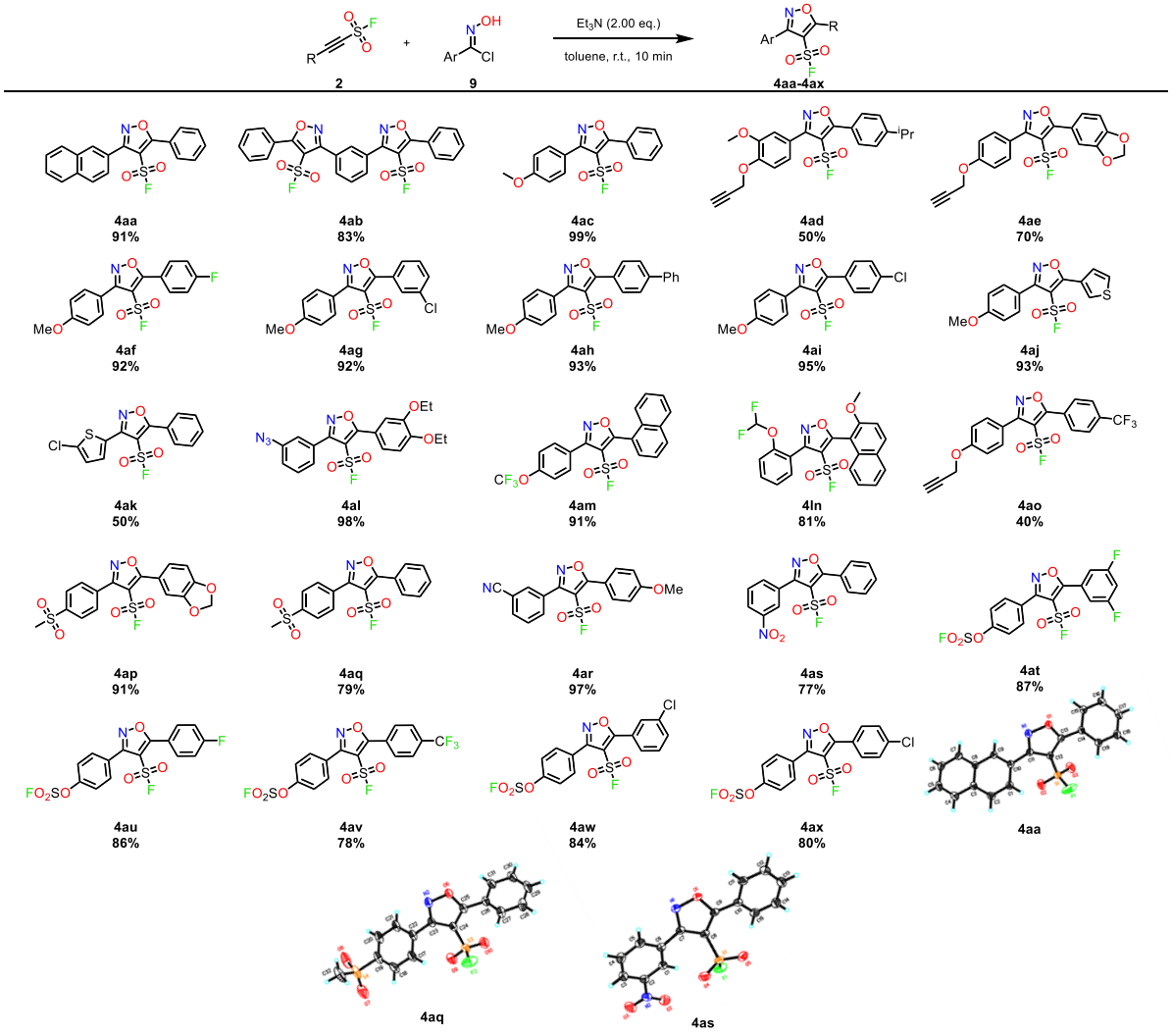


Following general procedure B, the title compound was isolated after purification by flash column chromatography (0-5% EtOAc in petroleum ether) as a yellow solid (1.95 g, 72%). **m.p.** 70 - 71 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.31 (dd, *J* = 8.4, 1.8 Hz, 1H), 7.10 (d, *J* = 1.8 Hz, 1H), 6.91 (d, *J* = 8.4 Hz, 1H), 4.67 (hept, *J* = 6.1 Hz, 1H), 3.89 (s, 3H), 1.43 (d, *J* = 6.1 Hz, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 152.3, 150.1, 128.4, 115.8, 113.9, 106.9, 97.5 (d, *J* = 8.1 Hz), 76.2 (d, *J* = 60.5 Hz), 71.7, 56.3, 22.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.8; **HRMS** (ASAP): calculated for $C_{12}H_{14}FO_4S$ [M+H]: m/z = 273.0597, m/z found 273.0595; **IR** ν_{max} (ATR)/cm^{-1}: 3022, 2906, 2169, 1592, 1506, 1417, 1272, 1247, 1211, 1141, 1107, 947, 850, 500, 770.

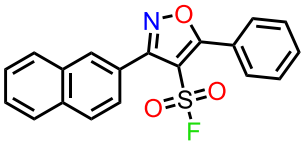
Synthesis and experimental data for compounds 4aa-4ax

General procedure C

To a solution of the required SASF **2** (500 µmol) and the required imidoyl chloride **9** (500 µmol) in toluene (1.50 mL) was added Et_3N (139 µL, 1.00 mmol) and stirred at room temperature for 10 min. The reaction mixture was then extracted into EtOAc (10.0 mL) washed with brine (10.0 mL) and H_2O (2 x 10.0 mL). The aqueous layer was extracted with EtOAc (10.0 mL), the organic fractions combined, dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure to obtain the analytically pure product.

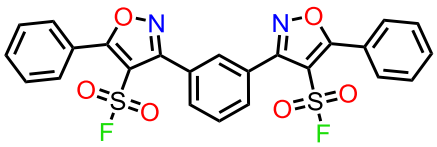


3-(Naphthalen-2-yl)-5-phenylisoxazole-4-sulfonyl fluoride (4aa)



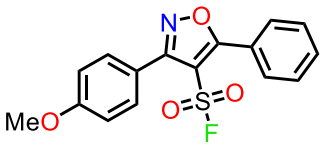
Following general procedure C, the title compound was isolated as a colourless solid (161 mg, 81%). **m.p.** 140 - 142 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.27 (s, 1H), 8.01 (d, *J* = 9.1 Hz, 1H), 8.00 – 7.90 (m, 4H), 7.79 (dd, *J* = 8.5, 1.8 Hz, 1H), 7.72 – 7.66 (m, 1H), 7.65 – 7.57 (m, 4H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 175.8 (d, *J* = 2.9 Hz), 161.9, 134.4, 133.2, 132.9, 129.9, 129.8, 129.1, 128.9, 128.7, 128.0, 127.9, 127.1, 125.7, 124.6, 123.2, 110.1 (d, *J* = 34.8 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 72.0; **HRMS** (ESI^+): calculated for $C_{19}H_{12}FNO_3SNa$ [M+Na^+]: m/z = 376.0414, m/z found 376.0415; **IR** ν_{max} (ATR)/cm^{-1}: 2923, 2863, 1498, 1551, 1417, 1215, 1056, 751.

3-(3-(4-(Fluorosulfonyl)-5-phenylisoxazol-3-yl)phenyl)-5-phenylisoxazole-4-sulfonyl fluoride (4ab)



Following general procedure C (1.50 mL of toluene used, 250 µmol of the required imidoyl chloride), the title compound was isolated as a colourless solid (110 mg, 83%). **m.p.** 185 - 186 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 8.12 (appt. t, *J* = 1.5 Hz, 1H), 7.96 (dd, *J* = 7.8, 1.8 Hz, 2H), 7.93 – 7.88 (m, 4H), 7.74 (t, *J* = 7.8 Hz, 1H), 7.71 – 7.67 (m, 2H), 7.64 – 7.58 (m, 4H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 176.0 (d, *J* = 2.9 Hz), 160.9, 133.3, 132.0, 130.2, 129.8, 129.4, 129.1, 126.8, 124.4, 110.0 (d, *J* = 35.2 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 72.4; **HRMS** (ESI^+): calculated for $C_{24}H_{14}F_2N_2O_6S_2Na$ [M+Na^+]: m/z = 551.0154, m/z found 551.0143; **IR** ν_{max} (ATR)/cm^{-1}: 3067, 1551, 1420, 1217, 771.

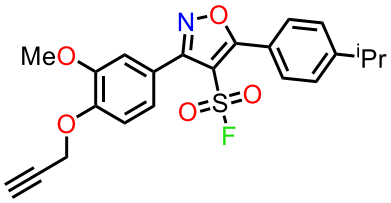
3-(4-Methoxyphenyl)-5-phenylisoxazole-4-sulfonyl fluoride (4ac)



Following general procedure C (250 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated as a colourless solid (82.0 mg, 99%). **m.p.** 104 - 106; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.89 – 7.84 (m, 2H), 7.72 – 7.64 (m, 3H), 7.62 – 7.56 (m, 2H), 7.06 (appt. d, *J* = 8.9 Hz, 2H), 3.90 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 175.8 (d, *J* = 3.1 Hz), 162.0, 161.4, 133.0, 130.9, 129.8, 129.0, 124.7, 118.0, 114.4, 109.8 (d, *J* = 34.5 Hz), 55.6; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.0; **HRMS** (ASAP): calculated for $C_{16}H_{13}FNO_4S$ [M+H]: m/z =

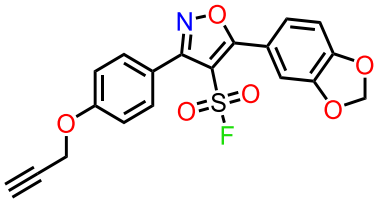
334.0549, m/z found 334.0547; **IR** ν_{max} (ATR)/cm^{-1}: 2922, 2863, 1603, 1550, 1523, 1414, 1381, 1258, 1216, 1017, 833, 764.

5-(4-Isopropylphenyl)-3-(3-methoxy-4-(prop-2-yn-1-yloxy)phenyl)isoxazole-4-sulfonyl fluoride (4ad)



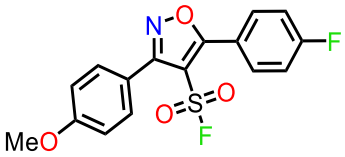
Following general procedure C, the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a colourless solid (108 mg, 50%). **m.p.** 103 - 104 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.80 (d, *J* = 8.4 Hz, 2H), 7.44 (d, *J* = 8.4 Hz, 2H), 7.35 (dd, *J* = 8.3, 2.1 Hz, 1H), 7.30 (d, *J* = 2.1 Hz, 1H), 7.18 (d, *J* = 8.3 Hz, 1H), 4.86 (d, *J* = 2.4 Hz, 2H), 3.96 (s, 3H), 3.03 (hept, *J* = 6.9 Hz, 1H), 2.57 (t, *J* = 2.4 Hz, 1H), 1.32 (d, *J* = 6.9 Hz, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 176.0 (d, *J* = 3.0 Hz), 161.3, 154.7, 149.6, 149.3, 129.9, 127.2, 122.3, 122.0, 119.4, 113.7, 112.6, 109.2 (d, *J* = 34.5 Hz), 78.1, 76.5, 56.8, 56.2, 34.5, 23.8; **^{19}F NMR** (471 MHz, $CDCl_3$) δ = 71.3; **HRMS** (ESI^+): calculated for $C_{22}H_{20}FNO_5SNa$ [$M+Na^+$]: m/z = 452.0938, m/z found 452.0936; **IR** ν_{max} (ATR)/cm^{-1}: 3264, 2963, 2927, 2855, 1606, 1498, 1430, 1258, 1218, 1139, 1007, 754.

5-(Benzo[d][1,3]dioxol-5-yl)-3-(4-(prop-2-yn-1-yloxy)phenyl)isoxazole-4-sulfonyl fluoride (4ae)



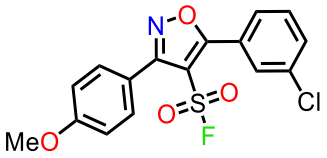
Following general procedure C, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (140 mg, 70%). **m.p.** 154 - 156 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.68 (appt. d, *J* = 8.9 Hz, 2H), 7.46 (dd, *J* = 8.2, 1.8 Hz, 1H), 7.32 (d, *J* = 1.8 Hz, 1H), 7.13 (d, *J* = 8.9 Hz, 2H), 7.00 (d, *J* = 8.2 Hz, 1H), 6.13 (s, 2H), 4.78 (d, *J* = 2.4 Hz, 2H), 2.58 (t, *J* = 2.4 Hz, 1H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 175.2 (d, *J* = 2.7 Hz), 161.4, 159.9, 151.9, 148.4, 130.9, 125.7, 119.0, 118.0, 115.2, 109.5, 109.0, 108.7 (d, *J* = 34.5 Hz), 102.4, 78.1, 76.2, 56.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 71.8; **HRMS** (ESI^+): calculated for $C_{19}H_{12}FNO_6SNa$ [$M+Na^+$]: m/z = 424.0262, m/z found 424.0264; **IR** ν_{max} (ATR)/cm^{-1}: 3283, 2923, 2854, 2119, 1607, 1555, 1490, 1460, 1427, 1251, 1226, 1030, 759.

5-(4-Fluorophenyl)-3-(4-methoxyphenyl)isoxazole-4-sulfonyl fluoride (4af)



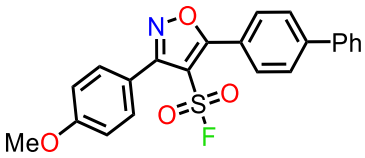
Following general procedure C (100 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated as a white solid (32.0 mg, 92%). **m.p.** 121 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.97 – 7.83 (m, 2H), 7.67 (appt. d, *J* = 8.8 Hz, 2H), 7.36 – 7.23 (m, 2H), 7.04 (appt. d, *J* = 8.8 Hz, 2H), 3.89 (s, 3H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 174.7 (d, *J* = 3.0 Hz), 165.6 (d, *J* = 256.0 Hz), 162.0, 161.5, 132.3 (d, *J* = 9.3 Hz), 130.9, 120.9 (d, *J* = 3.4 Hz), 117.8, 116.5 (d, *J* = 22.3 Hz), 114.4, 109.7 (d, *J* = 34.6 Hz), 55.6; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 71.3, -104.9; **HRMS** (APCI): calculated for $C_{16}H_{12}F_2NO_4S$ [M+H$^+$]: m/z = 352.0455, m/z found 352.0458

5-(3-Chlorophenyl)-3-(4-methoxyphenyl)isoxazole-4-sulfonyl fluoride (4ag)



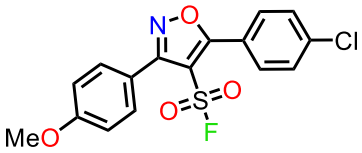
Following general procedure C (100 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated as a pale yellow solid (34.0 mg, 92%). **m.p.** 127.8 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.83 (s, 1H), 7.74 (d, *J* = 7.8 Hz, 1H), 7.68 (appt. d, *J* = 8.2 Hz, 2H), 7.63 (d, *J* = 8.1 Hz, 1H), 7.53 (t, *J* = 7.8 Hz, 1H), 7.05 (appt. d, *J* = 8.2 Hz, 2H), 3.89 (s, 3H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 174.1 (d, *J* = 2.9 Hz), 162.1, 161.4, 135.2, 133.1, 130.9, 130.3, 129.6, 128.0, 126.2, 117.7, 114.5, 110.5 (d, *J* = 34.8 Hz), 55.6; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 71.3; **HRMS** (APCI): calculated for $C_{16}H_{12}ClFNO_4S$ [M+H$^+$]: m/z = 368.0160, m/z found 368.0154

5-([1,1'-Biphenyl]-4-yl)-3-(4-methoxyphenyl)isoxazole-4-sulfonyl fluoride (4ah)



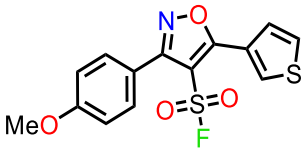
Following general procedure C (100 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated as a white solid (38.0 mg, 93%). **m.p.** 173 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.95 (appt. d, *J* = 8.5 Hz, 2H), 7.80 (appt. d, *J* = 8.5 Hz, 2H), 7.73 – 7.63 (m, 4H), 7.55 – 7.46 (m, 2H), 7.48 – 7.39 (m, 1H), 7.05 (appt. d, *J* = 8.8 Hz, 2H), 3.89 (s, 3H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 175.5 (d, *J* = 2.8 Hz), 162.0, 161.5, 145.9, 139.6, 130.9, 130.3, 129.2, 128.7, 127.6, 127.4, 123.3, 118.0, 114.4, 109.5 (d, *J* = 34.5 Hz), 55.6; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 71.2; **HRMS** (APCI): calculated for $C_{22}H_{17}FNO_4S$ [M+H$^+$]: m/z = 410.0862, m/z found 410.0862

5-(4-Chlorophenyl)-3-(4-methoxyphenyl)isoxazole-4-sulfonyl fluoride (4ai)



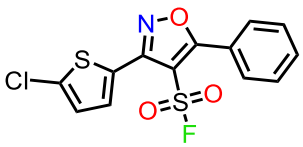
Following general procedure C (100 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated as a pale yellow solid (35.0 mg, 95%). **m.p.** 105.5 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.80 (appt. d, *J* = 8.5 Hz, 2H), 7.67 (appt. d, *J* = 8.4 Hz, 2H), 7.57 (appt. d, *J* = 8.5 Hz, 2H), 7.04 (appt. d, *J* = 8.4 Hz, 2H), 3.89 (s, 3H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 174.6 (d, *J* = 3.0 Hz), 162.1, 161.5, 139.7, 131.1, 130.9, 129.5, 123.0, 117.8, 114.5, 110.0 (d, *J* = 34.8 Hz), 55.6; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 71.3; **HRMS** (APCI): calculated for $C_{16}H_{12}ClFNO_4S$ [M+H$^+$]: m/z = 368.0160, m/z found 368.0166;

3-(4-Methoxyphenyl)-5-(thiophen-3-yl)isoxazole-4-sulfonyl fluoride (4aj)



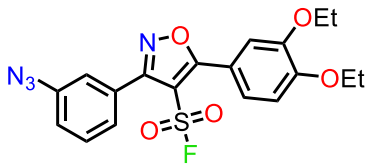
Following general procedure C (100 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated as a yellow solid (31.5 mg, 93%). **m.p.** 93.7 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.34 (dd, *J* = 3.0, 1.3 Hz, 1H), 7.71 (dd, *J* = 5.2, 1.3 Hz, 1H), 7.63 (appt. d, *J* = 8.8 Hz, 2H), 7.51 (dd, *J* = 5.2, 3.0 Hz, 1H), 7.03 (appt. d, *J* = 8.9 Hz, 2H), 3.88 (s, 3H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 170.2 (d, *J* = 2.4 Hz), 161.9, 161.5, 132.5, 131.0, 127.6, 127.2, 125.0, 117.9, 114.3, 108.08 (d, *J* = 34.1 Hz), 55.5; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 71.0; **HRMS** (APCI): calculated for $C_{14}H_{11}FNO_4S_2$ [M+H$^+$]: m/z = 340.0114, m/z found 340.0118;

3-(5-Chlorothiophen-2-yl)-5-phenylisoxazole-4-sulfonyl fluoride (4ak)



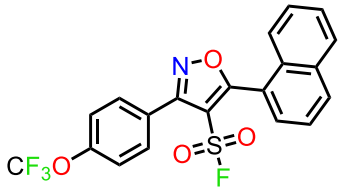
Following general procedure C, the title compound was isolated after purification by flash column chromatography (0-5% EtOAc in petroleum ether) as a yellow solid (134 mg, 77%). **m.p.** 94 - 96 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.83 – 7.78 (m, 2H), 7.70 – 7.65 (m, 1H), 7.63 (dd, *J* = 4.1, 0.6 Hz, 1H), 7.62 – 7.56 (m, 2H), 7.05 (d, *J* = 4.1 Hz, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 176.6 (d, *J* = 3.6 Hz), 154.9, 135.3, 133.2, 131.4 (d, *J* = 1.7 Hz), 129.9, 129.0, 127.6, 124.2, 124.1, 108.9 (d, *J* = 35.7 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 70.4; **HRMS** (ESI$^+$): calculated for $C_{13}H_8ClFNO_3S_2$ [M+H$^+$]: m/z = 343.9613, m/z found 343.9605; **IR** ν max (ATR)/cm^{-1}: 3041, 2889, 2853, 1560, 1421, 1218, 1078, 1039, 770, 725.

3-(3-Azidophenyl)-5-(3,4-diethoxyphenyl)isoxazole-4-sulfonyl fluoride (4al)



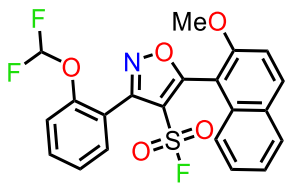
Following general procedure C, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a beige solid (212 mg, 98%). **m.p.** 100 - 101 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.57 – 7.49 (m, 2H), 7.47 – 7.44 (m, 1H), 7.43 (d, *J* = 2.2 Hz, 2H), 7.35 – 7.33 (m, 1H), 7.23 (ddd, *J* = 8.0, 2.3, 1.1 Hz, 1H), 7.03 (d, *J* = 8.5 Hz, 1H), 4.25 – 4.16 (m, 4H), 1.55 – 1.49 (m, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 175.4 (d, *J* = 2.5 Hz), 161.2, 153.3, 148.7, 140.9, 130.2, 127.9, 125.9, 123.9, 121.6, 120.0, 116.1, 113.8, 112.4, 108.2 (d, *J* = 34.5 Hz), 65.0, 64.8, 14.8, 14.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 72.1; **HRMS** (ESI^+): calculated for $C_{19}H_{17}FN_4O_5SNa$ [$M+Na^+$]: m/z = 455.0796, m/z found 455.0799; **IR** ν_{max} (ATR)/cm^{-1}: 2987, 2933, 2892, 2099, 1599, 1517, 1420, 1272, 1209, 1136, 1039, 762.

5-(Naphthalen-1-yl)-3-(4-(trifluoromethoxy)phenyl)isoxazole-4-sulfonyl fluoride (4am)



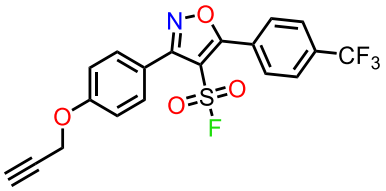
Following general procedure C (3.00 mL of toluene used), the title compound was isolated as a yellow solid (183 mg, 81%). **m.p.** 125 - 126 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 8.17 – 8.14 (m, 1H), 8.02 – 7.98 (m, 1H), 7.94 – 7.90 (m, 2H), 7.81 – 7.76 (m, 2H), 7.68 – 7.62 (m, 3H), 7.46 – 7.42 (m, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 176.8 (d, *J* = 3.2 Hz), 160.0, 151.6 – 151.5 (m), 133.6, 133.3, 131.2, 130.6 – 130.2 (m), 130.1, 129.0, 128.3, 127.2, 124.9, 124.4, 124.3, 121.67, 121.2, 120.5 (q, *J* = 258.8 Hz), 112.9 (d, *J* = 35.0 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 71.8, -57.6; **HRMS** (ASAP): calculated for $C_{20}H_{12}F_4NO_4S$ [M+H]: m/z = 438.0423, m/z found 438.0421; **IR** ν_{max} (ATR)/cm^{-1}: 2967, 2937, 1601, 1559, 1431, 1254, 1217, 1159, 1055, 772.

3-(2-(Difluoromethoxy)phenyl)-5-(2-methoxynaphthalen-1-yl)isoxazole-4-sulfonyl fluoride (4an)



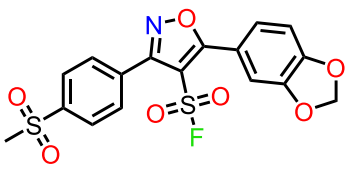
Following general procedure C (3.00 mL of toluene used), the title compound was isolated as a beige solid (200 mg, 91%). **m.p.** 90 - 91 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 8.12 (d, *J* = 9.1 Hz, 1H), 7.89 (appt. d, *J* = 8.1 Hz, 1H), 7.70 (dd, *J* = 7.6, 1.7 Hz, 1H), 7.64 – 7.60 (m, 1H), 7.61 – 7.54 (m, 1H), 7.54 – 7.51 (m, 1H), 7.46 (ddd, *J* = 8.1, 6.6, 1.3 Hz, 1H), 7.42 (appt. td, *J* = 7.6, 1.1 Hz, 1H), 7.39 (d, *J* = 9.2 Hz, 1H), 7.38 – 7.33 (m, 1H), 6.59 (t, *J* = 73.3 Hz, 1H), 4.01 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 173.6 (d, *J* = 2.4 Hz), 157.8, 156.9, 149.8 (t, *J* = 2.7 Hz), 135.0, 132.7, 132.7, 131.7, 128.8, 128.7, 128.6, 125.6, 124.7, 123.3, 119.0, 118.7, 116.2 (t, *J* = 260.9 Hz), 114.9 (d, *J* = 33.8 Hz), 112.4, 106.6, 56.4; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 67.2, -81.1 (t, *J*= 78.7 Hz); **HRMS** (ESI^+): calculated for $C_{21}H_{14}F_3NO_5SNa$ [M+Na^+]: m/z = 472.0437, m/z found 472.0437; **IR** ν_{max} (ATR)/cm^{-1}: 2926, 2852, 15993, 1558, 1509, 1456, 1415, 1267, 1127, 1052, 779.

3-(4-(Prop-2-yn-1-yloxy)phenyl)-5-(4-(trifluoromethyl)phenyl)isoxazole-4-sulfonyl fluoride (4ao)



Following general procedure C (100 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (17.0 mg, 40%). **m.p.** 124 – 125 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.99 (d, *J* = 8.2 Hz, 2H), 7.87 (d, *J* = 8.2 Hz, 2H), 7.72 (appt. d, *J* = 8.9 Hz, 2H), 7.15 (appt. d, *J* = 8.9 Hz, 2H), 4.79 (d, *J* = 2.4 Hz, 2H), 2.59 (t, *J* = 2.4 Hz, 1H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 174.1 (d, *J* = 3.1 Hz), 161.4, 160.1, 134.6 (q, *J* = 33.2 Hz), 130.9, 130.3, 127.9, 126.1 (q, *J* = 3.7 Hz), 123.5 (q, *J* = 272.9 Hz), 118.5, 115.4, 111.0 (d, *J* = 35.1 Hz), 78.0, 76.3, 56.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 71.9, -63.3; **HRMS** (ESI^+): calculated for $C_{19}H_{11}F_4NO_4SNa$ [M+Na^+]: m/z = 448.0237, m/z found 448.0239; **IR** ν max (ATR)/cm^{-1}: 3280, 2898, 2133, 1608, 1564, 1432, 1320, 1244, 1223, 1181, 1140, 1069, 1021, 837, 770.

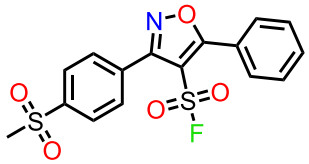
5-(Benzo[d][1,3]dioxol-5-yl)-3-(4-(methylsulfonyl)phenyl)isoxazole-4-sulfonyl fluoride (4p)



Following general procedure C, the title compound was isolated after washing with Et_2O as a yellow solid (193 mg, 91%). **m.p.** 180 °C (decomposition); **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 8.12 (appt. d, *J* = 8.7 Hz, 2H), 7.91 (appt. d, *J* = 8.7 Hz, 2H), 7.50 (dd, *J* = 8.2, 1.8 Hz, 1H), 7.35 (d, *J* = 1.8 Hz, 1H), 7.02 (d, *J* = 8.2 Hz, 1H), 6.15 (s, 2H), 3.14 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 175.6 (d, *J* = 2.4 Hz), 160.6, 152.3, 148.5, 143.0, 131.5, 130.6, 127.9, 125.9,

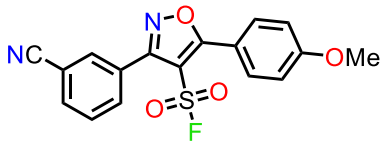
117.4, 109.4, 109.1, 108.7 (d, *J* = 35.2 Hz), 102.5, 44.6; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 72.8; **HRMS** (ESI^+): calculated for $C_{17}H_{12}FNO_7S_2Na$ [M+Na^+]: m/z = 447.9931, m/z found 447.9936; **IR** ν_{max} (ATR)/cm^{-1}: 3015, 2359, 1556, 1486, 1420, 1311, 1264, 1244, 1214, 1149, 1034, 779.

3-(4-(Methylsulfonyl)phenyl)-5-phenylisoxazole-4-sulfonyl fluoride (4aq)



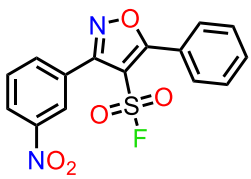
Following general procedure C, the title compound was isolated after washing with Et_2O as a yellow solid (151 mg, 79%). **m.p.** 139 - 141 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 8.14 (appt. d, *J* = 8.7 Hz, 2H), 7.95 (appt. d, *J* = 8.7 Hz, 2H), 7.92 – 7.89 (m, 2H), 7.73 – 7.68 (m, 1H), 7.65 – 7.60 (m, 2H), 3.14 (s, 4H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 176.2 (d, *J* = 2.8 Hz), 160.4, 143.0, 133.5, 131.4, 130.6, 129.8, 129.2, 127.9, 124.0, 109.9 (d, *J* = 35.4 Hz), 44.6; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 72.9; **HRMS** (ESI^+): calculated for $C_{16}H_{12}FNO_5S_2Na$ [M+Na^+]: m/z = 404.0033, m/z found 404.0031; **IR** ν_{max} (ATR)/cm^{-1}: 3074, 1606, 1557, 1424, 1306, 1219, 1146, 778.

3-(3-Cyanophenyl)-5-(4-methoxyphenyl)isoxazole-4-sulfonyl fluoride (4ar)



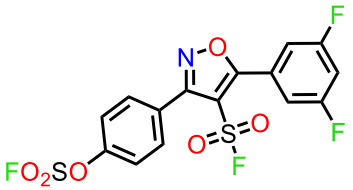
Following general procedure C, the title compound was isolated as a yellow solid (174 mg, 97%) **^{1}H NMR** (400 MHz, $CDCl_3$) δ = 7.99 (appt. td, *J* = 1.7, 0.6 Hz, 1H), 7.94 (ddd, *J* = 7.9, 1.8, 1.2 Hz, 1H), 7.90 (appt. d, *J* = 9.1 Hz, 2H), 7.87 (ddd, *J* = 7.8, 1.6, 1.2 Hz, 1H), 7.68 (appt. td, *J* = 7.9, 0.6 Hz, 1H), 7.10 (appt. d, *J* = 9.0 Hz, 2H), 3.93 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 175.8 (d, *J* = 2.5 Hz), 163.8, 160.1, 134.4, 133.7, 132.8, 131.7, 129.7, 127.7, 117.9, 116.0, 114.7, 113.3, 108.0 (d, *J* = 35.0 Hz), 55.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 72.9; **HRMS** (ESI^+): calculated for $C_{17}H_{11}FN_2O_4SNa$ [M+Na^+]: m/z = 381.0316, m/z found 381.0322; **IR** ν_{max} (ATR)/cm^{-1}: 2961, 2928, 2232, 1713, 1604, 1511, 1415, 1259, 1178, 1021, 803.

3-(3-Nitrophenyl)-5-phenylisoxazole-4-sulfonyl fluoride (4as)



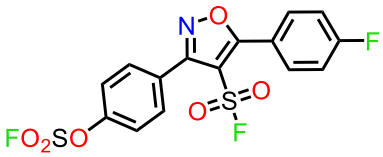
Following general procedure C, the title compound was isolated after purification by flash column chromatography (0-2% EtOAc in petroleum ether) as a beige solid (86.0 mg, 50%). **m.p.** 140 - 141 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.64 – 8.61 (m, 1H), 8.46 (ddd, *J* = 8.3, 2.3, 1.1 Hz, 1H), 8.06 (ddd, *J* = 7.7, 1.7, 1.1 Hz, 1H), 7.94 – 7.88 (m, 2H), 7.80 – 7.74 (m, 1H), 7.73 – 7.68 (m, 1H), 7.65 – 7.60 (m, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 176.3 (d, *J* = 2.7 Hz), 160.1, 148.4,135.3, 133.6, 130.1, 129.8, 129.2, 127.7, 125.9, 124.7, 124.0, 109.8 (d, *J* = 35.5 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.2; **HRMS** (ESI^+): calculated for $C_{15}H_9FN_2O_5SNa$ $[M+Na^+]$: m/z = 371.0108, m/z found 371.0100; **IR** ν_{max} (ATR)/cm^{-1}: 2922, 2857, 1600, 1531, 1420, 1348, 1215, 1058, 767, 721.

4-(5-(3,5-Difluorophenyl)-4-(fluorosulfonyl)isoxazol-3-yl)phenyl fluorosulfate (4at)



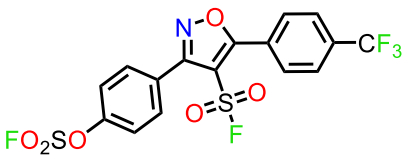
Following general procedure C (100 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated as a white solid (38.0 mg, 87%). **m.p.** 138.7 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.85 (appt. d, *J* = 8.5 Hz, 2H), 7.55 (appt. d, *J* = 8.5 Hz, 2H), 7.49 – 7.35 (m, 2H), 7.15 (td, *J* = 8.7, 2.4 Hz, 1H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 173.2 (d, *J* = 3.1 Hz), 163.0 (dd, *J* = 252.3, 12.4 Hz), 160.4, 151.9, 131.9, 126.5 (t, *J* = 10.5 Hz), 126.1, 121.7, 113.3 (dd, *J* = 22.0, 6.7 Hz), 111.2 (d, *J* = 35.8 Hz), 109.0 (t, *J* = 24.9 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.3, 38.3, -106.6; **HRMS** (APCI): calculated for $C_{15}H_8F_4NO_6S_2$ $[M+H^+]$: m/z = 437.9729, m/z found 437.9727;

4-(5-(4-Fluorophenyl)-4-(fluorosulfonyl)isoxazol-3-yl)phenyl fluorosulfate (4au)



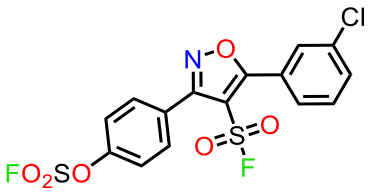
Following general procedure C (100 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated as a white solid (36.0 mg, 86%). **m.p.** 123.4 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.92 (dd, *J* = 8.5, 5.1 Hz, 2H), 7.85 (appt. d, *J* = 8.3 Hz, 2H), 7.54 (appt. d, *J* = 8.3 Hz, 2H), 7.30 (t, *J* = 8.3 Hz, 2H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 175.1 (d, *J* = 2.7 Hz), 165.8 (d, *J* = 256.8 Hz), 160.3, 151.8, 132.4 (d, *J* = 9.3 Hz), 131.8, 126.6, 121.6, 120.3 (d, *J* = 3.4 Hz), 116.8 (d, *J* = 22.4 Hz), 109.8 (d, *J* = 35.6 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.2, 38.2, -104.0; **HRMS** (APCI): calculated for $C_{15}H_9F_3NO_6S_2$ $[M+H^+]$: m/z = 419.9823, m/z found 419.9824;

4-(4-(Fluorosulfonyl)-5-(4-(trifluoromethyl)phenyl)isoxazol-3-yl)phenyl fluorosulfate (4av)



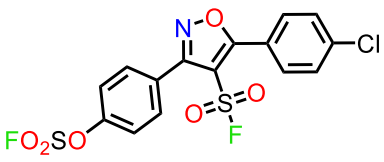
Following general procedure C (100 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated as a white solid (36.5 mg, 78%). **m.p.** 134.4 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.01 (appt. d, *J* = 8.1 Hz, 2H), 7.93 – 7.75 (m, 4H), 7.55 (appt. d, *J* = 8.3 Hz, 2H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 174.5 (d, *J* = 2.8 Hz), 160.3, 151.9, 135.0 (q, *J* = 33.3 Hz), 131.8, 130.4, 127.4, 126.2, 126.2 (q, *J* = 3.8 Hz), 123.4 (q, *J* = 273.0 Hz), 121.7, 111.1 (d, *J* = 35.7 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.3, 38.3, -63.8; **HRMS** (APCI): calculated for $C_{16}H_9F_5NO_6S_2$ [M+H$^+$]: m/z = 469.9791, m/z found 469.9780;

4-(5-(3-Chlorophenyl)-4-(fluorosulfonyl)isoxazol-3-yl)phenyl fluorosulfate (4aw)



Following general procedure C (100 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated as a white solid (36.0 mg, 84%). **m.p.** 120.0 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.94 – 7.81 (m, 3H), 7.77 (d, *J* = 7.9 Hz, 1H), 7.66 (d, *J* = 8.2 Hz, 1H), 7.60 – 7.51 (m, 3H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 174.6 (d, *J* = 2.8 Hz), 160.3, 151.9, 135.4, 133.5, 131.8, 130.5, 129.7, 128.0, 126.4, 125.7, 121.7, 110.6 (d, *J* = 35.4 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.3, 38.2; **HRMS** (APCI): calculated for $C_{15}H_9ClF_2NO_6S_2$ [M+H$^+$]: m/z = 435.9528, m/z found 435.9536;

4-(5-(4-Chlorophenyl)-4-(fluorosulfonyl)isoxazol-3-yl)phenyl fluorosulfate (4ax)

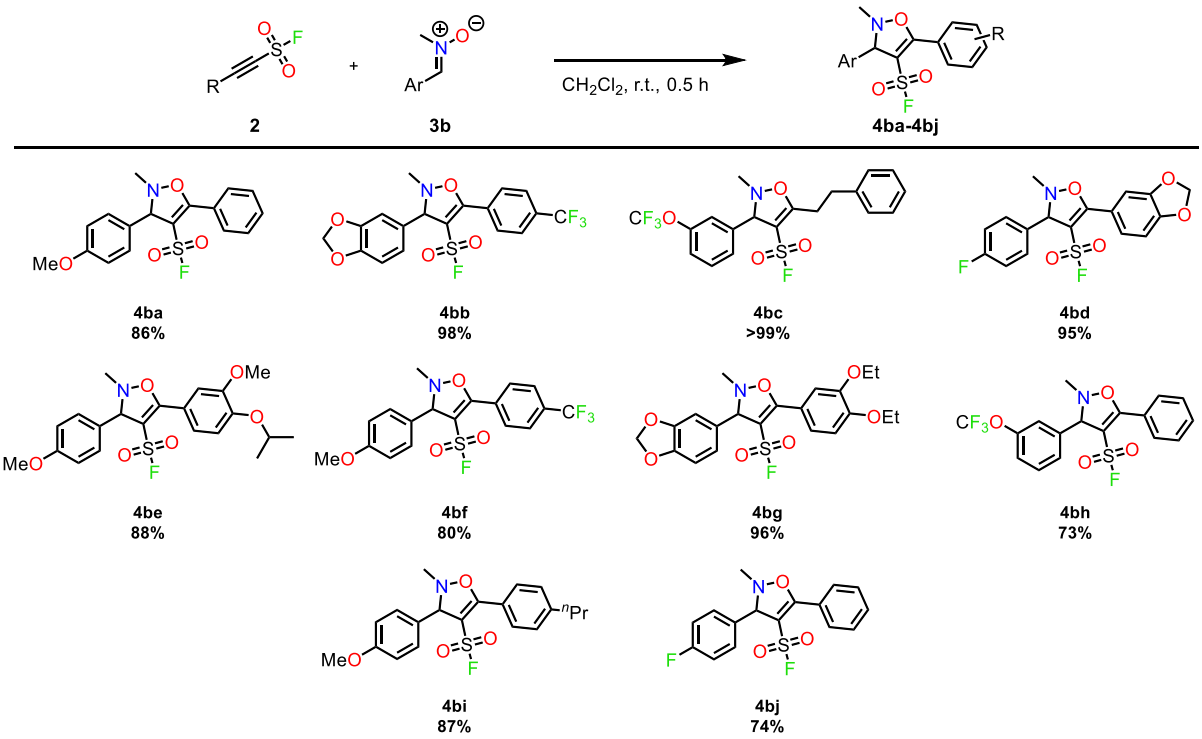


Following general procedure C (100 µmol of the required SASF and the required imidoyl chloride used), the title compound was isolated as a white solid (35.0 mg, 80%). **m.p.** 96.3 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.92 – 7.74 (m, 4H), 7.59 (appt. d, *J* = 8.0 Hz, 2H), 7.54 (appt. d, *J* = 8.4 Hz, 2H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 175.0 (d, *J* = 2.6 Hz), 160.4, 151.9, 140.3, 131.8, 131.1, 130.0, 129.7, 126.5, 122.5, 121.6, 110.2; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.23, 38.20; **HRMS** (APCI): calculated for $C_{15}H_9ClF_2NO_6S_2$ [M+H$^+$]: m/z = 435.9528, m/z found 435.9524;

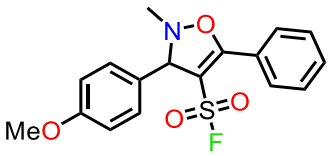
Synthesis and experimental data for compounds 4ba-4aj

General Procedure D

A solution of the required SASF **2** (100 µmol) and the required nitrone **3b** (100 µmol) was stirred in CH_2Cl_2 (500 µL) at room temperature for 0.5 h and the solvent was then removed under reduced pressure to obtain the analytically pure product.

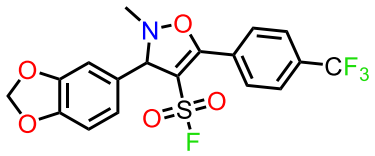


3-(4-Methoxyphenyl)-2-methyl-5-phenyl-2,3-dihydroisoxazole-4-sulfonyl fluoride (4ba)



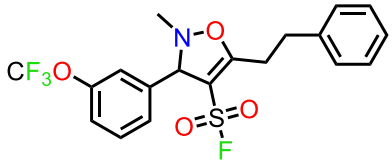
Following general procedure D, the title compound was isolated as a colourless oil (30.0 mg, 86%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.76 (appt. d, *J* = 8.5 Hz, 1H), 7.60 (appt. t, *J* = 7.5 Hz, 1H), 7.50 (appt. t, *J* = 7.6 Hz, 1H), 7.37 (appt. d, *J* = 8.7 Hz, 1H), 6.94 (d, *J* = 8.7 Hz, 1H), 5.19 (s, 1H), 3.82 (s, 2H), 3.10 (s, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 165.8 (d, *J* = 2.3 Hz), 160.1, 133.0, 130.6, 129.9, 128.6, 128.4, 124.5, 114.4, 102.9 (d, *J* = 29.9 Hz), 76.3, 55.3, 46.8. **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.3; **HRMS** (ASAP): calculated for $C_{17}H_{17}FNO_4S$ [M+H$^+$]: m/z = 350.0862, m/z found 350.0861; **IR** ν_{max} (ATR)/cm^{-1}: 3066, 2840, 1678, 1597, 761.

3-(Benzo[*d*][1,3]dioxol-5-yl)-2-methyl-5-(4-(trifluoromethyl)phenyl)-2,3-dihydroisoxazole-4-sulfonyl fluoride (4bb)



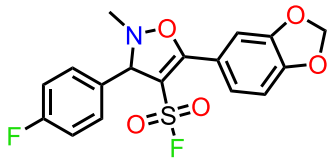
Following general procedure D, the title compound was isolated as a yellow solid (42.0 mg, 98%). **m.p.** 105 - 107 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.87 (appt. d, *J* = 8.2 Hz, 2H), 7.77 (appt. d, *J* = 8.2 Hz, 2H), 6.94 (d, *J* = 1.7 Hz, 1H), 6.91 (dd, *J* = 8.0, 1.7 Hz, 1H), 6.84 (d, *J* = 8.0 Hz, 1H), 6.00 (appt. q, *J* = 2.5 Hz, 2H), 5.19 (s, 1H), 3.12 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 164.2, 148.5 (d, *J* = 3.0 Hz), 134.6 (q, *J* = 33.1 Hz), 131.9, 130.5, 128.1, 125.7 (q, *J* = 3.7 Hz), 123.5 (q, *J* = 272.8 Hz), 121.2, 108.7, 107.5, 104.8 (d, *J* = 30.5 Hz), 101.6, 76.8, 47.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.0, -63.3; **HRMS** (ESI^+): calculated for $C_{18}H_{14}F_4NO_5S$ [M+H$^+$]: m/z = 432.0523, m/z found 435.0525; **IR** ν_{max} (ATR)/cm^{-1}: 2966, 2892, 1687, 1632, 1607, 1490, 1449, 1406, 1320, 1247, 1211, 1172, 1125, 1063, 1038, 743.

2-Methyl-5-phenethyl-3-(3-(trifluoromethoxy)phenyl)-2,3-dihydroisoxazole-4-sulfonyl fluoride (4bc)



Following general procedure D, the title compound was isolated as a yellow oil (43.0 mg, >99%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.40 – 7.31 (m, 3H), 7.29 – 7.23 (m, 3H), 7.23 – 7.18 (m, 1H), 7.18 – 7.14 (m, 2H), 4.98 (s, 1H), 3.17 – 2.97 (m, 4H), 2.92 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 170.7 (d, *J* = 2.8 Hz), 149.6 (q, *J* = 1.8 Hz), 140.7, 138.7, 130.3, 128.8, 128.7, 127.1, 125.8, 121.3, 120.6 (q, *J* = 257.5 Hz), 120.1, 103.5 (d, *J* = 29.6 Hz), 75.1, 47.4, 32.6, 27.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 71.3, -57.8; **HRMS** (ESI^+): calculated for $C_{19}H_{17}F_4NO_4SNa$ [M+Na$^+$]: m/z = 454.0707, m/z 454.0708; **IR** ν_{max} (ATR)/cm^{-1}: 3031, 2963, 1736, 1621, 1404, 1256, 1207, 1161, 789, 757.

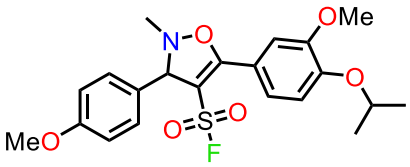
5-(Benzo[*d*][1,3]dioxol-5-yl)-3-(4-fluorophenyl)-2-methyl-2,3-dihydroisoxazole-4-sulfonyl fluoride (4bd)



Following general procedure D, the title compound was isolated as a yellow solid (36.0 mg, 95%). **m.p.** 92 - 93 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.44 – 7.40 (m, 2H), 7.37 (dd, *J* = 8.2, 1.8 Hz, 1H), 7.21 (d, *J* = 1.8 Hz, 1H), 7.12 – 7.07 (m, 2H), 6.92 (d, *J* = 8.2 Hz, 1H), 6.08 (s, 2H), 5.19 (s, 1H), 3.10 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 165.6 (d, *J* =

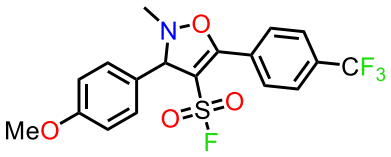
1.9 Hz), 163.1 (d, *J* = 247.7 Hz), 152.1, 148.1, 134.9, 128.9 (d, *J* = 8.4 Hz), 126.3, 117.7, 116.1 (d, *J* = 21.7 Hz), 110.0, 108.7, 102.3, 101.3 (d, *J* = 30.4 Hz), 76.0, 47.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.9, -112.9; **HRMS** (ESI^+): calculated for $C_{17}H_{14}F_2NO_5S$ [$M+H^+$]: m/z = 382.0555, m/z found 382.0557; **IR** ν_{max} (ATR)/cm^{-1}: 2960, 2922, 2857, 1629, 1604, 1505, 1486, 1451, 1413, 1256, 1211, 1095, 1031, 791, 732.

5-(4-isopropoxy-3-methoxyphenyl)-3-(4-methoxyphenyl)-2-methyl-2,3-dihydroisoxazole-4-sulfonyl fluoride (4be)



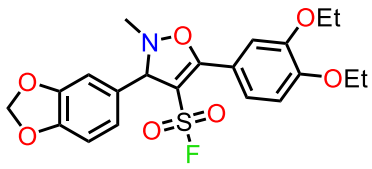
Following general procedure D, the title compound was isolated as a yellow oil (37.0 mg, 84%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.43 (appt. dd, *J* = 8.5, 2.1 Hz, 1H), 7.35 (appt. d, *J* = 8.7 Hz, 1H), 7.32 (appt. d, *J* = 2.1 Hz, 1H), 6.99 – 6.87 (m, 1H), 5.17 (s, 1H), 4.67 (hept, *J* = 6.1 Hz, 1H), 3.90 (s, 1H), 3.81 (s, 1H), 3.07 (s, 1H), 1.42 (d, *J* = 6.1 Hz, 1H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 165.5, 160.1, 152.0, 149.7, 128.4, 124.3, 116.2, 114.4, 113.4, 113.4, 100.7 (d, *J* = 29.6 Hz), 76.4, 71.5, 56.3, 55.4, 22.1, 22.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.7; **HRMS** (ESI^+): calculated for $C_{21}H_{25}FNO_6S$ [$M+H^+$]: m/z = 438.1381, m/z found 438.1391; **IR** ν_{max} (ATR)/cm^{-1}: 2977, 2933, 2838, 1599, 1505, 740.

3-(4-Methoxyphenyl)-2-methyl-5-(4-(trifluoromethyl)phenyl)-2,3-dihydroisoxazole-4-sulfonyl fluoride (4bf)



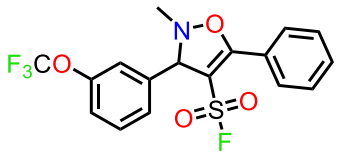
Following general procedure D, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a yellow amorphous solid (33.0 mg, 80%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.88 (appt. d, *J* = 8.2 Hz, 2H), 7.77 (appt. d, *J* = 8.2 Hz, 2H), 7.37 (appt. d, *J* = 8.5 Hz, 2H), 6.96 (appt. d, *J* = 8.6 Hz, 2H), 5.23 (s, 1H), 3.84 (s, 3H), 3.12 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.1, 160.4, 134.5 (q, *J* = 33.0 Hz), 130.5, 130.1, 128.7, 128.2, 125.7 (q, *J* = 3.7 Hz), 123.5 (q, *J* = 272.9 Hz), 114.6, 104.9 (d, *J* = 30.3 Hz), 76.6, 55.5, 47.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.9, -63.3; **HRMS** (ASAP): calculated for $C_{18}H_{16}F_4NO_4S$ [M+H]: m/z = 418.0736, m/z found 418.0732; **IR** ν_{max} (ATR)/cm^{-1}: 2924, 2841, 1606, 1513, 1408, 1322, 1246, 1212, 1176, 1124, 1066, 850, 731.

3-(Benzo[*d*][1,3]dioxol-5-yl)-5-(3,4-diethoxyphenyl)-2-methyl-2,3-dihydroisoxazole-4-sulfonyl fluoride (4bg)



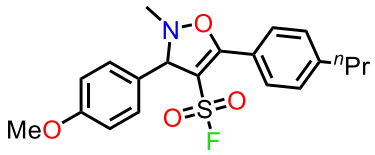
Following general procedure D, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a yellow oil (43.0 mg, 96%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.42 (dd, *J* = 8.5, 2.1 Hz, 1H), 7.32 (d, *J* = 2.1 Hz, 1H), 6.94 (d, *J* = 8.5 Hz, 1H), 6.93 – 6.89 (m, 2H), 6.82 (d, *J* = 7.9 Hz, 1H), 5.98 (appt. q, *J* = 3.0 Hz, 2H), 5.13 (s, 1H), 4.21 – 4.12 (m, 4H), 3.08 (s, 3H), 1.50 (t, *J* = 7.0 Hz, 3H), 1.48 (t, *J* = 7.0 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 165.7 (d, *J* = 1.7 Hz), 153.3, 148.4, 148.2, 133.0, 124.4, 120.9, 116.2, 114.6, 112.1, 108.6, 107.4, 101.4, 100.5 (d, *J* = 29.5 Hz), 76.7, 65.0, 64.7, 46.9, 14.8, 14.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.8; **HRMS** (ESI^+): calculated for $C_{21}H_{22}FNO_7SNa$ [M+Na^+]: m/z = 474.0993, m/z found 474.0988; **IR** ν_{max} (ATR)/cm^{-1}: 2985, 2931, 2884, 1735, 1599, 1505, 1398, 1241, 1201, 1036, 742.

2-Methyl-5-phenyl-3-(3-(trifluoromethoxy)phenyl)-2,3-dihydroisoxazole-4-sulfonyl fluoride (4bh)



Following general procedure D, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a yellow oil (29.0 mg, 73%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.75 (appt. d, *J* = 7.2 Hz, 1H), 7.61 (appt. t, *J* = 6.9 Hz, 1H), 7.51 (appt. t, *J* = 7.6 Hz, 1H), 7.48 – 7.39 (m, 1H), 7.35 (br s, 1H), 7.24 (br d, *J* = 7.7 Hz, 1H), 5.25 (s, 1H), 3.14 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 166.5 (d, *J* = 2.2 Hz), 149.8 (q, *J* = 1.7 Hz), 141.2, 133.4, 130.6, 130.2, 128.8, 125.4, 124.3, 121.4, 120.6 (q, *J* = 257.6 Hz), 119.8, 102.4 (d, *J* = 30.8 Hz), 76.0, 47.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.8, -57.8; **HRMS** (ESI^+): calculated for $C_{17}H_{14}F_4NO_4S$ [M+H^+]: m/z = 404.0574, m/z found 404.0573; **IR** ν_{max} (ATR)/cm^{-1}: 3068, 2857, 1704, 1408, 751.

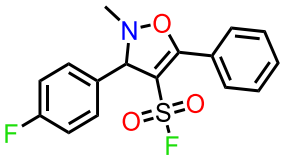
3-(4-Methoxyphenyl)-2-methyl-5-(4-propylphenyl)-2,3-dihydroisoxazole-4-sulfonyl fluoride (4bi)



Following general procedure D, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a yellow oil (34.0 mg, 87%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.69 (appt. d, *J* = 8.3 Hz, 2H), 7.35 (appt. d, *J* = 8.7 Hz, 2H), 7.30 (appt. d, *J* = 8.2 Hz, 2H), 6.93 (appt. d, *J* = 8.7 Hz,

2H), 5.18 (s, 1H), 3.82 (s, 3H), 3.08 (s, 3H), 2.66 (t, *J* = 7.5 Hz, 2H), 1.74 – 1.62 (m, 2H), 0.96 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 166.1, 160.2, 148.8, 130.1, 128.8, 128.5, 121.9, 114.5, 102.1 (d, *J* = 29.9 Hz), 76.4, 55.5, 46.9, 38.2, 24.3, 13.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.5; **HRMS** (ESI^+): calculated for $C_{20}H_{23}FNO_4S$ $[M+H^+]$: m/z = 392.1326, m/z found 392.1332; **IR** ν_{max} (ATR)/cm^{-1}: 2961, 2931, 2872, 1610, 1511, 748.

3-(4-Fluorophenyl)-2-methyl-5-phenyl-2,3-dihydroisoxazole-4-sulfonyl fluoride (4bj)

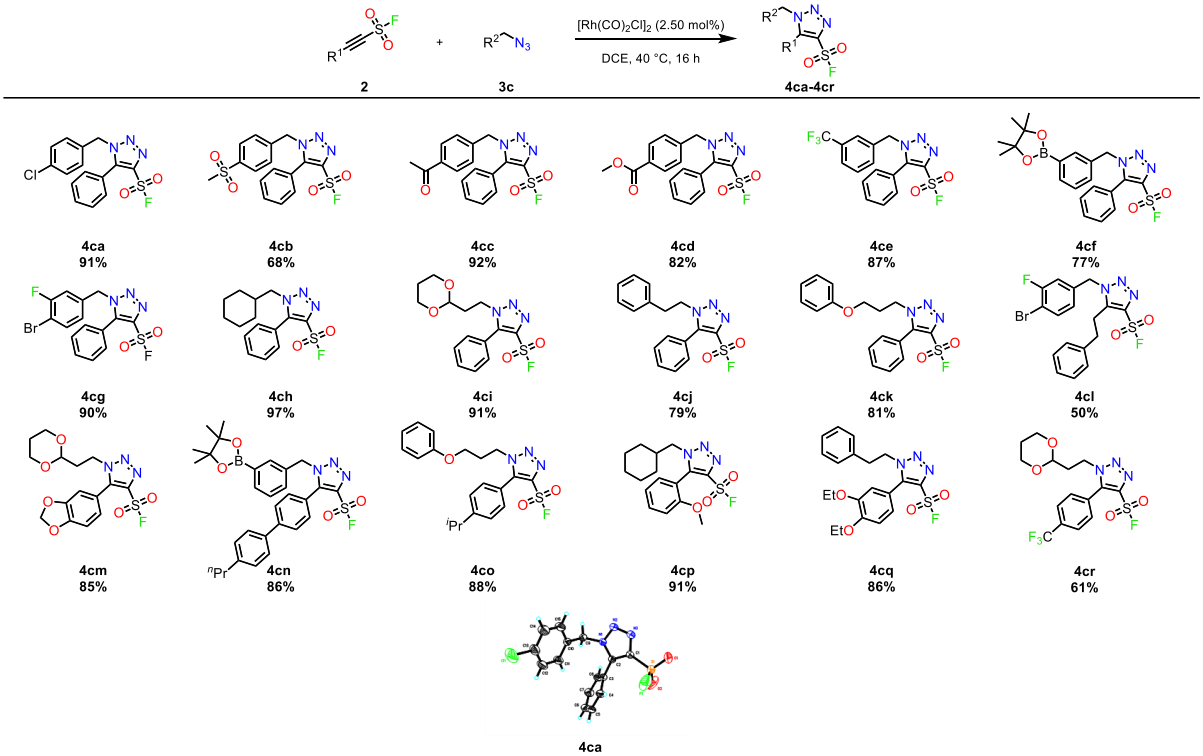


Following general procedure D, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a yellow oil (28.0 mg, 74%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.75 (appt. d, *J* = 7.2 Hz, 2H), 7.61 (appt. t, *J* = 6.9 Hz, 1H), 7.50 (appt. t, *J* = 7.6 Hz, 2H), 7.47 – 7.40 (m, 2H), 7.10 (appt. t, *J* = 8.7 Hz, 2H), 5.22 (s, 1H), 3.12 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 166.1 (d, *J* = 2.3 Hz), 163.2 (d, *J* = 247.9 Hz), 134.7, 133.3, 130.1, 129.0 (d, *J* = 8.4 Hz), 128.8, 124.4, 116.1 (d, *J* = 21.8 Hz), 102.8 (d, *J* = 30.4 Hz), 76.1, 47.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.6, -112.8; **HRMS** (ESI^+): calculated for $C_{16}H_{14}F_2NO_3S$ $[M+H^+]$: m/z = 338.0657, m/z found 338.0657; **IR** ν_{max} (ATR)/cm^{-1}: 3069, 2967, 2923, 1509, 1403, 746.

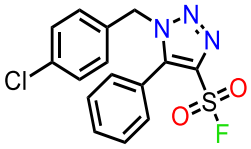
Synthesis and experimental data for compounds 4ca-4ar

General procedure E

To a solution of the required SASF **2** (100 µmol) and the required azide **3c** (100 µmol) in DCE (1.00 mL) was added $[Rh(CO)_2Cl]_2$ (1.00 mg, 2.50 mol%) and stirred at 40 °C for 16 h.[18] The solvent was removed under reduced pressure and the crude mixture was purified by flash column chromatography to obtain the analytically pure product.

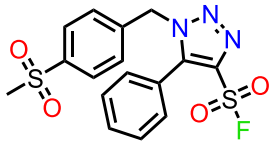


1-(4-Chlorobenzyl)-5-phenyl-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4ca)



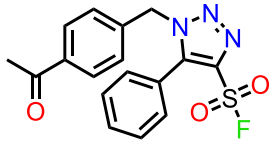
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless solid (32.0 mg, 91%). **m.p.** 129 - 130 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.65 – 7.59 (m, 1H), 7.57 – 7.49 (m, 2H), 7.30 – 7.27 (m, 2H), 7.26 – 7.22 (m, 2H), 6.98 (appt. d, *J* = 8.7 Hz, 2H), 5.44 (s, 2H).**^{13}C NMR** (126 MHz, $CDCl_3$) δ 141.6 (d, *J* = 2.7 Hz), 138.3 (d, *J* = 35.8 Hz), 135.4, 131.9, 131.7, 129.7, 129.5, 129.4, 122.8, 52.5; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.6; **HRMS** (ESI^+): calculated for $C_{15}H_{12}ClFN_3O_2S$ $[M+H^+]$: m/z = 352.0317, m/z found 352.0314; **IR** ν_{max} (ATR)/cm^{-1}: 3061, 2852, 1493, 1427, 1204, 1093, 783.

1-(4-(Methylsulfonyl)benzyl)-5-phenyl-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4cb)



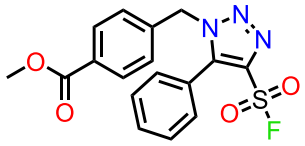
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-70% EtOAc in petroleum ether) as a colourless solid (27.0 mg, 68%). **m.p.** 98 - 99 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.89 (appt. d, *J* = 8.2 Hz, 2H), 7.62 (appt. t, *J* = 7.5 Hz, 1H), 7.54 (appt. t, *J* = 7.7 Hz, 2H), 7.26 (m, 4H), 5.55 (s, 2H), 3.04 (s, 3H). **^{13}C NMR** (126 MHz, $CDCl_3$) δ 141.9 (d, *J* = 2.6 Hz), 141.5, 139.2, 138.4 (d, *J* = 36.2 Hz), 132.0, 129.6, 129.6, 128.9, 128.4, 122.5, 52.3, 44.5; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.6; **HRMS** (ESI^+): calculated for $C_{16}H_{14}F_2N_3O_4S_2Na$ [$M+Na^+$]: m/z = 418.0302, m/z found 418.0305; **IR** ν_{max} (ATR)/cm^{-1}: 2926, 2857, 1416, 1307, 1146, 722.

1-(4-Acetylbenzyl)-5-phenyl-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4cc)



Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-40% EtOAc in petroleum ether) as a colourless solid (33.0 mg, 92%). **m.p.** 111 - 112 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.89 (appt. d, *J* = 8.2 Hz, 2H), 7.60 (appt. t, *J* = 7.5 Hz, 1H), 7.51 (appt. t, *J* = 7.7 Hz, 2H), 7.23 (appt. d, *J* = 7.7 Hz, 2H), 7.13 (appt. d, *J* = 8.2 Hz, 2H), 5.52 (s, 2H), 2.58 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 197.3, 141.8 (d, *J* = 2.6 Hz), 138.28 (d, *J* = 35.9 Hz), 138.3, 137.6, 131.8, 129.7, 129.4, 129.2, 128.1, 122.6, 52.7, 26.8; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.6; **HRMS** (ESI^+): calculated for $C_{17}H_{14}FN_3O_3SNa$ [$M+Na^+$]: m/z = 382.0632, m/z found 382.0630; **IR** ν_{max} (ATR)/cm^{-1}: 2925, 2855, 1681, 1610, 1428, 1201, 776.

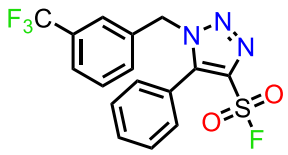
Methyl 4-((4-(fluorosulfonyl)-5-phenyl-1*H*-1,2,3-triazol-1-yl)methyl)benzoate (4cd)



Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-30% EtOAc in petroleum ether) as a colourless solid (31.0 mg, 82%). **m.p.** 129 - 130 °C; **^{1}H**

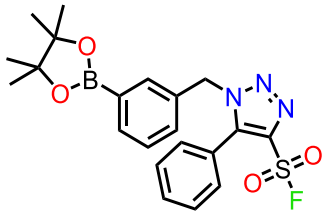
NMR (500 MHz, $CDCl_3$) δ 7.97 (appt. d, *J* = 8.5 Hz, 1H), 7.59 (appt. t, *J* = 6.9 Hz, 1H), 7.50 (appt. t, *J* = 8.0 Hz, 1H), 7.21 (appt. d, *J* = 7.1 Hz, 1H), 7.09 (appt. d, *J* = 8.6 Hz, 1H), 5.52 (s, 1H), 3.92 (s, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 166.4, 141.8 (d, *J* = 2.7 Hz), 138.3 (d, *J* = 36.0 Hz), 138.1, 131.8, 131.0, 130.5, 129.7, 129.4, 127.8, 122.7, 52.8, 52.5; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.6; **HRMS** (ESI^+): calculated for $C_{17}H_{14}FN_3O_4SNa$ [M+Na^+]: m/z = 398.0581; m/z found 398.0579; **IR** ν_{max} (ATR)/cm^{-1}: 2955, 2925, 2854, 1725, 1281, 768.

5-Phenyl-1-(3-(trifluoromethyl)benzyl)-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4ce)



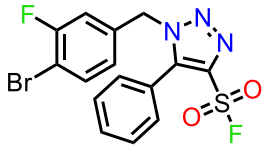
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a yellow oil (34.0 mg, 87%) **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.65 – 7.58 (m, 2H), 7.56 – 7.51 (m, 2H), 7.47 (appt. t, *J* = 7.8 Hz, 1H), 7.30 (appt. d, *J* = 7.8 Hz, 1H), 7.24 – 7.19 (m, 3H), 5.54 (s, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 141.7 (d, *J* = 2.8 Hz), 138.4 (d, *J* = 36.1 Hz), 134.2, 131.9, 132.1 – 131.2 (m), 131.5, 130.0, 129.6, 129.5, 126.2 (q, *J* = 3.7 Hz), 125.2 (q, *J* = 3.8 Hz), 123.6 (q, *J* = 272.6 Hz), 122.7, 52.7; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 68.6, -62.9; **HRMS** (ESI^+): calculated for $C_{16}H_{11}F_4N_3O_2SNa$ [M+Na^+]: m/z = 408.0400, m/z found 408.0400; **IR** ν_{max} (ATR)/cm^{-1}: 3068, 2926, 1424, 1327, 1202, 1124, 1074, 779.

5-Phenyl-1-(3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)benzyl)-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4cf)



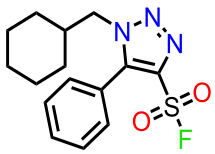
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless solid (34.0 mg, 77%). **m.p.** 108 - 109 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.75 (appt. dt, *J* = 7.4, 1.0 Hz, 1H), 7.61 – 7.56 (m, 1H), 7.53 – 7.46 (m, 3H), 7.30 (appt. t, *J* = 7.6 Hz, 1H), 7.25 – 7.21 (m, 2H), 7.09 (appt. ddd, *J* = 7.7, 1.9, 1.3 Hz, 1H), 5.48 (s, 2H), 1.34 (s, 12H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 141.7 (d, *J* = 2.7 Hz), 138.1 (d, *J* = 35.7 Hz), 135.4, 134.4, 132.7, 131.5, 130.7, 129.8, 129.3, 128.6, 122.9, 84.2, 53.3, 25.0; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 68.6; **HRMS** (ESI^+): calculated for $C_{21}H_{24}BFN_3O_4S$ [M+H^+]: m/z = 444.1559, m/z found 444.1564; **IR** ν_{max} (ATR)/cm^{-1}: 2982, 2927, 2361, 1417, 1362, 1201, 1147, 780.

1-(4-Bromo-3-fluorobenzyl)-5-phenyl-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4cg)



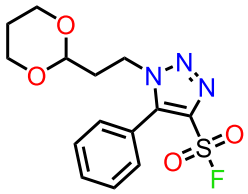
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless solid (37.0 mg, 90%). **m.p.** 103 - 104 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.64 (appt. t, *J* = 7.5 Hz, 1H), 7.56 (appt. t, *J* = 7.7 Hz, 2H), 7.24 (appt. d, *J* = 7.9 Hz, 2H), 7.20 (appt. dd, *J* = 6.2, 1.8 Hz, 1H), 7.05 (appt. t, *J* = 8.3 Hz, 1H), 7.00 – 6.94 (m, 1H), 5.42 (s, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 159.6 (d, *J* = 250.6 Hz), 141.6, 138.4 (d, *J* = 36.1 Hz), 133.6, 131.9, 130.6 (d, *J* = 4.0 Hz), 129.7, 129.5, 128.9 (d, *J* = 7.7 Hz), 122.7, 117.3 (d, *J* = 22.9 Hz), 110.0 (d, *J* = 21.6 Hz), 51.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.6, -105.6; **HRMS** (ESI^+): calculated for $C_{15}H_{10}BrF_2N_3O_2SNa$ [M+Na$^+$]: m/z = 435.9537, m/z found 435.9542; **IR** ν_{max} (ATR)/cm^{-1}: 3096, 2980, 2946, 1494, 1426, 771.

1-(Cyclohexylmethyl)-5-phenyl-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4ch)



Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (31.0 mg, 97%). **m.p.** 71 - 72 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.65 – 7.56 (m, 3H), 7.40 – 7.35 (m, 2H), 4.11 (d, *J* = 7.4 Hz, 2H), 1.96 – 1.85 (m, 1H), 1.72 – 1.59 (m, 3H), 1.55 – 1.48 (m, 2H), 1.23 – 1.04 (m, 3H), 0.90 – 0.80 (m, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 141.8 (d, *J* = 2.7 Hz), 137.7 (d, *J* = 35.3 Hz), 131.5, 129.7, 129.4, 123.3, 55.2, 38.4, 30.4, 26.0, 25.4; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 68.6; **HRMS** (ESI^+): calculated for $C_{15}H_{19}FN_3O_2S$ [M+H$^+$]: m/z = 324.1177, m/z found 324.1178; **IR** ν_{max} (ATR)/cm^{-1}:2922, 2851, 1422, 1201, 773.

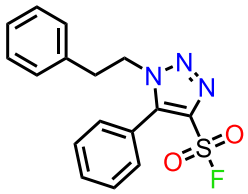
1-(2-(1,3-Dioxan-2-yl)ethyl)-5-phenyl-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4ci)



Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-35% EtOAc in petroleum ether) as a yellow oil (31.0 mg, 91%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ

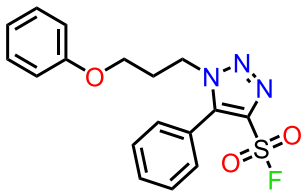
7.64 – 7.56 (m, 3H), 7.43 – 7.39 (m, 2H), 4.55 (t, *J* = 4.6 Hz, 1H), 4.43 (t, *J* = 7.1 Hz, 2H), 4.02 – 3.96 (m, 2H), 3.69 – 3.63 (m, 2H), 2.17 (td, *J* = 7.1, 4.6 Hz, 2H), 2.01 – 1.90 (m, 1H), 1.33 – 1.27 (m, 1H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 141.7 (d, *J* = 2.7 Hz), 137.7 (d, *J* = 35.5 Hz), 131.5, 129.7, 129.3, 123.1, 98.8, 66.9, 44.7, 34.7, 25.5; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 68.6; **HRMS** (ESI^+): calculated for $C_{14}H_{16}FN_3O_4SNa$ [M+Na$^+$]: m/z = 364.0738, m/z found 364.0740; **IR** ν_{max} (ATR)/cm^{-1}: 2962, 2926, 2855, 1421, 1201, 1142, 1005, 770.

1-Phenethyl-5-phenyl-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4cj)



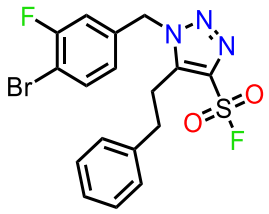
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a yellow oil (26.0 mg, 79%).**^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.57 – 7.52 (m, 1H), 7.46 – 7.41 (m, 2H), 7.27 – 7.21 (m, 3H), 6.93 – 6.89 (m, 2H), 6.89 – 6.84 (m, 2H), 4.48 (t, *J* = 7.0 Hz, 2H), 3.22 (t, *J* = 7.0 Hz, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 142.1 (d, *J* = 2.6 Hz), 137.6 (d, *J* = 35.6 Hz), 136.1, 131.3, 129.5, 129.1, 129.1, 128.8, 127.6, 122.7, 50.6, 36.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.7; **HRMS** (ESI^+): calculated for $C_{16}H_{14}FN_3O_2SNa$ [M+Na$^+$]: m/z = 332.0863, m/z found 332.0864; **IR** ν_{max} (ATR)/cm^{-1}: 3064, 3030, 2929, 1421, 1200, 773.

1-(3-Phenoxypropyl)-5-phenyl-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4ck)



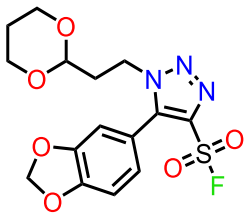
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a yellow oil (29.0 mg, 81%) **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.61 – 7.55 (m, 1H), 7.53 – 7.47 (m, 2H), 7.36 – 7.31 (m, 2H), 7.30 – 7.24 (m, 3H), 7.00 – 6.94 (m, 1H), 6.74 – 6.69 (m, 2H), 4.52 (t, *J* = 6.8 Hz, 2H), 3.93 (appt. t, *J* = 5.5 Hz, 2H), 2.45 – 2.37 (m, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 158.1 (s), 142.0 (d, *J* = 2.8 Hz), 137.8 (d, *J* = 35.6 Hz), 131.5, 129.7, 129.7, 129.4, 122.8, 121.4, 114.3, 63.6, 46.5, 29.5; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 68.6; **HRMS** (ESI^+): calculated for $C_{17}H_{16}FN_3O_3SNa$ [M+Na$^+$]: m/z = 362.0969, m/z found 362.0966; **IR** ν_{max} (ATR)/cm^{-1}: 2925, 1600, 1421, 1242, 1200, 754, 689.

1-(4-Bromo-3-fluorobenzyl)-5-phenethyl-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4cl)



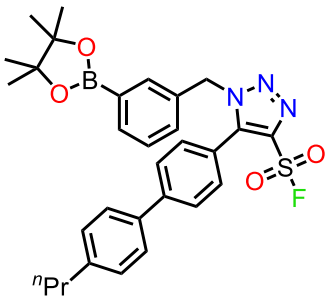
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a yellow oil (22.0 mg, 50%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.36 – 7.27 (m, 4H), 7.12 (t, *J* = 8.3 Hz, 1H), 7.05 – 6.97 (m, 3H), 4.93 (s, 2H), 3.14 (t, *J* = 7.4 Hz, 2H), 2.84 (t, *J* = 7.4 Hz, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 159.6 (d, *J* = 250.8 Hz), 142.1 (d, *J* = 3.4 Hz), 138.6, 137.6 (d, *J* = 35.4 Hz), 133.0, 130.5 (d, *J* = 4.0 Hz), 129.4, 128.6, 128.4 (d, *J* = 7.6 Hz), 127.6, 117.6 (d, *J* = 22.9 Hz), 110.4 (d, *J* = 21.7 Hz), 51.2, 35.1, 25.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.7, -105.3 – -105.6 (m); **HRMS** (ESI^+): calculated for $C_{17}H_{14}BrF_2N_3O_2SNa$ [M+Na^+]: m/z = 463.9850, m/z found 463.9853; **IR** ν_{max} (ATR)/cm^{-1}: 3064, 3030, 2929, 2213, 1497, 1417, 1213, 779.

1-(2-(1,3-Dioxan-2-yl)ethyl)-5-(benzo[d][1,3]dioxol-5-yl)-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4cm)



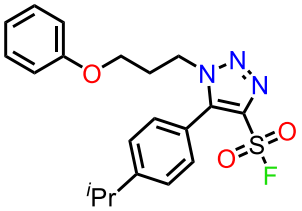
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a yellow oil (33.0 mg, 85%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 6.98 (d, *J* = 8.0 Hz, 1H), 6.88 (dd, *J* = 8.0, 1.8 Hz, 1H), 6.85 (d, *J* = 1.8 Hz, 1H), 6.10 (s, 2H), 4.58 (t, *J* = 4.6 Hz, 1H), 4.43 (t, *J* = 7.1 Hz, 2H), 4.07 – 3.98 (m, 2H), 3.73 – 3.64 (m, 2H), 2.18 (td, *J* = 7.1, 4.6 Hz, 2H), 2.06 – 1.92 (m, 1H), 1.34 – 1.30 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 150.4, 148.6, 141.4 (d, *J* = 2.8 Hz), 137.6 (d, *J* = 35.3 Hz), 124.4, 115.9, 109.7, 109.2, 102.2, 98.8, 66.9, 44.6, 34.7, 25.6; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.5; **HRMS** (ESI^+): calculated for $C_{15}H_{16}FN_3O_6SNa$ [M+Na^+]: m/z = 408.0636, m/z found 408.0636; **IR** ν_{max} (ATR)/cm^{-1}: 2924, 2854, 1477, 1420, 1200, 1141, 1036, 772.

5-(4'-Propyl-[1,1'-biphenyl]-4-yl)-1-(3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)benzyl)-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4cn)



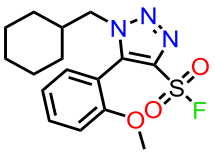
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a yellow solid (48.0 mg, 86%). **m.p.** 123 - 124 °C **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.77 (appt. d, *J* = 7.4 Hz, 1H), 7.71 (appt. d, *J* = 8.5 Hz, 2H), 7.57 (appt. d, *J* = 8.2 Hz, 2H),7.53 (s, 1H), 7.34 – 7.27 (m, 5H), 7.14 (appt. ddd, *J* = 7.7, 1.7, 1.3 Hz, 1H), 5.52 (s, 2H), 2.67 (appt. t, *J* = 7.4 Hz, 2H), 1.76 – 1.65 (m, 2H), 1.30 (s, 12H), 0.99 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 144.4, 143.3, 141.7 (d, *J* = 2.7 Hz), 138.1 (d, *J* = 35.5 Hz), 136.9, 135.5, 134.4, 132.8, 130.7, 130.2, 129.3, 128.6, 127.6, 127.2, 121.1, 84.2, 53.3, 37.8, 24.9, 24.6, 13.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.6; **HRMS** (ESI^+): calculated for $C_{30}H_{33}BFN_3O_4SNa$ [$M+Na^+$]: m/z = 584.2161, m/z found 584.2163; **IR** ν_{max} (ATR)/cm^{-1}: 2980, 2868, 2360, 1424, 1360, 1203, 776.

5-(4-Isopropylphenyl)-1-(3-phenoxypropyl)-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4co)



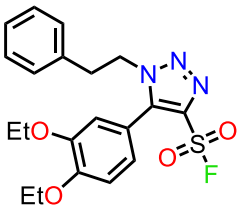
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a yellow oil (35.0 mg, 88%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.37 (appt. d, *J* = 8.1 Hz, 1H), 7.31 – 7.25 (m, 4H), 7.01 – 6.96 (m, 1H), 6.74 (appt. d, *J* = 7.8 Hz, 1H), 4.54 (t, *J* = 6.8 Hz, 2H), 3.95 (appt. t, *J* = 5.6 Hz, 1H), 3.01 (hept, *J* = 6.9 Hz, 1H), 2.48 – 2.40 (m, 2H), 1.33 (d, *J* = 6.9 Hz, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 158.1, 152.6, 142.2 (d, *J* = 2.7 Hz), 137.6 (d, *J* = 35.4 Hz), 129.7), 129.6, 127.5, 121.4, 120.0, 114.4, 63.6, 46.3, 34.2, 29.5, 23.8; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.5; **HRMS** (ESI^+): calculated for $C_{20}H_{23}FN_3O_3SNa$ [$M+H^+$]: m/z = 426.1258, m/z found 426.1254; **IR** ν_{max} (ATR)/cm^{-1}: 2962, 2874, 1600, 1495, 1422, 1242, 1201, 777, 754.

1-(Cyclohexylmethyl)-5-(2-methoxyphenyl)-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4cp)



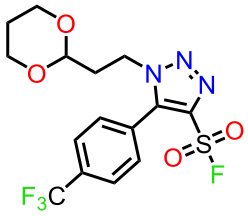
Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a yellow oil (32.0 mg, 91%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.58 (ddd, *J* = 8.4, 7.5, 1.8 Hz, 1H), 7.22 (dd, *J* = 7.6, 1.7 Hz, 1H), 7.13 (appt. td, *J* = 7.5, 0.9 Hz, 1H), 7.07 (d, *J* = 8.4 Hz, 1H), 4.04 (ddd, *J* = 61.5, 13.5, 7.4 Hz, 2H), 3.81 (s, 3H), 1.95 – 1.82 (m, 1H), 1.70 – 1.58 (m, 3H), 1.59 – 1.44 (m, 2H), 1.22 – 1.06 (m, 3H), 0.89 – 0.77 (m, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 157.3, 139.1 (d, *J* = 3.0 Hz), 138.0 (d, *J* = 35.1 Hz), 133.3, 131.2, 121.1, 112.2, 111.7, 55.8, 55.4, 38.1, 30.4 (d, *J* = 5.4 Hz), 26.0, 25.5; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 66.9; **HRMS** (ESI^+): calculated for $C_{16}H_{21}FN_3O_3S$ [$M+H^+$]: m/z = 354.1282, m/z found 354.1281; **IR** ν_{max} (ATR)/cm^{-1}:2927, 2852, 1609, 1486, 1419, 1200, 772.

5-(3,4-Diethoxyphenyl)-1-phenethyl-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4cq)



Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a yellow oil (36.0 mg, 86%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.26 – 7.21 (m, 3H), 6.91 – 6.86 (m, 3H), 6.52 – 6.48 (m, 2H), 4.51 (t, *J* = 7.1 Hz, 2H), 4.15 (q, *J* = 7.0 Hz, 2H), 4.00 (q, *J* = 7.0 Hz, 2H), 3.22 (t, *J* = 7.0 Hz, 2H), 1.50 (t, *J* = 7.0 Hz, 3H), 1.45 (t, *J* = 7.0 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 151.3, 148.9, 142.1 (d, *J* = 2.5 Hz), 137.4 (d, *J* = 35.1 Hz), 136.2, 129.0, 128.8, 127.5, 122.5, 114.4, 114.2, 112.9, 65.0, 64.7, 50.5, 36.3, 14.8, 14.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.4; **HRMS** (ESI^+): calculated for $C_{20}H_{22}FN_3O_4SNa$ [$M+Na^+$]: m/z = 442.1207, m/z found 442.1209; **IR** ν_{max} (ATR)/cm^{-1}: 2983, 2931, 1606, 1501, 1421, 1258, 1196, 1142, 1039, 770.

1-(2-(1,3-Dioxan-2-yl)ethyl)-5-(4-(trifluoromethyl)phenyl)-1*H*-1,2,3-triazole-4-sulfonyl fluoride (4cr)

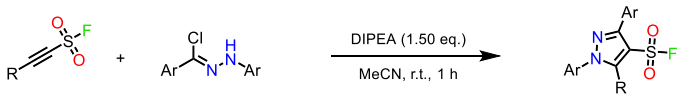


Following general procedure E, the title compound was isolated after purification by flash column chromatography (0-30% EtOAc in petroleum ether) as a yellow oil (25.0 mg, 61%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.86 (d, *J* = 8.1 Hz, 2H), 7.58 (d, *J* = 8.0 Hz, 2H), 4.58 (t, *J* = 4.4 Hz, 1H), 4.44 (t, *J* = 7.0 Hz, 2H), 4.04 – 3.95 (m, 2H), 3.72 – 3.61 (m, 2H), 2.20 (td, *J* = 7.0, 4.5 Hz, 2H), 1.94 (qt, *J* = 12.5, 5.0 Hz, 1H), 1.35 – 1.28 (m, 1H);**^{13}C NMR** (101 MHz, $CDCl_3$) δ 140.2 (d, *J* = 2.9 Hz), 138.1 (d, *J* = 36.0 Hz), 133.6 (q, *J* = 33.3 Hz), 130.5, 127.0, 126.4 (q, *J* = 3.7 Hz), 123.5 (d, *J* = 272.8 Hz), 98.7, 66.9, 44.8, 34.6, 25.5; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.7, -63.2; **HRMS** (ESI^+): calculated for $C_{15}H_{15}F_4N_3O_4SNa$ [$M+Na^+$]: m/z = 410.0792, m/z found 410.0793; **IR** ν_{max} (ATR)/cm^{-1}: 2967, 2858, 1424,1323, 1202, 1127, 1070, 1003, 849, 785

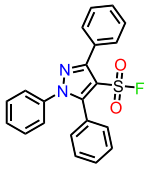
Synthesis and experimental data for compounds 4da-4dk

General procedure F

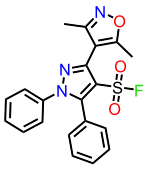
To a solution of the required SASF **2** (500 µmol) and the required hydrazonoyl chloride **14** (250 µmol) in MeCN (500 µL) was added DIPEA (65.2 µL, 375 µmol) and stirred at room temperature for 1 h. The reaction mixture was then extracted into EtOAc (10.0 mL) washed with brine (10.0 mL) and H_2O (2 x 10.0 mL). The aqueous layer was extracted with EtOAc (10.0 mL), the organic fractions combined, dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure. The crude mixture was purified by flash column chromatography to obtain the analytically pure product.



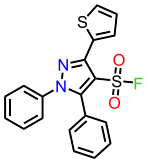
2 **14** **4da-4dj**



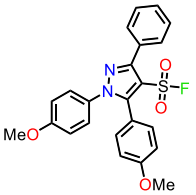
4da
84%



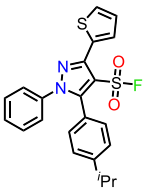
4db
96%



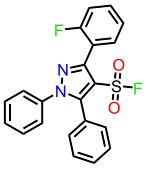
4dc
72%



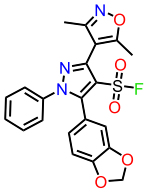
4dd
93%



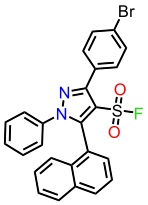
4de
83%



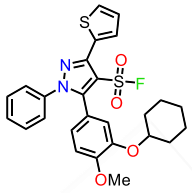
4df
80%



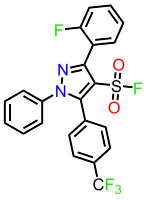
4dg
92%



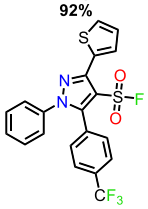
4dh
80%



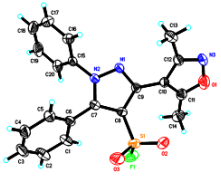
4di
92%



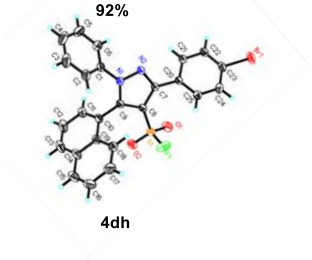
4dj
89%



4dk
71%

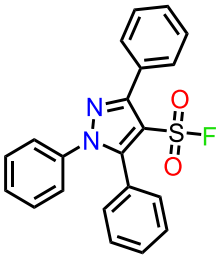


4db



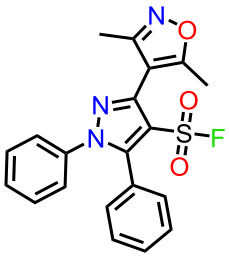
4dh

1,3,5-Triphenyl-1*H*-pyrazole-4-sulfonyl fluoride (4da)



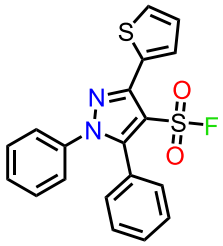
Following general procedure F, the title compound was isolated after purification by flash column chromatography (0-5% EtOAc in petroleum ether) as an off white solid (80.0 mg, 84%). **m.p.** 138 - 139 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.85 – 7.81 (m, 2H), 7.53 – 7.46 (m, 4H), 7.44 – 7.40 (m, 2H), 7.39 – 7.36 (m, 2H), 7.36 – 7.32 (m, 3H), 7.30 – 7.27 (m, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 152.8, 147.8 (d, *J* = 2.0 Hz), 138.4, 130.6, 130.5, 130.3, 129.8, 129.5, 129.2, 129.0, 128.7, 128.5, 126.8, 125.6, 112.3 (d, *J* = 31.2 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 73.7; **HRMS** (ESI^+): calculated for $C_{21}H_{16}FN_2O_2S$ [$M+H^+$]: m/z = 379.0911, m/z found 379.0912; **IR** ν_{max} (ATR)/cm^{-1}: 3069, 2925, 2853, 1961, 1594, 1494, 1449, 1408, 1221, 1184, 774, 690.

3-(3,5-Dimethylisoxazol-4-yl)-1,5-diphenyl-1*H*-pyrazole-4-sulfonyl fluoride (4db)



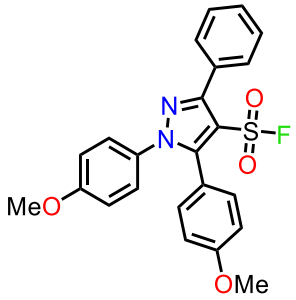
Following general procedure F, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as an off white solid (95.0 mg, 96%). **m.p.** 158 - 161 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.52 – 7.48 (m, 1H), 7.46 – 7.41 (m, 2H), 7.40 – 7.33 (m, 5H), 7.26 – 7.23 (m, 2H), 2.51 (s, 3H), 2.37 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 169.2, 159.5, 147.5, 143.2, 138.1, 130.9, 130.3, 129.4, 129.3, 128.9, 126.2, 125.3, 114.0 (d, *J* = 30.4 Hz), 106.9, 12.2, 10.8; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 73.5; **HRMS** (ESI^+): calculated for $C_{20}H_{16}FN_3O_3SNa$ [$M+Na^+$]: m/z = 420.0789, m/z found 420.0787; **IR** ν_{max} (ATR)/cm^{-1}: 3067, 2926, 1642, 1496, 1409, 1221, 1188, 769.

1,5-Diphenyl-3-(thiophen-2-yl)-1*H*-pyrazole-4-sulfonyl fluoride (4dc)



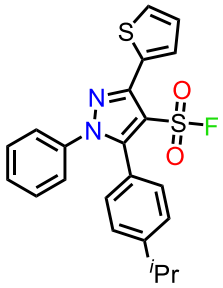
Following general procedure F, the title compound was isolated after purification by flash column chromatography (0-5% EtOAc in petroleum ether) as a beige solid (69.0 mg, 72%). **m.p.** 142 - 143 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ = 7.85 – 7.79 (m, 1H), 7.51 – 7.42 (m, 2H), 7.45 – 7.36 (m, 2H), 7.37 – 7.29 (m, 5H), 7.28 – 7.21 (m, 2H), 7.18 (dd, *J* = 5.1, 3.7 Hz, 1H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 148.3 (d, *J* = 2.6 Hz), 146.3, 138.1, 131.1, 130.6, 130.5, 129.7 (d, *J* = 1.4 Hz), 129.2, 129.1, 128.6, 128.0, 128.0, 126.6, 125.7, 111.2 (d, *J* = 31.9 Hz); **^{19}F NMR** (471 MHz, $CDCl_3$) δ = 71.5; **HRMS** (ESI^+): calculated for $C_{19}H_{14}FN_2O_2S_2$ [M+H$^+$]: m/z = 385.0475, m/z found 385.0481; **IR** ν_{max} (ATR)/cm^{-1}: 2967, 2923, 1477, 1403, 1214, 1056, 765.

1,5-Bis(4-methoxyphenyl)-3-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4dd)



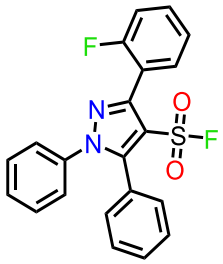
Following general procedure F, the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a colourless solid (102 mg, 93%). **m.p.** 183 - 184 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.82 – 7.77 (m, 2H), 7.52 – 7.47 (m, 3H), 7.28 (appt. d, *J* = 8.8 Hz, 2H), 7.20 (appt. d, *J* = 9.0 Hz, 2H), 6.92 (appt. d, *J* = 8.8 Hz, 2H), 6.84 (appt. d, *J* = 9.0 Hz, 2H), 3.84 (s, 3H), 3.81 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 161.1, 159.8, 152.5, 147.7, 131.9, 131.5, 130.5, 129.7, 129.5, 128.4, 127.0, 118.8, 114.4, 114.2, 111.6 (d, *J* = 31.0 Hz), 55.7, 55.4; **^{19}F NMR** (471 MHz, $CDCl_3$) δ = 73.7; **HRMS** (ESI^+): calculated for $C_{23}H_{20}FN_2O_4S$ [M+H$^+$]: m/z = 439.1122, m/z found 439.1142; **IR** ν_{max} (ATR)/cm^{-1}: 3010, 2971, 2923, 1610, 1519, 1478, 1405, 1250, 1226, 1169, 1027, 757.

5-(4-Isopropylphenyl)-1-phenyl-3-(thiophen-2-yl)-1*H*-pyrazole-4-sulfonyl fluoride (4de)



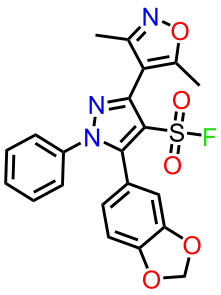
Following general procedure F, the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a Yellow solid (89.0 mg, 83%) **m.p.** 134 - 136 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ = 7.81 (ddd, *J* = 3.7, 1.2, 0.5 Hz, 1H), 7.46 (dd, *J* = 5.1, 1.1 Hz, 1H), 7.36 – 7.30 (m, 3H), 7.26 – 7.22 (m, 6H), 7.17 (dd, *J* = 5.1, 3.7 Hz, 1H), 2.93 (hept, *J* = 6.9 Hz, 1H), 1.26 (d, *J*= 6.9 Hz, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 151.5, 148.5 (d, *J* = 2.5 Hz), 146.3, 138.3, 131.2, 130.4, 129.7 (d, *J* = 1.6 Hz), 129.1, 129.0, 128.0, 127.9, 126.7, 125.7, 123.8, 111.0 (d, *J* = 31.7 Hz), 34.1, 23.8; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 71.4; **HRMS** (ESI^+): calculated for $C_{22}H_{20}FN_2O_2S_2$ [M+H$^+$]: m/z = 427.0945, m/z found 427.0951; **IR** ν_{max} (ATR)/cm^{-1}: 2962, 2927, 1410, 1217, 1191, 839, 757, 708.

3-(2-Fluorophenyl)-1,5-diphenyl-1*H*-pyrazole-4-sulfonyl fluoride (4df)



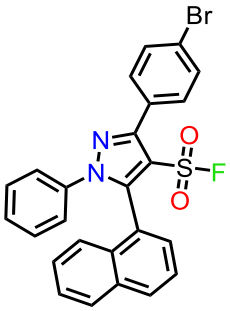
Following general procedure F, the title compound was isolated after purification by flash column chromatography (0-5% EtOAc in petroleum ether) as an off white solid (79.0 mg, 80%). **m.p.** 168 - 169 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.65 (appt. td, *J* = 7.4, 1.8 Hz, 1H), 7.53 – 7.46 (m, 2H), 7.45 – 7.39 (m, 4H), 7.37 – 7.33 (m, 3H), 7.32 – 7.27 (m, 3H), 7.23 (ddd, *J* = 9.6, 8.3, 1.1 Hz, 1H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 160.8 (d, *J* = 249.8 Hz), 147.8, 147.3, 138.3, 131.9 (d, *J* = 8.3 Hz), 131.6 (d, *J* = 2.5 Hz), 130.7, 130.4, 129.3, 129.1, 128.8, 126.5, 125.6, 124.2 (d, *J* = 3.6 Hz), 118.8 (d, *J* = 15.0 Hz), 115.9 (d, *J* = 21.4 Hz), 113.8 (d, *J* = 31.0 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 72.0 (d, *J* = 11.5 Hz), -112.8 – -113.2 (m); **HRMS** (ESI^+): calculated for $C_{21}H_{15}F_2N_2O_5S$ [M+H$^+$]: m/z = 397.0817, m/z found 397.0835; **IR** ν_{max} (ATR)/cm^{-1}: 3064, 2923, 2853, 1497, 1458, 1405, 1216, 1182, 764.

5-(Benzo[d][1,3]dioxol-5-yl)-3-(3,5-dimethylisoxazol-4-yl)-1-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4dg)



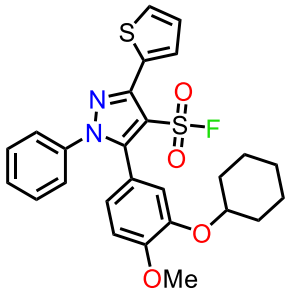
Following general procedure F, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless solid (101 mg, 92%). **m.p.** 178 - 180 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.42 – 7.36 (m, 3H), 7.31 – 7.27 (m, 2H), 6.88 – 6.83 (m, 2H), 6.82 – 6.79 (m, 1H), 6.05 (s, 2H), 2.49 (s, 3H), 2.35 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 169.2, 159.5, 149.9, 148.2, 147.1, 143.2, 138.2, 129.5, 129.3, 125.2, 125.1, 119.2, 113.9 (d, *J* = 30.1 Hz), 110.3, 108.9, 107.0, 102.0, 12.2, 10.9; **^{19}F NMR** (471 MHz, $CDCl_3$) δ = 73.4; **HRMS** (ESI^+): calculated for $C_{21}H_{17}FN_3O_5S$ [M+H^+]: m/z = 442.0867, m/z found 442.0874; **IR** ν_{max} (ATR)/cm^{-1}: 3070, 1646, 1484, 1454, 1417, 1236, 1217, 1178, 1039, 756.

3-(4-Bromophenyl)-5-(naphthalen-1-yl)-1-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4dh)



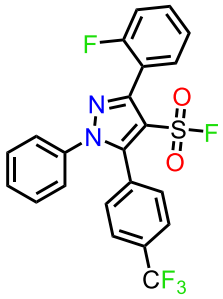
Following general procedure F (0.1 mmol of the required hydrazonoyl chloride), the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a colourless solid (41.0 mg, 80%). **m.p.** 161 - 164 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 8.01 – 7.95 (m, 1H), 7.93 – 7.88 (m, 1H), 7.83 – 7.79 (m, 2H), 7.71 – 7.66 (m, 2H), 7.60 – 7.57 (m, 1H), 7.55 – 7.48 (m, 4H), 7.25 – 7.15 (m, 5H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 151.5, 146.9 (d, *J* = 1.9 Hz), 138.4, 133.3, 132.1, 131.8, 131.4, 131.1, 129.6, 129.1, 129.1, 128.9, 127.8, 126.8, 125.1, 124.7, 124.5, 124.4, 124.3, 113.8 (d, *J* = 31.4 Hz).**^{19}F NMR** (376 MHz, $CDCl_3$) δ = 72.73; **HRMS** (ESI^+): calculated for $C_{25}H_{17}BrFN_2O_2S$ [M+H^+]: m/z = 507.0173, m/z found 507.0156; **IR** ν_{max} (ATR)/cm^{-1}: 3056, 2924, 2854, 1595, 1492, 1414, 1226, 767, 745.

5-(3-(Cyclohexyloxy)-4-methoxyphenyl)-1-phenyl-3-(thiophen-2-yl)-1*H*-pyrazole-4-sulfonyl fluoride (4di)



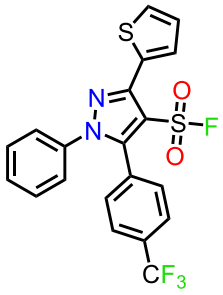
Following general procedure F (100 µmol of the required hydrazonoyl chloride), the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (47.0 mg, 92%). **m.p.** 69 - 71 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.79 (d, *J* = 3.7 Hz, 1H), 7.46 (dd, *J* = 5.1, 0.9 Hz, 1H), 7.36 – 7.31 (m, 3H), 7.29 – 7.24 (m, 2H), 7.17 (dd, *J* = 5.1, 3.8 Hz, 1H), 6.92 – 6.84 (m, 2H), 6.76 (d, *J* = 1.4 Hz, 1H), 4.30 – 4.20 (m, 1H), 3.70 (s, 3H), 2.08 – 2.00 (m, 2H), 1.88 – 1.79 (m, 2H), 1.64 – 1.52 (m, 3H), 1.42 – 1.28 (m, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 150.0, 149.2, 148.2 (d, *J* = 2.5 Hz), 146.4, 138.4, 131.2, 129.7, 129.7, 129.2, 128.9, 128.0, 127.9, 125.6, 123.8, 118.3, 114.6, 114.3, 110.8 (d, *J* = 31.6 Hz), 56.2, 32.0, 25.6, 24.2; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 71.4; **HRMS** (ESI^+): calculated for $C_{26}H_{26}FN_2O_4S_2$ [$M+H^+$]: m/z = 513.1313, m/z found 513.1309; **IR** ν_{max} (ATR)/cm^{-1}: 3104, 2934, 2854, 1604, 1488, 1410, 1254, 1215, 1139, 763.

3-(2-Fluorophenyl)-1-phenyl-5-(4-(trifluoromethyl)phenyl)-1*H*-pyrazole-4-sulfonyl fluoride (4dj)



Following general procedure F (100 µmol of the required hydrazonoyl chloride), the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a yellow solid (41.0 mg, 89%). **m.p.** 164 - 165 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.83 – 7.78 (m, 2H), 7.68 (d, *J* = 8.0 Hz, 2H), 7.51 (d, *J* = 8.0 Hz, 2H), 7.41 – 7.34 (m, 3H), 7.27 – 7.24 (m, 2H), 7.21 (appt. t, *J* = 8.7 Hz, 2H);**^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.0 (d, *J* = 250.0 Hz), 152.0, 146.3, 137.9, 132.6 (q, *J* = 33.0 Hz), 131.5 (d, *J* = 8.6 Hz), 131.1, 130.4 (appt. d, *J* = 1.1 Hz), 129.6, 129.6, 126.0 (d, *J* = 3.4 Hz), 125.8 (q, *J* = 3.7 Hz), 125.7, 123.7 (q, *J* = 272.7 Hz), 115.8 (d, *J* = 21.9 Hz), 112.8 (d, *J* = 31.8 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.0, -63.0, -110.8 – -110.9 (m); **HRMS** (ESI^+): calculated for $C_{22}H_{14}F_5N_2O_2S$ [$M+H^+$]: m/z = 465.0691, m/z found 465.0690; **IR** ν_{max} (ATR)/cm^{-1}:3024, 2885, 2785, 1608, 1493, 1410, 1334, 1219, 1159, 1122, 1070, 838, 787, 761, 689.

1-Phenyl-3-(thiophen-2-yl)-5-(4-(trifluoromethyl)phenyl)-1*H*-pyrazole-4-sulfonyl fluoride (4dk)

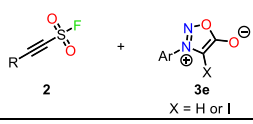


Following general procedure F (100 µmol of the required hydrazonoyl chloride), the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a yellow solid (32.0 mg, 71%). **m.p.** 175 - 177 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 3.6 Hz, 1H), 7.67 (d, *J* = 8.2 Hz, 2H), 7.50 – 7.47 (m, 2H), 7.47 (s, 1H), 7.39 – 7.33 (m, 3H), 7.26 – 7.21 (m, 2H), 7.19 (dd, *J* = 5.1, 3.8 Hz, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 146.5, 137.6, 132.4 (q, *J* = 33.0 Hz), 131.0, 130.6, 130.2 (q, *J* = 1.0 Hz), 129.8 (d, *J* = 1.4 Hz), 129.4, 129.4, 128.1, 128.0, 125.6, 125.5 (q, *J* = 3.7 Hz), 123.5 (q, *J* = 272.6 Hz), 111.6 (d, *J* = 32.5 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 71.5, -63.0. **HRMS** (ESI^+): calculated for $C_{20}H_{13}F_4N_2O_2S_2$ [$M+H^+$]: m/z = 453.0349, m/z found 453.0350; **IR** ν_{max} (ATR)/cm^{-1}: 3112, 3084, 2923, 1410, 1322, 1218, 1170, 1141, 1122, 1066, 850, 767, 709.

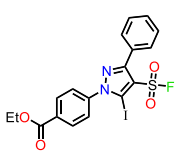
Synthesis and experimental data for compounds 4ea-4ay

General Procedure G

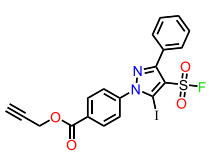
A vial containing a solution of the required SASF **2** (250 µmol) and the required Sydnone **3e** (250 µmol) in toluene (2.00 mL) was sealed and stirred at 120 °C for 16 h. The reaction mixture was cooled, unsealed and the solvent was removed under reduced pressure. The crude product was purified by flash column chromatography to obtain the analytically pure product.



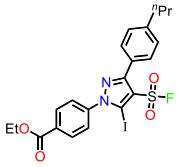
2 | **3e** (X = H or I) | **4ea-4ey**



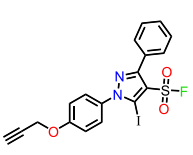
4ea
65%



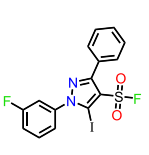
4eb
52%



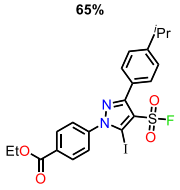
4ec
79%



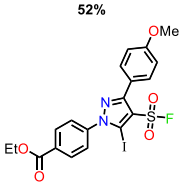
4ed
63%



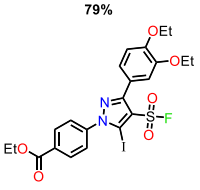
4ee
54%



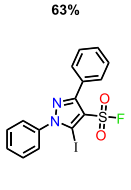
4ef
77%



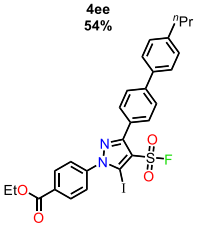
4eg
68%



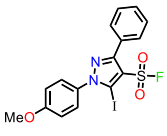
4eh
82%



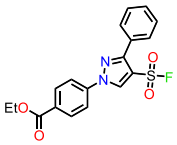
4ei
88%



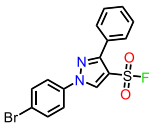
4ej
91%



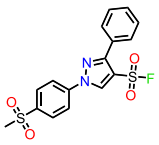
4ek
66%



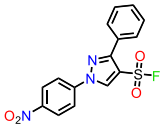
4el
88%



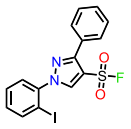
4em
76%



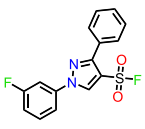
4en
38%



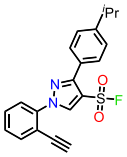
4eo
41%



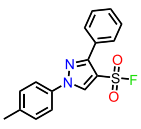
4ep
95%



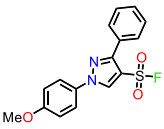
4eq
88%



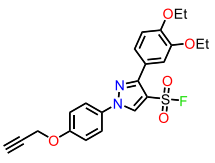
4er
59%



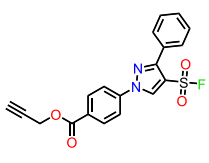
4es
85%



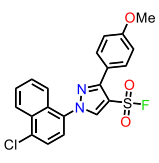
4et
95%



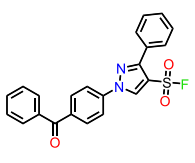
4eu
82%



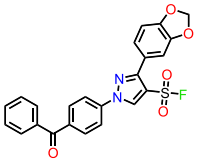
4ev
65%



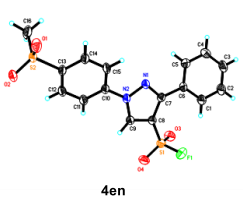
4ew
79%



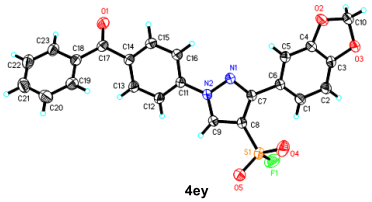
4ex
86%



4ey
81%

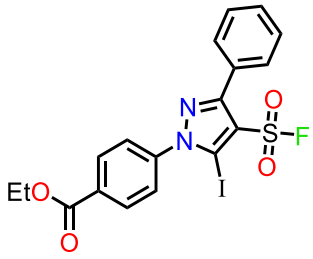


4en



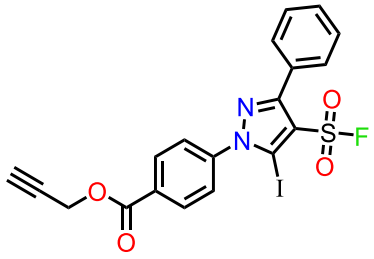
4ey

Ethyl 4-(4-(fluorosulfonyl)-5-iodo-3-phenyl-1H-pyrazol-1-yl)benzoate (4ea)



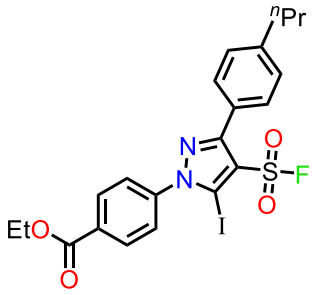
Following general procedure G, the title compound was isolated by flash column chromatography (0-30% EtOAc in petroleum ether) as a pale yellow solid (81.0 mg, 65%). **m.p**; 137 - 138 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.26 (appt. d, *J* = 8.6 Hz, 2H), 7.74 – 7.63 (m, 4H), 7.52 – 7.44 (m, 3H), 4.45 (q, *J* = 7.1 Hz, 2H), 1.45 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 165.3, 155.3, 142.7, 132.3, 130.8, 130.2, 129.6, 129.4, 128.5, 127.1, 119.6 (d, *J* = 32.5 Hz), 91.8, 61.8, 14.4; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.2; **HRMS** (ESI^+): calculated for $C_{18}H_{15}FIN_2O_4S$ $[M+H^+]$: m/z = 500.9776, m/z found 500.9775; **IR** ν_{max} (ATR)/cm^{-1}: 3073, 3003, 1702, 1606, 1411, 1281.

Prop-2-yn-1-yl 4-(4-(fluorosulfonyl)-5-iodo-3-phenyl-1H-pyrazol-1-yl)benzoate (4eb)



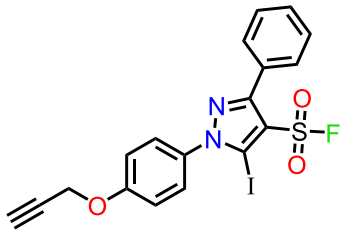
Following general procedure G (110 µmol of the required SASF), the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a colourless oil (29.0 mg, 52%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.29 (appt. d, *J* = 8.0 Hz, 2H), 7.71– 7.67 (m, 4H), 7.53 – 7.45 (m, 3H), 5.00 (d, *J* = 2.5 Hz, 2H), 2.57 (t, *J* = 2.5 Hz, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.6, 155.4, 143.1, 131.2, 131.1, 130.3, 129.6, 129.5, 128.5, 127.2, 119.8 (d, *J* = 32.5 Hz), 91.7, 75.7, 53.2; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.2; **HRMS** (ESI^+): calculated for $C_{19}H_{13}FIN_2O_4S$ $[M+H^+]$: m/z = 510.9619, m/z found 510.9638. **IR** ν_{max} (ATR)/cm^{-1}: 3304, 2928, 1728, 1607, 1413, 1267.

Ethyl 4-(4-(fluorosulfonyl)-5-iodo-3-(4-propylphenyl)-1*H*-pyrazol-1-yl)benzoate (4ec)



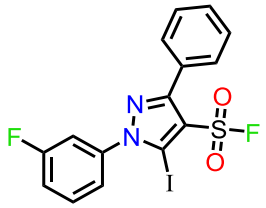
Following general procedure G, the title compound was isolated by flash column chromatography (0-8% EtOAc in petroleum ether) as white solid (43.0 mg, 79%). **m.p.** 139 - 140 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.25 (appt. d, *J* = 8.7 Hz, 2H), 7.67 (appt. d, *J* = 8.7 Hz, 2H), 7.60 (appt. d, *J* = 8.2 Hz, 2H), 7.29 (appt. d, *J* = 8.3 Hz, 2H), 4.45 (q, *J* = 7.1 Hz, 2H), 2.68 – 2.63 (m, 2H), 1.74 – 1.63 (m, 2H), 1.45 (t, *J* = 7.1 Hz, 3H), 0.97 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 165.4, 155.4, 145.1, 142.8, 132.3, 130.8, 129.3, 128.7, 127.1, 126.9, 119.4 (d, *J* = 32.4 Hz), 91.6, 61.8, 38.0, 24.4, 14.4, 14.0; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 72.1; **HRMS** (ESI^+): calculated for $C_{21}H_{21}FIN_2O_4S$ [$M+H^+$]: m/z = 543.0245, m/z found 543.0248; **IR** ν_{max} (ATR)/cm^{-1}: 2989, 2875, 1714, 1606, 1456, 1410, 1280, 1220.

5-Iodo-3-phenyl-1-(4-(prop-2-yn-1-yloxy)phenyl)-1*H*-pyrazole-4-sulfonyl fluoride (4ed)



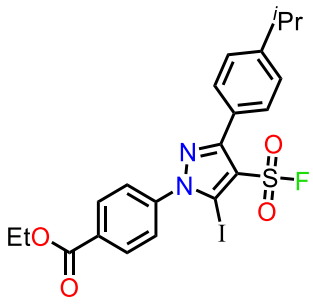
Following general procedure G, the title compound was isolated by flash column chromatography (0-15% EtOAc in petroleum ether) as an off-white solid (88.0 mg, 63%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.71 – 7.66 (m, 2H), 7.52 – 7.43 (m, 5H), 7.14 (appt. d, *J* = 9.0 Hz, 2H), 4.79 (d, *J* = 2.4 Hz, 2H), 2.59 (t, *J* = 2.4 Hz, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 158.9, 154.9, 133.2, 130.1, 129.9, 129.5, 128.5, 118.6 (d, *J* = 32.4 Hz), 115.6, 92.8, 77.8, 76.5, 56.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.2; **HRMS** (ESI^+): calculated for $C_{18}H_{13}FIN_2O_3S$ [$M+H^+$]: m/z = 482.9670, m/z found 482.9670; **IR** ν_{max} (ATR)/cm^{-1}: 3287, 3073, 2926, 1601, 1513, 1409, 1218.

1-(3-Fluorophenyl)-5-iodo-3-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4ee)



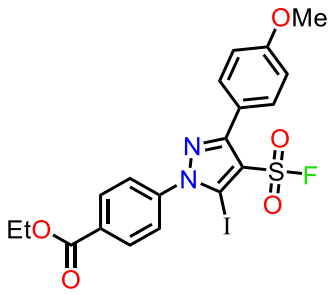
Following general procedure G, the title compound was isolated by flash column chromatography (0-8% EtOAc in petroleum ether) as a pale yellow solid (24.0 mg, 54%). **m.p.** 119 - 120 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.70 – 7.66 (m, 2H), 7.56 (tdd, *J* = 8.1, 5.9, 0.6 Hz, 1H), 7.53 – 7.44 (m, 3H), 7.41 – 7.37 (m, 1H), 7.35 – 7.27 (m, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 162.6 (d, *J* = 250.3 Hz), 155.2, 140.5 (d, *J* = 9.9 Hz), 130.8 (d, *J* = 8.9 Hz), 130.2, 129.6, 129.4, 128.5, 123.1 (d, *J* = 3.5 Hz), 119.4 (d, *J* = 32.4 Hz), 117.8 (d, *J* = 20.9 Hz), 115.1 (d, *J* = 24.7 Hz), 92.1; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 72.2, -109.5 – -109.6 (m); **HRMS** (ESI^+): calculated for $C_{15}H_{10}F_2IN_2O_2S$ $[M+H^+]$: m/z = 446.9470, m/z found 446.9470; **IR** ν_{max} (ATR)/cm^{-1}: 2981, 2865, 1600, 1416, 1222, 1055, 766.

Ethyl 4-(4-(fluorosulfonyl)-5-iodo-3-(4-isopropylphenyl)-1*H*-pyrazol-1-yl)benzoate (4ef)



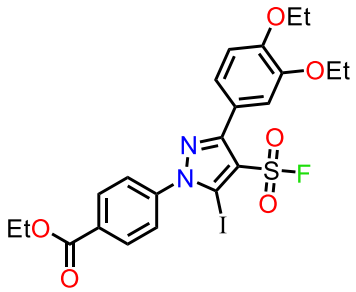
Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a pale yellow solid (42.0 mg, 77%). **m.p.** 121 - 122 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.25 (appt. d, *J* = 8.8 Hz, 2H), 7.67 (appt. d, *J* = 8.8 Hz, 2H), 7.62 (appt. d, *J* = 8.2 Hz, 2H), 7.34 (appt. d, *J* = 8.5 Hz, 2H), 4.45 (q, *J* = 7.1 Hz, 2H), 2.98 (hept, *J* = 6.8 Hz, 1H), 1.45 (t, *J* = 7.1 Hz, 3H), 1.29 (d, *J* = 6.9 Hz, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 165.4, 155.4, 151.2, 142.8, 132.3, 130.8, 129.4, 127.1, 127.0, 126.7, 119.4 (d, *J* = 32.3 Hz), 91.6, 61.8, 34.2, 24.0, 14.4; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.1; **HRMS** (ESI^+): calculated for $C_{21}H_{21}FIN_2O_4S$ $[M+H^+]$: m/z = 543.0245, m/z found 543.0246; **IR** ν_{max} (ATR)/cm^{-1}: 2960, 2927, 1723, 1607, 1462, 1413, 1274.

Ethyl 4-(4-(fluorosulfonyl)-5-iodo-3-(4-methoxyphenyl)-1*H*-pyrazol-1-yl)benzoate (4eg)



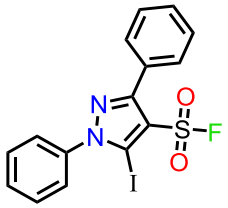
Following general procedure G, the title compound was isolated by flash column chromatography (0-12% EtOAc in petroleum ether) as a pale yellow solid (36.0 mg, 68%). **m.p.** 154 - 156 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.25 (appt. d, *J* = 8.8 Hz, 2H), 7.69 – 7.61 (m, 4H), 7.00 (appt. d, *J* = 8.9 Hz, 2H), 4.45 (q, *J* = 7.1 Hz, 2H), 3.87 (s, 3H), 1.45 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 165.4, 161.2, 155.1, 142.8, 132.3, 130.8, 130.8, 127.1, 121.9, 119.2 (d, *J* = 32.3 Hz), 114.0, 91.7, 61.8, 55.5, 14.4; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 72.1; **HRMS** (ESI^+): calculated for $C_{19}H_{17}FIN_2O_5S$ [M+H$^+$]: m/z = 530.9881, m/z found 500.9884; **IR** ν_{max} (ATR)/cm^{-1}: 2982, 2832, 1714, 1612, 1462, 1412, 1280.

Ethyl 4-(3-(3,4-diethoxyphenyl)-4-(fluorosulfonyl)-5-iodo-1*H*-pyrazol-1-yl)benzoate (4eh)



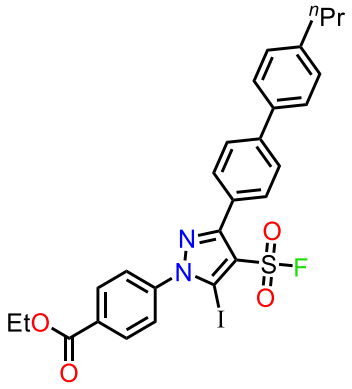
Following general procedure G, the title compound was isolated by flash column chromatography (0-12% EtOAc in petroleum ether) as an off-white solid (48.0 mg, 82%). **m.p.** 127 - 128°C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.25 (appt. d, *J* = 8.3 Hz, 2H), 7.66 (appt. d, *J* = 8.3 Hz, 2H), 7.26 (appt. d, *J* = 8.4 Hz, 2H), 6.95 (d, *J* = 8.7 Hz, 1H), 4.45 (q, *J* = 7.1 Hz, 2H), 4.20 – 4.11 (m, *J* = 6.9, 4.5 Hz, 4H), 1.52 – 1.41 (m, 9H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 165.4, 155.1, 150.5, 148.4, 142.8, 132.3, 130.8, 127.2, 122.4, 121.9, 119.2 (d, *J* = 32.4 Hz), 114.4, 112.7, 91.7, 64.8, 64.6, 61.8, 14.9, 14.9, 14.4; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 71.8; **HRMS** (ESI^+): calculated for $C_{22}H_{23}FIN_2O_6S$ [M+H$^+$]: m/z = 589.0300, m/z found 589.0301; **IR** ν_{max} (ATR)/cm^{-1}: 2981, 2935, 1716, 1607, 1472, 1420, 1294.

5-Iodo-1,3-diphenyl-1*H*-pyrazole-4-sulfonyl fluoride (4ei)



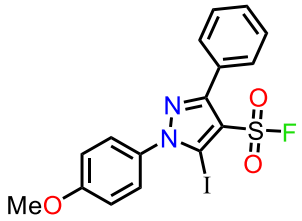
Following general procedure G (250 µmol of SASF), the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (94.0 mg, 88%). **m.p.** 159 - 160 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.72 – 7.67 (m, 2H), 7.61 – 7.53 (m, 5H), 7.51 – 7.44 (m, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 155.0, 139.5, 130.5, 130.1, 129.9, 129.5, 129.5, 128.7, 128.5, 127.1, 126.8, 118.9 (d, *J* = 32.4 Hz), 92.2; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 72.2; **HRMS** (ESI^+): calculated for $C_{15}H_{11}FIN_2O_2S$ $[M+H^+]$: m/z = 428.9564, m/z found 428.9565; **IR** ν_{max} (ATR)/cm^{-1}: 3075, 2925, 1494, 1468, 1417, 1228.

Ethyl 4-(4-(fluorosulfonyl)-5-iodo-3-(4'-propyl-[1,1'-biphenyl]-4-yl)-1*H*-pyrazol-1-yl)benzoate (4ej)



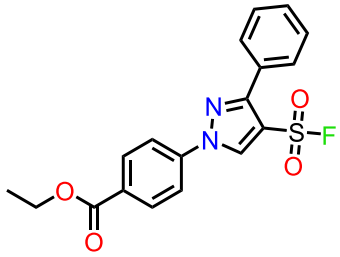
Following general procedure G, the title compound was isolated by flash column chromatography (0-8% EtOAc in petroleum ether) as a pale yellow solid (56.0 mg, 91%). **m.p.** 128 - 129 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.27 (appt. d, *J* = 8.8 Hz, 2H), 7.77 (appt. d, *J* = 8.6 Hz, 2H), 7.72 – 7.67 (m, 4H), 7.57 (appt. d, *J* = 8.3 Hz, 2H), 7.28 (appt. d, *J* = 8.4 Hz, 2H), 4.46 (q, *J* = 7.1 Hz, 2H), 2.69 – 2.62 (m, 2H), 1.75 – 1.65 (m, 2H), 1.45 (t, *J* = 7.1 Hz, 3H), 0.99 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 165.4, 155.1, 143.0, 142.7, 142.6, 137.7, 132.3, 130.8, 129.8, 129.1, 128.1, 127.2, 127.1, 127.0, 119.5 (d, *J* = 32.5 Hz), 91.8, 61.8, 37.9, 24.7, 14.4, 14.0; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 72.2; **HRMS** (ESI^+): calculated for $C_{27}H_{25}FIN_2O_4S$ $[M+H^+]$: m/z = 619.0558, m/z found 619.0556; **IR** ν_{max} (ATR)/cm^{-1}: 2960, 2926, 1705, 1607, 1464, 1409, 1279, 1218, 772.

5-Iodo-1-(4-methoxyphenyl)-3-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4ek)



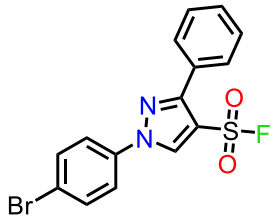
Following general procedure G (250 µmol of the required SASF), the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (75.0 mg, 66%). **m.p.** 146 - 148 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.71 – 7.66 (m, 2H), 7.52 – 7.43 (m, 5H), 7.05 (appt. d, *J* = 9.0 Hz, 2H), 3.90 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 160.9, 154.8, 132.4, 130.0, 129.9, 129.4, 128.4, 118.4 (d, *J* = 32.2 Hz), 114.5 (d, *J* = 9.9 Hz), 93.0, 55.8;^{19}F NMR (471 MHz, $CDCl_3$) δ 72.2; **HRMS** (ESI^+): calculated for $C_{16}H_{13}FIN_2O_3S$ [$M+H^+$]: m/z = 458.9670, m/z found 458.9670; **IR** ν_{max} (ATR)/cm^{-1}: 2925, 2851, 1510, 1417, 1254.

Ethyl 4-(4-(fluorosulfonyl)-3-phenyl-1*H*-pyrazol-1-yl)benzoate (4el)



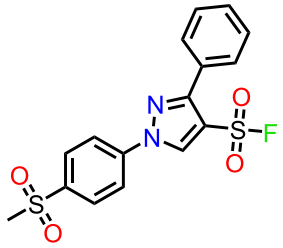
Following general procedure G, the title compound was isolated by flash column chromatography (0-30% EtOAc in petroleum ether) as a white solid (82.0 mg, 88%). **m.p.** 106 - 108 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.71 (d, *J* = 1.1 Hz, 1H), 8.24 (appt. d, *J* = 9.0 Hz, 2H), 7.93 – 7.86 (m, 4H), 7.55 – 7.49 (m, 3H), 4.44 (q, *J* = 7.1 Hz, 2H), 1.44 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 165.3, 152.2, 141.3, 133.9, 131.4, 130.6, 130.2, 129.1, 128.7, 119.2, 115.1 (d, *J* = 33.3 Hz), 61.5, 14.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.8; **HRMS** (ESI^+): calculated for $C_{18}H_{16}FN_2O_4S$ [$M+H^+$]: m/z = 375.0809, m/z found 375.0806; **IR** ν_{max} (ATR)/cm^{-1}: 3107, 2977, 2927, 1699, 1608, 1521, 1410, 1280, 1211, 764.

1-(4-Bromophenyl)-3-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4em)



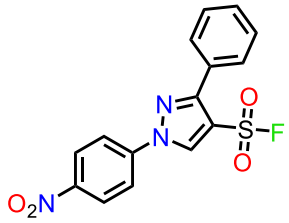
Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as an off white solid (72.0 mg, 76%). **m.p.** 133 - 135 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.61 (d, *J* = 1.1 Hz, 1H), 7.90 – 7.86 (m, 2H), 7.68 (s, 4H), 7.54 – 7.49 (m, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 152.1, 137.5, 133.8, 133.2, 130.3, 129.3, 128.9, 122.6, 121.4, 114.8 (d, *J* = 33.3 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.9 (d, *J* = 16.0 Hz); **HRMS** (ESI^+): calculated for $C_{15}H_{11}BrFN_2O_2S$ [M+H$^+$]: m/z = 380.9703, m/z found 380.9695; **IR** ν_{max} (ATR)/cm^{-1}: 3137, 2965, 2865, 1505, 1402, 1207, 1060, 764.

1-(4-(Methylsulfonyl)phenyl)-3-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4en)



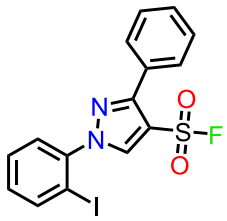
Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (36.0 mg, 38%). **m.p.** 202 - 204 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 8.76 (d, *J* = 0.9 Hz, 1H), 8.15 (appt. d, *J* = 8.9 Hz, 2H), 8.04 (appt. d, *J* = 8.9 Hz, 2H), 7.92 – 7.87 (m, 2H), 7.55 – 7.51 (m, 3H), 3.13 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 152.7, 142.1, 140.6, 134.2 (d, *J* = 2.4 Hz), 130.6 129.7, 129.0, 128.9, 128.8, 120.3, 115.9 (d, *J* = 33.7 Hz), 44.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.8. **HRMS** (ESI^+): calculated for $C_{16}H_{14}FN_2O_4S_2$ [M+H$^+$]: m/z = 381.0374, m/z found 381.0371; **IR** ν_{max} (ATR)/cm^{-1}: 3140, 2926, 1598, 1521, 1393, 1298, 1213, 1147.

1-(4-Nitrophenyl)-3-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4eo)



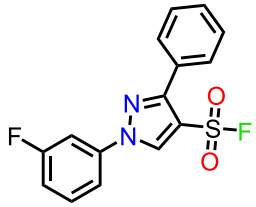
Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a pale yellow solid (36.0 mg, 41%). **m.p.** 200 - 202 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.76 (d, *J* = 1.2 Hz, 1H), 8.45 (appt. d, *J* = 9.4 Hz, 2H), 8.02 (appt. d, *J* = 9.4 Hz, 2H), 7.93 – 7.87 (m, 2H), 7.56 – 7.51 (m, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 152.9, 147.3, 142.6, 134.3, 130.6, 129.0, 128.9, 128.8, 125.8, 120.0, 116.2 (d, *J* = 33.8 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.7; **HRMS** (ESI^+): calculated for $C_{15}H_{11}FN_3O_4S$ [$M+H^+$]: m/z = 348.0449, m/z found 348.0439; **IR** ν_{max} (ATR)/cm^{-1}: 3142, 2926, 2853, 1595, 1514, 1398, 1338, 1203;

1-(2-Iodophenyl)-3-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4ep)



Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (102 mg, 95%). **m.p.** 85 - 87 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.44 (s, 1H), 8.03 (appt. d, *J* = 7.9 Hz, 1H), 7.94 – 7.88 (m, 2H), 7.56 – 7.47 (m, 5H), 7.30 – 7.24 (m, 1H) **^{13}C NMR** (101 MHz, $CDCl_3$) δ 151.7, 141.6, 140.6, 138.3 (d, *J* = 2.4 Hz), 131.8, 130.1, 129.6, 129.4, 128.9, 128.8, 128.0, 113.7 (d, *J* = 33.1 Hz), 93.9 ; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 70.1; **HRMS** (ESI^+): calculated for $C_{15}H_{11}FIN_2O_2S$ [$M+H^+$]: m/z = 428.9564, m/z found 428.9564; **IR** ν_{max} (ATR)/cm^{-1}: 3126, 1504, 1448, 1402, 1203, 761.

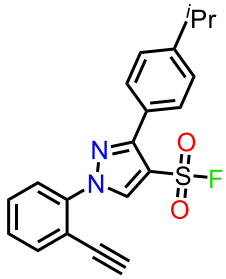
1-(3-Fluorophenyl)-3-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4eq)



Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (70.0 mg, 88%). **m.p.** 105 - 107 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.63 (d, *J* =

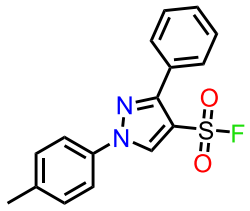
1.1 Hz, 1H), 7.92 – 7.86 (m, 2H), 7.59 (ddt, *J* = 8.5, 3.5, 1.6 Hz, 1H), 7.56 – 7.49 (m, 5H), 7.20 – 7.14 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 163.4 (d, *J* = 249.1 Hz), 152.1, 139.7 (d, *J* = 10.2 Hz), 134.0 (d, *J* = 2.5 Hz), 131.5 (d, *J* = 9.0 Hz), 130.3, 129.3, 128.9, 115.8 (d, *J* = 21.2 Hz), 115.1 (d, *J* = 3.3 Hz), 114.9 (d, *J* = 33.4 Hz), 108.1 (d, *J* = 26.6 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.9, -109.2 (m); **HRMS** (ESI^+): calculated for $C_{15}H_{11}F_2N_2O_2S$ [$M+H^+$]: m/z = 321.0504, m/z found 321.0507; **IR** ν_{max} (ATR)/cm^{-1}: 3142, 2964, 2923, 1606, 1504, 1407, 1209, 1056, 865, 766.

1-(2-Ethynylphenyl)-3-(4-isopropylphenyl)-1*H*-pyrazole-4-sulfonyl fluoride (4er)



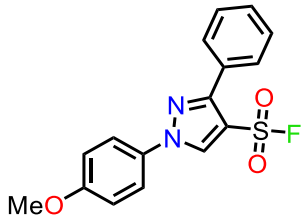
Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a pale yellow (54.0 mg, 59%). **m.p.** 89 - 90 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.97 (d, *J* = 1.1 Hz, 1H), 7.85 – 7.79 (m, 3H), 7.70 (dd, *J* = 7.8, 1.5 Hz, 1H), 7.58 – 7.52 (appt. td, *J* = 7.6, 1.3 Hz, 1H), 7.45 (appt. td, *J* = 7.6, 1.3 Hz, 1H), 7.36 (appt. d, *J* = 8.1 Hz, 2H), 3.42 (s, 1H), 2.99 (hept, *J* = 6.9 Hz, 1H), 1.30 (d, *J* = 6.9 Hz, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 151.7, 151.1, 139.9, 137.6, 134.8, 130.4, 129.0, 128.8, 126.9, 126.9, 125.1, 115.7, 113.3 (d, *J* = 32.9 Hz), 84.6, 79.2, 34.2, 24.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.8; **HRMS** (ESI^+): calculated for $C_{20}H_{18}FN_2O_2S$ [$M+H^+$]: m/z = 369.1068, m/z found 369.1072; **IR** ν_{max} (ATR)/cm^{-1}: 3280, 3136, 2970, 1506, 1406, 1206, 771.

3-Phenyl-1-(*p*-tolyl)-1*H*-pyrazole-4-sulfonyl fluoride (4es)



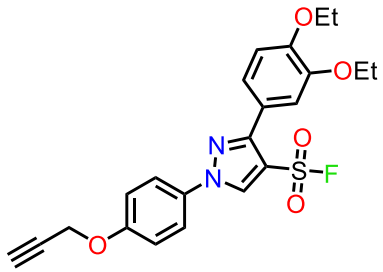
Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a pale yellow solid (67.0 mg, 85%). **m.p.** 126 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.58 (s, 1H), 7.89 (dd, *J* = 6.6, 2.9 Hz, 2H), 7.65 (d, *J* = 8.4 Hz, 2H), 7.53 – 7.47 (m, 3H), 7.34 (d, *J* = 8.5 Hz, 2H), 2.44 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 151.8, 139.1, 136.3, 128.9, 128.8, 120.0, 114.0 (d, *J* = 32.9 Hz), 21.2; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 70.1; **HRMS** (ESI^+): calculated for $C_{16}H_{14}FN_2O_2S$ [$M+H^+$]: m/z = 317.0755, m/z found 317.0754; **IR** ν_{max} (ATR)/cm^{-1}: 3134, 2927, 2853, 1527, 1446, 1407, 1204, 752.

1-(4-Methoxyphenyl)-3-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4et)



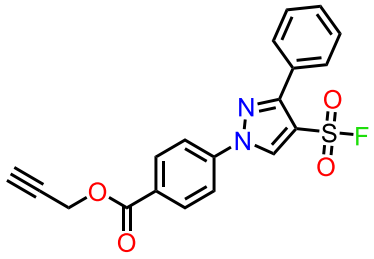
Following general procedure G, the title compound was isolated by flash column chromatography (0-20% EtOAc in petroleum ether) as a white solid (79.0 mg, 95%). **m.p.** 125 - 126 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.51 (d, *J* = 1.1 Hz, 1H), 7.91 – 7.86 (m, 2H), 7.67 (appt. d, *J* = 9.2 Hz, 2H), 7.53 – 7.47 (m, 3H), 7.04 (appt. d, *J* = 9.2 Hz, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 159.9, 151.5, 133.6 (d, *J* = 2.2 Hz), 131.9, 129.9, 129.5, 128.7, 128.6, 121.6, 114.9, 113.6 (d, *J* = 32.6 Hz), 55.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 70.2; **HRMS** (ESI^+): calculated for $C_{16}H_{14}FN_2O_3S$ $[M+H^+]$: m/z = 333.0704, m/z found 333.0708; **IR** ν_{max} (ATR)/cm^{-1}: 3114, 2971, 2939, 1522, 1397, 1204, 1018, 752.

3-(3,4-Diethoxyphenyl)-1-(4-(prop-2-yn-1-yloxy)phenyl)-1*H*-pyrazole-4-sulfonyl fluoride (4eu)



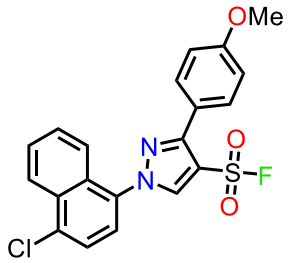
Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (91.0 mg, 82%). **m.p.** 109 - 110 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.50 (d, *J* = 0.9 Hz, 1H), 7.69 (appt. d, *J* = 9.1 Hz, 2H), 7.49 – 7.44 (m, 3H), 7.12 (appt. d, *J* = 9.1 Hz, 2H), 6.98 (appt. d, *J* = 9.0 Hz, 1H), 4.77 (d, *J* = 2.4 Hz, 2H), 4.18 (qd, *J* = 7.0, 5.6 Hz, 5H), 2.59 – 2.56 (m, 1H), 1.49 (td, *J* = 7.0, 1.1 Hz, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 157.8, 151.5, 150.4, 148.7, 133.9, 132.8, 122.1, 121.7, 116.1, 113.7, 113.4 (d, *J* = 32.6 Hz), 113.0, 78.0, 76.3, 64.8, 64.6, 56.3, 14.9, 14.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.2; **HRMS** (ESI^+): calculated for $C_{22}H_{22}FN_2O_5S$ $[M+H^+]$: m/z = 445.1228, m/z found 445.1228; **IR** ν_{max} (ATR)/cm^{-1}: 3252, 3136, 1518, 1456, 1407, 1209, 761.

Prop-2-yn-1-yl 4-(4-(fluorosulfonyl)-3-phenyl-1H-pyrazol-1-yl)benzoate (4ev)



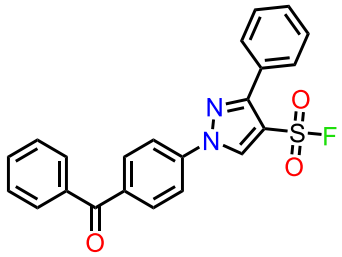
Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (62.0 mg, 65%). **m.p.** 155 - 156 °C **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.72 (d, *J* = 1.0 Hz, 1H), 8.27 (d, *J* = 8.9 Hz, 2H), 7.95 – 7.85 (m, 4H), 7.56 – 7.49 (m, 3H), 4.98 (d, *J* = 2.5 Hz, 2H), 2.57 (t, *J* = 2.5 Hz, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.7, 152.4, 141.8, 134.1 (d, *J* = 2.5 Hz), 131.9, 130.4, 129.6, 129.2, 128.9, 128.9, 119.5, 115.4 (d, *J* = 33.4 Hz), 75.6, 53.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.9; **HRMS** (ESI^+): calculated for $C_{19}H_{14}FN_2O_4S$ [$M+H^+$]: m/z = 385.0653, m/z found 385.0670. **IR** ν_{max} (ATR)/cm^{-1}: 3262, 3142, 2133, 1719, 1608, 1529, 1404, 1273, 1204.

1-(4-Chloronaphthalen-1-yl)-3-(4-methoxyphenyl)-1*H*-pyrazole-4-sulfonyl fluoride (4ew)



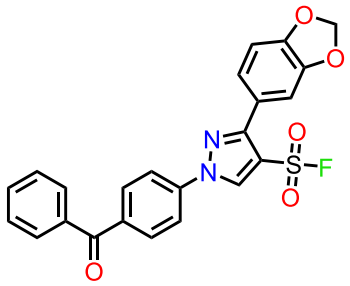
Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (82.0 mg, 79%). **m.p.** 109 - 110 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.46 (d, *J* = 0.9 Hz, 1H), 8.44 – 8.39 (m, 1H), 7.89 (appt. d, *J* = 8.9 Hz, 2H), 7.85 – 7.81 (m, 1H), 7.77 – 7.65 (m, 3H), 7.55 (d, *J* = 7.9 Hz, 1H), 7.02 (appt. d, *J* = 9.0 Hz, 2H), 3.87 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 161.2, 151.8, 138.8 (d, *J* = 2.2 Hz), 134.7, 134.5, 131.6, 130.3, 129.5, 129.0, 128.5, 125.4, 125.3, 123.7, 123.0, 121.7, 114.3, 113.3 (d, *J* = 32.9 Hz), 55.5; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.7; **HRMS** (ESI^+): calculated for $C_{20}H_{15}ClFN_2O_3S$ [$M+H^+$]: m/z = 417.0470, m/z found 417.0468; **IR** ν_{max} (ATR)/cm^{-1}: 3142, 3005, 2841, 1612, 1504, 1429, 1401, 1255, 1210, 959, 762.

1-(4-Benzoylphenyl)-3-phenyl-1*H*-pyrazole-4-sulfonyl fluoride (4ex)



Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (87.0 mg, 86%). **m.p.** 126 - 127 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.74 (d, *J* = 1.1 Hz, 1H), 8.01 (appt. d, *J* = 8.9 Hz, 2H), 7.95 – 7.88 (m, 4H), 7.85 – 7.81 (m, 2H), 7.68 – 7.62 (m, 1H), 7.56 – 7.50 (m, 5H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 195.2, 152.4, 141.0, 137.6, 137.2, 134.1 (d, *J* = 2.4 Hz), 133.1, 132.0, 130.4, 130.1, 129.2, 128.9, 128.9, 128.7, 119.4, 115.2 (d, *J* = 33.3 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.9; **HRMS** (ESI^+): calculated for $C_{22}H_{16}FN_2O_3S$ [M+H^+]: m/z = 407.0860, m/z found 407.0856; **IR** ν_{max} (ATR)/cm^{-1}: 3139, 1662, 1602, 1524, 1395, 1215, 771.

3-(Benzo[*d*][1,3]dioxol-5-yl)-1-(4-benzoylphenyl)-1*H*-pyrazole-4-sulfonyl fluoride (4ey)

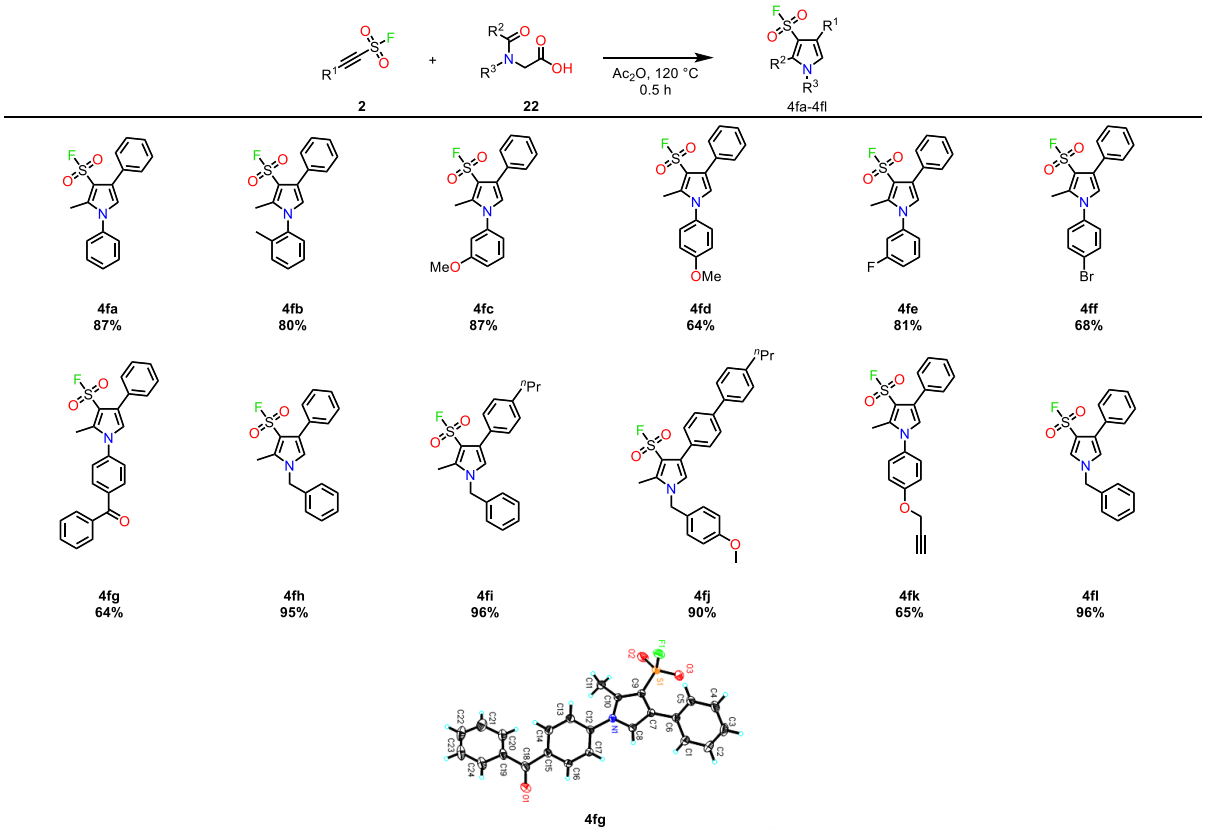


Following general procedure G, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (91.0 mg, 81%). **m.p.** 138 - 140 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.70 (d, *J* = 0.8 Hz, 1H), 8.00 (appt. d, *J* = 8.7 Hz, 2H), 7.91 (appt. d, *J* = 8.7 Hz, 2H), 7.85 – 7.80 (m, 2H), 7.68 – 7.62 (m, 1H), 7.58 – 7.51 (m, 2H), 7.44 (dd, *J* = 8.1, 1.8 Hz, 1H), 7.40 – 7.38 (m, 1H), 6.95 (d, *J* = 8.1 Hz, 1H), 6.06 (s, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 195.2, 152.0, 149.5, 148.2, 141.0, 137.6, 137.2, 134.1 (d, *J* = 2.4 Hz), 133.1, 132.0, 130.1, 128.7, 123.4, 123.0, 119.3, 114.9 (d, *J* = 33.1 Hz), 109.1, 108.7, 101.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.5; **HRMS** (ESI^+): calculated for $C_{23}H_{16}FN_2O_5S$ [M+H^+]: m/z = 451.0758, m/z found 451.0759; **IR** ν_{max} (ATR)/cm^{-1}: 3129, 1651, 1605, 1516, 1461, 1408, 1207, 763.

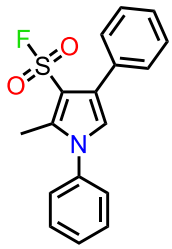
Synthesis and experimental data for compounds 4fa-4fl

General Procedure H

To a suspension of required substituted glycine **22** (100 µmol) in acetic anhydride (1.00 mL) was added the required SASF **2** (120 µmol) at room temperature. The reaction mixture was stirred at 120 °C for 0.5 h. The resultant solution was cooled to room temperature, the Ac_2O was removed under a stream of nitrogen, and the crude product was purified by flash column chromatography to obtain the analytically pure product.



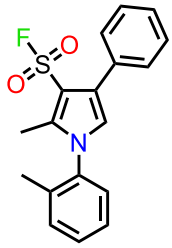
2-Methyl-1,4-diphenyl-1*H*-pyrrole-3-sulfonyl fluoride (4fa)



Following general procedure H, the title compound was isolated by flash column chromatography (0-6% EtOAc in petroleum ether) as a white solid (67.0 mg, 87%). **m.p.** 91 - 92 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.61 – 7.48 (m, 5H), 7.46 – 7.33 (m, 5H), 6.82 (s, 1H), 2.49 (d, *J* = 1.1 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 137.9, 137.8 (d, *J* = 2.8 Hz), 132.3, 129.9, 129.5, 129.4, 128.3, 127.9, 126.6, 126.1, 122.3, 111.1 (d, *J* = 28.6 Hz), 12.4; **^{19}F NMR** (471 MHz,

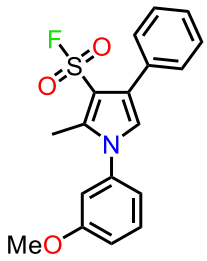
$CDCl_3$) δ 74.0; **HRMS** (ESI^+): calculated for $C_{17}H_{14}FNO_2SNa$ [M+Na^+]: m/z = 338.0621, m/z found 338.0621; **IR** ν_{max} (ATR)/cm^{-1}: 3137, 2926, 1597, 1500, 1399, 1208, 758, 728.

2-Methyl-4-phenyl-1-(*o*-tolyl)-1*H*-pyrrole-3-sulfonyl fluoride (4fb)



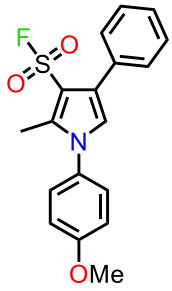
Following general procedure H, the title compound was isolated by flash column chromatography (0-6% EtOAc in petroleum ether) as a white solid (66.0 mg, 80%). **m.p.** 95 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.55 – 7.34 (m, 8H), 7.25 (s, 1H), 6.71 (s, 1H), 2.34 (s, 3H), 2.12 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 138.3 (d, *J* = 2.8 Hz), 136.8, 135.7, 132.4, 131.5, 130.0, 129.5, 128.3, 127.8, 127.8, 127.3, 126.1, 121.8, 110.3 (d, *J* = 28.6 Hz), 17.4, 11.9; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 74.0; **HRMS** (ESI^+): calculated for $C_{18}H_{16}FNO_2SNa$ [M+Na^+]: m/z = 352.0778, m/z found 352.0775; **IR** ν_{max} (ATR)/cm^{-1}: 3127, 2926, 2853, 1498, 1397, 1212, 752.

1-(3-Methoxyphenyl)-2-methyl-4-phenyl-1*H*-pyrrole-3-sulfonyl fluoride (4fc)



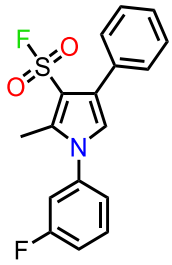
Following general procedure H, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a colourless oil (75.0 mg, 87%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.52 – 7.34 (m, 6H), 7.05 (ddd, *J* = 8.4, 2.5, 0.9 Hz, 1H), 6.93 (ddd, *J* = 7.8, 2.0, 0.9 Hz, 1H), 6.87 (t, *J* = 2.2 Hz, 1H), 6.82 (s, 1H), 3.88 (s, 3H), 2.50 (d, *J* = 1.0 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 160.6, 138.9, 137.8 (d, *J* = 2.7 Hz), 132.3, 130.6, 129.5, 128.3, 127.9, 126.1, 122.2, 118.8, 114.9, 112.6, 111.1 (d, *J* = 28.5 Hz), 55.8, 12.5; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 74.0; **HRMS** (ESI^+): calculated for $C_{18}H_{16}FNO_3SNa$ [M+Na^+]: m/z = 368.0727, m/z found 368.0715; **IR** ν_{max} (ATR)/cm^{-1}: 3135, 3064, 2932, 1605, 1496, 1399, 1200, 733.

1-(4-Methoxyphenyl)-2-methyl-4-phenyl-1*H*-pyrrole-3-sulfonyl fluoride (4fd)



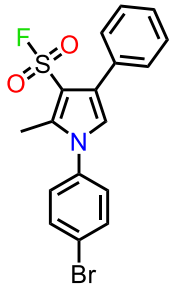
Following General general procedure H, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (67.0 mg, 64%). **m.p.** 106 - 108 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.53 – 7.47 (m, 2H), 7.46 – 7.33 (m, 3H), 7.26 (appt. d, *J* = 9.0 Hz, 2H), 7.04 (appt. d, *J* = 9.0 Hz, 2H), 6.78 (s, 1H), 3.89 (s, 3H), 2.46 (d, *J* = 1.0 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 160.2, 138.1 (d, *J* = 2.6 Hz), 132.4, 130.6, 129.5, 128.3, 127.8, 125.8, 122.5, 114.9, 110.6 (d, *J* = 28.5 Hz), 55.8, 12.4; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 74.0; **HRMS** (ESI^+): calculated for $C_{18}H_{16}FNO_3SNa$ [M+Na^+]: m/z = 368.0727, m/z found 368.0729; **IR** ν_{max} (ATR)/cm^{-1}: 3149, 2926, 2853, 1515, 1398, 1250, 1205, 1027, 752.

1-(3-Fluorophenyl)-2-methyl-4-phenyl-1*H*-pyrrole-3-sulfonyl fluoride (4fe)



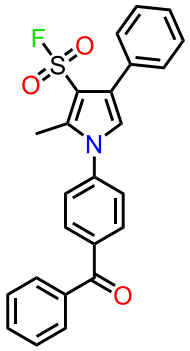
Following general procedure H, the title compound was isolated by flash column chromatography (0-6% EtOAc in petroleum ether) as a white solid (91.0 mg, 81%). **m.p.** 84 - 86 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.60 – 7.45 (m, 3H), 7.45 – 7.35 (m, 3H), 7.28 – 7.22 (m, 1H), 7.19 – 7.15 (m, 1H), 7.11 (appt. dt, *J* = 8.8, 2.2 Hz, 1H), 6.81 (s, 1H), 2.51 (d, *J* = 1.1 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 163.0 (d, *J* = 250.4 Hz), 139.2 (d, *J* = 9.7 Hz), 137.6 (d, *J* = 3.0 Hz), 132.1, 131.2 (d, *J* = 9.0 Hz), 129.5, 128.3, 128.0, 126.5, 122.5 (d, *J* = 3.4 Hz), 122.0 (d, *J* = 1.4 Hz), 116.6 (d, *J* = 21.9 Hz), 114.4 (d, *J* = 23.7 Hz), 111.8 (d, *J* = 28.8 Hz), 12.4; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 73.9, -109.5 – -109.6 (m); **HRMS** (ESI^+): calculated for $C_{17}H_{13}F_2NO_2SNa$ [M+Na^+]: m/z = 356.0527, m/z found 356.0531; **IR** ν_{max} (ATR)/cm^{-1}: 3135, 2926, 1599, 1495, 1399, 1216, 876, 759, 733.

1-(4-Bromophenyl)-2-methyl-4-phenyl-1*H*-pyrrole-3-sulfonyl fluoride (4ff)



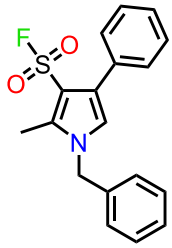
Following general procedure H, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (67.0 mg, 68%). **m.p.** 116 - 118 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.69 (appt. d, *J* = 8.8 Hz, 2H), 7.51 – 7.46 (m, 2H), 7.44 – 7.35 (m, 3H), 7.24 (appt. d, *J* = 8.8 Hz, 2H), 6.79 (s, 1H), 2.48 (d, *J* = 1.0 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 137.6 (d, *J* = 2.9 Hz), 136.8, 133.1, 132.1, 129.5, 128.3, 128.2, 128.0, 126.4, 123.5, 122.0, 111.6 (d, *J* = 28.8 Hz), 12.4; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 74.0; **HRMS** (ESI^+): calculated for $C_{17}H_{13}BrFKNO_2S$ [M+K^+]: m/z = 433.9446, m/z found 433.9440; **IR** ν_{max} (ATR)/cm^{-1}: 3142, 2927, 2853, 1494, 1398, 1204.

1-(4-Benzoylphenyl)-2-methyl-4-phenyl-1*H*-pyrrole-3-sulfonyl fluoride (4fg)



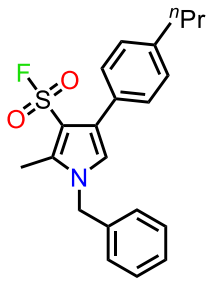
Following general procedure H, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as an off-white solid (67.0 mg, 64%). **m.p.** 160 - 162 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.00 (appt. d, *J* = 8.7 Hz, 2H), 7.88 – 7.84 (m, 2H), 7.69 – 7.63 (m, 1H), 7.58 – 7.47 (m, 6H), 7.46 – 7.35 (m, 3H), 6.87 (s, 1H), 2.56 (d, *J* = 0.8 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 195.3, 141.0, 138.4, 137.5 (d, *J* = 3.0 Hz), 137.0, 133.2, 132.0, 131.6, 130.2, 129.5, 128.7, 128.3, 128.1, 126.7, 126.5, 121.9, 112.1 (d, *J* = 28.8 Hz), 12.6; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.9; **HRMS** (ESI^+): calculated for $C_{24}H_{18}FNO_3SNa$ [M+Na^+]: m/z = 442.0884, m/z found 442.0890; **IR** ν_{max} (ATR)/cm^{-1}: 3064, 2925, 1661, 1601, 1511, 1400, 1207, 741.

1-Benzyl-2-methyl-4-phenyl-1*H*-pyrrole-3-sulfonyl fluoride (4fh)



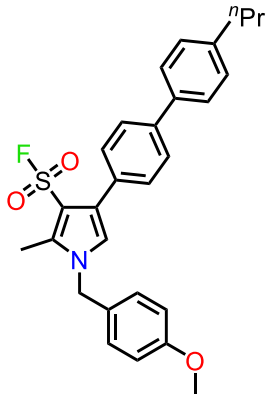
Following general procedure H, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a colourless oil (78.0 mg, 95%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.49 – 7.31 (m, 8H), 7.15 – 7.10 (m, 2H), 6.69 (s, 1H), 5.12 (s, 2H), 2.54 (d, *J* = 1.0 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 137.5 (d, *J* = 2.7 Hz), 135.3, 132.6, 129.5, 129.4, 128.5, 128.2, 127.7, 126.9, 126.0, 121.7, 110.4 (d, *J* = 28.3 Hz), 51.4, 11.4; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 74.1; **HRMS** (ESI^+): calculated for $C_{18}H_{16}FNO_2SNa$ [M+Na^+]: m/z = 352.0778, m/z found 352.0779; **IR** ν_{max} (ATR)/cm^{-1}: 3064, 3033, 1605, 1506, 1397, 1229, 1183, 739.

1-Benzyl-2-methyl-4-(4-propylphenyl)-1*H*-pyrrole-3-sulfonyl fluoride (4fi)



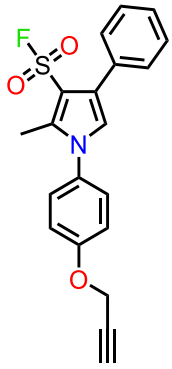
Following general procedure H, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a colourless oil (89.0 mg, 96%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.43 – 7.33 (m, 5H), 7.19 (appt. d, *J* = 8.4 Hz, 2H), 7.14 – 7.09 (m, 2H), 6.67 (s, 1H), 5.11 (s, 2H), 2.64 – 2.59 (m, 2H), 2.53 (d, *J* = 0.9 Hz, 3H), 1.73 – 1.62 (m, 2H), 1.00 – 0.95 (m, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 142.3, 137.3 (d, *J* = 2.4 Hz), 135.4, 129.8, 129.4, 129.3, 128.5, 128.3, 126.9, 126.0, 121.6, 110.3 (d, *J* = 28.0 Hz), 51.3, 37.9, 24.6, 14.1, 11.5; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 74.0; **HRMS** (ESI^+): calculated for $C_{21}H_{22}FNO_2SNa$ [M+Na^+]: m/z = 394.1247, m/z found 394.1249; **IR** ν_{max} (ATR)/cm^{-1}: 3031, 2959, 2927, 2870, 1508, 1456, 1397, 1229, 1183, 733.

1-(4-Methoxybenzyl)-4-(4'-propyl-[1,1'-biphenyl]-4-yl)-1*H*-pyrrole-3-sulfonyl fluoride (4fj)



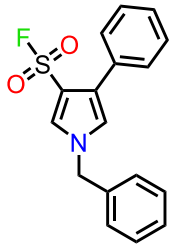
Following general procedure H, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a yellow solid (107 mg, 90%). **m.p.** 130 - 132 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.60 (appt. d, *J* = 8.6 Hz, 2H), 7.54 (appt. d, *J* = 8.3 Hz, 2H), 7.50 (appt. d, *J* = 8.6 Hz, 2H), 7.28 – 7.24 (m, 2H), 7.08 (appt. d, *J* = 8.9 Hz, 2H), 6.93 (appt. d, *J* = 8.8 Hz, 2H), 6.69 (s, 1H), 5.05 (s, 2H), 3.83 (s, 3H), 2.68 – 2.61 (m, 2H), 2.56 (d, *J* = 0.8 Hz, 3H), 1.70 (dp, *J* = 8.9, 7.3 Hz, 2H), 0.99 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 159.8, 142.0, 140.5, 138.3, 137.5 (d, *J* = 2.7 Hz), 131.3, 129.8, 129.0, 128.5, 127.1, 127.0, 126.8, 125.6, 121.6, 114.8, 110.2 (d, *J* = 28.1 Hz), 55.5, 51.0, 37.9, 24.6, 14.0, 11.5; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 74.1; **HRMS** (ESI^+): calculated for $C_{28}H_{28}FNO_3SNa$ [$M+Na^+$]: m/z = 500.1666, m/z found 500.1666; **IR** ν_{max} (ATR)/cm^{-1}: 3127, 2927, 1609, 1509, 1388, 1245, 1182, 744.

2-Methyl-4-phenyl-1-(4-(prop-2-yn-1-yloxy)phenyl)-1*H*-pyrrole-3-sulfonyl fluoride (4fk)



Following general procedure H, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a yellow oil (60.0 mg, 65%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.51 – 7.47 (m, 2H), 7.43 – 7.34 (m, 3H), 7.28 (appt. d, *J* = 9.4 Hz, 2H), 7.13 (appt. d, *J* = 8.9 Hz, 2H), 6.78 (s, 1H), 4.78 (d, *J* = 2.4 Hz, 2H), 2.59 (t, *J* = 2.4 Hz, 1H), 2.46 (d, *J* = 0.6 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 158.0, 138.1 (d, *J* = 2.7 Hz), 132.4, 131.4, 129.5, 128.3, 127.9, 126.0, 122.5, 116.0, 110.8 (d, *J* = 28.4 Hz), 78.0, 76.4, 56.3, 12.4; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.9; **HRMS** (ESI^+): calculated for $C_{20}H_{16}FNO_3SNa$ [$M+Na^+$]: m/z = 392.0727, m/z found 392.0727; **IR** ν_{max} (ATR)/cm^{-1}: 3290, 3057, 1512, 1398, 1204.

1-Benzyl-4-phenyl-1*H*-pyrrole-3-sulfonyl fluoride (4fl)

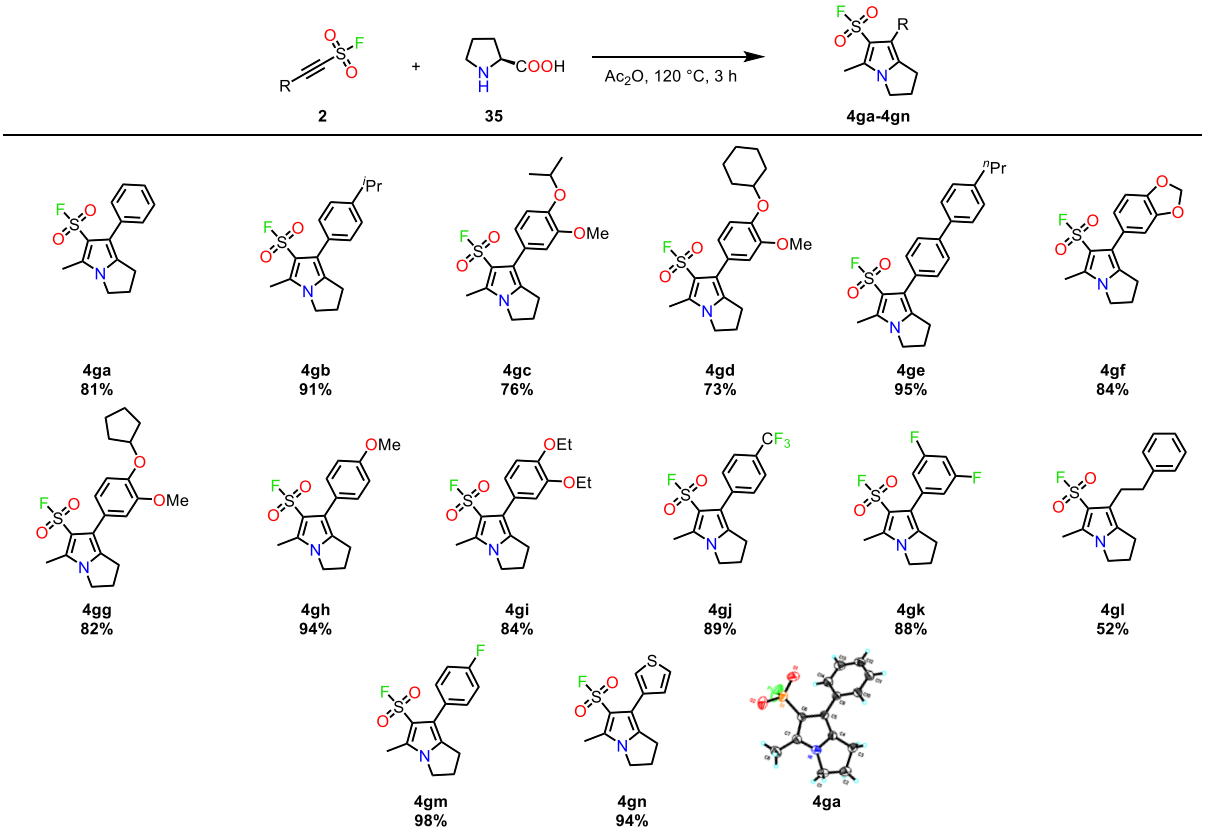


Following general procedure H, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a colourless oil (75.0 mg, 96%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.54 – 7.49 (m, 3H), 7.46 – 7.32 (m, 6H), 7.28 – 7.24 (m, 2H), 6.83 (d, *J* = 2.6 Hz, 1H), 5.11 (s, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 134.9, 131.7, 129.4, 129.4, 129.0, 128.8, 128.6, 128.0, 127.9, 126.2, 122.7, 113.1 (d, *J* = 30.1 Hz), 54.6; **^{19}F NMR** (471 MHz, $CDCl_3$) δ 70.0; **HRMS** (ESI^+): calculated for $C_{17}H_{14}FNO_2SNa$ [$M+Na^+$]: m/z = 338.0621, m/z found 338.0613; **IR** ν_{max} (ATR)/cm^{-1}: 3132, 2926, 2854, 1604, 1507, 1394, 1176, 749.

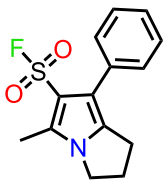
Synthesis and experimental data for compounds 4ga-4an

General Procedure I

To a solution of *L*-proline **35** (100 µmol) in Ac_2O (400 µL) was added the required SASF **2** (120 µmol) and heated to 120 °C for 3 h. The Ac_2O was removed under a stream of nitrogen and the crude product purified by flash column chromatography to obtain the analytically pure product.

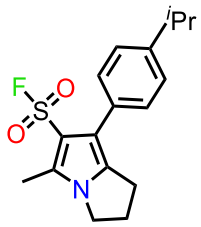


5-Methyl-7-phenyl-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4ga)



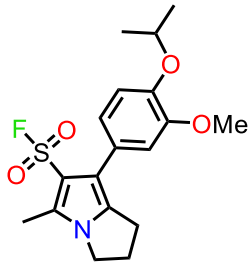
Following general procedure I (250 µmol of *L*-proline used), the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (57.0 mg, 81%). **m.p.** 138 - 141 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.43 – 7.28 (m, 5H), 3.99 (appt. t, *J* = 7.3 Hz, 2H), 2.89 (appt. t, *J* = 7.4 Hz, 2H), 2.63 – 2.49 (m, 5H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 135.0 (d, *J* = 1.4 Hz), 133.1, 132.4 (d, *J* = 2.8 Hz), 129.5, 128.2, 127.1, 116.6, 110.9 (d, *J* = 27.3 Hz), 45.6, 26.9, 24.1, 12.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.1; **HRMS** (ESI^+): calculated for $C_{14}H_{14}FNO_2SNa$ [$M+Na^+$]: m/z = 302.0621, m/z found 302.0623; **IR** ν_{max}: 3070, 2926, 2853, 1501, 1372, 1240, 1171, 764, 739, 703.

7-(4-Isopropylphenyl)-5-methyl-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4gb)



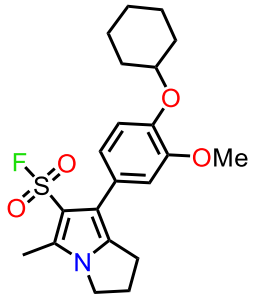
Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a beige solid (29.0 mg, 91%). **m.p** 105 - 106 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.33 (appt. d, *J* = 8.3 Hz, 2H), 7.25 – 7.22 (m, 2H), 3.97 (appt. t, *J* = 7.1 Hz, 2H), 2.97 – 2.88 (m, 3H), 2.57 – 2.49 (m, 5H), 1.28 (d, *J* = 6.9 Hz, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 147.5, 134.8, 132.3 (d, *J* = 2.6 Hz), 130.3, 130.1, 129.3, 126.3, 116.7, 110.8 (d, *J* = 27.1 Hz), 45.5, 33.9, 26.9, 24.2, 24.0, 12.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.0; **HRMS** (ESI^+): calculated for $C_{17}H_{20}FNO_2SNa$ [$M+Na^+$]: m/z = 344.1091, m/z found 344.1091; **IR** ν_{max} (ATR)/cm^{-1}: 2959, 2927, 2854, 1515, 1394, 1238, 1172, 724.

7-(4-Isopropoxy-3-methoxyphenyl)-5-methyl-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4gc)



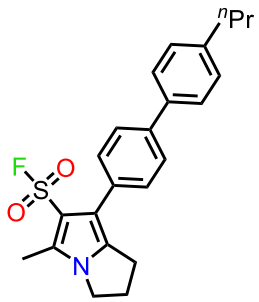
Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (29.0 mg, 76%). **m.p.** 93 - 94 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.01 – 6.98 (m, 1H), 6.90 – 6.88 (m, 2H), 4.55 (hept, *J* = 6.1 Hz, 1H), 3.97 (appt. t, *J* = 7.1 Hz, 2H), 3.86 (s, *J* = 3.6 Hz, 3H), 2.91 (appt. t, *J* = 7.4 Hz, 2H), 2.57 – 2.50 (m, 5H), 1.39 (d, *J* = 6.1 Hz, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 149.8, 146.6, 134.7, 132.2, 125.8, 121.6, 116.5, 115.1, 113.8, 110.9 (d, *J* = 27.0 Hz), 71.4, 56.1, 45.5, 26.9, 24.3, 22.3, 12.2; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.6; **HRMS** (ESI^+): calculated for $C_{18}H_{22}FNO_4SNa$ [$M+Na^+$]: m/z = 390.1146, m/z found 390.1146; **IR** ν_{max} (ATR)/cm^{-1}: 2978, 2928, 1510, 1464, 1240, 1211, 1165, 1139, 1109, 719.

7-(4-(Cyclohexyloxy)-3-methoxyphenyl)-5-methyl-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4gd)



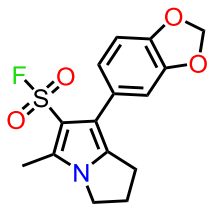
Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a beige solid (30.0 mg, 73%). **m.p.** 138 °C (decomposed); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 6.99 (d, *J* = 1.2 Hz, 1H), 6.92 – 6.86 (m, 2H), 4.24 – 4.16 (m, 1H), 3.96 (appt. t, *J* = 7.1 Hz, 2H), 3.85 (s, 3H), 2.90 (appt. t, *J* = 7.4 Hz, 2H), 2.59 – 2.48 (m, 5H), 2.12 – 2.02 (m, 2H), 1.88 – 1.79 (m, 2H), 1.64 – 1.52 (m, 3H), 1.41 – 1.28 (m, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 150.0, 146.6, 134.7, 132.2 (d, *J* = 2.8 Hz), 125.9, 121.6, 116.5, 115.6, 113.9, 110.9 (d, *J* = 27.3 Hz), 77.4, 56.1, 45.5, 32.3, 26.9, 25.8, 24.4, 24.3, 12.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.7; **HRMS** (ESI^+): calculated for $C_{21}H_{26}FNO_4SNa$ [$M+Na^+$]: m/z = 430.1459, m/z found 430.1457; **IR** ν_{max} (ATR)/cm^{-1}:2925, 2853, 1512, 1392, 1237, 1162, 1137, 732.

5-Methyl-7-(4'-propyl-[1,1'-biphenyl]-4-yl)-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4ge)



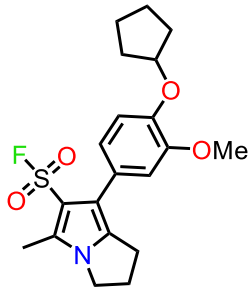
Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a beige solid (38.0 mg, 95%). **m.p.** 116 - 117 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.61 (appt. d, *J* = 8.5 Hz, 2H), 7.56 (appt. d, *J* = 8.2 Hz, 2H), 7.47 (appt. d, *J* = 8.5 Hz, 2H), 7.27 (appt. d, *J* = 8.3 Hz, 2H), 3.97 (appt. t, *J* = 7.2 Hz, 2H), 2.93 (appt. t, *J* = 7.4 Hz, 2H), 2.68 – 2.63 (m, 2H), 2.58 – 2.50 (m, 5H), 1.75 – 1.66 (m, 2H), 1.00 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 141.9, 139.8, 138.3, 135.1, 132.5 (d, *J* = 2.5 Hz), 131.7, 129.7, 129.0, 127.0 (s, *J* = 4.2 Hz), 126.8, 116.3, 110.9 (d, *J* = 27.3 Hz), 45.6, 37.8, 26.9, 24.7, 24.3, 14.0, 12.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.1; **HRMS** (ESI^+): calculated for $C_{23}H_{24}FNO_2SNa$ [$M+Na^+$]: m/z = 420.1404, m/z found 420.1400; **IR** ν_{max} (ATR)/cm^{-1}: 2926, 2869, 1499, 1394, 1241, 1173, 738.

7-(Benzo[*d*][1,3]dioxol-5-yl)-5-methyl-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4gf)



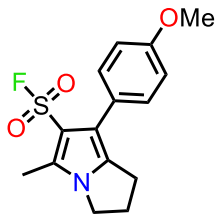
Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a beige solid (27.0 mg, 84%). **m.p.** 145 - 146 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 6.89 – 6.80 (m, 3H), 5.98 (s, 2H), 3.97 (appt. t, *J* = 7.1 Hz, 2H), 2.87 (appt. t, *J* = 7.4 Hz, 2H), 2.59 – 2.43 (m, 5H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 147.5, 146.9, 134.8, 132.1, 126.7, 123.0, 116.3, 111.0 (d, *J* = 27.1 Hz), 110.1, 108.2, 101.2, 45.6, 26.9, 24.0, 12.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.0; **HRMS** (ESI^+): calculated for $C_{15}H_{14}FNO_4SNa$ [M+Na^+]: m/z = 346.0520, m/z found 346.0521; **IR** ν_{max} (ATR)/cm^{-1}: 3071, 2905, 2856, 1489, 1449, 1375, 1225, 1175, 730.

7-(4-(Cyclopentyloxy)-3-methoxyphenyl)-5-methyl-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4gg)



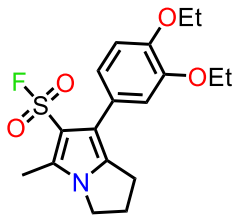
Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a brown solid (32.0 mg, 82%). **m.p.** 105 - 107 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 6.98 (d, *J* = 1.9 Hz, 1H), 6.90 (dd, *J* = 8.3, 1.9 Hz, 1H), 6.86 (d, *J* = 8.3 Hz, 1H), 4.81 – 4.76 (m, 1H), 3.96 (appt. t, *J* = 7.1 Hz, 2H), 3.85 (s, 3H), 2.90 (appt. t, *J* = 7.4 Hz, 2H), 2.57 – 2.50 (m, 5H), 1.97 – 1.91 (m, 4H), 1.88 – 1.81 (m, 2H), 1.65 – 1.58 (m, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 149.4, 147.1, 134.7, 132.2, 125.4, 121.6, 116.6, 114.3, 113.8, 110.9 (d, *J* = 27.1 Hz), 80.4, 56.2, 45.5, 33.1, 26.9, 24.3, 24.2, 12.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.6; **HRMS** (ESI^+): calculated for $C_{20}H_{24}FNO_4SNa$ [M+Na^+]: m/z = 416.1302, m/z found 416.1304; **IR** ν_{max} (ATR)/cm^{-1}: 2952, 2888, 1513, 1392, 1238, 1163, 1140, 1027, 733.

7-(4-Methoxyphenyl)-5-methyl-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4gh)



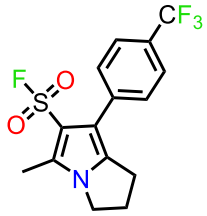
Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless solid (29.0 mg, 94%). **m.p.** 78 - 81 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.32 (appt. d, *J* = 8.8 Hz, 2H), 6.92 (appt. d, *J* = 8.8 Hz, 2H), 3.96 (appt. t, *J* = 7.2 Hz, 2H), 3.83 (s, 3H), 2.87 (appt. t, *J* = 7.4 Hz, 2H), 2.58 – 2.49 (m, 5H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 158.8, 134.7, 132.1 (d, *J* = 2.7 Hz), 130.6, 125.3, 116.3, 113.7, 110.9 (d, *J* = 26.7 Hz), 55.3, 45.5, 26.9, 24.0, 12.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.9; **HRMS** (ESI^+): calculated for $C_{15}H_{16}FNO_3SNa$ [M+Na^+]: m/z = 332.0727, m/z found 332.0727; **IR** ν_{max} (ATR)/cm^{-1}: 2926, 2854, 1513, 1391, 1237, 1169, 1028, 836, 735.

7-(3,4-Diethoxyphenyl)-5-methyl-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4gi)



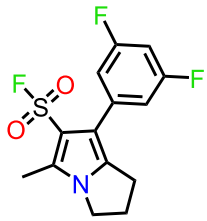
Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a beige solid (31.0 mg, 84%); **m.p.** 136 - 137 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 6.99 (d, *J* = 1.5 Hz, 1H), 6.91 – 6.86 (m, 2H), 4.12 (appt. q, *J* = 7.0 Hz, 4H), 3.96 (appt. t, *J* = 7.1 Hz, 2H), 2.89 (appt. t, *J* = 7.4 Hz, 2H), 2.57 – 2.49 (m, 5H), 1.48 – 1.42 (m, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 148.2, 148.0, 134.7, 132.2 (d, *J* = 2.8 Hz), 125.6, 121.7, 116.5, 115.3, 113.1, 110.8 (d, *J* = 27.0 Hz), 64.6, 64.6, 45.5, 26.9, 24.2, 15.0, 14.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.7; **HRMS** (ESI^+): calculated for $C_{18}H_{22}FNO_4SNa$ [M+Na^+]: m/z = 390.1146, m/z found 390.1148; **IR** ν_{max} (ATR)/cm^{-1}: 2981, 2926, 1515, 1393, 1239, 1140, 1040, 723.

5-Methyl-7-(4-(trifluoromethyl)phenyl)-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4gj)



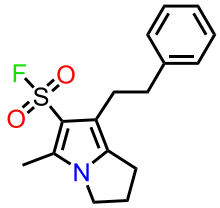
Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless solid (31.0 mg, 89%). **m.p.** 106 - 108 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.63 (appt. d, *J* = 8.1 Hz, 2H), 7.51 (appt. d, *J* = 8.0 Hz, 2H), 4.00 (appt. t, *J* = 7.2 Hz, 2H), 2.90 (appt. t, *J* = 7.4 Hz, 2H), 2.61 – 2.53 (m, 5H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 136.9, 135.7, 133.0 (d, *J* = 2.7 Hz), 129.7, 129.1 (q, *J* = 32.4 Hz), 125.2 (q, *J* = 3.8 Hz), 124.4 (q, *J* = 272.1 Hz), 115.4, 111.1 (d, *J* = 27.9 Hz), 45.7 (s), 26.9, 24.2, 12.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.1, -62.5; **HRMS** (ESI^+): calculated for $C_{15}H_{13}F_4NO_2SNa$ [M+Na^+]: m/z = 370.0495, m/z found 370.0490; **IR** ν_{max} (ATR)/cm^{-1}: 3036, 2960, 2851, 1618, 1397, 1323, 1244, 1161, 1109, 1067, 1039, 726.

7-(3,5-Difluorophenyl)-5-methyl-2,3-dihydro-1H-pyrrolizine-6-sulfonyl fluoride (4gk)



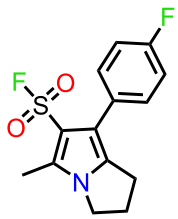
Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-25% EtOAc in petroleum ether) as a colourless solid (28.0 mg, 88%). **m.p.** 158 - 159 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 6.91 (dt, *J* = 6.4, 3.2 Hz, 2H), 6.75 (tt, *J* = 9.0, 2.3 Hz, 1H), 3.99 (appt. t, *J* = 7.2 Hz, 2H), 2.90 (appt. t, *J* = 7.4 Hz, 2H), 2.62 – 2.50 (m, 5H); **^{13}C NMR (**126 MHz, $CDCl_3$) δ 162.8 (dd, *J* = 247.6, 13.4 Hz), 136.3 (t, *J* = 10.5 Hz), 135.7, 133.0 (d, *J* = 2.7 Hz), 114.6, 112.4 (dd, *J* = 20.0, 6.2 Hz), 111.0 (d, *J* = 28.1 Hz), 102.6 (t, *J* = 25.3 Hz), 45.7, 26.8, 24.2, 12.1. **^{19}F NMR** (376 MHz, $CDCl_3$) δ 74.1, -110.5 (t, *J* = 8.1 Hz); **HRMS** (ESI^+): calculated for $C_{14}H_{12}F_3NO_2SNa$ [M+Na^+]: m/z = 338.0433, m/z found 338.0439; **IR** ν_{max} (ATR)/cm^{-1}: 3088, 2927, 2852, 1625, 1594, 1434, 1396, 1280, 1213, 1160, 1118, 984, 863, 733.

5-Methyl-7-phenethyl-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4gl)



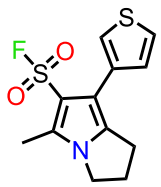
Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (16.0 mg, 52%). **m.p.** 59 - 60 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.27 – 7.23 (m, 2H), 7.20 – 7.16 (m, 1H), 7.15 – 7.11 (m, 2H), 3.84 – 3.79 (m, 2H), 2.90 – 2.83 (m, 4H), 2.46 (d, *J* = 0.9 Hz, 3H), 2.37 – 2.33 (m, 4H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 142.1, 134.6, 131.5, 128.9 (s, *J* = 9.1 Hz), 128.3, 125.9, 114.3, 110.6 (d, *J* = 25.2 Hz), 45.1, 36.8, 27.6, 27.1, 23.1, 11.8; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.7; **HRMS** (ESI^+): calculated for $C_{16}H_{18}FNO_2SNa$ [M+Na^+]: m/z = 330.0934, m/z found 330.0933; **IR** ν_{max} (ATR)/cm^{-1}: 3023, 2865, 1453, 1375, 1212, 1150, 753, 721.

7-(4-Fluorophenyl)-5-methyl-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4gm)



Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a yellow solid (42.0 mg, 94%). **m.p.** 143.5 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.40 – 7.29 (m, 2H), 7.15 – 6.98 (m, 2H), 3.97 (t, *J* = 7.2 Hz, 2H), 2.86 (t, *J* = 7.4 Hz, 2H), 2.61 – 2.49 (m, 2H), 2.51 (s, 3H); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 162.2 (d, *J* = 246.0 Hz), 135.0, 132.4 (d, *J* = 2.7 Hz), 131.2 (d, *J* = 8.1 Hz), 129.0 (d, *J* = 3.3 Hz), 115.6, 115.2 (d, *J* = 21.5 Hz), 111.1 (d, *J* = 27.1 Hz), 45.6, 26.9, 24.0, 12.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.45, -115.89; **HRMS** (APCI): calculated for $C_{14}H_{14}F_2NO_2S$ [M+H^+]: m/z = 298.0713, m/z found 298.0711.

5-Methyl-7-(thiophen-3-yl)-2,3-dihydro-1*H*-pyrrolizine-6-sulfonyl fluoride (4gn)

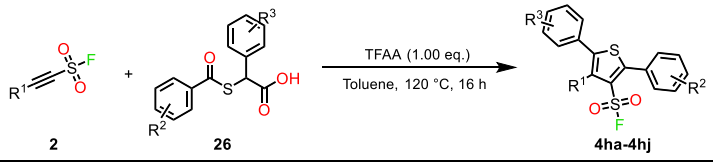


Following general procedure I, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a yellow solid (40.0 mg, 93%). **m.p.** 125.1 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.37 – 7.29 (m, 2H), 7.21 (d, *J* = 4.9 Hz, 1H), 3.96 (t, *J* = 7.3 Hz, 2H), 2.93 (t, *J* = 7.4 Hz, 2H), 2.60 – 2.52 (m, 2H), 2.51 (s, 3H). **^{13}C NMR** (151 MHz, $CDCl_3$) δ 135.1, 132.7, 132.4 (d, *J* = 3.2 Hz), 128.6, 125.0, 122.7, 111.4, 110.7 (d, *J* = 27.6 Hz), 45.6, 26.9, 24.6, 12.2; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 71.7; **HRMS** (APCI): calculated for $C_{12}H_{13}FNO_2S_2$ [M+H$^+$]: m/z = 286.0372, m/z found 286.0374.

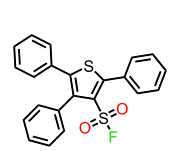
Synthesis and experimental data for compounds 4ha-4hj

General Procedure J

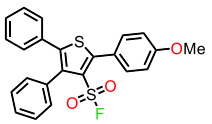
To a solution of the required 2-(benzoylthio)-2-arylacetic acid **26** (100 µmol) in toluene (500 µL) was added TFAA (120 µmol), the required SASF **2** (120 µmol) and stirred at 120 °C for 16 h. The solvent was removed under reduced pressure and the crude product was purified by flash column chromatography to obtain the analytically pure product.



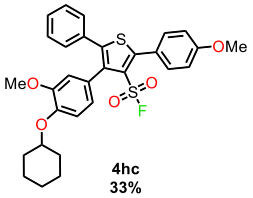
2 **26** **4ha-4hj**



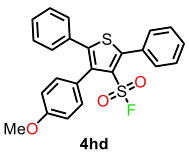
4ha
83%



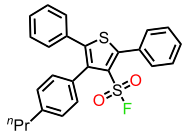
4hb
84%



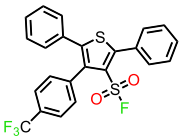
4hc
33%



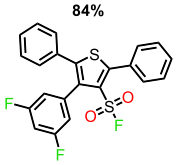
4hd
74%



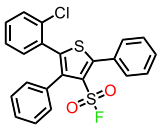
4he
63%



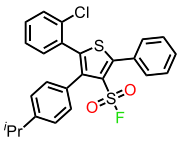
4hf
91%



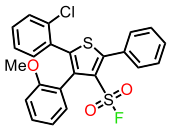
4hg
78%



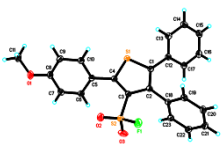
4hh
58%



4hi
39%

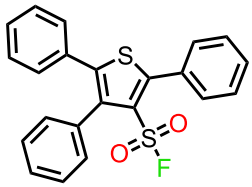


4hj
85%



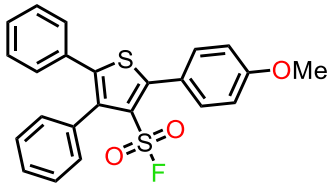
4hb

2,4,5-Triphenylthiophene-3-sulfonyl fluoride (4ha)



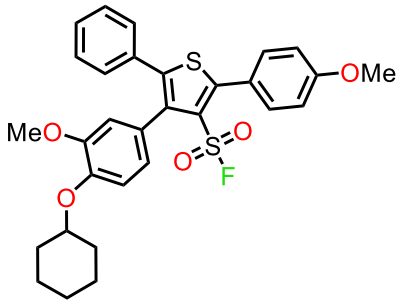
Following general procedure J (300 µmol of the required 2-(benzoylthio)-2-arylacetic acid used), the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (33.0 mg, 83%). **m.p.** 135 - 136 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.64 – 7.58 (m, 2H), 7.54 – 7.47 (m, 3H), 7.40 – 7.31 (m, 5H), 7.26 – 7.21 (m, 3H), 7.19 – 7.14 (m, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 151.7, 141.7, 137.5, 133.5, 132.0, 131.1, 130.6, 130.0, 130.0, 129.3, 128.7, 128.6 (d, *J* = 2.6 Hz), 128.54, 128.4, 127.9 (d, *J* = 23.7 Hz), 116.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.8; **HRMS** (ESI^+): calculated for $C_{22}H_{15}FO_2S_2Na$ [M+Na^+]: m/z =417.0389, m/z found 417.0393; **IR** ν_{max} (ATR)/cm^{-1}:3054, 2926, 2852, 2359, 1410, 1201, 746.

5-(4-Methoxyphenyl)-2,4-diphenylthiophene-3-sulfonyl fluoride (4hb)



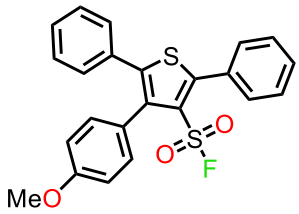
Following general procedure J, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (36.0 mg, 84%). **m.p.** 110 – 112 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.58 – 7.51 (m, 2H), 7.40 – 7.30 (m, 5H), 7.24 (m, 3H), 7.19 – 7.12 (m, 2H), 7.07 – 6.98 (m, 2H), 3.89 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 161.1, 152.0, 141.1, 137.5, 133.7, 132.2, 131.4, 130.6, 129.3, 128.7, 128.5, 128.5, 128.4, 123.3, 114.1, 55.5; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.7; **HRMS** (ESI^+): calculated for $C_{23}H_{17}FO_3S_2Na$ [M+Na^+]: m/z =447.0495, m/z found 447.0498; **IR** ν_{max} (ATR)/cm^{-1}:3060, 3001, 2927, 2851, 1604, 1407, 1200, 755.

4-(4-(Cyclohexyloxy)-3-methoxyphenyl)-5-(4-methoxyphenyl)-2-phenylthiophene-3-sulfonyl fluoride (4hc)



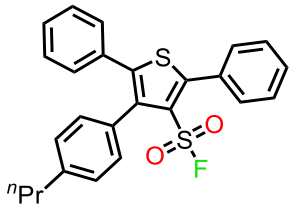
Following general procedure J, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (18.0 mg, 33%). **m.p.** 72 - 74 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.54 (appt. d, *J* = 8.8 Hz, 2H), 7.27 – 7.20 (m, 3H), 7.21 – 7.13 (m, 2H), 7.01 (appt. d, *J* = 8.8 Hz, 2H), 6.91 – 6.78 (m, 3H), 4.23 (appt. ddd, *J* = 13.8, 9.6, 3.8 Hz, 1H), 3.88 (s, 3H), 3.74 (s, 3H), 2.17 – 1.94 (m, 2H), 1.94 – 1.71 (m, 2H), 1.71 – 1.48 (m, 3H), 1.48 – 1.15 (m, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 161.1, 151.6, 150.1, 147.4, 140.8, 137.4, 132.4, 131.3, 129.2, 128.7, 128.4, 127.5 (d, *J* = 22.8 Hz), 126.1, 123.4, 123.2, 115.5, 114.7, 114.0, 77.3, 56.1, 55.53, 32.1, 25.7, 24.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 68.8; **HRMS** (ESI^+): calculated for $C_{30}H_{29}FO_5S_2Na$ [M+Na^+]: m/z =575.1332, m/z found 575.1338; **IR** ν_{max} (ATR)/cm^{-1}:3069, 2931, 2854, 2360, 1605, 1605, 1249, 753.

4-(4-Methoxyphenyl)-2,5-diphenylthiophene-3-sulfonyl fluoride (4hd)



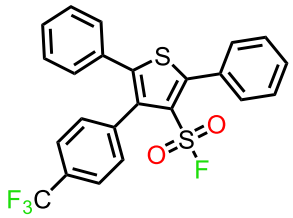
Following general procedure J, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (31.0 mg, 74%). **m.p.** 149 - 150 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.65 – 7.57 (m, 2H), 7.50 (m, 3H), 7.31 – 7.22 (m, 5H), 7.23 – 7.15 (m, 2H), 6.94 – 6.83 (m, 2H), 3.84 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 159.7, 151.5 (d, *J* = 2.1 Hz), 141.6 (d, *J* = 2.0 Hz), 137.2, 132.2, 131.8, 131.2, 130.0, 129.9, 129.2, 128.7, 128.5, 128.0 (d, *J* = 23.3 Hz), 125.6, 113.9, 55.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.3; **HRMS** (ESI^+): calculated for $C_{23}H_{17}FO_3S_2Na$ [M+Na^+]: m/z =447.0495, m/z found 447.0499; **IR** ν_{max} (ATR)/cm^{-1}:2934, 2859, 2359, 1605, 1404, 1031, 752.

2,5-Diphenyl-4-(4-propylphenyl)thiophene-3-sulfonyl fluoride (4he)



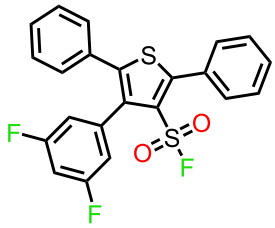
Following general procedure J, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (28.0 mg, 63%). **m.p.** 157 - 159 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.66 – 7.57 (m, 2H), 7.55 – 7.46 (m, 3H), 7.26 – 7.20 (m, 5H), 7.20 – 7.13 (m, 4H), 2.68 – 2.58 (m, 2H), 1.74 – 1.62 (m, 2H), 0.94 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 151.5 (d, *J* = 2.2 Hz), 143.0, 141.5 (d, *J* = 1.8 Hz), 137.7, 132.2, 131.2, 130.7, 130.4, 130.0, 129.9, 129.2, 128.6, 128.5, 128.5, 128.0 (d, *J* = 23.4 Hz), 37.9, 24.3, 13.8; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.5; **HRMS** (ESI^+): calculated for $C_{25}H_{21}FO_2S_2Na$ [$M+Na^+$]: m/z =459.0859, m/z found 459.0854; **IR** ν_{max} (ATR)/cm^{-1}:3040, 2958, 2924, 2860, 1408, 1202 750.

2,5-Diphenyl-4-(4-(trifluoromethyl)phenyl)thiophene-3-sulfonyl fluoride (4hf)



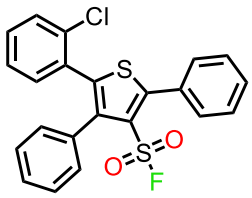
Following general procedure J, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (42.0 mg, 91%). **m.p.** 199 - 200 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.66 – 7.59 (m, 4H), 7.52 (m, 3H), 7.47 (d, *J* = 8.1 Hz, 2H), 7.34 – 7.24 (m, 3H), 7.14 (appt. dd, *J* = 8.0, 1.6 Hz, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 152.4 (d, *J* = 2.1 Hz), 142.5, 137.4, 135.8, 131.5, 131.1, 130.8, 130.2, 130.6 (d, *J* = 32.5 Hz), 130.0, 129.3, 129.0, 128.9, 128.6, 127.6 (d, *J* = 24.5 Hz), 125.3 (q, *J* = 3.7 Hz), 124.1 (q, *J* = 272.3 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 70.4, -62.6; **HRMS** (ESI^+): calculated for $C_{23}H_{14}F_4O_2S_2Na$ [$M+Na^+$]: m/z =485.0263, m/z found 485.0264; **IR** ν_{max} (ATR)/cm^{-1}:3066, 2960, 2924, 2854, 1326, 1124, 746.

4-(3,5-Difluorophenyl)-2,5-diphenylthiophene-3-sulfonyl fluoride (4hg)



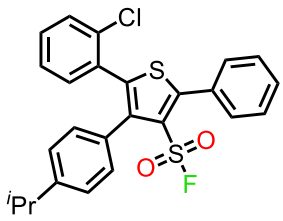
Following general procedure J, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (34.0 mg, 78%). **m.p.** 165 - 168 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.65 – 7.56 (m, 2H), 7.56 – 7.45 (m, 3H), 7.38 – 7.25 (m, 3H), 7.22 – 7.14 (m, 2H), 6.96 – 6.77 (m, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.0 (d, *J* = 13.0 Hz), 161.5 (d, *J* = 13.0 Hz), 152.4 (d, *J* = 2.1 Hz), 142.6 (d, *J* = 1.9 Hz), 136.6 (t, *J* = 10.3 Hz), 134.7, 131.3, 130.7, 130.2, 130.0, 129.2, 129.1, 129.0, 128.6, 127.4 (d, *J* = 24.8 Hz), 114.0 (d, *J* = 26.0 Hz), 114.0 (d, *J* = 11.5 Hz), 104.3 (t, *J* = 25.1 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 70.6, -106.0 – -115.6 (m); **HRMS** (ESI^+): calculated for $C_{22}H_{13}F_3O_2S_2Na$ [$M+Na^+$]: m/z =453.0201, m/z found 453.0200; **IR** ν_{max} (ATR)/cm^{-1}:3087, 2927, 2852, 1620, 1202, 1118, 752.

2-(2-Chlorophenyl)-4,5-diphenylthiophene-3-sulfonyl fluoride (4hh)



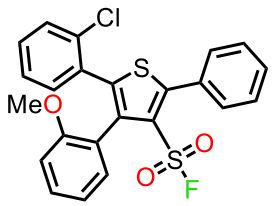
Following general procedure J, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (25.0 mg, 58%). **m.p.** 95 - 96 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.70 – 7.60 (m, 2H), 7.58 – 7.45 (m, 3H), 7.42 – 7.36 (m, 1H), 7.34 – 7.21 (m, 6H), 7.21 – 7.11 (m, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 153.1, 140.4, 138.1, 134.7, 133.2, 133.1, 131.0, 130.7, 130.5, 130.1, 130.0, 129.9, 128.5, 128.4, 128.0, 126.9 (d, *J* = 24.4 Hz), 126.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 70.0; **HRMS** (ESI^+): calculated for $C_{22}H_{14}ClFO_2S_2Na$ [$M+Na^+$]: m/z =451.0000, m/z found 451.0005; **IR** ν_{max} (ATR)/cm^{-1}:3065, 2925, 2853, 1409, 1201, 744.

2-(2-Chlorophenyl)-4-(4-isopropylphenyl)-5-phenylthiophene-3-sulfonyl fluoride (4hi)



Following general procedure J, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (18.0 mg, 39%). **m.p.** 112 - 114 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.68 – 7.60 (m, 2H), 7.55 – 7.47 (m, 3H), 7.39 (appt. dd, *J* = 8.0, 0.7 Hz, 1H), 7.27 – 7.17 (m, 3H), 7.14 (m, 4H), 2.93 – 2.77 (m, 1H), 1.21 (d, *J* = 6.9 Hz, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 152.9, 148.9, 140.6, 137.9, 134.7, 133.2, 131.1, 130.9, 130.3, 130.0, 130.0, 129.8, 128.5, 127.0 (d, *J* = 23.9 Hz), 126.6, 126.0, 33.8, 23.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.6; ; **HRMS** (ESI^+): calculated for $C_{25}H_{20}ClFO_2S_2Na$ [M+Na^+]: m/z =493.0469, m/z found 493.0470; **IR** ν_{max} (ATR)/cm^{-1}:3071, 2960, 2926, 2889, 2360, 1202, 749.

2-(2-Chlorophenyl)-4-(2-methoxyphenyl)-5-phenylthiophene-3-sulfonyl fluoride (4hj)

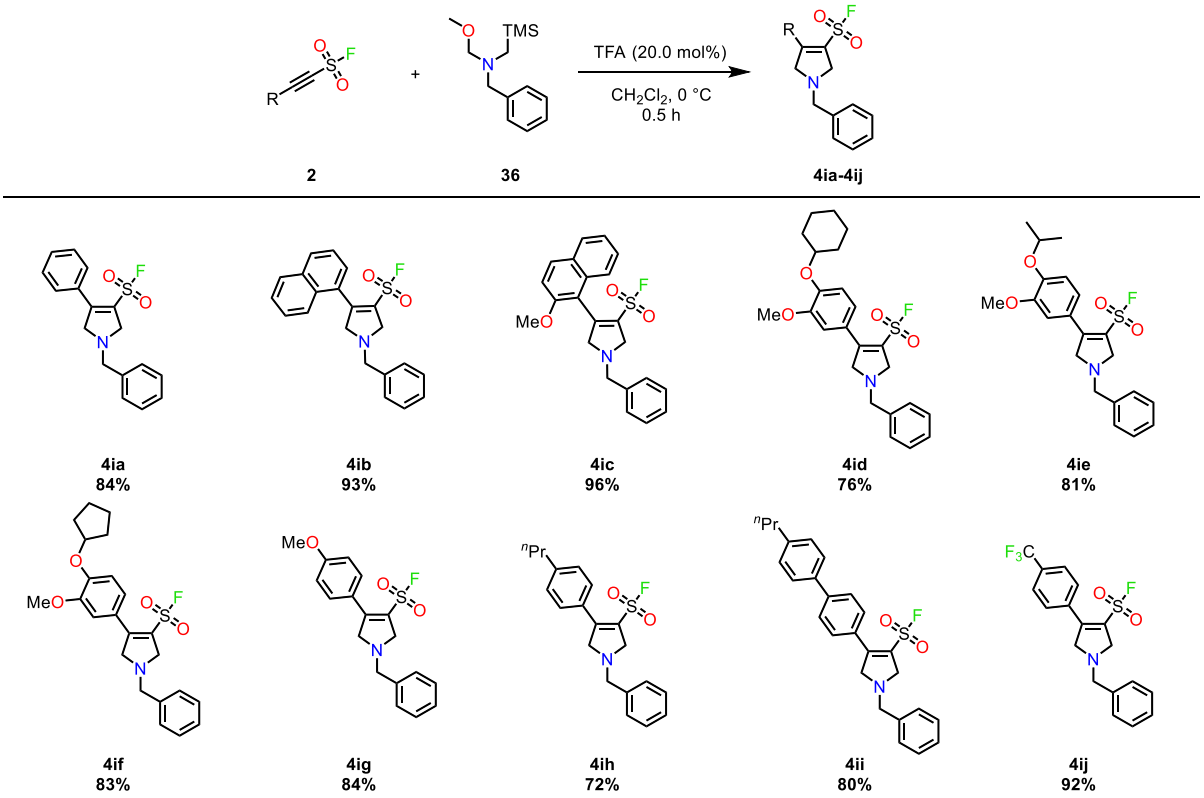


Following general procedure J, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (39.0 mg, 85%). **m.p.** 119 - 120 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.69 (appt. dd, *J* = 6.5, 2.8 Hz, 2H), 7.54 – 7.47 (m, 3H), 7.39 (d, *J* = 7.9 Hz, 1H), 7.30 – 7.22 (m, 2H), 7.22 – 7.16 (m, 1H), 7.16 – 7.09 (m, 1H), 7.07 (appt. d, *J* = 7.4 Hz, 1H), 6.88 – 6.78 (m, 2H), 3.80 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 157.6, 152.7, 137.9, 137.1, 134.5, 132.9, 131.4, 131.3, 131.2, 130.2, 130.2, 130.1, 130.0, 129.8, 128.5, 127.5 (d, *J* = 24.0 Hz), 126.6, 122.4, 120.2, 110.4, 55.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 69.0; **HRMS** (ESI^+): calculated for $C_{23}H_{16}ClFO_3S_2Na$ [M+Na^+]: m/z =481.0105, m/z found 481.0108; **IR** ν_{max} (ATR)/cm^{-1}:2979, 2934, 1674, 1590, 1412, 1265, 787.

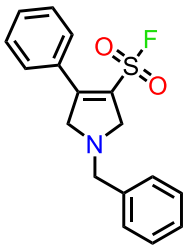
Synthesis and experimental data for compounds 4ia-4aj

General Procedure K

To a solution of the required SASF **2** (100 µmol) in CH_2Cl_2 (500 µL) at 0 °C was added *N*-(methoxymethyl)-*N*-(trimethylsilylmethyl)benzylamine **36** (92%, 110 µmol, 30.0 µL) and TFA (1.50 µL, 20.0 mol%).[19] The solution was stirred at 0 °C for 0.5 h and the solvent was then removed under reduced pressure. The crude product was purified by flash column chromatography to obtain the analytically pure product.

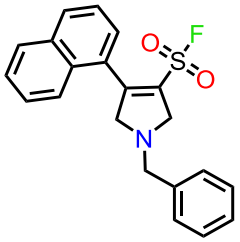


1-Benzyl-4-phenyl-2,5-dihydro-1*H*-pyrrole-3-sulfonyl fluoride (4ia)



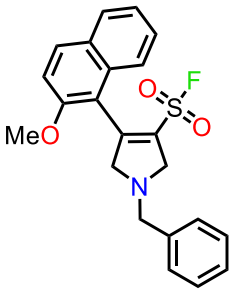
Following general procedure K (250 µmol of SASF), the title compound was isolated by flash column chromatography (0-15% EtOAc in petroleum ether) as a pale yellow oil (66.0 mg, 84%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.46 – 7.29 (m, 10H), 4.13 – 4.05 (m, 4H), 3.90 (s, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 156.2 (d, *J* = 3.1 Hz), 137.7, 130.6, 130.6, 128.8, 128.8, 128.56, 128.1 (d, *J* = 0.9 Hz), 127.8, 125.5 (d, *J* = 26.9 Hz), 65.4 (d, *J* = 1.6 Hz), 60.8, 59.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 63.8; **HRMS** (ESI^+): calculated for $C_{17}H_{17}FNO_2S$ [$M+H^+$]: m/z = 318.0959, m/z found 318.0966; **IR** ν_{max} (ATR)/cm^{-1}: 3029, 1603, 1552, 1396, 1207, 1176.

1-Benzyl-4-(naphthalen-1-yl)-2,5-dihydro-1*H*-pyrrole-3-sulfonyl fluoride (4ib)



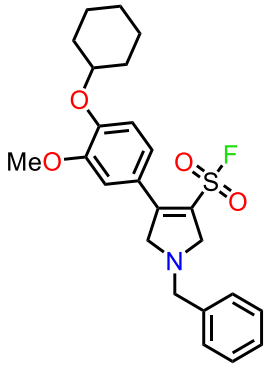
Following general procedure K, the title compound was isolated by flash column chromatography (0-12% EtOAc in petroleum ether) as a pale yellow oil (34.0 mg, 93%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.90 (d, *J* = 7.6 Hz, 2H), 7.79 (d, *J* = 7.7 Hz, 1H), 7.60 – 7.47 (m, 3H), 7.44 – 7.28 (m, 6H), 4.27 – 4.04 (m, 4H), 3.95 (s, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 157.2, 137.7, 133.5, 130.2, 129.9, 129.4 (d, *J* = 27.2 Hz), 128.8, 127.8, 127.2, 126.6, 125.3, 125.1, 124.5, 66.7, 59.9, 59.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 62.3; **HRMS** (ESI^+): calculated for $C_{21}H_{19}FNO_2S$ [$M+H^+$]: m/z = 368.1115, m/z found 368.1124; **IR** ν_{max} (ATR)/cm^{-1}: 2925, 1503, 1396, 1194, 1121.

1-Benzyl-4-(2-methoxynaphthalen-1-yl)-2,5-dihydro-1*H*-pyrrole-3-sulfonyl fluoride (4ic)



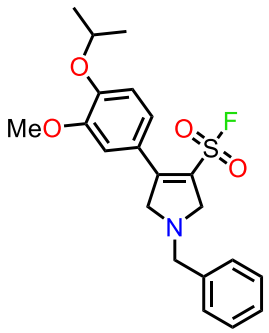
Following general procedure K, the title compound was isolated by flash column chromatography (0-12% EtOAc in petroleum ether) as a pale yellow oil (38.0 mg, 96%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.89 (d, *J* = 9.0 Hz, 1H), 7.81 (d, *J* = 8.2 Hz, 1H), 7.65 – 7.62 (m, 1H), 7.52 (ddd, *J* = 8.4, 6.8, 1.3 Hz, 1H), 7.43 (t, *J* = 6.9 Hz, 2H), 7.41 – 7.35 (m, 3H), 7.33 – 7.28 (m, 2H), 4.30 – 4.22 (m, 1H), 4.18 – 4.03 (m, 2H), 4.03 – 3.92 (m, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 154.3, 153.4, 138.0, 131.5, 131.3, 129.5 (d, *J* = 27.6 Hz), 128.9, 128.8, 128.7, 128.5, 127.7, 127.6, 124.2, 123.4, 113.5, 112.8, 65.0, 60.1, 59.7, 56.5; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 59.8; **HRMS** (ESI^+): calculated for $C_{22}H_{21}FNO_3S$ [$M+H^+$]: m/z = 398.1221, m/z found 398.1230; **IR** ν_{max} (ATR)/cm^{-1}: 2936, 2838, 1620, 1593, 1506, 1396, 1251, 1202, 1065.

1-Benzyl-4-(4-(cyclohexyloxy)-3-methoxyphenyl)-2,5-dihydro-1*H*-pyrrole-3-sulfonyl fluoride (4id)



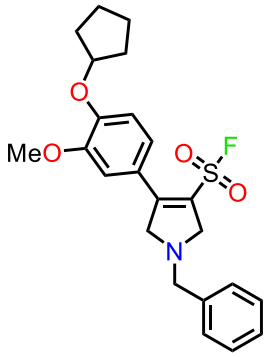
Following general procedure K, the title compound was isolated by flash column chromatography (0-15% EtOAc in petroleum ether) as a pale yellow oil (34.0 mg, 76%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.41 – 7.28 (m, 5H), 7.07 (d, *J* = 2.2 Hz, 1H), 6.99 (dd, *J* = 8.5, 2.2 Hz, 1H), 6.88 (d, *J* = 8.5 Hz, 1H), 4.32 – 4.23 (m, 1H), 4.07 (s, 4H), 3.86 (s, 5H), 2.10 – 1.99 (m, 2H), 1.89 – 1.79 (m, 2H), 1.65 – 1.53 (m, 3H), 1.43 – 1.23 (m, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 155.5, 149.8, 149.8, 137.9, 128.8, 128.7, 127.7, 123.2 (d, *J* = 25.9 Hz), 122.7, 121.8, 114.3, 112.8, 77.1, 65.1, 61.2, 59.8, 56.3, 32.0, 25.6, 24.2; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 64.0; **HRMS** (ESI^+): calculated for $C_{24}H_{29}FNO_4S$ [$M+H^+$]: m/z = 446.1796, m/z found 446.1785; **IR** ν_{max} (ATR)/cm^{-1}: 2933, 2856, 1501, 1453, 1395, 1203.

1-Benzyl-4-(4-isopropoxy-3-methoxyphenyl)-2,5-dihydro-1*H*-pyrrole-3-sulfonyl fluoride (4ie)



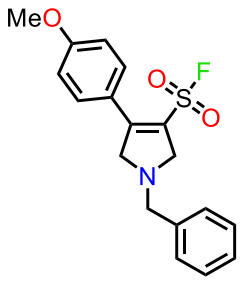
Following general procedure K, the title compound was isolated by flash column chromatography (0-15% EtOAc in petroleum ether) as a pale yellow oil (33.0 mg, 81%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.40 – 7.28 (m, 5H), 7.08 (d, *J* = 2.1 Hz, 1H), 6.99 (dd, *J* = 8.5, 2.1 Hz, 1H), 6.87 (d, *J* = 8.5 Hz, 1H), 4.60 (hept, *J* = 6.0 Hz, 1H), 4.07 (s, 4H), 3.87 (s, 5H), 1.40 (d, *J* = 6.1 Hz, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 155.5 (d, *J* = 2.8 Hz), 149.9, 149.7, 137.9, 128.8, 128.7, 127.7, 123.2 (d, *J* = 26.0 Hz), 122.7, 121.8, 113.9, 112.6, 71.4, 65.1, 61.2, 59.8, 56.2, 22.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 64.0; **HRMS** (ESI^+): calculated for $C_{21}H_{25}FNO_4S$ [$M+H^+$]: m/z = 406.1483, m/z found 406.1498; **IR** ν_{max} (ATR)/cm^{-1}: 2976, 2931, 1599, 1510, 1402, 1257, 1200, 1140.

1-Benzyl-4-(4-(cyclopentyloxy)-3-methoxyphenyl)-2,5-dihydro-1*H*-pyrrole-3-sulfonyl fluoride (4if)



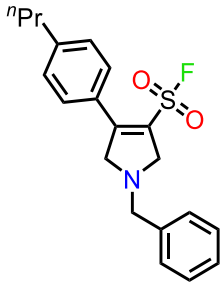
Following general procedure K, the title compound was isolated by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless oil (36.0 mg, 83%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.41 – 7.28 (m, 5H), 7.07 (d, *J* = 2.1 Hz, 1H), 6.99 (dd, *J* = 8.5, 2.1 Hz, 1H), 6.85 (d, *J* = 8.5 Hz, 1H), 4.80 (appt. dt, *J* = 9.4, 3.1 Hz, 1H), 4.07 (s, 4H), 3.86 (d, *J* = 7.2 Hz, 5H), 2.02 – 1.78 (m, 6H), 1.69 – 1.58 (m, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 155.5, 150.3, 149.5, 137.7, 128.8, 128.8, 127.8, 123.0 (d, *J* = 26.0 Hz), 122.3, 121.9, 113.6, 112.6, 80.6, 65.0, 61.1, 59.8, 56.3, 33.0, 24.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 64.1; **HRMS** (ESI^+): calculated for $C_{23}H_{27}FNO_4S$ [M+H$^+$]: m/z = 432.1639, m/z found 432.1645; **IR** ν_{max} (ATR)/cm^{-1}: 2956, 2870, 1501, 1395, 1236, 1203, 1165, 1031.

1-Benzyl-4-(4-methoxyphenyl)-2,5-dihydro-1*H*-pyrrole-3-sulfonyl fluoride (4ig)



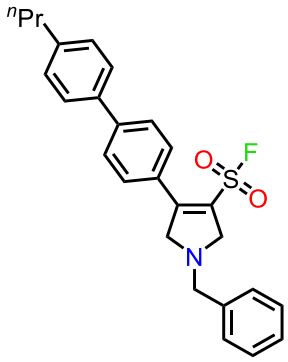
Following general procedure K, the title compound was isolated by flash column chromatography (0-15% EtOAc in petroleum ether) as a white solid (29.0 mg, 84%). **m.p.** 73 - 75 °C **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.42 (appt. d, *J* = 9.0 Hz, 2H), 7.39 – 7.29 (m, 5H), 6.92 (appt. d, *J* = 9.0 Hz, 2H), 4.07 (s, 4H), 3.87 (s, 2H), 3.84 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 161.7, 155.6, 137.7, 130.3, 128.8, 127.8, 123.2 (d, *J* = 26.3 Hz), 122.6, 114.0, 65.1, 61.0, 59.8, 55.5; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 64.0; **HRMS** (ESI^+): calculated for $C_{18}H_{19}FNO_3S$ [M+H$^+$]: m/z = 348.1064, m/z found 348.1077; **IR** ν_{max} (ATR)/cm^{-1}: 2926, 2816, 1599, 1514, 1400, 1259, 1186, 1023.

1-Benzyl-4-(4-propylphenyl)-2,5-dihydro-1*H*-pyrrole-3-sulfonyl fluoride (4ih)



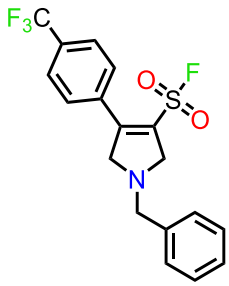
Following general procedure K, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a colourless oil (26.0 mg, 72%). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.40 – 7.28 (m, 7H), 7.22 (appt. d, *J* = 8.2 Hz, 2H), 4.12 – 4.03 (m, 4H), 3.88 (s, 2H), 2.64 – 2.59 (m, 2H), 1.73 – 1.58 (m, 2H), 0.95 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 156.2 (d, *J* = 2.9 Hz), 145.9, 137.7, 128.8, 128.8, 128.7, 128.3, 128.3, 127.8, 124.4 (d, *J* = 26.6 Hz), 65.3, 60.9, 59.8, 38.0, 24.3, 13.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 63.8; **HRMS** (ESI^+): calculated for $C_{20}H_{23}FNO_2S$ [M+H$^+$]: m/z = 360.1428, m/z found 360.1435; **IR** ν_{max} (ATR)/cm^{-1}: 2958, 2928, 1556, 1497, 1397, 1206, 1176, 1112.

1-Benzyl-4-(4'-propyl-[1,1'-biphenyl]-4-yl)-2,5-dihydro-1*H*-pyrrole-3-sulfonyl fluoride (4ii)



Following general procedure K, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (35.0 mg, 80%). **m.p.** 123 - 125 °C **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.63 (appt. d, *J* = 8.3 Hz, 2H), 7.54 – 7.46 (m, 4H), 7.40 – 7.25 (m, 7H), 4.10 (s, 4H), 3.89 (s, 2H), 2.67 – 2.61 (m, 2H), 1.75 – 1.64 (m, 2H), 0.98 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 155.8, 143.5, 142.9, 137.8, 137.3, 129.2, 129.0, 128.8, 128.8, 127.8, 127.1, 127.0, 125.0 (d, *J* = 26.7 Hz), 65.3, 61.0, 59.8, 37.8, 24.6, 14.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 63.9; **HRMS** (ESI^+): calculated for $C_{26}H_{27}FNO_2S$ [M+H$^+$]: m/z = 436.1741, m/z found 436.1727; **IR** ν_{max} (ATR)/cm^{-1}: 2870, 2800, 1603, 1402, 1201, 1155.

1-Benzyl-4-(4-(trifluoromethyl)phenyl)-2,5-dihydro-1H-pyrrole-3-sulfonyl fluoride (4ij)

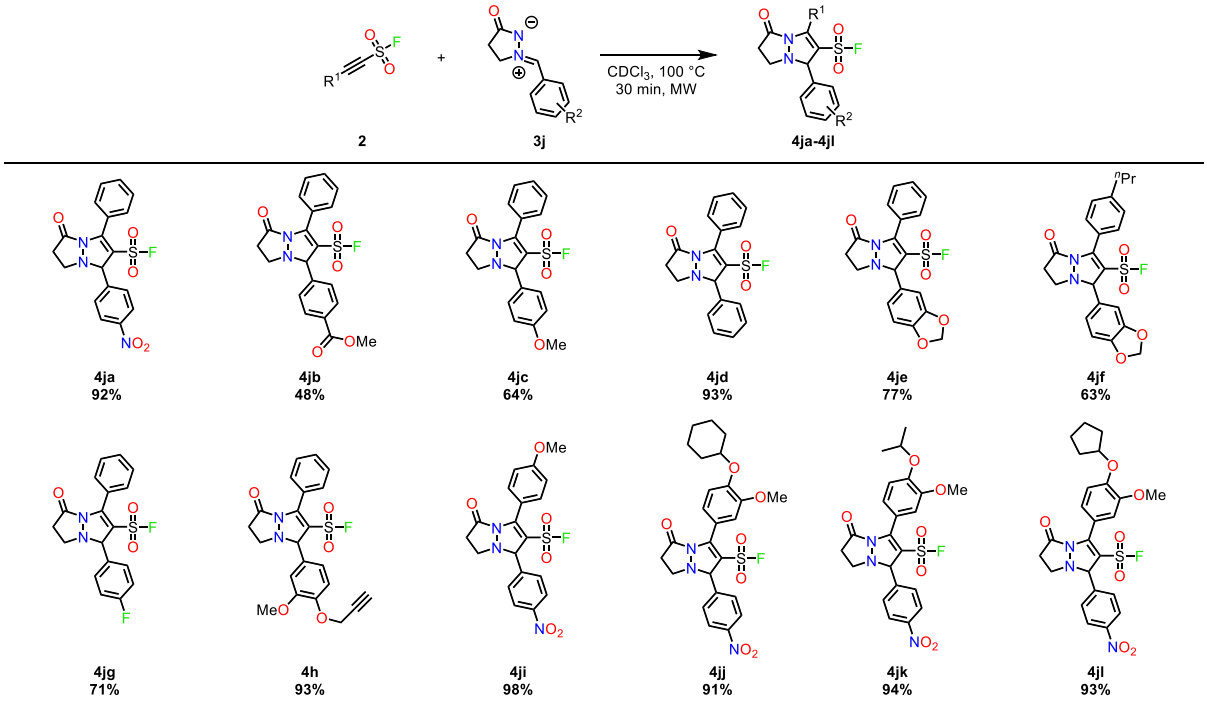


Following general procedure K, the title compound was isolated by flash column chromatography (0-10% EtOAc in petroleum ether) as a white solid (36.0 mg, 94%). **m.p.** 72 - 73 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.68 (d, *J* = 8.2 Hz, 2H), 7.51 (d, *J* = 8.2 Hz, 2H), 7.40 – 7.29 (m, 5H), 4.12 (t, *J* = 4.6 Hz, 2H), 4.07 (dd, *J* = 3.9, 2.4 Hz, 2H), 3.89 (s, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 154.6 (d, *J* = 3.2 Hz), 137.6, 134.2, 132.3 (q, *J* = 32.9 Hz), 128.9, 128.7, 128.5 (d, *J* = 0.8 Hz), 127.9, 127.7 (d, *J* = 27.5 Hz), 125.6 (q, *J* = 3.7 Hz), 123.8 (q, *J* = 272.5 Hz), 65.4 (d, *J* = 1.4 Hz), 60.7, 59.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 63.6, -63.0; **HRMS** (ESI^+): calculated for $C_{18}H_{16}F_4NO_2S$ [$M+H^+$]: m/z = 386.0832, m/z found 386.0839; **IR** ν_{max} (ATR)/cm^{-1}: 2928, 2802, 1616, 1409, 1320, 1206, 1172, 1124, 1067.

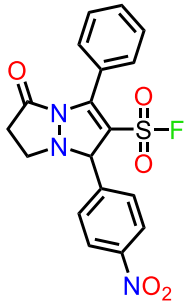
Synthesis and experimental data for compounds 4ja-4jl

General Procedure L

To a solution of the required azomethine imine **3j** (100 µmol) in $CDCl_3$ (1.00 mL) was added the required SASF **2** (100 µmol). The reaction vial was sealed and irradiated with microwaves at 100 °C for 0.5 h. The solvent was then removed under reduced pressure and the crude product was purified by flash column chromatography to obtain the analytically pure product.



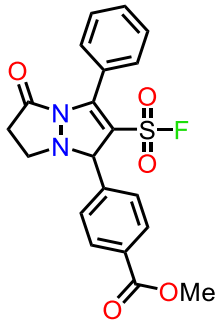
1-(4-Nitrophenyl)-5-oxo-3-phenyl-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazole-2-sulfonyl fluoride (4ja)



Following general procedure L (250 µmol of SASF), the title compound was isolated by flash column chromatography (0-50% EtOAc in petroleum ether) as a yellow foam (93.0 mg, 92%). **m.p.** 72 - 74 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.32 (appt. d, *J* = 8.8 Hz, 2H), 7.77 (appt. d, *J* = 8.8 Hz, 2H), 7.62 – 7.56 (m, 3H), 7.54 – 7.48 (m, 2H), 5.52 (s, 1H), 3.47 (appt. td, *J* = 8.4, 2.8 Hz, 1H), 3.21 (ddd, *J* = 11.2, 8.8, 7.5 Hz, 1H), 3.00 (ddd, *J* = 17.0, 11.2, 8.2 Hz, 1H), 2.86 (ddd, *J* = 17.0, 7.5, 2.8 Hz, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.8, 148.8, 148.6 (d, *J* = 2.7 Hz), 143.6, 132.2, 129.9, 129.8, 128.3, 124.1, 123.2, 110.3 (d, *J* = 29.1 Hz), 73.4, 51.0, 36.0; **^{19}F NMR** (376 MHz,

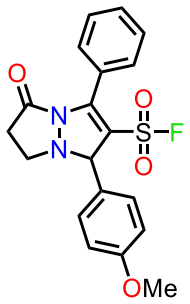
$CDCl_3$) δ 73.0; **HRMS** (ESI$^+$): calculated for $C_{18}H_{14}FN_3O_5SNa$ [M+Na$^+$]: m/z = 426.0530, m/z found 426.0531; **IR** ν_{max} (ATR)/cm^{-1}: 2927, 2855, 1739, 1520, 1404, 1345, 1190.

Methyl 4-(2-(fluorosulfonyl)-5-oxo-3-phenyl-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazol-1-yl)benzoate (4jb)



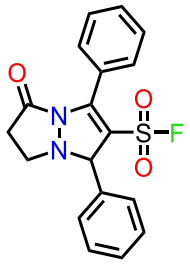
Following general procedure L, the title compound was isolated by flash column chromatography (0-40% EtOAc in petroleum ether) as a yellow foam (24.0 mg, 58%). **m.p.** 70 - 72 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.14 (d, *J* = 8.4 Hz, 2H), 7.64 – 7.55 (m, 5H), 7.50 (appt. t, *J* = 7.4 Hz, 2H), 5.48 (s, 1H), 3.95 (s, 3H), 3.34 (appt. td, *J* = 7.9, 4.7 Hz, 1H), 3.17 (dd, *J* = 17.4, 9.1 Hz, 1H), 2.98 – 2.82 (m, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 166.6, 164.9, 148.2 (d, *J* = 2.8 Hz), 140.7, 132.1, 131.5, 130.3, 129.9, 129.0, 128.3, 123.5, 111.2 (d, *J* = 28.8 Hz), 73.2, 52.4, 50.1, 36.2; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.7; **HRMS** (ESI$^+$): calculated for $C_{20}H_{18}FN_2O_5S$ [M+H$^+$]: m/z = 417.0915, m/z found 417.0908; **IR** ν_{max} (ATR)/cm^{-1}: 2927, 2856, 1719, 1612, 1404, 1365, 1278, 1190.

1-(4-Methoxyphenyl)-5-oxo-3-phenyl-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazole-2-sulfonyl fluoride (4jc)



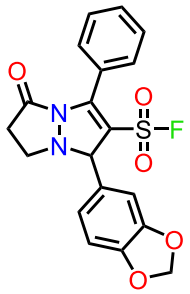
Following general procedure L, the title compound was isolated by flash column chromatography (0-40% EtOAc in petroleum ether) as a yellow foam (25.0 mg, 64%). **m.p.** 108 - 110 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.64 – 7.55 (m, 3H), 7.50 (appt. t, *J* = 7.4 Hz, 2H), 7.41 (d, *J* = 8.7 Hz, 2H), 6.99 (d, *J* = 8.7 Hz, 2H), 5.43 (s, 1H), 3.85 (s, 3H), 3.21 – 3.06 (m, 2H), 2.95 – 2.77 (m, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 165.1, 160.8, 147.6, 132.1, 130.2, 130.0, 128.3, 126.7, 123.8, 114.6, 112.1 (d, *J* = 28.1 Hz), 72.0, 55.5, 48.4, 36.4; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.8; **HRMS** (ESI$^+$): calculated for $C_{19}H_{18}FN_2O_4S$ [M+H$^+$]: m/z = 389.0966, m/z found 389.0960; **IR** ν_{max} (ATR)/cm^{-1}: 2934, 1727, 1610, 1404, 1369, 1191.

5-Oxo-1,3-diphenyl-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazole-2-sulfonyl fluoride (4jd)



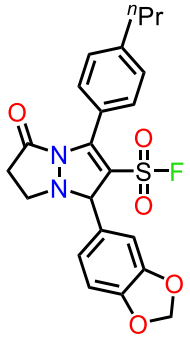
Following general procedure L (250 µmol of the required SASF), the title compound was isolated by flash column chromatography (0-40% EtOAc in petroleum ether) as a yellow foam (84.0 mg, 93%). **m.p.** 58 - 60 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.64 – 7.55 (m, 3H), 7.53 – 7.43 (m, 7H), 5.46 (s, 1H), 3.26 – 3.18 (m, 1H), 3.12 (appt. td, *J* = 8.8, 4.4 Hz, 1H), 2.93 – 2.79 (m, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 165.0, 147.8 (d, *J* = 2.7 Hz), 135.1, 132.0, 129.9, 129.8, 129.2, 128.9, 128.3, 123.7, 111.9 (d, *J* = 28.5 Hz), 72.9, 49.0, 36.4; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.7; **HRMS** (ESI^+): calculated for $C_{18}H_{16}FN_2O_3S$ [M+H$^+$]: m/z = 359.0855, m/z found 359.0861; **IR** ν_{max} (ATR)/cm^{-1}: 2926, 1736, 1571, 1402, 1364, 1191.

1-(Benzo[*d*][1,3]dioxol-5-yl)-5-oxo-3-phenyl-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazole-2-sulfonyl fluoride (4je)



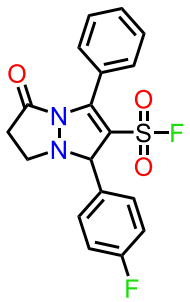
Following general procedure L, the title compound was isolated by flash column chromatography (0-60% EtOAc in petroleum ether) as a yellow foam (37.0 mg, 92%). **m.p.** 172 - 173 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.63 – 7.55 (m, *J* = 7.5, 6.8, 4.1 Hz, 3H), 7.53 – 7.47 (appt. dd, *J* = 11.4, 4.4 Hz, 2H), 7.00 (d, *J* = 1.6 Hz, 1H), 6.94 (dd, *J* = 8.0, 1.7 Hz, 1H), 6.87 (d, *J* = 7.9 Hz, 1H), 6.03 (s, 2H), 5.39 (s, 1H), 3.23 (appt. td, *J* = 8.3, 6.4 Hz, 1H), 3.11 (dd, *J* = 16.5, 8.4 Hz, 1H), 2.95 – 2.79 (m, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.9, 148.9, 148.6, 147.7, 132.1, 129.9, 128.7, 128.3, 123.7, 122.9, 111.8 (d, *J* = 28.3 Hz), 108.8, 108.7, 101.7, 72.4, 48.6, 36.4; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.8; **HRMS** (ESI^+): calculated for $C_{19}H_{16}FN_2O_5S$ [M+H$^+$]: m/z = 403.0753, m/z found 403.0748; **IR** ν_{max} (ATR)/cm^{-1}: 2926, 1722, 1411, 1371, 1252, 1193.

1-(Benzo[*d*][1,3]dioxol-5-yl)-5-oxo-3-(4-propylphenyl)-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazole-2-sulfonyl fluoride (4jf)



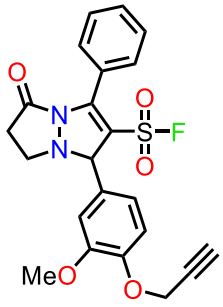
Following general procedure L, the title compound was isolated by flash column chromatography (0-40% EtOAc in petroleum ether) as a yellow foam (29.0 mg, 65%). **m.p.** 144 - 145 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.53 (appt. d, *J* = 8.2 Hz, 2H), 7.29 (appt. d, *J* = 8.3 Hz, 2H), 6.97 (d, *J* = 1.6 Hz, 1H), 6.92 (dd, *J* = 7.9, 1.7 Hz, 1H), 6.87 (d, *J* = 7.9 Hz, 1H), 6.03 (s, 1H), 5.37 (s, 1H), 3.19 (dd, *J* = 15.5, 8.5 Hz, 1H), 3.10 (dd, *J* = 16.8, 7.8 Hz, 1H), 2.95 – 2.77 (m, 1H), 2.71 – 2.63 (m, 1H), 1.75 – 1.65 (m, 1H), 0.98 (t, *J* = 7.3 Hz, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 165.0, 148.9, 148.6, 148.1 (d, *J* = 2.6 Hz), 147.4, 130.1, 128.7, 128.3, 122.9, 120.7, 111.3 (d, *J* = 28.2 Hz), 108.8, 108.7, 101.7, 72.2, 48.3, 38.3, 36.4, 24.1, 14.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.0; **HRMS** (ESI^+): calculated for $C_{22}H_{22}FN_2O_5S$ $[M+H^+]$: m/z = 445.1222, m/z found 445.1221; **IR** ν_{max} (ATR)/cm^{-1}: 2926, 1731, 1504, 1407, 1358, 1178.

1-(4-Fluorophenyl)-5-oxo-3-phenyl-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazole-2-sulfonyl fluoride (4jg)



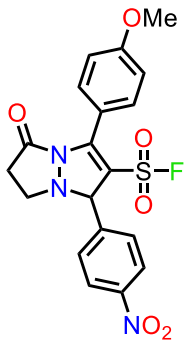
Following general procedure L, the title compound was isolated by flash column chromatography (0-40% EtOAc in petroleum ether) as a yellow foam (29.0 mg, 77%). **m.p.** 121 - 123 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.62 – 7.55 (m, 3H), 7.54 – 7.47 (m, 4H), 7.19 – 7.13 (m, 2H), 5.44 (s, 1H), 3.29 (ddd, *J* = 9.0, 7.3, 5.7 Hz, 1H), 3.16 – 3.09 (m, 1H), 2.91 – 2.86 (m, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 164.9, 163.5 (d, *J* = 249.0 Hz), 147.9, 132.1, 131.4 (d, *J* = 3.1 Hz), 130.7 (d, *J* = 8.5 Hz), 129.9, 128.8 (d, *J* = 7.7 Hz), 128.3, 123.6, 116.1 (d, *J* = 21.8 Hz), 111.6 (d, *J* = 28.6 Hz), 72.6, 49.5, 36.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.62, -111.6; **HRMS** (ESI^+): calculated for $C_{18}H_{15}F_2N_2O_3S$ $[M+H^+]$: m/z = 377.0760, m/z found 377.0755; **IR** ν_{max} (ATR)/cm^{-1}: 2924, 1735, 1605, 1508, 1404, 1369, 1189.

1-(3-Methoxy-4-(prop-2-yn-1-yloxy)phenyl)-5-oxo-3-phenyl-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazole-2-sulfonyl fluoride (4jh)



Following general procedure L (250 µmol of the required SASF), the title compound was isolated by flash column chromatography (0-50% EtOAc in petroleum ether) as a yellow foam (103 mg, 93%). **m.p.** 62 - 63 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.64 – 7.55 (m, 3H), 7.52 – 7.47 (m, 2H), 7.11 (d, *J* = 8.2 Hz, 1H), 7.06 – 7.01 (m, 2H), 5.41 (s, 1H), 4.81 (d, *J* = 2.4 Hz, 2H), 3.93 (s, 3H), 3.23 (appt. td, *J* = 8.1, 6.2 Hz, 1H), 3.11 (dd, *J* = 16.6, 8.6 Hz, 1H), 2.94 – 2.80 (m, 2H), 2.55 (t, *J* = 2.4 Hz, 1H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 165.0, 150.1, 148.1, 147.7, 132.1, 129.9, 128.5, 128.3, 123.7, 121.4, 114.0, 112.0, 111.8 (d, *J* = 28.4 Hz), 78.4, 76.3, 72.6, 56.8, 56.2, 48.8, 36.4; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 72.6; **HRMS** (ESI^+): calculated for $C_{22}H_{20}FN_2O_5S$ $[M+H^+]$: m/z = 443.1071, m/z found 443.1060; **IR** ν_{max} (ATR)/cm^{-1}: 3284, 2936, 1733, 1511, 1402, 1365, 1191.

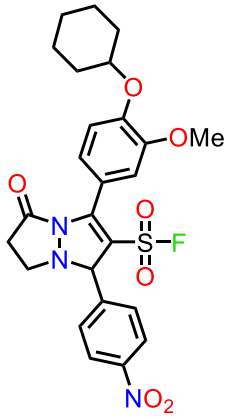
3-(4-Methoxyphenyl)-1-(4-nitrophenyl)-5-oxo-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazole-2-sulfonyl fluoride (4ji)



Following general procedure L, the title compound was isolated by flash column chromatography (0-40% EtOAc in petroleum ether) as a yellow foam (42.0 mg, 98%). **m.p.** 65 - 66 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.31 (appt. d, *J* = 8.6 Hz, 2H), 7.74 (appt. d, *J* = 8.7 Hz, 2H), 7.58 (appt. d, *J* = 8.7 Hz, 2H), 7.00 (appt. d, *J* = 8.8 Hz, 2H), 5.48 (s, 1H), 3.88 (s, 3H), 3.41 (appt. td, *J* = 8.5, 3.4 Hz, 1H), 3.22 – 3.13 (m, 1H), 2.98 (ddd, *J* = 18.9, 10.7, 8.3 Hz, 1H), 2.86 (ddd, *J* = 16.8, 7.6, 3.2 Hz, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 165.0, 162.9, 148.8, 148.7, 143.6, 132.2, 130.0, 124.1, 114.7, 113.8, 108.9 (d, *J* = 28.5 Hz), 73.3, 55.5, 50.7, 36.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.4; **HRMS** (ESI^+):

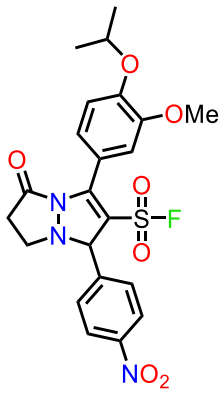
calculated for $C_{19}H_{17}FN_3O_6S$ [M+H$^+$]: m/z = 434.0817, m/z found 434.0832; **IR** ν_{max} (ATR)/cm^{-1}: 2925, 2853, 1738, 1607, 1504, 1345, 1174.

3-(4-(Cyclohexyloxy)-3-methoxyphenyl)-1-(4-nitrophenyl)-5-oxo-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazole-2-sulfonyl fluoride (4jj)



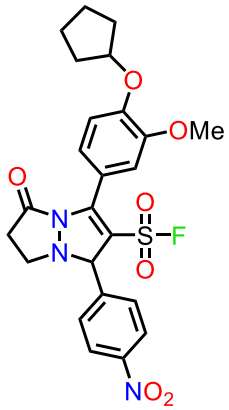
Following general procedure L, the title compound was isolated by flash column chromatography (0-60% EtOAc in petroleum ether) as a yellow foam (48.0 mg, 91%). **m.p.** 76 - 78 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.30 (appt. d, *J* = 8.7 Hz, 2H), 7.74 (appt. d, *J* = 8.7 Hz, 2H), 7.22 (dd, *J* = 8.4, 2.1 Hz, 1H), 7.13 (d, *J* = 2.1 Hz, 1H), 6.95 (d, *J* = 8.6 Hz, 1H), 5.48 (s, 1H), 4.37 – 4.28 (m, 1H), 3.88 (s, 3H), 3.40 (appt. td, *J* = 8.4, 3.5 Hz, 1H), 3.23 – 3.13 (m, 1H), 2.98 (ddd, *J* = 18.6, 10.4, 8.2 Hz, 1H), 2.87 (ddd, *J* = 16.8, 7.7, 3.5 Hz, 1H), 2.07 (dd, *J* = 9.6, 6.5 Hz, 2H), 1.90 – 1.79 (m, 2H), 1.67 – 1.55 (m, 2H), 1.45 – 1.22 (m, 4H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.9, 151.3, 149.3, 148.8, 148.7, 143.7, 130.0, 124.4, 124.1, 114.2, 114.2, 113.2, 108.8 (d, *J* = 28.3 Hz), 77.1, 73.3, 56.3, 50.5, 36.2, 32.0, 25.6, 24.2; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.8; **HRMS** (ESI$^+$): calculated for $C_{25}H_{27}FN_3O_7S$ [M+H$^+$]: m/z = 532.1548, m/z found 532.1538; **IR** ν_{max} (ATR)/cm^{-1}: 2933, 2857, 1735, 1503, 1344, 1189.

3-(4-Isopropoxy-3-methoxyphenyl)-1-(4-nitrophenyl)-5-oxo-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazole-2-sulfonyl fluoride (4jk)



Following general procedure L, the title compound was isolated by flash column chromatography (0-60% EtOAc in petroleum ether) as a yellow foam (46.0 mg, 94%). **m.p.** 58 - 60 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.31 (appt. d, *J* = 8.7 Hz, 2H), 7.74 (appt. d, *J* = 8.7 Hz, 2H), 7.23 (dd, *J* = 8.4, 2.1 Hz, 1H), 7.13 (d, *J* = 2.1 Hz, 1H), 6.94 (d, *J* = 8.6 Hz, 1H), 5.48 (s, 1H), 4.66 (hept, *J* = 6.2 Hz, 1H), 3.89 (s, 3H), 3.40 (appt. td, *J* = 8.4, 3.5 Hz, 1H), 3.19 (appt. dt, *J* = 10.4, 8.3 Hz, 1H), 2.98 (ddd, *J* = 18.8, 10.6, 8.2 Hz, 1H), 2.87 (ddd, *J* = 16.9, 7.7, 3.5 Hz, 1H), 1.43 (d, *J* = 6.1 Hz, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.9, 151.4, 149.2, 148.8, 148.7, 143.7, 130.0, 124.4, 124.1, 114.3, 114.0, 112.8, 108.9 (d, *J* = 28.4 Hz), 73.3, 71.4, 56.3, 50.6, 36.2, 22.1, 22.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.7; **HRMS** (ESI^+): calculated for $C_{22}H_{23}FN_3O_7S$ [M+H$^+$]: m/z = 492.1235, m/z found 492.1223; **IR** ν_{max} (ATR)/cm^{-1}: 2925, 2854, 1742, 1504, 1346, 1190.

3-(4-(Cyclopentyloxy)-3-methoxyphenyl)-1-(4-nitrophenyl)-5-oxo-6,7-dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]pyrazole-2-sulfonyl fluoride (4jl)



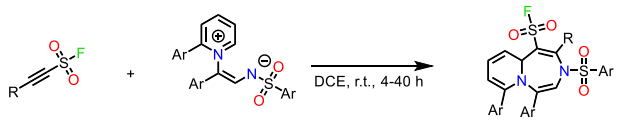
Following general procedure L, the title compound was isolated by flash column chromatography (0-60% EtOAc in petroleum ether) as a yellow foam (48.0 mg, 93%). **m.p.** 64 - 66 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.31 (appt. d, *J* = 8.7 Hz, 2H), 7.74 (appt. d, *J* = 8.7 Hz, 2H), 7.23 (dd, *J* = 8.4, 2.1 Hz, 1H), 7.12 (d, *J* = 2.1 Hz, 1H), 6.93 (d, *J* = 8.5 Hz, 1H), 5.48 (s, 1H), 4.88 – 4.82 (m, 1H), 3.88 (s, 3H), 3.40 (appt. td, *J* = 8.5, 3.7 Hz, 1H), 3.23 – 3.14 (m, 1H), 2.98

(ddd, *J* = 18.6, 10.6, 8.2 Hz, 1H), 2.88 (ddd, *J* = 16.8, 7.7, 3.6 Hz, 1H), 2.03 – 1.91 (m, 4H), 1.91 – 1.80 (m, 2H), 1.70 – 1.58 (m, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 164.9, 151.8, 149.1, 148.9 (d, *J* = 2.2 Hz), 148.7, 143.7, 130.0, 124.4, 124.1, 114.1, 114.0, 112.8, 108.8 (d, *J* = 28.4 Hz), 80.7, 73.3, 56.3, 50.5, 36.1, 33.0 (d, *J* = 2.8 Hz), 24.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 73.8; **HRMS** (ESI^+): calculated for $C_{24}H_{25}FN_3O_7S$ $[M+H^+]$: m/z = 518.1392, m/z found 518.1383; **IR** ν_{max} (ATR)/cm^{-1}: 2963, 1742, 1503, 1345, 1189.

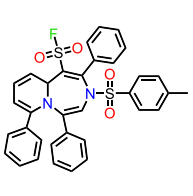
Synthesis and experimental data for compounds 4ka-4kj

General Procedure M

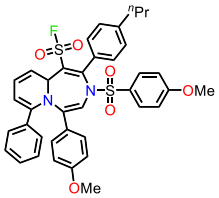
A solution of the required SASF **2** (100 µmol) and the required azomethine imine **3k** (100 µmol) in DCE (1.00 mL) was stirred at room temperature for 4 h. The solvent was then removed under reduced pressure and the crude product was purified by flash column chromatography to obtain the analytically pure product.



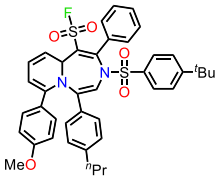
2 **3k** **4ka-4kj**



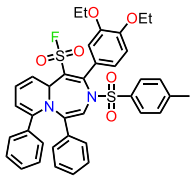
4ka
87%



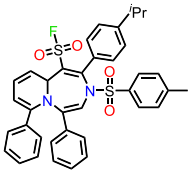
4kb
64%



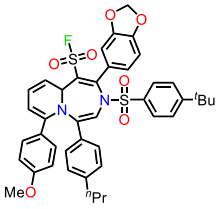
4kc
82%



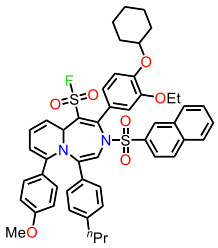
4kd
61%



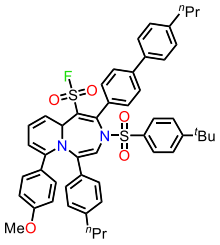
4ke
57%



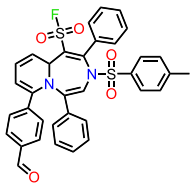
4kf
78%



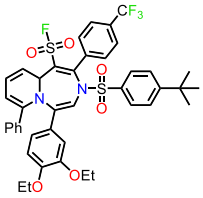
4kg
56%



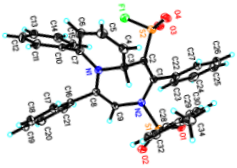
4kh
76%



4ki
63%

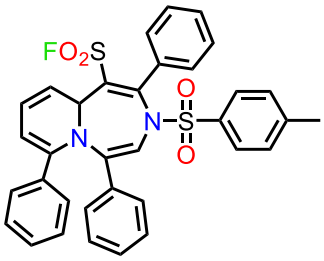


4kj
46%



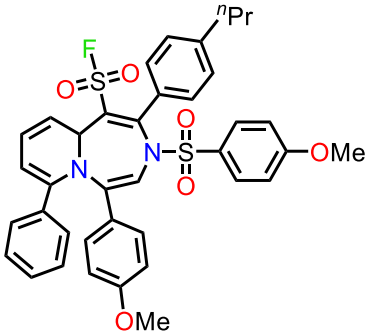
4ka

2,5,7-Triphenyl-3-tosyl-3,10a-dihydropyrido[1,2-*d*][1,4]diazepine-1-sulfonyl fluoride (4ka)



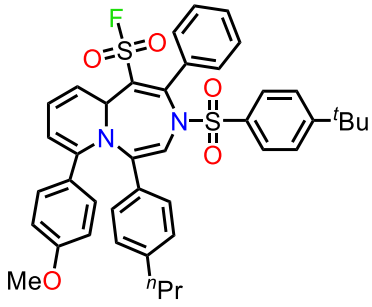
Following general procedure M, the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a purple solid (53.0 mg, 87%). **m.p.** 148 – 149 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.58 – 7.53 (m, 3H), 7.47 – 7.41 (m, 2H), 7.41 – 7.36 (m, 2H), 7.33 – 7.27 (m, 2H), 7.07 – 6.98 (m, 3H), 6.98 – 6.87 (m, 5H), 6.82 (dt, *J* = 15.6, 7.0 Hz, 2H), 5.99 (s, 1H), 5.46 – 5.39 (m, 1H), 5.33 (dd, *J* = 5.9, 1.4 Hz, 1H), 5.23 (d, *J* = 5.6 Hz, 1H), 2.49 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 157.3 (d, *J* = 5.7 Hz), 145.4, 140.8, 138.8, 138.1, 137.6 (d, *J* = 25.6 Hz), 137.1, 134.8, 134.3, 131.7, 130.8, 130.1, 128.2, 128.0, 127.9, 127.8, 127.5, 127.4, 127.2, 126.5, 126.2, 114.4, 109.6, 106.2, 56.8, 21.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 63.5; **HRMS** (ESI^+): calculated for $C_{34}H_{28}FN_2O_4S_2$ [M+H$^+$]: m/z = 611.1469, m/z found 611.1462; **IR** ν_{max} (ATR)/cm^{-1}: 2988, 2803, 1565, 1394, 1370, 1175, 1148, 750.

5-(4-Methoxyphenyl)-3-((4-methoxyphenyl)sulfonyl)-7-phenyl-2-(4-propylphenyl)-3,10a-dihydropyrido[1,2-*d*][1,4]diazepine-1-sulfonyl fluoride (4kb)



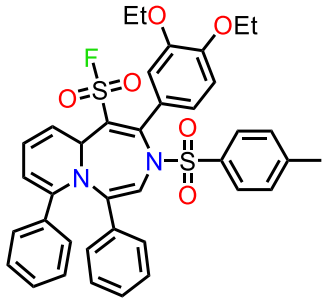
Following general procedure M, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a purple solid (45.0 mg, 64%). **m.p.** 148 - 150 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.46 – 7.40 (m, 4H), 7.24 (appt. d, *J* = 8.3 Hz, 2H), 6.98 – 6.90 (m, 5H), 6.85 – 6.78 (m, 4H), 6.54 (appt. d, *J* = 8.9 Hz, 2H), 6.25 (ddd, *J* = 9.4, 5.7, 1.5 Hz, 1H), 5.90 (s, 1H), 5.47 (ddd, *J* = 9.3, 6.0, 0.4 Hz, 1H), 5.39 (dd, *J* = 5.9, 1.3 Hz, 1H), 5.21 (d, *J* = 5.6 Hz, 1H), 3.91 (s, 3H), 3.71 (s, 3H), 2.71 – 2.65 (m, 2H), 1.76 – 1.68 (m, 2H), 1.01 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 164.1, 159.2, 157.8 (d, *J* = 5.6 Hz), 147.0, 140.9, 139.1, 136.7, 136.8 – 136.5 (m), 132.3, 130.8, 130.7, 129.8, 129.1, 128.7, 128.3, 127.9, 127.2, 126.4, 126.0, 114.6, 114.6, 113.5, 108.8, 106.2, 56.8, 56.0, 55.4, 38.2, 24.4, 14.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 63.4 **HRMS** (ESI^+): calculated for $C_{38}H_{36}FN_2O_6S_2$ [M+H$^+$]: m/z = 699.1993, m/z found 699.1995; **IR** ν_{max} (ATR)/cm^{-1}: 3027 ,2888, 1593, 1575, 1393, 1373, 1248, 1168.

3-((4-(*tert*-Butyl)phenyl)sulfonyl)-7-(4-methoxyphenyl)-2-phenyl-5-(4-propylphenyl)-3,10a-dihydropyrido[1,2-*d*][1,4]diazepine-1-sulfonyl fluoride (4kc)



Following general procedure M, the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a purple solid (59.0 mg, 82%). **m.p.** 116 - 117 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.55 – 7.49 (m, 5H), 7.46 – 7.38 (m, 4H), 6.86 – 6.79 (m, 4H), 6.73 (appt. d, *J* = 8.5 Hz, 1H), 6.48 (appt. d, *J* = 8.8 Hz, 1H), 6.21 (ddd, *J* = 9.4, 5.7, 1.5 Hz, 1H), 5.31 (dd, *J* = 9.4, 5.9 Hz, 1H), 5.18 (dd, *J* = 5.9, 1.2 Hz, 1H), 5.14 (d, *J* = 5.6 Hz, 1H), 3.66 (s, 3H), 2.46 (t, *J* = 7.4 Hz, 2H), 1.59 – 1.51 (m, 2H), 1.39 (s, 9H), 0.87 (t, *J* = 7.4 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 158.8, 158.4, 157.3 (d, *J* = 5.5 Hz), 142.2, 140.7, 137.6 (d, *J* = 26.0 Hz), 137.3, 135.6, 134.9, 134.1, 131.7, 131.6, 130.8, 128.1, 127.5, 127.3, 127.2, 126.5, 113.8, 113.4, 109.1, 105.2, 56.8, 55.3, 37.6, 35.5, 31.2, 24.6, 13.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 63.22; **HRMS** (ESI^+): calculated for $C_{41}H_{42}FN_2O_5S_2$ [$M+H^+$]: m/z = 725.2514, m/z found 725.2513; **IR** ν_{max} (ATR)/cm^{-1}: 2963, 2871, 1603, 1579, 1508, 1400, 1372, 1247, 1172.

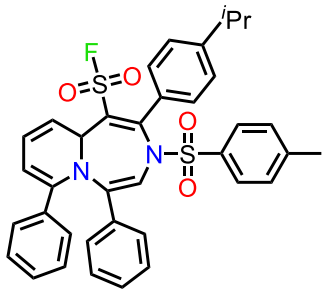
2-(3,4-Diethoxyphenyl)-5,7-diphenyl-3-tosyl-3,10a-dihydropyrido[1,2-*d*][1,4]diazepine-1-sulfonyl fluoride (4kd)



Following general procedure M (stirring for 20 h at room temperature), the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as an orange solid (43.0 mg, 61%). **m.p.** 56 - 57 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.41 (appt. d, *J* = 8.3 Hz, 2H), 7.31 (appt. d, *J* = 8.0 Hz, 2H), 7.09 (dd, *J* = 8.3, 2.1 Hz, 1H), 7.04 – 6.98 (m, 4H), 6.96 – 6.88 (m, 5H), 6.85 (d, *J* = 8.4 Hz, 1H), 6.83 – 6.78 (m, 2H), 6.24 (ddd, *J* = 9.5, 5.7, 1.6 Hz, 1H), 5.96 (s, 1H), 5.42 (dd, *J* = 9.2, 5.9 Hz, 1H), 5.24 (dd, *J* = 5.9, 1.5 Hz, 1H), 5.20 (d, *J* = 5.6 Hz, 1H), 4.21 – 4.06 (m, 4H), 2.49 (s, 3H), 1.52 (t, *J* = 7.0 Hz, 3H), 1.50 (t, *J* = 7.0 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 157.6, 152.5, 148.2, 145.3, 140.8, 139.0, 138.3, 137.3, 135.2 (d, *J* = 25.8 Hz), 134.6, 130.0, 127.9,

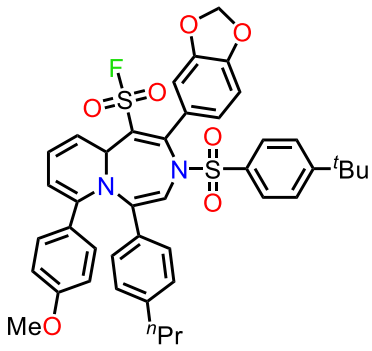
127.8, 127.7, 127.6, 127.5, 127.1, 126.8, 126.3, 126.3, 124.8, 116.1, 114.7, 111.8, 109.5, 106.0, 64.9, 64.6, 56.8, 21.9, 14.9, 14.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 63.1; **HRMS** (ESI^+): calculated for $C_{38}H_{35}FN_2O_6S_2$ [M+H^+]: m/z = 699.1993, m/z found 699.1991; **IR** ν_{max} (ATR)/cm^{-1}: 2924, 2857, 1595, 1565, 1509, 1403, 1374, 1273, 1171, 1052.

2-(4-Isopropylphenyl)-5,7-diphenyl-3-tosyl-3,10a-dihydropyrido[1,2-*d*][1,4]diazepine-1-sulfonyl fluoride (4ke)



Following general procedure M (stirring for 7 h at room temperature), the title compound was isolated after purification by flash column chromatography (0-6% EtOAc in petroleum ether) as an orange solid (37.0 mg, 57%). **m.p.** 153 - 155 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ = 7.43 (appt. d, *J* = 8.2 Hz, 2H), 7.35 (appt. d, *J* = 8.3 Hz, 2H), 7.28 – 7.24 (m, 4H), 7.04 – 6.99 (m, 3H), 6.97 – 6.87 (m, 5H), 6.84 – 6.79 (m, 2H), 6.26 (ddd, *J* = 9.3, 5.7, 1.4 Hz, 1H), 5.97 (s, 1H), 5.48 – 5.46 (ddd, *J* = 9.2, 6.0, 0.4 Hz, 1H), 5.41 (dd, *J* = 6.0, 1.2 Hz, 1H), 5.22 (d, *J* = 5.6 Hz, 1H), 3.05 – 2.95 (hept, *J* = 6.9 Hz, 1H), 2.48 (s, 3H), 1.32 (d, *J* = 6.9 Hz, 6H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ = 157.5, 153.1, 145.2, 140.8, 138.9, 138.2, 137.0, 136.8 (d, *J* = 25.6 Hz), 134.7, 132.0, 130.9, 130.0, 128.0, 127.9, 127.7, 127.5, 127.4, 127.2, 126.4, 126.3, 126.3, 114.6, 109.7, 106.2, 56.9, 34.3, 23.9, 21.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ = 63.4; **HRMS** (ESI^+): calculated for $C_{37}H_{34}FN_2O_4S_2$ [M+H^+]: m/z = 653.1939, m/z found 653.1935; **IR** ν_{max} (ATR)/cm^{-1}: 2967, 1937, 1400, 1373, 1176, 1055, 1014.

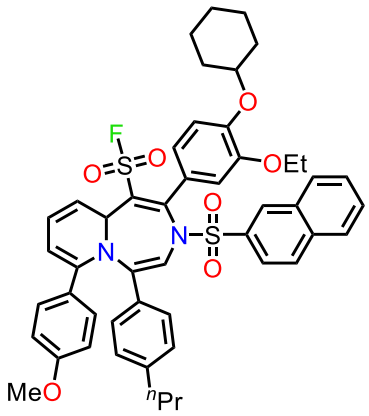
2-(Benzo[*d*][1,3]dioxol-5-yl)-3-((4-(*tert*-butyl)phenyl)sulfonyl)-7-(4-methoxyphenyl)-5-(4-propylphenyl)-3,10a-dihydropyrido[1,2-*d*][1,4]diazepine-1-sulfonyl fluoride (4kf)



Following general procedure M (stirring for 20 h at room temperature), the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a purple solid (60.0 mg, 78%).

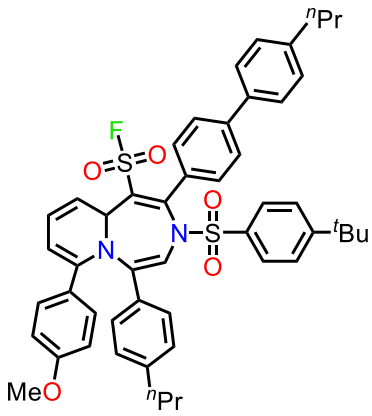
m.p. 128 - 130 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.57 (appt. d, *J* = 8.7 Hz, 2H), 7.52 (appt. d, *J* = 8.8 Hz, 2H), 7.11 (dd, *J* = 8.0, 1.8 Hz, 1H), 6.97 (d, *J* = 1.7 Hz, 1H), 6.85 (d, *J* = 8.0 Hz, 1H), 6.84 – 6.77 (m, 4H), 6.71 (appt. d, *J* = 8.5 Hz, 2H), 6.47 (appt. d, *J* = 8.8 Hz, 2H), 6.17 (ddd, *J* = 9.4, 5.7, 1.6 Hz, 1H), 6.07 (dd, *J* = 4.4, 1.5 Hz, 2H), 5.98 (s, 1H), 5.24 (dd, *J* = 9.4, 5.9 Hz, 1H), 5.10 (d, *J* = 5.6 Hz, 1H), 4.93 (dd, *J* = 5.9, 1.5 Hz, 1H), 3.66 (s, 3H), 2.45 (t, *J* = 7.4 Hz, 2H), 1.59 – 1.49 (m, 2H), 1.40 (s, 9H), 0.87 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 158.8, 158.6, 156.9 (d, *J* = 5.3 Hz), 151.1, 147.7, 142.2, 140.6, 137.7, 136.1 (d, *J* = 25.9 Hz), 135.7, 133.8, 131.8, 128.8, 128.1, 127.9, 127.4, 127.2, 126.5, 126.3, 113.9, 113.3, 110.8, 108.8, 108.2, 105.0, 102.0, 56.7, 55.3, 37.6, 35.6, 31.3, 24.6, 13.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 62.8; **HRMS** (ESI^+): calculated for $C_{42}H_{42}FN_2O_7S_2$ [M+H$^+$]: m/z = 769.2412, m/z found 769.2404; **IR** $\tilde{\nu}_{max}$ (ATR)/cm^{-1}: 2963, 2925, 2869, 1607, 1578, 1507, 1485, 1399, 1374, 1248, 1173, 1034, 781, 730.

2-(4-(Cyclohexyloxy)-3-methoxyphenyl)-7-(4-methoxyphenyl)-3-(naphthalen-2-ylsulfonyl)-5-(4-propylphenyl)-3,10a-dihydropyrido[1,2-*d*][1,4]diazepine-1-sulfonyl fluoride (4kg)



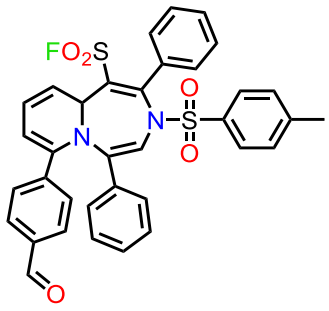
Following general procedure M (stirring for 40 h at room temperature), the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a purple solid (49.0 mg, 58%). **m.p.** 112 - 113 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.96 – 7.90 (m, 3H), 7.85 – 7.82 (m, 1H), 7.73 – 7.69 (m, 1H), 7.66 – 7.62 (m, 1H), 7.54 (dd, *J* = 8.7, 1.9 Hz, 1H), 7.01 – 6.97 (m, 2H), 6.84 – 6.78 (m, 4H), 6.74 – 6.69 (m, 2H), 6.66 (d, *J* = 8.4 Hz, 1H), 6.48 – 6.42 (m, 2H), 6.16 (ddd, *J* = 9.4, 5.7, 1.6 Hz, 1H), 6.01 (s, 1H), 5.53 (dd, *J* = 5.8, 1.3 Hz, 1H), 5.35 (dd, *J* = 9.4, 5.9 Hz, 1H), 5.12 (d, *J* = 5.6 Hz, 1H), 4.18 – 4.07 (m, 1H), 3.80 (s, 3H), 3.65 (s, 3H), 2.46 (t, *J* = 7.4 Hz, 2H), 2.08 – 2.03 (m, 1H), 1.99 – 1.94 (m, 1H), 1.88 – 1.82 (m, 2H), 1.65 – 1.52 (m, 6H), 1.40 – 1.29 (m, 4H), 0.87 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 158.7, 157.4 (d, *J* = 4.5 Hz), 151.1, 149.5, 142.2, 140.7, 137.3, 135.7, 135.4 – 135.2 (m), 135.1, 134.9, 132.0, 131.9, 129.7, 129.6, 129.5, 129.5, 128.1, 128.1, 127.5, 127.3, 126.5, 125.9, 124.9, 122.0, 115.0, 114.3, 113.3, 113.0, 109.1, 105.4, 57.2, 56.3, 55.3, 37.6, 32.1, 32.0, 25.6, 24.6 24.3, 24.3, 13.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 63.4; **HRMS** (ESI^+): calculated for $C_{48}H_{48}FN_2O_7S_2$ [M+H$^+$]: m/z = 847.2881, m/z found 847.2890; **IR** $\tilde{\nu}_{max}$ (ATR)/cm^{-1}: 3056, 2933, 2854, 1602, 1505, 1400, 1270, 1247, 1169,1143, 809, 748.

3-((4-(*tert*-Butyl)phenyl)sulfonyl)-7-(4-methoxyphenyl)-2-(4'-propyl-[1,1'-biphenyl]-4-yl)-5-(4-propylphenyl)-3,10a-dihydropyrido[1,2-*d*][1,4]diazepine-1-sulfonyl fluoride (4kh)



Following general procedure M (stirring for 16 h at room temperature), the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a purple solid (64.0 mg, 76%). **m.p.** 112 - 114 °C;**^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.61 – 7.54 (m, 6H), 7.49 – 7.42 (m, 4H), 7.30 (appt. d, *J* = 8.1 Hz, 2H), 6.86 – 6.82 (m, 4H), 6.75 (appt. d, *J* = 8.4 Hz, 2H), 6.49 (appt. d, *J* = 8.7 Hz, 2H), 6.24 (ddd, *J* = 9.3, 5.7, 1.3 Hz, 1H), 6.03 (s, 1H), 5.38 (dd, *J* = 9.3, 6.0 Hz, 1H), 5.31 (dd, *J* = 5.9, 1.0 Hz, 1H), 5.16 (d, *J* = 5.6 Hz, 1H), 3.67 (s, 3H), 2.67 (t, *J* = 7.6 Hz, 2H), 2.47 (t, *J* = 7.4 Hz, 2H), 1.76 – 1.68 (m, 2H), 1.60 – 1.52 (m, 2H), 1.32 (s, 9H), 1.00 (t, *J* = 7.3 Hz, 3H), 0.88 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 158.8, 158.3, 157.1 (d, *J* = 5.4 Hz), 144.4, 142.9, 142.2, 140.7, 137.4, 137.2, 137.0 (d, *J* = 25.6 Hz), 135.7, 134.5, 133.1, 131.8, 131.4, 129.2, 128.1, 127.5, 127.2, 126.5, 126.4, 126.4, 113.9, 113.4, 109.3, 105.2, 56.9, 55.3, 37.8, 37.6, 35.4, 31.2, 24.6, 24.6, 13.9, 13.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 63.4; **HRMS** (ESI^+): calculated for $C_{50}H_{52}FN_2O_5S_2$ [$M+H^+$]: m/z = 843.3296, m/z found 843.3299; **IR** ν_{max} (ATR)/cm^{-1}: 3063, 2888, 2815, 1637m 1580m 1508, 1401, 1247, 1198, 1084, 1039, 983.

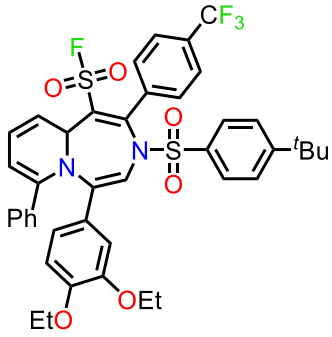
7-(4-Formylphenyl)-2,5-diphenyl-3-tosyl-3,10a-dihydropyrido[1,2-*d*][1,4]diazepine-1-sulfonyl fluoride (4ki)



Following general procedure M (50.0 µmol of the required SASF used, stirring for 20 h at room temperature), the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as an orange solid (20.0 mg, 63%). **m.p.** 153 - 154 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 9.81 (s, 1H), 7.58 – 7.51 (m, 3H), 7.49 – 7.41 (m, 4H), 7.36 (appt. d, *J* = 8.4 Hz, 1H), 7.30 (appt. d, *J* = 8.0 Hz, 1H), 7.07 – 6.96 (m, 5H), 6.93 – 6.88 (m, 2H), 6.29 (ddd, *J* = 9.5, 5.7, 1.7 Hz, 1H), 6.01 (s, 1H), 5.52 (dd, *J* = 9.1, 5.9 Hz, 1H), 5.40 (dd, *J* = 5.9, 1.5

Hz, 1H), 5.31 (d, *J* = 5.7 Hz, 1H), 2.49 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 191.6, 157.7, 145.5, 144.8, 139.5, 137.6, 137.2 (d, *J* = 25.2 Hz), 136.6, 134.9, 134.4, 134.3, 131.9, 130.9, 130.2, 129.5, 128.3, 128.3, 128.2, 127.6, 127.6, 126.6, 126.2, 115.9, 110.0, 107.8, 56.7, 21.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 63.9; **HRMS** (ESI^+): calculated for $C_{35}H_{28}FN_2O_5S_2$ [M+H^+]: m/z = 639.1418, m/z found 639.1412; **IR** ν_{max} (ATR)/cm^{-1}: 3052, 2926, 2865, 1696, 1602, 1404, 1356, 1198, 1160, 794, 747.

3-((4-(*tert*-butyl)Phenyl)sulfonyl)-5-(3,4-diethoxyphenyl)-7-phenyl-2-(4-(trifluoromethyl)phenyl)-3,10a-dihydropyrido[1,2-*d*][1,4]diazepine-1-sulfonyl fluoride (4kj)



Following general procedure M, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a purple solid (37.0 mg, 46%). **m.p.** 146 - 148 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.61 (s, 4H), 7.49 (appt. d, *J* = 8.7 Hz, 2H), 7.38 (appt. d, *J* = 8.7 Hz, 2H), 7.01 – 6.96 (m, 3H), 6.85 – 6.80 (m, 2H), 6.53 (d, *J* = 8.3 Hz, 1H), 6.46 – 6.37 (m, 2H), 6.27 (ddd, *J* = 9.0, 5.7, 1.0 Hz, 1H), 5.99 (s, 1H), 5.45 – 5.36 (m, 2H), 5.24 (d, *J* = 5.6 Hz, 1H), 4.03 – 3.88 (m, 4H), 1.43 – 1.38 (m, 6H), 1.38 (s, 9H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 158.7, 155.4 (d, *J* = 5.3 Hz), 148.7, 148.4, 141.0, 139.1 (d, *J* = 26.0 Hz), 138.8, 137.9, 136.9, 134.4, 133.0 (q, *J* = 32.7 Hz), 131.2, 130.8, 127.9, 127.3, 127.0, 126.7, 126.6, 126.1, 125.0 (q, *J* = 3.5 Hz), 124.9 – 122.6 (m), 120.5, 114.1, 113.4, 113.3, 109.0, 106.3, 64.9, 64.8, 56.8, 35.5, 31.2, 15.0, 14.8; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 64.0, -62.8; **HRMS** (ESI^+): calculated for $C_{42}H_{41}F_4N_2O_6S_2$ [M+H^+]: m/z = 809.2337, m/z found 809.2338; **IR** ν_{max} (ATR)/cm^{-1}: 3098, 2975, 2870, 1567, 1512, 1396, 1321, 1172, 1129, 1066, 844.

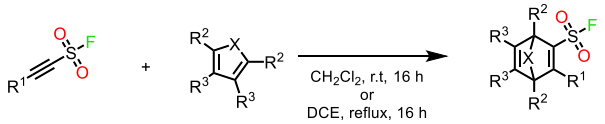
Synthesis and experimental data for compounds 4la-4lq

General Procedure N

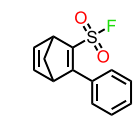
To a solution of the required diene **3l** (100 µmol) in CH_2Cl_2 (500 µL) was added the required SASF **2** (100 µmol) and stirred at room temperature for 2-16 h. The solvent was then removed under reduced pressure and the crude product was then purified by flash column chromatography to obtain the analytically pure product.

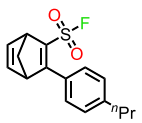
General Procedure O

To a solution of required diene **3l** (100 µmol) in DCE (500 µL) was added the required SASF **2** (100 µmol) and refluxed for 16 h. The solvent was then removed under reduced pressure and the crude product was then purified by flash column chromatography to obtain the analytically pure product.



2 **3l** X = C or O **4la-4lq**


4la
98%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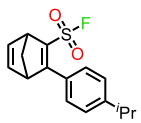
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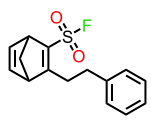
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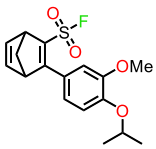
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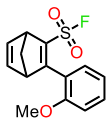
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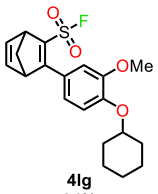
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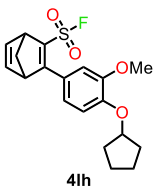
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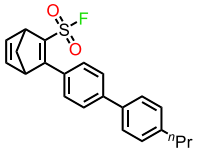
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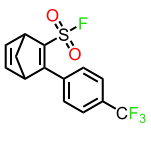
88%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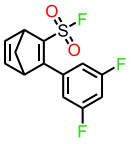
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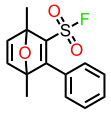
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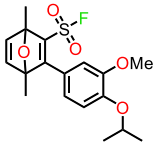
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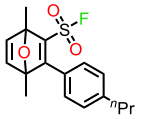
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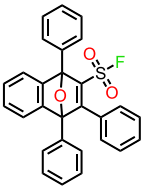
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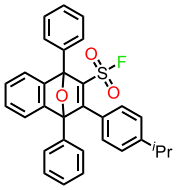
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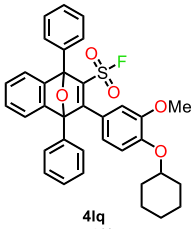
71%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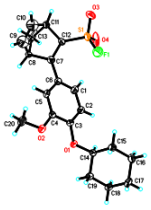
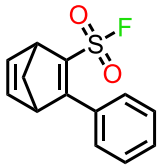
78%

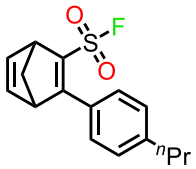

4lg

3-Phenylbicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4la)



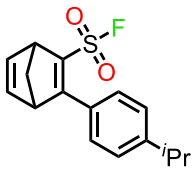
Following general procedure N (500 µmol of the required diene used), the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (24.0 mg, 98%). **m.p.** 48 - 49 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.51 – 7.37 (m, 5H), 7.13 (dd, *J* = 4.9, 3.1 Hz, 1H), 7.00 (dd, *J* = 4.7, 3.5 Hz, 1H), 4.28 – 4.13 (m, 1H), 4.11 – 3.99 (m, 1H), 2.49 (appt. dt, *J* = 7.1, 1.5 Hz, 1H), 2.30 – 2.15 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 172.1 (d, *J* = 5.1 Hz), 143.4, 140.6, 138.2 (d, *J* = 27.9 Hz), 132.3, 130.6, 128.4, 128.0 (d, *J* = 1.1 Hz), 71.2, 59.7 (d, *J* = 1.4 Hz), 54.4; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 61.4; **HRMS** (ESI^+): calculated for $C_{13}H_{11}FO_2SNa$ [M+Na^+]: m/z = 273.0356, m/z found 273.0356; **IR** ν_{max} (ATR)/cm^{-1}: 3069, 2959, 2881, 1578, 1395, 739.

3-(4-Propylphenyl)bicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4lb)



Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless solid (29.0 mg, 86%). **m.p.** 48 - 50 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.42 (appt. d, *J* = 8.3 Hz, 2H), 7.25 (appt. d, *J* = 8.4 Hz, 2H), 7.11 (dd, *J* = 4.9, 3.0 Hz, 1H), 6.98 (dd, *J* = 4.7, 3.4 Hz, 1H), 4.21 – 4.16 (m, 1H), 4.08 – 4.02 (m, 1H), 2.69 – 2.59 (m, 2H), 2.50 – 2.42 (m, 1H), 2.26 – 2.15 (m, 1H), 1.75 – 1.60 (m, 2H), 0.97 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 171.0 (d, *J* = 5.1 Hz), 144.7, 142.1, 139.3 (d, *J* = 1.0 Hz), 135.7 (d, *J* = 27.5 Hz), 127.3, 127.1 (d, *J* = 1.2 Hz), 69.7 (d, *J* = 0.9 Hz), 58.5 (d, *J* = 1.4 Hz), 53.3, 36.9, 23.2, 12.8; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 61.7; **HRMS** (ESI^+): calculated for $C_{16}H_{17}FO_2SNa$ [M+Na^+]: m/z =315.0826, m/z found 315.0826; **IR** ν_{max} (ATR)/cm^{-1}:3077, 2960, 2873, 2188, 1398, 1209, 1183, 745.

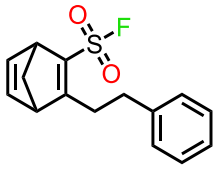
3-(4-Isopropylphenyl)bicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4lc)



Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a yellow oil (21.0 mg, 73%); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.44 (appt. d, *J* = 8.3 Hz, 2H), 7.30 (appt. d, *J* = 8.4 Hz, 2H), 7.11 (dd, *J* = 4.9, 3.0 Hz, 1H), 6.98 (dd, *J* = 4.7, 3.3 Hz,

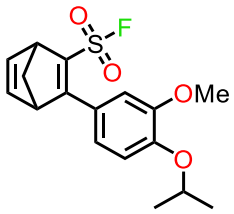
1H), 4.21 – 4.14 (m, 1H), 4.09 – 4.02 (m, 1H), 2.95 (hept, *J* = 7.0 Hz, 1H), 2.53 – 2.38 (m, 1H), 2.24 – 2.14 (m, 1H), 1.28 (d, *J* = 6.9 Hz, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 172.1 (d, *J* = 5.0 Hz), 152.0, 143.3, 140.5, 136.9 (d, *J* = 27.5 Hz), 129.7, 128.4 (d, *J* = 0.9 Hz), 126.5, 70.9, 59.6 (d, *J* = 1.2 Hz), 54.4, 34.2, 23.8 (d, *J* = 2.6 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 61.6; **HRMS** (ESI^+): calculated for $C_{16}H_{17}FO_2SNa$ [M+Na^+]: m/z =315.0826, m/z found 315.0829; **IR** ν_{max} (ATR)/cm^{-1}:3075, 2962, 2873, 1398, 1208, 757.

3-Phenethylbicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4ld)



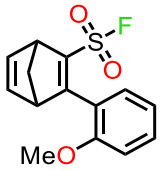
Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a yellow oil (16.0 mg, 59%); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.39 – 7.17 (m, 5H), 6.97 (dd, *J* = 4.9, 3.0 Hz, 1H), 6.70 – 6.62 (m, 1H), 4.00 – 3.90 (m, 1H), 3.72 – 3.62 (m, 1H), 3.14 – 2.93 (m, 2H), 2.91 – 2.71 (m, 2H), 2.20 – 2.12 (m, 1H), 2.11 – 1.99 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 177.5 (d, *J* = 5.7 Hz), 143.2, 140.5 (d, *J* = 1.4 Hz), 139.9, 139.1 (d, *J* = 27.6 Hz), 128.6, 128.5, 126.6, 71.7 (d, *J* = 1.0 Hz), 57.2 (d, *J* = 1.4 Hz), 52.6, 33.1 (d, *J* = 1.3 Hz), 31.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 60.7; **HRMS** (ESI^+): calculated for $C_{15}H_{15}FO_2SNa$ [M+Na^+]: m/z =301.0669, m/z found 301.0674; **IR** ν_{max} (ATR)/cm^{-1}:3065, 3028, 2968, 2930, 2873, 2213, 1612, 1395, 1208, 748.

3-(4-Isopropoxy-3-methoxyphenyl)bicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4le)



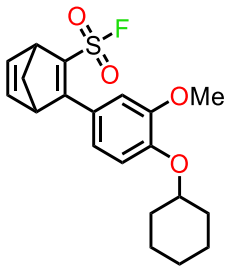
Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless solid (29.0 mg, 86%). **m.p.** 48 - 50 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.18 (d, *J* = 2.1 Hz, 1H), 7.12 – 7.06 (m, 2H), 6.95 (dd, *J* = 4.5, 3.5 Hz, 1H), 6.91 (d, *J* = 8.5 Hz, 1H), 4.63 (hept, *J* = 6.1 Hz, 1H), 4.20 – 4.13 (m, 1H), 4.12 – 4.04 (m, 1H), 3.89 (s, 3H), 2.44 – 2.38 (m, 1H), 2.21 – 2.13 (m, 1H), 1.41 (d, *J* = 6.0 Hz, 3H), 1.14 (d, *J* = 6.1 Hz, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 171.6 (d, *J* = 4.8 Hz), 149.8 (d, *J* = 34.0 Hz), 143.3, 140.1, 135.0 (d, *J* = 26.6 Hz), 128.4, 124.6, 121.8, 115.7, 113.8, 112.9 (d, *J* = 1.3 Hz), 71.4, 70.3 (d, *J* = 1.1 Hz), 59.34(d, *J* = 1.3 Hz), 56.2, 54.6, 22.1 (d, *J* = 1.7 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 62.1; **HRMS** (ESI^+): calculated for $C_{17}H_{19}FO_4SNa$ [M+Na^+]: m/z = 361.0880, m/z found 361.0882; **IR** ν_{max} (ATR)/cm^{-1}: 3074, 2978, 2939, 2172, 1597, 1504,744.

3-(2-Methoxyphenyl)bicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4lf)



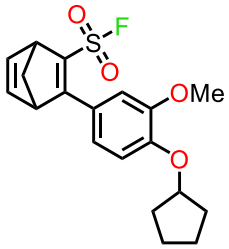
Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a yellow oil (25.0 mg, 90%); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.42 – 7.35 (m, 1H), 7.20 (dd, *J* = 7.6, 1.7 Hz, 1H), 7.08 (dd, *J* = 4.9, 3.0 Hz, 1H), 6.99 (td, *J* = 7.5, 0.9 Hz, 1H), 6.96 – 6.90 (m, 2H), 4.13 (d, *J* = 2.1 Hz, 1H), 4.01 (s, 1H), 3.85 (s, 3H), 2.52 – 2.46 (m, 1H), 2.20 (d, *J* = 6.9 Hz, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 170.7 (d, *J* = 5.4 Hz), 156.9, 142.5, 141.7, 139.7 (d, *J* = 28.6 Hz), 131.6, 129.5, 122.1, 120.3, 111.0, 71.2, 59.5 (d, *J* = 1.2 Hz), 55.5, 53.3; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 59.5; **HRMS** (ESI^+): calculated for $C_{14}H_{13}FO_3SNa$ [M+Na^+]: m/z =303.0462, m/z found 303.0460; **IR** $\tilde{\nu}_{max}$ (ATR)/cm^{-1}:3074, 3002, 2943, 2842, 1592, 1395, 1207, 1188, 743.

3-(4-(Cyclohexyloxy)-3-methoxyphenyl)bicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4lg)



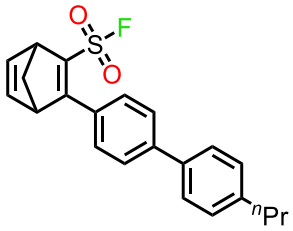
Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless solid (32.0 mg, 84%). **m.p.** 99 - 100 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.18 (d, *J* = 2.1 Hz, 1H), 7.11 – 7.05 (m, 2H), 6.97 – 6.89 (m, 2H), 4.35 – 4.25 (m, 1H), 4.20 – 4.15 (m, 1H), 4.11 – 4.05 (m, 1H), 3.89 (s, 3H), 2.46 – 2.38 (m, 1H), 2.21 – 2.15 (m, 1H), 2.10 – 1.99 (m, 2H), 1.90 – 1.78 (m, 2H), 1.67 – 1.53 (m, 3H), 1.44 – 1.21 (m, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 171.6 (d, *J* = 4.8 Hz), 149.9, 149.8, 143.3, 140.1, 134.9 (d, *J* = 26.6 Hz), 124.6, 121.8, 114.2, 113.0, 77.1, 70.3, 59.3, 56.3, 54.6, 31.9 (d, *J* = 1.5 Hz), 25.6, 24.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 62.2; **HRMS** (ESI^+): calculated for $C_{20}H_{23}FO_4SNa$ [M+Na^+]: m/z = 401.1193, m/z found 401.1188; **IR** $\tilde{\nu}_{max}$ (ATR)/cm^{-1}:3003, 2933, 2859, 1595, 1508, 1396, 723.

3-(4-(Cyclopentyloxy)-3-methoxyphenyl)bicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4lh)



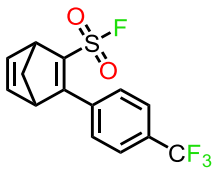
Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless solid (24.0 mg, 66%). **m.p.** 62 - 63 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.17 (d, *J* = 2.1 Hz, 1H), 7.12 – 7.06 (m, 2H), 6.94 (dd, *J* = 4.6, 3.5 Hz, 1H), 6.90 (d, *J* = 8.5 Hz, 1H), 4.83 (tt, *J* = 6.3, 3.2 Hz, 1H), 4.21 – 4.14 (m, 1H), 4.12 – 4.04 (m, 1H), 3.88 (s, 3H), 2.46 – 2.38 (m, 1H), 2.21 – 2.15 (m, 1H), 2.05 – 1.78 (m, 6H), 1.71 – 1.58 (m, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 171.6 (d, *J* = 4.8 Hz), 150.4, 149.4, 143.3, 140.1, 134.8 (d, *J* = 26.5 Hz), 124.3, 121.8, 113.4, 112.9, 80.6, 70.3, 59.3 (d, *J* = 1.3 Hz), 56.3, 54.6, 33.0 (d, *J* = 3.0 Hz), 24.2; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 62.2; **HRMS** (ESI^+): calculated for $C_{19}H_{21}FO_4SNa$ [$M+Na^+$]: m/z = 387.1037, m/z found 387.1030; **IR** ν_{max} (ATR)/cm^{-1}:2958, 2875, 2361, 1598, 1394, 728.

3-(4'-Propyl-[1,1'-biphenyl]-4-yl)bicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4li)



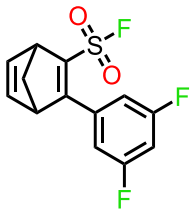
Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a colourless solid (32.0 mg, 88%). **m.p.** 80 - 82 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.69 – 7.63 (m, 2H), 7.60 – 7.51 (m, 4H), 7.31 – 7.25 (m, 2H), 7.14 (dd, *J* = 4.9, 3.0 Hz, 1H), 7.01 (dd, *J* = 4.8, 3.3 Hz, 1H), 4.25 – 4.17 (m, 1H), 4.15 – 4.04 (m, 1H), 2.71 – 2.59 (m, 2H), 2.54 – 2.43 (m, 1H), 2.29 – 2.18 (m, 1H), 1.78 – 1.62 (m, 2H), 1.00 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 171.7 (d, *J* = 5.0 Hz), 143.4, 143.3, 142.8, 140.5, 137.6 (d, *J* = 27.7 Hz), 137.4, 130.7, 129.2, 128.8 (d, *J* = 1.0 Hz), 127.0, 126.8, 71.0, 59.6 (d, *J* = 1.2 Hz), 54.5, 37.8, 24.6, 14.0; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 61.6; **HRMS** (ESI^+): calculated for $C_{22}H_{21}FO_2SNa$ [$M+Na^+$]: m/z =391.1138, m/z found 391.1139; **IR** ν_{max} (ATR)/cm^{-1}:2955, 2867, 1581, 1390, 1180, 1055, 746.

3-(4-(Trifluoromethyl)phenyl)bicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4lj)



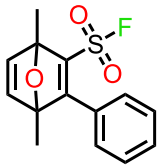
Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-10% EtOAc in petroleum ether) as a colourless solid (30.0 mg, 93%). **m.p.** 55 - 56 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.69 (appt. d, *J* = 8.3 Hz, 2H), 7.54 (appt. d, *J* = 8.3 Hz, 2H), 7.16 (dd, *J* = 4.8, 3.2 Hz, 1H), 7.03 (dd, *J* = 4.6, 3.4 Hz, 1H), 4.29 – 4.08 (m, 1H), 4.08 – 3.94 (m, 1H), 2.59 – 2.43 (m, 1H), 2.30 – 2.10 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 170.2 (d, *J* = 5.3 Hz), 143.5, 140.9 (d, *J* = 28.7 Hz), 140.6, 135.8, 132.1 (q, *J* = 32.9 Hz), 128.2 (d, *J* = 1.0 Hz), 123.8 (q, *J* = 272.4 Hz), 125.4 (q, *J* = 3.8 Hz), 71.8, 59.8, 54.5; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 61.1, -63.0; **HRMS** (ASAP): calculated for $C_{14}H_{11}F_4O_2S$ [M+H]: m/z = 319.0416, m/z found 319.0412; **IR** ν_{max} (ATR)/cm^{-1}:2967, 2642, 2579, 1603, 1393, 1322, 1130, 764.

3-(3,5-Difluorophenyl)bicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4lk)



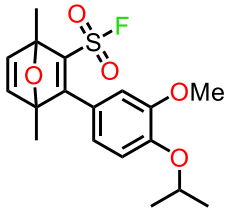
Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (28.0 mg, 99%). **m.p.** 56 - 58 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.15 (dd, *J* = 4.7, 3.3 Hz, 1H), 7.05 – 7.00 (m, 1H), 7.00 – 6.92 (m, 2H), 6.92 – 6.82 (m, 1H), 4.27 – 4.15 (m, 1H), 4.04 – 3.90 (m, 1H), 2.56 – 2.42 (m, 1H), 2.33 – 2.20 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.1 (d, *J* = 5.1 Hz), 162.7 (dd, *J* = 250.1, 12.8 Hz), 143.5, 141.2 (d, *J* = 28.6 Hz), 140.6 (d, *J* = 1.1 Hz), 135.2 (t, *J* = 10.0 Hz), 111.1 (dd, *J* = 26.8, 1.2 Hz), 111.1 (dd, *J* = 11.5, 1.1 Hz), 105.7 (t, *J* = 25.2 Hz), 71.7, 59.7 (d, *J* = 1.4 Hz), 54.6; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 61.4, -108.6 (t, *J* = 7.6 Hz); **HRMS** (ASAP): calculated for $C_{13}H_{10}F_3O_2S$ [M+H]: m/z = 287.0354, m/z found 287.0350; **IR** ν_{max} (ATR)/cm^{-1}:3094, 2987, 2947, 2878, 1593, 1397, 1204, 737.

1,4-Dimethyl-3-phenyl-7-oxabicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4ll)



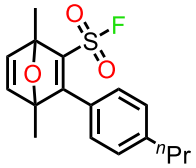
Following general procedure O, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a yellow oil (26.0 mg, 95%); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.50 – 7.42 (m, 3H), 7.21 – 7.13 (m, 3H), 7.03 (d, *J* = 5.1 Hz, 1H), 1.98 (s, 3H), 1.64 (s, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 175.7 (d, *J* = 4.8 Hz), 148.9, 145.3, 143.8 (d, *J* = 31.3 Hz), 130.3, 130.0, 128.5, 126.6, 95.1, 92.5, 15.9, 15.7; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 65.8; **HRMS** (ESI^+): calculated for $C_{14}H_{13}FO_3SNa$ [M+Na^+]: m/z =303.0461, m/z found 303.0463; **IR** ν_{max} (ATR)/cm^{-1}:2987, 2939, 1619, 1403, 1196, 747.

3-(4-Isopropoxy-3-methoxyphenyl)-1,4-dimethyl-7-oxabicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4lm)



Following general procedure O, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a yellow oil (13.0 mg, 35%); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.15 (d, *J* = 5.1 Hz, 1H), 7.00 (d, *J* = 5.1 Hz, 1H), 6.92 (d, *J* = 8.3 Hz, 1H), 6.78 – 6.69 (m, 2H), 4.68 – 4.54 (m, 1H), 3.87 (s, 3H), 1.97 (s, 3H), 1.69 (s, 3H), 1.41 (dd, *J* = 6.0, 2.0 Hz, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 175.7 (d, *J* = 4.7 Hz), 149.7 (d, *J* = 3.6 Hz), 148.6, 144.9, 141.3 (d, *J* = 30.5 Hz), 121.9, 120.0, 113.8, 111.9, 95.0, 92.3, 71.4, 56.3, 22.1 (d, *J* = 2.5 Hz), 16.3, 15.9; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 66.6; **HRMS** (ASAP): calculated for $C_{18}H_{22}FO_5S$ [M+H]: m/z =369.1172, m/z found 369.1169; **IR** ν_{max} (ATR)/cm^{-1}:2979, 2934, 1674, 1412, 1265, 787.

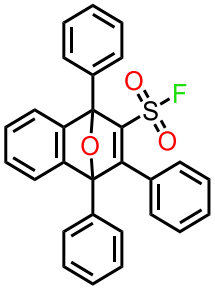
1,4-Dimethyl-3-(4-propylphenyl)-7-oxabicyclo[2.2.1]hepta-2,5-diene-2-sulfonyl fluoride (4ln)



Following general procedure O, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a yellow oil (25.0 mg, 78%); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.28 – 7.23 (m, 2H), 7.17 (appt. d, *J* = 5.1 Hz, 1H), 7.12 – 7.07 (m, 2H), 7.02 (appt. d, *J* = 5.1 Hz, 1H), 2.68 – 2.58

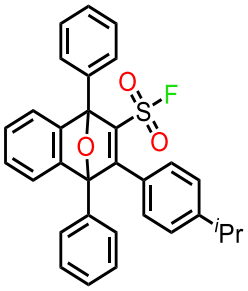
(m, 2H), 2.01 – 1.93 (m, 3H), 1.74 – 1.66 (m, 2H), 1.65 (s, 3H), 0.97 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 175.8 (d, *J* = 4.9 Hz), 148.6, 145.4, 145.0, 142.5 (d, *J* = 30.9 Hz), 128.4, 127.0, 126.6, 94.9, 92.2, 37.9, 24.1, 15.9, 15.6, 13.8; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 66.1; **HRMS** (ESI^+): calculated for $C_{17}H_{19}FO_3SNa$ [M+Na^+]: m/z =345.0931, m/z found 345.0932; **IR** ν_{max} (ATR)/cm^{-1}:3028, 2961, 2935, 2872, 1613, 1404, 1197, 759.

1,3,4-Triphenyl-1,4-dihydro-1,4-epoxynaphthalene-2-sulfonyl fluoride (4lo)



Following general procedure N (0.30 mmol of the required diene used), the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (43.0 mg, 95%). **m.p.** 69 - 70 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.97 (d, *J* = 7.6 Hz, 2H), 7.76 – 7.68 (m, 1H), 7.59 – 7.53 (m, 1H), 7.53 – 7.40 (m, 3H), 7.38 (dd, *J* = 5.8, 2.2 Hz, 2H), 7.34 – 7.14 (m, 8H), 7.01 (d, *J* = 7.1 Hz, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 173.3 (d, *J* = 2.9 Hz), 149.3, 147.7, 145.1 (d, *J* = 26.5 Hz), 132.6, 132.0, 130.5, 130.4, 129.6, 129.2, 128.9, 128.8, 128.5, 128.3, 128.2, 127.6, 126.9, 126.4, 122.7 (d, *J* = 8.2 Hz), 96.3, 94.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 67.4; **HRMS** (ESI^+): calculated for $C_{28}H_{19}FO_3SK$ [M+K^+]: m/z =493.0670, m/z found 493.0676; **IR** ν_{max} (ATR)/cm^{-1}:3062, 2932, 2601, 2359, 1590, 1406, 1199, 748.

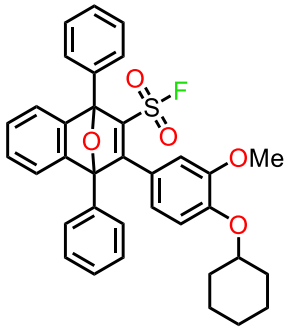
3-(4-Isopropylphenyl)-1,4-diphenyl-1,4-dihydro-1,4-epoxynaphthalene-2-sulfonyl fluoride (4lp)



Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (35.0 mg, 71%). **m.p.** 116 - 118 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.07 – 8.00 (m, 2H), 7.81 – 7.75 (m, 1H), 7.69 – 7.63 (m, 1H), 7.59 – 7.44 (m, 5H), 7.41 – 7.31 (m, 3H), 7.30 – 7.24 (m, 2H), 7.18 (appt. d, *J* = 8.2 Hz, 2H), 7.08 (appt. d, *J* = 8.3 Hz, 2H), 2.96 – 2.83 (m, 1H), 1.23 (dd, *J* = 6.9, 1.6 Hz, 6H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 173.3 (d, *J* = 2.7 Hz), 151.8, 149.4, 147.7, 143.9 (d, *J* = 25.7 Hz), 132.8, 132.2, 129.6, 129.4, 129.3, 128.8, 128.5, 128.4, 127.9, 127.7, 126.9, 126.4, 126.3, 122.9, 96.5,

94.4, 34.1, 23.7 (d, *J* = 7.9 Hz); **^{19}F NMR** (376 MHz, $CDCl_3$) δ 67.5; **HRMS** (ESI^+): calculated for $C_{31}H_{25}FO_3SNa$ [M+Na^+]: m/z =519.1400, m/z found 519.1402; **IR** ν_{max} (ATR)/cm^{-1}:3063, 2963, 2869, 2361, 1400, 1198, 996, 748.

3-(4-(Cyclohexyloxy)-3-methoxyphenyl)-1,4-diphenyl-1,4-dihydro-1,4-epoxynaphthalene-2-sulfonyl fluoride (4lq)

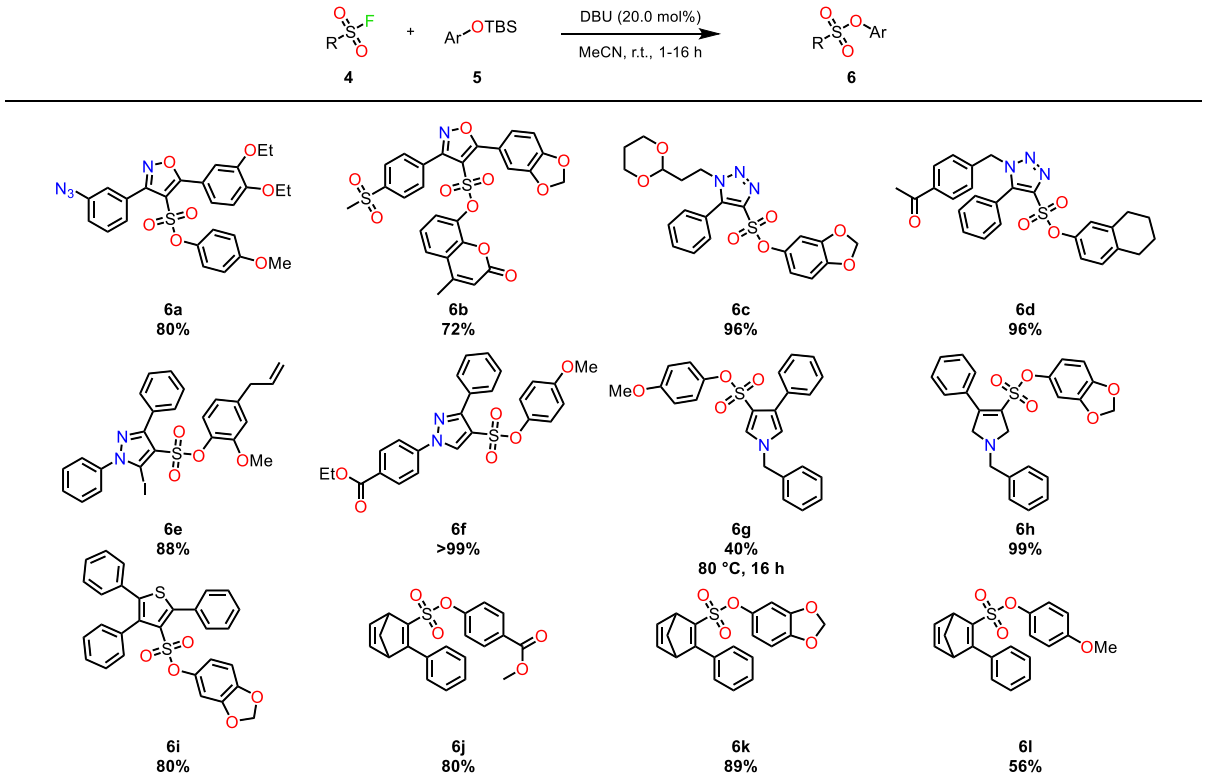


Following general procedure N, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a colourless solid (45.0 mg, 78%). **m.p.** 87 - 88 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.05 – 7.98 (m, 2H), 7.80 – 7.74 (m, 1H), 7.69 – 7.65 (m, 1H), 7.59 – 7.47 (m, 5H), 7.42 – 7.33 (m, 3H), 7.31 – 7.23 (m, 2H), 6.84 – 6.70 (m, 3H), 4.31 – 4.11 (m, 1H), 3.68 (s, 3H), 2.08 – 1.96 (m, 2H), 1.89 – 1.77 (m, 2H), 1.66 – 1.48 (m, 3H), 1.41 – 1.20 (m, 3H);**^{13}C NMR** (101 MHz, $CDCl_3$) δ 172.8, 149.7, 149.5, 149.4, 147.6, 141.9 (d, *J* = 24.4 Hz), 133.0, 132.4, 129.7, 129.6, 129.3, 128.8, 128.6, 128.6, 126.9, 126.2, 113.9, 112.4, 96.5, 94.6, 77.1, 56.0, 31.9 (d, *J* = 2.2 Hz), 25.6, 24.1; **^{19}F NMR** (376 MHz, $CDCl_3$) δ 67.2; **HRMS** (ESI^+): calculated for $C_{35}H_{31}FO_5SNa$ [M+Na^+]: m/z = 605.1768, m/z found 605.1768; **IR** ν_{max} (ATR)/cm^{-1}:3157, 2936, 2861, 1503, 1402, 1004, 751.

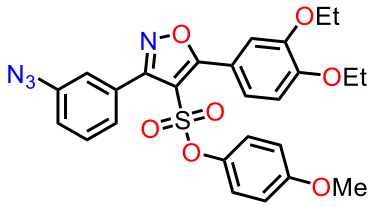
Synthesis and experimental data for compounds 6a-6l

General Procedure P

To a solution of the required sulfonyl fluoride **4** (100 µmol) and the required aryl silyl-ether **5** (100 µmol) in a solution of MeCN (400 µL) was added DBU (3.00 µL, 20.0 µmol). The reaction mixture was stirred at room temperature for 1 h. The reaction mixture was extracted into EtOAc (5.00 mL), then washed with brine (10.0 mL) and H_2O (10.0 mL). The aqueous layer was then extracted with EtOAc (5.00 mL), the organic fractions combined, dried over anhydrous $MgSO_4$, filtered under vacuum and the solvent was removed under reduced pressure to obtain the analytically pure product.



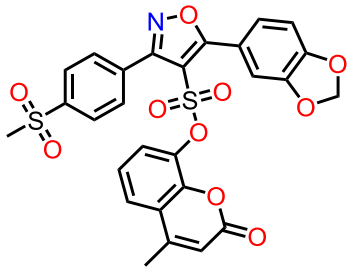
4-Methoxyphenyl 3-(3-azidophenyl)-5-(3,4-diethoxyphenyl)isoxazole-4-sulfonate (6a)



Following general procedure P, the title compound was isolated after purification by flash column chromatography (0-15% EtOAc in petroleum ether) as a brown solid (43.0 mg, 80%). **m.p.** 87 - 88 °C; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.53 (dd, *J* = 8.5, 2.2 Hz, 1H), 7.49 (d, *J* = 2.1 Hz, 1H), 7.41 (appt. t, *J* = 7.9 Hz, 1H), 7.25 (ddd,

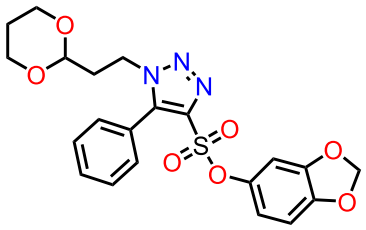
J = 7.7, 1.5, 1.0 Hz, 1H), 7.15 (ddd, *J* = 8.1, 2.3, 1.0 Hz, 1H), 7.08 – 7.06 (m, 1H), 6.98 (d, *J* = 8.5 Hz, 1H), 6.90 (appt. d, *J* = 9.2 Hz, 2H), 6.80 (appt. d, *J* = 9.2 Hz, 2H), 4.20 (q, *J* = 7.0 Hz, 2H), 4.13 (q, *J* = 7.0 Hz, 2H), 3.79 (s, 3H), 1.52 (t, *J* = 6.4 Hz, 3H), 1.49 (t, *J* = 6.4 Hz, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 173.8, 161.8, 158.8, 152.6, 148.5, 142.5, 140.3, 129.7, 128.7, 126.1, 123.5, 123.3, 121.0, 120.2, 117.1, 114.9, 113.9, 112.4, 110.1, 64.9, 64.7, 55.8, 14.8, 14.8; **HRMS** (ESI^+): calculated for $C_{26}H_{25}N_4O_7S$ [$M+H^+$]: m/z = 537.1438, m/z found 537.1440; **IR** ν_{max} (ATR)/cm^{-1}: 3079, 2976, 2100, 1603, 1562, 1500, 1450, 1388, 1290, 1252, 1149, 1032, 845, 794.

4-Methyl-2-oxo-2*H*-chromen-8-yl 5-(benzo[*d*][1,3]dioxol-5-yl)-3-(4-(methylsulfonyl)phenyl)isoxazole-4-sulfonate (6b)



Following general procedure P, the title compound was isolated after filtration and washing with Et_2O as a colourless solid (42.0 mg, 72%). **m.p.** 230 - 231 °C; **^{1}H NMR** (500 MHz, DMSO) δ 8.03 (appt. d, *J* = 8.6 Hz, 2H), 7.79 – 7.76 (m, 3H), 7.32 (dd, *J* = 8.2, 1.8 Hz, 1H), 7.25 (d, *J* = 2.4 Hz, 1H), 7.18 (d, *J* = 1.7 Hz, 1H), 7.13 (dd, *J* = 8.7, 2.4 Hz, 1H), 7.10 (d, *J* = 8.2 Hz, 1H), 6.48 (q, *J* = 1.3 Hz, 1H), 6.16 (s, 2H), 3.31 (s, 3H), 2.44 (d, *J* = 1.3 Hz, 3H); **^{13}C NMR** (126 MHz, DMSO) δ 174.1, 160.5, 159.2, 153.4, 152.5, 151.1, 149.7, 147.5, 142.6, 131.1, 130.5, 127.2, 126.8, 125.3, 119.4, 118.4, 117.3, 114.8, 110.8, 110.4, 108.9, 108.6, 102.4, 43.2, 18.1; **HRMS** (ESI^+): calculated for $C_{27}H_{19}NO_{10}S_2Na$ [$M+Na^+$]: m/z = 604.0343, m/z found 604.0345; **IR** ν_{max} (ATR)/cm^{-1}: 3094, 3073, 3001, 2884, 2795, 1721, 1607, 1579, 1485, 1370, 1257, 1145, 1109, 813, 774.

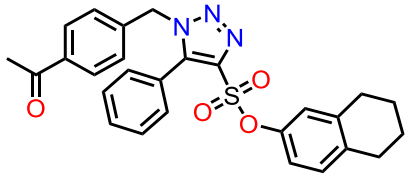
Benzo[*d*][1,3]dioxol-5-yl 1-(2-(1,3-dioxan-2-yl)ethyl)-5-phenyl-1*H*-1,2,3-triazole-4-sulfonate (6c)



Following general procedure P, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as an orange gum (44.0 mg, 96%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.56 – 7.52 (m, 1H), 7.50 – 7.45 (m, 2H), 7.20 – 7.17 (m, 2H), 6.66 (d, *J* = 8.5 Hz, 1H), 6.59 (d, *J* = 2.4 Hz, 1H), 6.51 (dd, *J* = 8.5, 2.4 Hz, 1H), 5.97 (s, 2H), 4.50 (t, *J* = 4.7 Hz, 1H), 4.35 (t, *J* = 7.0 Hz, 2H), 4.01 – 3.96 (m, 2H), 3.68 – 3.61 (m, 2H), 2.12 (td, *J* = 7.0, 4.7 Hz, 2H), 1.96 (dddt, *J* = 22.5, 17.5, 12.5, 5.0 Hz, 1H), 1.29 (dtt, *J* = 13.5, 2.6,

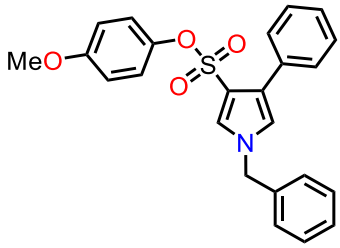
1.3 Hz, 1H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 148.2, 146.7, 143.6, 141.0, 139.6, 130.9, 129.7, 128.9, 123.8, 115.4, 108.0, 104.6, 102.1, 98.8, 66.9, 44.5, 34.8, 25.6; **HRMS** (ESI^+): calculated for $C_{21}H_{21}N_3O_7SNa$ [M+Na^+]: m/z = 482.0992, m/z found 482.0990; **IR** ν_{max} (ATR)/cm^{-1}: 3063, 2960, 2928, 2851, 1483, 1381, 1240, 1161, 1138, 1115, 1093, 1038, 945, 860, 834, 769, 738.

5,6,7,8-Tetrahydronaphthalen-2-yl 1-(4-acetylbenzyl)-5-phenyl-1*H*-1,2,3-triazole-4-sulfonate (6d)



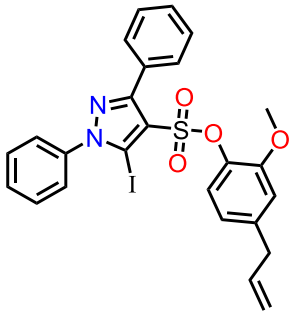
Following general procedure P, the title compound was isolated as an orange gum (47.0 mg, 96%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.86 (appt. d, *J* = 8.5 Hz, 2H), 7.51 – 7.46 (m, 1H), 7.34 (appt. t, *J* = 7.8 Hz, 2H), 7.04 (appt. d, *J* = 8.5 Hz, 2H), 6.90 (d, *J* = 8.3 Hz, 1H), 6.83 – 6.79 (m, 2H), 6.72 – 6.66 (m, 2H), 5.44 (s, 2H), 2.69 (t, *J* = 6.0 Hz, 2H), 2.60 – 2.56 (m, 5H), 1.78 – 1.69 (m, 4H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 197.3, 147.00, 141.3, 140.2, 139.0, 138.9, 137.4, 136.6, 131.0, 130.2, 129.7, 129.0, 128.8, 127.8, 123.5, 122.6, 119.4, 52.3, 29.4, 29.0 (s), 26.8, 23.0, 22.8; **HRMS** (ESI^+): calculated for $C_{27}H_{26}N_3O_4S$ [M+H^+]: m/z = 488.1639, m/z found 488.1640; **IR** ν_{max} (ATR)/cm^{-1}: 2927, 2857, 1681, 1609, 1492, 1386, 1264, 1174, 923, 788, 695.

4-Methoxyphenyl 1-benzyl-4-phenyl-1*H*-pyrrole-3-sulfonate (6e)



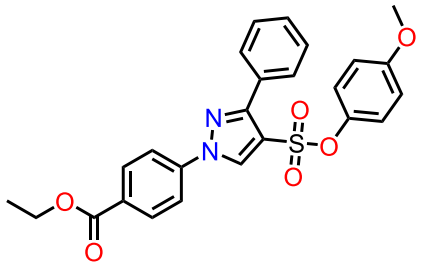
Following general procedure P (heating to 80 °C for 1.5 h), the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless gum (17.0 mg, 40%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.70 – 7.66 (m, 2H), 7.42 – 7.30 (m, 6H), 7.18 (d, *J* = 2.6 Hz, 1H), 7.09 – 7.05 (m, 2H), 6.90 (appt. d, *J* = 9.2 Hz, 2H), 6.82 (d, *J* = 2.6 Hz, 1H), 6.73 (appt. d, *J* = 9.2 Hz, 2H), 5.02 (s, 2H), 3.77 (s, 3H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 158.1, 143.5, 135.6, 132.5, 129.8, 129.2, 128.9, 128.7, 128.5, 127.6, 127.4, 125.6, 123.5, 122.5, 115.1, 114.4, 55.7, 54.3; **HRMS** (ESI^+): calculated for $C_{24}H_{21}NO_4SNa$ [M+Na^+]: m/z = 442.1083, m/z found 442.1084; **IR** ν_{max} (ATR)/cm^{-1}: 3128, 2925, 2852, 1500, 1361, 1249, 1149, 1106, 836, 788, 730, 694.

4-Allyl-2-methoxyphenyl 5-iodo-1,3-diphenyl-1*H*-pyrazole-4-sulfonate (6f)



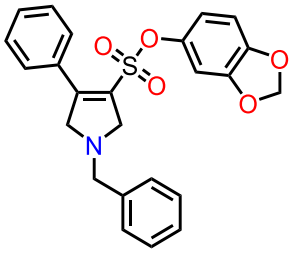
Following general procedure P (3.00 mL MeCN used, stirring for 18 h at room temperature), the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a white solid (50.0 mg, 88%). **m.p.** 140 - 142 °C **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.70 – 7.63 (m, 2H), 7.50 (ddd, *J* = 16.6, 7.5, 5.4 Hz, 5H), 7.44 – 7.37 (m, 3H), 7.23 (d, *J* = 8.2 Hz, 1H), 6.77 (d, *J* = 8.3 Hz, 1H), 6.73 (s, 1H), 5.95 (ddt, *J* = 16.3, 9.6, 6.6 Hz, 1H), 5.15 – 5.11 (m, 1H), 5.09 (s, 1H), 3.62 (s, 3H), 3.38 (d, *J* = 6.4 Hz, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 155.1, 151.8, 140.9, 139.9, 136.9, 136.4, 130.8, 130.1, 129.6, 129.5, 129.4, 128.0, 127.1, 125.2, 121.5, 121.2, 116.5, 113.0, 92.1, 55.7, 40.2; **HRMS** (ESI^+): calculated for $C_{25}H_{22}IN_2O_4S$ [M+H$^+$]: m/z = 573.0339, m/z found 573.0355; **IR** ν_{max} (ATR)/cm^{-1}: 3072, 2929, 1596, 1497, 1466, 1381.

Ethyl 4-(4-((4-methoxyphenoxy)sulfonyl)-3-phenyl-1*H*-pyrazol-1-yl)benzoate (6g)



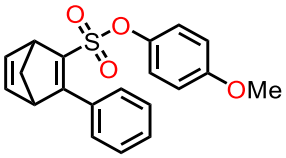
Following general procedure P, the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless oil (48.0 mg, quantitative). **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.42 (s, 1H), 8.18 (d, *J* = 9.0 Hz, 2H), 8.12 – 8.07 (m, 2H), 7.81 (d, *J* = 9.0 Hz, 2H), 7.55 – 7.48 (m, 3H), 6.94 (d, *J* = 9.3 Hz, 2H), 6.75 (d, *J* = 9.3 Hz, 2H), 4.42 (q, *J* = 7.1 Hz, 2H), 3.74 (s, 3H), 1.43 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 165.6, 158.5, 151.5, 143.0, 141.6, 134.0, 131.4, 130.2, 130.1, 130.0, 128.9, 128.8, 123.3, 119.0, 117.6, 114.8, 61.5, 55.7, 14.5; **HRMS** (ESI^+): calculated for $C_{25}H_{23}N_2O_6S$ [M+H$^+$]: m/z = 479.1271, m/z found 479.1275; **IR** ν_{max} (ATR)/cm^{-1}: 3124, 1705, 1607, 1504, 1375, 1279, 1194.

Benzo[*d*][1,3]dioxol-5-yl 1-benzyl-4-phenyl-2,5-dihydro-1*H*-pyrrole-3-sulfonate (6h)



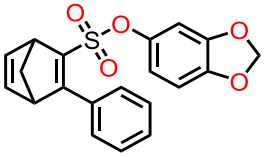
Following general procedure P (10.0 µmol DBU used instead), the title compound was isolated after purification by flash column chromatography (0-20% EtOAc in petroleum ether) as a colourless oil (43.0 mg, 99%). **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.40 – 7.27 (m, 10H), 6.73 (d, *J* = 8.4 Hz, 1H), 6.66 (d, *J* = 2.4 Hz, 1H), 6.62 (dd, *J* = 8.4, 2.4 Hz, 1H), 5.99 (s, 2H), 3.99 (dq, *J* = 8.0, 4.1 Hz, 4H), 3.83 (s, 2H); **^{13}C NMR** (126 MHz, $CDCl_3$) δ 153.4, 148.2, 146.7, 143.5, 138.0, 131.3, 130.0, 128.7, 128.7, 128.2, 128.2, 127.9, 127.6, 115.2, 108.1, 104.5, 102.1, 65.5, 61.7, 59.8; **HRMS** (ESI^+): calculated for $C_{24}H_{22}NO_5S$ [$M+H^+$]: m/z = 436.1213, m/z found 436.1231; **IR** ν_{max} (ATR)/cm^{-1}: 2901, 1606, 1478, 1363, 1246, 1158, 1089, 1034.

4-Methoxyphenyl 3-phenylbicyclo[2.2.1]hepta-2,5-diene-2-sulfonate (6i)



Following general procedure P, the title compound was isolated after purification by flash column chromatography (0-25% Et_2O in petroleum ether) as a colourless solid (20.0 mg, 56%). **m.p.** 79 - 80 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.35 (s, 5H), 7.05 – 6.99 (m, 2H), 6.99 – 6.95 (m, 1H), 6.95 – 6.89 (m, 1H), 6.83 – 6.76 (m, 2H), 4.12 – 4.03 (m, 1H), 4.01 – 3.90 (m, 1H), 3.79 (s, 3H), 2.42 – 2.29 (m, 1H), 2.18 – 2.03 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 168.6, 158.3, 143.3, 142.9, 140.9, 140.5, 133.1, 129.8, 128.1, 127.9, 123.5, 114.5, 70.8, 59.6, 55.7, 55.0; **HRMS** (ESI^+): calculated for $C_{20}H_{18}O_4SNa$ [$M+Na^+$]: m/z =377.0818, m/z found 377.0818; **IR** ν_{max} (ATR)/cm^{-1}:3013, 2937, 2873, 2844, 1449, 1362, 769.

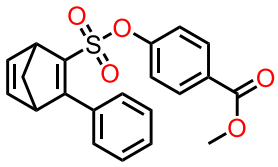
Benzo[d][1,3]dioxol-5-yl 3-phenylbicyclo[2.2.1]hepta-2,5-diene-2-sulfonate (6j)



Following general procedure P, the title compound was isolated after purification by flash column chromatography (0-25% Et_2O in petroleum ether) as a colourless solid (33.0 mg, 89%). **m.p.** 71 - 72 °C; **^{1}H NMR**

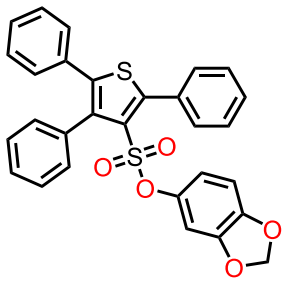
(400 MHz, $CDCl_3$) δ 7.44 – 7.29 (m, 5H), 7.00 (dd, *J* = 4.8, 2.9 Hz, 1H), 6.97 – 6.90 (m, 1H), 6.67 (d, *J* = 8.4 Hz, 1H), 6.60 (d, *J* = 2.4 Hz, 1H), 6.54 (dd, *J* = 8.4, 2.4 Hz, 1H), 5.97 (s, 2H), 4.13 – 4.06 (m, 1H), 3.97 (s, 1H), 2.42 – 2.31 (m, 1H), 2.18 – 2.09 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 168.8, 148.0, 146.4, 143.6, 143.3, 140.8, 140.5, 133.1, 129.9, 128.2, 127.9, 115.4, 107.8, 104.6, 102.0, 70.9, 59.7, 55.0; **HRMS** (ESI^+): calculated for $C_{20}H_{16}O_5SNa$ [$M+Na^+$]: m/z =391.0610, m/z found 391.0614; **IR** ν_{max} (ATR)/cm^{-1}:3065, 2983, 2939, 1478, 1365, 1158, 824.

Methyl 4-(((3-phenylbicyclo[2.2.1]hepta-2,5-dien-2-yl)sulfonyl)oxy)benzoate (6k)



Following general procedure P, the title compound was isolated after purification by flash column chromatography (0-25% Et_2O in petroleum ether) as a colourless solid (31.0 mg, 80%). **m.p.** 63 - 64 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.96 (appt. d, *J* = 8.7 Hz, 2H), 7.36 (s, 5H), 7.08 (appt. d, *J* = 8.8 Hz, 2H), 6.91 (dt, *J* = 8.3, 5.2 Hz, 2H), 4.14 – 4.07 (m, 1H), 3.99 – 3.92 (m, 1H), 3.91 (s, 3H), 2.37 – 2.31 (m, 1H), 2.15 – 2.10 (m, 1H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 169.3, 166.1, 153.0, 143.2, 140.8, 140.5, 133.0, 131.3, 130.1, 128.7, 128.2, 127.9, 122.1, 71.0, 59.7, 54.9, 52.4; **HRMS** (ESI^+): calculated for $C_{21}H_{18}O_5SNa$ [$M+Na^+$]: m/z =405.0767, m/z found 405.0764; **IR** ν_{max} (ATR)/cm^{-1}:3069, 2998, 2949, 2873, 1721, 1277, 1148, 865.

Benzo[d][1,3]dioxol-5-yl 2,4,5-triphenylthiophene-3-sulfonate (6l)



Following general procedure P, the title compound was isolated after purification by flash column chromatography (0-25% Et_2O in petroleum ether) as a colourless solid (41.0 mg, 80%). **m.p.** 152 - 154 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.51 – 7.39 (m, 5H), 7.39 – 7.33 (m, 5H), 7.26 – 7.20 (m, 3H), 7.20 – 7.14 (m, 2H), 6.64 (d, *J* = 8.4 Hz, 1H), 6.34 – 6.27 (m, 1H), 6.28 – 6.20 (m, 1H), 5.96 (s, 2H); **^{13}C NMR** (101 MHz, $CDCl_3$) δ 150.7, 148.0, 146.4, 142.9, 141.3, 137.8, 134.4, 132.5, 131.8, 131.2, 130.23, 130.1, 129.5, 129.4, 128.6, 128.3, 128.2, 128.1, 128.1, 115.3, 107.9, 104.7, 101.9; **HRMS** (ESI^+): calculated for $C_{29}H_{20}O_5S_2Na$ [$M+Na^+$]: m/z =535.0644, m/z found 534.0647; **IR** ν_{max} (ATR)/cm^{-1}:2929, 2865, 1481, 1373, 1054, 835.

LLAMA and principle moments of inertia (PMI) analysis for DOC and SuFEx libraries

LLAMA (Lead-Likeness and Molecular Analysis) is an open access tool for assessing the lead-likeness and novelty of molecular scaffolds where the plot possesses a lead-like chemical space (Alog P of -1 to 3 and RMM of 200 to 350) and a 'Lipinski' space (Alog P <5 and RMM <500). Using a set of criteria each molecule or scaffold is also given a lead-likeness penalty. The lead-likeness penalty is a measure of how far outside lead-like space a compound lies. For each of the key properties (heavy atom count, AlogP, number of aromatic rings and an undesirable functional group filter) the compound gains penalty points dependent on how far outside the ideal space it lies. The overall score is the sum of these individual penalties (for more information on the scoring criteria see Colomer *et al.*, 2016).[20]

Using the LLAMA package the principal moments of inertia (PMI) of each molecule can also be determined to assess the shape distribution of a library. The three vertices of the triangular plot represent the extremes of molecular geometry. The top left-hand corner represents a linear molecule (diacetylene), the top right-hand corner represents a spherical molecule (adamantane) and the bottom corner represents a disc-like molecule (benzene). To generate the PMI coordinates for each molecule, the system randomly generates a number of 3D conformers, minimises their energy and selects the lowest-energy conformer. The system then calculates the moments of inertia in the *x*, *y* and *z* axes. The PMI plot I1 coordinates are calculated by dividing inertia(*x*) by inertia(*z*). The I2 coordinates are calculated by dividing inertia(*y*) by inertia(*z*).[21]

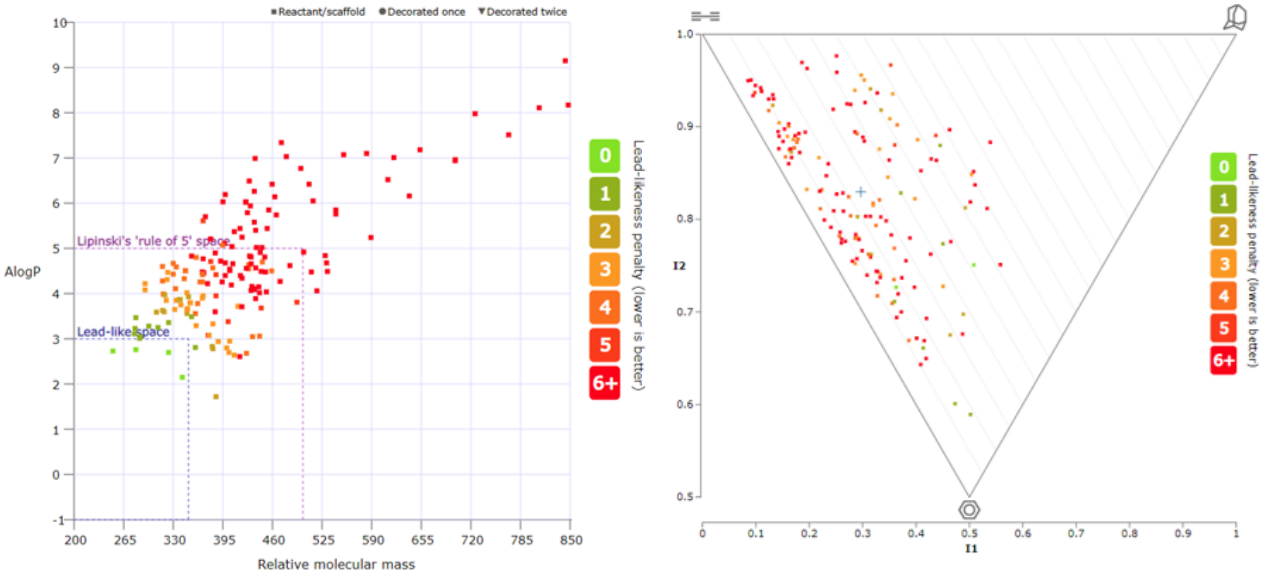


Figure S1. Lead-likeness analysis and PMI analysis of the DOC library using the LLAMA software package.

Of the 173 DOC compounds (Figure S-1) 2.30% were deemed to be in lead-like chemical space with 68.0% in 'Lipinski' space; indicating that the majority of the library could be considered 'drug-like'. A principle moment of inertia (PMI) plot for the library suggests that the majority of the library lies between the linear (diacetylene) and the flat disc-like (benzene) sections— this is inherently related to the nature of the cycloaddition reactions and the sp^2 rich products. In comparison, the sulfonate modification compound library 0% were deemed to be

in lead-like chemical space and 28.3% in 'Lipinski' space, most likely due to the increase in molecular weight and the addition of an extra ring through SuFEx modification. The sulfonate products however, had a more diverse PMI compared to the DOC library and can be used to increase the 3D nature of the library.

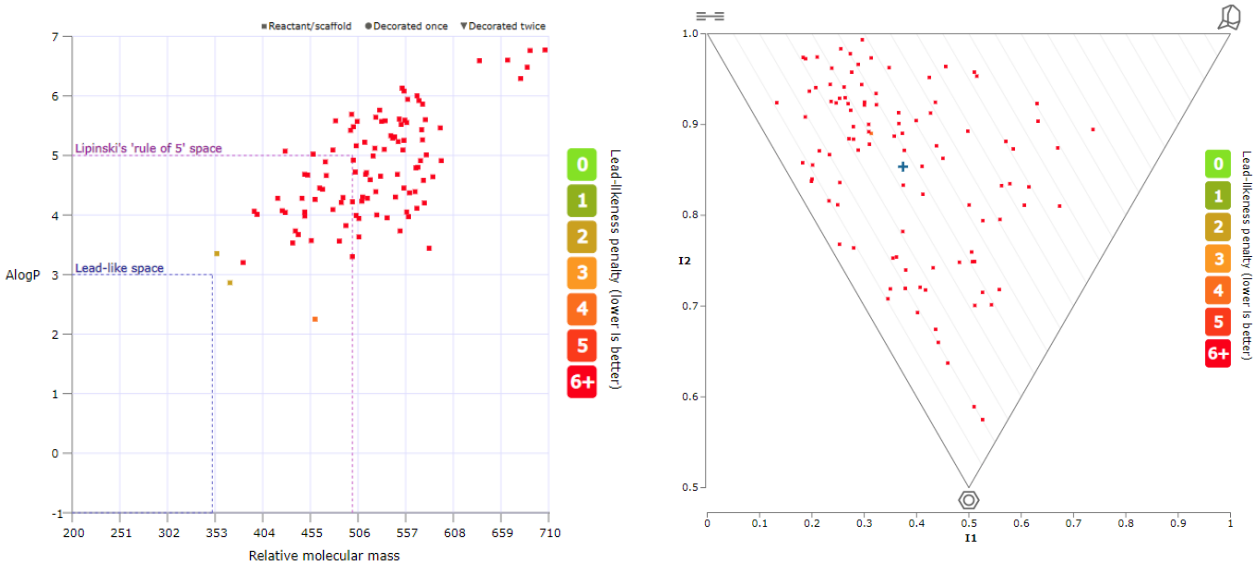
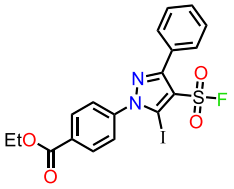
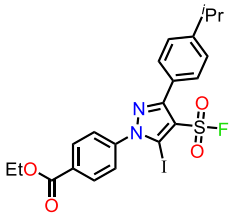
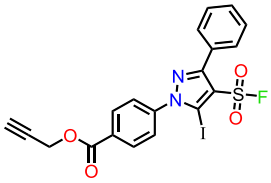
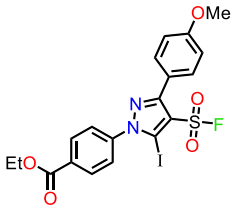
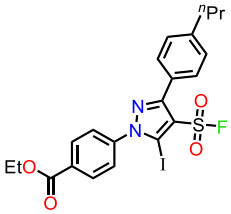
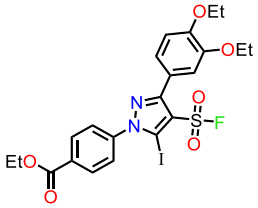
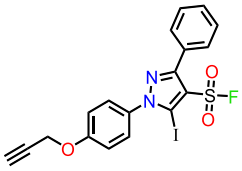
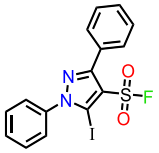
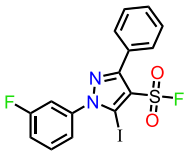
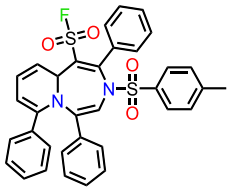


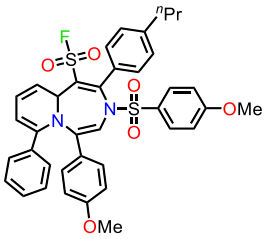
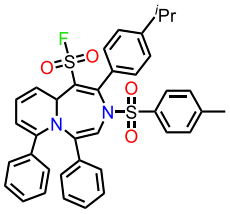
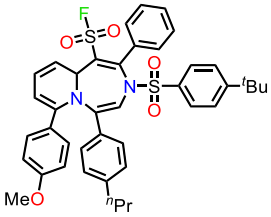
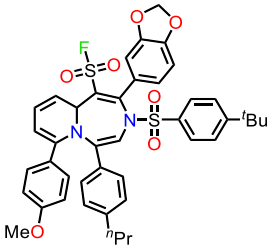
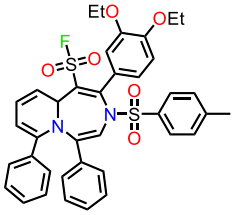
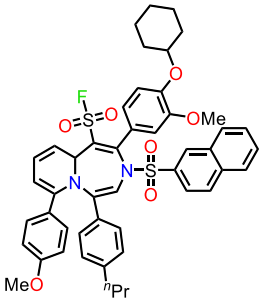
Figure S2. Lead-likeness analysis and PMI analysis of the sulfonate library using the LLAMA software package.

Antibacterial assays and method

Effects of molecules on bacterial growth and minimum inhibitory concentrations (MIC) were determined as described previously,[22,23] using a modified CLSI microbroth dilution method in 100 µL of Mueller Hinton broth containing 2-fold dilutions of molecules with 2% DMSO at the highest concentration. DMSO vehicle or methicillin were used as controls. The MIC was defined as the lowest concentration of molecules that resulted in no increase in growth relative to background at 24 hours.

Table 1. Hit compounds after screening **4a-h** and **4k-l** library originally at 200 µM, followed by the determination of MICs

#	Structure	MIC (*Staphylococcus aureus* USA300)	#	Structure	MIC (*Staphylococcus aureus* USA300)
	Methicillin	5.00 µg/mL			
4ea		0.625 µg/mL	**4ef**		5.00 µg/mL
4eb		0.625 µg/mL	**4eg**		5.00 µg/mL
4ec		2.50 µg/mL	**4eh**		5.00-10.0 µg/mL
4ed		1.25 µg/mL	**4ei**		~20.0 µg/mL
4ee		0.625 µg/mL	**4ka**		>40.0 µg/mL (100 µM)

4kb		40.0 μg/mL	**4ke**		40.0 μg/mL
4kc		20.0 μg/mL	**4kf**		40.0 μg/mL
4kd		>40.0 μg/mL (100 μM)	**4kg**		>40.0 μg/mL (100 μM)

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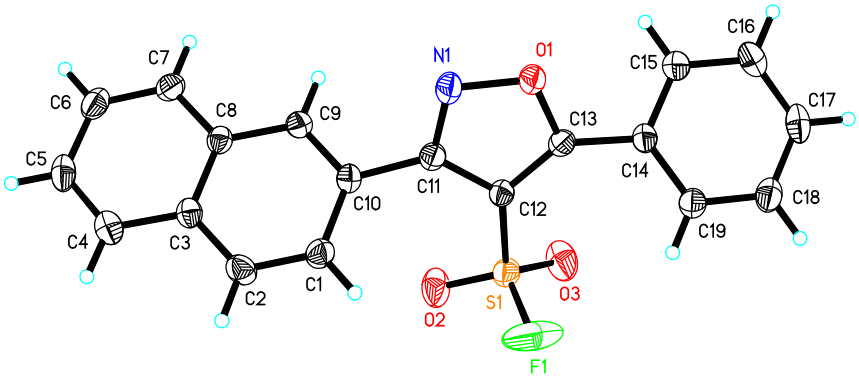
X-ray crystallography data

X-ray data of structure **4aa** (CCDC1983970)



Datablock: d8v19481

Bond precision: C-C = 0.0041 A Wavelength=0.71073

Cell: a=6.0654(9) b=14.541(3) c=18.061(3)
alpha=90 beta=90.981(4) gamma=90

Temperature: 293 K

	Calculated	Reported
Volume	1592.7(5)	1592.7(4)
Space group	P 21/n	P 21/n
Hall group	-P 2yn	-P 2yn
Moiety formula	C19 H12 F N O3 S	?
Sum formula	C19 H12 F N O3 S	C19 H12 F N O3 S
Mr	353.36	353.36
Dx,g cm-3	1.474	1.474
Z	4	4
Mu (mm-1)	0.233	0.233
F000	728.0	728.0
F000'	728.87	
h,k,lmax	7,17,21	7,17,21
Nref	2961	2954
Tmin,Tmax	0.959,0.975	0.658,0.746
Tmin'	0.959	

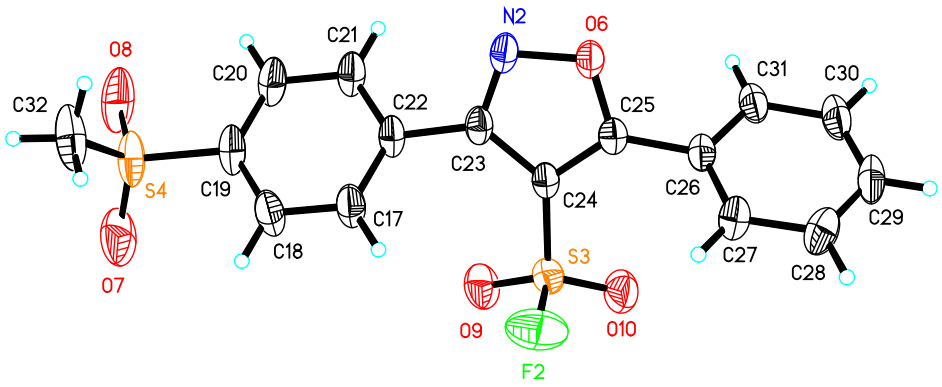
Correction method= # Reported T Limits: Tmin=0.658 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.998 Theta(max)= 25.496

R(reflections)= 0.0573(2245) wR2(reflections)= 0.1469(2954)

S = 1.081 Npar= 226

X-ray data of structure 4aq (CCDC1983972)



Datablock: mo_d8v19492_0m

Bond precision: C-C = 0.0036 A Wavelength=0.71073

Cell: a=7.8645(3) b=15.0207(6) c=15.6640(6)
alpha=68.380(1) beta=75.602(1) gamma=86.551(1)

Temperature: 293 K

	Calculated	Reported
Volume	1665.17(11)	1665.17(11)
Space group	P -1	P -1
Hall group	-P 1	-P 1
Moiety formula	C16 H12 F N O5 S2	?
Sum formula	C16 H12 F N O5 S2	C16 H12 F N O5 S2
Mr	381.39	381.39
Dx,g cm-3	1.521	1.521
Z	4	4
Mu (mm-1)	0.358	0.358
F000	784.0	784.0
F000'	785.42	
h,k,lmax	9,18,19	9,18,19
Nref	6552	6509
Tmin,Tmax	0.942,0.965	0.665,0.746
Tmin'	0.934	

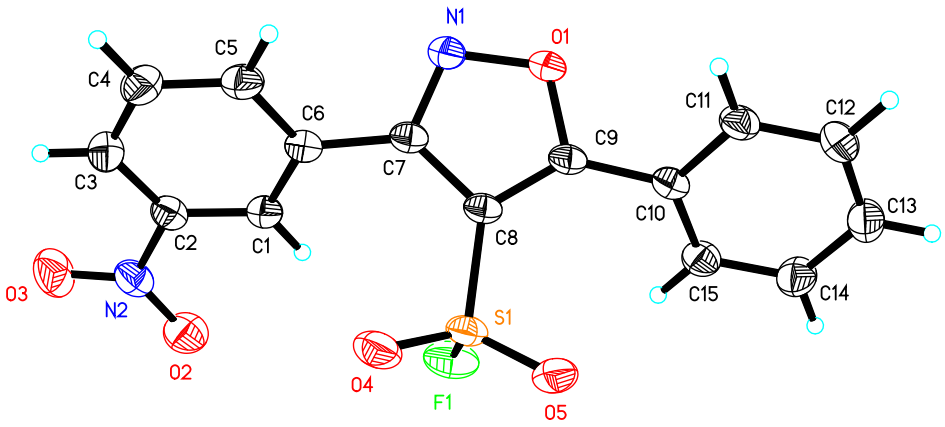
Correction method= # Reported T Limits: Tmin=0.665 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.993 Theta(max)= 25.997

R(reflections)= 0.0444(5152) wR2(reflections)= 0.1227(6509)

S = 1.045 Npar= 453

X-ray data of structure 4as (CCDC1983971)



Datablock: mo_d8v19491_0m

Bond precision: C-C = 0.0028 A Wavelength=0.71073

Cell: a=8.5194(2) b=11.1364(3) c=15.8544(3)
alpha=90 beta=101.678(1) gamma=90

Temperature: 293 K

	Calculated	Reported
Volume	1473.06(6)	1473.06(6)
Space group	P 21/c	P 21/c
Hall group	-P 2ybc	-P 2ybc
Moiety formula	C15 H9 F N2 O5 S	?
Sum formula	C15 H9 F N2 O5 S	C15 H9 F N2 O5 S
Mr	348.30	348.30
Dx,g cm-3	1.571	1.571
Z	4	4
Mu (mm-1)	0.262	0.262
F000	712.0	712.0
F000'	712.92	
h,k,lmax	10,13,19	10,13,19
Nref	2902	2887
Tmin,Tmax	0.957,0.974	0.653,0.746
Tmin'	0.954	

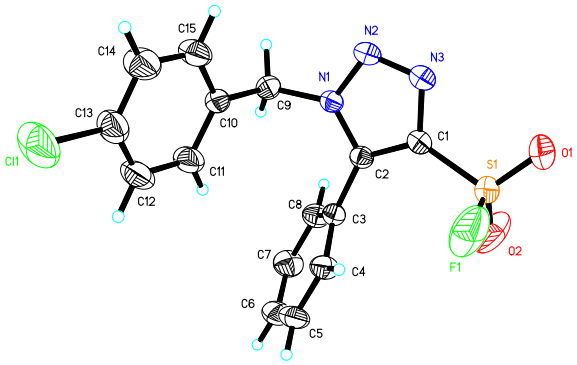
Correction method= # Reported T Limits: Tmin=0.653 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.995 Theta(max)= 25.997

R(reflections)= 0.0369(2366) wR2(reflections)= 0.1017(2887)

S = 1.066 Npar= 218

X-ray data of structure 4ca (CCDC1983969)



Datablock: mo_d8v191015_0m

Bond precision:	C-C = 0.0051 A		Wavelength=0.71073
Cell:	a=25.8046(10)	b=14.9084(7)	c=8.5482(4)
	alpha=90	beta=105.211(1)	gamma=90
Temperature:	293 K		

	Calculated	Reported
Volume	3173.3(2)	3173.3(2)
Space group	C 2/c	C 2/c
Hall group	-C 2yc	-C 2yc
Moiety formula	C15 H11 Cl F N3 O2 S	?
Sum formula	C15 H11 Cl F N3 O2 S	C15 H11 Cl F N3 O2 S
Mr	351.78	351.78
Dx,g cm-3	1.473	1.473
Z	8	8
Mu (mm-1)	0.394	0.394
F000	1440.0	1440.0
F000'	1442.79	
h,k,lmax	31,18,10	31,18,10
Nref	3125	3105
Tmin,Tmax	0.936,0.958	0.654,0.746
Tmin'	0.935	

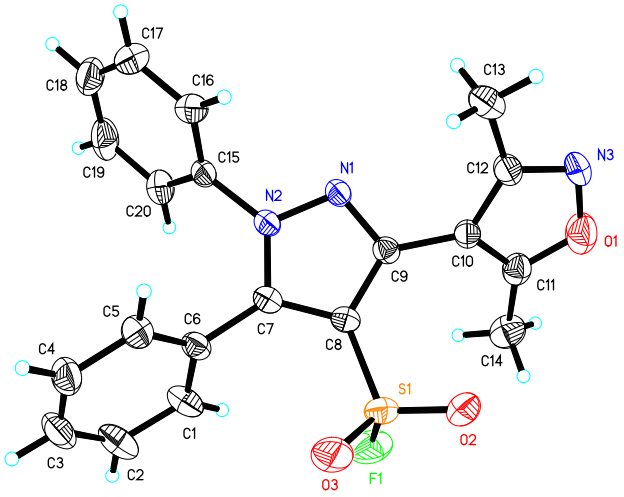
Correction method= # Reported T Limits: Tmin=0.654 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.994 Theta(max)= 25.990

R(reflections)= 0.0610(2364) wR2(reflections)= 0.1806(3105)

S = 1.037 Npar= 208

X-ray data of structure 4db (CCDC1983973)



Datablock: mo_d8v19493_0m

Bond precision: C-C = 0.0042 A Wavelength=0.71073

Cell: a=39.5801(10) b=11.7992(3) c=17.4500(4)
alpha=90 beta=109.001(1) gamma=90

Temperature: 293 K

	Calculated	Reported
Volume	7705.4(3)	7705.3(3)
Space group	C 2/c	C 2/c
Hall group	-C 2yc	-C 2yc
Moiety formula	C20 H16 F N3 O3 S	?
Sum formula	C20 H16 F N3 O3 S	C20 H16 F N3 O3 S
Mr	397.42	397.42
Dx,g cm-3	1.370	1.370
Z	16	16
Mu (mm-1)	0.203	0.203
F000	3296.0	3296.0
F000'	3299.56	
h,k,lmax	48,14,21	48,14,21
Nref	7589	7568
Tmin,Tmax	0.964,0.978	0.605,0.746
Tmin'	0.960	

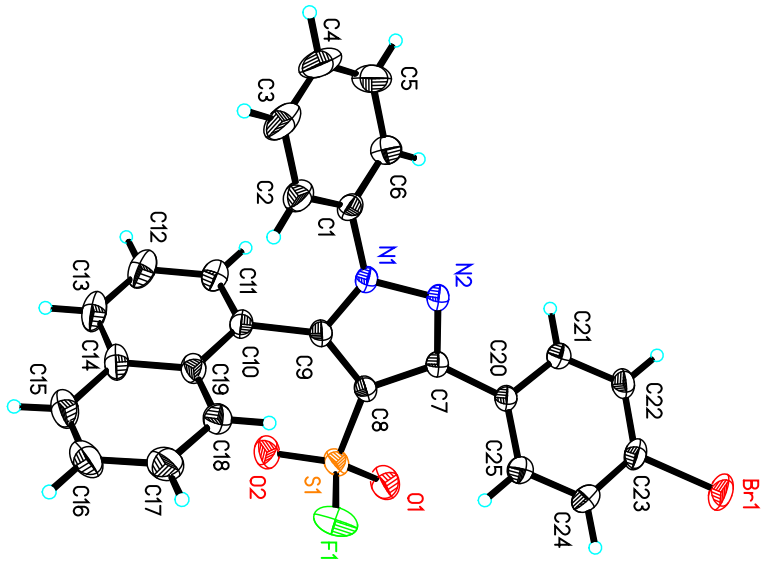
Correction method= # Reported T Limits: Tmin=0.605 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.997 Theta(max)= 26.000

R(reflections)= 0.0538(5736) wR2(reflections)= 0.1542(7568)

S = 1.026 Npar= 518

X-ray data of structure 4dh (CCDC1983977)



Datablock: mo_d8v19487_0m

Bond precision: C-C = 0.0043 A Wavelength=0.71073

Cell: a=10.0429(4) b=10.1977(5) c=11.6072(5)
alpha=96.715(2) beta=111.783(1) gamma=91.036(2)

Temperature: 293 K

	Calculated	Reported
Volume	1093.85(8)	1093.85(8)
Space group	P -1	P -1
Hall group	-P 1	-P 1
Moiety formula	C25 H16 Br F N2 O2 S	?
Sum formula	C25 H16 Br F N2 O2 S	C25 H16 Br F N2 O2 S
Mr	507.36	507.37
Dx,g cm-3	1.540	1.540
Z	2	2
Mu (mm-1)	2.009	2.009
F000	512.0	512.0
F000'	511.88	
h,k,lmax	12,12,14	12,12,14
Nref	4297	4254
Tmin,Tmax	0.732,0.818	0.587,0.746
Tmin'	0.718	

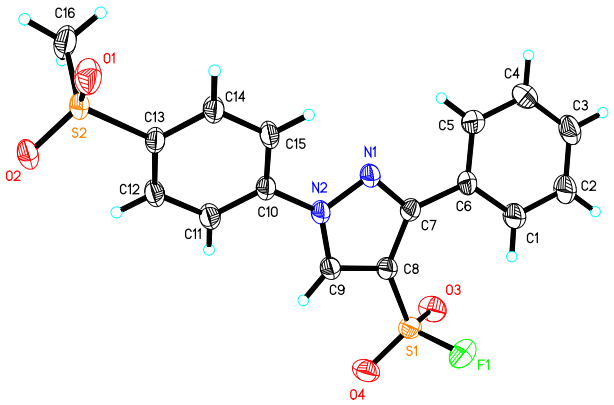
Correction method= # Reported T Limits: Tmin=0.587 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.990 Theta(max)= 25.999

R(reflections)= 0.0363(3279) wR2(reflections)= 0.0951(4254)

S = 1.026 Npar= 290

X-ray data of structure 4en (CCDC1983974)



Datablock: mo_d8v19490_0m

Bond precision: C-C = 0.0052 A Wavelength=0.71073

Cell: a=4.9232(4) b=10.7857(9) c=15.7702(14)
alpha=91.102(3) beta=95.522(3) gamma=93.169(3)

Temperature: 293 K

	Calculated	Reported
Volume	831.99(12)	831.99(12)
Space group	P -1	P -1
Hall group	-P 1	-P 1
Moiety formula	C16 H13 F N2 O4 S2	?
Sum formula	C16 H13 F N2 O4 S2	C16 H13 F N2 O4 S2
Mr	380.40	380.40
Dx,g cm-3	1.518	1.518
Z	2	2
Mu (mm-1)	0.355	0.355
F000	392.0	392.0
F000'	392.69	
h,k,lmax	5,13,19	5,13,19
Nref	3079	3057
Tmin,Tmax	0.950,0.975	0.617,0.746
Tmin'	0.931	

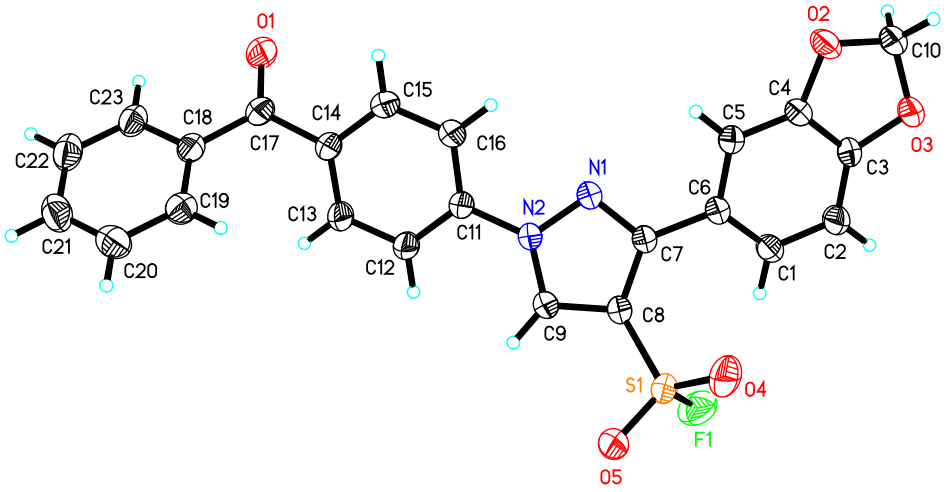
Correction method= # Reported T Limits: Tmin=0.617 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.993 Theta(max)= 25.499

R(reflections)= 0.0573(2480) wR2(reflections)= 0.1739(3057)

S = 1.091 Npar= 227

X-ray data of structure 4ey (CCDC1983976)



Datablock: mo_d8v19489_0m

Bond precision: C-C = 0.0033 A Wavelength=0.71073

Cell: a=12.2503(8) b=12.4284(10) c=14.2741(11)
alpha=90 beta=110.834(2) gamma=90

Temperature: 293 K

	Calculated	Reported
Volume	2031.2(3)	2031.2(3)
Space group	P 21/n	P 21/n
Hall group	-P 2yn	-P 2yn
Moiety formula	C23 H15 F N2 O5 S	?
Sum formula	C23 H15 F N2 O5 S	C23 H15 F N2 O5 S
Mr	450.43	450.43
Dx,g cm-3	1.473	1.473
Z	4	4
Mu (mm-1)	0.209	0.209
F000	928.0	928.0
F000'	929.00	
h,k,lmax	15,15,17	15,15,17
Nref	3991	3984
Tmin,Tmax	0.961,0.973	0.598,0.746
Tmin'	0.959	

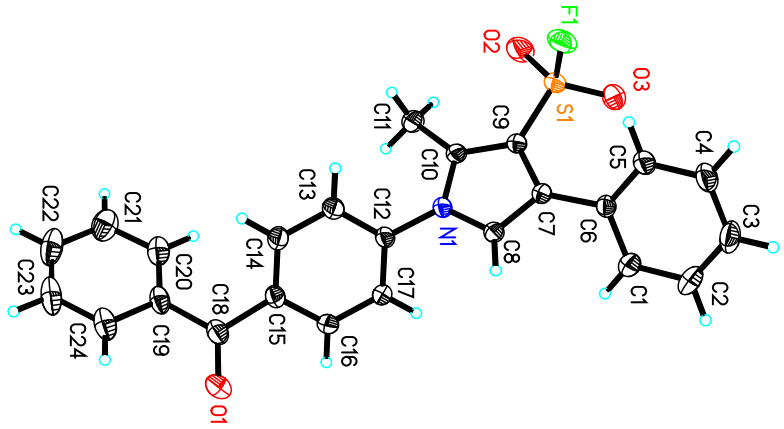
Correction method= # Reported T Limits: Tmin=0.598 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.998 Theta(max)= 25.999

R(reflections)= 0.0429(2951) wR2(reflections)= 0.1190(3984)

S = 1.017 Npar= 290

X-ray data of structure 4fg (CCDC1983975)



Datablock: mo_d8v19488_0m

Bond precision: C-C = 0.0028 A Wavelength=0.71073

Cell: a=7.8823(2) b=10.9580(3) c=12.2338(3)
alpha=78.789(1) beta=76.764(1) gamma=83.985(1)

Temperature: 293 K

	Calculated	Reported
Volume	1006.97(5)	1006.97(5)
Space group	P -1	P -1
Hall group	-P 1	-P 1
Moiety formula	C24 H18 F N O3 S	?
Sum formula	C24 H18 F N O3 S	C24 H18 F N O3 S
Mr	419.45	419.45
Dx,g cm-3	1.383	1.383
Z	2	2
Mu (mm-1)	0.196	0.196
F000	436.0	436.0
F000'	436.46	
h,k,lmax	9,13,15	9,13,15
Nref	3958	3916
Tmin,Tmax	0.970,0.981	0.680,0.746
Tmin'	0.969	

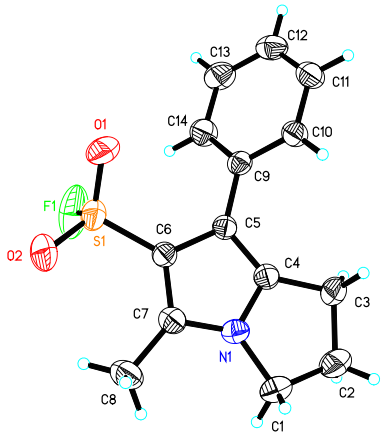
Correction method= # Reported T Limits: Tmin=0.680 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.989 Theta(max)= 25.996

R(reflections)= 0.0409(3227) wR2(reflections)= 0.1121(3916)

S = 1.033 Npar= 273

X-ray data of structure 4ga (CCDC1983978)



Datablock: mo_d8v191016_0m

Bond precision: C-C = 0.0038 A Wavelength=0.71073

Cell: a=8.2800(5) b=16.9766(11) c=9.6583(6)
alpha=90 beta=101.364(2) gamma=90

Temperature: 293 K

	Calculated	Reported
Volume	1331.02(14)	1331.01(14)
Space group	P 21/c	P 21/c
Hall group	-P 2ybc	-P 2ybc
Moiety formula	C14 H14 F N O2 S	?
Sum formula	C14 H14 F N O2 S	C14 H14 F N O2 S
Mr	279.32	279.32
Dx,g cm-3	1.394	1.394
Z	4	4
Mu (mm-1)	0.252	0.252
F000	584.0	584.0
F000'	584.78	
h,k,lmax	10,20,11	10,20,11
Nref	2603	2591
Tmin,Tmax	0.956,0.973	0.674,0.746
Tmin'	0.956	

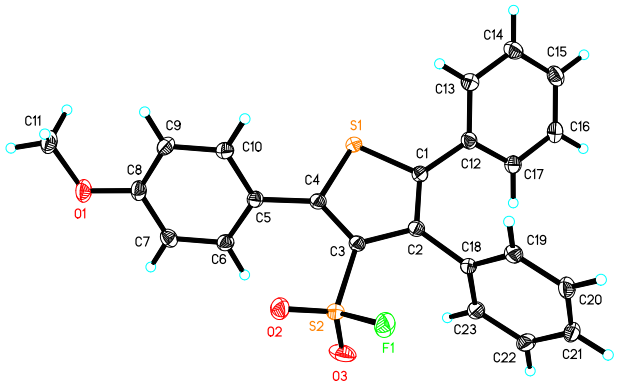
Correction method= # Reported T Limits: Tmin=0.674 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.995 Theta(max)= 25.994

R(reflections)= 0.0500(2013) wR2(reflections)= 0.1484(2591)

S = 1.064 Npar= 173

X-ray data of structure 4hb (CCDC1983963)



Datablock: d8v191004

Bond precision:	C-C = 0.0025 A		Wavelength=0.71073
Cell:	a=14.8154(7)	b=12.1306(6)	c=12.0053(6)
	alpha=90	beta=113.789(1)	gamma=90
Temperature:	193 K		

	Calculated	Reported
Volume	1974.27(17)	1974.27(17)
Space group	P 21/c	P 21/c
Hall group	-P 2ybc	-P 2ybc
Moiety formula	C23 H17 F O3 S2	?
Sum formula	C23 H17 F O3 S2	C23 H17 F O3 S2
Mr	424.49	424.48
Dx,g cm-3	1.428	1.428
Z	4	4
Mu (mm-1)	0.302	0.301
F000	880.0	880.0
F000'	881.41	
h,k,lmax	18,14,14	18,14,14
Nref	3883	3877
Tmin,Tmax	0.947,0.965	0.646,0.746
Tmin'	0.947	

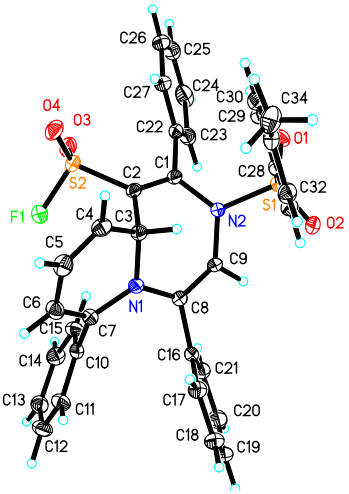
Correction method= # Reported T Limits: Tmin=0.646 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.998 Theta(max)= 25.997

R(reflections)= 0.0332(3449) wR2(reflections)= 0.0835(3877)

S = 1.060 Npar= 263

X-ray data of structure 4ka (CCDC1983965)



Datablock: mo_d8v191009_0m

Bond precision: C-C = 0.0031 A Wavelength=0.71073

Cell: a=9.3192(2) b=29.3986(8) c=10.7679(3)
alpha=90 beta=102.820(1) gamma=90

Temperature: 193 K

	Calculated	Reported
Volume	2876.56(13)	2876.56(13)
Space group	P 21/n	P 21/n
Hall group	-P 2yn	-P 2yn
Moiety formula	C34 H27 F N2 O4 S2	?
Sum formula	C34 H27 F N2 O4 S2	C34 H27 F N2 O4 S2
Mr	610.70	610.69
Dx,g cm-3	1.410	1.410
Z	4	4
Mu (mm-1)	0.235	0.235
F000	1272.0	1272.0
F000'	1273.56	
h,k,lmax	11,36,13	11,36,13
Nref	5654	5621
Tmin,Tmax	0.959,0.970	0.673,0.746
Tmin'	0.959	

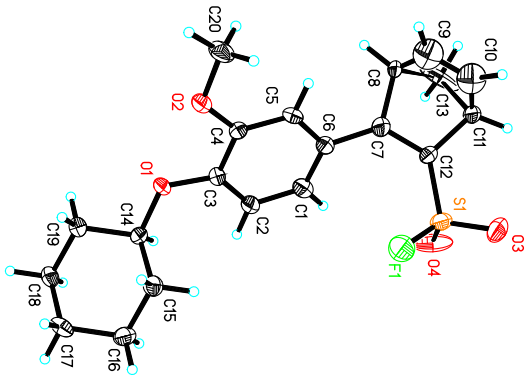
Correction method= # Reported T Limits: Tmin=0.673 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 0.994 Theta(max)= 26.000

R(reflections)= 0.0405(4618) wR2(reflections)= 0.1024(5621)

S = 1.027 Npar= 390

X-ray data of structure 4lg (CCDC1983966)



Datablock: d8v191012

Bond precision:	C-C = 0.0109 A		Wavelength=0.71073
Cell:	a=13.6756(6)	b=14.5111(6)	c=9.2765(4)
	alpha=90	beta=98.364(1)	gamma=90
Temperature:	193 K		

	Calculated	Reported
Volume	1821.32(14)	1821.32(14)
Space group	P c	P c
Hall group	P -2yc	P -2yc
Moiety formula	C20 H23 F O4 S	?
Sum formula	C20 H23 F O4 S	C20 H23 F O4 S
Mr	378.44	378.44
Dx,g cm-3	1.380	1.380
Z	4	4
Mu (mm-1)	0.210	0.210
F000	800.0	800.0
F000'	800.92	
h,k,lmax	16,17,11	16,17,11
Nref	7163[3590]	7107
Tmin,Tmax	0.963,0.975	0.653,0.746
Tmin'	0.963	

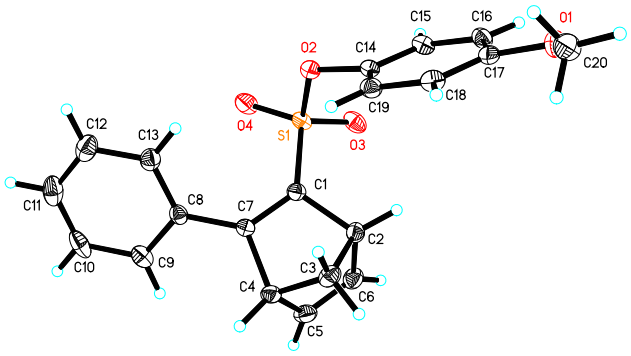
Correction method= # Reported T Limits: Tmin=0.653 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 1.98/0.99 Theta(max)= 25.999

R(reflections)= 0.0532(5726) wR2(reflections)= 0.1322(7107)

S = 1.028 Npar= 472

X-ray data of structure 6l (CCDC1983962)



Datablock: mo_d8v191003_0m

Bond precision: C-C = 0.0048 A Wavelength=0.71073

Cell: a=9.9964(4) b=7.9770(3) c=11.5581(5)
alpha=90 beta=113.947(1) gamma=90

Temperature: 193 K

	Calculated	Reported
Volume	842.32(6)	842.32(6)
Space group	P 21	P 21
Hall group	P 2yb	P 2yb
Moiety formula	C20 H18 O4 S	?
Sum formula	C20 H18 O4 S	C20 H18 O4 S
Mr	354.40	354.40
Dx,g cm-3	1.397	1.397
Z	2	2
Mu (mm-1)	0.214	0.214
F000	372.0	372.0
F000'	372.43	
h,k,lmax	12,9,14	12,9,14
Nref	3131[1687]	2942
Tmin,Tmax	0.967,0.983	0.672,0.746
Tmin'	0.962	

Correction method= # Reported T Limits: Tmin=0.672 Tmax=0.746 AbsCorr = MULTI-SCAN

Data completeness= 1.74/0.94 Theta(max)= 25.497

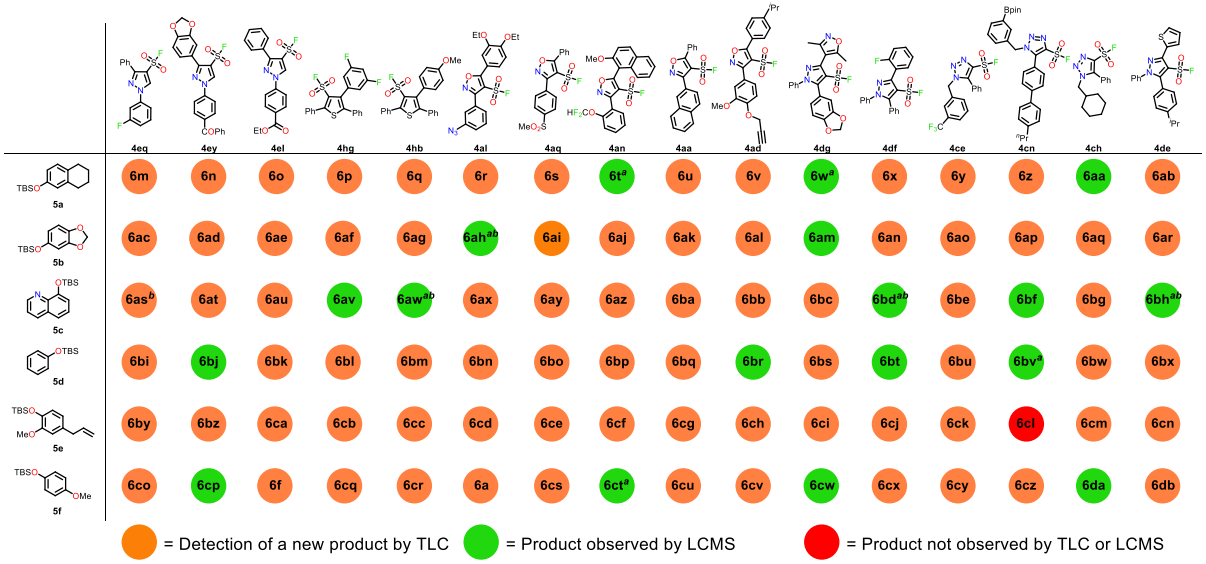
R(reflections)= 0.0317(2758) wR2(reflections)= 0.0718(2942)

S = 1.070 Npar= 228

Experimental procedure for SuFEx reactions performed in a 96 well plate format

Method

Stock solutions of heterocyclic sulfonyl fluorides (**4eq**, **4ey**, **4ei**, **4hg**, **4hb**, **4al**, **4aq**, **4an**, **4aa**, **4ad**, **4dg**, **4df**, **4ce**, **4cn**, **4ch** and **4de**) (3.00 µmol), TBS ethers **5a-5f** (3.00 µmol) and DBU (600 nmol) in MeCN were added to a 96 well plate totalling a volume of 500 µL in each well. The plate was agitated at 310 rpm at room temperature for 16 h and 150 µL aliquots were taken from the reaction mixture and analyzed by LCMS (70-90 % CH_3CN/water 15.9 min) or TLC.



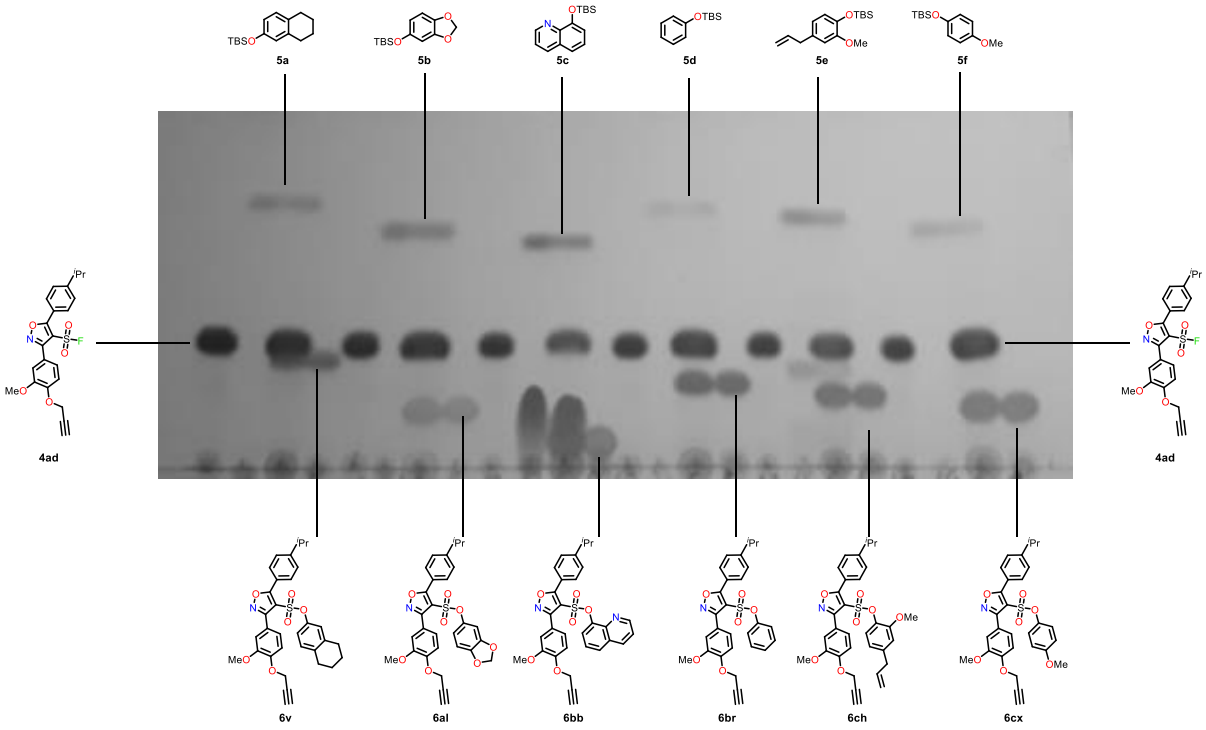
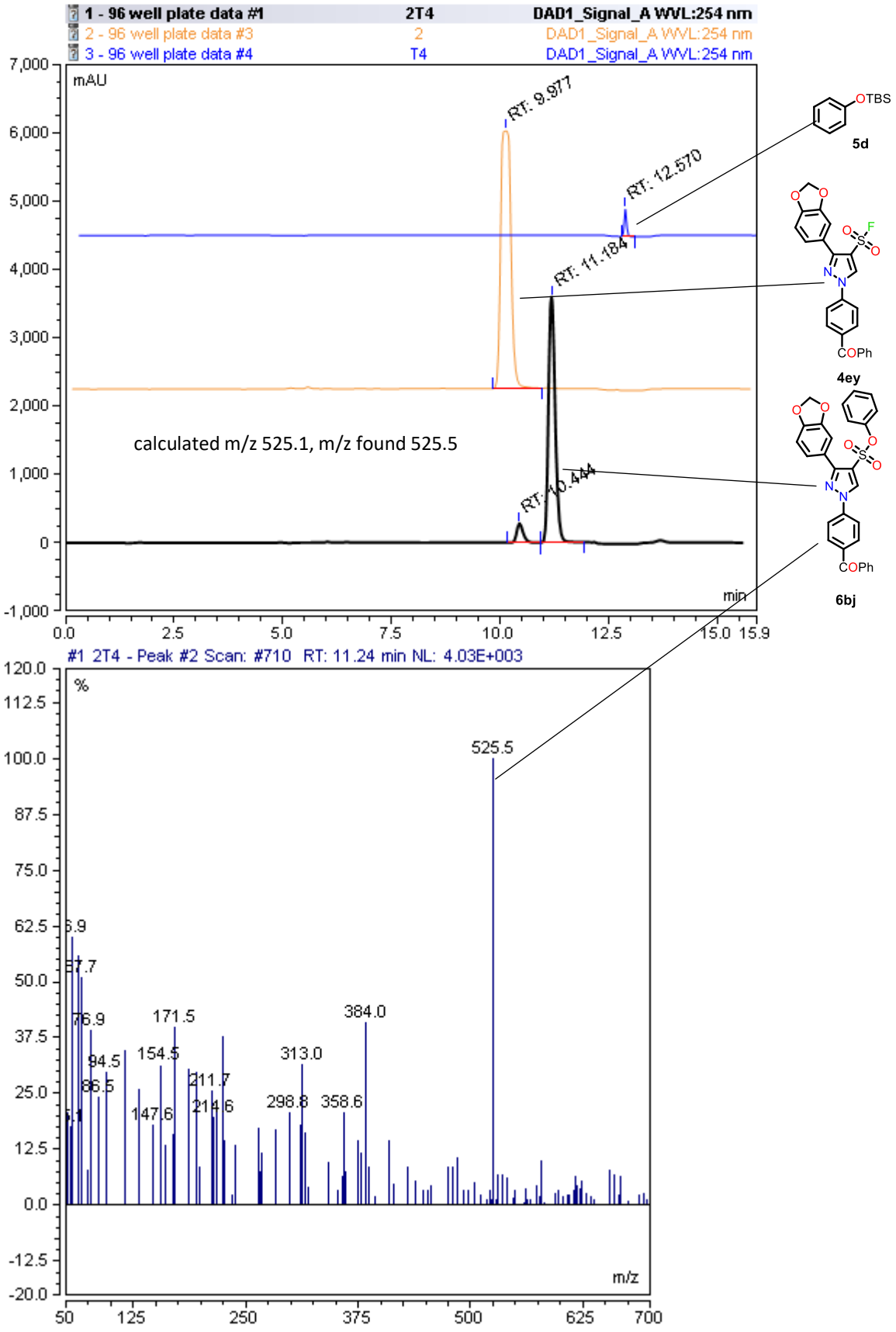
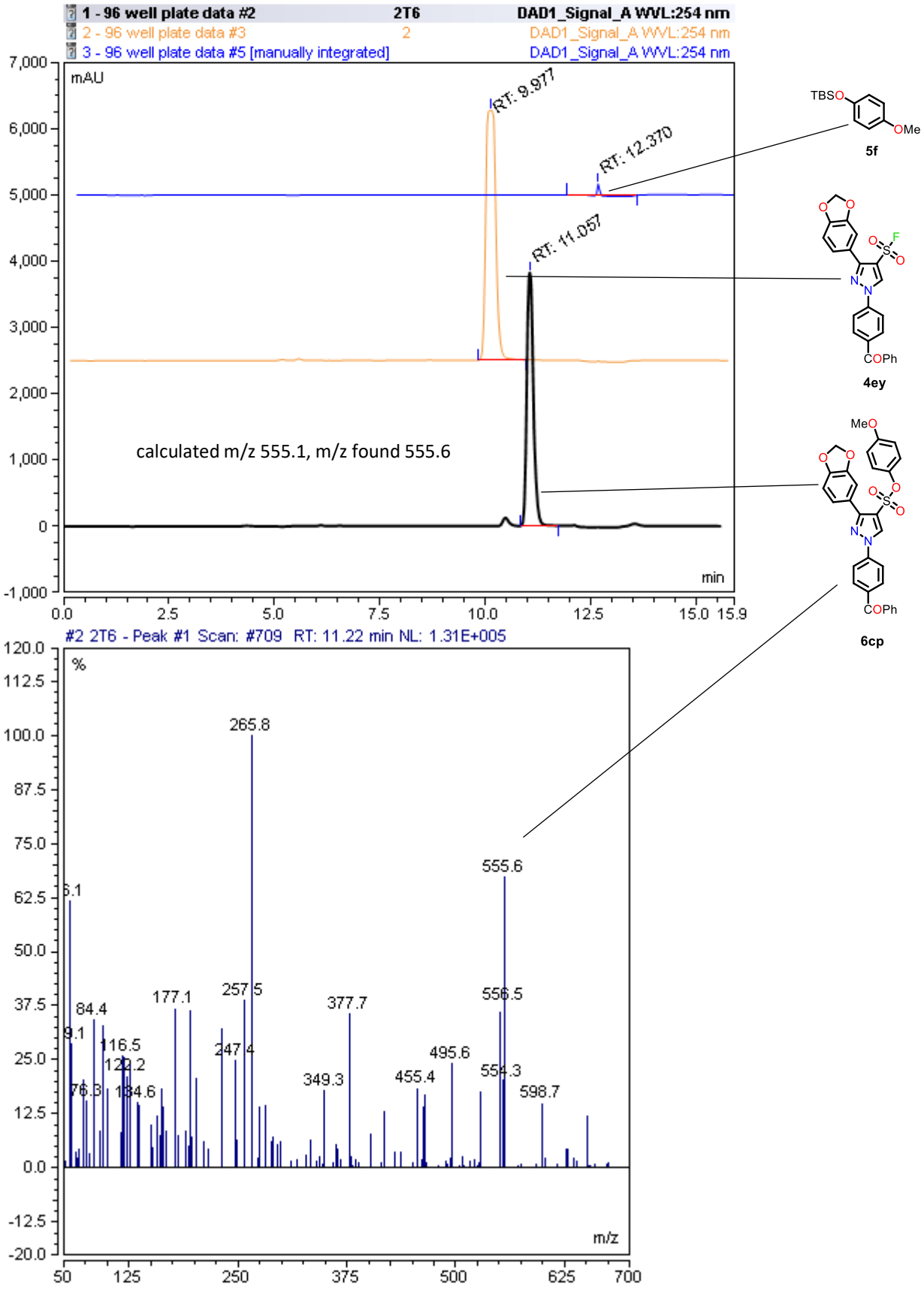
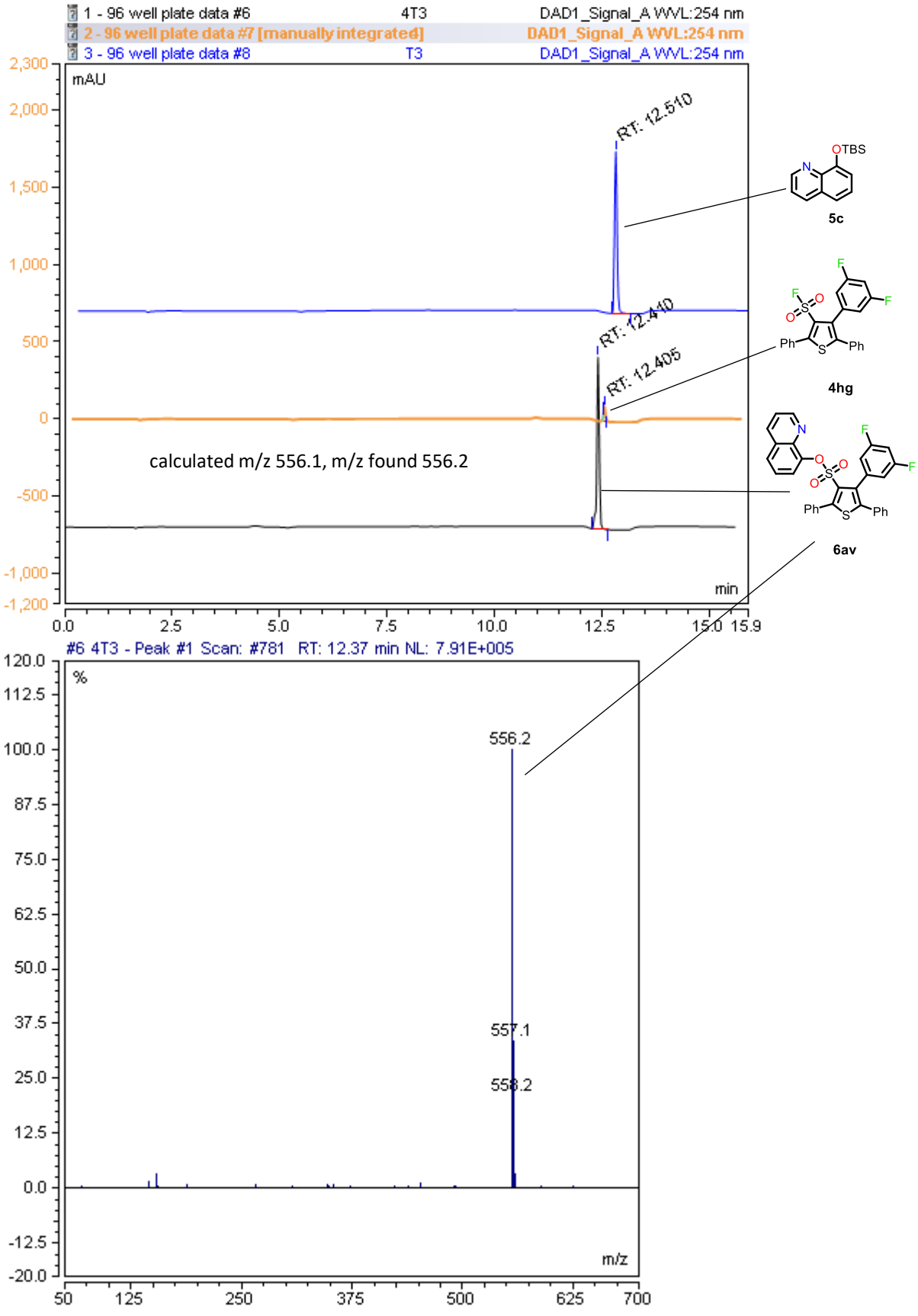
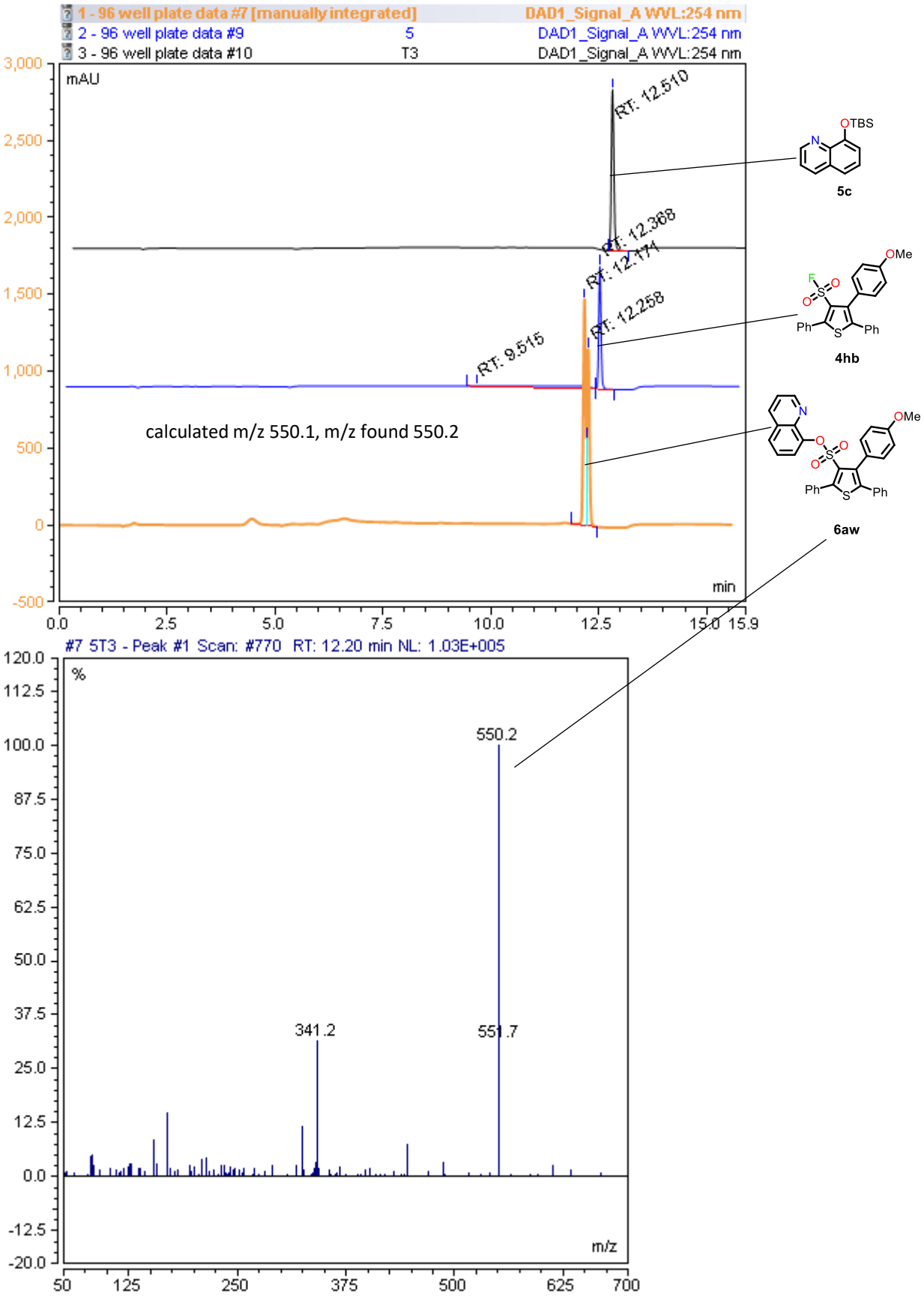


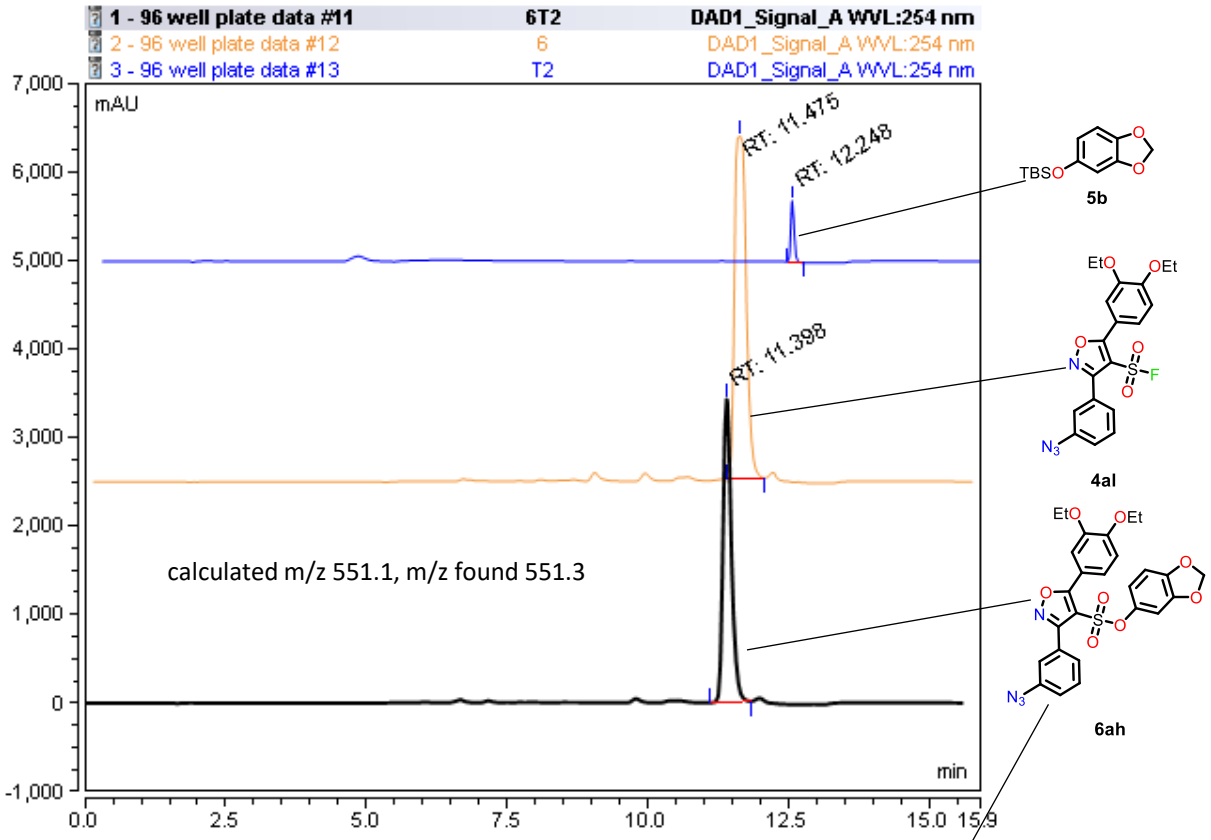
Figure S3. Representative TLC of SuFEx reactions performed in a 96 well plate format, Eluent: 15% EtOAc in petroleum ether

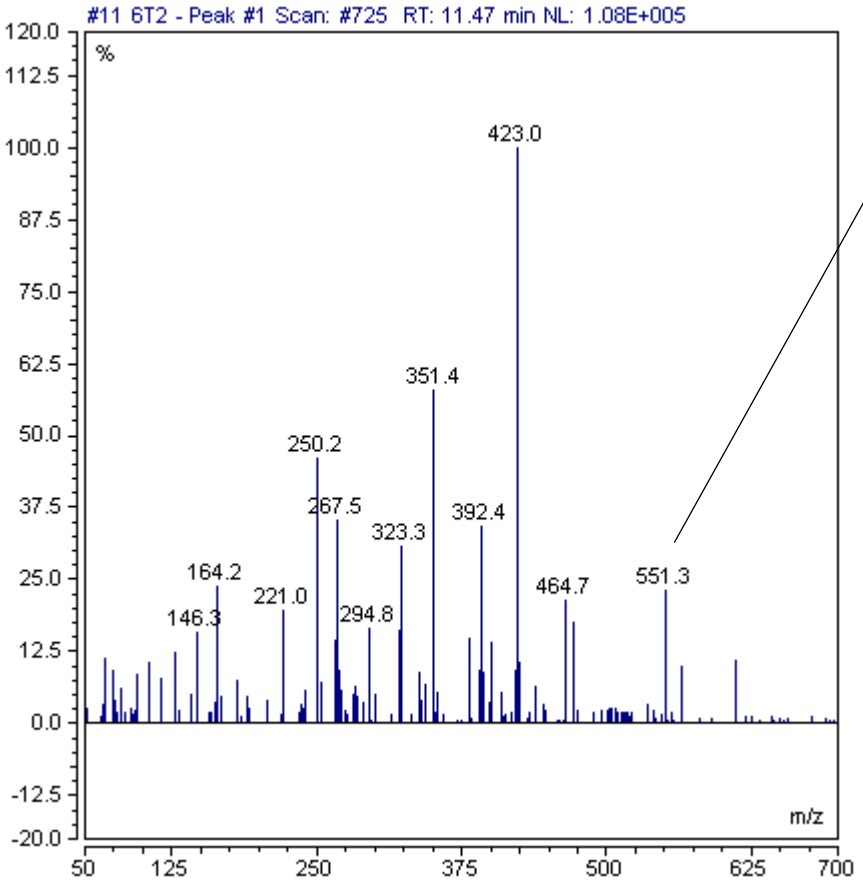

1 - 96 well plate data #1 2T4 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #3 2 DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #4 T4 DAD1_Signal_A WVL:254 nm
mAU
RT: 9.977
RT: 12.570
RT: 11.184
RT: 10.444
calculated m/z 525.1, m/z found 525.5
min
OTBS
5d
F
COPh
4ey
COPh
6bj
#1 2T4 - Peak #2 Scan: #710 RT: 11.24 min NL: 4.03E+003
%
525.5
384.0
313.0
171.5
154.5
94.5
211.7
214.6
298.8
358.6
147.6
m/z

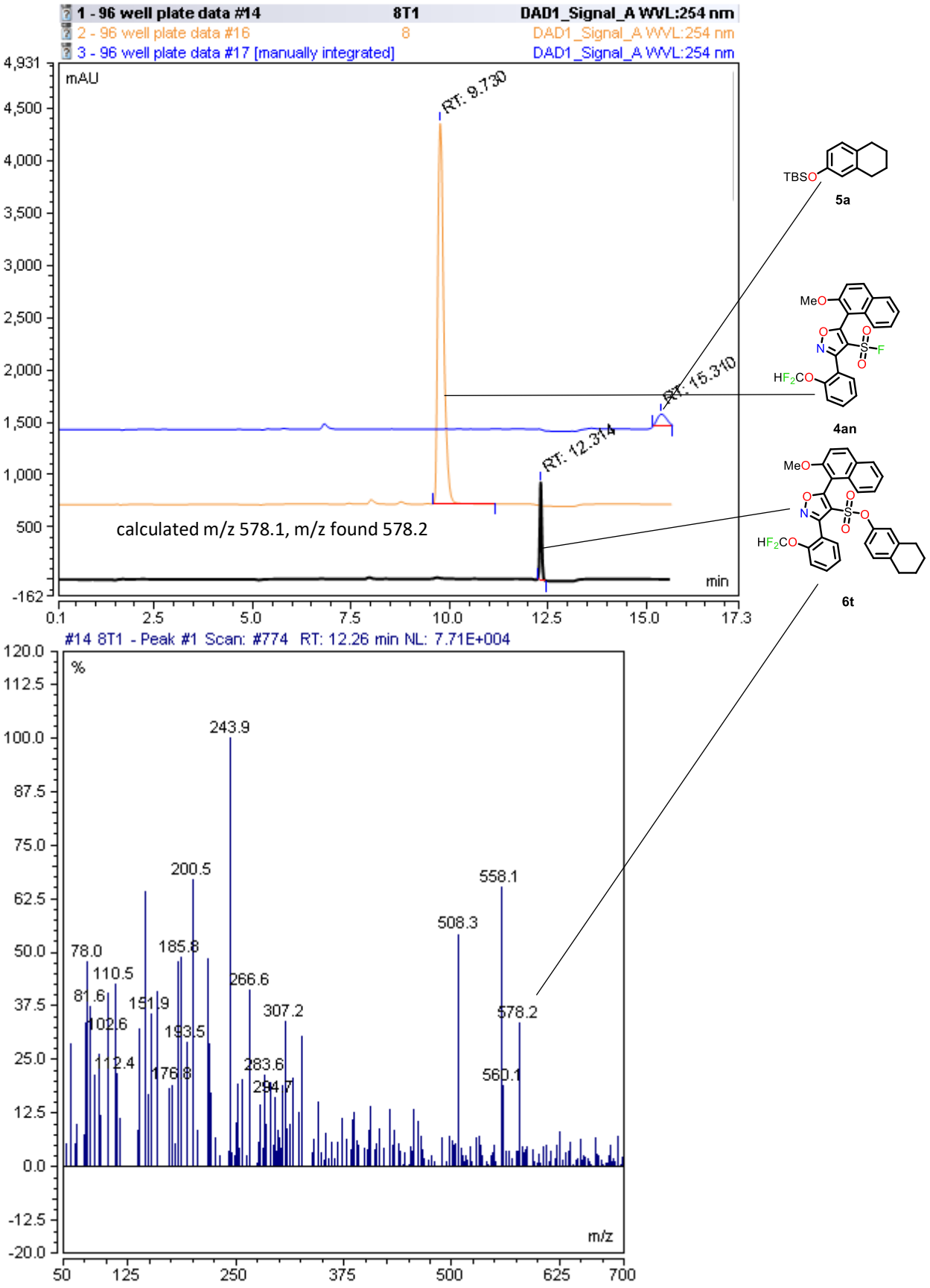

1 - 96 well plate data #2 2T6 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #3 2 DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #5 [manually integrated] DAD1_Signal_A WVL:254 nm
mAU
RT: 9.977
RT: 12.370
RT: 11.057
calculated m/z 555.1, m/z found 555.6
min
TBSO
OMe
5f
F
COPh
4ey
MeO
6cp
#2 2T6 - Peak #1 Scan: #709 RT: 11.22 min NL: 1.31E+005
%
265.8
555.6
177.1
257.5
377.7
556.5
84.4
116.5
247.4
495.6
349.3
455.4
554.3
598.7
m/z

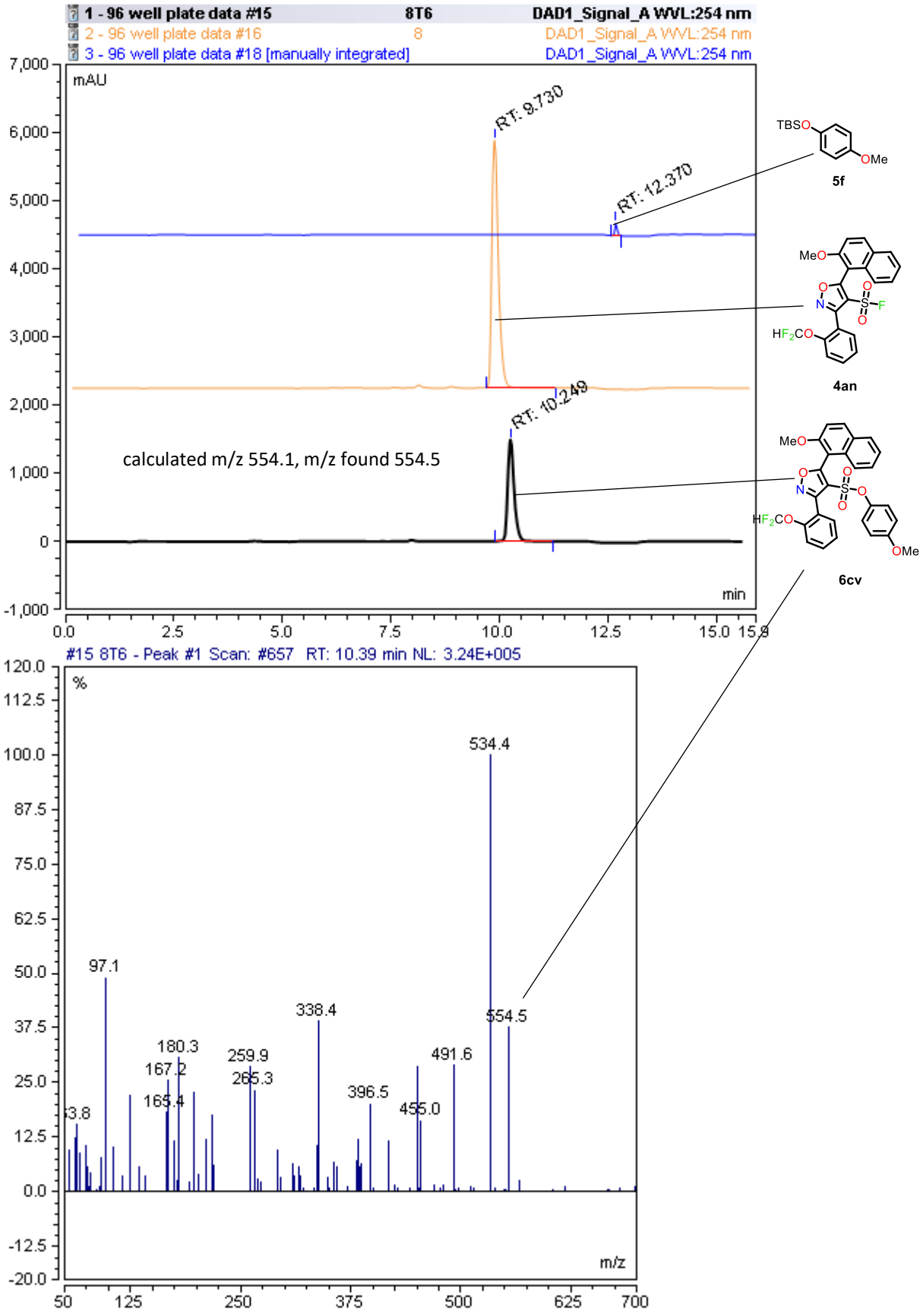

1 - 96 well plate data #6 4T3 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #7 [manually integrated] DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #8 T3 DAD1_Signal_A WVL:254 nm
mAU
RT: 12.510
RT: 12.440
RT: 12.405
calculated m/z 556.1, m/z found 556.2
min
OTBS
5c
4hg
6av
#6 4T3 - Peak #1 Scan: #781 RT: 12.37 min NL: 7.91E+005
%
556.2
557.1
558.2
m/z

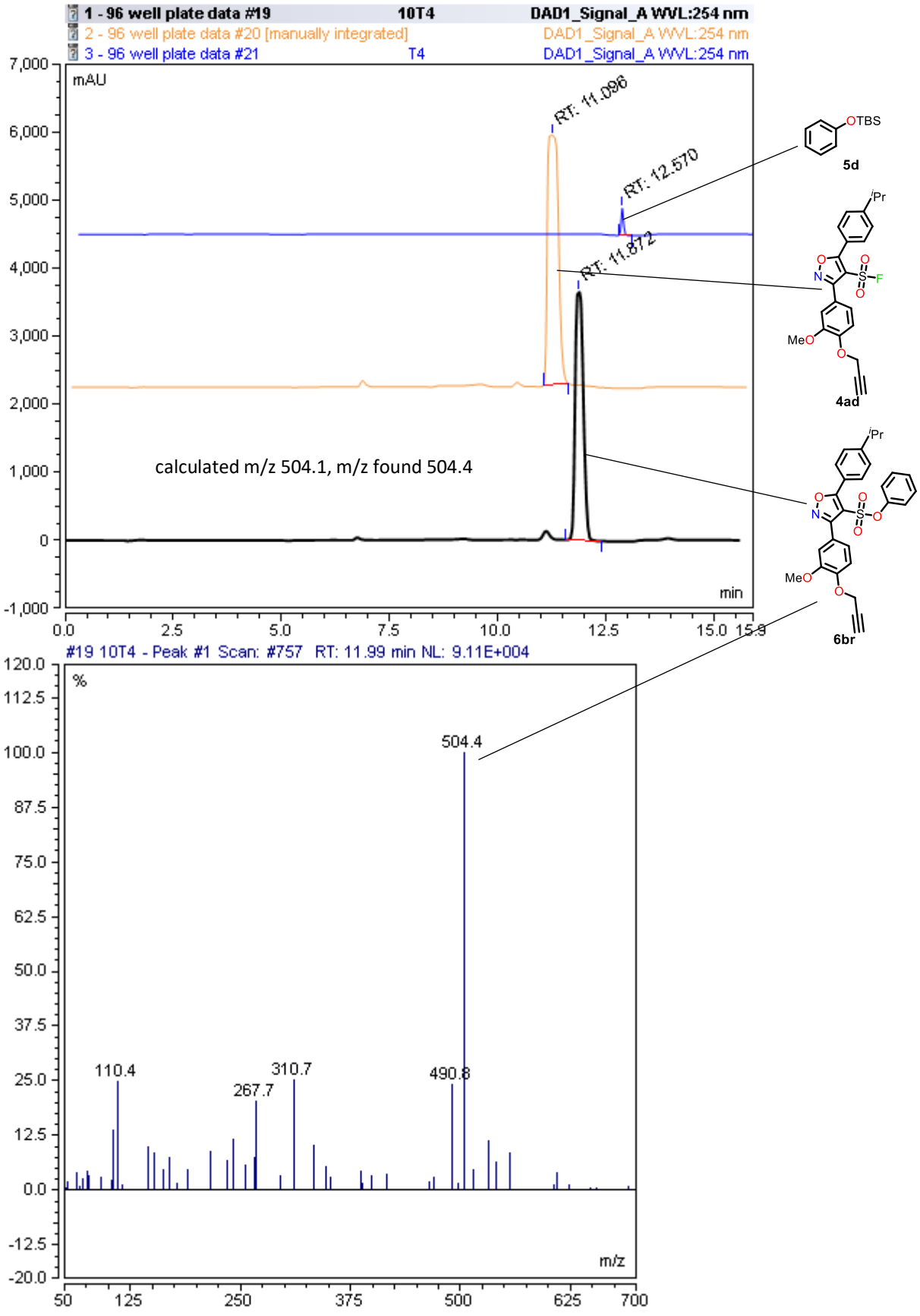

1 - 96 well plate data #7 [manually integrated] DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #9 5 DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #10 T3 DAD1_Signal_A WVL:254 nm
mAU
RT: 12.510
RT: 12.368
RT: 12.171
RT: 12.258
RT: 9.515
calculated m/z 550.1, m/z found 550.2
min
OTBS
5c
OMe
4hb
6aw
#7 5T3 - Peak #1 Scan: #770 RT: 12.20 min NL: 1.03E+005
%
550.2
341.2
551.7
m/z

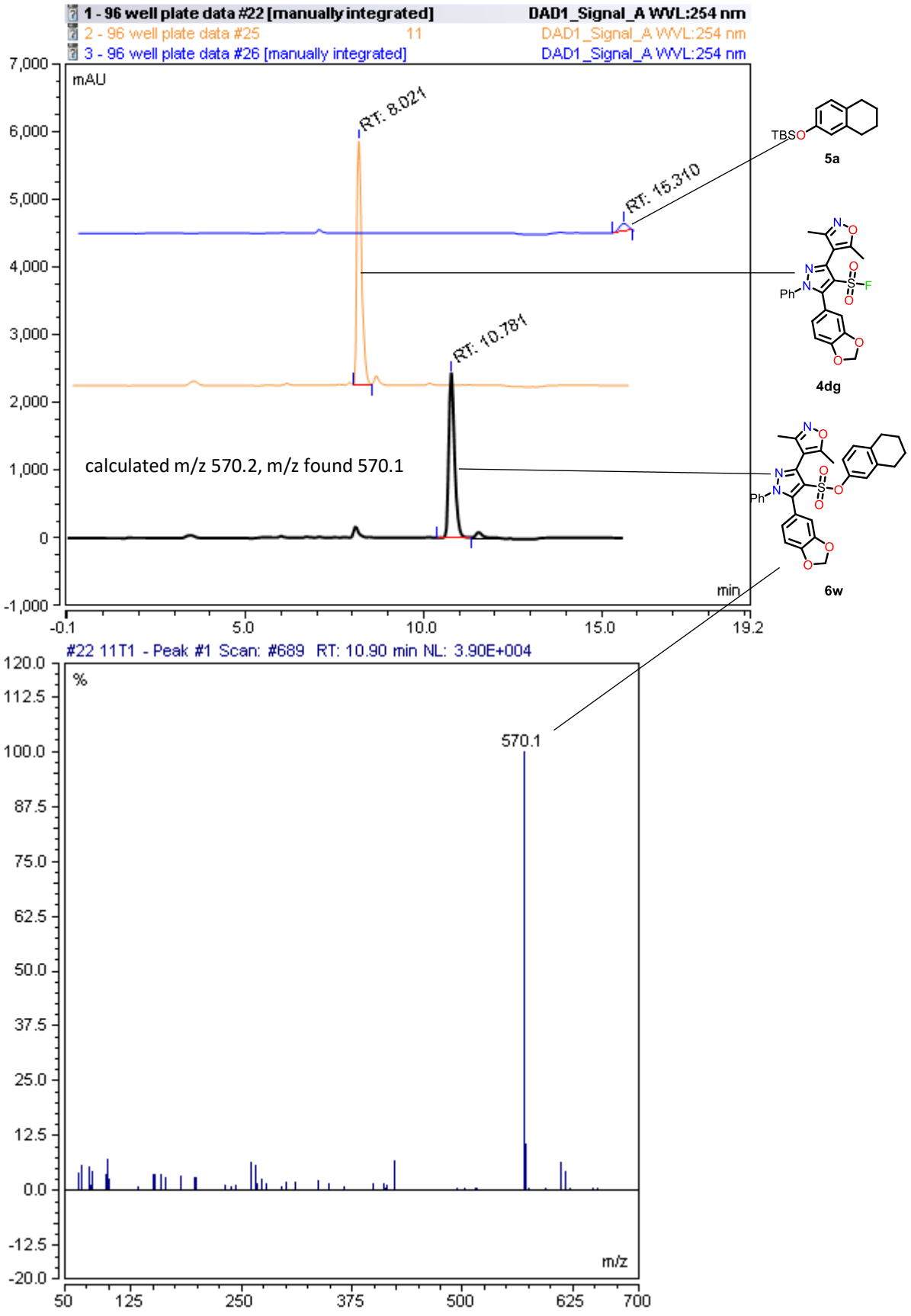

1 - 96 well plate data #11 6T2 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #12 6 DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #13 T2 DAD1_Signal_A WVL:254 nm
mAU
RT: 11.475
RT: 12.248
RT: 11.398
calculated m/z 551.1, m/z found 551.3
min
5b
4al
6ah

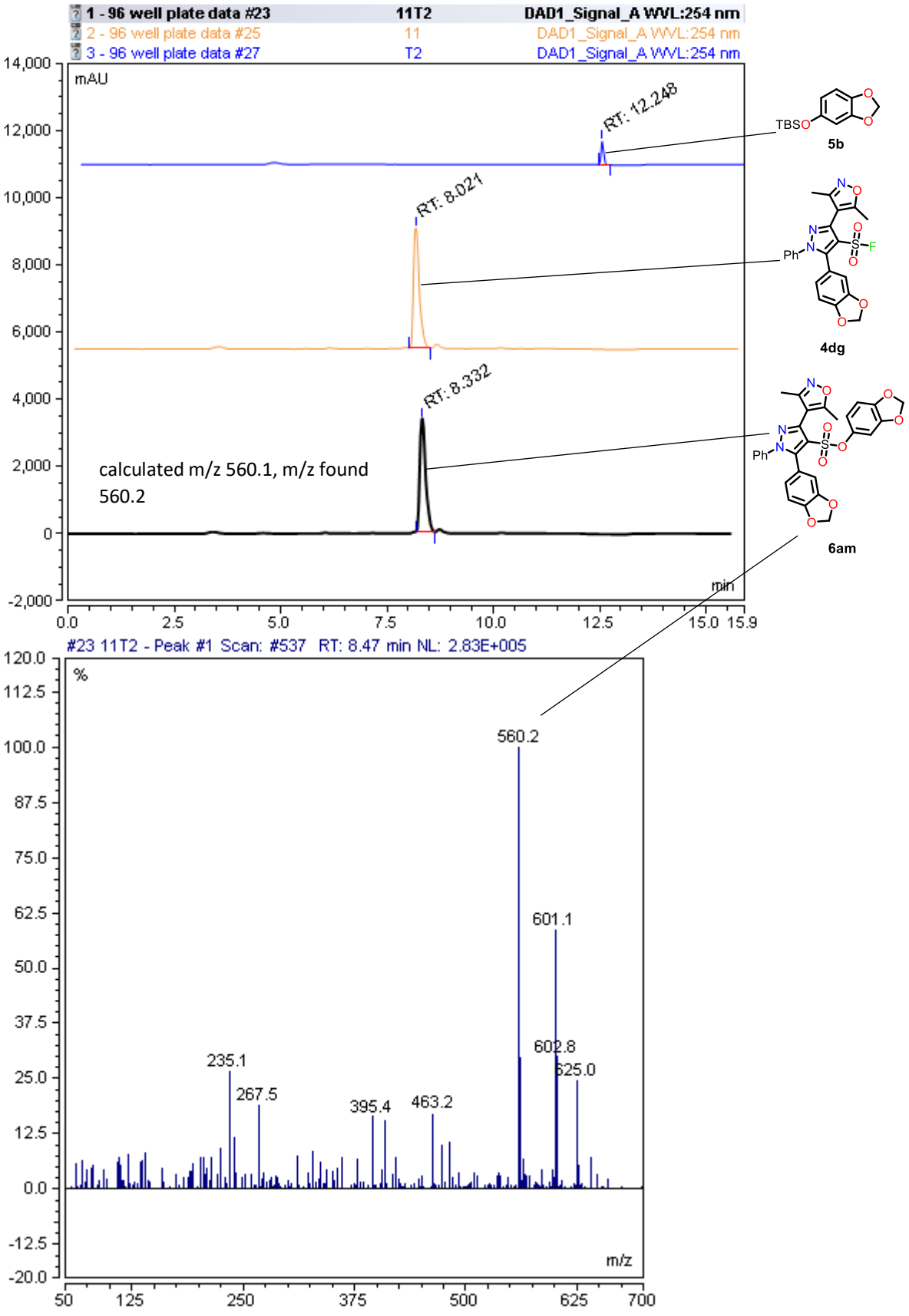

#11 6T2 - Peak #1 Scan: #725 RT: 11.47 min NL: 1.08E+005
%
423.0
351.4
250.2
267.5
323.3
392.4
164.2
221.0
146.3
294.8
464.7
551.3
m/z

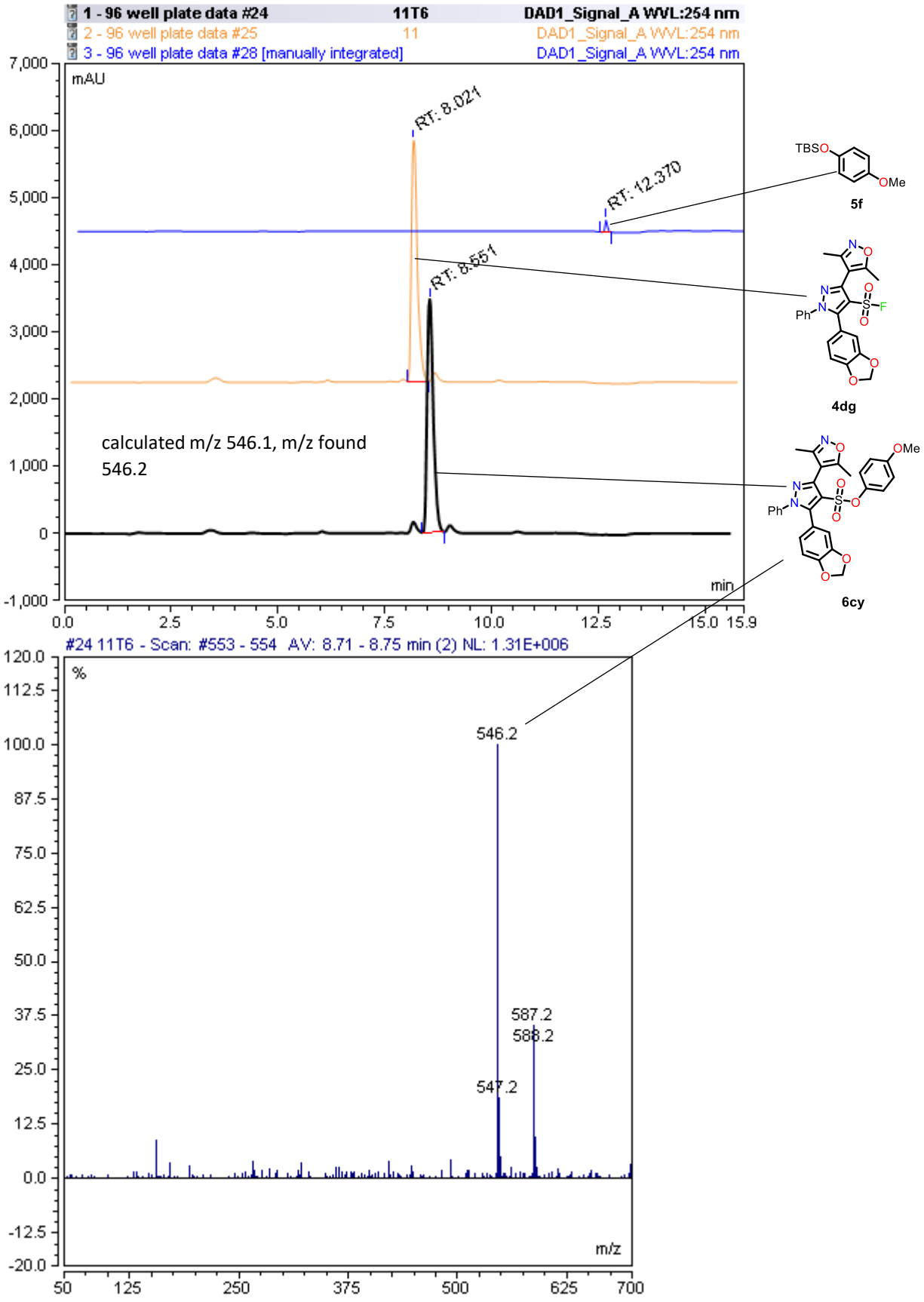

1 - 96 well plate data #14 8T1 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #16 8 DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #17 [manually integrated] DAD1_Signal_A WVL:254 nm
mAU
RT: 9.730
RT: 15.310
RT: 12.314
calculated m/z 578.1, m/z found 578.2
min
TBSO
5a
MeO
HF2CO
4an
6t
#14 8T1 - Peak #1 Scan: #774 RT: 12.26 min NL: 7.71E+004
%
243.9
200.5
558.1
508.3
185.8
78.0
110.5
266.6
307.2
578.2
560.1
283.6
m/z

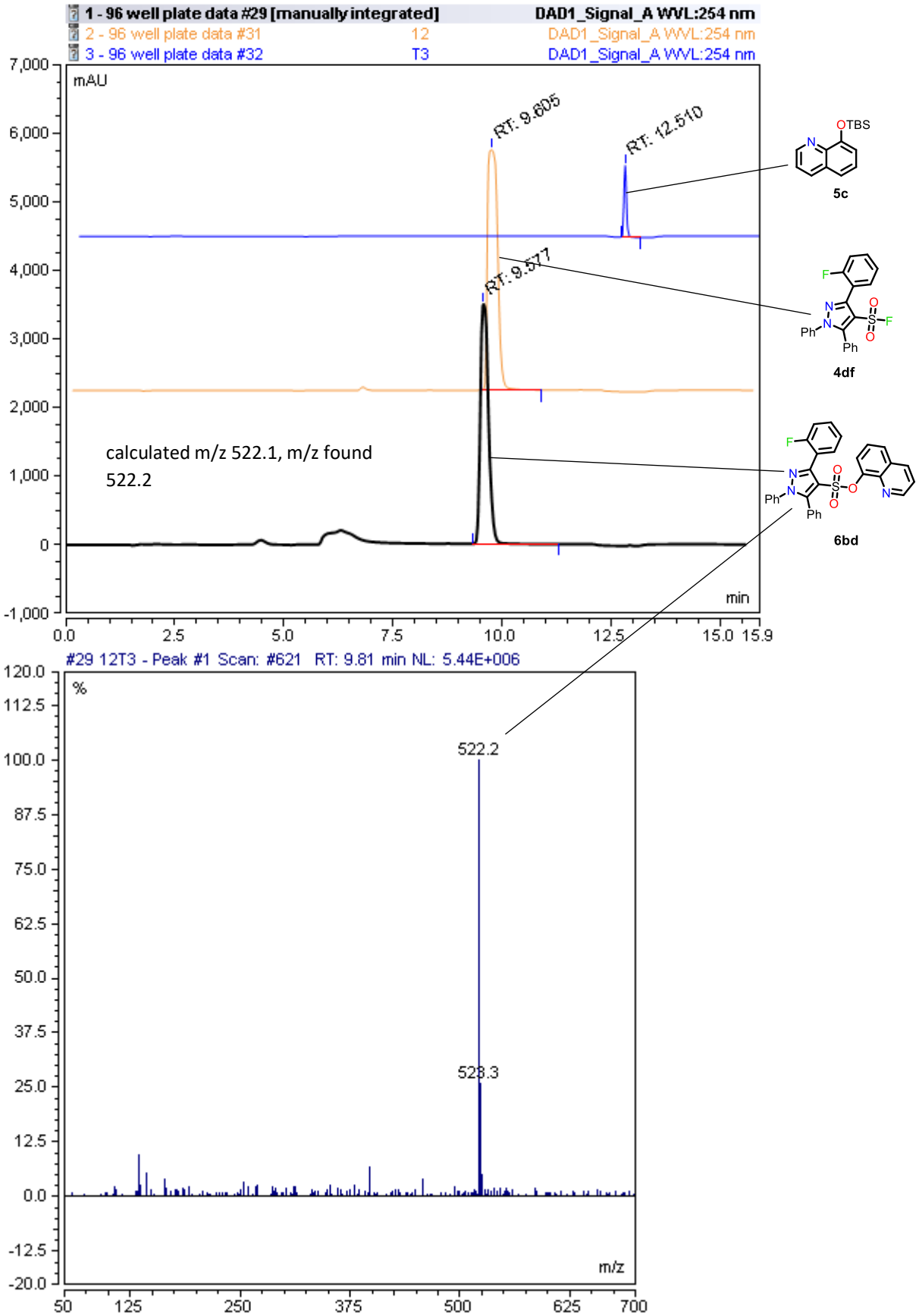

1 - 96 well plate data #15 8T6 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #16 8 DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #18 [manually integrated] DAD1_Signal_A WVL:254 nm
mAU
RT: 9.730
RT: 12.370
RT: 10.249
calculated m/z 554.1, m/z found 554.5
min
5f
4an
6cv
#15 8T6 - Peak #1 Scan: #657 RT: 10.39 min NL: 3.24E+005
%
534.4
554.5
97.1
338.4
180.3
167.2
165.4
259.9
265.3
396.5
455.0
491.6
m/z

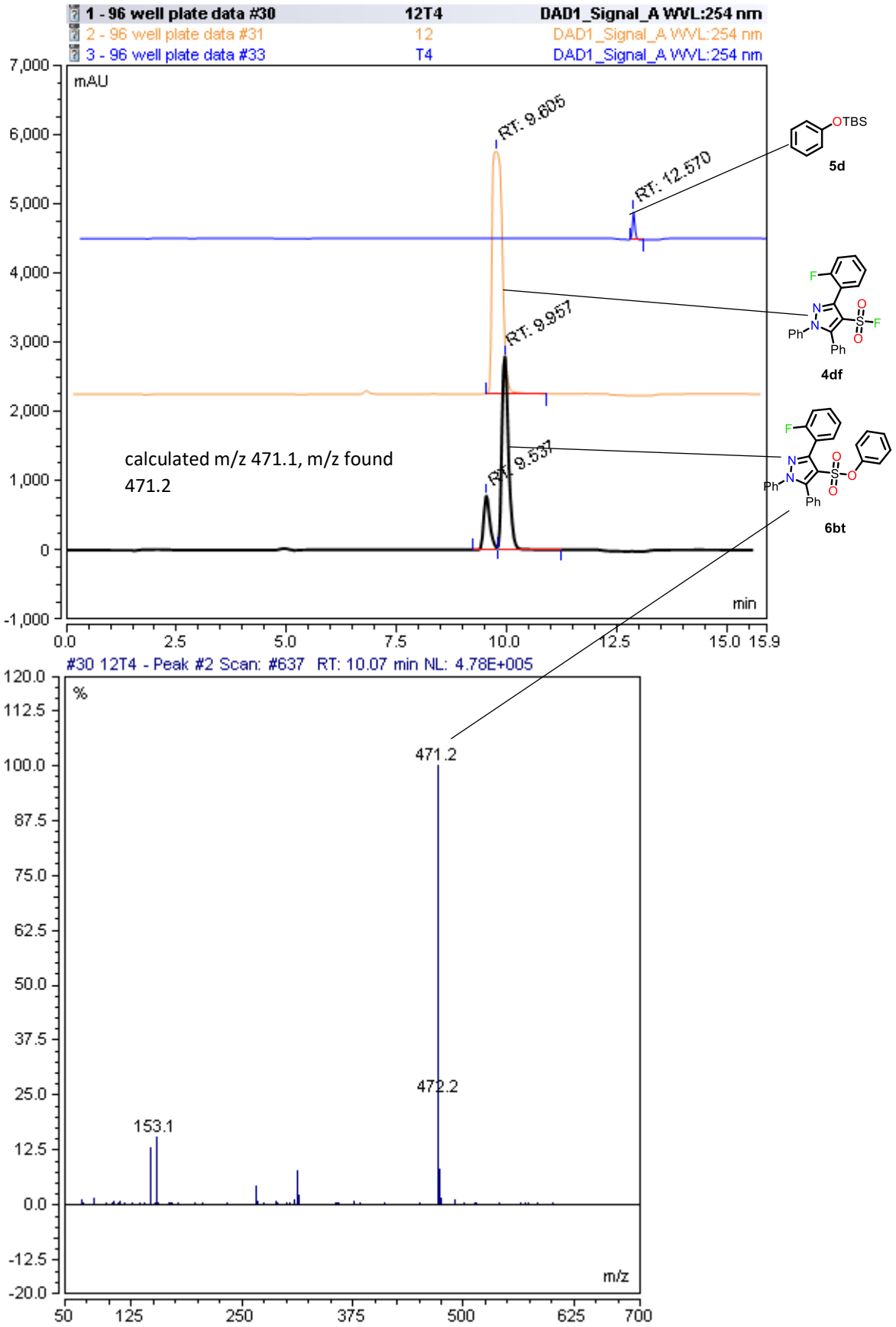

1 - 96 well plate data #19 10T4 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #20 [manually integrated] DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #21 T4 DAD1_Signal_A WVL:254 nm
mAU
RT: 11.096
RT: 12.570
RT: 11.872
calculated m/z 504.1, m/z found 504.4
min
OTBS
5d
iPr
MeO
4ad
6br
#19 10T4 - Peak #1 Scan: #757 RT: 11.99 min NL: 9.11E+004
%
504.4
110.4
267.7
310.7
490.8
m/z

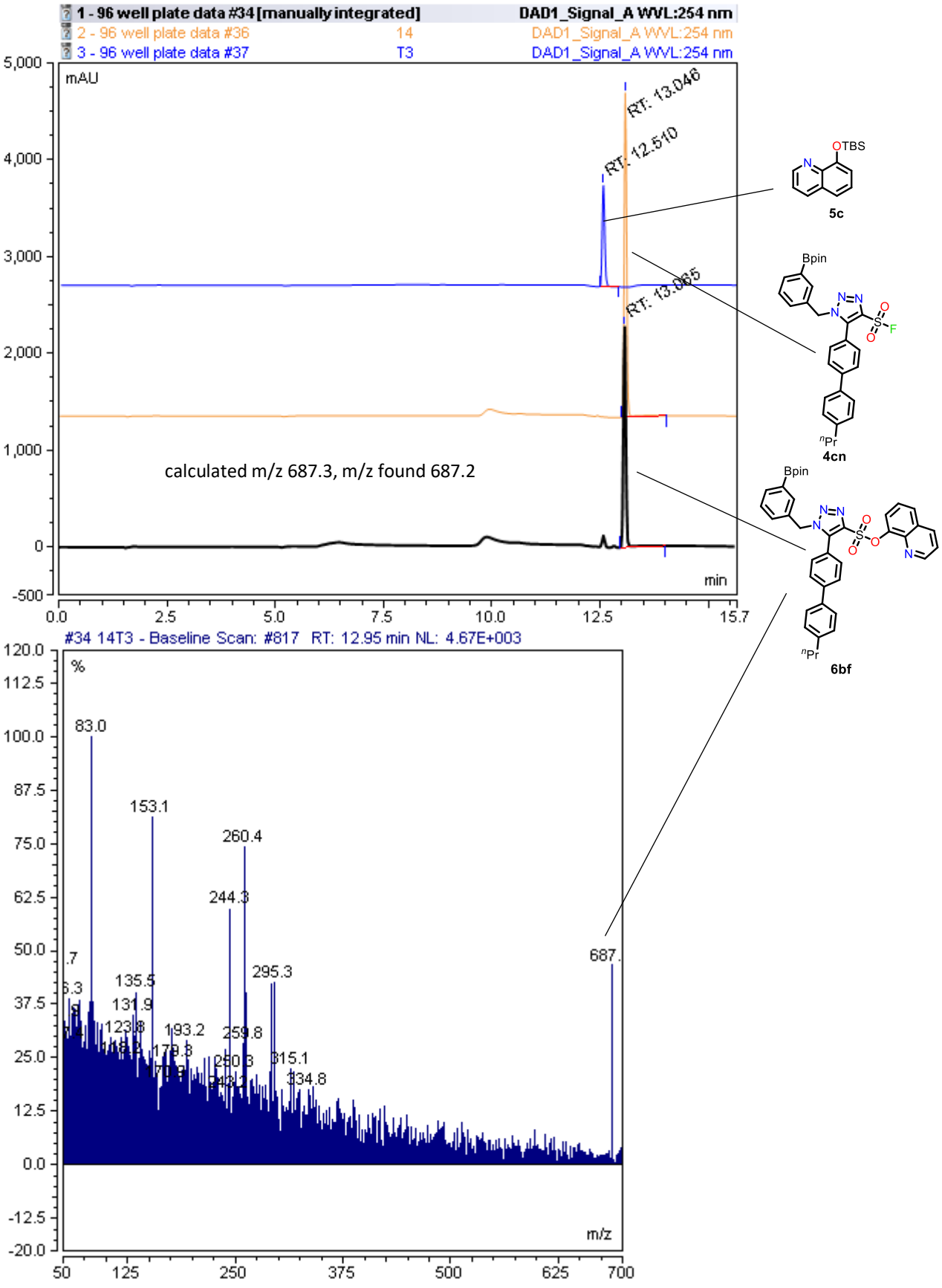

1 - 96 well plate data #22 [manually integrated]
DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #25
11
DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #26 [manually integrated]
DAD1_Signal_A WVL:254 nm
mAU
RT: 8.021
RT: 15.310
RT: 10.781
calculated m/z 570.2, m/z found 570.1
min
5a
4dg
6w
#22 11T1 - Peak #1 Scan: #689 RT: 10.90 min NL: 3.90E+004
%
570.1
m/z

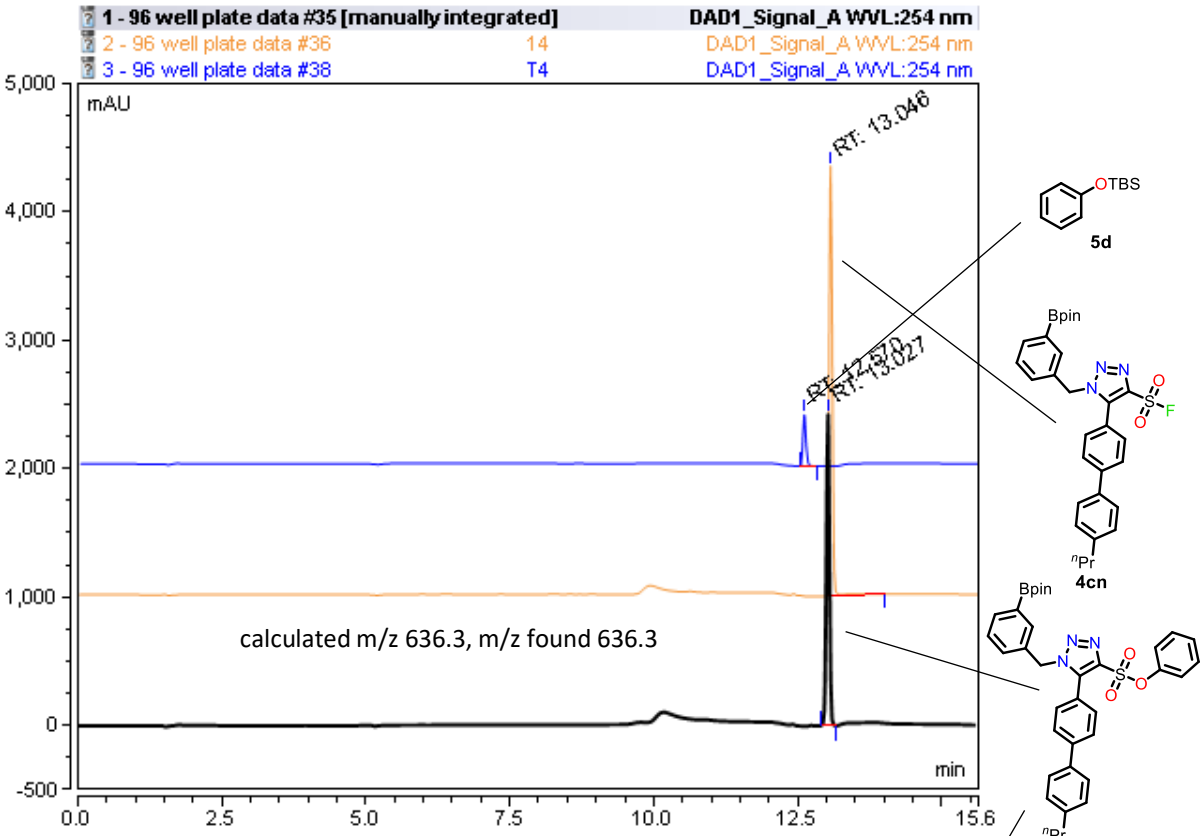

1 - 96 well plate data #23 11T2 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #25 11 DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #27 T2 DAD1_Signal_A WVL:254 nm
mAU
RT: 12.248
RT: 8.021
RT: 8.332
calculated m/z 560.1, m/z found 560.2
min
#23 11T2 - Peak #1 Scan: #537 RT: 8.47 min NL: 2.83E+005
%
560.2
601.1
602.8
625.0
235.1
267.5
395.4
463.2
m/z
5b
4dg
6am

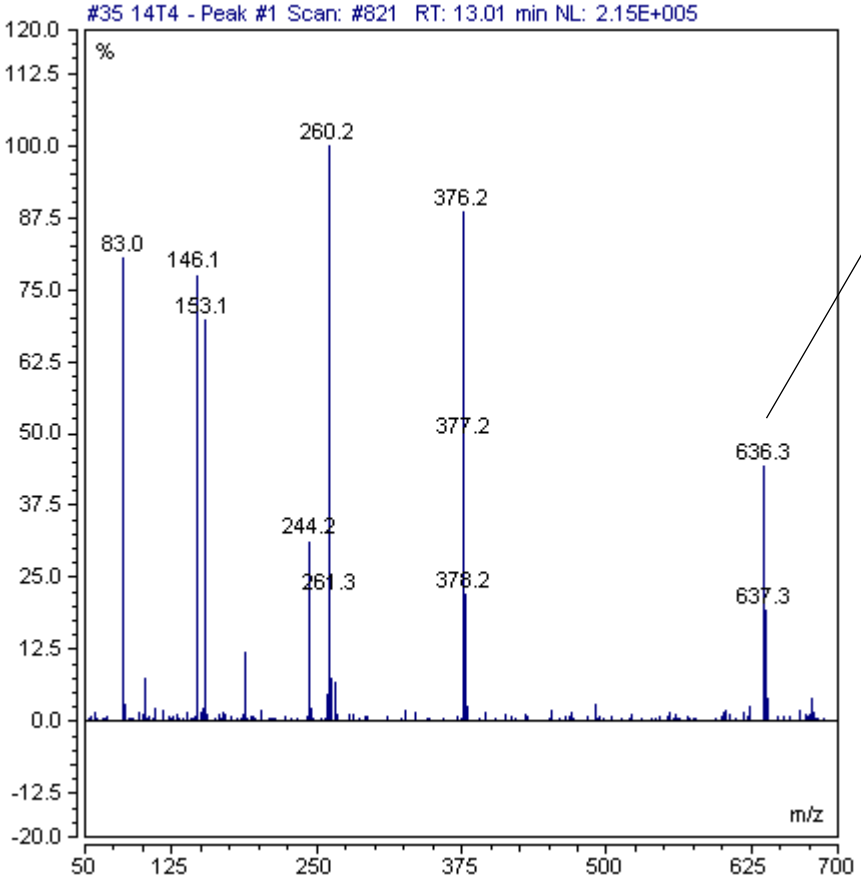

1 - 96 well plate data #24 11T6 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #25 11 DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #28 [manually integrated] DAD1_Signal_A WVL:254 nm
mAU
RT: 8.021
RT: 12.370
RT: 8.551
calculated m/z 546.1, m/z found 546.2
min
#24 11T6 - Scan: #553 - 554 AV: 8.71 - 8.75 min (2) NL: 1.31E+006
%
546.2
587.2
588.2
547.2
m/z
TBSO
OMe
5f
Ph
4dg
6cy

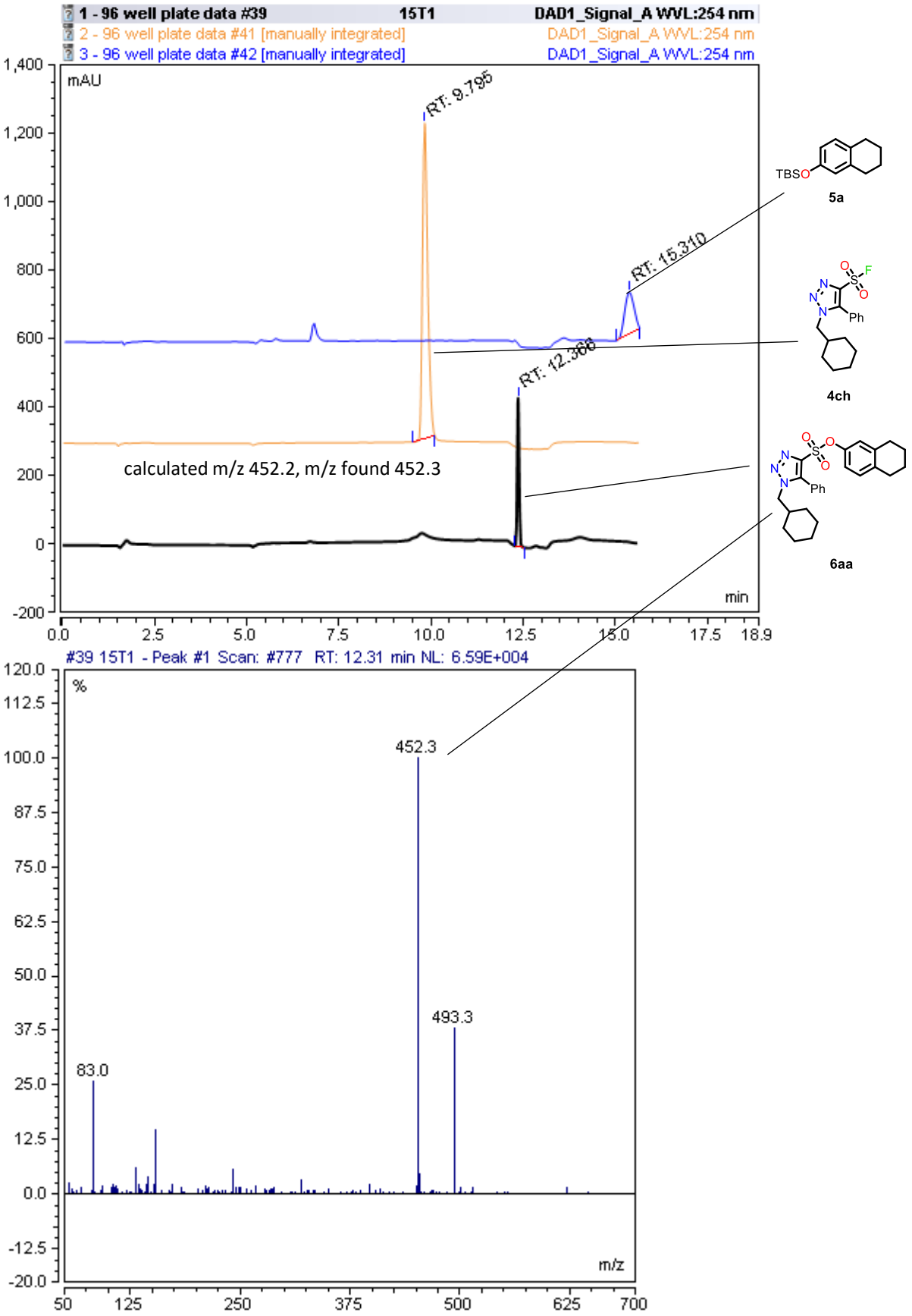

1 - 96 well plate data #29 [manually integrated] DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #31 12 DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #32 T3 DAD1_Signal_A WVL:254 nm
mAU
RT: 9.605
RT: 12.510
RT: 9.571
calculated m/z 522.1, m/z found 522.2
min
#29 12T3 - Peak #1 Scan: #621 RT: 9.81 min NL: 5.44E+006
%
522.2
523.3
m/z
5c
4df
6bd

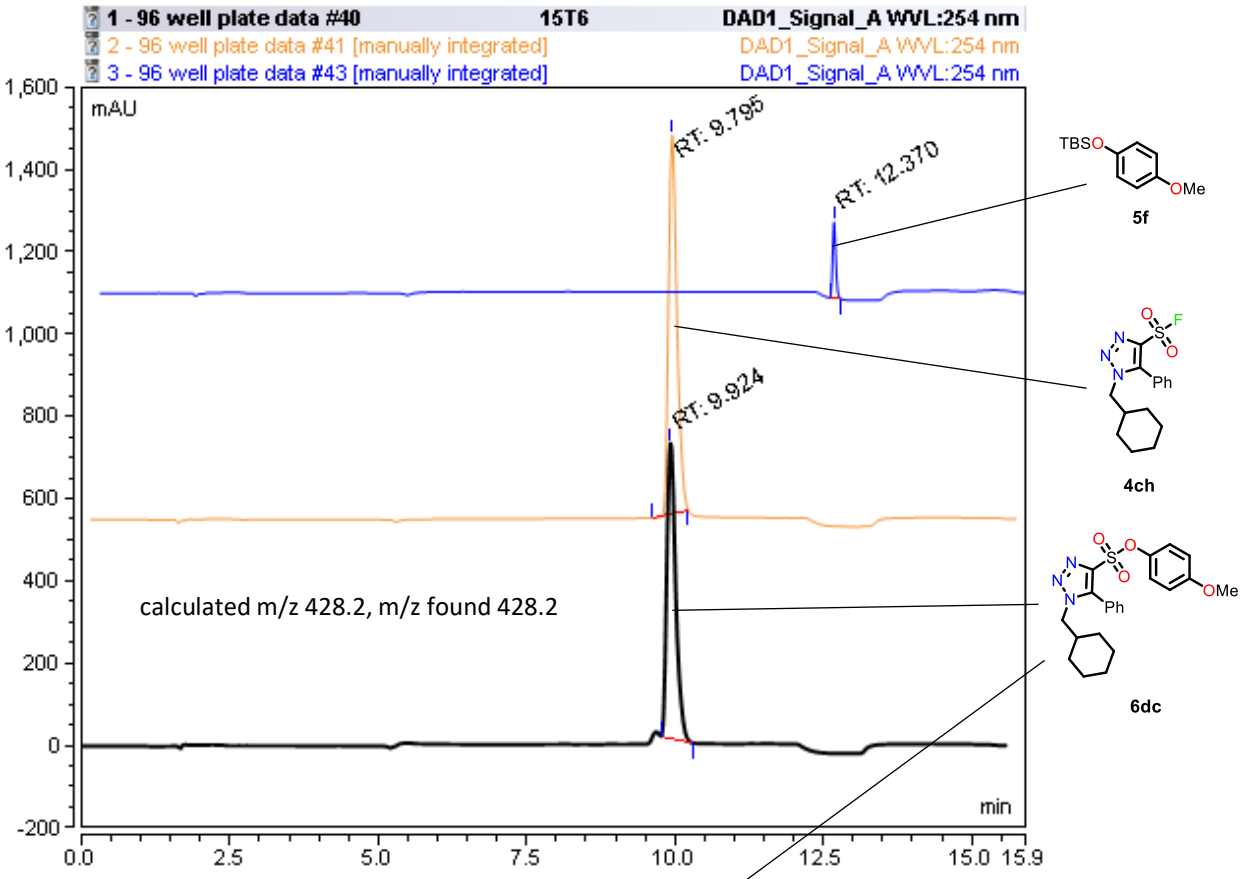

1 - 96 well plate data #30 12T4 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #31 12 DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #33 T4 DAD1_Signal_A WVL:254 nm
mAU
RT: 9.605
RT: 12.570
RT: 9.957
RT: 9.537
calculated m/z 471.1, m/z found 471.2
min
OTBS
5d
4df
6bt
#30 12T4 - Peak #2 Scan: #637 RT: 10.07 min NL: 4.78E+005
%
471.2
472.2
153.1
m/z

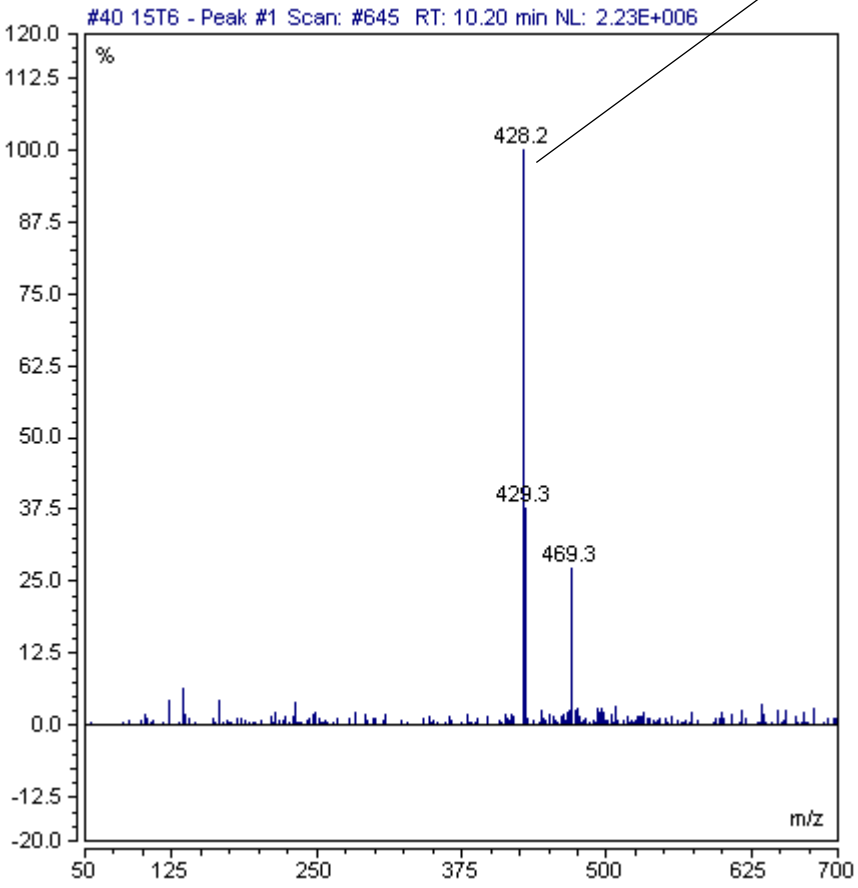

1 - 96 well plate data #34 [manually integrated] DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #36 14 DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #37 T3 DAD1_Signal_A WVL:254 nm
mAU
RT: 13.046
RT: 12.510
RT: 13.065
calculated m/z 687.3, m/z found 687.2
min
#34 14T3 - Baseline Scan: #817 RT: 12.95 min NL: 4.67E+003
%
83.0
153.1
260.4
244.3
295.3
687.
135.5
131.9
193.2
259.8
315.1
334.8
m/z
OTBS
5c
Bpin
4cn
Bpin
6bf

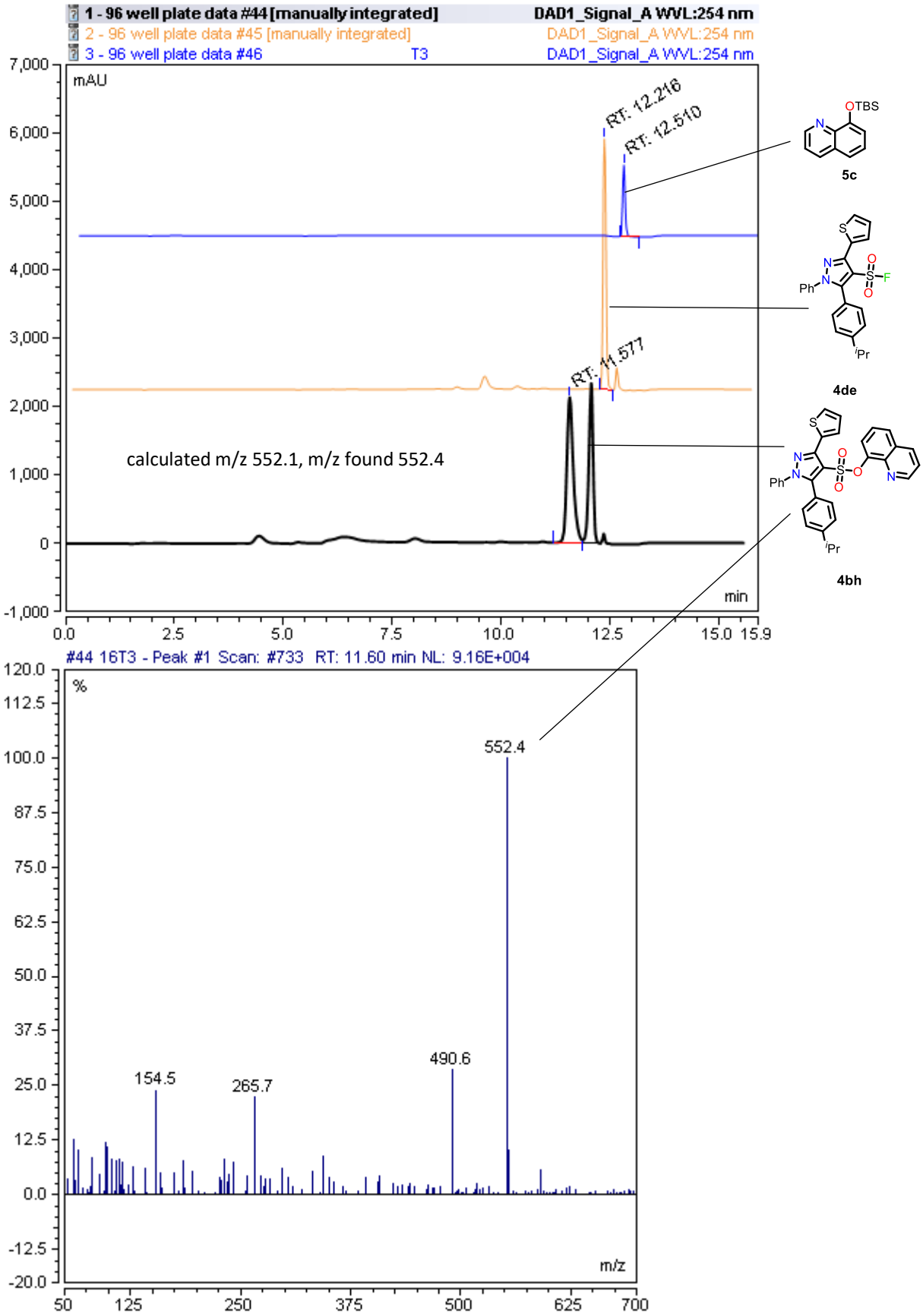

1 - 96 well plate data #35 [manually integrated]
DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #36
14
DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #38
T4
DAD1_Signal_A WVL:254 nm
mAU
RT: 13.046
RT: 13.027
calculated m/z 636.3, m/z found 636.3
min
OTBS
5d
Bpin
4cn
6bv


#35 14T4 - Peak #1 Scan: #821 RT: 13.01 min NL: 2.15E+005
%
260.2
376.2
83.0
146.1
153.1
377.2
636.3
244.2
261.3
378.2
637.3
m/z


1 - 96 well plate data #39 15T1 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #41 [manually integrated] DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #42 [manually integrated] DAD1_Signal_A WVL:254 nm
mAU
RT: 9.795
RT: 15.310
RT: 12.366
calculated m/z 452.2, m/z found 452.3
min
TBSO
5a
4ch
6aa
#39 15T1 - Peak #1 Scan: #777 RT: 12.31 min NL: 6.59E+004
%
452.3
493.3
83.0
m/z


1 - 96 well plate data #40 15T6 DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #41 [manually integrated] DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #43 [manually integrated] DAD1_Signal_A WVL:254 nm
mAU
RT: 9.795
RT: 12.370
RT: 9.924
calculated m/z 428.2, m/z found 428.2
min
TBSO
OMe
5f
Ph
4ch
6dc

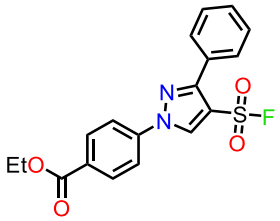

#40 15T6 - Peak #1 Scan: #645 RT: 10.20 min NL: 2.23E+006
%
428.2
429.3
469.3
m/z


1 - 96 well plate data #44 [manually integrated]
DAD1_Signal_A WVL:254 nm
2 - 96 well plate data #45 [manually integrated]
DAD1_Signal_A WVL:254 nm
3 - 96 well plate data #46
T3
DAD1_Signal_A WVL:254 nm
mAU
RT: 12.216
RT: 12.510
RT: 11.577
calculated m/z 552.1, m/z found 552.4
min
5c
4de
4bh
#44 16T3 - Peak #1 Scan: #733 RT: 11.60 min NL: 9.16E+004
%
552.4
490.6
154.5
265.7
m/z

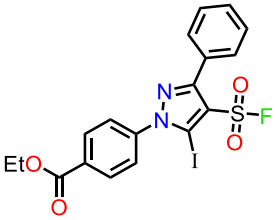
Experimental procedure for SuFEx reactivity comparison

Method

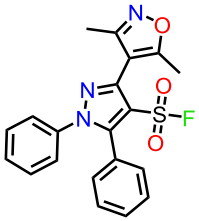
Stock solutions of heterocyclic sulfonyl fluorides (5.00 µmol) or Diels-Alder adducts (5.00 µmol), TBS ether (5.00 µmol) and DBU (100 nmol) in CD_3CN were added to a 96 well plate totalling a volume of 500 µL in each well. The plate was agitated at 310 rpm at r.t. for 16 h. The reaction mixture was analysed directly by ^{19}F qNMR. Integrals extend ±32x the half height width of the peak except for the competition between compounds 1 and 8 which extends ±15x the half height width of the peak to avoid peak overlap. The ratio of starting materials remaining was used to determine their relative reactivity.



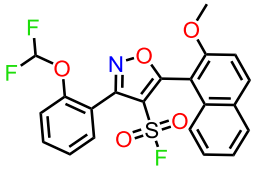
Compound 1



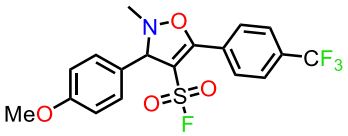
Compound 2



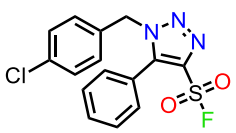
Compound 3



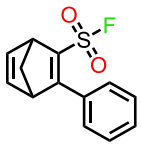
Compound 4



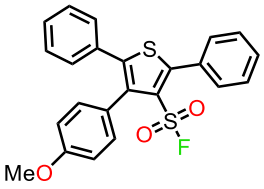
Compound 5



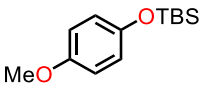
Compound 6



Compound 7



Compound 8

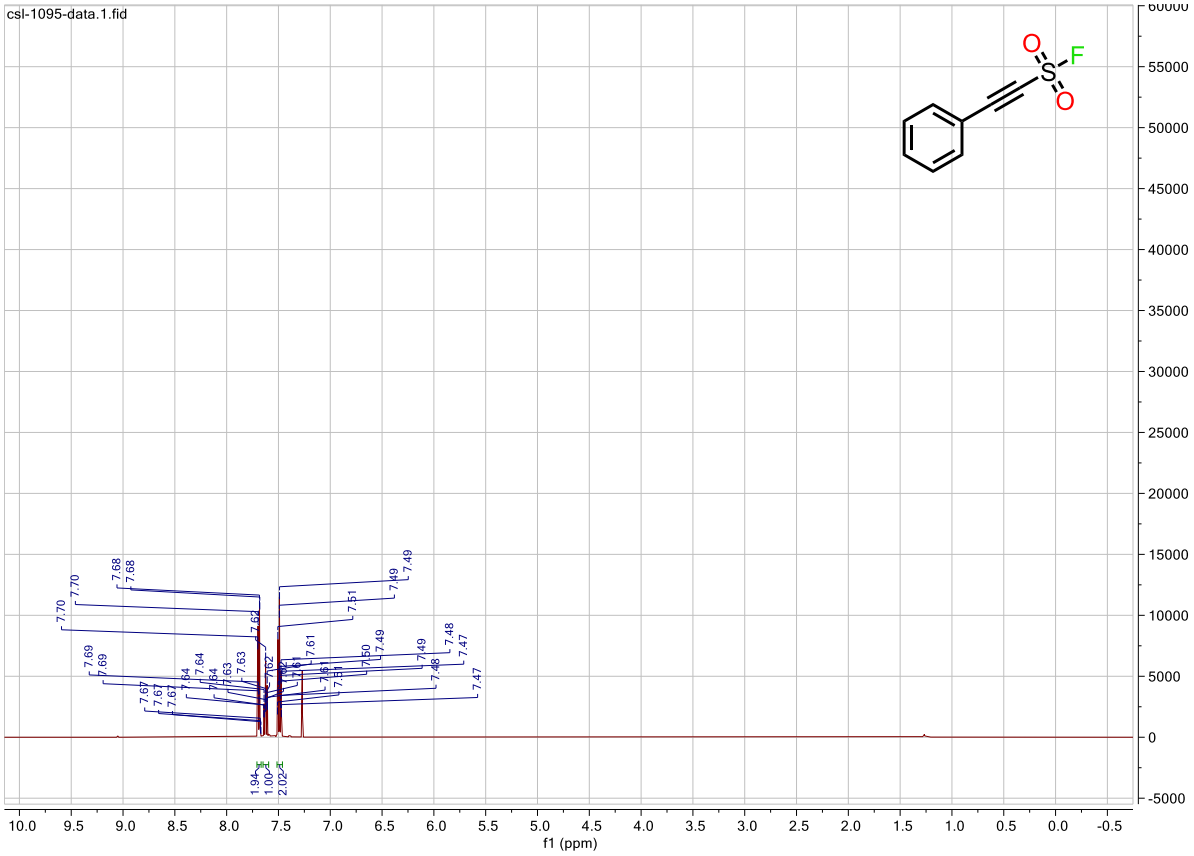


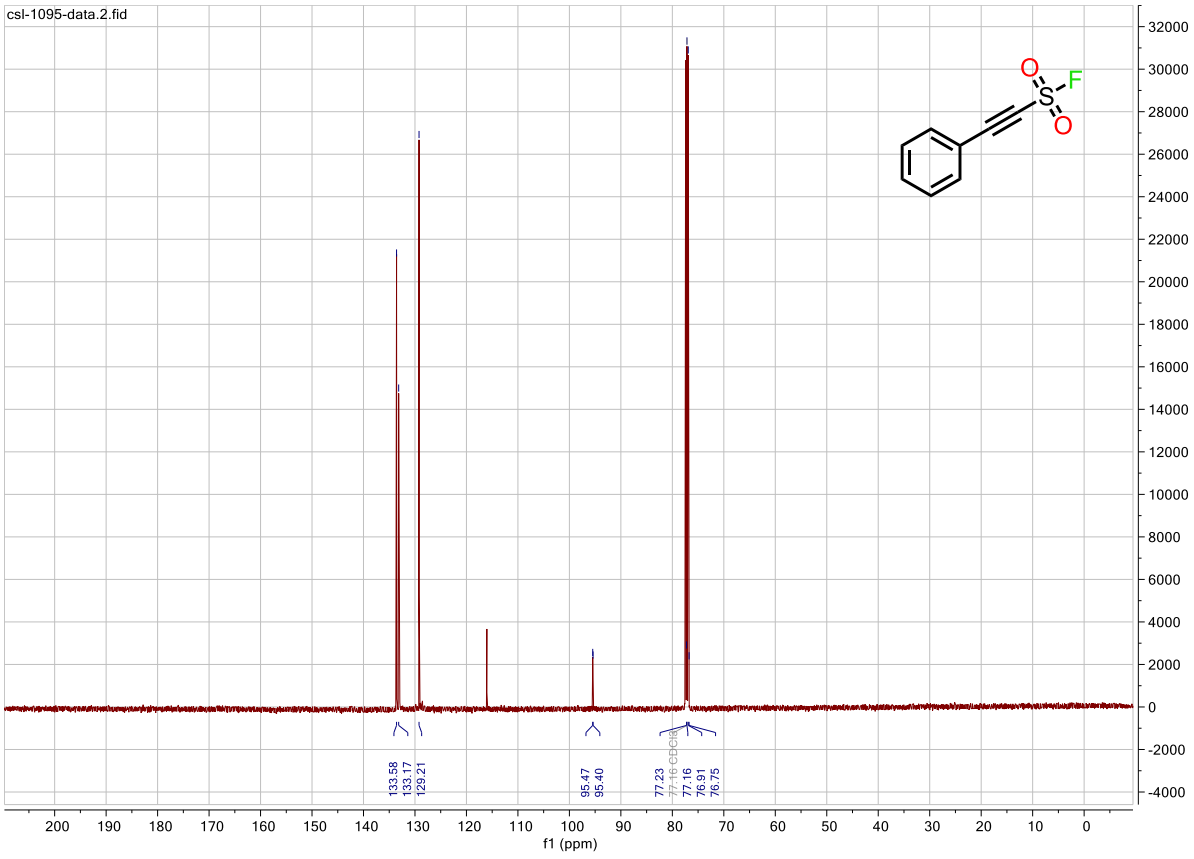
TBS ether

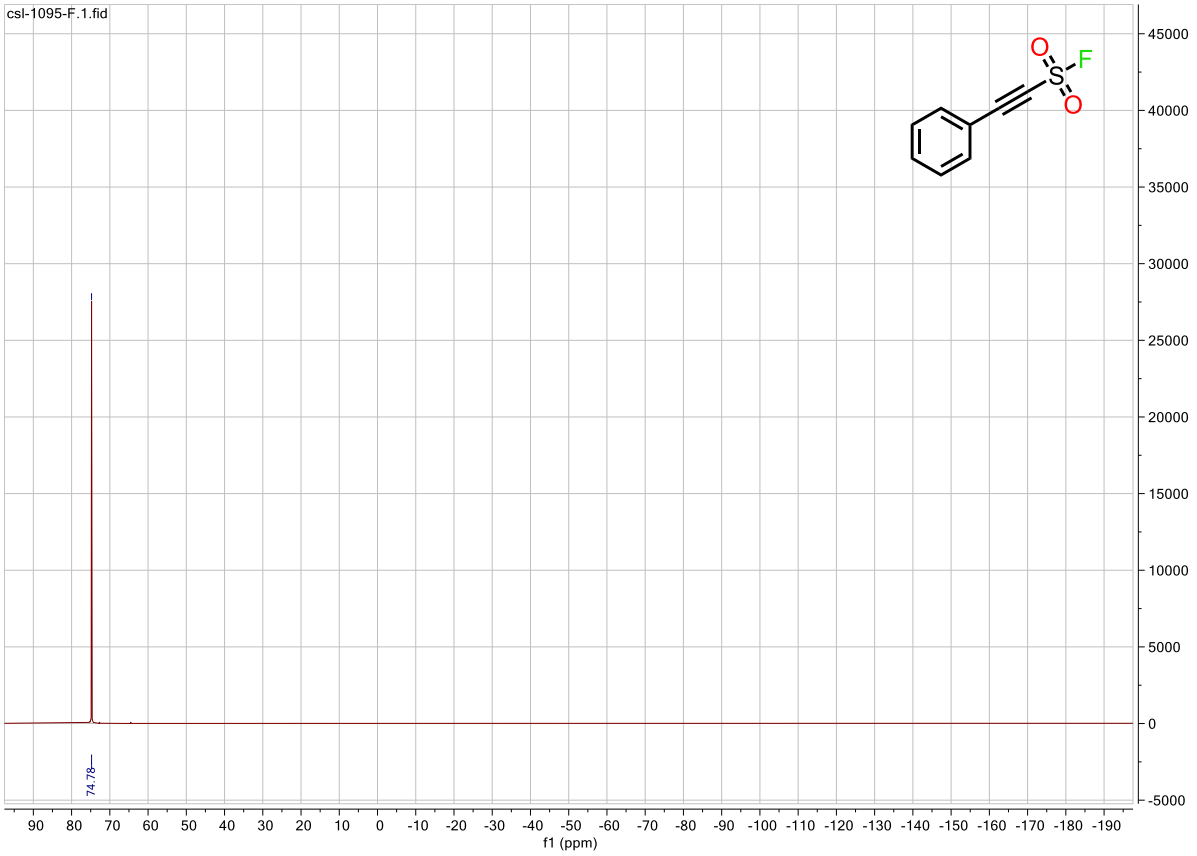
Table 2. SuFEx Competition studies.

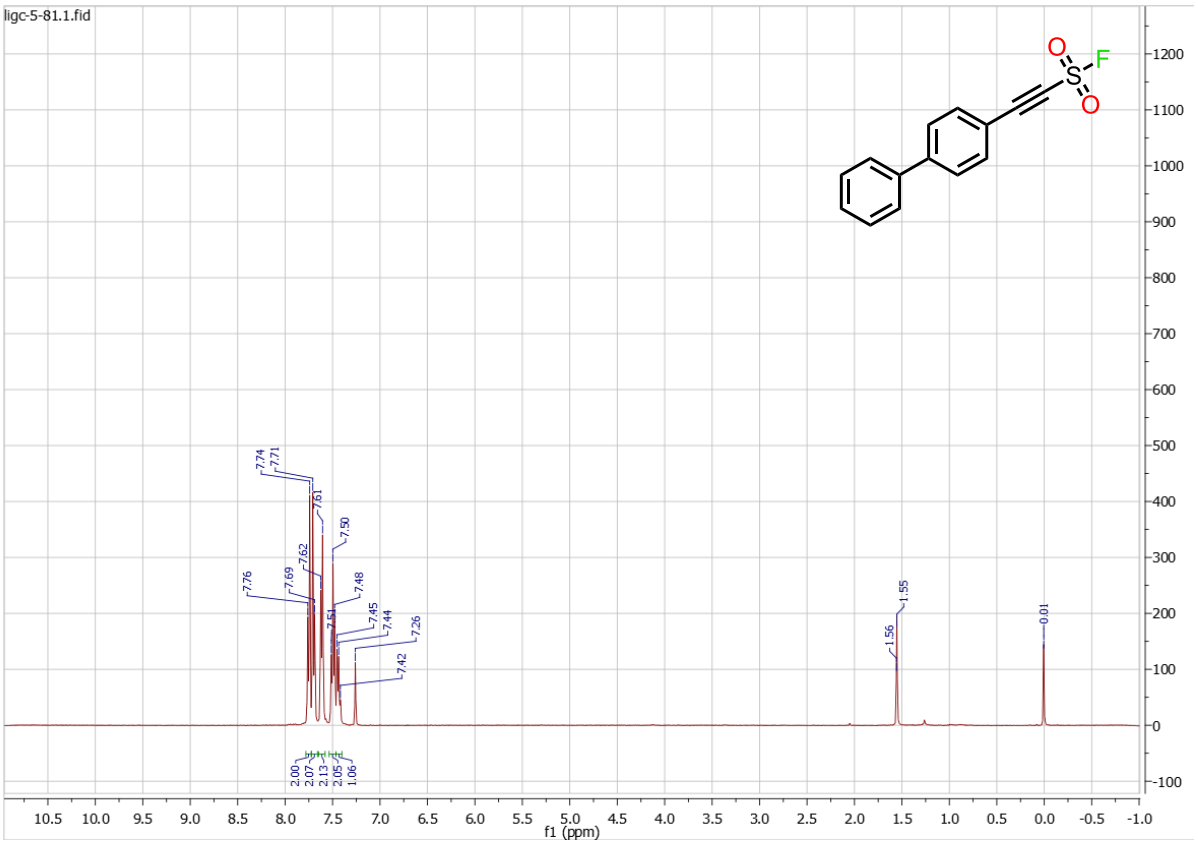
Compound	1	2	3	4	5	6	7	8
1		2>1	1>3	4>1	5>1	6>1	1>7	8>1
2	2>1		2>3	2>4	2≈5	6>2	2>7	2>8
3	1>3	2>3		4>3	5>3	6>3	3>7	8>3
4	4>1	2>4	4>3		5>4	6>4	4>7	4>8
5	5>1	2≈5	5>3	5>4		6>5	5>7	8>5
6	6>1	6>2	6>3	6>4	6>5		6>7	6>8
7	1>7	2>7	3>7	4>7	5>7	6>7		8>7
8	8>1	2>8	8>3	4>8	8>5	6>8	8>7	

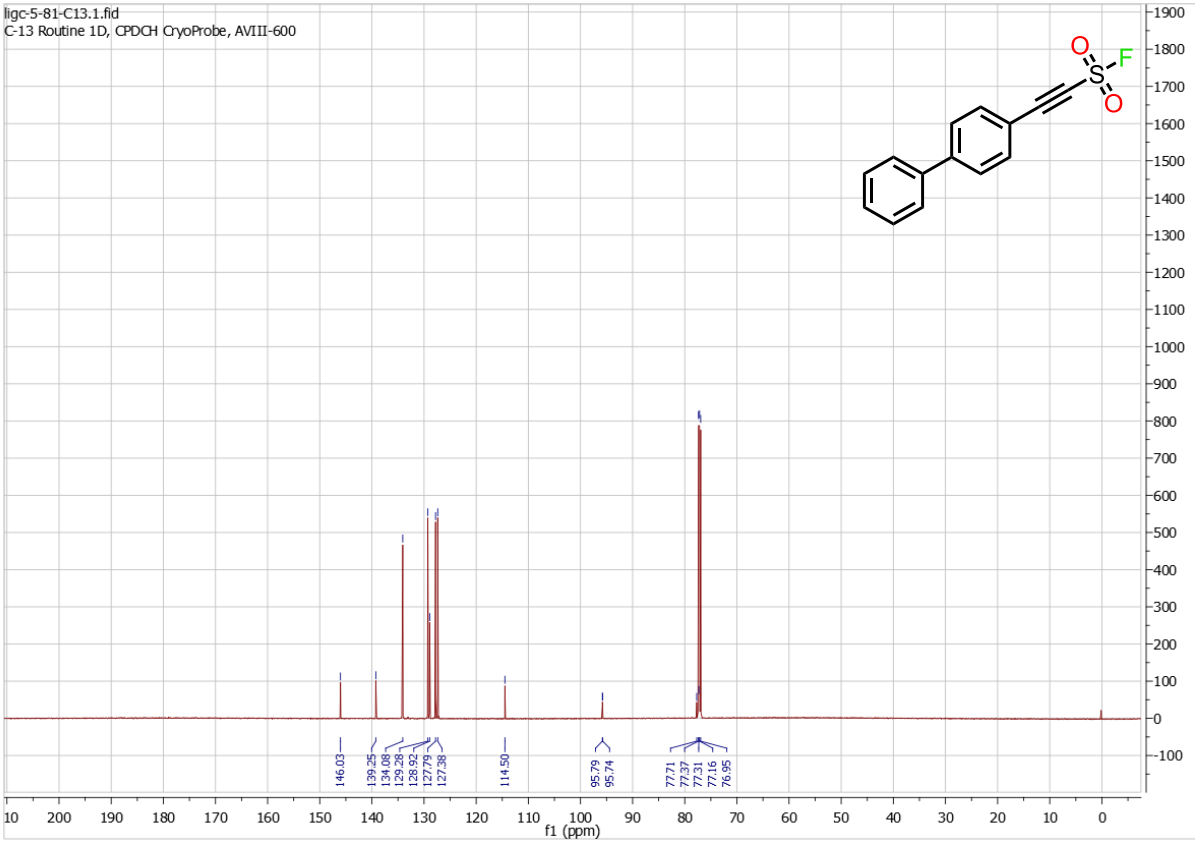
^{1}H, ^{13}C and ^{19}F NMR spectra

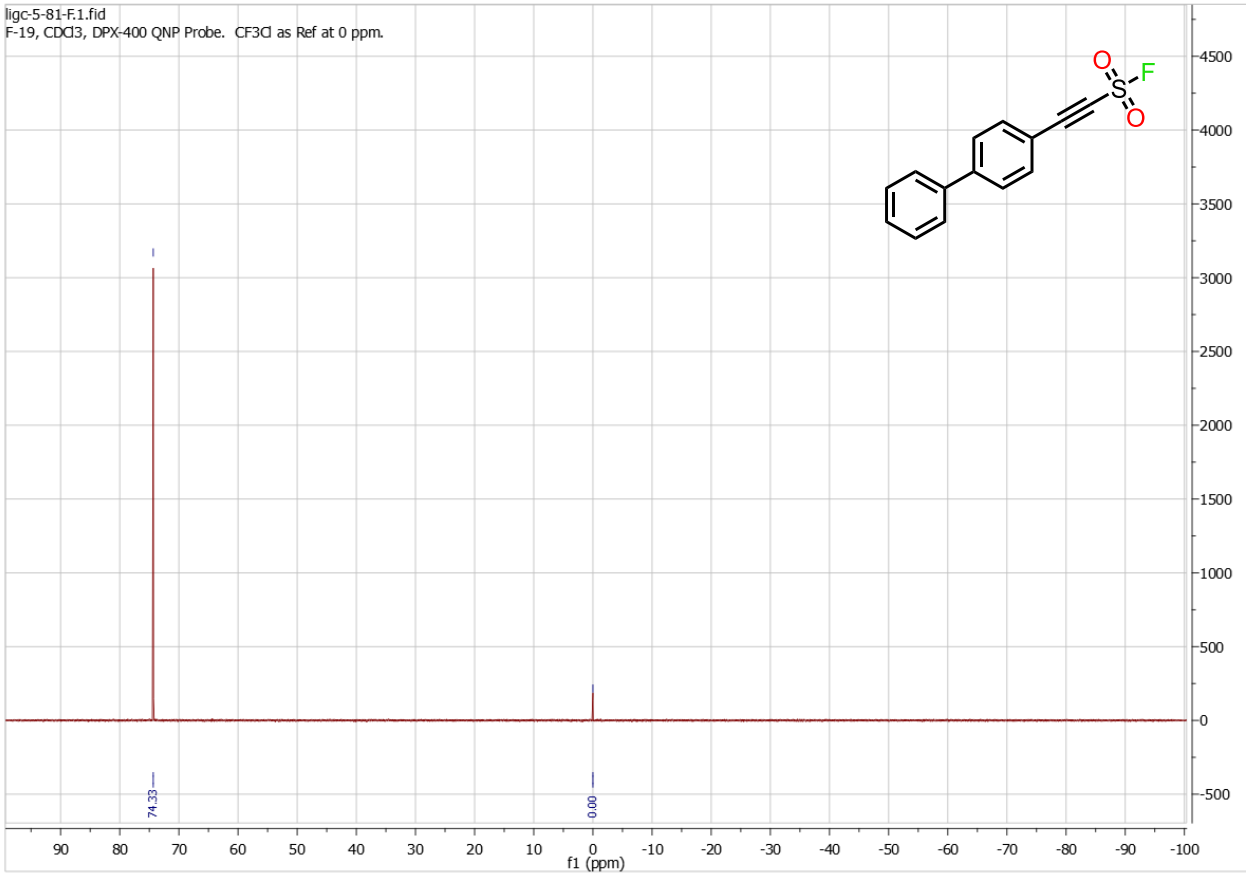


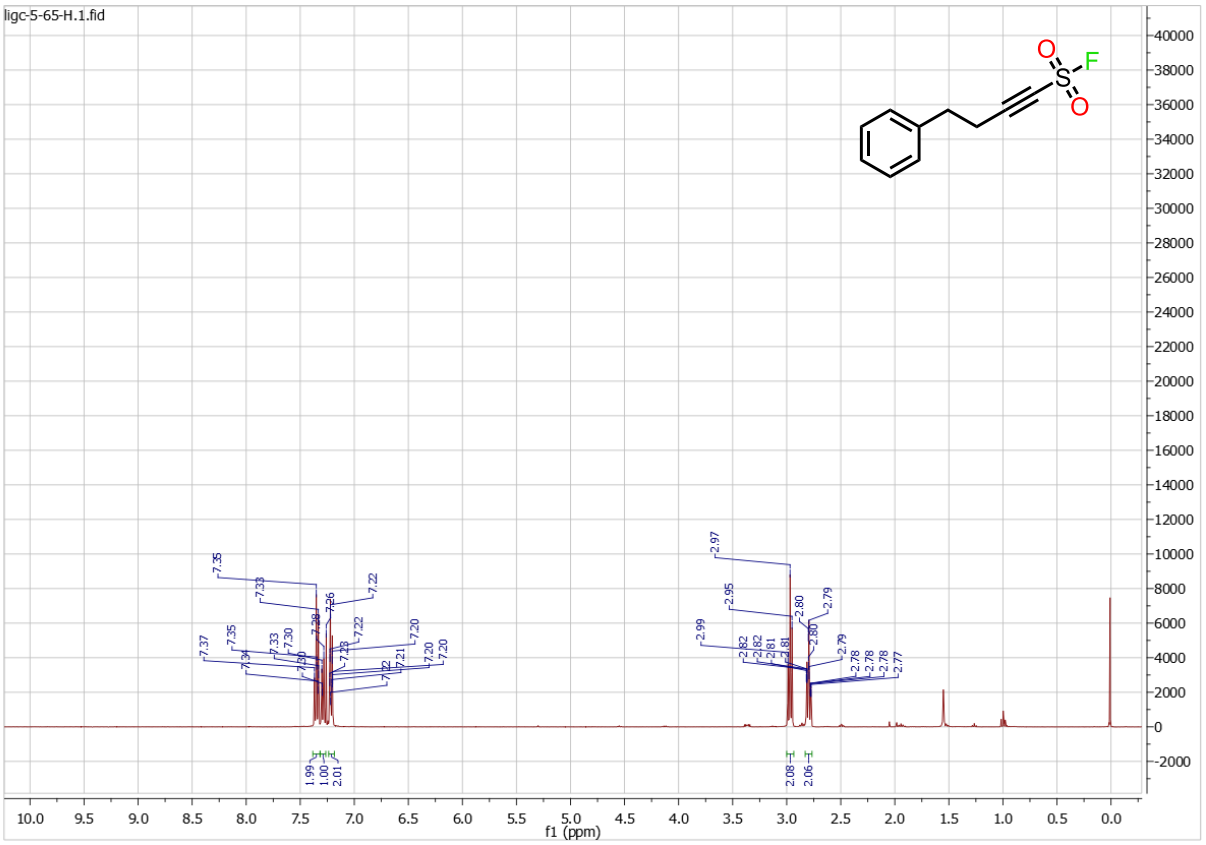


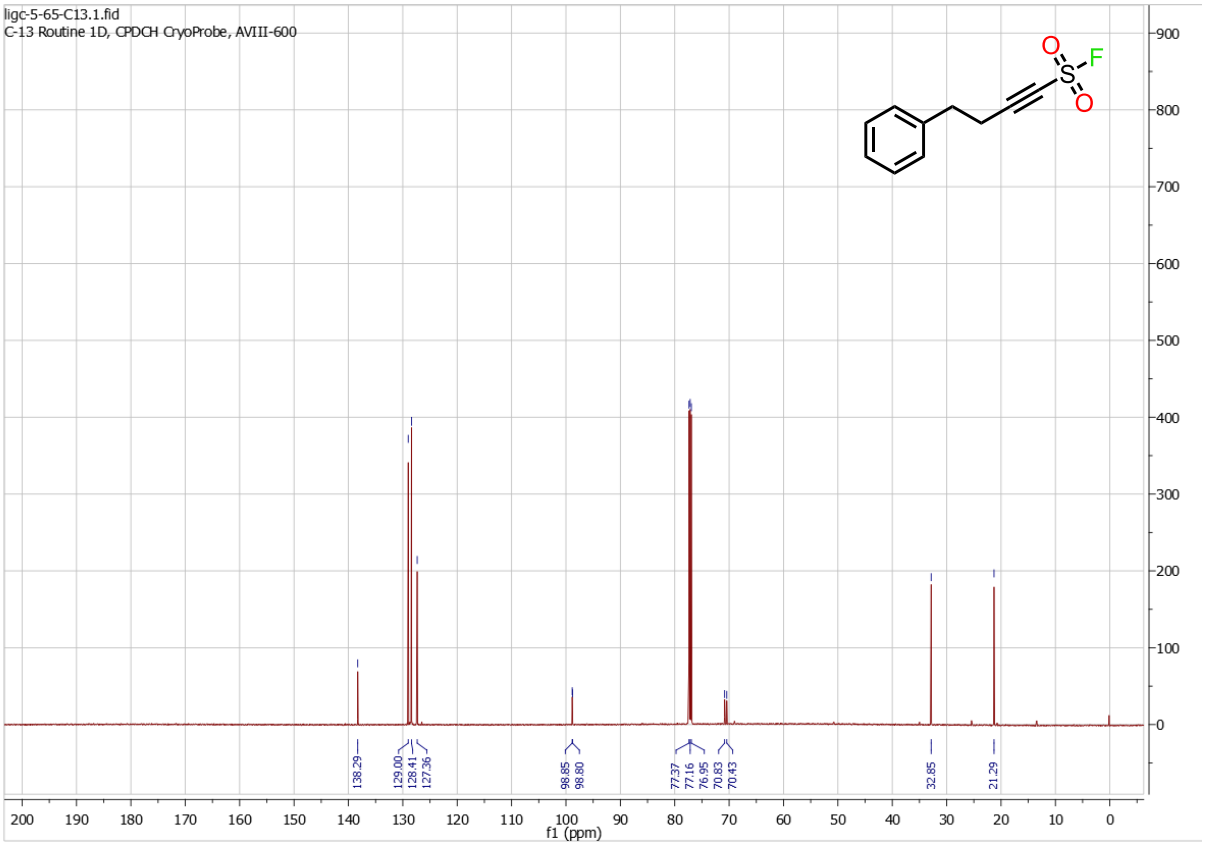

csl-1095-F.1.fid
O
S
F
O
74.78
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
-5000
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190
f1 (ppm)

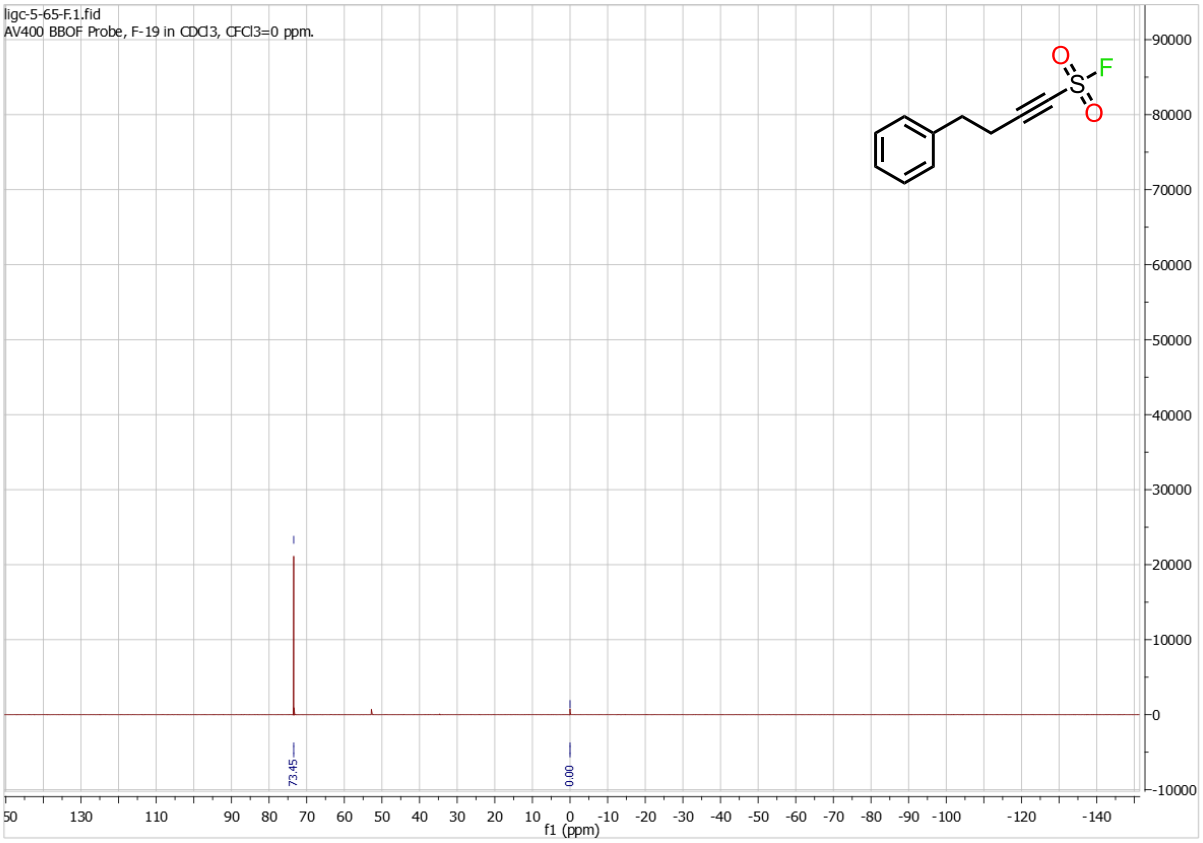

ligc-5-81.1.fid
O
S
F
O
7.74
7.71
7.61
7.50
7.62
7.76
7.69
7.48
7.45
7.44
7.26
7.42
2.51
1.55
1.56
0.01
2.00
2.07
2.13
2.05
1.06
f1 (ppm)

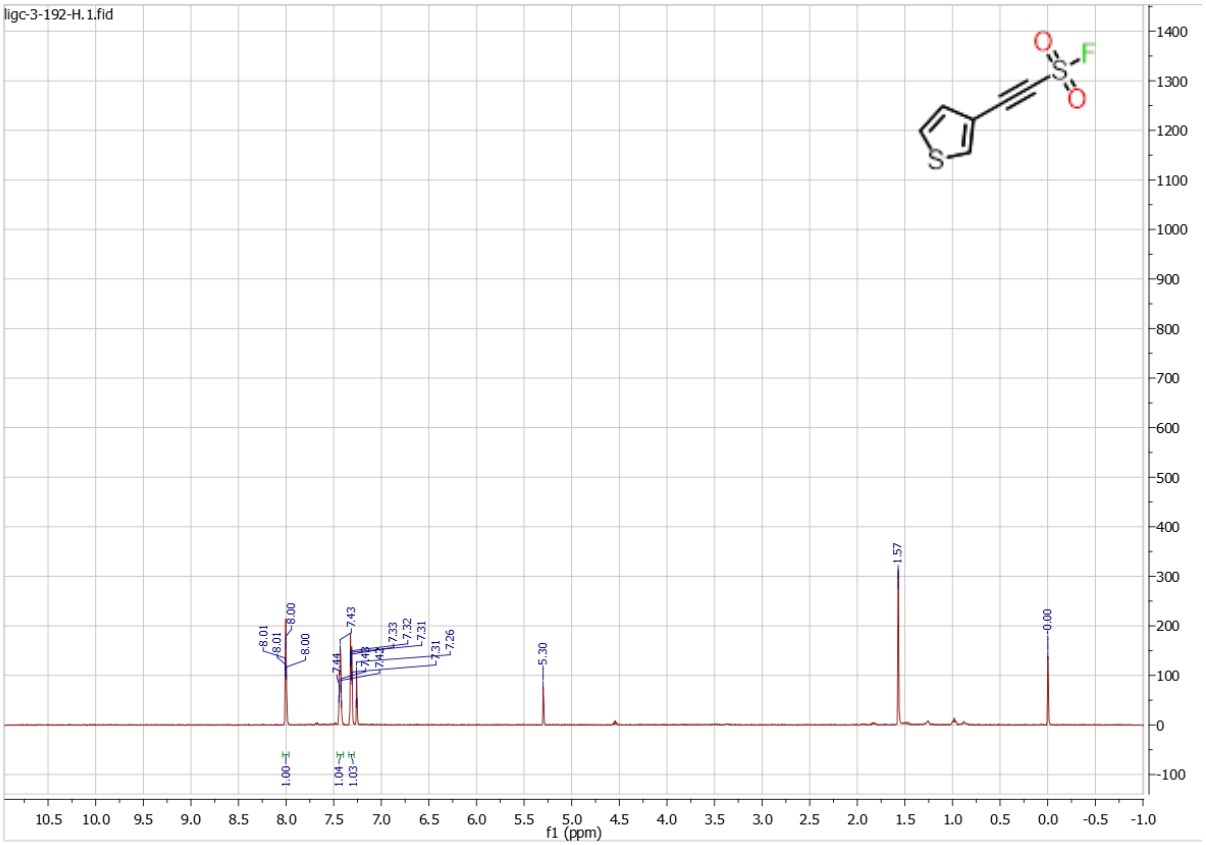

ligc-5-81-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
O
S
F
O
146.03
139.25
134.08
129.28
128.92
127.79
127.38
114.50
95.79
95.74
77.71
77.37
77.31
77.16
76.95
f1 (ppm)

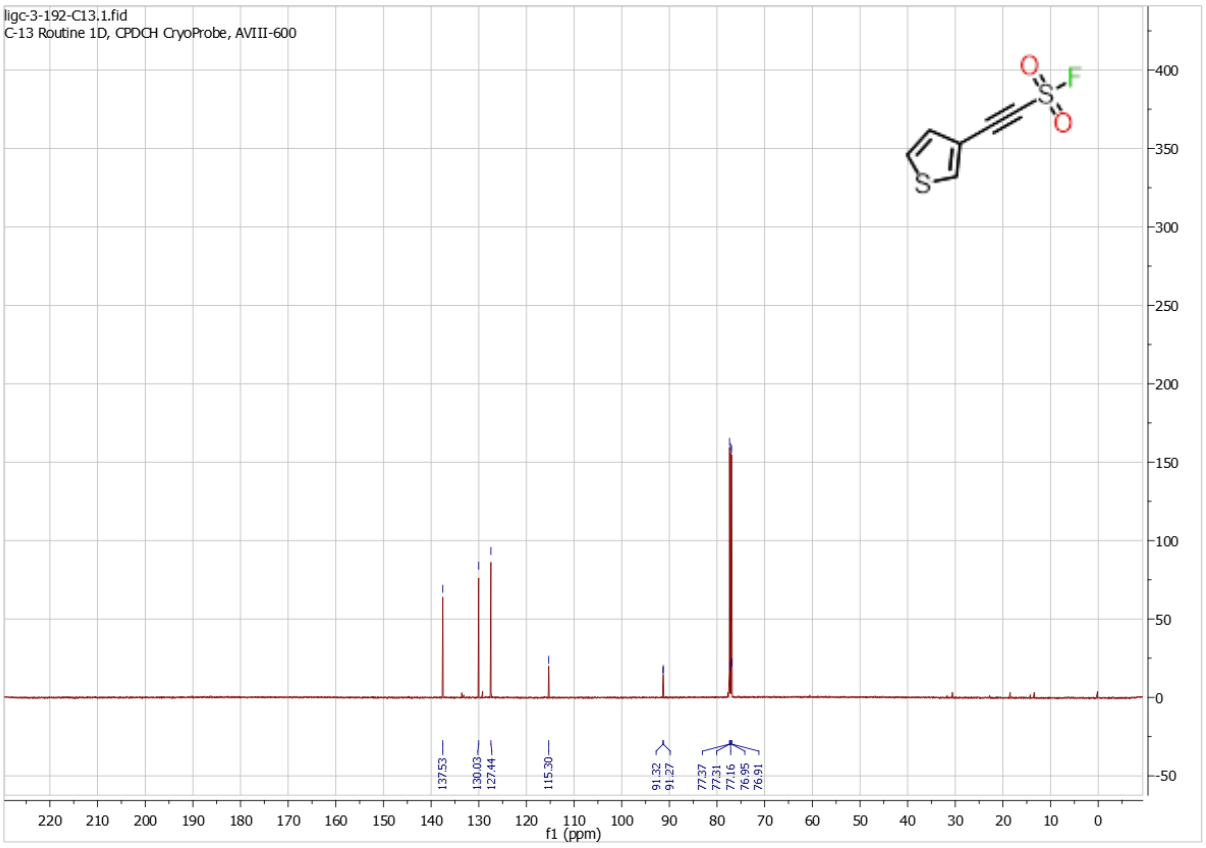

ligc-5-81-F.1.fid
F-19, CDCl3, DPX-400 QNP Probe. CF3Cl as Ref at 0 ppm.
O
S
F
O
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
74.33
0.00
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
f1 (ppm)

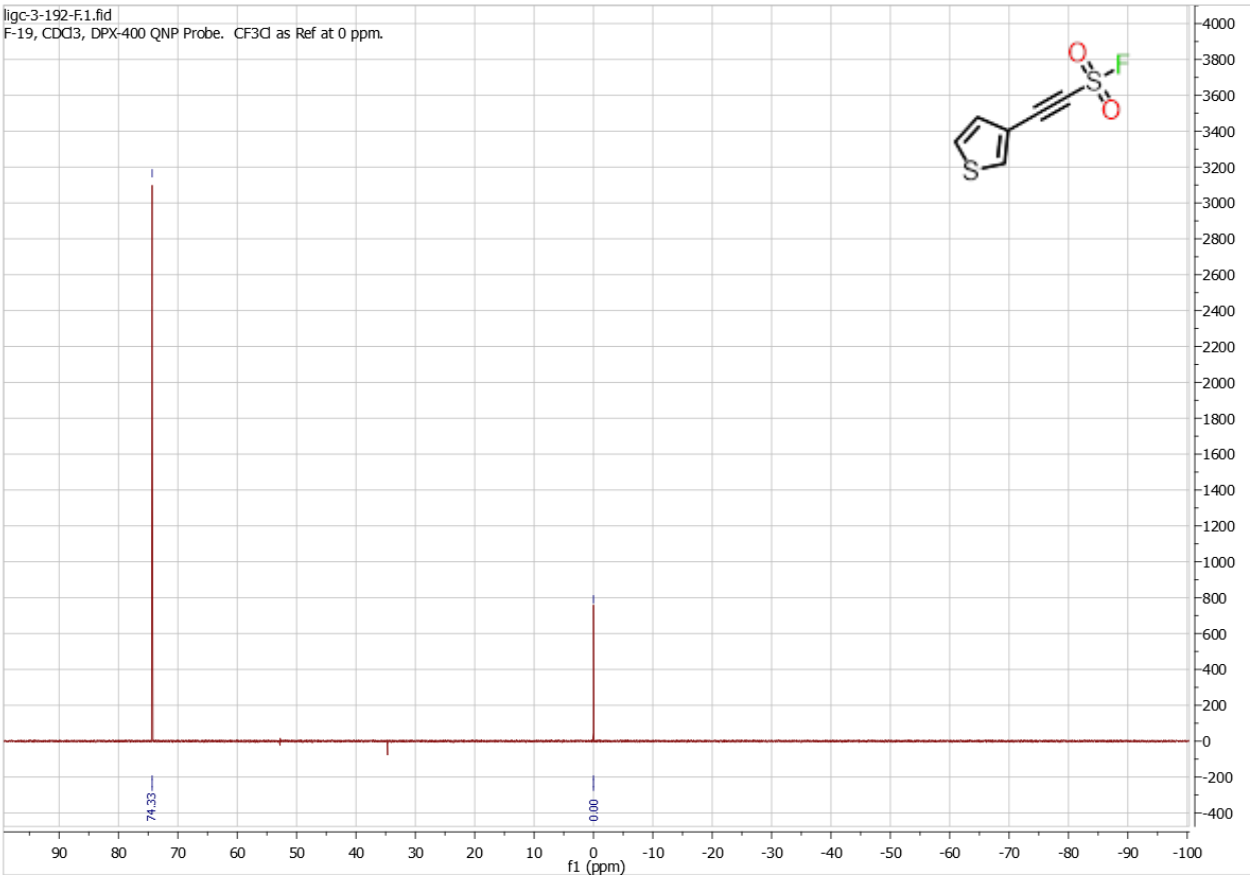

ligc-5-65-H.1.fid
f1 (ppm)

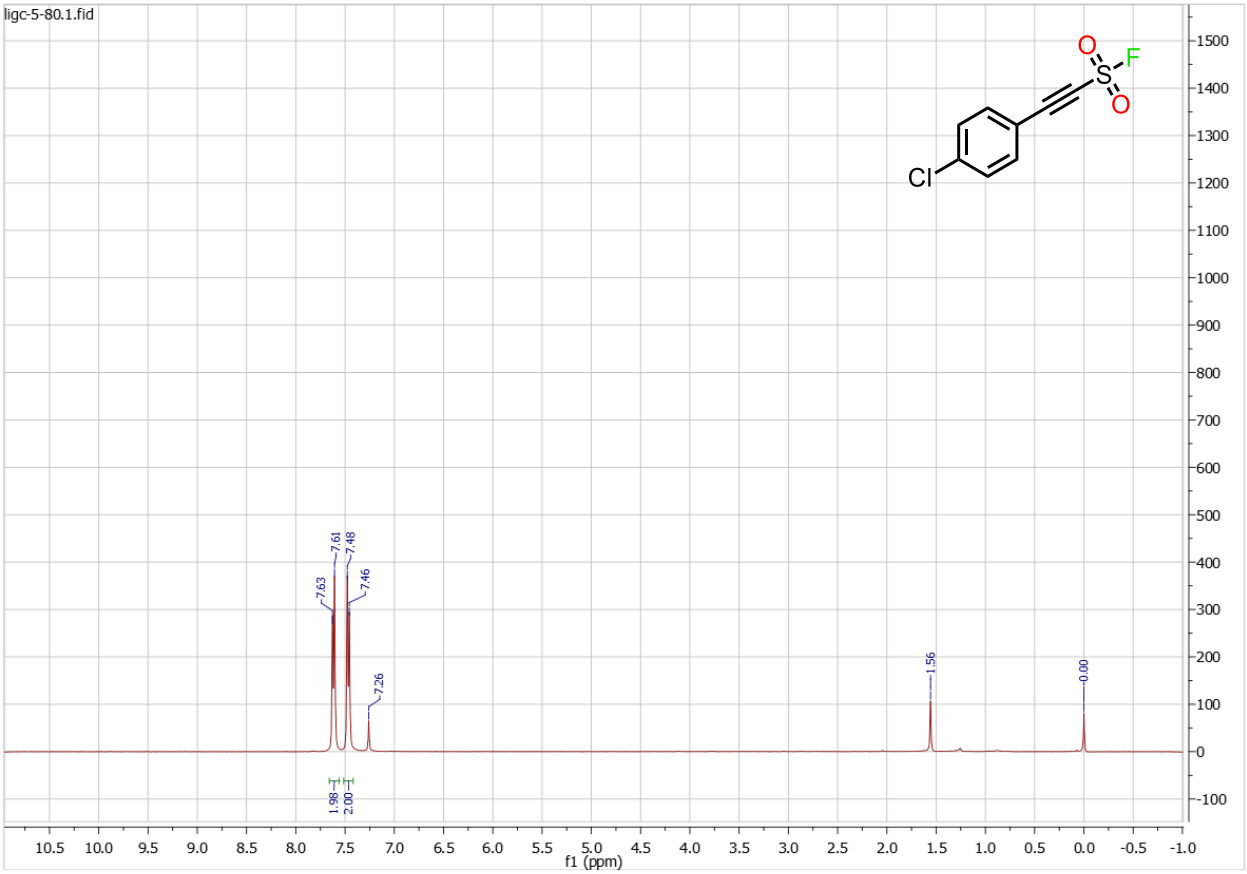

ligc-5-65-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
f1 (ppm)

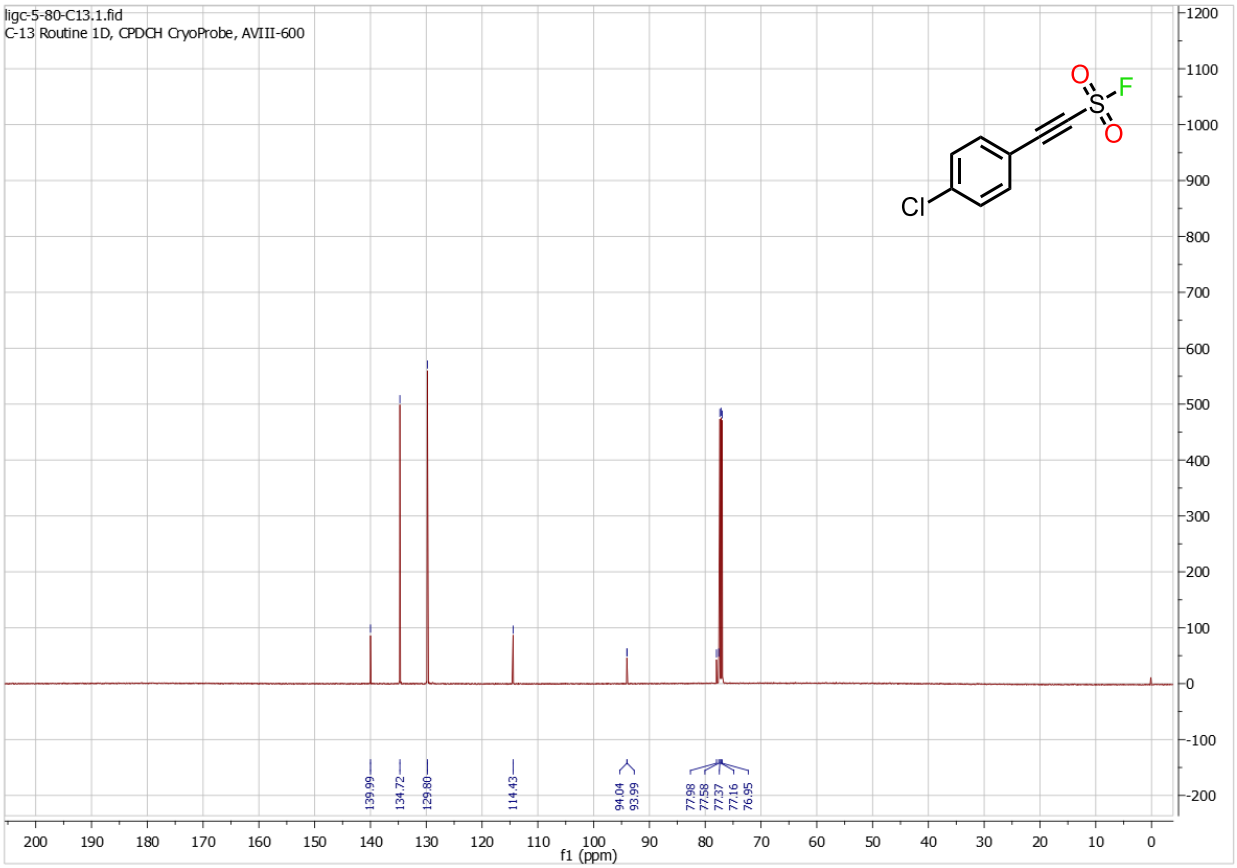

igc-5-65-F.1.fid
AV400 BBOF Probe, F-19 in CDCl3, CFCl3=0 ppm.
O
S
F
O
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
-10000
73.45
0.00
50
130
110
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-120
-140
f1 (ppm)

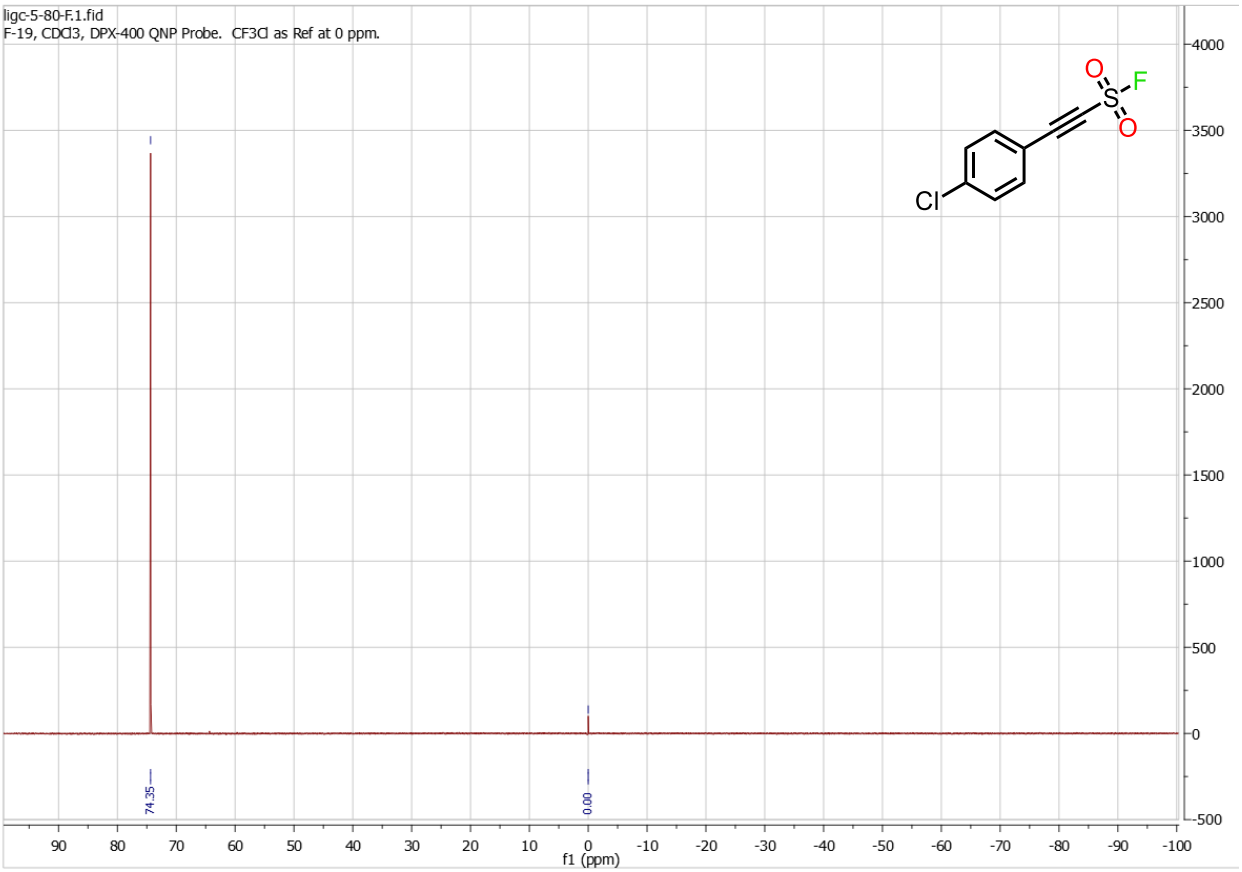

ligc-3-192-H.1.fid
8.01
8.01
8.00
8.00
7.44
7.43
7.33
7.32
7.31
7.31
7.26
5.30
1.57
0.00
1.00
1.04
1.03
f1 (ppm)

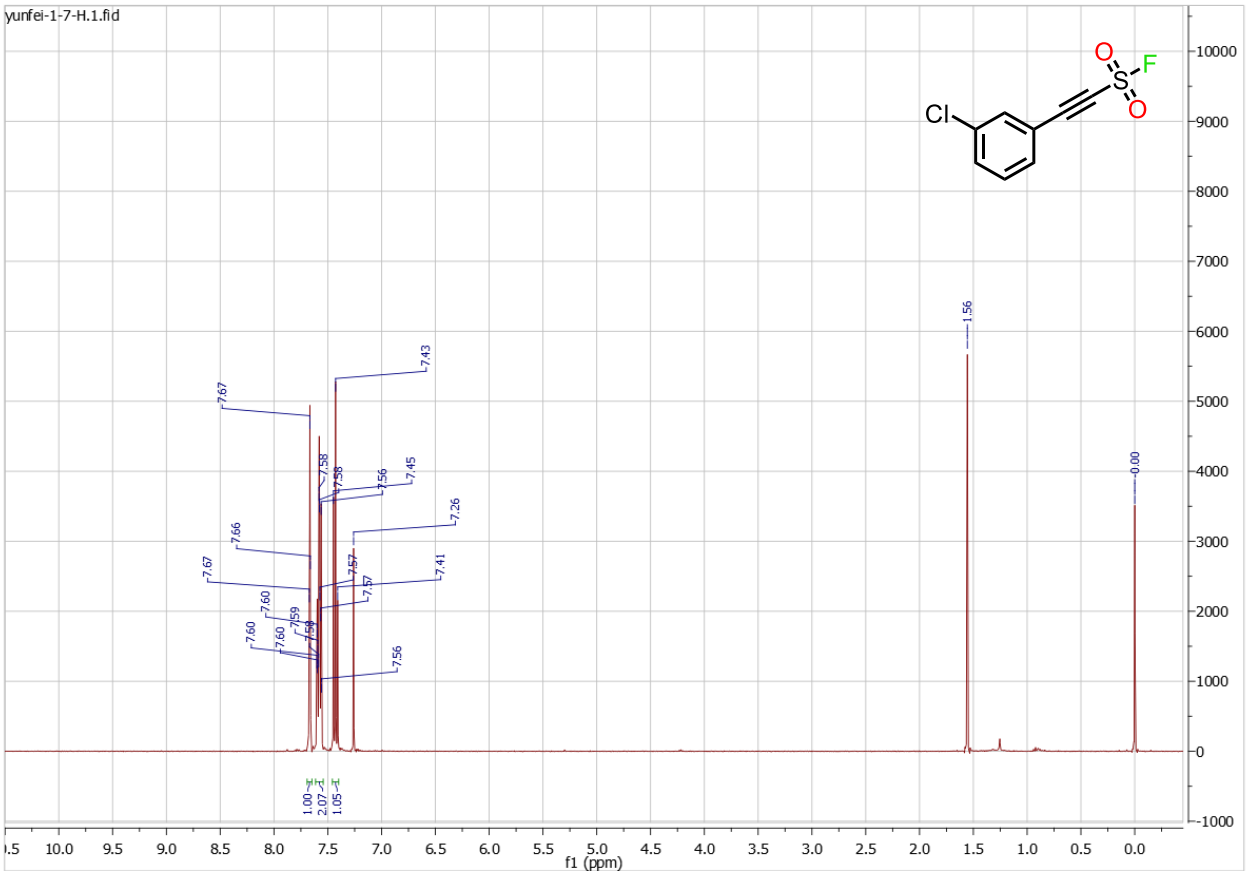

ligc-3-192-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
137.53
130.03
127.44
115.30
91.32
91.27
77.37
77.31
77.16
76.95
76.91
f1 (ppm)

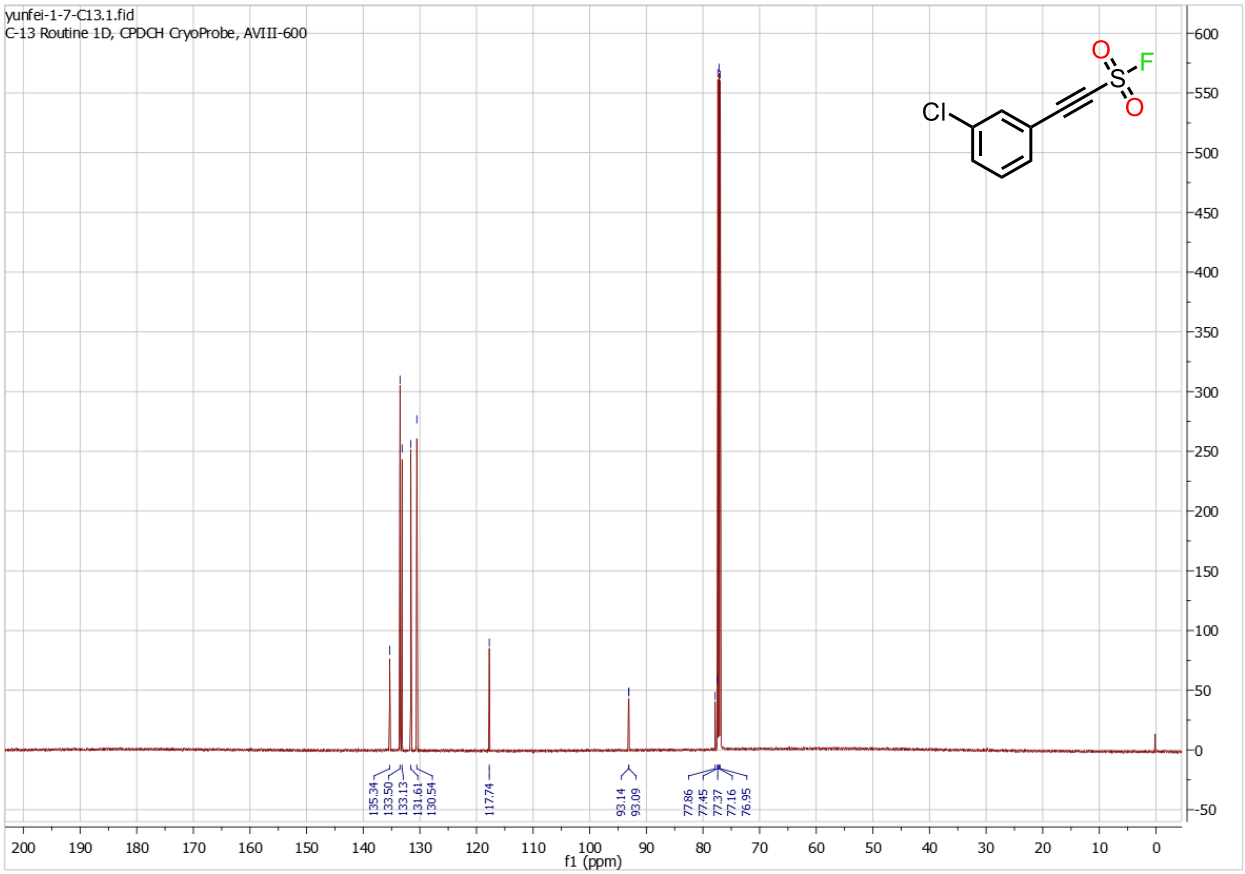

ligc-3-192-F.1.fid
F-19, CDCl3, DPX-400 QNP Probe. CF3Cl as Ref at 0 ppm.
O
S
F
O
S
74.33
0.00
f1 (ppm)

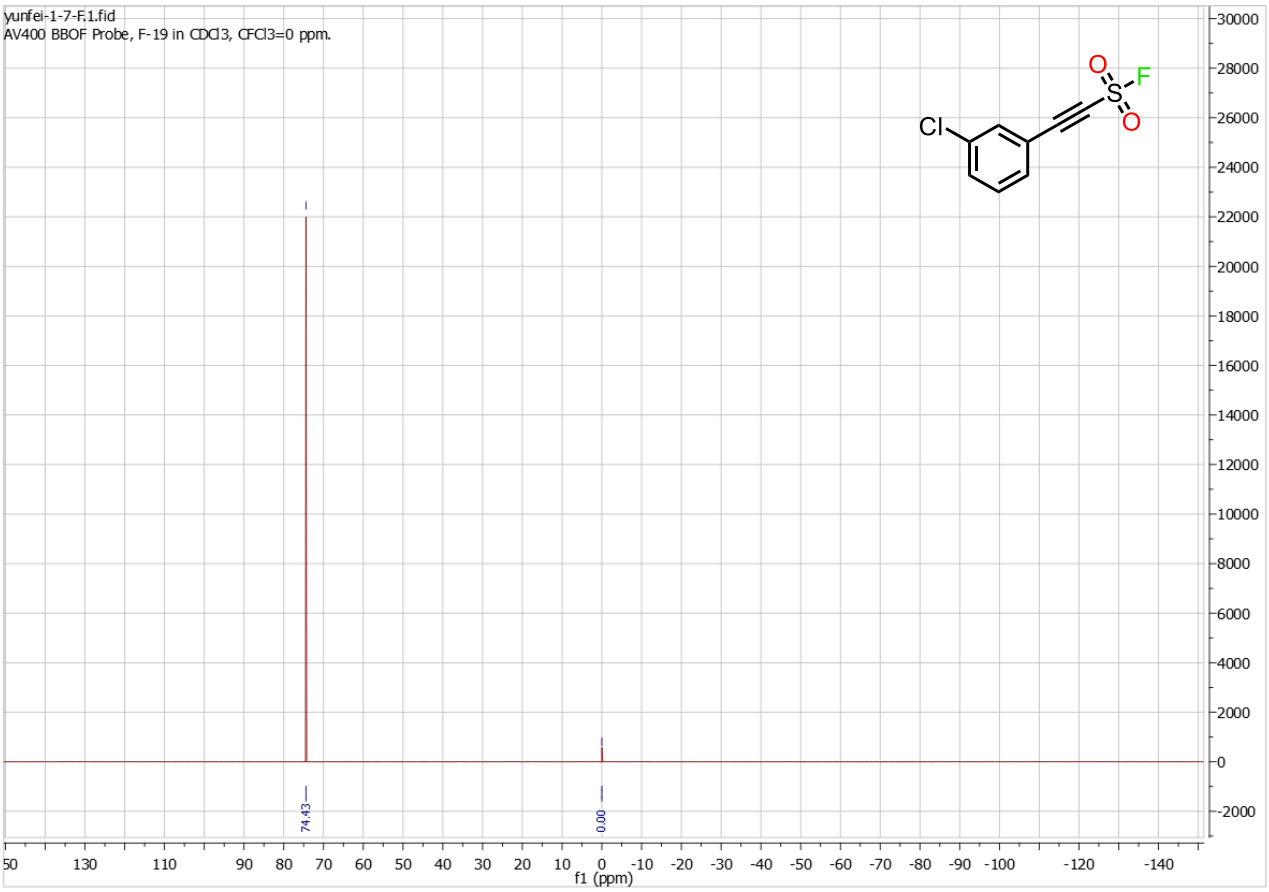

ligc-5-80.1.fid
O
S
F
O
Cl
7.61
7.48
7.63
7.46
7.26
1.56
0.00
1.98
2.00
f1 (ppm)

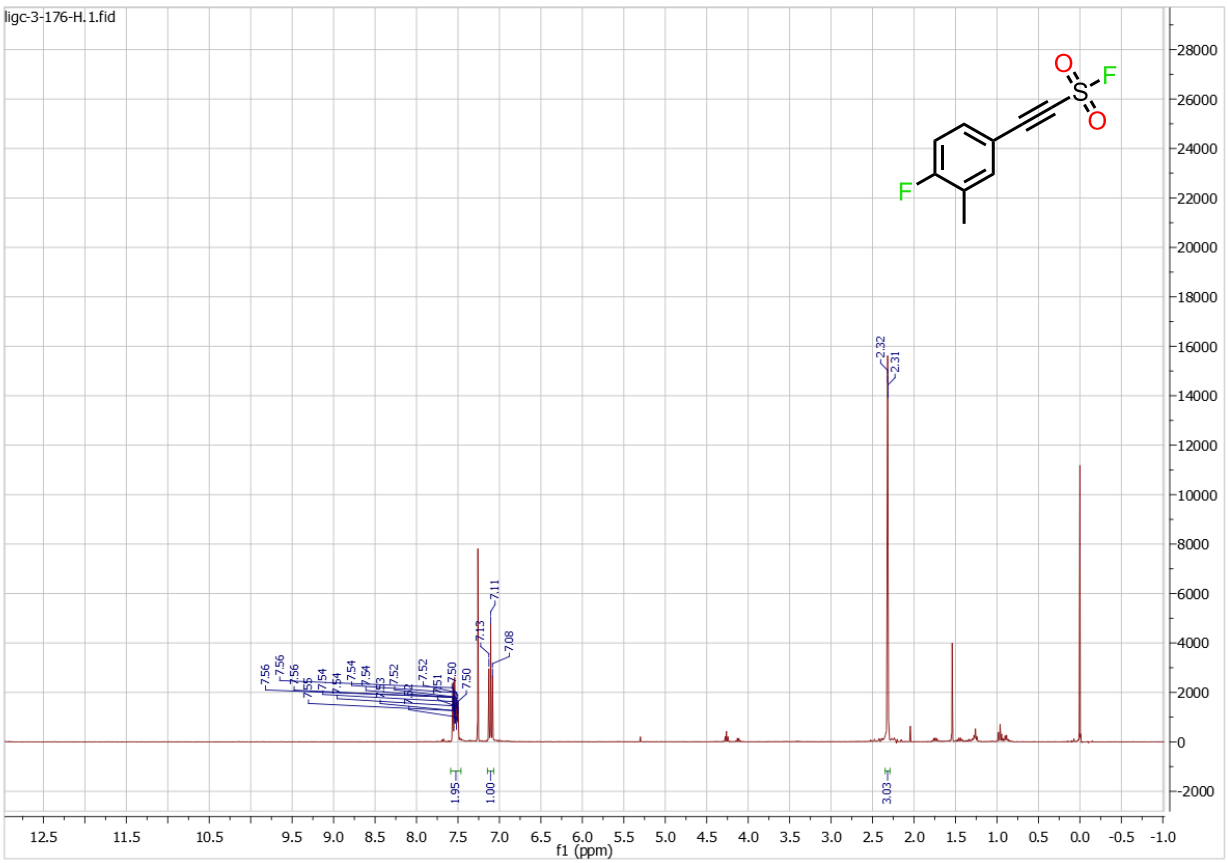

ligc-5-80-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
O
S
F
O
Cl
139.99
134.72
129.80
114.43
94.04
93.99
77.98
77.58
77.37
77.16
76.95
f1 (ppm)

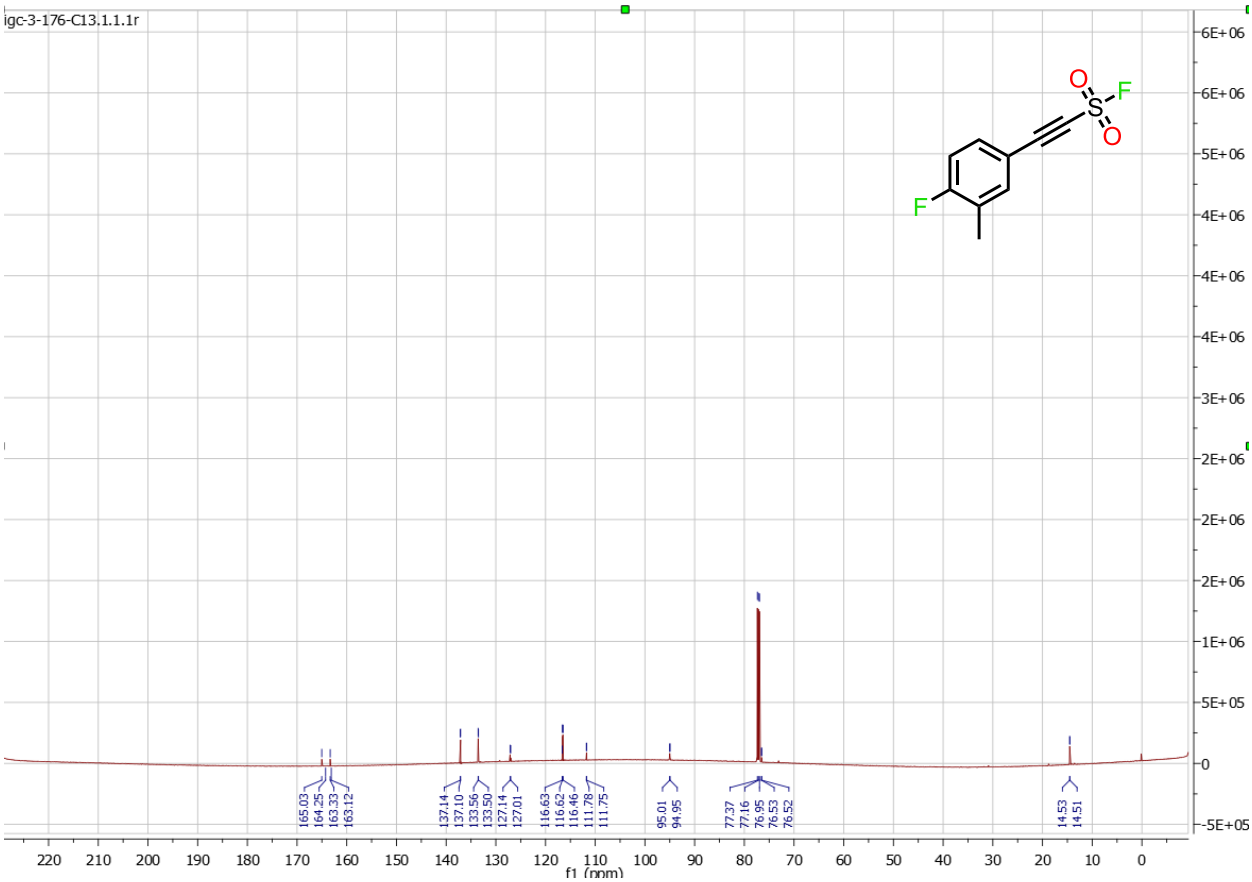

ligc-5-80-F.1.fid
F-19, CDCl3, DPX-400 QNP Probe. CF3Cl as Ref at 0 ppm.
O
S
F
O
Cl
74.35
0.00
f1 (ppm)

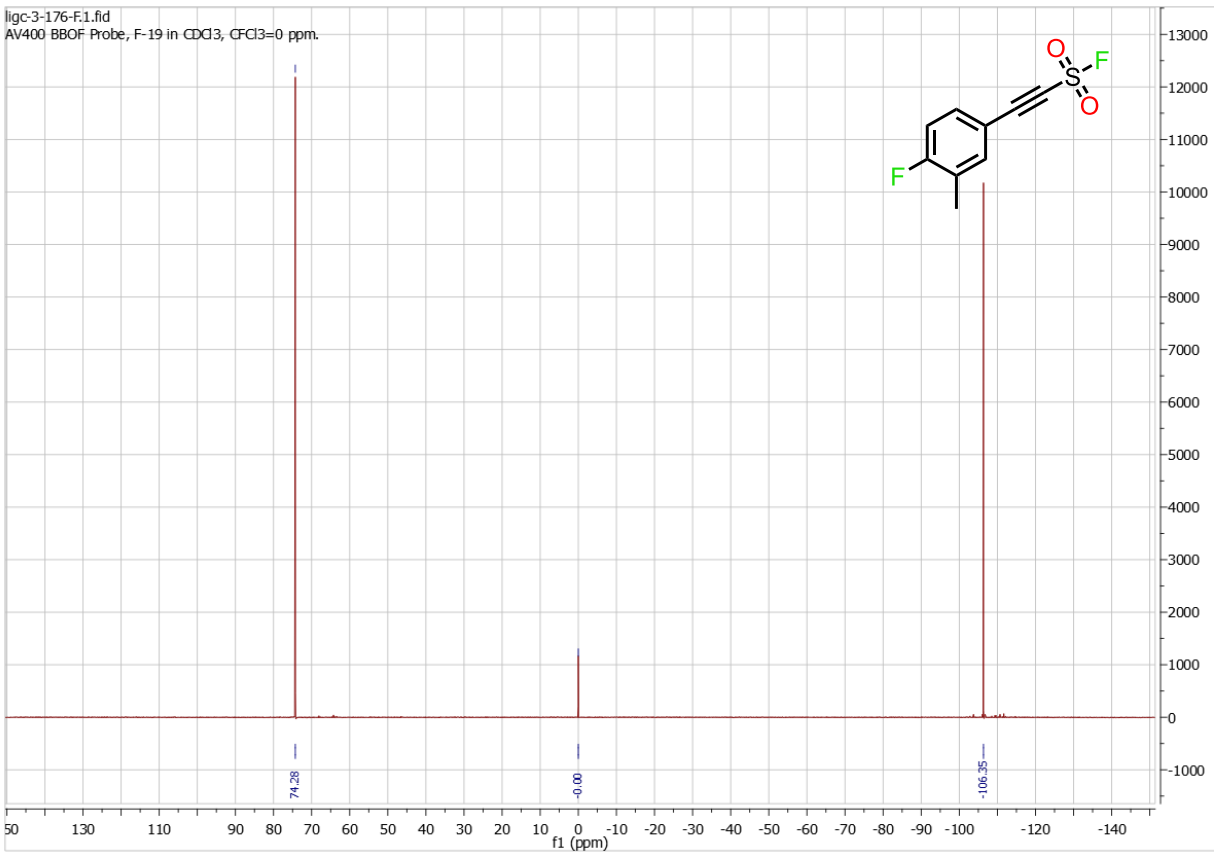

yunfei-1-7-H.1.fid
O
F
S
O
Cl
7.67
7.43
7.58
7.58
7.56
7.45
7.26
7.66
7.67
7.57
7.57
7.41
7.60
7.60
7.59
7.58
7.56
1.56
0.00
1.00
2.07
1.05
f1 (ppm)

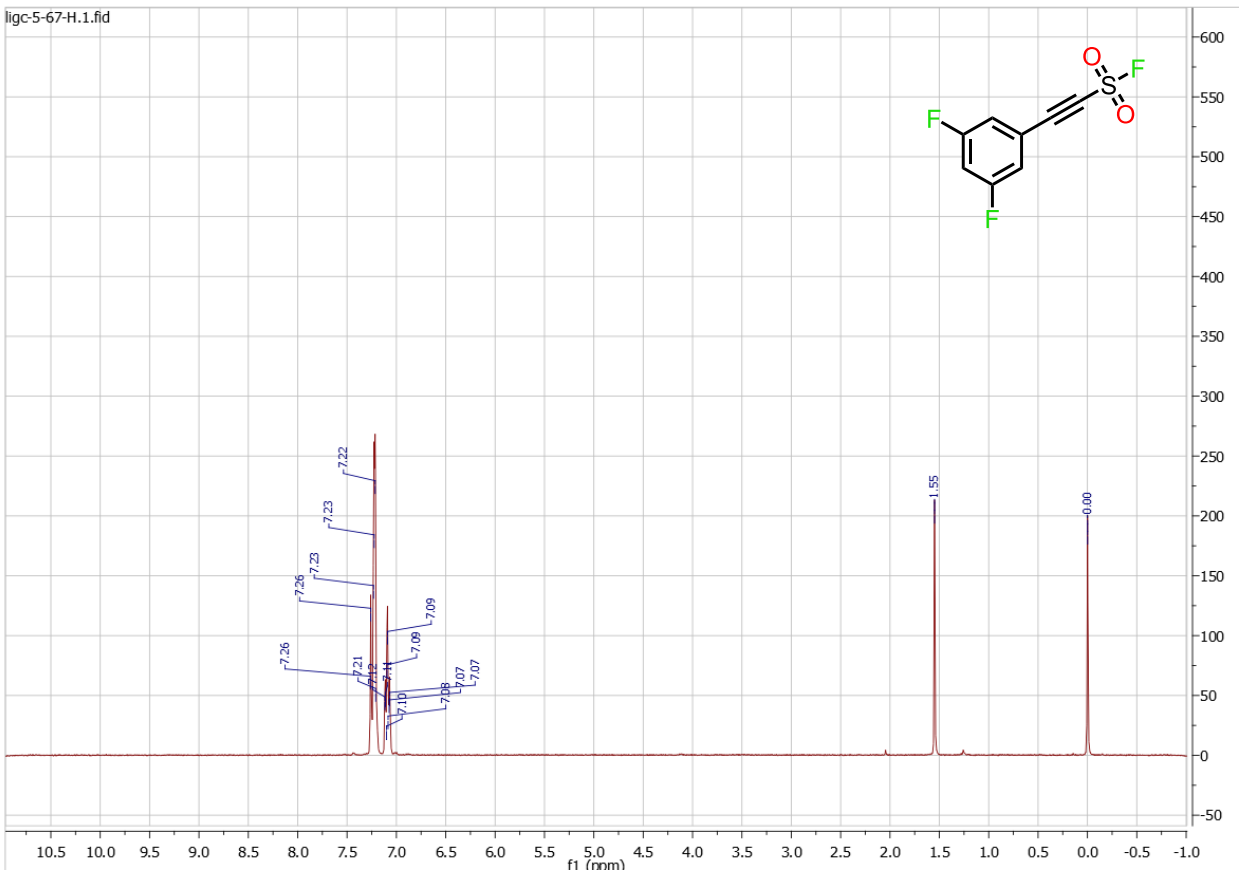

yunfei-1-7-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
O
F
S
O
Cl
135.34
133.50
133.13
131.61
130.54
117.74
93.14
93.09
77.86
77.45
77.37
77.16
76.95
f1 (ppm)

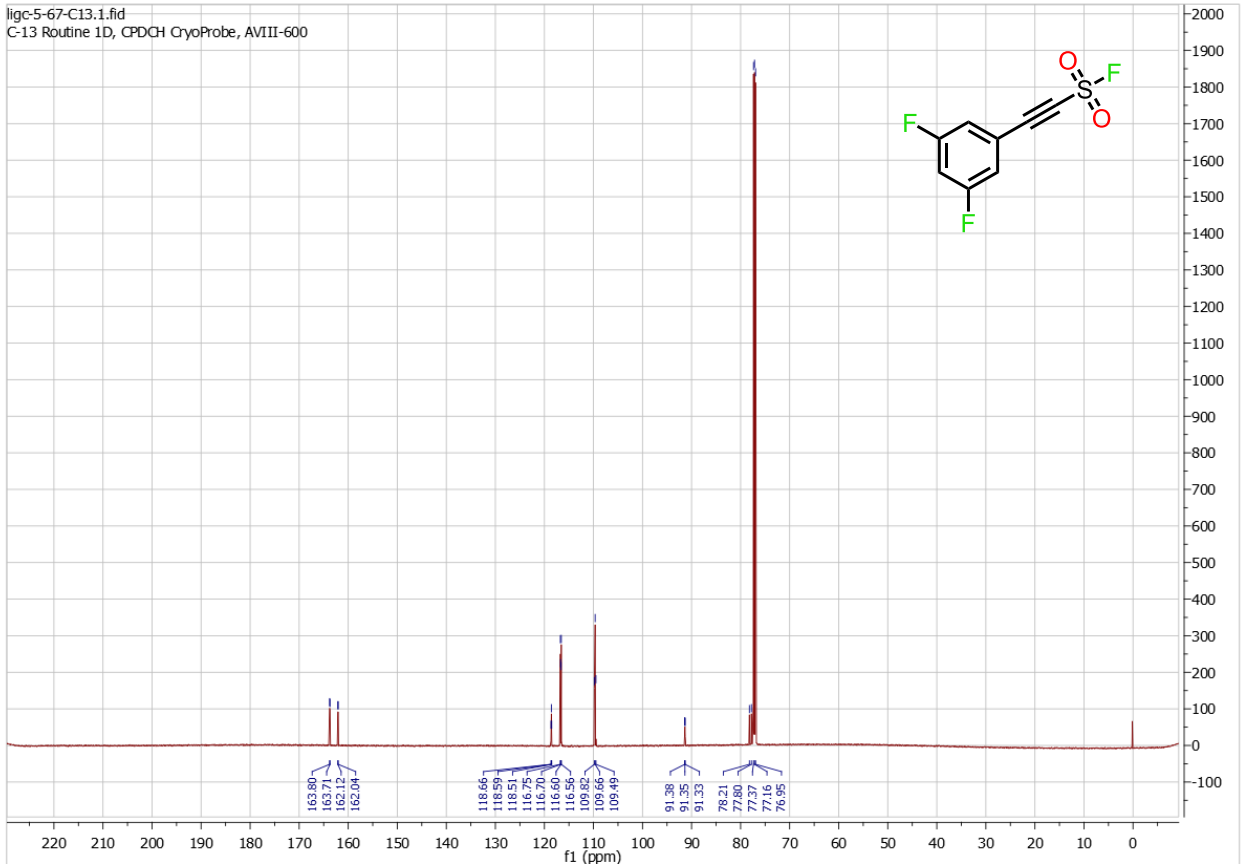

yunfei-1-7-F.1.fid
AV400 BBOF Probe, F-19 in CDCl3, CFCl3=0 ppm.
O
S
F
O
Cl
74.43
0.00
f1 (ppm)

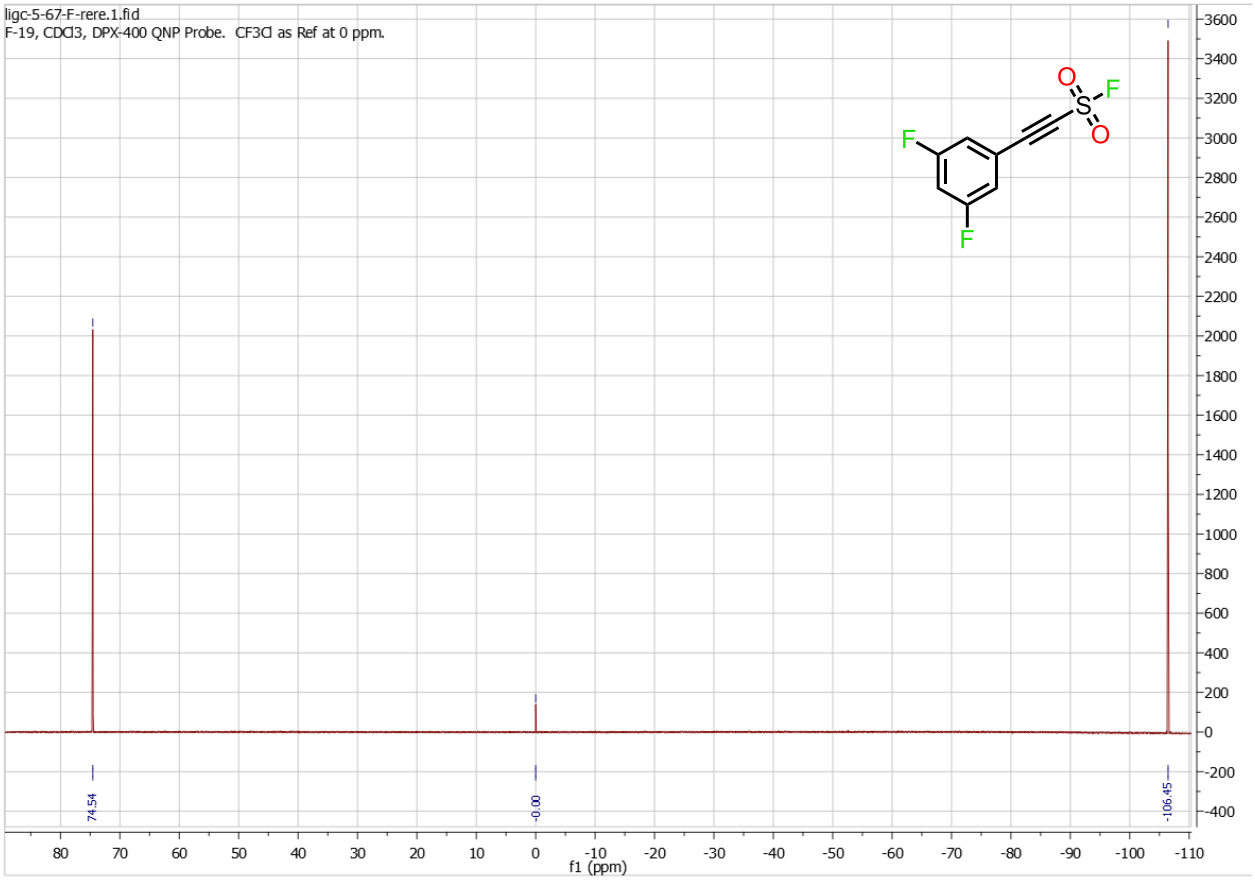

igc-3-176-H.1.fid
f1 (ppm)

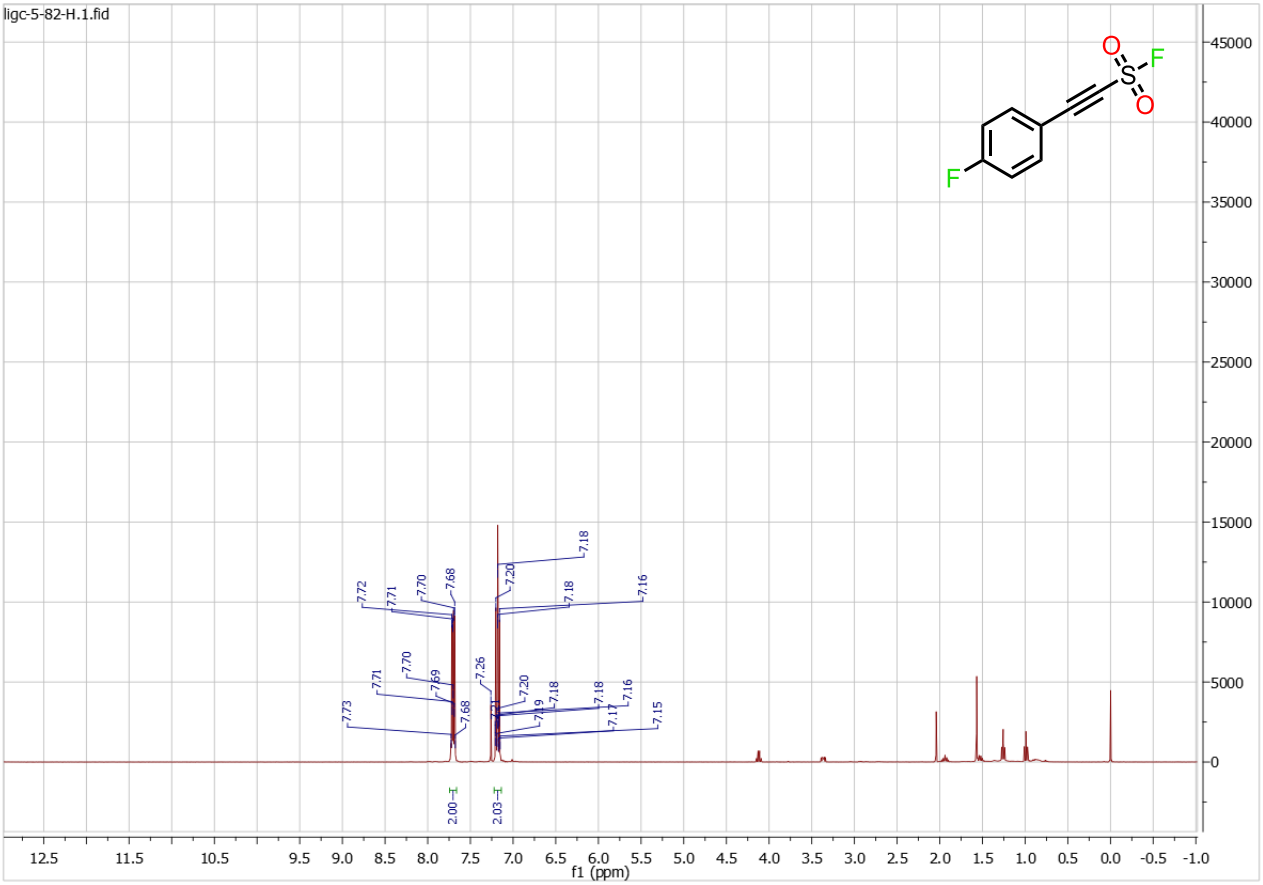

igc-3-176-C13.1.1.1r
f1 (ppm)

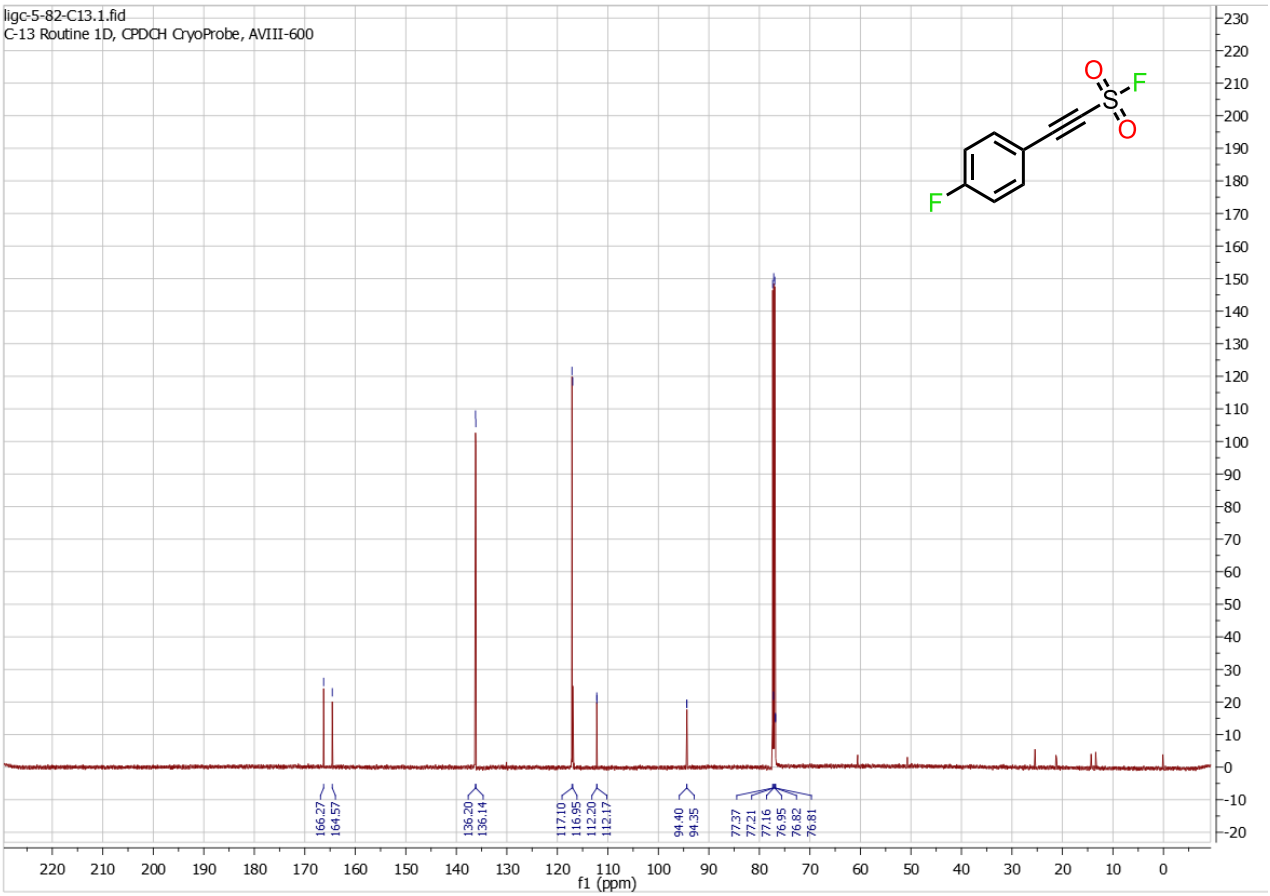

ligc-3-176-F.1.fid
AV400 BBOF Probe, F-19 in CDCl3, CFCl3=0 ppm.
O
S
F
O
F
74.28
-0.00
-106.35
f1 (ppm)

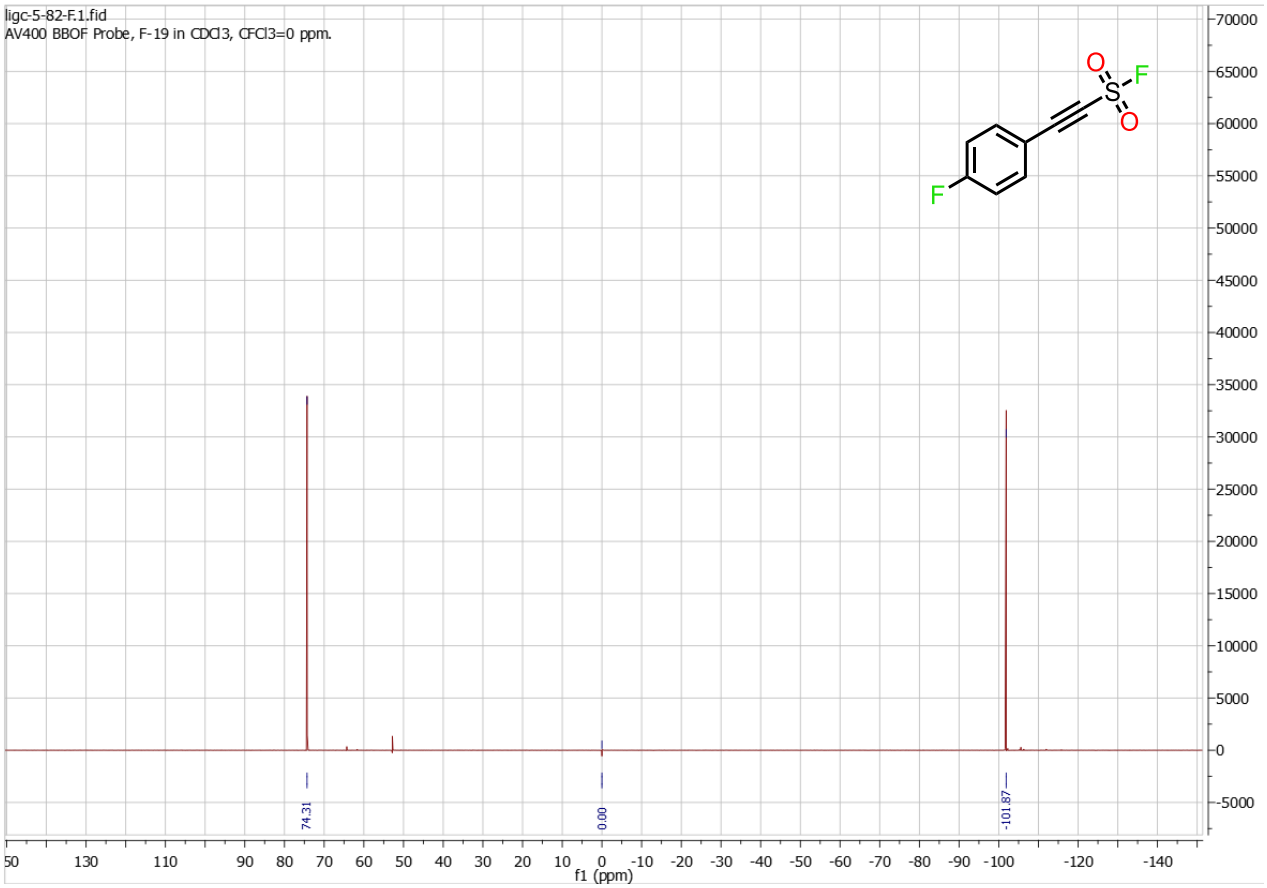

ligc-5-67-H.1.fid
7.22
7.23
7.23
7.26
7.09
7.09
7.26
7.21
7.12
7.11
7.10
7.08
7.07
7.07
1.55
0.00
f1 (ppm)

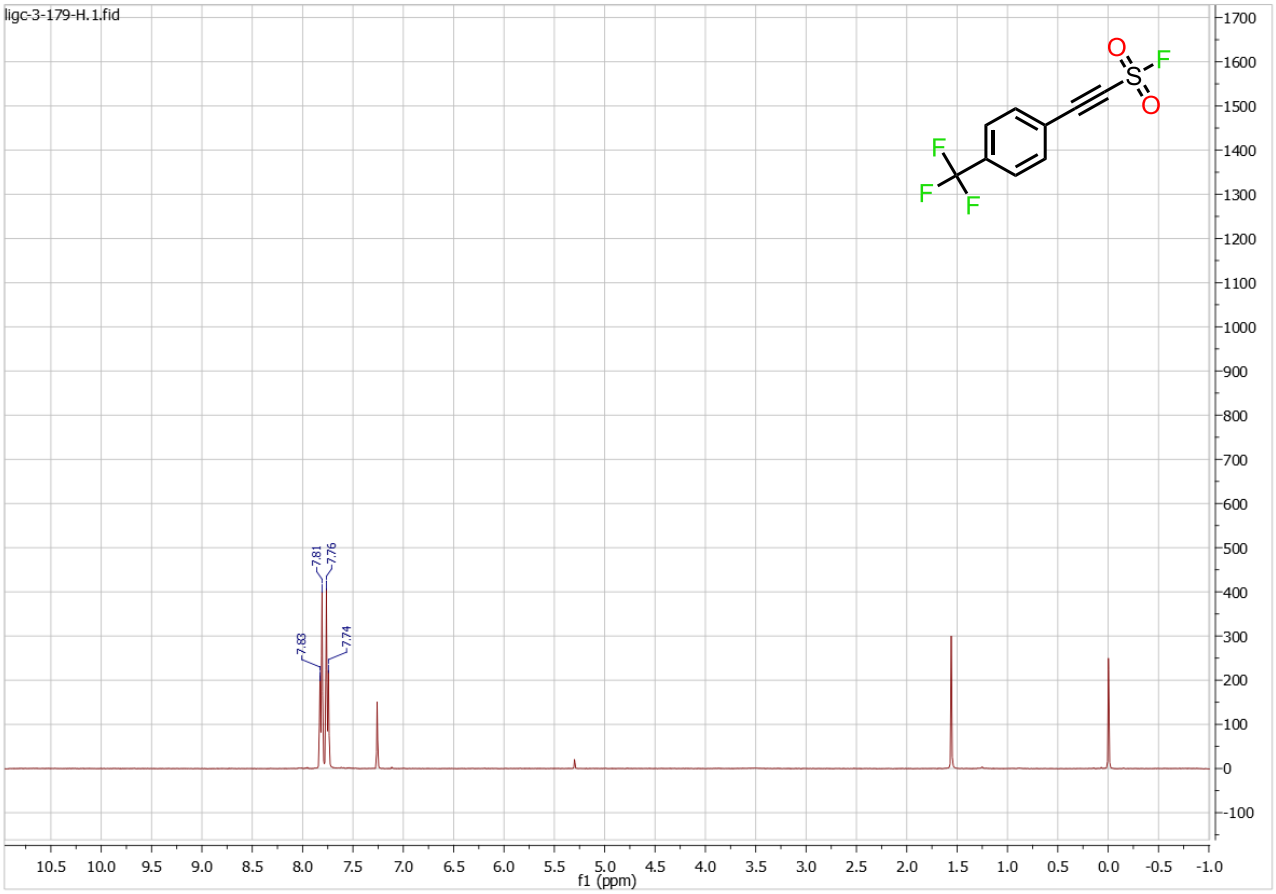

ligc-5-67-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
163.80
163.71
162.12
162.04
118.66
118.59
118.51
116.75
116.70
116.60
116.56
109.82
109.66
109.49
91.38
91.35
91.33
78.21
77.80
77.37
77.16
76.95
f1 (ppm)

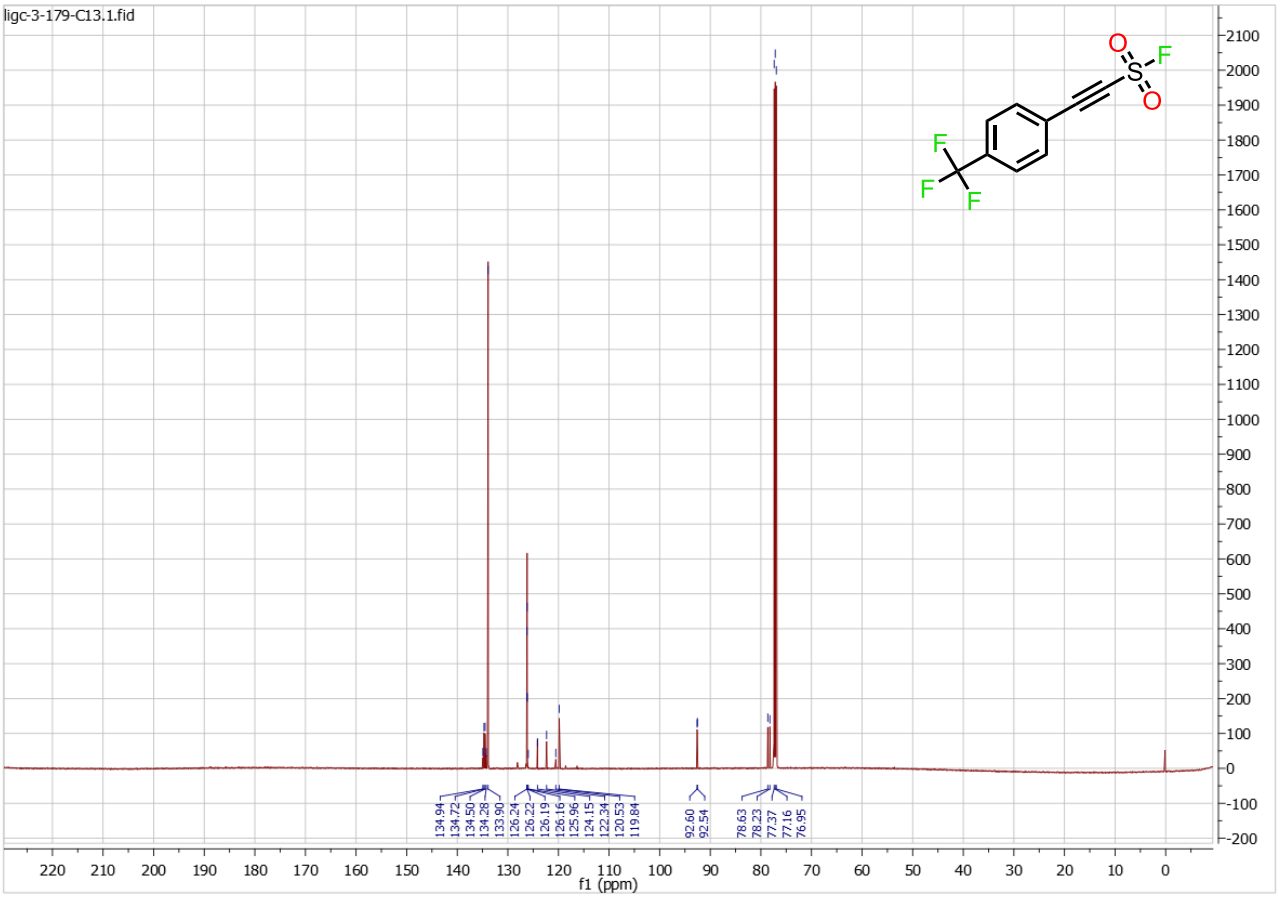

ligc-5-67-F-rere.1.fid
F-19, CDCl3, DPX-400 QNP Probe. CF3Cl as Ref at 0 ppm.
74.54
-0.00
-106.45
f1 (ppm)

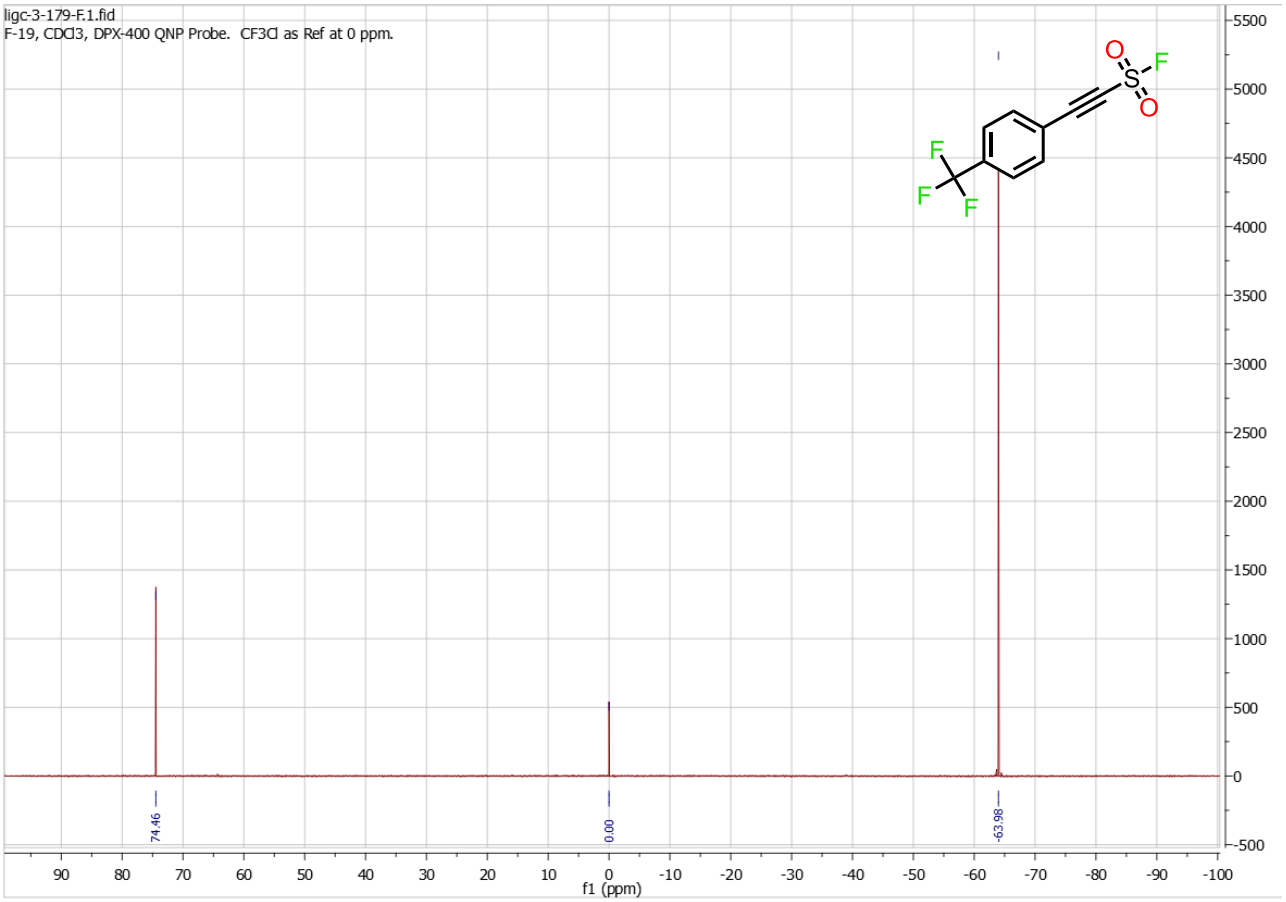

ligc-5-82-H.1.fid
O
S
F
O
F
7.72
7.71
7.70
7.68
7.20
7.18
7.18
7.16
7.71
7.70
7.69
7.26
7.20
7.18
7.18
7.16
7.73
7.68
7.9
7.17
7.15
2.00
2.03
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
12.5
11.5
10.5
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
f1 (ppm)

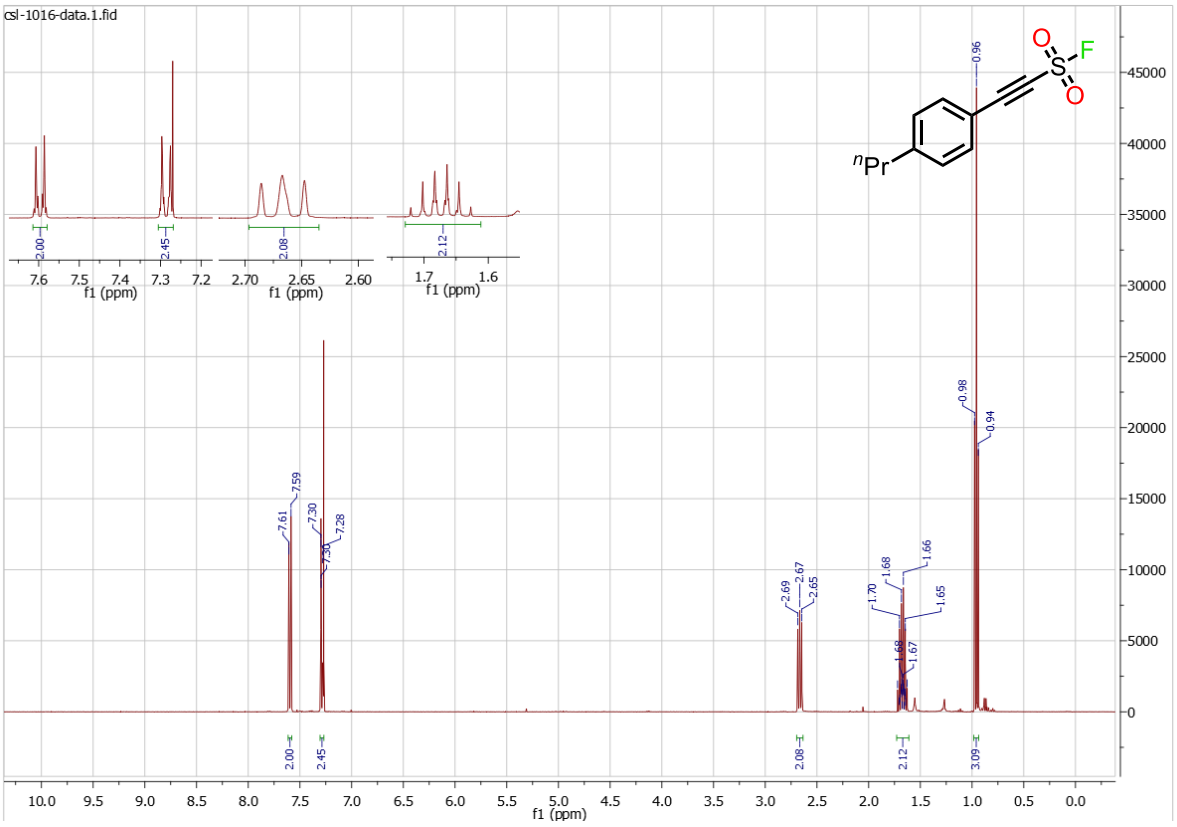

ligc-5-82-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
O
S
F
O
F
166.27
164.57
136.20
136.14
117.10
116.95
112.20
112.17
94.40
94.35
77.37
77.21
77.16
76.95
76.82
76.81
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

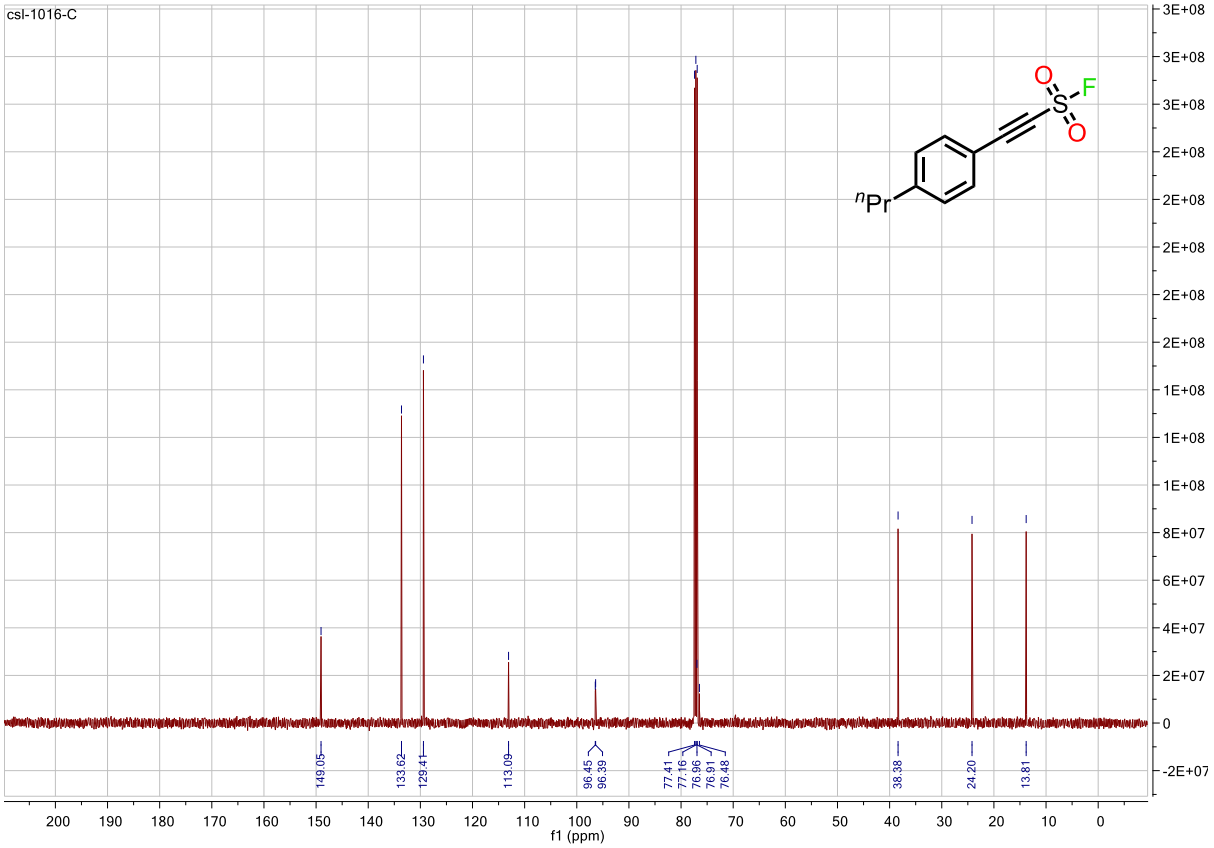

ligc-5-82-F.1.fid
AV400 BBOF Probe, F-19 in CDCl3, CFCl3=0 ppm.
O
S
F
O
F
74.31
0.00
-101.87
f1 (ppm)

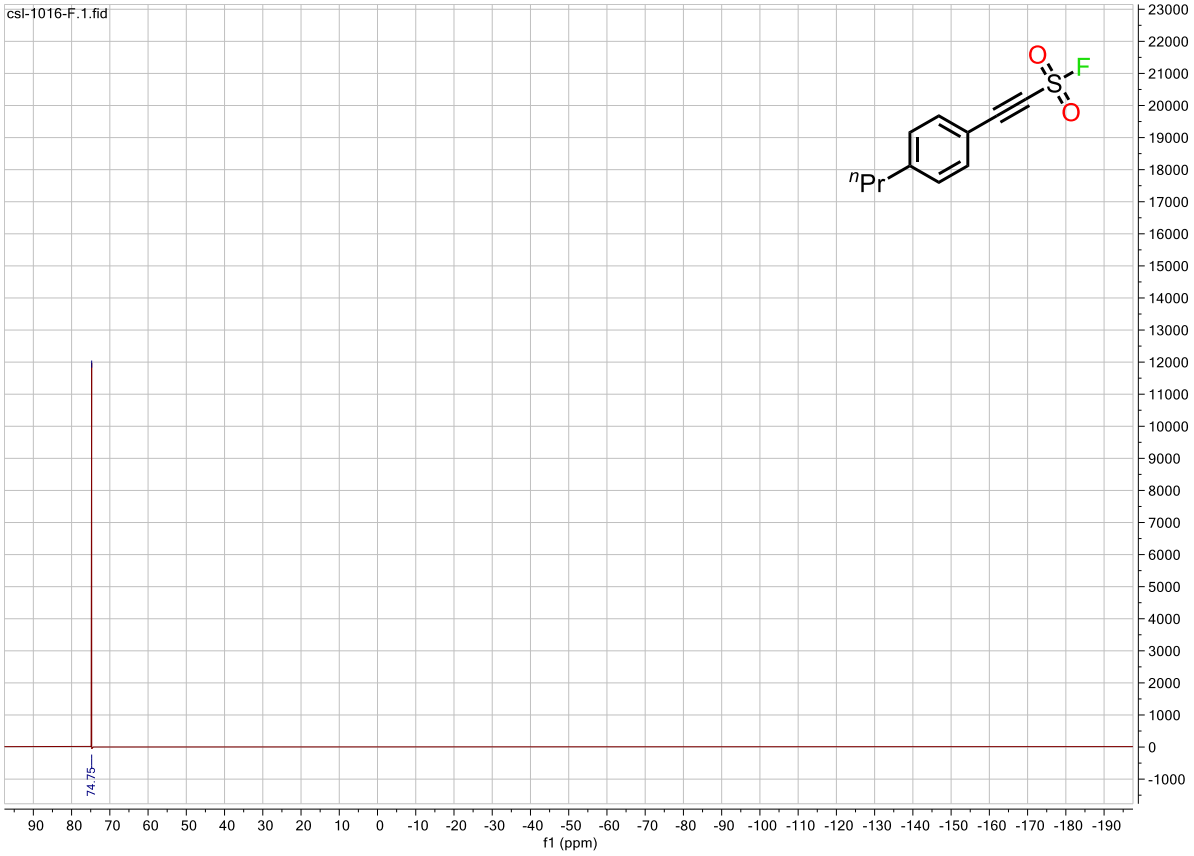

ligc-3-179-H.1.fid
7.81
7.76
7.83
7.74
f1 (ppm)

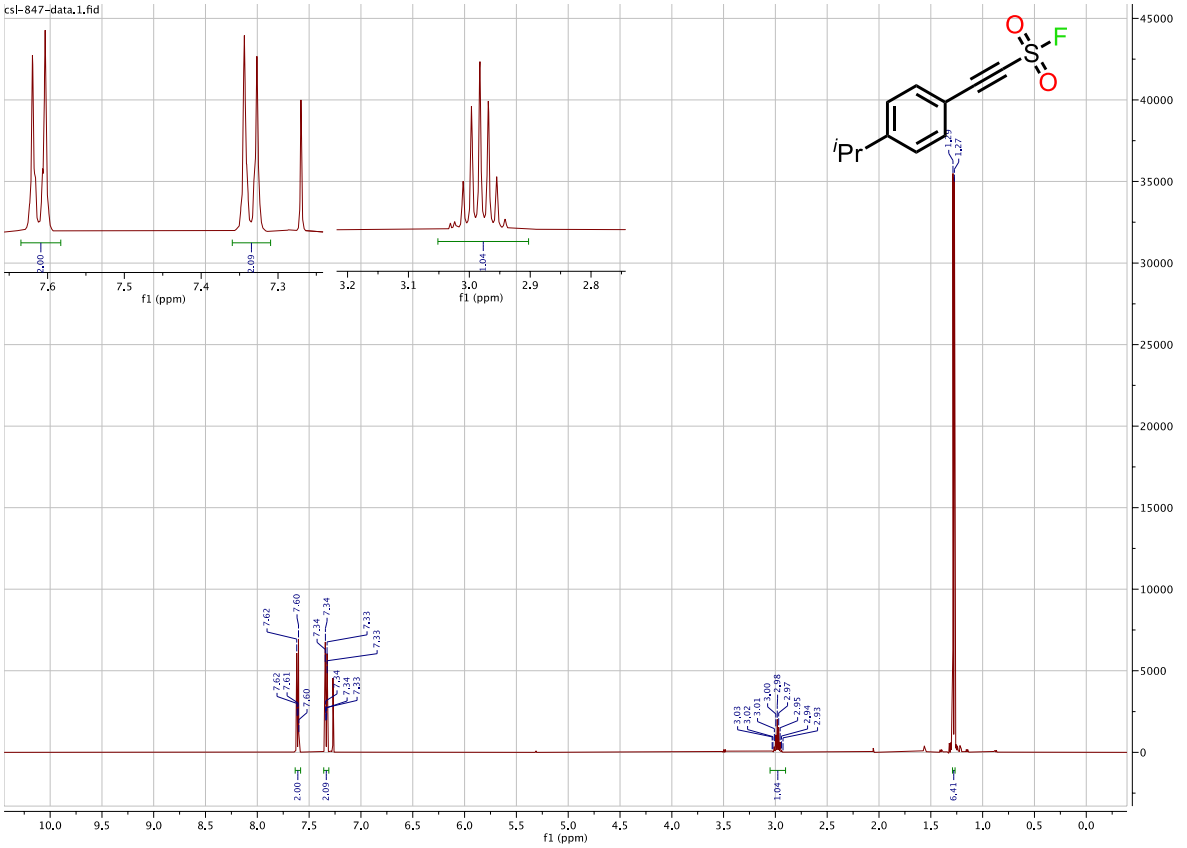

ligc-3-179-C13.1.fid
134.94
134.72
134.50
134.28
133.90
126.24
126.22
126.19
126.16
125.96
124.15
122.34
120.53
119.84
92.60
92.54
78.63
78.23
77.37
77.16
76.95
f1 (ppm)

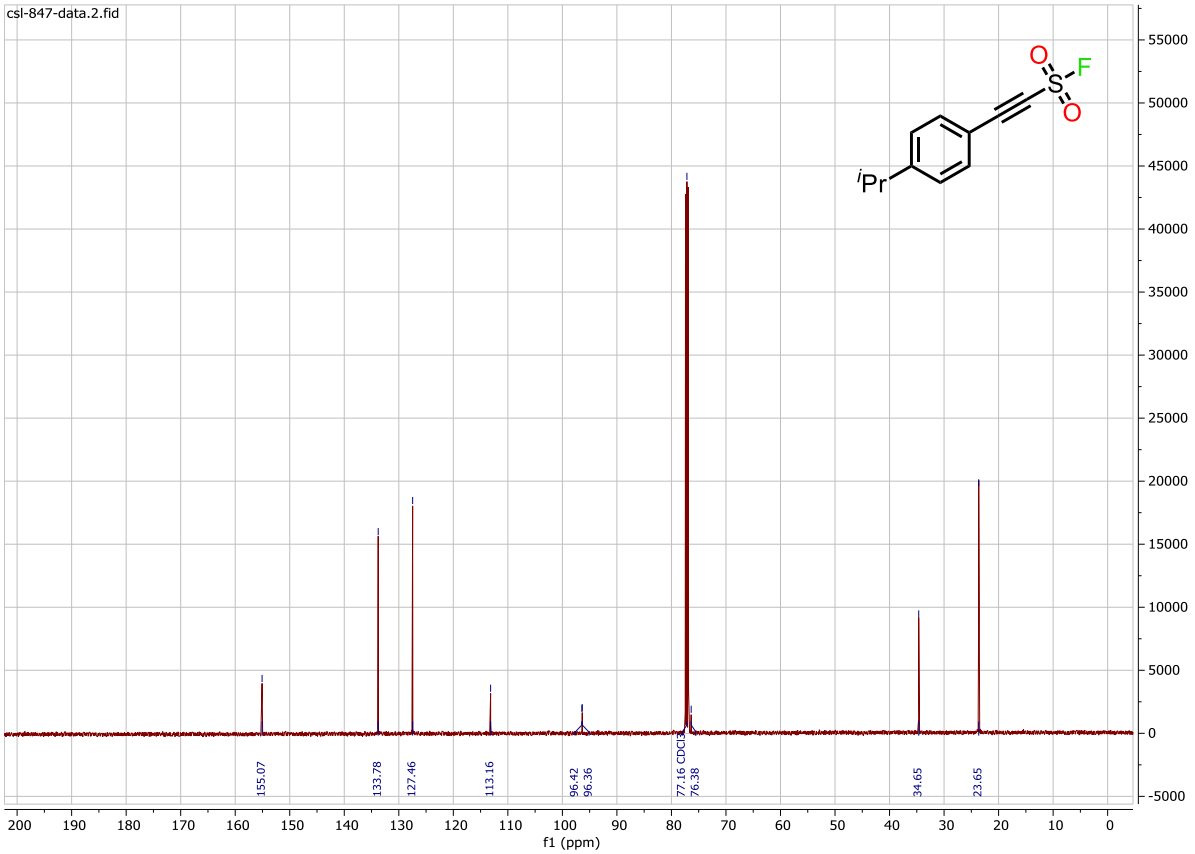

ligc-3-179-F.1.fid
F-19, CDCl3, DPX-400 QNP Probe. CF3Cl as Ref at 0 ppm.
O
S
F
O
F
F
F
74.46
0.00
-63.98
f1 (ppm)

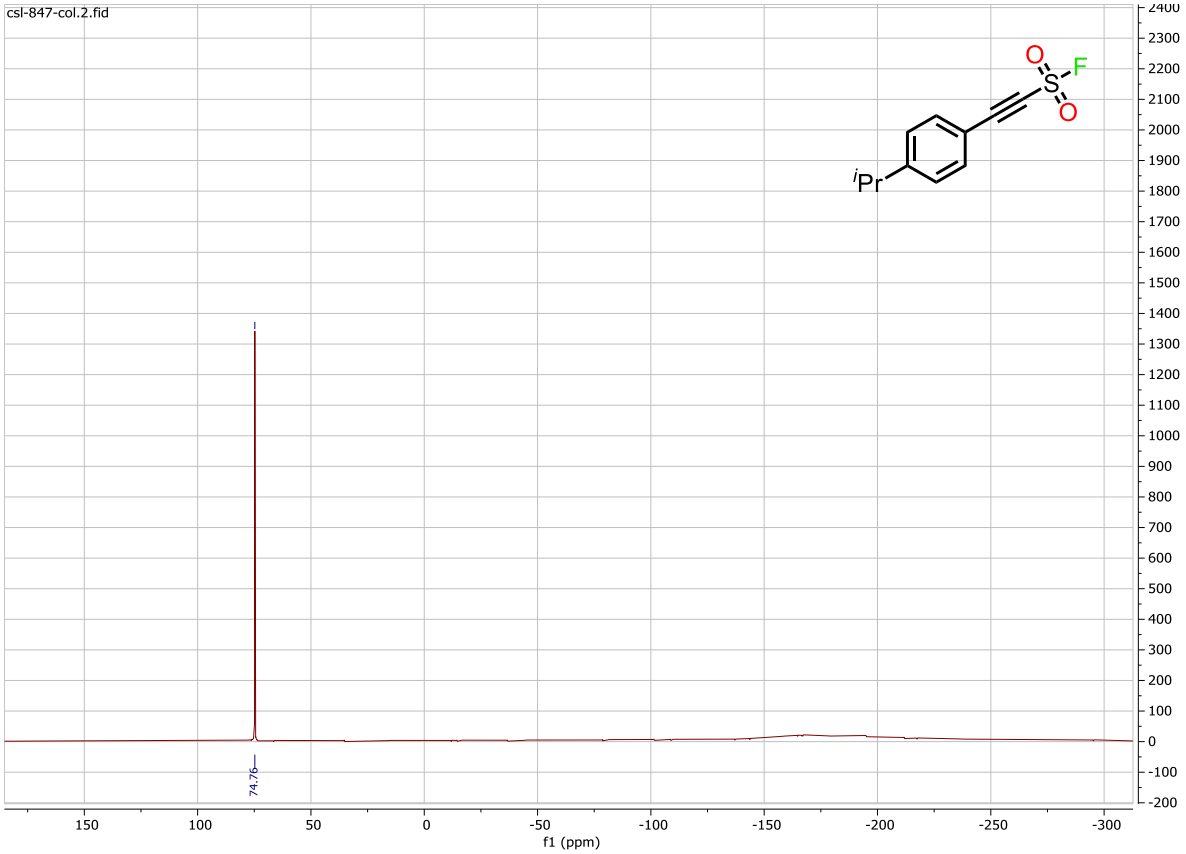

csl-1016-data.1.fid
f1 (ppm)

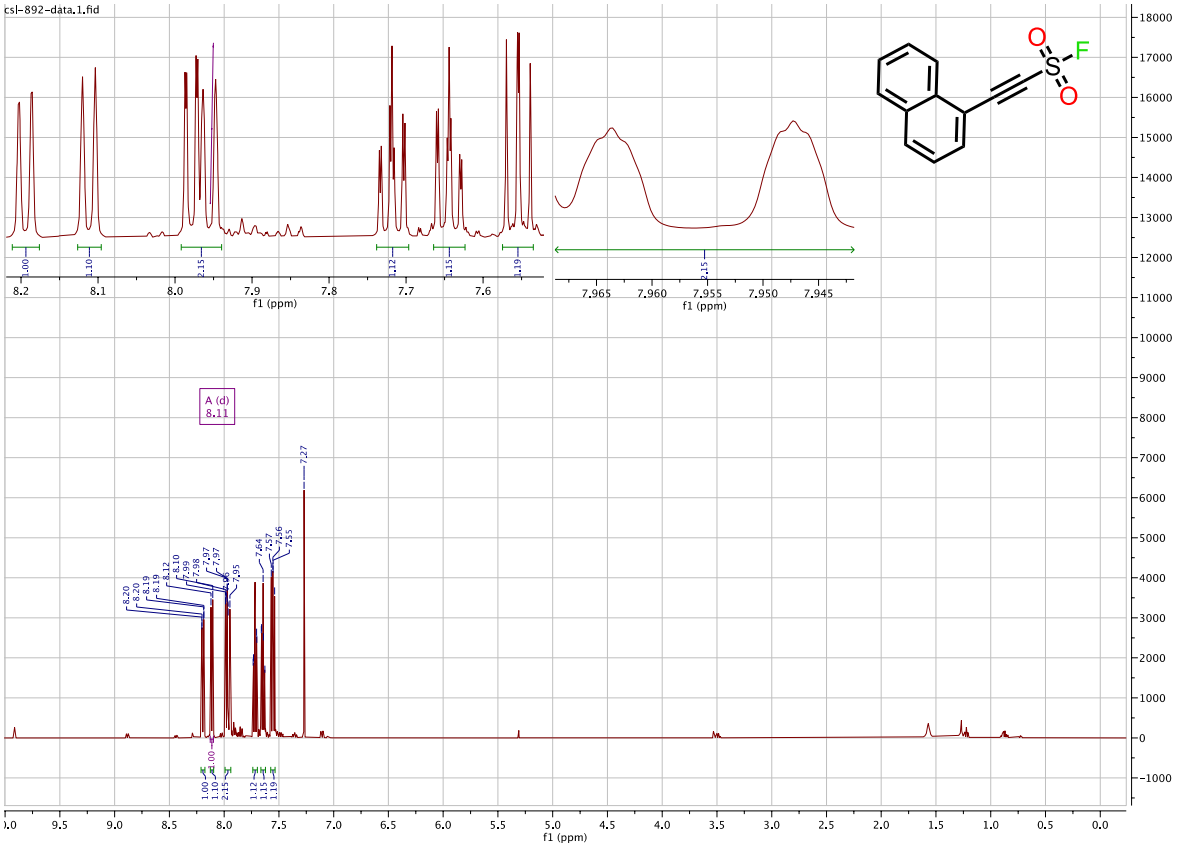

csl-1016-C
f1 (ppm)

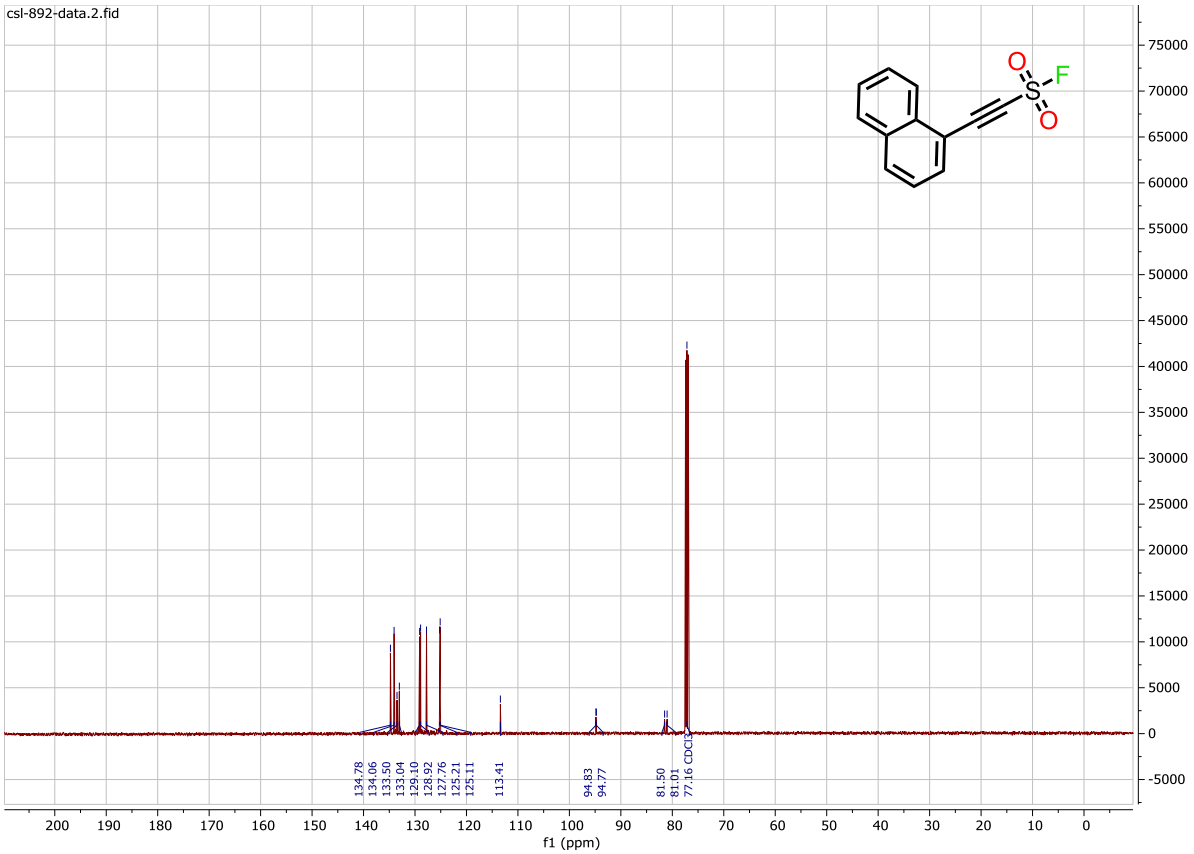

csl-1016-F.1.fid
O
S
F
O
nPr
74.75
f1 (ppm)

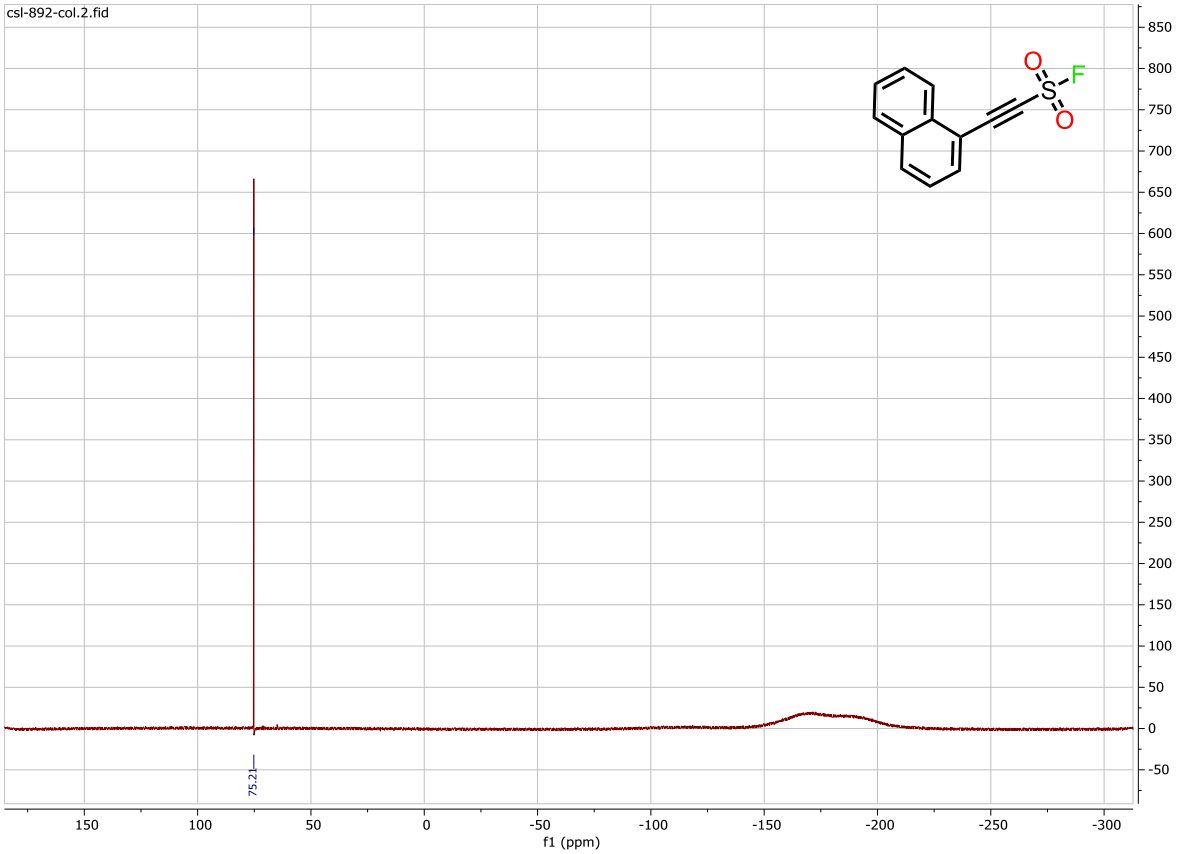

csl-847-data.1.fid
f1 (ppm)
7.62
7.60
7.34
7.33
3.03
3.02
3.01
3.00
2.98
2.97
2.95
2.94
2.93
1.29
1.27
2.00
2.09
1.04
6.41
O
S
F
O
iPr

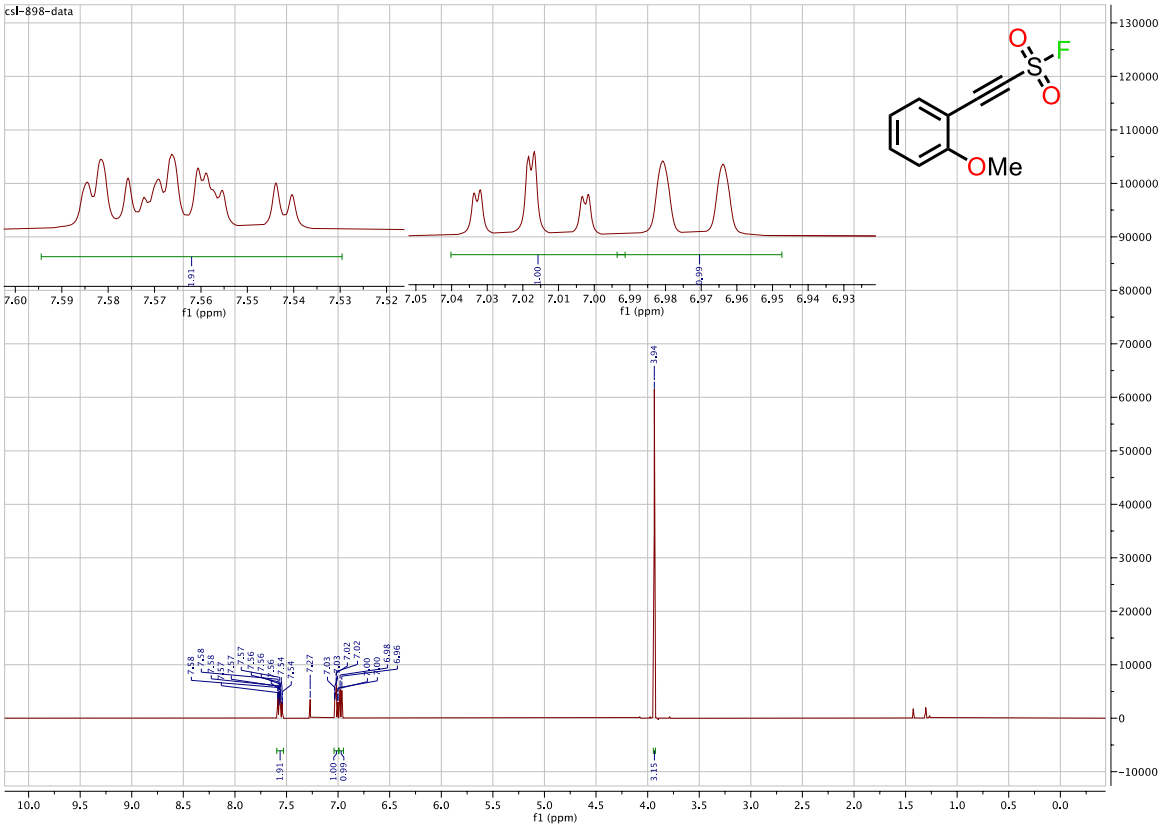

csl-847-data.2.fid
f1 (ppm)
155.07
133.78
127.46
113.16
96.42
96.36
77.16 CDCl3
76.38
34.65
23.65
O
S
F
O
iPr

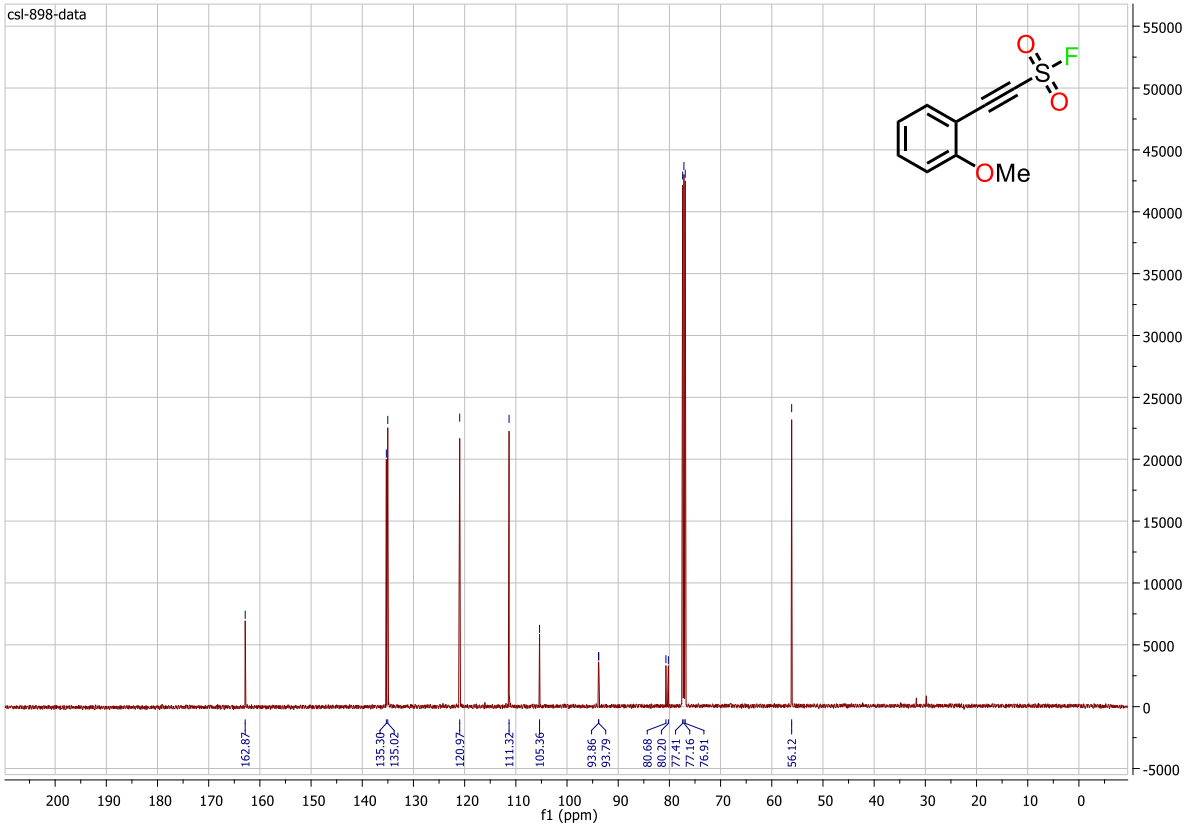

csl-847-col.2.fid
74.76
f1 (ppm)

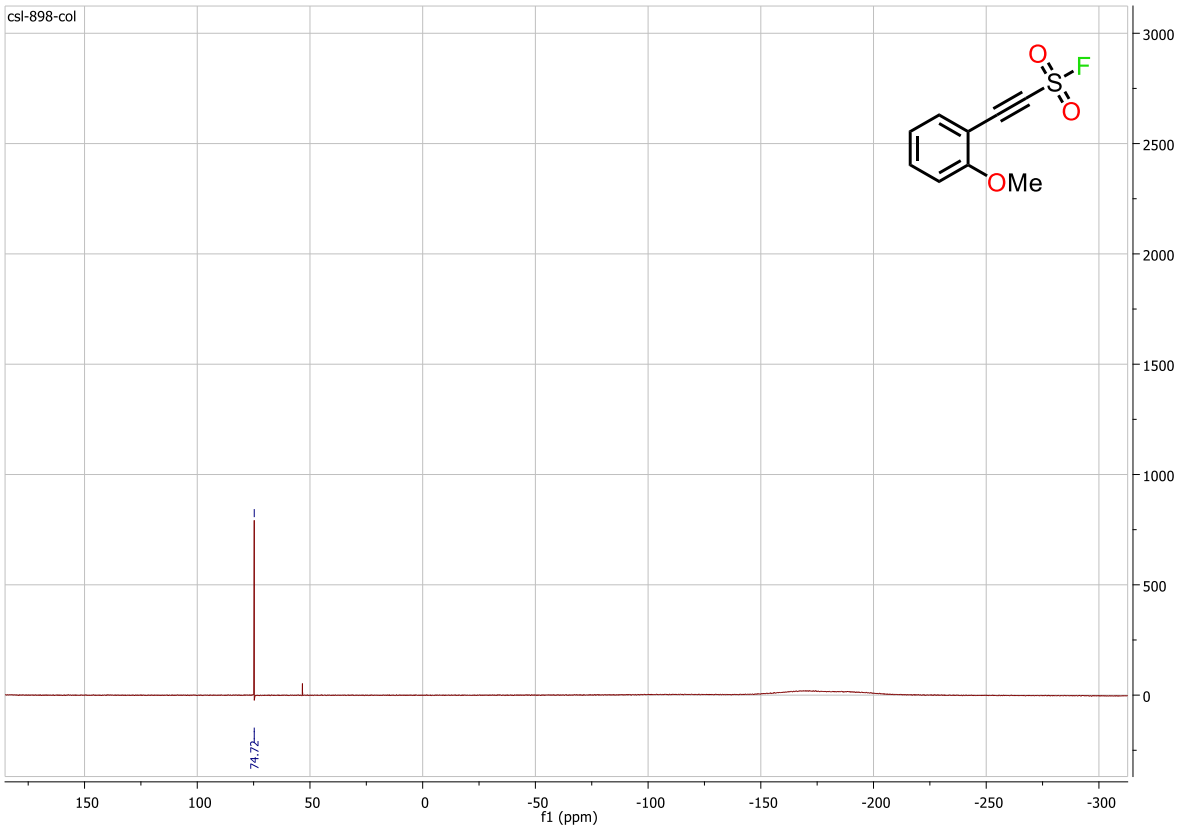

csl-892-data.1.fid
A (d)
8.11
f1 (ppm)

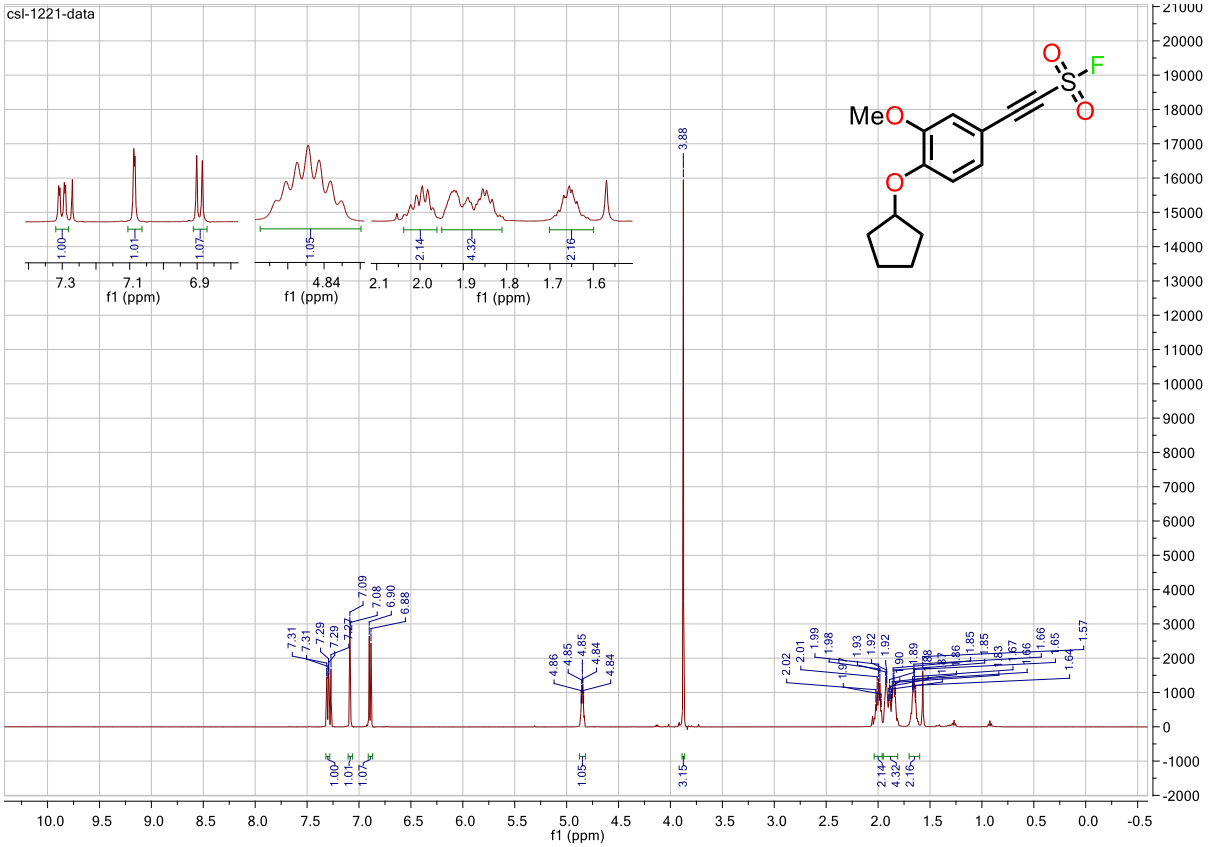

csl-892-data.2.fid
f1 (ppm)

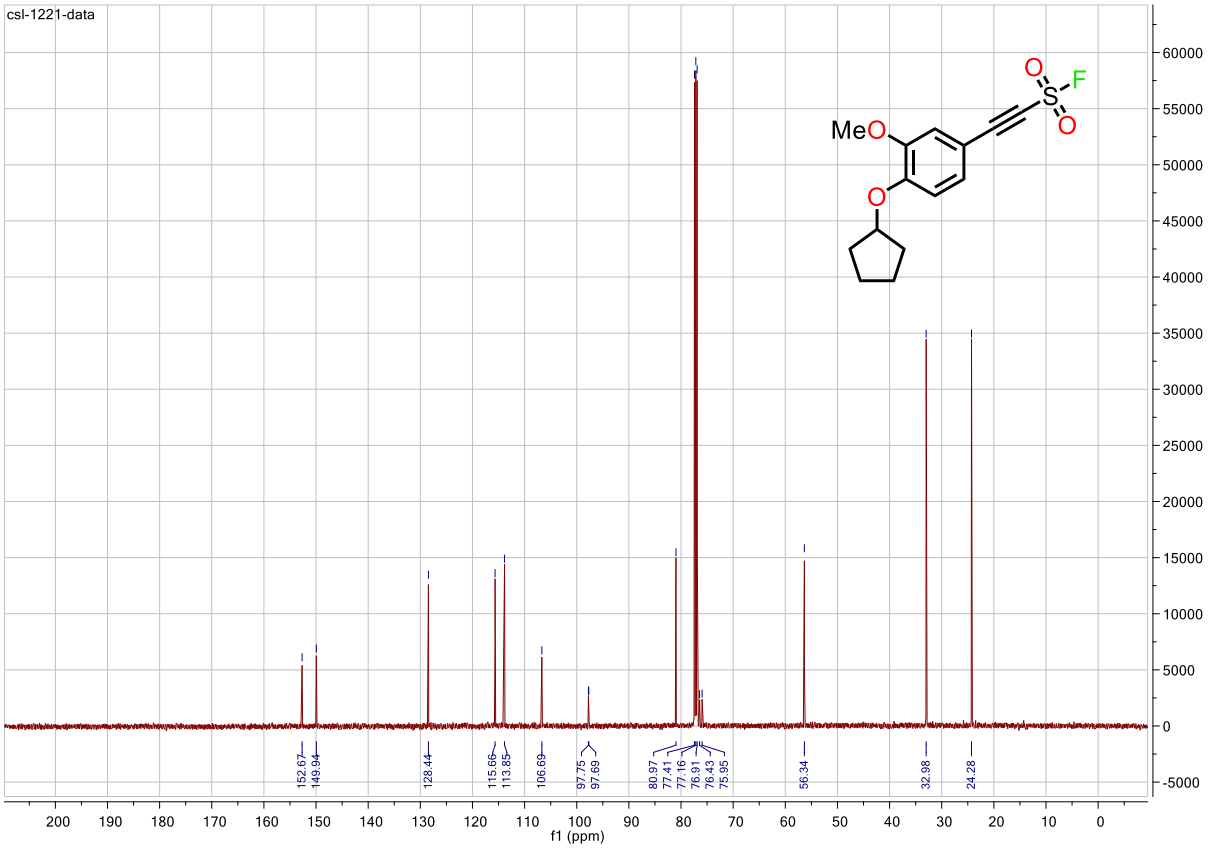

csl-892-col.2.fid
O
S
F
O
75.21
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-50

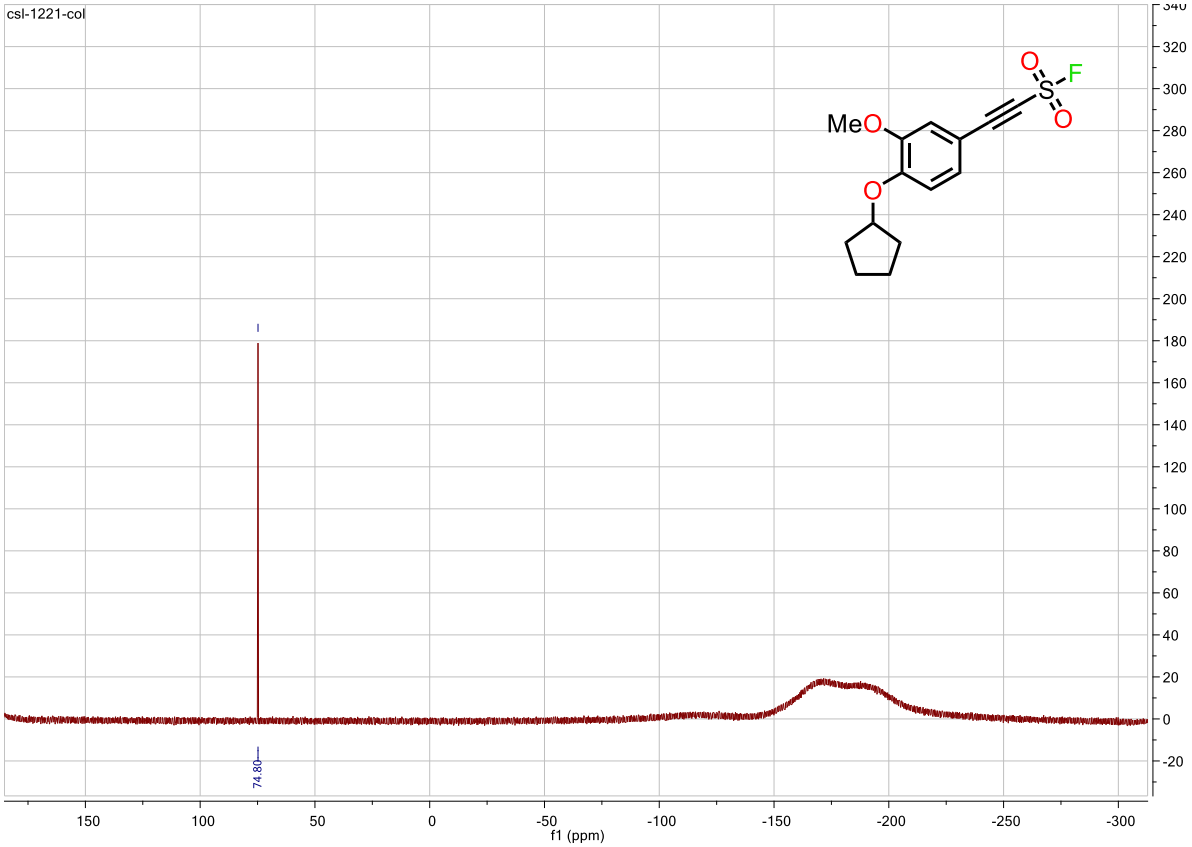

csl-898-data
O
S
F
O
OMe
f1 (ppm)

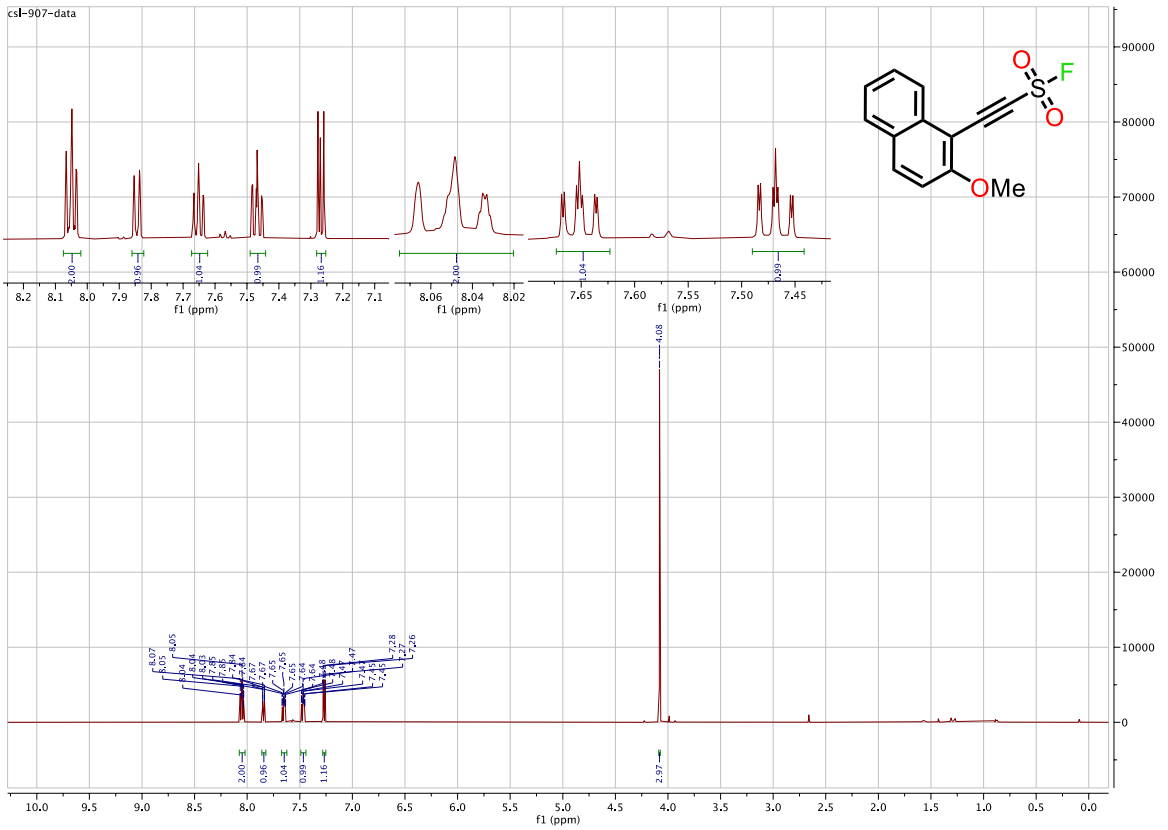

csl-898-data
O
S
F
O
OMe
162.87
135.30
135.02
120.97
111.32
105.36
93.86
93.79
80.68
80.20
77.41
77.16
76.91
56.12
f1 (ppm)

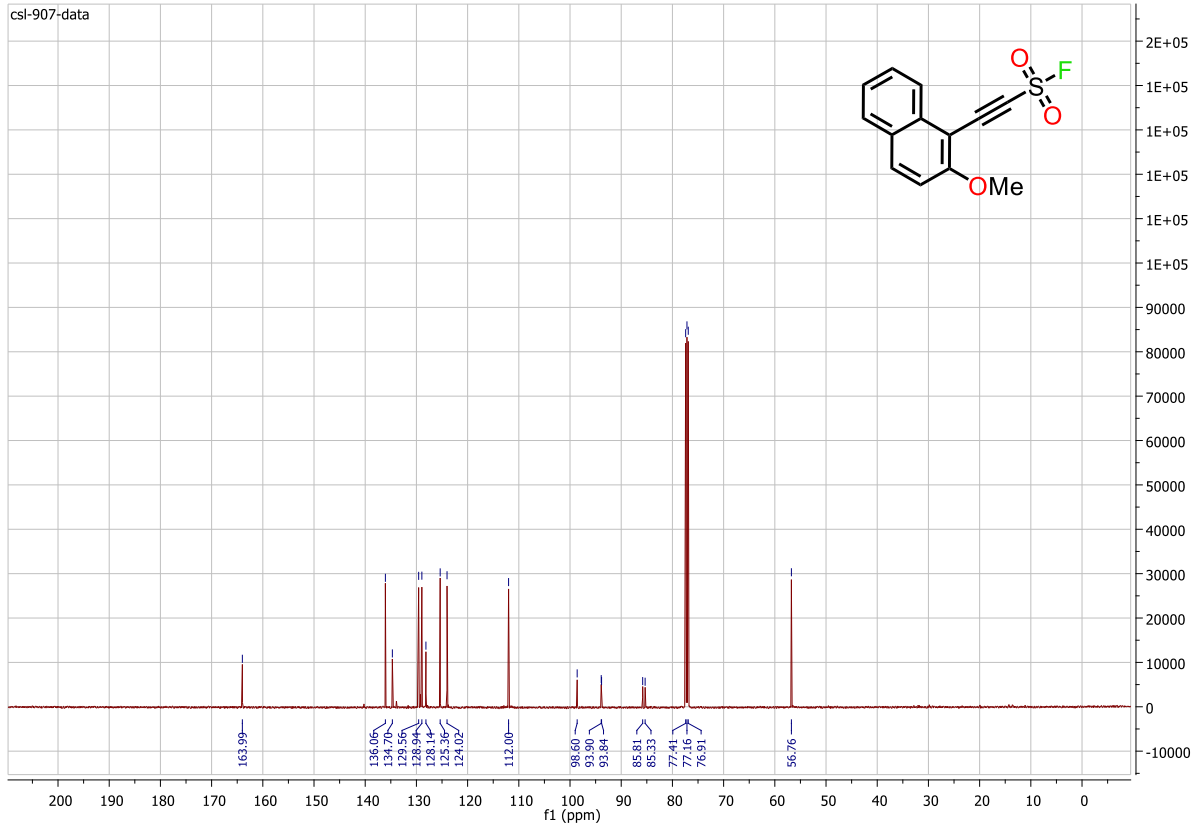

csl-898-col
O
S
F
O
OMe
3000
2500
2000
1500
1000
500
0
74.72
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

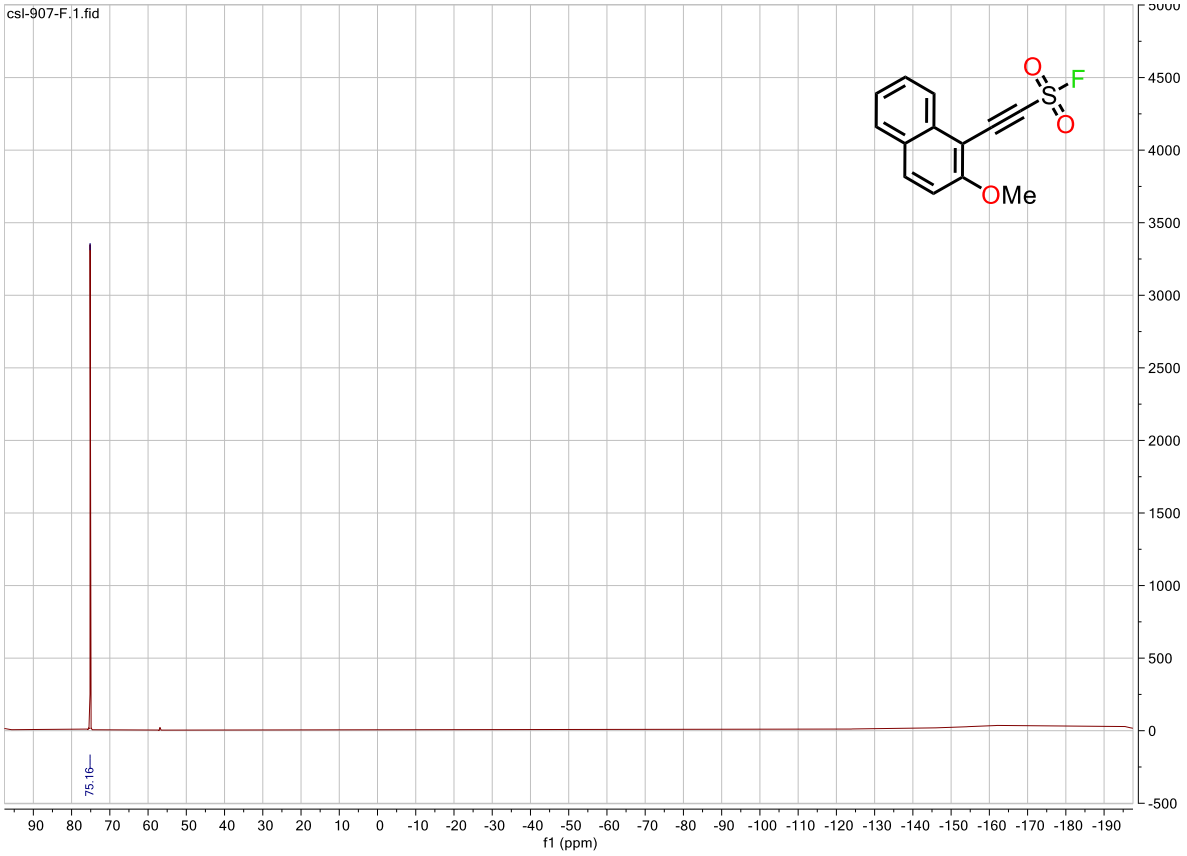

csl-1221-data
MeO
O
O
S
F
O
f1 (ppm)

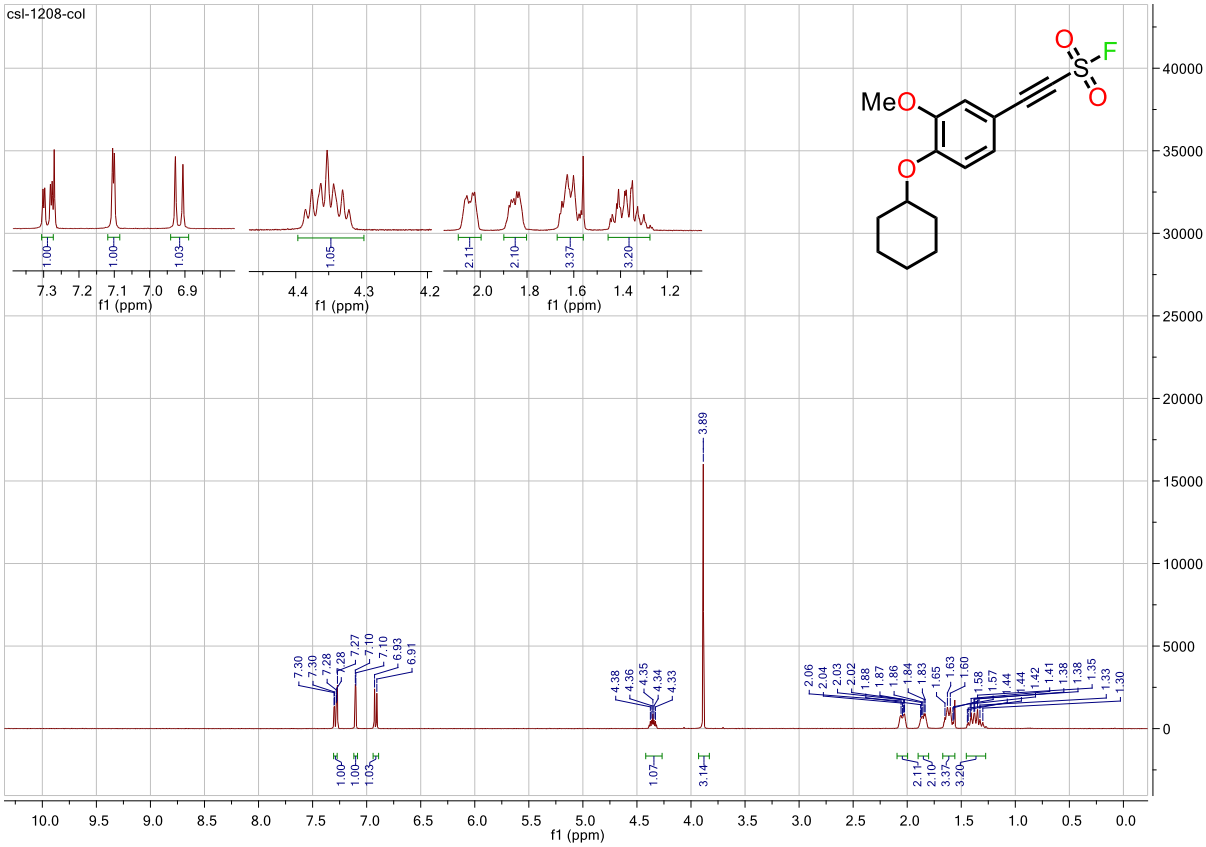

csl-1221-data
MeO
O
O
S
F
O
f1 (ppm)

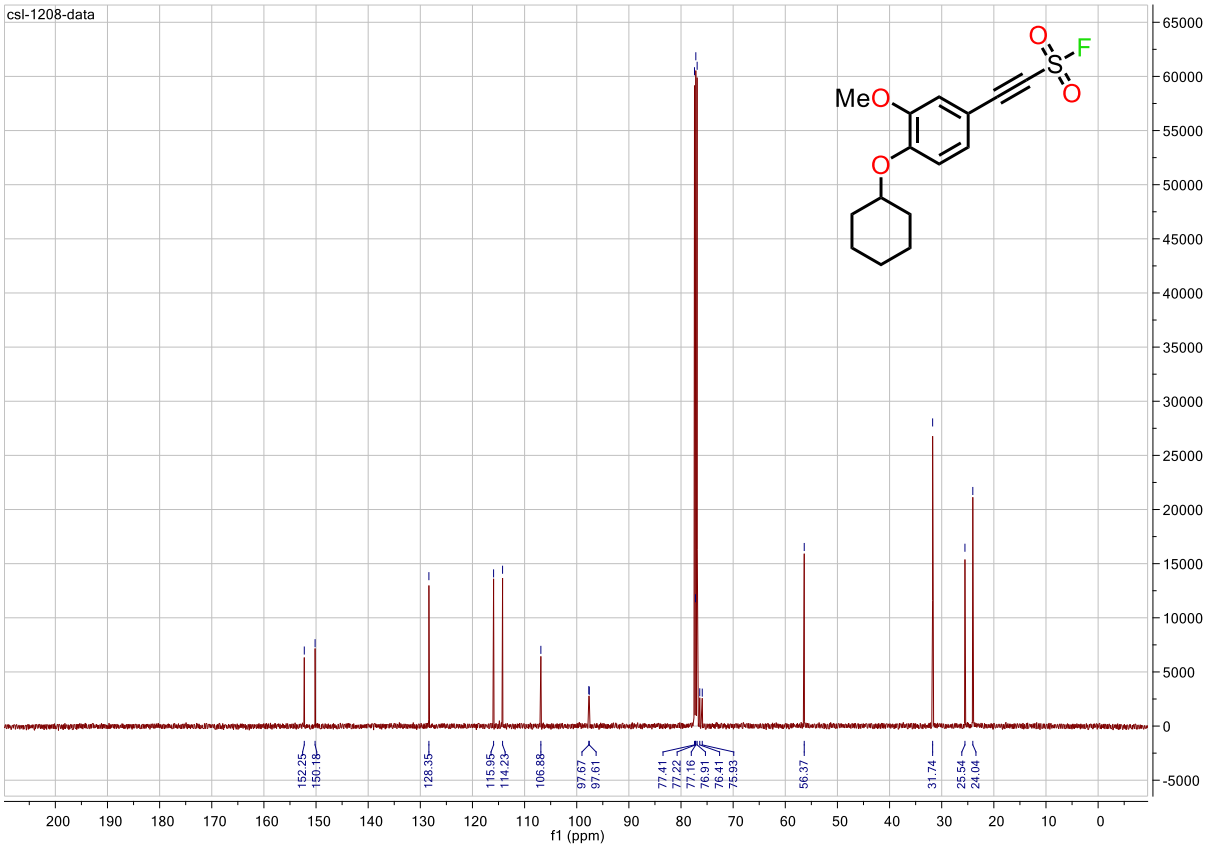

csl-1221-col
MeO
O
O
S
F
O
74.80
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
-20

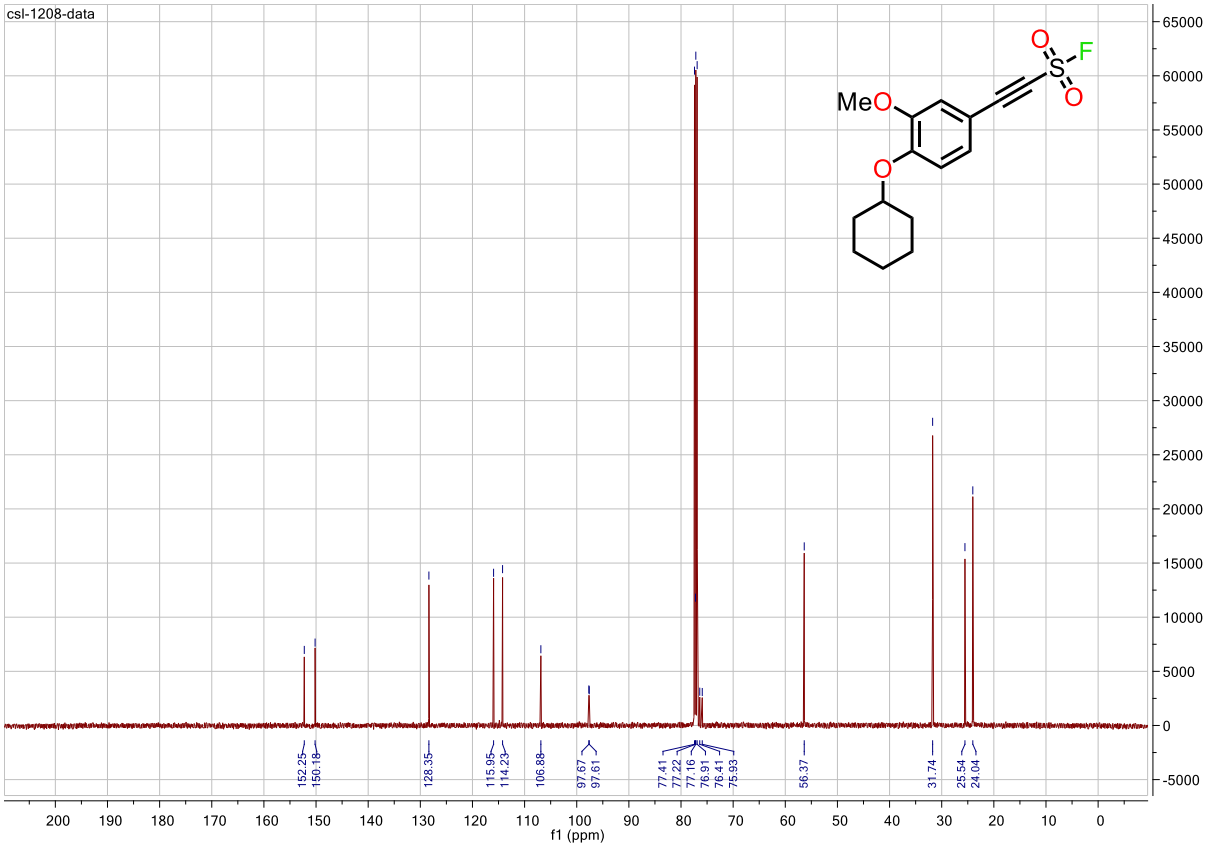

csl-907-data
f1 (ppm)
OMe

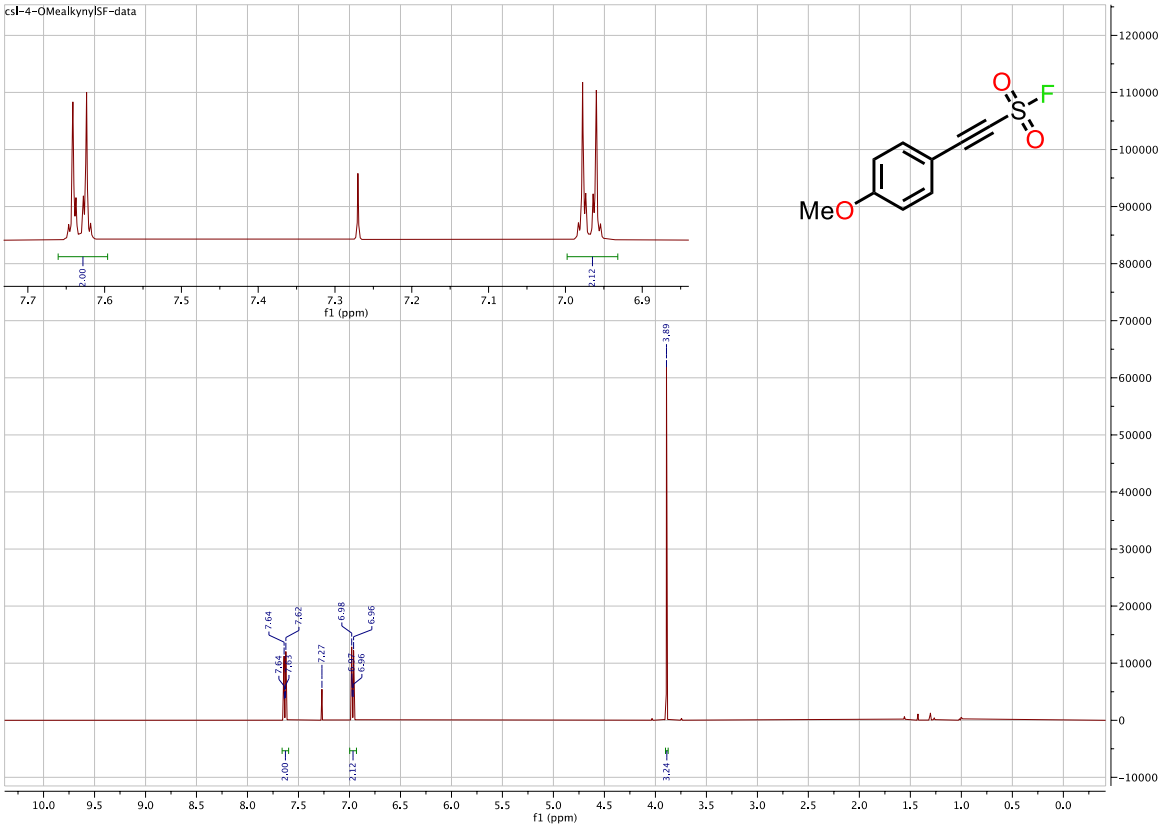

csl-907-data
f1 (ppm)
OMe

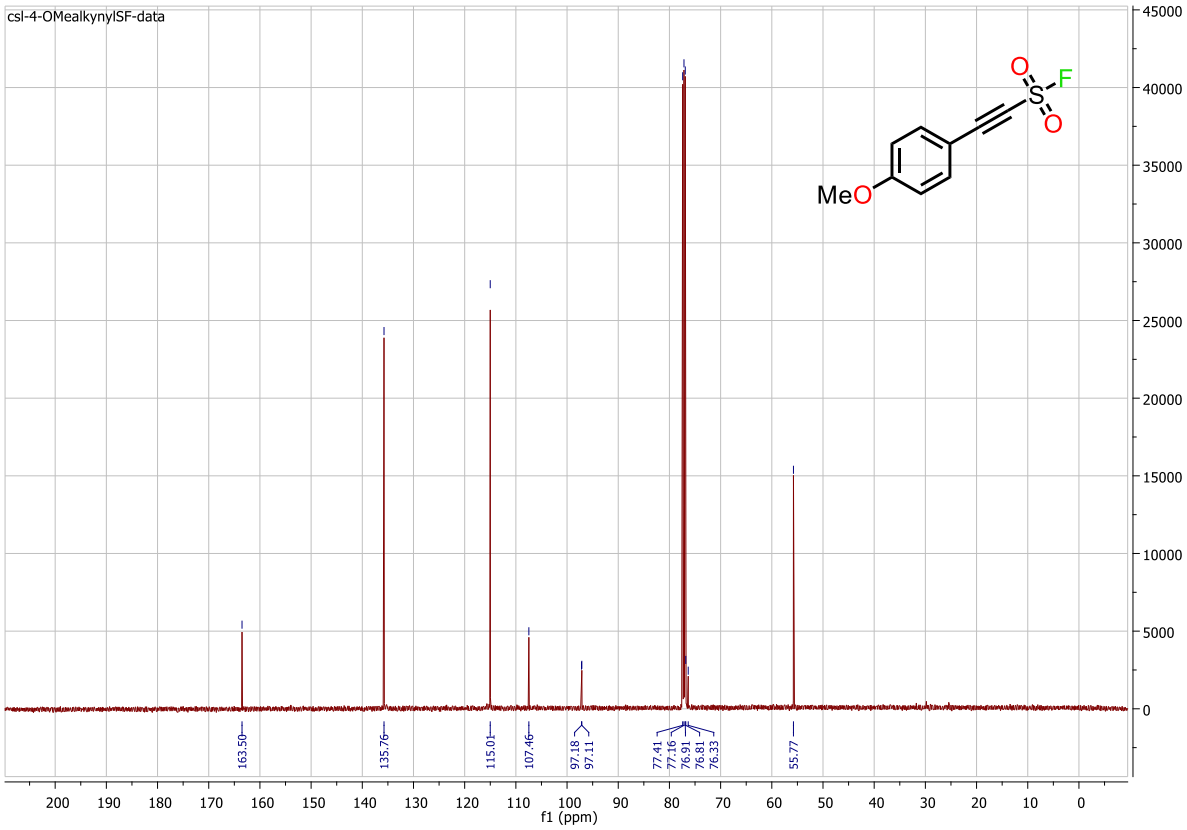

csl-907-F.1.fid
O
S
F
O
OMe
75.16
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190
f1 (ppm)

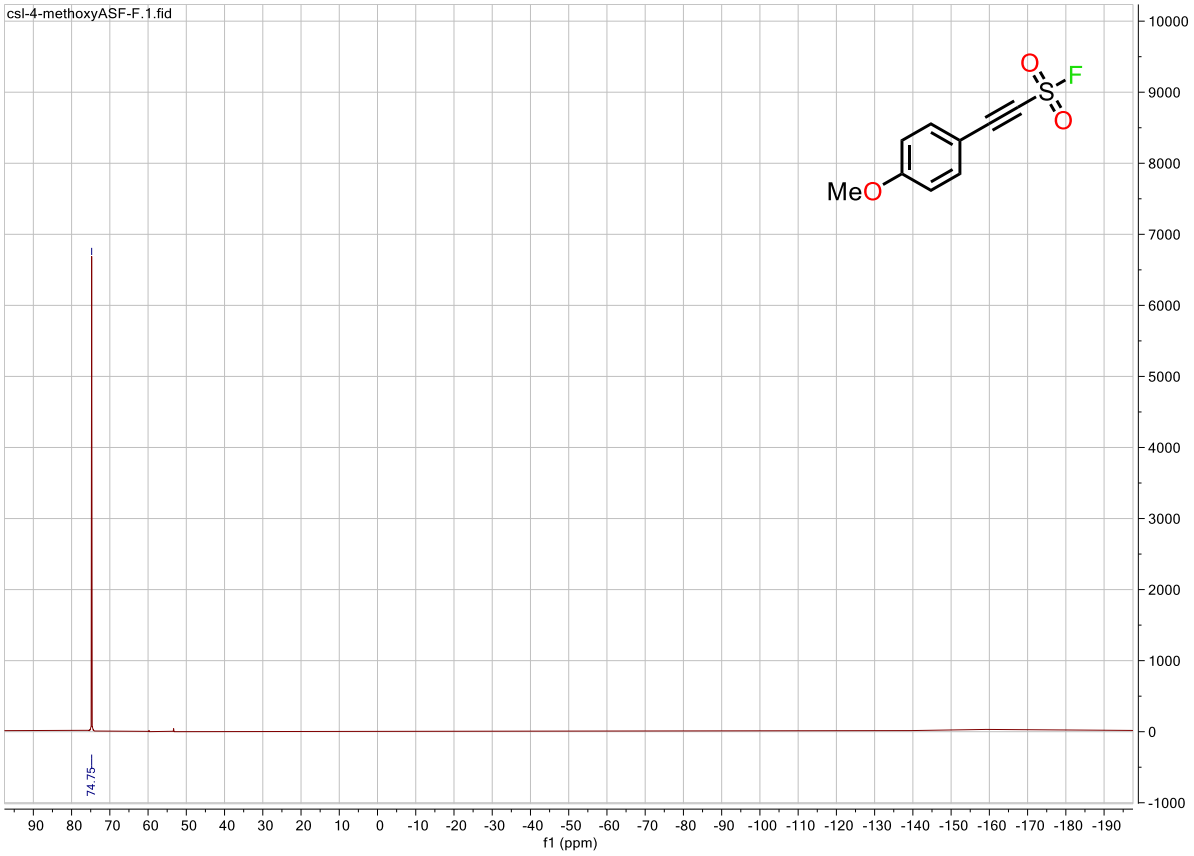

csl-1208-col
MeO
O
O
S
O
F
f1 (ppm)

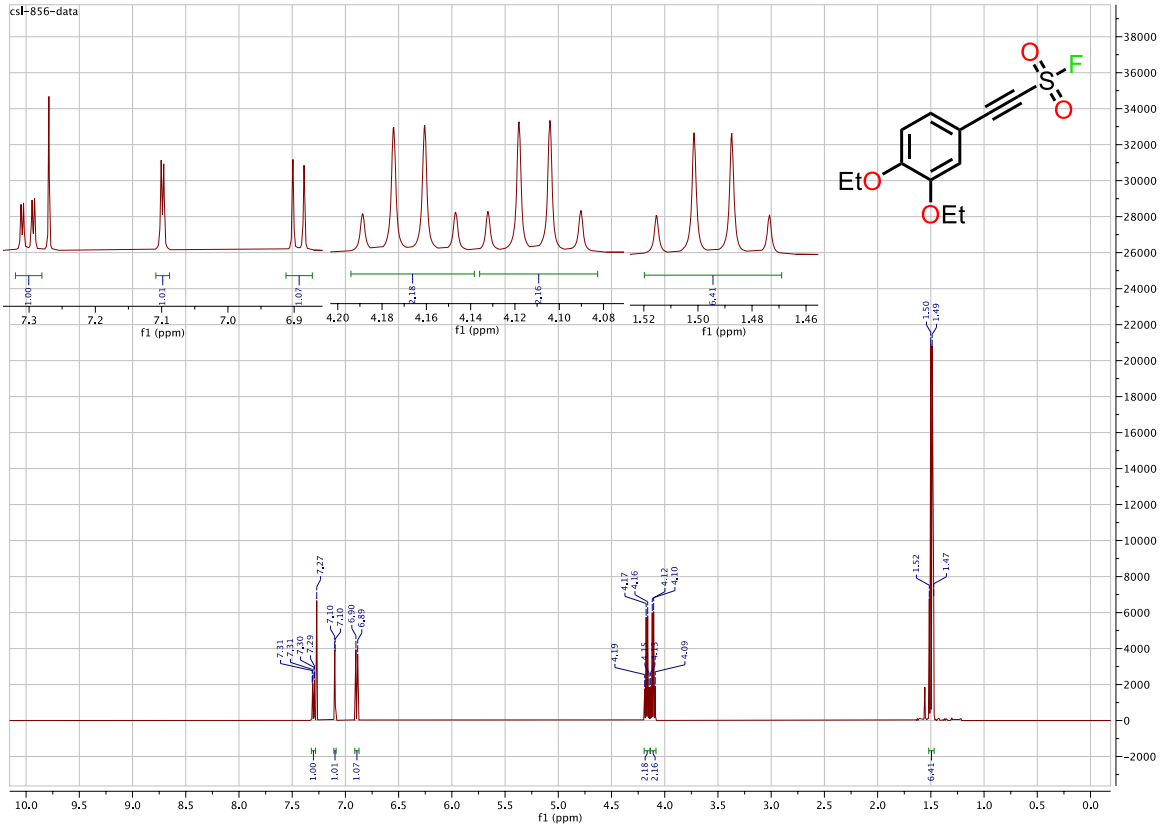

csl-1208-data
MeO
O
O
S
O
F
f1 (ppm)

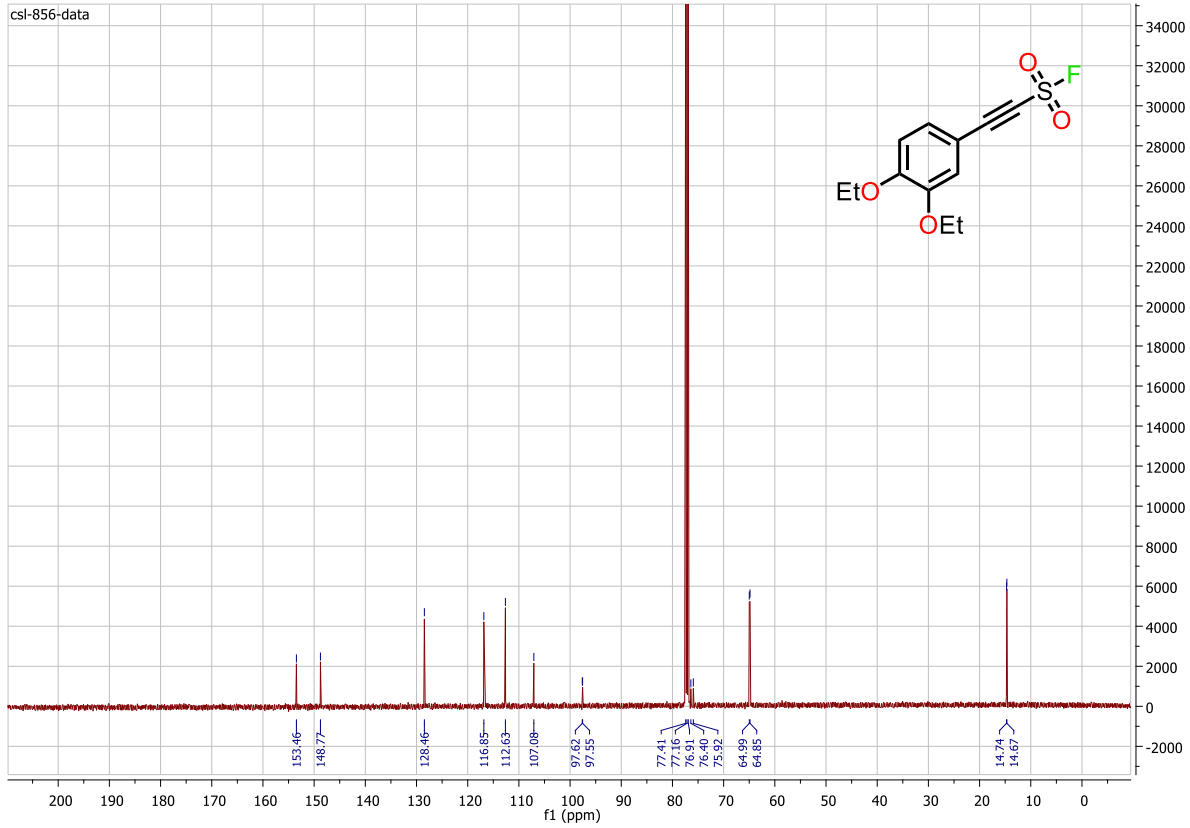

csl-1208-data
MeO
O
O
S
F
O
152.25
150.18
128.35
115.95
114.23
106.88
97.67
97.61
77.41
77.22
77.16
76.91
76.41
75.93
56.37
31.74
25.54
24.04
f1 (ppm)

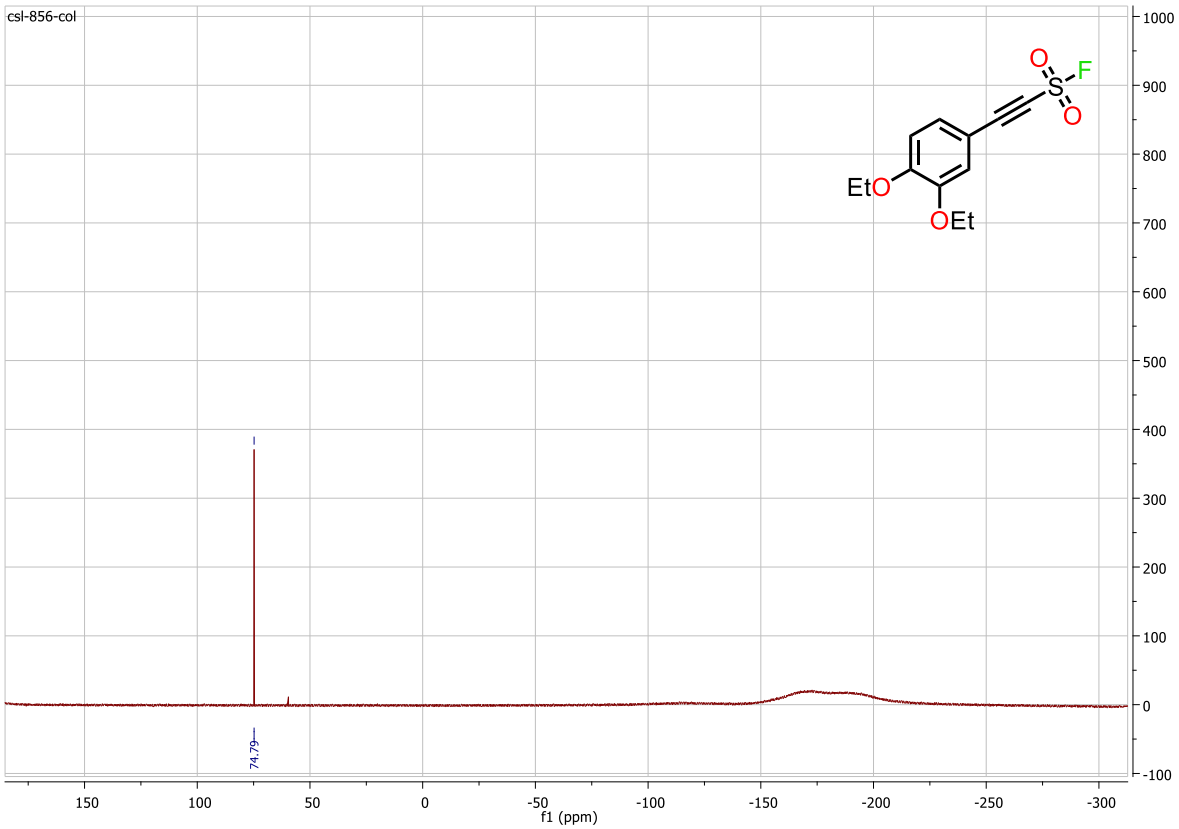

csl-4-OMealkynylSF-data
f1 (ppm)
MeO
O
S
F
O

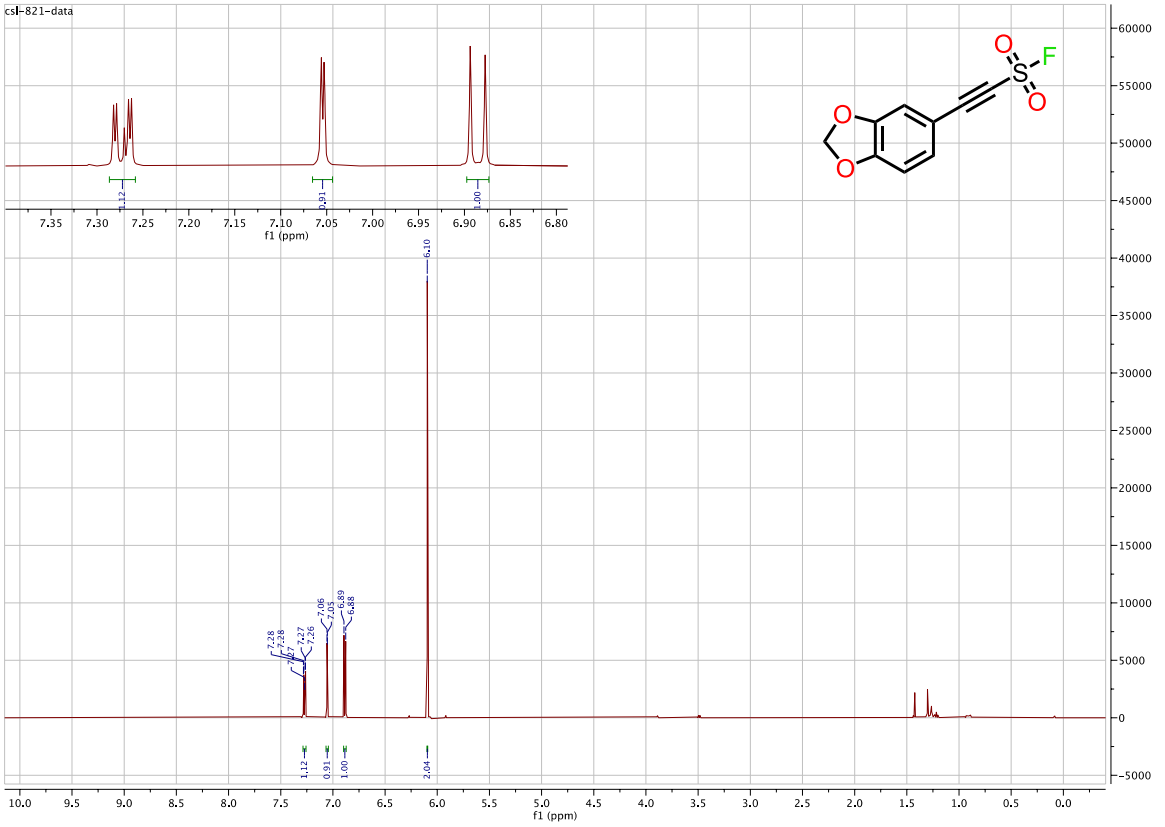

csl-4-OMealkynylSF-data
f1 (ppm)
MeO
O
S
F
O

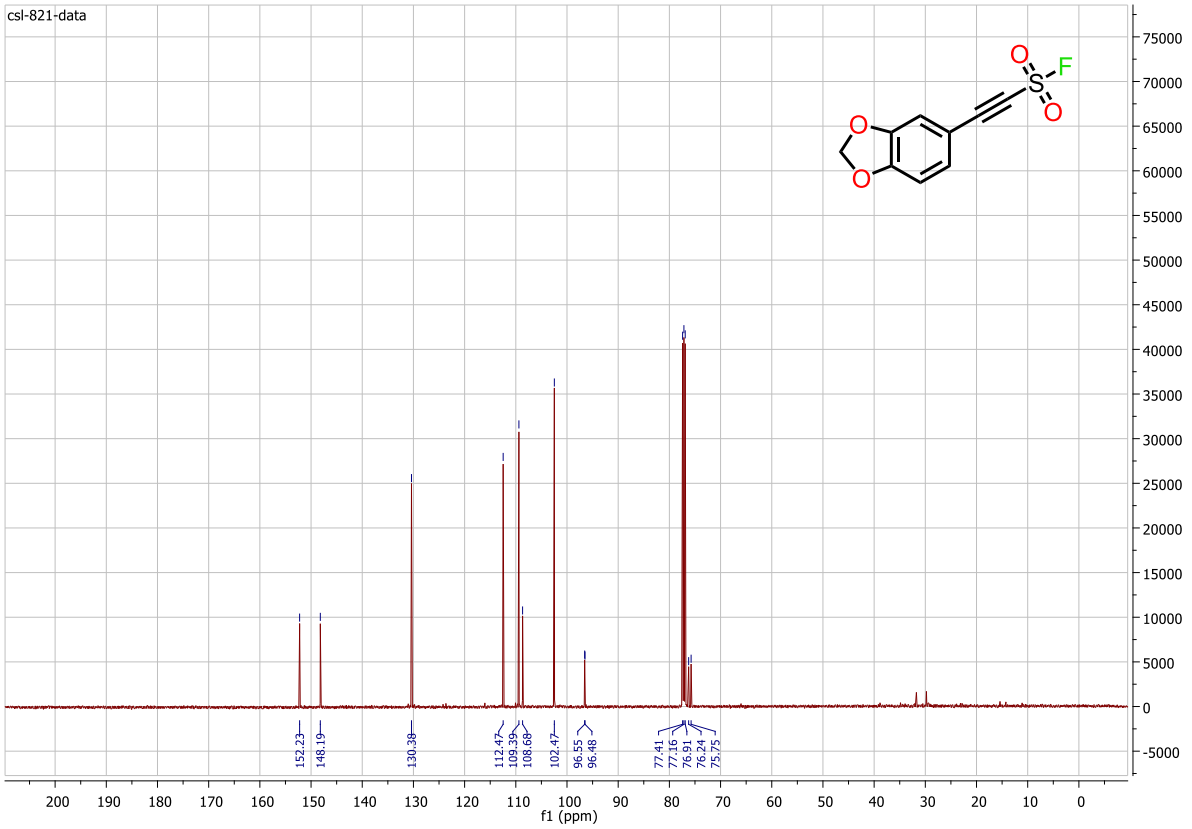

csl-4-methoxyASF-F.1.fid
MeO
O
S
F
O
74.75
f1 (ppm)

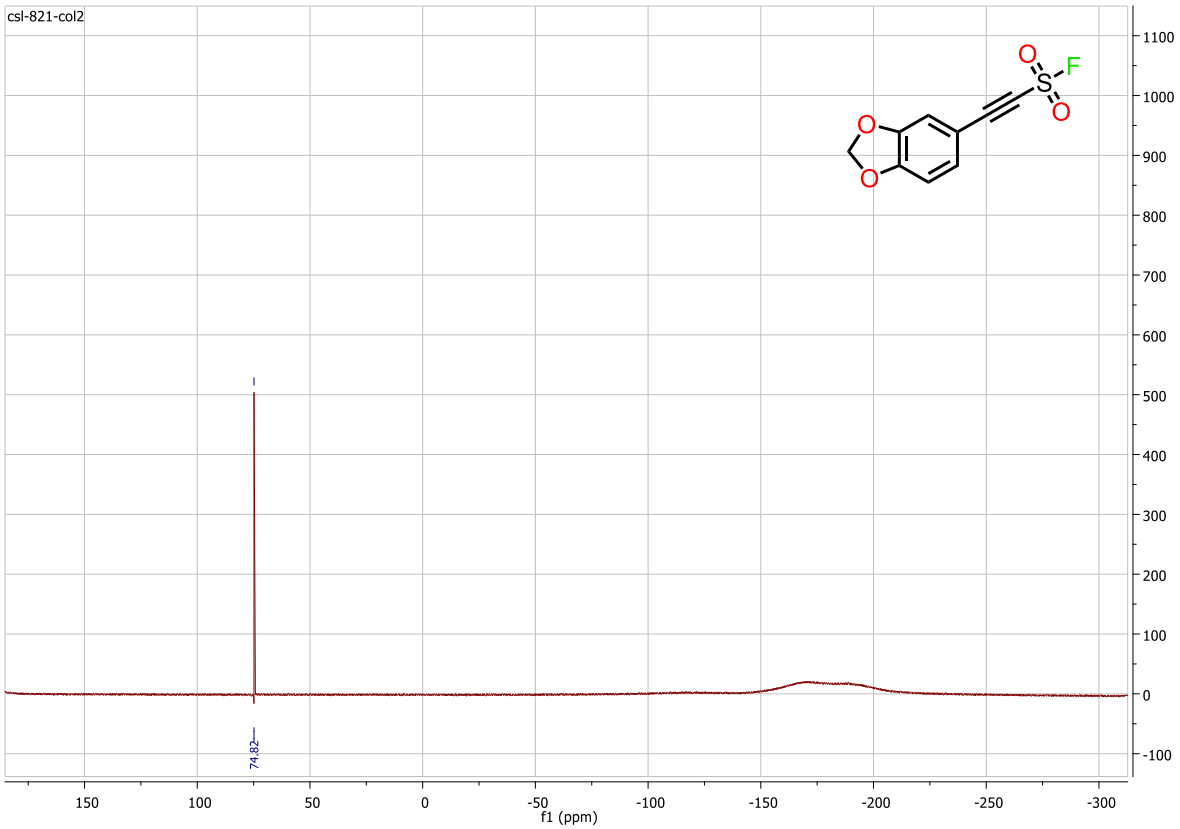

csl-856-data
O
S
F
O
EtO
OEt
f1 (ppm)

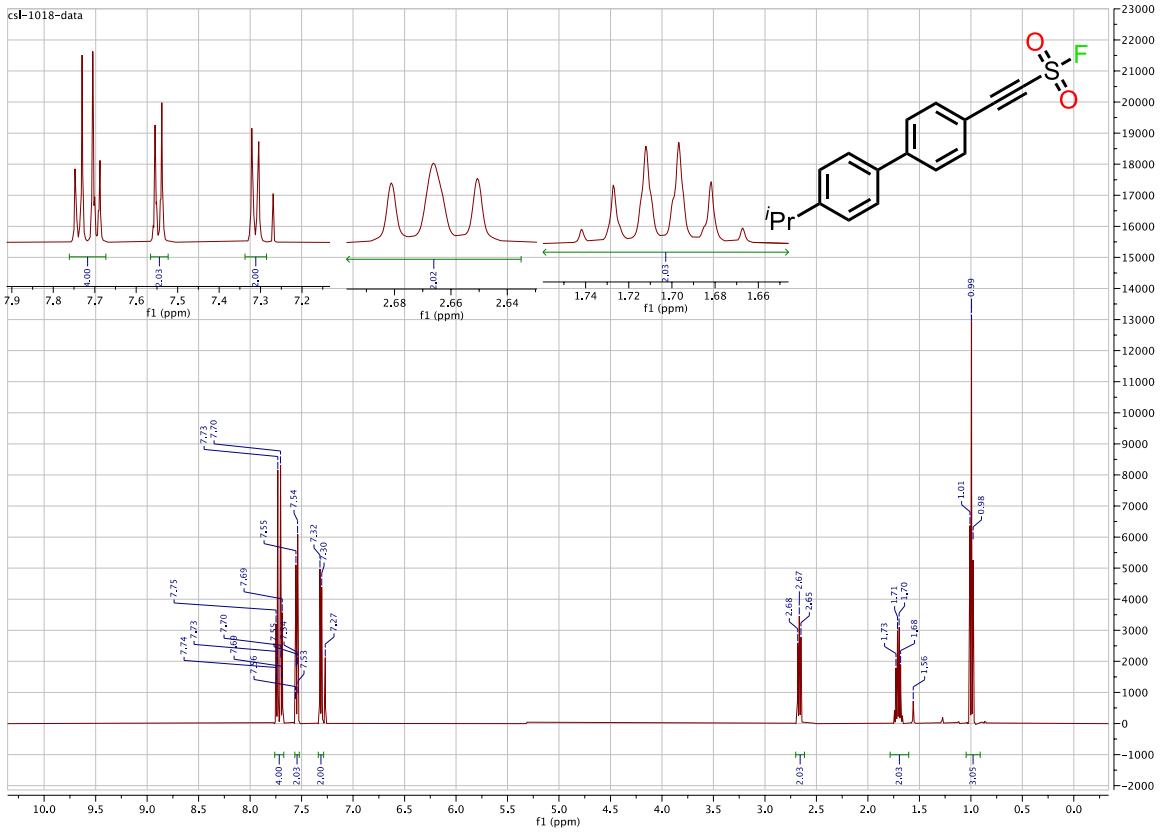

csl-856-data
O
S
F
O
EtO
OEt
f1 (ppm)

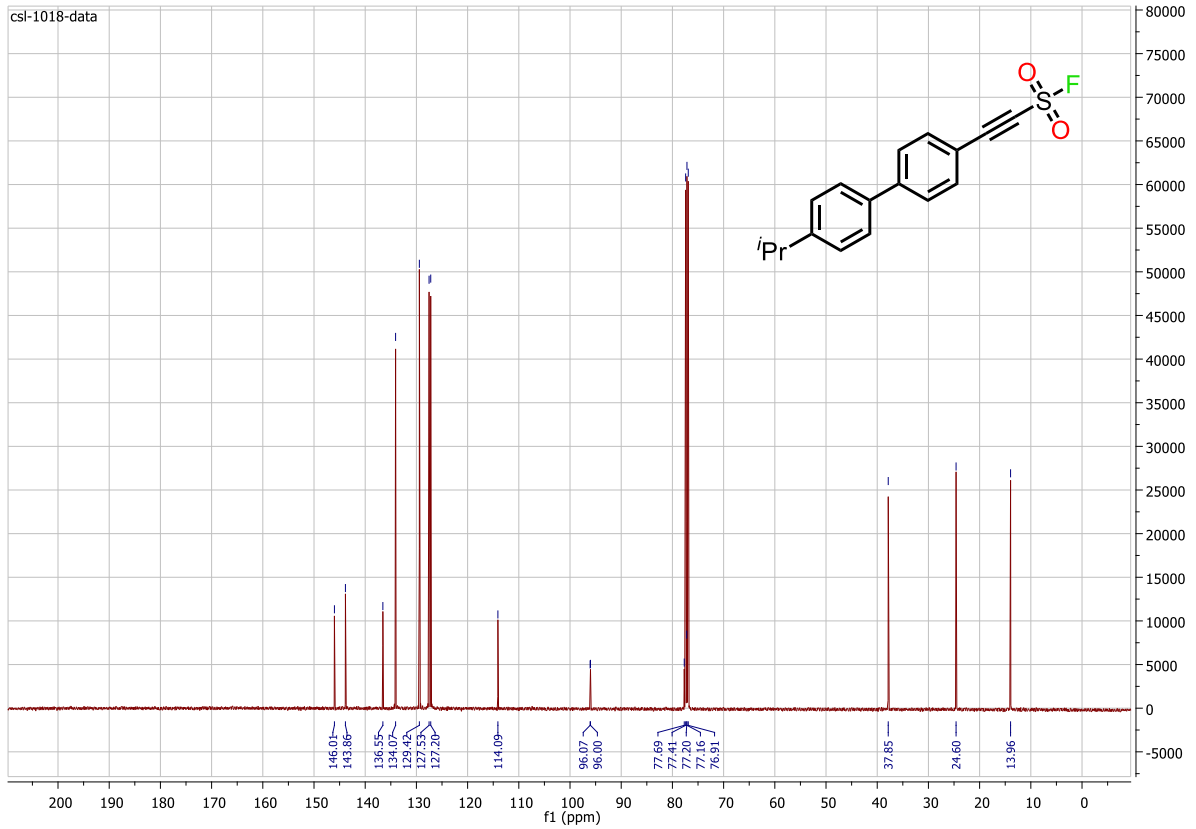

csl-856-col
O
S
F
O
EtO
OEt
74.79
1000
900
800
700
600
500
400
300
200
100
0
-100
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

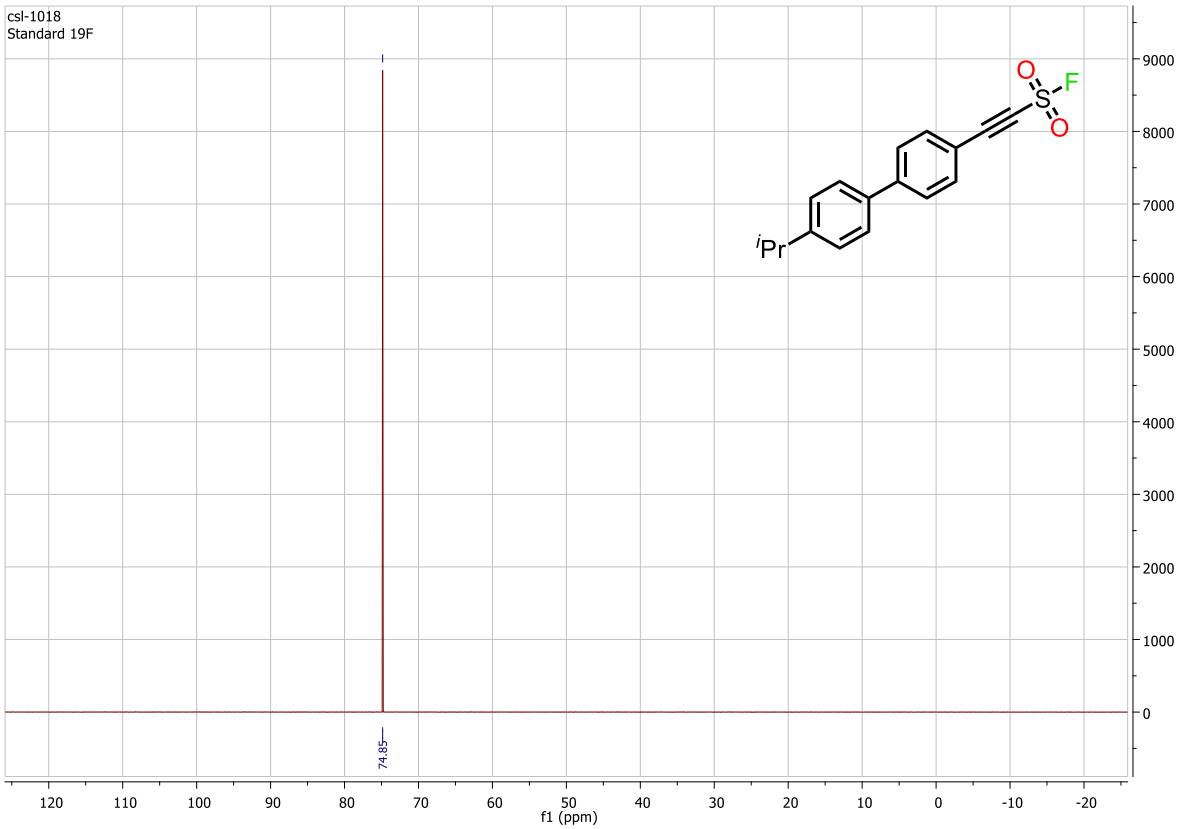

csl-821-data
f1 (ppm)

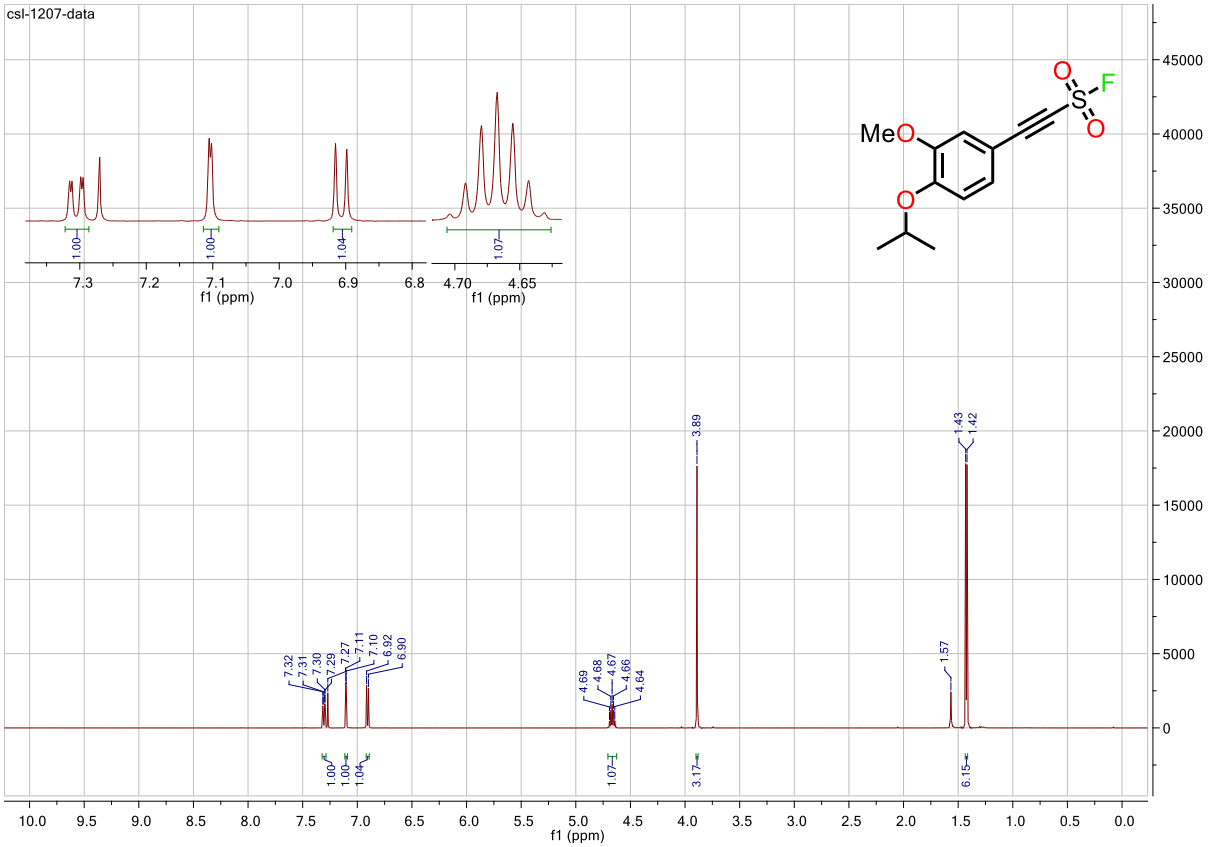

csl-821-data
f1 (ppm)

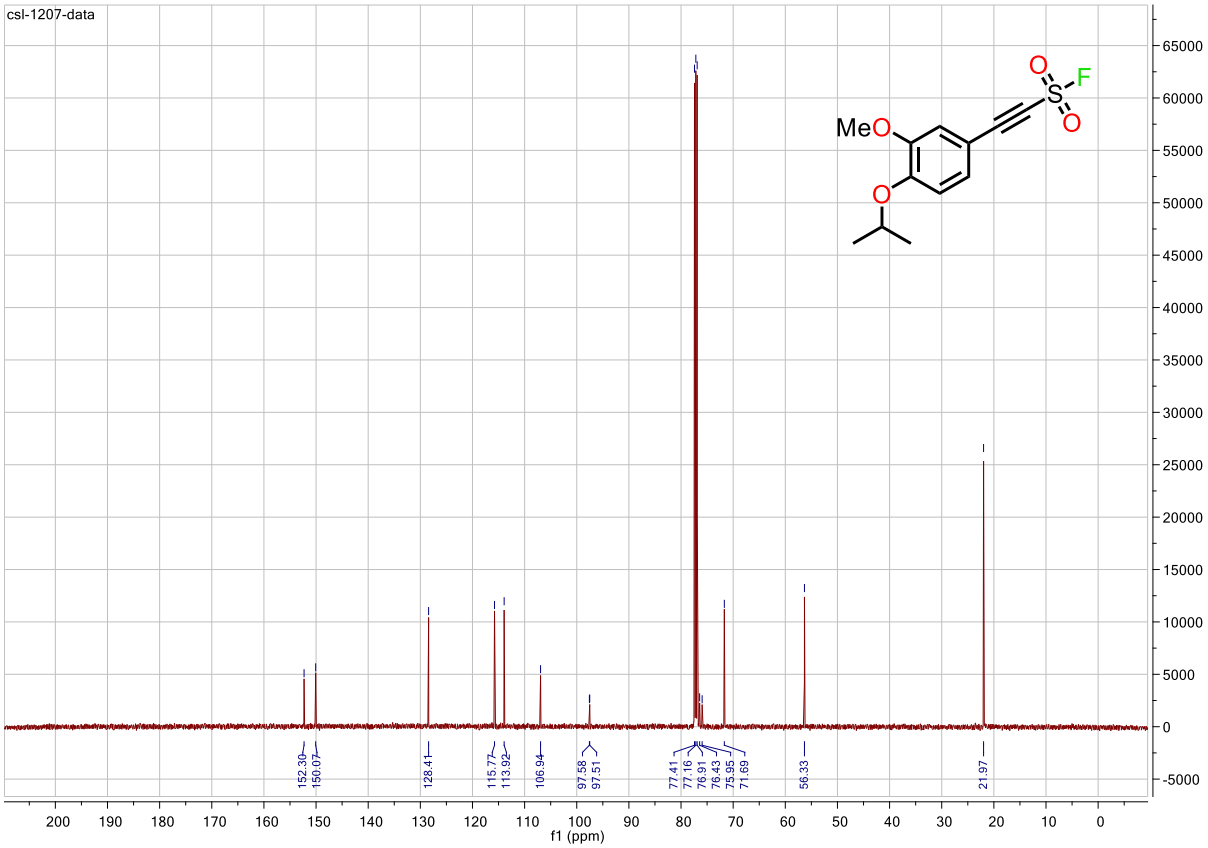

csl-821-col2
74.82
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
O
S
F
O
O
O

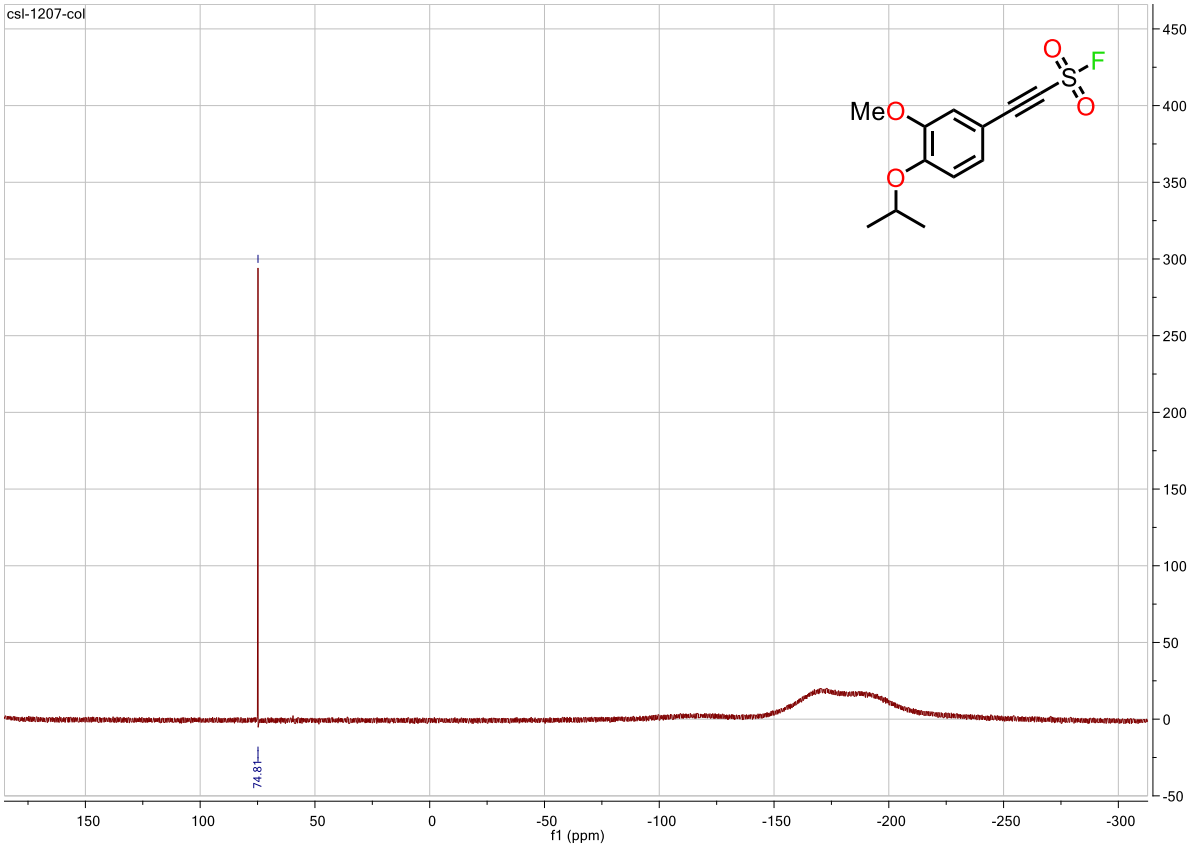

csl-1018-data
f1 (ppm)

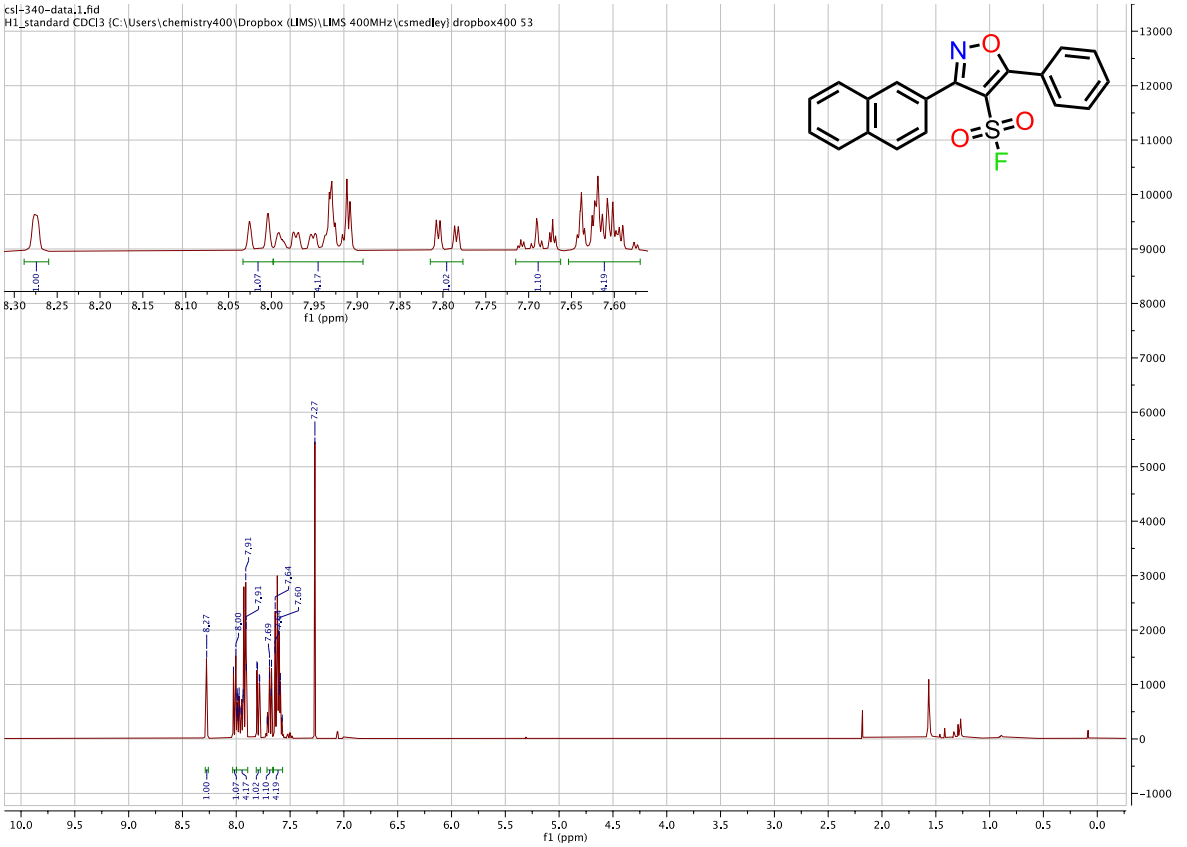

csl-1018-data
f1 (ppm)

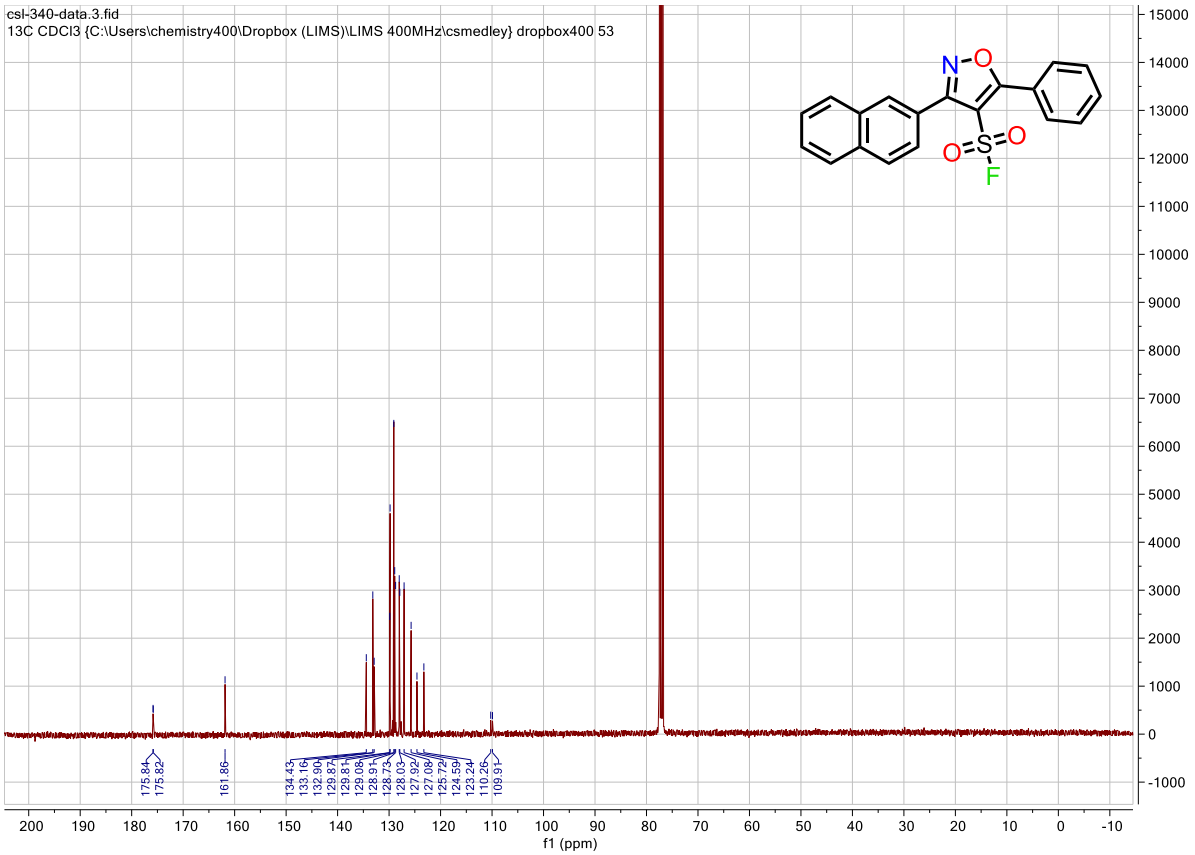

csl-1018
Standard 19F
74.85
f1 (ppm)
iPr
O
S
F
O

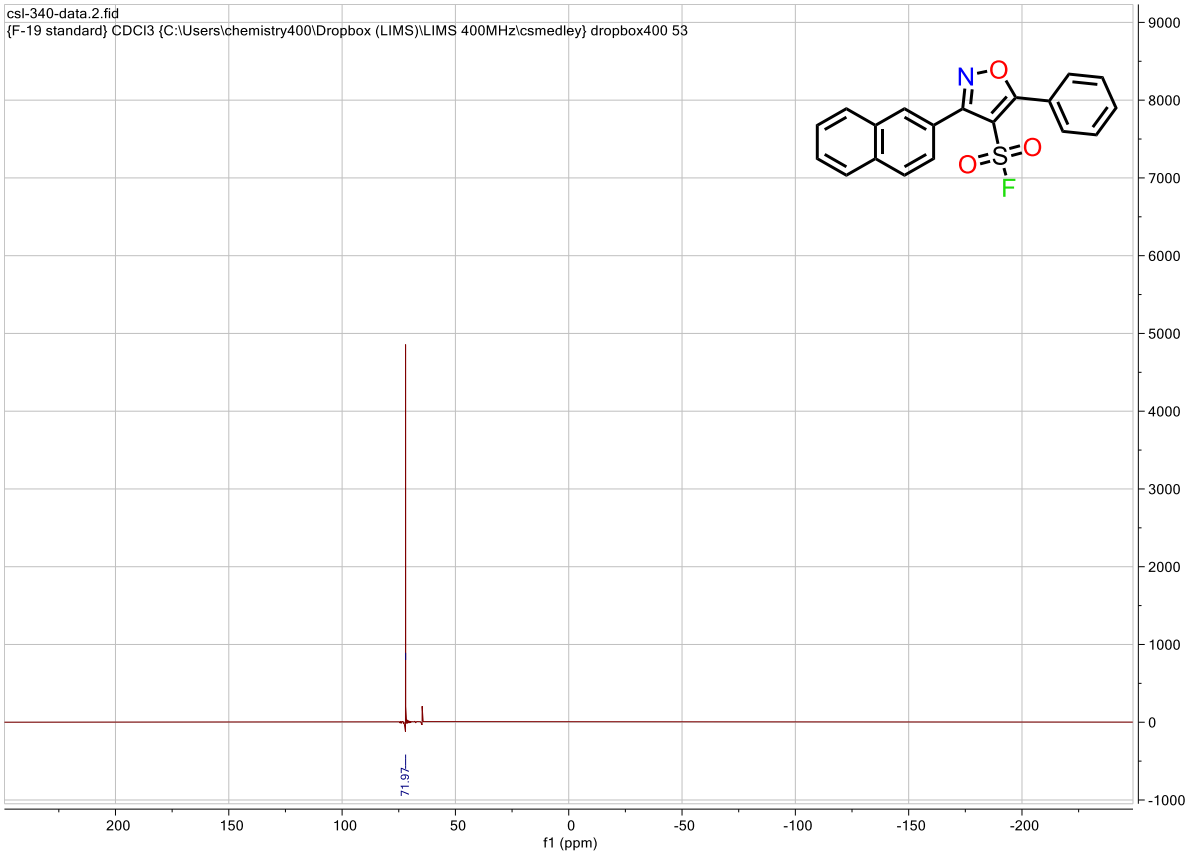

csl-1207-data
MeO
O
O
S
F
O
7.32
7.31
7.30
7.29
7.27
7.11
7.10
6.92
6.90
4.69
4.68
4.67
4.66
4.64
3.89
1.57
1.43
1.42
f1 (ppm)

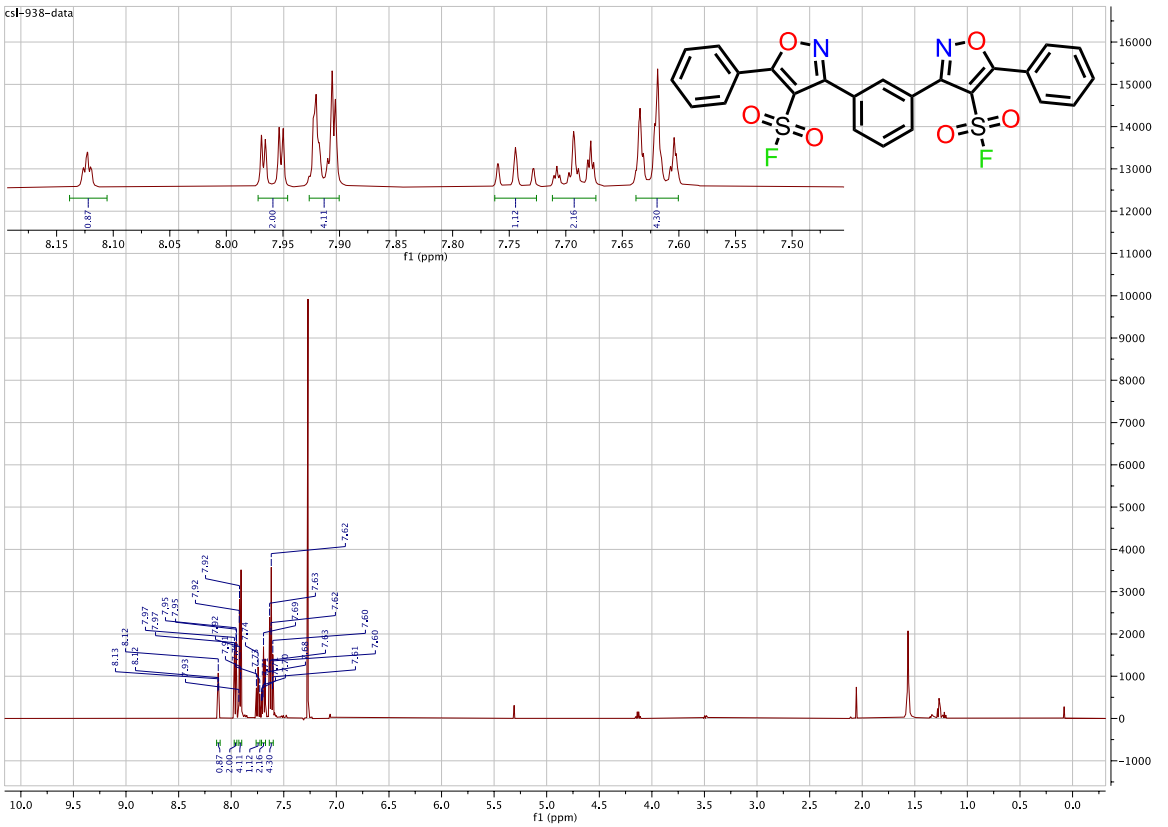

csl-1207-data
MeO
O
O
S
F
O
152.30
150.07
128.41
115.77
113.92
106.94
97.58
97.51
77.41
77.16
76.91
76.43
75.95
71.69
56.33
21.97
f1 (ppm)

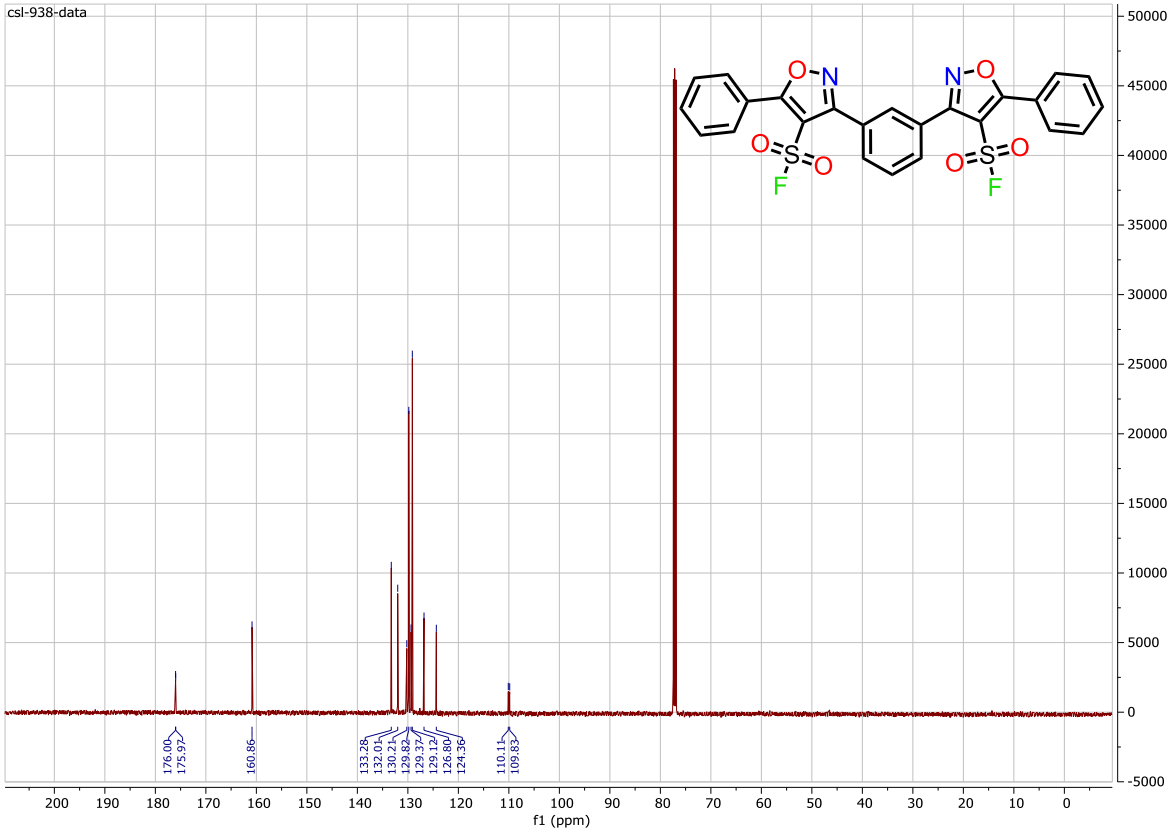

csl-1207-col
MeO
O
O
S
F
O
74.81
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
450
400
350
300
250
200
150
100
50
0
-50

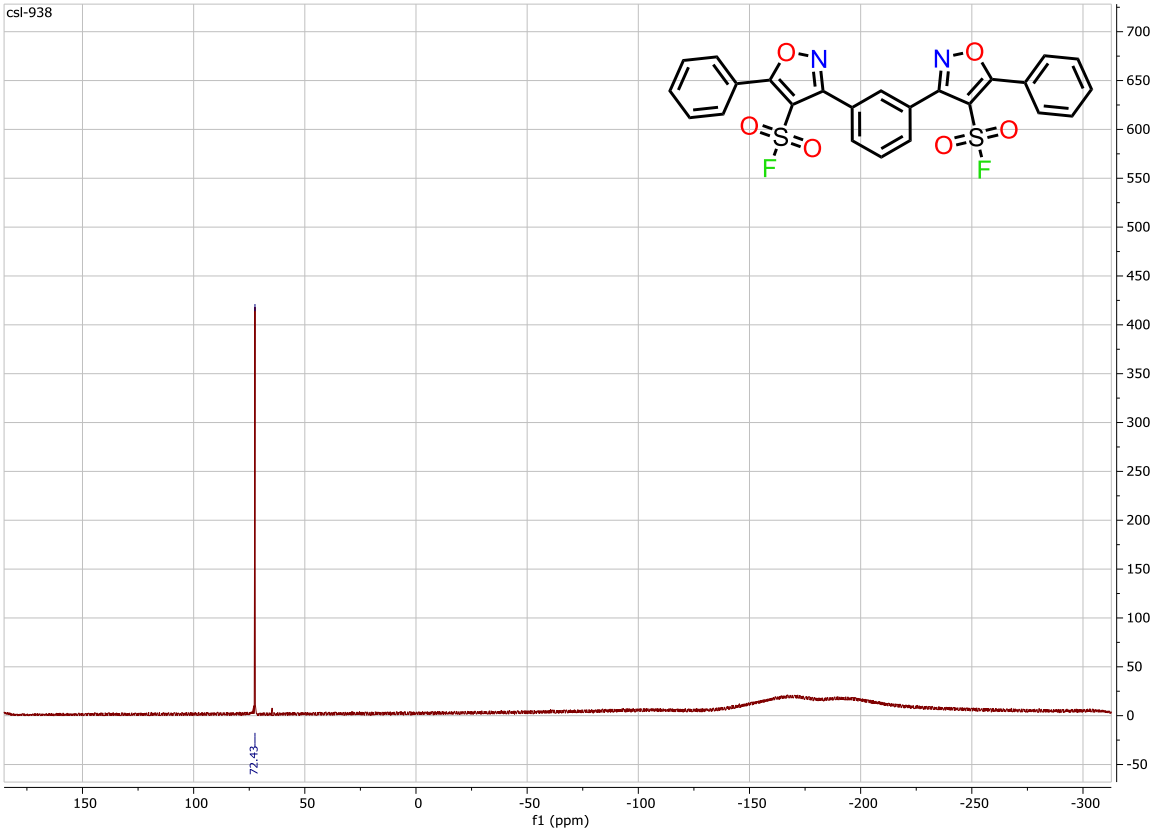

csl-340-data.1.fid
H1_standard CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 53
f1 (ppm)

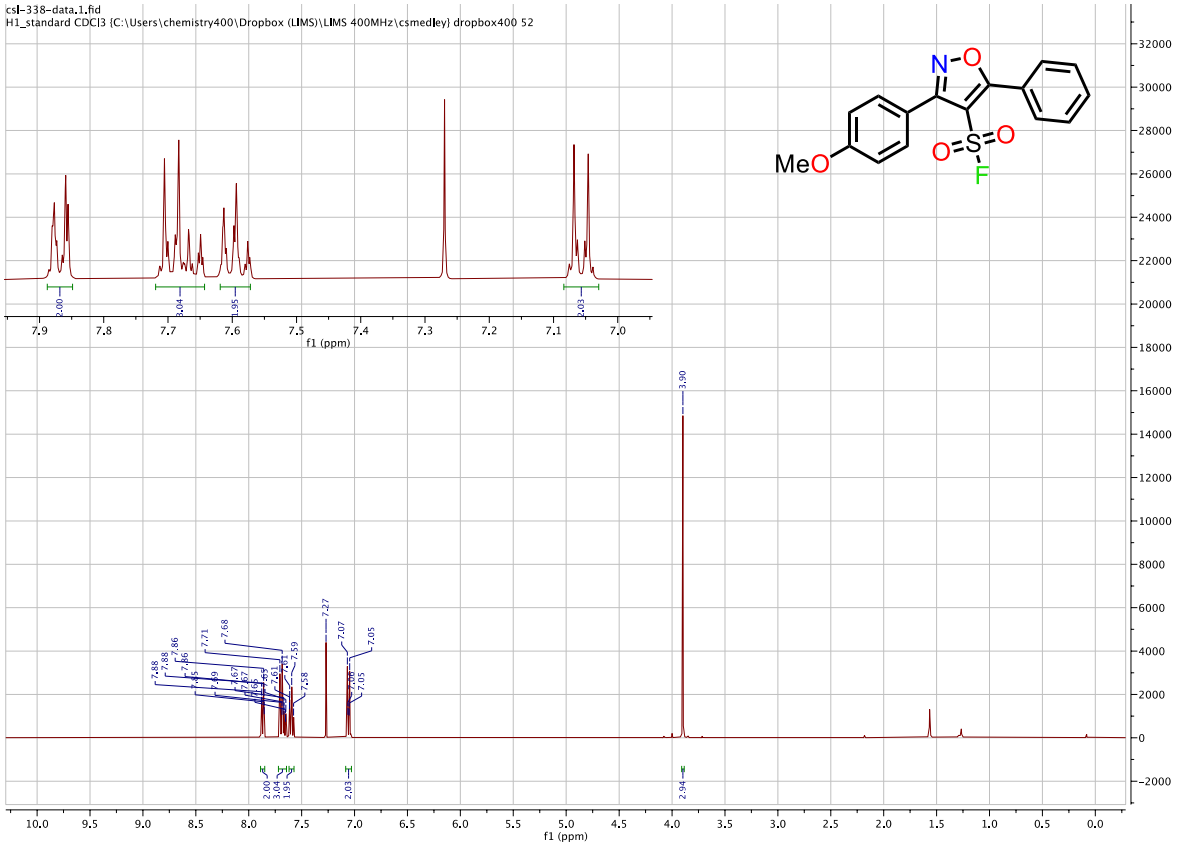

csl-340-data.3.fid
13C CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 53
f1 (ppm)

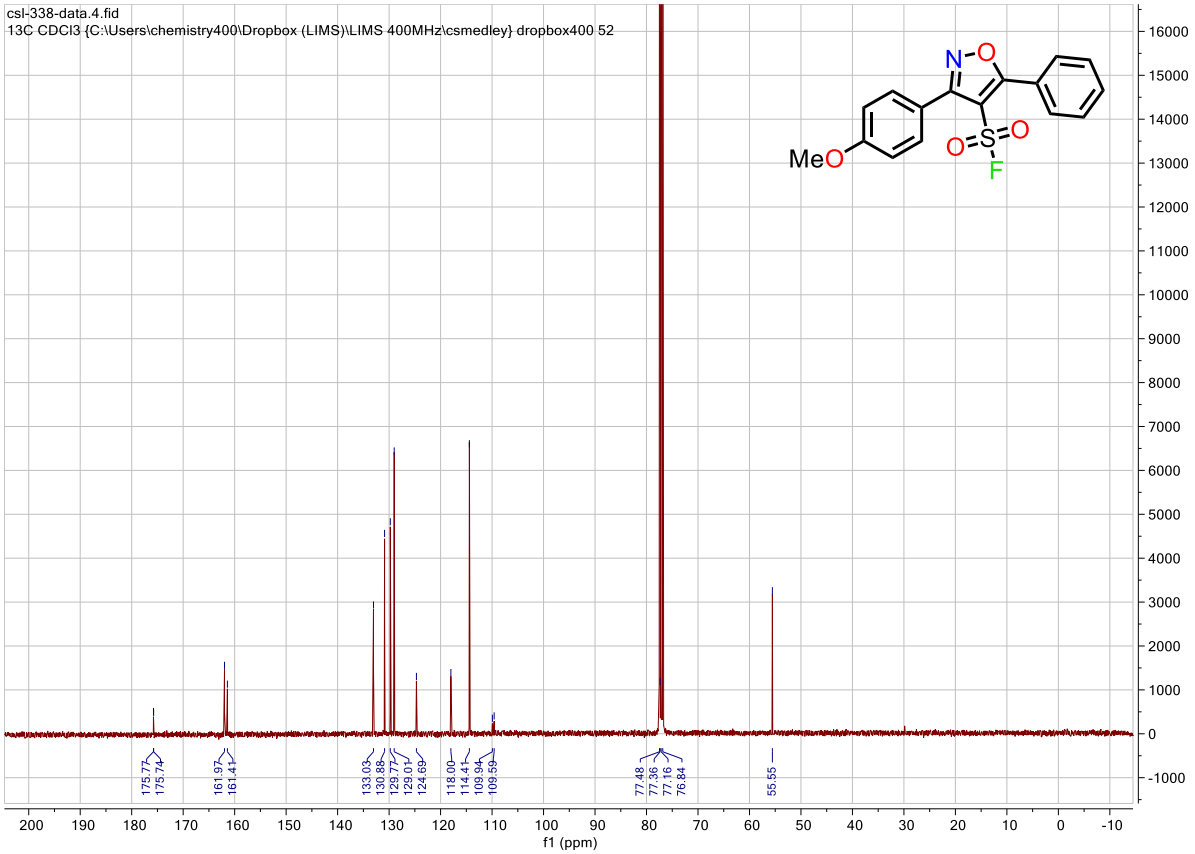

csl-340-data.2.fid
{F-19 standard} CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 53
N
O
O
S
O
F
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
71.97
200
150
100
50
0
-50
-100
-150
-200
f1 (ppm)

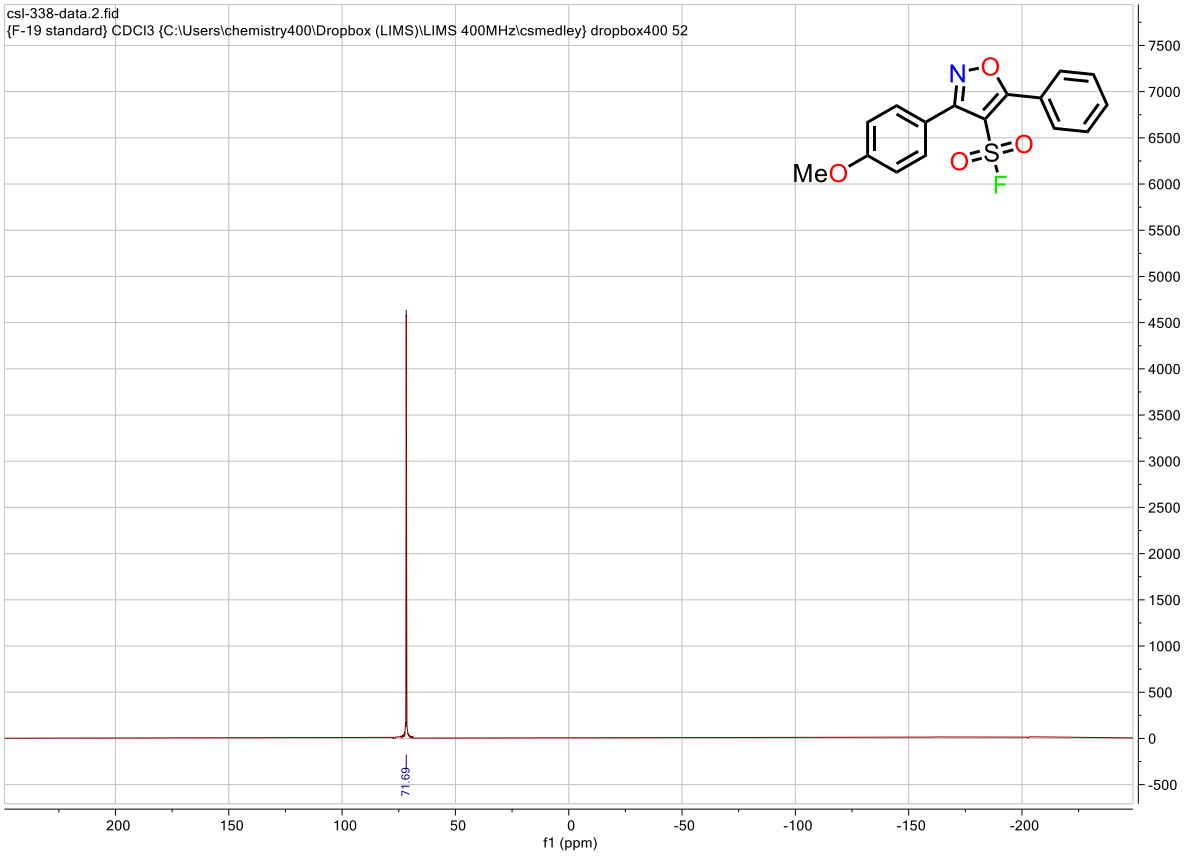

csl-938-data
f1 (ppm)

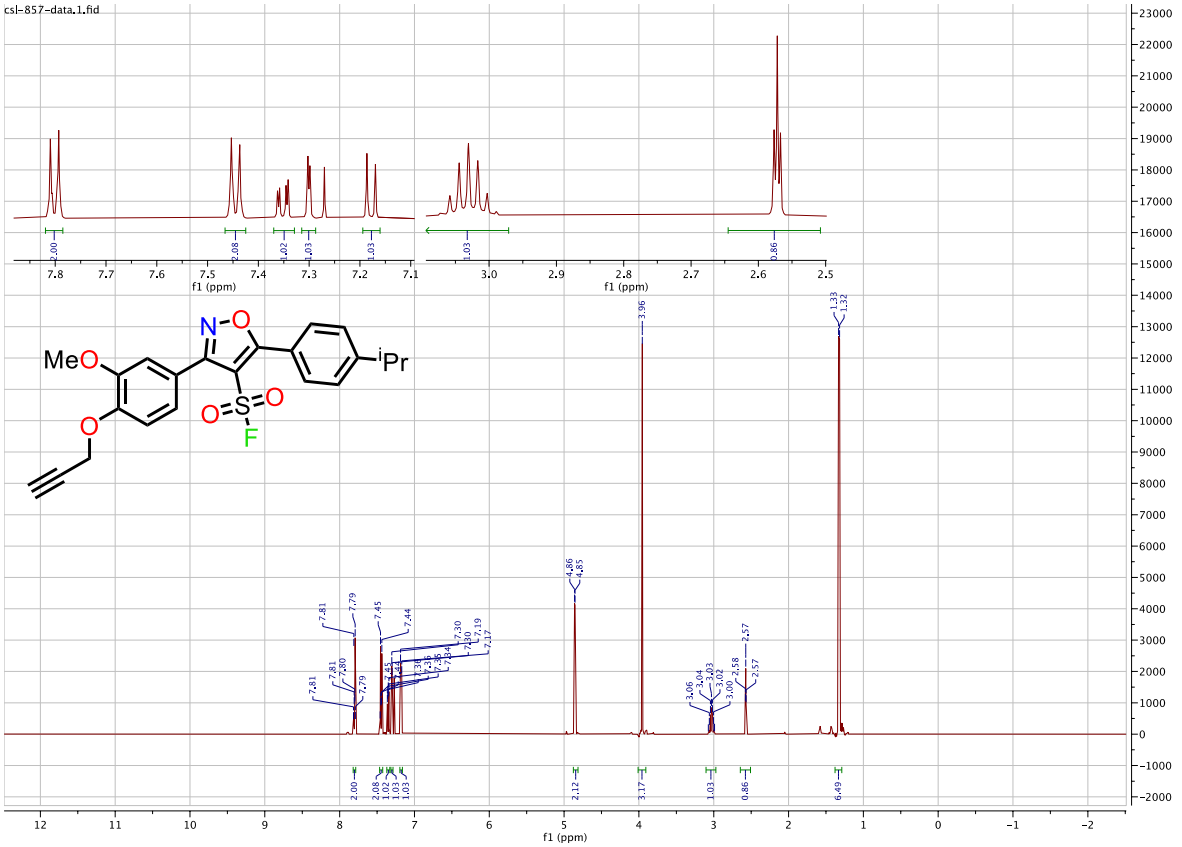

csl-938-data
f1 (ppm)

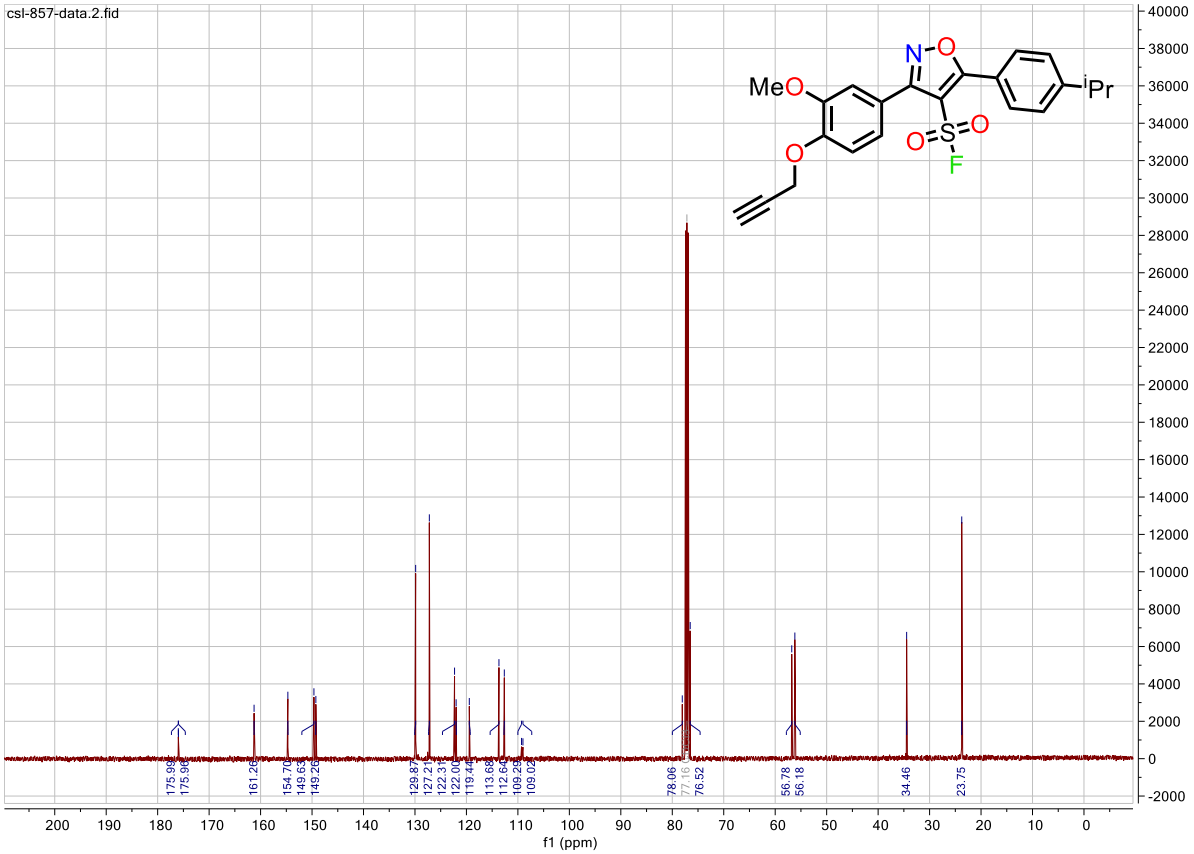

csl-938
72.43
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-50

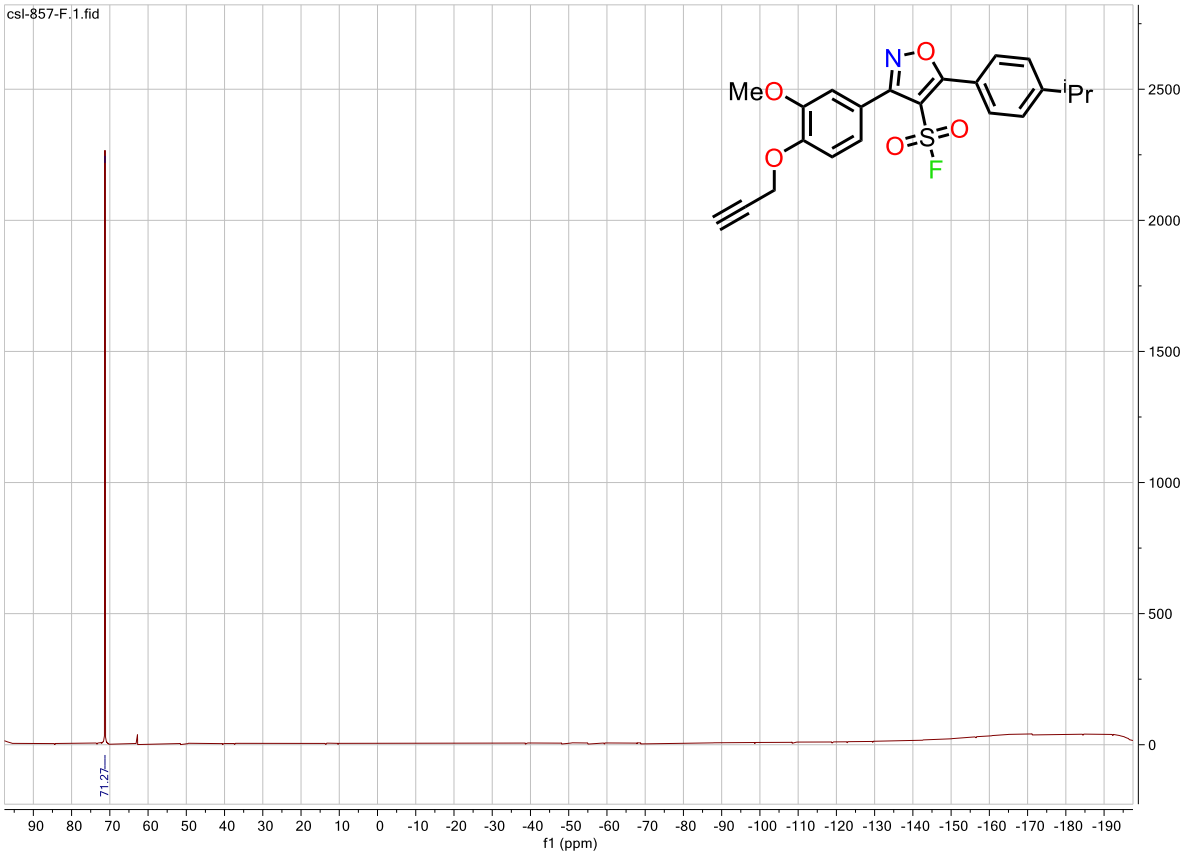

csl-338-data.1.fid
H1_standard CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 52
f1 (ppm)

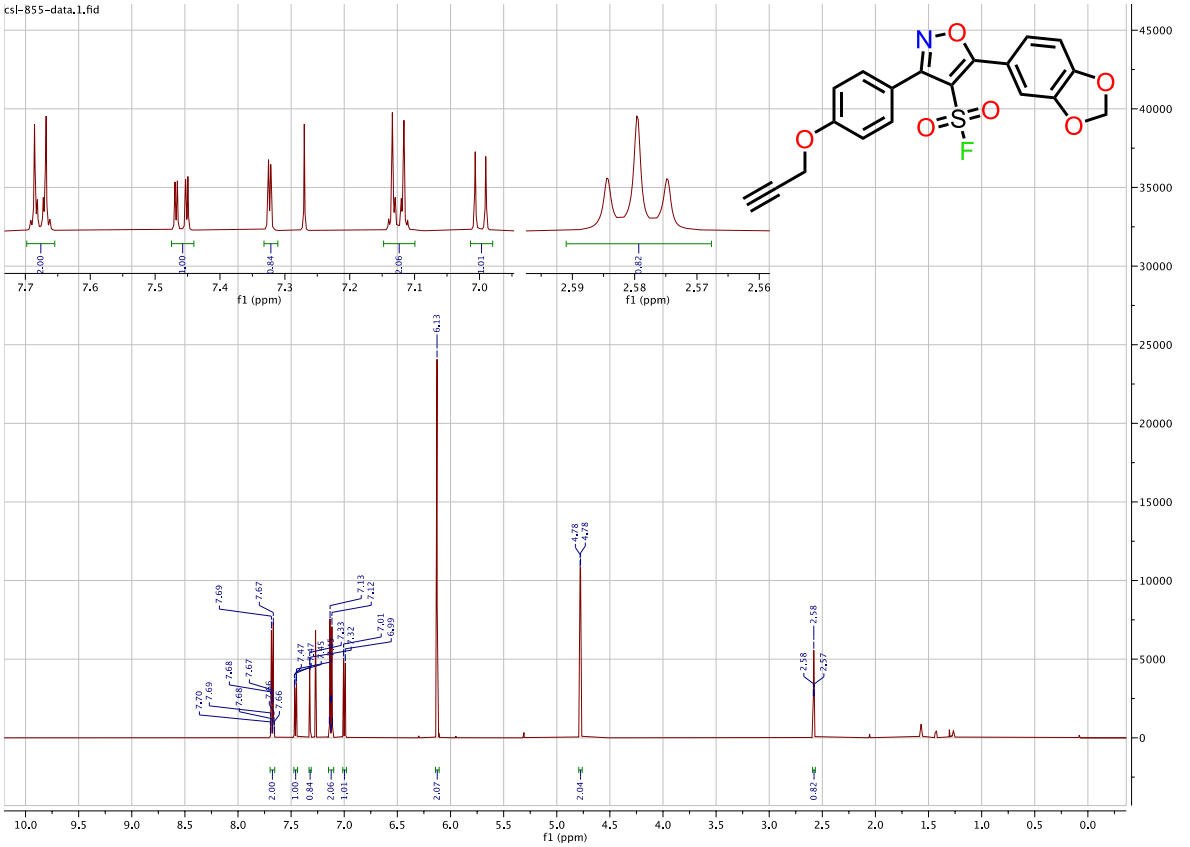

csl-338-data.4.fid
13C CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 52
f1 (ppm)

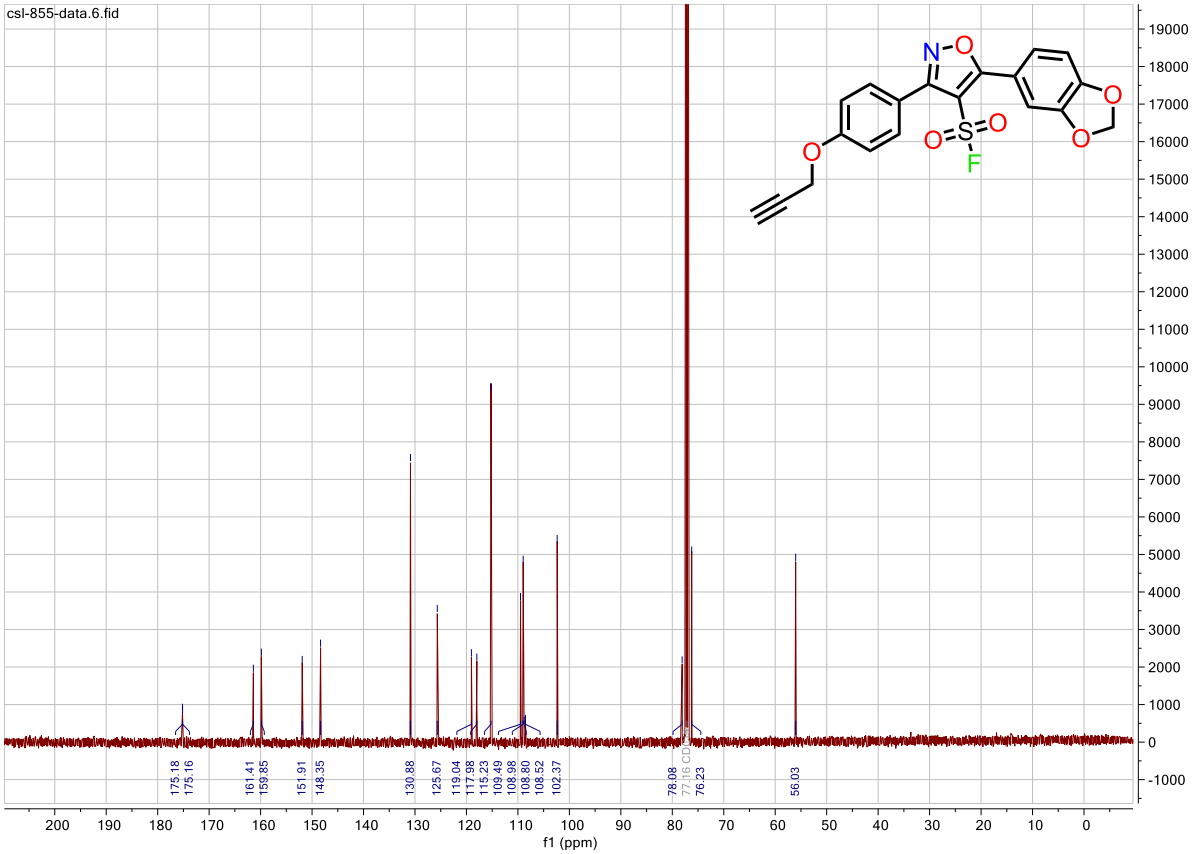

csl-338-data.2.fid
{F-19 standard} CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 52
N
O
MeO
O
S
O
F
71.69
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
200
150
100
50
0
-50
-100
-150
-200
f1 (ppm)

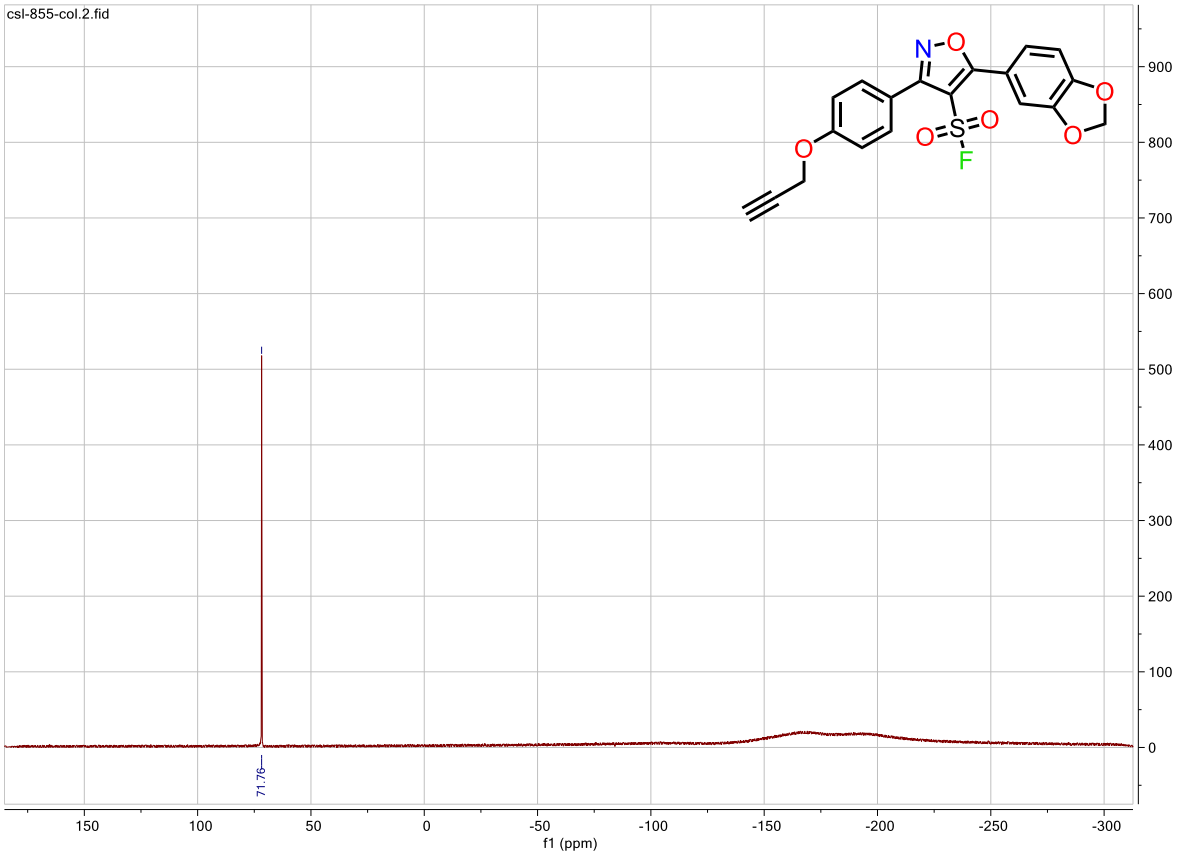

csl-857-data.1.fid
f1 (ppm)

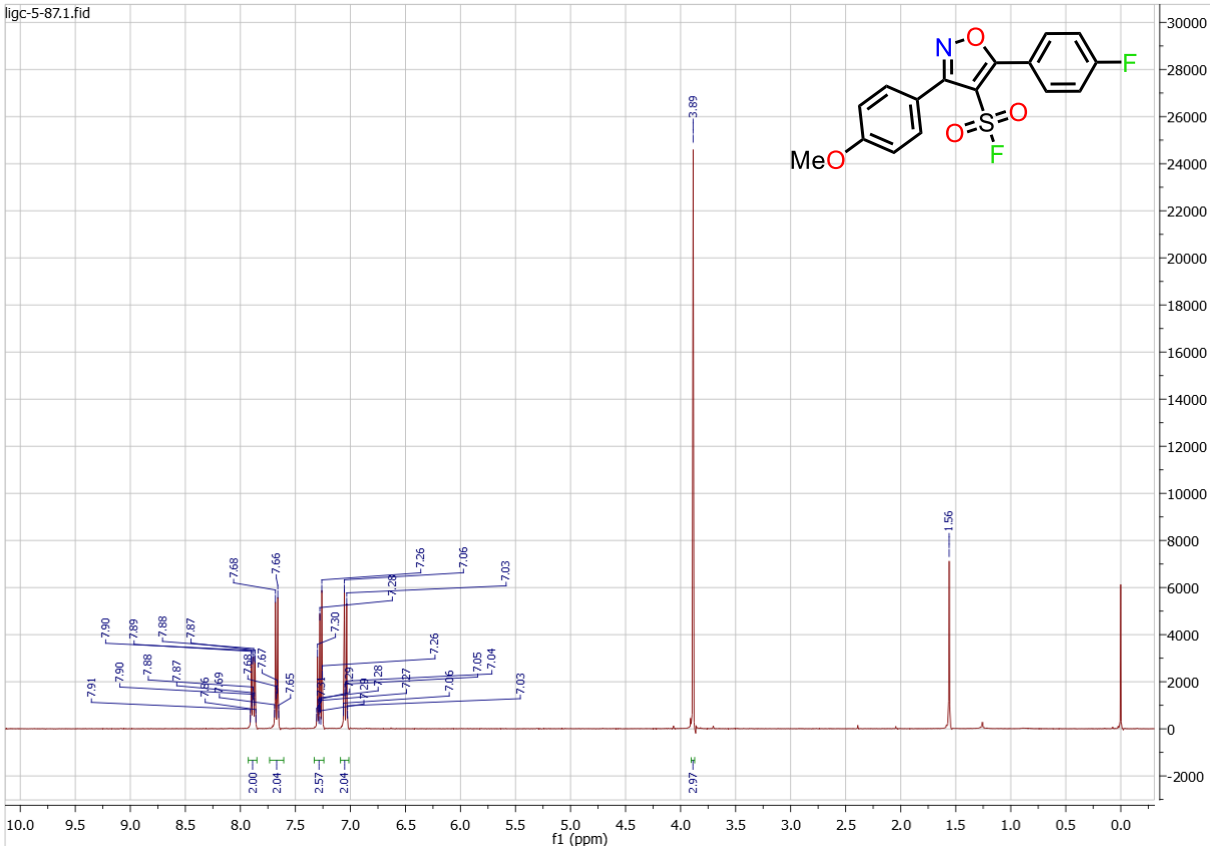

csl-857-data.2.fid
f1 (ppm)

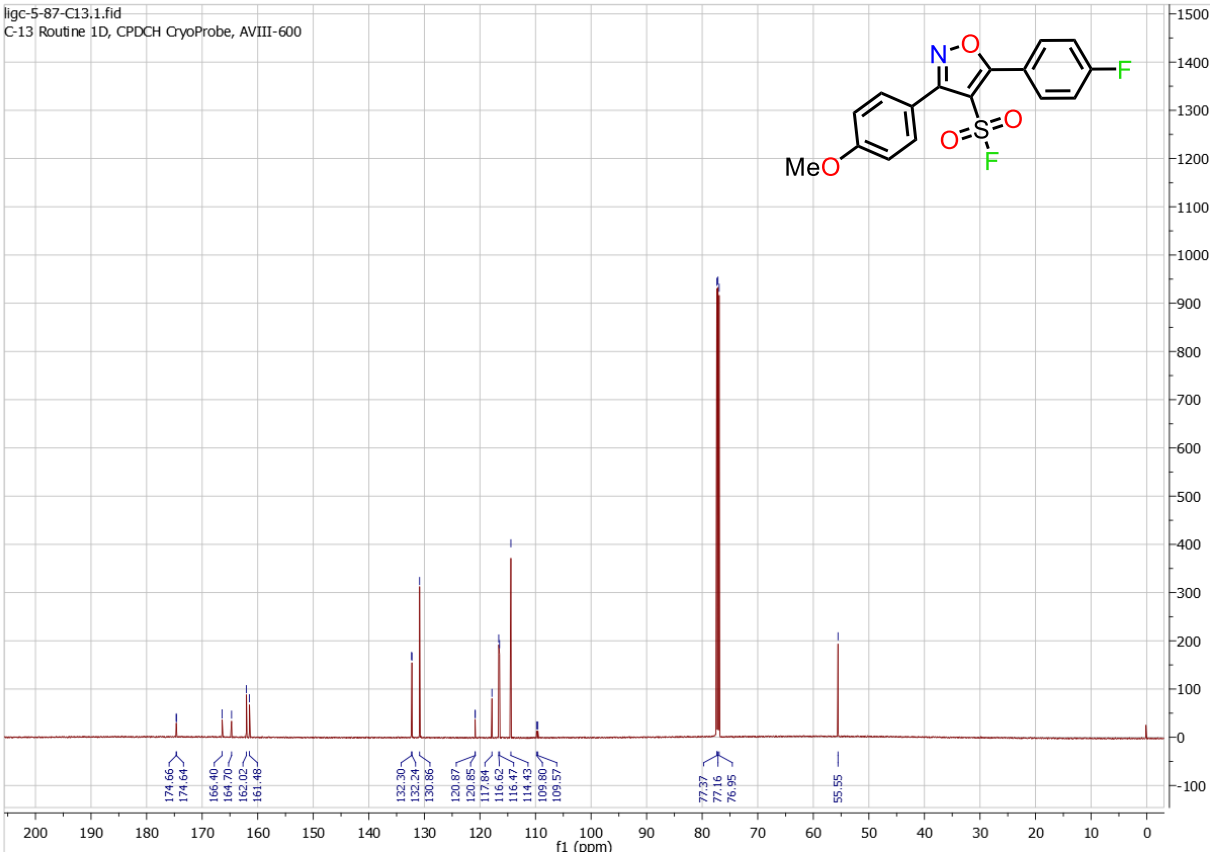

csl-857-F.1.fid
MeO
O
N
O
O
S
O
F
iPr
2500
2000
1500
1000
500
0
71.27
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190
f1 (ppm)

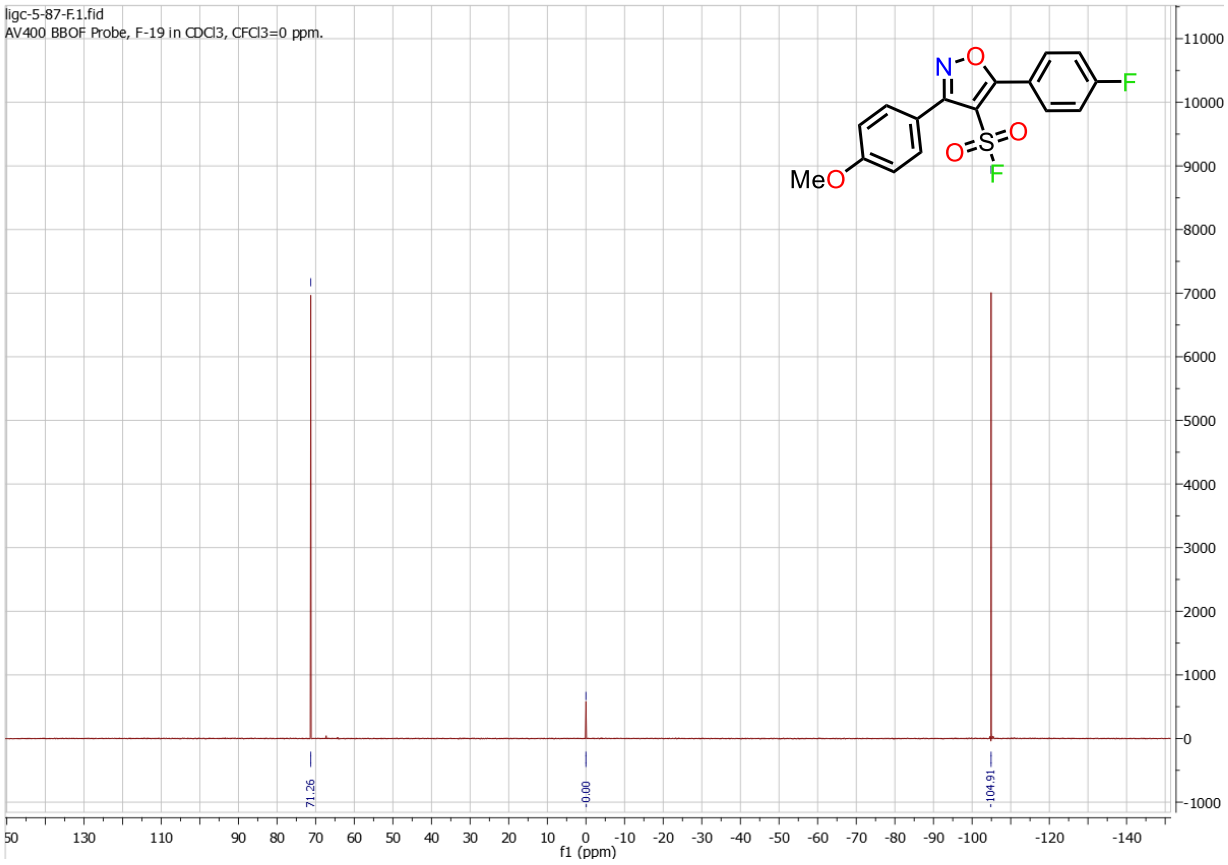

csl-855-data.1.fid
f1 (ppm)

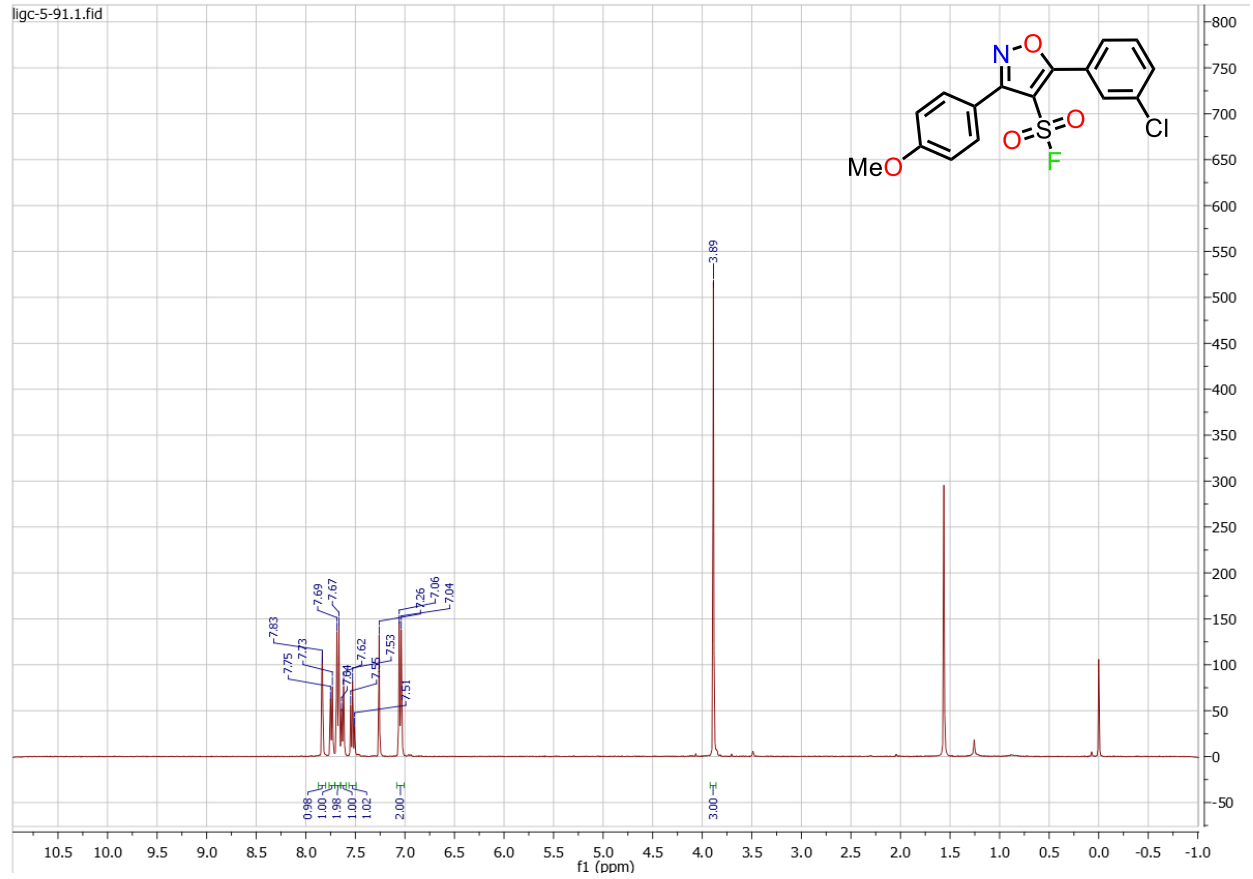

csl-855-data.6.fid
f1 (ppm)

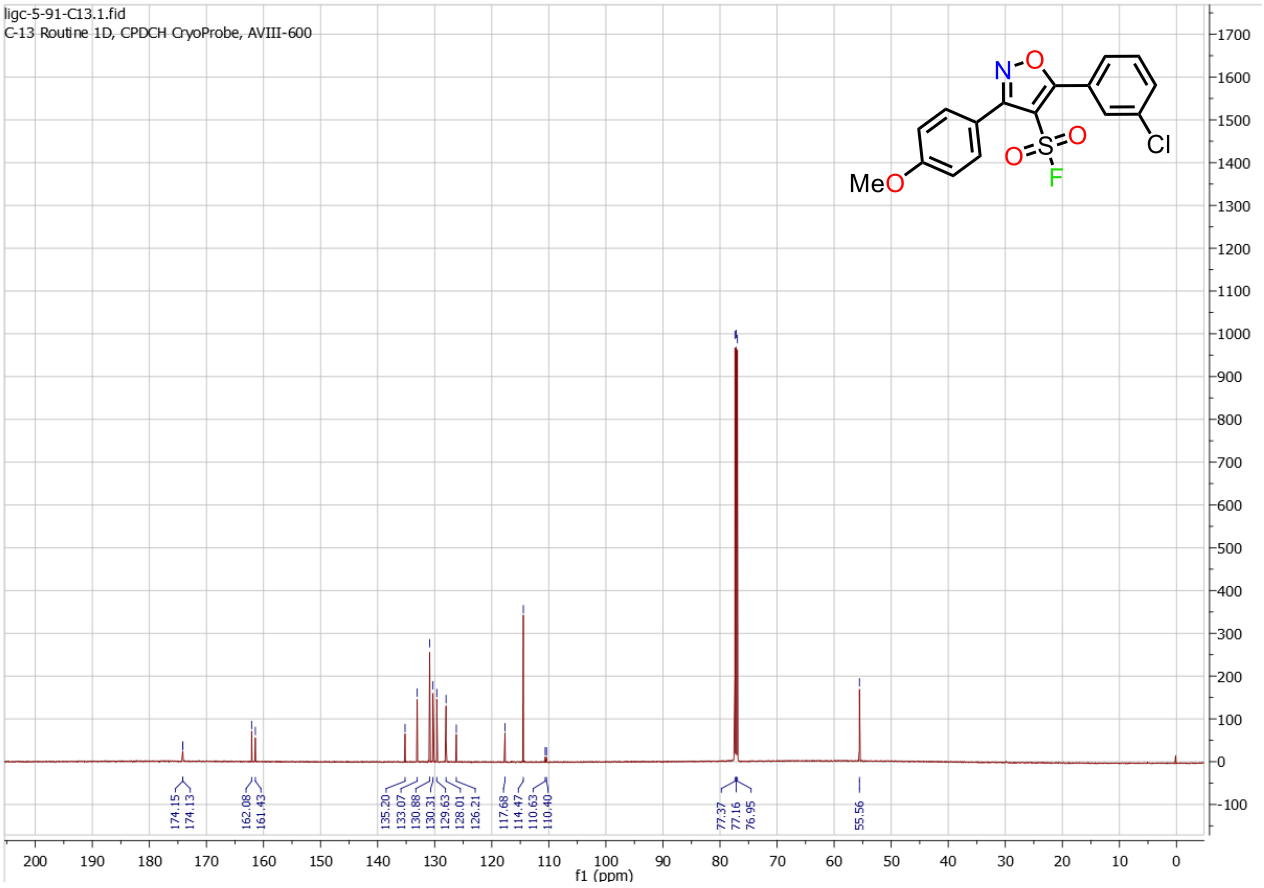

csl-855-col.2.fid
71.76
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
900
800
700
600
500
400
300
200
100
0
N
O
O
S
O
O
F
O
O

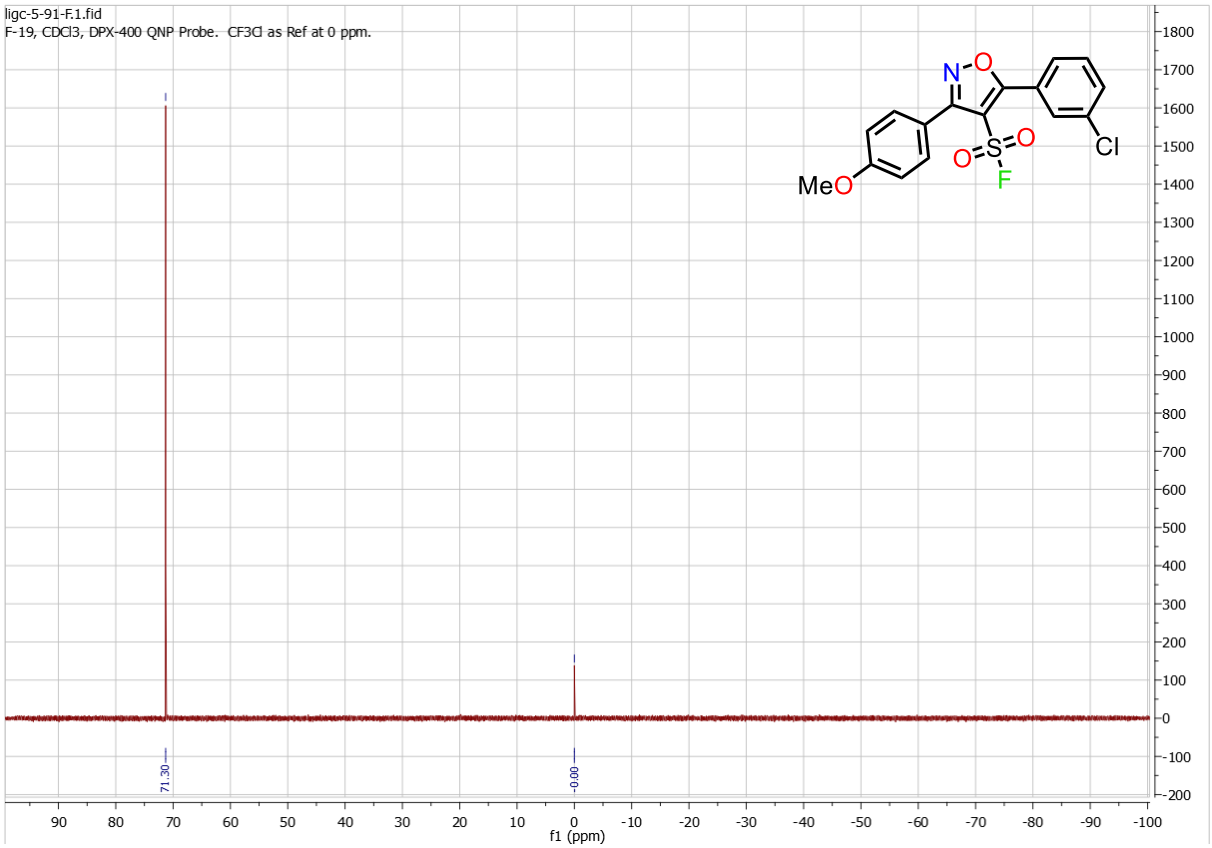

ligc-5-87.1.fid
3.89
1.56
7.91
7.90
7.89
7.88
7.87
7.68
7.67
7.66
7.65
7.30
7.28
7.26
7.06
7.05
7.04
7.03
2.00
2.04
2.57
2.04
2.97
f1 (ppm)

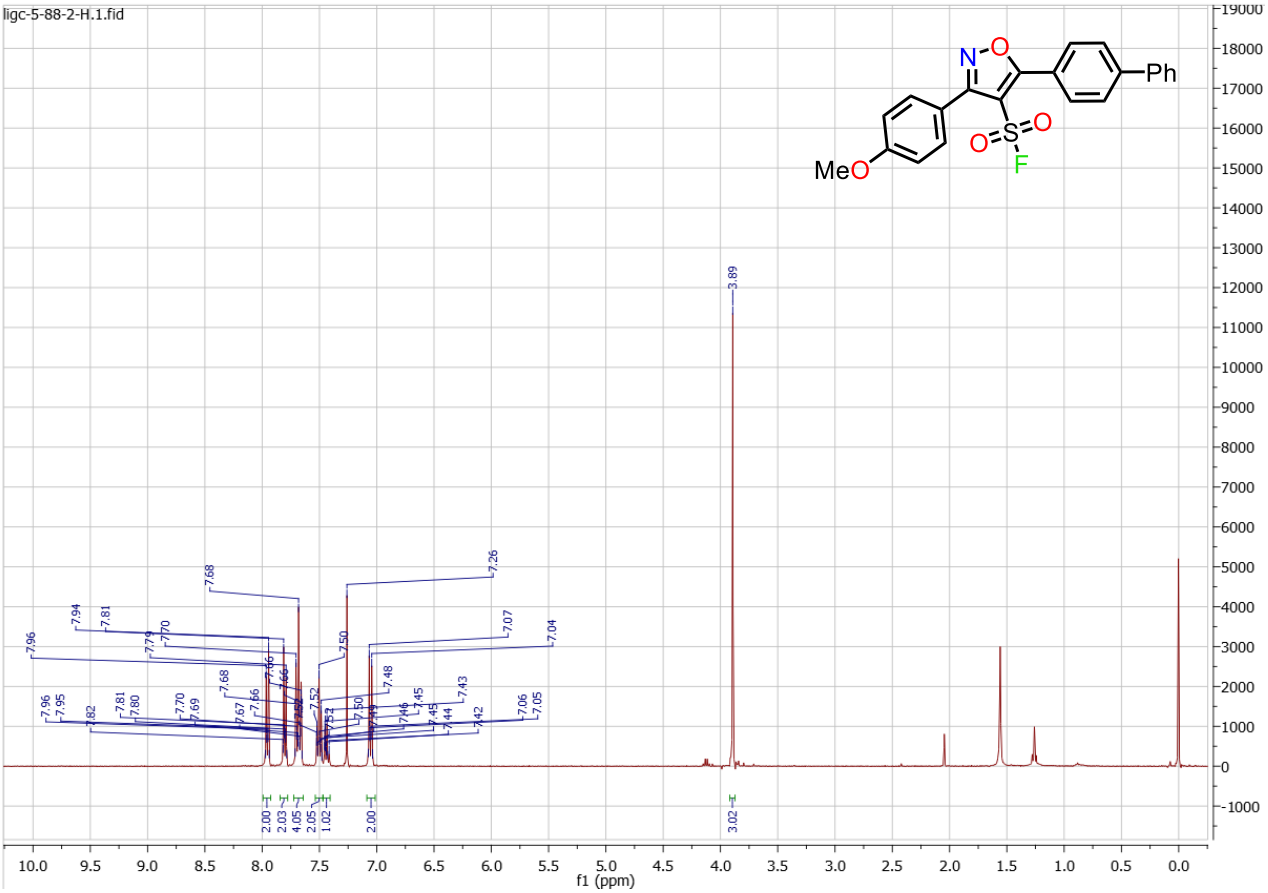

ligc-5-87-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
174.66
174.64
166.40
164.70
162.02
161.48
132.30
132.24
130.86
120.87
120.85
117.84
116.62
116.47
114.43
109.80
109.57
77.37
77.16
76.95
55.55
f1 (ppm)

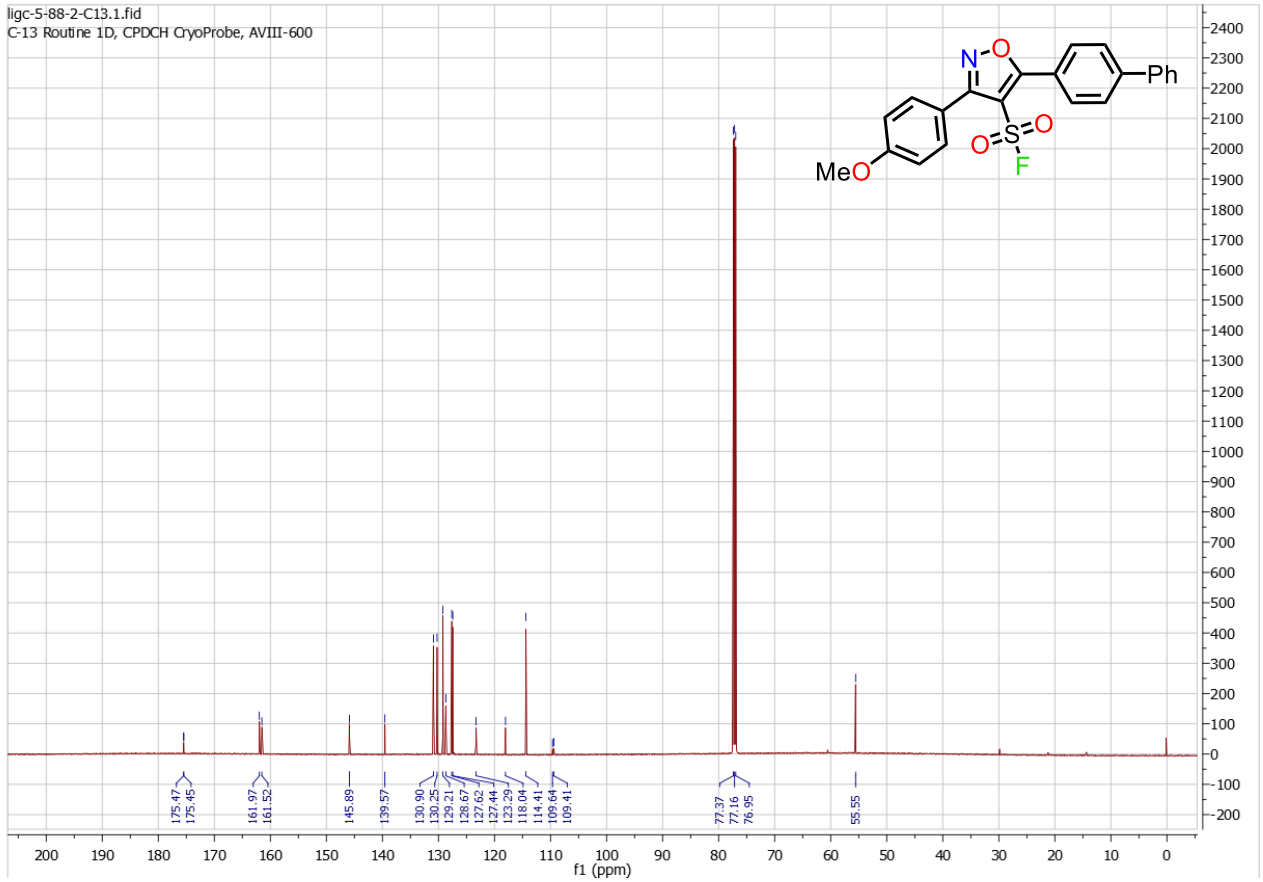

ligc-5-87-F.1.fid
AV400 BBOF Probe, F-19 in CDCl3, CFCl3=0 ppm.
N
O
F
O
S
O
F
MeO
71.26
-0.00
-104.91
f1 (ppm)

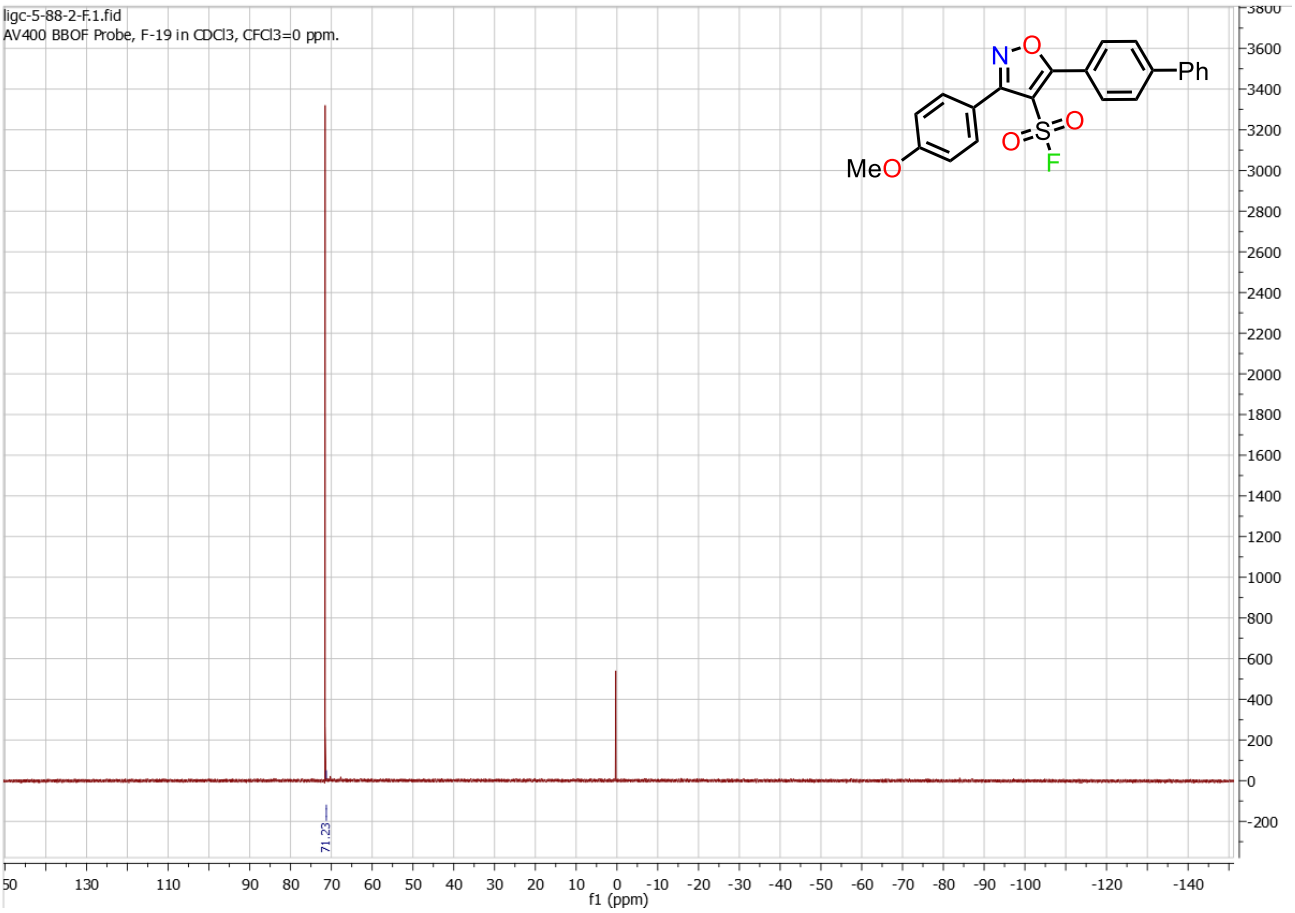

ligc-5-91.1.fid
N
O
Cl
O
S
O
F
MeO
3.89
7.83
7.75
7.73
7.69
7.67
7.62
7.53
7.51
7.26
7.06
7.04
f1 (ppm)

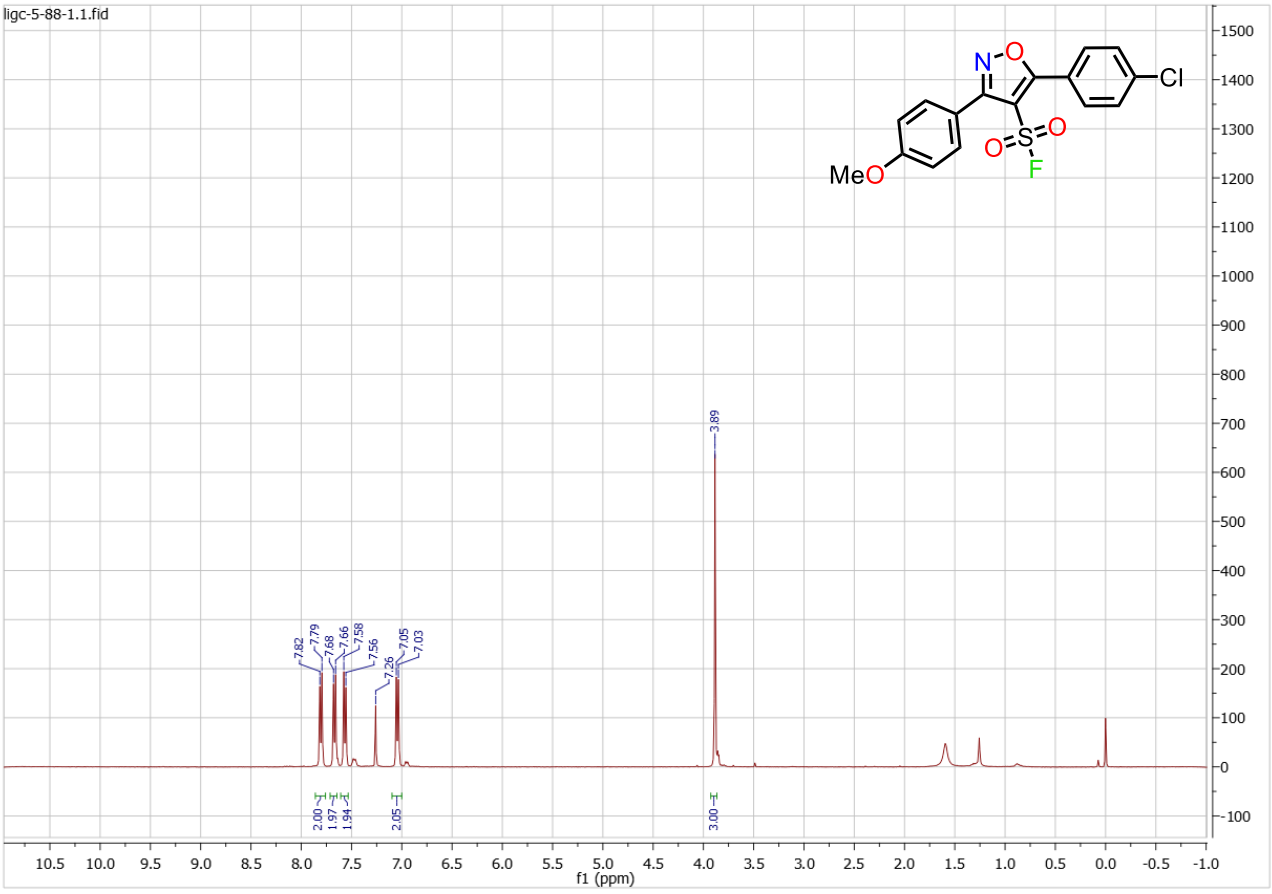

ligc-5-91-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
N
O
Cl
O
S
O
F
MeO
174.15
174.13
162.08
161.43
135.20
133.07
130.88
130.31
129.63
128.01
126.21
117.68
114.47
110.63
110.40
77.37
77.16
76.95
55.56
f1 (ppm)

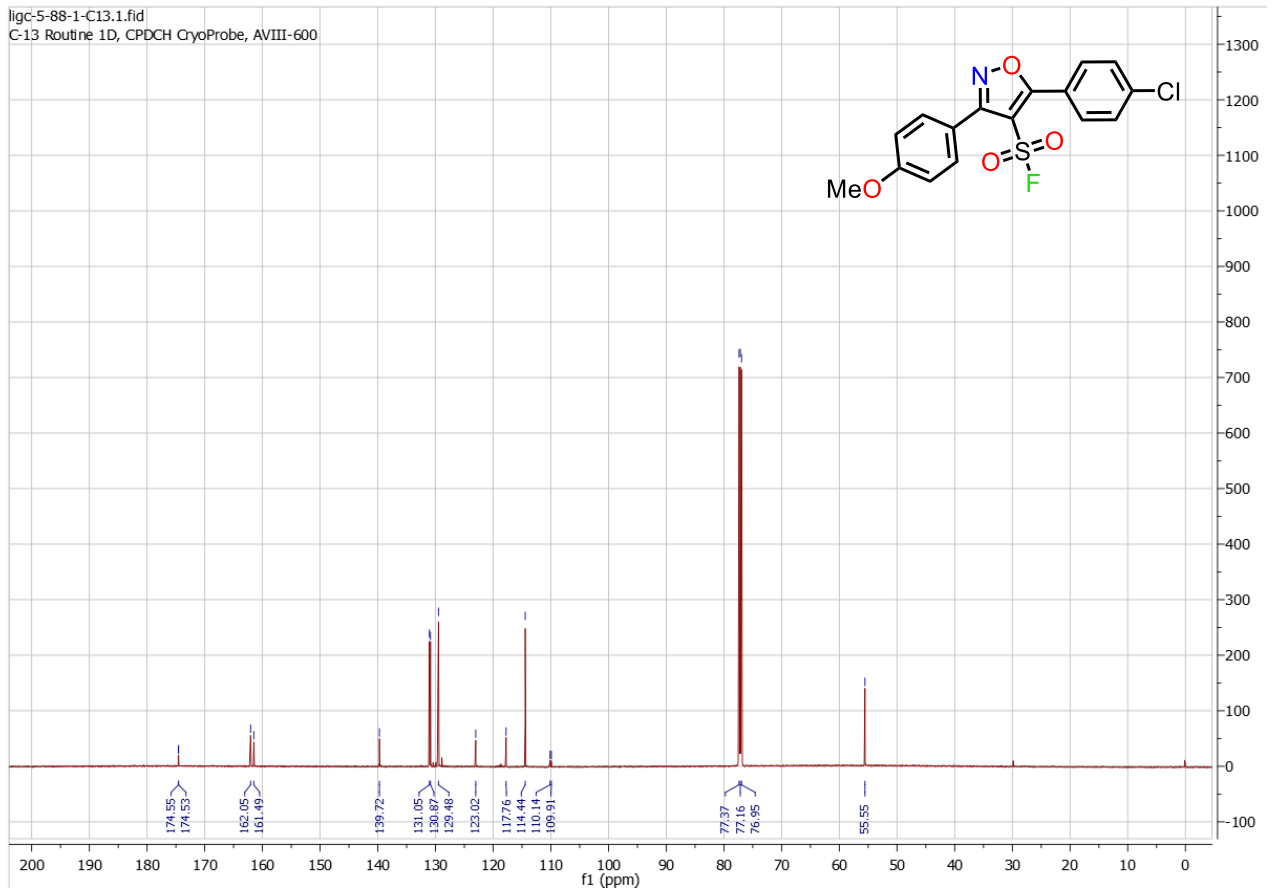

ligc-5-91-F.1.fid
F-19, CDCl3, DPX-400 QNP Probe. CF3Cl as Ref at 0 ppm.
N
O
O
S
O
F
MeO
Cl
71.30
0.00
f1 (ppm)

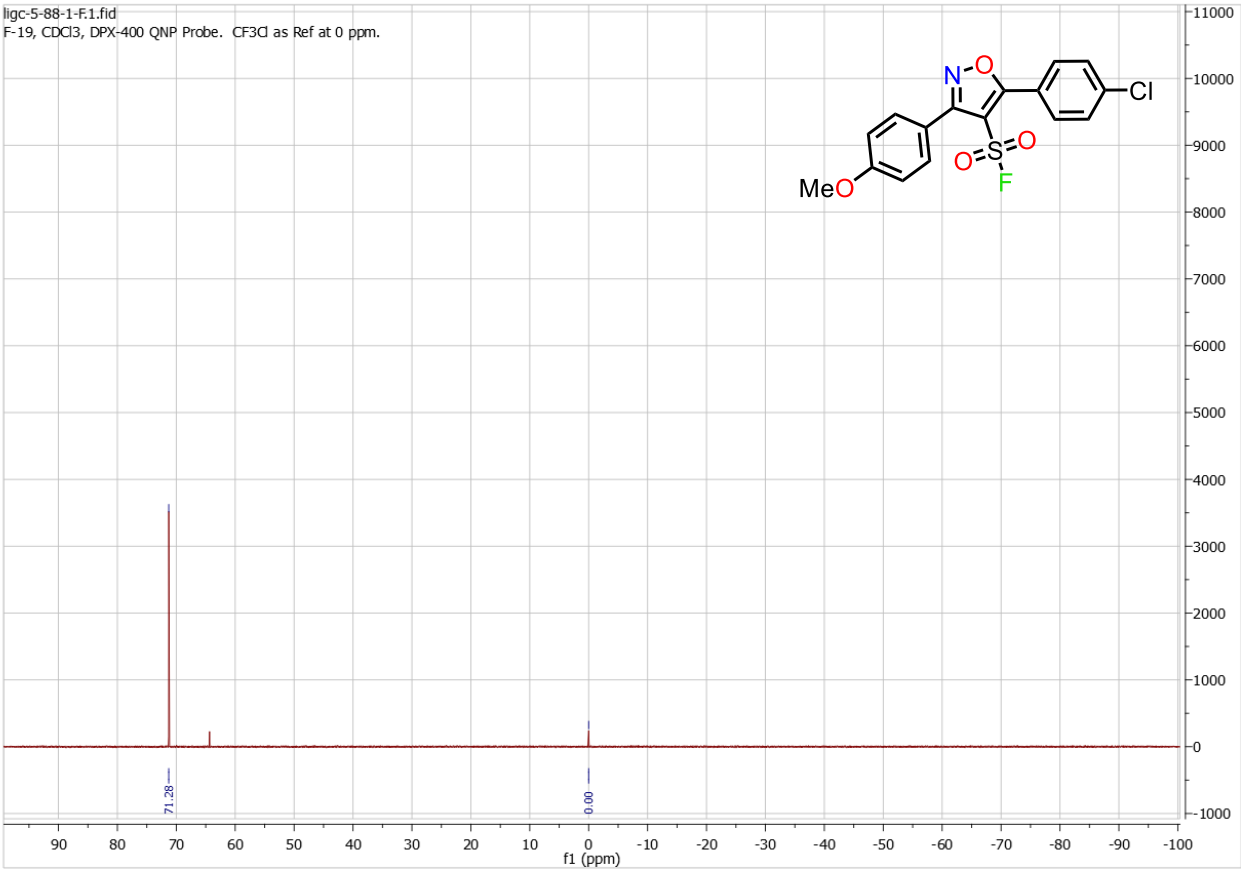

ligc-5-88-2-H.1.fid
N
O
Ph
MeO
O
S
O
F
3.89
7.68
7.26
7.94
7.81
7.96
7.79
7.70
7.07
7.04
7.50
7.48
7.45
7.43
7.06
7.05
7.42
2.00
2.03
4.05
2.05
1.02
2.00
3.02
f1 (ppm)

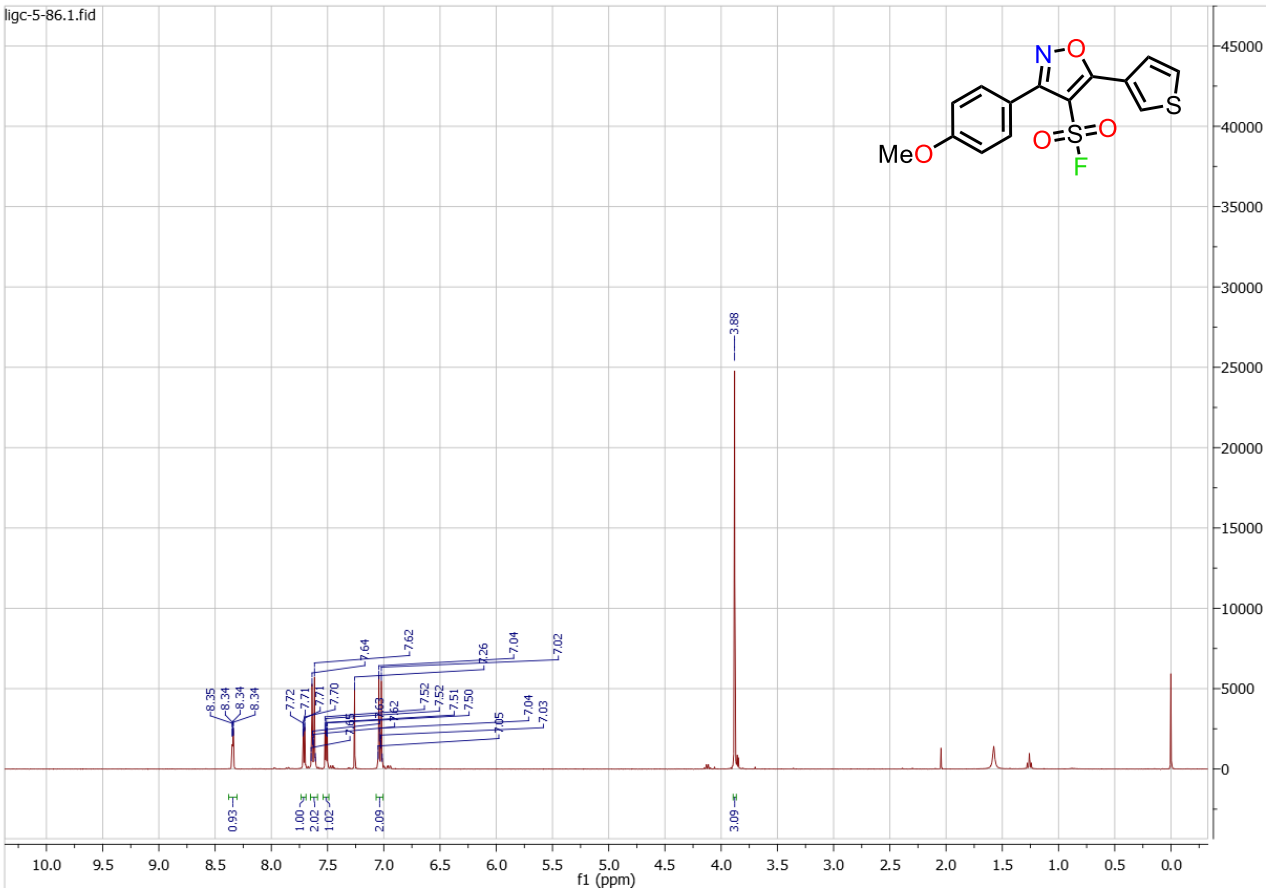

ligc-5-88-2-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
N
O
Ph
MeO
O
S
O
F
175.47
175.45
161.97
161.52
145.89
139.57
130.90
130.25
129.21
128.67
127.62
127.44
123.29
118.04
114.41
109.64
109.41
77.37
77.16
76.95
55.55
f1 (ppm)

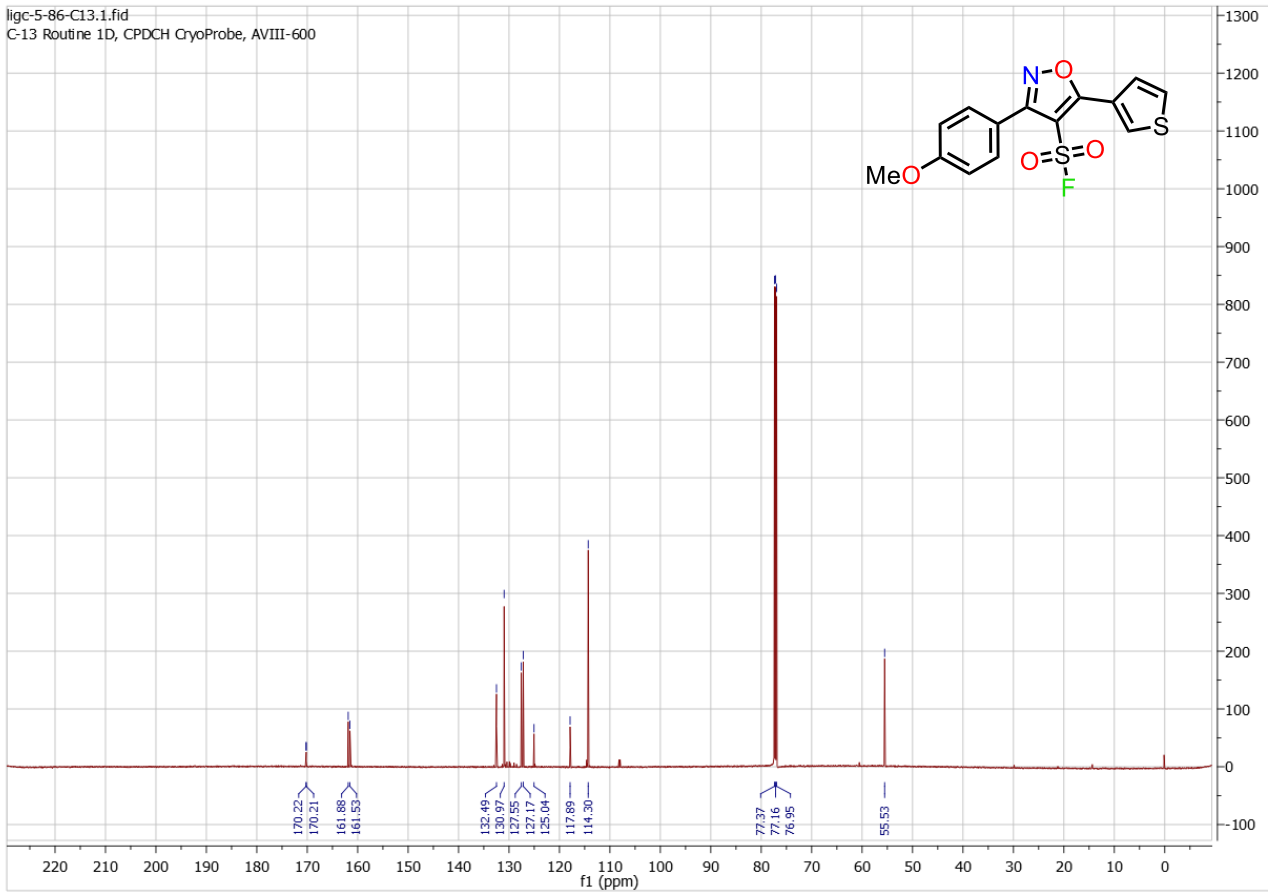

ligc-5-88-2-F.1.fid
AV400 BBOF Probe, F-19 in CDCl3, CFCl3=0 ppm.
N
O
Ph
S
O
O
F
MeO
71.23
f1 (ppm)

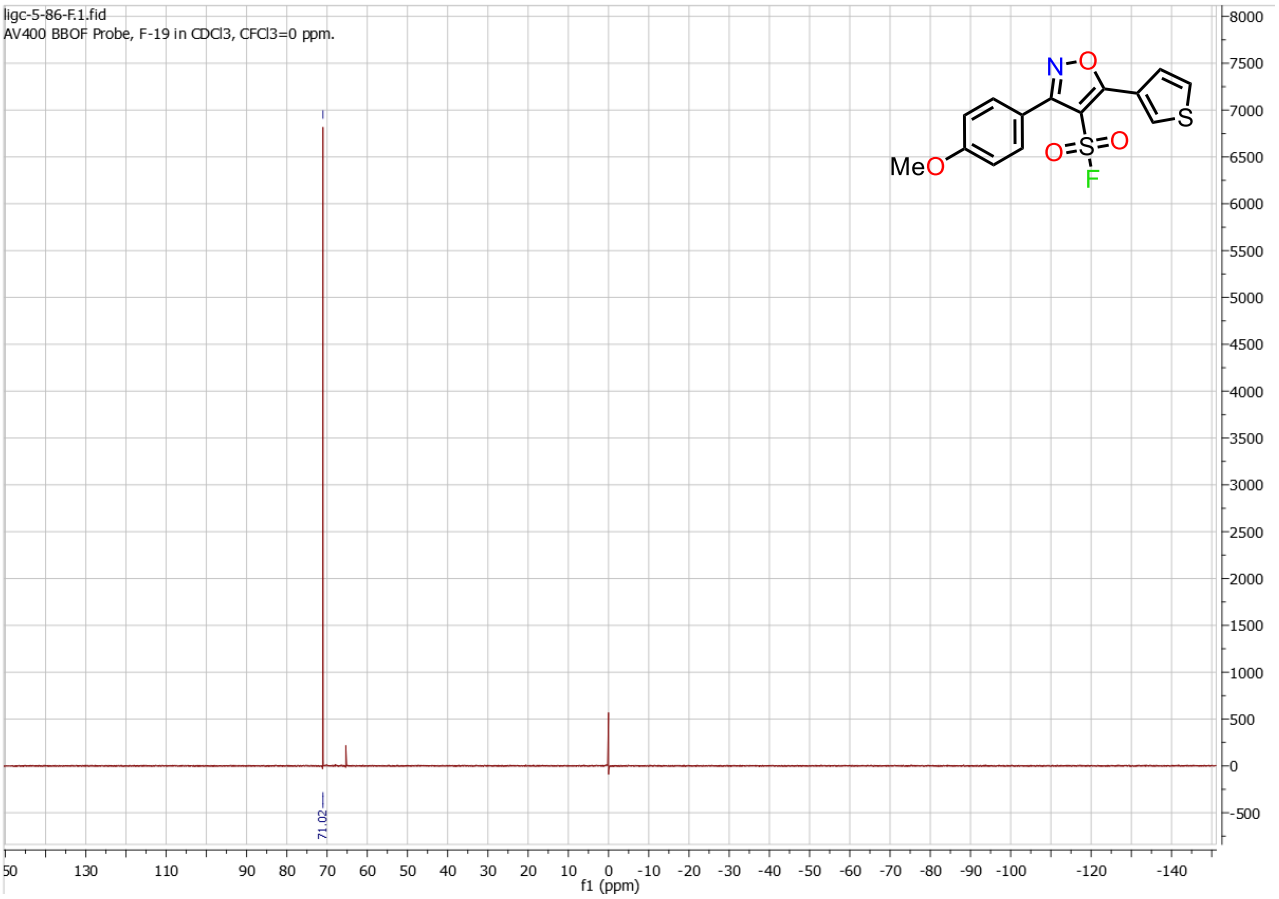

ligc-5-88-1.1.fid
N
O
Cl
O
S
O
F
MeO
7.82
7.79
7.68
7.66
7.58
7.56
7.26
7.05
7.03
3.89
2.00
1.97
1.94
2.05
3.00
f1 (ppm)

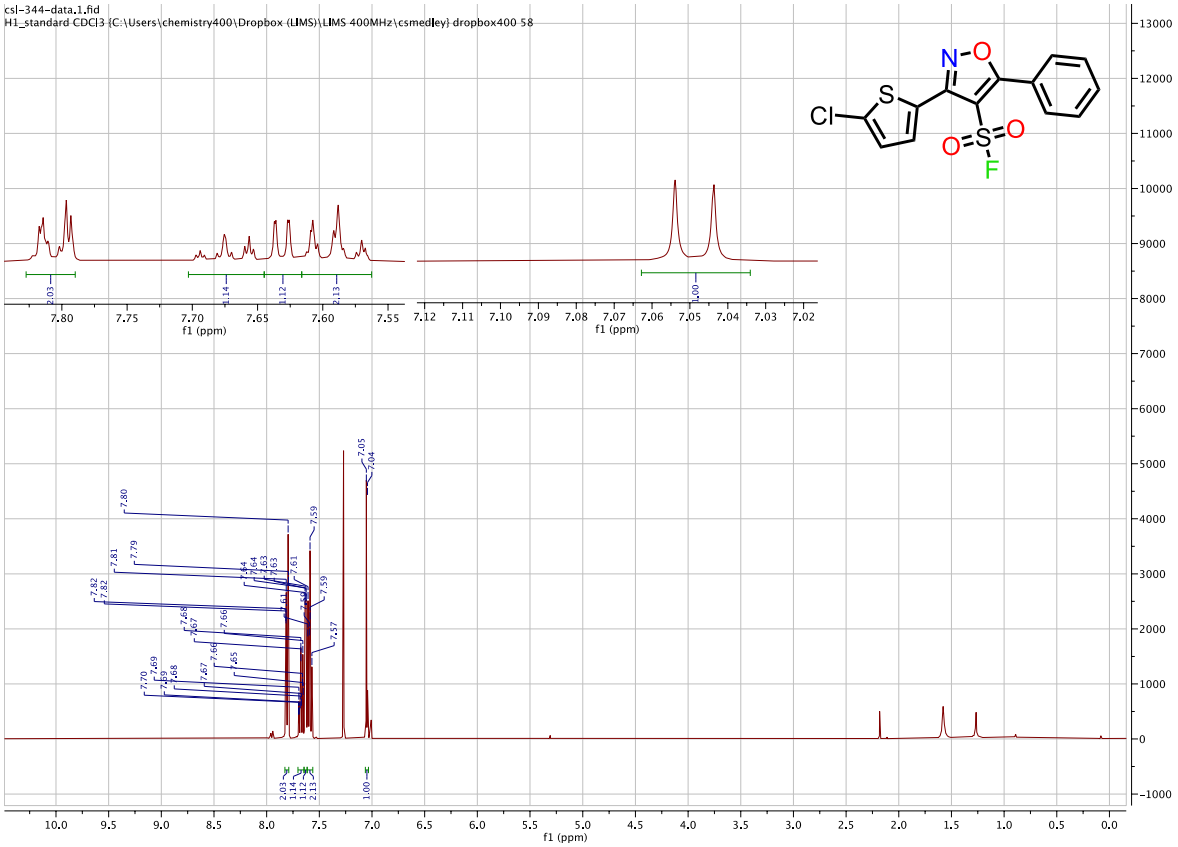

ligc-5-88-1-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
N
O
Cl
O
S
O
F
MeO
174.55
174.53
162.05
161.49
139.72
131.05
130.87
129.48
123.02
117.76
114.44
110.14
109.91
77.37
77.16
76.95
55.55
f1 (ppm)

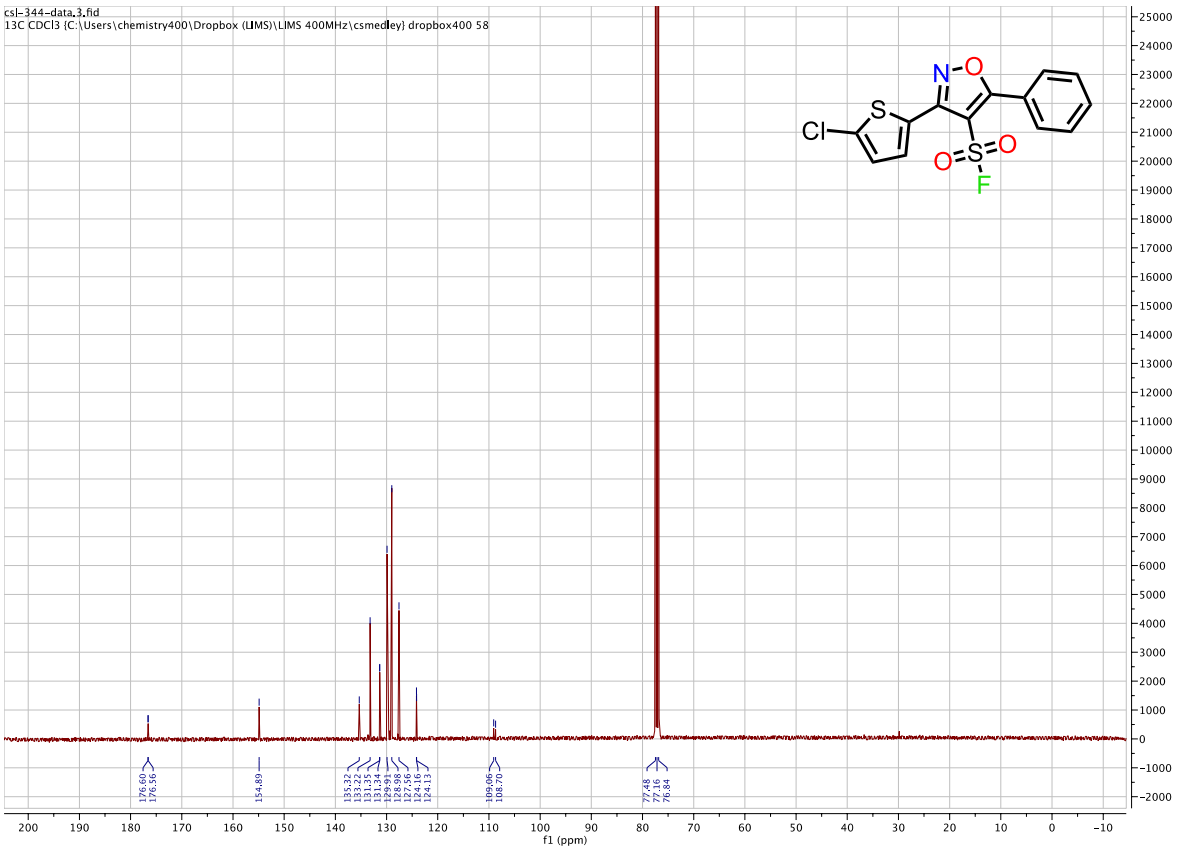

ligc-5-88-1-F.1.fid
F-19, CDCl3, DPX-400 QNP Probe. CF3Cl as Ref at 0 ppm.
N
O
Cl
O
S
O
F
MeO
71.28
0.00
f1 (ppm)

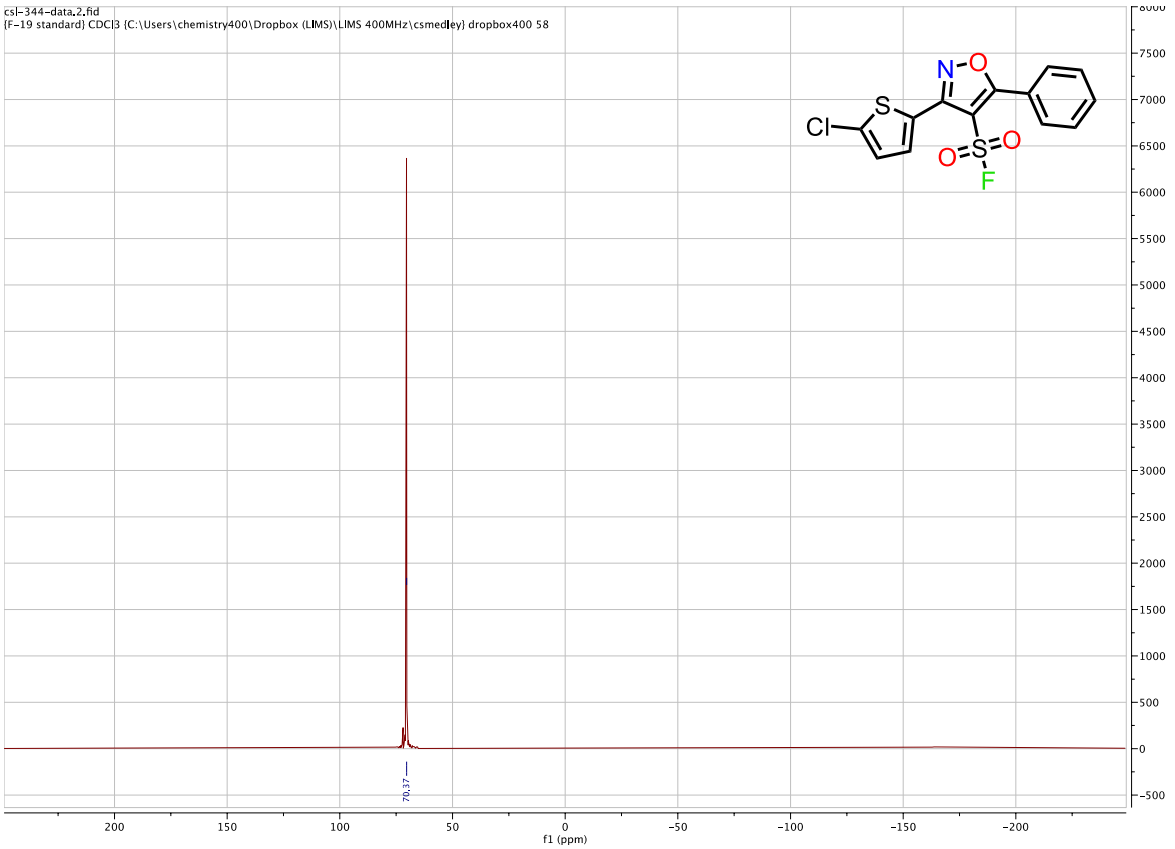

ligc-5-86.1.fid
MeO
N
O
S
O
O
F
3.88
7.64
7.62
7.26
7.04
7.02
8.35
8.34
8.34
8.34
7.72
7.71
7.71
7.70
7.52
7.52
7.51
7.50
7.63
7.62
7.05
7.04
7.03
0.93
1.00
2.02
1.02
2.09
3.09
f1 (ppm)

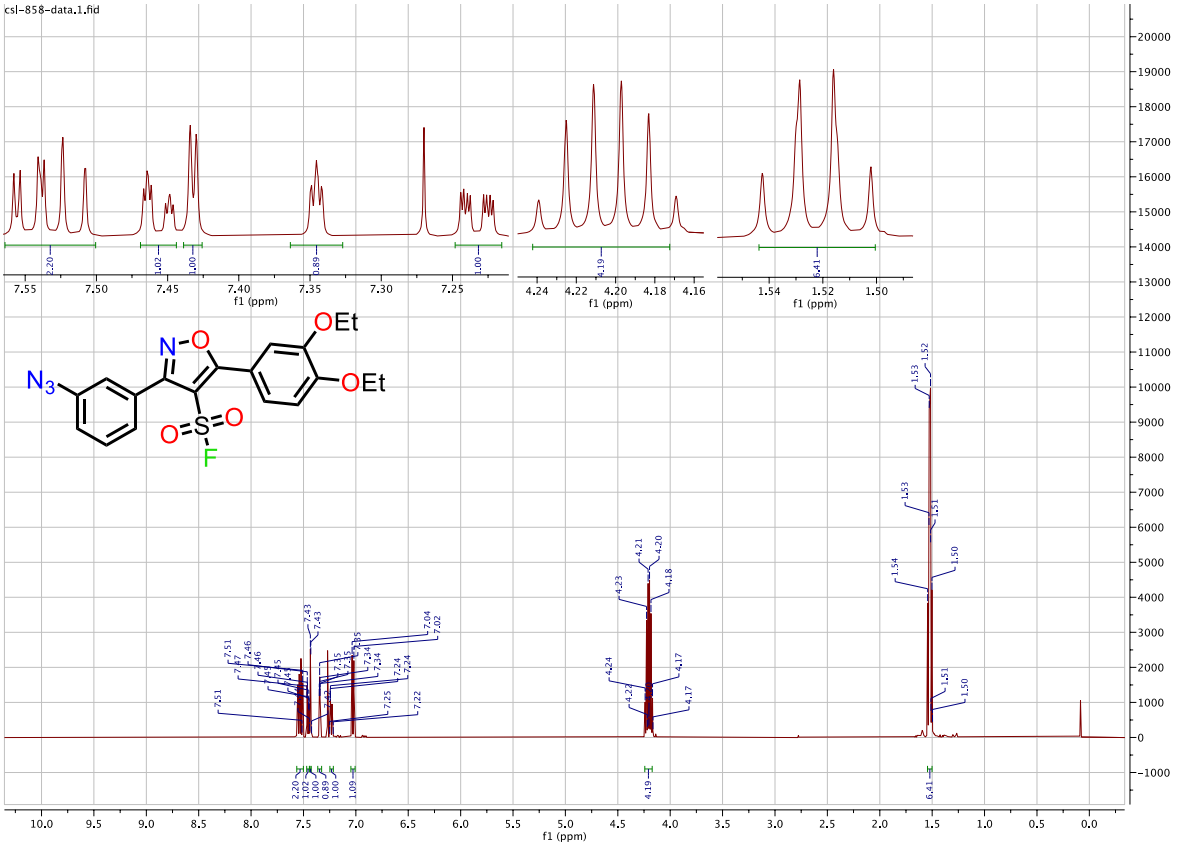

ligc-5-86-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
MeO
N
O
S
O
O
F
170.22
170.21
161.88
161.53
132.49
130.97
127.55
127.17
125.04
117.89
114.30
77.37
77.16
76.95
55.53
f1 (ppm)

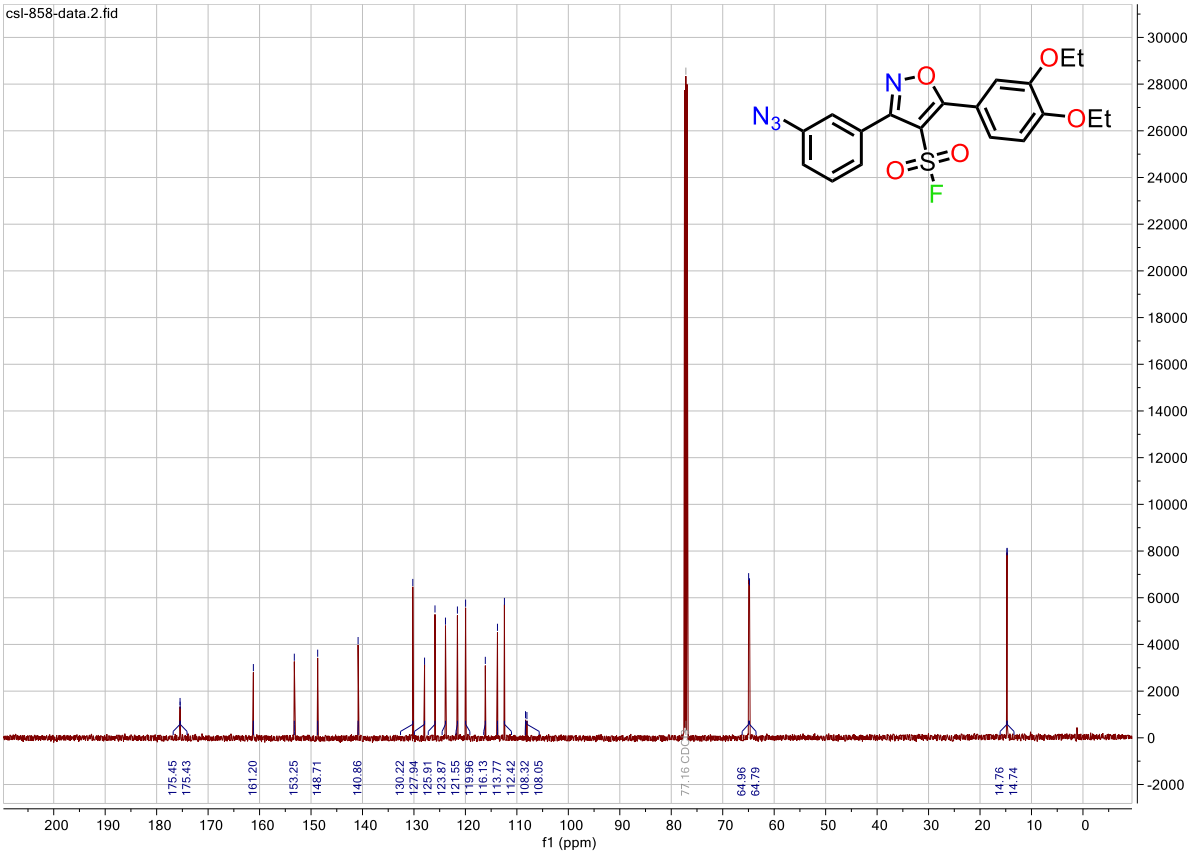

ligc-5-86-F.1.fid
AV400 BBOF Probe, F-19 in CDCl3, CFCl3=0 ppm.
71.02
f1 (ppm)

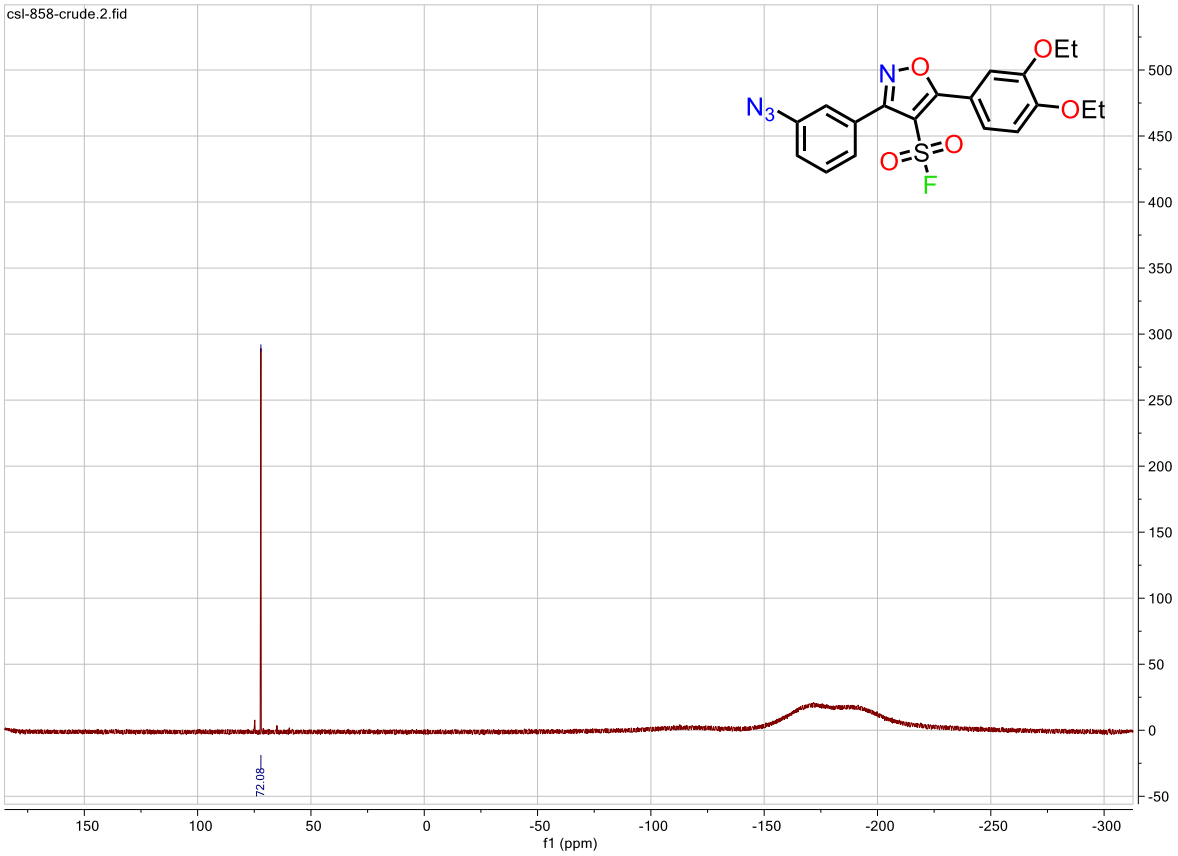

csl-344-data.1.fid
H1_standard CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 58
f1 (ppm)

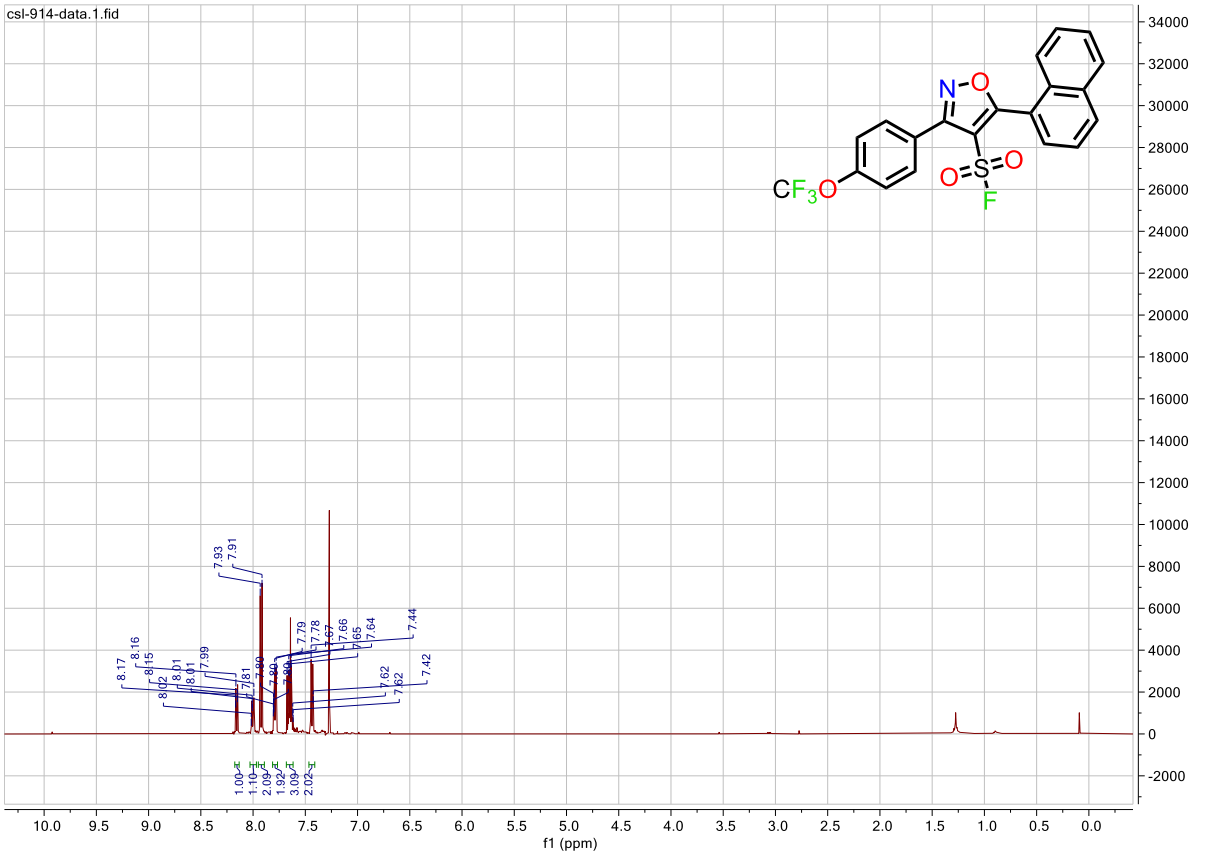

csl-344-data.3.fid
13C CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 58
f1 (ppm)

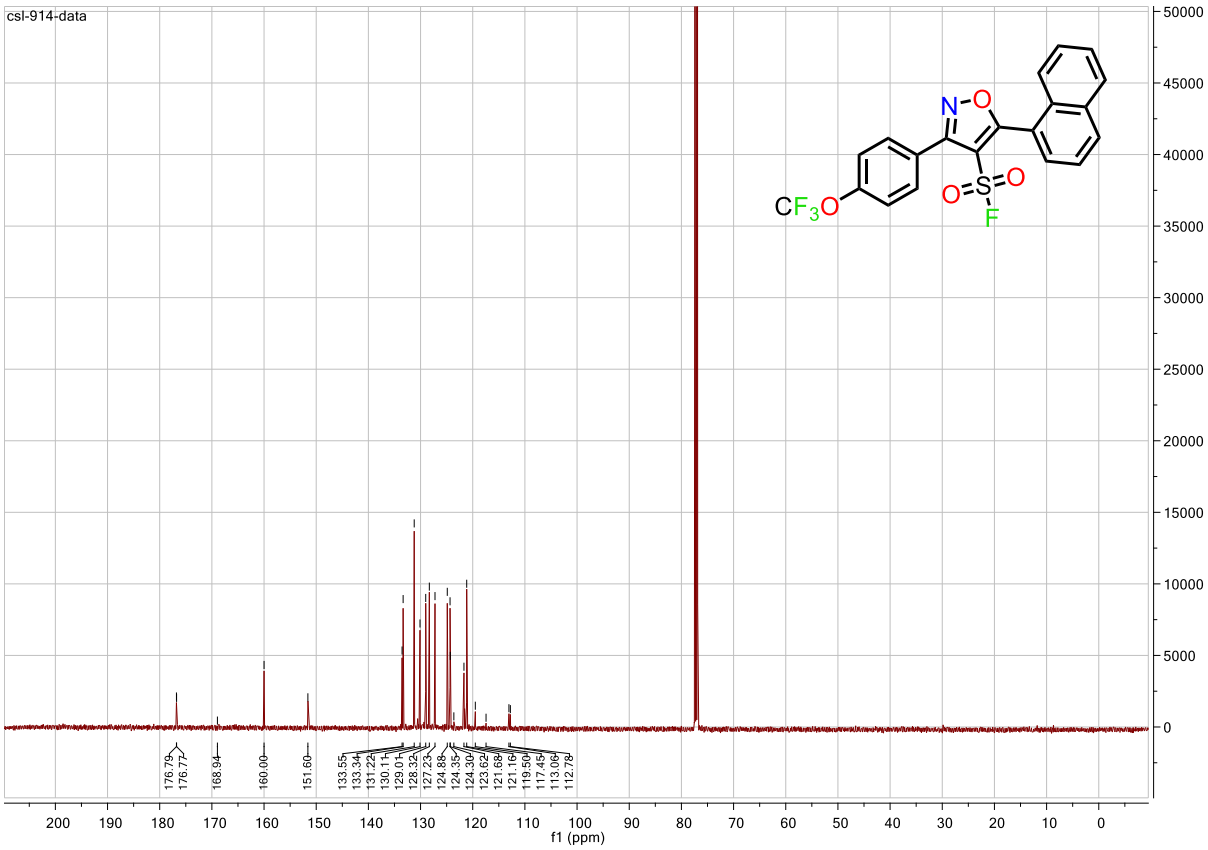

csl-344-data.2.fid
{F-19 standard} CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 58
N
O
S
Cl
O
S
O
F
70.37
f1 (ppm)

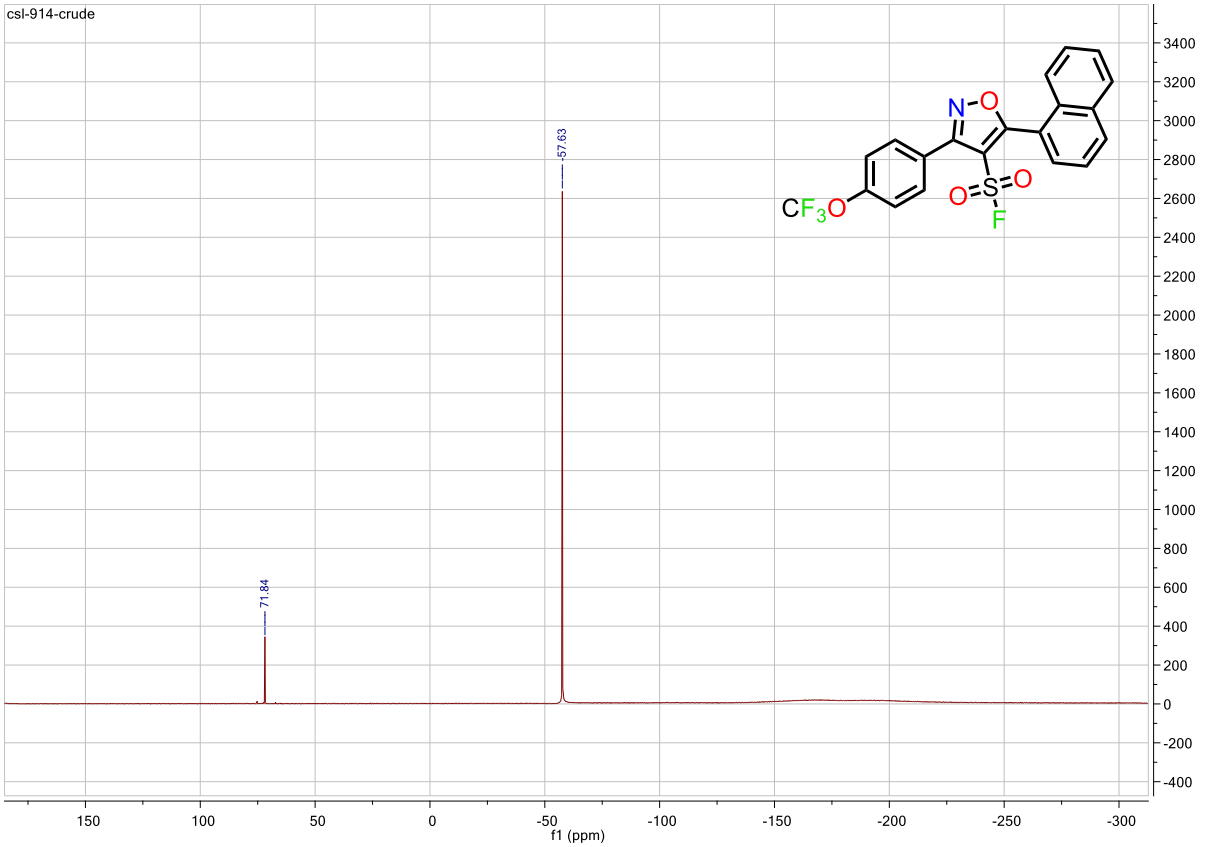

csl-858-data.1.fid
f1 (ppm)

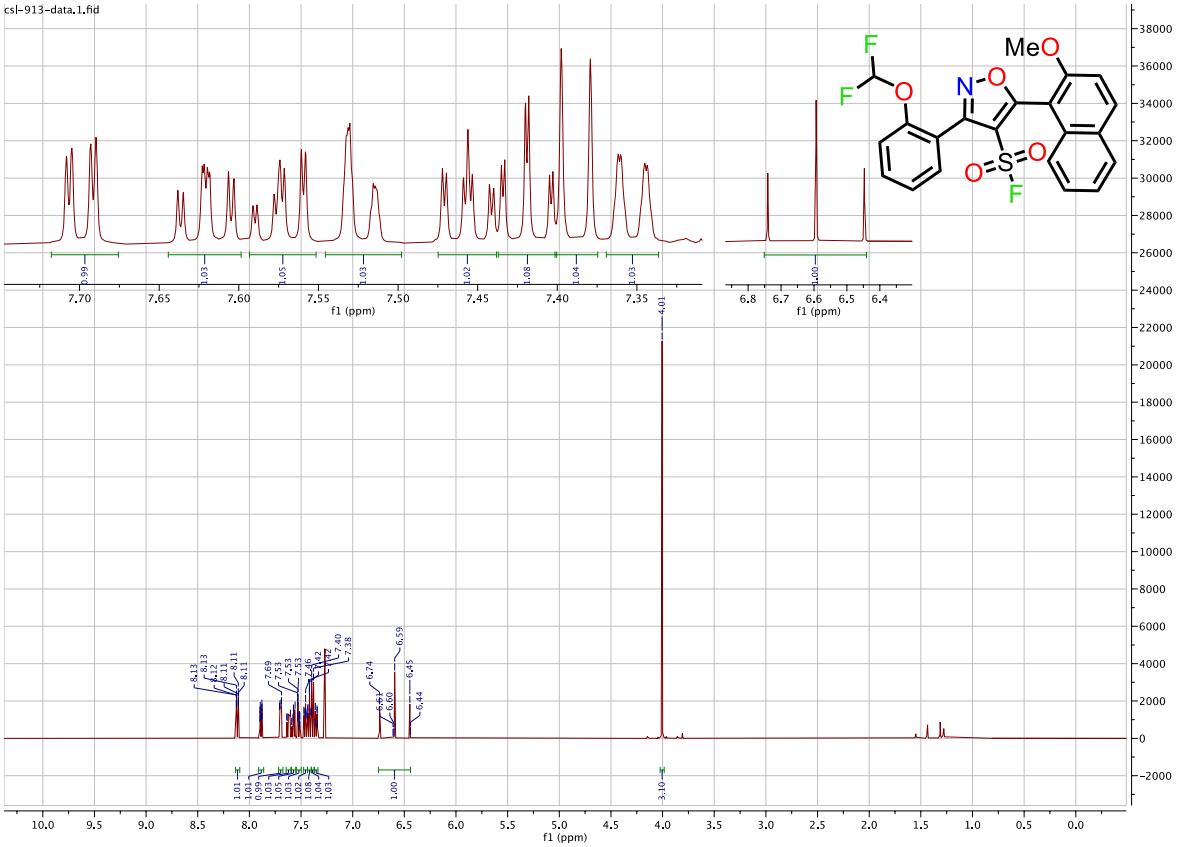

csl-858-data.2.fid
f1 (ppm)

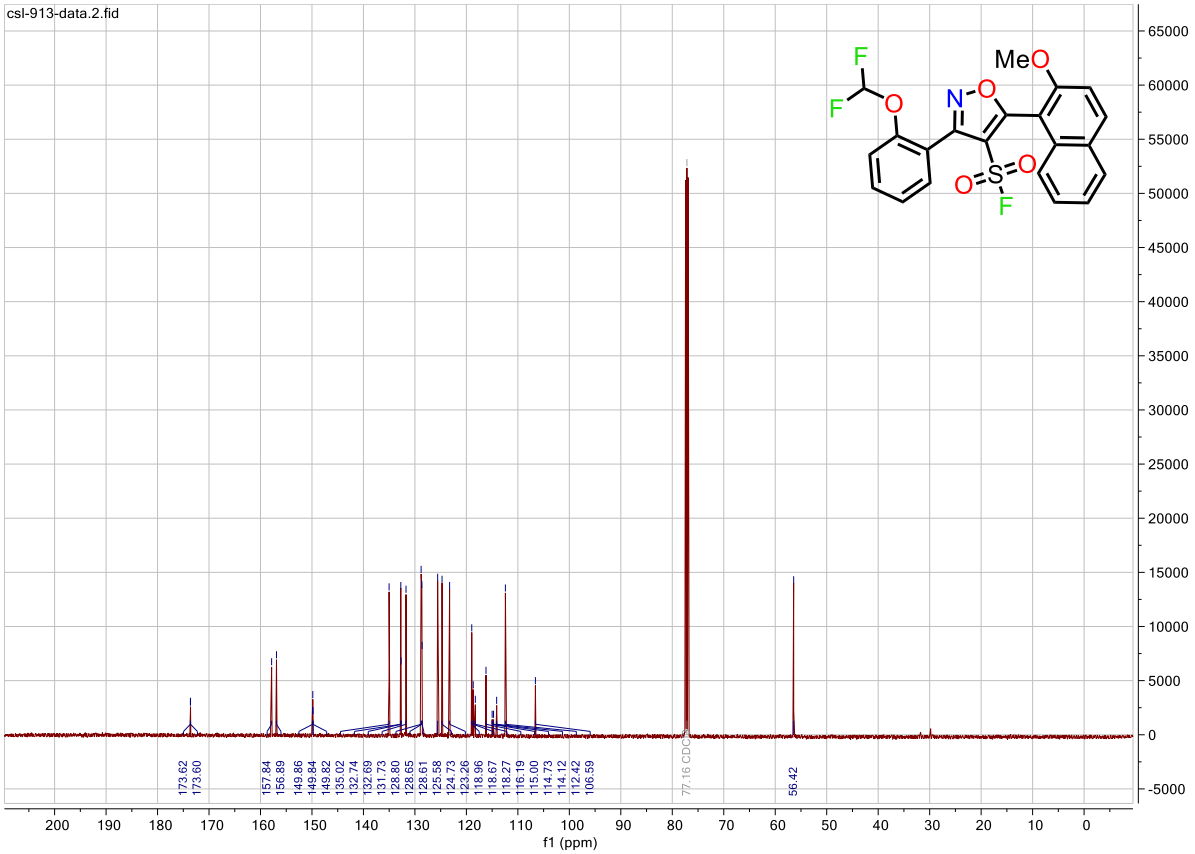

csl-858-crude.2.fid
OEt
OEt
N
O
N3
O
S
O
F
500
450
400
350
300
250
200
150
100
50
0
-50
72.08
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

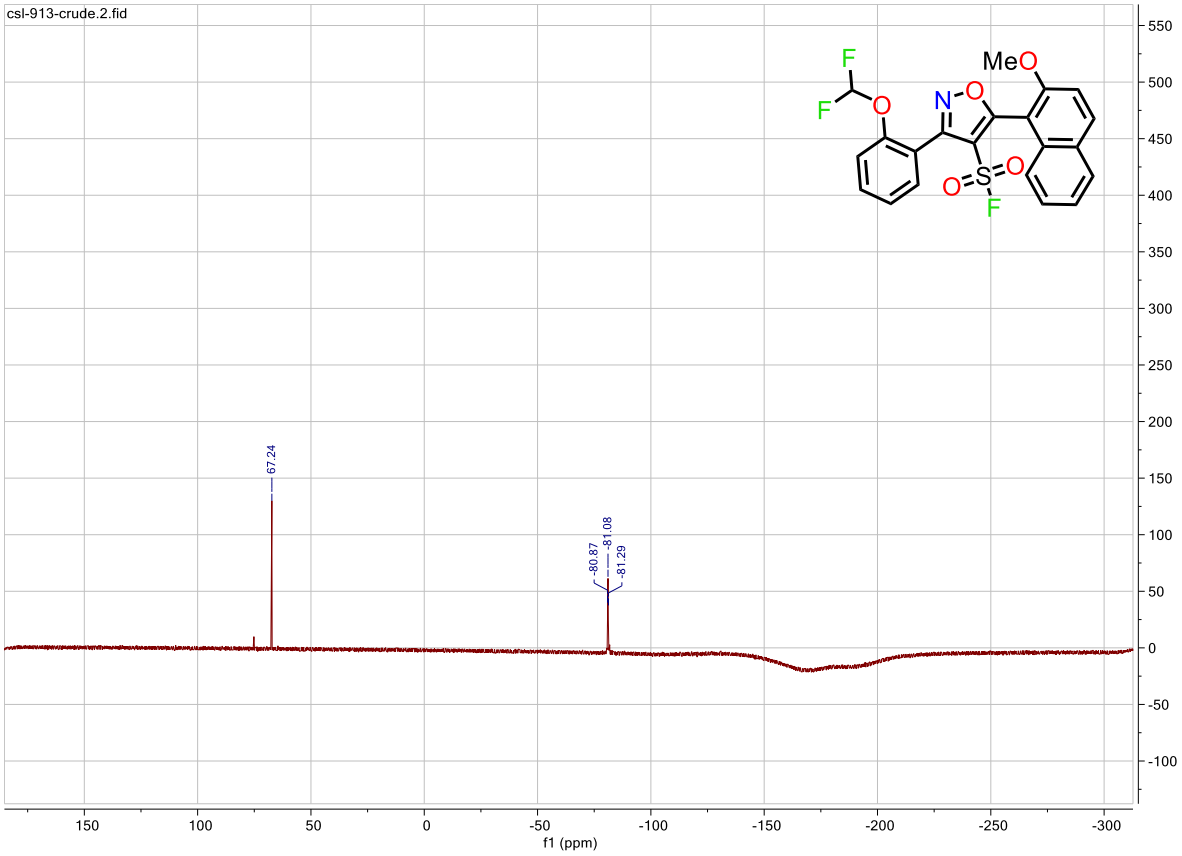

csl-914-data.1.fid
f1 (ppm)

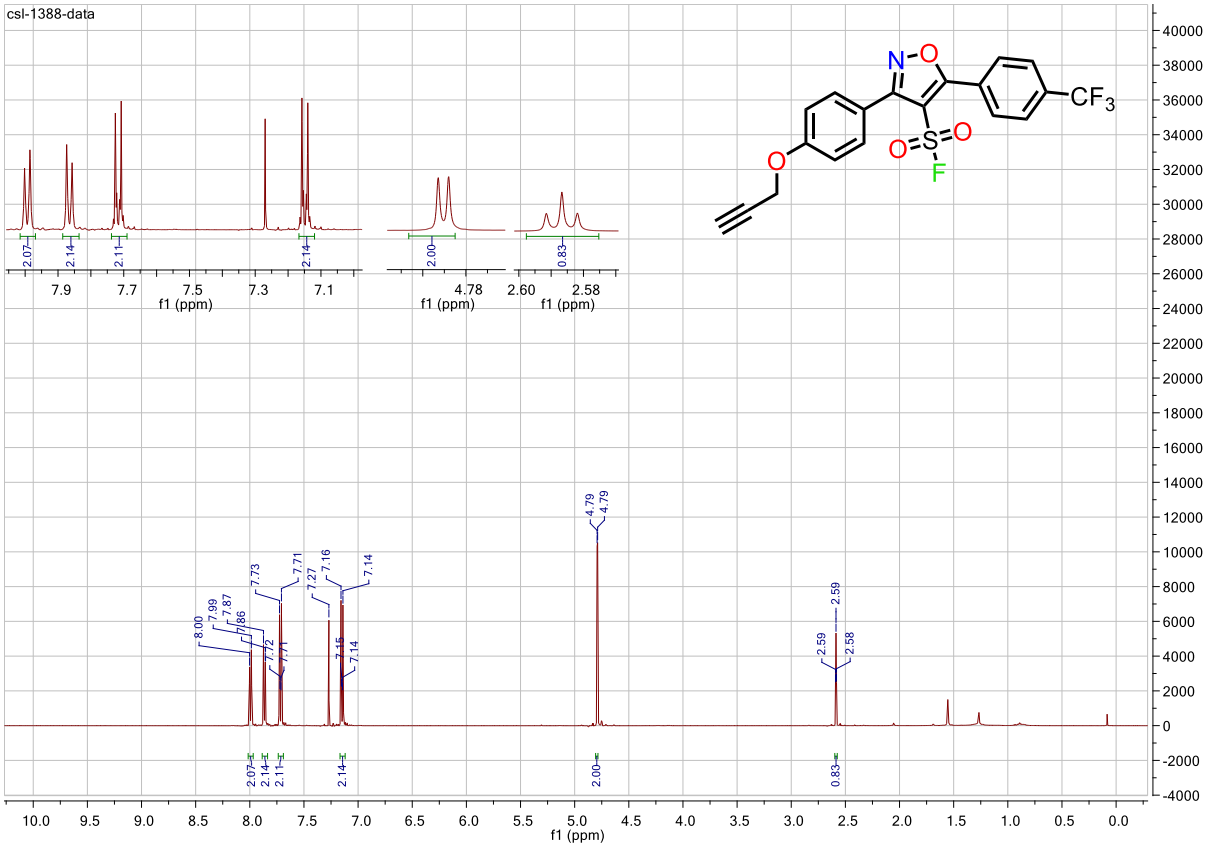

csl-914-data
f1 (ppm)

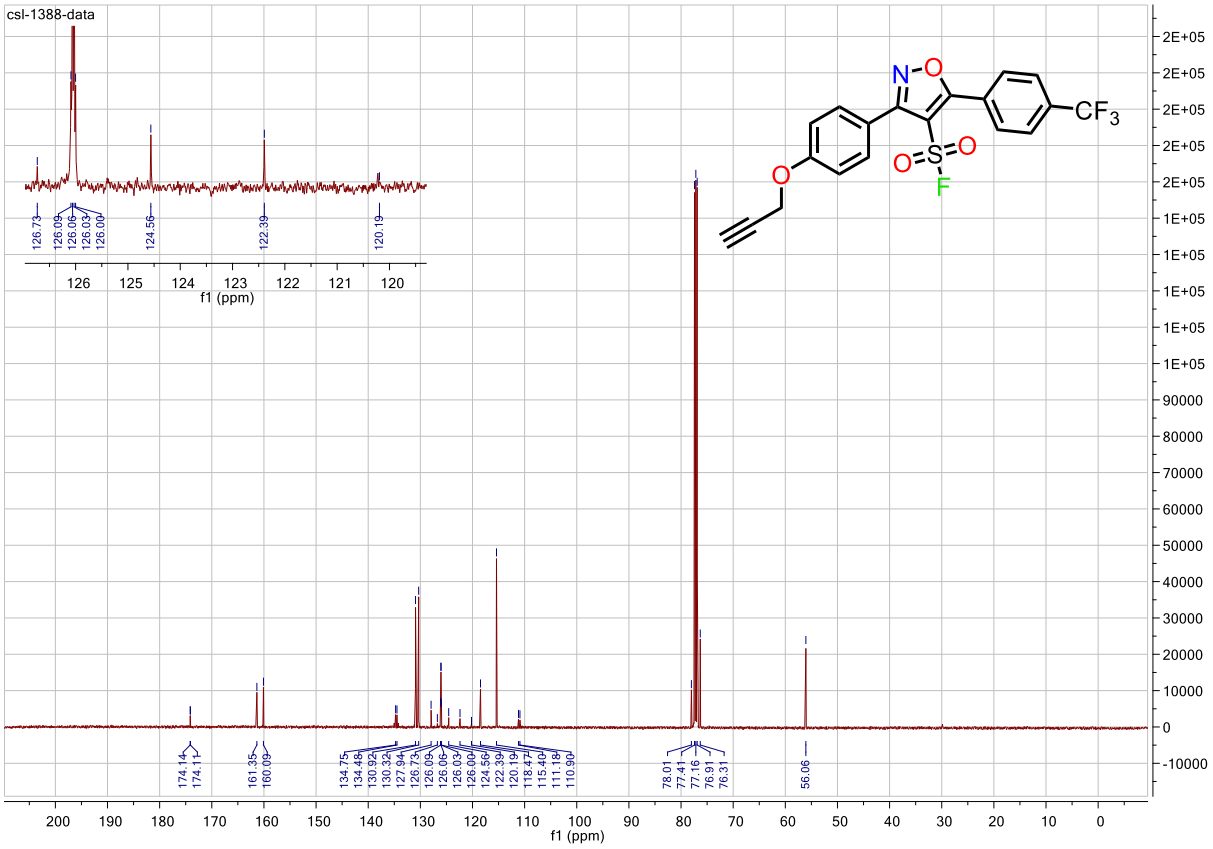

csl-914-crude
-57.63
71.84
N
O
O
S
O
F
CF3O
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
-400
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

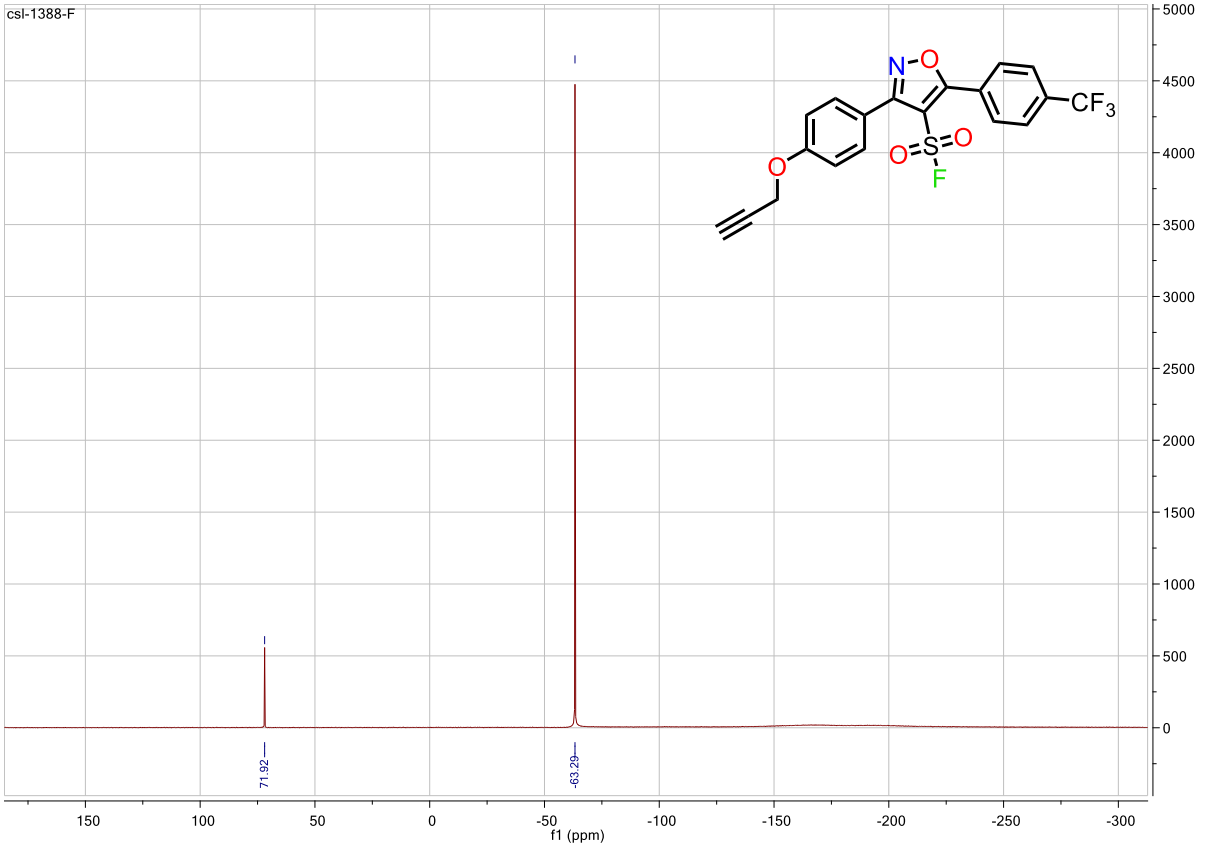

csl-913-data.1.fid
F
F
O
N
O
MeO
O
S
O
F
f1 (ppm)

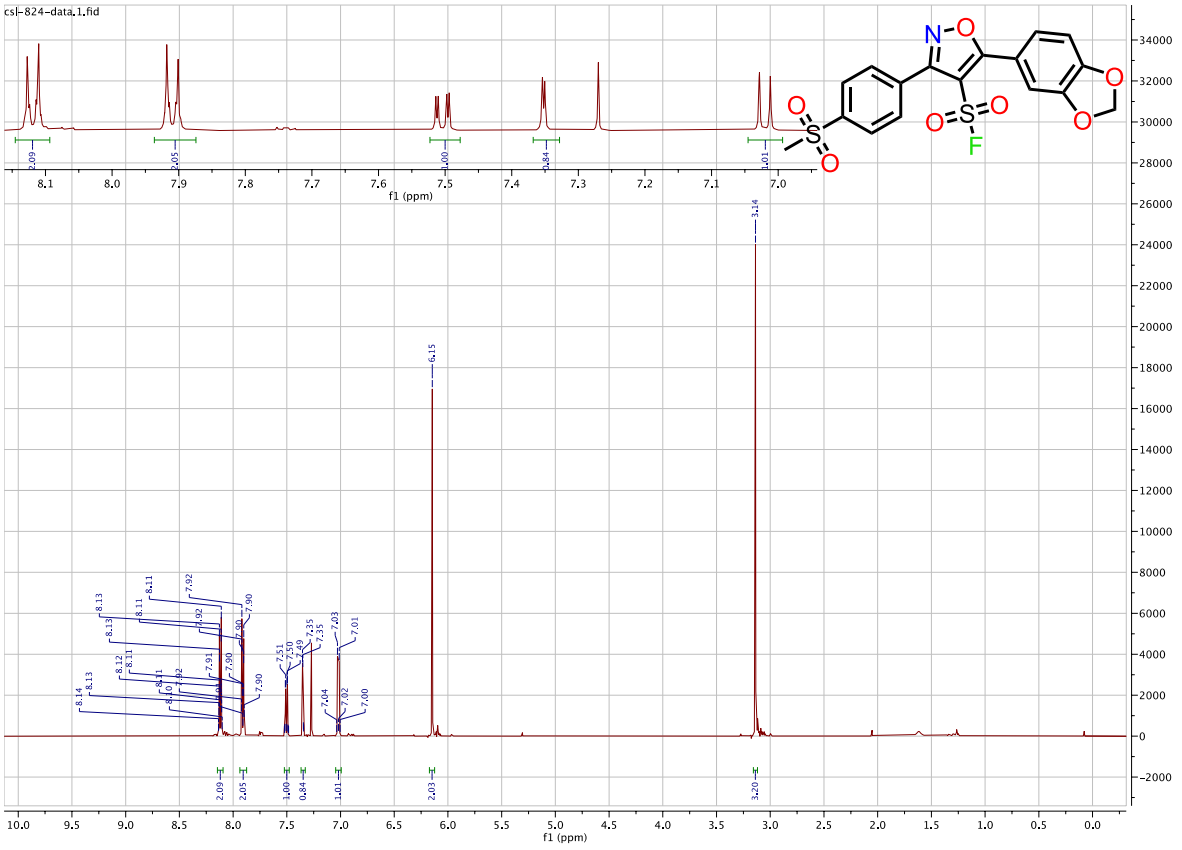

csl-913-data.2.fid
F
F
O
N
O
MeO
O
S
O
F
173.62
173.60
157.84
156.89
149.86
149.84
149.82
135.02
132.74
132.69
131.73
128.80
128.65
128.61
125.58
124.73
123.26
118.96
118.67
118.27
116.19
115.00
114.73
114.12
112.42
106.59
77.16 CDCl3
56.42
f1 (ppm)

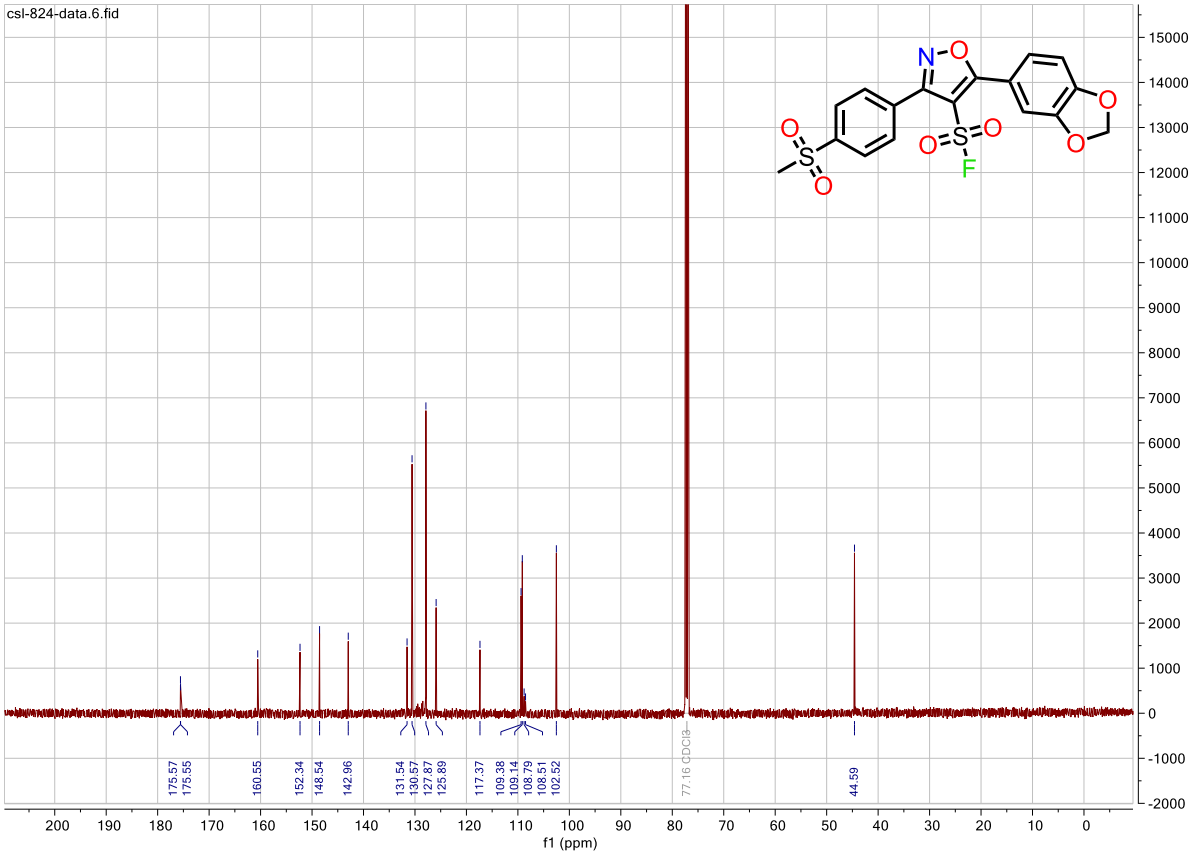

csl-913-crude.2.fid
67.24
-80.87
-81.08
-81.29
f1 (ppm)
F
F
O
N
O
MeO
O
S
O
F

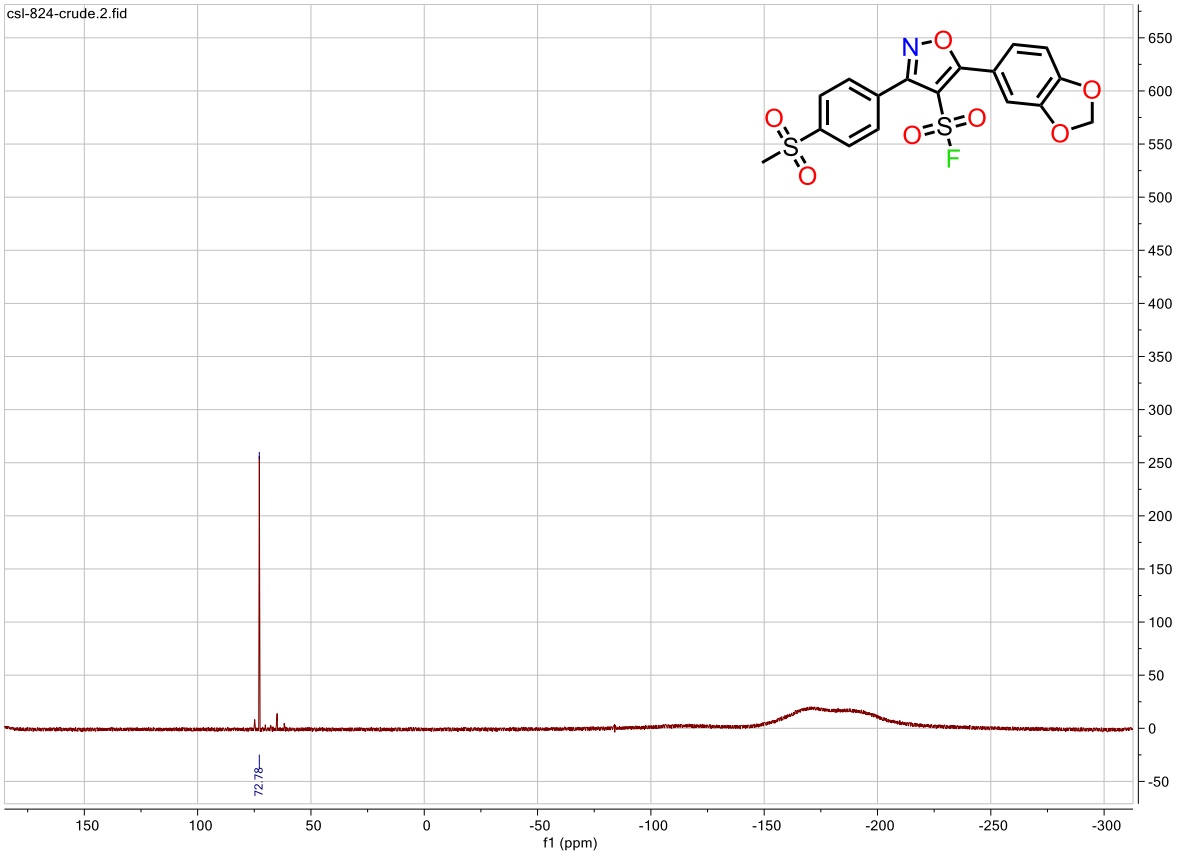

csl-1388-data
f1 (ppm)

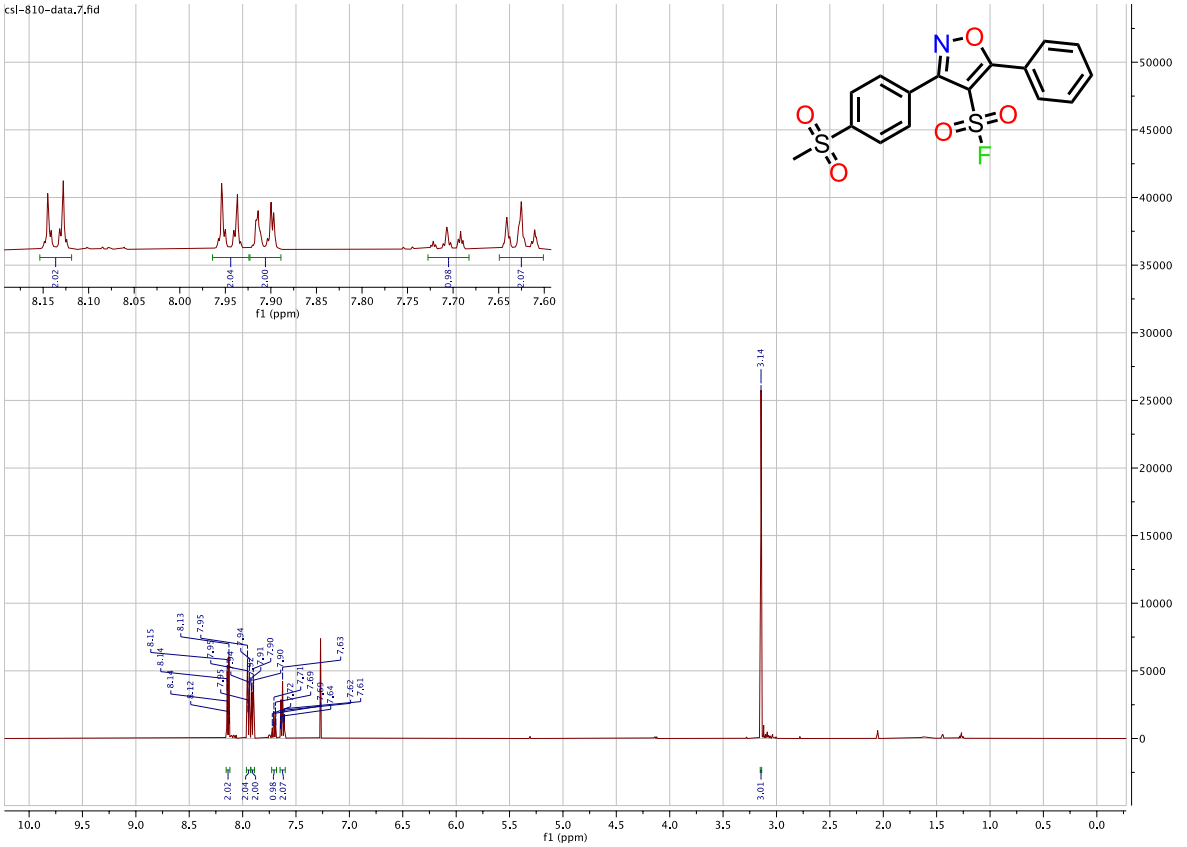

csl-1388-data
f1 (ppm)

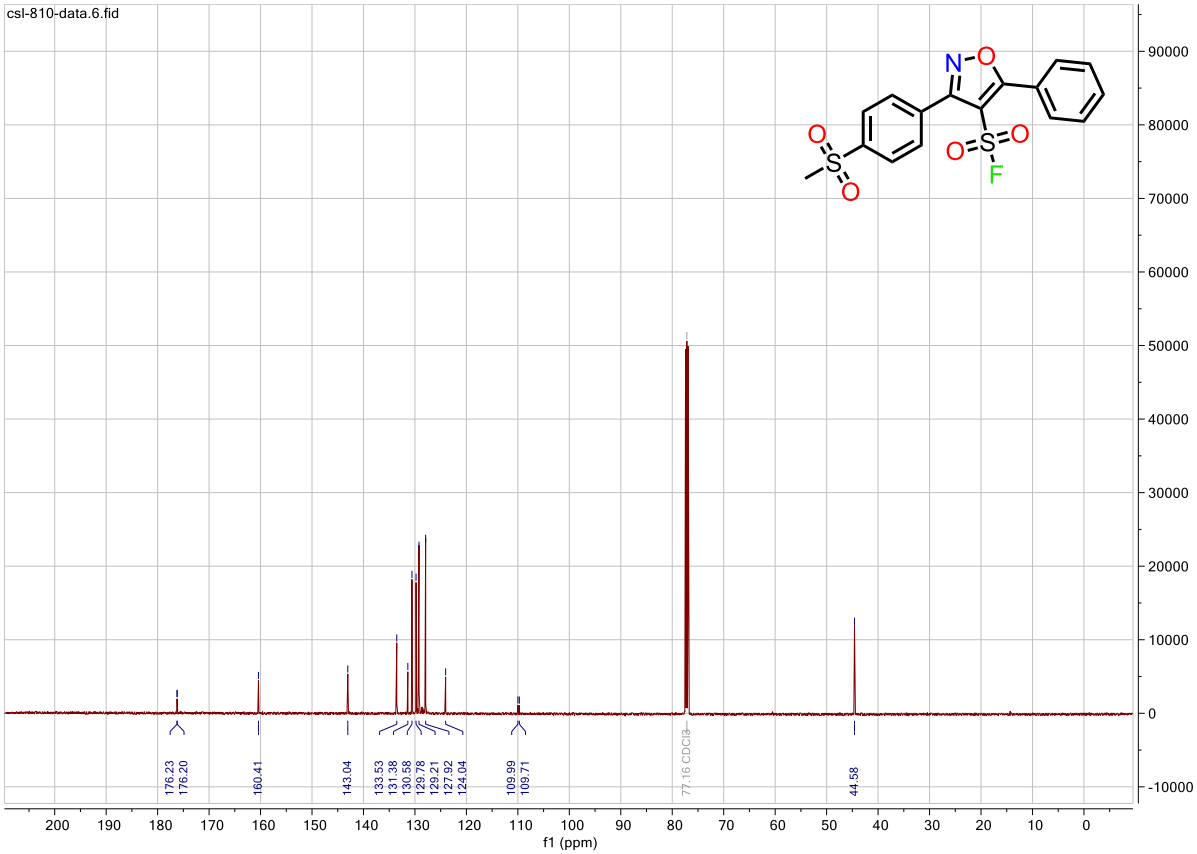

csl-1388-F
N
O
CF3
O
S
O
O
F
71.92
-63.29
f1 (ppm)

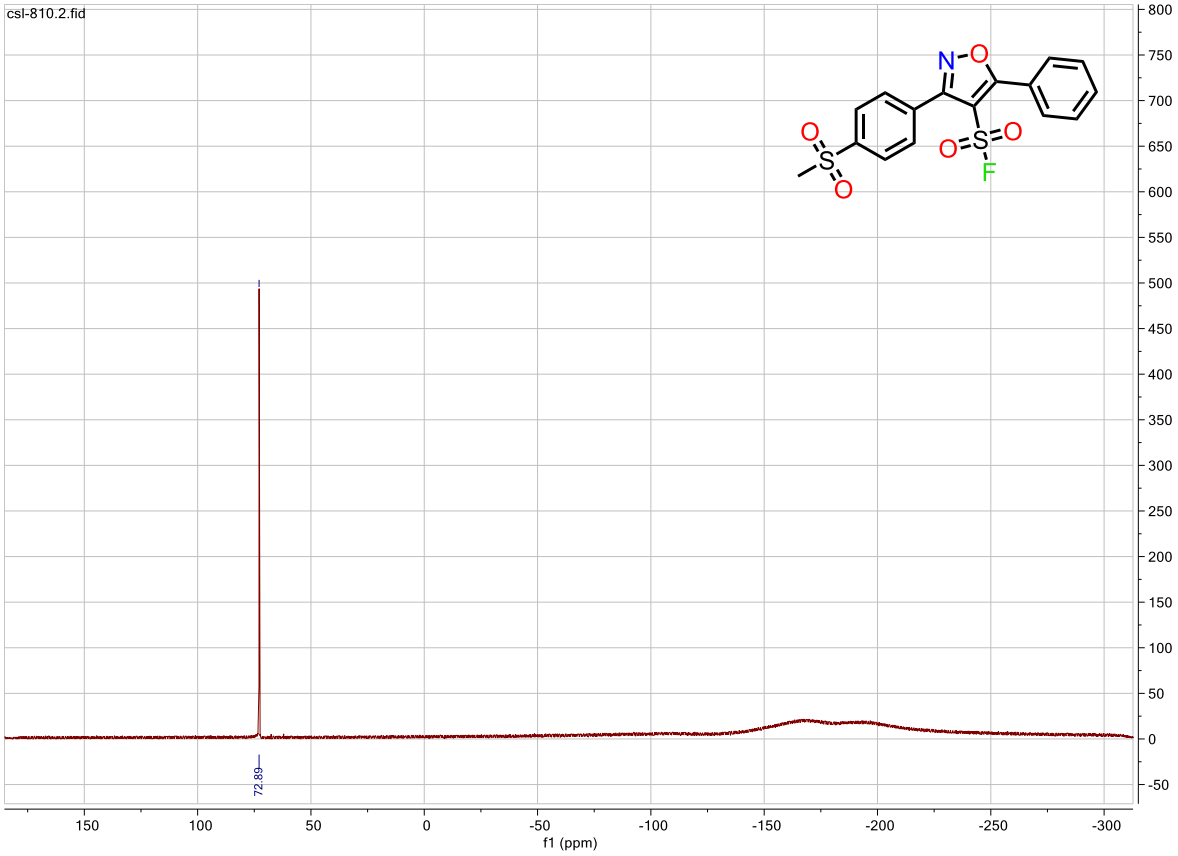

csl-824-data.1.fid
f1 (ppm)

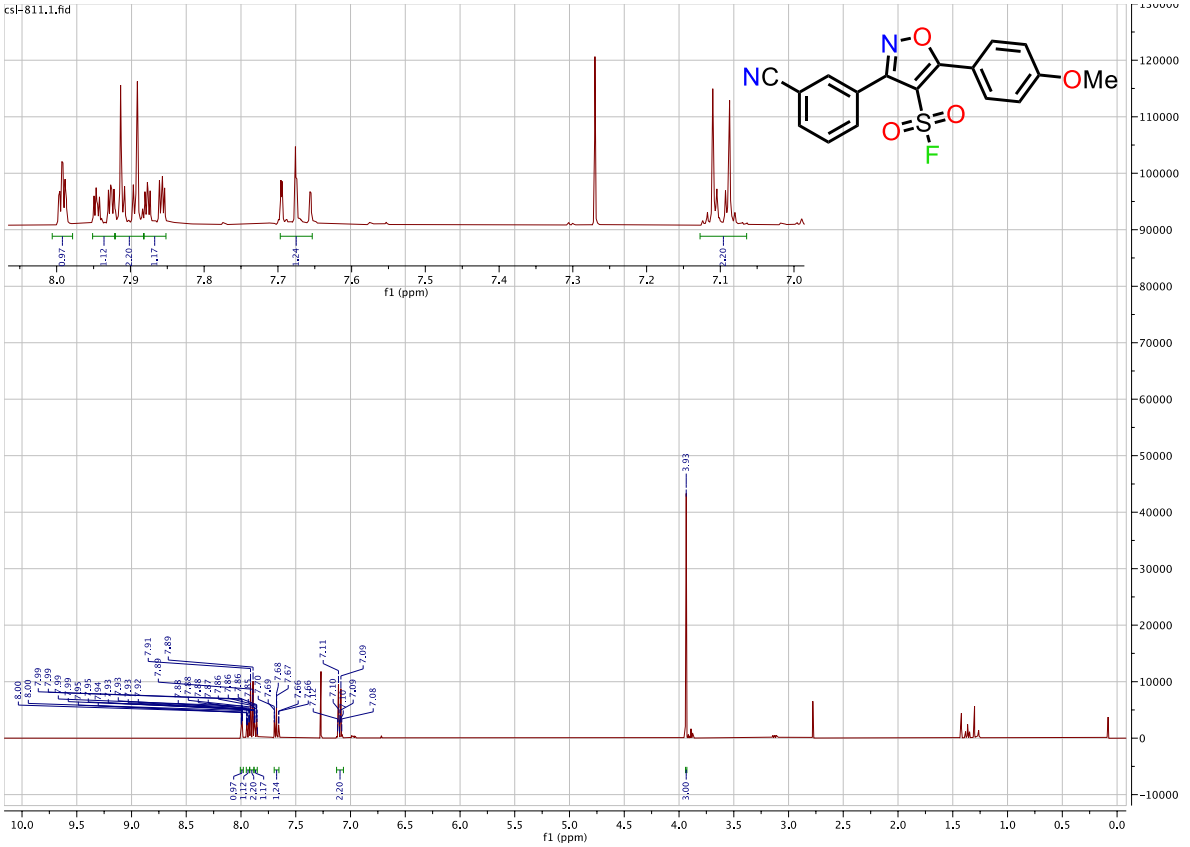

csl-824-data.6.fid
77.16 CDCl3
f1 (ppm)

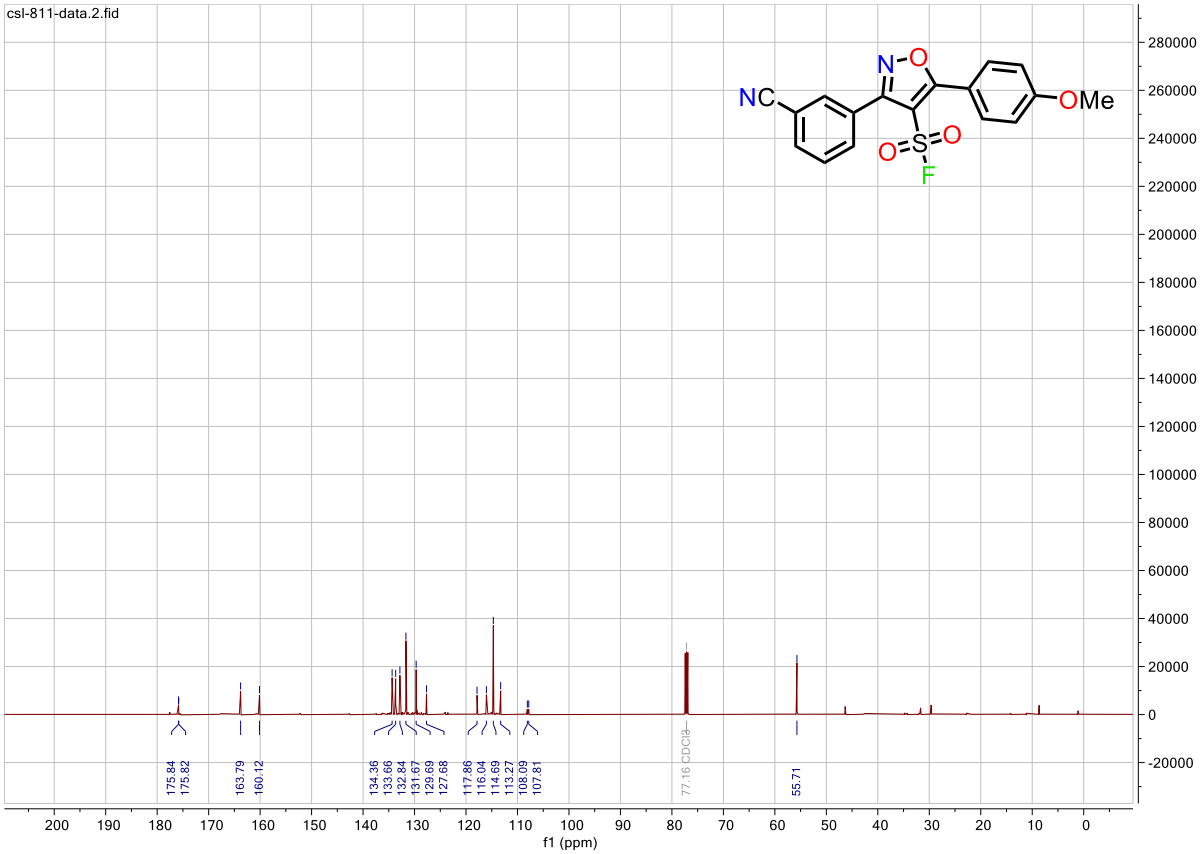

csl-824-crude.2.fid
72.78
f1 (ppm)

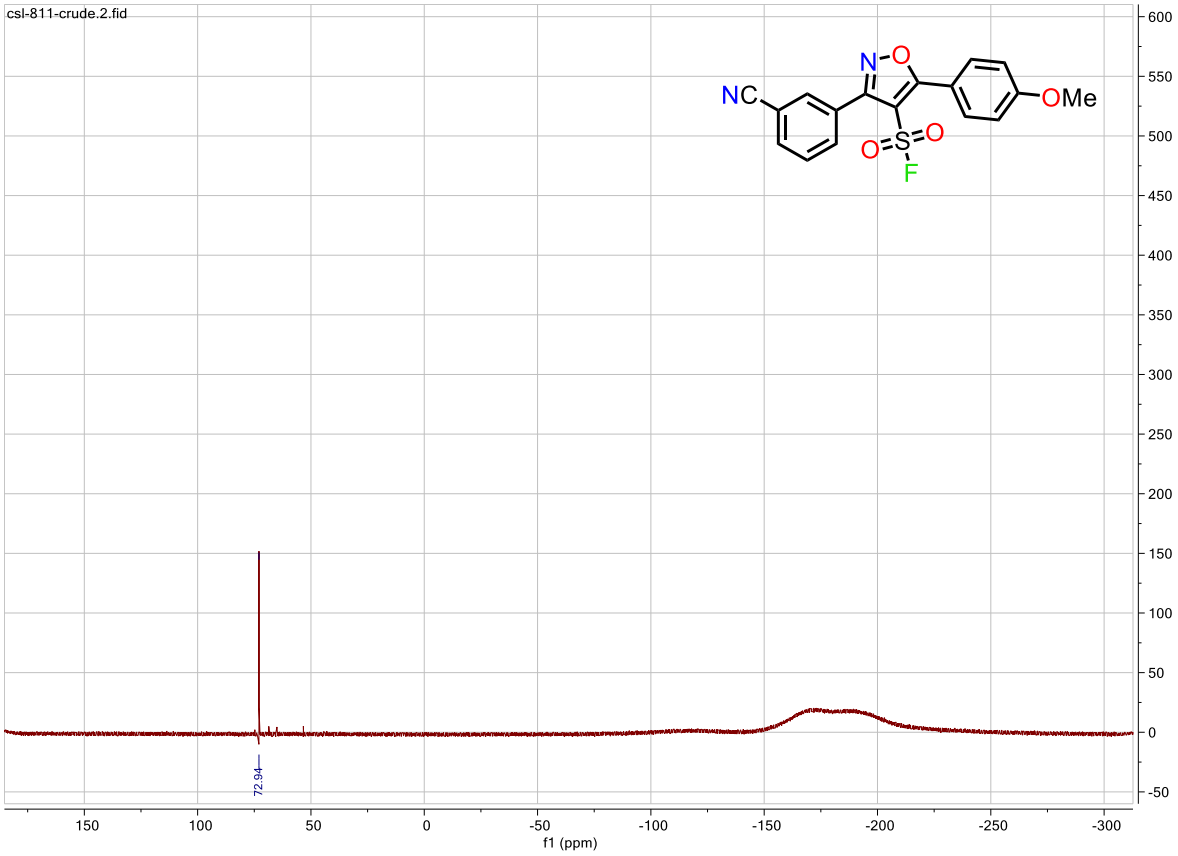

csl-810-data.7.fid
f1 (ppm)

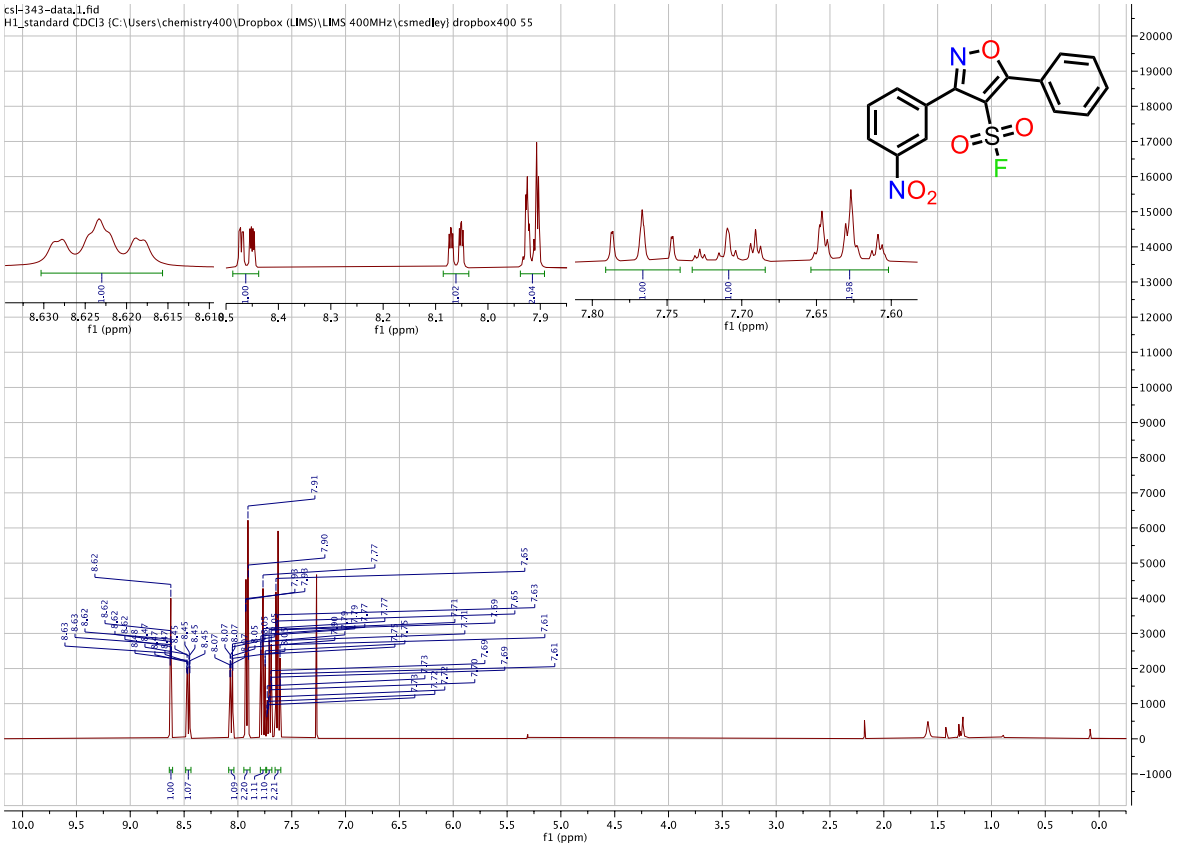

csl-810-data.6.fid
f1 (ppm)

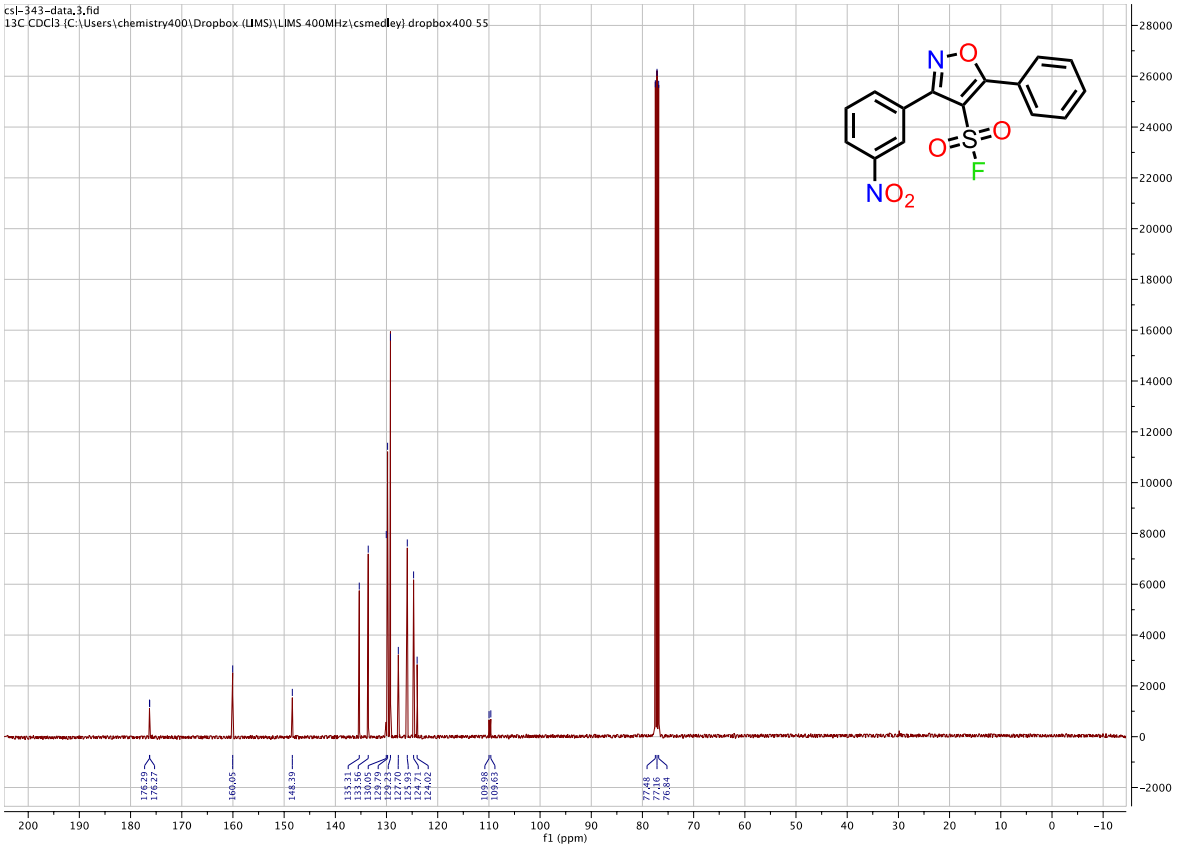

csl-810.2.fid
72.89
f1 (ppm)

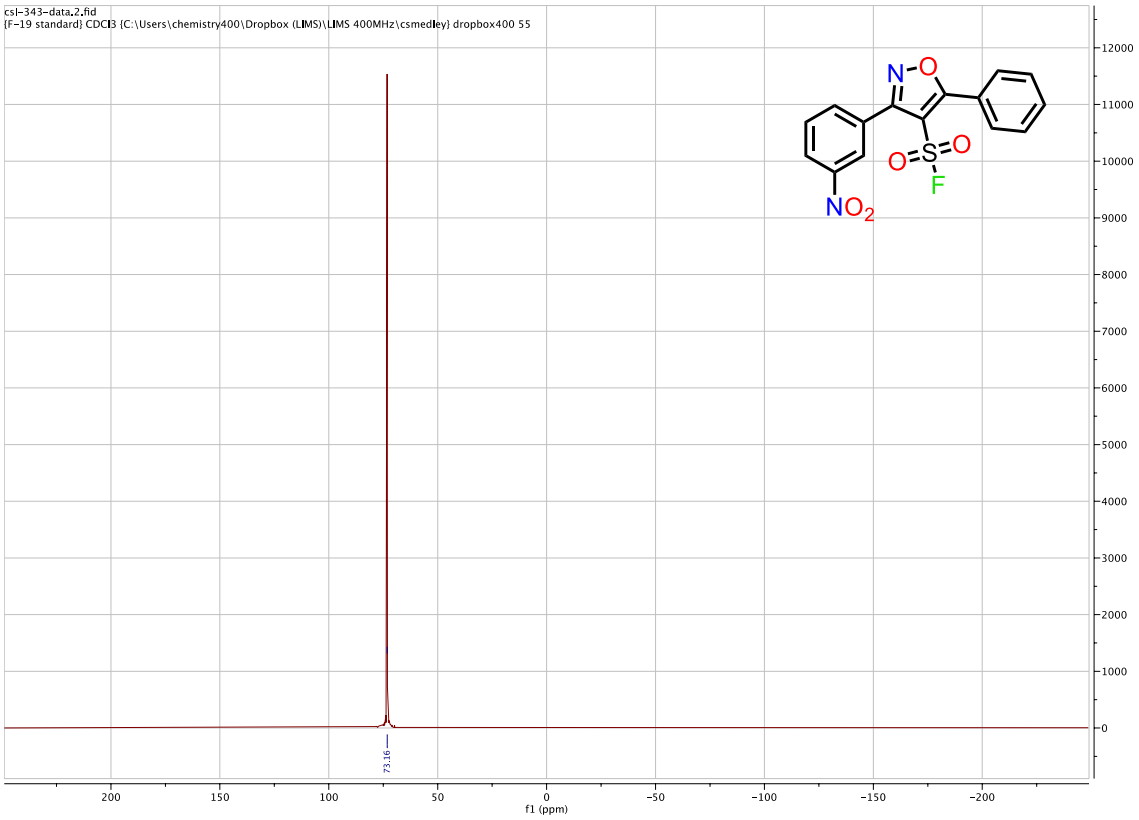

csl-811.1.fid
NC
N
O
OMe
O
S
O
F
f1 (ppm)

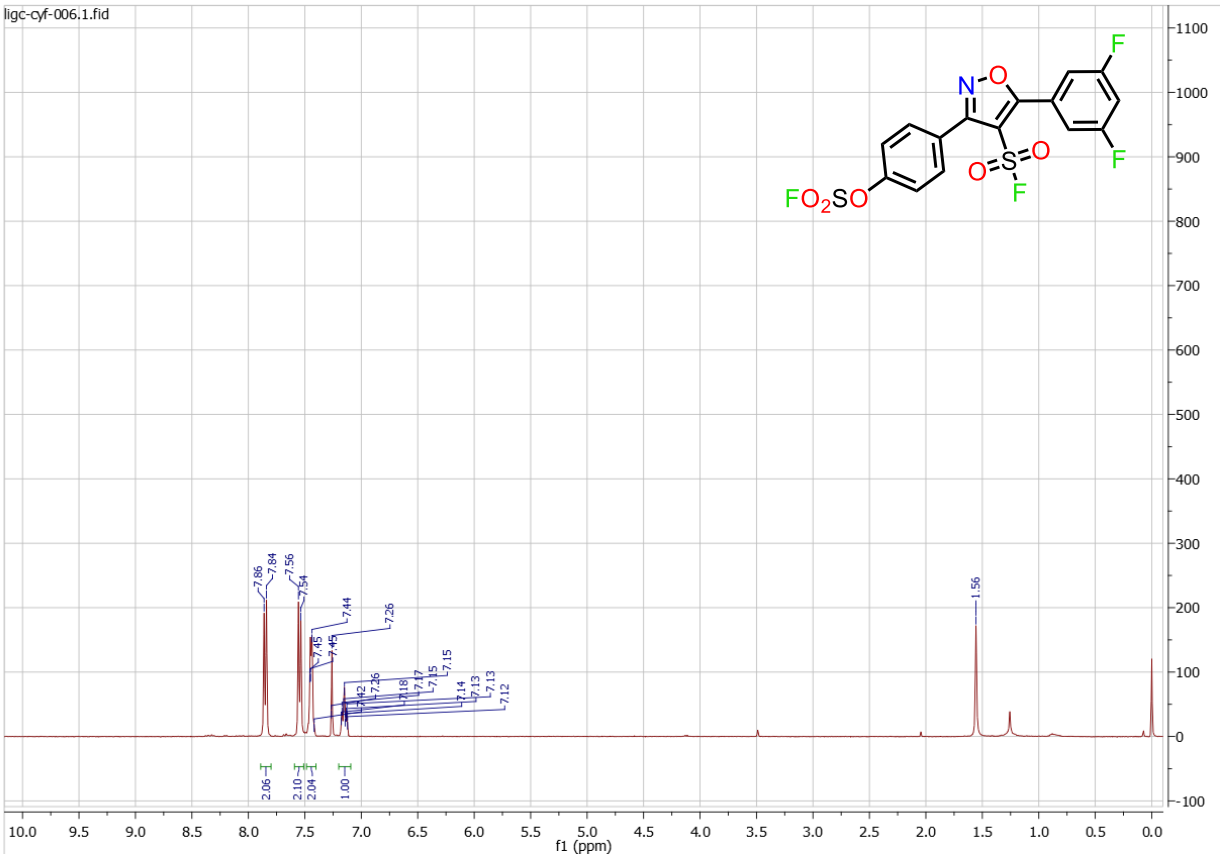

csl-811-data.2.fid
NC
N
O
OMe
O
S
O
F
175.84
175.82
163.79
160.12
134.36
133.66
132.84
131.67
129.69
127.68
117.86
116.04
114.69
113.27
108.09
107.81
77.16 CDCl3
55.71
f1 (ppm)

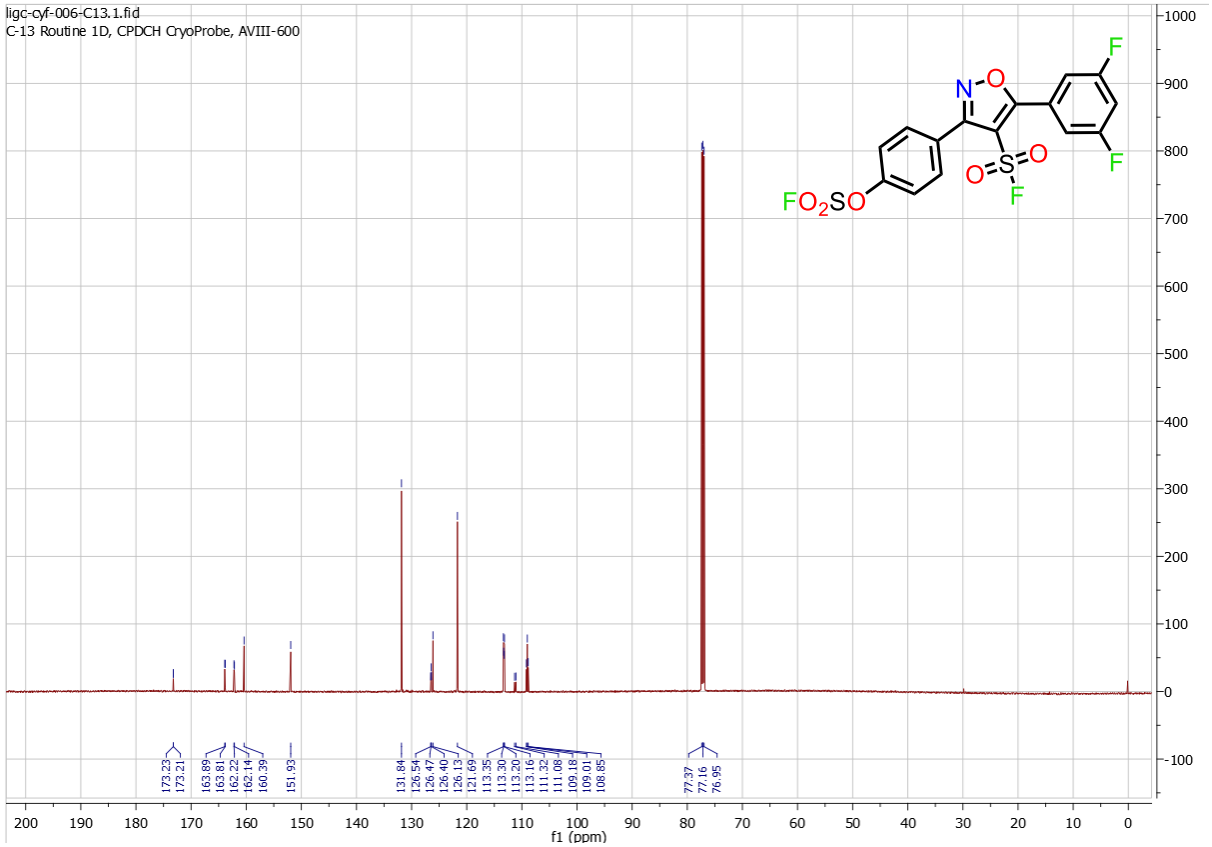

csl-811-crude.2.fid
NC
N
O
OMe
O
S
O
F
72.94
600
550
500
450
400
350
300
250
200
150
100
50
0
-50
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

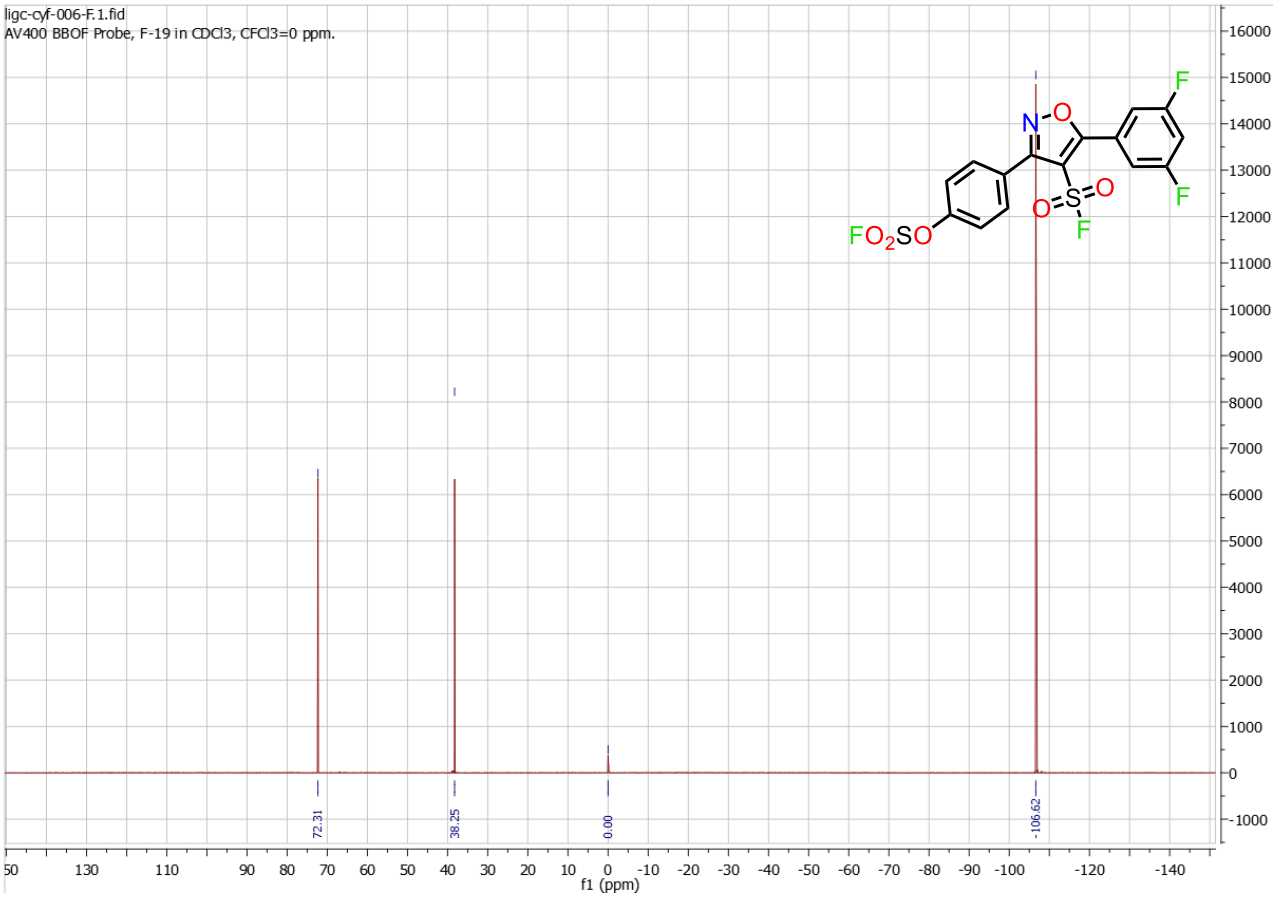

csl-343-data.1.fid
H1_standard CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 55
f1 (ppm)

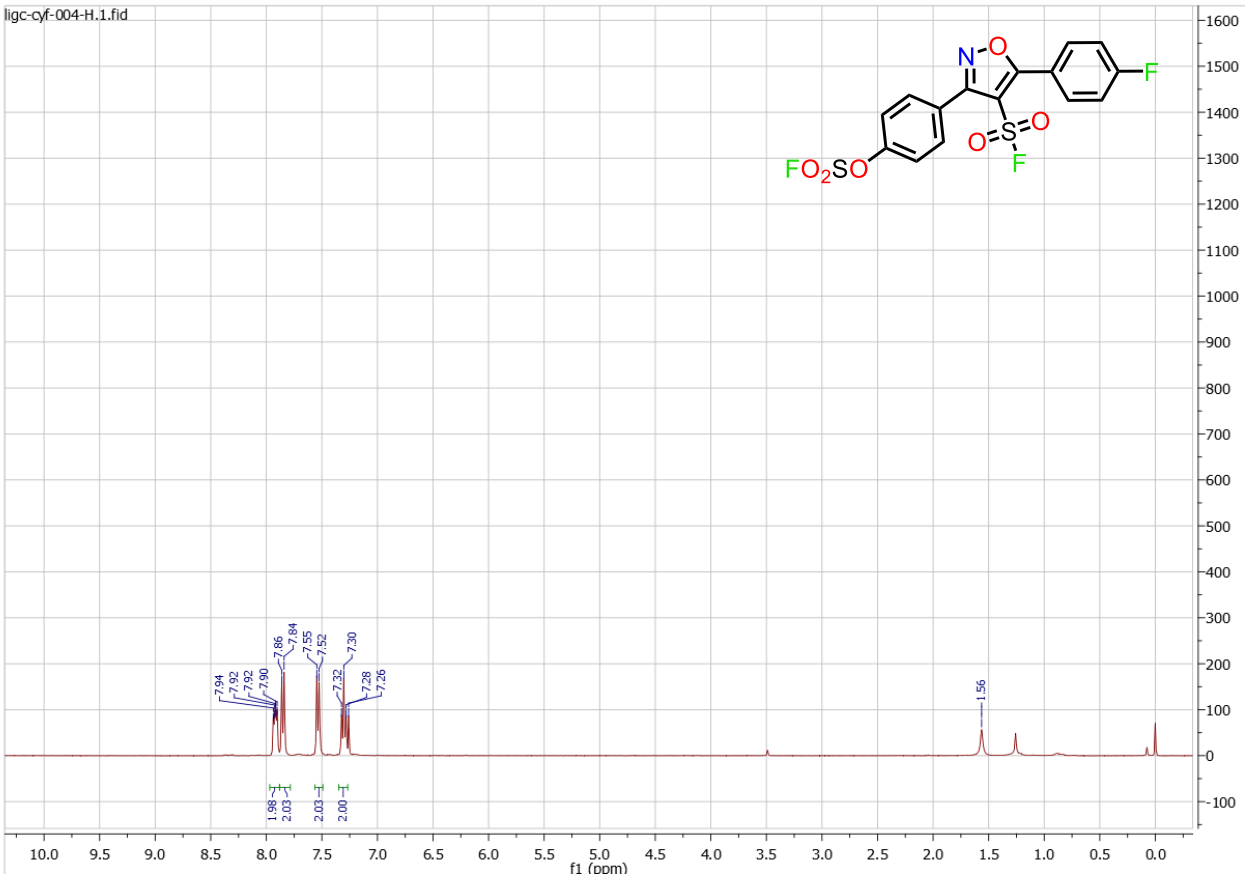

csl-343-data.3.fid
13C CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 55
f1 (ppm)

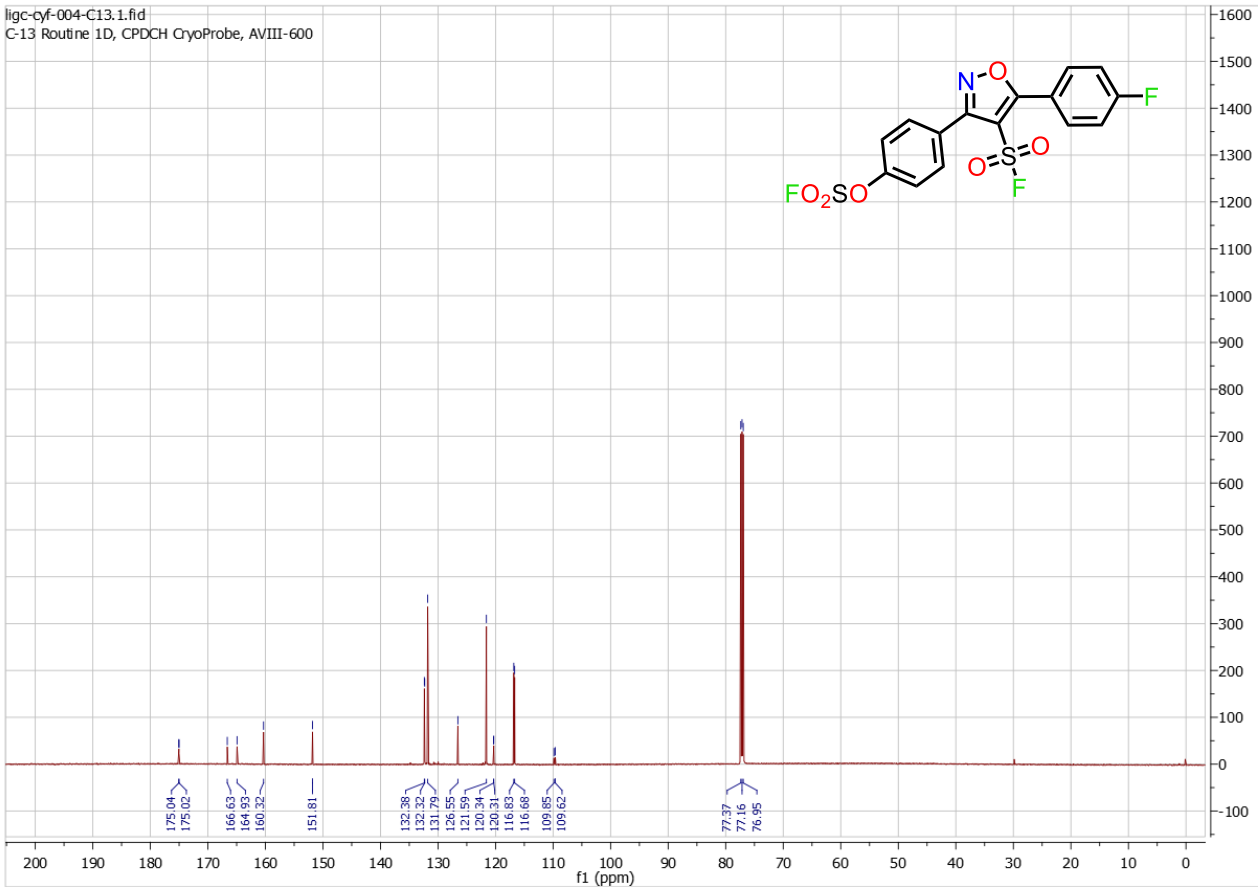

csl-343-data.2.fid
{F-19 standard} CDCl3 {C:\Users\chemistry400\Dropbox (LIMS)\LIMS 400MHz\csmedley} dropbox400 55
N
O
O
S
O
F
NO2
73.16
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
200
150
100
50
0
-50
-100
-150
-200
f1 (ppm)

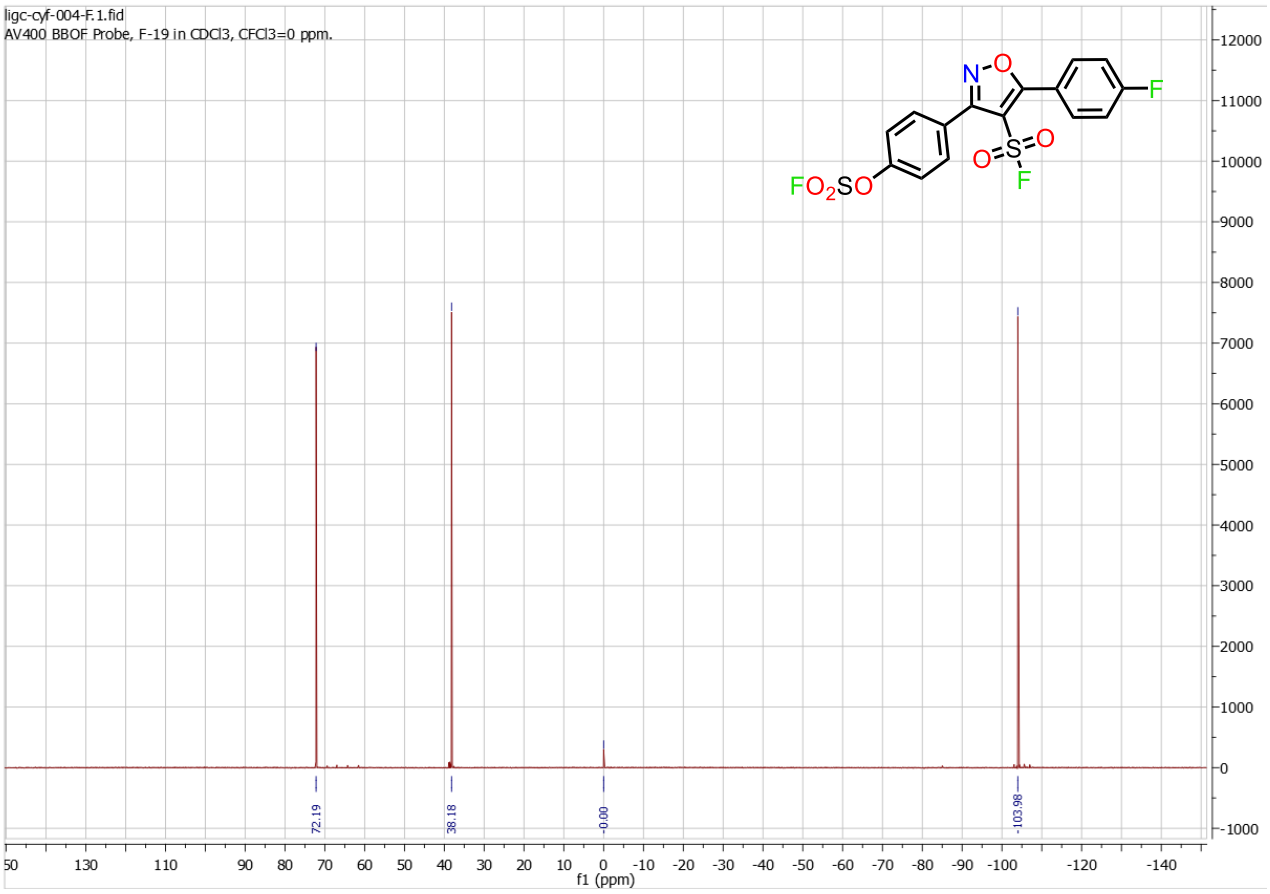

ligc-cyf-006.1.fid
F
N
O
O
S
O
F
F
FO2SO
7.86
7.84
7.56
7.54
7.44
7.26
7.45
7.45
7.42
7.36
7.18
7.17
7.15
7.15
7.14
7.13
7.13
7.12
1.56
2.06
2.10
2.04
1.00
f1 (ppm)

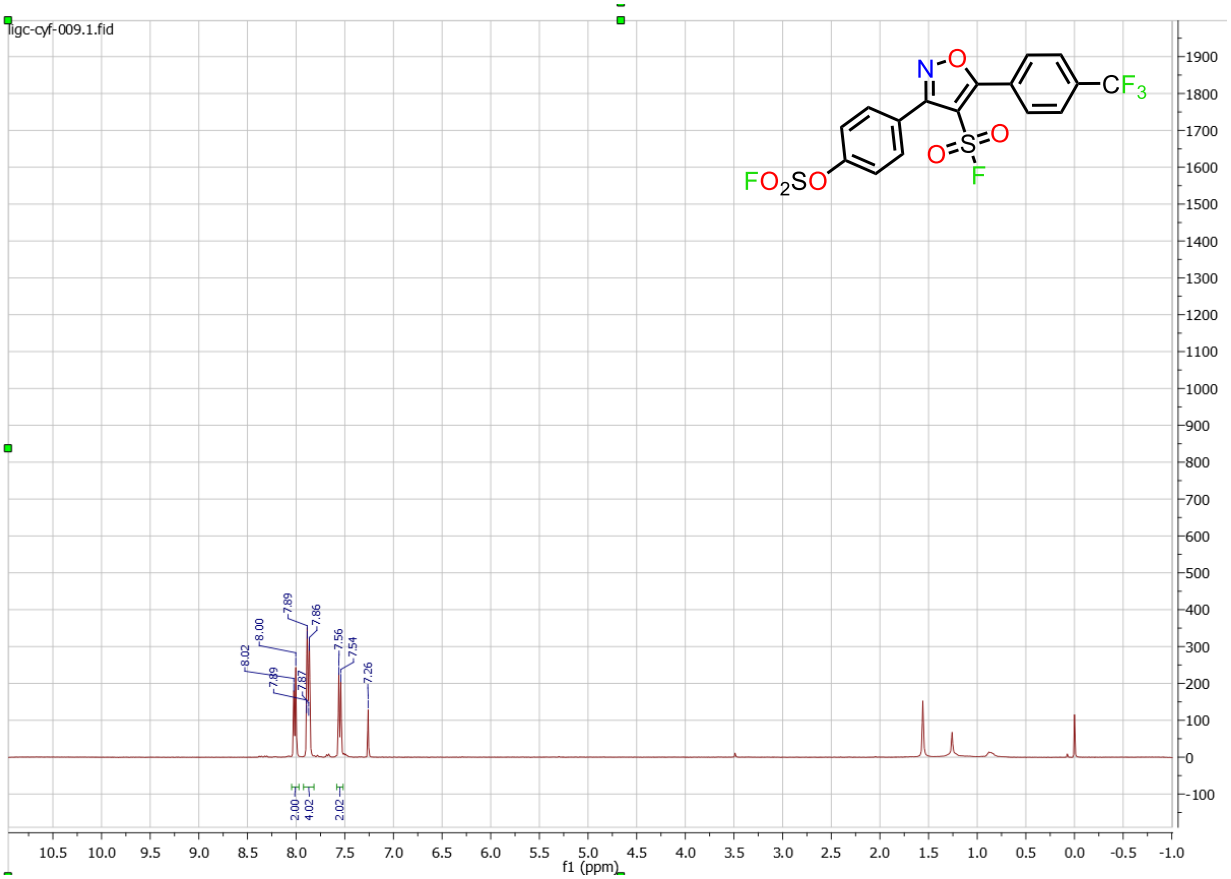

ligc-cyf-006-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
F
N
O
O
S
O
F
F
FO2SO
173.23
173.21
163.89
163.81
162.22
162.14
160.39
151.93
131.84
126.54
126.47
126.40
126.13
121.69
113.35
113.30
113.20
113.16
111.32
111.08
109.18
109.01
108.85
77.37
77.16
76.95
f1 (ppm)

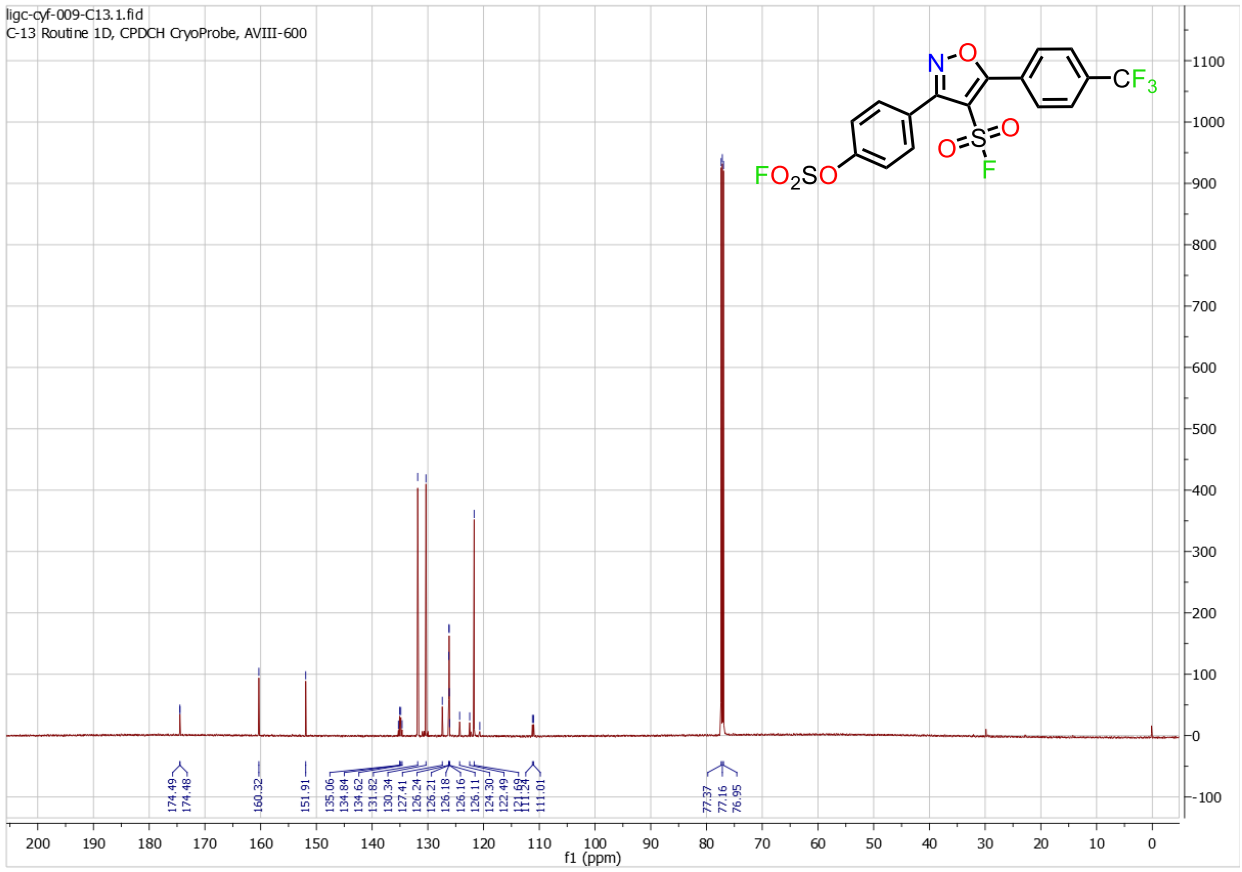

igc-cyf-006-F.1.fid
AV400 BBOF Probe, F-19 in CDCl3, CFCl3=0 ppm.
F
N
O
O
S
O
F
F
FO2SO
72.31
38.25
0.00
-106.62
f1 (ppm)

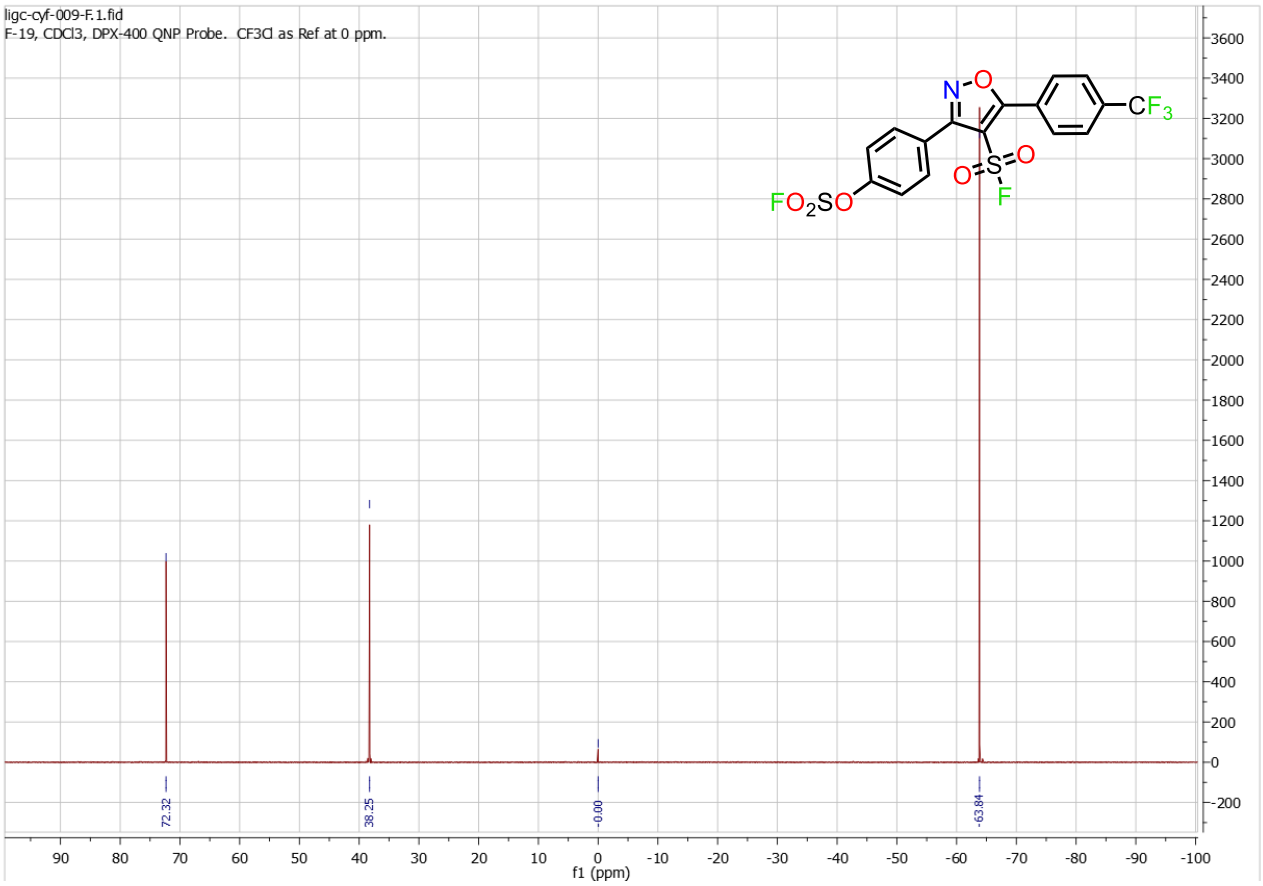

ligc-cyf-004-H.1.fid
7.94
7.92
7.92
7.90
7.86
7.84
7.55
7.52
7.32
7.30
7.28
7.26
1.56
1.98
2.03
2.03
2.00
f1 (ppm)

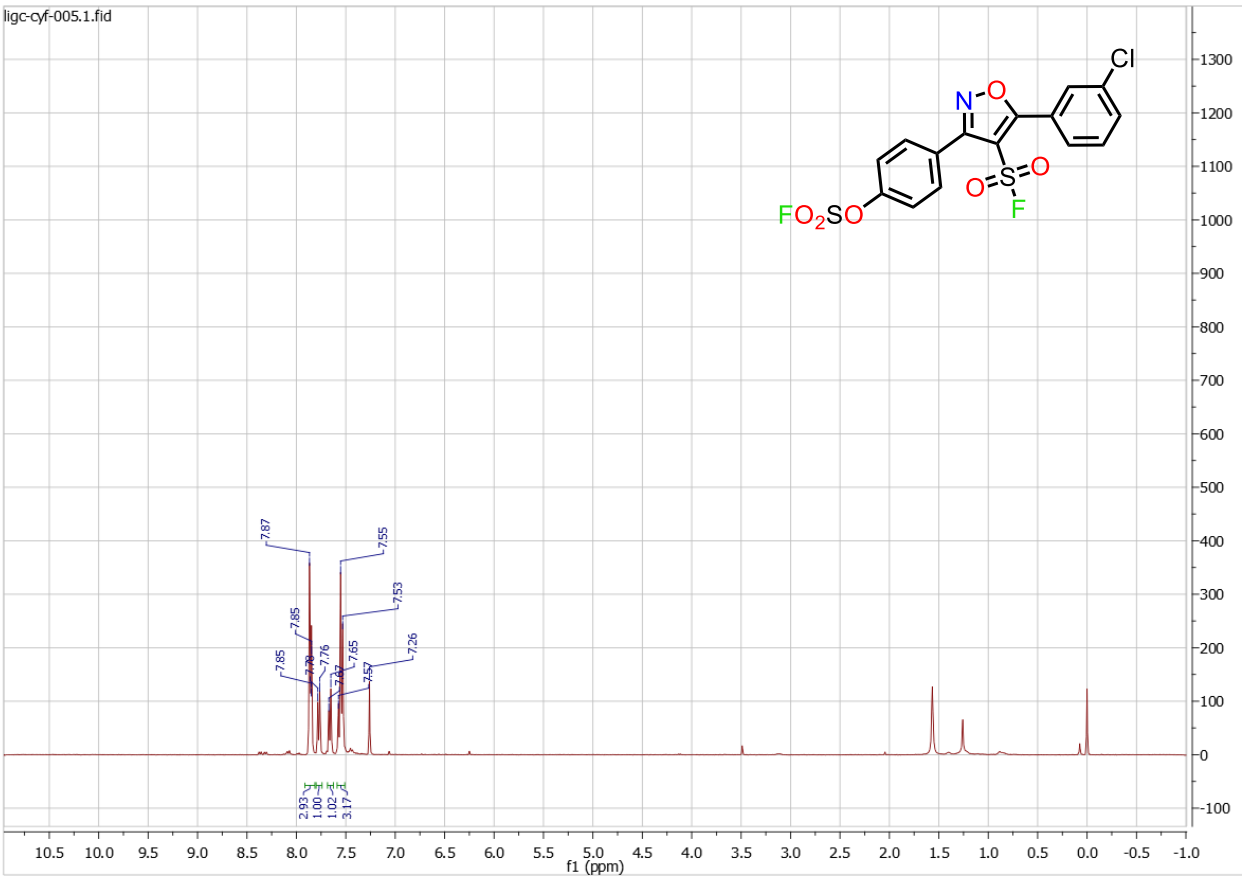

ligc-cyf-004-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
175.04
175.02
166.63
164.93
160.32
151.81
132.38
132.32
131.79
126.55
121.59
120.34
120.31
116.83
116.68
109.85
109.62
77.37
77.16
76.95
f1 (ppm)

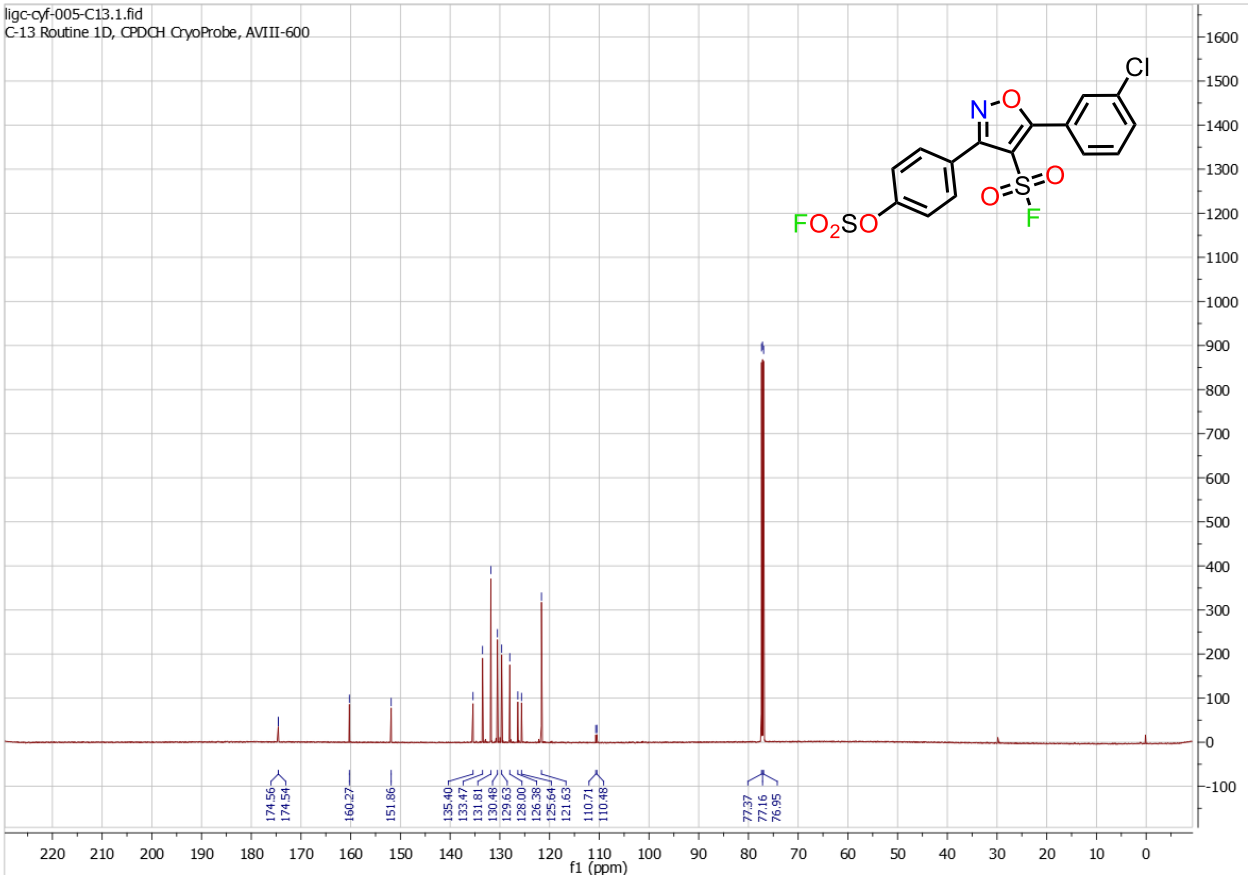

ligc-cyf-004-F.1.fid
AV400 BBOF Probe, F-19 in CDCl3, CFCl3=0 ppm.
N
O
F
O
S
O
F
FO2SO
72.19
38.18
-0.00
-103.98
f1 (ppm)

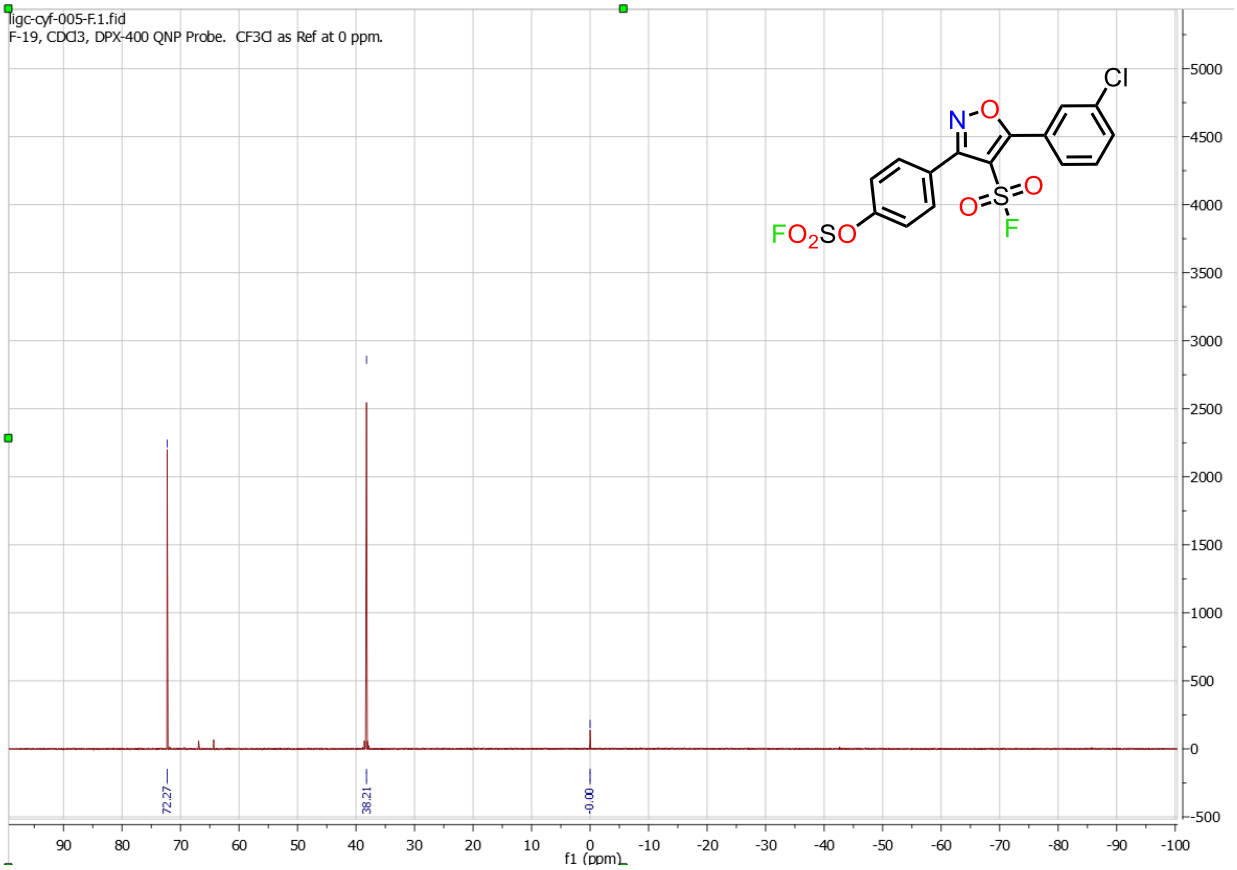

ligc-cyf-009.1.fid
8.02
8.00
7.89
7.89
7.87
7.86
7.56
7.54
7.26
2.00
4.02
2.02
f1 (ppm)

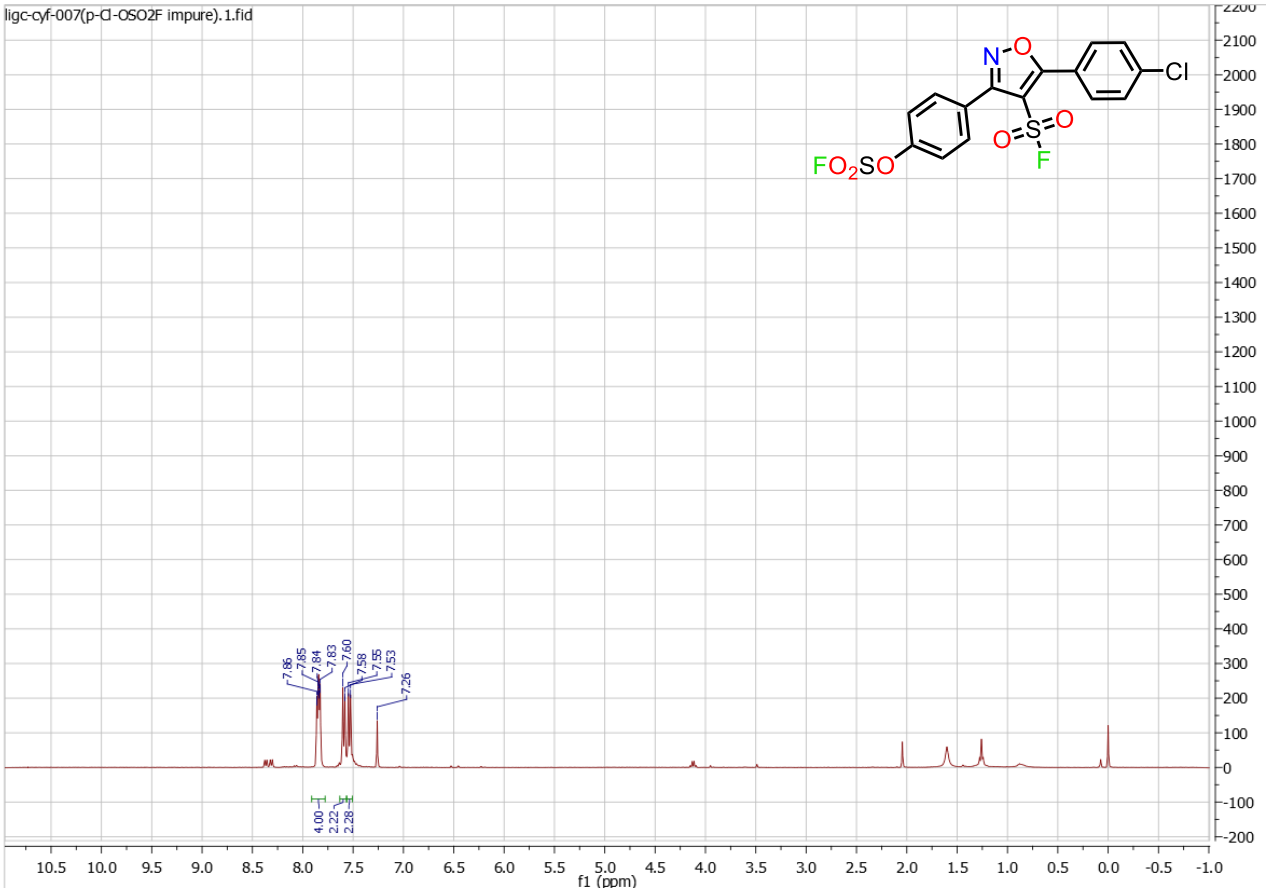

ligc-cyf-009-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
174.49
174.48
160.32
151.91
135.06
134.84
134.62
131.82
130.34
127.41
126.24
126.21
126.18
126.16
126.11
124.30
122.49
111.94
111.91
111.01
77.37
77.16
76.95
f1 (ppm)

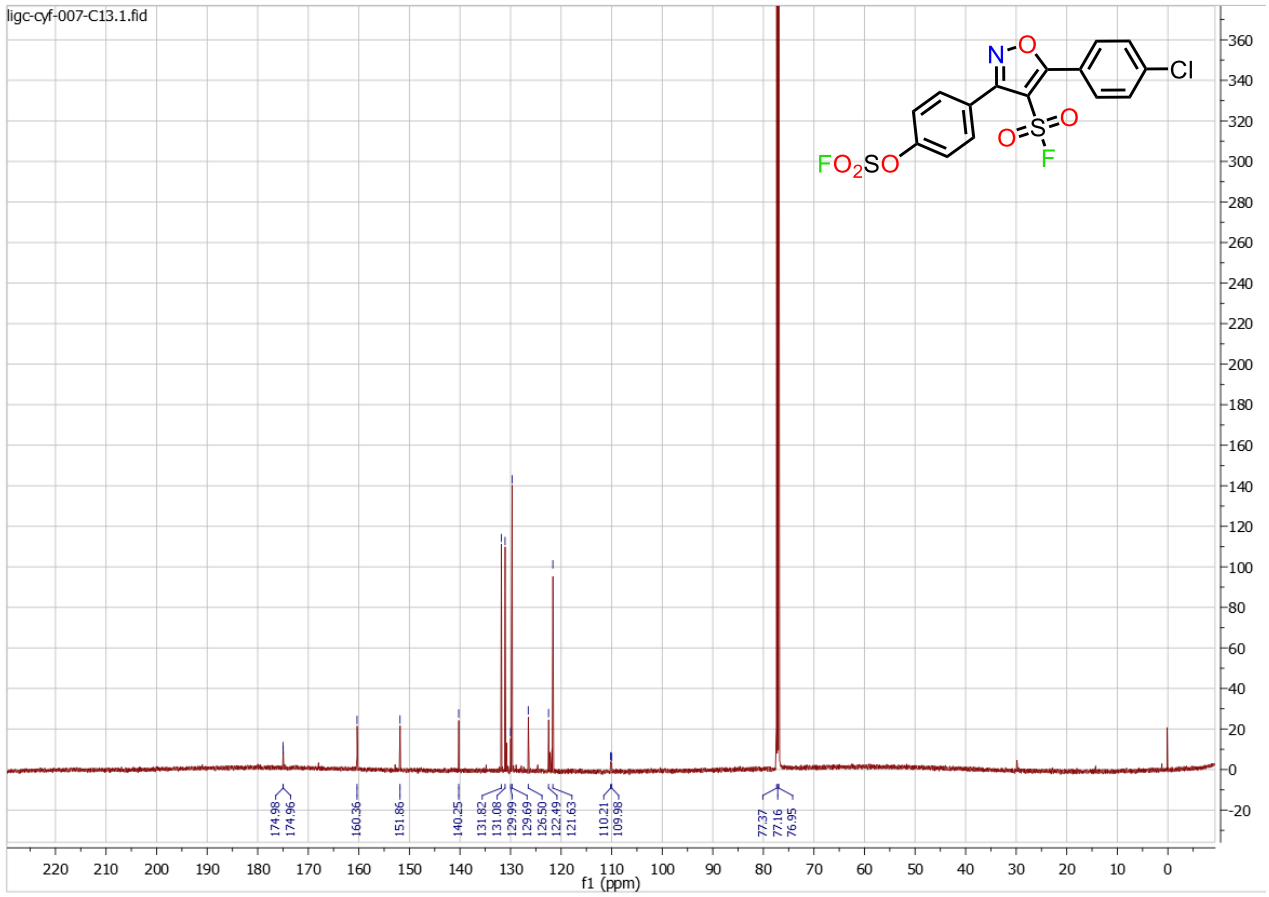

ligc-cyf-009-F.1.fid
F-19, CDCl3, DPX-400 QNP Probe. CF3Cl as Ref at 0 ppm.
N
O
CF3
O
S
O
F
FO2SO
72.32
38.25
-0.00
-63.84
f1 (ppm)

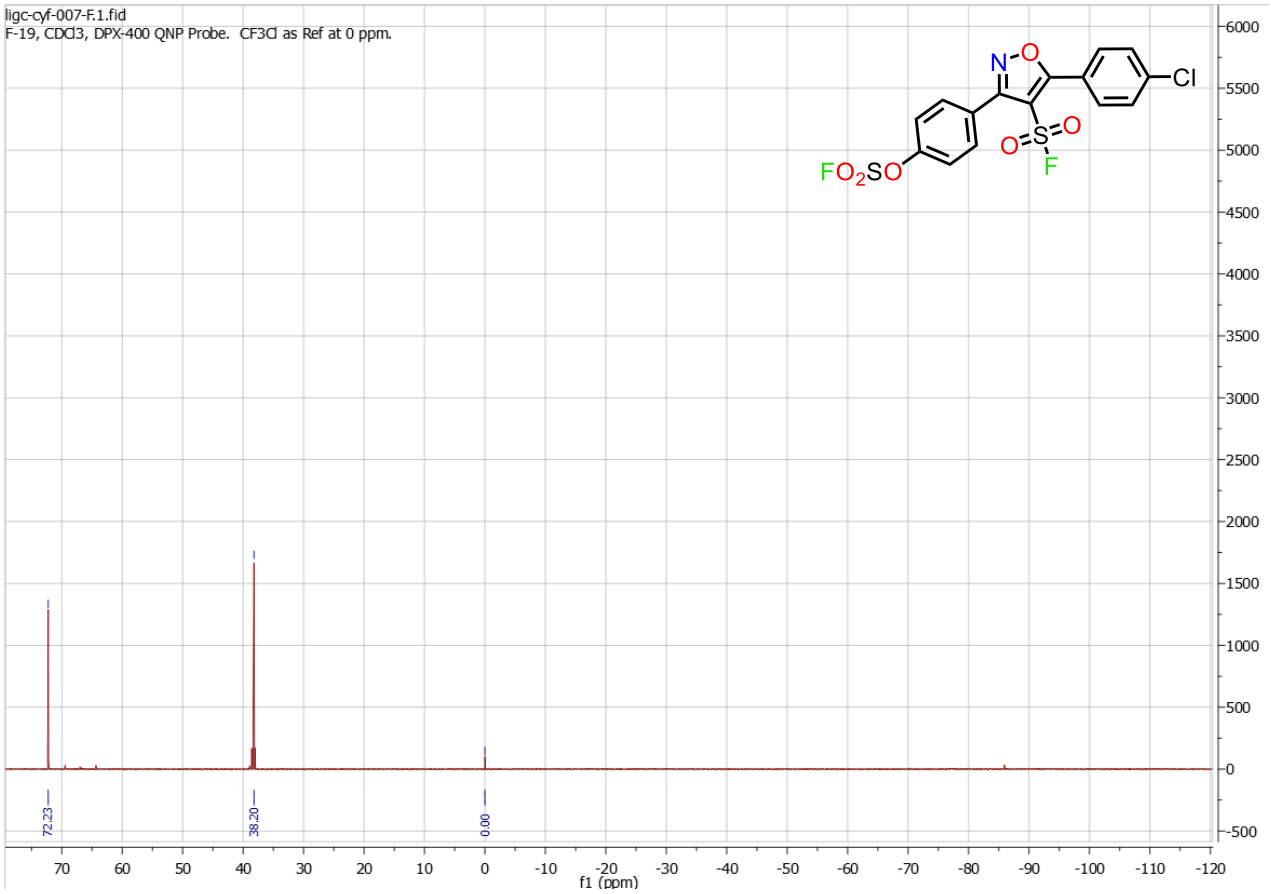

ligc-cyf-005.1.fid
Cl
N
O
O
S
O
F
FO2SO
7.87
7.85
7.85
7.79
7.76
7.74
7.65
7.57
7.55
7.53
7.26
2.93
1.00
1.02
3.17
f1 (ppm)

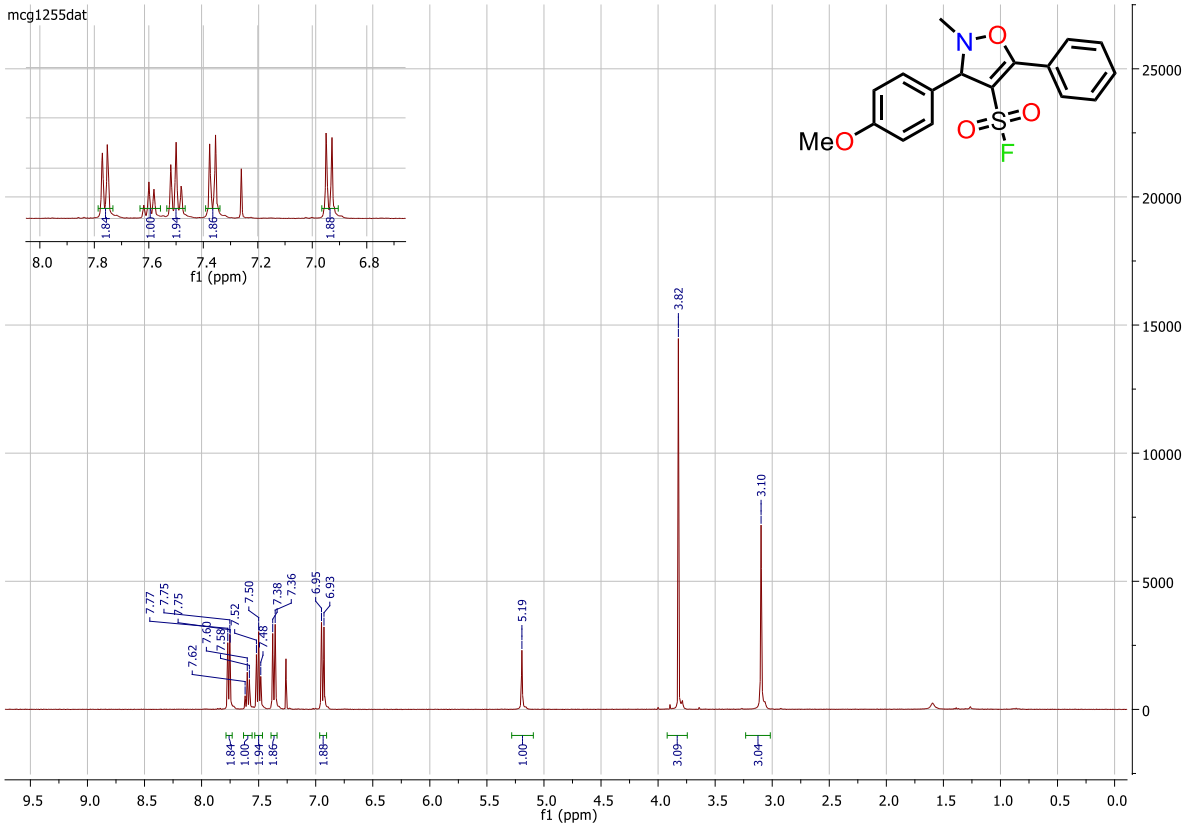

ligc-cyf-005-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
Cl
N
O
O
S
O
F
FO2SO
174.56
174.54
160.27
151.86
135.40
133.47
131.81
130.48
129.63
128.00
126.38
125.64
121.63
110.71
110.48
77.37
77.16
76.95
f1 (ppm)

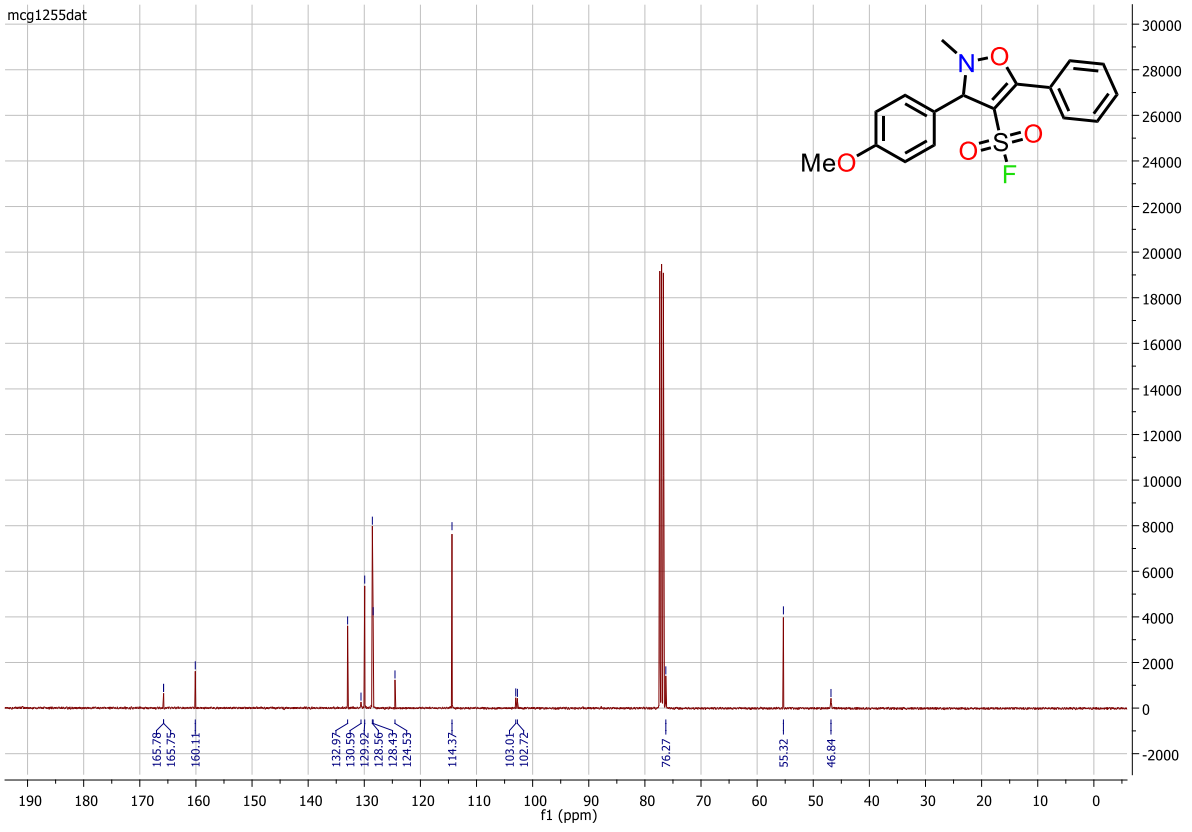

ligc-cyf-005-F.1.fid
F-19, CDCl3, DPX-400 QNP Probe. CF3Cl as Ref at 0 ppm.
Cl
N
O
O
S
O
F
FO2SO
72.27
38.21
-0.00
f1 (ppm)

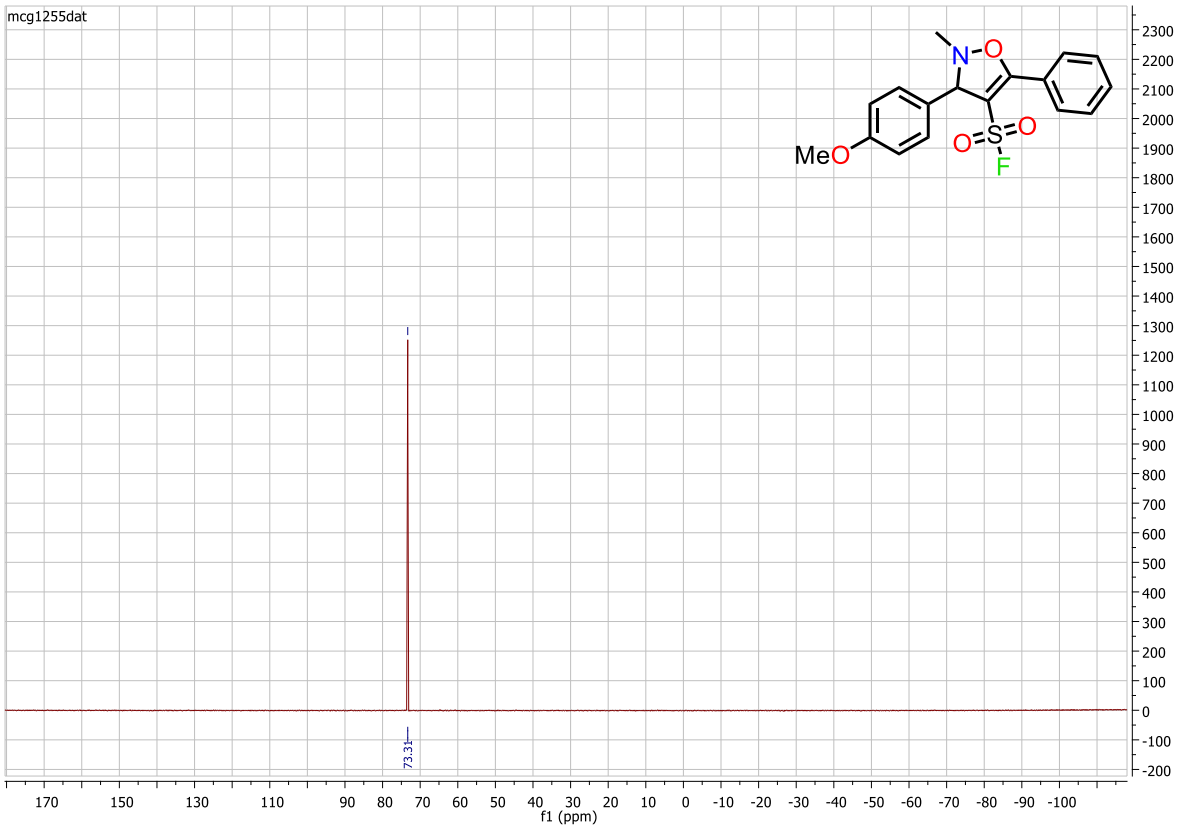

ligc-cyf-007(p-Cl-OSO2F impure).1.fid
7.86
7.85
7.84
7.83
7.60
7.58
7.55
7.53
7.26
4.00
2.22
2.28
f1 (ppm)

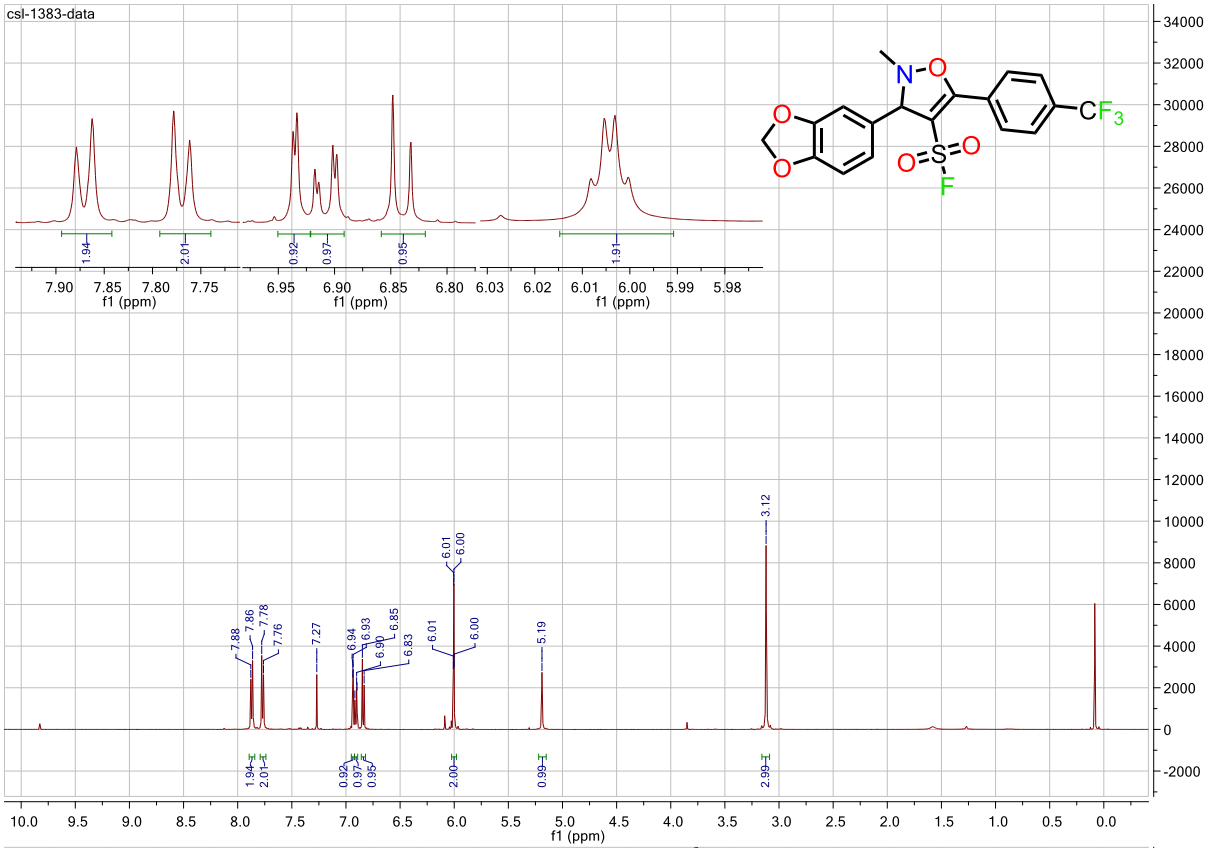

ligc-cyf-007-C13.1.fid
174.98
174.96
160.36
151.86
140.25
131.82
131.08
129.99
129.69
126.50
122.49
121.63
110.21
109.98
77.37
77.16
76.95
f1 (ppm)

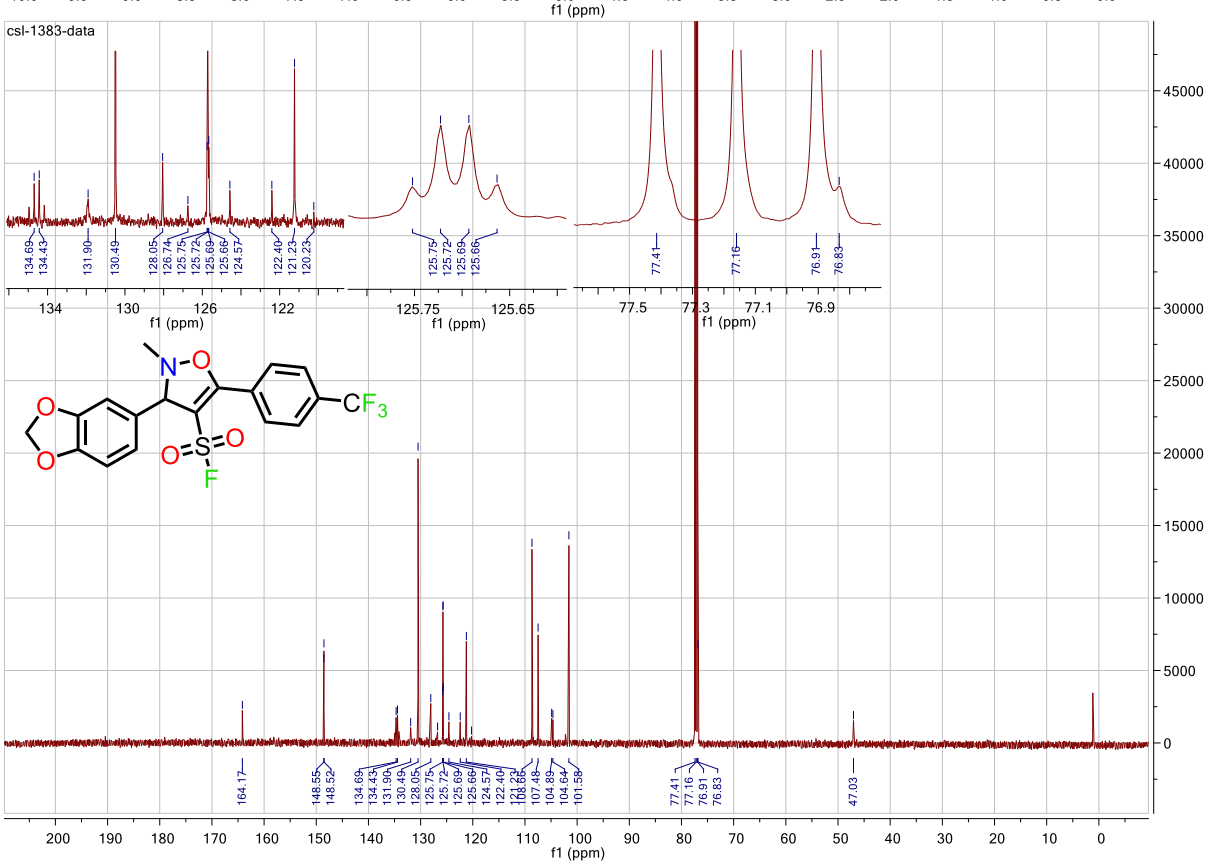

ligc-cyf-007-F.1.fid
F-19, CDCl3, DPX-400 QNP Probe. CF3Cl as Ref at 0 ppm.
N
O
Cl
O
S
O
F
FO2SO
72.23
38.20
0.00
f1 (ppm)

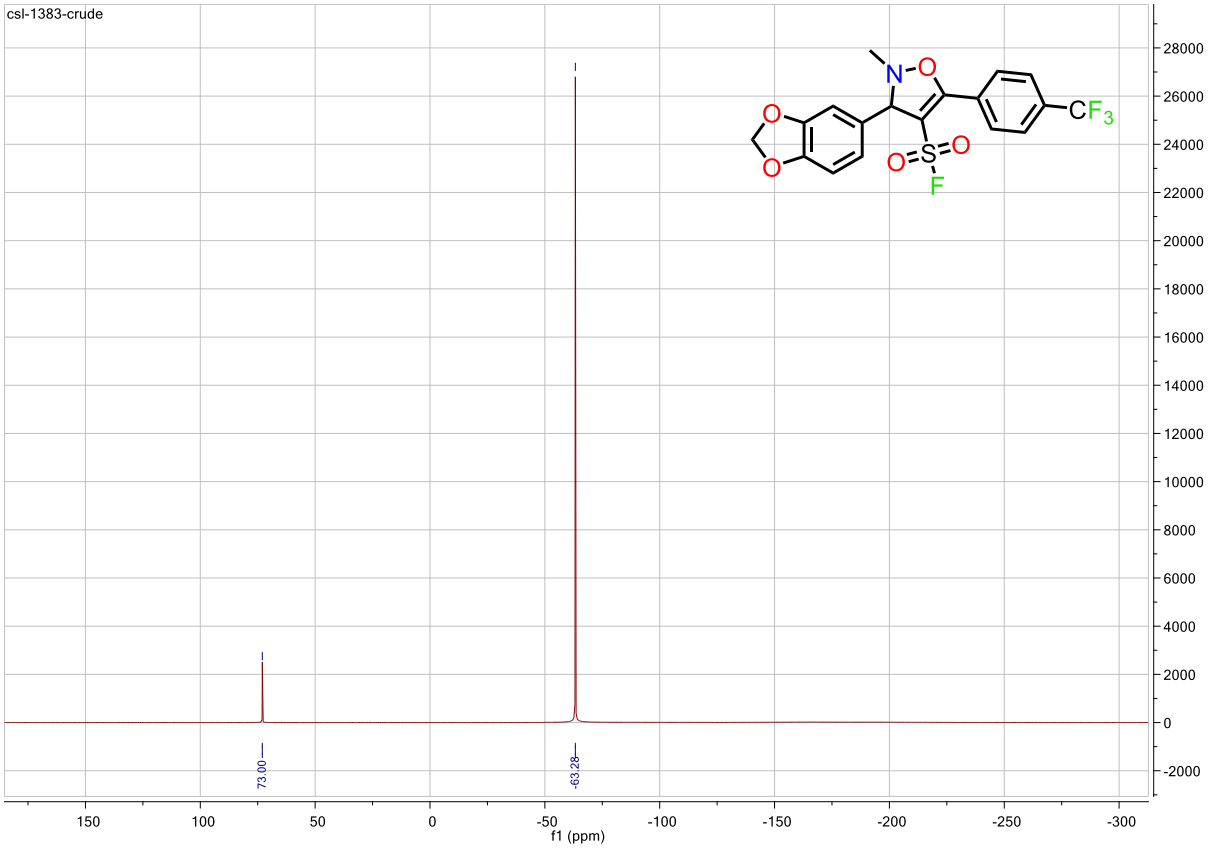

mcg1255dat
f1 (ppm)
MeO
N
O
S
F

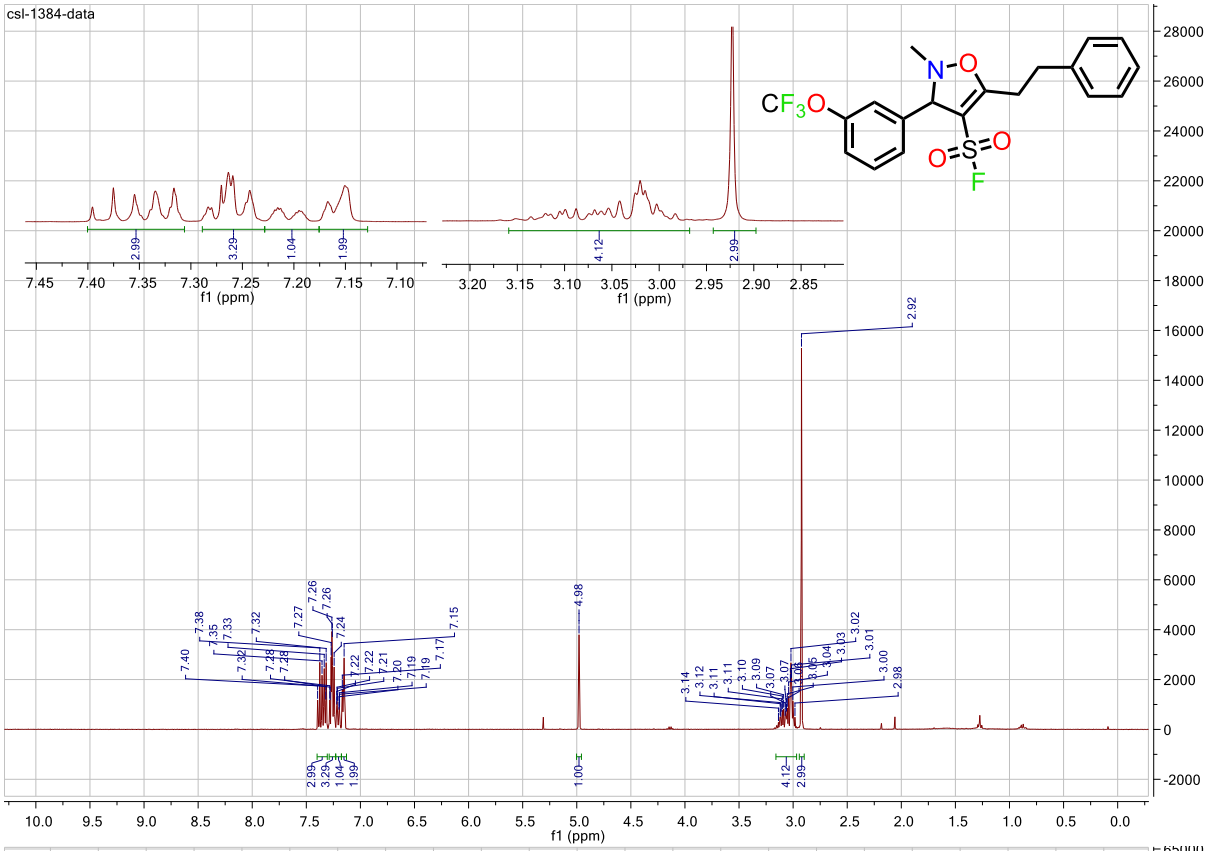

mcg1255dat
f1 (ppm)
MeO
N
O
S
F

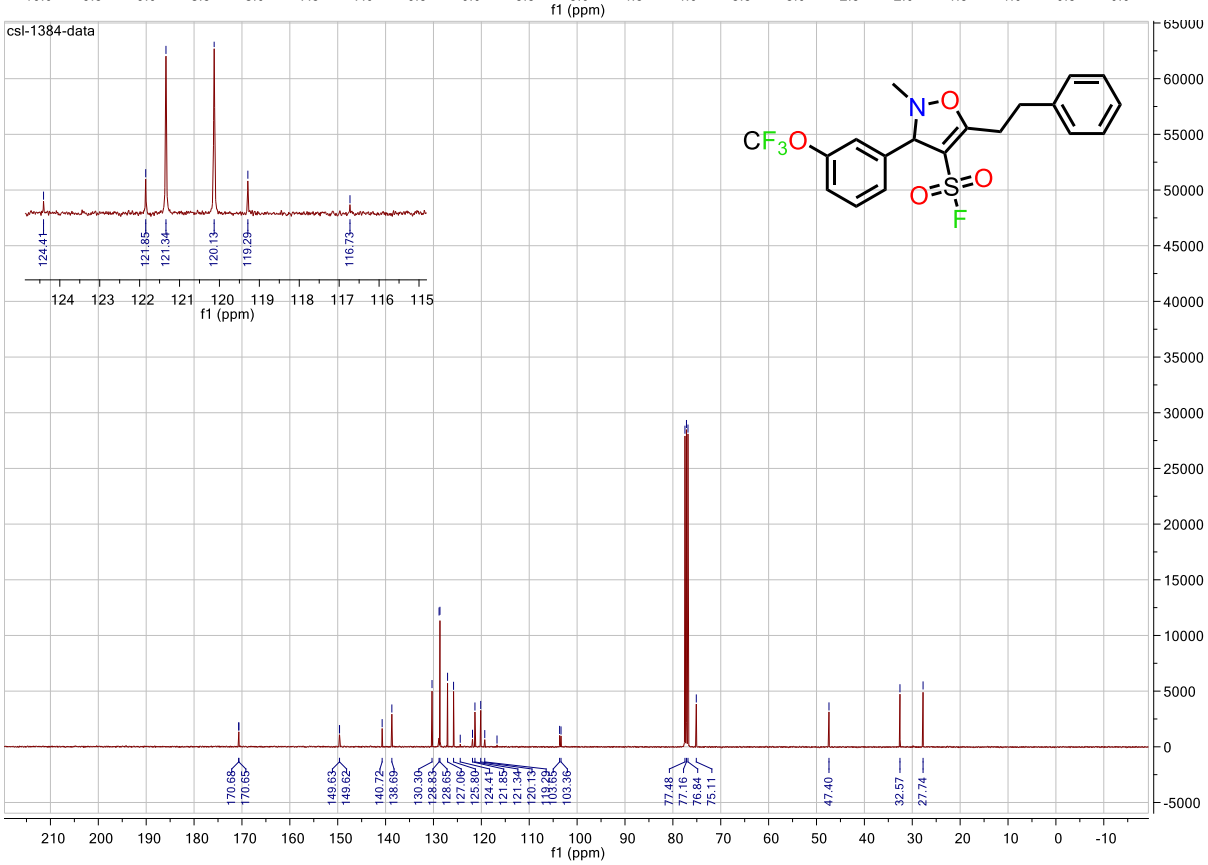

mcg1255dat
N
O
MeO
O
S
O
F
73.31
f1 (ppm)

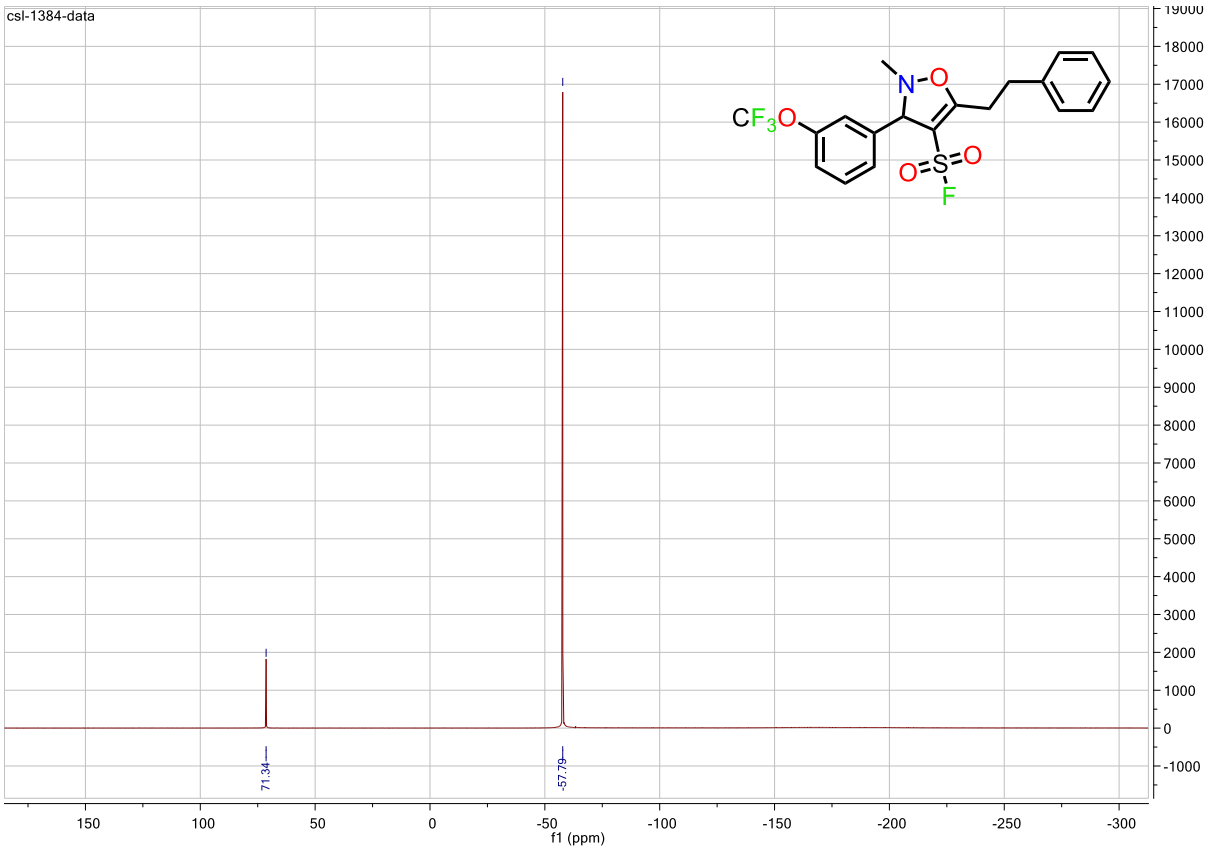

csl-1383-data
f1 (ppm)

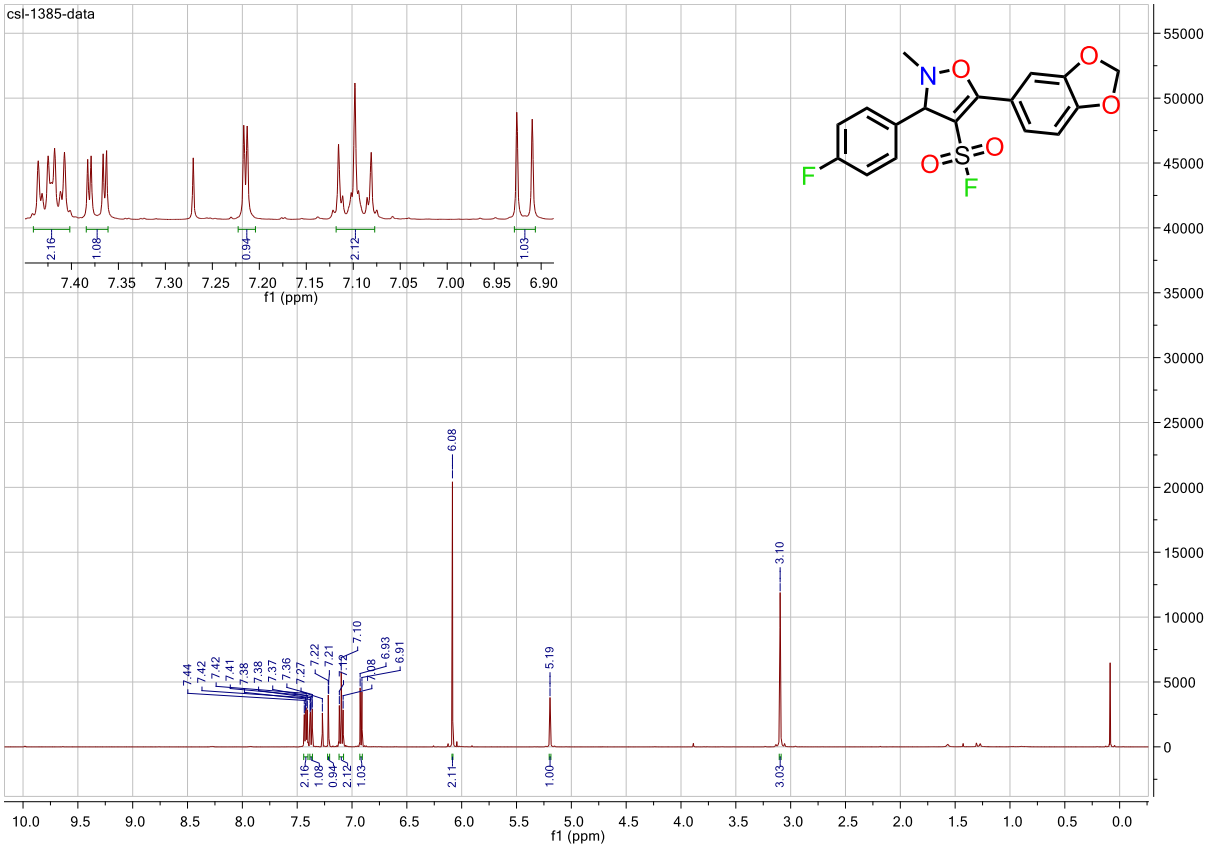

csl-1383-data
f1 (ppm)

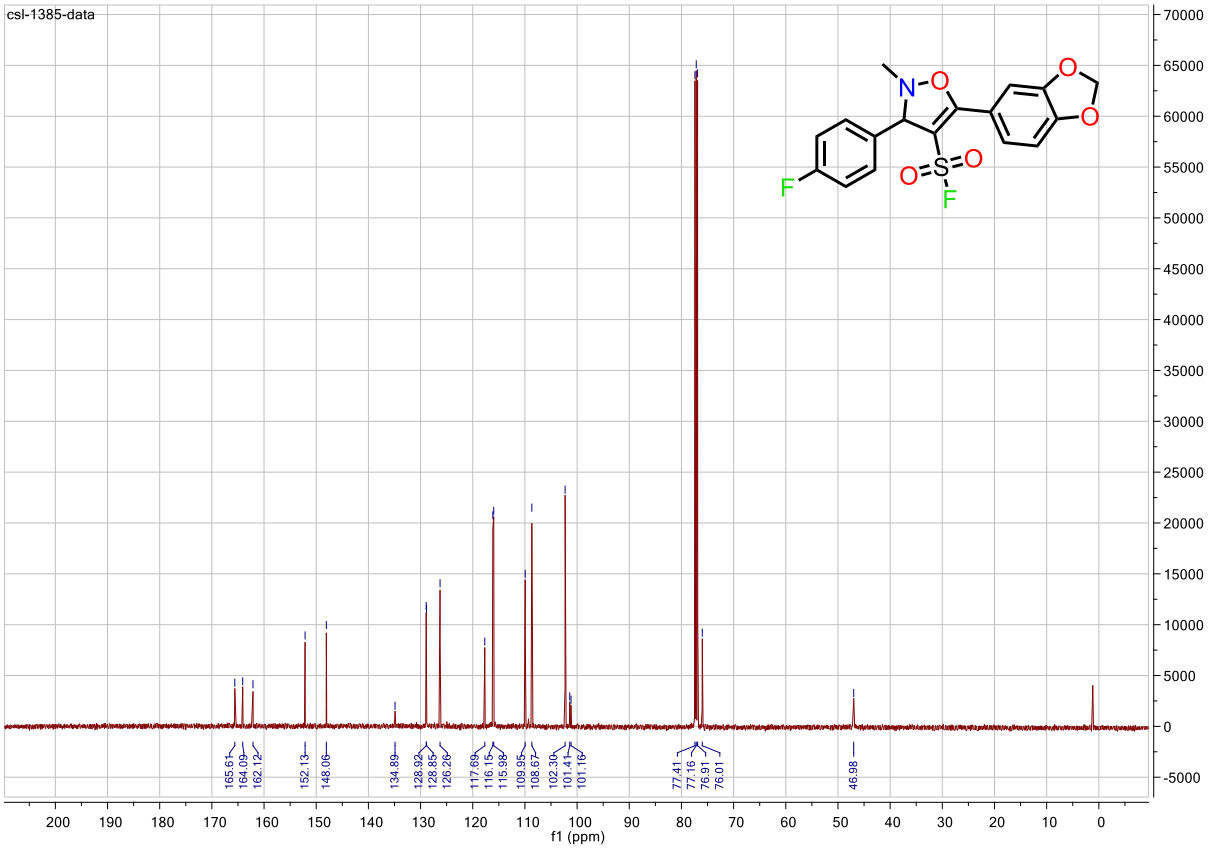

csl-1383-crude
28000
26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
-2000
73.00
-63.28
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
N
O
O
O
O
S
O
F
CF3

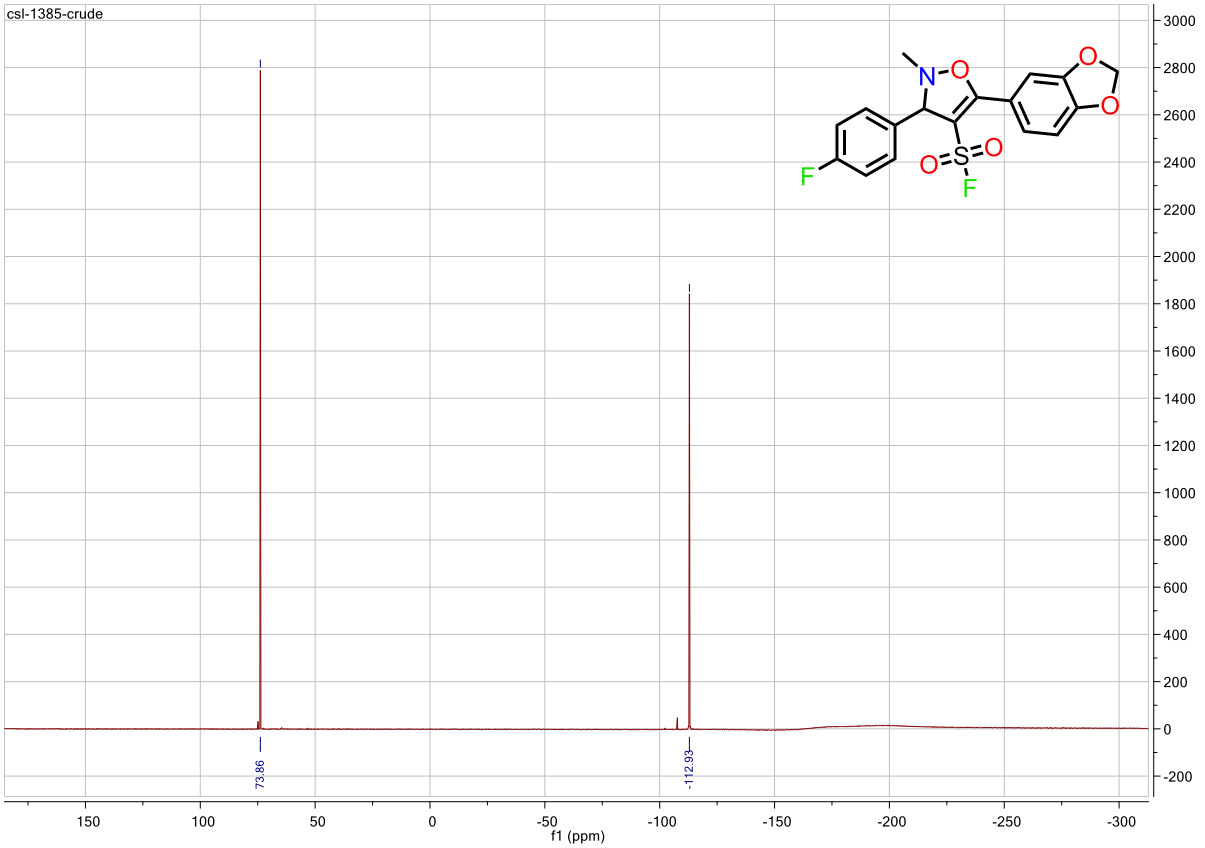

csl-1384-data
f1 (ppm)

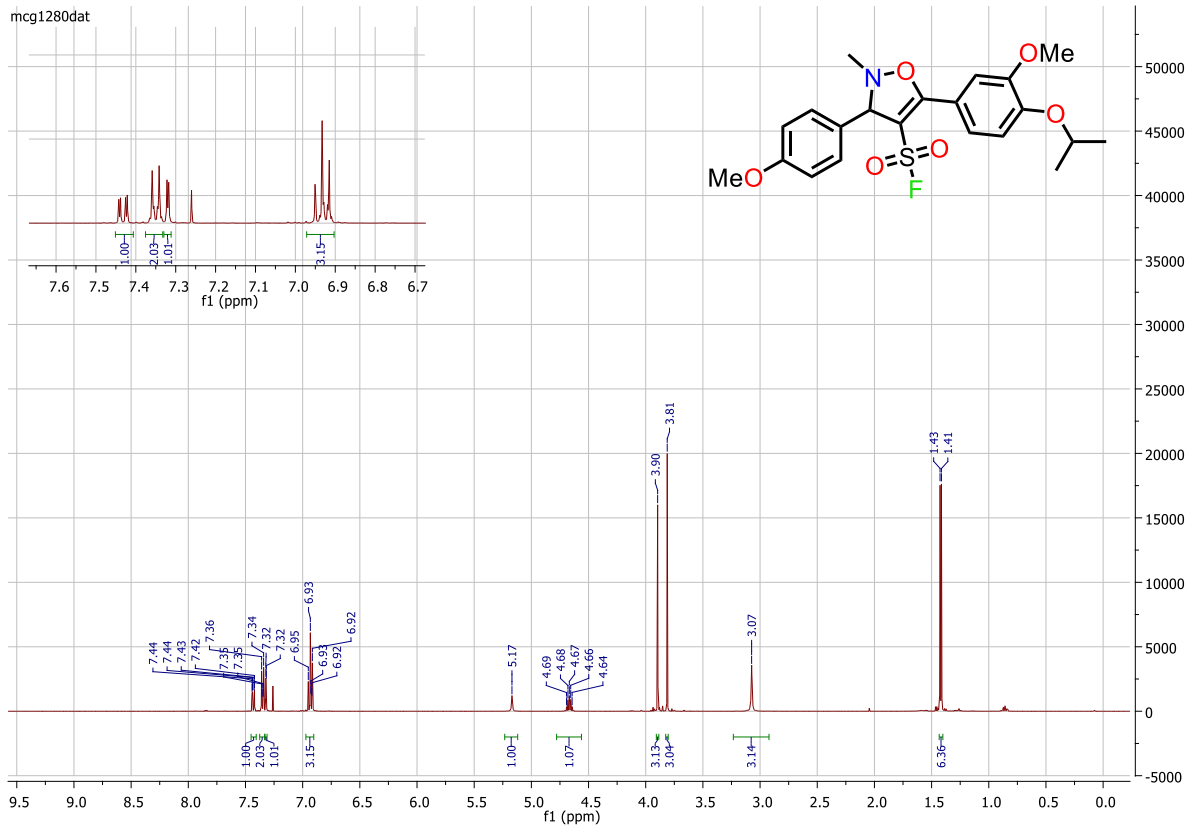

csl-1384-data
f1 (ppm)

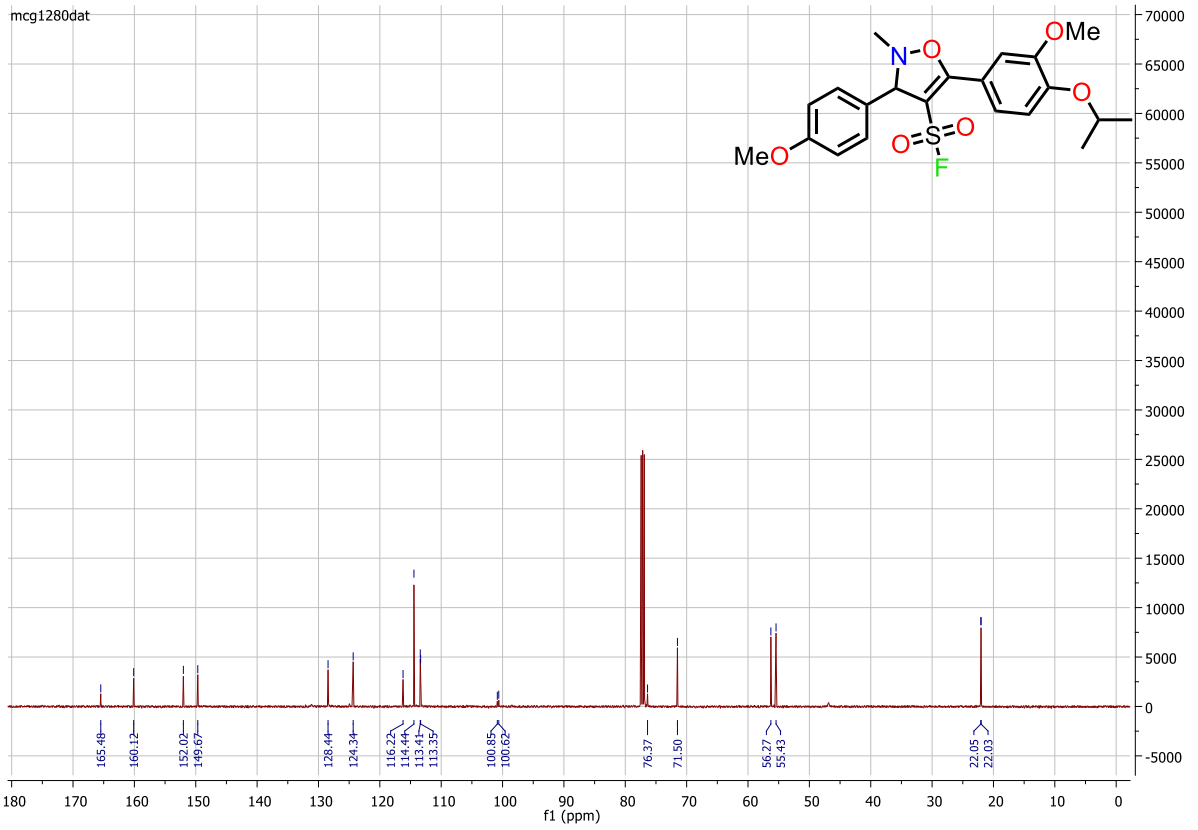

csl-1384-data
71.34
-57.79
f1 (ppm)

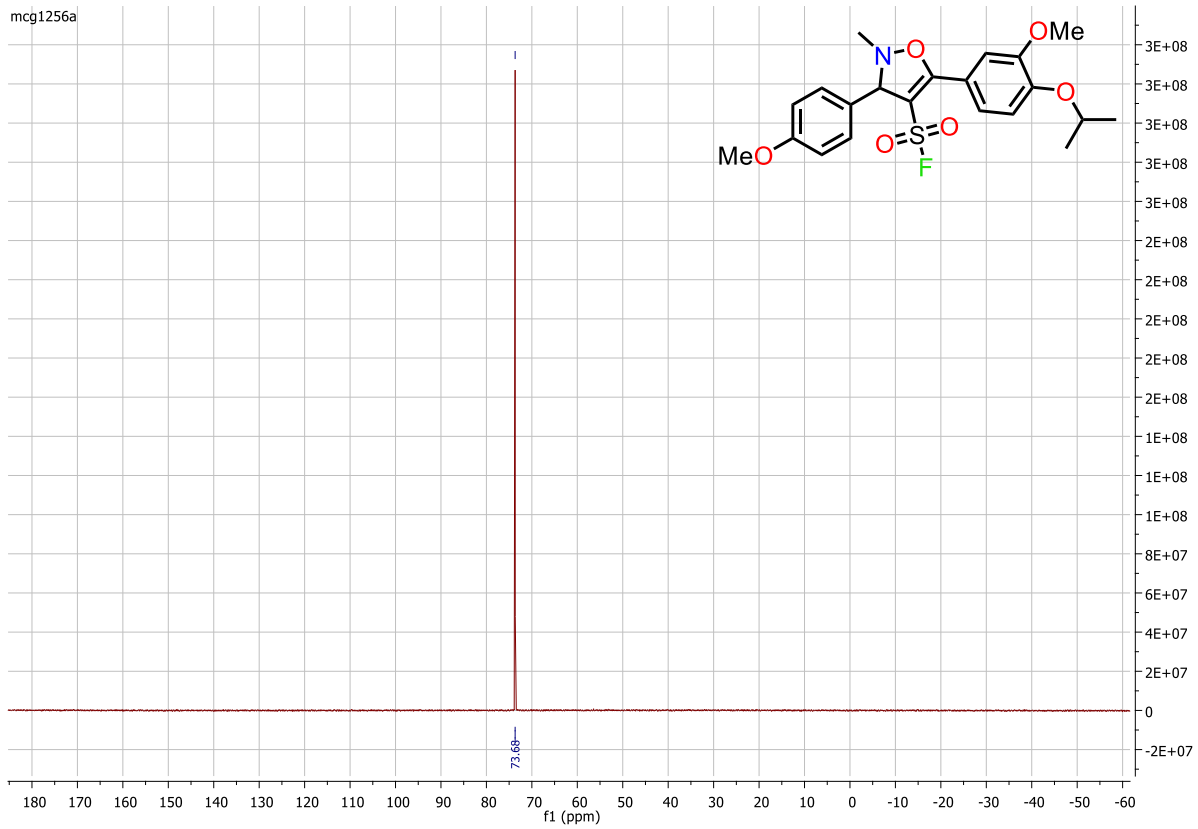

csl-1385-data
f1 (ppm)

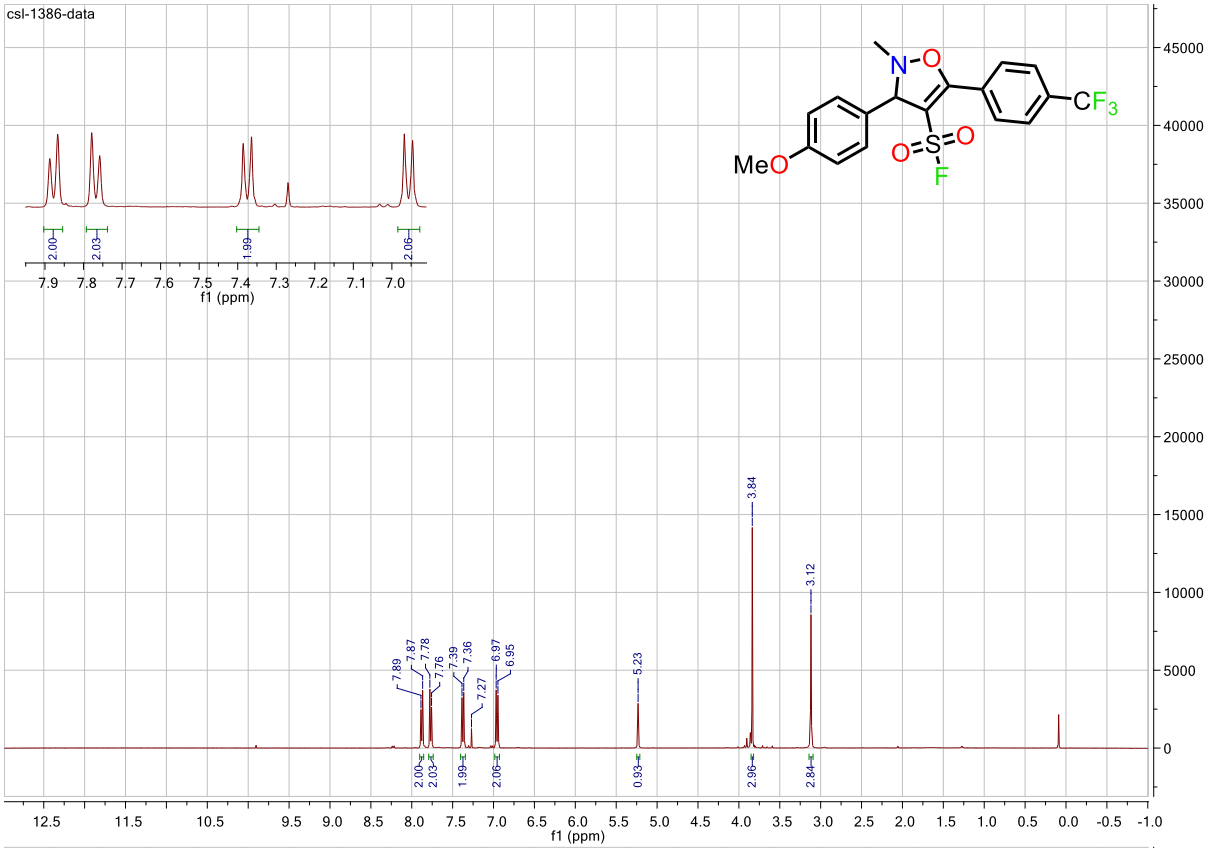

csl-1385-data
f1 (ppm)

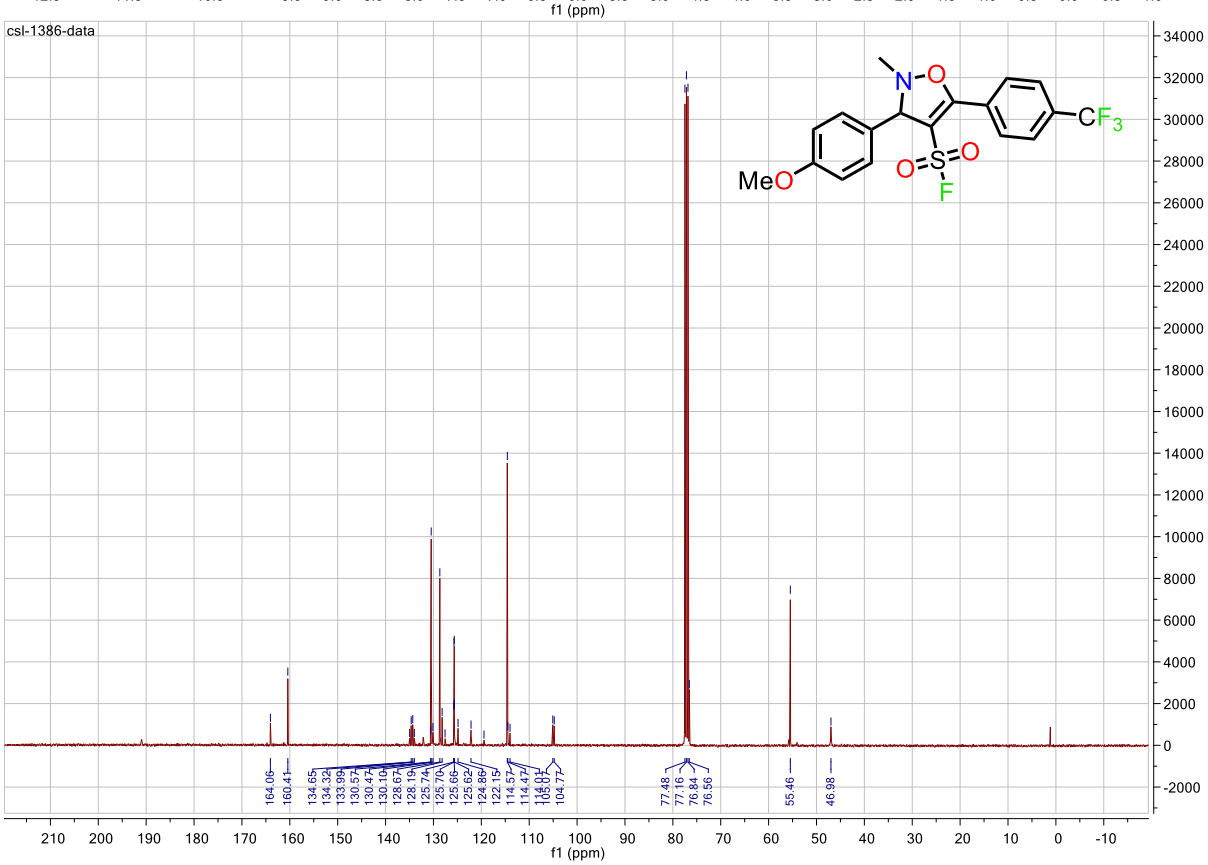

csl-1385-crude
73.86
-112.93
f1 (ppm)

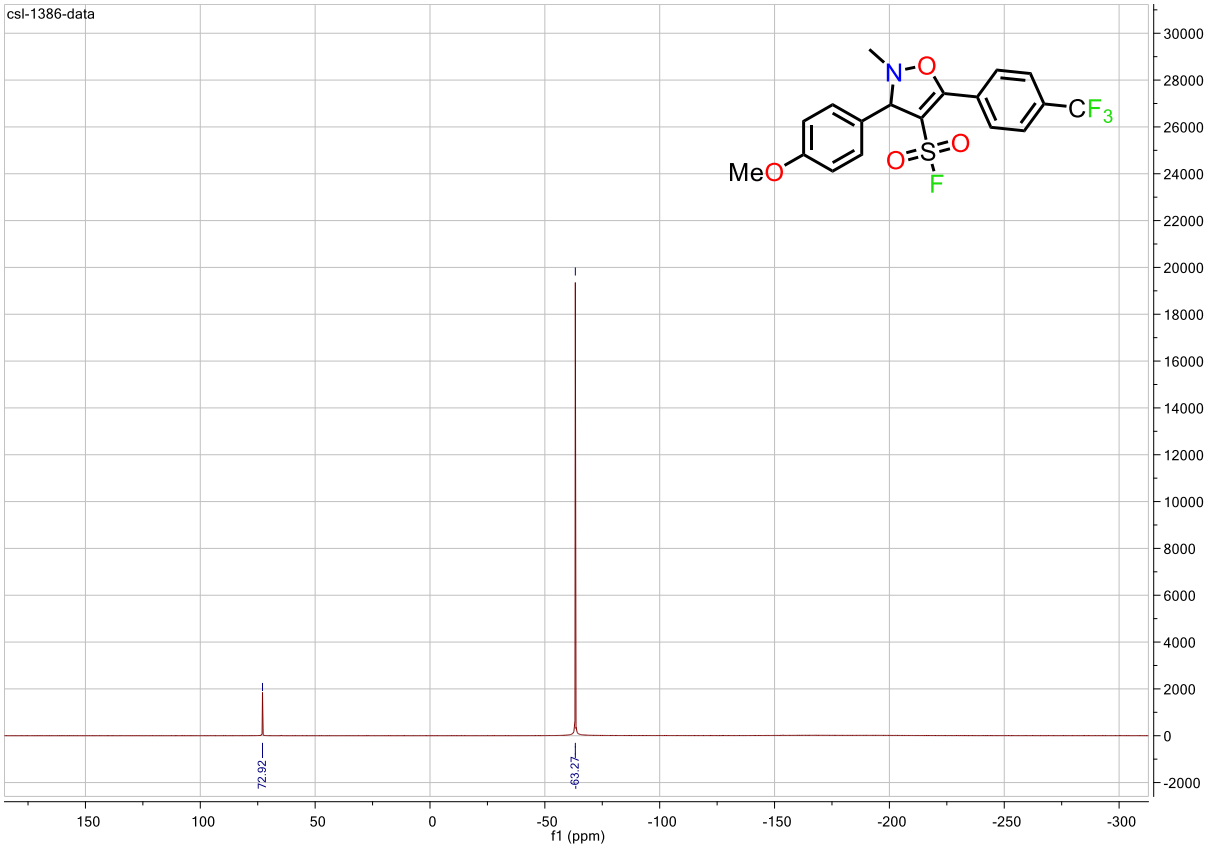

mcg1280dat
OMe
N
O
O
MeO
O=S=O
F
f1 (ppm)

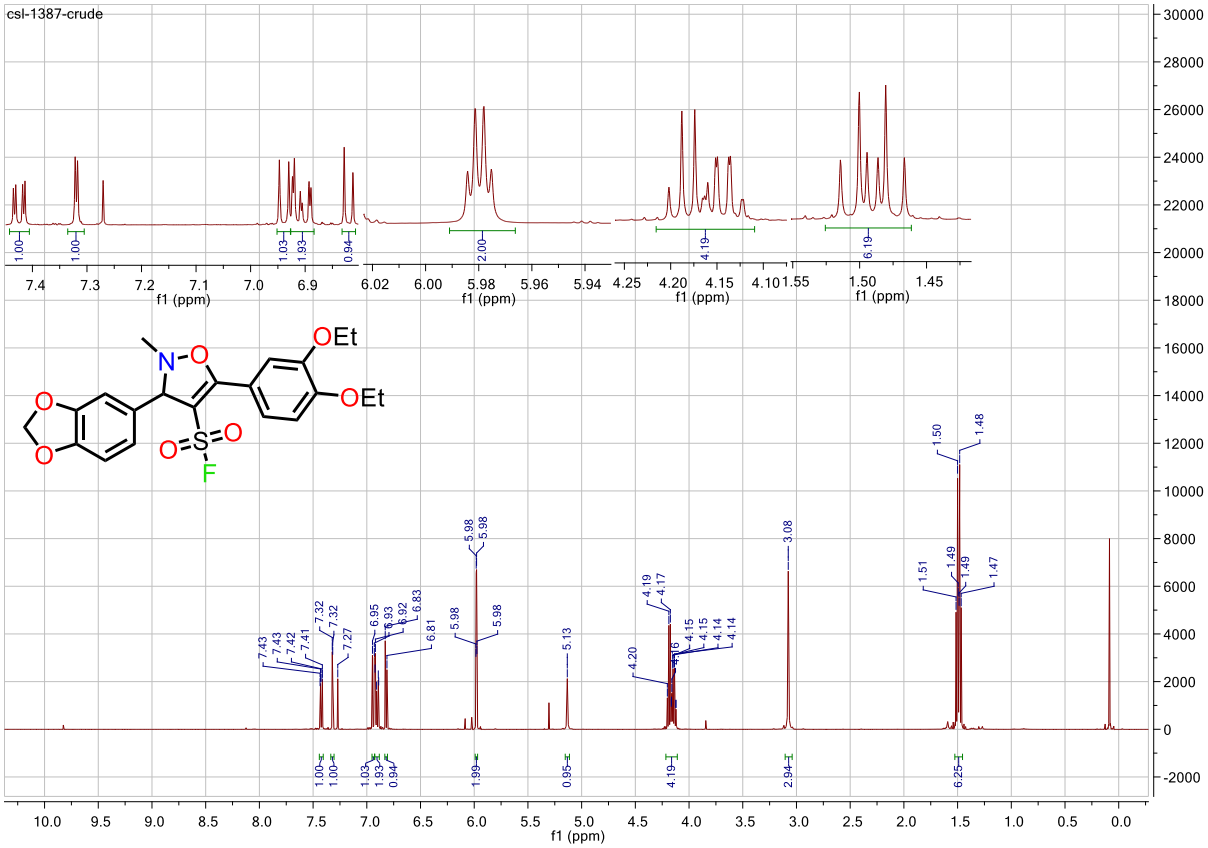

mcg1280dat
OMe
N
O
O
MeO
O=S=O
F
f1 (ppm)

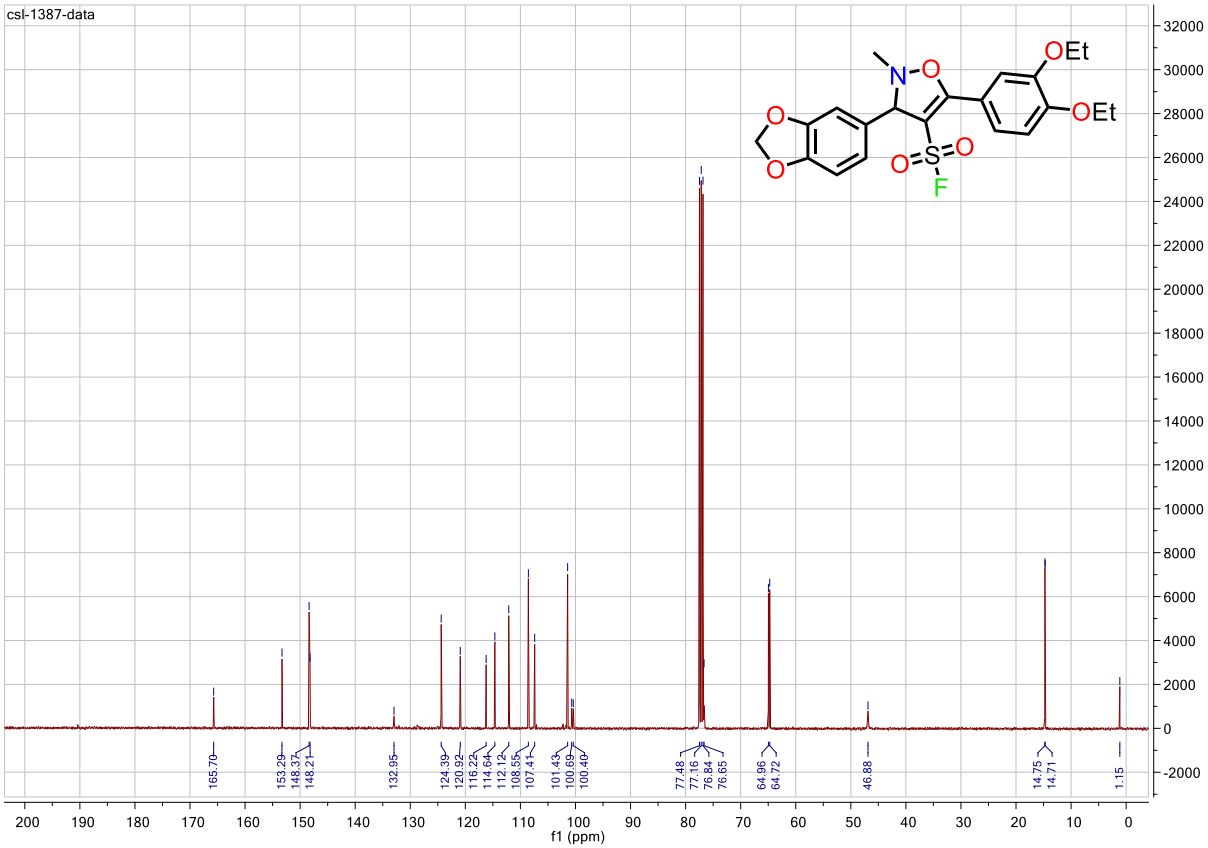

mcg1256a
OMe
N
O
O
S
O
F
MeO
3E+08
2E+08
1E+08
8E+07
6E+07
4E+07
2E+07
0
-2E+07
73.68
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60
f1 (ppm)

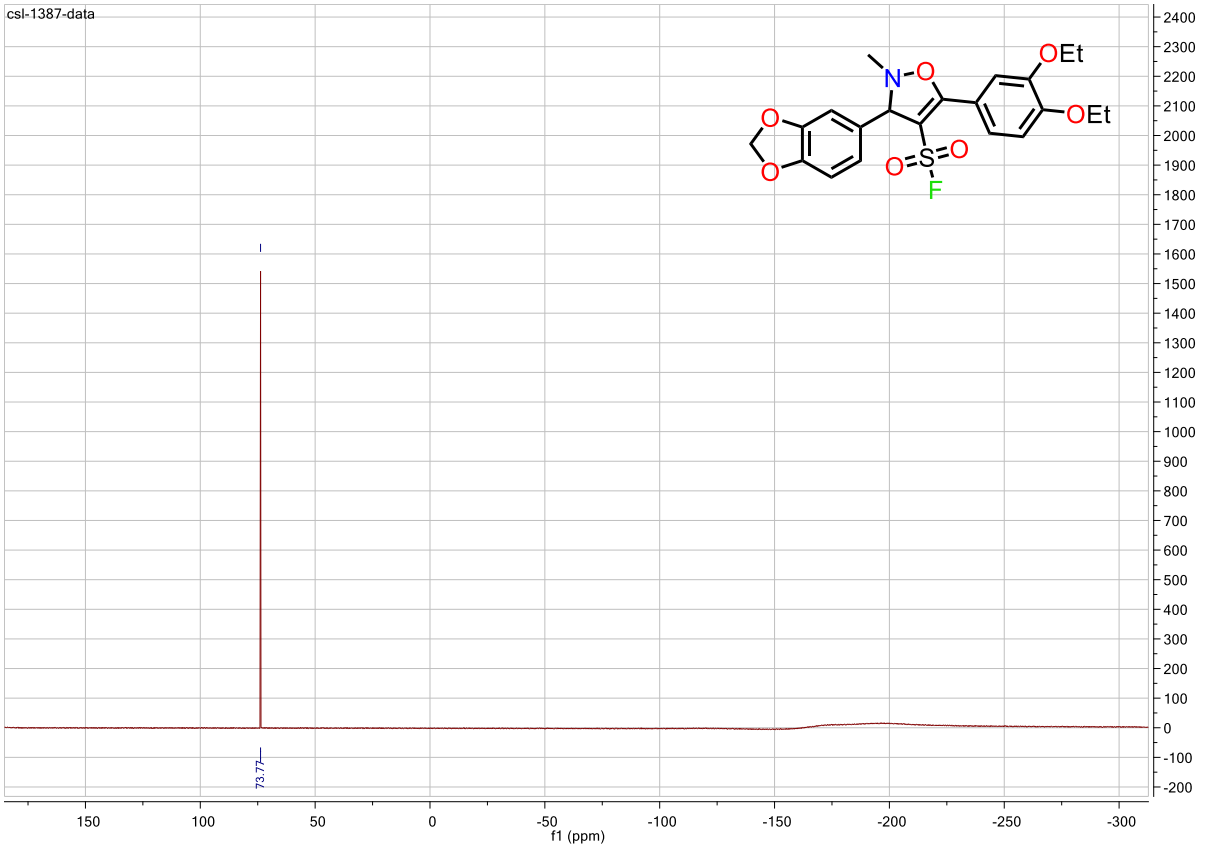

csl-1386-data
f1 (ppm)
7.89
7.87
7.78
7.76
7.39
7.36
7.27
6.97
6.95
5.23
3.84
3.12
2.00
2.03
1.99
2.06
0.93
2.96
2.84
MeO
N
O
O
S
O
F
CF3

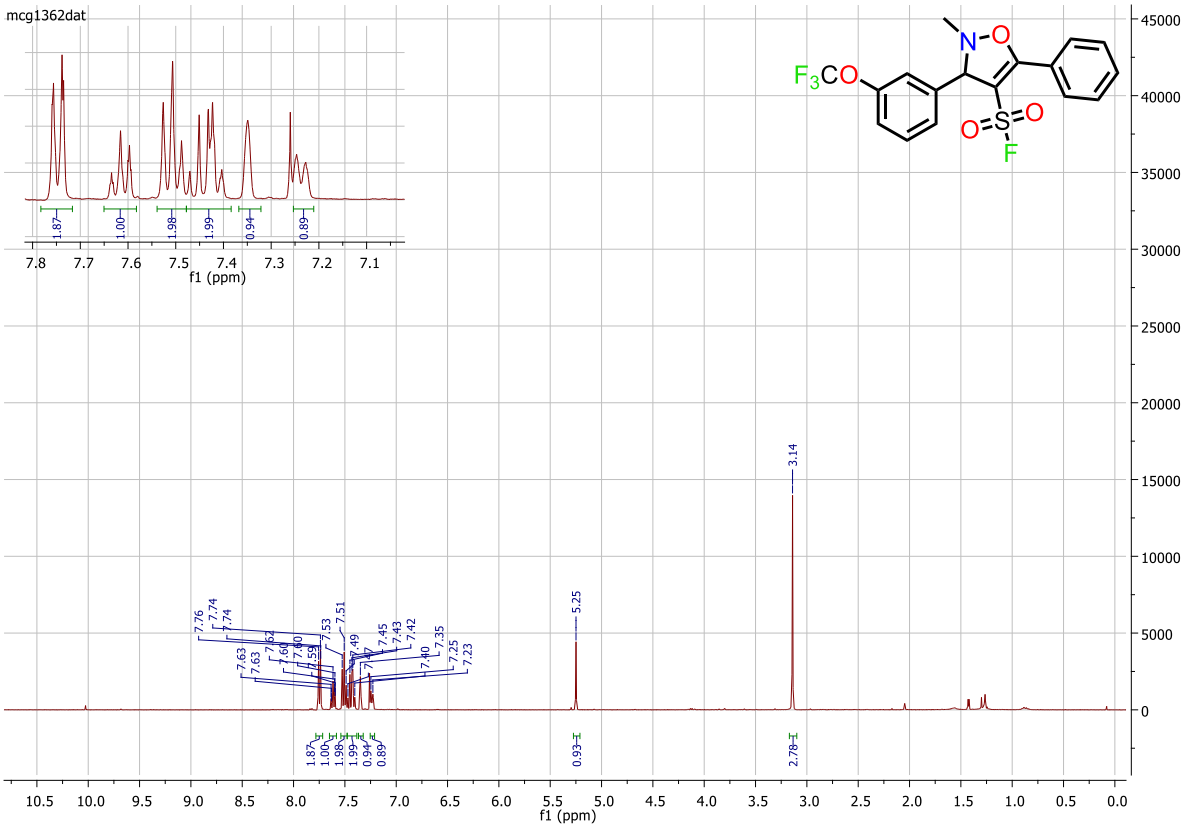

csl-1386-data
f1 (ppm)
164.06
160.41
134.65
134.32
133.99
130.57
130.47
130.10
128.67
128.19
125.74
125.70
125.66
125.62
124.86
122.15
114.57
114.47
108.07
104.77
77.48
77.16
76.84
76.56
55.46
46.98
MeO
N
O
O
S
O
F
CF3

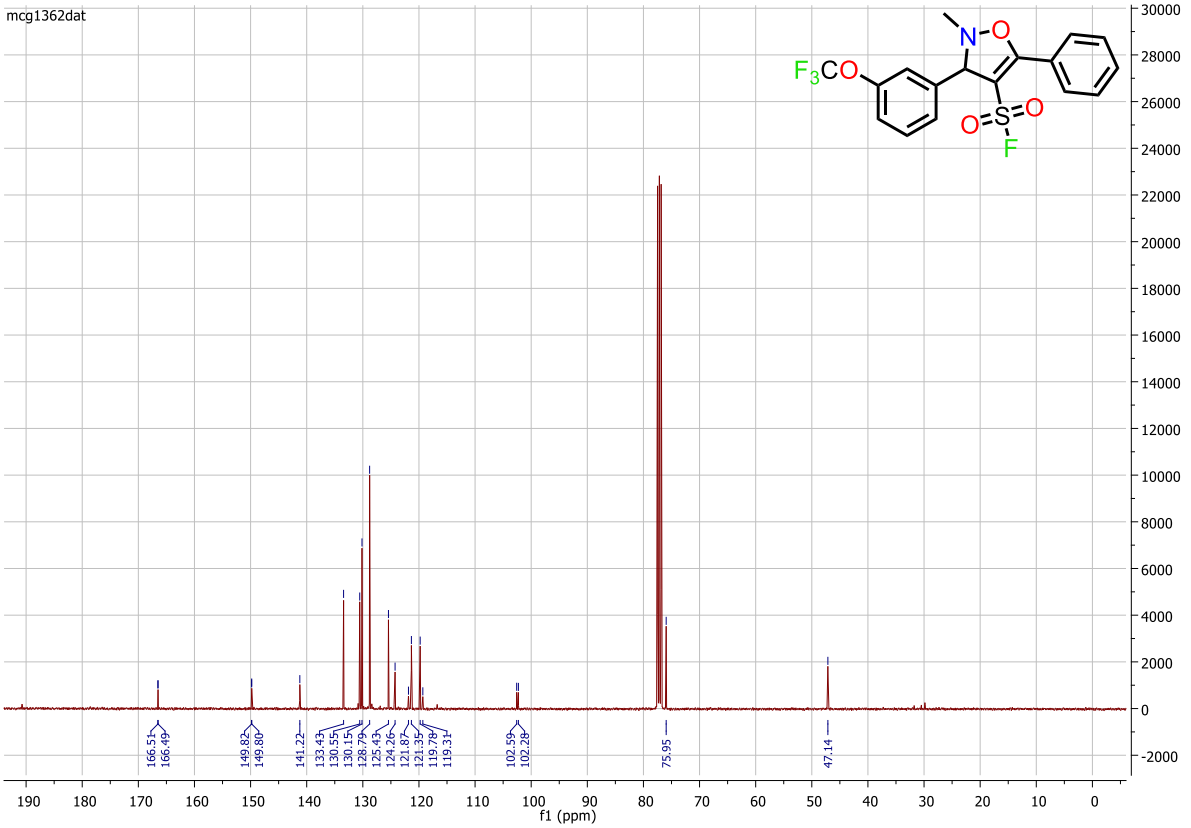

csl-1386-data
MeO
O
S
O
F
N
O
CF3
72.92
-63.27
f1 (ppm)

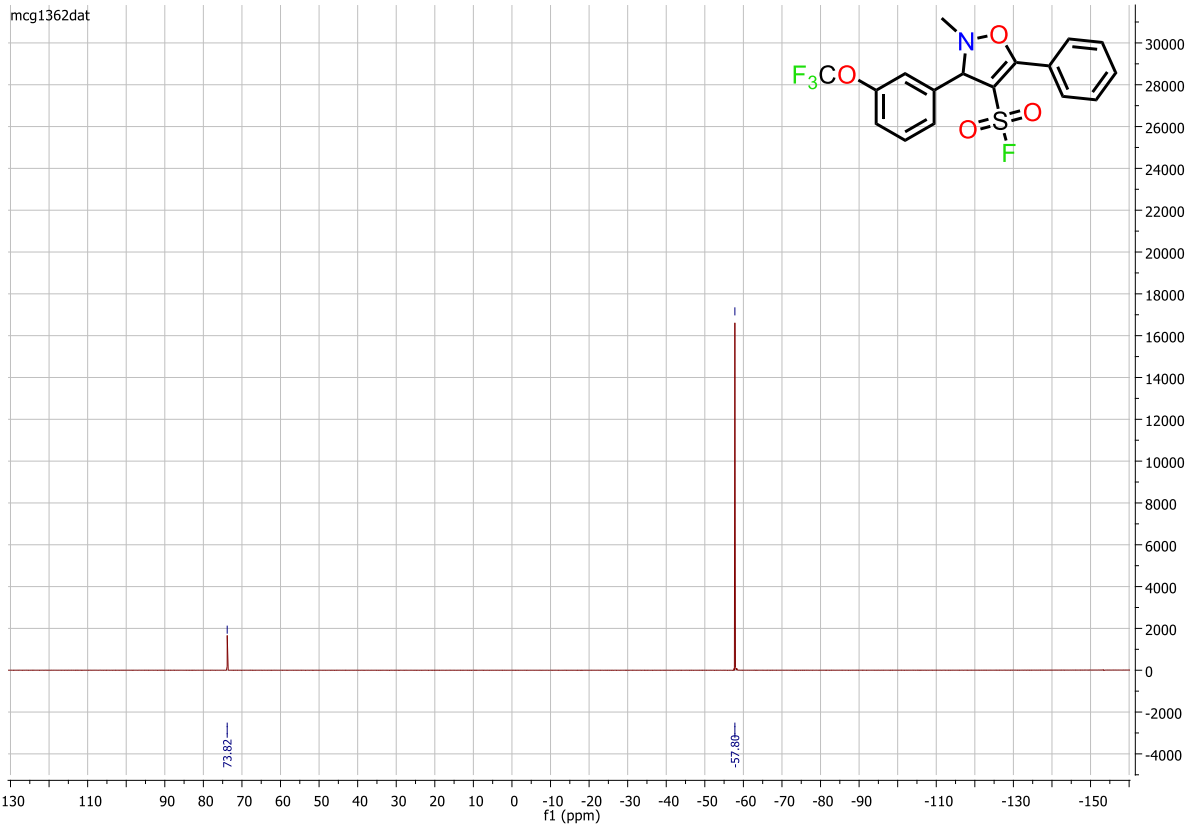

csl-1387-crude
OEt
OEt
f1 (ppm)

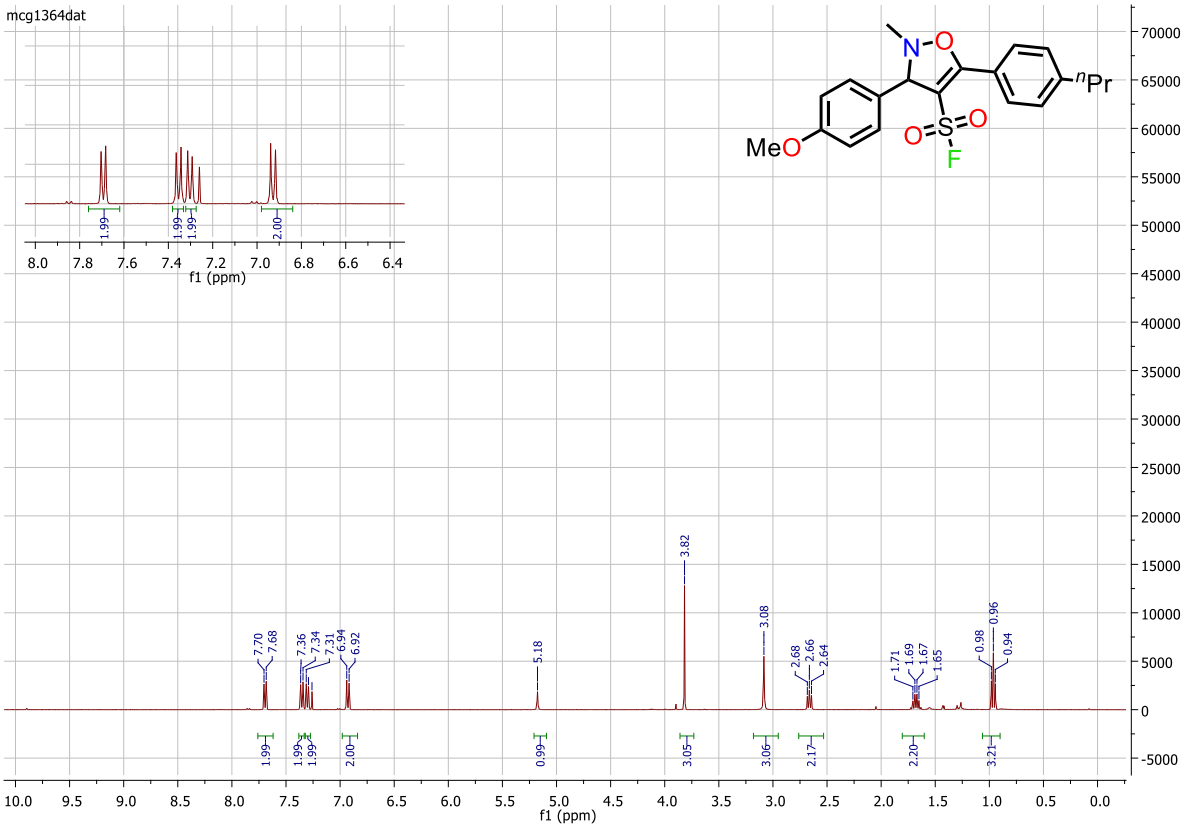

csl-1387-data
OEt
OEt
f1 (ppm)

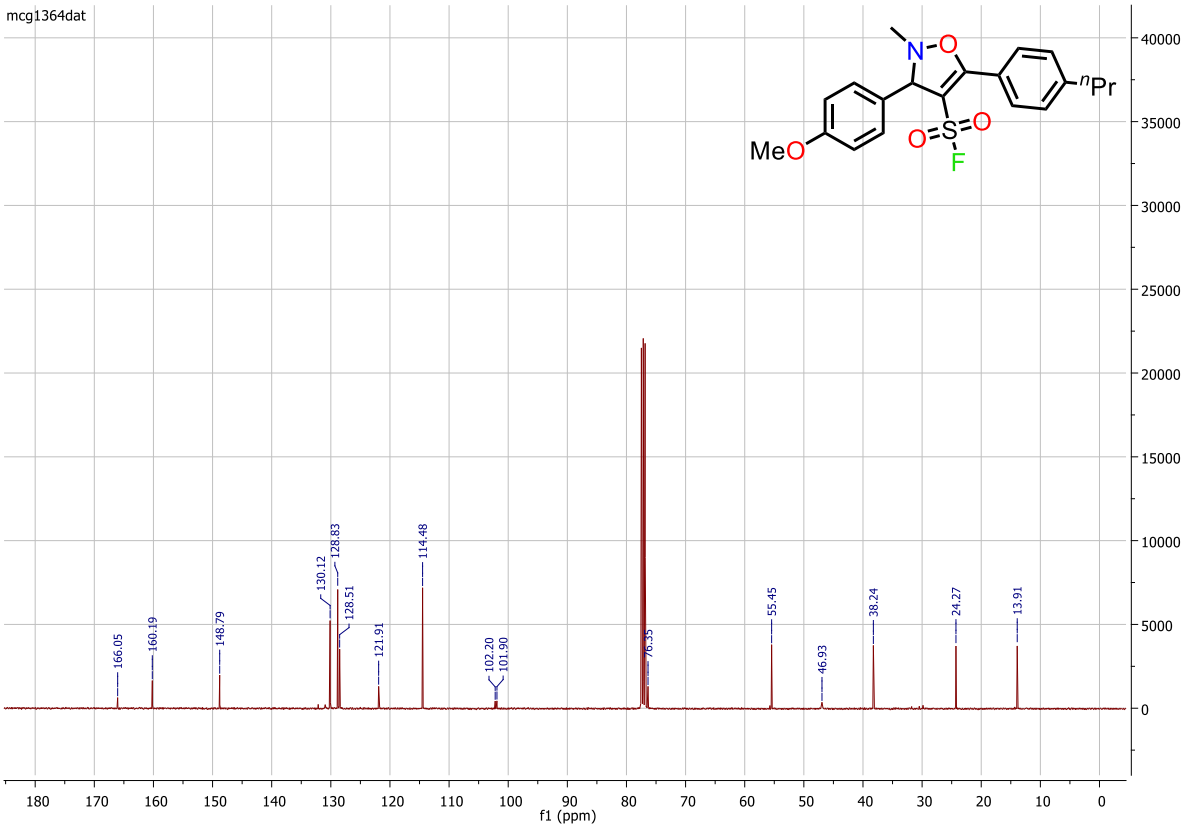

csl-1387-data
OEt
OEt
N
O
O
O
O
S
O
F
73.77
f1 (ppm)

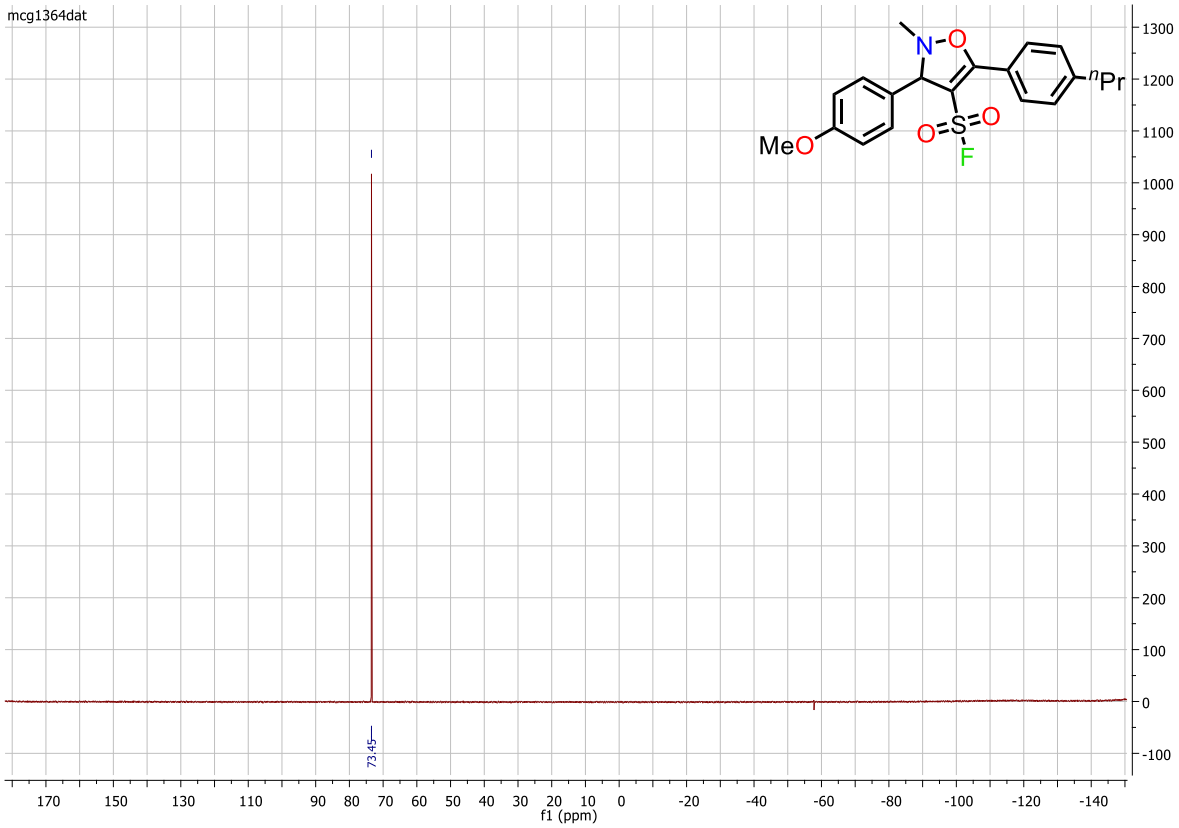

mcg1362dat
F3CO
N
O
O=S=O
F
1.87
1.00
1.98
1.99
0.94
0.89
f1 (ppm)
7.76
7.74
7.74
7.63
7.63
7.62
7.60
7.60
7.59
7.53
7.51
7.49
7.47
7.45
7.43
7.42
7.40
7.35
7.25
7.23
5.25
3.14
0.93
2.78
f1 (ppm)

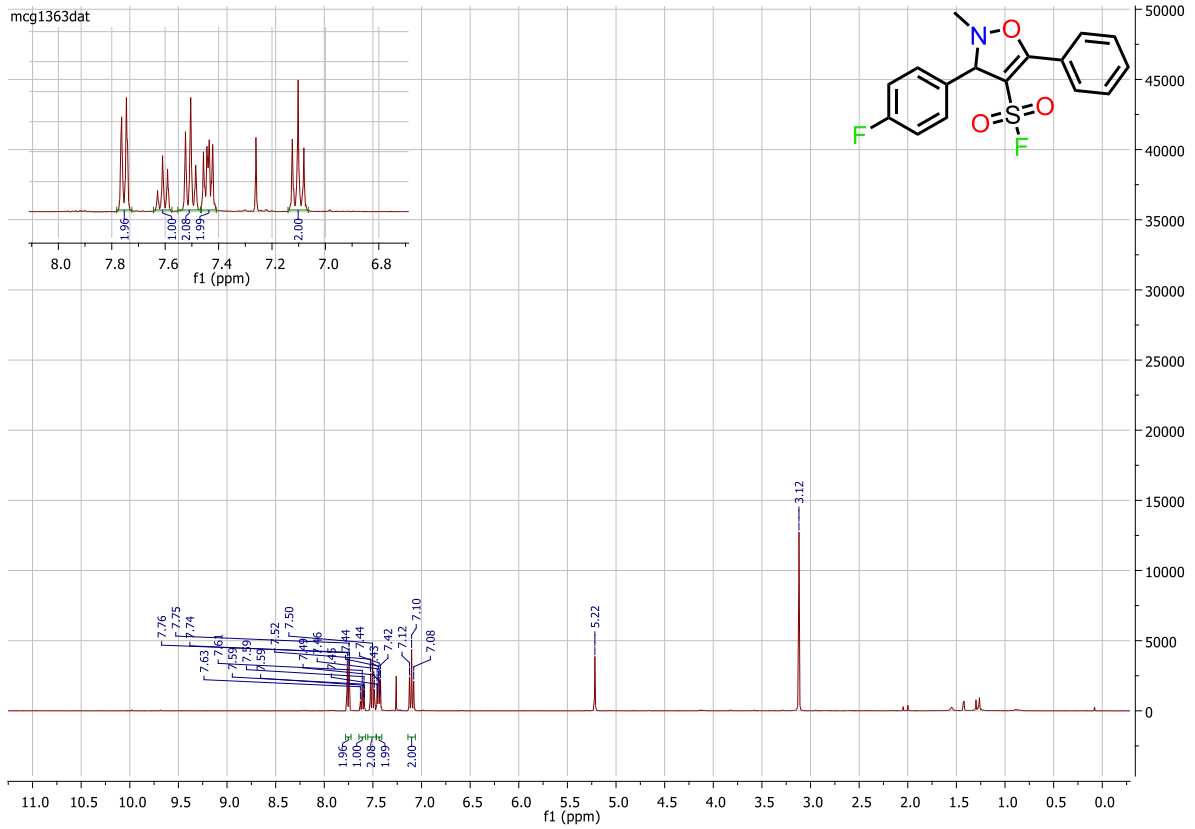

mcg1362dat
F3CO
N
O
O=S=O
F
166.51
166.49
149.82
149.80
141.22
133.43
130.55
130.15
128.79
125.43
124.26
121.87
121.35
119.78
119.31
102.59
102.28
75.95
47.14
f1 (ppm)

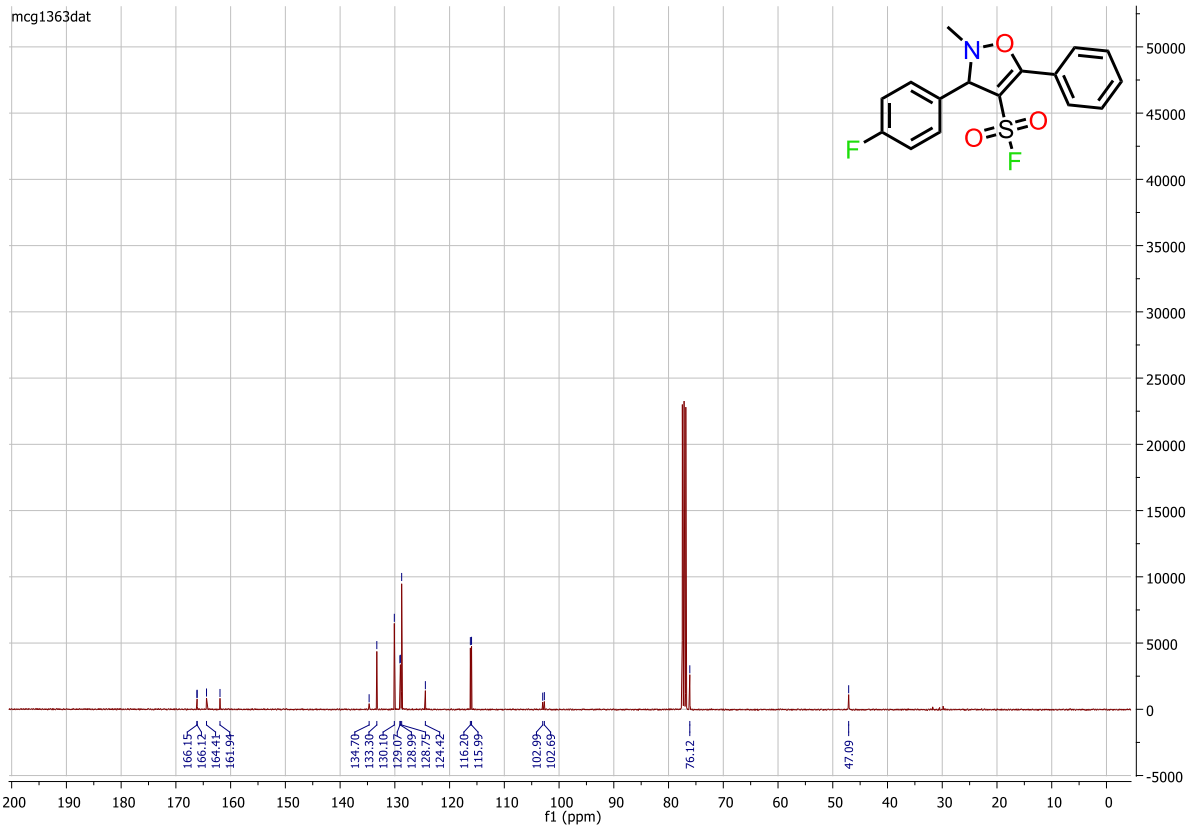

mcg1362dat
F3CO
N
O
O
S
O
F
73.82
-57.80
f1 (ppm)

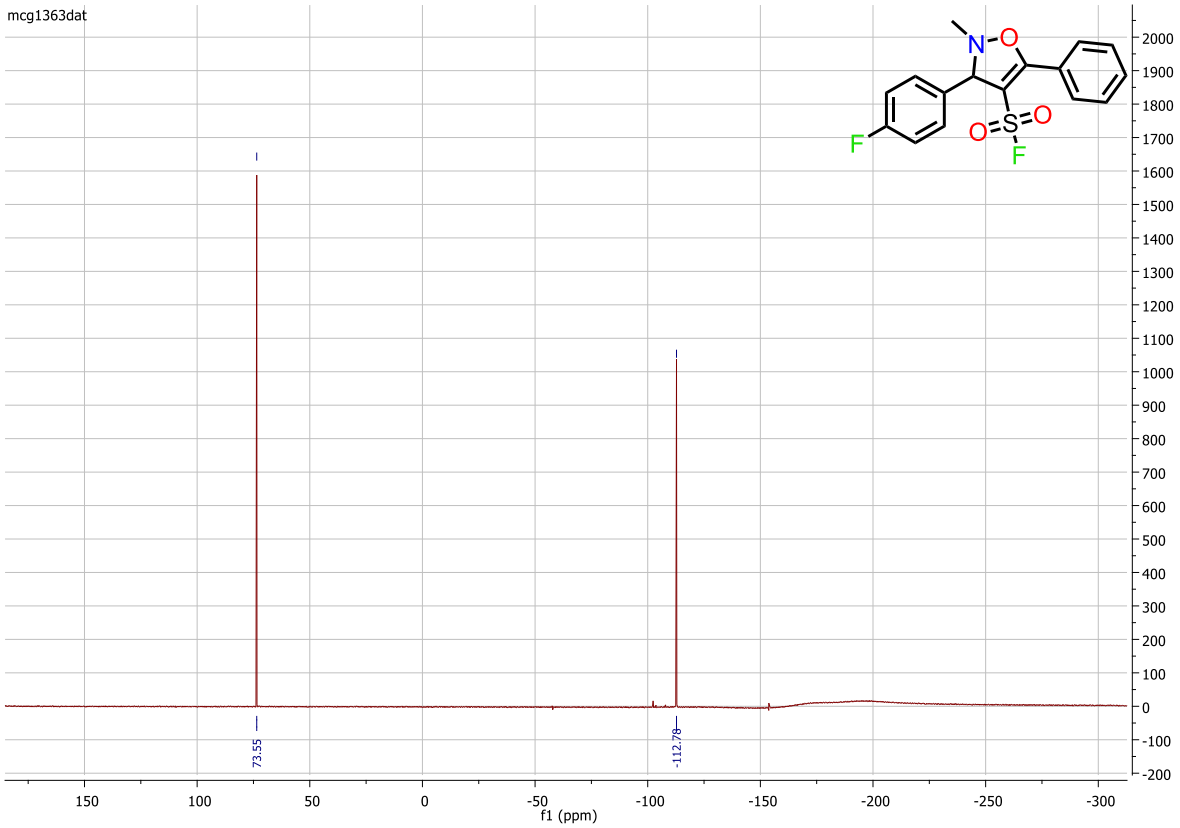

mcg1364dat
f1 (ppm)
MeO
O=S=O
F
nPr

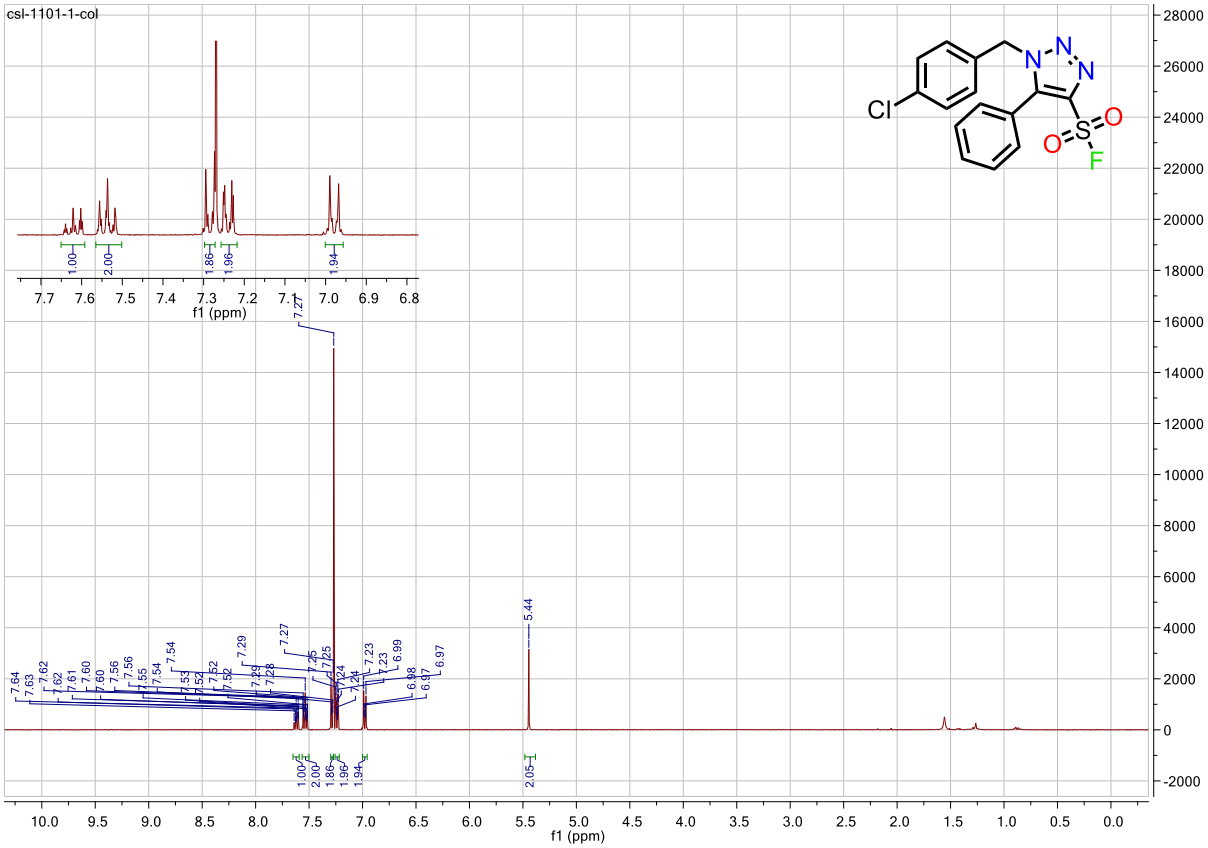

mcg1364dat
f1 (ppm)
MeO
O=S=O
F
nPr

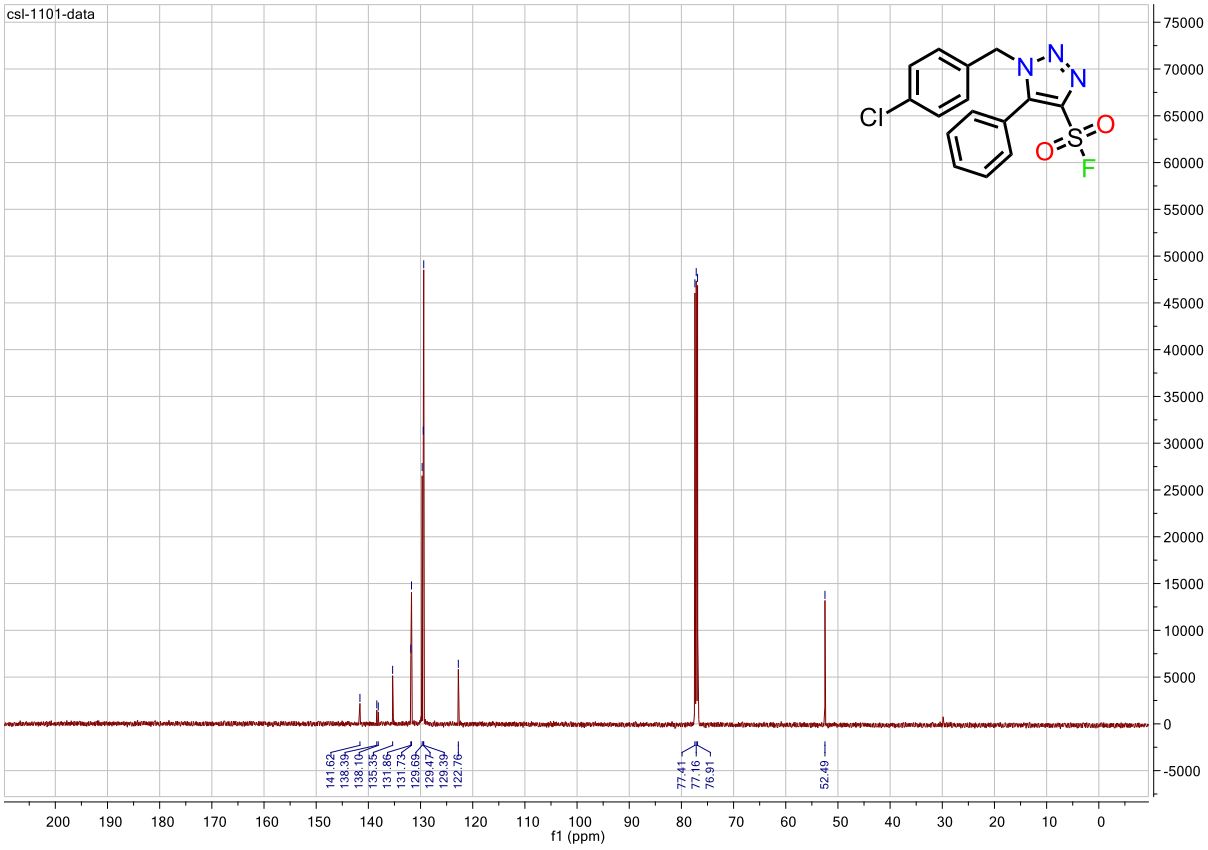

mcg1364dat
MeO
N
O
O
S
O
F
nPr
73.45
f1 (ppm)

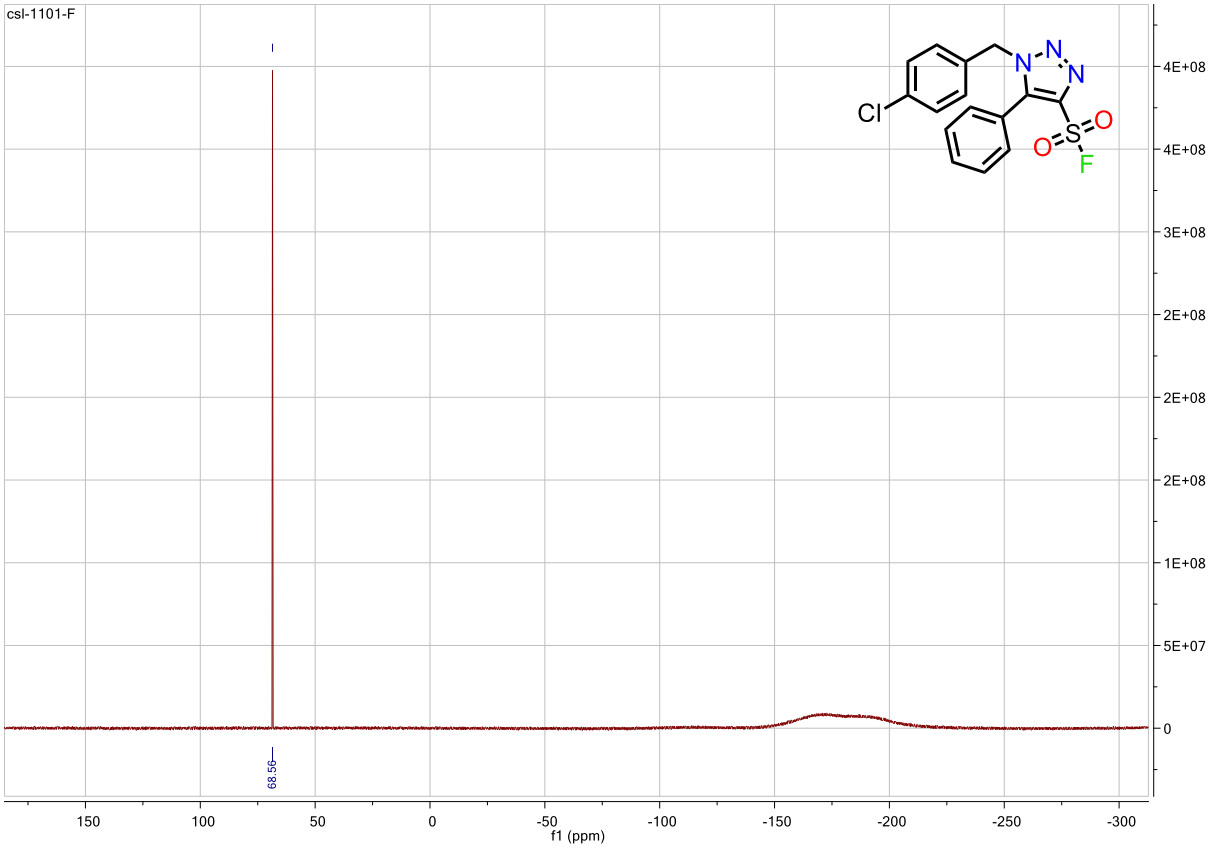

mcg1363dat
f1 (ppm)
7.76
7.75
7.74
7.63
7.61
7.59
7.59
7.59
7.52
7.50
7.49
7.46
7.45
7.44
7.44
7.43
7.42
7.12
7.10
7.08
5.22
3.12
1.96
1.00
2.08
1.99
2.00

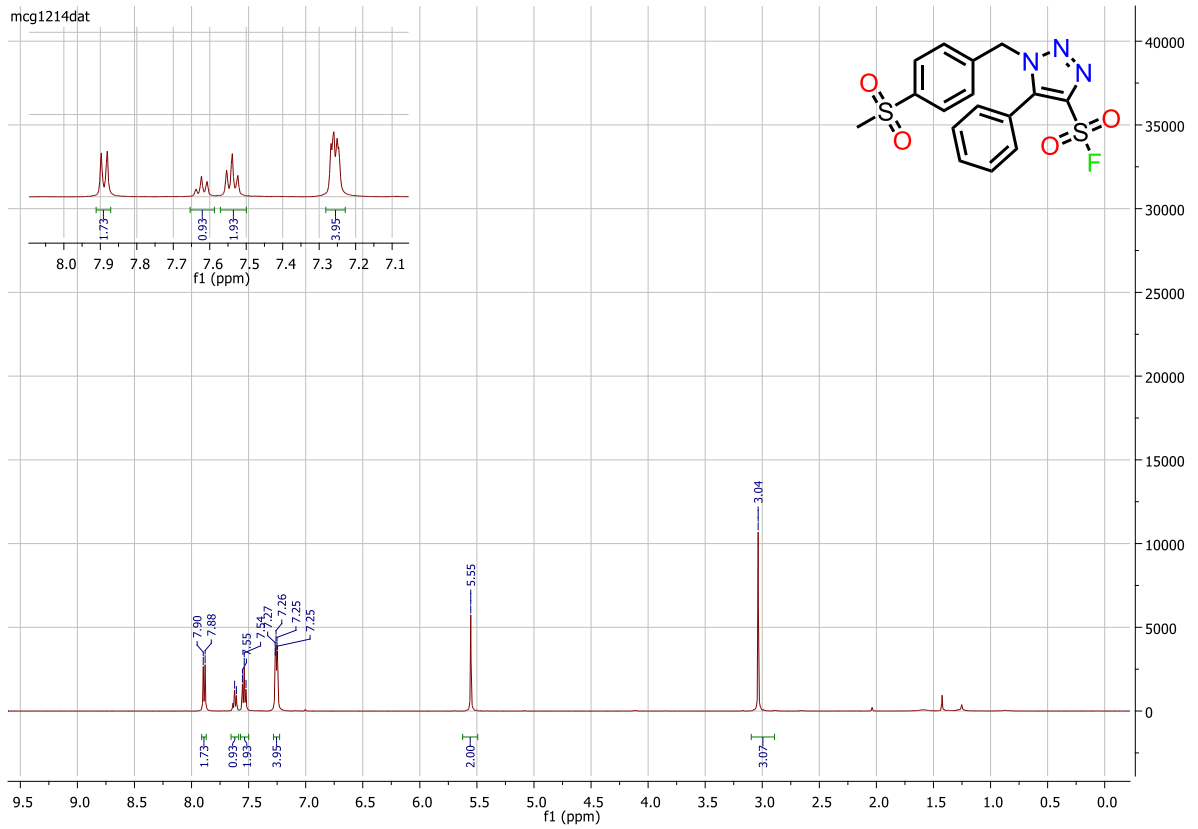

mcg1363dat
f1 (ppm)
166.15
166.12
164.41
161.94
134.70
133.30
130.10
129.07
128.99
128.75
124.42
116.20
115.99
102.99
102.69
76.12
47.09

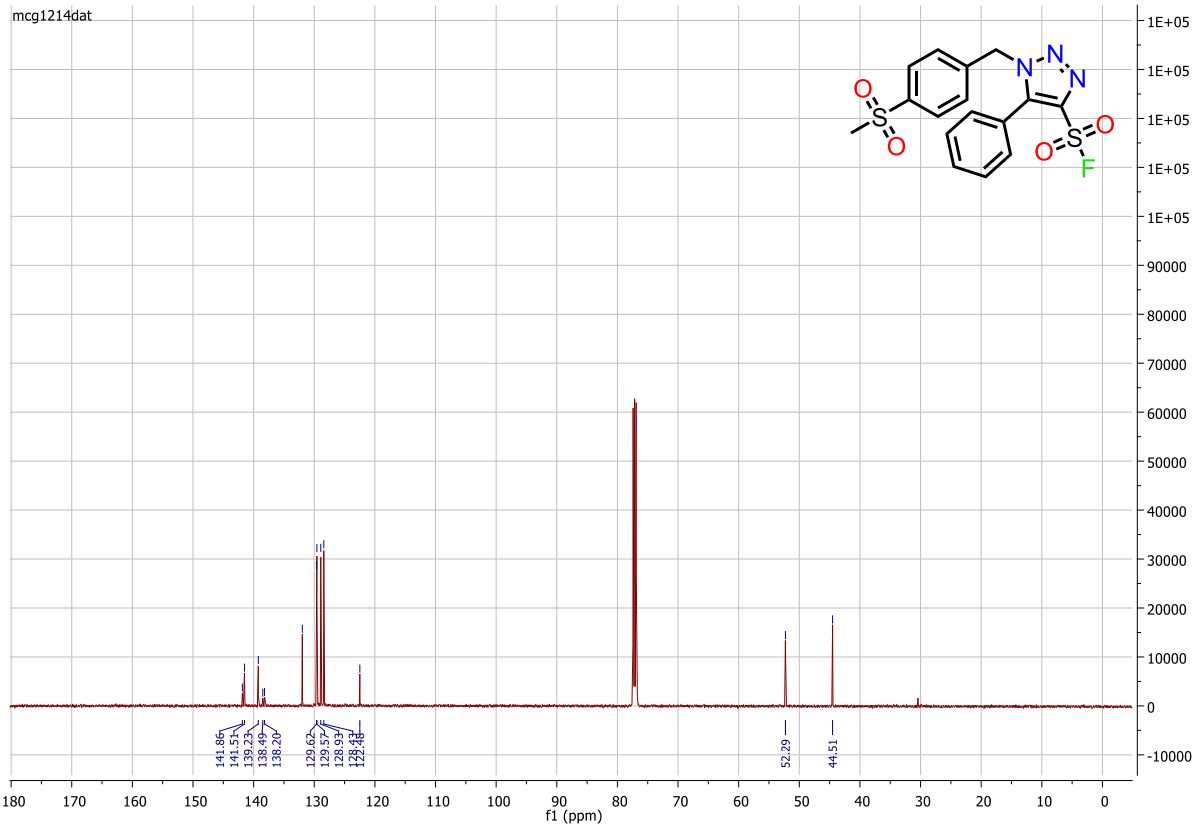

mcg1363dat
N
O
O
S
O
F
F
73.55
-112.78
f1 (ppm)

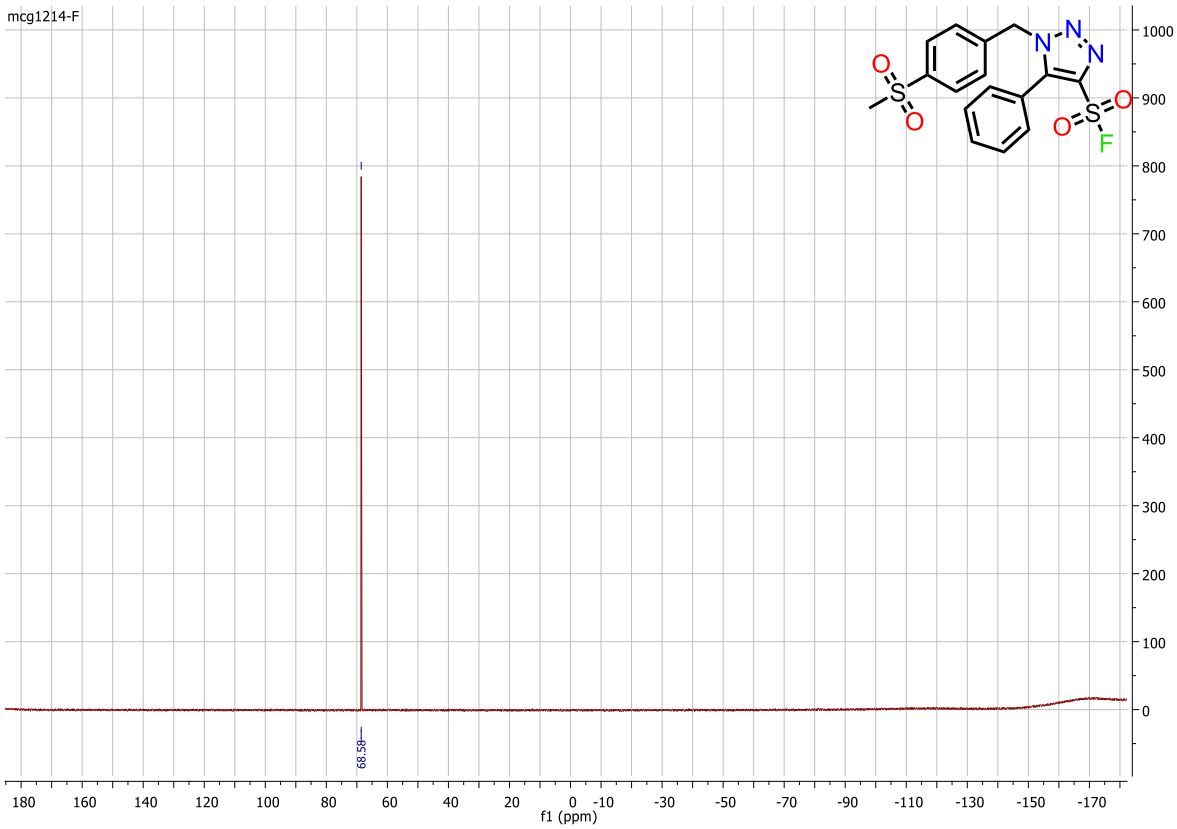

csl-1101-1-col
f1 (ppm)
Cl
N
N
N
O
S
O
F

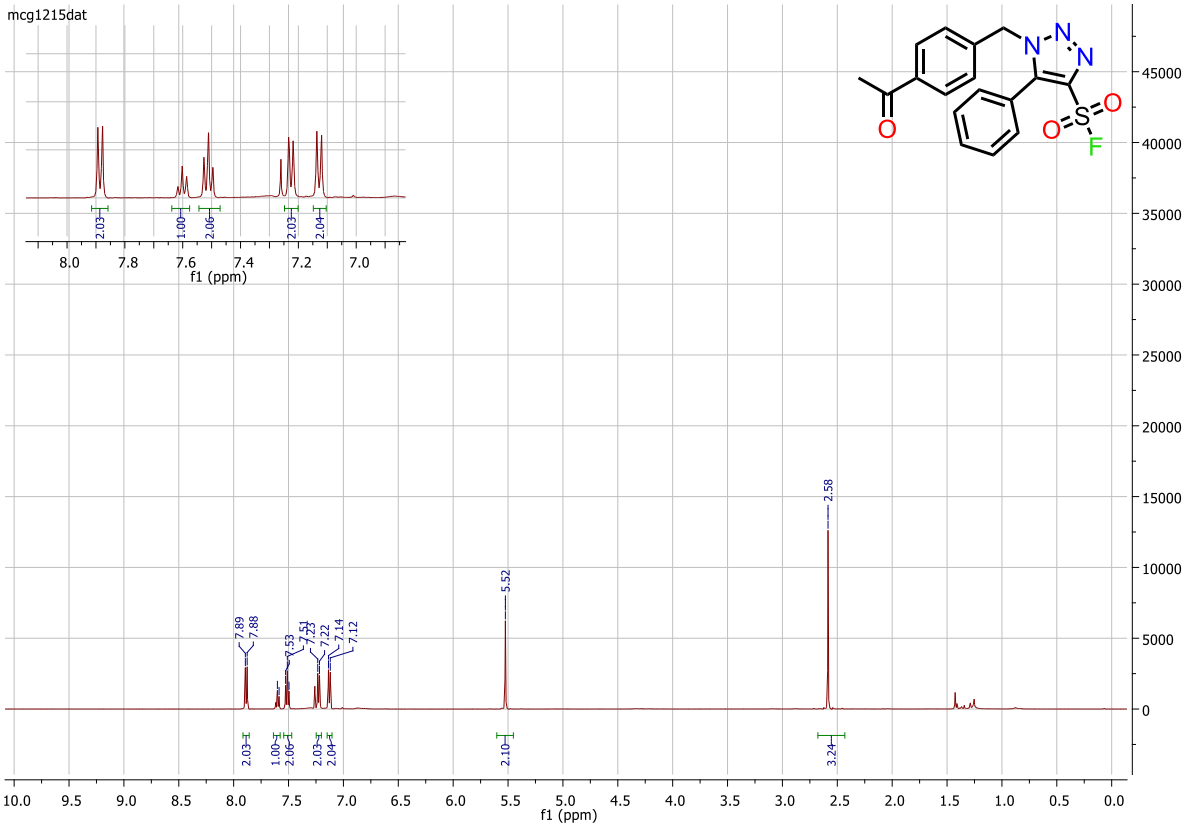

csl-1101-data
f1 (ppm)
Cl
N
N
N
O
S
O
F

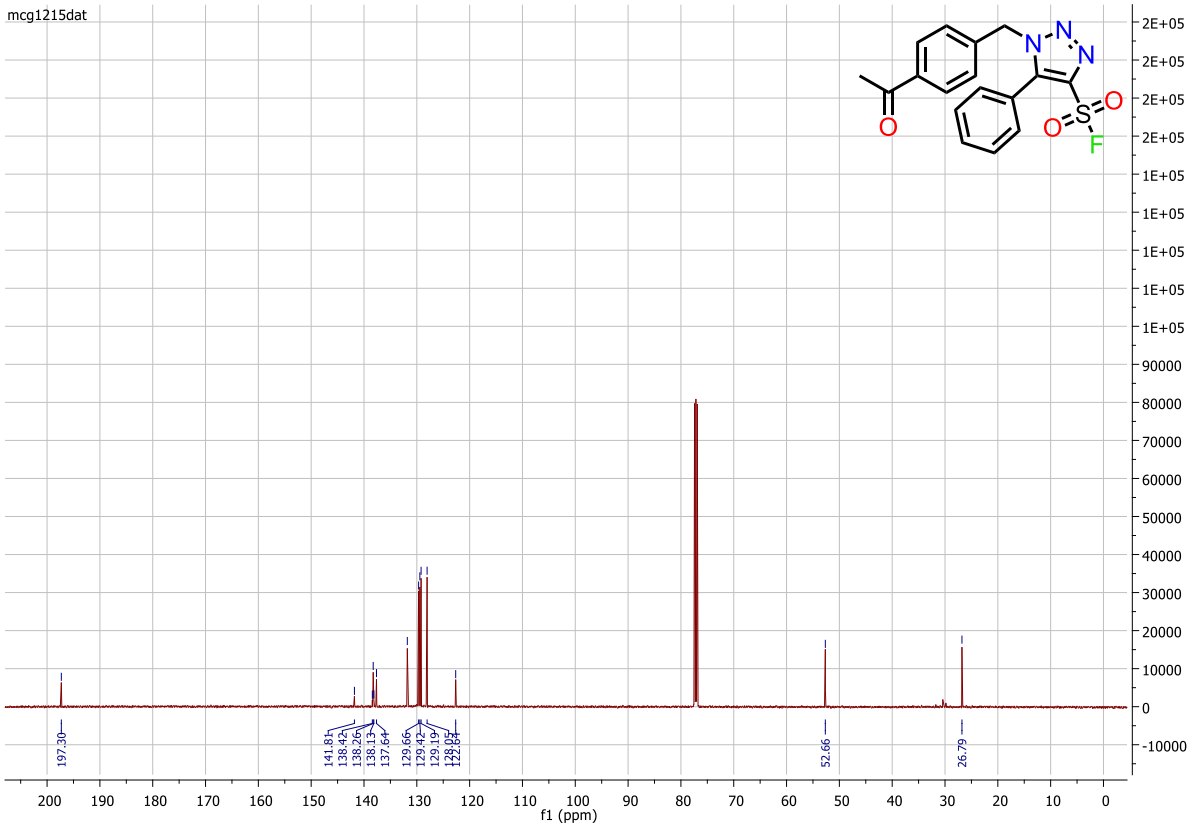

csl-1101-F
Cl
N
N
N
S
O
O
F
68.56
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

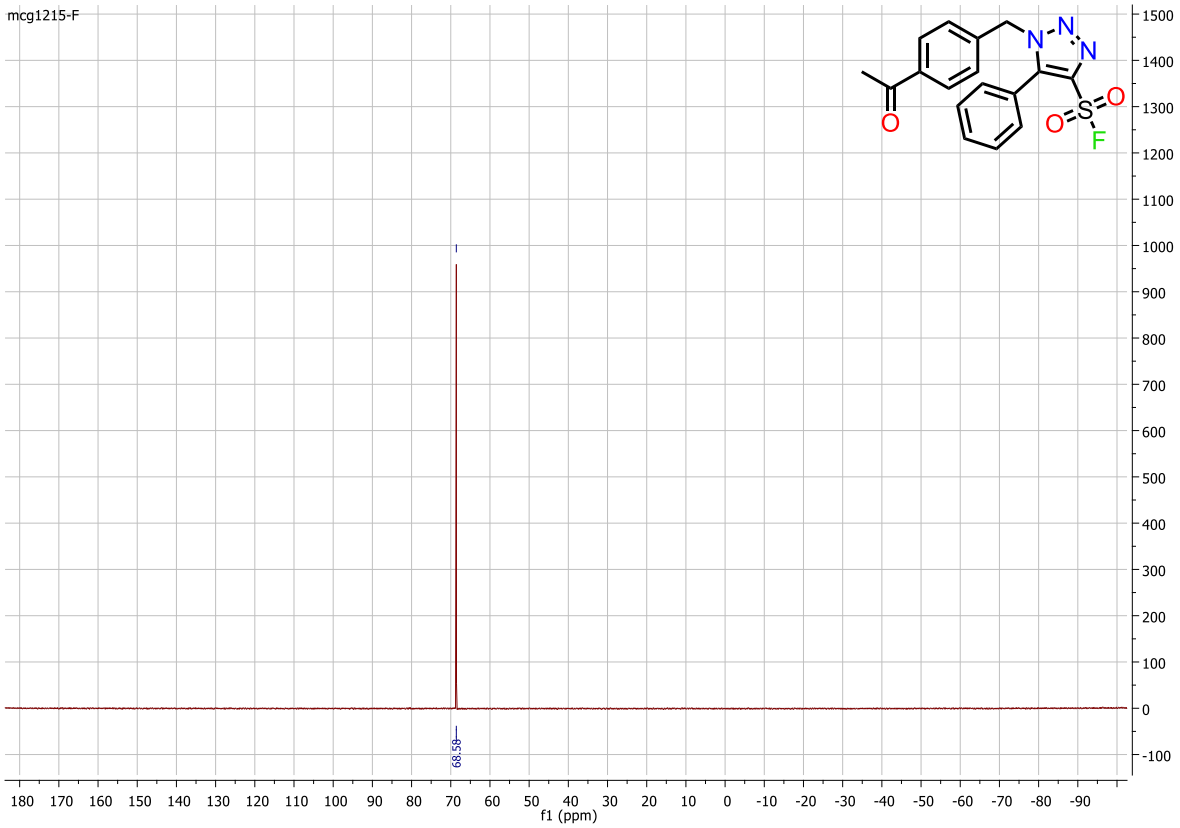

mcg1214dat
f1 (ppm)

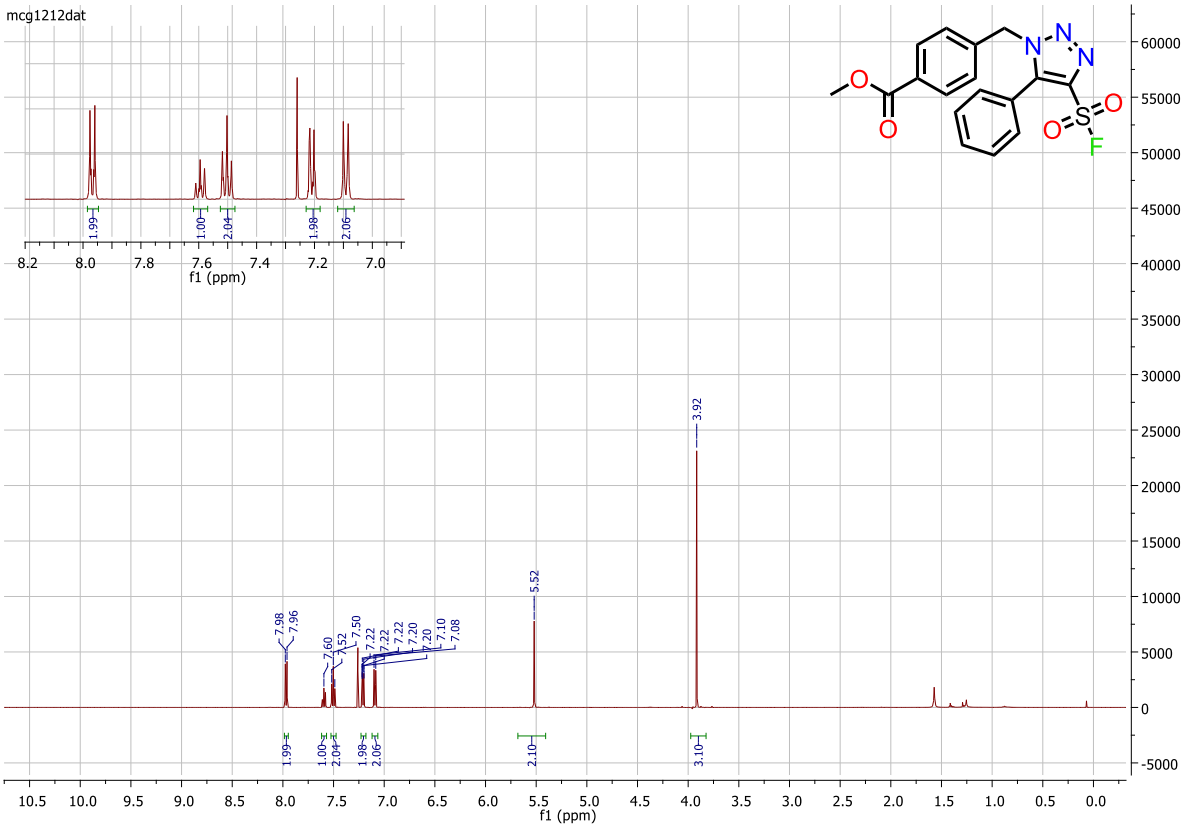

mcg1214dat
f1 (ppm)

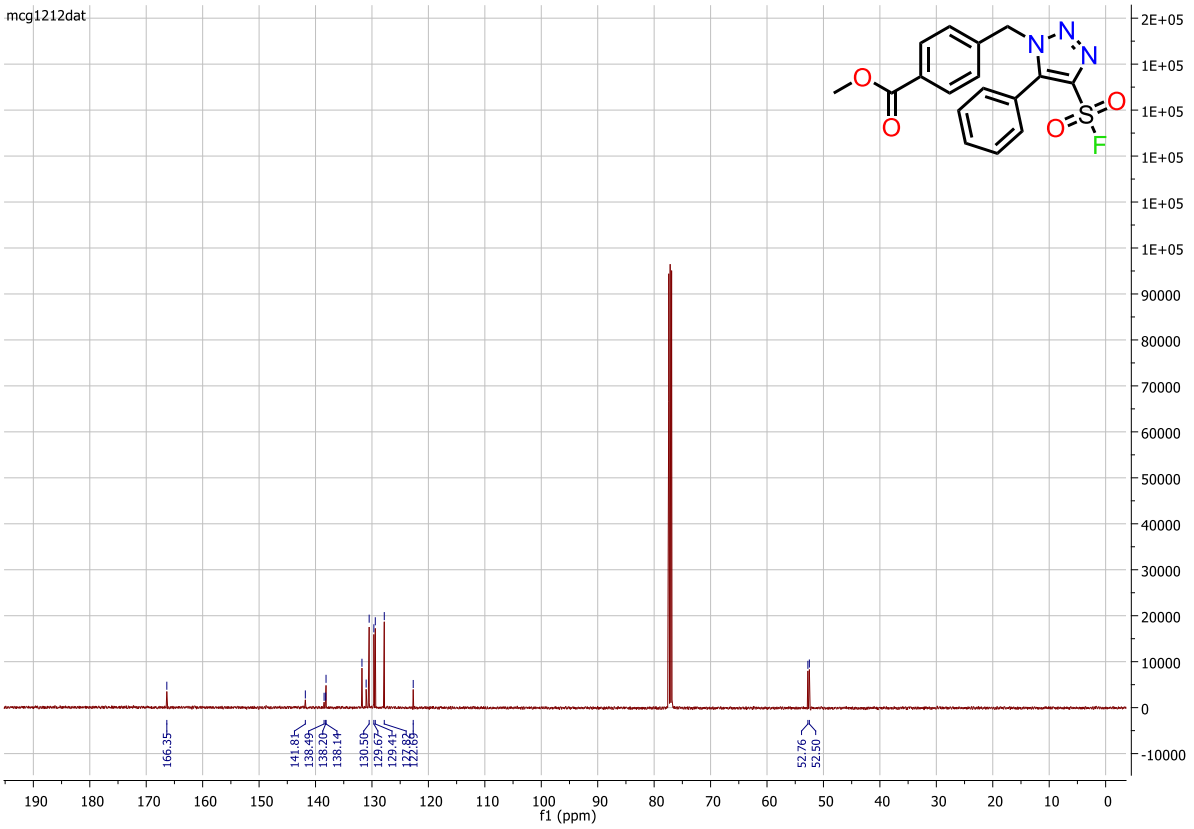

mcg1214-F
68.58
f1 (ppm)

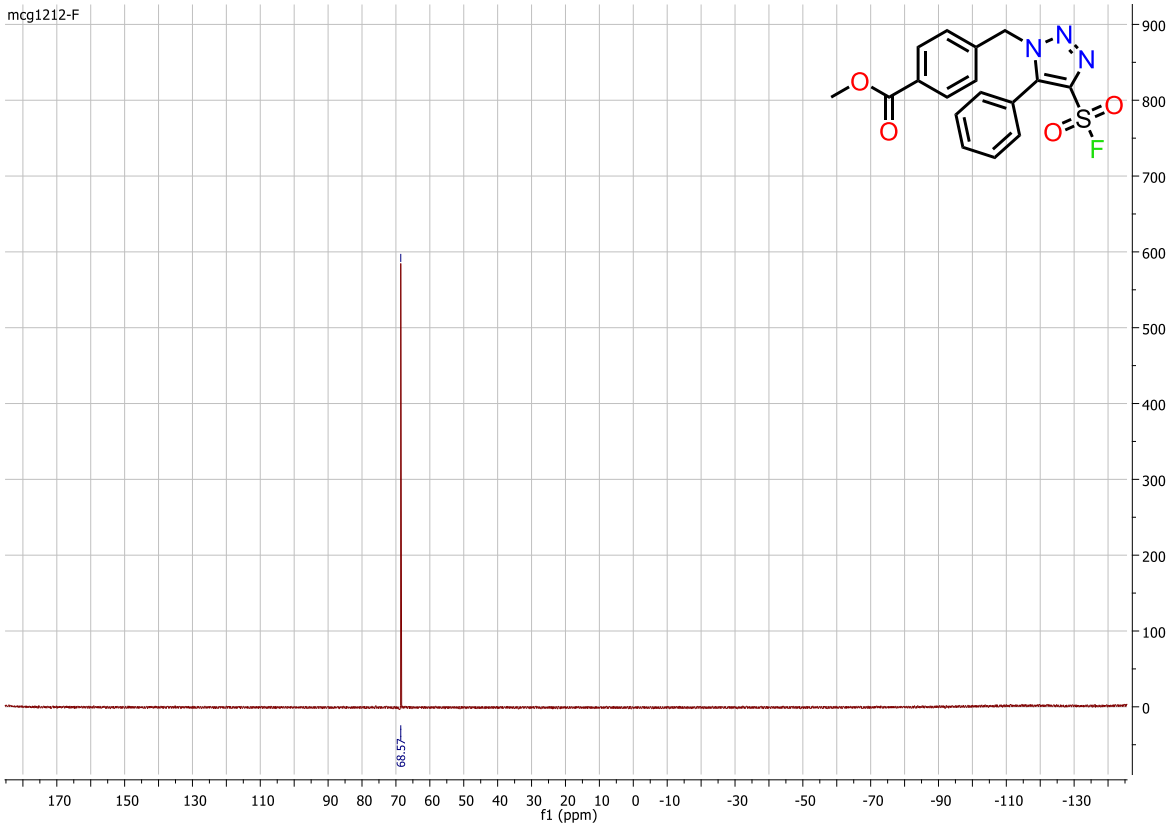

mcg1215dat
f1 (ppm)
7.89
7.88
7.53
7.51
7.23
7.22
7.14
7.12
5.52
2.58

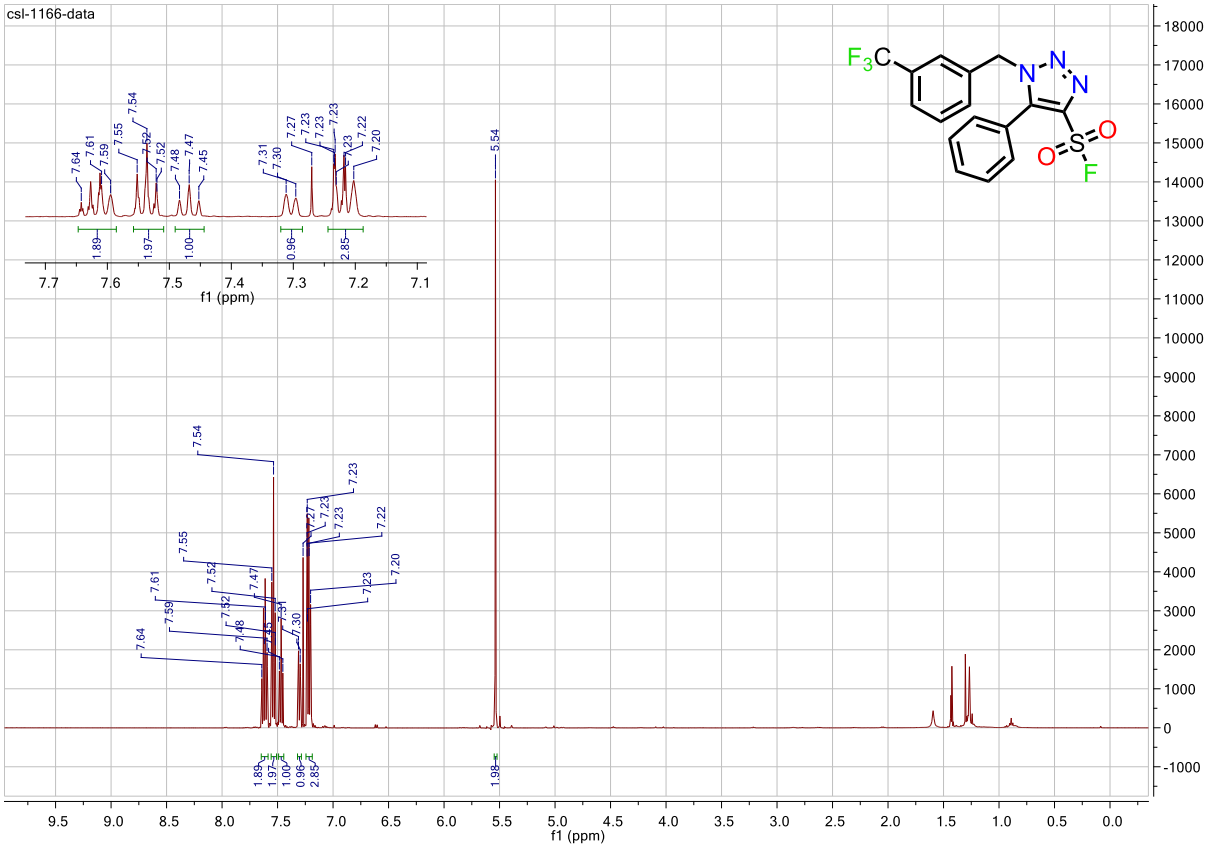

mcg1215dat
f1 (ppm)
197.30
141.81
138.42
138.26
138.13
137.64
129.66
129.42
129.19
52.66
26.79

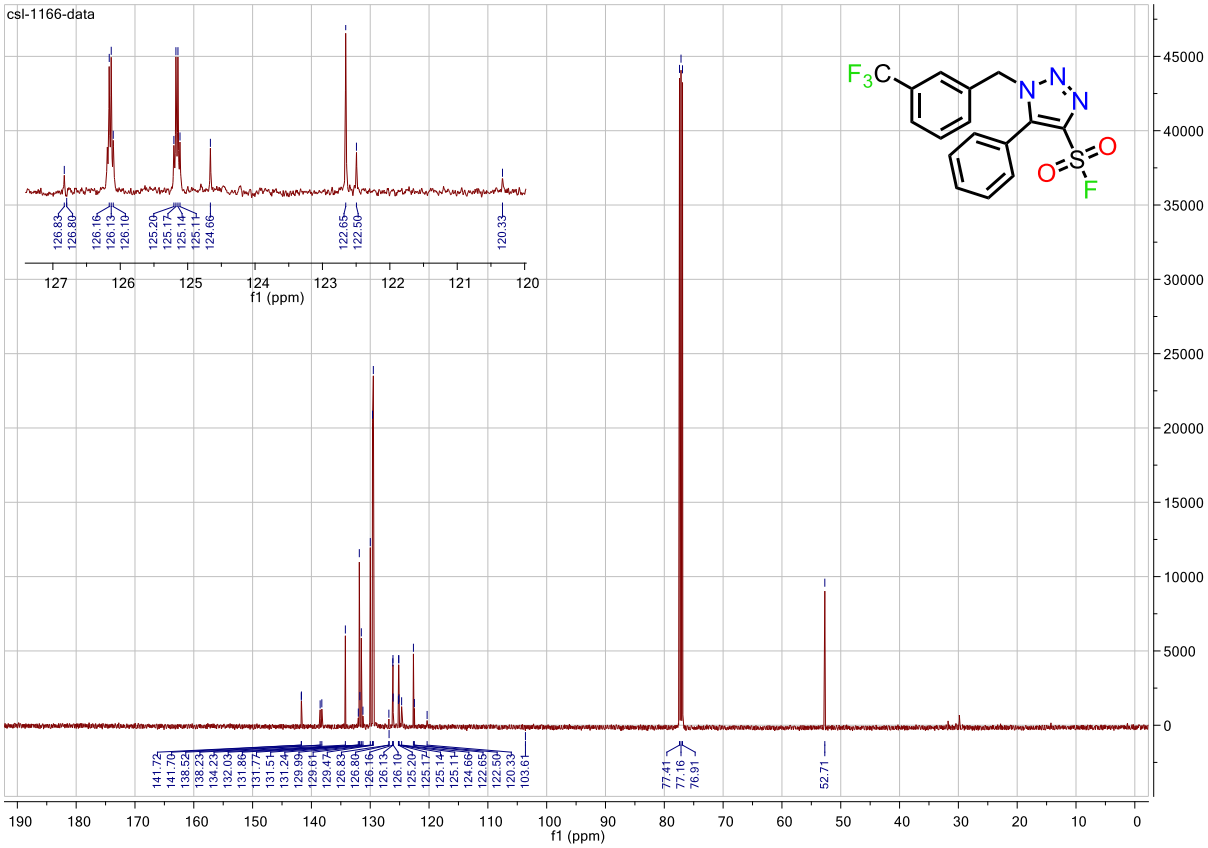

mcg1215-F
68.58
f1 (ppm)

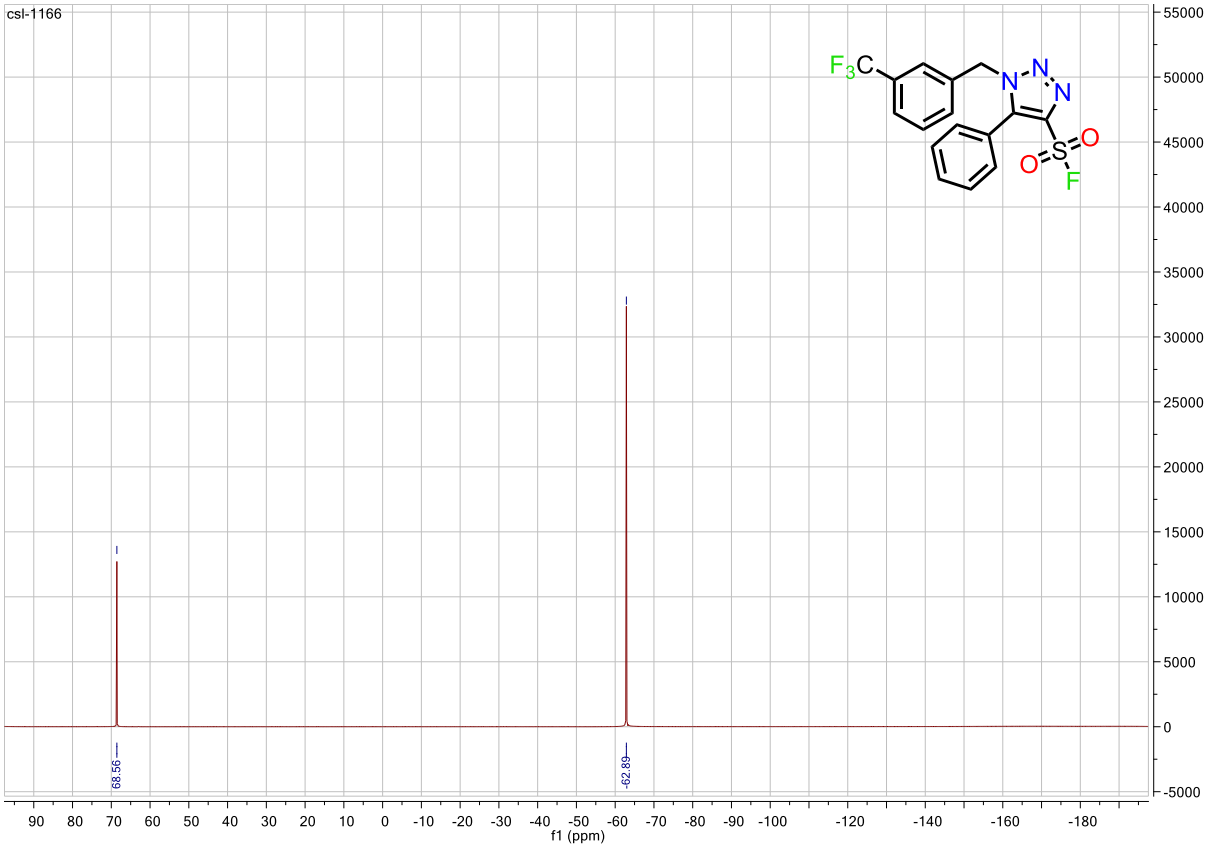

mcg1212dat
f1 (ppm)
7.98
7.96
7.60
7.52
7.50
7.22
7.22
7.20
7.20
7.10
7.08
5.52
3.92
1.99
1.00
2.04
1.98
2.06
2.10
3.10

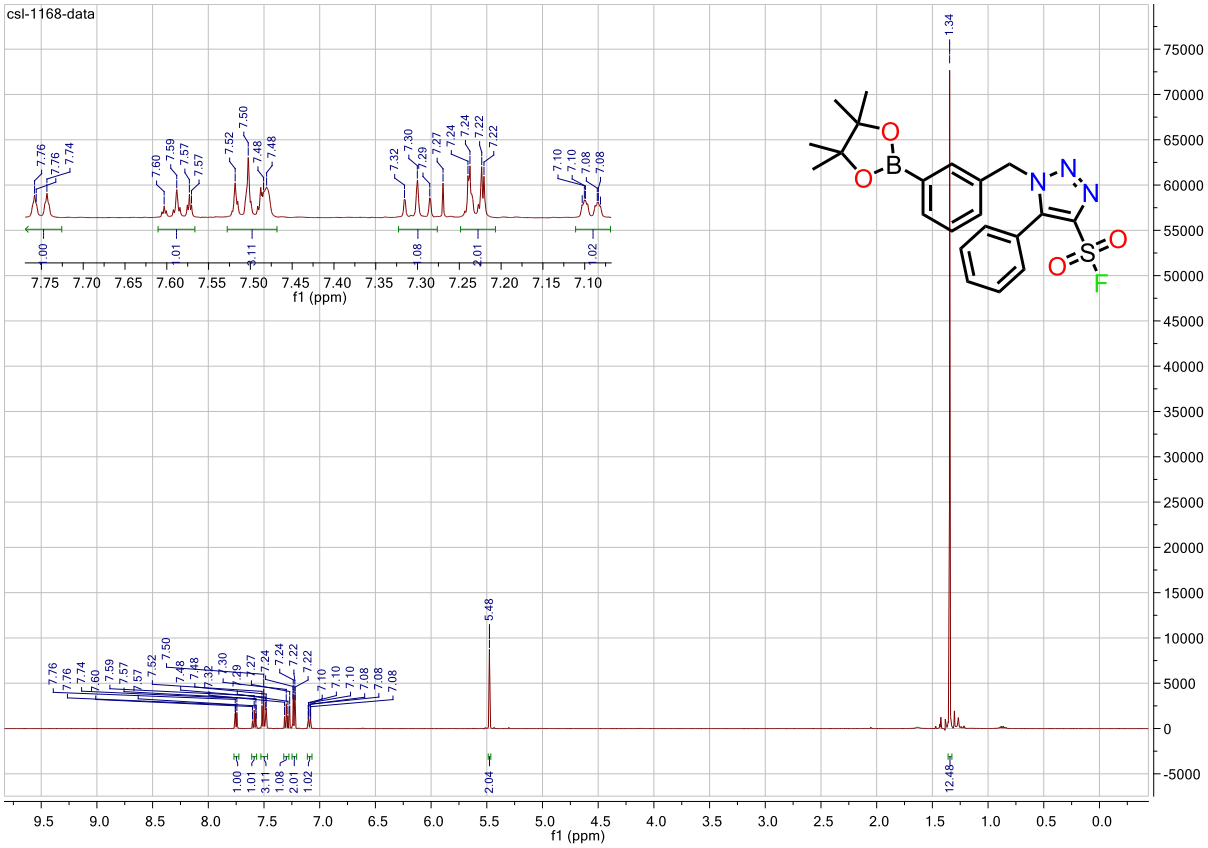

mcg1212dat
f1 (ppm)
166.35
141.81
138.49
138.20
138.14
130.50
129.67
129.41
52.76
52.50

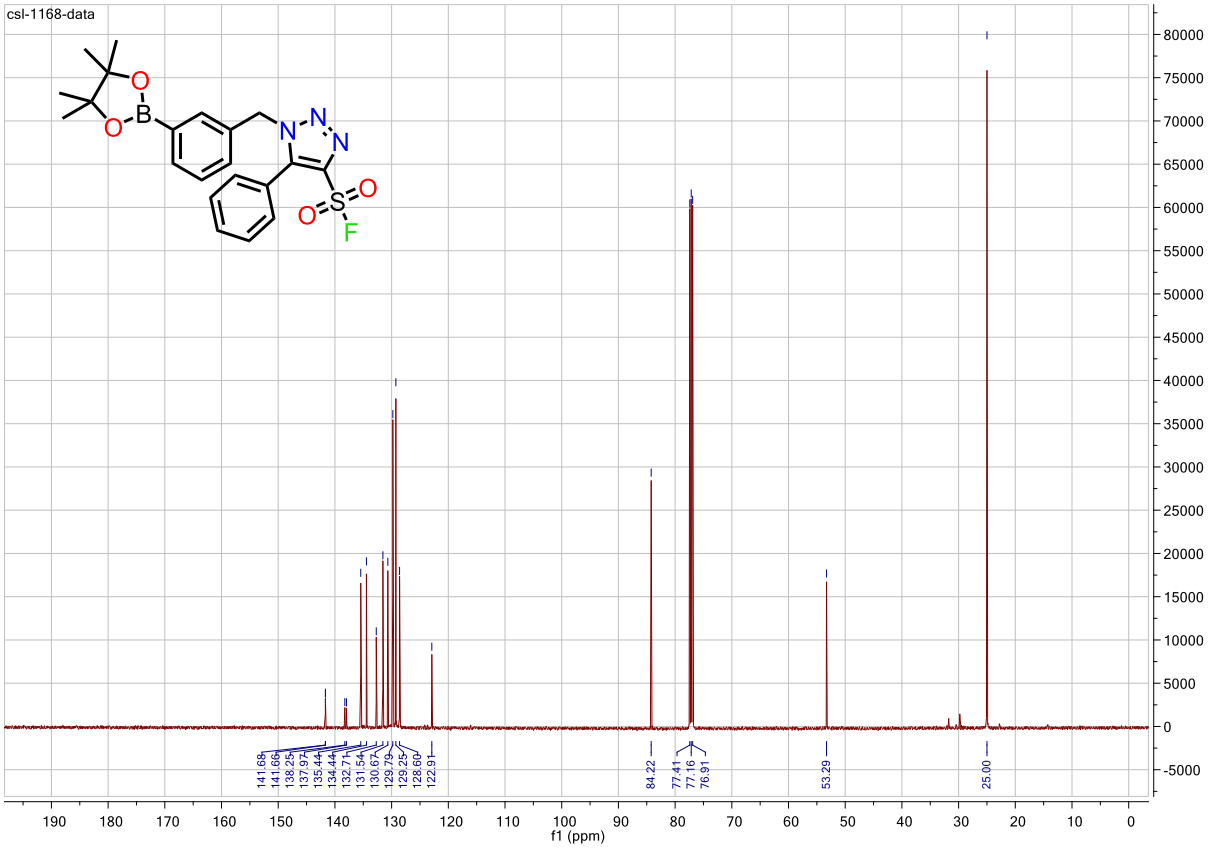

mcg1212-F
68.57
f1 (ppm)

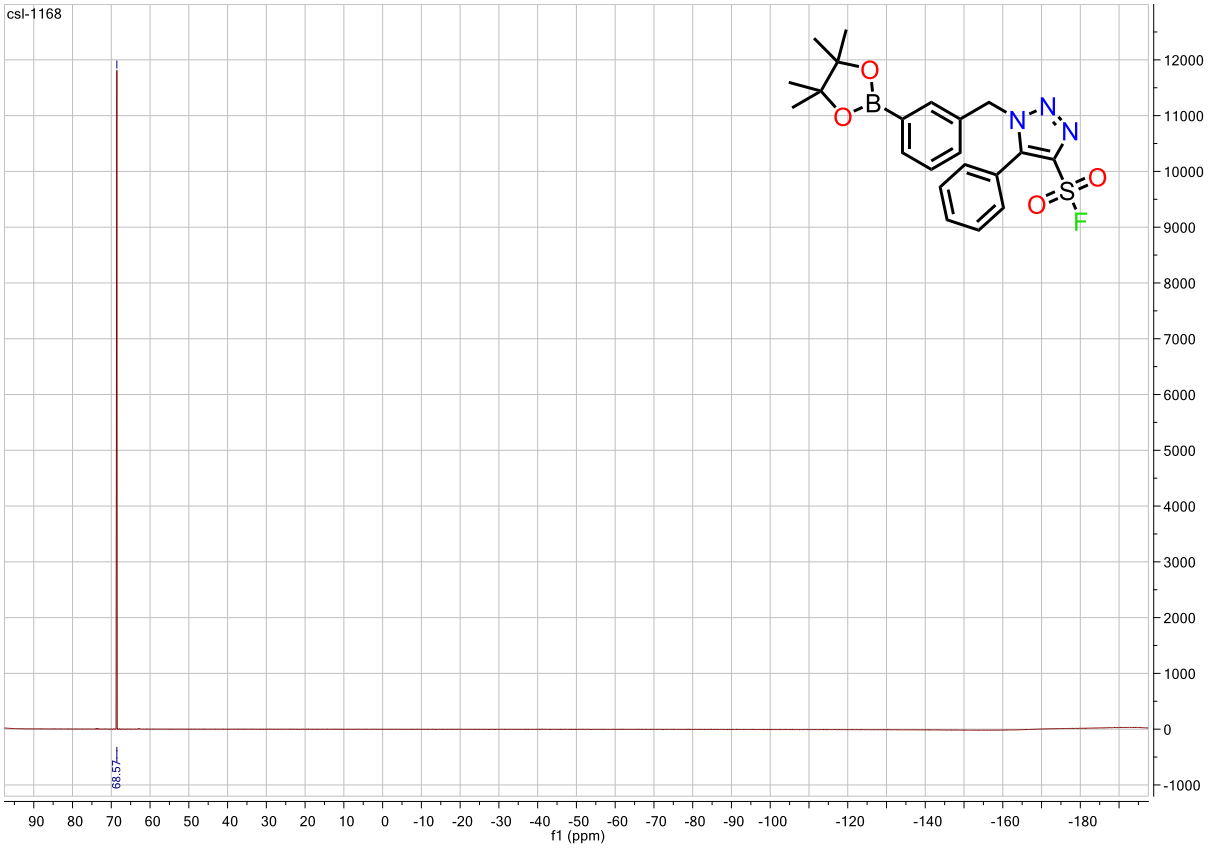

csl-1166-data
f1 (ppm)

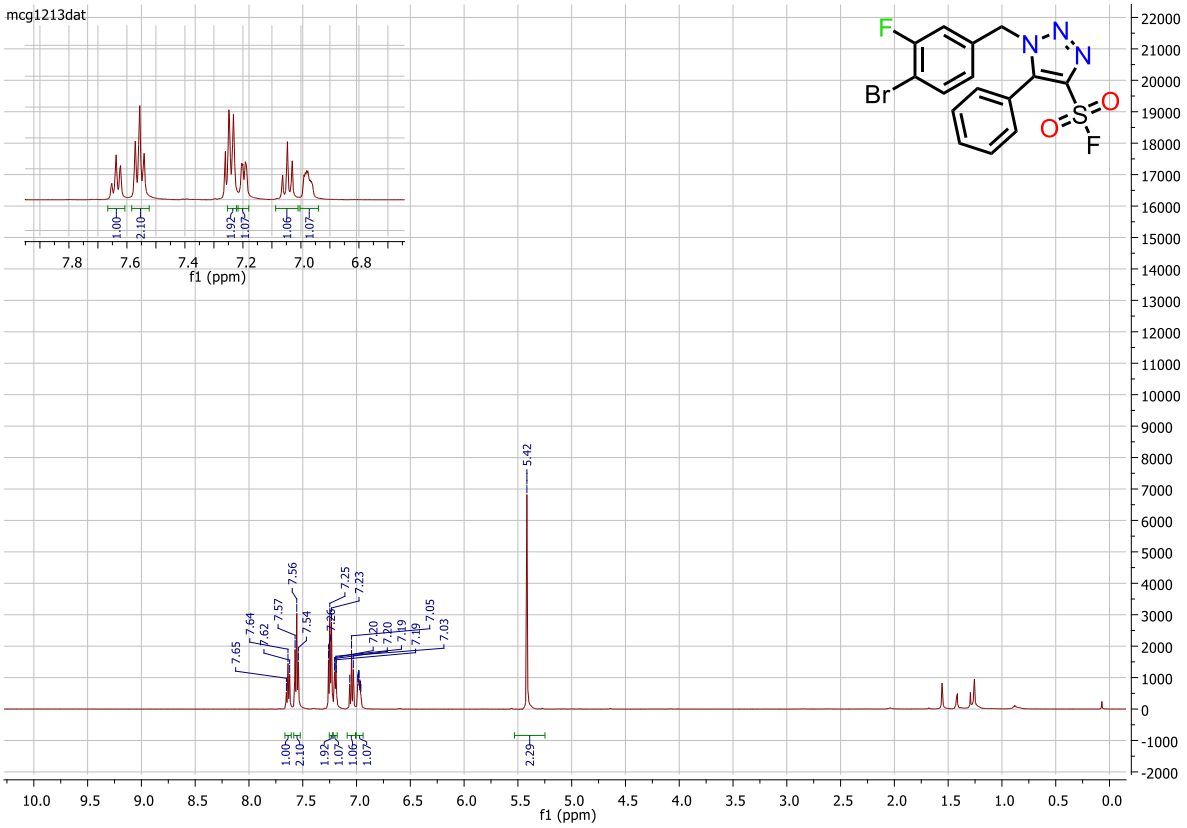

csl-1166-data
f1 (ppm)

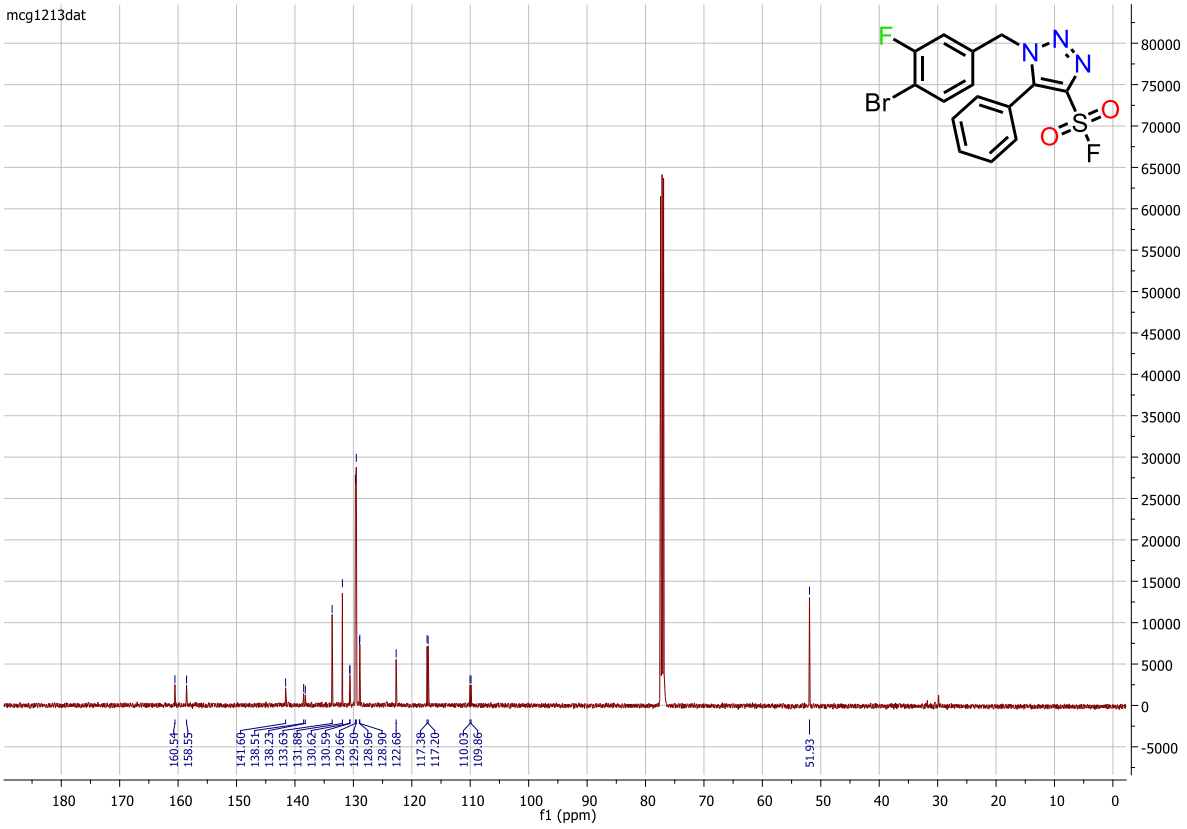

csl-1166
F3C
N
N
N
S
O
O
F
55000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
-5000
68.56
-62.89
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)

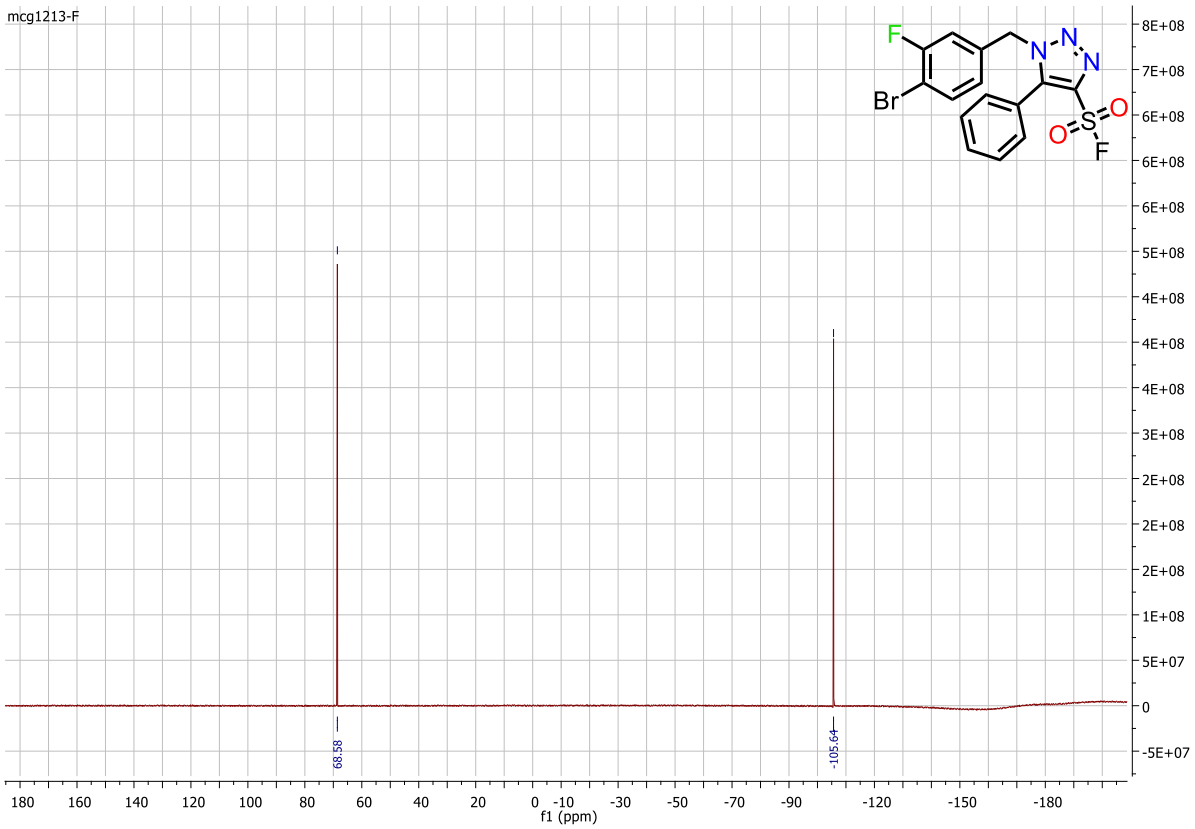

csl-1168-data
f1 (ppm)

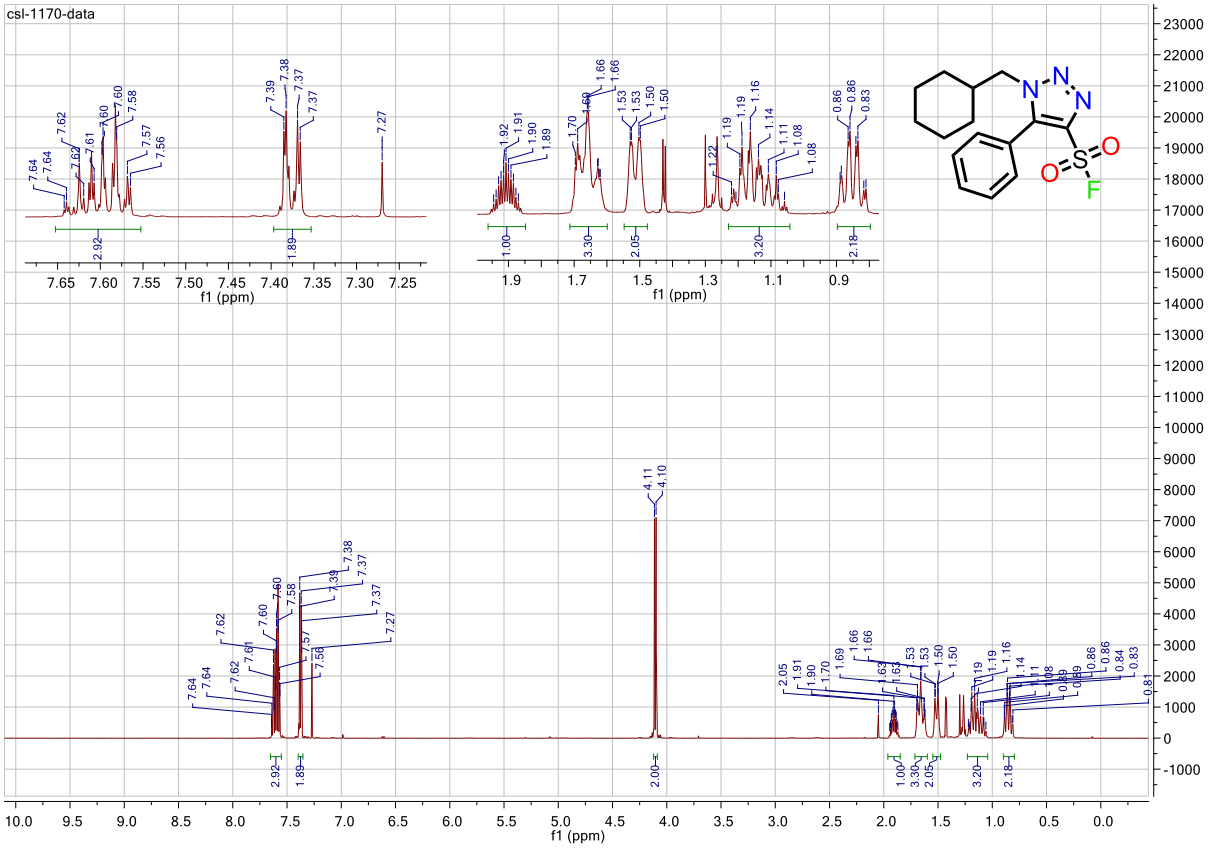

csl-1168-data
f1 (ppm)

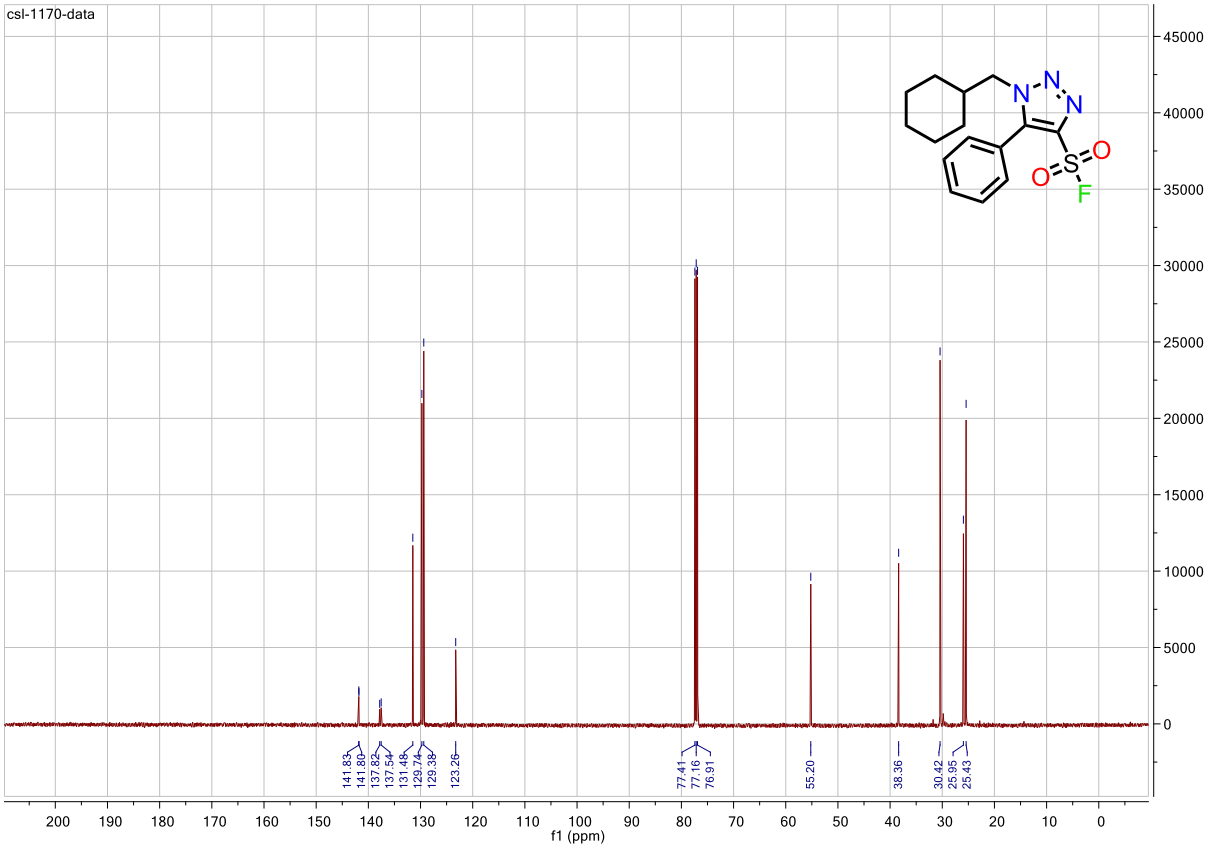

csl-1168
68.57
f1 (ppm)

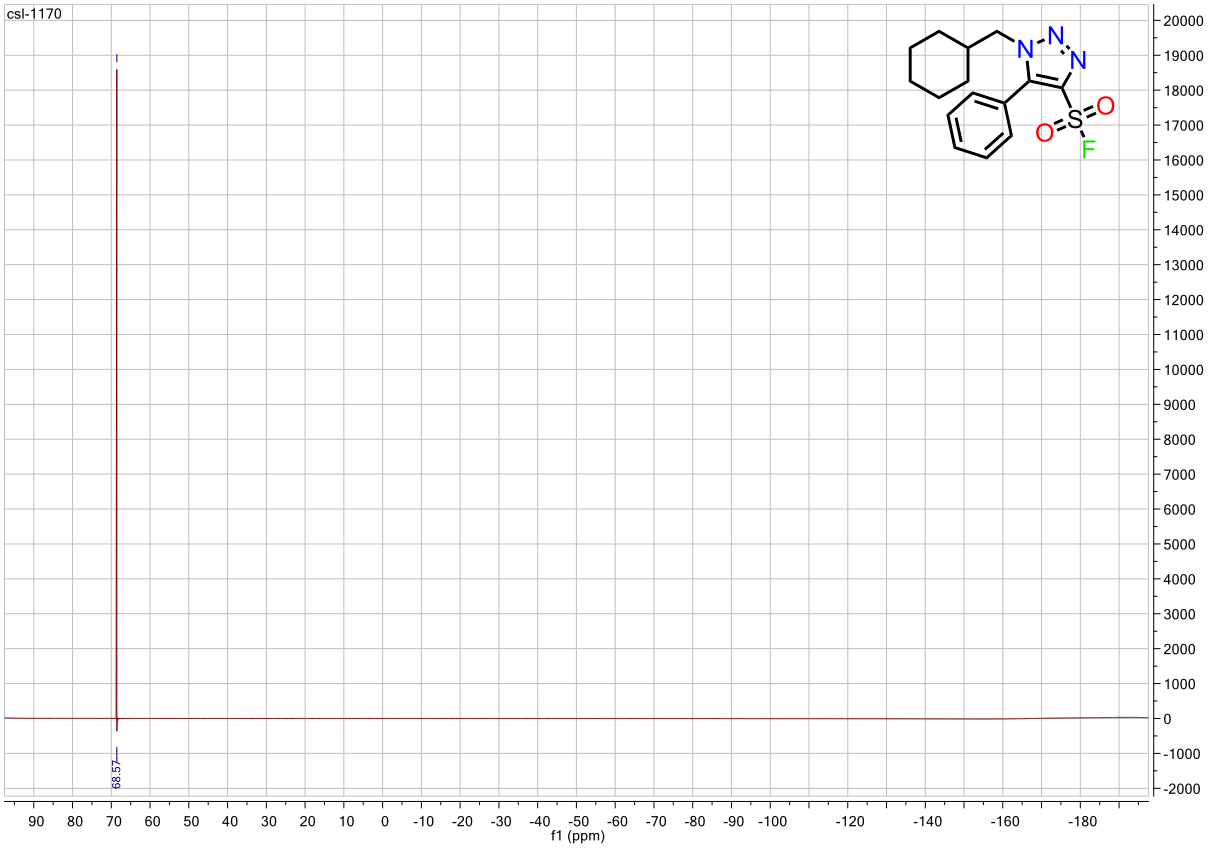

mcg1213dat
F
Br
N
N
N
S
O
O
F
7.65
7.64
7.62
7.57
7.56
7.54
7.25
7.23
7.20
7.10
7.05
7.03
5.42
f1 (ppm)

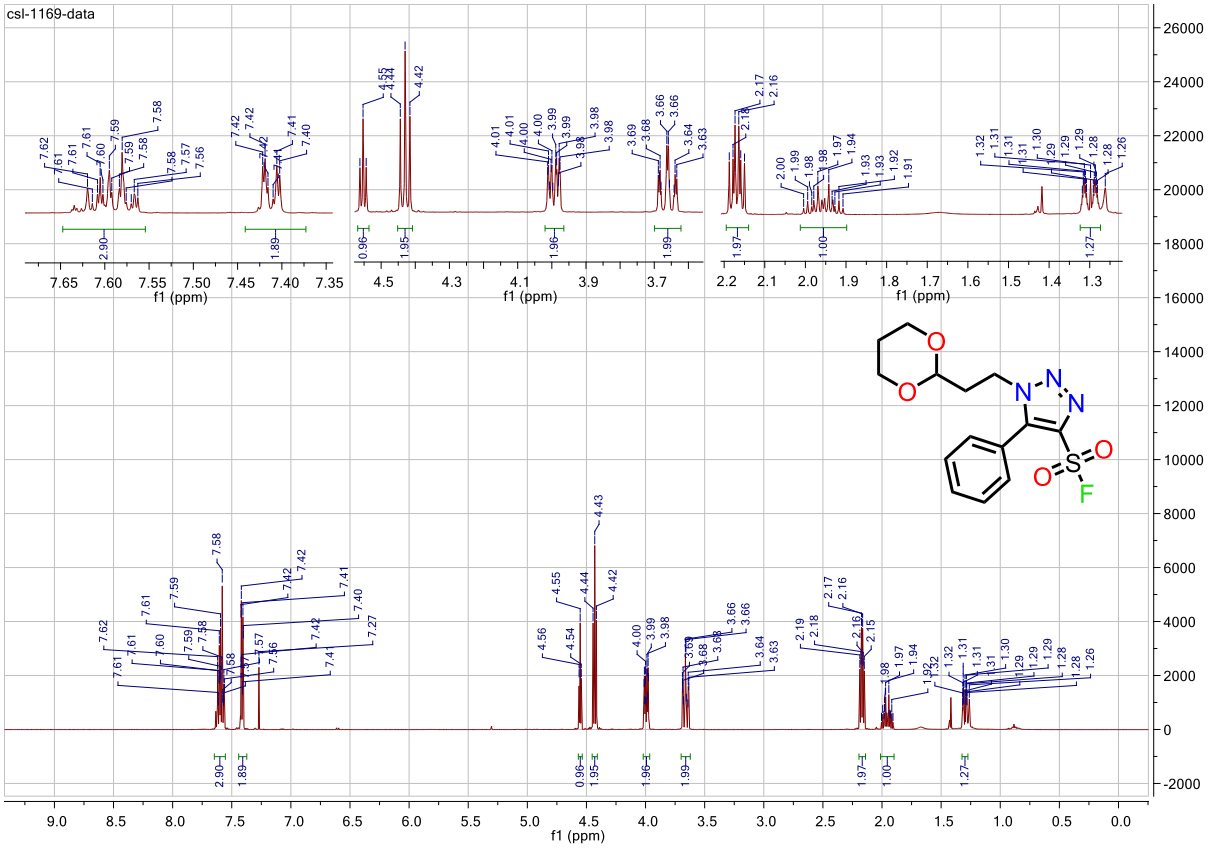

mcg1213dat
F
Br
N
N
N
S
O
O
F
160.54
158.55
141.60
138.51
138.23
133.63
131.88
130.62
130.59
129.66
129.50
128.96
128.90
122.68
117.38
117.20
110.03
109.86
51.93
f1 (ppm)

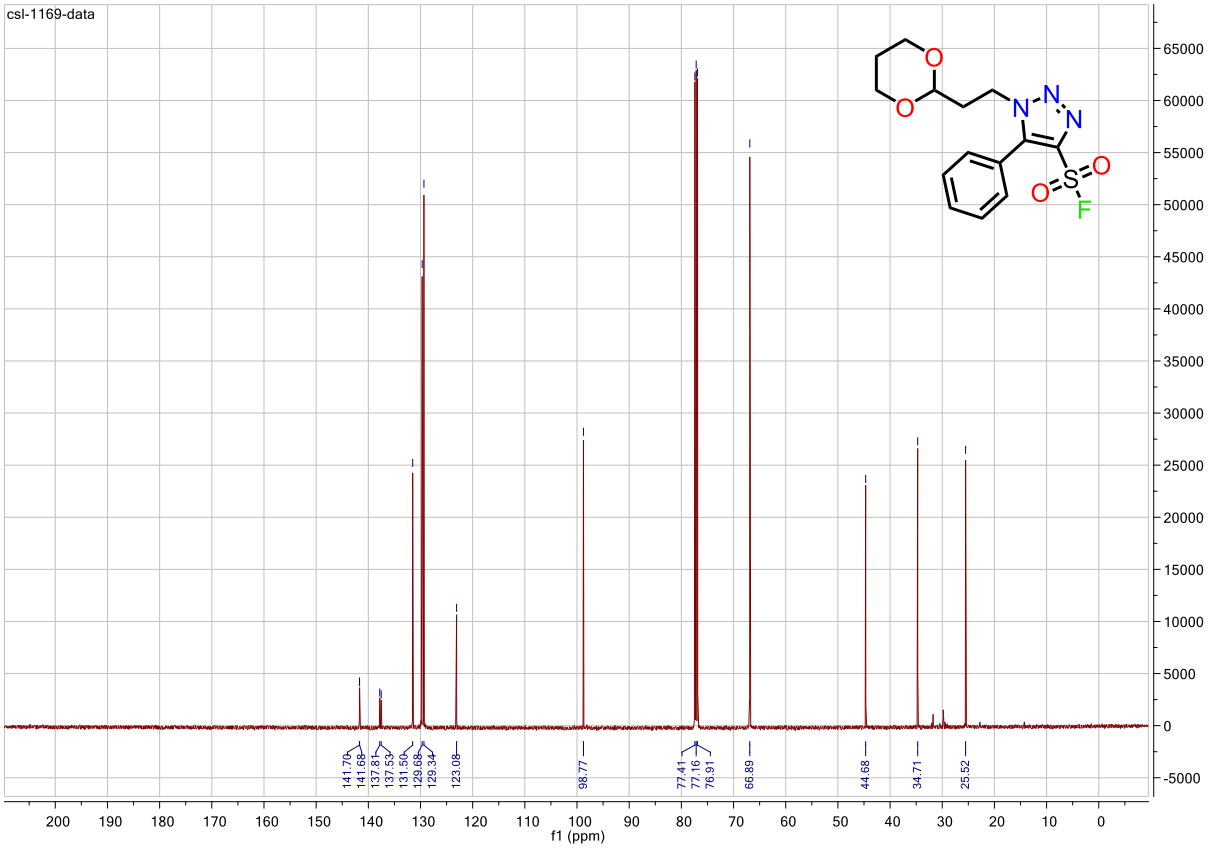

mcg1213-F
F
Br
N
N
N
O
O
S
F
8E+08
7E+08
6E+08
6E+08
6E+08
5E+08
4E+08
4E+08
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
-5E+07
68.58
-105.64
180
160
140
120
100
80
60
40
20
0
-10
-30
-50
-70
-90
-120
-150
-180
f1 (ppm)

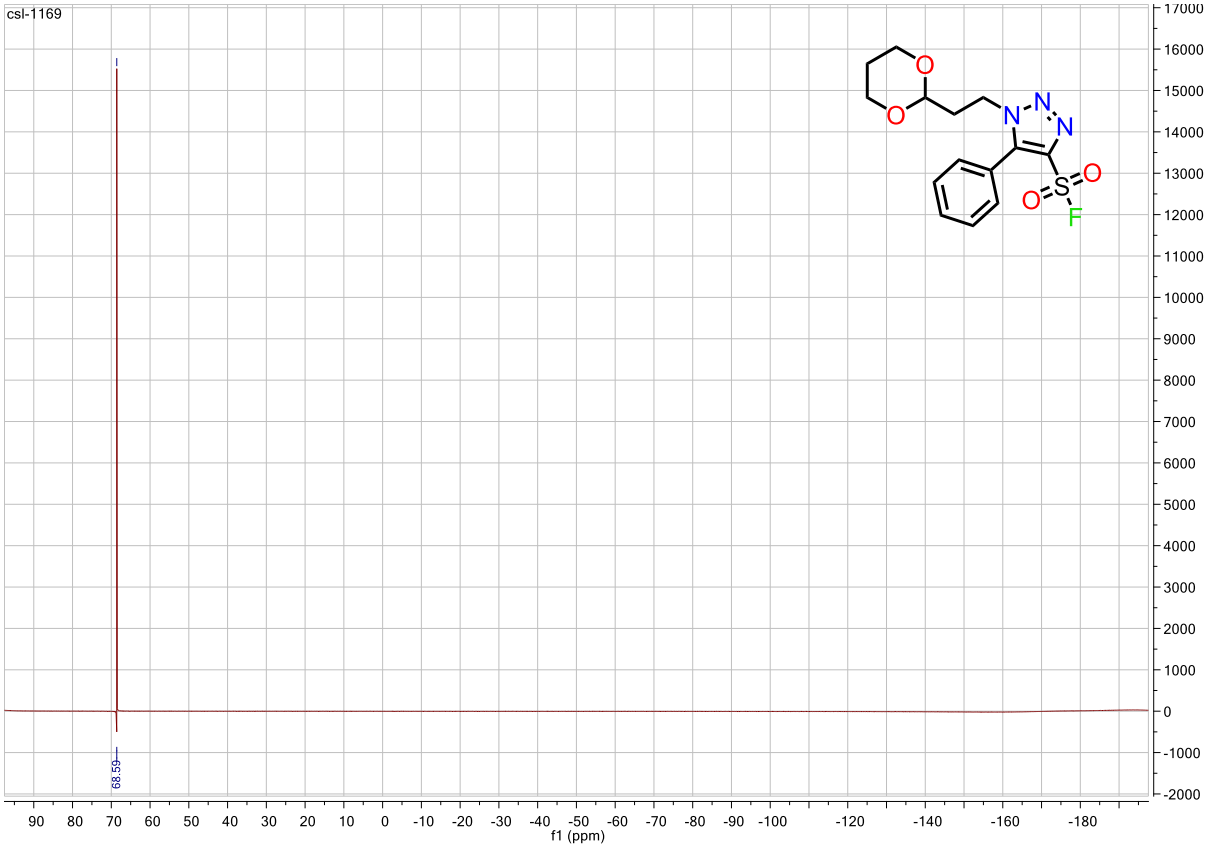

csl-1170-data
f1 (ppm)

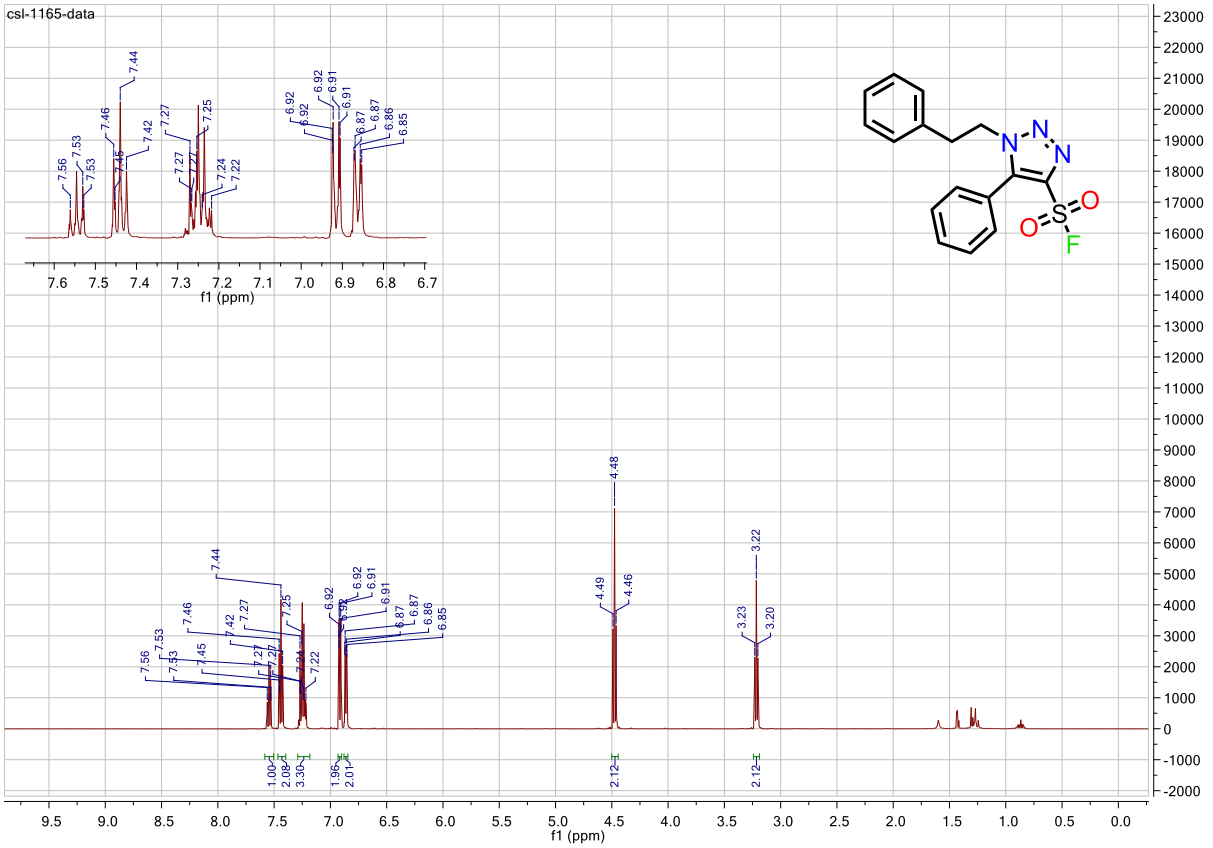

csl-1170-data
f1 (ppm)

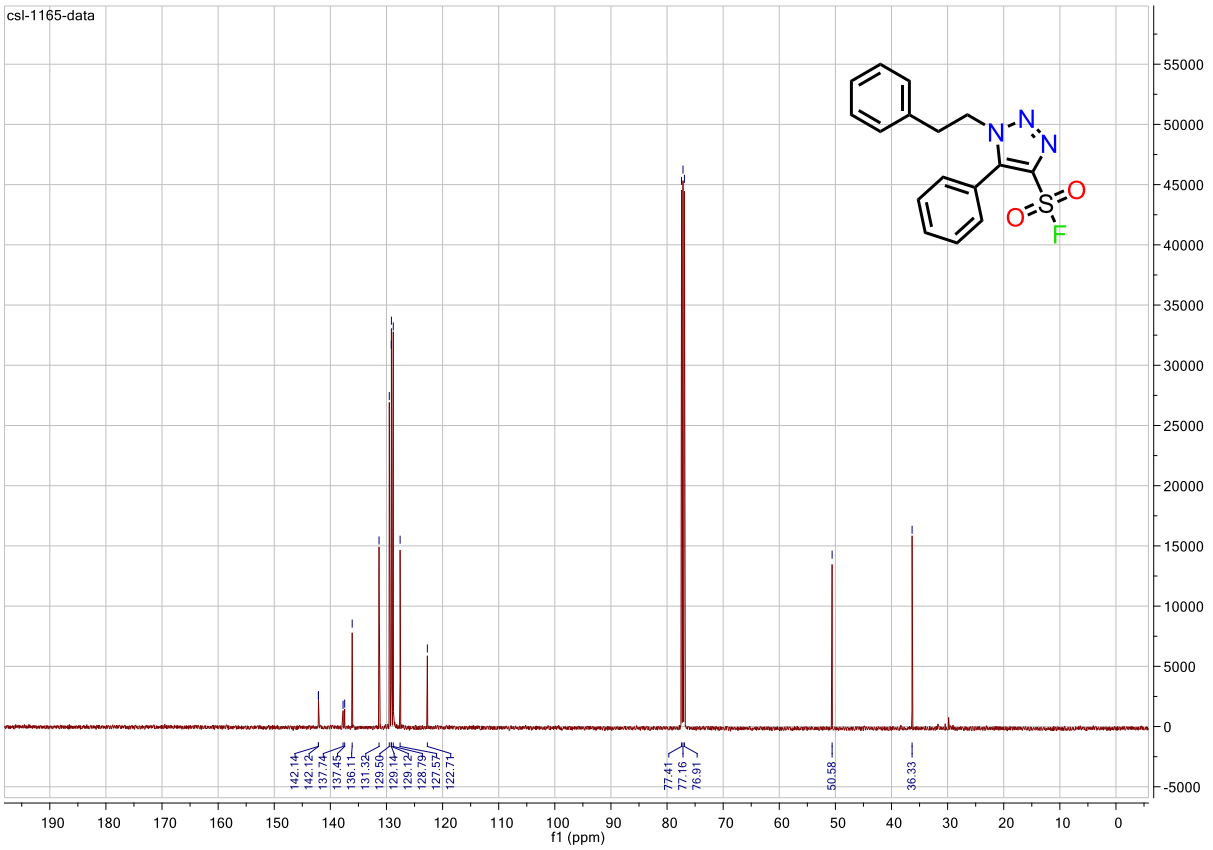

csi-1170
68.57
f1 (ppm)

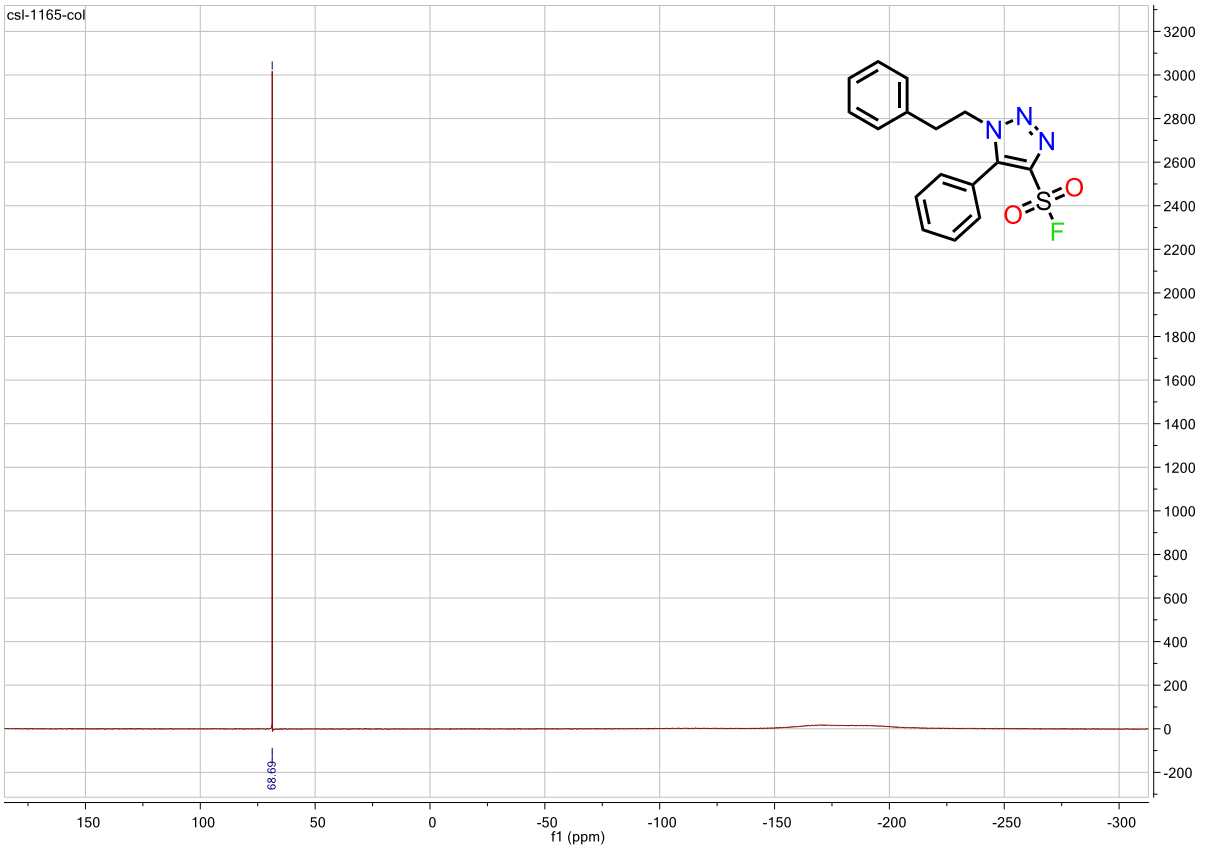

csl-1169-data
f1 (ppm)

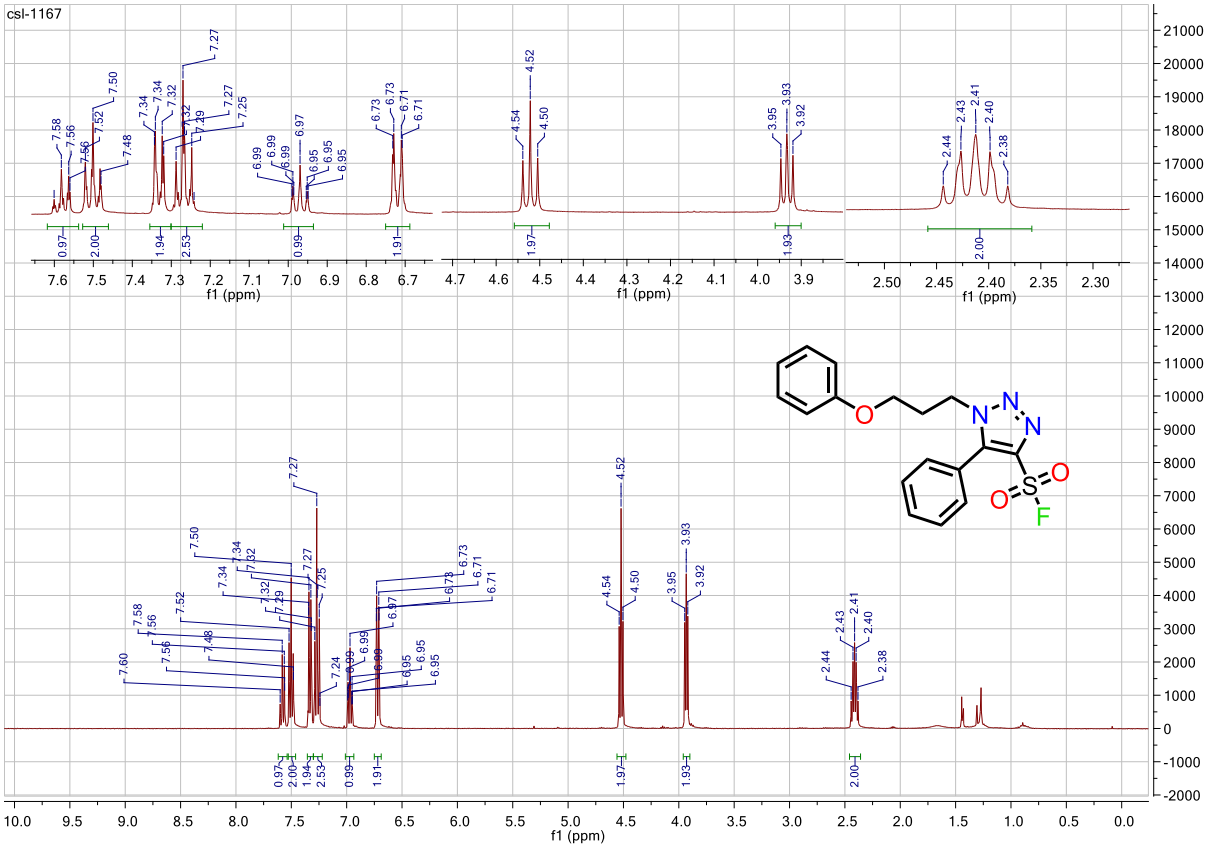

csl-1169-data
f1 (ppm)

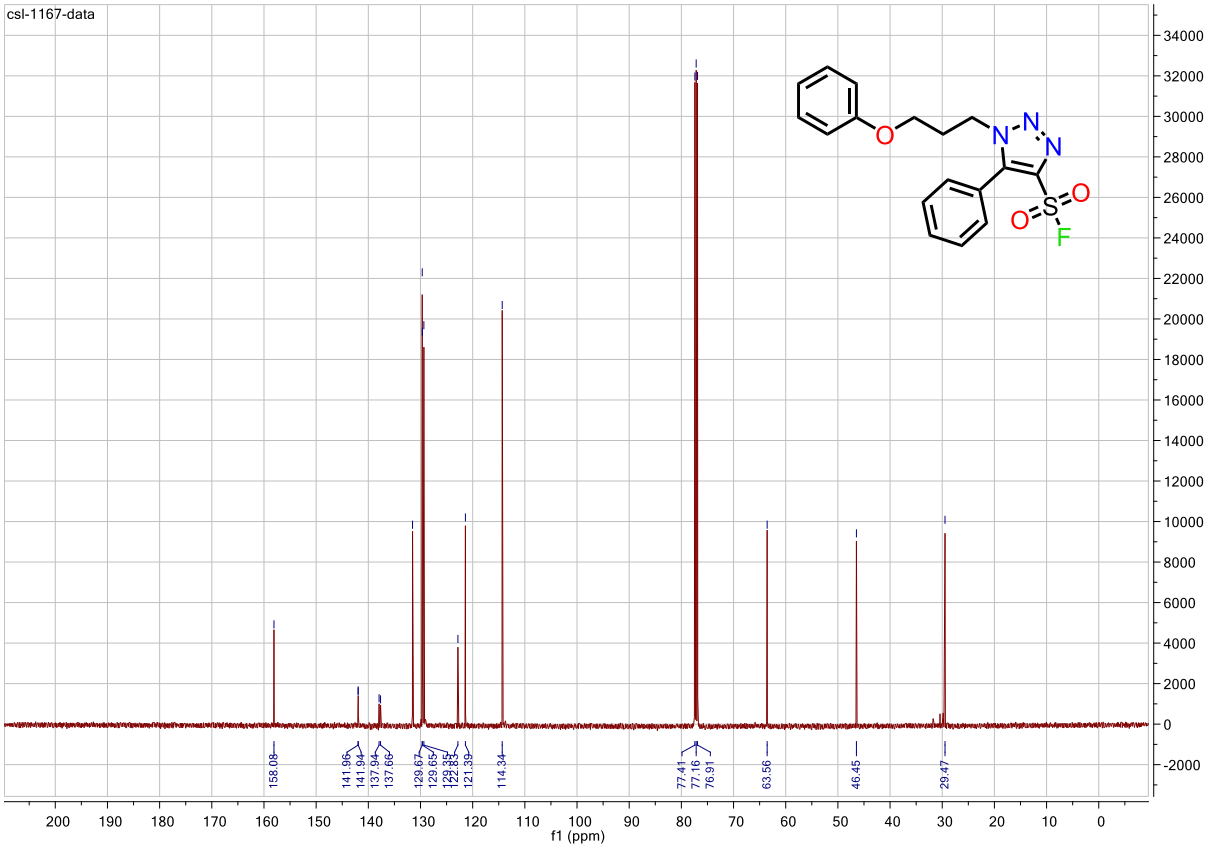

csl-1169
68.59
f1 (ppm)

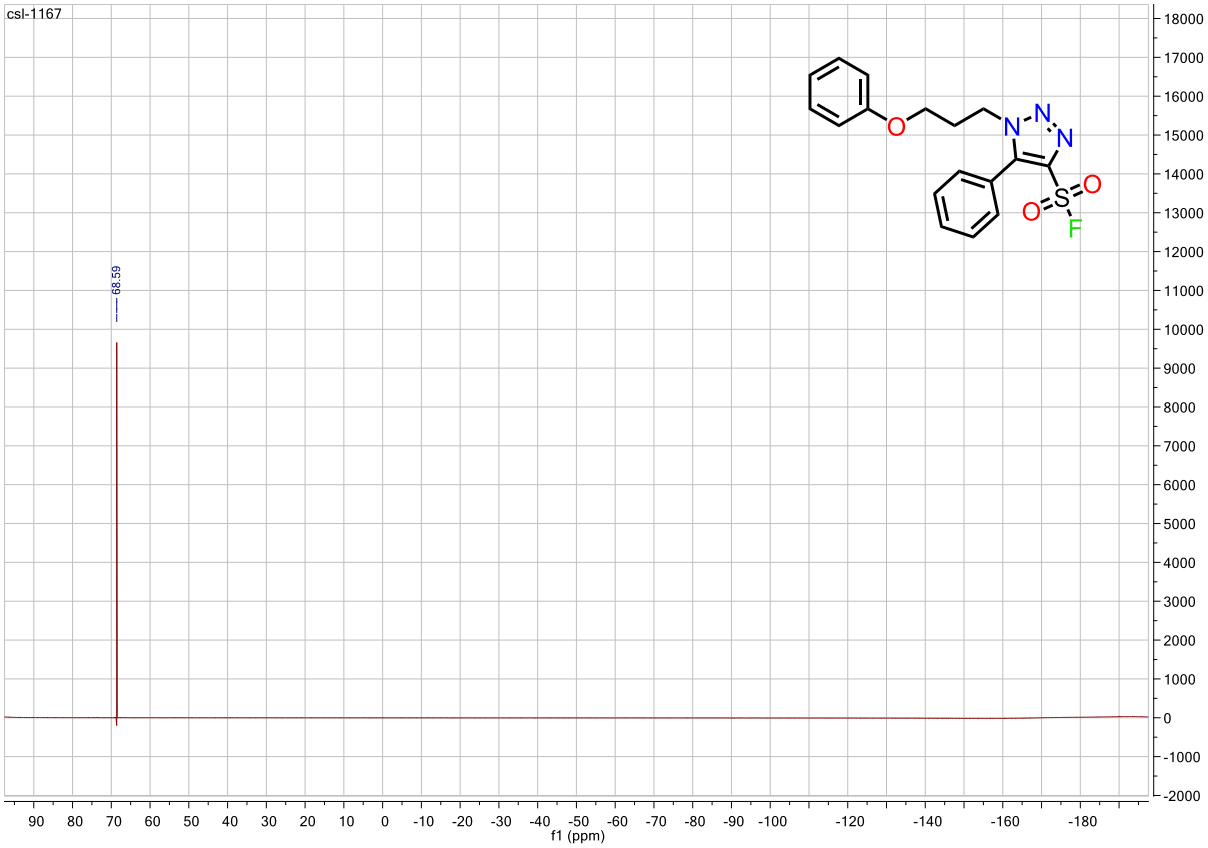

csl-1165-data
f1 (ppm)

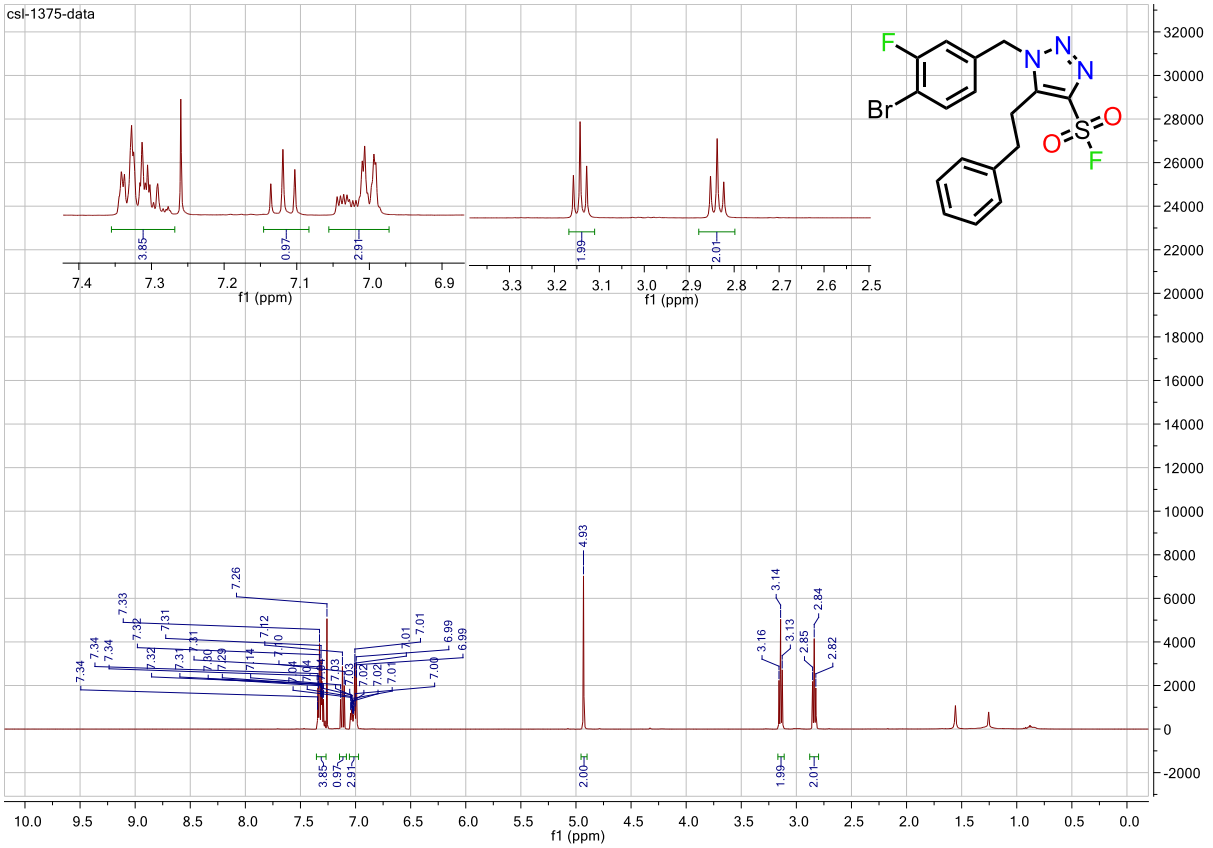

csl-1165-data
f1 (ppm)

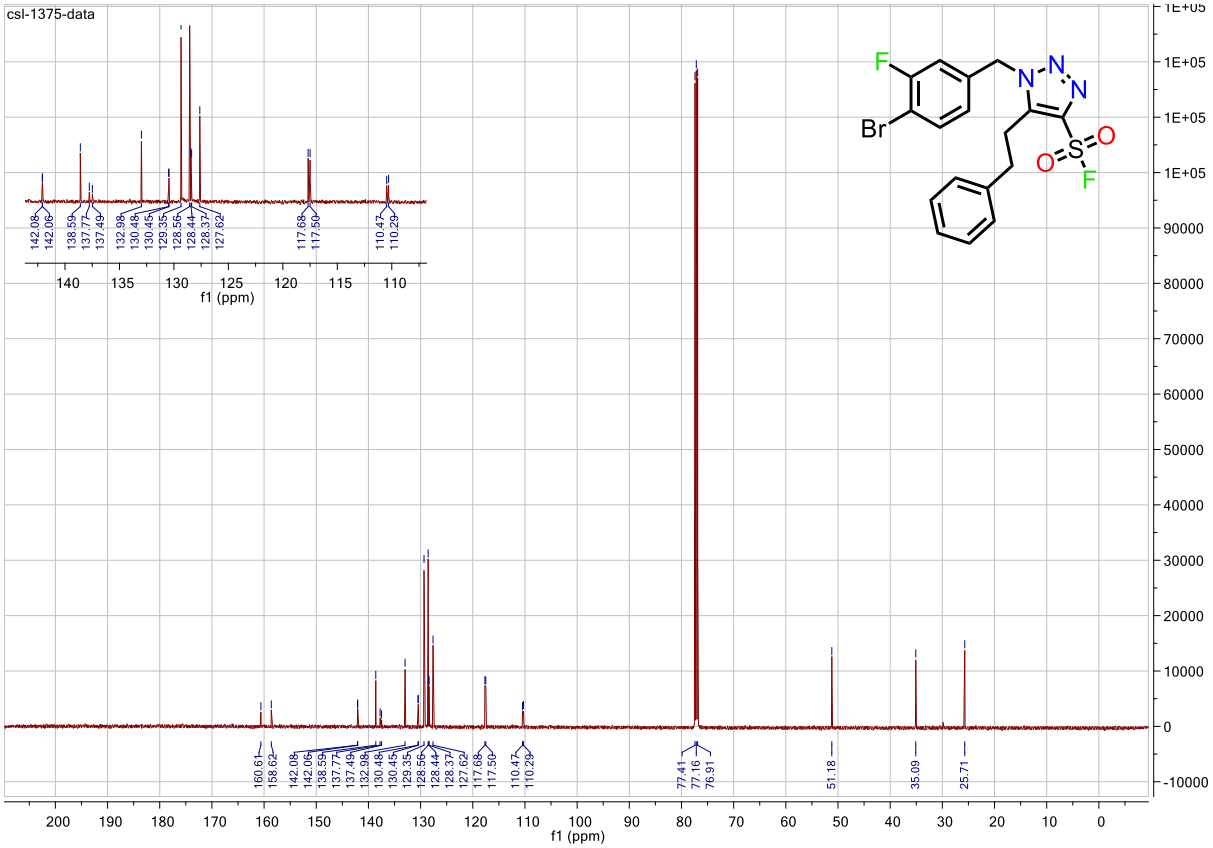

csl-1165-col
68.69
f1 (ppm)
150
100
50
0
-50
-100
-150
-200
-250
-300
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
N
N
N
O
O
S
F

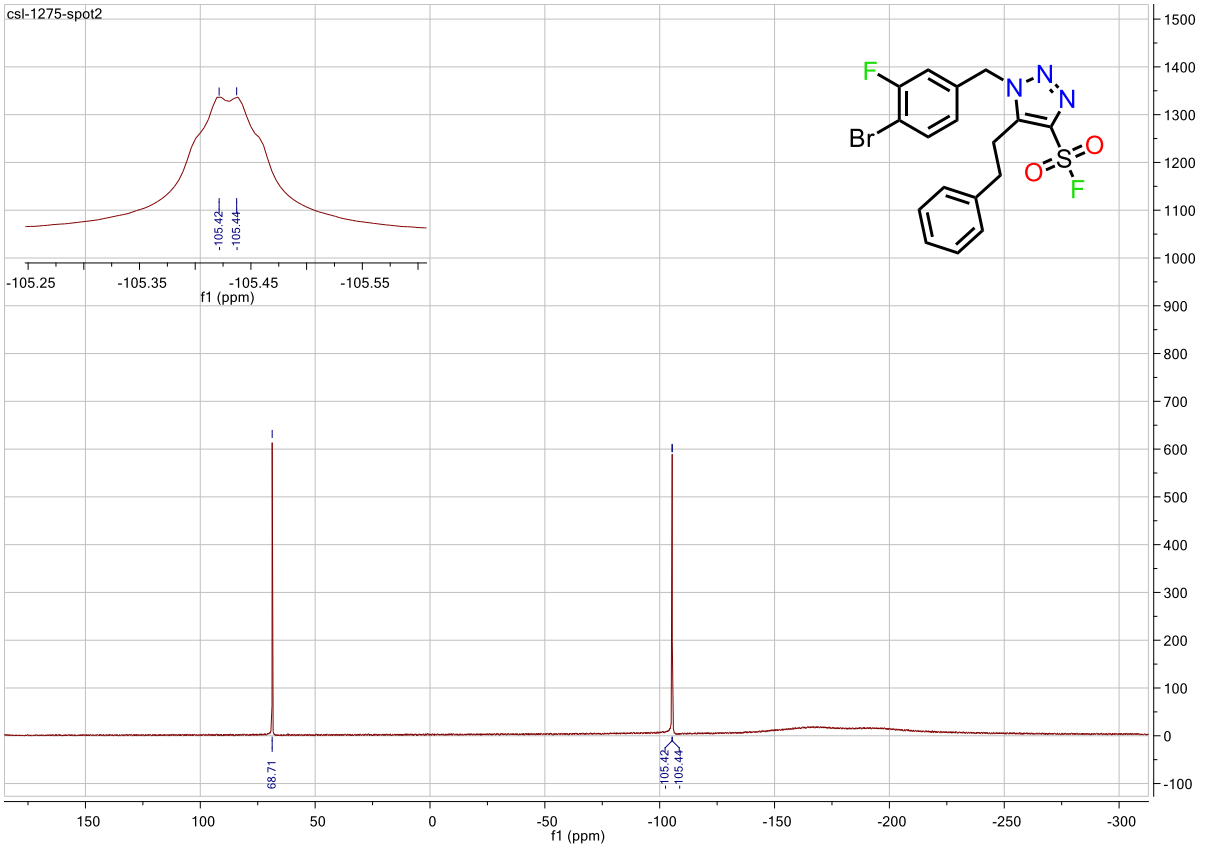

csl-1167
f1 (ppm)

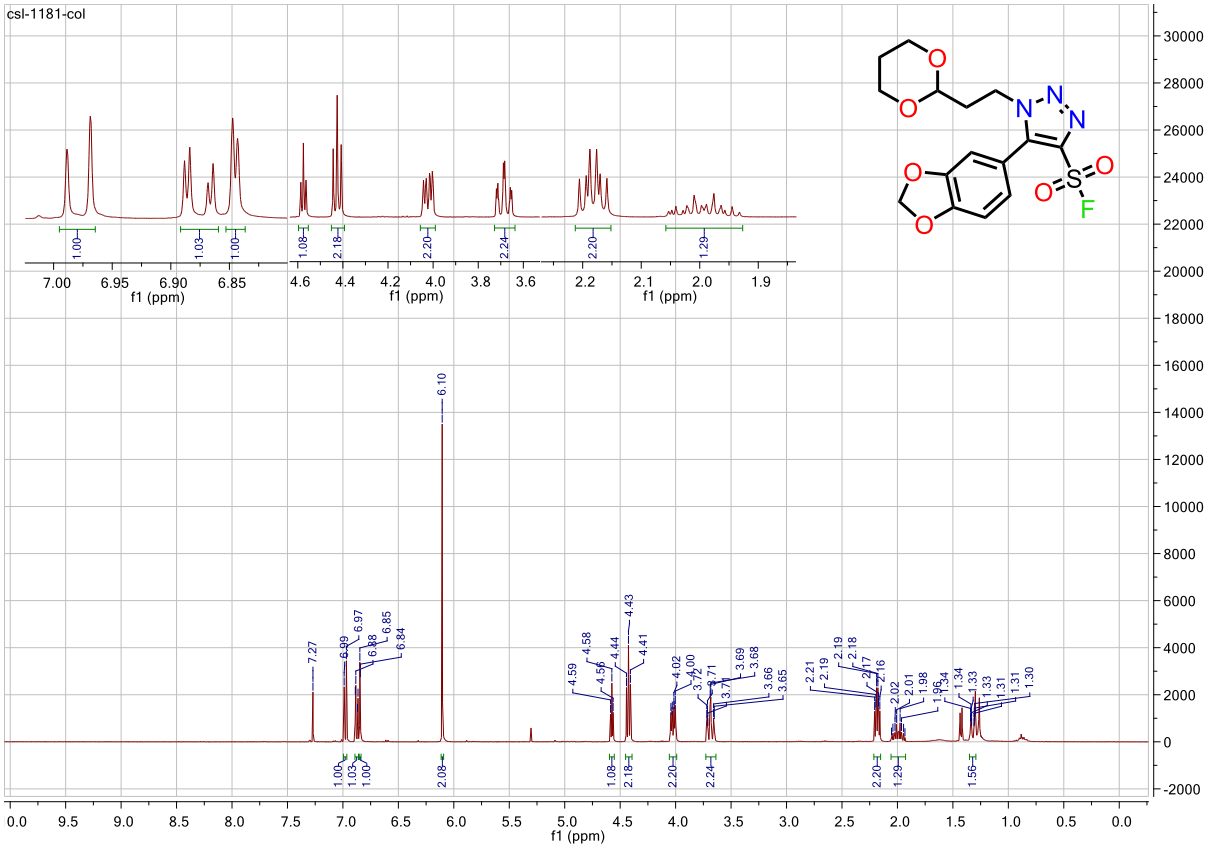

csl-1167-data
f1 (ppm)

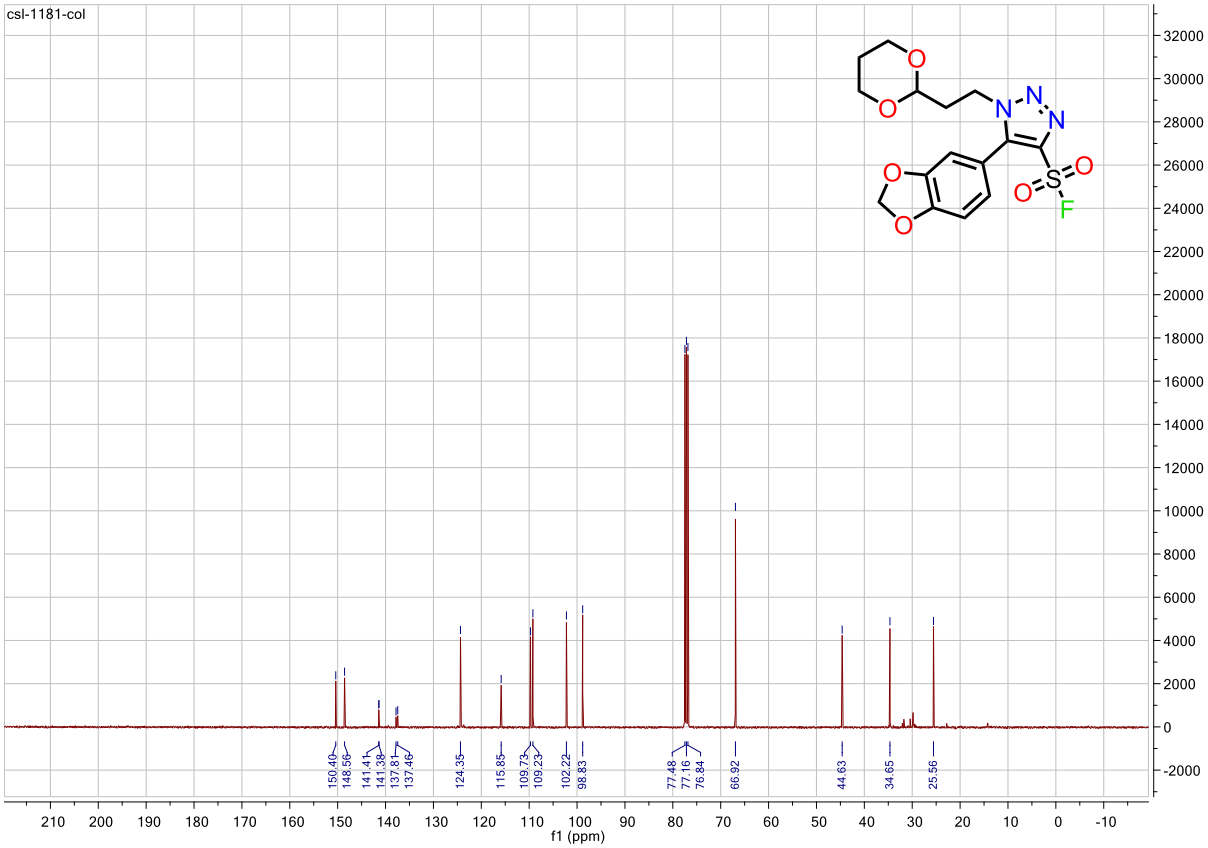

csl-1167
68.59
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
-2000
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)
O
N
N
N
S
O
O
F

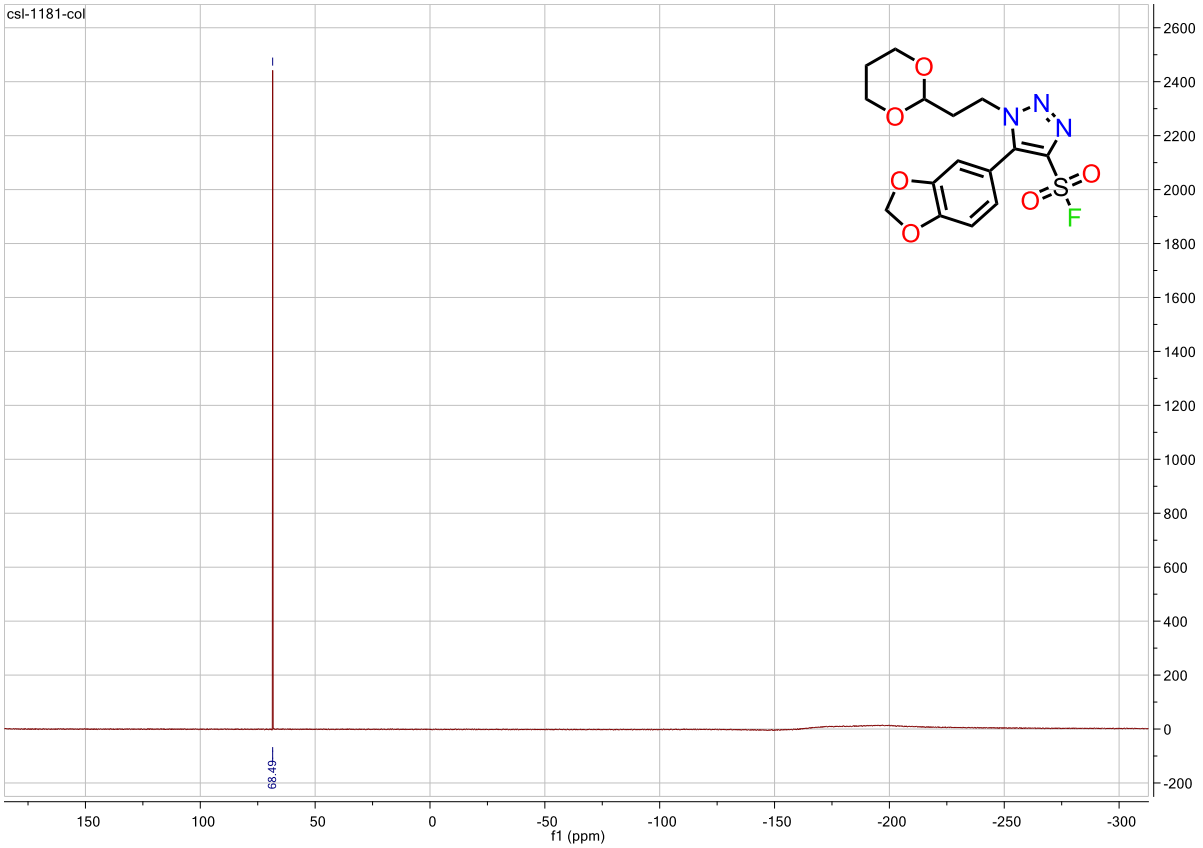

csl-1375-data
F
Br
N
N
N
O
S
O
F
f1 (ppm)

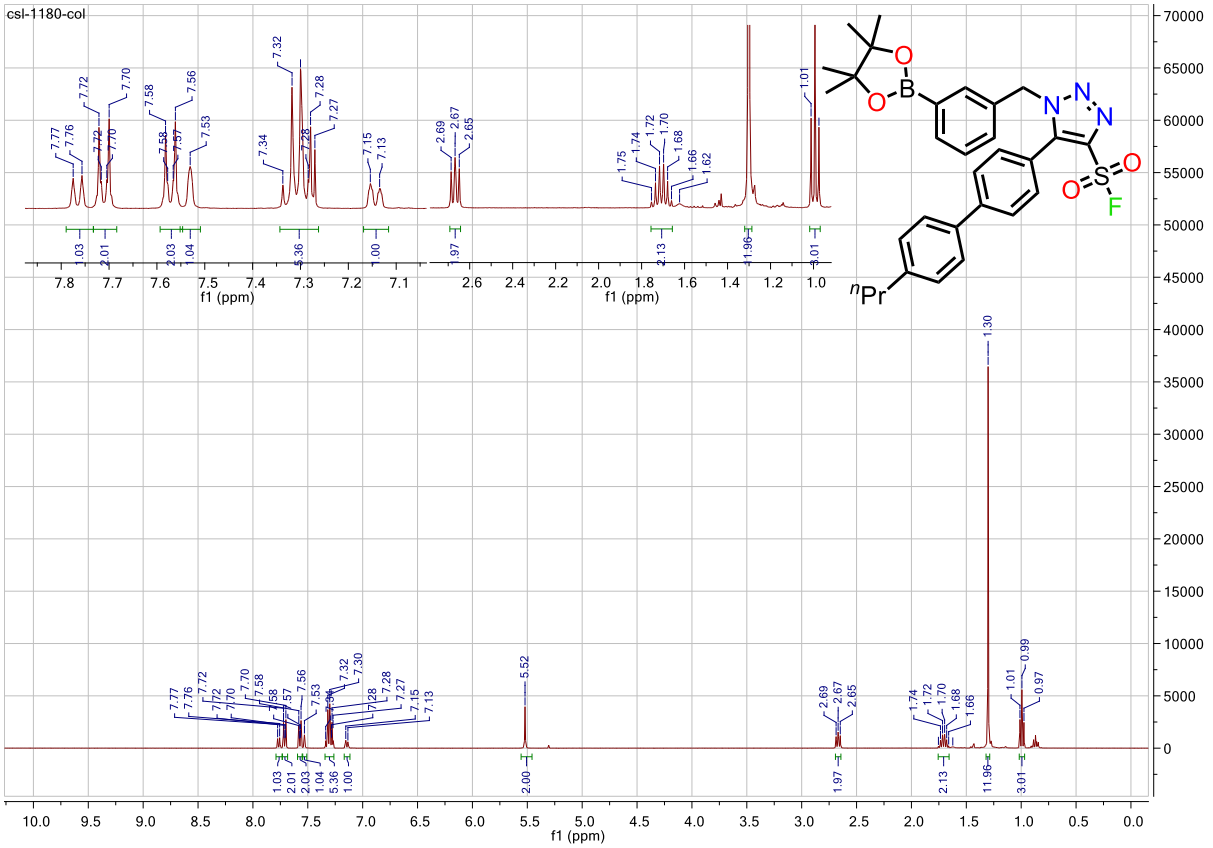

csl-1375-data
F
Br
N
N
N
O
S
O
F
f1 (ppm)

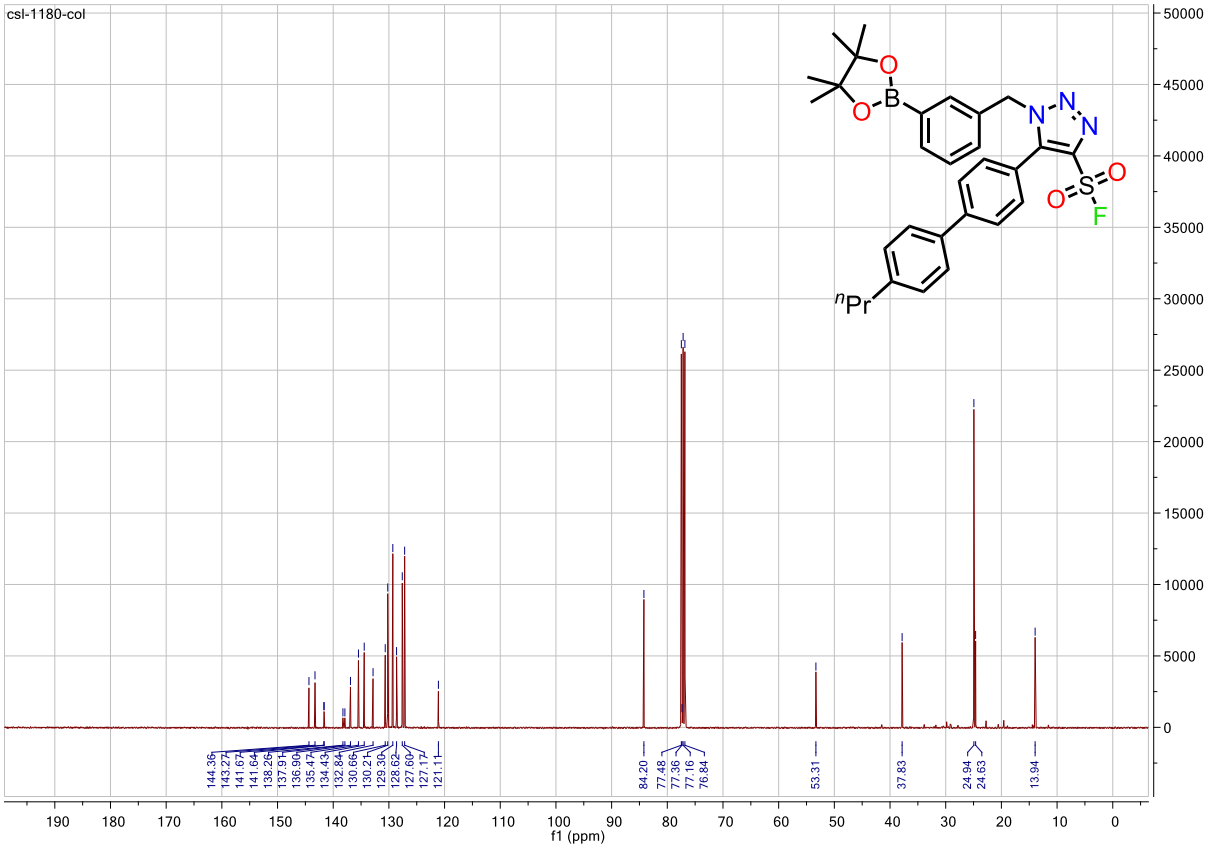

csl-1275-spot2
-105.42
-105.44
-105.25
-105.35
-105.45
-105.55
f1 (ppm)
F
Br
N
N
N
S
O
O
F
68.71
-105.42
-105.44
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100

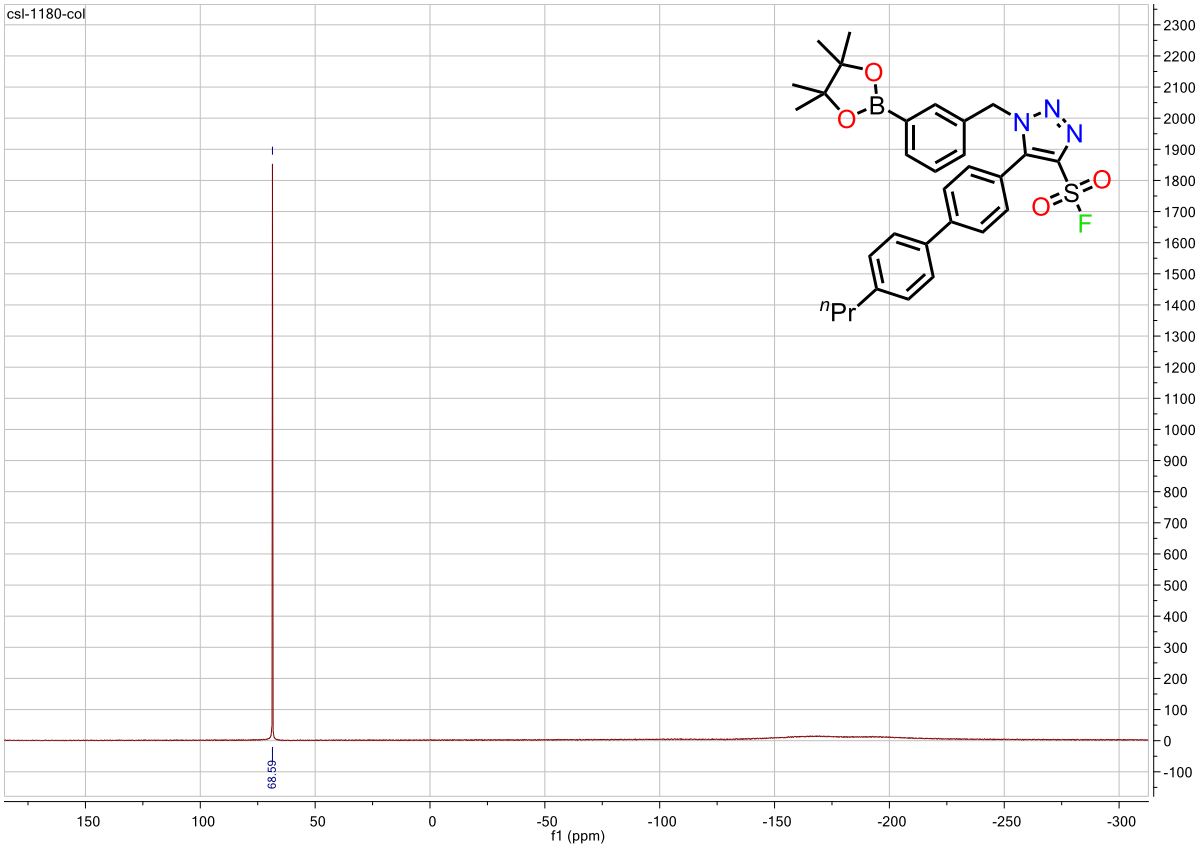

csl-1181-col
f1 (ppm)

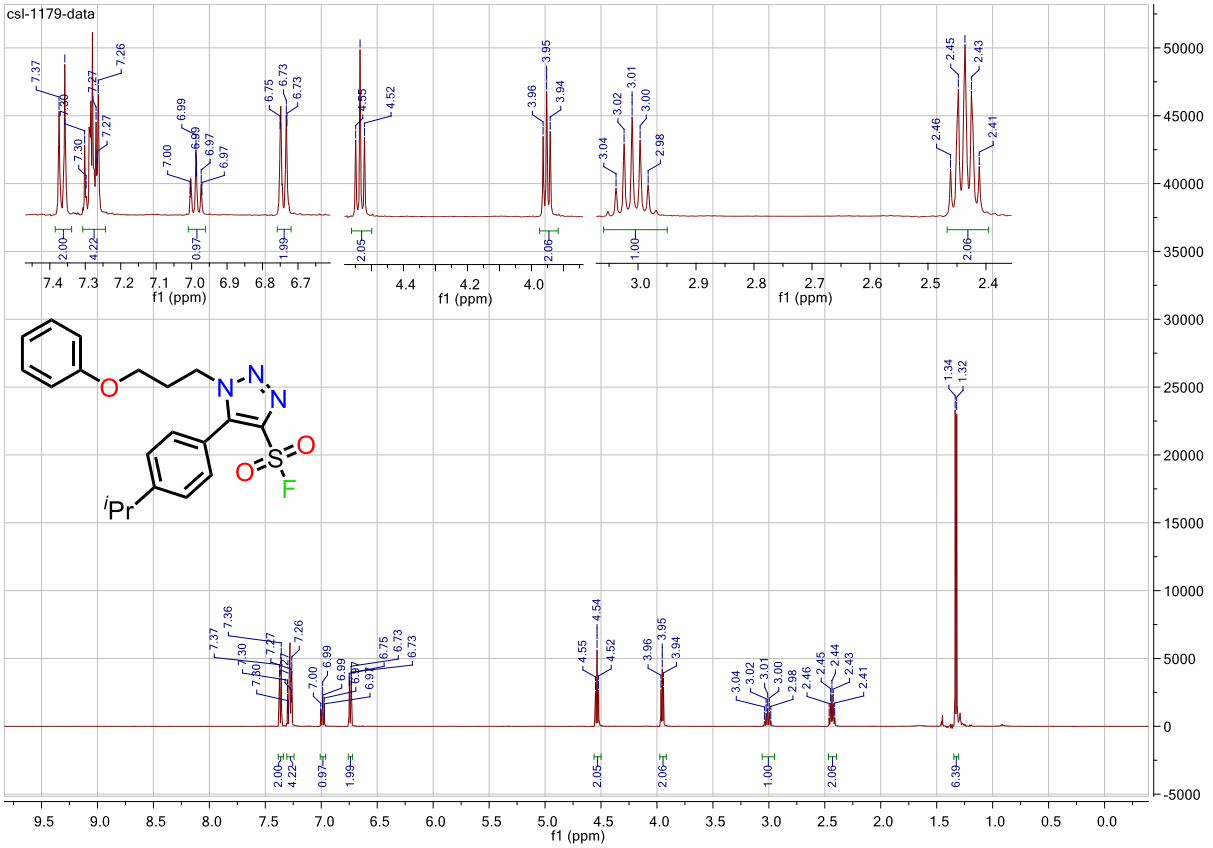

csl-1181-col
f1 (ppm)

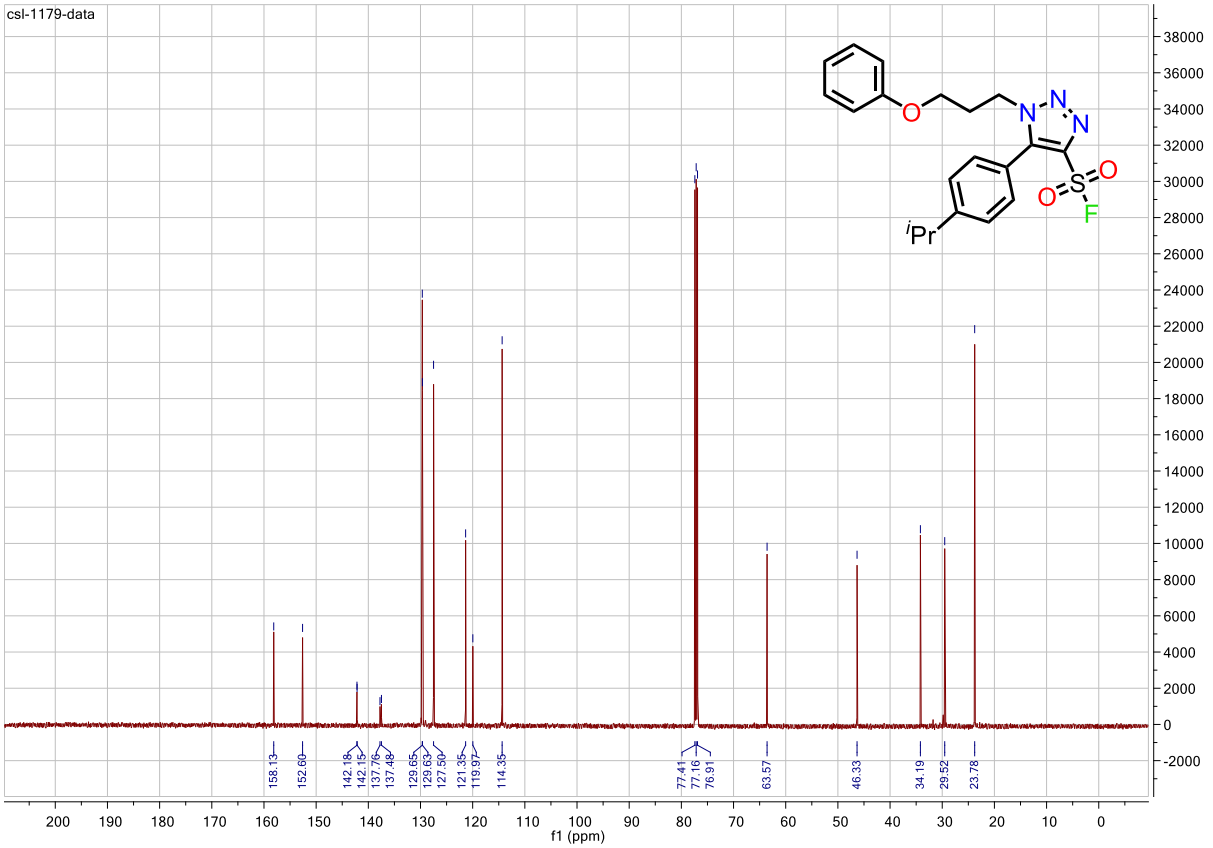

csl-1181-col
68.49
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
O
O
N
N
N
O
O
S
O
O
F

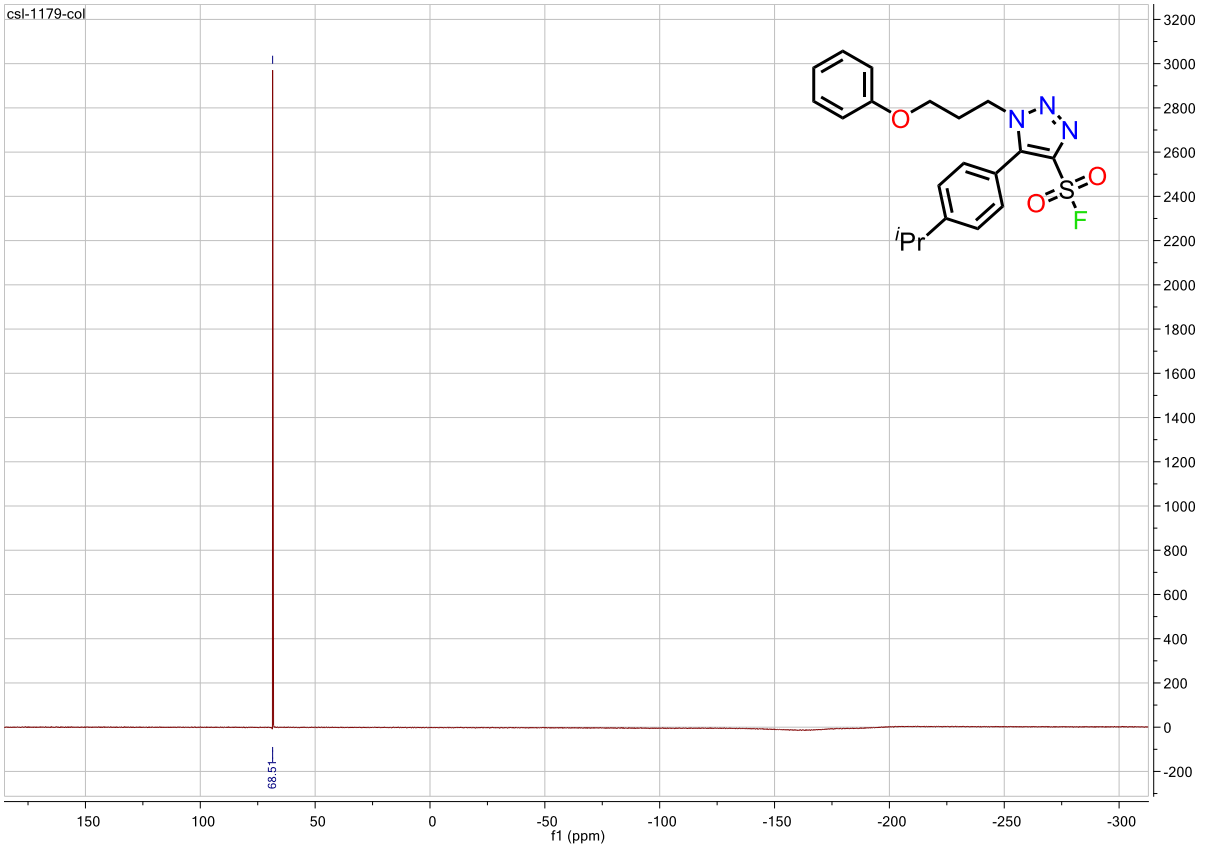

csl-1180-col
f1 (ppm)

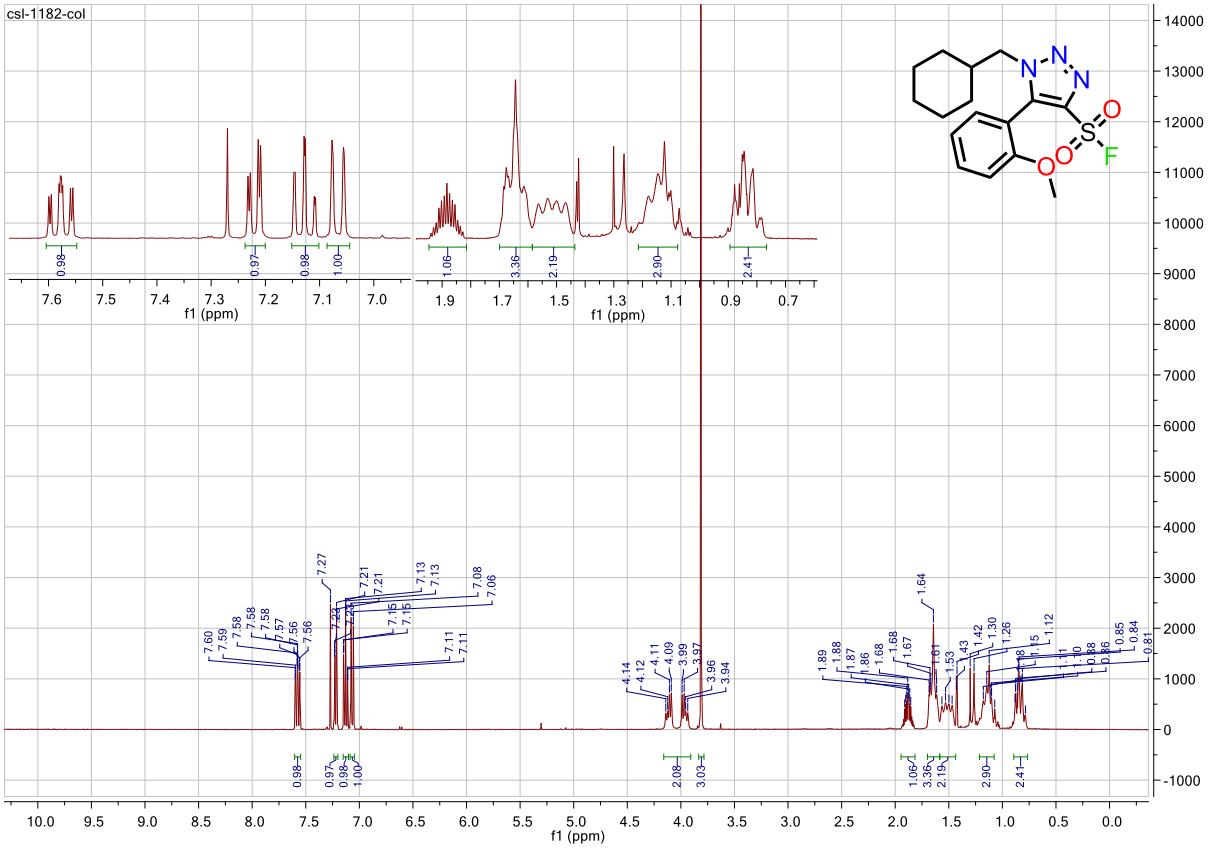

csl-1180-col
f1 (ppm)

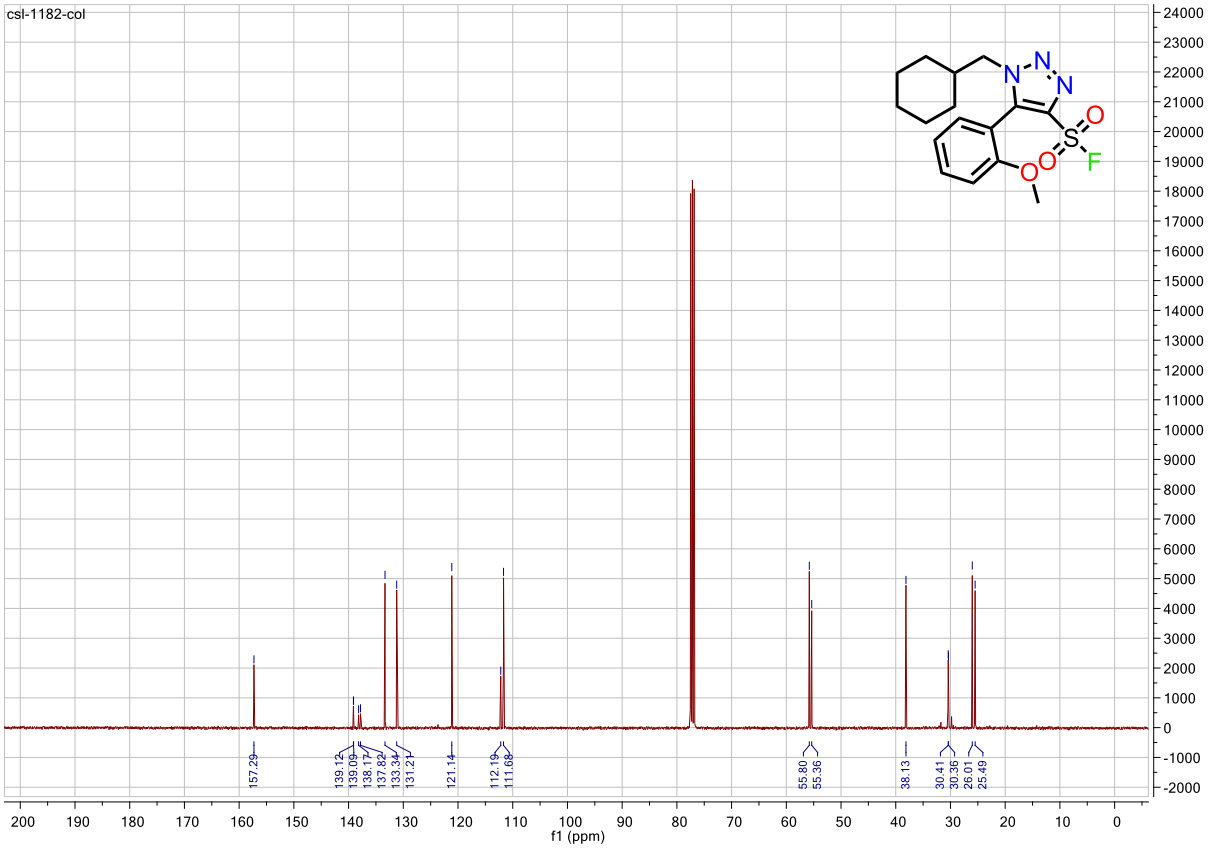

csl-1180-col
68.59
f1 (ppm)
150
100
50
0
-50
-100
-150
-200
-250
-300
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
O
B
O
N
N
N
O
S
O
F
nPr

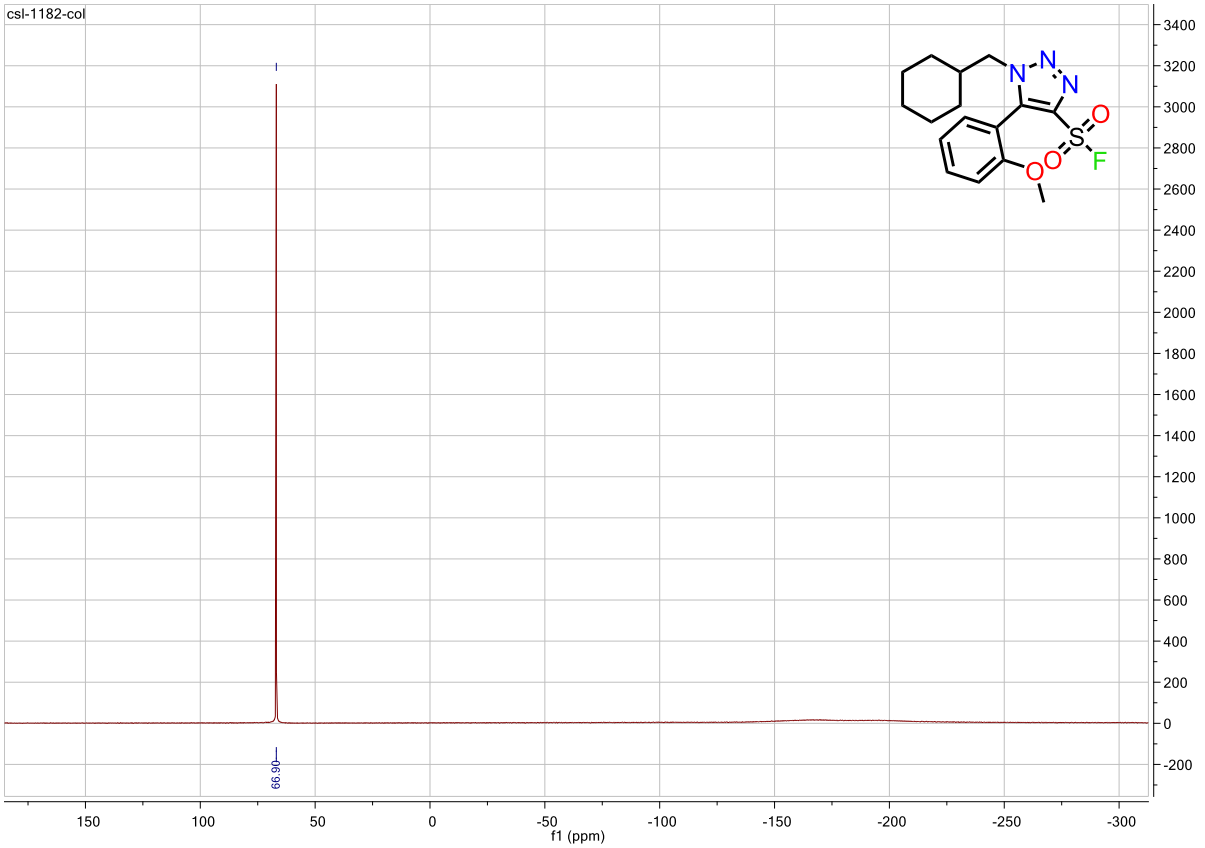

csl-1179-data
f1 (ppm)

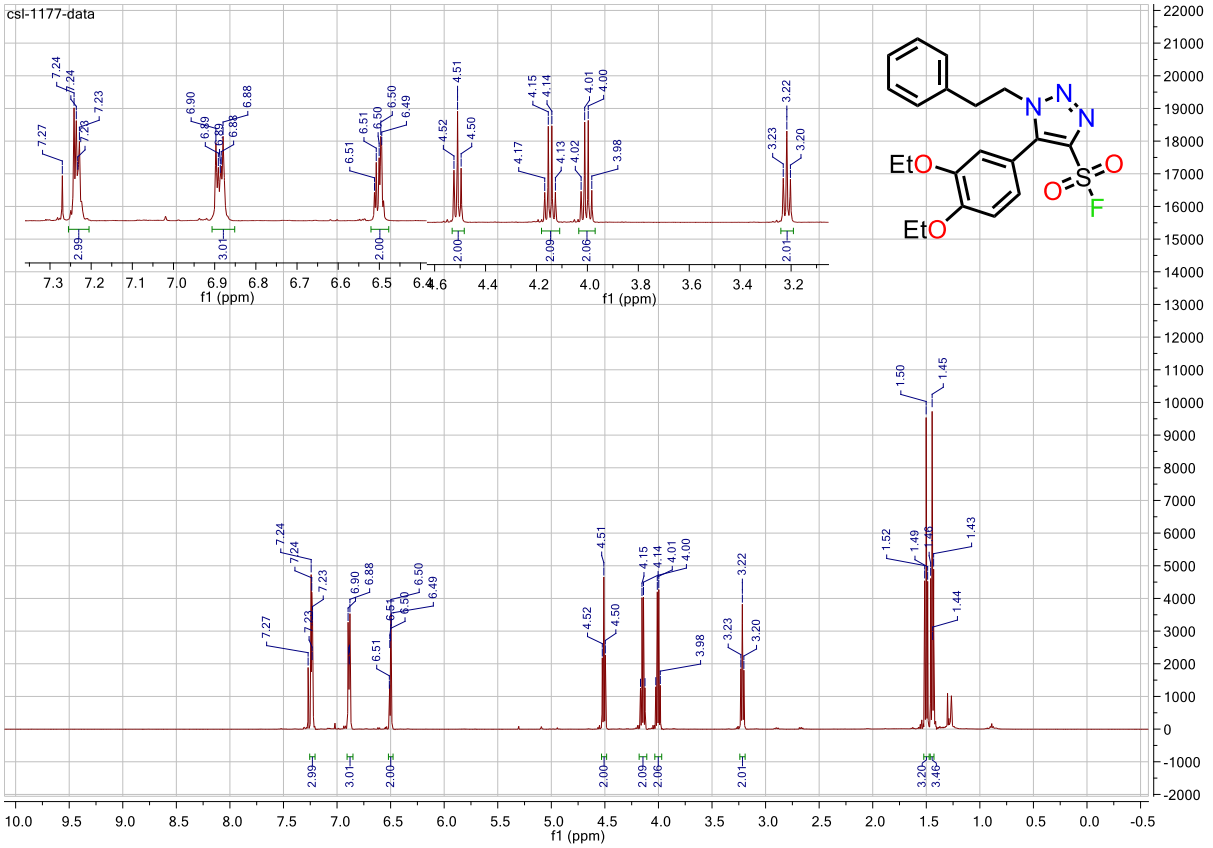

csl-1179-data
f1 (ppm)

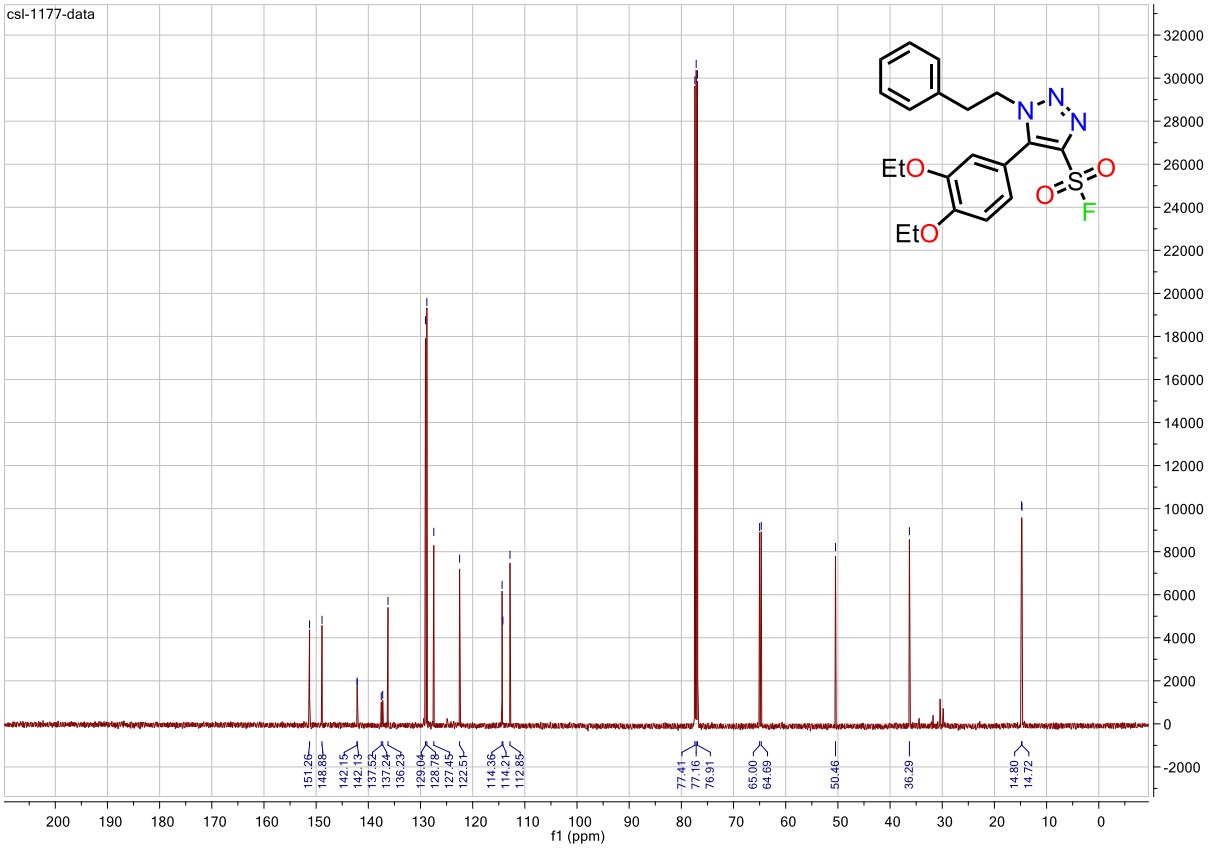

csl-1179-col
68.51
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
O
N
N
N
O
O
S
F
iPr

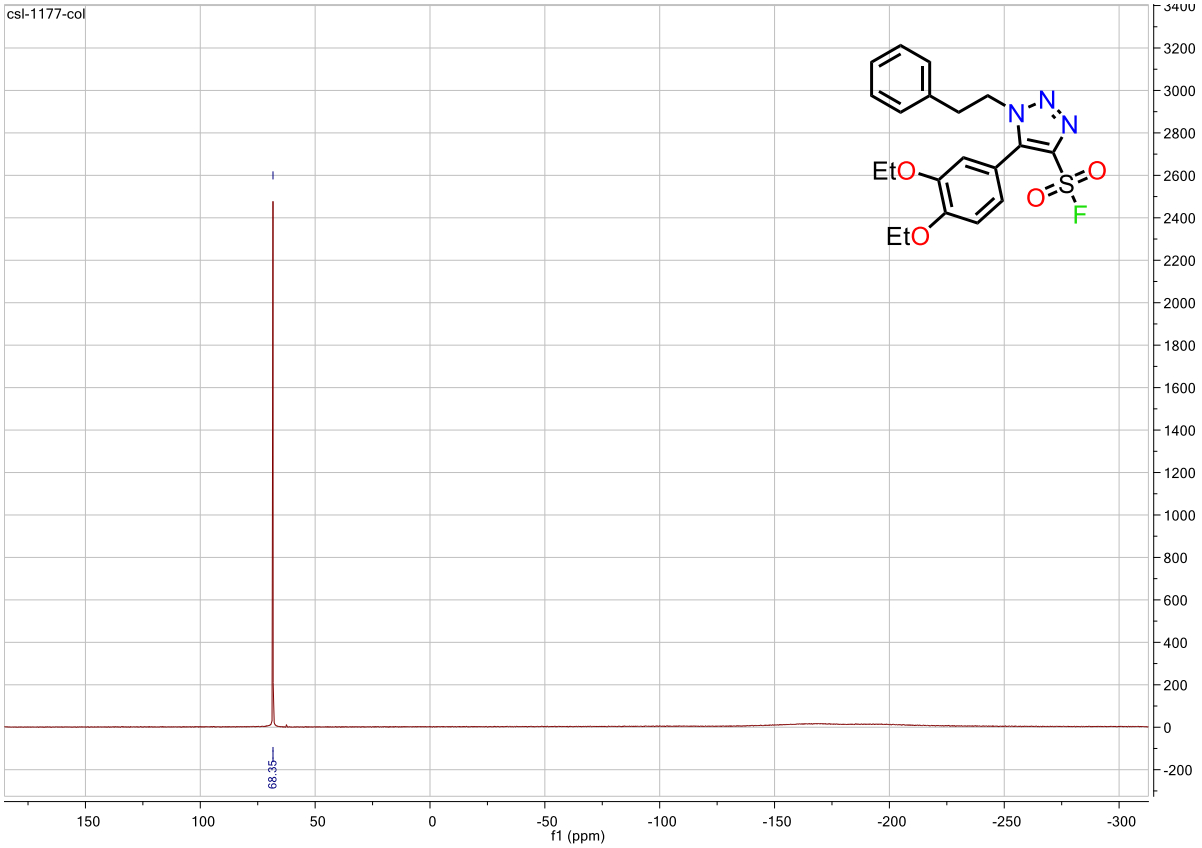

csl-1182-col
f1 (ppm)

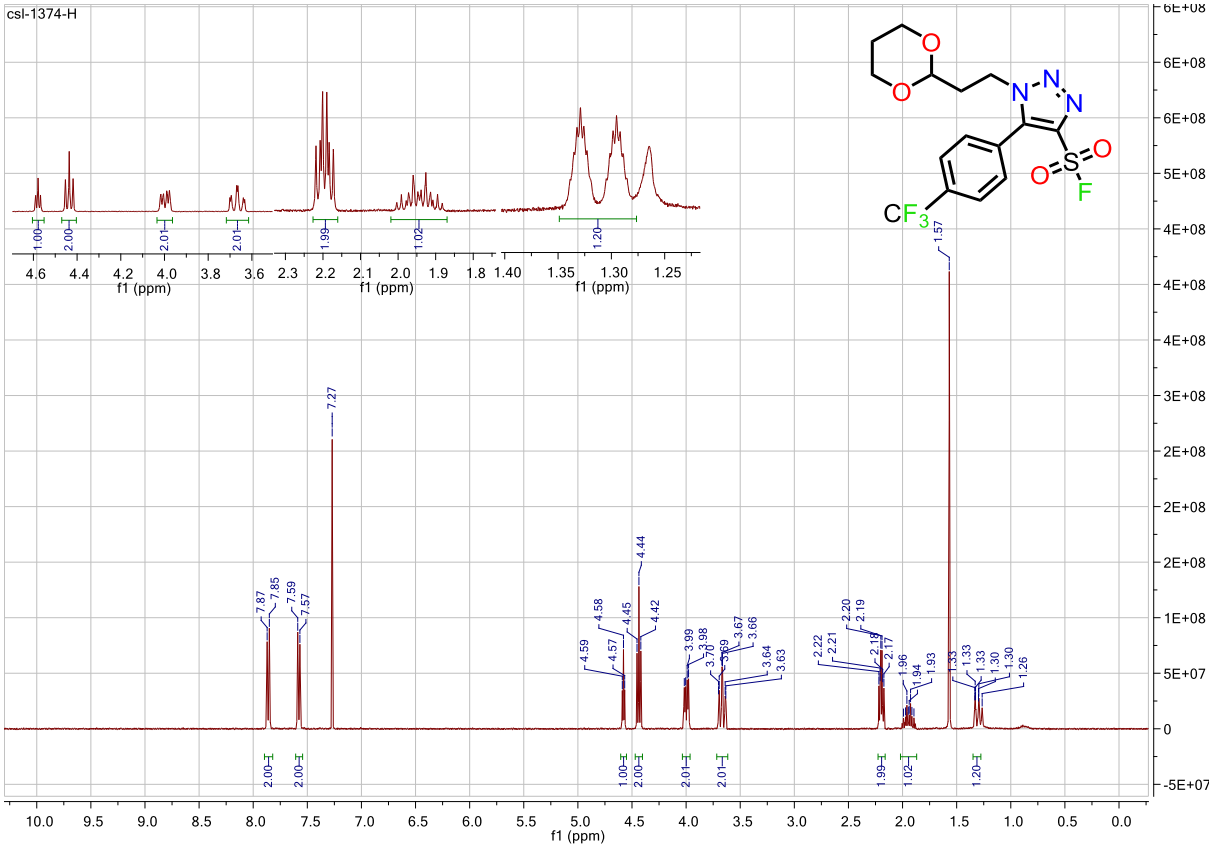

csl-1182-col
f1 (ppm)

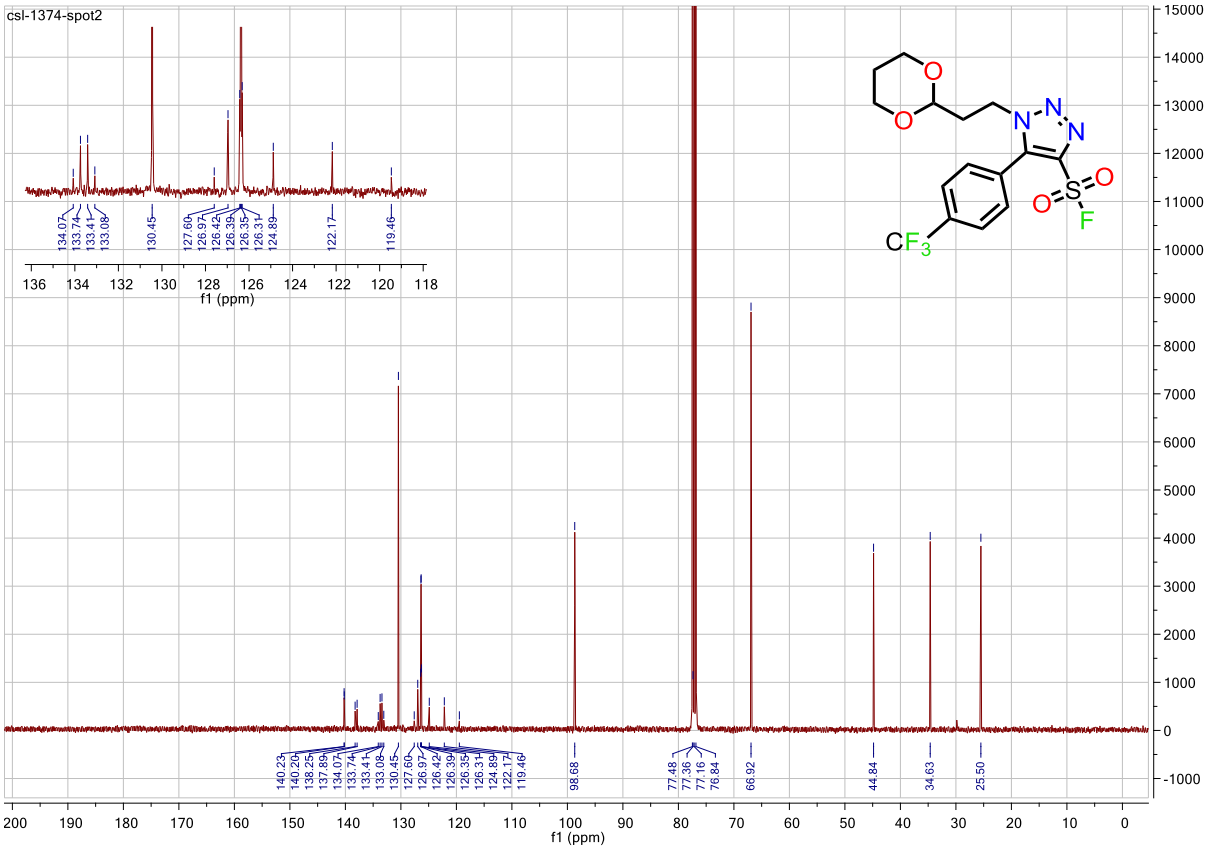

csl-1182-col
66.90
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
N
N
N
S
O
O
O
F

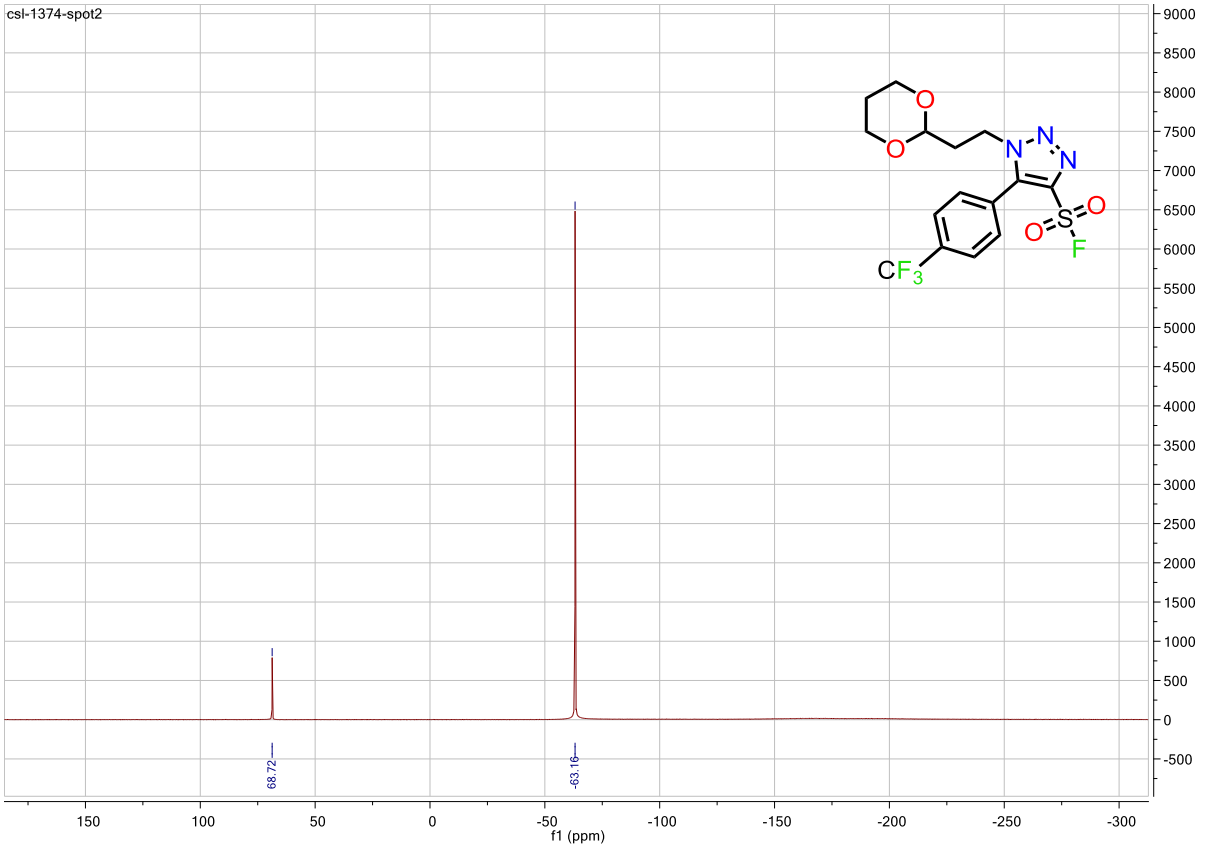

csl-1177-data
f1 (ppm)
EtO
EtO
O
O
S
F
N
N
N

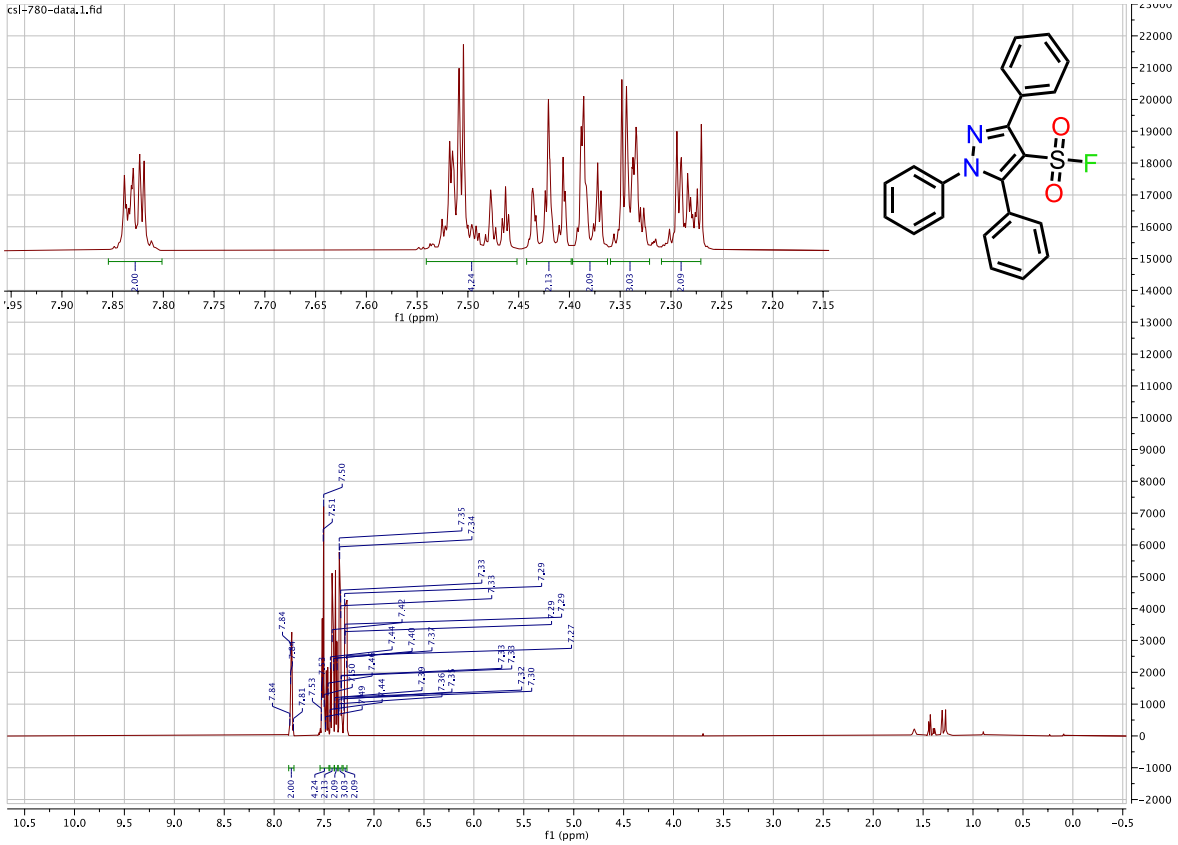

csl-1177-data
f1 (ppm)
EtO
EtO
O
O
S
F
N
N
N

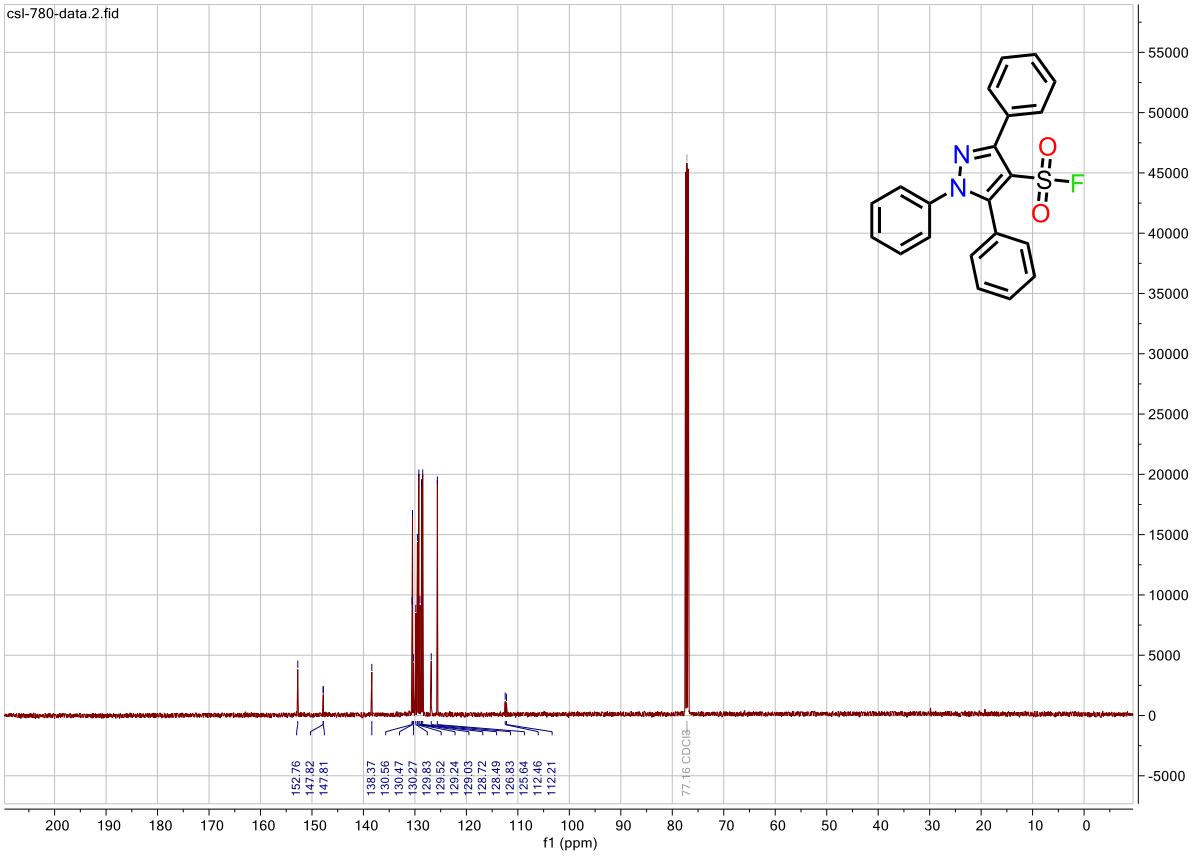

csl-1177-col
68.35
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
N
N
N
EtO
EtO
O
O
S
F

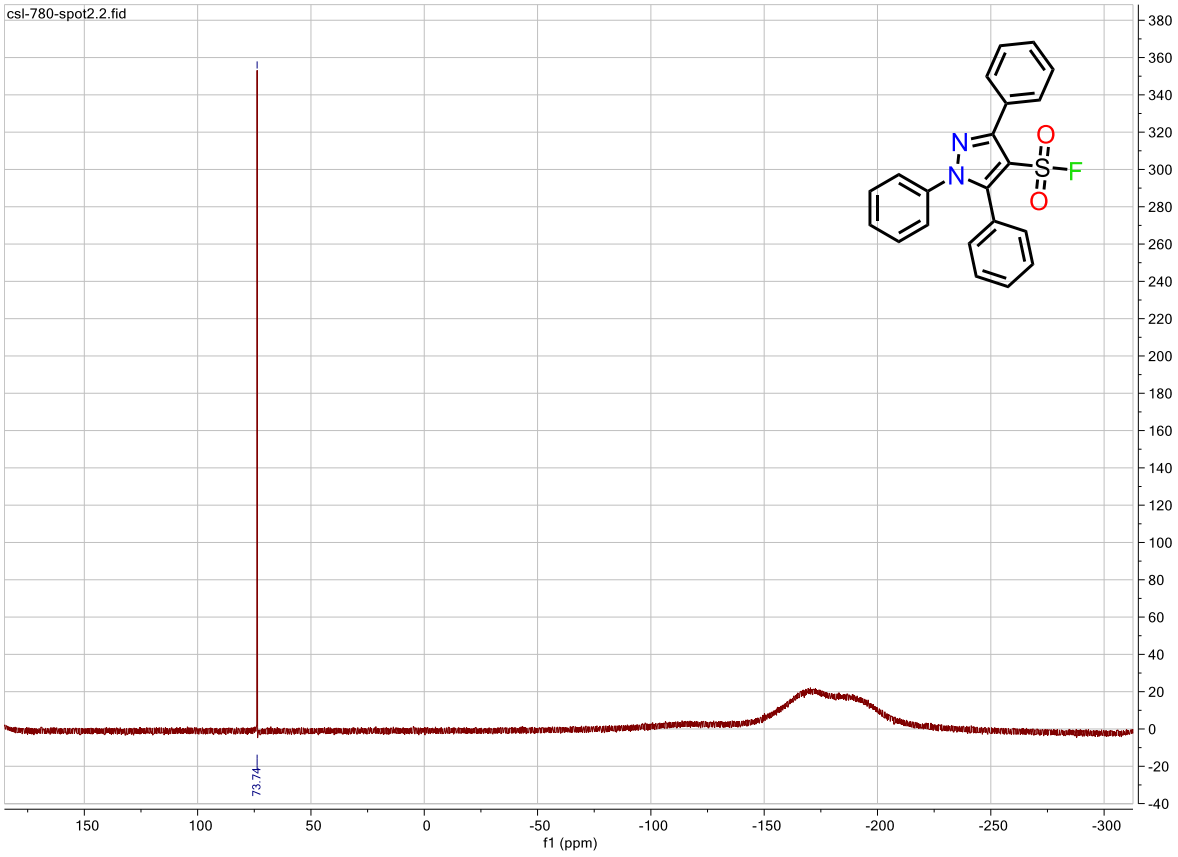

csl-1374-H
f1 (ppm)

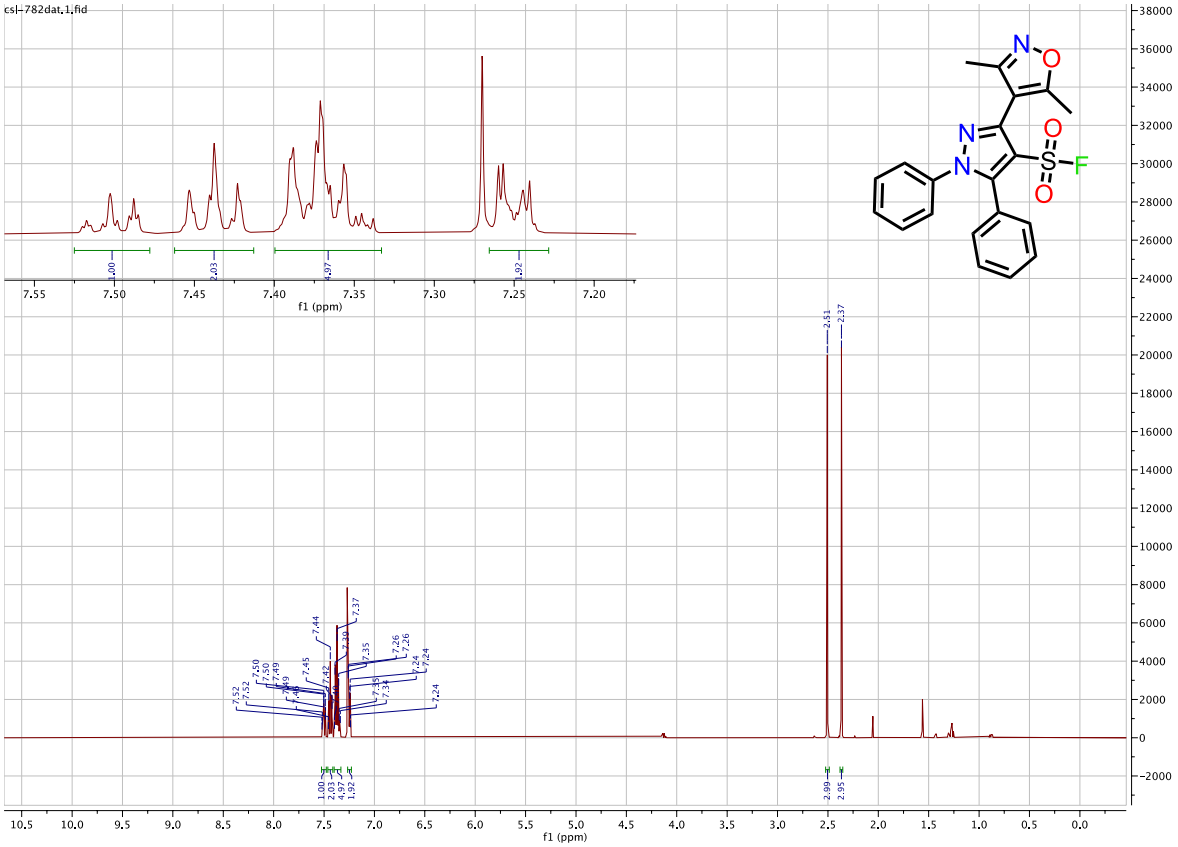

csl-1374-spot2
f1 (ppm)

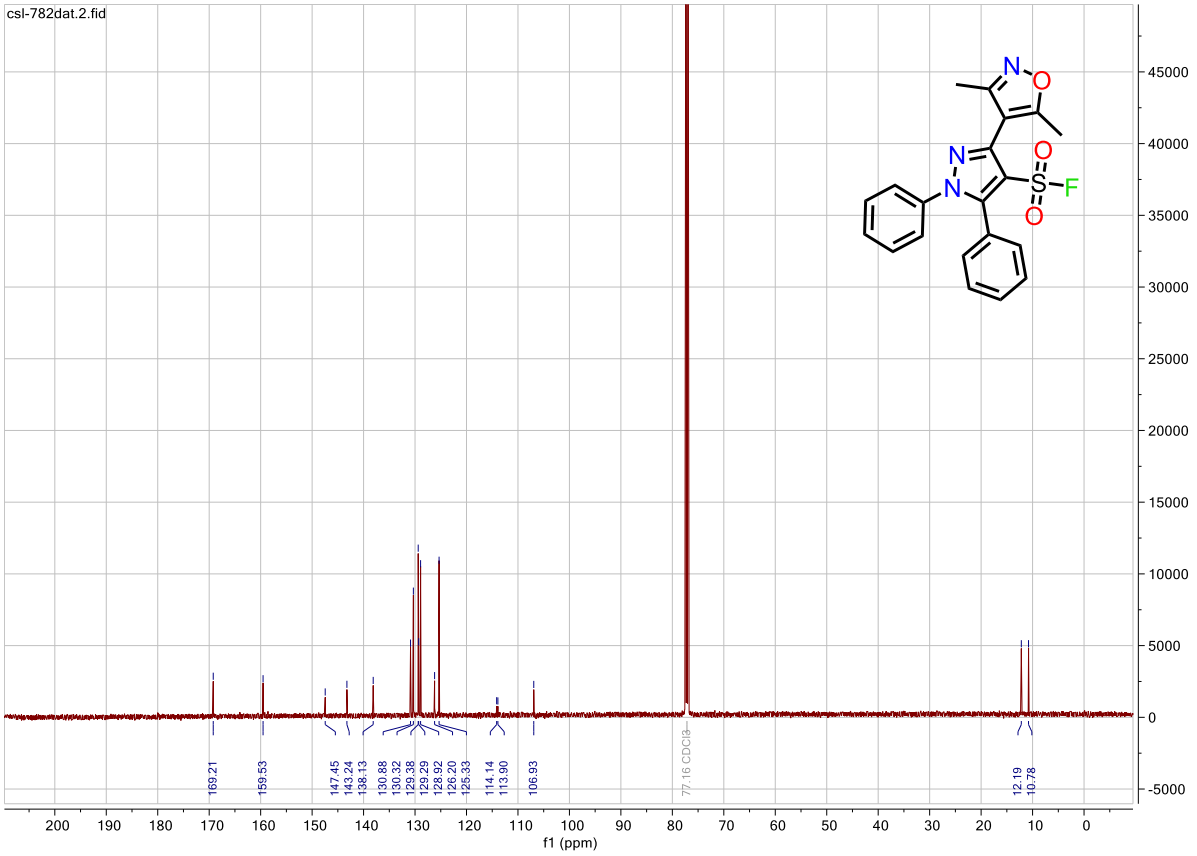

csl-1374-spot2
9000
8500
8000
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
68.72
-63.16
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
O
O
N
N
N
O
O
S
F
CF3

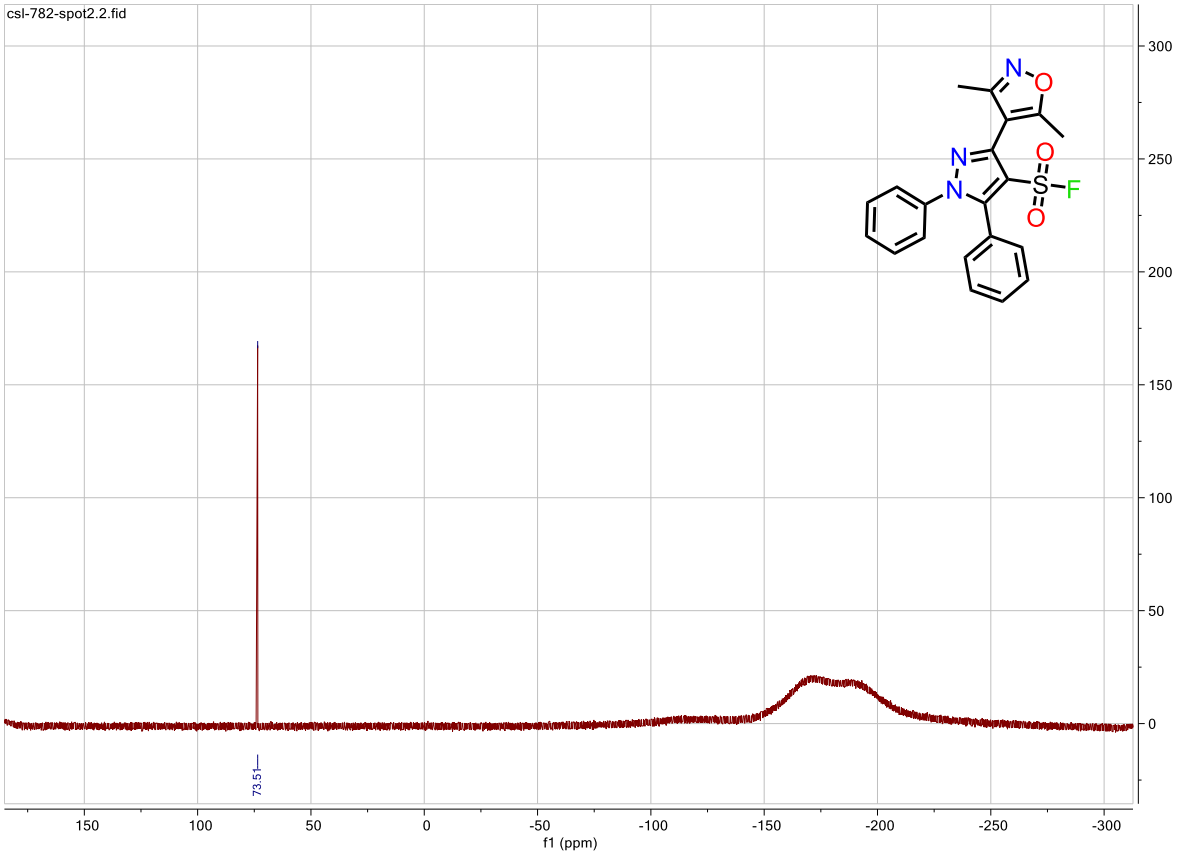

csl-780-data.1.fid
f1 (ppm)
f1 (ppm)

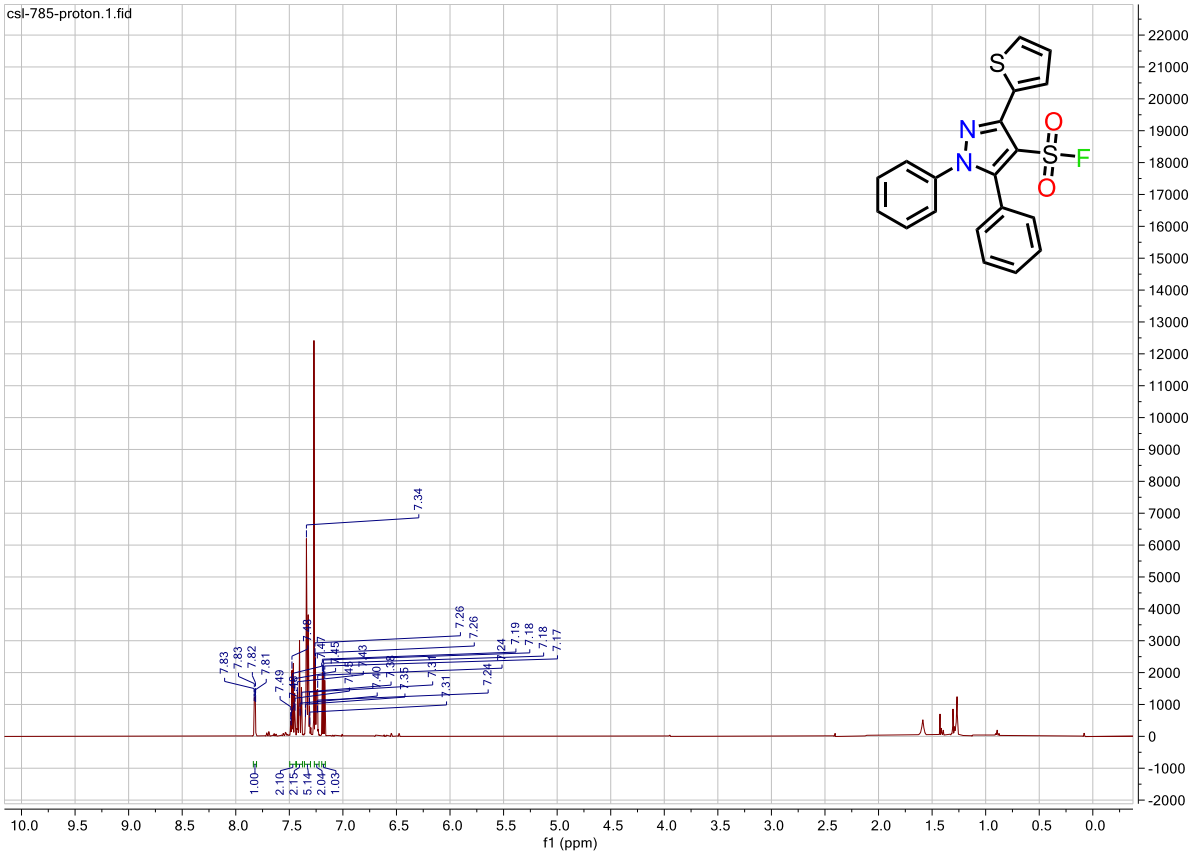

csl-780-data.2.fid
152.76
147.82
147.81
138.37
130.56
130.47
130.27
129.83
129.52
129.24
129.03
128.72
128.49
126.83
125.64
112.46
112.21
77.16 CDCl3
f1 (ppm)

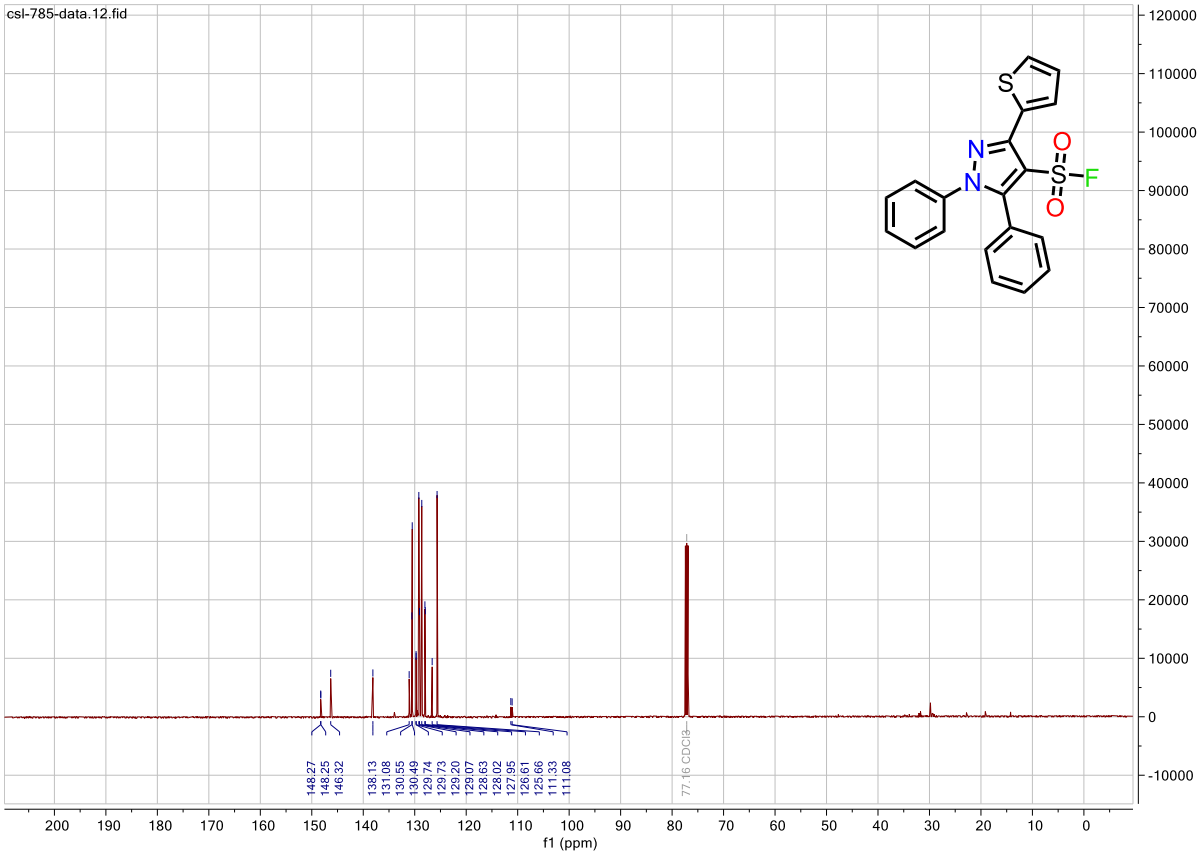

csl-780-spot2.2.fid
73.74
f1 (ppm)

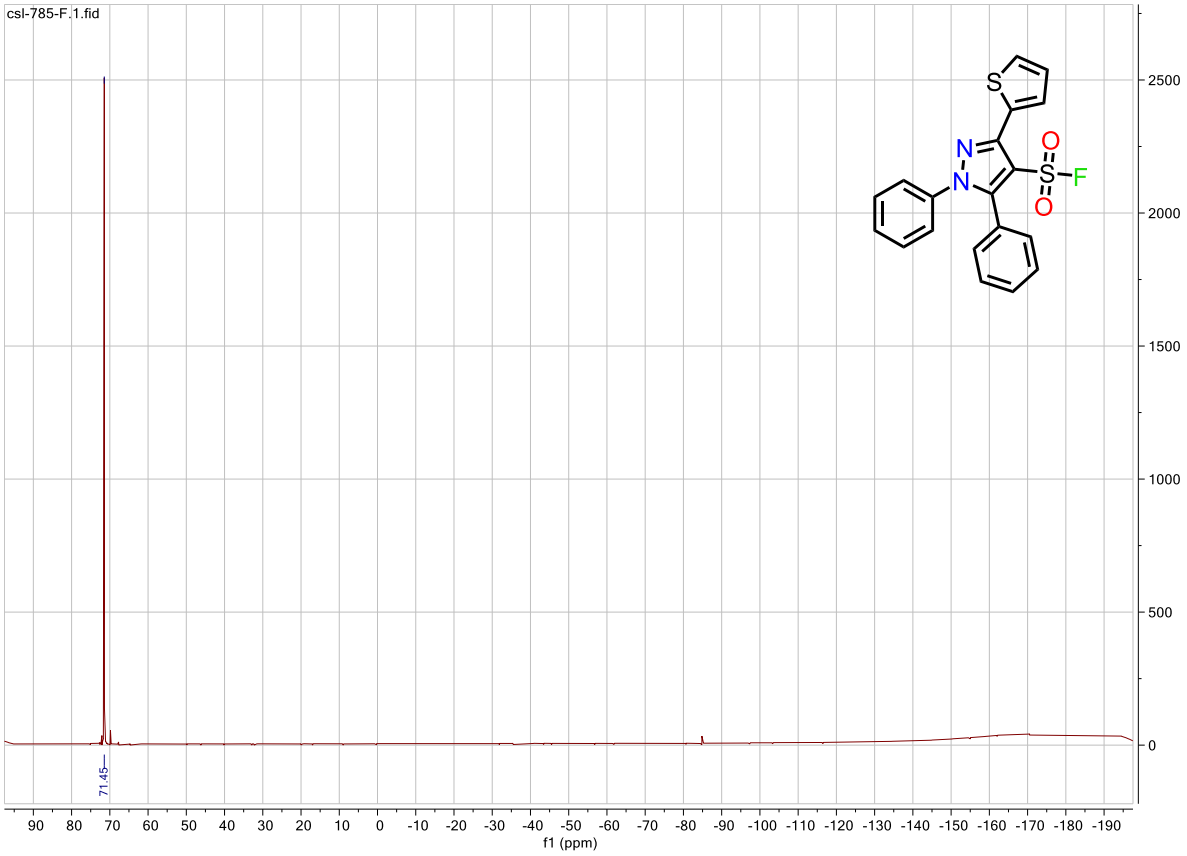

csl-782dat.1.fid
f1 (ppm)
f1 (ppm)

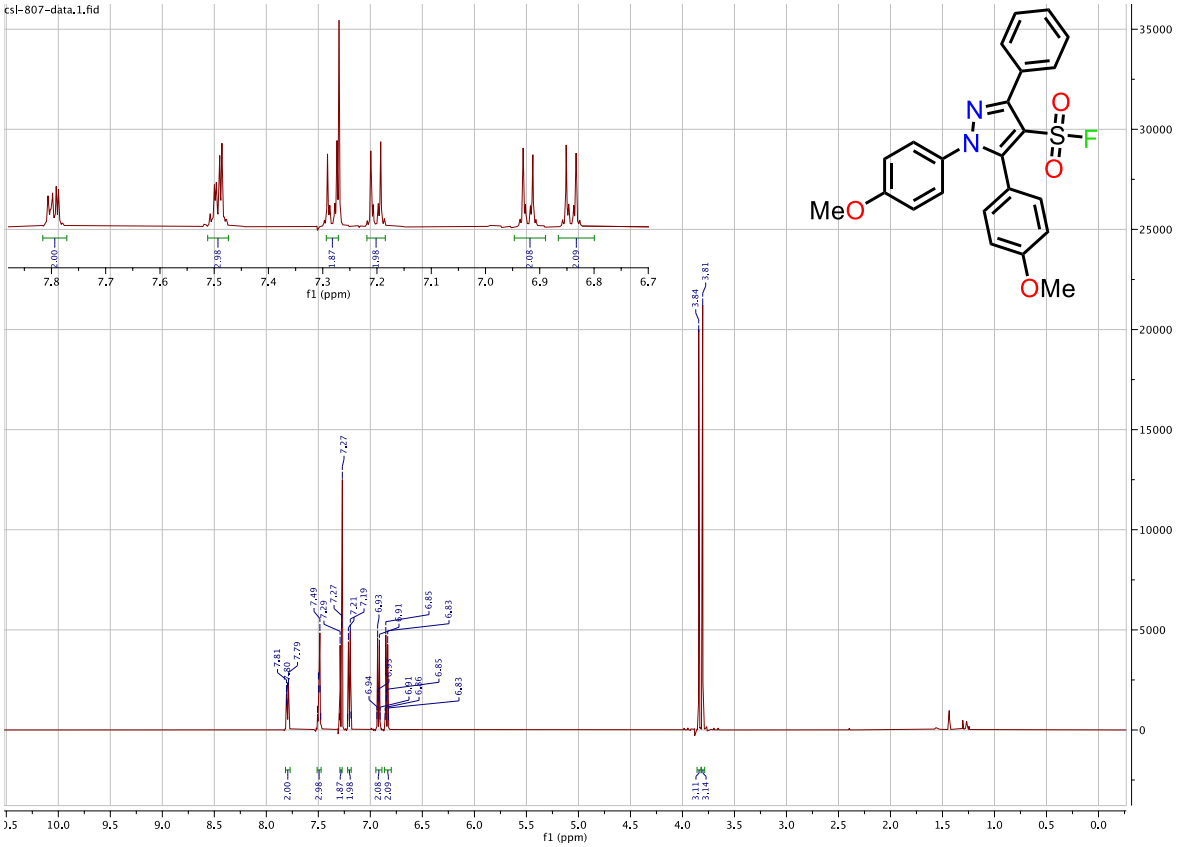

csl-782dat.2.fid
N
O
N
N
O
S
F
O
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
-5000
169.21
159.53
147.45
143.24
138.13
130.88
130.32
129.38
129.29
128.92
126.20
125.33
114.14
113.90
106.93
77.16 CDCl3
12.19
10.78
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

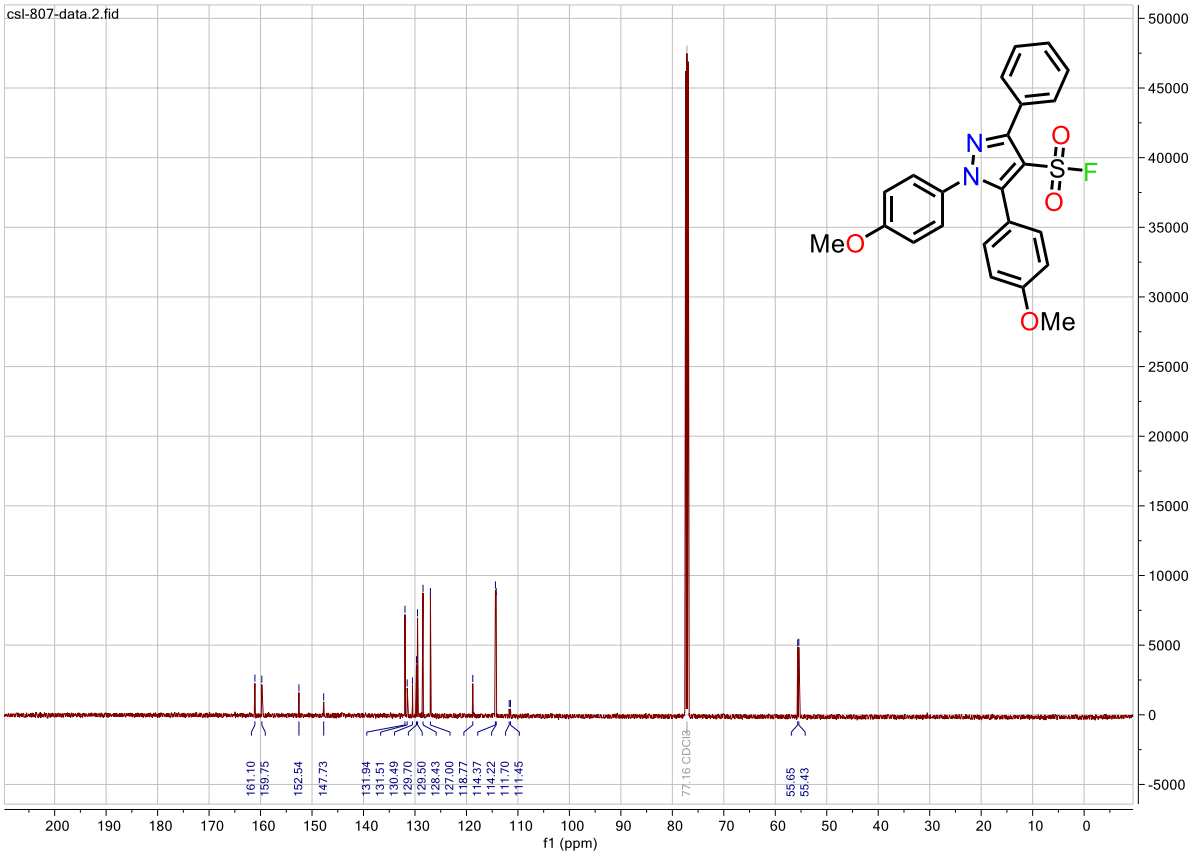

csl-782-spot2.2.fid
300
250
200
150
100
50
0
73.51
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
N
O
N
N
O
S
F
O

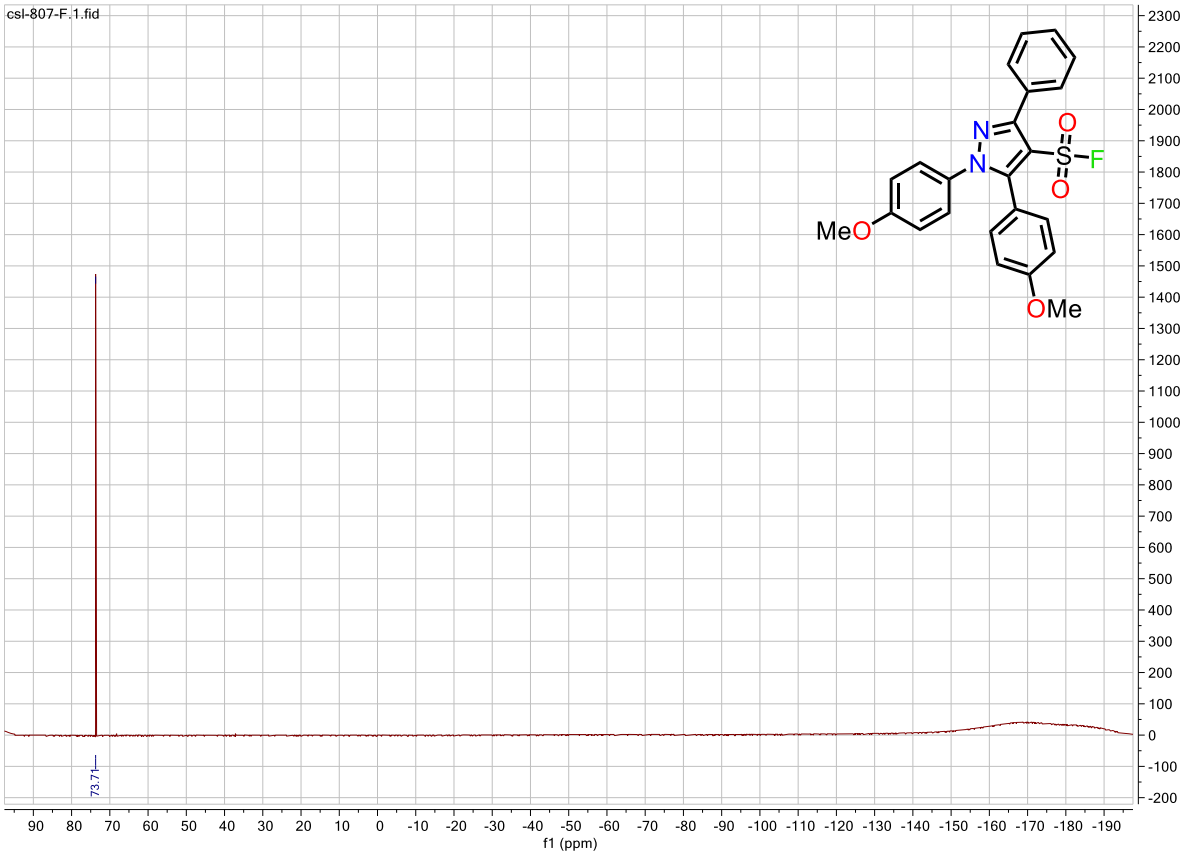

csl-785-proton.1.fid
f1 (ppm)

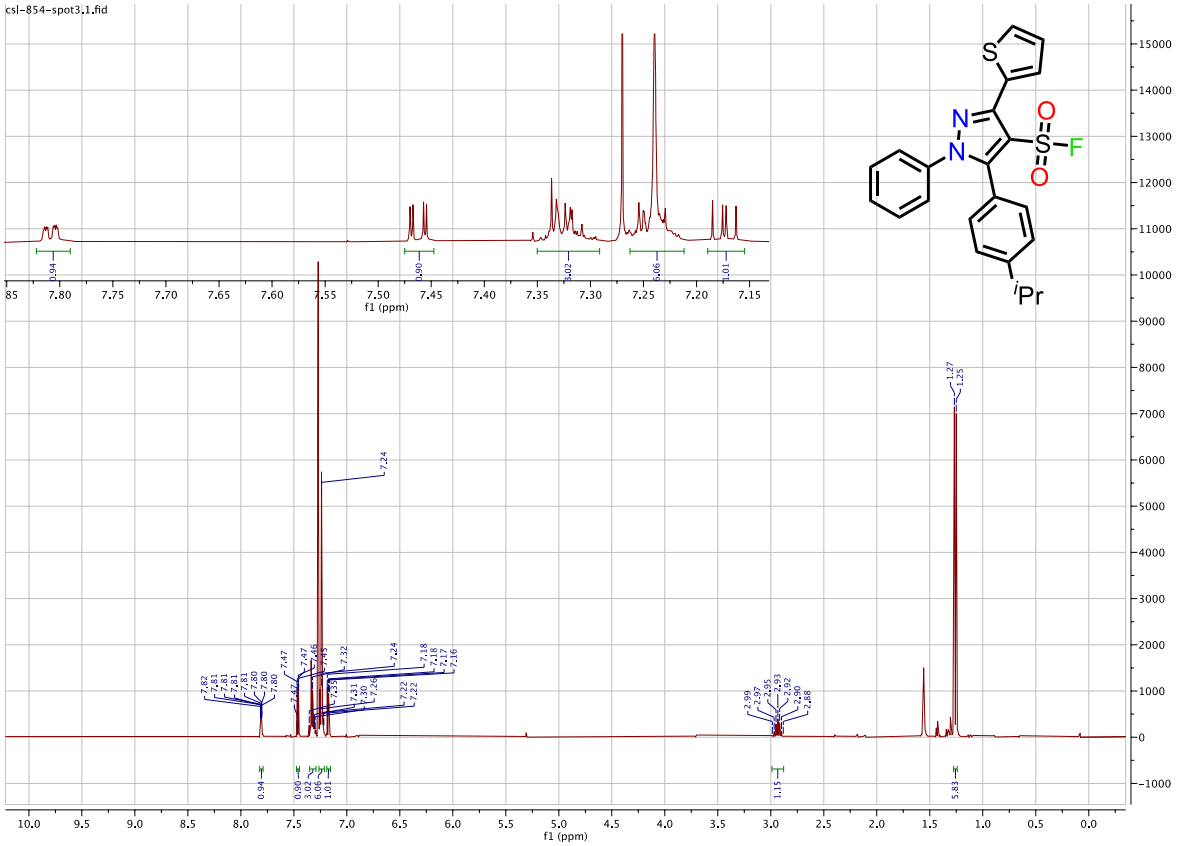

csl-785-data.12.fid
f1 (ppm)

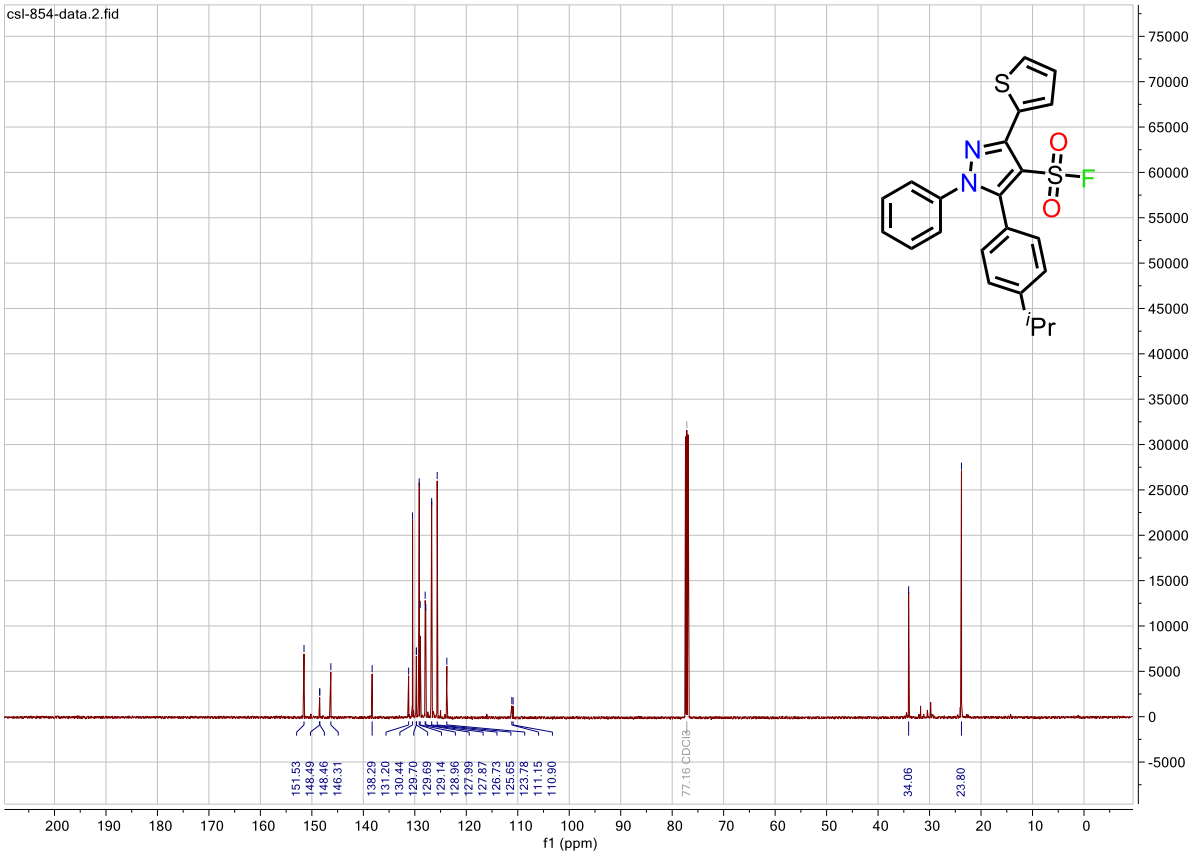

csl-785-F.1.fid
71.45
f1 (ppm)
S
N
N
O
S
F
O

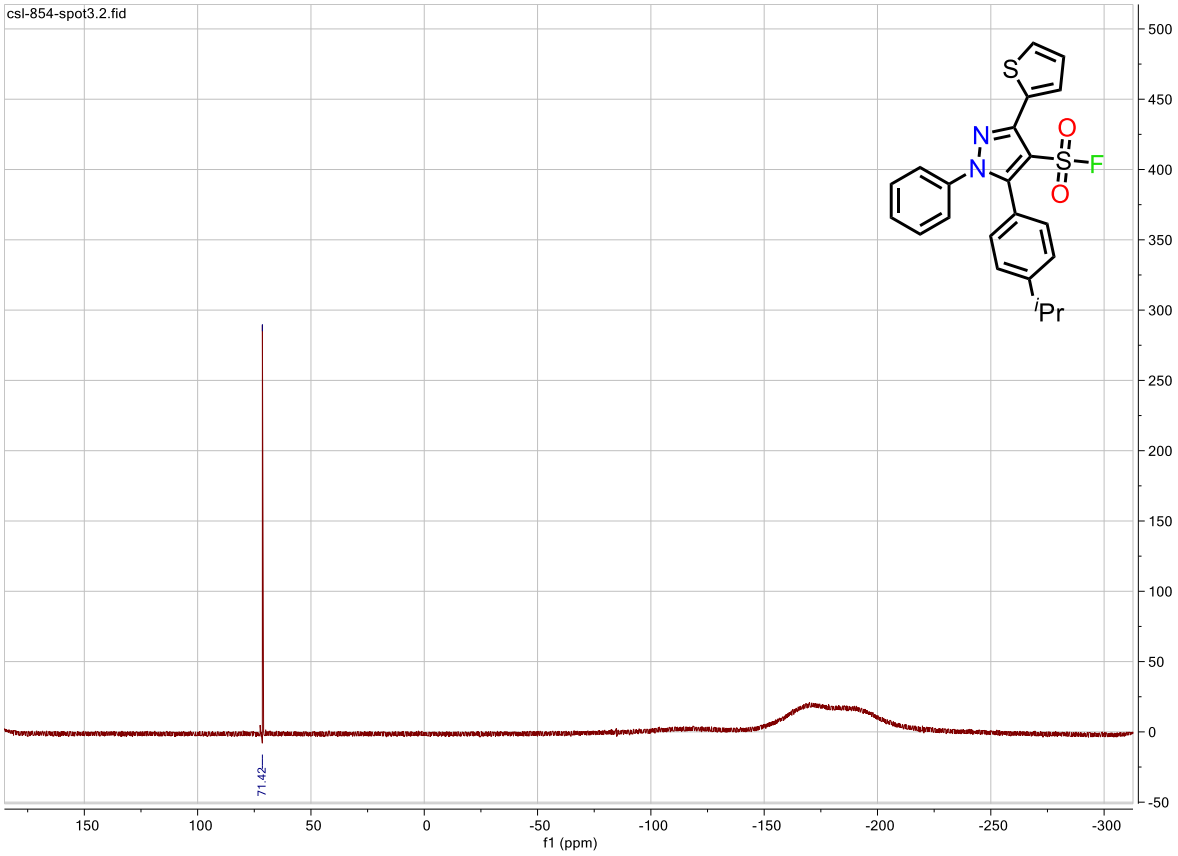

csl-807-data.1.fid
f1 (ppm)
MeO
OMe

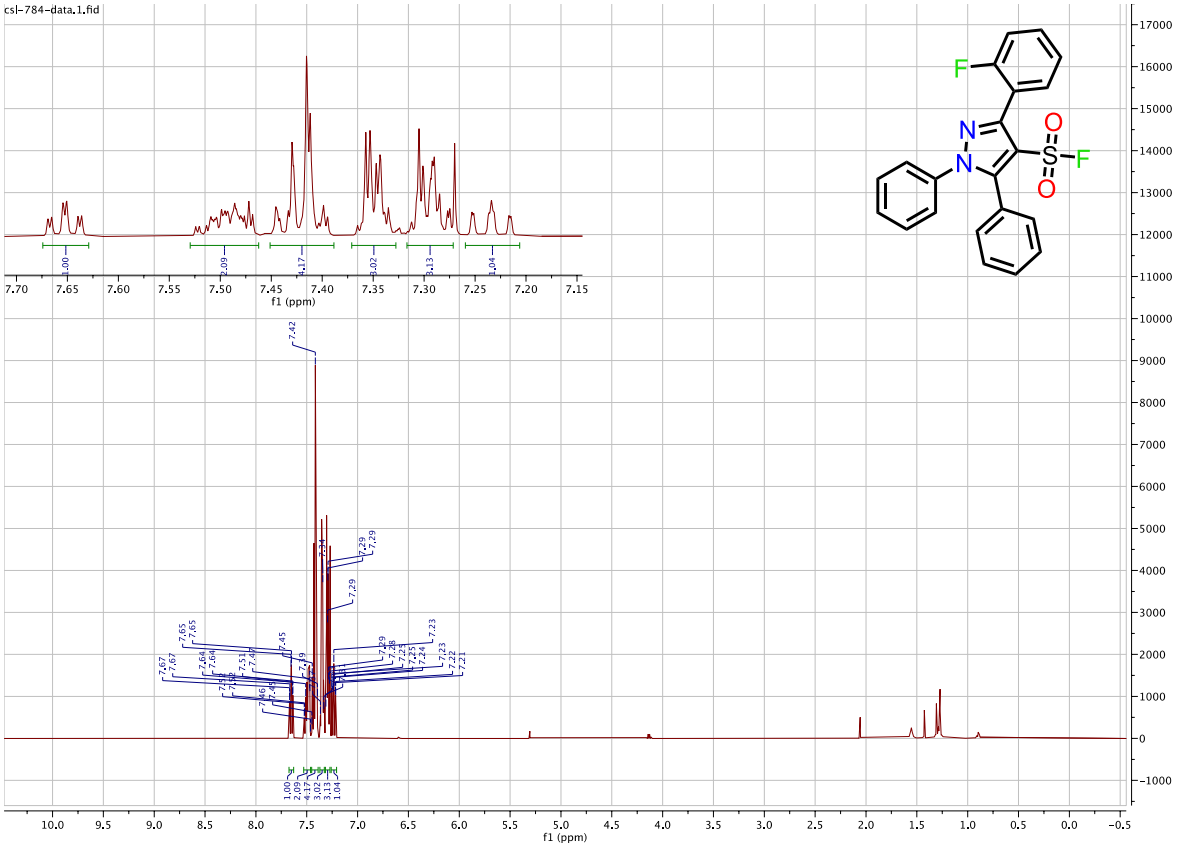

csl-807-data.2.fid
f1 (ppm)
MeO
OMe

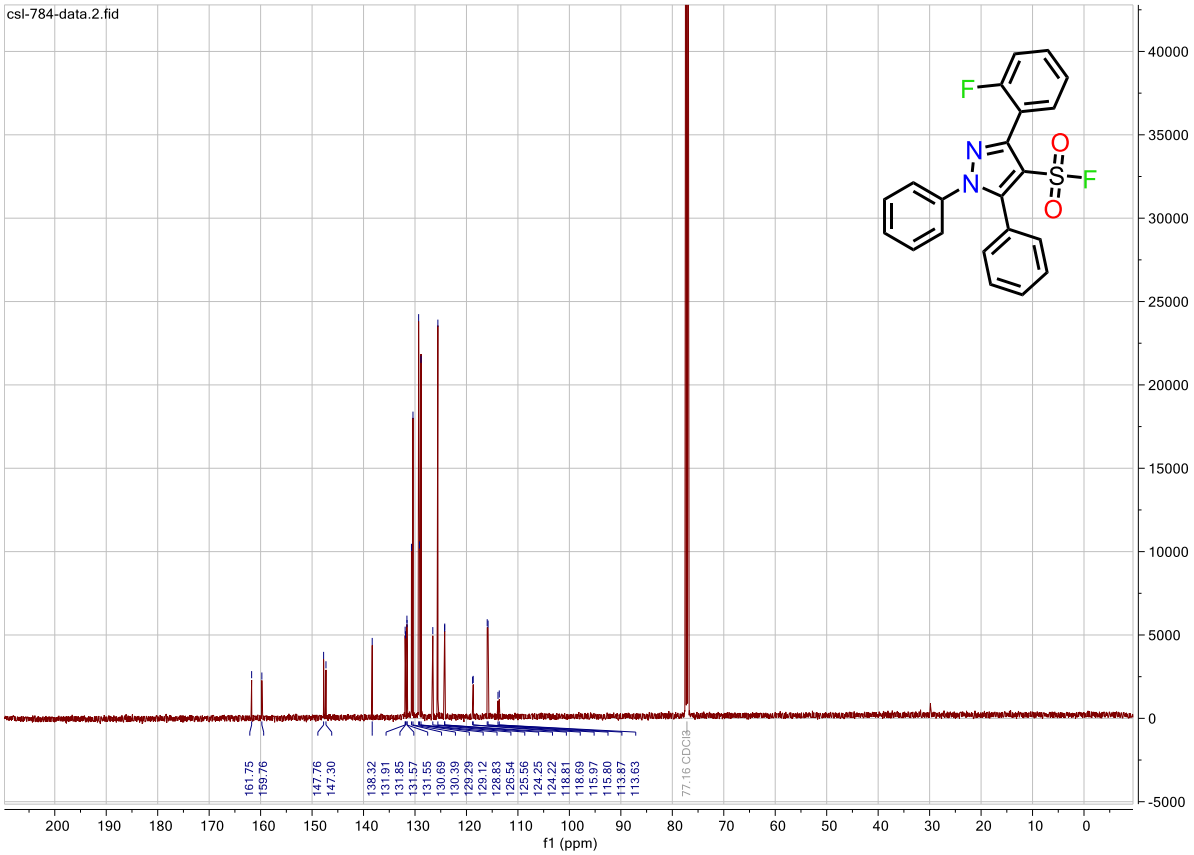

csl-807-F-1.fid
MeO
OMe
N
N
O
S
F
O
73.71
f1 (ppm)

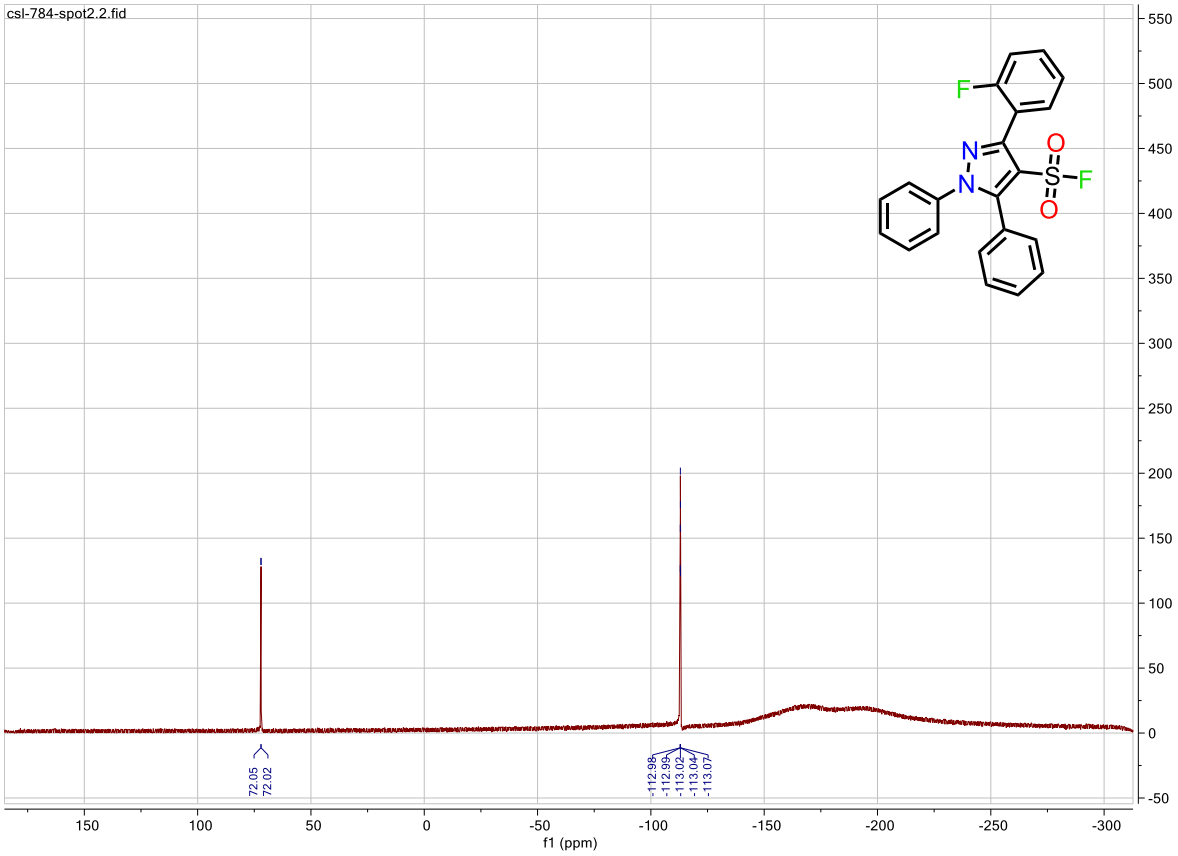

csl-854-spot3.1.fid
f1 (ppm)
S
N
N
O
S
F
O
iPr

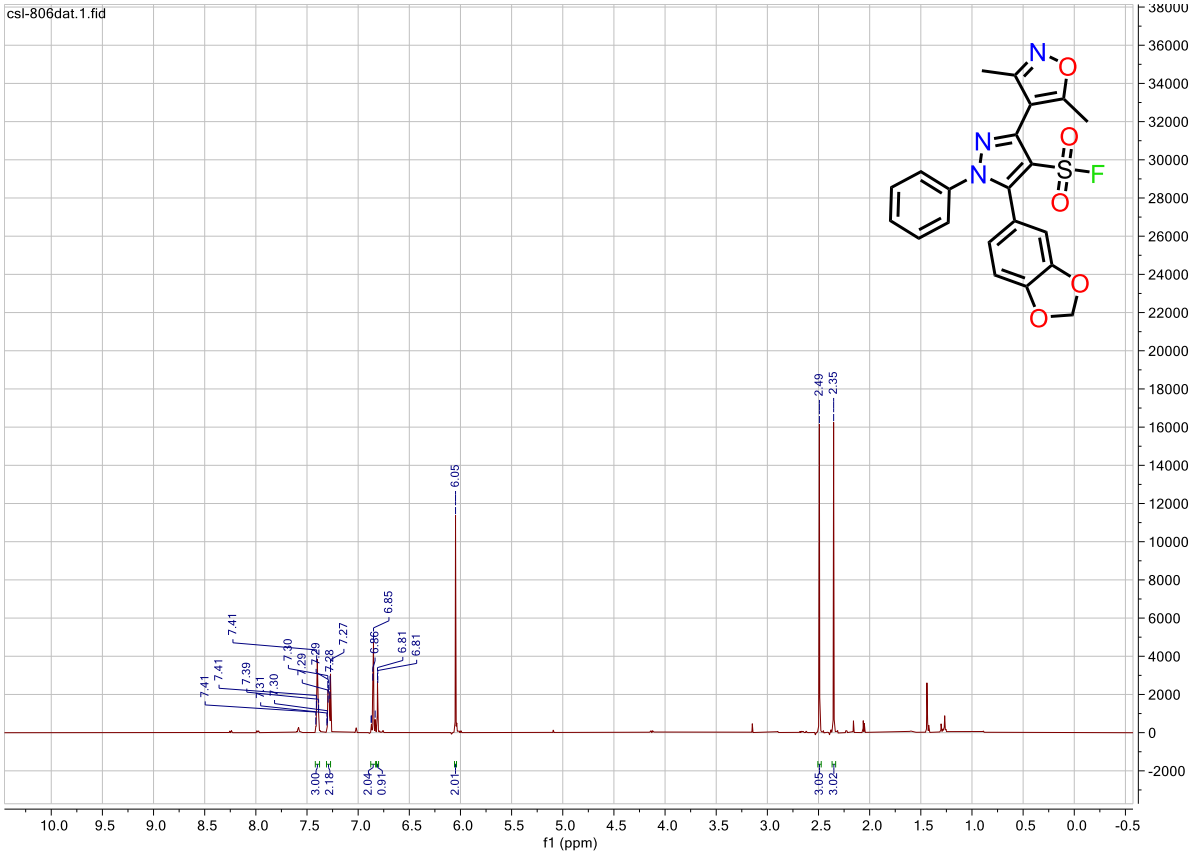

csl-854-data.2.fid
f1 (ppm)
77.16 CDCl3
S
N
N
O
S
F
O
iPr

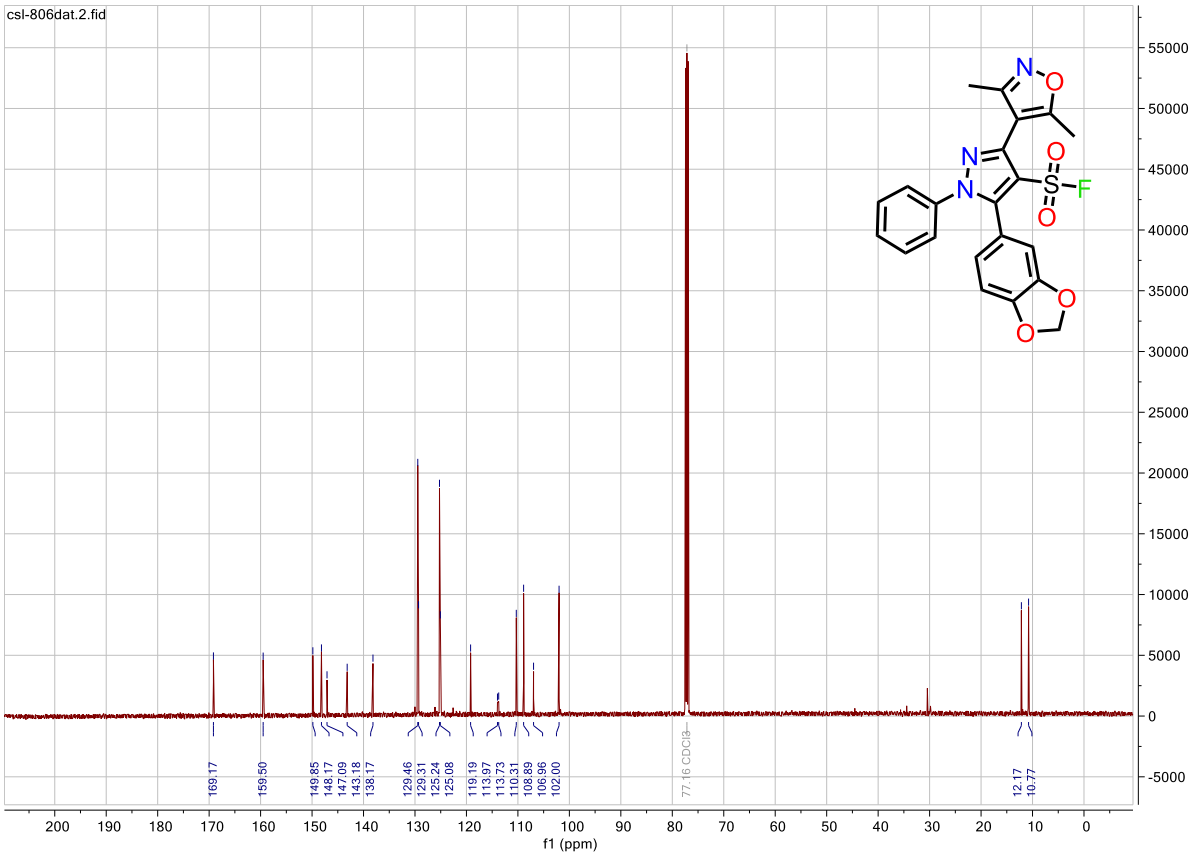

csl-854-spot3.2.fid
S
N
N
O
S
F
O
iPr
71.42
500
450
400
350
300
250
200
150
100
50
0
-50
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

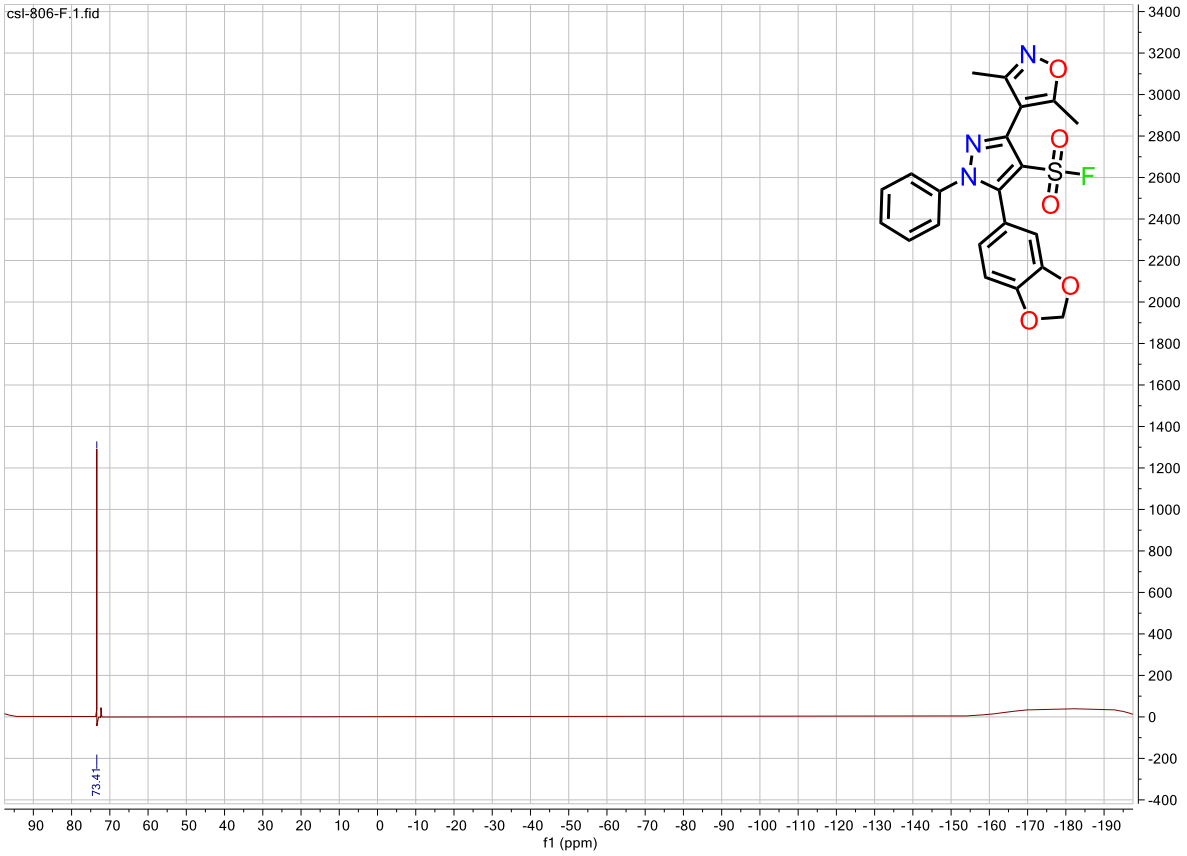

csl-784-data.1.fid
f1 (ppm)

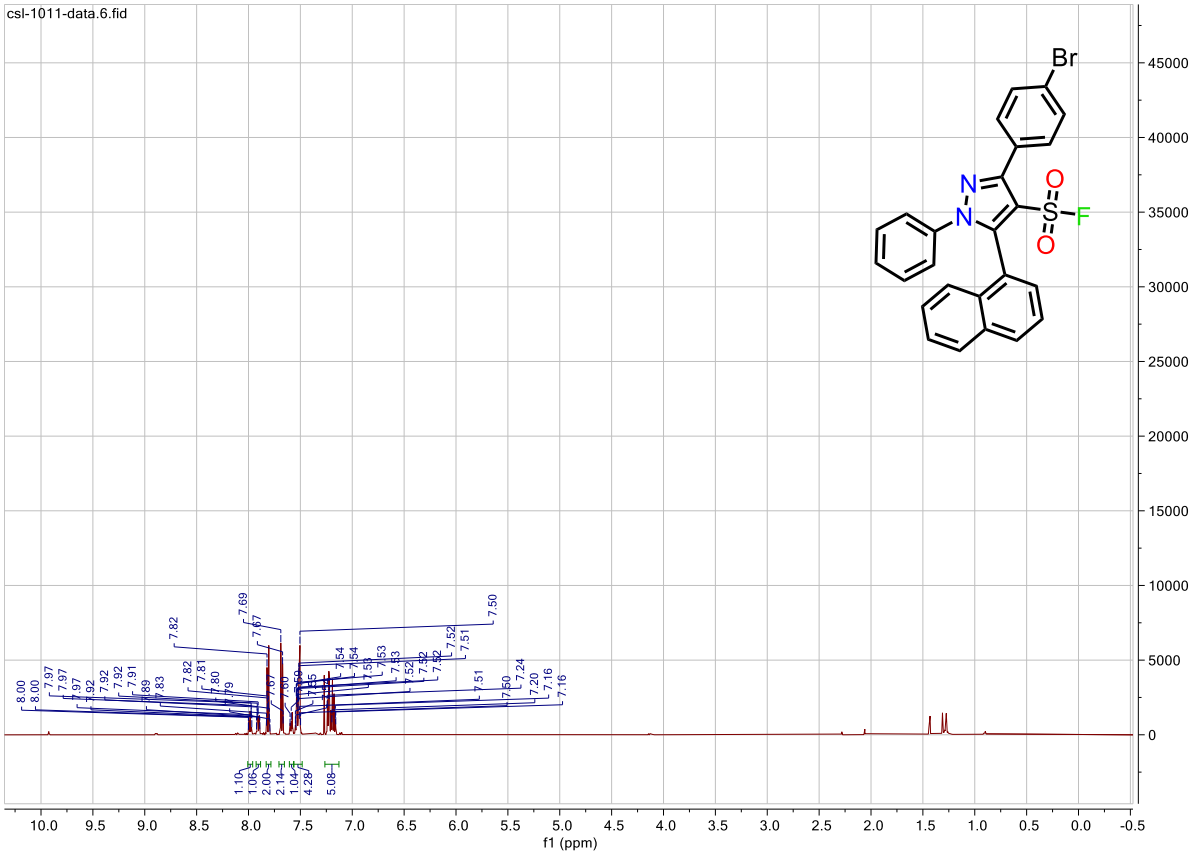

csl-784-data.2.fid
f1 (ppm)

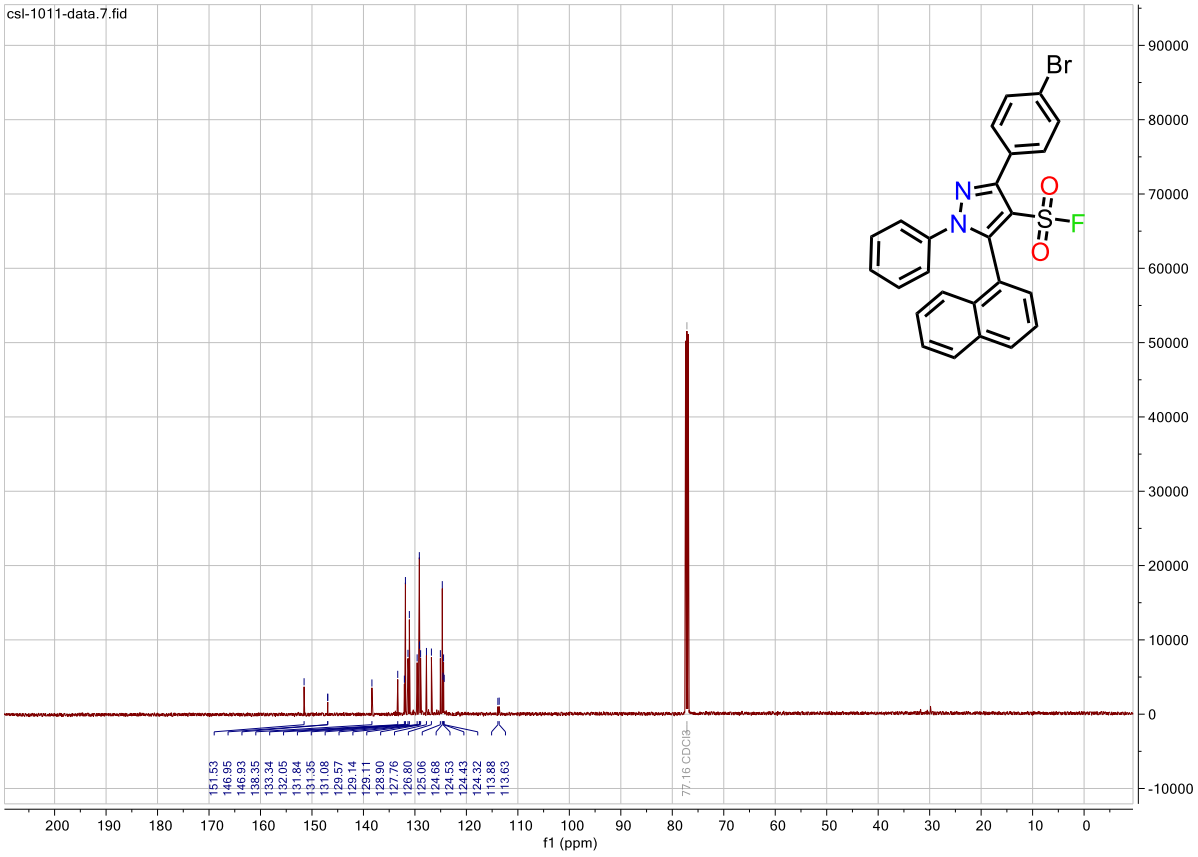

csl-784-spot2.2.fid
F
N
N
O
S
F
O
72.05
72.02
-112.98
-112.99
-113.02
-113.04
-113.07
f1 (ppm)

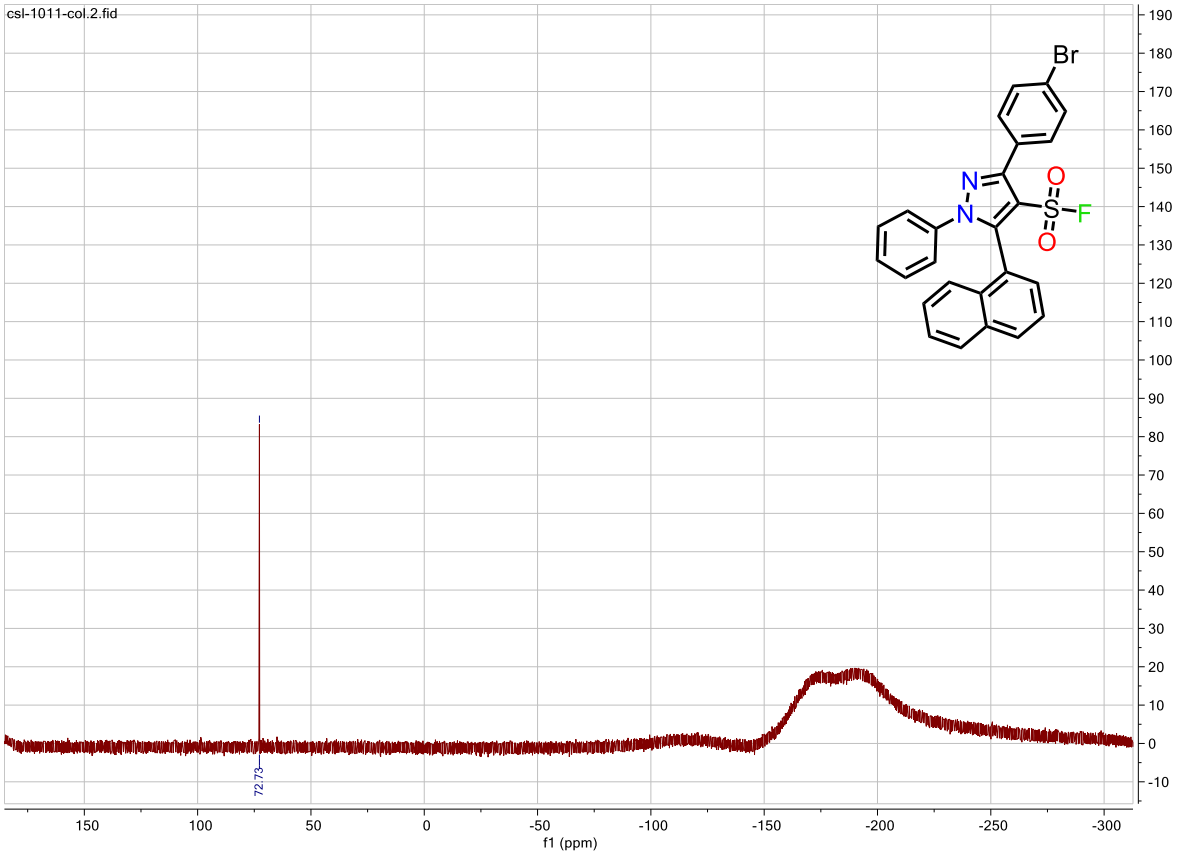

csl-806dat.1.fid
7.41
7.41
7.39
7.31
7.30
7.30
7.29
7.28
7.27
6.86
6.85
6.81
6.81
6.05
2.49
2.35
3.00
2.18
2.04
0.91
2.01
3.05
3.02
f1 (ppm)

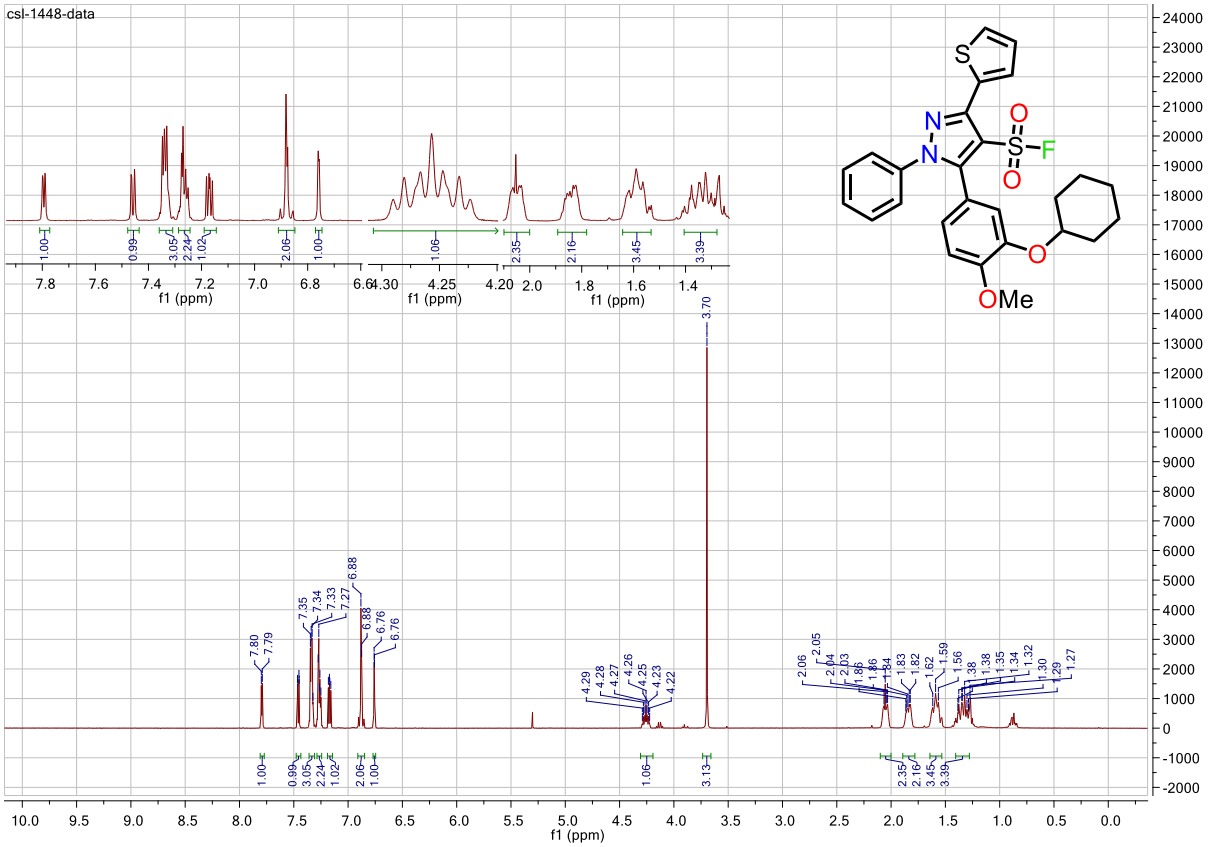

csl-806dat.2.fid
169.17
159.50
149.85
148.17
147.09
143.18
138.17
129.46
129.31
125.24
125.08
119.19
113.97
113.73
110.31
108.89
106.96
102.00
77.16 CDCl3
12.17
10.77
f1 (ppm)

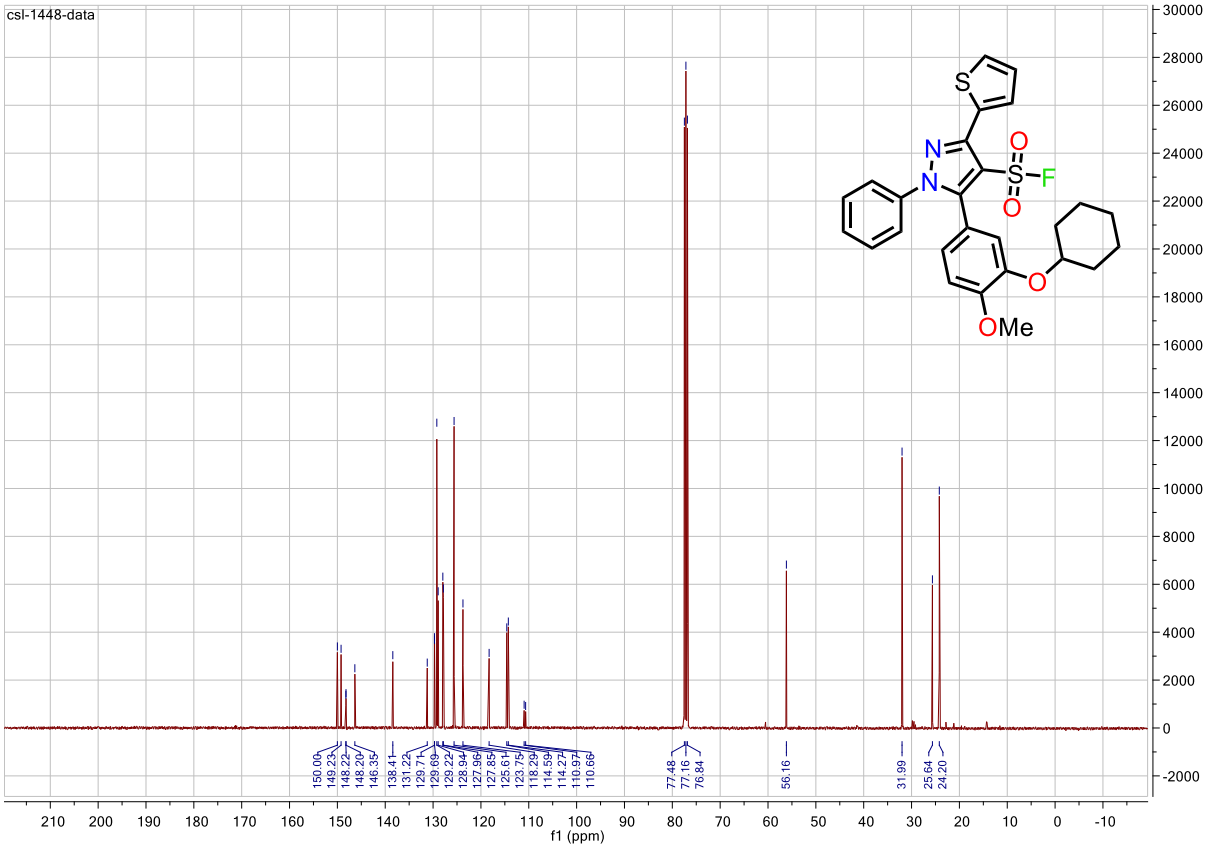

csl-806-F 1.fid
73.41
f1 (ppm)

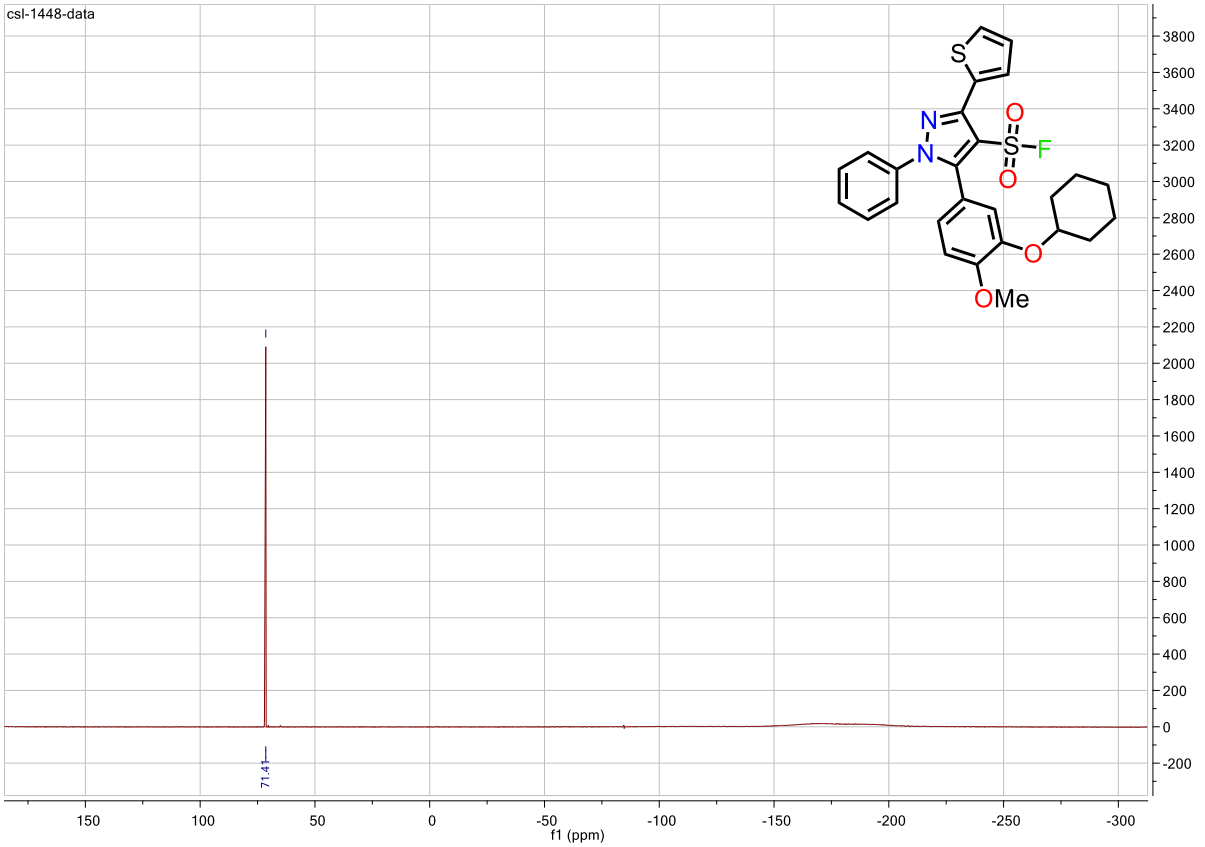

csl-1011-data.6.fid
Br
N
N
O
S
F
O
f1 (ppm)

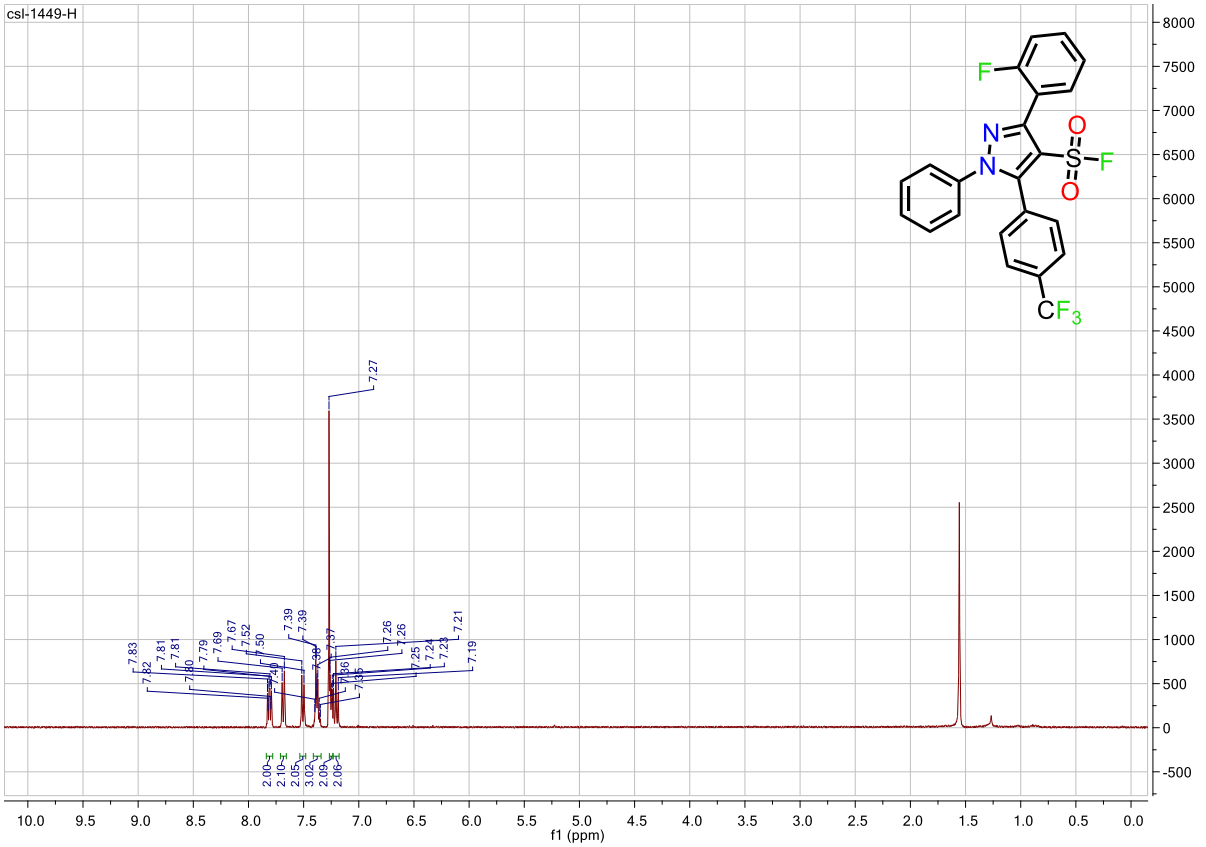

csl-1011-data.7.fid
Br
N
N
O
S
F
O
77.16 CDCl3
f1 (ppm)

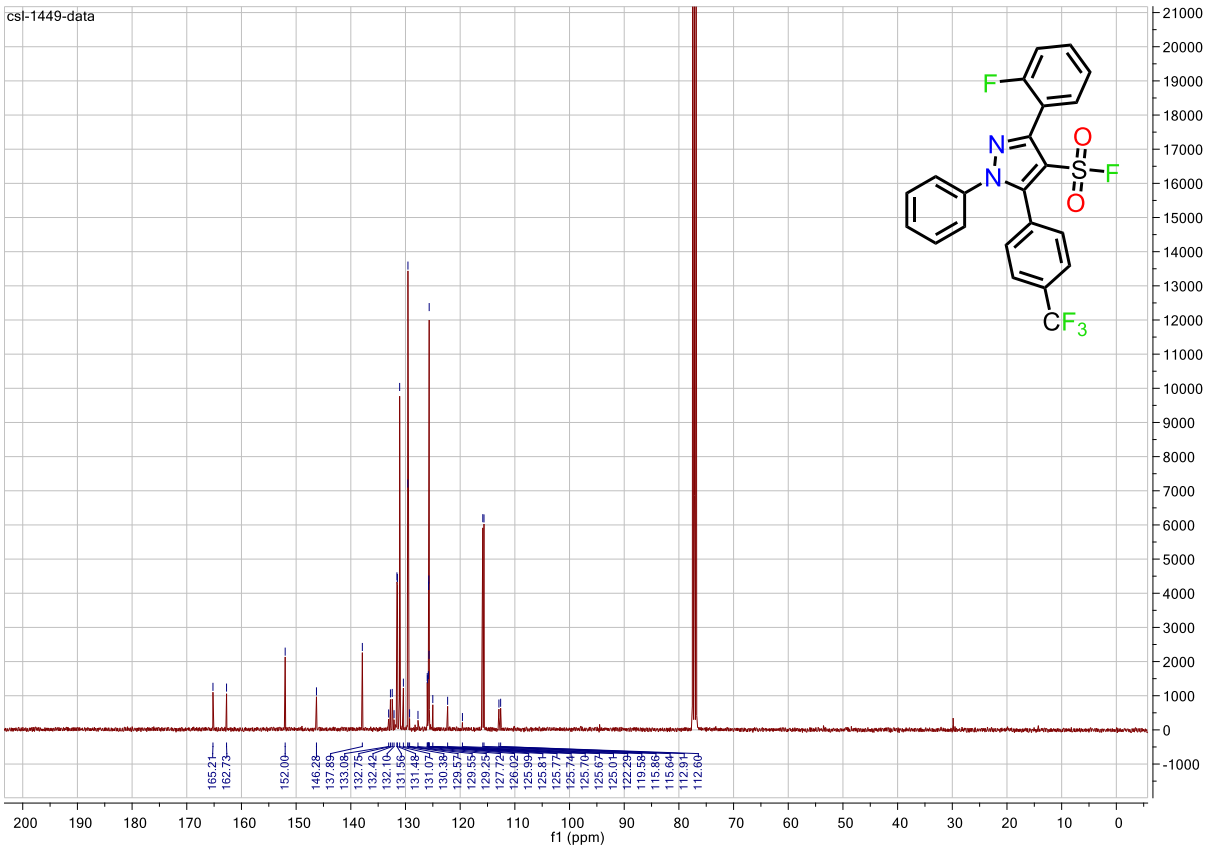

csl-1011-col.2.fid
Br
N
N
O
S
F
O
72.73
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10

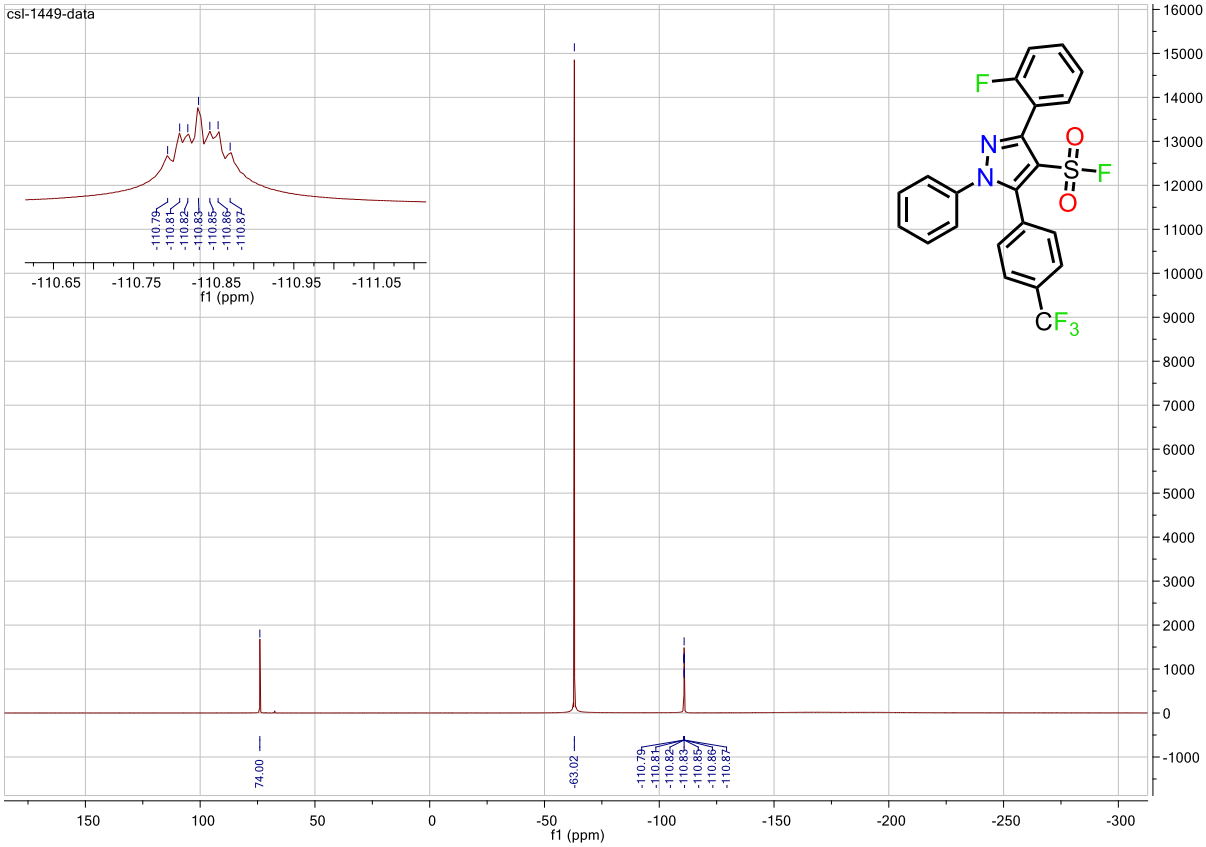

csl-1448-data
f1 (ppm)
S
N
N
O
S
F
O
O
OMe

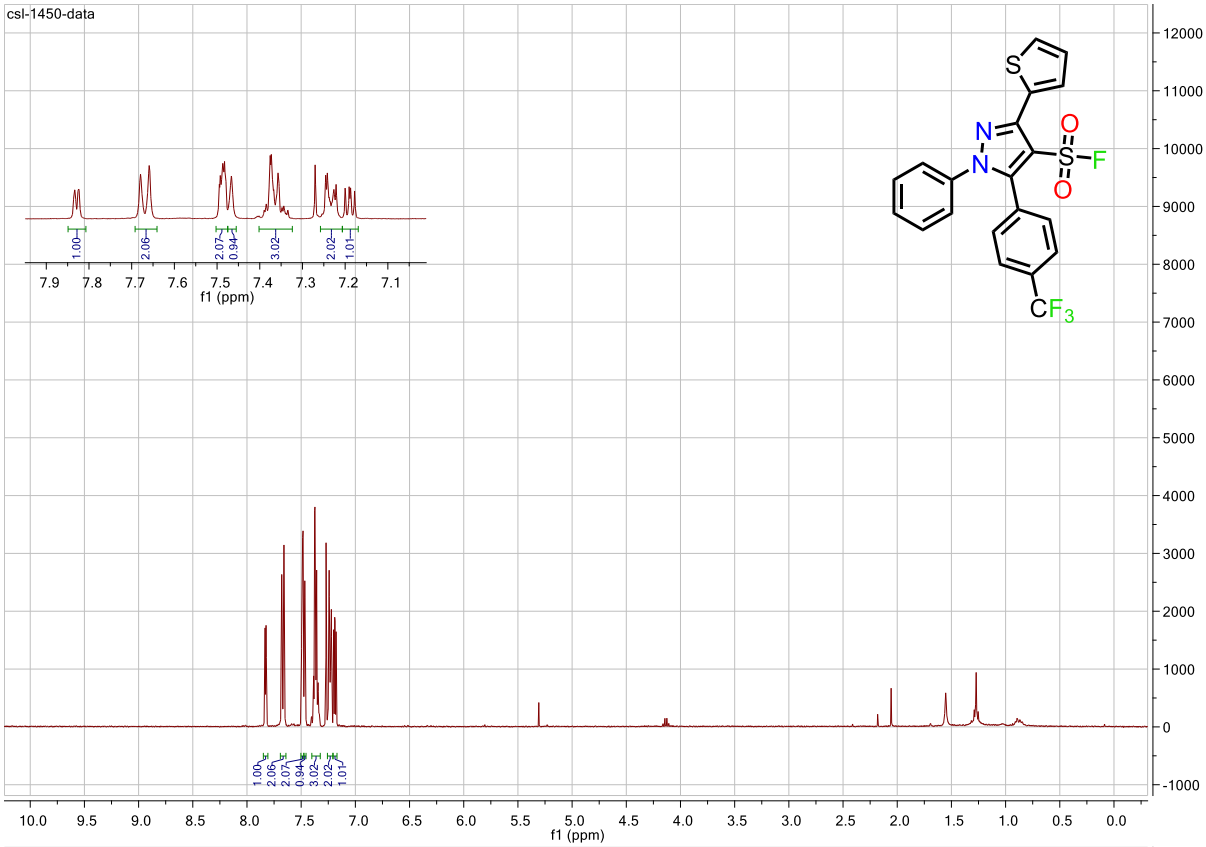

csl-1448-data
f1 (ppm)
S
N
N
O
S
F
O
O
OMe

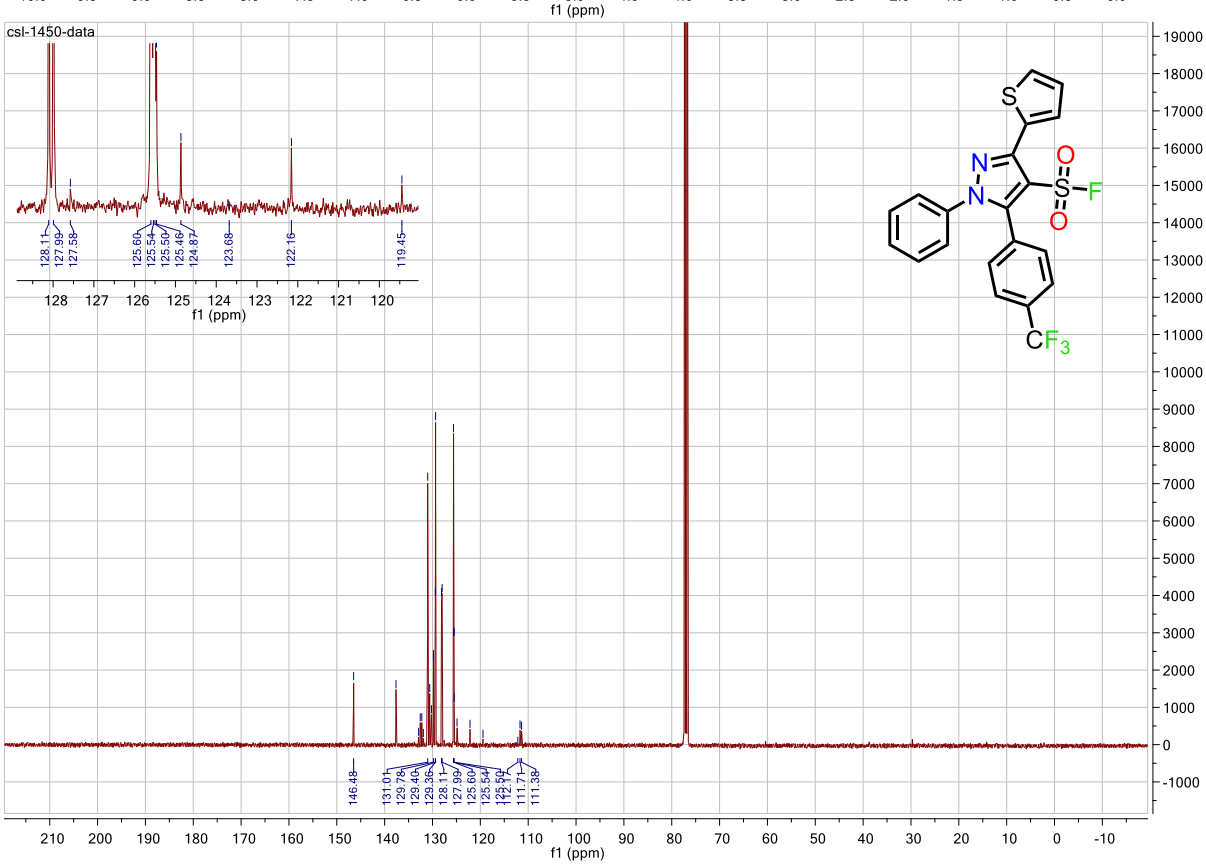

csl-1448-data
S
N
N
O
S
F
O
O
OMe
71.41
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
3800
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200

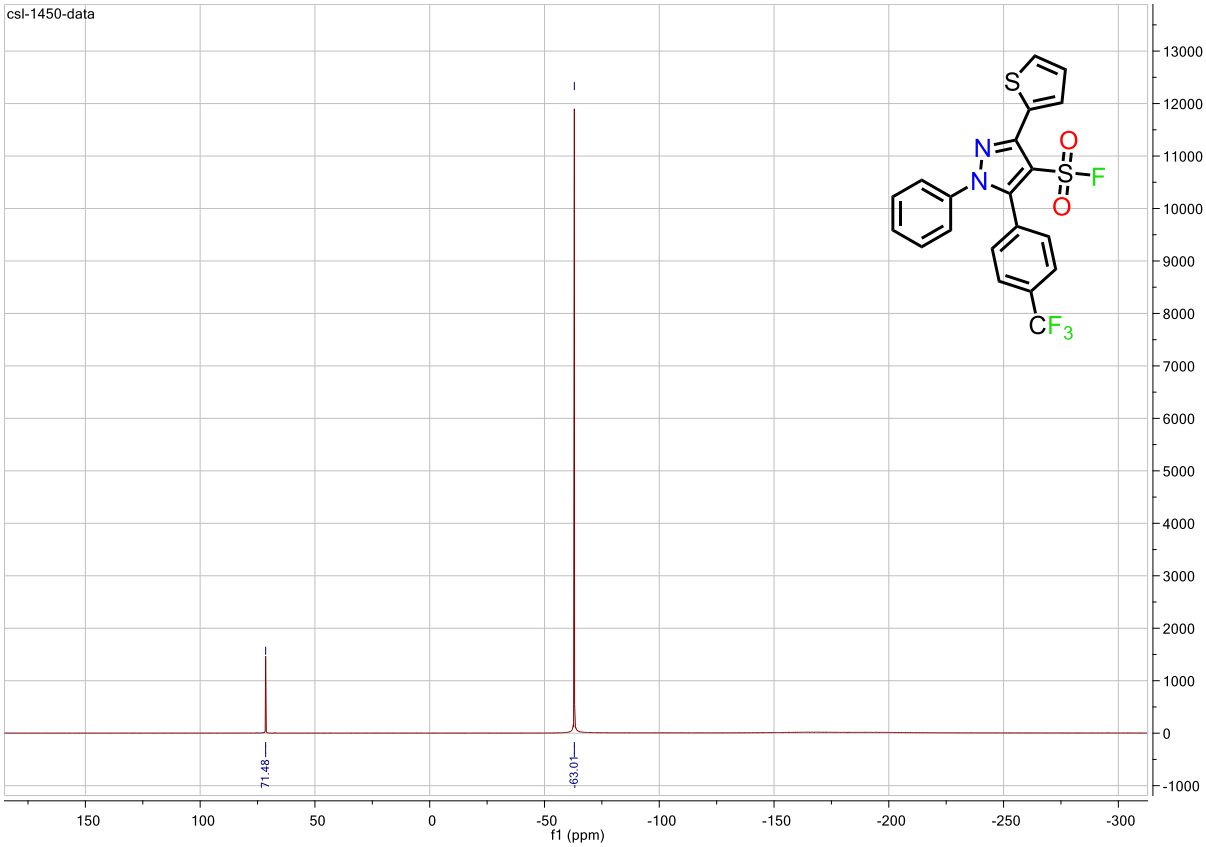

csl-1449-H
F
N
N
O
S
F
O
CF3
7.27
7.83
7.82
7.81
7.81
7.80
7.79
7.69
7.67
7.52
7.50
7.39
7.39
7.37
7.26
7.26
7.25
7.24
7.23
7.21
7.19
7.16
7.15
2.00
2.10
2.05
3.02
2.09
2.06
f1 (ppm)

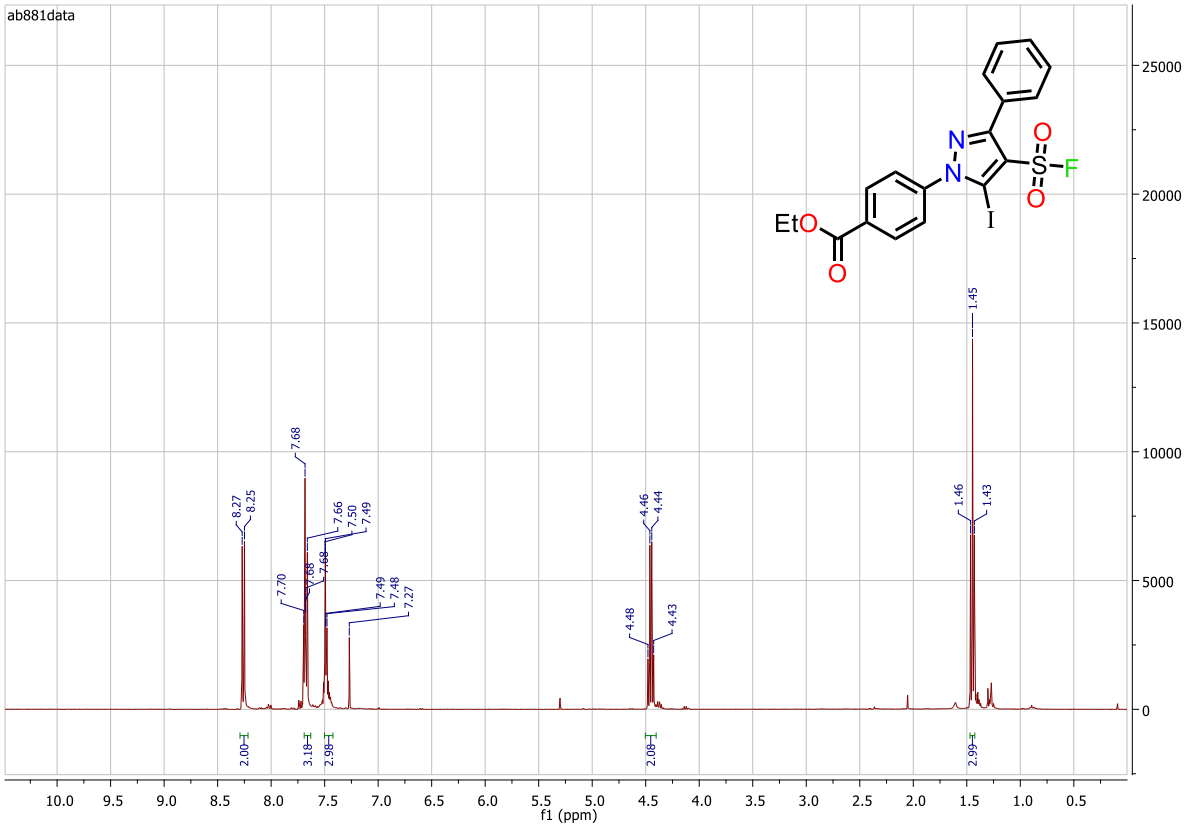

csl-1449-data
F
N
N
O
S
F
O
CF3
165.21
162.73
152.00
146.28
137.89
133.08
132.75
132.42
132.10
131.96
131.49
131.07
130.38
129.57
129.55
129.25
127.72
126.02
125.99
125.81
125.77
125.74
125.70
125.67
125.01
122.25
119.58
115.86
115.64
112.91
112.60
f1 (ppm)

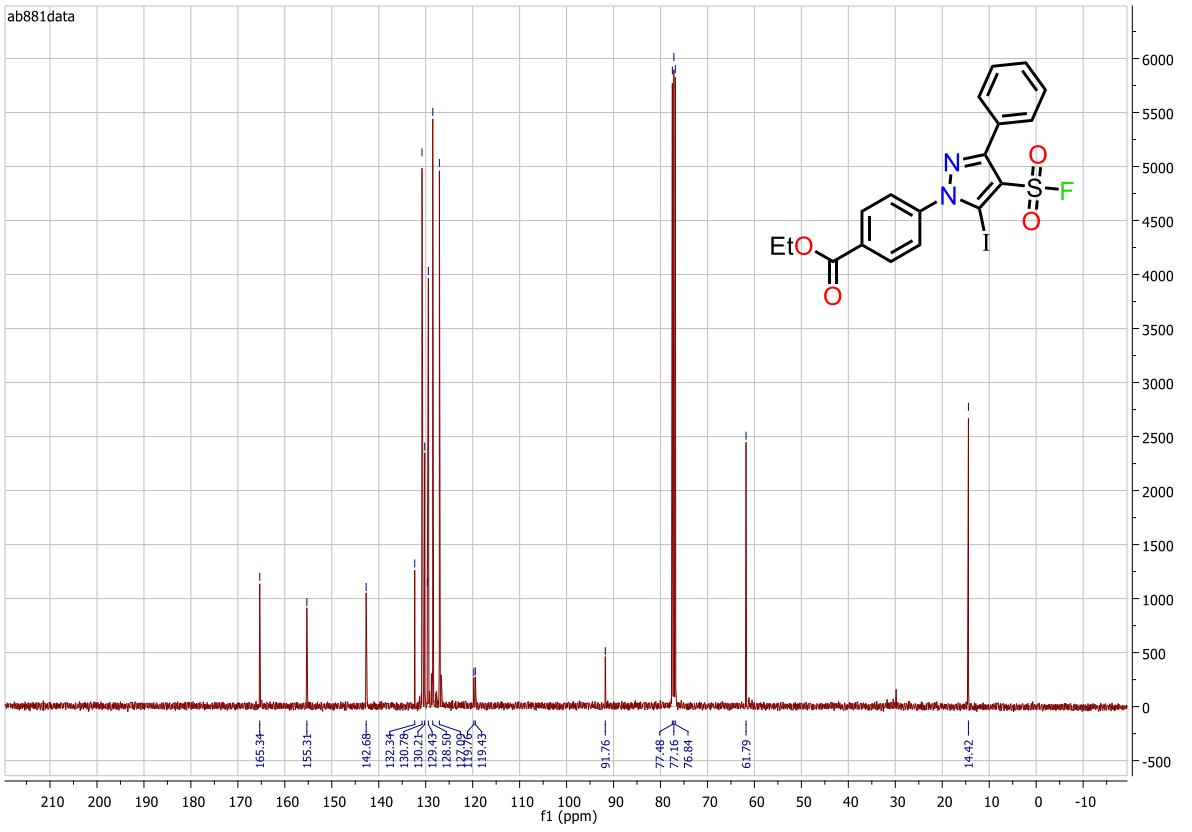

csl-1449-data
-110.79
-110.81
-110.82
-110.83
-110.85
-110.86
-110.87
-110.65
-110.75
-110.85
-110.95
-111.05
f1 (ppm)
F
N
N
O
S
F
O
CF3
74.00
-63.02
-110.79
-110.81
-110.82
-110.83
-110.85
-110.86
-110.87
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000

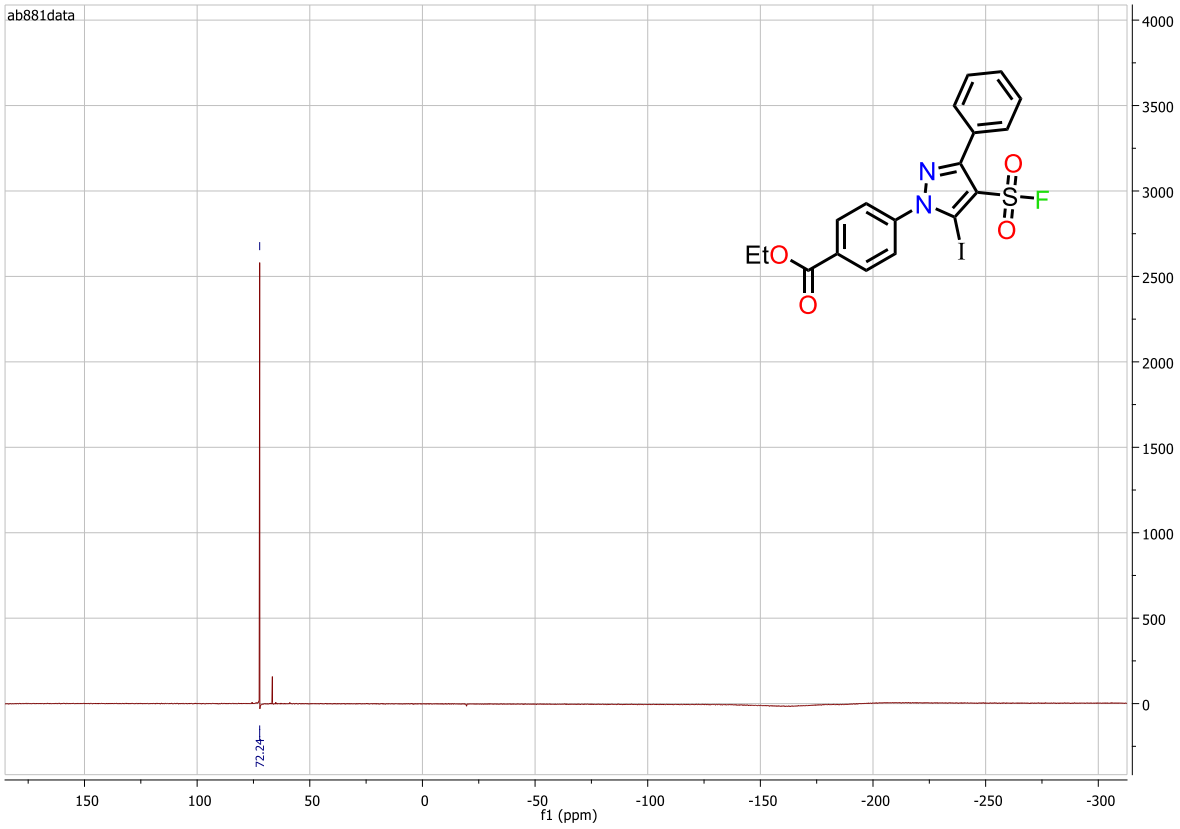

csl-1450-data
f1 (ppm)
S
N
N
O
S
F
O
CF3

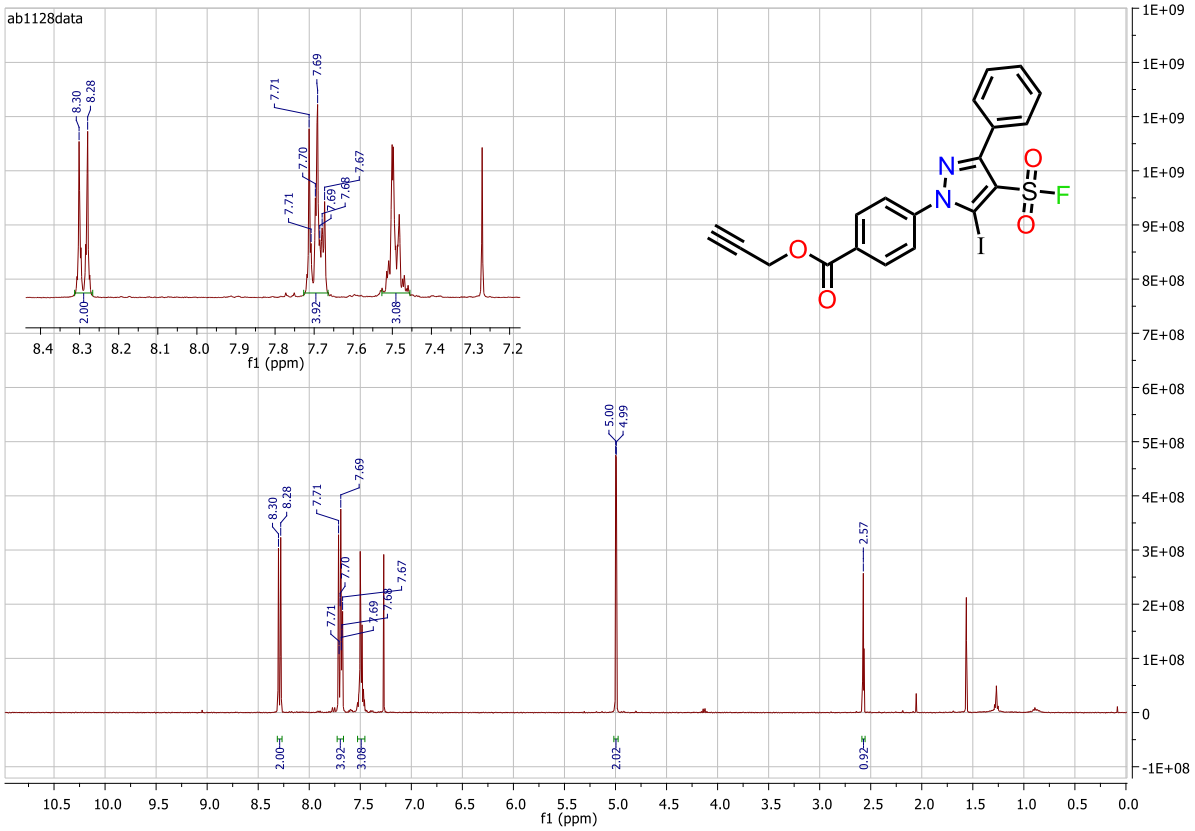

csl-1450-data
f1 (ppm)
S
N
N
O
S
F
O
CF3

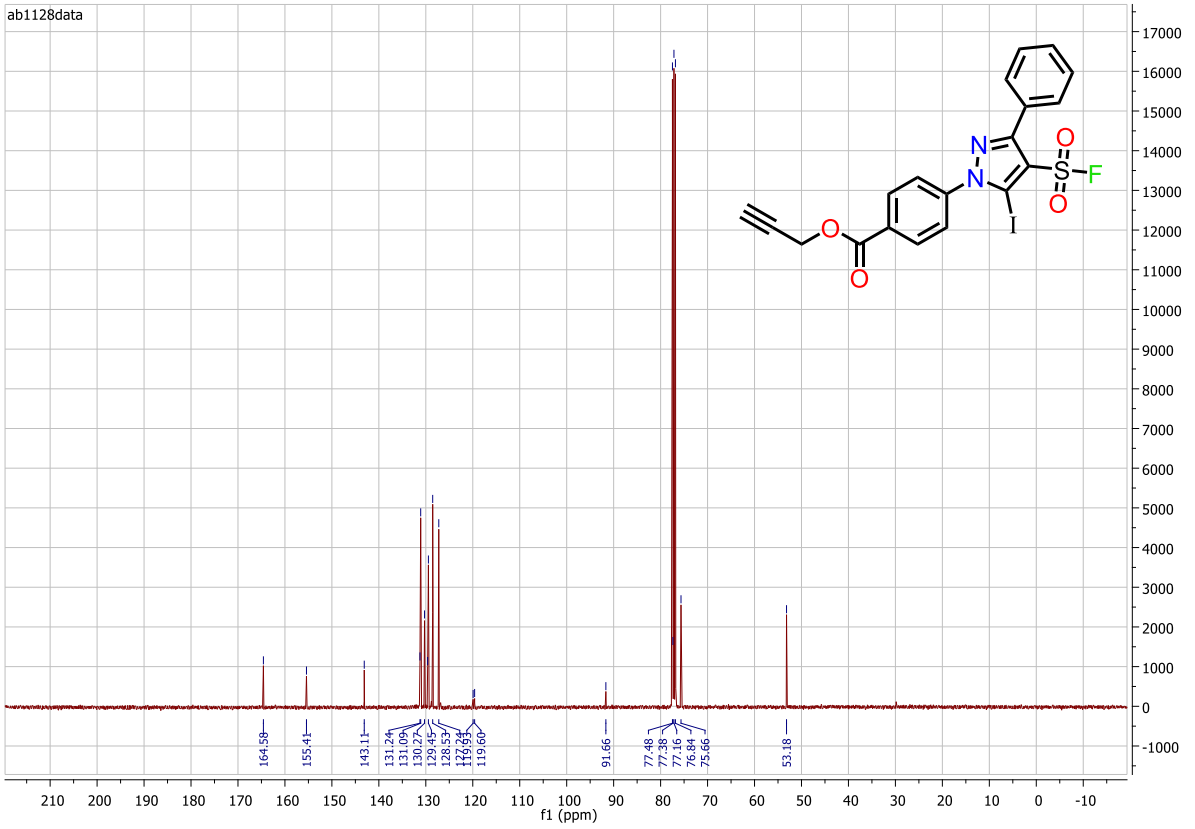

csl-1450-data
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
71.48
-63.01
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
S
N
N
O
S
F
O
CF3

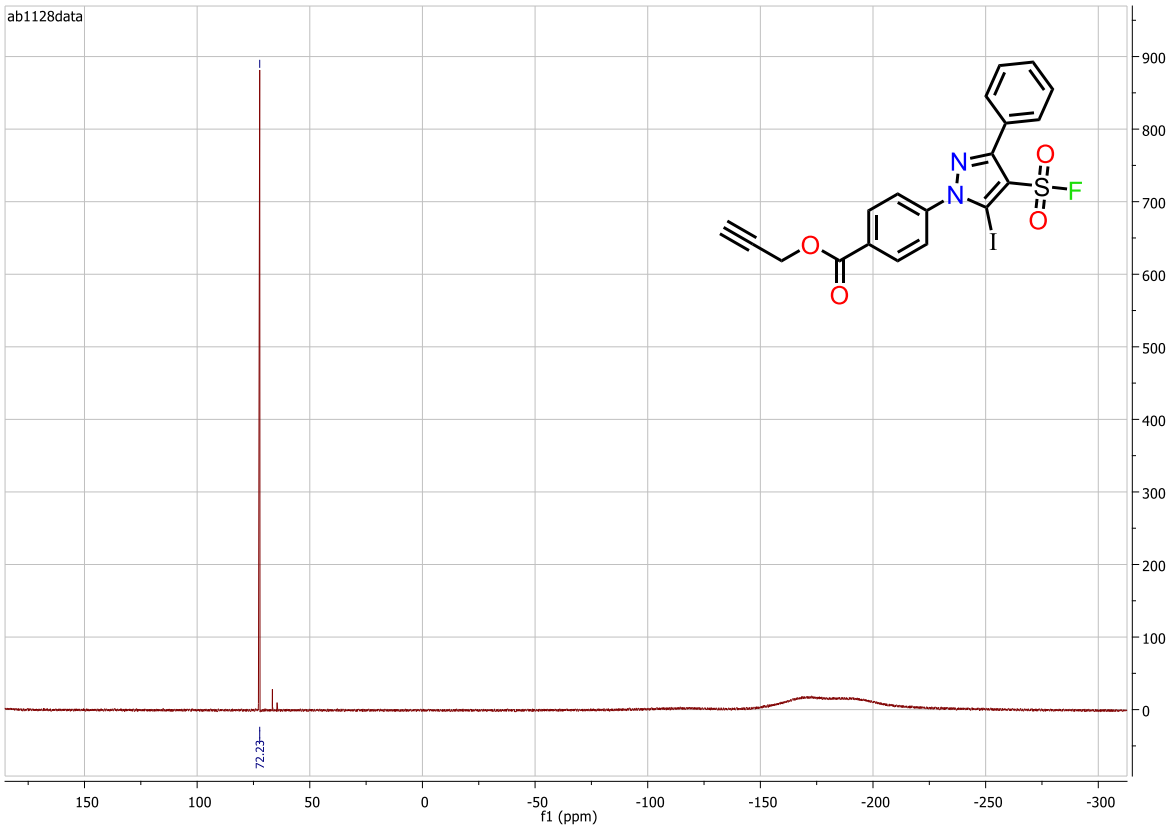

ab881data
8.27
8.25
7.68
7.70
7.66
7.50
7.49
7.49
7.48
7.27
4.46
4.44
4.48
4.43
1.45
1.46
1.43
2.00
3.18
2.98
2.08
2.99
f1 (ppm)

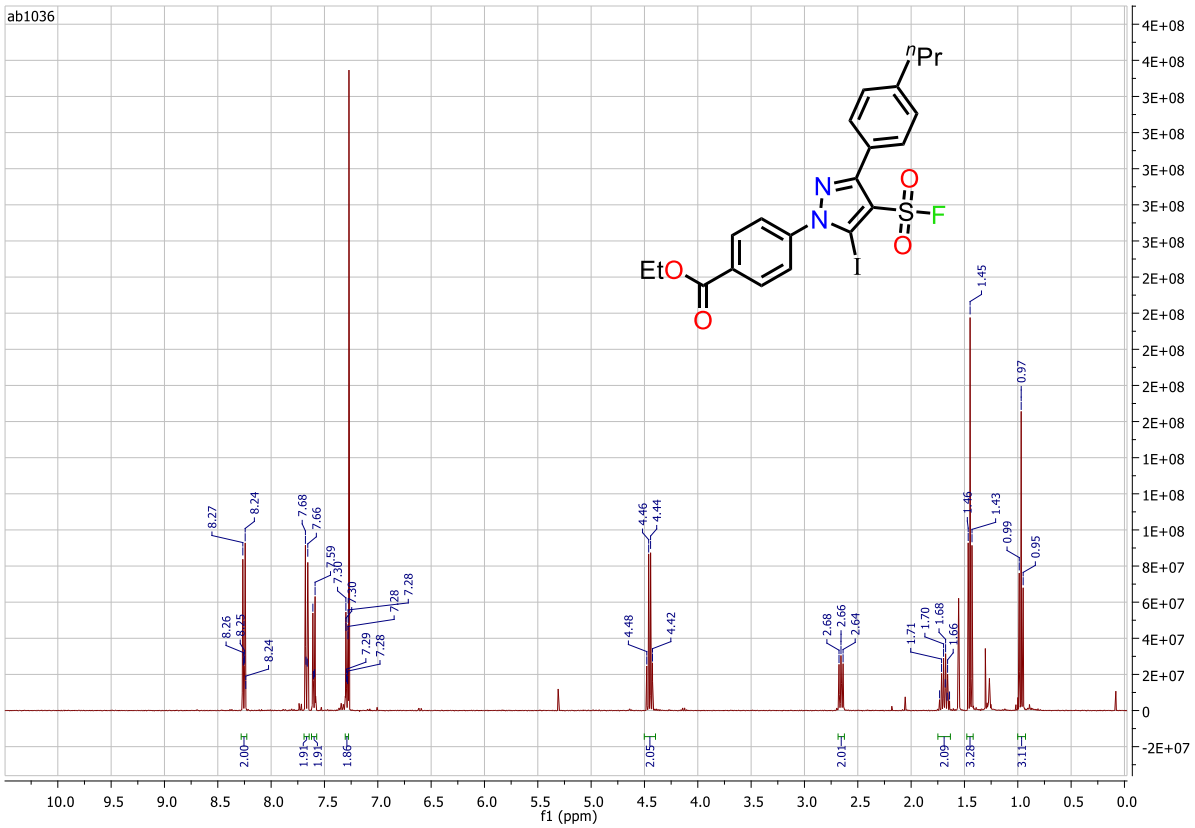

ab881data
165.34
155.31
142.68
132.34
130.78
130.21
129.43
128.50
119.76
119.43
91.76
77.48
77.16
76.84
61.79
14.42
f1 (ppm)

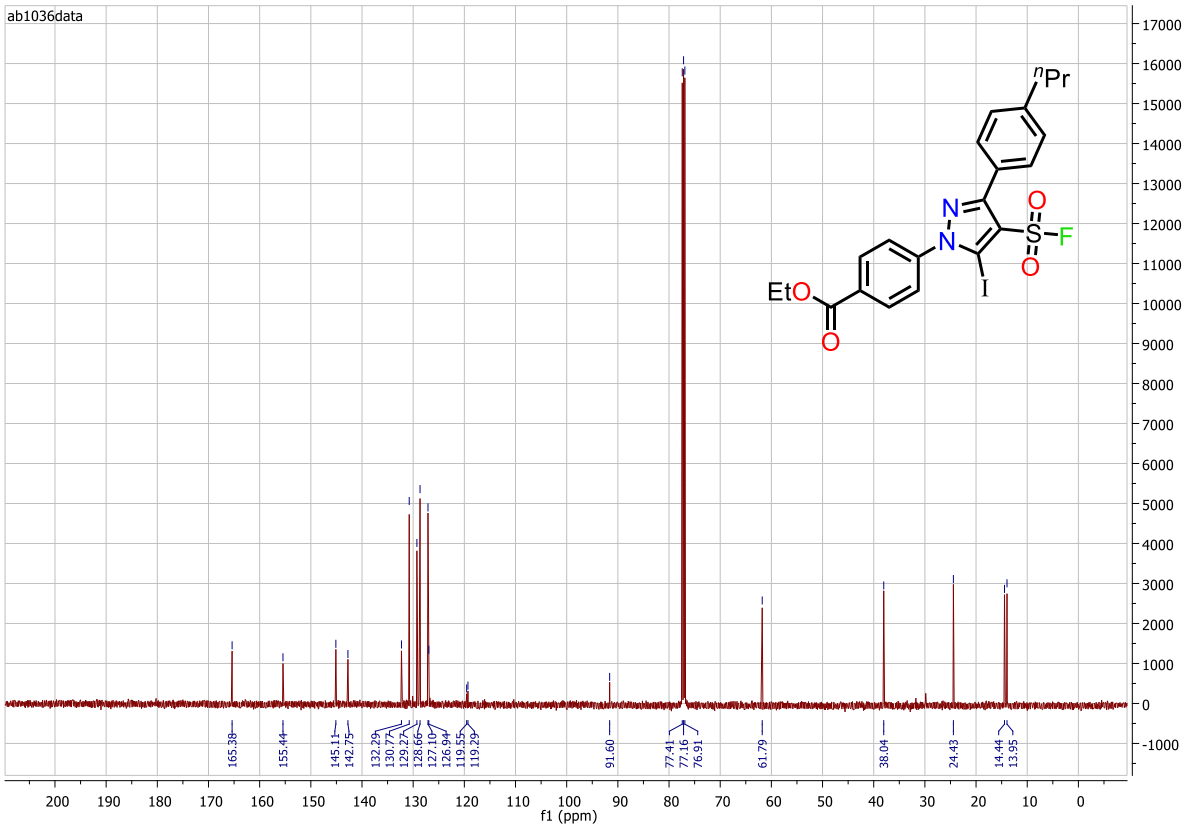

ab881data
4000
3500
3000
2500
2000
1500
1000
500
0
72.24
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
N
N
O
S
F
O
I
EtO
O

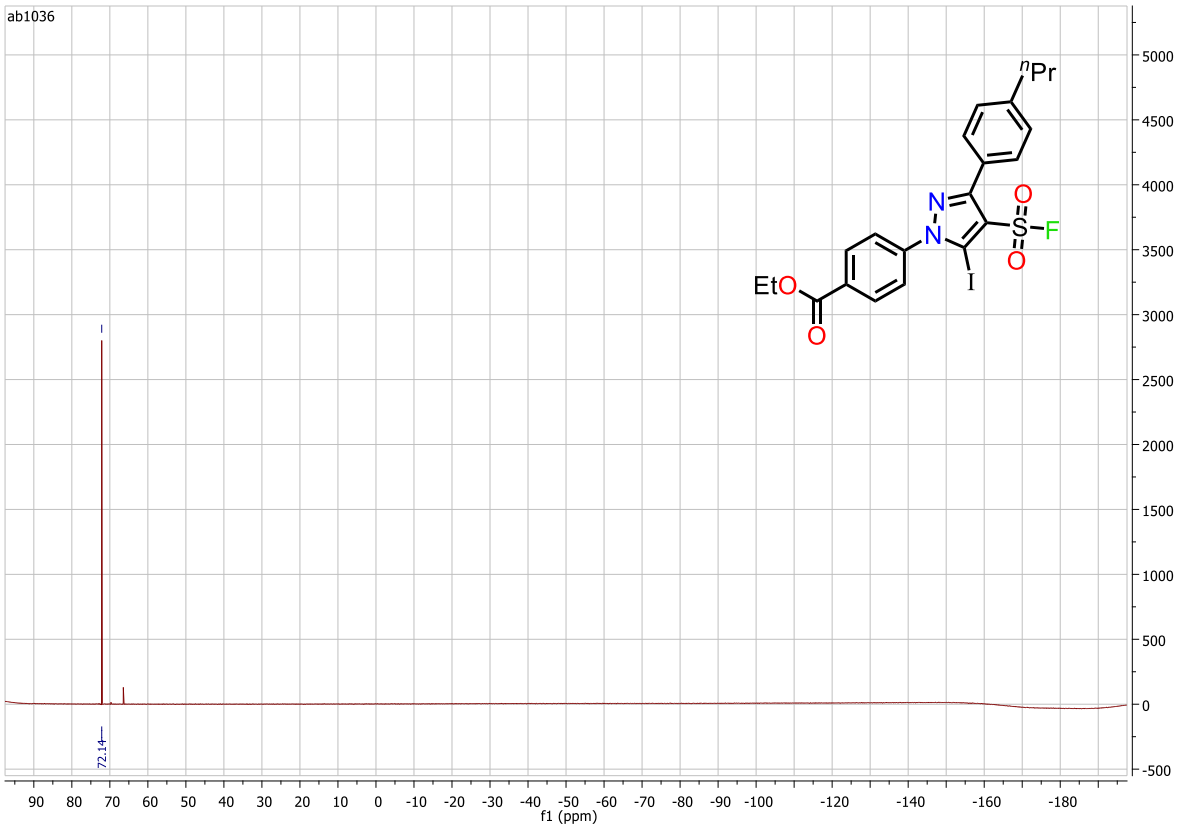

ab1128data
f1 (ppm)

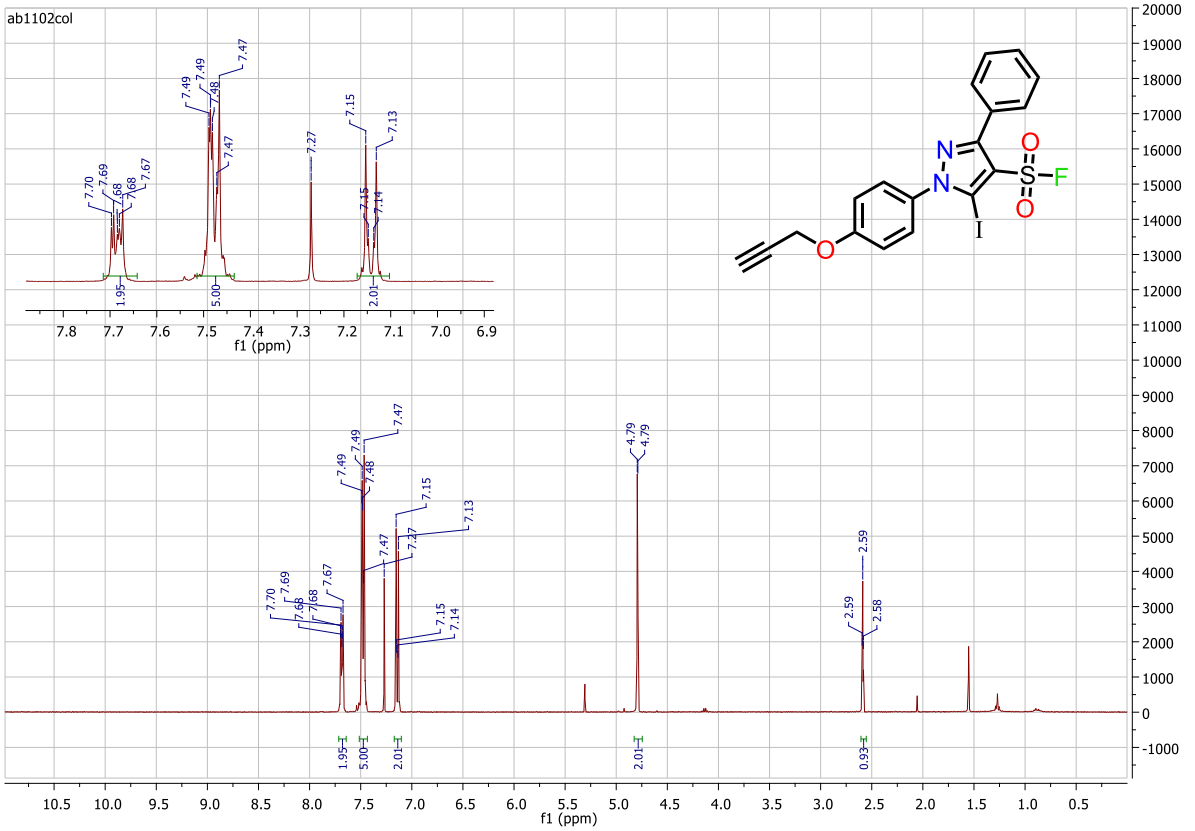

ab1128data
f1 (ppm)

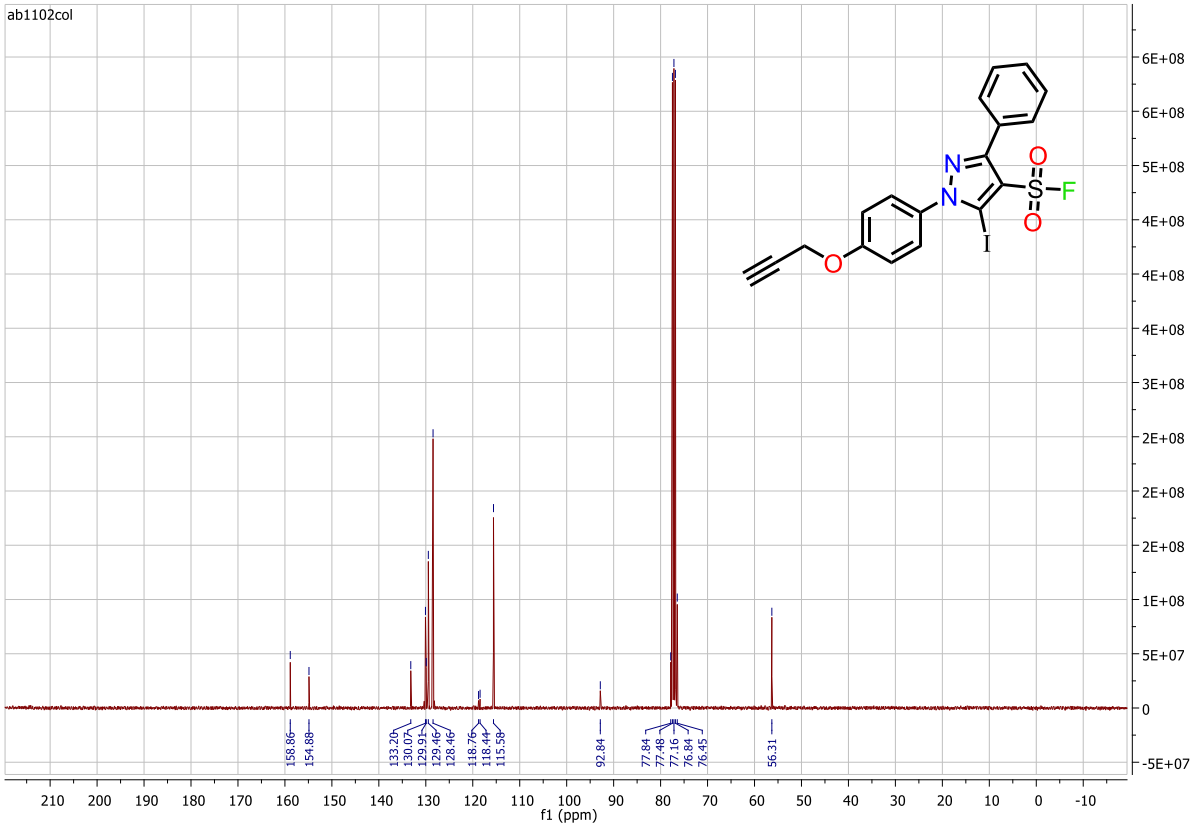

ab1128data
900
800
700
600
500
400
300
200
100
0
72.23
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
N
N
O
S
F
O
O
O
I

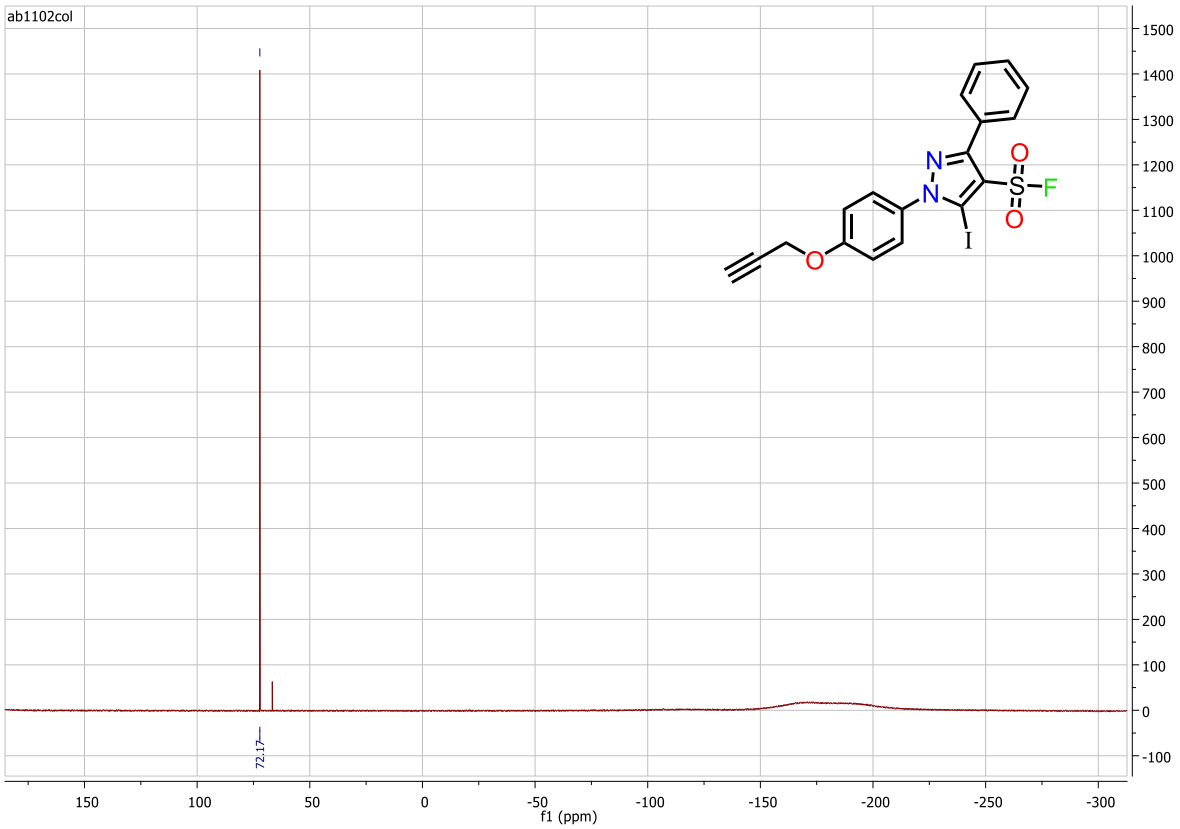

ab1036
nPr
N
N
O
S
F
O
I
EtO
O
f1 (ppm)

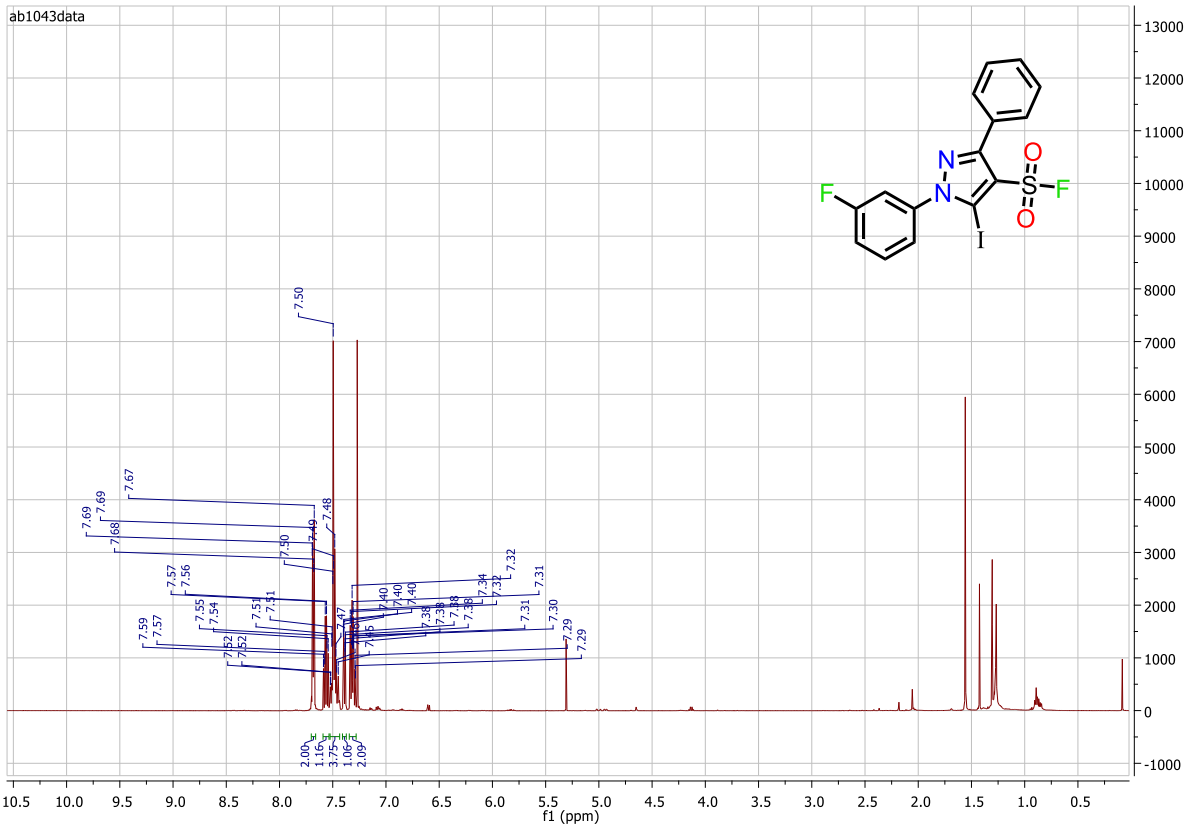

ab1036data
nPr
N
N
O
S
F
O
I
EtO
O
f1 (ppm)

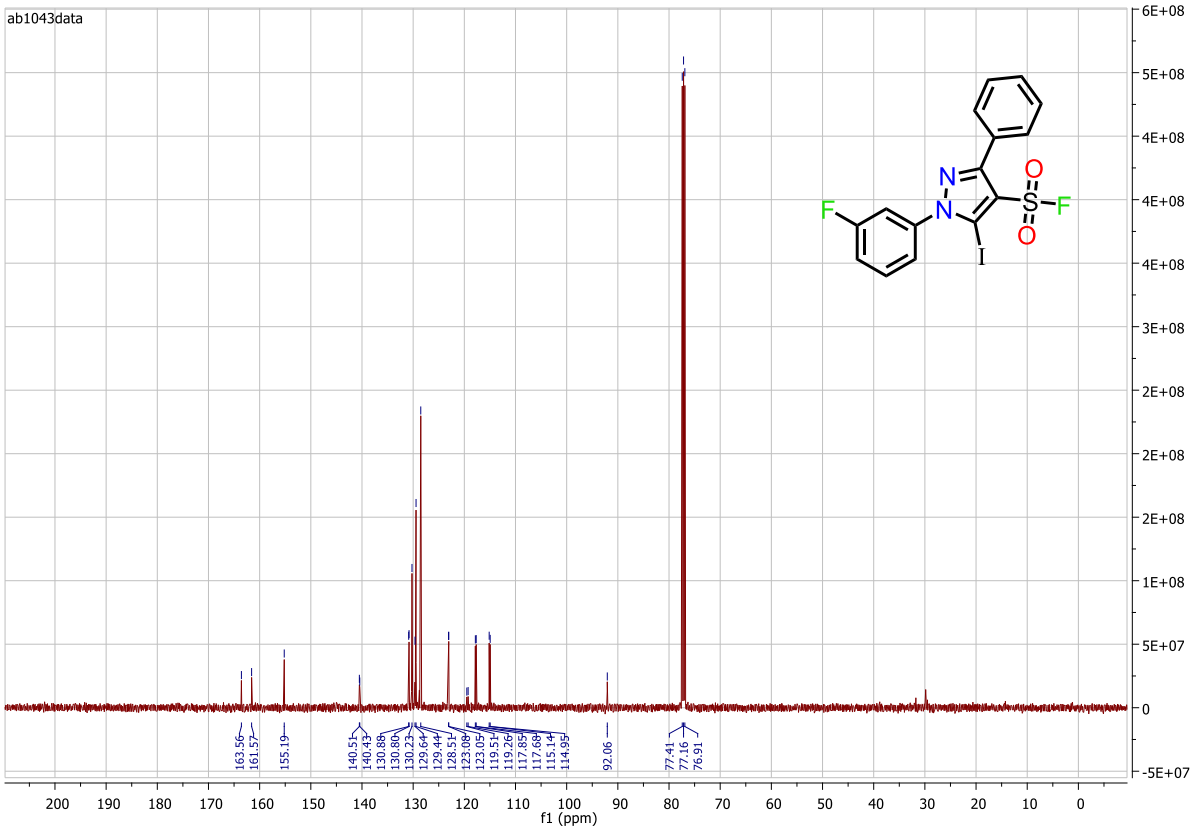

ab1036
nPr
N
N
O
S
F
O
I
EtO
O
72.14
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)

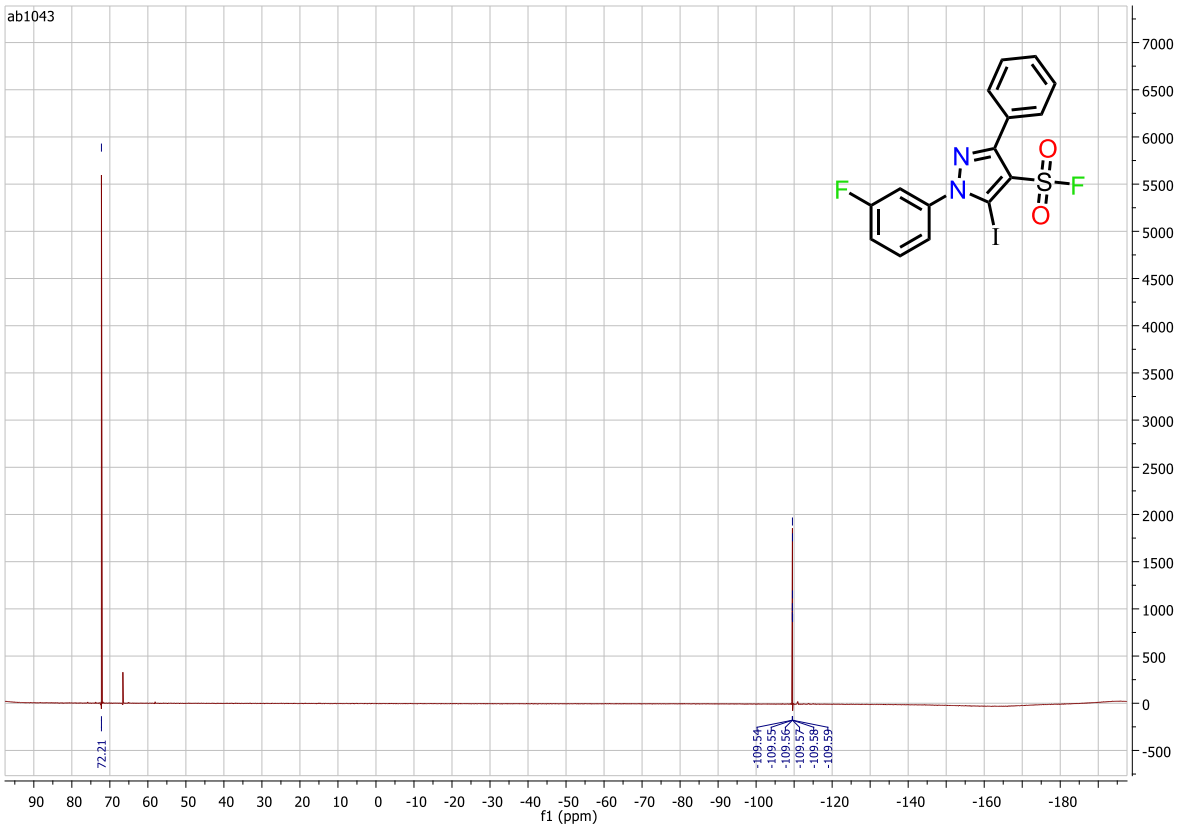

ab1102col
f1 (ppm)

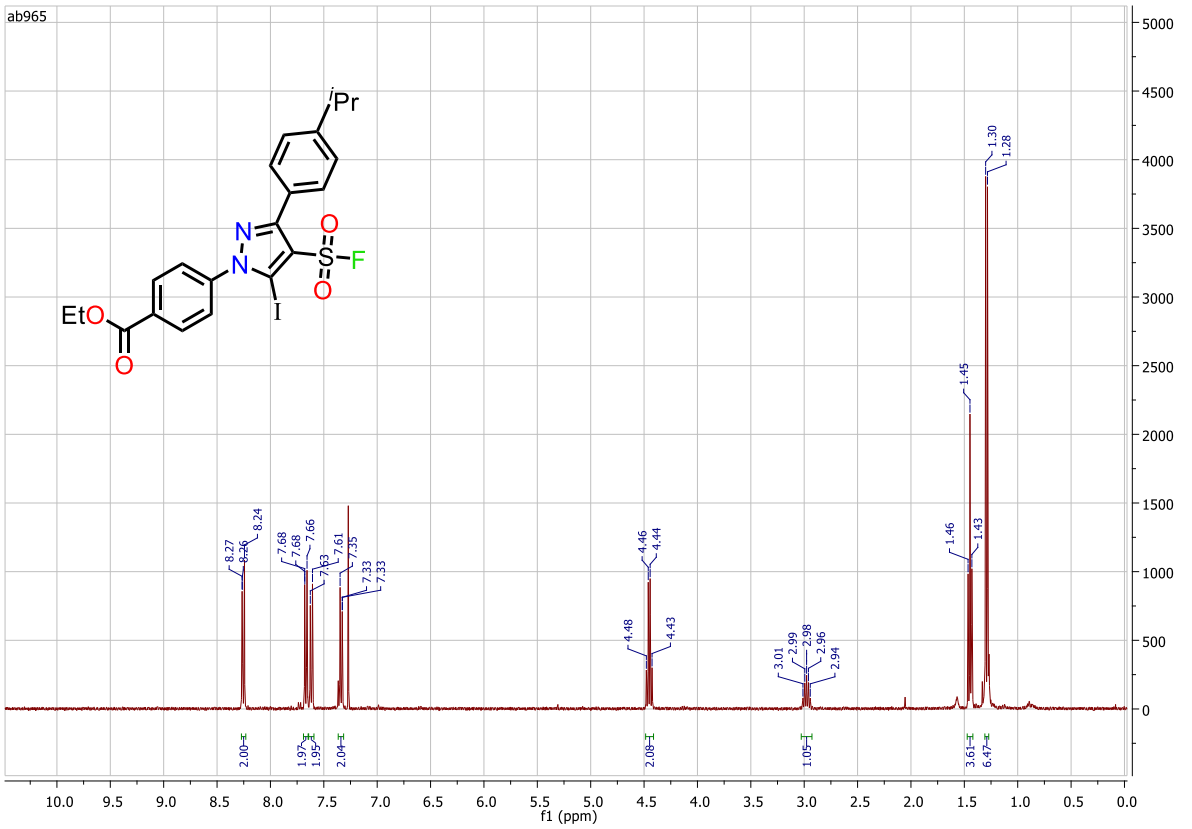

ab1102col
f1 (ppm)

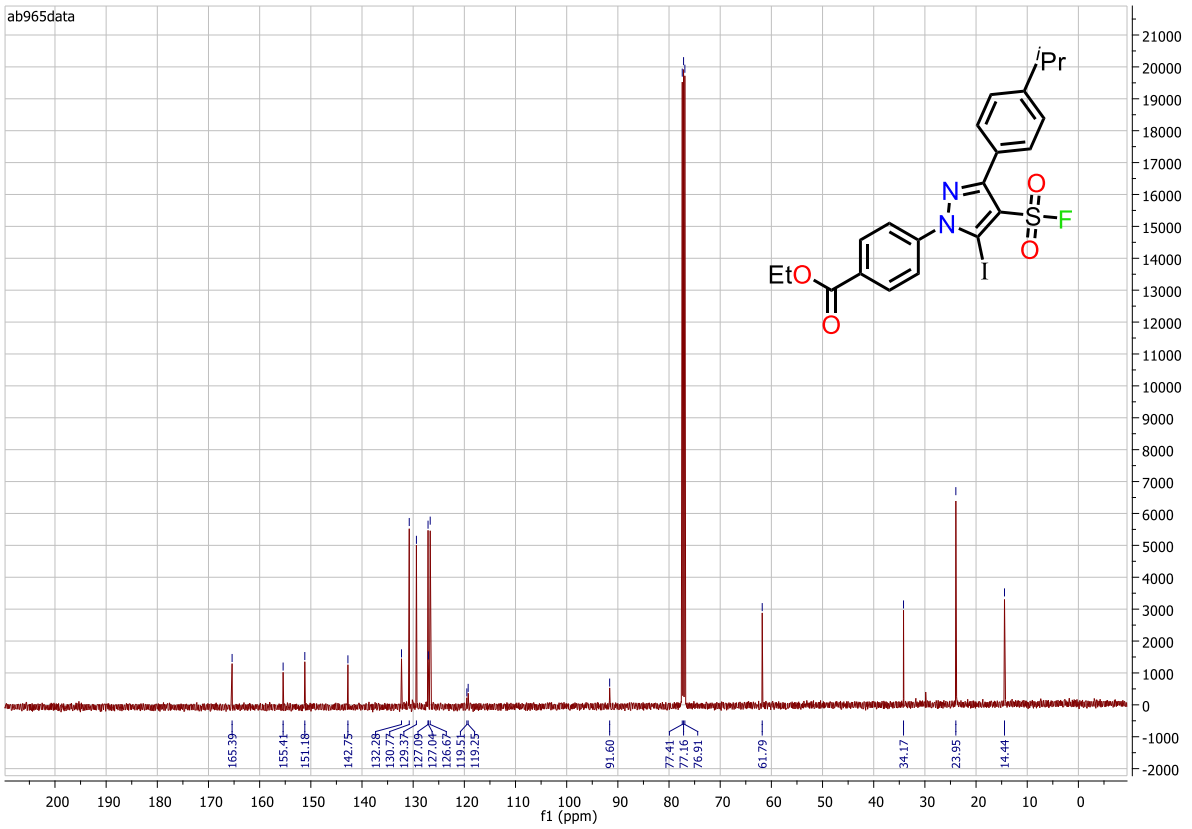

ab1102col
72.17
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
N
N
O
S
F
O
O
I

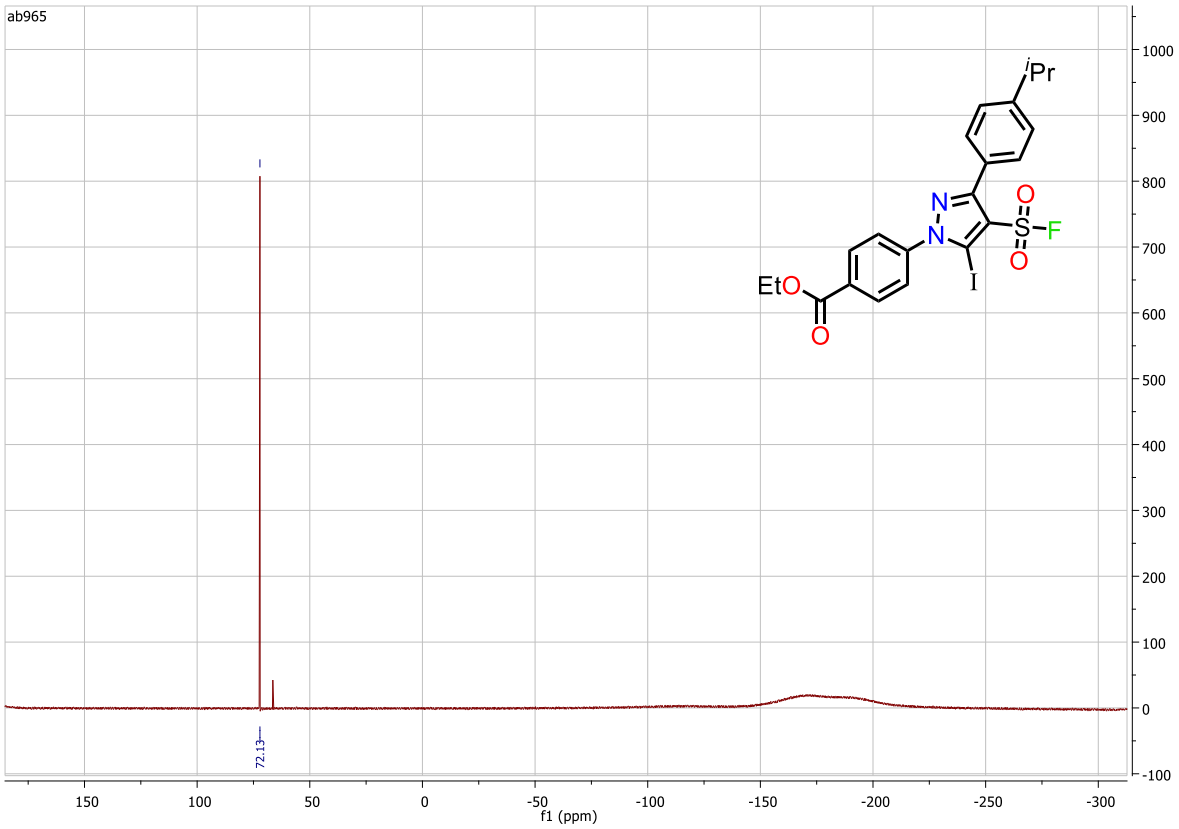

ab1043data
f1 (ppm)

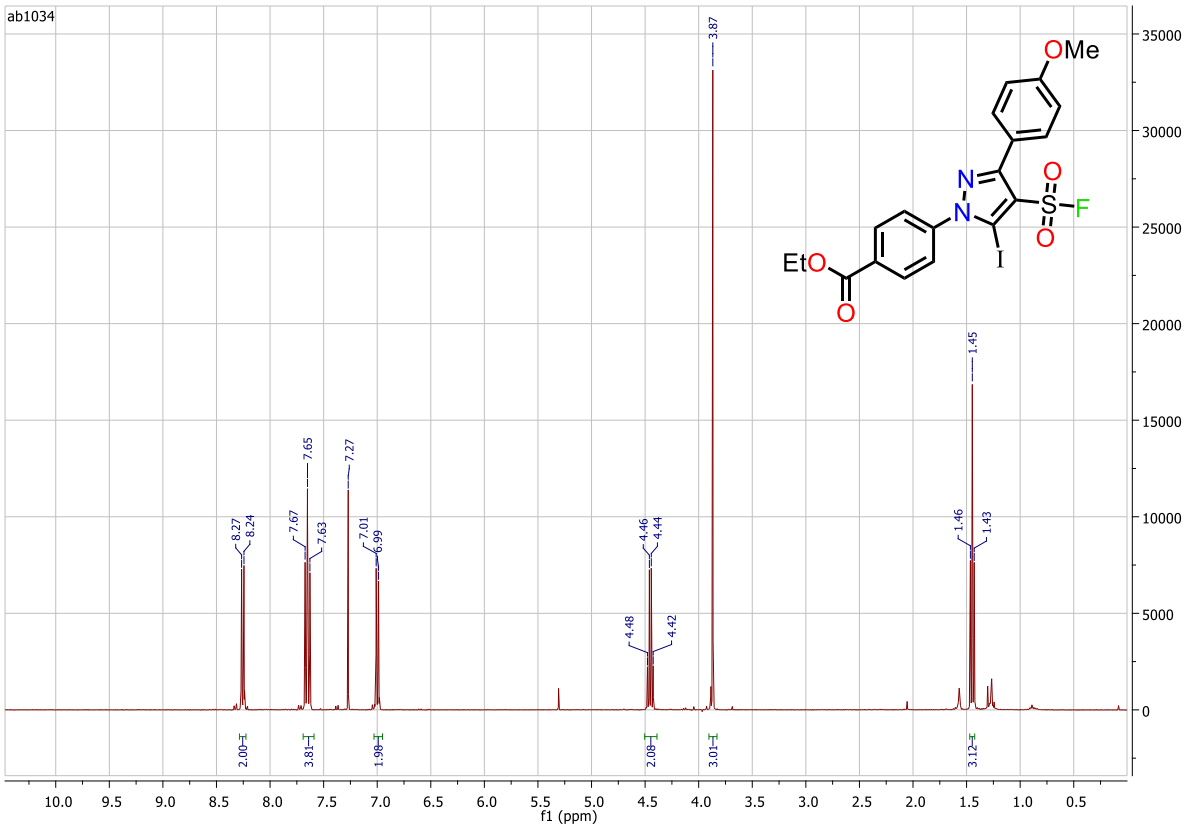

ab1043data
f1 (ppm)

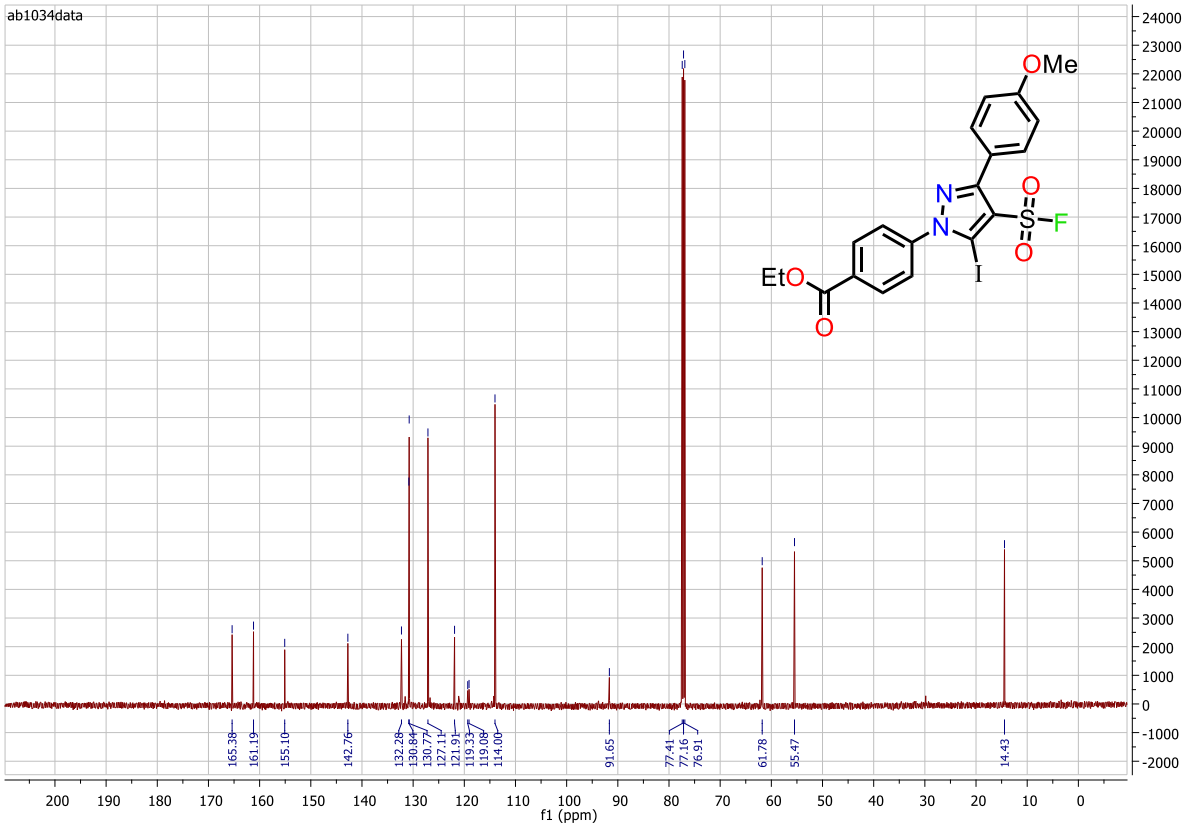

ab1043
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
72.21
-109.54
-109.55
-109.56
-109.57
-109.58
-109.59
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)
N
N
O
S
F
O
F
I

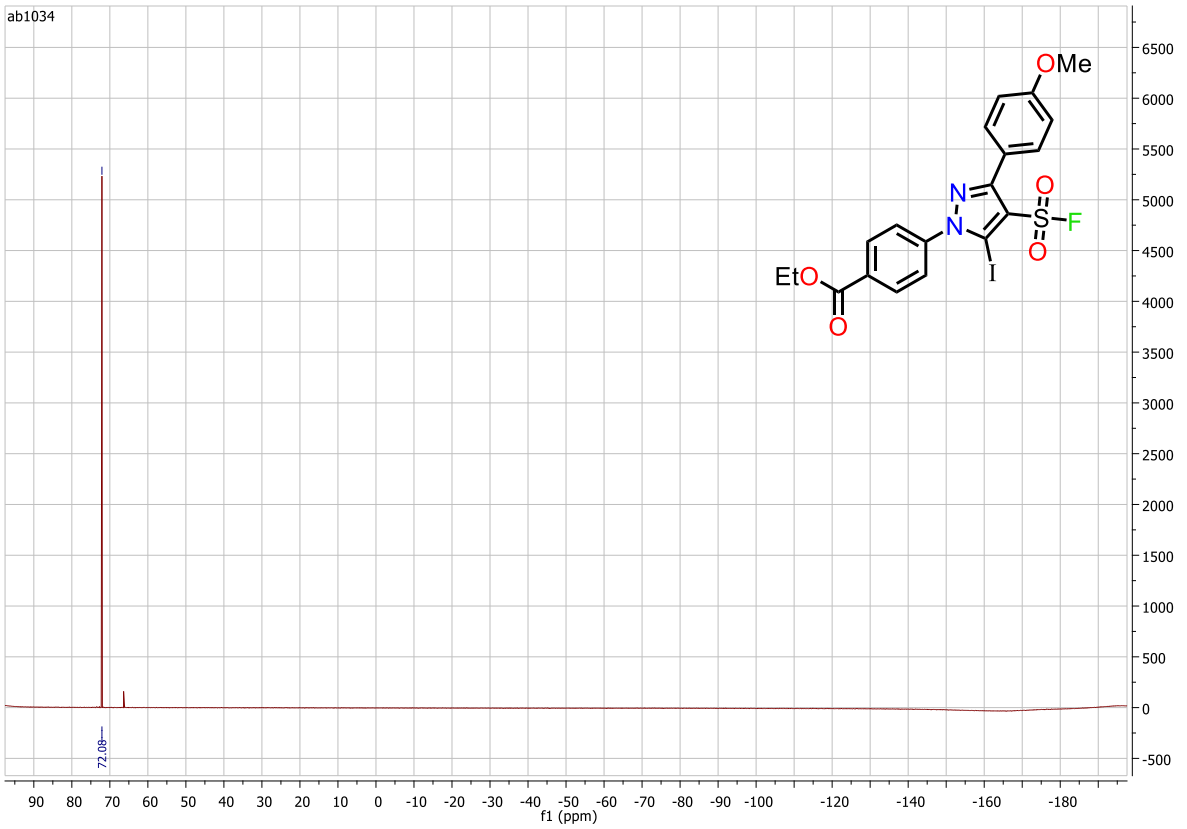

ab965
iPr
N
N
O
S
F
O
I
EtO
O
8.27
8.26
8.24
7.68
7.68
7.66
7.63
7.61
7.35
7.33
7.33
4.46
4.44
4.48
4.43
3.01
2.99
2.98
2.96
2.94
1.46
1.45
1.43
1.30
1.28
2.00
1.97
1.95
2.04
2.08
1.05
3.61
6.47
f1 (ppm)

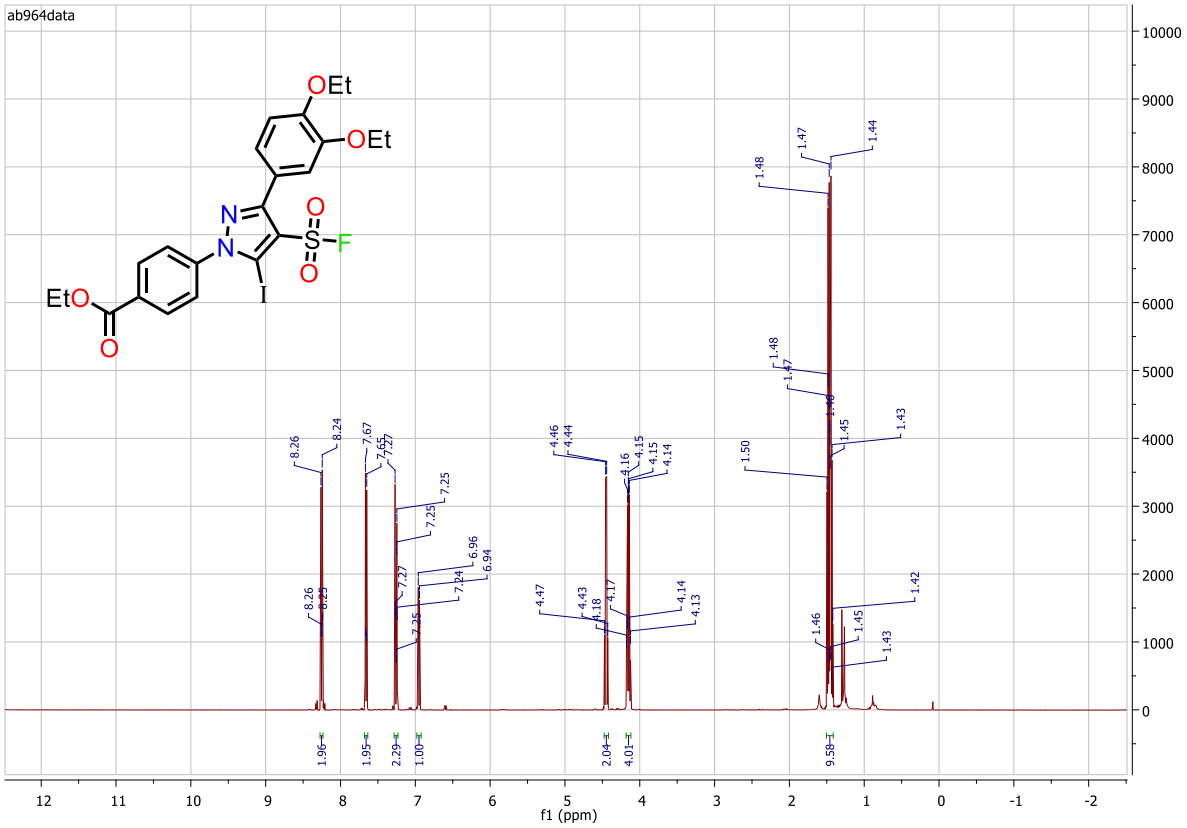

ab965data
iPr
N
N
O
S
F
O
I
EtO
O
165.39
155.41
151.18
142.75
132.28
130.74
129.37
127.09
127.04
126.67
119.51
119.25
91.60
77.41
77.16
76.91
61.79
34.17
23.95
14.44
f1 (ppm)

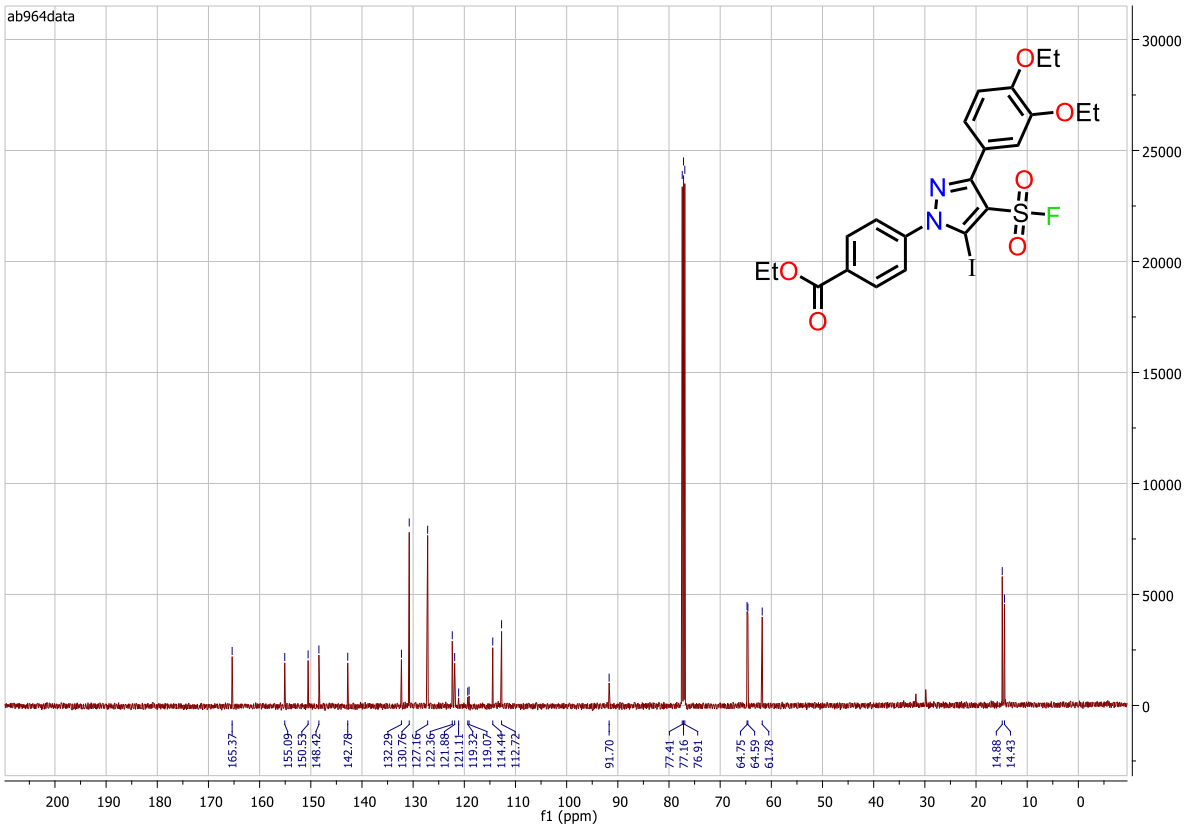

ab965
72.13
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1000
900
800
700
600
500
400
300
200
100
0
-100
iPr
N
N
O
S
F
O
I
EtO
O

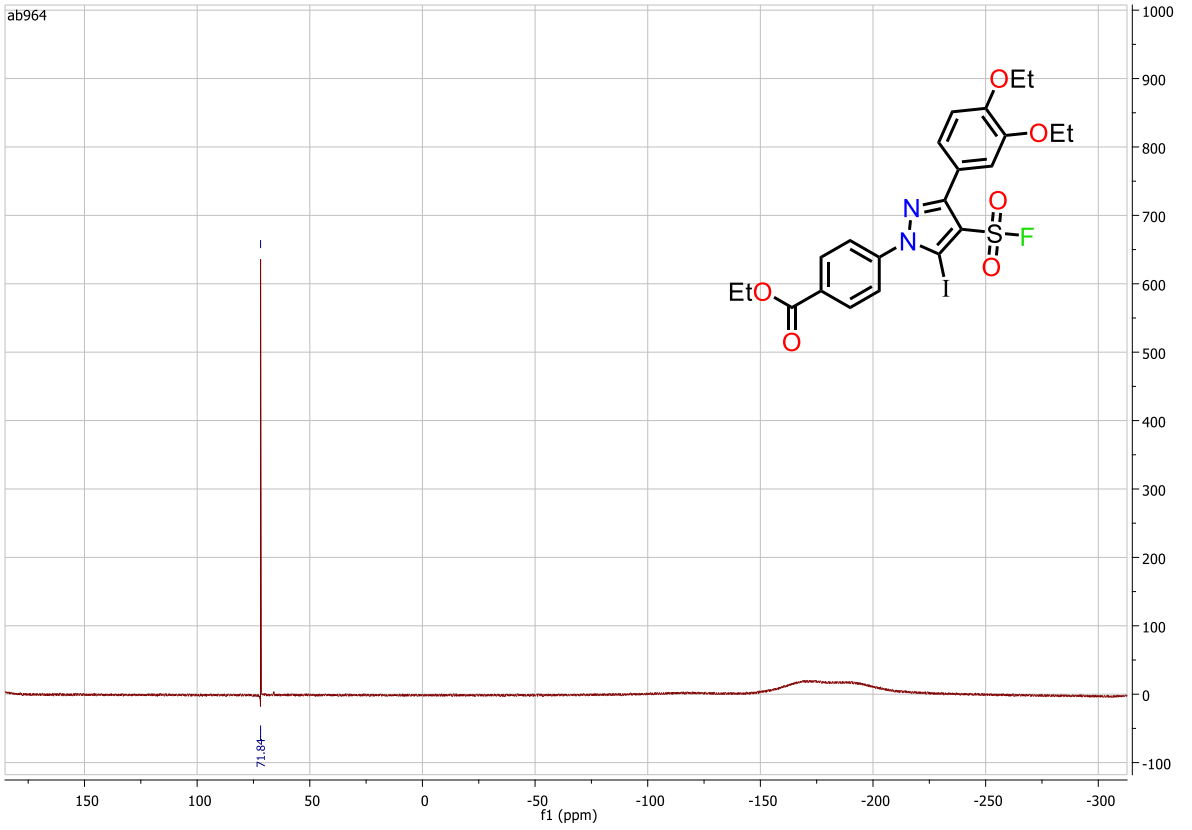

ab1034
OMe
N
N
O
S
F
O
EtO
O
I
3.87
1.45
7.65
7.27
8.27
8.24
7.67
7.63
7.01
6.99
4.46
4.44
4.48
4.42
1.46
1.43
2.00
3.81
1.98
2.08
3.01
3.12
f1 (ppm)

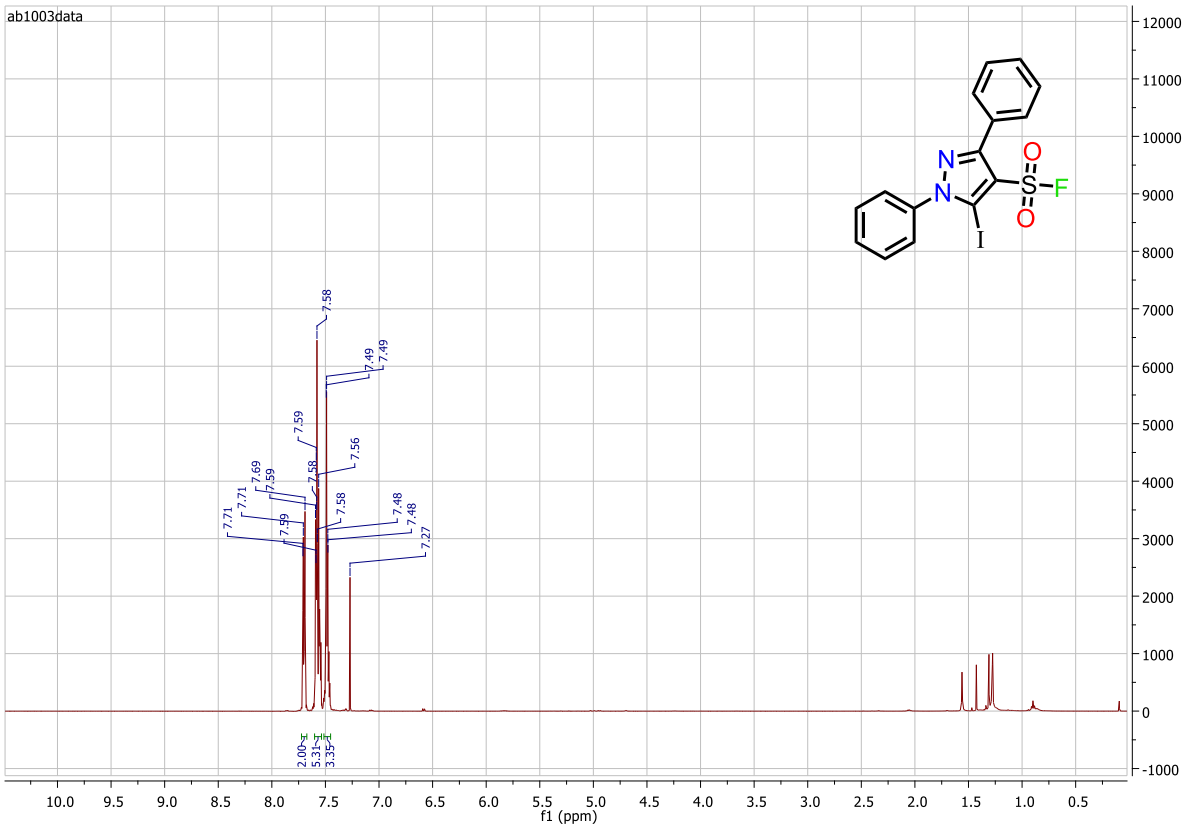

ab1034data
OMe
N
N
O
S
F
O
EtO
O
I
165.38
161.19
155.10
142.76
132.28
130.84
130.77
127.11
121.91
119.33
119.08
114.00
91.65
77.41
77.16
76.91
61.78
55.47
14.43
f1 (ppm)

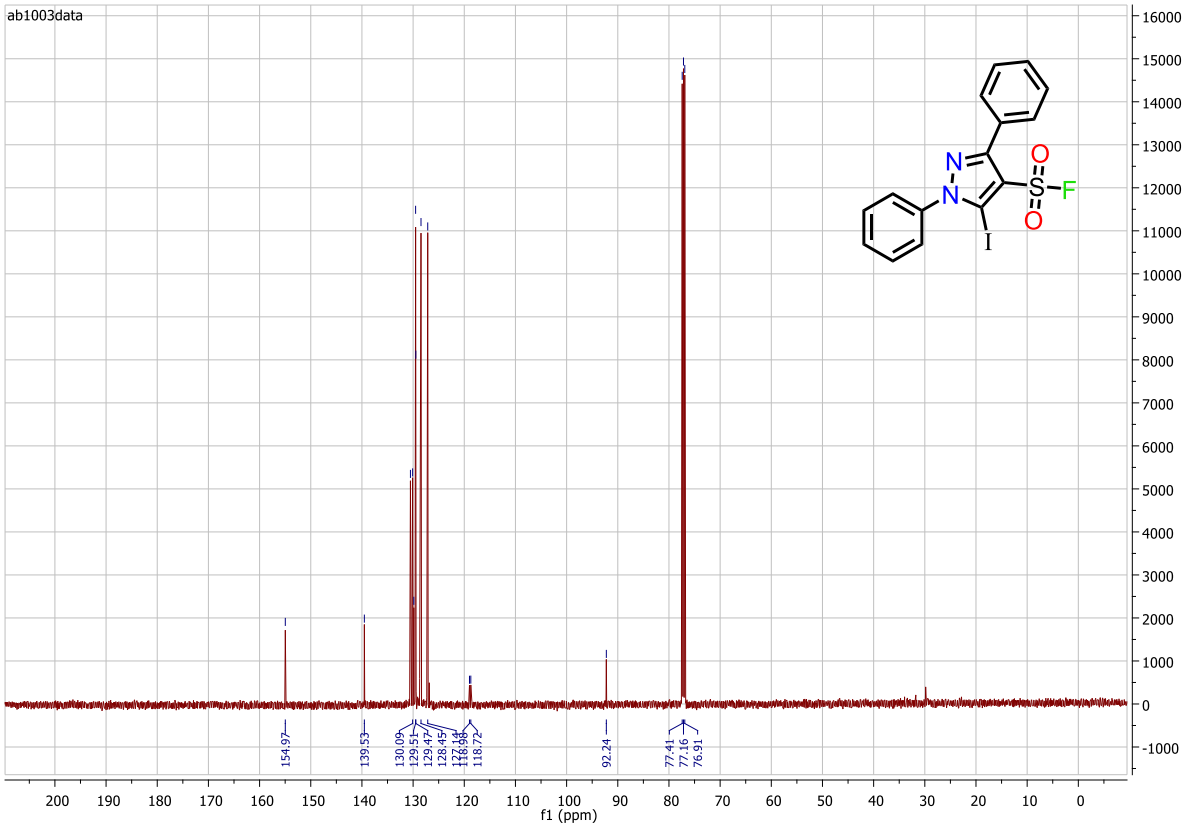

ab1034
OMe
N
N
O
S
F
O
I
EtO
O
72.08
f1 (ppm)

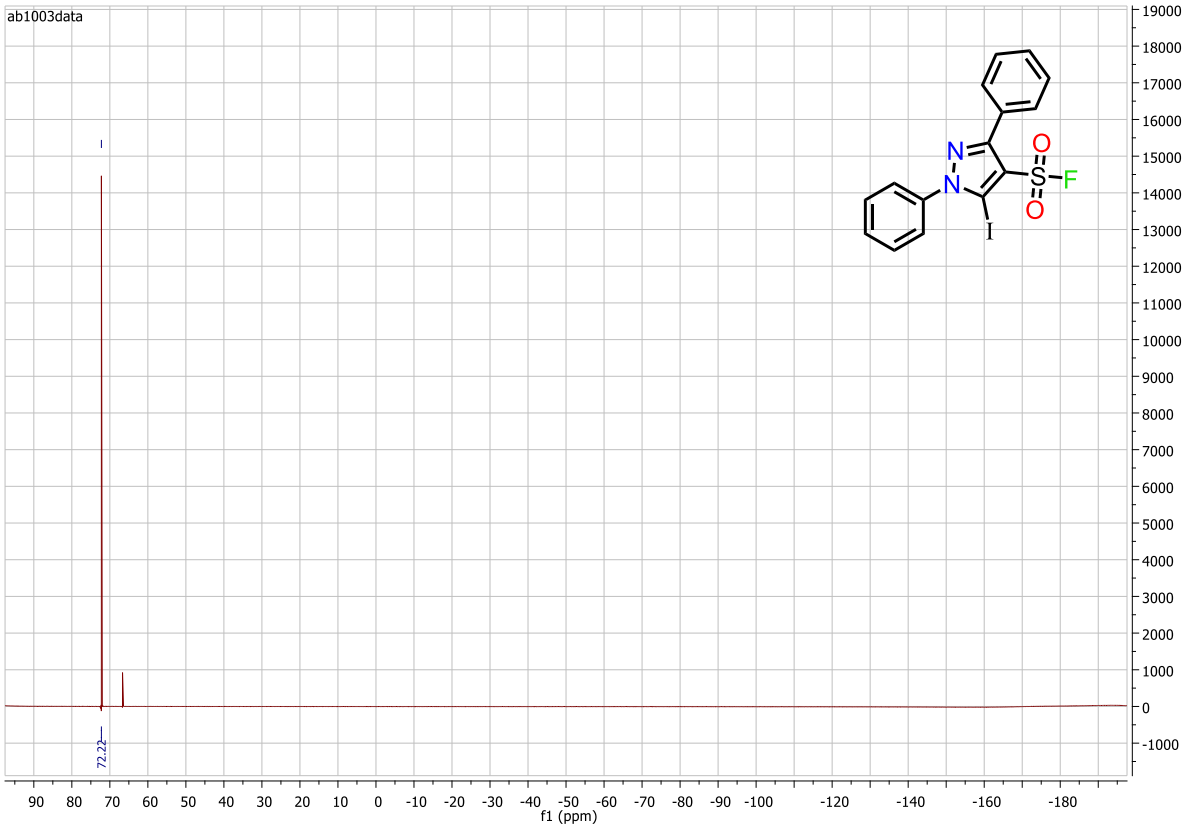

ab964data
OEt
OEt
N
N
O
S
F
O
I
EtO
O
8.26
8.24
7.67
7.65
7.27
7.25
6.96
6.94
4.46
4.44
4.16
4.15
4.14
1.50
1.48
1.47
1.45
1.44
1.43
1.42
f1 (ppm)

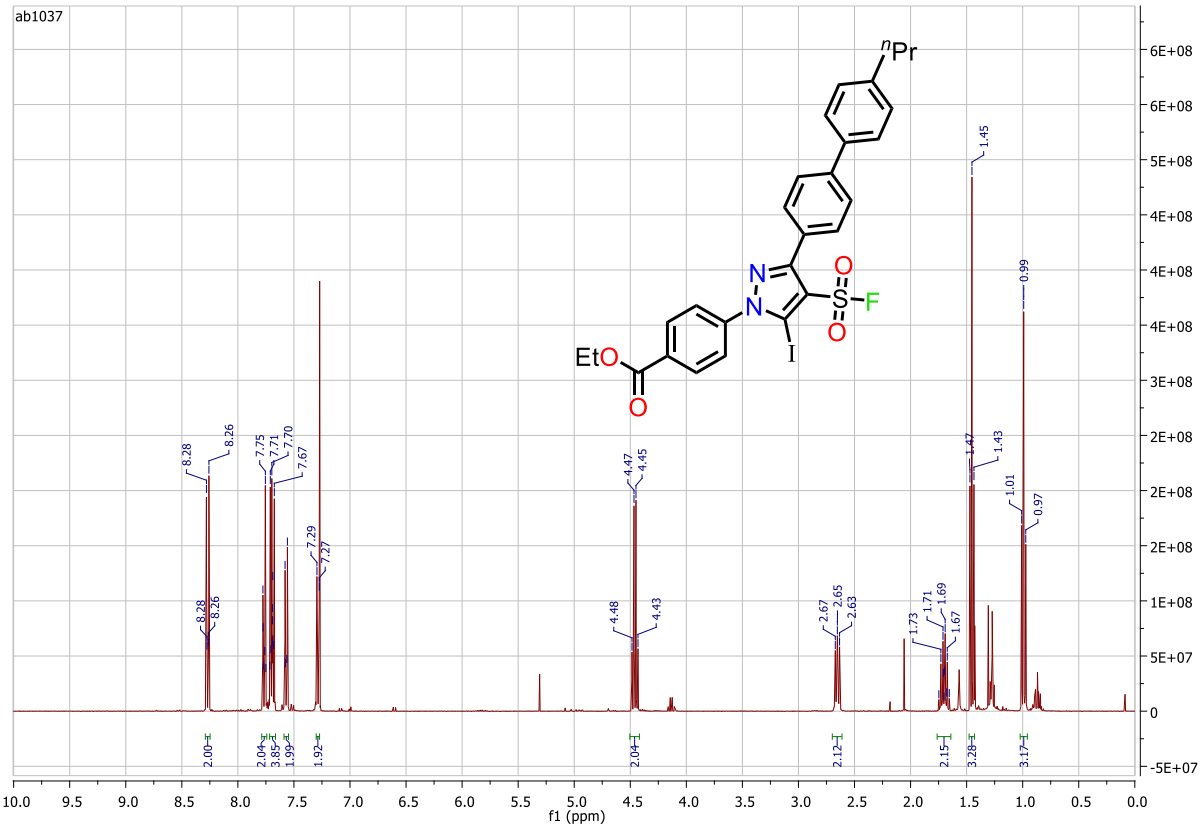

ab964data
OEt
OEt
N
N
O
S
F
O
I
EtO
O
165.37
155.09
150.53
148.42
142.78
132.29
130.76
127.16
122.36
121.88
121.11
119.32
119.07
114.44
112.72
91.70
77.41
77.16
76.91
64.75
64.59
61.78
14.88
14.43
f1 (ppm)

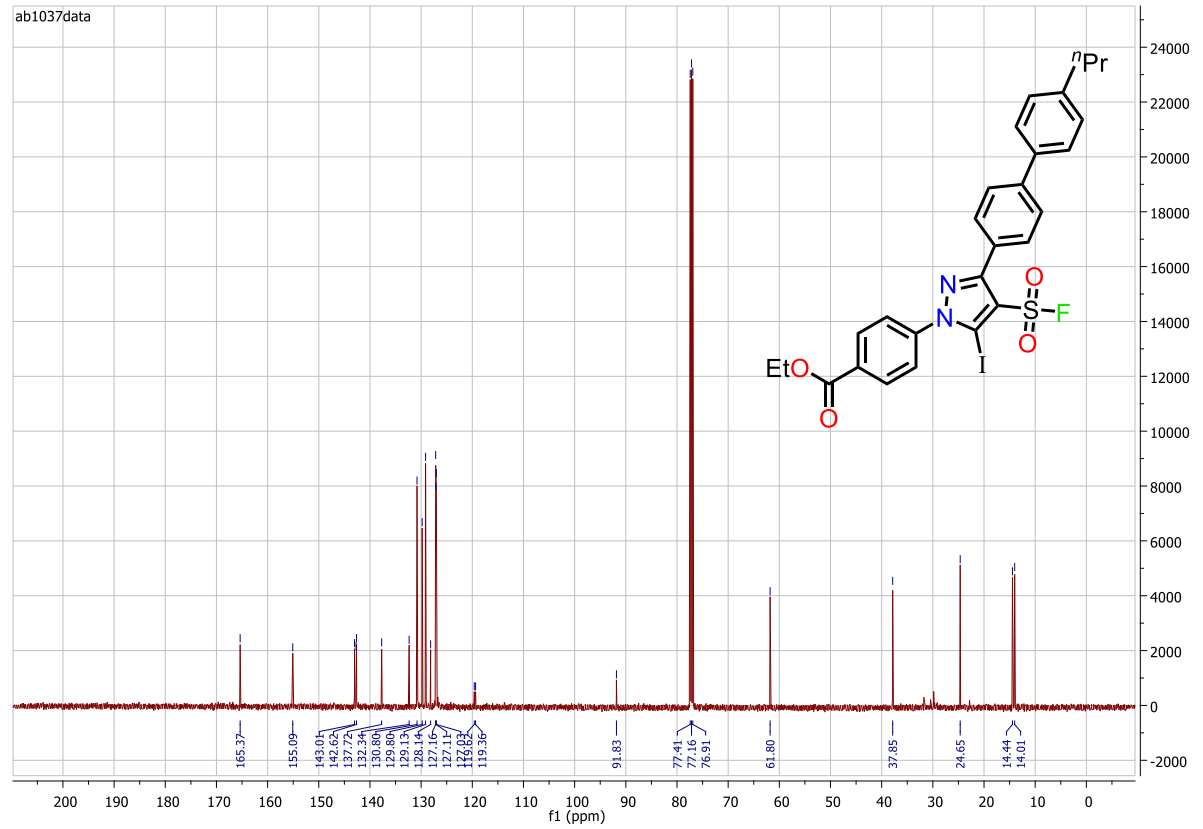

ab964
OEt
OEt
N
N
O
S
F
O
I
EtO
O
71.84
f1 (ppm)

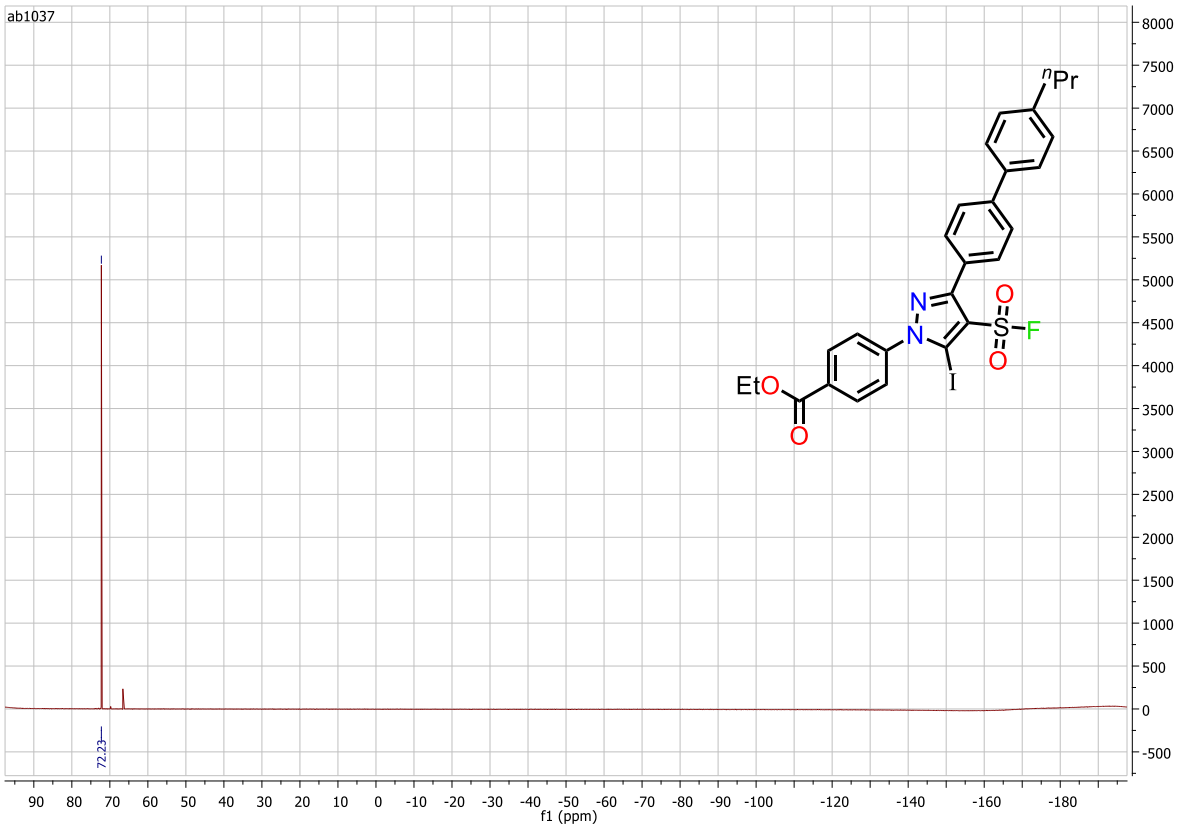

ab1003data
f1 (ppm)

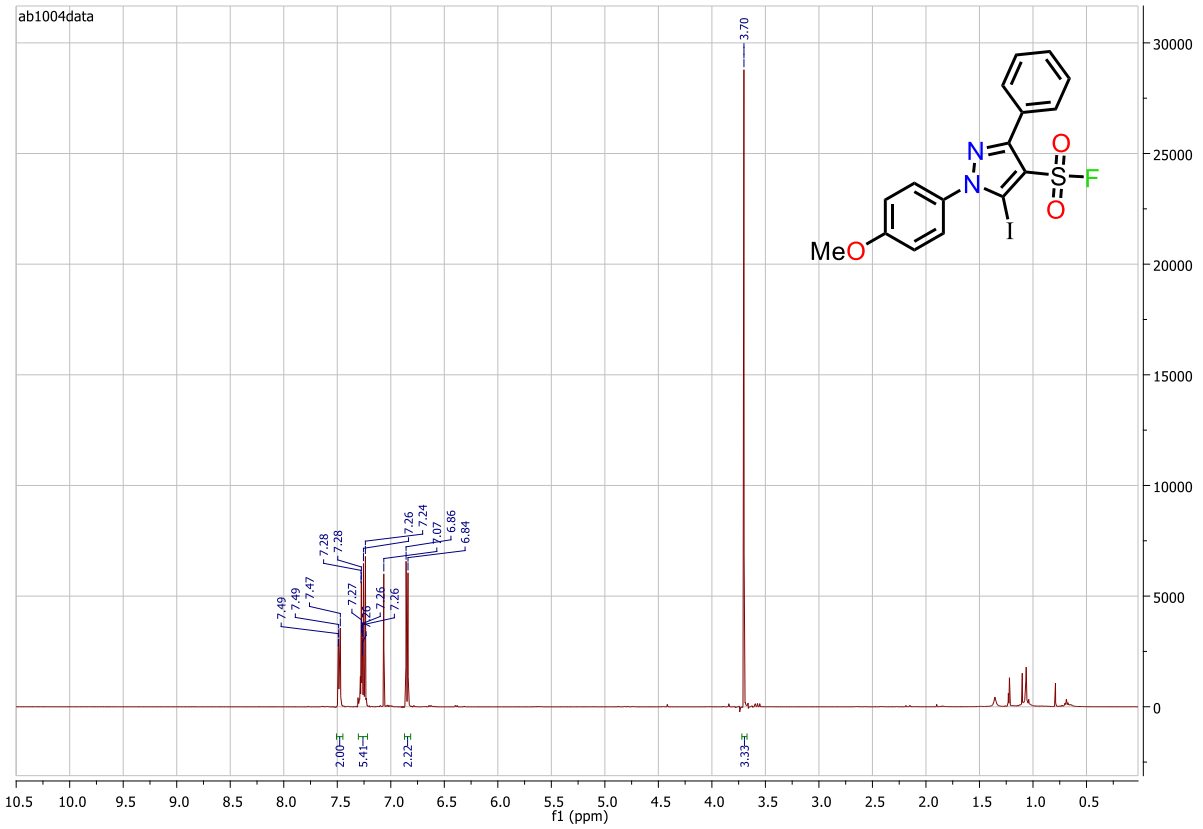

ab1003data
f1 (ppm)

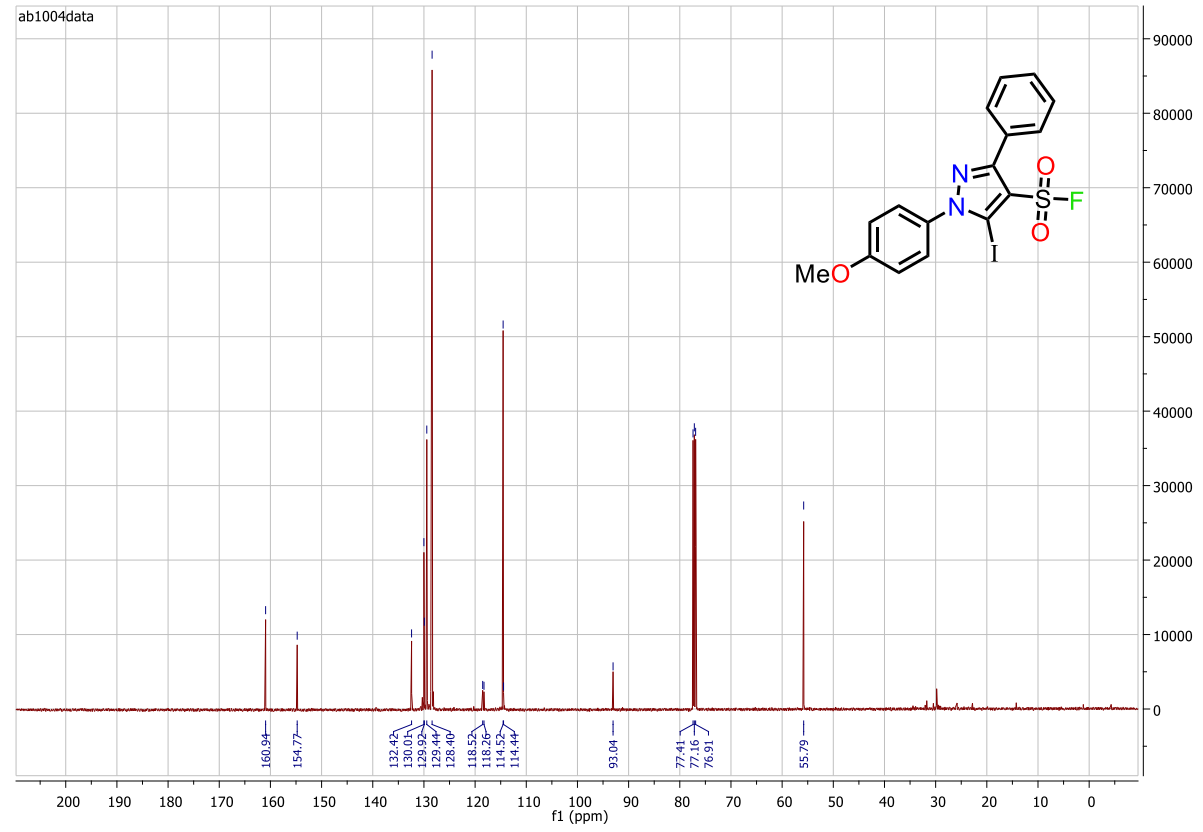

ab1003data
72.22
f1 (ppm)

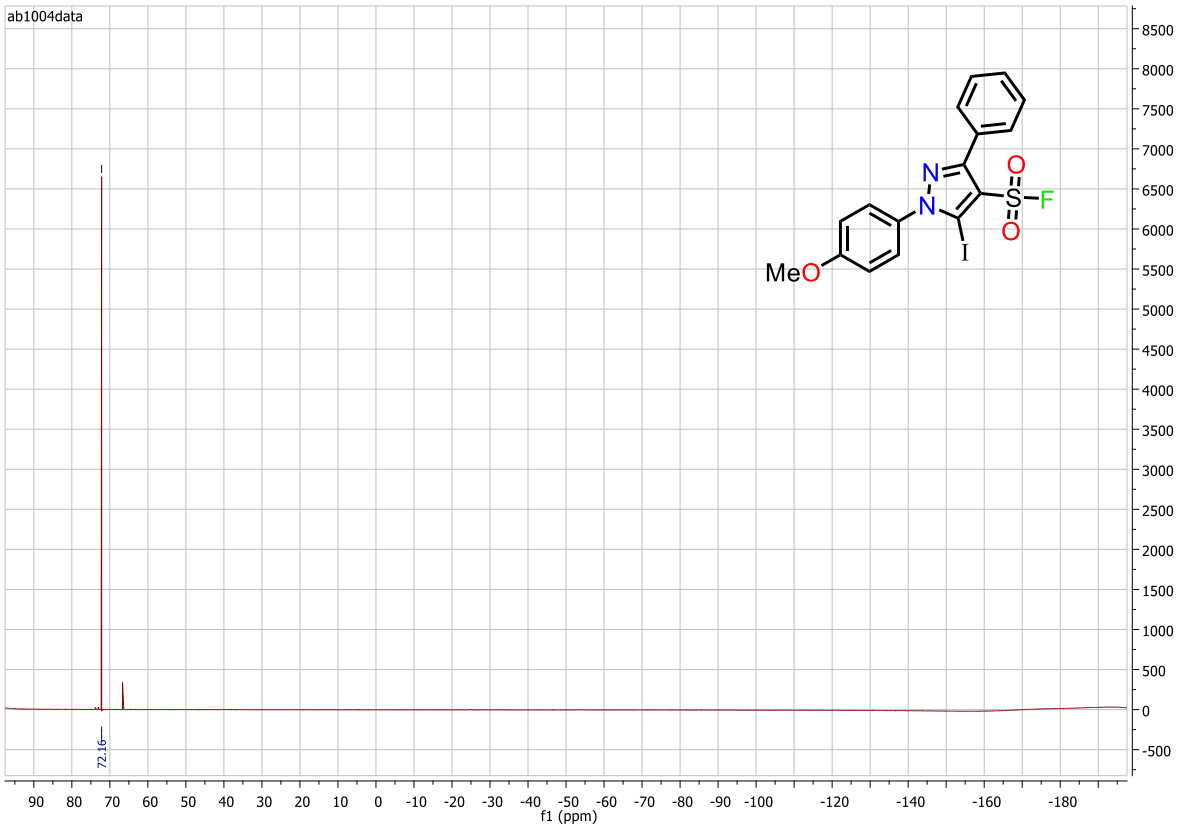

ab1037
nPr
N
N
O
S
F
O
I
EtO
O
8.28
8.26
7.75
7.71
7.70
7.67
7.29
7.27
4.47
4.45
4.48
4.43
2.67
2.65
2.63
1.73
1.71
1.69
1.67
1.45
1.43
1.01
0.99
0.97
f1 (ppm)

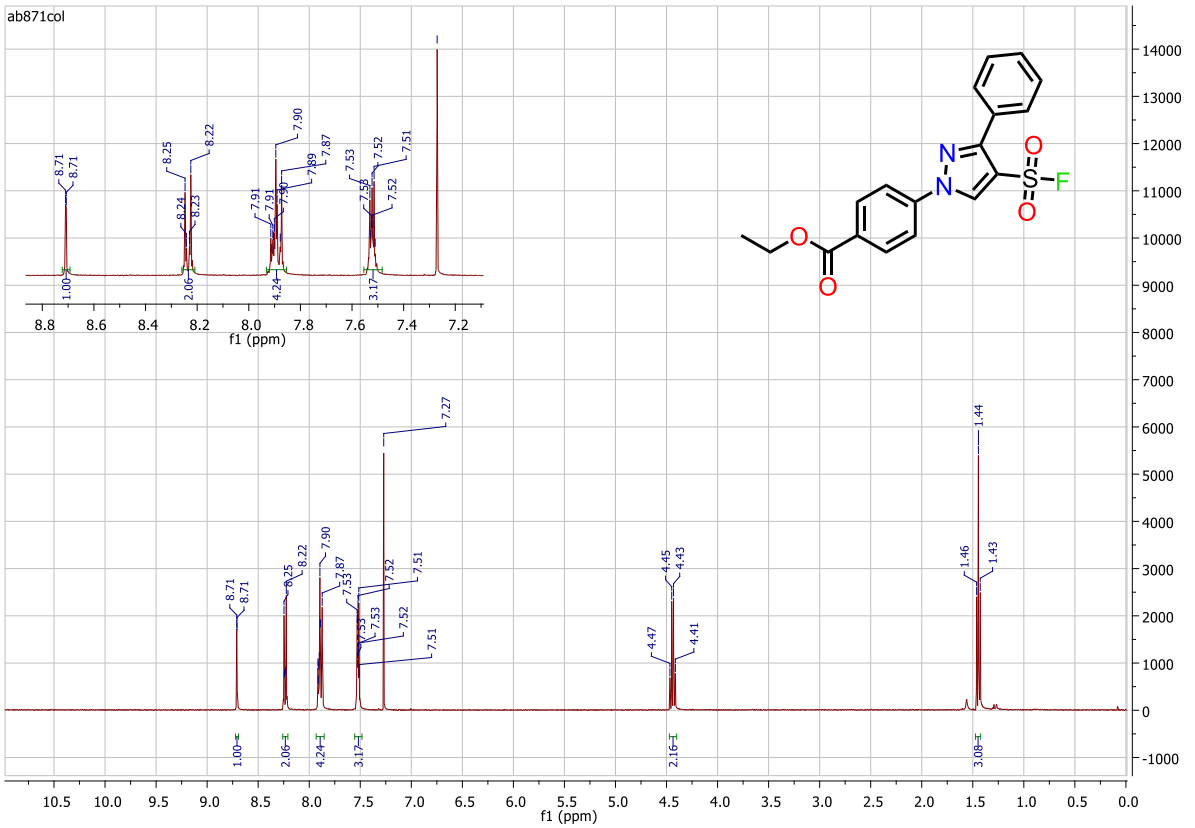

ab1037data
nPr
N
N
O
S
F
O
I
EtO
O
165.37
155.09
143.01
142.62
137.72
132.34
130.80
129.80
129.13
128.14
127.16
127.11
91.83
77.41
77.16
76.91
61.80
37.85
24.65
14.44
14.01
f1 (ppm)

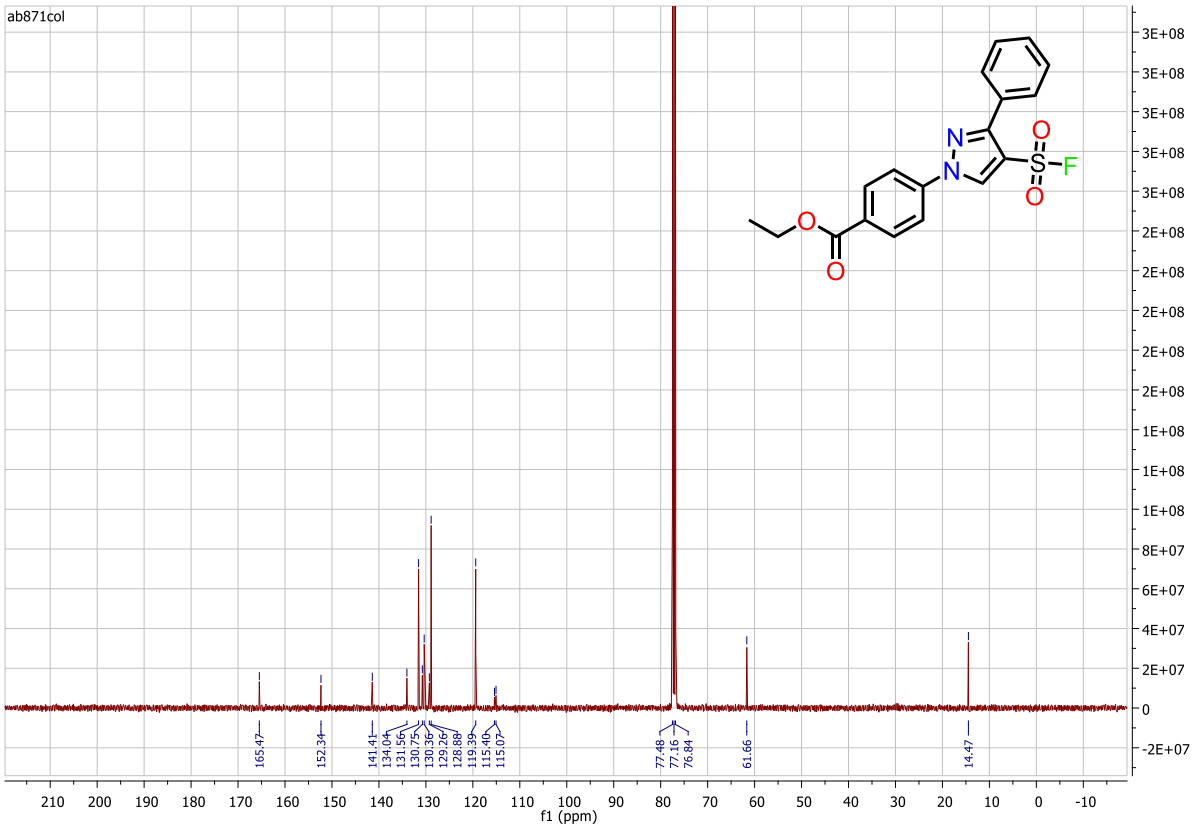

ab1037
72.23
f1 (ppm)
nPr
N
N
O
S
F
O
I
EtO
O

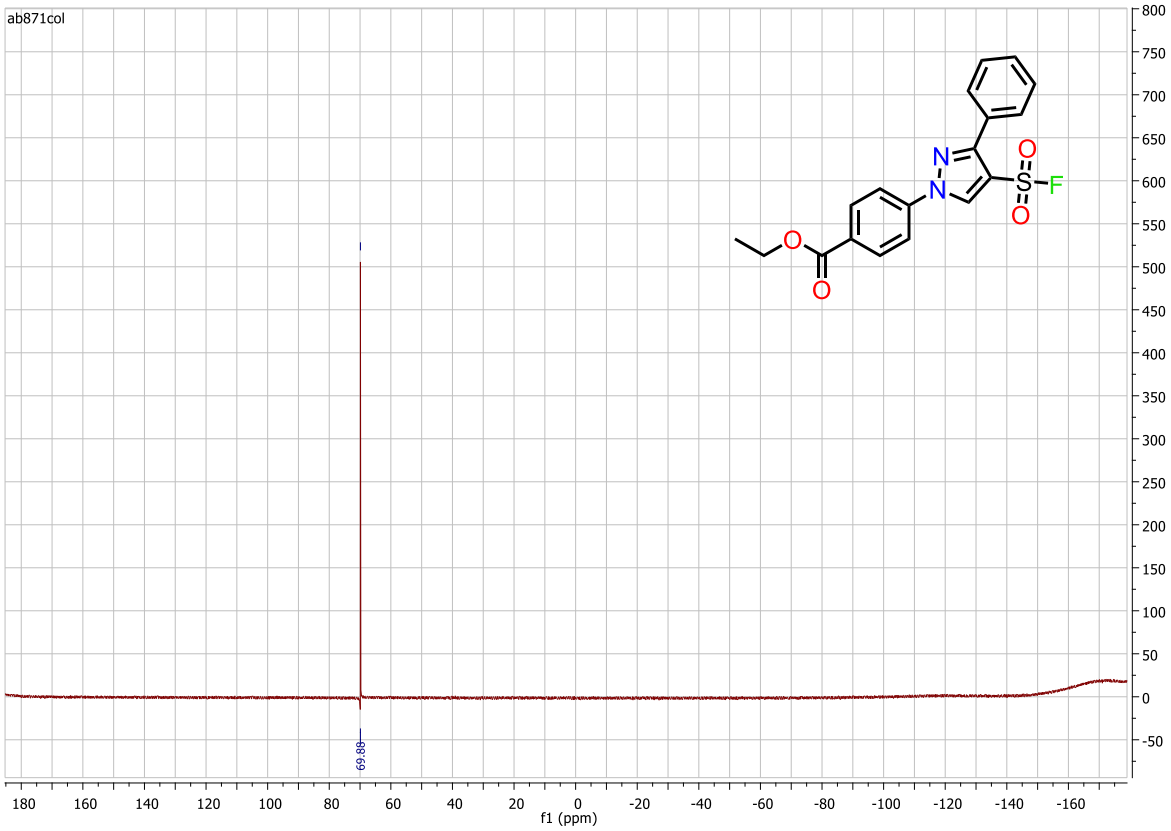

ab1004data
3.70
7.49
7.49
7.47
7.28
7.28
7.27
7.26
7.26
7.26
7.24
7.07
6.86
6.84
2.00
5.41
2.22
3.33
MeO
N
N
O
S
F
O
I
f1 (ppm)

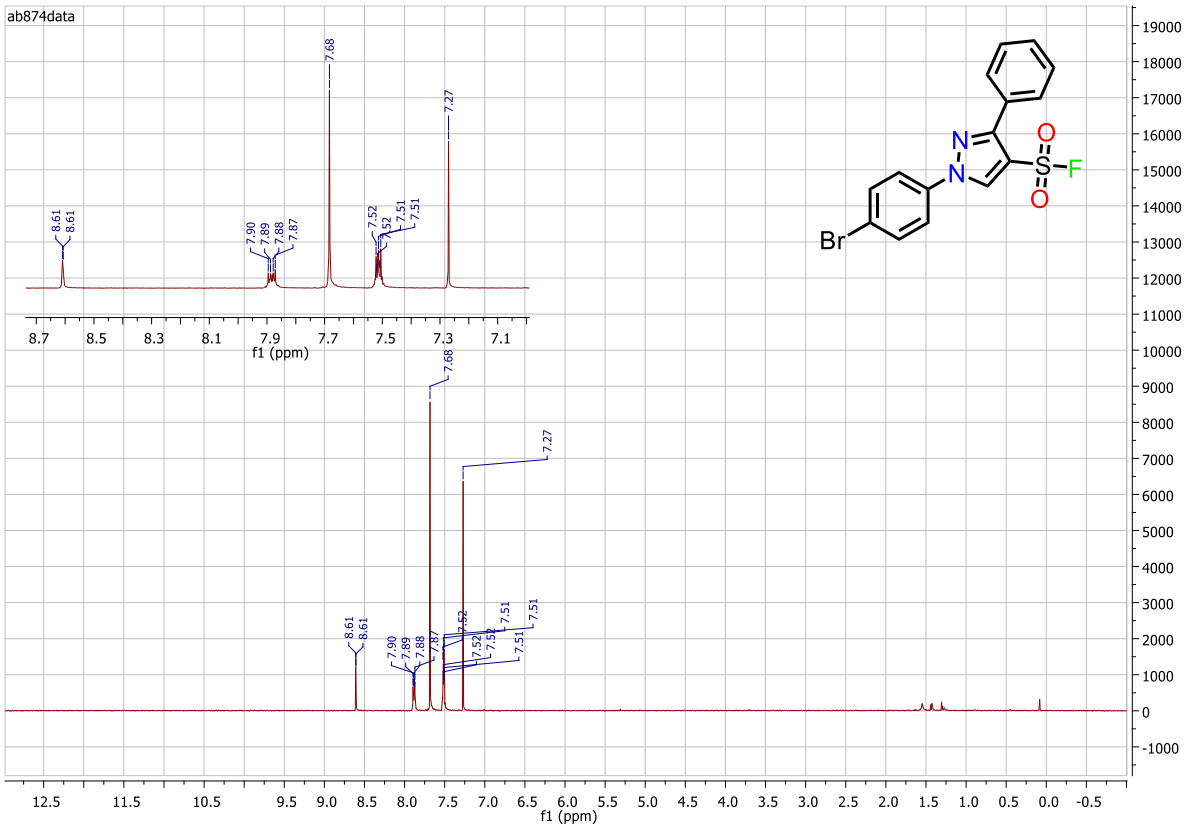

ab1004data
160.94
154.77
132.42
130.01
129.92
129.44
128.40
118.53
118.26
114.52
114.44
93.04
77.41
77.16
76.91
55.79
MeO
N
N
O
S
F
O
I
f1 (ppm)

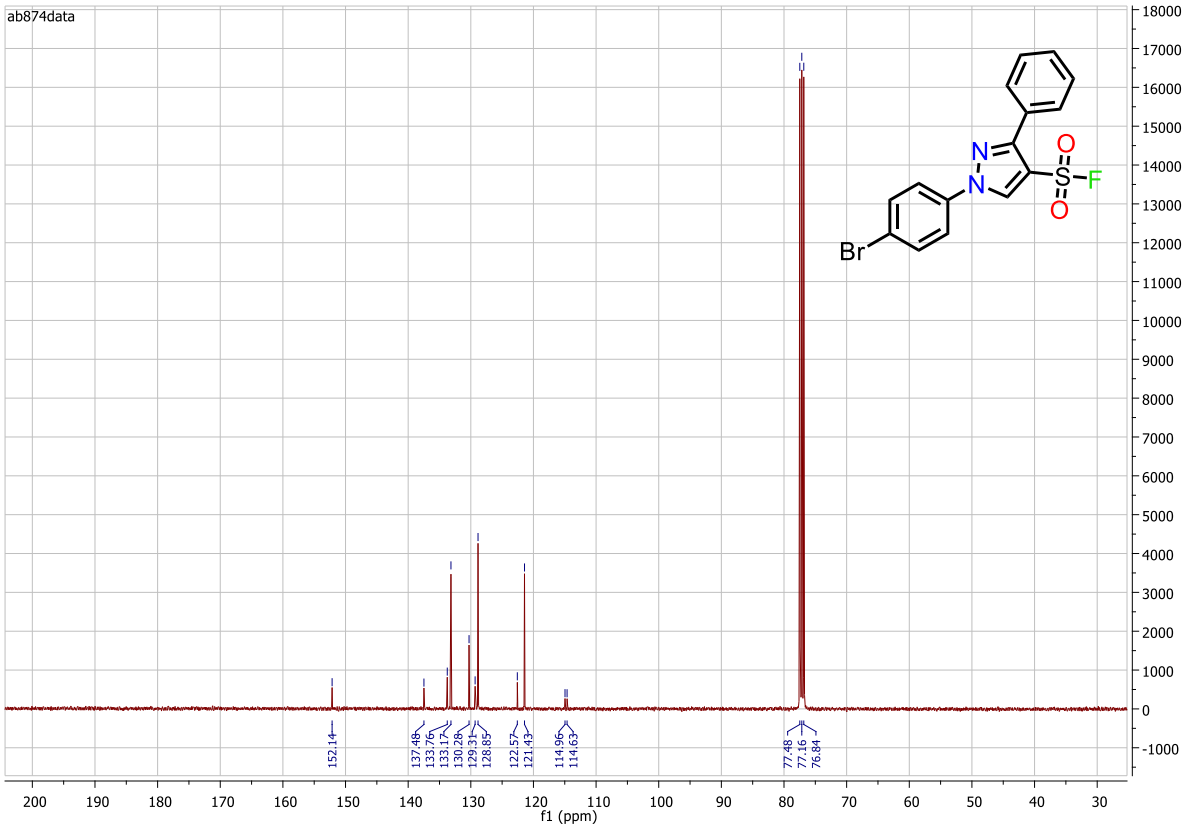

ab1004data
8500
8000
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
72.16
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)
N
N
O
S
F
O
I
MeO

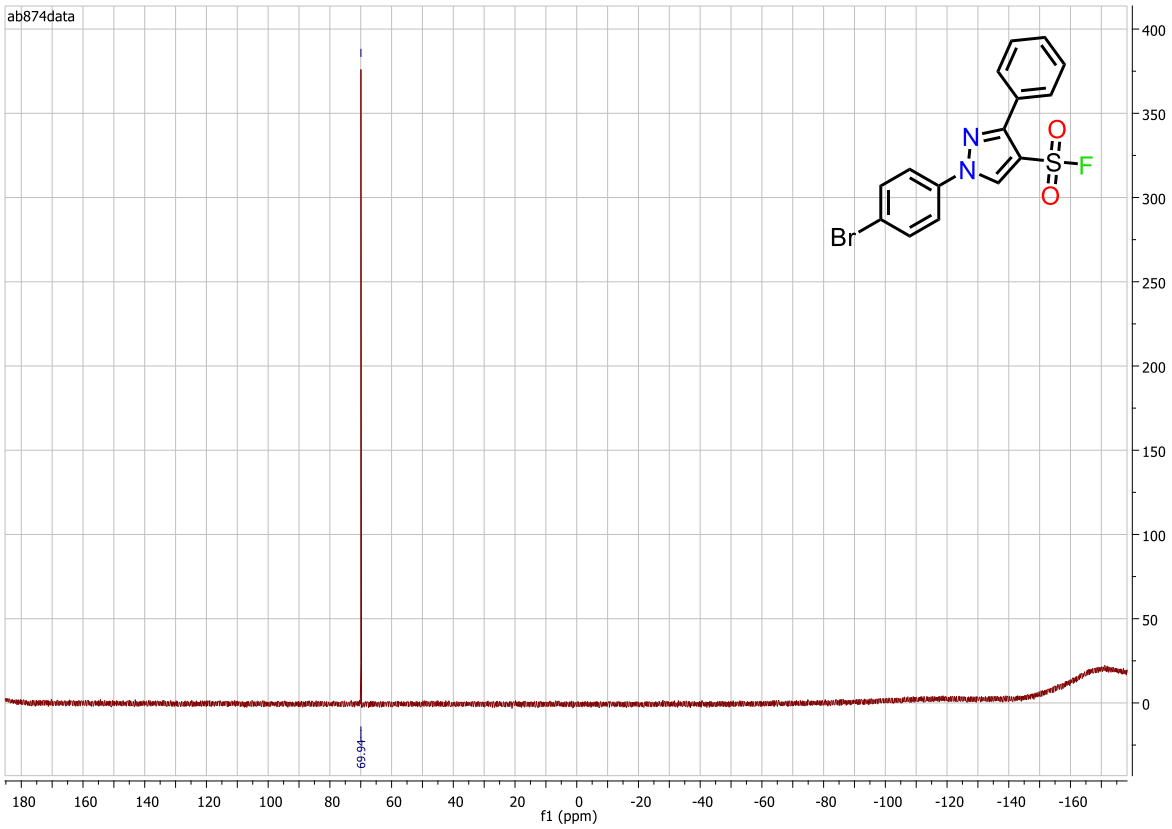

ab871col
f1 (ppm)

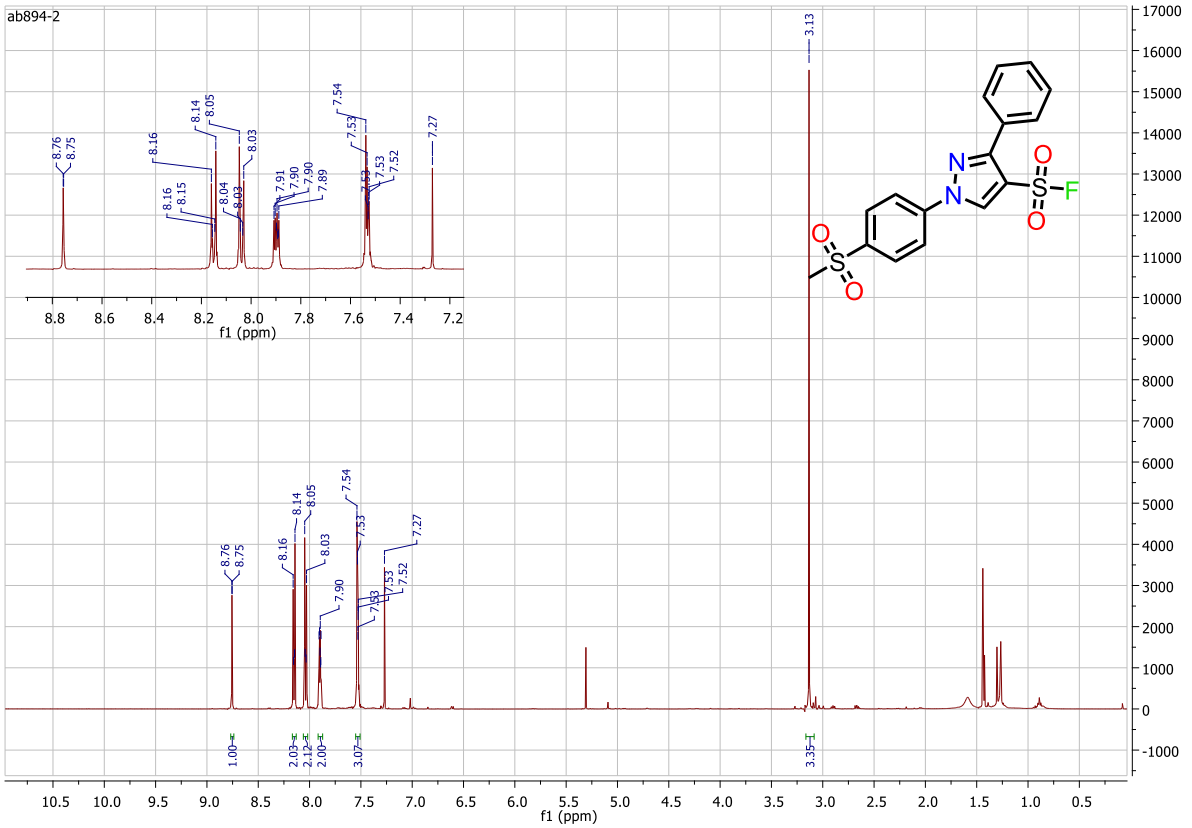

ab871col
f1 (ppm)

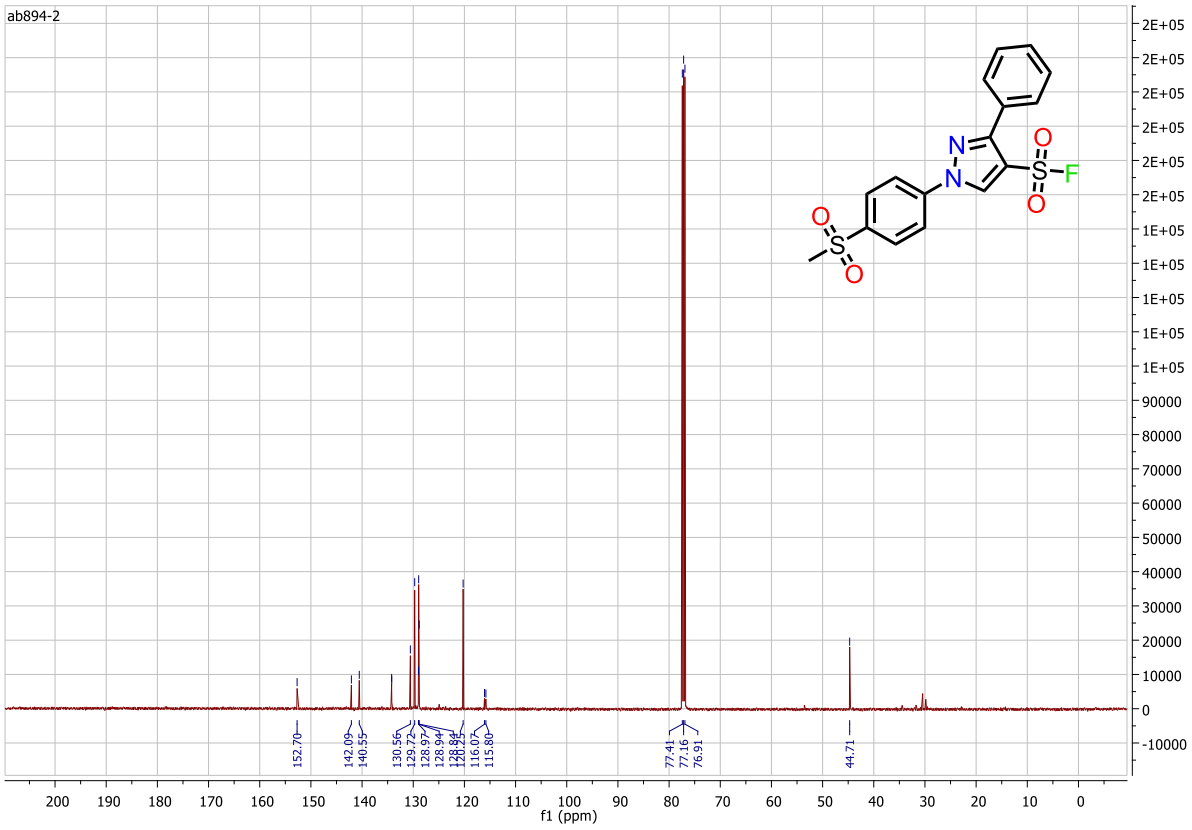

ab871col
69.88
f1 (ppm)

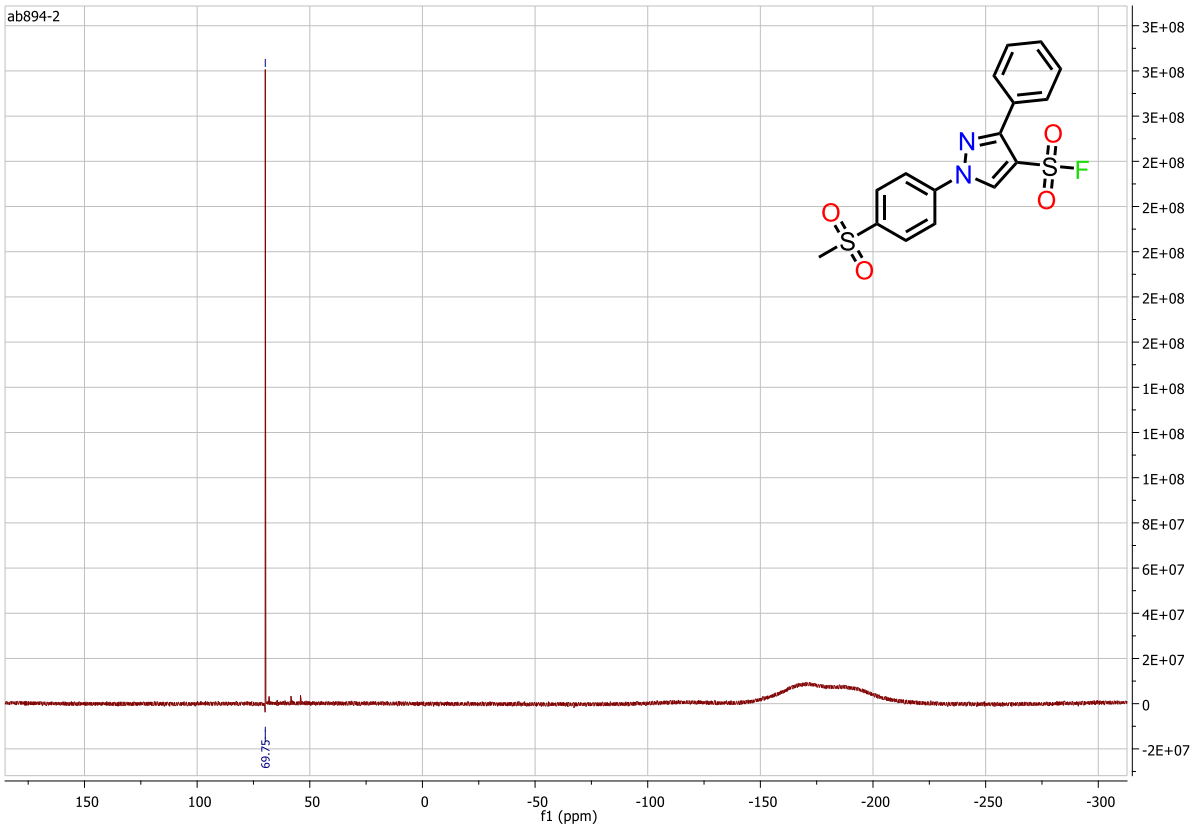

ab874data
7.68
7.27
8.61
8.61
7.90
7.89
7.88
7.87
7.52
7.52
7.51
7.51
f1 (ppm)
Br
N
N
O
S
F
O

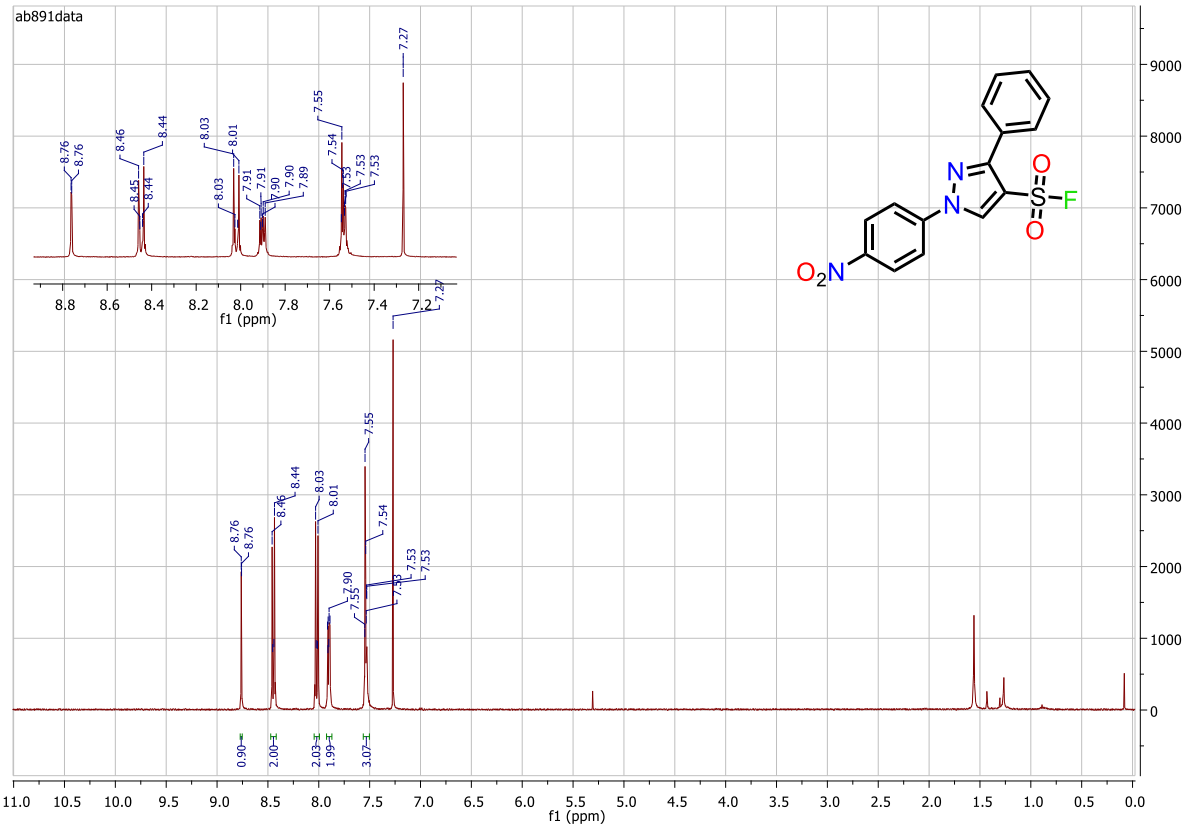

ab874data
152.14
137.48
133.76
133.17
130.28
129.31
128.85
122.57
121.43
114.96
114.63
77.48
77.16
76.84
f1 (ppm)
Br
N
N
O
S
F
O

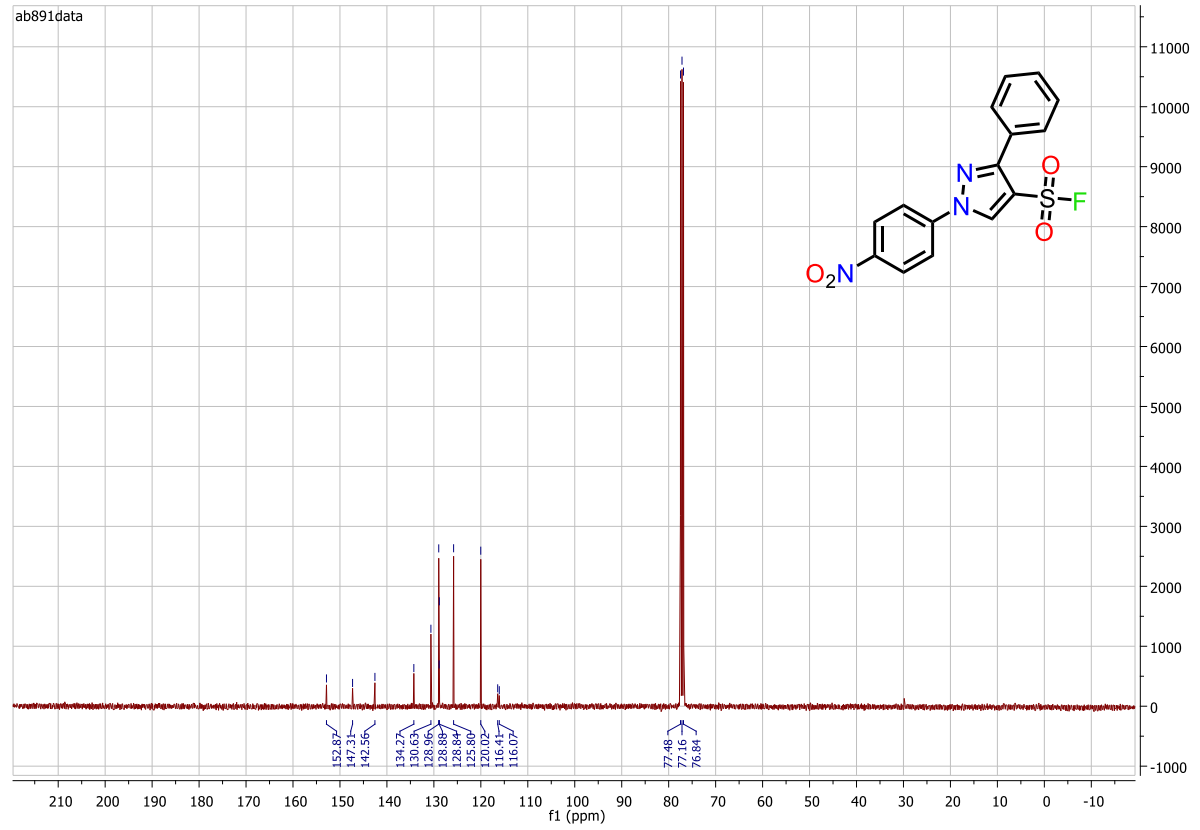

ab874data
69.94
f1 (ppm)
Br
N
N
O
S
F
O

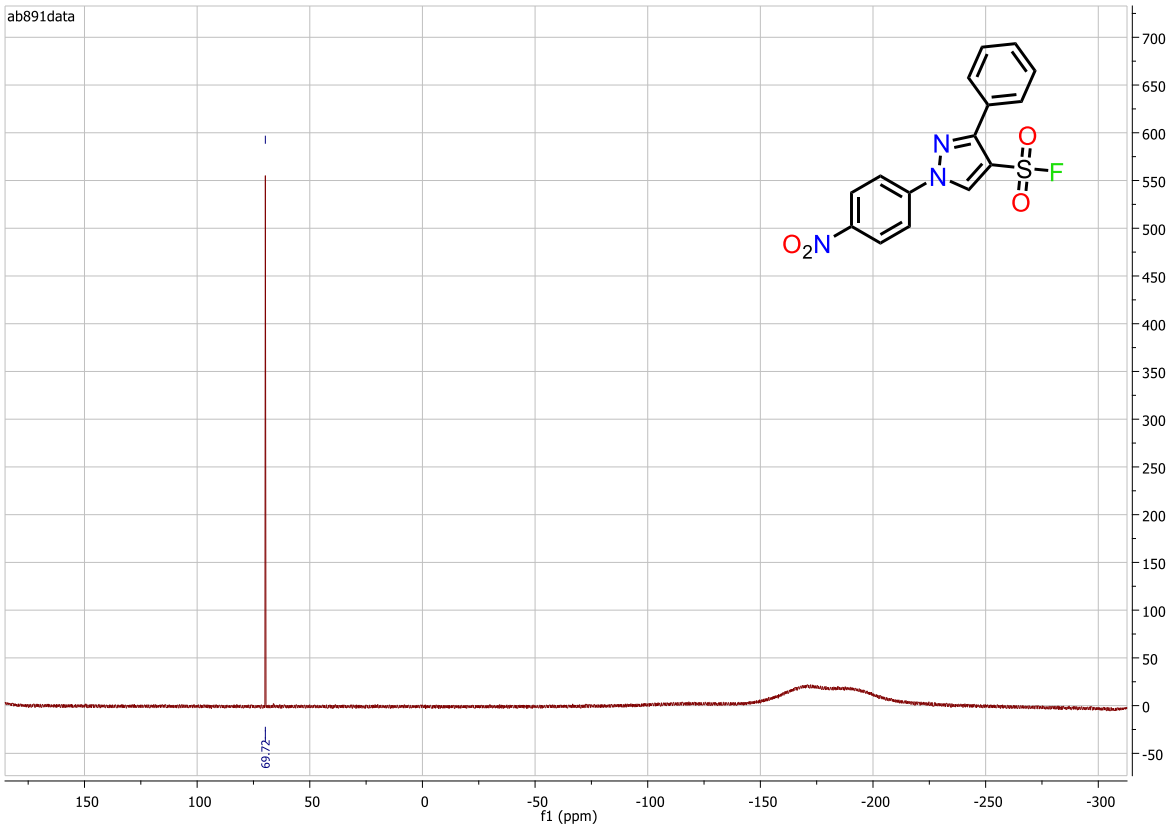

ab894-2
f1 (ppm)

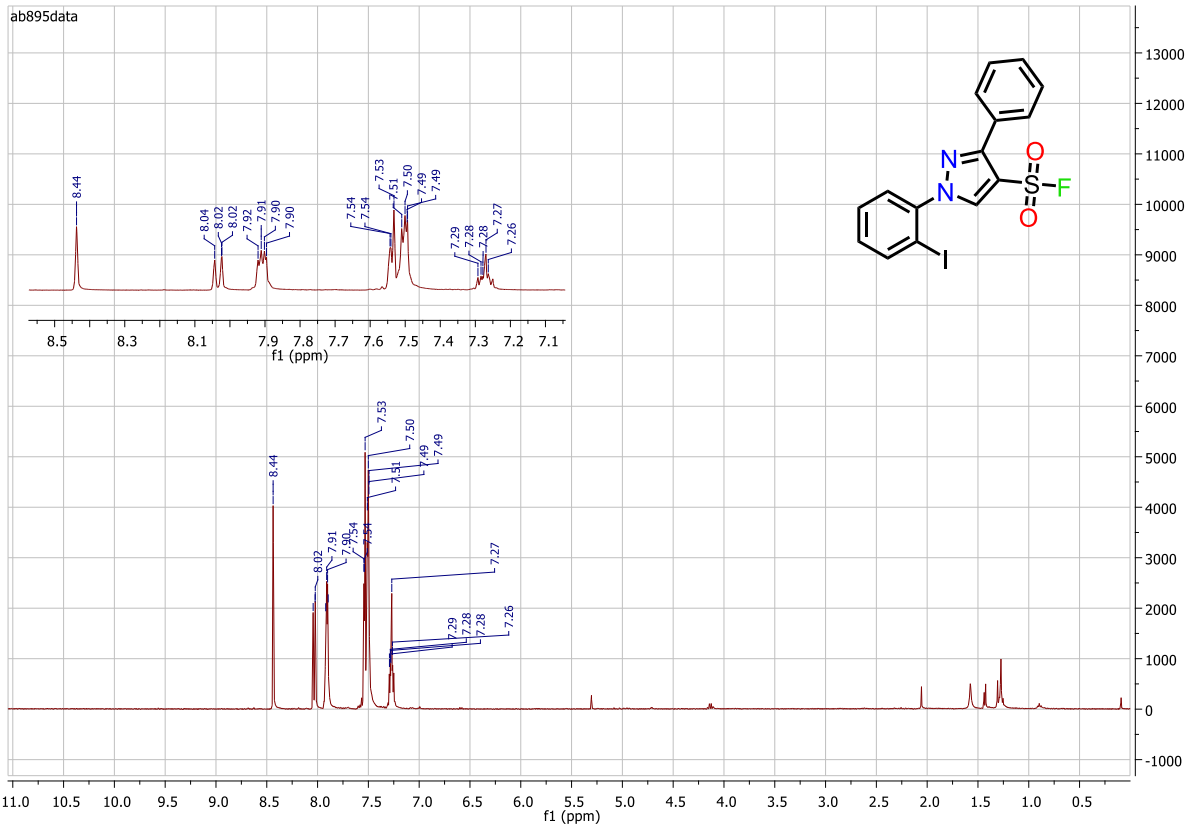

ab894-2
f1 (ppm)

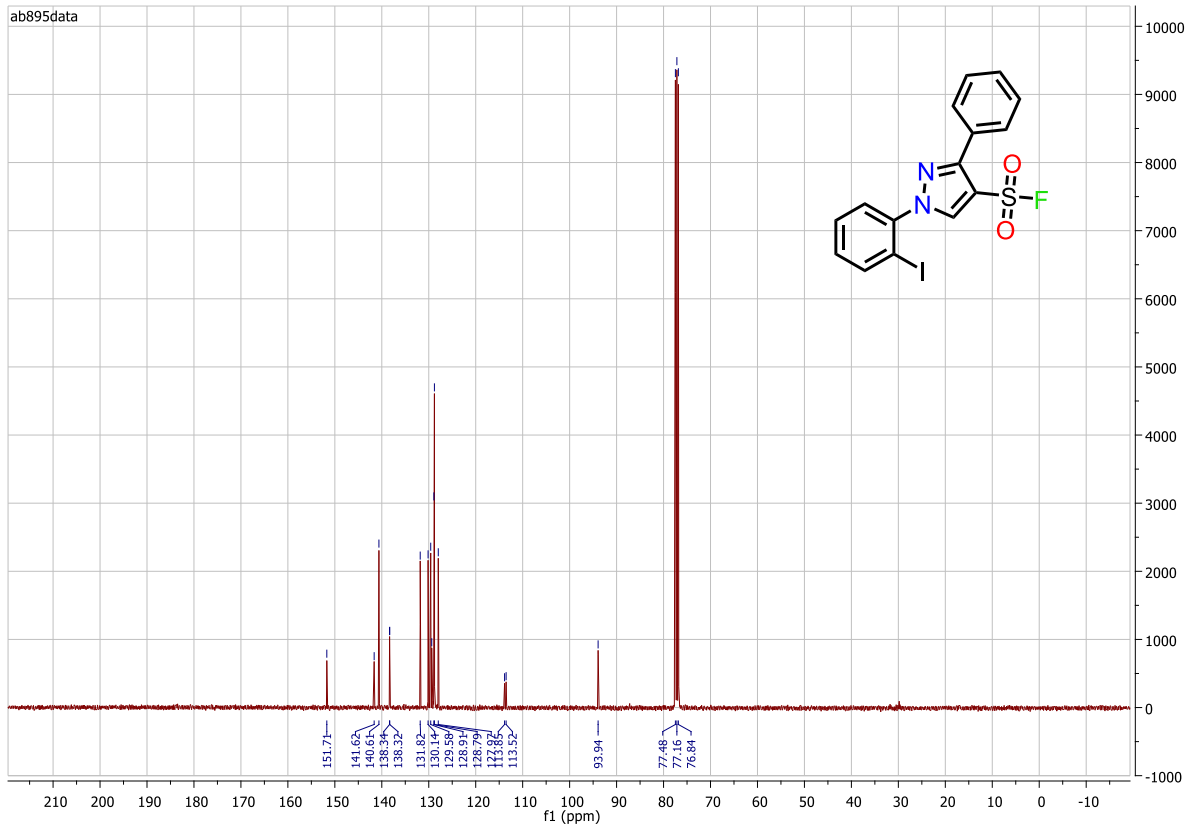

ab894-2
69.75
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
3E+08
3E+08
3E+08
2E+08
2E+08
2E+08
2E+08
2E+08
2E+08
1E+08
1E+08
1E+08
8E+07
6E+07
4E+07
2E+07
0
-2E+07
N
N
O
S
F
O
O
O
S
O

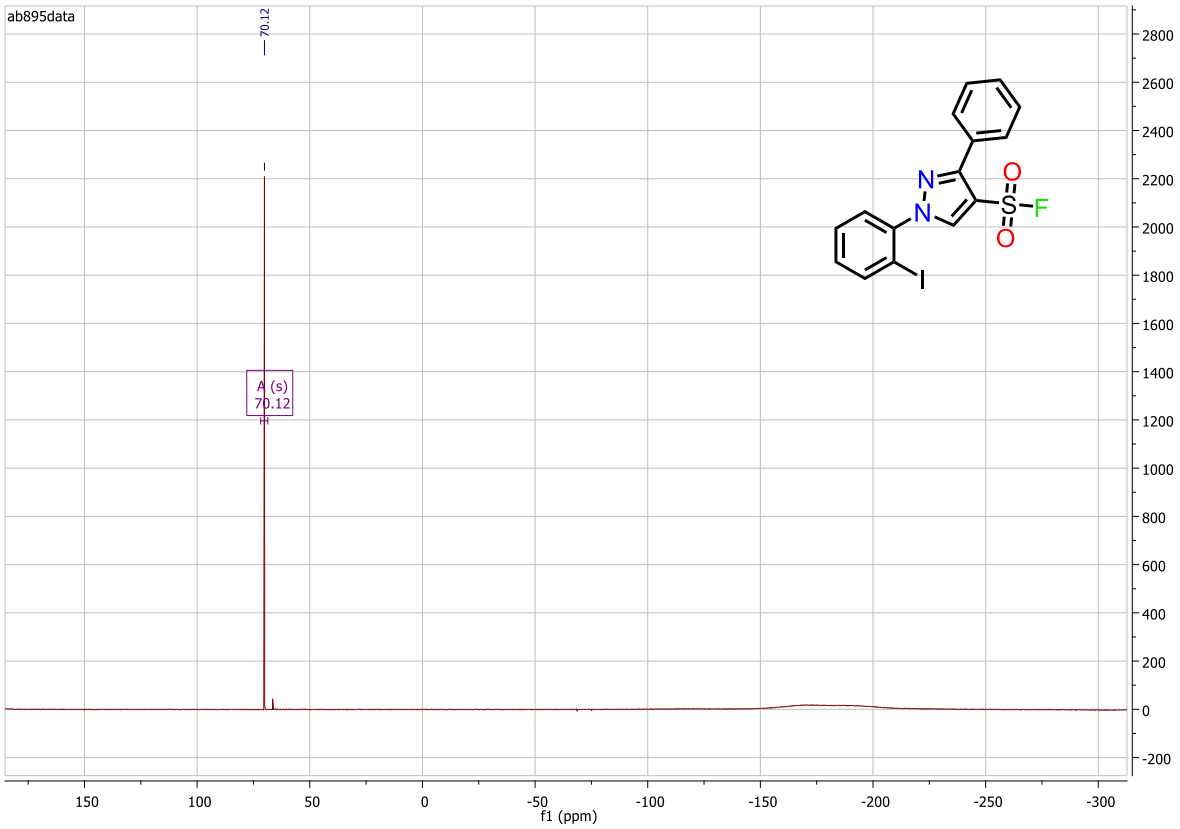

ab891data
8.76
8.76
8.46
8.45
8.44
8.44
8.03
8.03
8.01
7.91
7.91
7.90
7.90
7.89
7.55
7.54
7.53
7.53
7.27
f1 (ppm)
O2N
N
N
S
O
O
F
0.90
2.00
2.03
1.99
3.07
f1 (ppm)

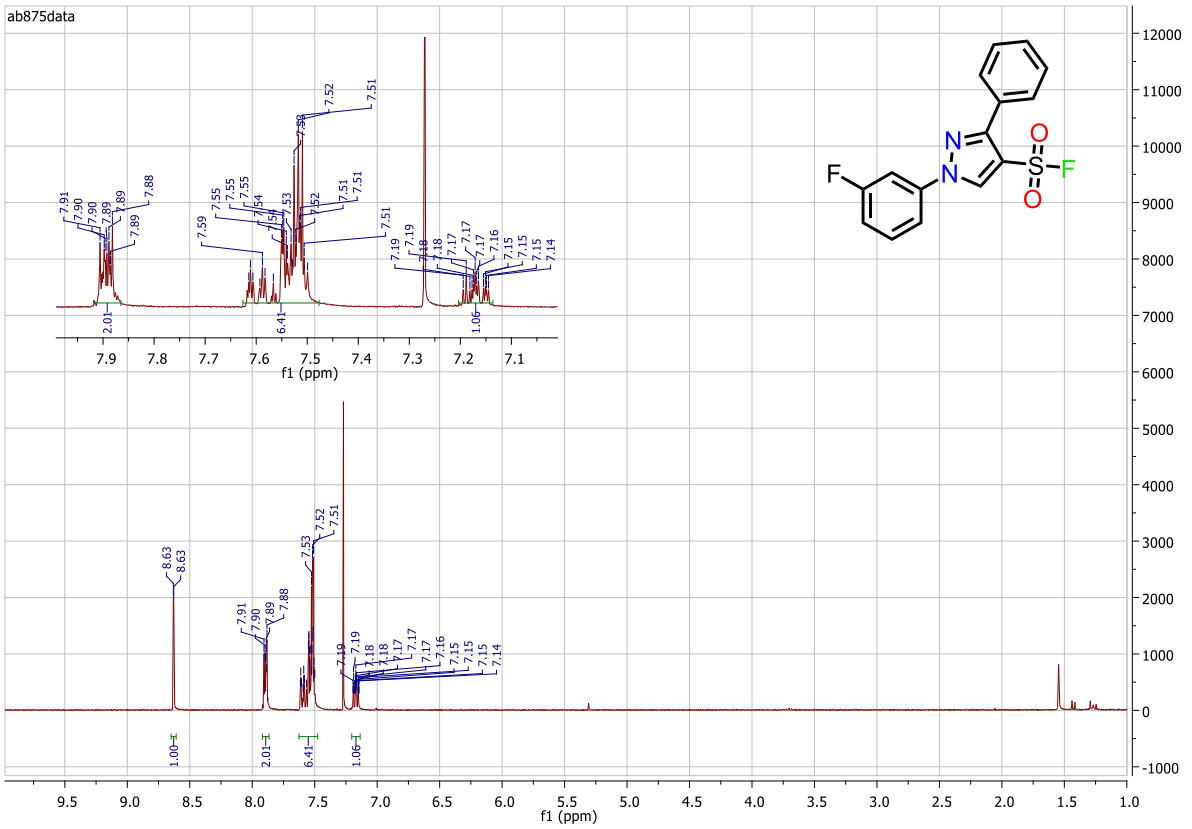

ab891data
O2N
N
N
S
O
O
F
152.82
147.31
142.56
134.27
130.63
128.96
128.88
128.84
125.80
120.02
116.41
116.07
77.48
77.16
76.84
f1 (ppm)

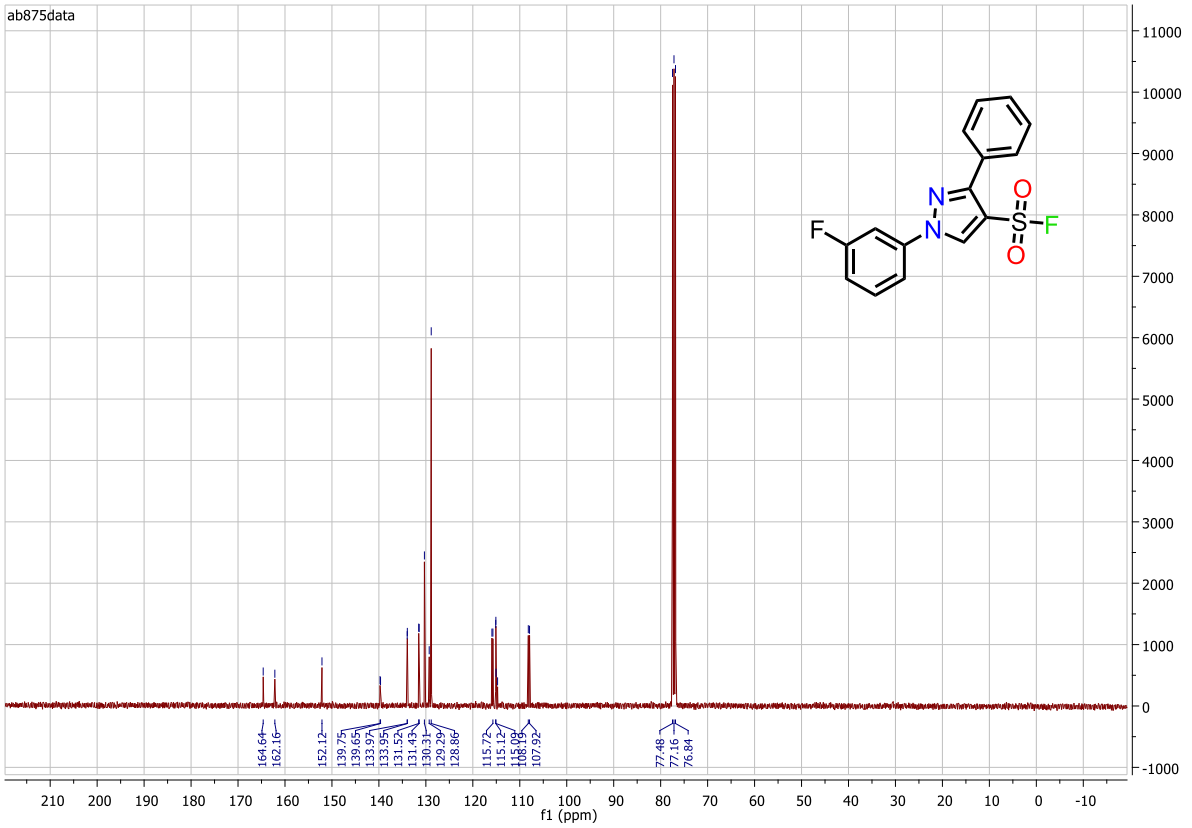

ab891data
69.72
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-50
N
N
O
S
F
O
O2N

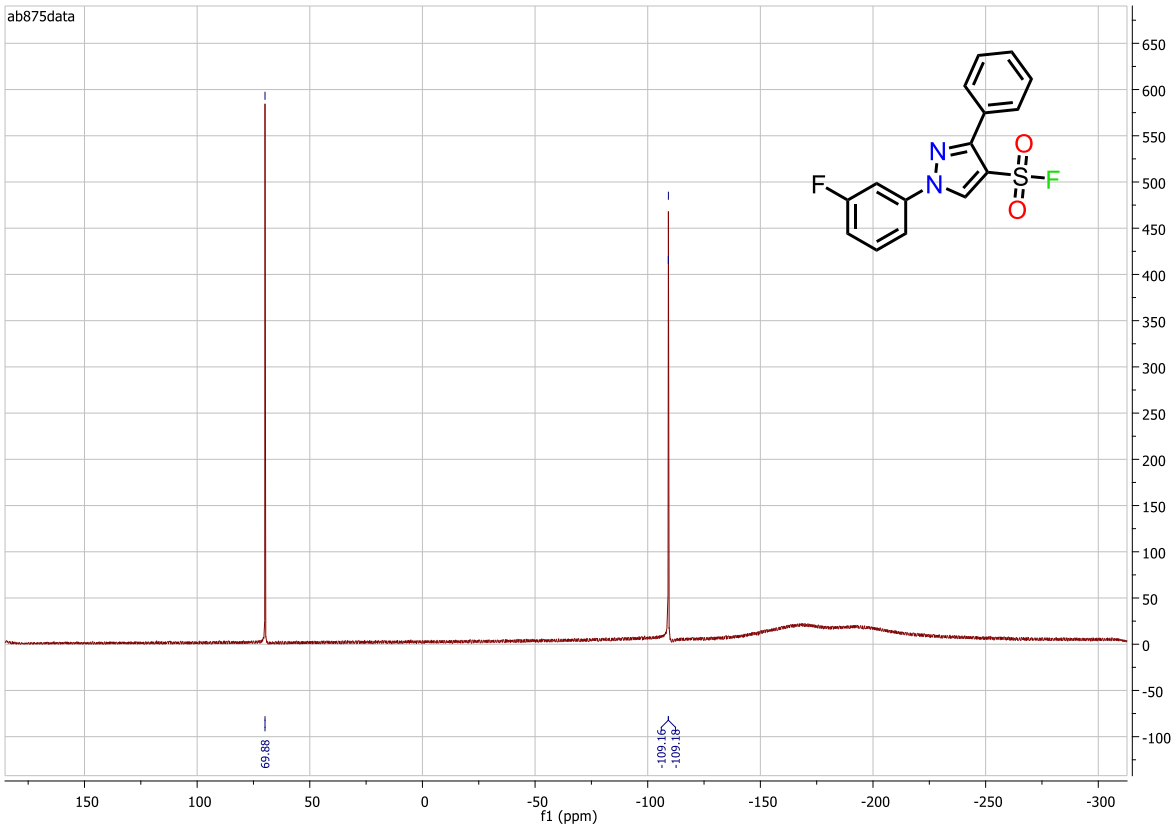

ab895data
8.44
8.04
8.02
8.02
7.92
7.91
7.90
7.90
7.54
7.54
7.53
7.51
7.50
7.49
7.49
7.29
7.28
7.28
7.27
7.26
f1 (ppm)
N
N
O
S
F
O
I

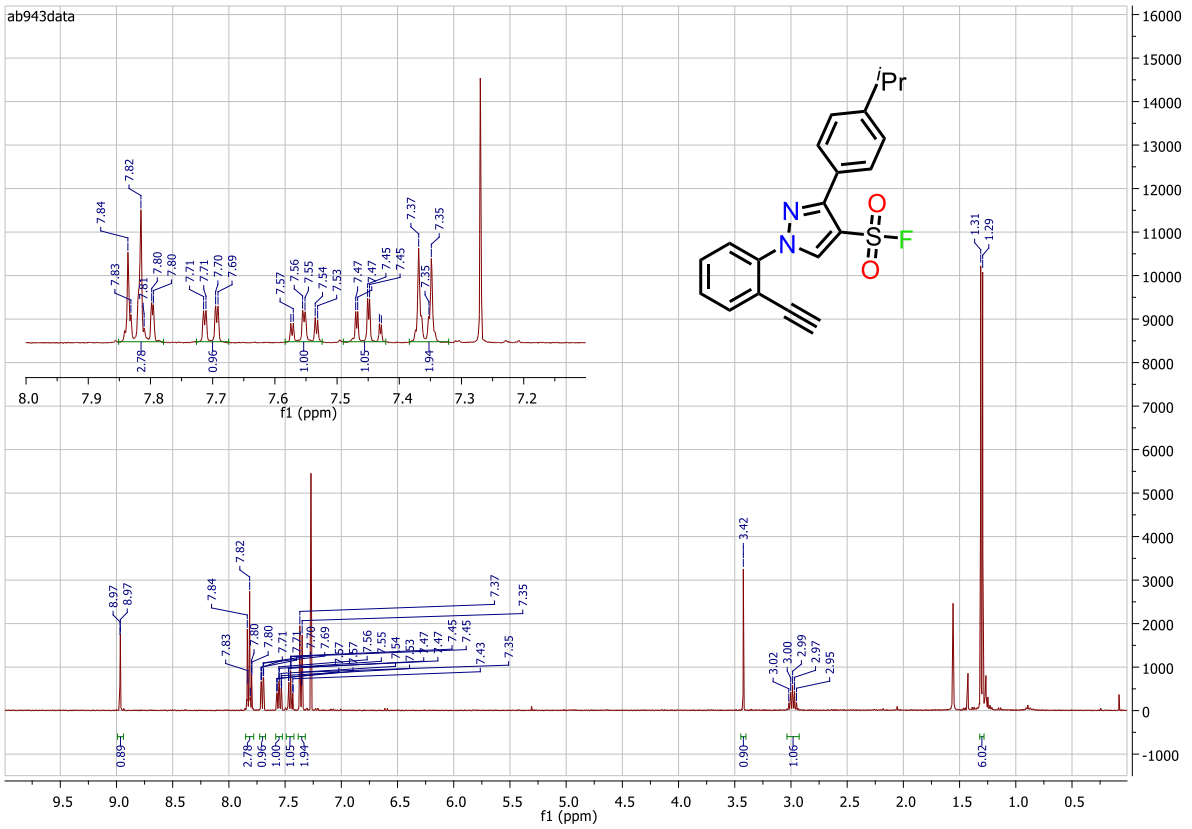

ab895data
151.71
141.62
140.61
138.34
138.32
131.82
130.14
129.59
128.91
128.79
113.85
113.52
93.94
77.48
77.16
76.84
f1 (ppm)
N
N
O
S
F
O
I

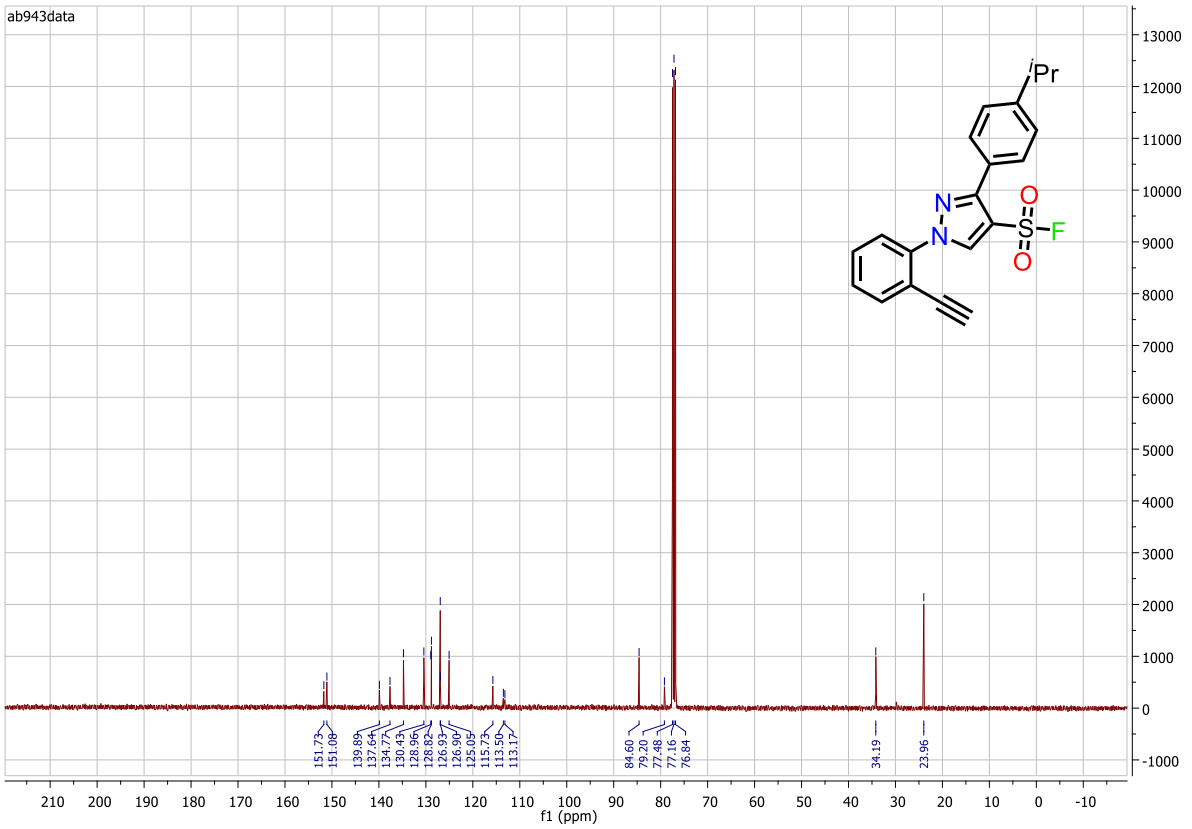

ab895data
70.12
A (s)
70.12
N
N
O
S
F
O
I
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

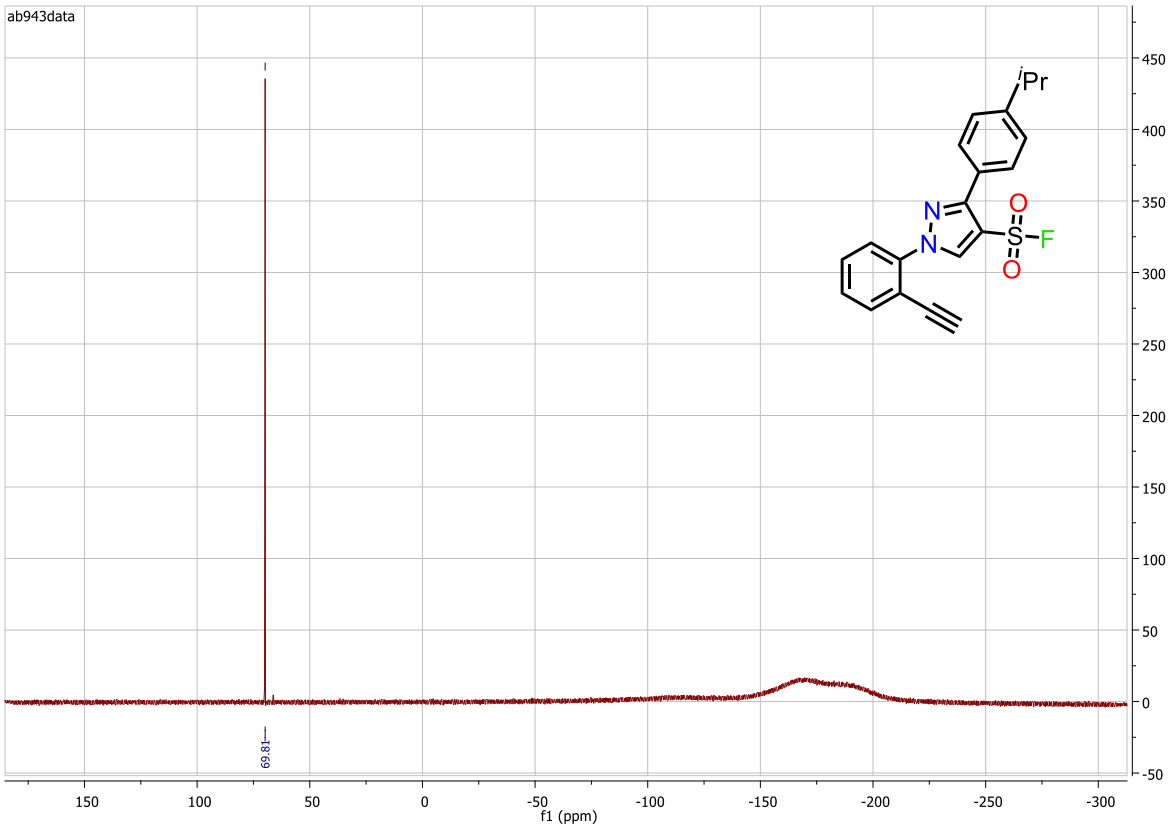

ab875data
f1 (ppm)

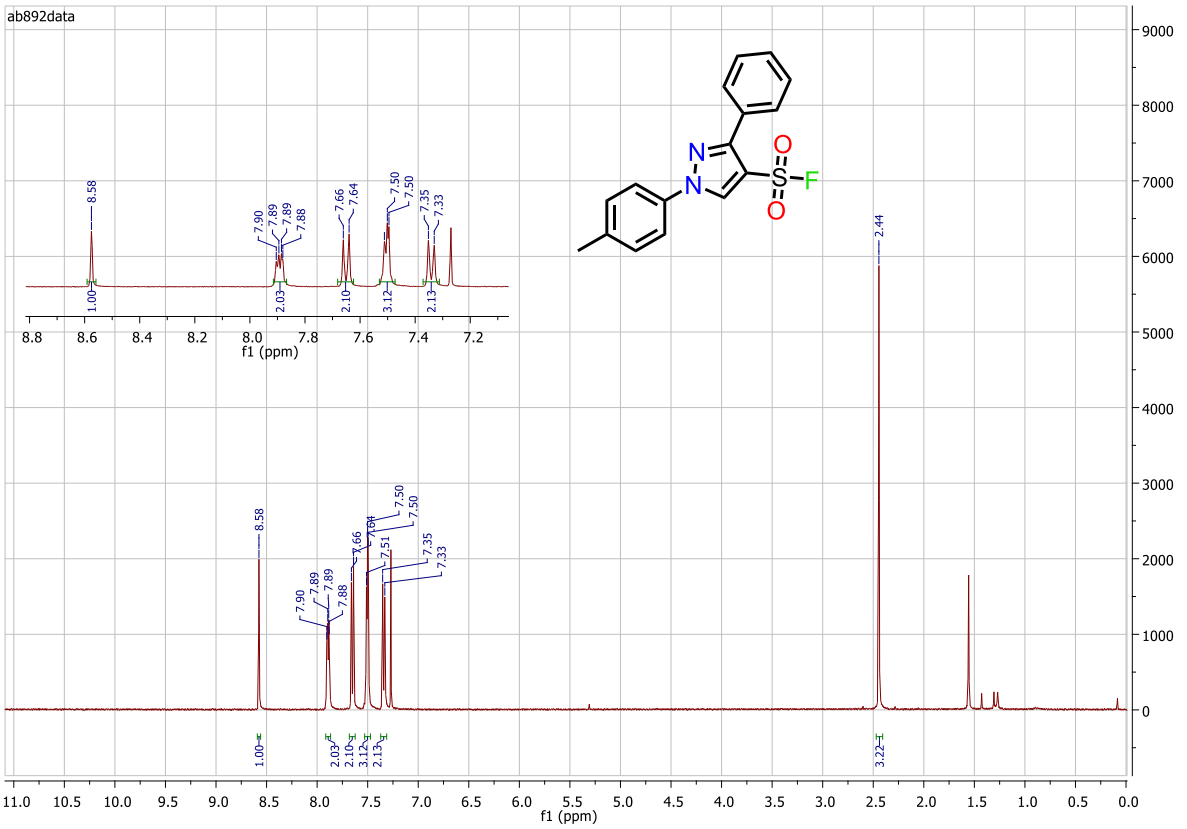

ab875data
f1 (ppm)

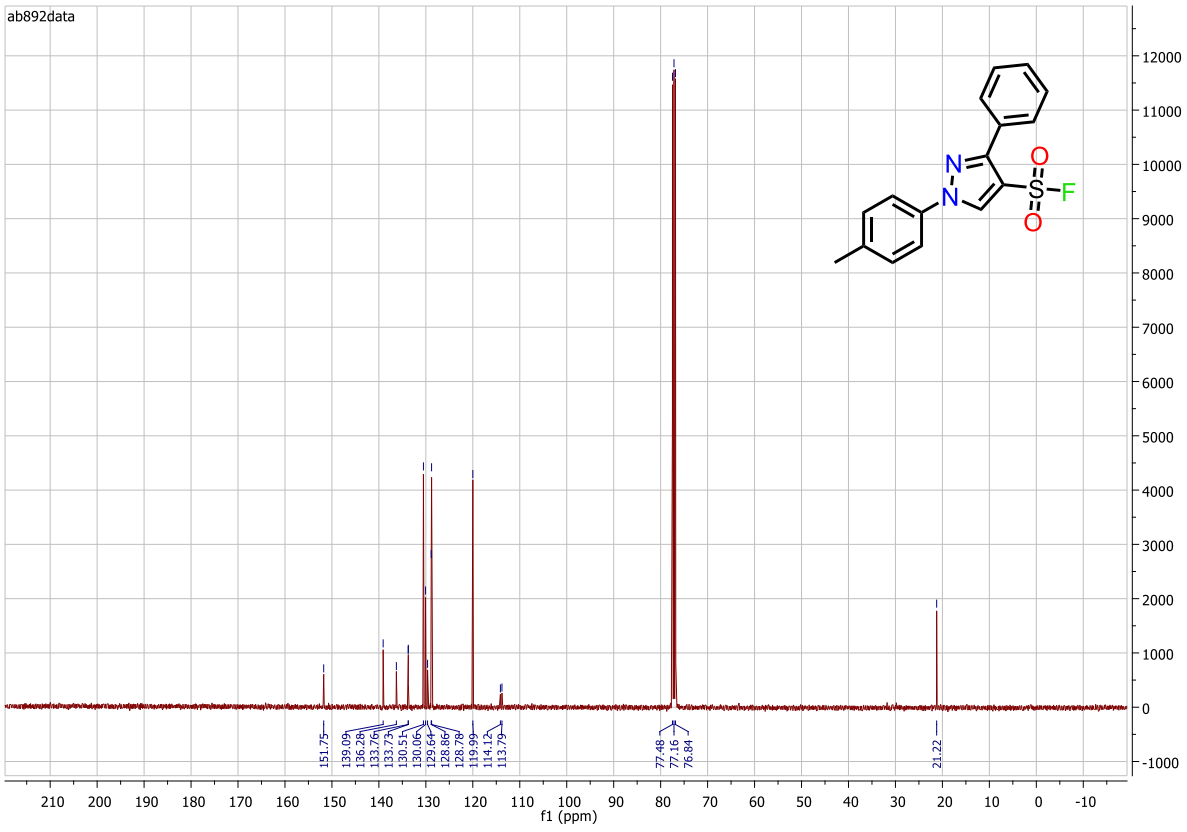

ab875data
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-50
-100
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
69.88
-109.16
-109.18
N
N
F
O
S
F
O

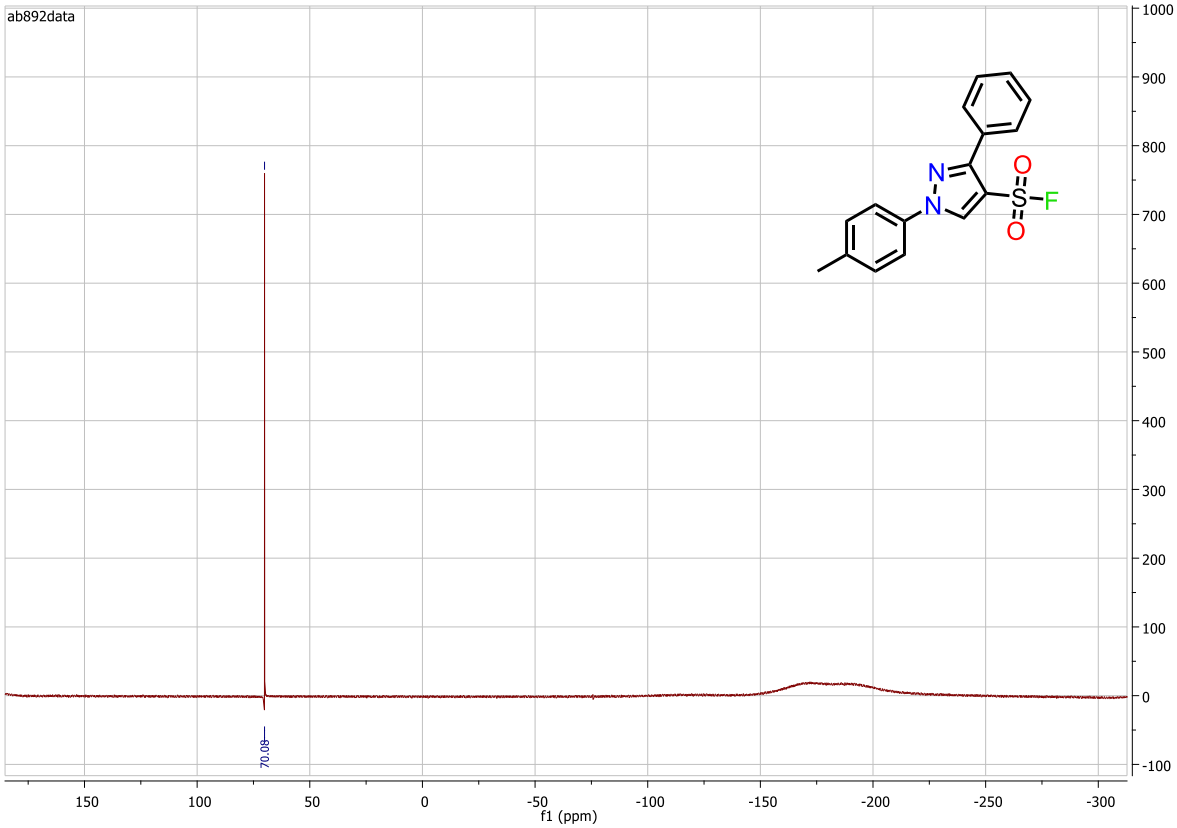

ab943data
iPr
N
N
O
S
F
O
f1 (ppm)

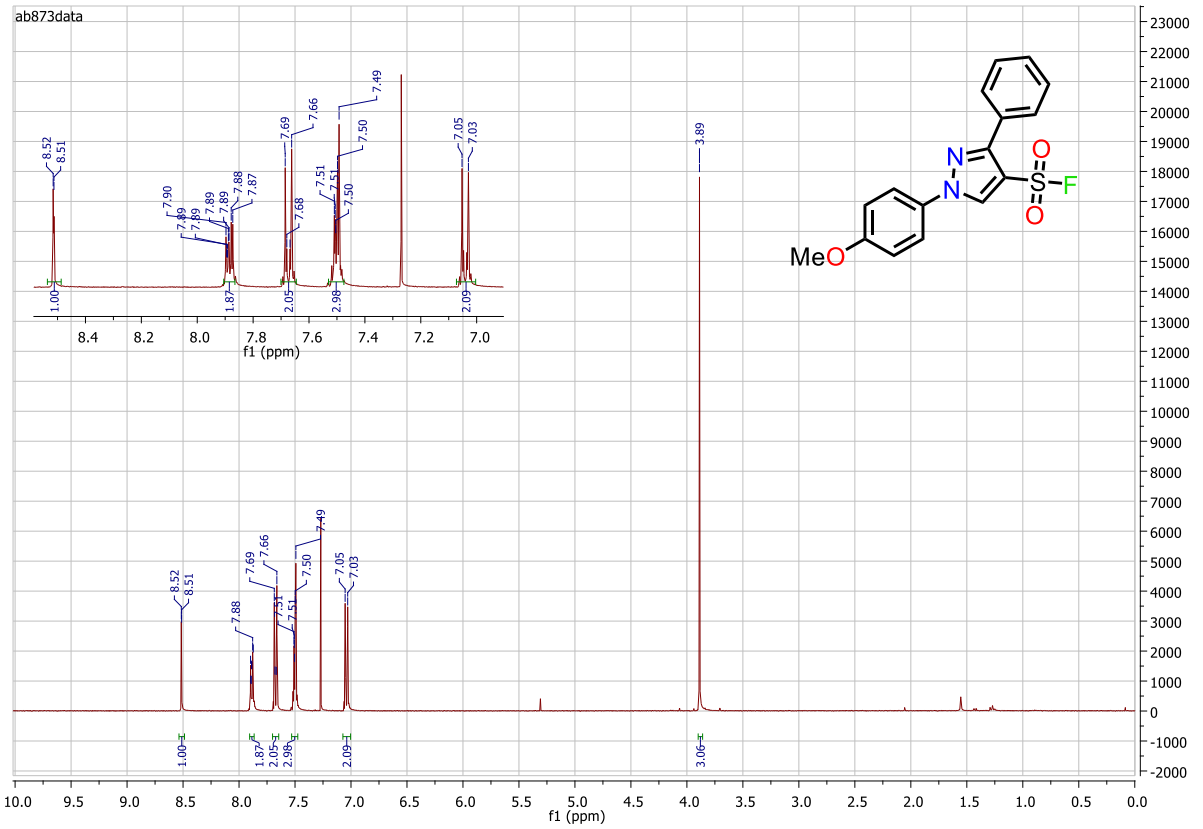

ab943data
iPr
N
N
O
S
F
O
f1 (ppm)

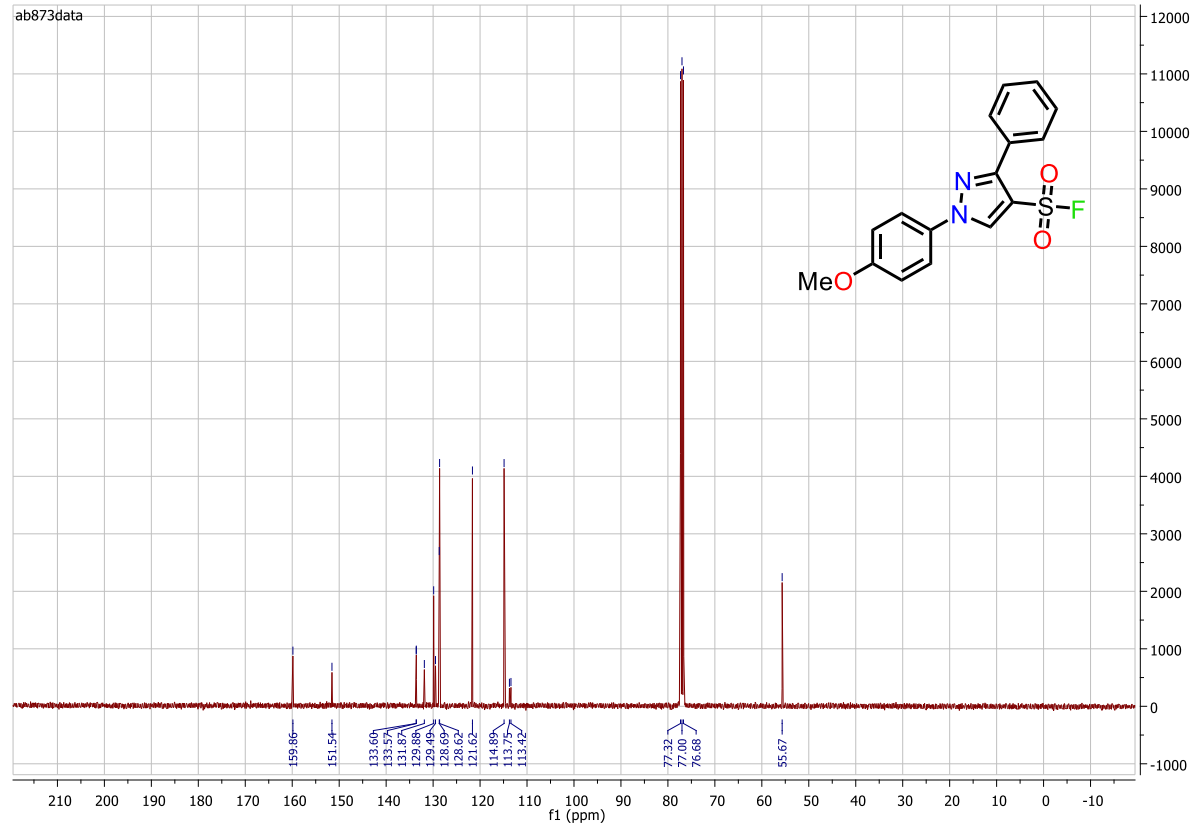

ab943data
69.81
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
450
400
350
300
250
200
150
100
50
0
-50
iPr
N
N
O
S
F
O

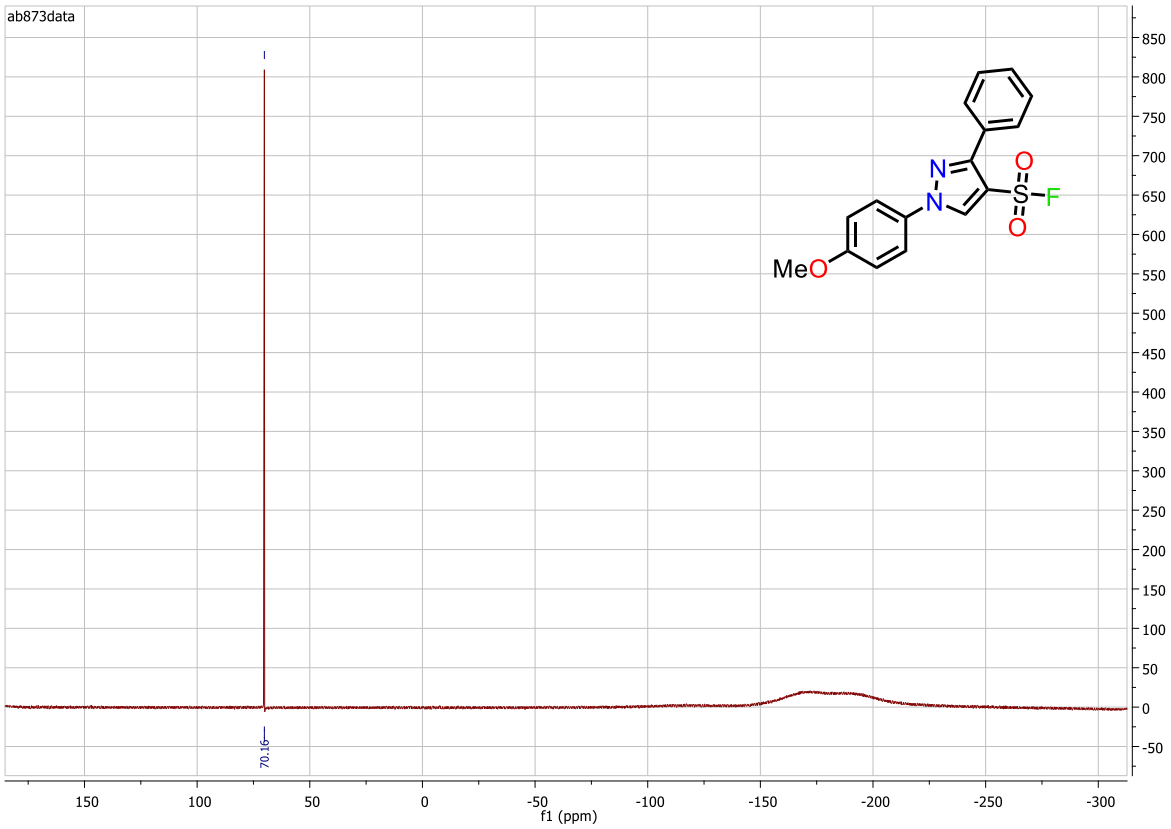

ab892data
f1 (ppm)

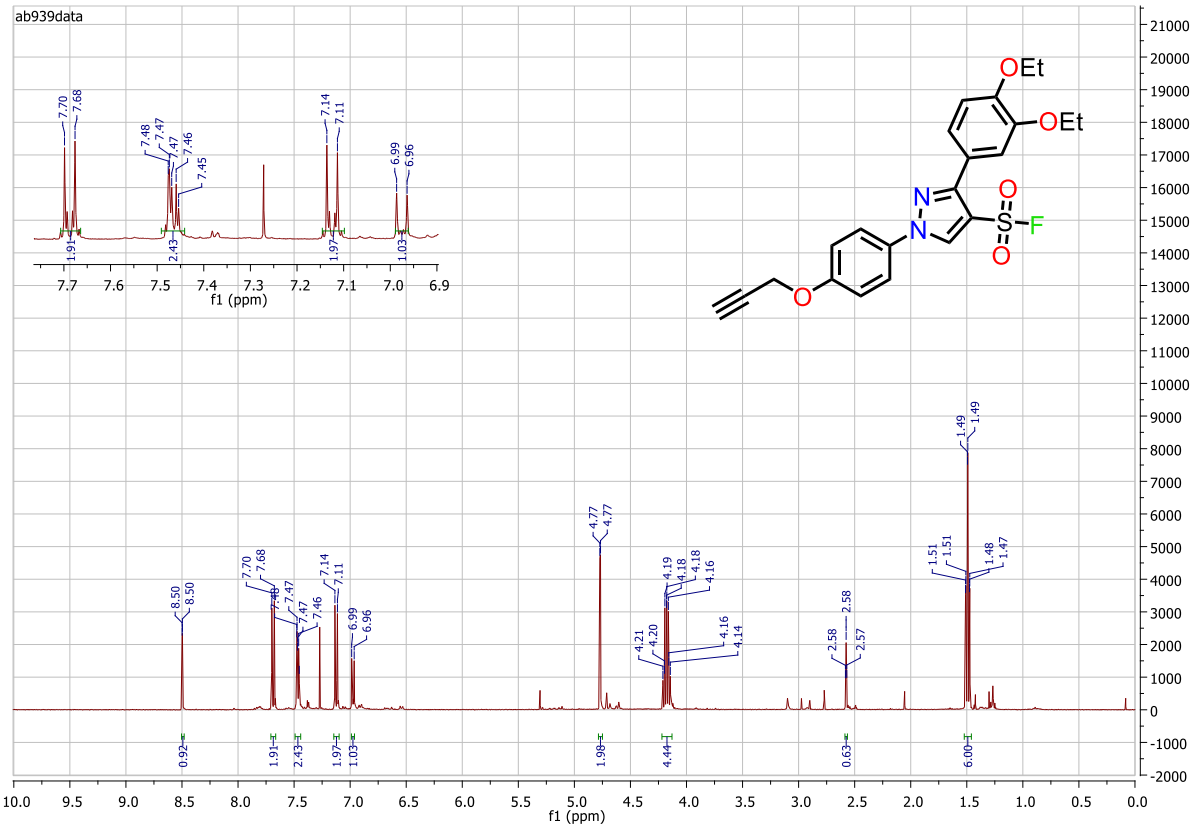

ab892data
f1 (ppm)

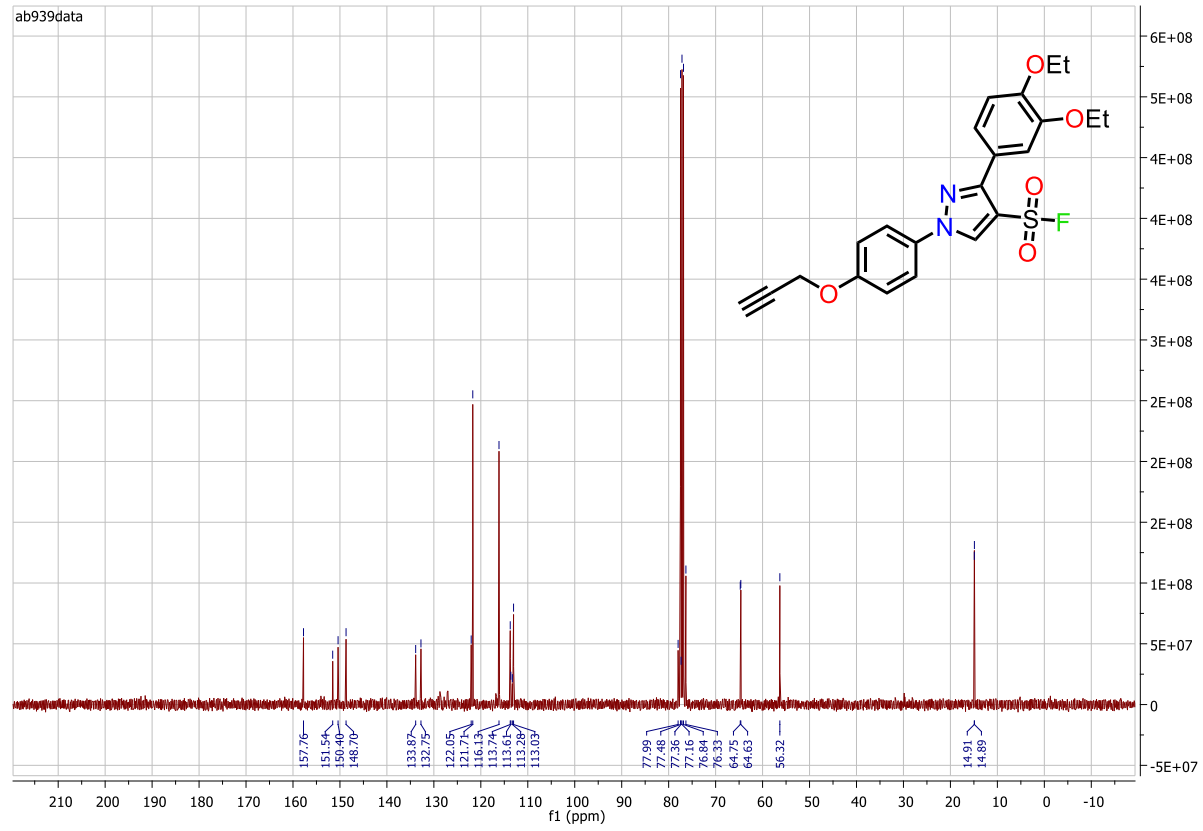

ab892data
70.08
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1000
900
800
700
600
500
400
300
200
100
0
-100
N
N
O
S
F
O

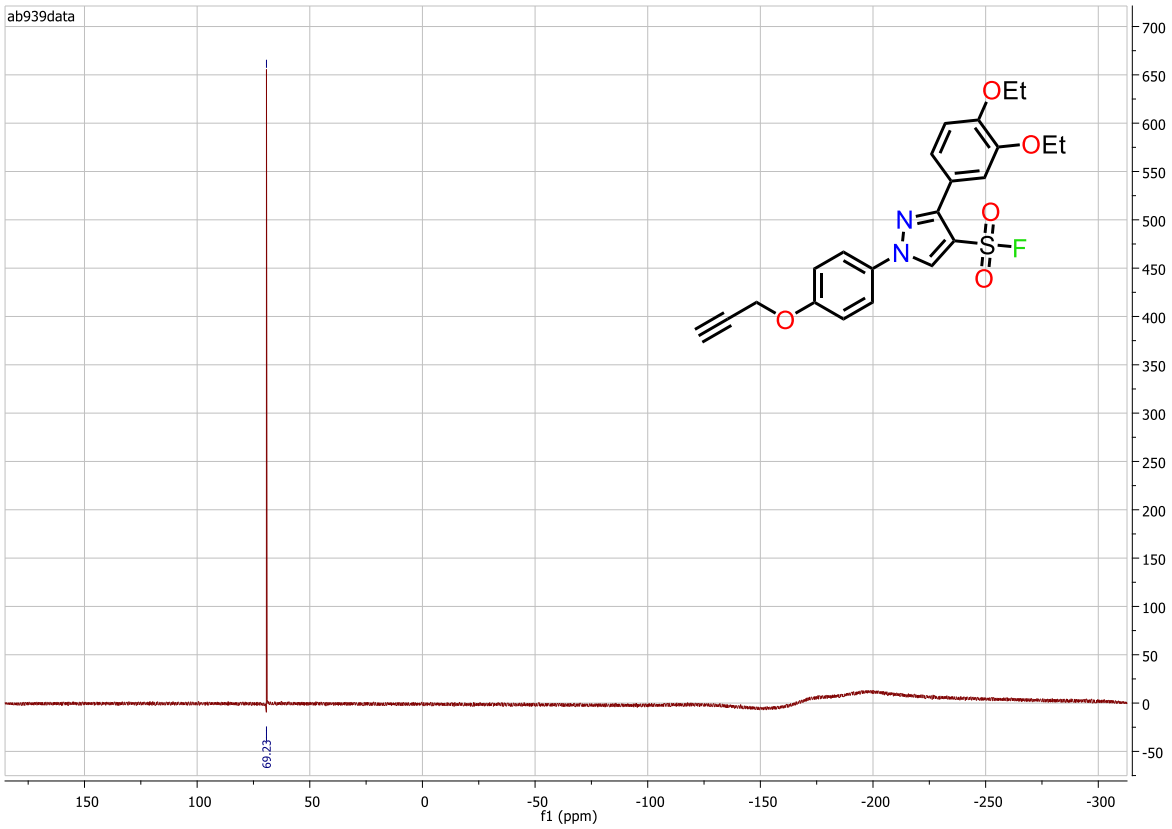

ab873data
f1 (ppm)
MeO
N
N
O
S
F
O

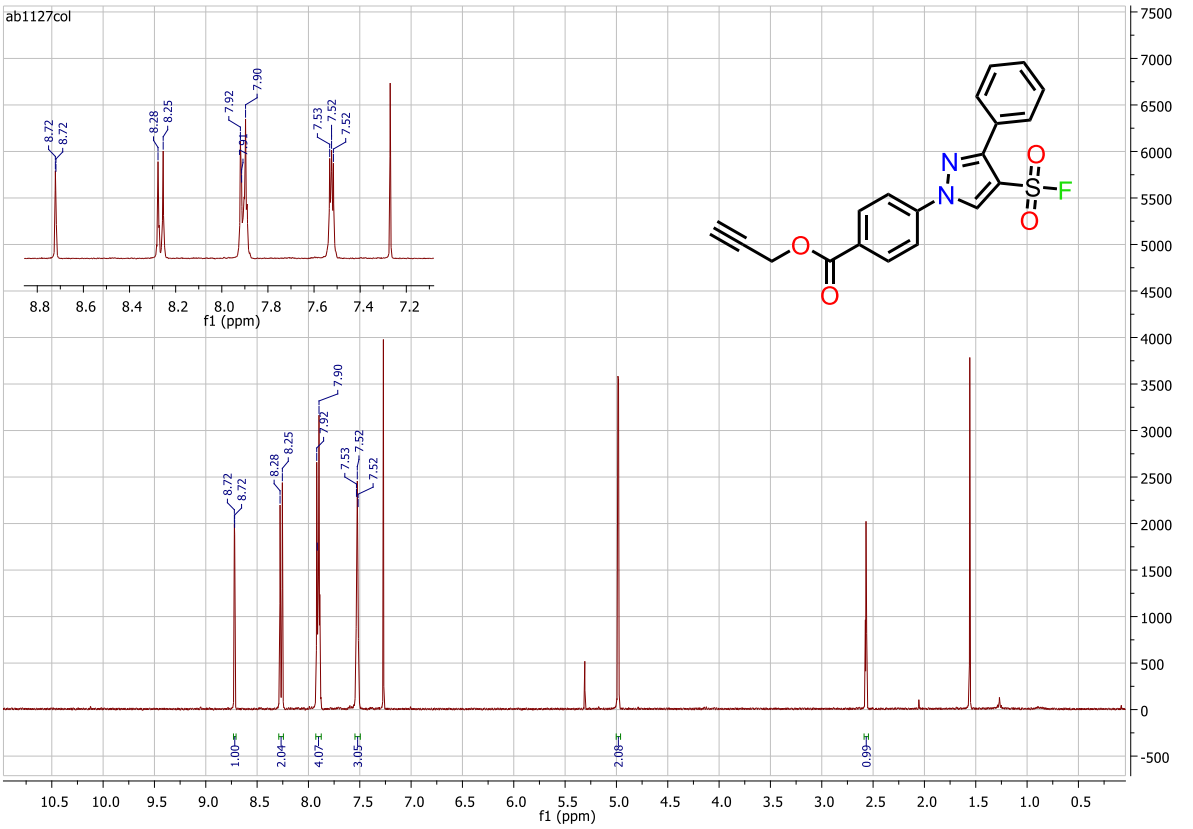

ab873data
f1 (ppm)
MeO
N
N
O
S
F
O

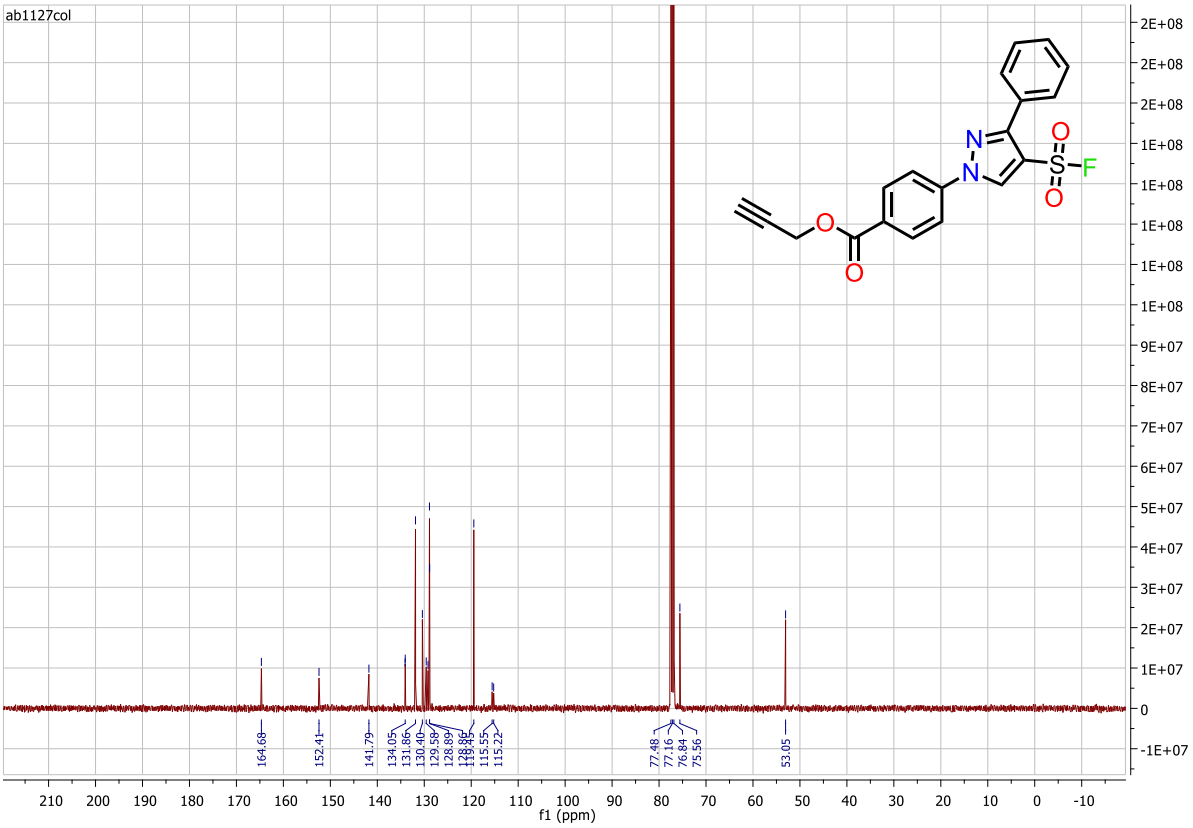

ab873data
70.16
f1 (ppm)
MeO
N
N
O
S
F
O

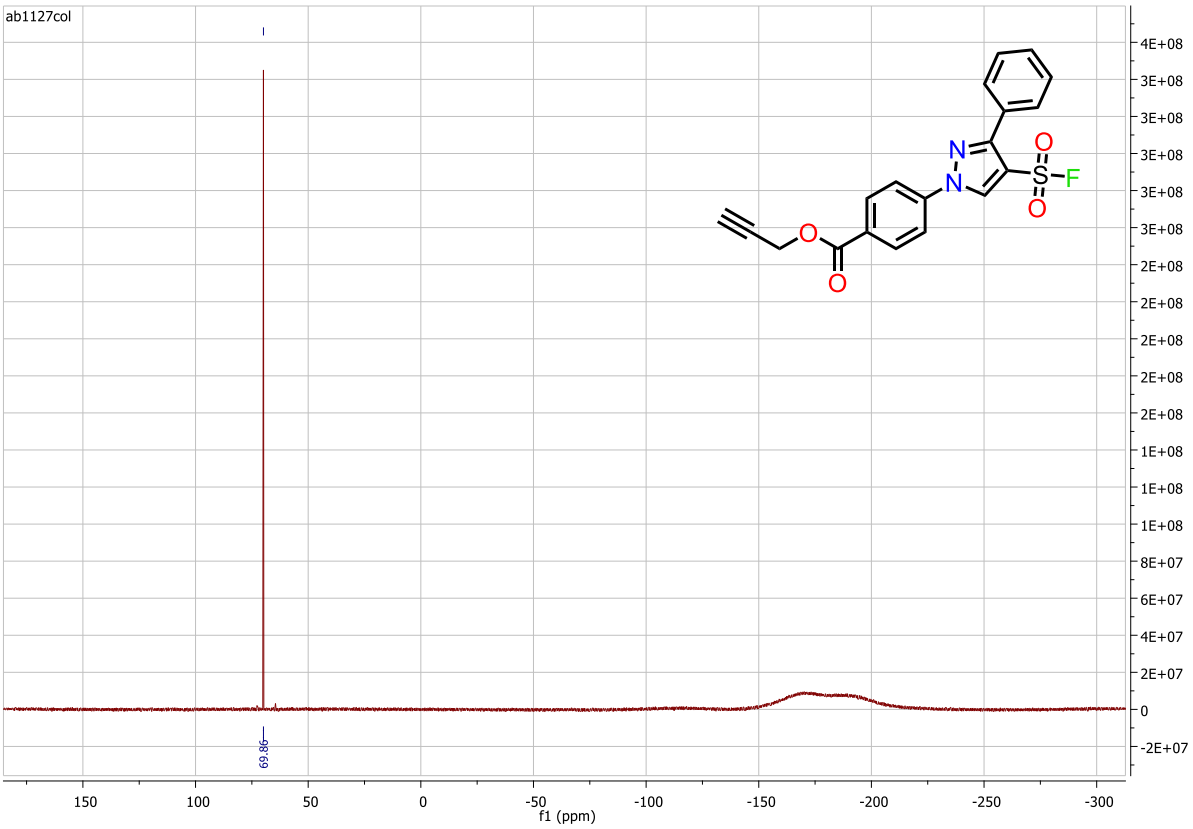

ab939data
OEt
OEt
N
N
O
S
F
O
O
f1 (ppm)

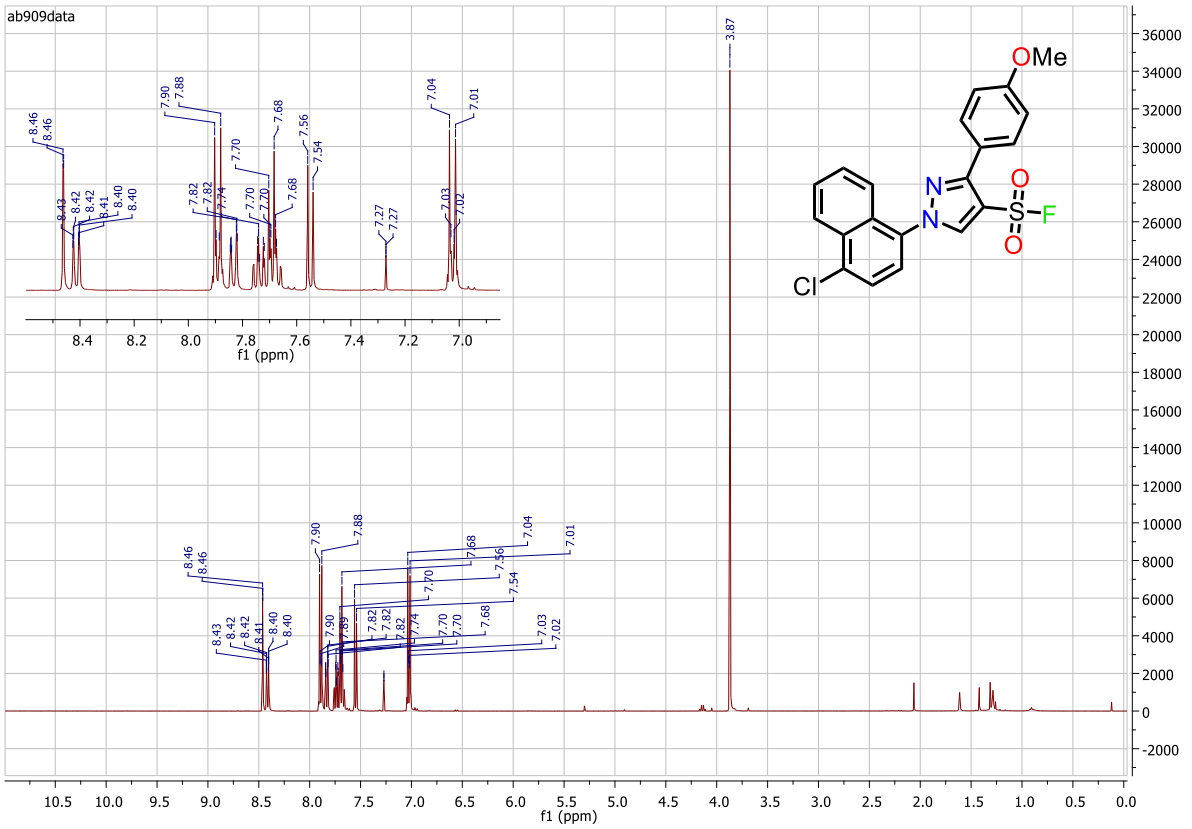

ab939data
OEt
OEt
N
N
O
S
F
O
O
f1 (ppm)

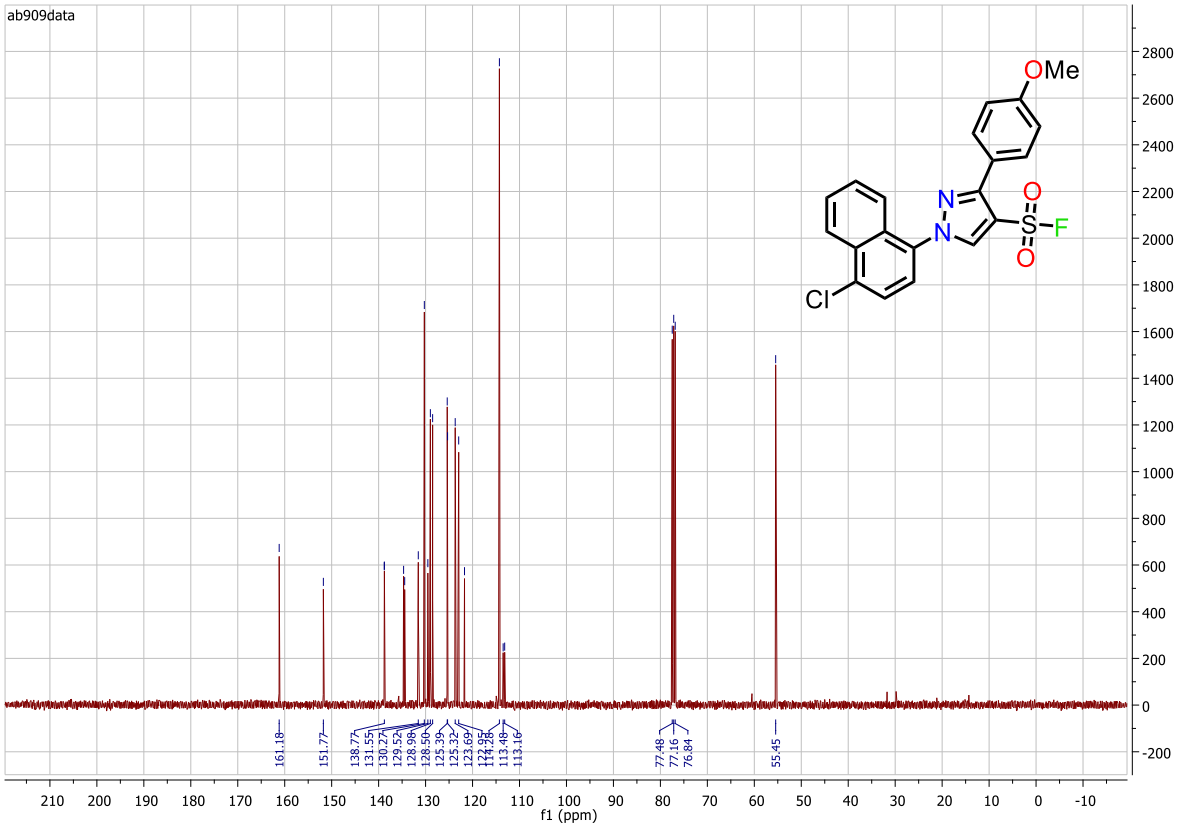

ab939data
OEt
OEt
N
N
O
S
F
O
O
69.23
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-50

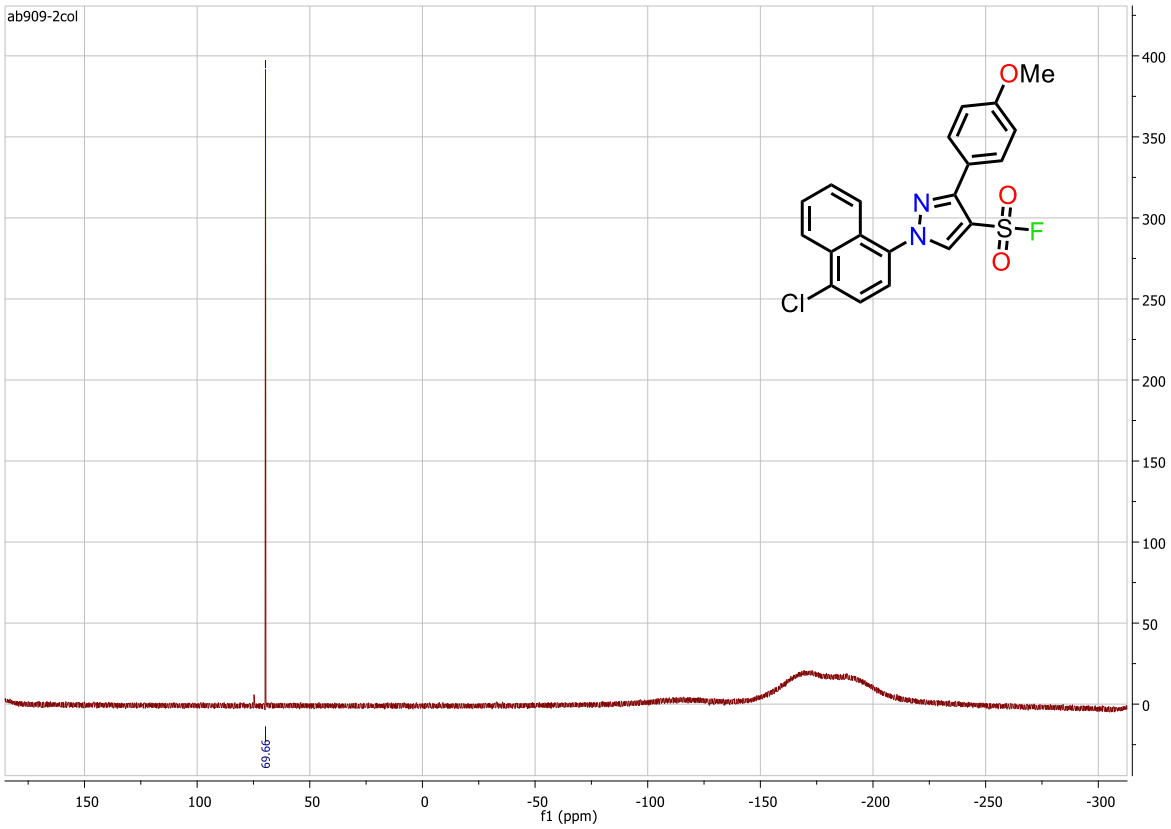

ab1127col
8.72
8.72
8.28
8.25
7.92
7.91
7.90
7.53
7.52
7.52
f1 (ppm)
1.00
2.04
4.07
3.05
2.00
0.99
f1 (ppm)

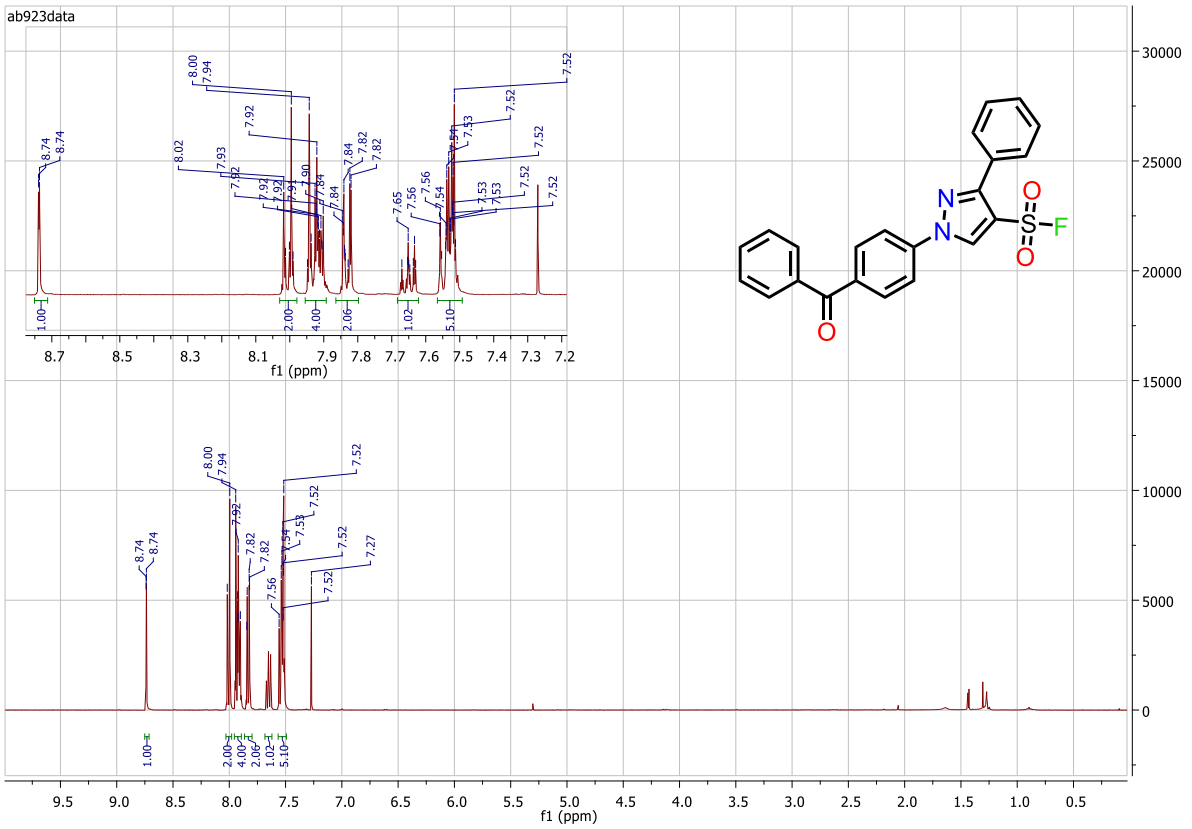

ab1127col
164.68
152.41
141.79
134.05
131.86
130.40
129.58
128.89
115.55
115.22
77.48
77.16
76.84
75.56
53.05
f1 (ppm)


ab1127col
69.86
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
4E+08
3E+08
3E+08
3E+08
3E+08
3E+08
3E+08
2E+08
2E+08
2E+08
2E+08
2E+08
2E+08
1E+08
1E+08
1E+08
8E+07
6E+07
4E+07
2E+07
0
-2E+07
N
N
O
S
F
O
O
O


ab909data
OMe
N
N
O
S
F
O
Cl
f1 (ppm)


ab909data
OMe
N
N
O
S
F
O
Cl
f1 (ppm)


ab909-2col
OMe
N
N
O
S
F
O
Cl
69.66
400
350
300
250
200
150
100
50
0
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)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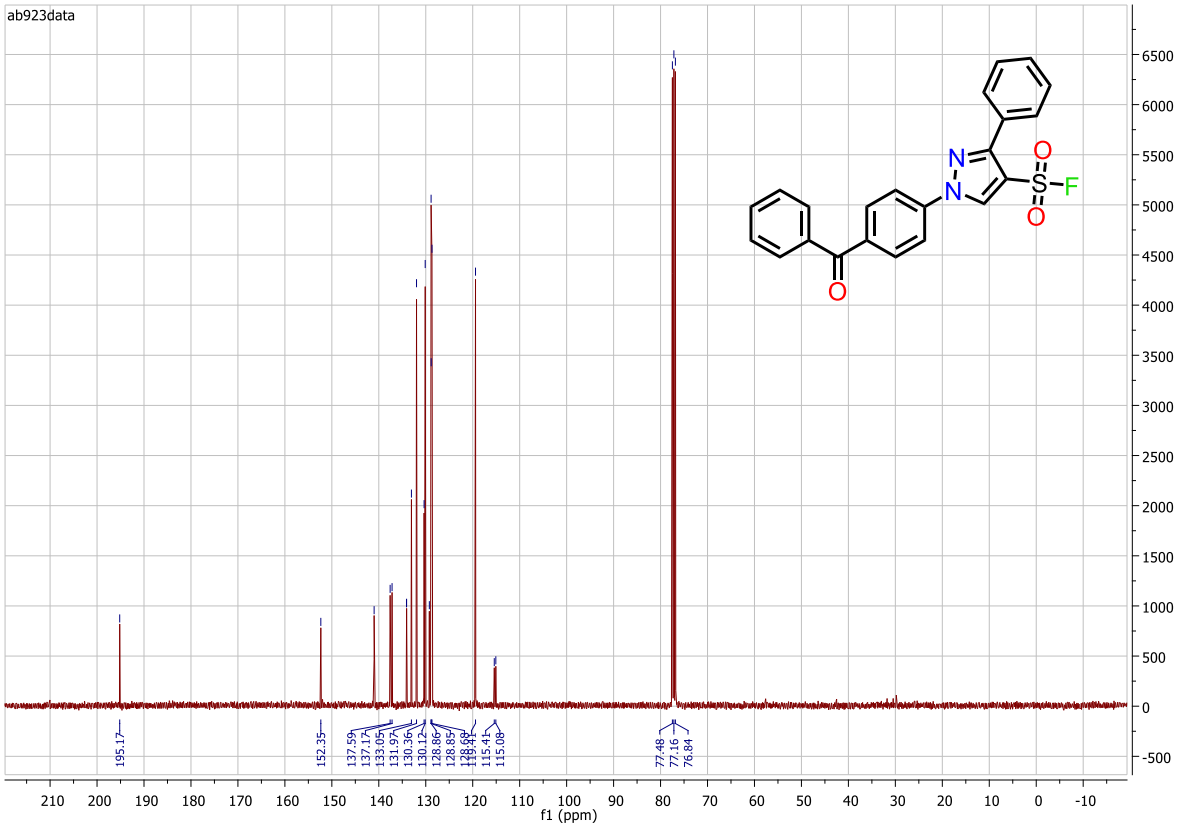
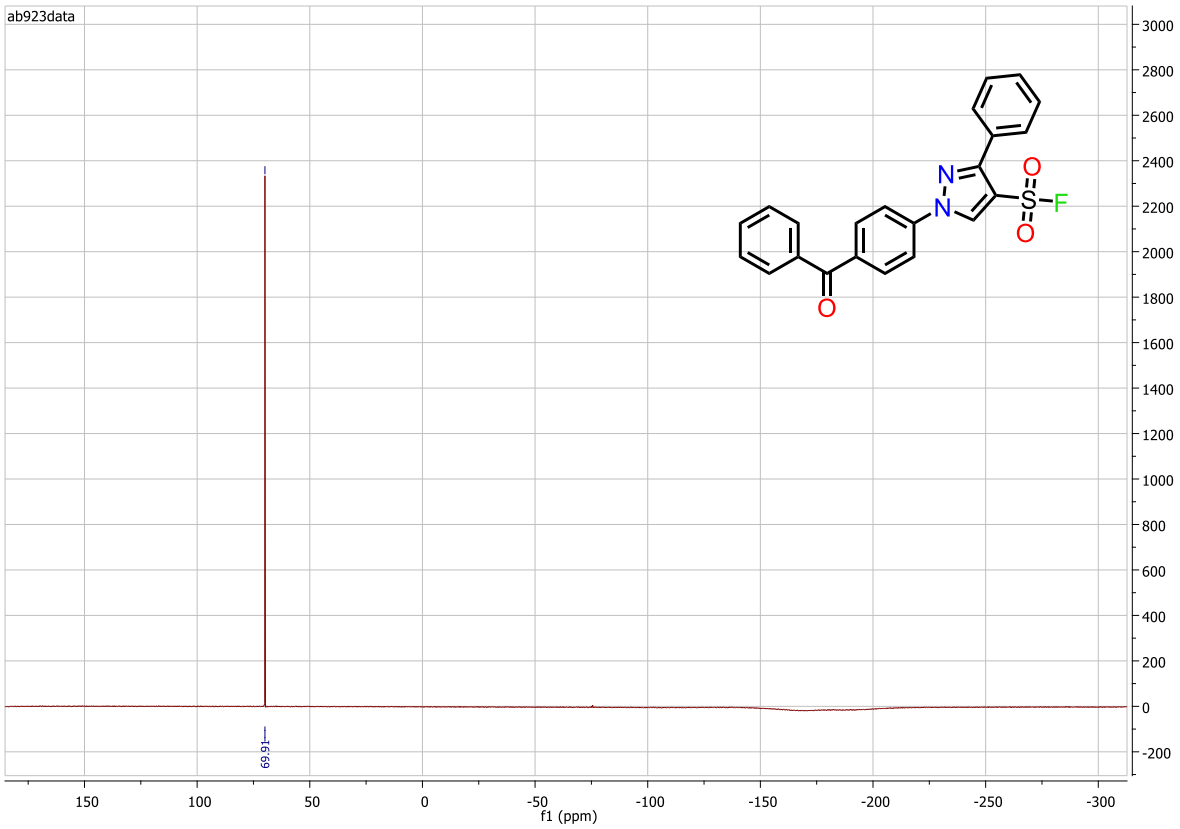
f1 (ppm)


ab923data
f1 (ppm)


ab923data
69.91
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
3000
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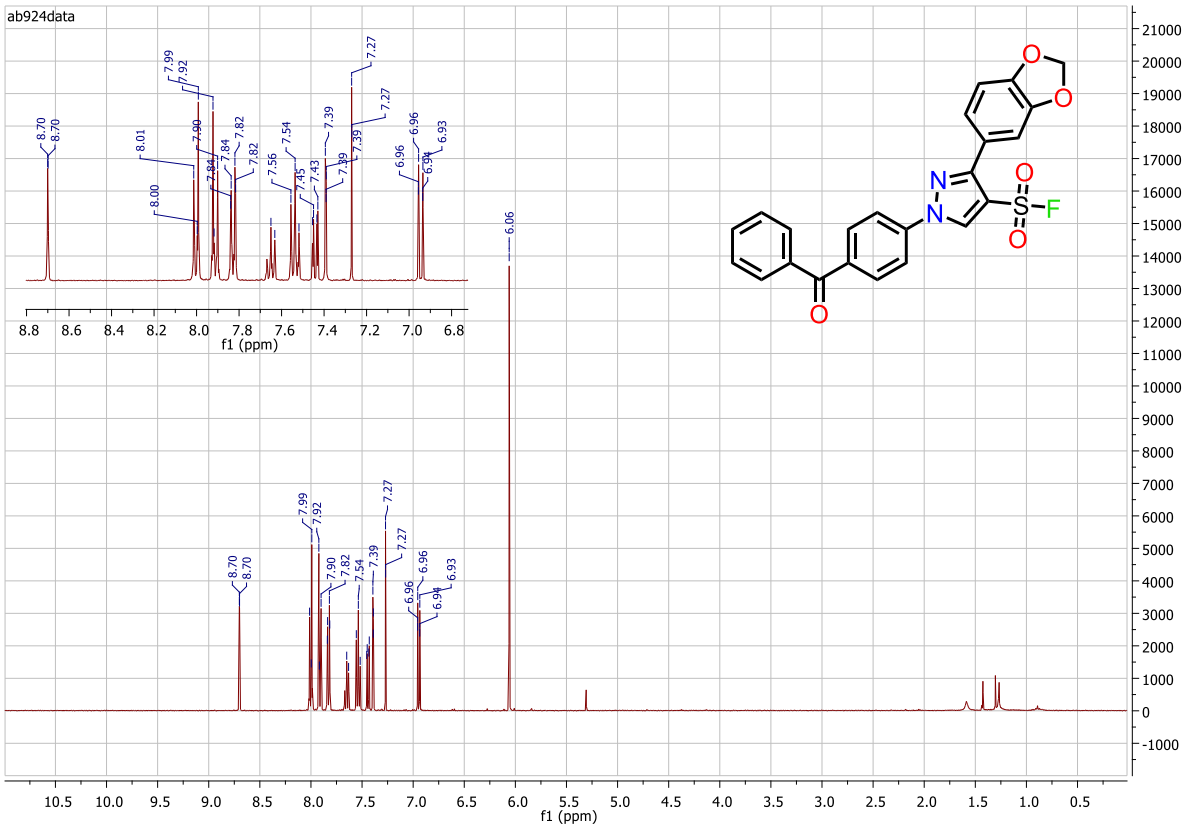
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
N
N
O
S
F
O
O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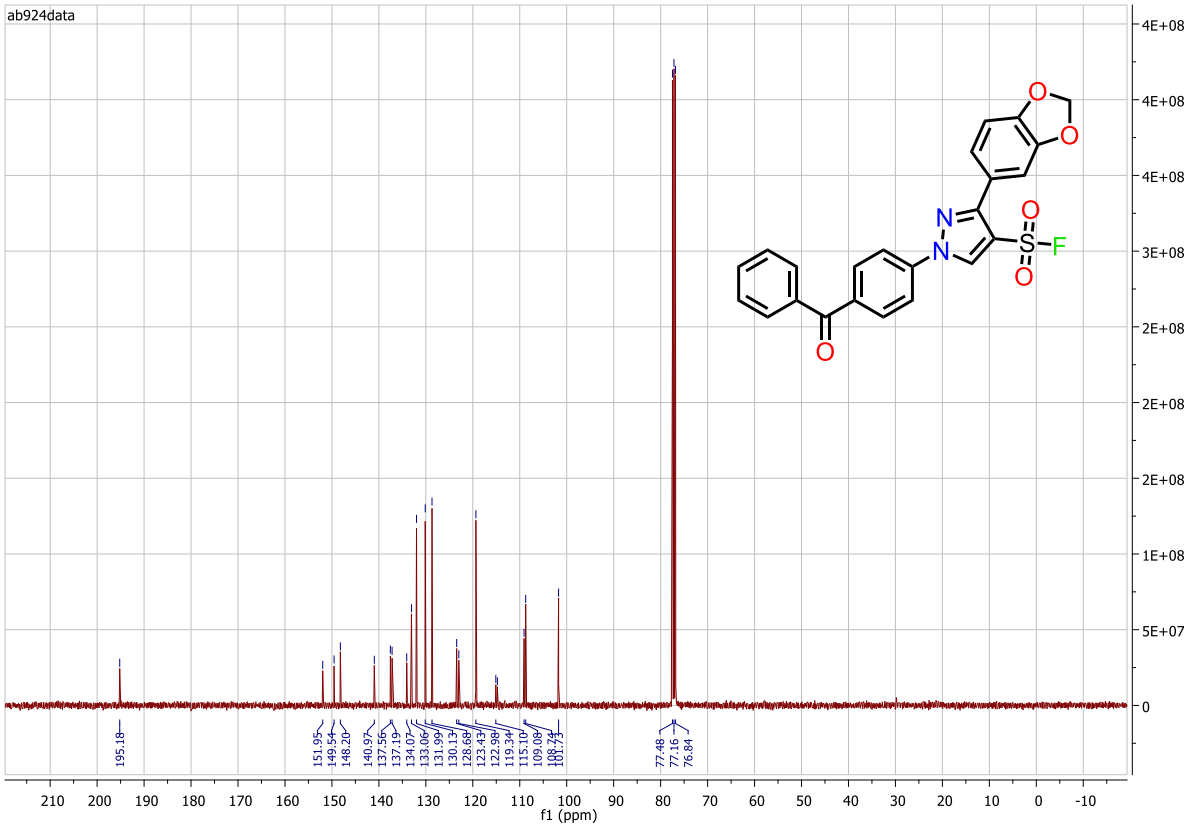
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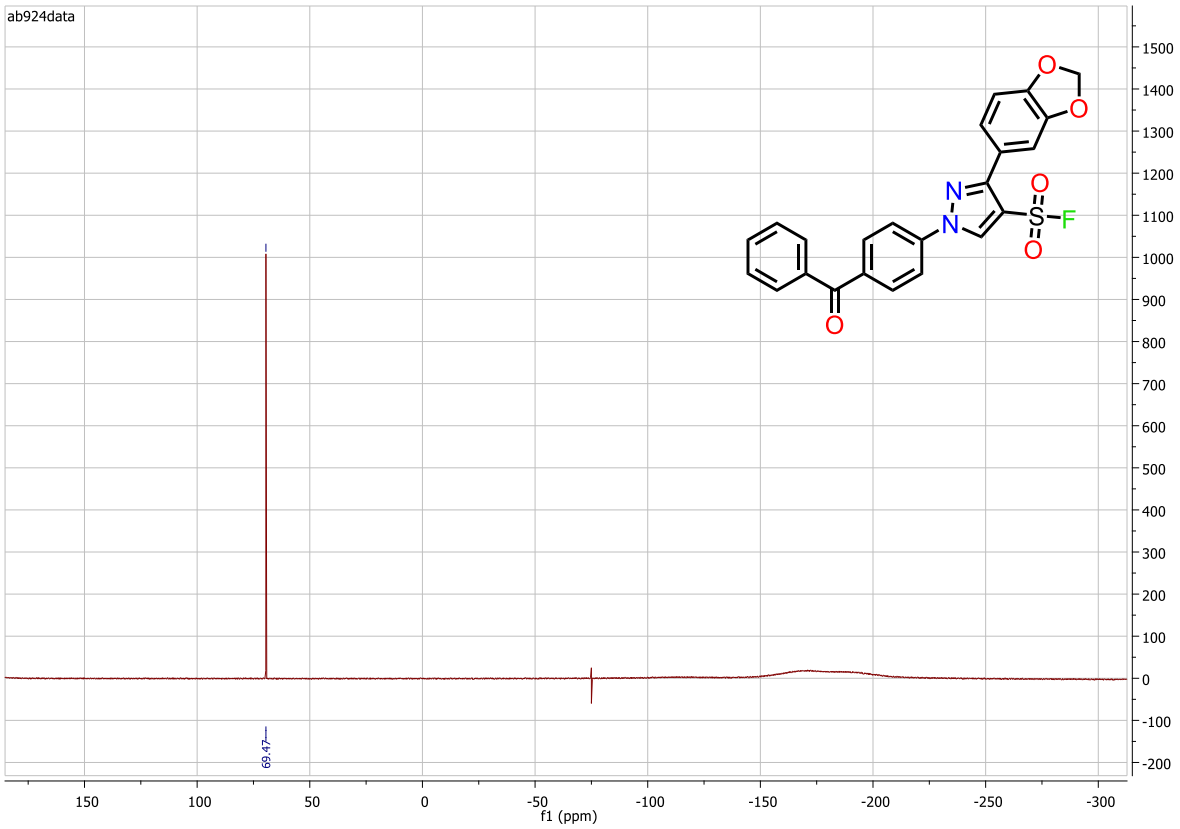
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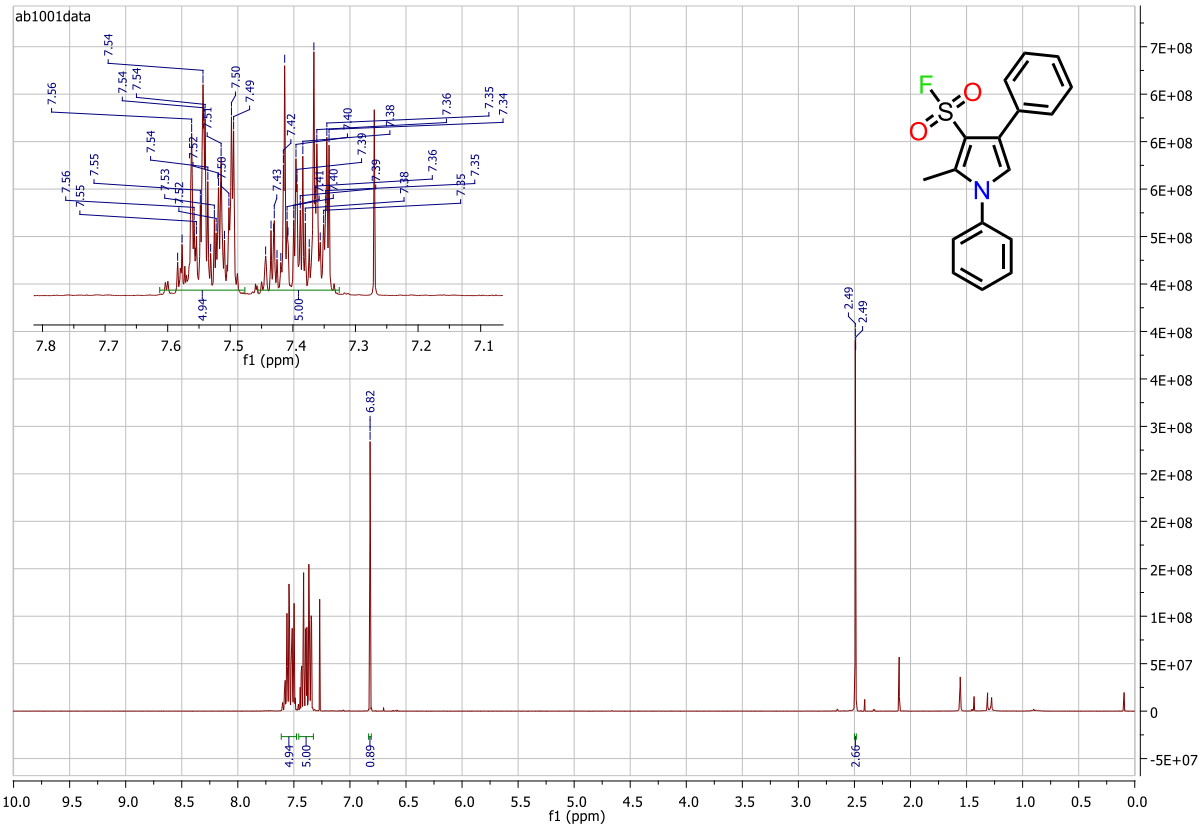
f1 (ppm)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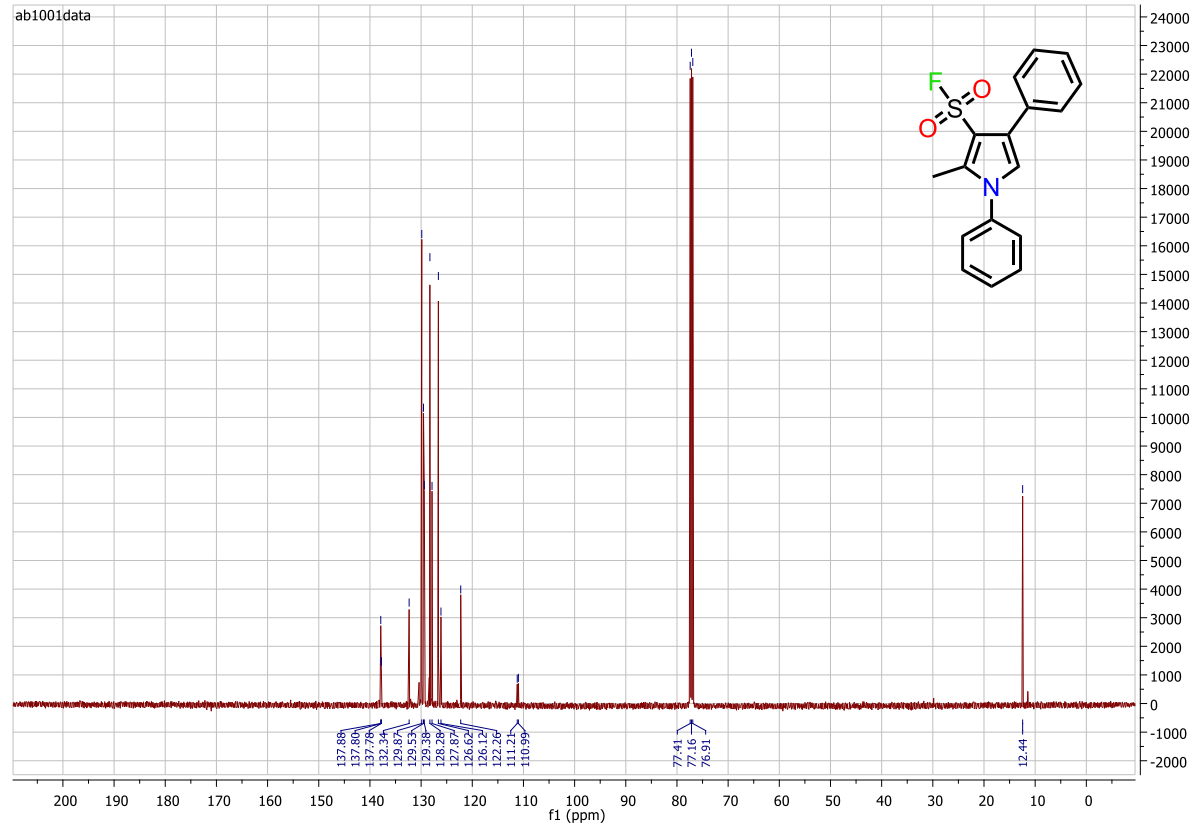
f1 (ppm)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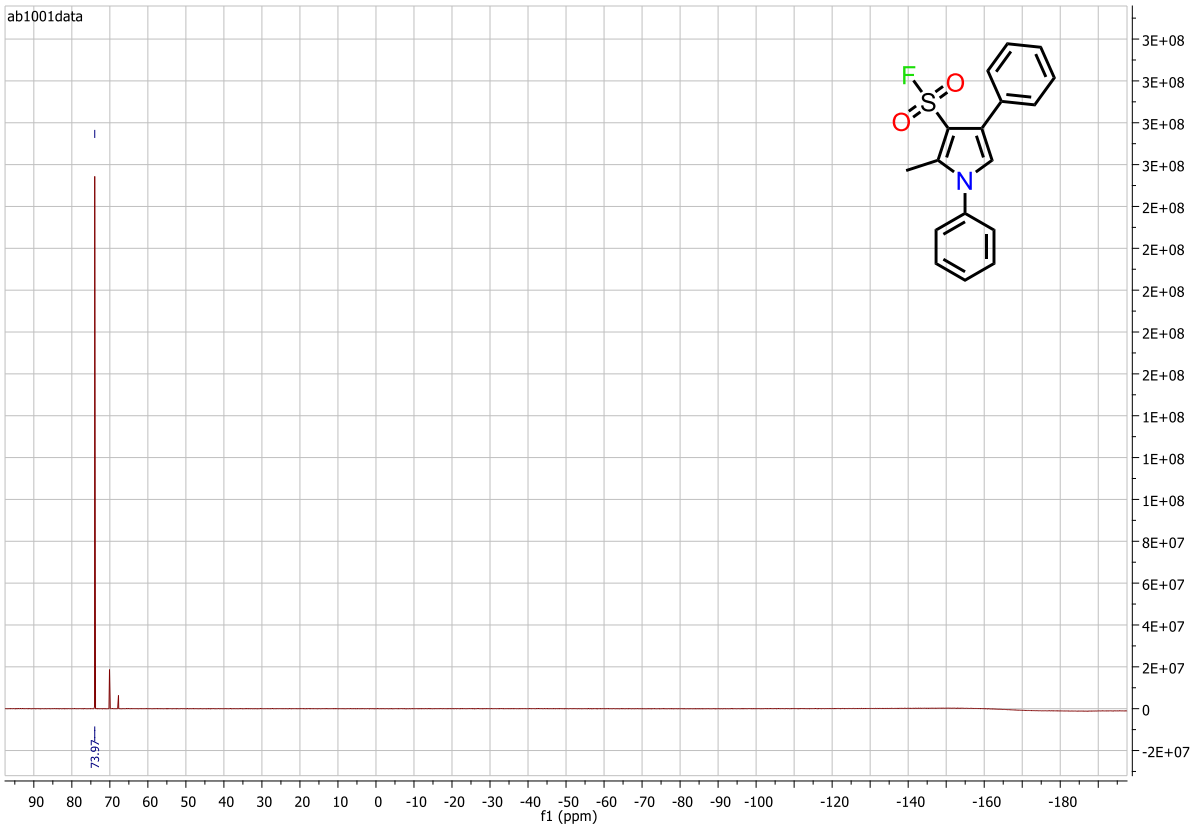
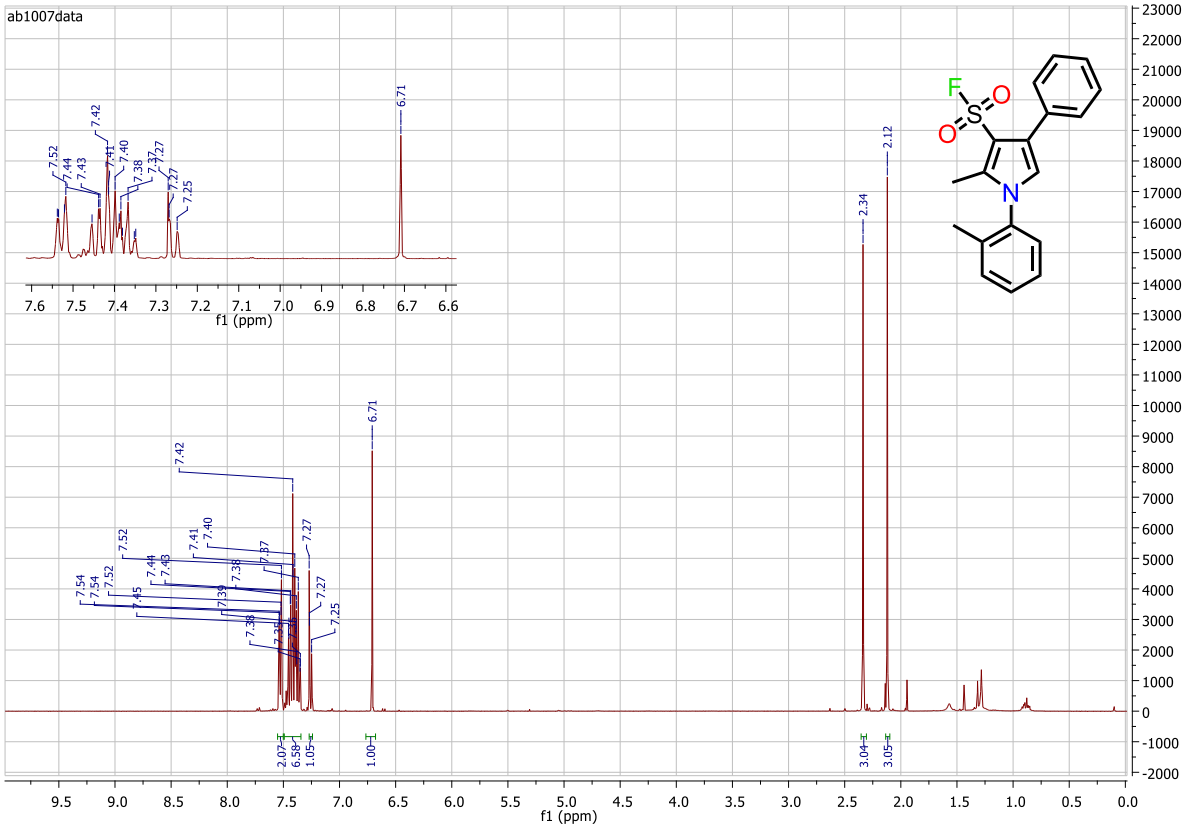
f1 (ppm)


ab1001data
F
O
O
S
N
73.97
3E+08
3E+08
3E+08
3E+08
2E+08
2E+08
2E+08
2E+08
2E+08
2E+08
1E+08
1E+08
1E+08
8E+07
6E+07
4E+07
2E+07
0
-2E+07
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)


ab1007data
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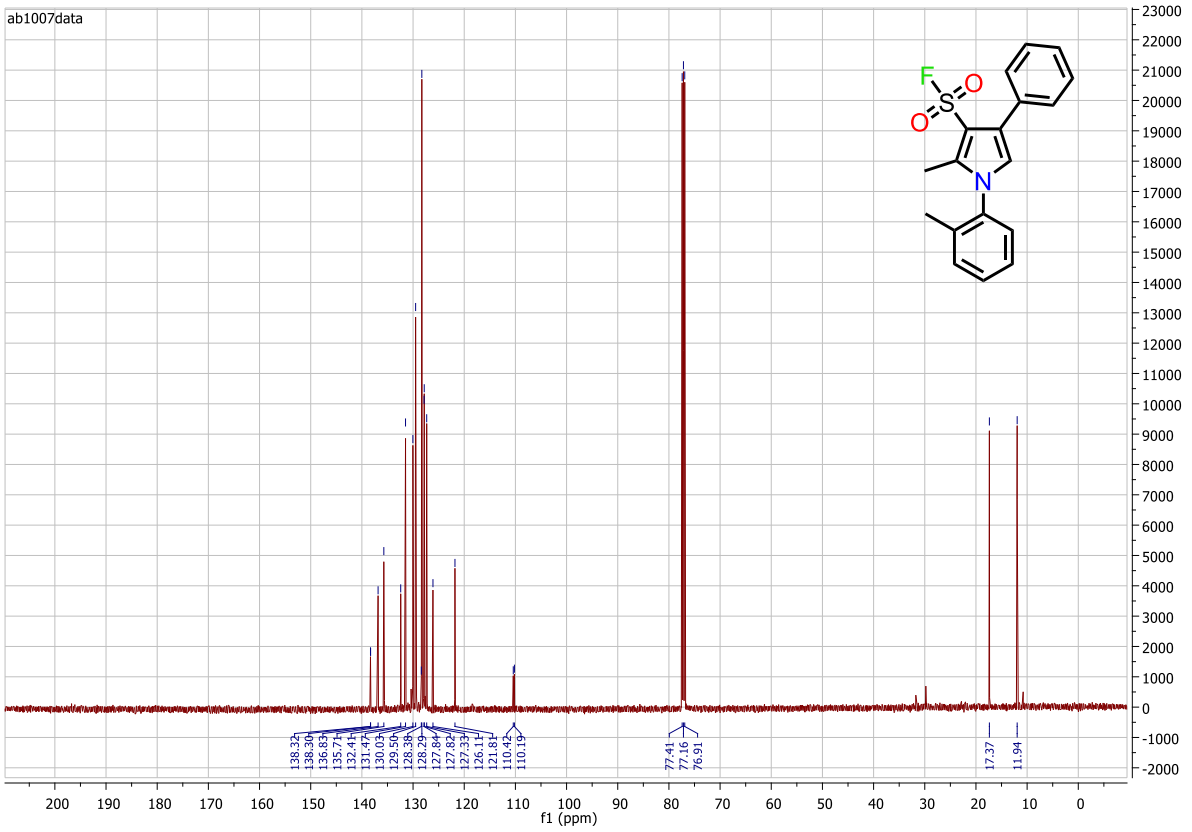
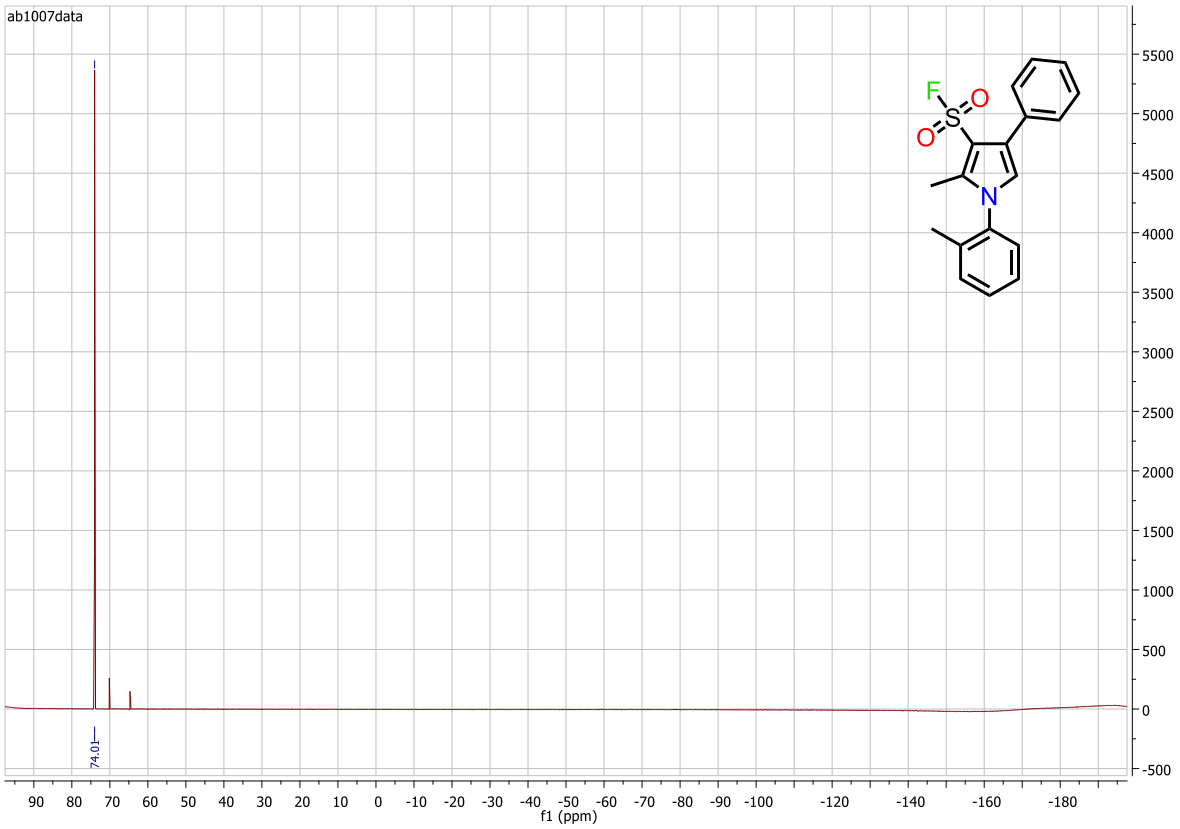
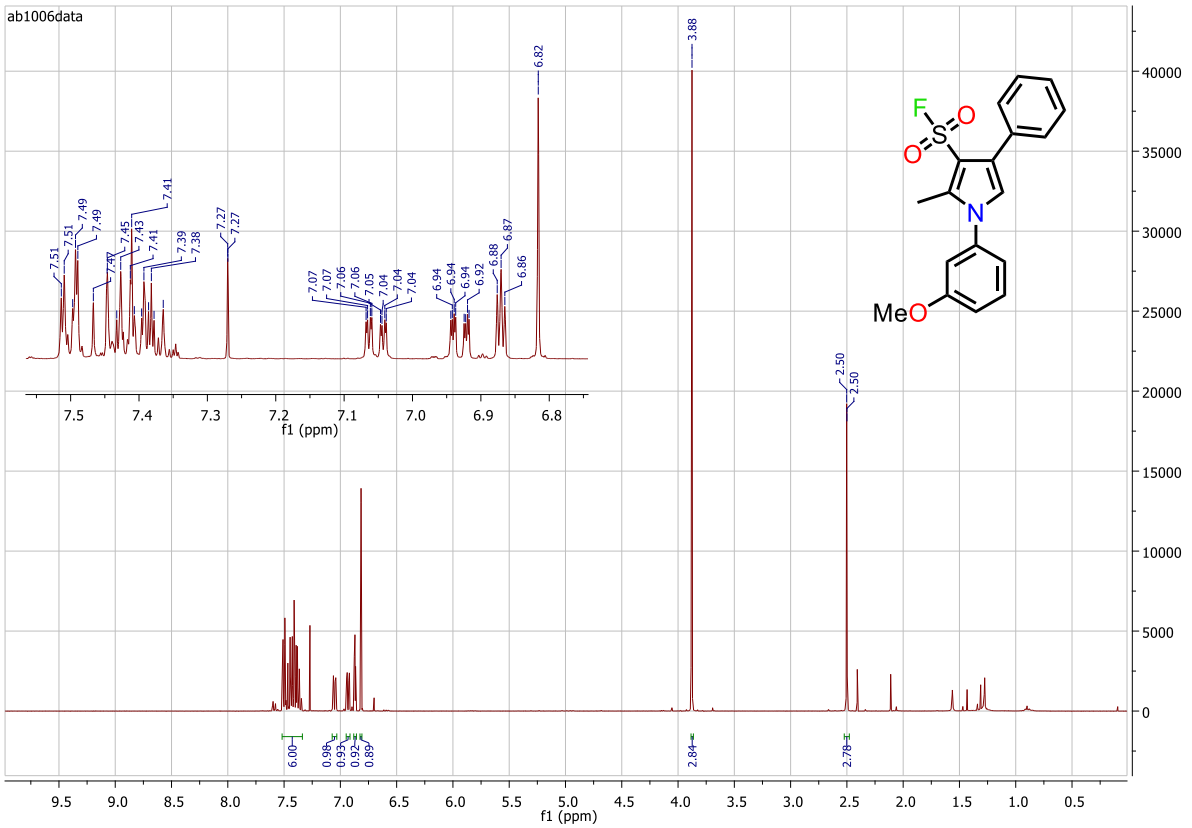
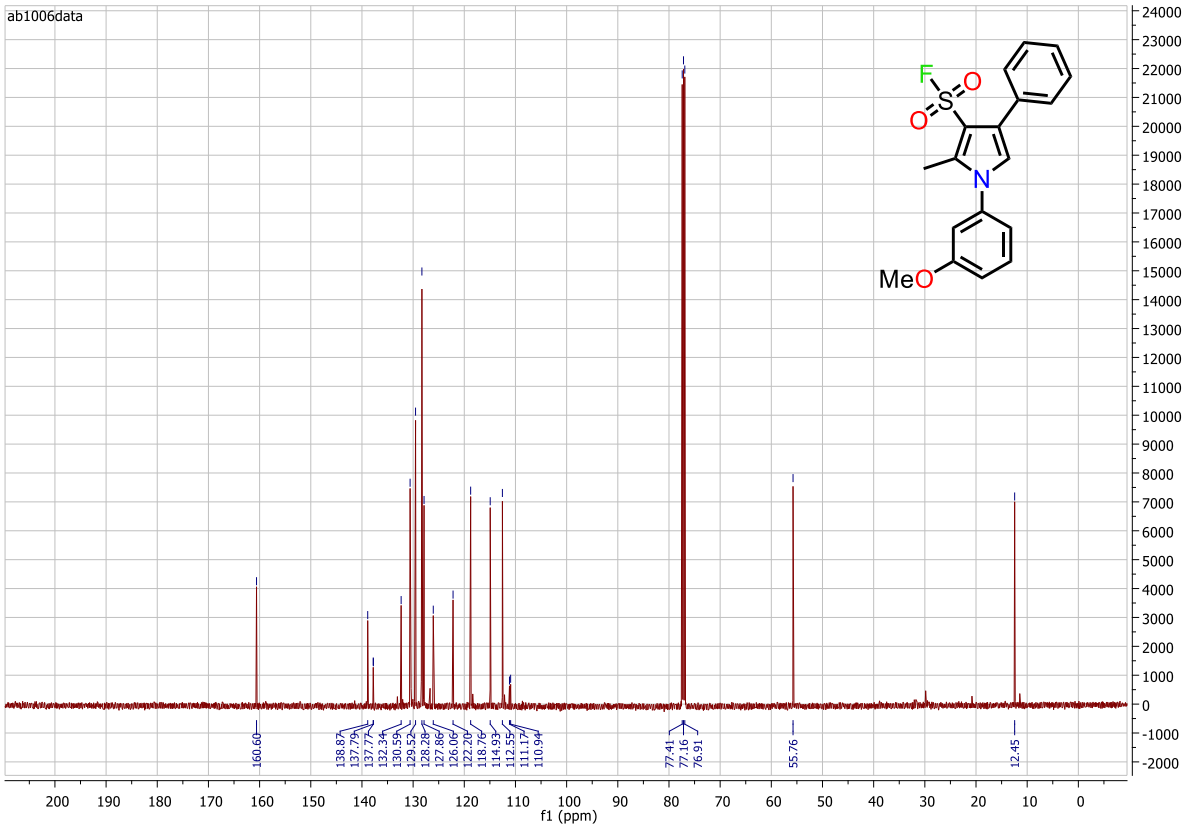
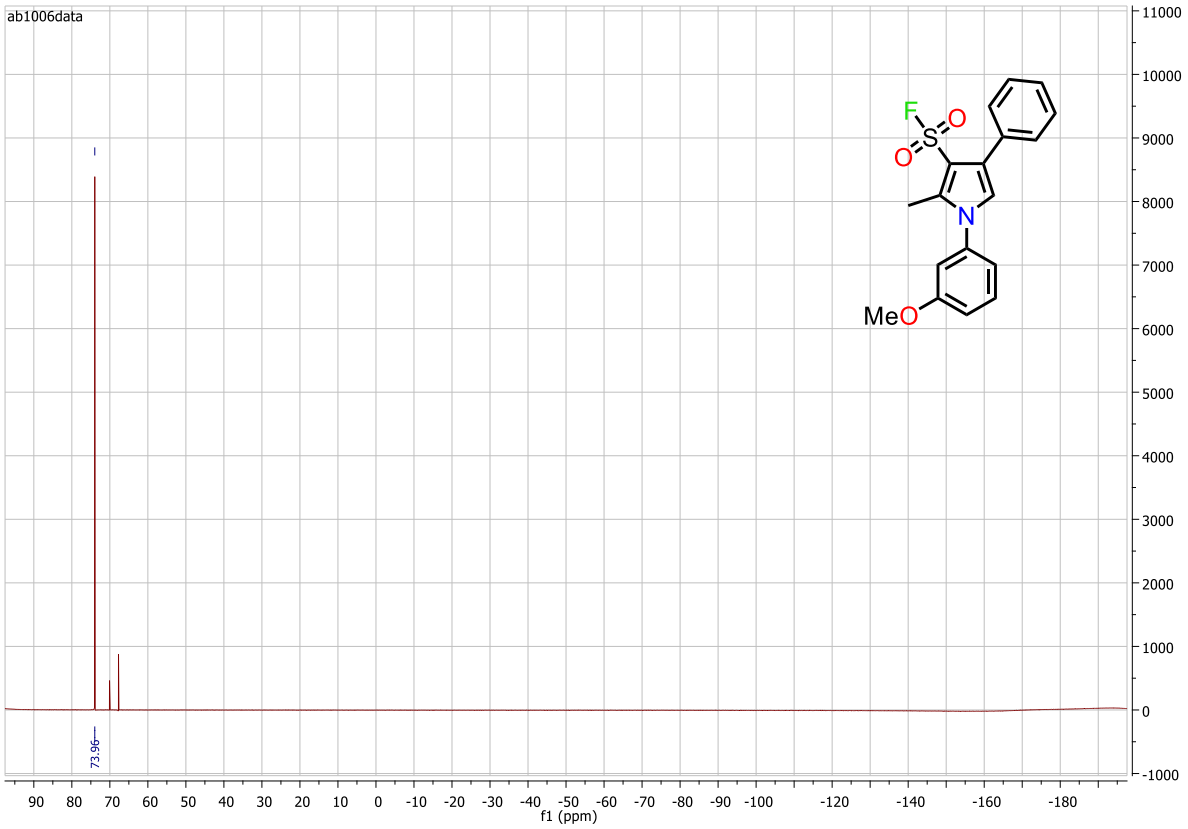
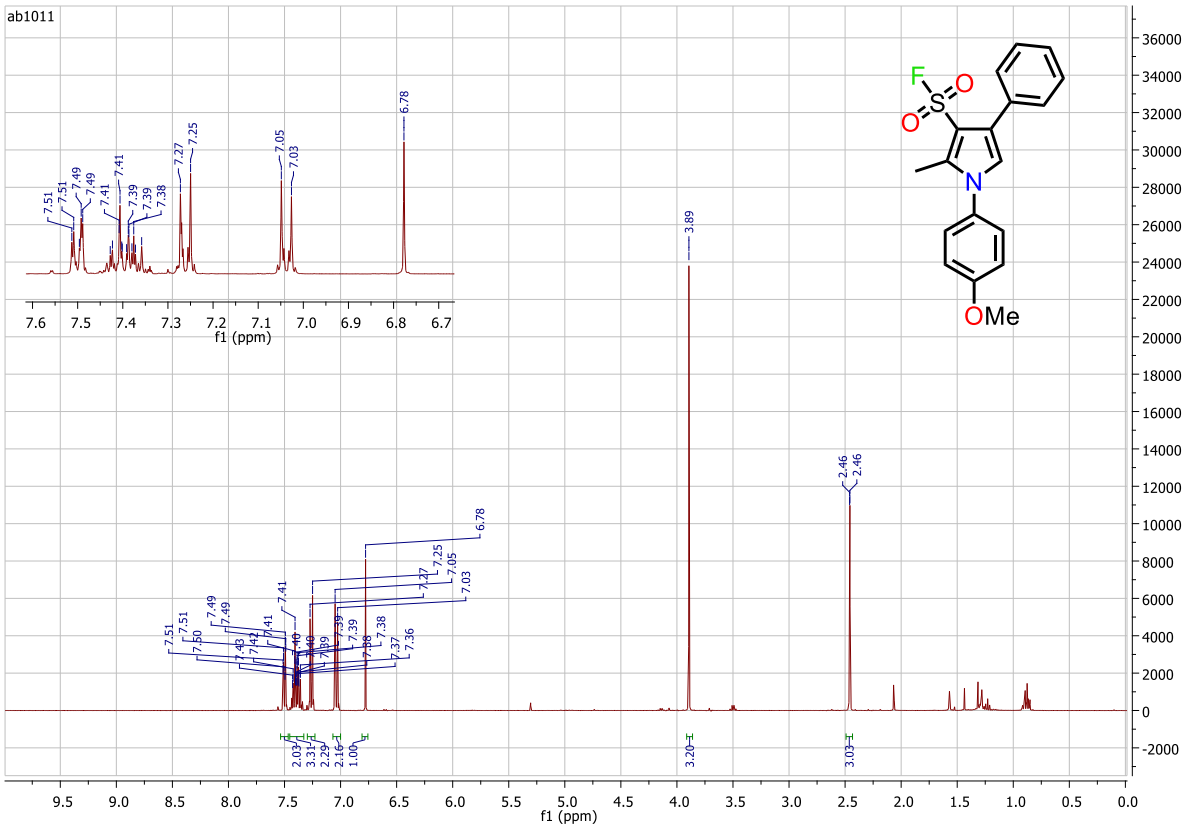

ab1007data
f1 (ppm)

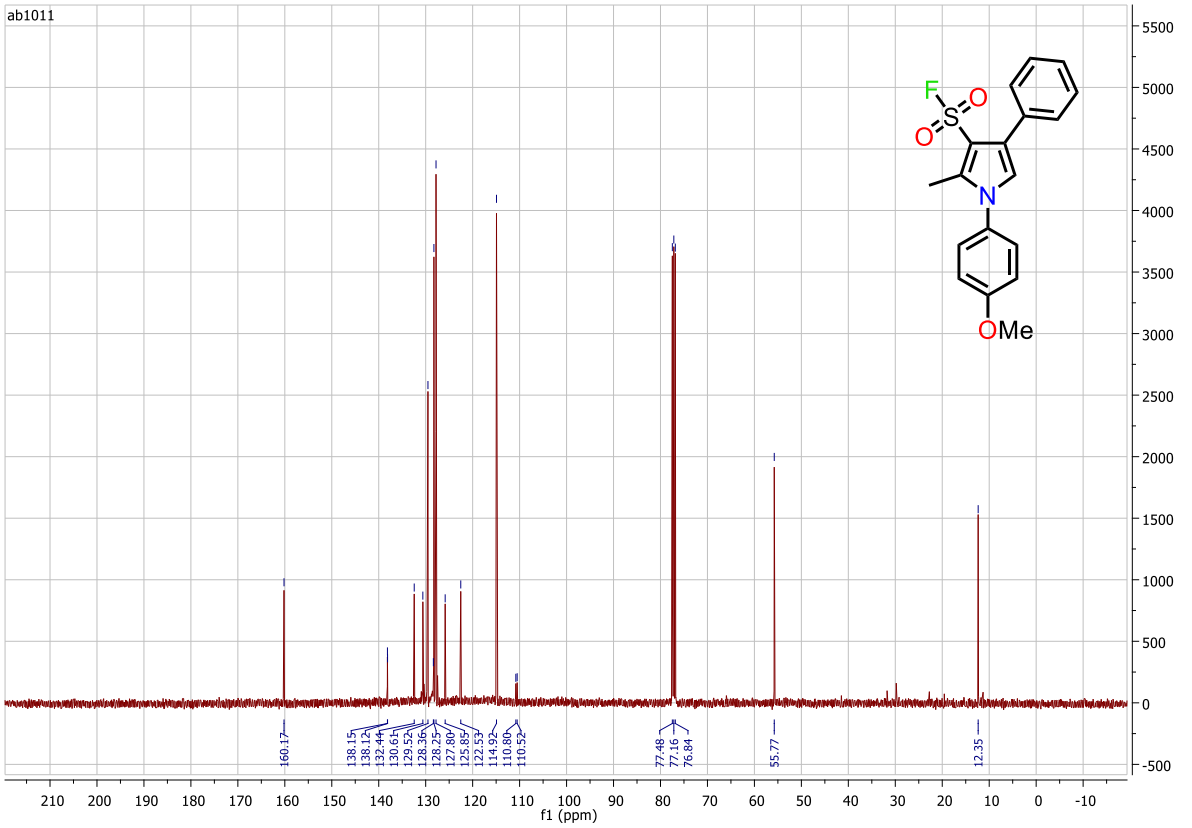

ab1007data
F
O
O
S
N
74.01
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)


ab1006data
F
O
O
S
N
MeO
f1 (ppm)


ab1006data
F
O
O
S
N
MeO
f1 (ppm)


ab1006data
F
O
O
S
N
MeO
73.96
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)


ab1011
F
O
O
S
N
OMe
f1 (ppm)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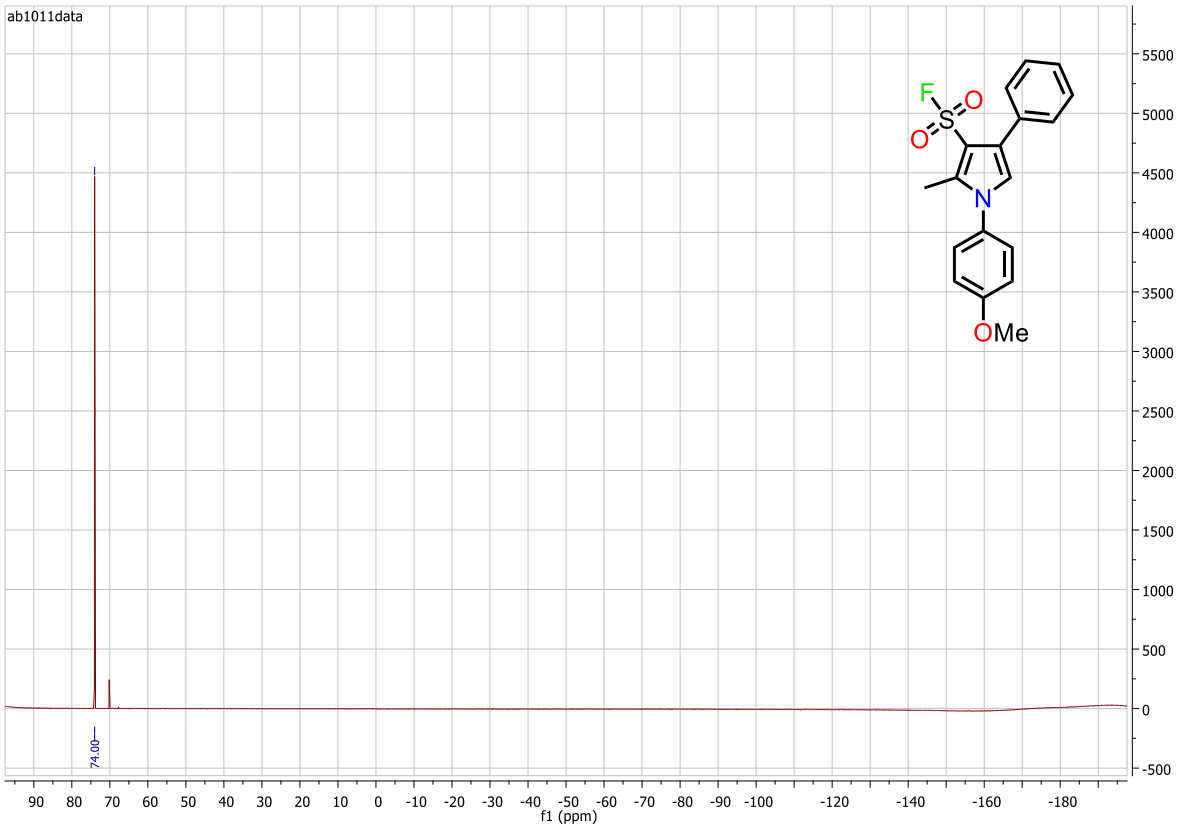
F
O
O
S
N
OMe
f1 (ppm)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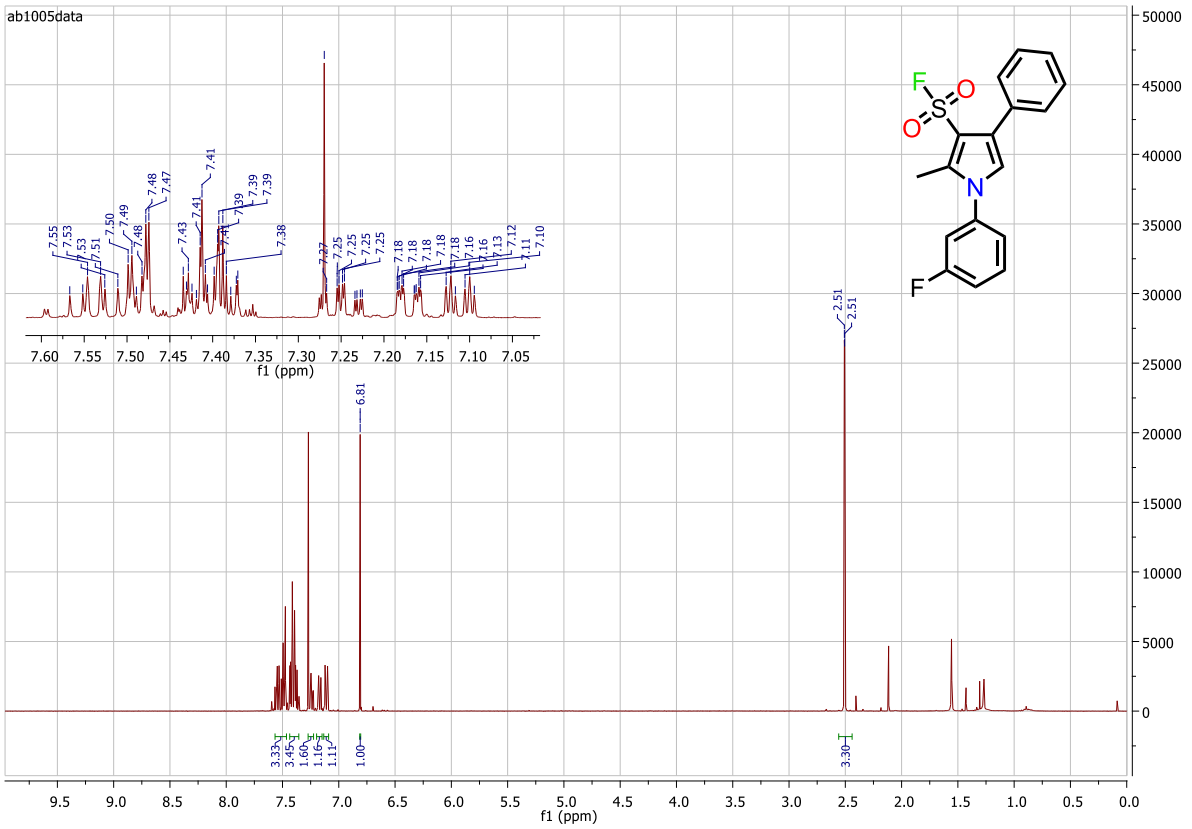
O
O
S
N
OMe
74.00
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)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O
O
S
N
F
7.55
7.53
7.53
7.51
7.50
7.49
7.48
7.48
7.47
7.43
7.41
7.41
7.41
7.39
7.39
7.38
7.27
7.25
7.25
7.25
7.18
7.18
7.18
7.18
7.16
7.16
7.13
7.12
7.11
7.10
6.81
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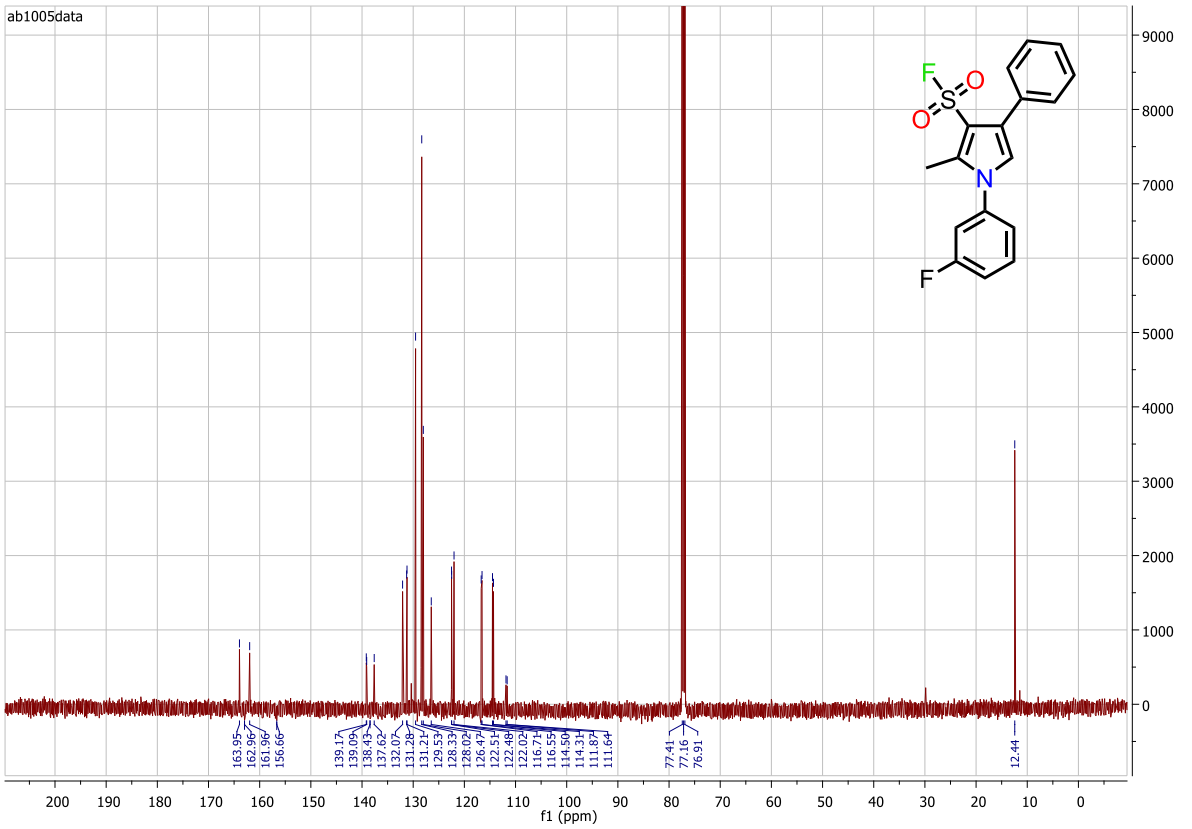
2.51
3.33
3.45
1.60
1.16
1.11
1.00
3.30
f1 (ppm)


ab1005data
F
O
O
S
N
F
163.95
162.96
161.96
156.66
139.17
139.09
138.43
137.62
132.07
131.28
131.21
129.53
128.33
128.02
126.47
122.51
122.48
122.02
116.71
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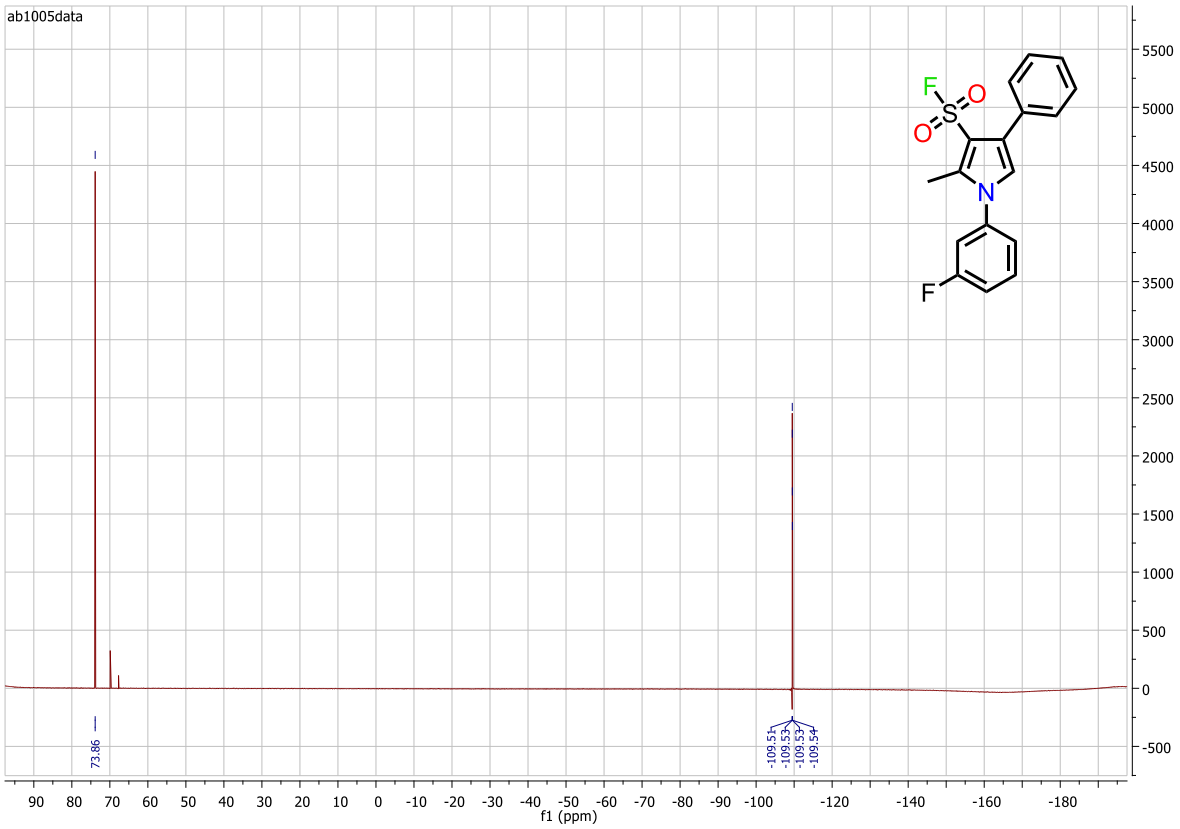
114.31
111.87
111.64
77.41
77.16
76.91
12.44
f1 (ppm)


ab1005data
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O
O
S
N
F
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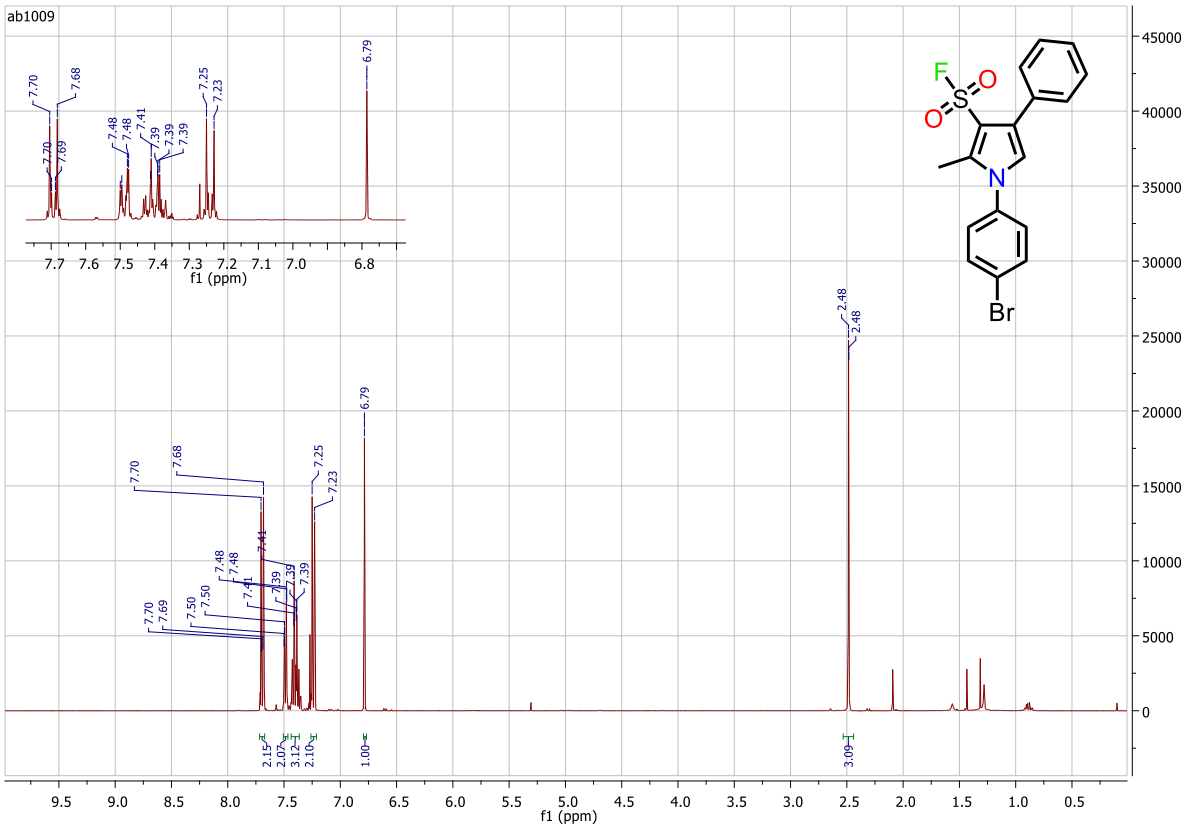
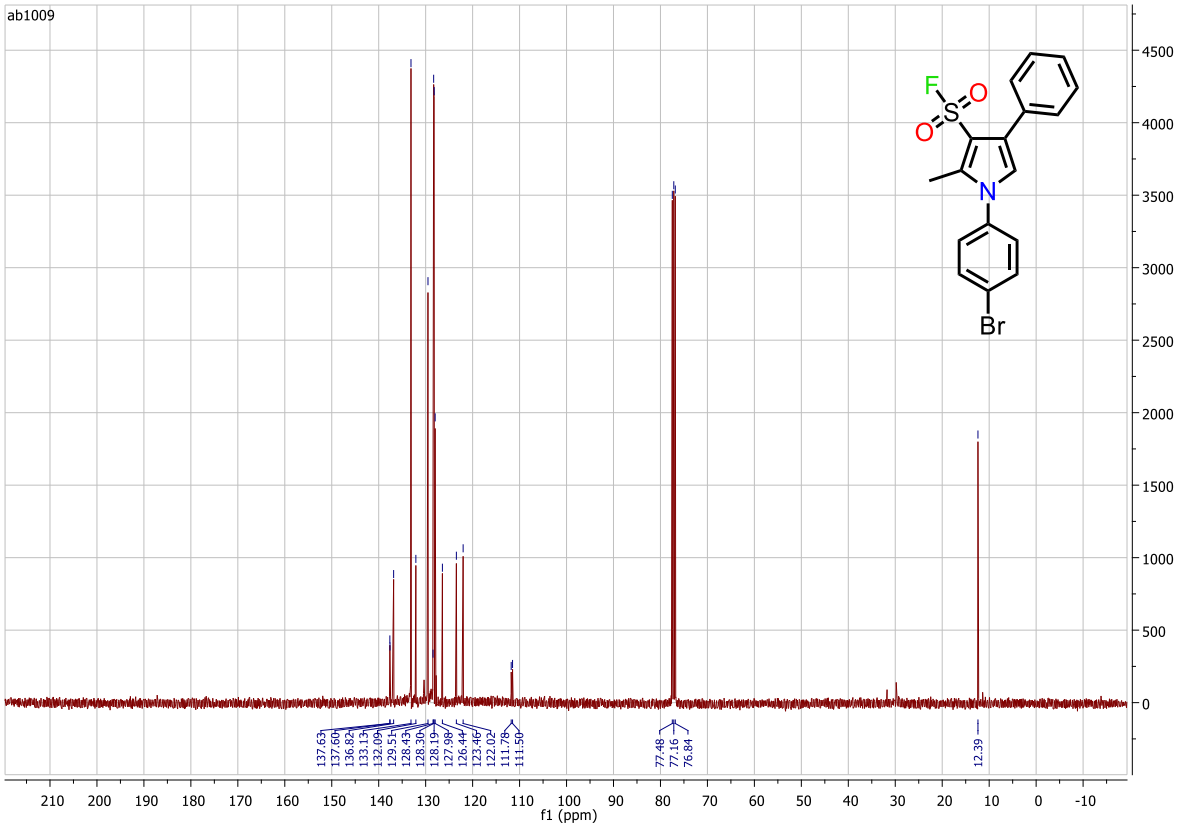
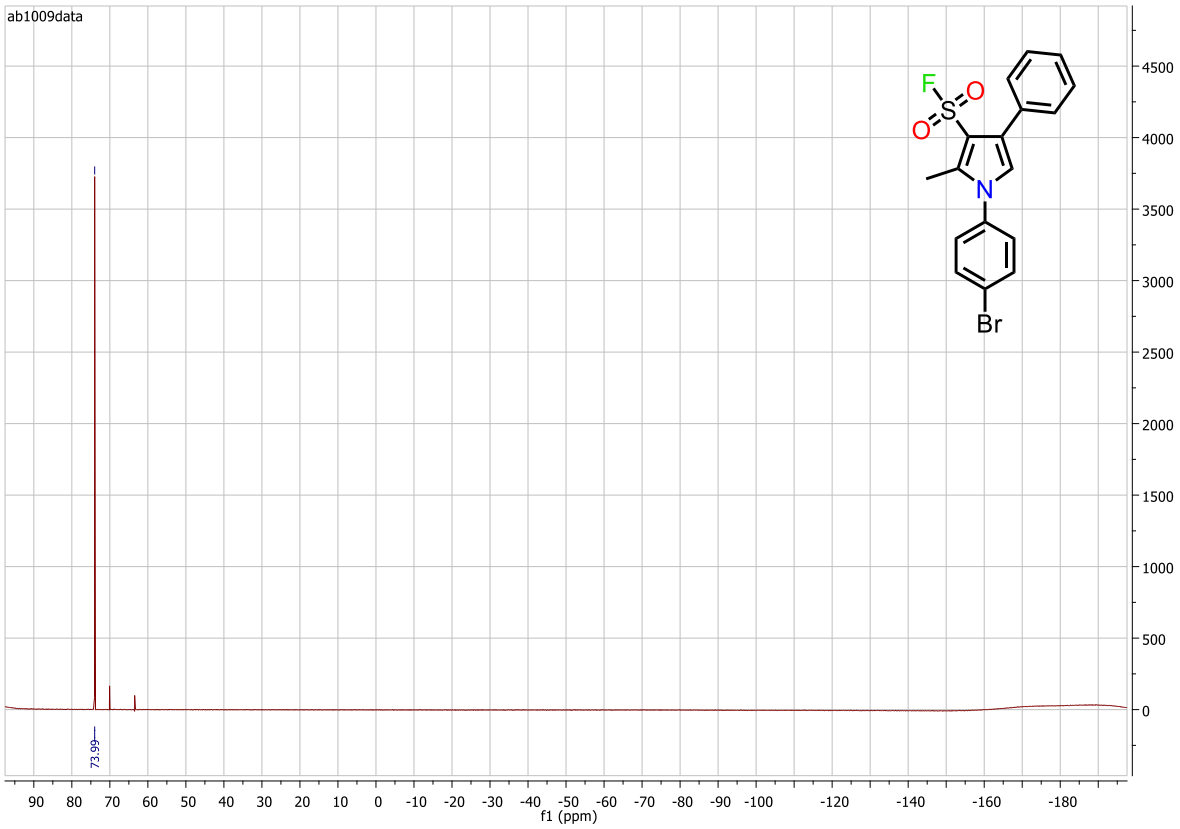
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
73.86
-109.51
-109.53
-109.53
-109.54
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)


ab1009
f1 (ppm)
F
O
O
S
N
Br


ab1009
f1 (ppm)
F
O
O
S
N
Br


ab1009data
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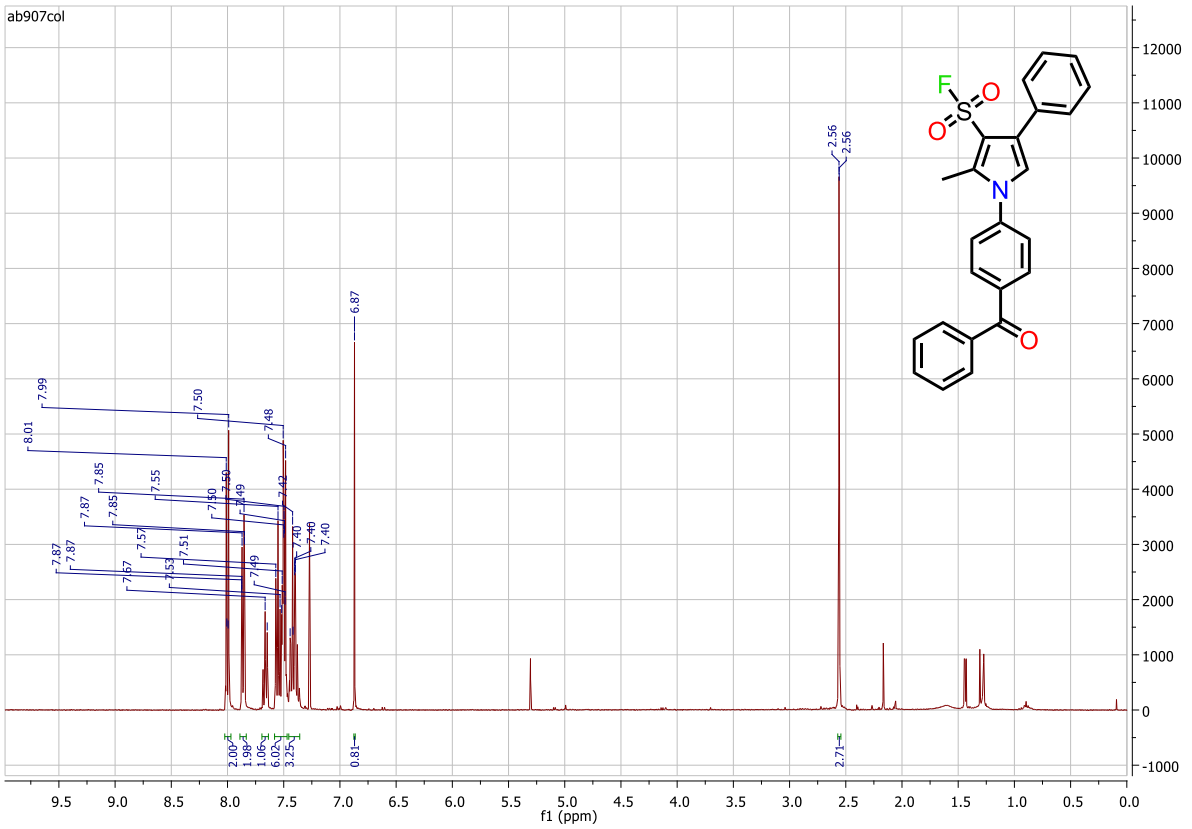
O
O
S
N
Br
4500
4000
3500
3000
2500
2000
1500
1000
500
0
73.99
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)


ab907col
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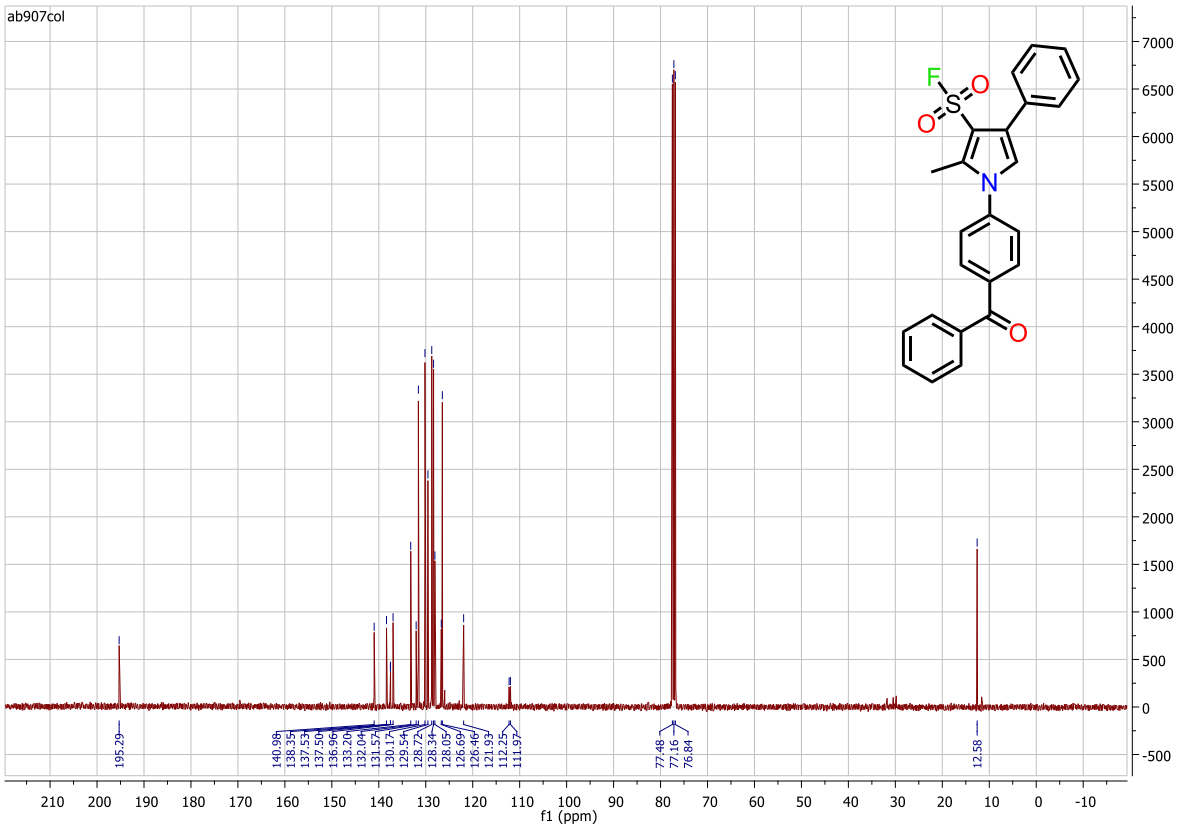
O
O
S
N
O
2.56
2.56
6.87
7.99
8.01
7.50
7.48
7.85
7.55
7.87
7.85
7.87
7.87
7.57
7.51
7.53
7.67
7.49
7.40
7.40
7.40
2.00
1.98
1.06
6.02
3.25
0.81
2.71
f1 (ppm)


ab907col
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O
O
S
N
O
195.29
140.98
138.35
137.53
137.50
136.96
133.20
132.04
131.57
131.11
130.14
129.54
128.72
128.34
128.05
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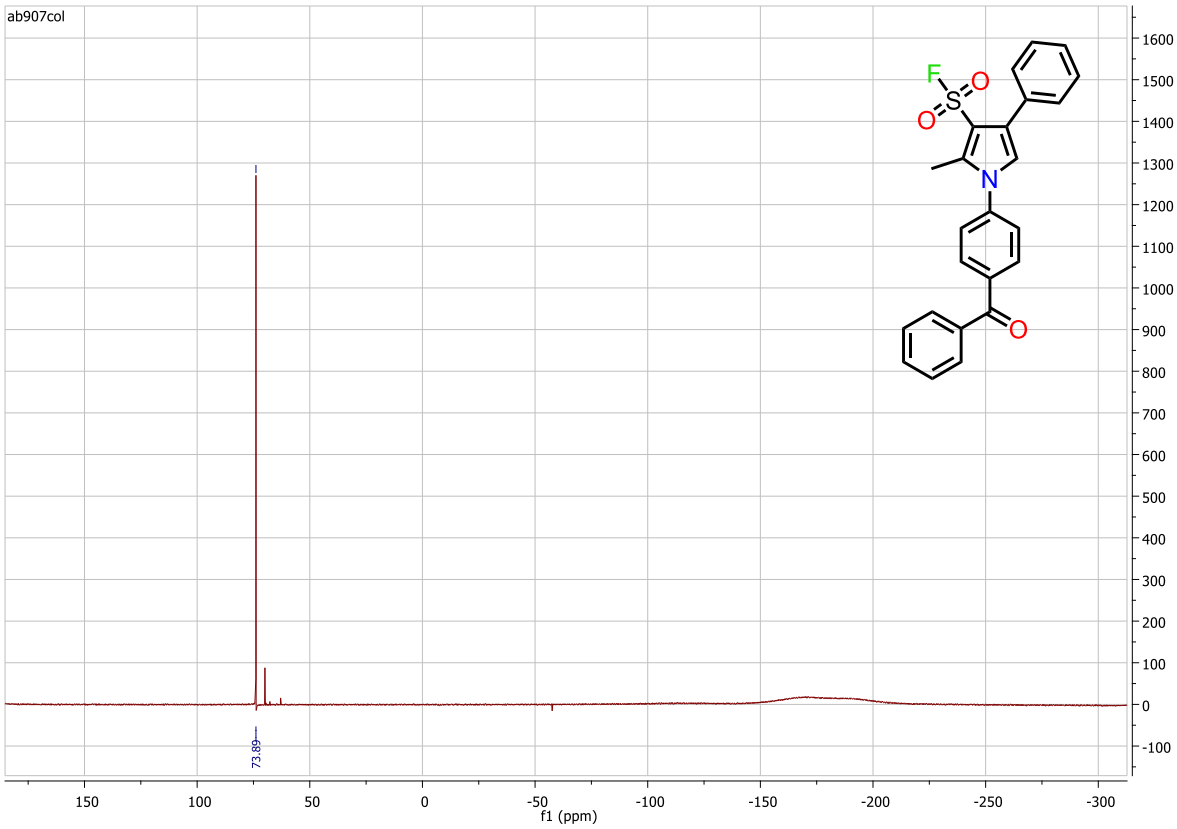
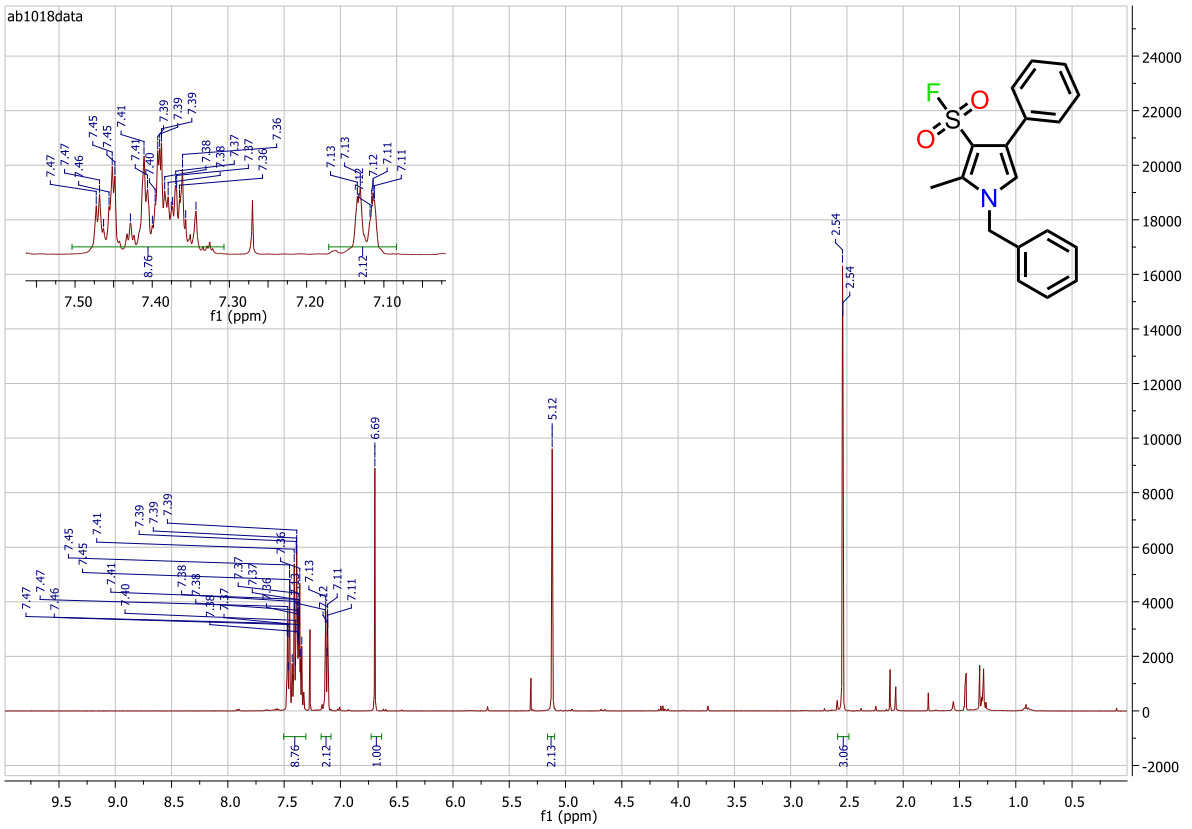
126.46
121.93
112.25
111.97
77.48
77.16
76.84
12.58
f1 (ppm)


ab907col
F
S
O
O
N
O
73.89
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100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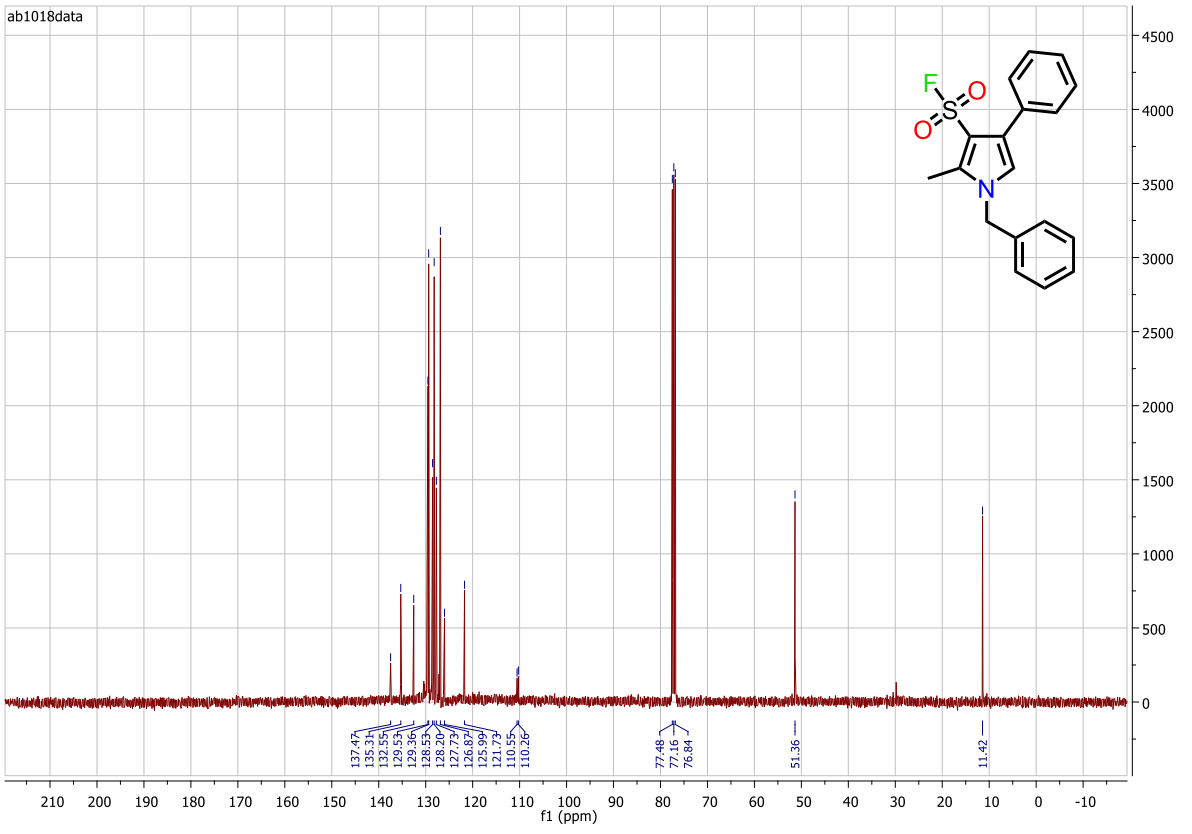
O
O
S
N
f1 (ppm)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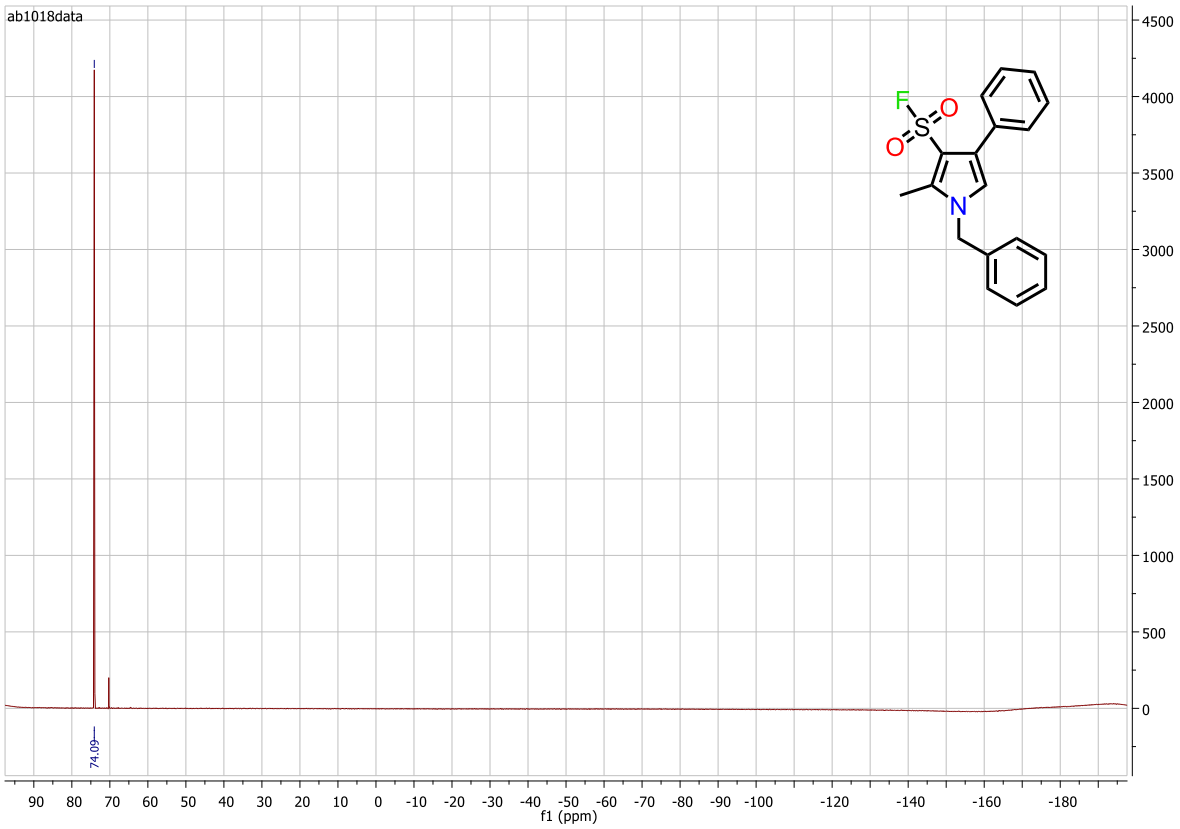
S
N
f1 (ppm)


ab1018data
F
O
O
S
N
74.09
4500
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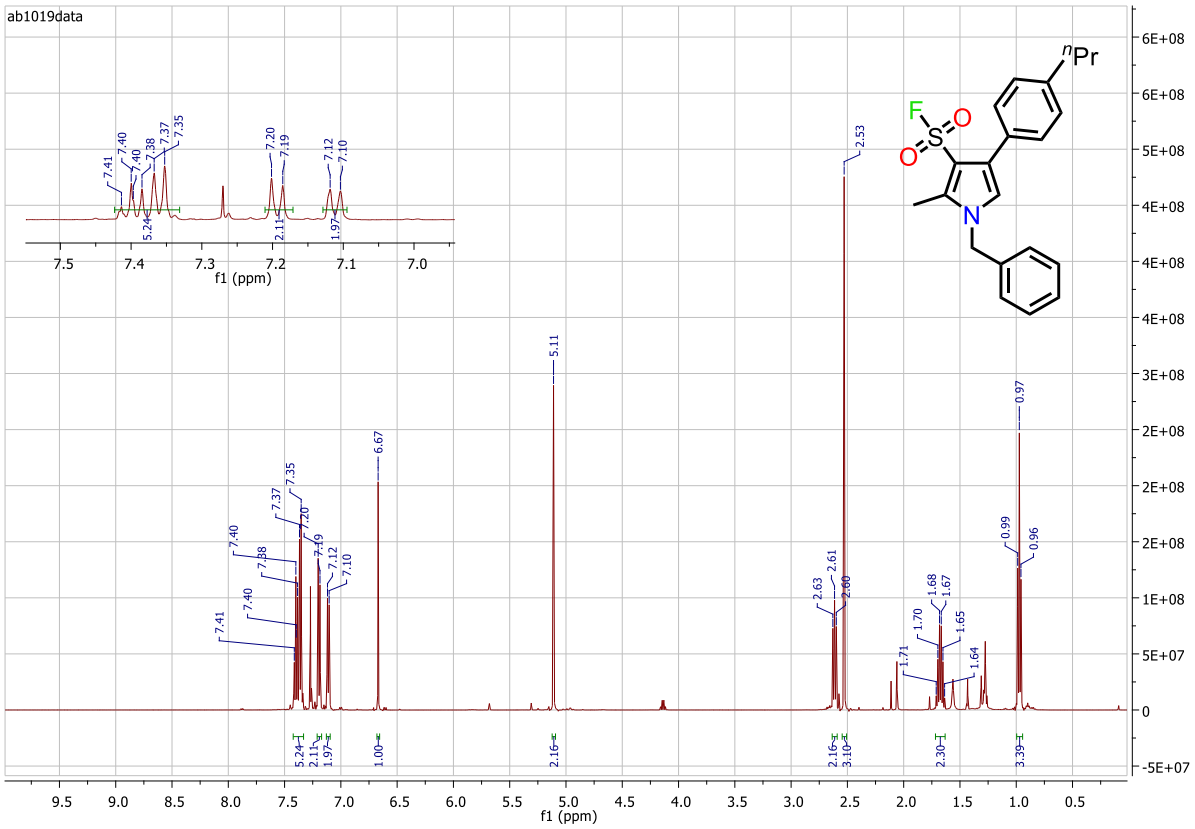
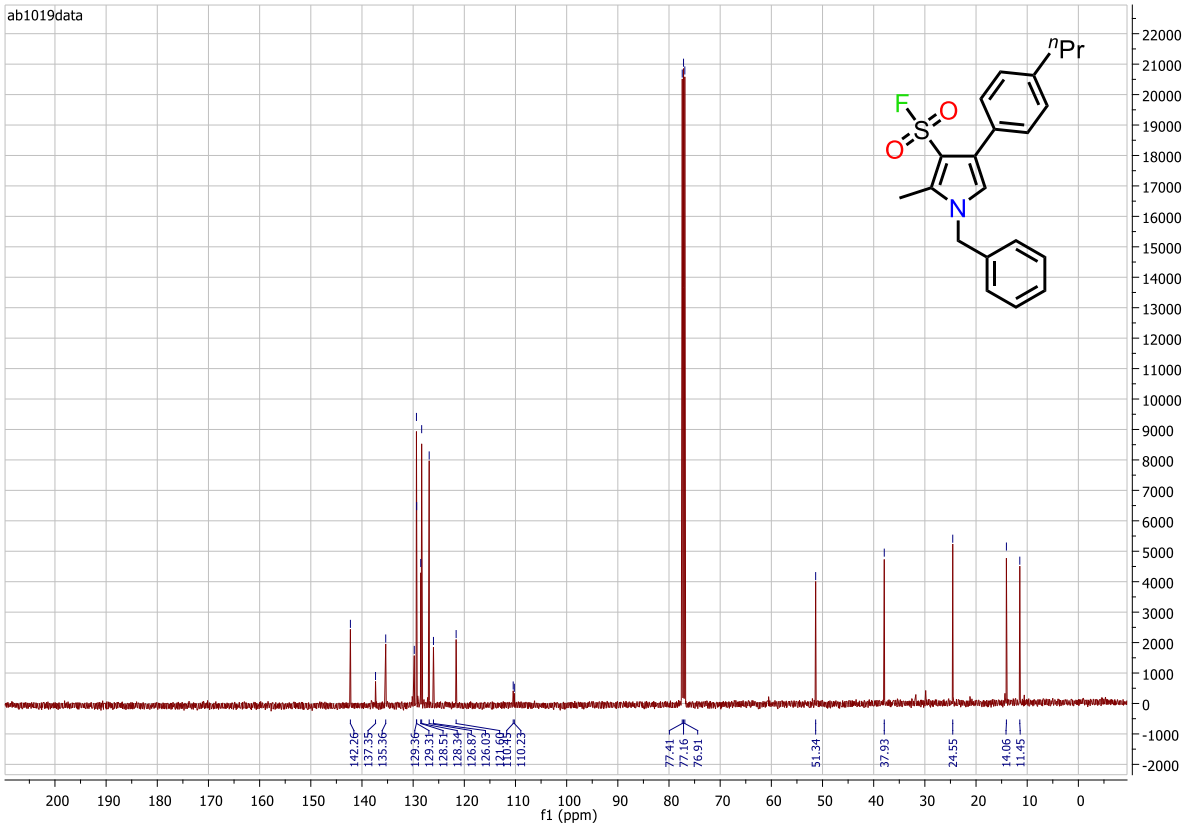
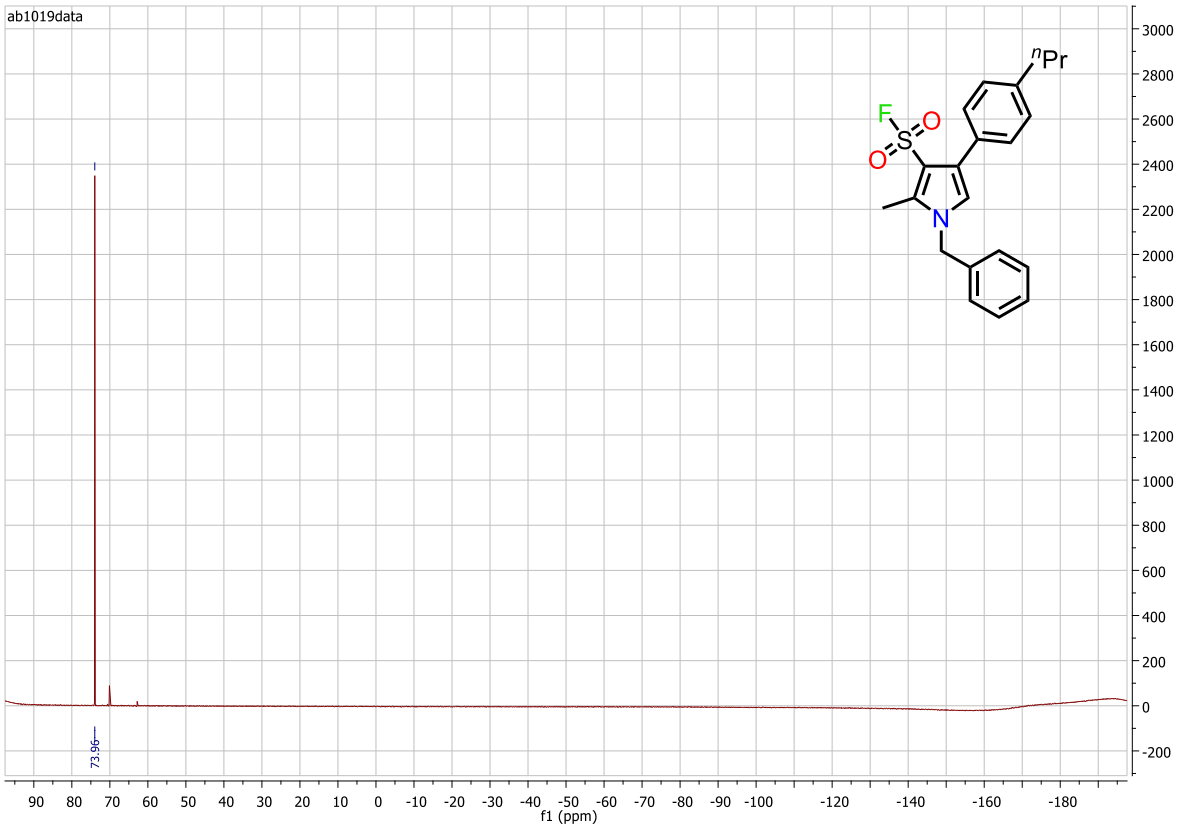
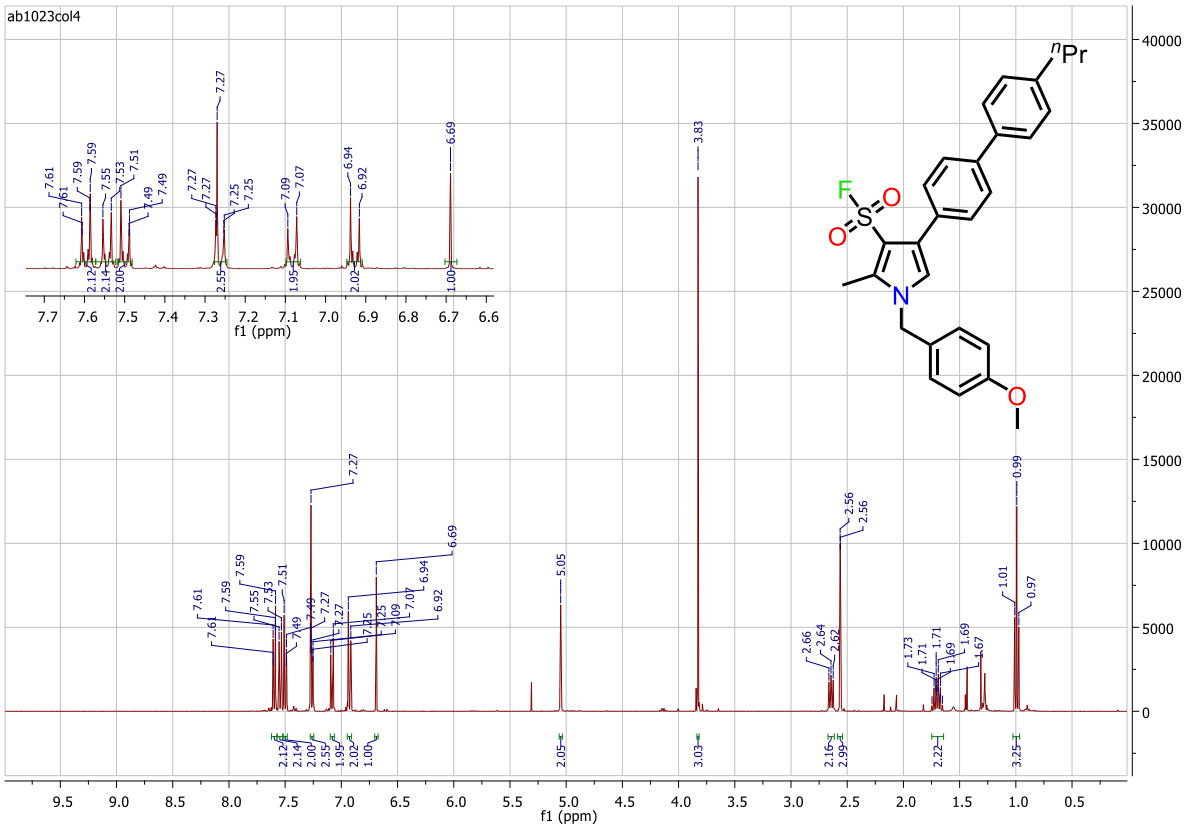
3500
3000
2500
2000
1500
1000
500
0
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)


ab1019data
f1 (ppm)


ab1019data
f1 (ppm)


ab1019data
73.96
f1 (ppm)
F
O
O
S
N
nPr


ab1023col4
nPr
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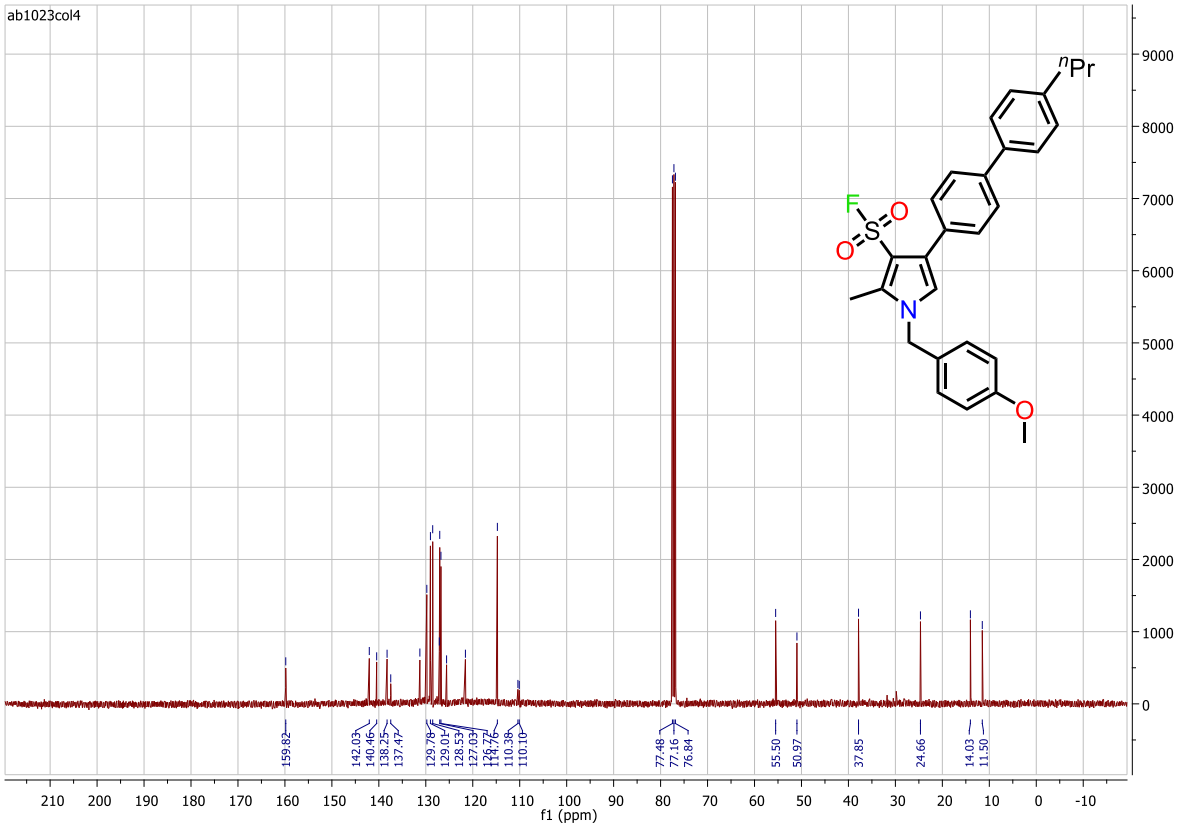
O
S
N
O
f1 (ppm)


ab1023col4
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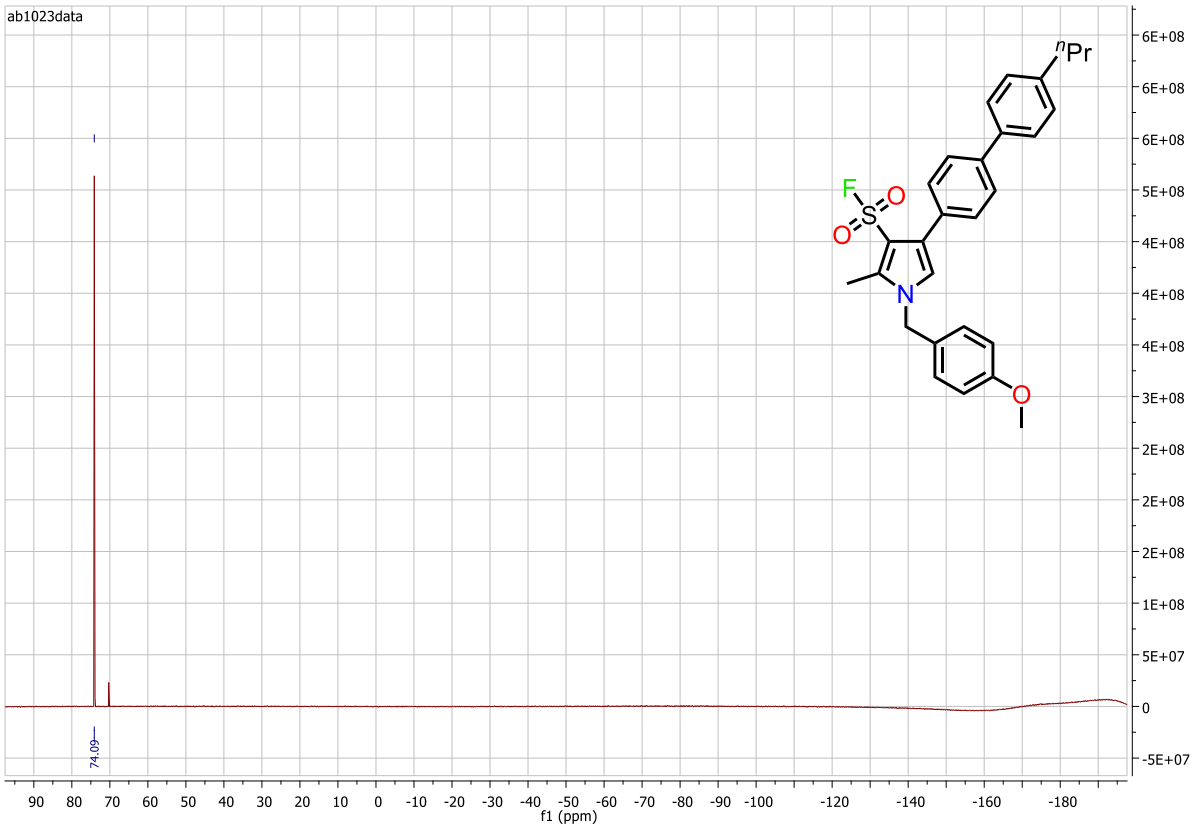
S
N
O
f1 (ppm)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O
S
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O
74.09
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6E+08
6E+08
5E+08
4E+08
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
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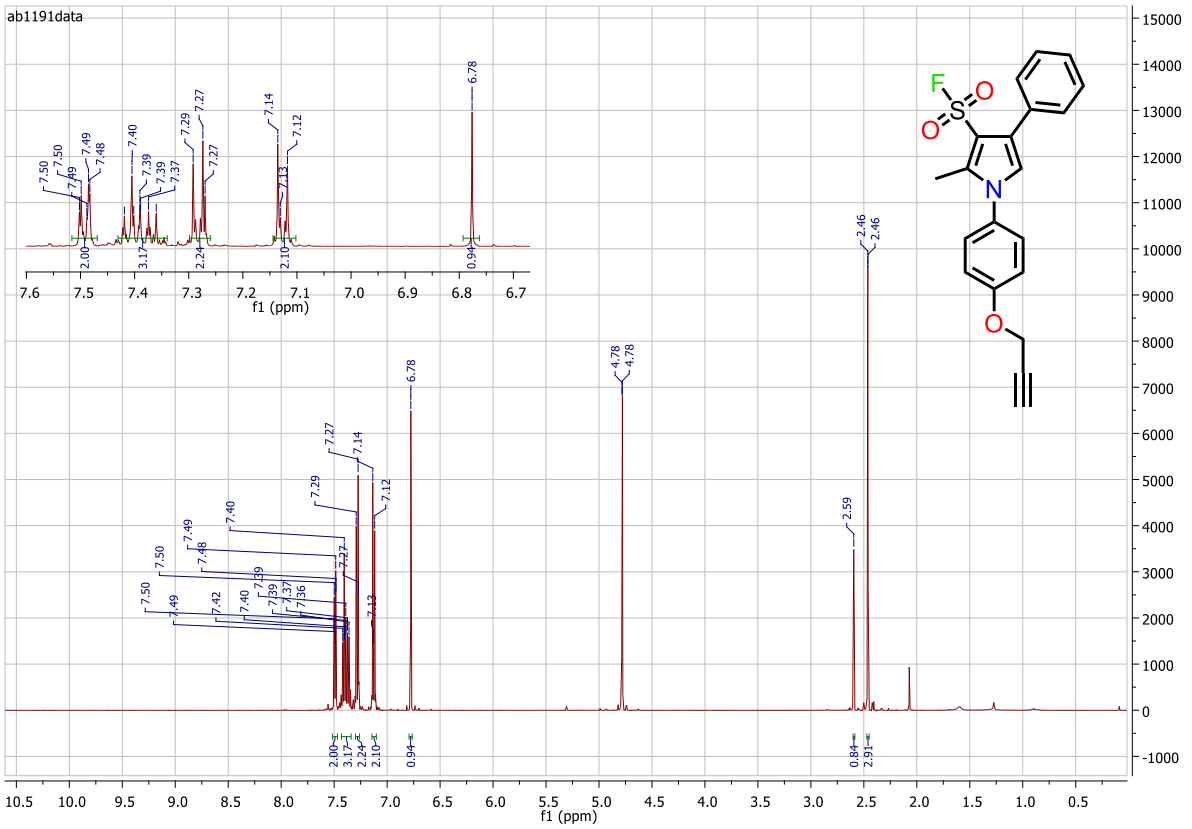
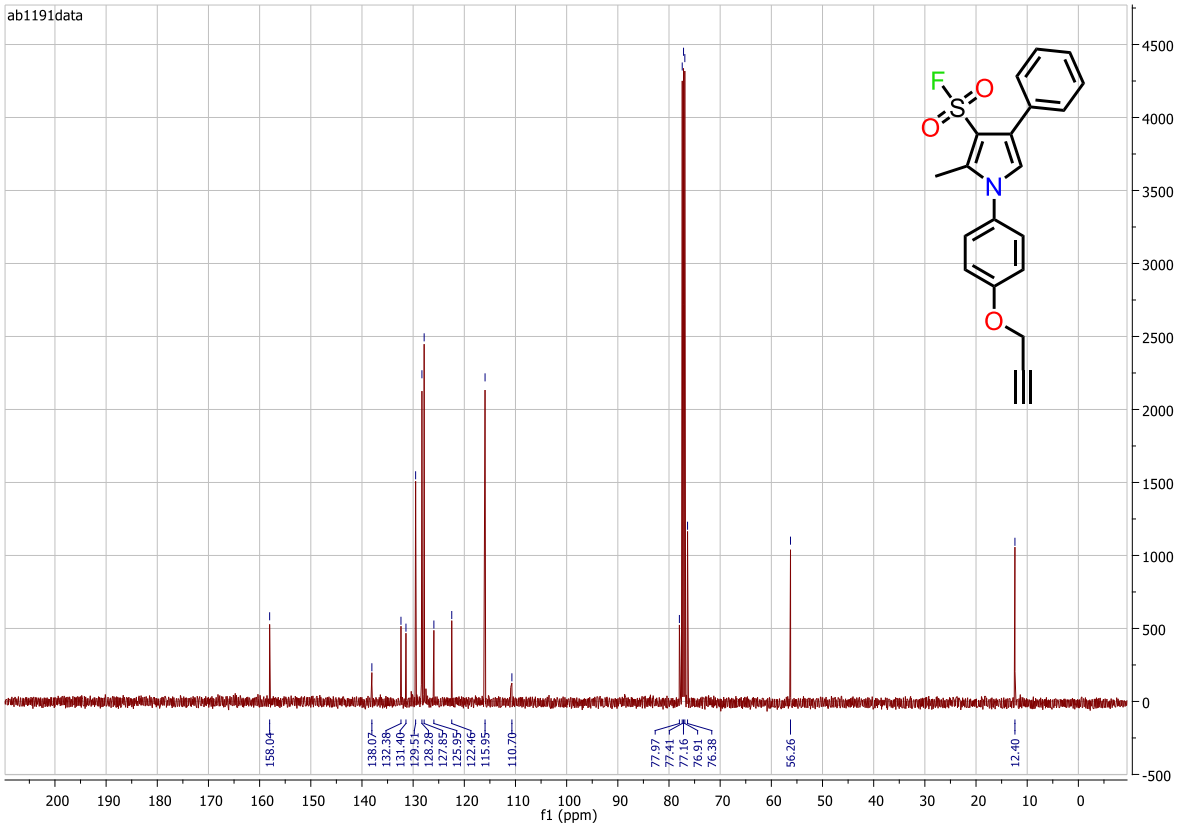
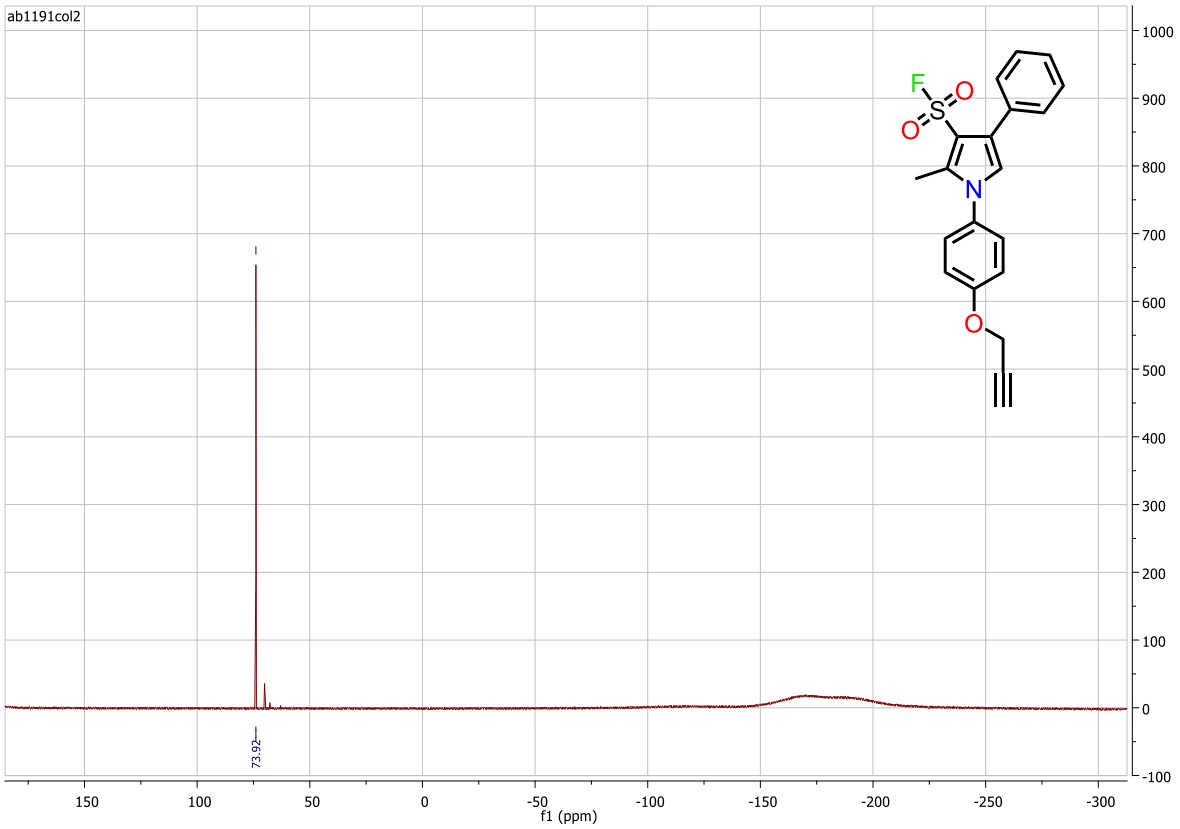
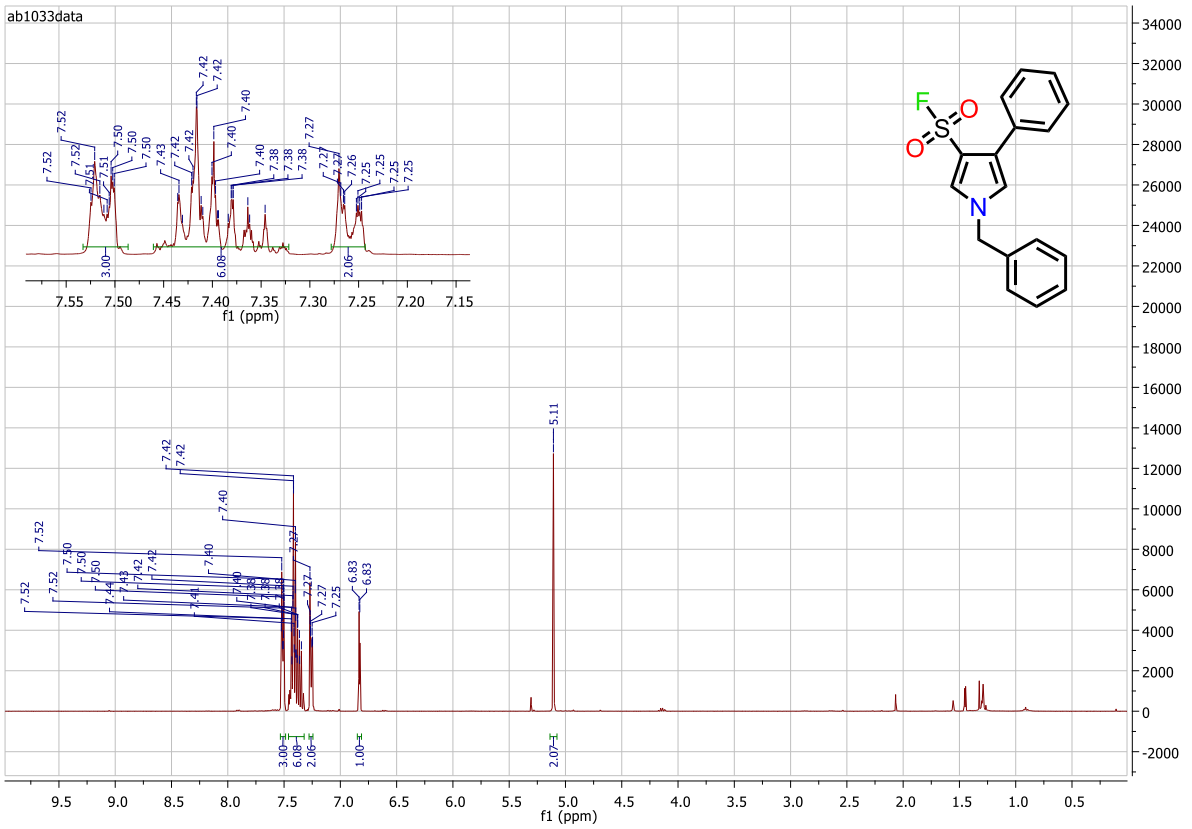
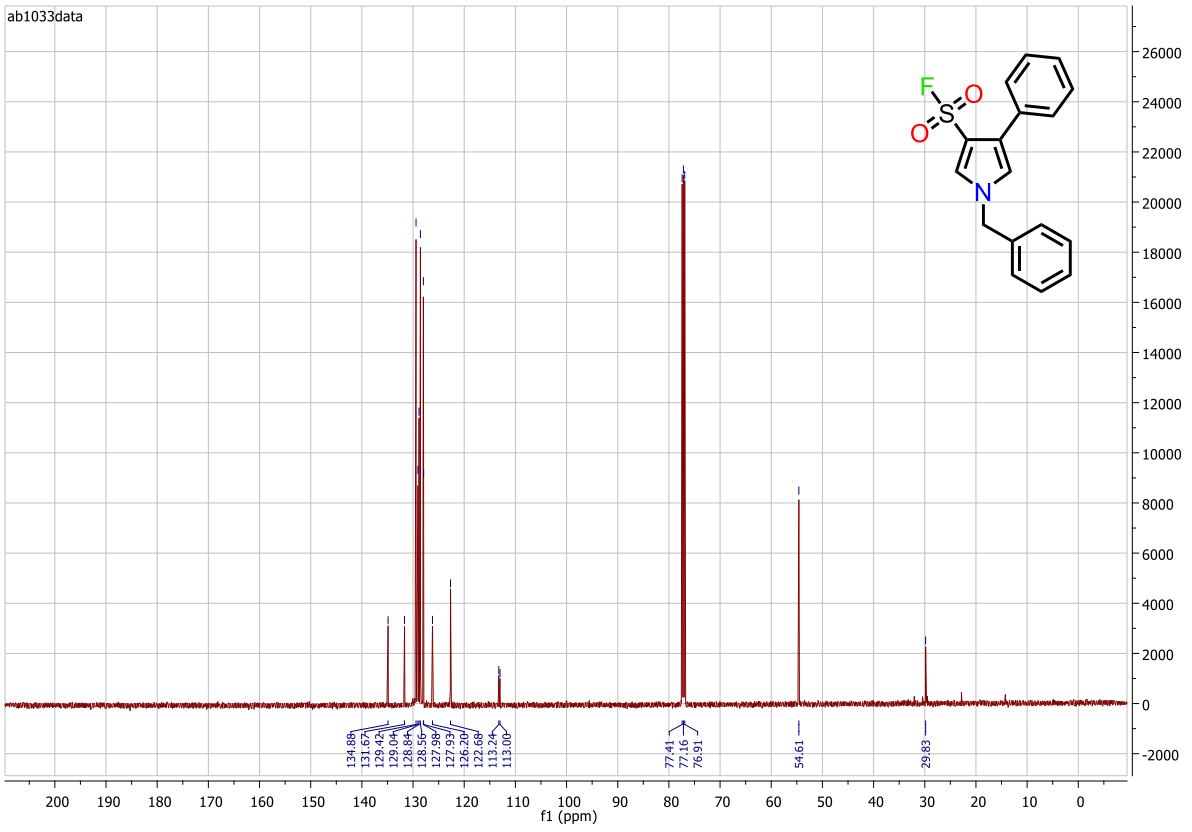
0
-5E+07
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)

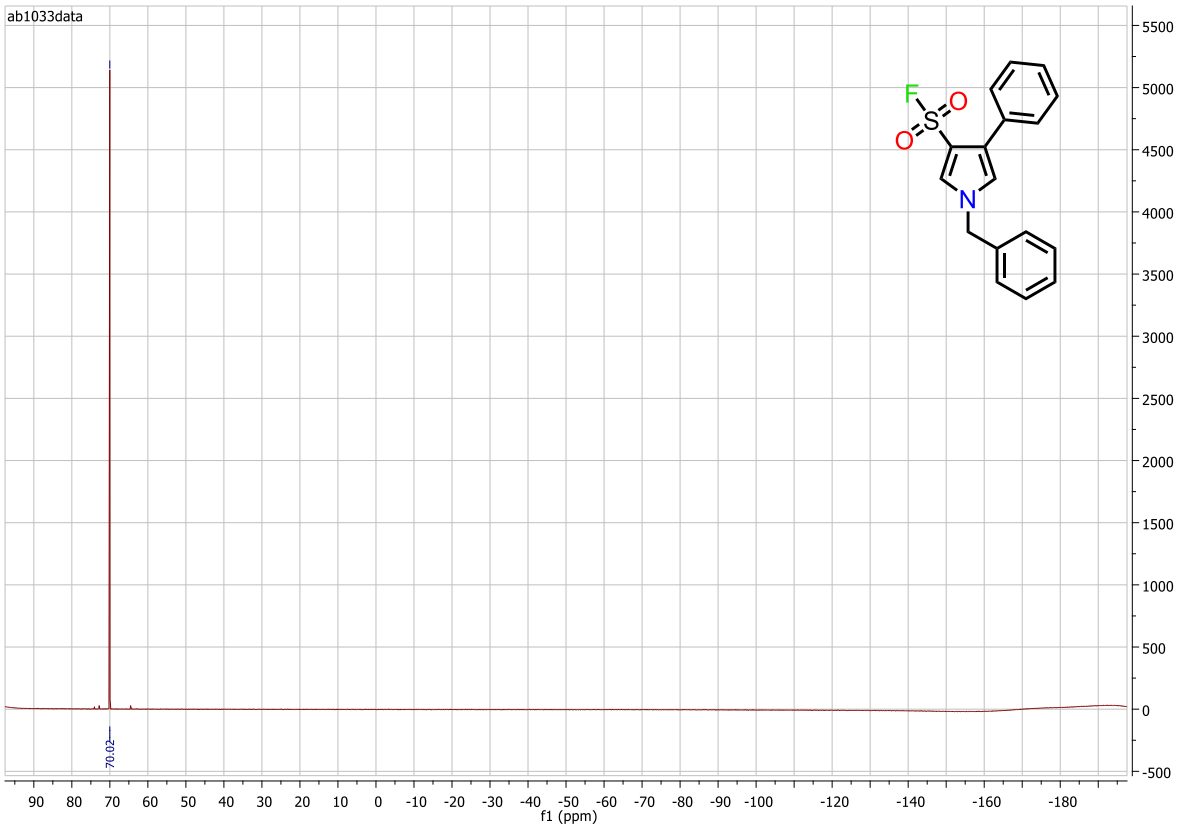

ab1191data
f1 (ppm)

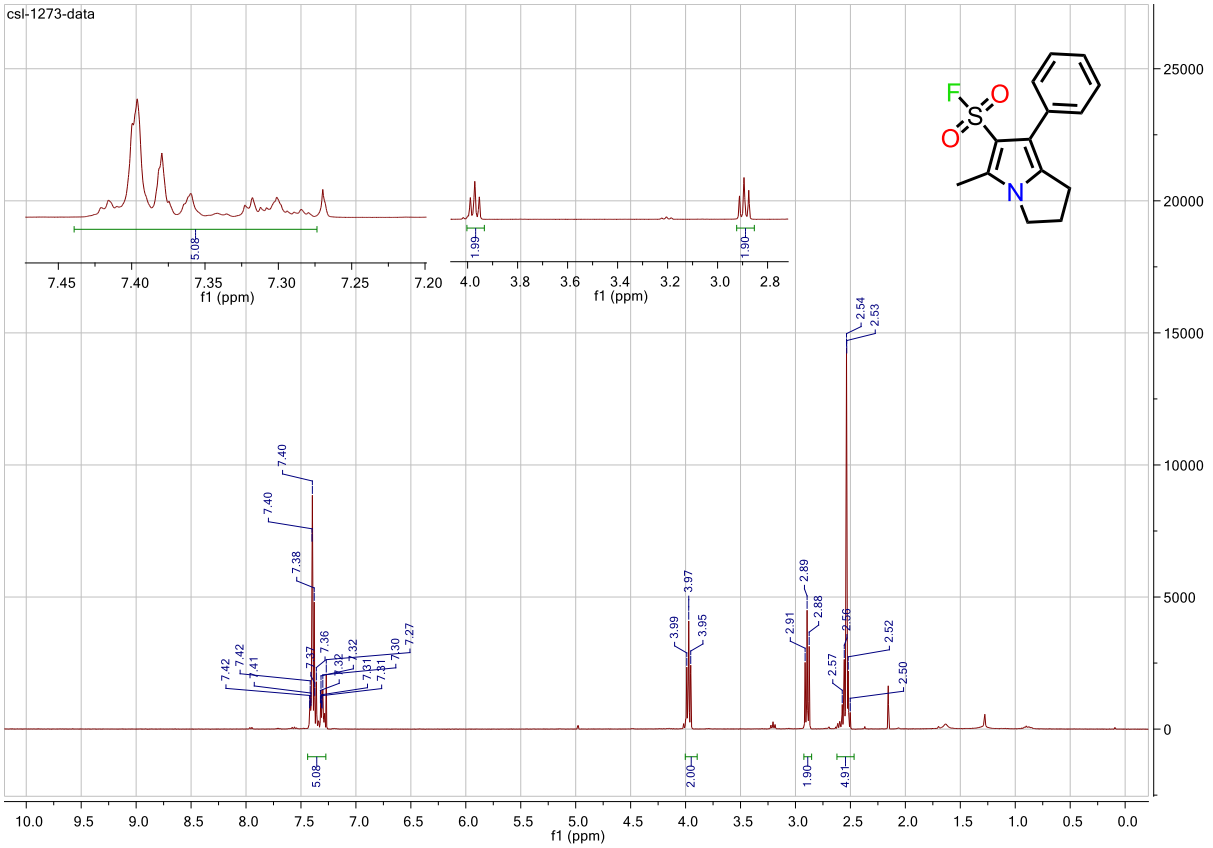

ab1191data
f1 (ppm)

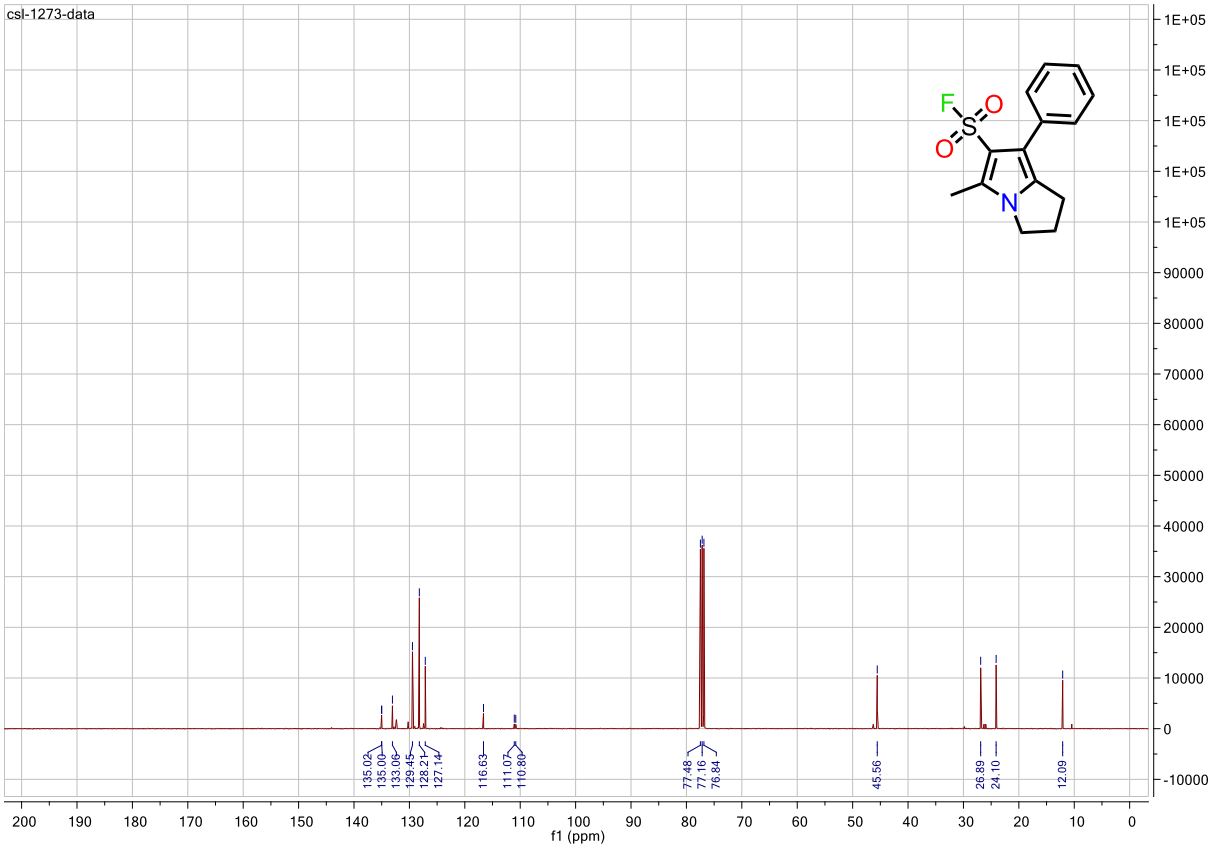

ab1191col2
73.92
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1000
900
800
700
600
500
400
300
200
100
0
-100
F
O
O
S
N
O

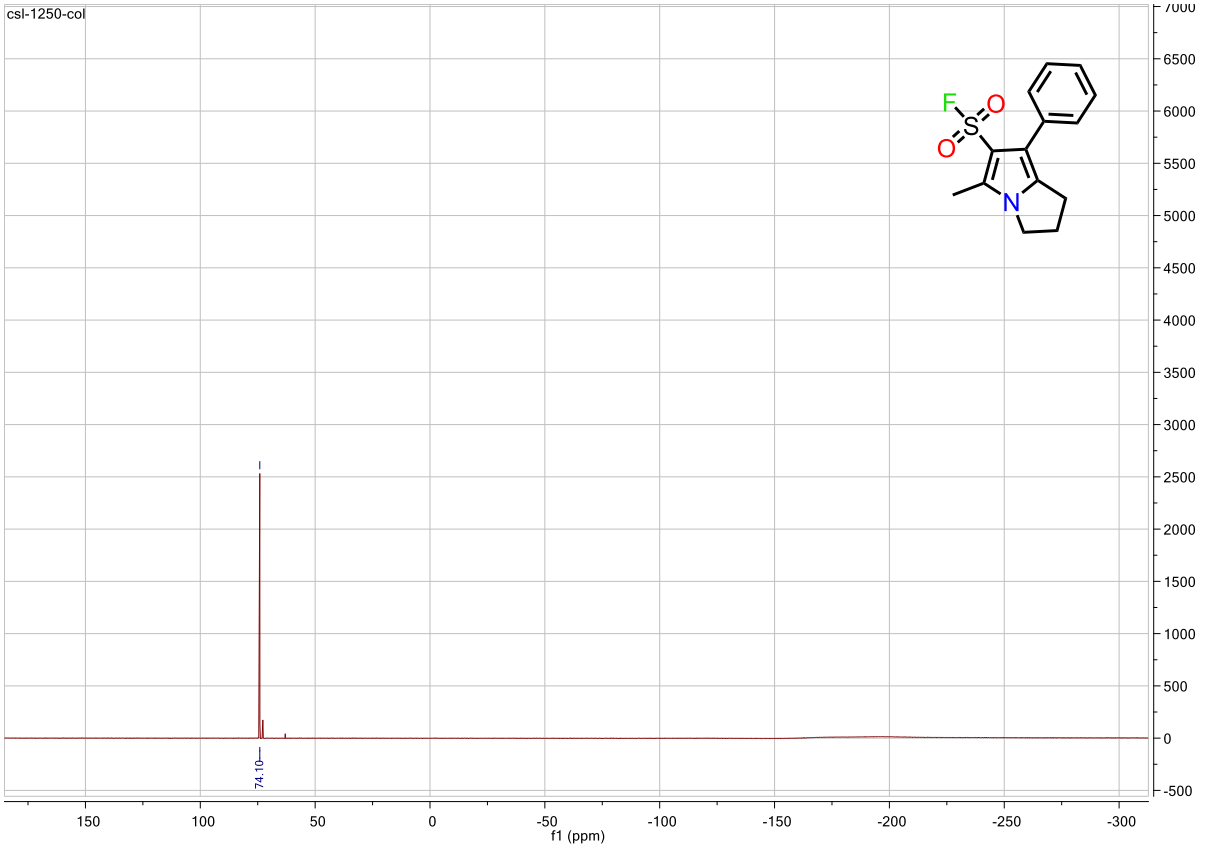

ab1033data
f1 (ppm)

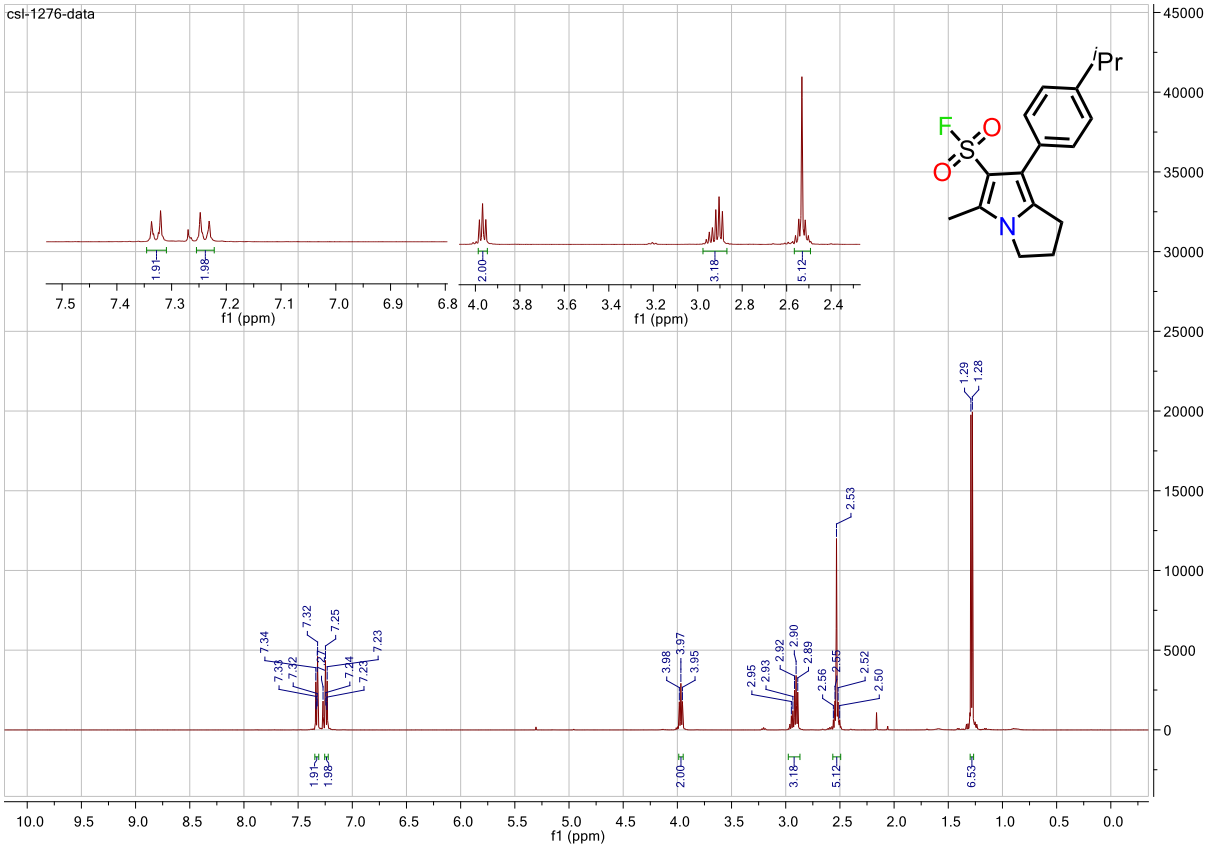

ab1033data
f1 (ppm)

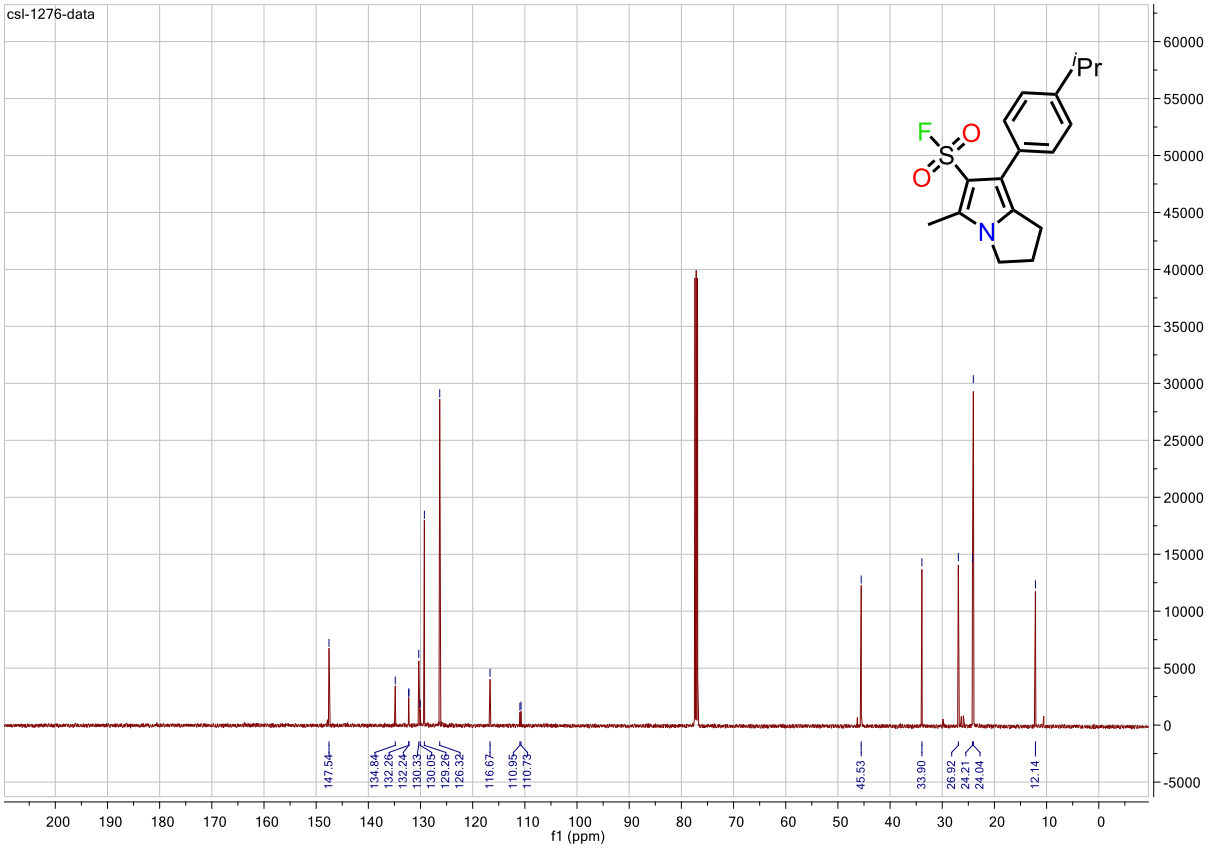

ab1033data
F
O
O
S
N
70.02
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -120 -140 -160 -180
f1 (ppm)

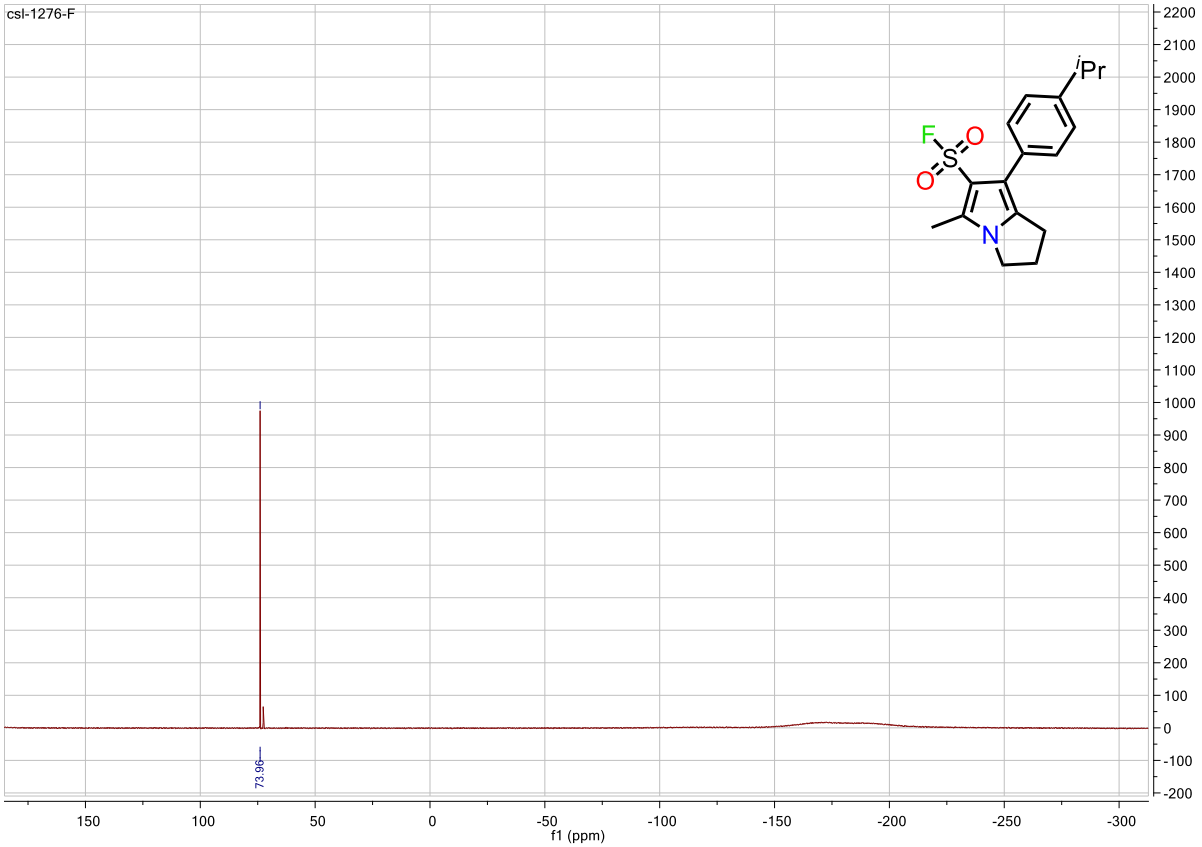

csl-1273-data
F
O
O
S
N
f1 (ppm)

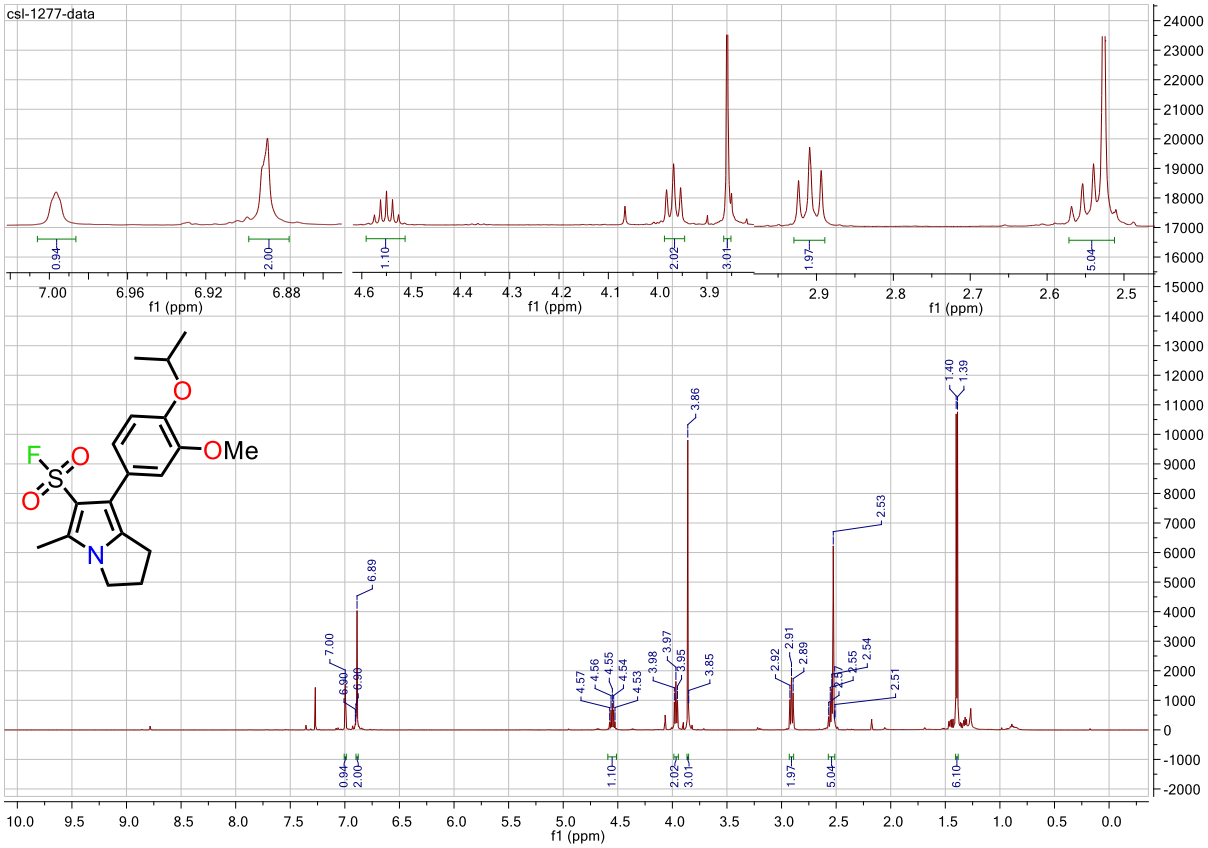

csl-1273-data
F
O
O
S
N
f1 (ppm)

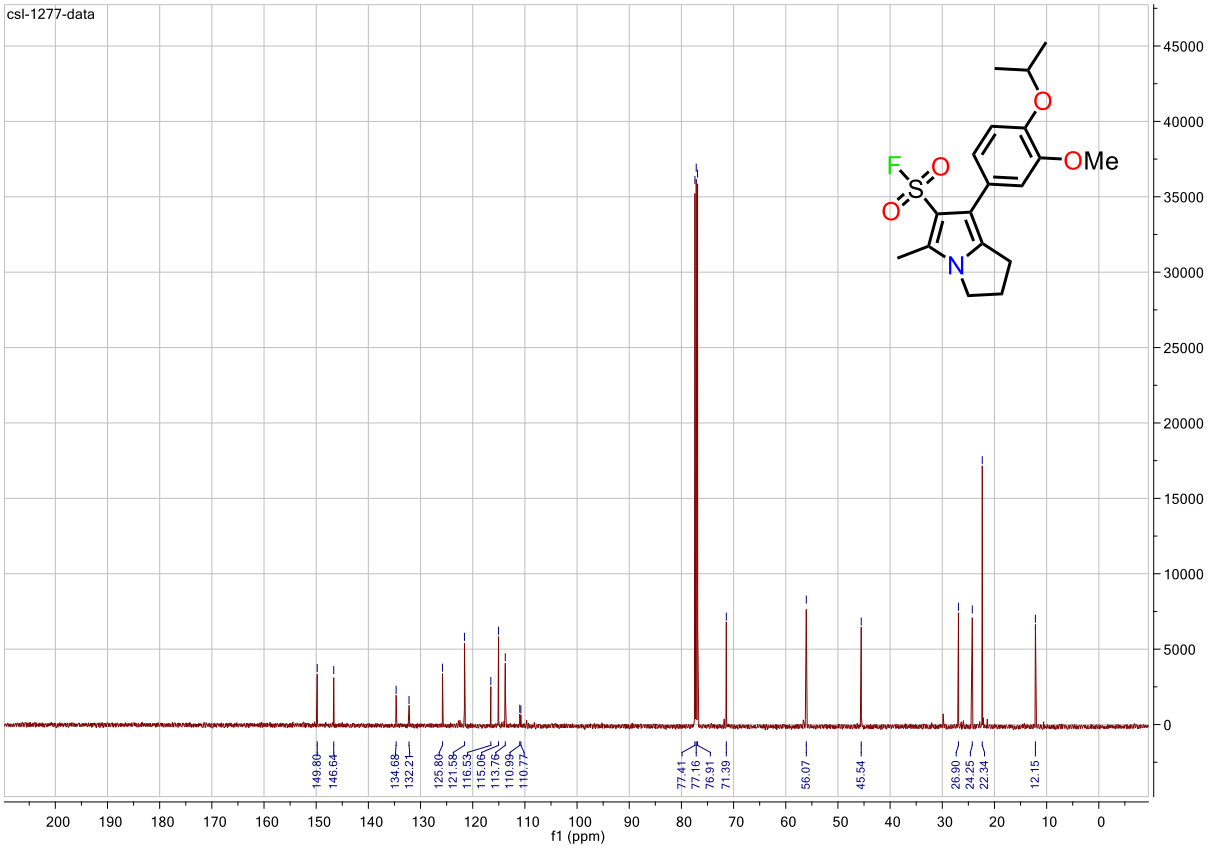

csl-1250-col
F
O
O
S
N
74.10
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500

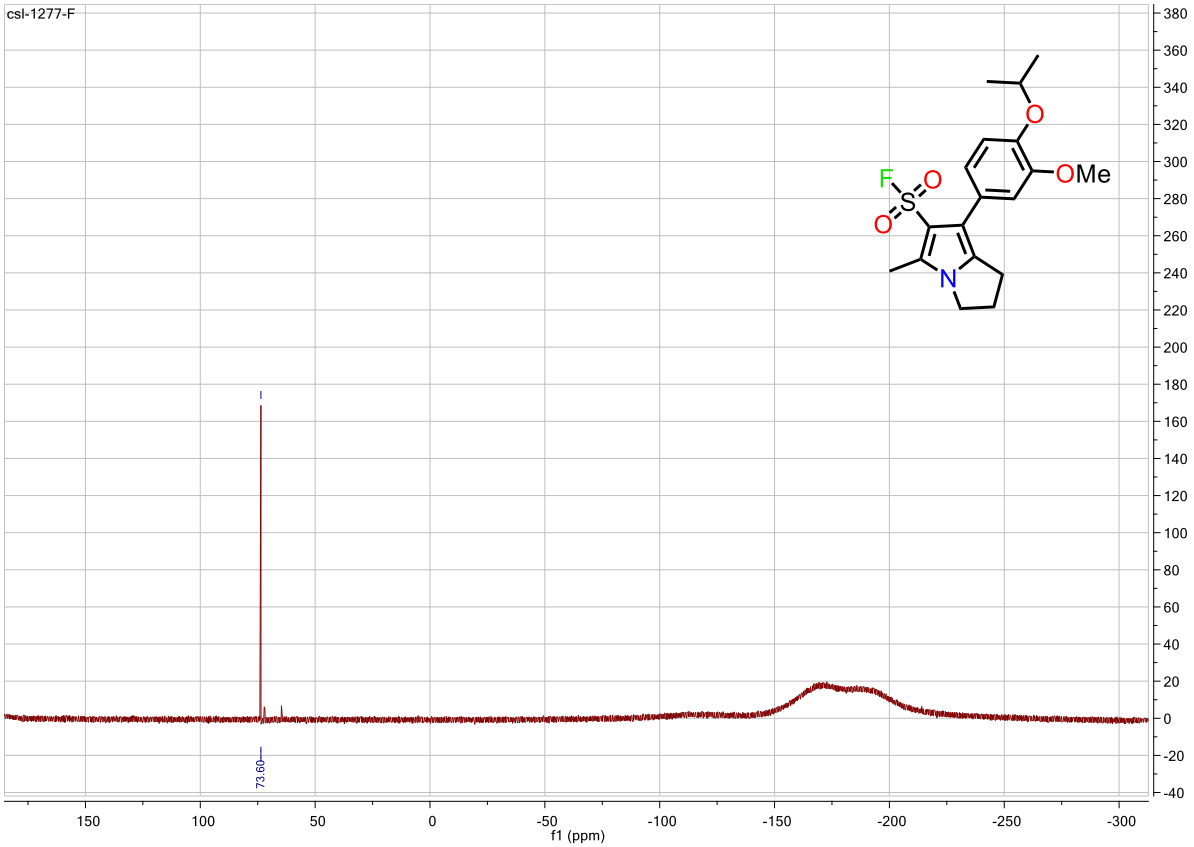

csl-1276-data
iPr
F
O
O
S
N
f1 (ppm)

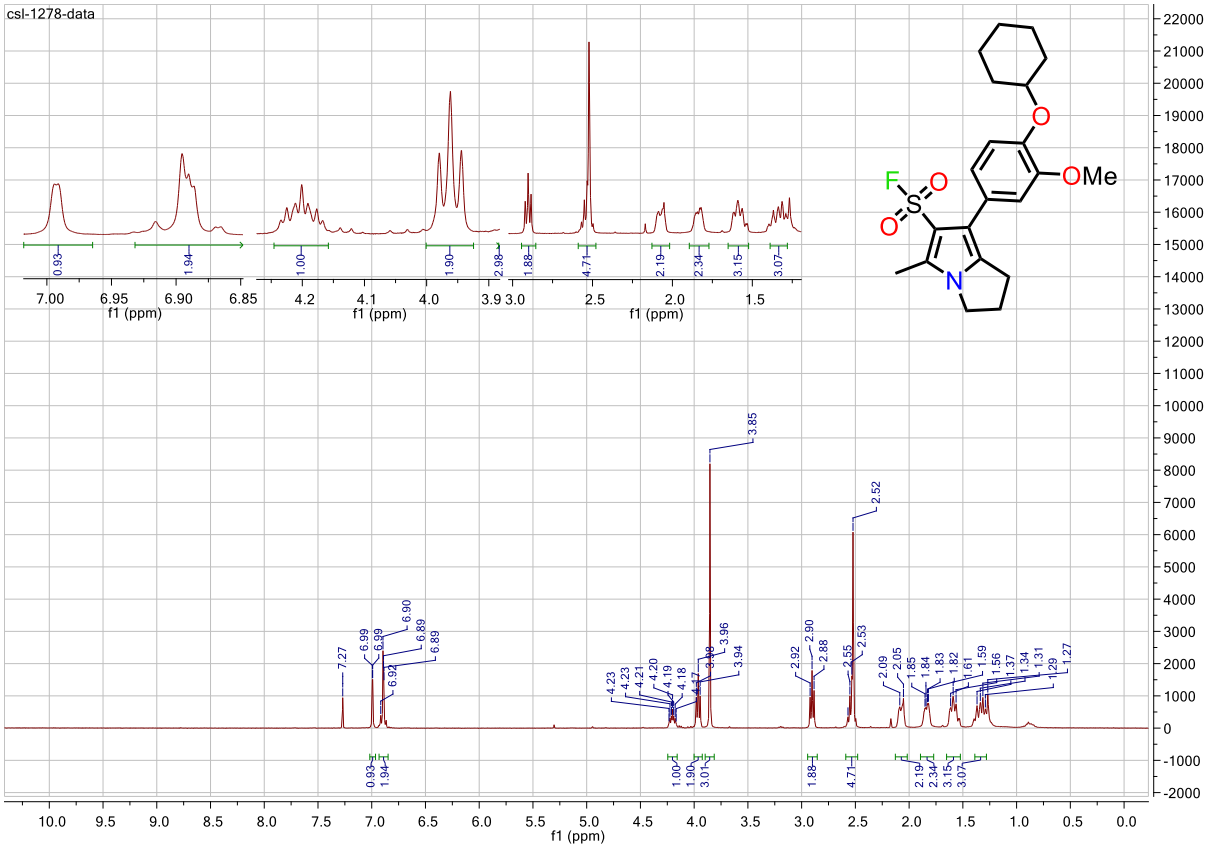

csl-1276-data
iPr
F
O
O
S
N
f1 (ppm)

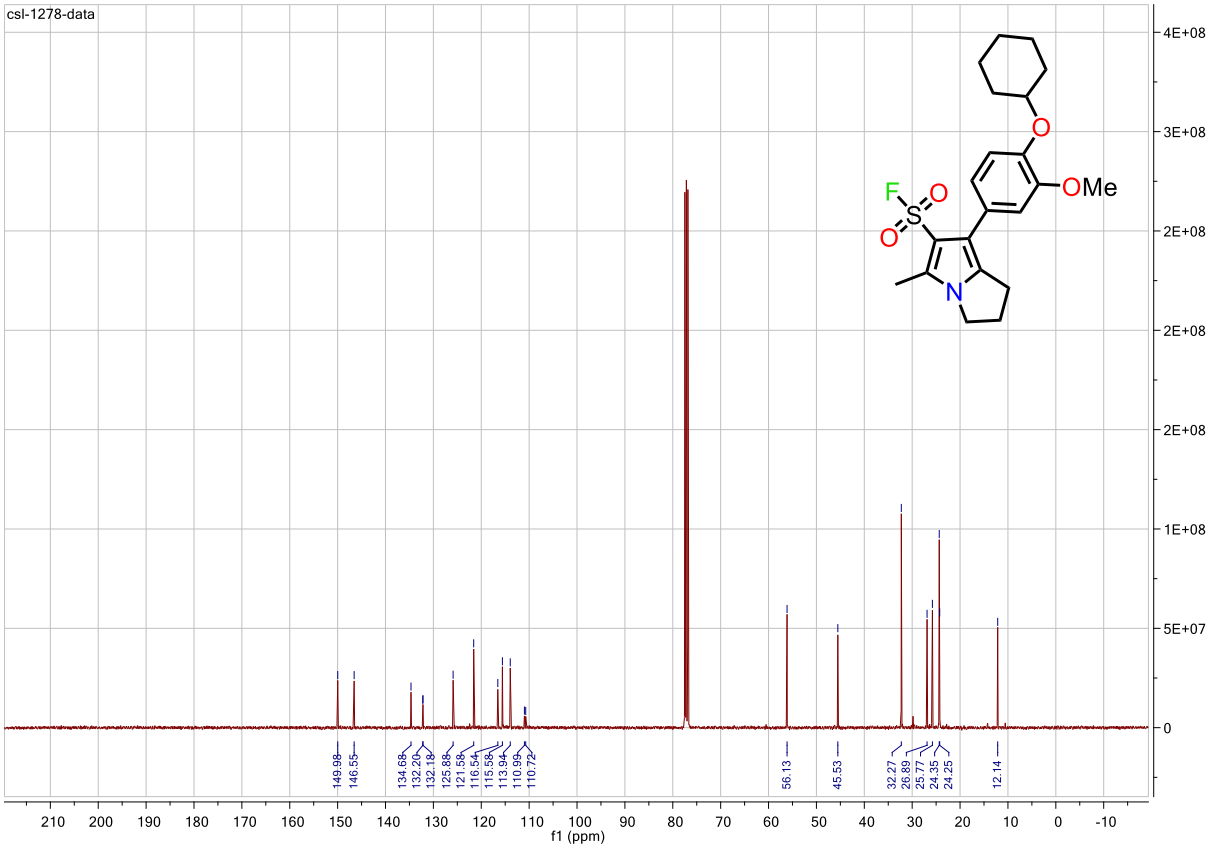

csl-1276-F
iPr
F
O
O
S
N
73.96
f1 (ppm)

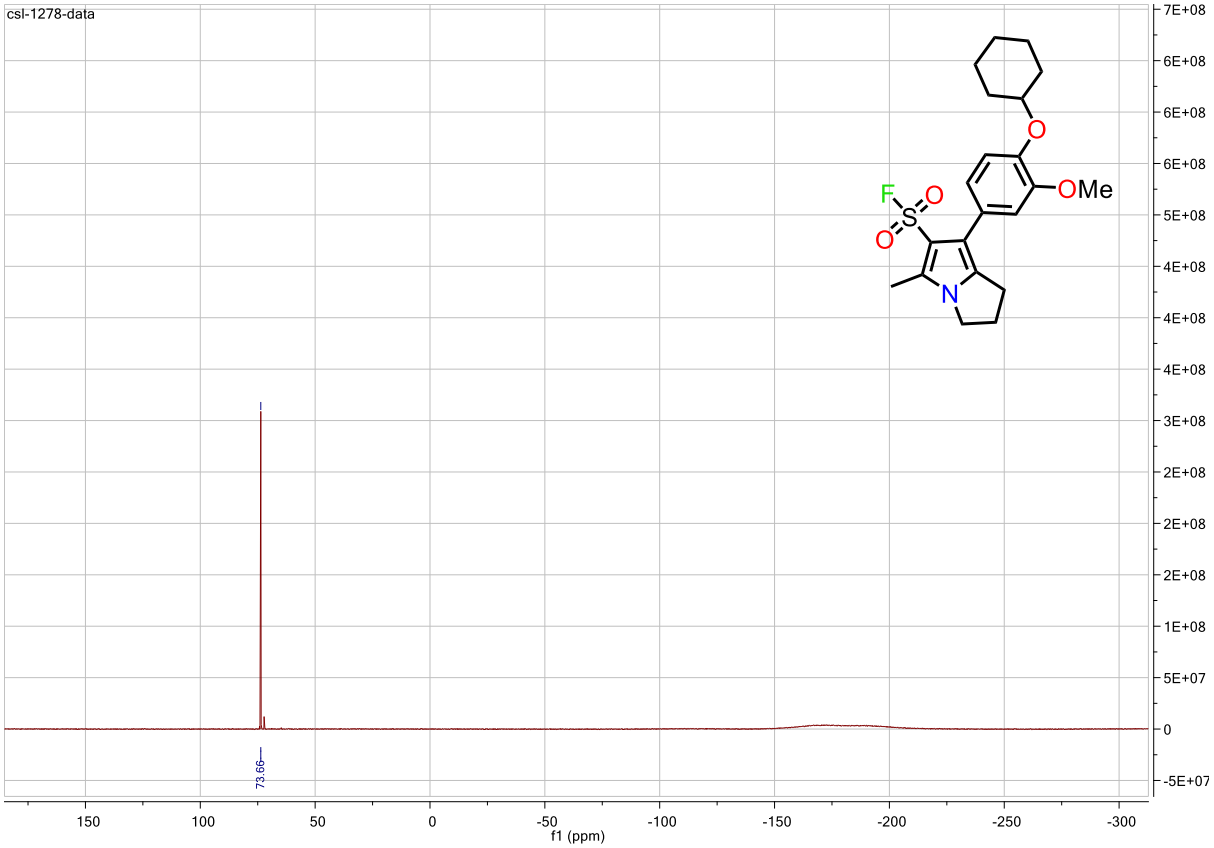

csl-1277-data
f1 (ppm)
O
OMe
F
O
O
S
N
6.89
7.00
6.90
6.90
4.57
4.56
4.55
4.54
4.53
3.98
3.97
3.95
3.86
3.85
2.92
2.91
2.89
2.53
2.55
2.54
2.51
1.40
1.39

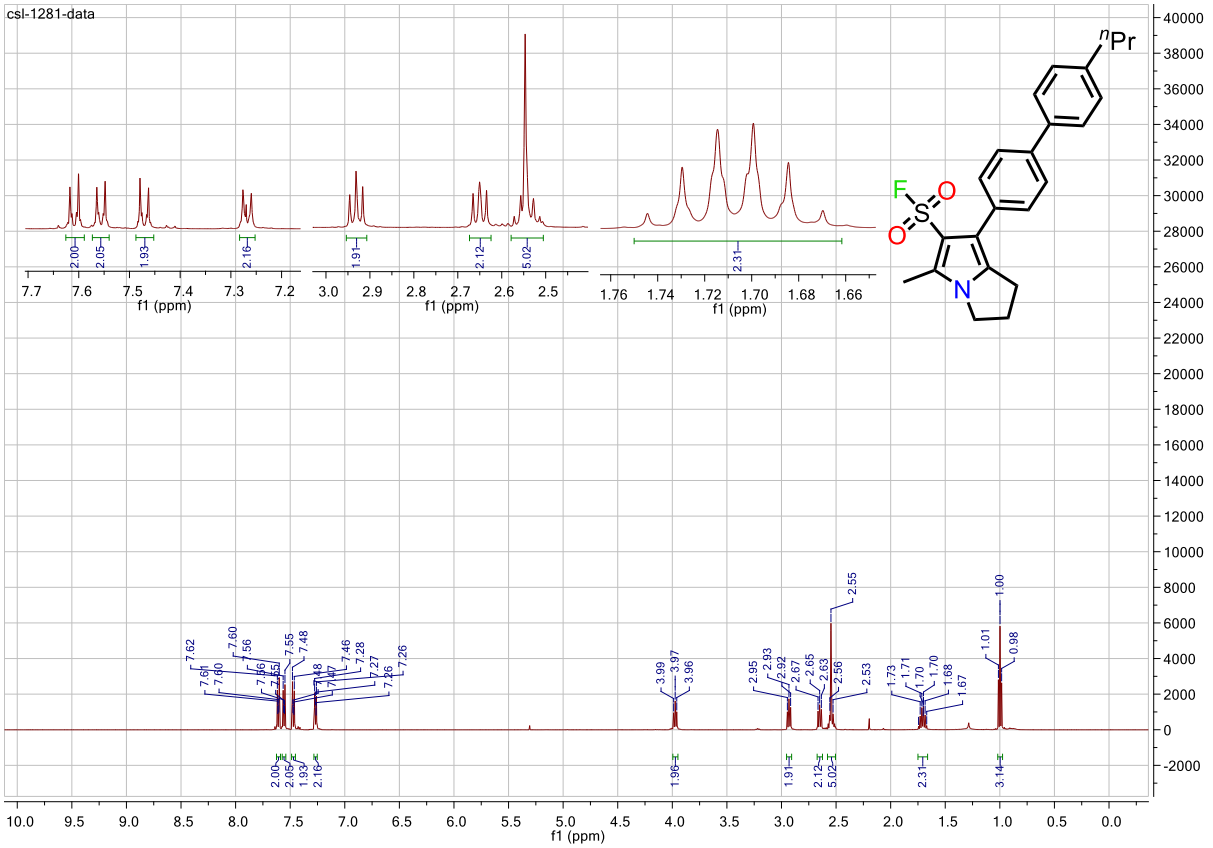

csl-1277-data
f1 (ppm)
O
OMe
F
O
O
S
N
149.80
146.64
134.68
132.21
125.80
121.58
116.53
115.06
113.76
110.99
110.77
77.41
77.16
76.91
71.39
56.07
45.54
26.90
24.25
22.34
12.15

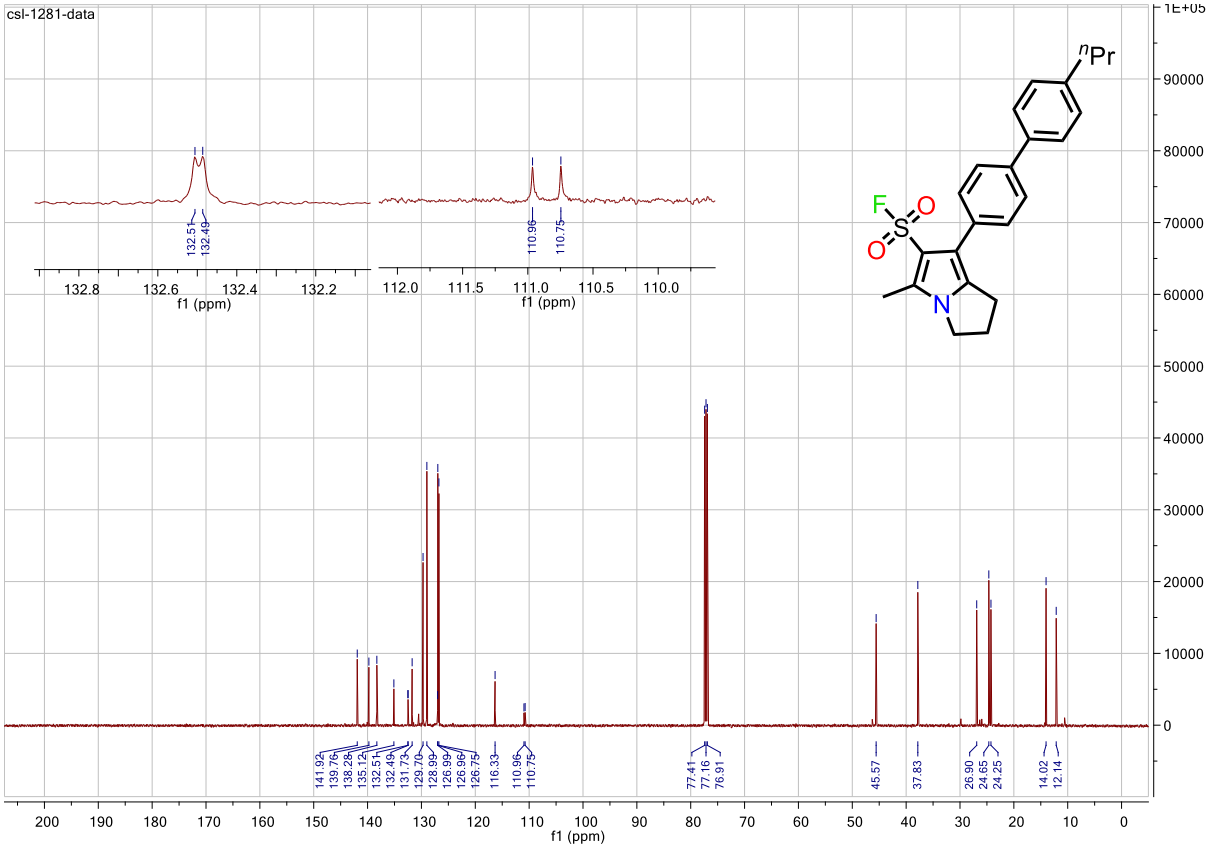

csl-1277-F
73.60
f1 (ppm)
F
O
S
O
O
OMe
N

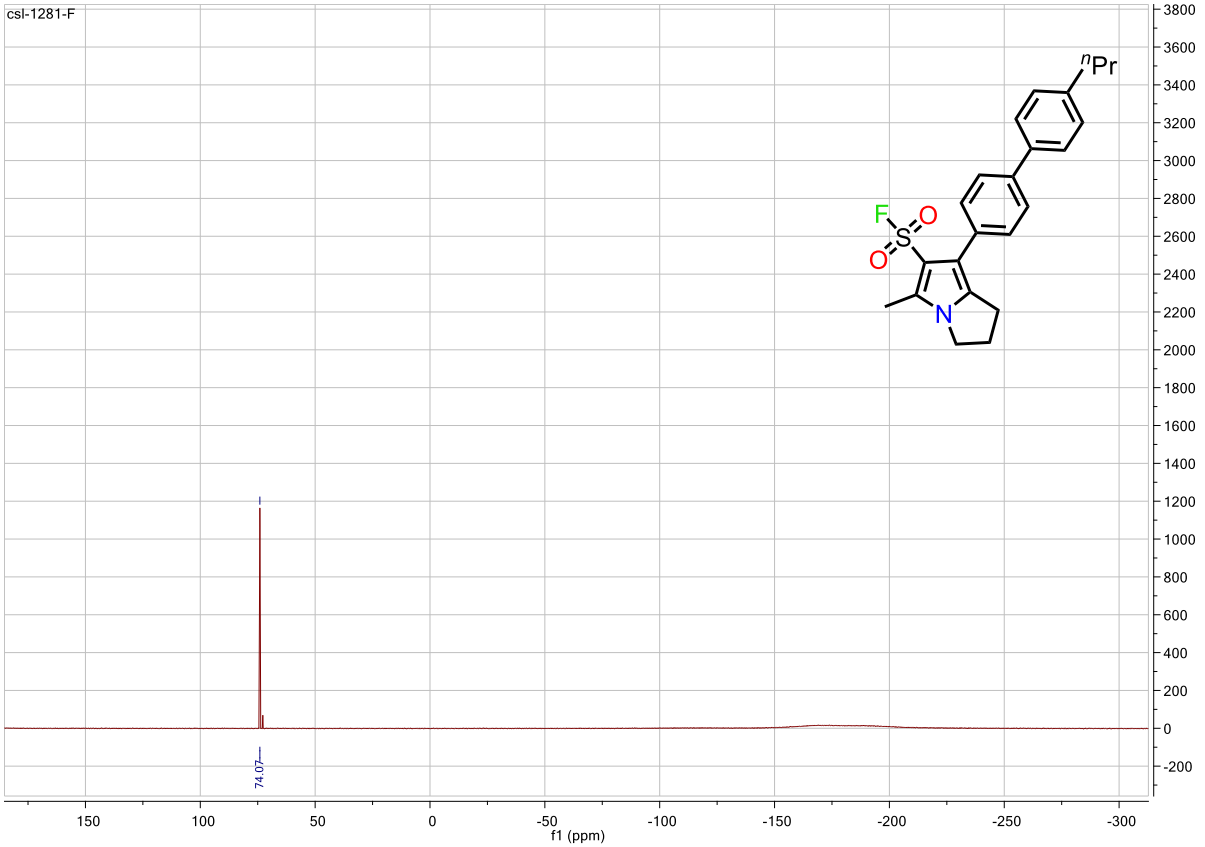

csl-1278-data
f1 (ppm)
O
OMe
F
O
O
S
N

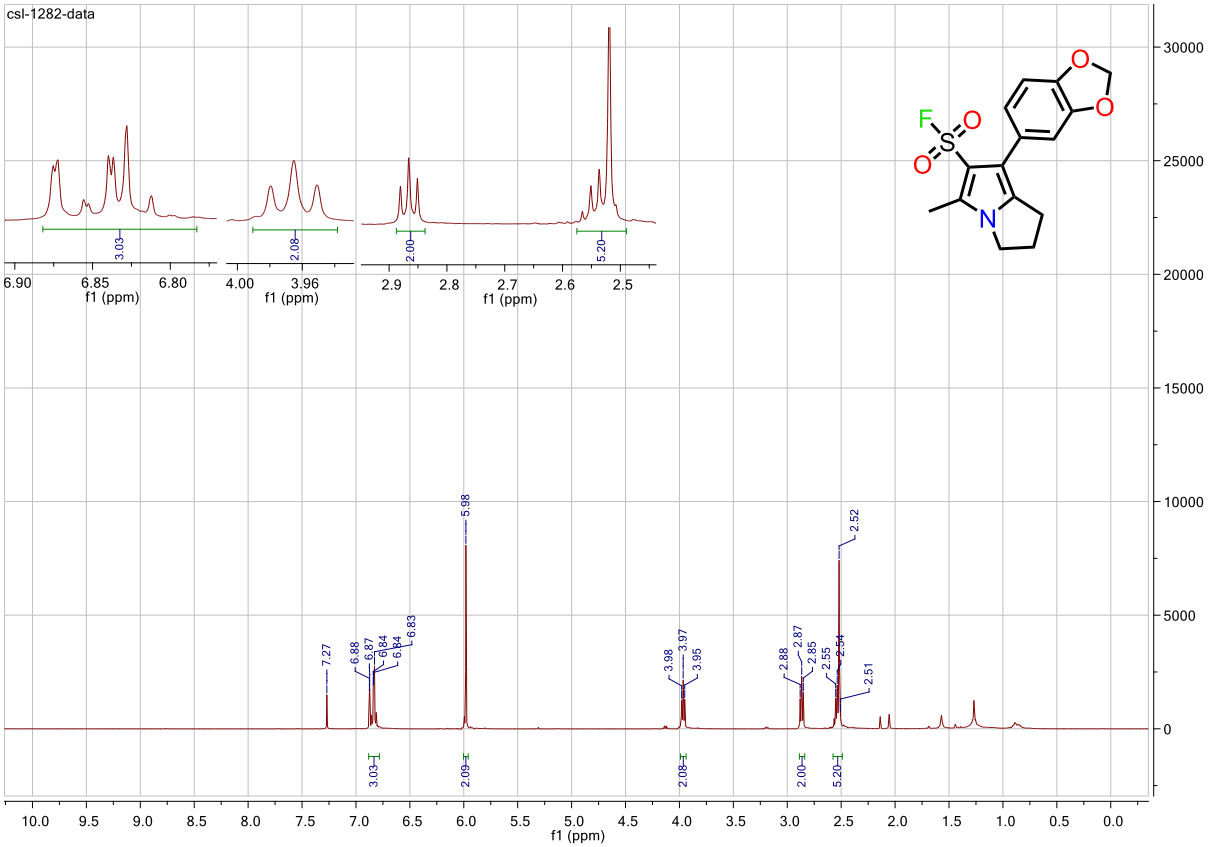

csl-1278-data
f1 (ppm)
O
OMe
F
O
O
S
N

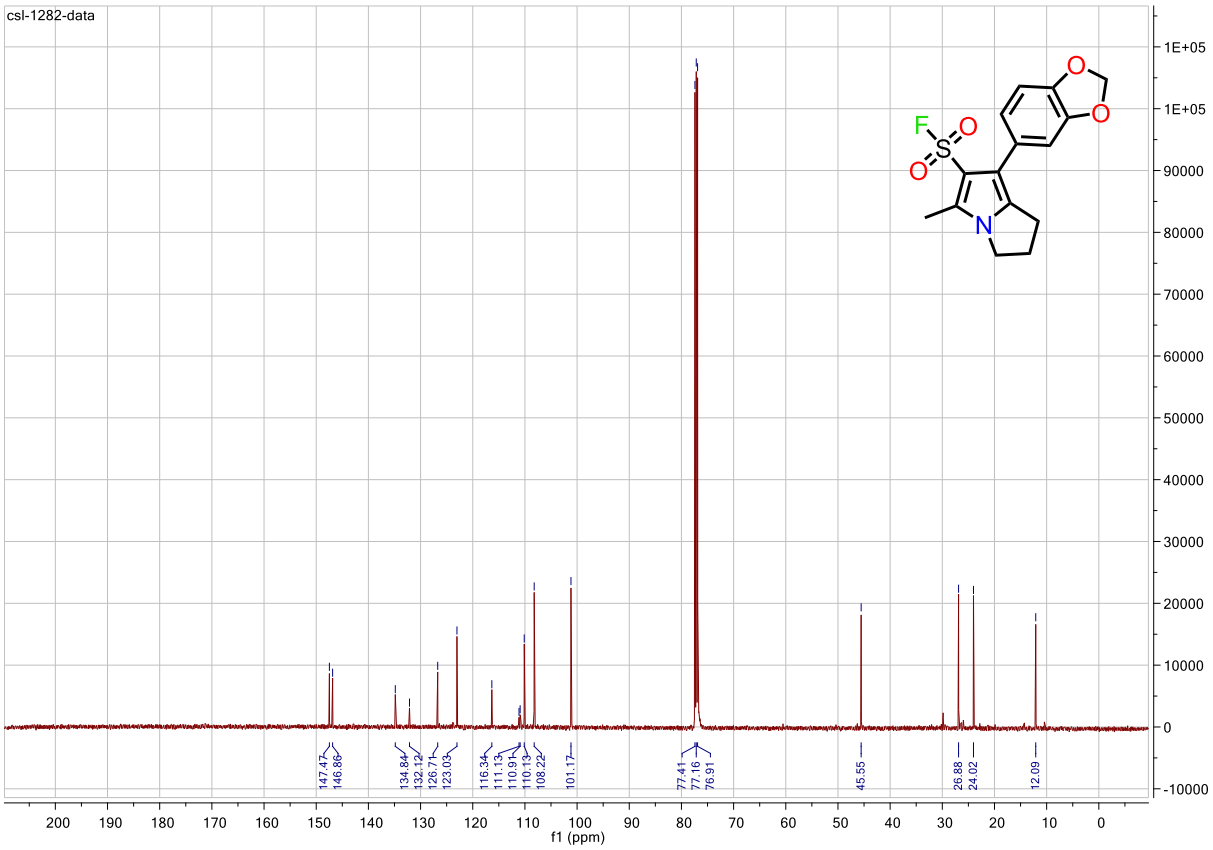

csl-1278-data
7E+08
6E+08
6E+08
6E+08
5E+08
4E+08
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
-5E+07
73.66
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
O
OMe
F
S
O
O
N

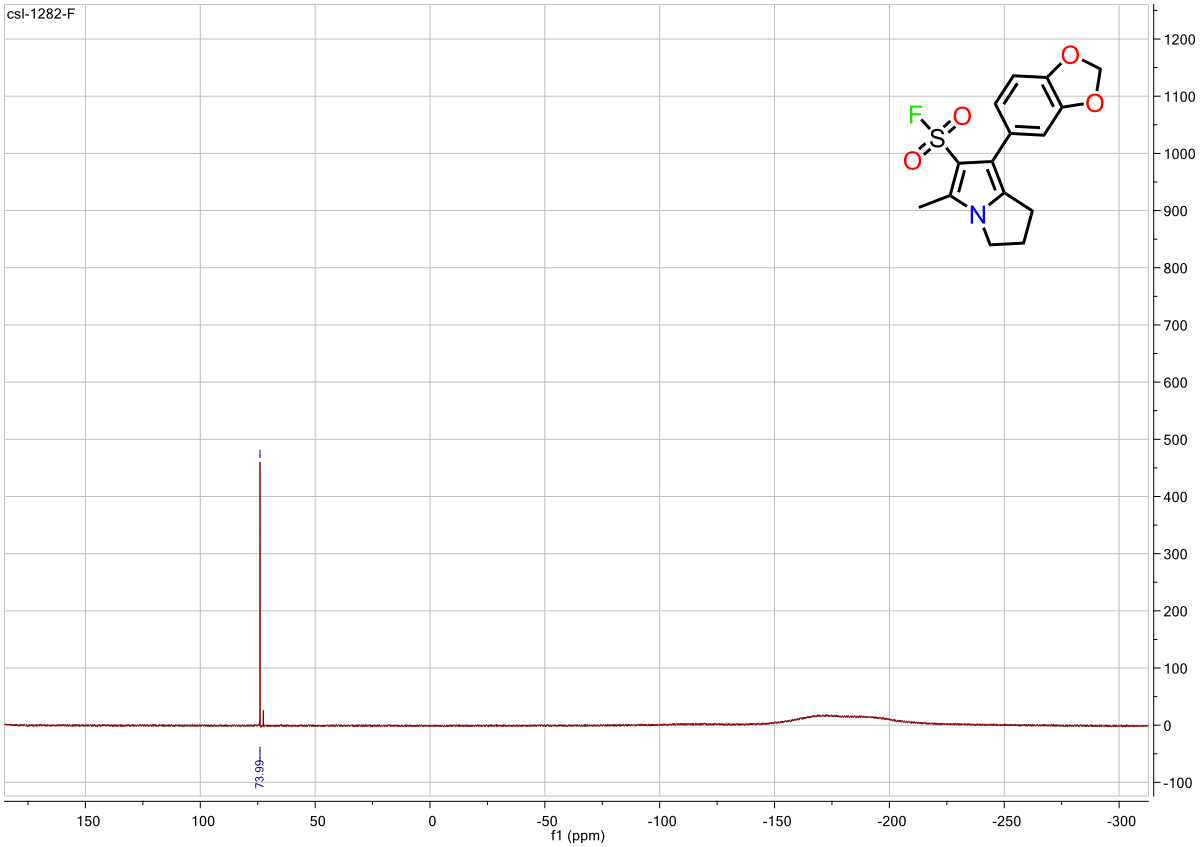

csl-1281-data
nPr
F
O
O
S
O
N
f1 (ppm)

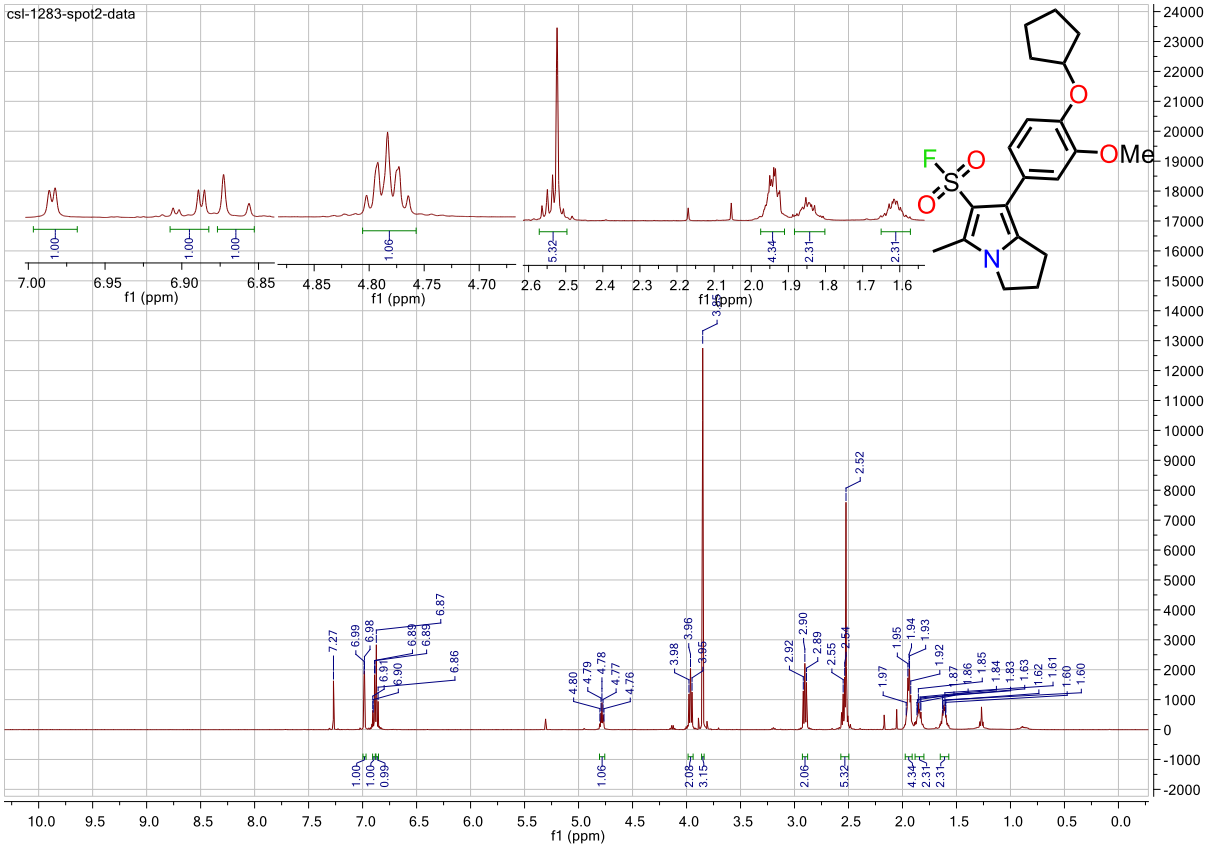

csl-1281-data
nPr
F
O
O
S
O
N
f1 (ppm)

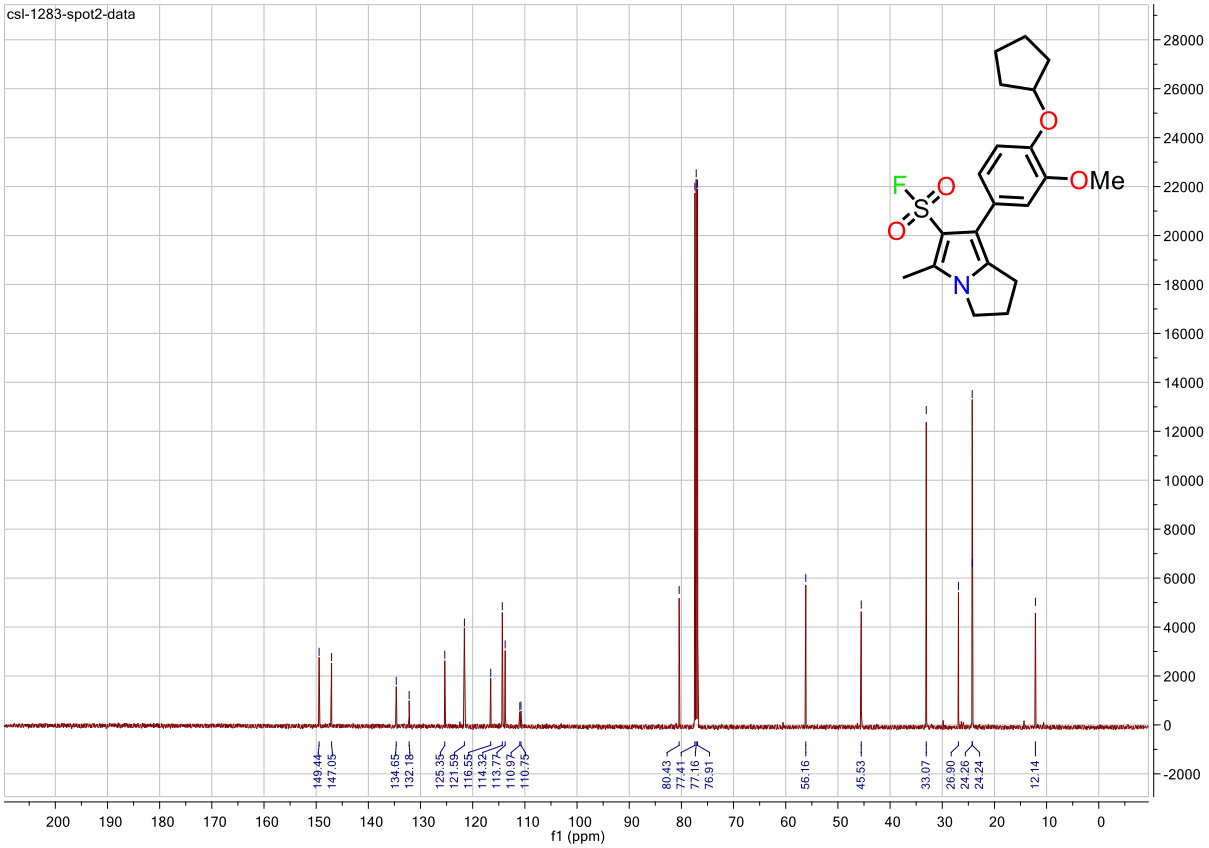

csl-1281-F
nPr
F
O
O
S
N
74.07
f1 (ppm)

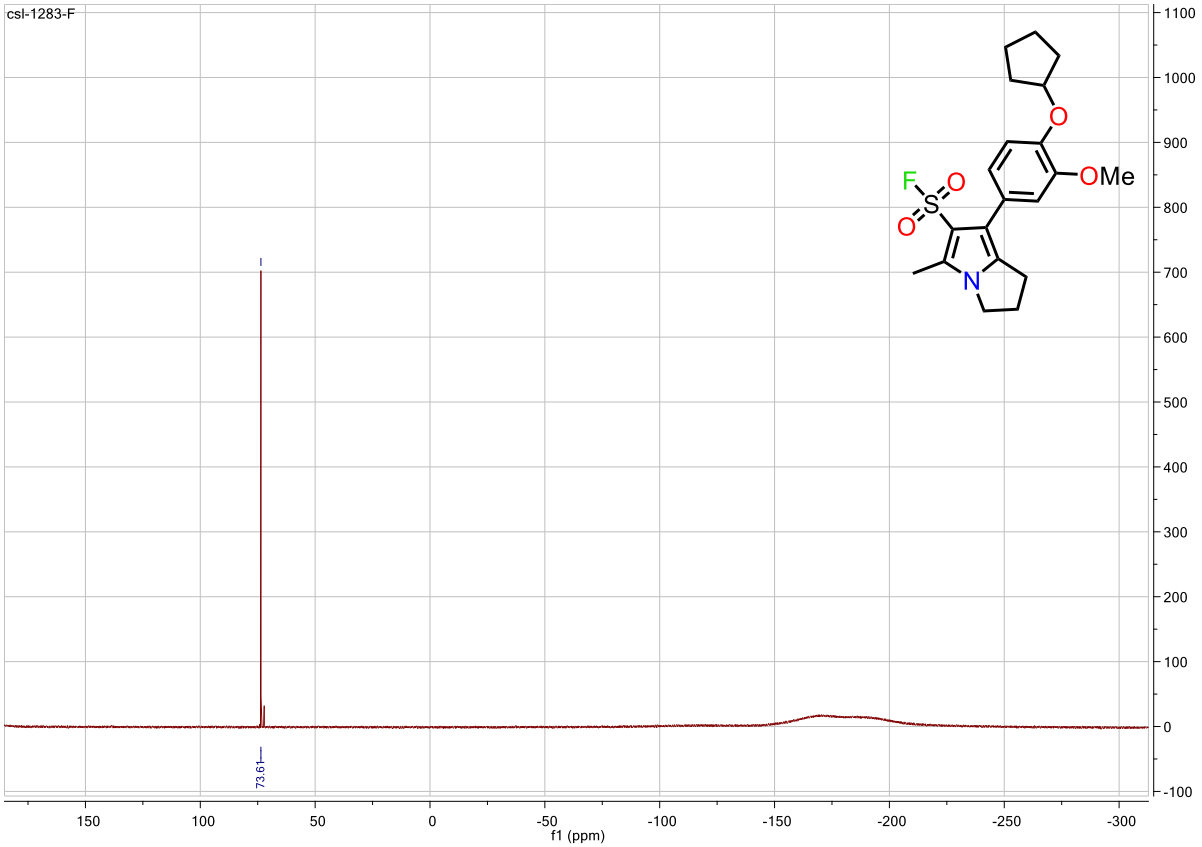

csl-1282-data
f1 (ppm)
7.27
6.88
6.87
6.84
6.84
6.83
5.98
3.98
3.97
3.95
2.88
2.87
2.85
2.55
2.54
2.52
2.51
3.03
2.09
2.08
2.00
5.20
O
O
F
S
O
O
N

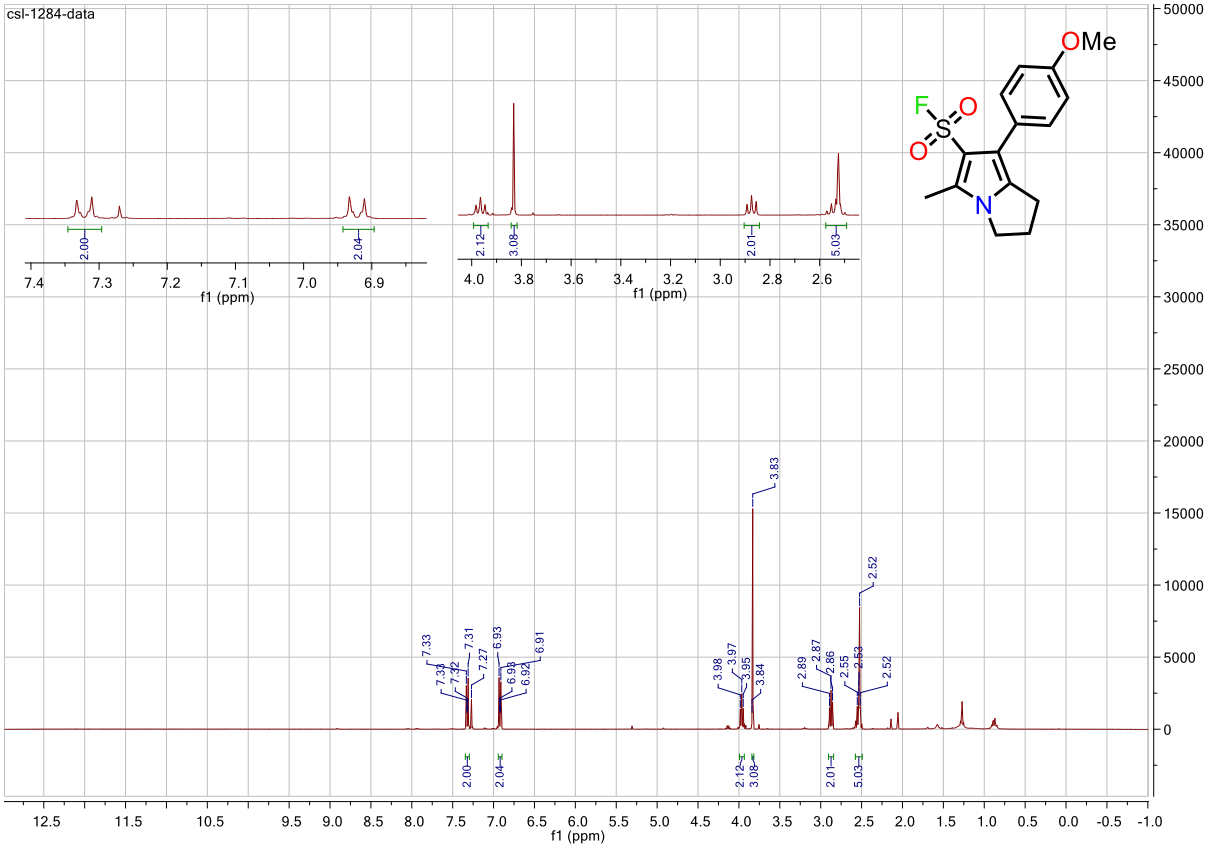

csl-1282-data
f1 (ppm)
147.47
146.86
134.84
132.12
126.71
123.03
116.34
111.13
110.94
110.19
108.22
101.17
77.41
77.16
76.91
45.55
26.88
24.02
12.09
O
O
F
S
O
O
N

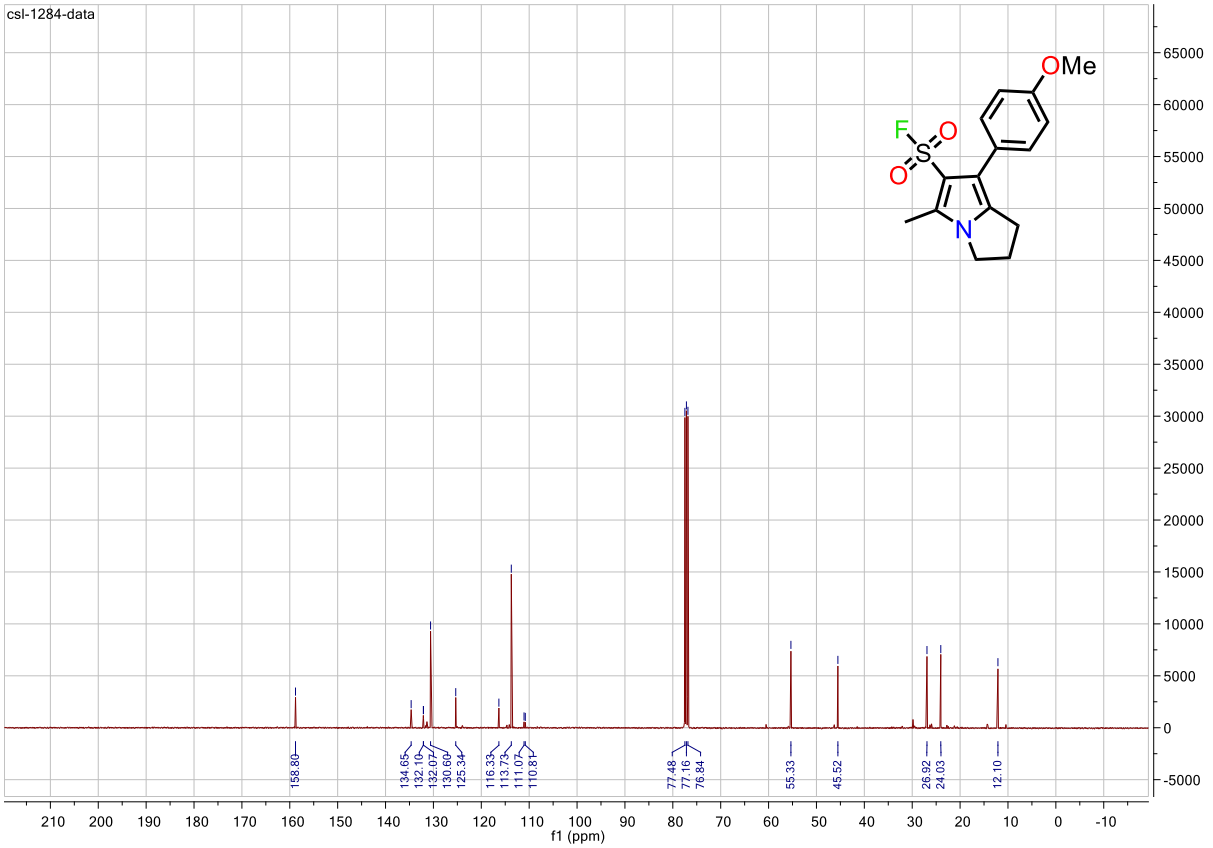

csl-1282-F
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
73.99
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
F
S
O
O
O
O
N

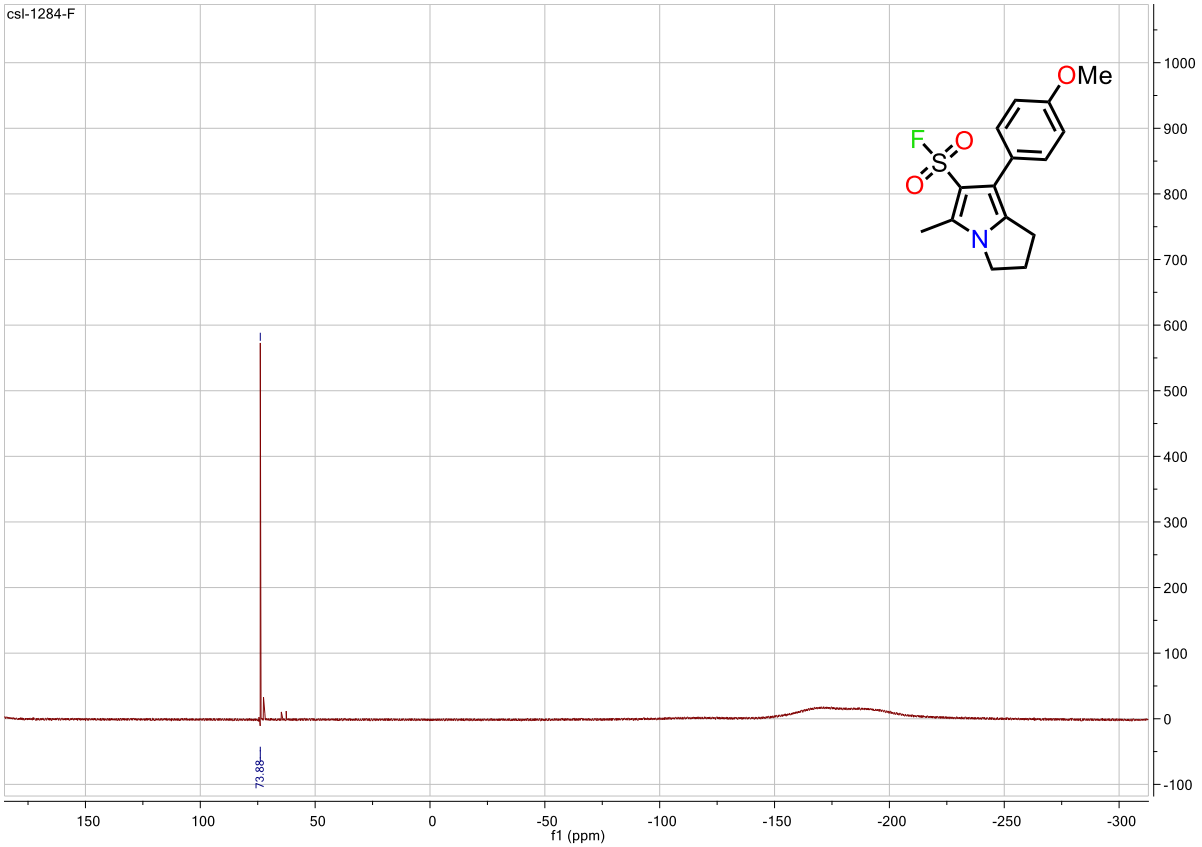

csl-1283-spot2-data
f1 (ppm)
O
OMe
F
O
S
O
N

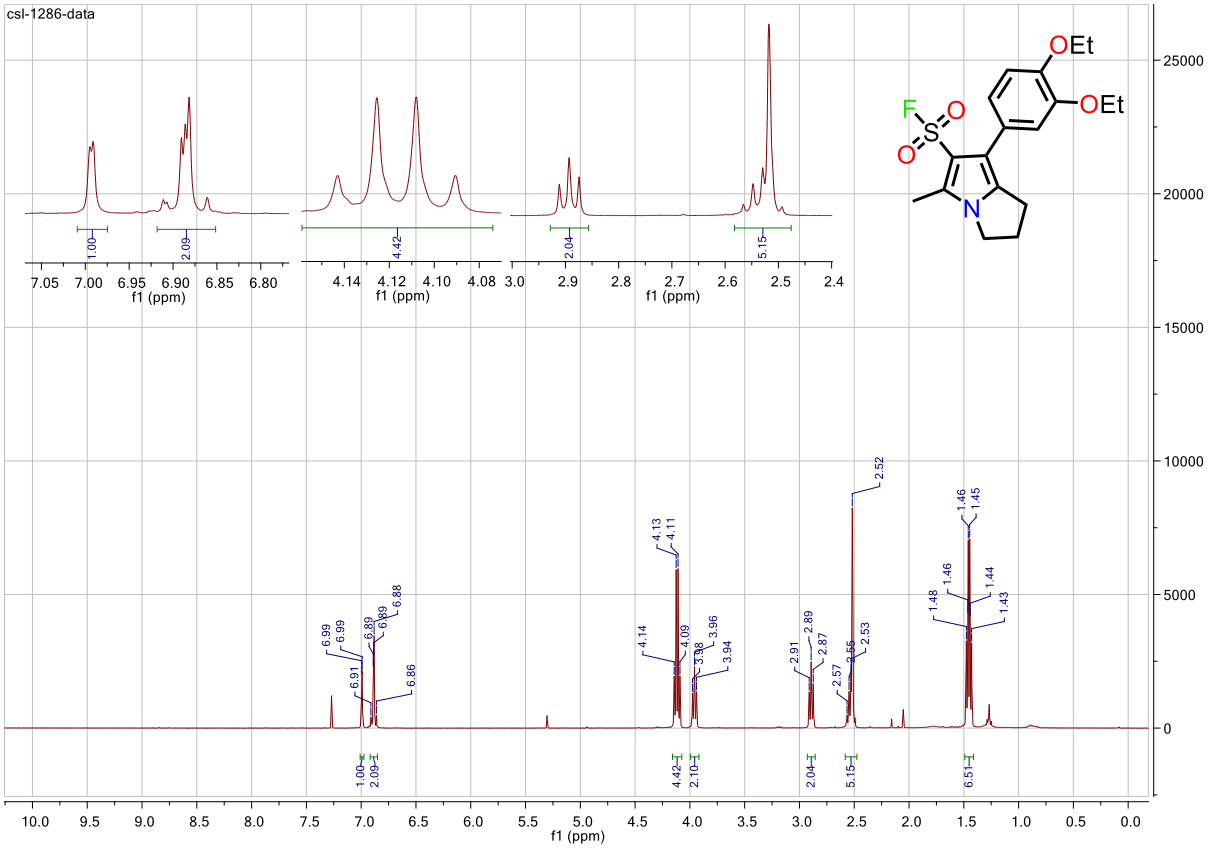

csl-1283-spot2-data
f1 (ppm)
O
OMe
F
O
S
O
N

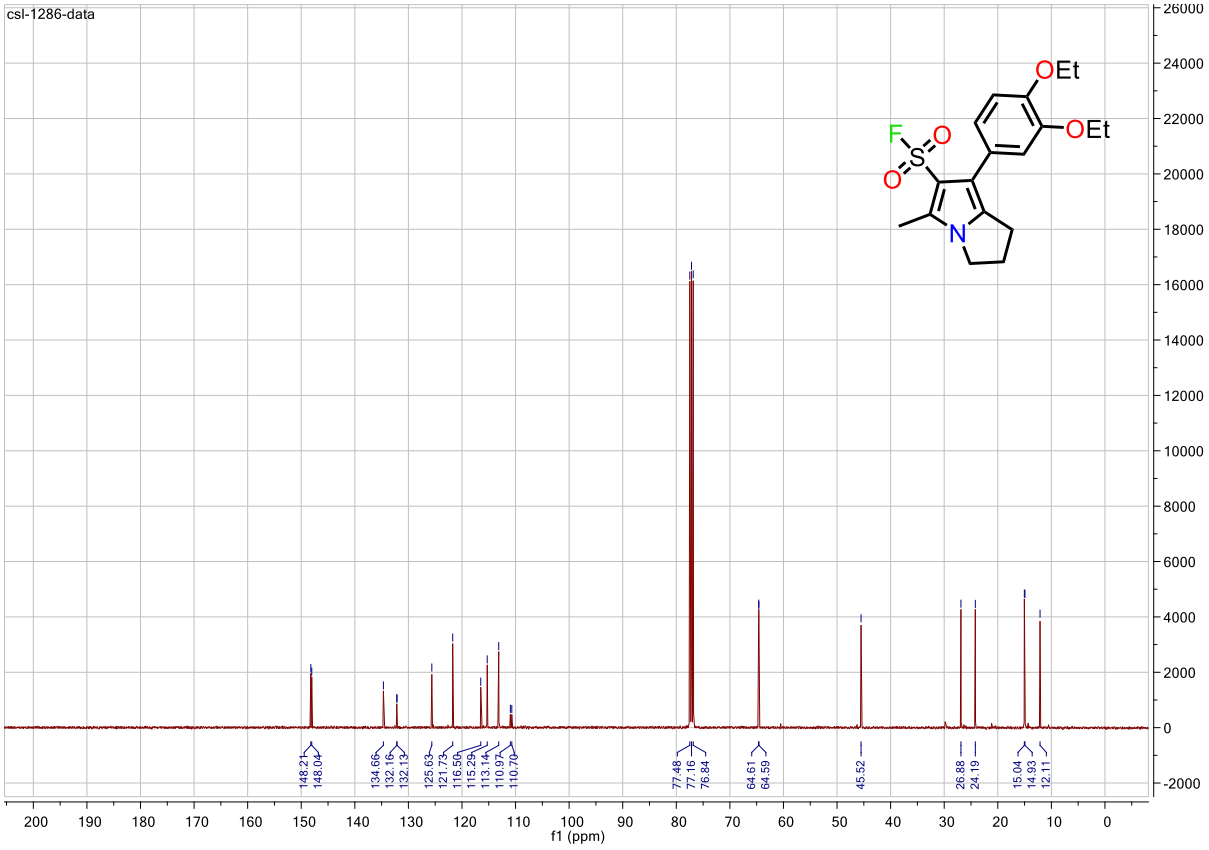

csl-1283-F
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
73.61
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
O
OMe
F
O
O
S
N

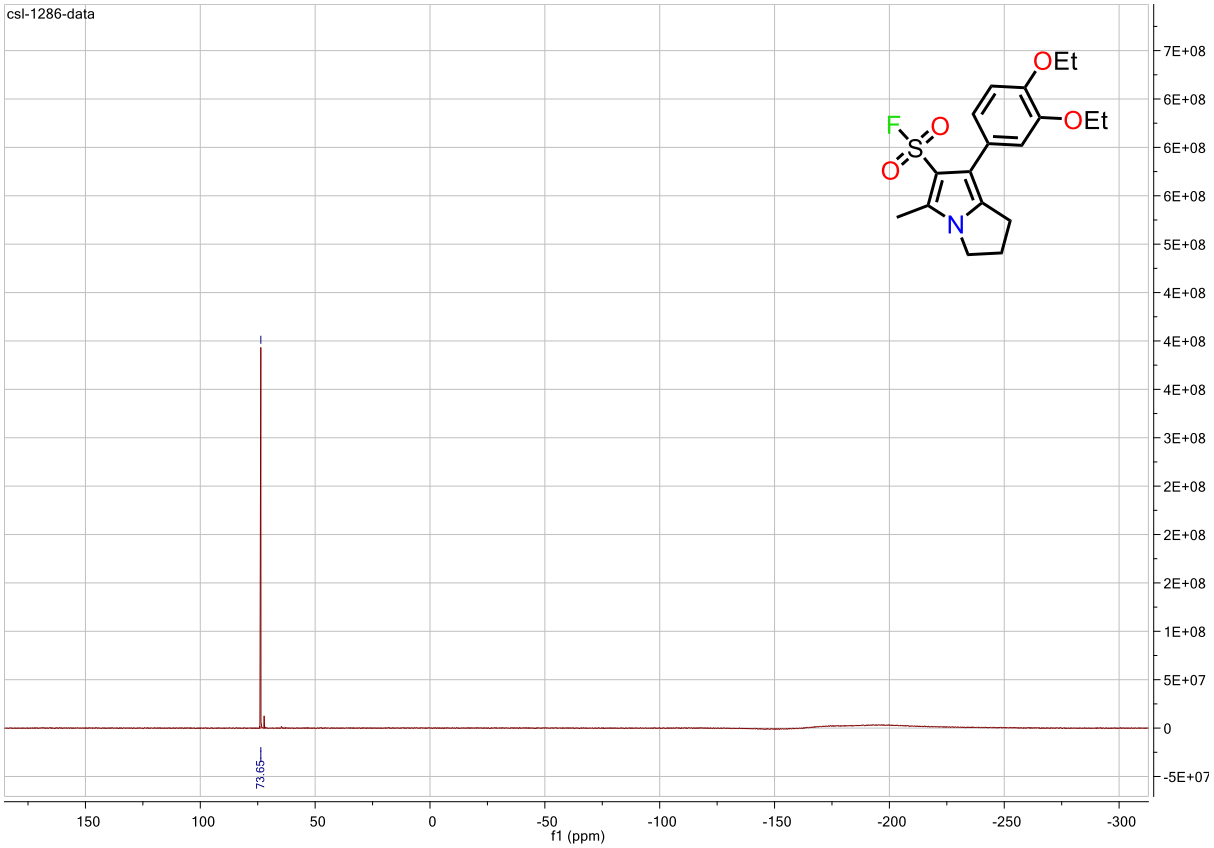

csl-1284-data
OMe
F
O
O
S
N
f1 (ppm)

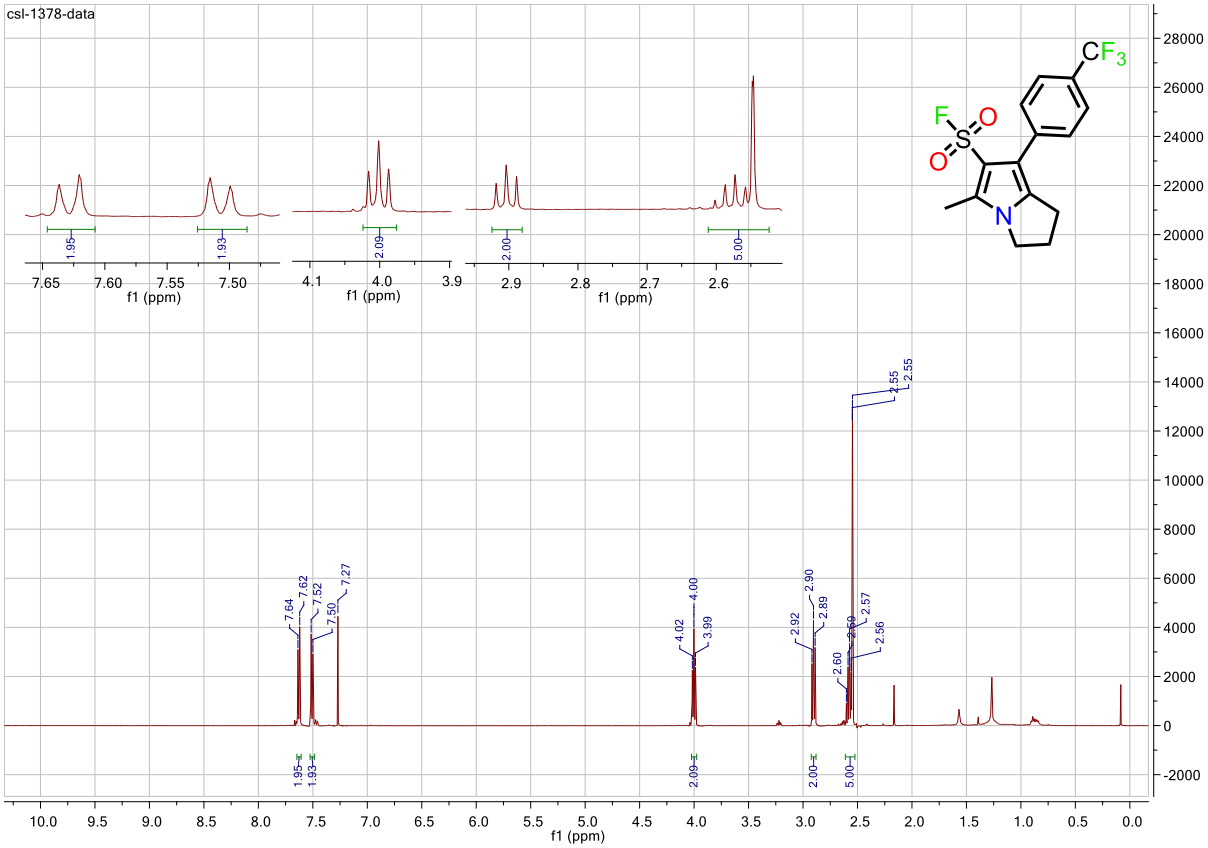

csl-1284-data
OMe
F
O
O
S
N
f1 (ppm)

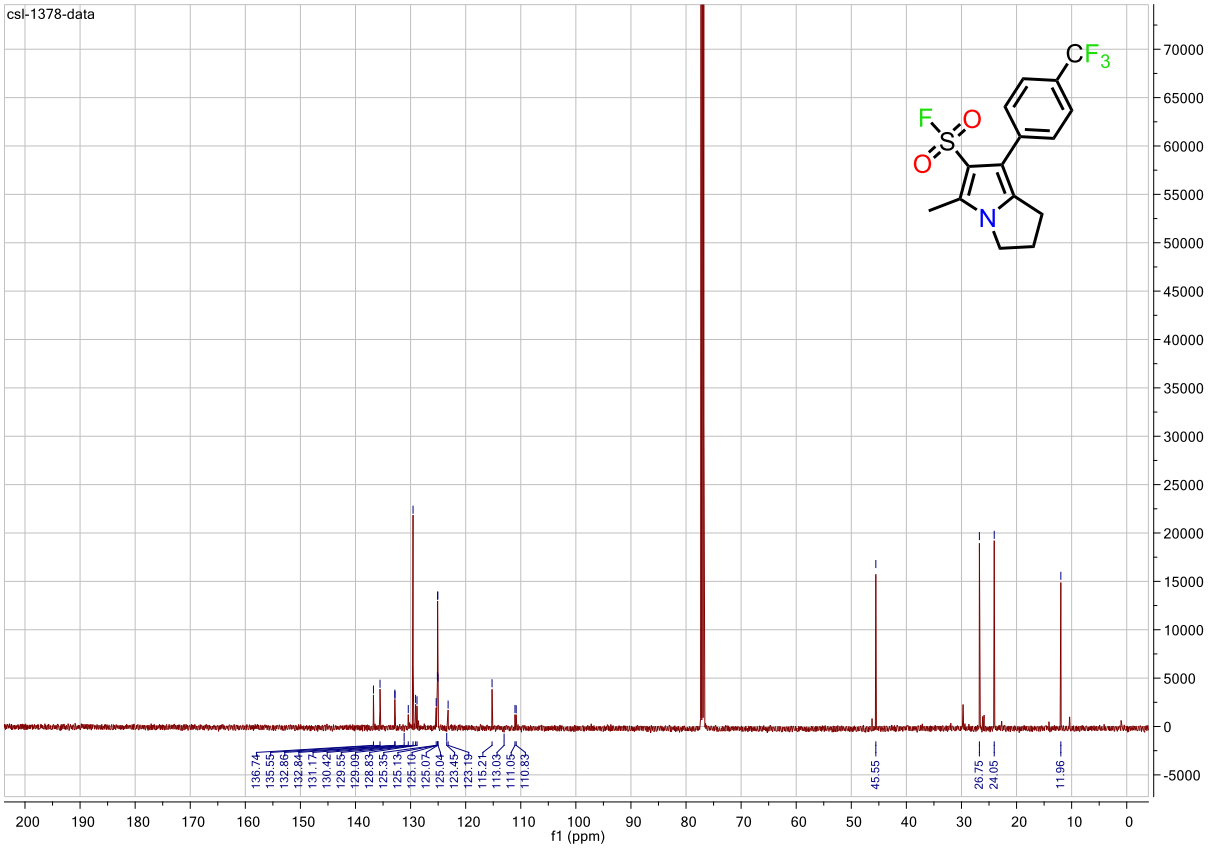

csl-1284-F
OMe
F
O
O
S
N
73.88
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1000
900
800
700
600
500
400
300
200
100
0
-100

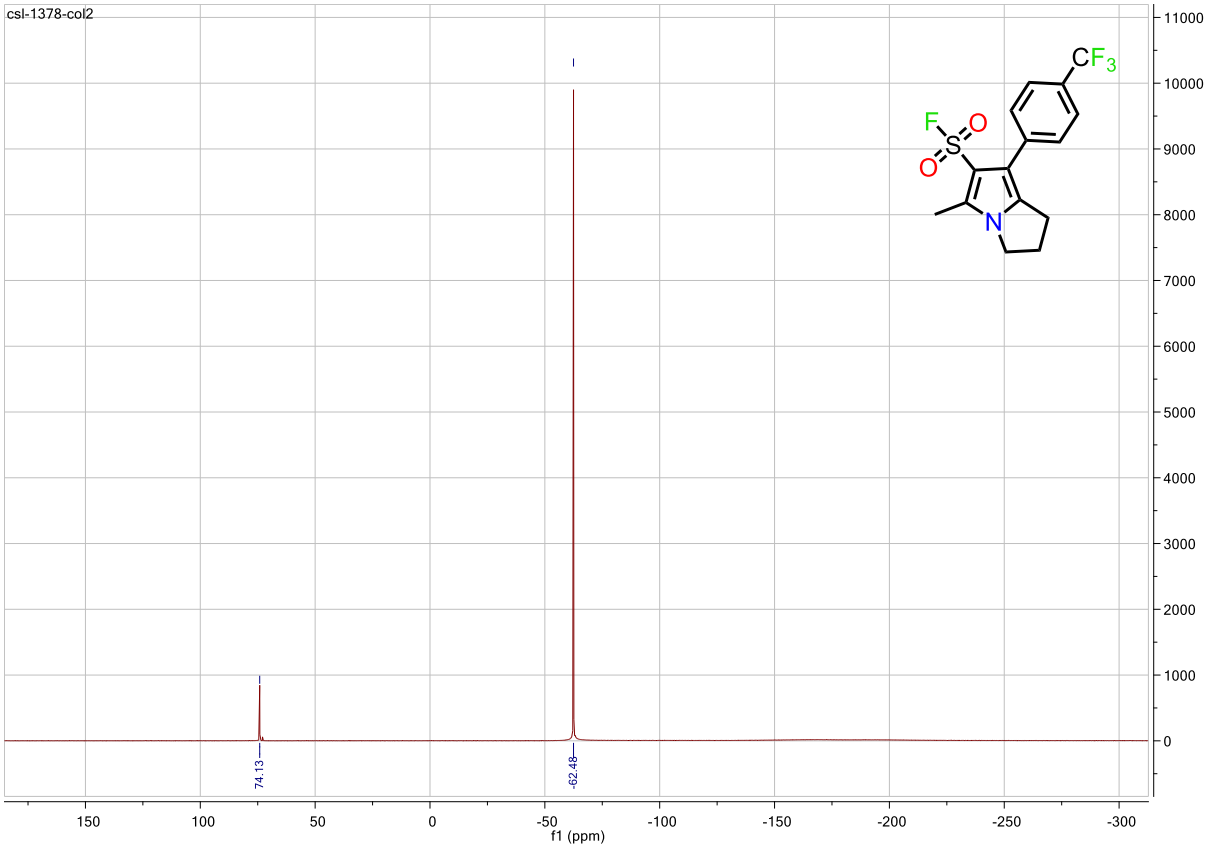

csl-1286-data
OEt
OEt
F
O
O
S
N
f1 (ppm)

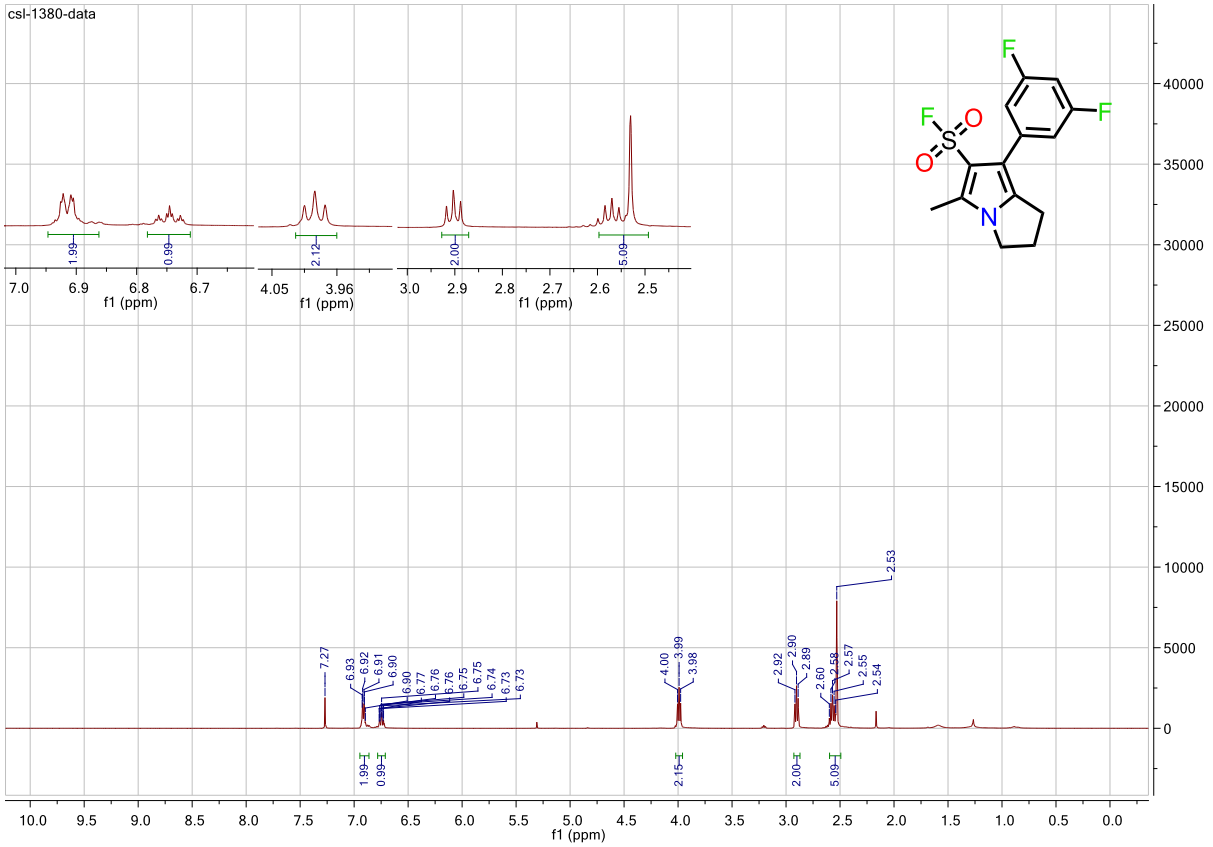

csl-1286-data
OEt
OEt
F
O
O
S
N
f1 (ppm)

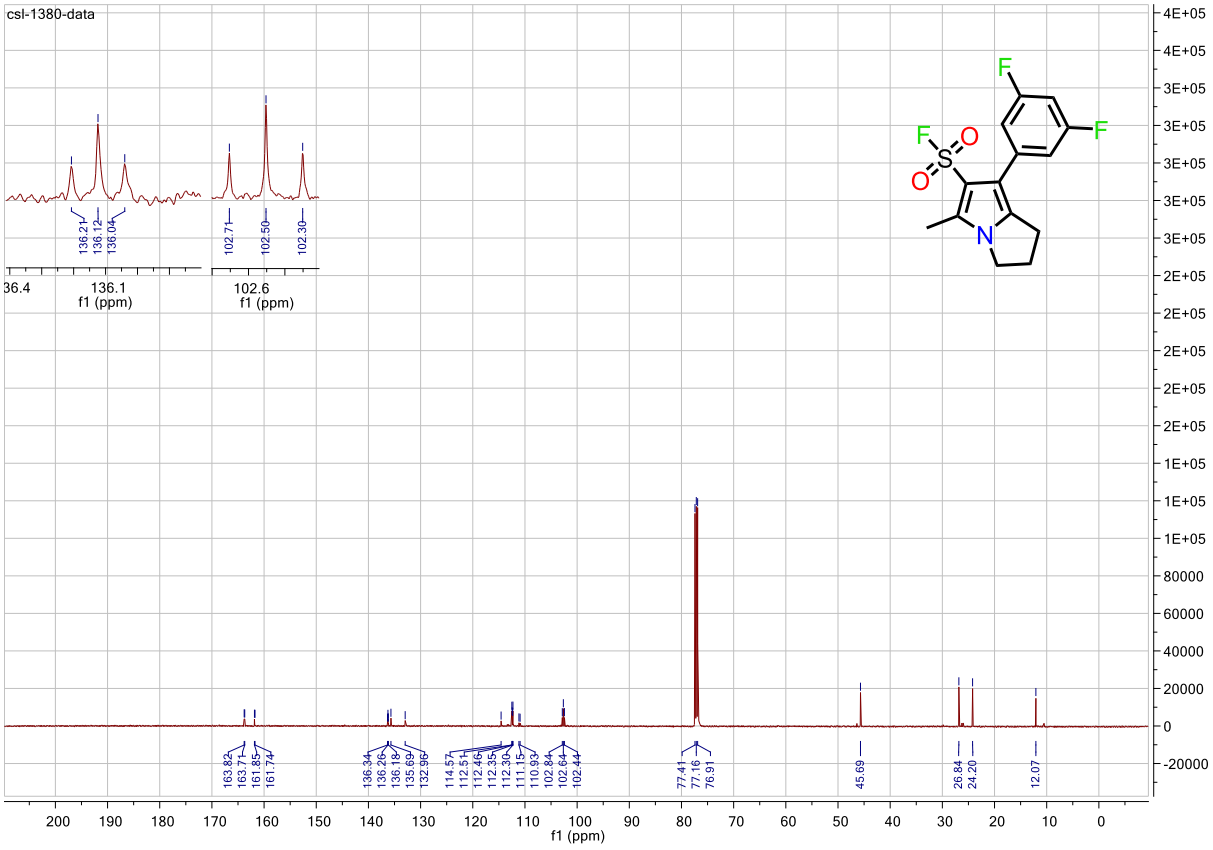

csl-1286-data
OEt
OEt
F
O
O
S
N
7E+08
6E+08
6E+08
6E+08
5E+08
4E+08
4E+08
4E+08
3E+08
2E+08
2E+08
2E+08
1E+08
5E+07
0
-5E+07
73.65
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

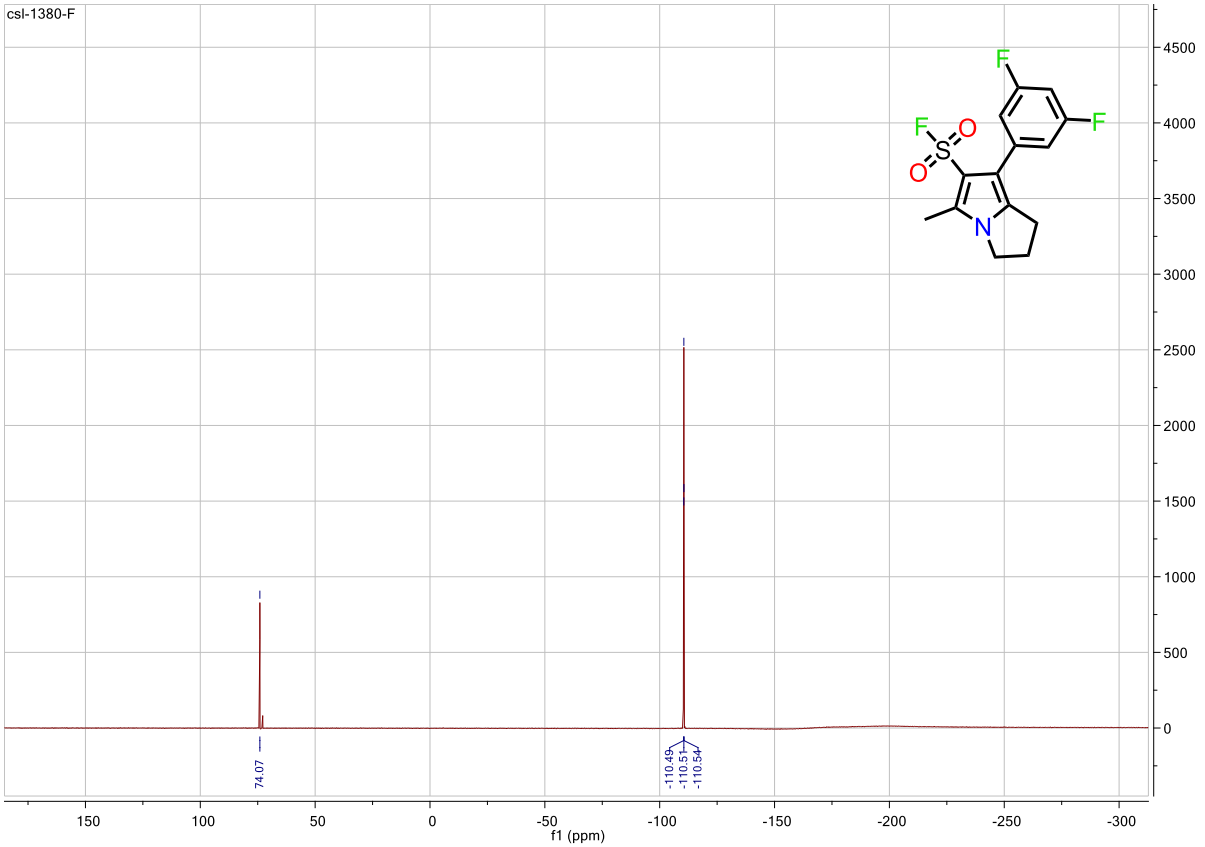

csl-1378-data
CF3
F
O
O
S
N
f1 (ppm)

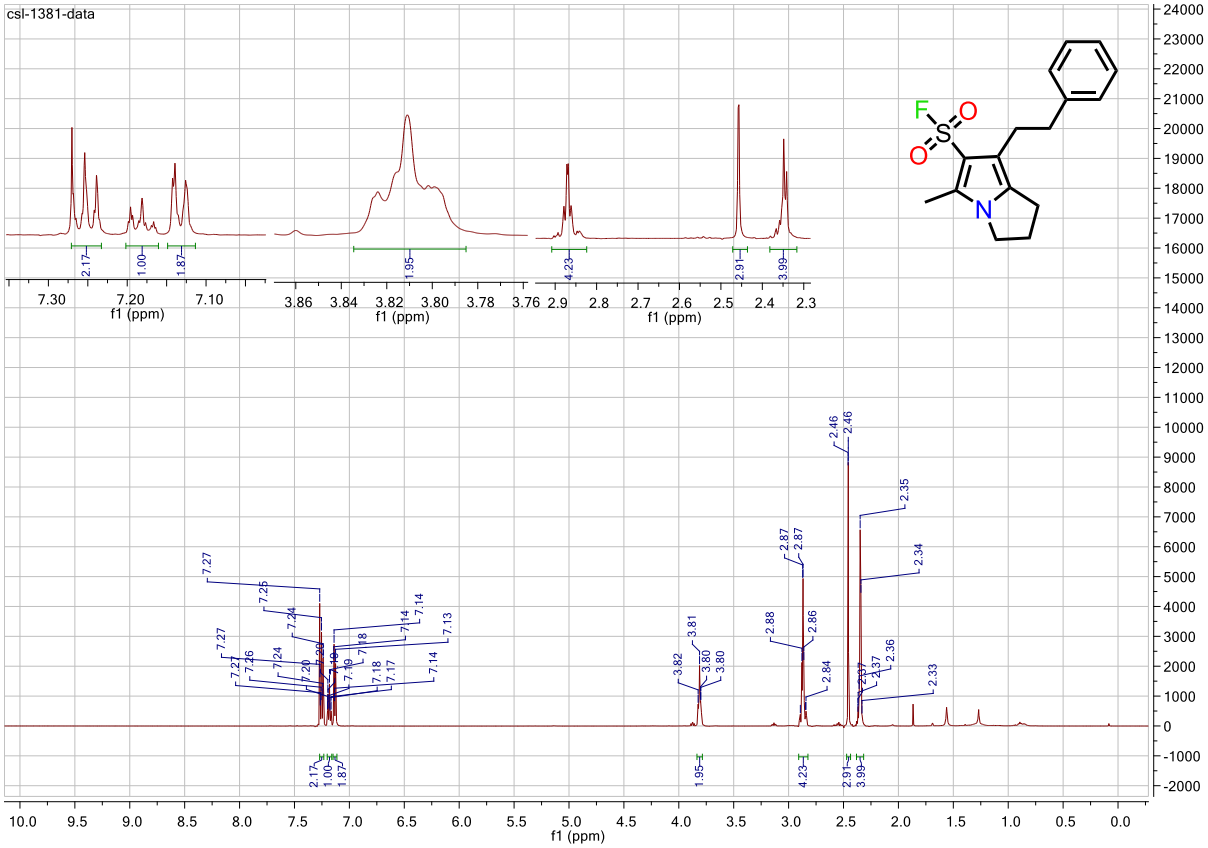

csl-1378-data
CF3
F
O
O
S
N
f1 (ppm)

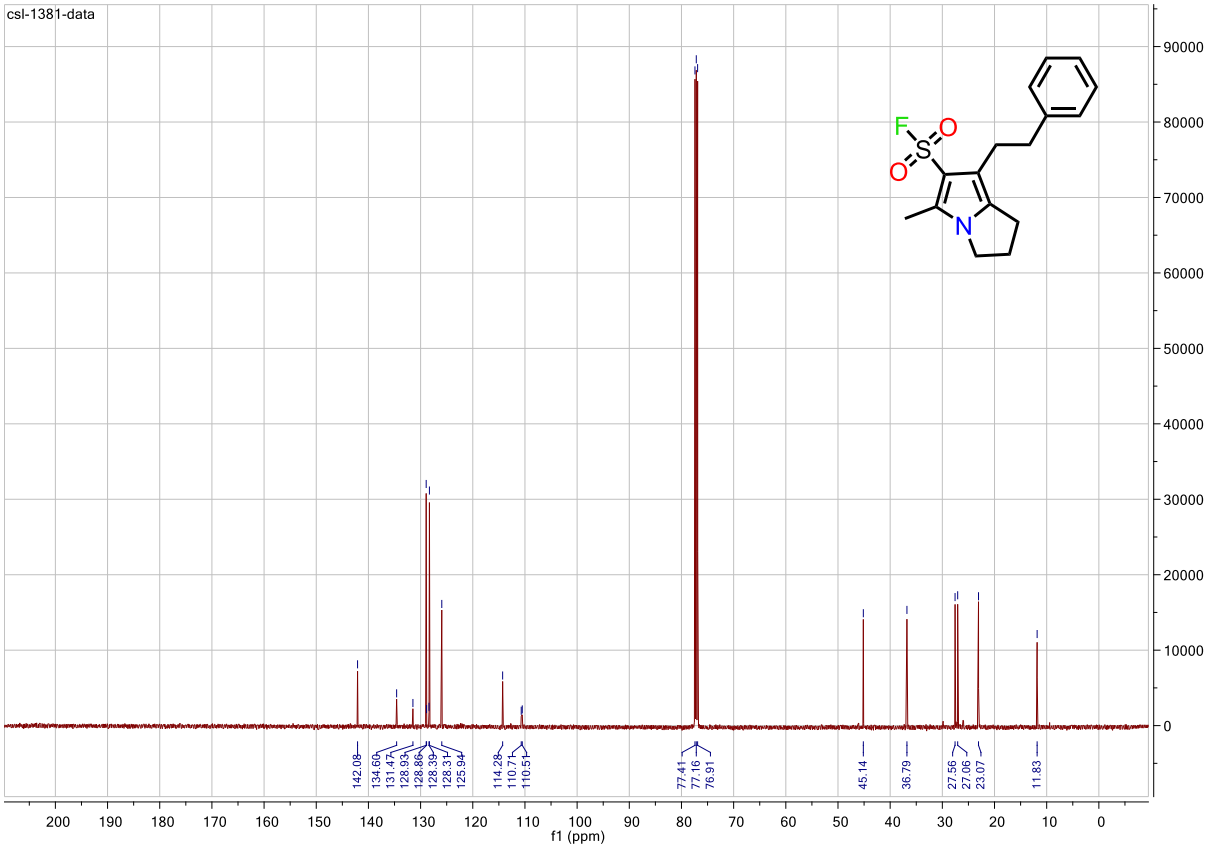

csl-1378-col2
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
74.13
-62.48
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
CF3
F
O
O
S
N

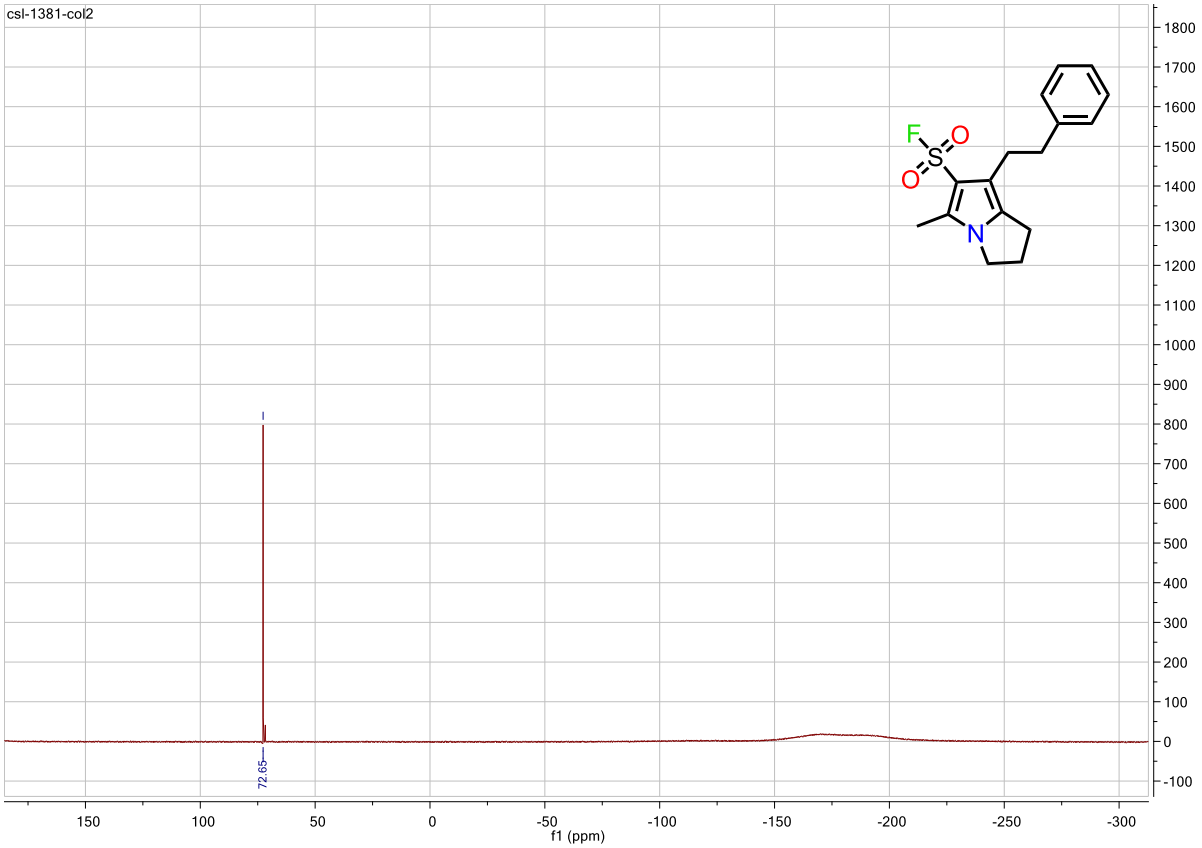

csl-1380-data
F
F
F
O
O
S
N
7.27
6.93
6.92
6.91
6.90
6.90
6.77
6.76
6.76
6.75
6.75
6.74
6.73
6.73
4.00
3.99
3.98
2.92
2.90
2.89
2.60
2.58
2.57
2.55
2.54
2.53
f1 (ppm)

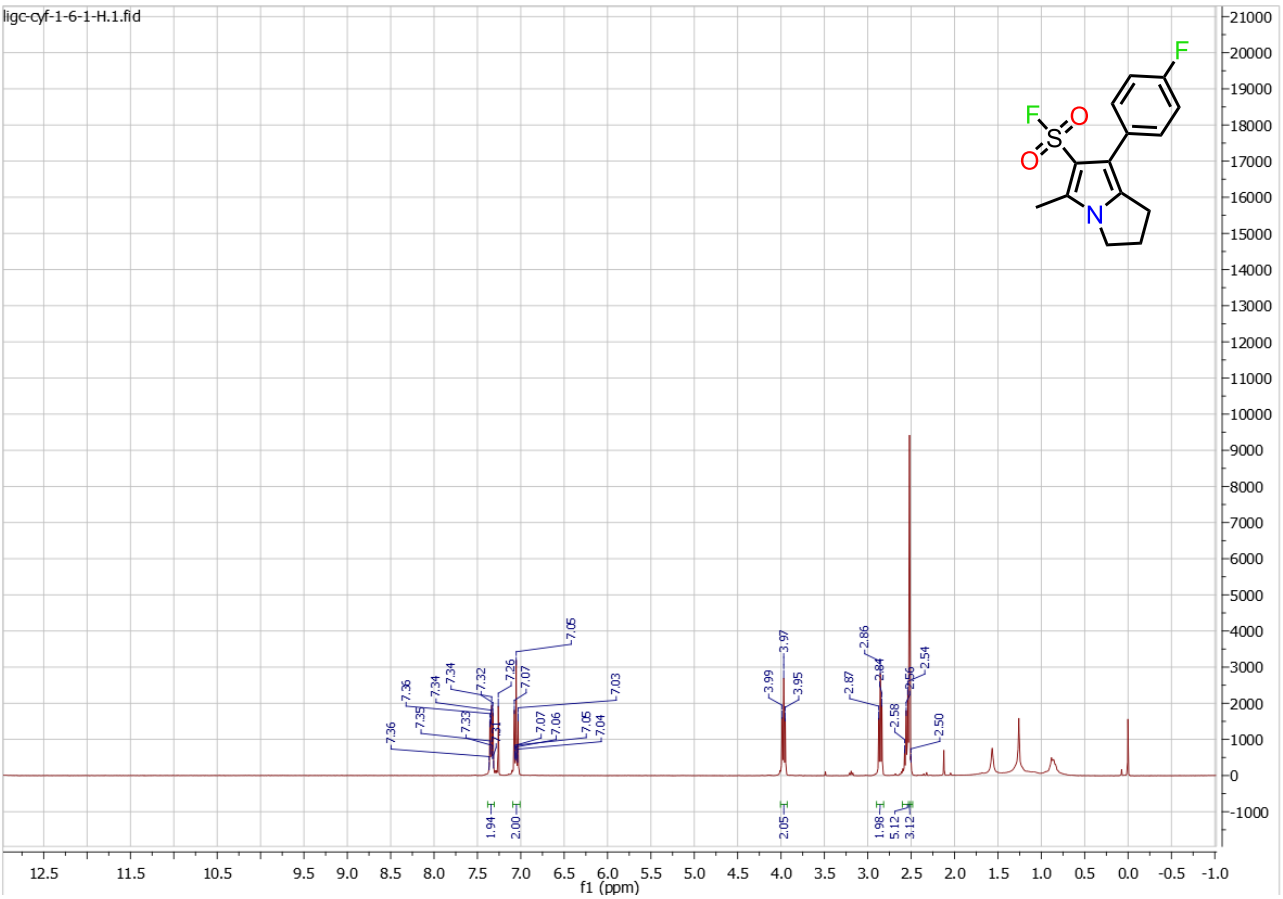

csl-1380-data
F
F
F
O
O
S
N
f1 (ppm)

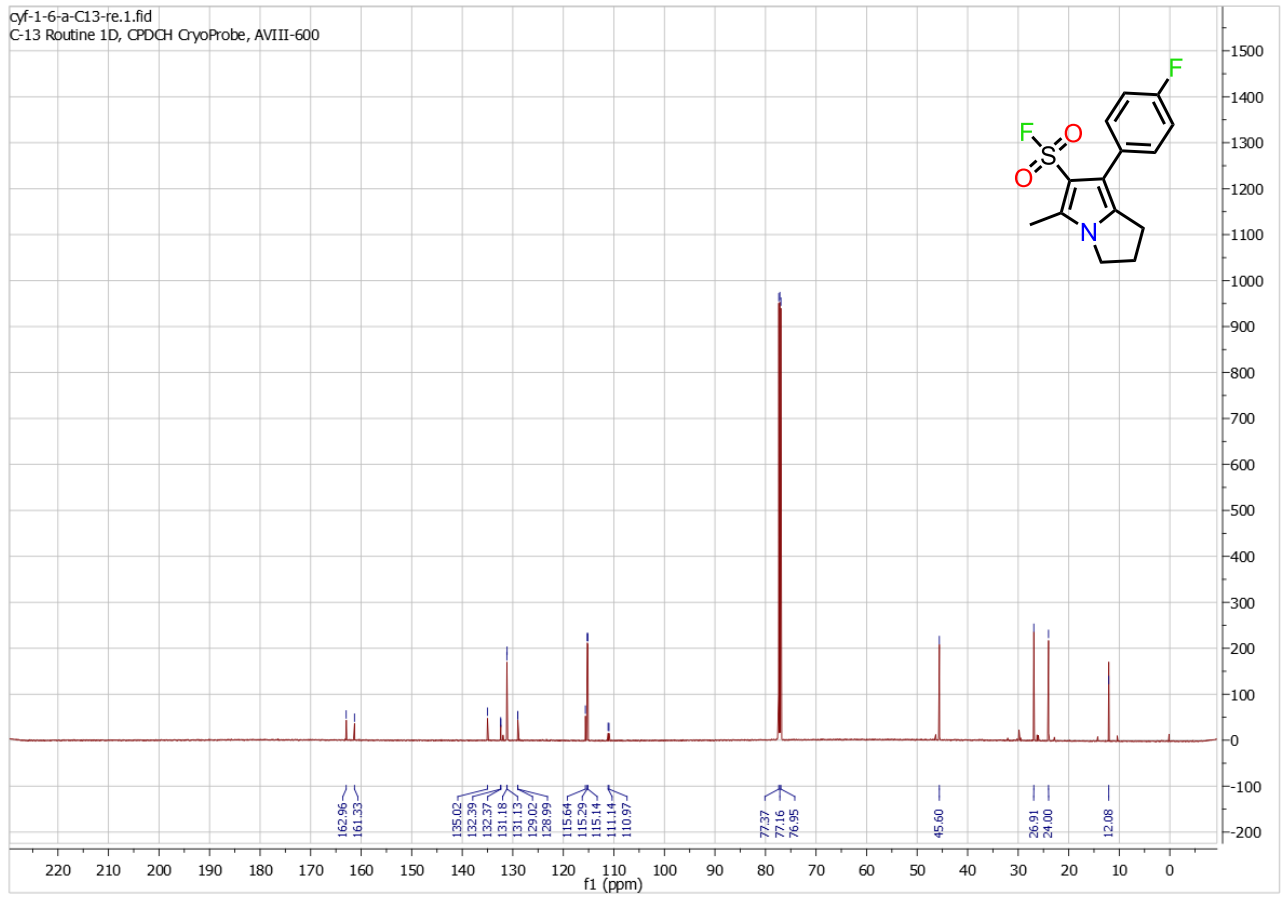

csl-1380-F
F
F
F
O
O
S
N
4500
4000
3500
3000
2500
2000
1500
1000
500
0
74.07
-110.49
-110.51
-110.54
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

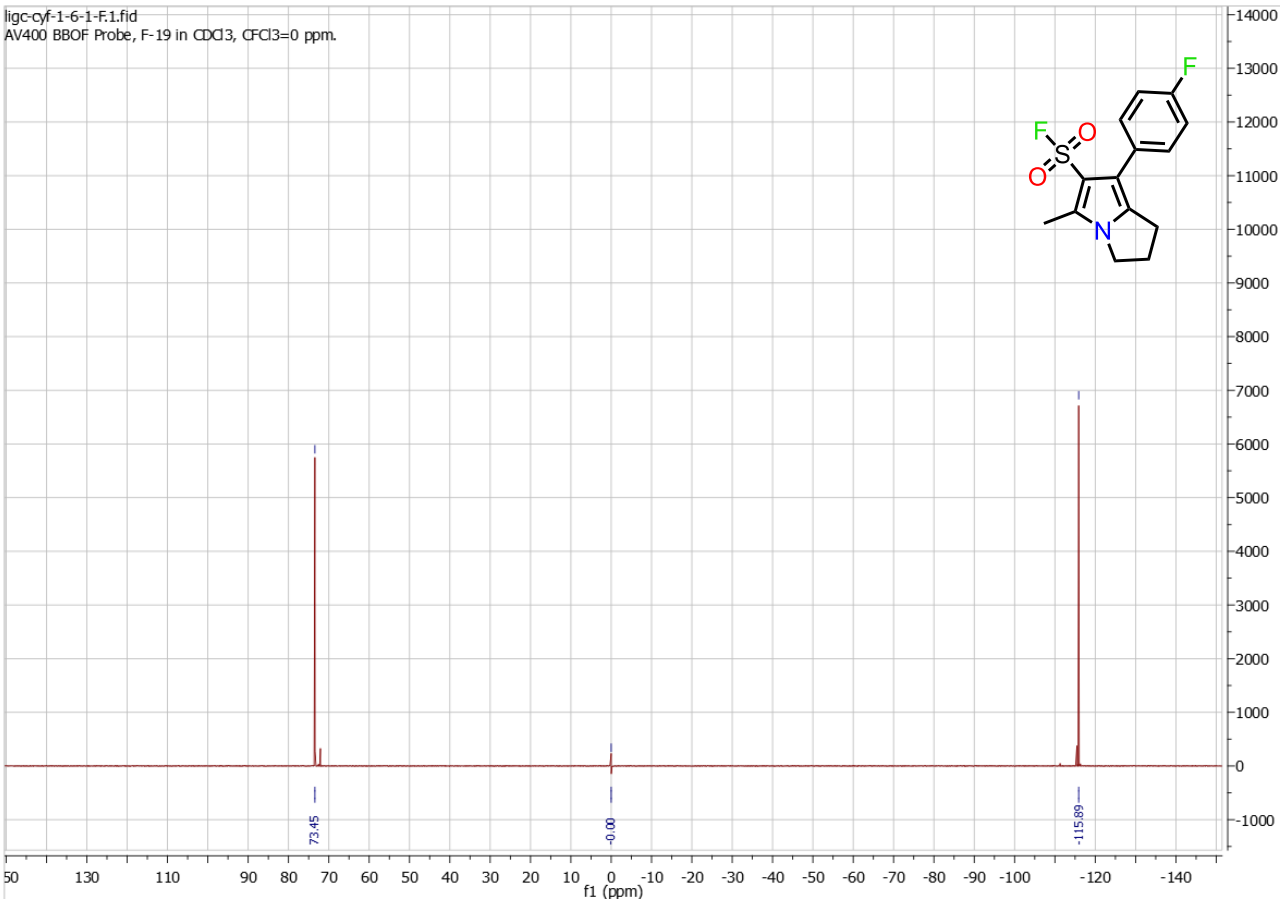

csl-1381-data
f1 (ppm)

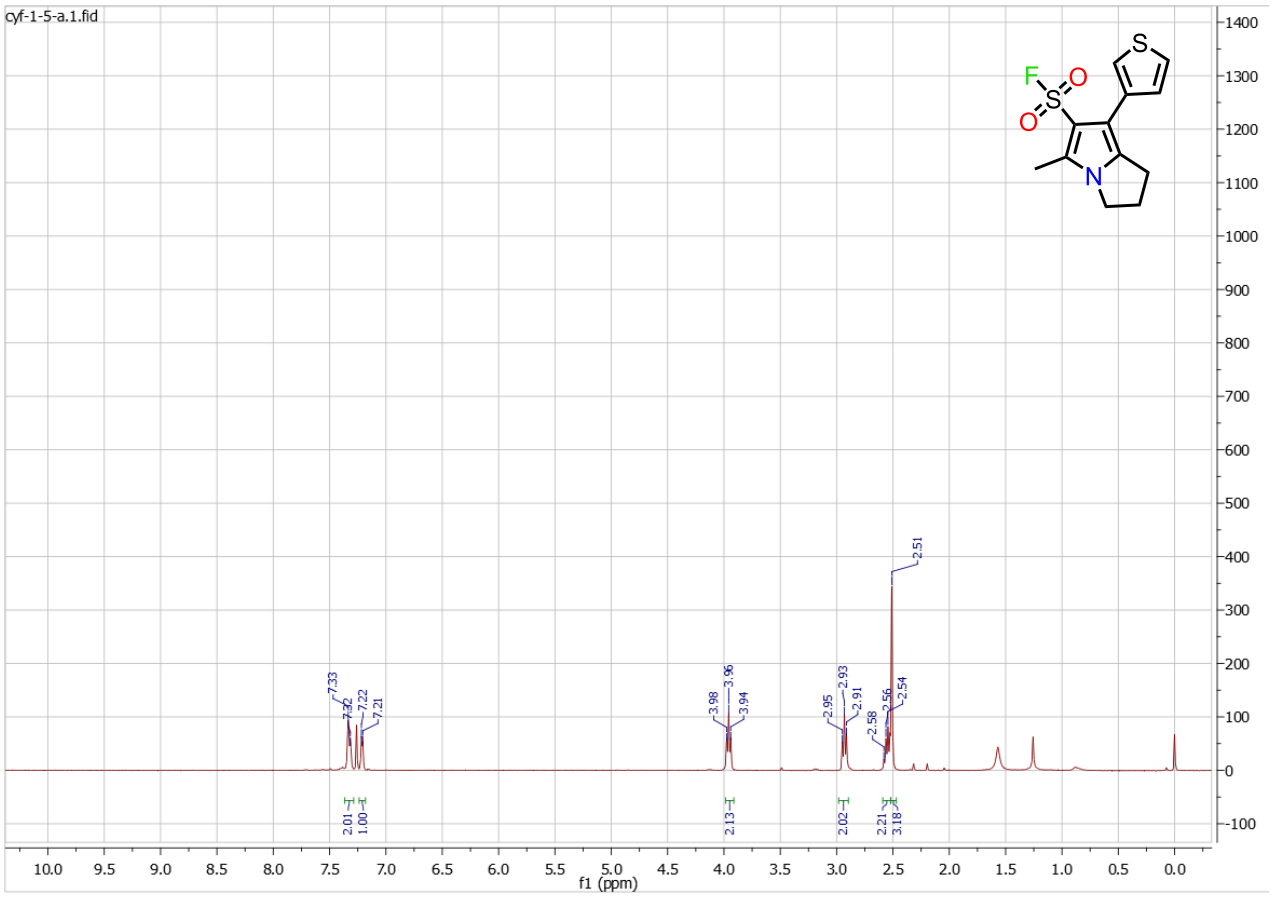

csl-1381-data
f1 (ppm)

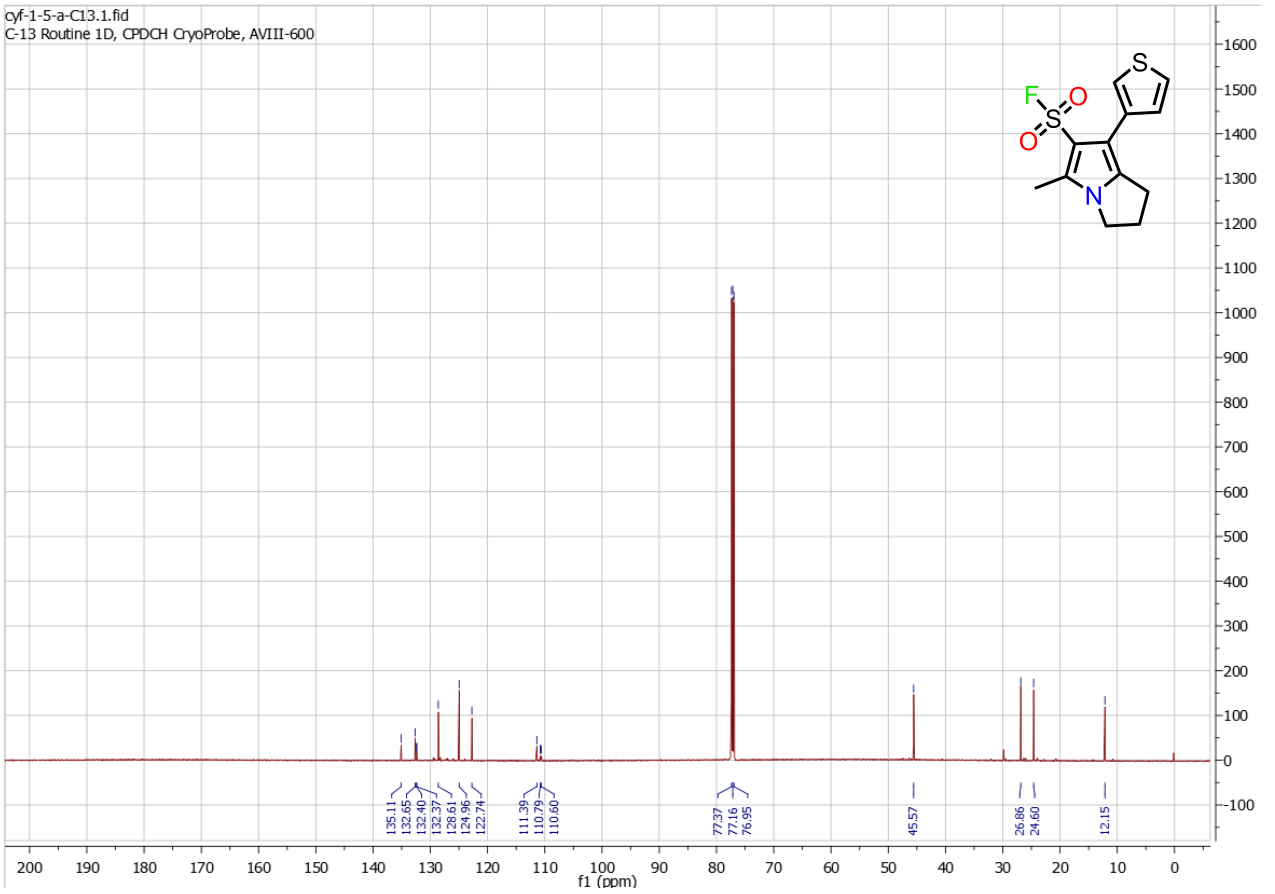

csl-1381-col2
72.65
f1 (ppm)
F
O
O
S
N

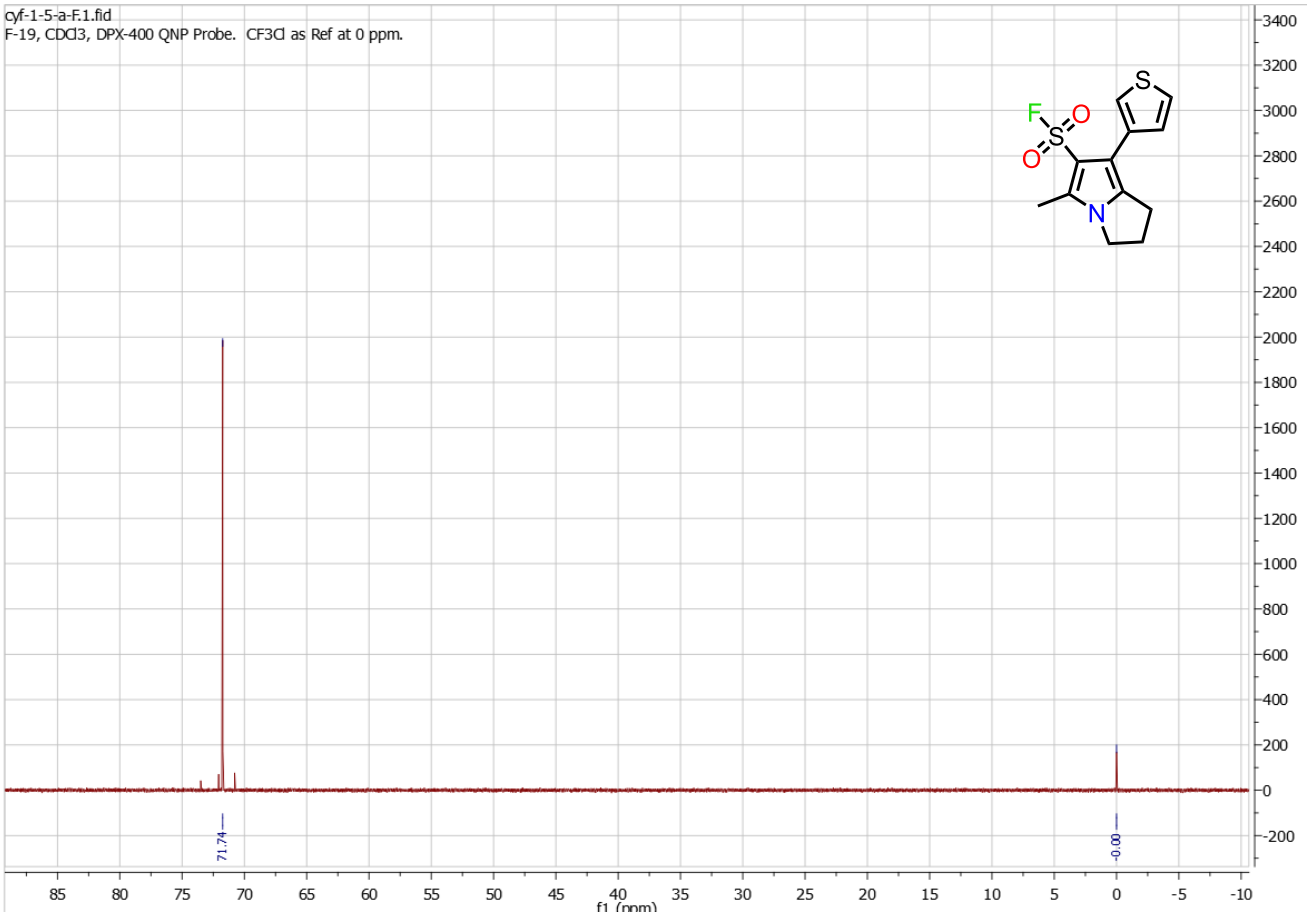

ligc-cyf-1-6-1-H.1.fid
F
F
O
O
S
N
7.36
7.35
7.34
7.34
7.33
7.32
7.31
7.26
7.07
7.07
7.06
7.05
7.05
7.04
7.03
3.99
3.97
3.95
2.87
2.86
2.84
2.66
2.58
2.54
2.50
1.94
2.00
2.05
1.98
5.12
3.12
f1 (ppm)

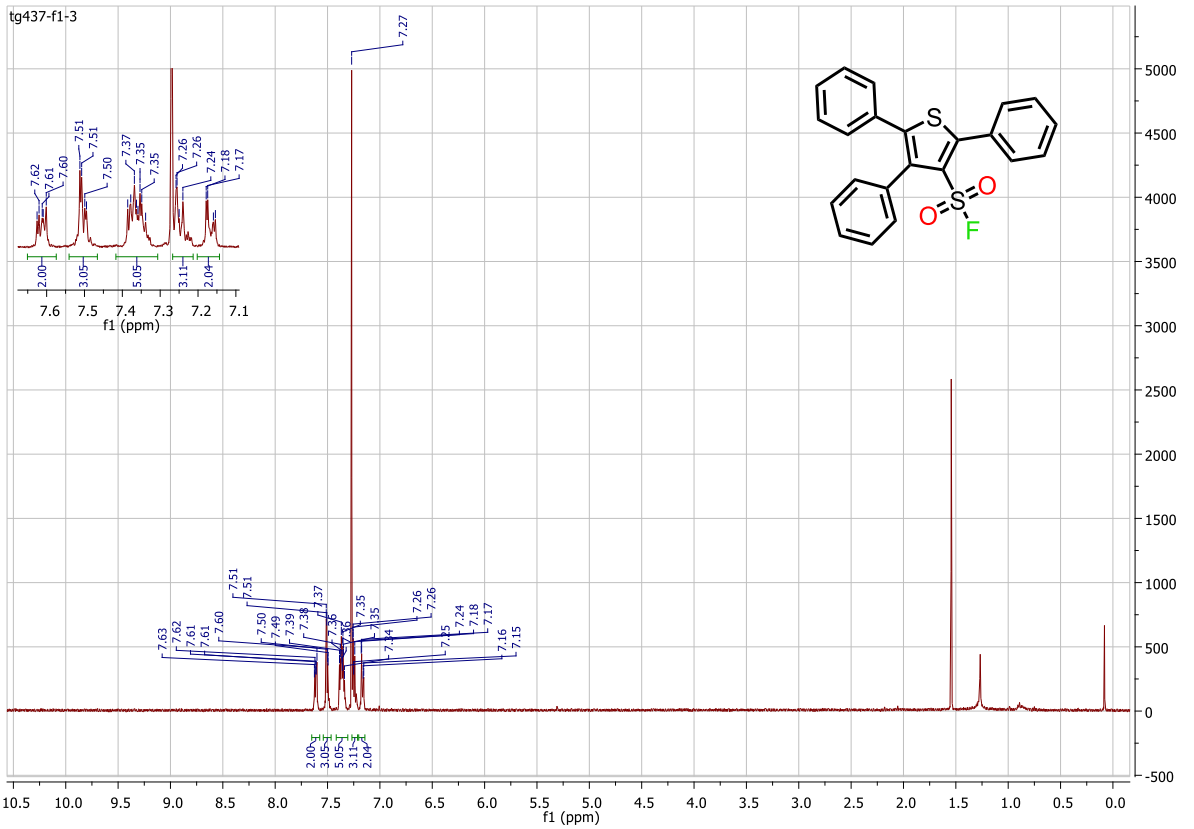

cyf-1-6-a-C13-re.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
F
F
O
O
S
N
162.96
161.33
135.02
132.39
132.37
131.18
131.13
129.02
128.99
115.64
115.29
115.14
111.14
110.97
77.37
77.16
76.95
45.60
26.91
24.00
12.08
f1 (ppm)

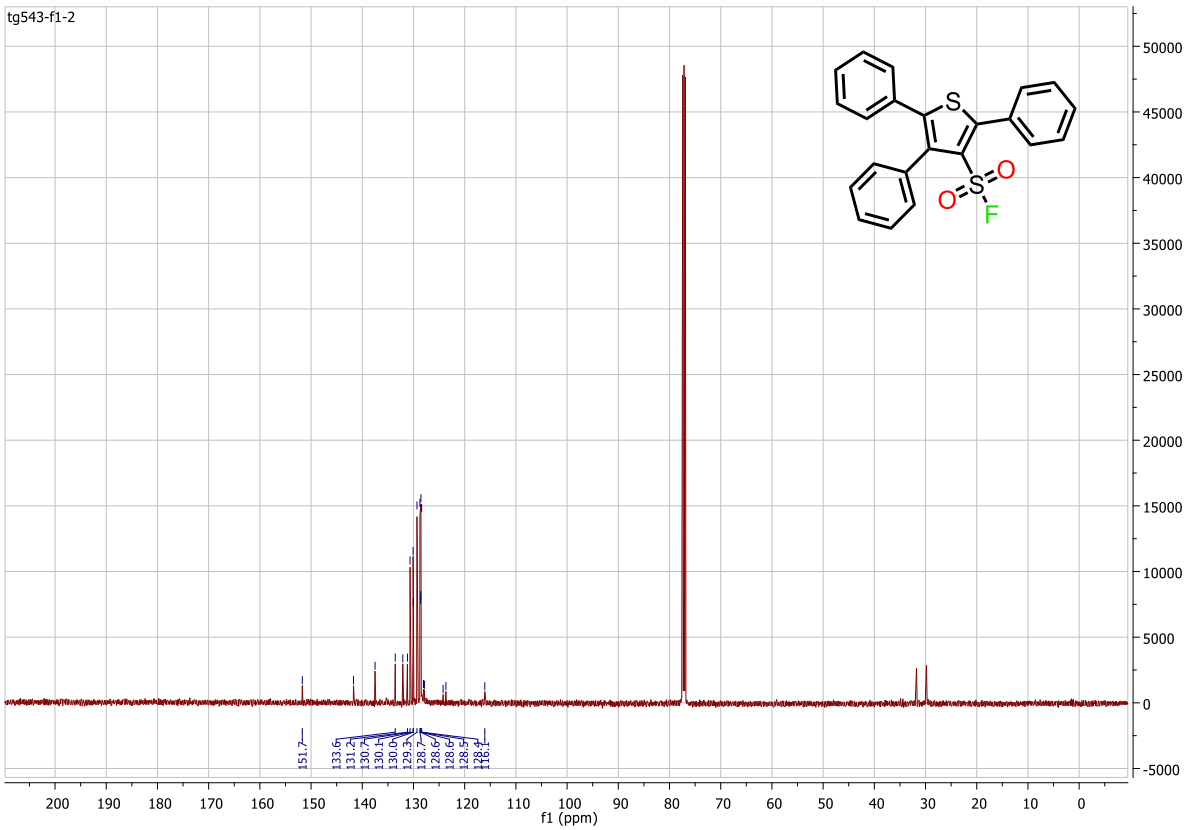

igc-cyf-1-6-1-F.1.fid
AV400 BBOF Probe, F-19 in CDCl3, CFCl3=0 ppm.
F
F
O
O
S
N
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
73.45
-0.00
-115.89
50
130
110
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-120
-140
f1 (ppm)

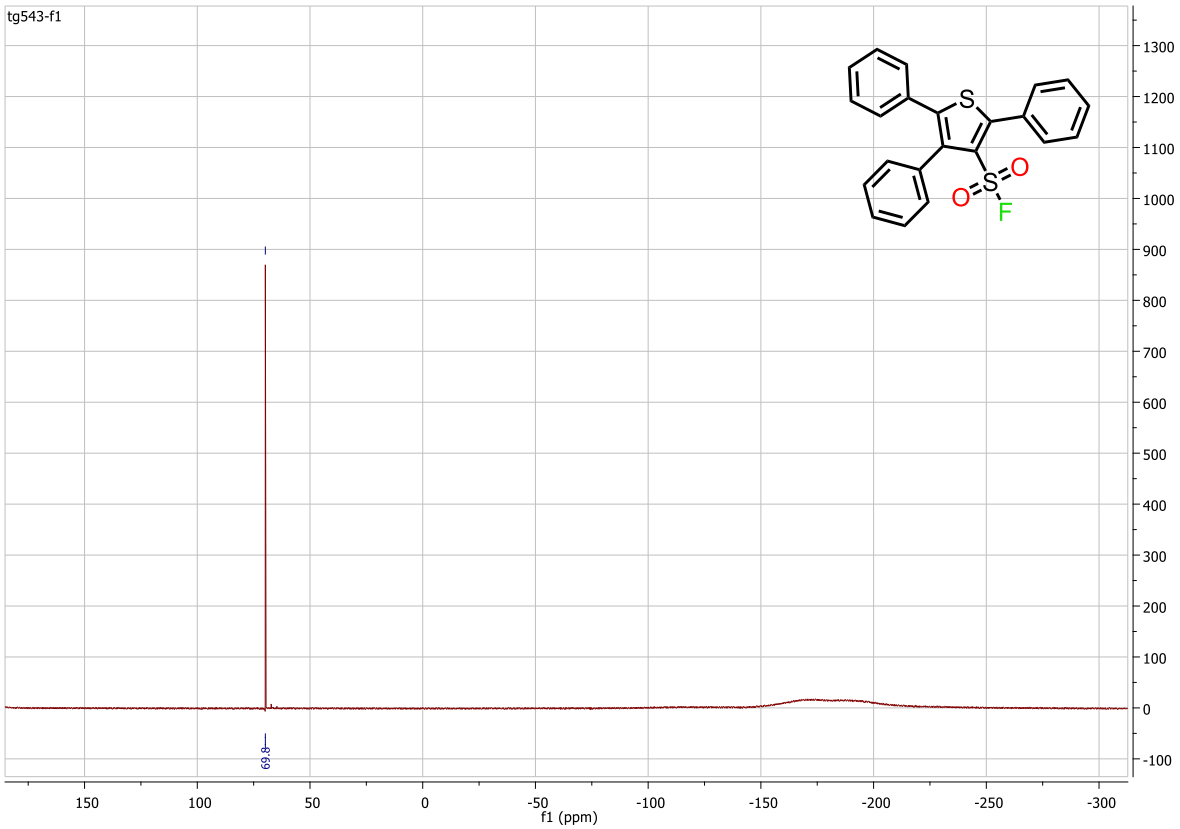

cyf-1-5-a.1.fid
F
O
O
S
S
N
7.33
7.32
7.22
7.21
3.98
3.96
3.94
2.95
2.93
2.91
2.58
2.56
2.54
2.51
2.01
1.00
2.13
2.02
2.21
3.18
f1 (ppm)

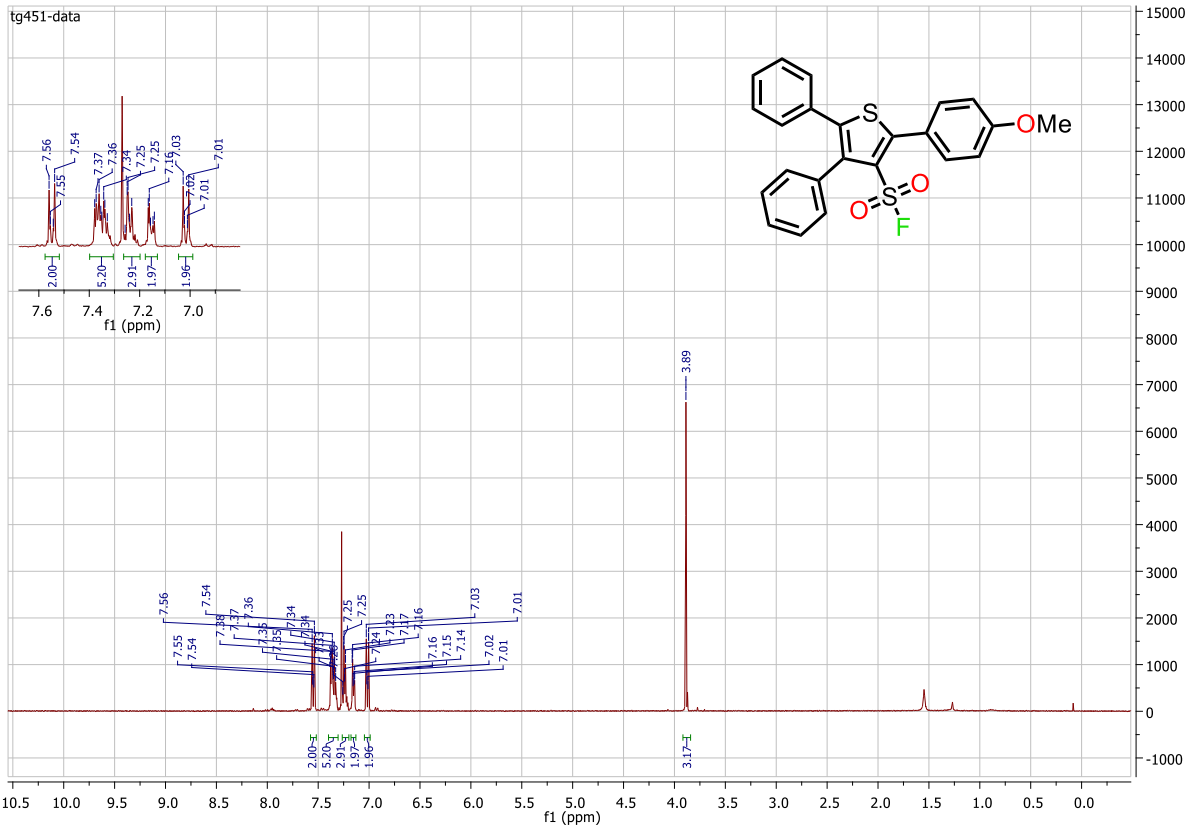

cyf-1-5-a-C13.1.fid
C-13 Routine 1D, CPDCH CryoProbe, AVIII-600
F
O
O
S
S
N
135.11
132.65
132.40
132.37
128.61
124.96
122.74
111.39
110.79
110.60
77.37
77.16
76.95
45.57
26.86
24.60
12.15
f1 (ppm)

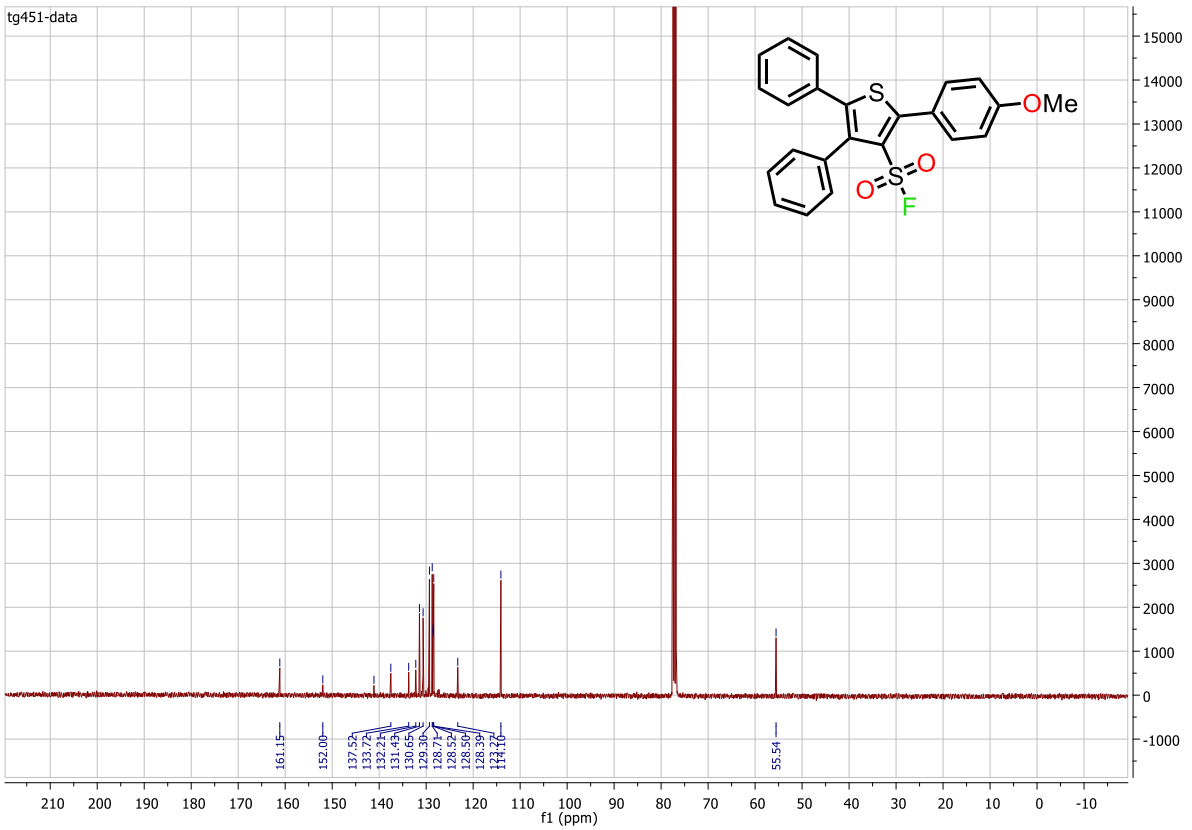

cyf-1-5-a-F.1.fid
F-19, CDCl3, DPX-400 QNP Probe. CF3Cl as Ref at 0 ppm.
F
O
S
O
S
N
71.74
-0.00
f1 (ppm)

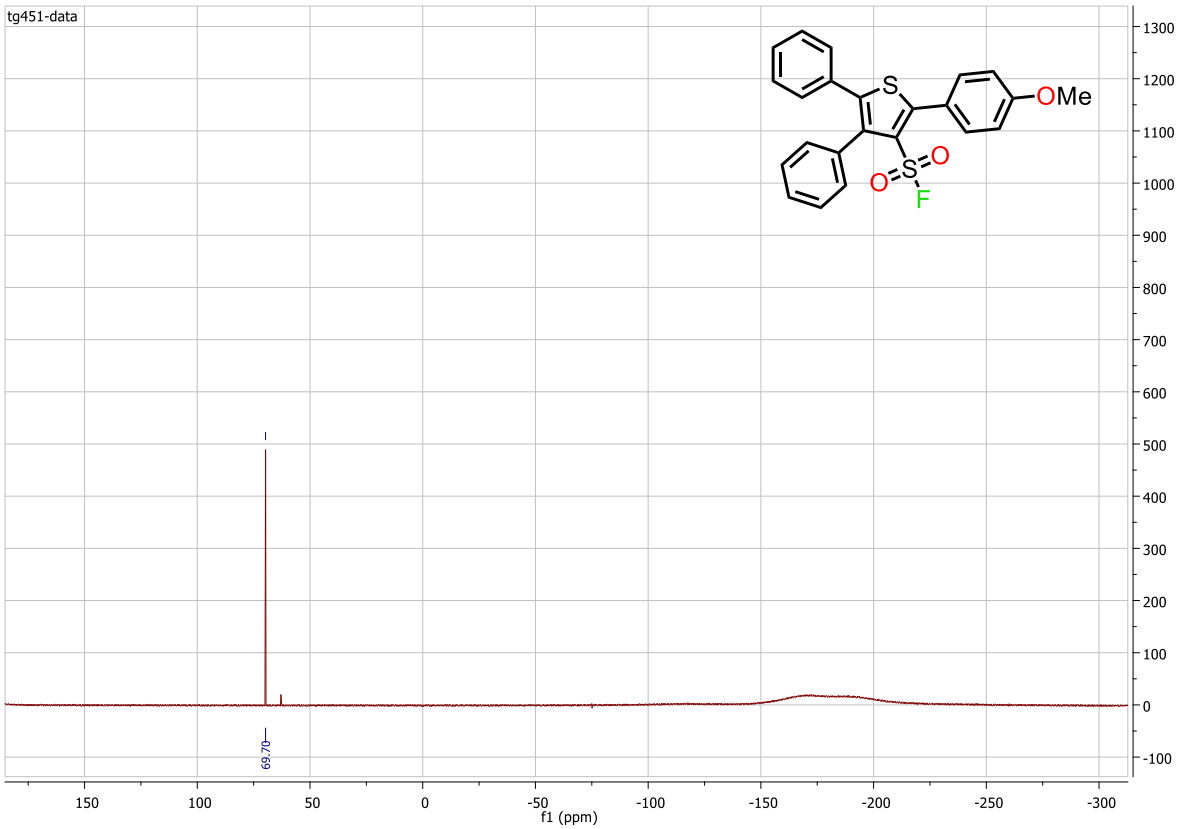

tg437-f1-3
f1 (ppm)

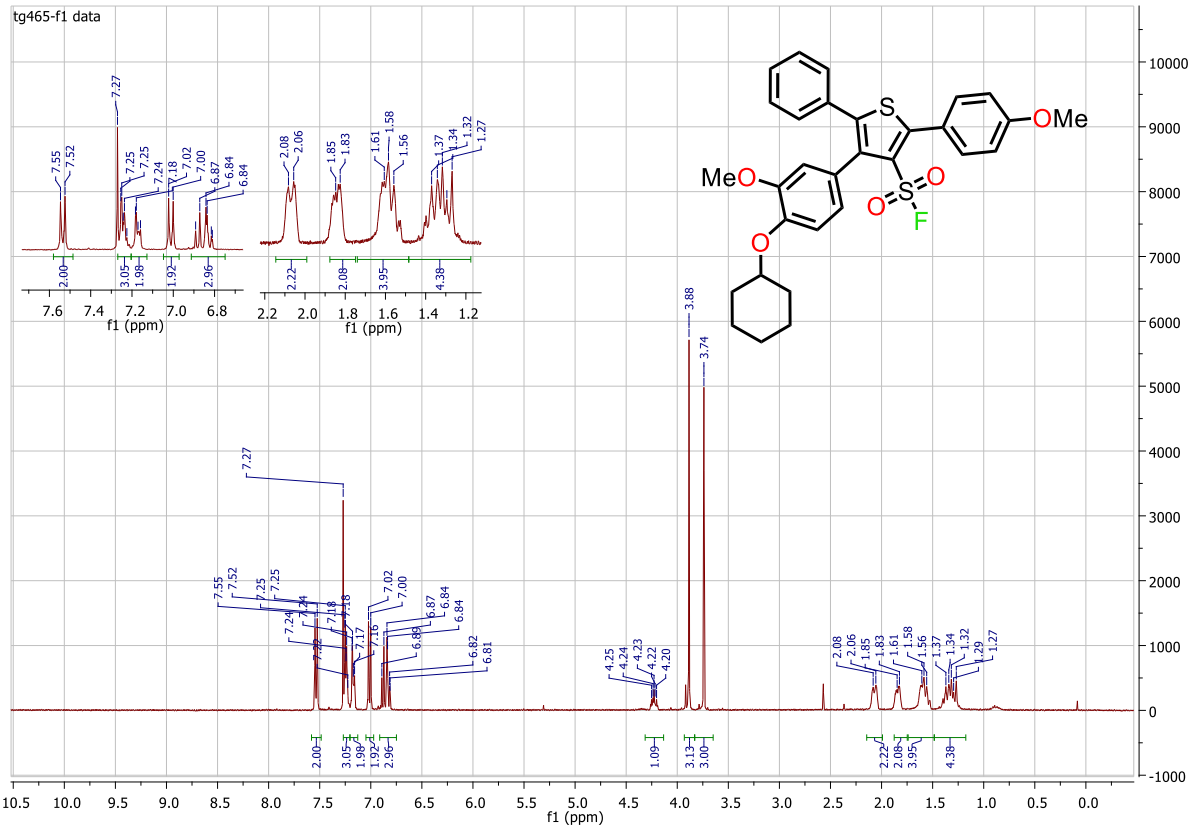

tg543-f1-2
f1 (ppm)

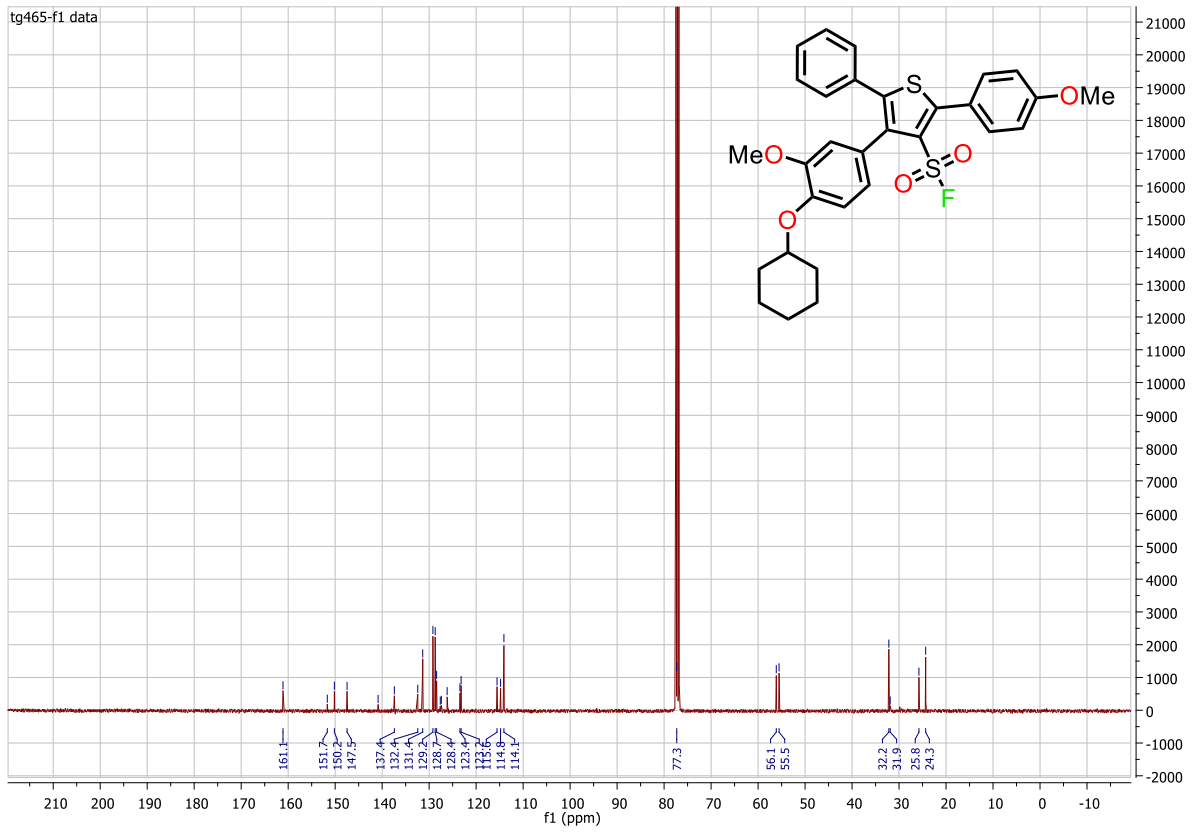

tg543-f1
S
O
O
F
69.8
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100

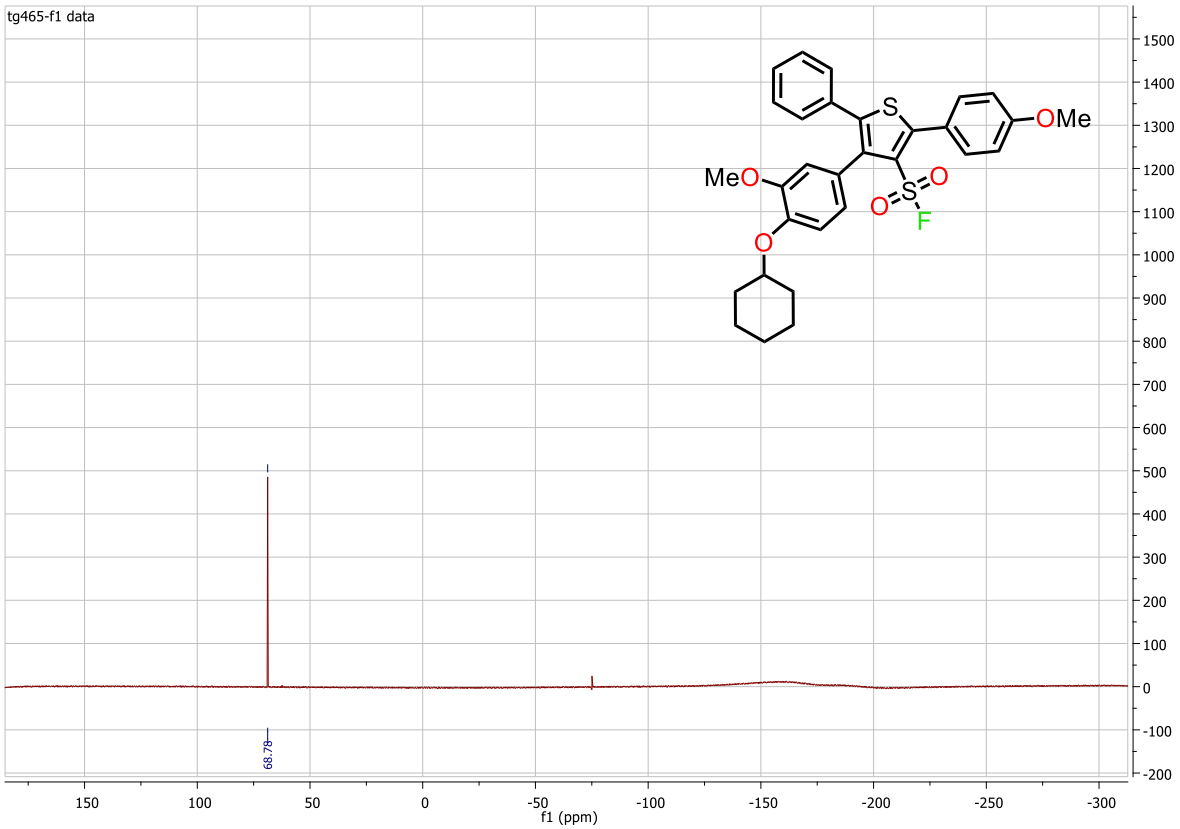

tg451-data
OMe
S
O
O
F
f1 (ppm)

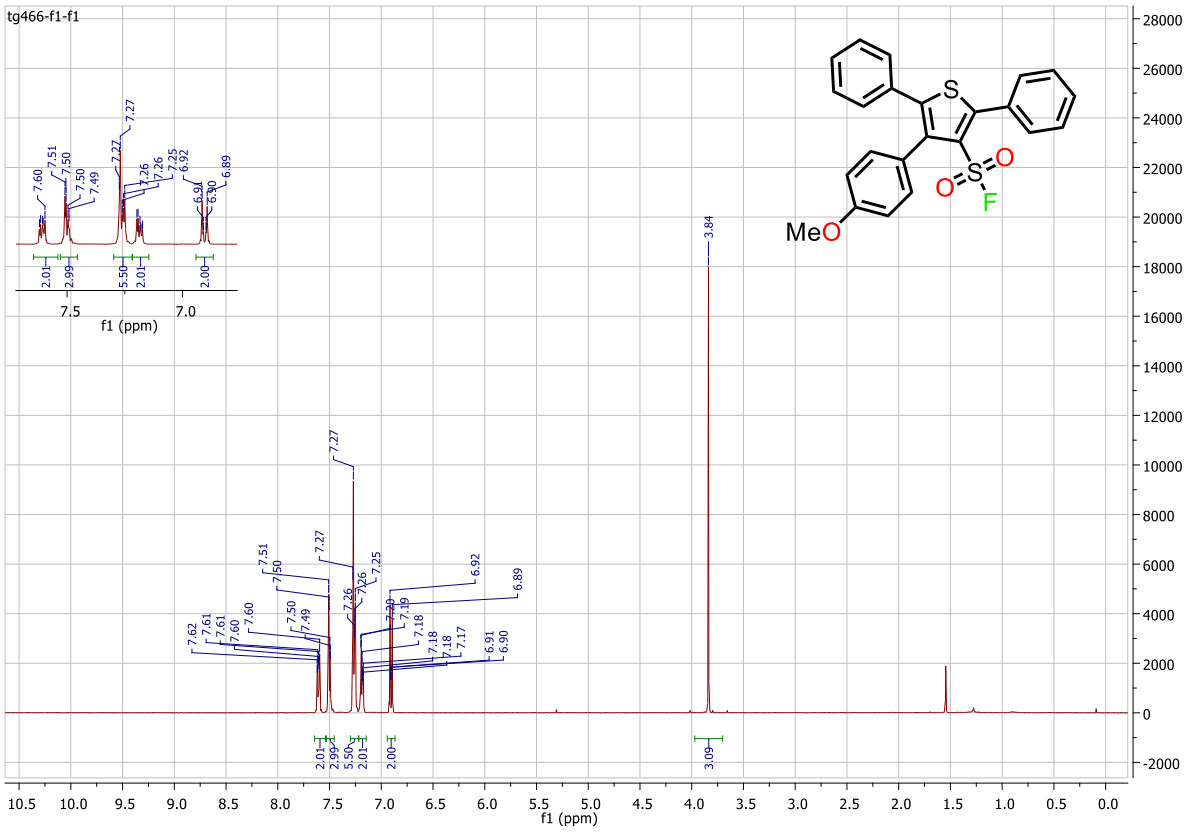

tg451-data
OMe
S
O
O
F
f1 (ppm)

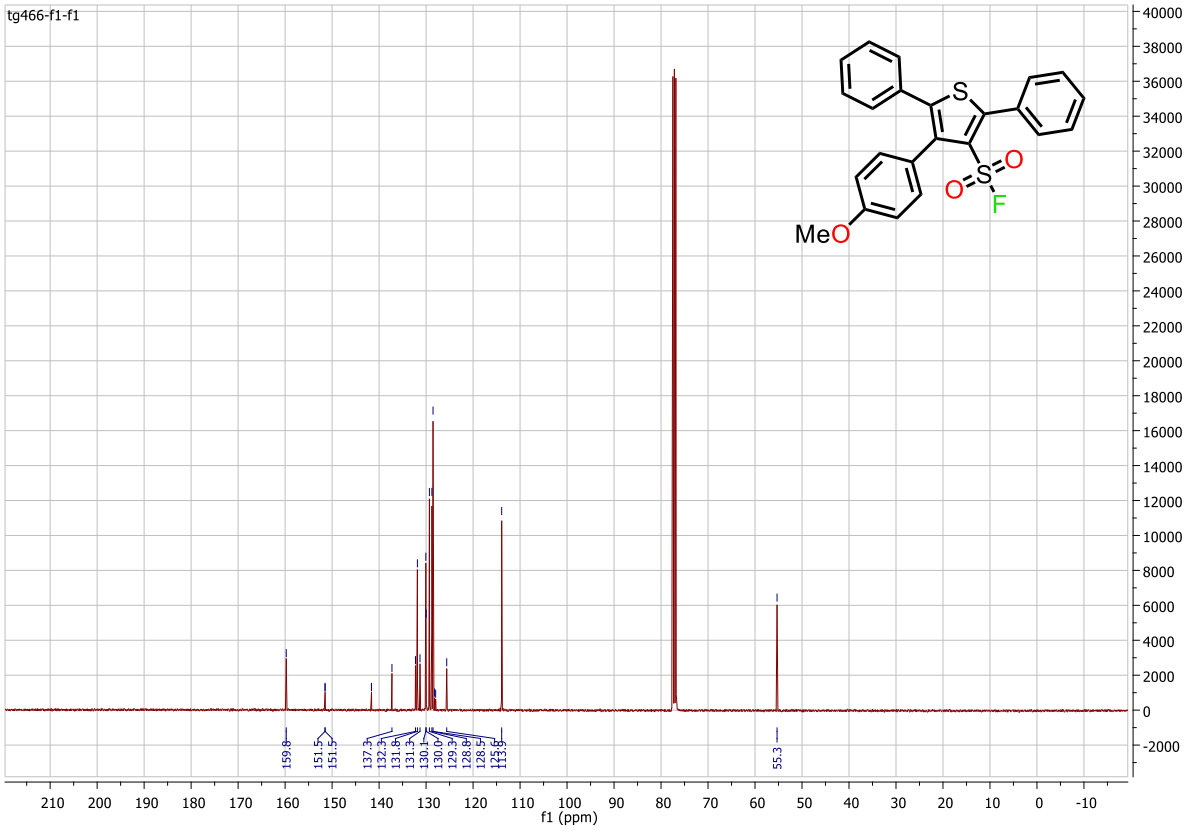

tg451-data
S
OMe
O
O
S
F
69.70
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100

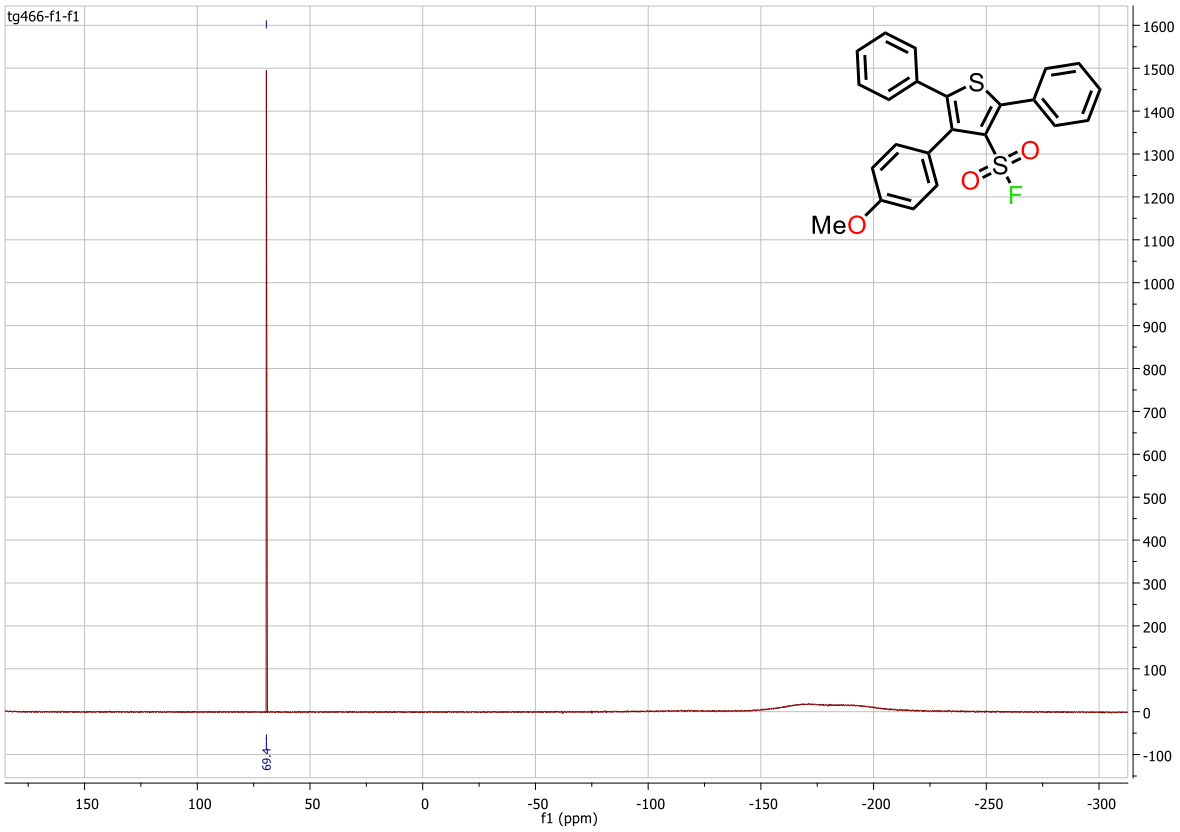

tg465-f1 data
OMe
MeO
O
S
O
O
S
F
f1 (ppm)

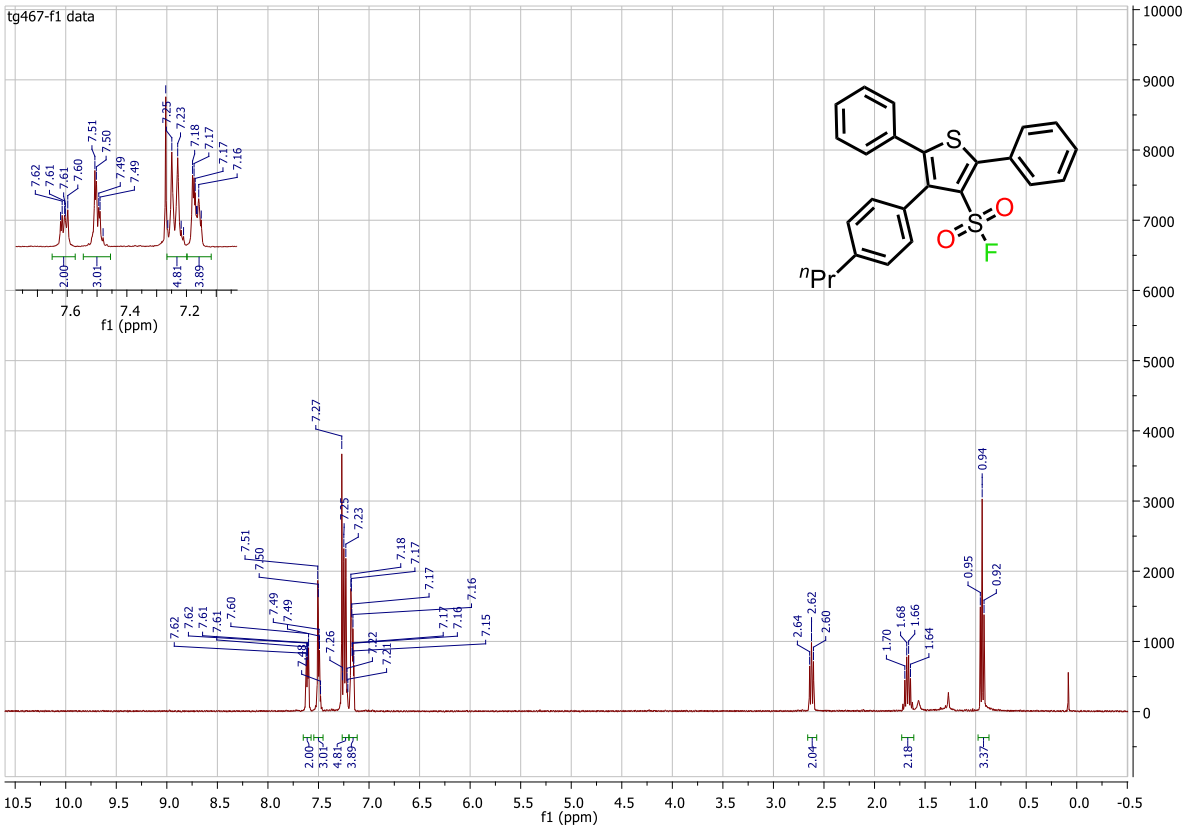

tg465-f1 data
OMe
MeO
O
S
O
O
S
F
f1 (ppm)

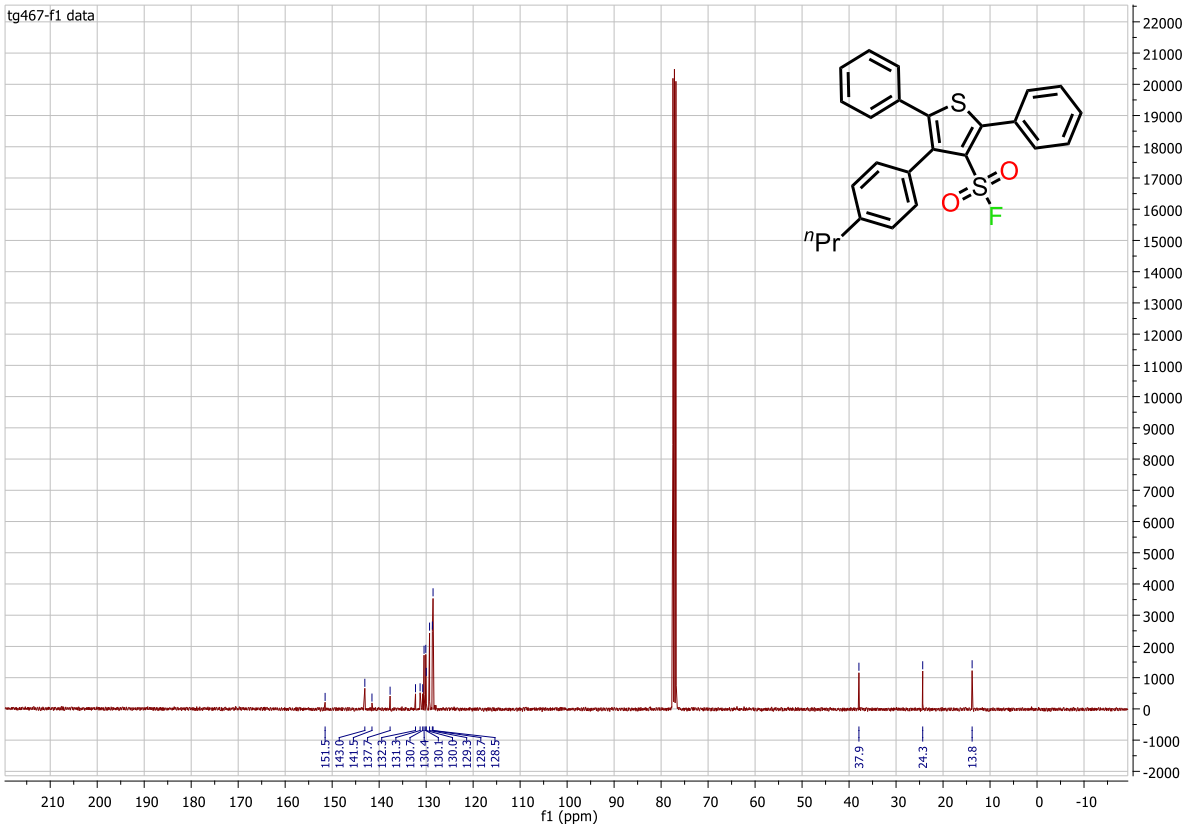

tg465-f1 data
S
OMe
MeO
O
O
S
O
F
68.78
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
-200

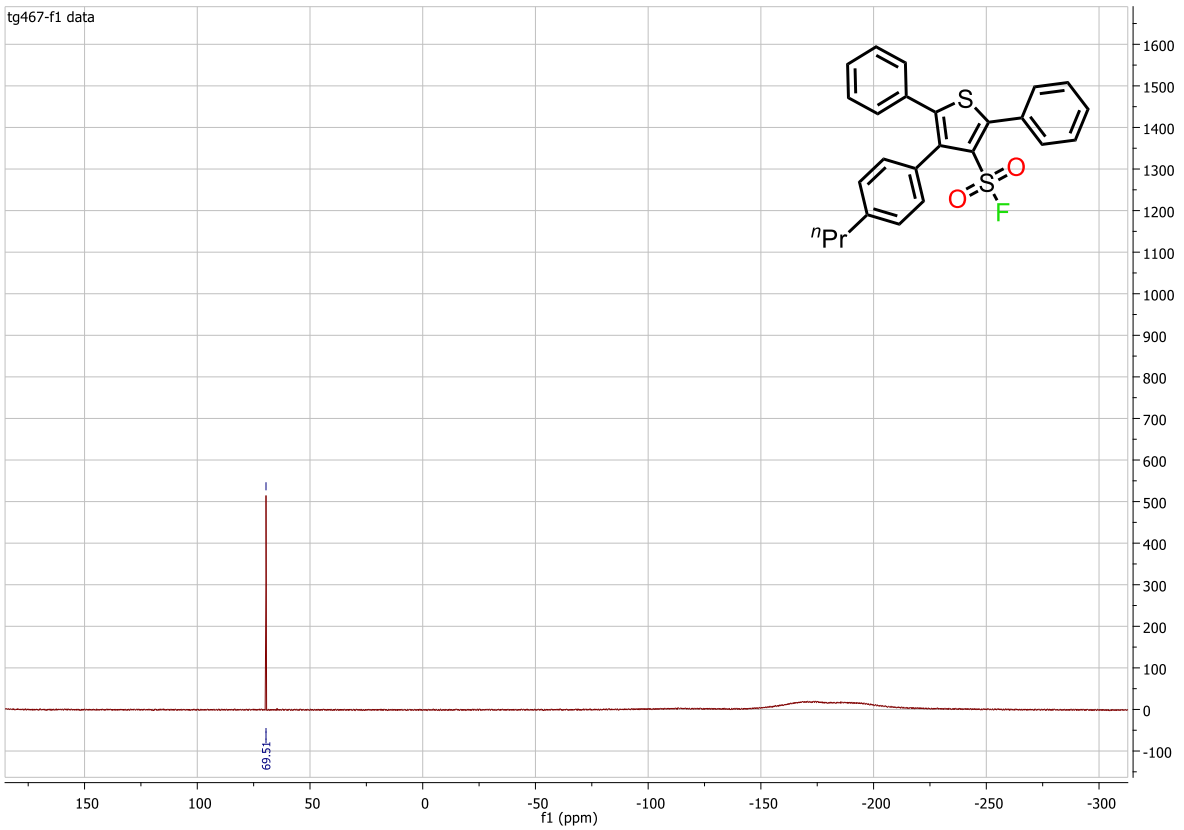

tg466-f1-f1
MeO
S
O
O
F
f1 (ppm)

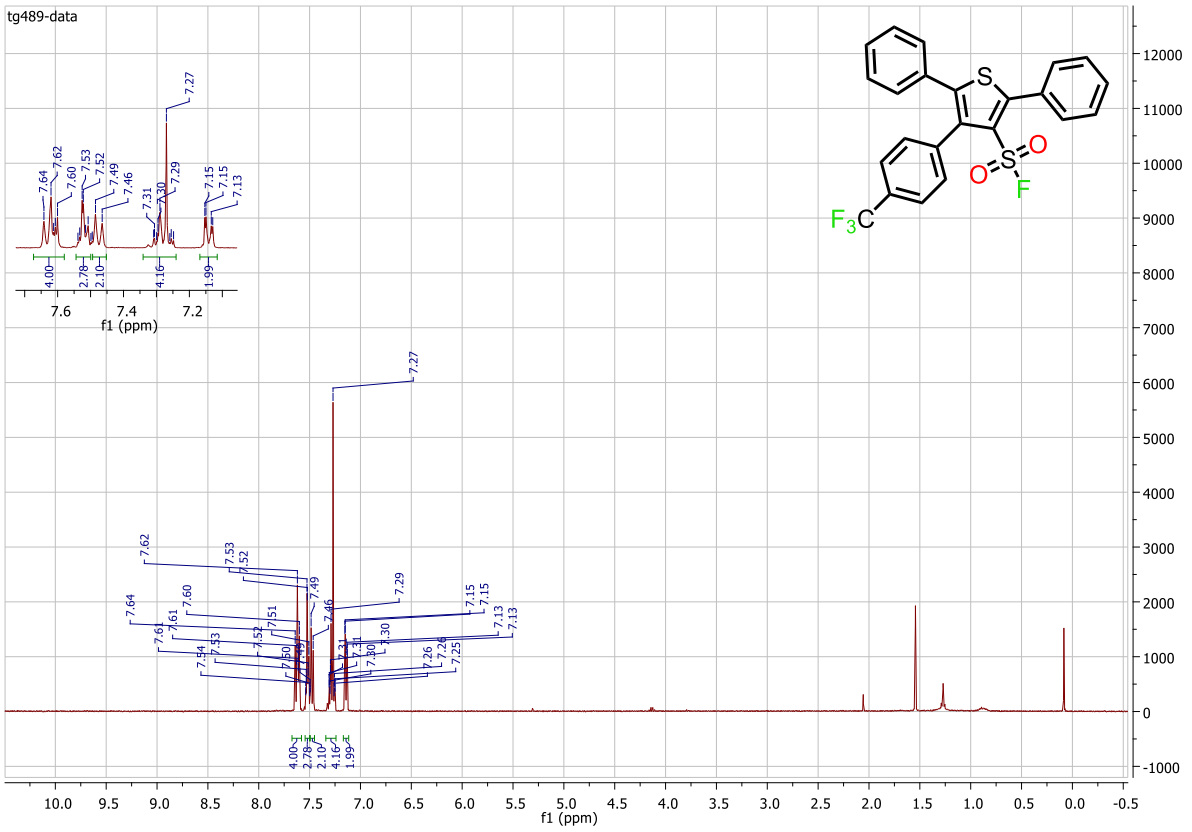

tg466-f1-f1
MeO
S
O
O
F
f1 (ppm)

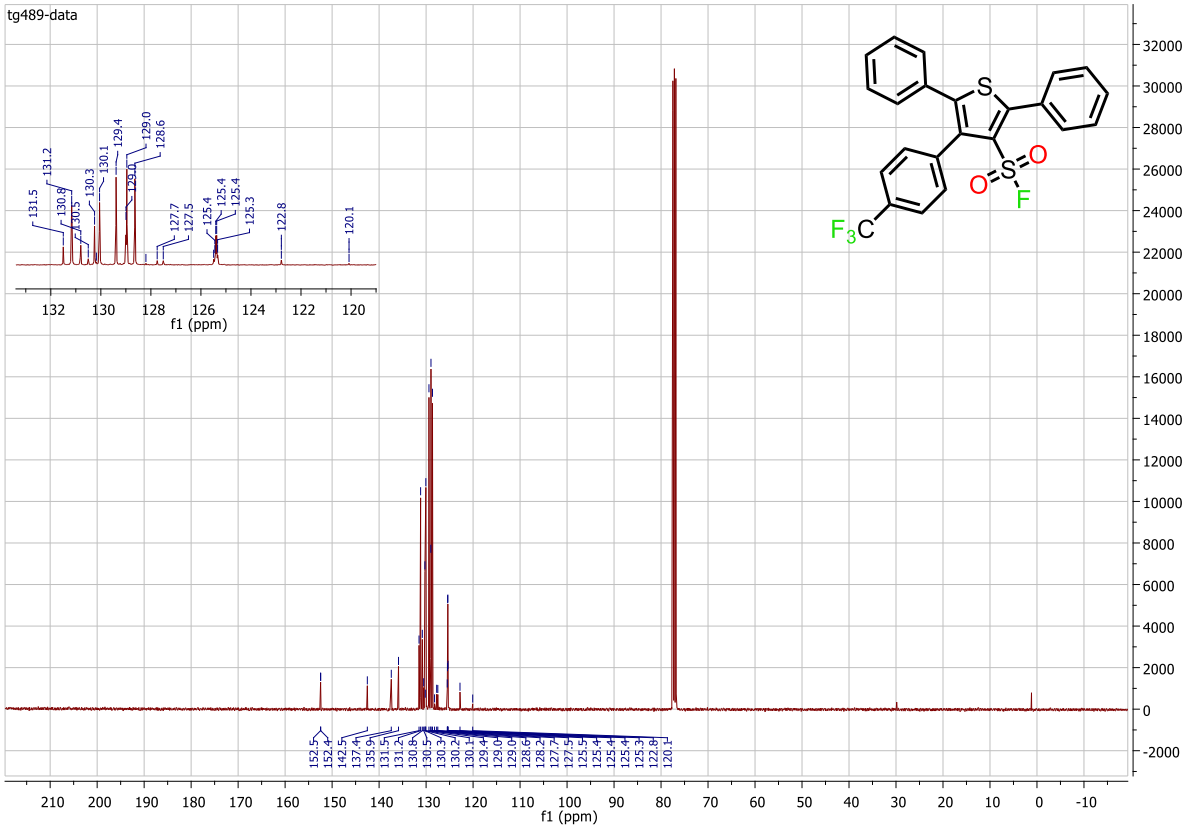

tg466-f1-f1
69.4
f1 (ppm)
MeO
S
O
O
F

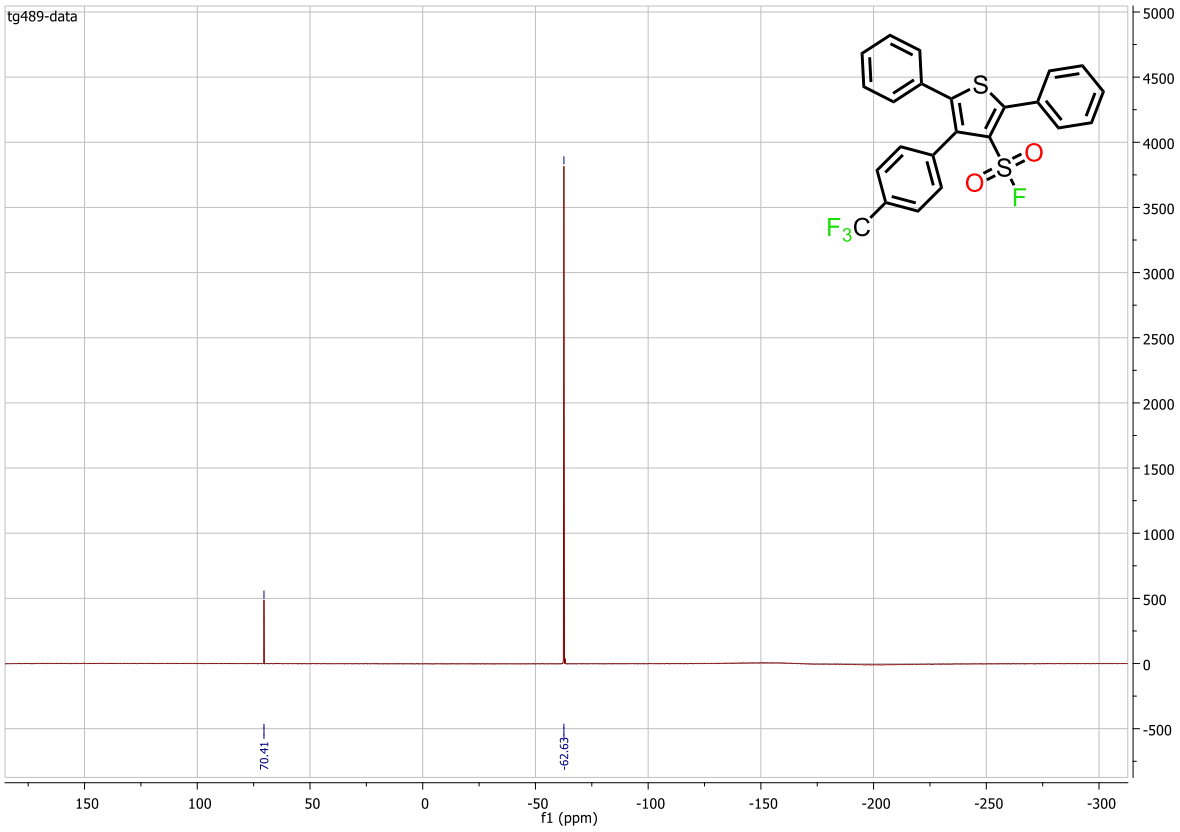

tg467-f1 data
f1 (ppm)

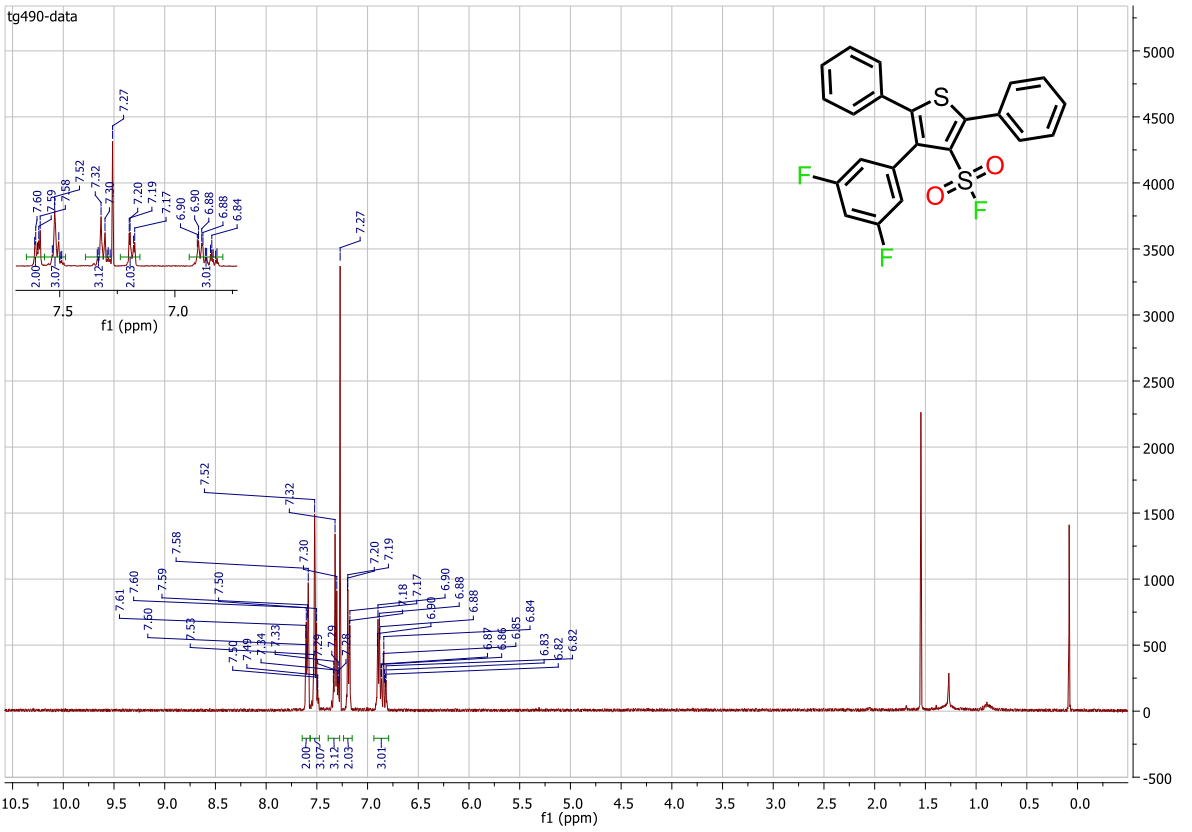

tg467-f1 data
f1 (ppm)

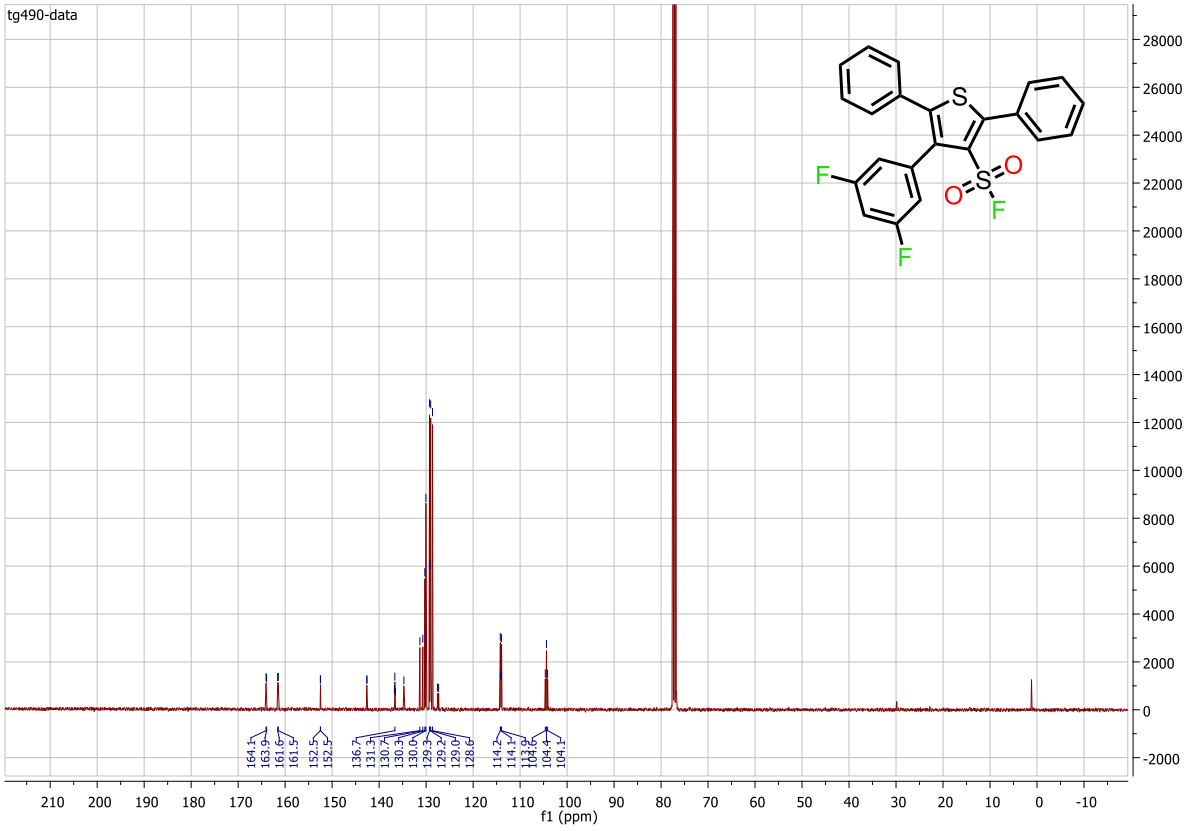

tg467-f1 data
S
O
O
S
F
nPr
69.51
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100

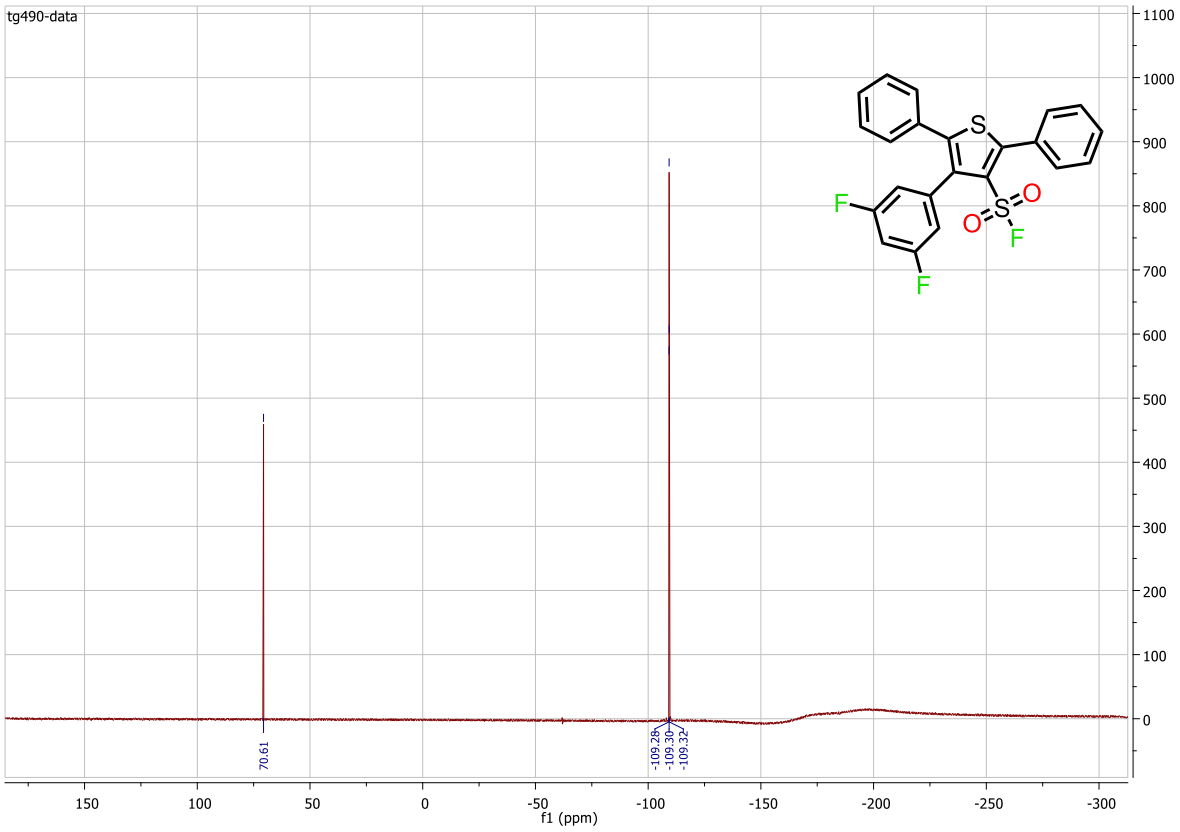

tg489-data
f1 (ppm)

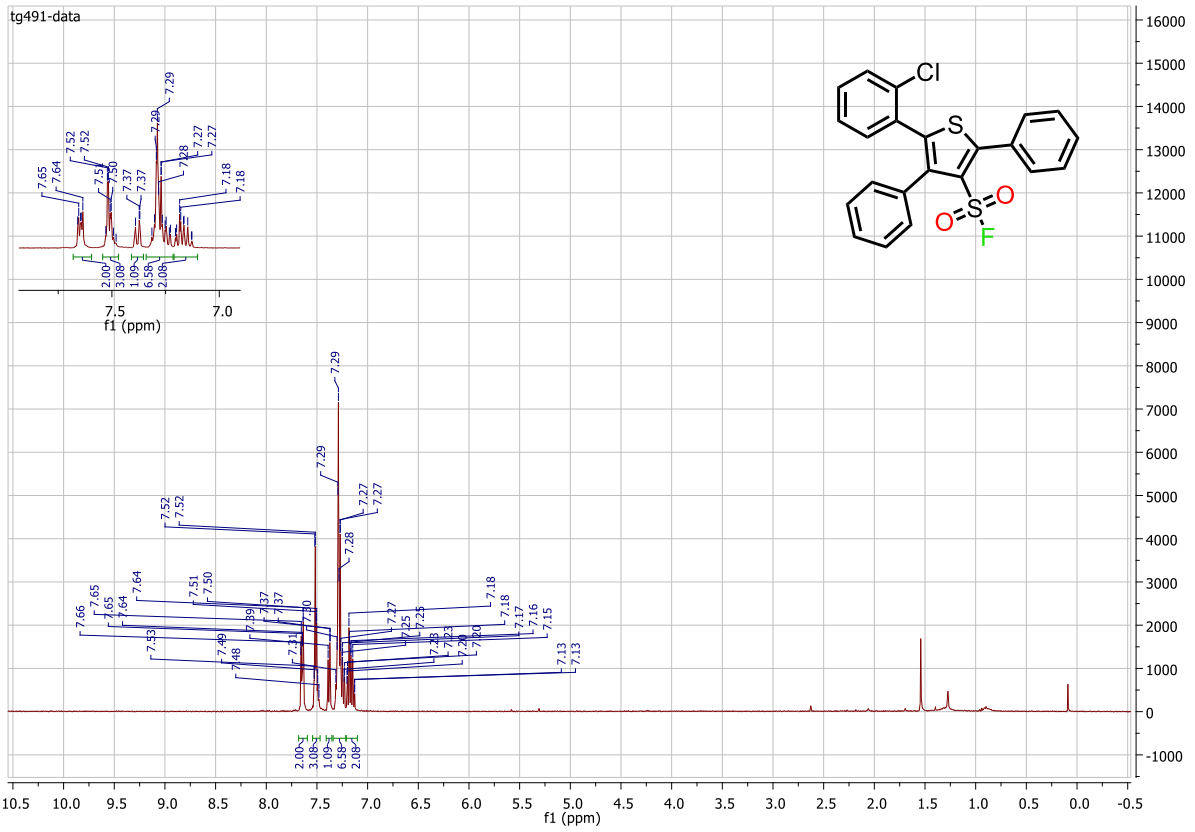

tg489-data
f1 (ppm)

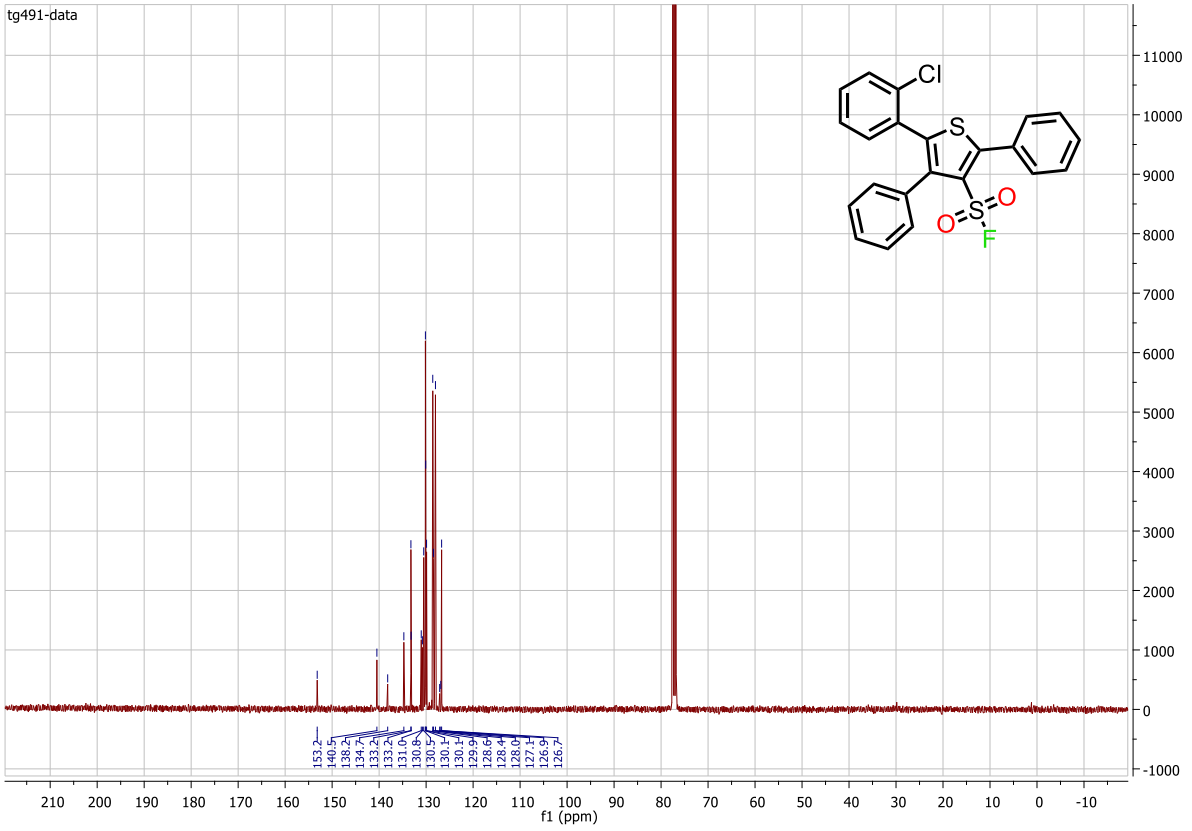

tg489-data
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
70.41
-62.63
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
S
O
O
F
F3C

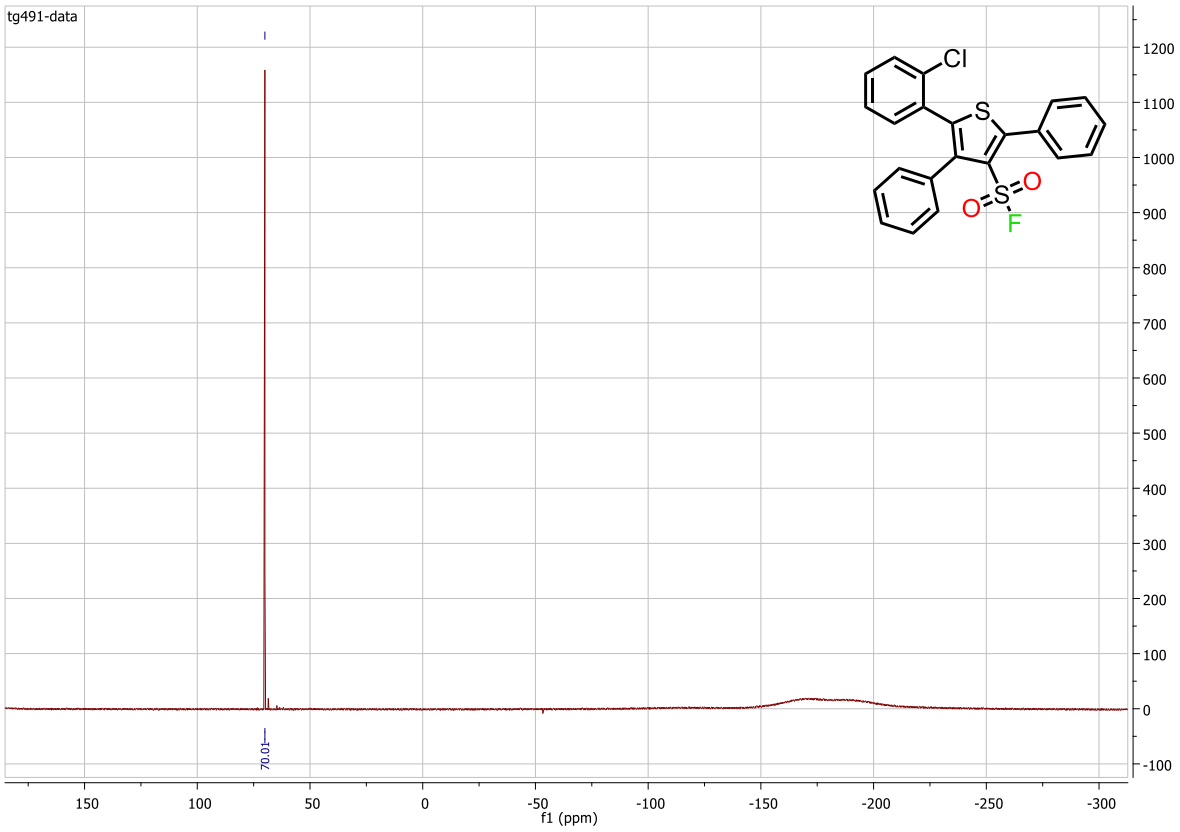

tg490-data
f1 (ppm)

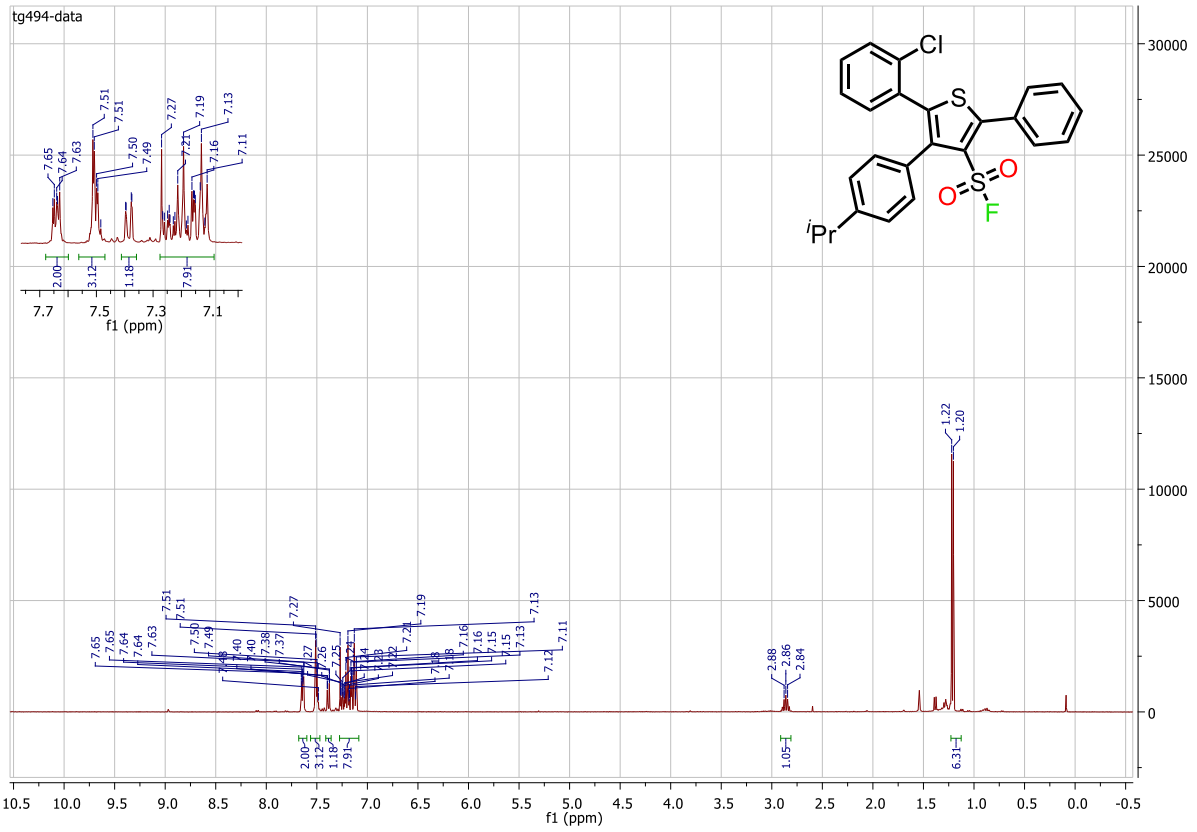

tg490-data
f1 (ppm)

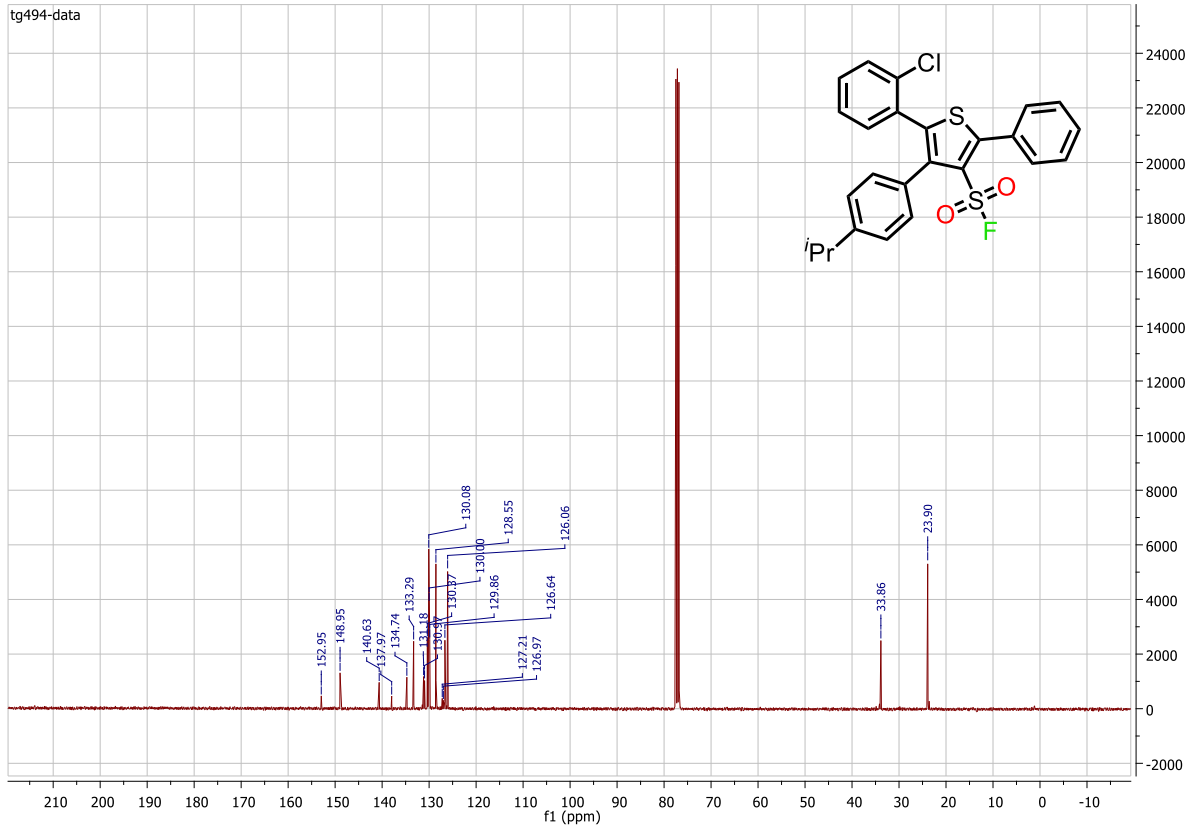

tg490-data
70.61
-109.28
-109.30
-109.32
f1 (ppm)

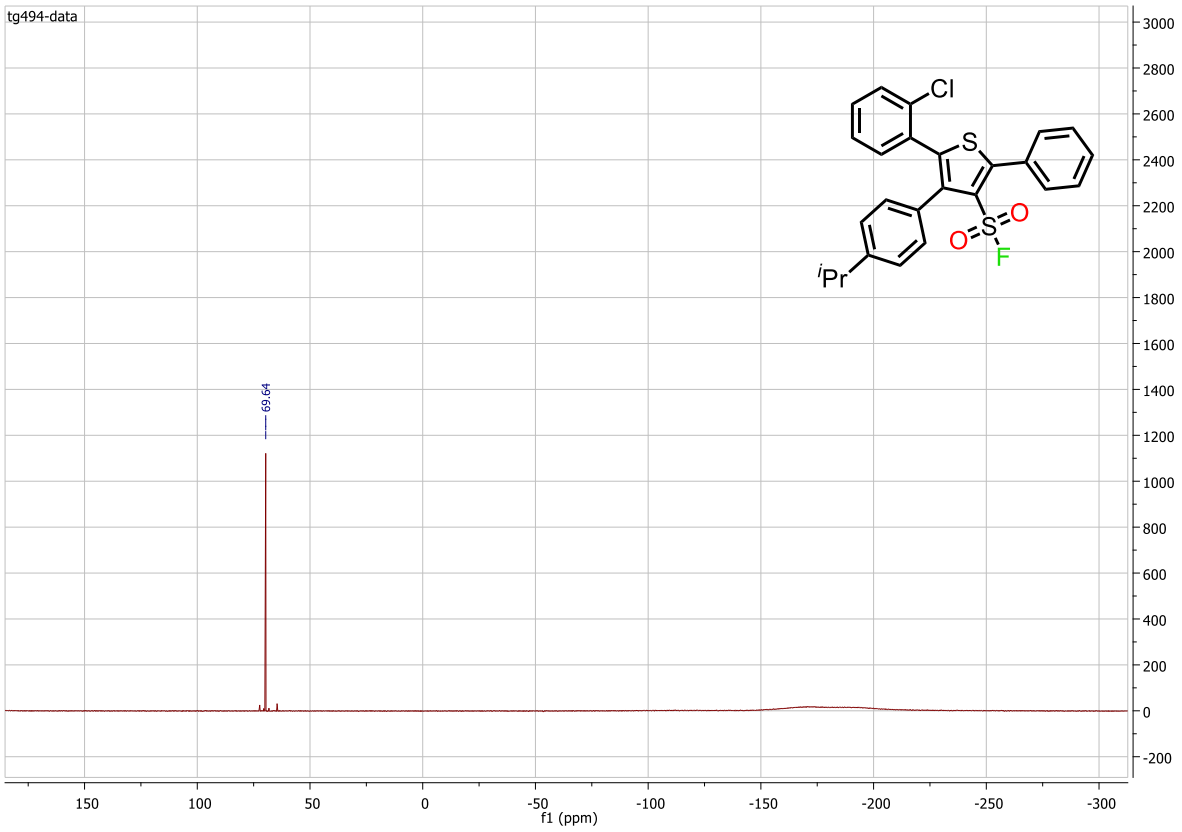

tg491-data
f1 (ppm)

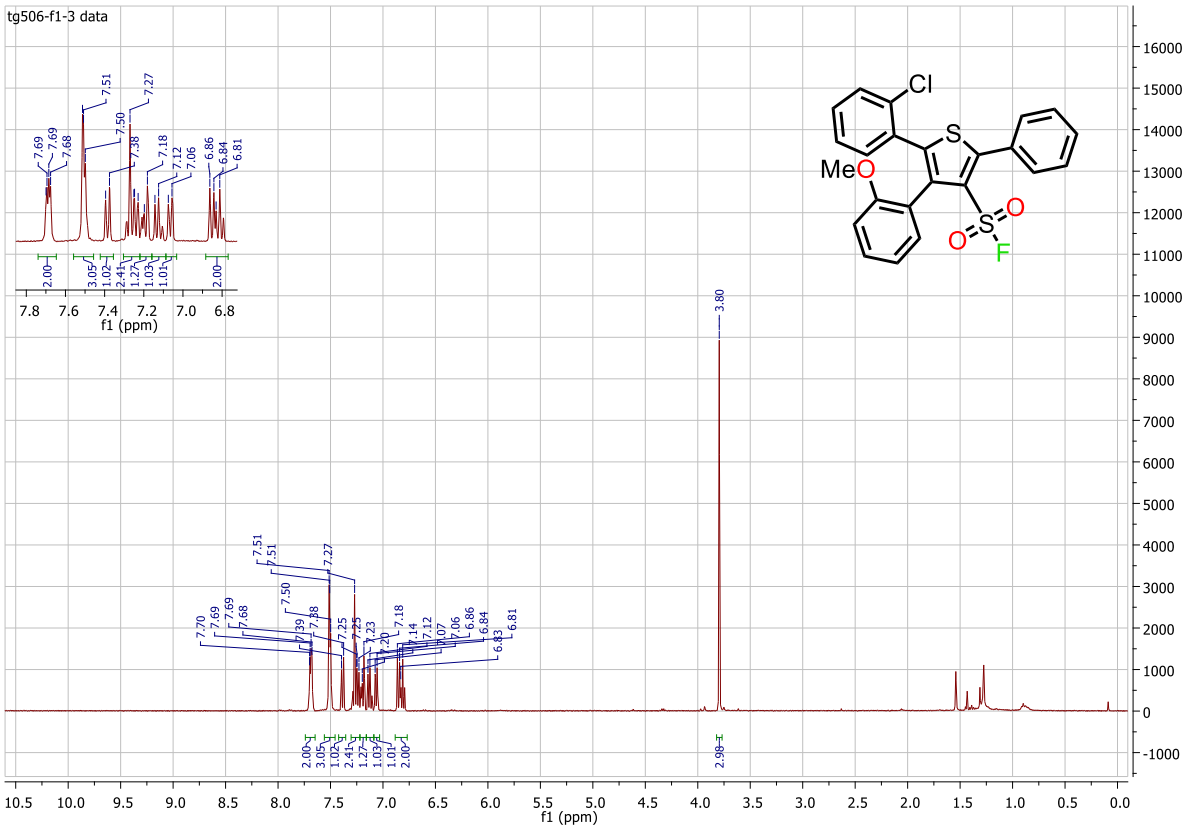

tg491-data
f1 (ppm)

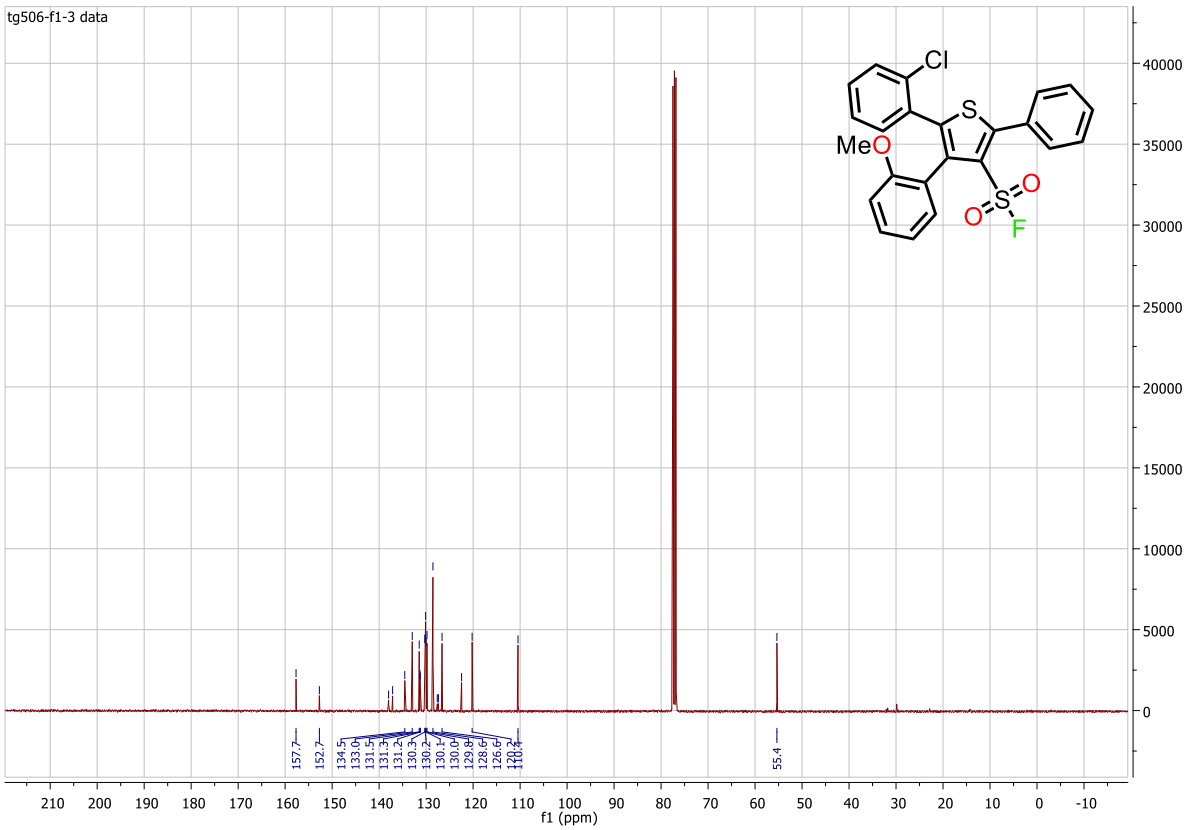

tg491-data
Cl
S
O
O
S
F
70.01
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100

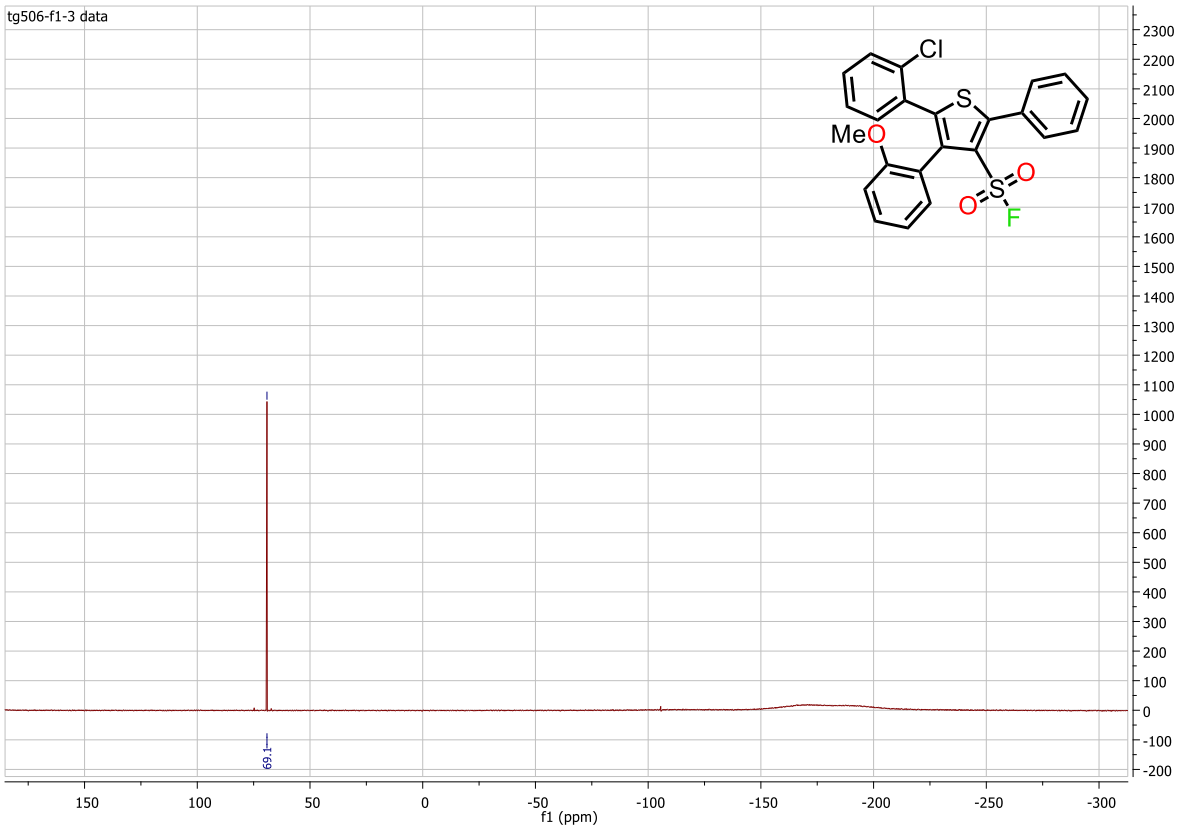

tg494-data
Cl
S
O
O
S
F
iPr
f1 (ppm)

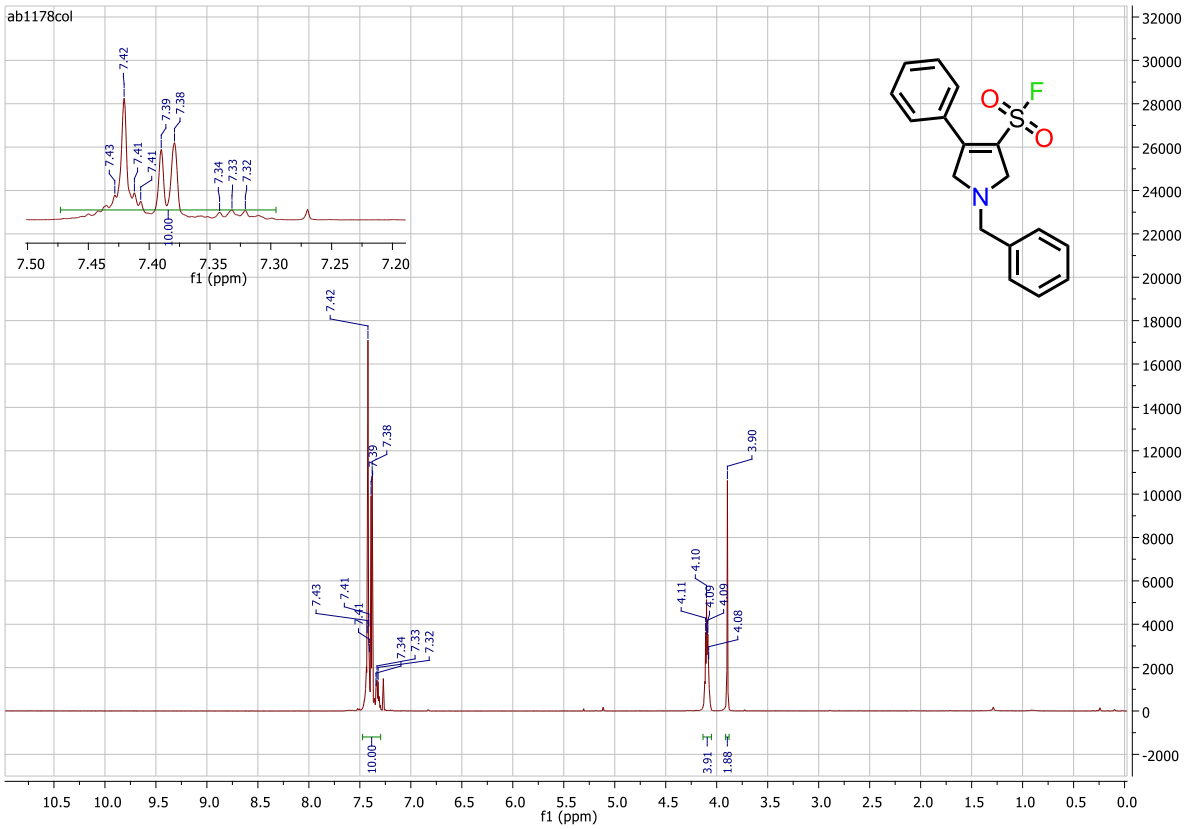

tg494-data
Cl
S
O
O
S
F
iPr
f1 (ppm)

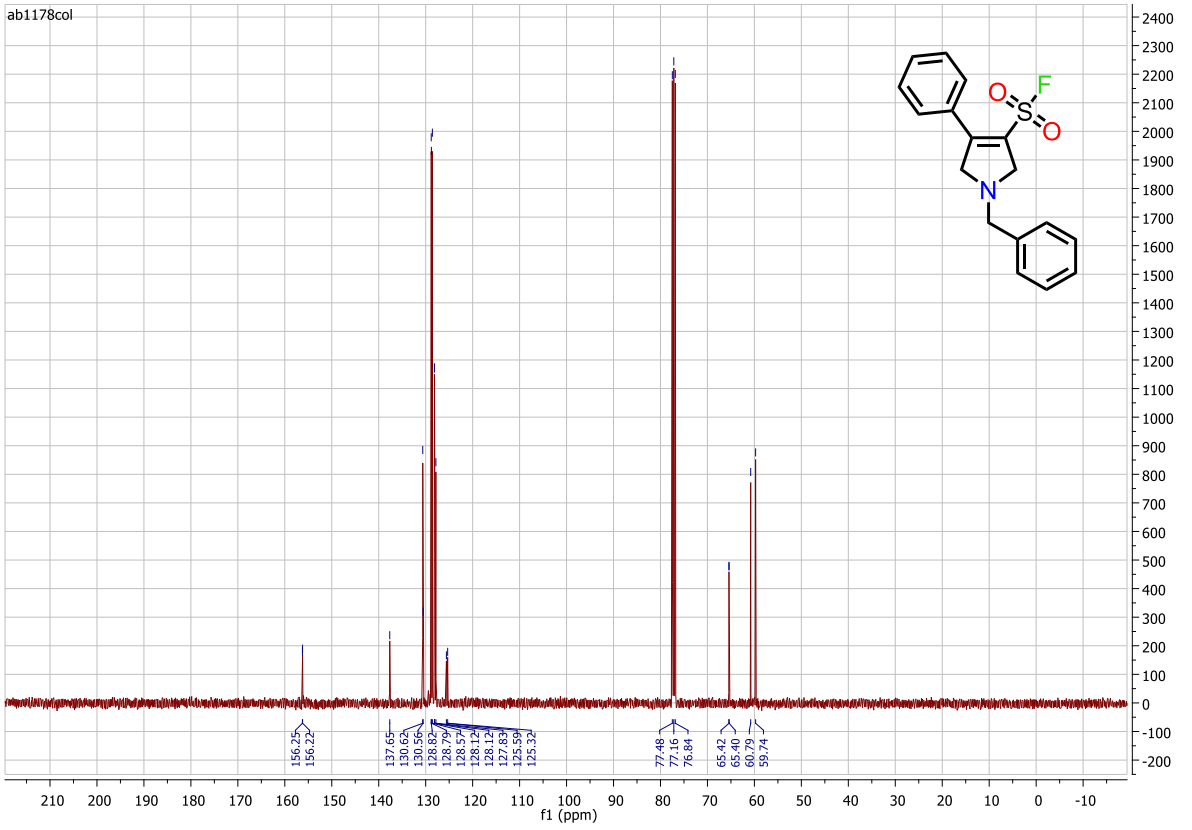

tg494-data
69.64
Cl
S
O
O
S
F
iPr
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

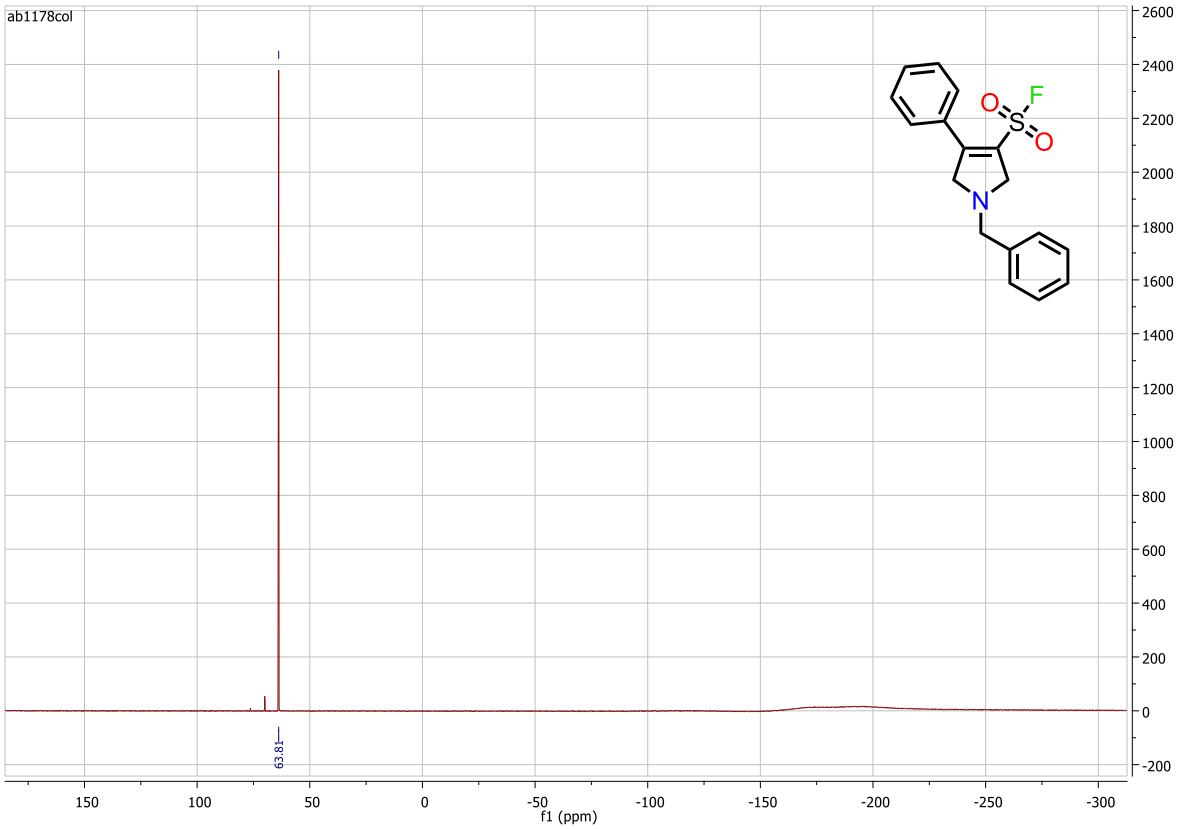

tg506-f1-3 data
Cl
S
MeO
O
O
S
F
f1 (ppm)

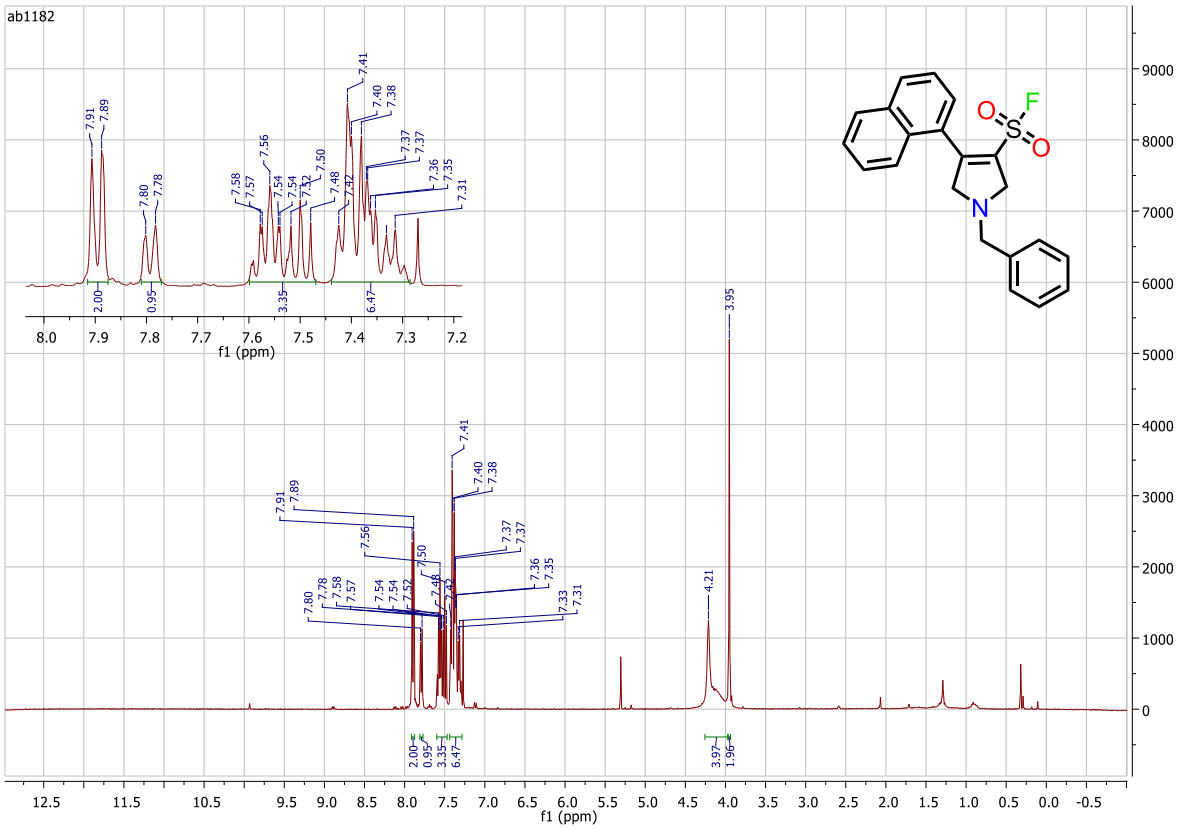

tg506-f1-3 data
Cl
S
MeO
O
O
S
F
f1 (ppm)

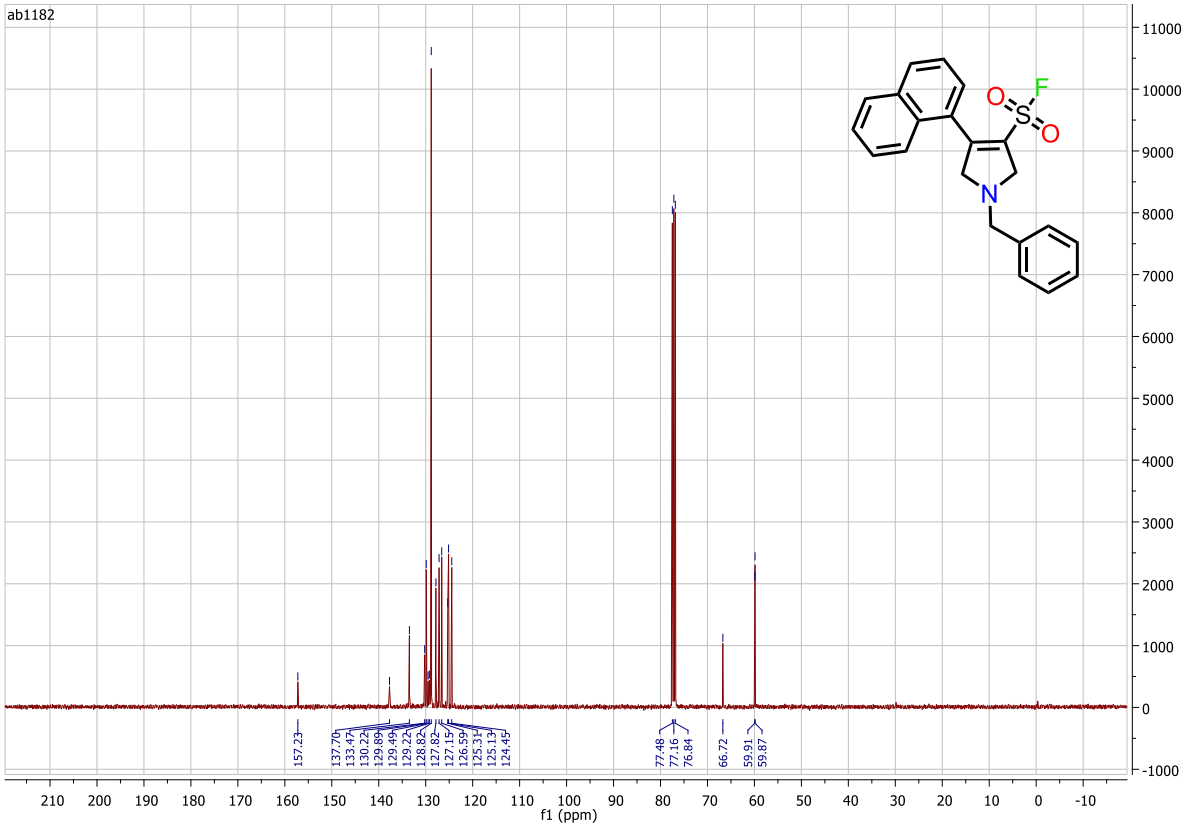

tg506-f1-3 data
Cl
S
MeO
O
S
O
F
69.1
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
-200

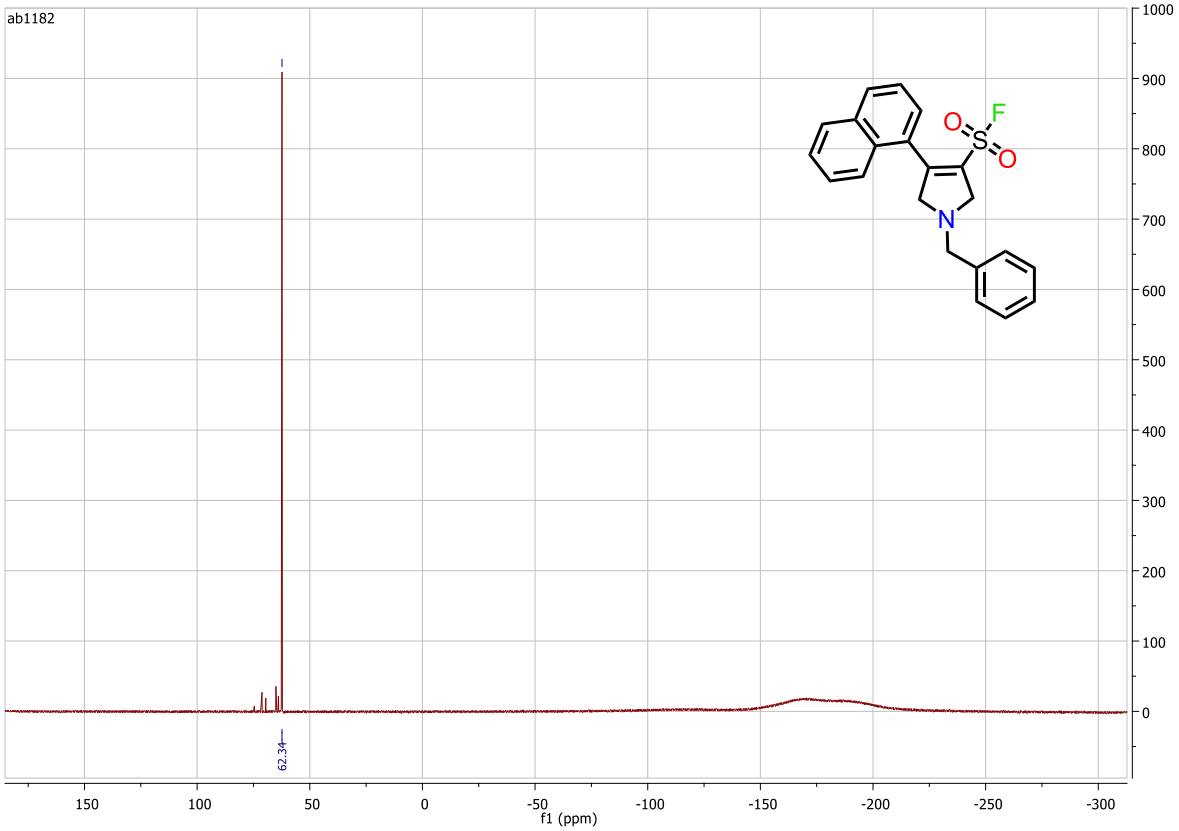

ab1178col
7.42
7.43
7.41
7.41
7.39
7.38
7.34
7.33
7.32
10.00
7.50 7.45 7.40 7.35 7.30 7.25 7.20
f1 (ppm)
O
S
F
O
N
7.42
7.39
7.38
7.43
7.41
7.41
7.34
7.33
7.32
3.90
4.10
4.11
4.09
4.09
4.08
10.00
3.91
1.88
f1 (ppm)

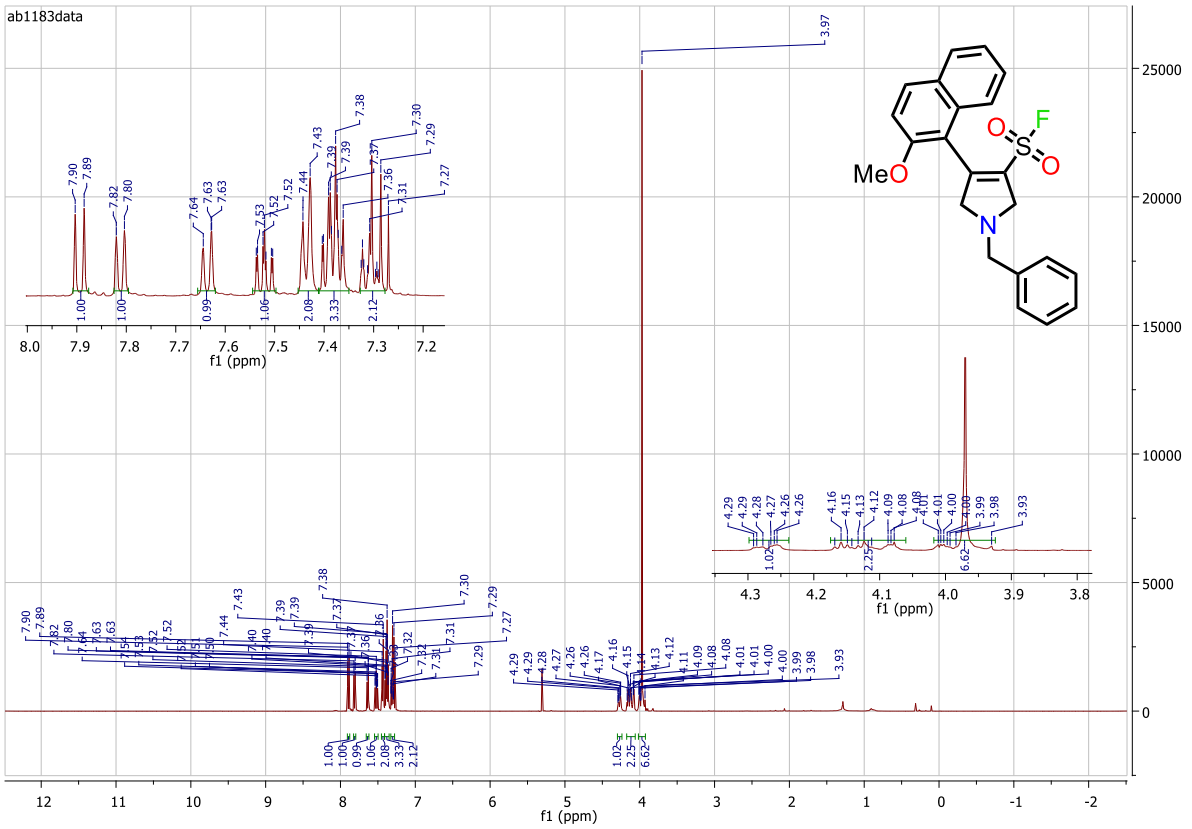

ab1178col
O
S
F
O
N
156.25
156.22
137.65
130.62
130.56
128.82
128.79
128.57
128.12
128.12
127.83
125.59
125.32
77.48
77.16
76.84
65.42
65.40
60.79
59.74
f1 (ppm)

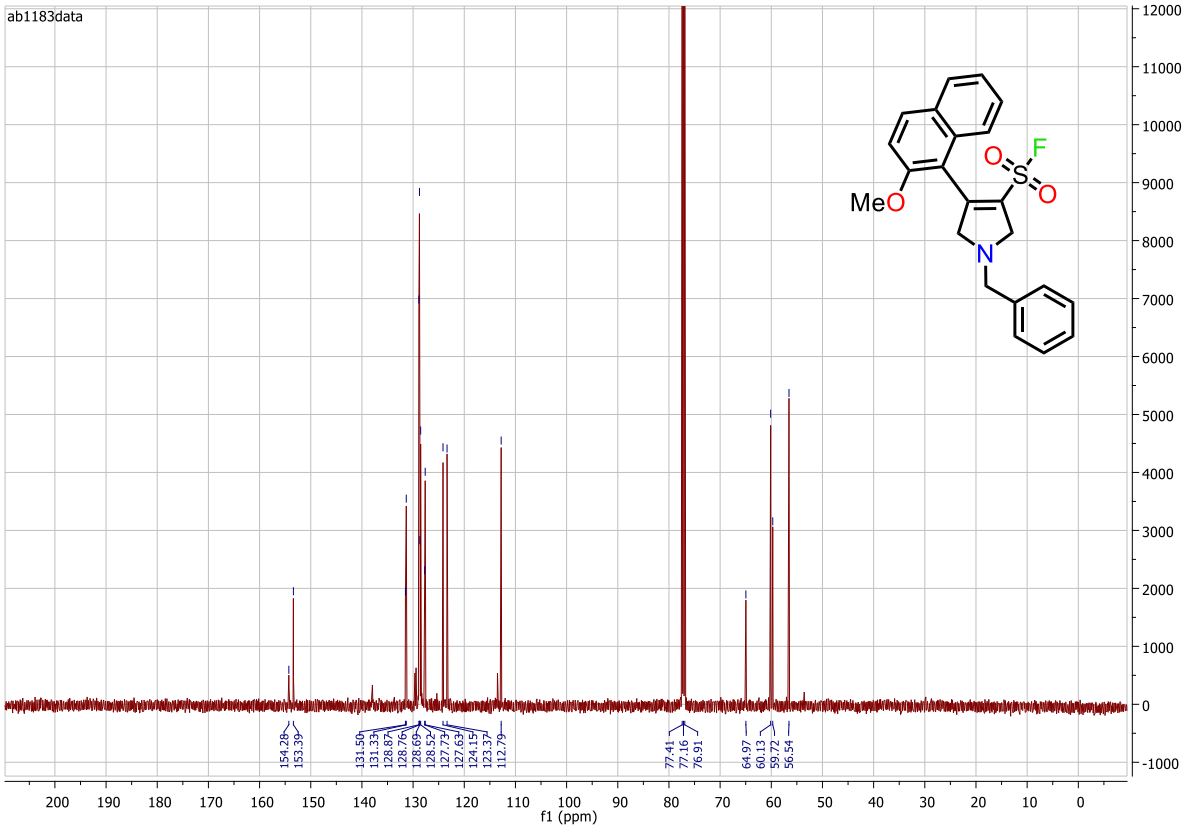

ab1178col
63.81
f1 (ppm)
150
100
50
0
-50
-100
-150
-200
-250
-300
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
O
S
F
O
N

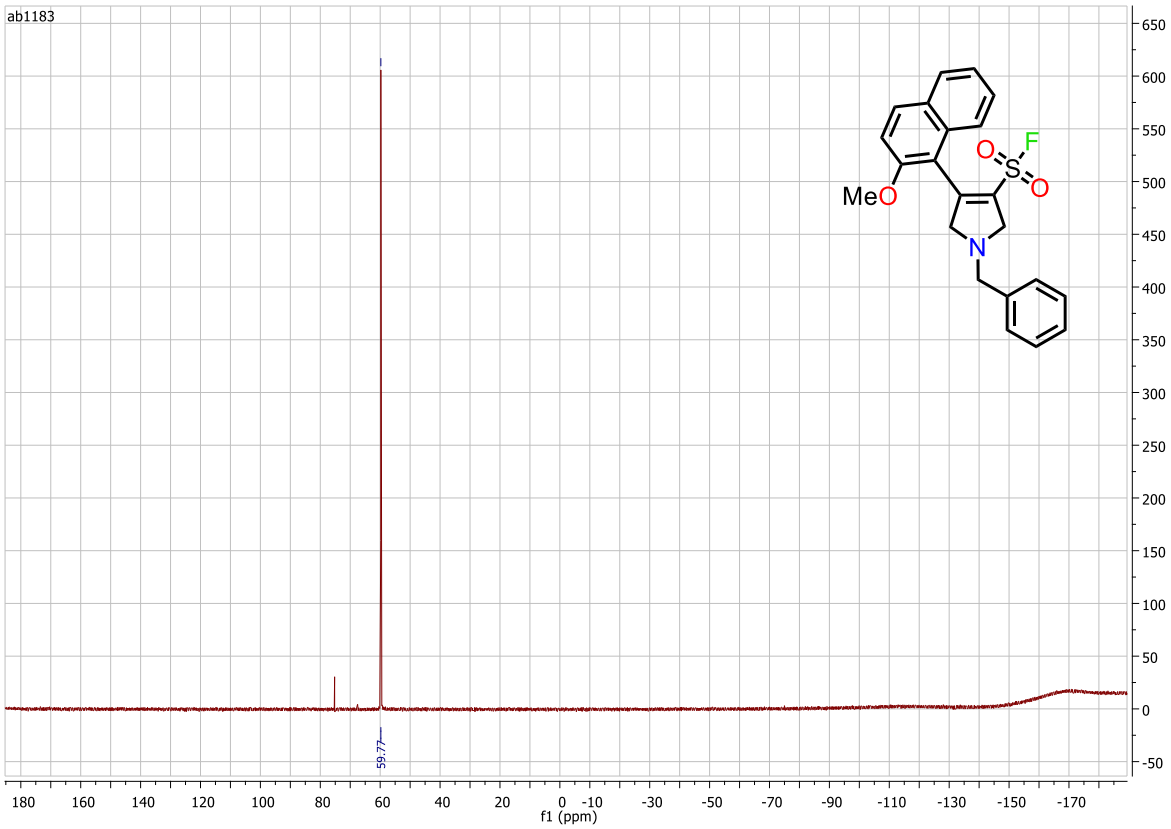

ab1182
f1 (ppm)

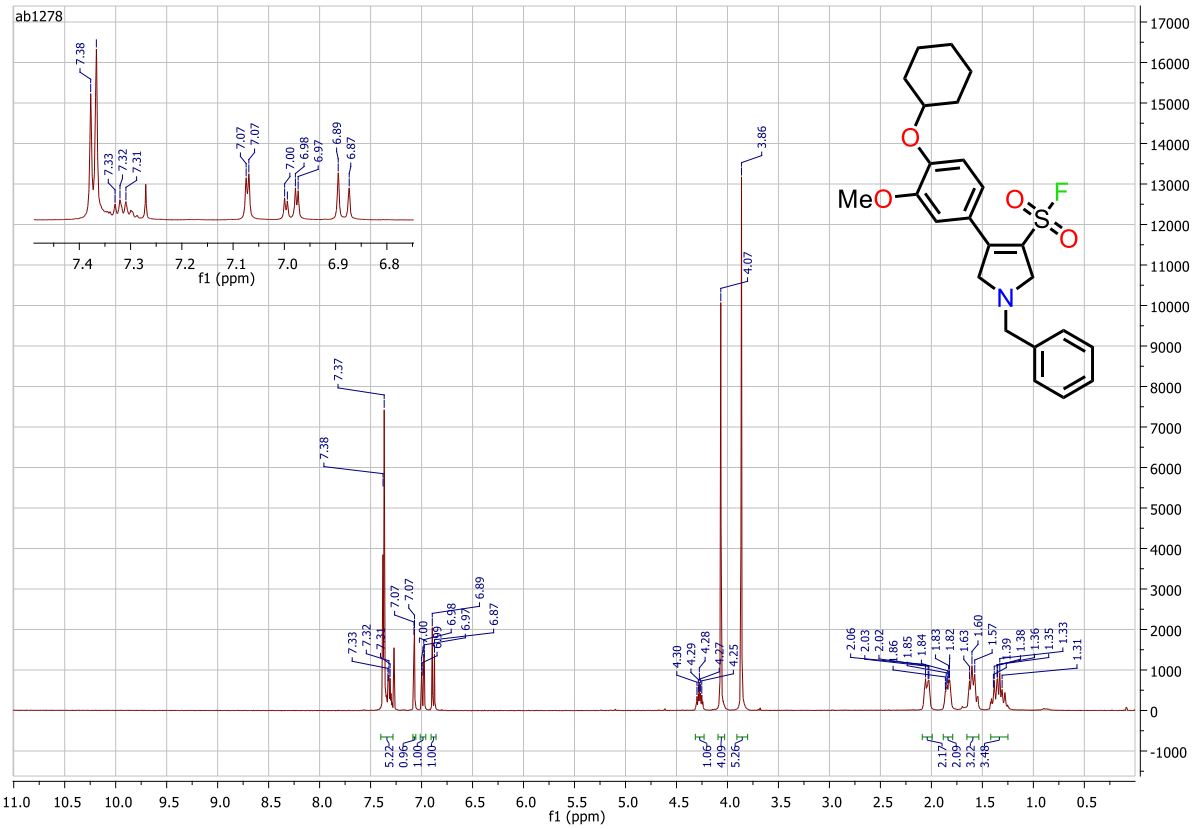

ab1182
f1 (ppm)

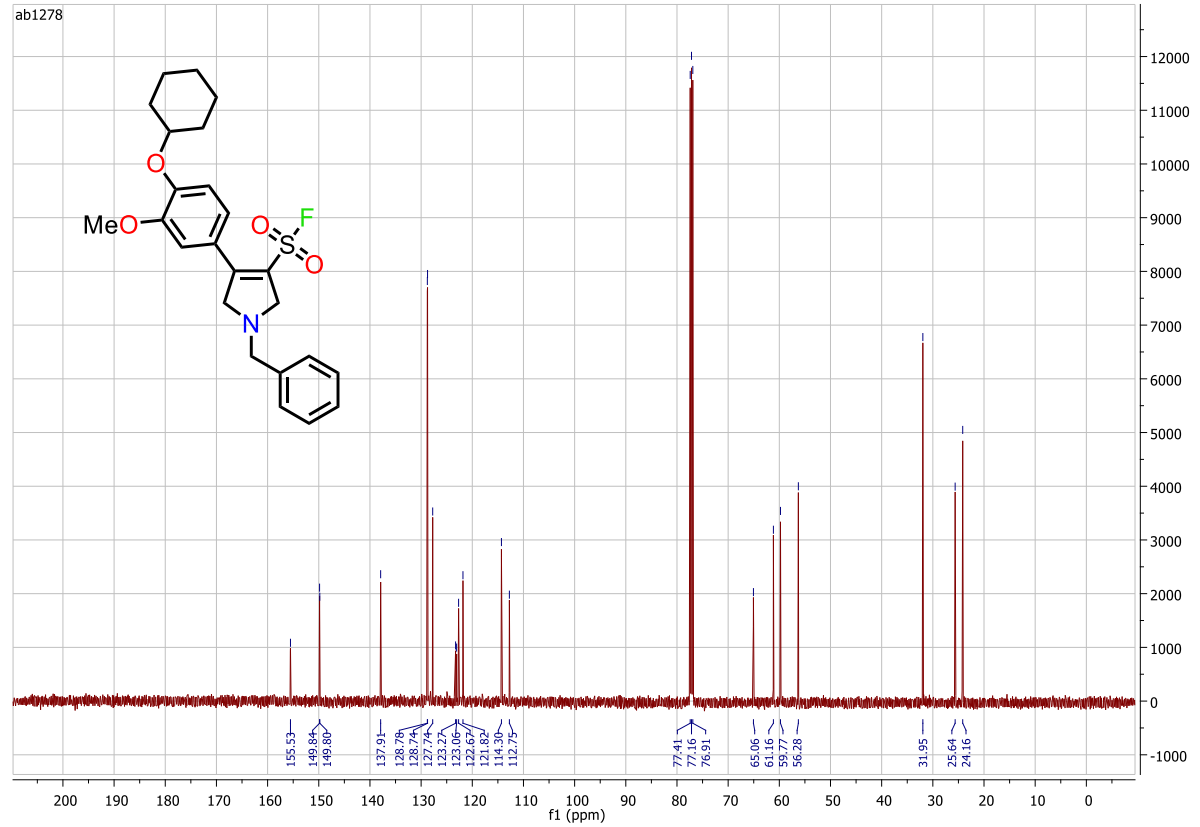

ab1182
62.34
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1000
900
800
700
600
500
400
300
200
100
0
O
S
O
F
N

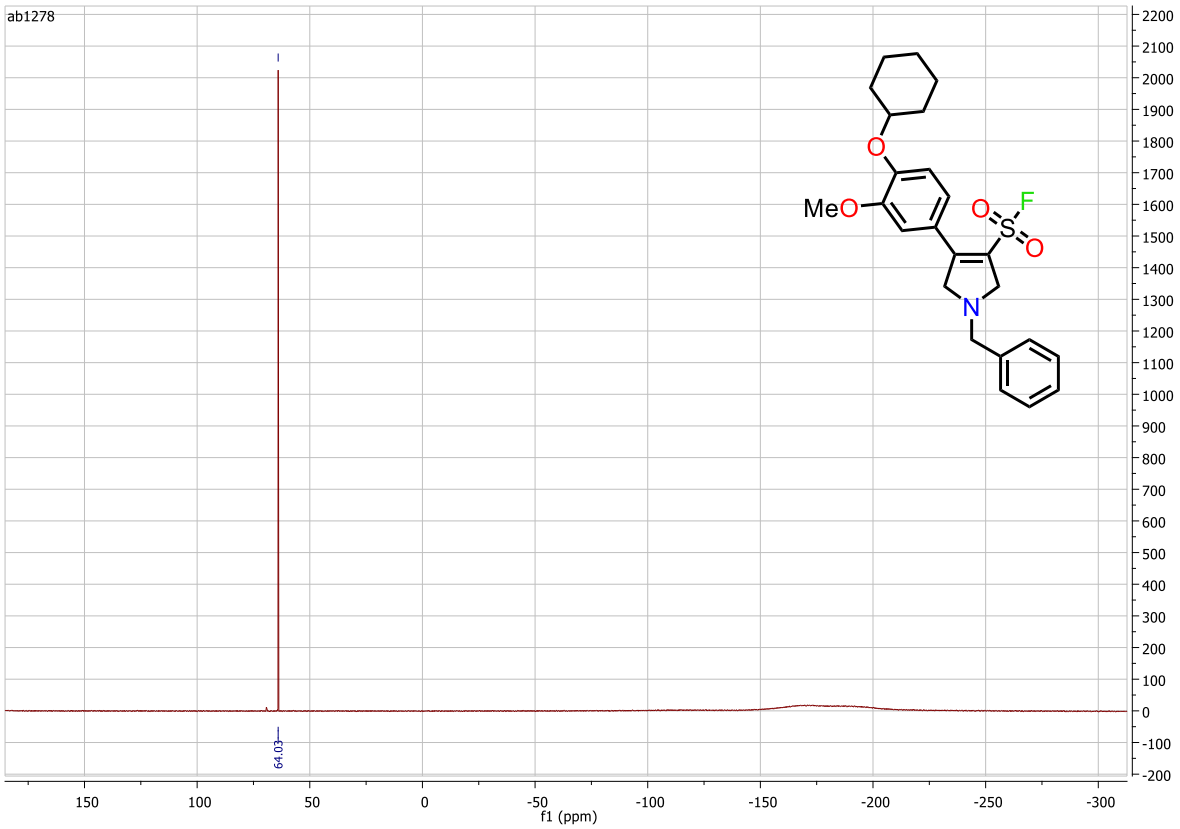

ab1183data
f1 (ppm)
MeO
F
O
S
O
N

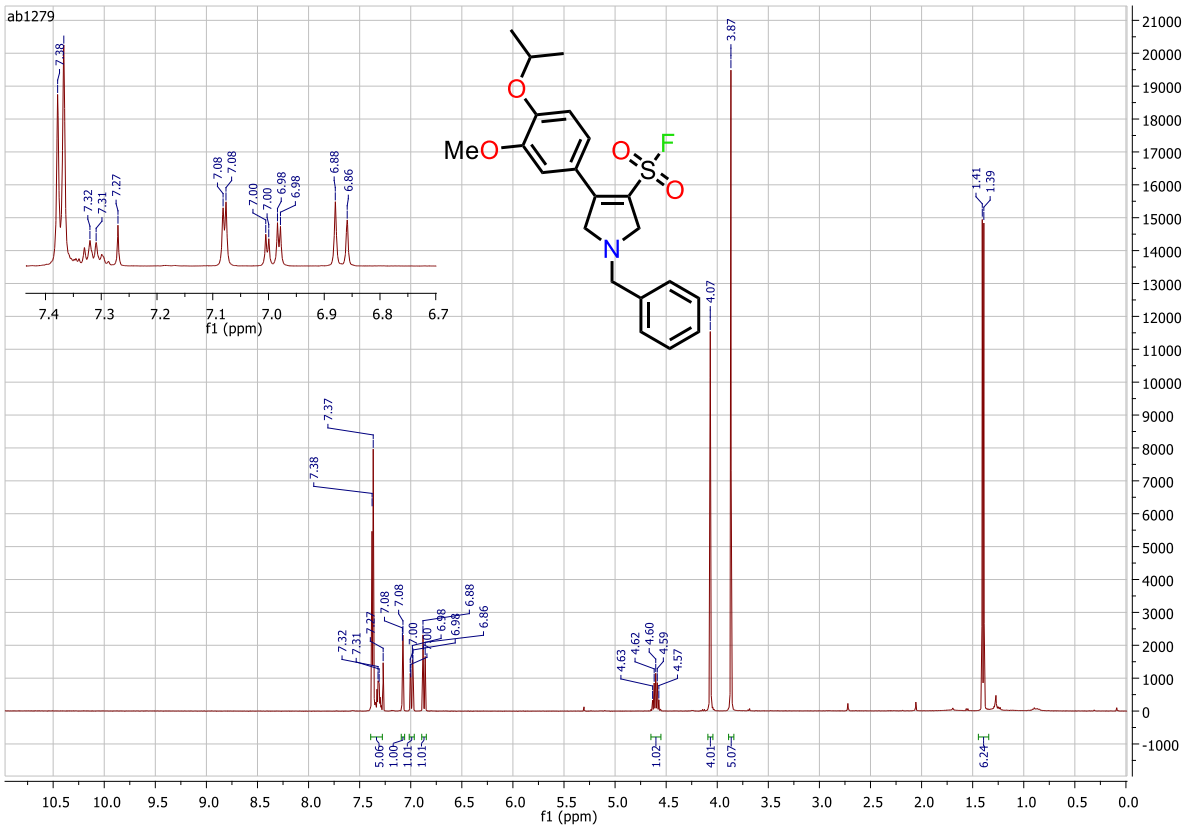

ab1183data
f1 (ppm)
MeO
F
O
S
O
N

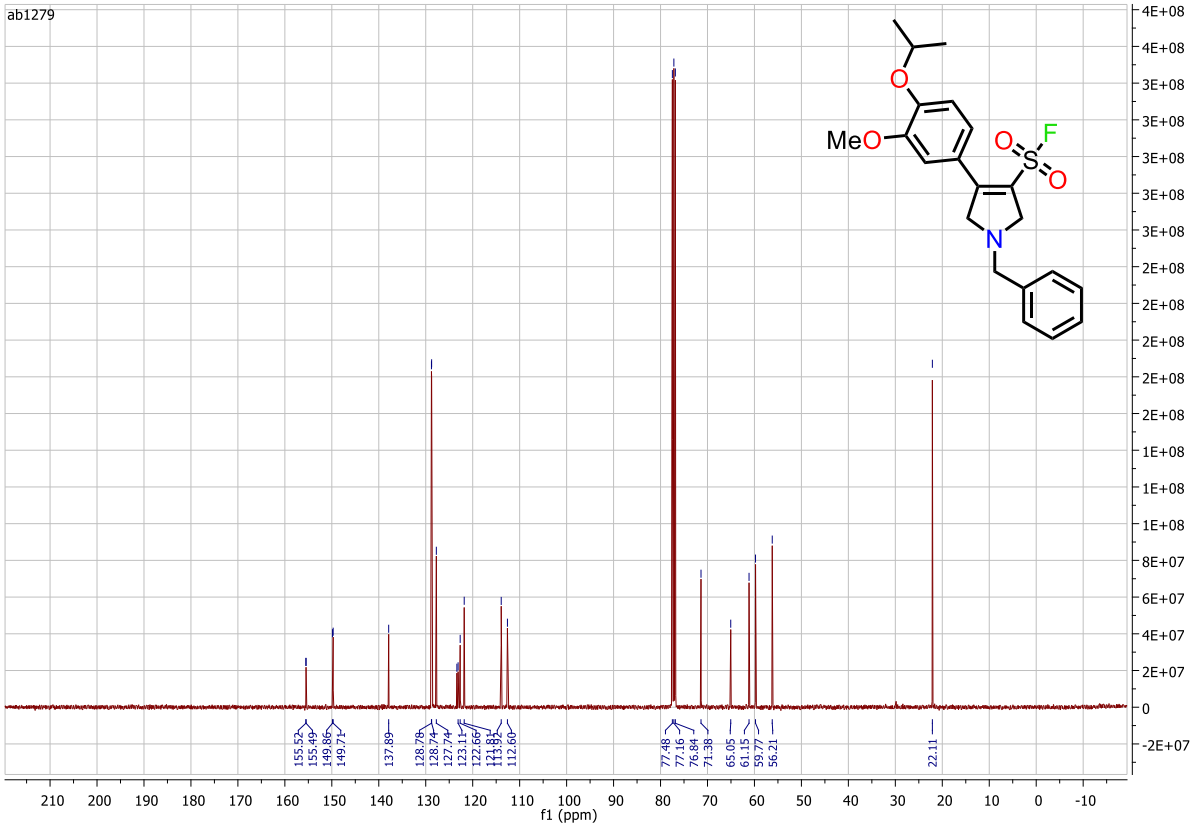

ab1183
59.77
f1 (ppm)
MeO
O
S
F
O
N

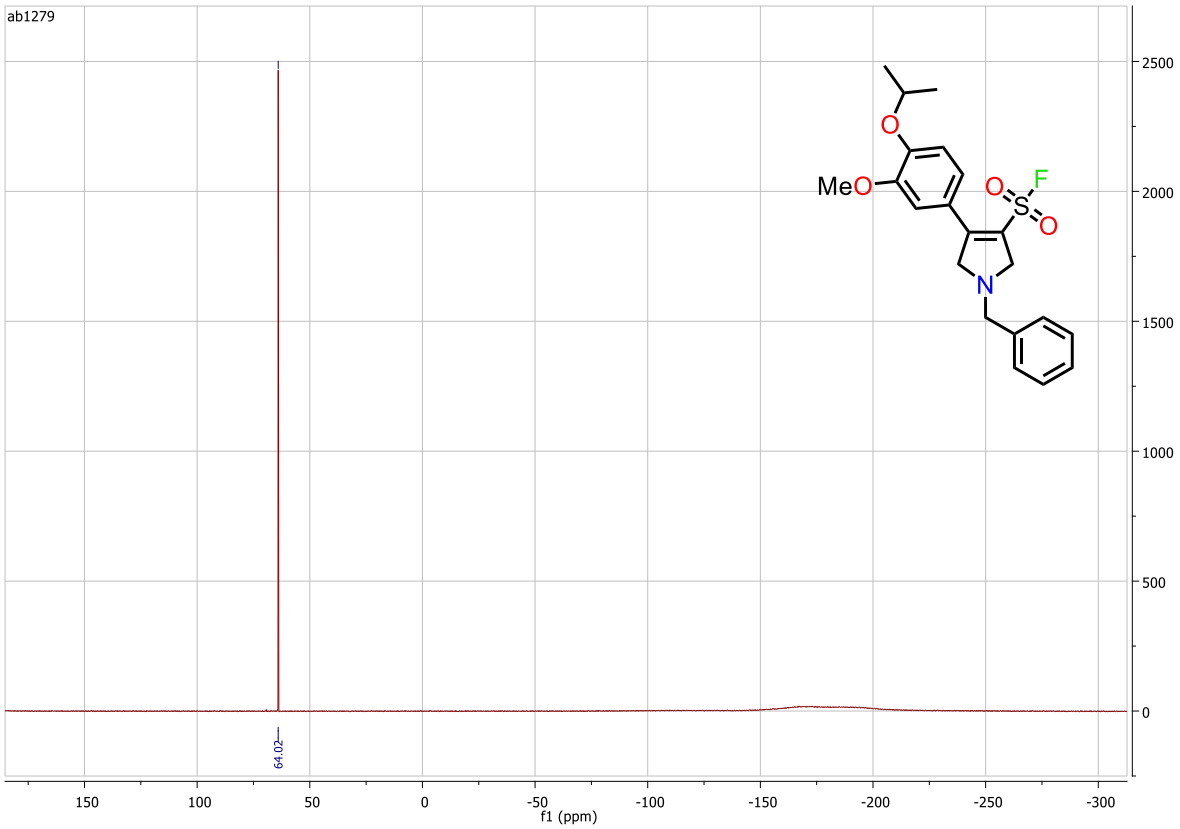

ab1278
f1 (ppm)

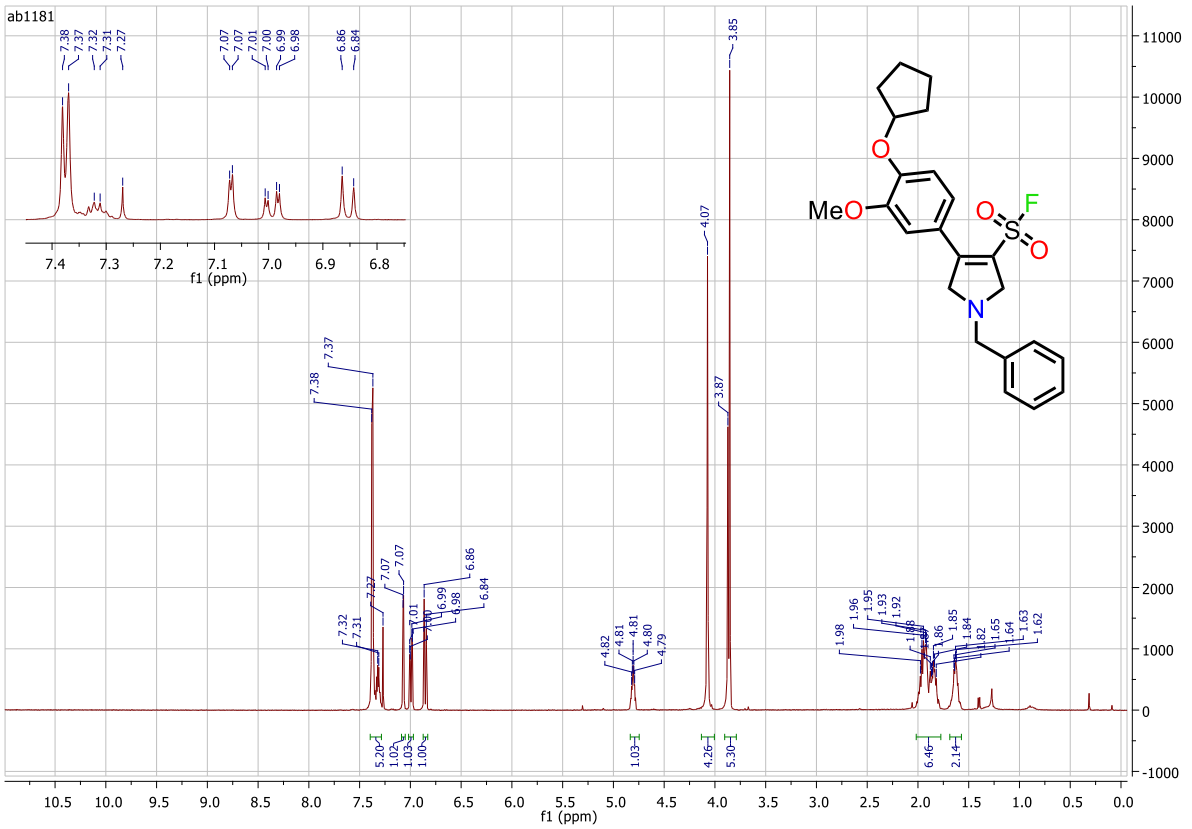

ab1278
f1 (ppm)

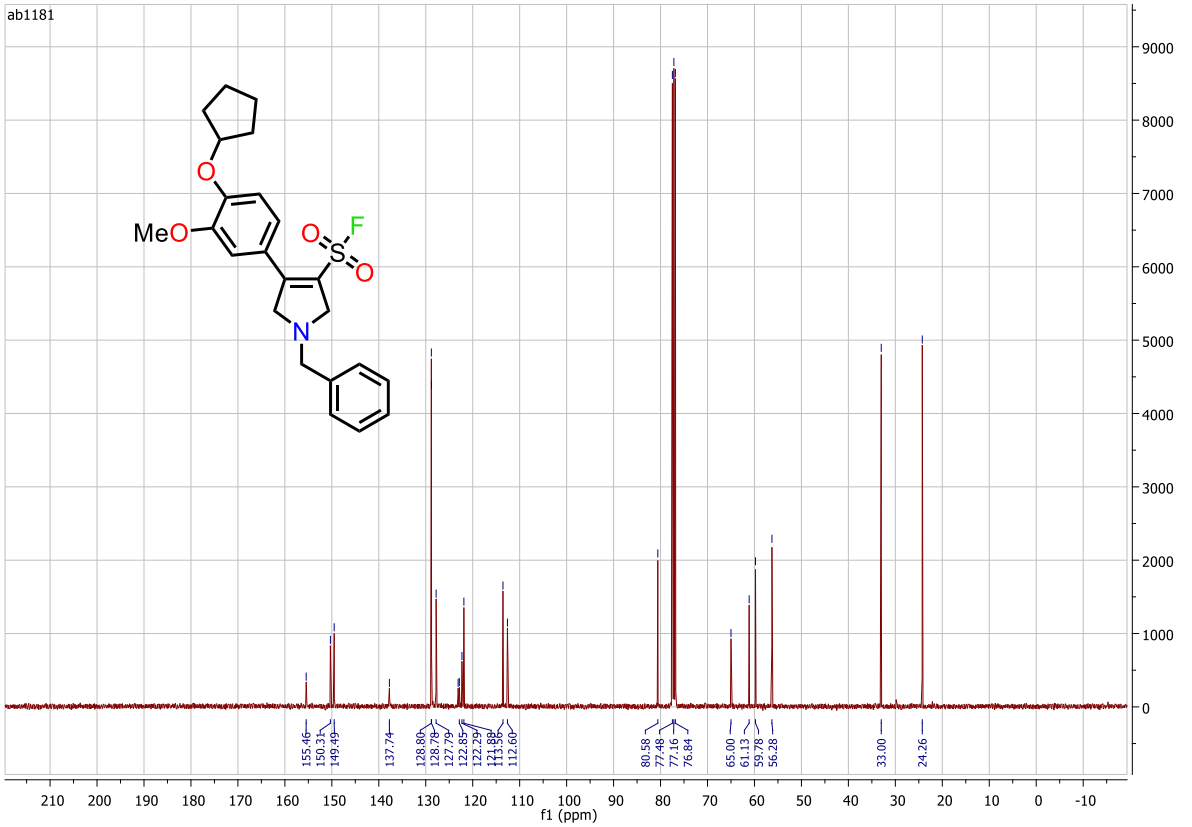

ab1278
64.03
f1 (ppm)
MeO
O
O
S
F
O
N

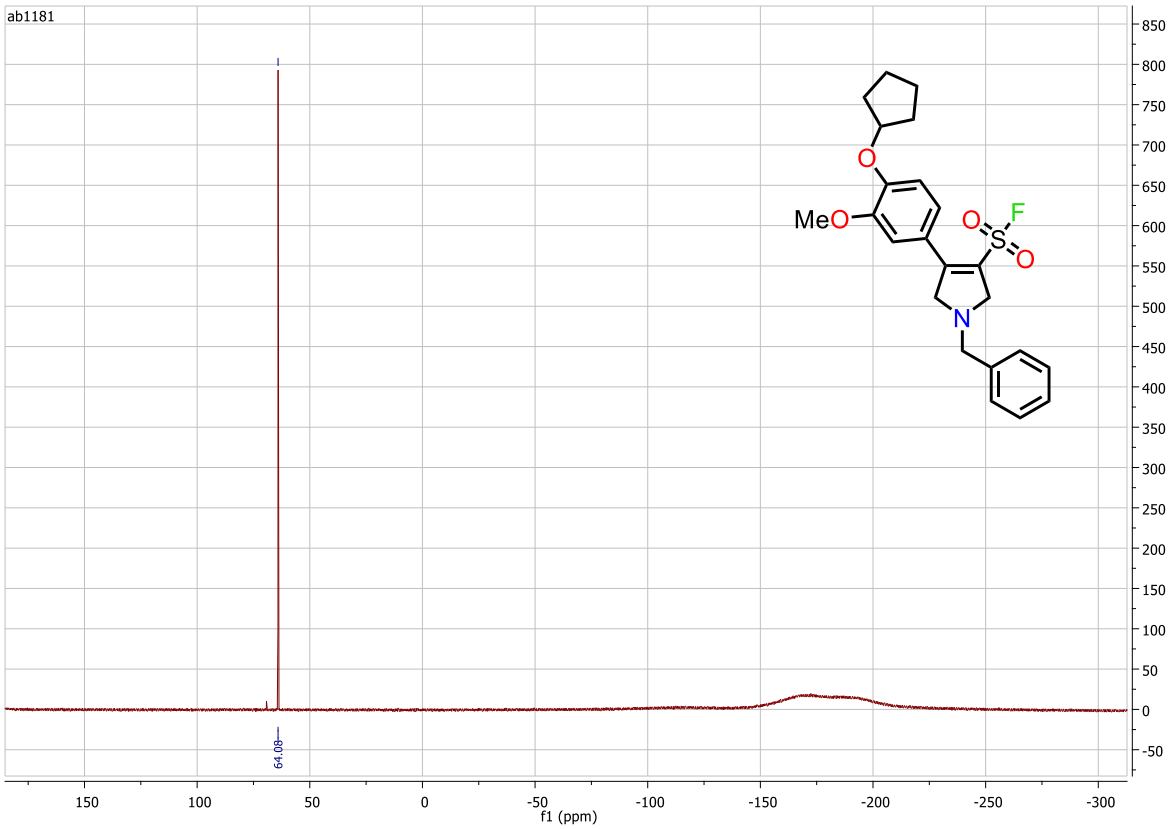

ab1279
MeO
O
F
S
N
f1 (ppm)

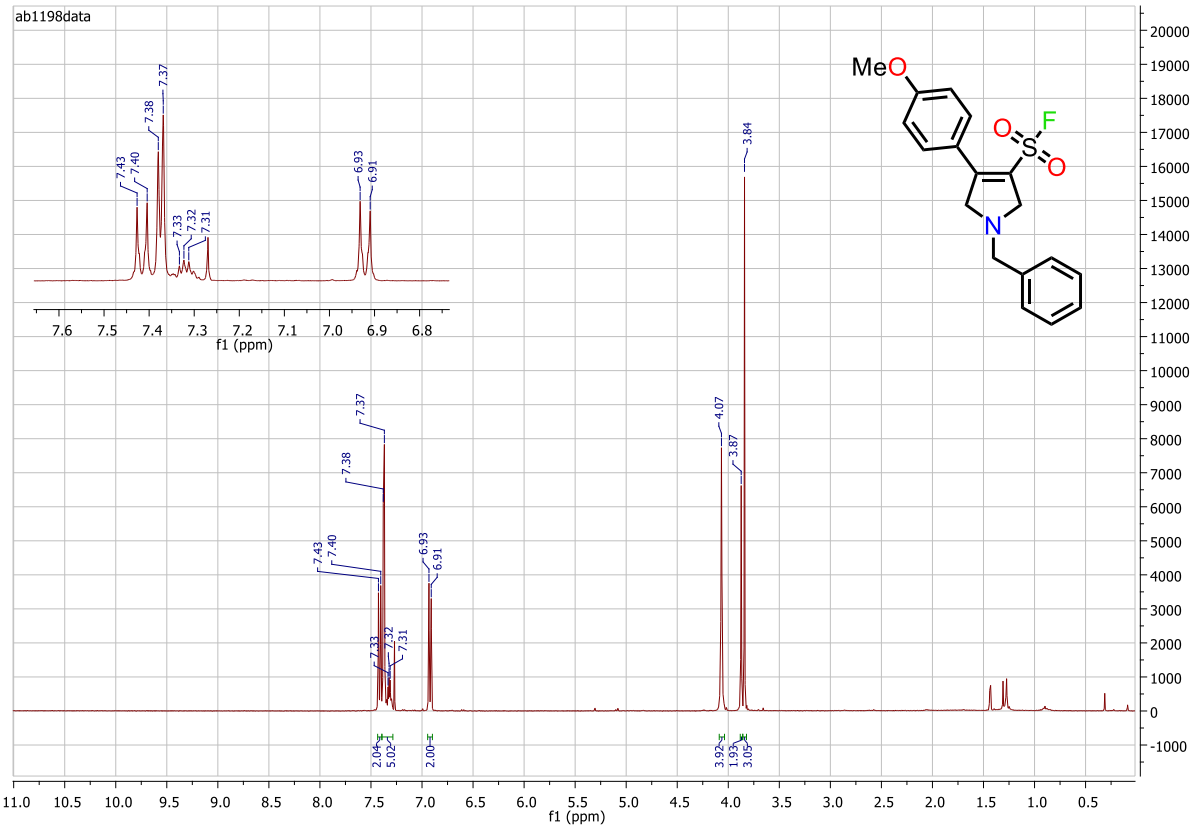

ab1279
MeO
O
F
S
N
f1 (ppm)

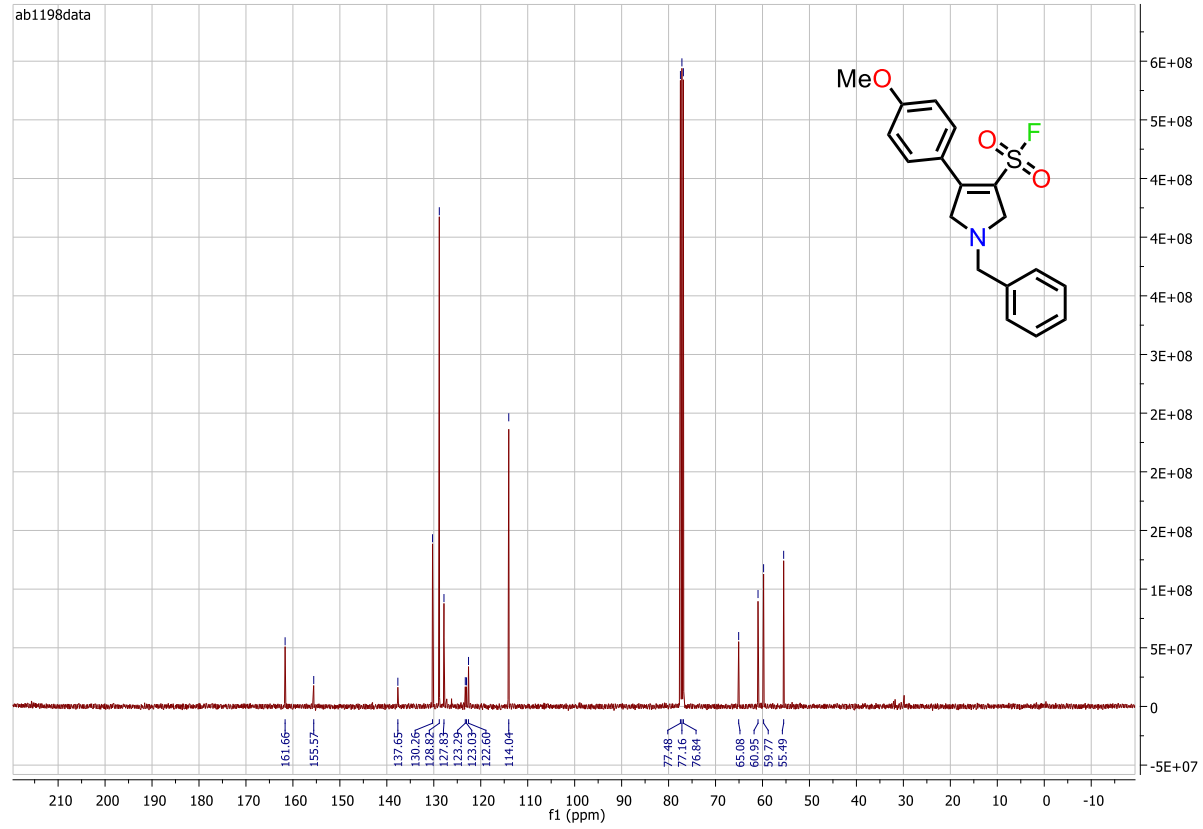

ab1279
2500
2000
1500
1000
500
0
64.02
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
MeO
O
O
S
F
O
N

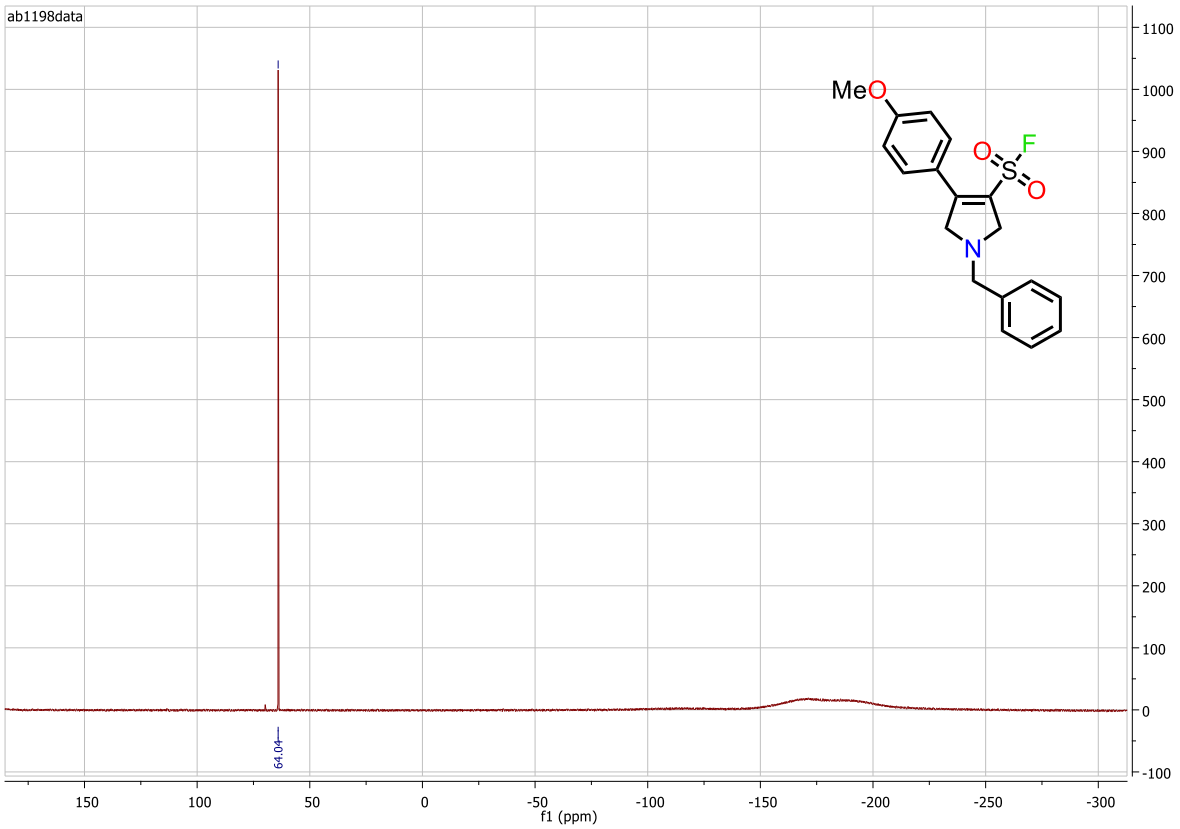

ab1181
f1 (ppm)
MeO
O
F
S
N

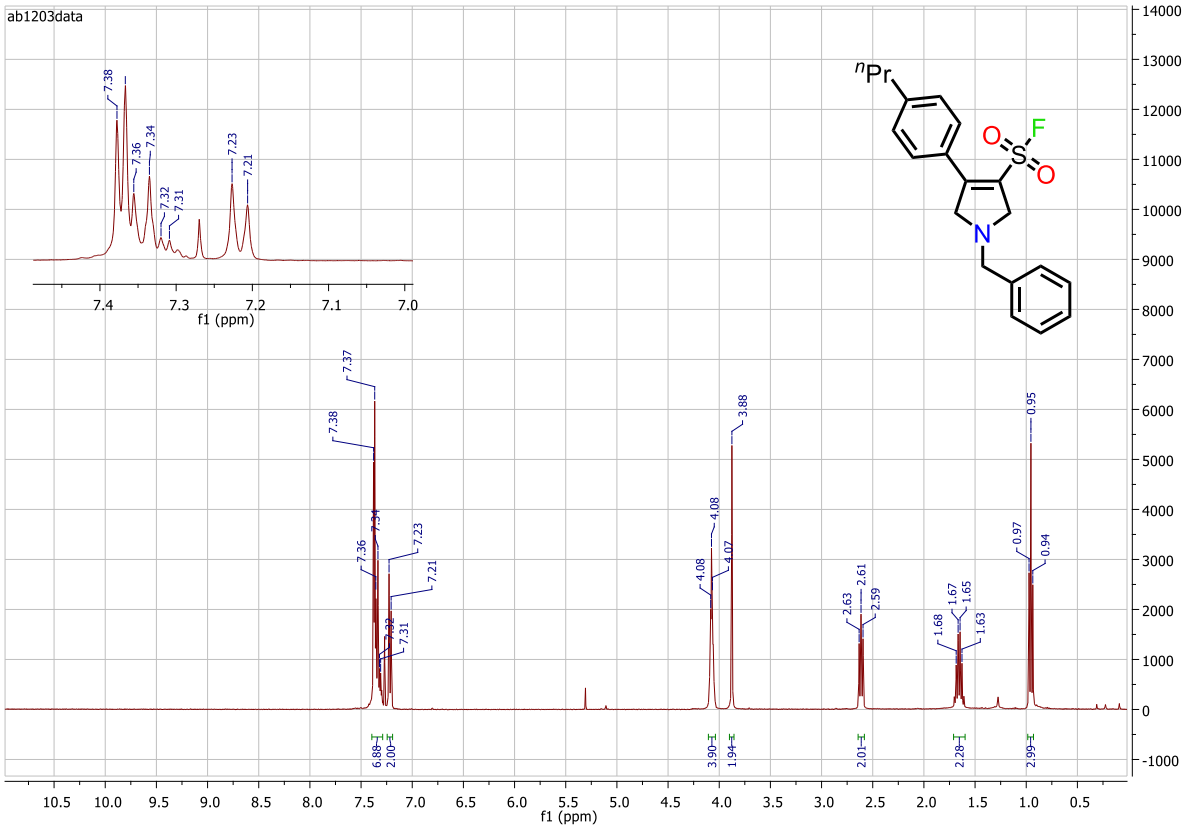

ab1181
f1 (ppm)
MeO
O
F
S
N

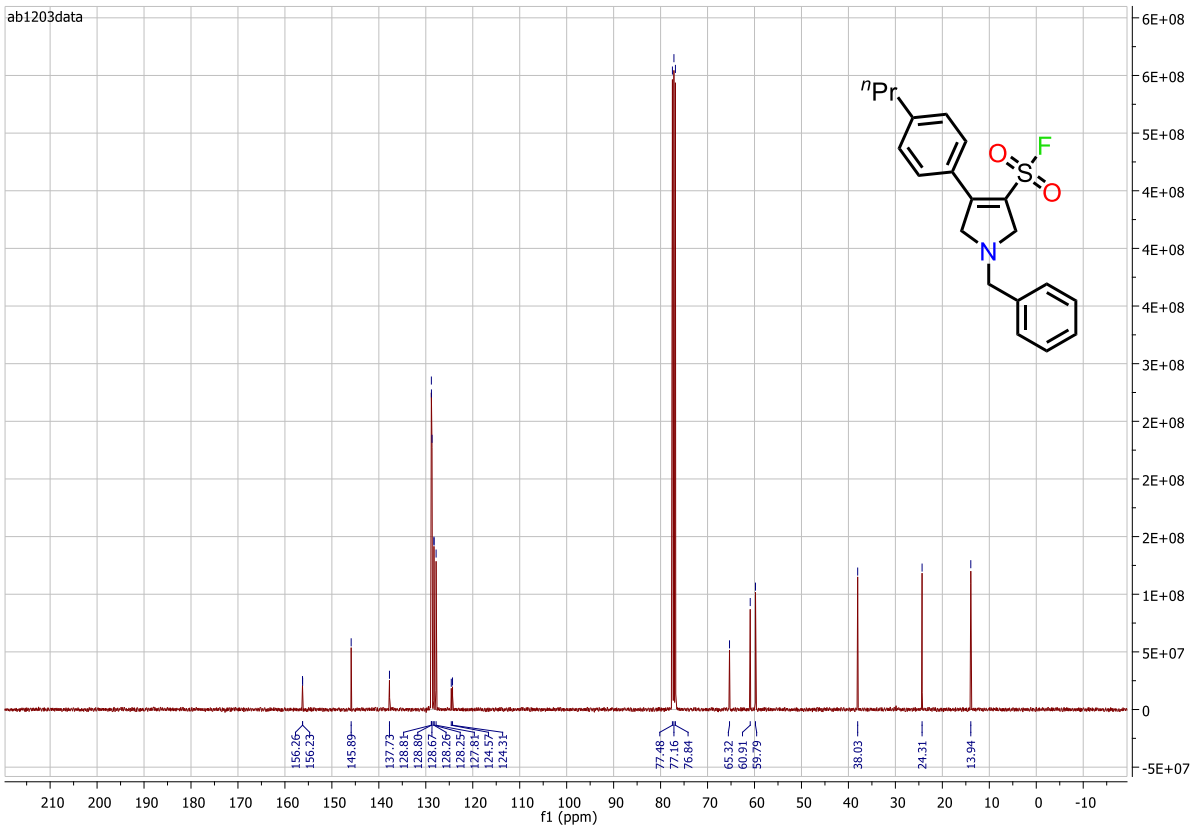

ab1181
64.08
f1 (ppm)
MeO
O
F
S
O
N

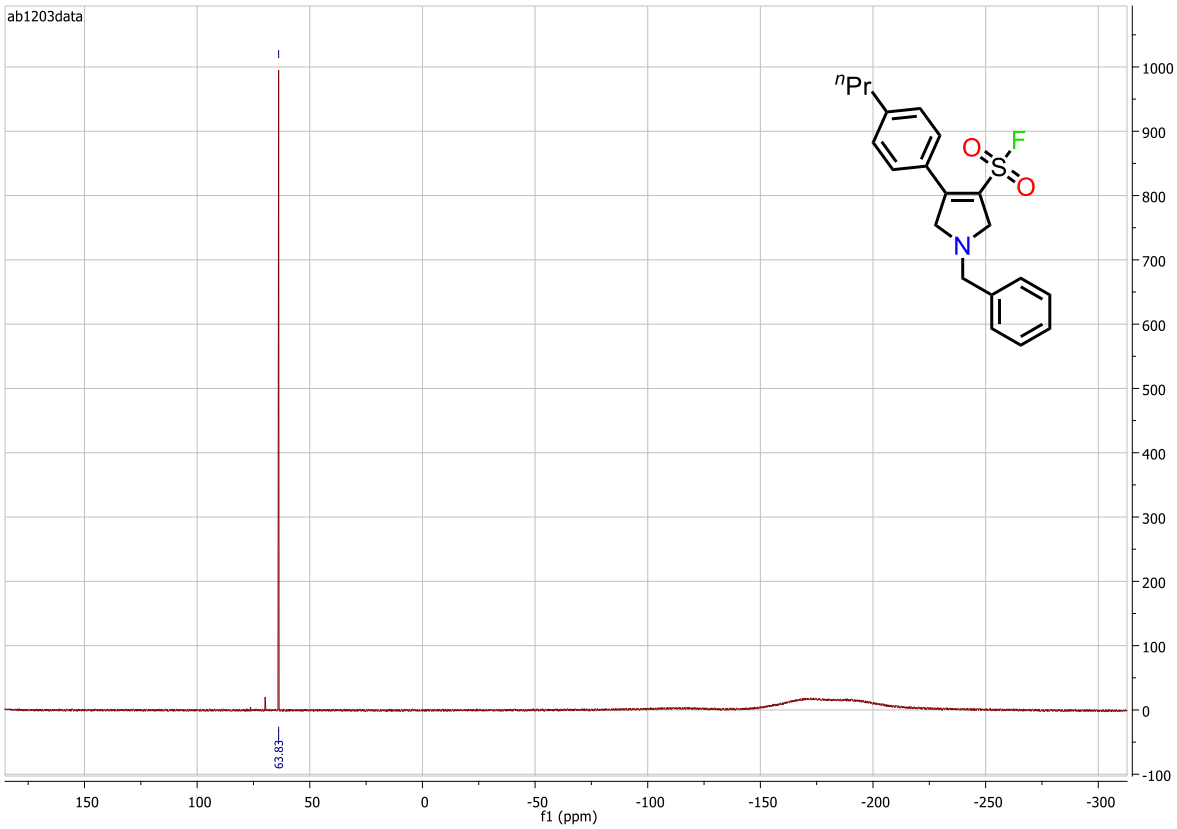

ab1198data
MeO
O
S
F
O
N
7.43
7.40
7.38
7.37
7.33
7.32
7.31
6.93
6.91
3.84
4.07
3.87
f1 (ppm)

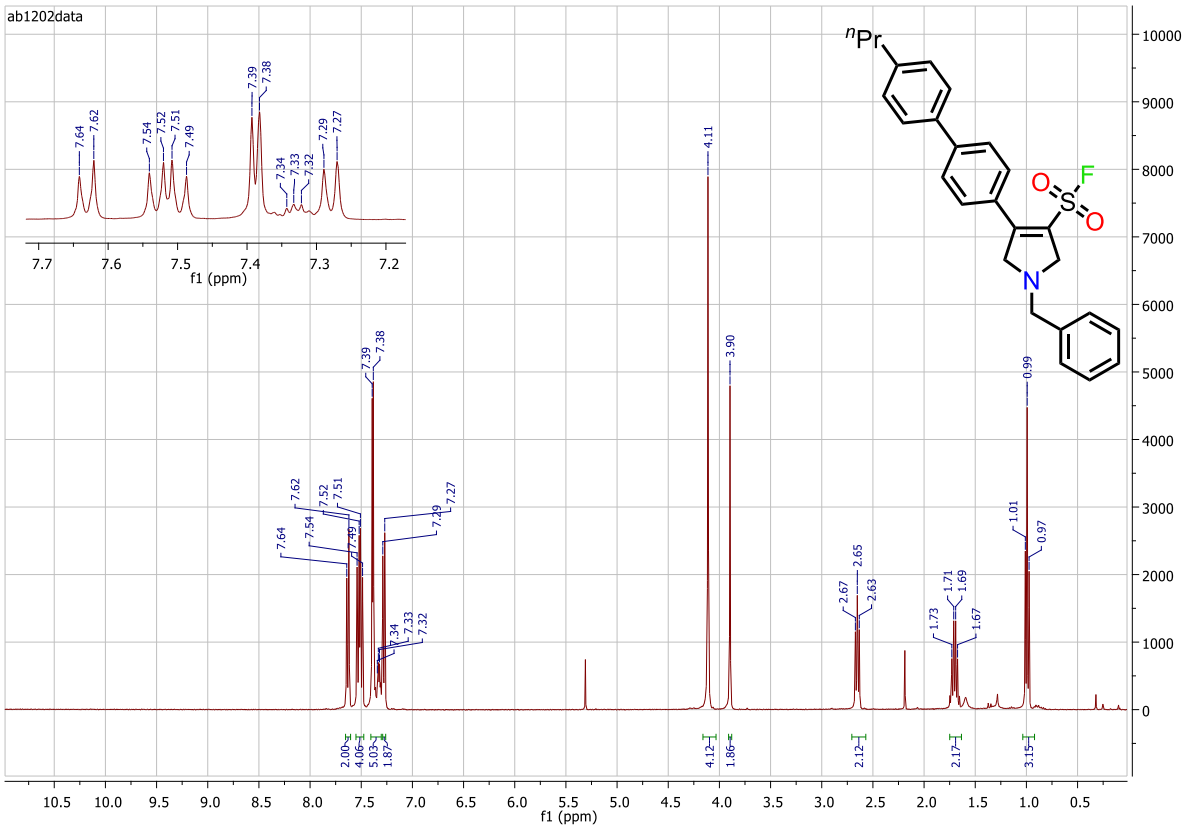

ab1198data
MeO
O
S
F
O
N
161.66
155.57
137.65
130.26
128.82
127.83
123.29
123.03
122.60
114.04
77.48
77.16
76.84
65.08
60.95
59.77
55.49
f1 (ppm)

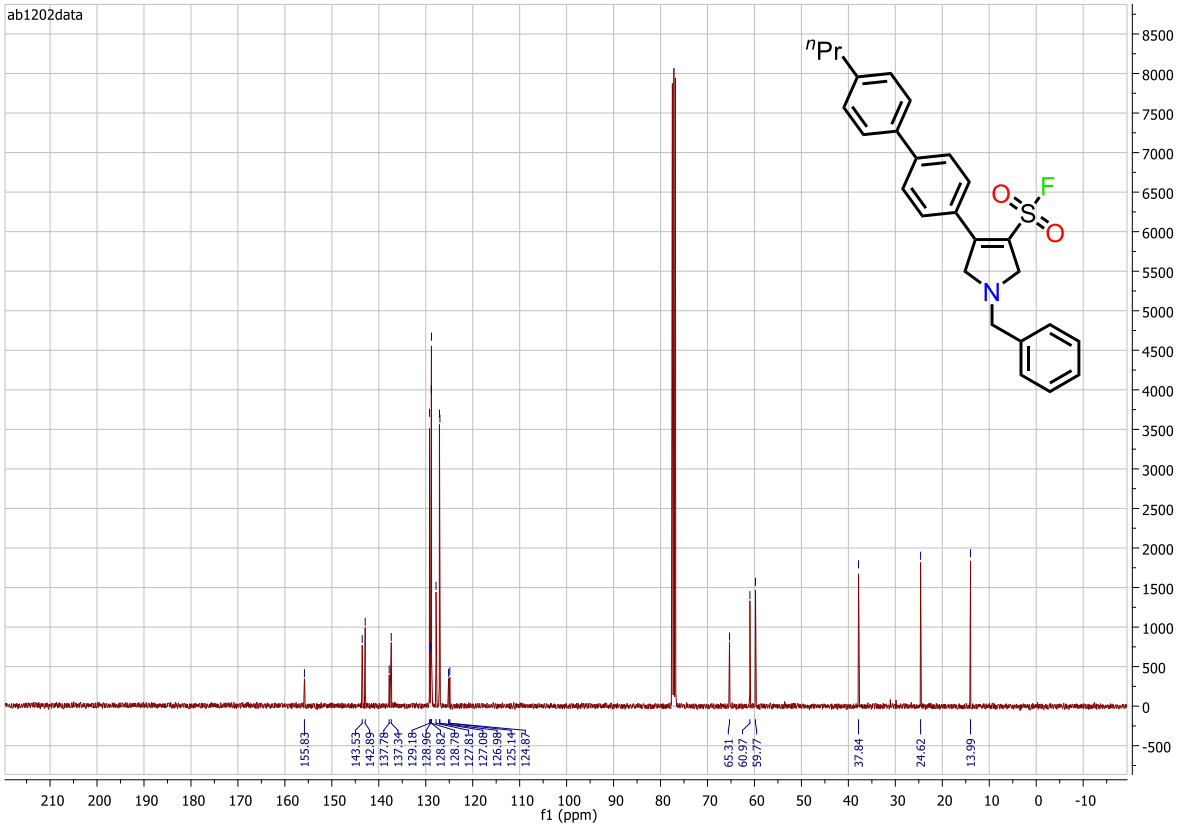

ab1198data
MeO
O
F
S
O
N
64.04
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

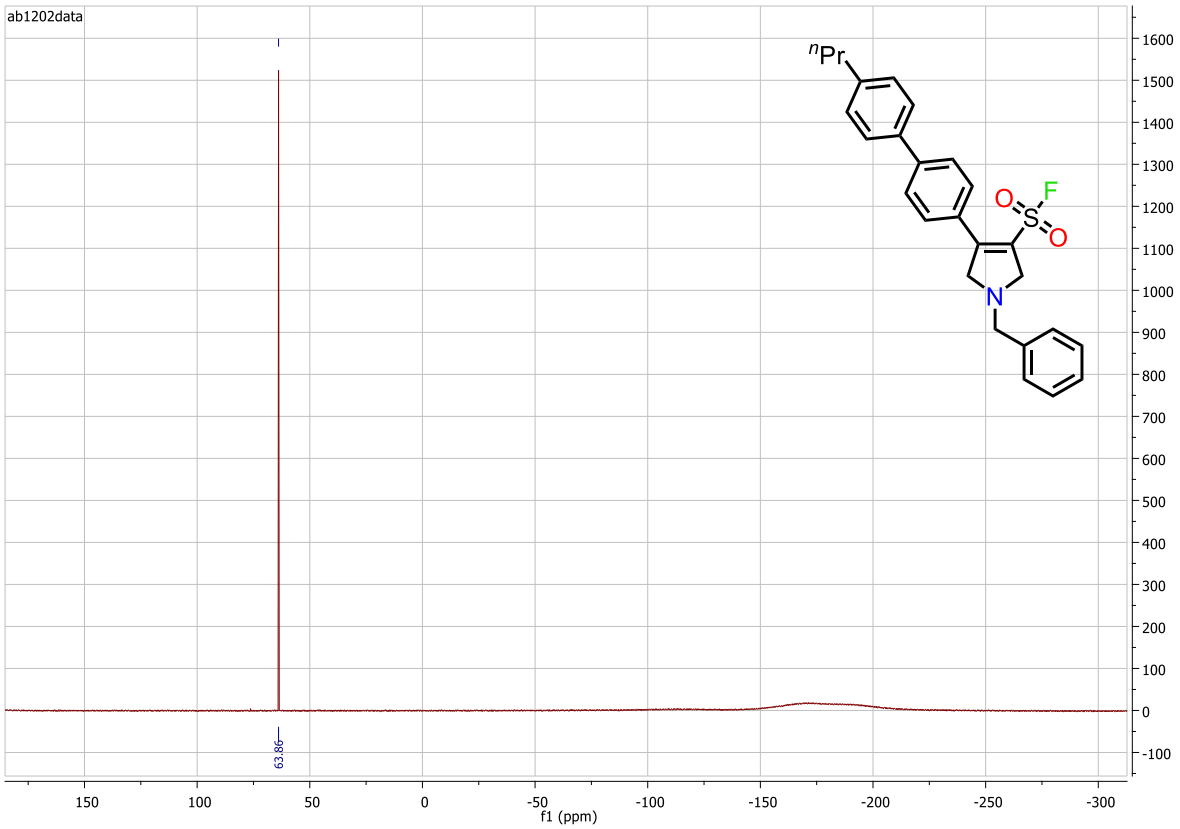

ab1203data
7.38
7.36
7.34
7.32
7.31
7.23
7.21
7.4
7.3
7.2
7.1
7.0
f1 (ppm)
nPr
O
S
F
O
N
7.37
7.38
7.36
7.34
7.23
7.21
7.32
7.31
3.88
4.08
4.07
2.63
2.61
2.59
1.68
1.67
1.65
1.63
0.95
0.97
0.94
6.88
2.00
3.90
1.94
2.01
2.28
2.99
f1 (ppm)

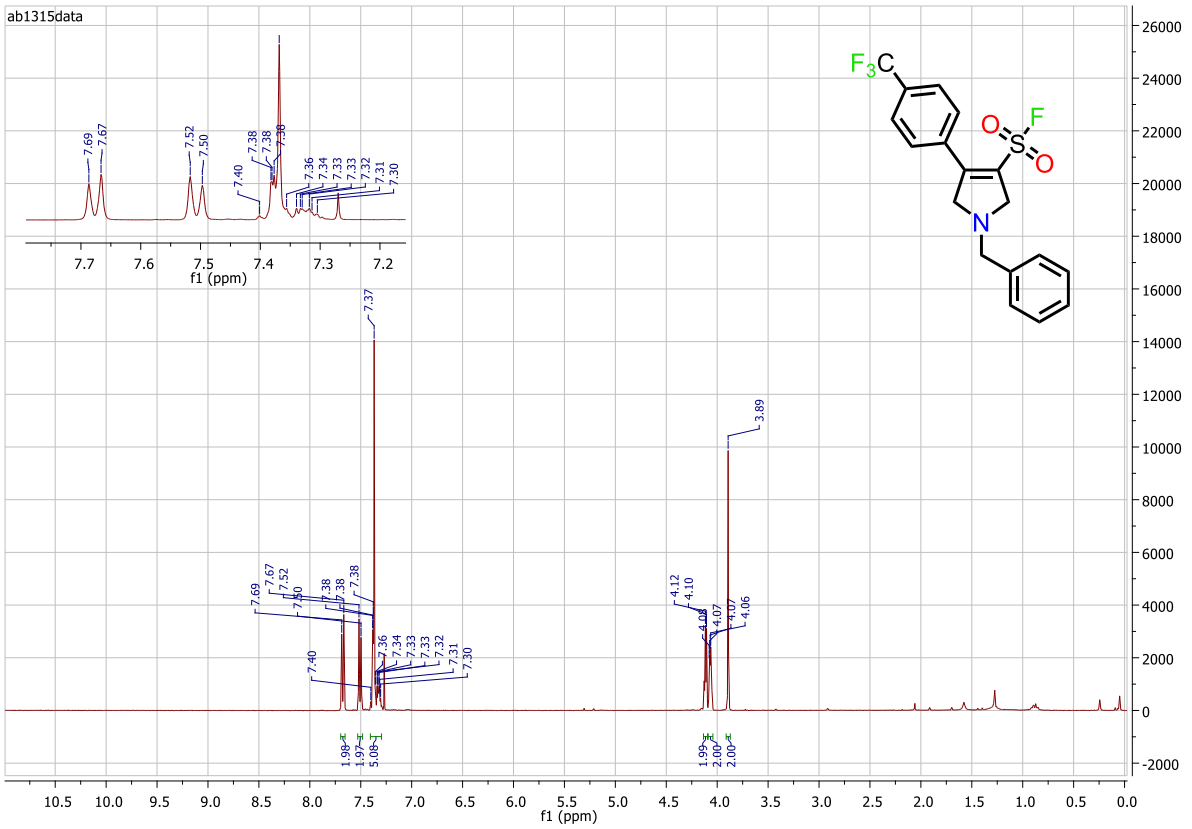

ab1203data
nPr
O
S
F
O
N
156.26
156.23
145.89
137.73
128.81
128.65
128.57
128.26
128.25
127.81
124.57
124.31
77.48
77.16
76.84
65.32
60.91
59.79
38.03
24.31
13.94
f1 (ppm)

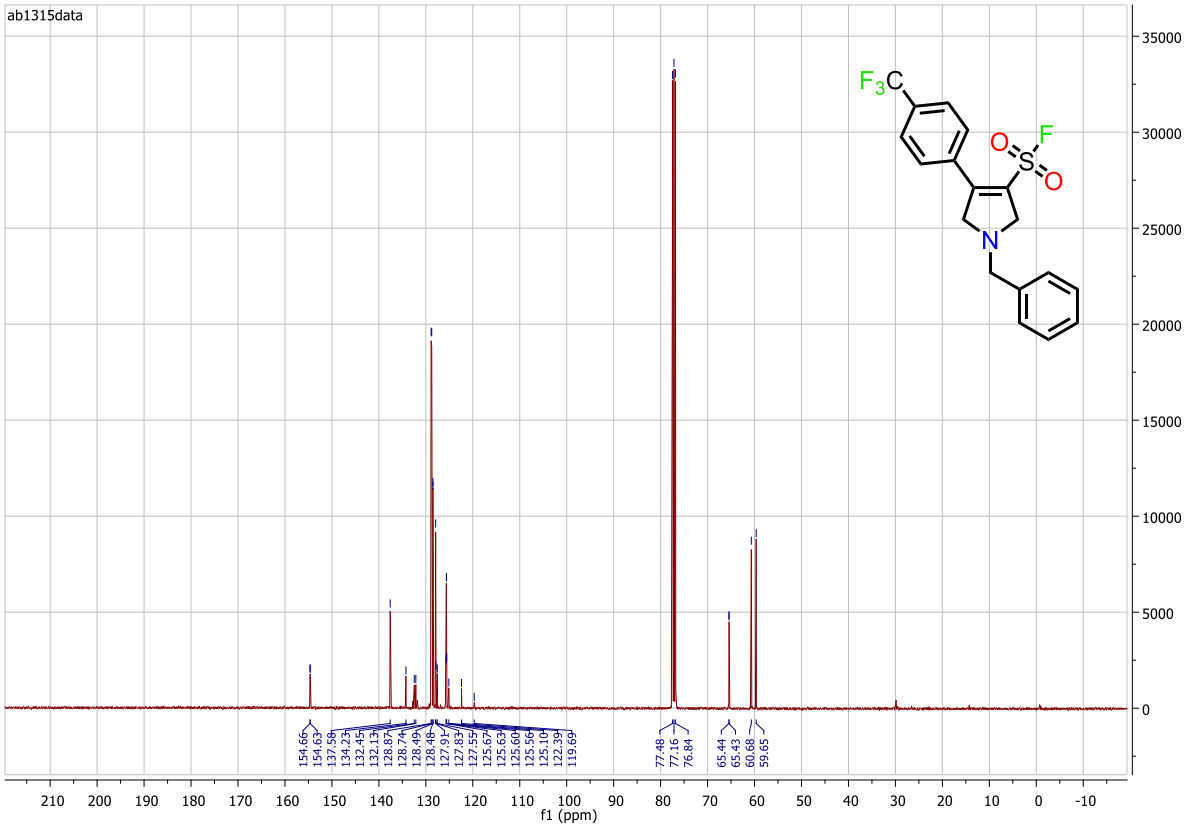

ab1203data
63.83
f1 (ppm)
150
100
50
0
-50
-100
-150
-200
-250
-300
1000
900
800
700
600
500
400
300
200
100
0
-100
nPr
O
S
F
O
N

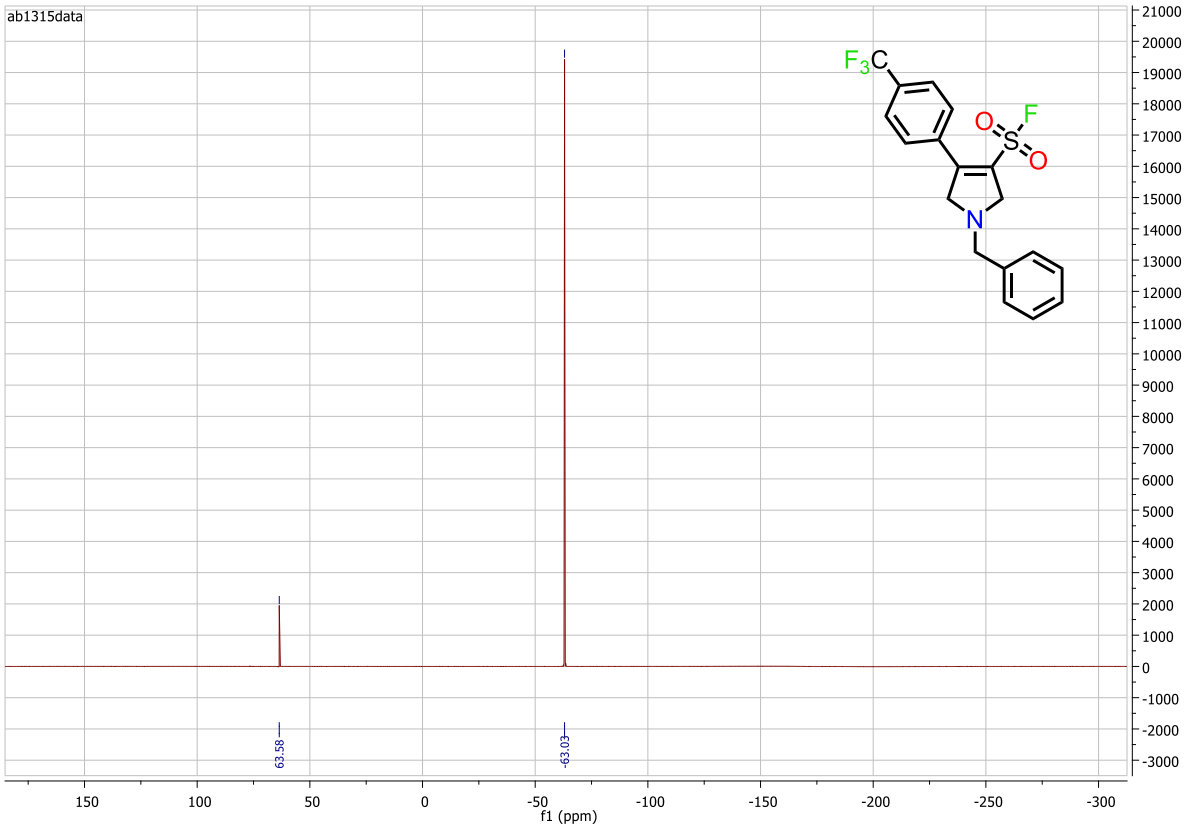

ab1202data
f1 (ppm)

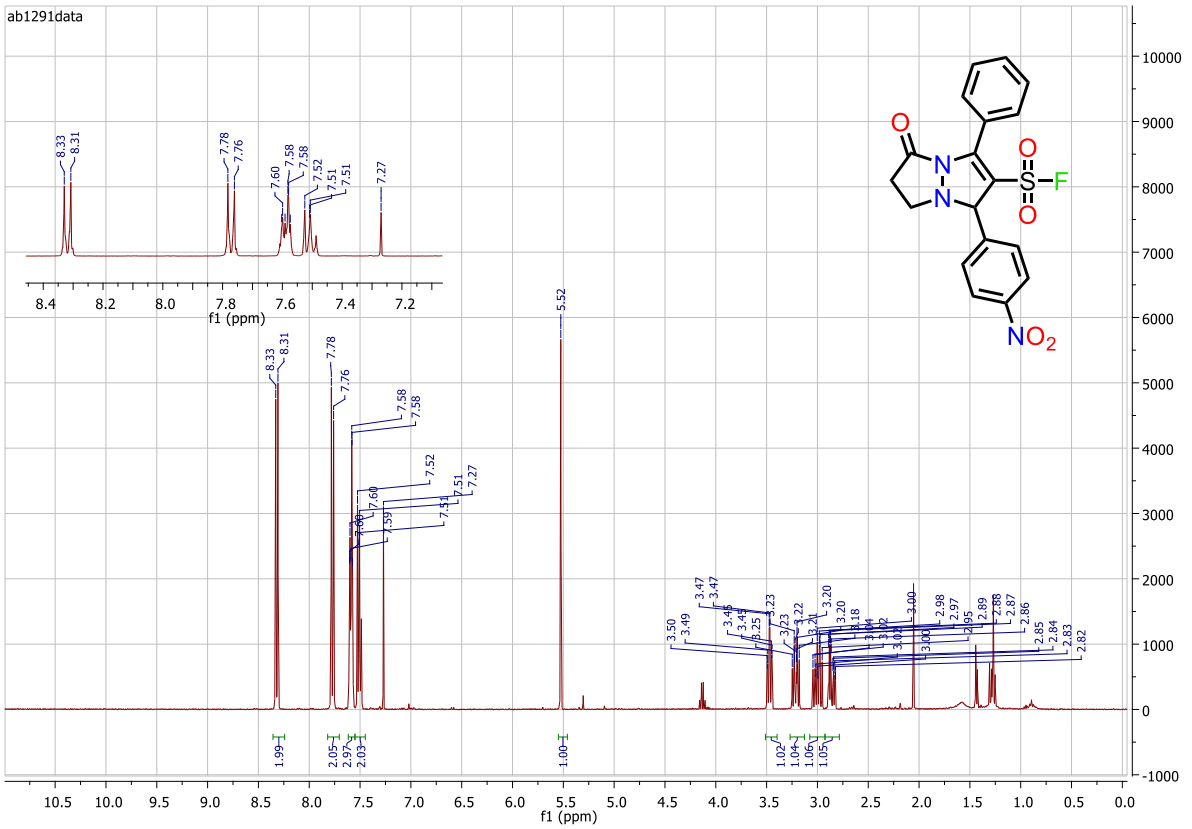

ab1202data
f1 (ppm)


ab1202data
63.86
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
nPr
O
S
F
O
N


ab1315data
f1 (ppm)


ab1315data
f1 (ppm)


ab1315data
F3C
O
S
F
O
N
63.58
-63.03
f1 (ppm)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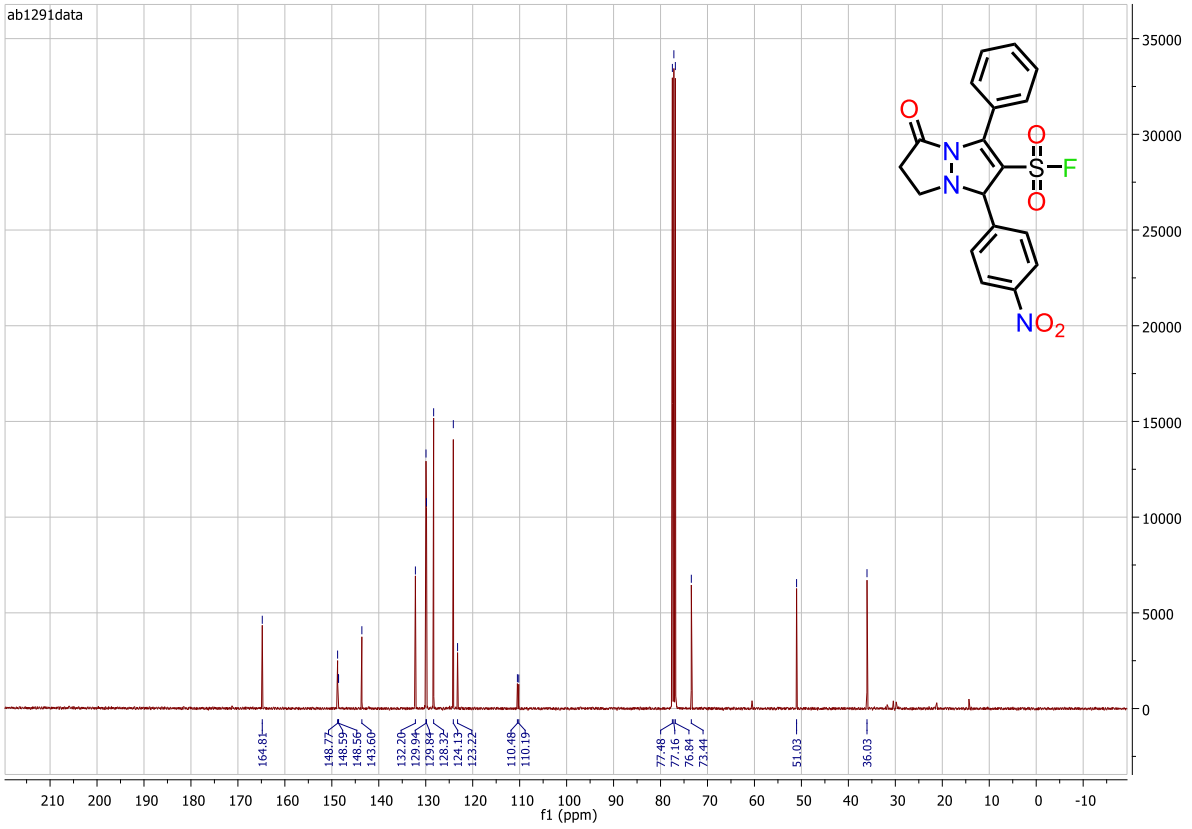
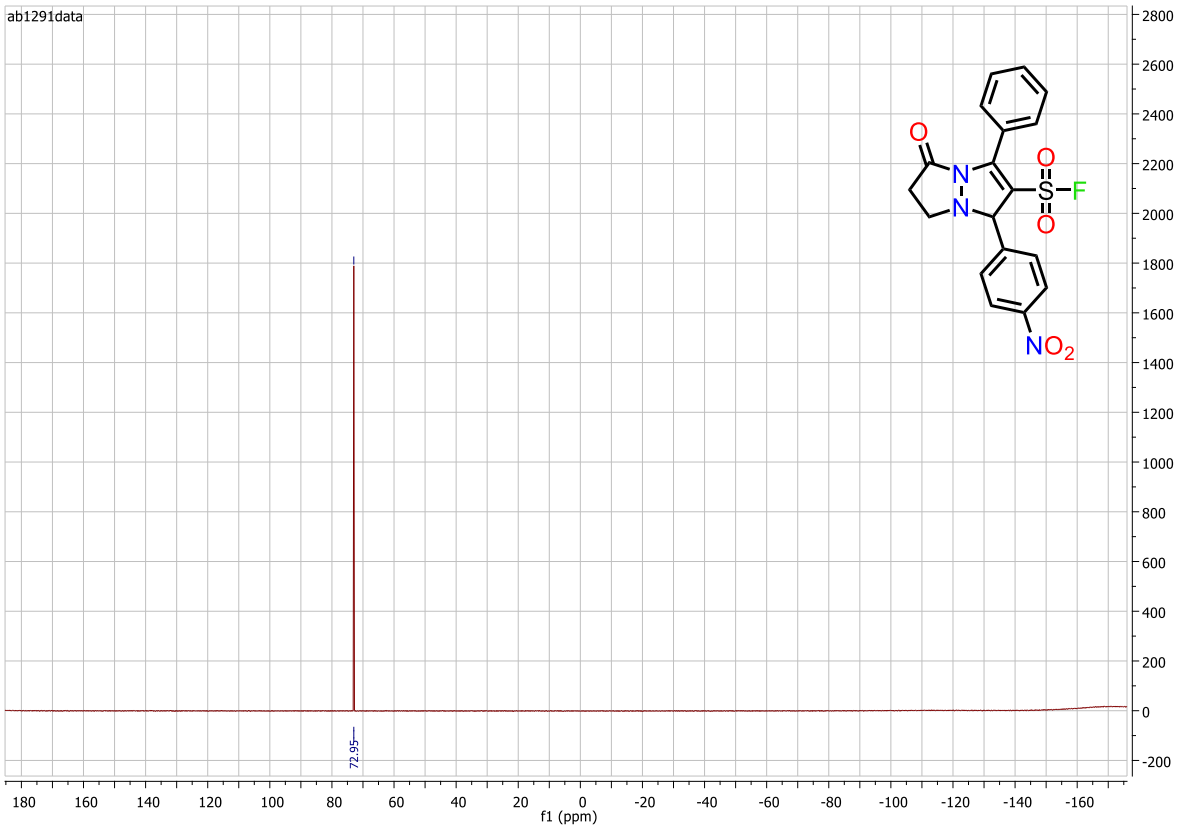
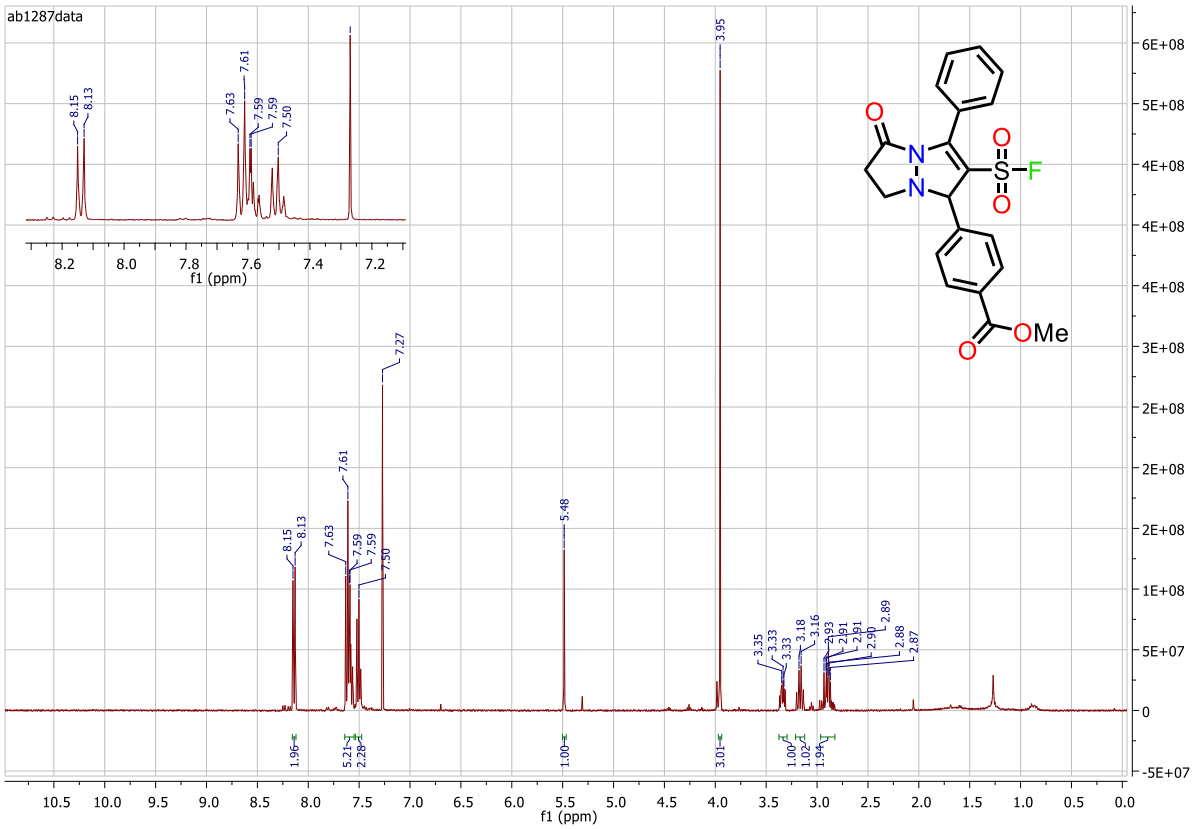
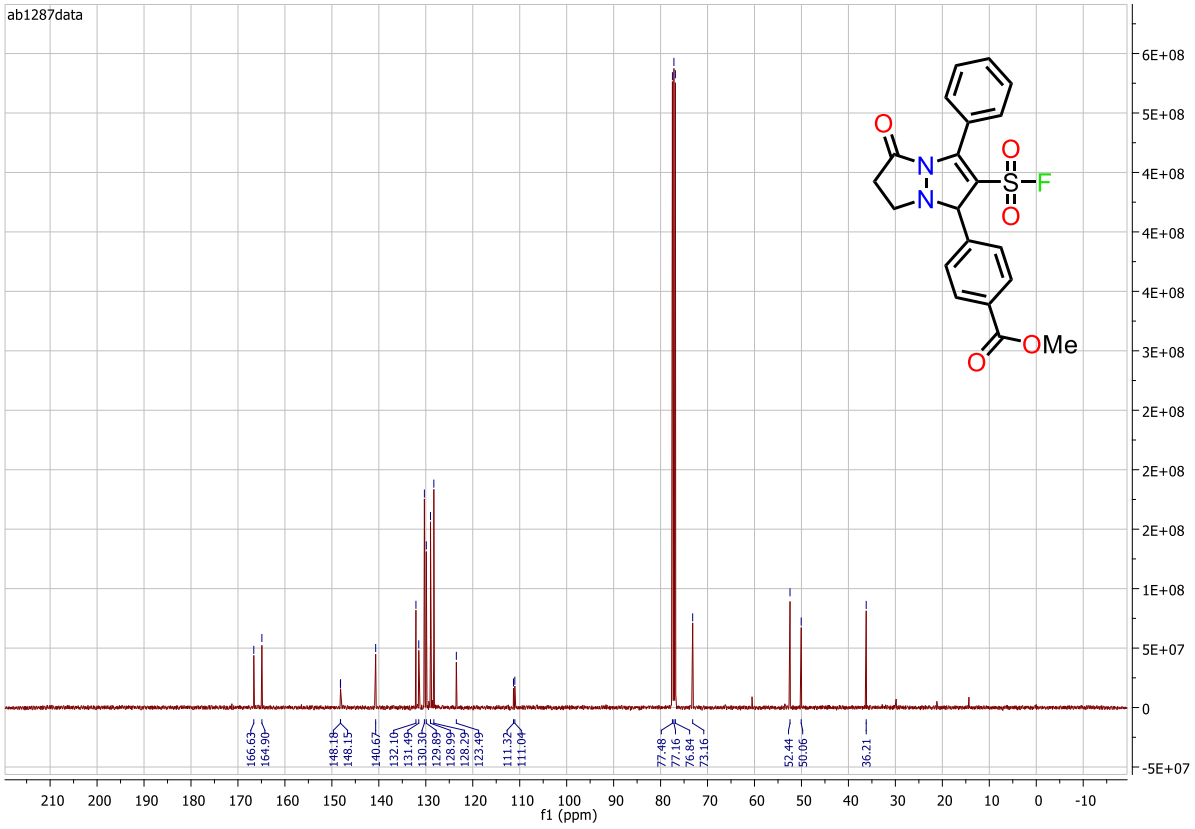
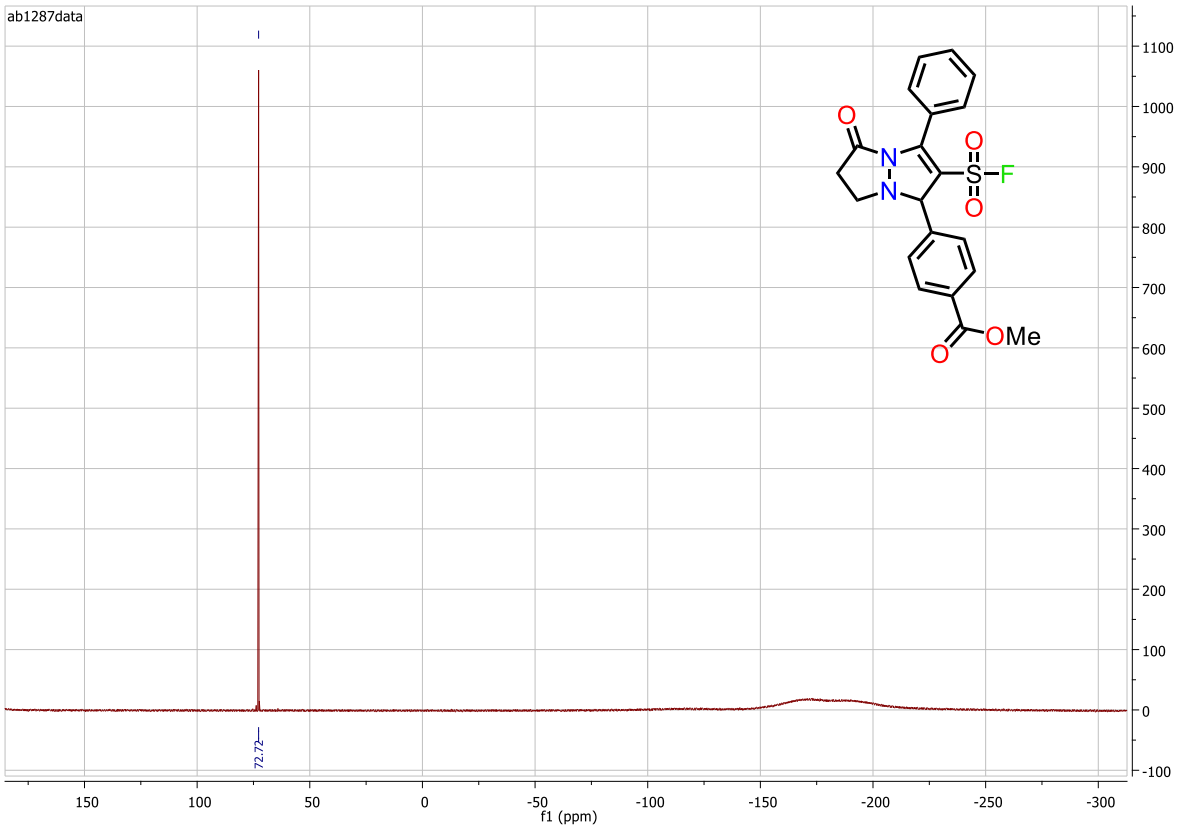
f1 (ppm)


ab1291data
f1 (ppm)


ab1291data
72.95
f1 (ppm)
O
N
N
O
S
F
O
NO2


ab1287data
f1 (ppm)
OMe


ab1287data
f1 (ppm)
OMe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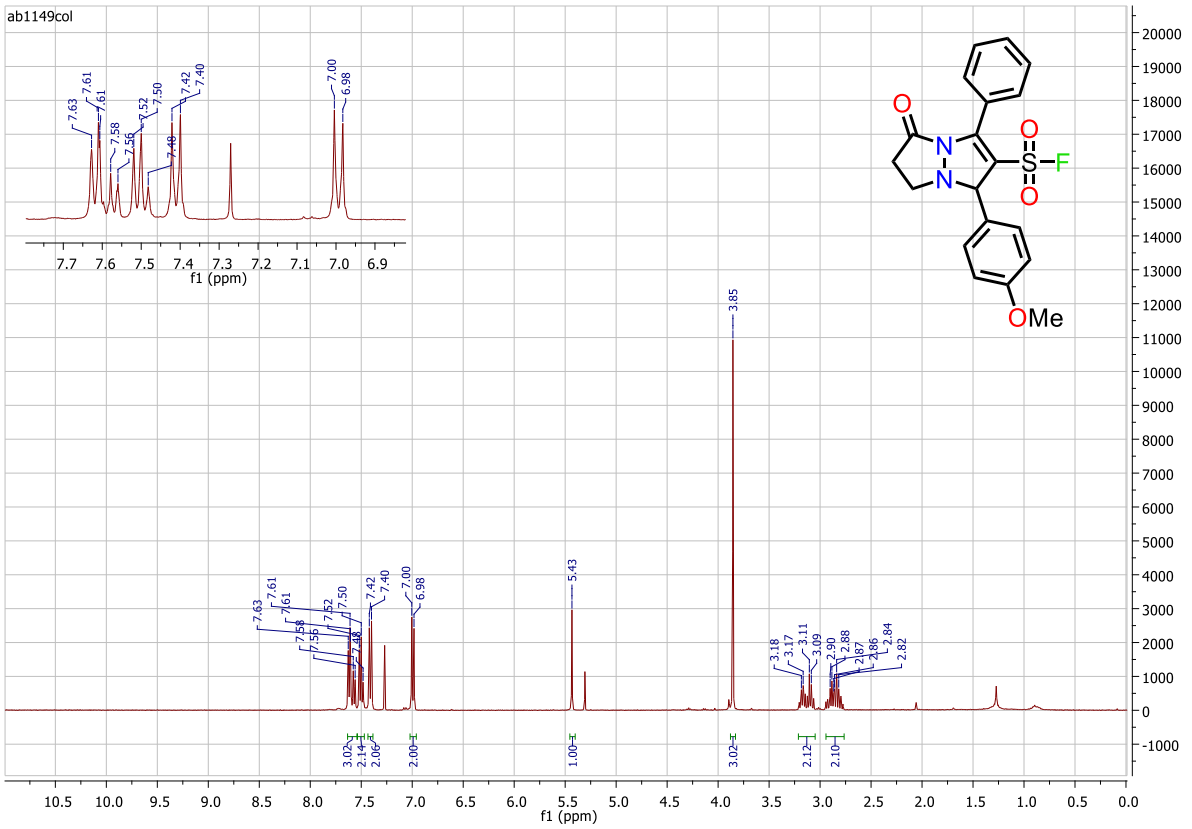
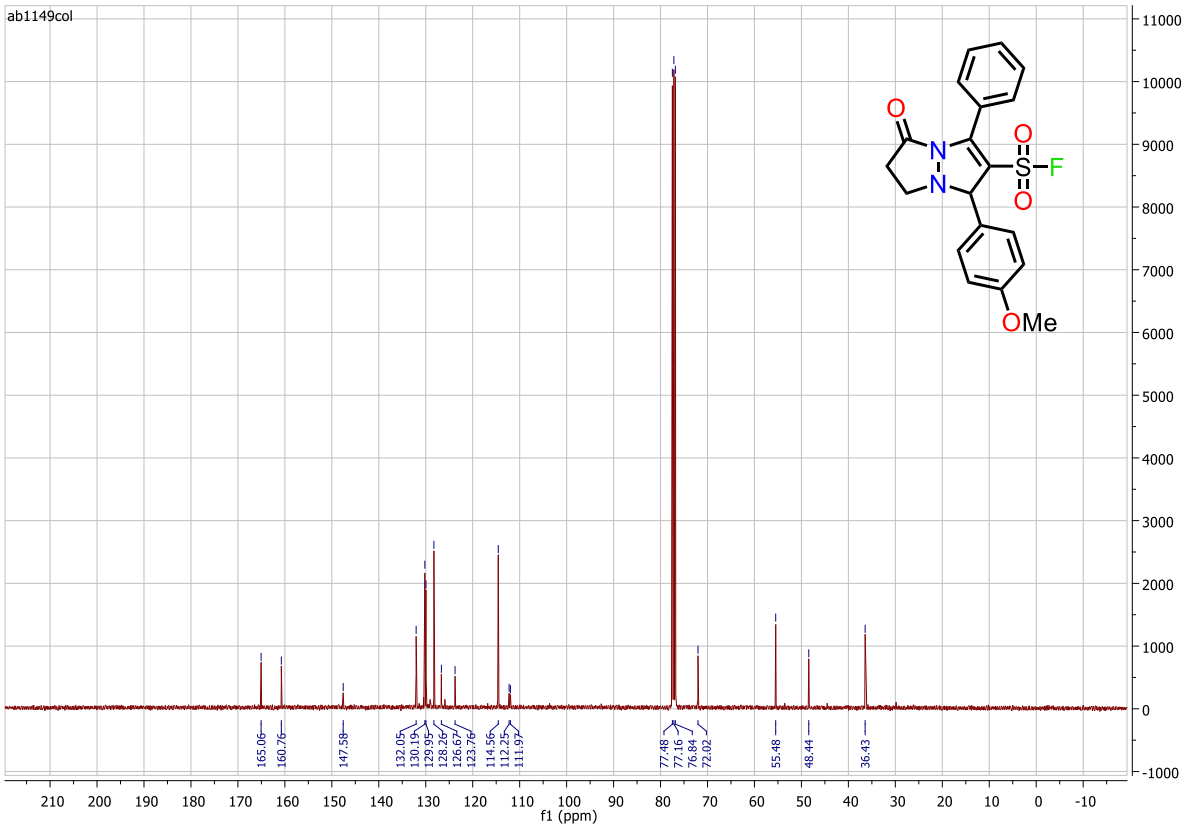
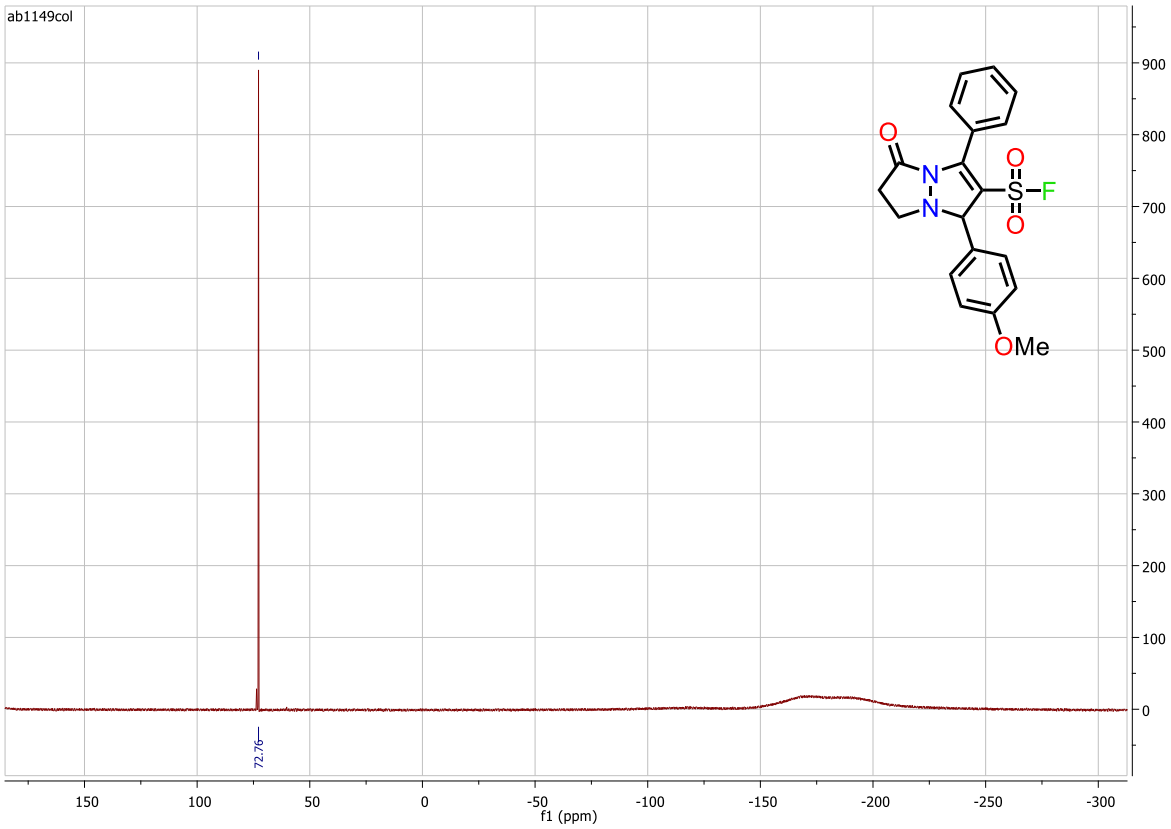
72.72
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
O
N
N
O
S
F
O
O
OMe


ab1149col
f1 (ppm)
OMe


ab1149col
f1 (ppm)
OMe


ab1149col
72.76
150
100
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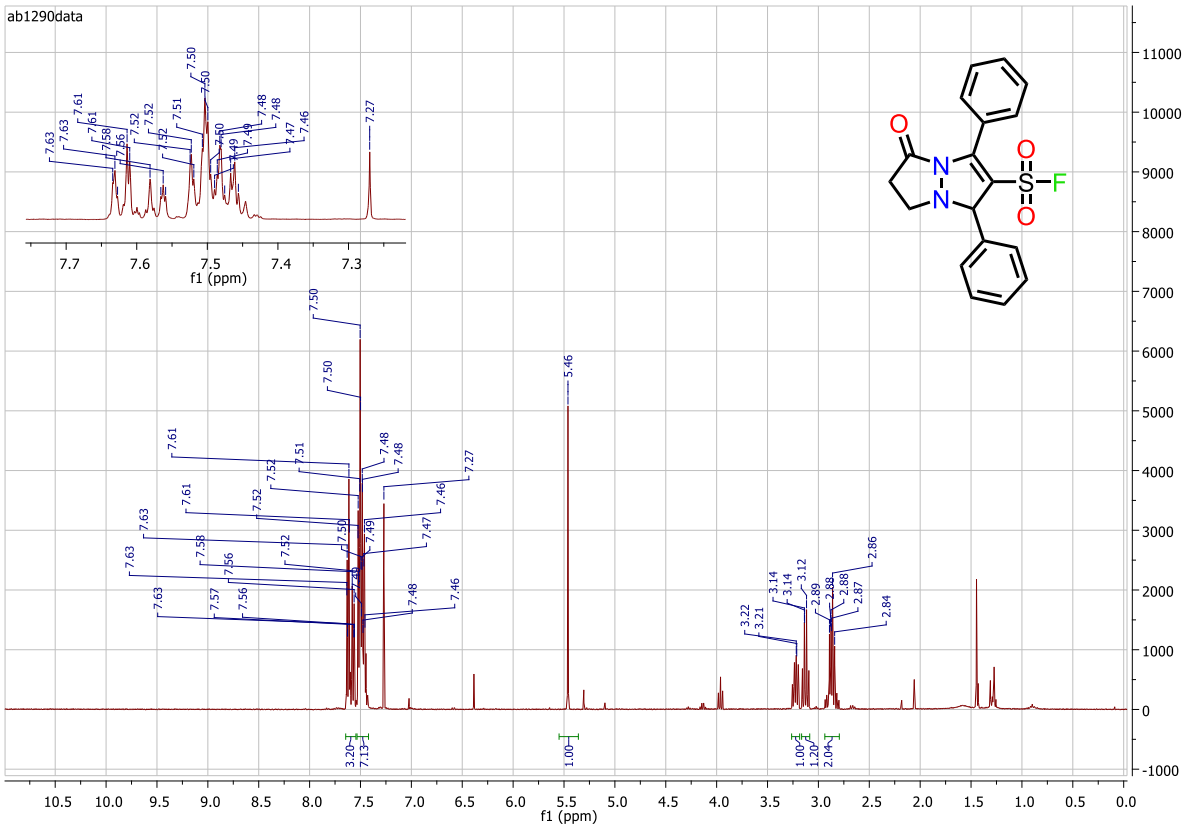
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
900
800
700
600
500
400
300
200
100
0
O
N
N
O
S
F
O
OMe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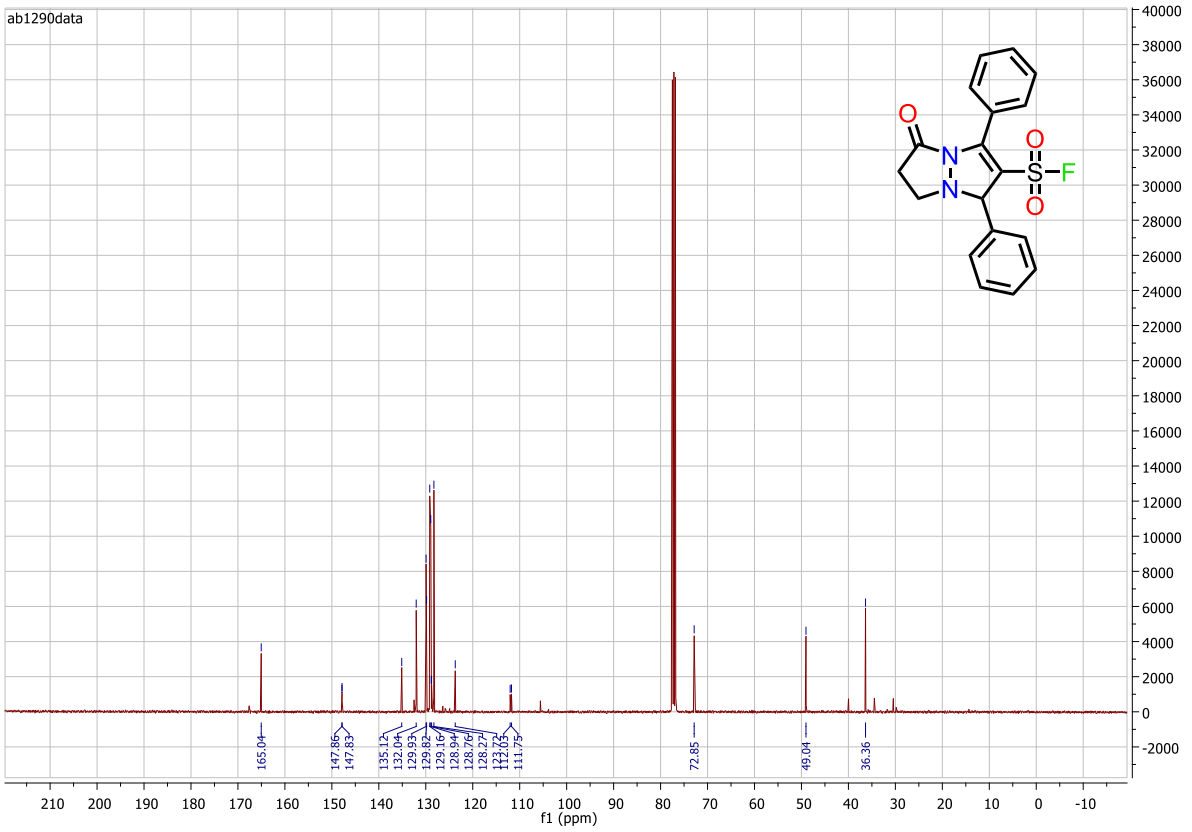
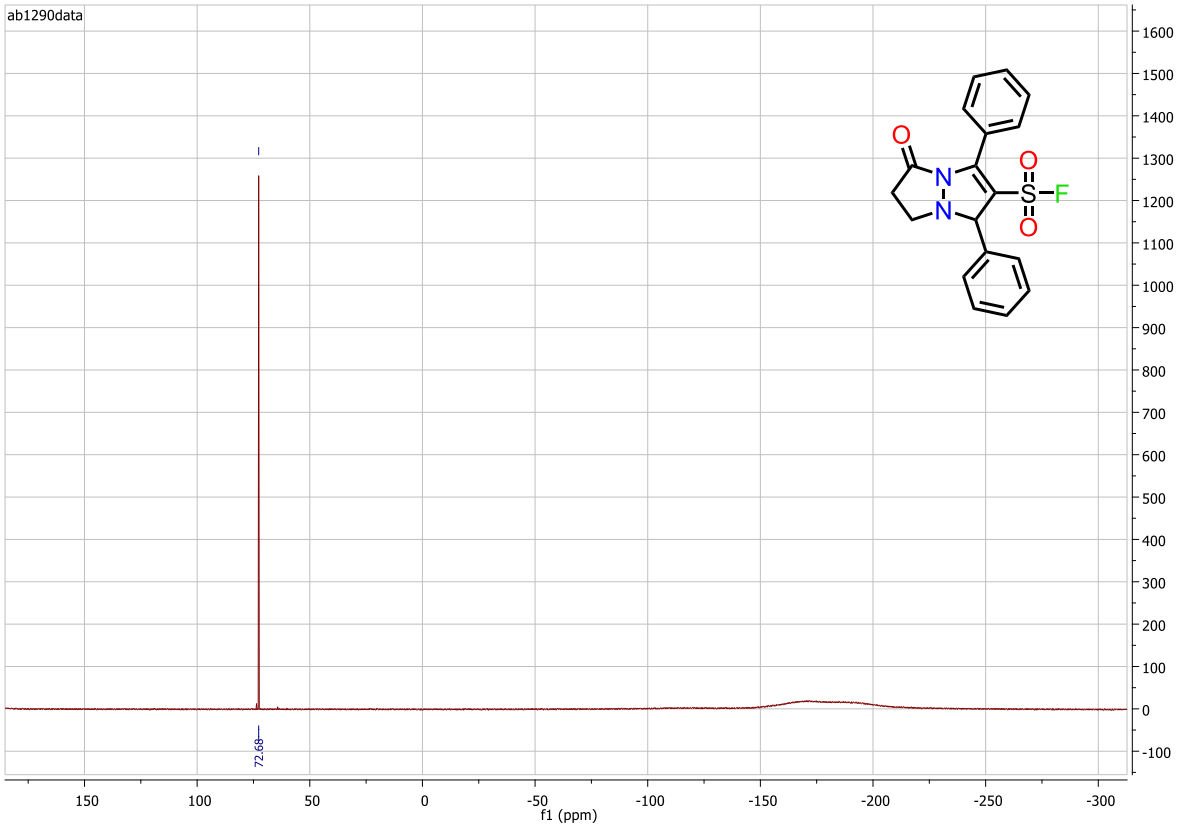
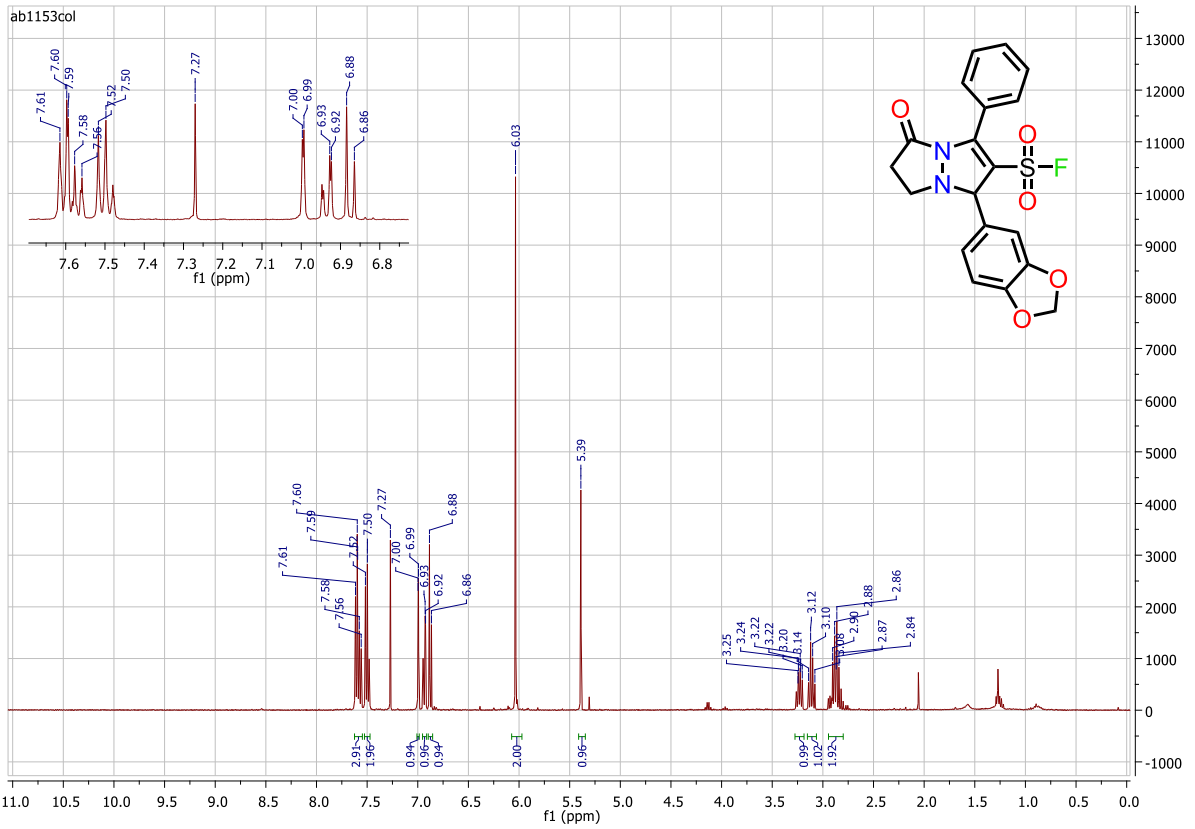
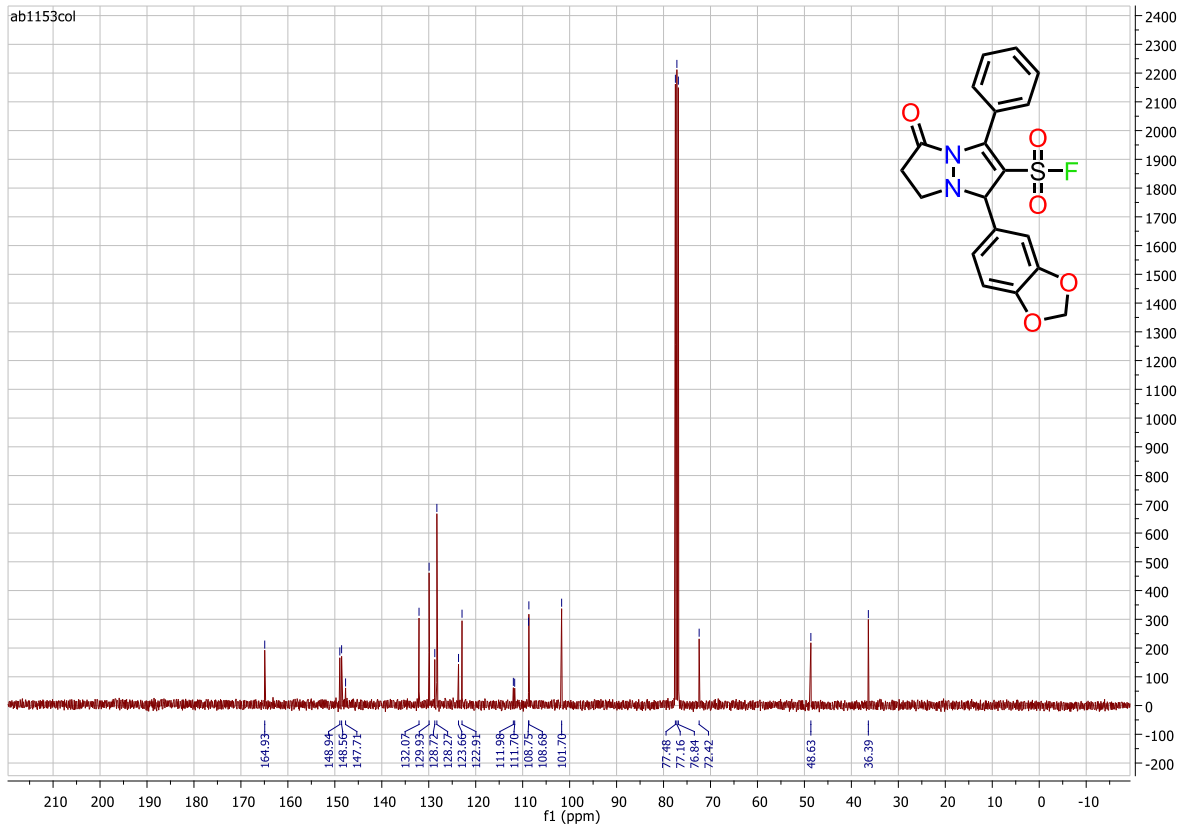
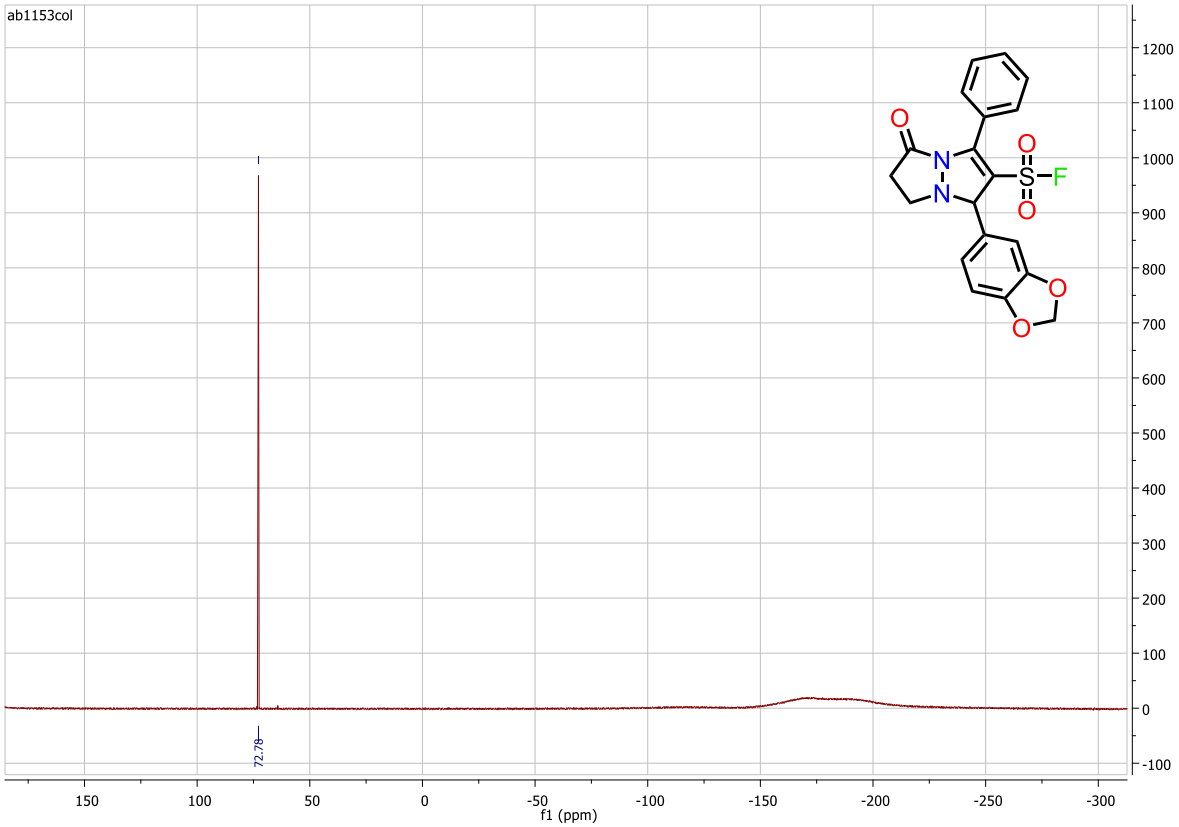
f1 (ppm)


ab1290data
f1 (ppm)


ab1290data
72.68
f1 (ppm)
O
N
N
O
S
F
O


ab1153col
f1 (ppm)


ab1153col
f1 (ppm)


ab1153col
72.78
f1 (ppm)
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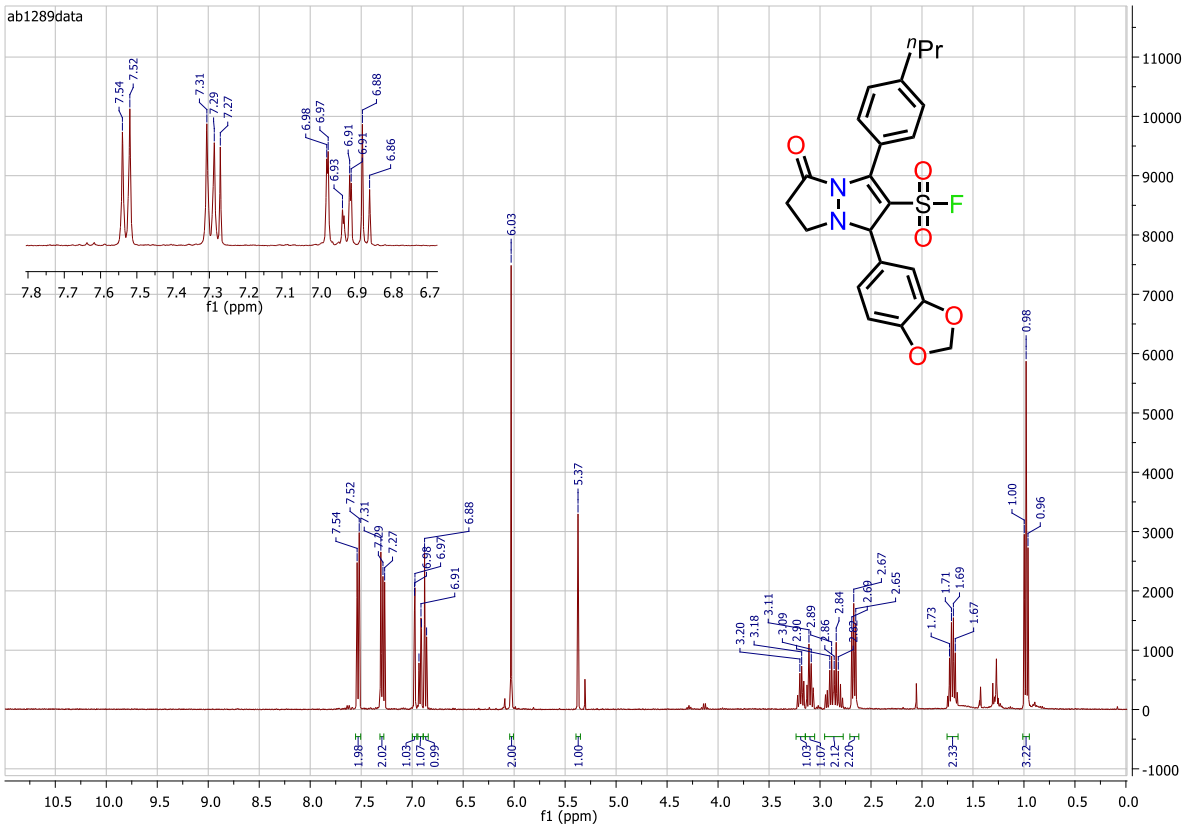
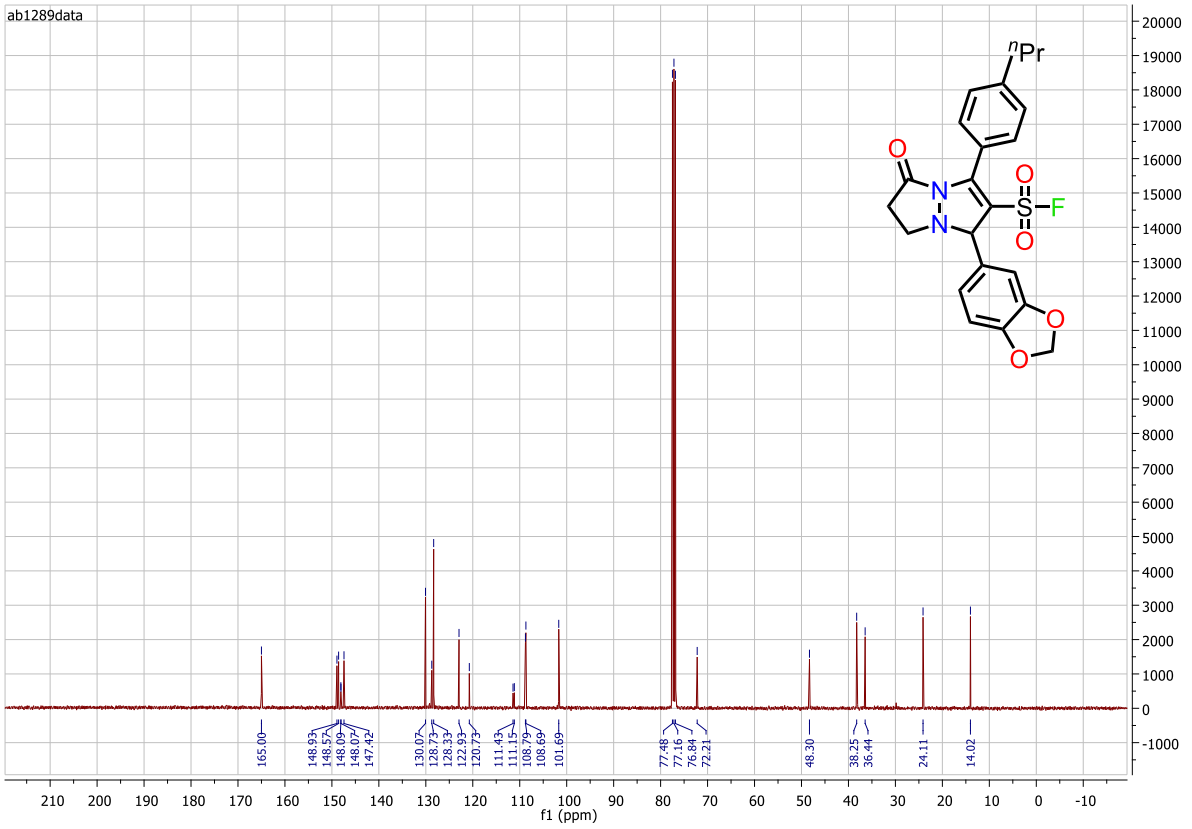
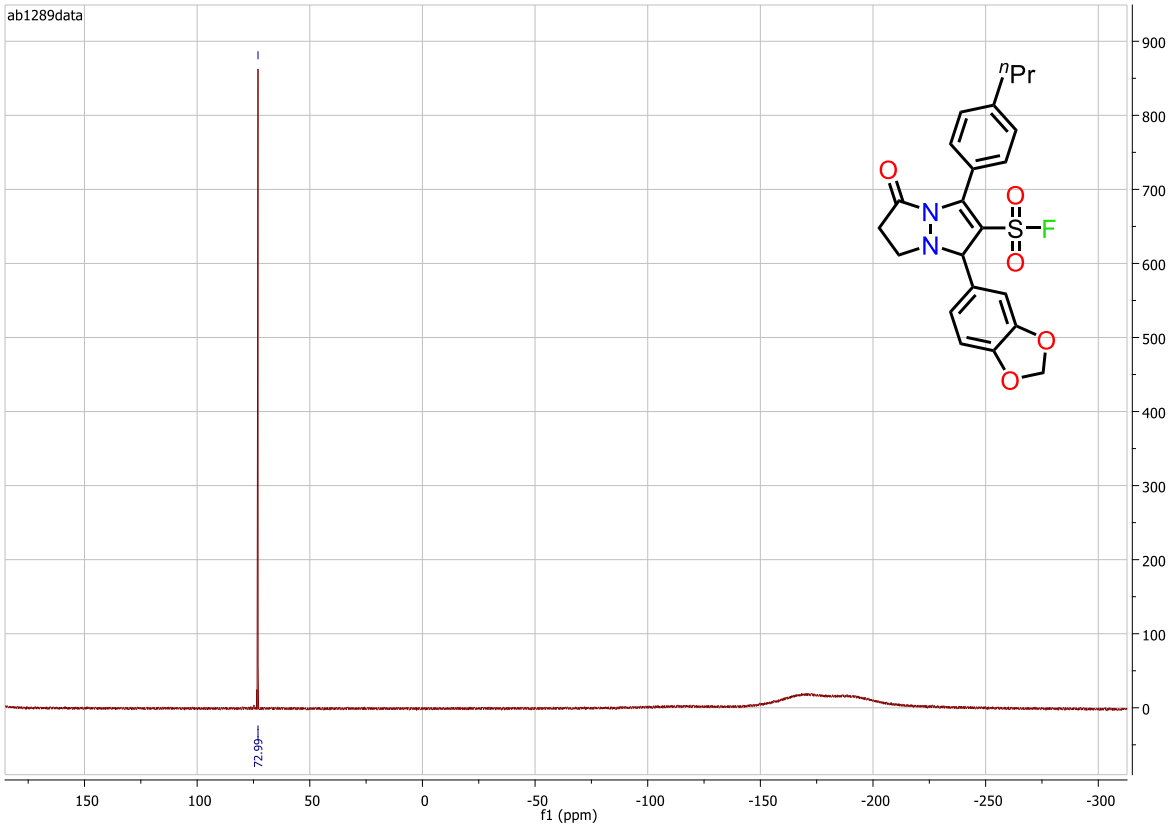
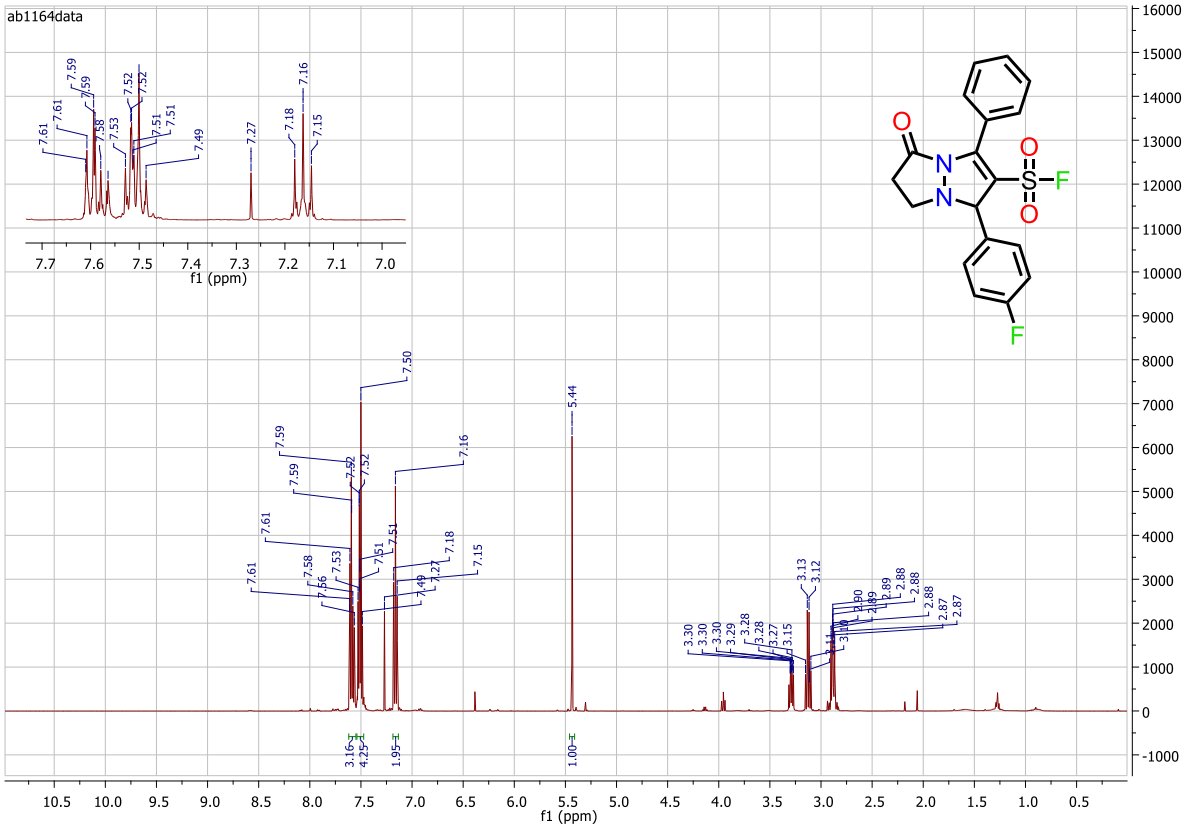
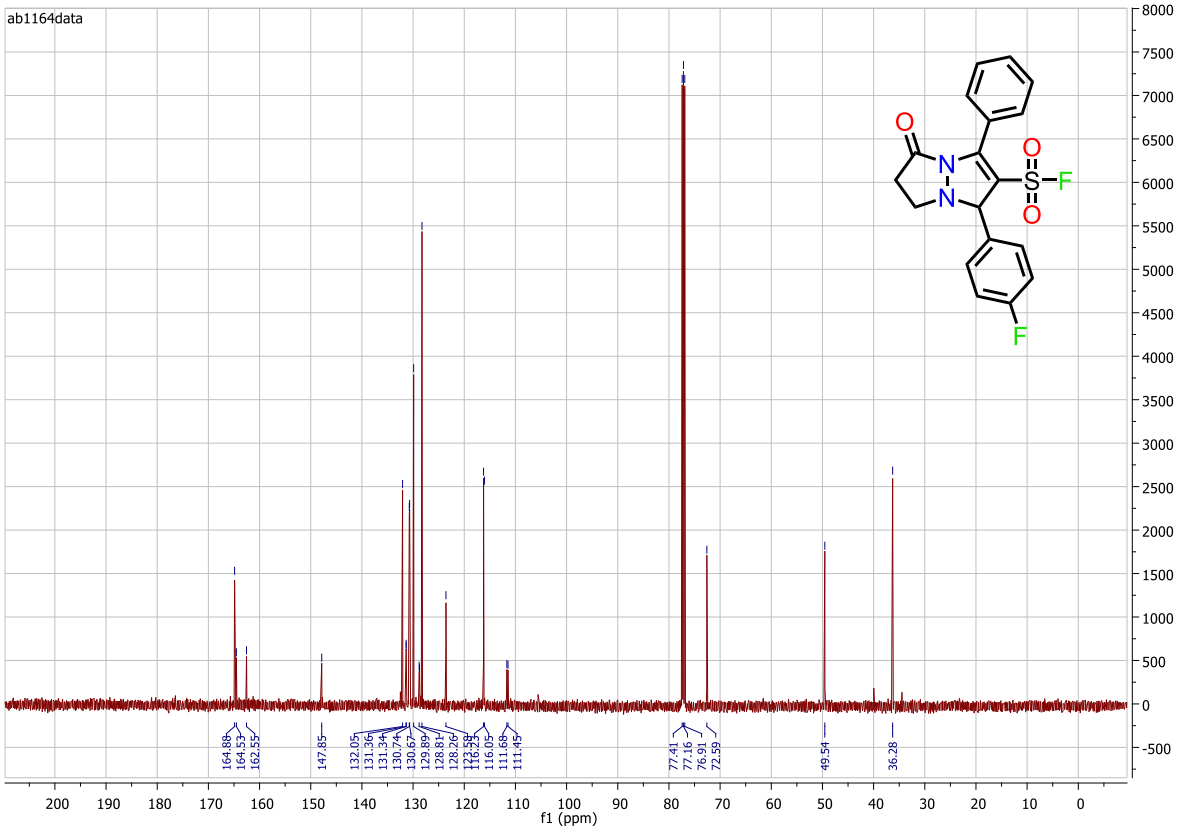
100
50
0
-50
-100
-150
-200
-250
-300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
O
N
N
O
S
F
O
O
O

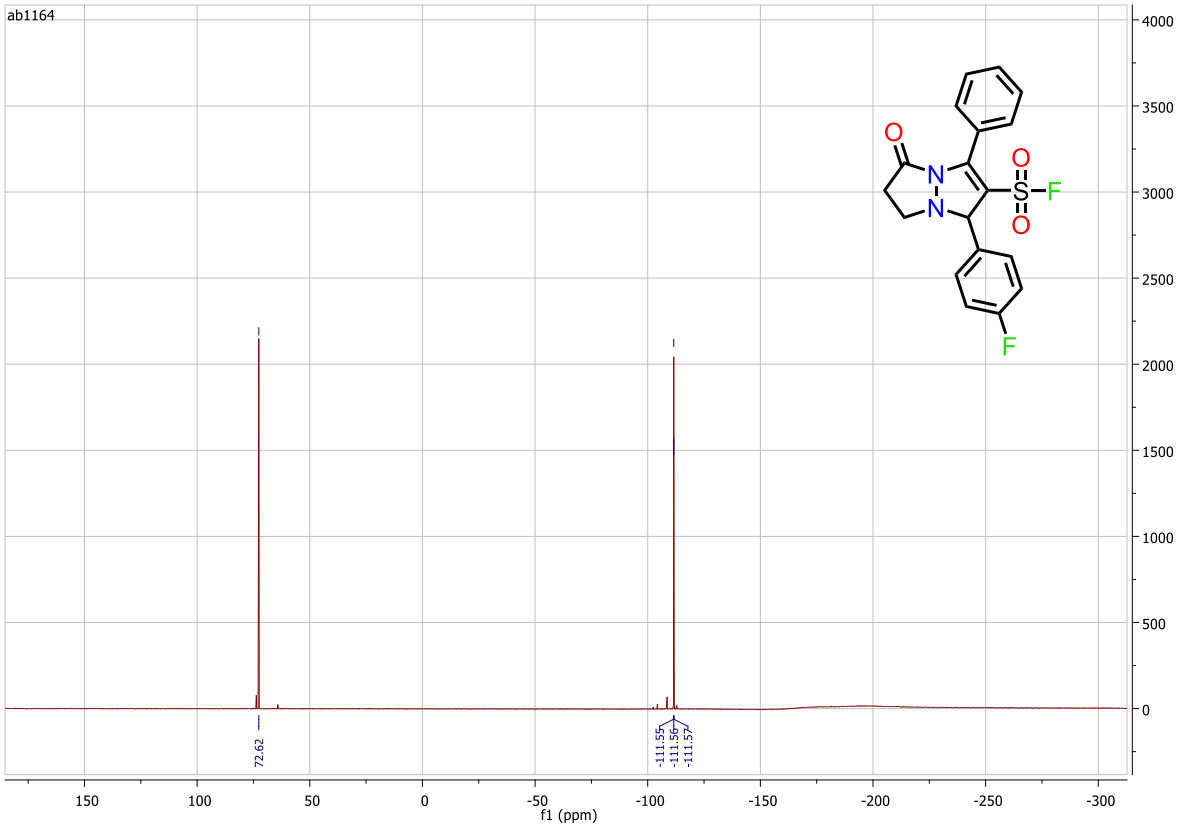

ab1289data
f1 (ppm)

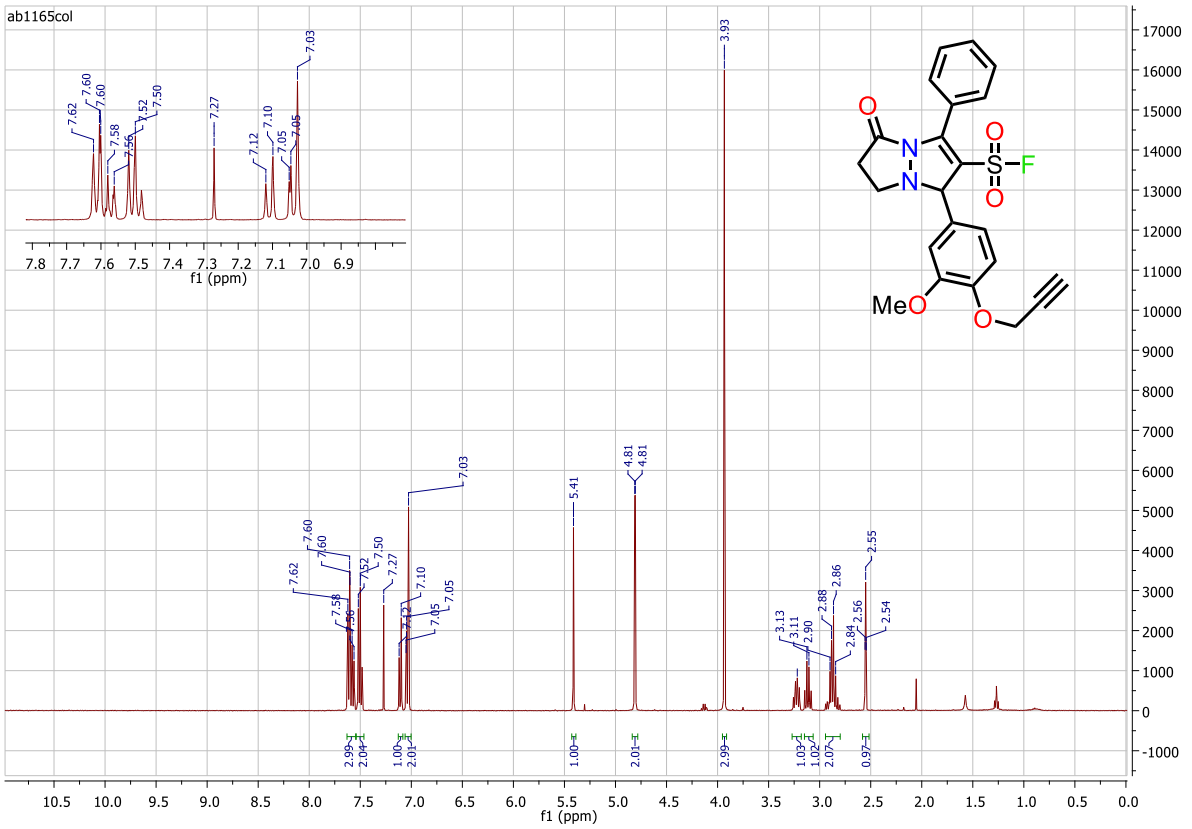

ab1289data
f1 (ppm)

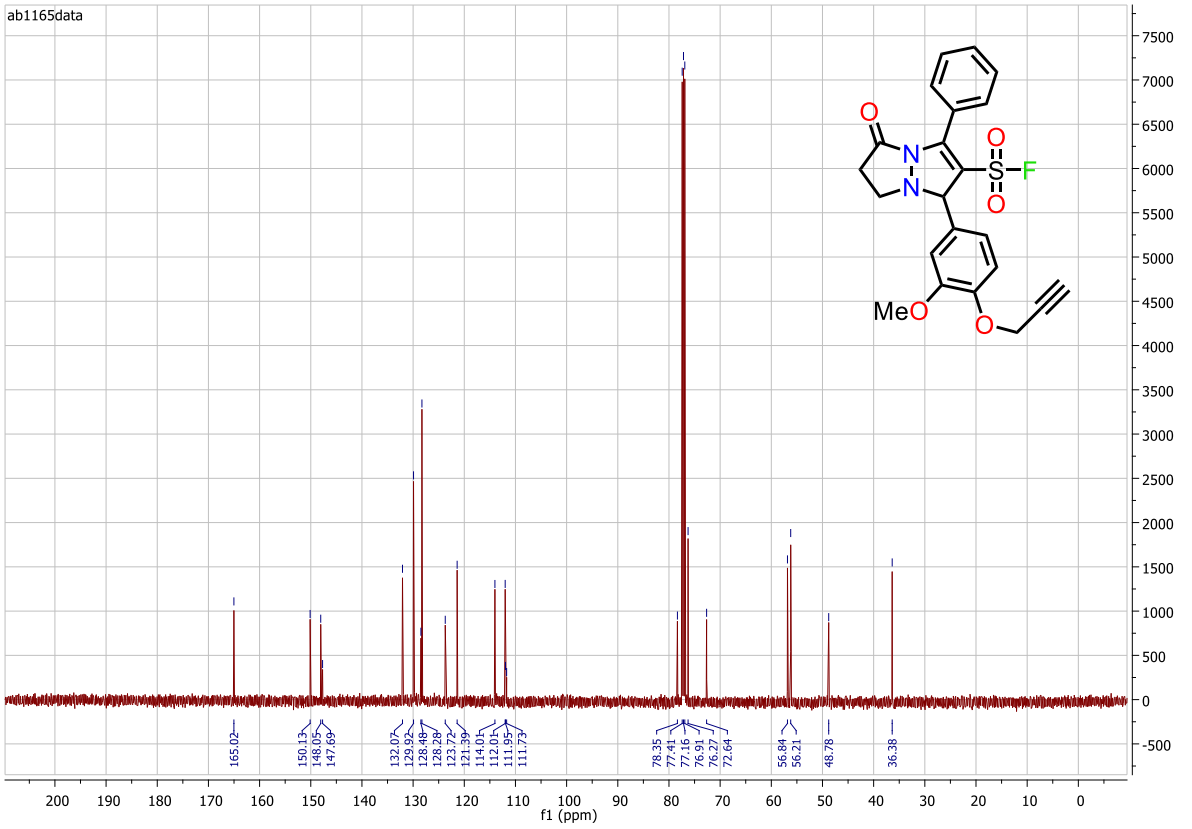

ab1289data
72.99
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
900
800
700
600
500
400
300
200
100
0
nPr
O
N
N
O
S
F
O
O
O

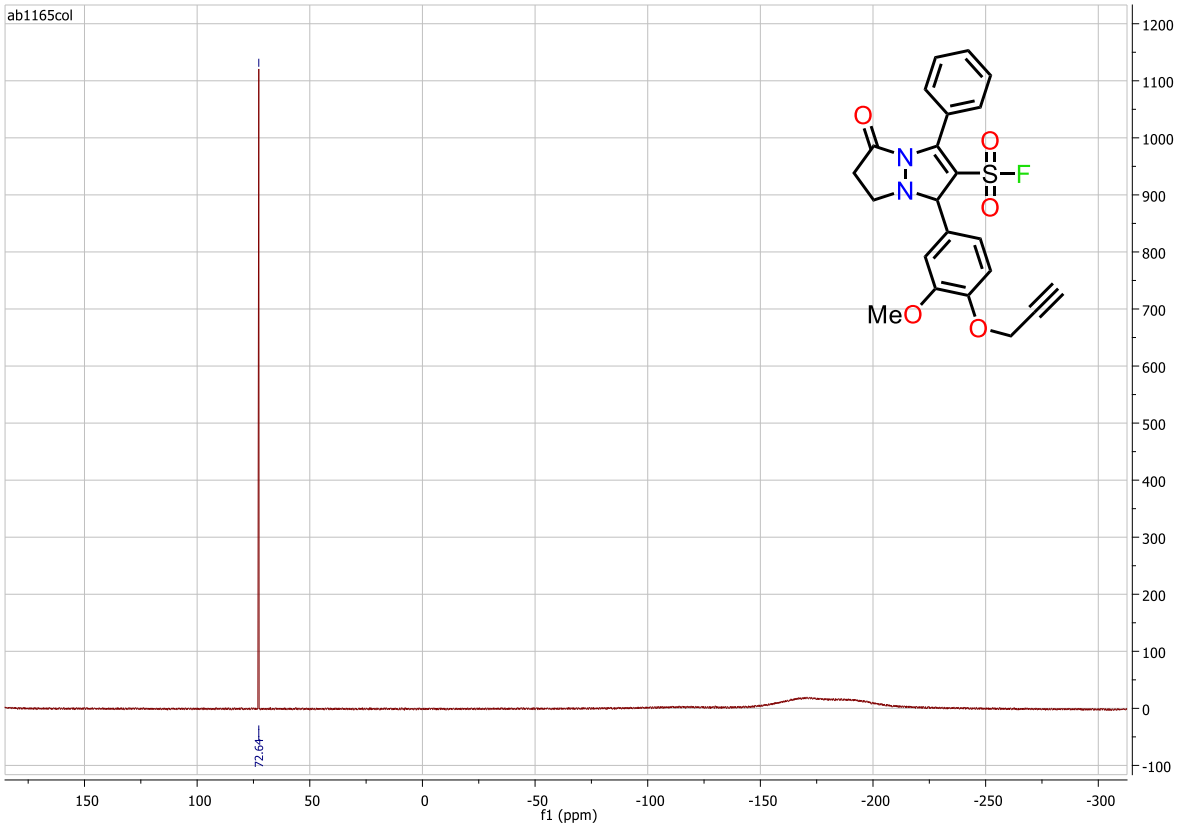

ab1164data
f1 (ppm)

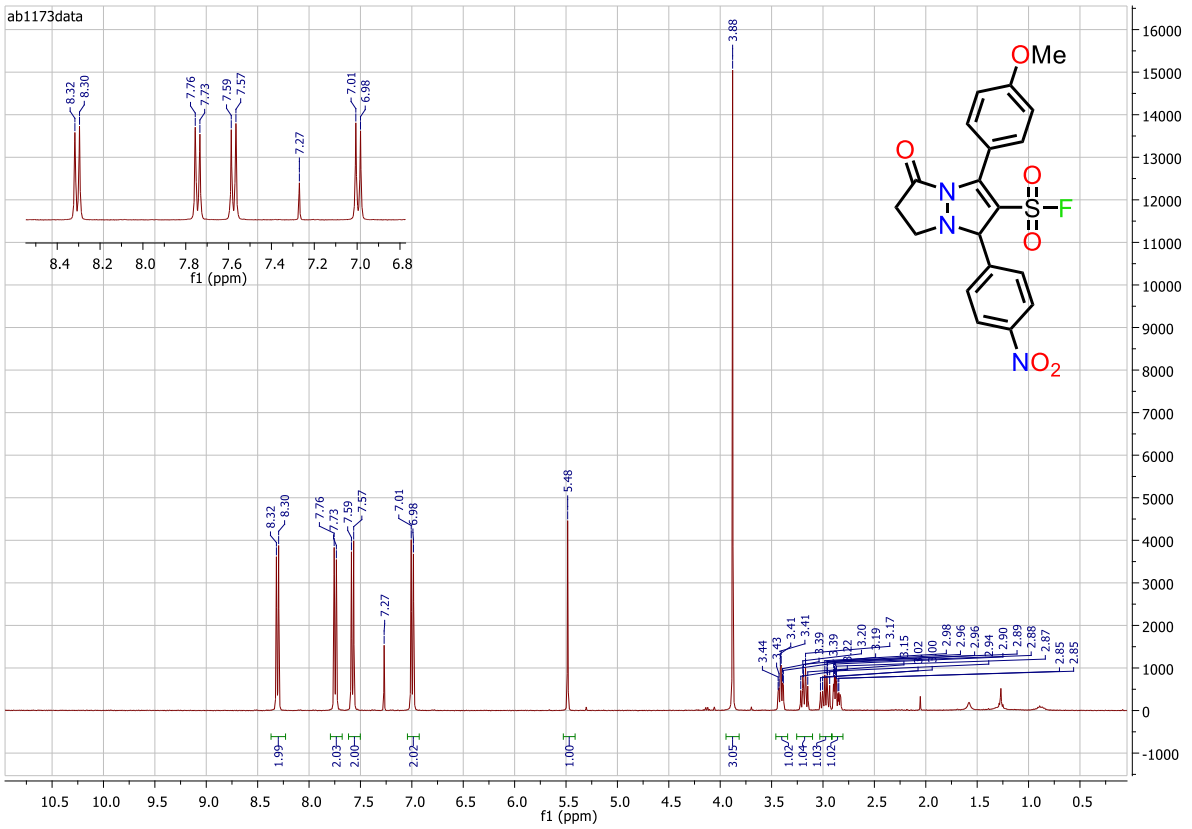

ab1164data
f1 (ppm)

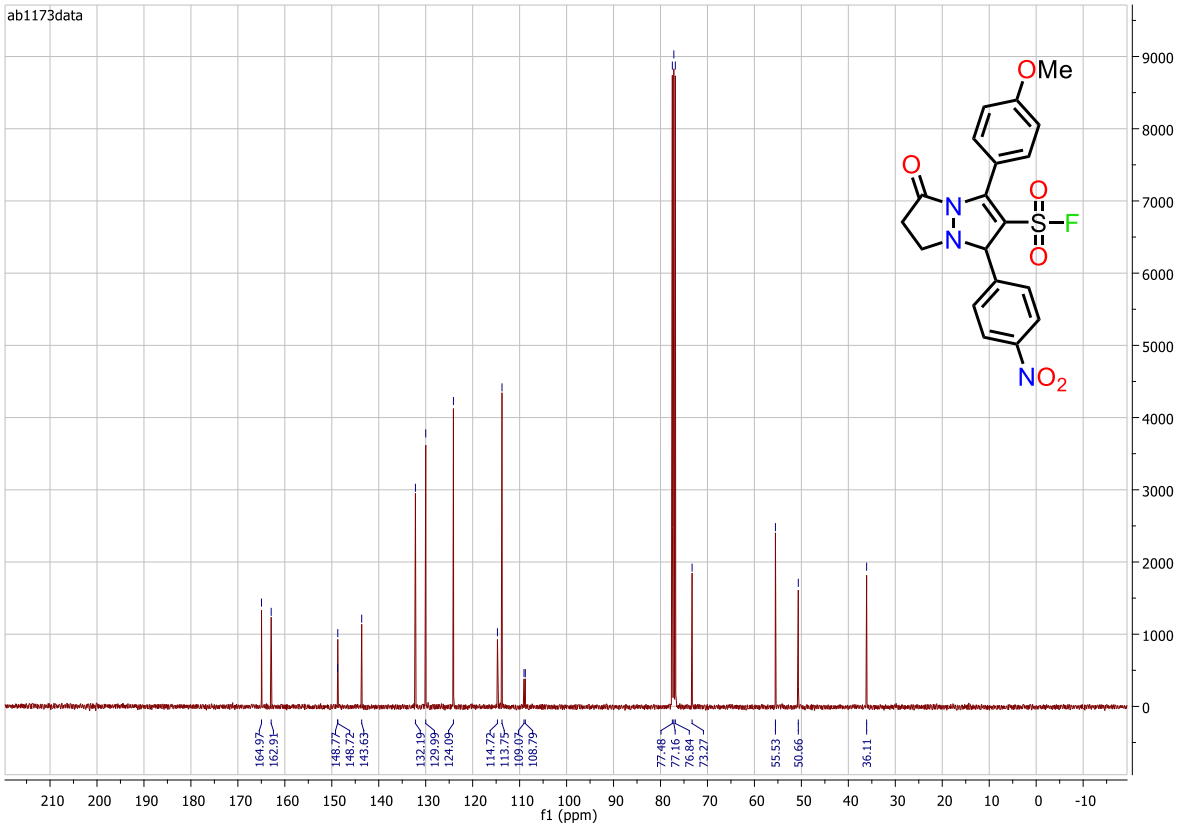

ab1164
O
N
N
O
S
F
O
F
4000
3500
3000
2500
2000
1500
1000
500
0
72.62
-111.55
-111.56
-111.57
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

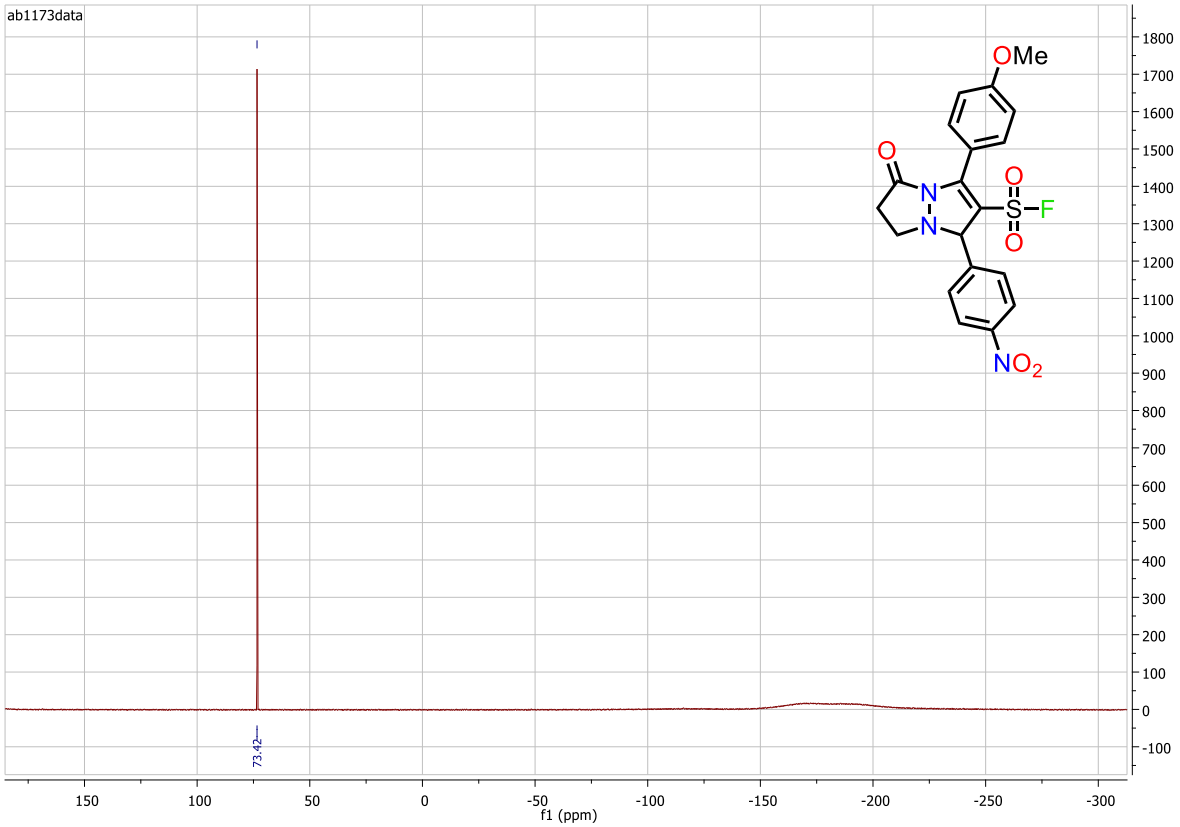

ab1165col
f1 (ppm)
MeO

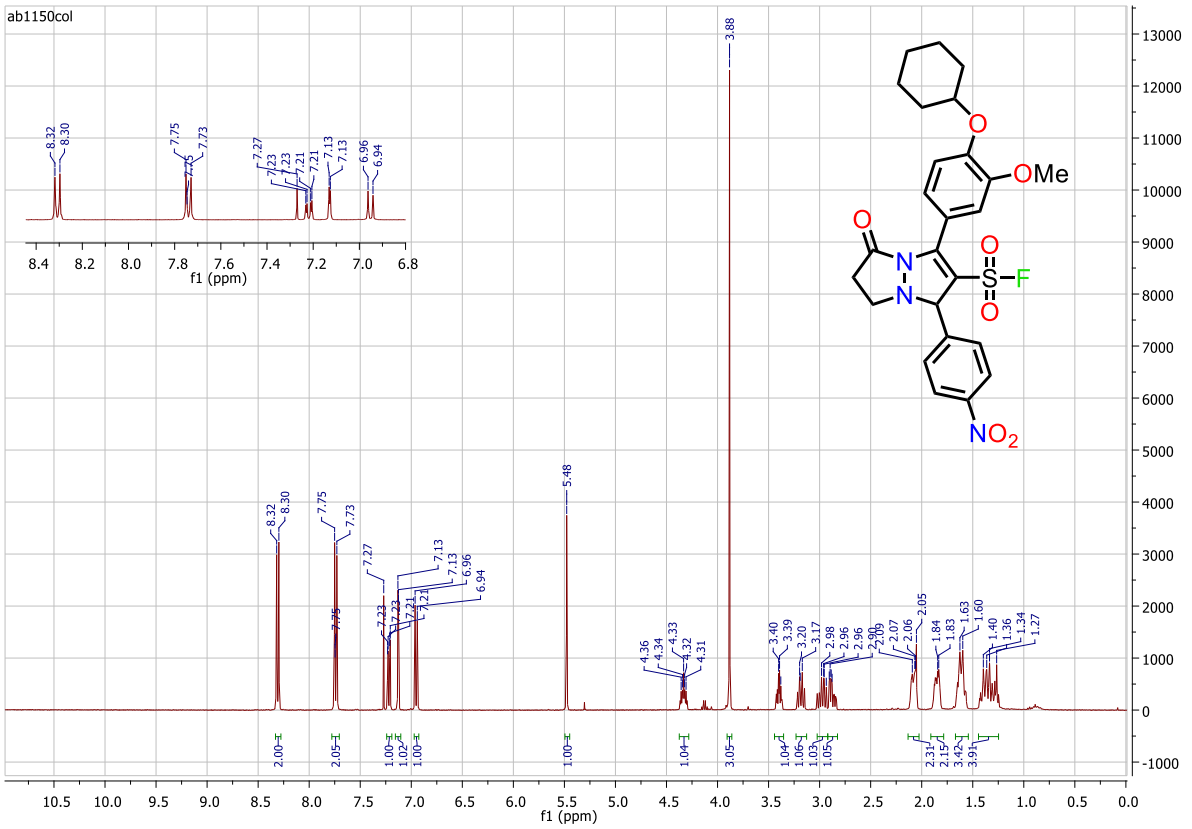

ab1165data
f1 (ppm)
MeO

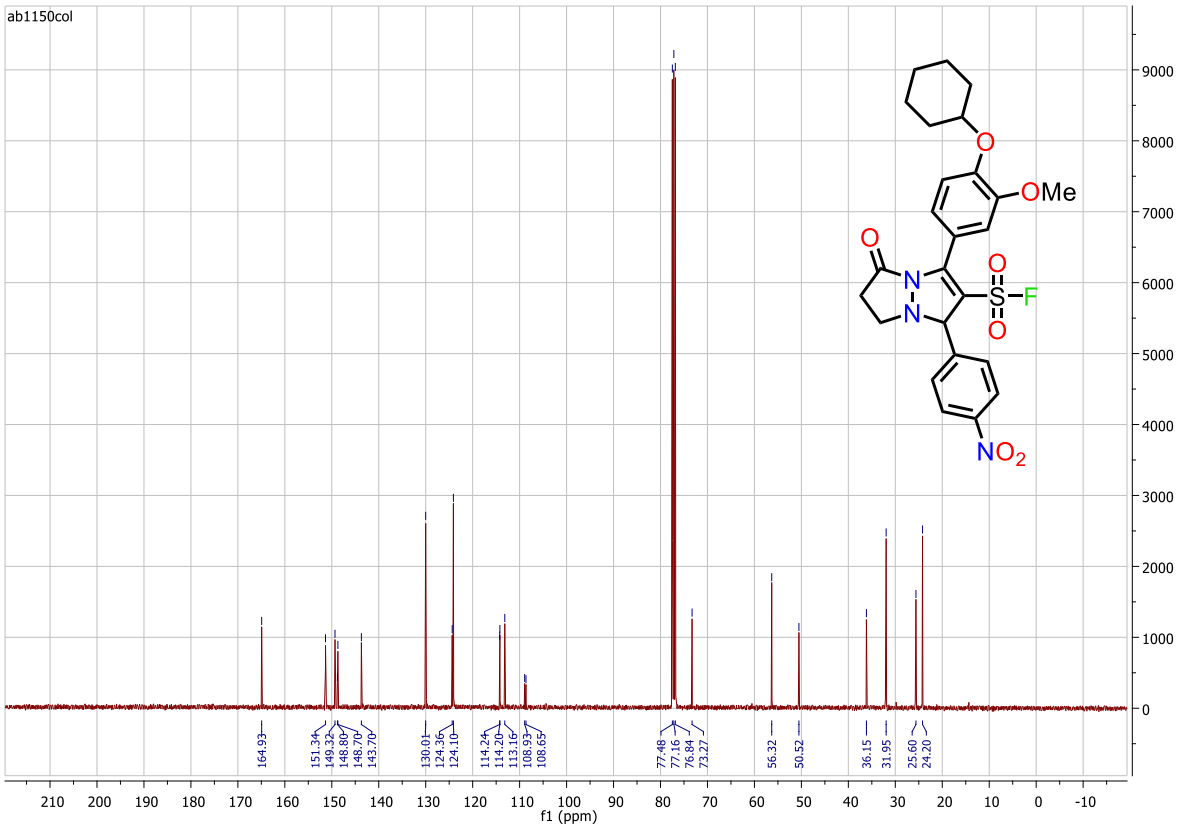

ab1165col
72.64
f1 (ppm)
O
N
N
O
S
F
O
MeO
O

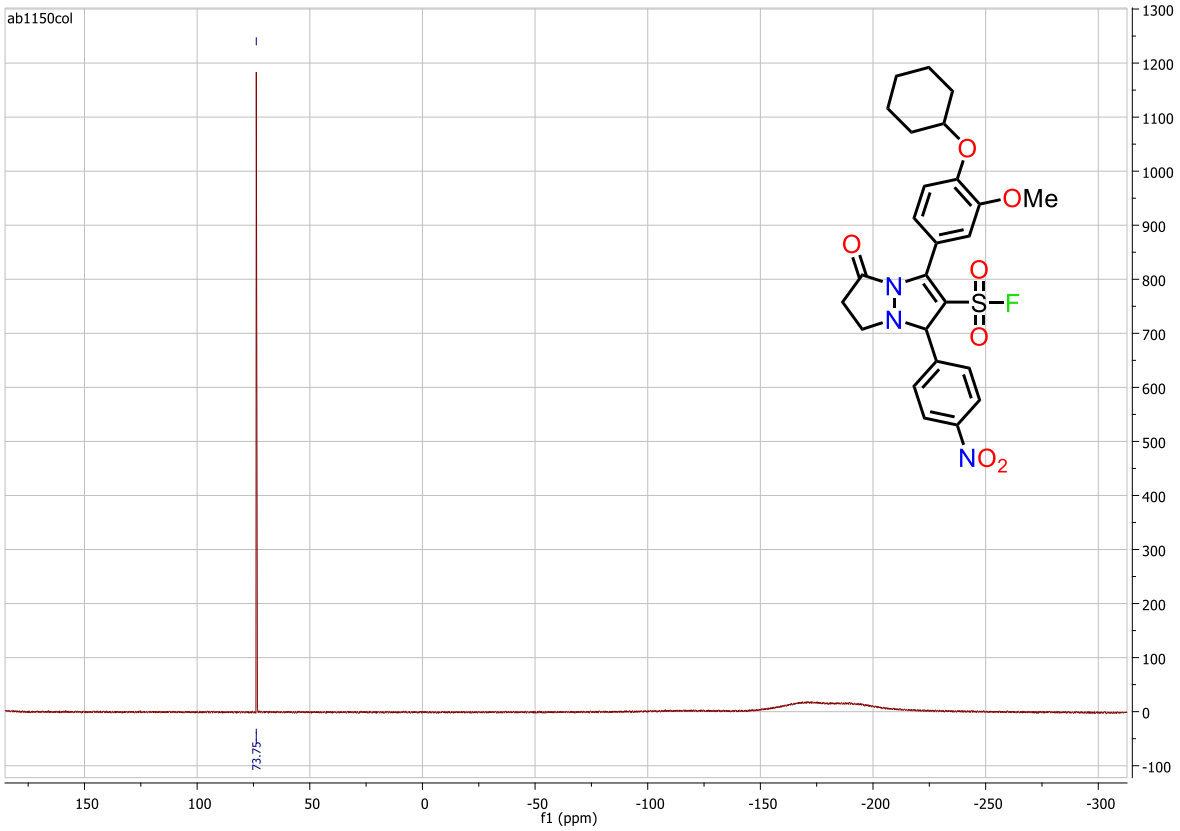

ab1173data
f1 (ppm)
OMe
NO2

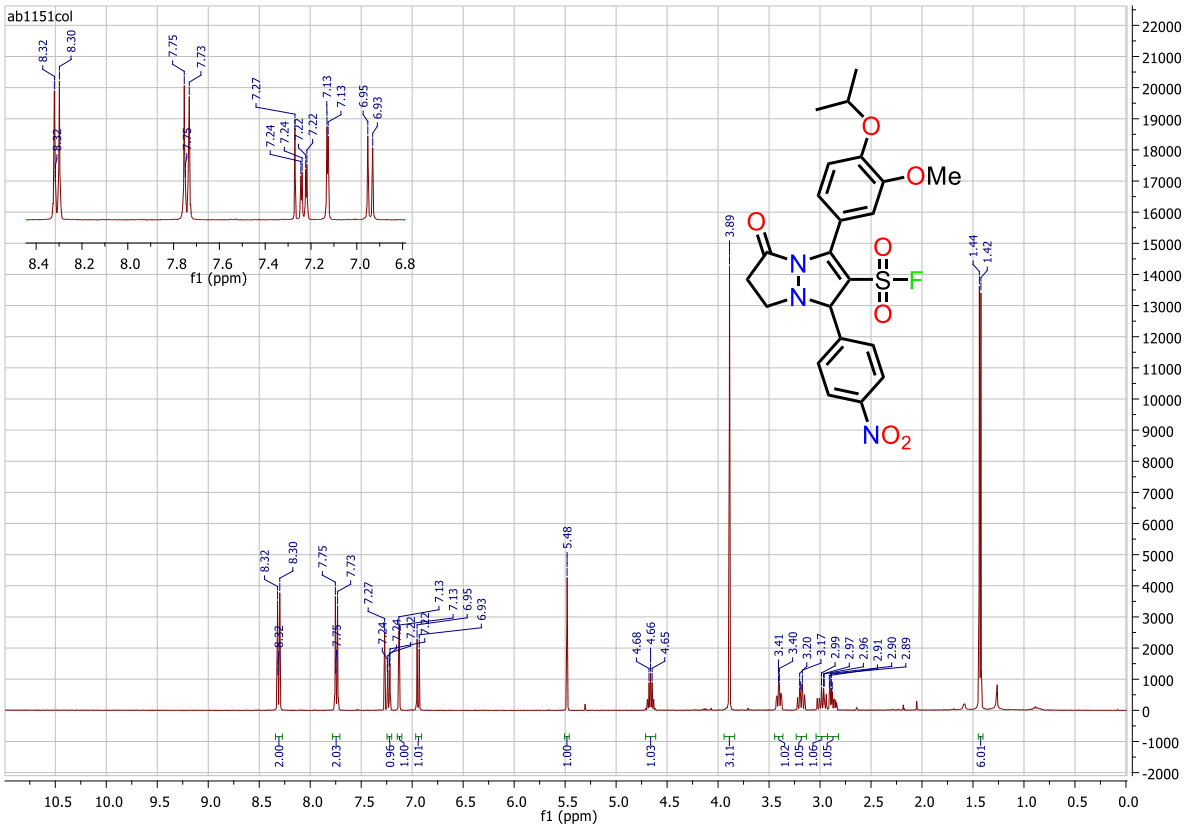

ab1173data
f1 (ppm)
OMe
NO2

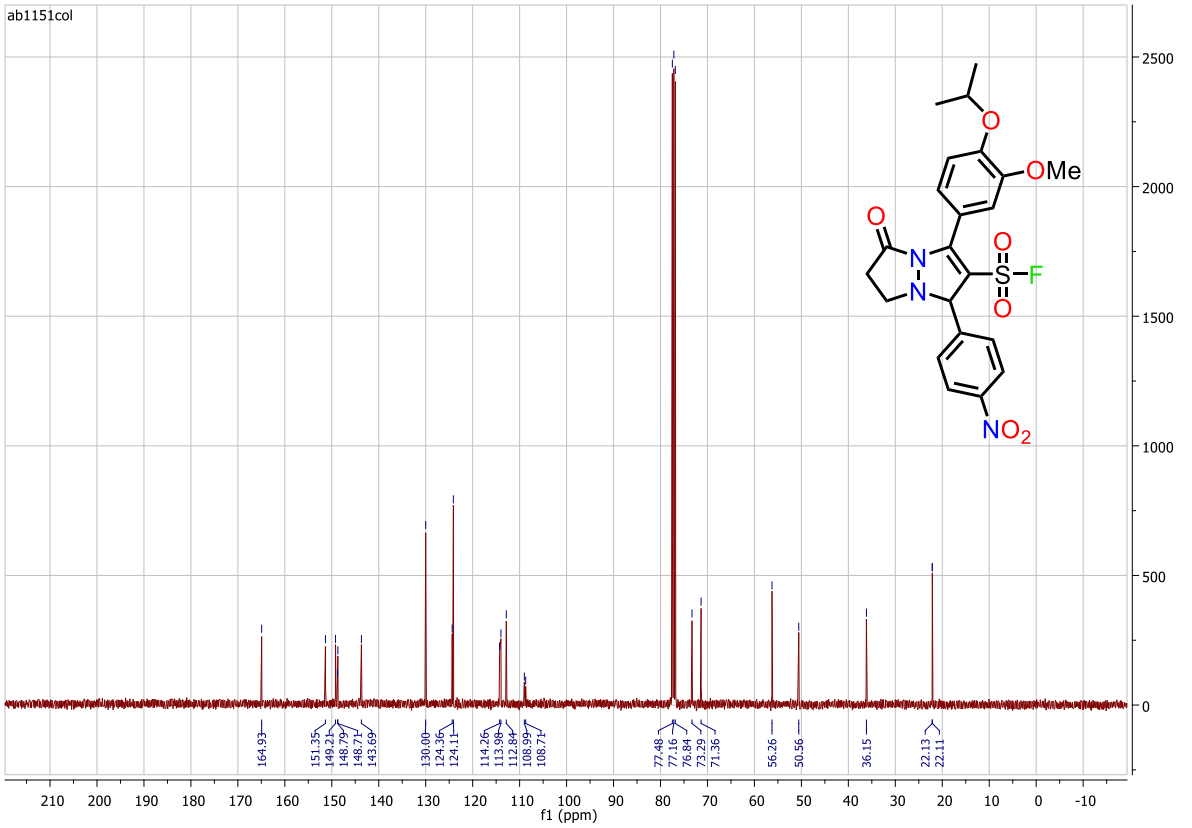

ab1173data
OMe
O
N
N
O
S
F
O
NO2
73.42
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100

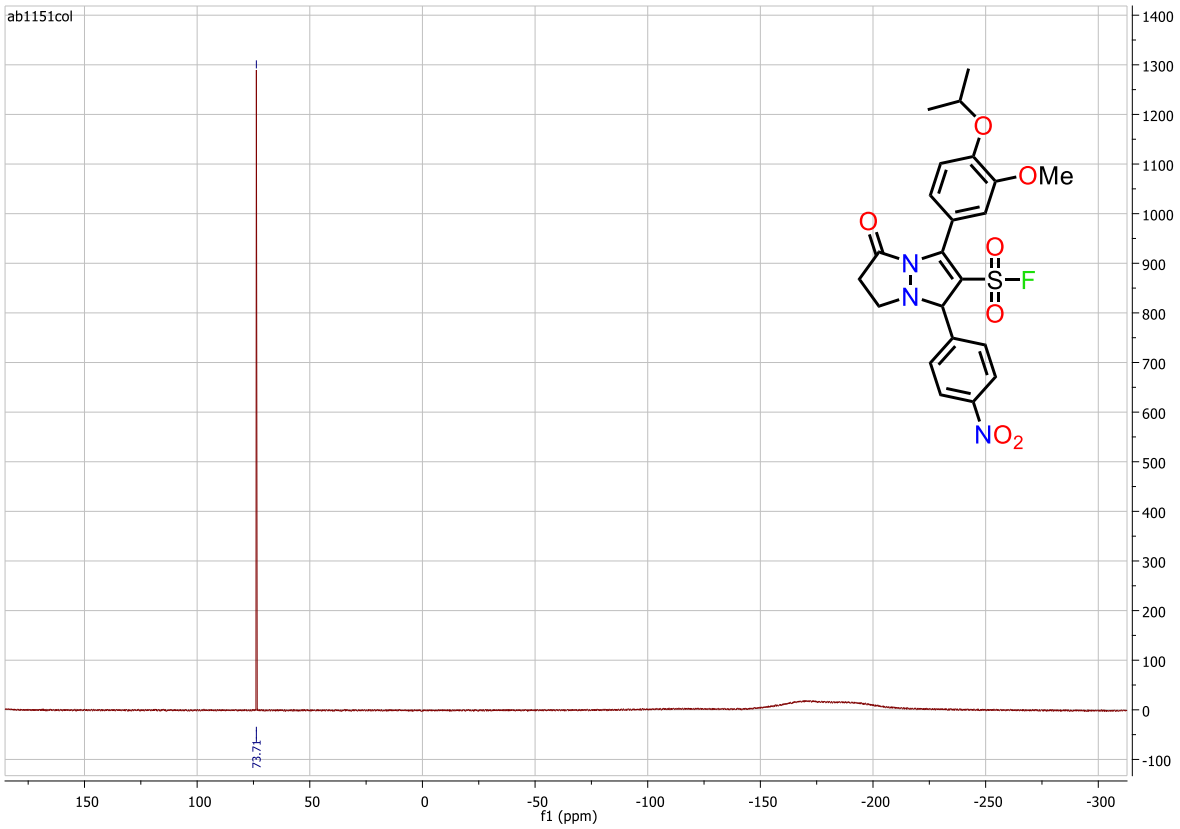

ab1150col
f1 (ppm)
OMe
NO2

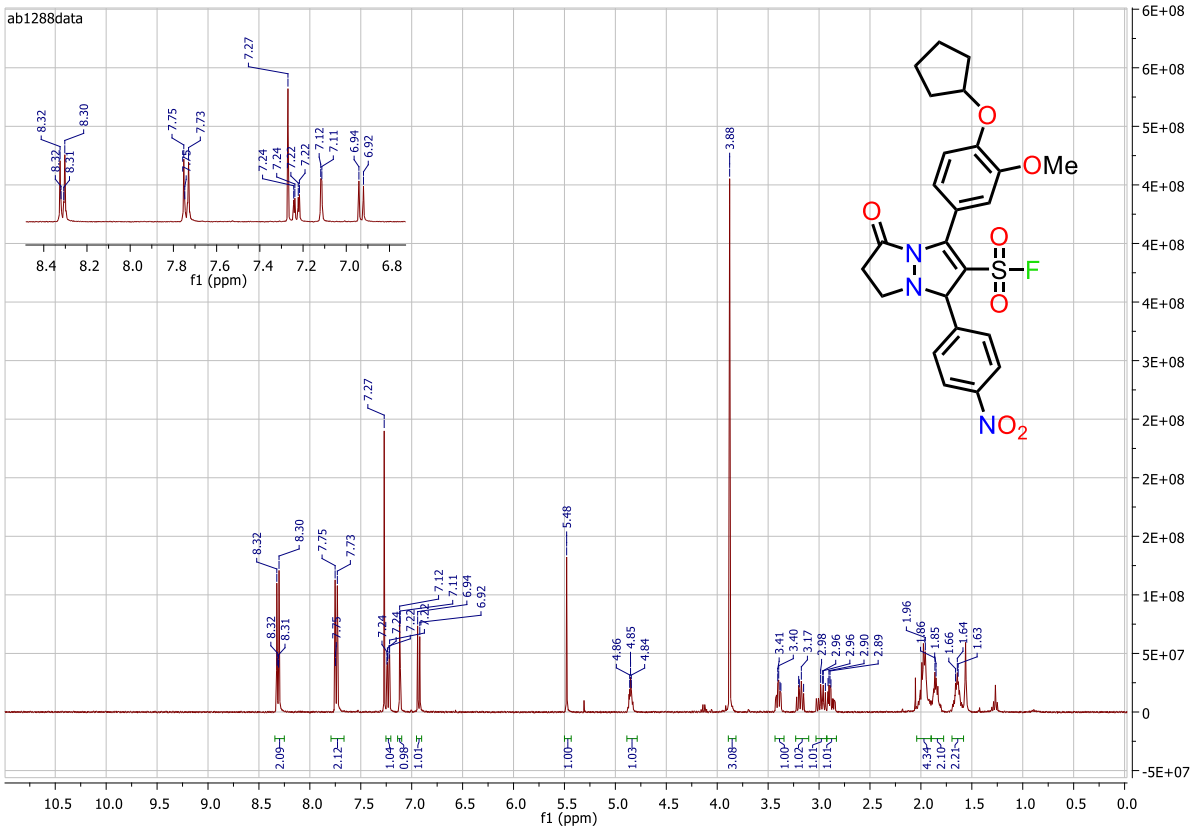

ab1150col
f1 (ppm)
OMe
NO2

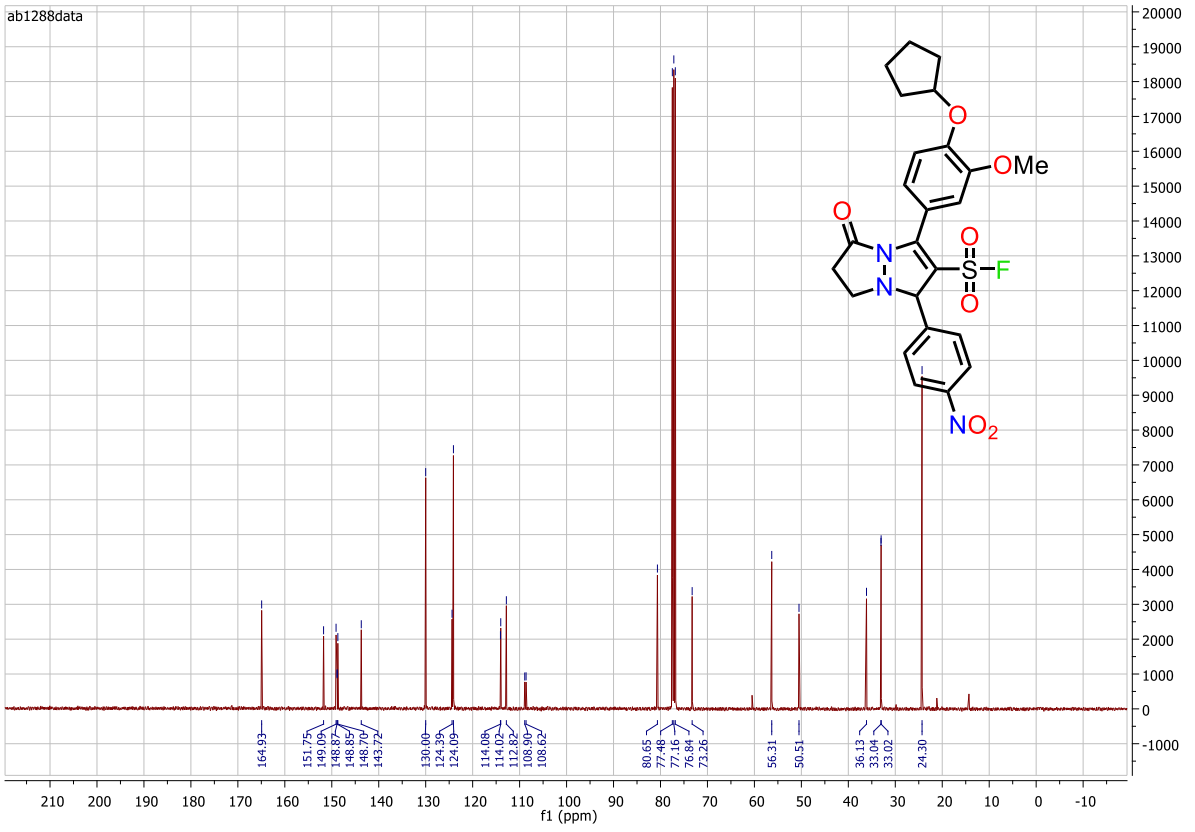

ab1150col
73.75
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
O
OMe
O
N
N
O
S
F
O
NO2

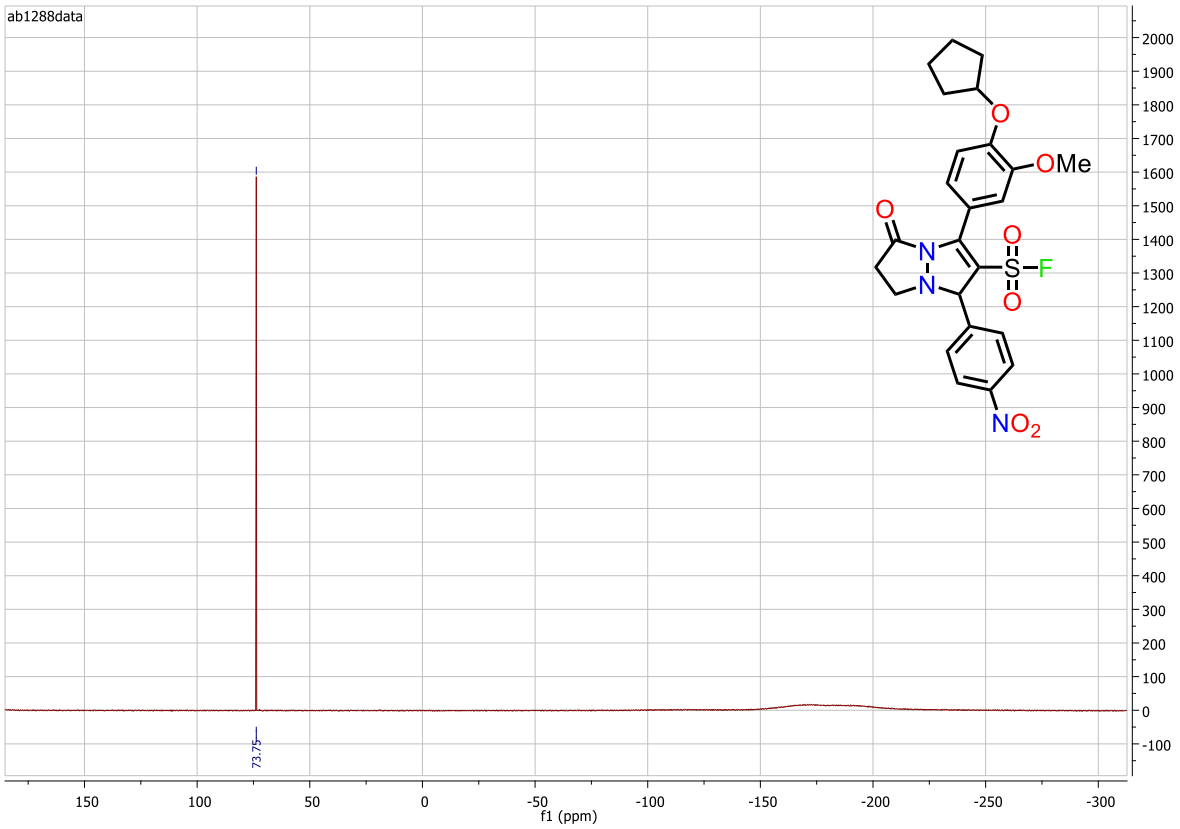

ab1151col
f1 (ppm)
OMe
NO2

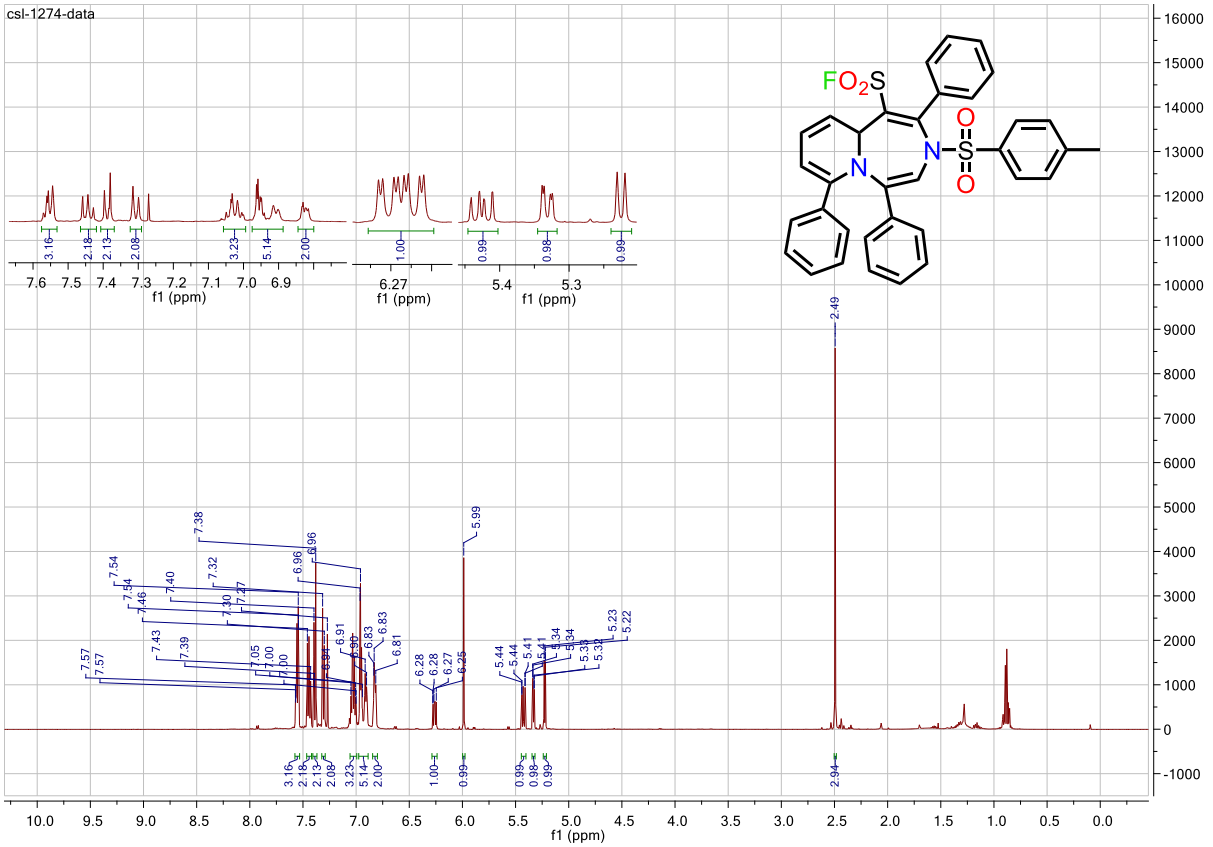

ab1151col
f1 (ppm)
OMe
NO2

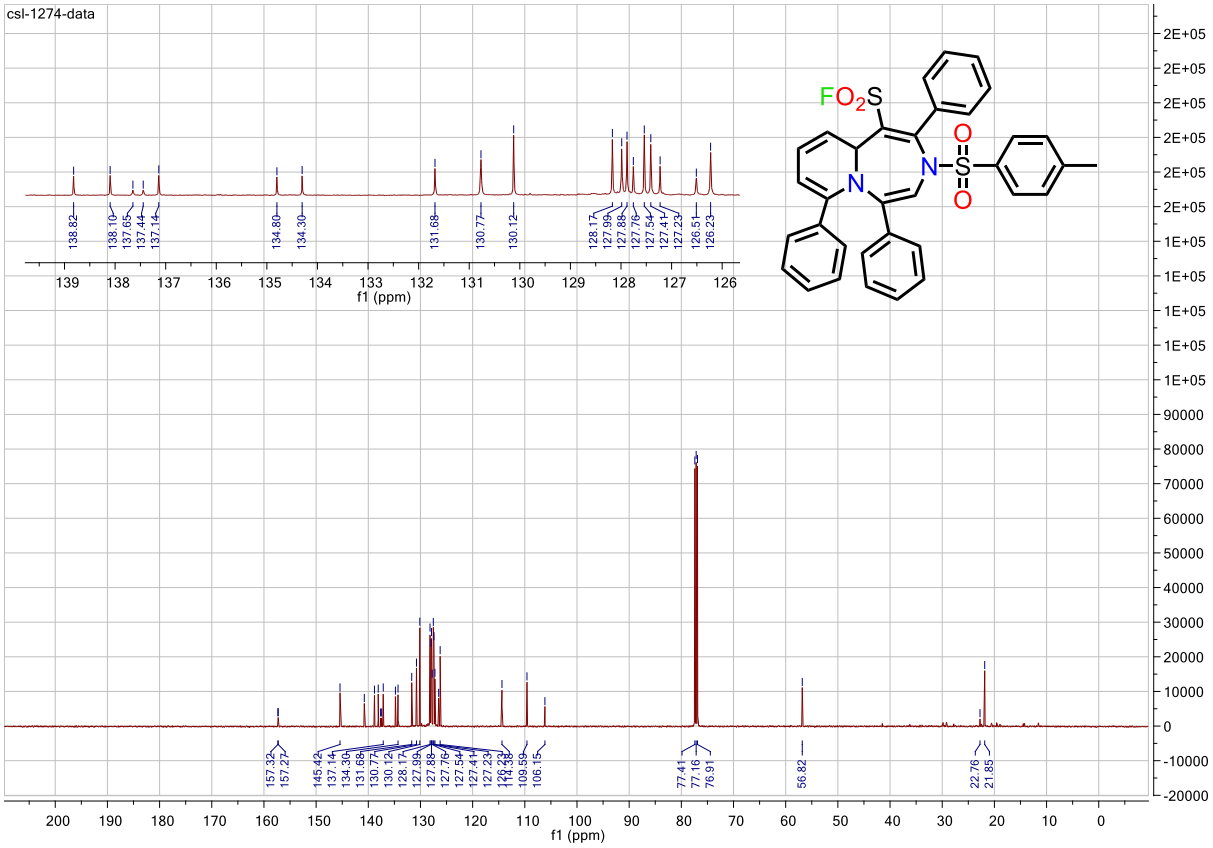

ab1151col
73.71
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
O
OMe
O
N
N
O
S
F
O
NO2

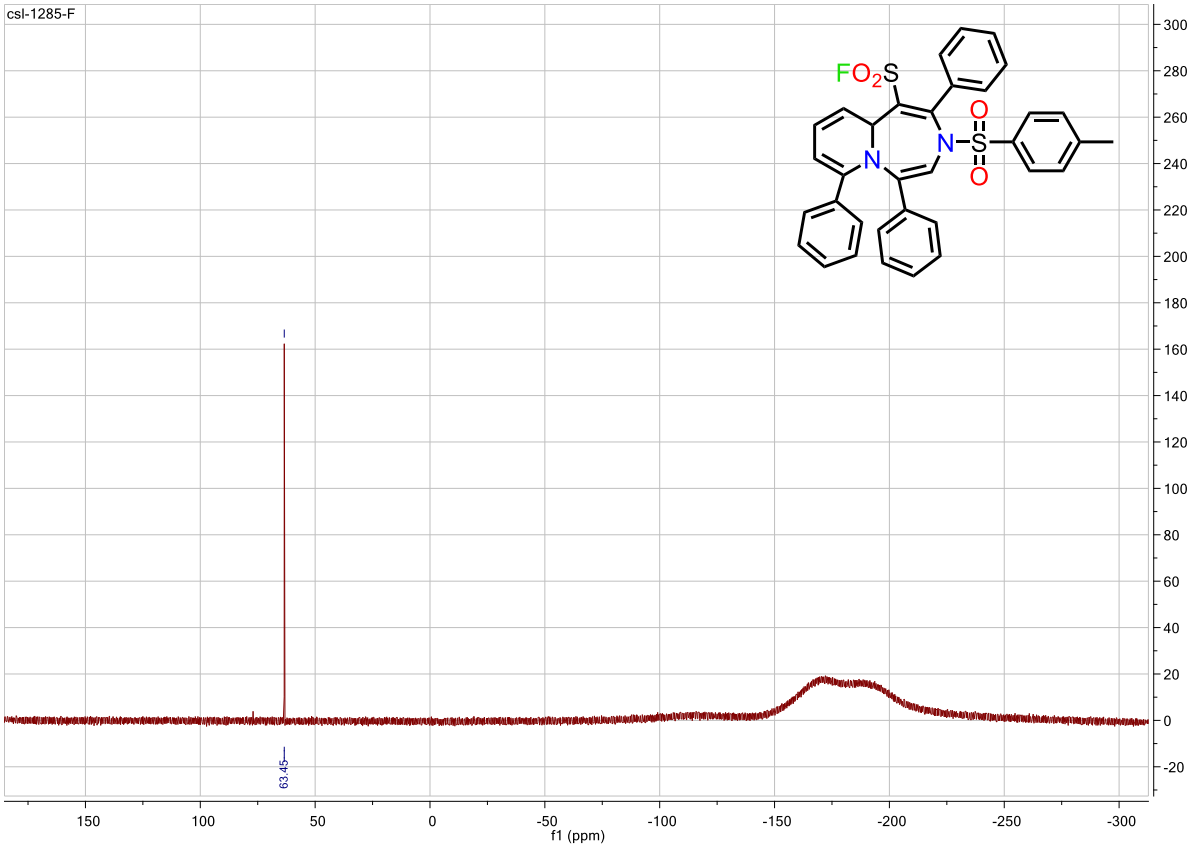

ab1288data
f1 (ppm)
OMe
NO2

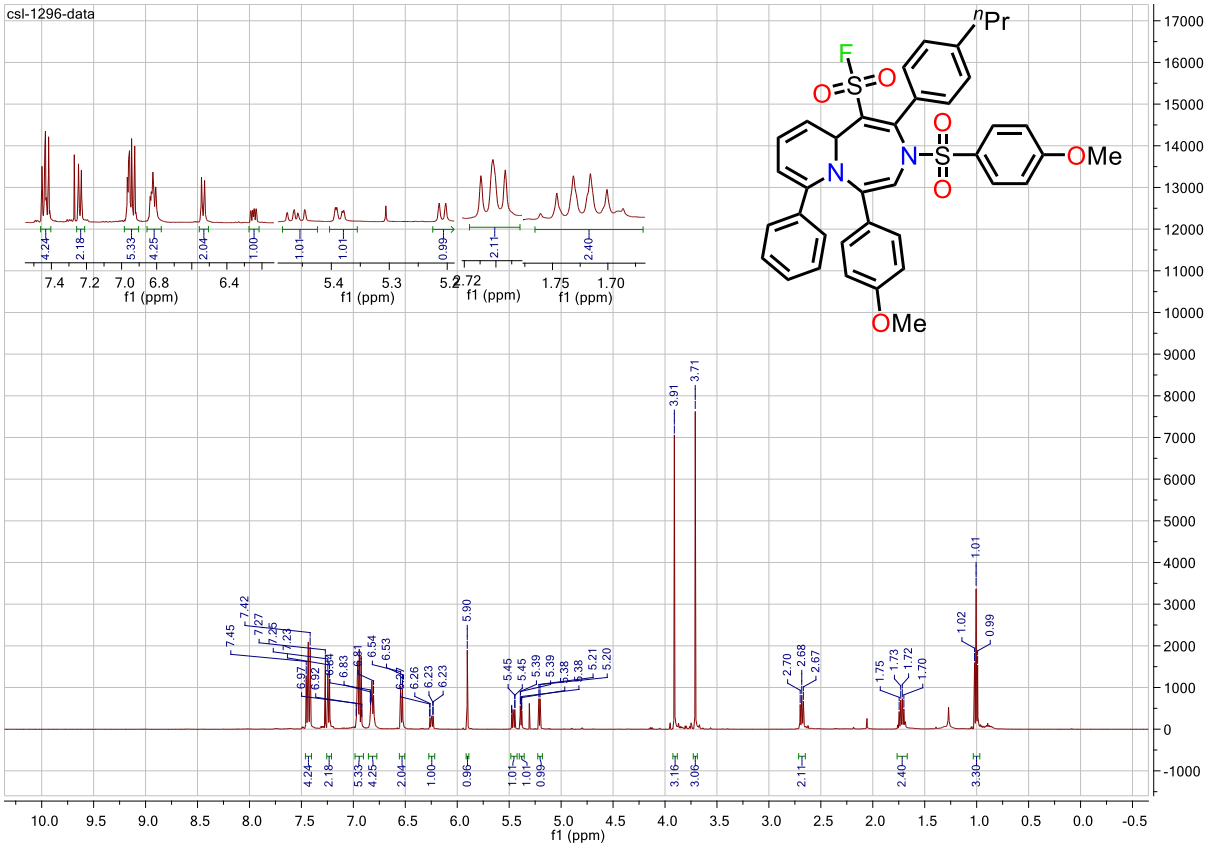

ab1288data
f1 (ppm)
OMe
NO2

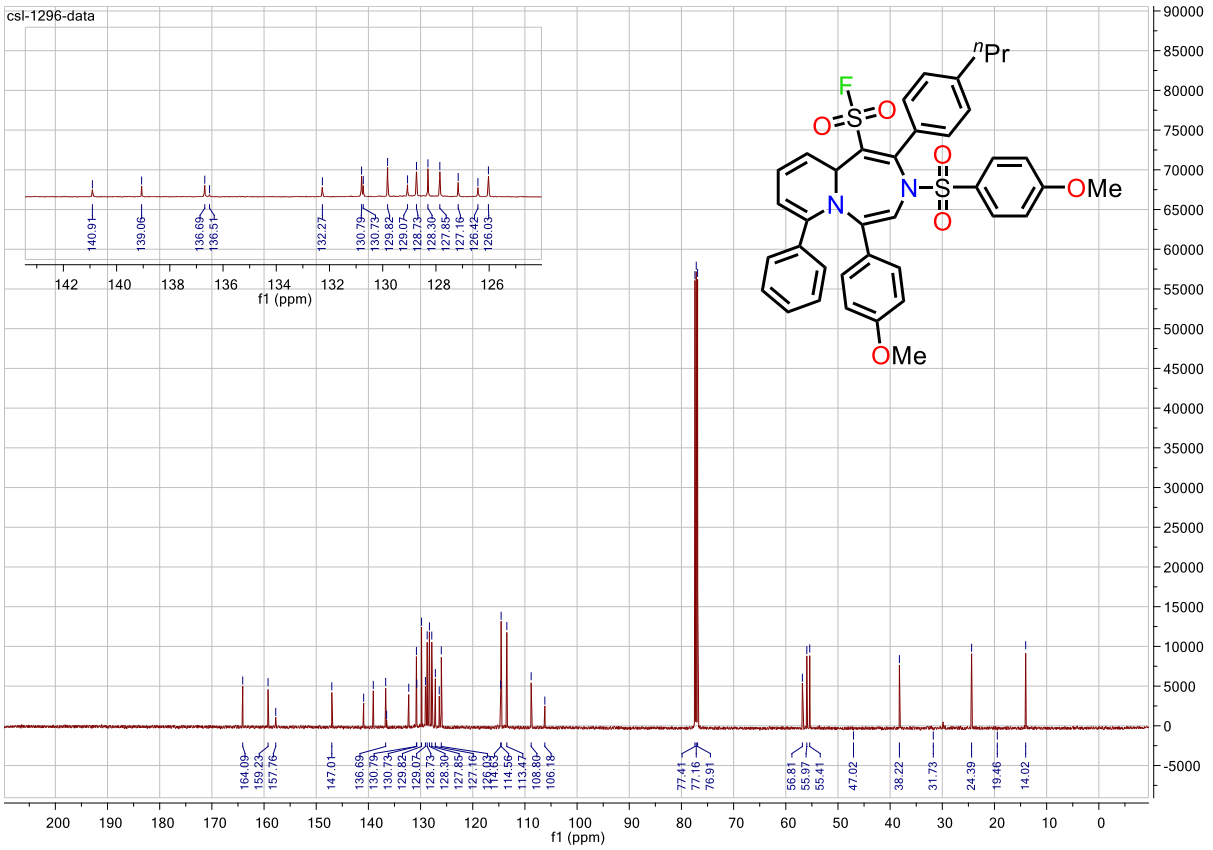

ab1288data
73.75
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
O
OMe
O
N
N
O
S
F
O
NO2

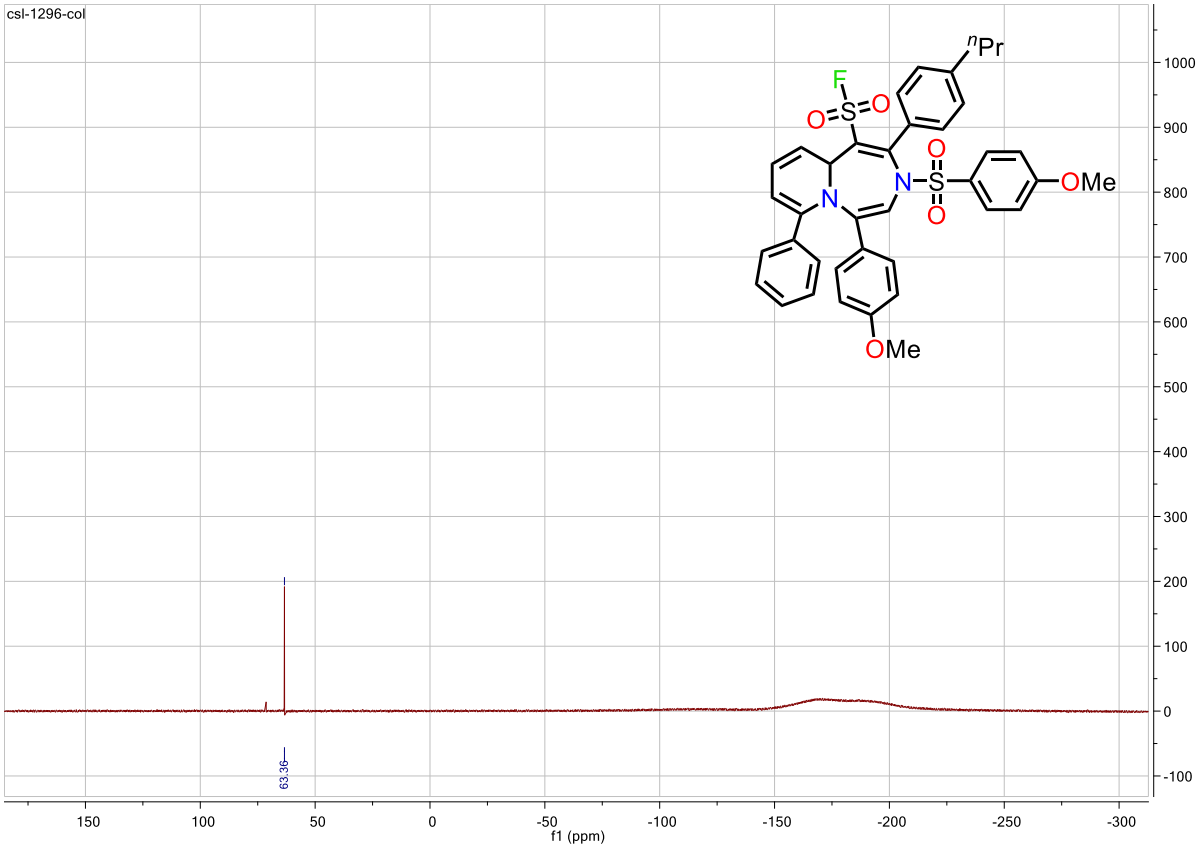

csl-1274-data
f1 (ppm)

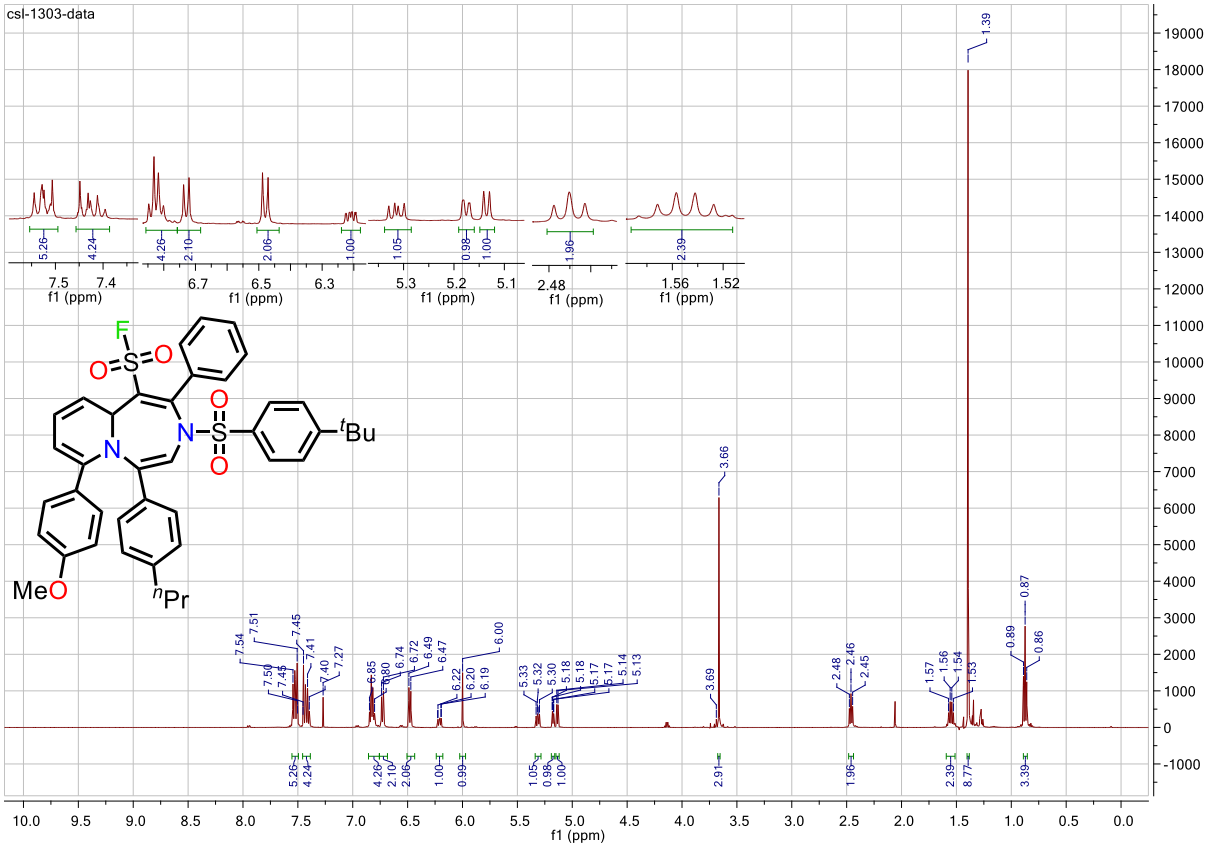

csl-1274-data
f1 (ppm)

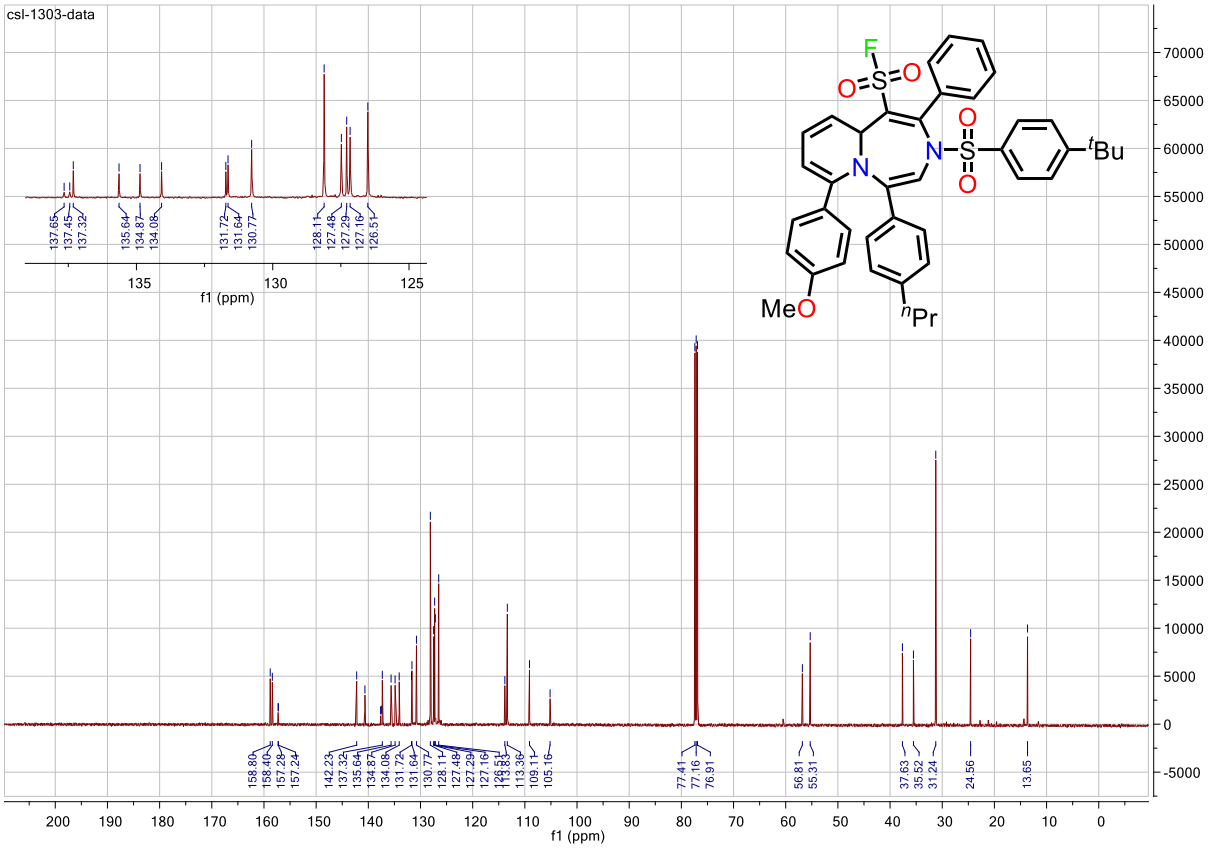

csl-1285-F
FO2S
O
N
S
N
O
63.45
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
-20

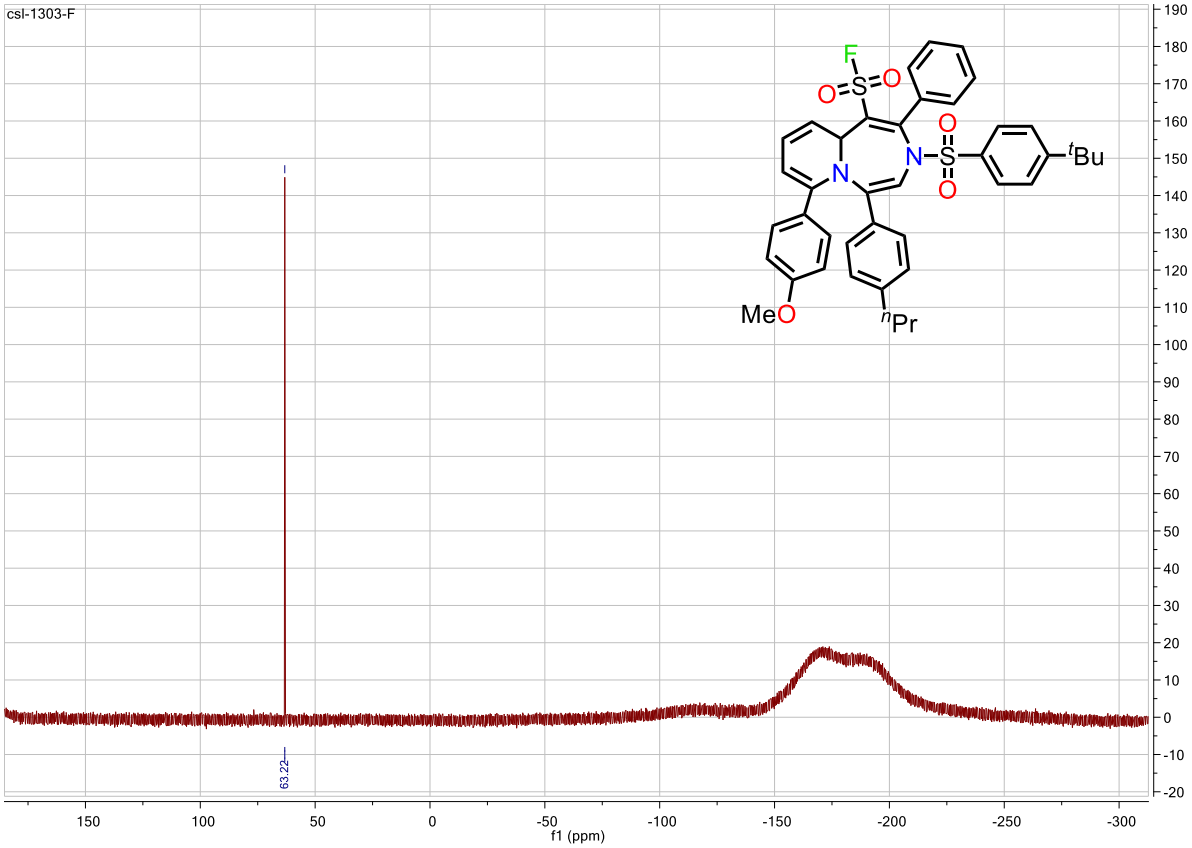

csl-1296-data
f1 (ppm)

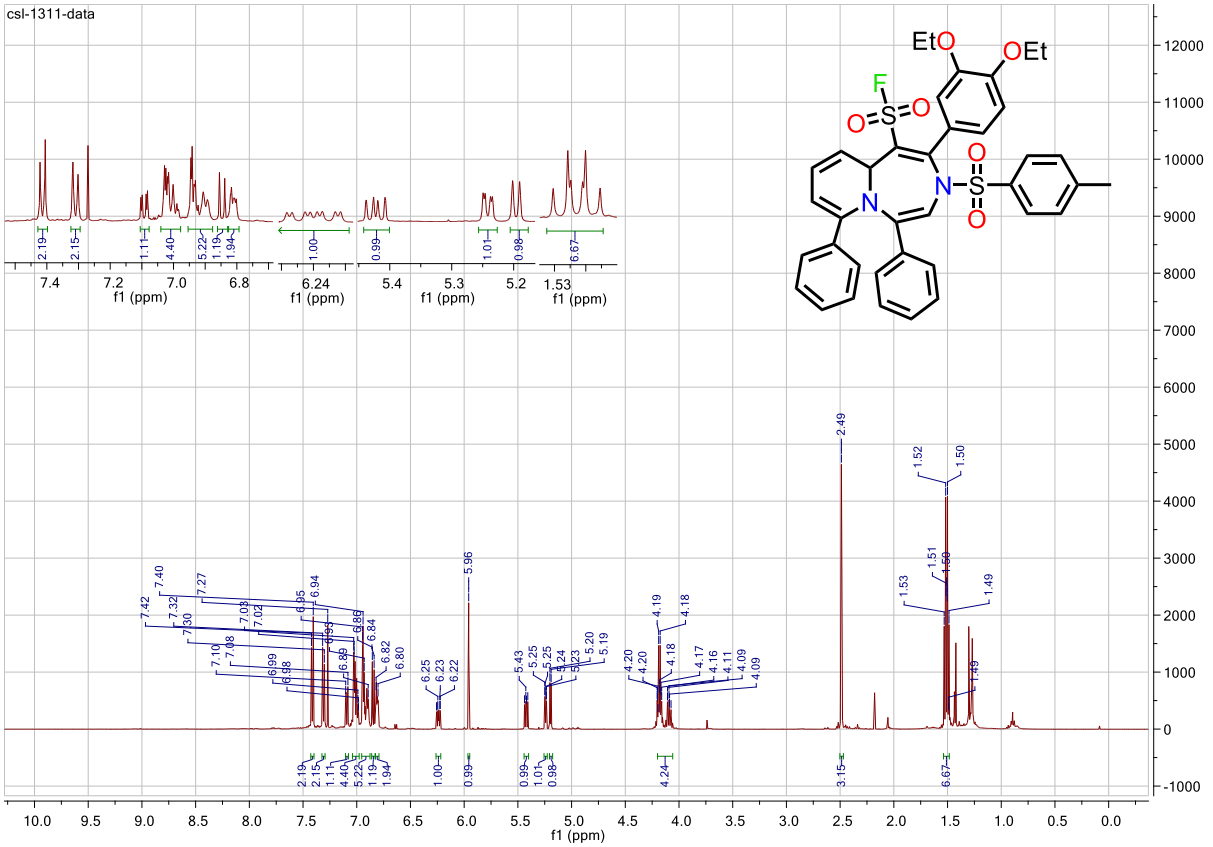

csl-1296-data
f1 (ppm)

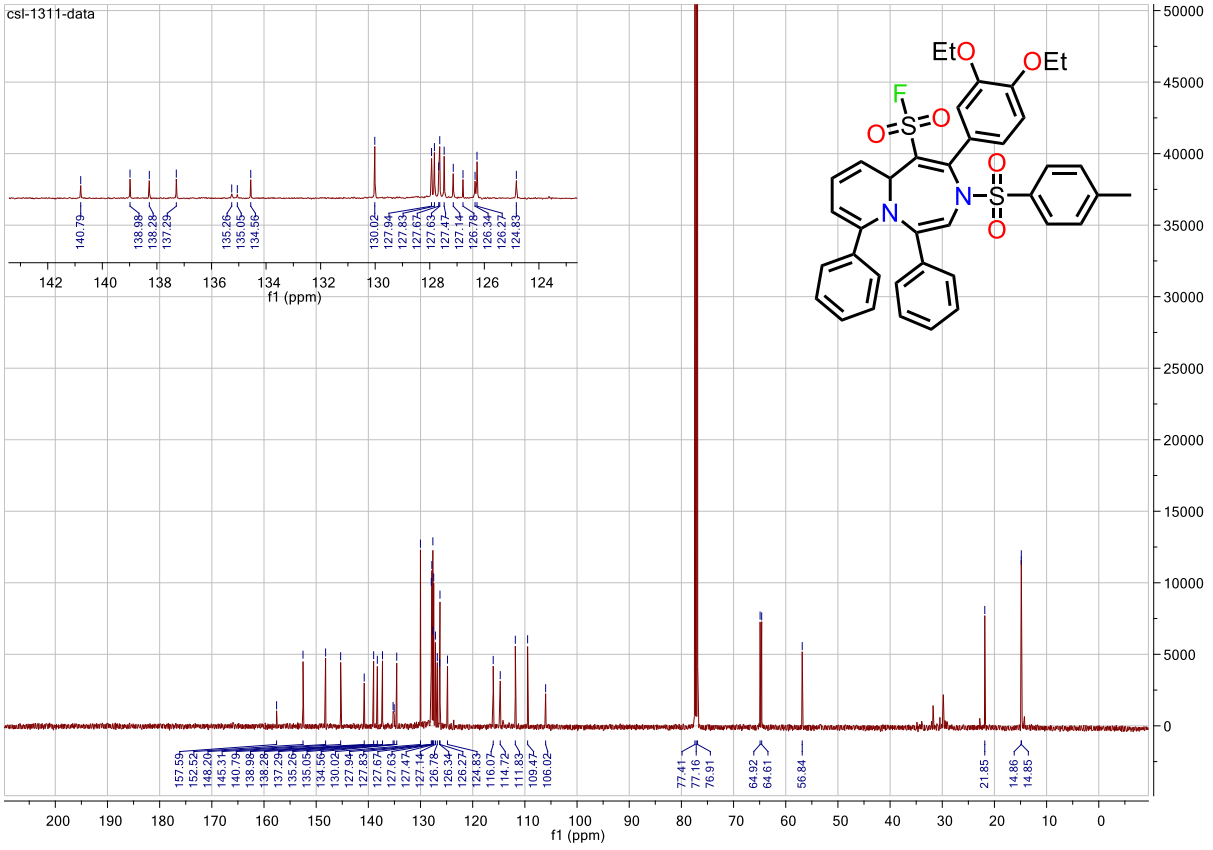

csl-1296-col
nPr
F
O
S
O
O
N
N
S
O
O
OMe
OMe
63.36
1000
900
800
700
600
500
400
300
200
100
0
-100
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

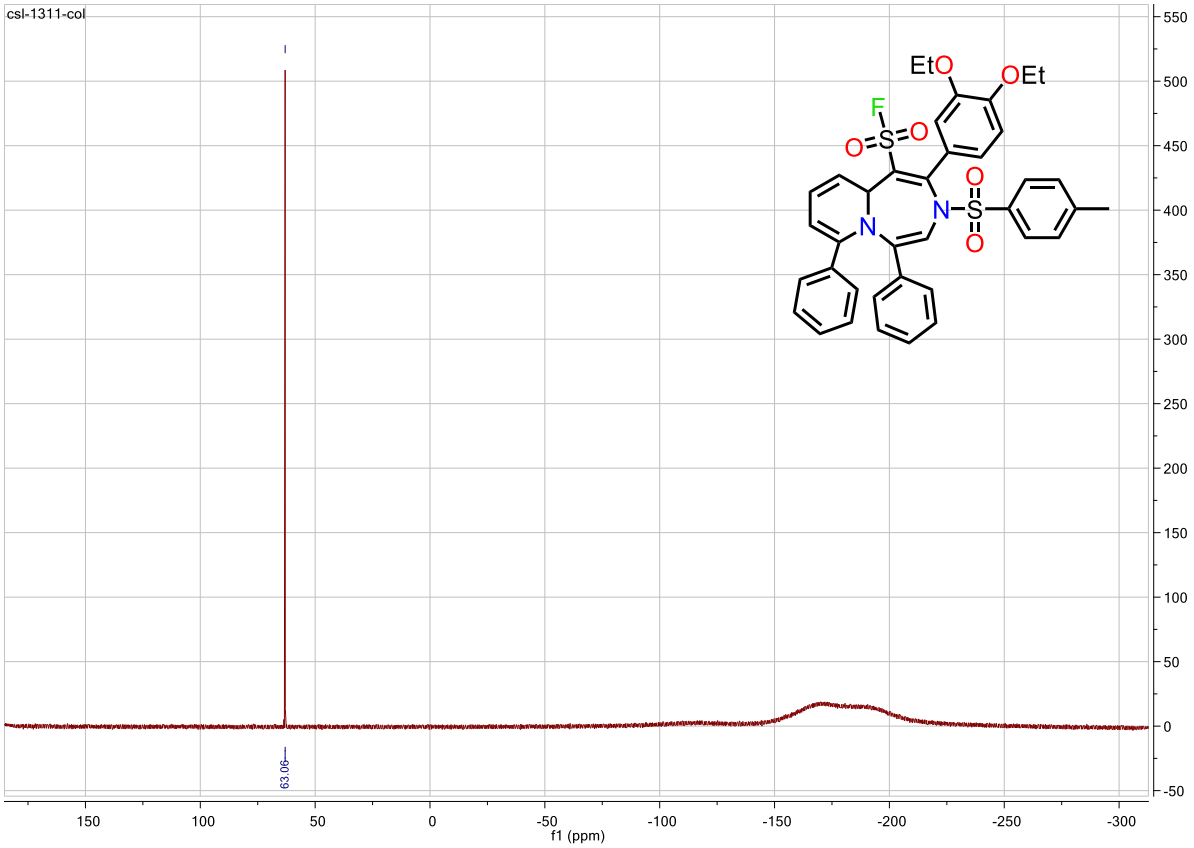

csl-1303-data
f1 (ppm)
F
O
S
O
N
O
S
O
tBu
MeO
nPr

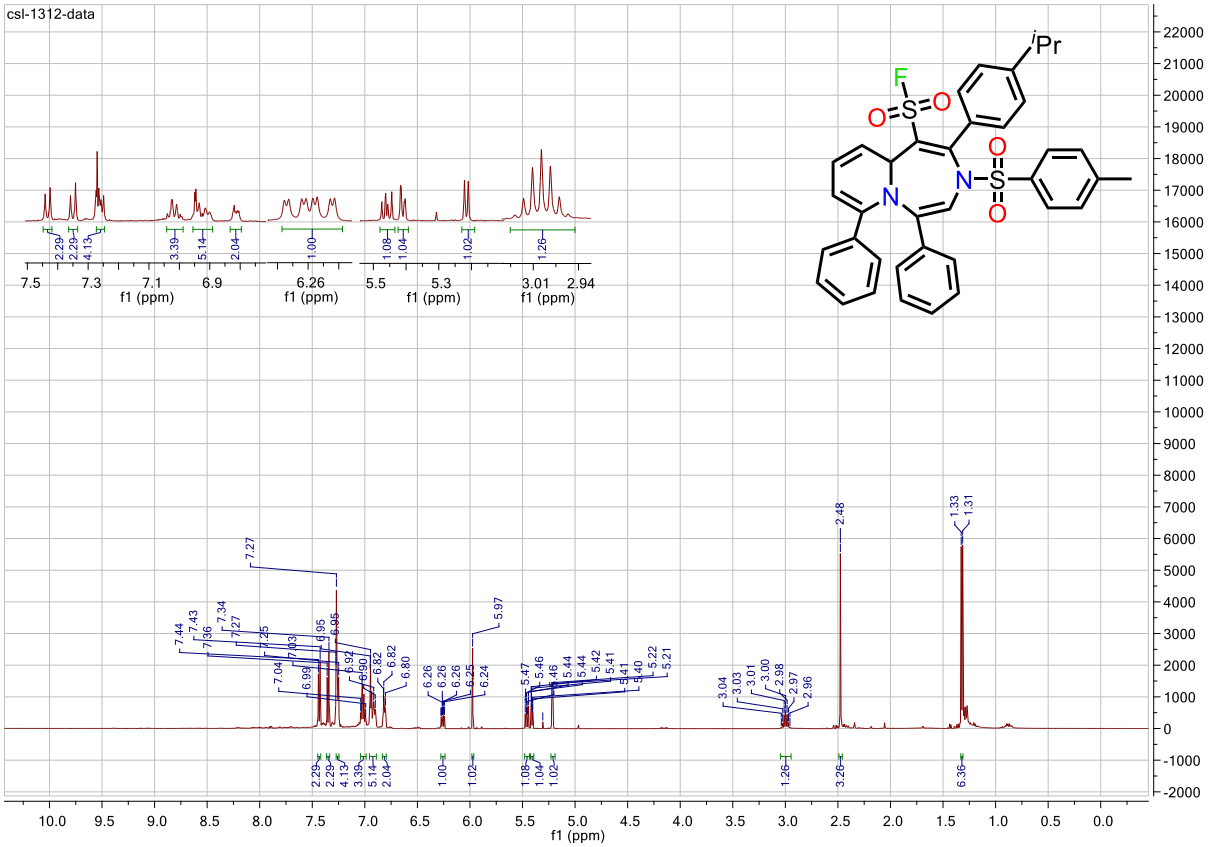

csl-1303-data
f1 (ppm)
F
O
S
O
N
O
S
O
tBu
MeO
nPr

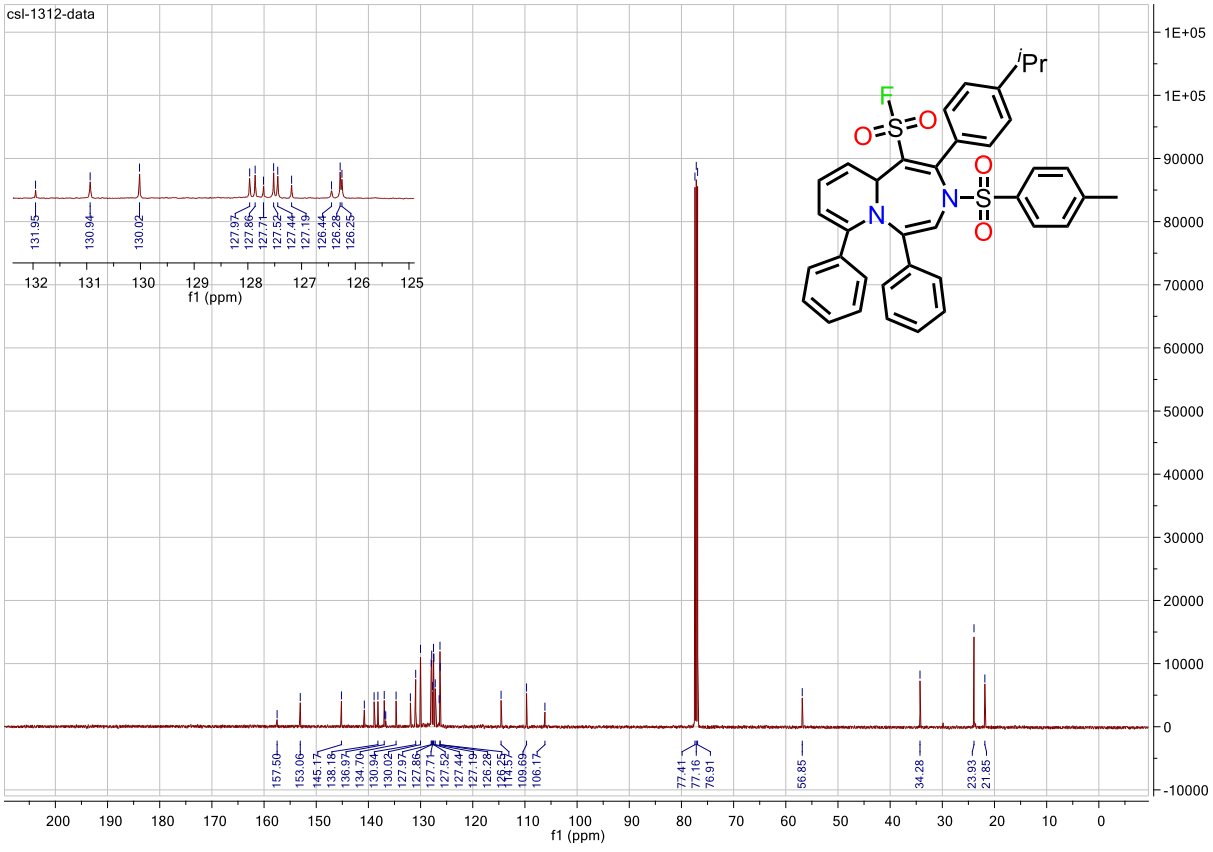

csl-1303-F
F
O
S
O
O
N
N
S
O
O
tBu
MeO
nPr
63.22
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

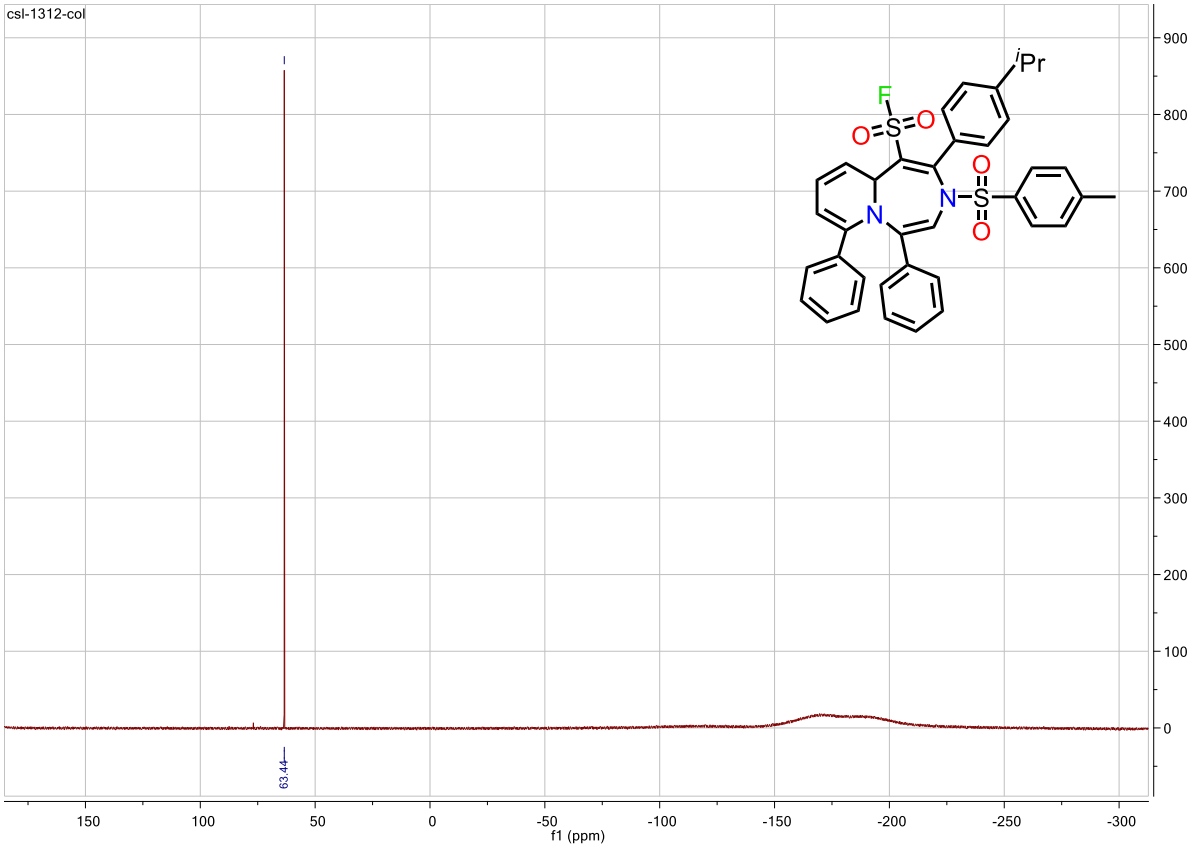

csl-1311-data
EtO
OEt
F
O=S=O
N
N-S
O
O
f1 (ppm)

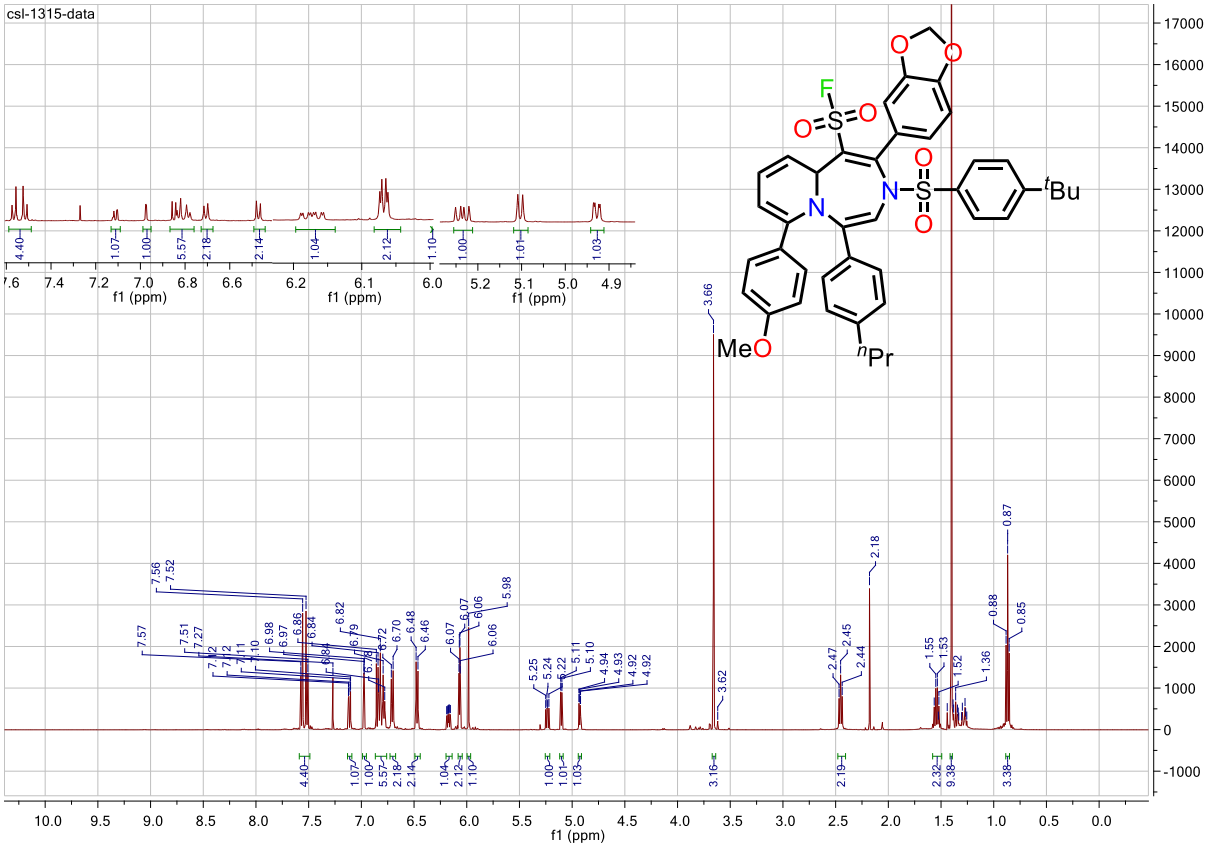

csl-1311-data
EtO
OEt
F
O=S=O
N
N-S
O
O
f1 (ppm)

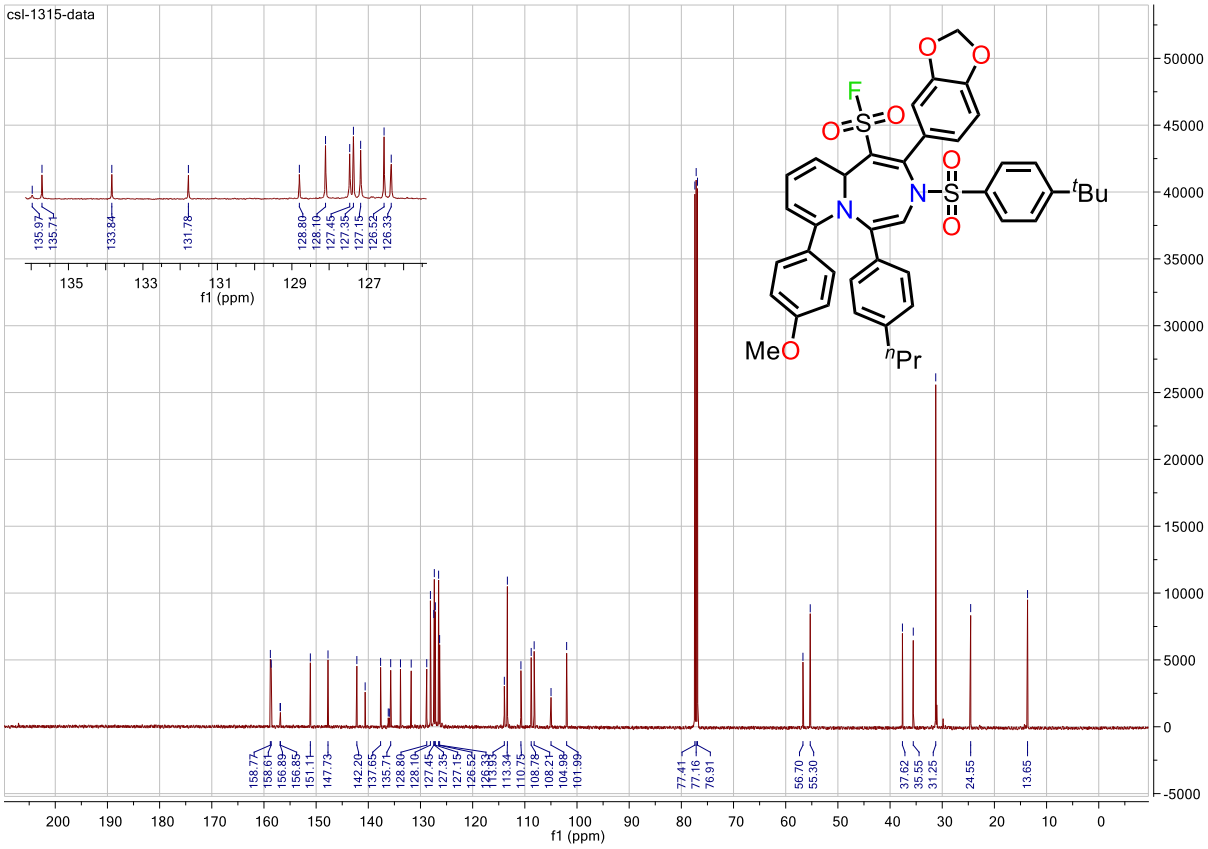

csl-1311-col
63.06
f1 (ppm)
EtO
OEt
F
O
S
O
N
N
S
O
O

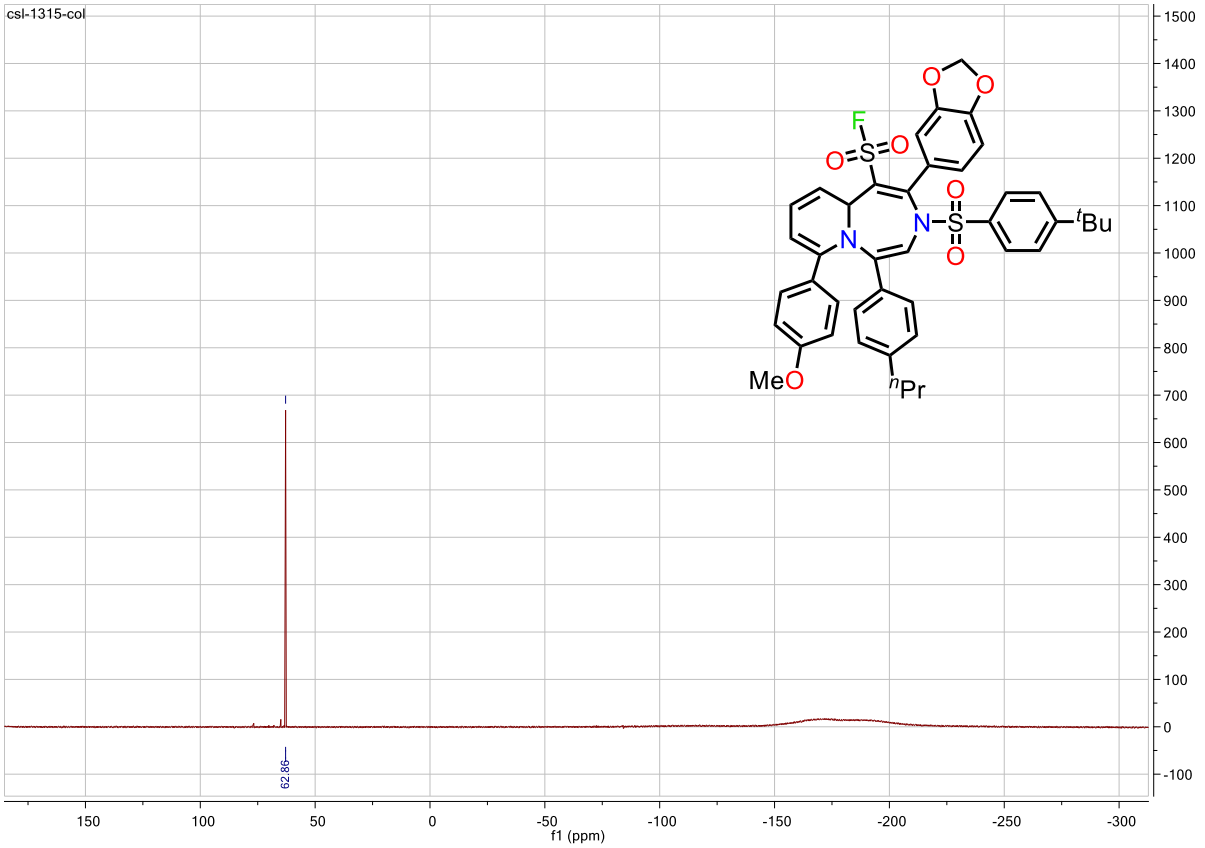

csl-1312-data
iPr
F
O
S
O
O
N
N
S
O
O
f1 (ppm)

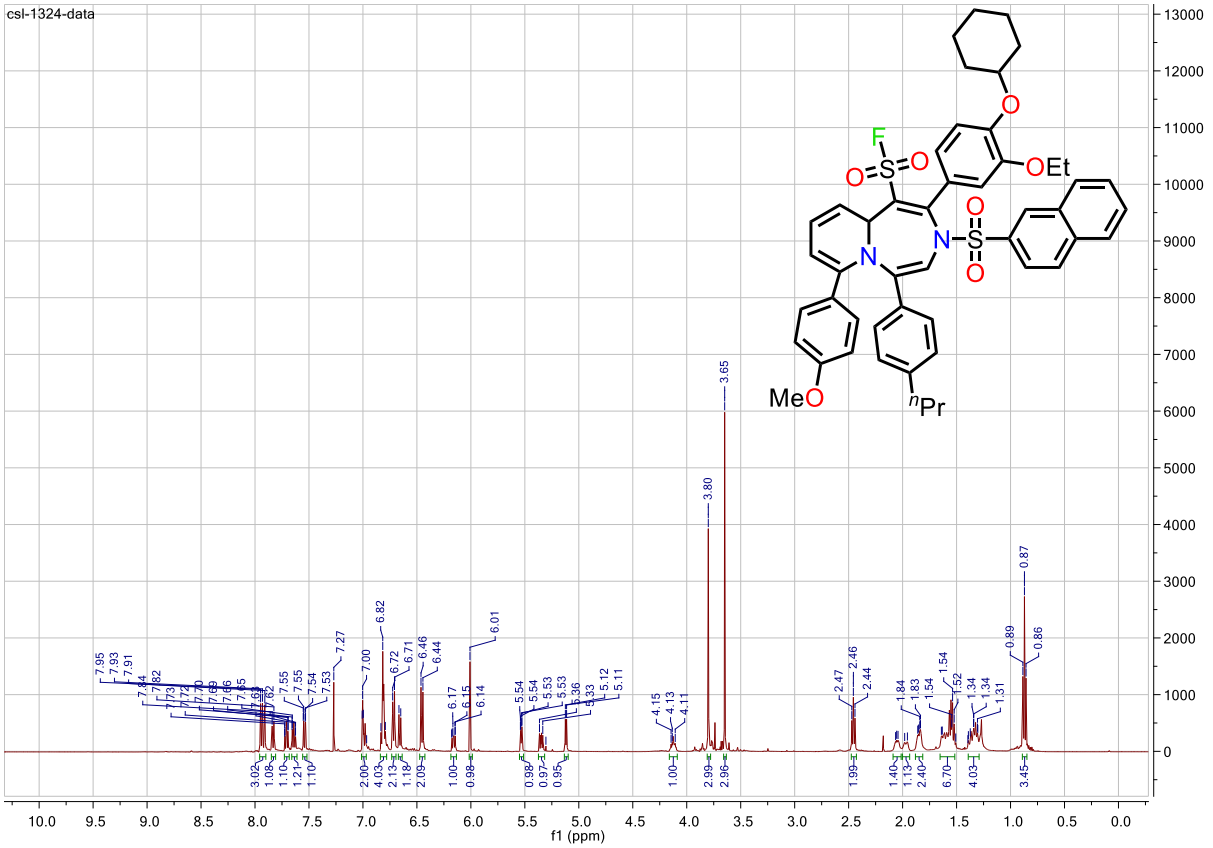

csl-1312-data
iPr
F
O
S
O
O
N
N
S
O
O
f1 (ppm)

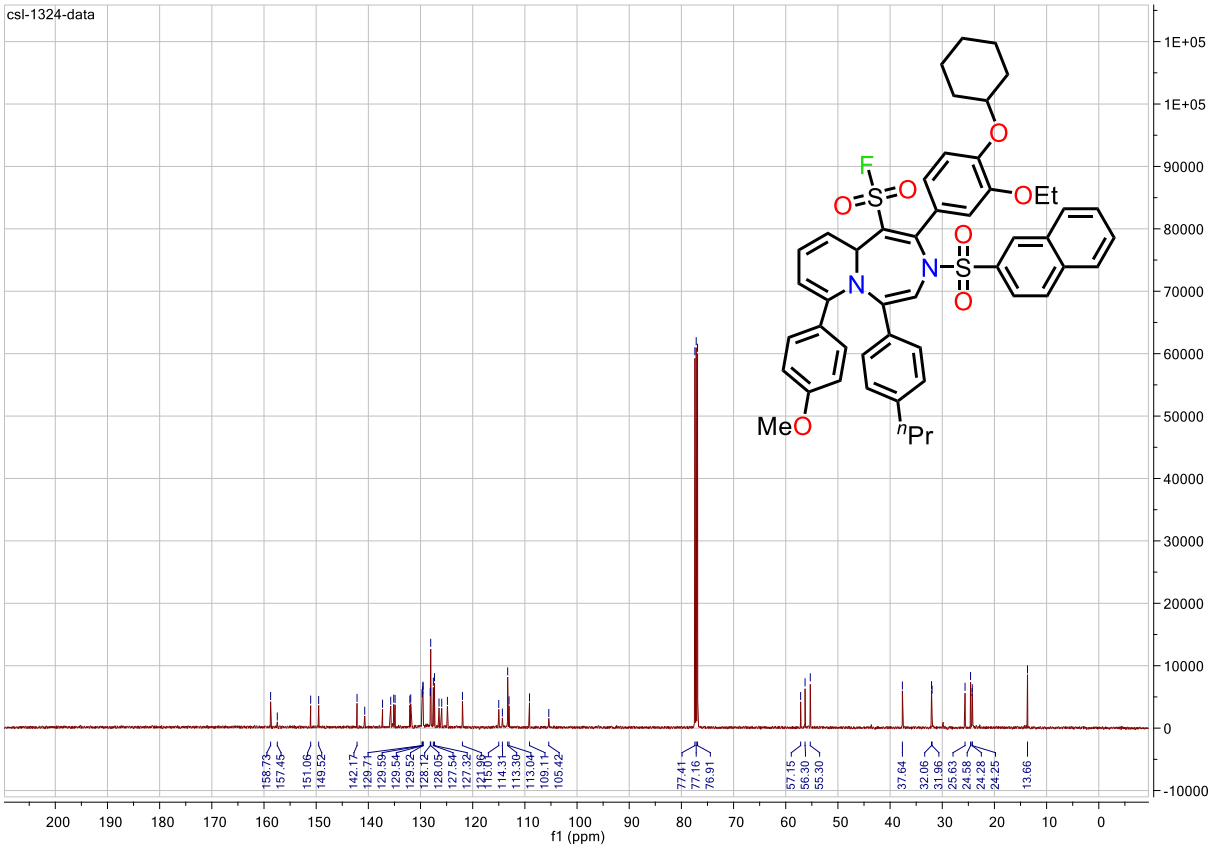

csl-1312-col
63.44
f1 (ppm)
150
100
50
0
-50
-100
-150
-200
-250
-300
900
800
700
600
500
400
300
200
100
0
F
O
S
O
iPr
O
N
S
N
O

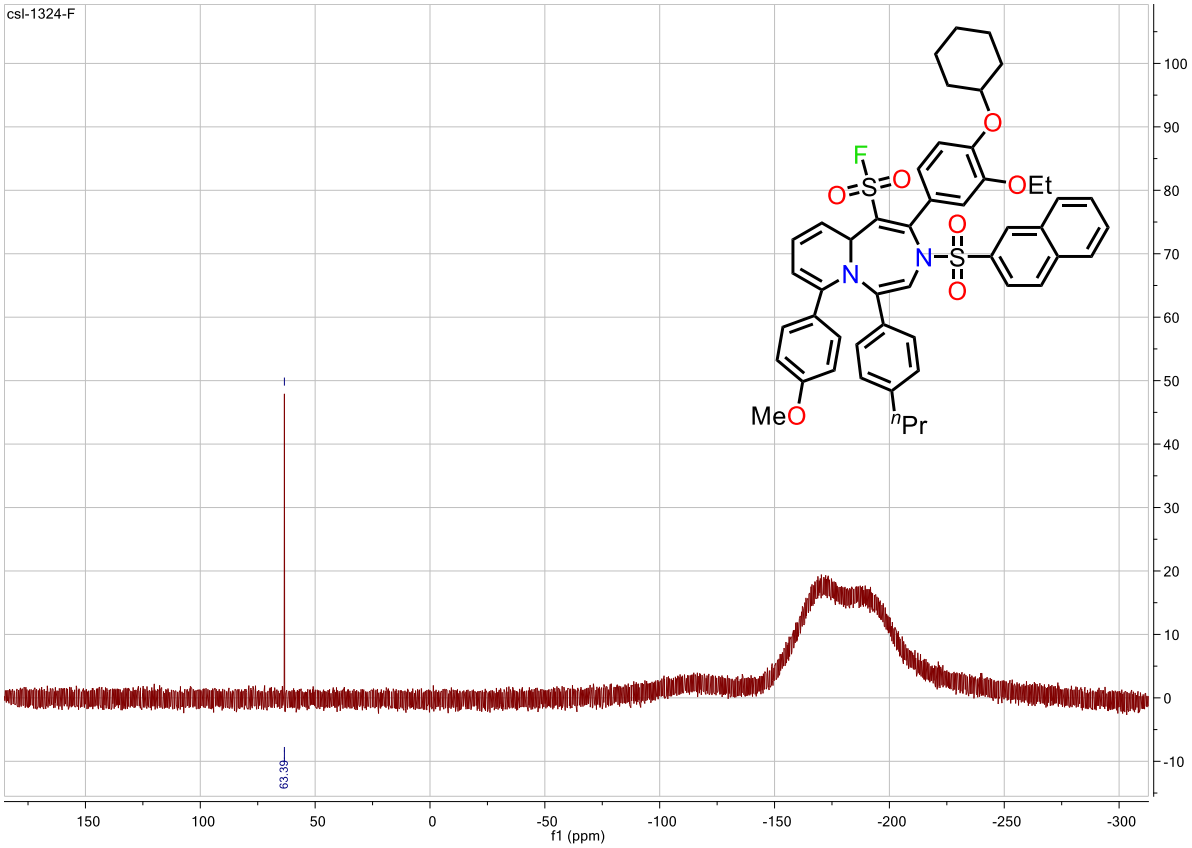

csl-1315-data
f1 (ppm)
F
O
S
N
tBu
MeO
nPr

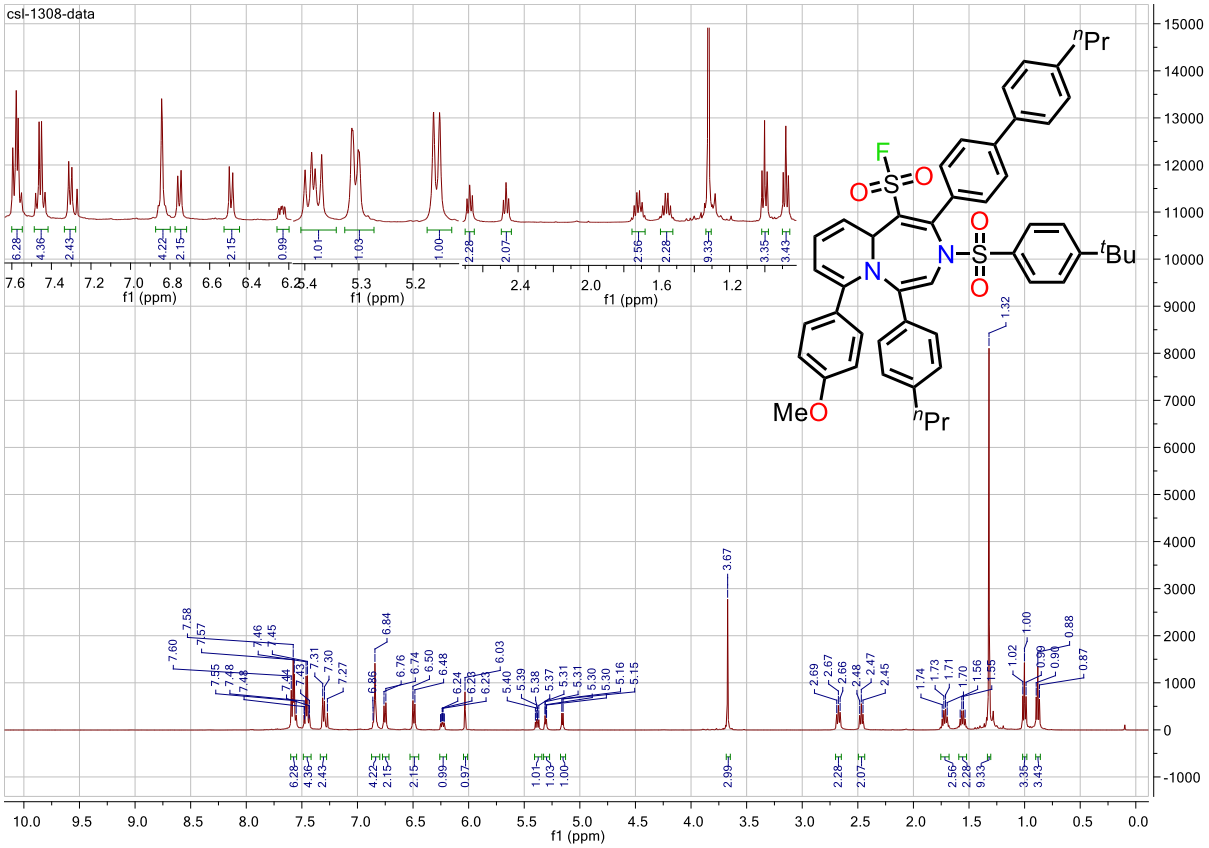

csl-1315-data
f1 (ppm)
F
O
S
N
tBu
MeO
nPr

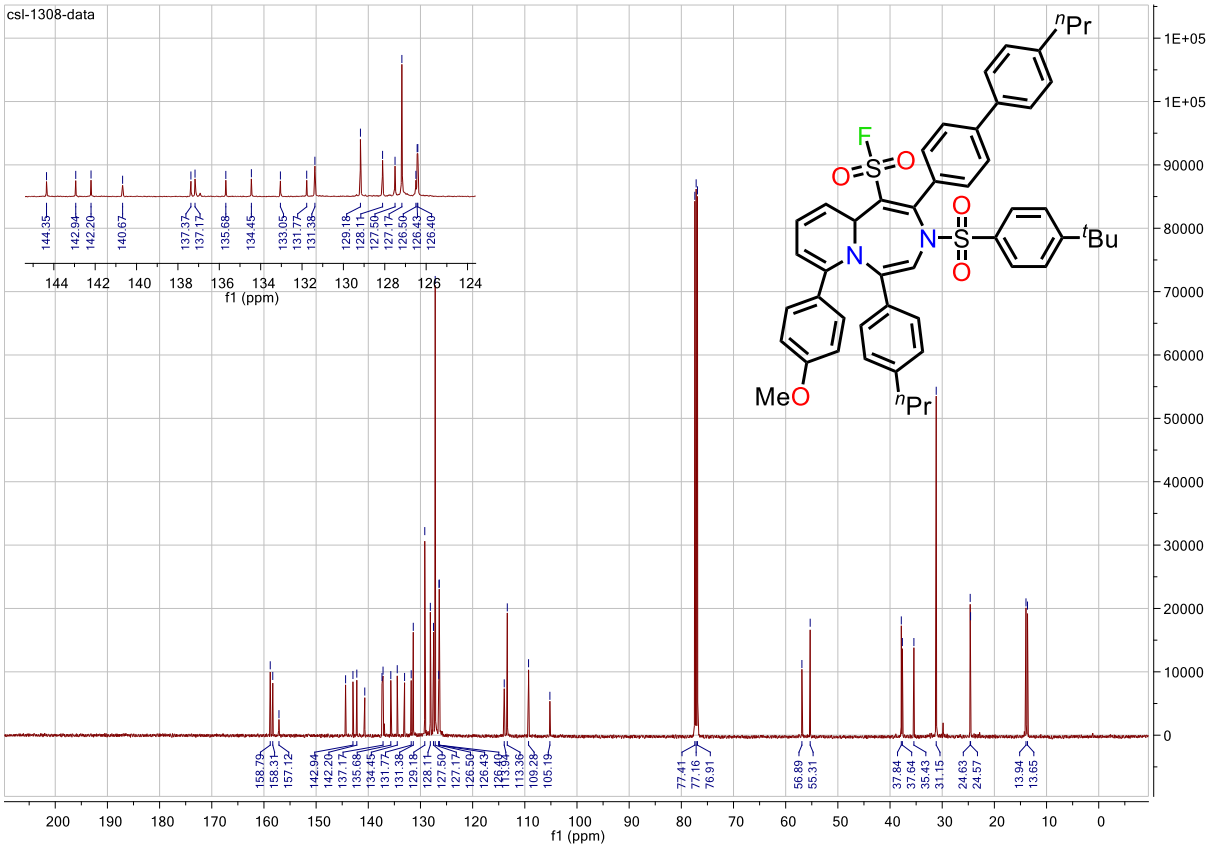

csl-1315-col
62.86
f1 (ppm)
F
O
S
N
MeO
nPr
tBu

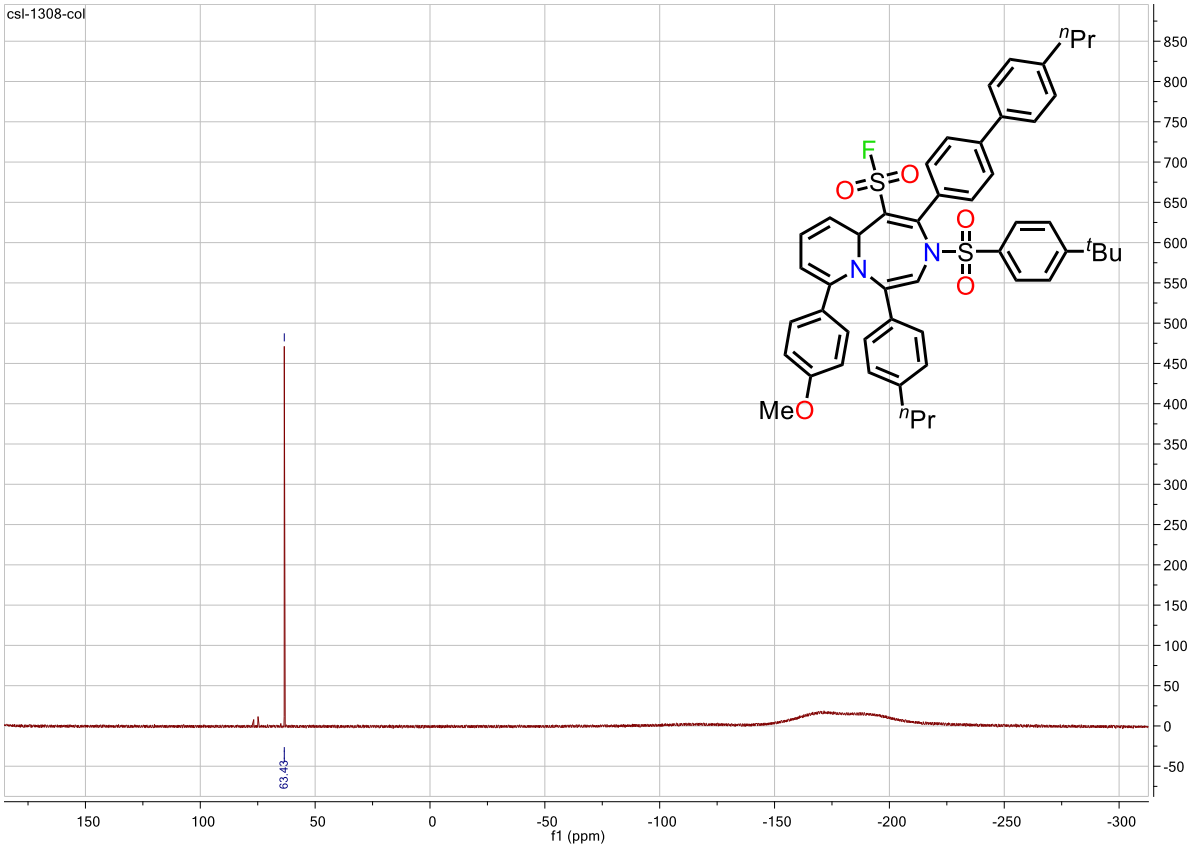

csl-1324-data
F
O
S
O
O
OEt
O
N
N
S
O
O
MeO
nPr
f1 (ppm)

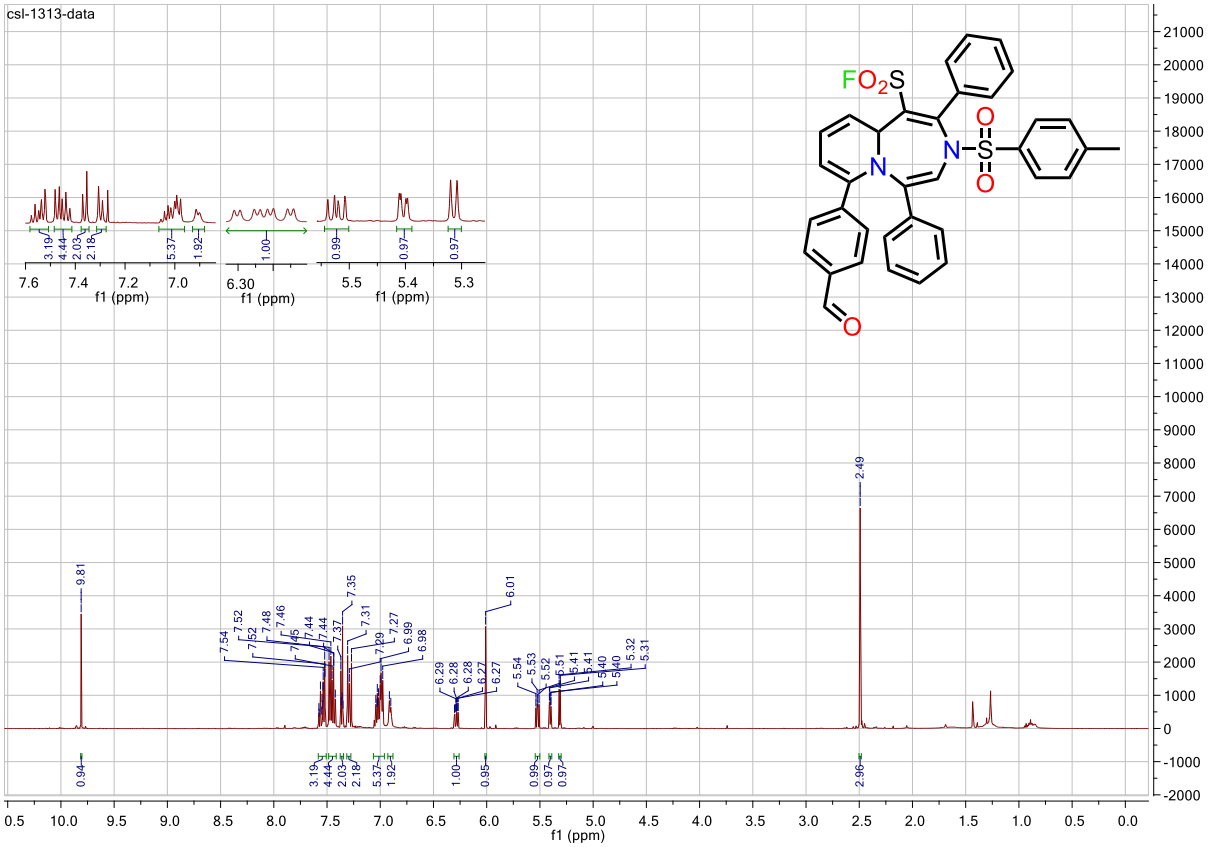

csl-1324-data
F
O
S
O
O
OEt
O
N
N
S
O
O
MeO
nPr
f1 (ppm)

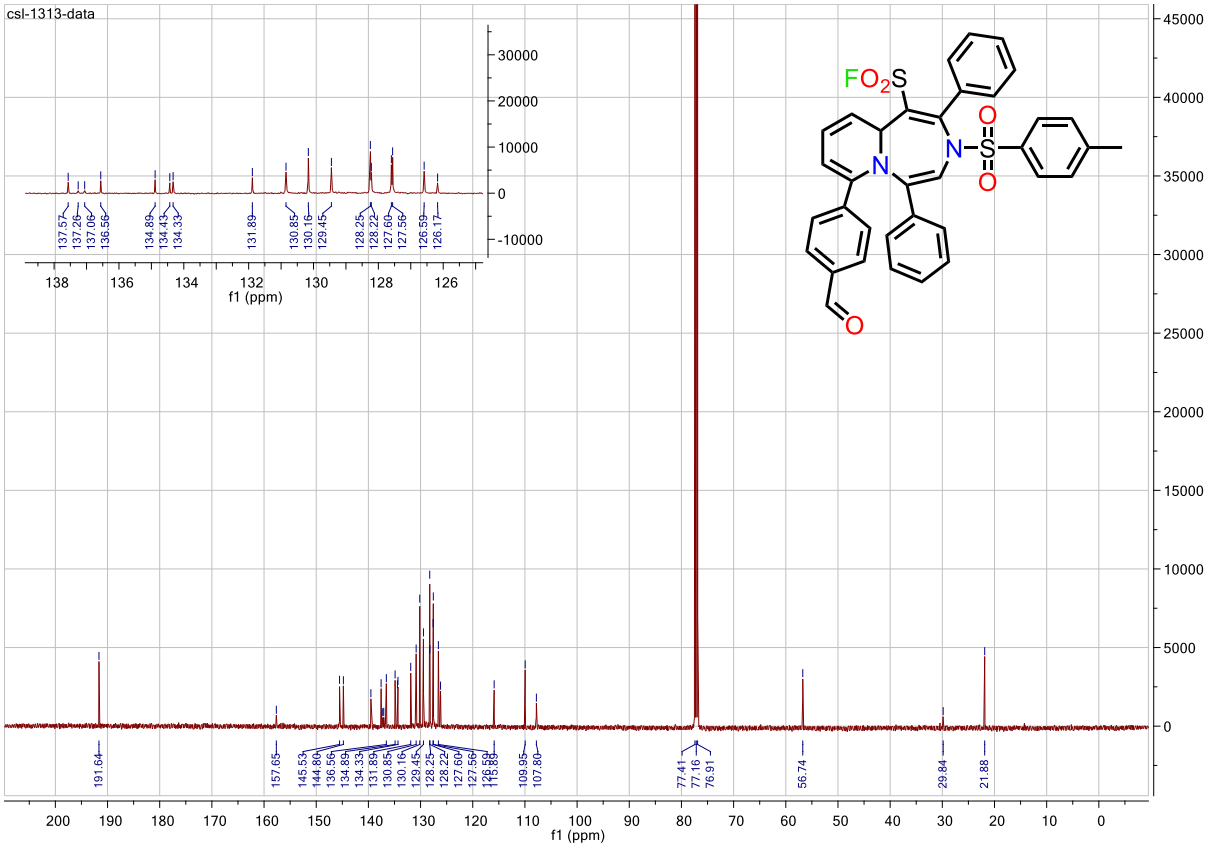

csl-1324-F
63.39
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
100
90
80
70
60
50
40
30
20
10
0
-10
F
O
S
O
O
OEt
O
N
N
S
O
O
MeO
nPr

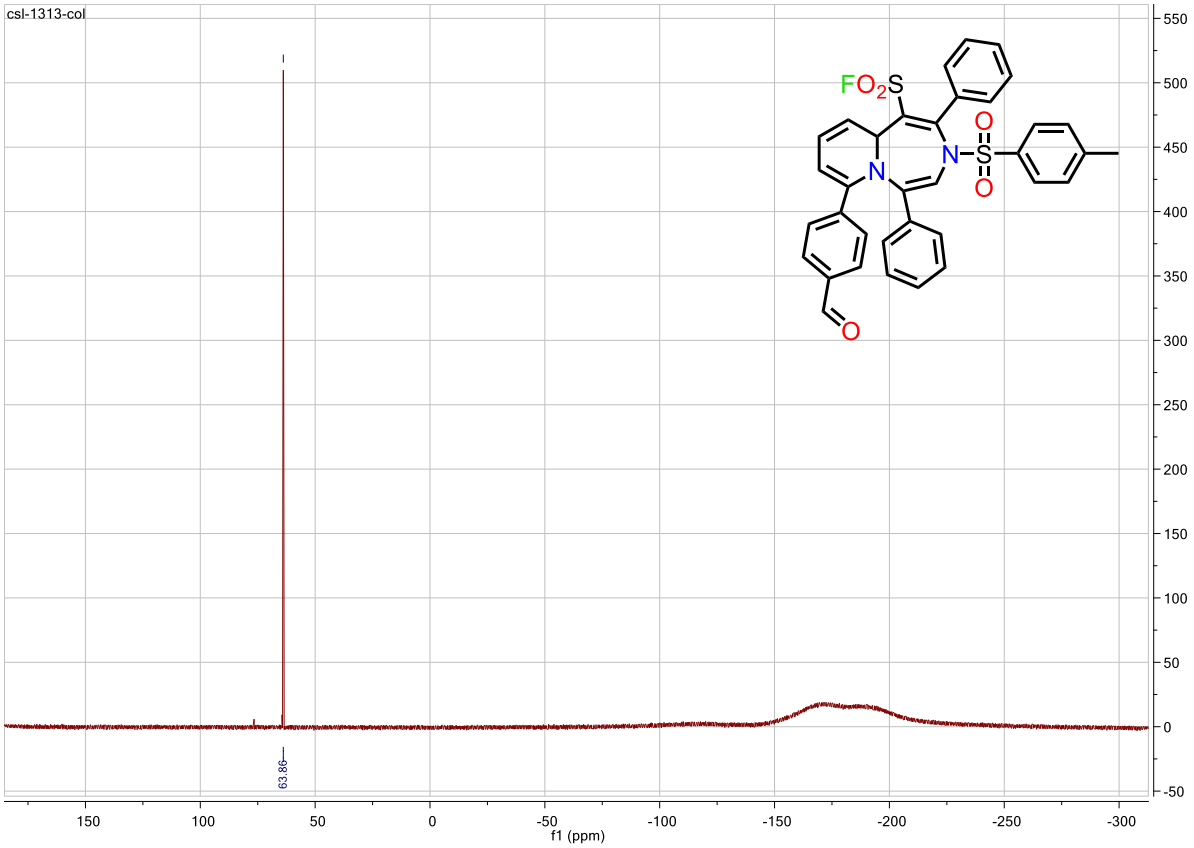

csl-1308-data
f1 (ppm)
nPr
F
O=S=O
N
N
S
O
O
O
tBu
MeO
nPr

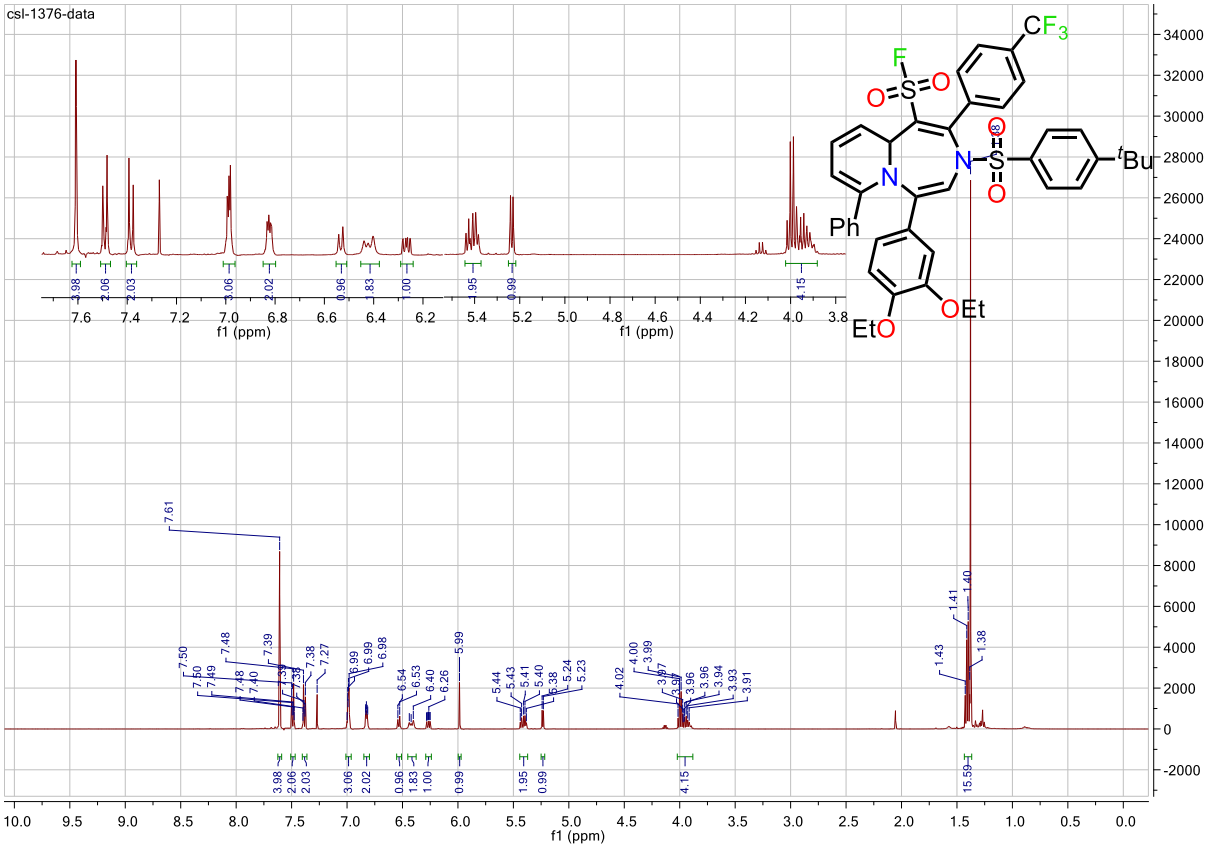

csl-1308-data
f1 (ppm)
nPr
F
O=S=O
N
N
S
O
O
O
tBu
MeO
nPr

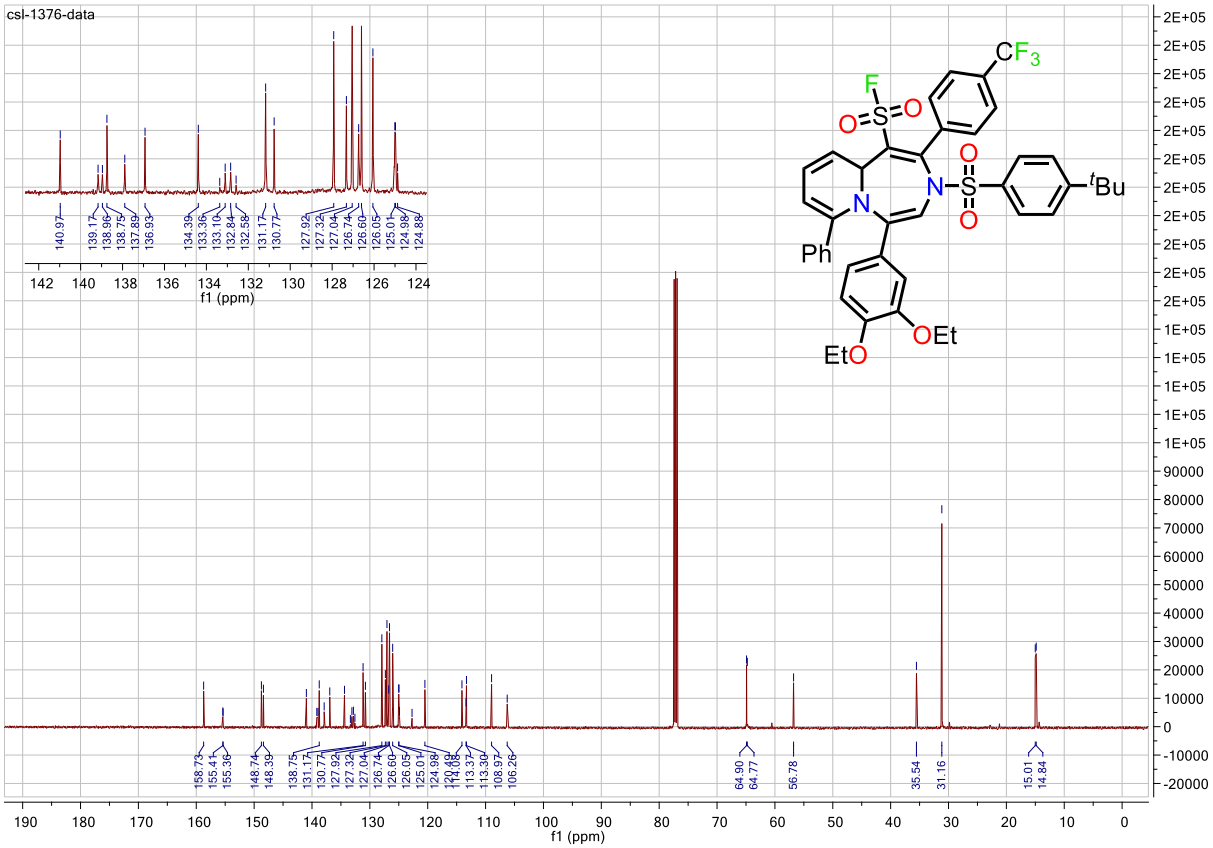

csl-1308-col
63.43
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-50
F
O
S
O
O
N
N
S
O
O
tBu
nPr
MeO
nPr

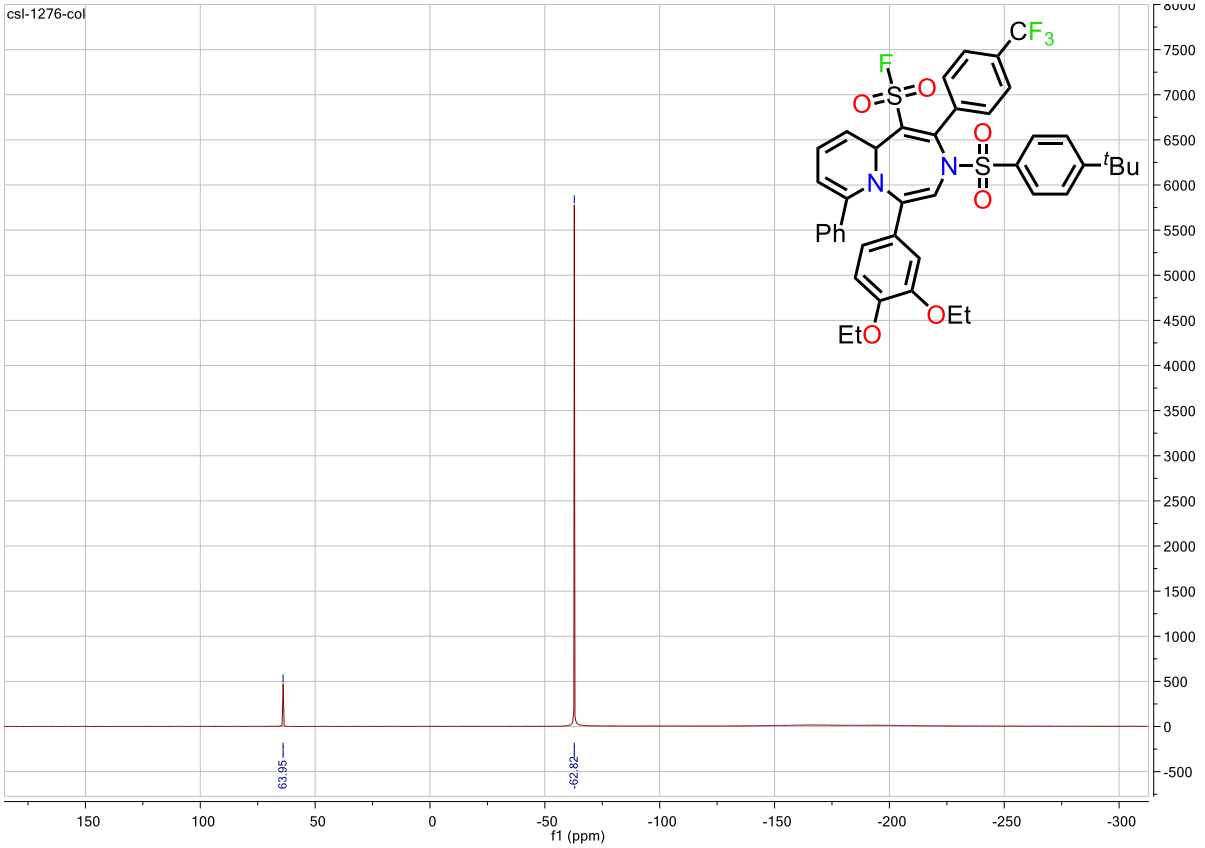

csl-1313-data
f1 (ppm)

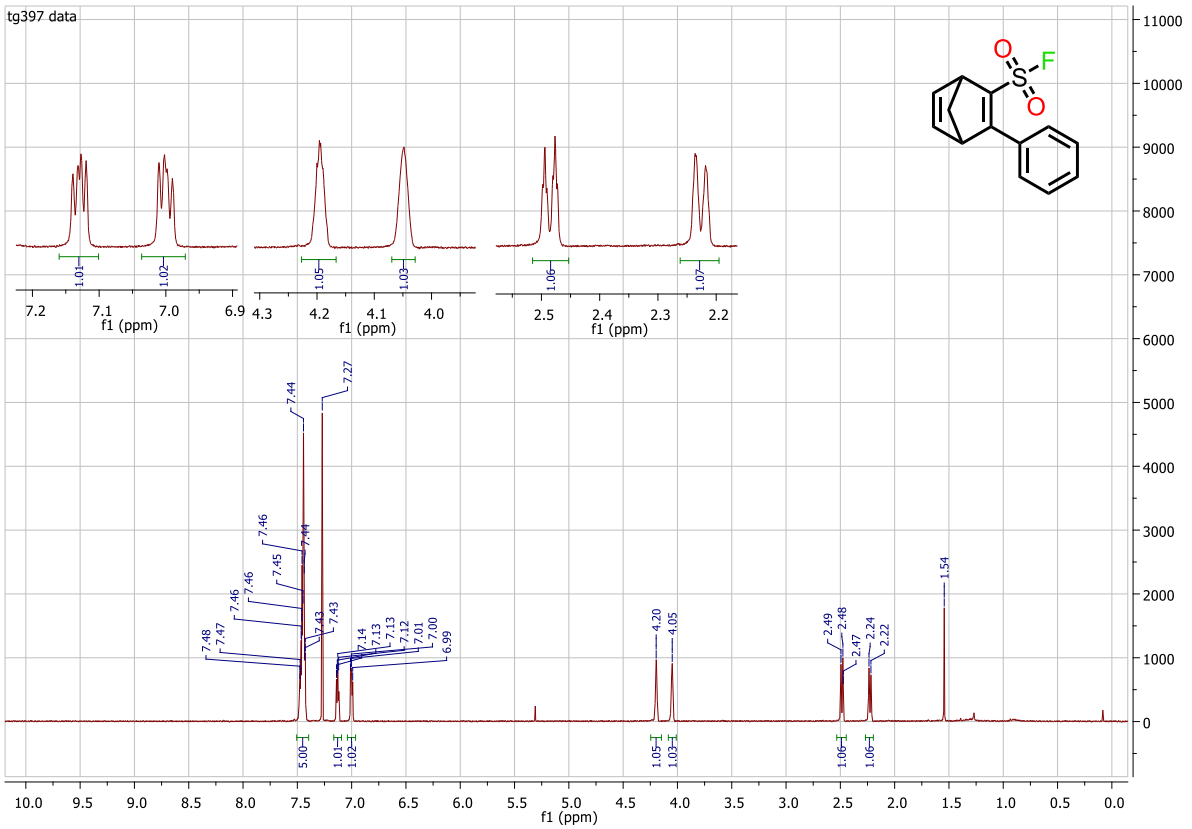

csl-1313-data
f1 (ppm)

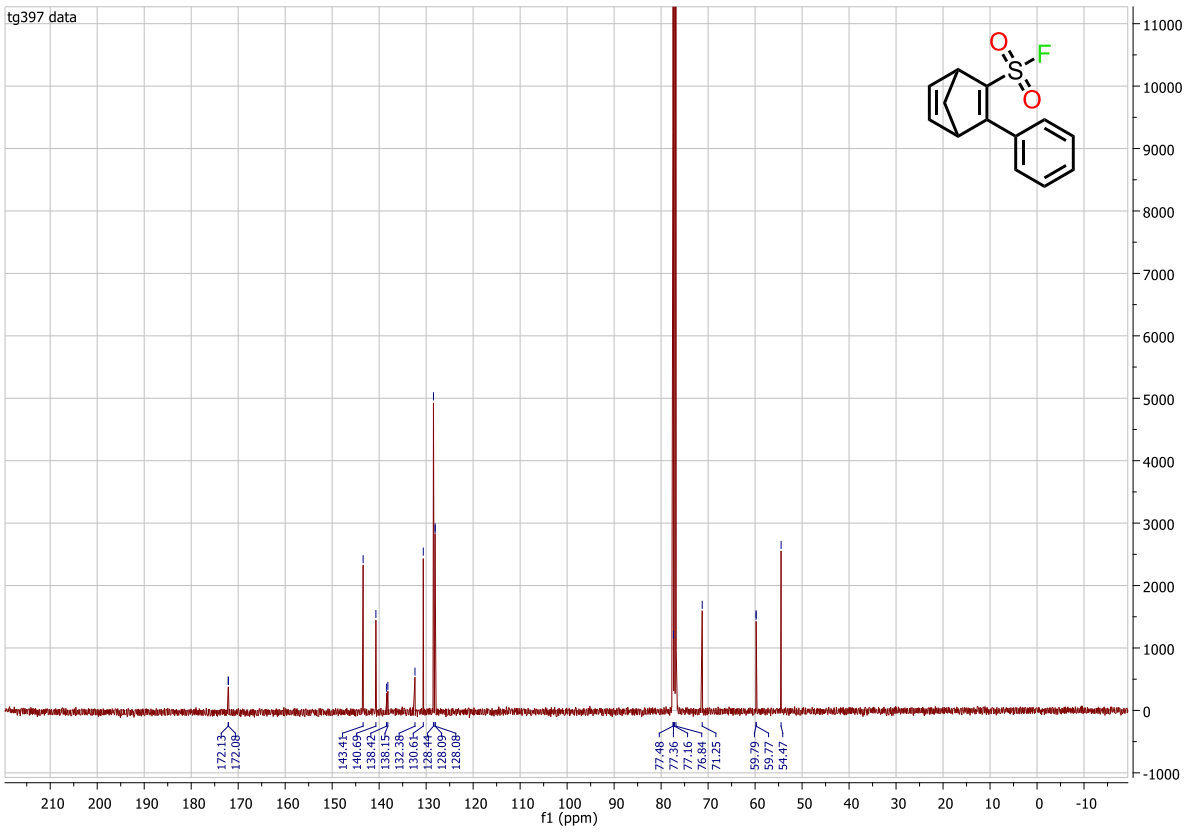

csl-1313-col
FO2S
O
N
N
S
O
O
63.86
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
550
500
450
400
350
300
250
200
150
100
50
0
-50

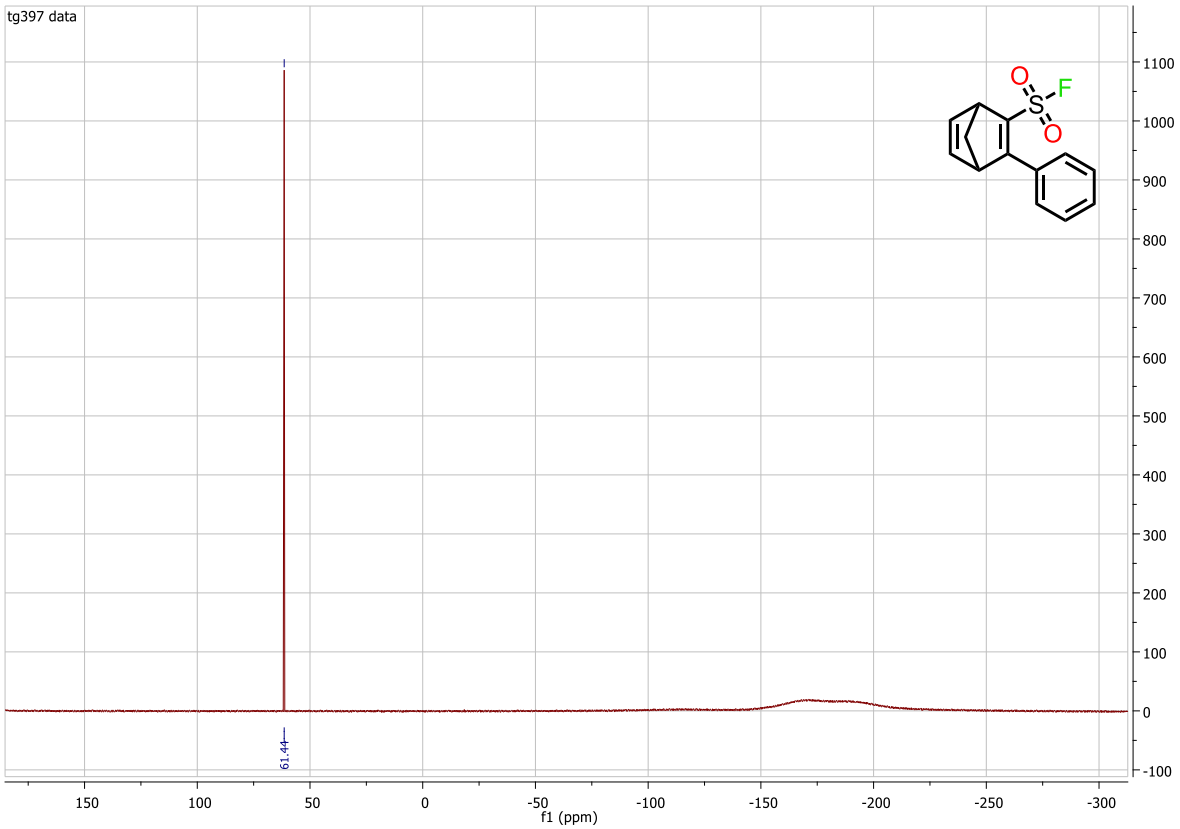

csl-1376-data
f1 (ppm)

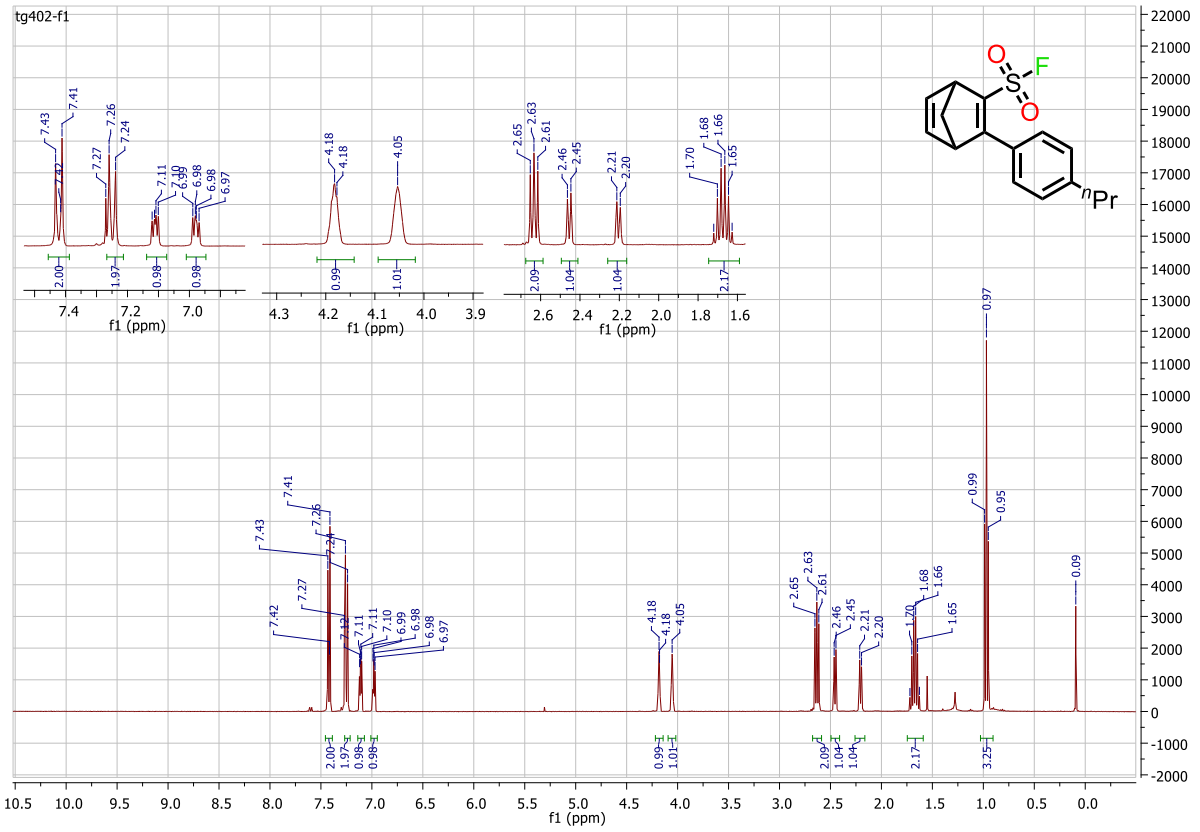

csl-1376-data
f1 (ppm)

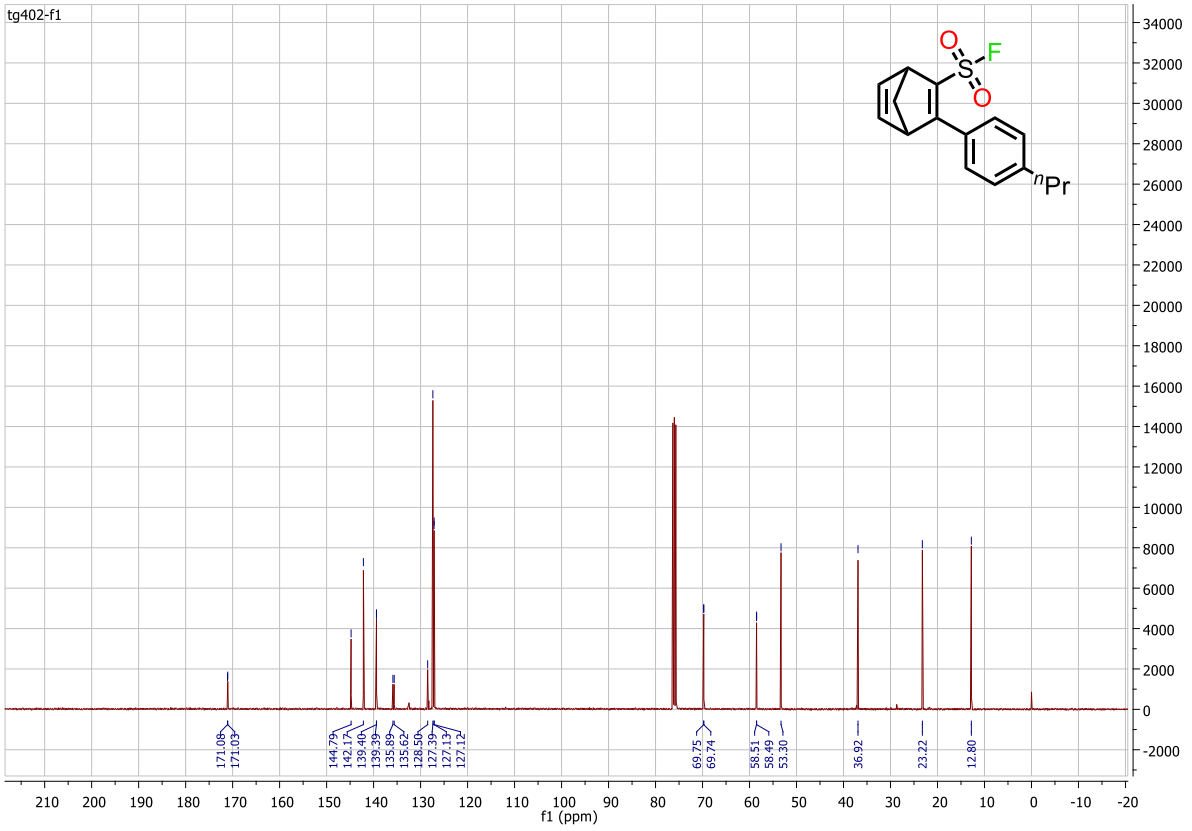

csl-1276-col
CF3
F
O
S
O
O
N
S
O
tBu
N
Ph
OEt
EtO
63.95
-62.82
f1 (ppm)

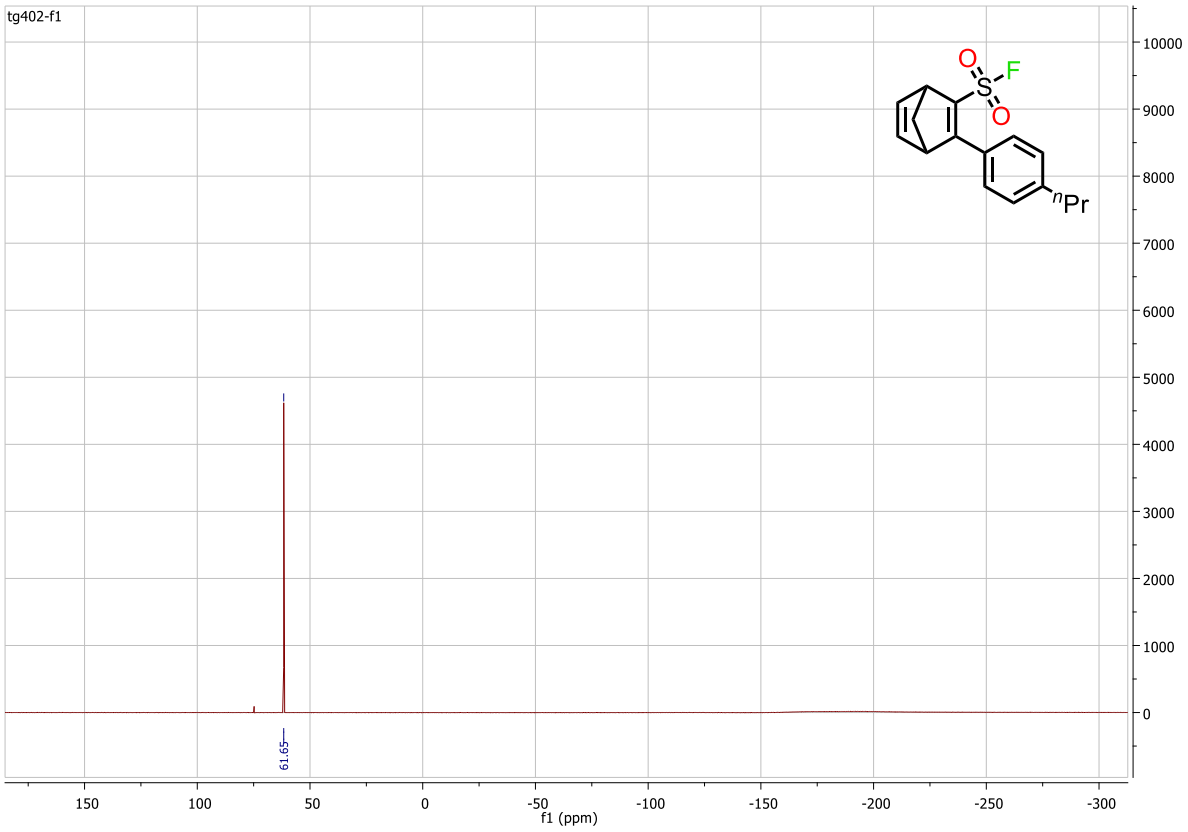

tg397 data
O
S
F
O
f1 (ppm)
7.44
7.27
7.46
7.45
7.43
7.14
7.13
7.12
7.01
7.00
6.99
4.20
4.05
2.49
2.48
2.47
2.24
2.22
1.54

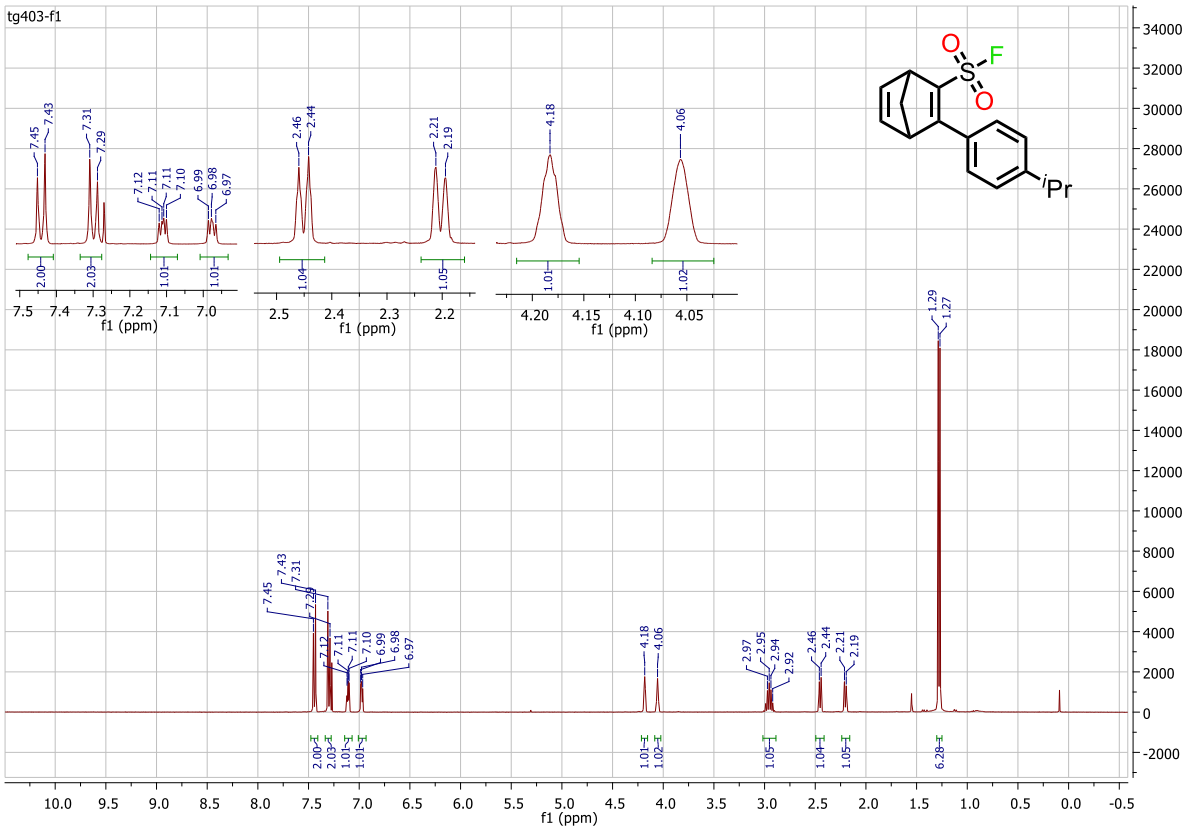

tg397 data
O
S
F
O
f1 (ppm)
172.13
172.08
143.41
140.69
138.42
138.15
132.38
130.61
128.44
128.09
128.08
77.48
77.36
77.16
76.84
71.25
59.79
59.77
54.47

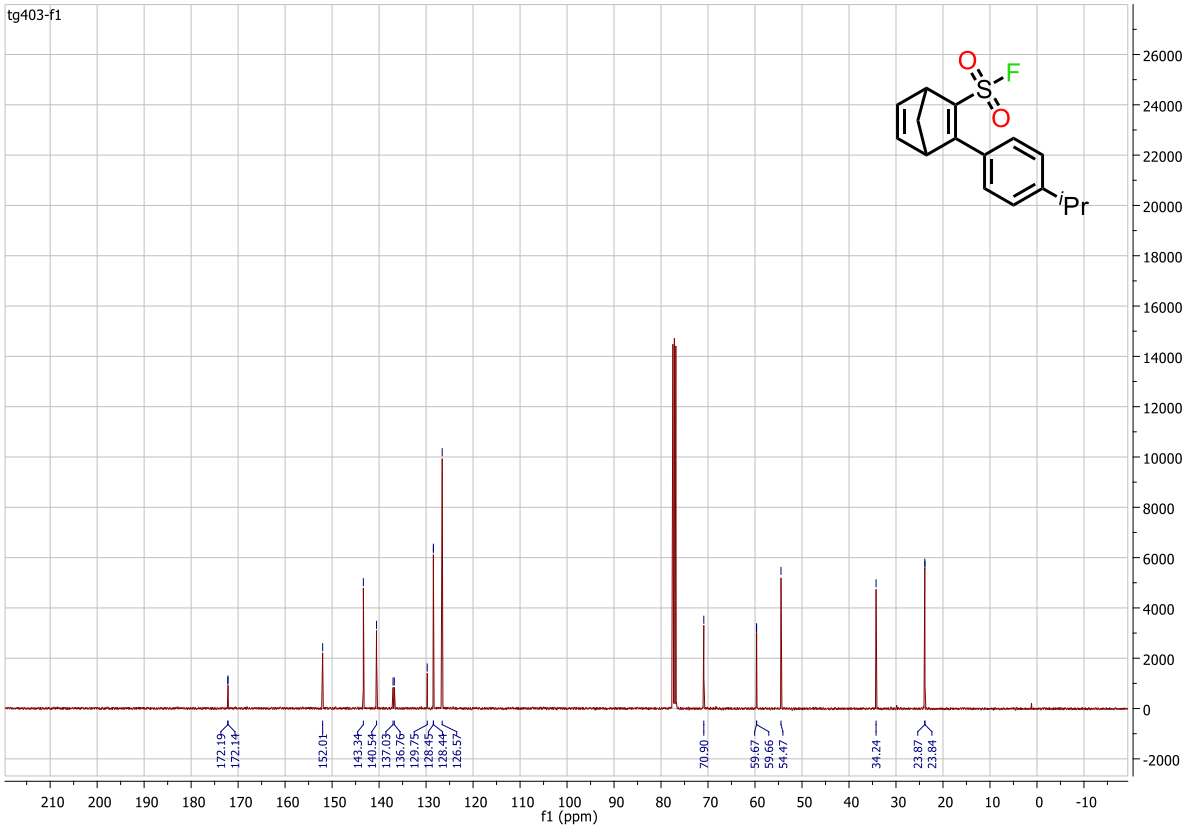

tg397 data
61.44
f1 (ppm)
150
100
50
0
-50
-100
-150
-200
-250
-300
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
O
S
F
O

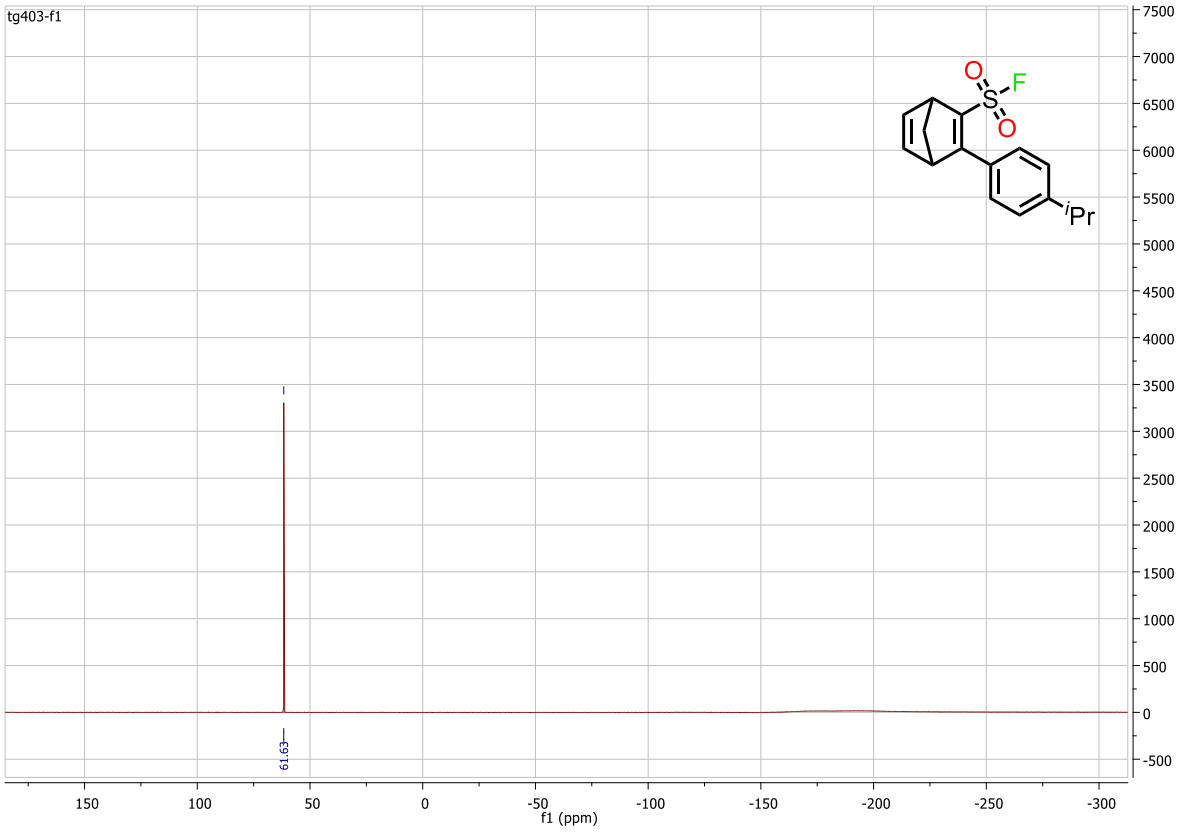

tg402-f1
F
O
S
O
nPr
f1 (ppm)

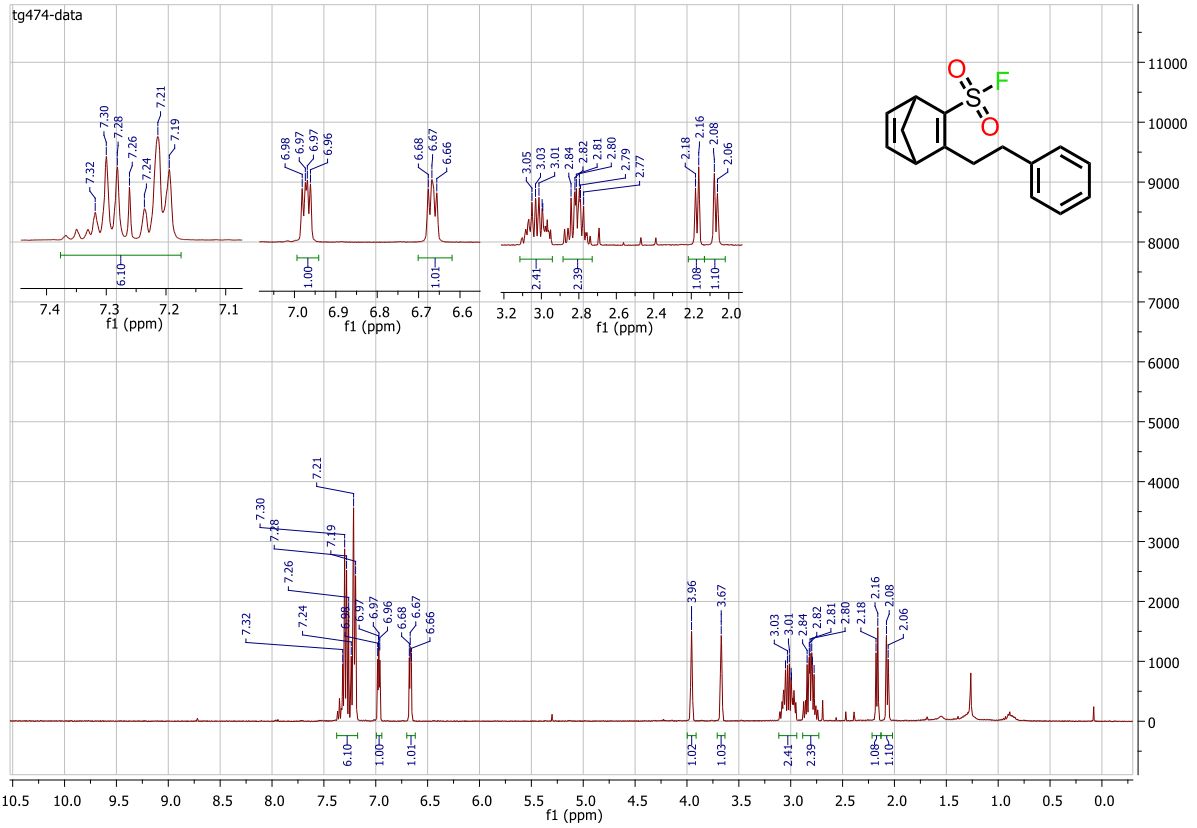

tg402-f1
F
O
S
O
nPr
f1 (ppm)

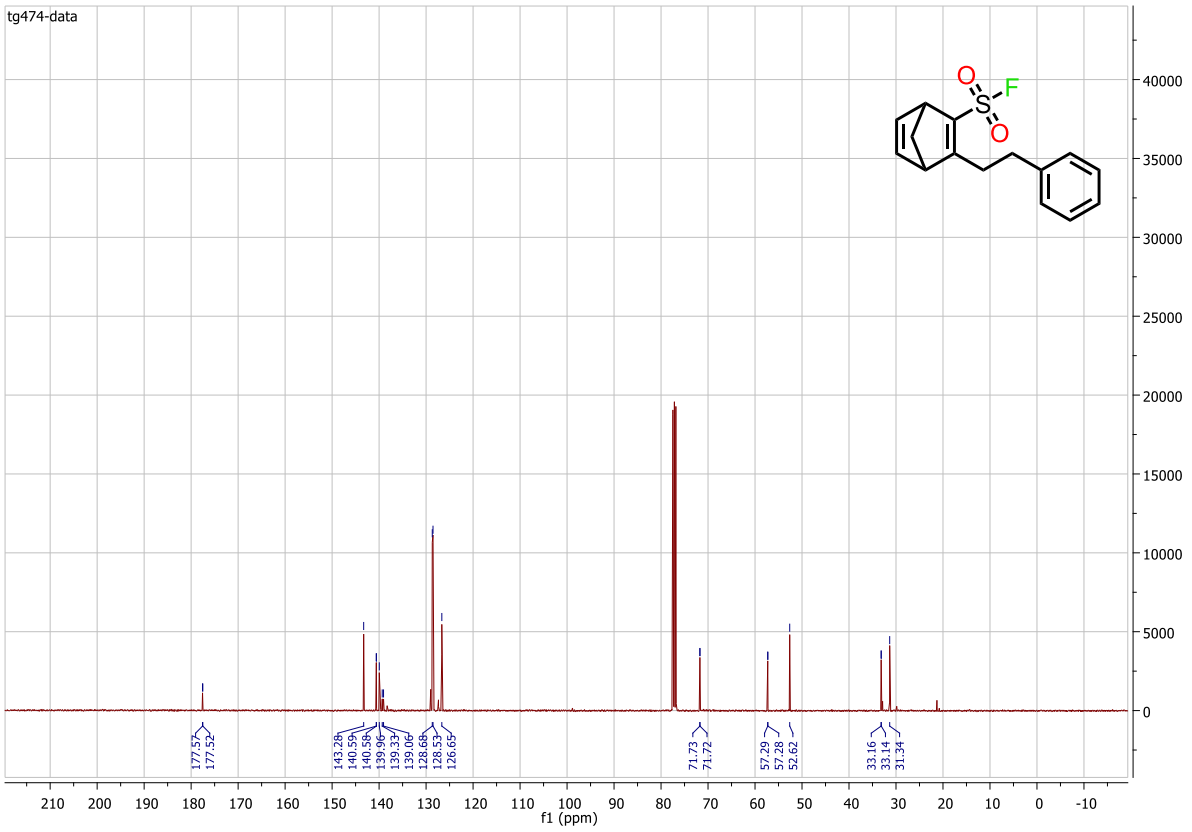

tg402-f1
O
S
F
O
nPr
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
61.65
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

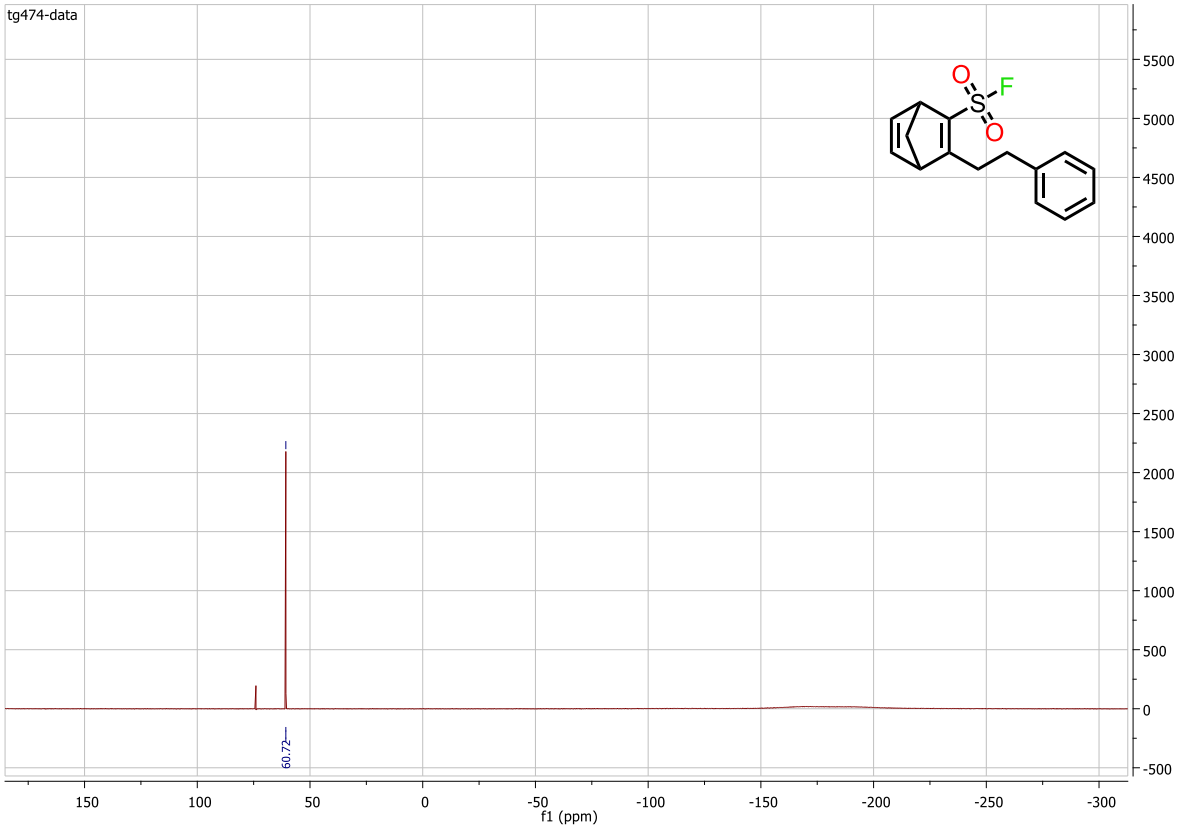

tg403-f1
O
S
F
O
iPr
f1 (ppm)

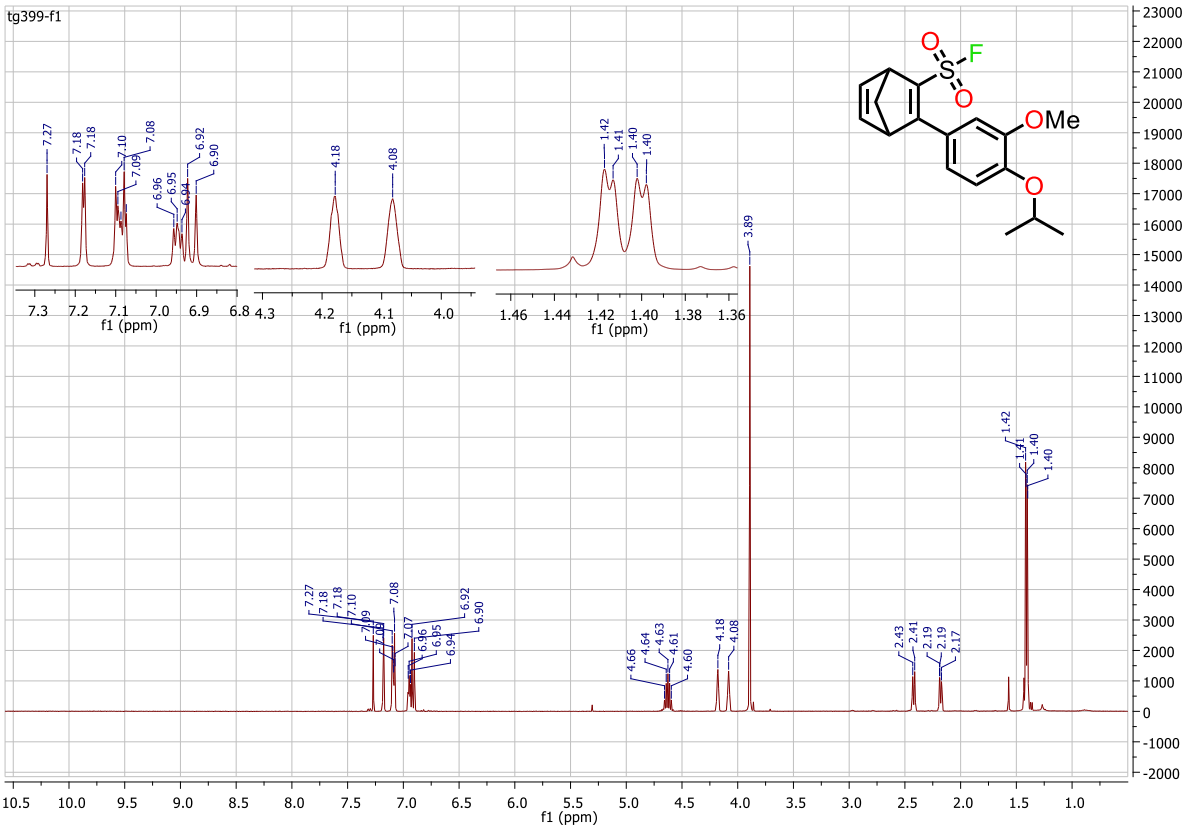

tg403-f1
O
S
F
O
iPr
f1 (ppm)

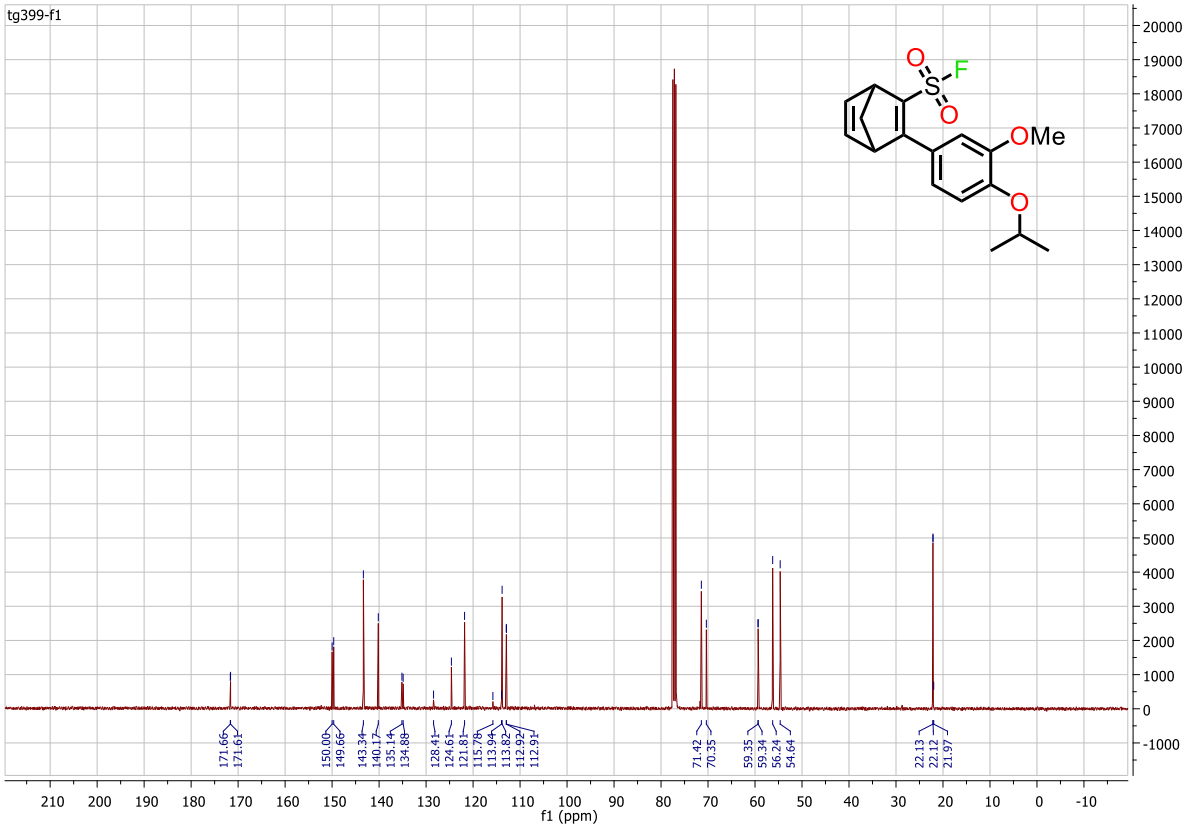

tg403-f1
O
S
F
O
iPr
61.63
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500

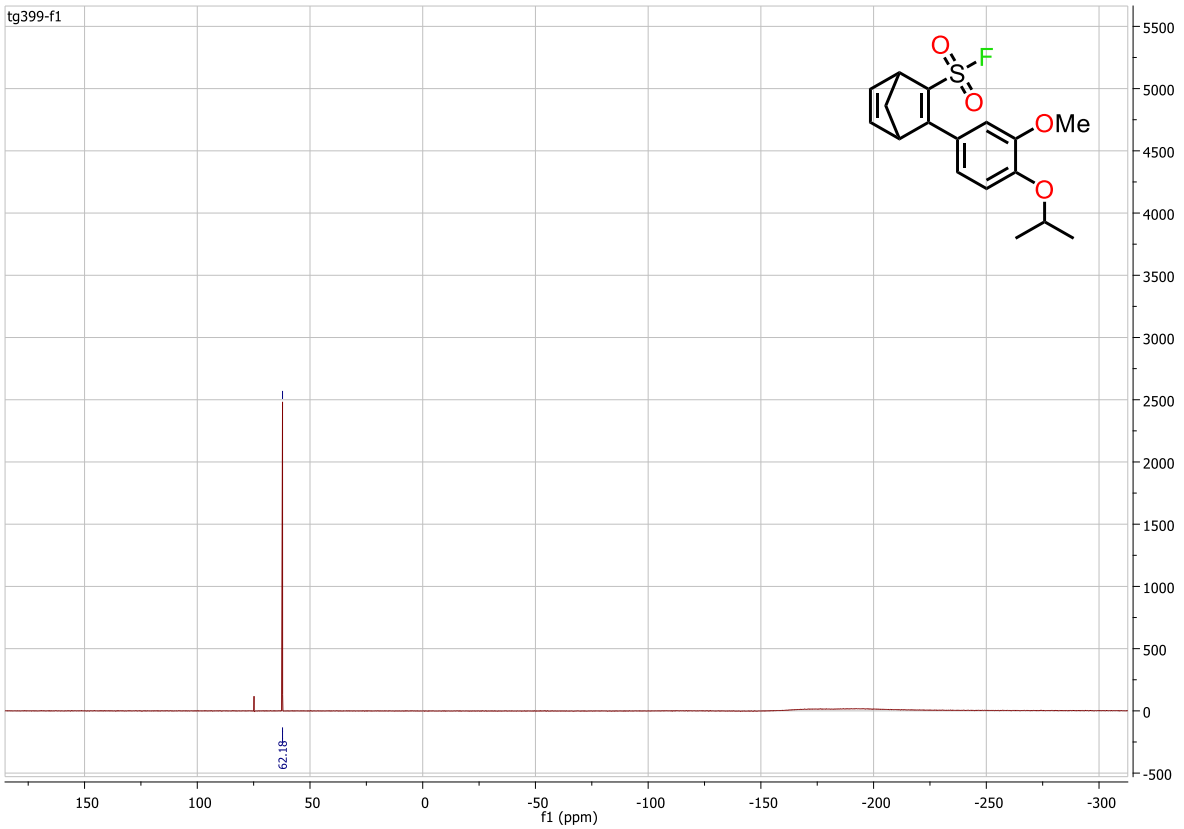

tg474-data
f1 (ppm)

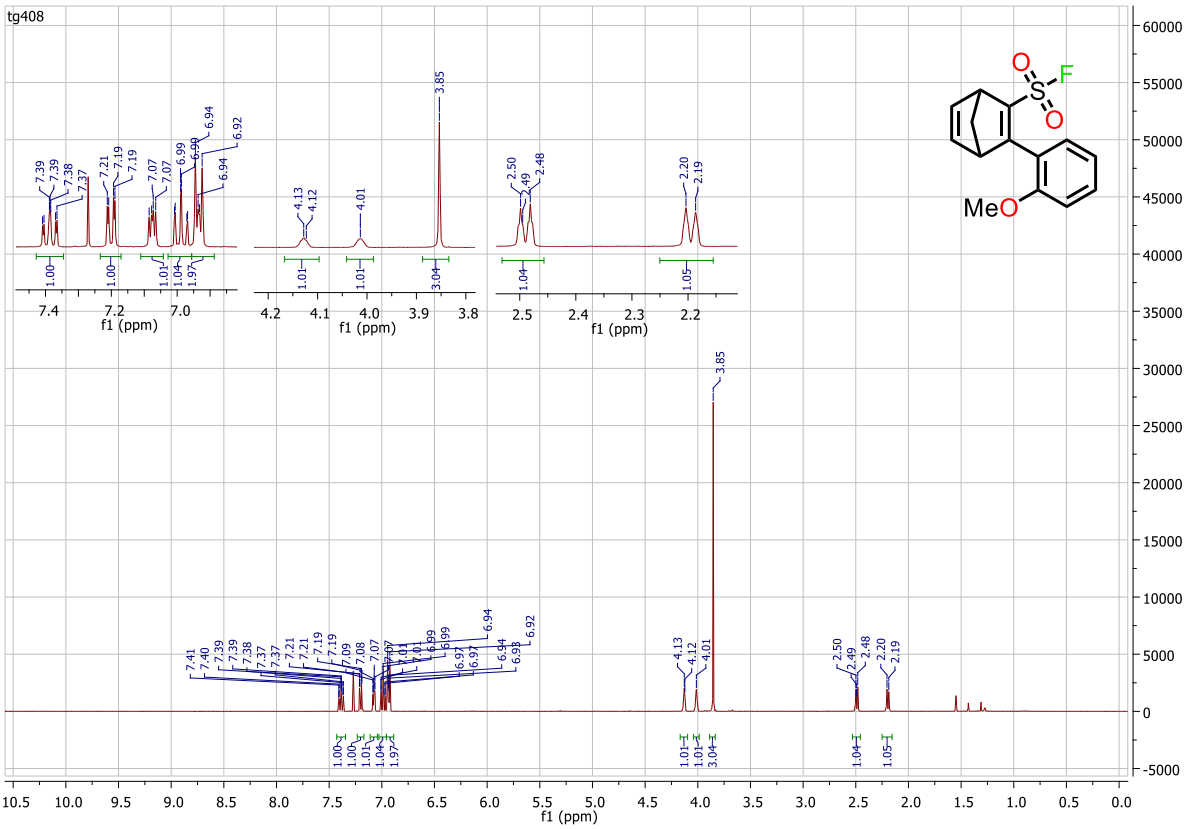

tg474-data
O
S
F
O
177.57
177.52
143.28
140.59
140.58
139.96
139.33
139.06
128.68
128.53
126.65
71.73
71.72
57.29
57.28
52.62
33.16
33.14
31.34
f1 (ppm)

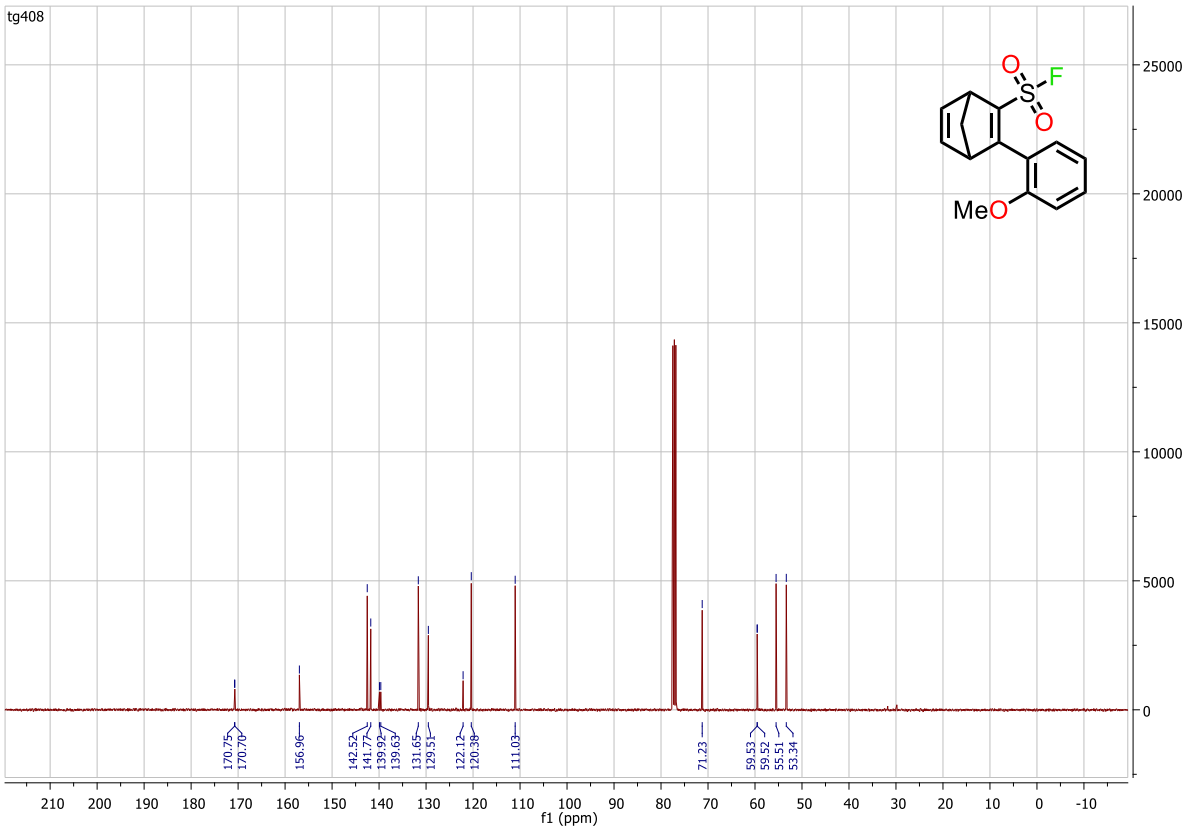

tg474-data
O
S
F
O
60.72
f1 (ppm)

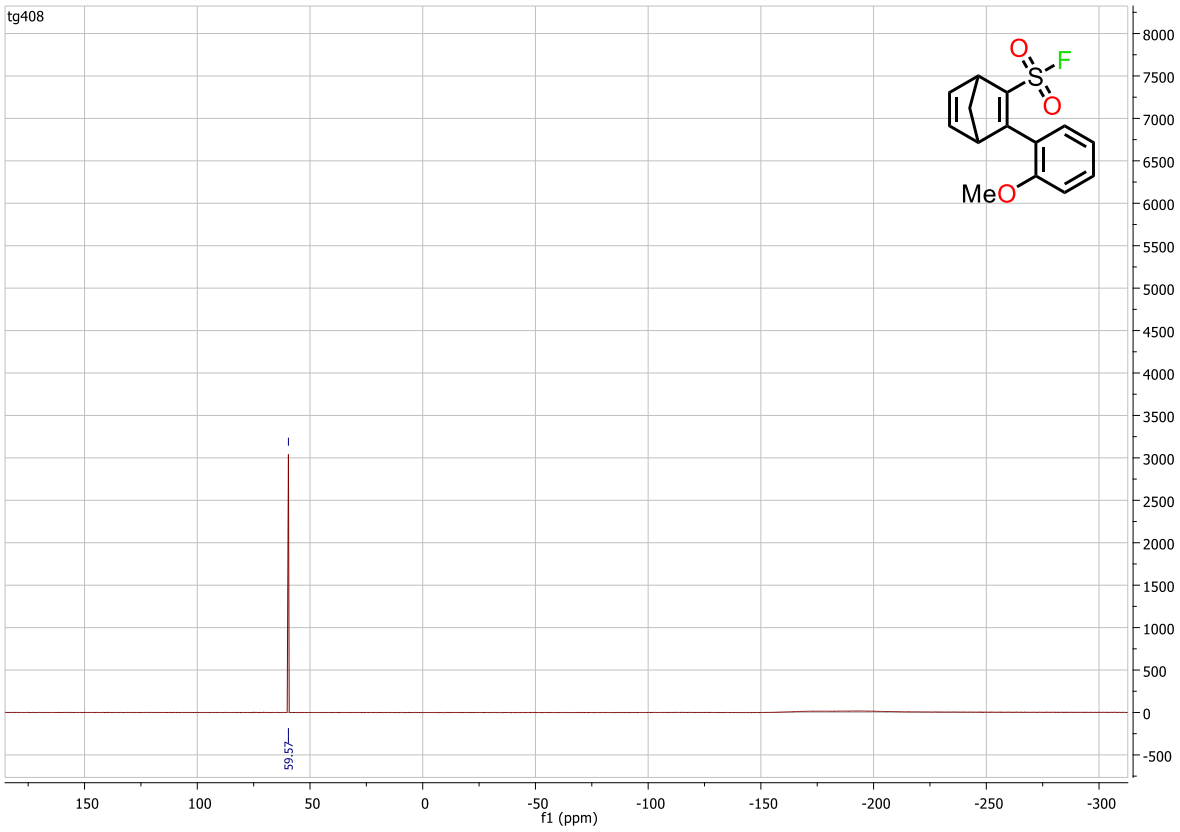

tg399-f1
O
S
F
O
OMe
O
f1 (ppm)

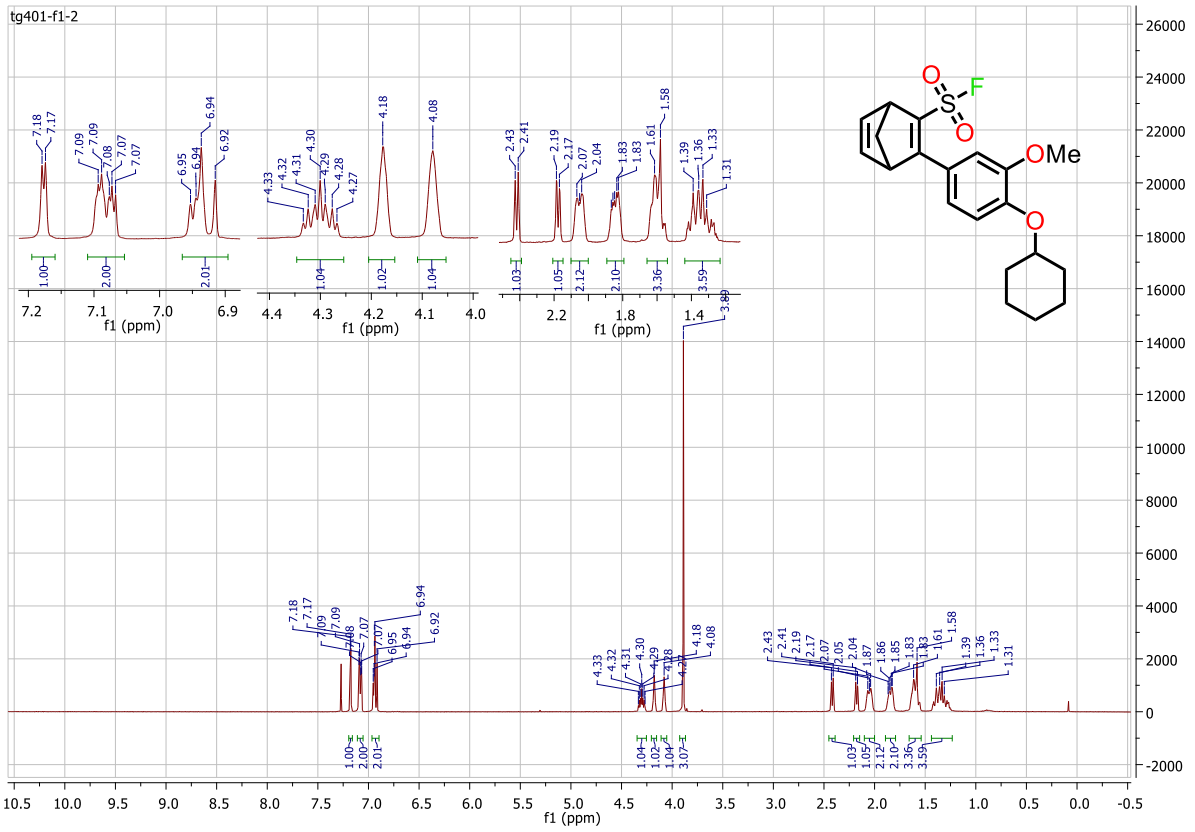

tg399-f1
O
S
F
O
OMe
O
f1 (ppm)

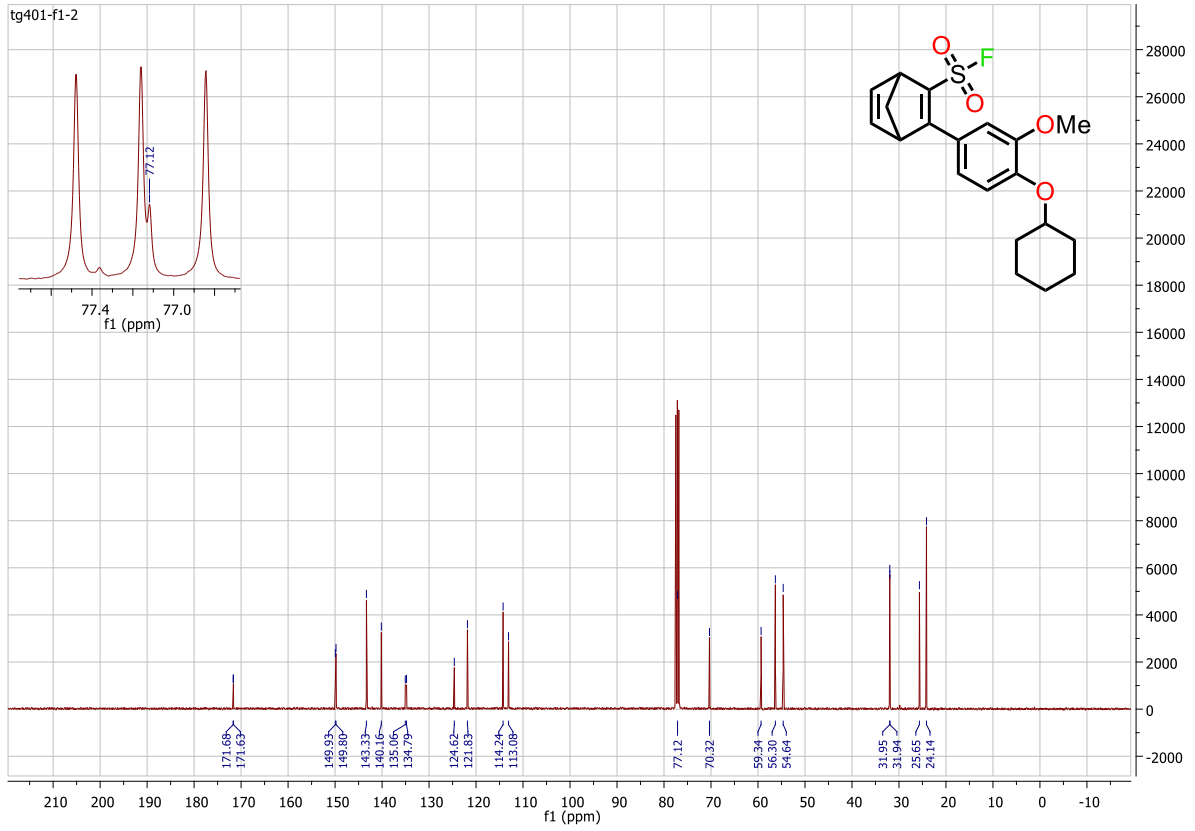

tg399-f1
O
S
F
O
OMe
O
62.18
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

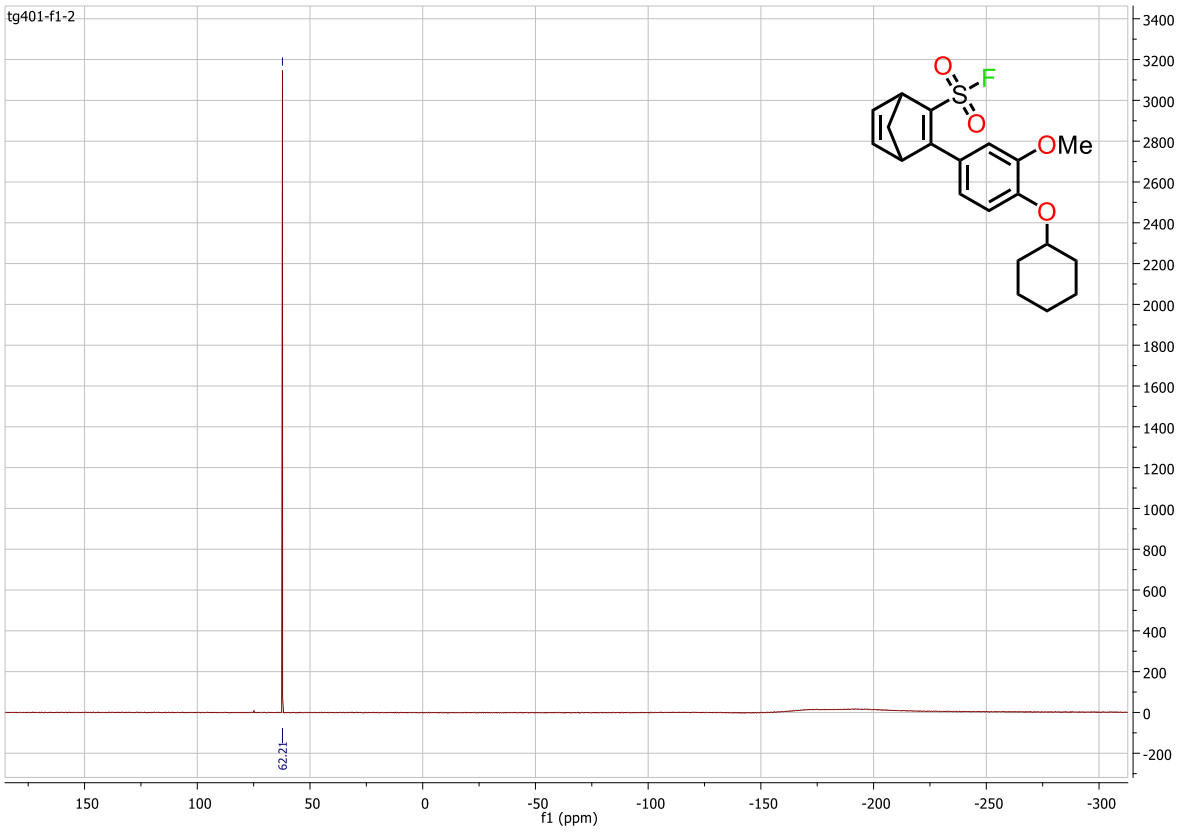

tg408
f1 (ppm)

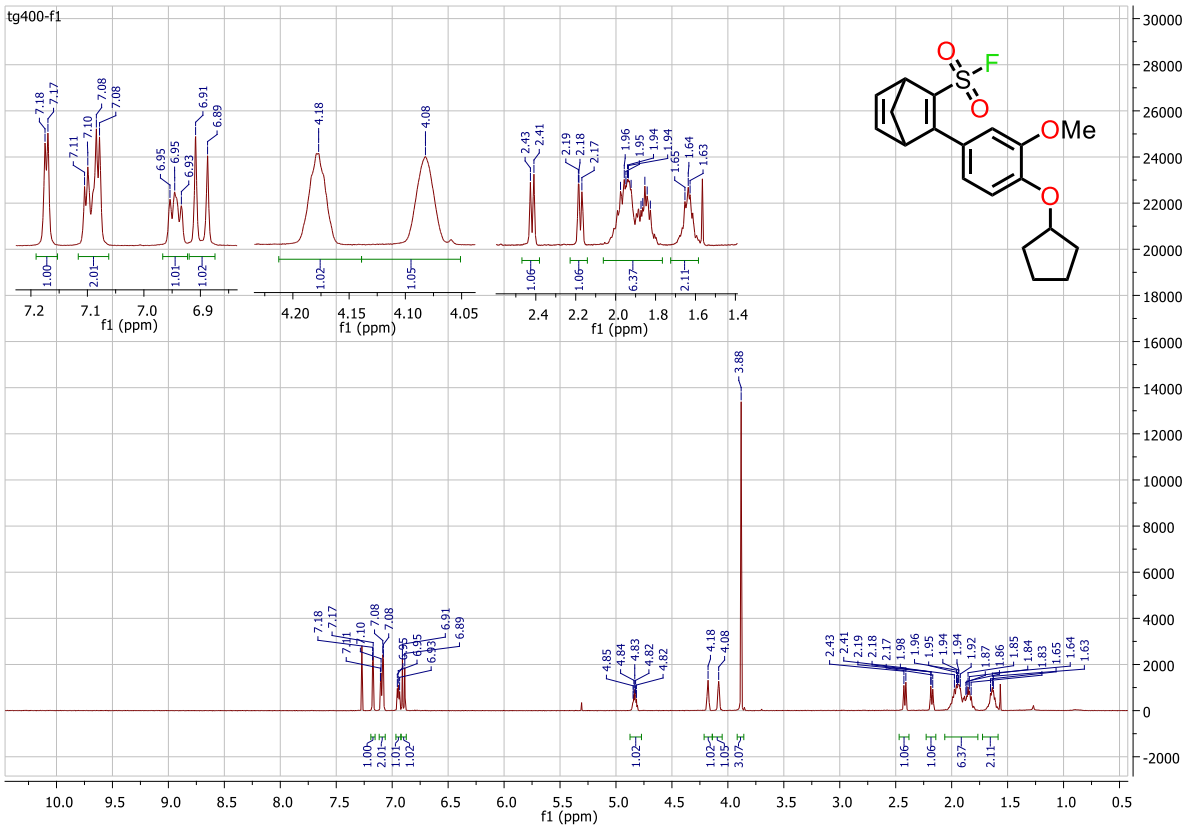

tg408
f1 (ppm)

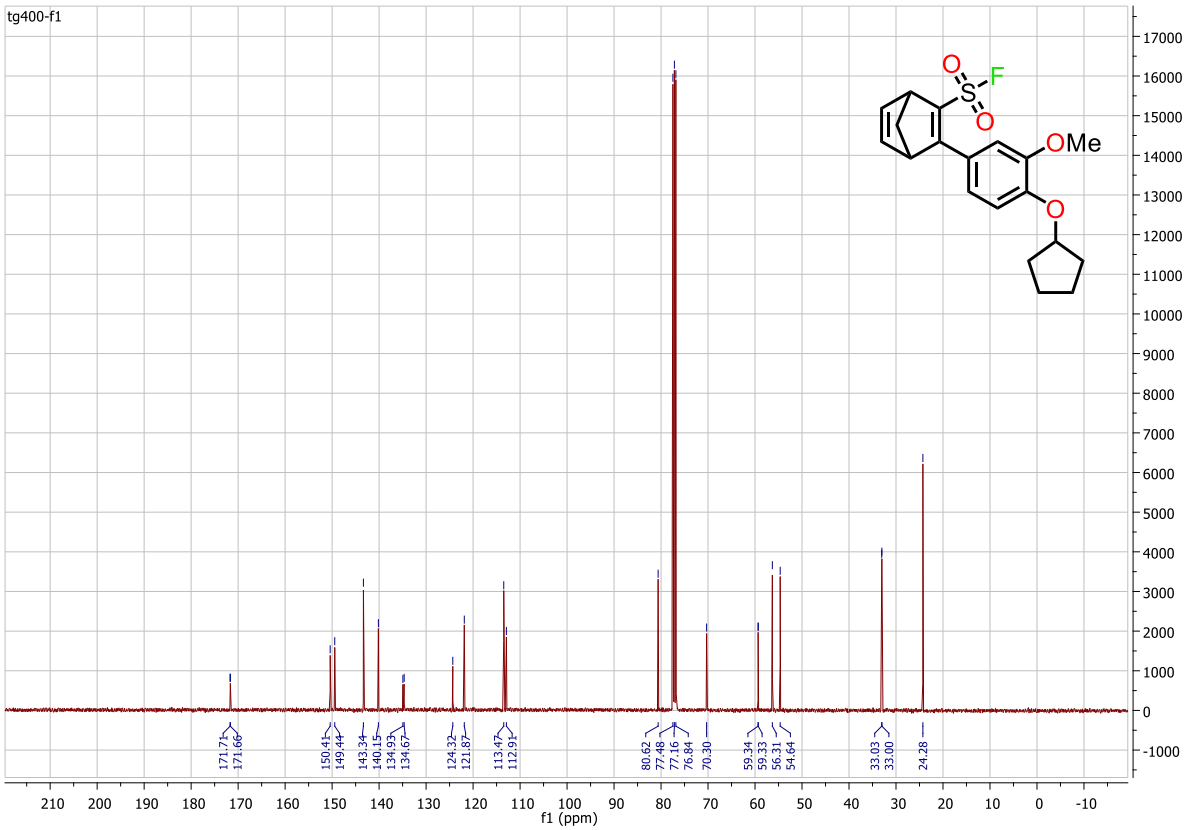

tg408
59.57
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
8000
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
O
S
F
O
MeO

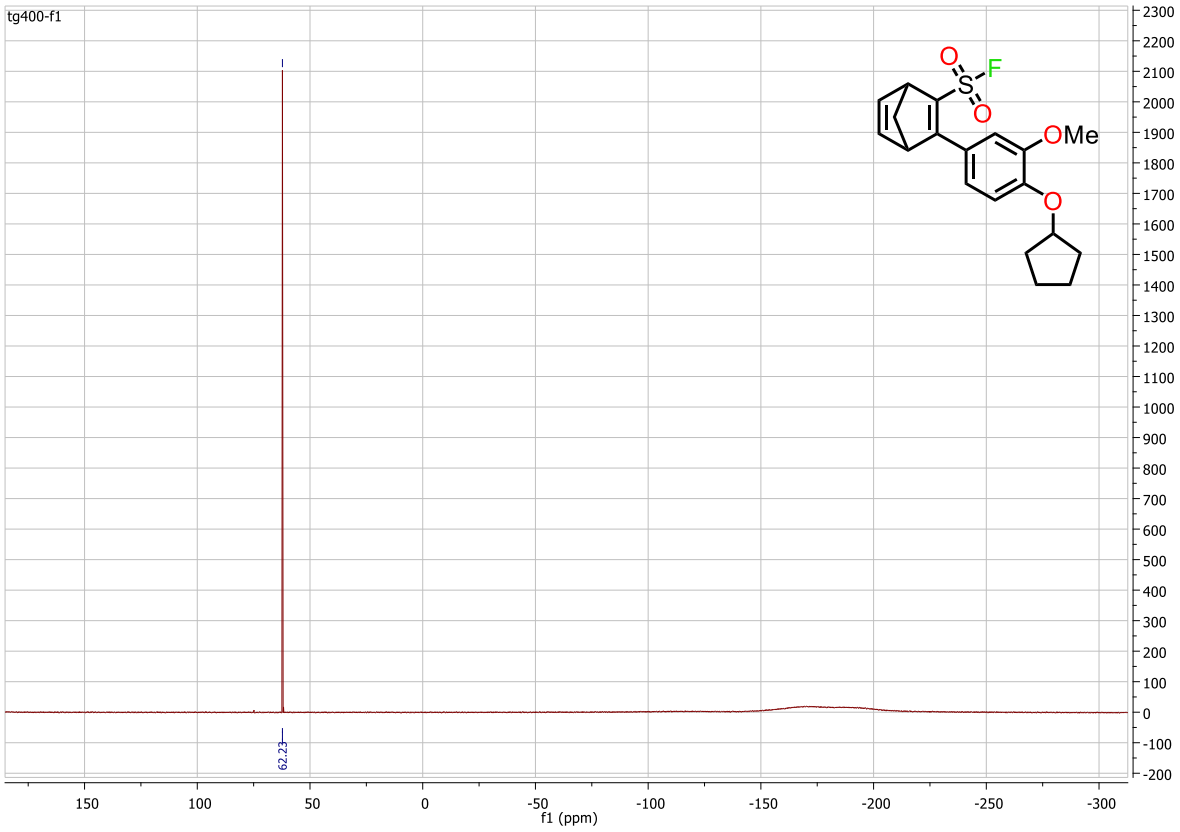

tg401-f1-2
f1 (ppm)
O
F
S
O
OMe
O

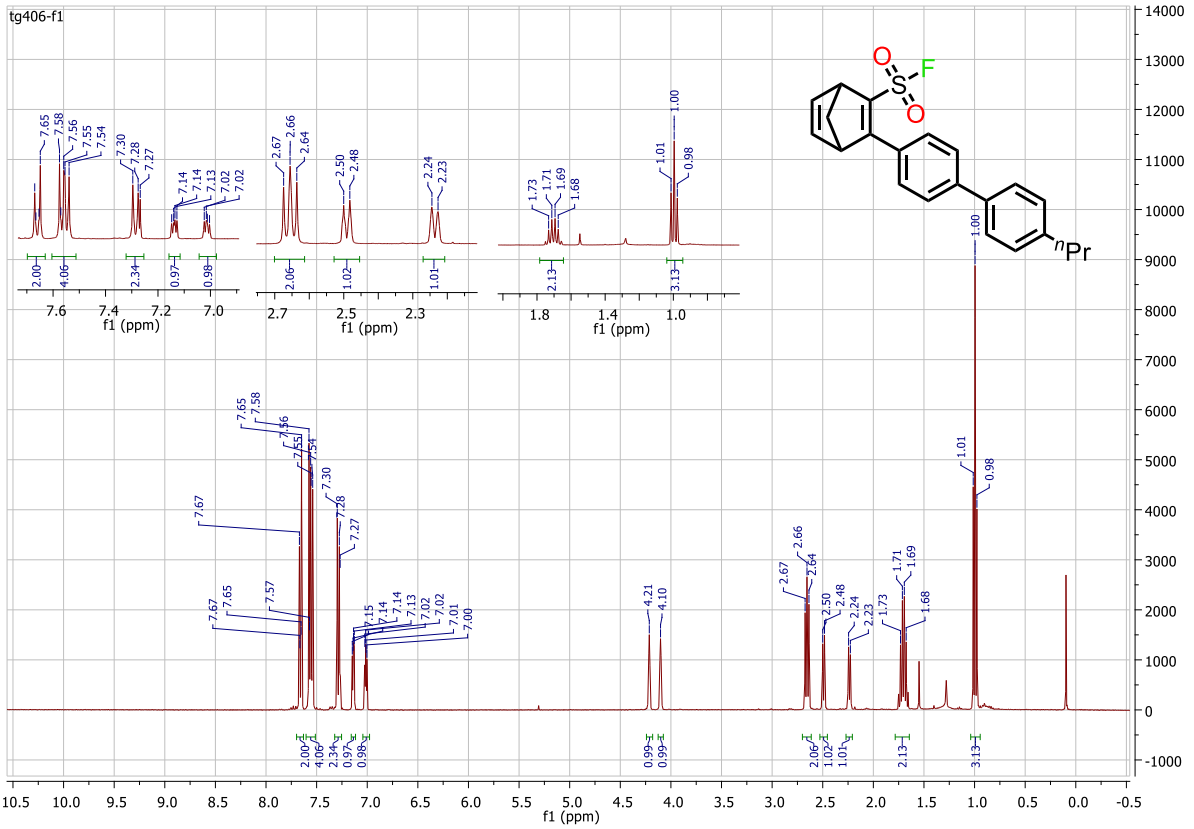

tg401-f1-2
77.12
f1 (ppm)
O
F
S
O
OMe
O

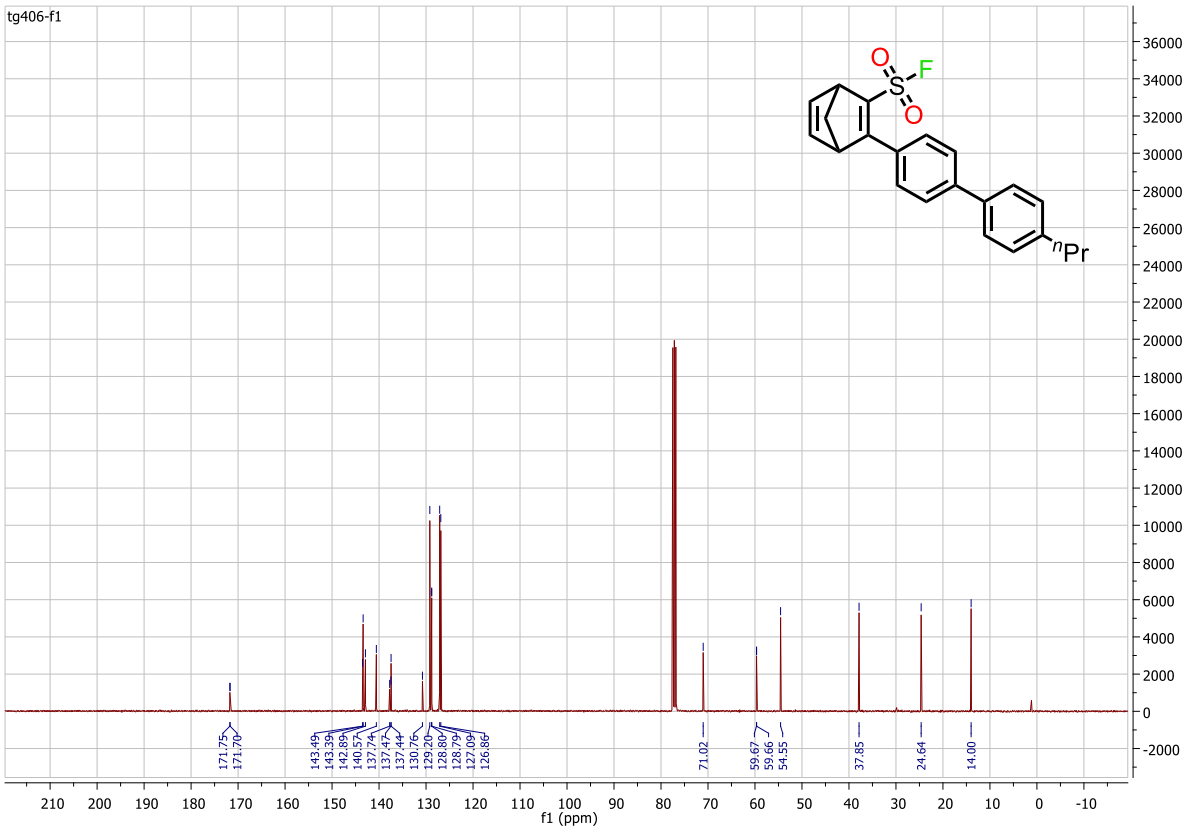

tg401-f1-2
O
S
F
O
OMe
O
62.21
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200

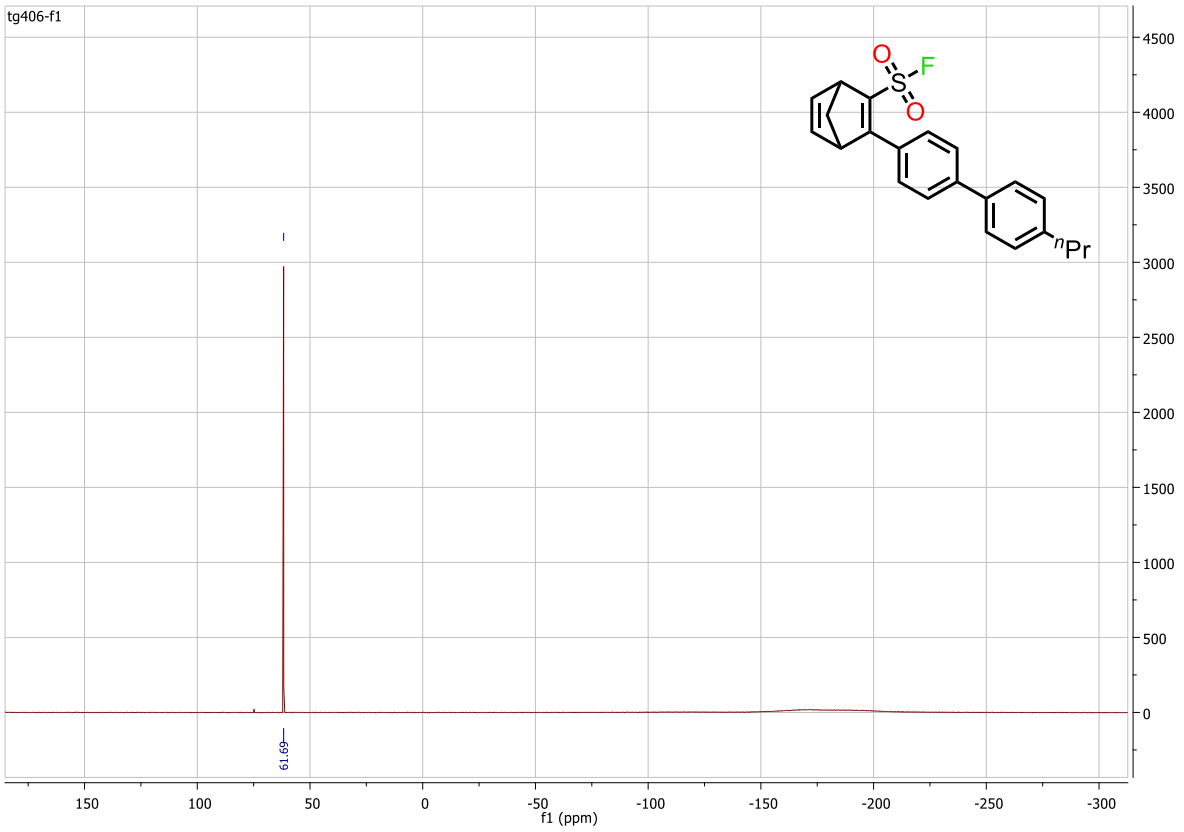

tg400-f1
O
S
F
O
OMe
O
f1 (ppm)

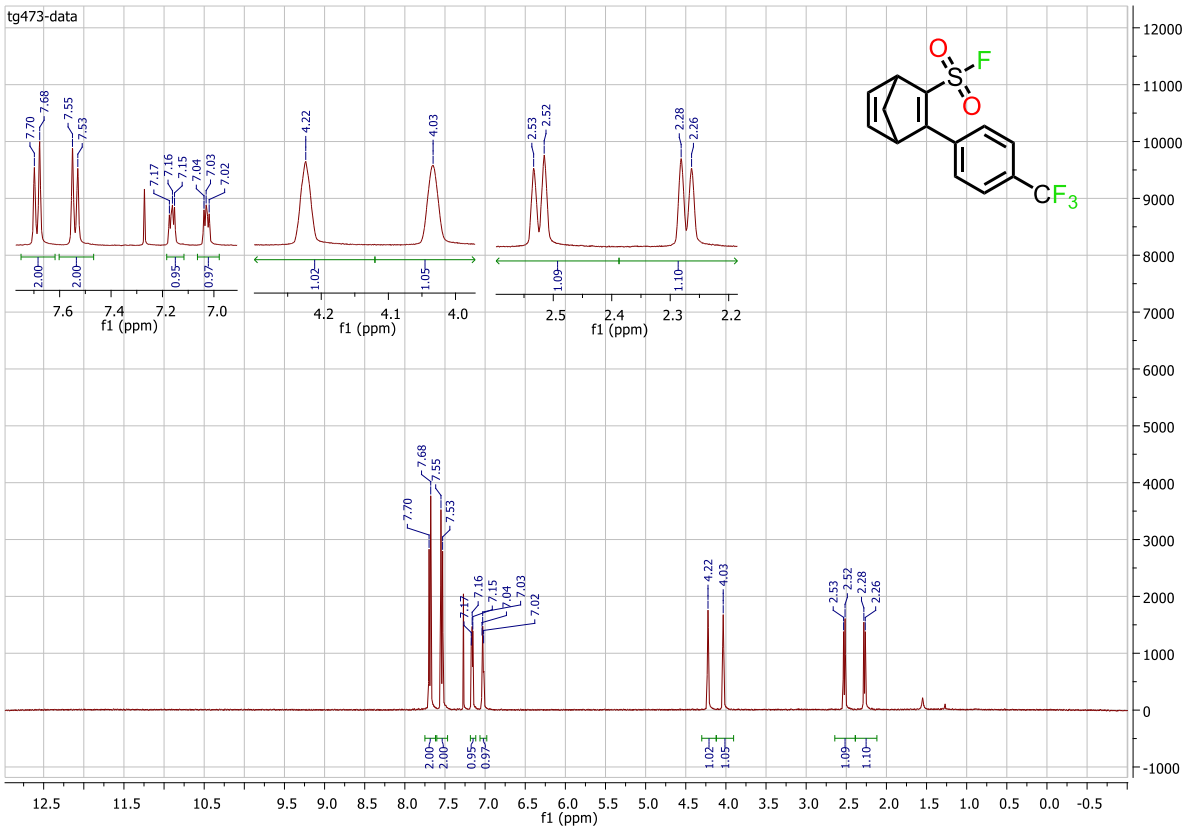

tg400-f1
O
S
F
O
OMe
O
f1 (ppm)

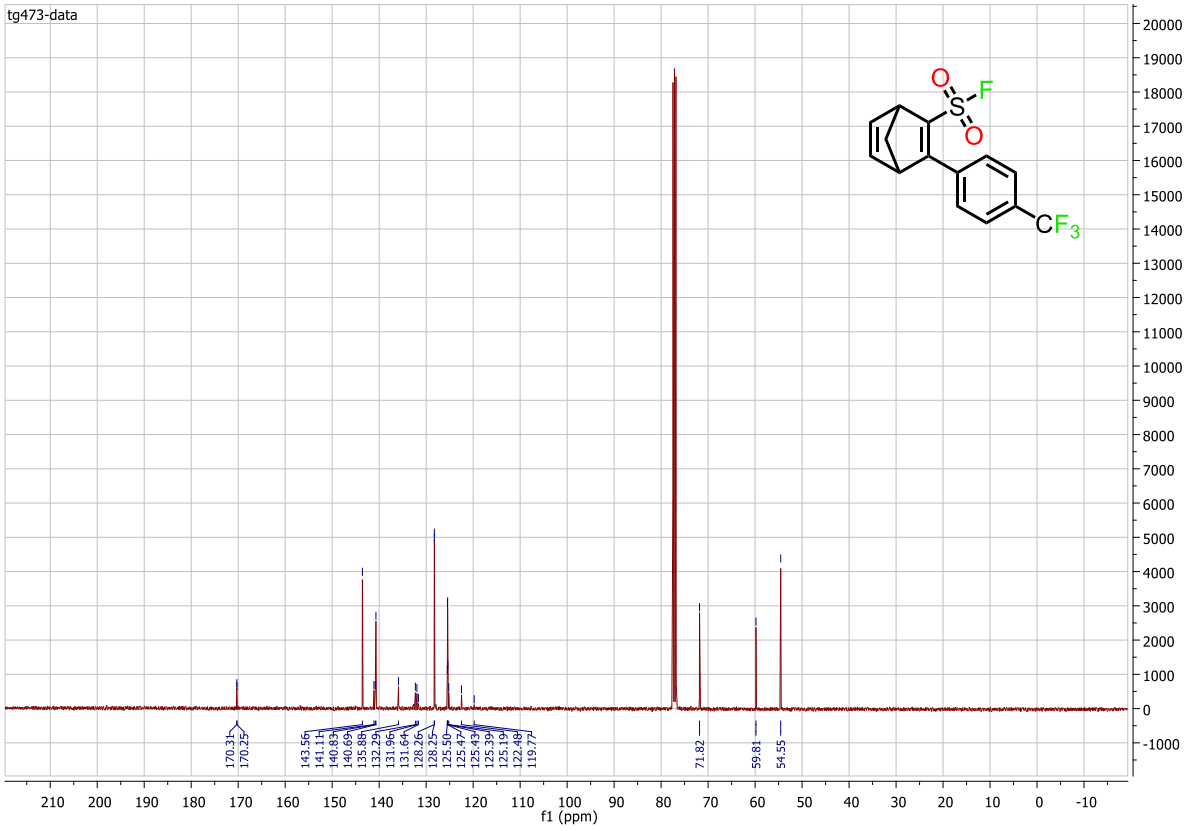

tg400-f1
O
S
F
O
OMe
O
62.23
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
-200
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

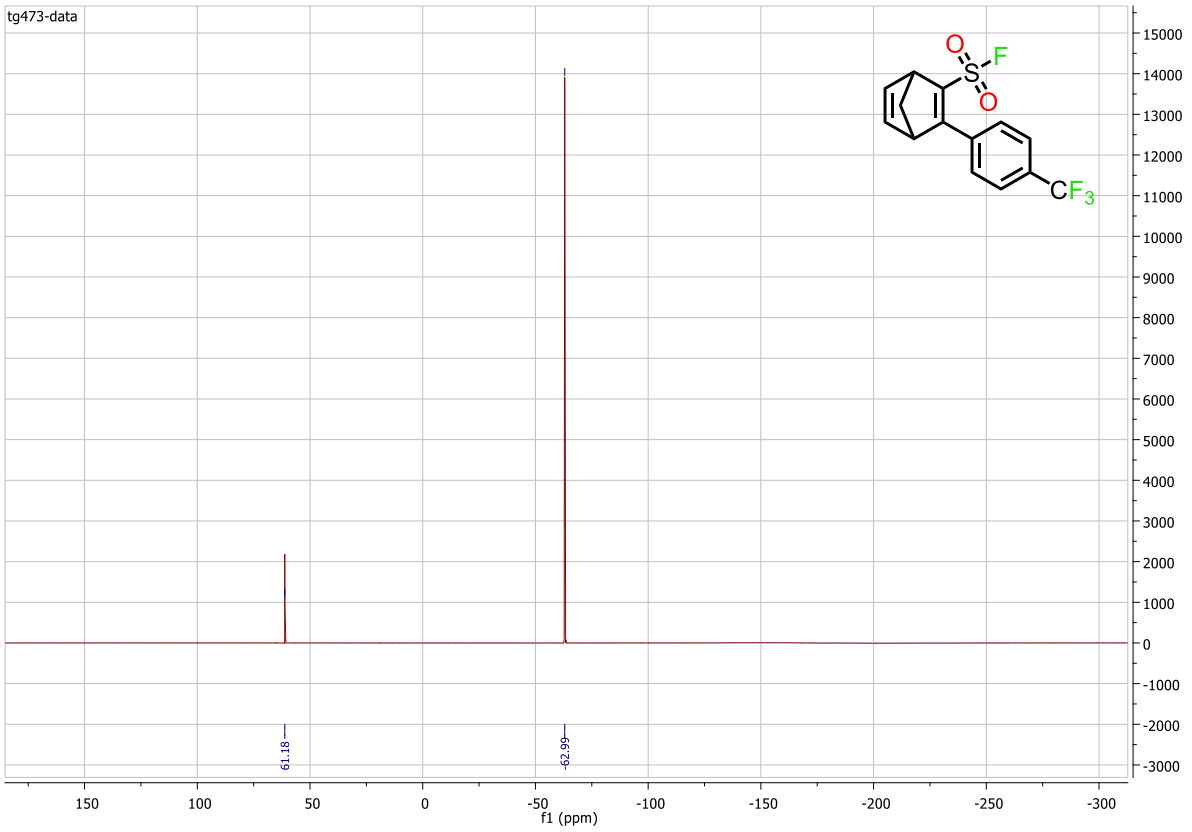

tg406-f1
f1 (ppm)

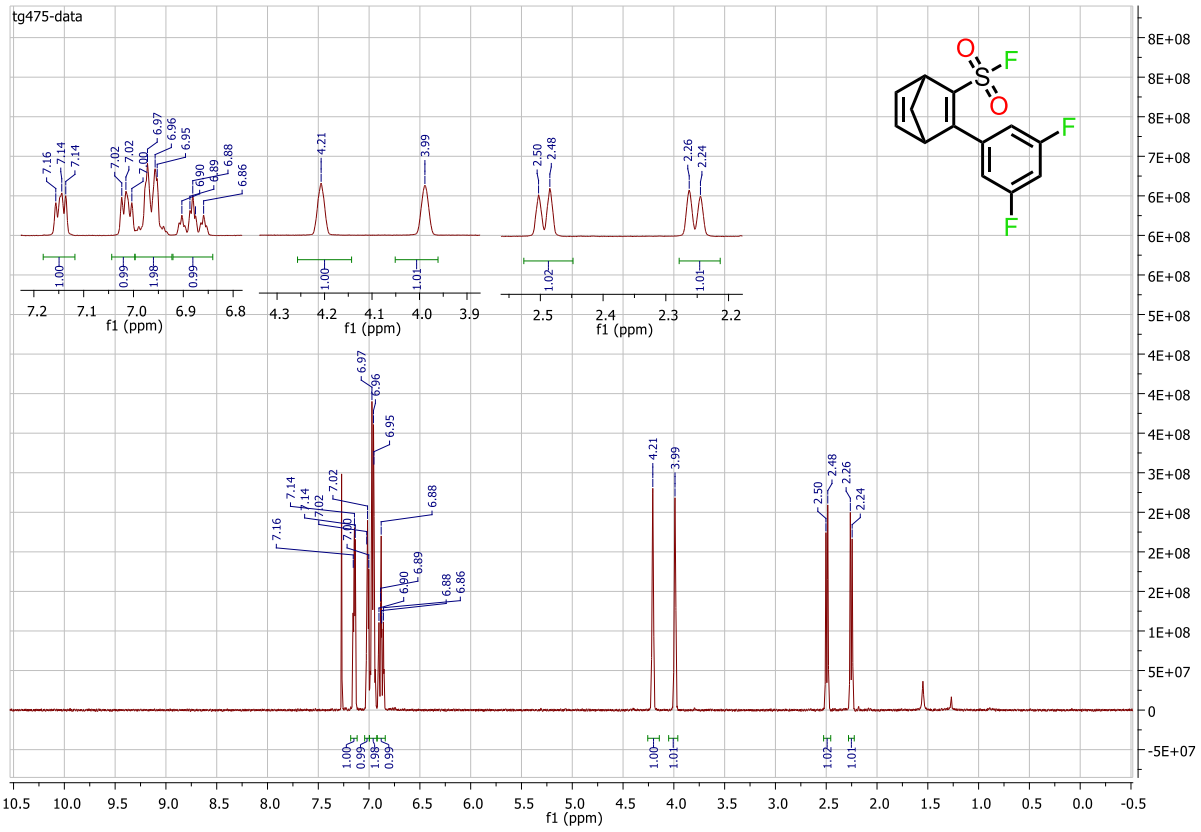

tg406-f1
f1 (ppm)

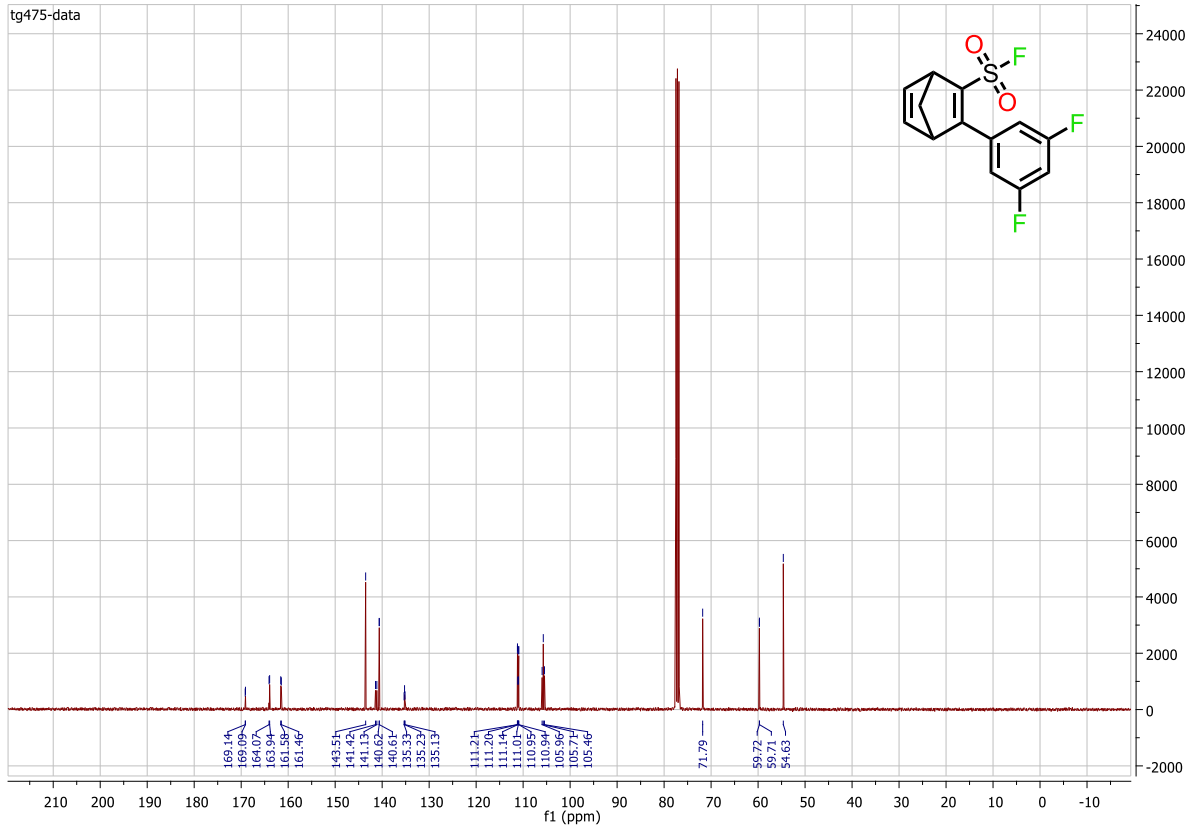

tg406-f1
O
S
F
O
nPr
4500
4000
3500
3000
2500
2000
1500
1000
500
0
61.69
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

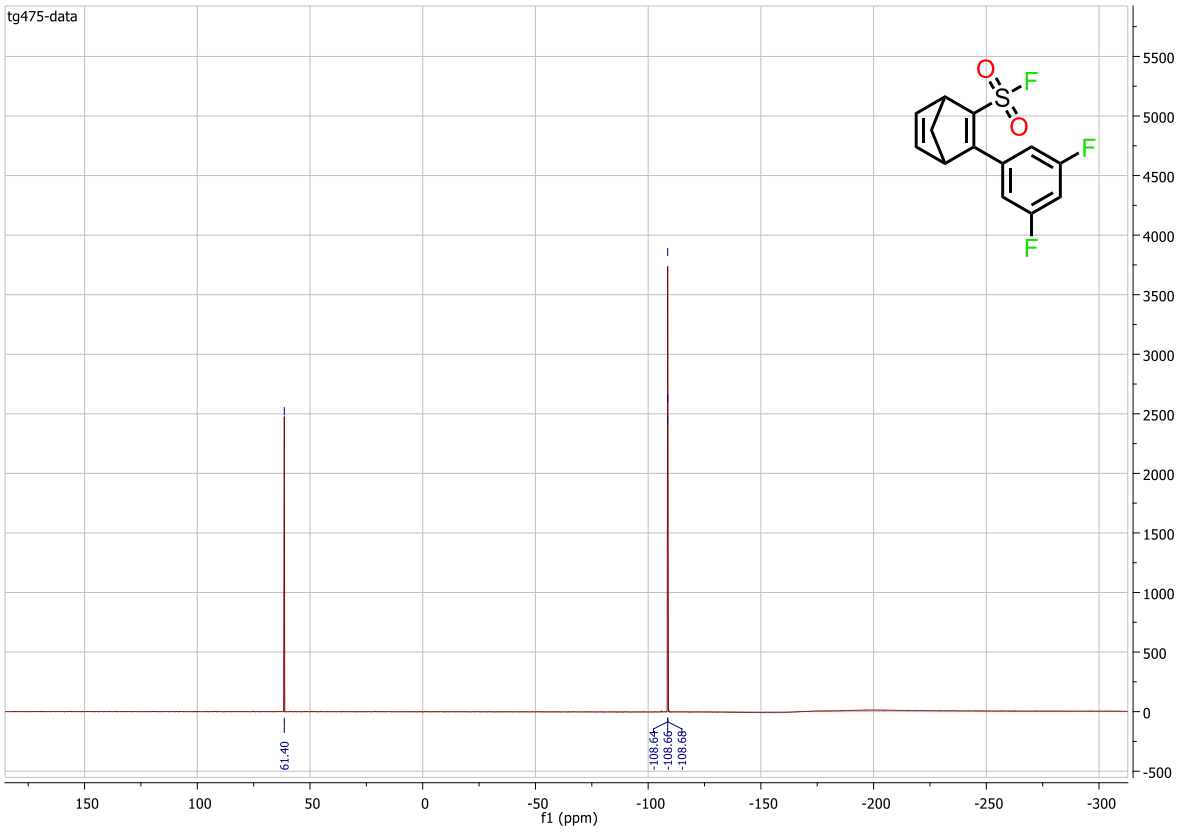

tg473-data
7.70
7.68
7.55
7.53
7.17
7.16
7.15
7.04
7.03
7.02
4.22
4.03
2.53
2.52
2.28
2.26
f1 (ppm)

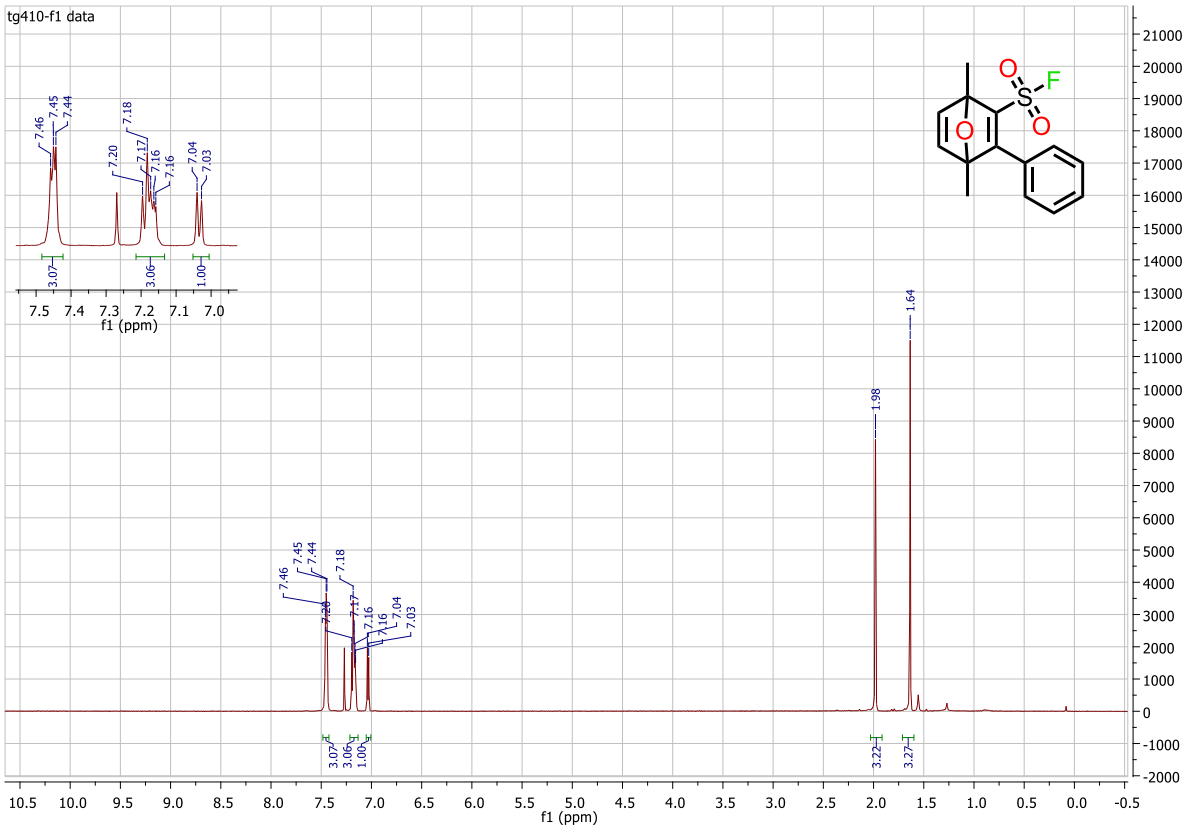

tg473-data
170.31
170.25
143.56
141.11
140.83
140.69
135.86
132.22
131.96
131.64
128.26
125.50
125.47
125.43
125.39
125.19
122.48
119.77
71.82
59.81
54.55
f1 (ppm)

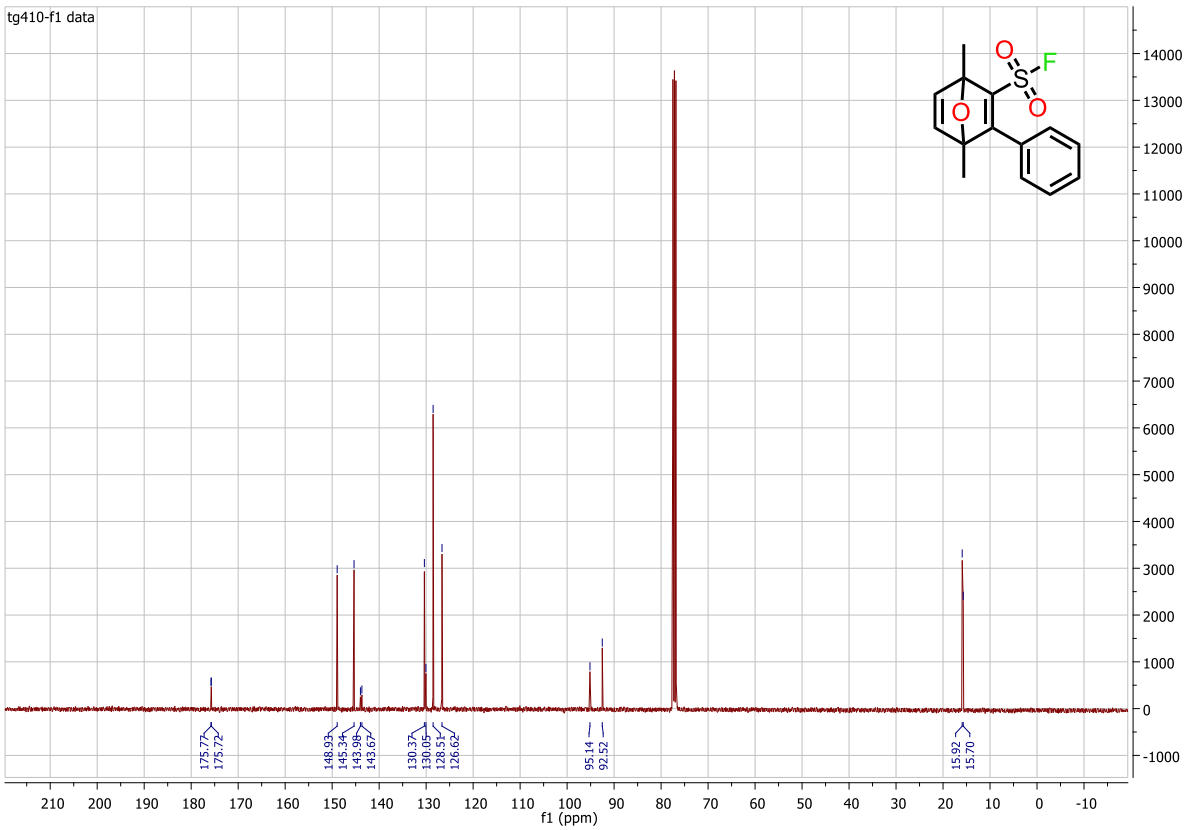

tg473-data
O
S
F
O
CF3
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
61.18
-62.99
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

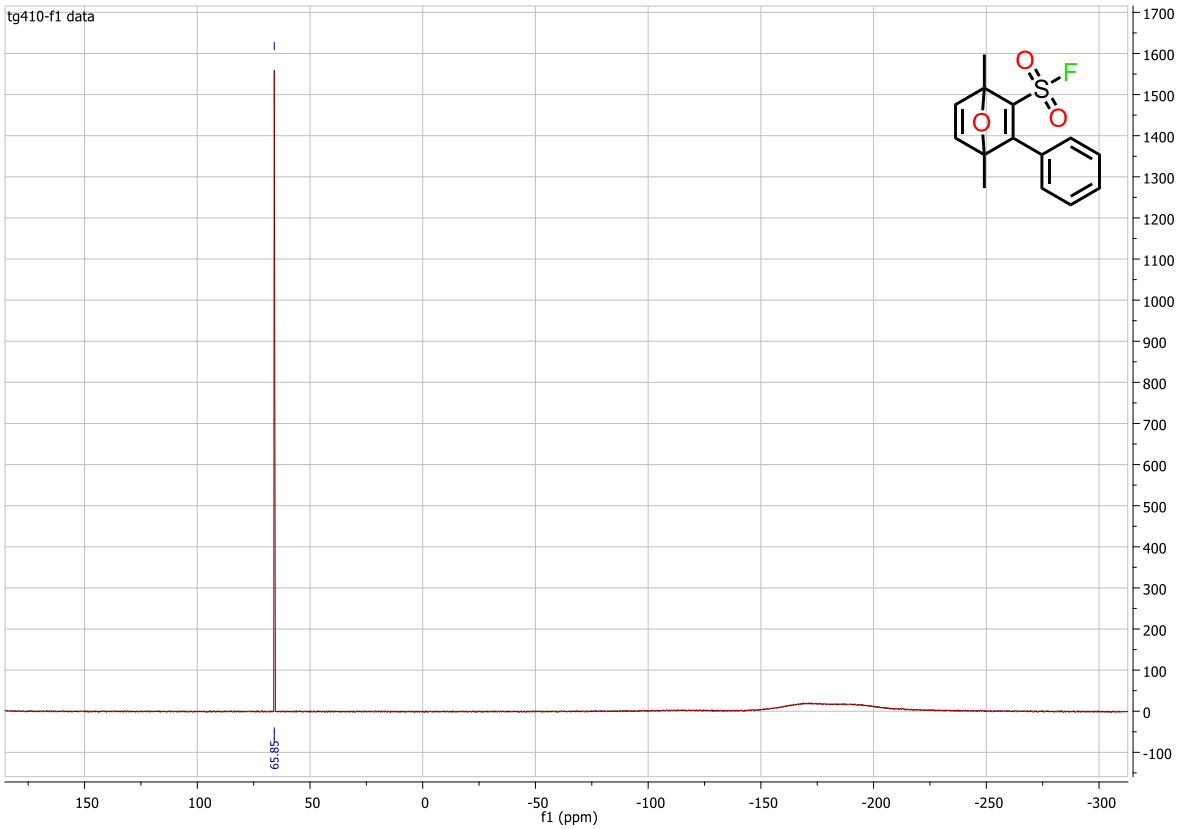

tg475-data
f1 (ppm)

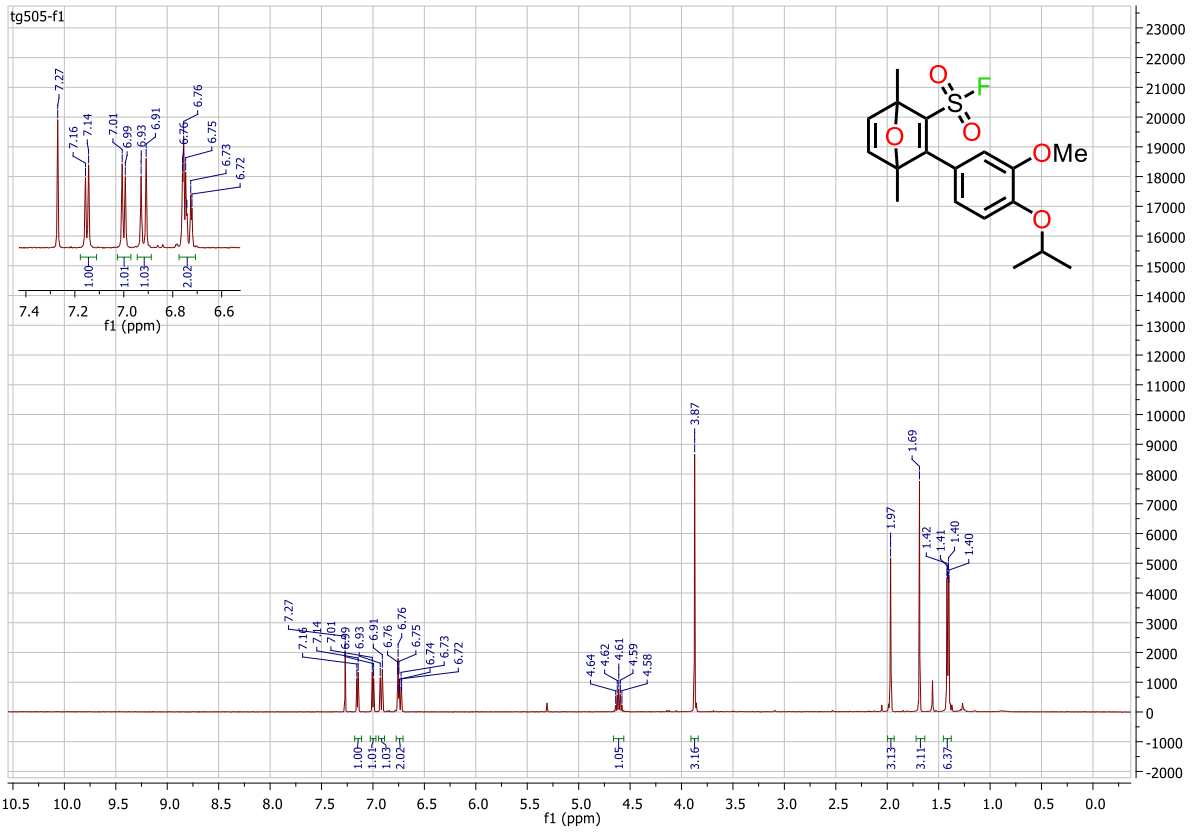

tg475-data
f1 (ppm)

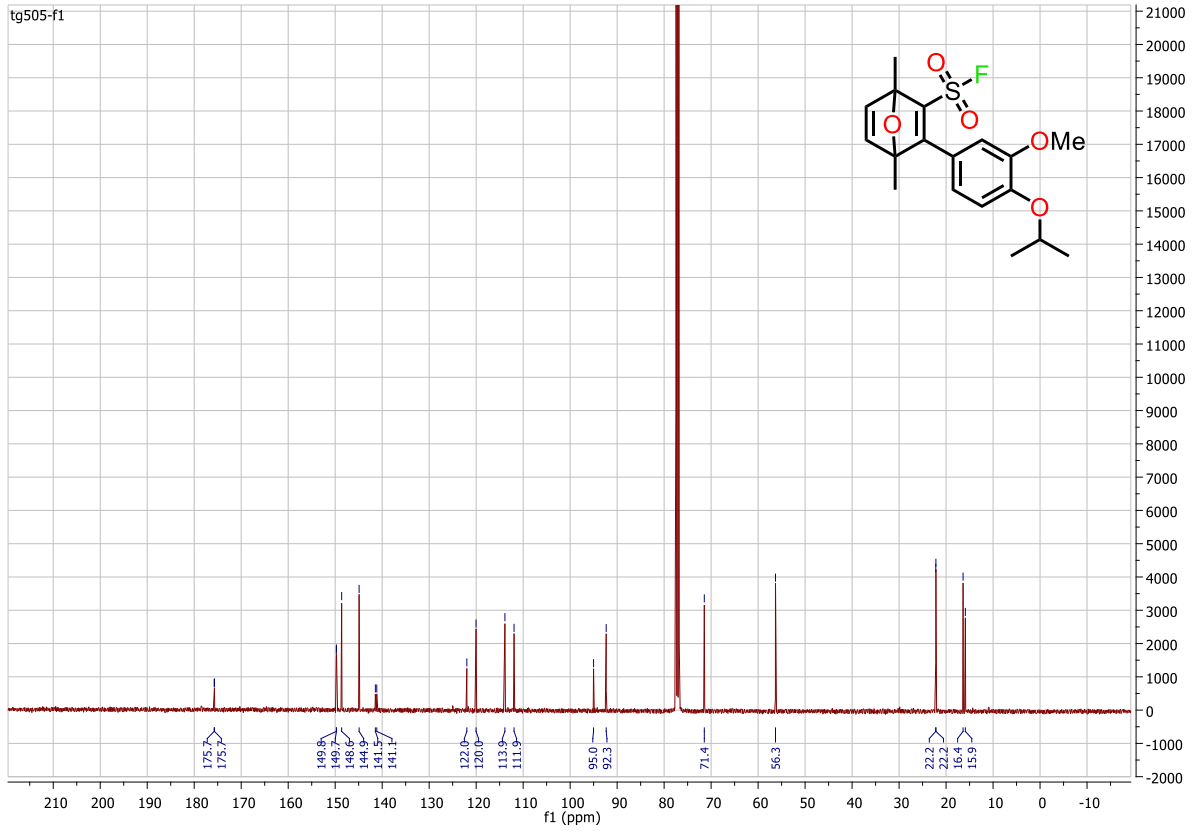

tg475-data
O
S
F
O
F
F
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
61.40
-108.64
-108.66
-108.69
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

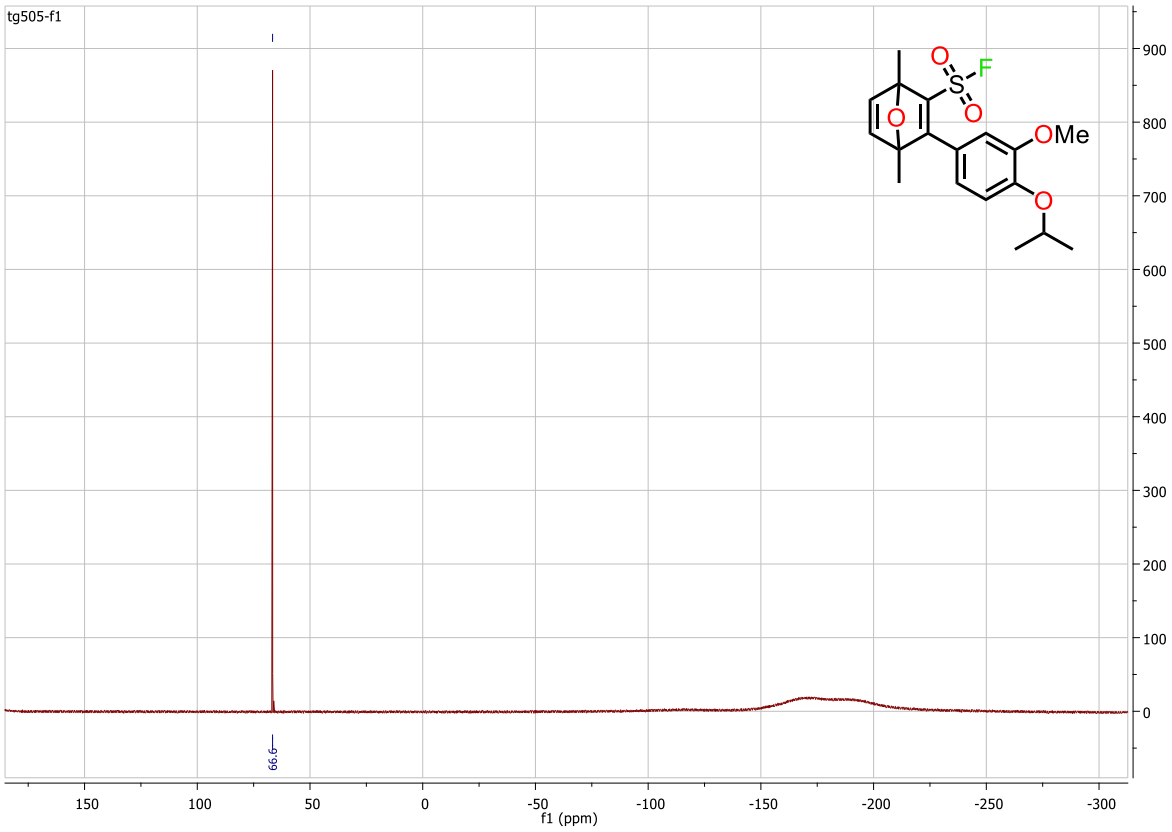

tg410-f1 data
7.46
7.45
7.44
7.20
7.18
7.17
7.16
7.04
7.03
3.07
3.06
1.00
7.5 7.4 7.3 7.2 7.1 7.0
f1 (ppm)
1.98
1.64
3.22
3.27
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)

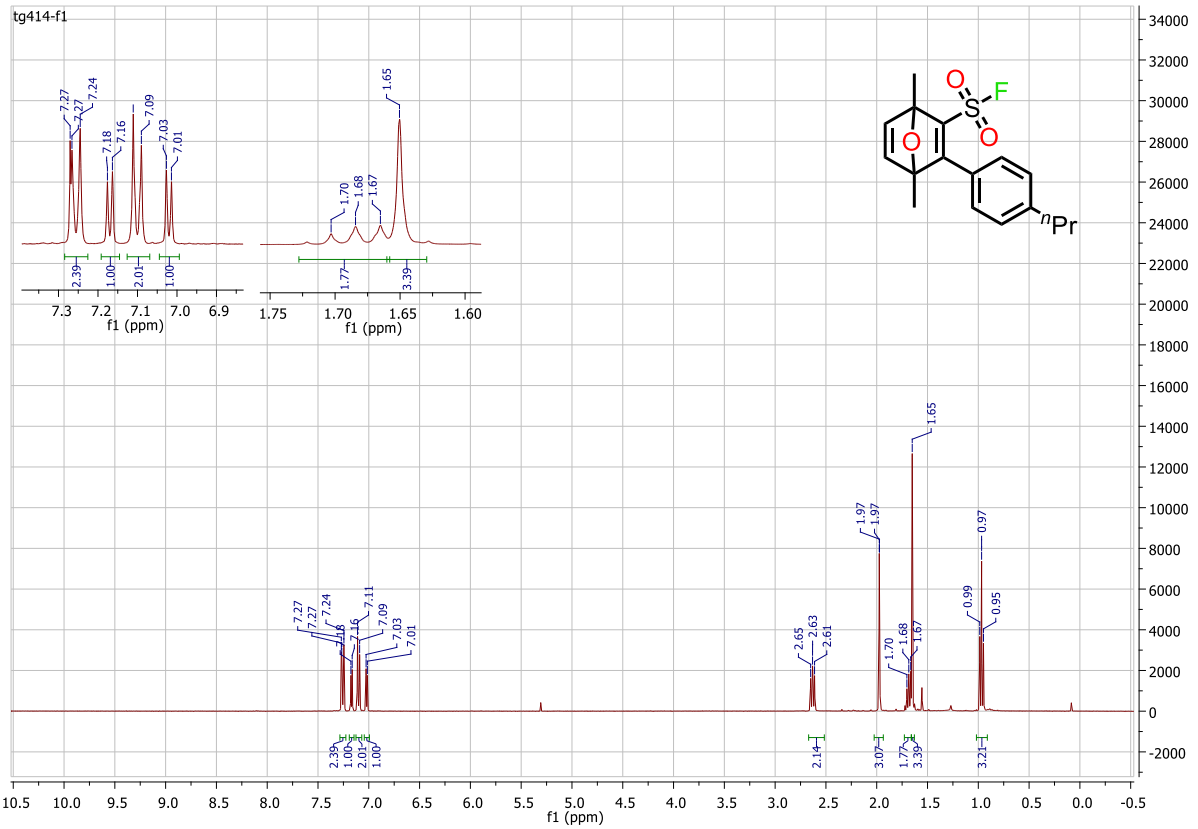

tg410-f1 data
175.77
175.72
148.93
145.34
143.98
143.67
130.37
130.05
128.51
126.62
95.14
92.52
15.92
15.70
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

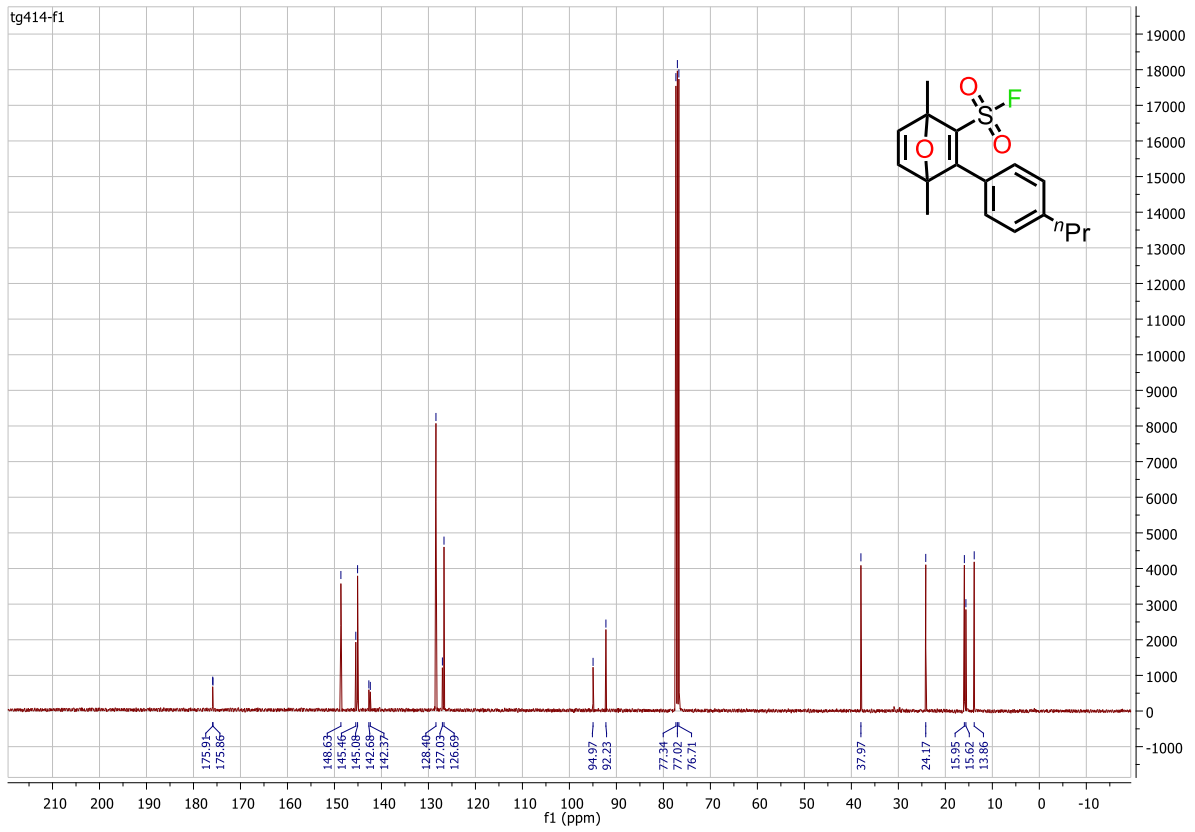

tg410-f1 data
65.85
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
O
F
S
O
O

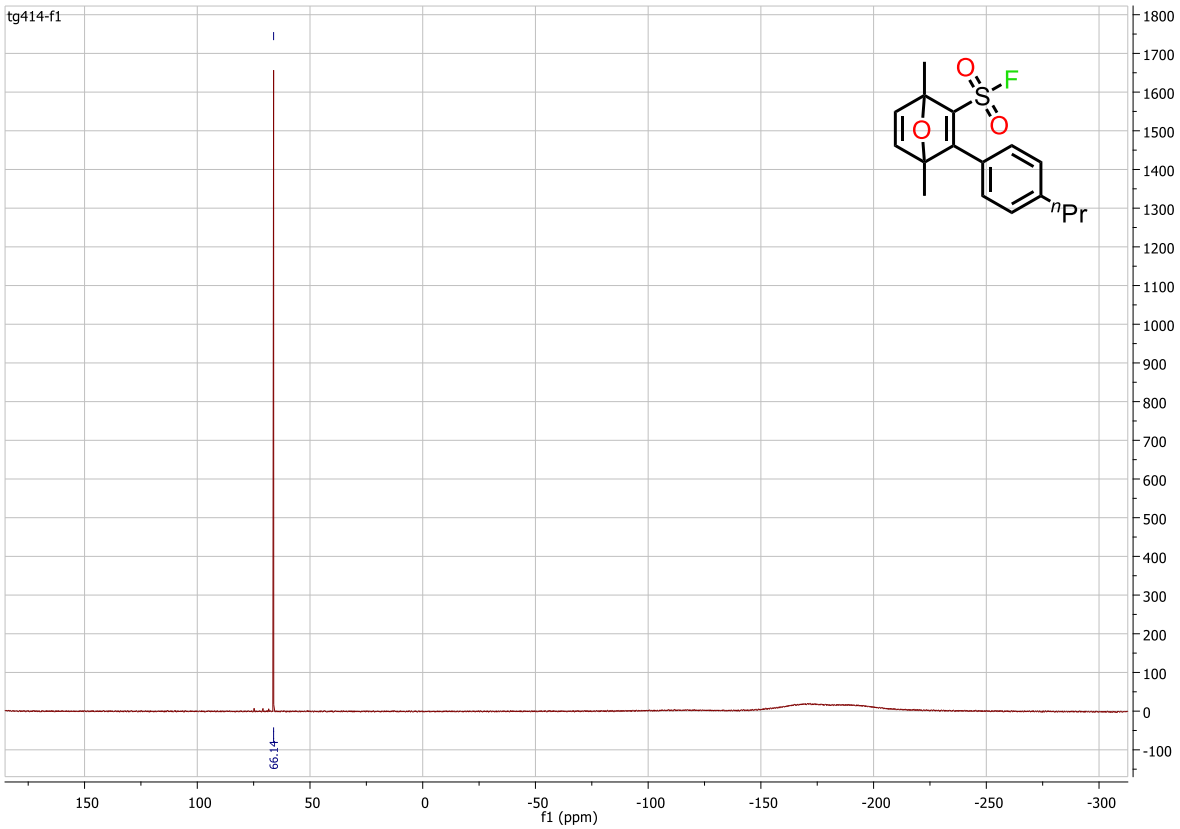

tg505-f1
f1 (ppm)
OMe

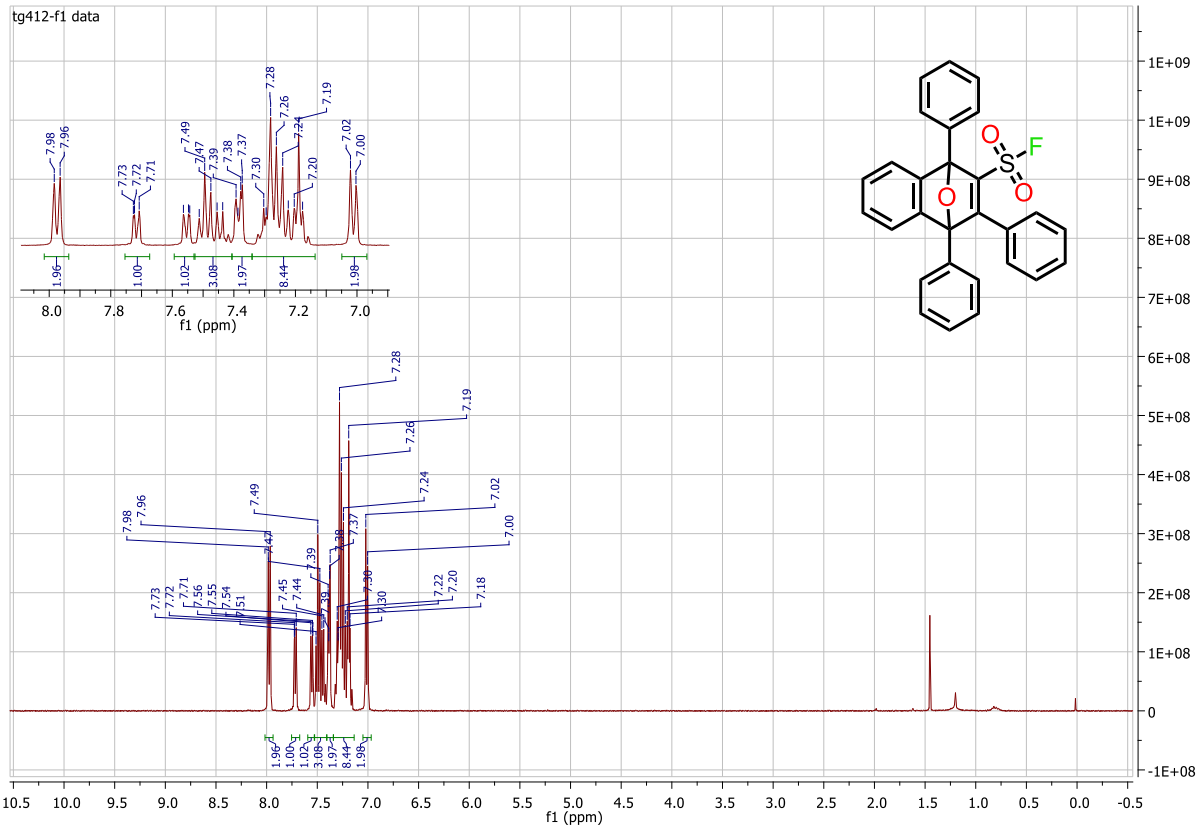

tg505-f1
f1 (ppm)
OMe

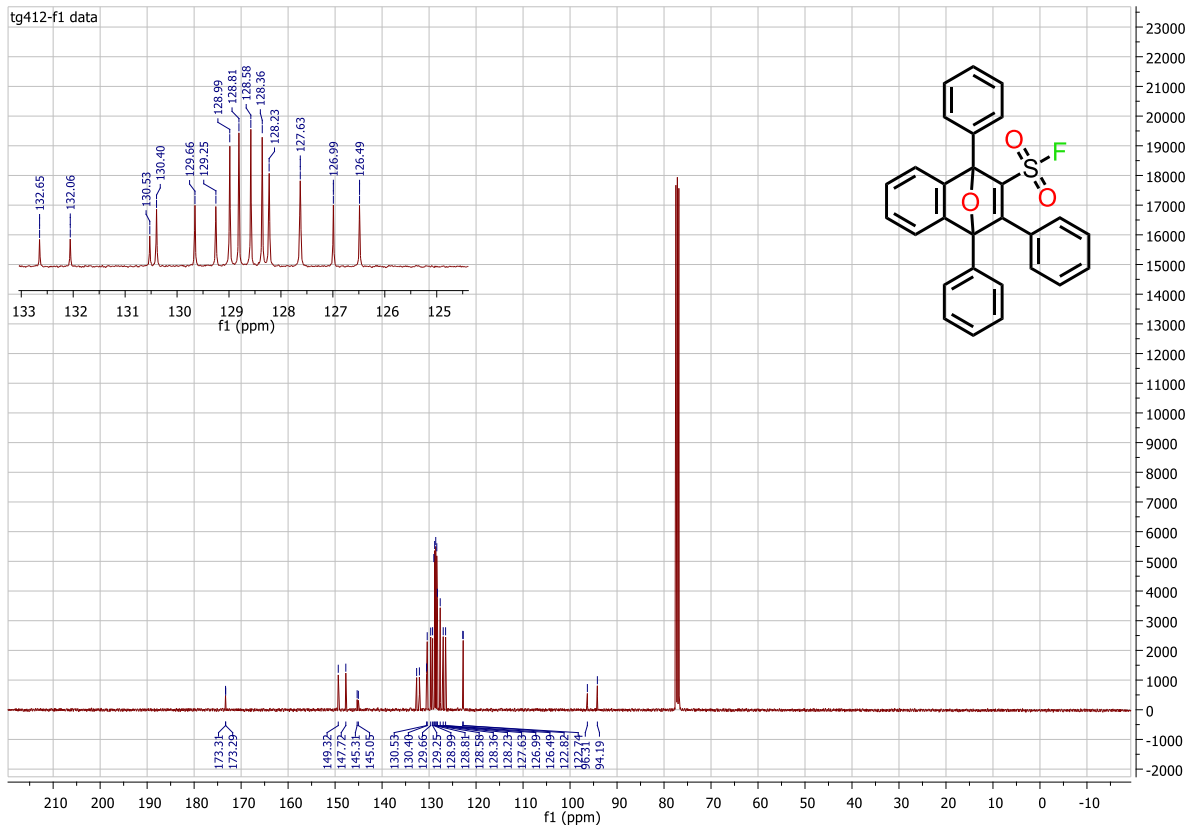

tg505-f1
O
S
F
O
O
OMe
O
900
800
700
600
500
400
300
200
100
0
66.6
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)

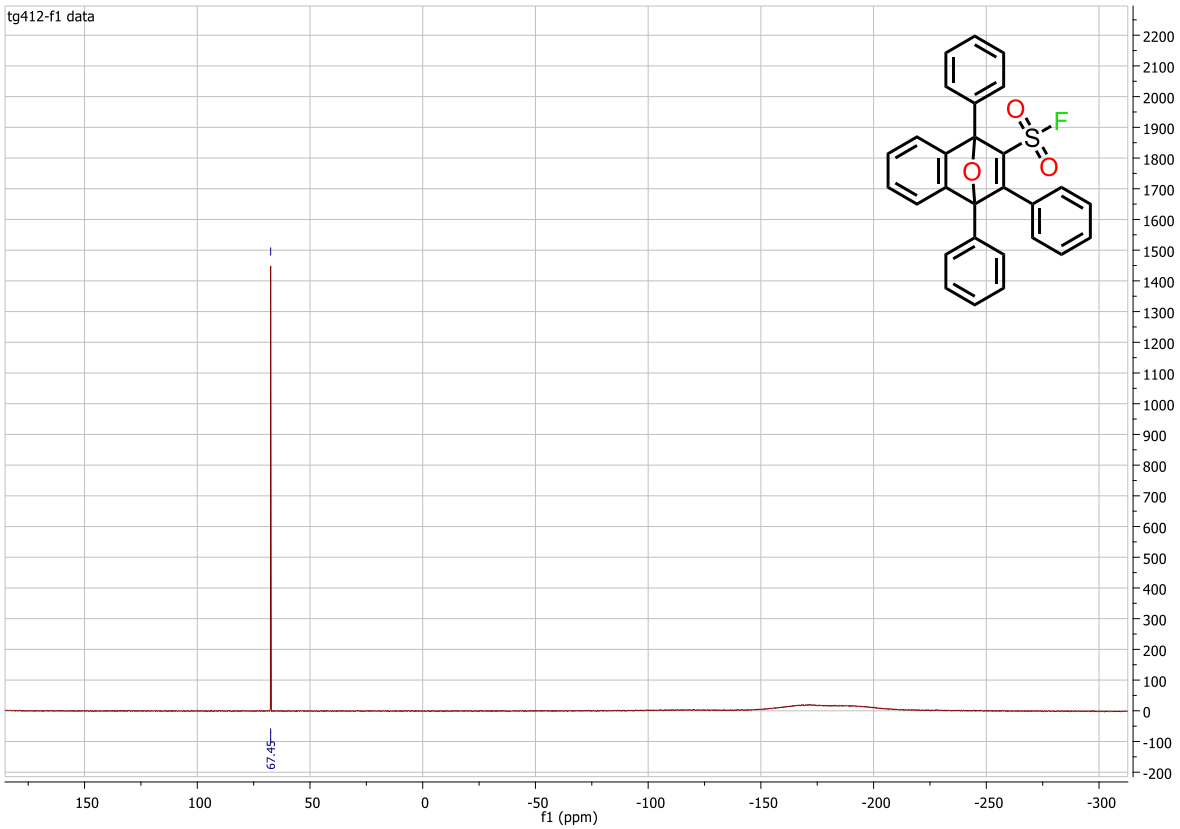

tg414-f1
f1 (ppm)

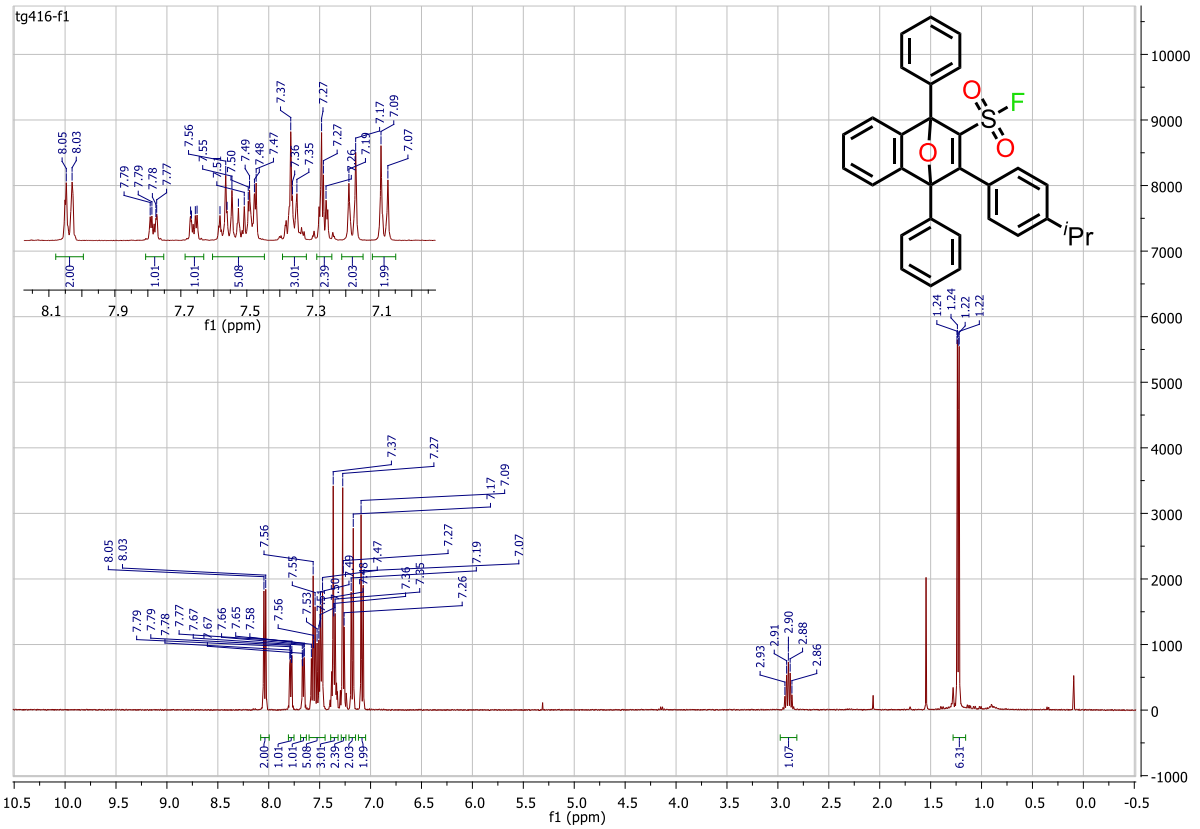

tg414-f1
f1 (ppm)

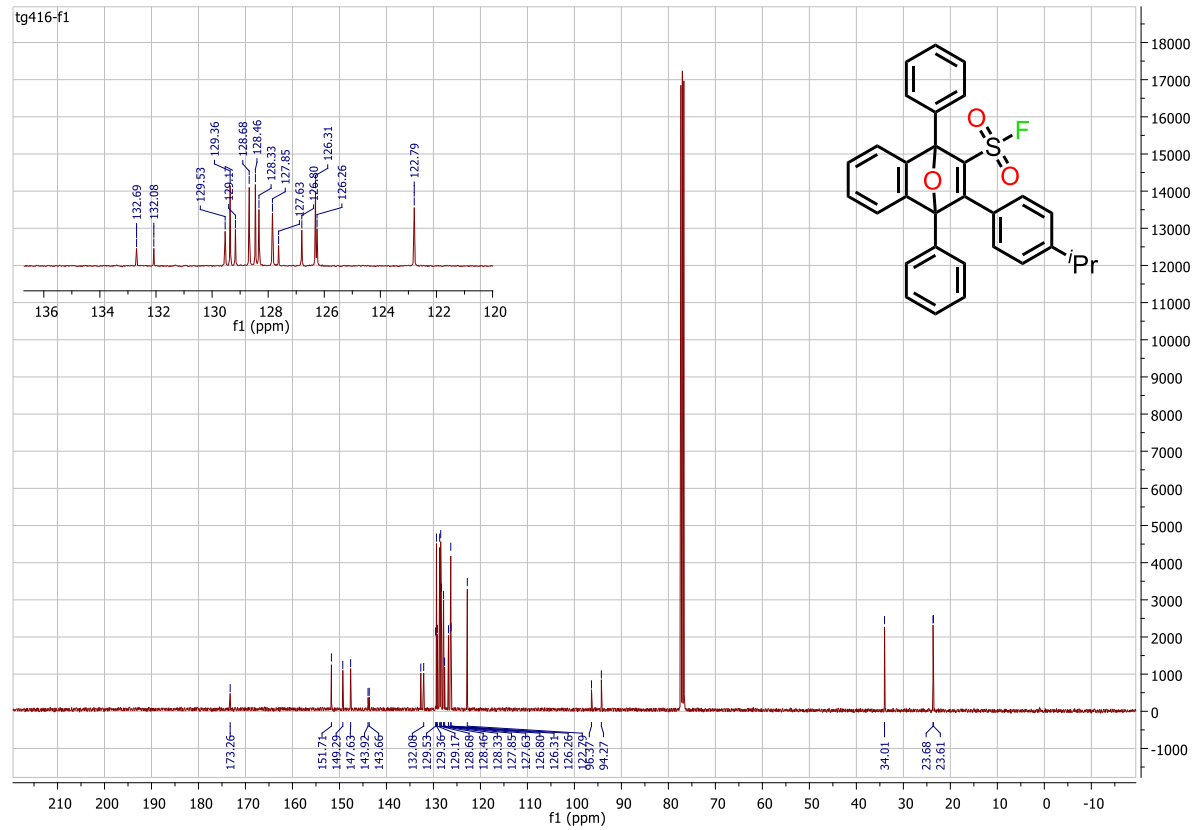

tg414-f1
66.14
f1 (ppm)
O
S
F
O
O
nPr

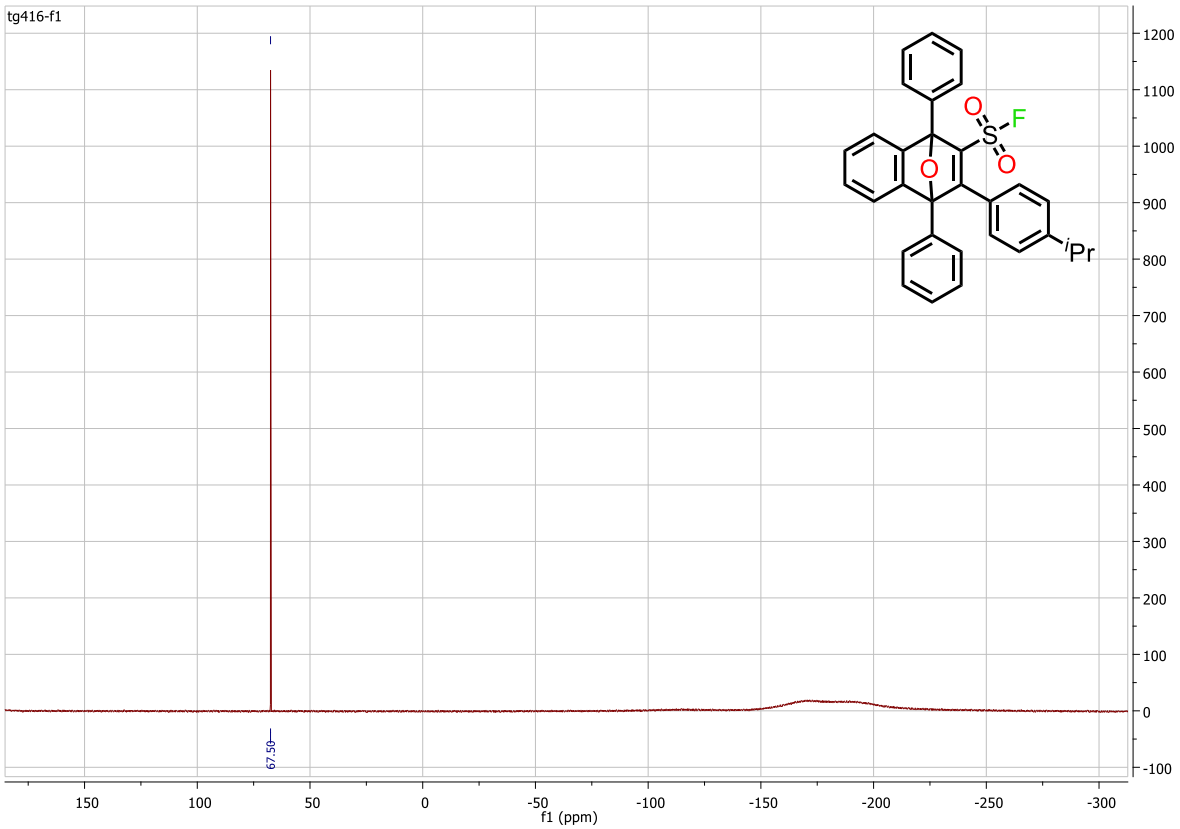

tg412-f1 data
f1 (ppm)

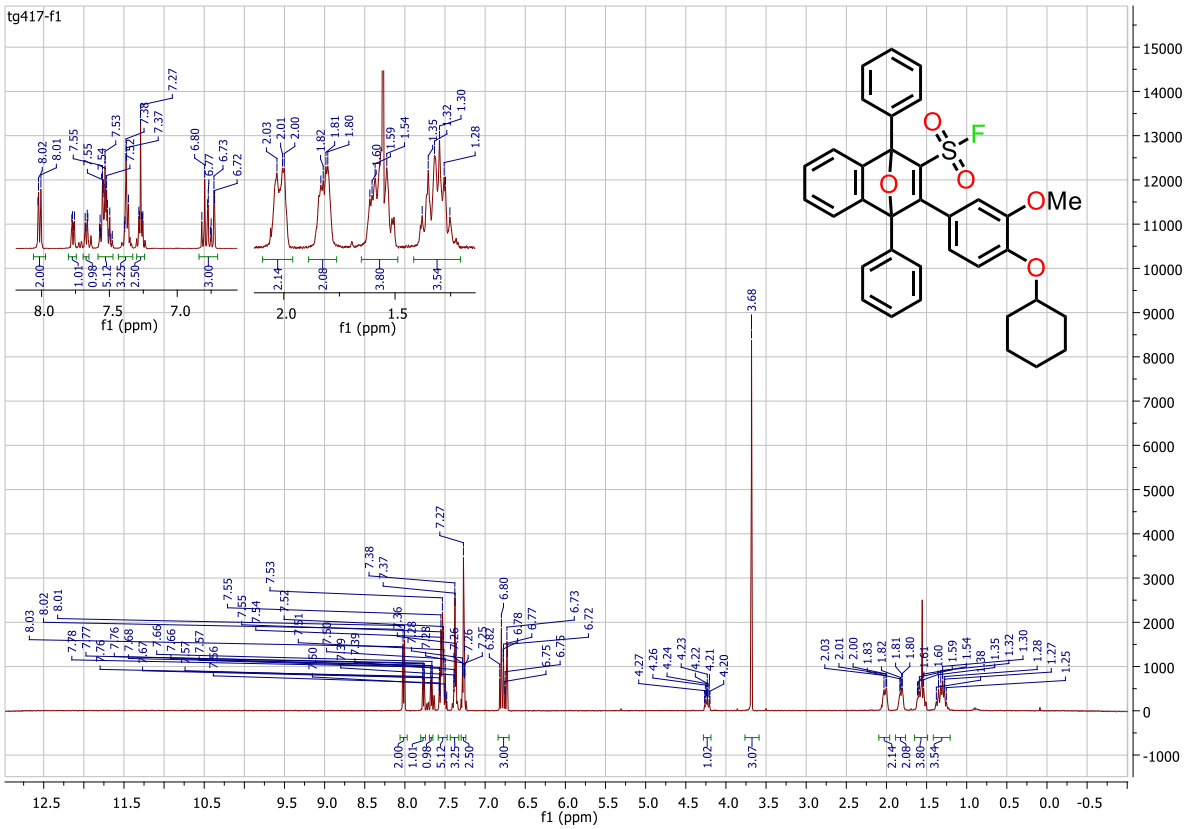

tg412-f1 data
f1 (ppm)

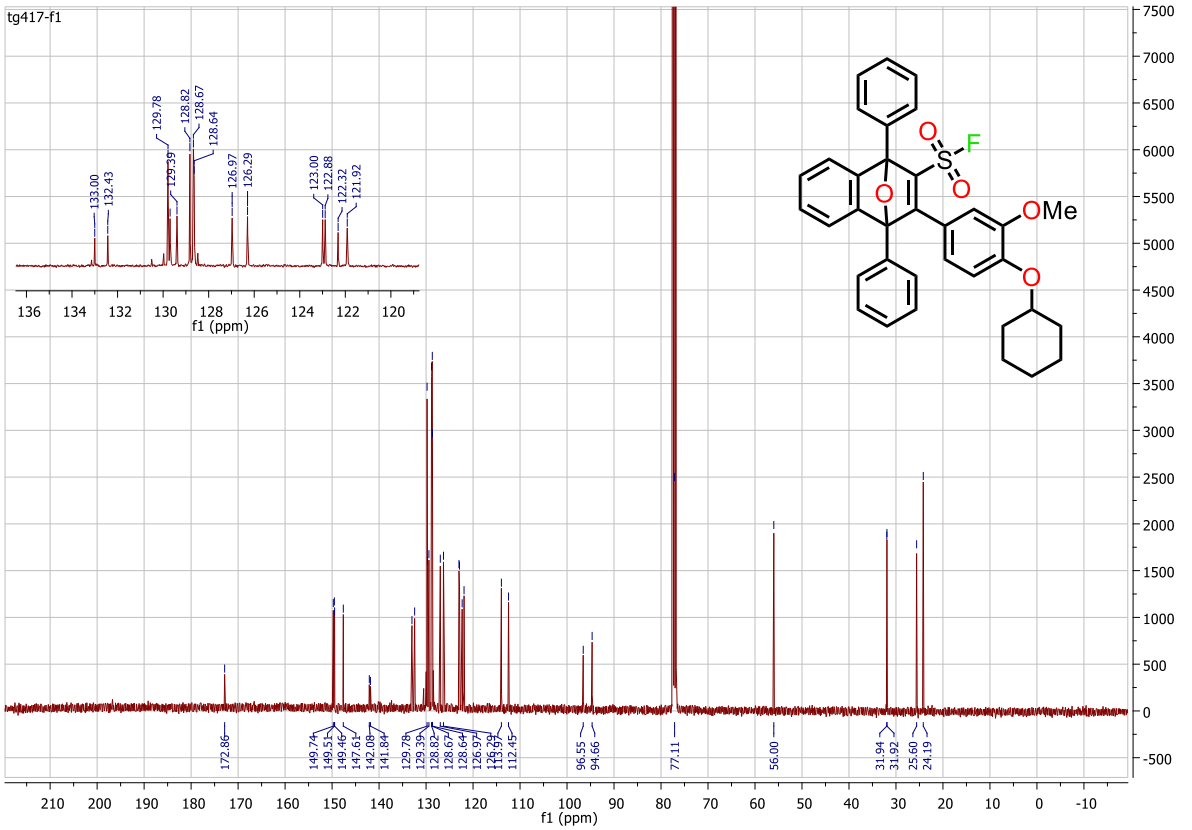

tg412-f1 data
67.45
f1 (ppm)
O
S
F
O
O

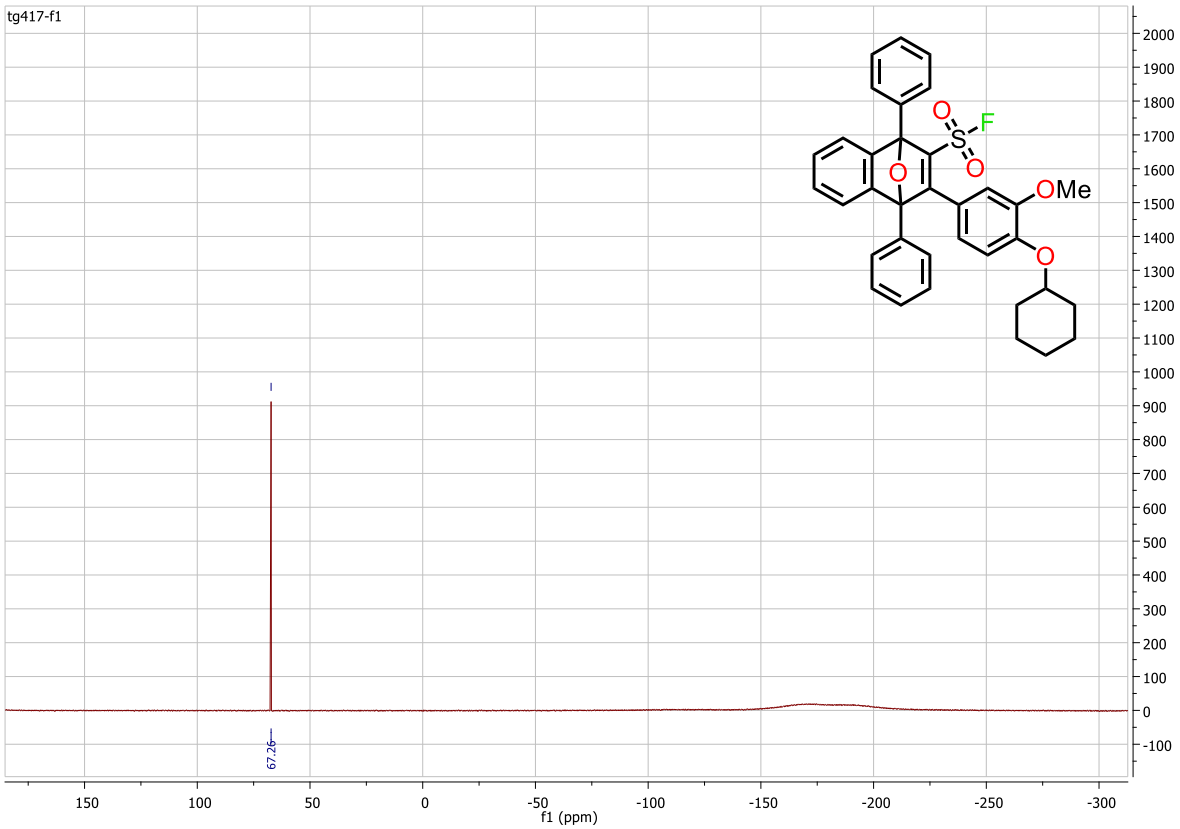

tg416-f1
f1 (ppm)

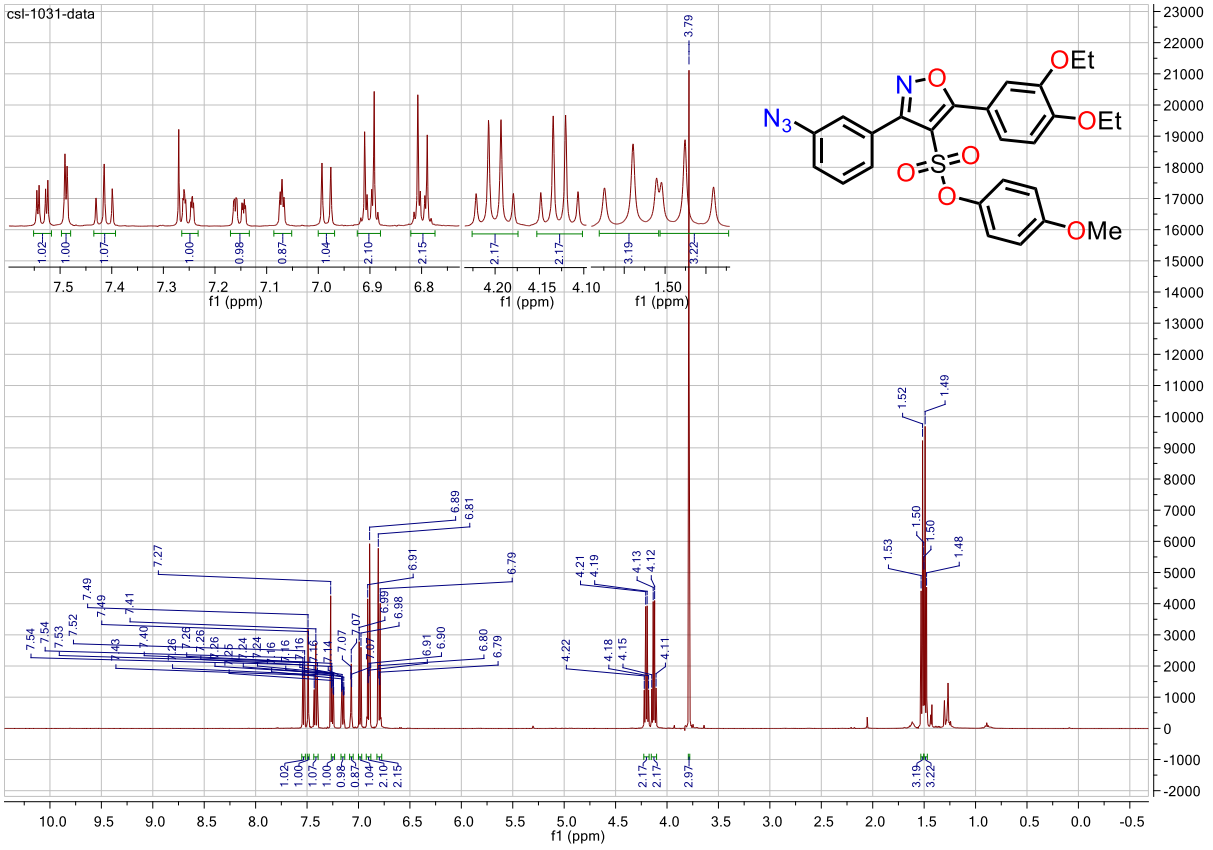

tg416-f1
f1 (ppm)

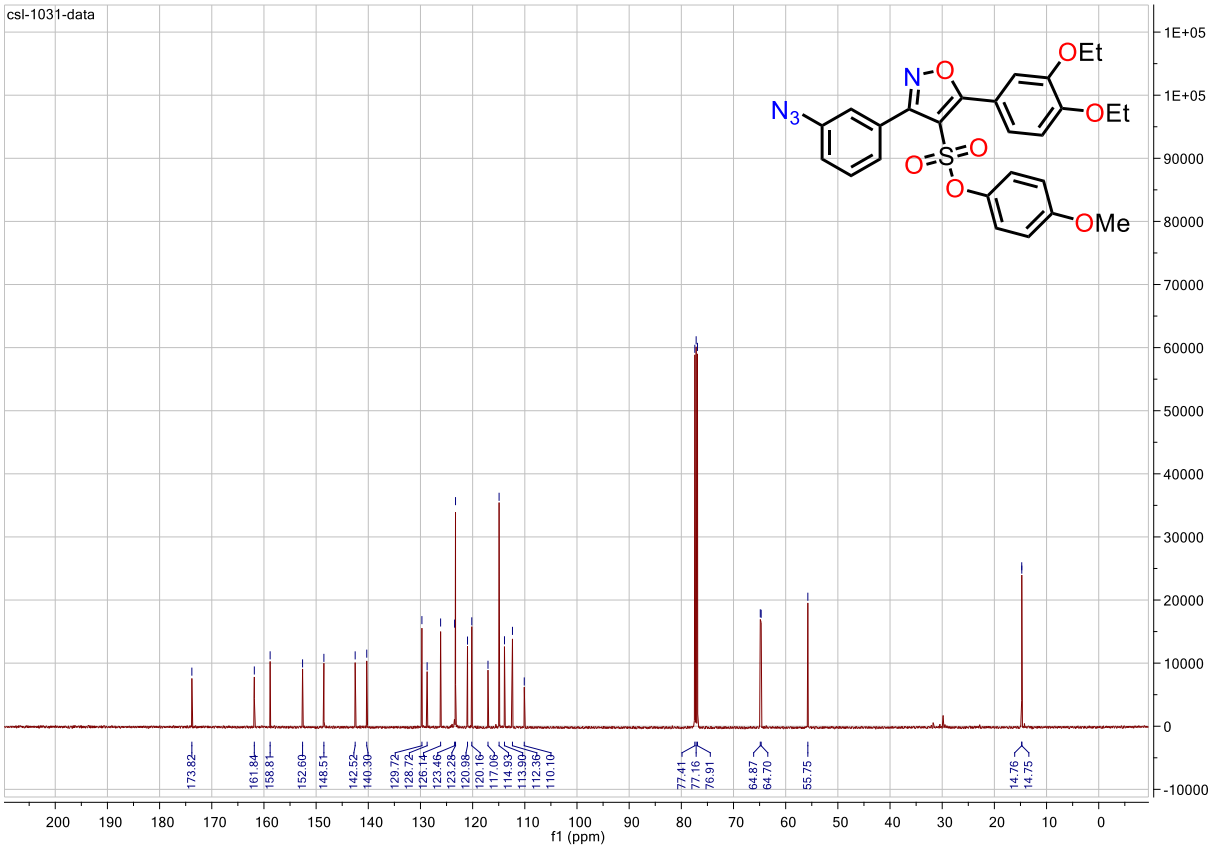

tg416-f1
67.59
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
O
S
F
O
O
iPr

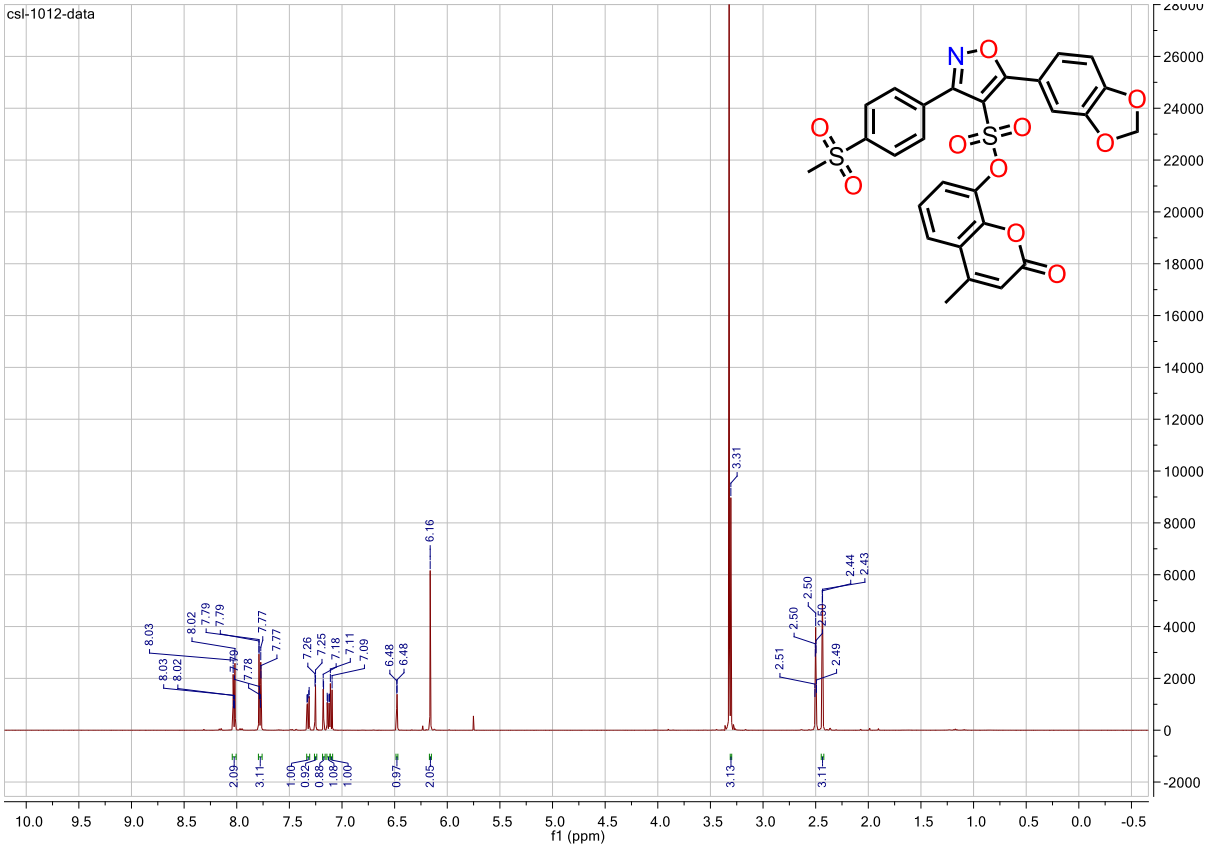

tg417-f1
f1 (ppm)

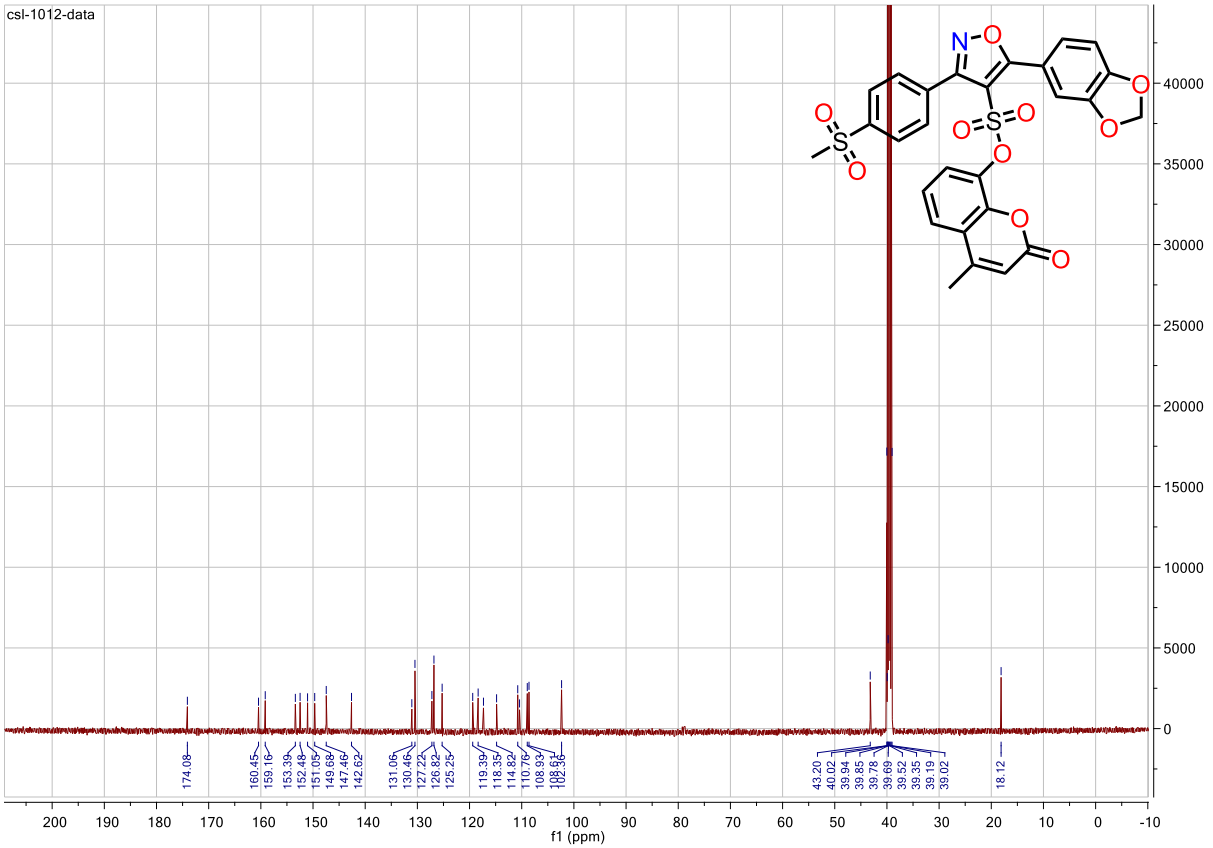

tg417-f1
f1 (ppm)

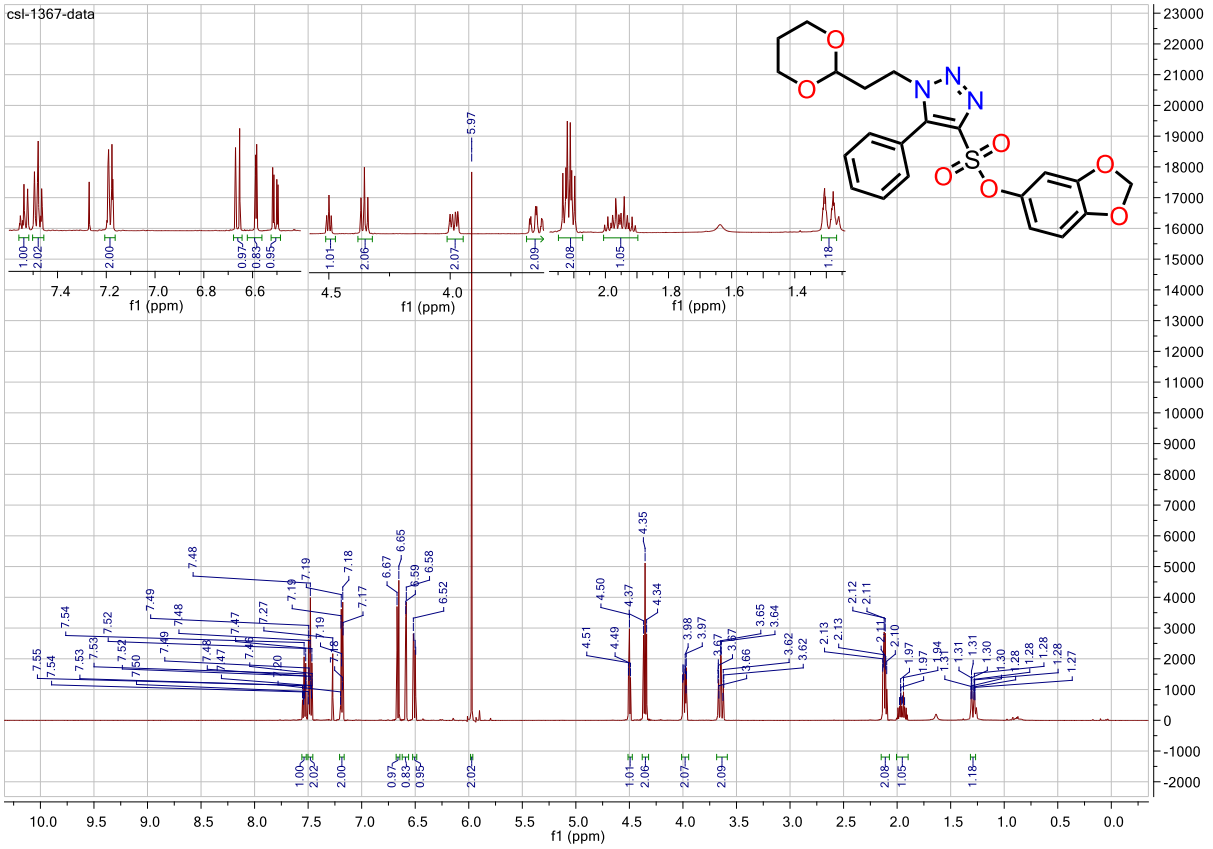

tg417-f1
O
S
F
O
O
OMe
O
67.26
150
100
50
0
-50
-100
-150
-200
-250
-300
f1 (ppm)
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100

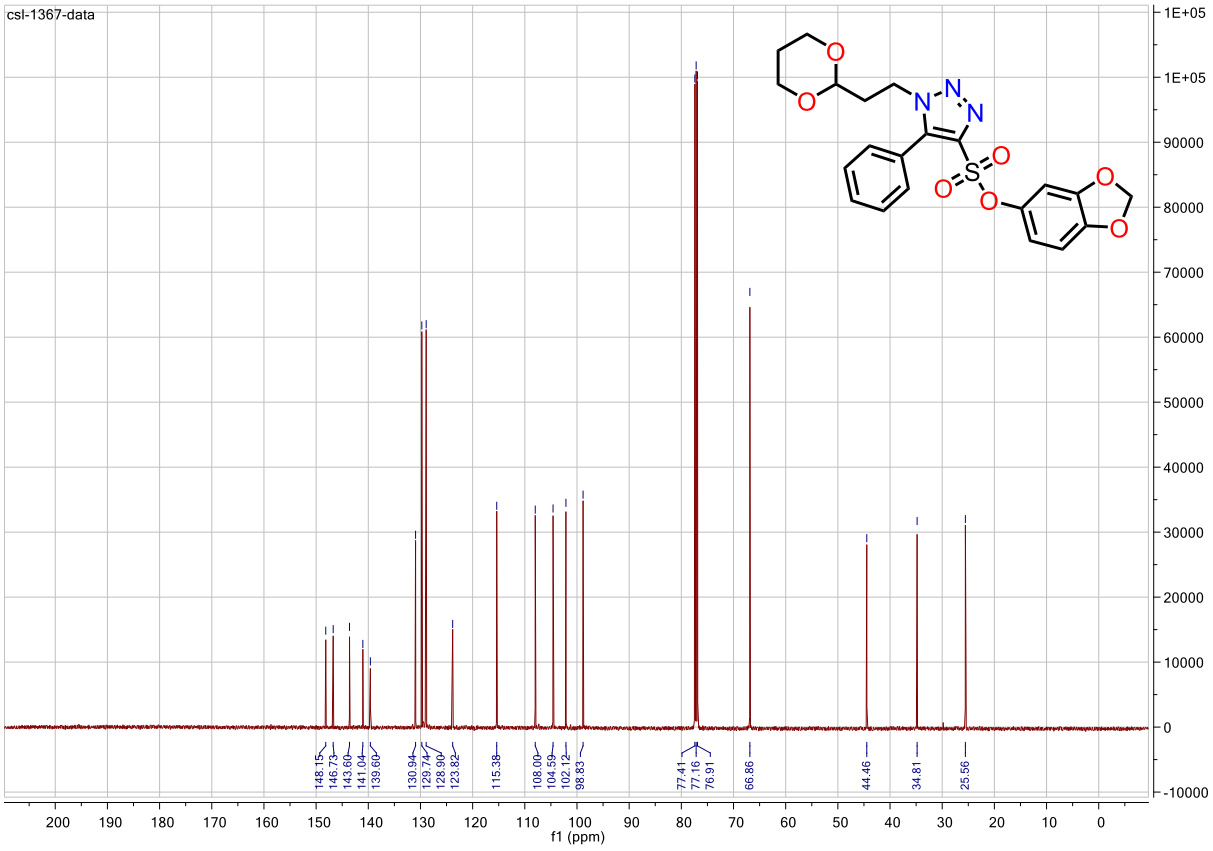

csl-1031-data
OEt
OEt
OMe
N3
f1 (ppm)

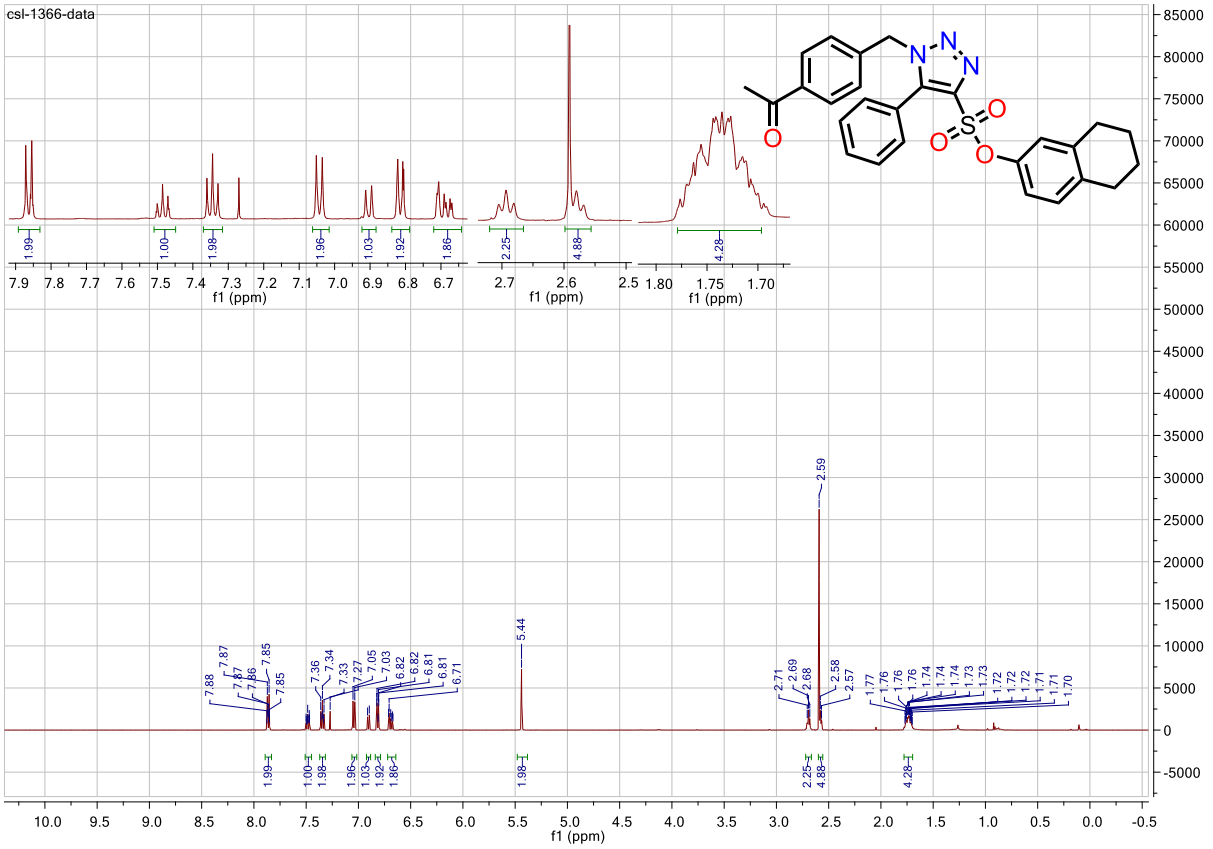

csl-1031-data
OEt
OEt
OMe
N3
f1 (ppm)

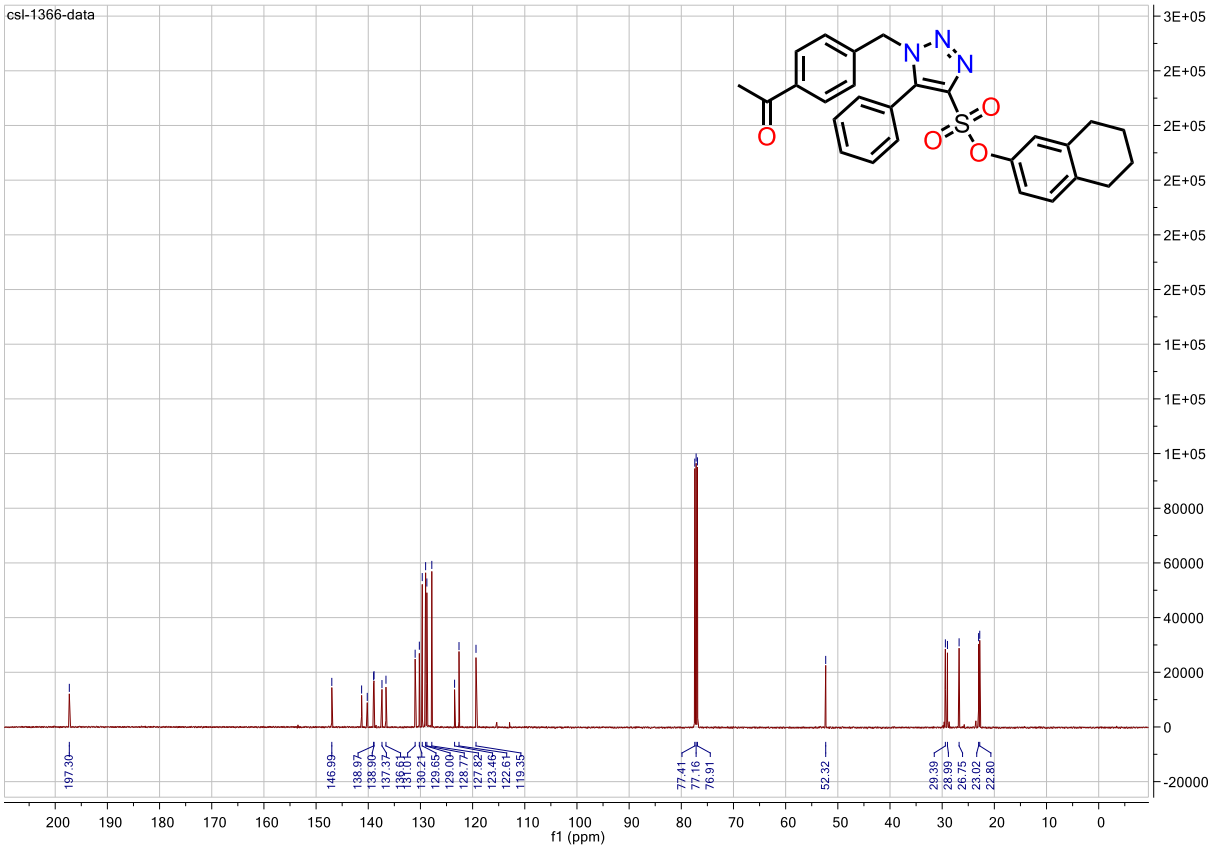

csl-1012-data
f1 (ppm)

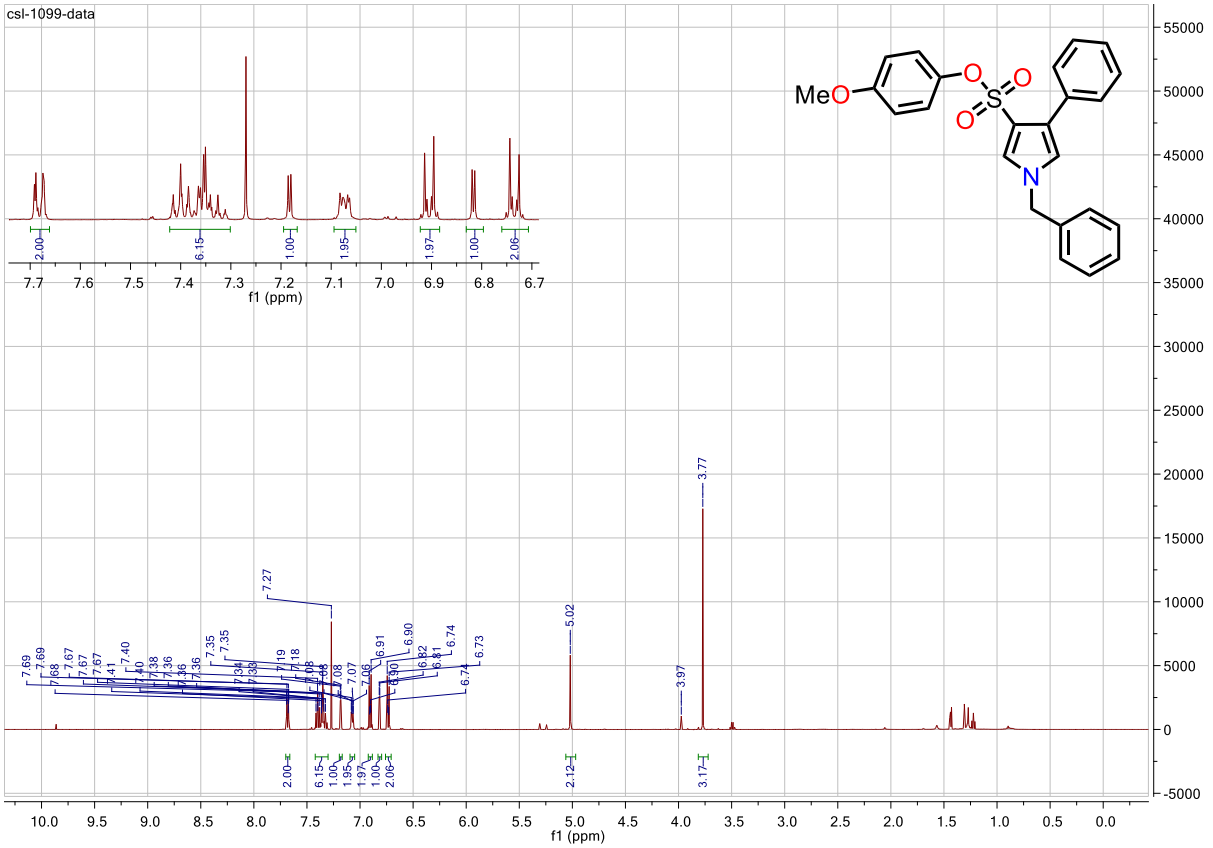

csl-1012-data
f1 (ppm)

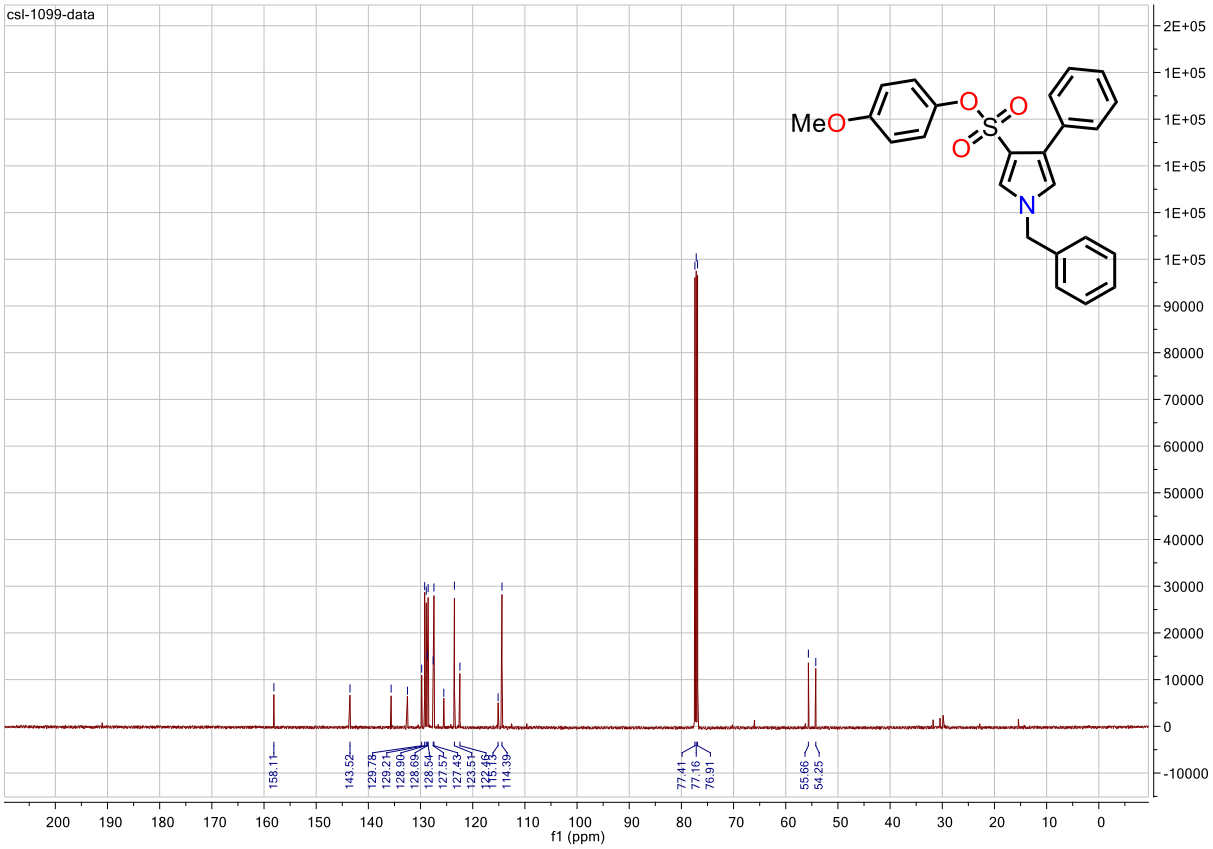

csl-1367-data
f1 (ppm)

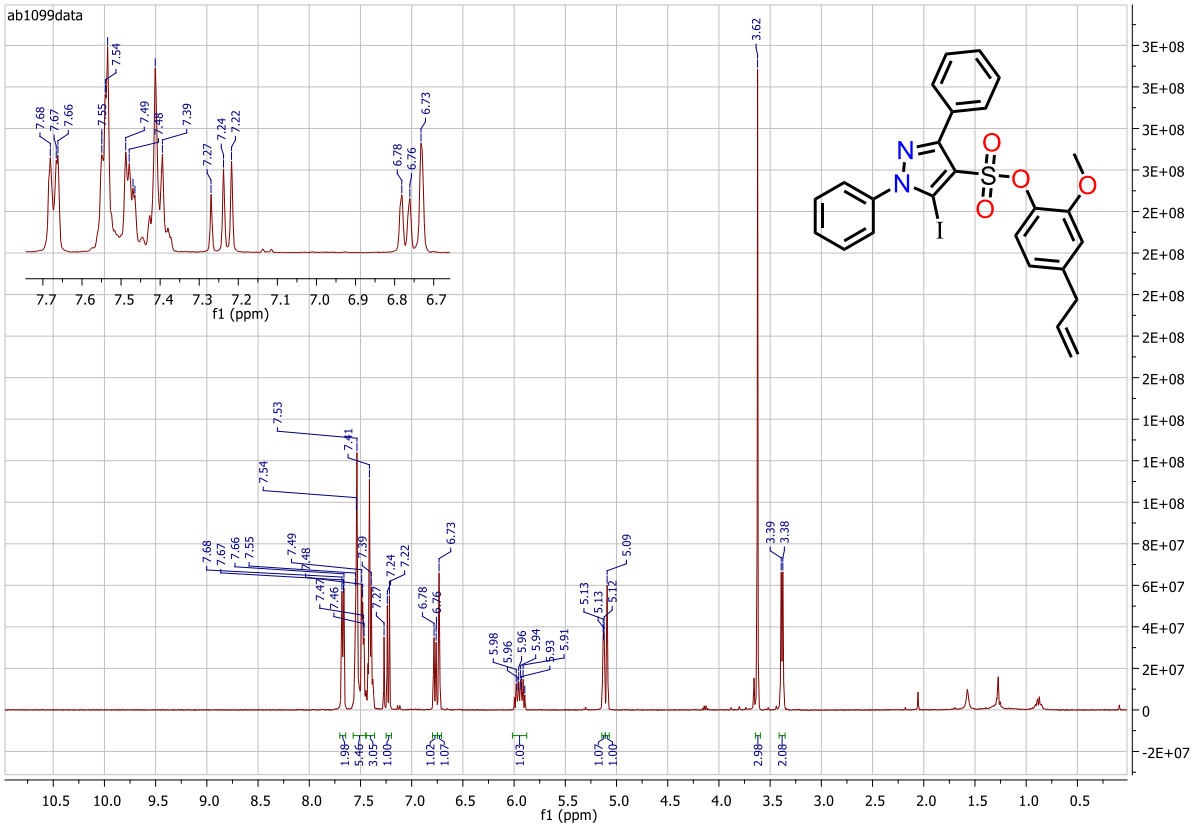

csl-1367-data
f1 (ppm)

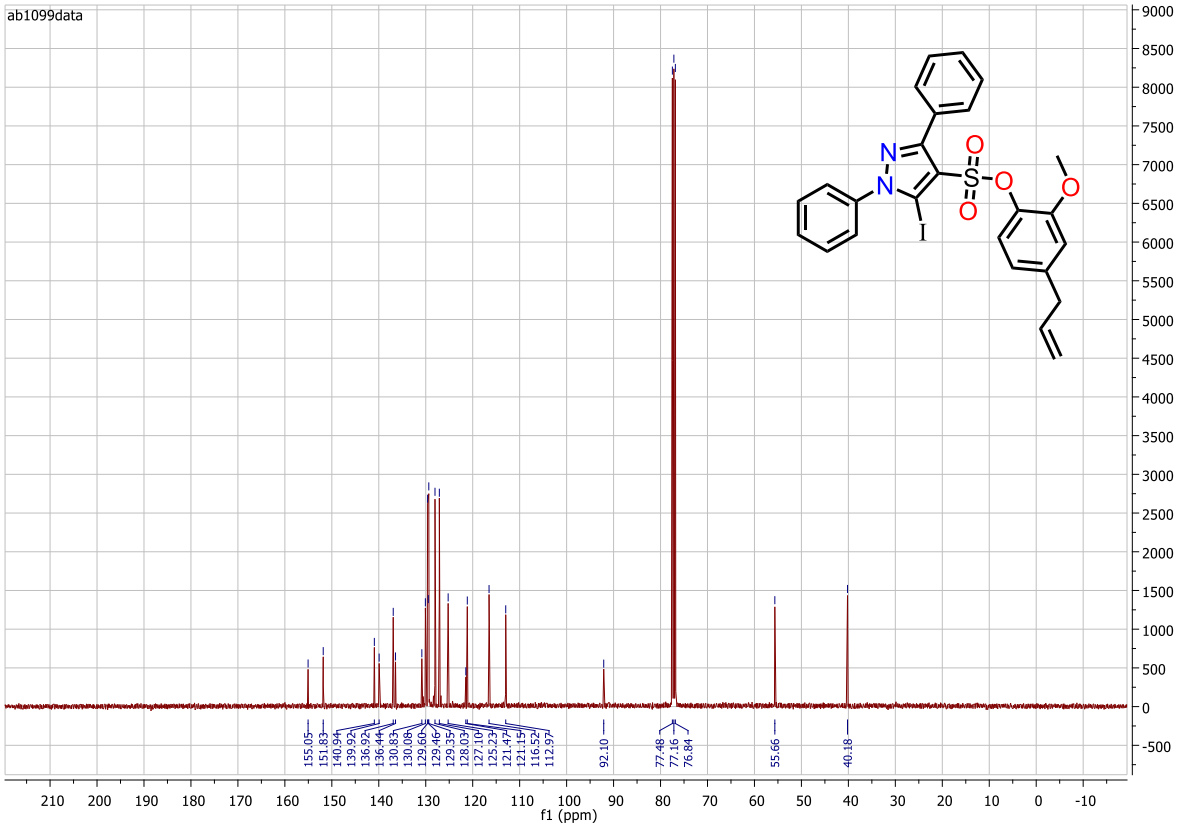

csl-1366-data
f1 (ppm)

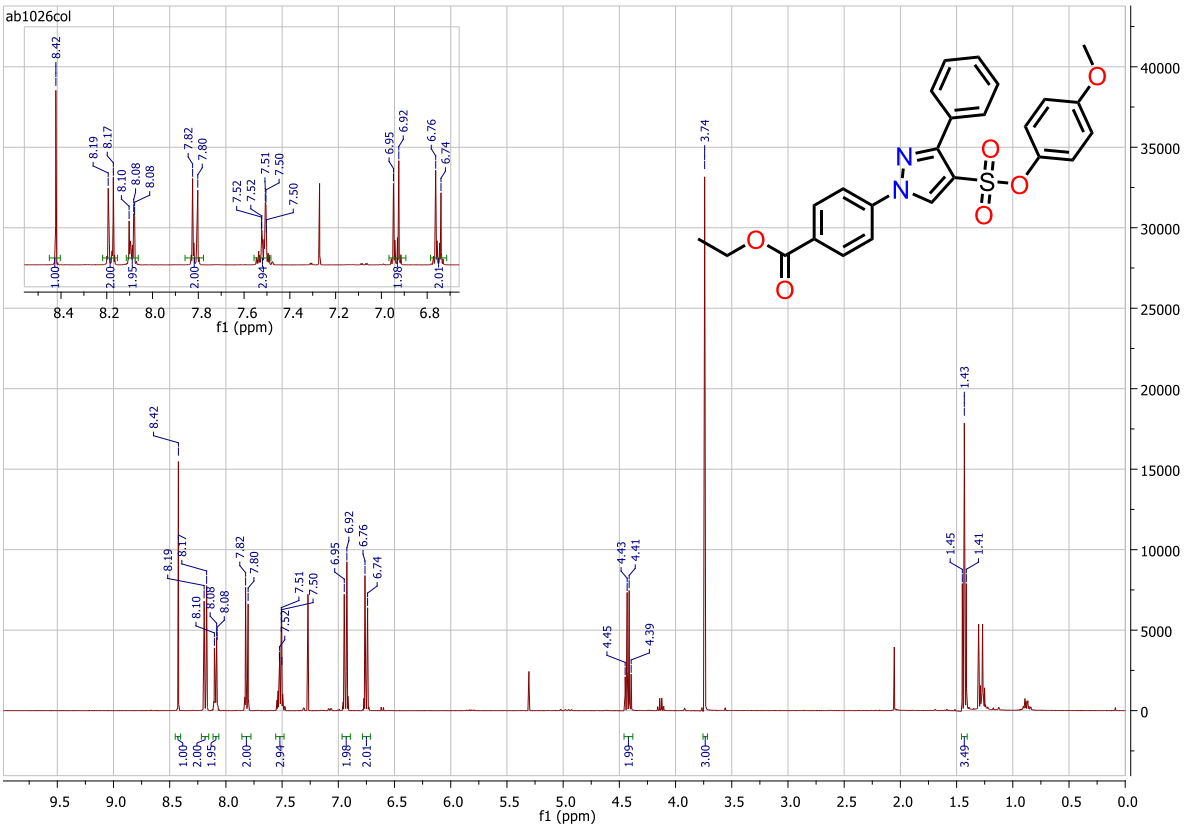

csl-1366-data
f1 (ppm)

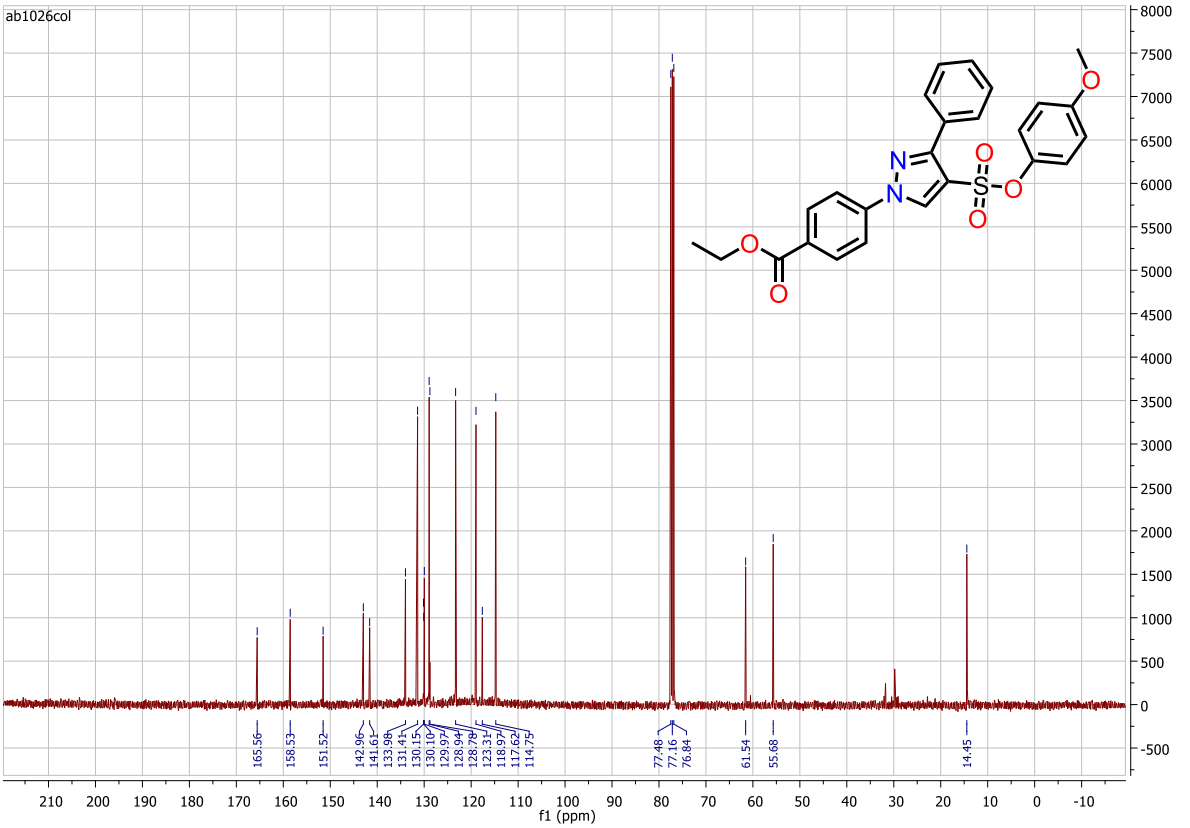

csl-1099-data
MeO
O
S
O
O
N
f1 (ppm)

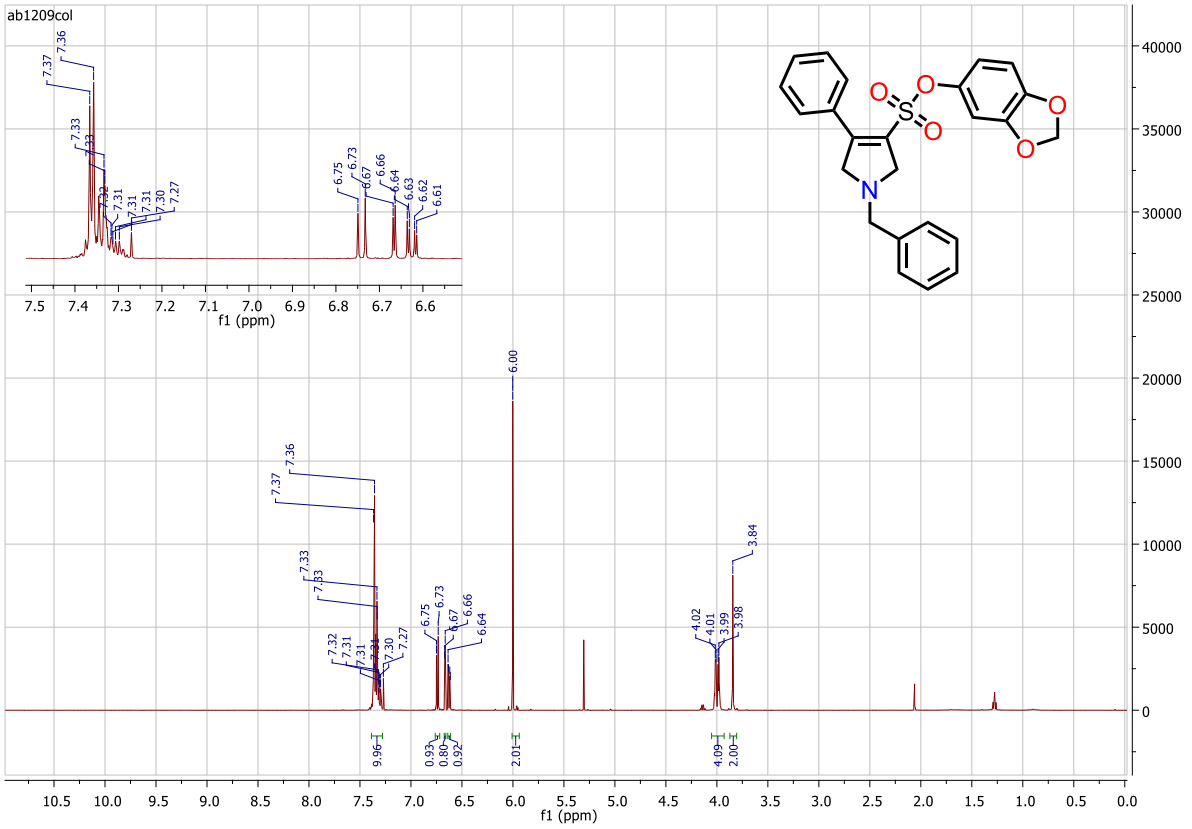

csl-1099-data
MeO
O
S
O
O
N
f1 (ppm)

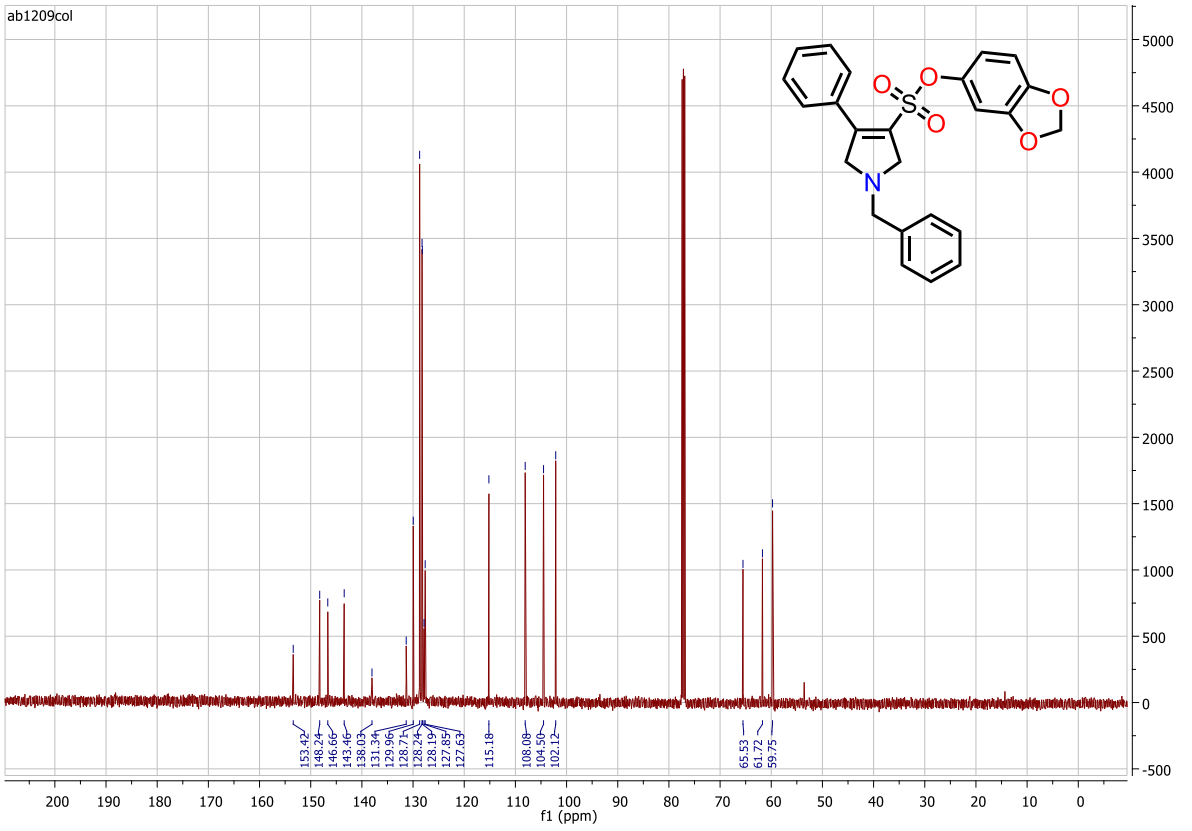

ab1099data
f1 (ppm)

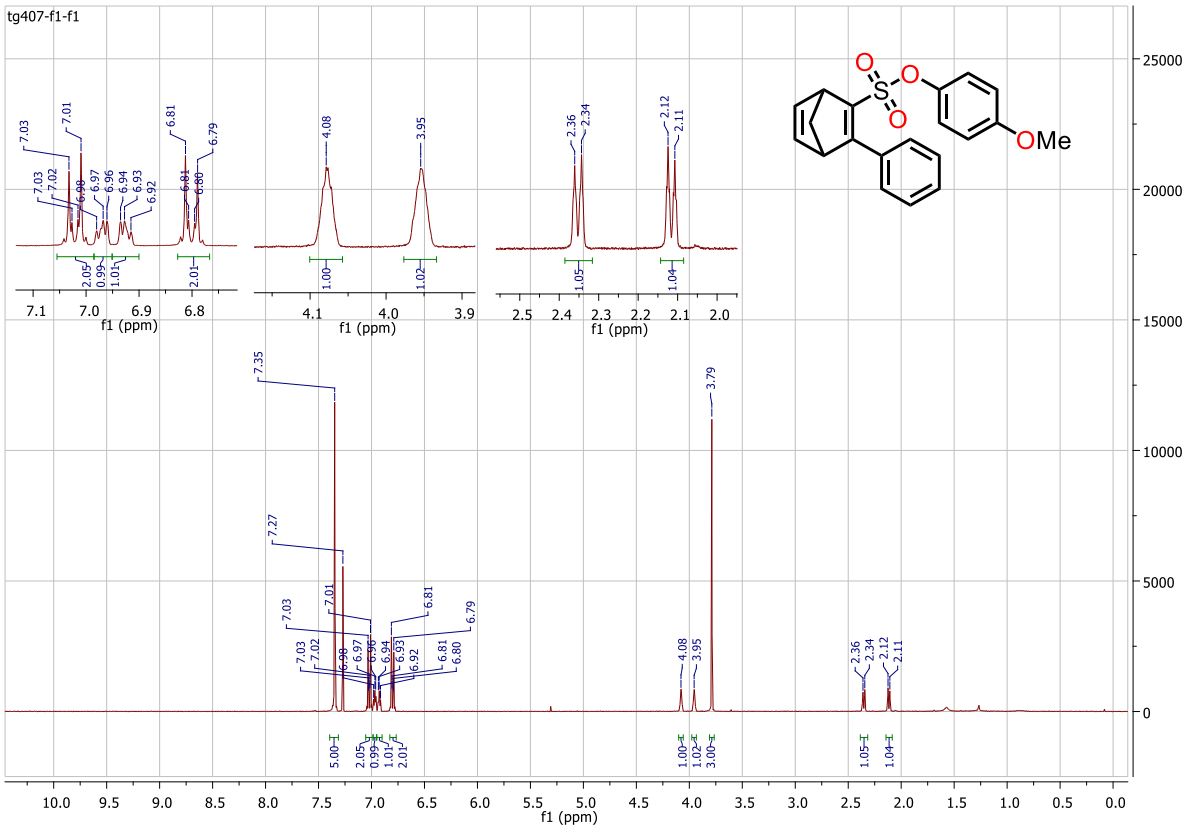

ab1099data
f1 (ppm)

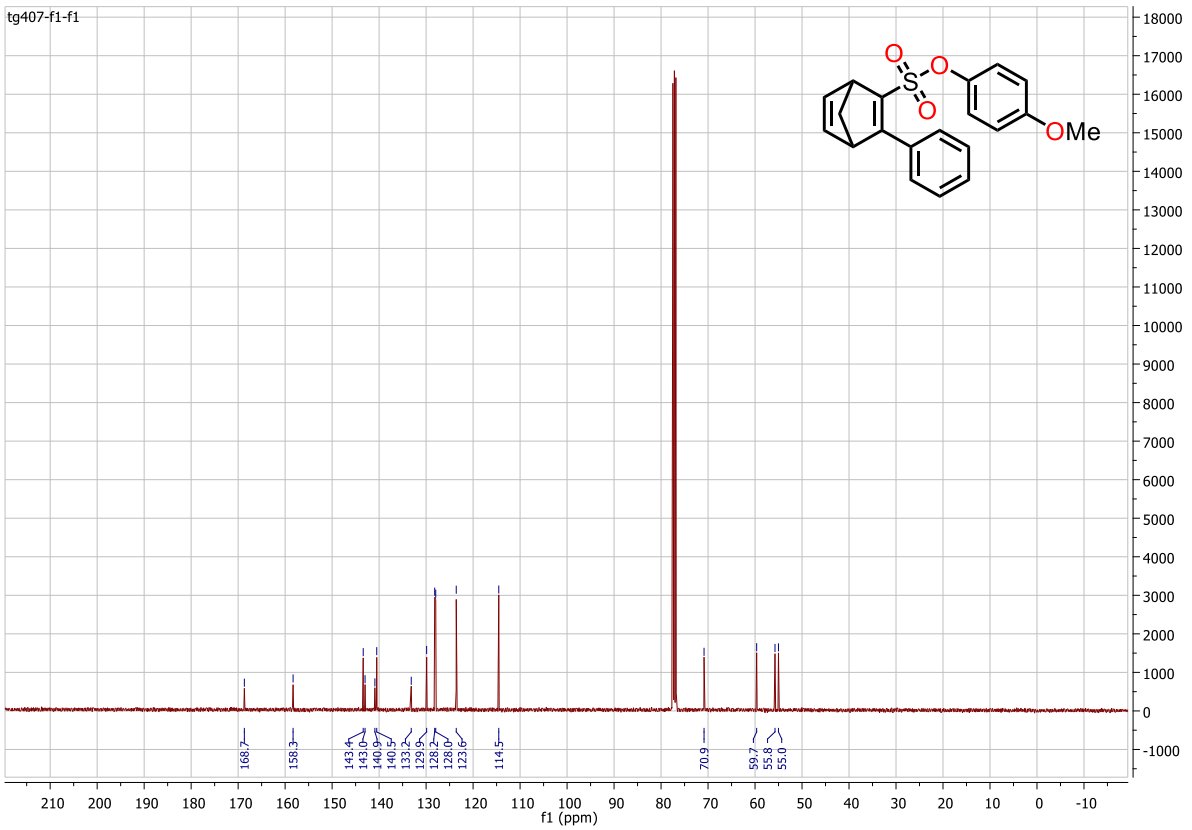

ab1026col
f1 (ppm)

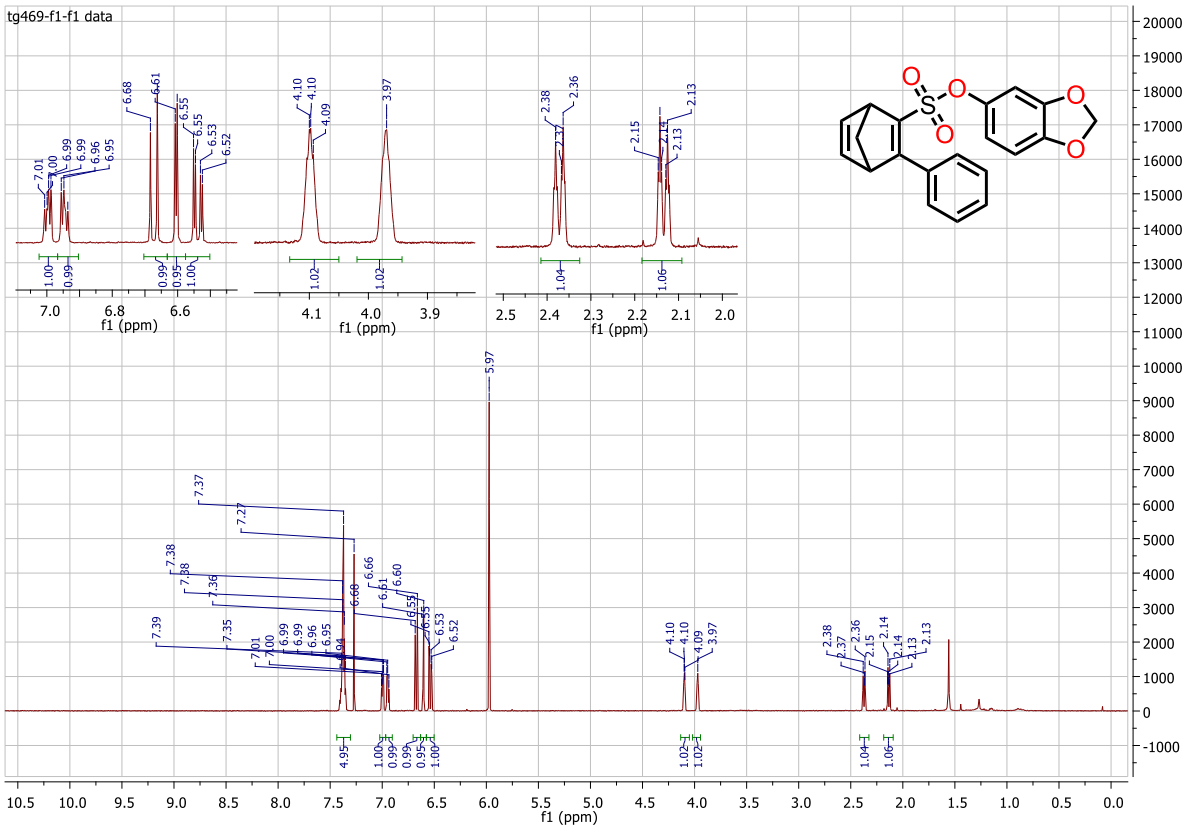

ab1026col
f1 (ppm)

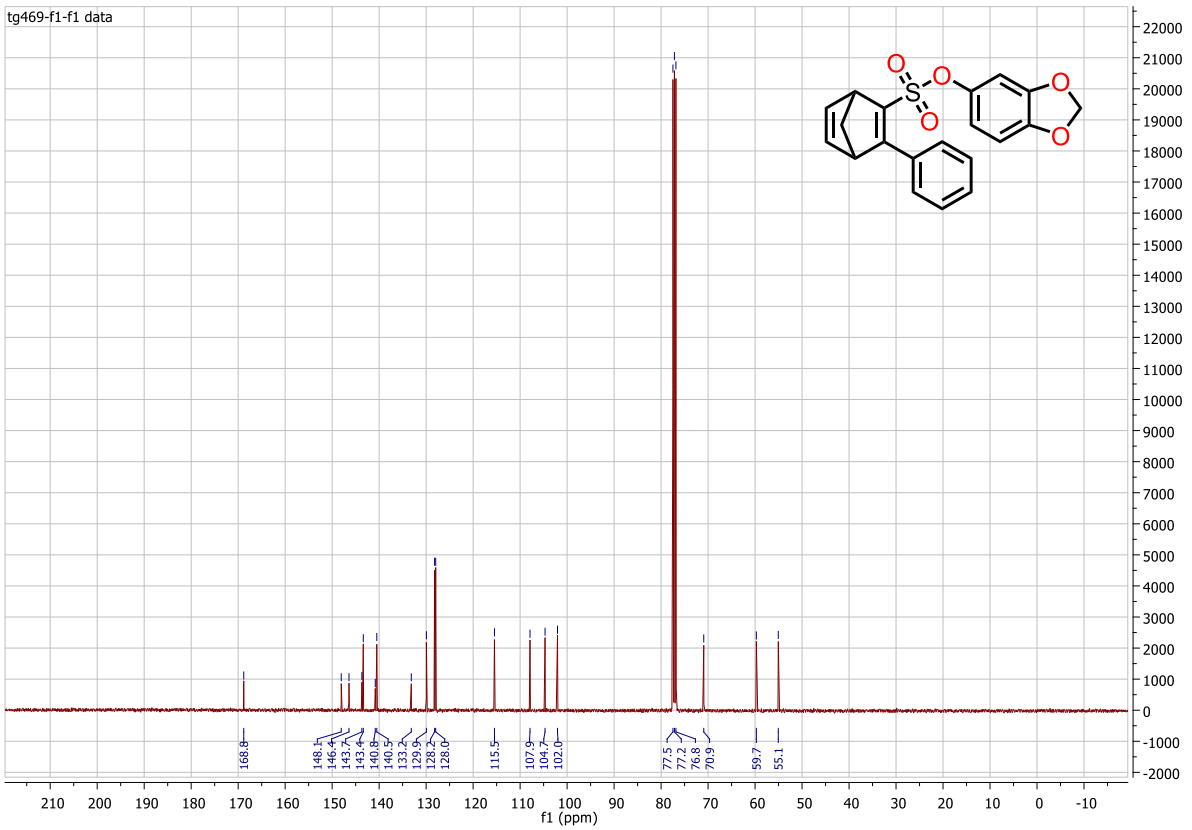

ab1209col
f1 (ppm)

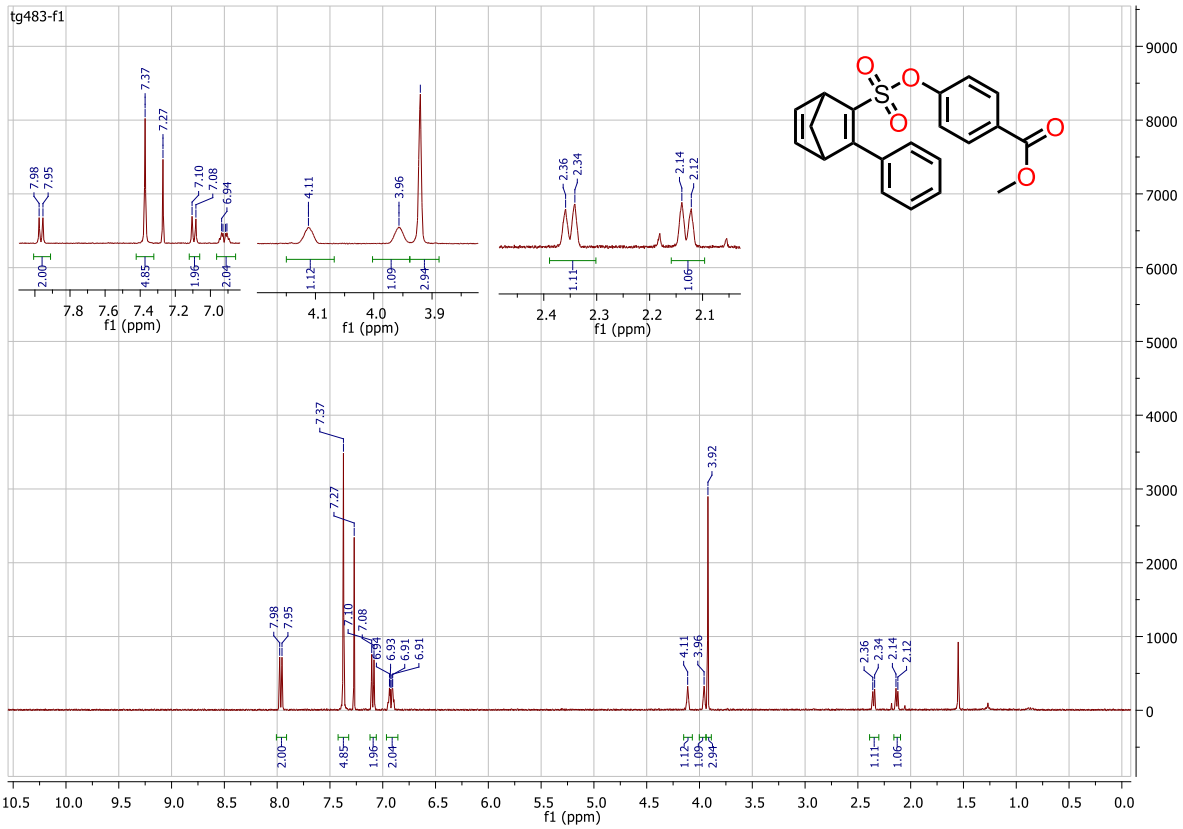

ab1209col
f1 (ppm)

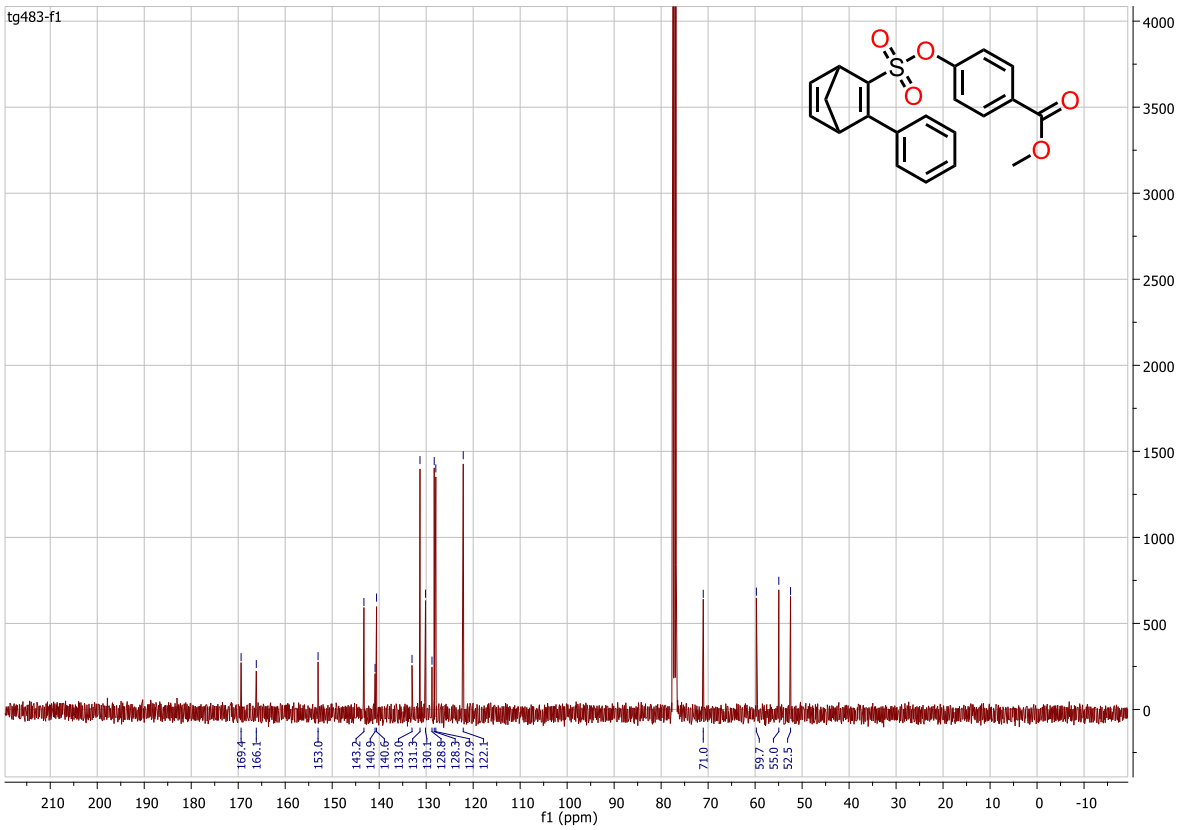

tg407-f1-f1
OMe
f1 (ppm)

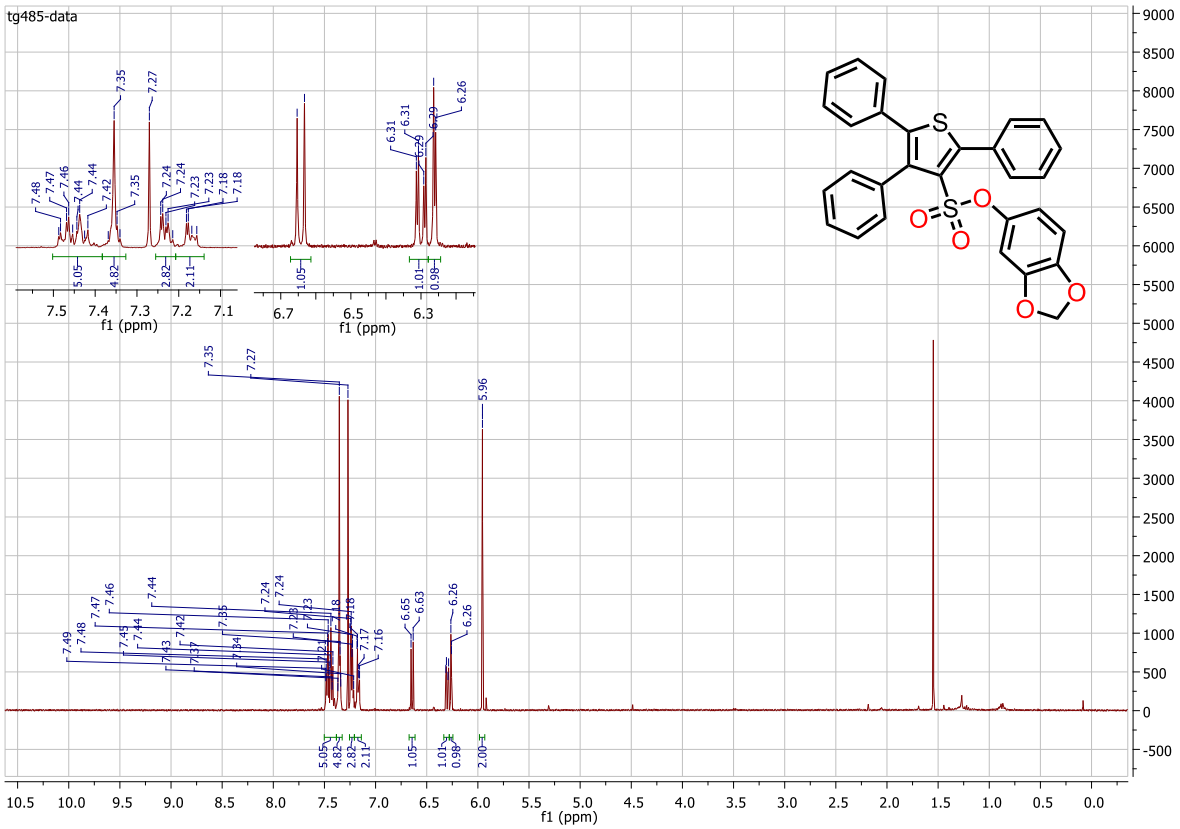

tg407-f1-f1
OMe
f1 (ppm)

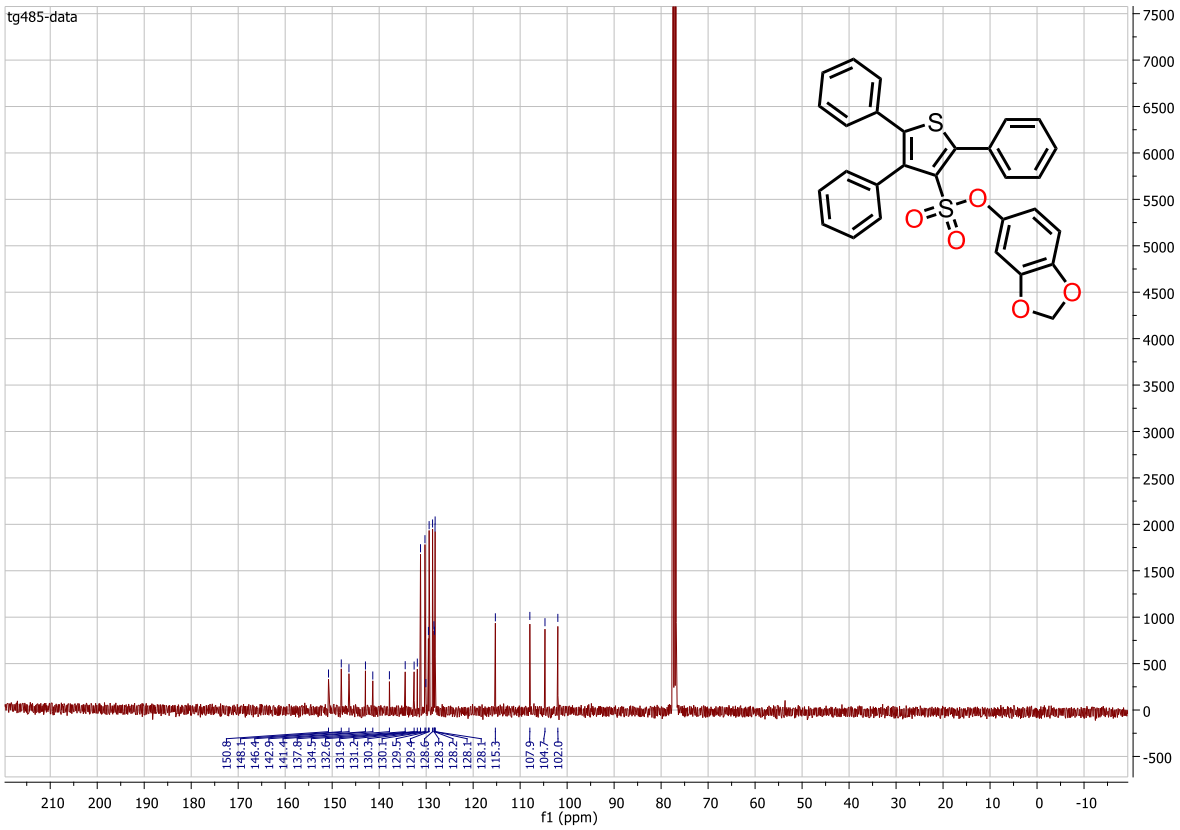

tg469-f1-f1 data
f1 (ppm)


tg469-f1-f1 data
f1 (ppm)


tg483-f1
7.98
7.95
7.37
7.27
7.10
7.08
6.94
4.11
3.96
2.36
2.34
2.14
2.12
3.92
6.93
6.91
f1 (ppm)


tg483-f1
169.4
166.1
153.0
143.2
140.9
140.6
133.0
131.3
130.1
128.8
128.3
127.9
122.1
71.0
59.7
55.0
52.5
f1 (ppm)


tg485-data
f1 (ppm)


tg485-data
f1 (ppm)