Supporting Information

General Reagent Information

Aryl and heteroaryl halides, copper iodide, potassium trifluoroacetate, pyridine and solvents were purchased from Aldrich Chemical, Alfa Aesar, or Combi-Block and were used as received without further purification.

Note: Silicone oil with a suitable temperature range (e.g., Alfa Aesar, catalogue number: 45896, temperature range: 25-250 °C) should be used. Approprite safety precaustions including the use of a safety shield in are hood should be employed.

General Analytical Information

All compounds were characterized by ^{1}H NMR, ^{13}C NMR, IR spectroscopy, and melting points (where applicable). Elemental analysis was conducted for unknown products. Copies of the ^{1}H and ^{13}C spectra can be found at the end of the Supporting Information. NMR spectra were recorded either on a Varian XL 300 or a Bruker AMX 400 MHz NMR spectrometer. ^{1}H NMR signals are reported in δ units, parts per million (ppm), and were measured relative to the signal for residual chloroform (7.26 ppm) in deuterochloroform ($CDCl_3$). ^{13}C NMR signals are reported in ppm relative to deuterochloroform (77.16 ppm), and were obtained with 1H decoupling. ^{19}F NMR spectra are reported in ppm relative to $CFCl_3$ (0.00 ppm). IR spectra were obtained on a Thermo Scientific – Nicolet iS5 spectrometer (iD5 ATR – diamond). Melting points (m.p.) were taken on a Mel-Temp capillary melting point apparatus. GC analyses were carried out on an Agilent 7890A gas chromatograph with an FID detector using a J & W DB-1 column (10 m, 0.1 mm I.D.). Elemental analyses were conducted by Atlantic Microlabs Inc., Norcross, GA. Products were purified by flash chromatography using a Biotage SP4 instrument with silica gel (230-400 mesh) cartridges.

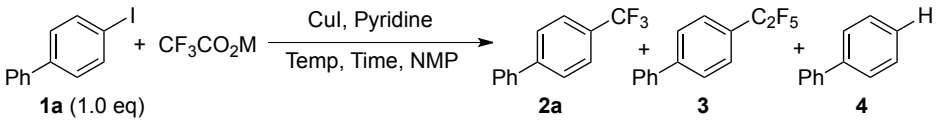
General Material Information for Continuous Flow Setup

All PFA and stainless steel tubing, connectors, nuts, fittings and back-pressure regulators were purchased from IDEX Health and Science, unless otherwise stated. The equipment

configuration that was used for the flow reactions are depicted in Figures S-1, S-2 and S-3. Reactor in Figure S-1 was made of 5 ft stainless steel tubing (0.0625" OD × 0.046" ID). Reactor in Figure S-2 was made of 1 m stainless steel tubing (0.125" OD × 0.08" ID). Reactor in Figure S-3 was made of 30 cm stainless steel tubing (0.0625" OD × 0.04" ID). Connections for reactors in Figure S-1 and S-3 were made using ferrules (peek) and 1/4-28 nuts (stainless steel). Connections for the reactor in Figure S-2 were made using stainless steel tube fitting (0.125" × 0.0625") purchased from Swagelok. Other connections were made using super flangeless ferrules with 1/4-28 flangeless nuts or 1/4-28 flat-bottomed flangeless fittings. All connecting tubing was made of PFA capillary tubing with 0.04" ID (0.0625" OD). The T-mixers (0.04" ID) and Y-mixers (0.04" ID) and check valves (1/4-28) used in this work were made out of PEEK. Stainless steel syringes and syringe pumps (PHD 2000) were purchased from Harvard Apparatus.

Experimental Procedures

Table S-1 Optimization of Aromatic Trifluoromethylation [a]



1a (1.0 eq) **2a** **3** **4**

Entry	CF_3CO_2M (eq.)	CuI (eq.)	Pyridine (eq.)	Temp (°C)	Time (min)	Conversion (%)	Yield (%)	**3** + **4** (%)
1	M = K (3.0)	2.0	none	180	60	100	87	<2
2	M = K (3.0)	2.0	2.4	180	60	100	91	<2
3	M = K (2.0)	2.0	none	200	15	100	89	<2
4	**M = K (2.0)**	**2.0**	**2.4**	**200**	**15**	**100**	**92 (95)[b]**	**<2**
5	M = K (2.0)	1.5	1.8	200	15	92	85	<5
6	M = Na (2.0)	2.0	2.4	200	15	49	40	<2

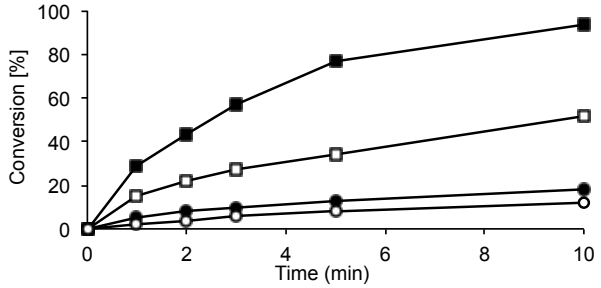
[a] All experiments were performed on a 0.2 mmol scale. All conversion and yields were determined by GC analysis, unless otherwise stated. [b] Determined with ^{19}F NMR using 1,4-difluorobenzene as an internal standard. [c] When 2,2'-bipyridine or 1,10-phenathroline was used instead of pyridine under the optimal conditions (Entry 4), a lot of solids were observed in the mixture before reaction, and less than 80% GC yields of **2a** were obtained for both cases. When TMEDA (*N*,*N*,*N*′,*N*′-tetramethylethylenediamine) was used instead of pyridine under the optimal conditions (Entry 4), less than 50% GC yields were obtained for **2a**, and reduced product **4** was obtained in 30% GC yields. When DMEDA (*N*,*N*′-dimethylethylenediamine) was used, no product **2a** was observed,

and reduced product **4** was obtained in 50% GC yields.

General Procedure for Table S-1:

An oven-dried resealable screw cap test tube equipped with a magnetic stir bar and fitted with a Teflon screw cap was charged 4-iodobiphenyl (0.2 mmol), CuI (0.3-0.4 mmol), CF_3CO_2M (0.4-0.6 mmol) and the ligand (when a solid ligand was used). The vessel was evacuated and backfilled with argon (this process was repeated a total of three times). To this vessel was added NMP (0.8 mL) and the ligand (when a liquid ligand was used) via syringe. The mixture was then stirred at room temperature for 2 min, and then the screw-cap was quickly changed to a new Teflon screw cap. The vessel was placed in an oil bath preheated to the reaction temperature as indicated (Caution: Hot!). After the reaction was complete, the tube was quickly cooled down by carefully submerging in an ice-water bath. The mixture was diluted with brine, ammonium hydroxide solution and EtOAc, and then the internal standard of dodecane (when GC analysis was conducted) or 1,4-difluorobenzene (when ^{19}F NMR analysis was conducted) was added. A small aliquot of the organic layer was filtered through either silica gel (for GC analysis) or Celite (for ^{19}F NMR analysis) before further analysis.

Decarboxylation of CF_3CO_2K at elevated temperatures



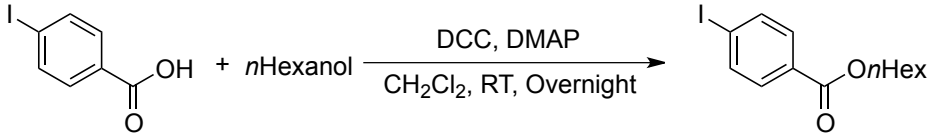
■ A: 200 °C with CuI (1.0 equiv.) and pyridine (1.2 equiv.) □ B: 200 °C without CuI or pyridine

● C: 160 °C with CuI (1.0 equiv.) and pyridine (1.2 equiv.) ○ D: 160 °C without CuI or pyridine

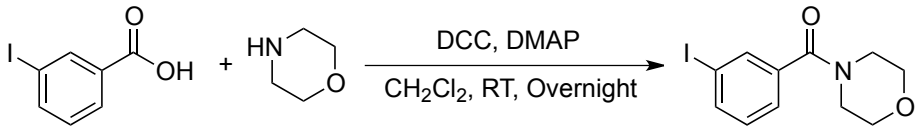
		Conversion (%)			
Entry	Time (min)	Conditions: A	Conditions: B	Conditions: C	Conditions: D
1	0	0	0	0	0
2	1	29	15	5	2
3	2	43	22	8	4
4	3	57	27	10	6
5	5	77	34	13	8
6	10	94	52	18	12

Figure S-1

Synthesis and Characterization of Non-Commercial Substrates



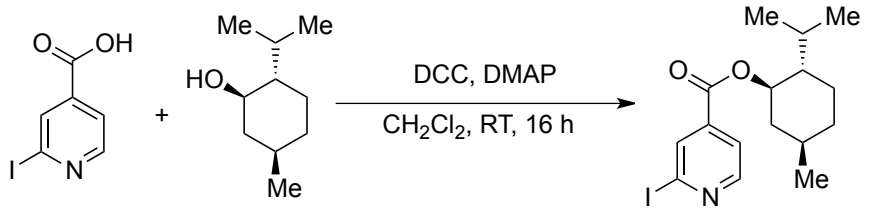
Hexyl 4-iodobenzoate (**1b**)[1] An oven-dried 100 mL round-bottom flask equipped with a magnetic stir bar was charged with 4-iodobenzoic acid (2.98 g, 12.0 mmol), *N*,*N*′-dicyclohexylcarbodiimide (DCC, 3.71 g, 18.0 mmol), 4-(dimethylamino)pyridine (DMAP, 440 mg, 3.6 mmol) and 20 mL anhydrous CH_2Cl_2. The flask was cooled to 0 °C and *n*hexanol (1.5 mL, 12.0 mmol) was added dropwise via syringe, then the reaction mixture was stirred at room temperature overnight. After the reaction was complete, the mixture was diluted with EtOAc (200 mL) and rinsed with brine (20 mL × 2). The organic layer was separated, dried with Na_2SO_4, and concentrated in vacuo. The residue was purified by flash column chromatography (eluting with 0-5 % EtOAc in hexanes) to afford **1b** (3.69 g, 93 %) as a colorless oil. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.83-7.71 (m, 4 H), 4.30 (t, *J* = 6.6 Hz, 2 H), 1.81-1.69 (m, 2 H), 1.48-1.28 (m, 6 H), 0.89 (t, *J* = 6.9 Hz, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 166.3, 137.8, 131.1, 130.1, 100.7, 65.5, 31.5, 28.7, 25.8, 22.6, 14.5 ppm. IR (neat, cm^{-1}): 2954, 2927, 1716, 1585, 1264, 1111, 1100, 1007, 751.



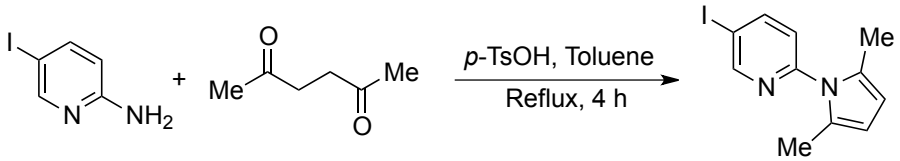
(3-Iodophenyl)(morpholino)methanone (**1d**) An oven-dried 100 mL round-bottom flask equipped with a magnetic stir bar was charged with 3-iodobenzoic acid (2.98 g, 12.0 mmol), *N*,*N*′-dicyclohexylcarbodiimide (DCC, 3.71 g, 18.0 mmol), 4-(dimethylamino)pyridine (DMAP, 440 mg, 3.6 mmol) and 20 mL anhydrous CH_2Cl_2. The flask was cooled to 0 °C and morpholine (1.2 mL, 14.0 mmol) was added dropwise via syringe, then the mixture was stirred at room temperature overnight. After the reaction was complete, the mixture was diluted with EtOAc (200 mL) and rinsed with saturated NH_4Cl (aq.) solution (20 mL × 2). The organic layer was separated, rinsed with brine (20 mL × 2), dried with Na_2SO_4, and concentrated in vacuo. The residue was

purified via by flash column chromatography (eluting with 0-30 % EtOAc in hexanes) to afforded **1d** (3.48 g, 92 %) as a white solid, mp = 83-84 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.80-7.73 (m, 2 H), 7.35 (d, *J* = 8.0 Hz, 1 H), 7.14 (d, *J* = 8.0 Hz, 1 H), 3.88-3.26 (m, 8 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ: 168.6, 138.9, 137.4, 136.0, 130.3, 126.2, 94.4, 66.9, 48.4, 42.7 ppm. IR (neat, cm^{-1}): 2961, 2852, 1626, 1557, 1427, 1276, 1252, 1112, 1066, 1021, 797, 732. Anal. Calcd. for $C_{11}H_{12}INO_2$: C, 41.66; H, 3.81. Found: C, 41.77; H, 3.80.

1-(3-Iodophenyl)piperidine (**1h**) An oven-dried 50 mL round-bottom flask equipped with a magnetic stir bar was charged with 3-iodoaniline (2.63g, 12.0 mmol), 1,5-dibromopentane (2.76g, 12.0 mmol), ethyldiisopropylamine (5.2 mL, 30.0 mmol) and 15 mL toluene. The mixture was allowed to reflux at 120 °C for 14 h. After the reaction was complete, the mixture was allowed to cool down to room temperature. Upon cooling down, a large amount of salts were precipitated. The solids were filtered off and washed with EtOAc (50 mL × 3). The collected organic solution was rinsed with saturated NH_4Cl (aq.) solution (20 mL × 2), and brine (20 mL × 2), dried with Na_2SO_4, and concentrated in vacuo. The residue was purified by flash column chromatography (eluting with 0-8 % EtOAc in hexanes) to afford **1h** (3.07 g, 89 %) as a colorless oil. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.25 (dd, *J* = 1.5, 1.5 Hz, 1 H), 7.13 (dd, *J* = 7.5, 1.2 Hz, 1 H), 6.95 (dd, *J* = 7.2, 7.2 Hz, 1 H), 6.88 (ddd, *J* = 8.4, 2.4, 1.2 Hz, 1 H), 3.15 (t, *J* = 5.1 Hz, 4 H), 1.74-1.64 (m, 4 H), 1.64-1.54 (m, 2 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 153.3, 130.5, 127.7, 125.1, 115.6, 95.4, 50.2, 25.7, 24.3 ppm. IR (neat, cm^{-1}): 2929, 1581, 1549, 1478, 1234, 979, 925, 760, 681. Anal. Calcd. for $C_{11}H_{14}IN$: C, 46.01; H, 4.91. Found: C, 46.25; H, 4.89.

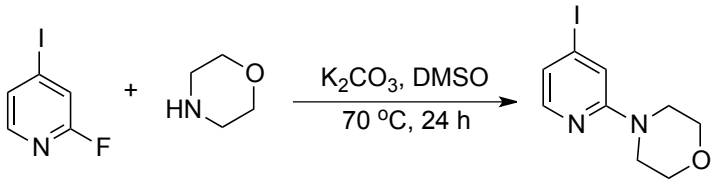


(1*R*,2*S*,5*R*)-2-Isopropyl-5-methylcyclohexyl 2-iodoisonicotinate (**1m**) An oven-dried 50 mL round-bottom flask equipped with a magnetic stir bar was charged with 2-iodopyridine-4-carboxylic acid (996 mg, 4.0 mmol), *N*,*N*′-dicyclohexylcarbodiimide (DCC, 1.24 g, 6.0 mmol), 4-(dimethylamino)pyridine (DMAP, 147 mg, 1.2 mmol) and 14 mL anhydrous CH_2Cl_2. The flask was cooled to 0 °C and (*1R,2S,5R*)-(-)-menthol (625 mg, 4.0 mmol) was added, then the mixture was stirred at room temperature overnight. After the reaction was complete, the mixture was diluted with EtOAc (150 mL) and rinsed with brine (20 mL × 2). The organic layer was separated, dried with Na_2SO_4, and concentrated in vacuo. The residue was purification by flash column chromatography (eluting with 0-3 % EtOAc in hexanes) to afford **1m** (1.52 g, 98 %) as a colorless oil. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.49 (dd, *J* = 5.7, 0.9 Hz, 1 H), 8.23 (dd, *J* = 1.2 0.9 Hz, 1 H), 7.79 (dd, *J* = 5.1, 1.5 Hz, 1 H), 4.94 (td, *J* = 10.8, 4.5 Hz, 1 H), 2.11-2.01 (m, 1 H), 1.92-1.80 (m, 1 H), 1.78-1.67 (m, 2 H), 1.61-1.47 (m, 2 H), 1.18-1.02 (m, 2 H), 0.99-0.85 (m, 7 H), 0.77 (d, *J* = 7.2 Hz, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 163.1, 151.4, 139.5, 134.3, 122.3, 118.3, 76.6, 47.2, 40.8, 34.2, 31.6, 26.6, 23.6, 22.1, 20.9, 16.5 ppm. IR (neat, cm^{-1}): 2954, 2924, 1721, 1543, 1452, 1356, 1288, 1254, 1130, 1068, 954, 758. HRMS (ESI) *m/z* $[M + H]^+$ calcd. for $C_{16}H_{23}INO_2$: 388.0768, found: 388.0767.

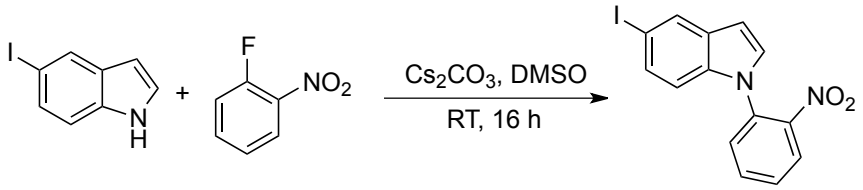


2-(2,5-Dimethyl-1*H*-pyrrol-1-yl)-5-iodopyridine (**1n**)[2] An oven-dried 50 mL round-bottom flask equipped with a magnetic stir bar was charged with 2-amino-5-iodopyridine (2.20 g, 10.0 mmol), *p*-toluenesulfonic acid (*p*-TsOH, 15.6 mg) and 10 mL toluene. 2,5-Hexanedione (1.3 mL, 10.5 mmol) was added dropwise into the flask via syringe at room temperature. The mixture was then allowed to reflux at 125 °C equipped with a Dean-Stark apparatus for 4 h. After cooling to room temperature, the mixture was diluted with

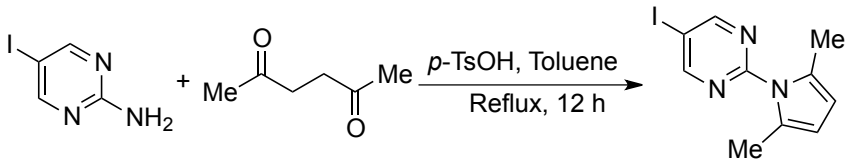
EtOAc (150 mL), and washed with brine (20 mL × 2). The organic layer was separated, dried with Na_2SO_4, and concentrated in vacuo. The residue was purified by flash column chromatography (eluting with 0-10 % EtOAc in hexanes) afforded **1n** (2.41 g, 81 %) as a white solid, mp = 118-119 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.80 (d, *J* = 2.4 Hz, 1 H), 8.11 (dd, *J* = 8.4, 2.4 Hz, 1 H), 7.03 (d, *J* = 8.1 Hz, 1 H), 5.91 (s, 2 H), 2.14 (s, 6 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 155.5, 151.3, 146.2, 128.7, 123.6, 107.6, 91.1, 13.4 ppm. IR (neat, cm^{-1}): 2918, 1564, 1460, 1395, 1323, 1080, 1000, 837, 757.



4-(4-Iodopyridin-2-yl)morpholine (**1o**) An oven-dried 50 mL round-bottom flask equipped with a magnetic stir bar was charged with 2-fluoro-4-iodopyridine (1.78 g, 9.0 mmol), anhydrous K_2CO_3 (3.32 g, 27.0 mmol) and 12 mL anhydrous DMSO. Morpholine (1.0 mL, 13.5 mmol) was added into the mixture via syringe at room temperature. Then, the mixture was stirred at 70 °C for 24 h. After the reaction was complete, the mixture was diluted with EtOAc (100 mL) and H_2O (50 mL). The water layer was separated and extracted with EtOAc (20 mL × 2). The combined organic layers were washed with saturated NH_4Cl (aq.) solution (20 mL × 2) and brine (20 mL × 2). The organic layer was separated, dried with Na_2SO_4 and concentrated in vacuo. The crude mixture was purified by flash column chromatography (0-10 % EtOAc in hexanes) to afford **1o** (2.35 g, 90 %) as a white solid, mp = 61-62 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.83 (d, *J* = 8.1 H, 1 H), 6.99-6.95 (m, 2 H), 3.78 (t, *J* = 4.8 Hz, 4 H), 3.47 (t, *J* = 4.8 Hz, 4 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 159.8, 148.3, 122.6, 116.0, 106.8, 66.7, 45.4 ppm. IR (neat, cm^{-1}): 2958, 2849, 1561, 1532, 1472, 1413, 1240, 1116, 969, 948. Anal. Calcd. for $C_9H_{11}IN_2O$: C, 37.26; H, 3.82. Found: C, 37.40; H, 3.90.

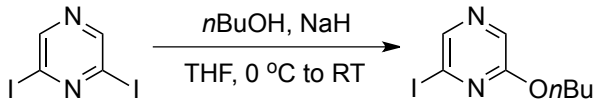


5-Iodo-1-(2-nitrophenyl)-1*H*-indole (**1p**) An oven-dried 100 mL round-bottom flask equipped with a magnetic stir bar was charged with 5-iodo-1*H*-indole (2.43 g, 10.0 mmol), 1-fluoro-2-nitrobenzene (1.41 g, 10.0 mmol), Cs_2CO_3 (3.91 g, 12.0 mmol) and anhydrous DMSO (30 mL). The mixture was stirred at room temperature for 16 h. After the reaction was complete, the mixture was diluted with EtOAc (150 mL) and H_2O (50 mL). The water layer was separated and extracted with EtOAc (20 mL × 2). The combined organic layers were washed with saturated NH_4Cl (aq.) solution (20 mL × 2), brine (20 mL × 2), dried with Na_2SO_4, and concentrated in vacuo. The crude mixture was purified by recrystallization with a solution of ethanol (40 mL) and EtOAc (6 mL) to afford **1p** (3.31 g, 91 %) as a light yellow solid, mp = 127-128 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.08-8.00 (m, 2 H), 7.74 (ddd, *J* = 7.5, 7.5, 1.5 Hz, 1 H), 7.63-7.52 (m, 2 H), 7.44 (dd, *J* = 8.4, 1.8 Hz, 1 H), 7.13 (d, *J* = 3.3 Hz, 1 H), 6.90 (d, *J* = 9.0 Hz, 1 H), 6.65 (d, *J* = 3.3 Hz, 1 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 146.3, 136.0, 134.0, 132.3, 131.5, 131.3, 130.2, 129.8, 129.0, 128.9, 125.6, 111.6, 104.2, 84.6 ppm. IR (neat, cm^{-1}): 1606, 1523, 1489, 1444, 1336, 1285, 1231, 1196, 1119, 953, 849, 717. Anal. Calcd. for $C_{14}H_9IN_2O_2$: C, 46.18; H, 2.49. Found: C, 46.07; H, 2.47.

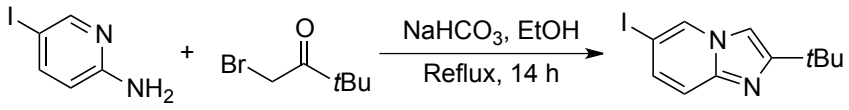


2-(2,5-Dimethyl-1*H*-pyrrol-1-yl)-5-iodopyrimidine (**1q**) An oven-dried 50 mL round-bottom flask equipped with a magnetic stir bar was charged with 2-amino-5-iodopyridine (2.20 g, 10.0 mmol), *p*-toluenesulfonic acid (*p*-TsOH, 15.6 mg) and 10 mL toluene. 2,5-Hexanedione (1.3 mL, 10.5 mmol) was added dropwise to the flask via syringe at room temperature. The reaction vessel was equipped with a Dean-Stark apparatus, and it was heated to 125 °C for 12 h. After cooling to room temperature, the mixture was diluted with EtOAc (150 mL), and washed with brine (20 mL × 2). The organic layer was

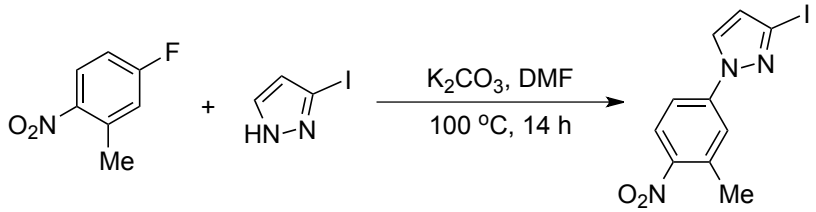
separated, dried with Na_2SO_4, and concentrated in vacuo. The residue was purified by flash column chromatography (eluting with 0-15 % EtOAc in hexanes) to afford **1q** (1.67 g, 56 %) as a light yellow solid, mp = 99-100 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.90 (s, 2 H), 5.91 (s, 2 H), 2.36 (s, 6 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 163.5, 156.8, 130.1, 109.4, 88.1, 15.0 ppm. IR (neat, cm^{-1}): 2921, 1528, 1422, 1389, 1233, 1116, 1003, 977, 797, 767. HRMS (ESI) *m/z* $[M + H]^+$ calcd. for $C_{10}H_{11}IN_3$: 299.9992, found: 299.9989.



2-Butoxy-6-iodopyrazine (**1r**) An oven-dried 100 mL round-bottom flask equipped with a magnetic stir bar was charged with NaH (95 %, 182 mg, 7.2 mmol). The flask was evacuated and backfilled with argon. Anhydrous THF (30 mL) was added and the suspension was cooled to 0 °C. *n*BuOH (660 μL, 7.2 mmol) was added via syringe and the mixture was stirred at room temperature for 20 min. Then, the mixture was again cooled to 0 °C. A solution of 2,6-diiodopyrazine (1.99 g, 6.0 mmol) in anhydrous THF (10 mL) was added dropwise into this mixture. After addition, the mixture was stirred at room temperature for 14 h. When the reaction was complete, water (2 mL) was added dropwise at 0 °C. The mixture was concentrated in vacuo. The residue was diluted with EtOAc (100 mL) and H_2O (15 mL). The water layer was extracted with EtOAc (20 mL × 2). The combined organic layers were washed with saturated NH_4Cl (aq.) solution (20 mL × 2) and brine (20 mL × 2). The organic layer was separated, dried with Na_2SO_4, and concentrated in vacuo. The residue was purified by flash column chromatography (eluting with 0-5 % EtOAc in hexanes) to afford **1r** (1.43 g, 86 %) as a colorless oil. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.35 (s, 1 H), 8.09 (s, 1 H), 4.29 (t, *J* = 6.6 Hz, 2 H), 1.80-1.67 (m, 2 H), 1.53-1.39 (m, 2 H), 0.96 (t, *J* = 7.2 Hz, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 159.8, 143.9, 133.7, 112.8, 67.3, 30.8, 19.2, 13.9 ppm. IR (neat, cm^{-1}): 2956, 2871, 1553, 1507, 1421, 1401, 1357, 1295, 1162, 1125, 992, 901, 857. HRMS (ESI) *m/z* $[M + H]^+$ calcd. for $C_8H_{12}IN_2O$: 278.9989, found: 278.9987.



2-(*tert*-Butyl)-6-iodoimidazo[1,2-*a*]pyridine (**1u**) An oven-dried 50 mL round-bottom flask equipped with a magnetic stir bar was charged with 1-bromo-3,3-dimethylbutan-2-one (2.33 g, 13.0 mmol) and 13 mL EtOH. 2-Amino-5-iodopyridine (2.20 g, 10.0 mmol) and $NaHCO_3$ (4.20 g, 50.0 mmol) were subsequently added into the solution at room temperature. Then, the mixture was heated at 80 °C for 14 h. After the reaction was complete, the mixture was cooled to room temperature, filtered, and the solids were washed with EtOH (20 mL × 2). The filtrate was concentrated in vacuo. The residue was diluted with EtOAc (150 mL), washed with saturated $NaHCO_3$ (aq.) solution (10 mL × 2) and brine (10 mL × 2). The separated organic layer was dried with Na_2SO_4, and concentrated in vacuo. The crude product was purified by flash column chromatography (eluting with 0-30 % EtOAc in hexanes) to afford **1u** (2.70 g, 90 %) as a white solid, mp = 157-158 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.28 (dd, *J* = 1.8, 0.9 Hz, 1 H), 7.35 (ddd, *J* = 9.6, 0.9, 0.9 Hz, 1 H), 7.28-7.22 (m, 2 H), 1.37 (s, 9 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 157.9, 143.6, 131.8, 130.4, 118.3, 106.8, 74.2, 32.4, 30.3 ppm. IR (neat, cm^{-1}): 2955, 1492, 1412, 1333, 1264, 1200, 1050, 789, 734, 684. Anal. Calcd. for $C_{11}H_{13}IN_2$: C, 44.02; H, 4.37. Found: C, 44.06; H, 4.24.



3-Iodo-1-(3-methyl-4-nitrophenyl)-1*H*-pyrazole (**1x**) An oven-dried 100 mL round-bottom flask equipped with a magnetic stir bar was charged with 3-iodo-1*H*-pyrazole (970 mg, 5.0 mmol), 4-fluoro-2-methyl-1-nitrobenzene (814 mg, 5.3 mmol), anhydrous K_2CO_3 (1.04 g, 7.5 mmol) and 10 mL anhydrous DMF. The mixture was stirred at 100 °C for 14 h. After the reaction was complete, the mixture was cooled down to room temperature, and was diluted with 150 mL EtOAc and 30 mL water. The H_2O was separated and extracted with EtOAc (20 mL × 3). The combined organic layers were washed with brine (20 mL × 2), dried with Na_2SO_4, and concentrated in vacuo. The crude

mixture was purified by flash column chromatography (eluting with 0-5 % EtOAc in Hexanes) to afford **1x** (1.38 g, 84 %) as a light yellow solid, mp = 117-118 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.13 (d, *J* = 8.7, 1 H), 7.82 (d, *J* = 2.7 Hz, 1 H), 7.72 (d, *J* = 2.4 Hz, 1 H), 7.59 (dd, *J* = 8.7, 2.7 Hz, 1 H), 6.68 (d, *J* = 2.4 Hz, 1 H), 2.69 (s, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 146.7, 141.9, 136.5, 128.9, 126.9, 122.1, 118.1, 116.1, 99.5, 21.3 ppm. IR (neat, cm^{-1}): 1610, 1584, 1500, 1328, 1304, 1202, 1040, 940, 872, 745. Anal. Calcd. for $C_{10}H_8IN_3O_2$: C, 36.50; H, 2.45. Found: C, 36.64; H, 2.44.

General Setup for Table 1 and 2

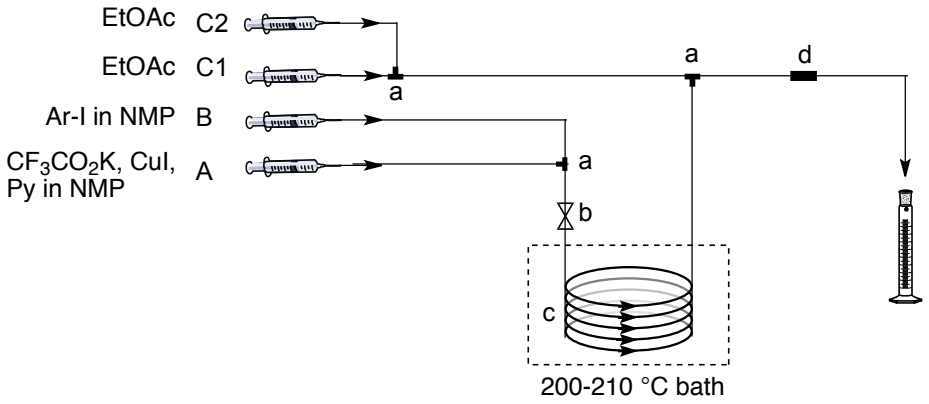


Figure S-2

a: T-mixer; b: in line check valve; c: stainless-steel-tube reactor (1.6 mL volume); d: back-pressure regulator (100 psi × 2)

General Procedure for Table 1 and 2

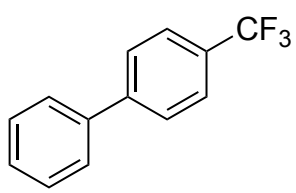
All reagents were added to oven-dried, screw-top, volumetric flasks that were fitted with Teflon screw-caps. The vessels were then evacuated and backfilled with argon.

A 10.0 mL volumetric flask was charged with CF_3CO_2K (1.22 g, 8.0 mmol, 0.8 M) and CuI (1.52 g, 8.0 mmol, 0.8 M). Anhydrous 1-methyl-2-pyrrolidinone (NMP) and pyridine (775 μL, 9.6 mmol) were added to make the solution volume 10.0 mL. Two 2.0 mL volumetric flask was charged with Ar-I (1.2 mmol for each vessel, 0.6 M). Anhydrous NMP was added to make the solution volume of each vessel to 2.0 mL. The volumetric flasks were sonicated to accelerate the dissolution of solids. Following the setup as shown

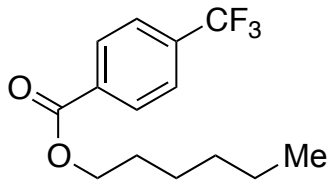
in **Figure S-2**, the first solution was loaded into an 8.0 mL stainless steel syringe (A), and fitted to a syringe pump. Both solutions of the Ar-I (4.0 mL total) were loaded into the second 8.0 mL stainless steel syringe (B), and fitted to a second syringe pump. EtOAc was loaded into two 8.0 mL stainless steel syringes (C1 and C2), and fitted to a third syringe pump. Before the reaction was started, all reactors and the connecting tubing were filled with anhydrous NMP or DMA. The flow rate for the solution from syringe A was 60 μL/min, the flow rate for the solution from syringe B was 40 μL/min, the flow rates for EtOAc from syringes C1 and C2 were both 50 μL/min. The reaction proceeded at the temperature as indicated for each example. After reaching steady state in 15 to 25 min as monitored by GC, a sample was collected a graduated cylinder for 42 min (8.4 mL, 1.0 mmol). The collected mixture was purified following general workup procedures A or B.

General Workup Procedure A: The collected mixture was diluted with Et_2O (150 mL), and was washed with a premixed solution of ammonium hydroxide solution and brine (v/v = 1/1, 20 mL) twice. The water layer was separated and extracted with Et_2O (10 mL × 2). The combined organic layers were then rinsed with brine (10 mL × 2), dried with $MgSO_4$, and concentrated in vacuo. The crude mixture was purified using a Biotage SP4 instrument to give the corresponding compound.

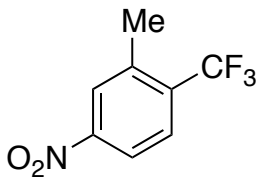
General Workup Procedure B: The collected mixture was diluted with EtOAc (150 mL), and was washed with a premixed solution of ammonium hydroxide solution and brine (v/v = 1/1, 20 mL) twice. The water layer was separated and extracted with EtOAc (10 mL × 2). The combined organic layers were then rinsed with brine (10 mL × 2), dried with Na_2SO_4, and concentrated in vacuo. The crude mixture was purified using a Biotage SP4 instrument to give the corresponding compound.



4-(Trifluoromethyl)-1,1'-biphenyl (**2a**)[3] Following the general procedure for Table 1 and general workup procedure A, a solution of 4-iodo-1,1'-biphenyl (672 mg, 2.4 mmol, 0.6 M) in NMP was loaded in syringe B. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with hexanes) to give the title compound as a white solid (193 mg, 87 %), mp = 69-70 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.72-7.71 (m, 4 H), 7.64-7.60 (m, 2 H), 7.52-7.47 (m, 2 H), 7.45-7.42 (m, 1 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 144.9, 139.9, 129.5 (q, J = 32.3 Hz), 129.1, 128.3, 127.6, 127.4, 125.8 (q, J = 3.8 Hz), 124.5 (q, J = 270.2 Hz) ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -64.3 ppm. IR (neat, cm^{-1}): 1328, 1161, 1112, 1073, 1006, 843, 767, 729, 691.

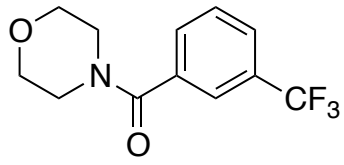


Hexyl 4-(trifluoromethyl)benzoate (**2b**)[3] Following the general procedure for Table 1 and general workup procedure A, a solution of hexyl 4-iodobenzoate (796 mg, 2.4 mmol, 0.6 M) in NMP was loaded in syringe B. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with 0-5 % EtOAc in hexanes) to give the title compound as a colorless oil (263 mg, 96 %). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.13 (d, J = 8.7 Hz, 2 H), 7.67 (d, J = 9.0 Hz, 2 H), 4.33 (t, J = 6.6 Hz, 2 H), 1.81-1.71 (m, 2 H), 1.46-1.37 (m, 2 H), 1.35-1.29 (m, 4 H), 0.88 (t, J = 6.9 Hz, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 165.4, 134.4 (q, J = 32.4 Hz), 133.8 (q, J = 1.3 Hz), 130.0, 125.4 (q, J = 3.8 Hz), 123.8 (q, J = 270.9 Hz), 65.8, 31.6, 28.7, 25.8, 22.6, 14.0 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -65.0 ppm. IR (neat, cm^{-1}): 1722, 1411, 1323, 1271, 1166, 1128, 1098, 1065, 1017, 861, 775.

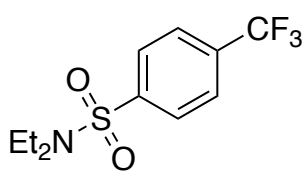


2-Methyl-4-nitro-1-(trifluoromethyl)benzene (**2c**)[6] Following the general procedure for Table 1 and general workup procedure A, a solution of 1-iodo-2-methyl-4-nitrobenzene (632 mg, 2.4 mmol, 0.6 M) in NMP was loaded in syringe B. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with 0-6 % CH_2Cl_2 in hexanes) to give the title compound as a colorless oil (168 mg, 82

%). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.15-8.09 (m, 2 H), 7.79 (d, *J* = 8.7 Hz, 1 H), 2.60 (s, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 149.7, 139.4 (q, *J* = 1.6 Hz), 134.5 (q, *J* = 30.7 Hz), 127.3 (q, *J* = 5.6 Hz), 126.6, 123.5 (q, *J* = 272.6 Hz), 120.9, 19.5 (q, *J* = 2.3 Hz) ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -64.3 ppm. IR (neat, cm^{-1}): 1532, 1353, 1310, 1270, 1174, 1120, 1044, 806, 754.

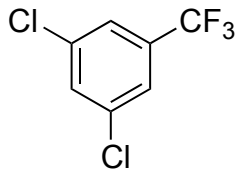


Morpholino(3-(trifluoromethyl)phenyl)methanone (**2d**) Following the general procedure for Table 1 and general workup procedure A, a solution of (3-iodophenyl)(morpholino)methanone (760 mg, 2.4 mmol, 0.6 M) in NMP was loaded in syringe B. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with 0-40 % EtOAc in hexanes) to give the title compound as a white solid (216 mg, 83 %), mp = 68-69 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.75-7.62 (m, 2 H), 7.62-7.48 (m, 2 H), 4.09-3.24 (m, 8 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 168.8, 136.1, 131.1 (q, *J* = 32.6 Hz), 130.4 (q, *J* = 1.3 Hz), 129.2, 126.6 (q, *J* = 3.7 Hz), 124.1 (q, *J* = 3.8 Hz), 123.6 (q, *J* = 270.8 Hz), 66.8, 48.2, 42.8 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -64.7 ppm. IR (neat, cm^{-1}): 1634, 1423, 1328, 1272, 1250, 1111, 1093, 1071, 1023, 912, 814. Anal. Calcd. for $C_{12}H_{12}F_3NO_2$: C, 55.60; H, 4.67. Found: C, 55.89; H, 4.67.

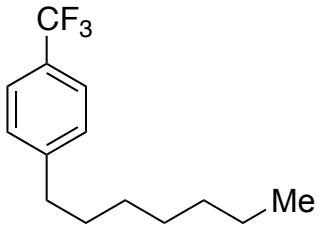


***N*,*N*-Diethyl-4-(trifluoromethyl)benzenesulfonamide** (**2e**) Following the general procedure for Table 1 and general workup procedure A, a solution of *N*,*N*-diethyl-4-iodobenzenesulfonamide (814 mg, 2.4 mmol, 0.6 M) in NMP was loaded in syringe B. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with 0-3 % EtOAc in hexanes) to give the title compound as a colorless oil (261 mg, 93 %). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.91 (d, *J* = 8.4 Hz, 2 H), 7.73 (d, *J* = 8.1 Hz, 2 H), 3.23 (q, *J* = 7.2 Hz, 4 H), 1.10 (t, *J* = 7.2 Hz, 6 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 144.1, 134.0 (q, *J* = 33.7 Hz), 127.5, 126.2 (q, *J* = 3.8 Hz), 123.4 (q, *J* = 271.1 Hz), 42.2, 14.2 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -

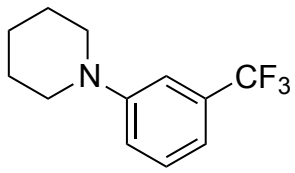
65.0 ppm. IR (neat, cm^{-1}): 1320, 1157, 1128, 1107, 1061, 1013, 935, 843, 717, 681. Anal. Calcd. for $C_{11}H_{14}F_3NO_2S$: C, 46.97; H, 5.02. Found: C, 47.22; H, 5.13.



1,3-Dichloro-5-(trifluoromethyl)benzene (**2f**)[4] Following the general procedure for Table 1 and general workup procedure A, a solution of 1,3-dichloro-5-iodobenzene (654 mg, 2.4 mmol, 0.6 M) in NMP was loaded in syringe B. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with pentane) to give the title compound as a colorless oil (172 mg, 80 %). ^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.55 (s, 1 H), 7.51 (s, 2 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ: 136.0, 133.5 (q, J = 33.5 Hz), 132.2, 124.2 (q, J = 3.7 Hz), 122.7 (q, J = 271.5 Hz) ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -63.9 ppm. IR (neat, cm^{-1}): 1574, 1434, 1306, 1176, 1133, 1096, 869, 805, 733, 690.

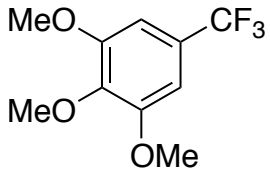


1-Heptyl-4-(trifluoromethyl)benzene (**2f**)[5] Following the general procedure for Table 1 and general workup procedure A, a solution of 1-heptyl-4-iodobenzene (724 mg, 2.4 mmol, 0.6 M) in NMP was loaded in syringe B. The reactor was heated at 205-210 °C. The crude mixture was purified by flash column chromatography (eluting with hexanes) to give the title compound as a colorless oil (217 mg, 89 %). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.54 (d, J = 8.1 Hz, 2 H), 7.29 (d, J = 7.8 Hz, 2 H), 2.67 (t, J = 7.5 Hz, 2 H), 1.67-1.59 (m, 2 H), 1.34-1.29 (m, 8 H), 0.90 (t, J = 6.9 Hz, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 147.2, 128.8, 128.2 (q, J = 32.0 Hz), 125.3 (q, J = 3.8 Hz), 124.7 (q, J = 269.9 Hz), 36.0, 32.0, 31.4, 29.4, 29.3, 22.9, 14.2 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -64.2 ppm. IR (neat, cm^{-1}): 2927, 2857, 1322, 1161, 1117, 1066, 1018, 841, 817.

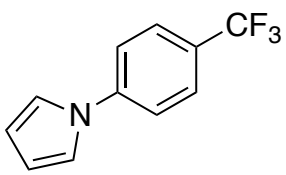


1-(3-(Trifluoromethyl)phenyl)piperidine (**2g**)[3] Following the general procedure for Table 1 and general workup procedure A, a solution of 1-(3-iodophenyl)piperidine (689 mg, 2.4 mmol, 0.6 M) in NMP was loaded in syringe B. The reactor was heated at

205-210 °C. The crude mixture was purified by flash column chromatography (eluting with 0-2 % EtOAc in hexanes) to give the title compound as a colorless oil (185 mg, 81 %). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.35 (t, *J* = 8.1 Hz, 1 H), 7.17 (s, 1 H), 7.11-7.06 (m, 2 H), 3.23 (t, *J* = 5.4 Hz, 4 H), 1.78-1.70 (m, 4 H), 1.67-1.60 (m, 2 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 152.3, 131.4 (q, *J* = 31.3 Hz), 129.5, 124.6 (q, *J* = 270.8 Hz), 119.3, 115.2 (q, *J* = 3.9 Hz), 112.5 (q, *J* = 4.0 Hz), 50.2, 25.8, 24.3 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -64.6 ppm. IR (neat, cm^{-1}): 2936, 1608, 1494, 1448, 1306, 1160, 1115, 1074, 939, 782, 694.

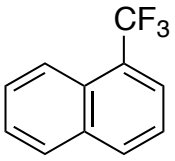


1,2,3-Trimethoxy-5-(trifluoromethyl)benzene (**2h**) Following the general procedure for Table 1 and general workup procedure A, a solution of 5-iodo-1,2,3-trimethoxybenzene (706 mg, 2.4 mmol, 0.6 M) in NMP was loaded in syringe B. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with 0-4 % EtOAc in hexanes) to give the title compound as a white solid (203 mg, 86 %), mp = 68-69 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 6.82 (s, 2 H), 3.89 (s, 6 H), 3.88 (s, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 153.5, 140.6, 125.8 (q, *J* = 32.6 Hz), 124.1 (q, *J* = 270.3 Hz), 102.5 (q, *J* = 3.8 Hz), 60.9, 56.3 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -64.0 ppm. IR (neat, cm^{-1}): 1596, 1465, 1418, 1357, 1229, 1164, 1113, 991, 908, 893, 842, 730. Anal. Calcd. for $C_{10}H_{11}F_3O_3$: C, 50.85; H, 4.69. Found: C, 51.14; H, 4.78.

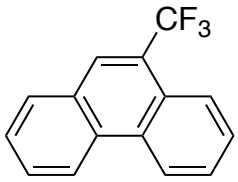


1-(4-(Trifluoromethyl)phenyl)-1*H*-pyrrole (**2i**)[3] Following the general procedure for Table 1 and general workup procedure B, a solution of 1-(4-iodophenyl)-1*H*-pyrrole (646 mg, 2.4 mmol, 0.6 M) in NMP was loaded in syringe B. The reactor was heated at 205-210 °C. The crude mixture was purified by flash column chromatography (eluting with 0-1 % EtOAc in hexanes) to give the title compound as a white solid (191 mg, 90 %), mp = 112-113 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.71 (d, *J* = 9.0 Hz, 2 H), 7.50 (d, *J* = 8.1 Hz, 2 H), 7.16 (t, *J* = 2.1 Hz, 2 H), 6.43 (t, *J* = 2.1 Hz, 2 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 143.3, 127.5 (q, *J* = 32.9 Hz), 127.0 (q, *J* = 3.8 Hz), 124.1 (q,

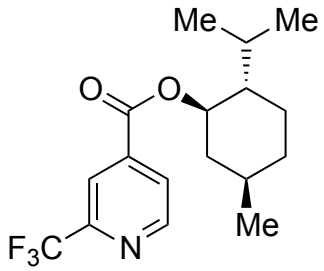
J = 269.9 Hz), 120.0, 119.2, 111.6 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -64.1 ppm. IR (neat, cm^{-1}): 1619, 1529, 1475, 1320, 1113, 1073, 1012, 920, 833, 722.



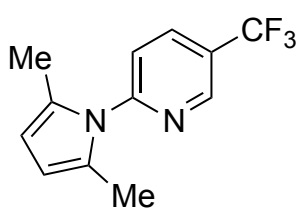
1-(Trifluoromethyl)naphthalene (**2j**)[3] Following the general procedure for Table 1 and general workup procedure A, a solution of 1-iodonaphthalene (610 mg, 2.4 mmol, 0.6 M) in NMP was loaded in syringe B. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with hexanes) to give the title compound as a colorless oil (171 mg, 87 %). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.27 (d, J = 8.4 Hz, 1 H), 8.03 (d, J = 8.4 Hz, 1 H), 7.92 (t, J = 7.8 Hz, 2 H), 7.69-7.57 (m, 2 H), 7.51 (t, J = 7.8 Hz, 1 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 134.0, 132.9 (q, J = 1.1 Hz), 129.1, 128.9, 127.8, 126.7, 126.2 (q, J = 29.9 Hz), 124.9 (q, J = 271.7 Hz), 124.8 (q, J = 5.9 Hz), 124.4 (q, J = 2.4 Hz), 124.3 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -61.7 ppm. IR (neat, cm^{-1}): 1514, 1354, 1313, 1261, 1201, 1109, 1067, 975, 801, 771.



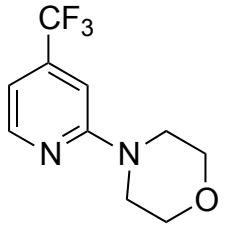
9-(Trifluoromethyl)phenanthrene (**2k**) Following the general procedure for Table 1 and general workup procedure B, syringe B was loaded with a solution of 9-iodophenanthrene (730 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 205-210 °C. The crude mixture was purified by flash column chromatography (eluting with hexanes) to give the title compound as a white solid (224 mg, 91 %), mp = 53-54 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.71-8.65 (m, 1 H), 8.60 (d, J = 8.4 Hz, 1 H), 8.35-8.28 (m, 1 H), 8.17 (s, 1 H), 7.89 (dd, J = 7.5, 1.2 Hz, 1 H), 7.76-7.68 (m, 3 H), 7.62 (dd, J = 7.5, 7.5 Hz, 1 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 131.9, 131.1, 130.0, 129.5, 129.1, 127.6, 127.5, 127.4, 127.1 (q, J = 6.3 Hz), 126.9 (q, J = 0.8 Hz), 125.3 (q, J = 2.7 Hz), 124.8 (q, J = 271.4 Hz), 124.7 (q, J = 29.6 Hz), 123.3, 122.8 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -62.2 ppm. IR (neat, cm^{-1}): 1450, 1325, 1263, 1143, 1109, 949, 905, 764, 745, 722. Anal. Calcd. for $C_{15}H_9F_3$: C, 73.17; H, 3.68. Found: C, 73.03; H, 3.65.



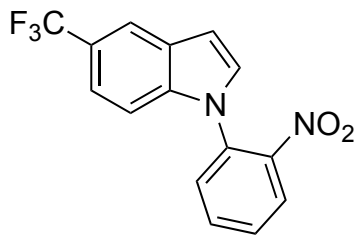
(1*R*,2*S*,5*R*)-2-Isopropyl-5-methylcyclohexyl-2-(trifluoromethyl)isonicotinate (**2m**) Following the general procedure for Table 2 and general workup procedure B, syringe B was loaded with a solution of (1*R*,2*S*,5*R*)-2-isopropyl-5-methylcyclohexyl 2-iodoisonicotinate (928 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with 0-3 % EtOAc in Hexanes) to give the title compound as a colorless oil (248 mg, 75 %). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.84 (d, *J* = 4.8 Hz, 1 H), 8.17 (s, 1 H), 8.02 (d, *J* = 4.8 Hz, 1 H), 4.96 (td, *J* = 10.8, 4.5 Hz, 1 H), 2.11-2.02 (m, 1 H), 1.91-1.78 (m, 1 H), 1.76-1.64 (m, 2 H), 1.62-1.43 (m, 2 H), 1.17-1.01 (m, 2 H), 0.99-0.82 (m, 7 H), 0.75 (d, *J* = 6.9 Hz, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 163.4, 151.0, 149.3 (q, *J* = 35.0 Hz), 139.9, 125.8, 121.3 (q, *J* = 272.6 Hz), 119.9, 76.8, 47.1, 40.8, 34.2, 31.5, 26.6, 23.6, 22.0, 20.7, 16.4 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -70.0 ppm. IR (neat, cm^{-1}): 2957, 2930, 1725, 1325, 1252, 1238, 1179, 1143, 1081, 955, 763, 696. Anal. Calcd. for $C_{17}H_{22}F_3NO_2$: C, 61.99; H, 6.73. Found: C, 62.25; H, 6.73.



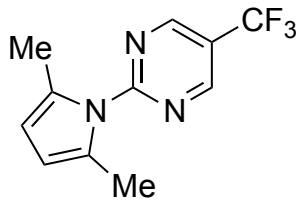
2-(2,5-Dimethyl-1*H*-pyrrol-1-yl)-5-(trifluoromethyl)pyridine (**2n**) Following the general procedure for Table 2 and general workup procedure B, syringe B was loaded with a solution of 2-(2,5-dimethyl-1*H*-pyrrol-1-yl)-5-iodopyridine (716 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with 0-5 % EtOAc in hexanes) to give the title compound as a white solid (198 mg, 82 %), mp = 71-72 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.88 (d, *J* = 2.7 Hz, 1 H), 8.07 (dd, *J* = 8.4, 2.7 Hz, 1 H), 7.35 (d, *J* = 8.4 Hz, 1 H), 5.95 (s, 2 H), 2.19 (s, 6 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 154.9, 146.5 (q, *J* = 4.1 Hz), 135.3 (q, *J* = 3.4 Hz), 128.9, 124.9 (q, *J* = 33.2 Hz), 123.5 (q, *J* = 270.6 Hz), 121.3, 108.3, 13.5 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -64.0 ppm. IR (neat, cm^{-1}): 1600, 1491, 1405, 1325, 1165, 1129, 1082, 1014, 764. Anal. Calcd. for $C_{12}H_{11}F_3N_2$: C, 60.00; H, 4.62. Found: C, 59.72; H, 4.63.



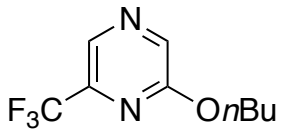
4-(4-(Trifluoromethyl)pyridin-2-yl)morpholine (**2o**) Following the general procedure for Table 2 and general workup procedure B, syringe B was loaded with a solution of 4-(4-iodopyridin-2-yl)morpholine (696 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with 0-5 % EtOAc in hexanes) to give the title compound as a white solid (212 mg, 91 %), mp = 36-37 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.28 (dd, *J* = 4.2, 3.6 Hz, 1 H), 6.81-6.73 (m, 2 H), 3.81-3.75 (m, 4 H), 3.56-3.49 (m, 4 H) ppm.^{13}C NMR (75 MHz, $CDCl_3$) δ: 159.6, 149.3, 139.8 (q, *J* = 32.9 Hz), 123.2 (q, *J* = 271.4 Hz), 108.7 (q, *J* = 3.4 Hz), 102.3 (q, *J* = 4.1 Hz), 66.6, 45.3 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -67.1 ppm. IR (neat, cm^{-1}): 2854, 1609, 1483, 1435, 1319, 1297, 1243, 1168, 1119, 1090, 982, 956. Anal. Calcd. for $C_{10}H_{11}F_3N_2O$: C, 51.73; H, 4.77. Found: C, 51.45; H, 4.63.



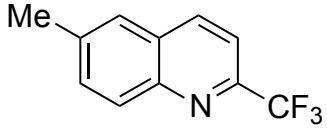
1-(2-Nitrophenyl)-5-(trifluoromethyl)-1*H*-indole (**2p**) Following the general procedure for Table 2 and general workup procedure B, syringe B was loaded with a solution of 5-iodo-1-(2-nitrophenyl)-1*H*-indole (874 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 205-210 °C. The crude mixture was purified by flash column chromatography (eluting with 0-15 % EtOAc in hexanes) to give the title compound as a light yellow solid (258 mg, 84 %), mp = 122-123 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.08 (dd, *J* = 8.1, 1.5 Hz, 1 H), 8.00 (s, 1 H), 7.77 (ddd, *J* = 7.5, 7.5, 1.5 Hz, 1 H), 7.63 (ddd, *J* = 7.5, 7.5, 1.5 Hz, 1 H), 7.57 (dd, *J* = 7.8, 1.5 Hz, 1 H) , 7.44 (d, *J* = 8.7 Hz, 1 H), 7.28 (d, *J* = 3.3 Hz, 1 H), 7.19 (d, *J* = 8.4 Hz, 1 H), 6.82 (d, *J* = 3.3 Hz, 1 H). ^{13}C NMR (75 MHz, $CDCl_3$) δ: 146.3, 138.2, 134.1, 132.1, 130.0, 129.9, 129.3, 128.4, 125.8, 125.2 (q, *J* = 270.1 Hz), 123.4 (q, *J* = 31.7 Hz), 119.8 (q, *J* = 3.5 Hz), 119.1 (q, *J* = 4.2 Hz), 109.9, 105.6 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -62.4 ppm. IR (neat, cm^{-1}): 1606, 1527, 1497, 1338, 1317, 1234, 1191, 1108, 1053, 850, 714. HRMS (ESI) *m/z* $[M + H]^+$ calcd. for $C_{15}H_{10}F_3N_2O_2$: 307.0689, found: 307.0691.



2-(2,5-Dimethyl-1*H*-pyrrol-1-yl)-5-(trifluoromethyl) pyrimidine (**2q**) Following the general procedure for Table 2 and general workup procedure B, syringe B was loaded with a solution of 2-(2,5-dimethyl-1*H*-pyrrol-1-yl)-5-iodopyrimidine (718 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with 0-3 % EtOAc in hexanes) to give the title compound as a light yellow oil (153 mg, 63 %). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.97 (s, 2 H), 5.96 (s, 2 H), 2.44 (s, 6 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 160.1, 155.6 (q, J = 3.6 Hz), 130.9, 123.1 (q, J = 270.1 Hz), 120.8 (q, J = 34.4 Hz), 110.5, 15.7 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -63.8 ppm. IR (neat, cm^{-1}): 1604, 1555, 1459, 1396, 1321, 1231, 1131, 1101, 1018, 979. HRMS (ESI) *m/z* $[M + H]^+$ calcd. for $C_{11}H_{11}F_3N_3$: 242.0900, found: 242.0901.

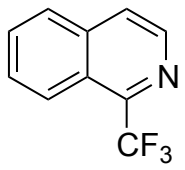


2-Butoxy-6-(trifluoromethyl)pyrazine (**2r**) Following the general procedure for Table 2 and general workup procedure A, syringe B was loaded with a solution of 2-butoxy-6-iodopyrazine (668 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with 0-3 % EtOAc in hexanes) to give the title compound as a colorless oil (141 mg, 64 %). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.43 (s, 1 H), 8.37 (s, 1 H), 4.37 (t, J = 6.6 Hz, 2 H), 1.82-1.72 (m, 2 H), 1.53-1.41 (m, 2 H), 0.96 (t, J = 7.5 Hz, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 159.9, 140.0 (q, J = 34.9 Hz), 139.9 (q, J = 1.4 Hz), 132.6 (q, J = 3.8 Hz), 121.2 (q, J = 272.3 Hz), 67.2, 30.7, 19.2, 13.8 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -70.1 ppm. IR (neat, cm^{-1}): 2962, 1546, 1453, 1430, 1344, 1294, 1224, 1143, 1115, 1003, 882. Anal. Calcd. for $C_9H_{11}F_3N_2O$: C, 49.09; H, 5.04. Found: C, 49.80; H, 5.28.

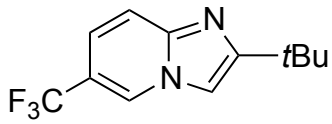


6-Methyl-2-(trifluoromethyl)quinoline (**2s**)[7] Following the general procedure for Table 2 and general workup procedure A, syringe B was loaded with a solution of 2-iodo-6-methylquinoline (646 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column

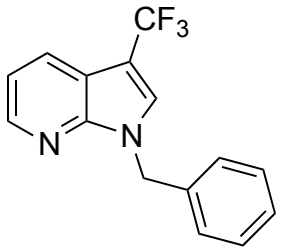
chromatography (eluting with 0-2 % EtOAc in hexanes) to give the title compound as a white solid (166 mg, 79 %), mp = 90-91 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.22 (d, *J* = 8.4 Hz, 1 H), 8.10 (d, *J* = 9.0 Hz, 1 H), 7.70-7.61 (m, 3 H), 2.56 (s, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 147.0 (q, *J* = 34.8 Hz), 145.8, 138.9, 137.3, 133.2, 129.7, 127.0, 126.5, 121.8 (q, *J* = 273.3 Hz), 116.7 (q, *J* = 2.3 Hz), 21.7 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -69.3 ppm. IR (neat, cm^{-1}): 1345, 1336, 1306, 1129, 1109, 1085, 910, 833, 733.



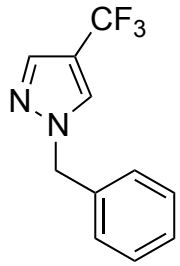
1-(Trifluoromethyl)isoquinoline (2t)[8] Following the general procedure for Table 2 and general workup procedure A, syringe B was loaded with a solution of 1-iodoisoquinoline (612 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 200-205 °C. The crude mixture was purified via by flash column chromatography (eluting with 0-5 % EtOAc in hexanes) to give the title compound as a colorless oil (129 mg, 66 %). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.57 (d, *J* = 5.4 Hz, 1 H), 8.29 (d, *J* = 7.5 Hz, 1 H), 7.91 (d, *J* = 7.5 Hz, 1 H), 7.83 (d, *J* = 5.4 Hz, 1 H), 7.90-7.66 (m, 2 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 146.3 (q, *J* = 32.9 Hz), 140.7, 137.1, 130.9, 128.8, 127.5, 124.6, 124.5 (q, *J* = 0.8 Hz), 124.4 (q, *J* = 3.1 Hz), 122.3 (q, *J* = 274.7 Hz) ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -64.9 ppm. IR (neat, cm^{-1}): 1300, 1255, 1232, 1191, 1167, 1115, 986, 872, 747, 687, 657.



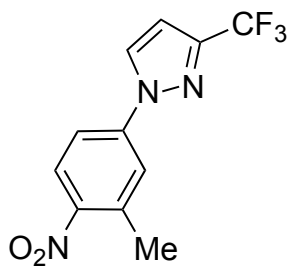
2-(*tert*-Butyl)-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine (2u) Following the general procedure for Table 2 and general workup procedure B, syringe B was loaded with a solution of 2-(*tert*-butyl)-6-iodoimidazo[1,2-*a*]pyridine (720 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 200-205 °C. The crude mixture was purified via by flash column chromatography (eluting with 0-10 % EtOAc in hexanes) to give the title compound as a white solid (158 mg, 65 %), mp = 81-82 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.38 (s, 1 H), 7.61 (d, *J* = 9.6 Hz, 1 H), 7.41 (s, 1 H), 7.21 (dd, *J* = 9.3, 1.8 Hz, 1 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 159.4, 144.8, 124.5 (q, *J* = 5.5 Hz), 123.8 (q, *J* = 269.0 Hz), 119.8 (q, *J* = 2.7 Hz), 117.8, 116.2 (q, *J* = 33.9 Hz), 108.2, 32.5, 30.1 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -63.8 ppm. IR (neat, cm^{-1}): 2962, 1648, 1381, 1333, 1304, 1164, 1121, 1053, 805, 672. Anal. Calcd. for $C_{12}H_{13}F_3N_2$: C, 59.50; H, 5.41. Found: C, 59.46; H, 5.46.



1-Benzyl-3-(trifluoromethyl)-1*H*-pyrrolo[2,3-*b*]pyridine (**2v**) Following the general procedure for Table 2 and general workup procedure B, syringe B was loaded with a solution of 1-benzyl-3-iodo-1*H*-pyrrolo[2,3-*b*]pyridine (802 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 205-210 °C. The crude mixture was purified via by flash column chromatography (eluting with 0-5 % EtOAc in hexanes) to give the title compound as a white solid (228 mg, 83 %), mp = 53-54 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.48 (d, *J* = 4.5 Hz, 1 H), 8.08 (d, *J* = 8.1 Hz, 1 H), 7.54 (s, 1 H), 7.39-7.31 (m, 3 H), 7.31-7.25 (m, 2 H), 7.22 (dd, *J* = 8.1, 4.8 Hz, 1 H), 5.52 (s, 2 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 147.4, 144.8, 136.6, 129.0, 128.2, 128.1, 127.9, 127.5 (q, *J* = 5.1 Hz), 123.9 (q, *J* = 264.7 Hz), 117.6, 116.6, 105.0 (q, *J* = 37.6 Hz), 48.3 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -59.0 ppm. IR (neat, cm^{-1}): 1603, 1550, 1455, 1266, 1174, 1133, 1093, 953, 774, 696. Anal. Calcd. for $C_{15}H_{11}F_3N_2$: C, 65.21; H, 4.01. Found: C, 60.03; H, 4.03.



1-Benzyl-4-(trifluoromethyl)-1*H*-pyrazole (**2w**) Following the general procedure for Table 2 and general workup procedure B, syringe B was loaded with a solution of 1-benzyl-4-iodo-1*H*-pyrazole (682 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 200-205 °C. The crude mixture was purified by flash column chromatography (eluting with 0-5 % EtOAc in hexanes) to give the title compound as a colorless oil (173 mg, 77 %). ^{1}H NMR (300 MHz, $CDCl_3$) δ: 7.75 (s, 1 H), 7.64 (s, 1 H), 7.42-7.35 (m, 3 H), 7.30-7.23 (m, 2 H), 5.32 (s, 2 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 144.6, 137.1 (q, *J* = 2.9 Hz), 135.2, 129.1, 128.6, 128.0, 122.7 (q, *J* = 264.2 Hz), 114.0 (q, *J* = 38.0 Hz), 56.5 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -58.2 ppm. IR (neat, cm^{-1}): 1574, 1399, 1230, 1192, 1111, 993, 967, 739, 710. HRMS (ESI) *m/z* $[M + H]^+$ calcd. for $C_{11}H_{10}F_3N_2$: 227.0791, found: 227.0792.



1-(3-Methyl-4-nitrophenyl)-3-(trifluoromethyl)-1*H*-pyrazole (**2x**) Following the general procedure for Table 2 and general workup procedure B, syringe B was loaded with a solution of 3-iodo-1-(3-methyl-4-nitrophenyl)-1*H*-pyrazole (790 mg, 2.4 mmol, 0.6 M) in NMP. The reactor was heated at 205-210 °C. The crude mixture was purified by flash column chromatography (eluting with 0-5 % EtOAc in hexanes) to give the title compound as a light yellow solid (175 mg, 65 %), mp = 86-87 °C. ^{1}H NMR (300 MHz, $CDCl_3$) δ: 8.12 (d, *J* = 8.7 Hz, 1 H), 8.06 (d, *J* = 2.7 Hz, 1 H), 7.76 (d, *J* = 2.4 Hz, 1 H), 7.67 (dd, *J* = 8.7, 2.7 Hz, 1 H), 6.78 (d, *J* = 2.4 Hz, 1 H), 2.68 (s, 3 H) ppm. ^{13}C NMR (75 MHz, $CDCl_3$) δ: 147.4, 145.3 (q, *J* = 38.6 Hz), 142.0, 136.4, 128.8, 126.8, 123.0, 120.9 (q, *J* = 267.5 Hz), 117.2, 107.2 (q, *J* = 2.0 Hz), 21.1 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -64.3 ppm. IR (neat, cm^{-1}): 1589, 1519, 1337, 1282, 1118, 1057, 977, 964, 875, 767. Anal. Calcd. for $C_{11}H_8F_3N_3O_2$: C, 48.72; H, 2.97. Found: C, 48.79; H, 2.99.

General Setup for Scheme 2

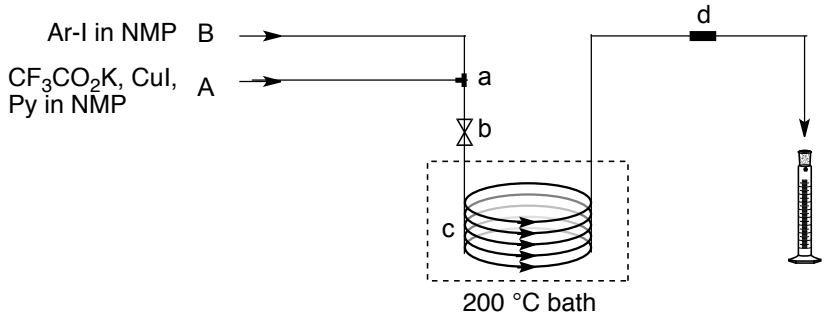
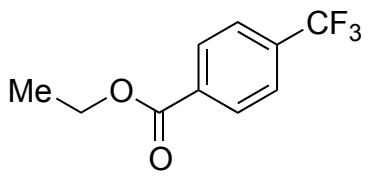


Figure S-3

a: T-mixer; b: in line check valve; c: stainless-steel-tube reactor (3.2 mL volume); d: back-pressure regulator (100 psi × 2)

Procedure for Scheme 2



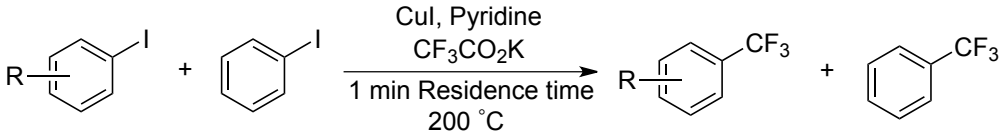
Ethyl 4-(trifluoromethyl)benzoate (2y)[9]

All reagents were added to oven-dried, screw-top, volumetric flasks that were fitted with Teflon screw-caps. The vessels were then evacuated and backfilled with argon. This process was repeated a total of 3 times.

A 25.0 mL volumetric flask was charged with CF_3CO_2K (3.14 g, 20.0 mmol, 0.8 M) and CuI (3.81 g, 20.0 mmol, 0.8 M). Pyridine (1.94 mL, 24.0 mmol) and anhydrous 1-methyl-2-pyrrolidinone (NMP) were added to make the solution volume 25.0 mL. A 10.0 mL volumetric flask was charged with CF_3CO_2K (1.22 g, 8.0 mmol, 0.8 M) and CuI (1.52 g, 8.0 mmol, 0.8 M). Pyridine (775 μL, 9.6 mmol) and anhydrous NMP were added to make the solution volume 10.0 mL. The volumetric flasks were sonicated to accelerate the dissolution of solids. Both solutions (total volume = 35 mL) were distributed by loading into four 8.0 mL stainless steel syringes, and fitted to two syringe pumps. The flow rate for each syringe was set to be 30.0 μL/min (120 μL/min in total). Following the setup as shown in **Figure S-3**, the solutions were combined through T-mixers and were injected from inlet A. A 25.0 mL volumetric flask was charged with ethyl 4-iodobenzoate (4.14 g, 15.0 mmol, 0.6 M). Anhydrous NMP was added to make the solution volume 25.0 mL. The solution was distributed by loading into three 8.0 mL stainless steel syringes, and fitted to two syringe pumps. The flow rate for each syringe was set to be 26.7 μL/min (80.1 μL/min in total). Following the setup as shown in **Figure S-3**, the solutions were combined through T-mixers and were injected from inlet B. The combined streams from A and B were introduced into the reactor at 200-205 °C. After reaching steady state (15-25 min as monitored with GC), a sample solution was collected into a graduated cylinder for 208 min (42 mL, 10 mmol). The collected mixture was diluted with Et_2O (150 mL) and water (100 mL). The water layer was separated and extracted with Et_2O (30 mL × 3). The combined organic layer was washed with saturated NH_4Cl (aq.) solution (20 mL × 2), brine (20 mL × 2), dried with $MgSO_4$, and concentrated in vacuo. The crude mixture was purified by flash column chromatography (eluting with 0-5 % EtOAc in hexanes) to give the title compound as a colorless oil (2.02 g, 93 %). ^{1}H NMR (400 MHz, $CDCl_3$) δ: 8.12 (d, J = 8.4 Hz, 2 H), 7.66 (d, J = 8.4 Hz, 2 H), 4.39 (q, J = 7.2 Hz, 2 H), 1.39 (t, J =

7.2 Hz, 3 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ: 165.4, 134.4 (q, J = 32.4 Hz), 133.8, 130.0, 125.4 (q, J = 3.7 Hz), 123.8 (q, J = 270.8 Hz), 61.6, 14.3 ppm. ^{19}F NMR (280 MHz, $CDCl_3$) δ: -63.6 ppm. IR (neat, cm^{-1}): 2985, 1720, 1323, 1273, 1125, 1098, 1065, 1017, 862, 774, 703.

Table S-2 The Hammett study of competition experiments [a]



Entry	R	k_X/k_H	$\log(k_X/k_H)$	σ ref [10]
1	4-CO_2Et	1.95	0.29	0.45
2	3-CO_2Et	1.55	0.19	0.37
3	H	0.00	0.00	0.00
4	4-*t*Bu	0.83	-0.08	-0.20
5	4-OMe	0.80	-0.10	-0.27

[a] Average results of three runs were shown. The ratios were determined by ^{19}F NMR.

General Setup for Figure 2

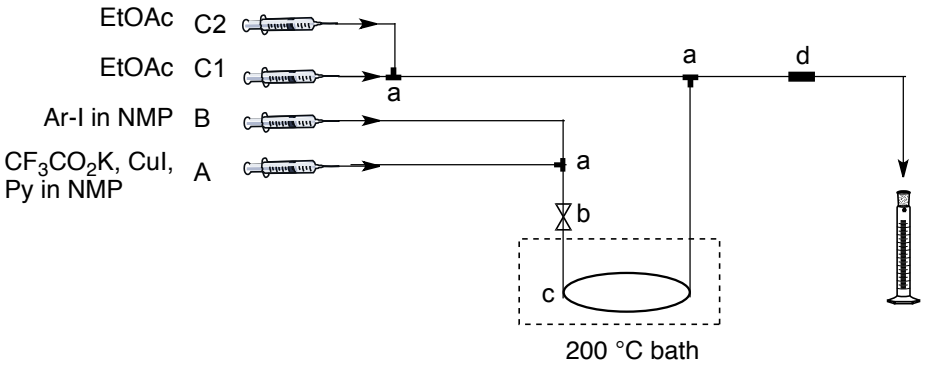


Figure S-4

a: T-mixer; b: in line check valve; c: stainless-steel-tube reactor (240 μL volume); d: back-pressure regulator (100 psi × 2)

General Procedure for Figure 2

All solid reagents were added to oven-dried, screw-top, volumetric flasks that were fitted with Teflon screw-caps. The vessels were then evacuated and backfilled with argon. This process was repeated a total of 3 times.

A 10.0 mL volumetric flask was charged with CF_3CO_2K (785 mg, 5.0 mmol, 0.5 M) and CuI (952 mg, 5.0 mmol, 0.5 M). Pyridine (480 μL, 6.0 mmol) and anhydrous 1-methyl-2-pyrrolidinone (NMP) were added to make the solution volume 10.0 mL. A 5.0 mL volumetric flask was charged with Ar-I (2.5 mmol, 0.5 M). Anhydrous NMP was added to make the solution volume of each vessel to 5.0 mL. The volumetric flasks were sonicated to accelerate the dissolution of solids. Following the setup as shown in **Figure S-4**, two solutions were loaded into two 8.0 mL stainless steel syringes A and B separately, and fitted to two syringe pumps. The flow rate for syringe A was set to be 40.0 μL/min. The flow rate for syringe B was set to be 200.0 μL/min. After mixing at a T-mixer, the solution was introduced into the reactor at 200 °C. EtOAc was loaded into two 8.0 mL stainless steel syringes C1 and C2 (flow rate = 50 μL/min for each syringe) and mixed with the resulting product stream from the reactor. After reaching steady state (8-15 min), a sample solution was collected into a test tube for 5 min. The mixture was diluted with NH_4Cl (aq.), brine and EtOAc. The organic layer was filtered through Celite before ^{19}F NMR analysis.

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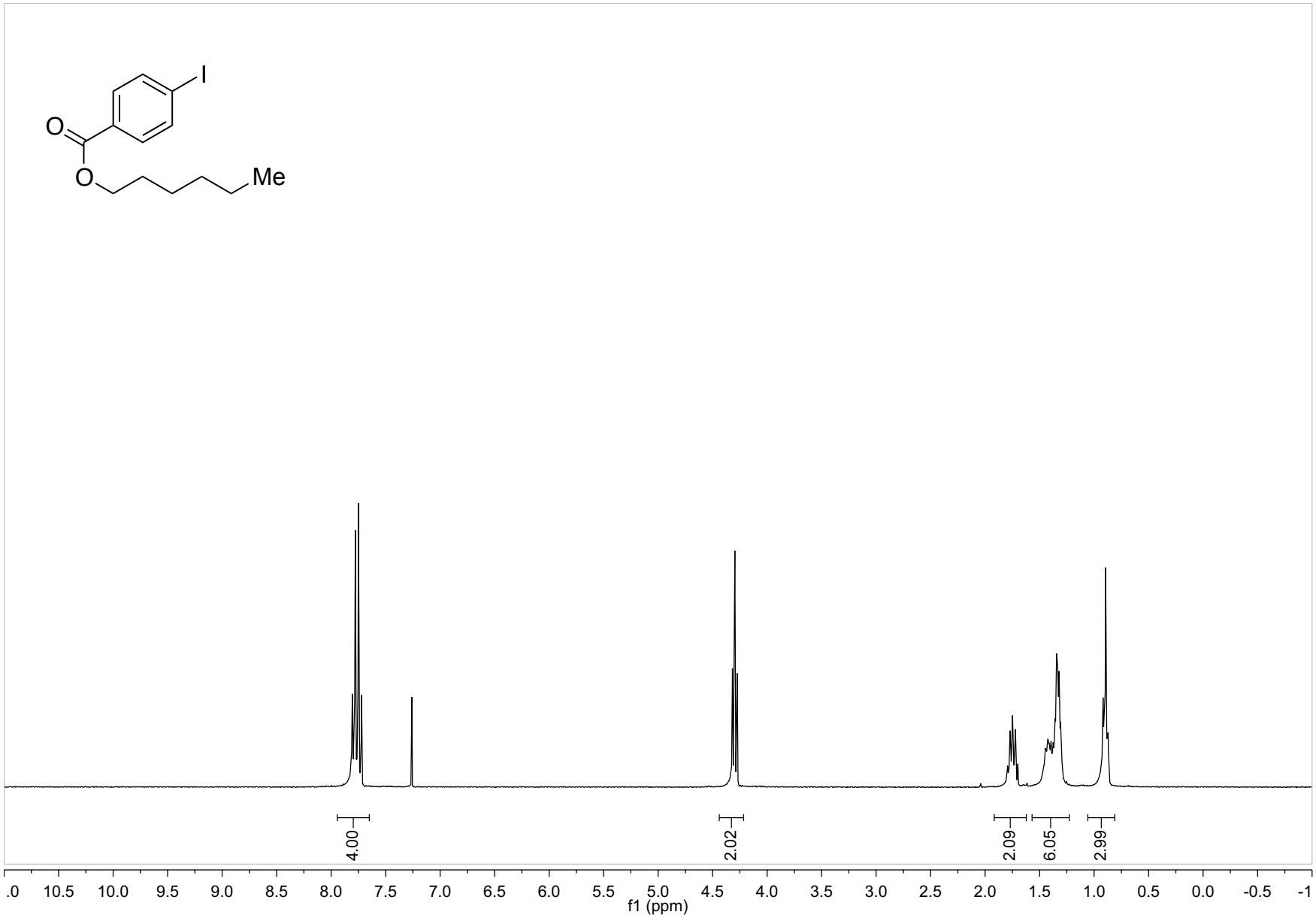
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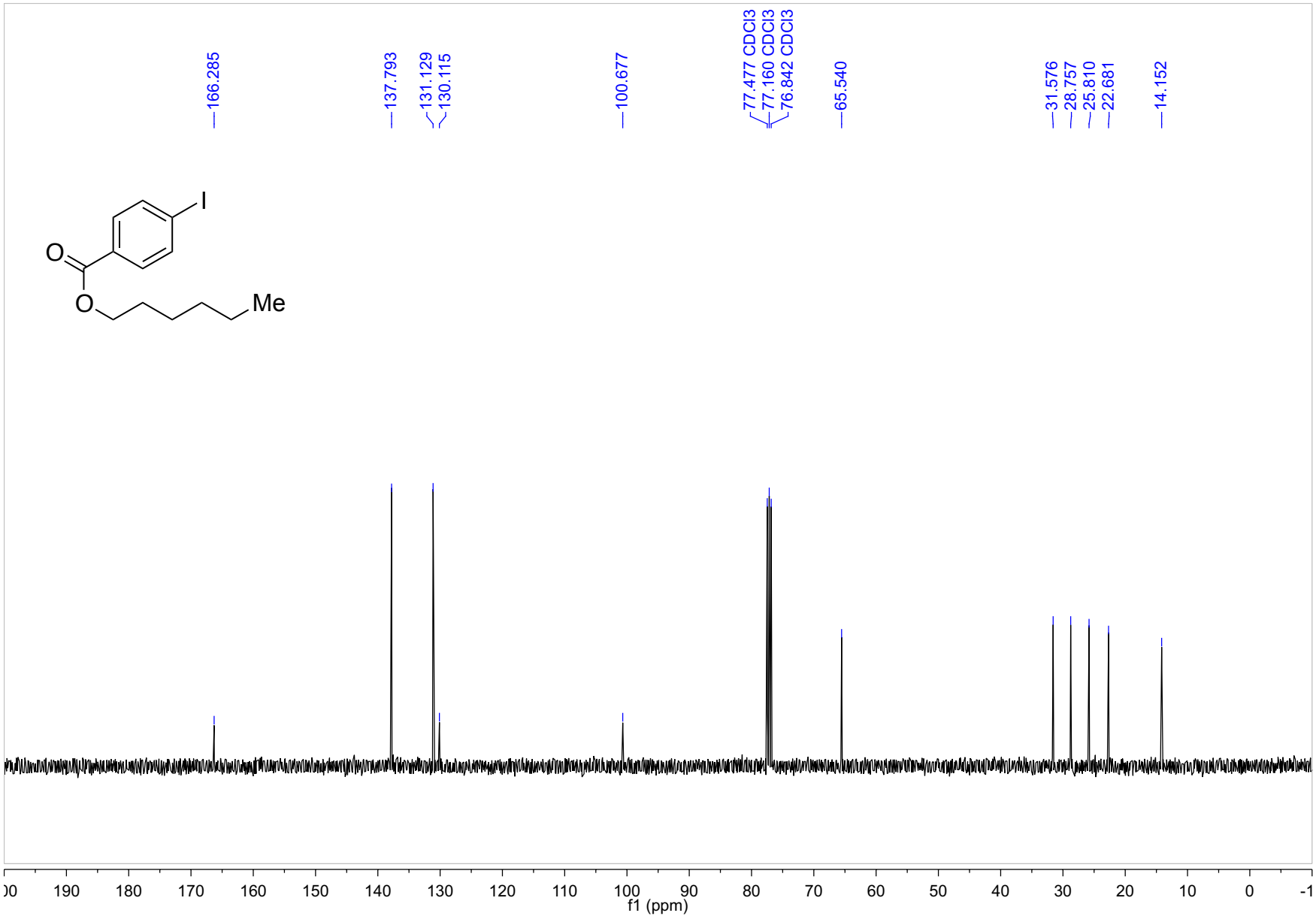
O
Me
4.00
2.02
2.09
6.05
2.99
.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)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130.115
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28.757
25.810
22.681
14.152
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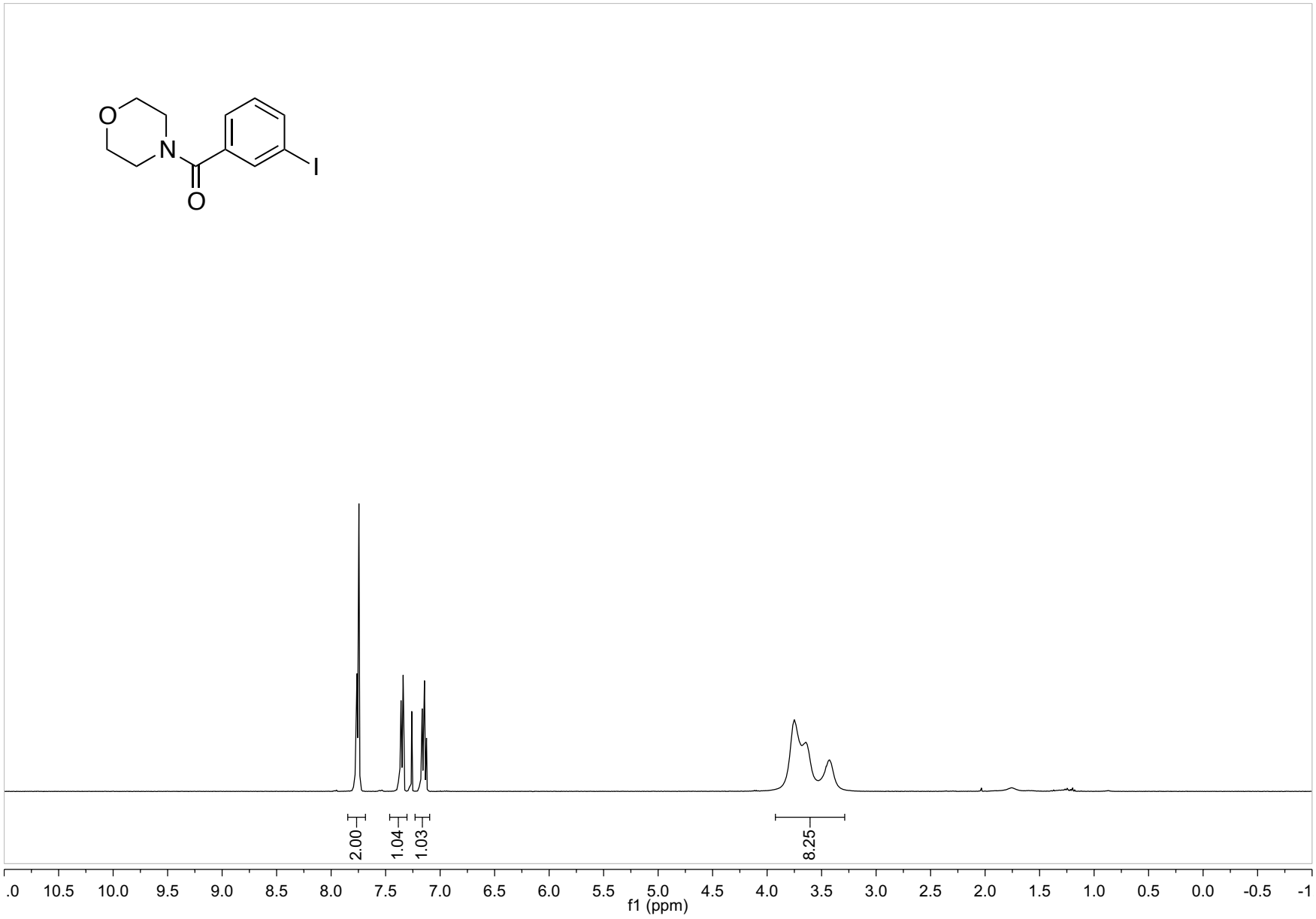
O
O
Me
f1 (ppm)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O
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1.03
8.25
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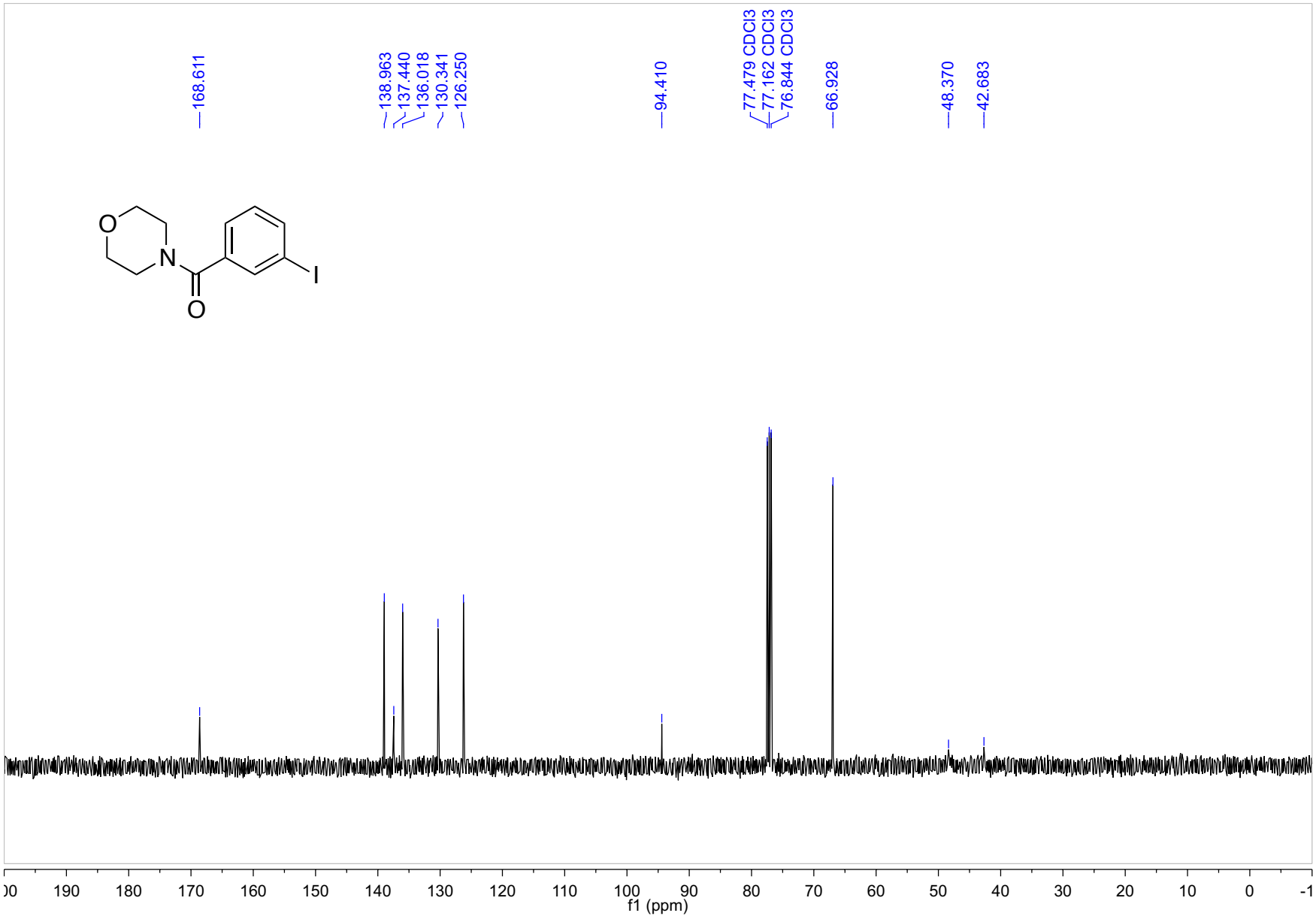
f1 (ppm)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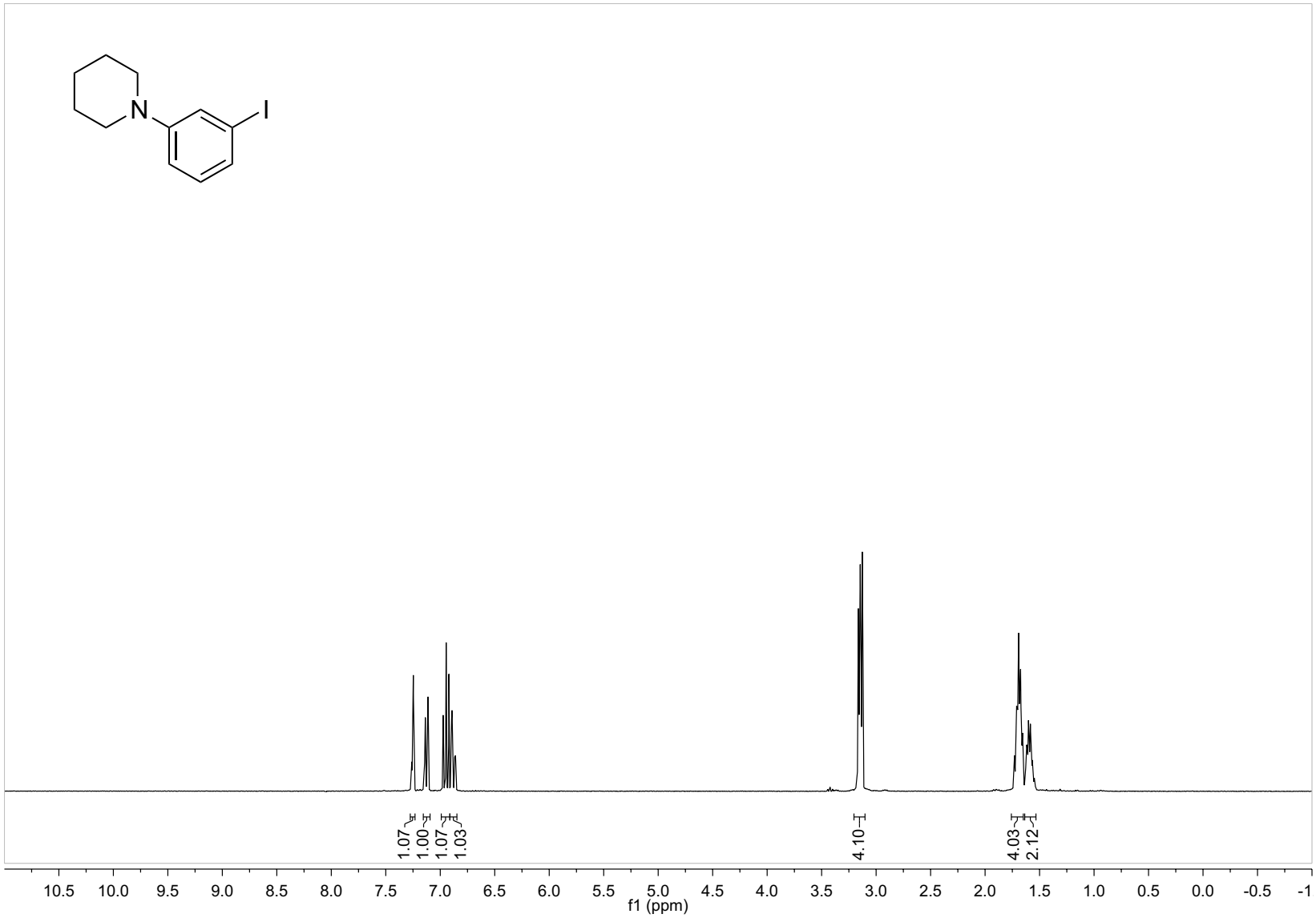
42.683
O
N
O
I
f1 (ppm)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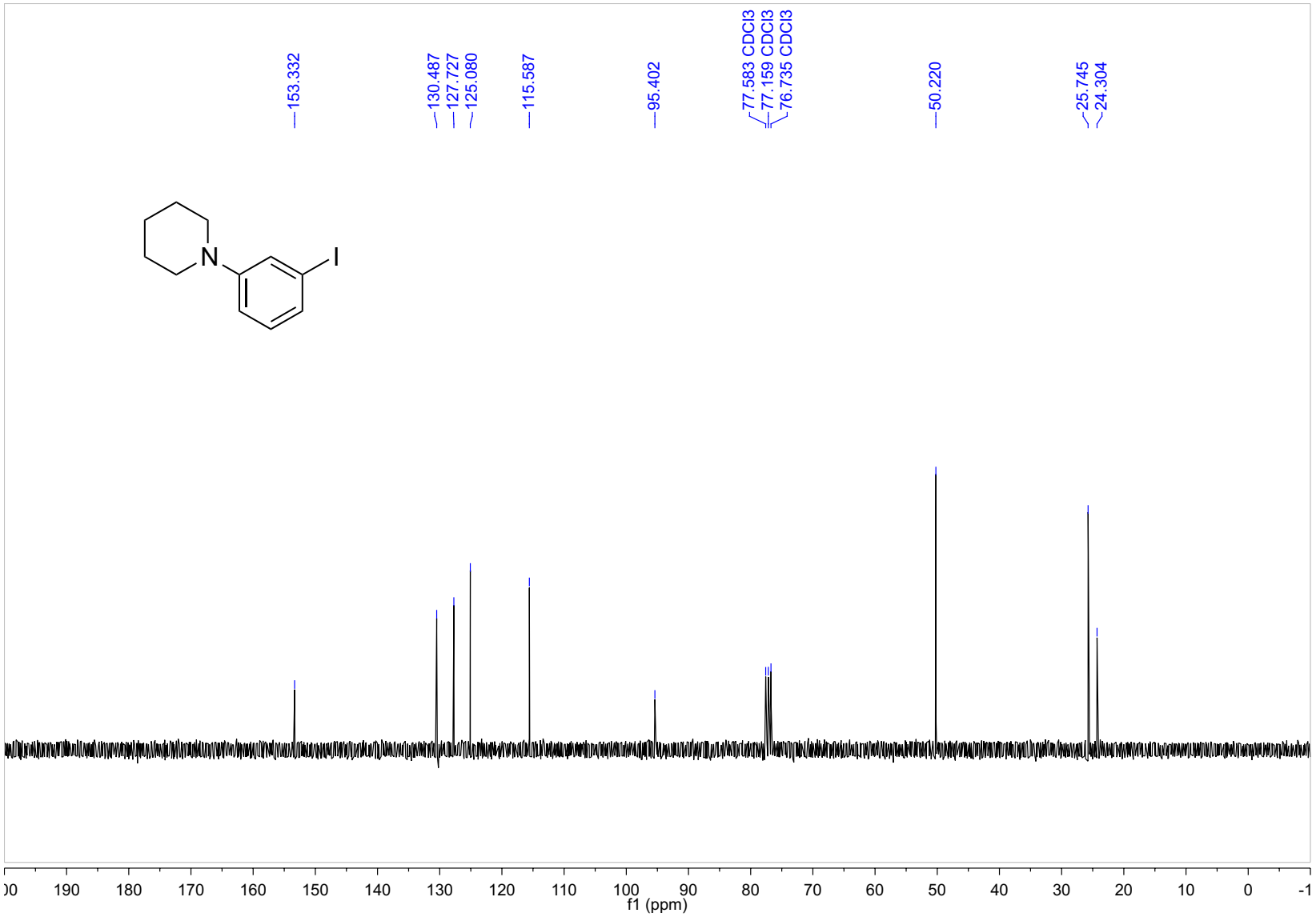
1.00
1.07
1.03
4.10
4.03
2.12
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)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77.159 CDCl3
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25.745
24.304
N
I
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180
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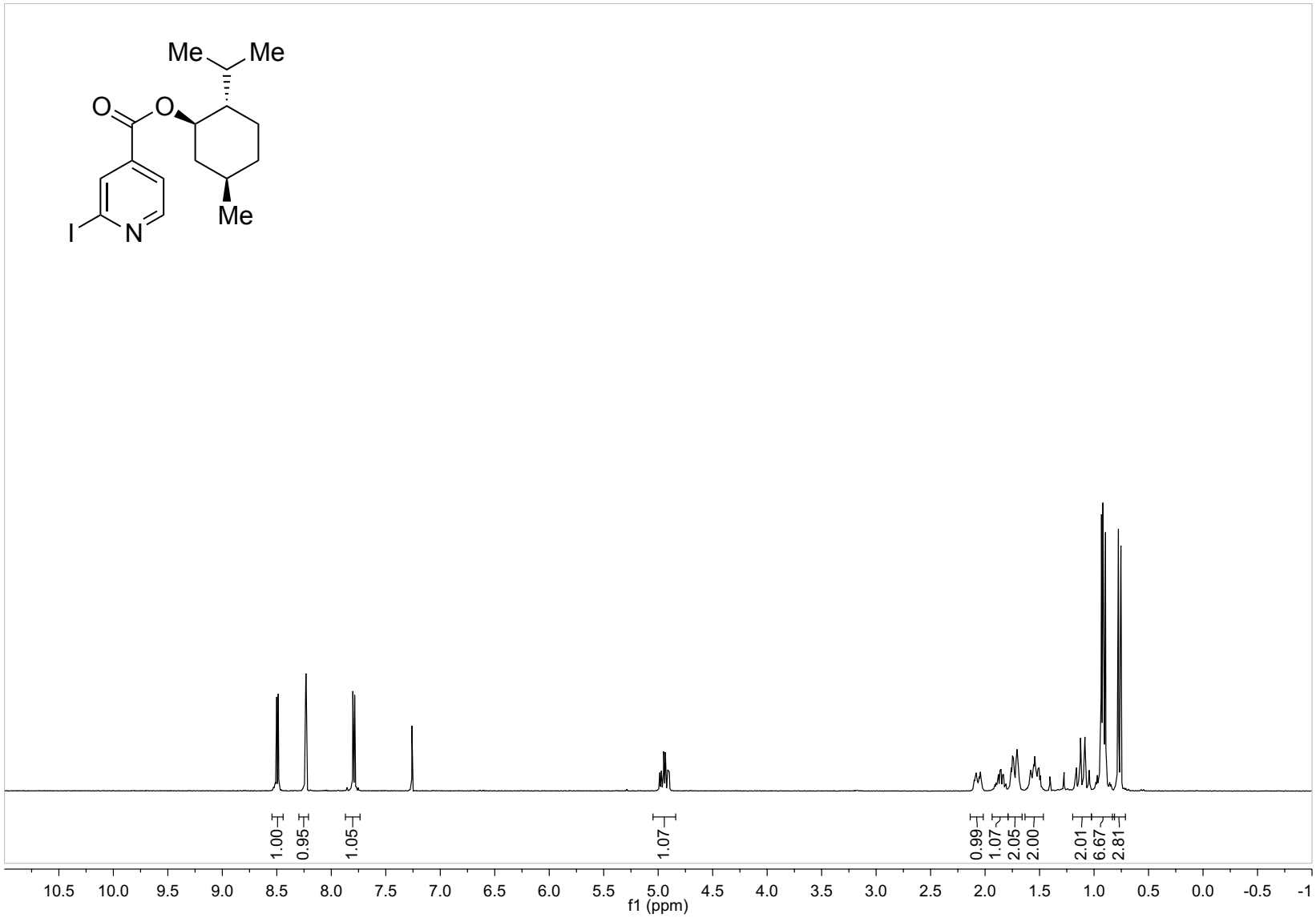
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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O
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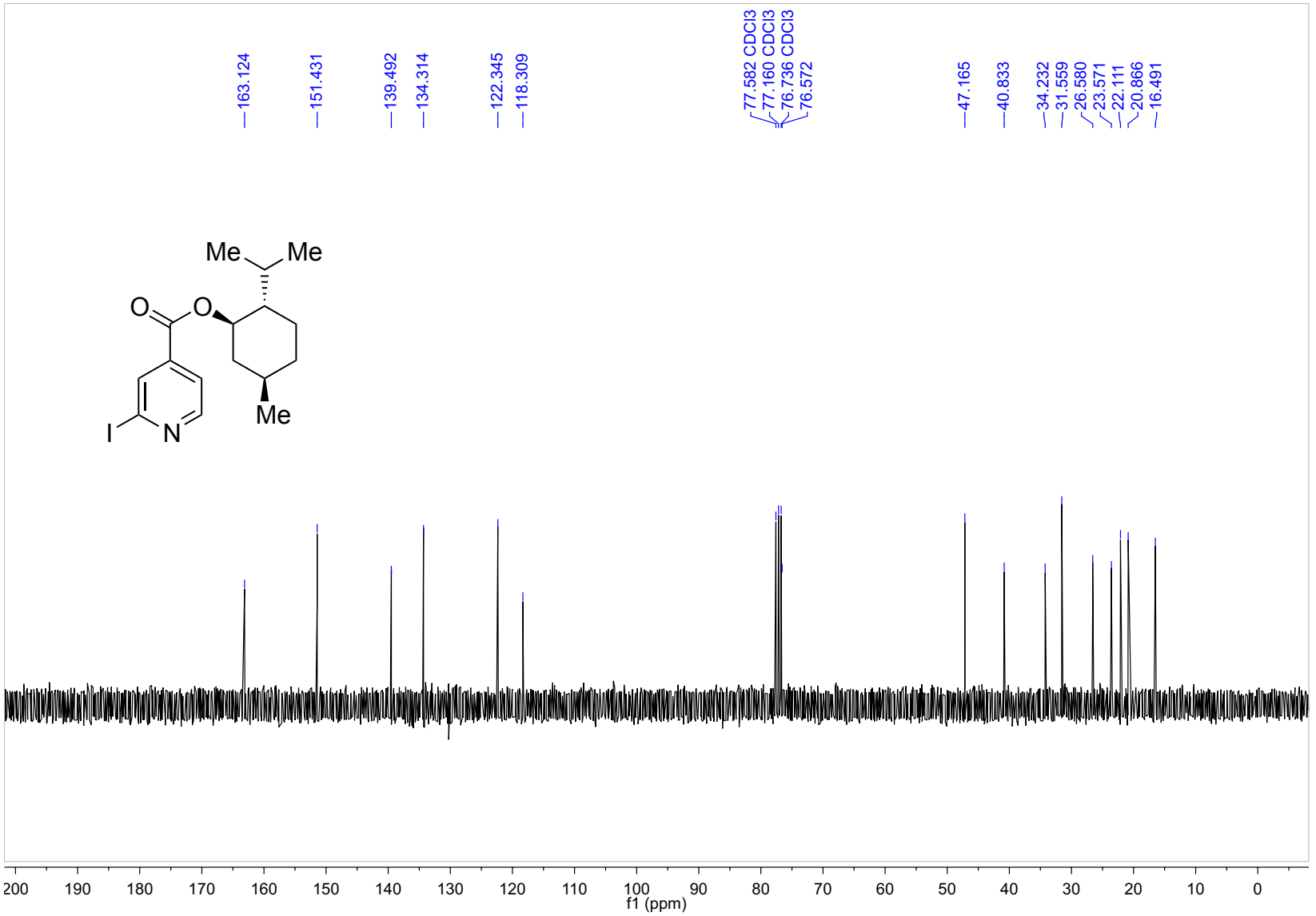
1.07
0.99
1.07
2.05
2.00
2.01
6.67
2.81
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)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26.580
23.571
22.111
20.866
16.491
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O
O
Me
I
N
200
190
180
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50
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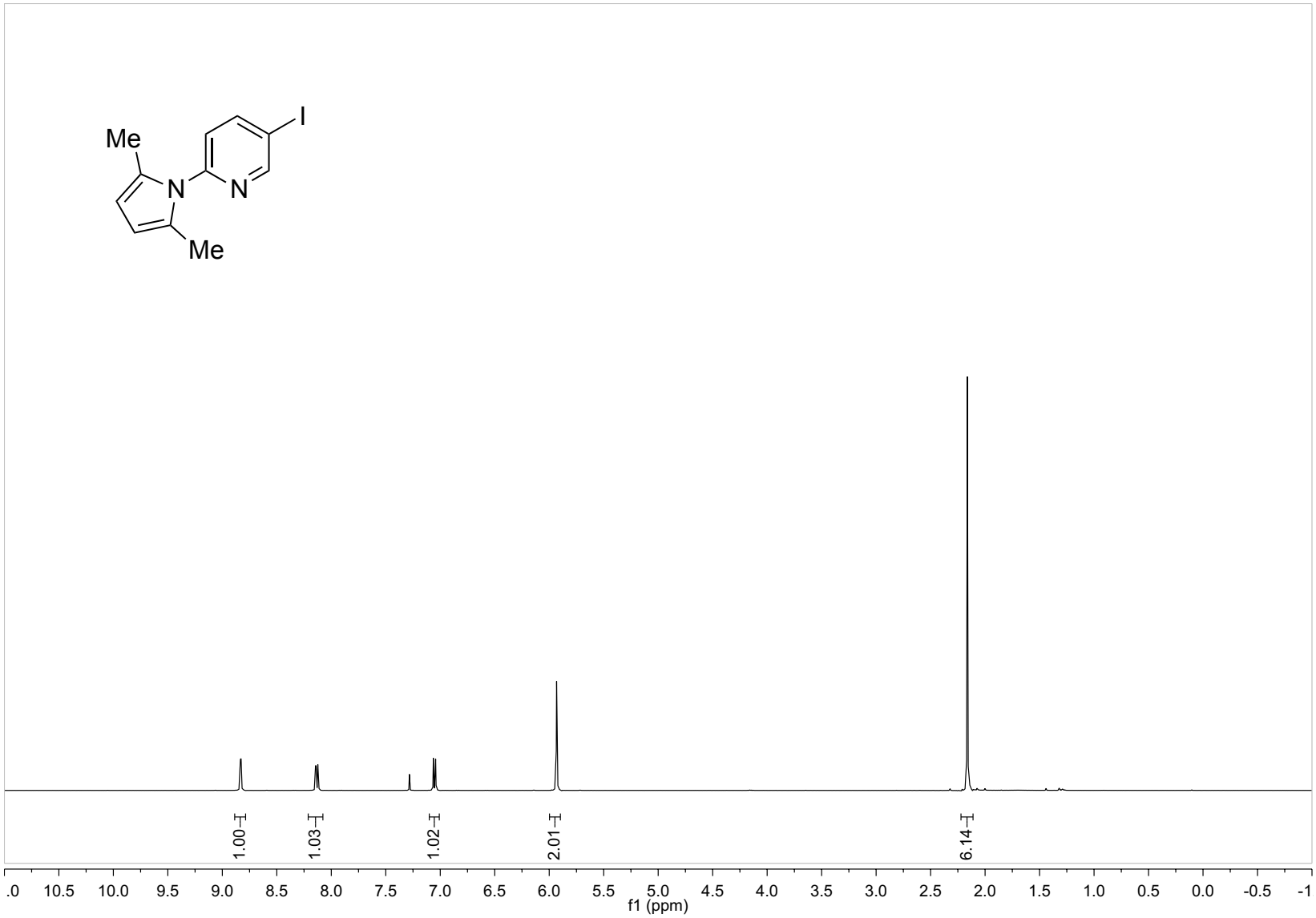
f1 (ppm)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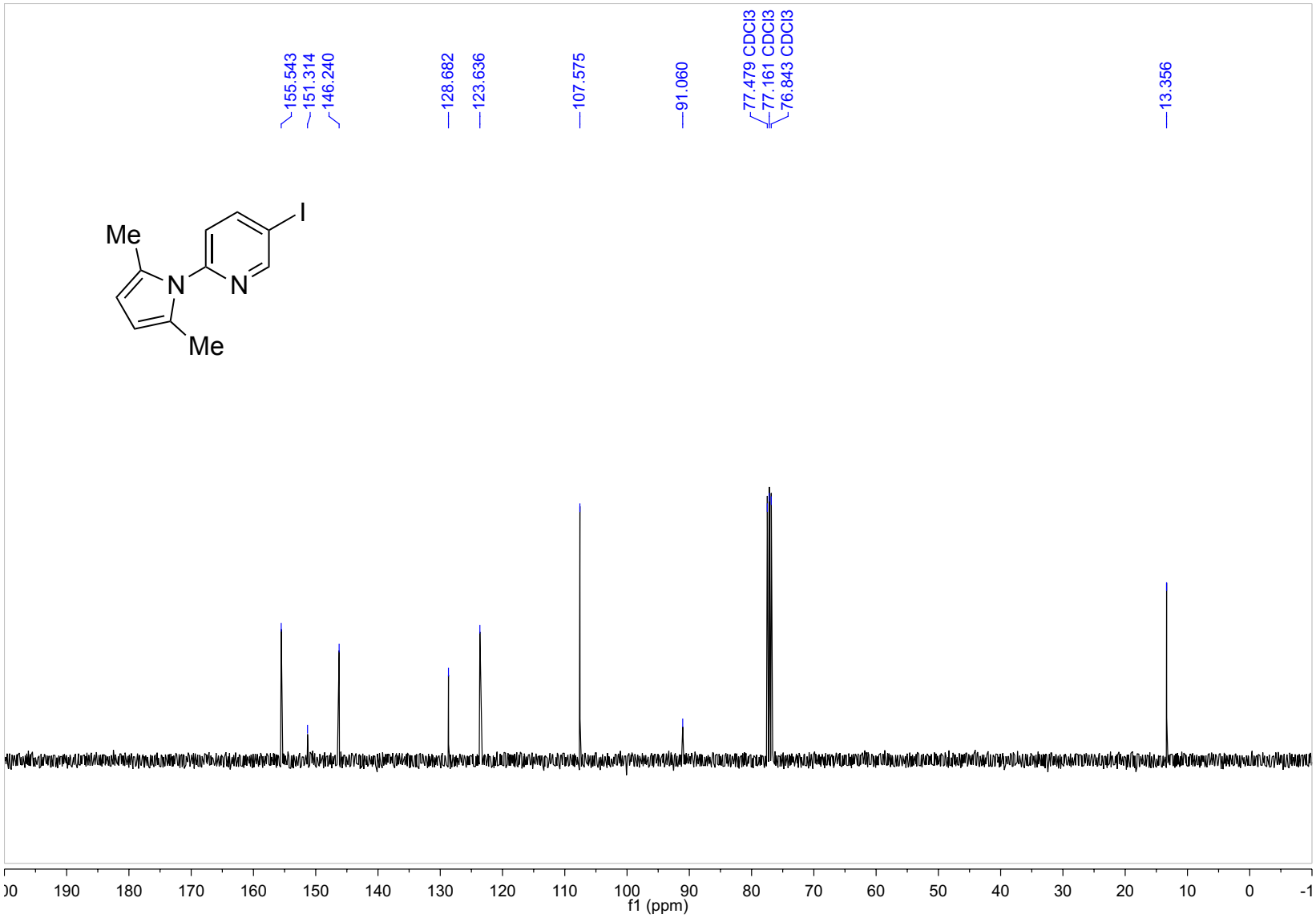
f1 (ppm)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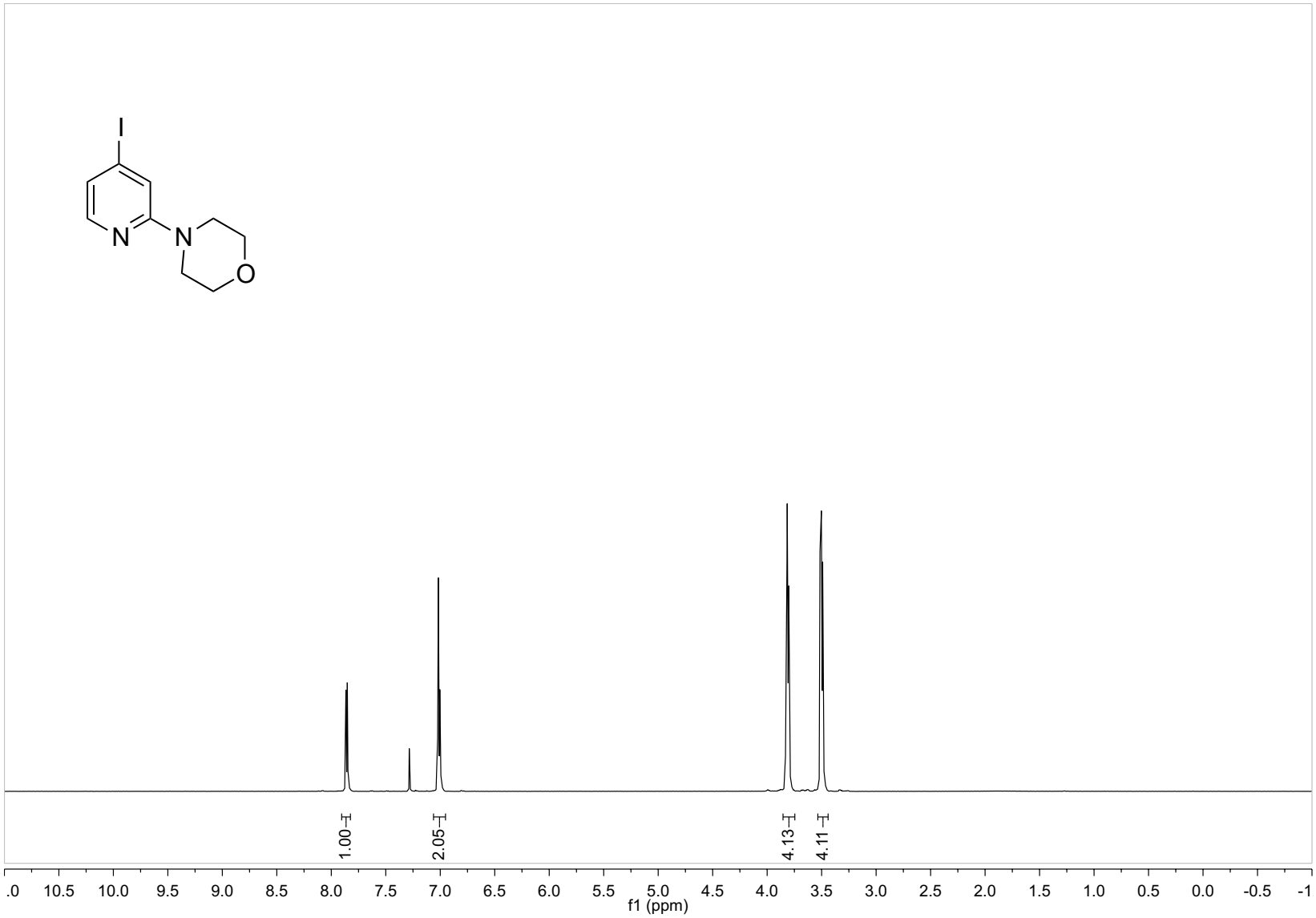
I
Me
f1 (ppm)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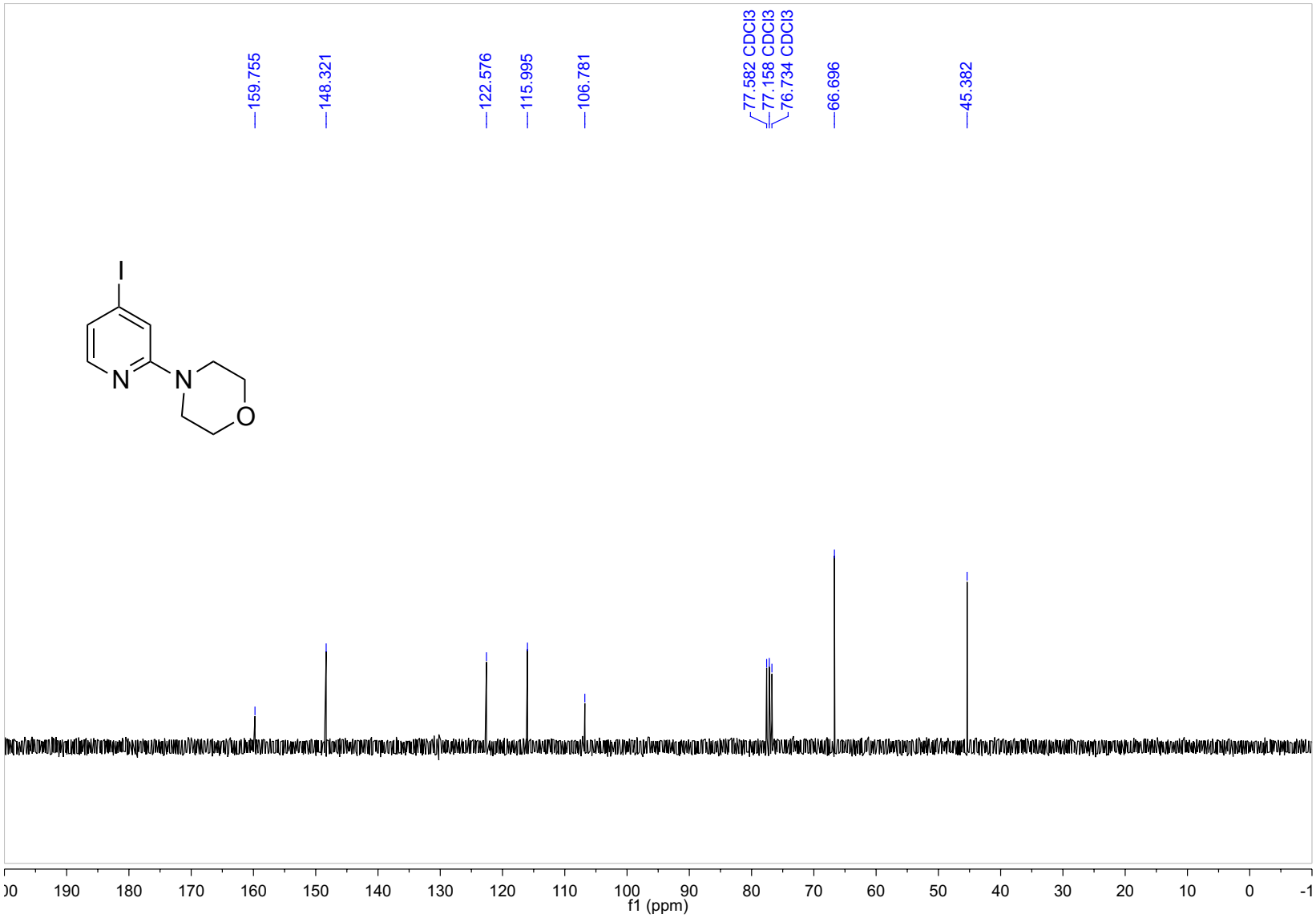
f1 (ppm)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N
O
190
180
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120
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100
90
80
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50
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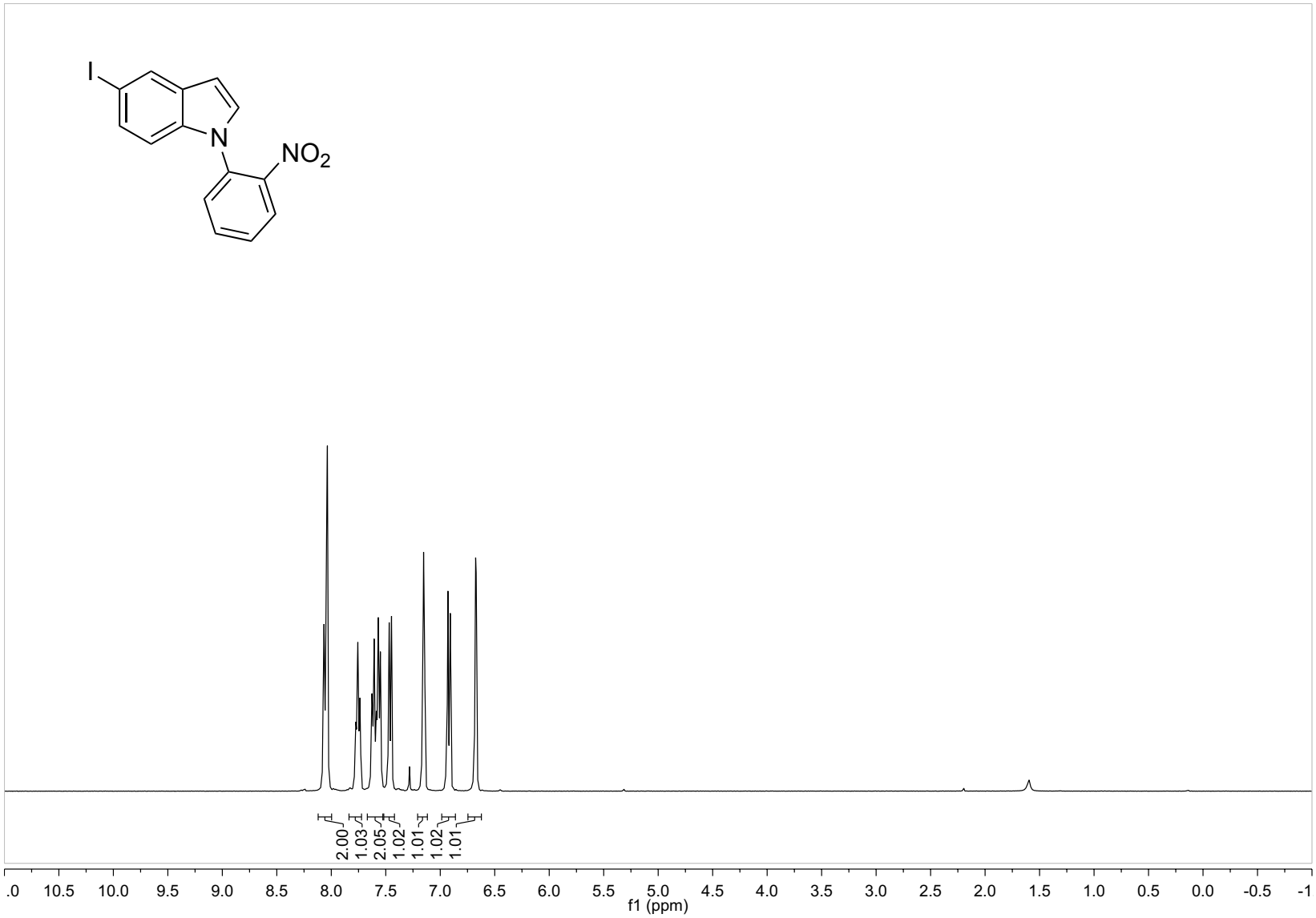
10
0
f1 (ppm)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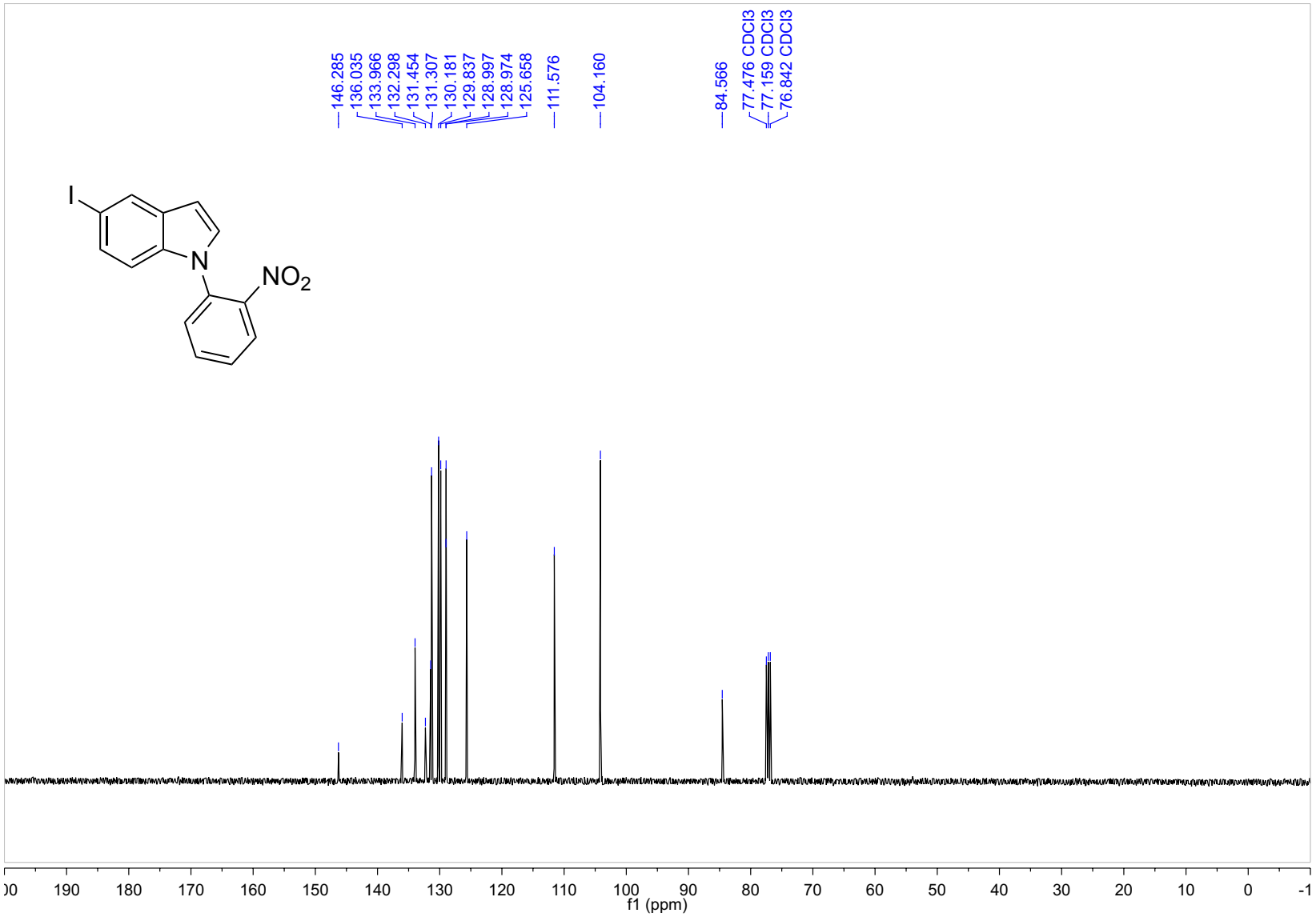
f1 (ppm)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76.842 CDCl3
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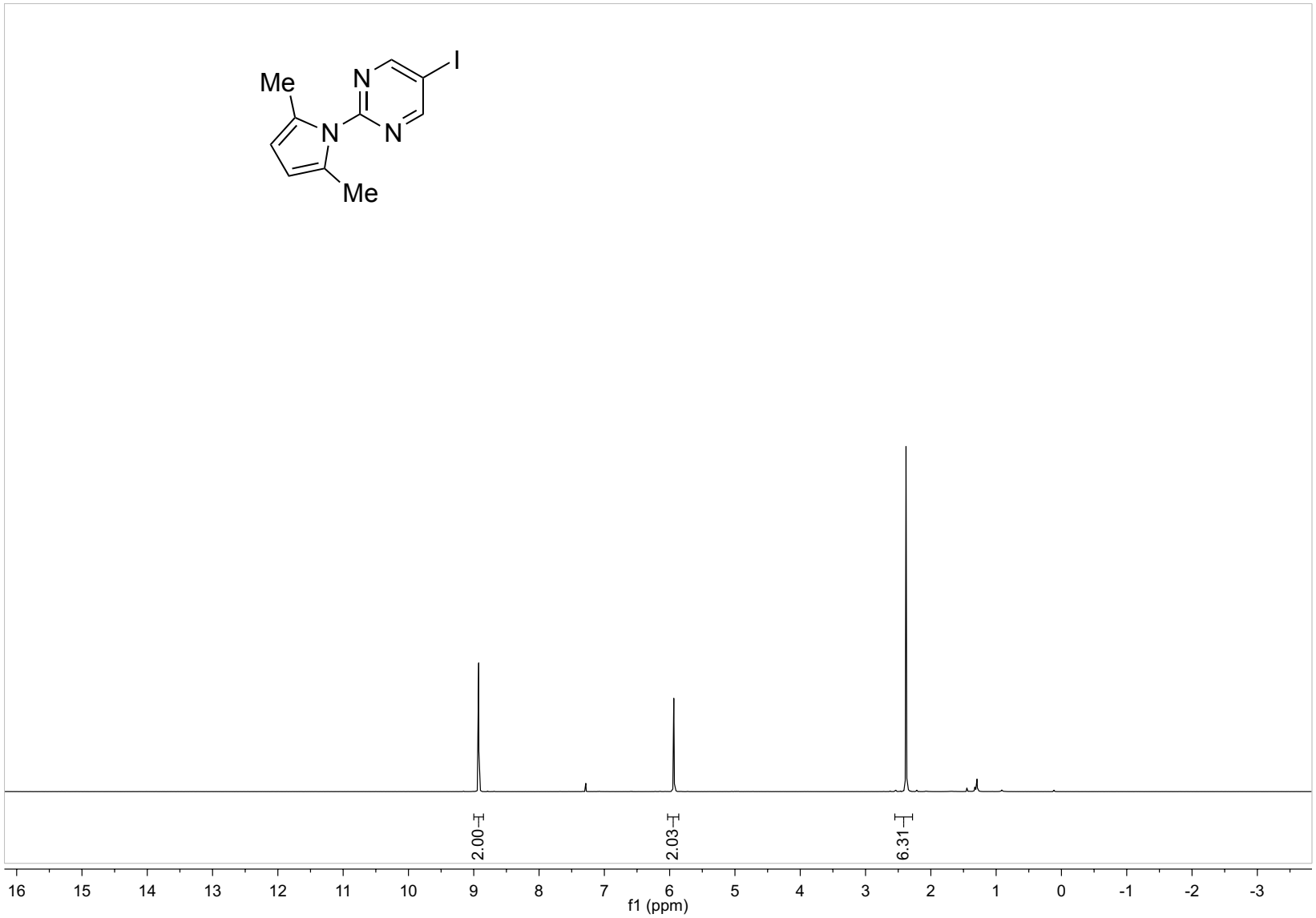
N
NO2
f1 (ppm)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2.03
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15
14
13
12
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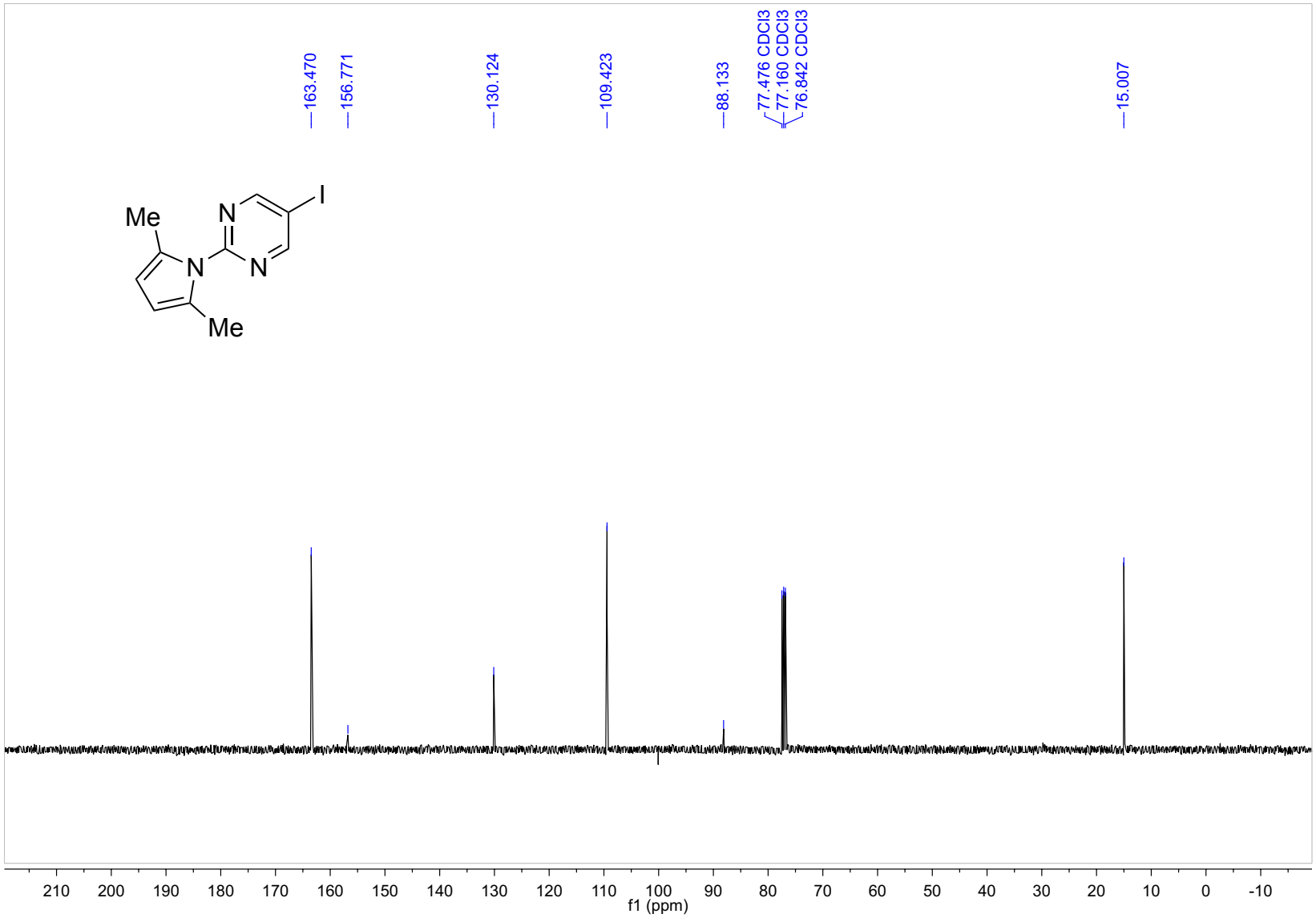
10
9
8
7
6
5
4
3
2
1
0
-1
-2
-3
f1 (ppm)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N
Me
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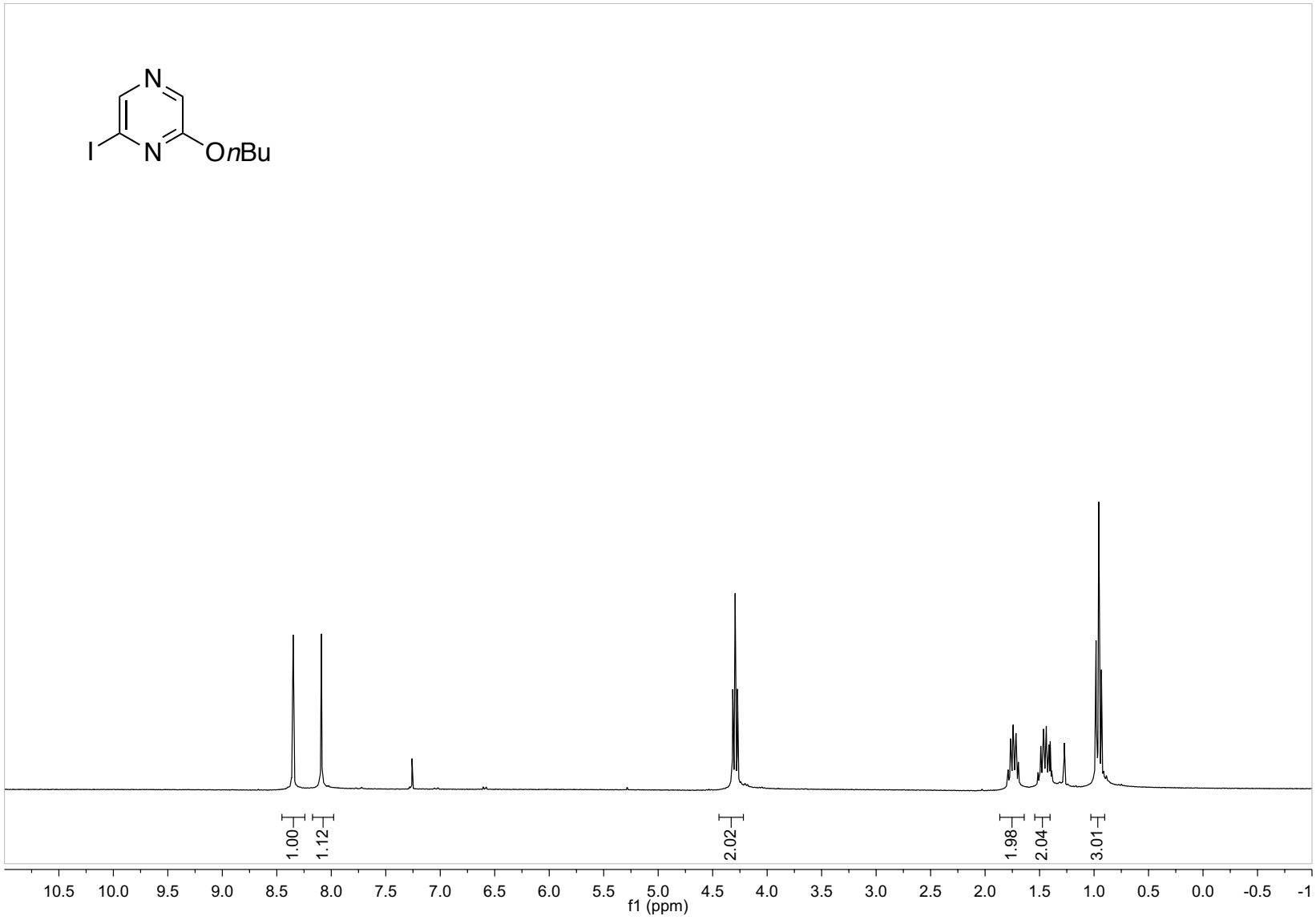
f1 (ppm)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OnBu
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1.98
2.04
3.01
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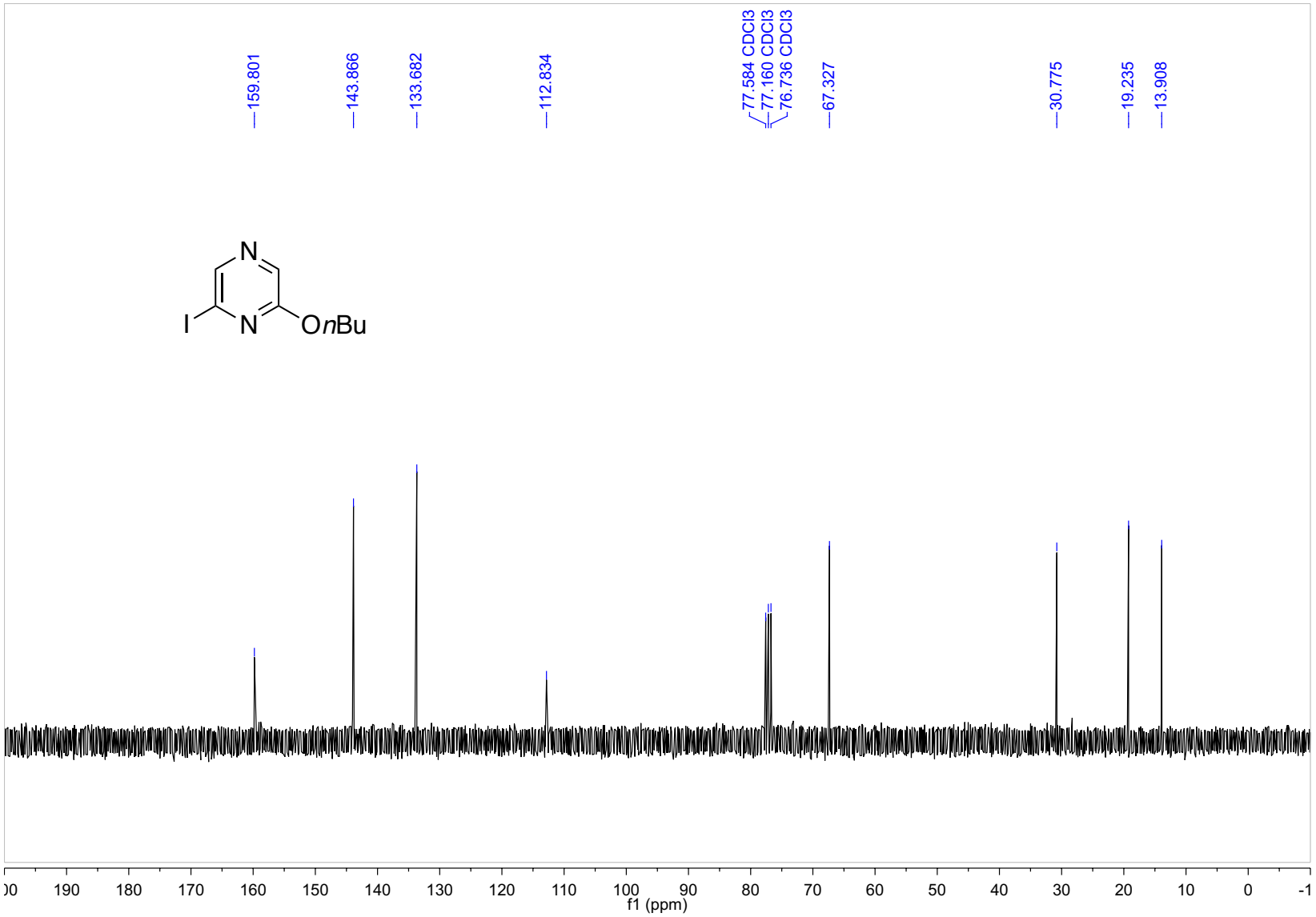
f1 (ppm)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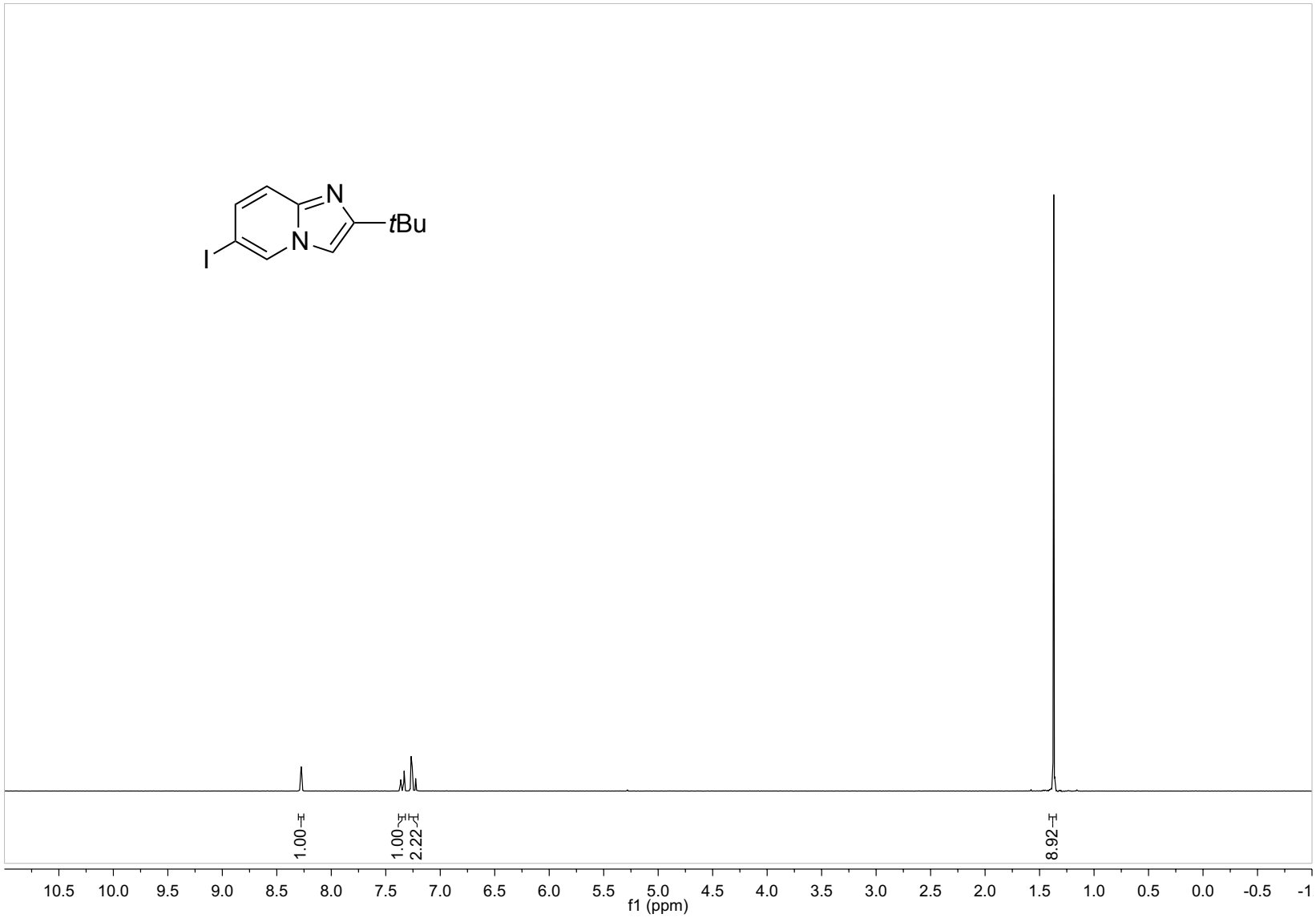
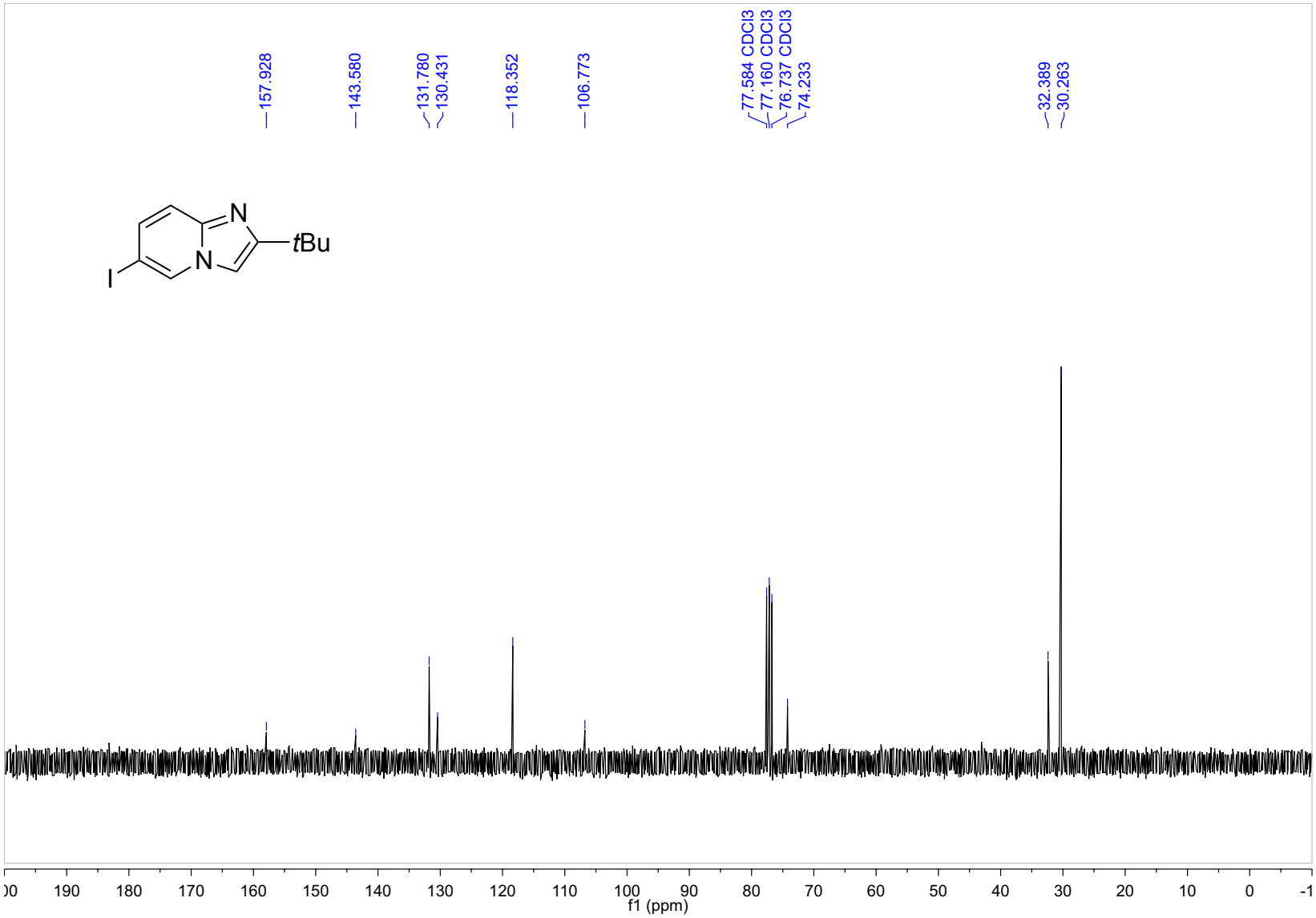
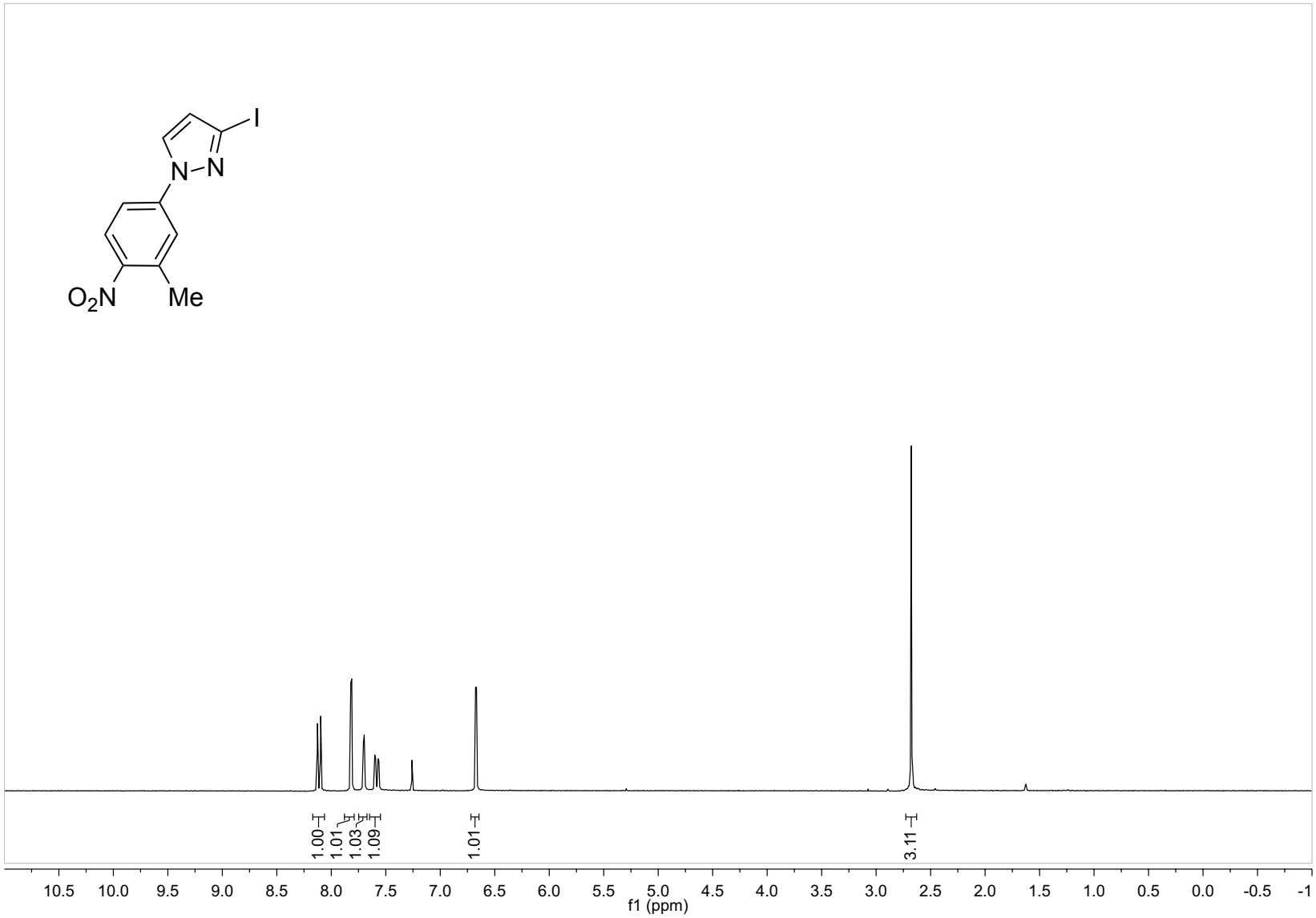
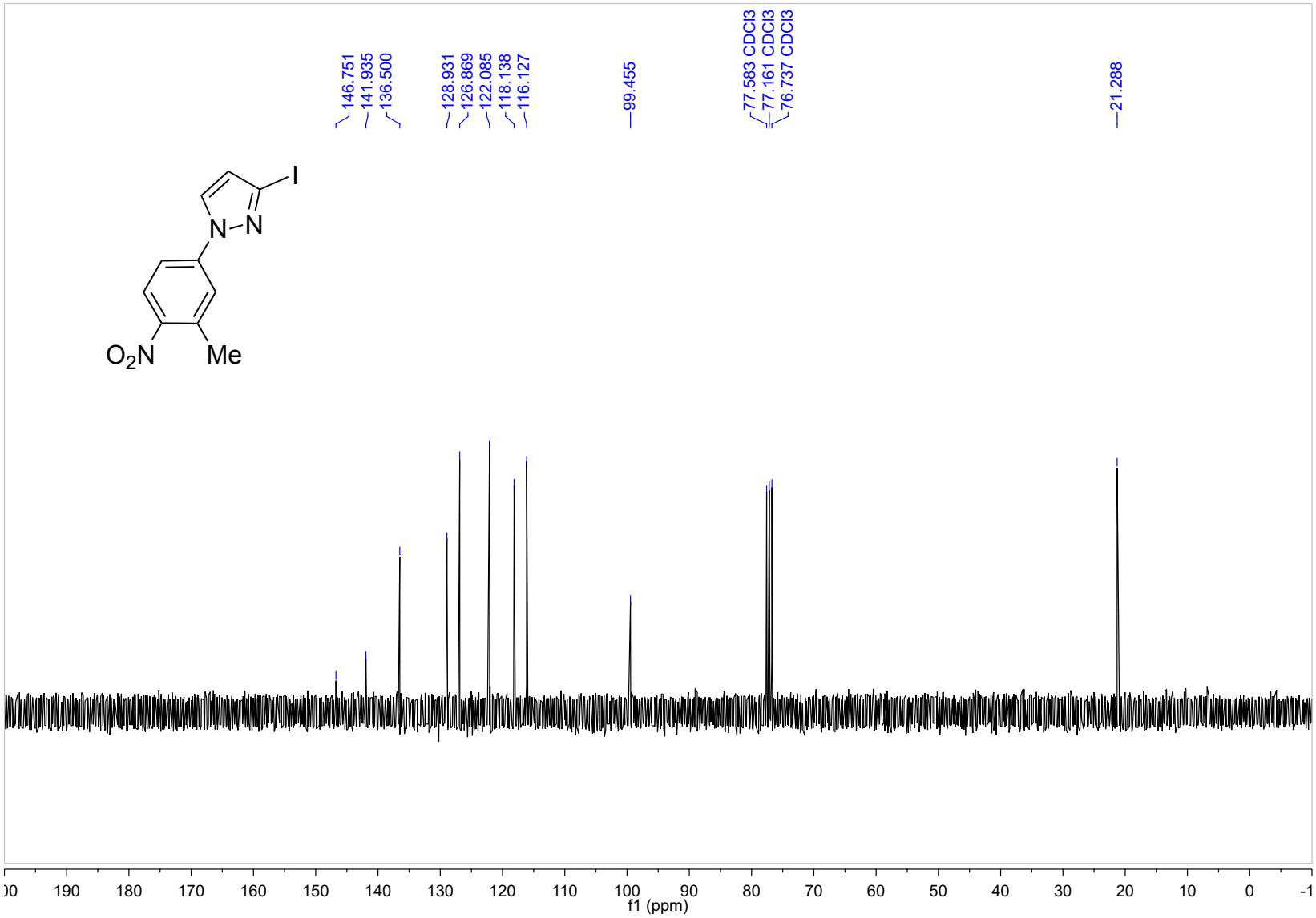
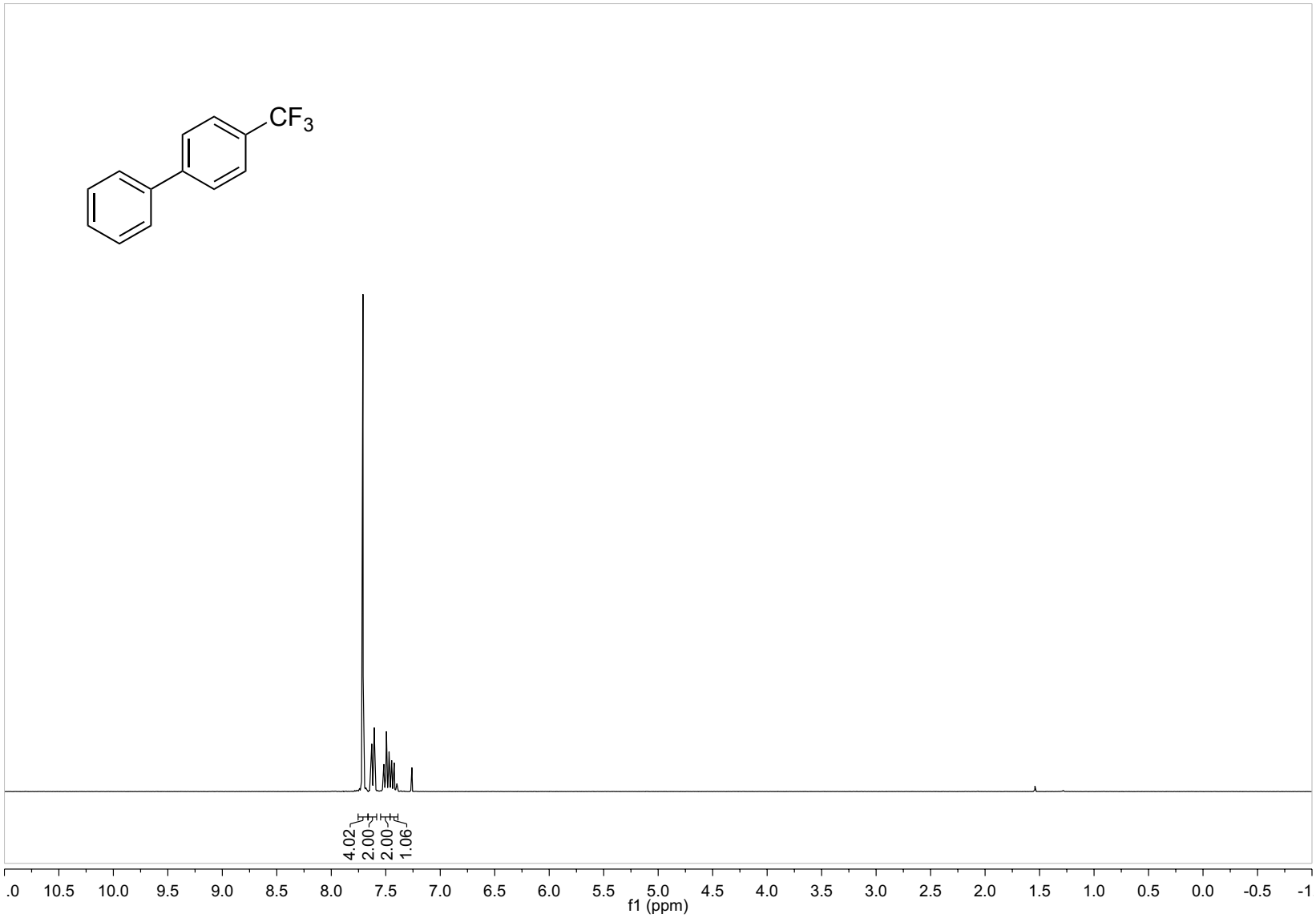
13.908
N
I
N
OnBu
f1 (ppm)

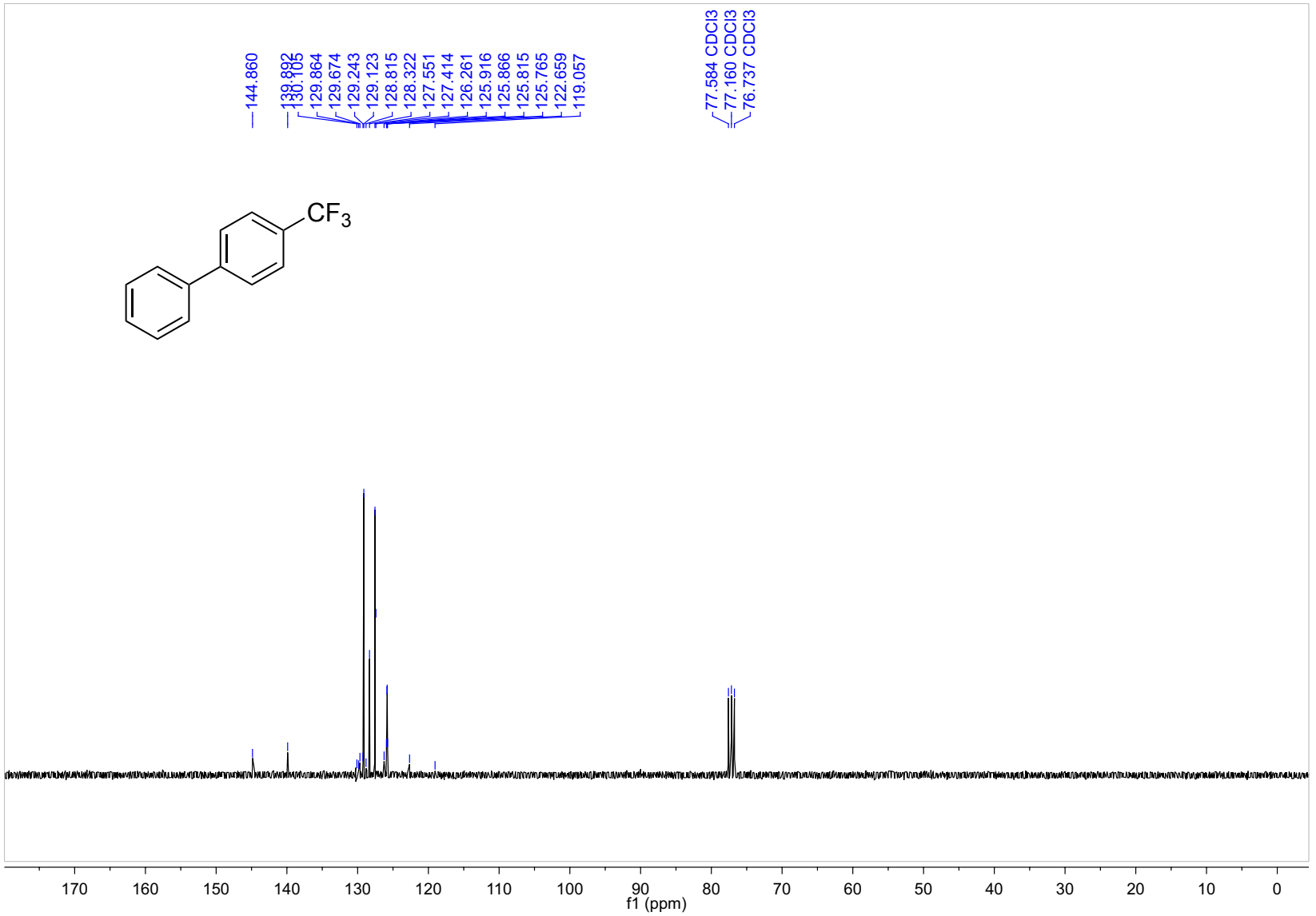

N
tBu
N
I
1.00
1.00
2.22
8.92
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

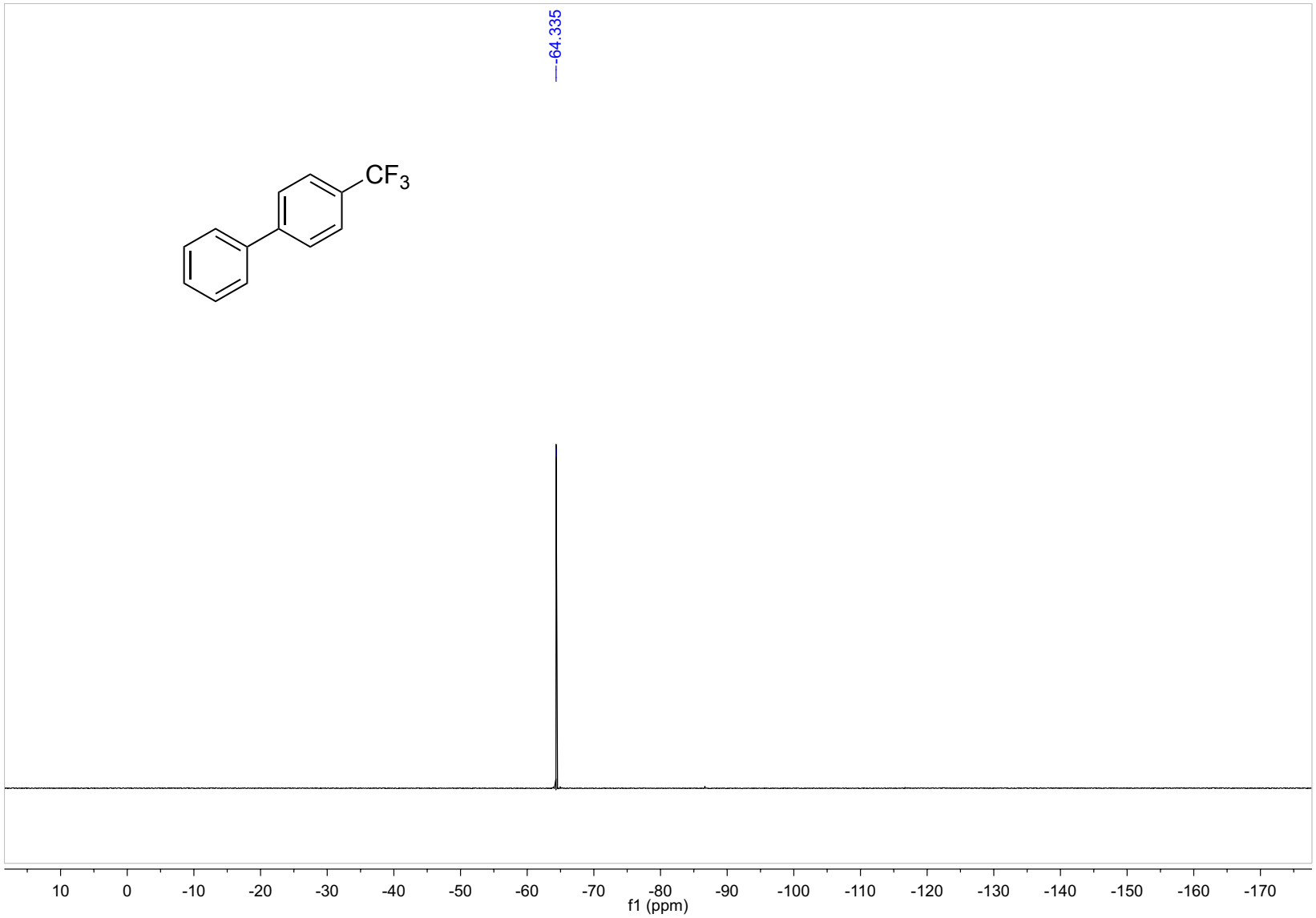

157.928
143.580
131.780
130.431
118.352
106.773
77.584 CDCl3
77.160 CDCl3
76.737 CDCl3
74.233
32.389
30.263
N
N
tBu
I
f1 (ppm)

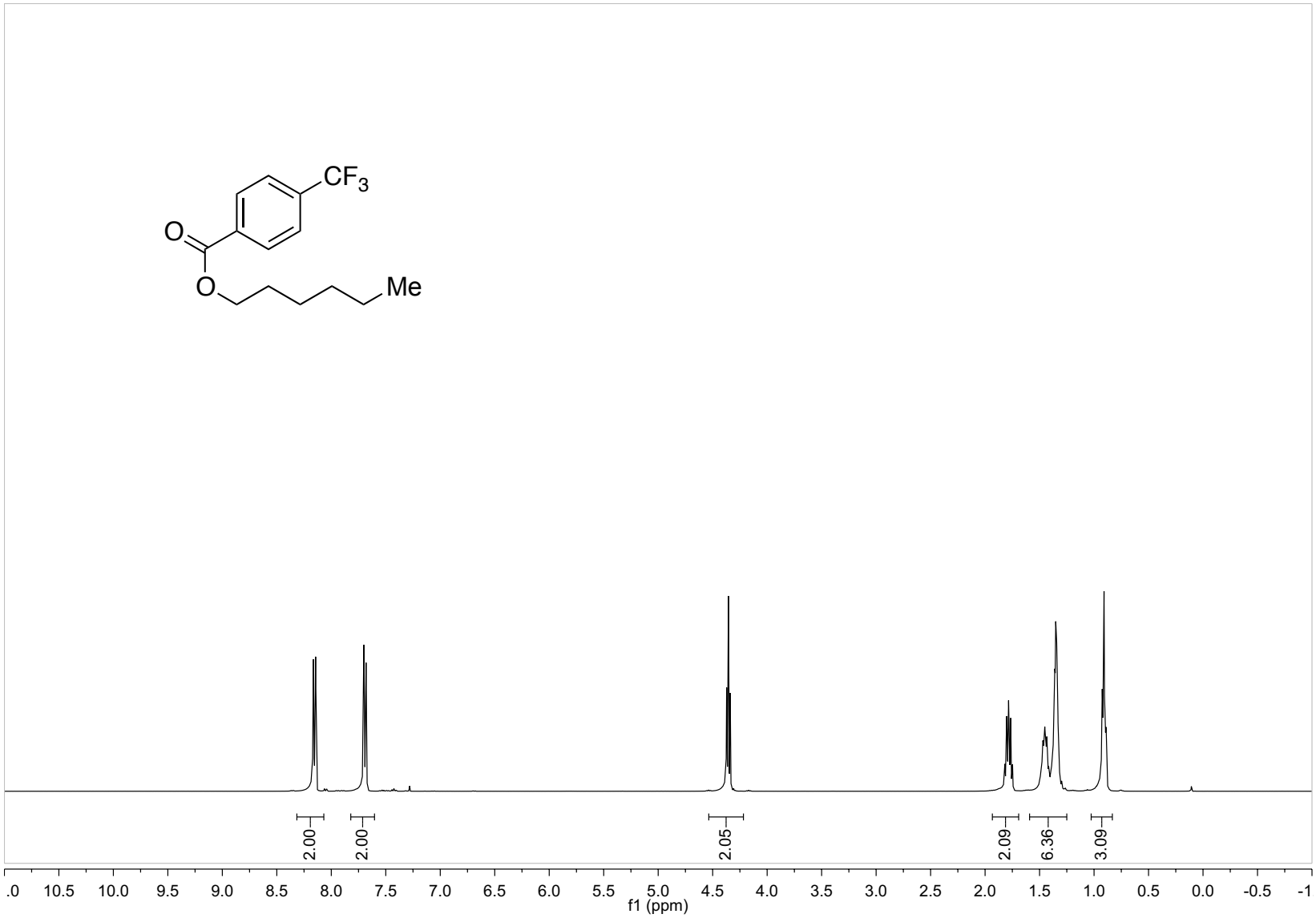

I
N
N
O2N
Me
1.00
1.01
1.03
1.09
1.01
3.11
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

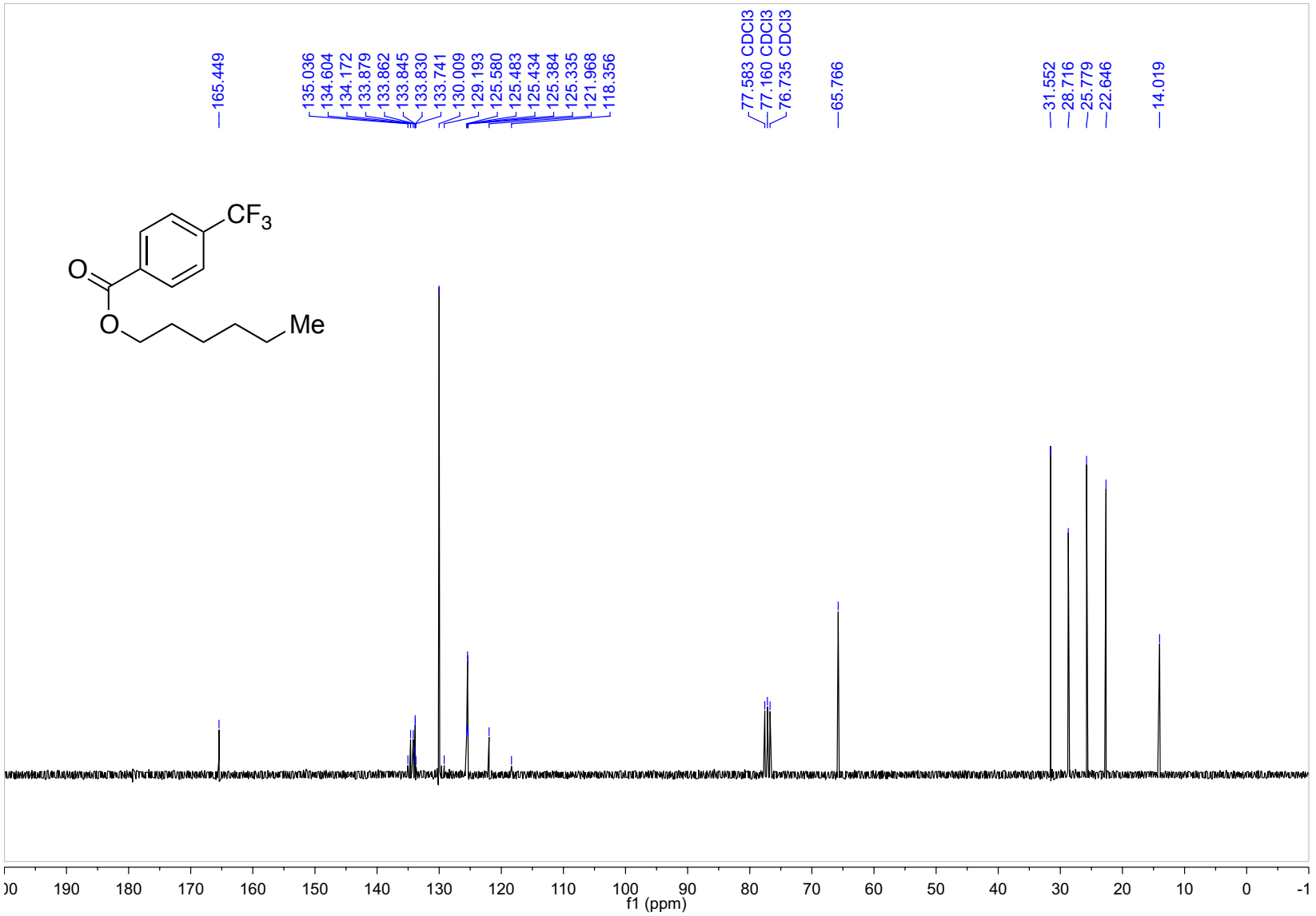

146.751
141.935
136.500
128.931
126.869
122.085
118.138
116.127
99.455
77.583 CDCl3
77.161 CDCl3
76.737 CDCl3
21.288
I
N
N
O2N
Me
f1 (ppm)

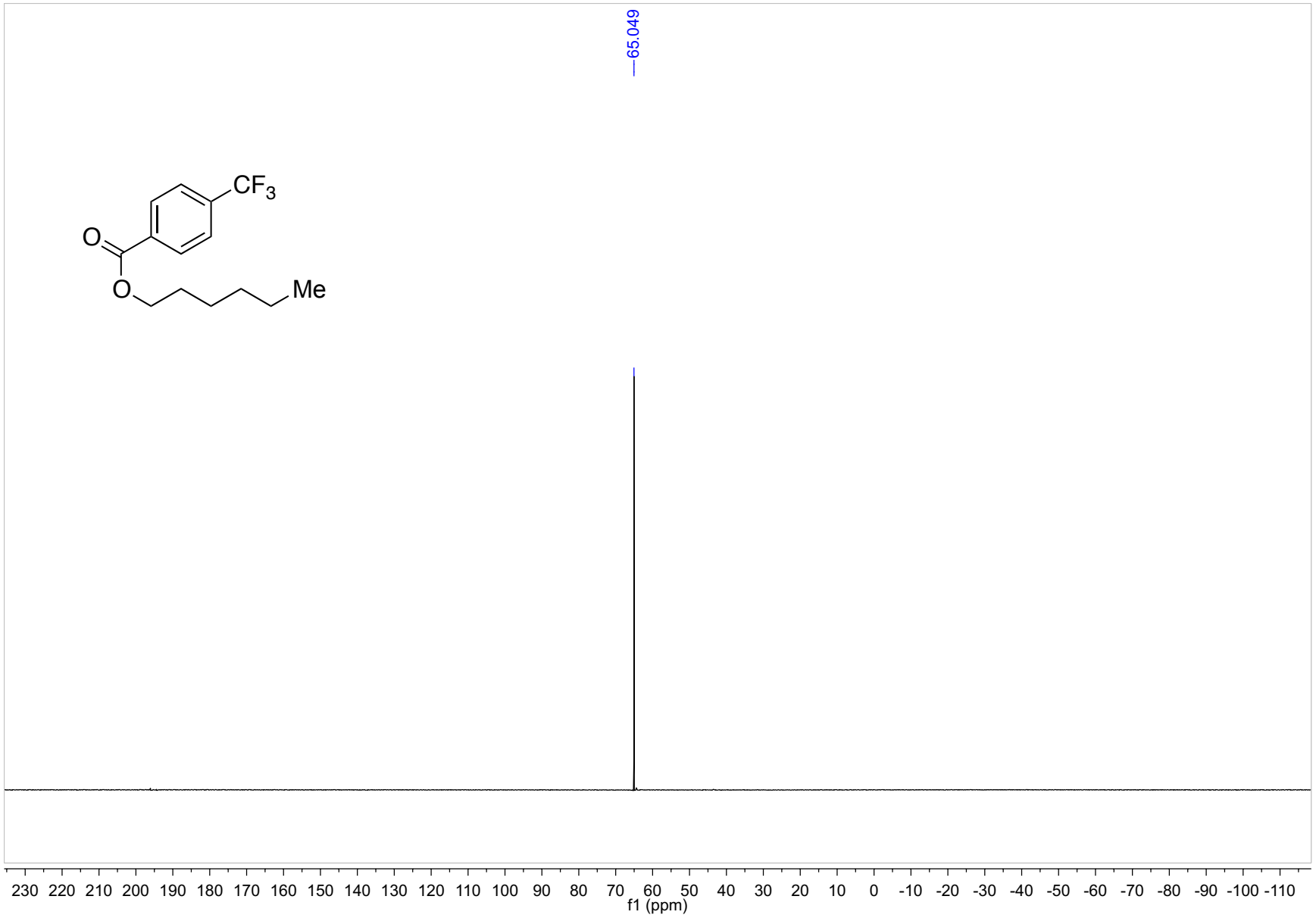

CF3
4.02
2.00
2.00
1.06
.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

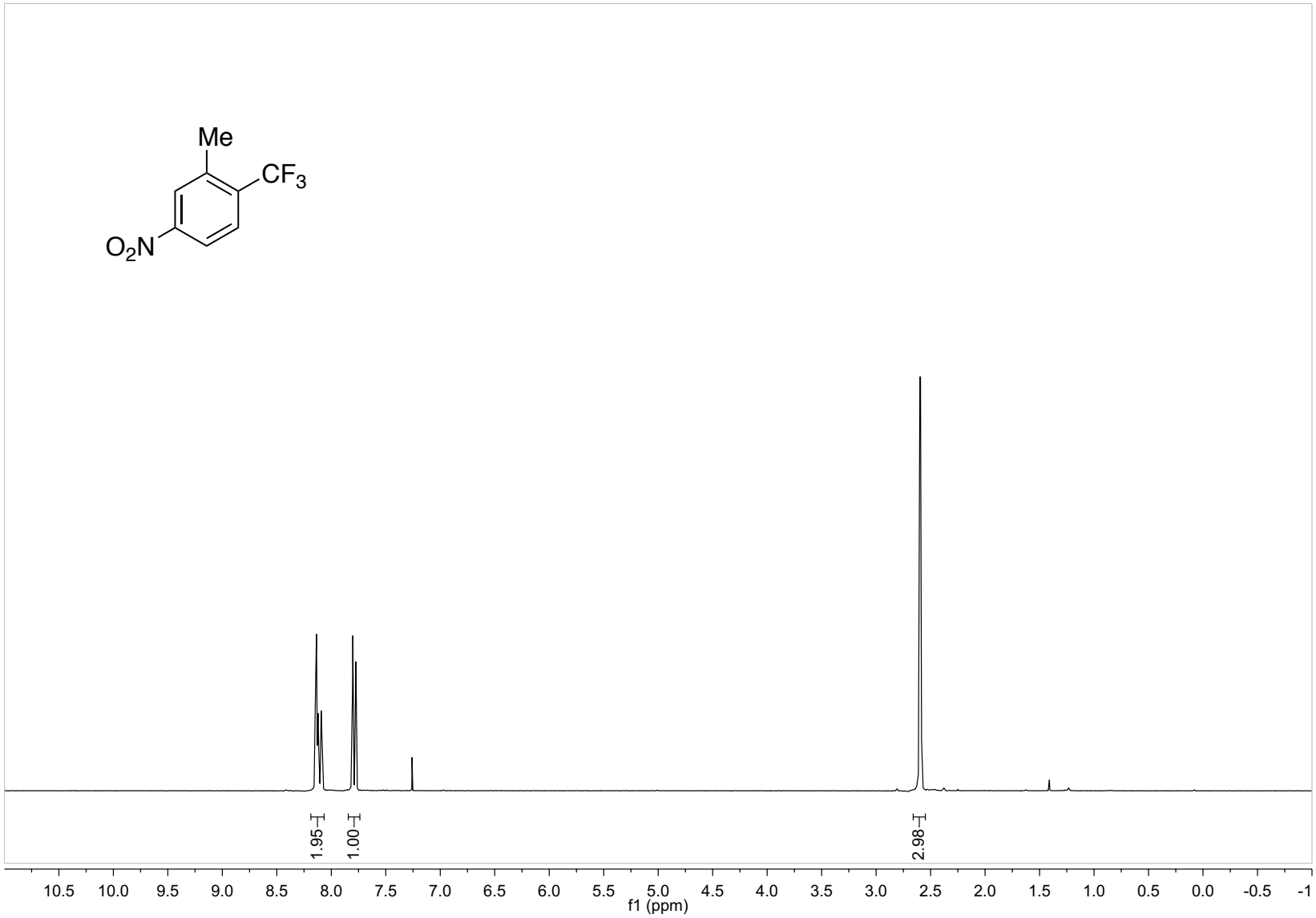

144.860
139.892
130.105
129.864
129.674
129.243
129.123
128.815
128.322
127.551
127.414
126.261
125.916
125.866
125.815
125.765
122.659
119.057
77.584 CDCl3
77.160 CDCl3
76.737 CDCl3
CF3
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

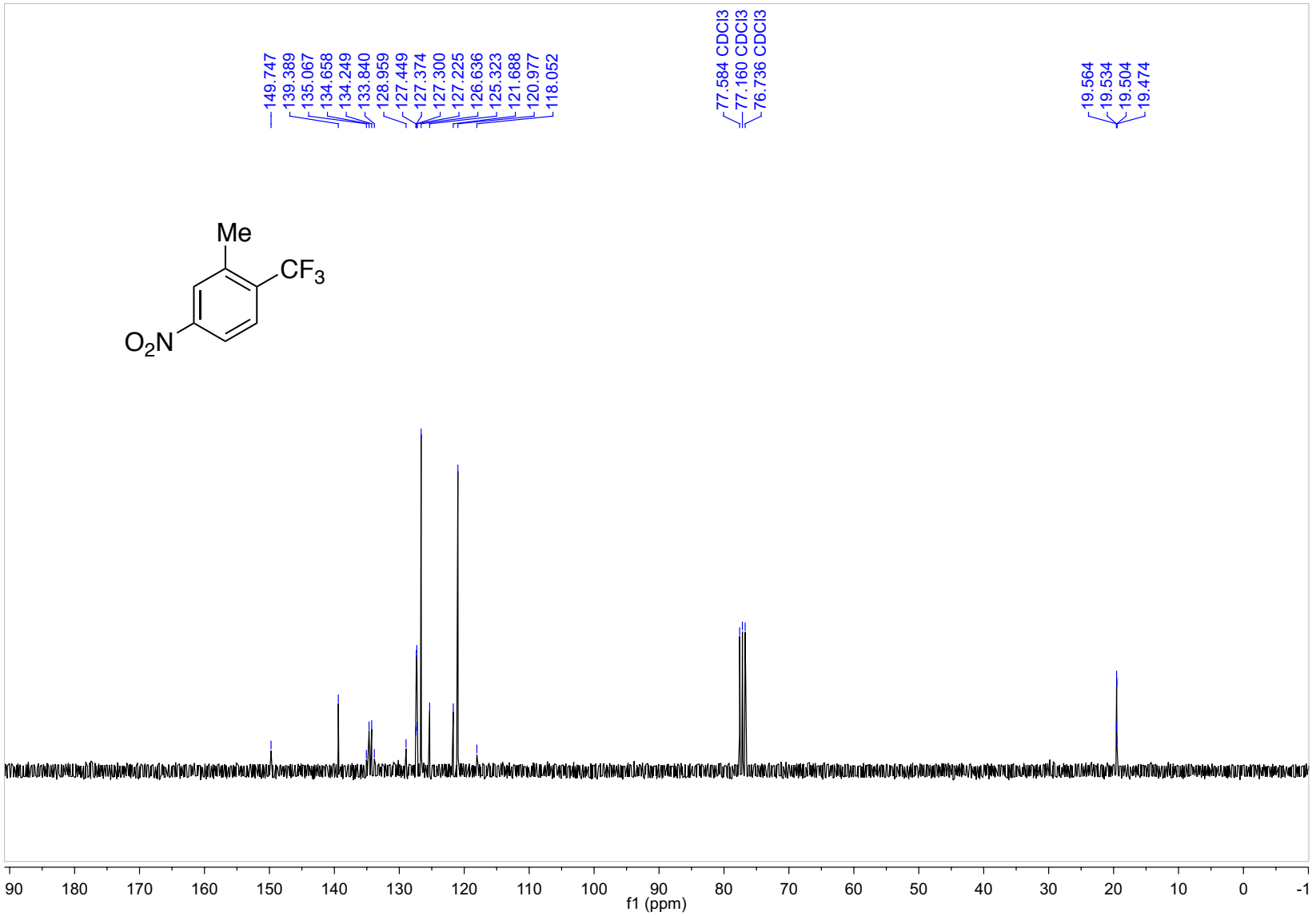

-64.335
CF3
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
f1 (ppm)

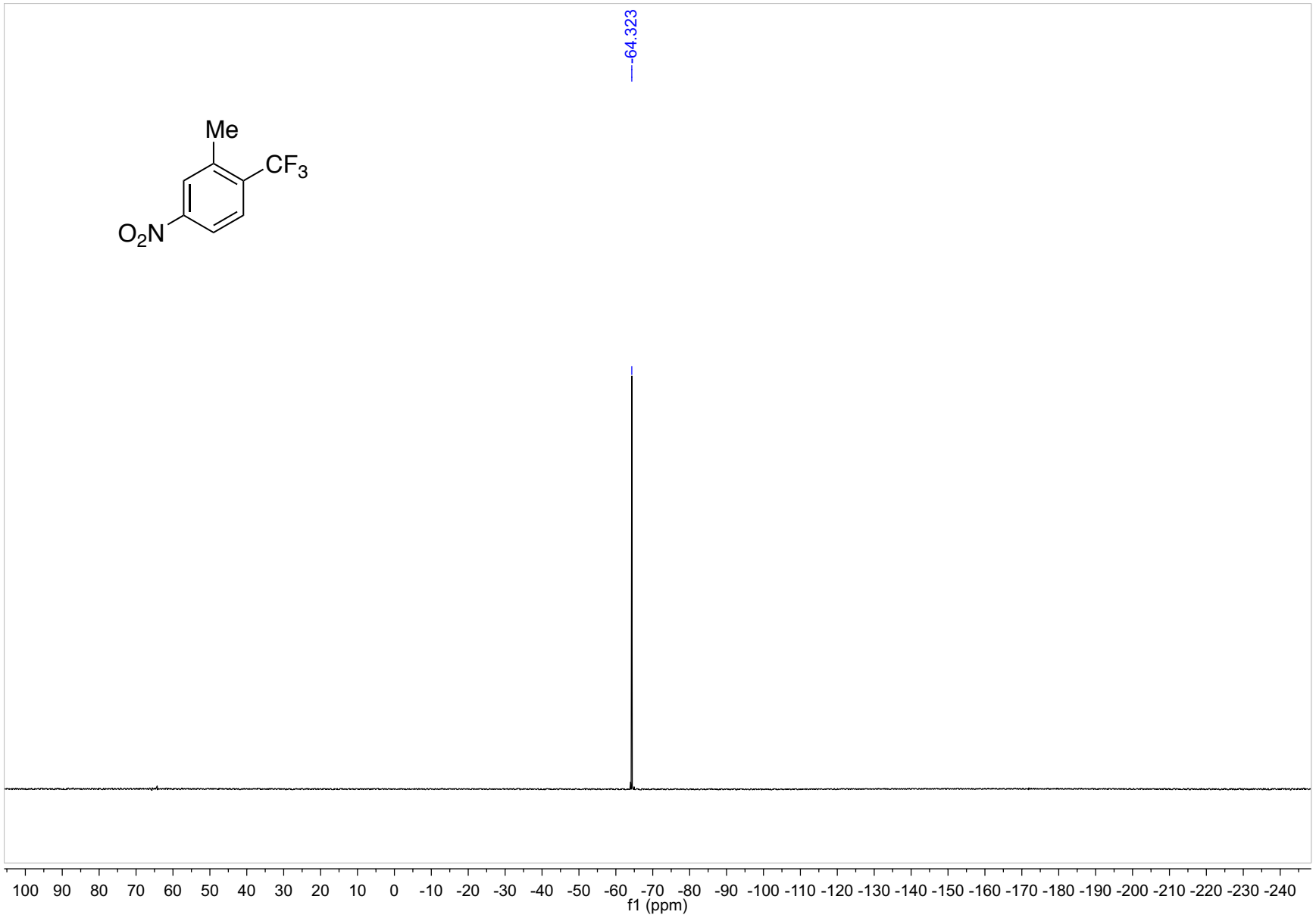

CF3
O
O
Me
2.00
2.00
2.05
2.09
6.36
3.09
f1 (ppm)

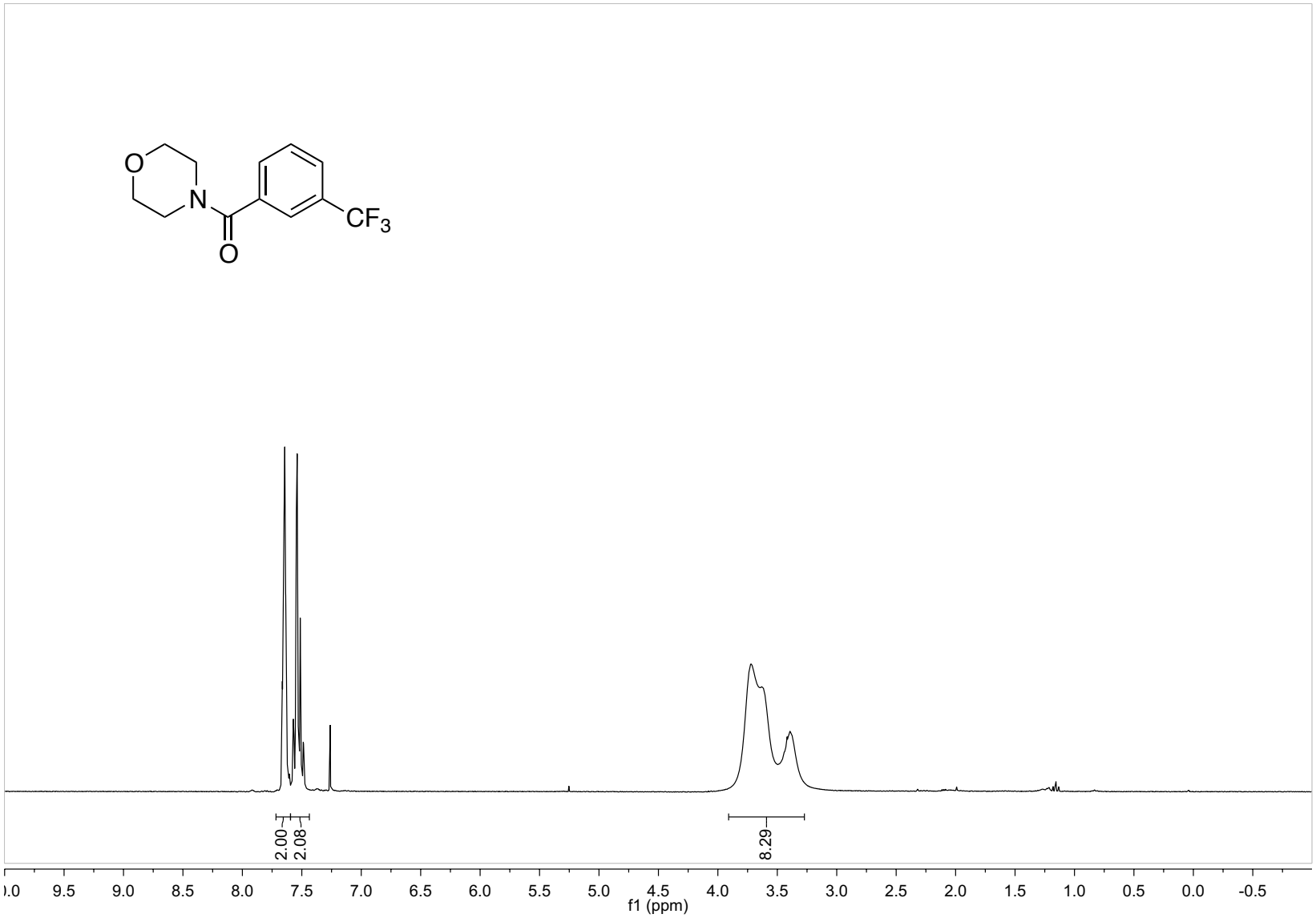

165.449
135.036
134.604
134.172
133.879
133.862
133.845
133.830
133.741
130.009
129.193
125.580
125.483
125.434
125.384
125.335
121.968
118.356
77.583 CDCl3
77.160 CDCl3
76.735 CDCl3
65.766
31.552
28.716
25.779
22.646
14.019
CF3
O
O
Me
f1 (ppm)

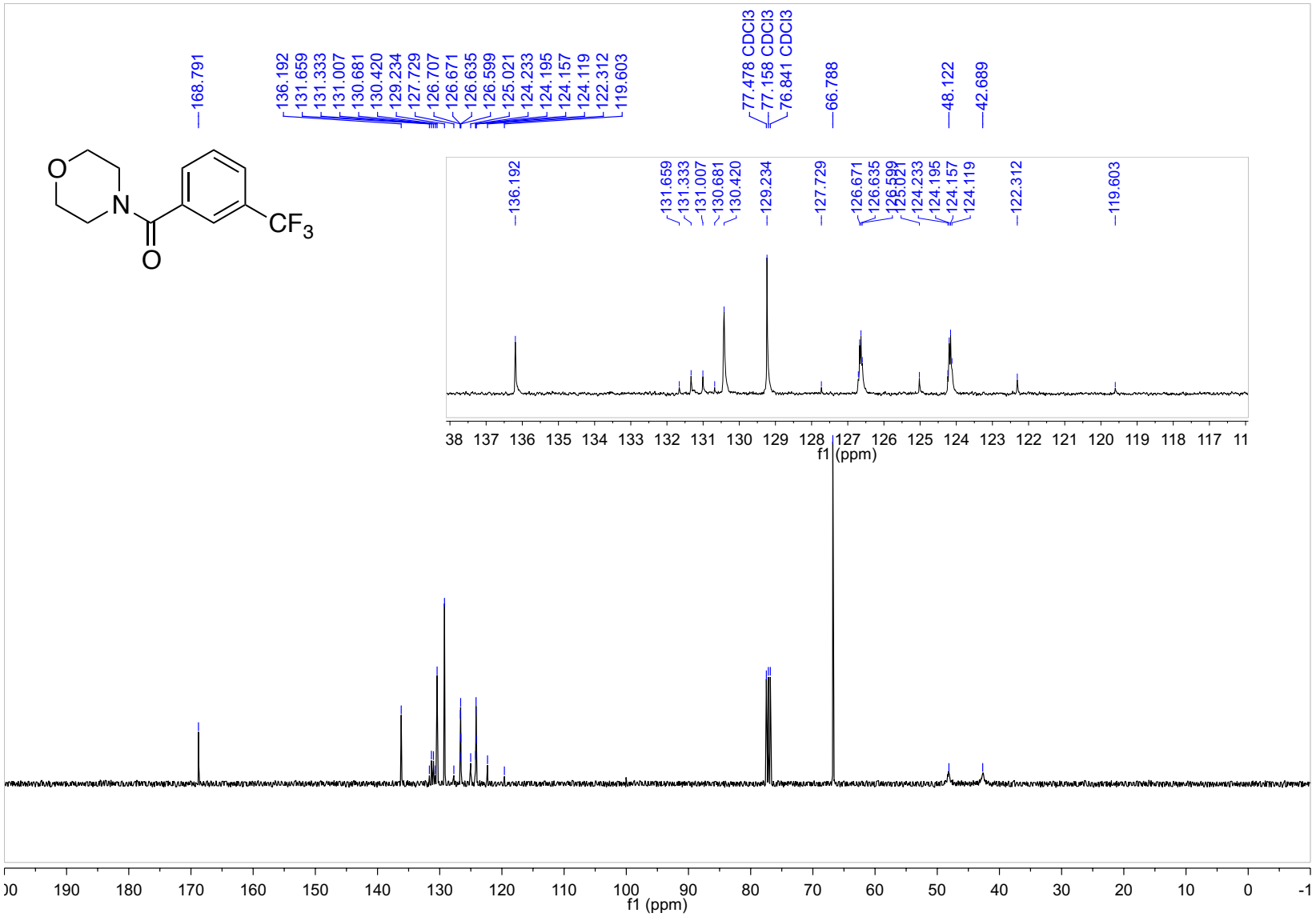

65.049
CF3
O
O
Me
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110
f1 (ppm)

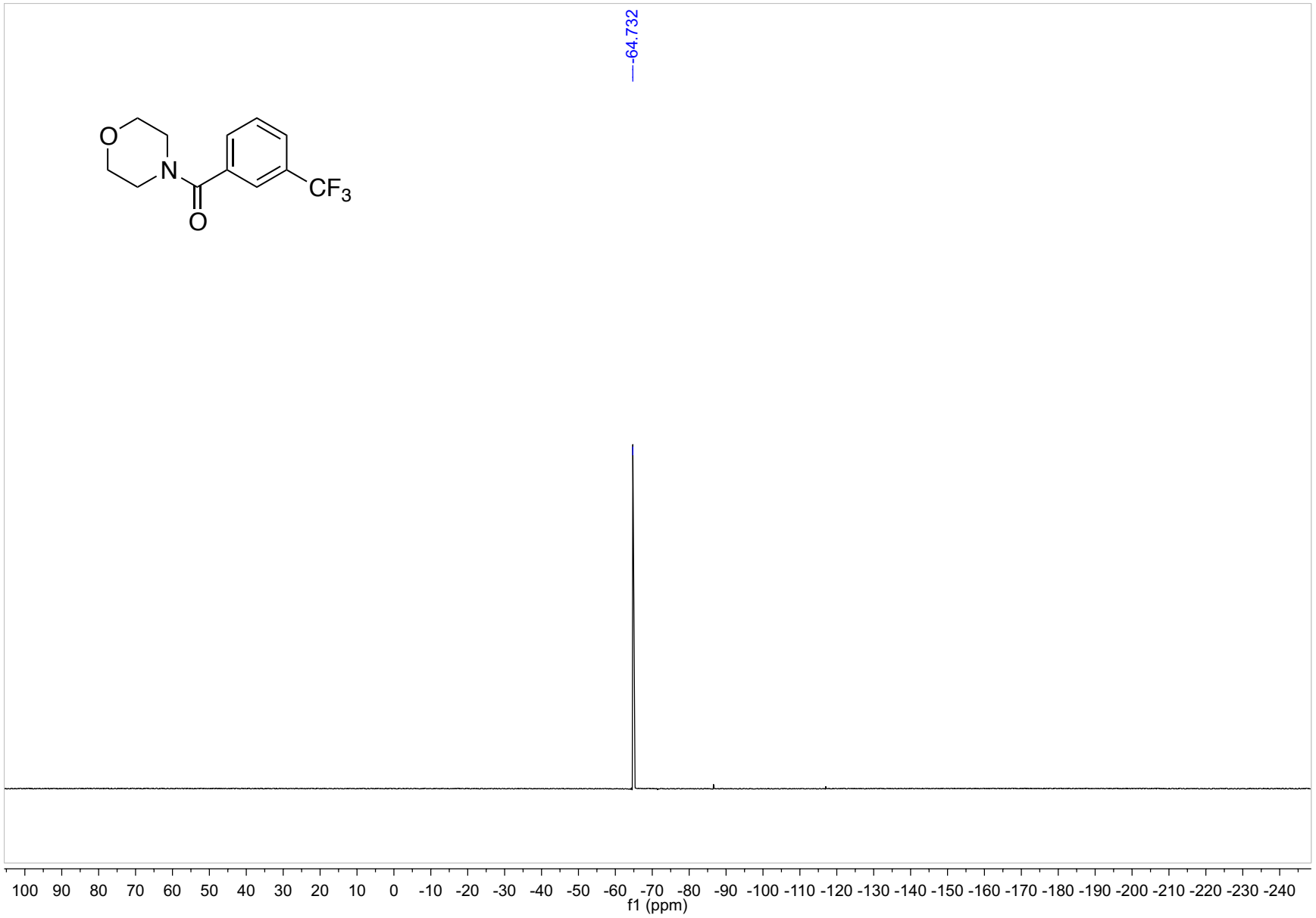

Me
CF3
O2N
1.95
1.00
2.98
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

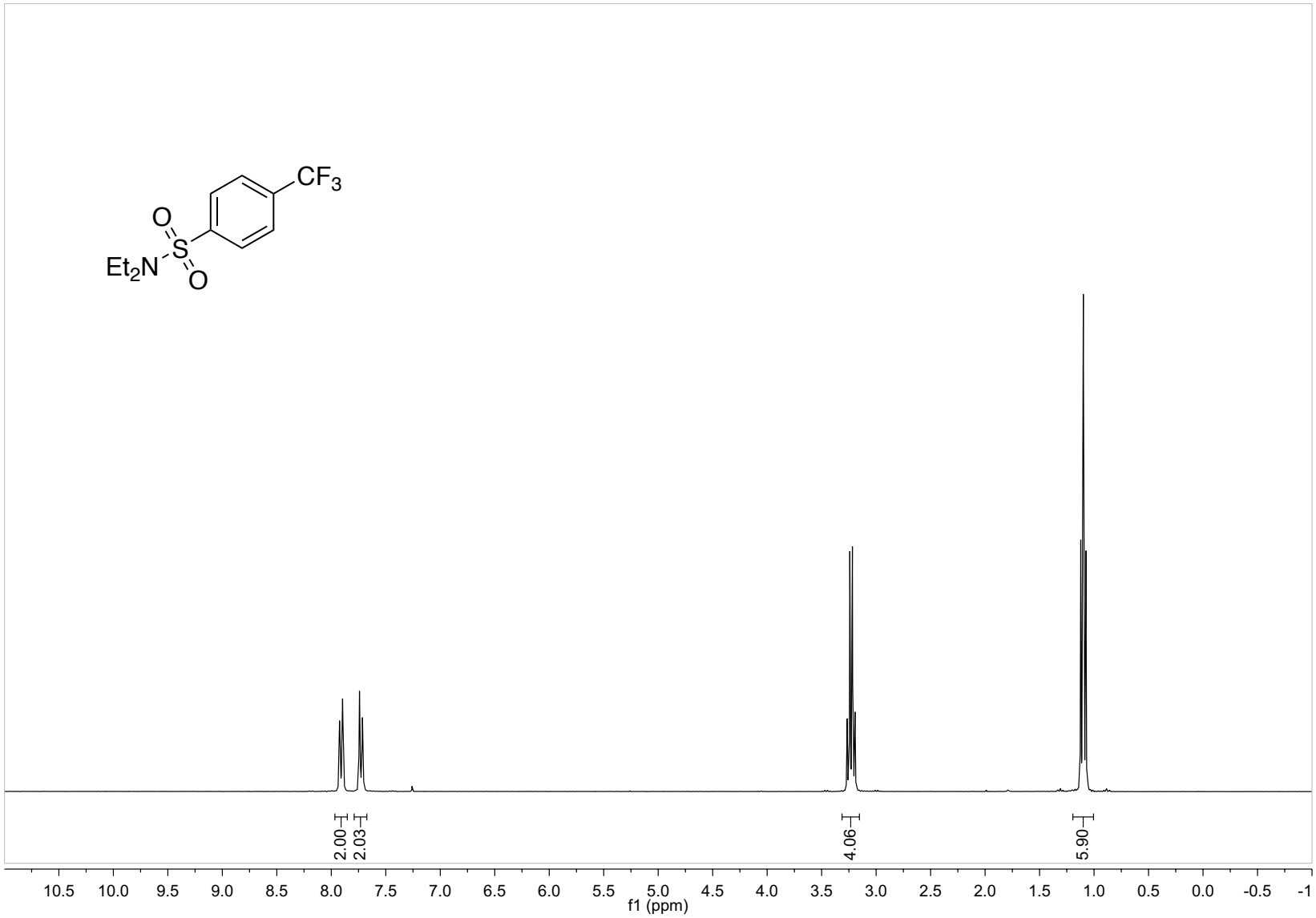

149.747
139.389
135.067
134.658
134.249
133.840
128.959
127.449
127.374
127.300
127.225
126.636
125.323
121.688
120.977
118.052
77.584 CDCl3
77.160 CDCl3
76.736 CDCl3
19.564
19.534
19.504
19.474
Me
CF3
O2N
90
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-1
f1 (ppm)

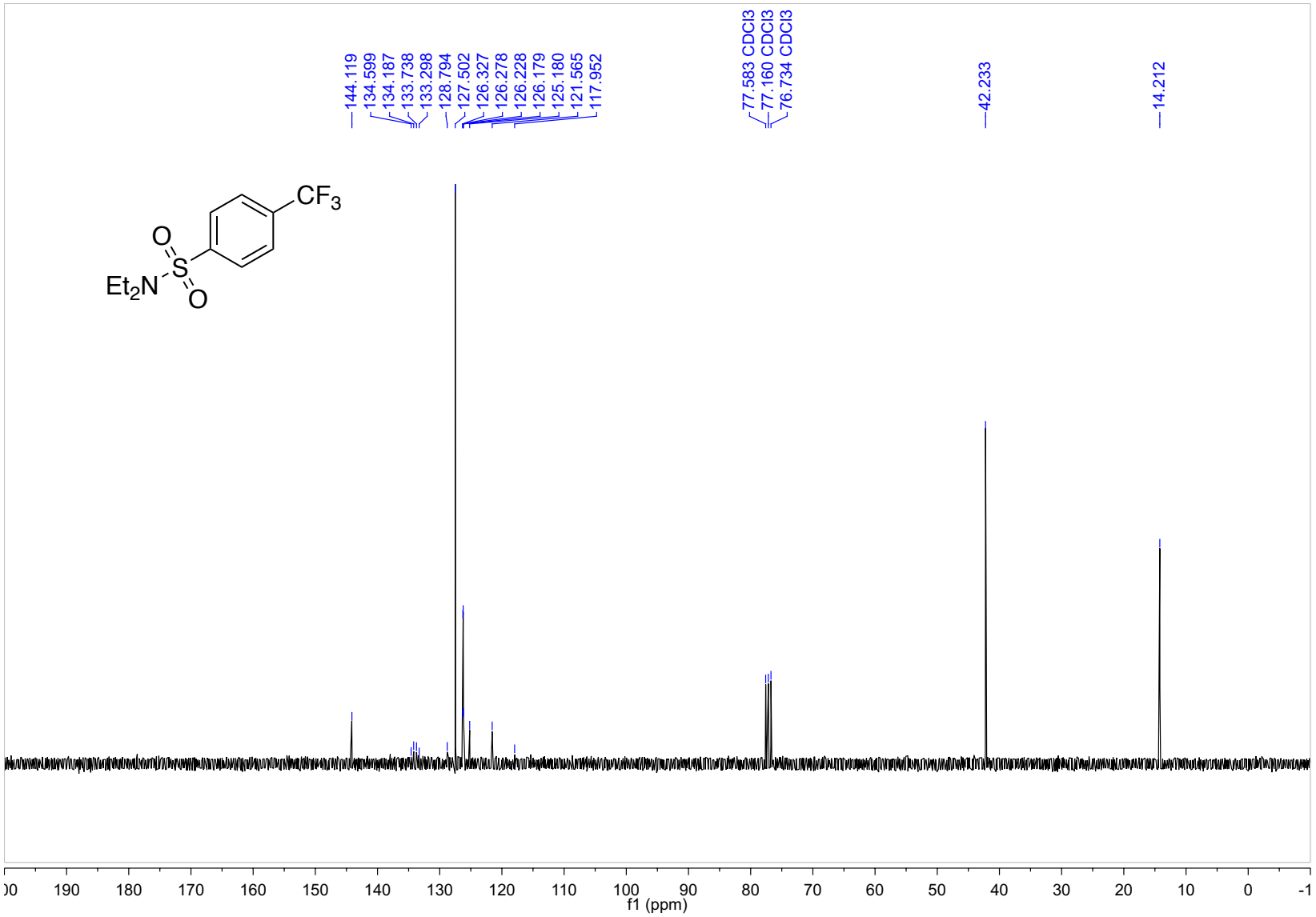

-64.323
Me
CF3
O2N
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

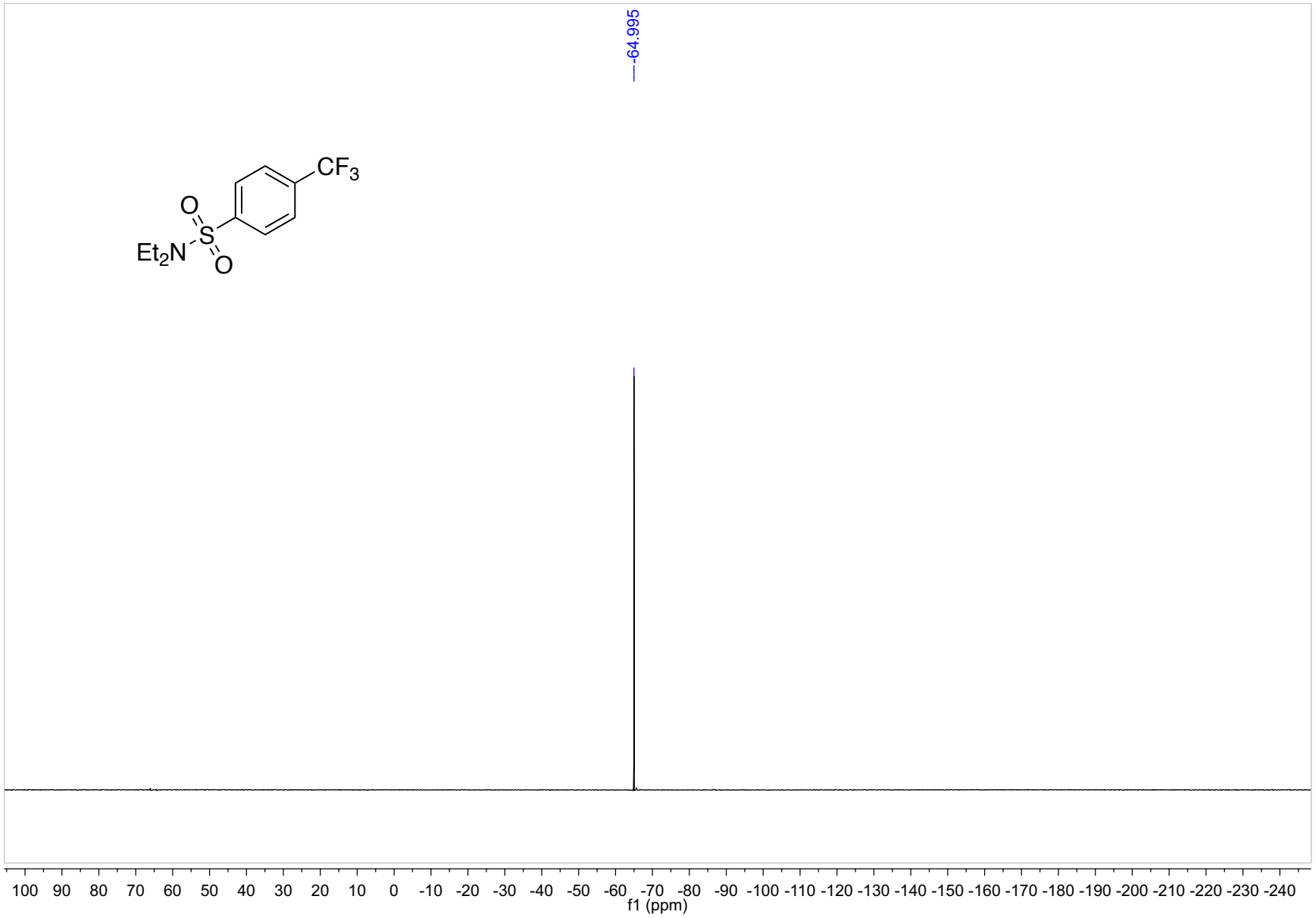

O
N
O
CF3
2.00
2.08
8.29
f1 (ppm)

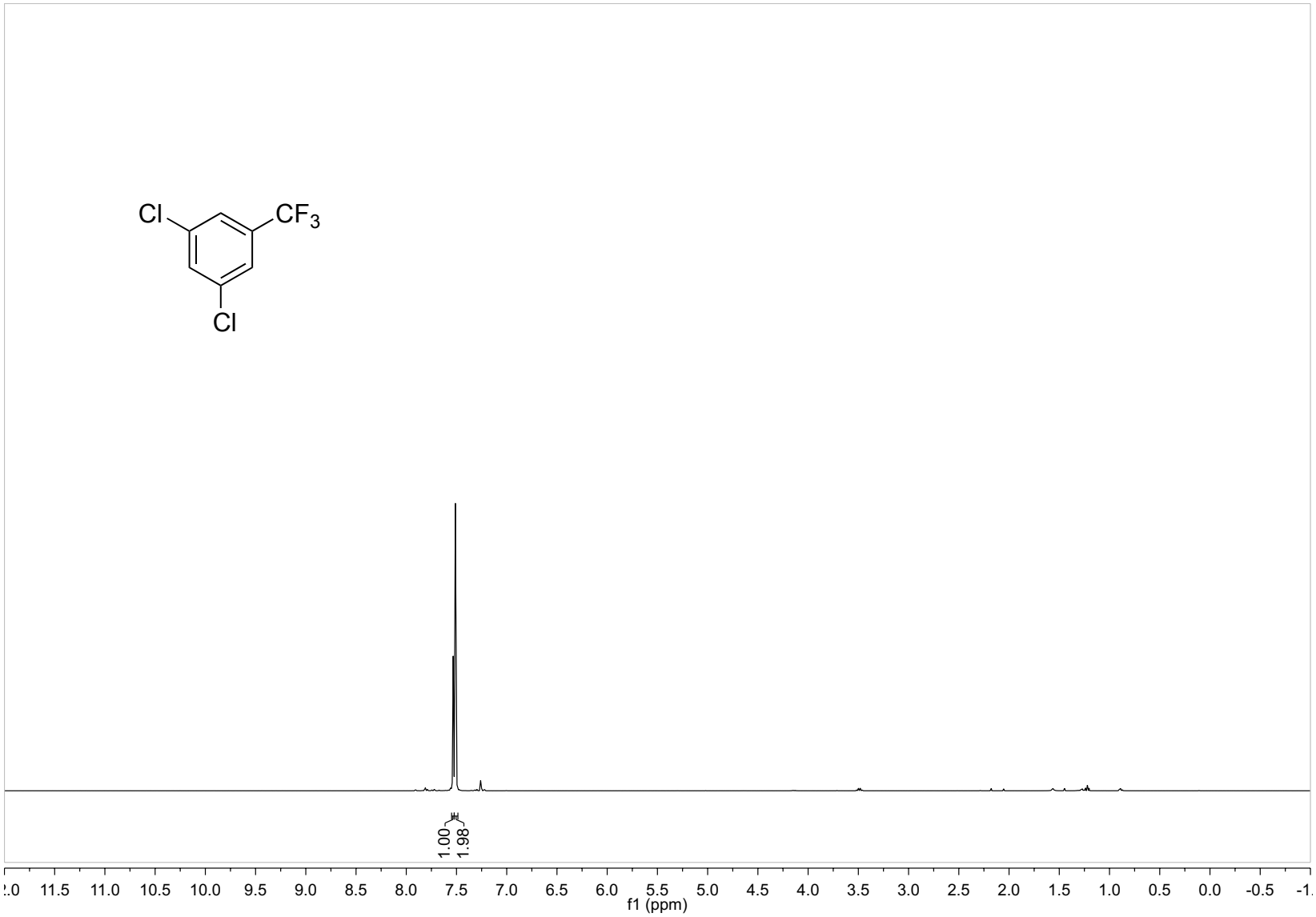

168.791
136.192
131.659
131.333
131.007
130.681
130.420
129.234
127.729
126.707
126.671
126.635
126.599
125.021
124.233
124.195
124.157
124.119
122.312
119.603
77.478 CDCl3
77.158 CDCl3
76.841 CDCl3
66.788
48.122
42.689
O
N
O
CF3
f1 (ppm)
f1 (ppm)

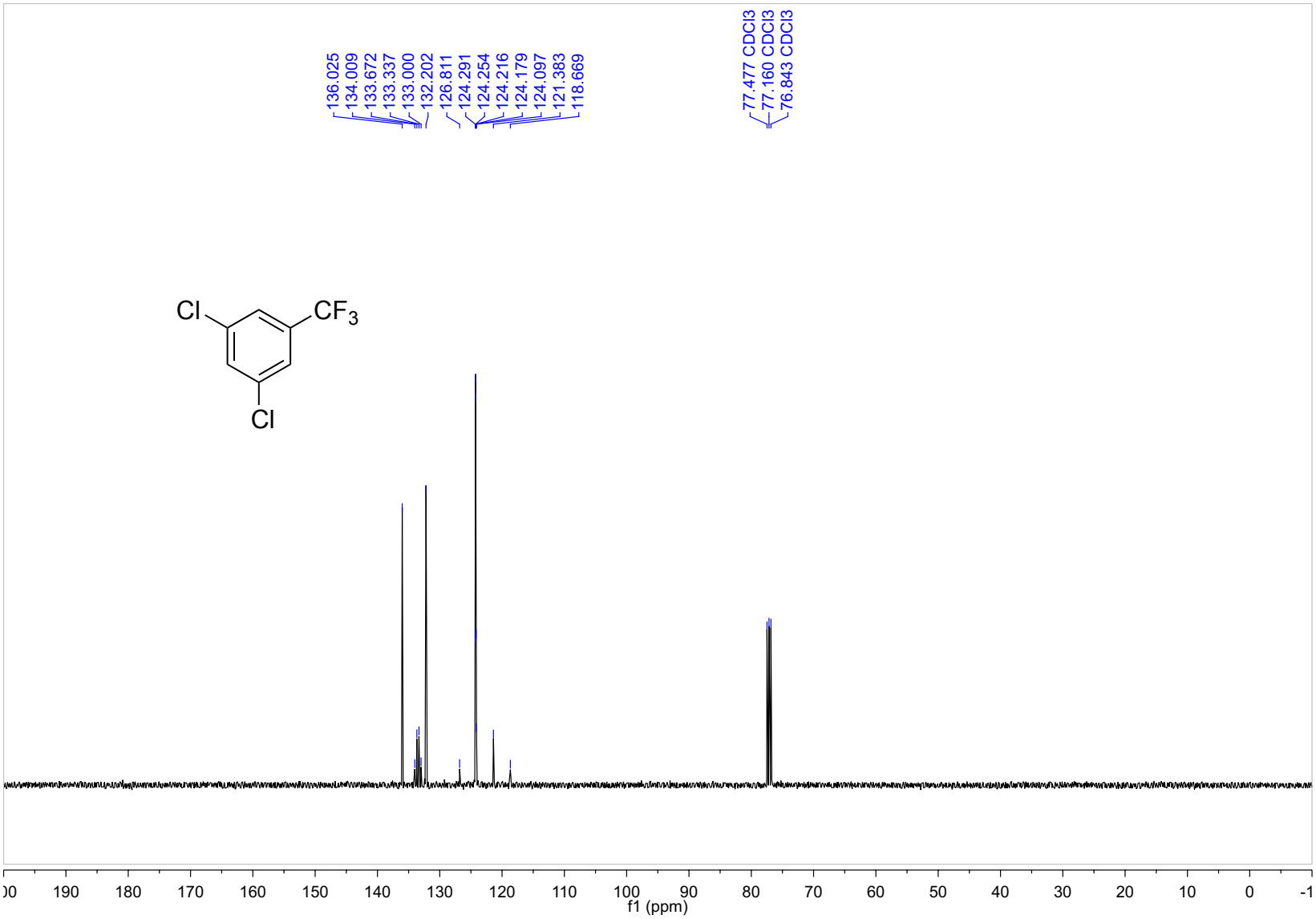

-64.732
O
N
O
CF3
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

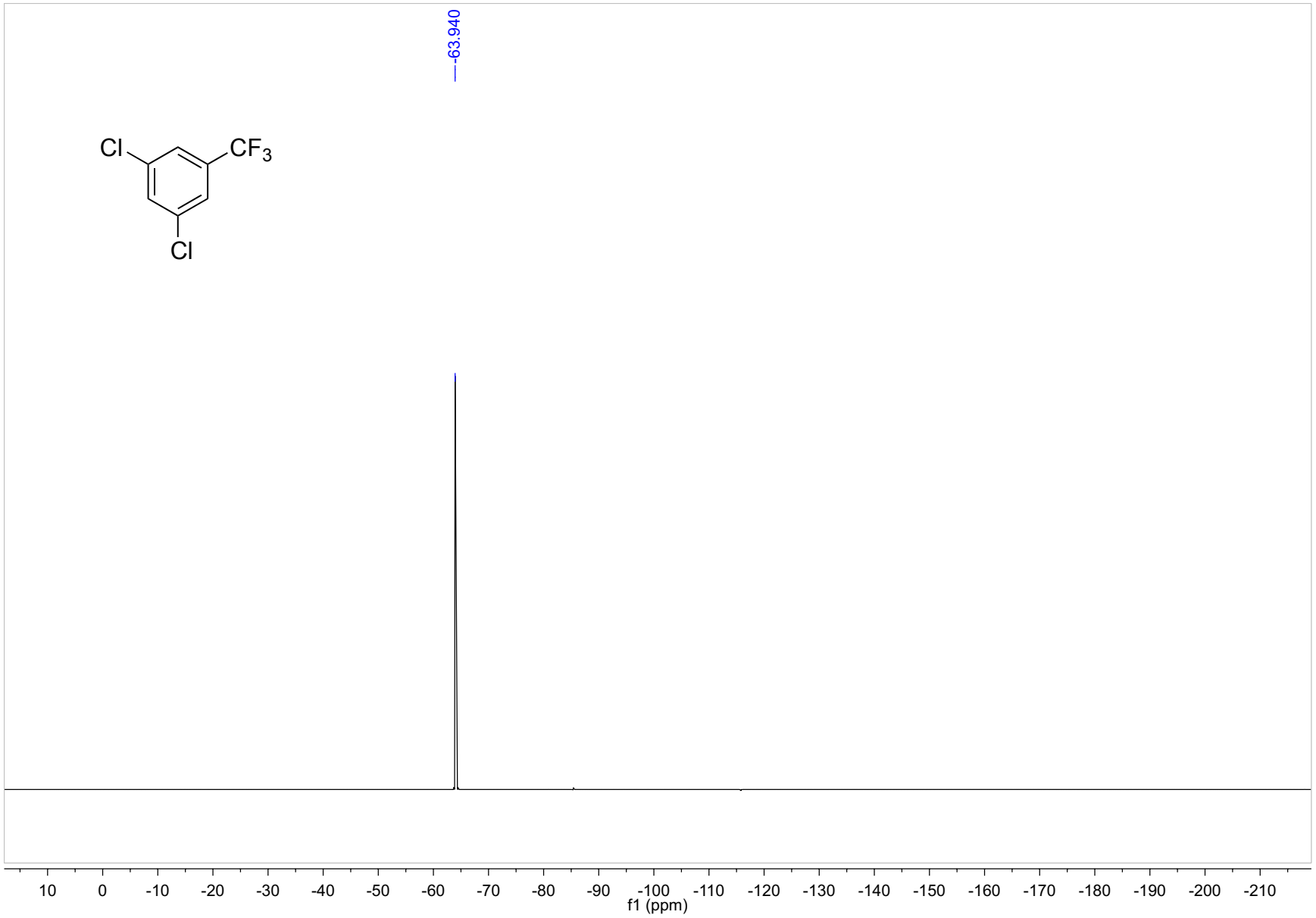

CF3
O
S
O
Et2N
2.00
2.03
4.06
5.90
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)


144.119
134.599
134.187
133.738
133.298
128.794
127.502
126.327
126.278
126.228
126.179
125.180
121.565
117.952
77.583 CDCl3
77.160 CDCl3
76.734 CDCl3
42.233
14.212
CF3
O
S
O
Et2N
f1 (ppm)


-64.995
CF3
O
S
Et2N
O
100 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 -200 -210 -220 -230 -240
f1 (ppm)


Cl
CF3
Cl
1.00
1.98
11.5
11.0
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)


136.025
134.009
133.672
133.337
133.000
132.202
126.811
124.291
124.254
124.216
124.179
124.097
121.383
118.669
77.477 CDCl3
77.160 CDCl3
76.843 CDCl3
Cl
CF3
Cl
f1 (ppm)


-63.940
Cl
CF3
Cl
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
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-130
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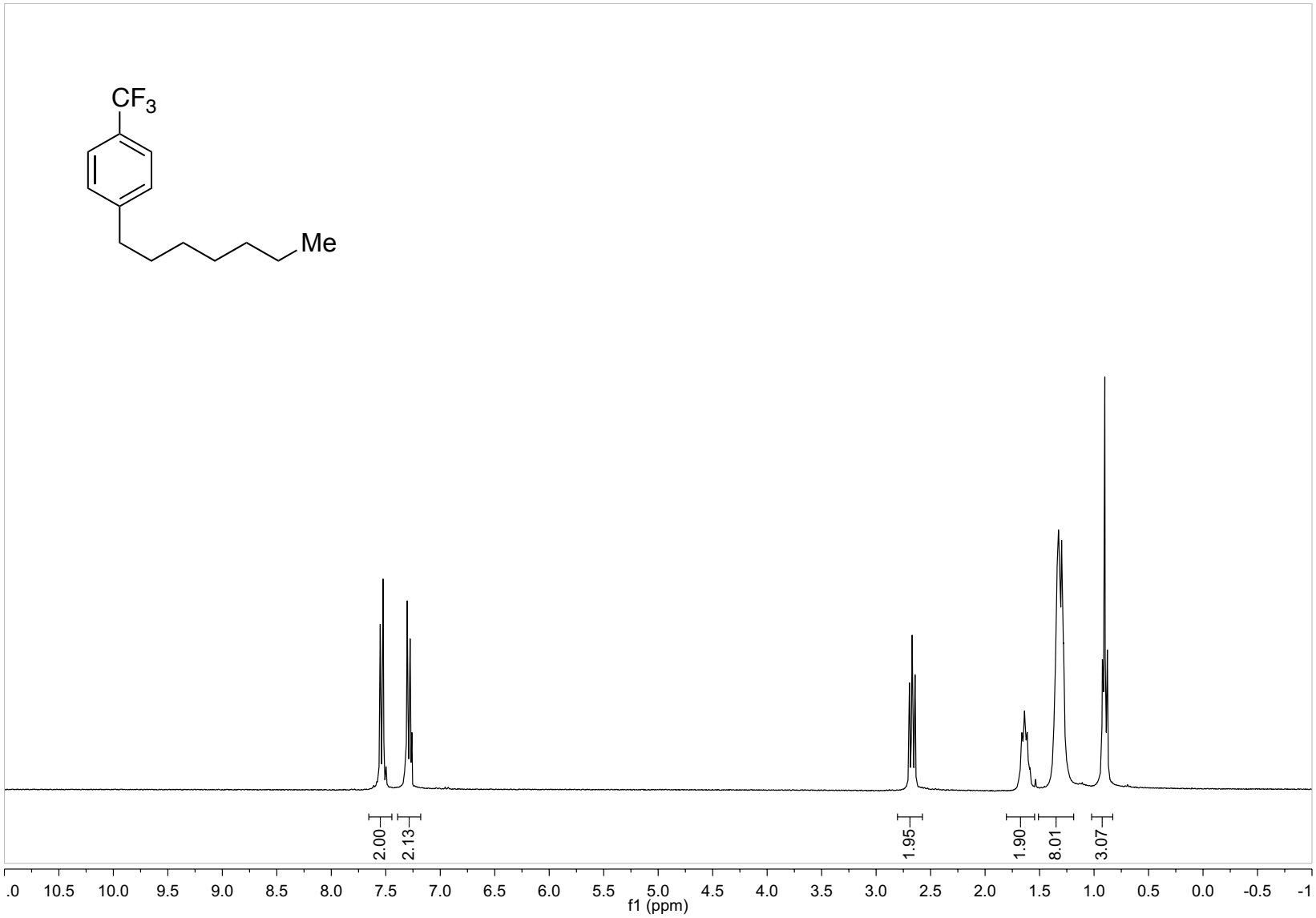
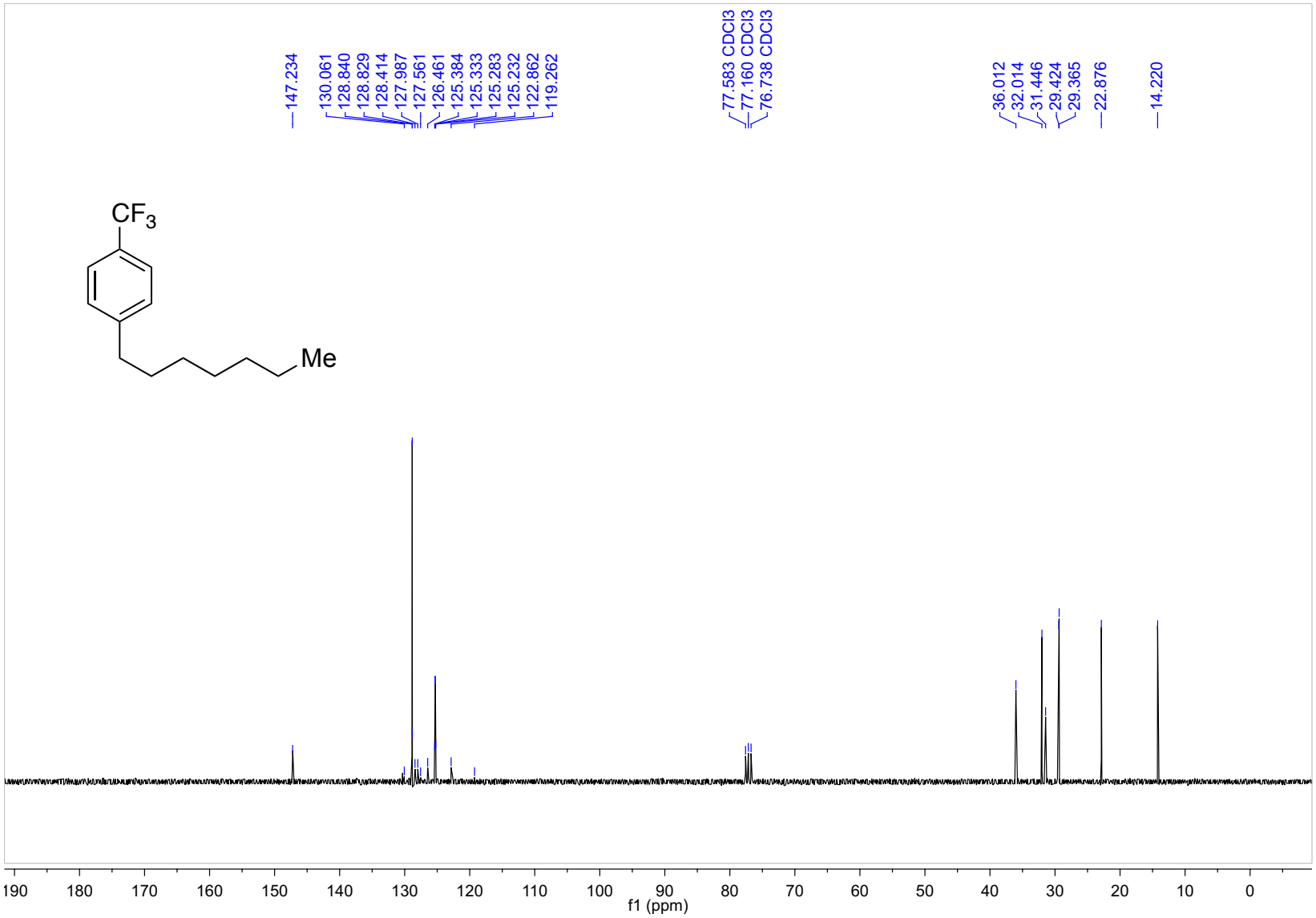
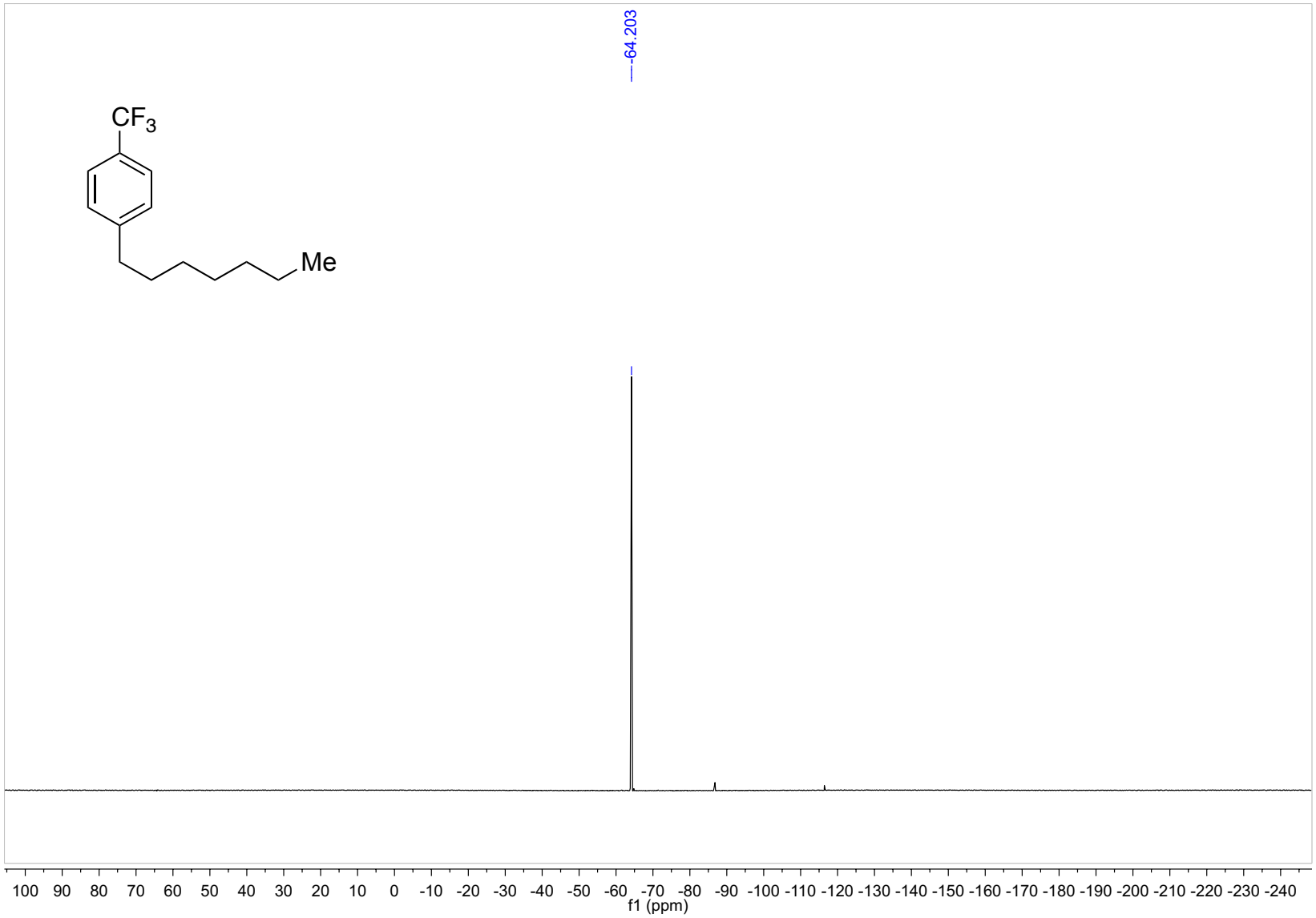
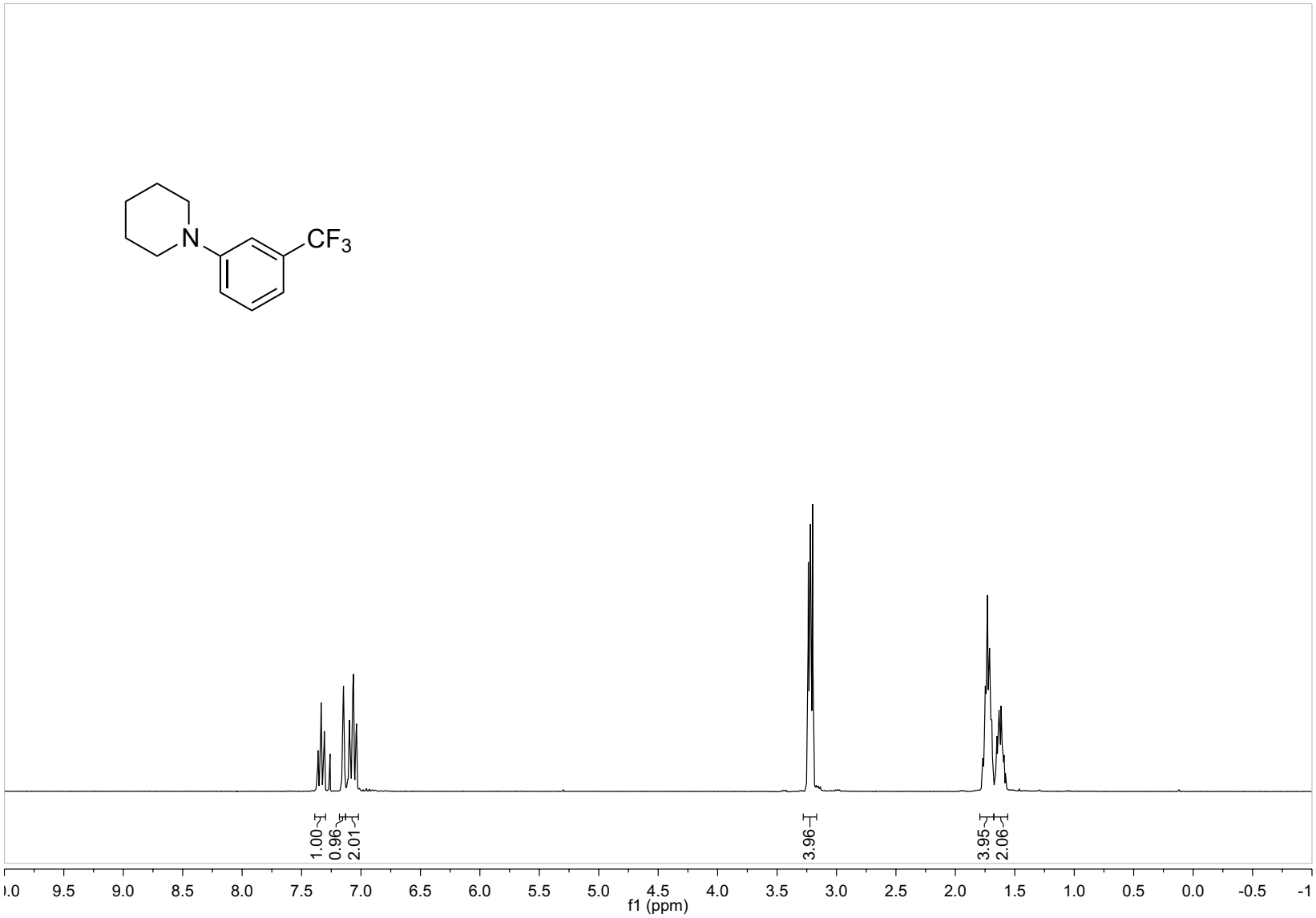
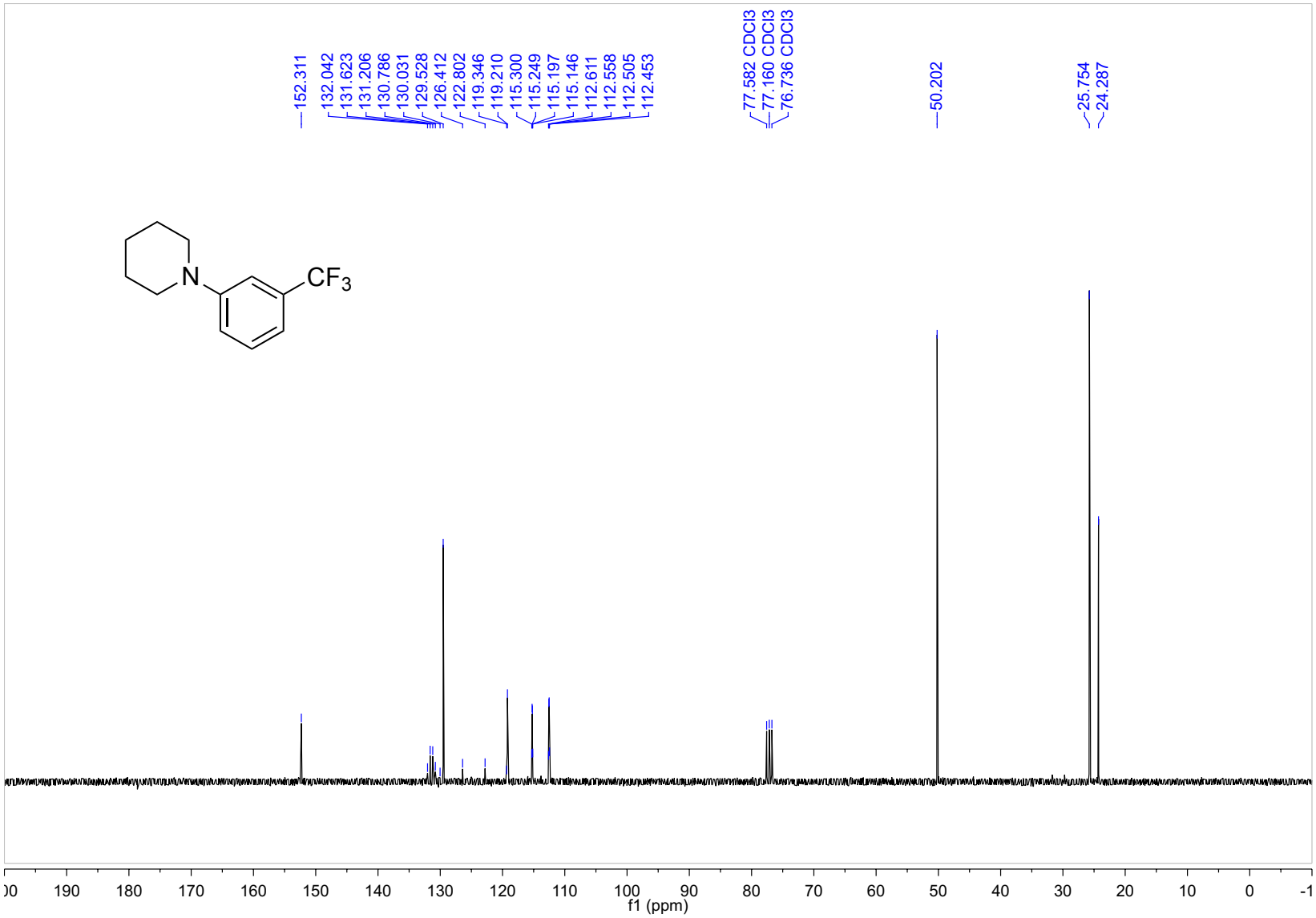
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)

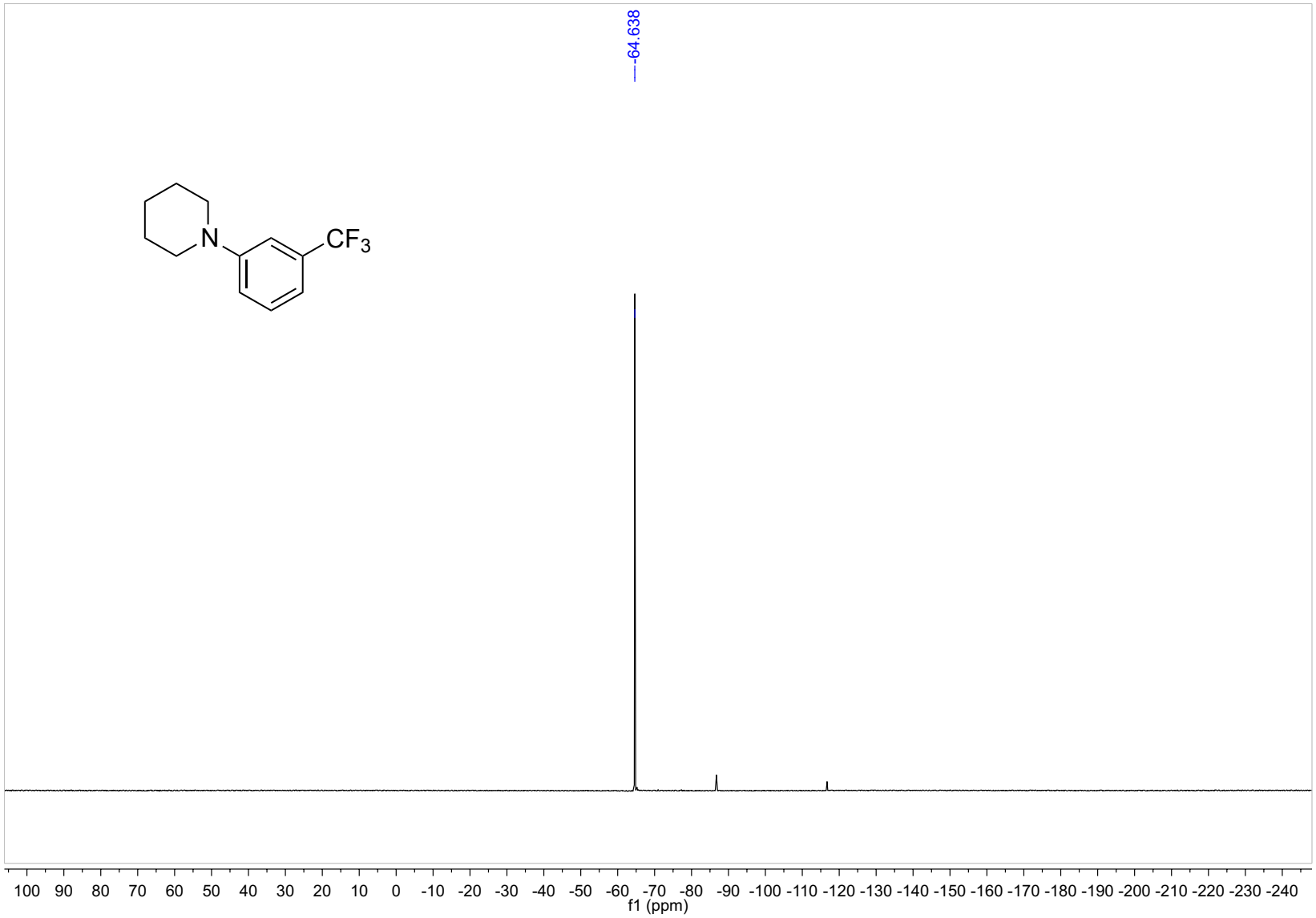

CF3
Me
2.00
2.13
1.95
1.90
8.01
3.07
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1
f1 (ppm)

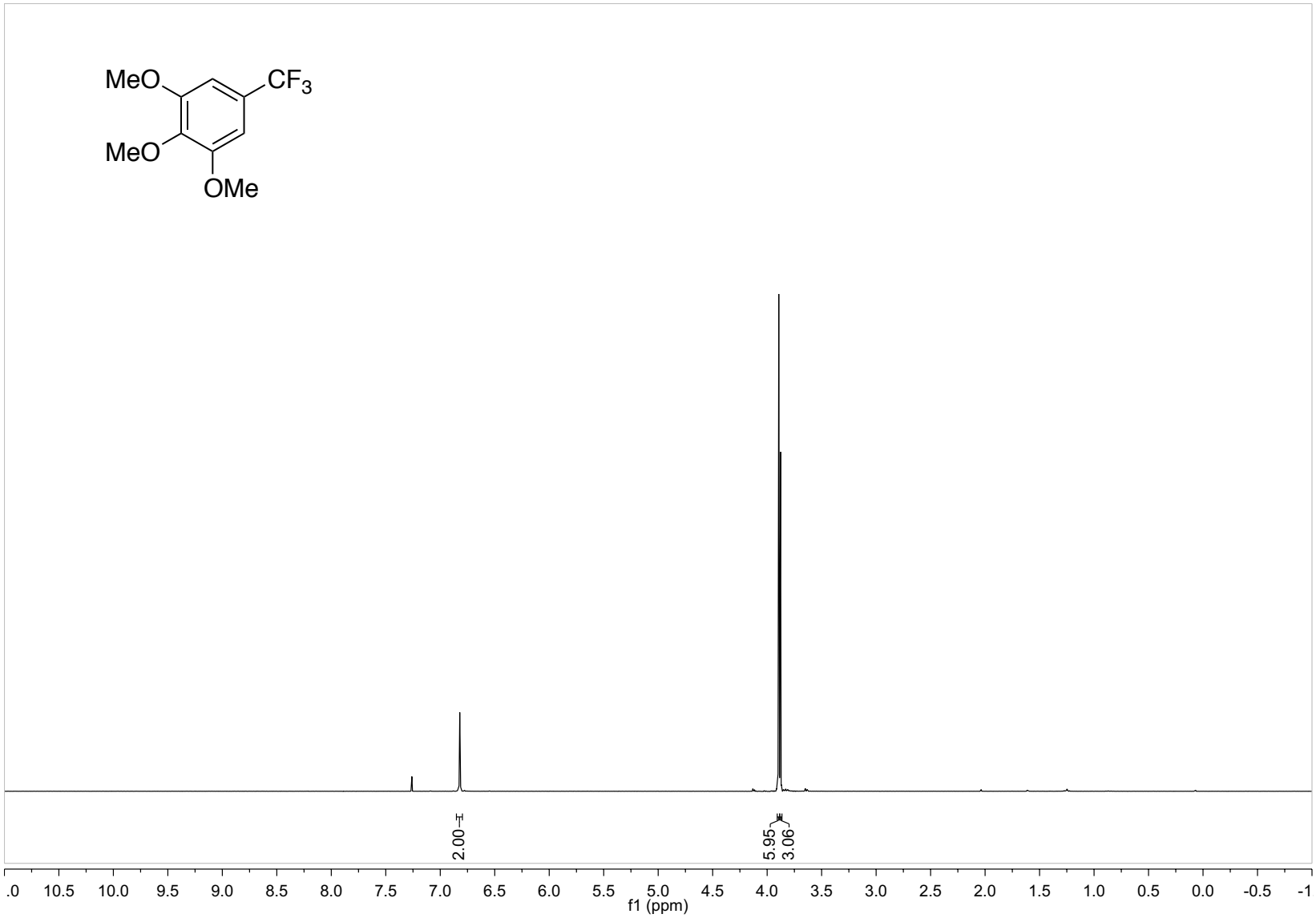

147.234
130.061
128.840
128.829
128.414
127.987
127.561
126.461
125.384
125.333
125.283
125.232
122.862
119.262
77.583 CDCl3
77.160 CDCl3
76.738 CDCl3
36.012
32.014
31.446
29.424
29.365
22.876
14.220
CF3
Me
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

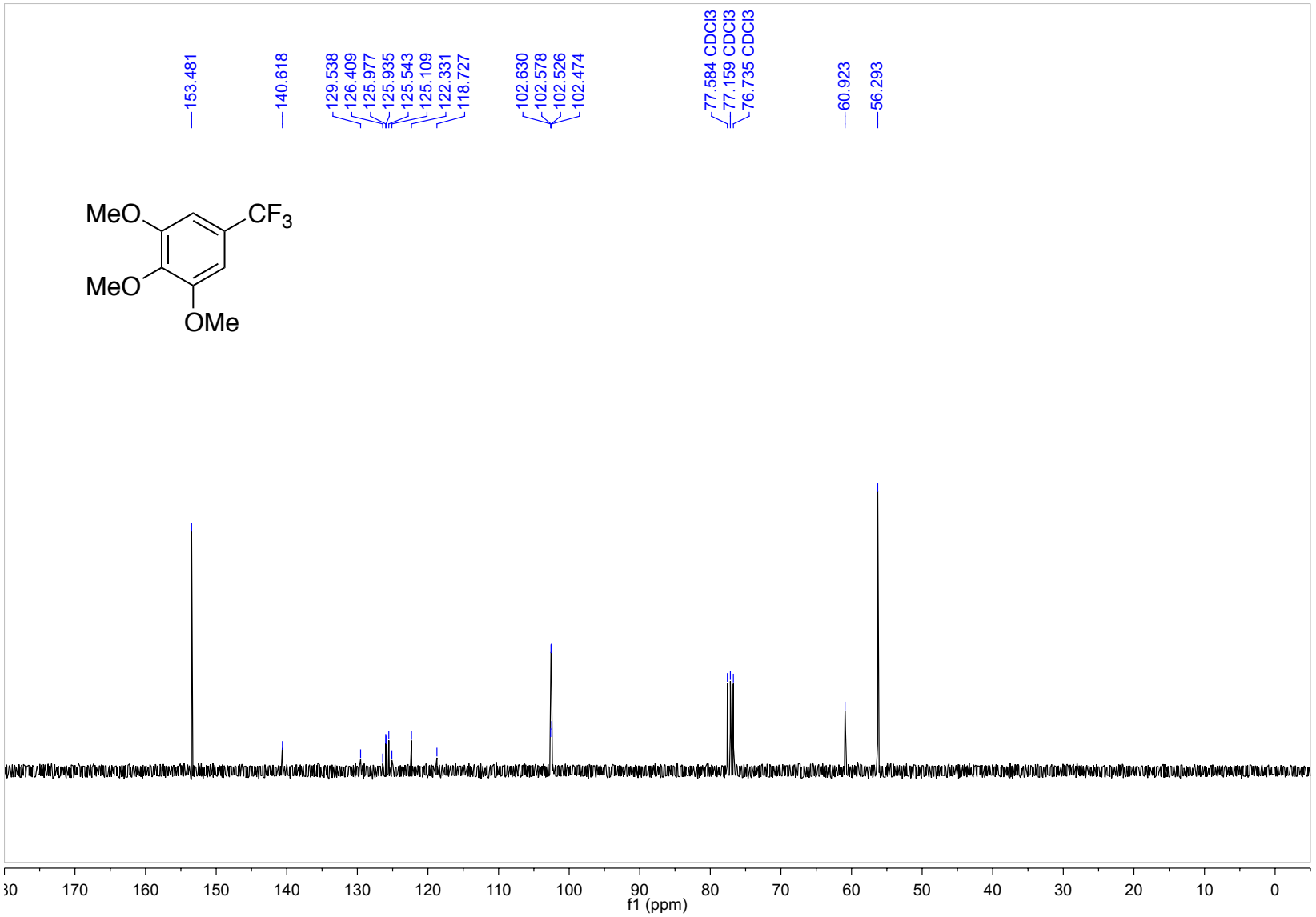

-64.203
CF3
Me
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

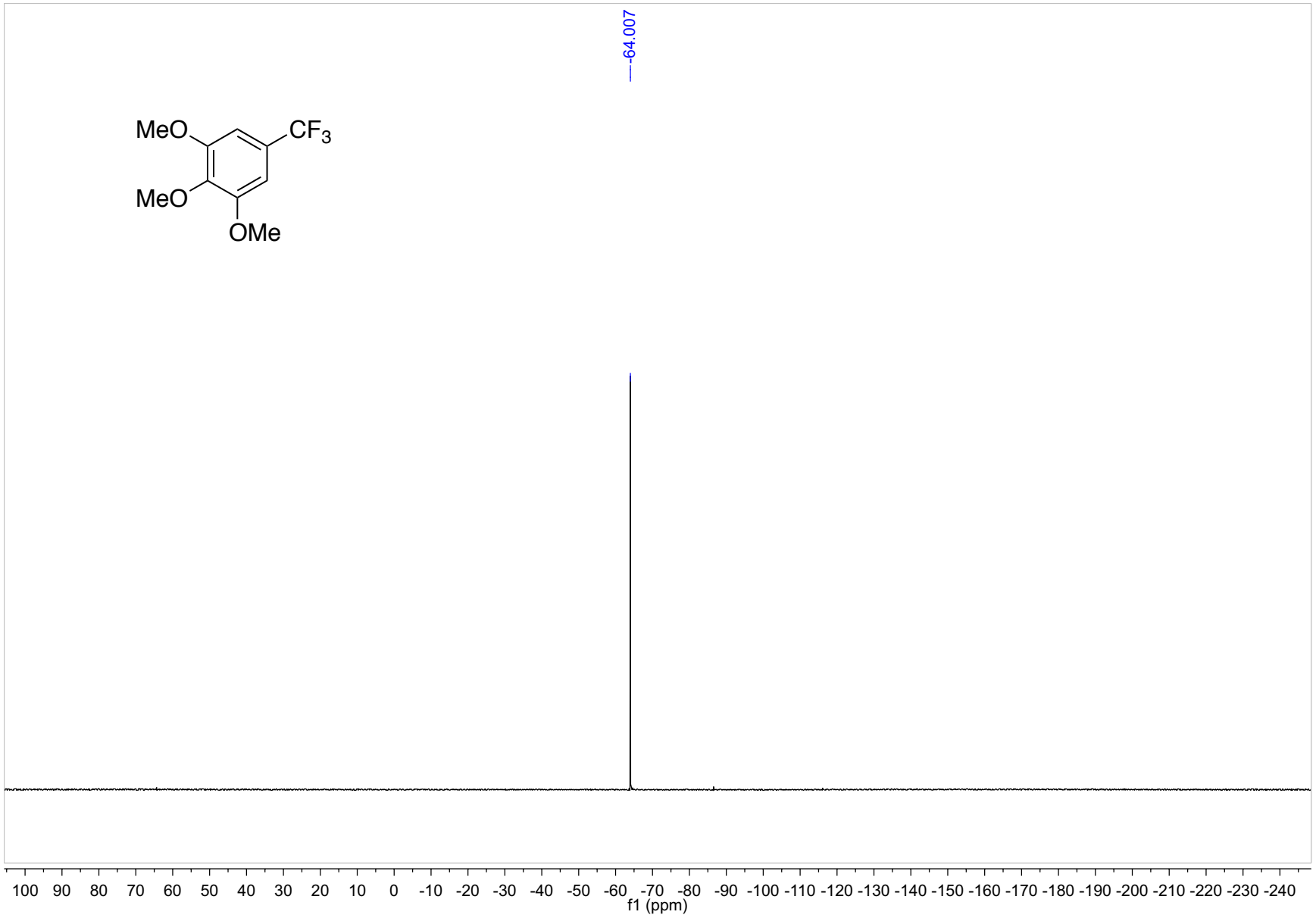

N
CF3
1.00
0.96
2.01
3.96
3.95
2.06
f1 (ppm)

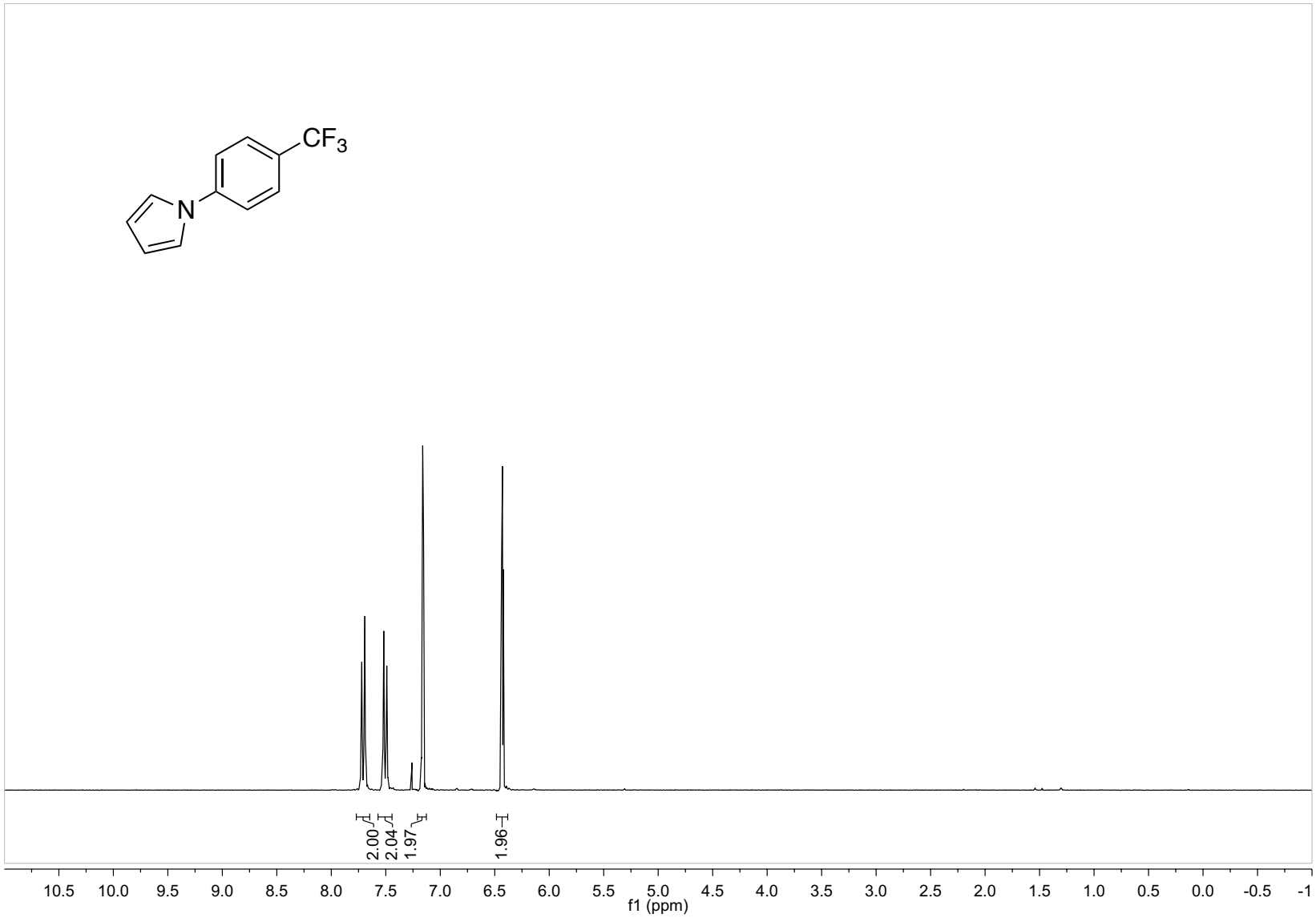

152.311
132.042
131.623
131.206
130.786
130.031
129.528
126.412
122.802
119.346
119.210
115.300
115.249
115.197
115.146
112.611
112.558
112.505
112.453
77.582 CDCl3
77.160 CDCl3
76.736 CDCl3
50.202
25.754
24.287
N
CF3
f1 (ppm)

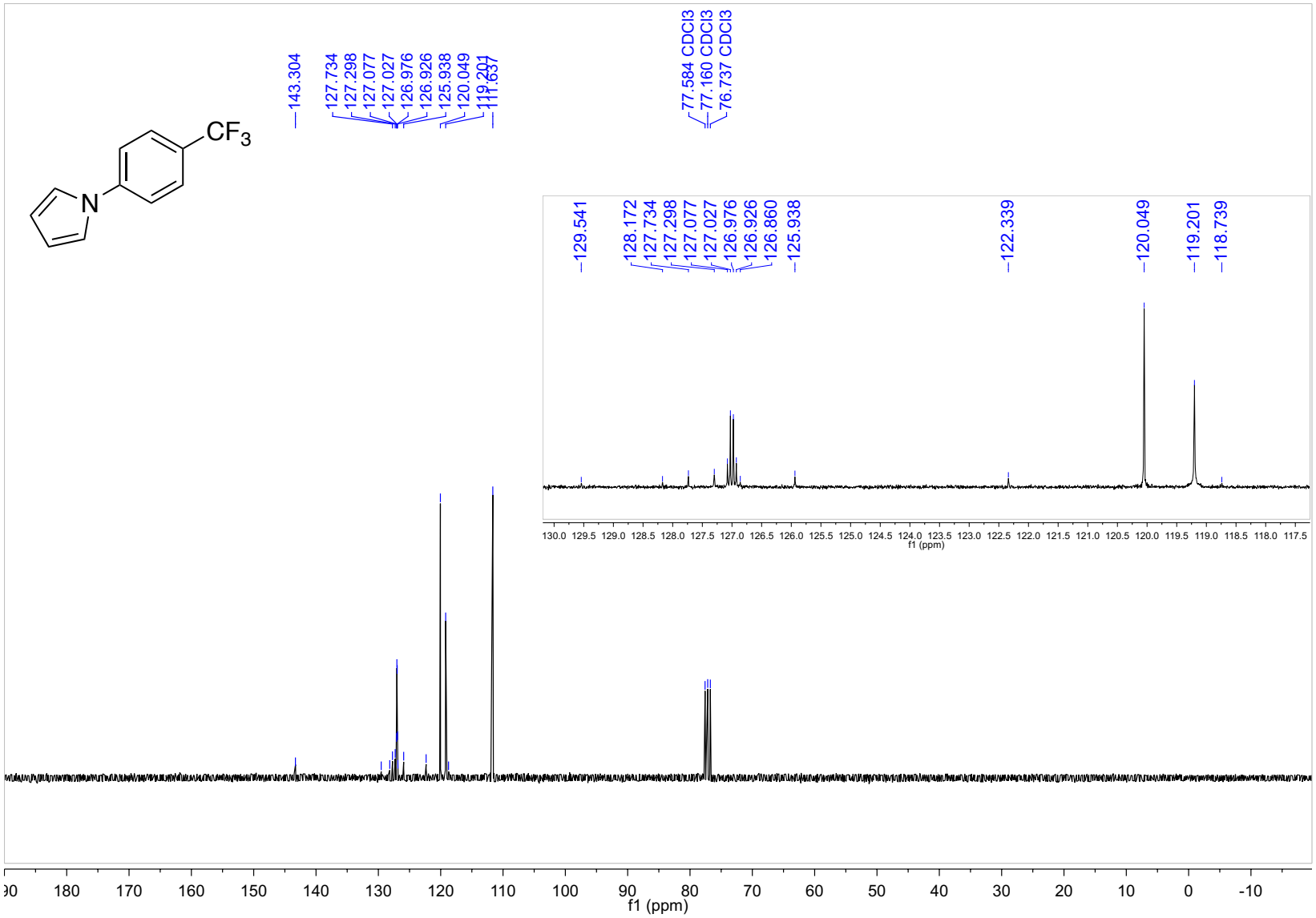

-64.638
N
CF3
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

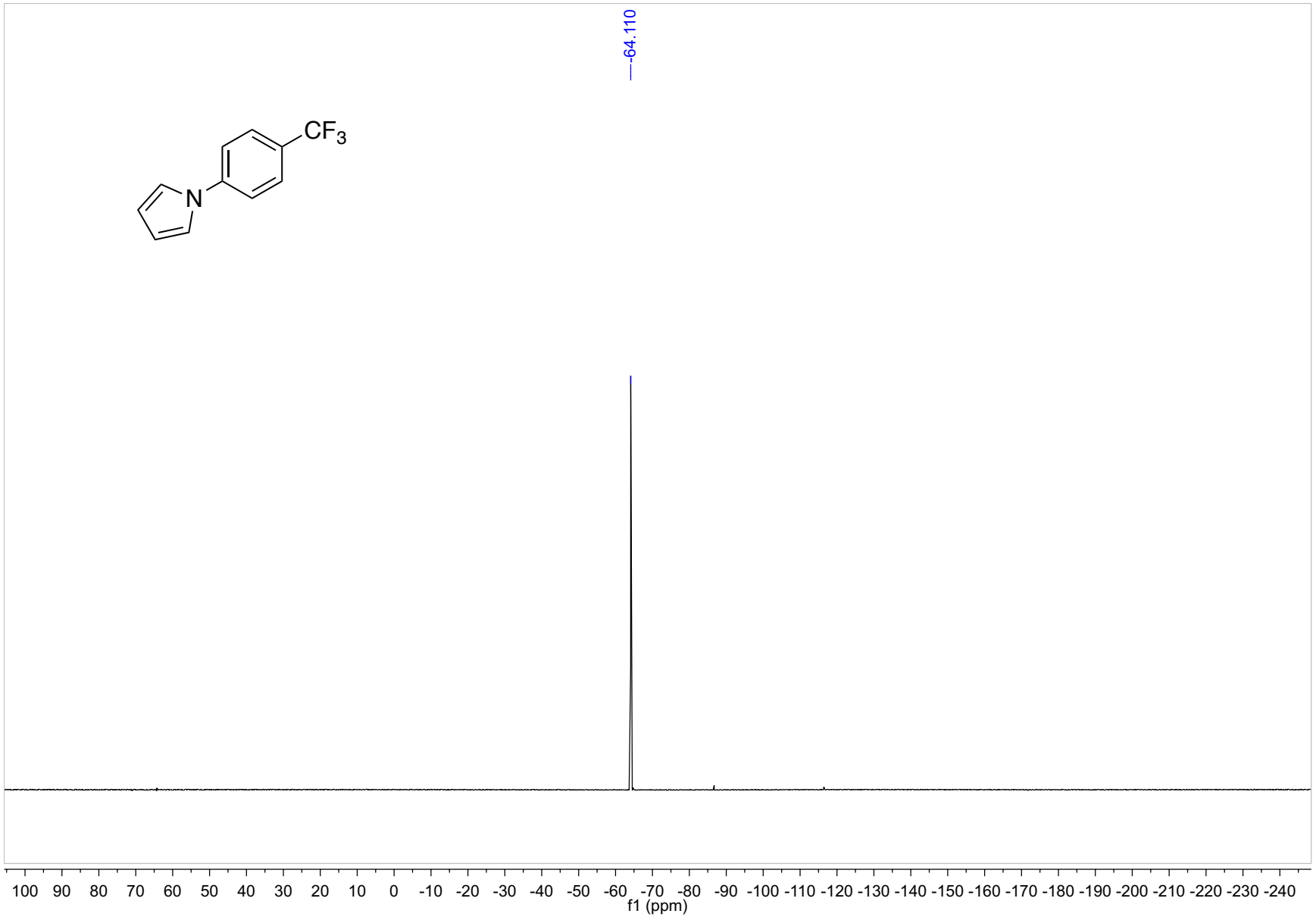

MeO
CF3
MeO
OMe
2.00
5.95
3.06
f1 (ppm)

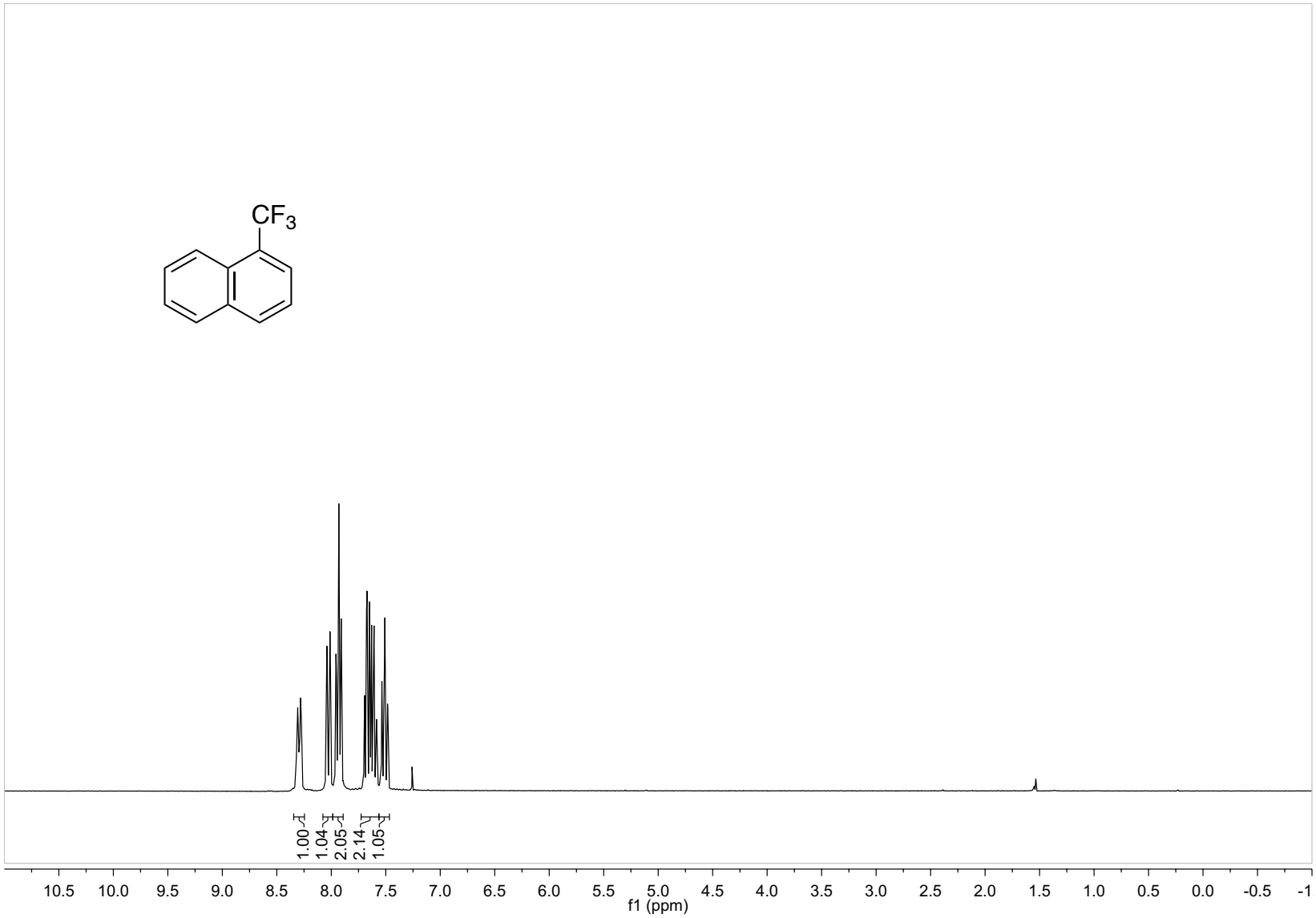

153.481
140.618
129.538
126.409
125.977
125.935
125.543
125.109
122.331
118.727
102.630
102.578
102.526
102.474
77.584 CDCl3
77.159 CDCl3
76.735 CDCl3
60.923
56.293
MeO
MeO
OMe
CF3
f1 (ppm)

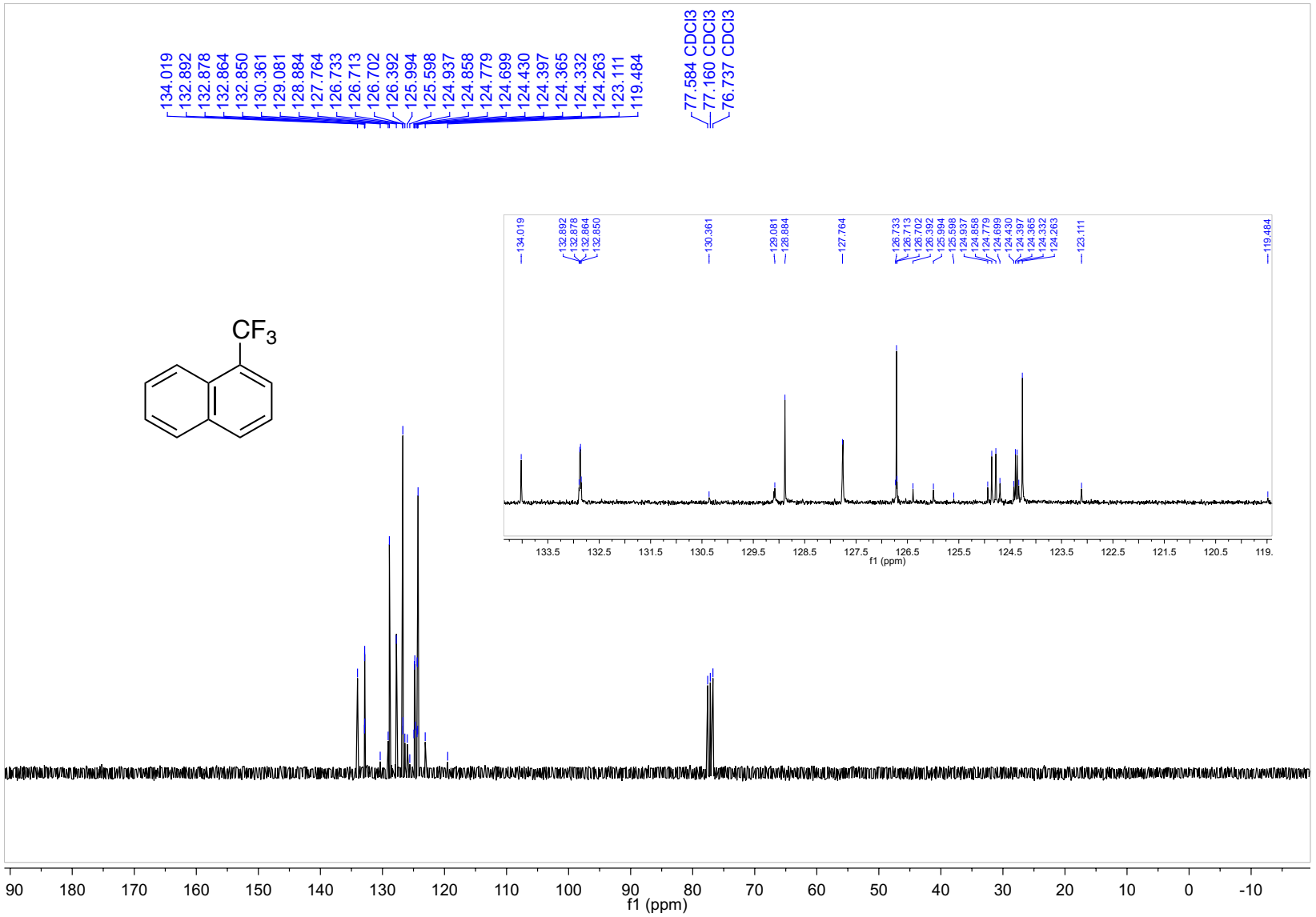

-64.007
MeO
MeO
OMe
CF3
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

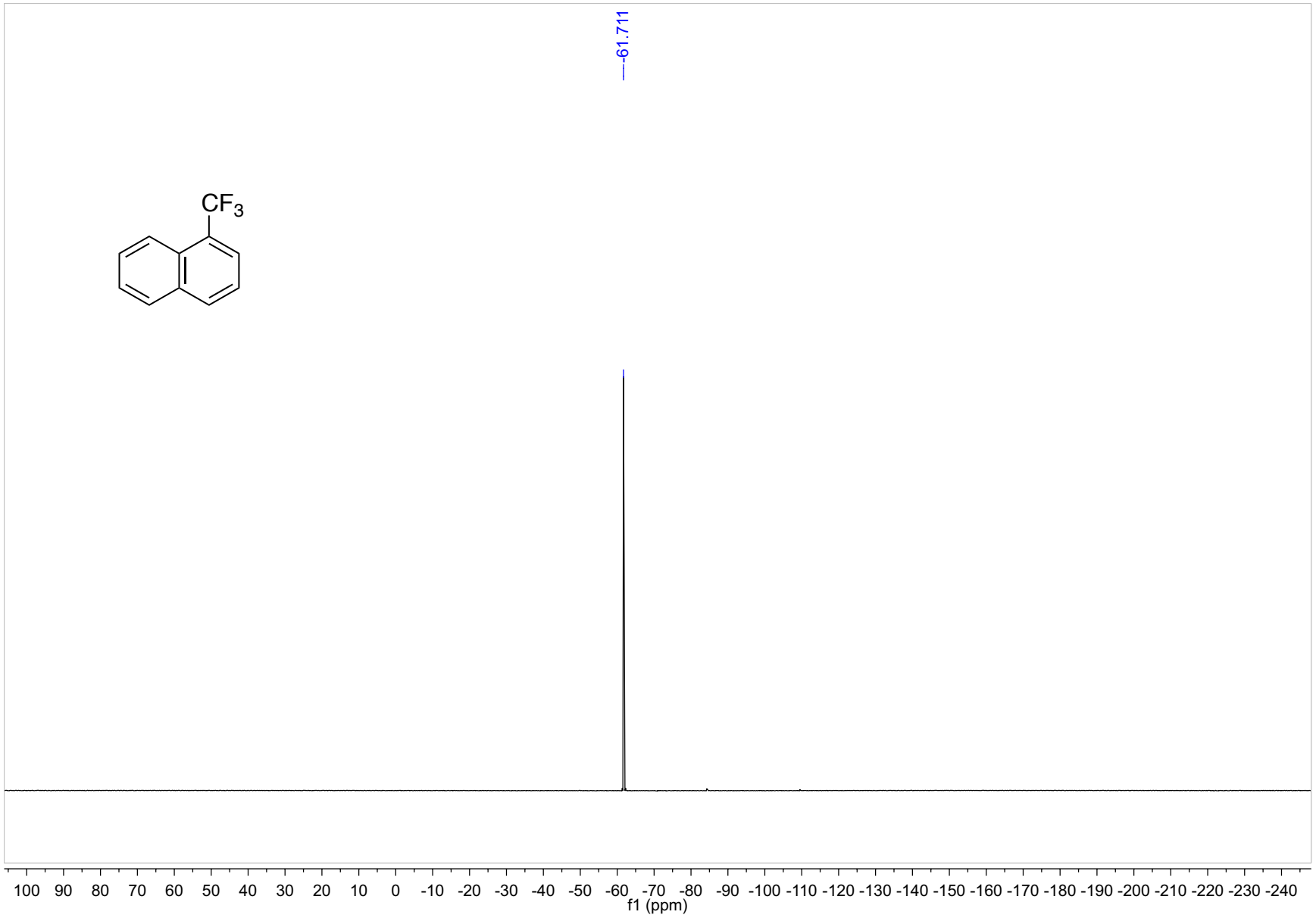

CF3
N
2.00
2.04
1.97
1.96
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

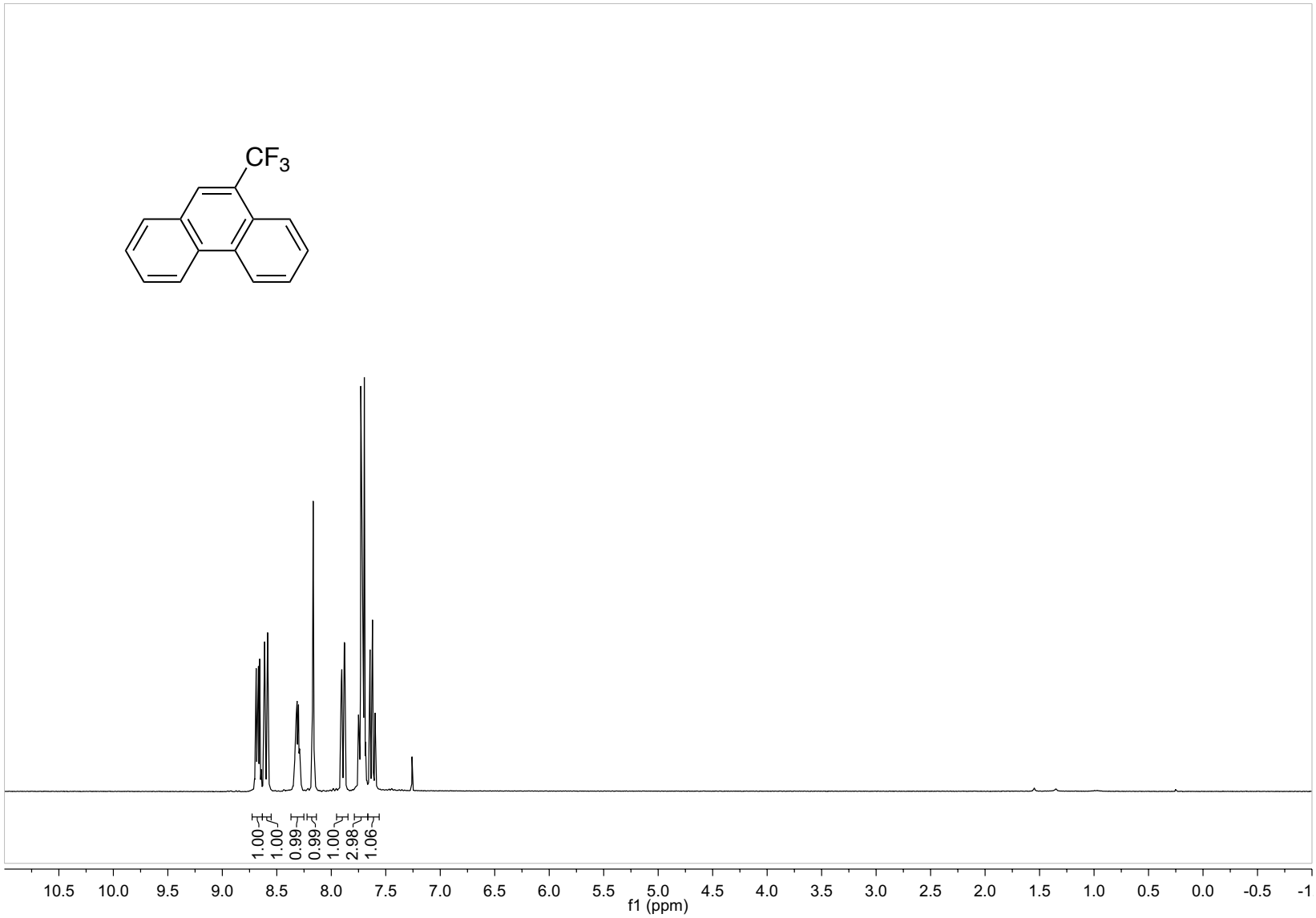

143.304
127.734
127.298
127.077
127.027
126.976
126.926
125.938
120.049
77.584 CDCl3
77.160 CDCl3
76.737 CDCl3
CF3
N
129.541
128.172
127.734
127.298
127.077
127.027
126.976
126.926
126.860
125.938
122.339
120.049
119.201
118.739
f1 (ppm)

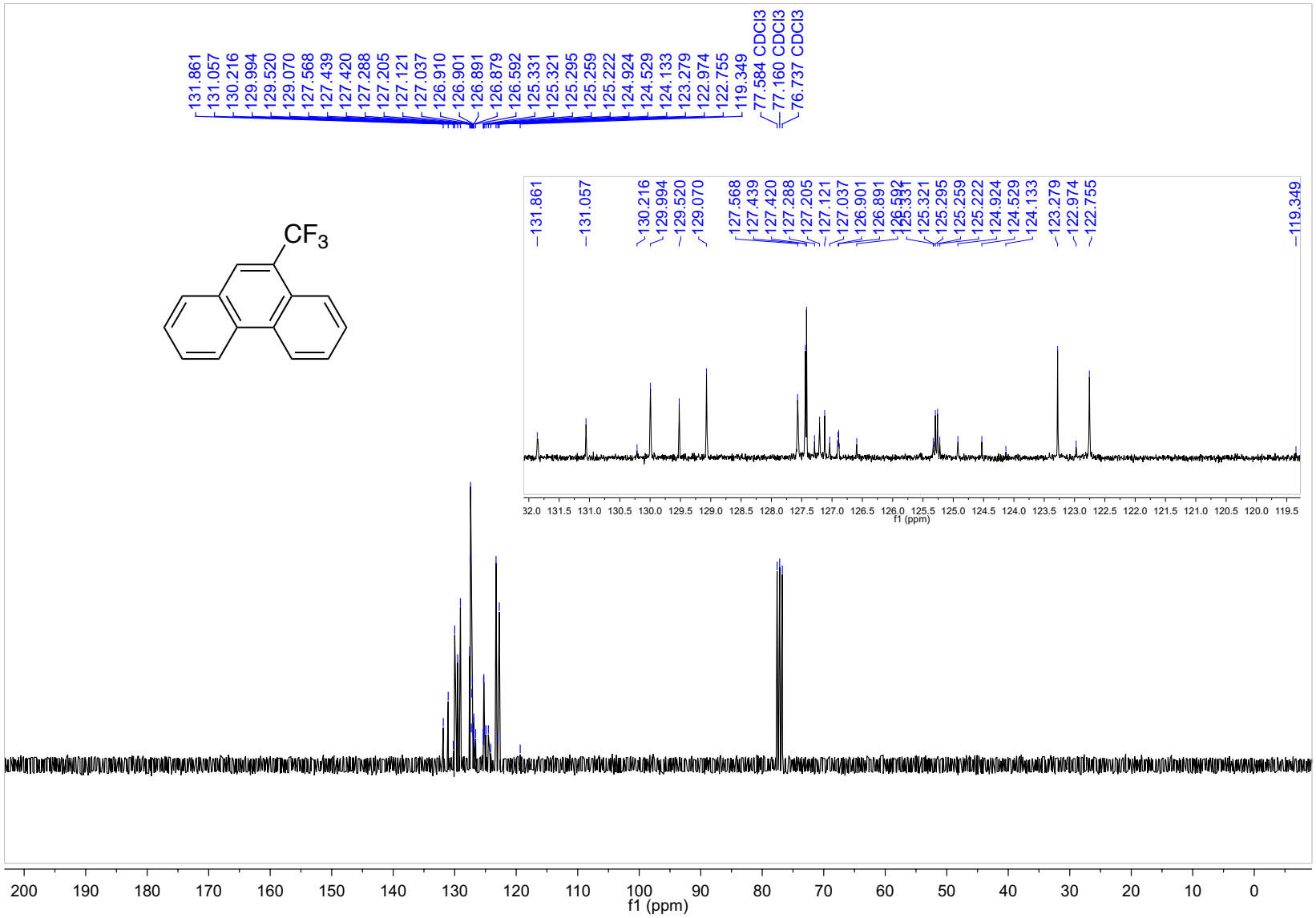

-64.110
CF3
N
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

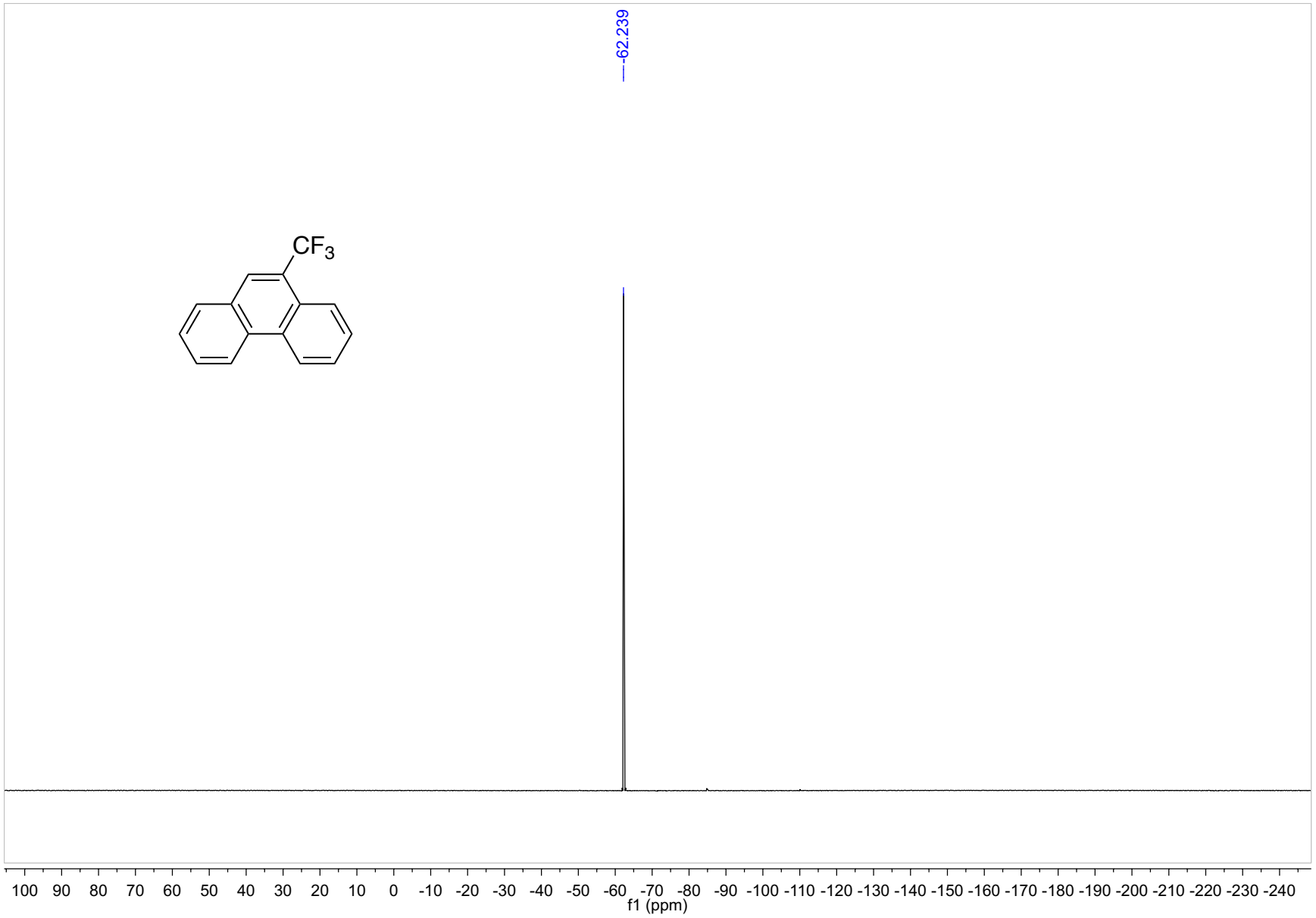

CF3
1.00
1.04
2.05
2.14
1.05
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

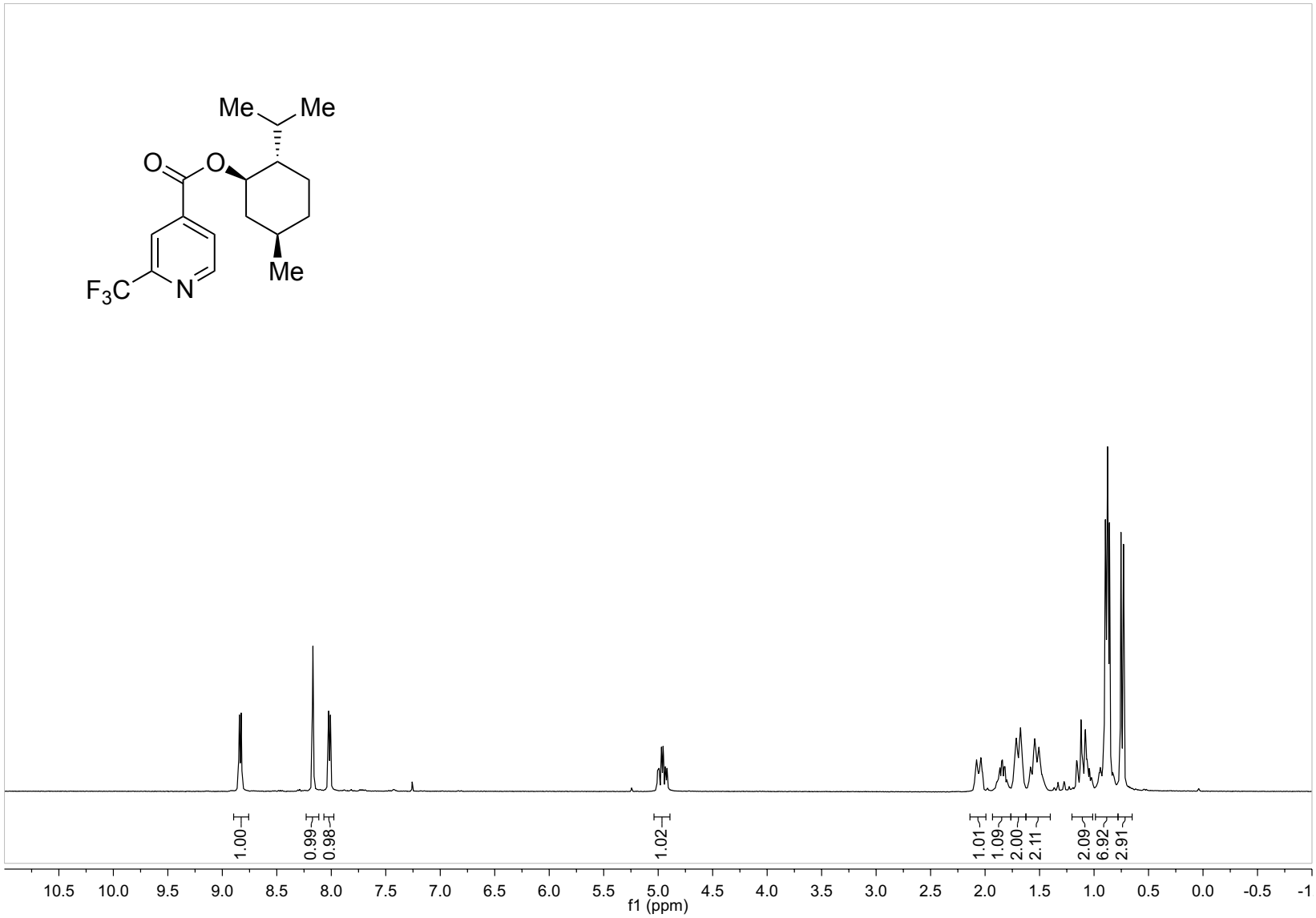

134.019
132.892
132.878
132.864
132.850
130.361
129.081
128.884
127.764
126.733
126.713
126.702
126.392
125.994
125.598
124.937
124.858
124.779
124.699
124.430
124.397
124.365
124.332
124.263
123.111
119.484
77.584 CDCl3
77.160 CDCl3
76.737 CDCl3
CF3
f1 (ppm)
f1 (ppm)

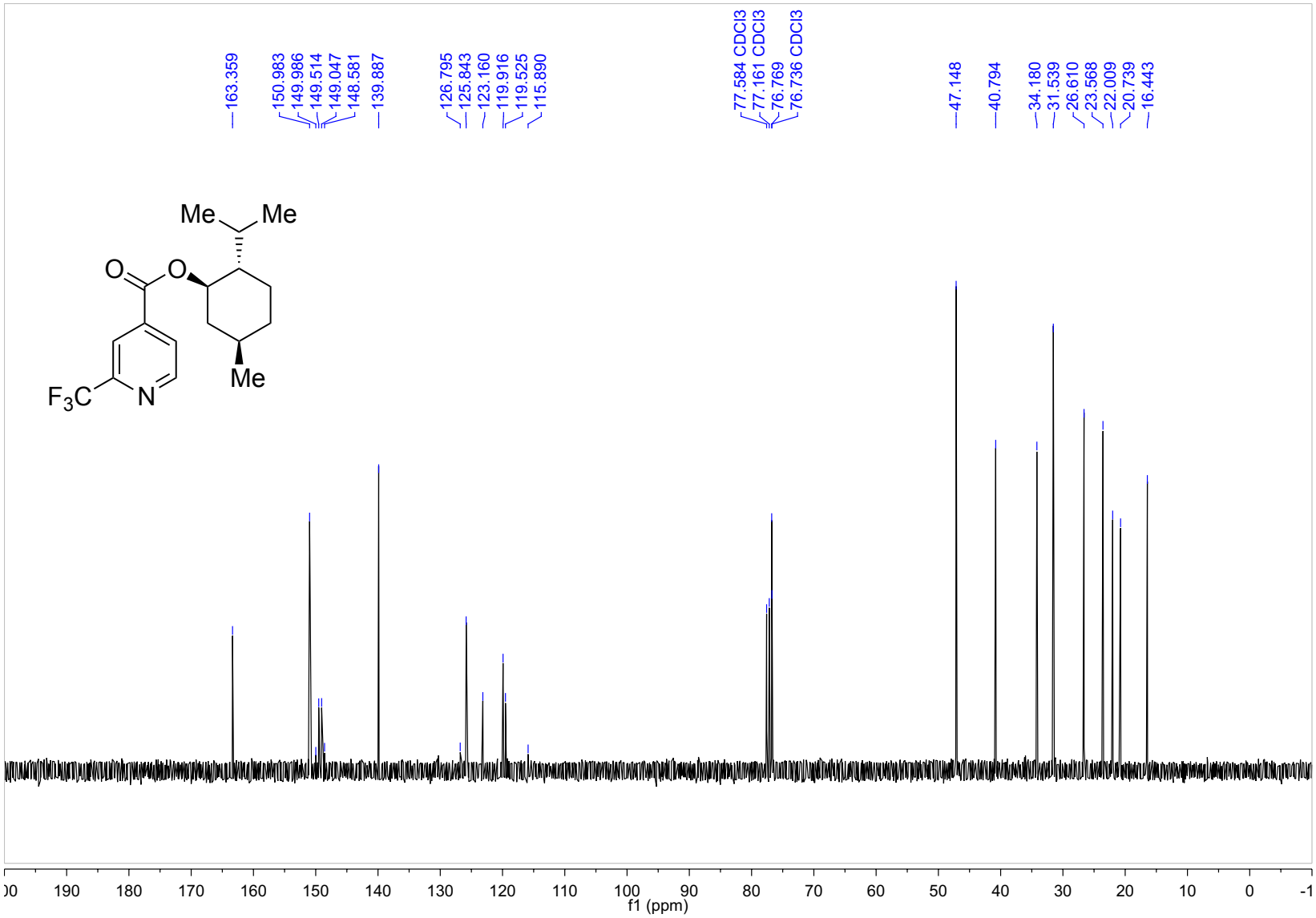

-61.711
CF3
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

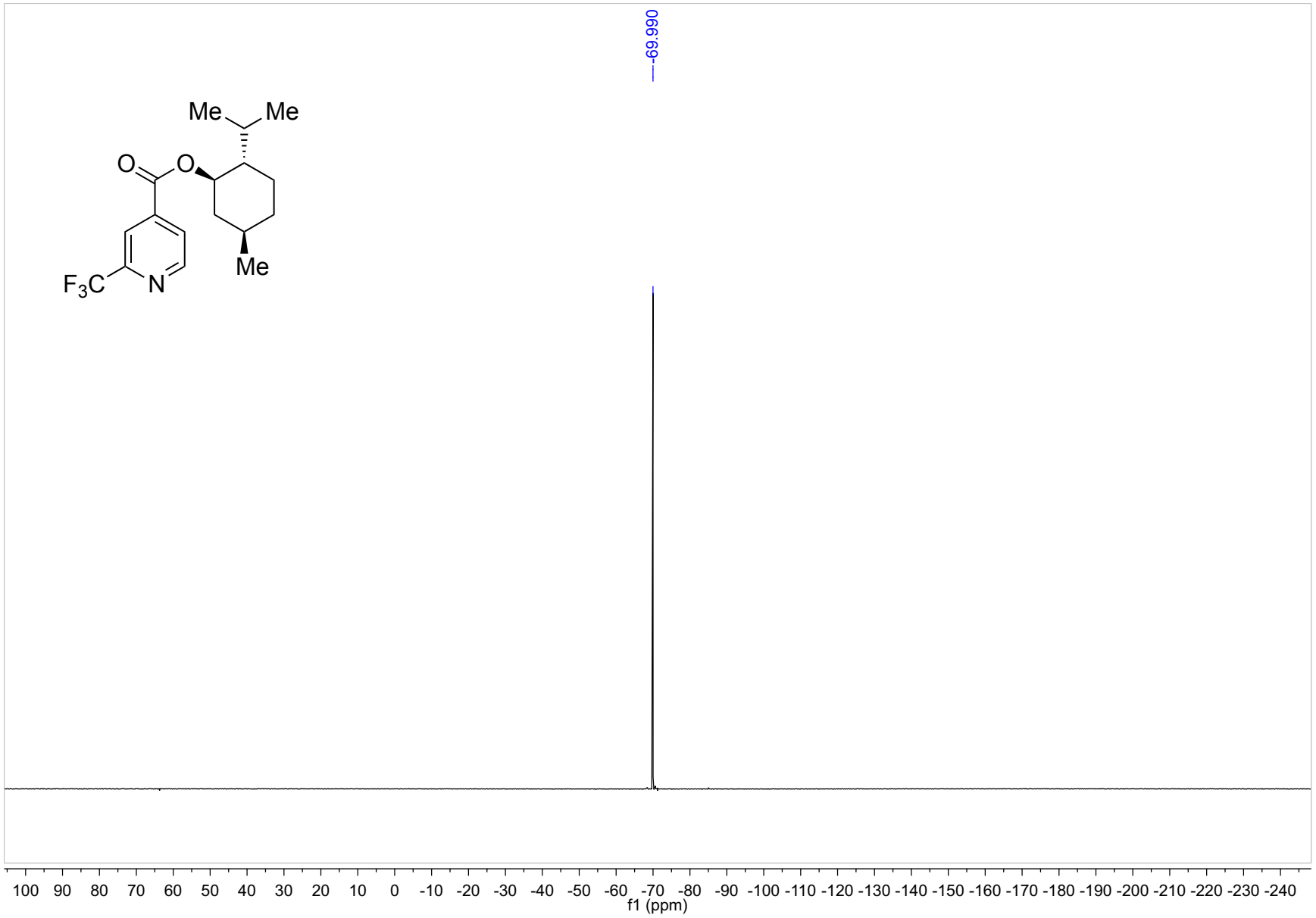

CF3
1.00
1.00
0.99
0.99
1.00
2.98
1.06
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

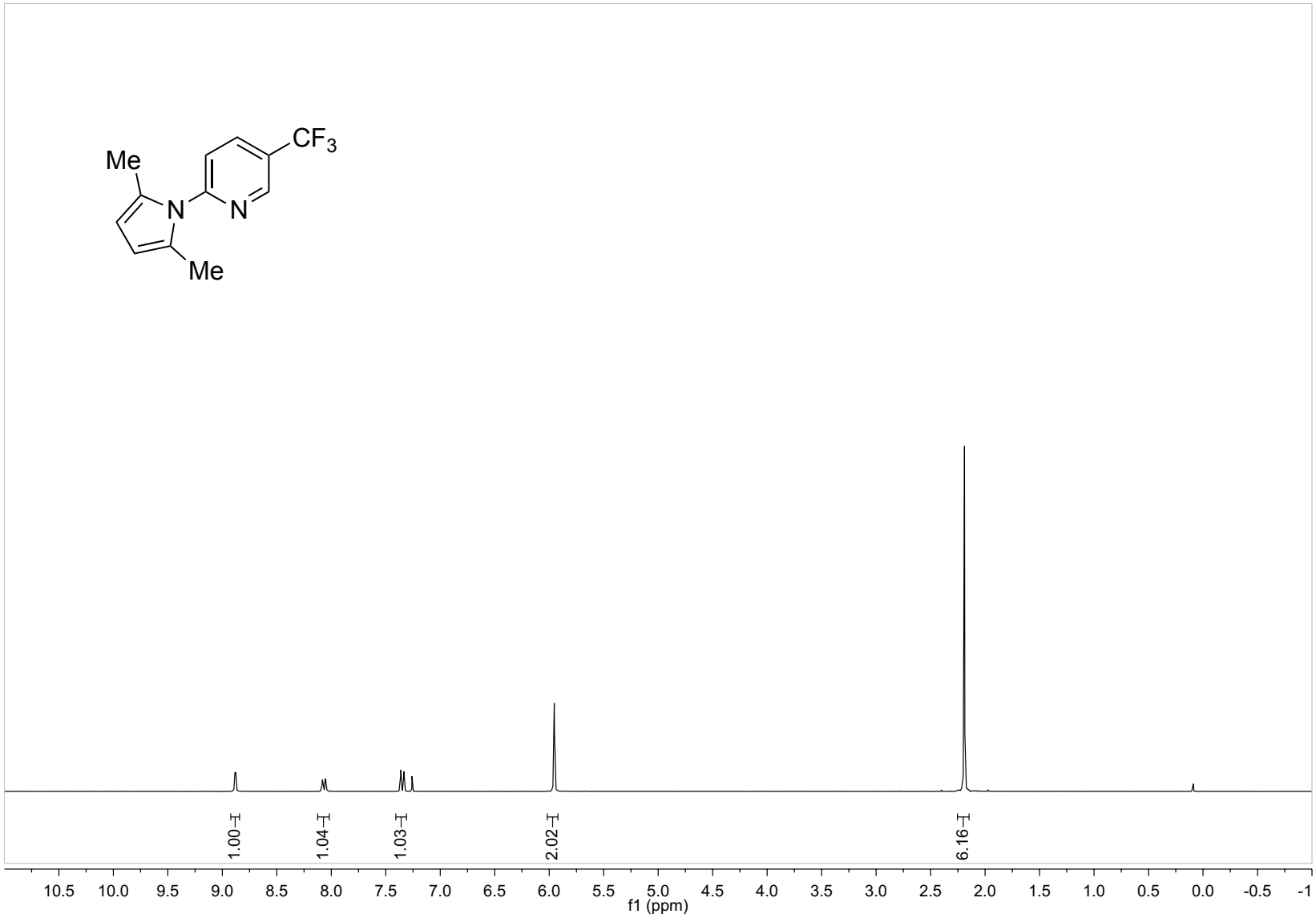

131.861
131.057
130.216
129.994
129.520
129.070
127.568
127.439
127.420
127.288
127.205
127.121
127.037
126.910
126.901
126.891
126.879
126.592
125.331
125.321
125.295
125.259
125.222
124.924
124.529
124.133
123.279
122.974
122.755
119.349
77.584 CDCl3
77.160 CDCl3
76.737 CDCl3
CF3
f1 (ppm)

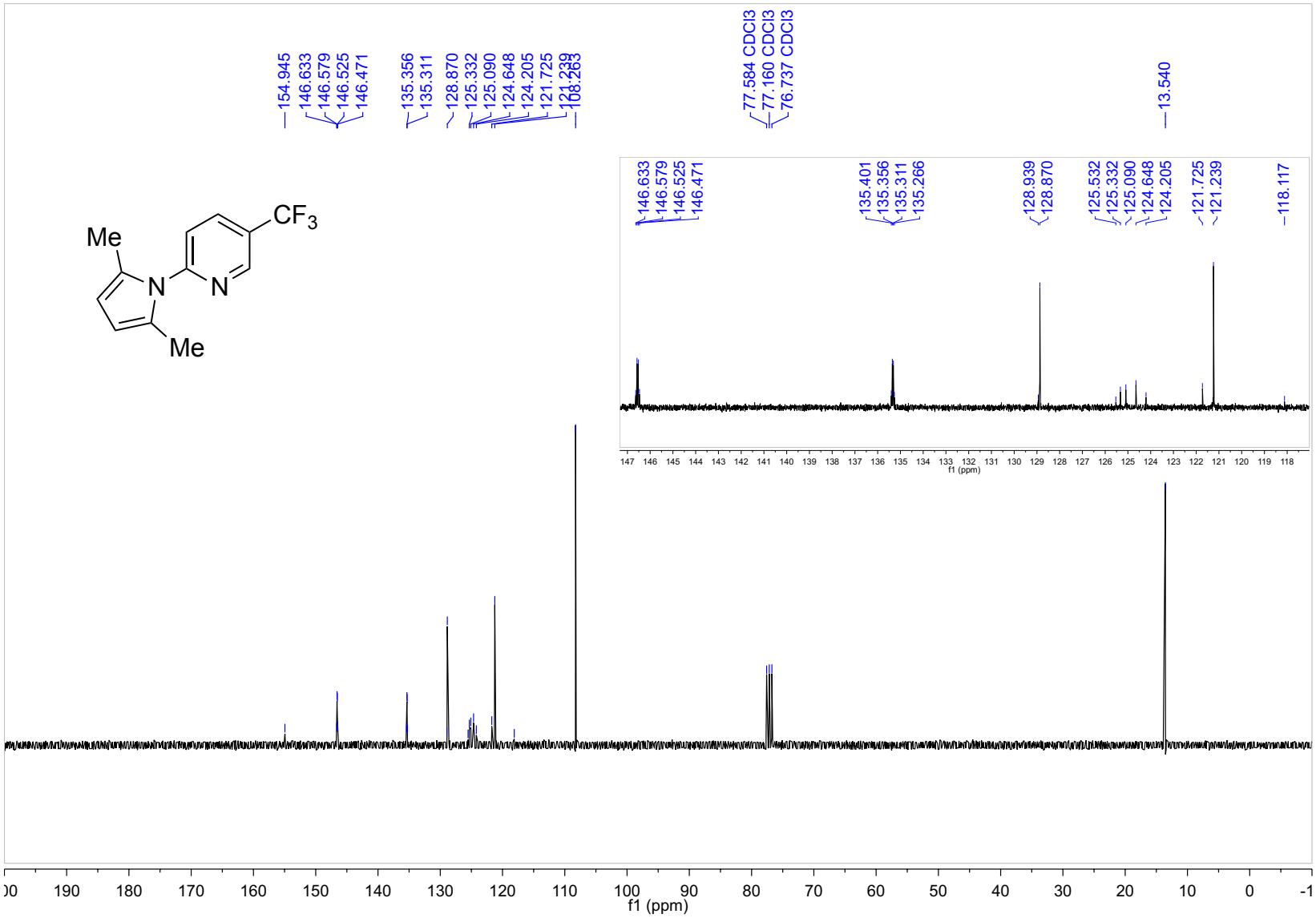

-62.239
CF3
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

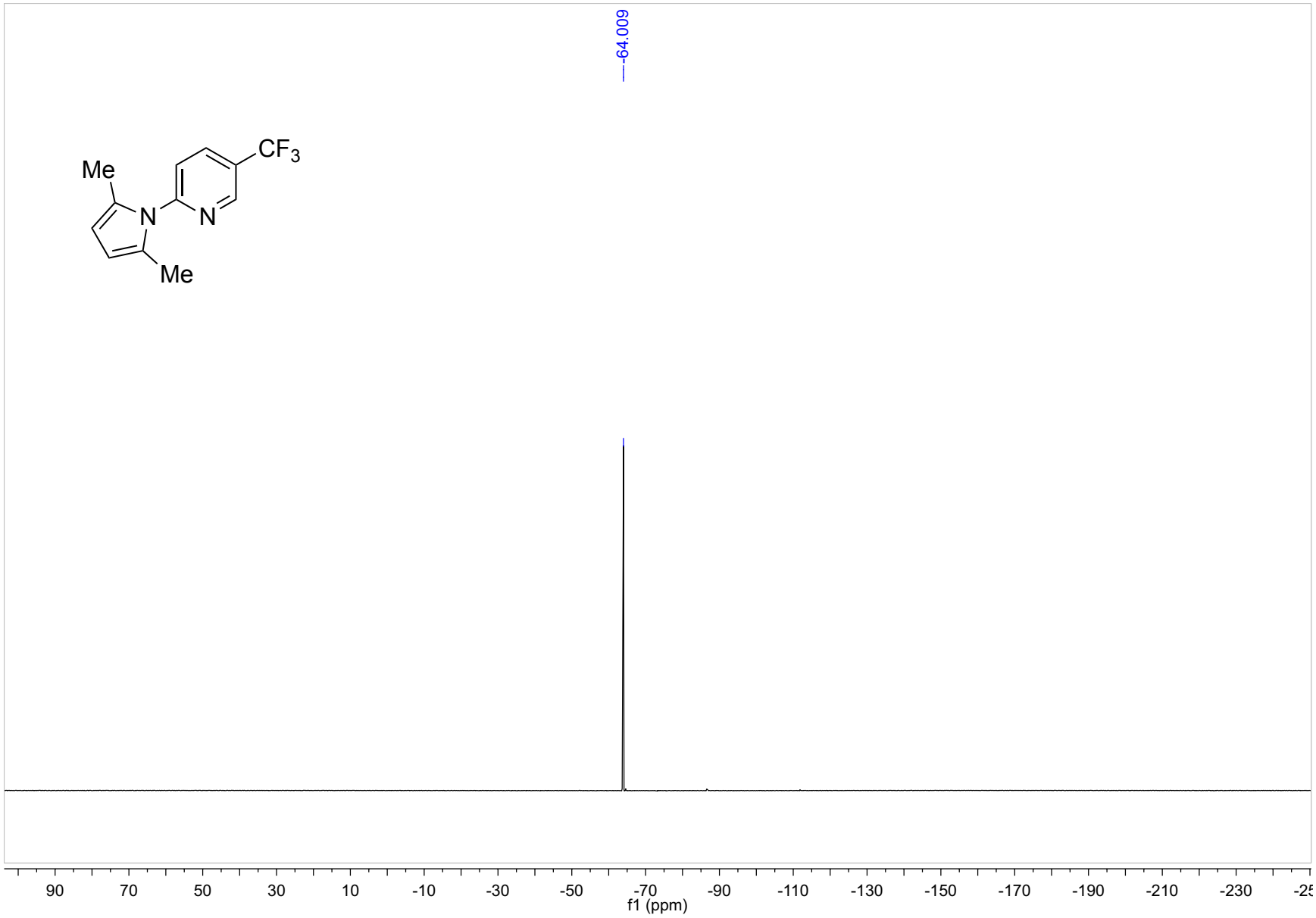

Me
Me
O
O
Me
F3C
N
1.00
0.99
0.98
1.02
1.01
1.09
2.00
2.11
2.09
6.92
2.91
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

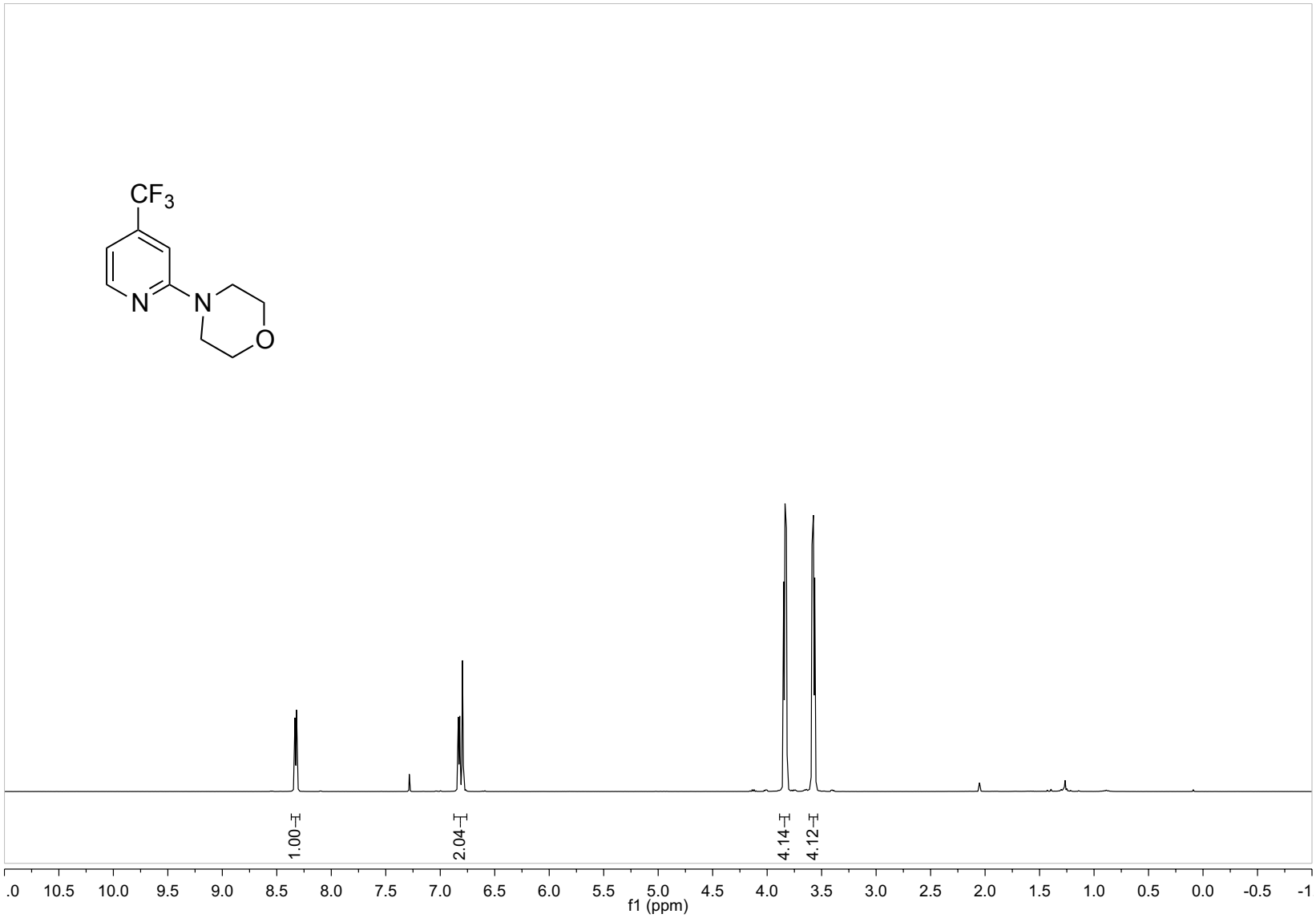

163.359
150.983
149.986
149.514
149.047
148.581
139.887
126.795
125.843
123.160
119.916
119.525
115.890
77.584 CDCl3
77.161 CDCl3
76.769
76.736 CDCl3
47.148
40.794
34.180
31.539
26.610
23.568
22.009
20.739
16.443
Me
Me
O
O
Me
F3C
N
f1 (ppm)

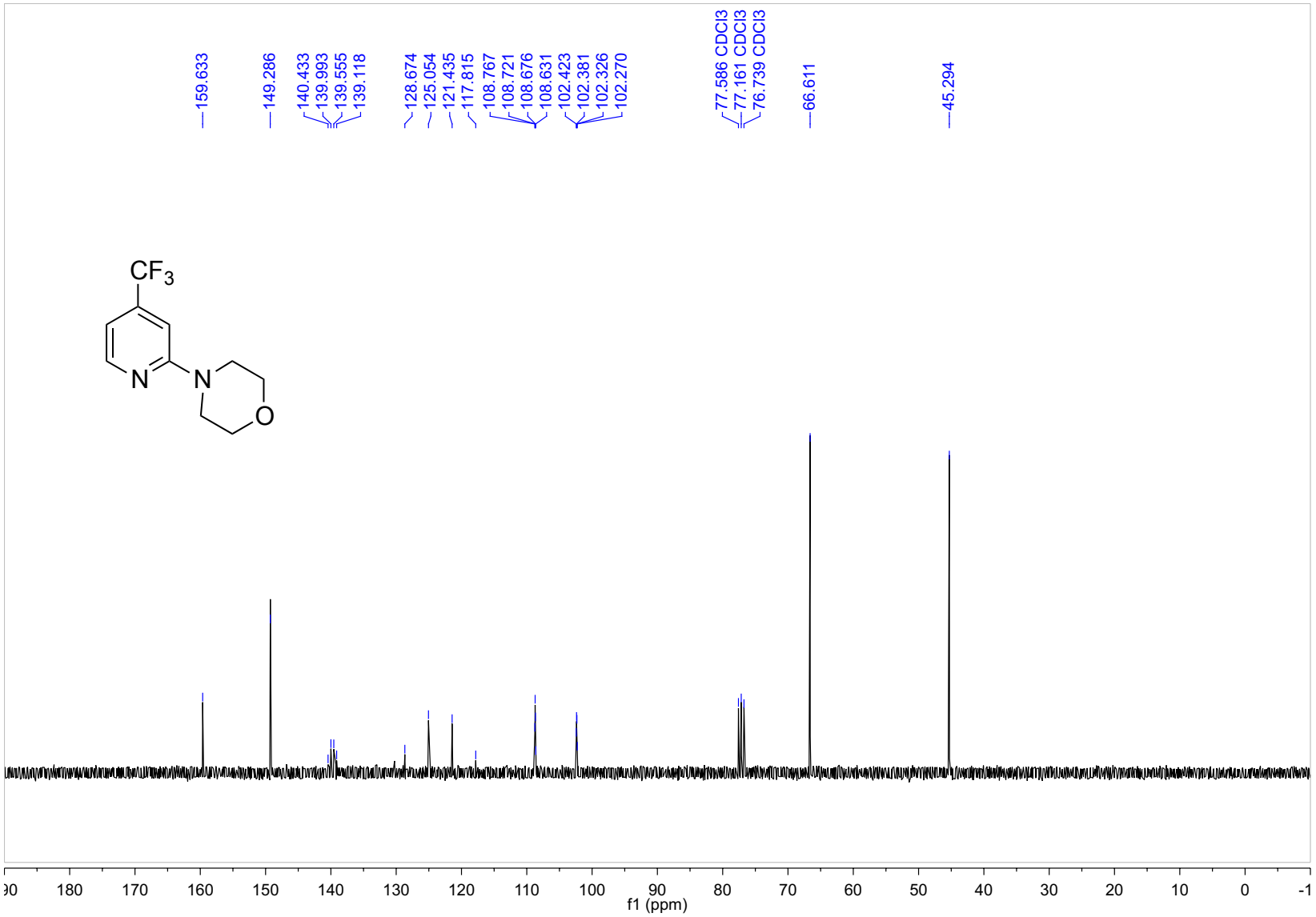

-69.990
Me
Me
O
O
F3C
N
Me
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

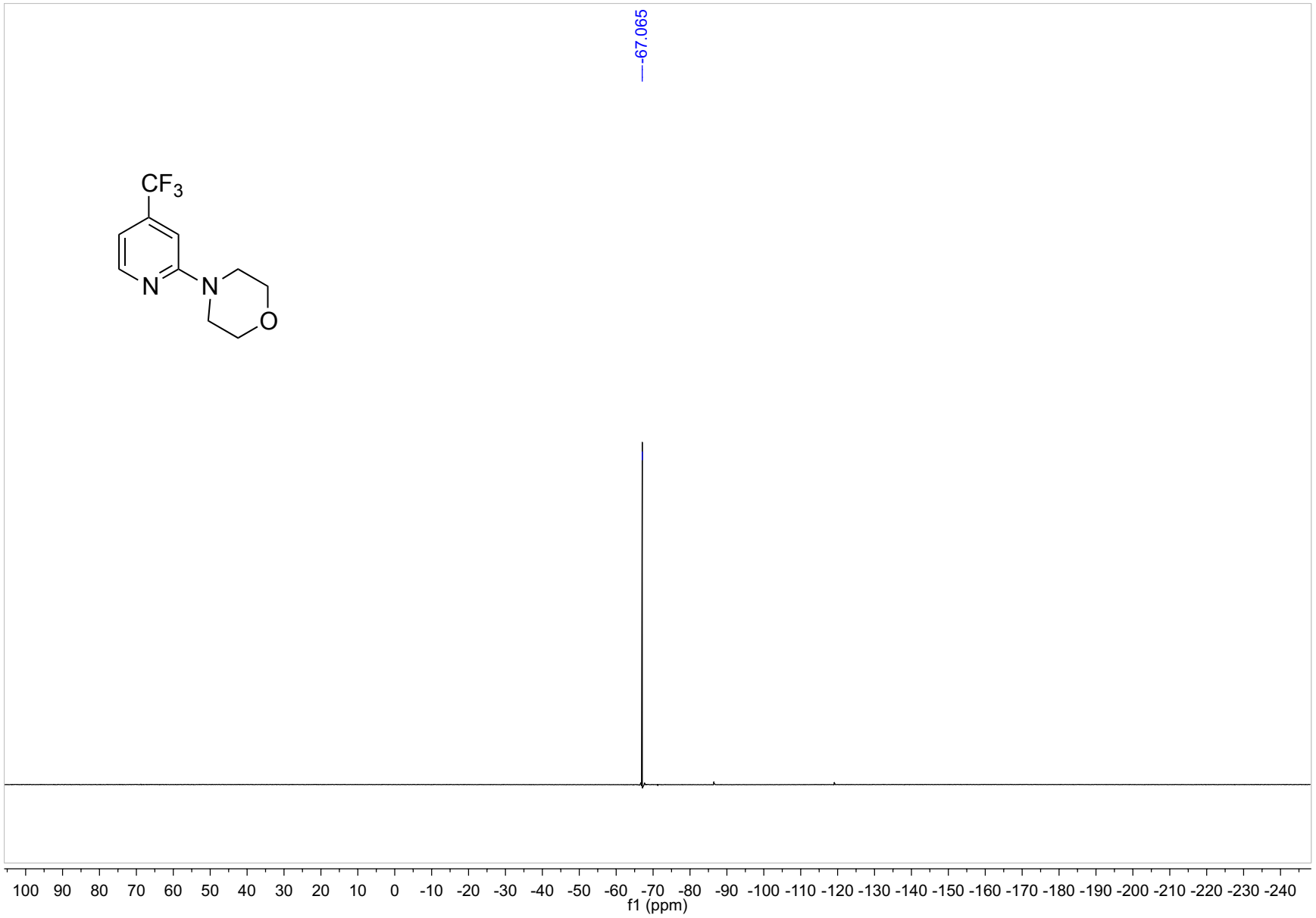

Me
N
N
CF3
Me
1.00
1.04
1.03
2.02
6.16
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

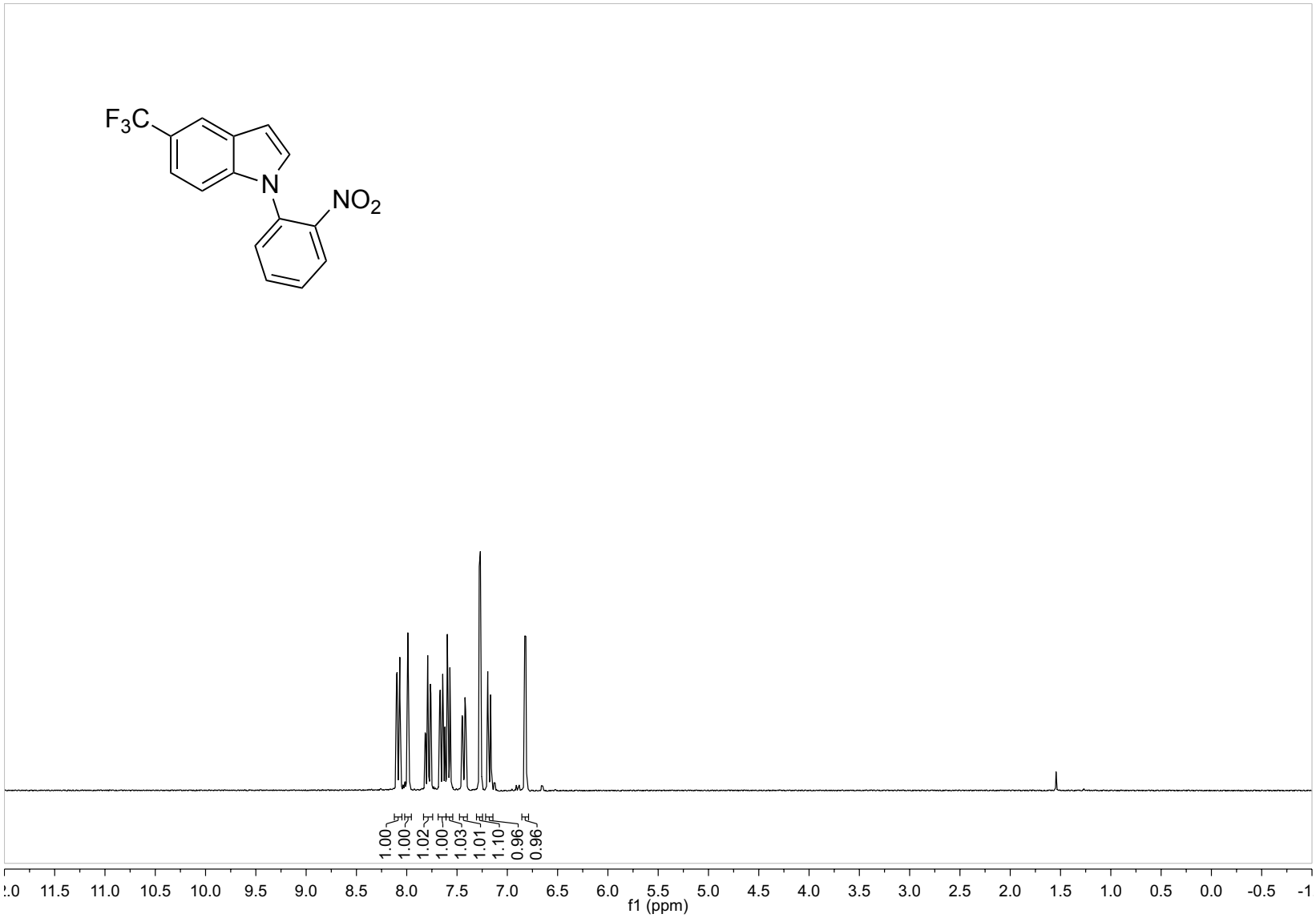

154.945
146.633
146.579
146.525
146.471
135.356
135.311
128.870
125.332
125.090
124.648
124.205
121.725
121.239
77.584 CDCl3
77.160 CDCl3
76.737 CDCl3
13.540
Me
N
N
CF3
Me
f1 (ppm)

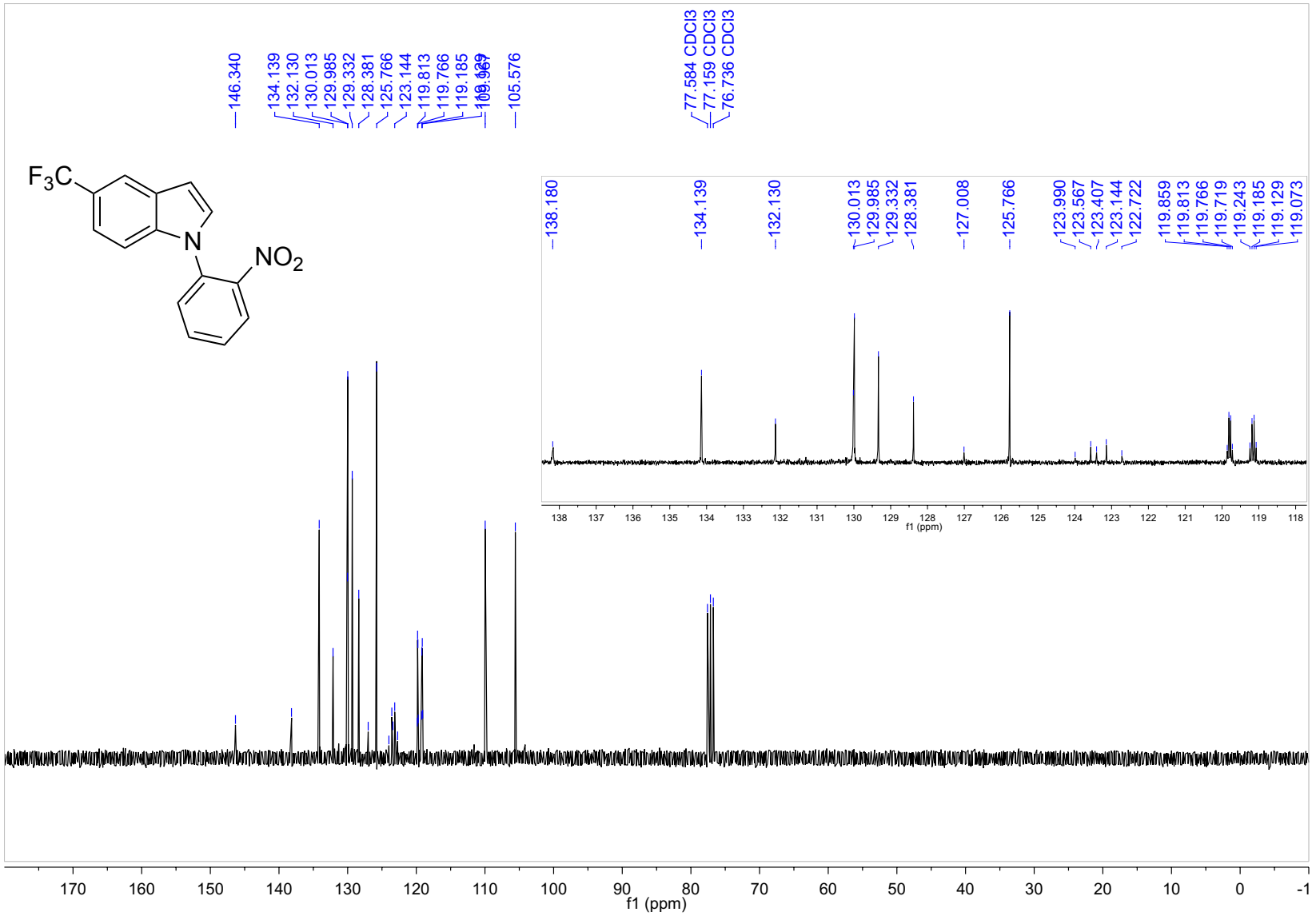

-64.009
Me
N
N
CF3
Me
90
70
50
30
10
-10
-30
-50
-70
-90
-110
-130
-150
-170
-190
-210
-230
f1 (ppm)

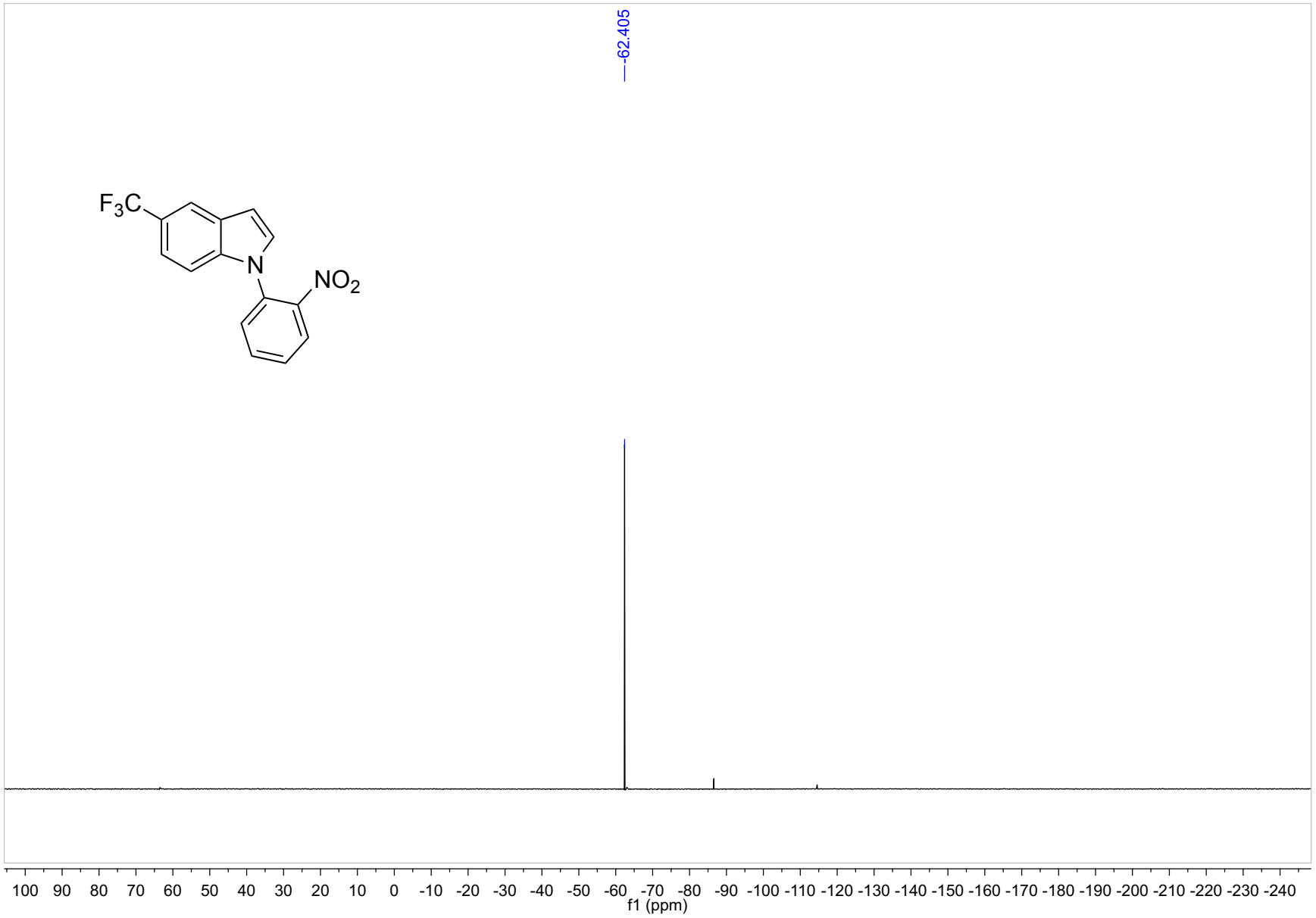

CF3
N
N
O
1.00
2.04
4.14
4.12
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1
f1 (ppm)

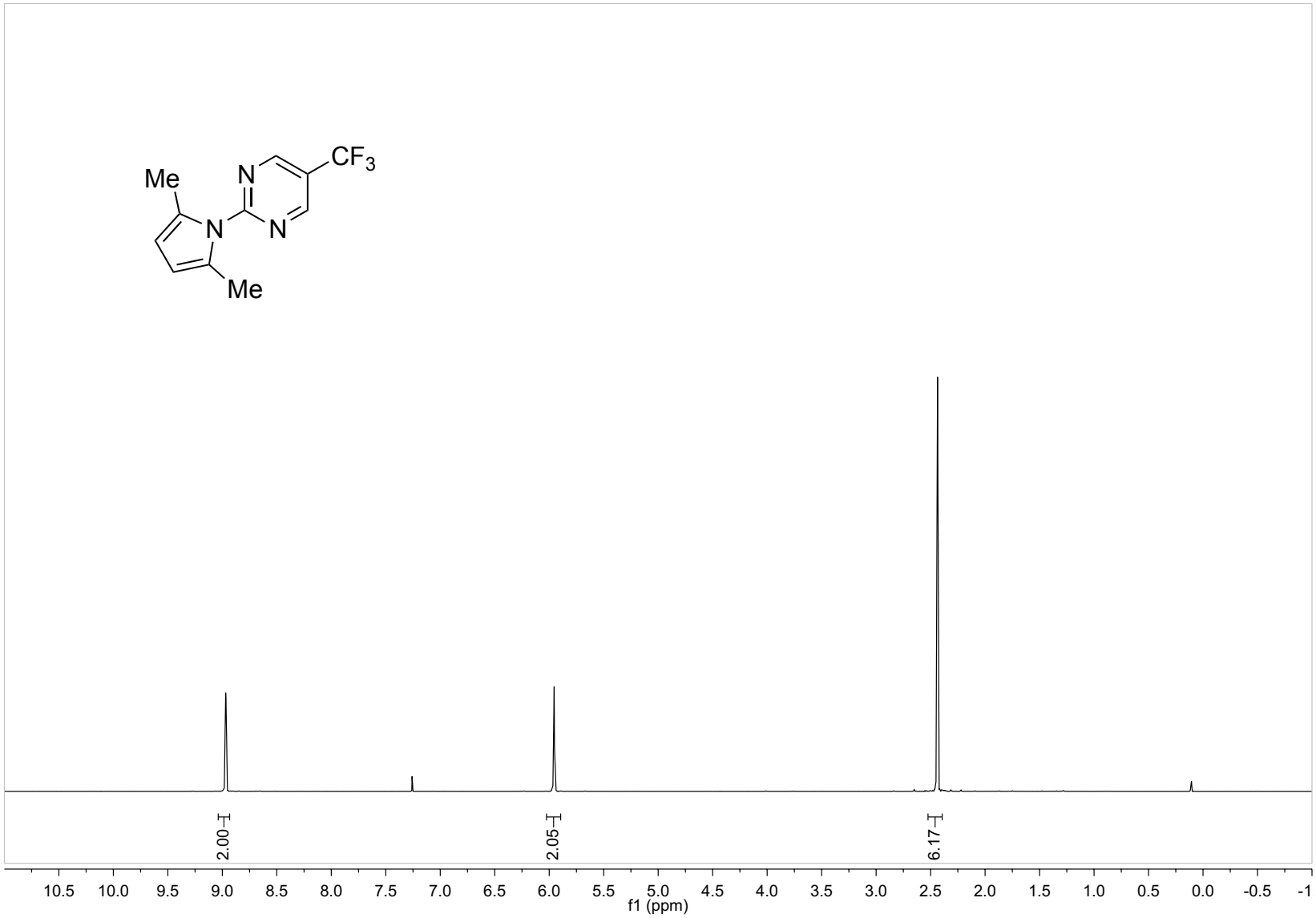

159.633
149.286
140.433
139.993
139.555
139.118
128.674
125.054
121.435
117.815
108.767
108.721
108.676
108.631
102.423
102.381
102.326
102.270
77.586 CDCl3
77.161 CDCl3
76.739 CDCl3
66.611
45.294
CF3
N
N
O
f1 (ppm)

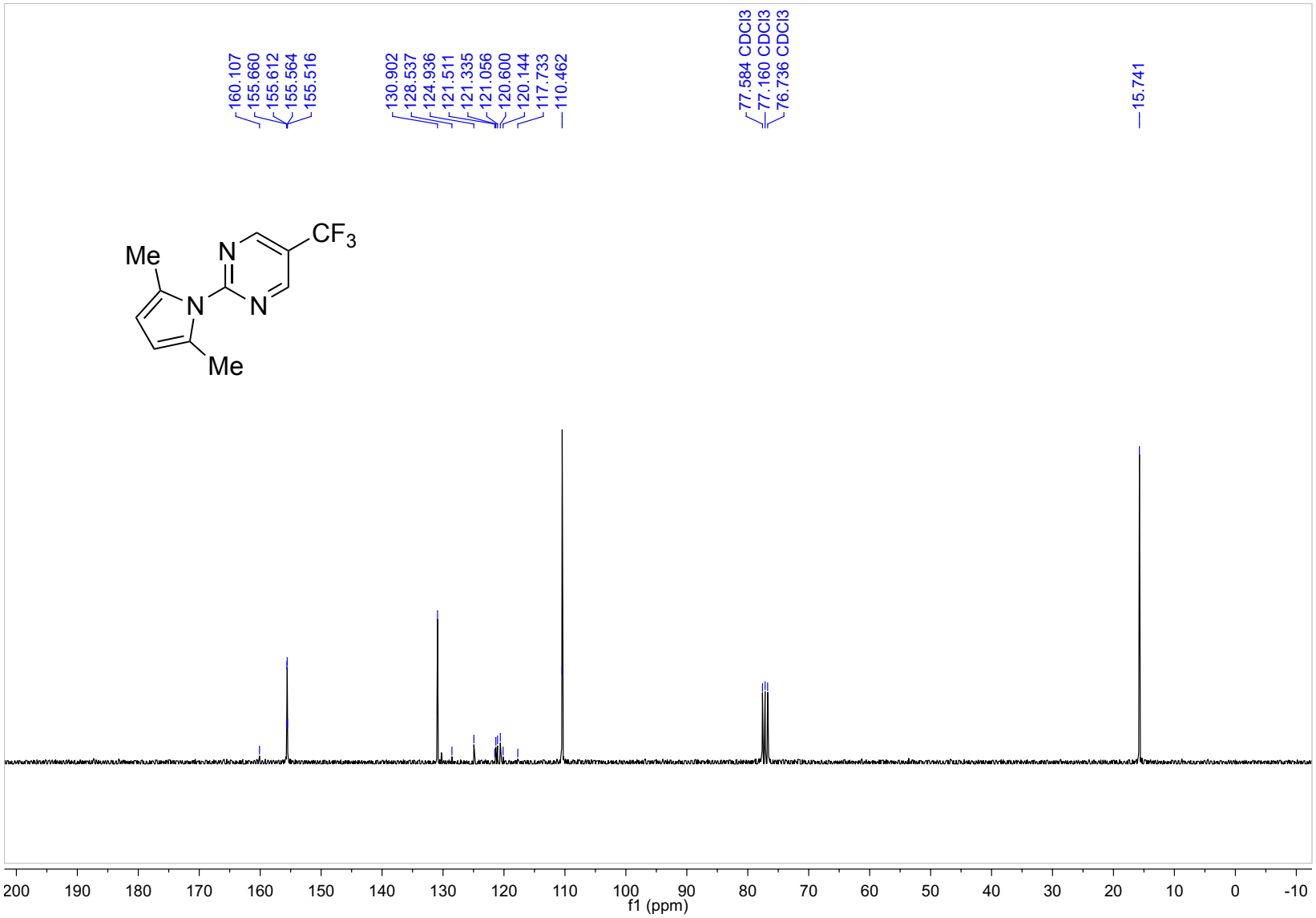

-67.065
CF3
N
N
O
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

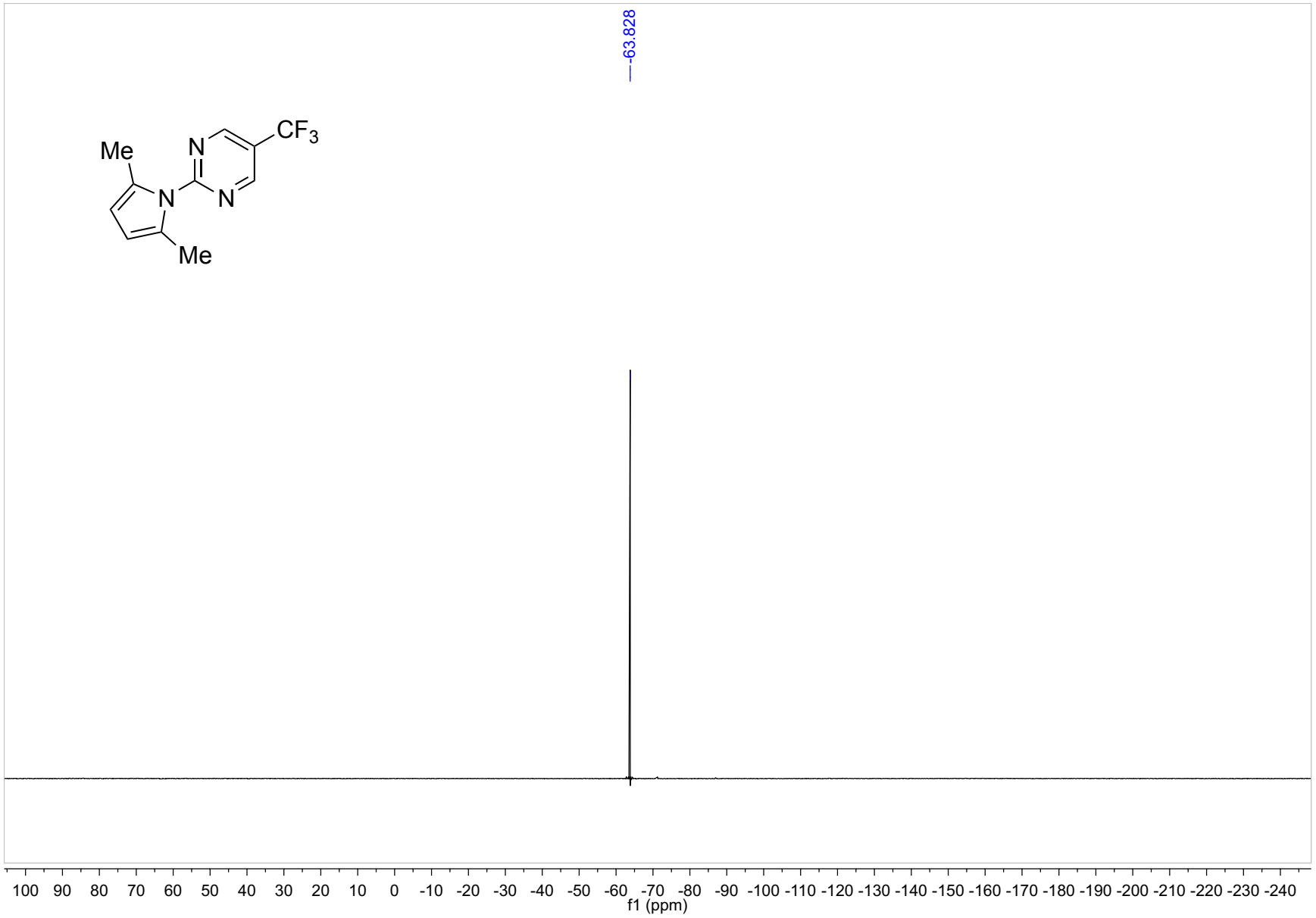

F3C
N
NO2
1.00
1.00
1.02
1.00
1.03
1.01
1.10
0.96
0.96
f1 (ppm)

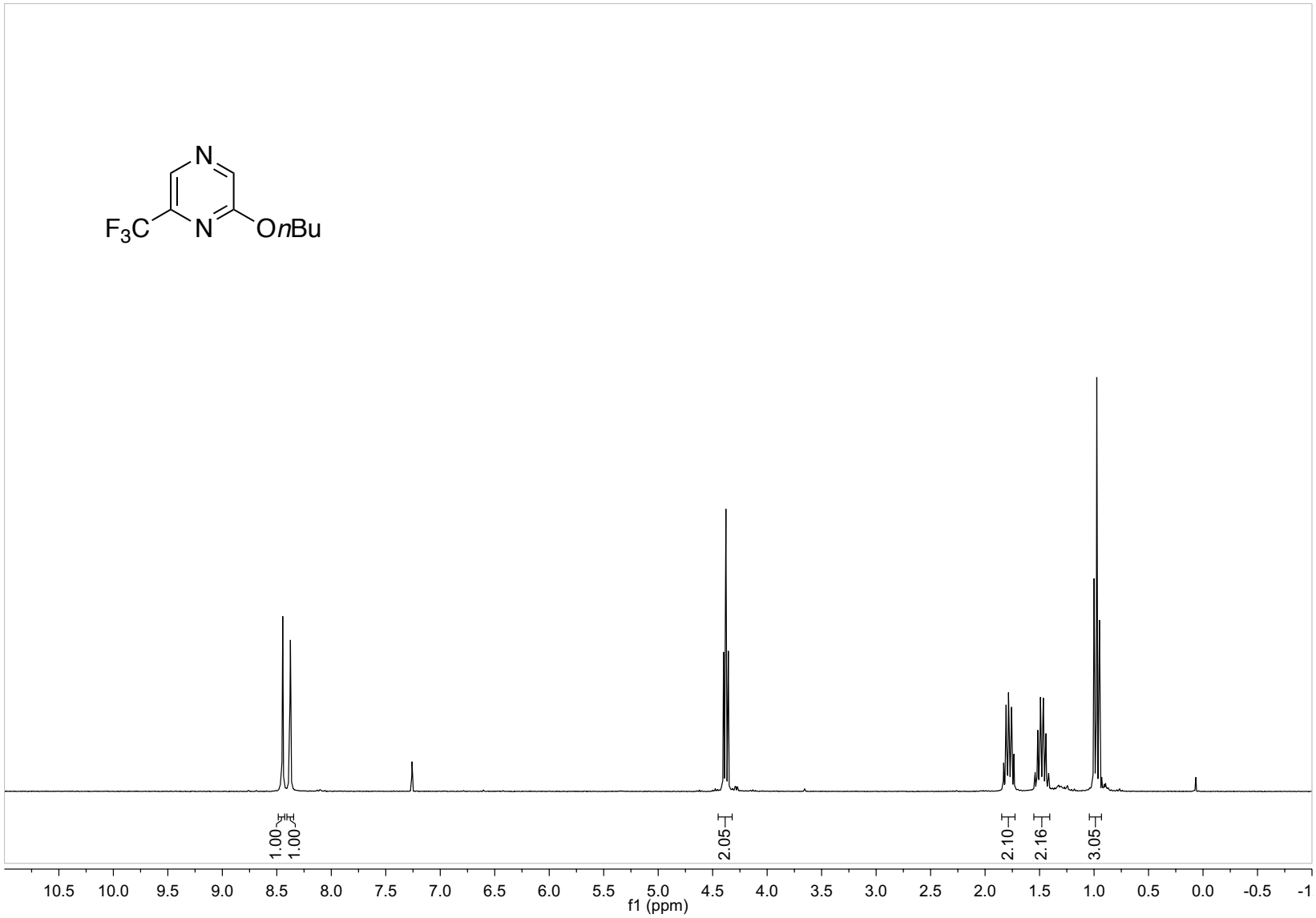

146.340
134.139
132.130
130.013
129.985
129.332
128.381
125.766
123.144
119.813
119.766
119.185
105.576
77.584 CDCl3
77.159 CDCl3
76.736 CDCl3
F3C
N
NO2
138.180
134.139
132.130
130.013
129.985
129.332
128.381
127.008
125.766
123.990
123.567
123.407
123.144
122.722
119.859
119.813
119.766
119.719
119.243
119.185
119.129
119.073
f1 (ppm)
f1 (ppm)

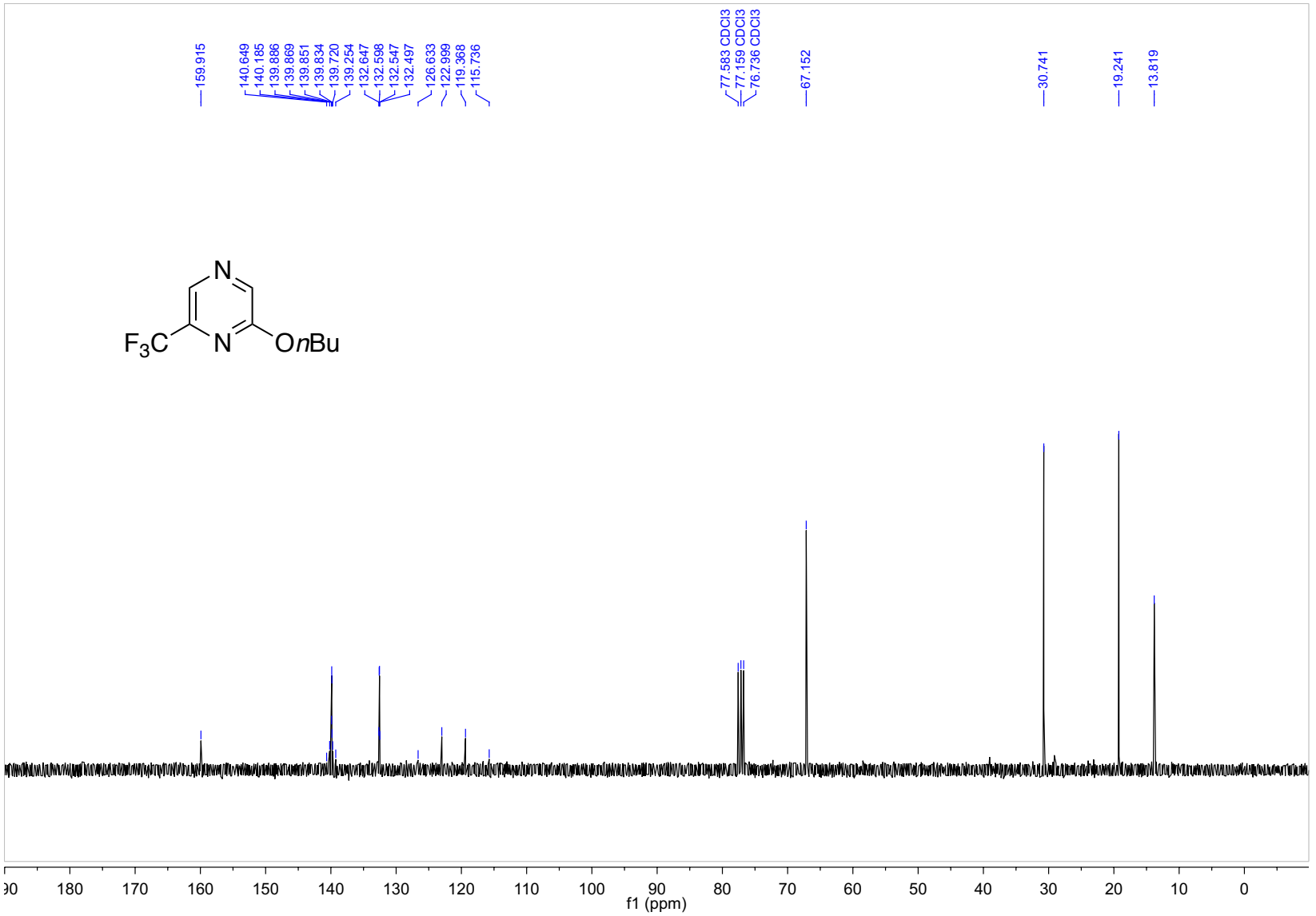

-62.405
F3C
N
NO2
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

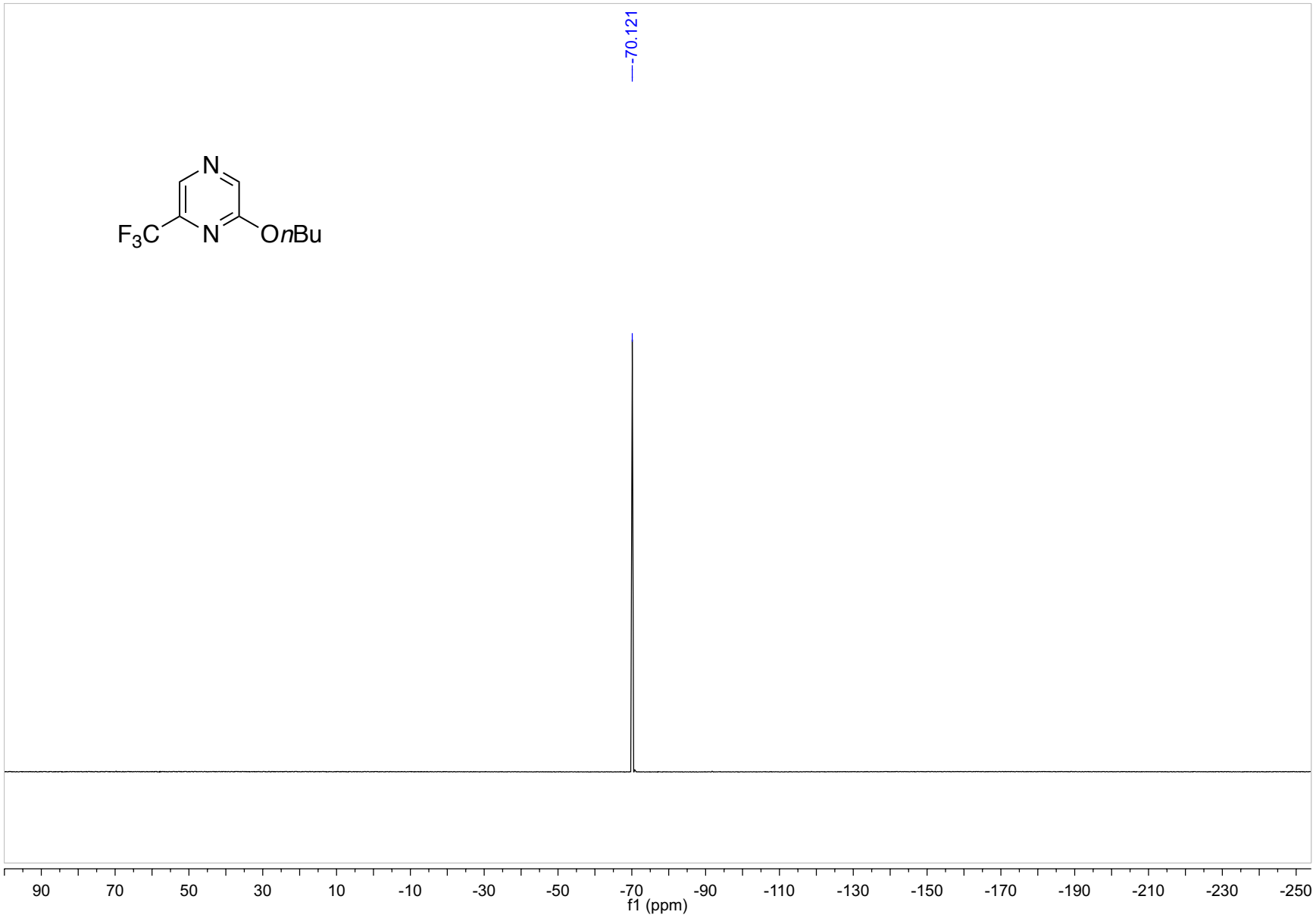

Me
N
CF3
N
N
Me
2.00
2.05
6.17
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

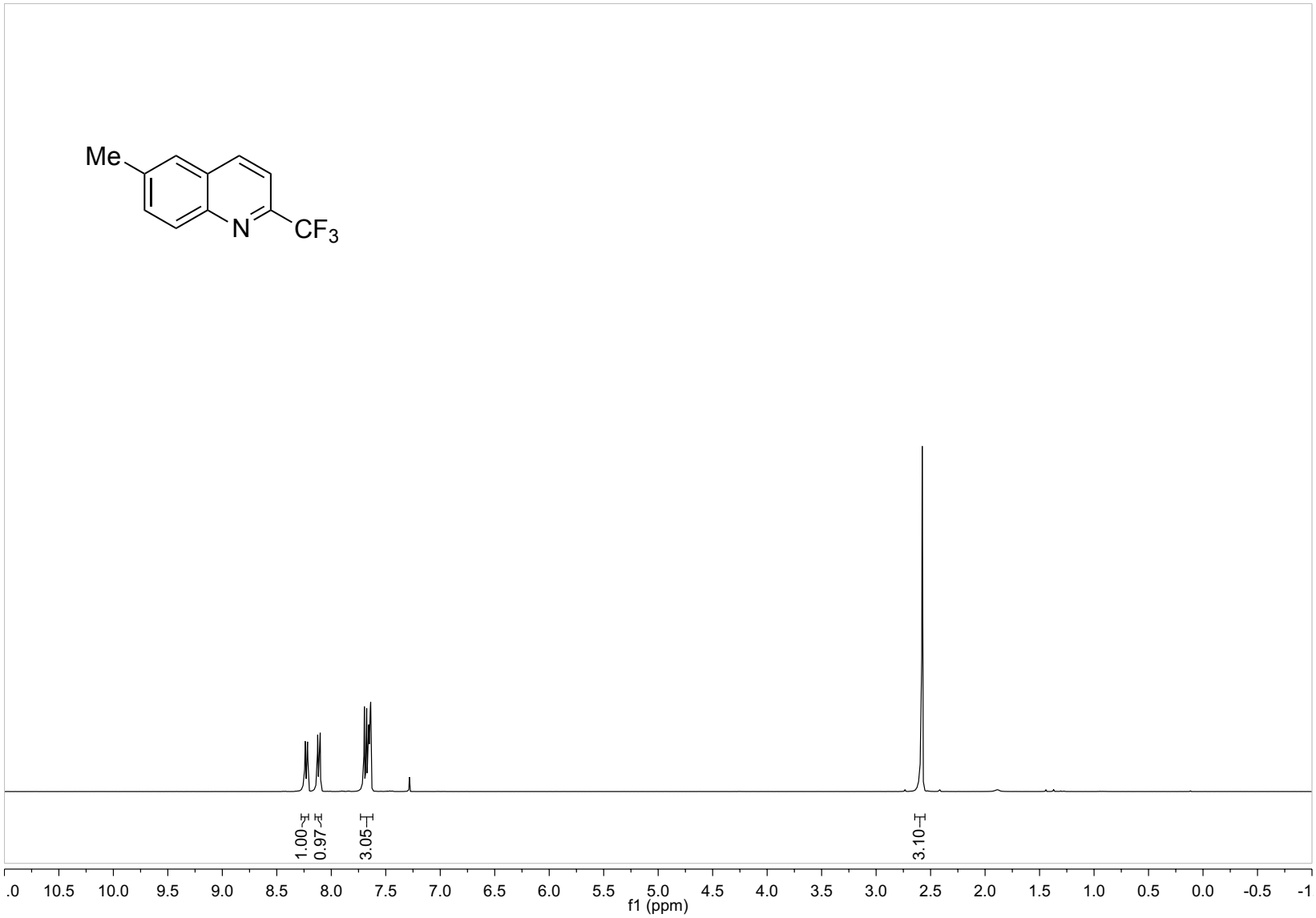

160.107
155.660
155.612
155.564
155.516
130.902
128.537
124.936
121.511
121.335
121.056
120.600
120.144
117.733
110.462
77.584 CDCl3
77.160 CDCl3
76.736 CDCl3
15.741
Me
N
CF3
N
N
Me
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

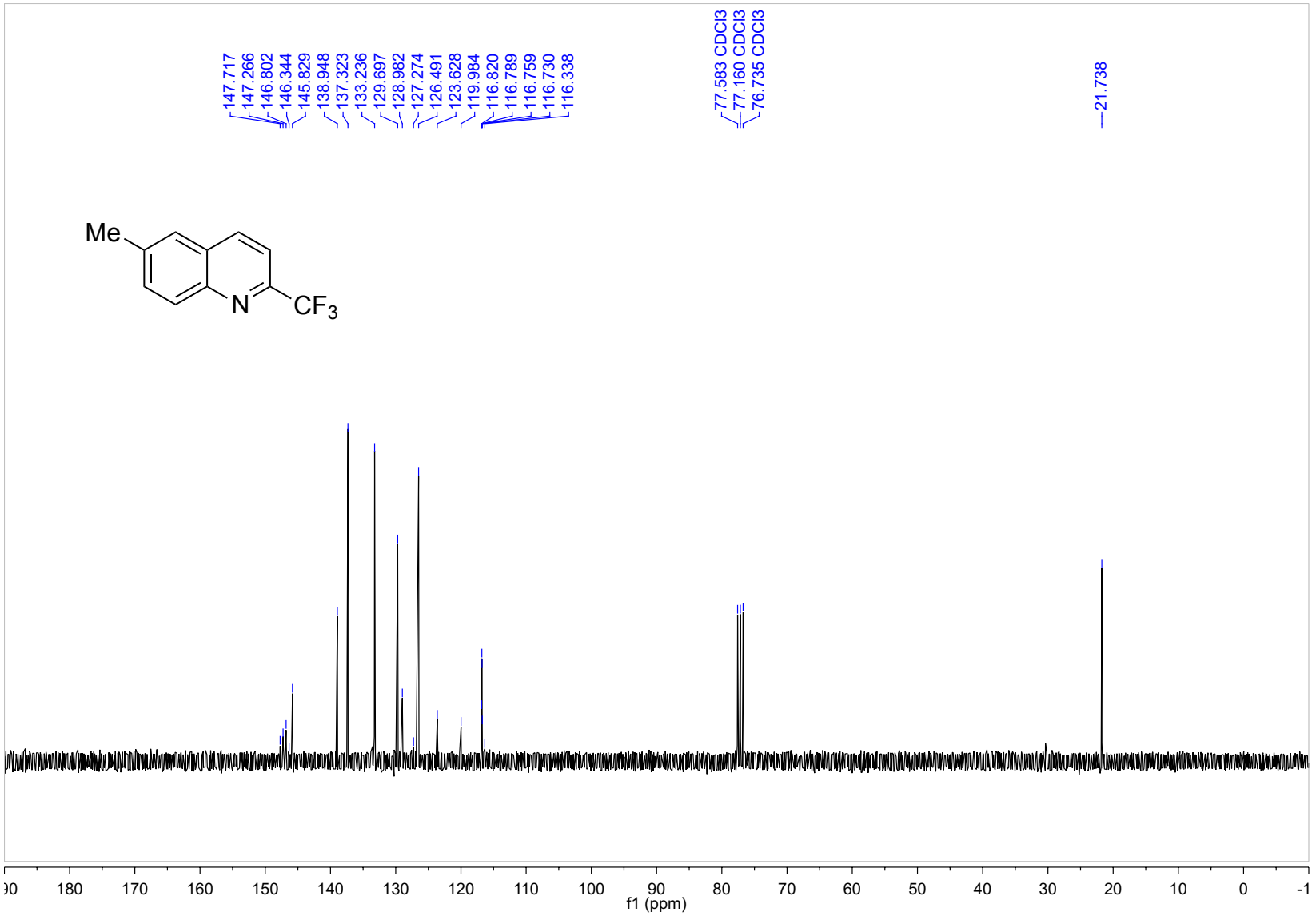

-63.828
Me
N
CF3
N
N
Me
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

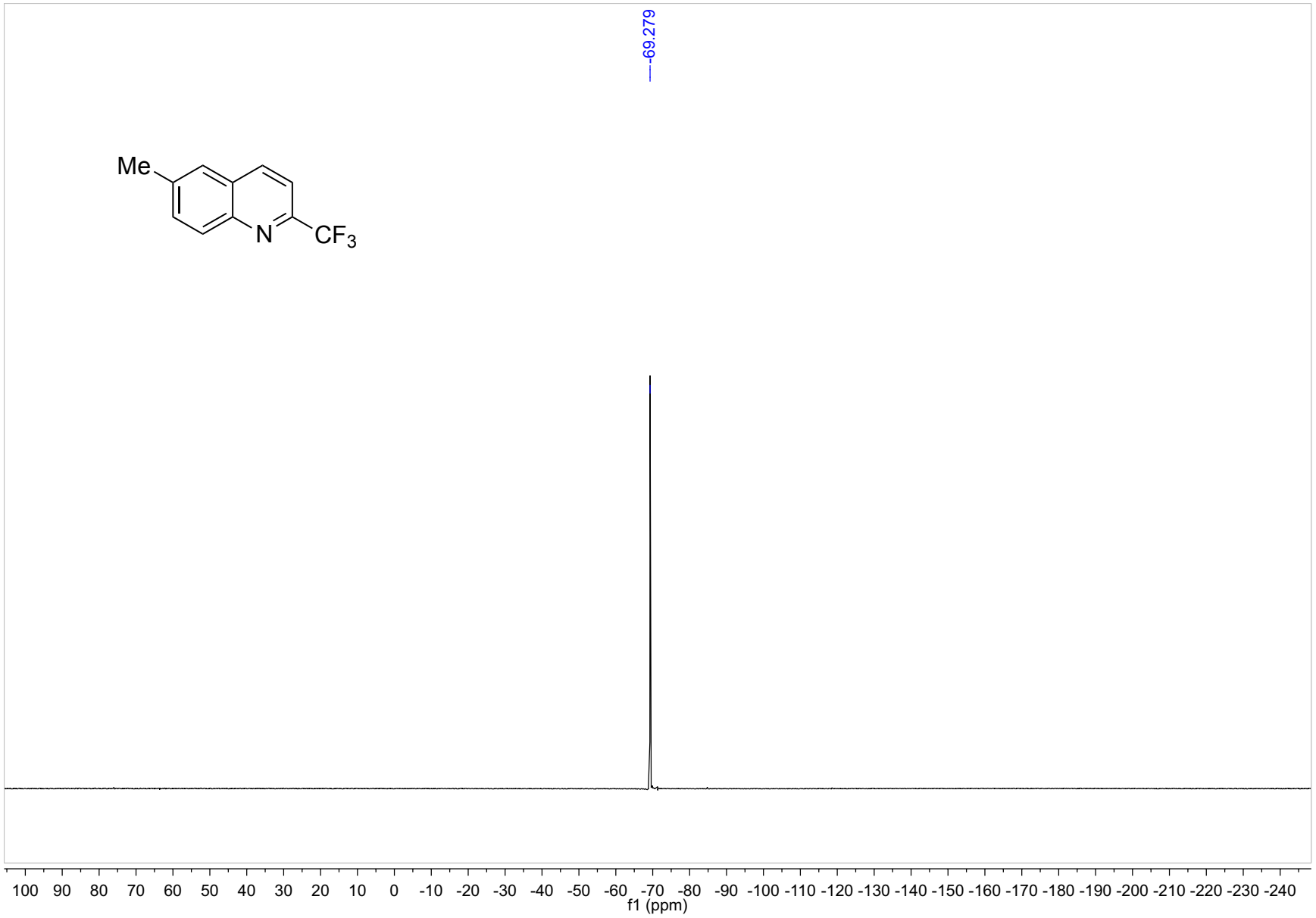

N
F3C
N
OnBu
1.00
1.00
2.05
2.10
2.16
3.05
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

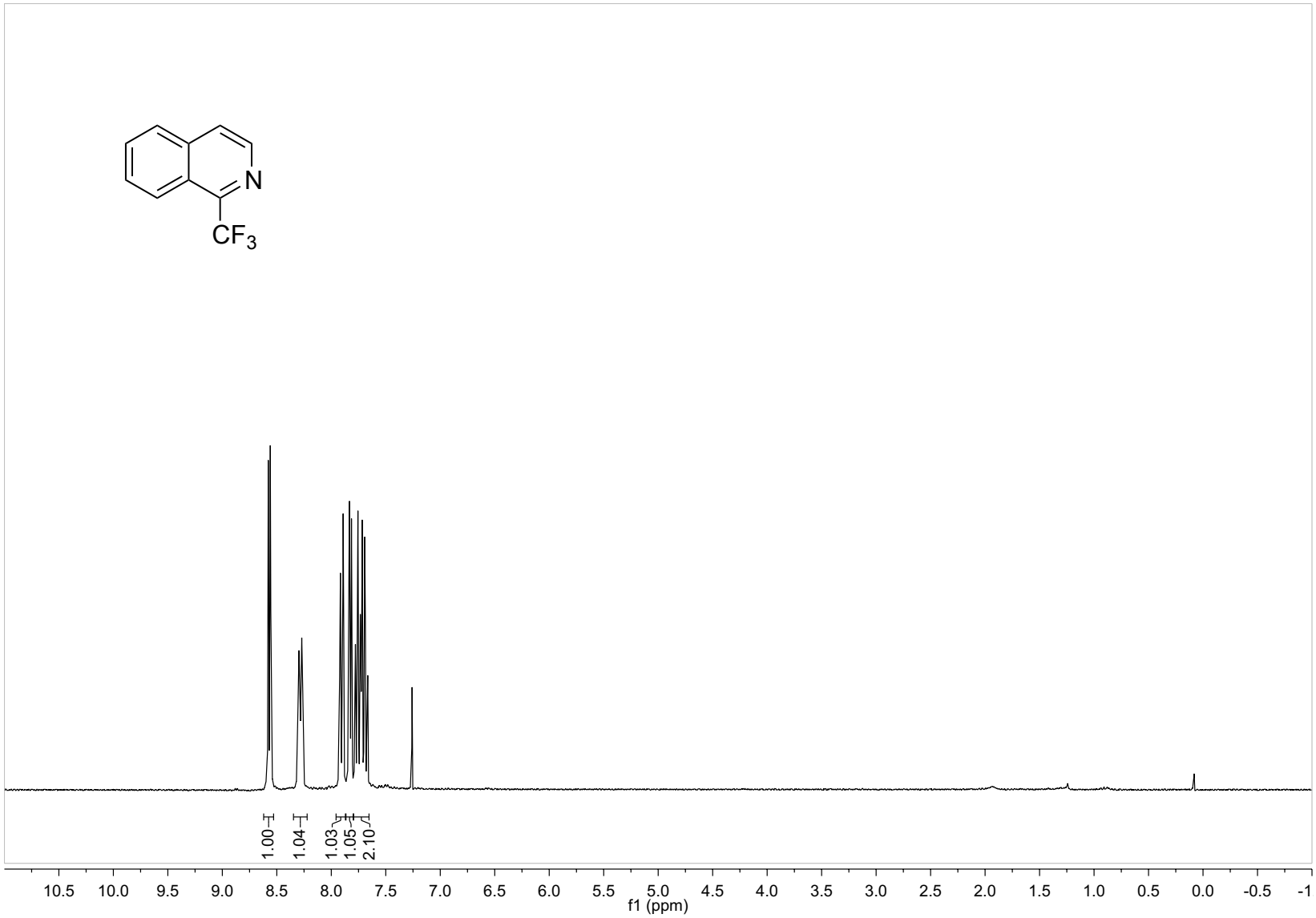

159.915
140.649
140.185
139.886
139.869
139.851
139.834
139.720
139.254
132.647
132.598
132.547
132.497
126.633
122.999
119.368
115.736
77.583 CDCl3
77.159 CDCl3
76.736 CDCl3
67.152
30.741
19.241
13.819
N
F3C
N
OnBu
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

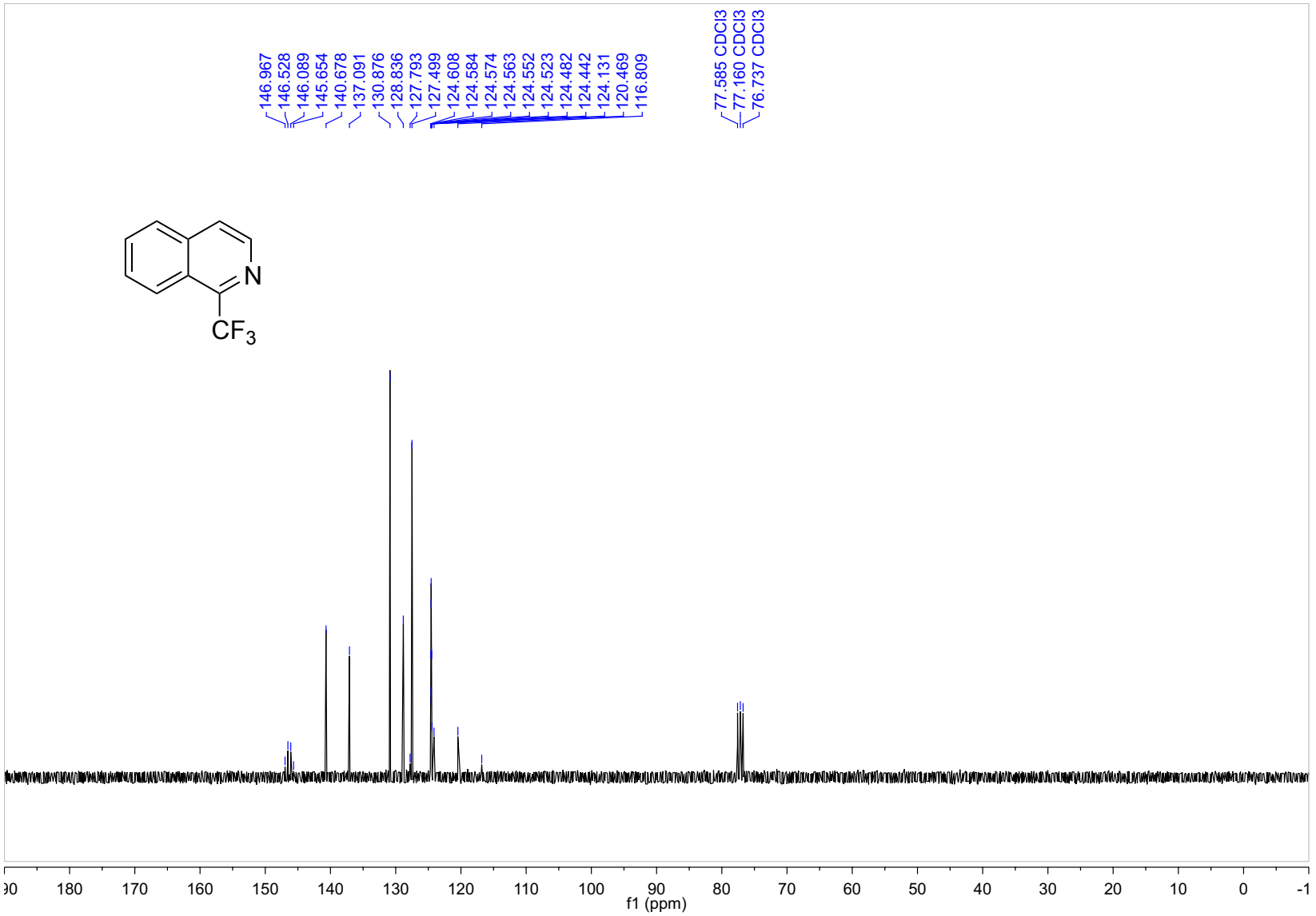

-70.121
N
F3C
N
OnBu
90
70
50
30
10
-10
-30
-50
-70
-90
-110
-130
-150
-170
-190
-210
-230
-250
f1 (ppm)

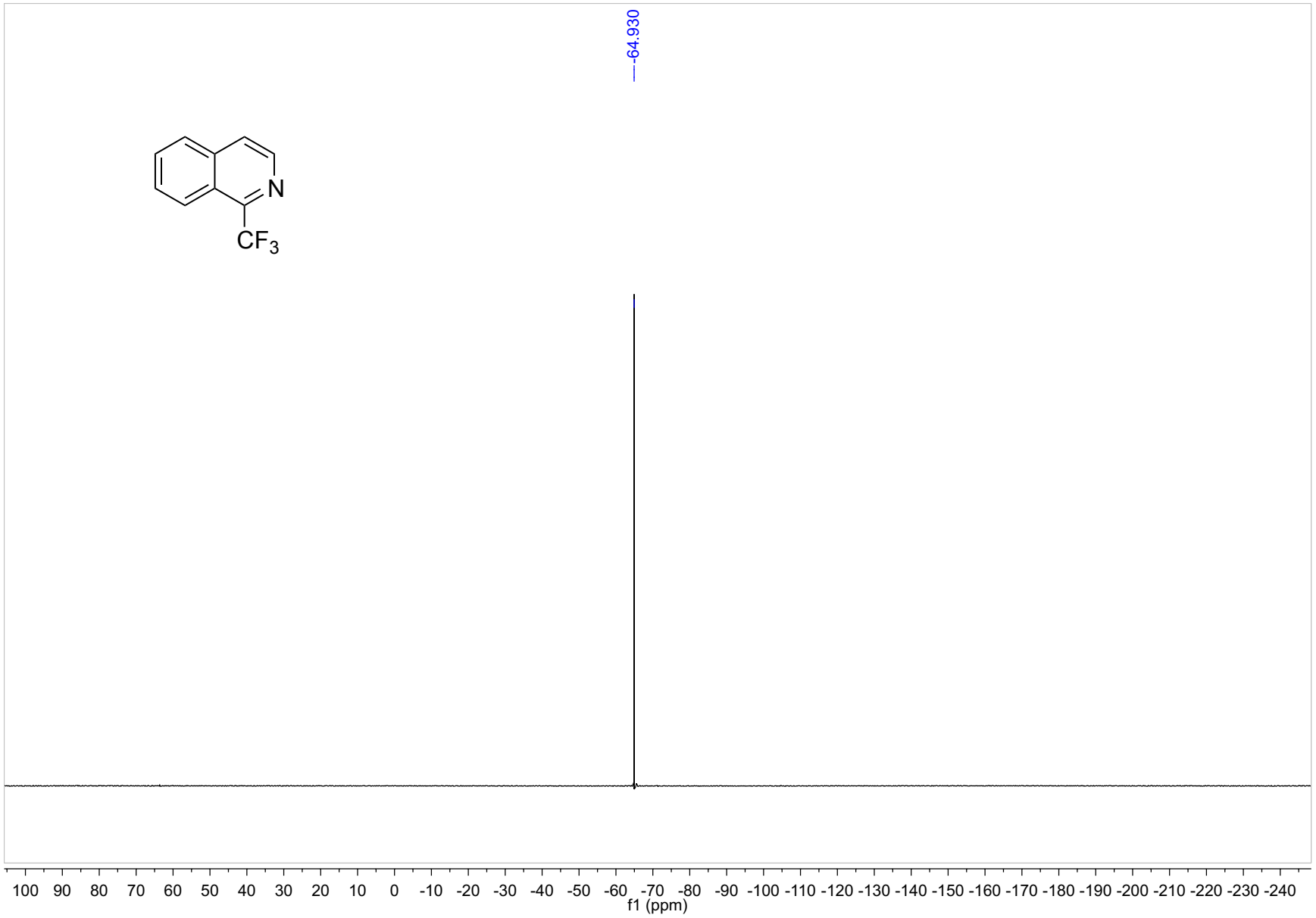

Me
N
CF3
1.00
0.97
3.05
3.10
f1 (ppm)

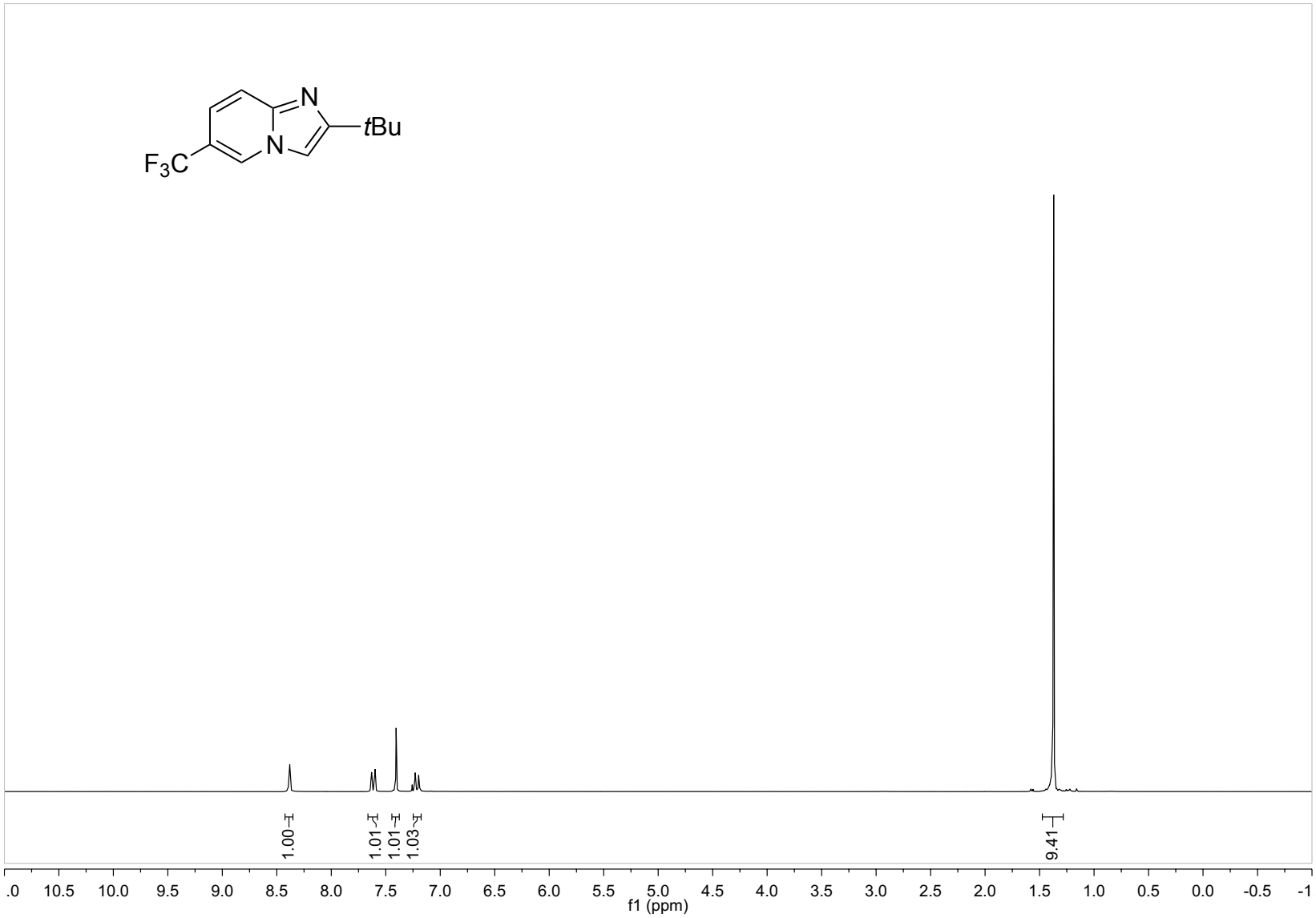

147.717
147.266
146.802
146.344
145.829
138.948
137.323
133.236
129.697
128.982
127.274
126.491
123.628
119.984
116.820
116.789
116.759
116.730
116.338
77.583 CDCl3
77.160 CDCl3
76.735 CDCl3
21.738
Me
N
CF3
f1 (ppm)

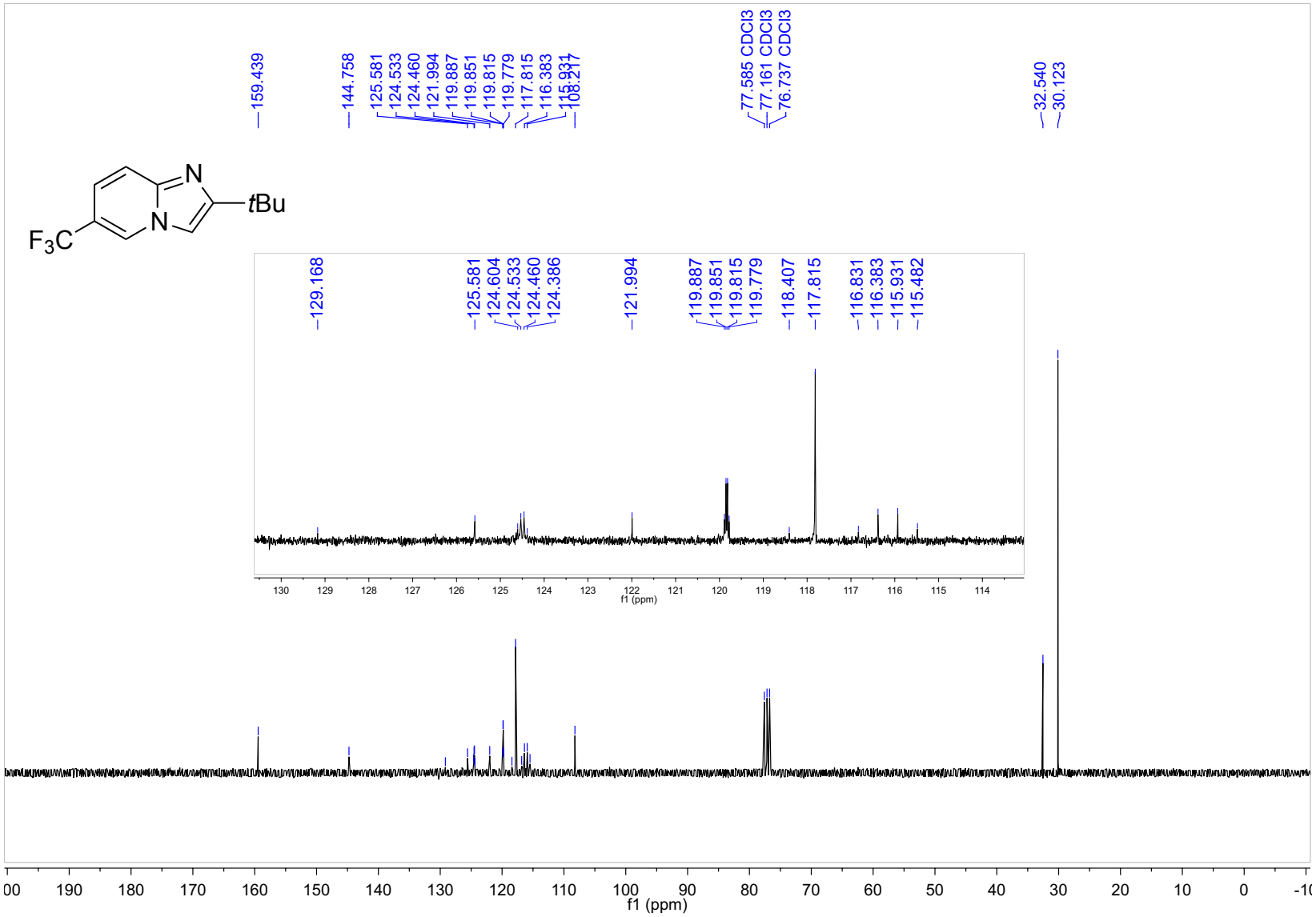

-69.279
Me
N
CF3
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

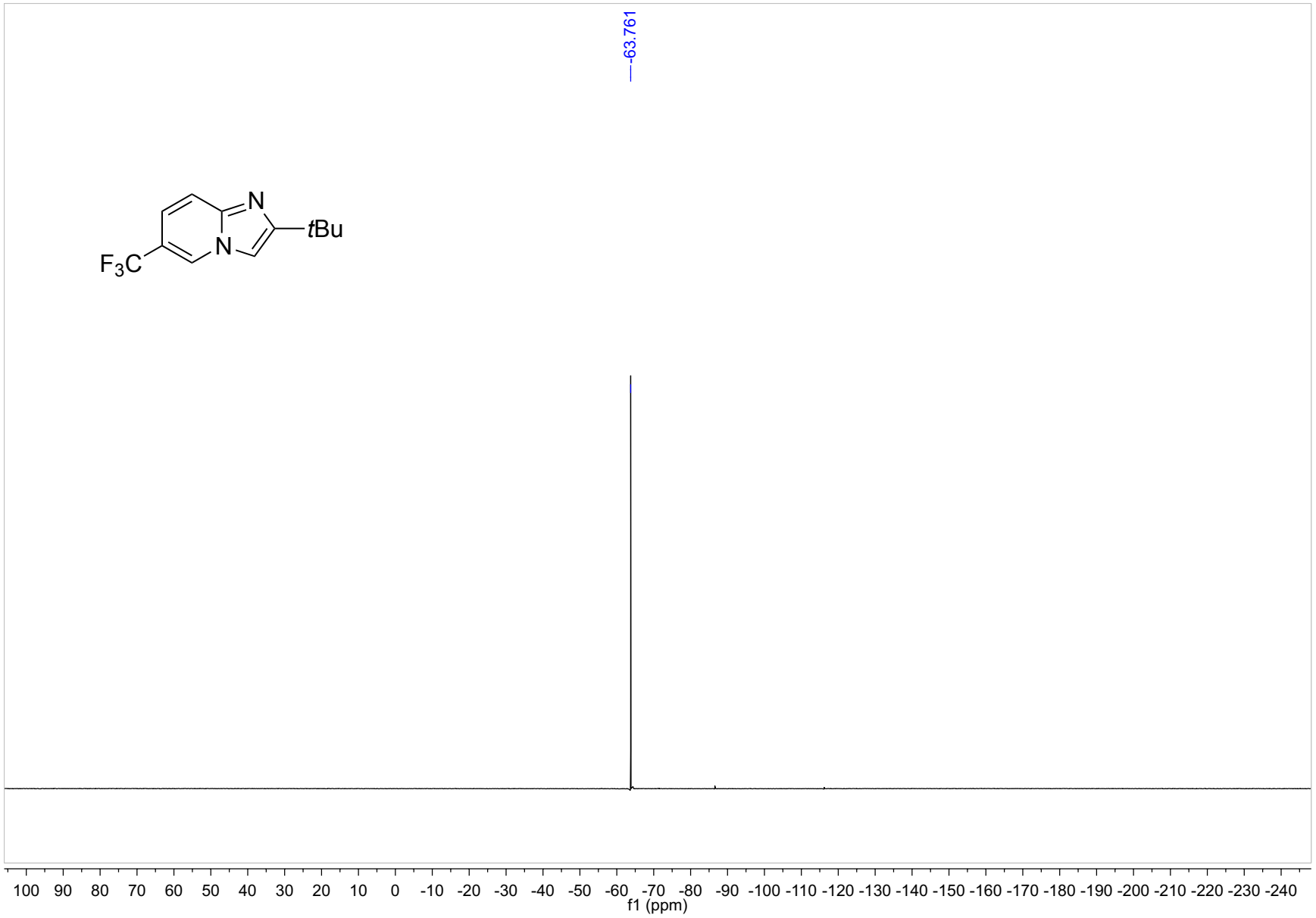

N
CF3
1.00
1.04
1.03
1.05
2.10
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

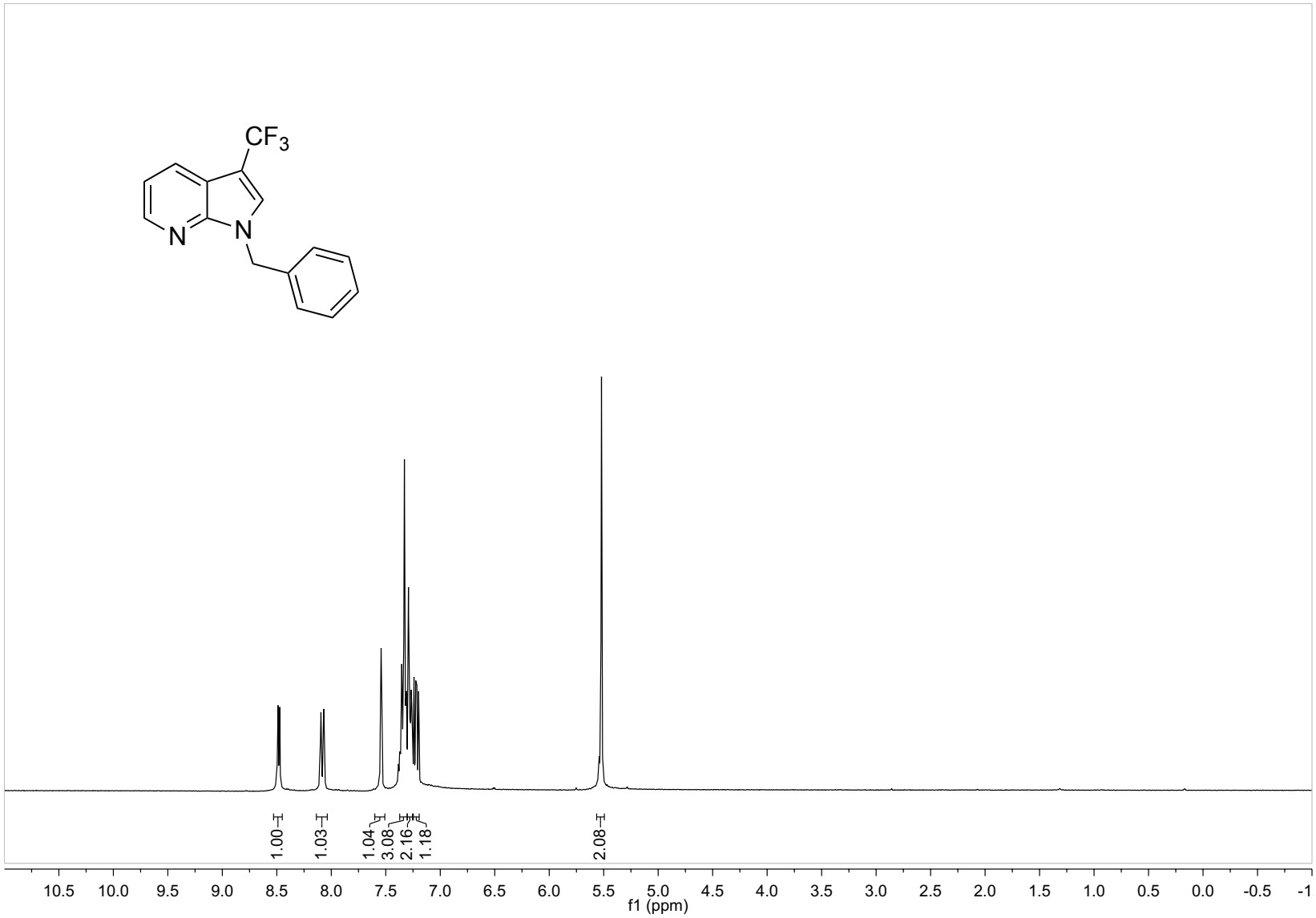

146.967
146.528
146.089
145.654
140.678
137.091
130.876
128.836
127.793
127.499
124.608
124.584
124.574
124.563
124.552
124.523
124.482
124.442
124.131
120.469
116.809
77.585 CDCl3
77.160 CDCl3
76.737 CDCl3
N
CF3
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-1
f1 (ppm)

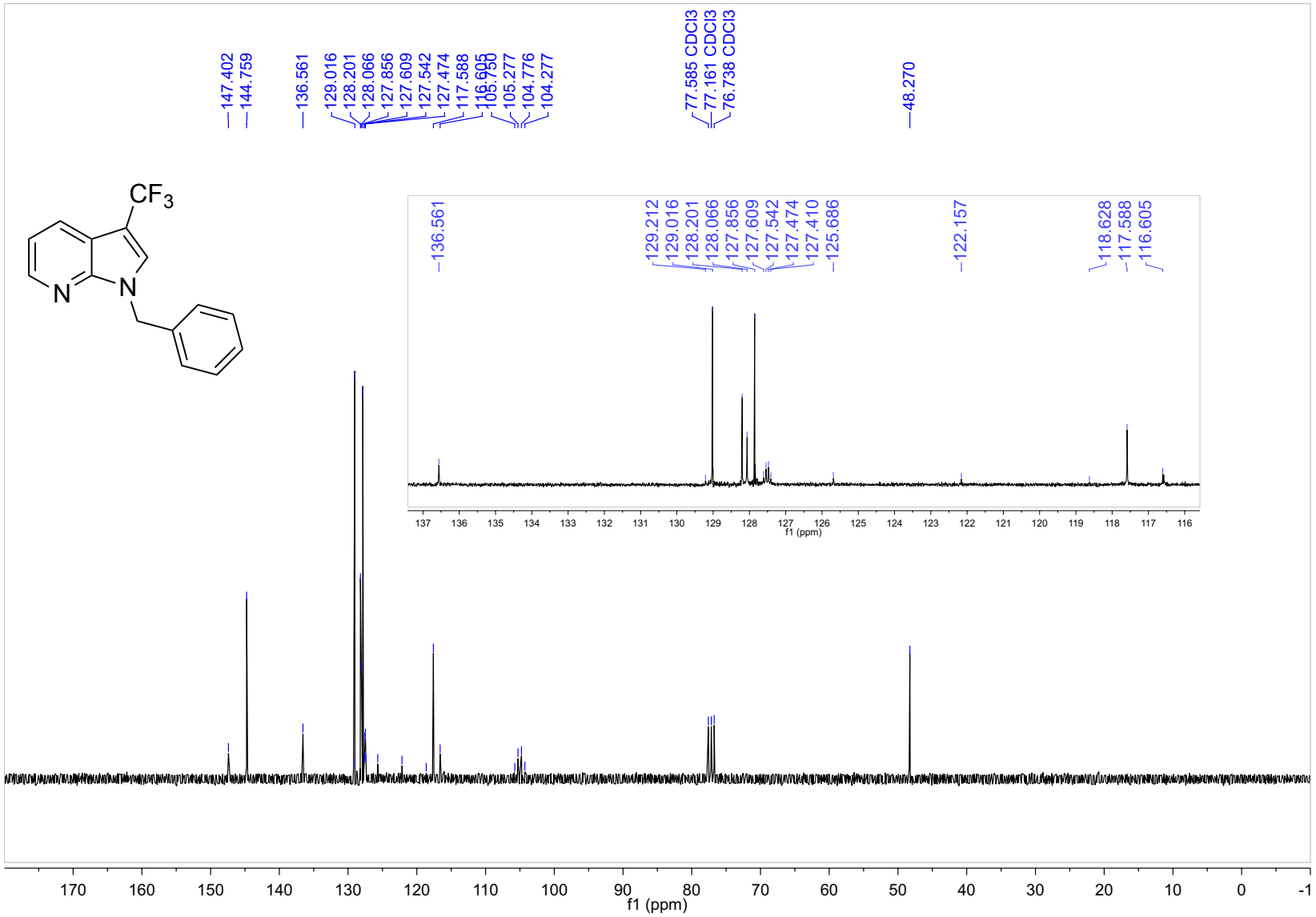

-64.930
N
CF3
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

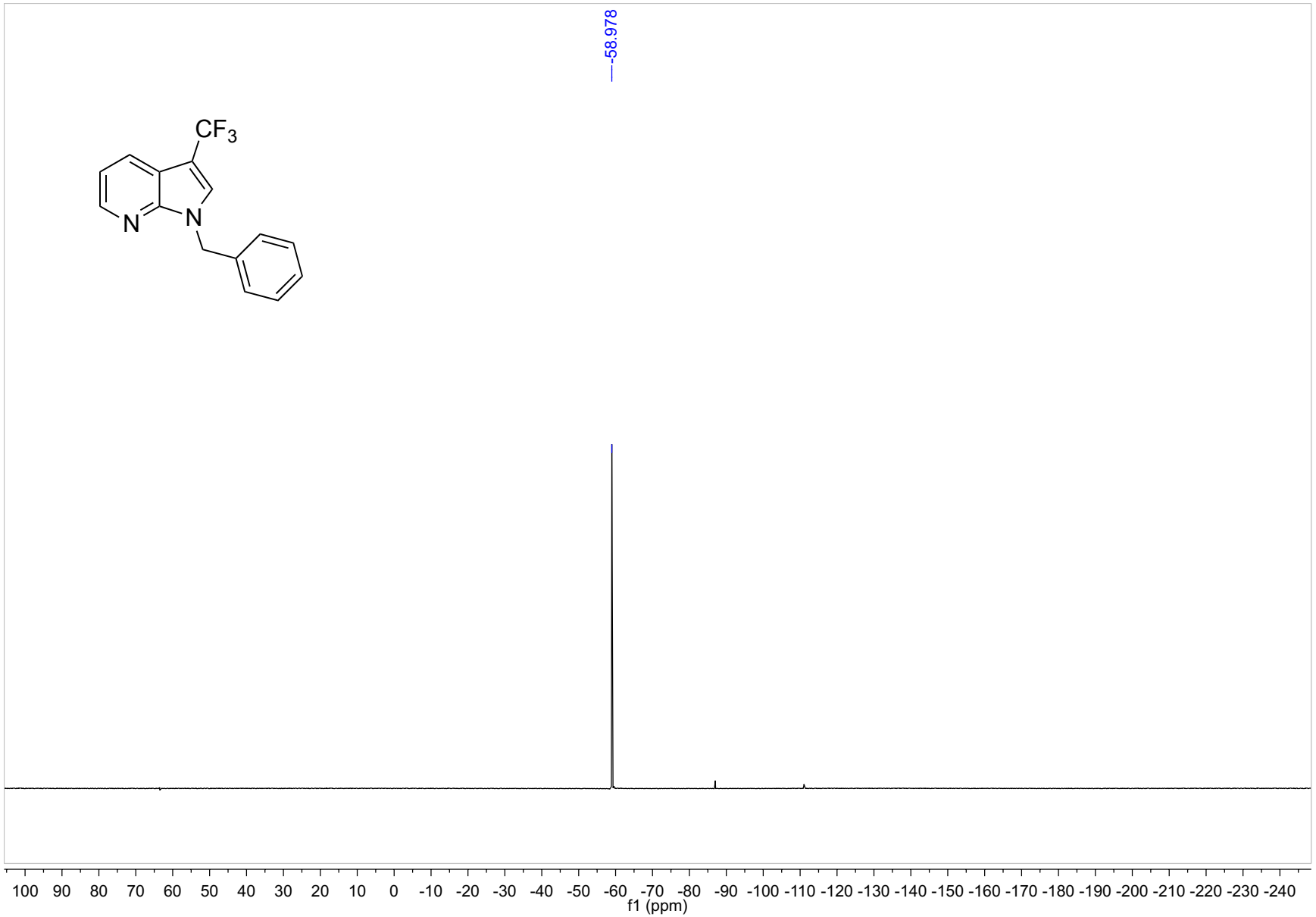

N
tBu
N
F3C
1.00
1.01
1.01
1.03
9.41
f1 (ppm)

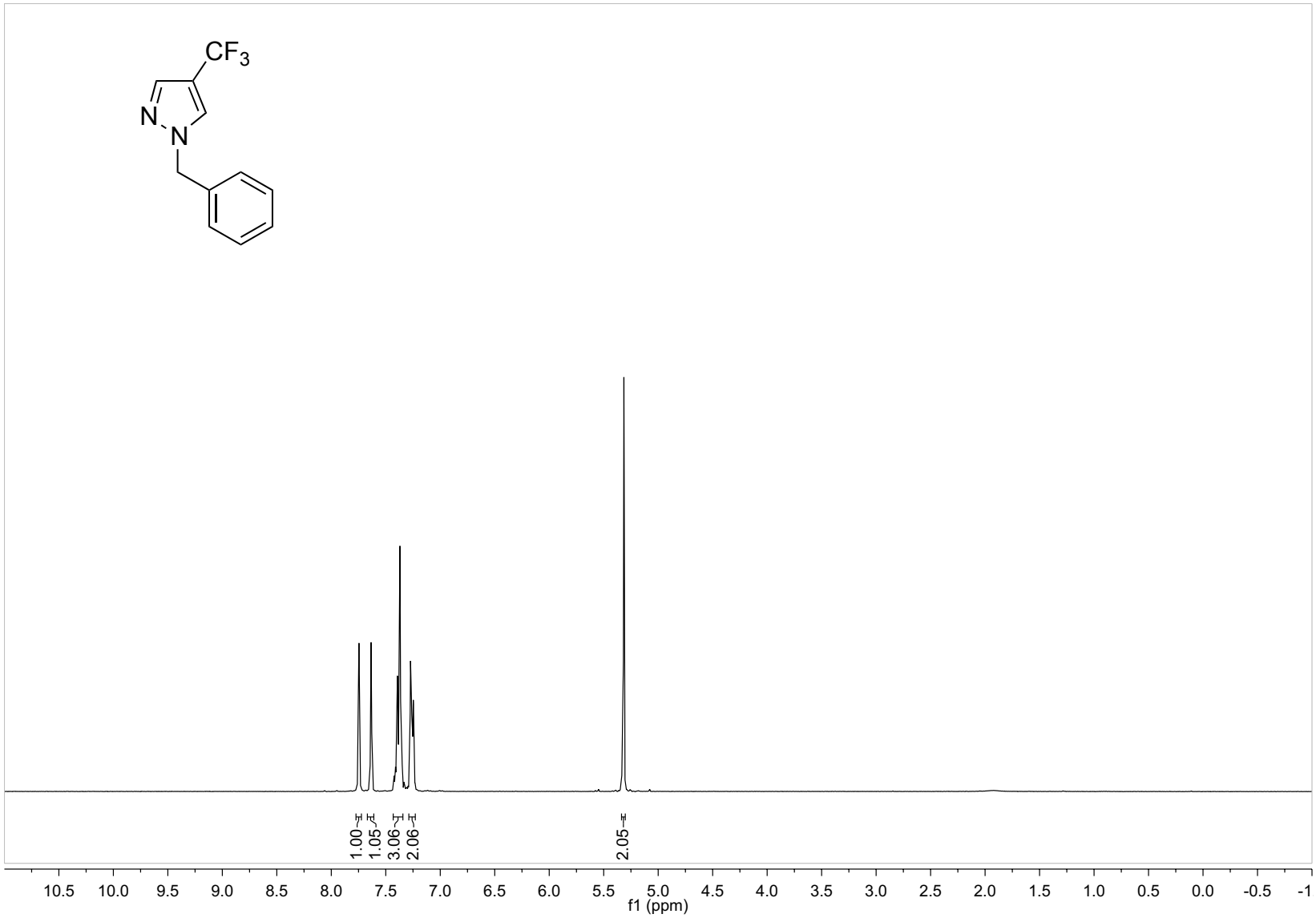

159.439
144.758
125.581
124.533
124.460
121.994
119.887
119.851
119.815
119.779
117.815
116.383
115.931
115.217
77.585 CDCl3
77.161 CDCl3
76.737 CDCl3
32.540
30.123
F3C
N
N
tBu
129.168
125.581
124.604
124.533
124.460
124.386
121.994
119.887
119.851
119.815
119.779
118.407
117.815
116.831
116.383
115.931
115.482
f1 (ppm)
f1 (ppm)

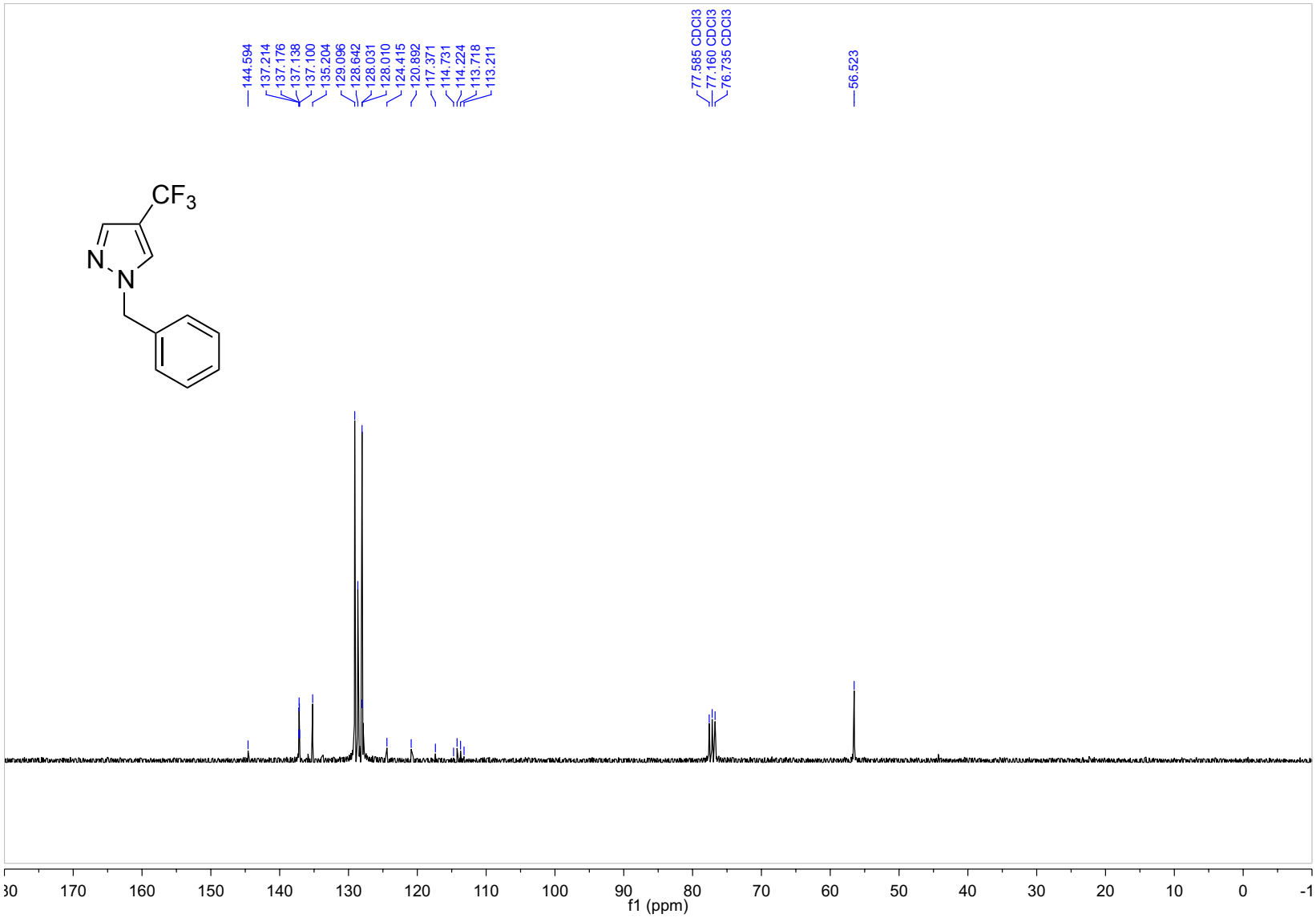

-63.761
N
tBu
N
F3C
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

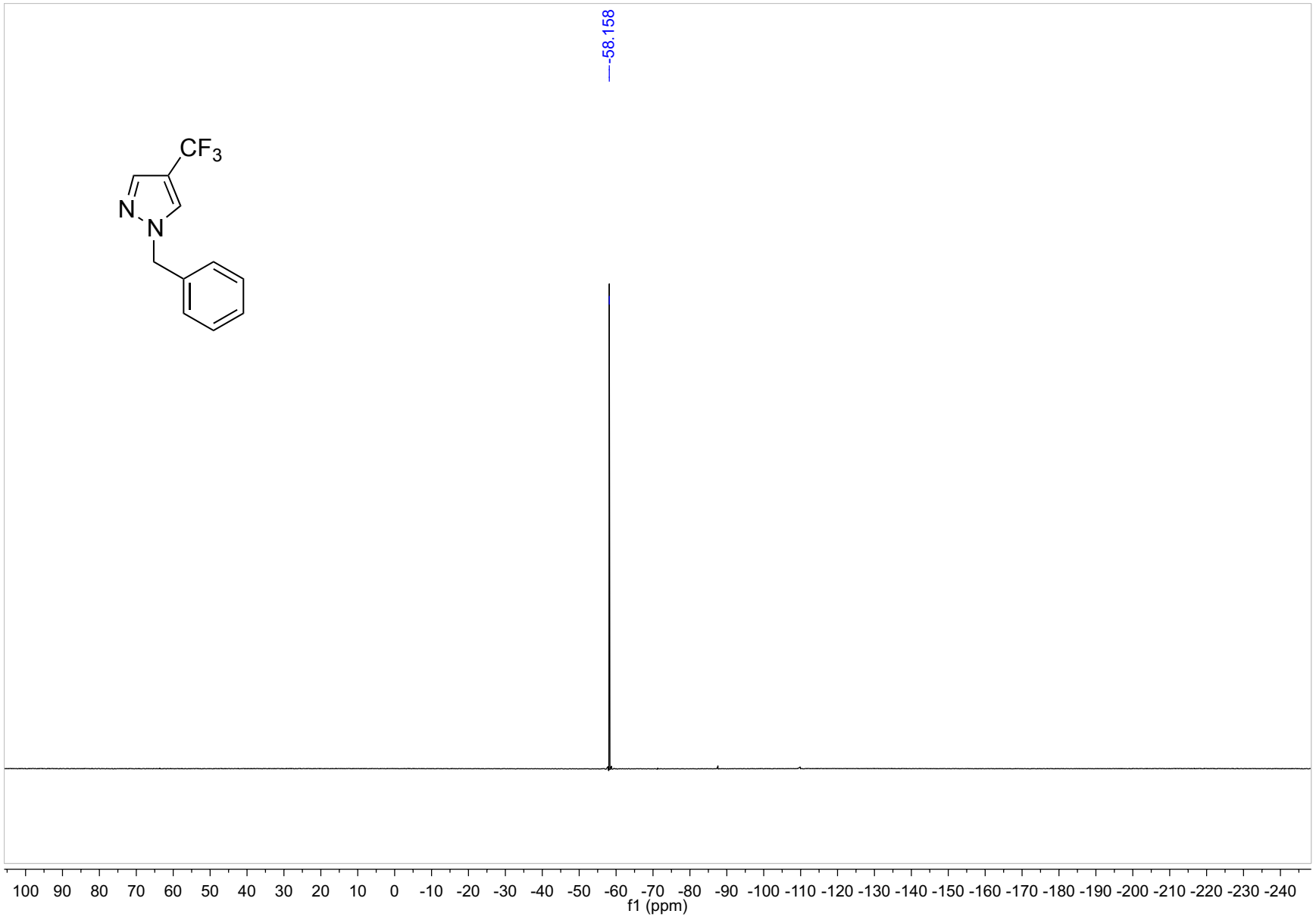

CF3
N
N
1.00
1.03
1.04
3.08
2.16
1.18
2.08
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

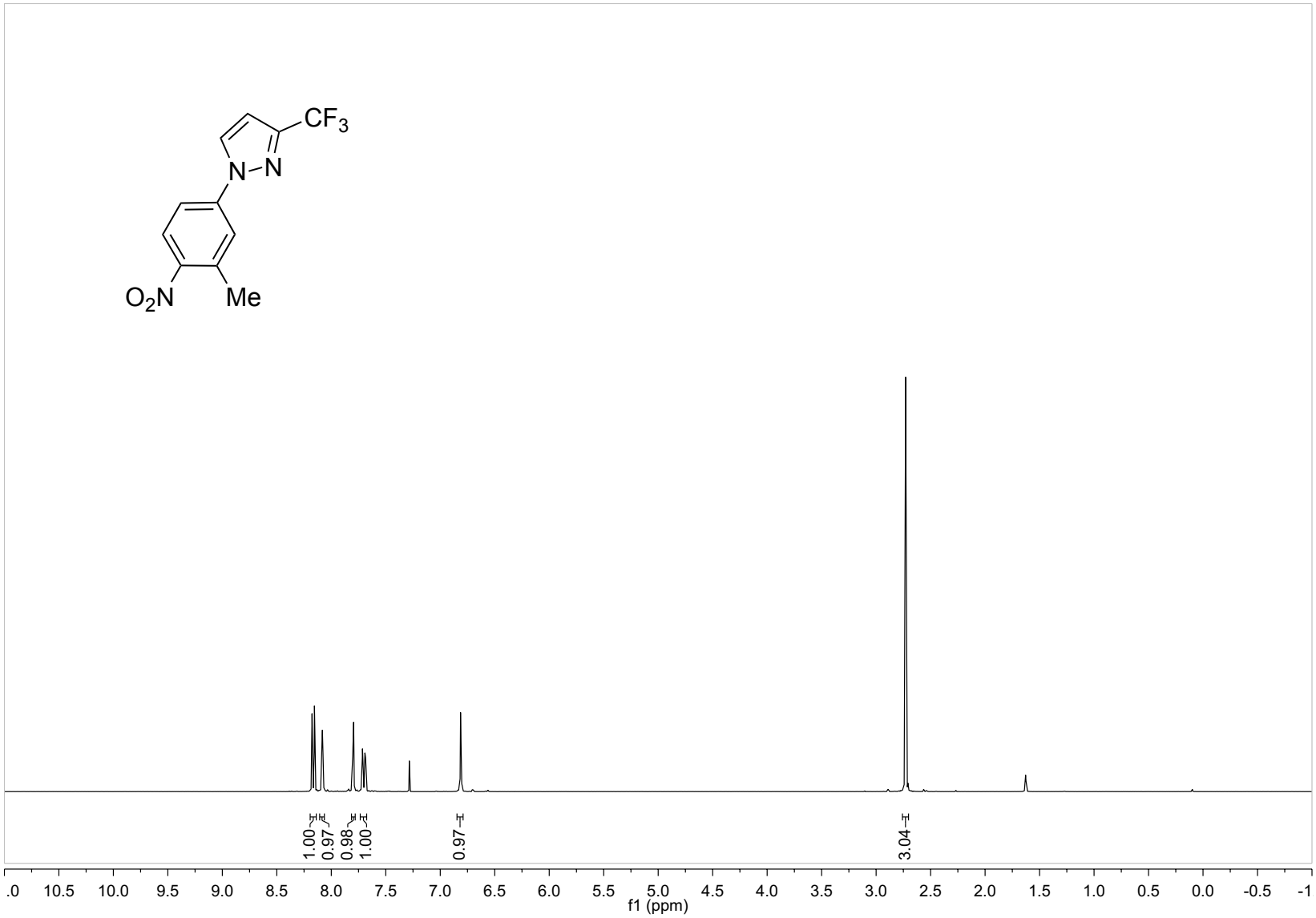

147.402
144.759
136.561
129.016
128.201
128.066
127.856
127.609
127.542
127.474
117.588
116.605
105.750
105.277
104.776
104.277
77.585 CDCl3
77.161 CDCl3
76.738 CDCl3
48.270
CF3
N
N
136.561
129.212
129.016
128.201
128.066
127.856
127.609
127.542
127.474
127.410
125.686
122.157
118.628
117.588
116.605
f1 (ppm)
f1 (ppm)

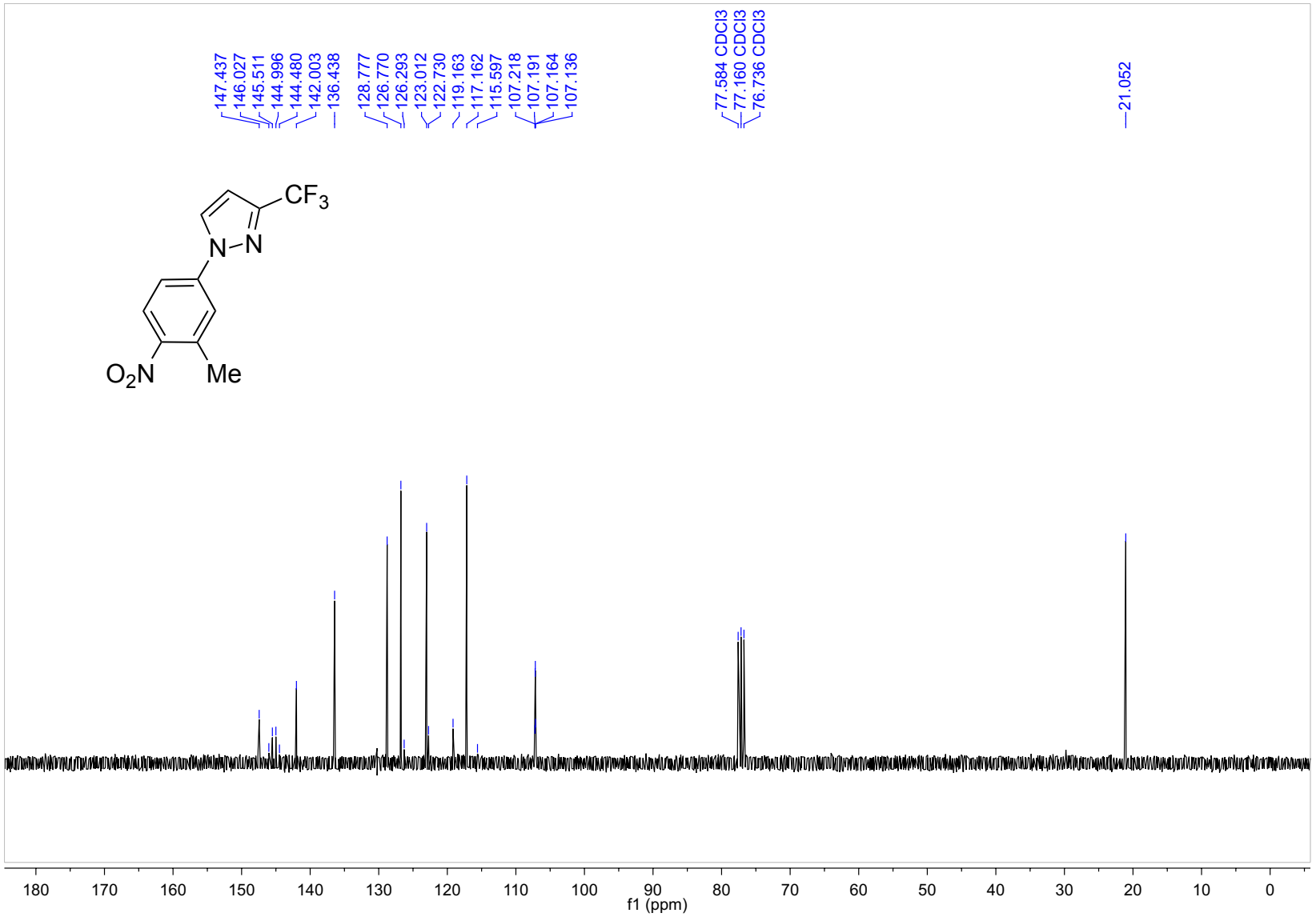

-58.978
CF3
N
N
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

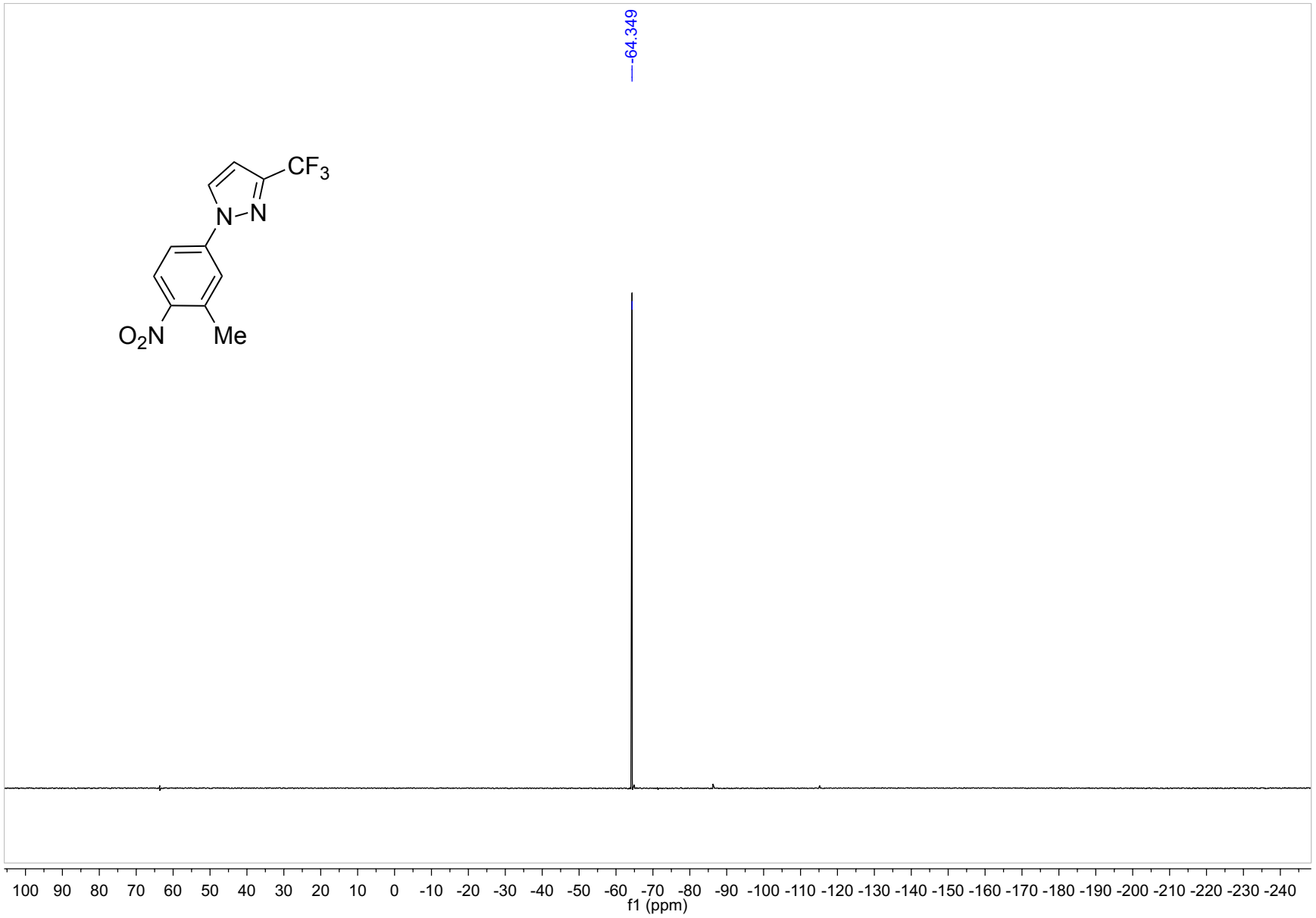

CF3
N
N
1.00
1.05
3.06
2.06
2.05
10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

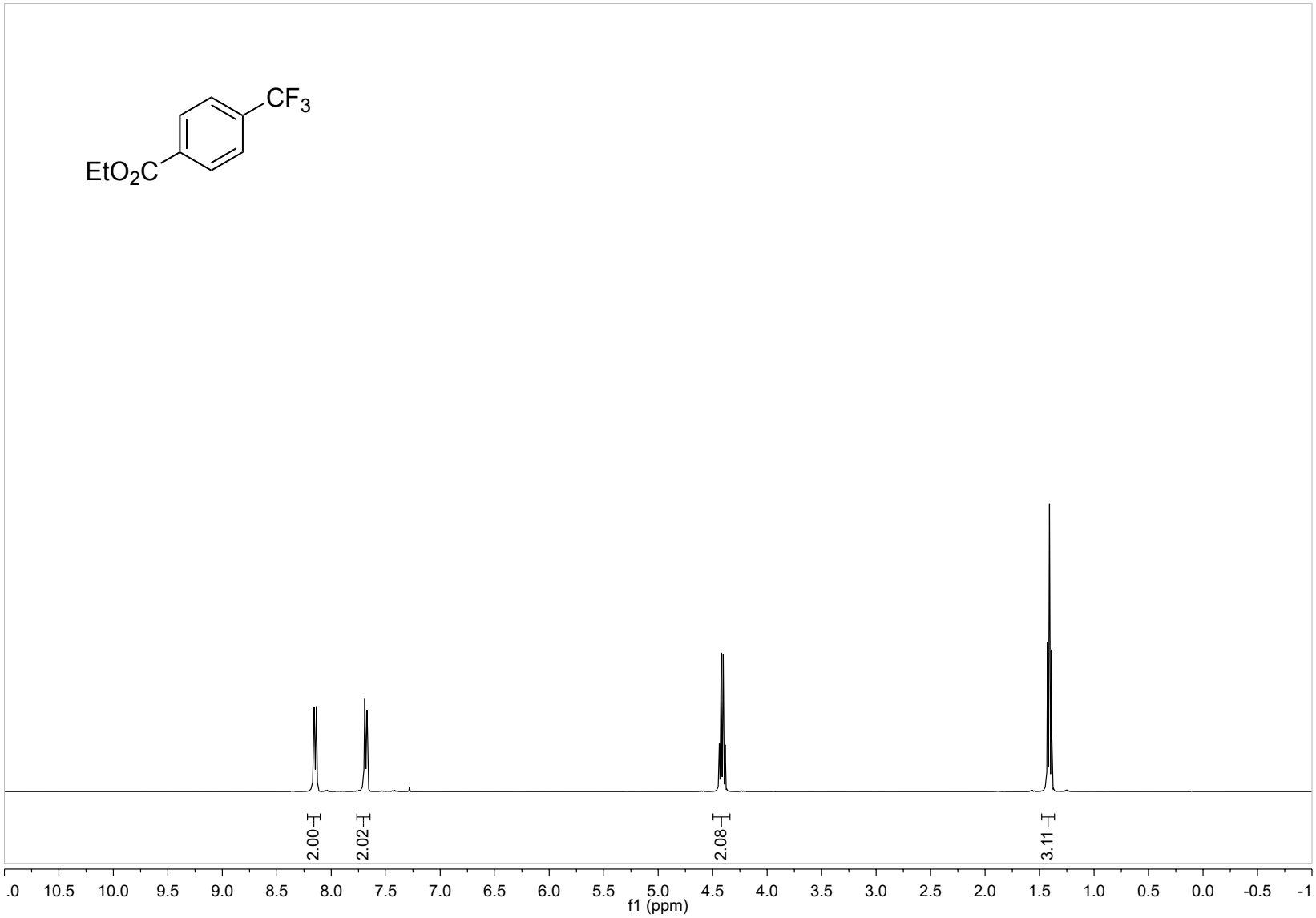

144.594
137.214
137.176
137.138
137.100
135.204
129.096
128.642
128.031
128.010
124.415
120.892
117.371
114.731
114.224
113.718
113.211
77.585 CDCl3
77.160 CDCl3
76.735 CDCl3
56.523
CF3
N
N
f1 (ppm)

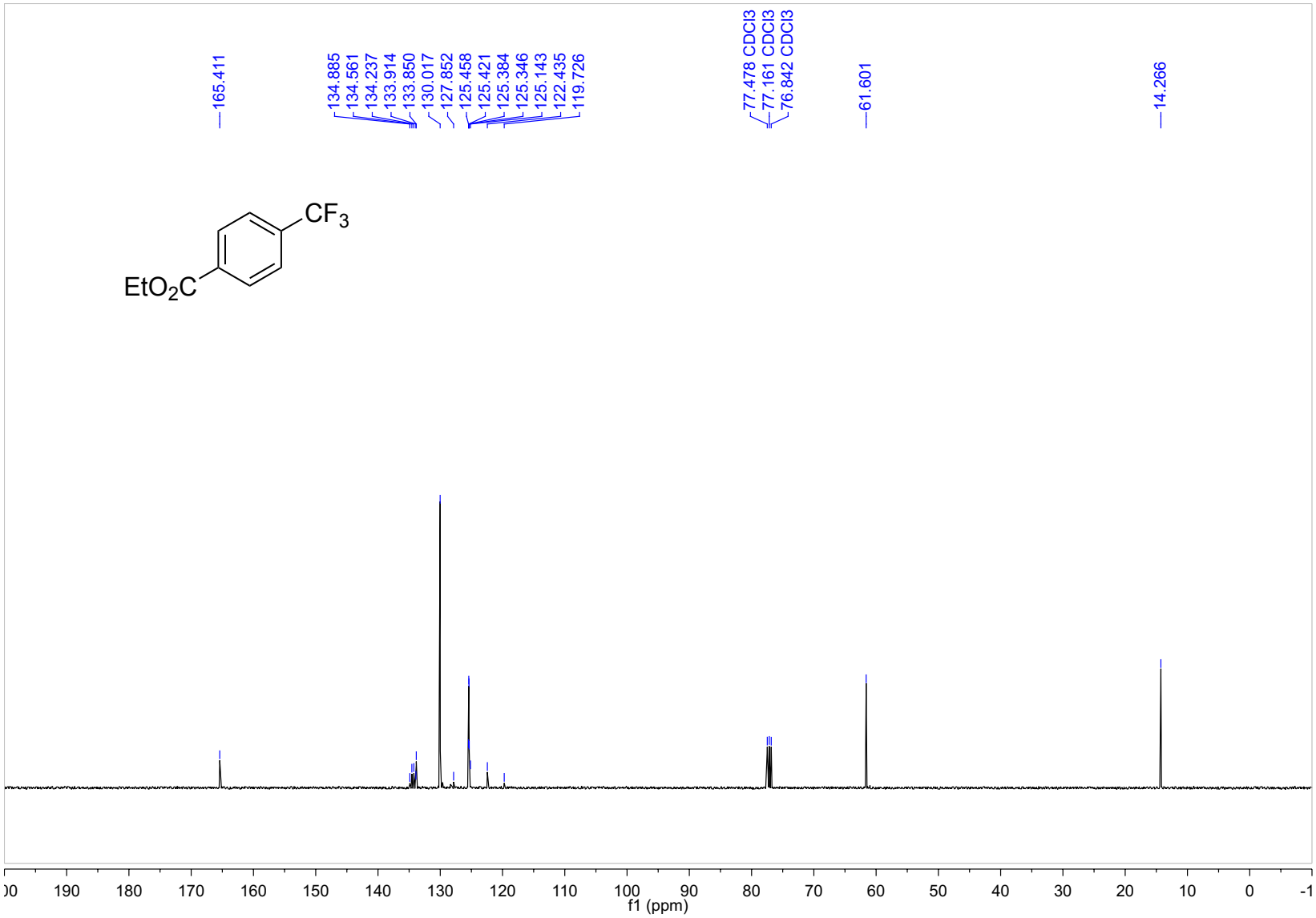

-58.158
CF3
N
N
100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200 -210 -220 -230 -240
f1 (ppm)

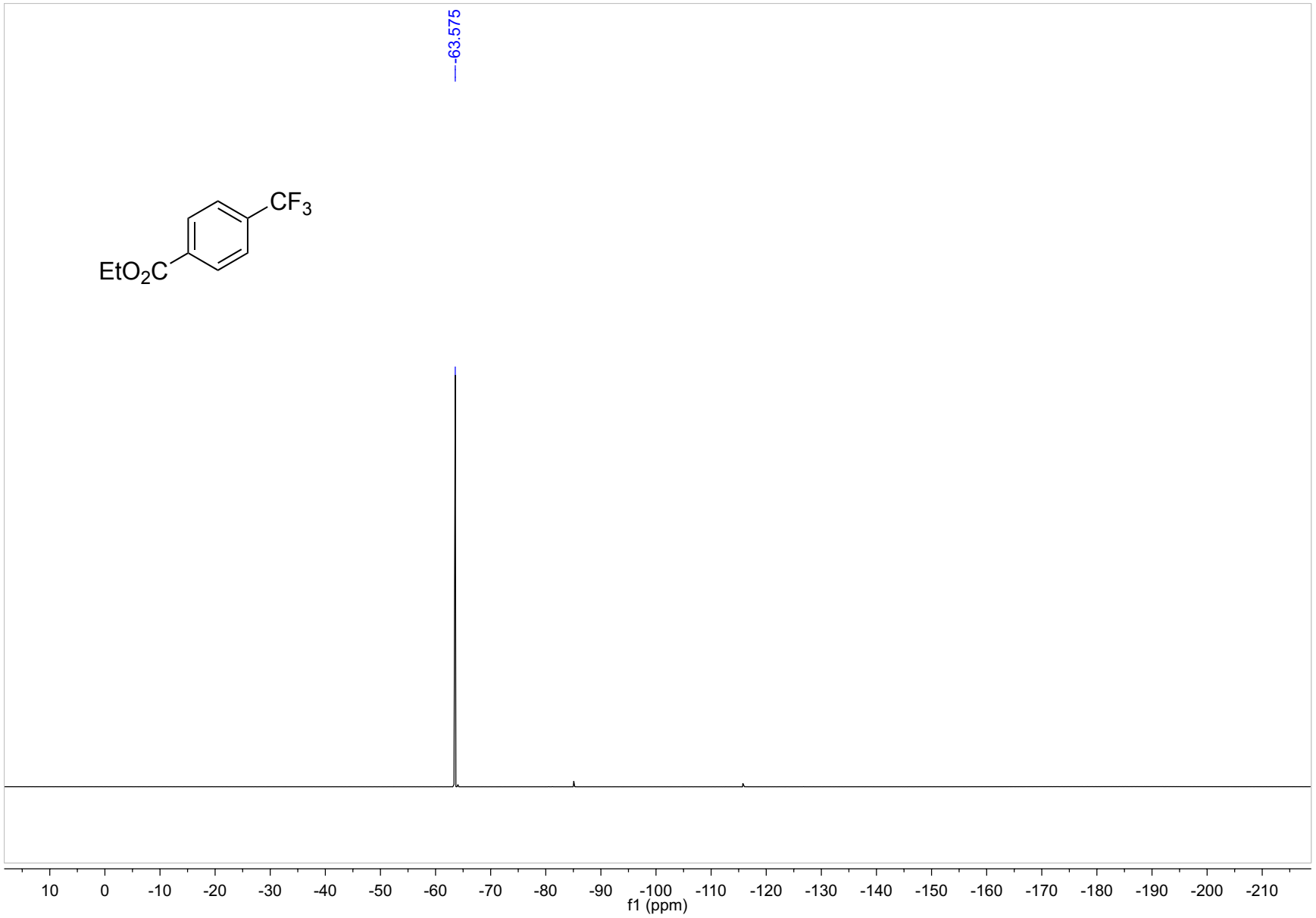

CF3
N
N
O2N
Me
1.00
0.97
0.98
1.00
0.97
3.04
f1 (ppm)


147.437
146.027
145.511
144.996
144.480
142.003
136.438
128.777
126.770
126.293
123.012
122.730
119.163
117.162
115.597
107.218
107.191
107.164
107.136
77.584 CDCl3
77.160 CDCl3
76.736 CDCl3
21.052
CF3
N–N
O2N
Me
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


-64.349
CF3
N
N
O2N
Me
100 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 -200 -210 -220 -230 -240
f1 (ppm)


CF3
EtO2C
2.00
2.02
2.08
3.11
f1 (ppm)


165.411
134.885
134.561
134.237
133.914
133.850
130.017
127.852
125.458
125.421
125.384
125.346
125.143
122.435
119.726
77.478 CDCl3
77.161 CDCl3
76.842 CDCl3
61.601
14.266
CF3
EtO2C
f1 (ppm)


-63.575
CF3
EtO2C
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
-170
-180
-190
-200
-210
f1 (ppm)