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Supporting Information

Electrochemical Strategies for N-Alkylation and N-Acylation of NH-Sulfoximines via the Decarboxylation and Deoxygenation of Carboxylic Acids

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Table of Contents

1. General information

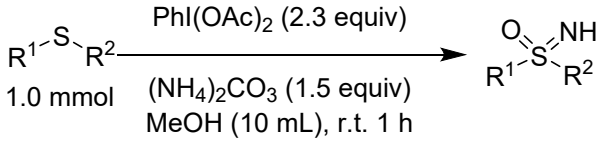
All reactions were carried out under an air atmosphere. Analytical thin-layer chromatography (TLC) was performed on glass plates coated with 0.25 mm 230–400 mesh silica gel containing a fluorescent indicator. All of the products in this article are compatible with standard silica gel chromatography. Column chromatography was performed on silica gel (200–300 mesh). The eluent generally contained ethyl acetate (EA) and petroleum ether (PE).

NMR spectra were recorded on a Bruker Ascend 400 spectrometer, and chemical shifts (δ) are reported in parts per million. ^{1}H NMR spectra were recorded at 400 MHz in NMR solvents and referenced internally to the corresponding solvent resonance, and ^{13}C NMR spectra were recorded at 101 MHz and referenced to the corresponding solvent resonance. Coupling constants are reported in hertz with multiplicities denoted as s (singlet), d (doublet), t (triplet), q (quartet), m (multiplet), and br (broad). Infrared spectra were recorded on a Thermo Fisher Nicolet 6700 FT-IR spectrometer using the ATR (attenuated total reflectance) method. Absorption maxima (ν_{max}) are reported in wavenumbers (inverse-centimeters). High -resolution mass spectra (HRMS) were recorded on a Thermo Scientific LTQ Orbitrap XL instrument with an APCI source. X-ray diffraction data were collected using a Bruker D8 Venture PHOTON II CMOS system equipped with a Cu Kα INCOATEC ImuSmicrofocus source (λ = 1.54178 Å). The data were collected at 173 K.

All of used reagents are purchased from commercial sources and used upon receipt, unless otherwise specified.

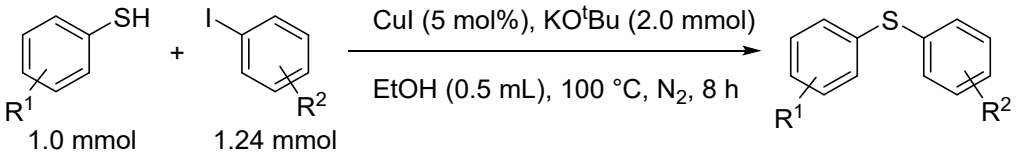
2. Typical experimental procedures

General procedure for the synthesis of NH-sulfoximines[1]



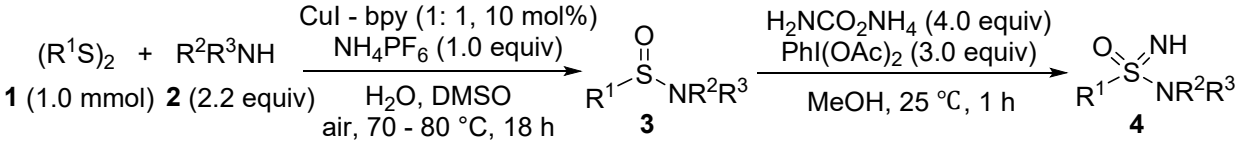
In a dried 50 mL pear shaped flask equipped with a stirring bar, sulfide (1.0 mmol), $PhI(OAc)_2$ (2.3 mmol, 2.3 equiv) and $(NH_4)_2CO_3$ (1.5 mmol, 1.5 equiv) were added. Then, MeOH (10.0 mL, 0.10 M) was added and the reaction was stirred at 25 °C for 5 min. The reaction was then quenched by the addition of saturated sodium bicarbonate (5.0 mL). The aqueous phase was extracted with ethyl acetate (10 mL×3). The combined organic phase was dried over anhydrous $MgSO_4$, filtered and concentrated. The resulting residual was purified by flash silica gel column chromatography using mixture of petroleum ether and ethyl acetate as eluent to afford the NH-sulfoximines.

General procedure for the synthesis of diaryl sulfides[2]



CuI (10 mg, 0.05 mmol, 5 mol%), thiophenol (1.0 mmol), aryl iodide (1.24 mmol), and KO^tBu (228 mg, 2.0 mmol) were put in an oven-dried Schlenk tube. 0.5 mL of ethanol was added to it. The reaction tube was sealed, and the mixture was degassed with nitrogen gas and stirred at 100 °C for 8 h. The reaction contents were then cooled and transferred to a separating funnel, diluted with 2-3 mL of ethyl acetate and washed with 5-10 mL of water. The aqueous layer was washed with 3 × 10 mL of ethyl acetate. The organic layers were then dried over anhydrous sodium sulphate. The solvent was filtered and concentrated under reduced pressure. The crude product was purified using column chromatography (SiO_2, petroleum ether / ethyl acetate gradient) to obtain the required product.

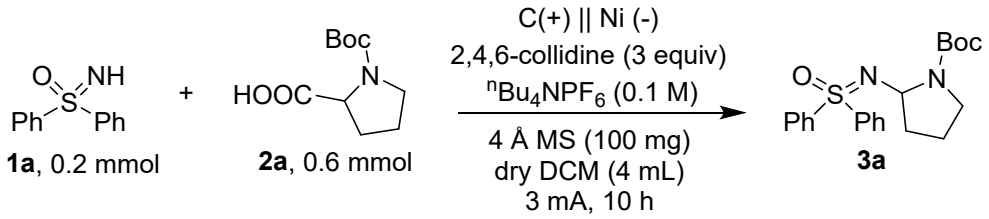
General procedure for the synthesis of NH-sulfonimidamides [3, 4]



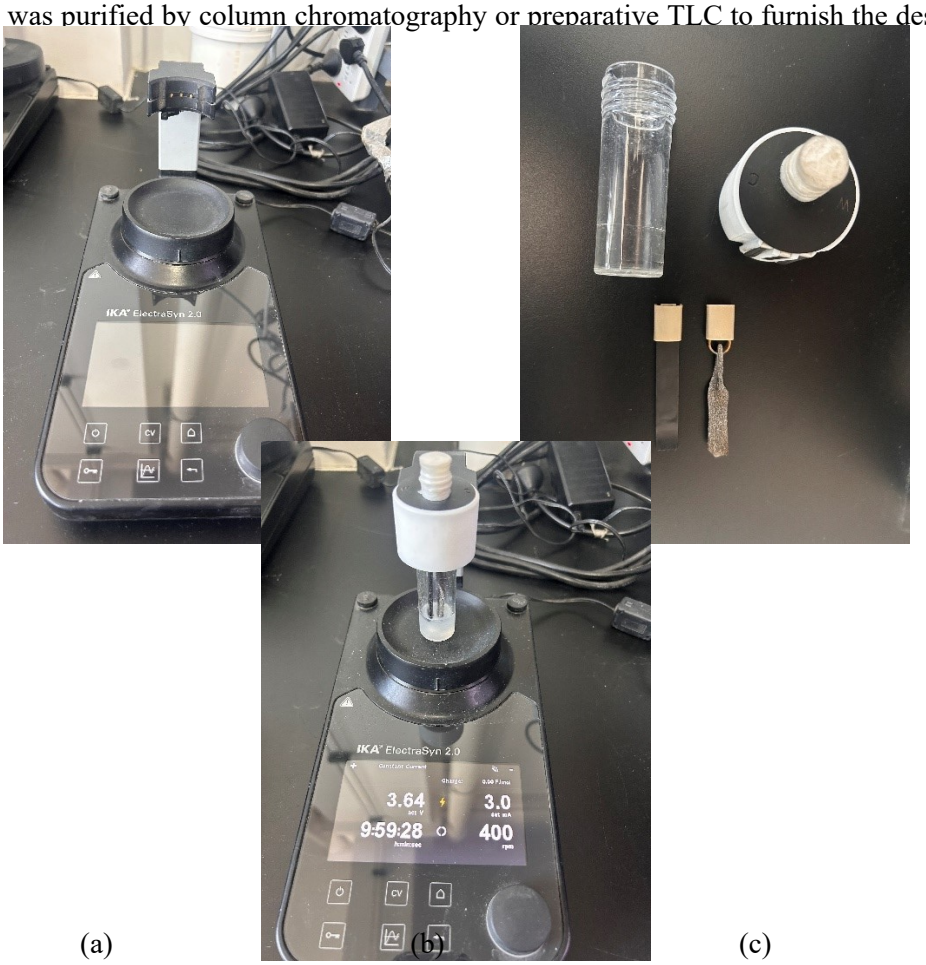
To a mixture of disulfides **1** (1.0 mmol), diethylamine **2** (2.2 mmol, 2.2 equiv), and NH_4PF_6 (1.0 mmol, 1.0 equiv), in DMSO (0.6 mL) and H_2O (0.15 mL) were added CuI (0.1 mmol, 10 mmol%) and bpy (0.1 mmol, 10 mmol%), and the mixture was stirred at 80 °C for 18 h in the presence of air provided by a balloon. After the residue was dissolved in Et_2O, the solution was washed with H_2O and saturated sodium chloride and dried with anhydrous magnesium sulfate. The resulting residual was purified by flash silica gel column chromatography using a mixture of diethyl ether and hexane as the eluent to afford the Sulfinamides **3**.

To the sulfinamide **3** (1.0 mmol) were added $PhI(OAc)_2$ (3.0 mmol, 3.0 equiv), $H_2NCO_2NH_4$ (4.0 mmol, 4.0 equiv) and finally MeOH (2.0 mL, 0.5 M). The mixture was stirred in an open flask at 25℃ for 1 h. The reaction was then quenched by the addition of saturated sodium bicarbonate (10.0 mL). The aqueous phase was extracted with ethyl acetate (10 mL × 3). The combined organic phase was dried over anhydrous $MgSO_4$, filtered, and concentrated. The resulting residual was purified by flash silica gel column chromatography using a mixture of PE and EA as the eluent to afford the NH-sulfonimidamides **4**.

General procedure A for the synthesis of N-alkylated sulfoximines



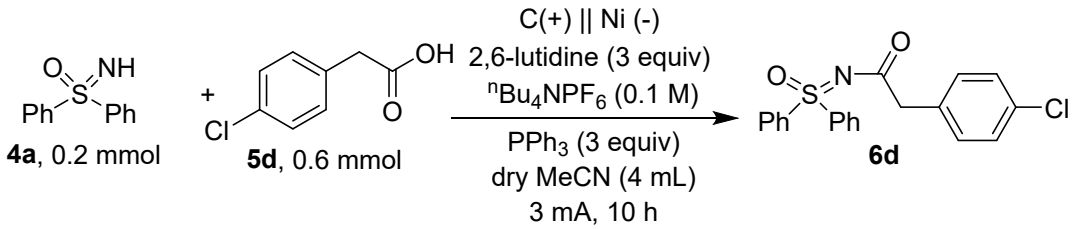
The electrolysis was carried out in the electrolysis cell of IKA® ElectraSyn 2.0 (Figure S1-a). The anodic electrode was the graphite plate (Figure S1-b, 2*8*50 mm) and the cathodic electrode was the nickel plate (Figure S1-b, 2*8*50 mm). S, S-diaryl sulfoximine **1a** (43.5 mg, 0.2 mmol), carboxylic acids **2a** (129.1 mg, 0.6 mmol), $^{n}Bu_4NPF_6$ (154.9 mg, 0.4 mmol), 2,4,6-collidine (72.7 mg, 0.6 mmol), 4 Å MS (100 mg) and dry DCM (4 mL) were added to an oven-dried undivided cell (10 mL) equipped with a stirring bar (the order of the addition did not affect the result). The reaction mixture was stirred and electrolyzed at a constant current of 3 mA at room temperature for 10 h (Figure S1-c). When the reaction was finished, the solvent was evaporated under vacuum and the crude material was purified by column chromatography or preparative TLC to furnish the desired product **3a**-**3zh**.



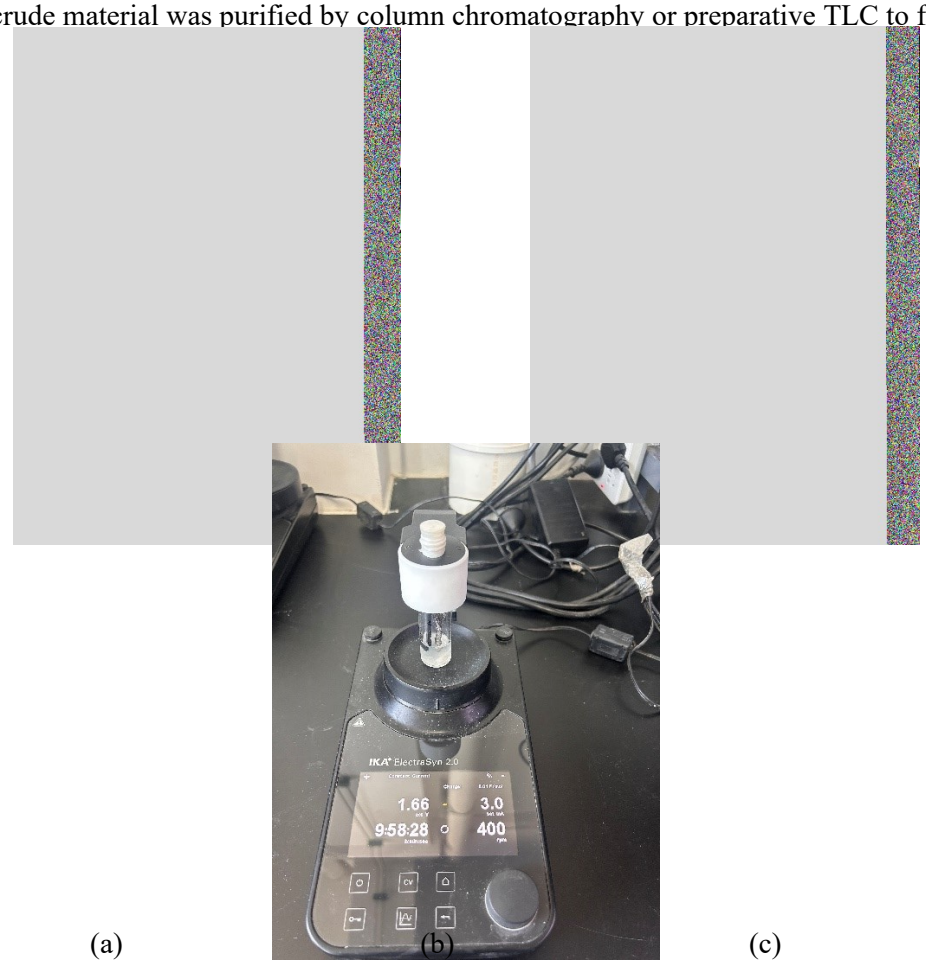
(a) (b) (c)

Figure S1. Electrocatalytic equipment. (a) IKA® ElectraSyn 2.0; (b) Electrodes and reaction vial; (c) Constant current power supply.

General procedure B for the synthesis of N-acylated sulfoximines



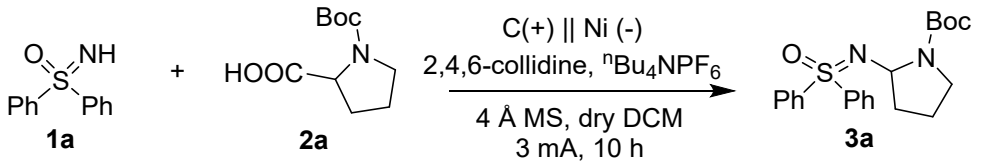
The electrolysis was carried out in the electrolysis cell of IKA® ElectraSyn 2.0 (Figure S2-a). The anodic electrode was the graphite plate (Figure S2-b, 2*8*50 mm) and the cathodic electrode was the nickel plate (Figure S2-b, 2*8*50 mm). S, S-diaryl sulfoximine **4a** (43.5 mg, 0.2 mmol), carboxylic acids **5d** (102.4 mg, 0.6 mmol), $^{n}Bu_4NPF_6$ (154.9 mg, 0.4 mmol), 2,6-lutidine (64.3 mg, 0.6 mmol), triphenylphosphine (157.3 mg, 0.6 mmol) and dry CH_3CN (4 mL) were added to an oven-dried undivided cell (10 mL) equipped with a stirring bar (the order of the addition did not affect the result). The reaction mixture was stirred and electrolyzed at a constant current of 3 mA at room temperature for 10 h (Figure S2-c). When the reaction was finished, the solvent was evaporated under vacuum and the crude material was purified by column chromatography or preparative TLC to furnish the desired product **6a**-**6zg**.



(a) (b) (c)

Figure S2. Electrocatalytic equipment. (a) IKA® ElectraSyn 2.0; (b) Electrodes and reaction vial; (c) Constant current power supply.

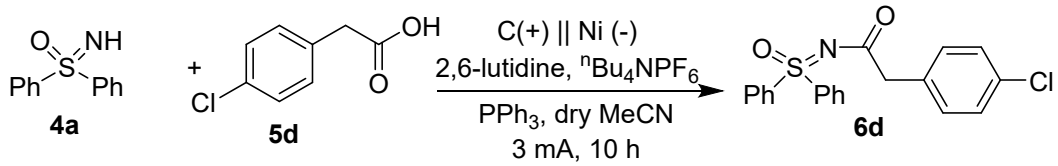
3. Optimization of N-alkylation of sulfoximines[a]



Entry	Variations from the 'standard' conditions	Yield **3a** (%)[b]
1	None	90
2	No current	N.R.[c]
3	C/C, C/Pt, Pt/Pt as electrode	41, 82, 59
4	MeCN, MeOH as solvent	63, N.R.
5	$^{n}Bu_4NClO_4$, $^{n}Bu_4NOAc$ as electrolyte	85, 17
6	8 h, 12 h as reaction time	65, 89
7	2 mA, 5 mA, 7 mA as current	51, 64, 65
8	2,6-lutidine, 2,3,5-collidine, 2,6-di-tert-butyl-4-methyl pyridine as base	80, 69, 43
9	No 2,4,6-collidine	25
10	3 Å MS instead of 4 Å MS	79
11	No 4 Å MS	67

[a]Standard conditions A: **1a** (0.2 mmol), **2a** (0.6 mmol), 2,4,6-collidine (0.6 mmol), $^{n}Bu_4NPF_6$ (0.1 M), dry DCM (4.0 mL), 4 Å MS (100 mg), constant current = 3 mA under air for 10 hours. [b]Isolated yields. [c]No reaction.

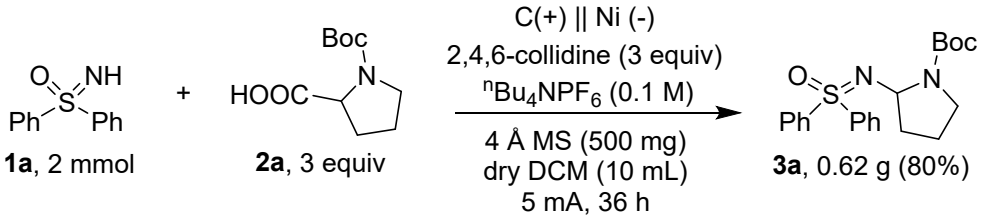
4. Optimization of N-acylation of sulfoximines[a]



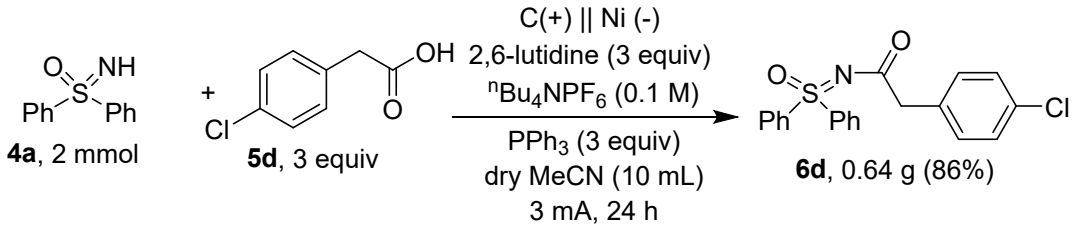
Entry	Variations from the 'standard' conditions	Yield **6d** (%)[b]
1	**None**	**94**
2	No current	N.R.[c]
3	C/C, Pt/Pt as electrode	39, 61
4	DCM, MeOH, DMSO as solvent	41, N.R., N.R.
5	$^{n}Bu_4NClO_4$, $^{n}Bu_4NOAc$ as electrolyte	79, 20
6	4 h, 6 h, 8 h, 12 h as reaction time	23, 49, 71, 89
7	1 mA, 5 mA, 7 mA as current	trace, 71, 77
8	2,4,6-collidine, 2,3,5-collidine as base	83, 51
9	No 2,6-lutidine	trace
10	No triphenylphosphine	trace

[a]Standard conditions A: **4a** (0.2 mmol), **5d** (0.6 mmol), 2,6-lutidine (0.6 mmol), $^{n}Bu_4NPF_6$ (0.1 M), dry MeCN (4.0 mL), triphenylphosphine (0.6 mmol), constant current = 3 mA under air for 10 hours. [b]Isolated yields. [c]No reaction.

5. Gram-scale synthesis of 3a and 6d at 2.0 mmol scale



After the addition of S, S-diaryl sulfoximine (434.6 mg, 2.0 mmol, 1.0 equiv), N-boc-D-proline (1291.5 mg, 6.0 mmol, 3.0 equiv), 2,4,6-collidine (727.1 mg, 6 mmol, 3.0 equiv), $^{n}Bu_4NPF_6$ (387.4 mg, 0.1 M) and 4 Å MS (500 mg) to a 50 mL oven-dried undivided three neck bottle equipped with the anodic electrode was the carbon electrode and the cathodic electrode was the nickel plate, dry DCM (10 mL) was then added. The resulting mixture was electrolyzed at constant current 5 mA under room temperature for 36 h. After concentration in vacuum, the residue was purified by column chromatography on silica gel to afford product **3a** (618.4 mg, 80% yield).



After the addition of S, S-diaryl sulfoximine (434.6 mg, 2.0 mmol, 1.0 equiv), 2-(4-chlorophenyl)acetic acid (1023.6 mg, 6.0 mmol, 3.0 equiv), 2,6-lutidine (642.9 mg, 6 mmol, 3.0 equiv), $^{n}Bu_4NPF_6$ (387.4 mg, 0.1 M) and triphenylphosphine (1573.7 mg, 6 mmol, 3.0 equiv) to a 50 mL oven-dried undivided three neck bottle equipped with the anodic electrode was the carbon electrode and the cathodic electrode was the nickel plate, dry MeCN (10 mL) was then added. The resulting mixture was electrolyzed at constant current 5 mA under room temperature for 24 h. After concentration in vacuum, the residue was purified by column chromatography on silica gel to afford product **6d** (636.2 mg, 86% yield).

6. X-Ray analysis

3a was dissolved in 1.0 mL of dichloromethane in a tube. Then, 2.0 mL of n-hexane was slowly added on the dichloromethane layer. The crystal that was suitable for X-Ray analysis was obtained after 24 hours.

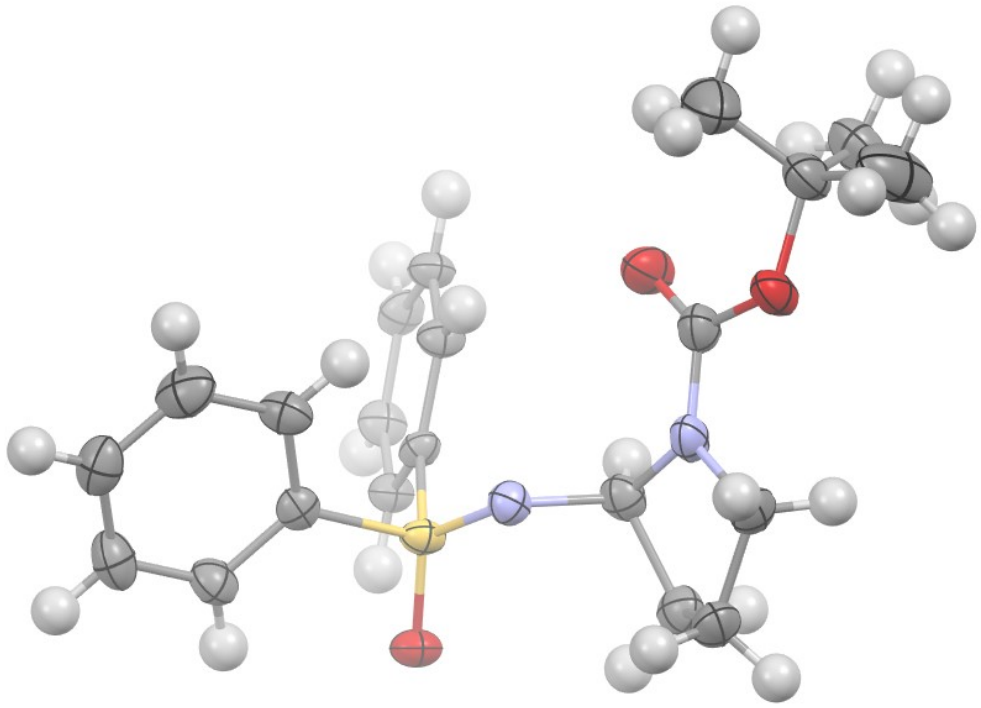


Figure S3. X-ray structure of **3a** (CCDC Deposition Number: 2368952).

Table 1. Crystal data and structure refinement for C:1.

Identification code	3a	
Empirical formula	C21 H26 N2 O3 S	
Formula weight	386.50	
Temperature	173.0 K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 1 21/n 1	
Unit cell dimensions	a = 12.1179(9) Å	a= 90°.
	b = 8.1502(6) Å	b= 102.343(2)°.
	c = 20.8037(15) Å	g = 90°.
Volume	2007.2(3) $Å^3$	
Z	4	
Density (calculated)	1.279 Mg/m^3	

Absorption coefficient	0.185 mm^{-1}
F(000)	824
Crystal size	0.22 x 0.19 x 0.18 mm^3
Theta range for data collection	1.796 to 26.759°.
Index ranges	-15<=h<=14, 0<=k<=10, 0<=l<=26
Reflections collected	4281
Independent reflections	4281 [R(int) = 0.0938]
Completeness to theta = 25.242°	100.0 %
Absorption correction	Semi-empirical from equivalents
Max. and min. transmission	0.8620 and 0.7037
Refinement method	Full-matrix least-squares on F^2
Data / restraints / parameters	4281 / 0 / 247
Goodness-of-fit on F^2	1.166
Final R indices [I>2sigma(I)]	R1 = 0.0880, wR2 = 0.1730
R indices (all data)	R1 = 0.1086, wR2 = 0.1834
Extinction coefficient	n/a
Largest diff. peak and hole	1.214 and -0.424 $e.Å^{-3}$

6d was dissolved in 1.0 mL of dichloromethane in a tube. Then, 2.0 mL of n-hexane was slowly added on the dichloromethane layer. The crystal that was suitable for X-Ray analysis was obtained after 24 hours.

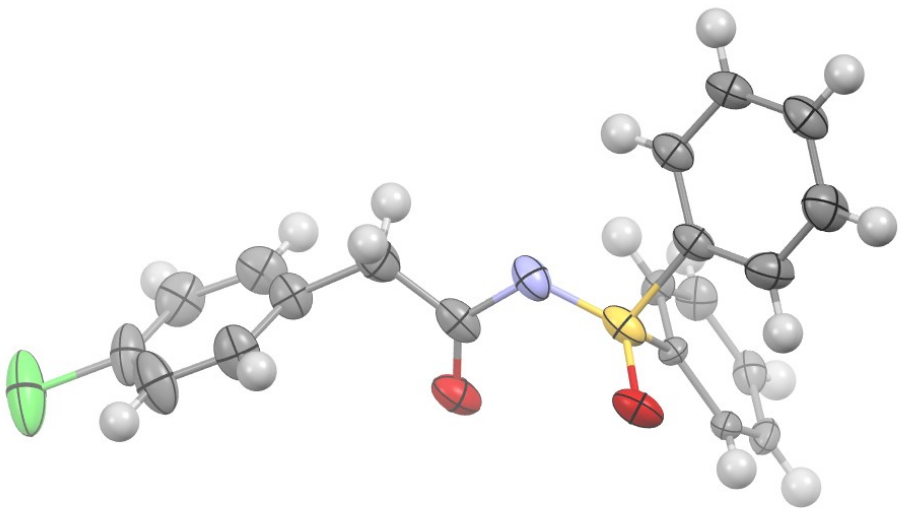


Figure S4. X-ray structure of **6d** (CCDC Deposition Number: 2368953).

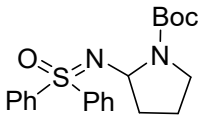
Table 2. Crystal data and structure refinement for C:2.

Identification code	6d	
Empirical formula	C20 H16 Cl N O2 S	
Formula weight	369.85	
Temperature	173.0 K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 1 21/c 1	
Unit cell dimensions	a = 6.2609(4) Å	a= 90°.
	b = 21.2544(13) Å	b= 101.420(3)°.
	c = 13.3471(8) Å	g = 90°.
Volume	1740.96(19) $Å^3$	
Z	4	
Density (calculated)	1.411 Mg/m^3	
Absorption coefficient	0.353 mm^{-1}	
F(000)	768	
Crystal size	0.19 x 0.18 x 0.16 mm^3	
Theta range for data collection	2.469 to 26.735°.	
Index ranges	-7<=h<=7, -26<=k<=26, -16<=l<=16	
Reflections collected	23549	
Independent reflections	3678 [R(int) = 0.0819]	
Completeness to theta = 25.242°	99.9 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.7454 and 0.6567	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3678 / 72 / 258	
Goodness-of-fit on F^2	1.164	
Final R indices [I>2sigma(I)]	R1 = 0.0605, wR2 = 0.1071	
R indices (all data)	R1 = 0.0875, wR2 = 0.1174	
Extinction coefficient	0.0043(5)	
Largest diff. peak and hole	0.275 and -0.390 $e.Å^{-3}$	

7. Characterization data of products

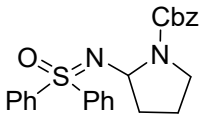
Preparation and Characterization Data for Isolated Products

Compounds **3n**[5], **3q**[6], **3r**[7], **3s**[6], **3t**[6] and **7**[8] are known compounds, and the characterization data were in accordance with the literature. $^{1}H/^{13}C/^{19}F$ NMR data for these compounds are provided here for completion's sake.



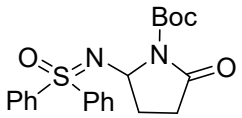
Chemical Formula: $C_{21}H_{26}N_2O_3S$
Exact Mass: 386.1664
Molecular Weight: 386.5100

(3a) Tert-butyl 2-((oxodiphenyl-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3a** was obtained as a white solid (69.6 mg, 90%). Mp. 136.2 - 138.1 °C. This target product was purified by column chromatography on silica gel (PE/EA = 4:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.15 (s, 1H), 8.09 – 7.90 (m, 3H), 7.58 – 7.36 (m, 6H), 5.50 – 5.17 (m, 1H), 3.55 – 3.11 (m, 2H), 2.37 – 2.20 (m, 1H), 2.14 – 2.01 (m, 1H), 195 – 1.76 (m, 2H), 1.51 – 1.37 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.1, 143.4, 142.3, 132.6, 132.2, 129.1, 128.9, 128.2, 127.9, 78.8, 68.9, 68.3, 46.0, 45.34, 36.7, 36.3, 28.6, 23.1, 22.1. IR (cm^{-1}): 3273, 2976, 1693, 1477, 1446, 1390, 1363, 1338, 1307, 1236, 1199, 1168, 1130, 1114, 1091, 1064, 1022, 999, 970, 923, 908, 891, 852, 827, 765, 727, 692, 599, 567, 538. HRMS (APCI) m/z calcd for $C_{21}H_{27}N_2O_3S^+$ $[M + H]^+$ 387.1737, found 387.1729.



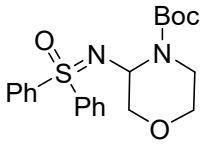
Chemical Formula: $C_{24}H_{24}N_2O_3S$
Exact Mass: 420.1508
Molecular Weight: 420.5270

(3b) Benzyl 2-((oxodiphenyl-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and N-benzyloxycarbonyl-D-proline (149.6 mg, 0.6 mmol), **3b** was obtained as a white solid (79.9 mg, 95%). Mp. 107.8 – 112.3 °C. This target product was purified by column chromatography on silica gel (PE/EA = 4:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.28 – 7.97 (m, 2H), 7.85 (dd, J = 28.8, 7.4 Hz, 2H), 7.59 – 7.21 (m, 11H), 5.32 – 4.99 (m, 3H), 3.62 (t, J = 9.2 Hz, 1H), 3.35 (dd, J = 21.0, 8.0 Hz, 1H), 2.31 (tt, J = 19.2, 9.6 Hz, 1H), 2.12 (dd, J = 14.6, 8.8 Hz, 1H), 1.89 (tt, J = 14.0, 6.8 Hz, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.8, 154.5, 141.8, 141.5, 140.4, 139.8, 137.1, 132.5, 132.3, 129.5, 129.2, 129.0, 128.8, 128.4, 128.3, 128.1, 127.8, 127.6, 82.2, 69.8, 68.8, 66.7, 66.4, 46.1, 45.9, 37.0, 36.3, 23.1, 22.3. IR (cm^{-1}): 3458, 3062, 3033, 2977, 2952, 2885, 1699, 1583, 1498, 1475, 1446, 1411, 1353,1280, 1238, 1197, 1174, 1137, 1091, 1024, 999, 981, 910, 867, 813, 754, 727, 692, 609, 590, 567, 543, 505, 439. HRMS (APCI) m/z calcd for $C_{24}H_{25}N_2O_3S^+$ $[M + H]^+$ 421.1580, found 421.1571.



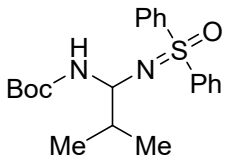
Chemical Formula: $C_{21}H_{24}N_2O_4S$
Exact Mass: 400.1457
Molecular Weight: 400.4930

(3c) Tert-butyl 2-oxo-5-((oxodiphenyl-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and (R)-Boc-5-oxopyrrolidine-2-carboxylic acid (137.5 mg, 0.6 mmol), **3c** was obtained as a light yellow solid (64.9 mg, 81%). Mp. 176.3 – 179.0 °C. This target product was purified by column chromatography on silica gel (PE/EA = 2:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06 – 7.92 (m, 4H), 7.60 – 7.38 (m, 6H), 5.54 (dd, J = 4.0, 2.8 Hz, 1H), 2.98 (dt, J = 17.2, 10.4 Hz, 1H), 2.50 – 2.32 (m, 1H), 2.18 – 2.06 (m, 2H), 1.51 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.4, 150.1, 141.6, 140.7, 132.6, 132.6, 129.3, 129.1, 128.7, 128.0, 82.8, 69.5, 31.5, 29.9, 28.0. IR (cm^{-1}): 3070, 2977, 2952, 2937, 1774, 1712, 1695, 1477, 1446, 1409, 1392, 1369, 1340, 1319, 1290, 1203, 1163, 1130, 1093, 1078, 1051, 1012, 999, 952, 873, 844, 813, 781, 761, 748, 727, 690, 659, 592, 570, 545, 511, 460. HRMS (APCI) m/z calcd for $C_{21}H_{25}N_2O_4S^+$ $[M + H]^+$ 401.1530, found 401.1520.



Chemical Formula: $C_{21}H_{26}N_2O_4S$
Exact Mass: 402.1613
Molecular Weight: 402.5090

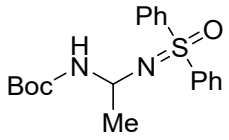
(3d) Tert-butyl 3-((oxodiphenyl-λ⁶-sulfaneylidene)amino)morpholine-4-carboxylate: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and morpholine-3,4-dicarboxylic acid 4-tert-butylester (138.7 mg, 0.6 mmol), **3d** was obtained as a white solid (70.0 mg, 87%). Mp. 131.4 – 135.5 °C. This target product was purified by column chromatography on silica gel (PE/EA = 2:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03 – 7.91 (m, 4H), 7.54 – 7.40 (m, 6H), 5.32 (s, 1H), 3.94 (t, J = 11.2 Hz, 2H), 3.81 – 3.64 (m, 2H), 3.64 – 3.58 (m, 1H), 3.57 – 3.48 (m, 1H), 1.32 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 153.6, 141.9, 141.4, 132.4, 129.1, 128.4, 128.3, 79.9, 73.3, 67.0, 61.5, 60.4, 28.2. IR (cm^{-1}): 3064, 2974, 2923, 2850, 2246, 1693, 1475, 1446, 1407, 1365, 1350, 1299, 1247, 1143, 1112, 1024, 983, 916, 869, 842, 759, 727, 690, 634, 592, 574, 547. HRMS (APCI) m/z calcd for $C_{21}H_{27}N_2O_4S^+$ $[M + H]^+$ 403.1686, found 403.1679.



Chemical Formula: $C_{21}H_{28}N_2O_3S$
Exact Mass: 388.1821
Molecular Weight: 388.5260

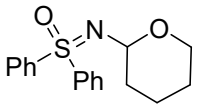
(3e) Tert-butyl (2-methyl-1-((oxodiphenyl-λ⁶-sulfaneylidene)amino)propyl)carbamate: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and (tert-butoxycarbonyl)valine (130.4 mg, 0.6 mmol), **3e** was obtained as a white solid (73.8 mg, 95%). Mp. 66.8 – 70.9 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09 – 7.84 (m, 4H), 7.55 – 7.34 (m, 6H), 4.88 (d, J = 9.2 Hz, 1H), 4.67 (dd, J = 9.2, 5.2 Hz, 1H), 1.95 – 1.74 (m, 1H), 1.42 (d, J =

28.0 Hz, 9H), 0.98 (dd, J = 10.8, 6.8 Hz, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 154.6, 141.5, 140.6, 132.6, 132.4, 132.3, 129.0, 128.6, 127.9, 78.9, 67.0, 35.9, 28.4, 28.4, 17.9, 17.5, 17.5. IR (cm^{-1}): 3269, 2968, 1708, 1683, 1517, 1475, 1446, 1390, 1365, 1292, 1249, 1228, 1174, 1122, 1093, 1037, 1008, 902, 875, 754, 729, 686, 617, 586, 557, 541. HRMS (APCI) m/z calcd for $C_{21}H_{29}N_2O_3S^+$ $[M + H]^+$ 389.1893, found 389.1890.



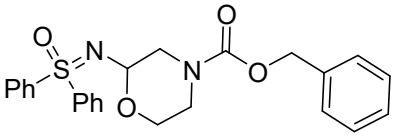
Chemical Formula: $C_{19}H_{24}N_2O_3S$
Exact Mass: 360.1508
Molecular Weight: 360.4720

(3f) Tert-butyl (1-((oxodiphenyl-λ^6-sulfaneylidene)amino)ethyl)carbamate: Following the General Procedure A with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and (tert-butoxycarbonyl)alanine (113.5 mg, 0.6 mmol), **3f** was obtained as a white solid (70.7 mg, 98%). Mp. 100.5 – 104.6 °C. This target product was purified by column chromatography on silica gel (PE/EA = 4:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06 – 7.93 (m, 4H), 7.54 – 7.43 (m, 6H), 4.99 (dd, J = 12.0, 6.2 Hz, 2H), 1.47 – 1.36 (m, 12H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 154.3, 141.0, 140.7, 132.54, 132.57, 129.2, 129.1, 128.3, 127.9, 79.0, 59.6, 28.4, 26.3. IR (cm^{-1}): 3234, 3006, 2976, 2923, 1716, 1519, 1475, 1446, 1390, 1365, 1317, 1265, 1249, 1230, 1176, 1134, 1118, 1093, 1080, 1020, 867, 831, 761, 725, 692, 597, 568, 555, 501. HRMS (APCI) m/z calcd for $C_{19}H_{25}N_2O_3S^+$ $[M + H]^+$ 361.1580, found 361.1574.



Chemical Formula: $C_{17}H_{19}NO_2S$
Exact Mass: 301.1136
Molecular Weight: 301.4040

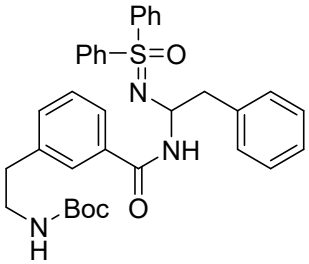
(3g) Diphenyl((tetrahydro-2H-pyran-2-yl)imino)- λ^6-sulfanone: Following the General Procedure A with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and oxane-2-carboxylic acid (78.1 mg, 0.6 mmol), **3g** was obtained as a yellow solid (24.7 mg, 41%). Mp. 99.6 – 104.1 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.07 – 7.98 (m, 4H), 7.51 – 7.42 (m, 6H), 4.59 (dd, J = 8.0, 3.2 Hz, 1H), 4.09 – 3.97 (m, 1H), 3.43 – 3.31 (m, 1H), 1.93 – 1.71 (m, 3H), 1.60 – 1.40 (m, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 141.1, 140.9, 132.5, 132.4, 129.0, 129.0, 128.9, 128.4, 84.2, 65.7, 35.6, 25.5, 22.0. IR (cm^{-1}): 3072, 2939, 2846, 1731, 1577, 1473, 1446, 1379, 1338, 1242, 1203, 1153, 1078, 1029, 995, 946, 929, 892, 854, 840, 804, 769, 756, 729, 692, 613, 561, 489, 441. HRMS (APCI) m/z calcd for $C_{17}H_{20}NO_2S^+$ $[M + H]^+$ 302.1209, found 302.1202.



Chemical Formula: $C_{24}H_{24}N_2O_4S$
Exact Mass: 436.1457
Molecular Weight: 436.5260

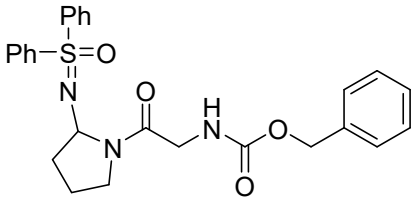
(3h) Benzyl 2-((oxodiphenyl-λ^6-sulfaneylidene)amino)morpholine-4-carboxylate: Following the General Procedure A with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and N-Cbz-2-morpholinecarboxylic acid (159.2 mg, 0.6 mmol), **3h** was obtained as light yellow oil (45.4 mg, 52%). This target product was purified by

column chromatography on silica gel (PE/EA = 2:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.02 (d, J = 7.2 Hz, 2H), 7.95 (d, J = 7.2 Hz, 2H), 7.56 – 7.39 (m, 6H), 7.36 – 7.29 (m, 5H), 5.18 – 5.07 (m, 2H), 4.55 (dd, J = 8.0, 2.8 Hz, 1H), 3.96 (d, J = 9.2 Hz, 2H), 3.71 (dd, J = 14.0, 7.2 Hz, 1H), 3.44 (t, J = 10.0 Hz, 1H), 3.18 (td, J = 13.2, 6.8 Hz, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.3, 140.8, 136.6, 132.8, 132.7, 129.2, 129.1, 128.6, 128.5, 128.3, 128.2, 128.0, 127.9, 67.2, 64.0, 43.1, 21.1, 18.5. IR (cm^{-1}): 3062, 3028, 2958, 2914, 2858, 1701, 1583, 1498, 1446, 1427, 1365, 1278, 1230, 1166, 1126, 1085, 1068, 1026, 997, 912, 848, 757, 729, 690, 605, 590, 568. HRMS (APCI) m/z calcd for $C_{24}H_{25}N_2O_4S^+$ $[M + H]^+$ 437.1530, found 437.1522.



Chemical Formula: $C_{34}H_{37}N_3O_4S$
Exact Mass: 583.2505
Molecular Weight: 583.7470

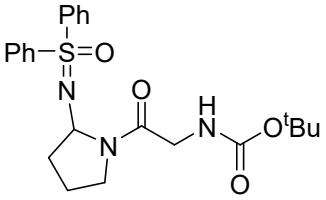
(3i) Tert-butyl (3-((1-((oxodiphenyl-λ^6-sulfaneylidene)amino)-2-phenylethyl)carbamoyl)phenethyl)carbamate: Following the General Procedure A with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and (2S)-2-[(2S)-2-[(tert-butoxycarbonyl)amino]-3-phenylpropanamido]-3-phenylpropanoic acid (247.5 mg, 0.6 mmol), **3i** was obtained as a light yellow oil (94.6 mg, 81%). This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 7.90 (dd, J = 12.4, 4.4 Hz, 2H), 7.52 – 7.37 (m, 4H), 7.35 – 7.17 (m, 14H), 6.34 (dd, J = 23.2, 7.2 Hz, 1H), 5.30 – 5.13 (m, 1H), 4.95 (s, 1H), 4.29 (s, 1H), 3.22 – 2.74 (m, 4H), 1.38 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 171.2, 169.3, 169.2, 155.2, 141.0, 140.8, 139.2, 139.1, 137.89, 137.86, 137.0, 136.8, 132.7, 132.7, 132.4, 132.4, 130.5, 130.4, 129.6, 129.4, 129.11, 129.08, 128.8, 128.7, 128.6, 128.5, 128.3, 128.22, 128.19, 126.8, 126.7, 126.54, 126.51, 79.9, 63.3, 62.9, 55.9, 55.3, 45.1, 45.0, 38.5, 38.1, 28.3. IR (cm^{-1}): 3423, 3313, 3062, 3028, 2976, 2927, 1668, 1494, 1446, 1390, 1367, 1245, 1166, 1139, 1082, 1024, 756, 729, 698, 601, 563, 518. HRMS (APCI) m/z calcd for $C_{34}H_{38}N_3O_4S^+$ $[M + H]^+$ 584.2578, found 584.2566.



Chemical Formula: $C_{26}H_{27}N_3O_4S$
Exact Mass: 477.1722
Molecular Weight: 477.5790

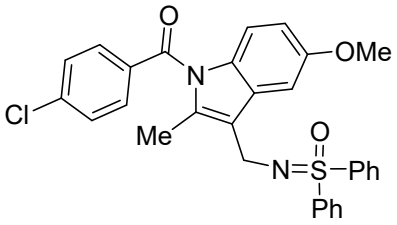
(3j) Benzyl (2-oxo-2-(2-((oxodiphenyl-λ^6-sulfaneylidene)amino)pyrrolidin-1-yl)ethyl)carbamate: Following the General Procedure A with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and benzyloxycarbonylglycylproline (183.8 mg, 0.6 mmol), **3j** was obtained as a colorless oil (92.7 mg, 97%). This target product was purified by column chromatography on silica gel (PE/EA = 1:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.18 – 8.11 (m, 1H), 8.07 – 7.88 (m, 3H), 7.56 – 7.42 (m, 6H), 7.39 – 7.27 (m, 5H), 5.91 – 5.34 (m, 2H), 5.19 – 5.06 (m, 2H), 4.01 – 3.69 (m, 2H), 3.66 – 3.19 (m, 2H), 2.51 – 2.08 (m, 2H), 2.01 – 1.75 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 167.2, 166.5, 156.2, 156.2, 141.5, 140.7, 140.0, 139.9,

136.6, 132.9, 132.8, 132.5, 132.4, 129.5, 129.3, 129.3, 129.2, 129.0, 128.5, 128.3, 128.2, 128.1, 128.02, 127.9, 68.8, 68.7, 66.8, 66.7, 45.8, 45.1, 43.7, 43.6, 36.9, 35.5, 23.3, 21.5. IR (cm^{-1}): 3406, 3062, 2950, 2879, 1718, 1656, 1500, 1446, 1346, 1236, 1166, 1134, 1091, 1055, 997, 908, 862, 813, 754, 727, 692, 555. HRMS (APCI) m/z calcd for $C_{26}H_{28}N_3O_4S^+$ $[M + H]^+$ 478.1795, found 478.1786.



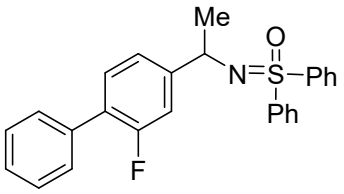
Chemical Formula: $C_{23}H_{29}N_3O_4S$
Exact Mass: 443.1879
Molecular Weight: 443.5620

(3k) Tert-butyl (2-oxo-2-(2-((oxodiphenyl-λ⁶-sulfaneylidene)amino)pyrrolidin-1-yl)ethyl)carbamate: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and tert-butyloxycarbonylglycyl-L-proline (163.4 mg, 0.6 mmol), **3k** was obtained as a colorless oil (72.7 mg, 82%). This target product was purified by column chromatography on silica gel (PE/EA = 1:1). ^1H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.15 (dt, J = 7.6, 3.2 Hz, 1H), 8.05 – 7.90 (m, 3H), 7.57 – 7.39 (m, 6H), 5.56 – 5.01 (m, 2H), 3.92 – 3.78 (m, 1H), 3.71 (dd, J = 17.2, 4.0 Hz, 1H), 3.62 – 3.49 (m, 1H), 3.46 – 3.19 (m, 1H), 2.48 – 2.08 (m, 2H), 2.00 – 1.74 (m, 2H), 1.44 (d, J = 1.5 Hz, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 167.7, 167.0, 155.8, 141.5, 140.9, 140.1, 139.9, 132.8, 132.7, 132.5, 132.4, 129.5, 129.4, 129.24, 129.18, 129.0, 128.3, 128.2, 127.9, 79.4, 79.2, 68.7, 45.7, 45.1, 43.2, 36.8, 35.5, 28.43, 28.39, 23.3, 21.4, 21.1. IR (cm^{-1}): 3415, 3334, 3064, 2977, 2246, 1710, 1654, 1581, 1502, 1446, 1365, 1238, 1166, 1136, 1093, 1068, 1024, 985, 916, 864, 759, 727, 692, 646, 568, 543. HRMS (APCI) m/z calcd for $C_{23}H_{30}N_3O_4S^+$ $[M + H]^+$ 444.1952, found 444.1943.



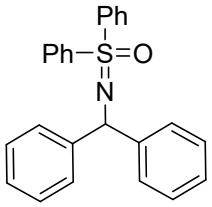
Chemical Formula: $C_{30}H_{25}ClN_2O_3S$
Exact Mass: 528.12744
Molecular Weight: 529.05100

(3l) (((1-(4-chlorobenzoyl)-5-methoxy-2-methyl-1H-indol-3-yl)methyl)imino)diphenyl-λ⁶-sulfanone: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and indomethacin (214.7 mg, 0.6 mmol), **3l** was obtained as a yellow oil (63.5 mg, 60%). This target product was purified by column chromatography on silica gel (PE/EA = 2:1). ^1H NMR (400 MHz, $CDCl_3$) δ 7.98 – 7.89 (m, 4H), 7.63 – 7.55 (m, 2H), 7.50 – 7.37 (m, 8H), 7.29 (d, J = 2.4 Hz, 1H), 6.83 (d, J = 9.2 Hz, 1H), 6.65 (dd, J = 8.8, 2.4 Hz, 1H), 4.38 (s, 2H), 3.86 (s, 3H), 2.20 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.3, 155.9, 141.1, 139.0, 134.7, 134.2, 132.3, 131.1, 131.0, 131.0, 129.0, 128.4, 119.1, 114.8, 111.6, 102.2, 55.8, 37.3, 13.2. IR (cm^{-1}): 2956, 2925, 2869, 2852, 1461, 1377, 1190, 1157, 1082, 968, 725. HRMS (APCI) m/z calcd for $C_{30}H_{26}ClN_2O_3S^+$ $[M + H]^+$ 529.1347, found 529.1338.



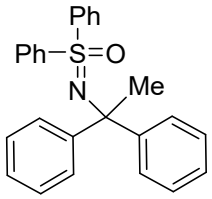
Chemical Formula: $C_{26}H_{22}FNOS$
Exact Mass: 415.14061
Molecular Weight: 415.52640

(3m) ((1-(2-fluoro-[1,1'-biphenyl]-4-yl)ethyl)imino)diphenyl-λ⁶-sulfanone: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and flurbiprofen (146.6 mg, 0.6 mmol), **3m** was obtained as a light yellow oil (45.7 mg, 55%). This target product was purified by column chromatography on silica gel (PE/EA = 5:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09 – 8.03 (m, 2H), 7.90 – 7.82 (m, 2H), 7.58 – 7.53 (m, 2H), 7.53 – 7.46 (m, 4H), 7.45 – 7.40 (m, 4H), 7.37 – 7.31 (m, 2H), 7.31 – 7.25 (m, 1H), 7.21 (dd, J = 8.0, 1.6 Hz, 1H), 4.43 (q, J = 6.8 Hz, 1H), 1.58 (d, J = 6.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) (101 MHz, $CDCl_3$) δ 160.9, 158.5, 149.3 (d, J = 7.0 Hz), 141.0 (d, J = 58.0 Hz), 136.0, 132.5, 130.4 (d, J = 3.9 Hz), 129.1, 129.0 (d, J = 2.9 Hz), 128.8, 128.4 (d, J = 5.2 Hz), 127.4, 122.2, 113.9 (d, J = 23.5 Hz), 53.5, 27.9. ^{19}F NMR (376 MHz, $CDCl_3$) δ -118.43. HRMS (APCI) m/z calcd for $C_{26}H_{23}FNOS^+$ $[M + H]^+$ 416.1479, found 416.1473.



Chemical Formula: $C_{25}H_{21}NOS$
Exact Mass: 383.13438
Molecular Weight: 383.50900

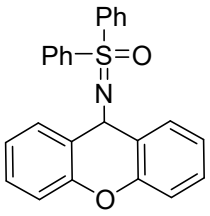
(3n) (Benzhydrylimino)diphenyl-λ⁶-sulfanone (CAS: 1584154-66-4)[5]: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and diphenylacetic acid (127.3 mg, 0.6 mmol), **3n** was obtained as a white solid (62.1 mg, 81%). Mp. 99.2 – 101.3 °C.This target product was purified by column chromatography on silica gel (PE/EA = 5:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.94 – 7.89 (m, 4H), 7.47 – 7.42 (m, 2H), 7.41 – 7.35 (m, 8H), 7.27 – 7.22 (m, 4H), 7.18 – 7.13 (m, 2H), 5.41 (s, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 145.9, 141.1, 132.4, 129.0, 128.8, 128.2, 127.5, 126.5, 61.8.



Chemical Formula: $C_{26}H_{23}NOS$
Exact Mass: 397.15004
Molecular Weight: 397.53600

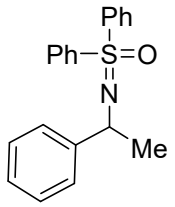
(3o) ((1,1-diphenylethyl)imino)diphenyl-λ⁶-sulfanone: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2,2-diphenylpropanoic acid (135.8 mg, 0.6 mmol), **3o** was obtained as a yellow solid (36.6 mg, 46%). Mp. 82.5 – 86.1 °C. This target product was purified by column chromatography on silica gel (PE/EA = 10:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.79 – 7.74 (m, 4H), 7.44 – 7.39 (m, 4H), 7.38 – 7.34 (m,

2H), 7.32 – 7.27 (m, 4H), 7.19 – 7.13 (m, 4H), 7.12 – 7.07 (m, 2H), 2.00 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 149.9, 144.0, 131.4, 128.6, 127.9, 127.5, 127.2, 125.9, 64.6, 31.7. IR (cm^{-1}): 3053, 2921, 2850, 1645, 1593, 1488, 1475, 1444, 1377, 1305, 1263, 1207, 1164, 1089, 1068, 1024, 999, 972, 854, 831, 771, 754, 729, 703, 688, 632, 607, 572, 561, 522. HRMS (APCI) m/z calcd for $C_{26}H_{22}NOS^-$ [M - H]$^-$ 396.1428, found 396.1434.



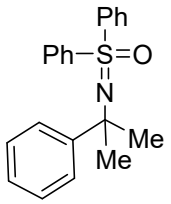
Chemical Formula: $C_{25}H_{19}NO_2S$
Exact Mass: 397.11365
Molecular Weight: 397.49200

(3p) ((9H-xanthen-9-yl)imino)diphenyl-λ^6-sulfanone: Following the General Procedure A with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and 9H-xanthene-9-carboxylic acid (135.7 mg, 0.6 mmol), **3p** was obtained as a yellow solid (69.2 mg, 87%). Mp. 102.7 – 107.4 °C. This target product was purified by column chromatography on silica gel (PE/EA = 5:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.98 – 7.91 (m, 4H), 7.52 (d, J = 7.6 Hz, 2H), 7.47 – 7.37 (m, 6H), 7.24 – 7.17 (m, 2H), 7.09 – 7.03 (m, 4H), 5.53 (s, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 152.1, 141.2, 132.5, 129.3, 129.1, 128.6, 128.1, 125.2, 123.1, 116.4, 50.1. IR (cm^{-1}): 3037, 2921, 2844, 1600, 1573, 1479, 1458, 1336, 1299, 1255, 1224, 1184, 1128, 1091, 1070, 1028, 999, 972, 894, 848, 754, 732, 692, 622, 599, 574, 553, 540, 513. HRMS (APCI) m/z calcd for $C_{25}H_{18}NO_2S^{\cdot-}$ [M + e]$^-$ 396.1064, found 396.1061.



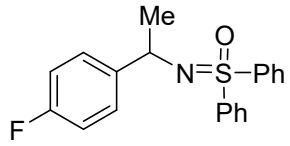
Chemical Formula: $C_{20}H_{19}NOS$
Exact Mass: 321.11873
Molecular Weight: 321.43800

(3q) Diphenyl((1-phenylethyl)imino)-λ^6-sulfanone (CAS: 2708150-07-4)[6]: Following the General Procedure A with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and 2-phenylpropionic acid (90.1 mg, 0.6 mmol), **3q** was obtained as a light yellow oil (28.9 mg, 45%). This target product was purified by column chromatography on silica gel (PE/EA = 5:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.08 – 8.02 (m, 2H), 7.86 – 7.79 (m, 2H), 7.52 – 7.45 (m, 3H), 7.45 – 7.40 (m, 3H), 7.39 – 7.34 (m, 2H), 7.33 – 7.27 (m, 2H), 7.23 – 7.17 (m, 1H), 4.40 (q, J = 6.8 Hz, 1H), 1.56 (d, J = 6.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 147.5, 141.5, 140.8, 132.4, 132.3, 129.0, 128.9, 128.5, 128.2, 126.4, 126.2, 54.2, 28.2.



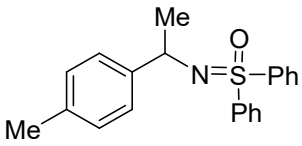
Chemical Formula: $C_{21}H_{21}NOS$
Exact Mass: 335.13438
Molecular Weight: 335.46500

(3r) Diphenyl((2-phenylpropan-2-yl)imino)-λ⁶-sulfanone (CAS: 2636650-78-5)[7]: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-phenylisobutyric acid (98.5 mg, 0.6 mmol), **3r** was obtained as a light yellow oil (26.8 mg, 40%). This target product was purified by column chromatography on silica gel (PE/EA = 10:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.98 – 7.88 (m, 4H), 7.66 – 7.60 (m, 2H), 7.43 – 7.34 (m, 6H), 7.31 – 7.23 (m, 2H), 7.19 – 7.14 (m, 1H), 1.62 (s, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 150.8, 144.8, 131.6, 128.8, 128.0, 127.9, 125.9, 125.4, 59.5, 33.2.



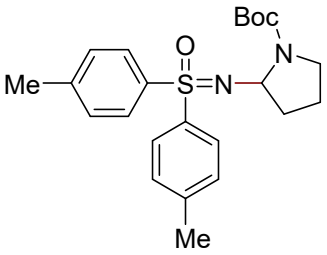
Chemical Formula: $C_{20}H_{18}FNOS$
Exact Mass: 339.10931
Molecular Weight: 339.42840

(3s) ((1-(4-fluorophenyl)ethyl)imino)diphenyl-λ⁶-sulfanone (CAS: 2708150-20-1)[6]: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(4-fluorophenyl)propanoic acid (100.9 mg, 0.6 mmol), **3s** was obtained as a white solid (41.4 mg, 61%). Mp. 97.5 – 101.1 °C. This target product was purified by column chromatography on silica gel (PE/EA = 10:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.05 – 8.00 (m, 2H), 7.85 – 7.80 (m, 2H), 7.53 – 7.43 (m, 4H), 7.42 – 7.33 (m, 4H), 7.01 – 6.93 (m, 2H), 4.38 (q, J = 6.8 Hz, 1H), 1.53 (d, J = 6.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 161.5 (d, J = 243.6 Hz), 153.3, 143.3 (d, J = 3.0 Hz), 141.1 (d, J = 54.7 Hz), 132.4 (d, J = 11.4 Hz), 129.1 (d, J = 2.6 Hz), 128.8, 128.4, 127.7 (d, J = 7.9 Hz), 114.8 (d, J = 21.1 Hz), 53.5, 28.2. ^{19}F NMR (376 MHz, $CDCl_3$) δ -117.20.



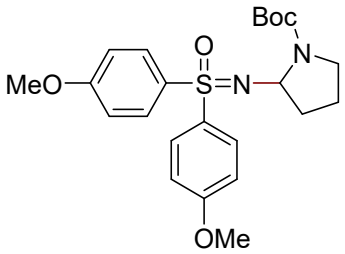
Chemical Formula: $C_{21}H_{21}NOS$
Exact Mass: 335.13438
Molecular Weight: 335.46500

(3t) Diphenyl((1-(p-tolyl)ethyl)imino)-λ⁶-sulfanone (CAS: 2708150-18-7)[6]: Following the General Procedure A with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(p-tolyl)propanoic acid (98.5 mg, 0.6 mmol), **3t** was obtained as a yellow oil (33.5 mg, 50%). This target product was purified by column chromatography on silica gel (PE/EA = 8:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.07 – 8.01 (m, 2H), 7.86 – 7.79 (m, 2H), 7.51 – 7.42 (m, 4H), 7.41 – 7.34 (m, 2H), 7.31 (d, J = 8.0 Hz, 2H), 7.11 (d, J = 7.6 Hz, 2H), 4.36 (q, J = 6.8 Hz, 1H), 2.33 (s, 3H), 1.54 (d, J = 6.8 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 144.6, 141.6, 140.9, 135.8, 132.3, 132.2, 129.0, 129.02, 128.97, 128.9, 128.5, 126.1, 54.0, 28.3, 21.1.



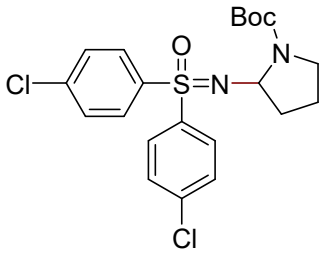
Chemical Formula: $C_{23}H_{30}N_2O_3S$
Exact Mass: 414.1977
Molecular Weight: 414.5640

(3u) Tert-butyl 2-((oxodi-p-tolyl-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with iminodi-p-tolyl-λ⁶-sulfanone (49.1 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3u** was obtained as a yellow oil (68.0 mg, 82%). This target product was purified by column chromatography on silica gel (PE/EA = 4:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.11 – 7.74 (m, 4H), 7.33 – 7.16 (m, 4H), 5.24 (d, J = 5.2 Hz, 1H), 3.50 (t, J = 9.2 Hz, 1H), 3.40 – 3.13 (m, 1H), 2.36 (d, J = 6.4 Hz, 6H), 2.06 (dd, J = 10.0, 6.4 Hz, 1H), 1.89 – 1.75 (m, 2H), 1.53 – 1.39 (m, 10H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.1, 143.2, 142.8, 140.8, 139.5, 129.7, 129.6, 128.1, 127.8, 79.4, 78.7, 69.0, 68.4, 45.9, 45.4, 36.7, 36.3, 32.7, 28.6, 23.1, 22.1, 21.41, 21.40. IR (cm^{-1}): 3060, 2974, 2929, 1919, 1695, 1595, 1479, 1454, 1392, 1365, 1242, 1168, 1136, 1093, 1016, 972, 910, 883, 813, 771, 705, 675, 626, 574, 536. HRMS (APCI) m/z calcd for $C_{23}H_{31}N_2O_3S^+$ $[M + H]^+$ 415.2050, found 415.2041.



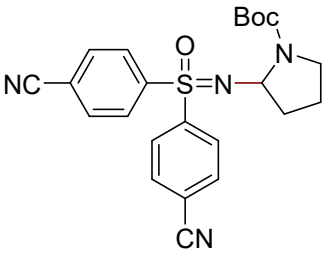
Chemical Formula: $C_{23}H_{30}N_2O_5S$
Exact Mass: 446.1875
Molecular Weight: 446.5620

(3v) Tert-butyl 2-((bis(4-methoxyphenyl)(oxo)-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with iminobis(4-methoxyphenyl)-λ⁶-sulfanone (55.5 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3v** was obtained as a yellow oil (64.3 mg, 72%). This target product was purified by column chromatography on silica gel (PE/EA = 1:2). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.18 – 7.76 (m, 4H), 7.00 – 6.83 (m, 4H), 5.50 – 5.14 (m, 1H), 3.87 – 3.72 (m, 6H), 3.55 – 3.17 (m, 2H), 2.35 – 2.18 (m, 1H), 2.10 – 1.99 (m, 1H), 1.92 – 1.73 (m, 2H), 1.51 – 1.43 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 162.5, 130.1, 129.8, 114.3, 114.1, 100.0, 97.8, 77.2, 65.6, 55.5, 28.6, 28.1. IR (cm^{-1}): 3271, 3076, 2974, 2839, 2052, 1901, 1780, 1691, 1593, 1494, 1458, 1390, 1365, 1305, 1253, 1166, 1124, 1026, 973, 910, 879, 833, 802, 773, 717, 678, 626, 545. HRMS (APCI) m/z calcd for $C_{23}H_{31}N_2O_5S^+$ $[M + H]^+$ 447.1948, found 447.1939.



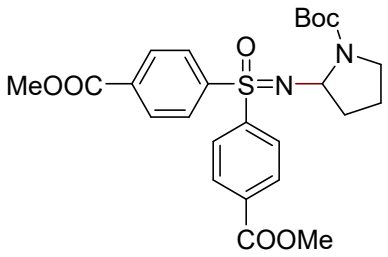
Chemical Formula: $C_{21}H_{24}Cl_2N_2O_3S$
Exact Mass: 454.0885
Molecular Weight: 455.3940

(3w) Tert-butyl 2-((bis(4-chlorophenyl)(oxo)-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with bis(4-chlorophenyl)(imino)-λ⁶-sulfanone (57.2 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3w** was obtained as a white solid (68.3 mg, 75%). Mp. 108.3 - 112.7 °C. This target product was purified by column chromatography on silica gel (PE/EA = 5:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.07 (d, J = 7.2 Hz, 1H), 7.99 – 7.81 (m, 3H), 7.49 – 7.36 (m, 4H), 5.52 – 5.16 (m, 1H), 3.47 (t, J = 9.2 Hz, 1H), 3.39 – 3.15 (m, 1H), 2.35 – 2.17 (m, 1H), 2.12 – 1.75 (m, 3H), 1.53 – 1.35 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.2, 141.7, 140.6, 139.6, 139.1, 130.8, 129.6, 129.5, 129.4, 79.0, 68.7, 68.2, 46.0, 45.3, 36.7, 36.2, 29.7, 28.5, 23.1, 22.1. IR (cm^{-1}): 3087, 2976, 2891, 1687, 1575, 1475, 1394, 1365, 1251, 1168, 1139, 1089, 1012, 908, 873, 835, 819, 759, 707, 636, 578, 507. HRMS (APCI) m/z calcd for $C_{21}H_{25}Cl_2N_2O_3S^+$ [M + H]$^+$ 455.0957, found 455.0948.



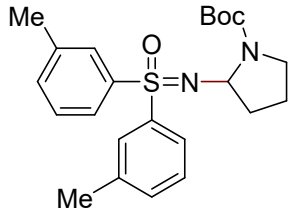
Chemical Formula: $C_{23}H_{24}N_4O_3S$
Exact Mass: 436.1569
Molecular Weight: 436.5300

(3x) Tert-butyl 2-((bis(4-cyanophenyl)(oxo)-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with 4,4'-sulfonimidoyldibenzonitrile (53.5 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3x** was obtained as a light yellow oil (26.2 mg, 30%). This target product was purified by column chromatography on silica gel (PE/EA = 5:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.24 (d, J = 8.0 Hz, 1H), 8.18 – 7.99 (m, 3H), 7.87 – 7.65 (m, 4H), 5.51 – 5.20 (m, 1H), 3.51 – 3.20 (m, 2H), 2.72 – 2.17 (m, 1H), 2.04 – 1.75 (m, 3H), 1.52 – 1.32 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 146.6, 133.2, 133.1, 132.9, 130.0, 129.0, 128.8, 117.1, 116.5, 81.8, 80.0, 79.4, 68.5, 45.9, 36.1, 33.5, 32.7, 28.53, 28.47, 28.41, 23.1, 22.7, 22.1. IR (cm^{-1}): 3284, 3093, 2977, 2889, 2233, 1693, 1479, 1454, 1394, 1365, 1284, 1247, 1164, 1136, 1089, 1041, 1016, 970, 910, 875, 846, 786, 773, 732, 648, 632, 588, 553, 505. HRMS (APCI) m/z calcd for $C_{23}H_{23}N_4O_3S^-$ [M - H]$^-$ 435.1496, found 435.1496.



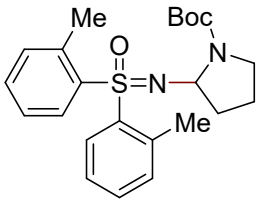
Chemical Formula: $C_{25}H_{30}N_2O_7S$
Exact Mass: 502.17737
Molecular Weight: 502.58200

(3y) Dimethyl 4,4'-((1-(tert-butoxycarbonyl)pyrrolidin-2-yl)sulfonimidoyl)dibenzoate: Following the General Procedure A with dimethyl 4,4'-sulfonimidoyldibenzoate (66.7 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3y** was obtained as a white solid (60.3 mg, 60%). Mp. 137.6 - 141.9 °C. This target product was purified by column chromatography on silica gel (PE/EA = 5:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.24 – 7.99 (m, 8H), 5.52 – 5.25 (m, 1H), 3.97 – 3.87 (m, 6H), 3.53 – 3.15 (m, 2H), 2.40 – 2.16 (m, 1H), 2.11 – 2.01 (m, 1H), 1.96 – 1.77 (m, 2H), 1.51 – 1.38 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 165.7, 165.5, 154.1, 146.8, 145.7, 144.7, 134.1, 133.7, 130.4, 130.4, 130.2, 129.4, 128.3, 128.1, 124.5, 79.7, 79.0, 68.6, 68.2, 60.9, 60.4, 52.7, 52.6, 45.9, 45.5, 36.6, 36.1, 29.7, 28.5, 23.1, 22.2. IR (cm^{-1}): 3427, 3296, 2974, 2952, 2927, 1728, 1689, 1595, 1571, 1475, 1438, 1392, 1365, 1278, 1245, 1166, 1137, 1107, 1014, 973, 908, 860, 819, 769, 738, 719, 696, 626, 594, 570, 557, 505. HRMS (APCI) m/z calcd for $C_{25}H_{30}N_2O_7S^{\cdot-}$ $[M + e]^{\cdot-}$502.1779, found 502.1779.



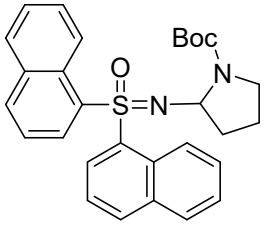
Chemical Formula: $C_{23}H_{30}N_2O_3S$
Exact Mass: 414.19771
Molecular Weight: 414.56400

(3z) Tert-butyl 2-((oxodi-m-tolyl-λ^6-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with iminodi-m-tolyl-**λ^6**-sulfanone (49.1 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3z** was obtained as a white solid (72.1 mg, 87%). Mp. 105.0 - 109.7 °C. This target product was purified by column chromatography on silica gel (PE/EA = 4:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.23 – 7.57 (m, 4H), 7.45 – 7.20 (m, 4H), 5.56 – 5.16 (m, 1H), 3.61 – 3.40 (m, 1H), 3.39 – 3.10 (m, 1H), 2.58 – 2.16 (m, 7H), 2.15 – 1.98 (m, 1H), 1.98 – 1.70 (m, 2H), 1.58 – 1.36 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.1, 143.3, 142.2, 139.3, 139.2, 133.3, 133.0, 129.0, 128.8, 128.5, 128.2, 125.3, 125.1, 79.3, 78.7, 69.0, 68.5, 45.9, 45.4, 36.7, 36.3, 28.5, 23.1, 22.2, 21.4, 21.4. IR (cm^{-1}): 3269, 3058, 2977, 2921, 1693, 1598, 1477, 1454, 1388, 1240, 1166, 1130, 1093, 1041, 999, 972, 912, 869, 784, 705, 690, 605, 580, 487. HRMS (APCI) m/z calcd for $C_{23}H_{31}N_2O_3S^+$ $[M + H]^+$ 415.2050, found 415.2041.



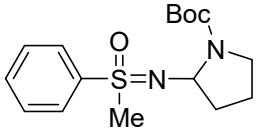
Chemical Formula: $C_{23}H_{30}N_2O_3S$
Exact Mass: 414.19771
Molecular Weight: 414.56400

(3za) Tert-butyl 2-((oxodi-o-tolyl-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with iminodi-o-tolyl-λ⁶-sulfanone (49.1 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3za** was obtained as a light yellow oil (71.3 mg, 86%). This target product was purified by column chromatography on silica gel (PE/EA = 5:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.56 – 8.13 (m, 2H), 7.50 – 7.29 (m, 4H), 7.23 – 7.08 (m, 2H), 5.59 – 5.21 (m, 1H), 3.55 – 3.42 (m, 1H), 3.41 – 3.07 (m, 1H), 2.40 – 2.23 (m, 7H), 2.03 – 1.71 (m, 3H), 1.52 – 1.29 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.1, 140.3, 137.7, 132.8, 132.8, 132.7, 132.4, 132.3, 129.5, 126.0, 125.9, 125.8, 79.4, 78.6, 68.4, 68.0, 45.7, 45.1, 36.4, 28.5, 22.7, 21.1, 20.4, 20.2, 20.1. IR (cm^{-1}): 3485, 3267, 3058, 2976, 2931, 1695, 1595, 1456, 1392, 1274, 1236, 1166, 1139, 1110, 1039, 970, 910, 881, 806, 761, 709, 694, 603, 584, 541, 503. HRMS (APCI) m/z calcd for $C_{23}H_{31}N_2O_3S^+$ [M + H]$^+$ 415.2050, found 415.2040.



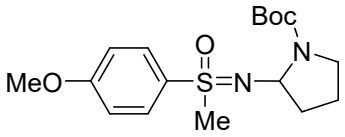
Chemical Formula: $C_{29}H_{30}N_2O_3S$
Exact Mass: 486.1977
Molecular Weight: 486.6300

(3zb) Tert-butyl 2-((di(naphthalen-1-yl)(oxo)-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with iminodi(naphthalen-1-yl)-λ⁶-sulfanone (63.5 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3zb** was obtained as a light yellow oil (77.9 mg, 80%). This target product was purified by column chromatography on silica gel (PE/EA = 4:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 9.13 – 8.72 (m, 1H), 8.71 – 8.36 (m, 3H), 8.07 – 7.91 (m, 2H), 7.89 – 7.76 (m, 2H), 7.70 – 7.34 (m, 6H), 5.64 – 5.25 (m, 1H), 3.60 – 3.12 (m, 2H), 2.40 – 2.11 (m, 1H), 2.00 – 1.96 (m, 3H), 1.52 – 1.24 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.2, 138.0, 134.5, 134.5, 134.0, 129.3, 128.9, 128.7, 127.9, 127.6, 126.6, 126.5, 125.0, 124.2, 78.9, 45.8, 28.5, 22.7, 21.1, 14.2. IR (cm^{-1}): 3452, 3057, 2974, 2925, 1691, 1595, 1506, 1477, 1454, 1392, 1365, 1240, 1164, 1145, 1110, 1028, 973, 906, 881, 827, 802, 769, 738, 684, 628, 594, 574, 530, 497. HRMS (APCI) m/z calcd for $C_{29}H_{31}N_2O_3S^+$ [M + H]$^+$ 487.2050, found 487.2040.



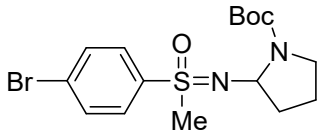
Chemical Formula: $C_{16}H_{24}N_2O_3S$
Exact Mass: 324.15076
Molecular Weight: 324.43900

(3zc) Tert-butyl 2-((methyl(oxo)(phenyl)-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with imino(methyl)(phenyl)-**λ⁶**-sulfanone (31.0 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3zc** was obtained as a yellow oil (59.0 mg, 91%), d.r.~1:1. This target product was purified by column chromatography on silica gel (PE/EA = 1:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.20 – 7.85 (m, 2H), 7.69 – 7.38 (m, 3H), 5.52 – 5.07 (m, 1H), 3.54 – 3.16 (m, 3H), 3.15 – 2.93 (m, 2H), 2.36 – 2.15 (m, 1H), 2.04 – 1.71 (m, 3H), 1.52 – 1.22 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.1 141.4, 140.1, 132.7, 132.6, 129.2, 129.0, 128.2, 128.0, 78.8, 68.5, 68.3, 47.1, 46.2, 45.8, 45.2, 43.2, 36.7, 36.1, 28.5, 28.4, 23.1, 22.1. IR (cm^{-1}): 3273, 3062, 2976, 2929, 1691, 1583, 1479, 1446, 1396, 1365, 1317, 1232, 1164, 1134, 981, 908, 879, 771, 740, 690, 572, 526. HRMS (APCI) m/z calcd for $C_{16}H_{25}N_2O_3S^+$ $[M + H]^+$ 325.1580, found 325.1572.



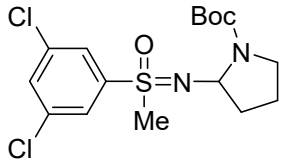
Chemical Formula: $C_{17}H_{26}N_2O_4S$
Exact Mass: 354.16133
Molecular Weight: 354.46500

(3zd) Tert-butyl 2-(((4-methoxyphenyl)(methyl)(oxo)-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with imino(4-methoxyphenyl)(methyl)-**λ⁶**-sulfanone (37.0 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3zd** was obtained as a white solid (42.5 mg, 60%), d.r.~1:1. Mp. 86.4 – 89.6 °C. This target product was purified by column chromatography on silica gel (PE/EA = 1:2). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.17 – 7.73 (m, 2H), 7.09 – 6.86 (m, 2H), 5.42 – 4.99 (m, 1H), 3.91 – 3.83 (m, 3H), 3.53 – 3.41 (m, 1H), 3.38 – 2.95 (m, 4H), 2.32 – 2.15 (m, 1H), 2.06 – 1.72 (m, 3H), 1.54 – 1.30 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 163.3, 163.2, 154.2, 131.3, 130.1, 129.9, 114.4, 114.4, 78.8, 68.6, 68.4, 55.7, 55.6, 46.6, 45.9, 36.4, 36.1, 28.6, 28.5, 23.1, 22.1. IR (cm^{-1}): 3448, 3273, 3074, 2976, 2840, 2565, 2395, 2246, 2054, 1903, 1693, 1595, 1496, 1456, 1392, 1365, 1309, 1253, 1166, 1132, 1022, 979, 910, 879, 835, 802, 771, 709, 624, 572, 518, 472. HRMS (APCI) m/z calcd for $C_{17}H_{27}N_2O_4S^+$ $[M + H]^+$ 355.1686, found 355.1678.



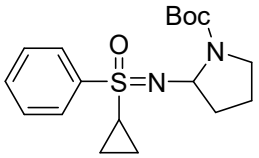
Chemical Formula: $C_{16}H_{23}BrN_2O_3S$
Exact Mass: 402.06128
Molecular Weight: 403.33500

(3ze) Tert-butyl 2-(((4-bromophenyl)(methyl)(oxo)-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with (4-bromophenyl)(imino)(methyl)-**λ⁶**-sulfanone (46.8 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3ze** was obtained as a white solid (67.0 mg, 83%), d.r.~1:1.2. Mp. 117.2 – 122.1 °C. This target product was purified by column chromatography on silica gel (PE/EA = 1:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.03 – 7.76 (m, 2H), 7.73. – 7.58 (m, 2H), 5.42 – 5.05 (m, 1H), 3.55 – 3.34 (m, 1H), 3.30 – 2.90 (m, 4H), 2.32 – 2.11 (m, 1H), 2.06 – 1.73 (m, 3H), 1.55 – 1.21 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.1, 140.6, 139.3, 132.4, 132.2, 130.7, 129.7, 128.0, 127.7, 79.0, 68.4, 68.3, 46.4, 45.9, 43.5, 36.1, 28.5, 28.4, 23.1, 23.0. IR (cm^{-1}): 3087, 2974, 2937, 2891, 1687, 1569, 1477, 1400, 1367, 1319, 1232, 1166, 1132, 1095, 1064, 1008, 981, 972, 908, 875, 850, 823, 769, 719, 576, 541, 499. HRMS (APCI) m/z calcd for $C_{16}H_{24}BrN_2O_3S^+$ $[M + H]^+$ 403.0685, found 403.0679.



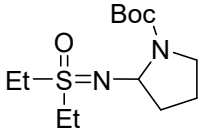
Chemical Formula: $C_{16}H_{22}Cl_2N_2O_3S$
Exact Mass: 392.07282
Molecular Weight: 393.32300

(3zf) Tert-butyl 2-(((3,5-dichlorophenyl)(methyl)(oxo)-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with (3,5-dichlorophenyl)(imino)(methyl)-λ⁶-sulfanone (44.8 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3zf** was obtained as a yellow solid (55.1 mg, 70%), d.r.~1:1.2. Mp. 91.5 – 95.3 °C. This target product was purified by column chromatography on silica gel (PE/EA = 4:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 7.99 – 7.74 (m, 2H), 7.65 – 7.49 (m, 1H), 5.52 – 5.07 (m, 1H), 3.71 – 2.99 (m, 5H), 2.38 – 2.07 (m, 1H), 2.02 – 1.72 (m, 3H), 1.56 – 1.26 (m, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.1, 146.8, 144.0, 136.2, 135.8, 133.1, 132.6, 127.4, 126.2, 81.8, 79.2, 68.0, 46.3, 46.0, 45.8.0, 36.0, 28.5, 28.3, 23.2, 22.7. IR (cm^{-1}): 3477, 3068, 2977, 2885, 1959, 1701, 1479, 1448, 1396, 1292, 1253, 1178, 1089, 1070, 1037, 999, 973, 929, 889, 852, 773, 736, 690, 597, 528, 464. HRMS (APCI) m/z calcd for $C_{16}H_{23}Cl_2N_2O_3S^+$ $[M + H]^+$ 393.0801, found 393.0794.



Chemical Formula: $C_{18}H_{26}N_2O_3S$
Exact Mass: 350.16641
Molecular Weight: 350.47700

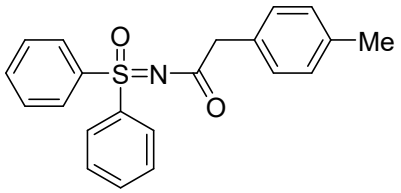
(3zg) Tert-butyl 2-((cyclopropyl(oxo)(phenyl)-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with cyclopropyl(imino)(phenyl)-λ⁶-sulfanone (36.3 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3zg** was obtained as a colorless oil (55.4 mg, 79%), d.r.~1:1.1. This target product was purified by column chromatography on silica gel (PE/EA = 2:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 8.13 – 7.83 (m, 2H), 7.62 – 7.42 (m, 3H), 5.66 – 5.13 (m, 1H), 3.59 – 3.09 (m, 2H), 2.65 – 2.10 (m, 2H), 2.04 – 1.75 (m, 3H), 1.56 – 1.17 (m, 11H), 1.12 – 0.97 (m, 1H), 0.90 – 0.67 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.1, 141.3, 134.0, 132.8, 132.4, 129.3, 129.1, 128.8, 128.4, 79.4, 78.8, 68.9, 68.5, 45.8, 45.3, 36.3, 34.3, 28.6, 28.4, 23.1, 22.1, 6.9, 6.2, 4.9, 4.6. IR (cm^{-1}): 3267, 3060, 2976, 2885, 1693, 1479, 1446, 1392, 1365, 1240, 1166, 1134, 1095, 1039, 970, 912, 885, 829, 759, 717, 690, 663, 559, 530. HRMS (APCI) m/z calcd for $C_{18}H_{27}N_2O_3S^+$ $[M + H]^+$ 351.1737, found 351.1729.



Chemical Formula: $C_{13}H_{26}N_2O_3S$
Exact Mass: 290.16641
Molecular Weight: 290.42200

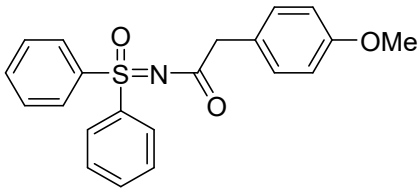
(3zh) Tert-butyl 2-((diethyl(oxo)-λ⁶-sulfaneylidene)amino)pyrrolidine-1-carboxylate: Following the General Procedure A with diethyl(imino)-λ⁶-sulfanone (24.2 mg, 0.2 mmol) and N-boc-D-proline (129.1 mg, 0.6 mmol), **3zh** was obtained as a colorless oil (37.8 mg, 65%). This target product was purified by column chromatography

on silica gel (PE/EA = 1:1). ^{1}H NMR (400 MHz, $CDCl_3$) (rotameric mixture) δ 5.46 – 5.27 (m, 1H), 3.57 – 3.38 (m, 1H), 3.37 – 2.81 (m, 5H), 2.21 – 2.00 (m, 1H), 1.99 – 1.73 (m, 3H), 1.61 – 1.34 (m, 11H), 1.29 (t, J = 7.4 Hz, 4H). ^{13}C NMR (101 MHz, $CDCl_3$) (rotameric mixture) δ 154.4, 81.8, 78.9, 66.8, 48.3, 46.0, 45.9, 45.7, 45.3, 36.6, 32.7, 28.5, 23.0, 22.7, 22.0, 8.8, 7.1, 6.5. IR (cm^{-1}): 2976, 2937, 2883, 1691, 1456, 1394, 1249, 1213, 1164, 1124,1089, 1039, 970, 914, 879, 854, 773, 711, 657, 565, 505, 451. HRMS (APCI) m/z calcd for $C_{13}H_{27}N_2O_3S^+$ $[M + H]^+$ 291.1737, found 291.1730.



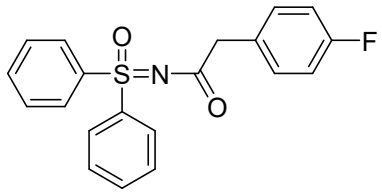
Chemical Formula: $C_{21}H_{19}NO_2S$
Exact Mass: 349.11365
Molecular Weight: 349.44800

(6a) N-(oxodiphenyl-λ^6-sulfaneylidene)-2-(p-tolyl)acetamide: Following the General Procedure B with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and 2-(p-tolyl)acetic acid (90.1 mg, 0.6 mmol), **6a** was obtained as a white solid (62.9 mg, 90%). Mp. 107.4 – 112.1 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.80 (d, J = 7.6 Hz, 4H), 7.56 – 7.47 (m, 2H), 7.46 – 7.39 (tm, 4H), 7.26 (d, J = 8.0 Hz, 2H), 7.15 (d, J = 8.0 Hz, 2H), 3.71 (s, 2H), 2.35 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 180.2, 139.7, 136.1, 133.2, 133.1, 129.5, 129.4, 129.1, 127.6, 46.8, 21.2. IR (cm^{-1}): 2916, 1658, 1517, 1475, 1448, 1400, 1338, 1230, 1217, 1176, 1089, 1012, 871, 837, 763, 738, 715, 686, 586, 561, 545, 513, 459. HRMS (APCI) m/z calcd for $C_{21}H_{20}NO_2S^+$ $[M + H]^+$ 350.1209, found 350.1202.



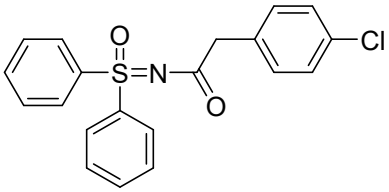
Chemical Formula: $C_{21}H_{19}NO_3S$
Exact Mass: 365.10856
Molecular Weight: 365.44700

(6b) 2-(4-methoxyphenyl)-N-(oxodiphenyl-λ^6-sulfaneylidene)acetamide: Following the General Procedure B with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and 2-(4-methoxyphenyl)acetic acid (99.7 mg, 0.6 mmol), **6b** was obtained as a light yellow solid (63.6 mg, 87%). Mp. 99.4 – 104.9 °C. This target product was purified by column chromatography on silica gel (PE/EA = 1:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 – 7.76 (m, 4H), 7.55 – 7.49 (m, 2H), 7.47 – 7.40 (m, 4H), 7.32 – 7.27 (m, 2H), 6.92 – 6.86 (m, 2H), 3.82 (s, 3H), 3.69 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 180.3, 158.5, 139.6, 133.2, 130.6, 129.4, 128.3, 127.5, 113.8, 55.3, 46.3. IR (cm^{-1}): 3070, 2910, 2835, 1909, 1658, 1610, 1581, 1512, 1463, 1448, 1402, 1338, 1301, 1234, 1168, 1089, 1033, 993, 869, 825, 771, 754, 736, 713, 686, 584, 545, 526, 439. HRMS (APCI) m/z calcd for $C_{21}H_{20}NO_3S^+$ $[M + H]^+$ 366.1158, found 366.1150.



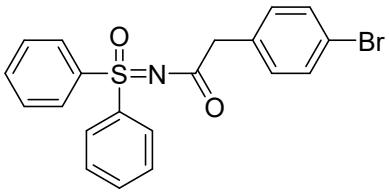
Chemical Formula: $C_{20}H_{16}FNO_2S$
Exact Mass: 353.08858
Molecular Weight: 353.41140

(6c) 2-(4-fluorophenyl)-N-(oxodiphenyl-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(4-fluorophenyl)acetic acid (92.5 mg, 0.6 mmol), **6c** was obtained as a white solid (65.7 mg, 93%). Mp. 119.3 - 123.7 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.85 – 7.78 (m, 4H), 7.57 – 7.50 (m, 2H), 7.49 – 7.41 (m, 4H), 7.34 – 7.28 (m, 2H), 7.05 – 6.98 (m, 2H), 3.72 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.8, 161.9 (d, J = 244.5 Hz), 139.5, 133.3, 131.9 (d, J = 3.3 Hz), 131.1 (d, J = 7.9 Hz), 129.5, 127.5, 115.1 (d, J = 21.3 Hz), 46.2. ^{19}F NMR (376 MHz, $CDCl_3$) δ -116.56. IR (cm^{-1}): 3076, 2914, 2000, 1897, 1809, 1656, 1600, 1508, 1475, 1448, 1409, 1340, 1226, 1182, 1089, 1010, 993, 968, 948, 921, 875, 835, 779, 757, 736, 715, 684, 588, 561, 545, 513, 497, 451. HRMS (APCI) m/z calcd for $C_{20}H_{17}FNO_2S^+$ $[M + H]^+$ 354.0958, found 354.0953.



Chemical Formula: $C_{20}H_{16}ClNO_2S$
Exact Mass: 369.05903
Molecular Weight: 369.86300

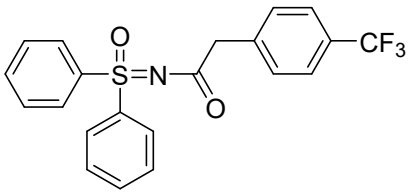
(6d) 2-(4-chlorophenyl)-N-(oxodiphenyl-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6d** was obtained as a white solid (69.5 mg, 94%). Mp. 109.5 - 114.5 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.88 – 7.72 (m, 4H), 7.57 – 7.51 (m, 2H), 7.50 – 7.42 (m, 4H), 7.33 – 7.27 (m, 4H), 3.72 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.4, 139.5, 134.6, 133.3, 132.5, 131.0, 129.5, 128.5, 127.5, 46.4. IR (cm^{-1}): 3068, 2956, 2918, 2850, 1992, 1897, 1739, 1656, 1596, 1492, 1473, 1448, 1402, 1377, 1336, 1226, 1186, 1089, 1012, 995, 973, 919, 873, 827, 810, 765, 740, 719, 698, 682, 588, 541, 497. HRMS (APCI) m/z calcd for $C_{20}H_{17}ClNO_2S^+$ $[M + H]^+$ 370.0663, found 370.0656.



Chemical Formula: $C_{20}H_{16}BrNO_2S$
Exact Mass: 413.00851
Molecular Weight: 414.31700

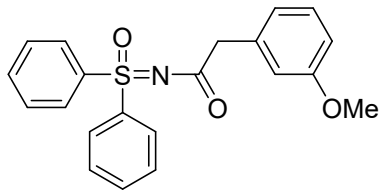
(6e) 2-(4-bromophenyl)-N-(oxodiphenyl-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(4-bromophenyl)acetic acid (129.0 mg, 0.6 mmol), **6e** was obtained as a white solid (76.2 mg, 92%). Mp. 137.1 - 142.5 °C. This target product was purified by column

chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 (d, J = 7.6 Hz, 4H), 7.57 – 7.51 (m, 2H), 7.49 – 7.42 (m, 6H), 7.23 (d, J = 8.4 Hz, 2H), 3.70 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.3, 139.4, 135.2, 133.3, 131.4, 131.4, 129.5, 127.5, 120.6, 46.4. IR (cm^{-1}): 3062, 2918, 2848, 1654, 1591, 1488, 1473, 1448, 1407, 1336, 1213, 1188, 1089, 1068, 1010, 995, 919, 871, 842, 827, 806, 765, 738, 717, 682, 642, 586, 547, 536, 489. HRMS (APCI) m/z calcd for $C_{20}H_{17}BrNO_2S^+$ $[M + H]^+$ 414.0158, found 414.0149.



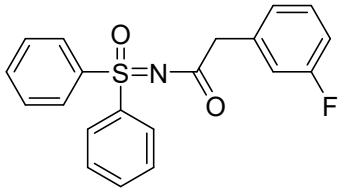
Chemical Formula: $C_{21}H_{16}F_3NO_2S$
Exact Mass: 403.08538
Molecular Weight: 403.41921

(6f) N-(oxodiphenyl-λ^6-sulfaneylidene)-2-(4-(trifluoromethyl)phenyl)acetamide: Following the General Procedure B with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and 2-(4-(trifluoromethyl)phenyl)acetic acid (122.5 mg, 0.6 mmol), **6f** was obtained as a white solid (77.5 mg, 96%). Mp. 99.3 - 102.6 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 – 7.78 (m, 4H), 7.59 (d, J = 8.0 Hz, 2H), 7.56 – 7.51 (m, 2H), 7.50 – 7.42 (m, 6H), 3.82 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 178.9, 140.2, 139.3, 133.4, 130.0, 129.5, 128.9 (q, J = 32.4 Hz), 127.4, 125.2 (q, J = 3.8 Hz), 124.3 (q, J = 272.9), 46.74. ^{19}F NMR (376 MHz, $CDCl_3$) δ -62.33. IR (cm^{-1}): 3072, 2923, 2000, 1915, 1811, 1656, 1583, 1475, 1450, 1419, 1409, 1326, 1232, 1176, 1116, 1089, 1064, 1016, 995, 925, 875, 852, 827, 763, 744, 723, 686, 638, 586, 547, 536, 497. HRMS (APCI) m/z calcd for $C_{21}H_{17}F_3NO_2S^+$ $[M + H]^+$ 404.0926, found 404.0919.



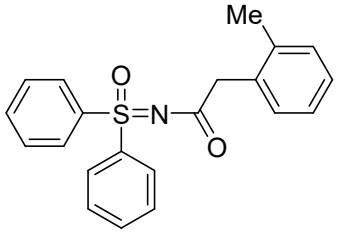
Chemical Formula: $C_{21}H_{19}NO_3S$
Exact Mass: 365.10856
Molecular Weight: 365.44700

(6g) 2-(3-methoxyphenyl)-N-(oxodiphenyl-λ^6-sulfaneylidene)acetamide: Following the General Procedure B with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and 2-(3-methoxyphenyl)acetic acid (99.7 mg, 0.6 mmol), **6g** was obtained as a yellow solid (68.0 mg, 93%). Mp. 77.6 – 81.6 °C. This target product was purified by column chromatography on silica gel (PE/EA = 2:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.79 (d, J = 7.6 Hz, 4H), 7.55 – 7.47 (m, 2H), 7.46 – 7.39 (m, 4H), 7.25 (d, J = 7.6 Hz, 1H), 6.97 (d, J = 7.6 Hz, 1H), 6.92 (s, 1H), 6.85 – 6.80 (m, 1H), 3.78 (s, 3H), 3.72 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.8, 159.7, 139.6, 137.6, 133.2, 129.4, 129.3, 127.5, 122.1, 114.9, 112.6, 55.2, 47.3. IR (cm^{-1}): 3060, 3006, 2920, 2837, 1647, 1606, 1583, 1487, 1450, 1298, 1265, 1230, 1184, 1163, 1145, 1126, 1097, 1045, 1018, 995, 902, 869, 827, 777, 761, 730, 717, 690, 646, 592, 568, 553, 534, 507, 466. HRMS (APCI) m/z calcd for $C_{21}H_{20}NO_3S^+$ $[M + H]^+$ 366.1158, found 366.1152.



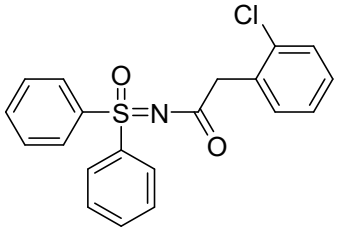
Chemical Formula: $C_{20}H_{16}FNO_2S$
Exact Mass: 353.08858
Molecular Weight: 353.41140

(6h) 2-(3-fluorophenyl)-N-(oxodiphenyl-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(3-fluorophenyl)acetic acid (92.5 mg, 0.6 mmol), **6h** was obtained as a light yellow oil (50.2 mg, 71%). This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (d, J = 8.0 Hz, 4H), 7.58 – 7.50 (m, 2H), 7.49 – 7.42 (m, 4H), 7.33 – 7.26 (m, 1H), 7.16 – 7.06 (m, 2H), 6.97 (td, J = 8.4, 2.4 Hz, 1H), 3.75 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.2, 162.8 (d, J = 245.3 Hz), 139.4, 138.5 (d, J = 7.9 Hz), 133.3, 129.7 (d, J = 8.3 Hz), 129.5, 127.5, 125.4 (d, J = 2.8 Hz), 116.6 (d, J = 21.3 Hz), 113.5 (d, J = 21.0 Hz), 46.74 (d, J = 1.8 Hz). ^{19}F NMR (376 MHz, $CDCl_3$) δ -113.76. IR (cm^{-1}): 3064, 2914, 2850, 1652, 1589, 1490, 1475, 1448, 1415, 1338, 1309, 1263, 1220, 1201, 1176, 1139, 1091, 1010, 997, 948, 906, 883, 852, 802, 769, 736, 686, 692, 557, 528, 459. HRMS (APCI) m/z calcd for $C_{20}H_{17}FNO_2S^+$ $[M + H]^+$ 354.0958, found 354.0953.



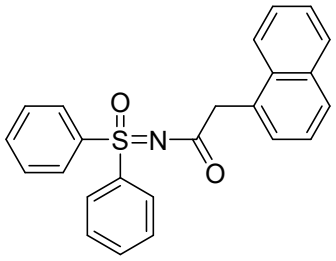
Chemical Formula: $C_{21}H_{19}NO_2S$
Exact Mass: 349.11365
Molecular Weight: 349.44800

(6i) N-(oxodiphenyl-λ⁶-sulfaneylidene)-2-(o-tolyl)acetamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(o-tolyl)acetic acid (90.1 mg, 0.6 mmol), **6i** was obtained as a yellow oil (60.8 mg, 87%). This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.77 (d, J = 7.6 Hz, 4H), 7.54 – 7.48 (m, 2H), 7.46 – 7.39 (m, 4H), 7.33 – 7.27 (m, 1H), 7.20 – 7.17 (m, 3H), 3.77 (s, 2H), 2.33 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.8, 139.7, 137.1, 135.0, 133.2, 130.6, 130.2, 129.4, 127.6, 126.9, 125.9, 44.9, 19.9. IR (cm^{-1}): 3388, 3064, 3022, 2921, 1645, 1581, 1494, 1475, 1448, 1377, 1326, 1257, 1218, 1157, 1093, 1012, 993, 941, 881, 835, 746, 719, 684, 640, 580, 551, 530, 466. HRMS (APCI) m/z calcd for $C_{21}H_{20}NO_2S^+$ $[M + H]^+$ 350.1209, found 350.1202.



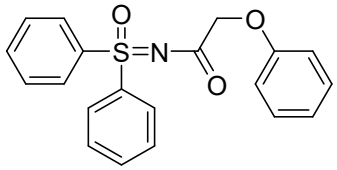
Chemical Formula: $C_{20}H_{16}ClNO_2S$
Exact Mass: 369.05903
Molecular Weight: 369.86300

(6j) 2-(2-chlorophenyl)-N-(oxodiphenyl-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(2-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6j** was obtained as a light yellow oil (48.1 mg, 65%). This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.86 (d, J = 7.6 Hz, 4H), 7.56 – 7.50 (m, 2H), 7.49 – 7.42 (m, 4H), 7.42 – 7.38 (m, 1H), 7.37 – 7.31 (m, 1H), 7.25 – 7.17 (m, 2H), 3.92 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 178.7, 139.6, 134.6, 134.6, 133.2, 132.0, 129.4, 129.3, 128.1, 127.6, 126.8, 44.5. IR (cm^{-1}): 3057, 2918, 2850, 1650, 1581, 1475, 1446, 1413, 1330, 1278, 1220, 1188, 1164, 1120, 1093, 1053, 989, 887, 864, 827, 756, 723, 684, 588, 549, 530. HRMS (APCI) m/z calcd for $C_{20}H_{17}ClNO_2S^+$ $[M + H]^+$ 370.0663, found 370.0656.



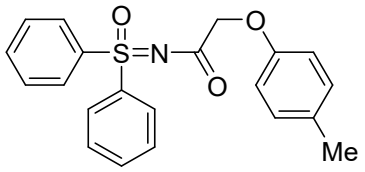
Chemical Formula: $C_{24}H_{19}NO_2S$
Exact Mass: 385.11365
Molecular Weight: 385.48100

(6k) 2-(naphthalen-1-yl)-N-(oxodiphenyl-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(naphthalen-1-yl)acetic acid (111.7 mg, 0.6 mmol), **6k** was obtained as a yellow solid (65.5 mg, 85%). Mp. 117.5 - 121.6 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.15 (d, J = 8.0 Hz, 1H), 7.93 – 7.87 (m, 1H), 7.82 (d, J = 7.6 Hz, 1H), 7.55 – 7.49 (m, 6H), 7.49 – 7.46 (m, 2H), 7.42 (t, J = 7.2 Hz, 2H), 7.27 (t, J = 8.0 Hz, 4H), 4.18 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.8, 139.4, 133.9, 133.2, 133.1, 132.5, 129.2, 128.6, 128.3, 127.5, 127.5, 126.1, 125.7, 125.6, 125.0, 45.1. IR (cm^{-1}): 3278, 2958, 2923, 2854, 1631, 1595, 1510, 1475, 1446, 1398, 1299, 1271, 1224, 1168, 1153, 1097, 1045, 1016, 997, 881, 840, 783, 765, 727, 707, 690, 640, 572, 551, 522, 511, 460, 447. HRMS (APCI) m/z calcd for $C_{24}H_{20}NO_2S^+$ $[M + H]^+$ 386.1209, found 386.1201.



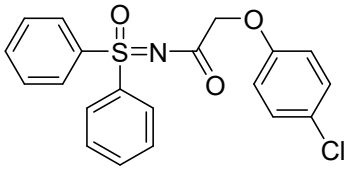
Chemical Formula: $C_{20}H_{17}NO_3S$
Exact Mass: 351.09291
Molecular Weight: 351.42000

(6l) N-(oxodiphenyl-λ⁶-sulfaneylidene)-2-phenoxyacetamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-phenoxyacetic acid (91.3 mg, 0.6 mmol), **6l** was obtained as a colorless oil (54.1 mg, 77%). This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 (d, J = 7.6 Hz, 4H), 7.55 (t, J = 7.2 Hz, 2H), 7.47 (t, J = 8.0 Hz, 4H), 7.30 (t, J = 8.8 Hz, 2H), 6.98 (t, J = 7.6 Hz, 3H), 4.72 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 177.2, 158.4, 139.2, 133.5, 129.5, 129.5, 127.7, 121.2, 114.8, 69.0. IR (cm^{-1}): 3066, 2921, 2850, 1674, 1645, 1598, 1494, 1448, 1369, 1284, 1228, 1195, 1174, 1093, 1018, 993, 865, 835, 786, 754, 736, 686, 601, 572, 551, 530, 514, 447. HRMS (APCI) m/z calcd for $C_{20}H_{18}NO_3S^+$ $[M + H]^+$ 352.1002, found 352.0994.



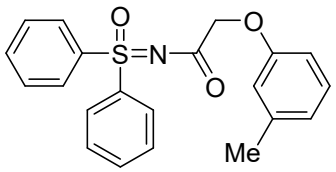
Chemical Formula: $C_{21}H_{19}NO_3S$
Exact Mass: 365.10856
Molecular Weight: 365.44700

(6m) N-(oxodiphenyl-λ⁶-sulfaneylidene)-2-(p-tolyloxy)acetamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(p-tolyloxy)acetic acid (99.7 mg, 0.6 mmol), **6m** was obtained as a white solid (52.6 mg, 72%). Mp. 68.5 – 72.9 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.90 – 7.81 (m, 4H), 7.59 – 7.52 (m, 2H), 7.50 – 7.43 (m, 4H), 7.09 (d, J = 8.0 Hz, 2H), 6.90 – 6.83 (m, 2H), 4.69 (s, 2H), 2.30 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 177.4, 156.3, 139.2, 133.4, 130.4, 129.9, 129.5, 127.7, 114.6, 69.3, 20.5. IR (cm^{-1}): 3062, 2921, 2852, 1676, 1647, 1610, 1583, 1510, 1475, 1448, 1369, 1299, 1222, 1176, 1093, 1022, 993, 865, 821, 757, 727, 686, 599, 551, 516, 449. HRMS (APCI) m/z calcd for $C_{21}H_{20}NO_3S^+$ $[M + H]^+$ 366.1158, found 366.1151.



Chemical Formula: $C_{20}H_{16}ClNO_3S$
Exact Mass: 385.05394
Molecular Weight: 385.86200

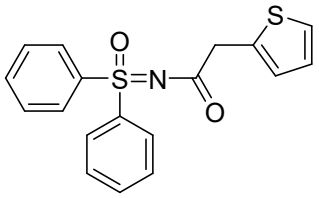
(6n) 2-(4-chlorophenoxy)-N-(oxodiphenyl-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(4-chlorophenoxy)acetic acid (112.0 mg, 0.6 mmol), **6n** was obtained as a light yellow solid (64.8 mg, 84%). Mp. 69.6 - 74.7 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.90 – 7.82 (m, 4H), 7.59 – 7.53 (m, 2H), 7.52 – 7.44 (m, 4H), 7.25 – 7.18 (m, 2H), 6.91 – 6.85 (m, 2H), 4.70 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 176.7, 157.0, 139.1, 133.6, 129.6, 129.3, 127.6, 126.0, 116.1, 69.3. IR (cm^{-1}): 3062, 2923, 2850, 1672, 1585, 1490, 1446, 1369, 1301, 1213, 1170, 1091, 1070, 993, 865, 823, 757, 736, 682, 642, 592, 545, 514, 457. HRMS (APCI) m/z calcd for $C_{20}H_{17}ClNO_3S^+$ $[M + H]^+$ 386.0612, found 386.0605.



Chemical Formula: $C_{21}H_{19}NO_3S$
Exact Mass: 365.10856
Molecular Weight: 365.44700

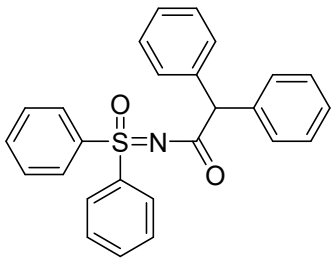
(6o) N-(oxodiphenyl-λ⁶-sulfaneylidene)-2-(m-tolyloxy)acetamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and 2-(m-tolyloxy)acetic acid (99.7 mg, 0.6 mmol), **6o** was obtained as a light yellow solid (43.9 mg, 60%). Mp. 73.9 – 78.2 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.87 – 7.79 (m, 4H), 7.59 – 7.52 (m,

2H), 7.50 – 7.42 (m, 4H), 7.21 – 7.15 (m, 1H), 6.85 – 6.75 (m, 3H), 4.71 (s, 2H), 2.33 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 177.4, 158.4, 139.5, 139.2, 133.4, 129.5, 129.2, 127.7, 122.0, 115.5, 111.9, 69.0, 21.6. IR (cm^{-1}): 3060, 2923, 2854, 1674, 1647, 1602, 1585,1488, 1448, 1373, 1292, 1226, 1157, 1093, 1018, 995, 910, 865, 838, 757, 727, 686, 607, 553, 516, 445. HRMS (APCI) m/z calcd for $C_{21}H_{20}NO_3S^+$ $[M + H]^+$ 366.1158, found 366.1151.



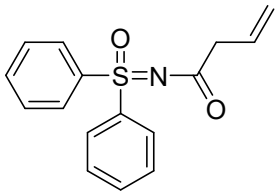
Chemical Formula: $C_{18}H_{15}NO_2S_2$
Exact Mass: 341.05442
Molecular Weight: 341.44300

(6p) N-(oxodiphenyl-λ^6-sulfaneylidene)-2-(thiophen-2-yl)acetamide: Following the General Procedure B with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and 2-(thiophen-2-yl)acetic acid (85.3 mg, 0.6 mmol), **6p** was obtained as a yellow solid (61.5 mg, 90%). Mp. 101.6 – 106.6 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.88 (d, J = 7.6 Hz, 4H), 7.56 – 7.50 (m, 2H), 7.49 – 7.43 (m, 4H), 7.23 (dd, J = 4.4, 1.6 Hz, 1H), 7.01 – 6.95 (m, 2H), 3.96 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 178.6, 139.5, 137.5, 133.3, 129.5, 127.6, 126.7, 126.6, 124.6, 41.2. IR (cm^{-1}): 3076, 2921, 2850, 1662, 1579, 1475, 1444, 1402, 1330, 1224, 1184, 1091, 1037, 991, 921, 865, 850, 831, 761, 738, 723, 702, 688, 611, 578, 547, 530, 462. HRMS (APCI) m/z calcd for $C_{18}H_{16}NO_2S_2^+$ $[M + H]^+$ 342.0617, found 342.0610.



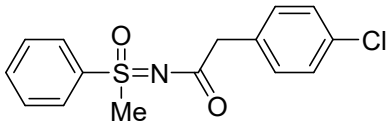
Chemical Formula: $C_{26}H_{21}NO_2S$
Exact Mass: 411.12930
Molecular Weight: 411.51900

(6q) N-(oxodiphenyl-λ^6-sulfaneylidene)-2,2-diphenylacetamide: Following the General Procedure B with iminodiphenyl-λ^6-sulfanone (43.5 mg, 0.2 mmol) and 2,2-diphenylacetic acid (127.3 mg, 0.6 mmol), **6q** was obtained as a white solid (74.9 mg, 91%). Mp. 158.7 – 162.5 °C. This target product was purified by column chromatography on silica gel (PE/EA = 4:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.77 – 7.72 (m, 4H), 7.54 – 7.47 (m, 2H), 7.44 – 7.35 (m, 8H), 7.33 – 7.27 (m, 4H), 7.26 – 7.23 (m, 2H), 5.21 (s, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 180.5, 140.1, 139.5, 133.2, 129.4, 129.2, 128.3, 127.6, 126.8, 61.6. IR (cm^{-1}): 3026, 2923, 2852, 1650, 1598, 1581, 1492, 1475, 1448, 1350, 1307, 1280, 1211, 1168, 1091, 1014, 993, 925, 883, 865, 837, 811, 759, 742, 721, 703, 688, 578, 555, 534, 497. HRMS (APCI) m/z calcd for $C_{26}H_{22}NO_2S^+$ $[M + H]^+$ 412.1365, found 412.1358.



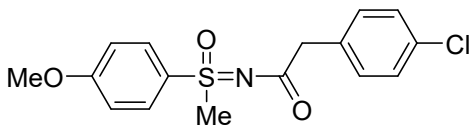
Chemical Formula: $C_{16}H_{15}NO_2S$
Exact Mass: 285.08235
Molecular Weight: 285.36100

(6r) N-(oxodiphenyl-λ⁶-sulfaneylidene)but-3-enamide: Following the General Procedure B with iminodiphenyl-λ⁶-sulfanone (43.5 mg, 0.2 mmol) and but-3-enoic acid (51.7 mg, 0.6 mmol), **6r** was obtained as a light yellow solid (23.4 mg, 41%). Mp. 109.8 – 113.5 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.00 – 7.93 (m, 4H), 7.59 – 7.48 (m, 6H), 6.15 – 6.02 (m, 1H), 5.22 – 5.11 (m, 2H), 3.26 (dt, J = 6.8, 1.2 Hz, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 180.1, 139.7, 133.2, 132.3, 129.5, 127.6, 117.5, 44.8. IR (cm^{-1}): 2958, 2921, 2850, 1739, 1654, 1581, 1473, 1448, 1421, 1377, 1282, 1257, 1218, 1190, 1097, 1016, 995, 910, 833, 759, 721, 688, 644, 588, 551, 532, 472. HRMS (APCI) m/z calcd for $C_{16}H_{16}NO_2S^+$ $[M + H]^+$ 286.0896, found 286.0890.



Chemical Formula: $C_{15}H_{14}ClNO_2S$
Exact Mass: 307.04338
Molecular Weight: 307.79200

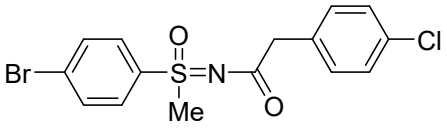
(6s) 2-(4-chlorophenyl)-N-(methyl(oxo)(phenyl)-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with imino(methyl)(phenyl)-λ⁶-sulfanone (31.0 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6s** was obtained as a light yellow solid (54.8 mg, 89%). Mp. 89.4 – 94.3 °C. This target product was purified by column chromatography on silica gel (PE/EA = 2:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.87 – 7.82 (m, 2H), 7.65 (t, J = 7.6 Hz, 1H), 7.58 – 7.52 (m, 2H), 7.30 – 7.22 (m, 4H), 3.66 (s, 2H), 3.30 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.9, 138.5, 134.4, 133.9, 132.5, 130.9, 129.6, 128.4, 127.0, 45.9, 44.1. IR (cm^{-1}): 3273, 3031, 2927, 2850, 1905, 1641, 1579, 1537, 1492, 1473, 1444, 1409, 1336, 1217, 1186, 1091, 1001, 981, 962, 871, 825, 783, 748, 686, 659, 588, 513, 489, 422. HRMS (APCI) m/z calcd for $C_{15}H_{15}ClNO_2S^+$ $[M + H]^+$ 308.0506, found 358.0500.



Chemical Formula: $C_{16}H_{16}ClNO_3S$
Exact Mass: 337.05394
Molecular Weight: 337.81800

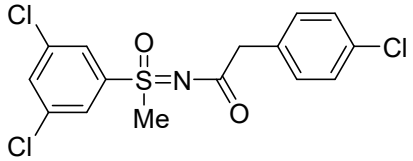
(6t) 2-(4-chlorophenyl)-N-((4-methoxyphenyl)(methyl)(oxo)-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with imino(4-methoxyphenyl)(methyl)-λ⁶-sulfanone (37.0 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6t** was obtained as a white solid (62.2 mg, 92%). Mp. 100.5 – 103.5 °C. This target product was purified by column chromatography on silica gel (PE/EA = 1:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.79 – 7.74 (m, 2H), 7.29 – 7.23 (m, 4H), 7.02 – 6.98 (m, 2H), 3.87 (s, 3H), 3.65 (s, 2H), 3.29 (s,

3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.8, 163.9, 134.5, 132.4, 130.9, 129.5, 129.2, 128.4, 114.9, 55.8, 46.0, 44.5. IR (cm^{-1}): 3020, 2918, 2850, 1739, 1633, 1589, 1494, 1467, 1433, 1402, 1323, 1263, 1238, 1209, 1174, 1145, 1095, 1020, 995, 972, 867, 837, 804, 783, 750, 621, 594, 518, 493, 445. HRMS (APCI) m/z calcd for $C_{16}H_{17}ClNO_3S^+$ [M + H]$^+$ 338.0612, found 338.0606.



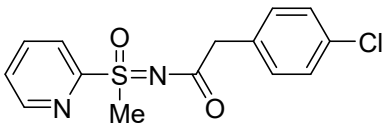
Chemical Formula: $C_{15}H_{13}BrClNO_2S$
Exact Mass: 384.95389
Molecular Weight: 386.68800

(6u) N-((4-bromophenyl)(methyl)(oxo)-λ^6-sulfaneylidene)-2-(4-chlorophenyl)acetamide: Following the General Procedure B with (4-bromophenyl)(imino)(methyl)-λ^6-sulfanone (46.8 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6u** was obtained as a white solid (65.7 mg, 85%). Mp. 139.5 - 144.6 °C. This target product was purified by column chromatography on silica gel (PE/EA = 2:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.68 (s, 4H), 7.30 – 7.20 (m, 4H), 3.64 (s, 2H), 3.27 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.8, 137.6, 134.2, 133.0, 132.6, 130.9, 129.3, 128.6, 128.5, 45.9, 44.1. IR (cm^{-1}): 3031, 2931, 2850, 1909, 1635, 1595, 1568, 1492, 1471, 1415, 1384, 1330, 1217, 1180, 1085, 1066, 1014, 1001, 970, 875, 823, 810, 783, 740, 721, 680, 657, 597, 526, 509, 491, 420. HRMS (APCI) m/z calcd for $C_{15}H_{14}BrClNO_2S^+$ [M + H]$^+$ 385.9611, found 385.9604.



Chemical Formula: $C_{15}H_{12}Cl_3NO_2S$
Exact Mass: 374.96543
Molecular Weight: 376.67600

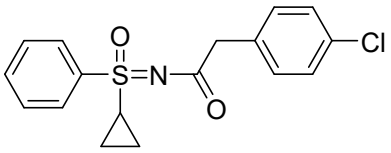
(6v) 2-(4-chlorophenyl)-N-((3,5-dichlorophenyl)(methyl)(oxo)-λ^6-sulfaneylidene)acetamide: Following the General Procedure B with (3,5-dichlorophenyl)(imino)(methyl)-λ^6-sulfanone (44.8 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6v** was obtained as a white solid (58.8 mg, 78%). Mp. 156.8 – 160.3 °C. This target product was purified by column chromatography on silica gel (PE/EA = 5:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.72 – 7.53 (m, 3H), 7.37 – 7.17 (m, 4H), 3.70 – 3.59 (m, 2H), 3.26 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.8, 141.6, 136.7, 134.0, 133.9, 132.8, 130.8, 128.6, 125.5, 45.9, 44.0. IR (cm^{-1}): 3064, 2918, 2850, 1649, 1569, 1492, 1413, 1332, 1224, 1186, 1174, 1141, 1085, 1010, 983, 972, 914, 875, 831, 802, 757, 732, 663, 588, 513, 493. HRMS (APCI) m/z calcd for $C_{15}H_{13}Cl_3NO_2S^+$ [M + H]$^+$ 375.9727, found 375.9720.



Chemical Formula: $C_{14}H_{13}ClN_2O_2S$
Exact Mass: 308.03863
Molecular Weight: 308.78000

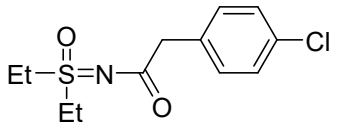
(6w) 2-(4-chlorophenyl)-N-(methyl(oxo)(pyridin-2-yl)-λ^6-sulfaneylidene)acetamide: Following the General Procedure B with imino(methyl)(pyridin-2-yl)-λ^6-sulfanone (31.2 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6w** was obtained as a light yellow oil (55.0 mg, 89%). This target product was purified by

column chromatography on silica gel (PE/EA/Et_3N = 1:1:0.5). ^1H NMR (400 MHz, $CDCl_3$) δ 8.71 – 8.65 (m, 1H), 8.26 – 8.13 (m, 1H), 7.96 (td, J = 8.0, 2.0 Hz, 1H), 7.59 – 7.49 (m, 1H), 7.26 – 7.16 (m, 4H), 3.70 – 3.57 (m, 2H), 3.41 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.8, 156.7, 149.9, 138.3, 134.1, 132.4, 130.9, 128.4, 127.4, 123.4, 45.2, 39.6. IR (cm^{-1}): 3028, 2923, 2850, 1641, 1579, 1492, 1452, 1425, 1323, 1296, 1267, 1222, 1190, 1139, 1091, 1014, 979, 875, 810, 788, 757, 686, 657, 590, 501. HRMS (APCI) m/z calcd for $C_{14}H_{14}ClN_2O_2S^+$ $[M + H]^+$ 309.0459, found 309.0453.



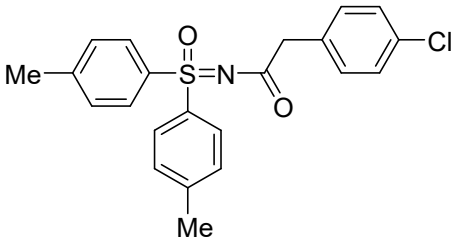
Chemical Formula: $C_{17}H_{16}ClNO_2S$
Exact Mass: 333.05903
Molecular Weight: 333.83000

(6x) 2-(4-chlorophenyl)-N-(cyclopropyl(oxo)(phenyl)-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with cyclopropyl(imino)(phenyl)-λ⁶-sulfanone (36.3 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6x** was obtained as a white solid (58.8 mg, 88%). Mp. 108.5 – 113.9 °C. This target product was purified by column chromatography on silica gel (PE/EA = 2:1). ^1H NMR (400 MHz, $CDCl_3$) δ 7.76 – 7.68 (m, 2H), 7.63 – 7.56 (m, 1H), 7.53 – 7.46 (m, 2H), 7.29 – 7.19 (m, 4H), 3.69 – 3.55 (m, 2H), 2.64 – 2.53 (m, 1H), 1.55 – 1.44 (m, 1H), 1.29 – 1.11 (m, 2H), 1.01 – 0.90 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.2, 138.8, 134.6, 133.4, 132.4, 130.9, 129.5, 128.4, 127.1, 46.0, 33.1, 6.8, 5.2. IR (cm^{-1}): 3041, 2923, 2854, 1745, 1641, 1598, 1492, 1444, 1411, 1342, 1240, 1217, 1193, 1168, 1089, 1072, 1035, 999, 904, 875, 838, 810, 763, 746, 715, 696, 594, 543, 534, 491, 414. HRMS (APCI) m/z calcd for $C_{17}H_{17}ClNO_2S^+$ $[M + H]^+$ 334.0663, found 334.0656.



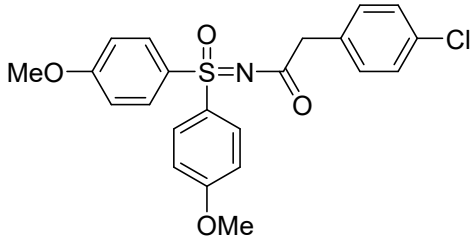
Chemical Formula: $C_{12}H_{16}ClNO_2S$
Exact Mass: 273.05903
Molecular Weight: 273.77500

(6y) 2-(4-chlorophenyl)-N-(diethyl(oxo)-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with diethyl(imino)-λ⁶-sulfanone (24.2 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6y** was obtained as a light yellow oil (39.4 mg, 72%). This target product was purified by column chromatography on silica gel (PE/EA/Et_3N = 1:1:0.5). ^1H NMR (400 MHz, $CDCl_3$) δ 7.29 – 7.23 (m, 4H), 3.61 (s, 2H), 3.48 – 7.37 (m, 2H), 3.35 – 3.24 (m, 2H), 1.33 (t, J = 7.6 Hz, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.7, 134.6, 132.5, 130.8, 128.4, 45.8, 45.2, 6.1. IR (cm^{-1}): 2921, 2850, 1637, 1595, 1494, 1461, 1409, 1332, 1230, 1186, 1078, 1037, 1014, 991, 877, 815, 786, 744, 711, 676, 640, 584, 505, 447. HRMS (APCI) m/z calcd for $C_{12}H_{17}ClNO_2S^+$ $[M + H]^+$ 274.0663, found 274.0659.



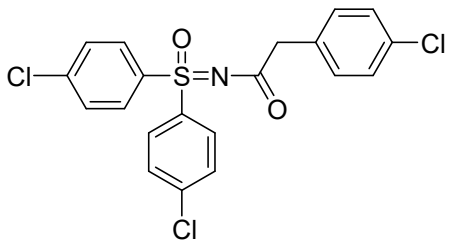
Chemical Formula: $C_{22}H_{20}ClNO_2S$
Exact Mass: 397.09033
Molecular Weight: 397.91700

(6z) 2-(4-chlorophenyl)-N-(oxodi-p-tolyl-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with iminodi-p-tolyl-λ⁶-sulfanone (49.1 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6z** was obtained as a white solid (74.8 mg, 94%). Mp. 123.3 – 128.2 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.59 (d, J = 8.4 Hz, 4H), 7.21 (s, 4H), 7.16 (d, J = 8.0 Hz, 4H), 3.62 (s, 2H), 2.28 (s, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.4, 144.2, 136.7, 134.8, 132.4, 131.0, 130.1, 128.4, 127.4, 46.4, 21.5. IR (cm^{-1}): 3062, 2920, 2850, 1905, 1649, 1591, 1490, 1448, 1407, 1379, 1328, 1263, 1224, 1182, 1128, 1093, 1014, 983, 879, 838, 806, 771, 750, 703, 675, 657, 619, 588, 522, 497, 457, 406. HRMS (APCI) m/z calcd for $C_{22}H_{21}ClNO_2S^+$ $[M + H]^+$ 398.0976, found 398.0969.



Chemical Formula: $C_{22}H_{20}ClNO_4S$
Exact Mass: 429.08016
Molecular Weight: 429.91500

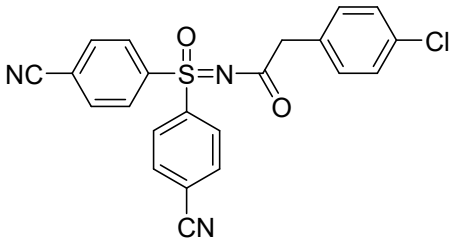
(6za) N-(bis(4-methoxyphenyl)(oxo)-λ⁶-sulfaneylidene)-2-(4-chlorophenyl)acetamide: Following the General Procedure B with iminobis(4-methoxyphenyl)-λ⁶-sulfanone (55.5 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6za** was obtained as a light yellow oil (78.2 mg, 91%). This target product was purified by column chromatography on silica gel (PE/EA = 1:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62 (d, J = 9.2 Hz, 4H), 7.20 (s, 4H), 6.82 (d, J = 8.8 Hz, 4H), 3.73 (s, 6H), 3.61 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.3, 163.3, 134.9, 132.4, 131.1, 131.0, 129.4, 128.4, 114.7, 55.7, 46.5. IR (cm^{-1}): 3068, 2939, 2840, 1899, 1645, 1591, 1492, 1460, 1440, 1413, 1311, 1253, 1217, 1172, 1093, 1018, 997, 875, 831, 804, 729, 686, 661, 624, 588, 534, 478. HRMS (APCI) m/z calcd for $C_{22}H_{21}ClNO_4S^+$ $[M + H]^+$ 430.0874, found 430.0867.



Chemical Formula: $C_{20}H_{14}Cl_3NO_2S$
Exact Mass: 436.98108
Molecular Weight: 438.74700

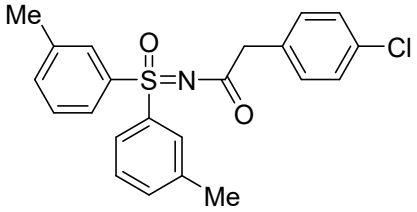
(6zb) N-(bis(4-chlorophenyl)(oxo)-λ⁶-sulfaneylidene)-2-(4-chlorophenyl)acetamide: Following the General Procedure B with bis(4-chlorophenyl)(imino)-λ⁶-sulfanone (57.2 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid

(102.4 mg, 0.6 mmol), **6zb** was obtained as a light yellow solid (80.7 mg, 92%). Mp. 115.2 – 119.8 °C. This target product was purified by column chromatography on silica gel (PE/EA = 5:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.63 (d, J = 8.4 Hz, 4H), 7.36 (d, J = 8.8 Hz, 4H), 7.21 (q, J = 8.4 Hz, 4H), 3.63 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.3, 140.4, 137.6, 134.3, 132.7, 130.9, 129.9, 128.9, 128.6, 46.3. IR (cm^{-1}): 3084, 2923, 2850, 1905, 1641, 1573, 1490, 1473, 1394, 1332, 1292, 1267, 1228, 1163, 1145, 1083, 999, 879, 848, 825, 804, 765, 740, 703, 669, 609, 599, 553, 538, 489, 435. HRMS (APCI) m/z calcd for $C_{20}H_{15}Cl_3NO_2S^+$ $[M + H]^+$ 437.9883, found 437.9875.



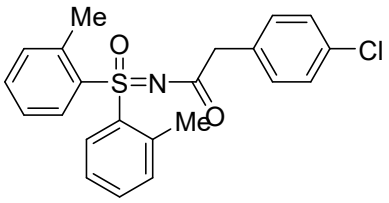
Chemical Formula: $C_{22}H_{14}ClN_3O_2S$
Exact Mass: 419.04953
Molecular Weight: 419.88300

(6zc) N-(bis(4-cyanophenyl)(oxo)-λ^6-sulfaneylidene)-2-(4-chlorophenyl)acetamide: Following the General Procedure B with 4,4'-sulfonimidoyldibenzonitrile (53.5 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6zc** was obtained as a light yellow solid (37.8 mg, 45%). Mp. 165.1 – 169.5 °C. This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.93 – 7.88 (m, 4H), 7.81 – 7.76 (m, 4H), 7.36 – 7.31 (m, 2H), 7.29 – 7.24 (m, 2H), 3.73 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.3, 142.7, 133.8, 133.4, 133.1, 130.9, 128.7, 128.4, 117.8, 116.7, 46.2. IR (cm^{-1}): 3091, 2921, 2850, 2233, 1647, 1490, 1467, 1398, 1334, 1294, 1230, 1159, 1089, 1004, 877, 831, 808, 746, 673, 621, 547, 495. HRMS (APCI) m/z calcd for $C_{22}H_{15}ClN_3O_2S^+$ $[M + H]^+$ 420.0568, found 420.0559.



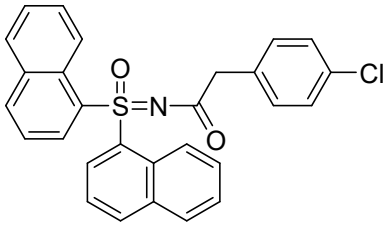
Chemical Formula: $C_{22}H_{20}ClNO_2S$
Exact Mass: 397.09033
Molecular Weight: 397.91700

(6zd) 2-(4-chlorophenyl)-N-(oxodi-m-tolyl-λ^6-sulfaneylidene)acetamide: Following the General Procedure B with iminodi-m-tolyl-λ^6-sulfanone (49.1 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6zd** was obtained as a light yellow oil (70.0 mg, 88%). This target product was purified by column chromatography on silica gel (PE/EA = 4:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62 – 7.54 (m, 4H), 7.34 – 7.28 (m, 8H), 3.71 (s, 2H), 2.34 (s, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.4, 139.8, 139.3, 134.9, 134.1, 132.5, 131.1, 129.3, 128.4, 127.7, 124.6, 46.4, 21.4. IR (cm^{-1}): 3280, 3062, 2923, 2858, 1905, 1650, 1598, 1490, 1407, 1379, 1326, 1230, 1164, 1091, 1018, 993, 871, 819, 788, 734, 703, 688, 661, 597, 570, 553, 509, 482, 433. HRMS (APCI) m/z calcd for $C_{22}H_{21}ClNO_2S^+$ $[M + H]^+$ 398.0976, found 398.0970.



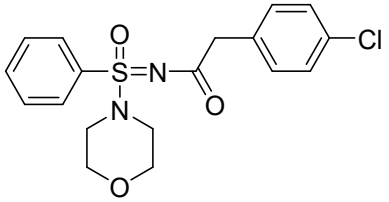
Chemical Formula: $C_{22}H_{20}ClNO_2S$
Exact Mass: 397.09033
Molecular Weight: 397.91700

(6ze) 2-(4-chlorophenyl)-N-(oxodi-o-tolyl-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with iminodi-o-tolyl-λ⁶-sulfanone (49.1 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6ze** was obtained as a light yellow solid (64.5 mg, 81%). Mp. 113.1 – 118.4 °C. This target product was purified by column chromatography on silica gel (PE/EA = 4:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.11 (dd, J = 8.0, 1.2 Hz, 2H), 7.41 – 7.35 (m, 2H), 7.27 (t, J = 7.2 Hz, 2H), 7.20 – 7.14 (m, 4H), 7.09 (d, J = 7.6 Hz, 2H), 3.61 (s, 2H), 2.08 (s, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 178.3, 138.1, 136.3, 134.8, 133.6, 133.1, 132.4, 131.0, 130.4, 128.4, 126.2, 46.5, 19.9. IR (cm^{-1}): 3307, 2933, 2850, 2096, 1974, 1859, 1747, 1649, 1564, 1490, 1456, 1407, 1384, 1319, 1294, 1265, 1209, 1139, 1095, 1062, 1008, 858, 837, 808, 769, 705, 603, 576, 555, 532, 507, 484, 466. HRMS (APCI) m/z calcd for $C_{22}H_{21}ClNO_2S^+$ $[M + H]^+$ 398.0976, found 398.0968.



Chemical Formula: $C_{28}H_{20}ClNO_2S$
Exact Mass: 469.09033
Molecular Weight: 469.98300

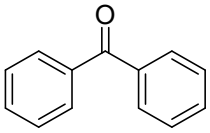
(6zf) 2-(4-chlorophenyl)-N-(di(naphthalen-1-yl)(oxo)-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with iminodi(naphthalen-1-yl)-λ⁶-sulfanone (63.5 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid (102.4 mg, 0.6 mmol), **6zf** was obtained as a colorless oil (61.1 mg, 65%). This target product was purified by column chromatography on silica gel (PE/EA = 3:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.54 (dd, J = 7.6, 1.2 Hz, 2H), 8.37 – 8.31 (m, 2H), 8.04 (d, J = 8.4 Hz, 2H), 7.83 (d, J = 8.0 Hz, 2H), 7.58 (t, J = 8.0 Hz, 2H), 7.48 – 7.42 (m, 2H), 7.38 – 7.32 (m, 2H), 7.25 – 7.15 (m, 4H), 3.68 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 178.2, 135.4, 134.7, 134.4, 133.4, 132.4, 131.1, 130.8, 129.2, 128.4, 128.4, 128.1, 126.8, 124.2, 124.0, 46.6. IR (cm^{-1}): 3095, 2920, 2850, 1645, 1593, 1504, 1492, 1409, 1326, 1222, 1182, 1085, 1012, 875, 829, 808, 767, 750, 694, 673, 626, 592, 555, 526, 484, 453. HRMS (APCI) m/z calcd for $C_{28}H_{21}ClNO_2S^+$ $[M + H]^+$ 470.0976, found 470.0968.



Chemical Formula: $C_{18}H_{19}ClN_2O_3S$
Exact Mass: 378.08049
Molecular Weight: 378.87100

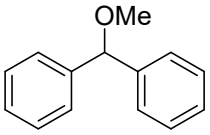
(6zg) 2-(4-chlorophenyl)-N-(morpholino(oxo)(phenyl)-λ⁶-sulfaneylidene)acetamide: Following the General Procedure B with 4-(phenylsulfonimidoyl)morpholine (45.3 mg, 0.2 mmol) and 2-(4-chlorophenyl)acetic acid

(102.4 mg, 0.6 mmol), **6zg** was obtained as a colorless oil (40.2 mg, 53%). This target product was purified by column chromatography on silica gel (PE/EA = 2:1). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.70 – 7.66 (m, 2H), 7.64 – 7.58 (m, 1H), 7.54 – 7.48 (m, 2H), 7.31 – 7.24 (m, 4H), 3.68 (t, J = 4.8 Hz, 4H), 3.66 (d, J = 2.0 Hz, 2H), 3.05 – 2.91 (m, 4H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 178.1, 134.9, 134.6, 133.5, 132.6, 130.9, 129.3, 128.5, 127.7, 66.0, 46.6, 45.5. IR (cm^{-1}): 3064, 2968, 2923, 2856, 2248, 1963, 1903, 1650, 1595, 1490, 1446, 1407, 1301, 1259, 1112, 1016, 939, 875, 833, 759, 725, 690, 663, 601, 584, 518, 495, 441. HRMS (APCI) m/z calcd for $C_{18}H_{20}ClN_2O_3S^+$ $[M + H]^+$ 379.0877, found 379.0873.



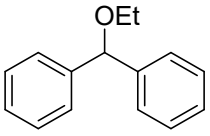
Chemical Formula: $C_{13}H_{10}O$
Exact Mass: 182.07316
Molecular Weight: 182.22200

（7）benzophenone[8]: ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.80 (d, J = 7.8 Hz, 4H), 7.58 (t, J = 7.4 Hz, 2H), 7.47 (t, J = 7.6 Hz, 4H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 196.8, 137.6, 132.4, 130.1, 128.3.



Chemical Formula: $C_{14}H_{14}O$
Exact Mass: 198.10447
Molecular Weight: 198.26500

（8）(methoxymethylene)dibenzene[9]: ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35 (t, J = 2.0 Hz, 1H), 7.35 – 7.32 (m, 4H), 7.32 – 7.28 (m, 3H), 7.26 – 7.21 (m, 2H), 5.24 (s, 1H), 3.38 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 142.1, 128.4, 127.5, 126.9, 85.5, 57.1.



Chemical Formula: $C_{15}H_{16}O$
Exact Mass: 212.12012
Molecular Weight: 212.29200

（9）(ethoxymethylene)dibenzene[9]: ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39 – 7.33 (m, 4H), 7.30 (dd, J = 10.0, 4.8 Hz, 4H), 7.25 – 7.19 (m, 2H), 5.35 (s, 1H), 3.52 (q, J = 7.0 Hz, 2H), 1.26 (t, J = 7.0 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 142.6, 128.4, 127.4, 127.0, 83.5, 64.6, 15.4.

8. Reference

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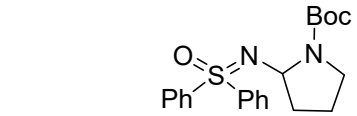
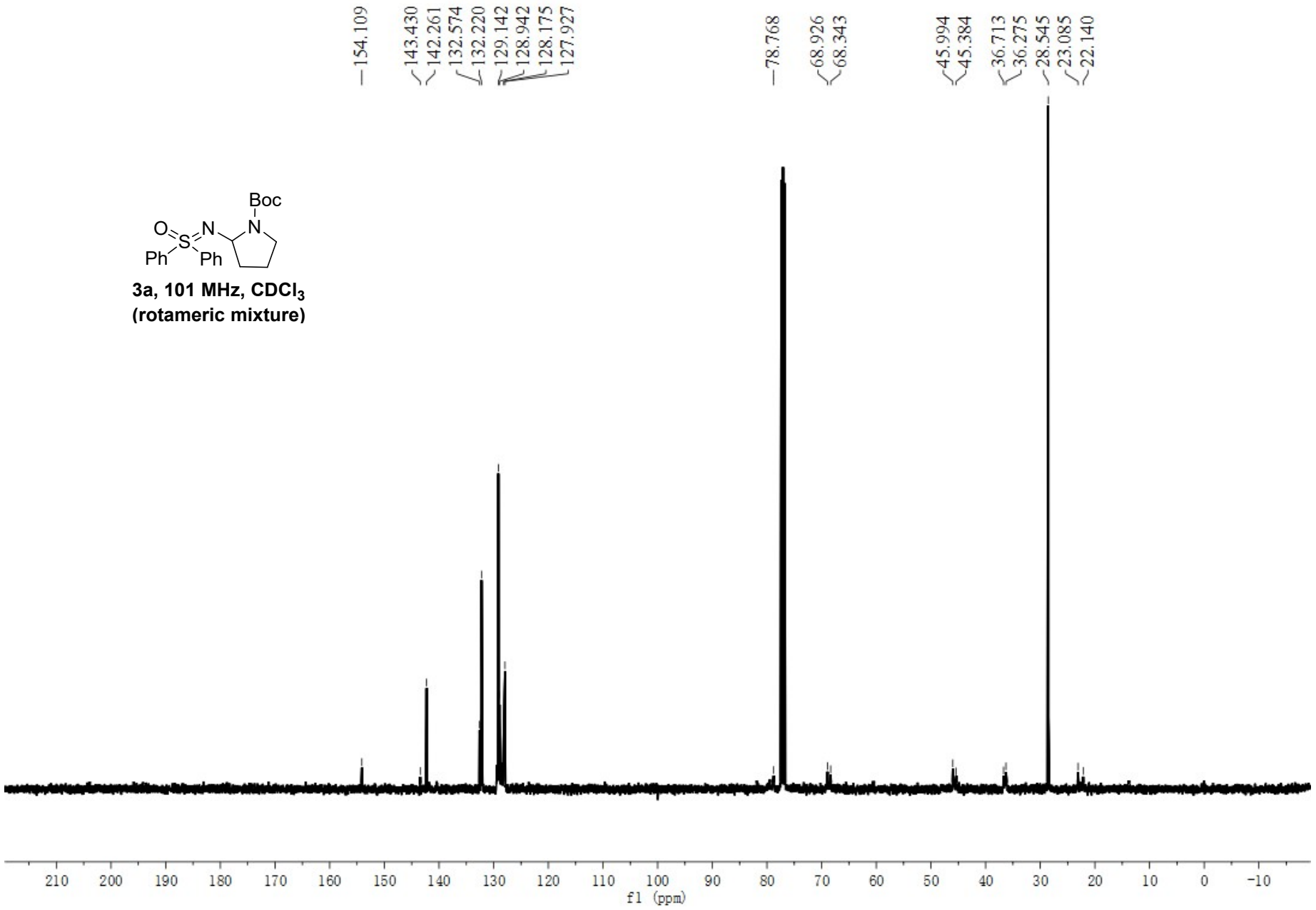
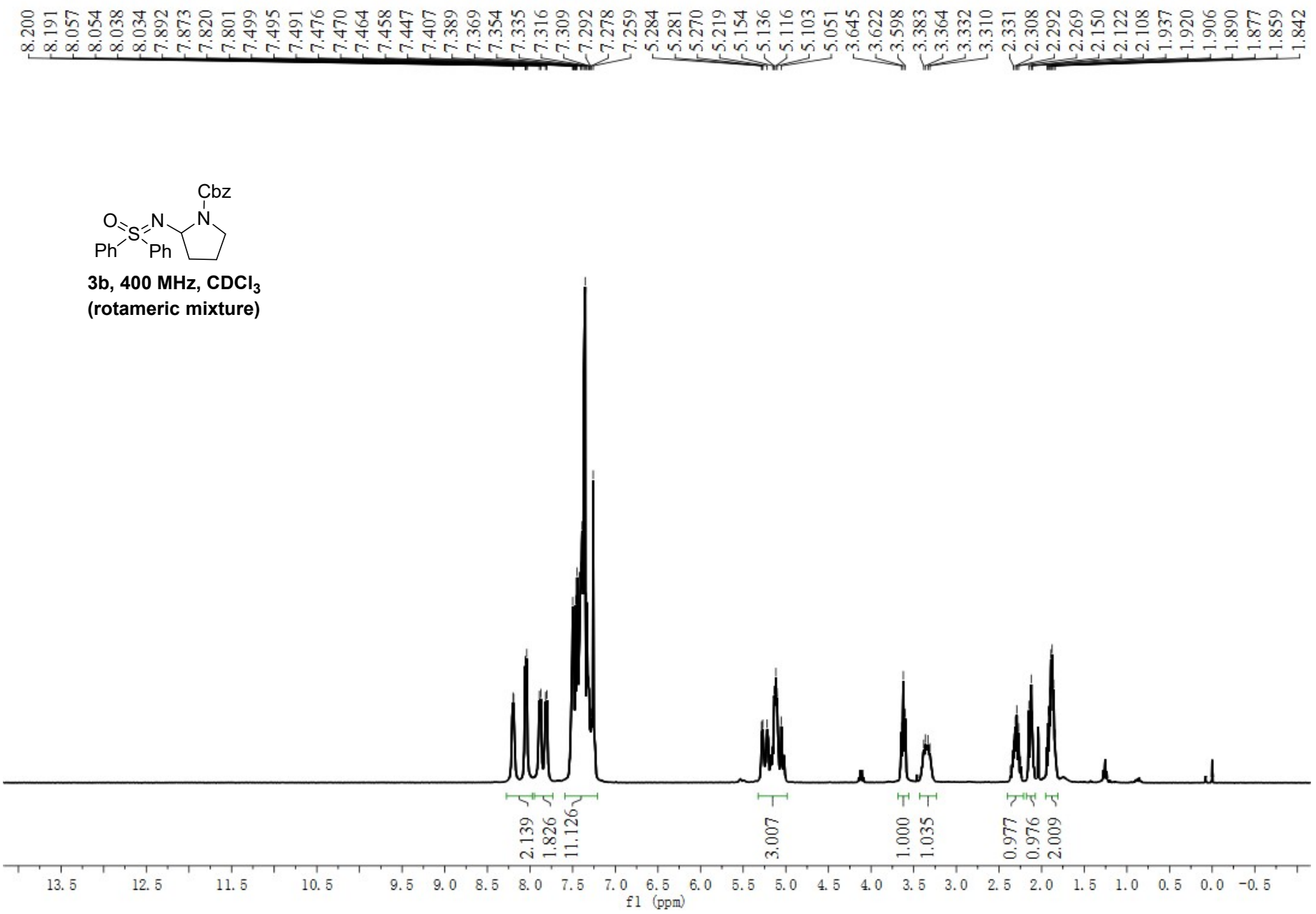
9. Copies of NMR spectra



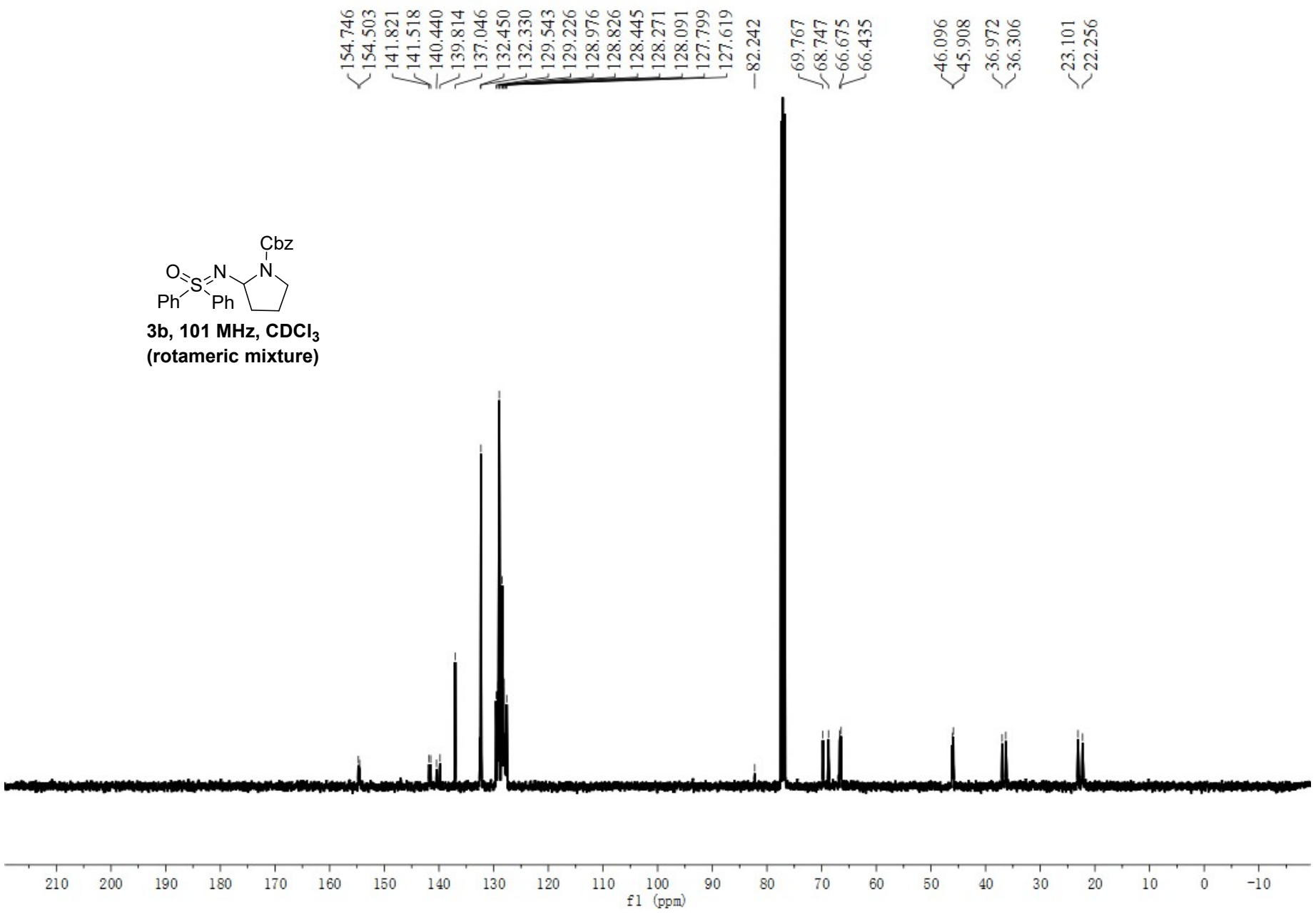
3a, 400 MHz, $CDCl_3$
(rotameric mixture)

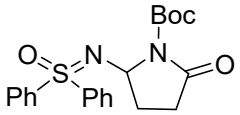


3a, 101 MHz, $CDCl_3$
(rotameric mixture)

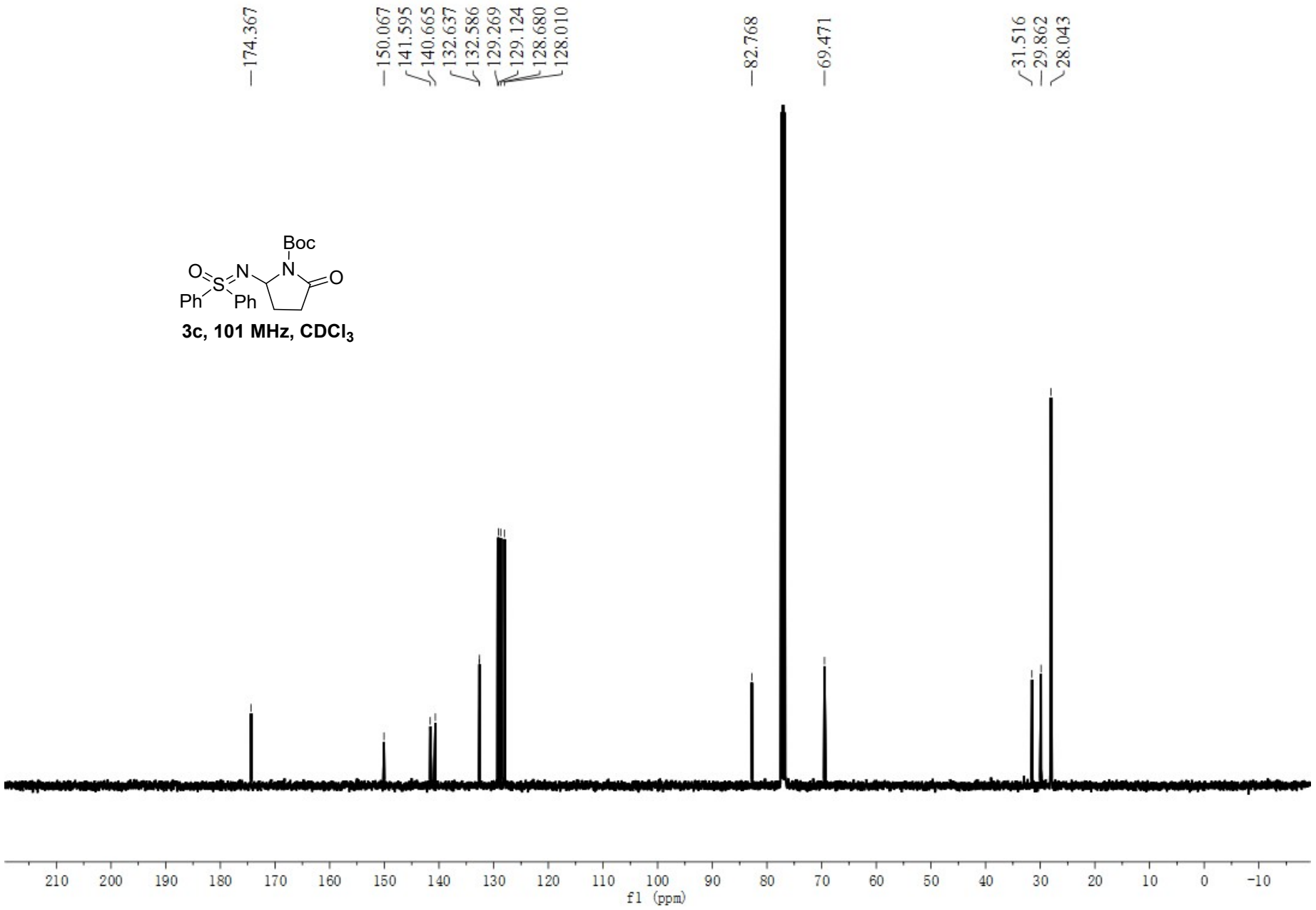


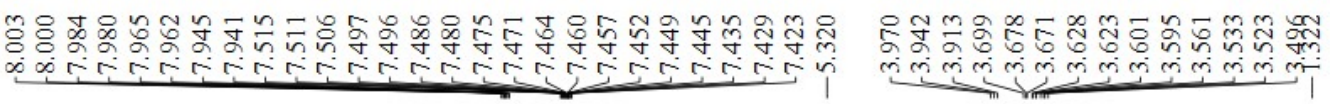
3b, 400 MHz, $CDCl_3$
(rotameric mixture)

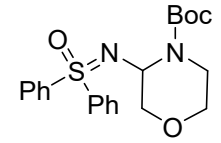

154.746
154.503
141.821
141.518
140.440
139.814
137.046
132.450
132.330
129.543
129.226
128.976
128.826
128.445
128.271
128.091
127.799
127.619
82.242
69.767
68.747
66.675
66.435
46.096
45.908
36.972
36.306
23.101
22.256
Cbz
O
S
N
N
Ph
Ph
3b, 101 MHz, CDCl3
(rotameric mixture)
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



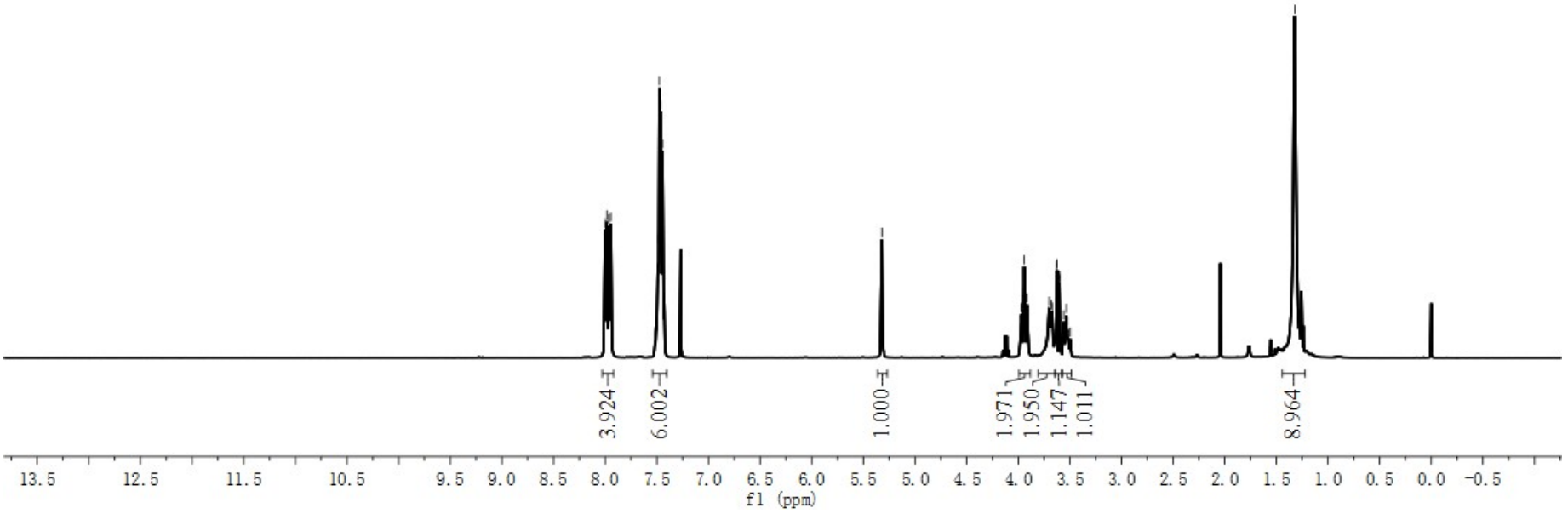
3c, 400 MHz, $CDCl_3$

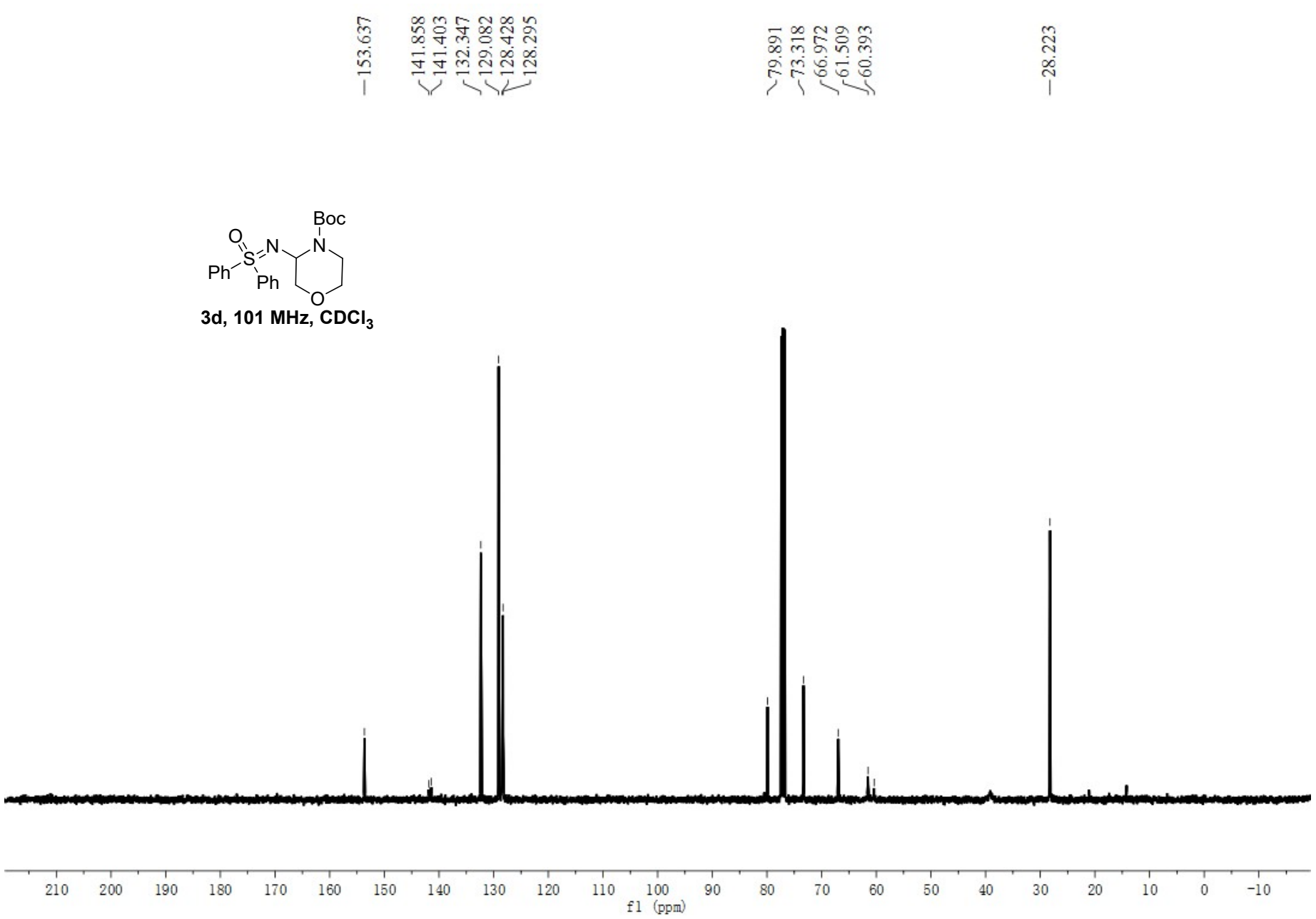

174.367
150.067
141.595
140.665
132.637
132.586
129.269
129.124
128.680
128.010
82.768
69.471
31.516
29.862
28.043
Boc
O
S
N
N
O
Ph
Ph
3c, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

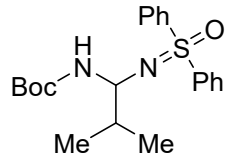




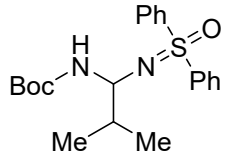
3d, 400 MHz, $CDCl_3$



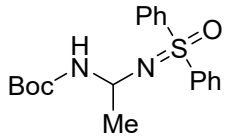

153.637
141.858
141.403
132.347
129.082
128.428
128.295
79.891
73.318
66.972
61.509
60.393
28.223
Boc
O
S
N
N
Ph
Ph
O
3d, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



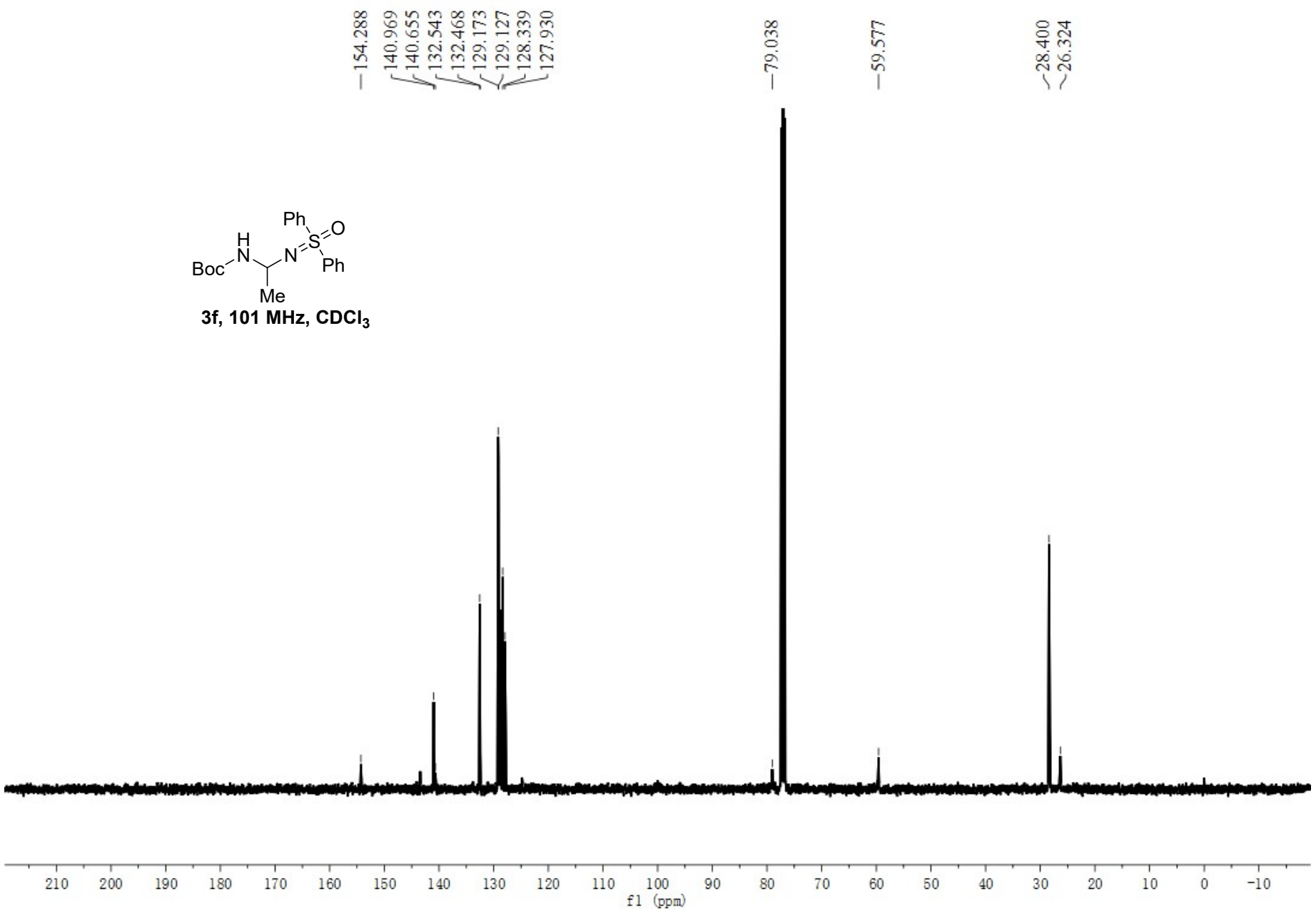
3e, 400 MHz, $CDCl_3$



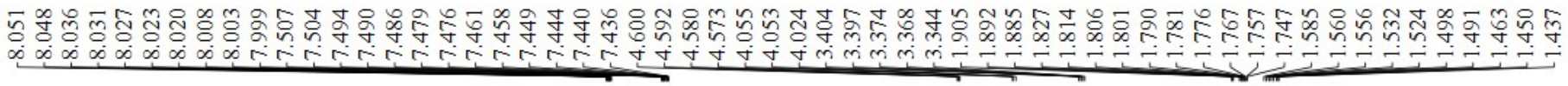
3e, 101 MHz, $CDCl_3$

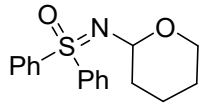


3f, 400 MHz, $CDCl_3$

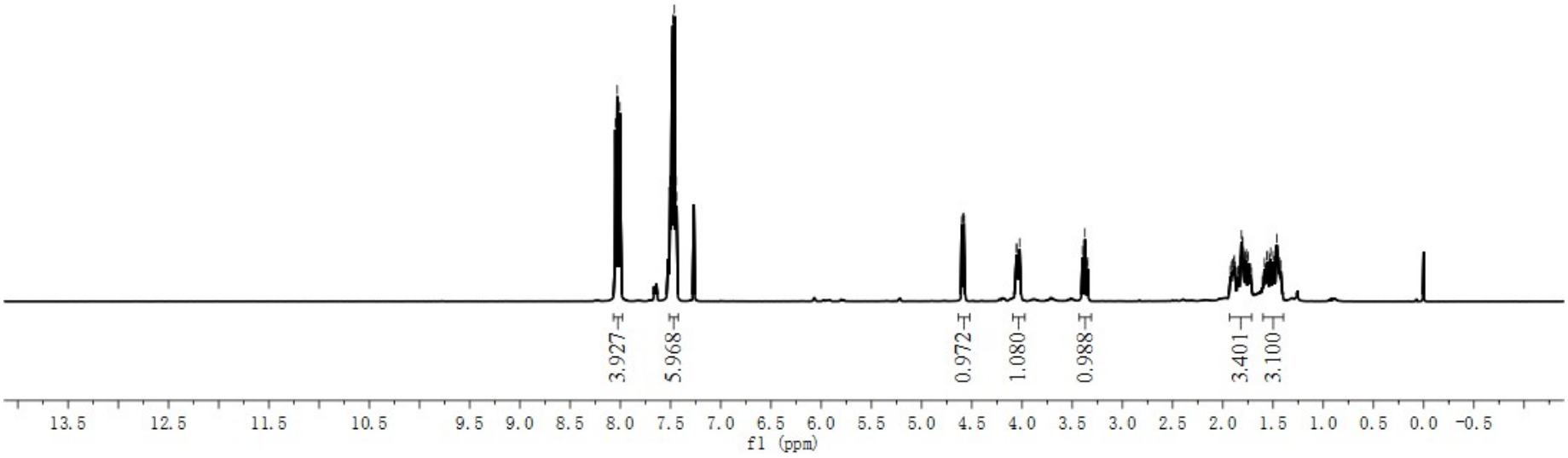


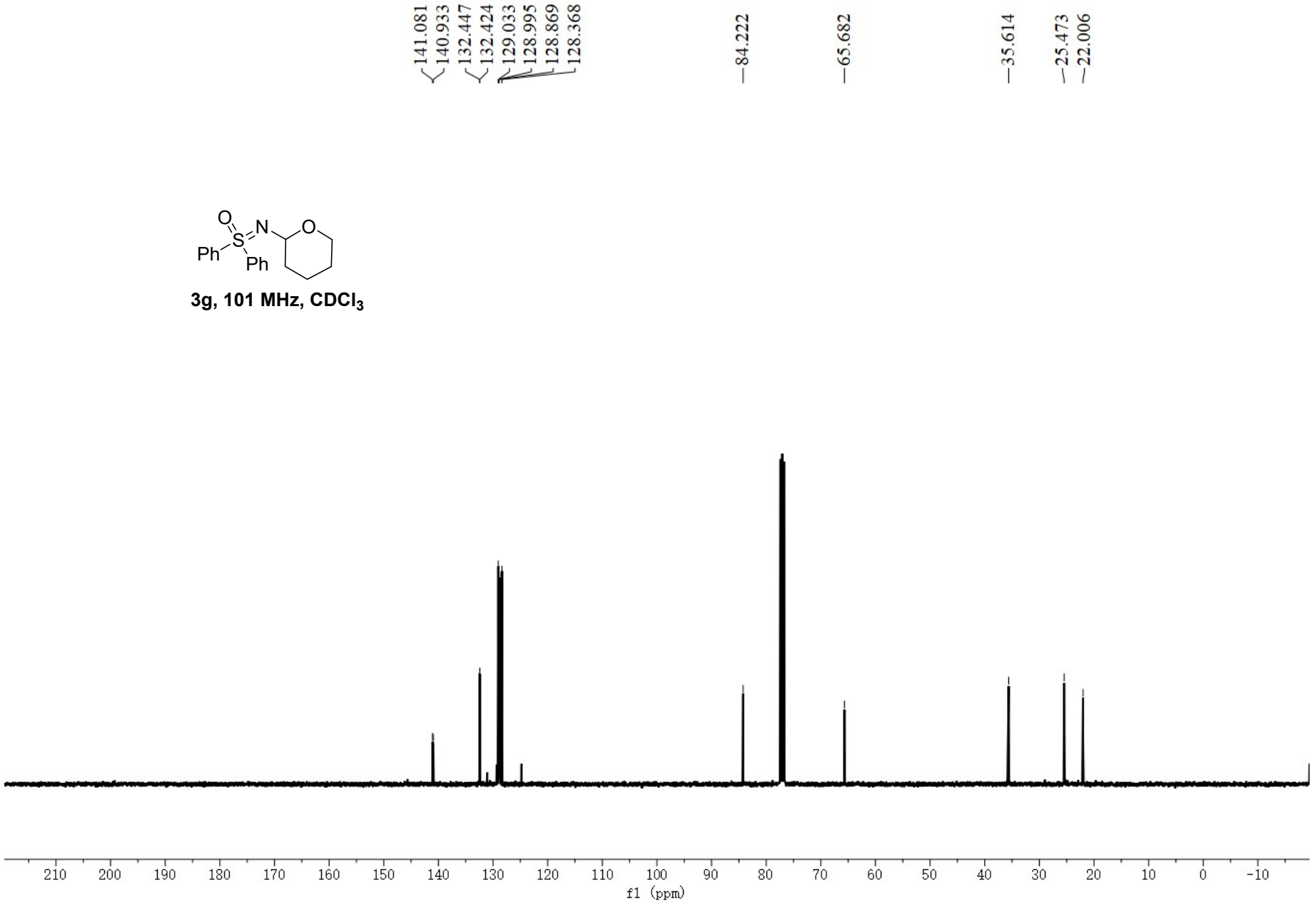
3f, 101 MHz, $CDCl_3$



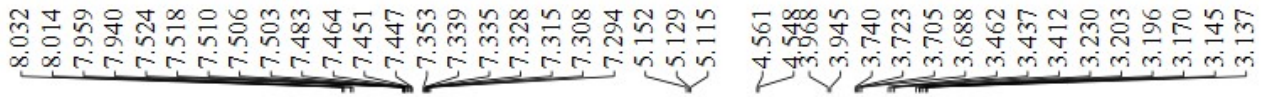


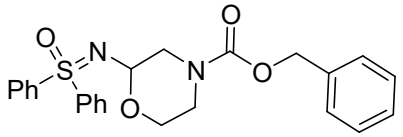
3g, 400 MHz, $CDCl_3$



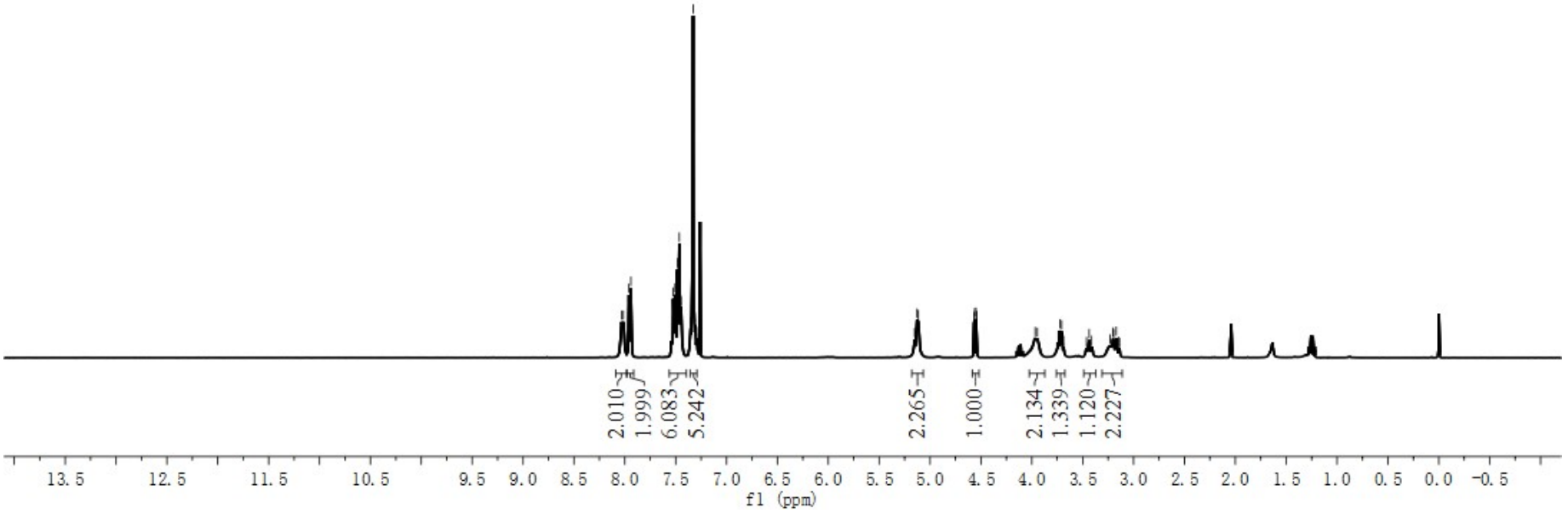


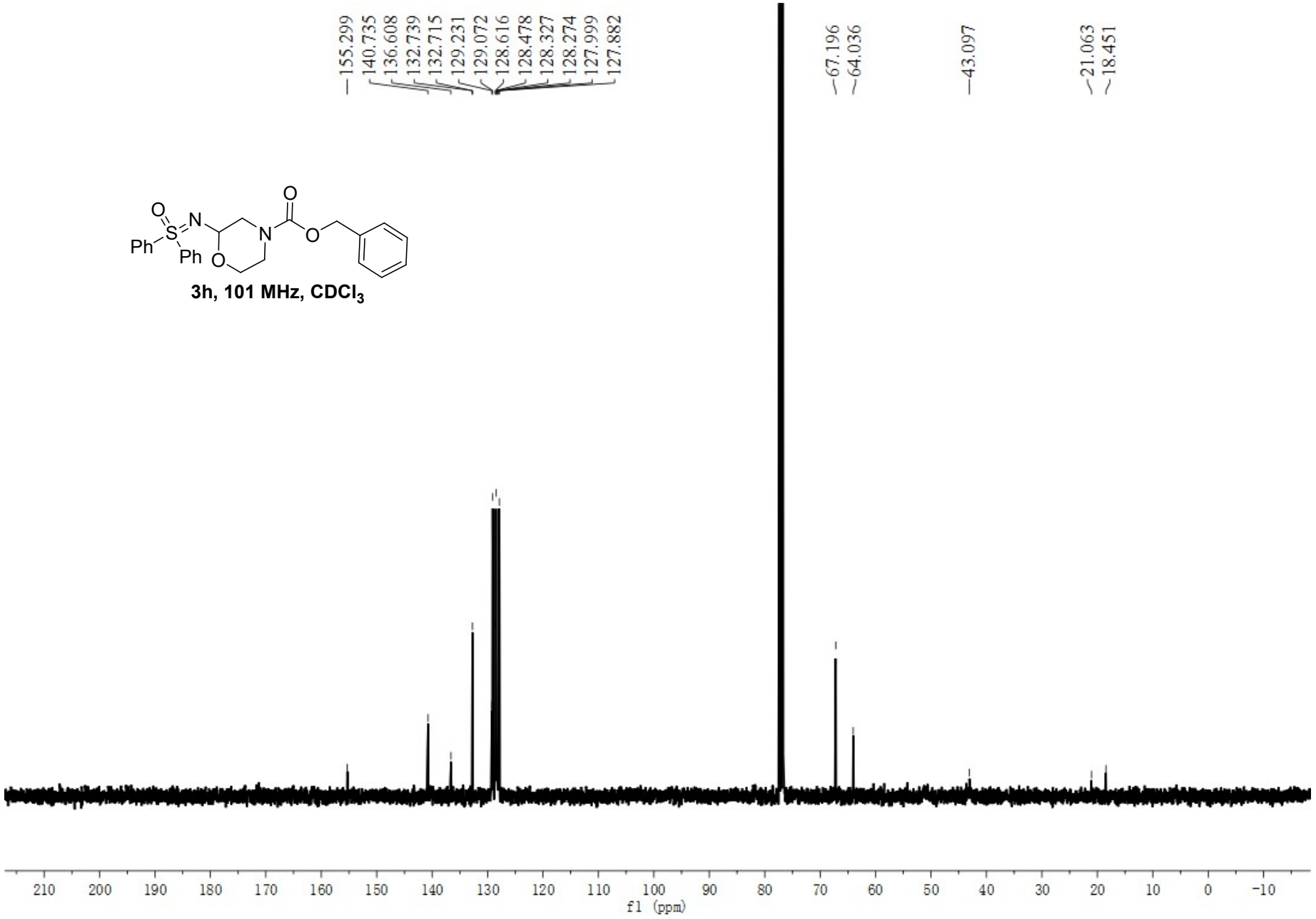
3g, 101 MHz, $CDCl_3$



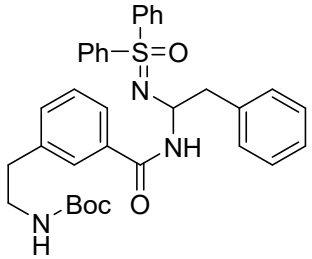


3h, 400 MHz, $CDCl_3$

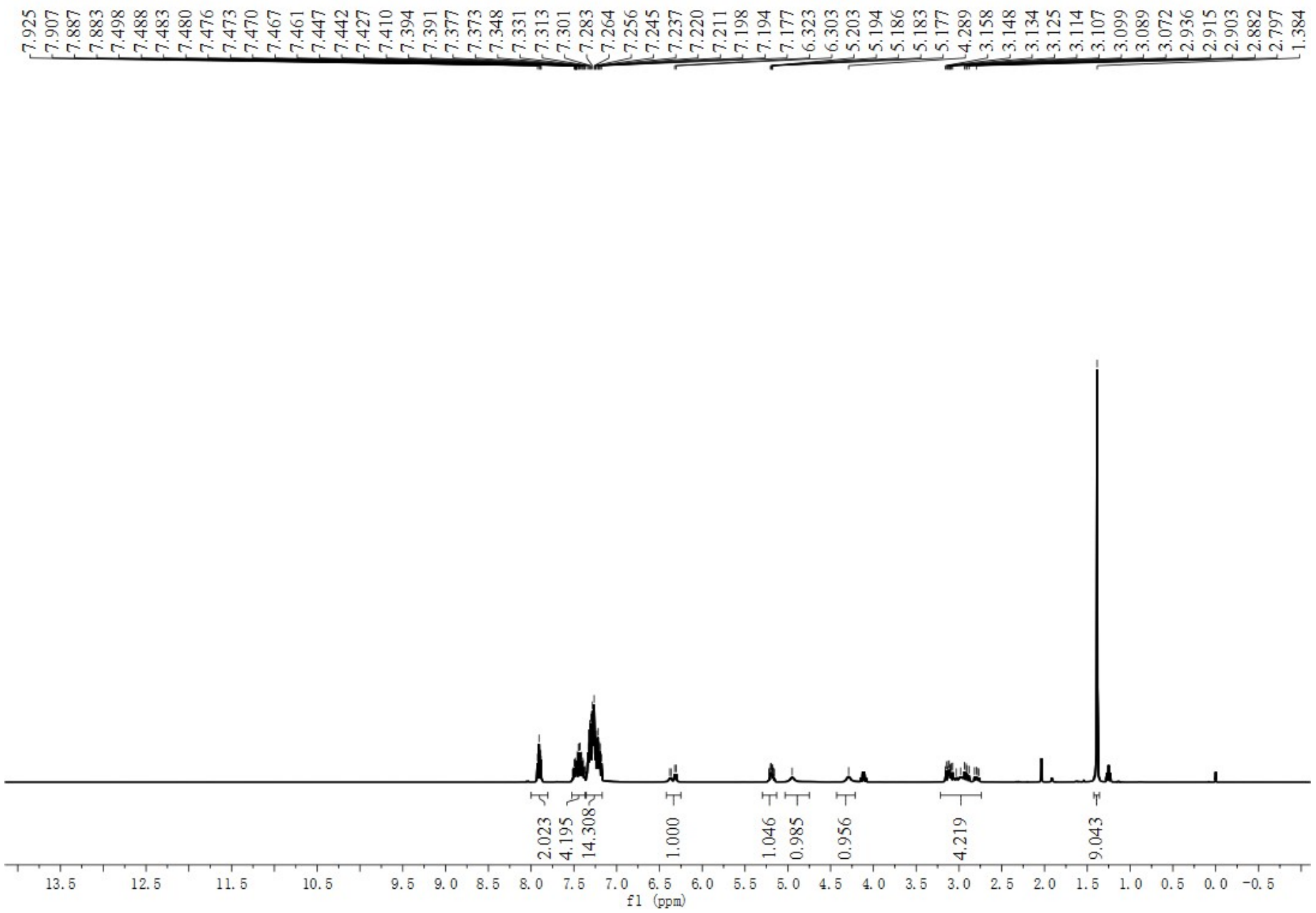


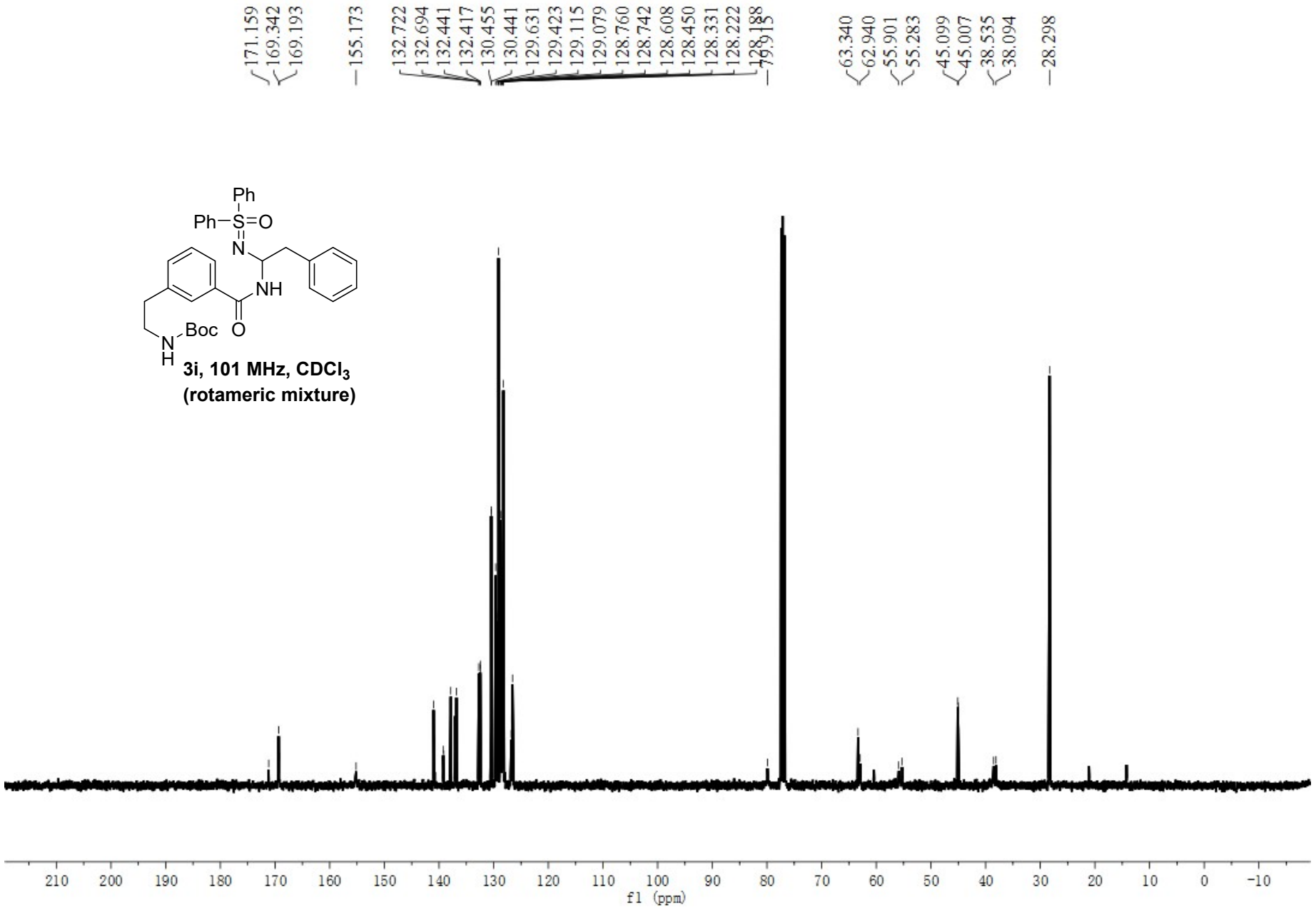


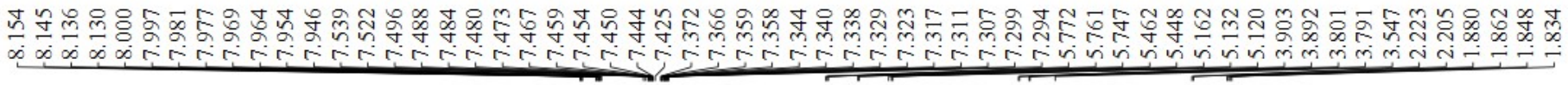
3h, 101 MHz, $CDCl_3$

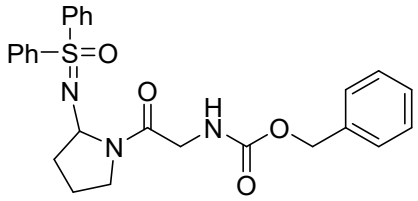


3i, 400 MHz, $CDCl_3$
(rotameric mixture)

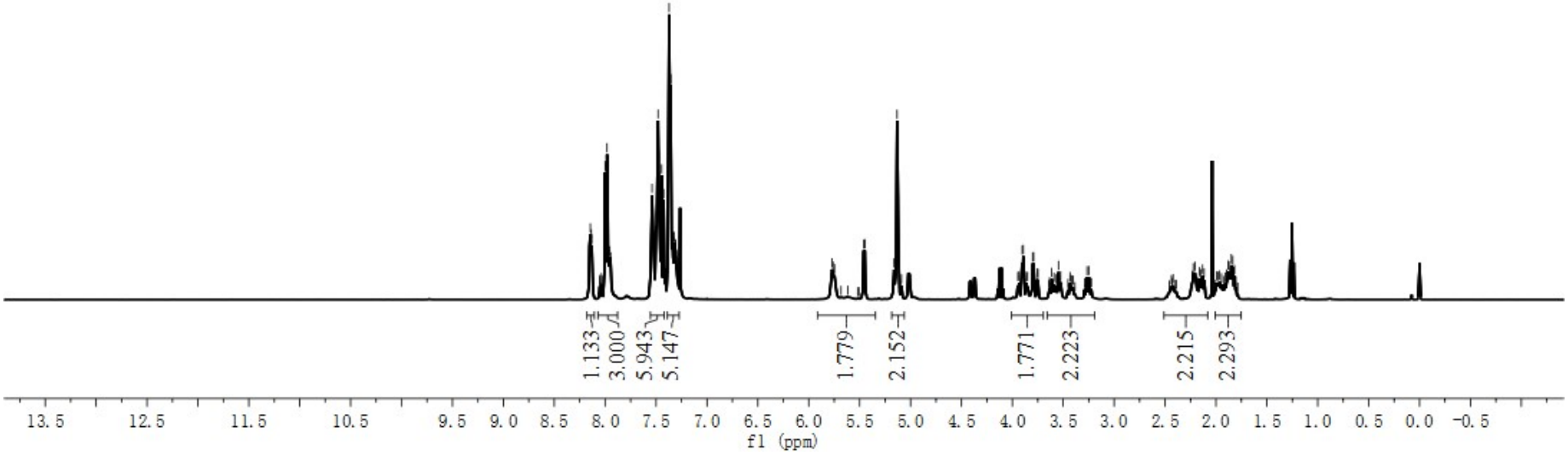

7.925
7.907
7.887
7.883
7.498
7.488
7.483
7.480
7.476
7.473
7.470
7.467
7.461
7.447
7.442
7.427
7.410
7.394
7.391
7.377
7.373
7.348
7.331
7.313
7.301
7.283
7.264
7.256
7.245
7.237
7.220
7.211
7.198
7.194
7.177
6.323
6.303
5.203
5.194
5.186
5.183
5.177
4.289
3.158
3.148
3.134
3.125
3.114
3.107
3.099
3.089
3.072
2.936
2.915
2.903
2.882
2.797
1.384
2.023
4.195
14.308
1.000
1.046
0.985
0.956
4.219
9.043
f1 (ppm)

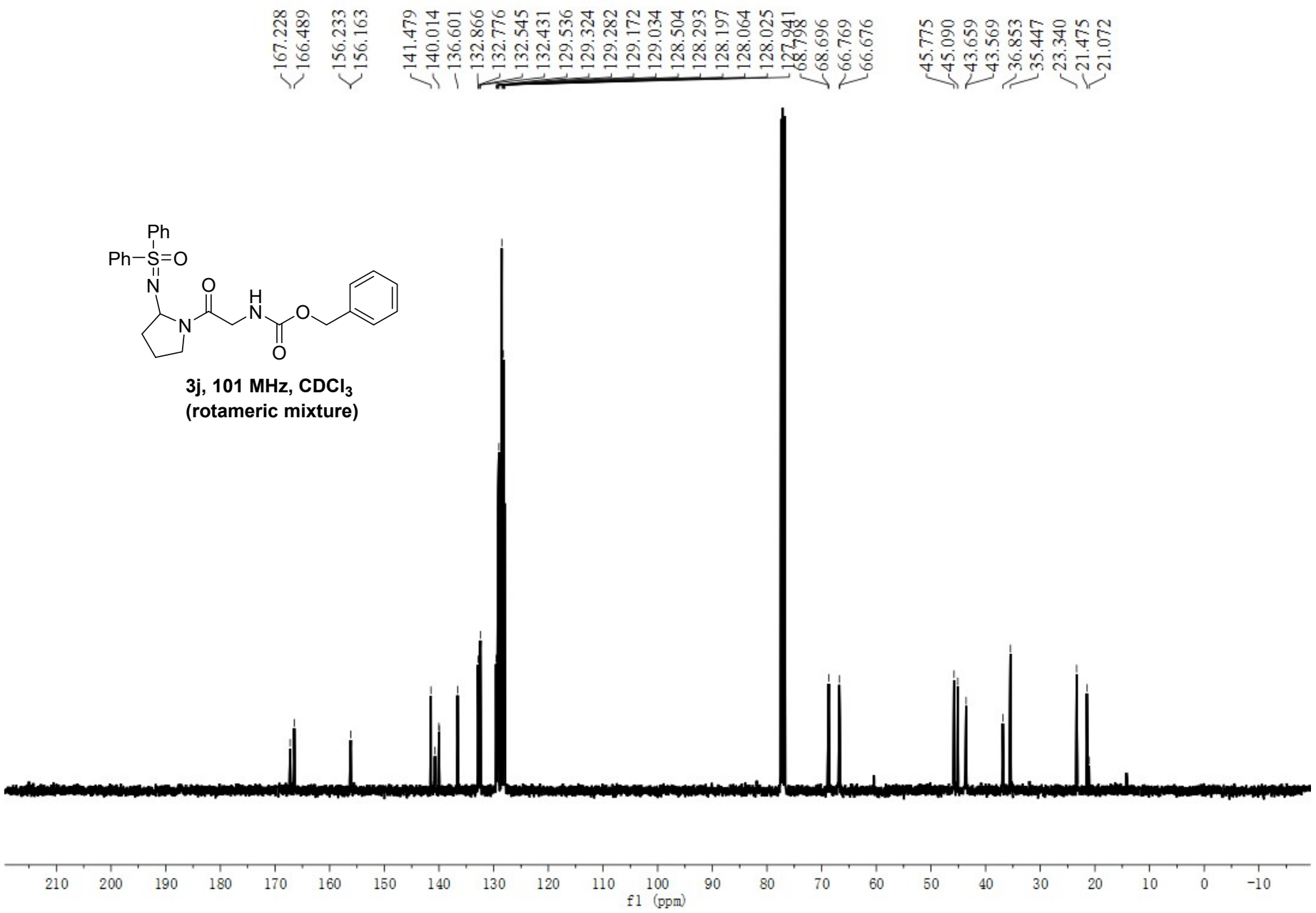

171.159
169.342
169.193
155.173
132.722
132.694
132.441
132.417
130.455
130.441
129.631
129.423
129.115
129.079
128.760
128.742
128.608
128.450
128.331
128.222
128.188
79.915
63.340
62.940
55.901
55.283
45.099
45.007
38.535
38.094
28.298
Ph
Ph—S=O
N
NH
O
Boc
N
H
3i, 101 MHz, CDCl3
(rotameric mixture)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)



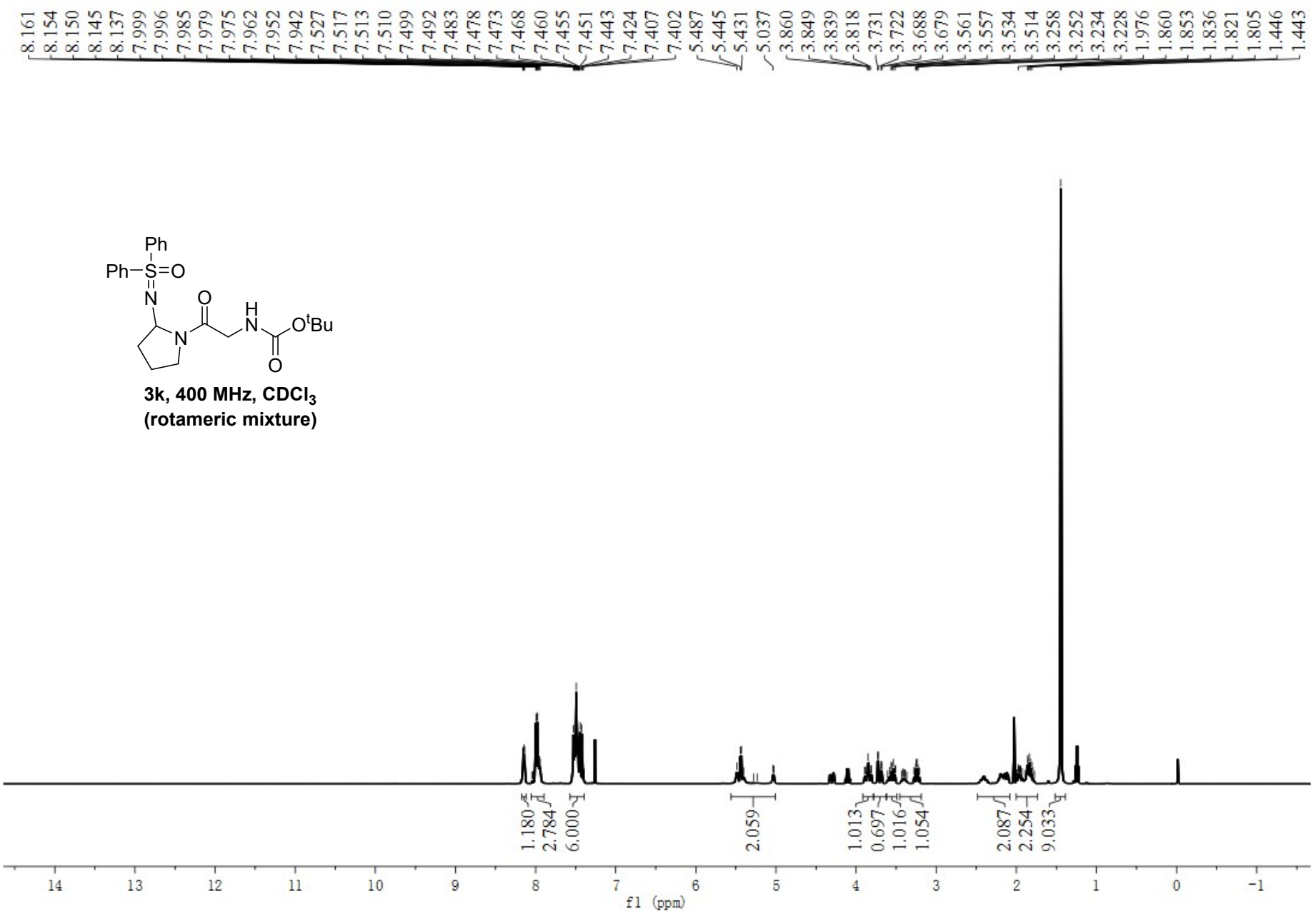


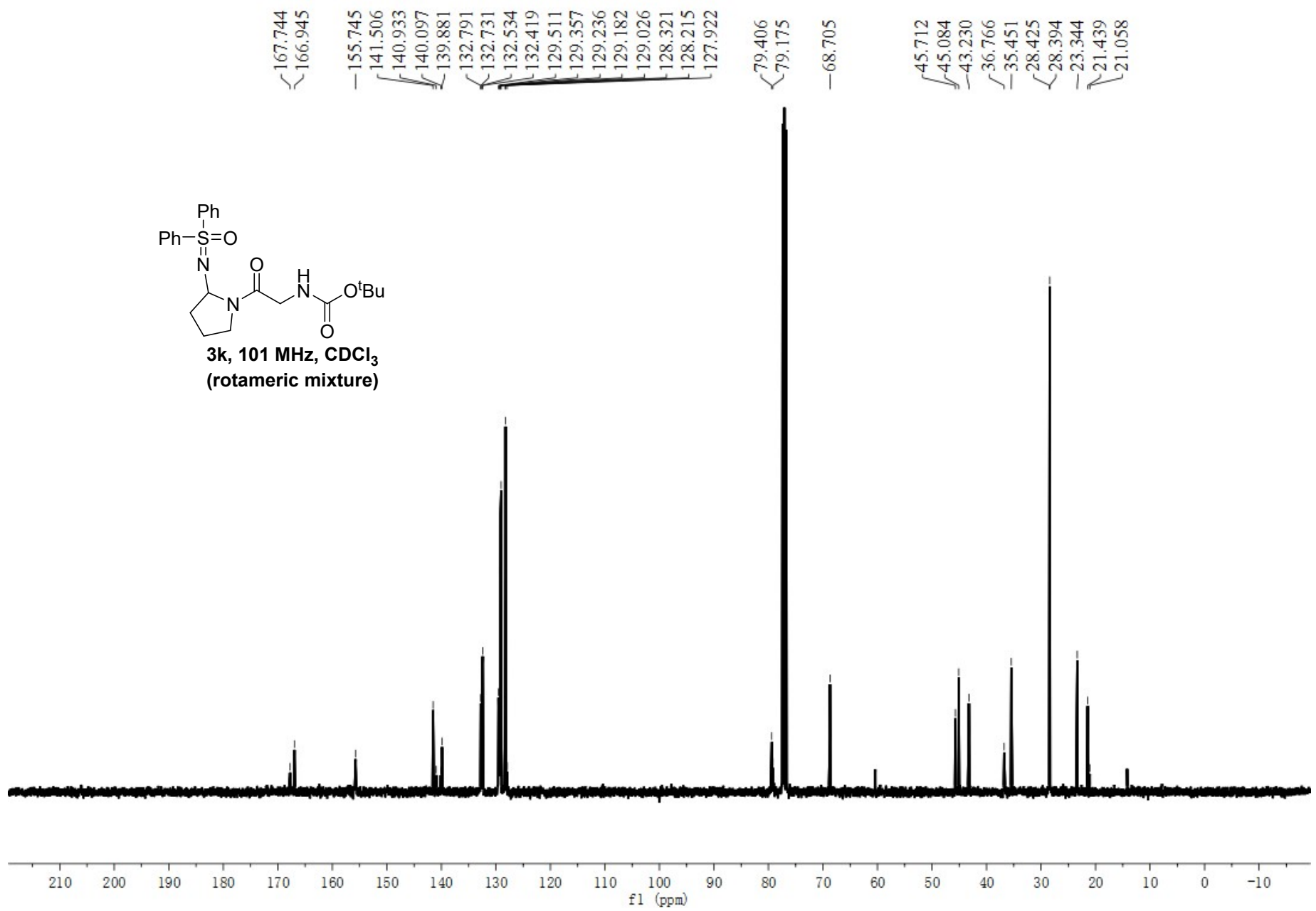
3j, 400 MHz, $CDCl_3$
(rotameric mixture)

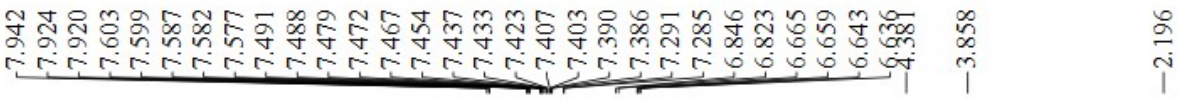


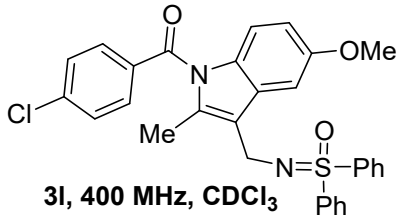


3j, 101 MHz, $CDCl_3$
(rotameric mixture)

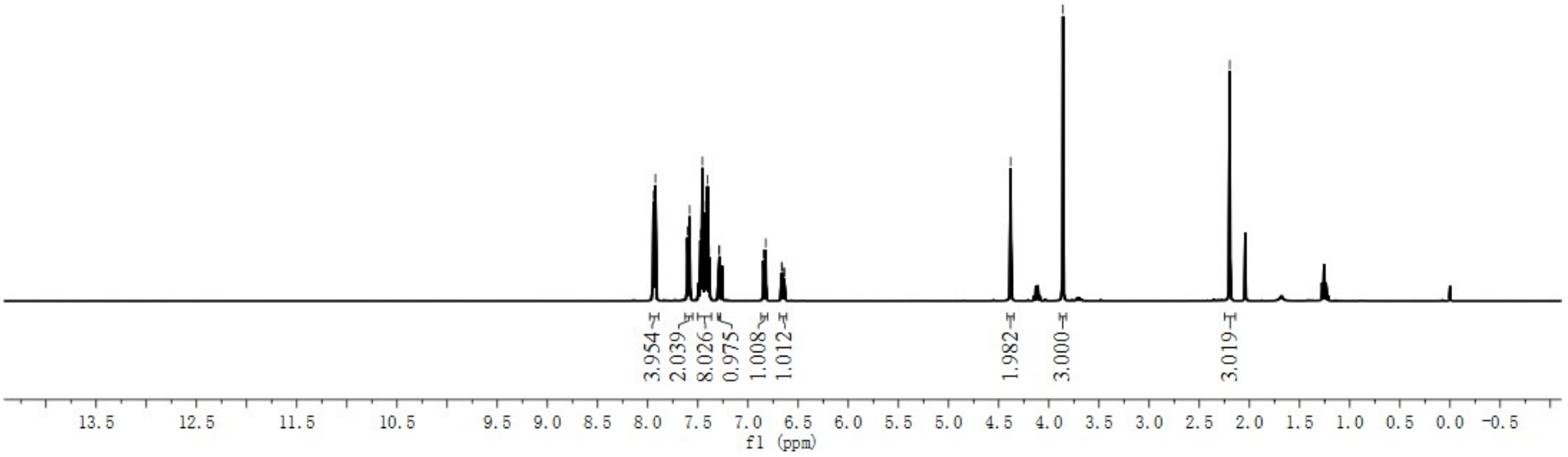

8.161
8.154
8.150
8.145
8.137
7.999
7.996
7.985
7.979
7.975
7.962
7.952
7.942
7.527
7.517
7.513
7.510
7.499
7.492
7.483
7.478
7.473
7.468
7.460
7.455
7.451
7.443
7.424
7.407
7.402
5.487
5.445
5.431
5.037
3.860
3.849
3.839
3.818
3.731
3.722
3.688
3.679
3.561
3.557
3.534
3.514
3.258
3.252
3.234
3.228
1.976
1.860
1.853
1.836
1.821
1.805
1.446
1.443
Ph
Ph—S=O
N
O
H
N
O
tBu
N
O
3k, 400 MHz, CDCl3
(rotameric mixture)
1.180
2.784
6.000
2.059
1.013
0.697
1.016
1.054
2.087
2.254
9.033
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
-1
f1 (ppm)

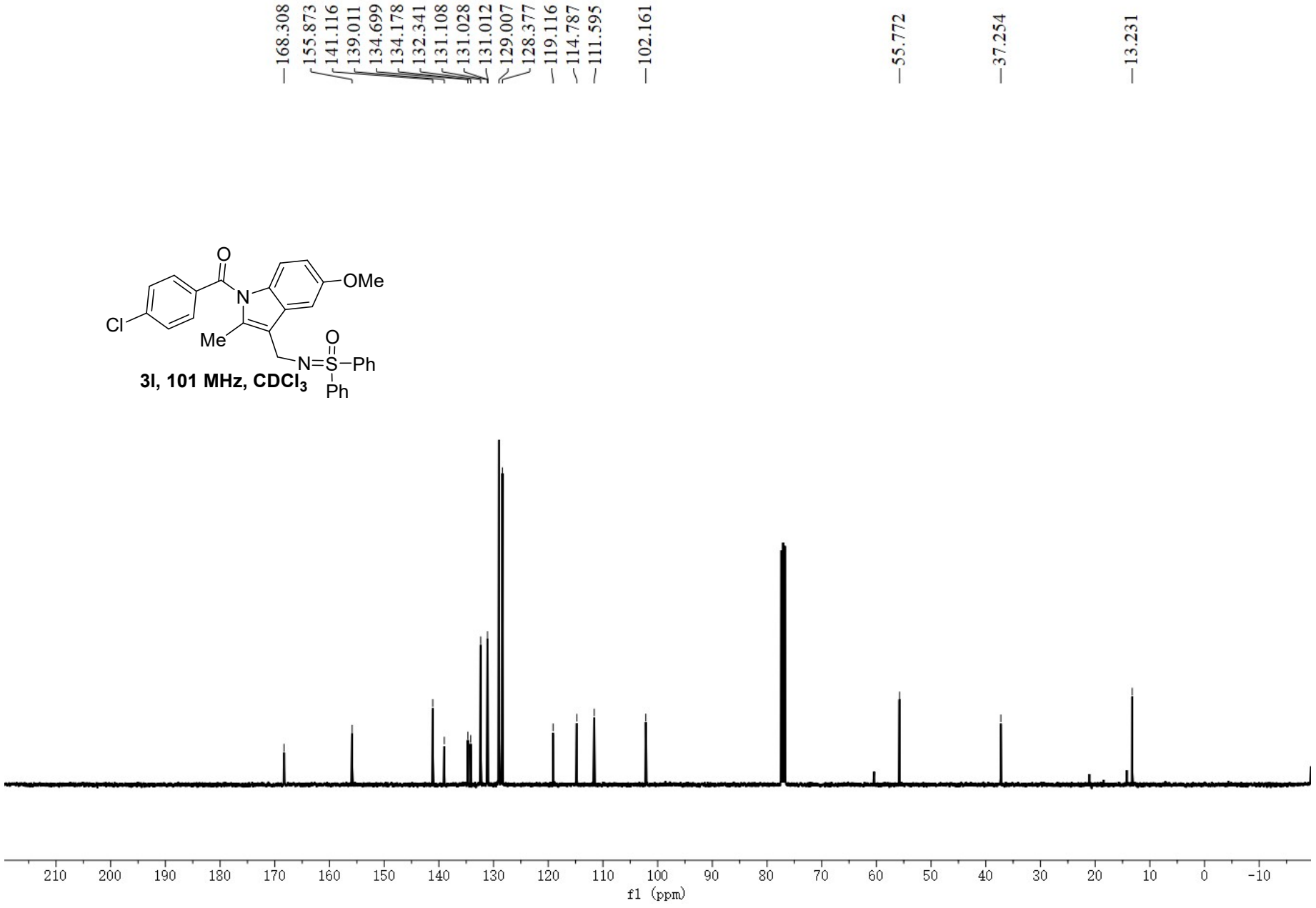

167.744
166.945
155.745
141.506
140.933
140.097
139.881
132.791
132.731
132.534
132.419
129.511
129.357
129.236
129.182
129.026
128.321
128.215
127.922
79.406
79.175
68.705
45.712
45.084
43.230
36.766
35.451
28.425
28.394
23.344
21.439
21.058
Ph
Ph—S=O
N
O
H
N
O
N
O
O
tBu
3k, 101 MHz, CDCl3
(rotameric mixture)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

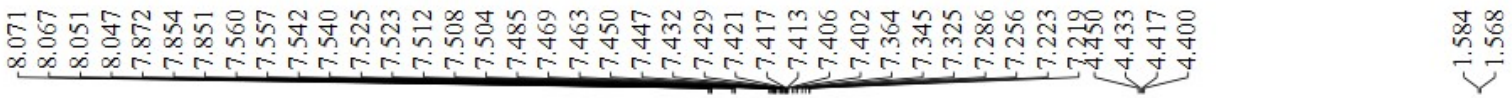


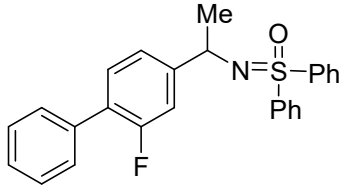


3l, 400 MHz, $CDCl_3$

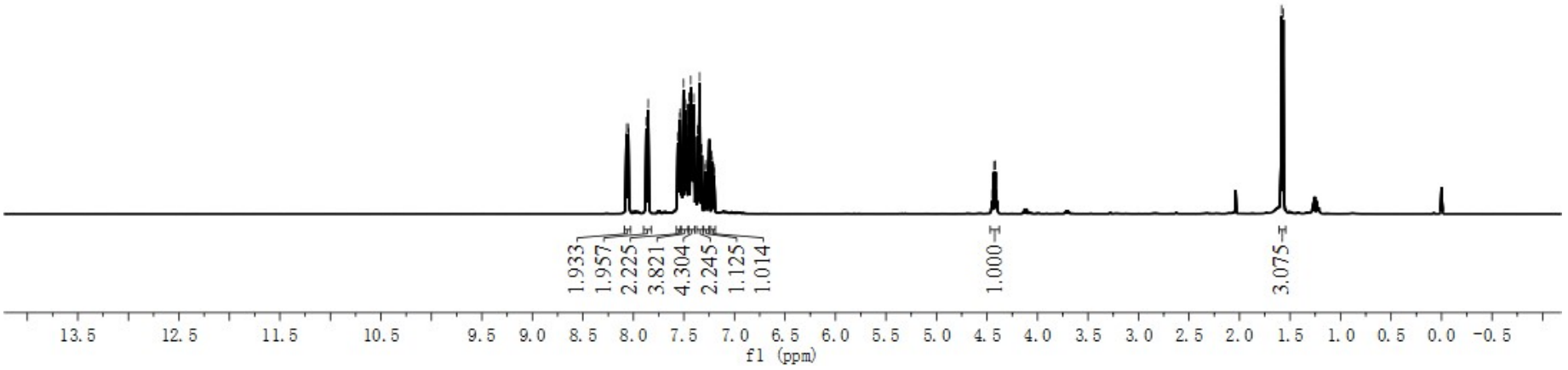


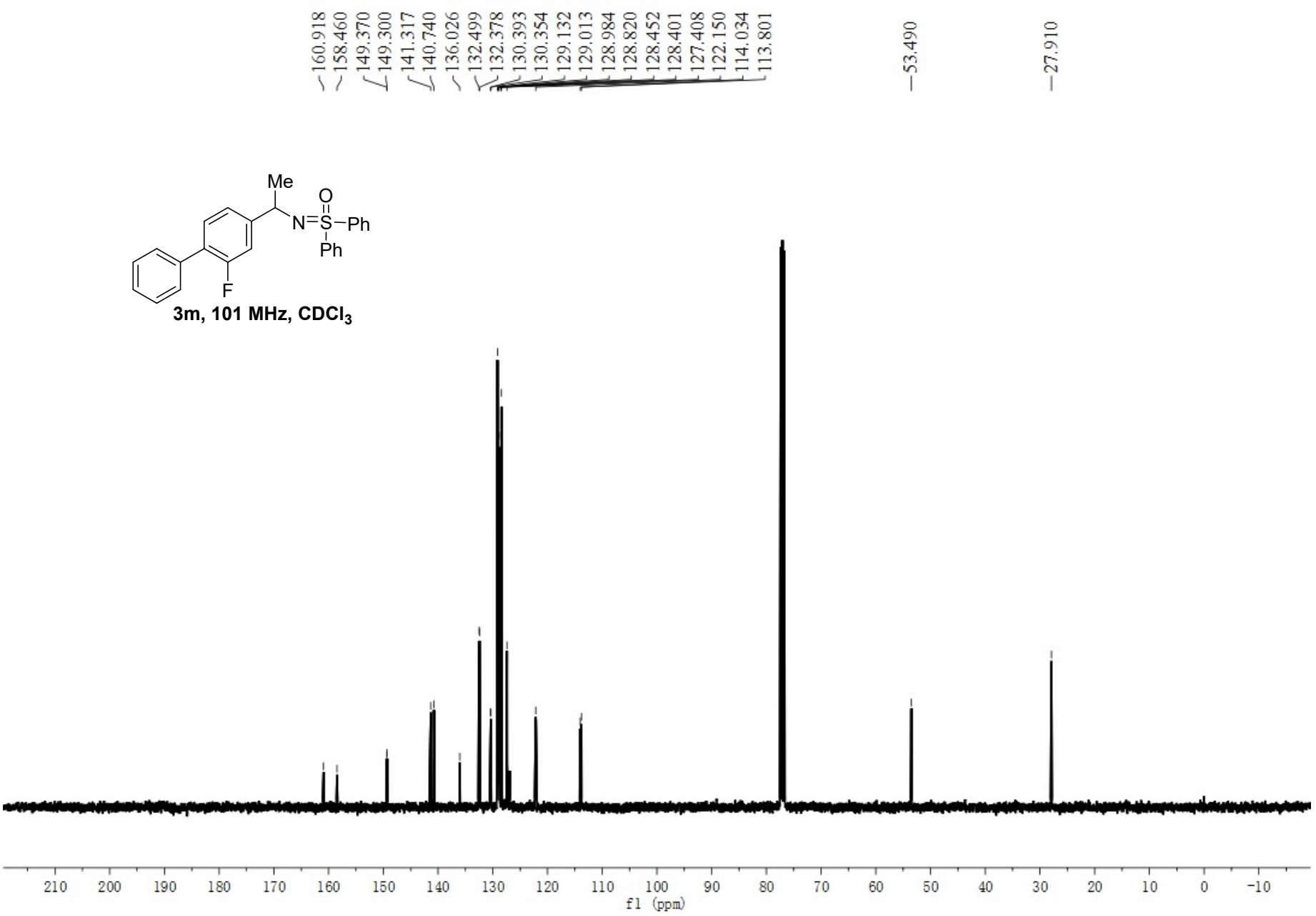

168.308
155.873
141.116
139.011
134.699
134.178
132.341
131.108
131.028
131.012
129.007
128.377
119.116
114.787
111.595
102.161
55.772
37.254
13.231
O
N
OMe
Cl
Me
O
N=S–Ph
Ph
3l, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

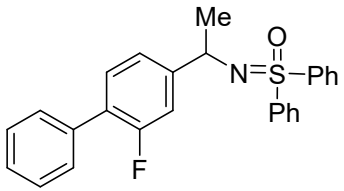




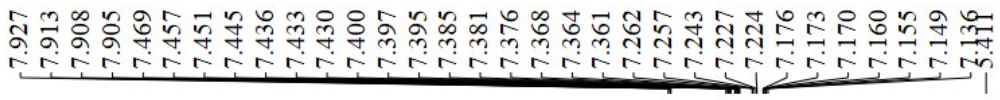
3m, 400 MHz, $CDCl_3$

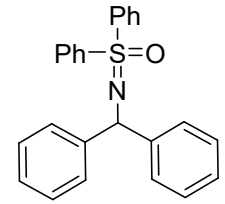



160.918
158.460
149.370
149.300
141.317
140.740
136.026
132.499
132.378
130.393
130.354
129.132
129.013
128.984
128.820
128.452
128.401
127.408
122.150
114.034
113.801
53.490
27.910
Me
O
N=S–Ph
Ph
F
3m, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

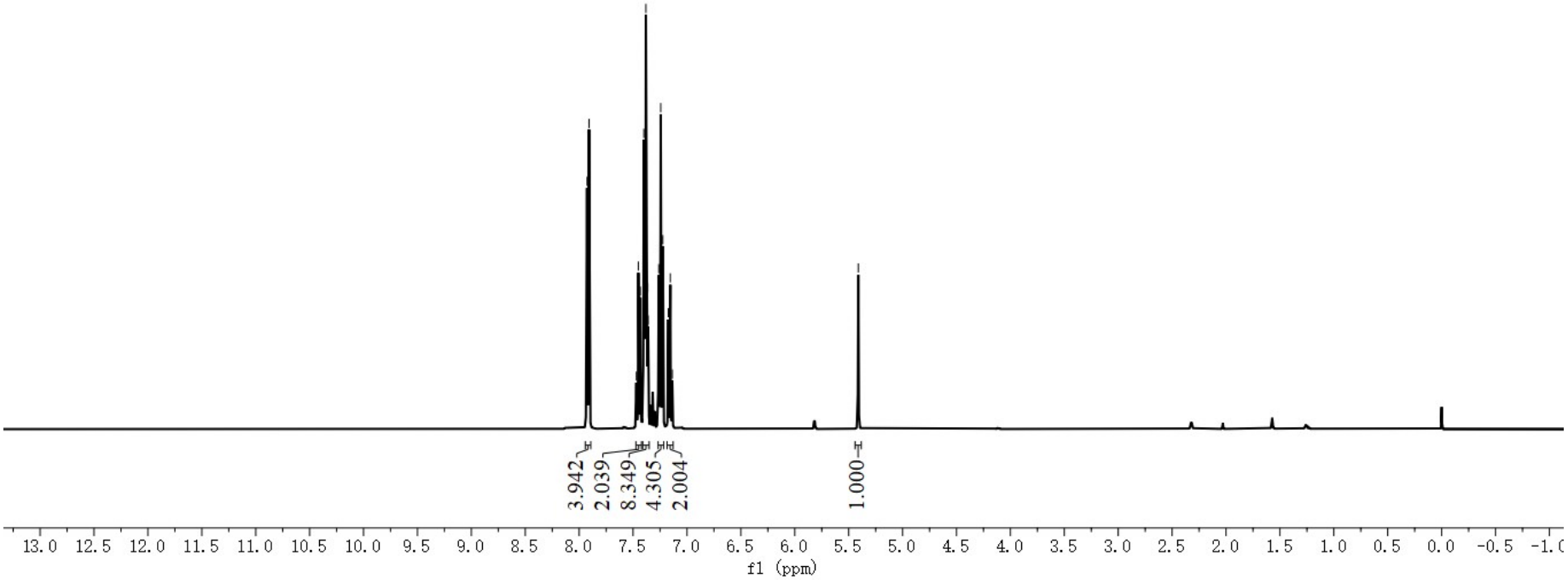


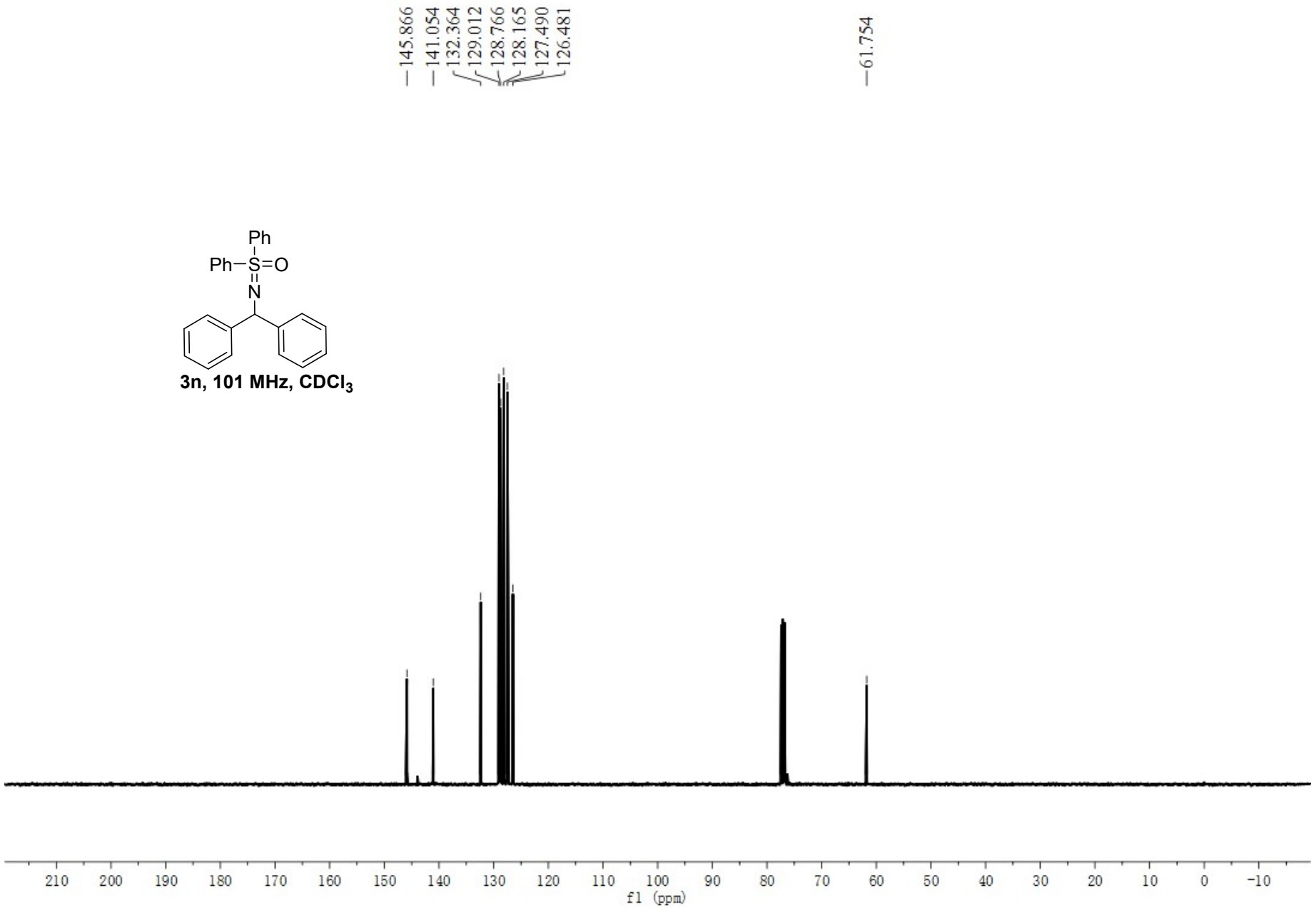
3m, 376 MHz, $CDCl_3$

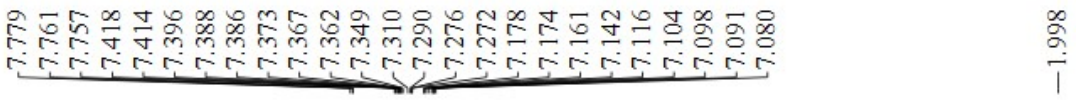


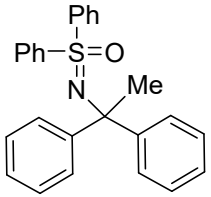


3n, 400 MHz, $CDCl_3$

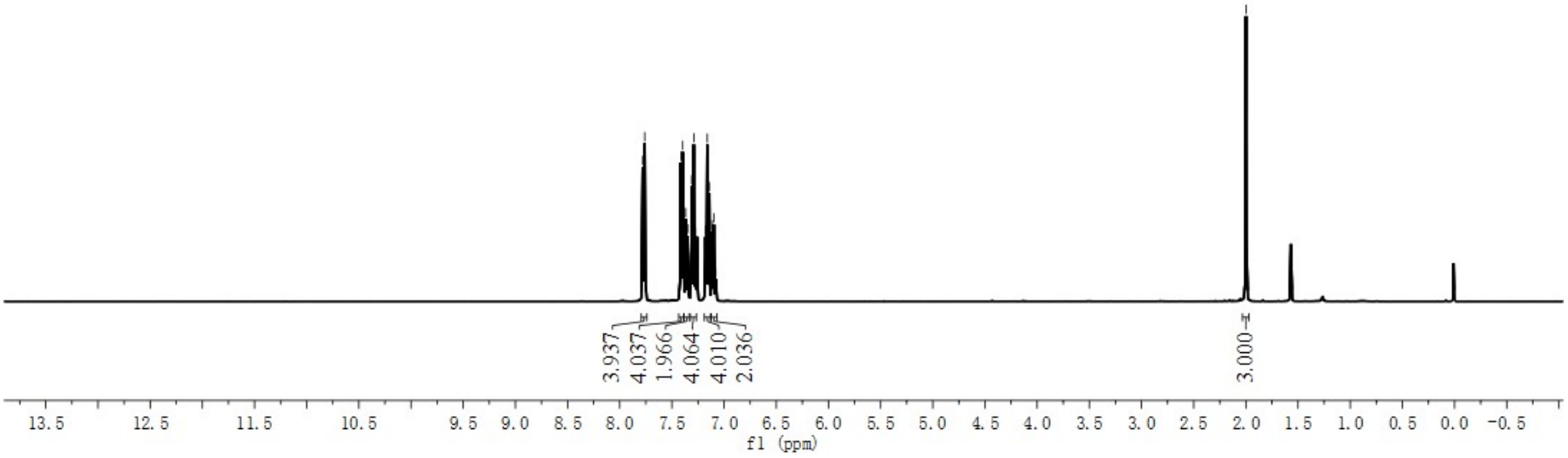


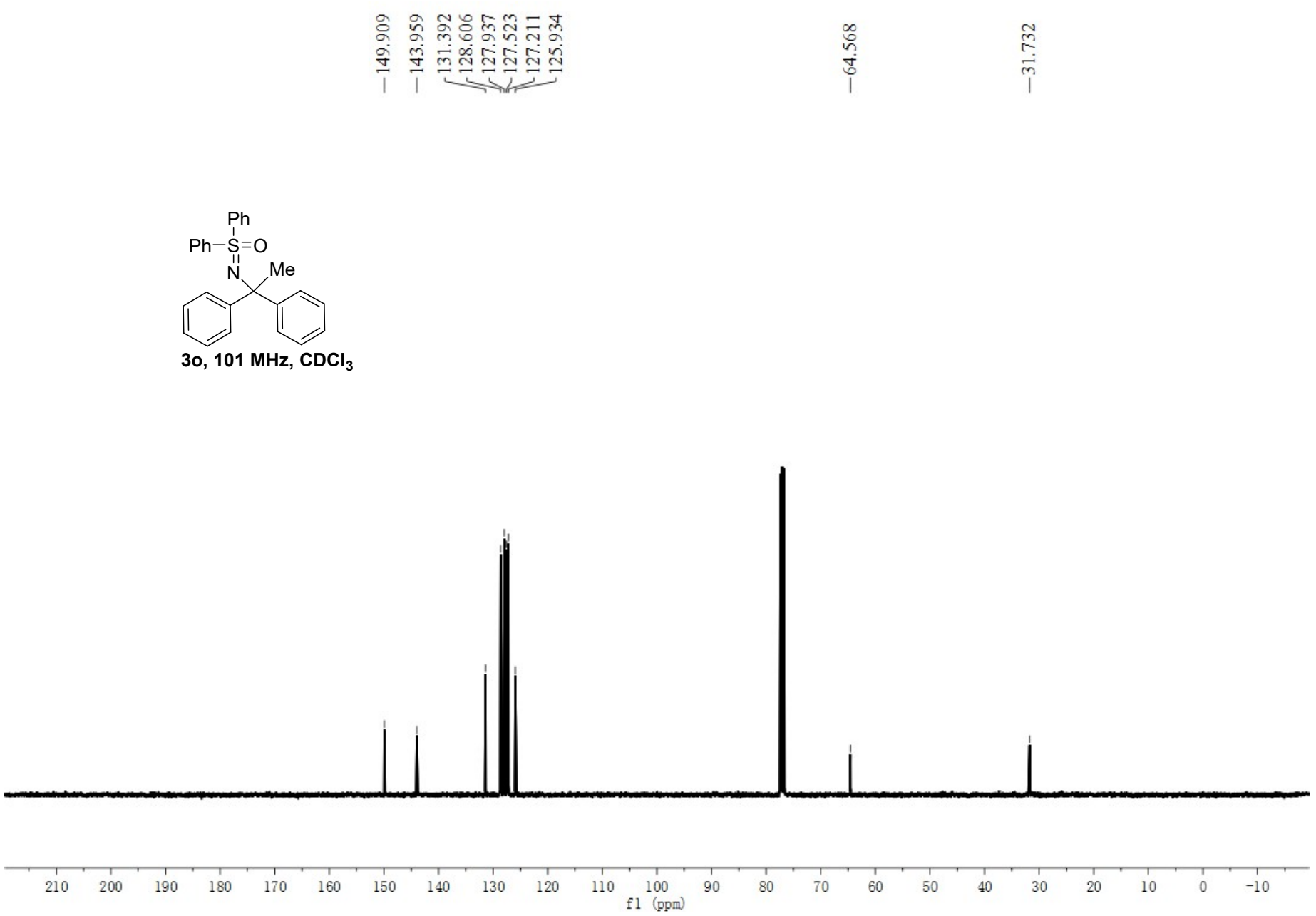

145.866
141.054
132.364
129.012
128.766
128.165
127.490
126.481
61.754
Ph
Ph—S=O
N
3n, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



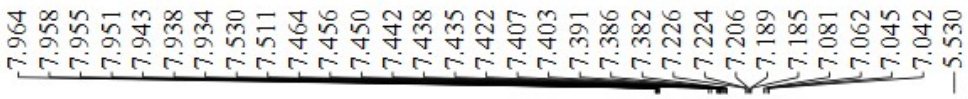


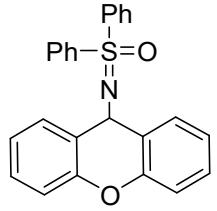
3o, 400 MHz, $CDCl_3$



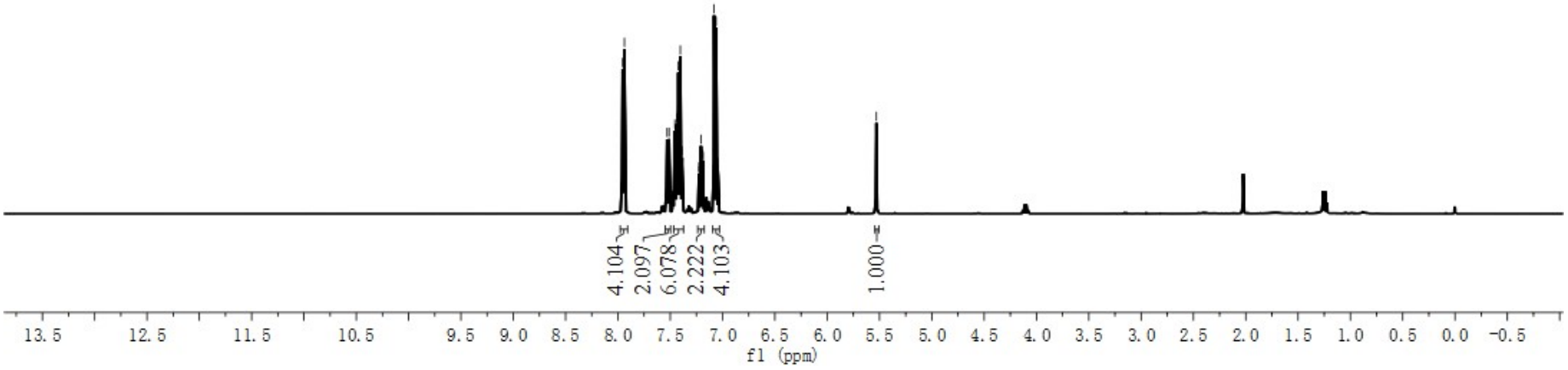


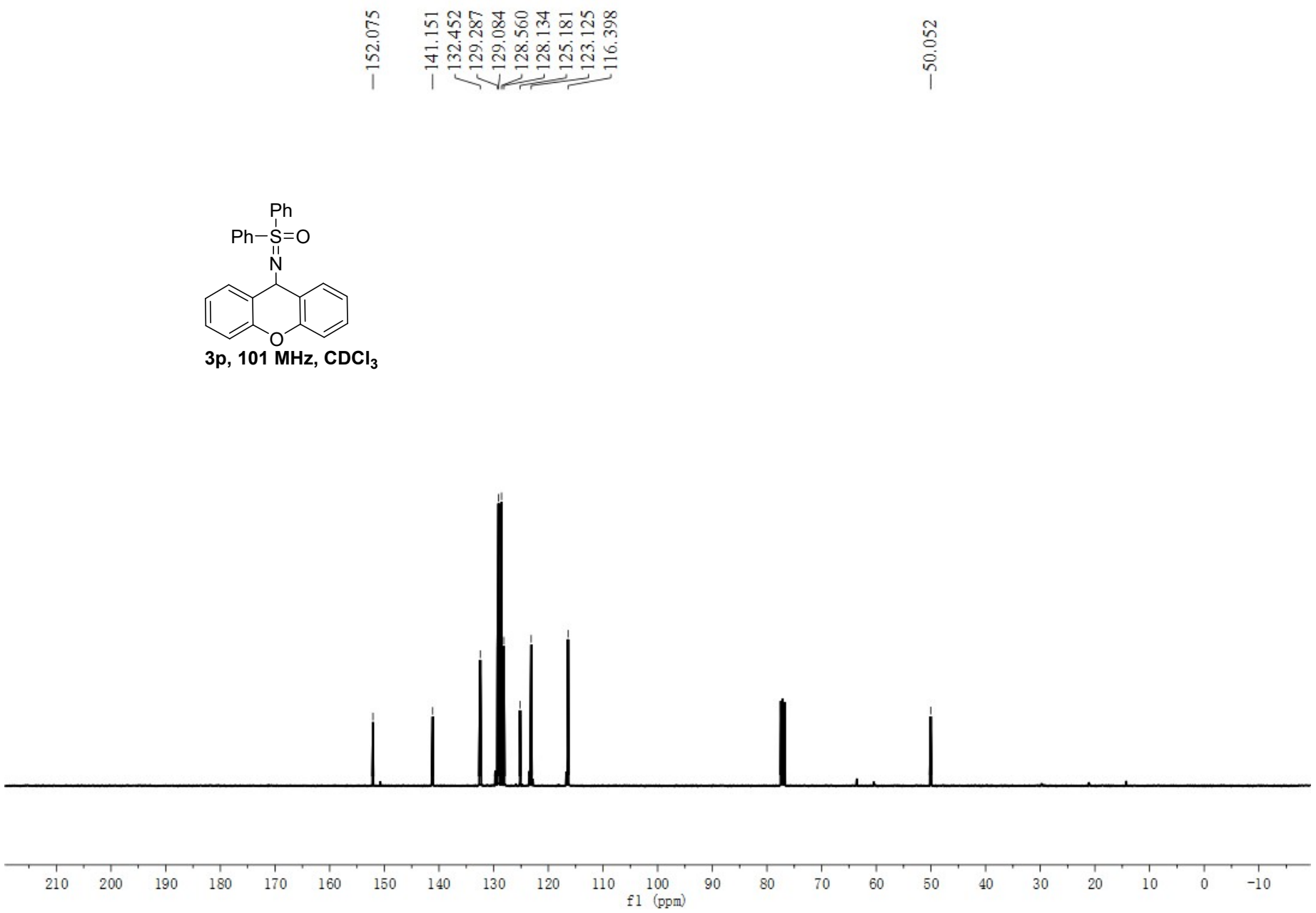
3o, 101 MHz, $CDCl_3$



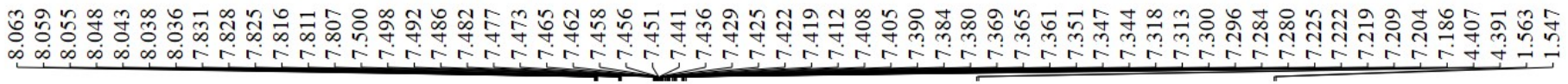


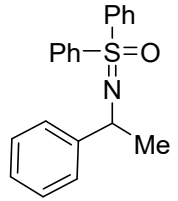
3p, 400 MHz, $CDCl_3$



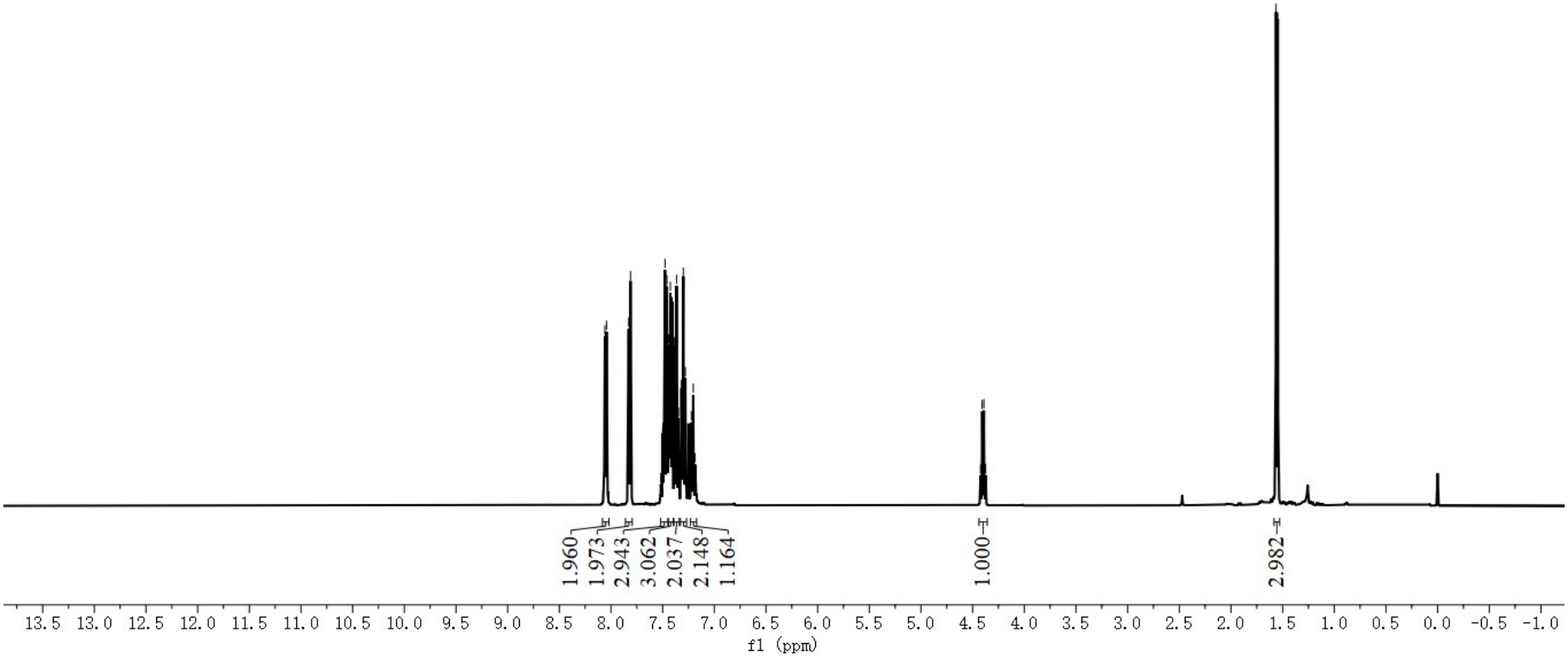


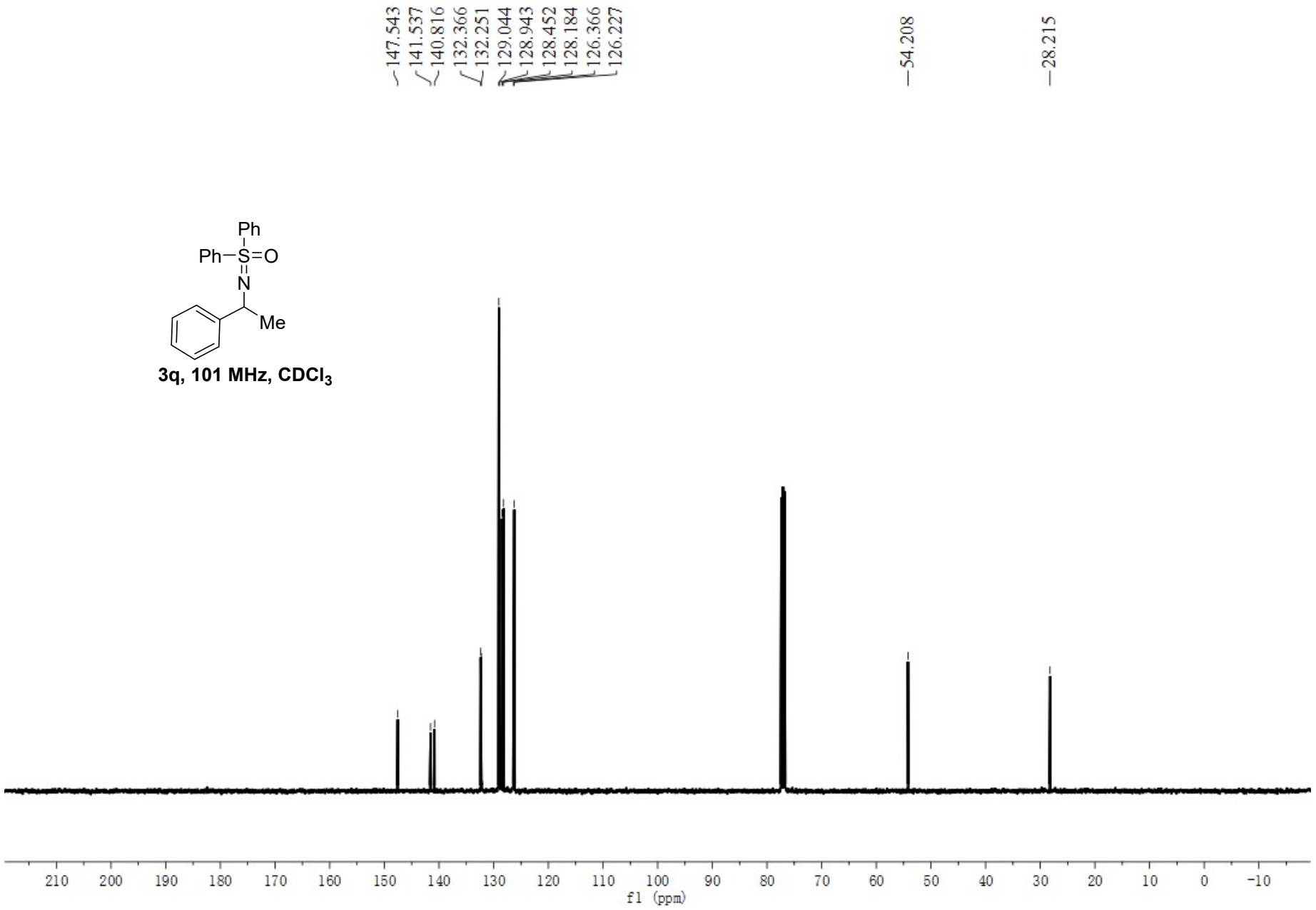
3p, 101 MHz, $CDCl_3$



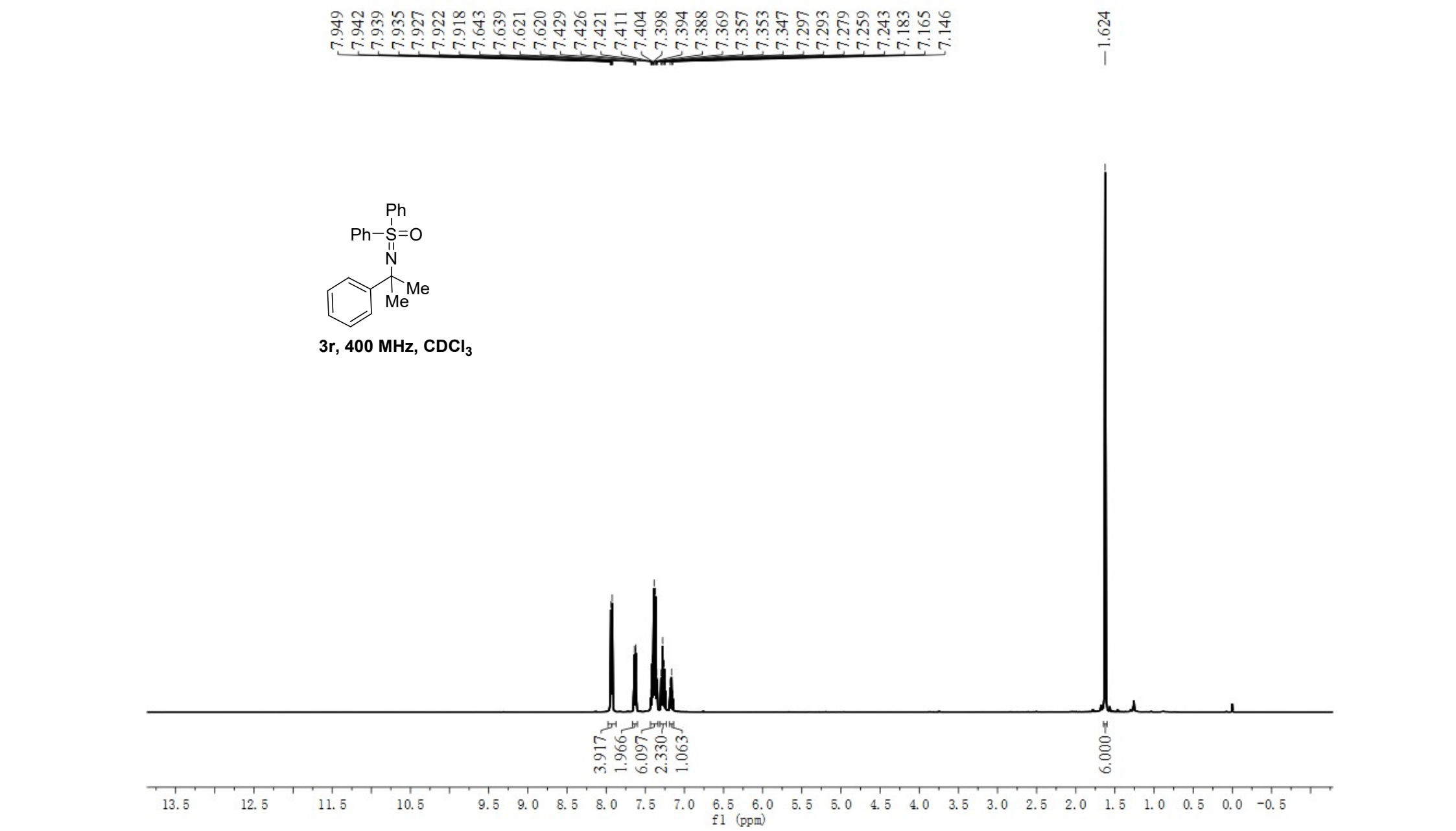


3q, 400 MHz, $CDCl_3$

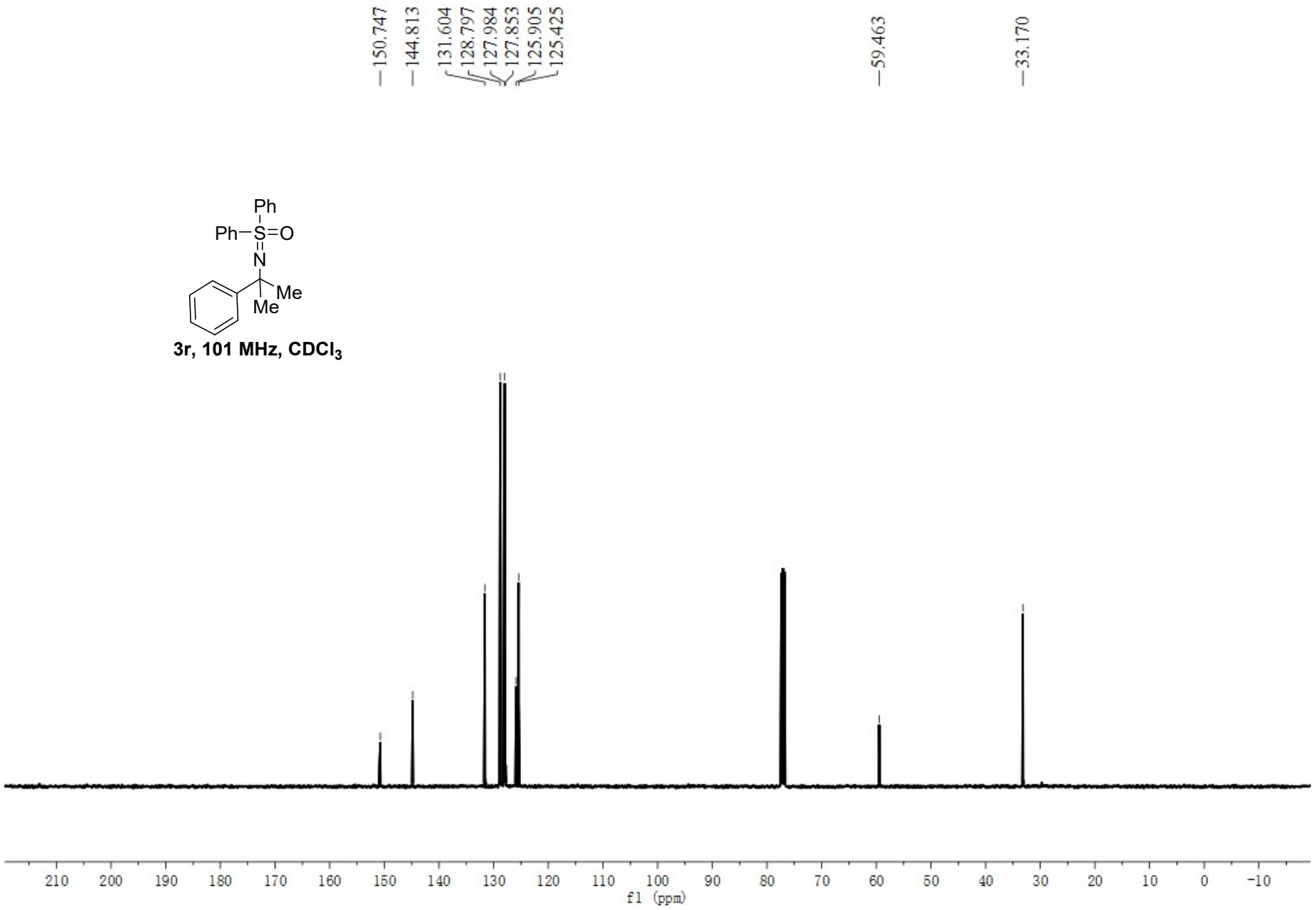




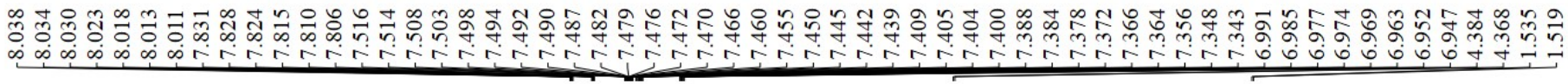
3q, 101 MHz, $CDCl_3$

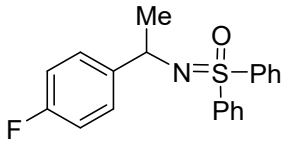


3r, 400 MHz, $CDCl_3$

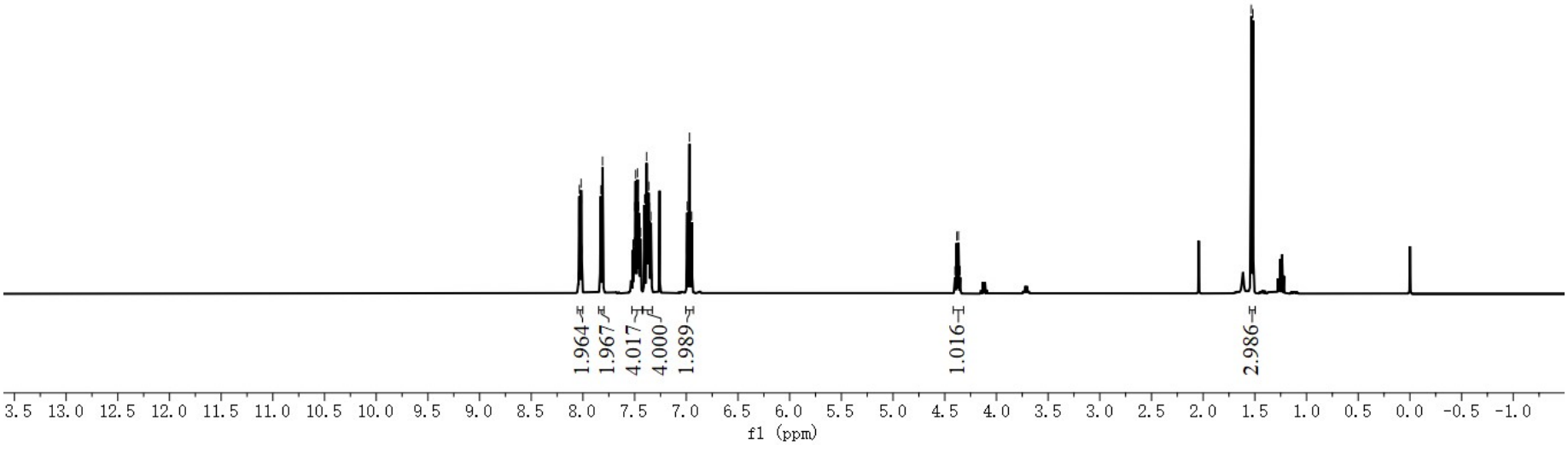


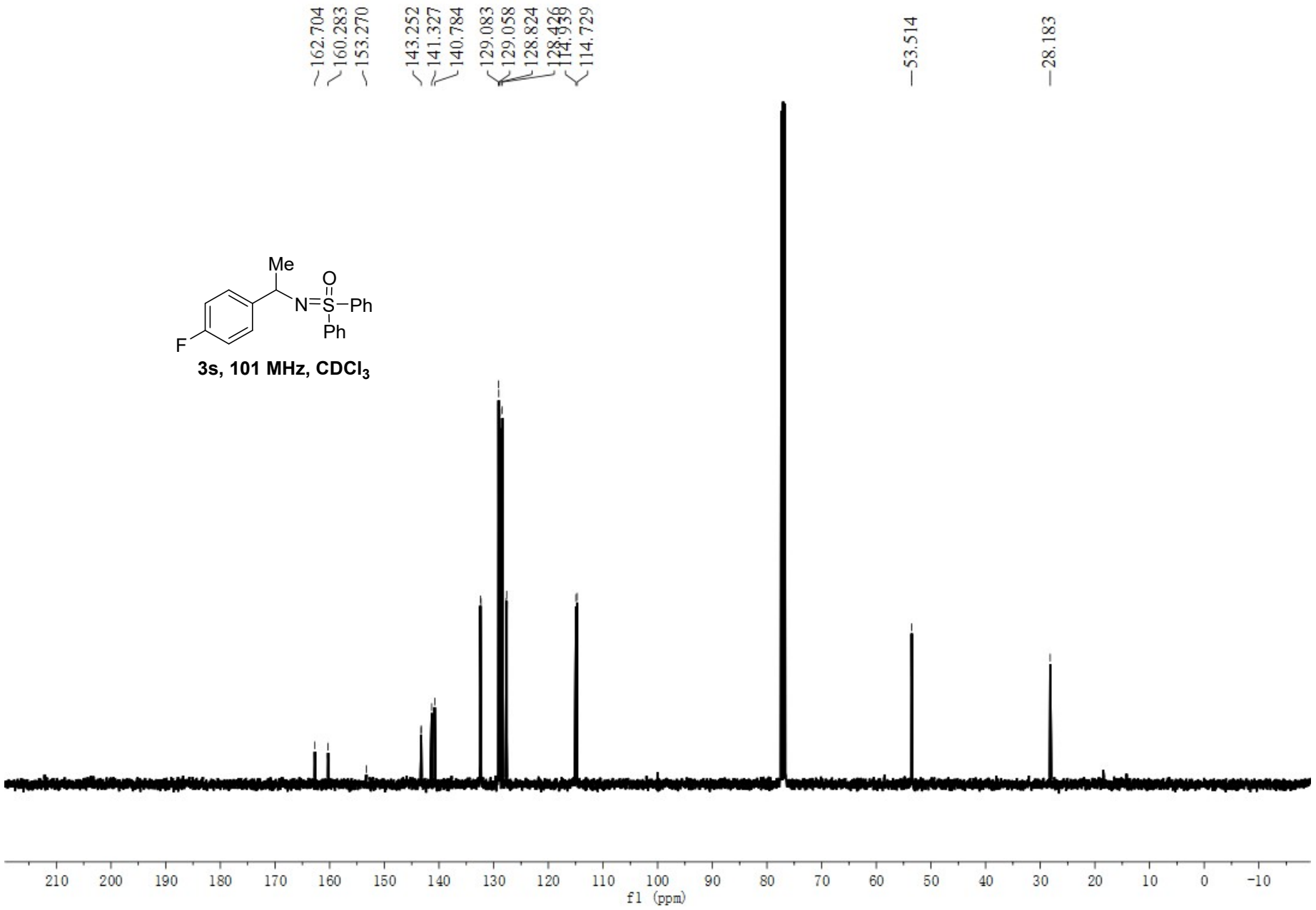
3r, 101 MHz, $CDCl_3$

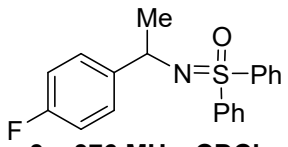




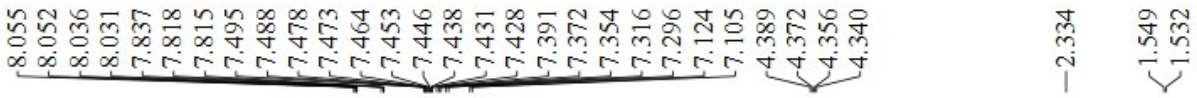
3s, 400 MHz, $CDCl_3$

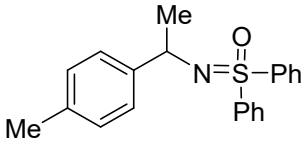



162.704
160.283
153.270
143.252
141.327
140.784
129.083
129.058
128.824
128.426
114.939
114.729
53.514
28.183
Me
O
N=S–Ph
Ph
F
3s, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

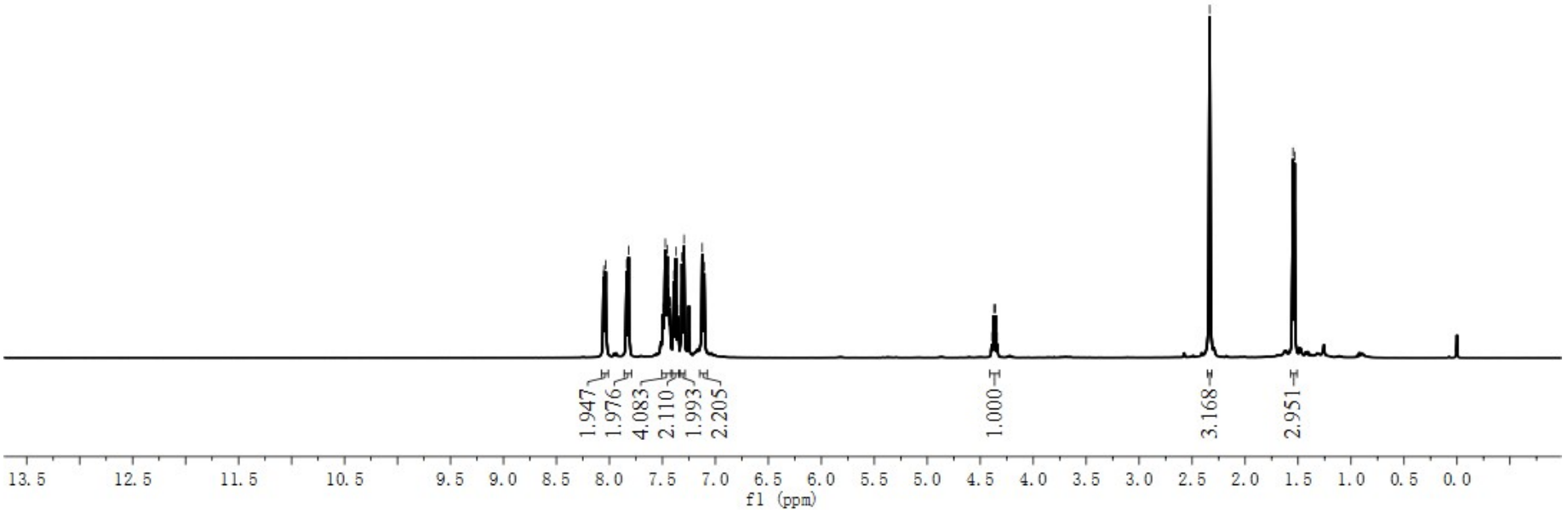


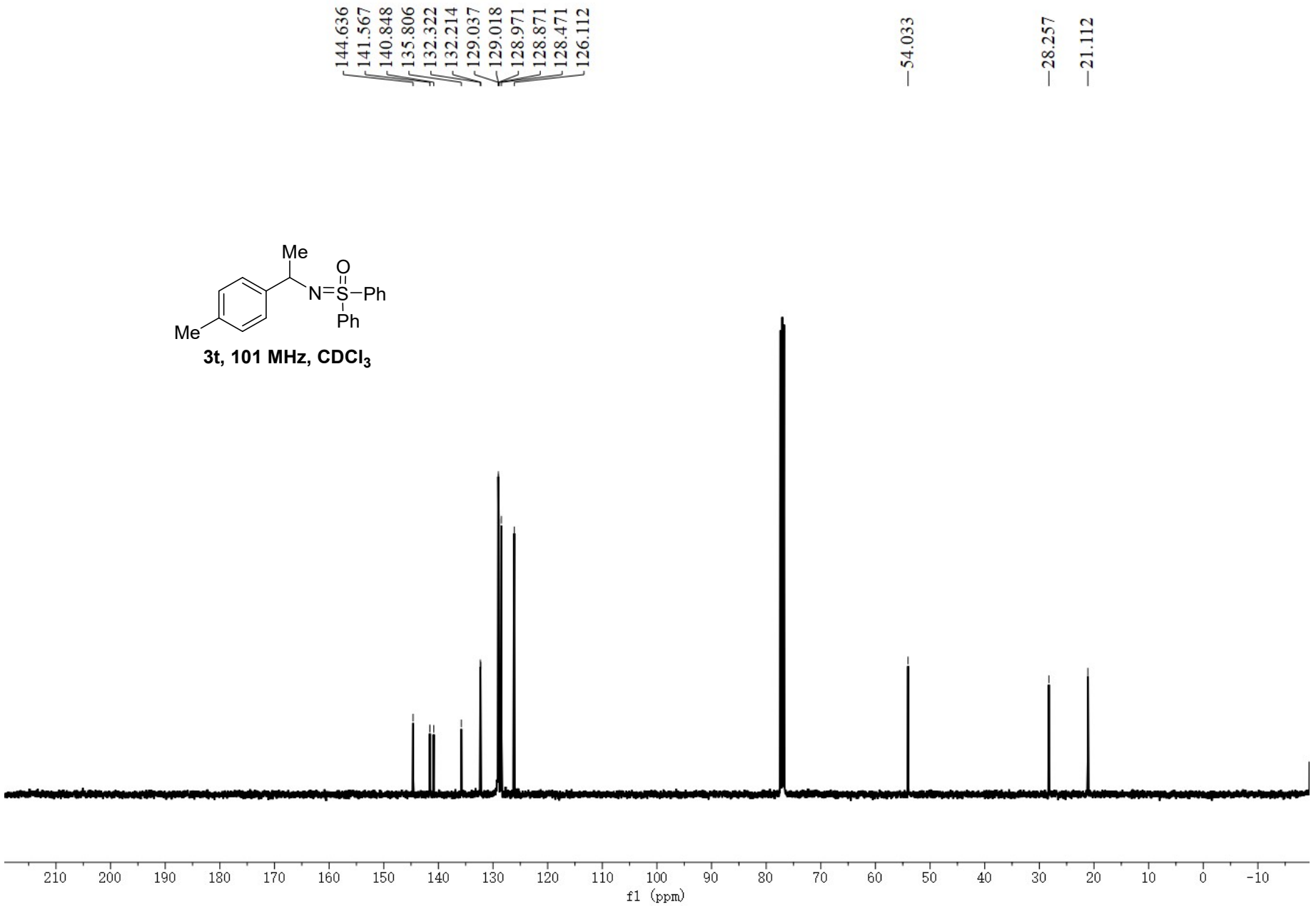
3s, 376 MHz, $CDCl_3$

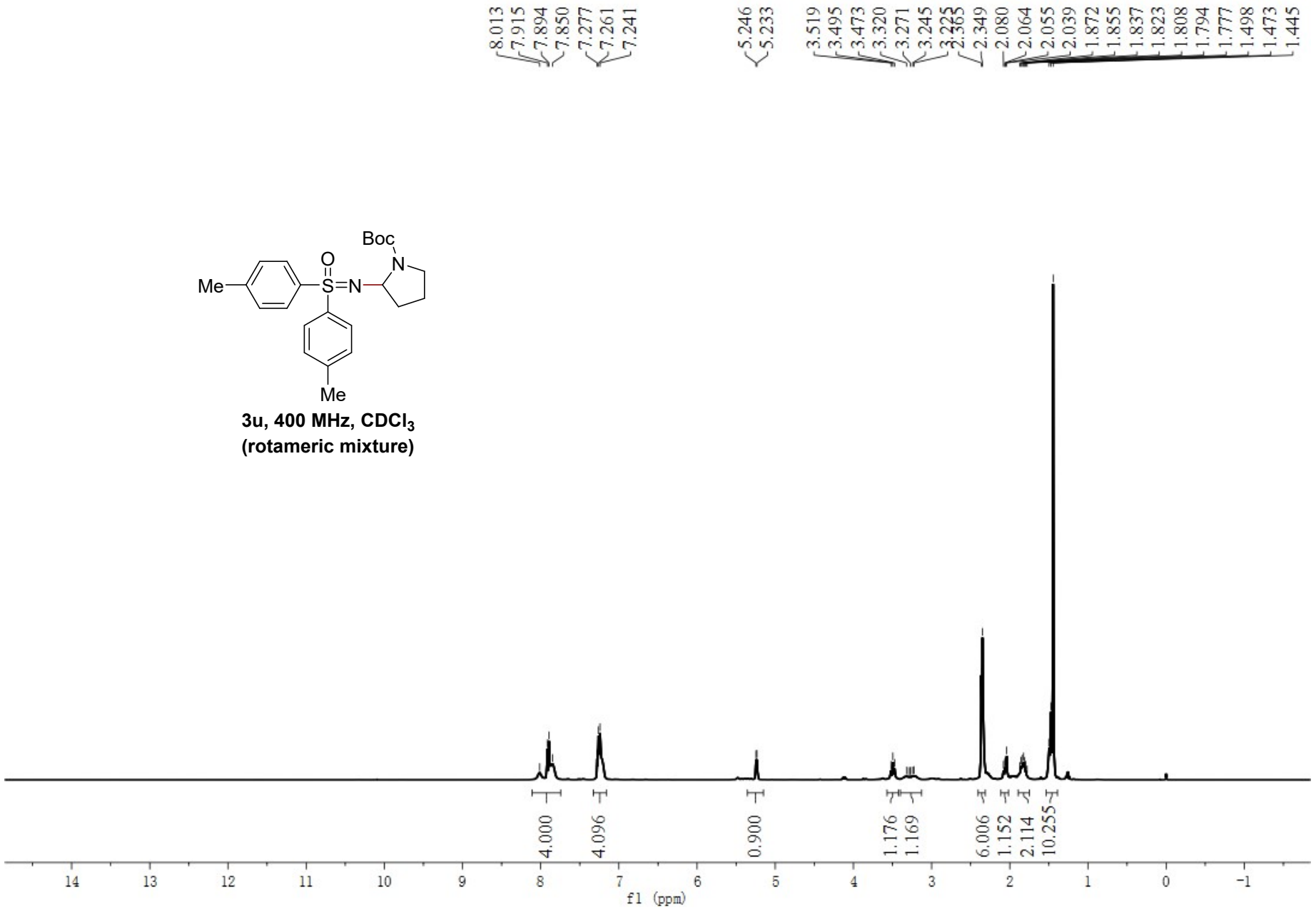




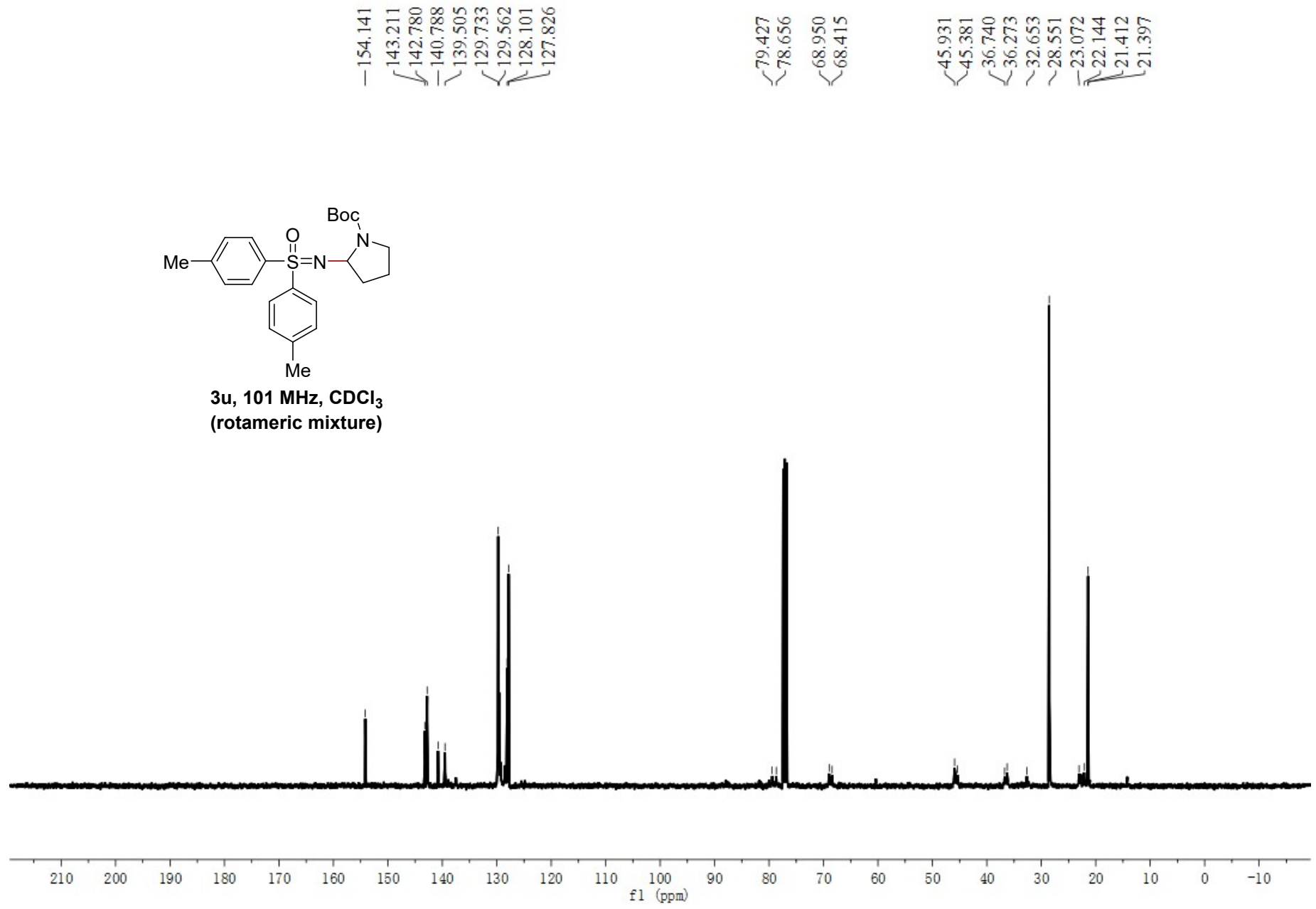
3t, 400 MHz, $CDCl_3$



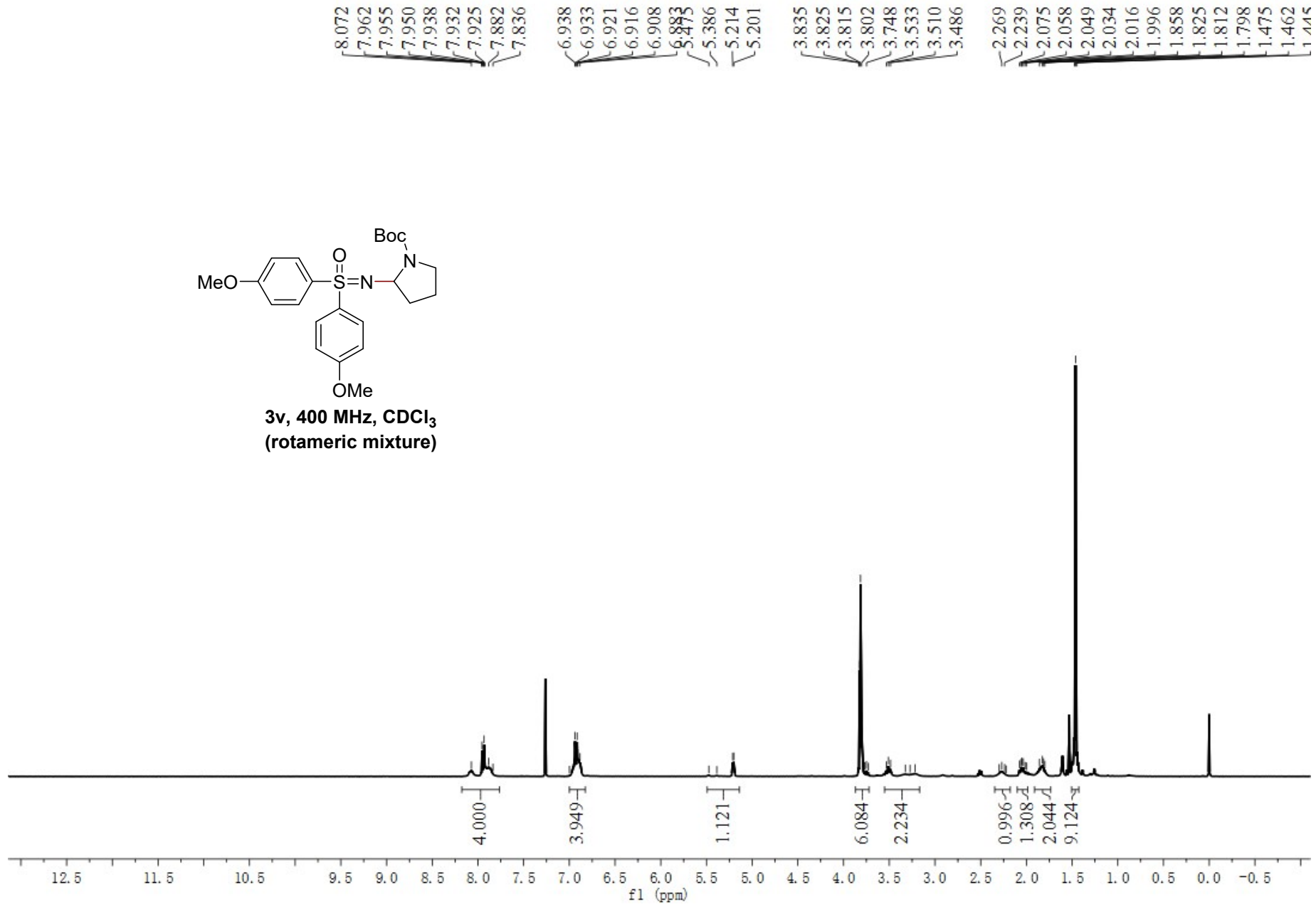

144.636
141.567
140.848
135.806
132.322
132.214
129.037
129.018
128.971
128.871
128.471
126.112
54.033
28.257
21.112
Me
O
N=S–Ph
Ph
Me
3t, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



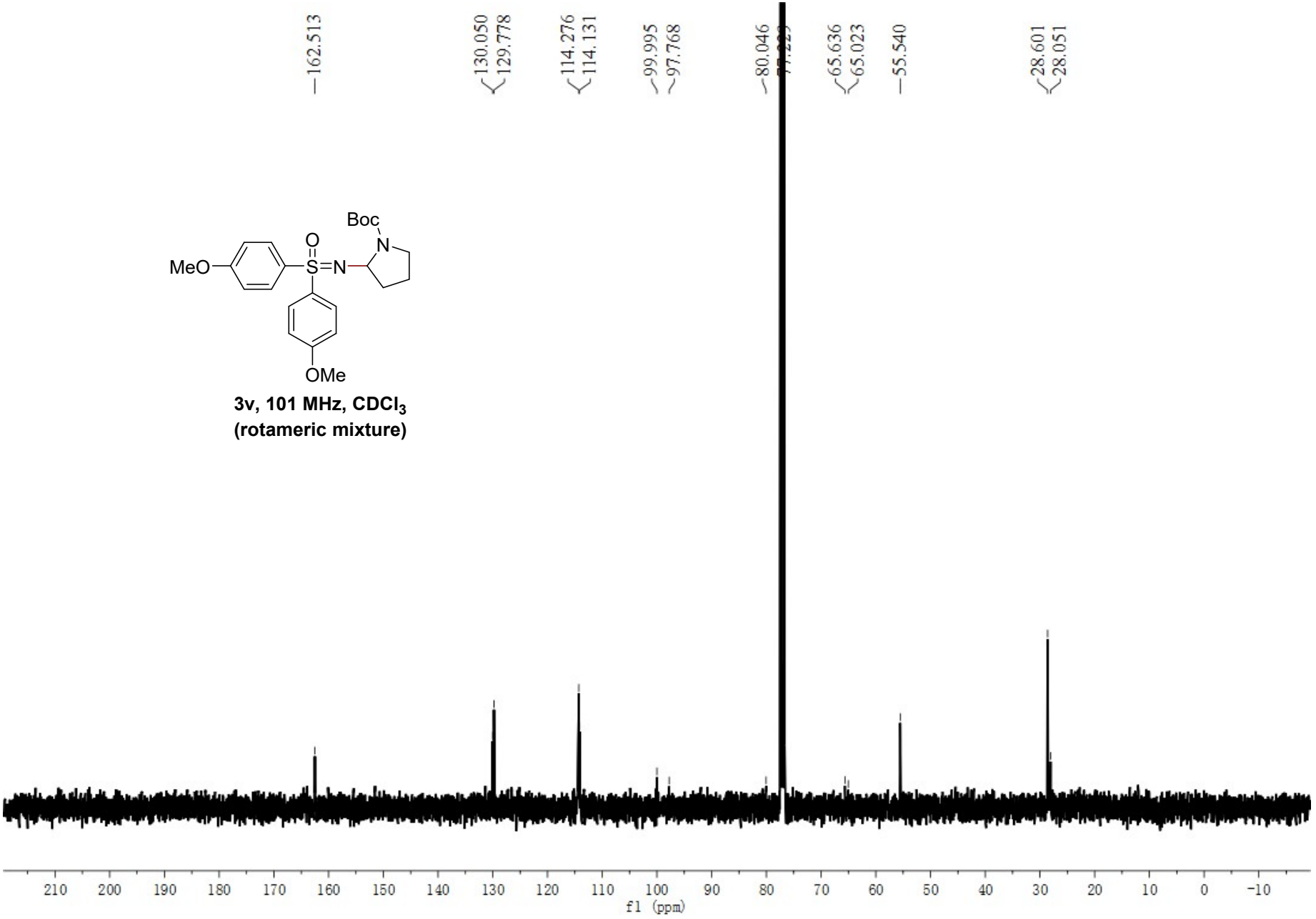
3u, 400 MHz, $CDCl_3$
(rotameric mixture)



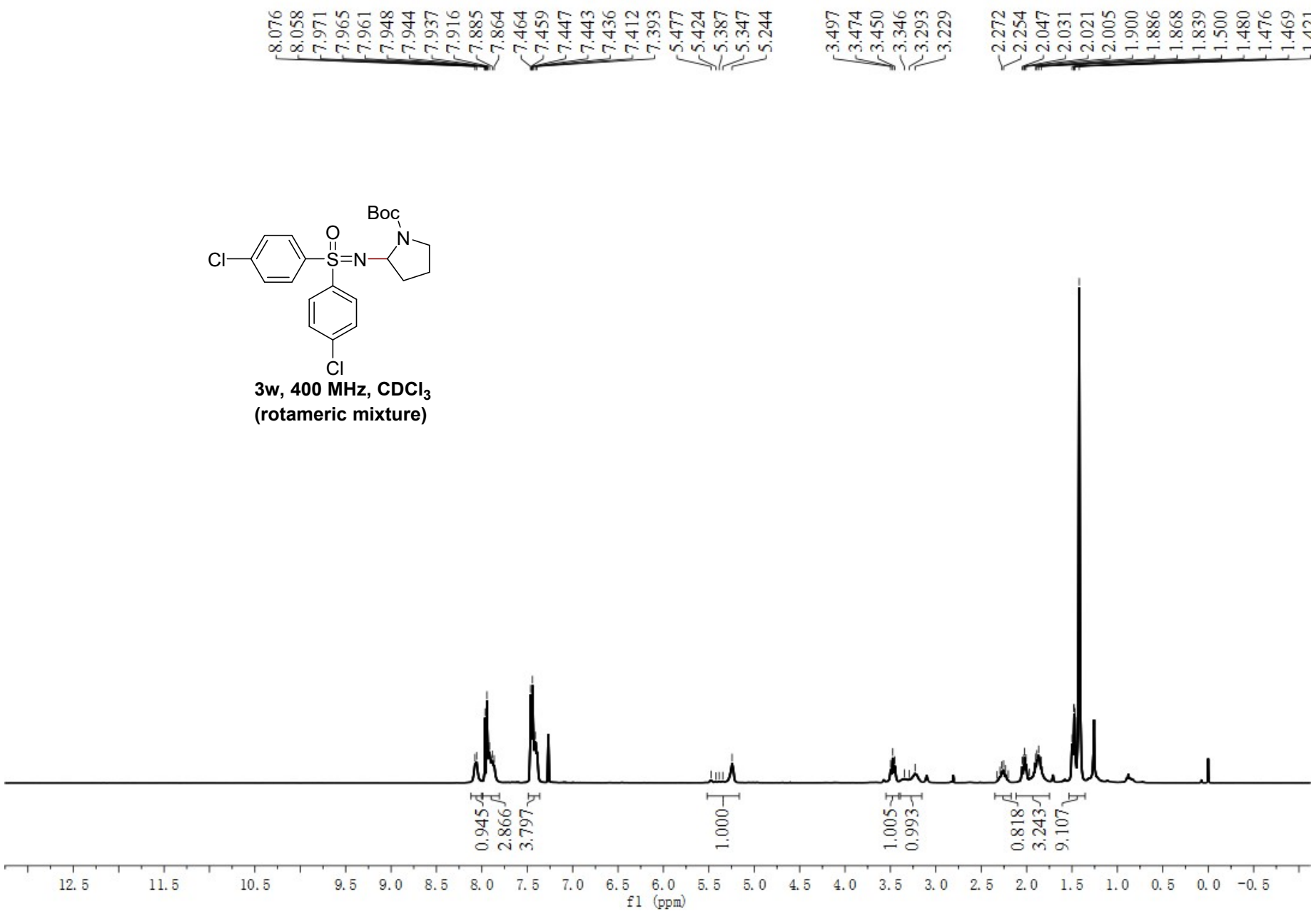
3u, 101 MHz, $CDCl_3$
(rotameric mixture)



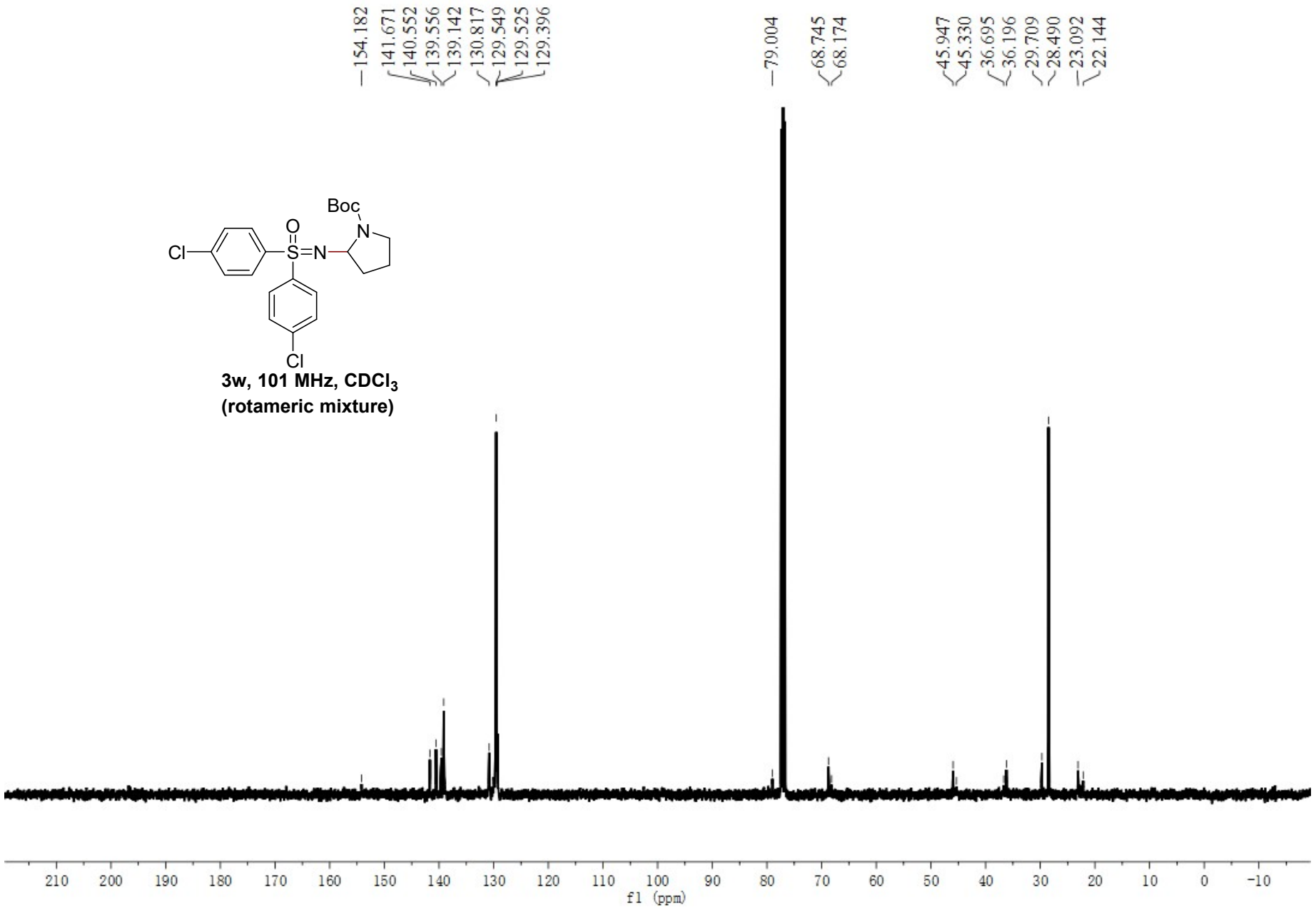
3v, 400 MHz, $CDCl_3$
(rotameric mixture)



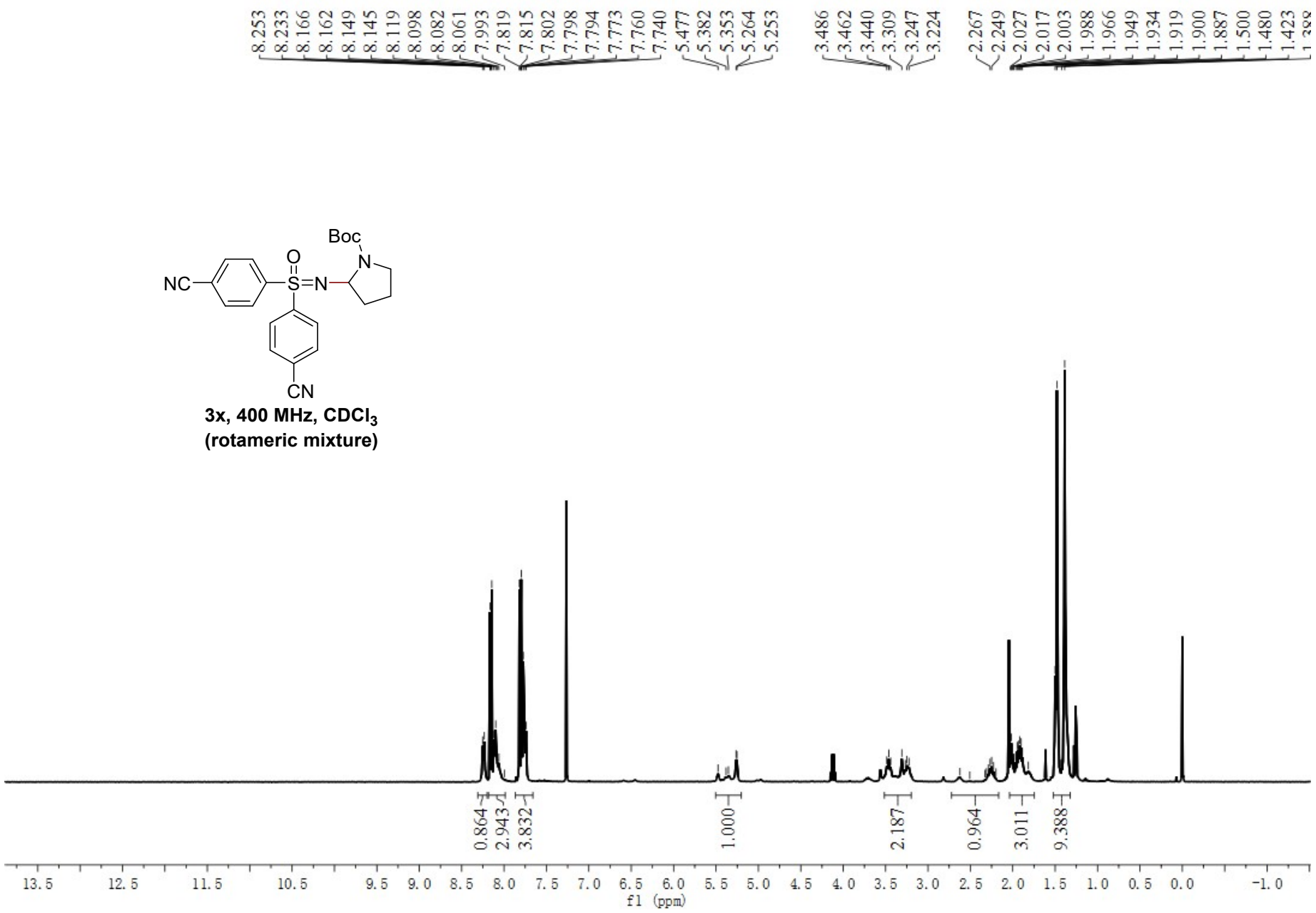
3v, 101 MHz, $CDCl_3$
(rotameric mixture)



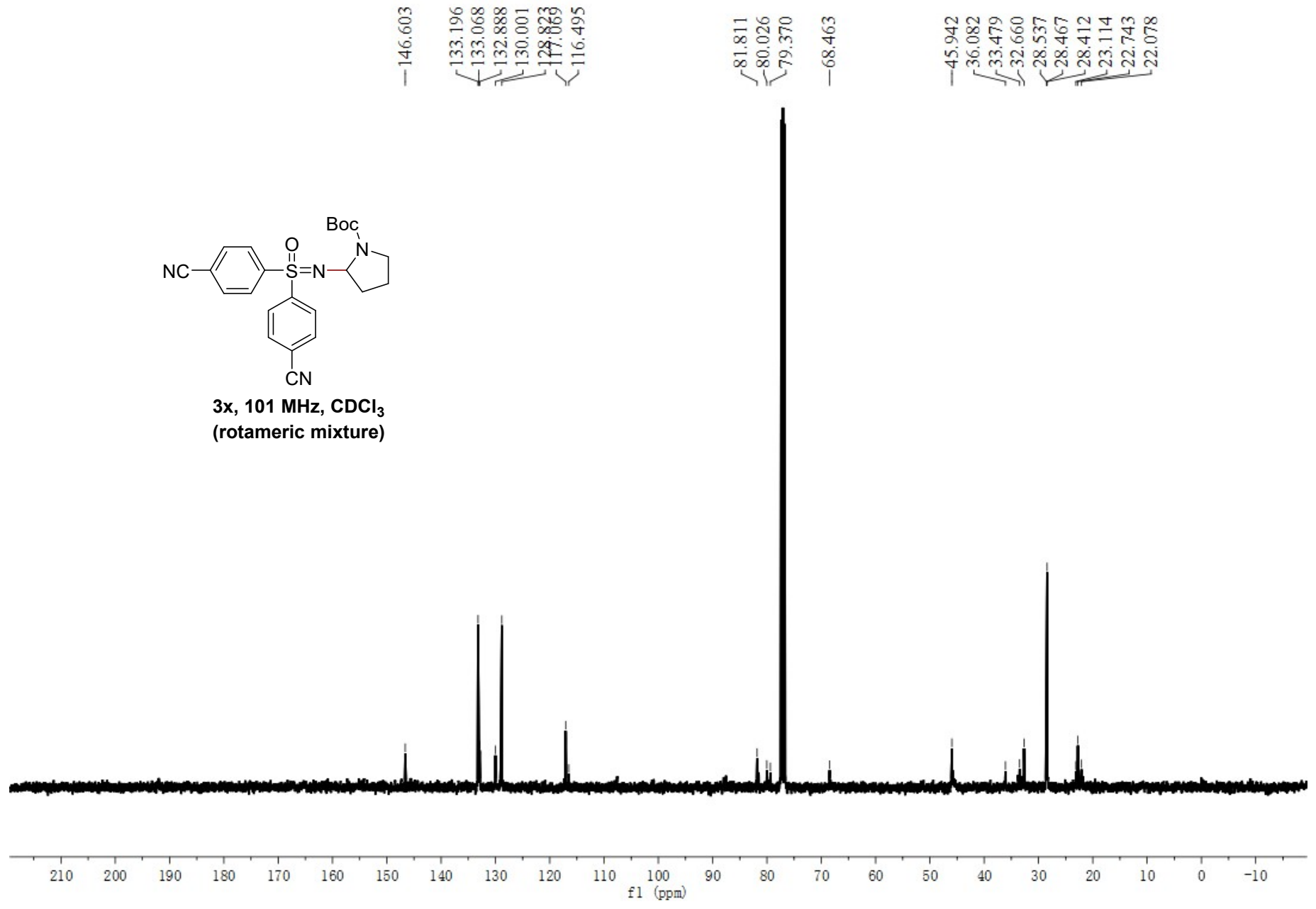
3w, 400 MHz, $CDCl_3$
(rotameric mixture)



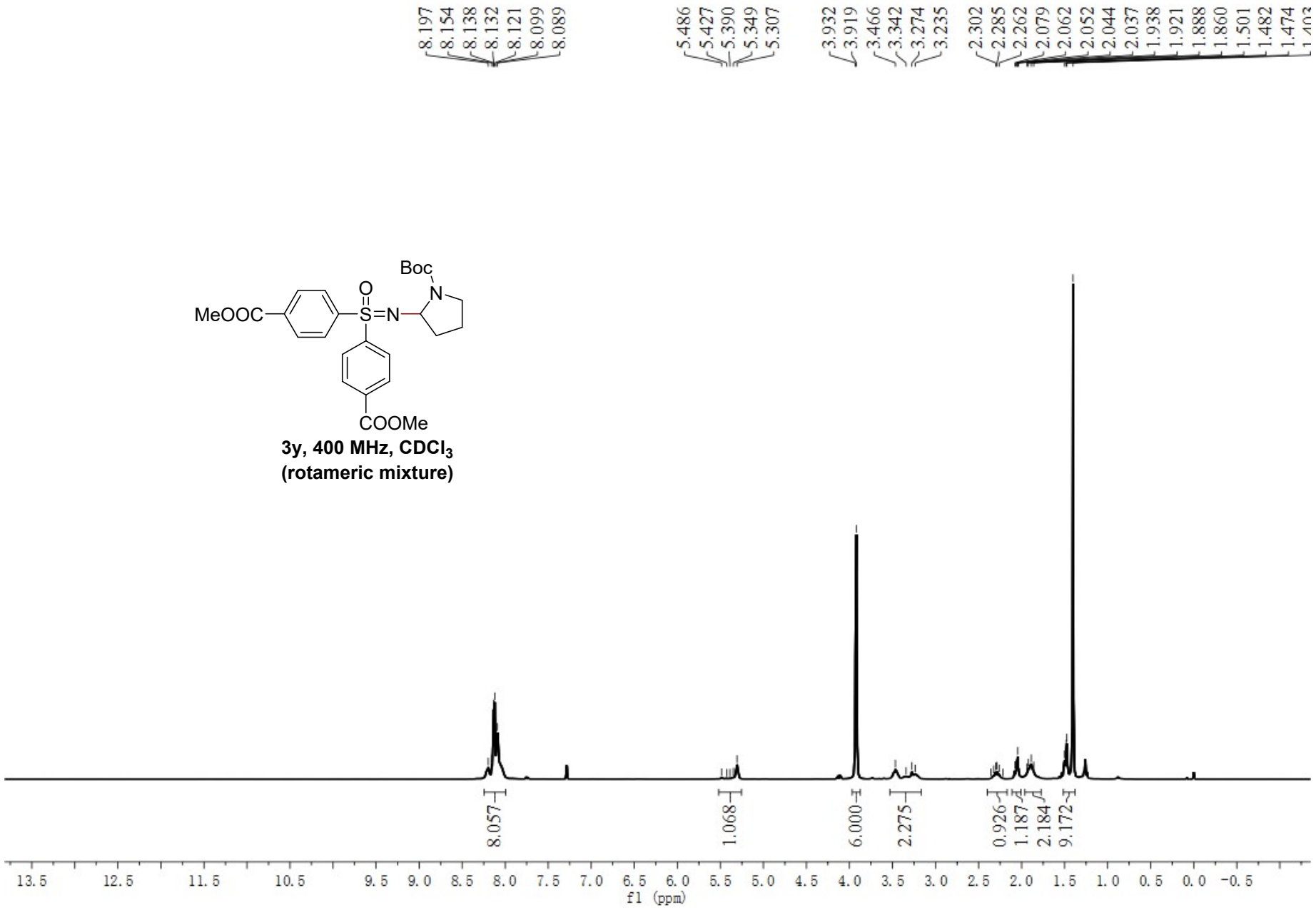
3w, 101 MHz, $CDCl_3$
(rotameric mixture)



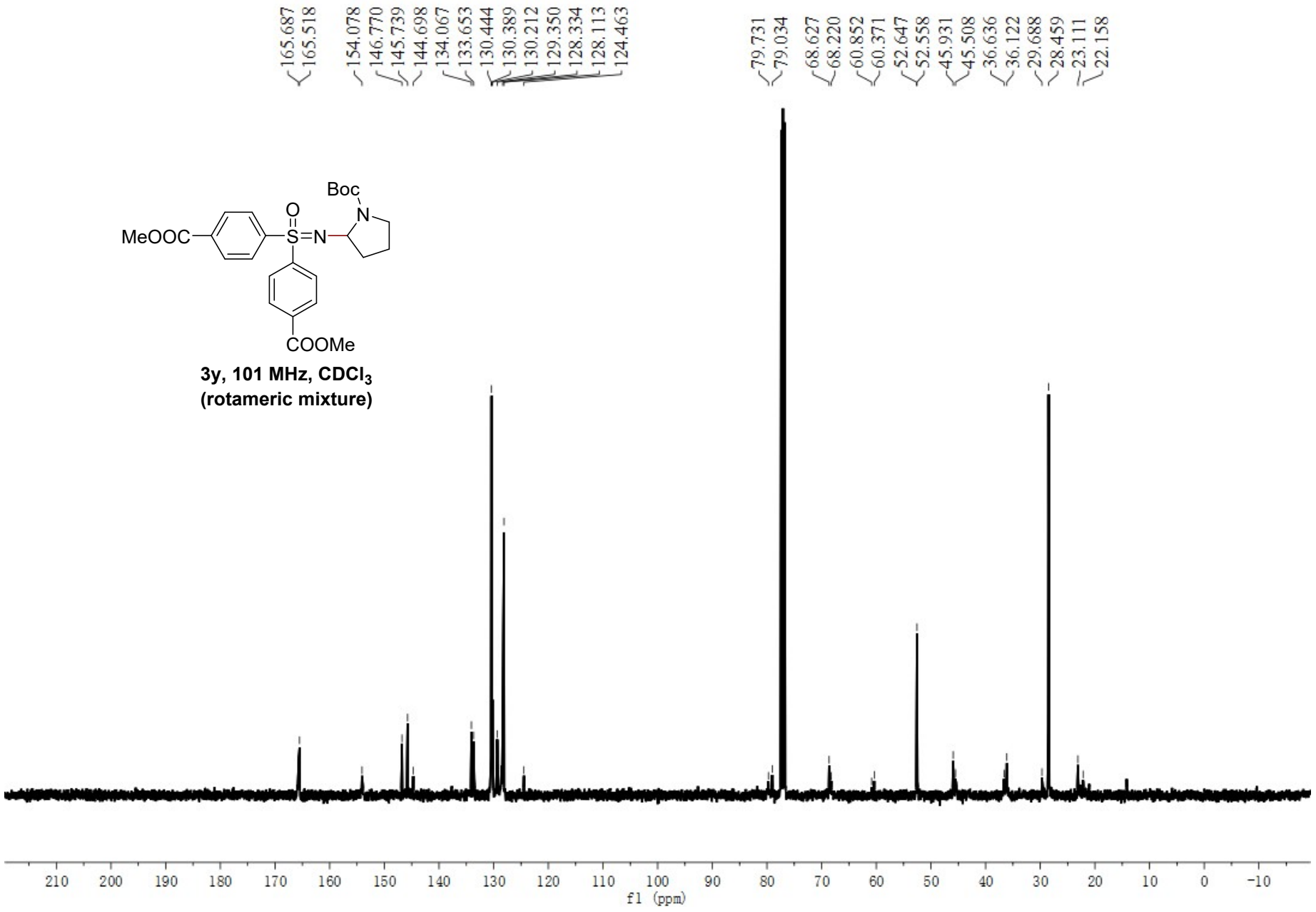
3x, 400 MHz, $CDCl_3$
(rotameric mixture)

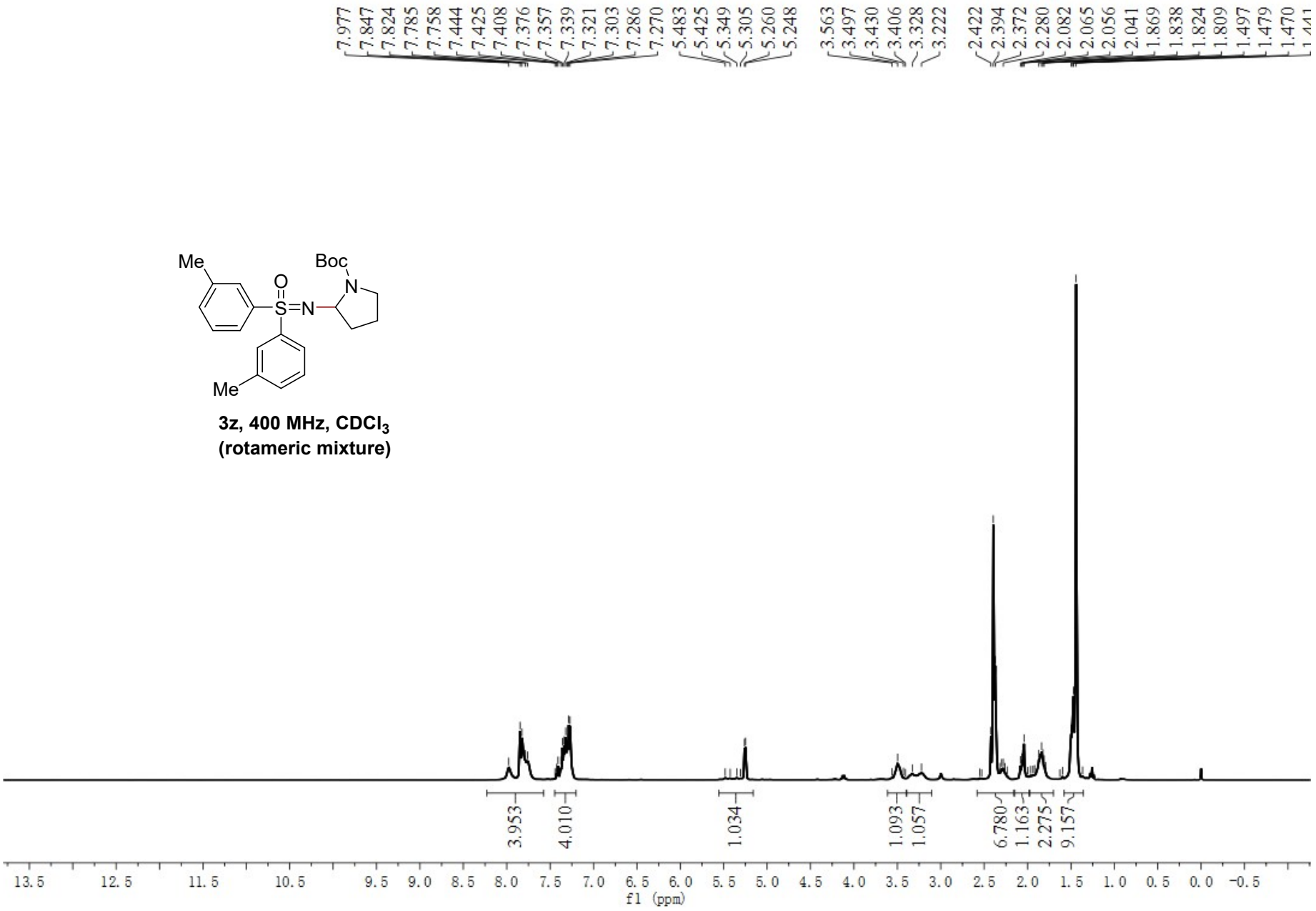


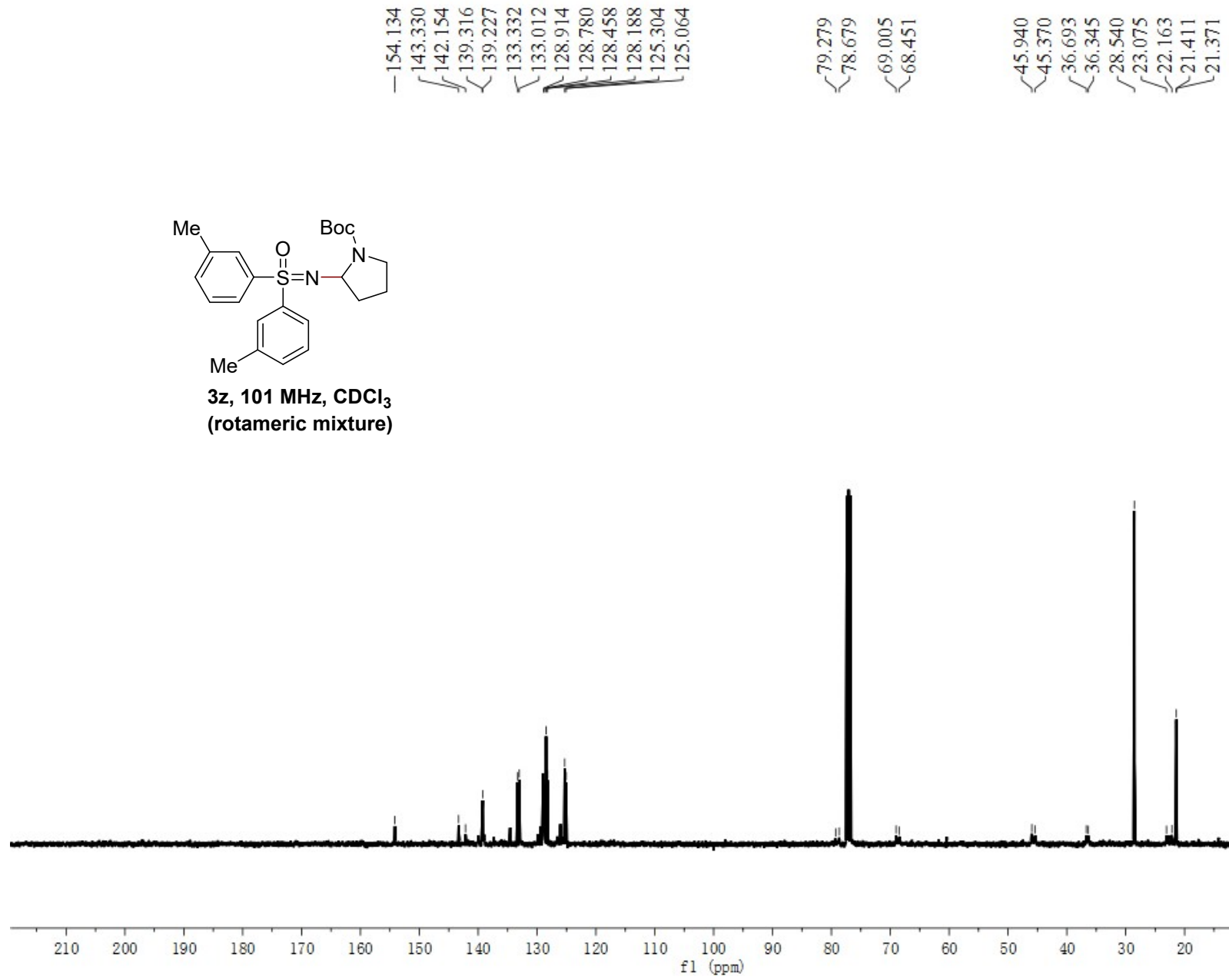
3x, 101 MHz, $CDCl_3$
(rotameric mixture)



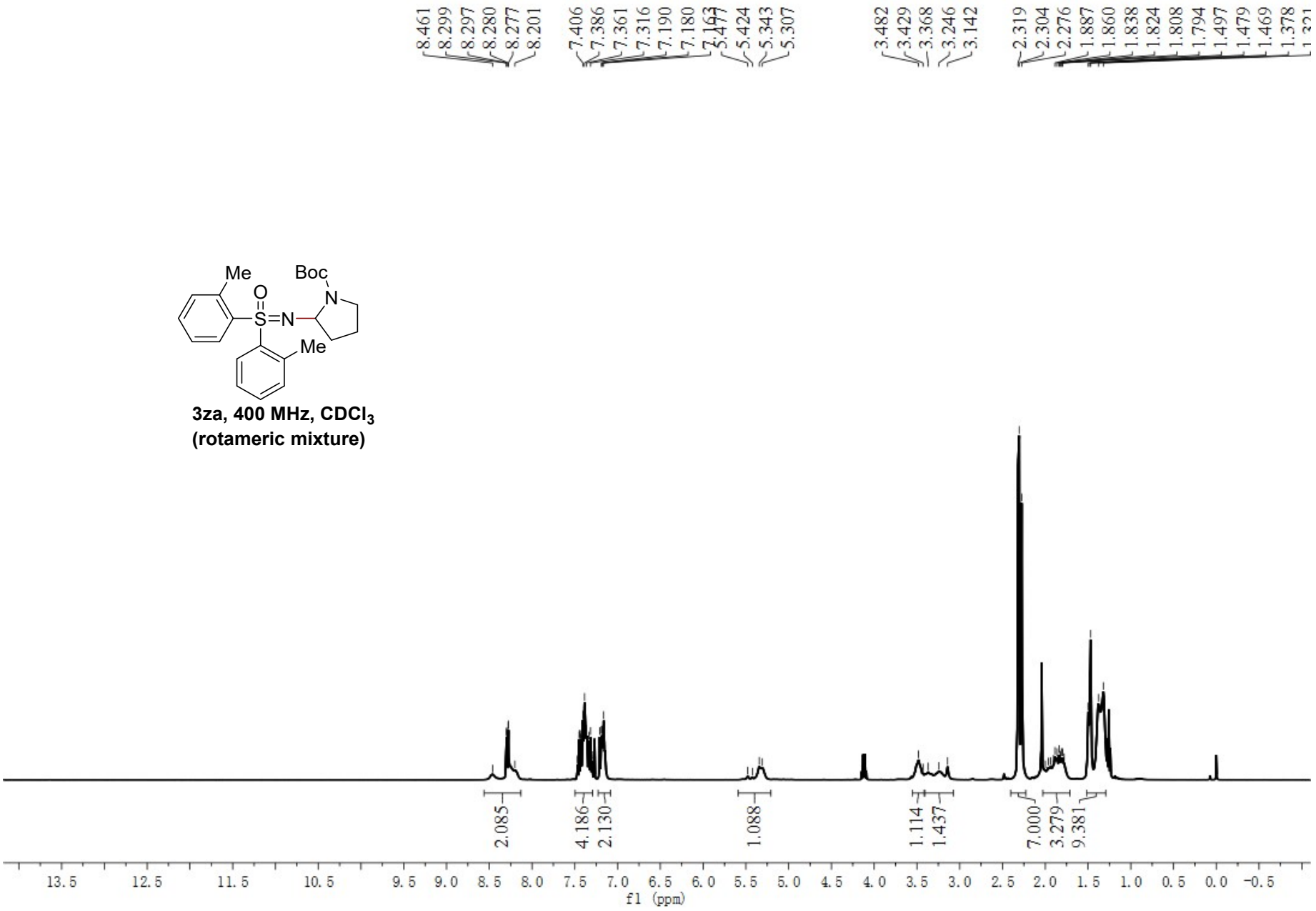
3y, 400 MHz, $CDCl_3$
(rotameric mixture)


165.687
165.518
154.078
146.770
145.739
144.698
134.067
133.653
130.444
130.389
130.212
129.350
128.334
128.113
124.463
79.731
79.034
68.627
68.220
60.852
60.371
52.647
52.558
45.931
45.508
36.636
36.122
29.688
28.459
23.111
22.158
Boc
N
O
S=N
MeOOC
COOMe
3y, 101 MHz, CDCl3
(rotameric mixture)
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

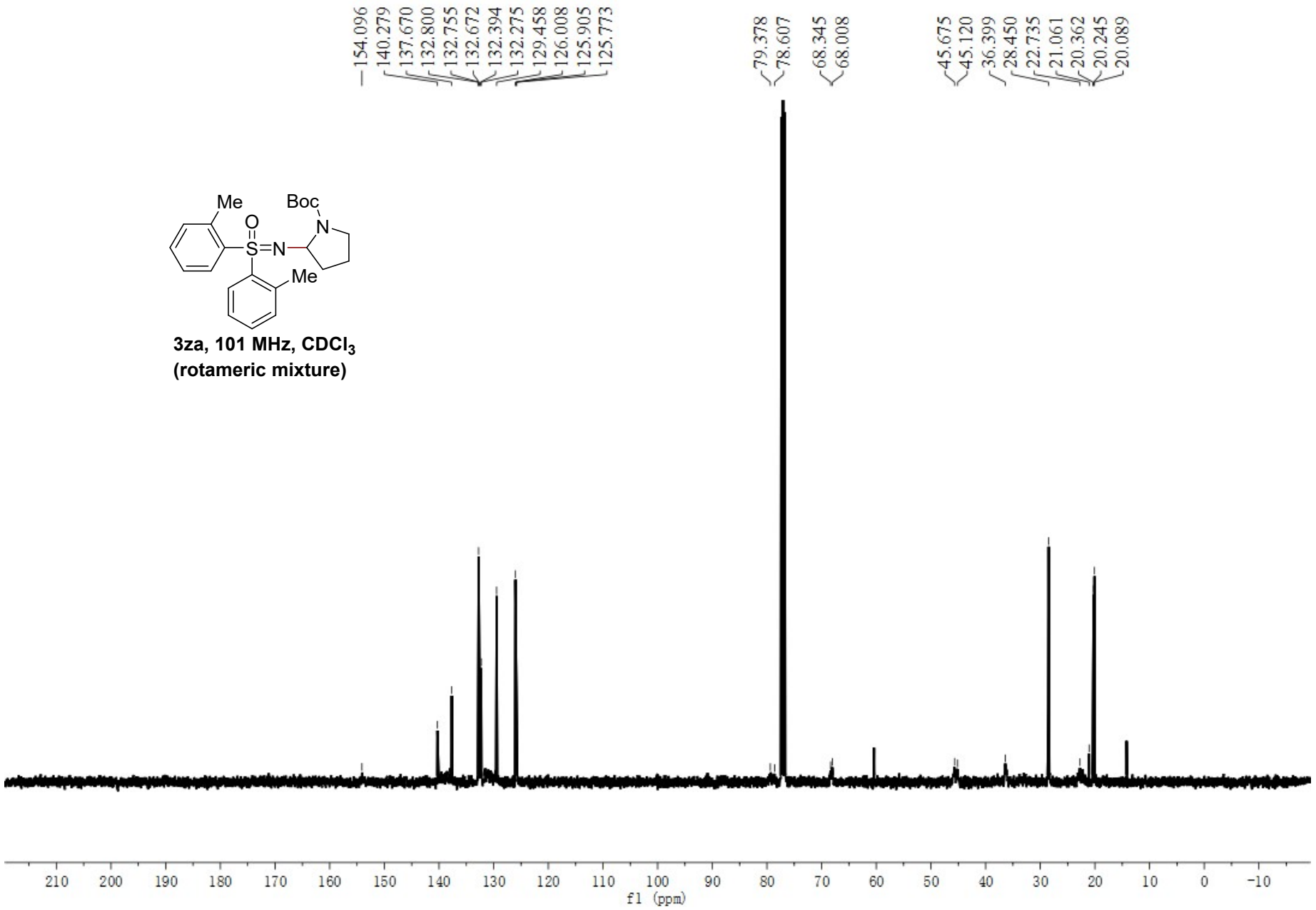

7.977
7.847
7.824
7.785
7.758
7.444
7.425
7.408
7.376
7.357
7.339
7.321
7.303
7.286
7.270
5.483
5.425
5.349
5.305
5.260
5.248
3.563
3.497
3.430
3.406
3.328
3.222
2.422
2.394
2.372
2.280
2.082
2.065
2.056
2.041
1.869
1.838
1.824
1.809
1.497
1.479
1.470
Me
Boc
N
O
S=N
Me
3z, 400 MHz, CDCl3
(rotameric mixture)
3.953
4.010
1.034
1.093
1.057
6.780
1.163
2.275
9.157
13.5
12.5
11.5
10.5
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)



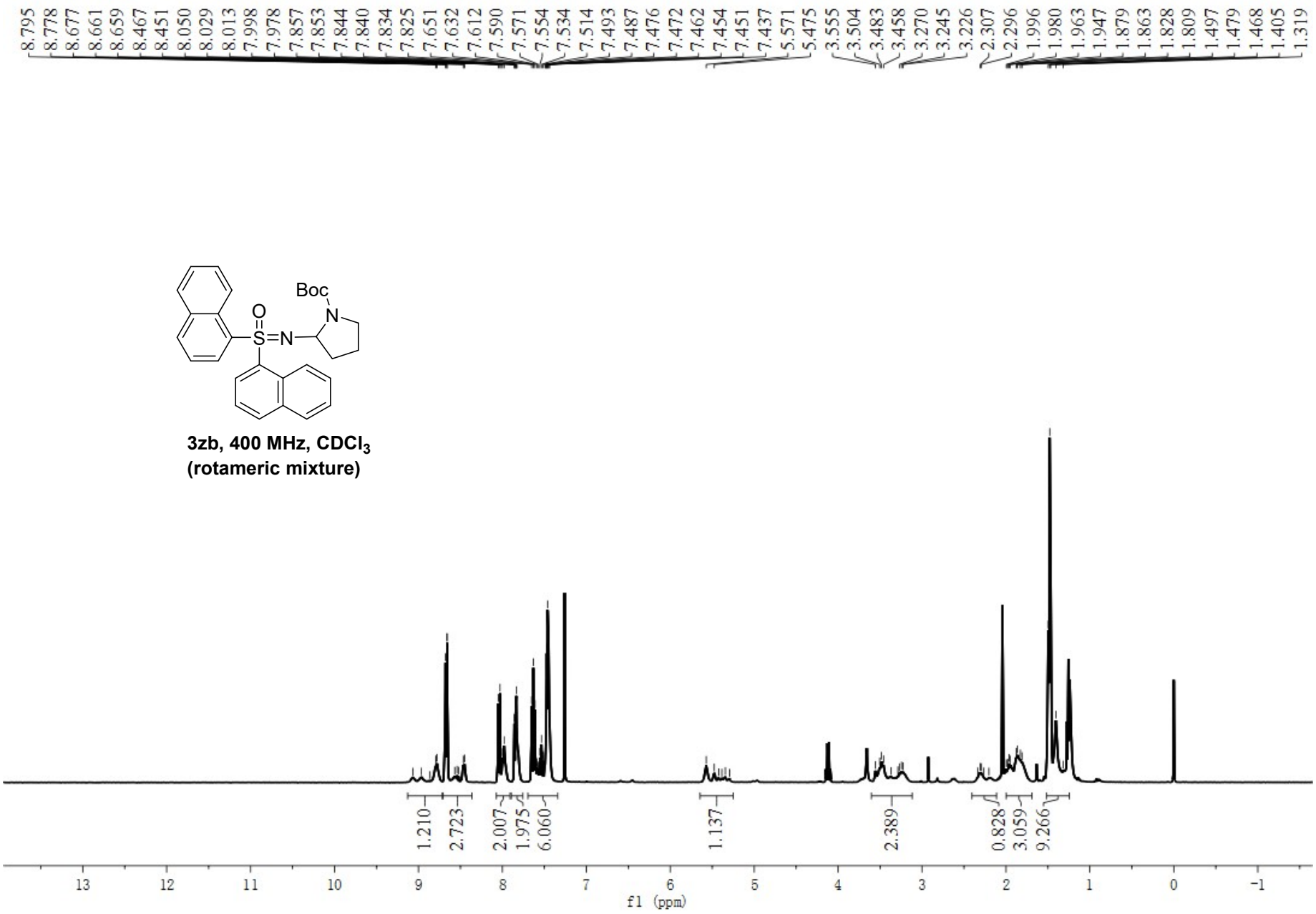
3z, 101 MHz, $CDCl_3$
(rotameric mixture)



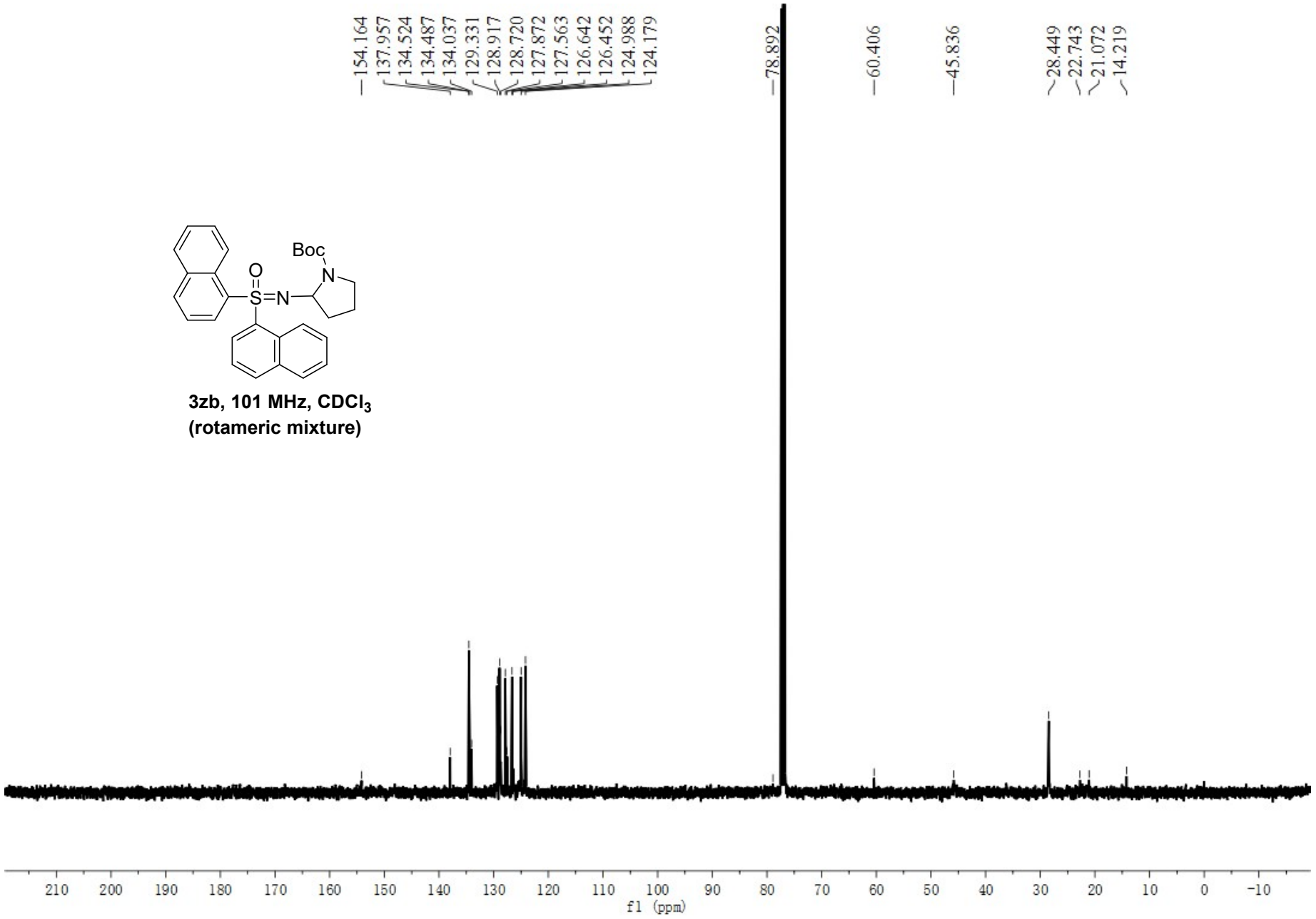
3za, 400 MHz, $CDCl_3$
(rotameric mixture)



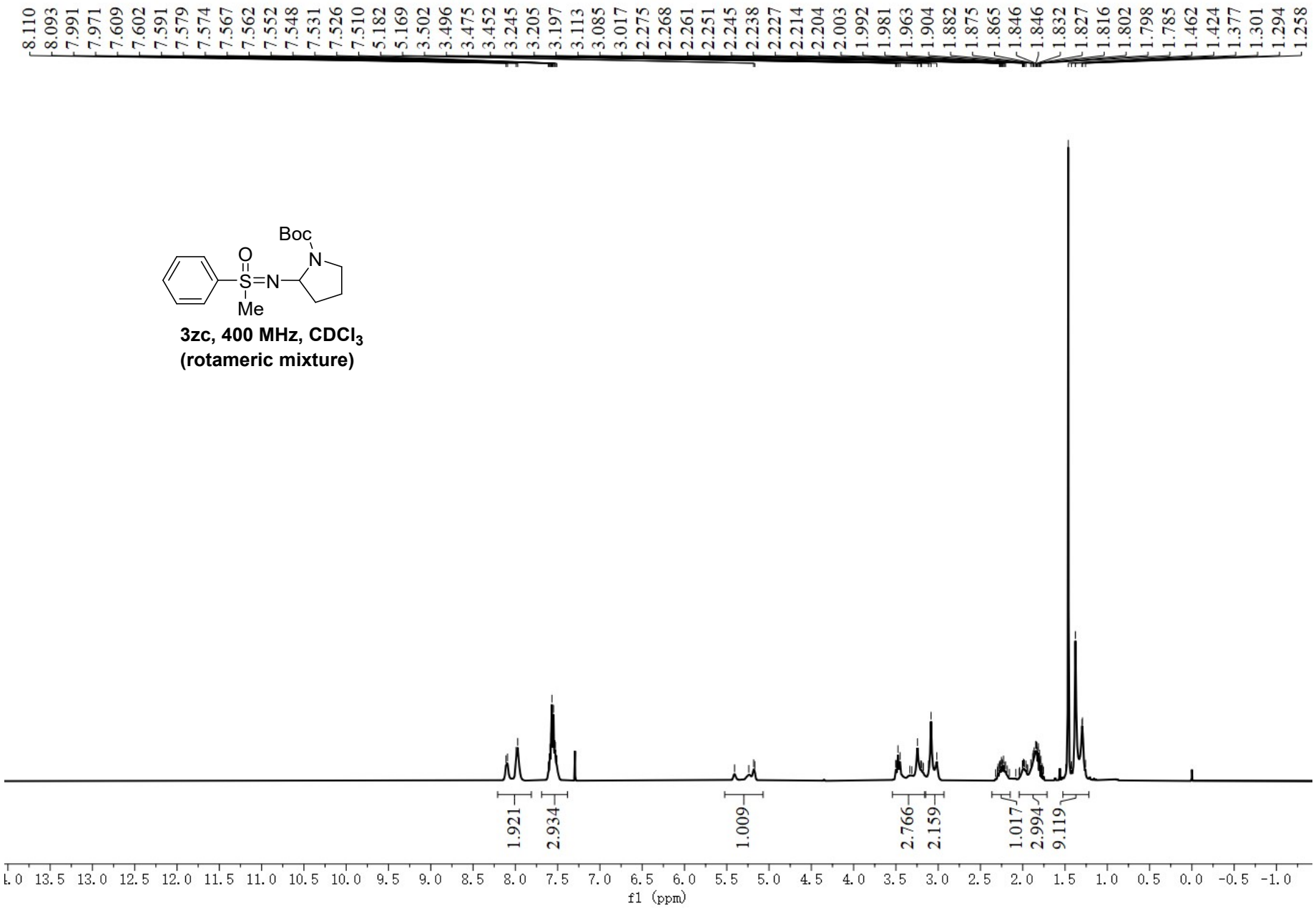
3za, 101 MHz, $CDCl_3$
(rotameric mixture)



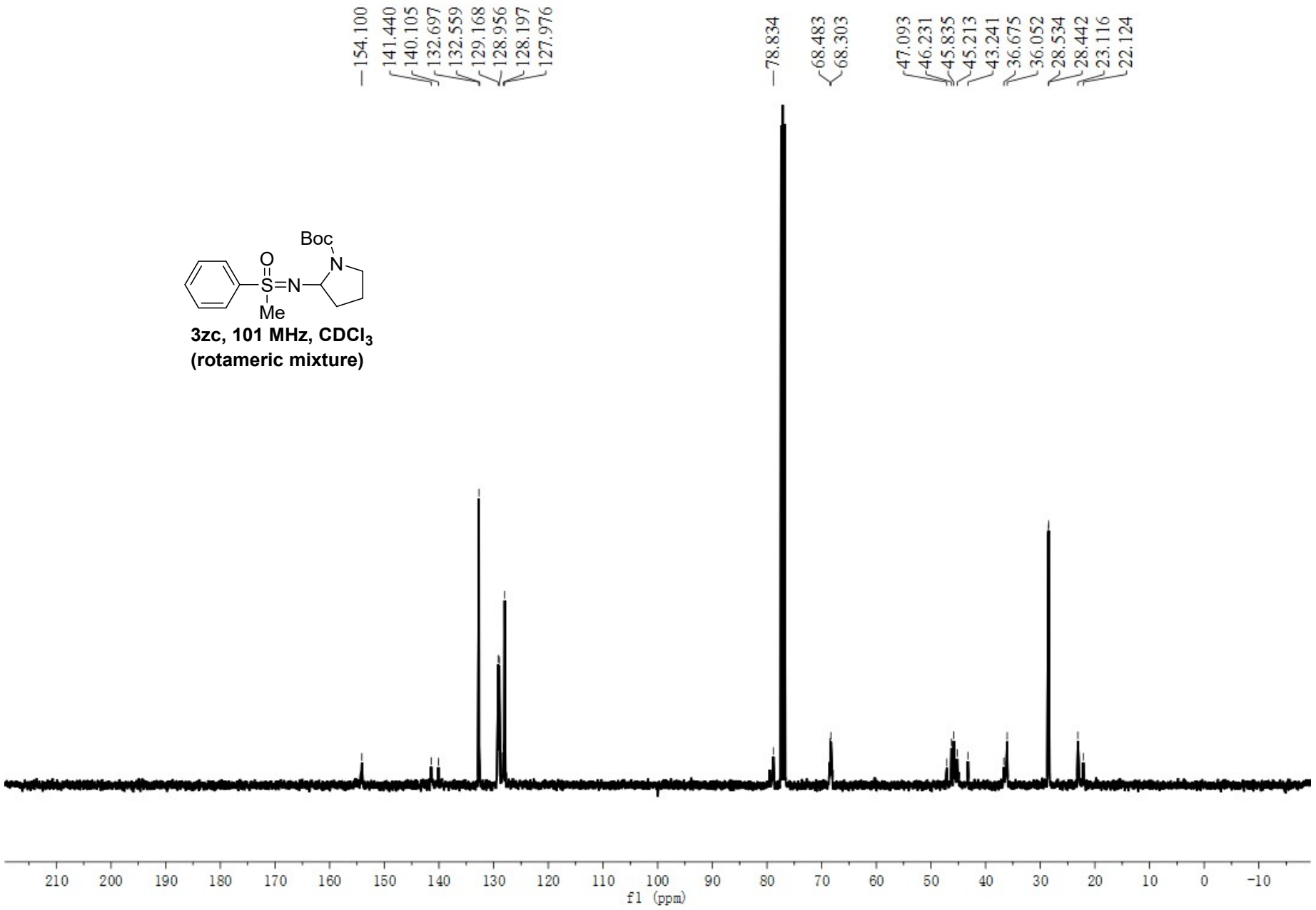
3zb, 400 MHz, $CDCl_3$
(rotameric mixture)



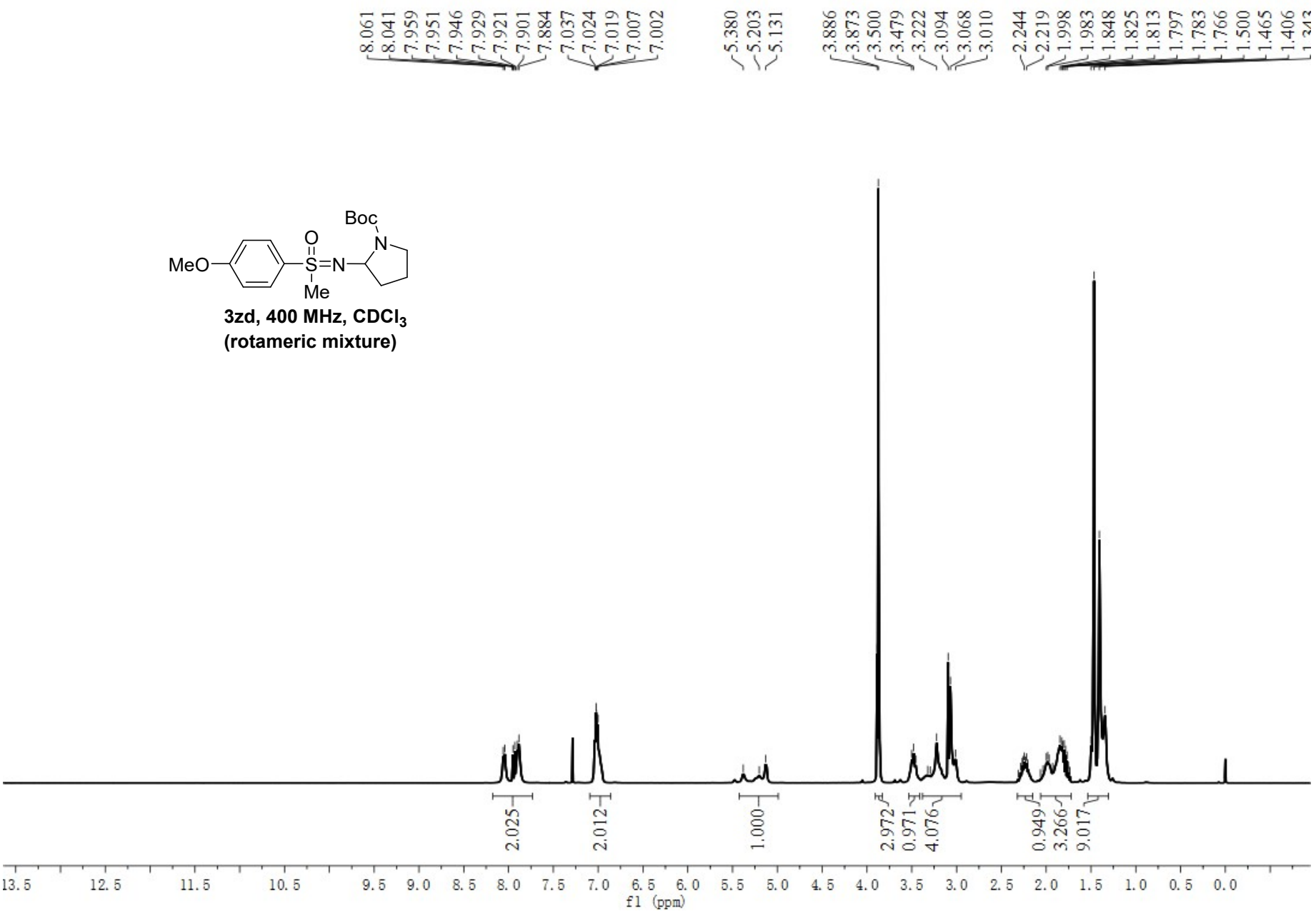
3zb, 101 MHz, $CDCl_3$
(rotameric mixture)



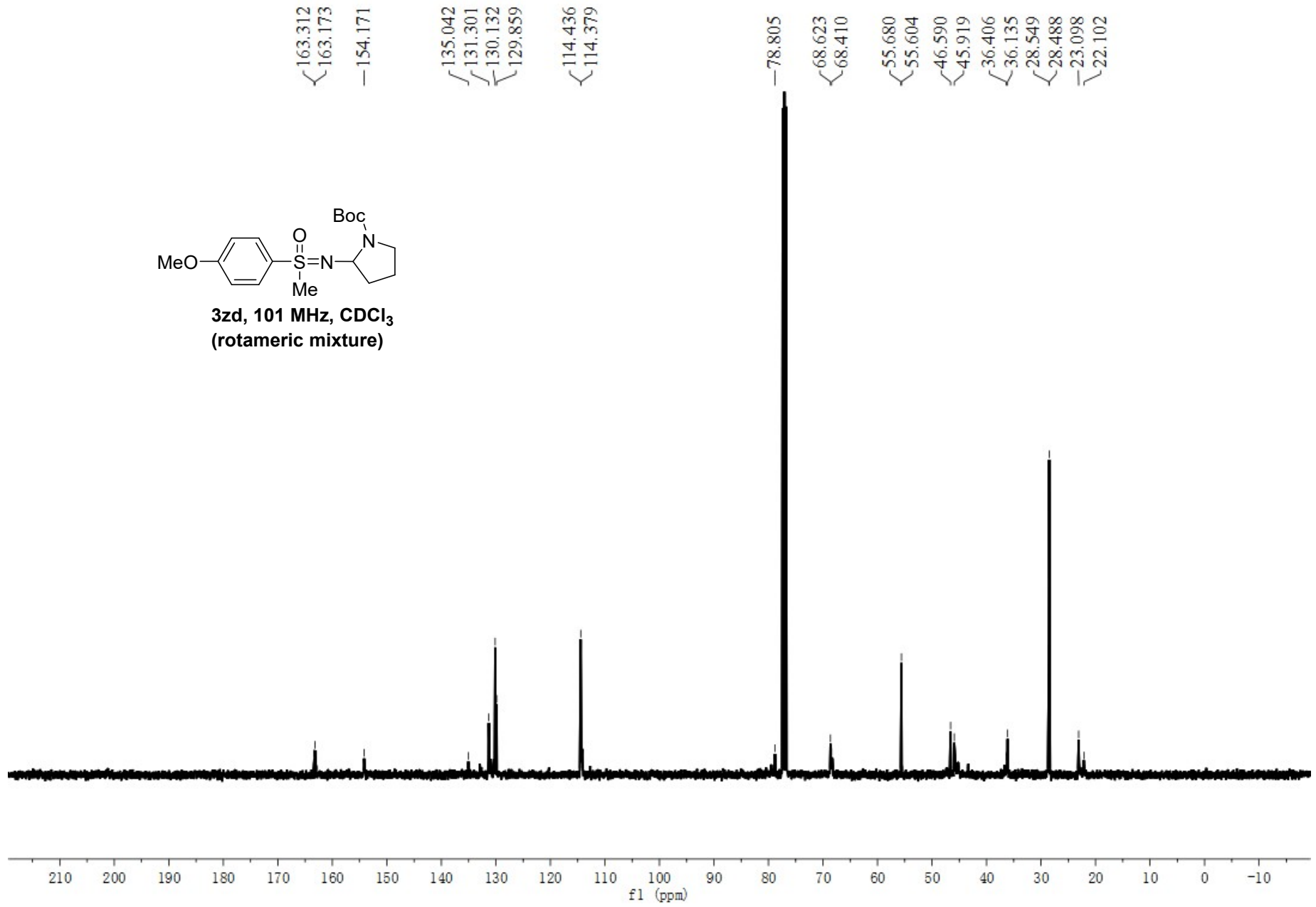
3zc, 400 MHz, $CDCl_3$
(rotameric mixture)



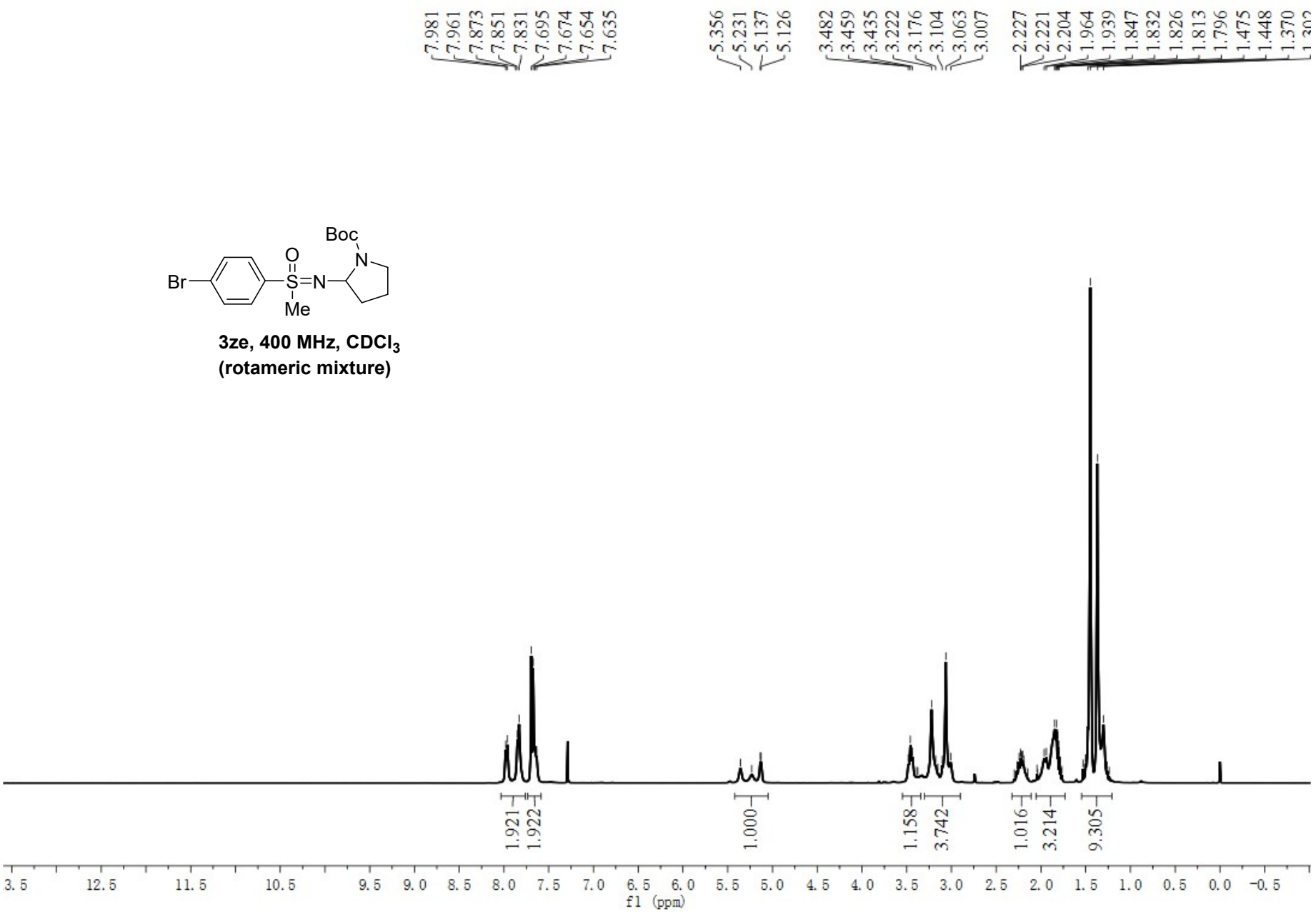
3zc, 101 MHz, $CDCl_3$
(rotameric mixture)



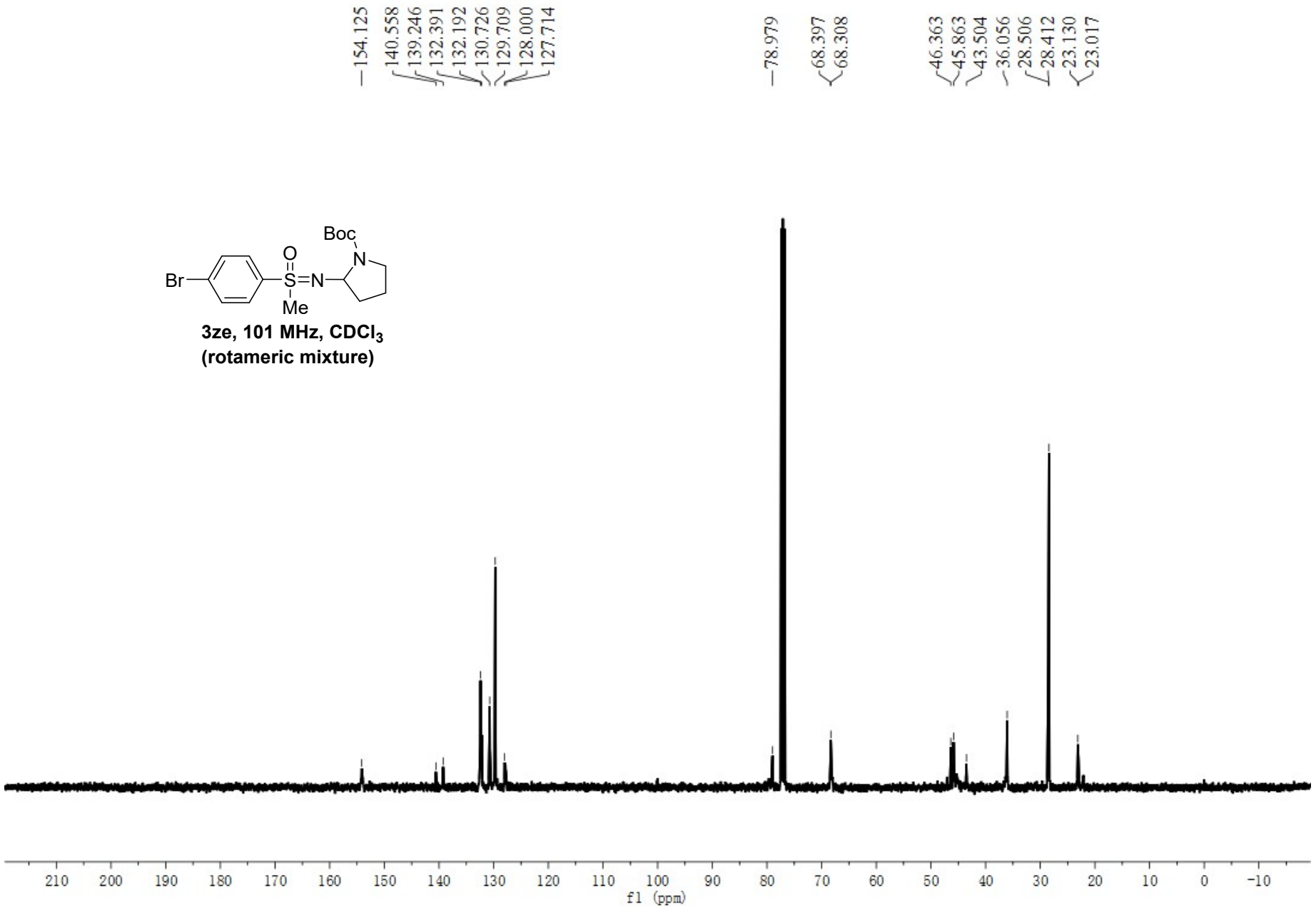
3zd, 400 MHz, $CDCl_3$
(rotameric mixture)



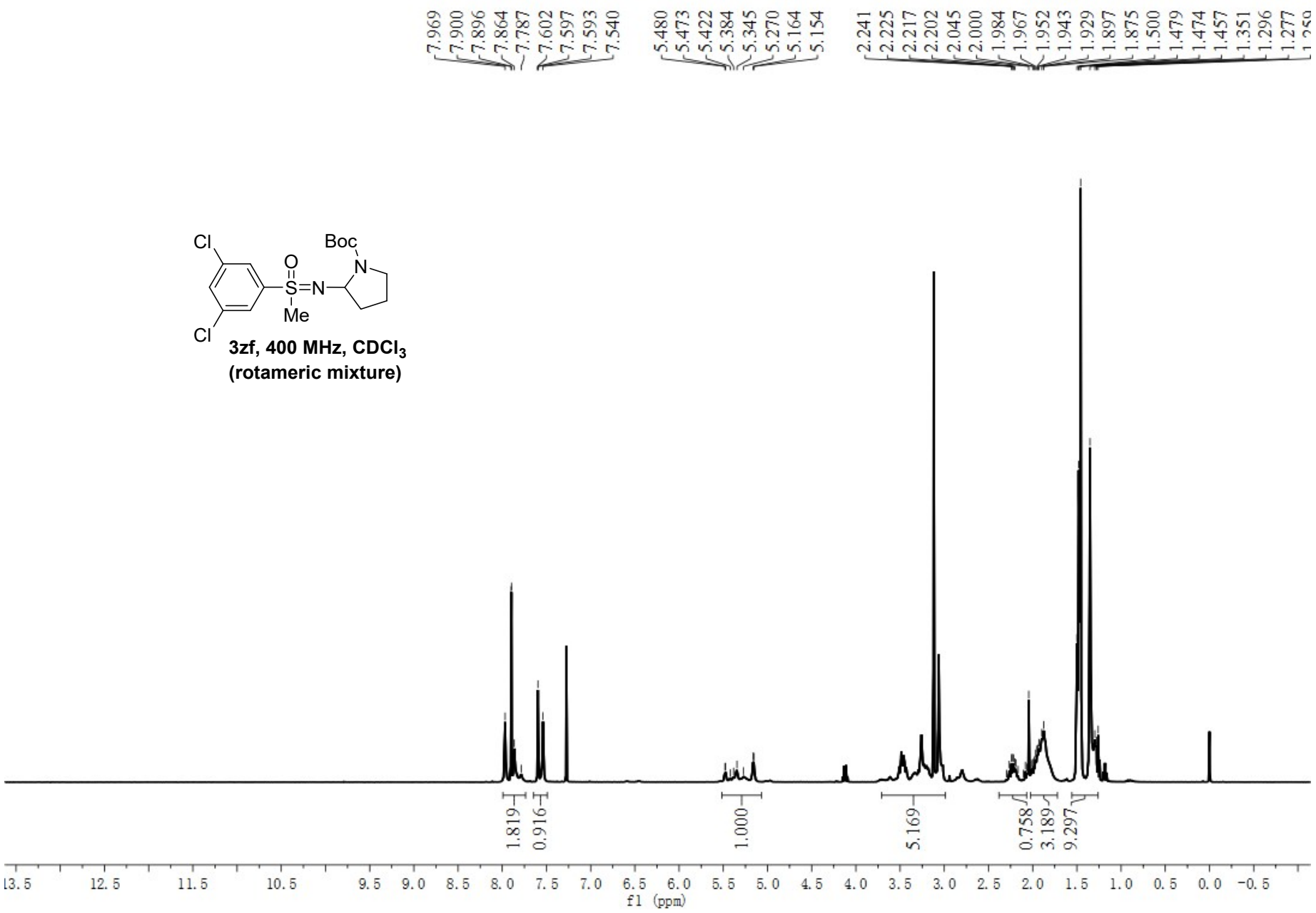
3zd, 101 MHz, $CDCl_3$
(rotameric mixture)



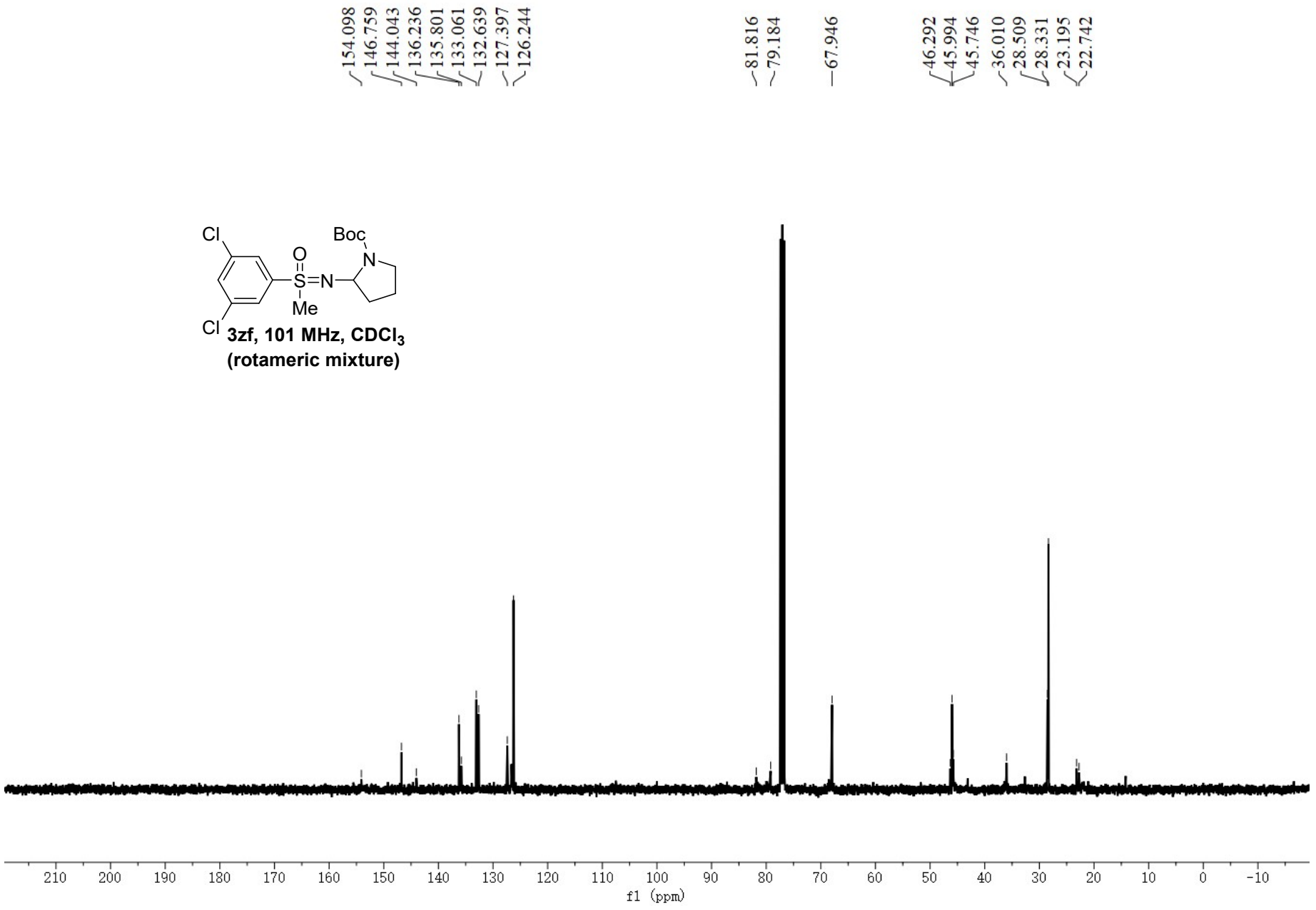
3ze, 400 MHz, $CDCl_3$
(rotameric mixture)

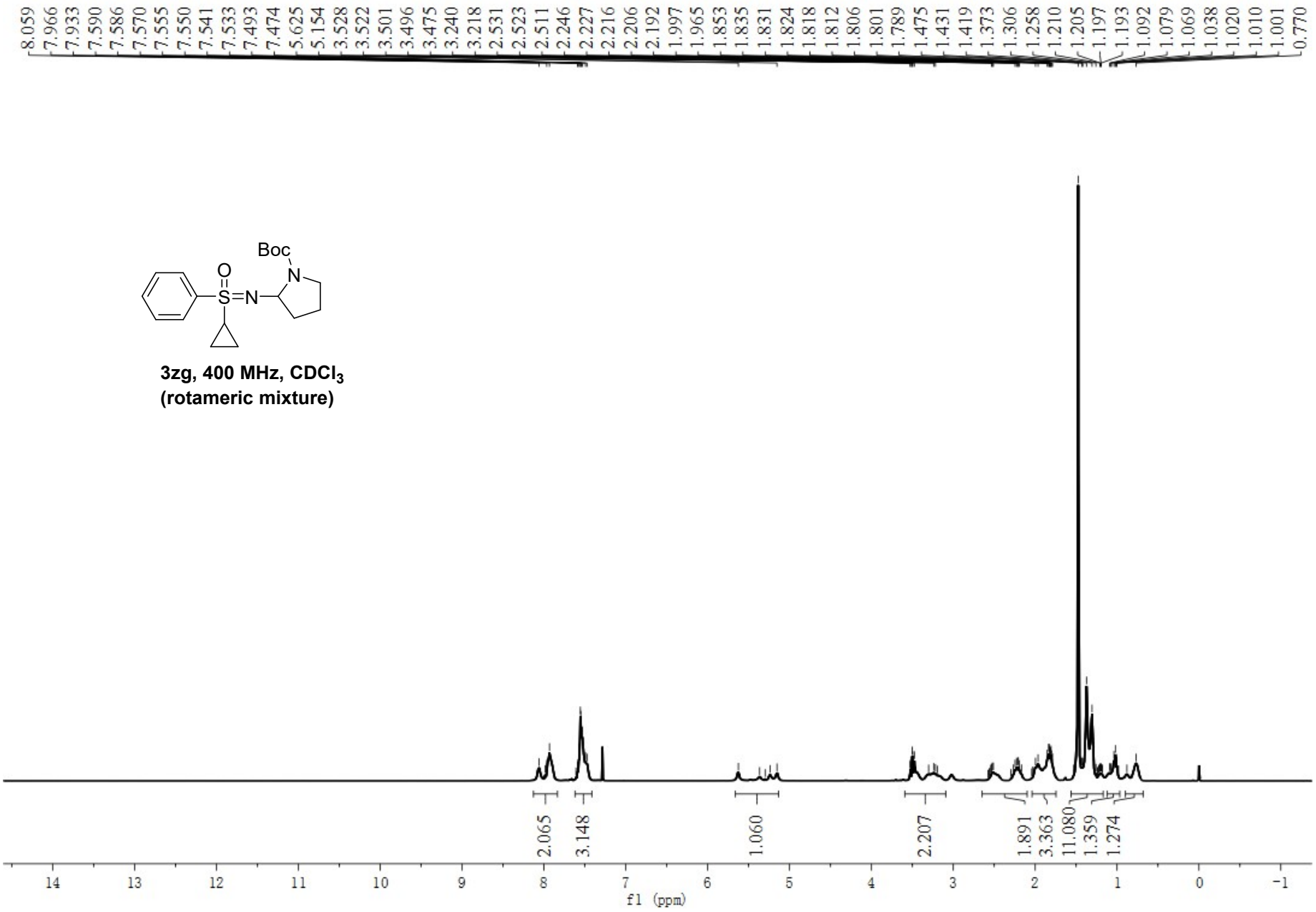


3ze, 101 MHz, $CDCl_3$
(rotameric mixture)

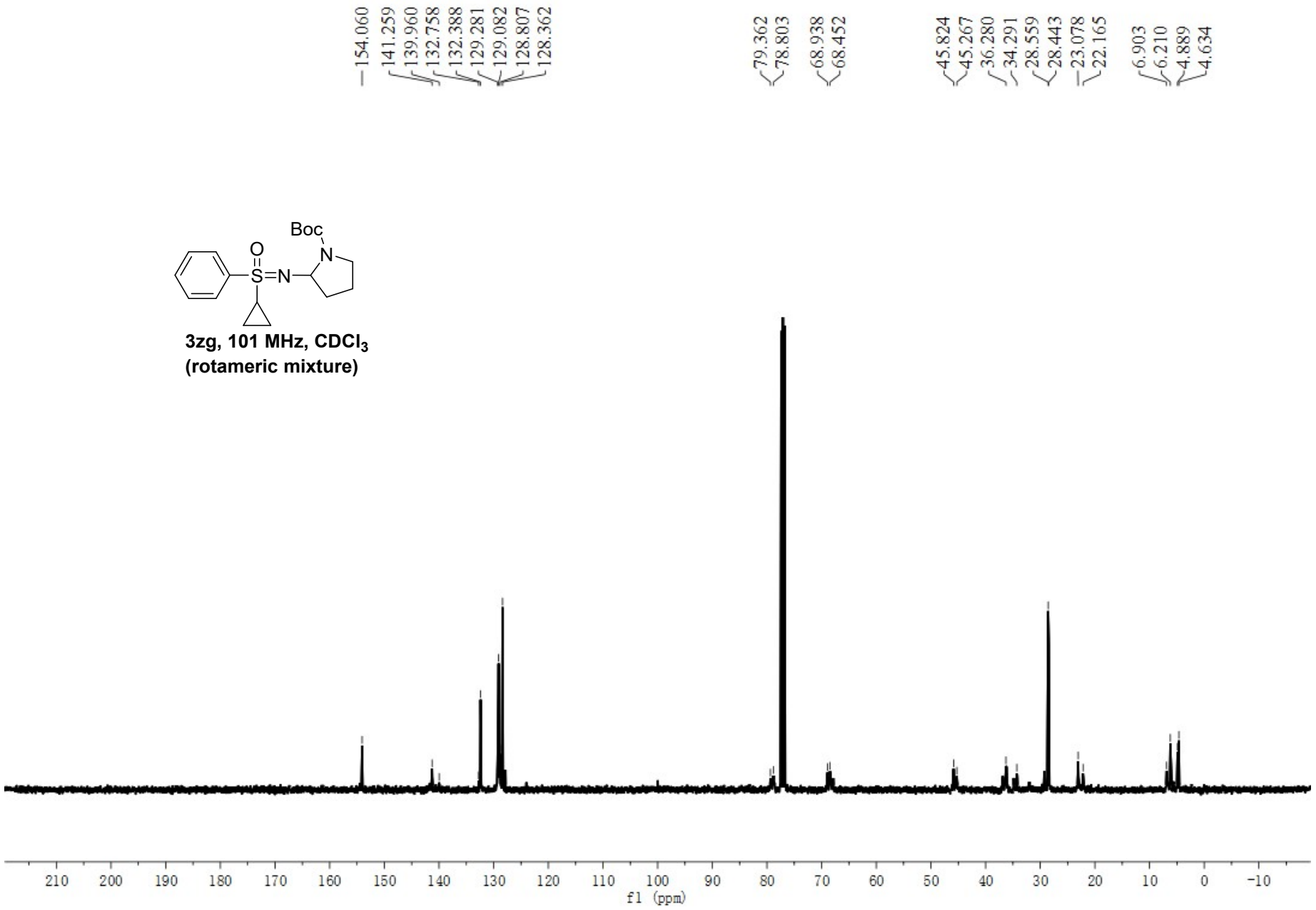


3zf, 400 MHz, $CDCl_3$
(rotameric mixture)

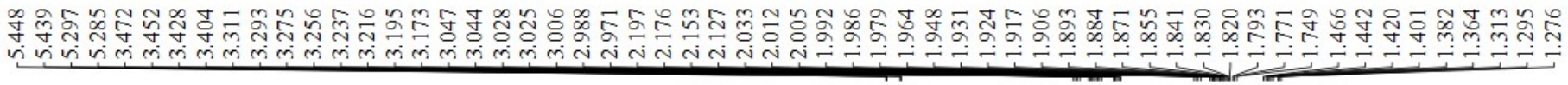

154.098
146.759
144.043
136.236
135.801
133.061
132.639
127.397
126.244
81.816
79.184
67.946
46.292
45.994
45.746
36.010
28.509
28.331
23.195
22.742
Cl
Boc
O
S=N
N
Me
Cl
3zf, 101 MHz, CDCl3
(rotameric mixture)
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

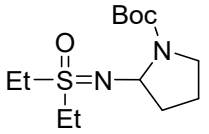


3zg, 400 MHz, $CDCl_3$
(rotameric mixture)

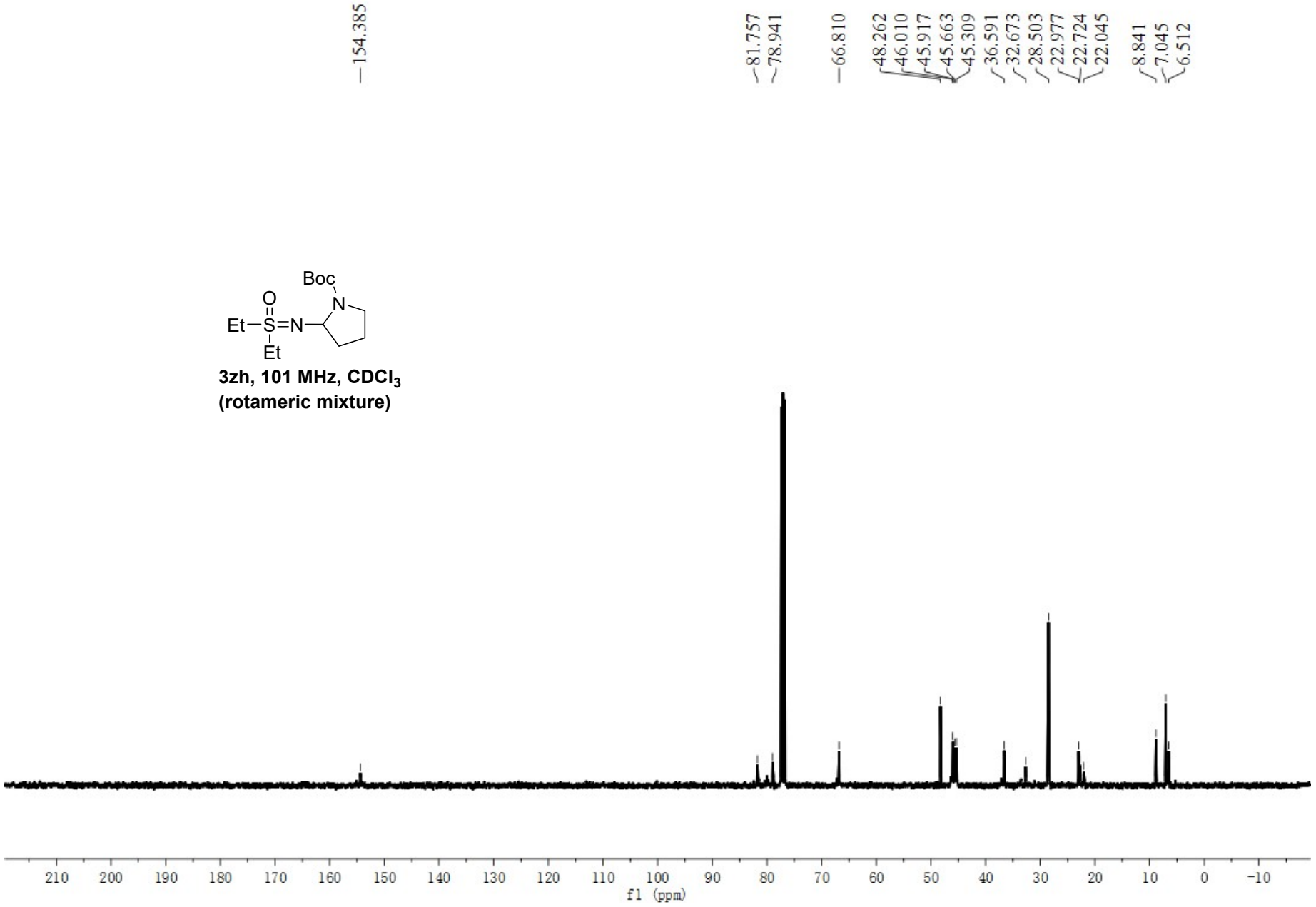


3zg, 101 MHz, $CDCl_3$
(rotameric mixture)

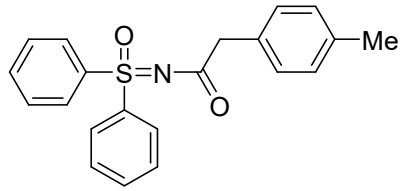




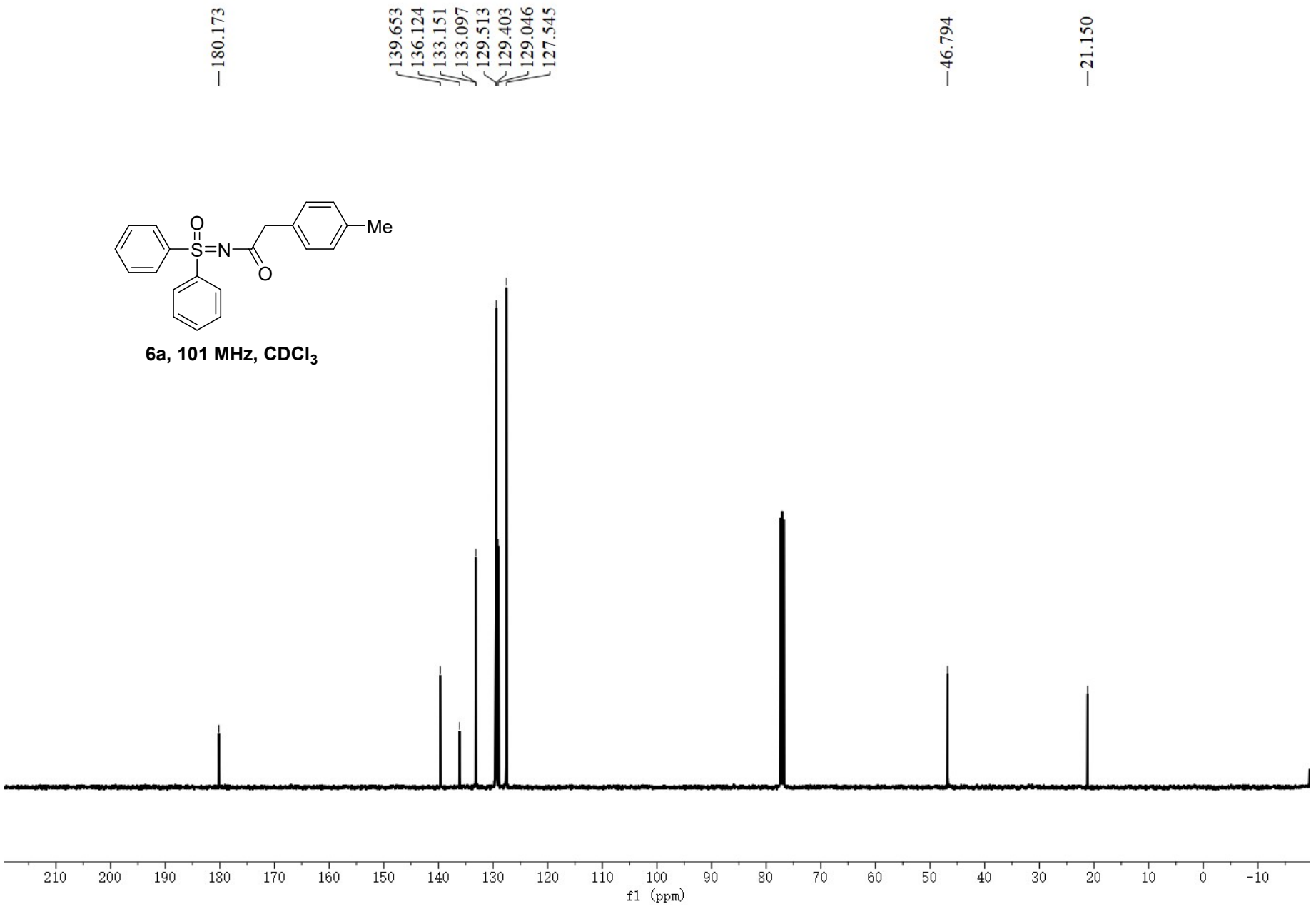
3zh, 400 MHz, $CDCl_3$
(rotameric mixture)



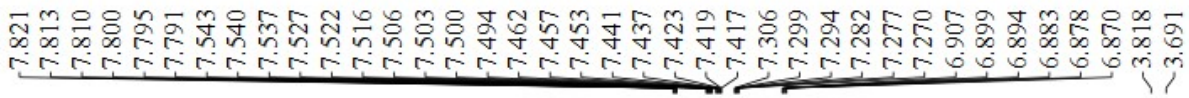
3zh, 101 MHz, $CDCl_3$
(rotameric mixture)

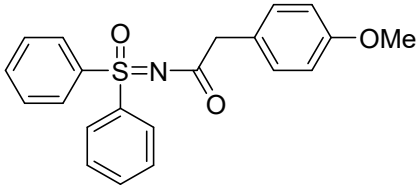


6a, 400 MHz, $CDCl_3$

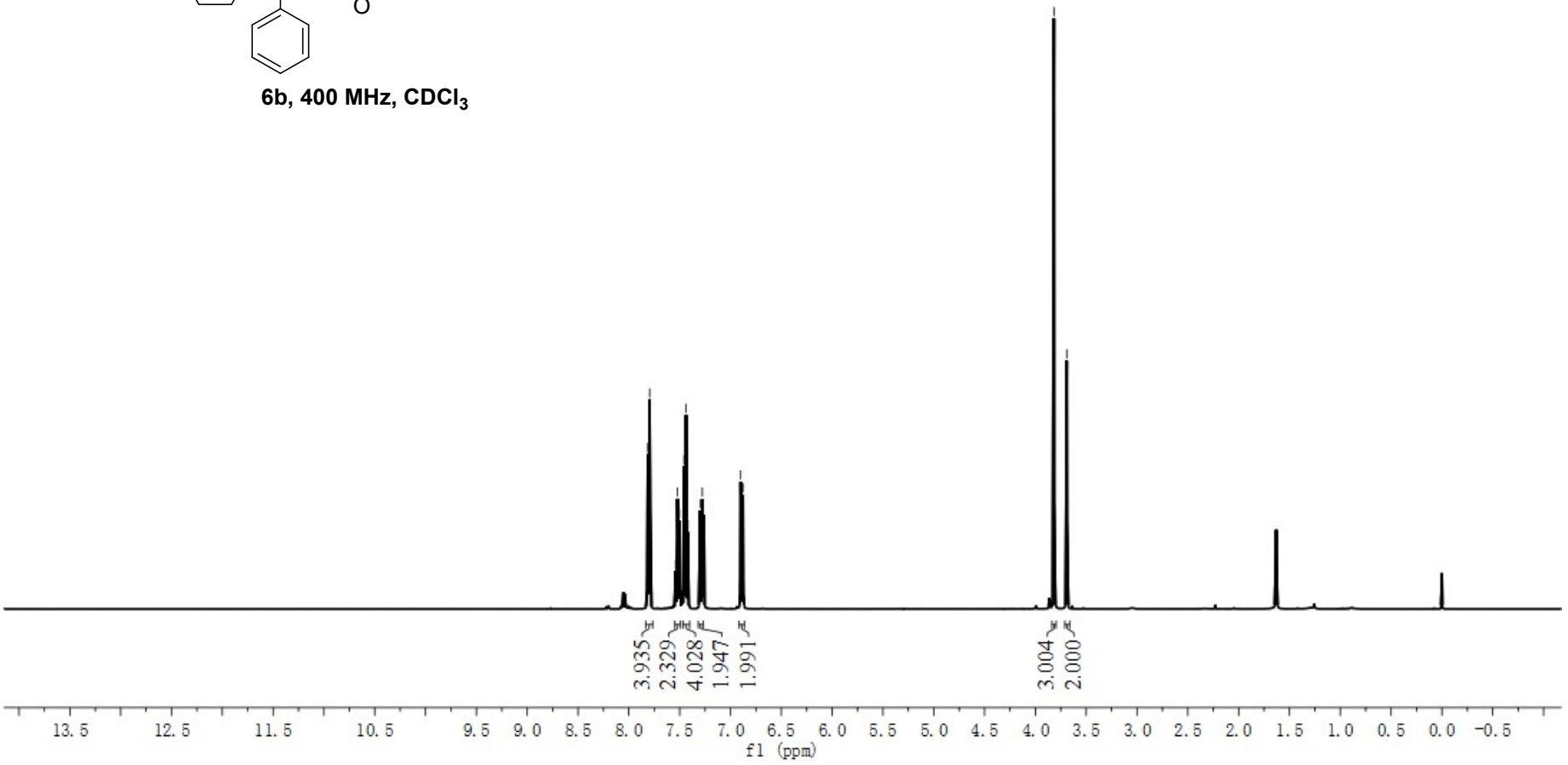


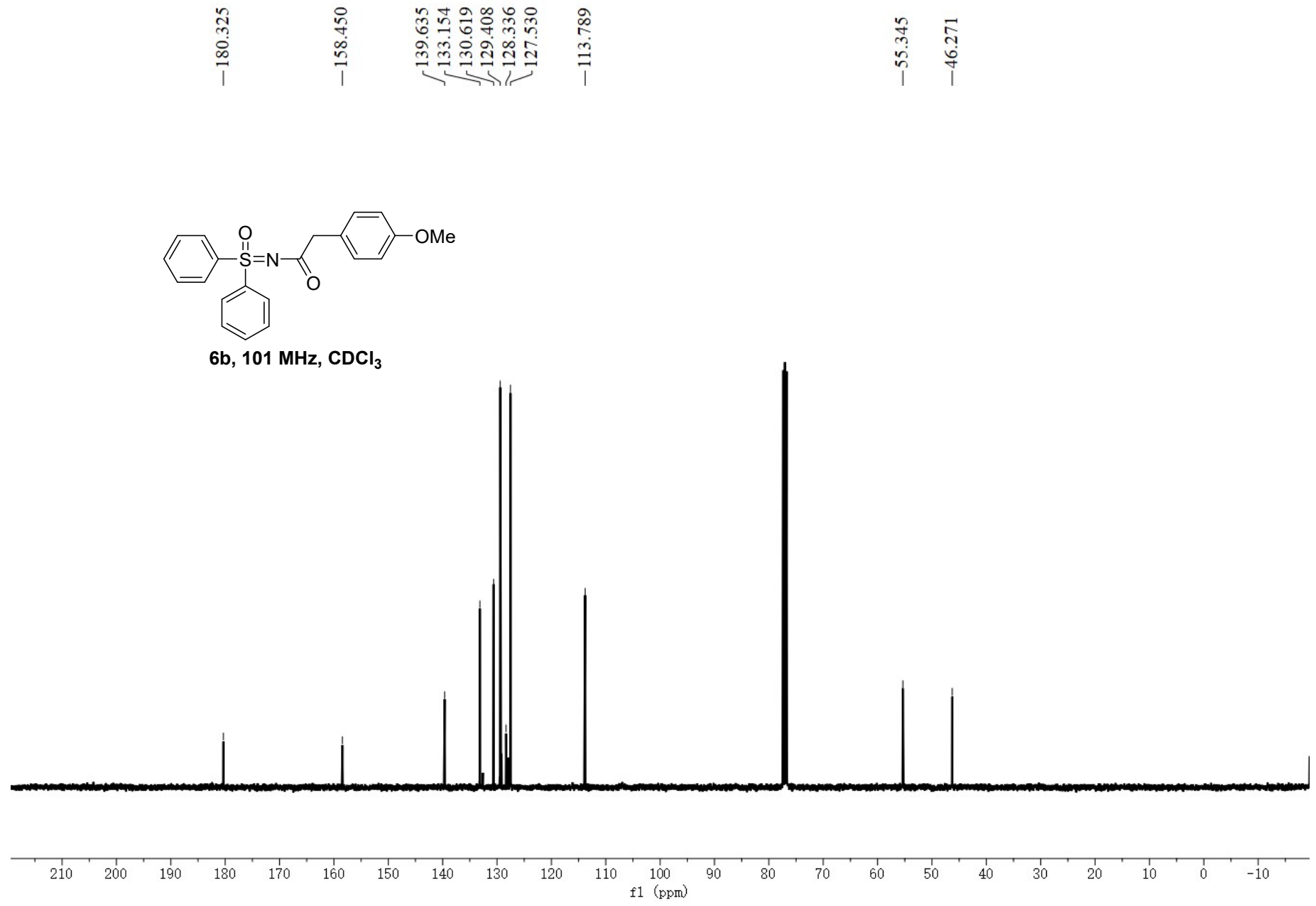
6a, 101 MHz, $CDCl_3$

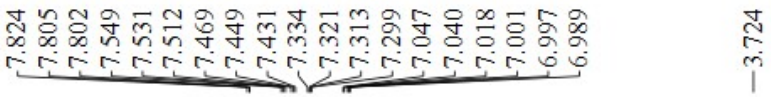


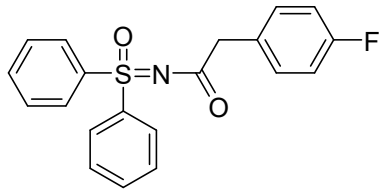


6b, 400 MHz, $CDCl_3$

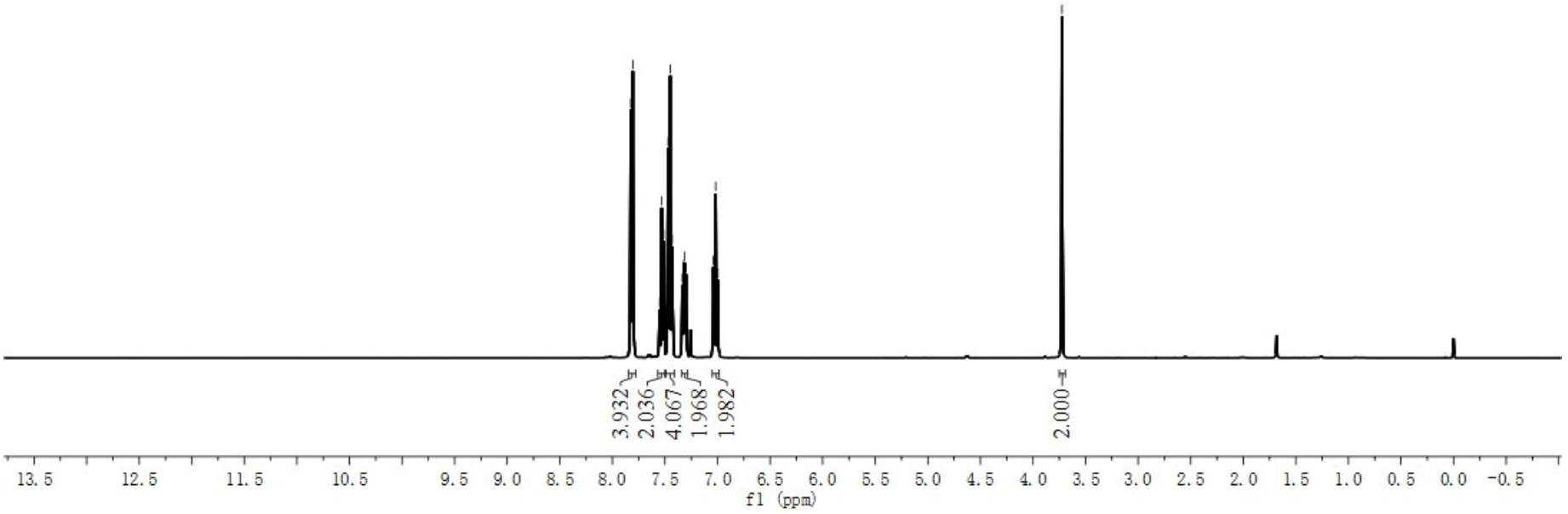


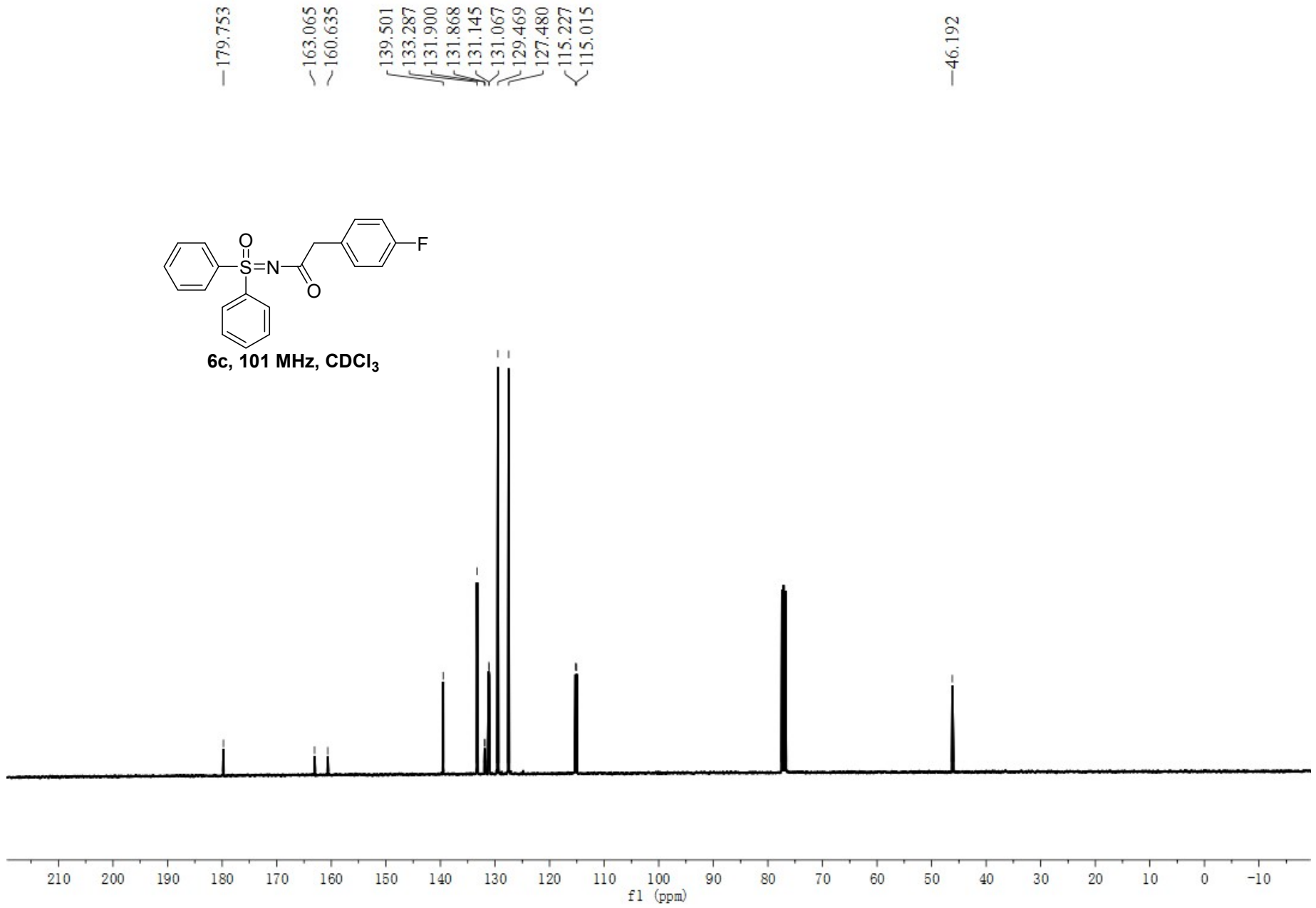

180.325
158.450
139.635
133.154
130.619
129.408
128.336
127.530
113.789
55.345
46.271
O
S=N
O
OMe
6b, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



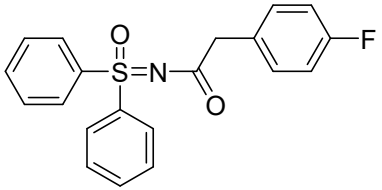


6c, 400 MHz, $CDCl_3$

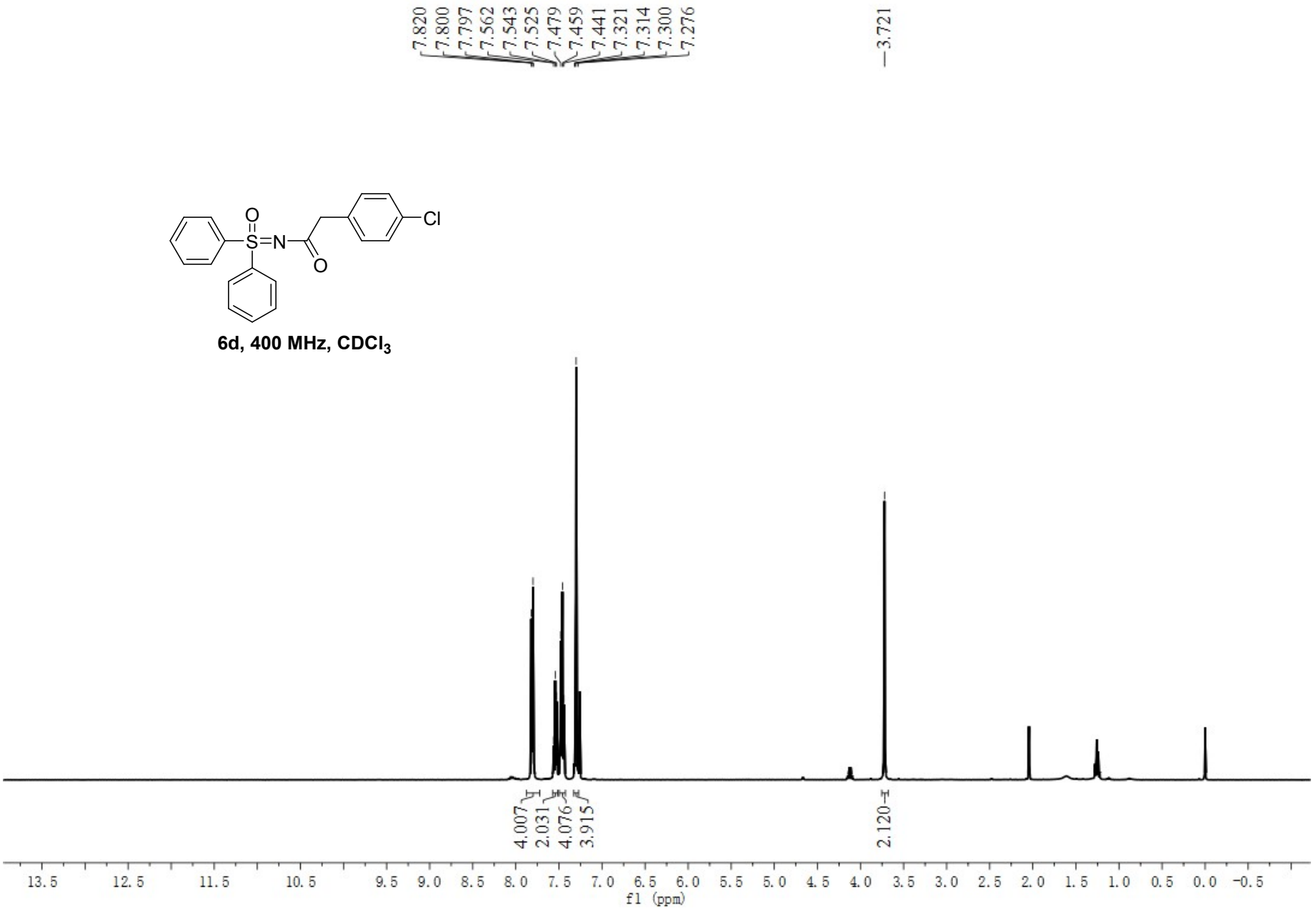




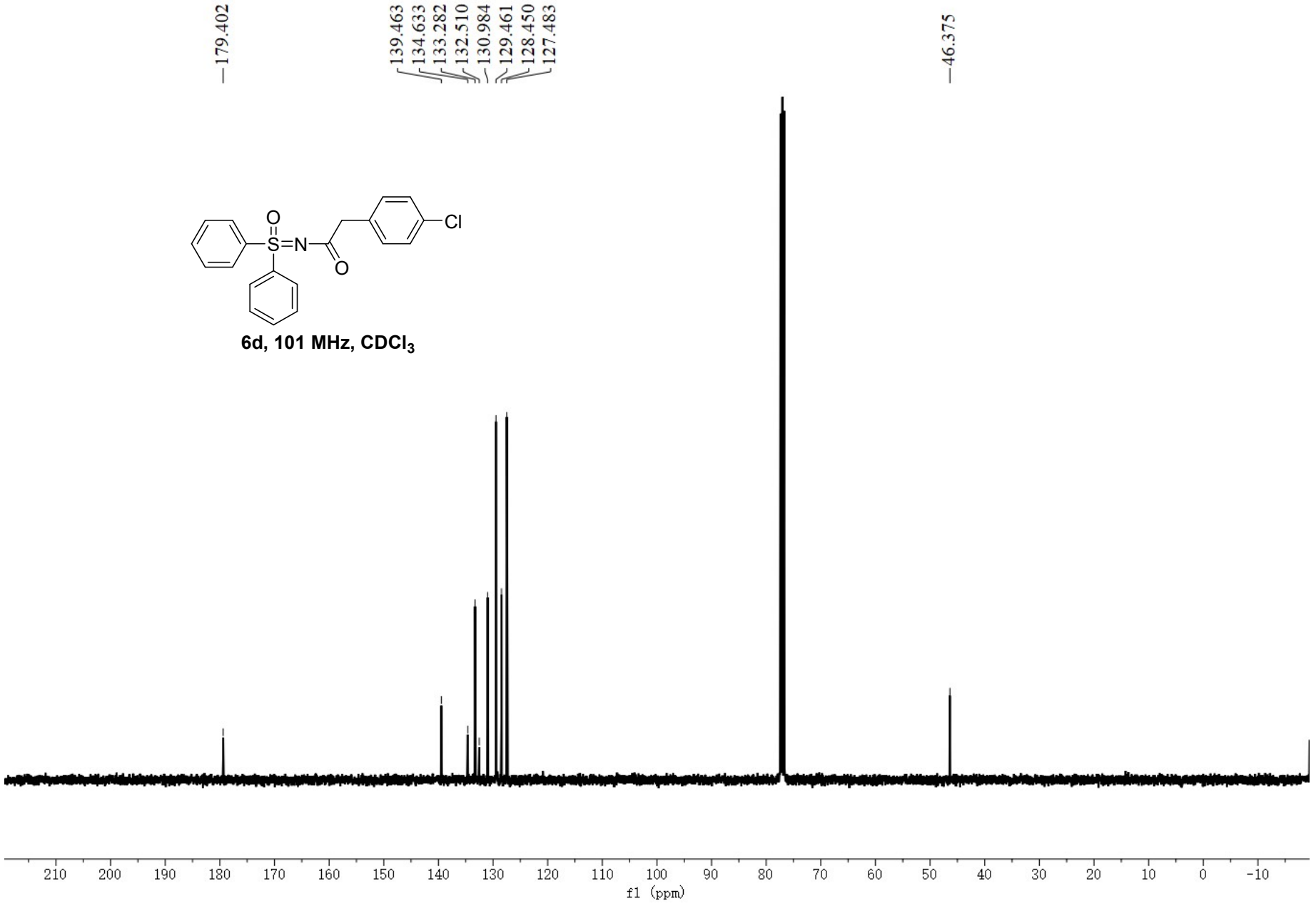
6c, 101 MHz, $CDCl_3$



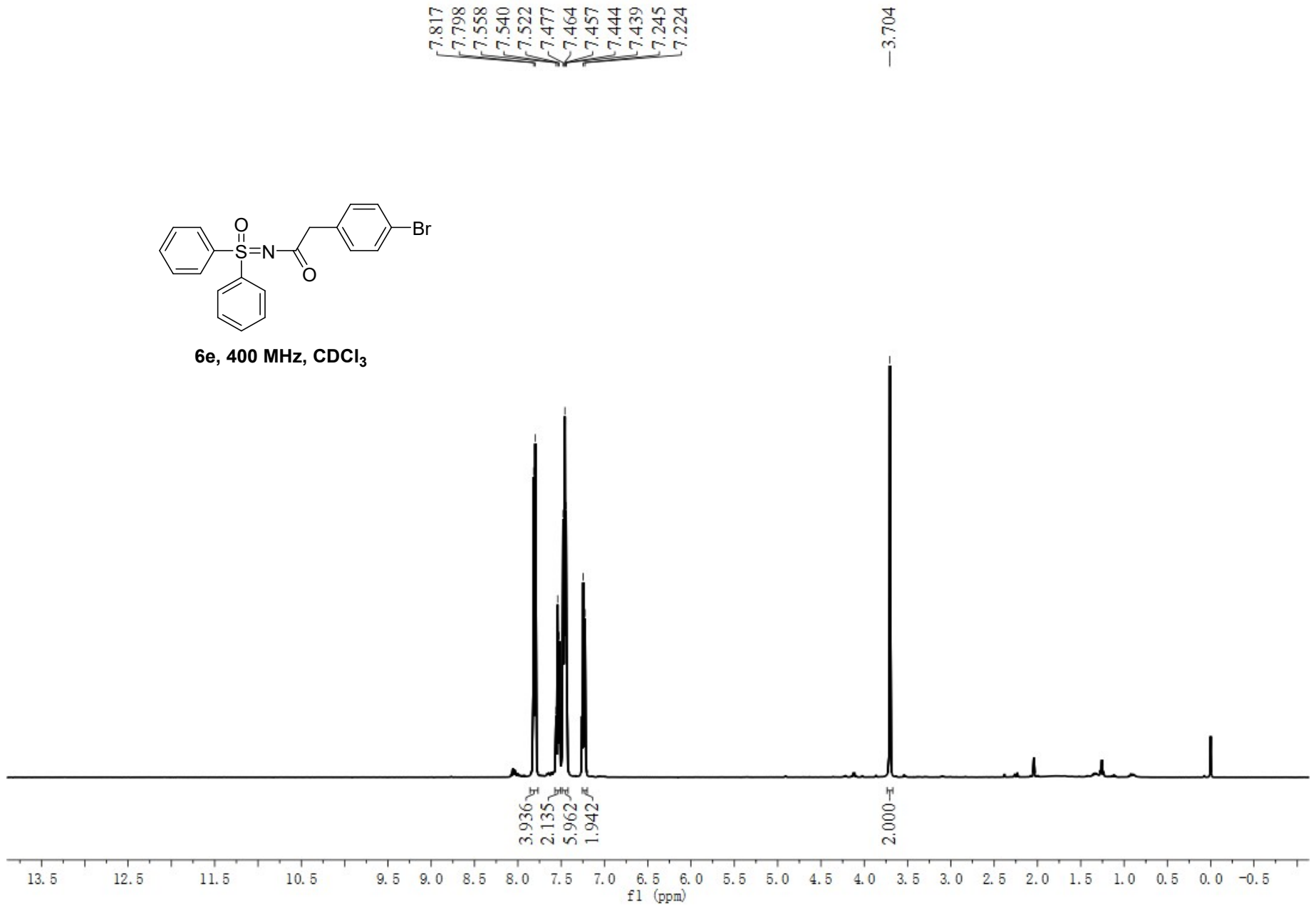
6c, 376 MHz, $CDCl_3$



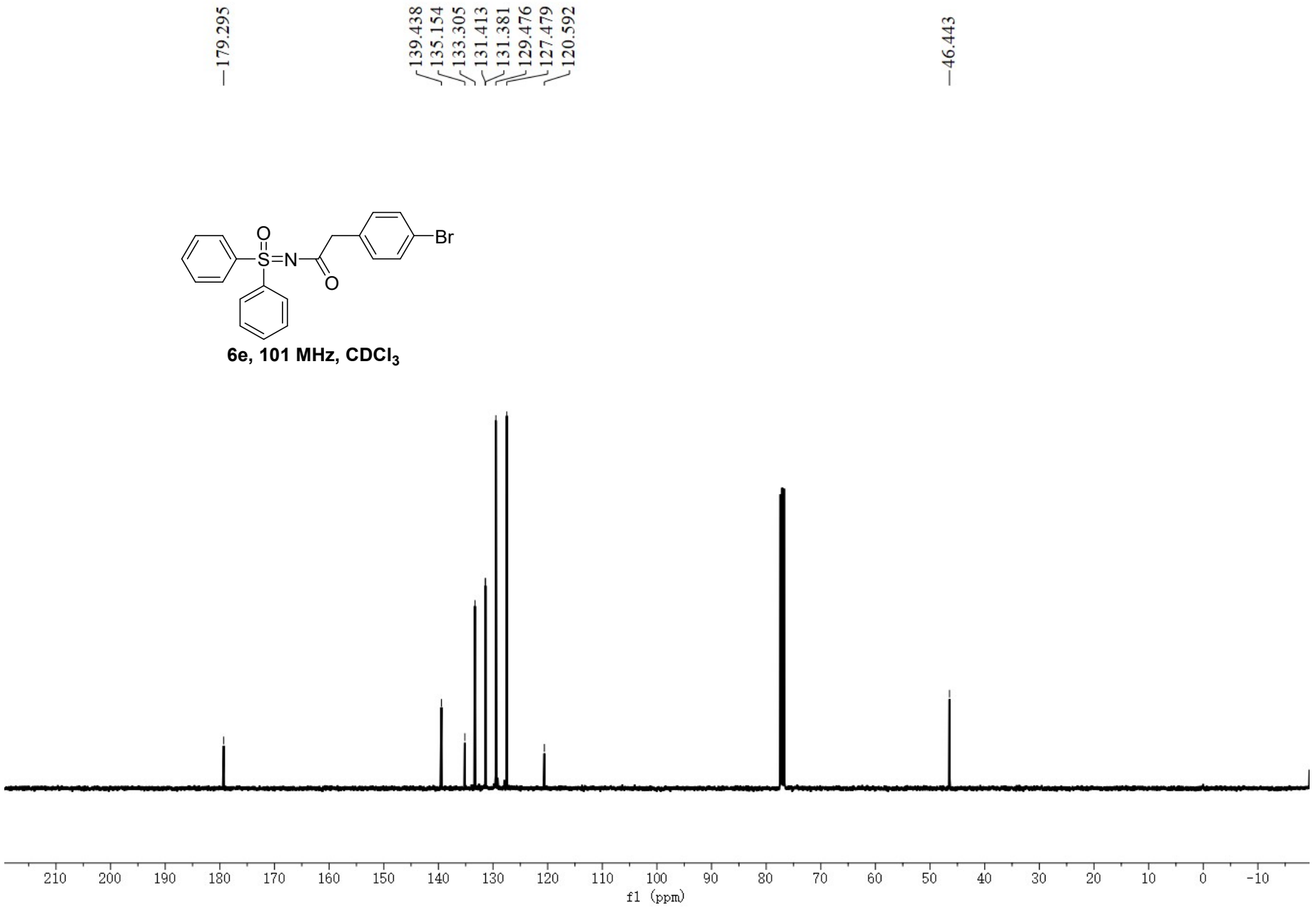
6d, 400 MHz, $CDCl_3$

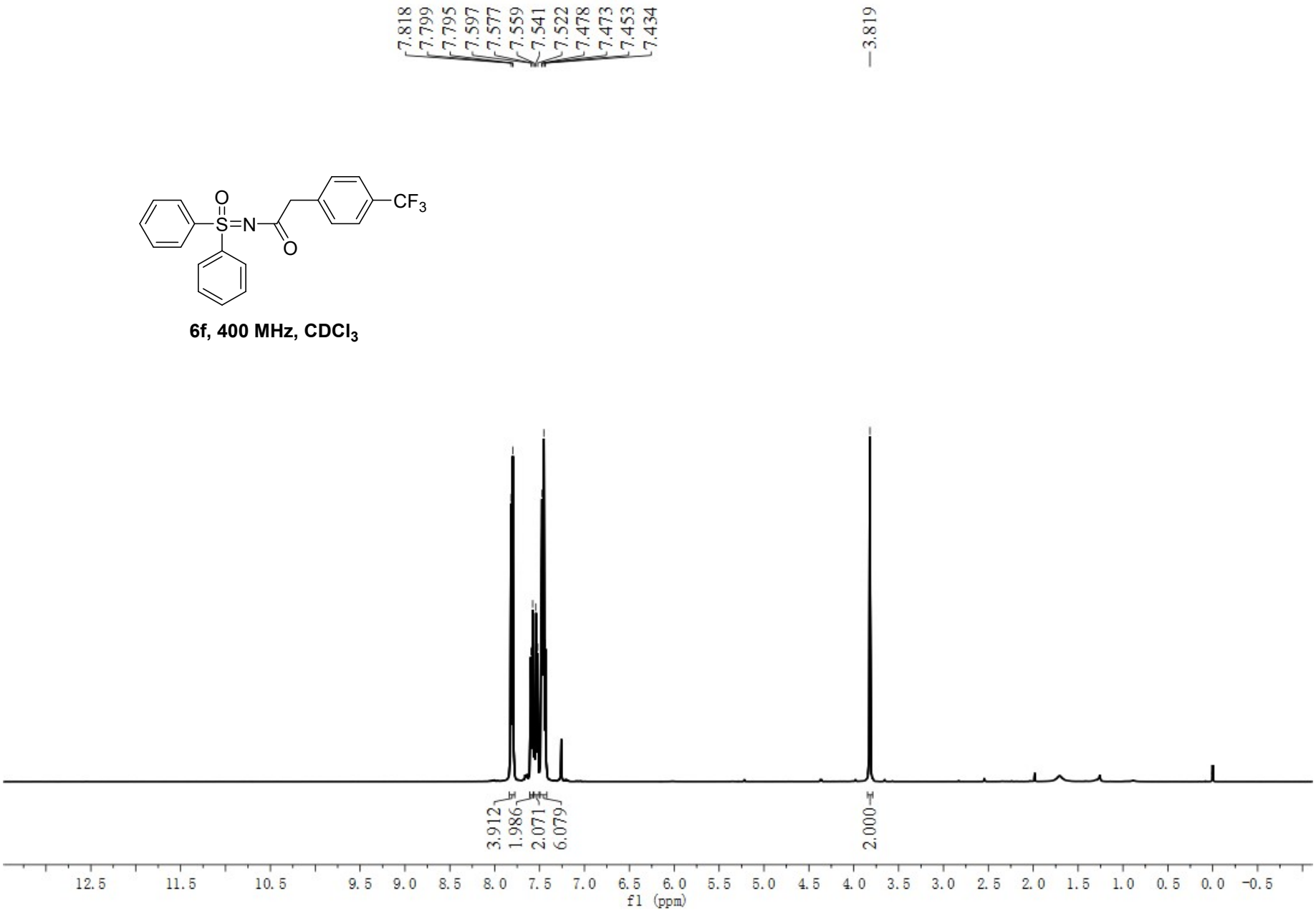


6d, 101 MHz, $CDCl_3$

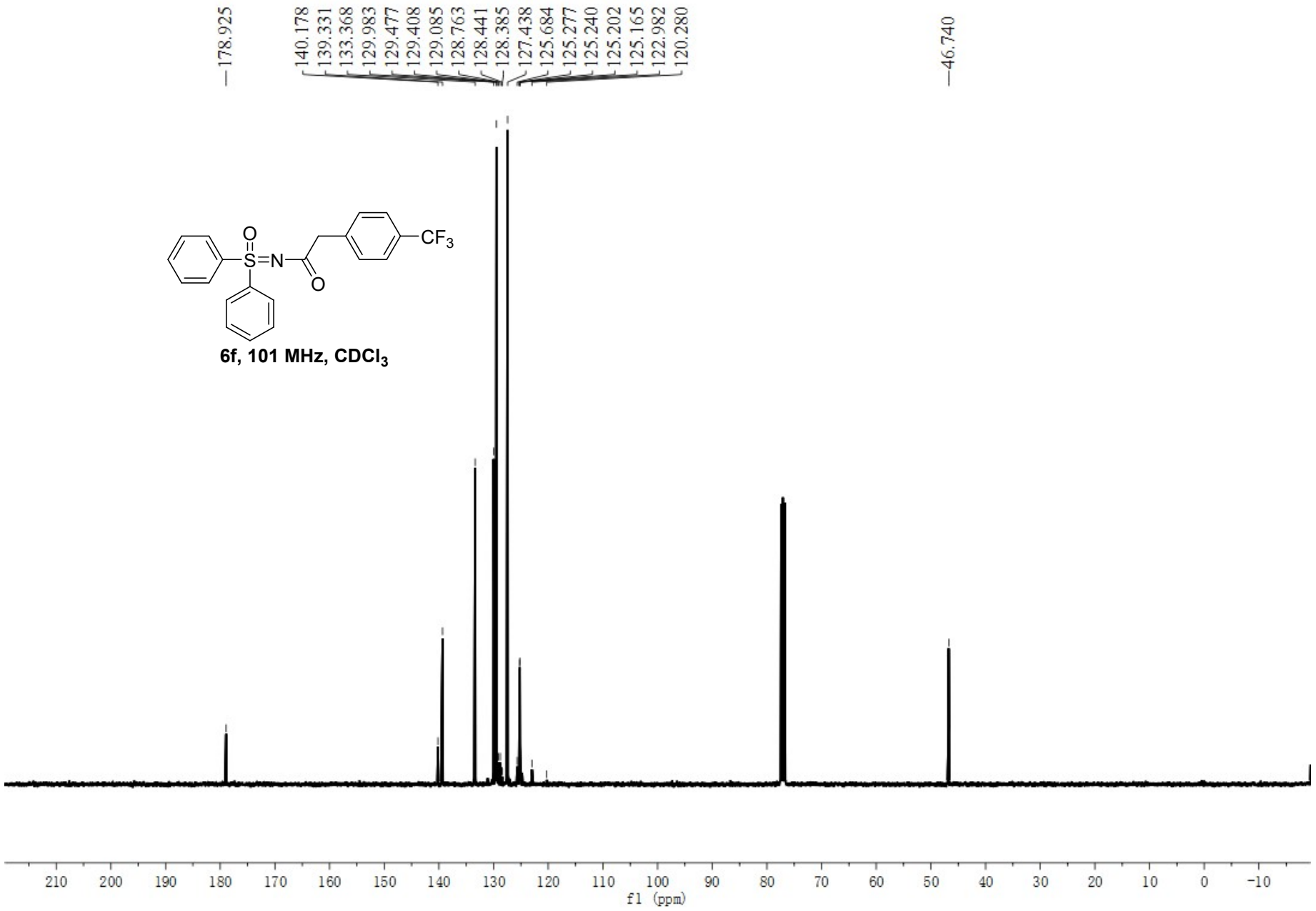


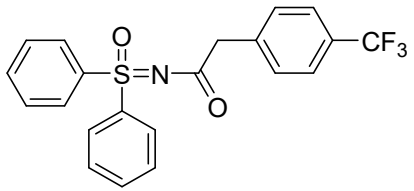
6e, 400 MHz, $CDCl_3$


179.295
139.438
135.154
133.305
131.413
131.381
129.476
127.479
120.592
46.443
O
S=N
O
Br
6e, 101 MHz, CDCl3
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

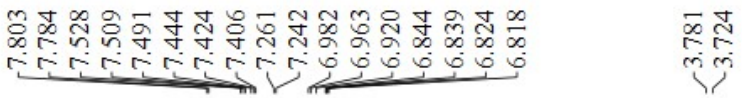


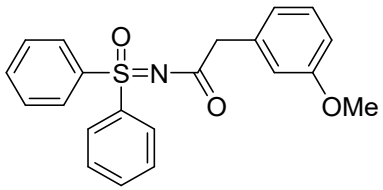
6f, 400 MHz, $CDCl_3$


178.925
140.178
139.331
133.368
129.983
129.477
129.408
129.085
128.763
128.441
128.385
127.438
125.684
125.277
125.240
125.202
125.165
122.982
120.280
46.740
O
S=N
O
CF3
6f, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

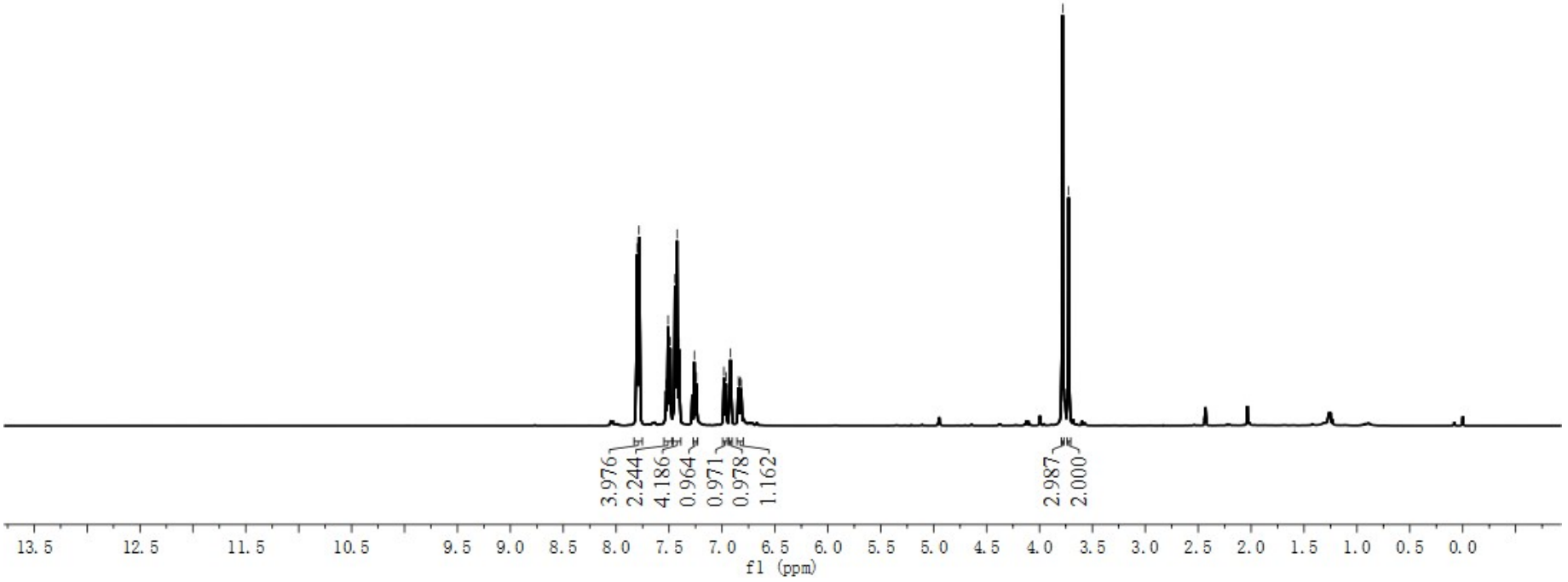


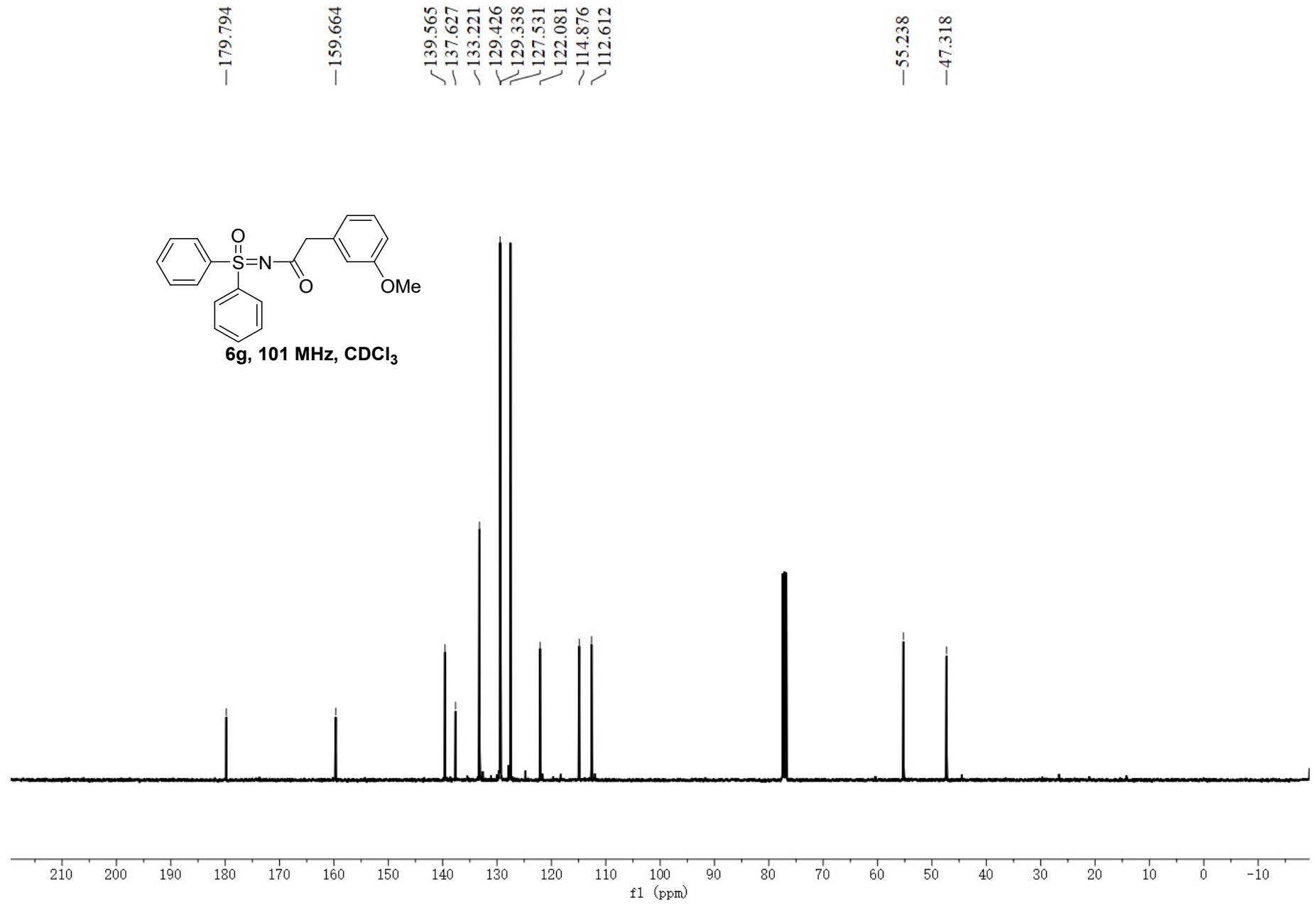
6f, 376 MHz, $CDCl_3$

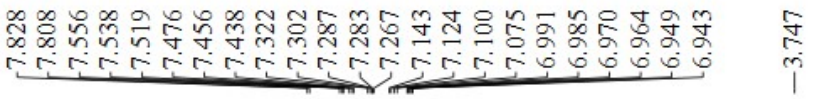


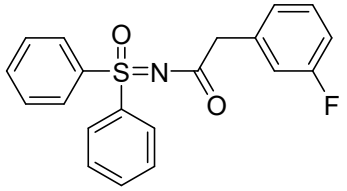


6g, 400 MHz, $CDCl_3$

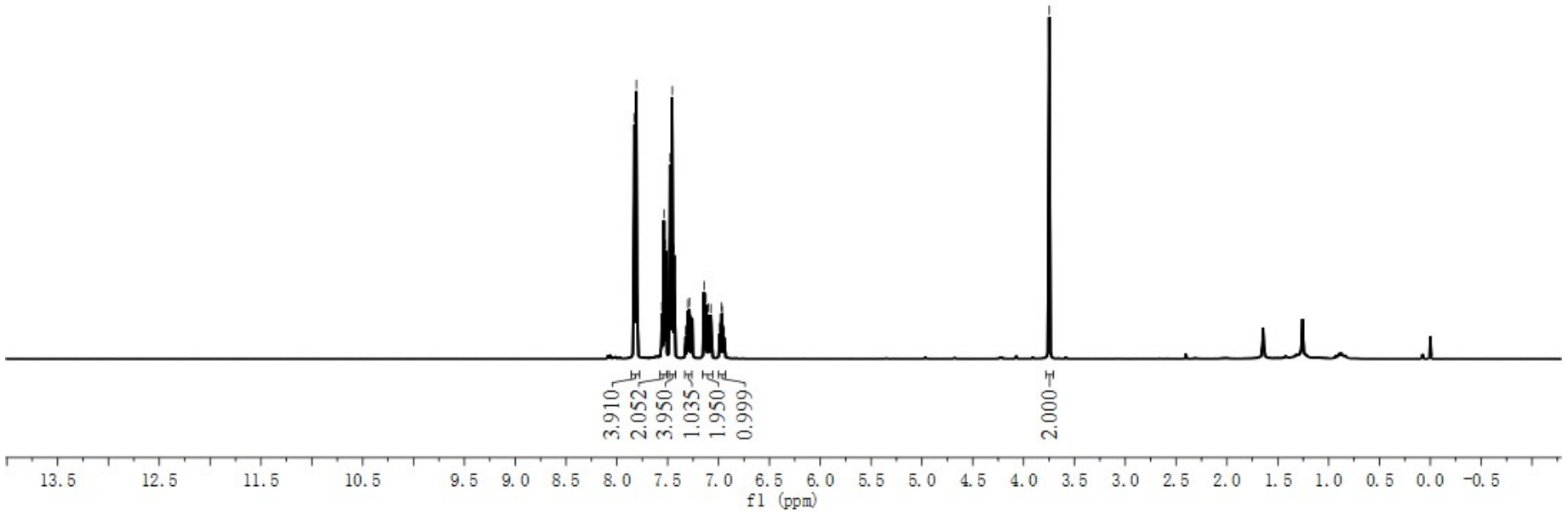


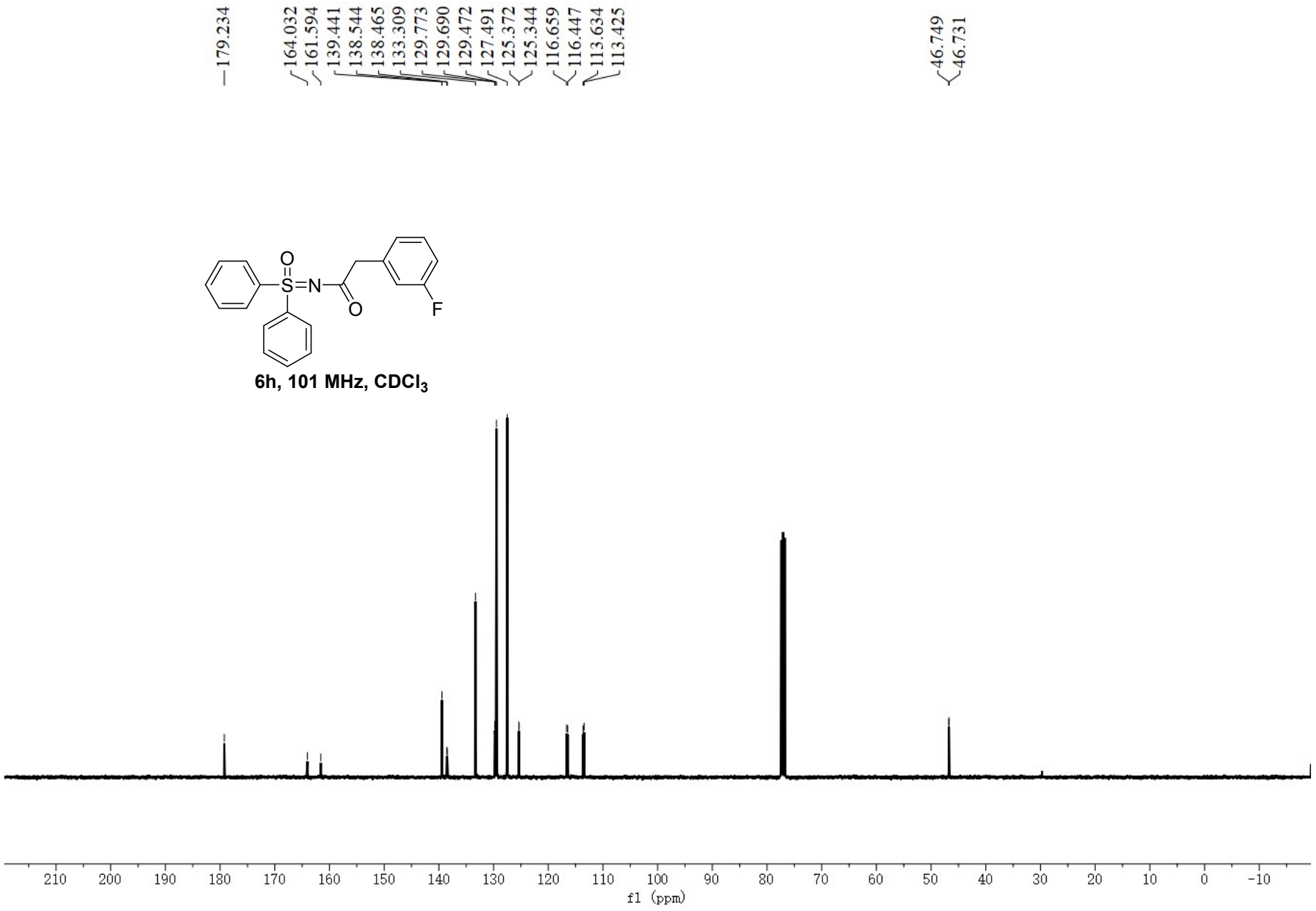

179.794
159.664
139.565
137.627
133.221
129.426
129.338
127.531
122.081
114.876
112.612
55.238
47.318
O
S=N
O
OMe
6g, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



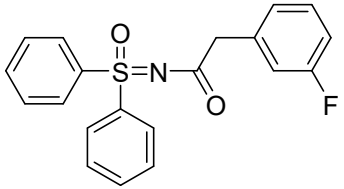


6h, 400 MHz, $CDCl_3$

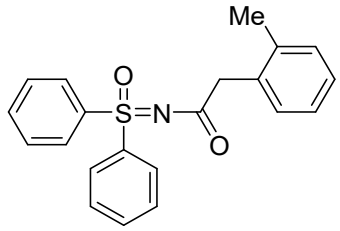




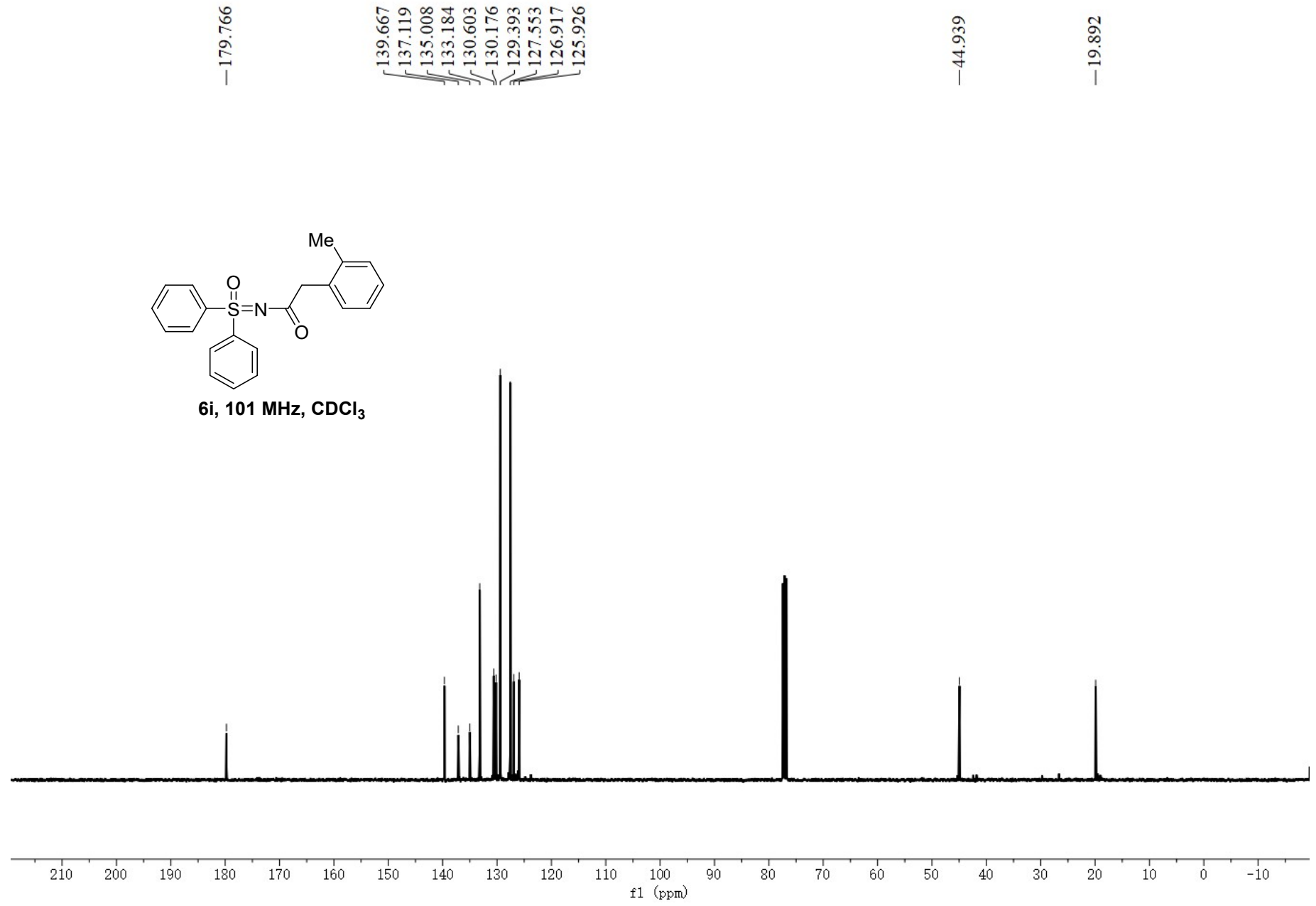
6h, 101 MHz, $CDCl_3$



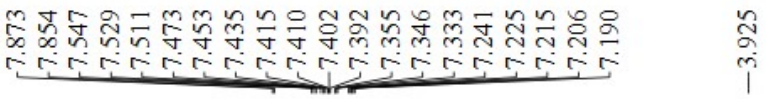
6h, 376 MHz, $CDCl_3$

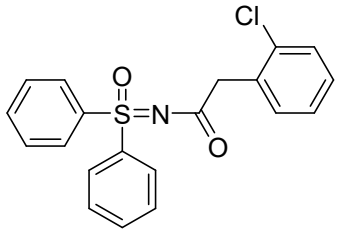


6i, 400 MHz, $CDCl_3$

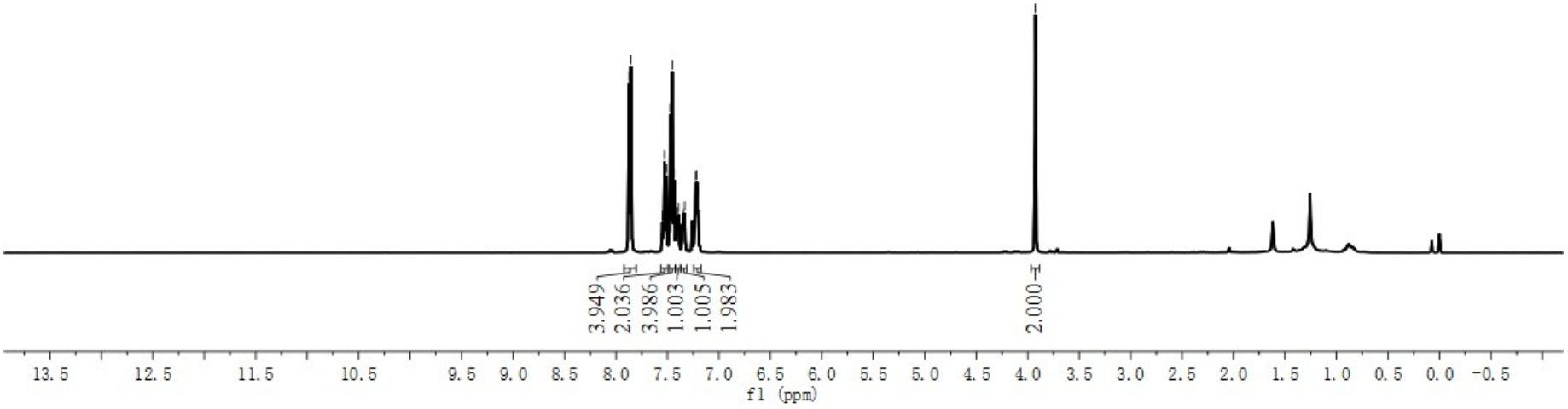


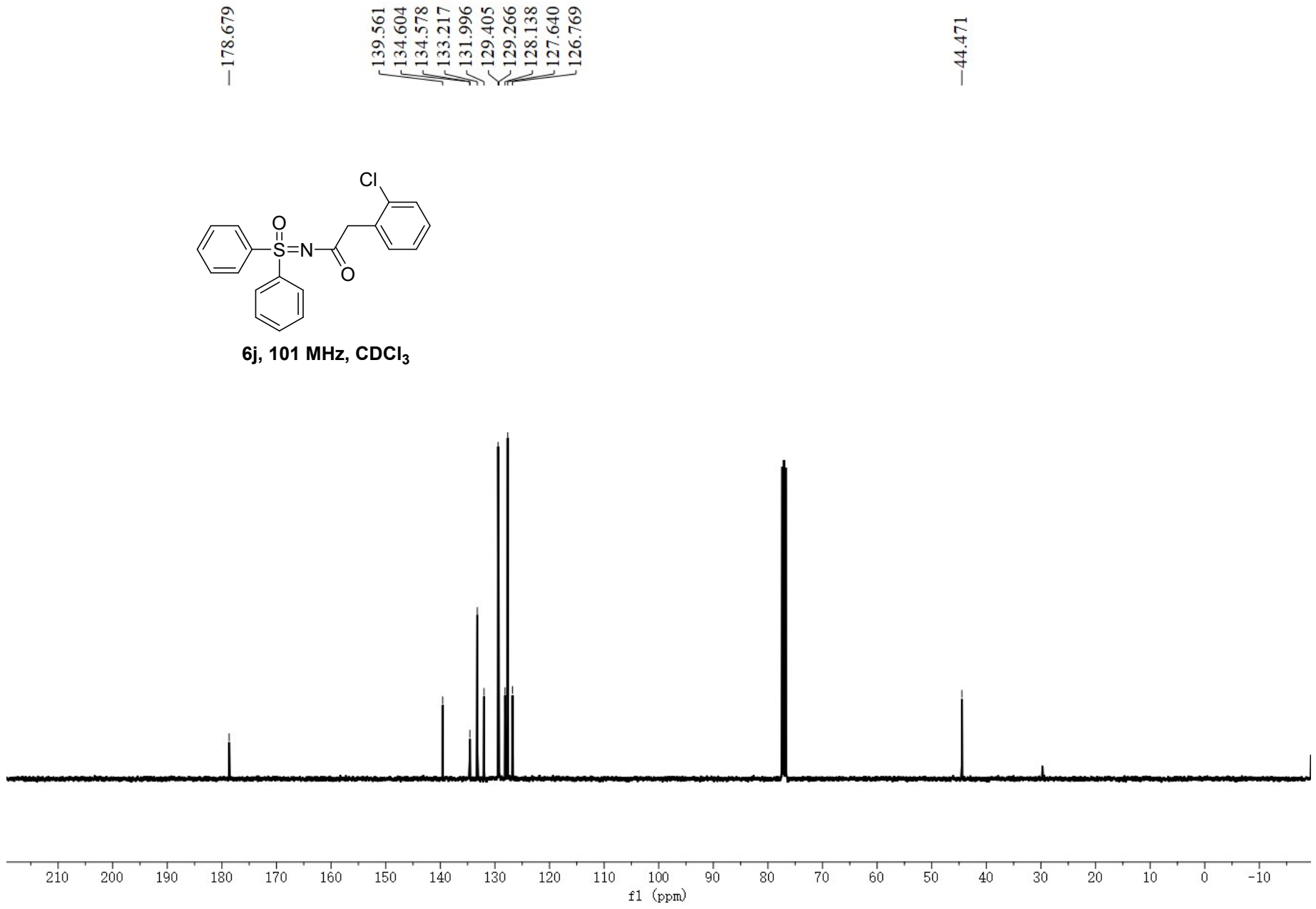
6i, 101 MHz, $CDCl_3$



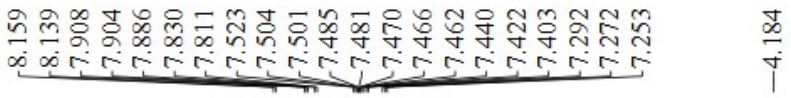


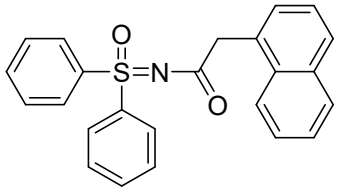
6j, 400 MHz, $CDCl_3$



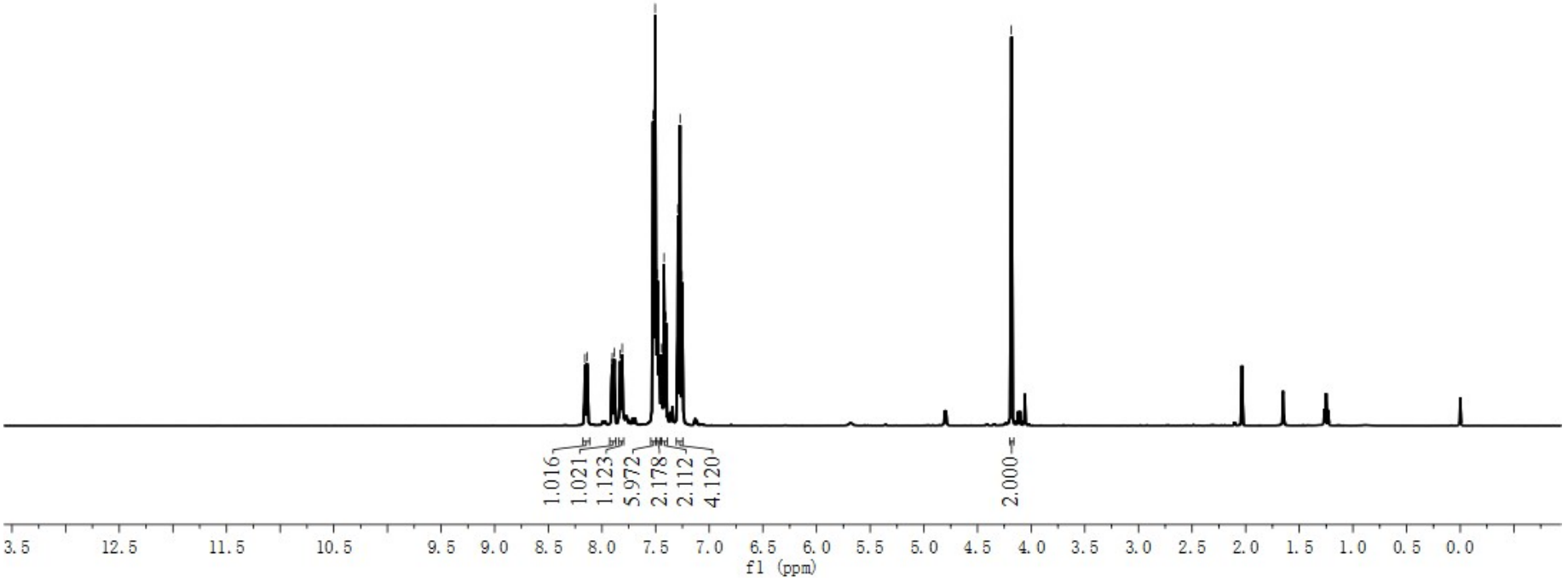


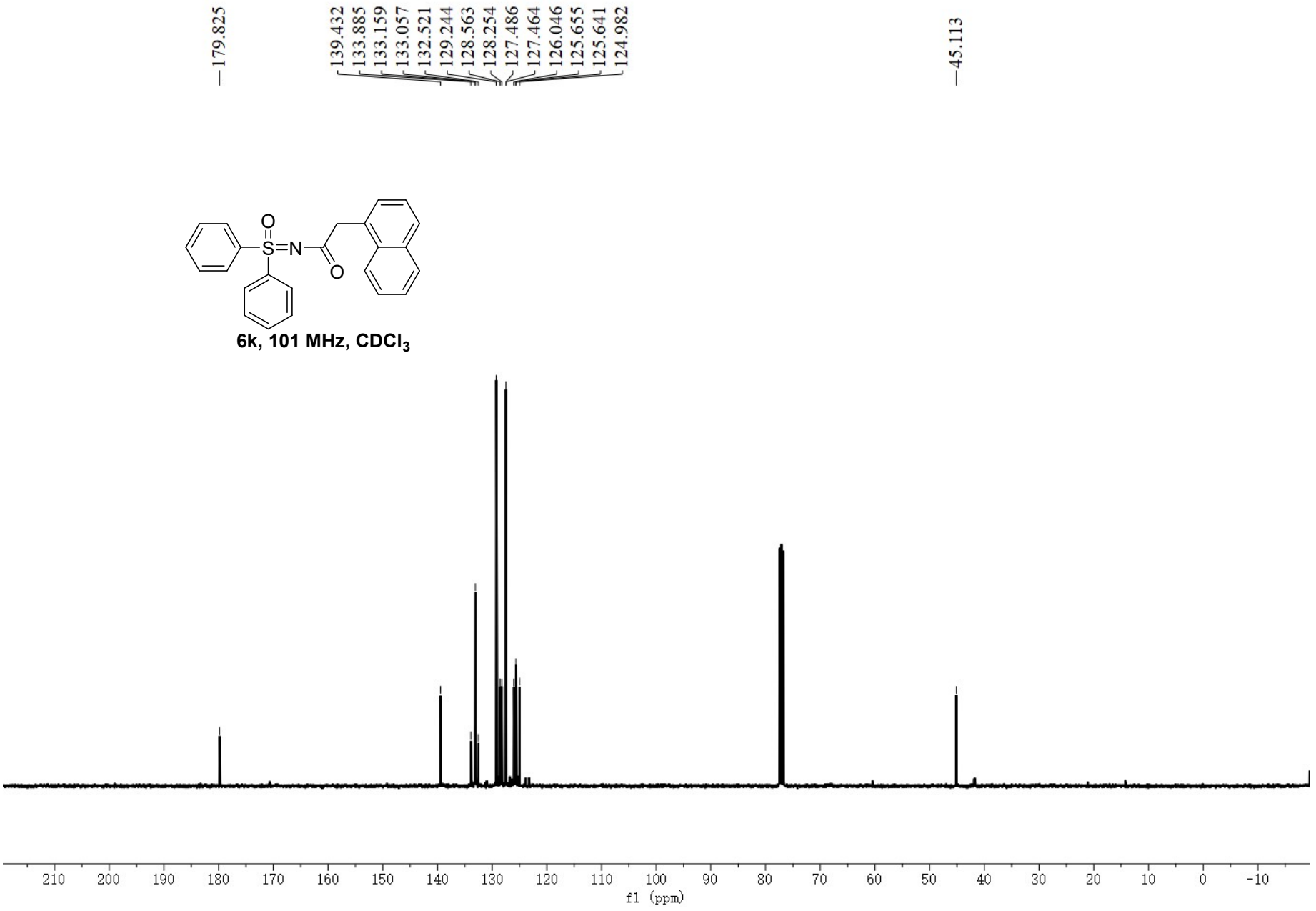
6j, 101 MHz, $CDCl_3$



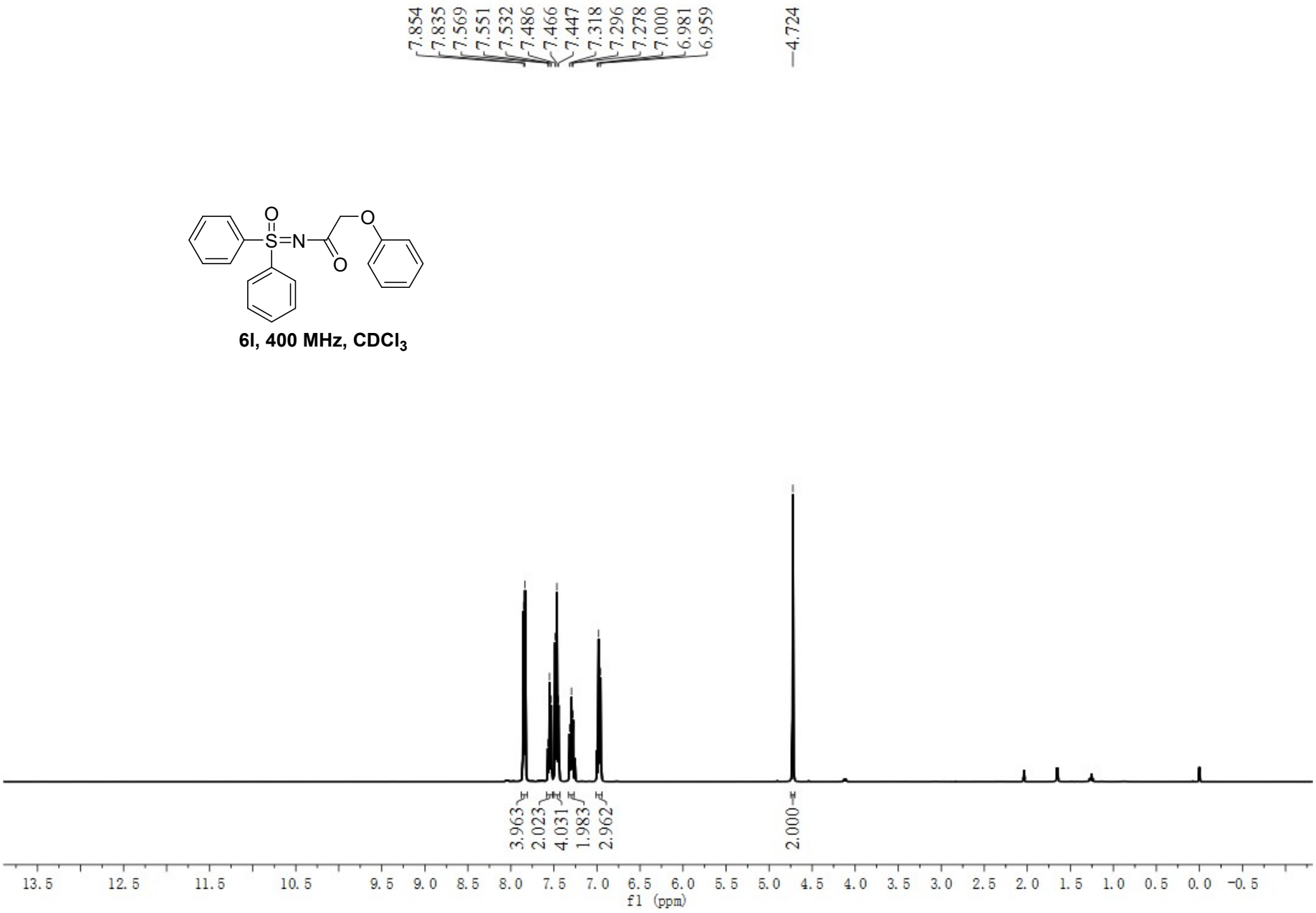


6k, 400 MHz, $CDCl_3$

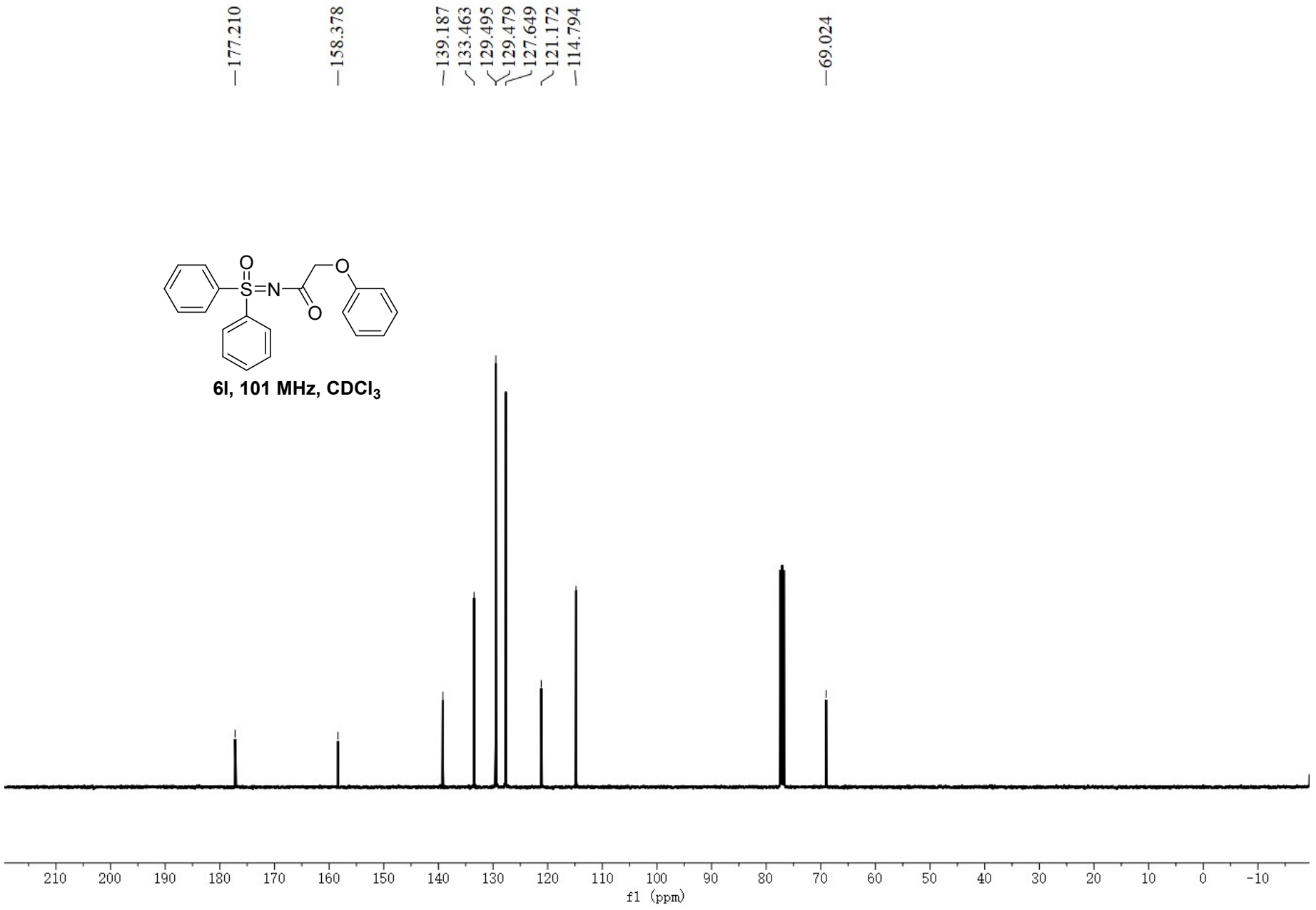




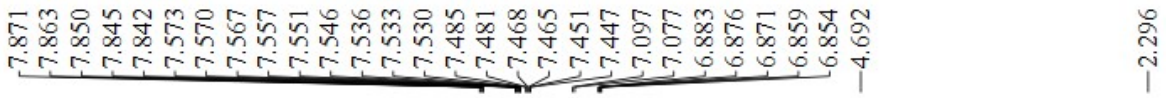
6k, 101 MHz, $CDCl_3$

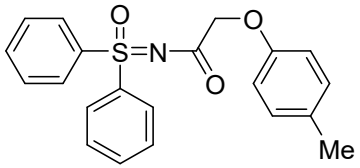


6l, 400 MHz, $CDCl_3$

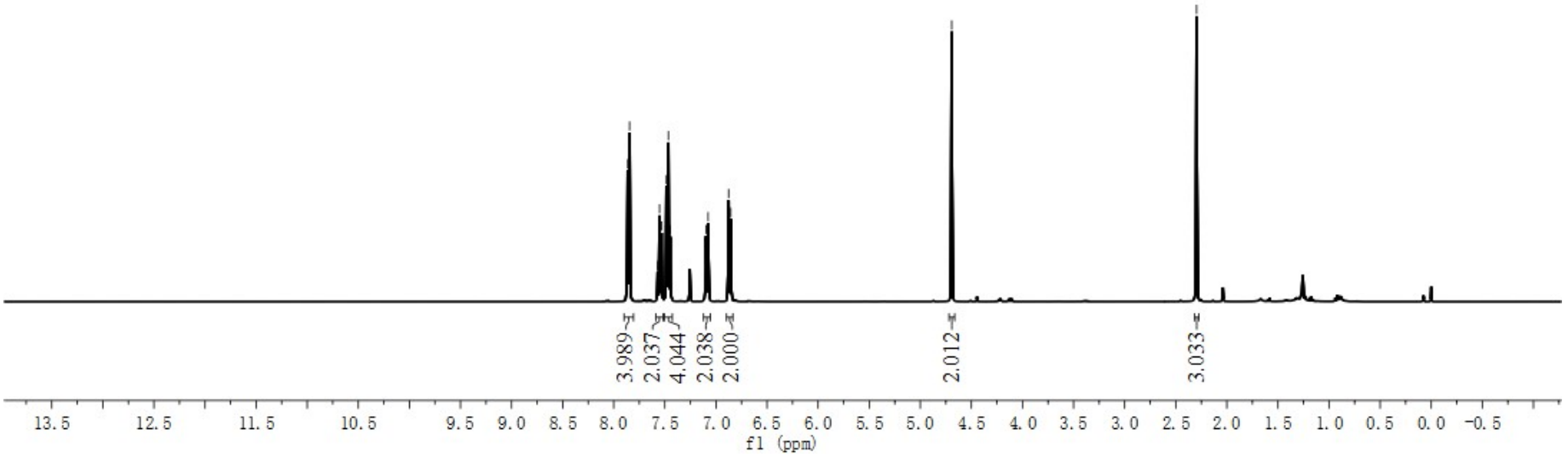


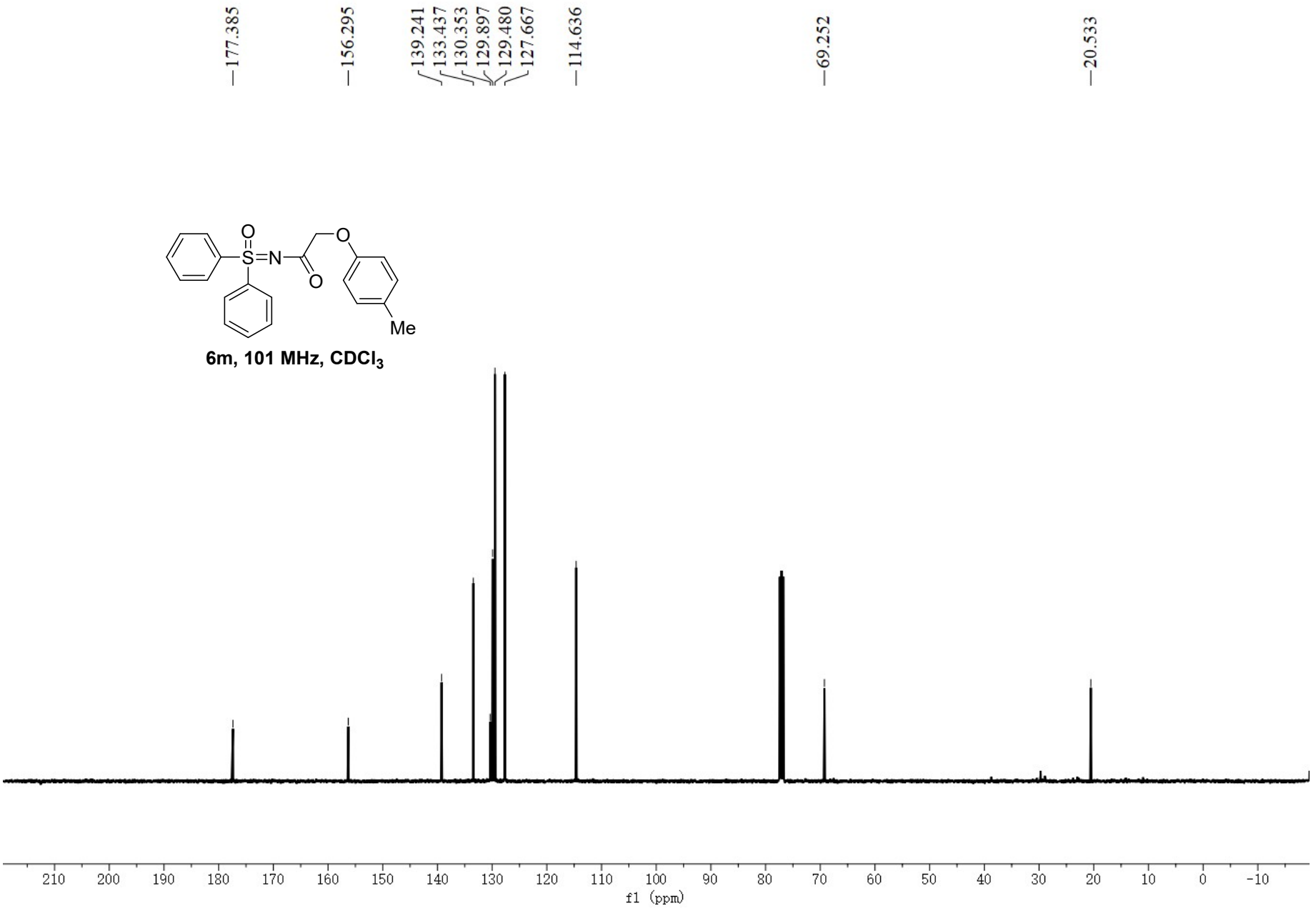
6l, 101 MHz, $CDCl_3$

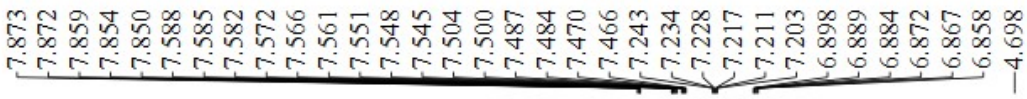


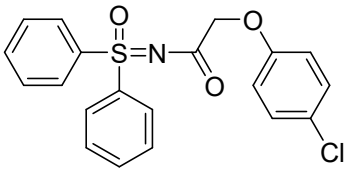


6m, 400 MHz, $CDCl_3$

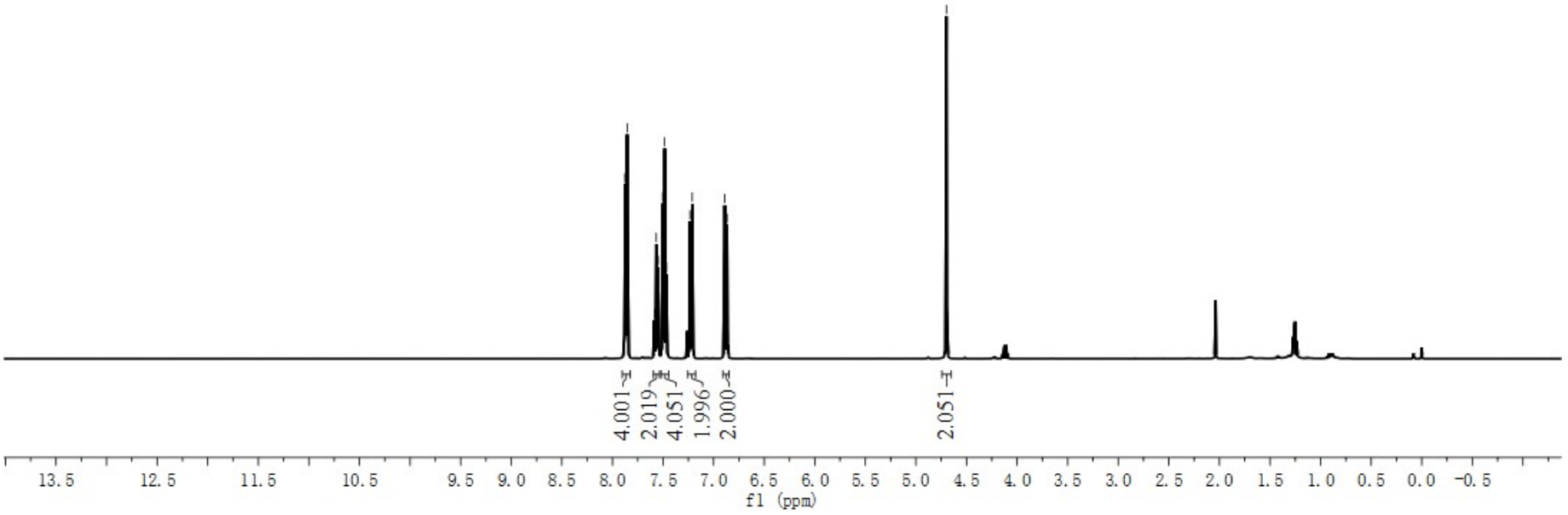


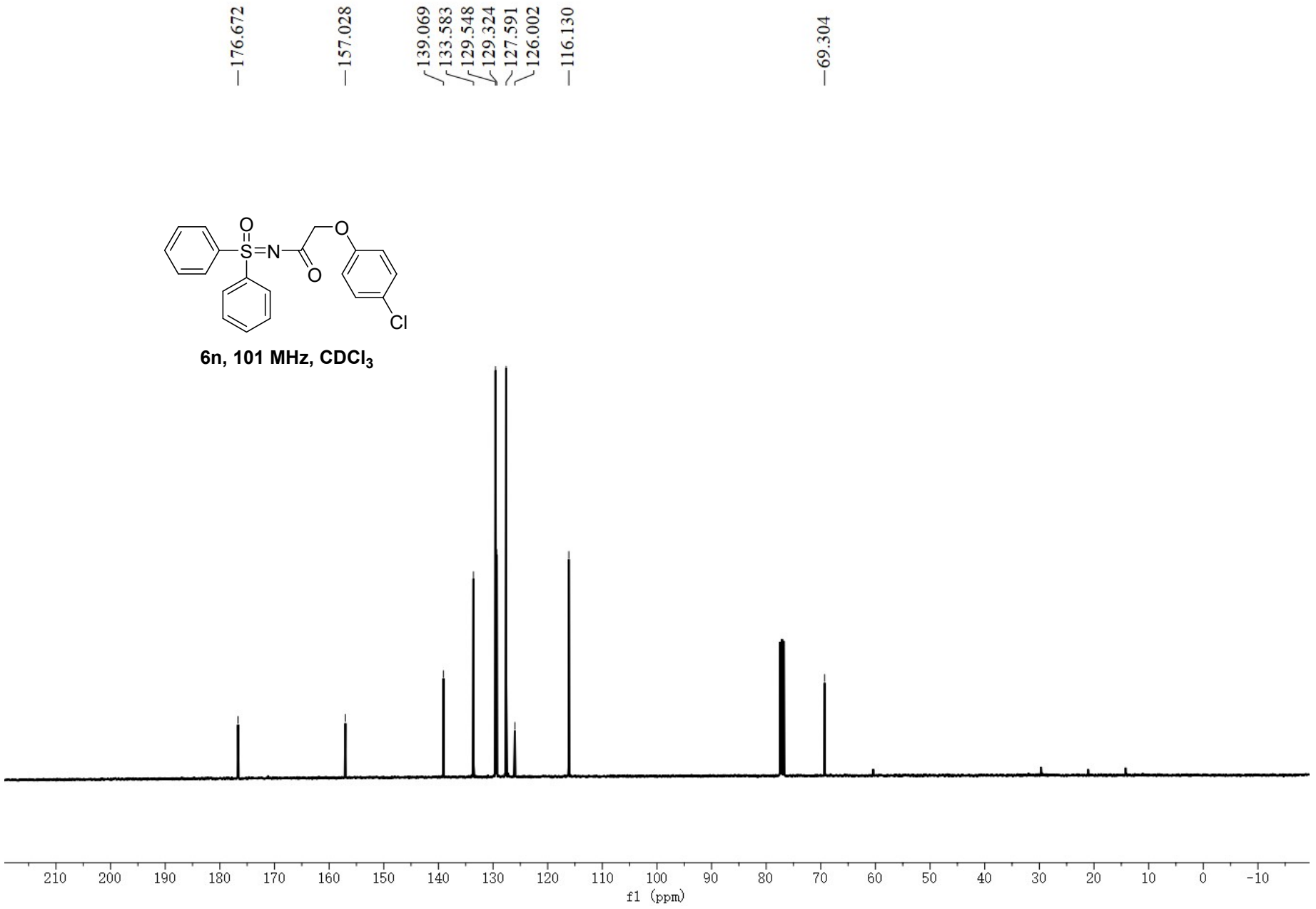

177.385
156.295
139.241
133.437
130.353
129.897
129.480
127.667
114.636
69.252
20.533
O
S=N
O
O
Me
6m, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



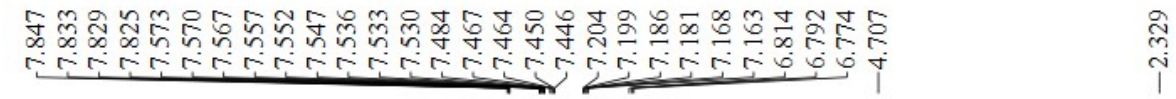


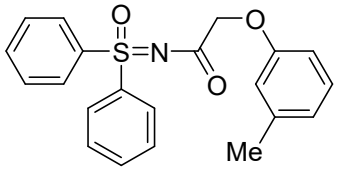
6n, 400 MHz, $CDCl_3$



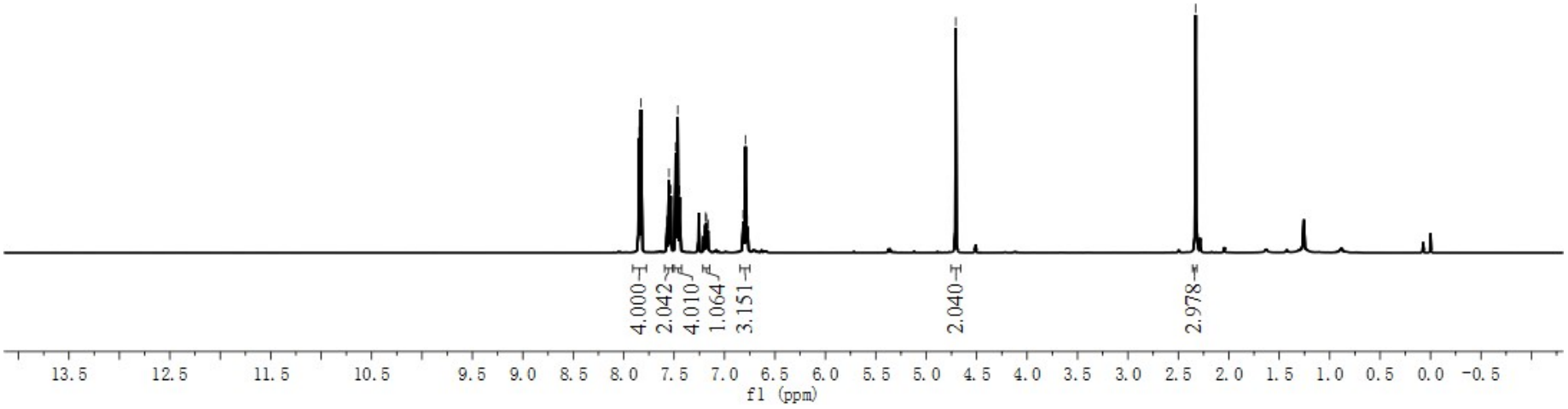


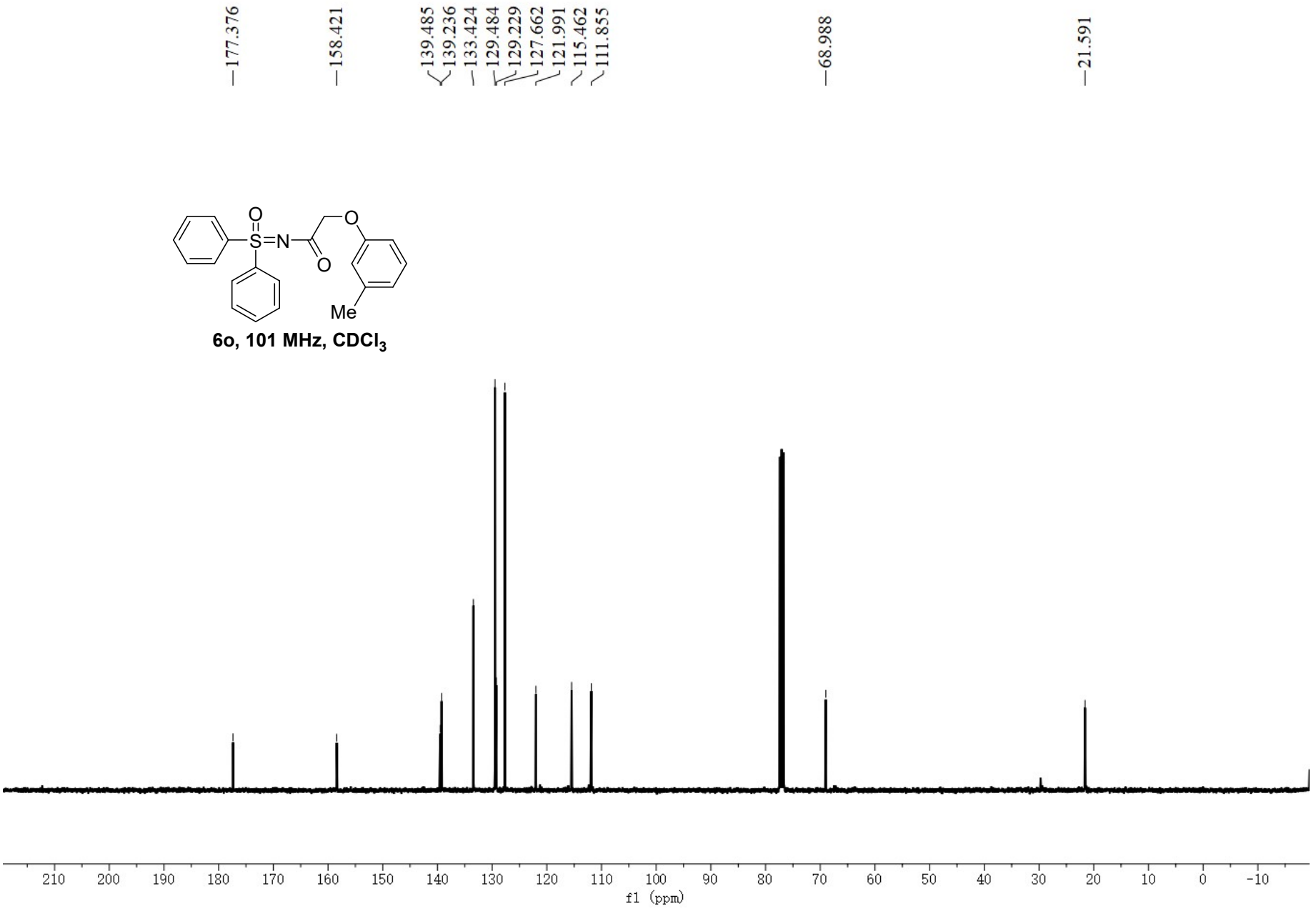
6n, 101 MHz, $CDCl_3$



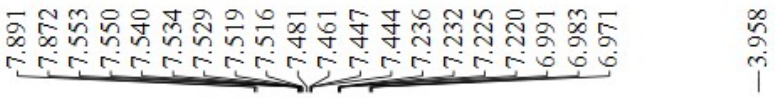


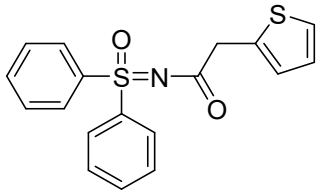
6o, 400 MHz, $CDCl_3$



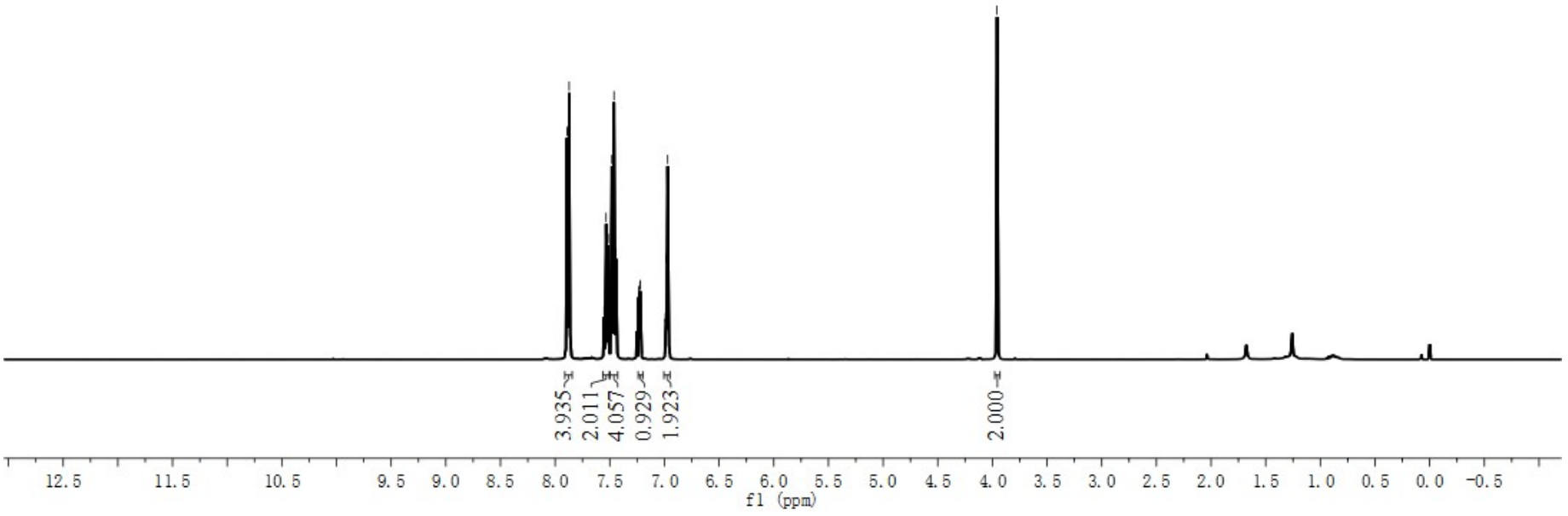


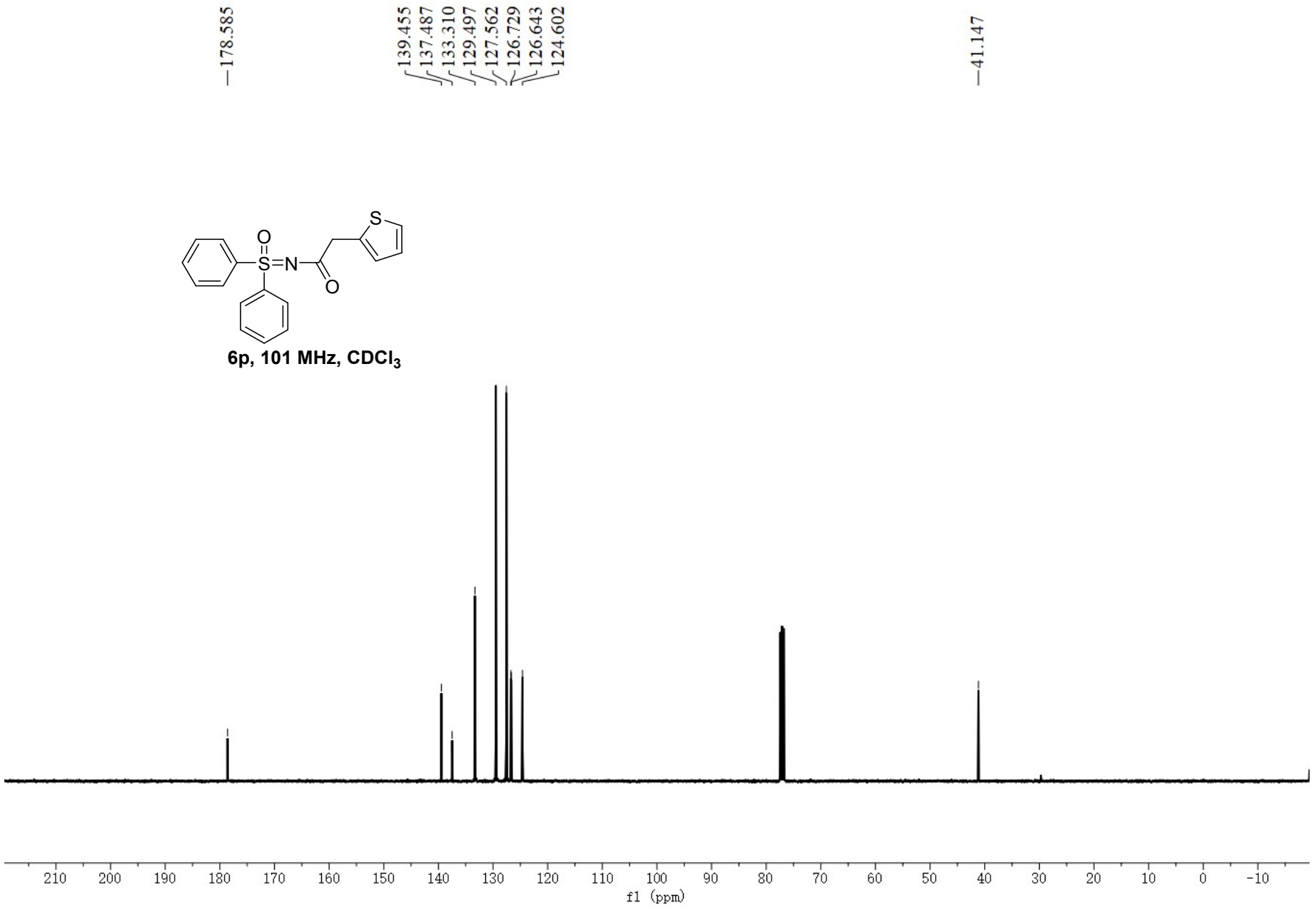
6o, 101 MHz, $CDCl_3$



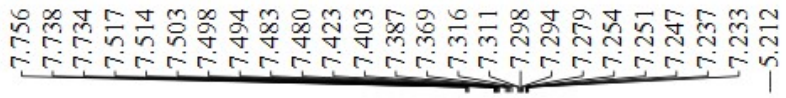


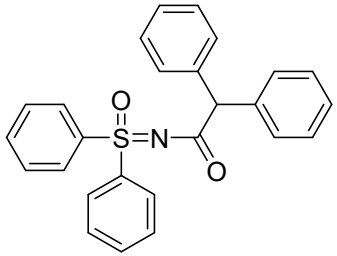
6p, 400 MHz, $CDCl_3$



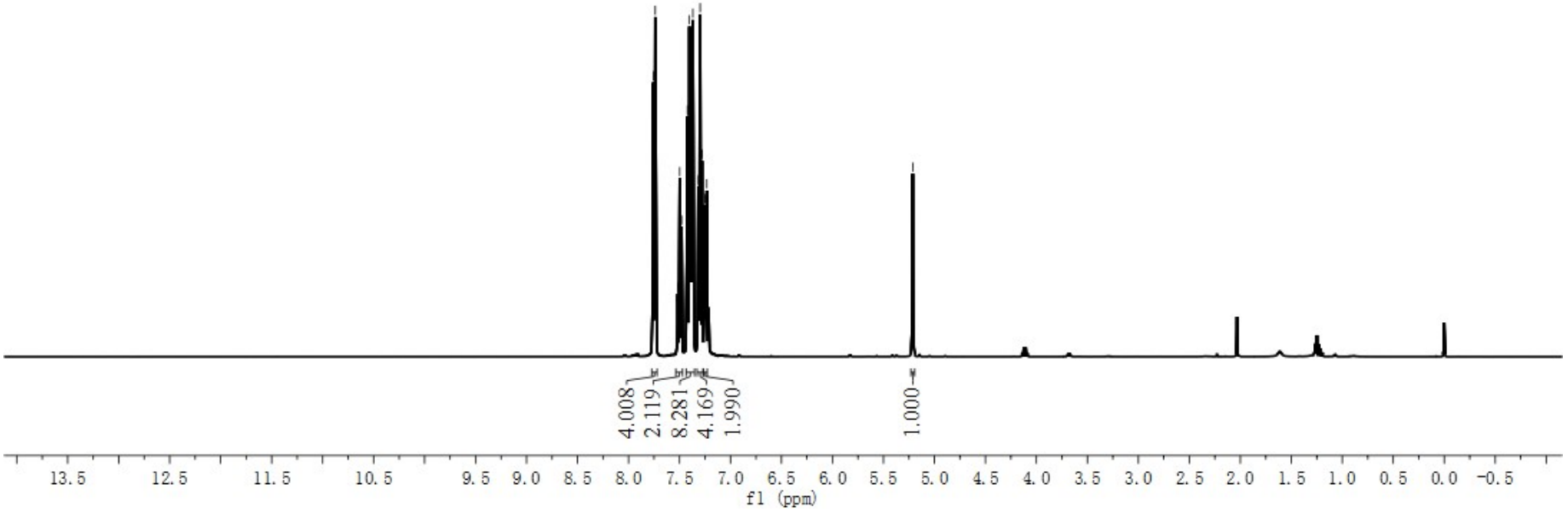


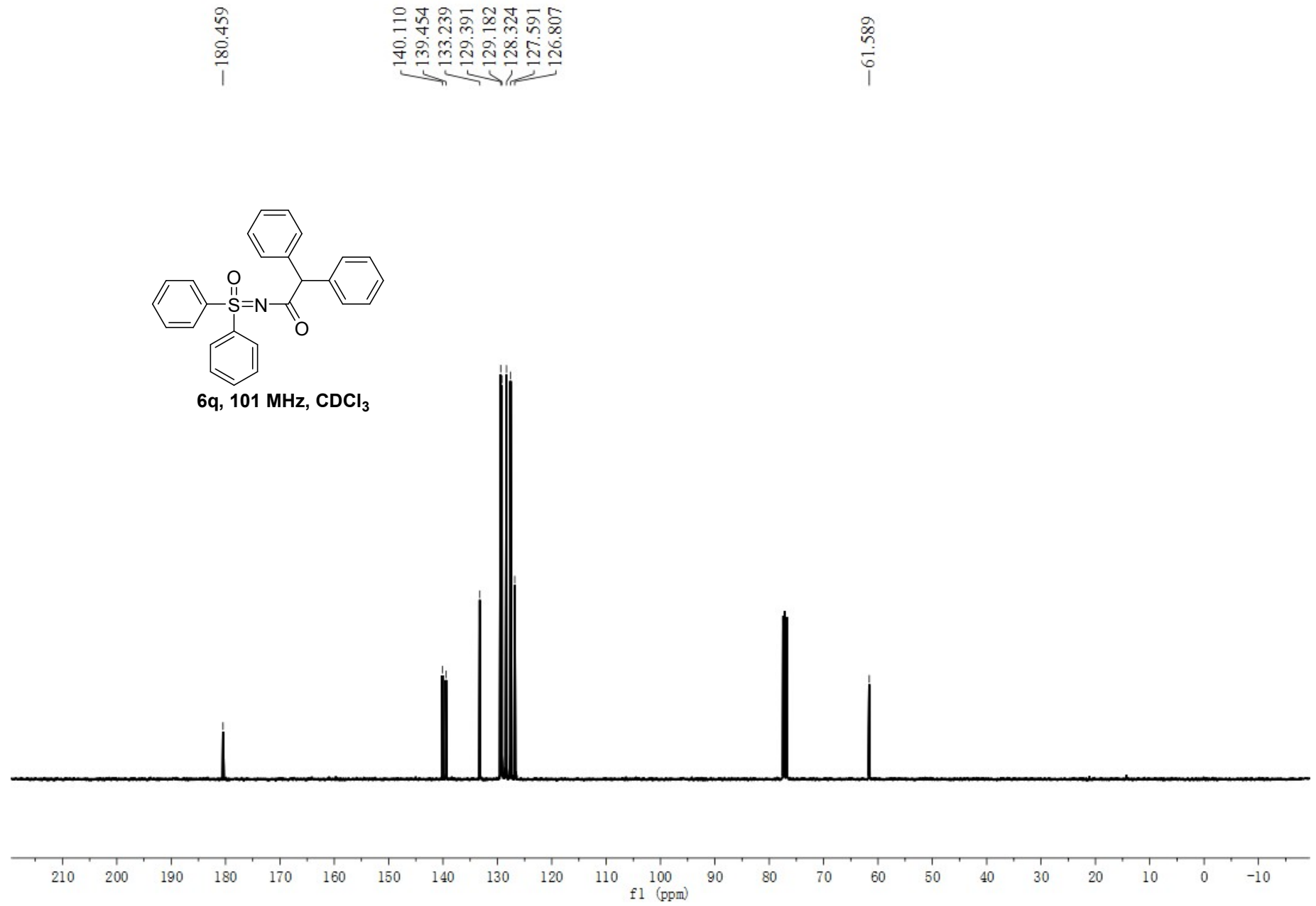
6p, 101 MHz, $CDCl_3$



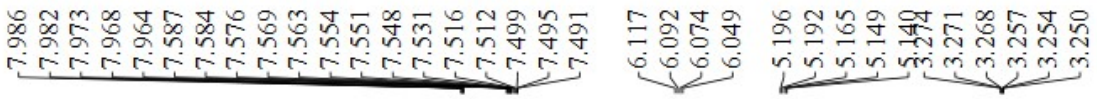


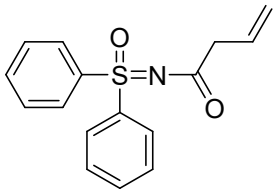
6q, 400 MHz, $CDCl_3$



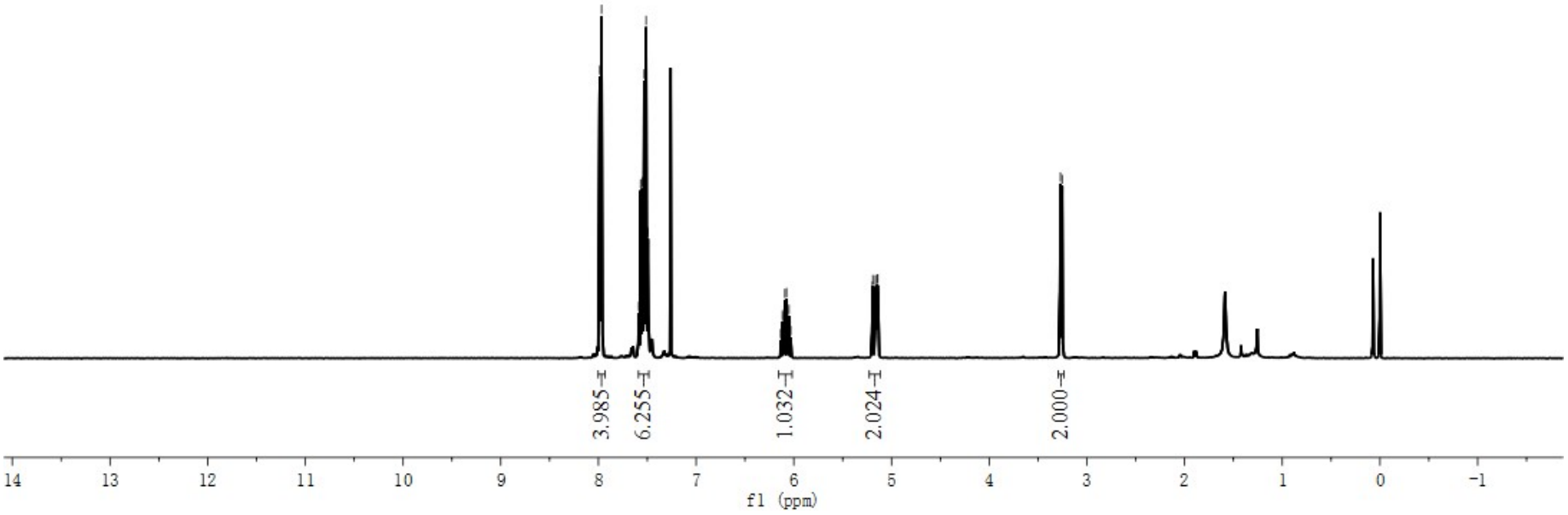


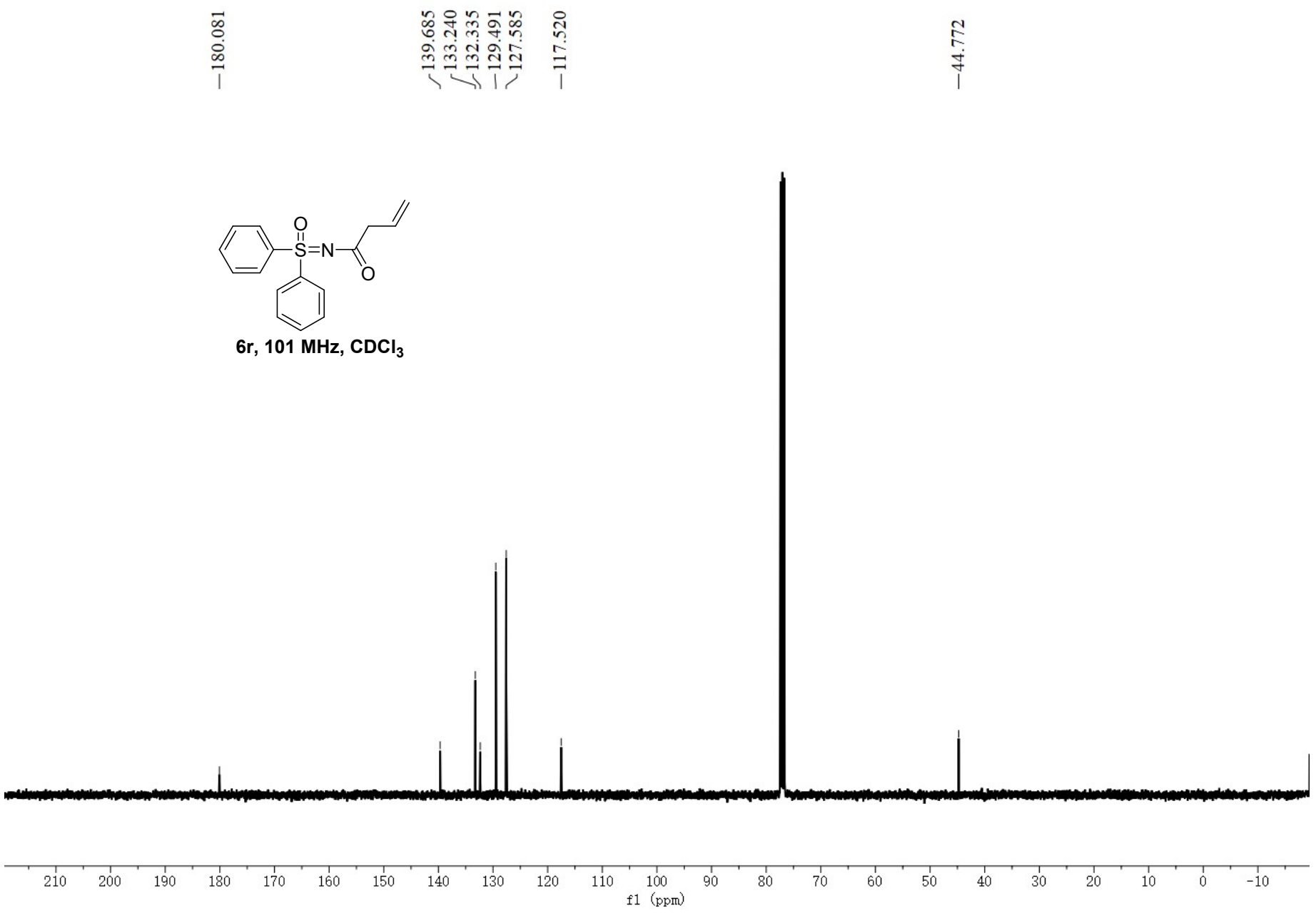
6q, 101 MHz, $CDCl_3$



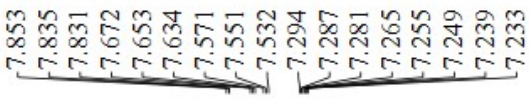


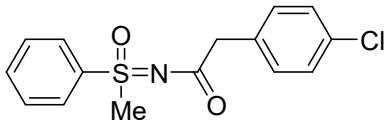
6r, 400 MHz, $CDCl_3$



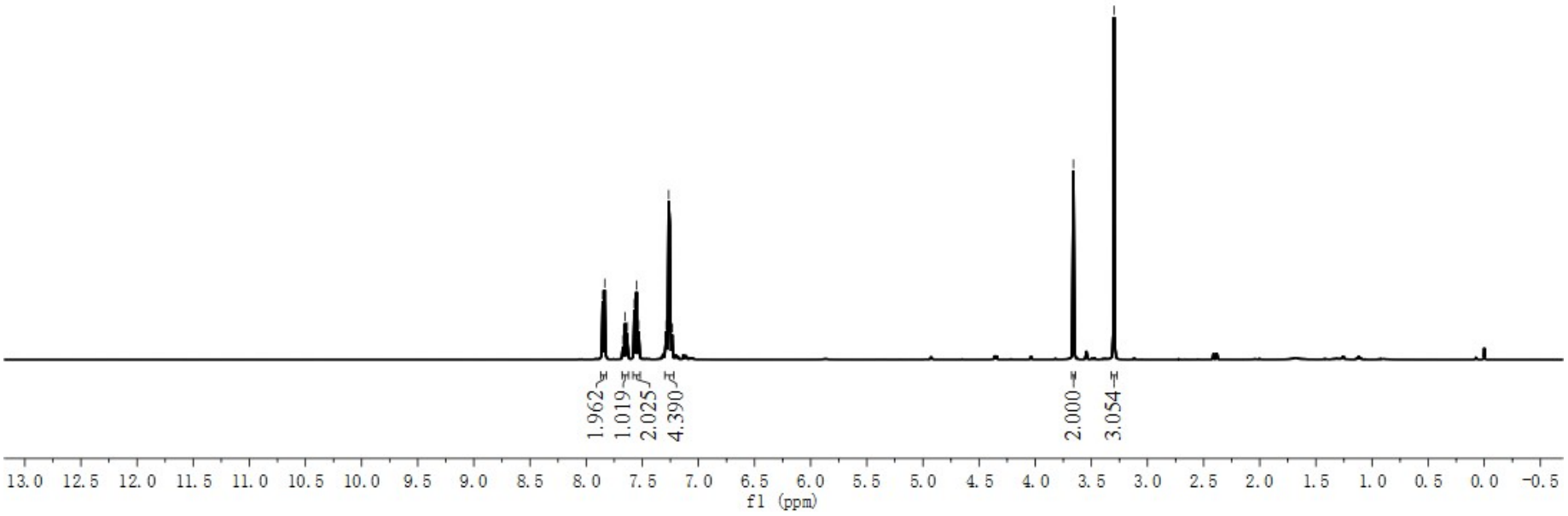


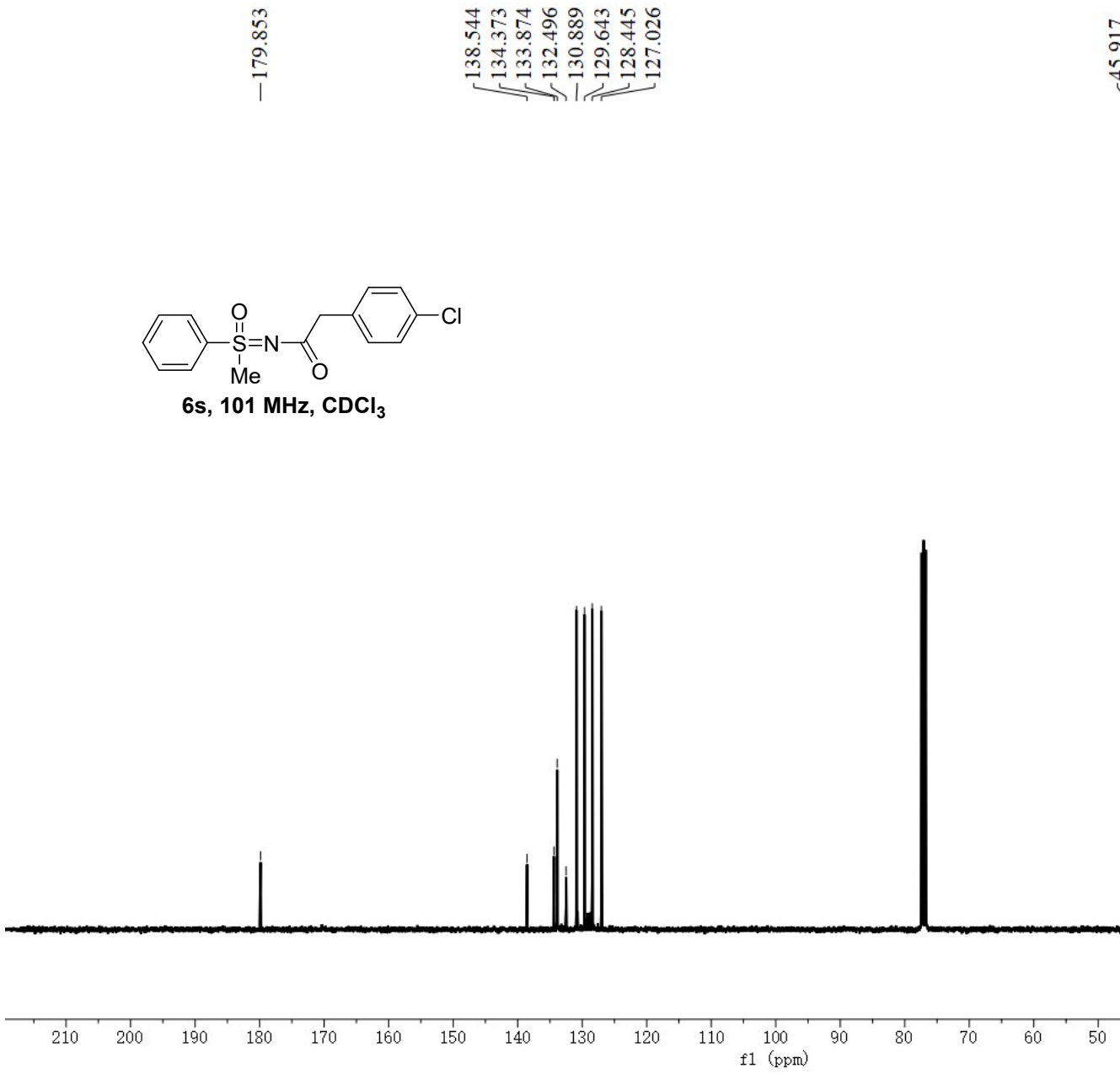
6r, 101 MHz, $CDCl_3$



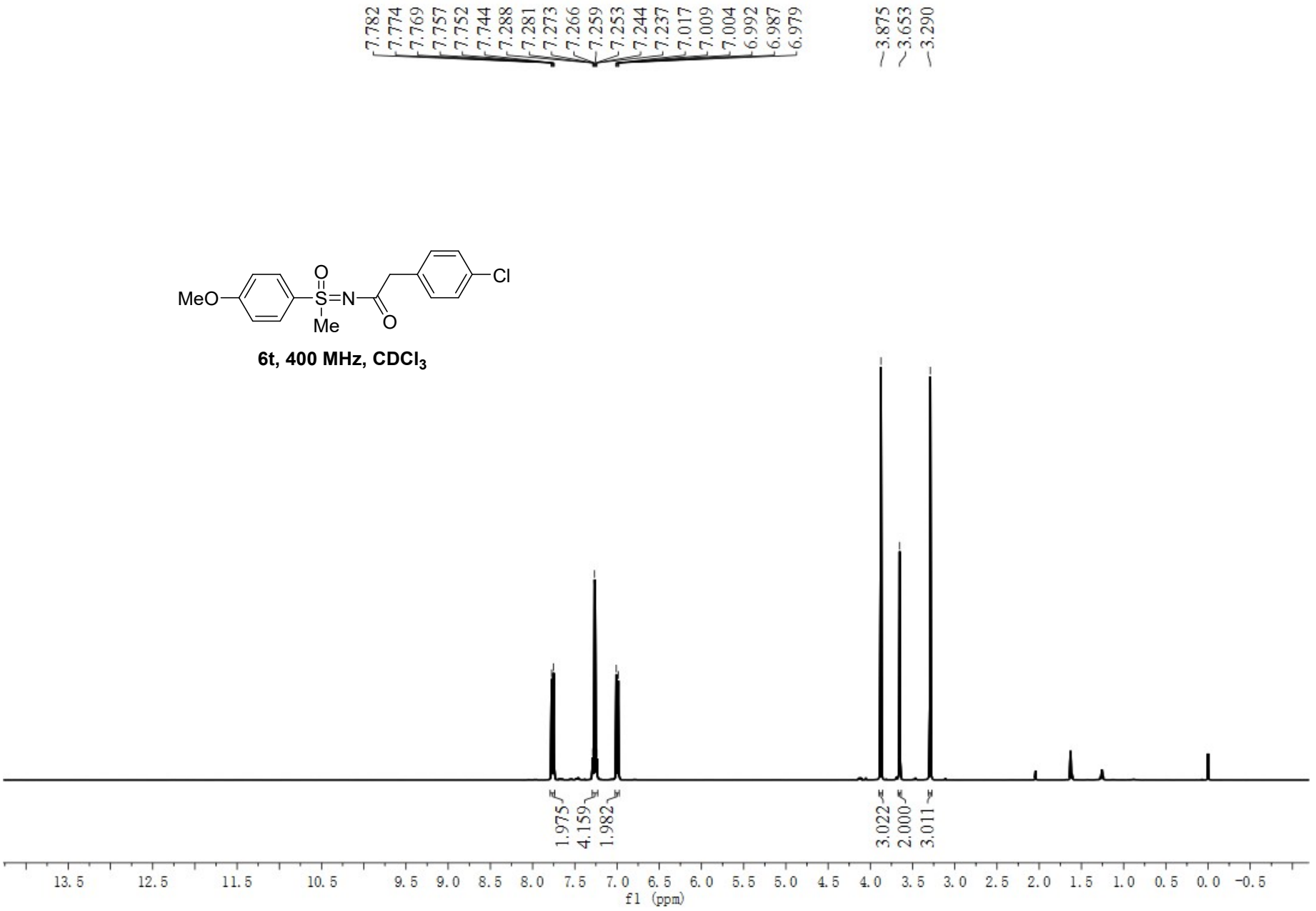


6s, 400 MHz, $CDCl_3$

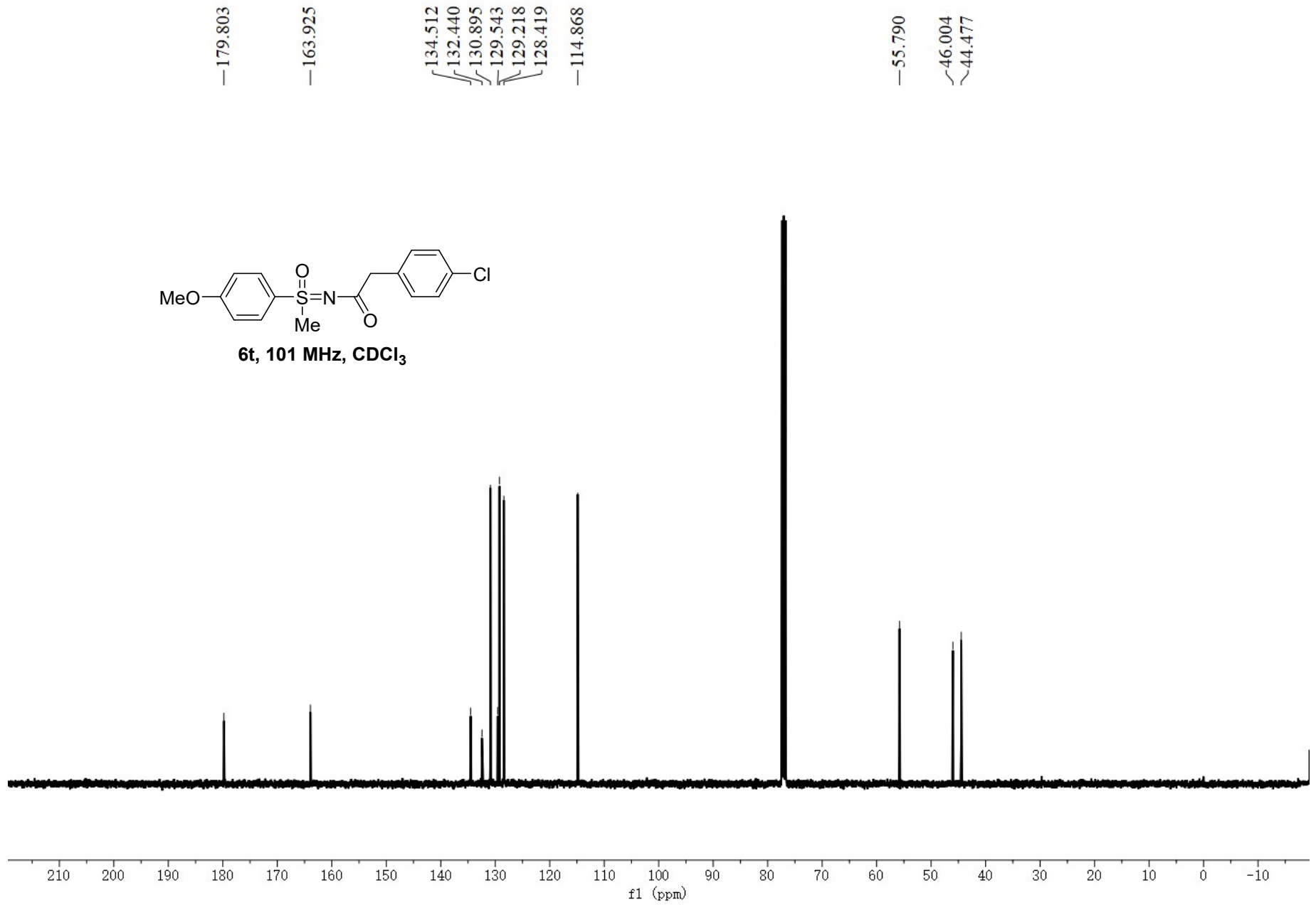




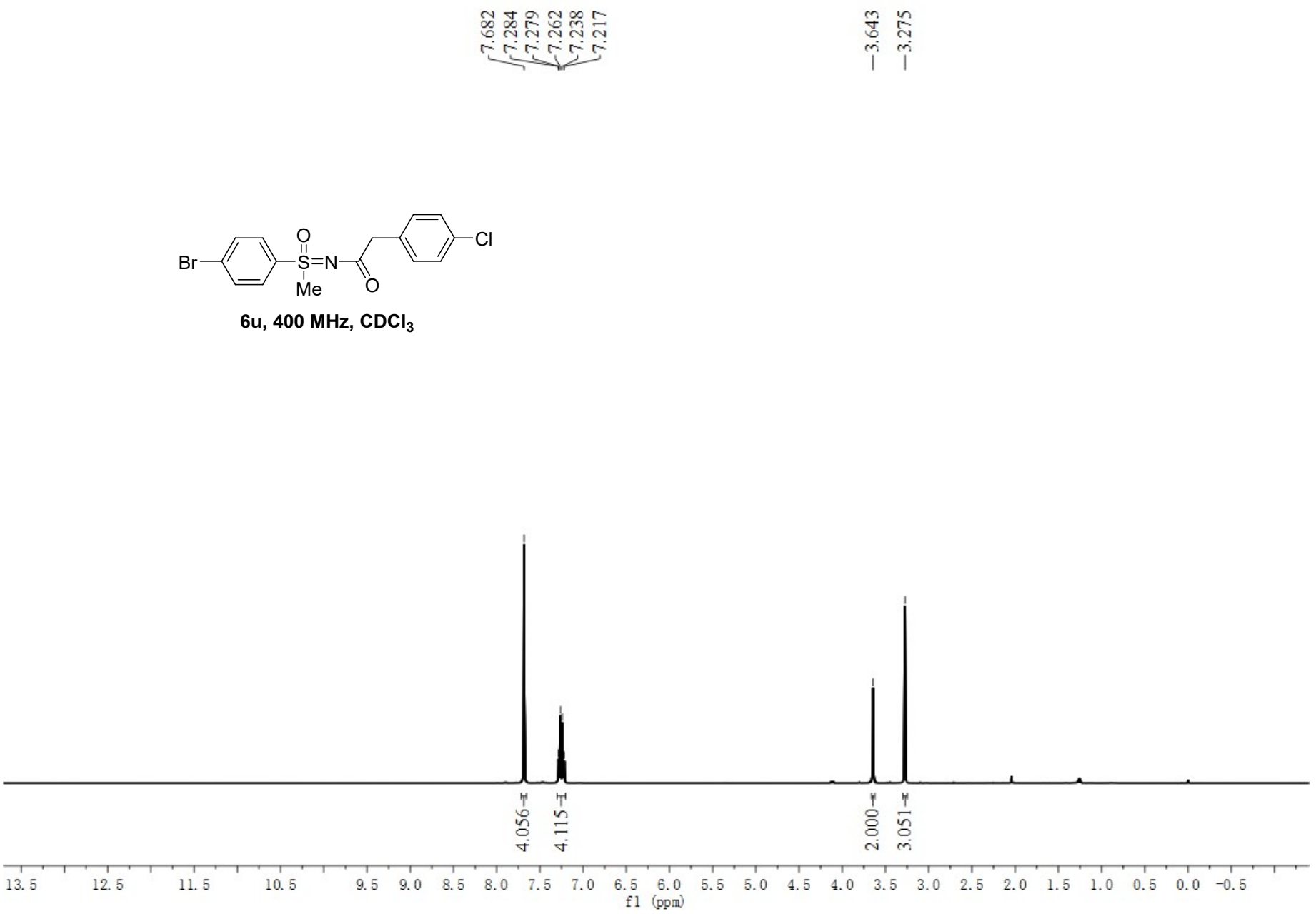
6s, 101 MHz, $CDCl_3$



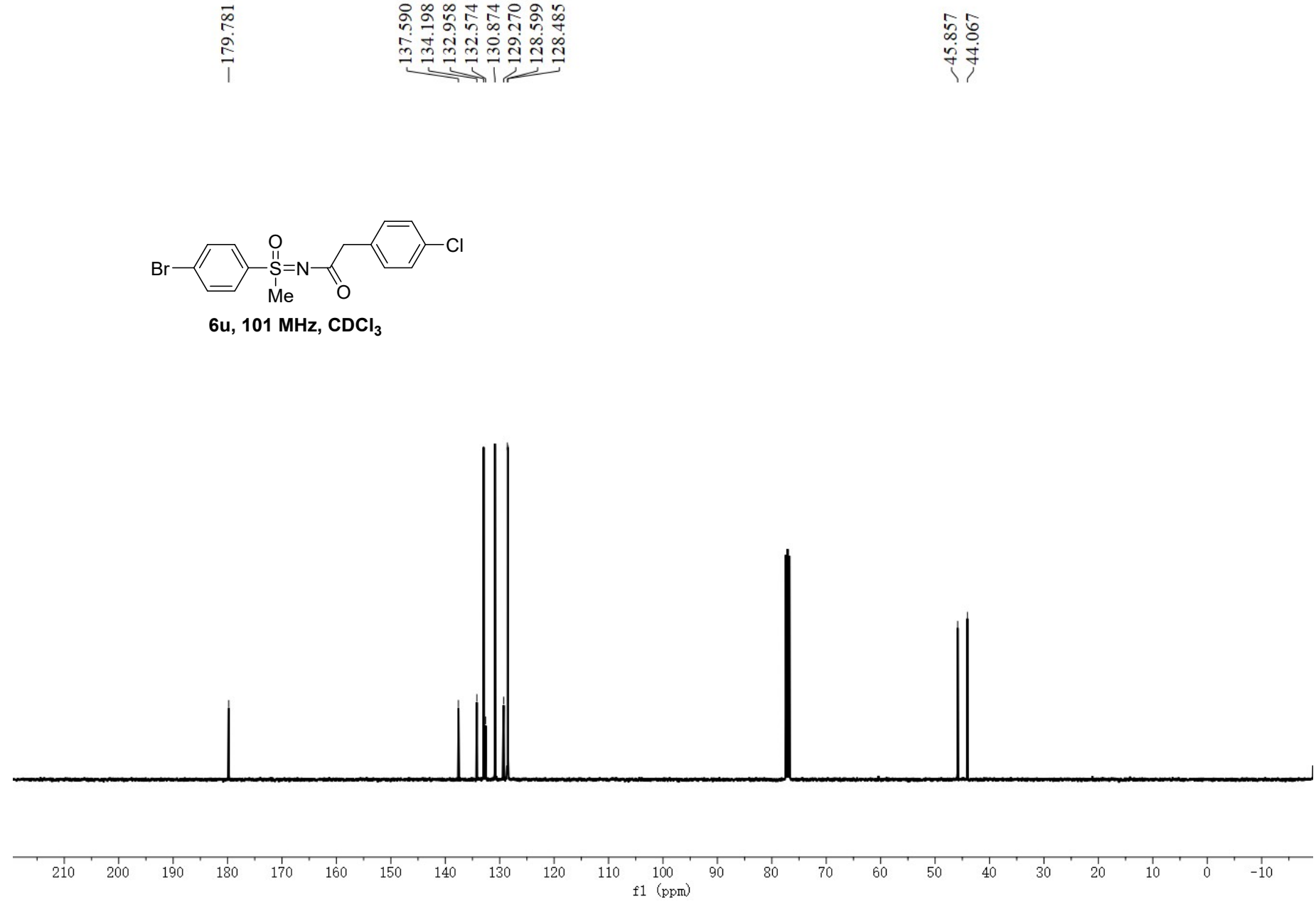
6t, 400 MHz, $CDCl_3$



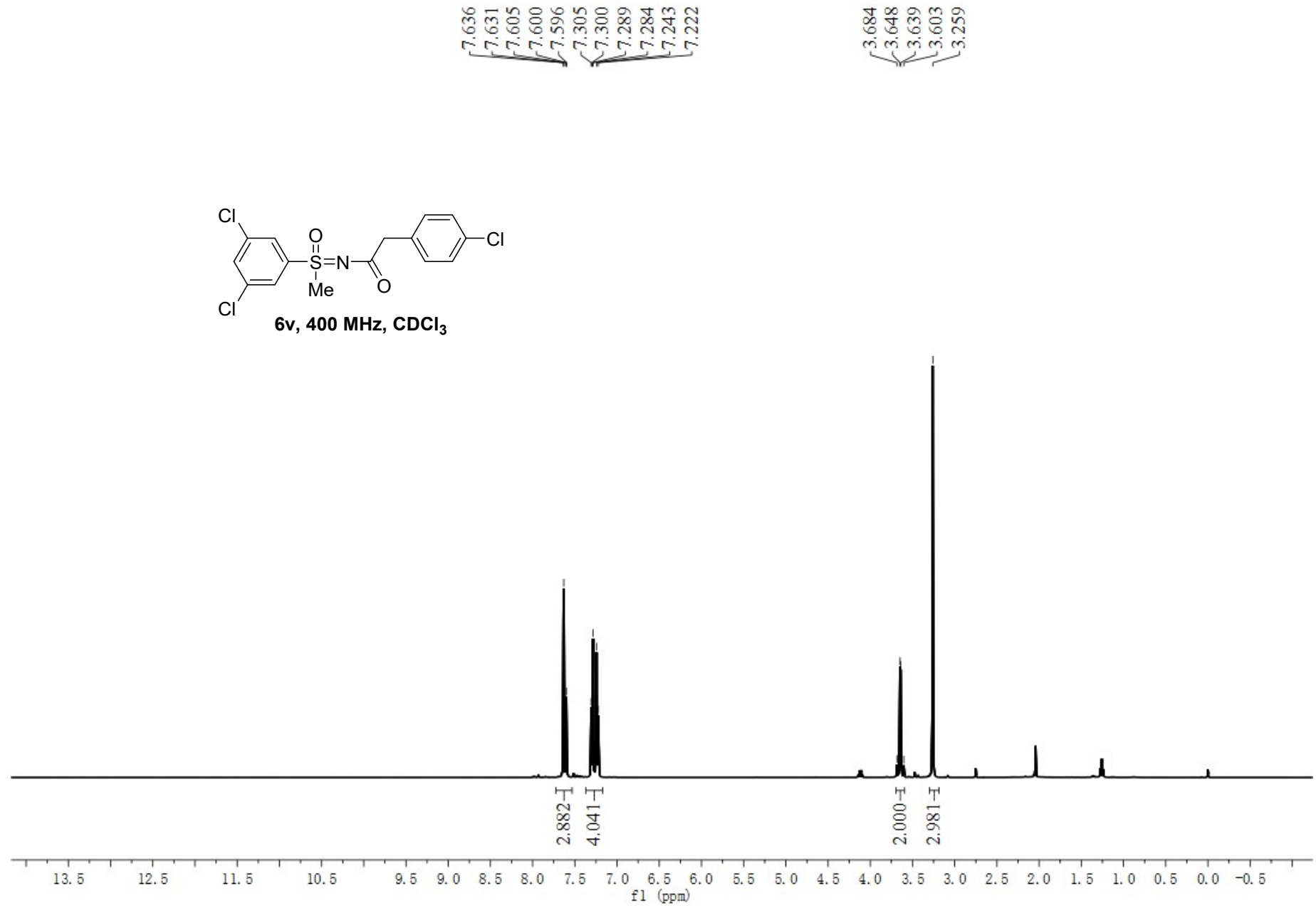
6t, 101 MHz, $CDCl_3$



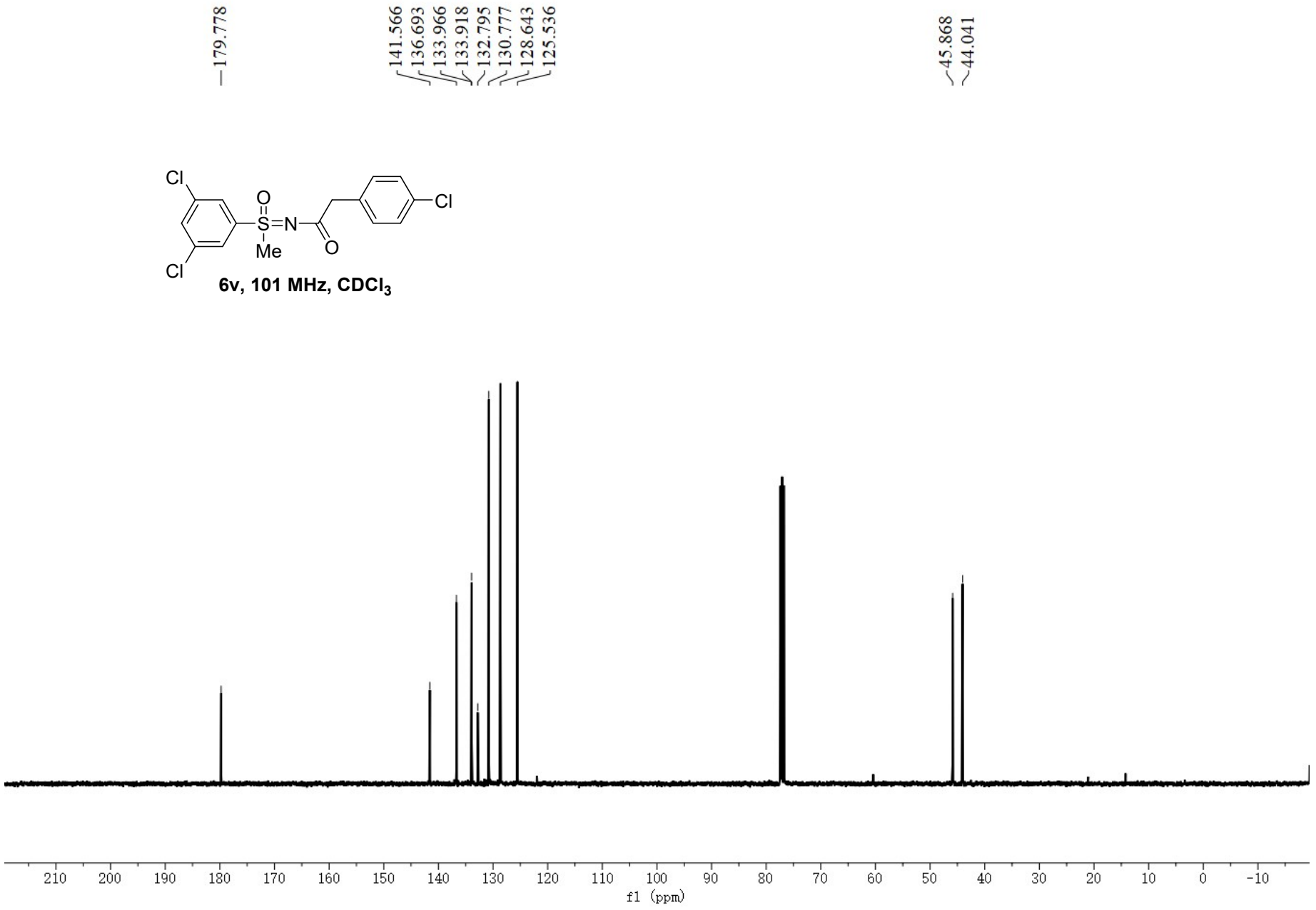
6u, 400 MHz, $CDCl_3$



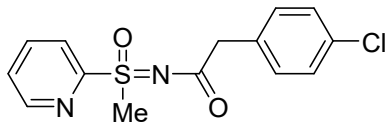
6u, 101 MHz, $CDCl_3$



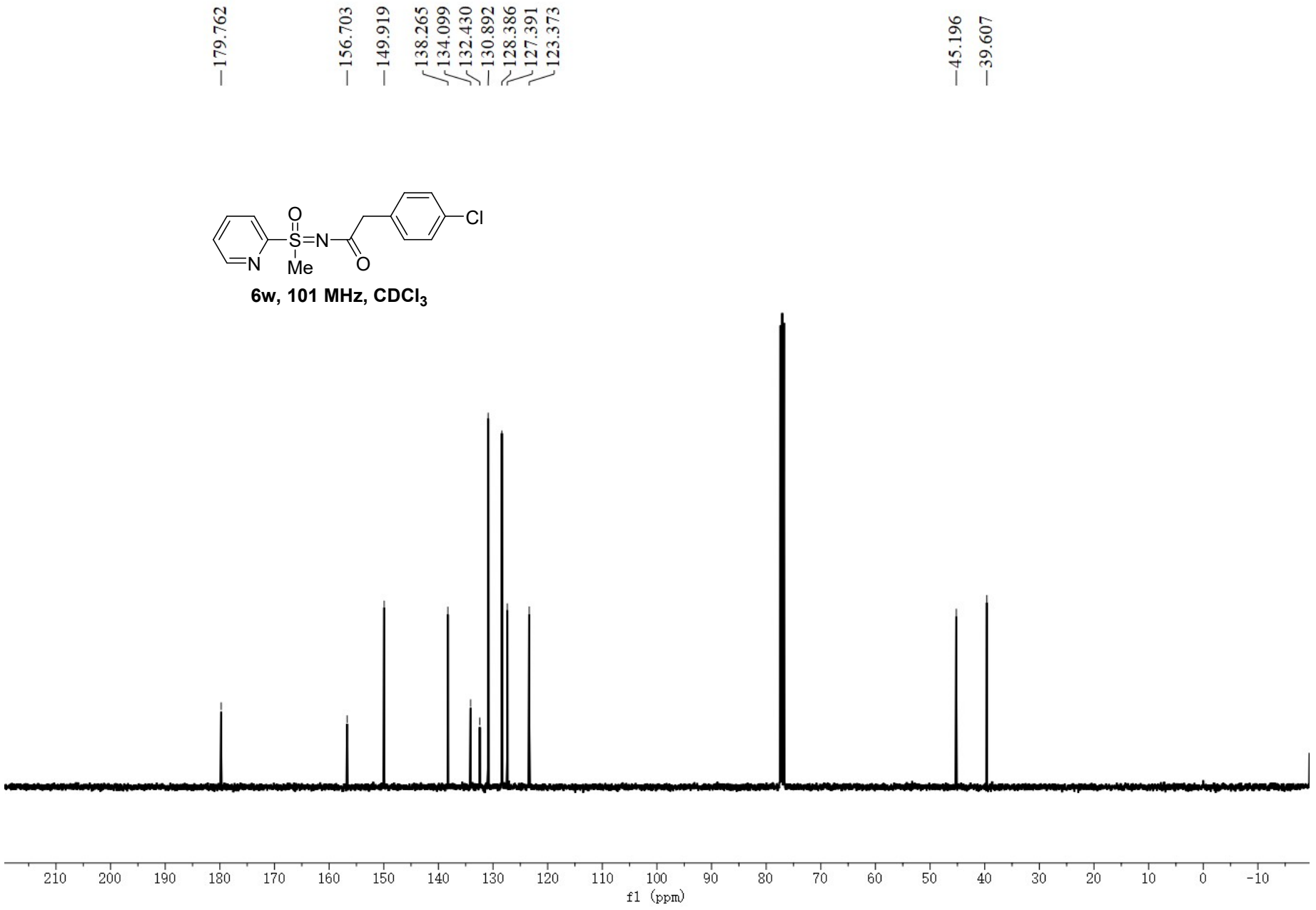
6v, 400 MHz, $CDCl_3$

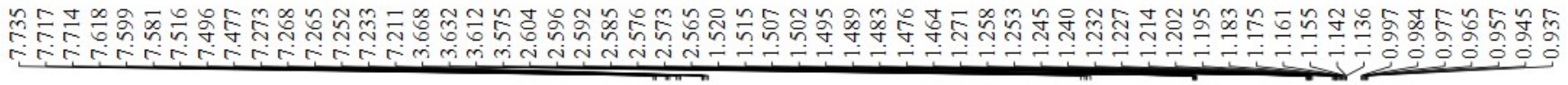


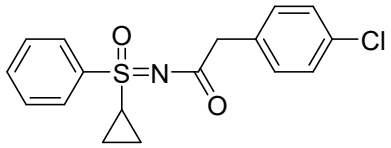
6v, 101 MHz, $CDCl_3$



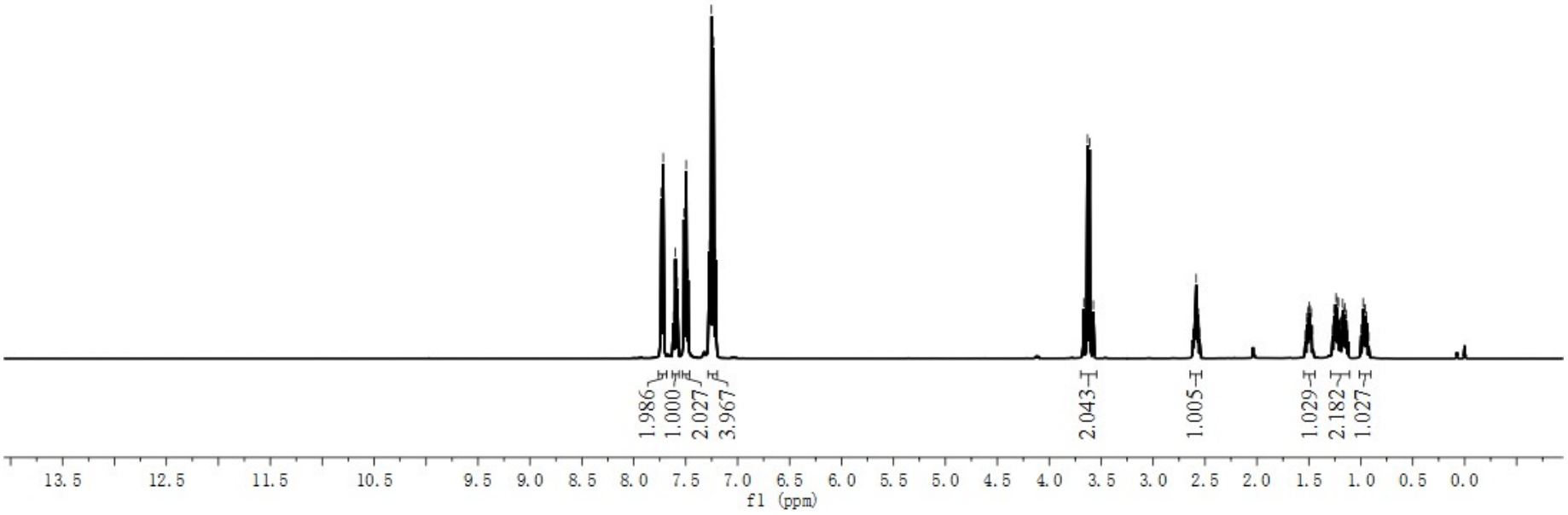
6w, 400 MHz, $CDCl_3$

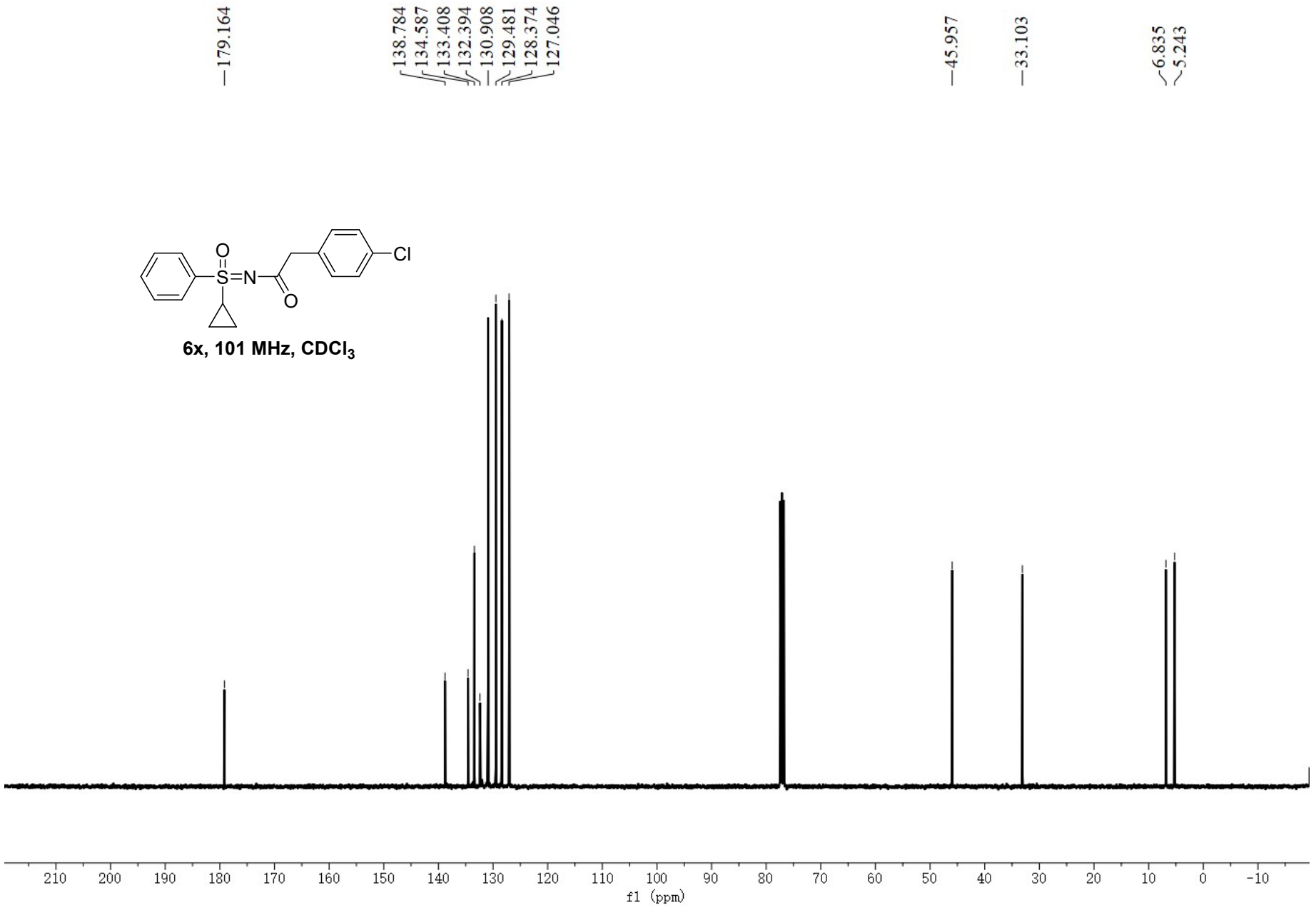

179.762
156.703
149.919
138.265
134.099
132.430
130.892
128.386
127.391
123.373
45.196
39.607
O
S=N
Me
N
O
Cl
6w, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



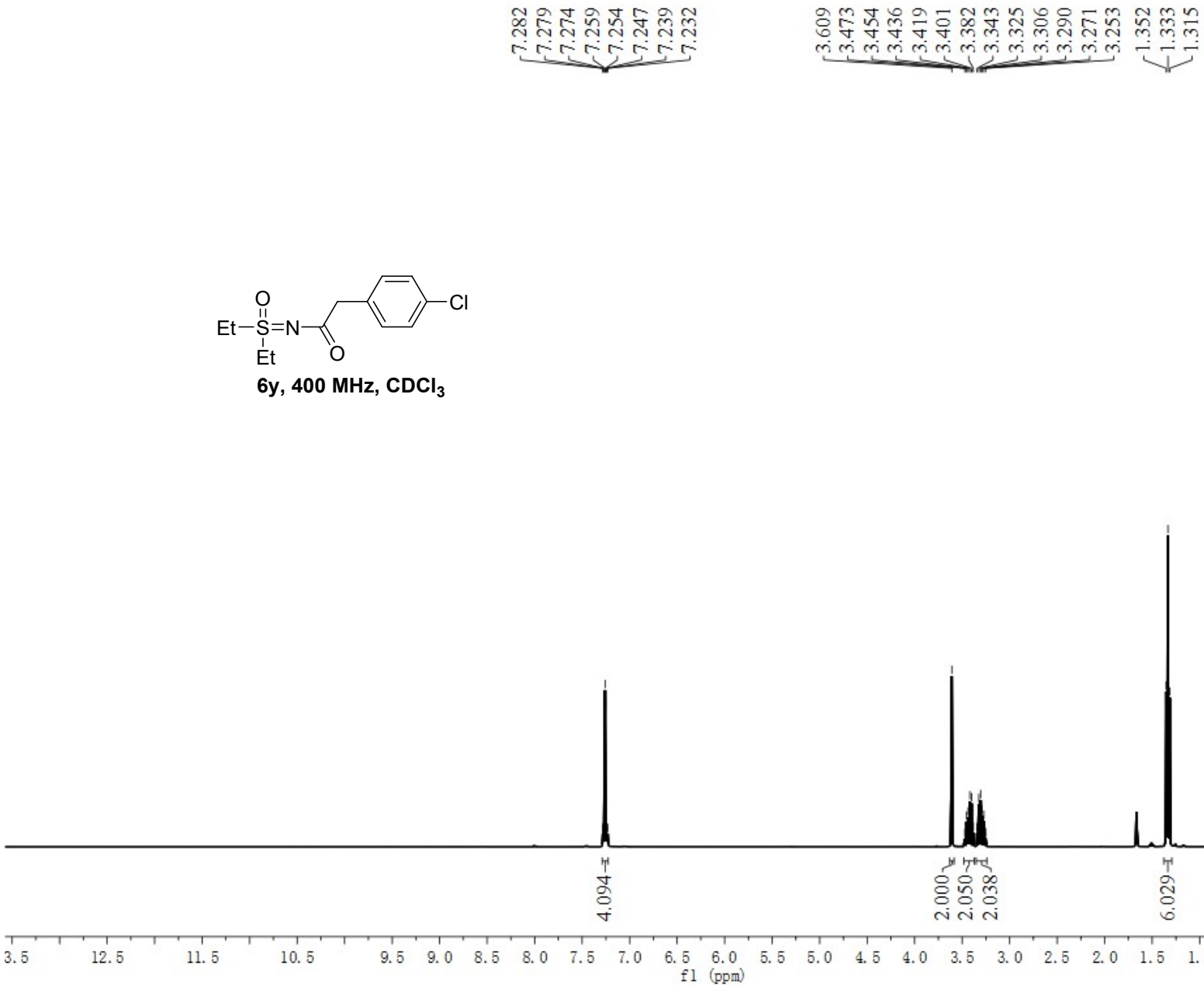


6x, 400 MHz, $CDCl_3$

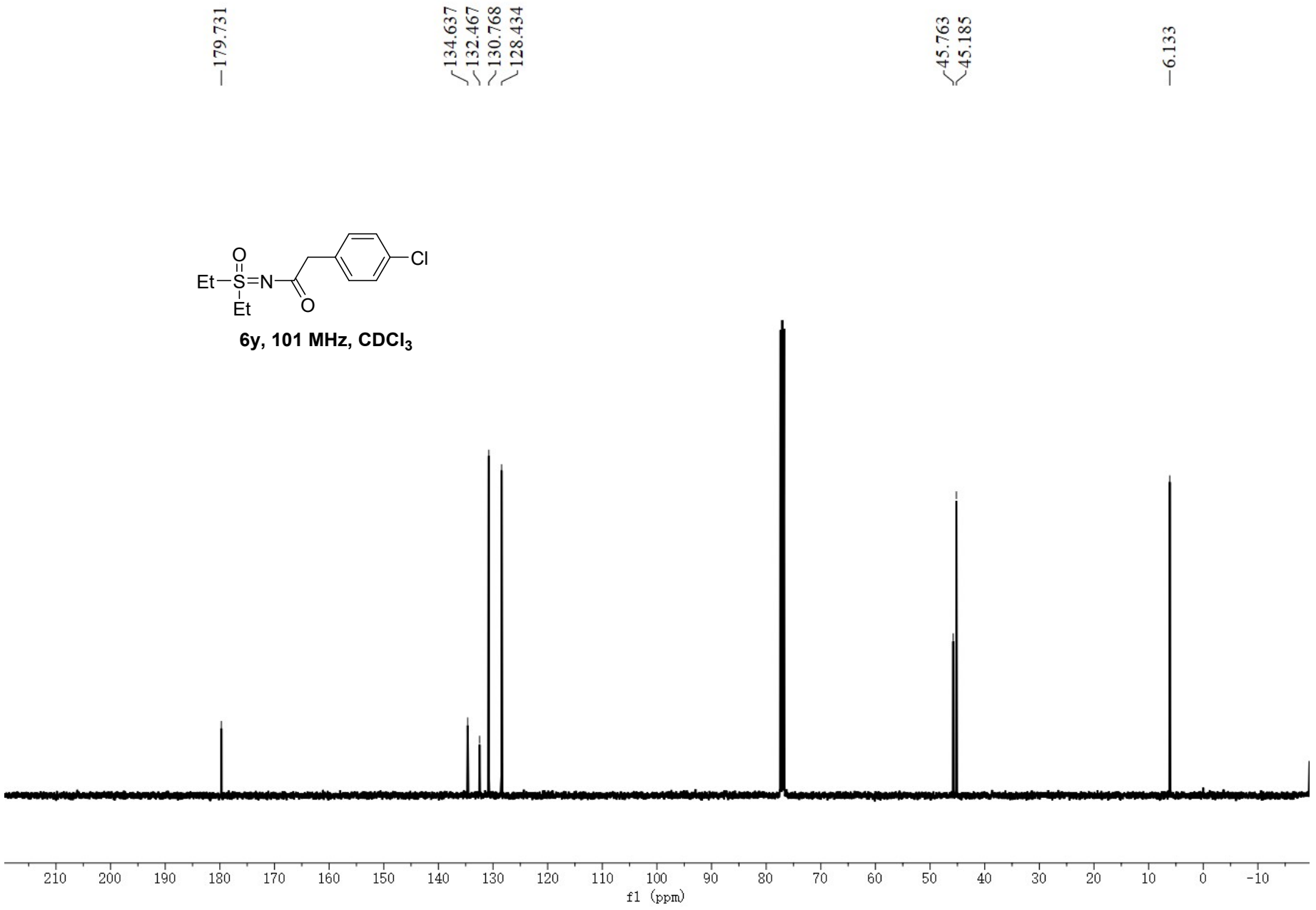




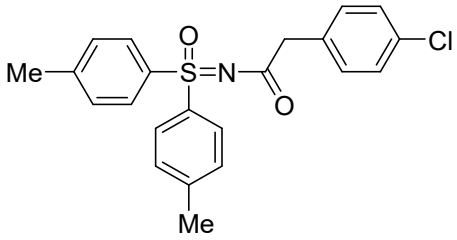
6x, 101 MHz, $CDCl_3$



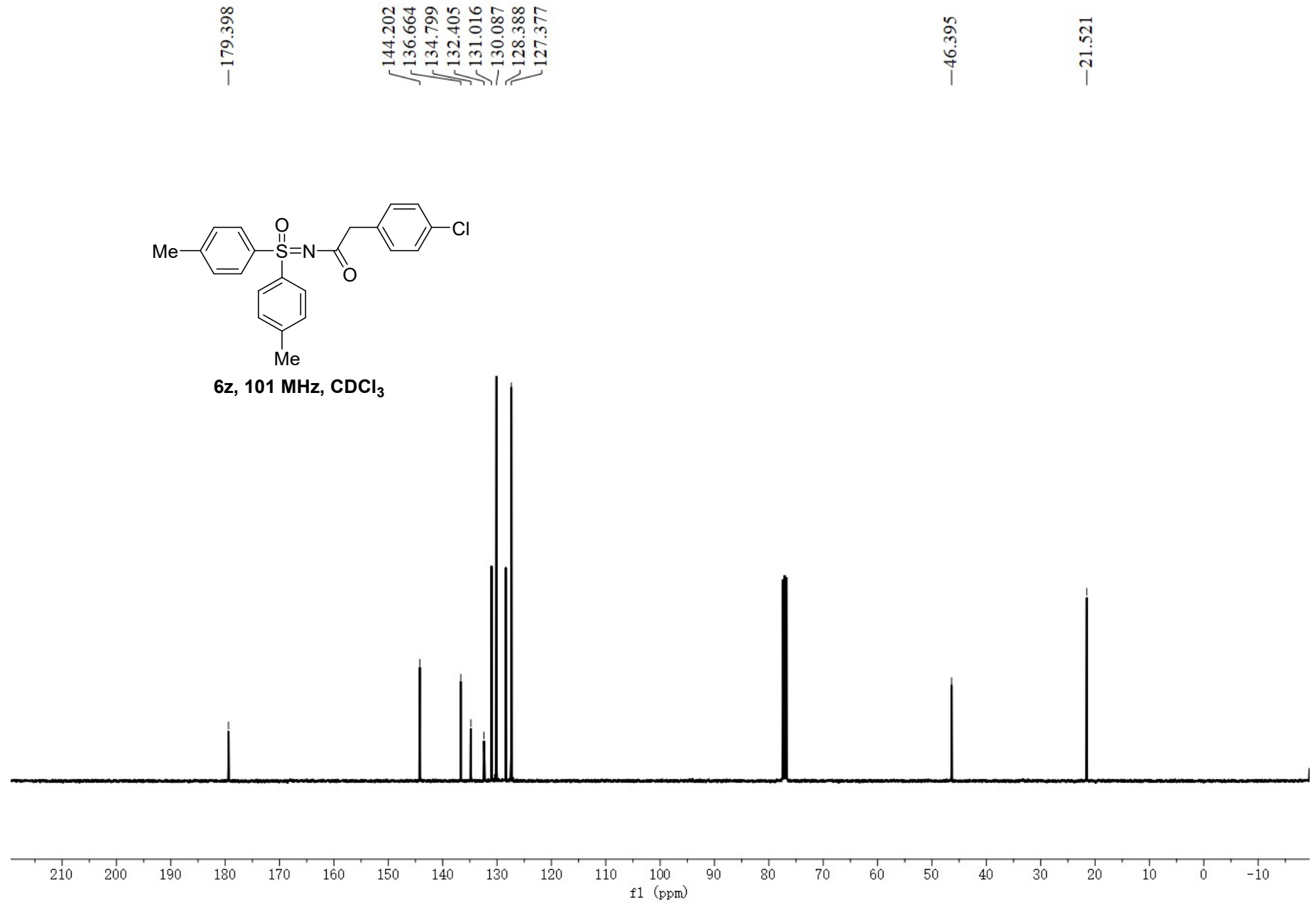
6y, 400 MHz, $CDCl_3$

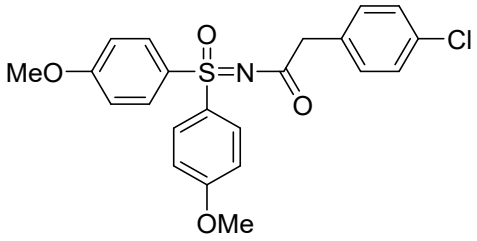


6y, 101 MHz, $CDCl_3$

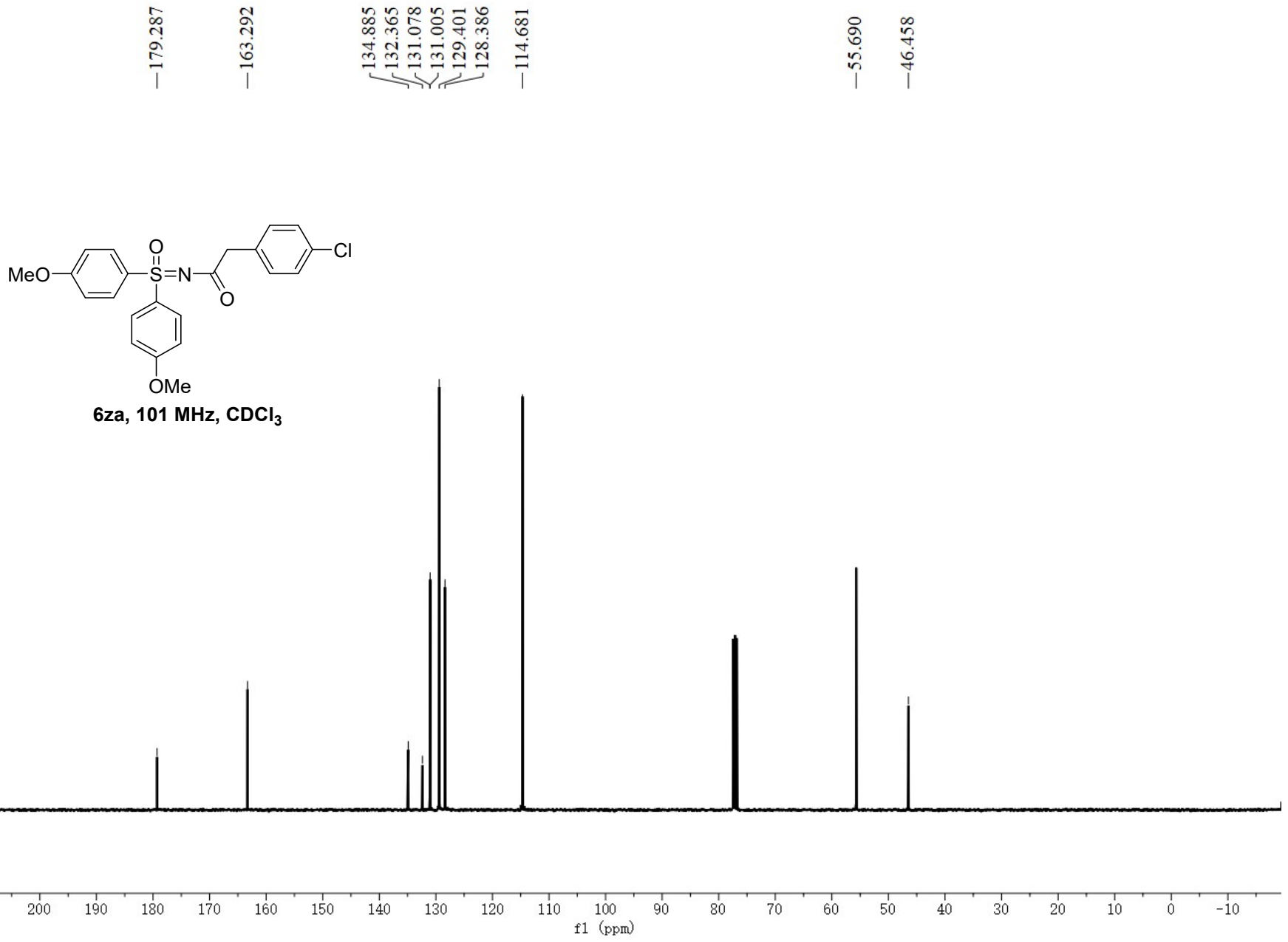


6z, 400 MHz, $CDCl_3$

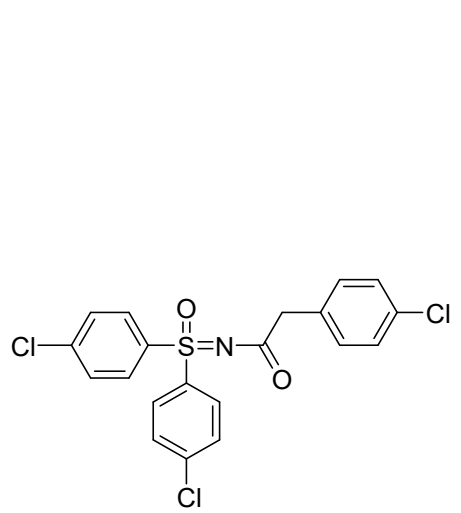

179.398
144.202
136.664
134.799
132.405
131.016
130.087
128.388
127.377
46.395
21.521
Me
O
S=N
O
Cl
Me
6z, 101 MHz, CDCl3
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)



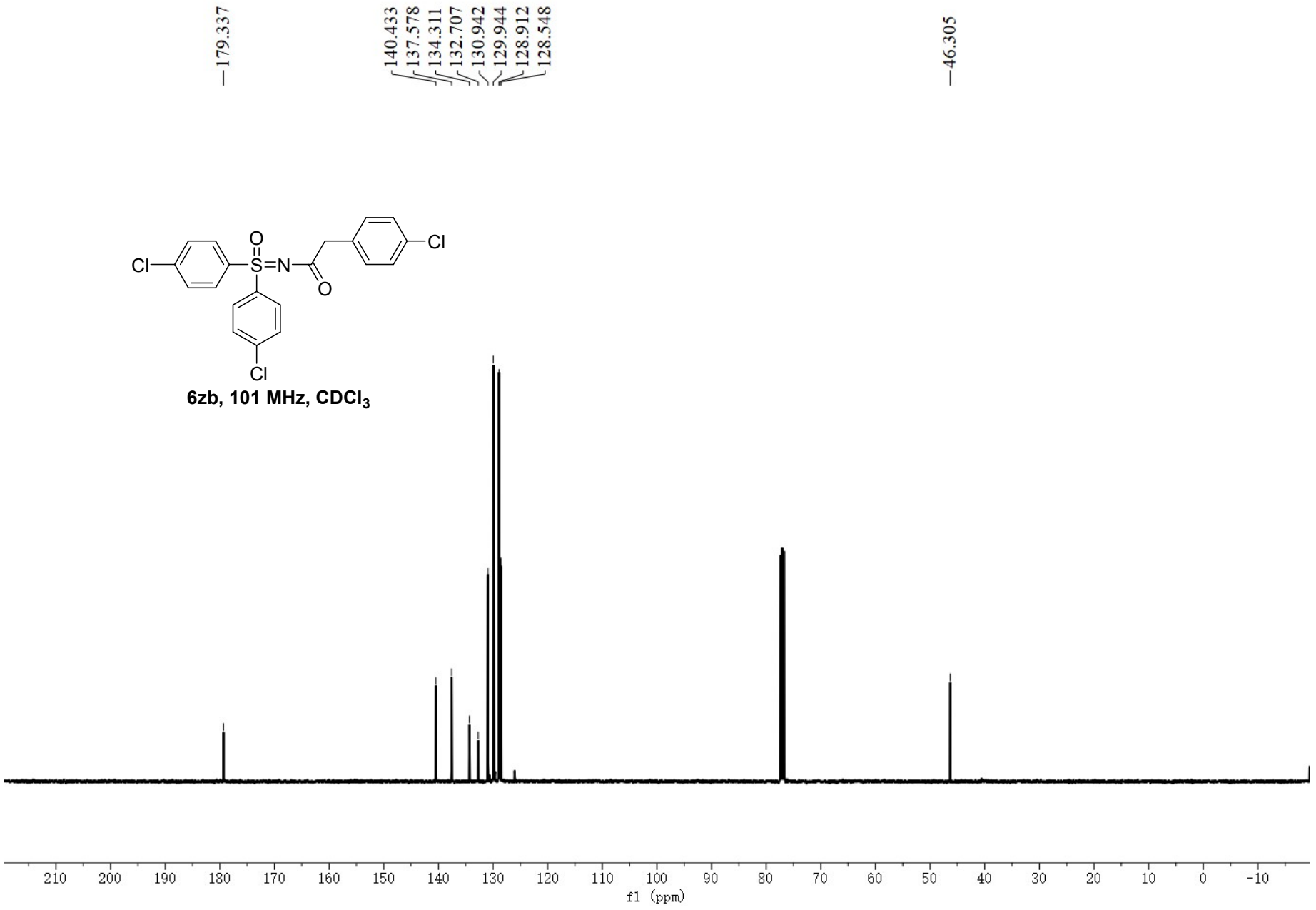
6za, 400 MHz, $CDCl_3$



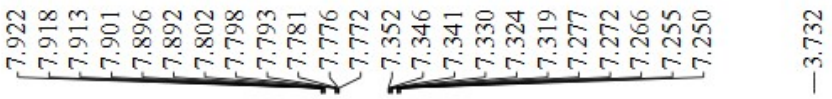
6za, 101 MHz, $CDCl_3$

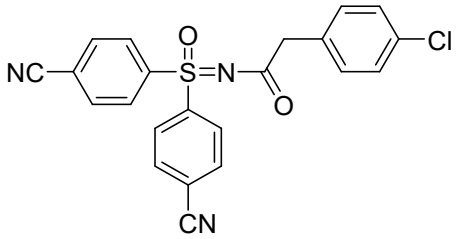


6zb, 400 MHz, $CDCl_3$

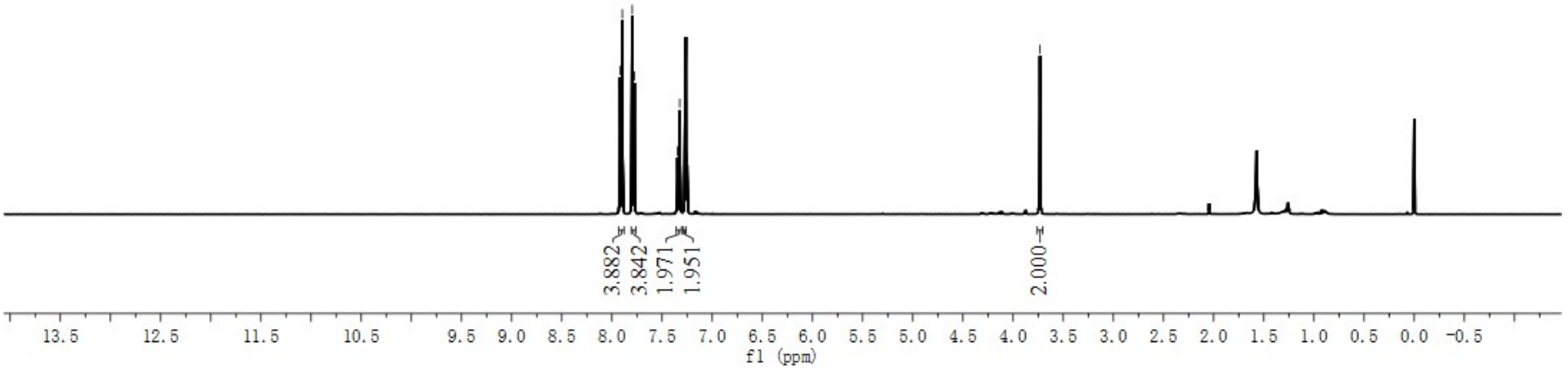


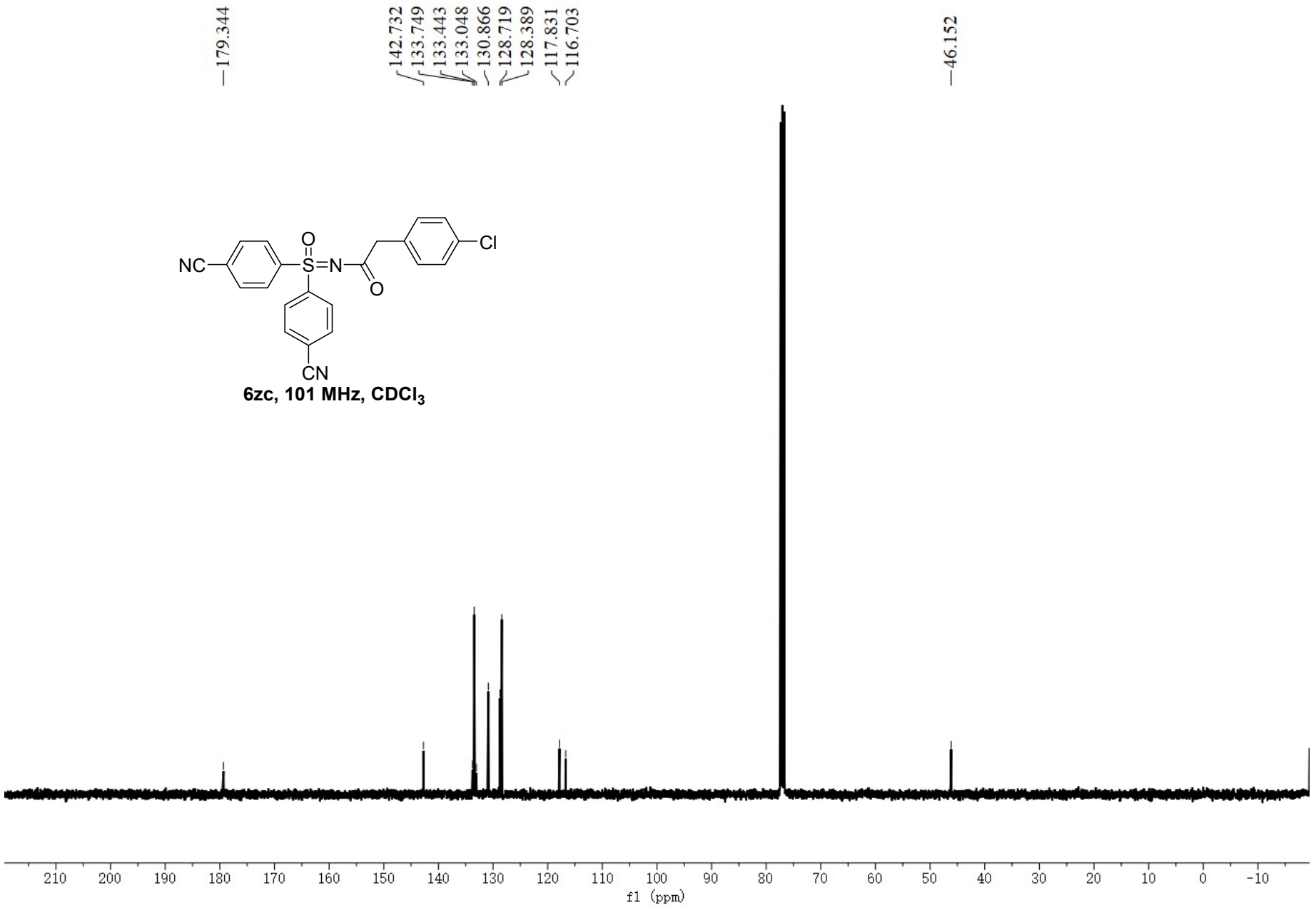
6zb, 101 MHz, $CDCl_3$



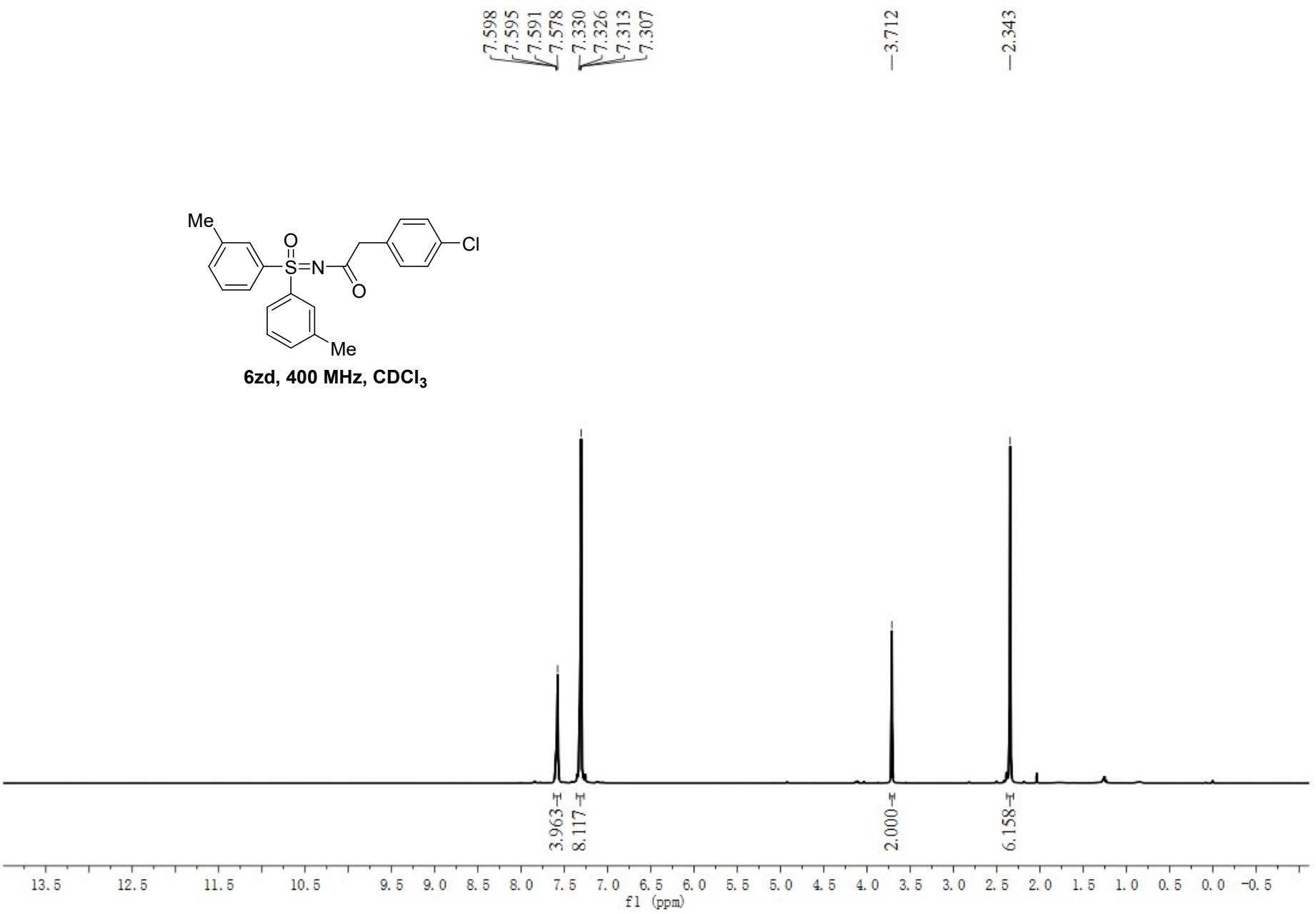


6zc, 400 MHz, $CDCl_3$

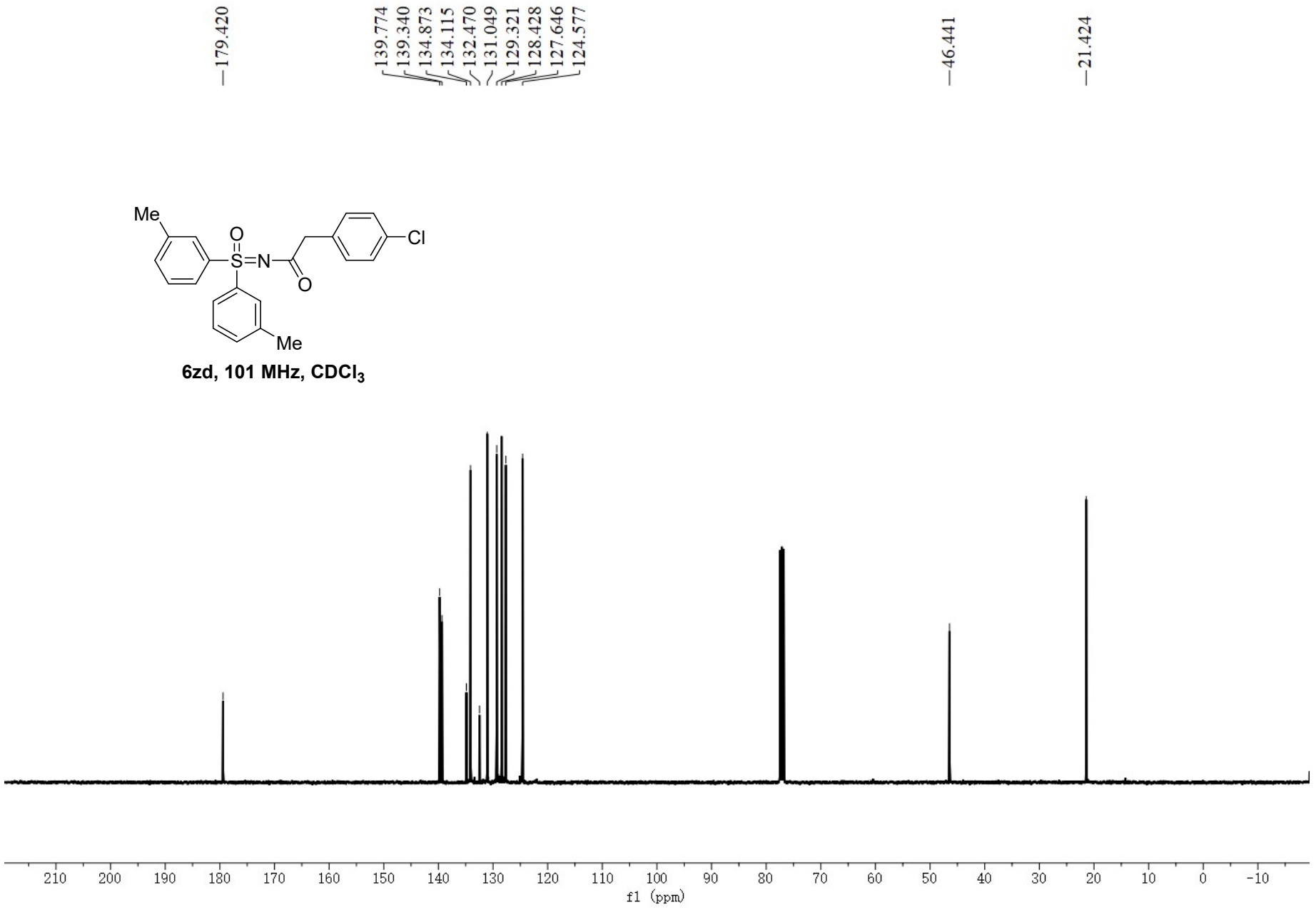




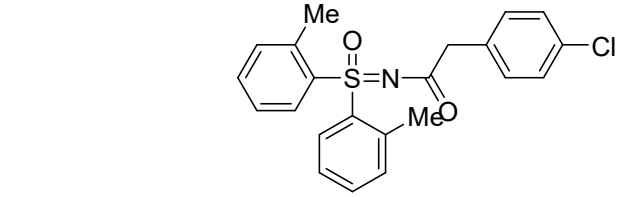
6zc, 101 MHz, $CDCl_3$



6zd, 400 MHz, $CDCl_3$

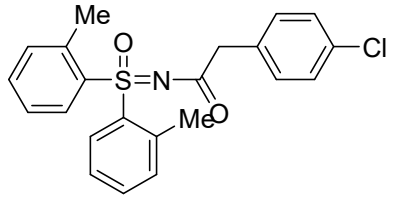


6zd, 101 MHz, $CDCl_3$

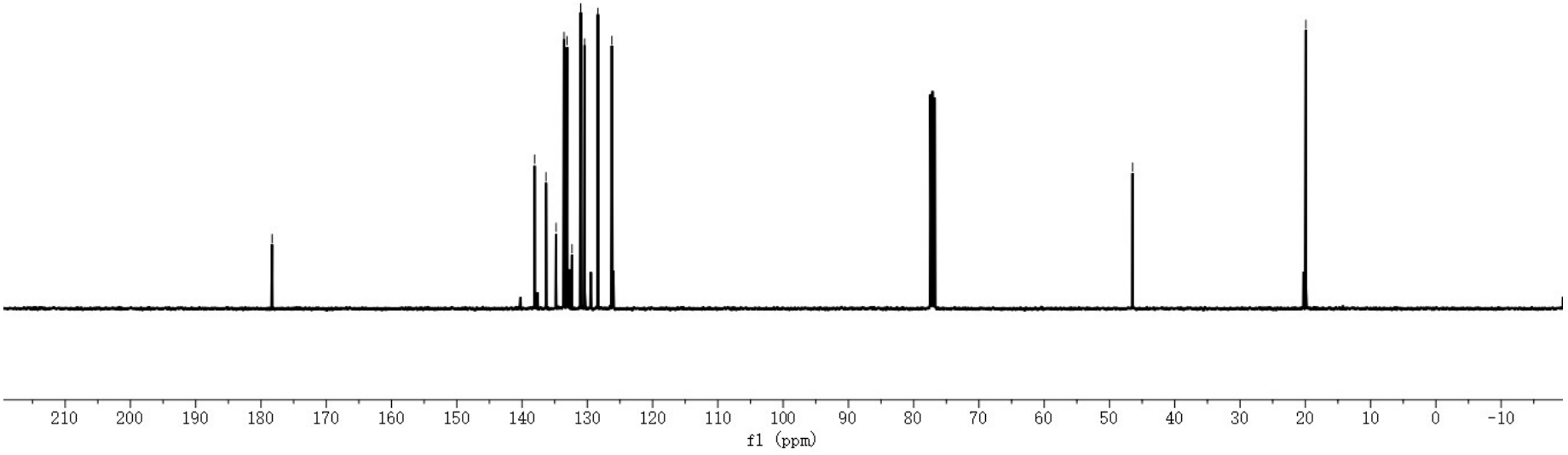


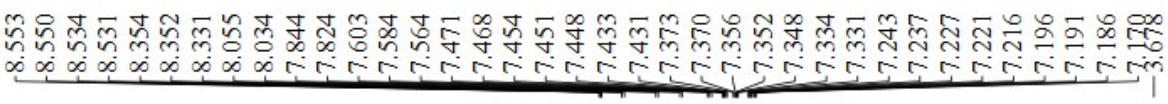
6ze, 400 MHz, $CDCl_3$

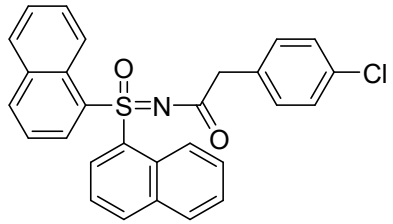
178.302
138.073
136.327
134.789
133.564
133.115
132.350
131.005
130.415
128.377
126.239
46.461
19.916



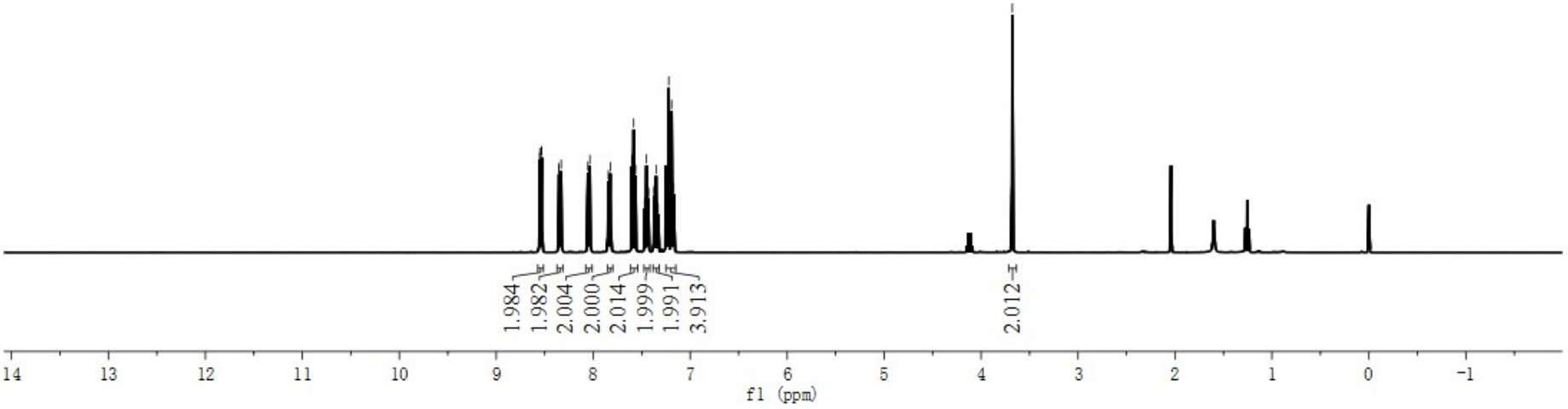
6ze, 101 MHz, $CDCl_3$

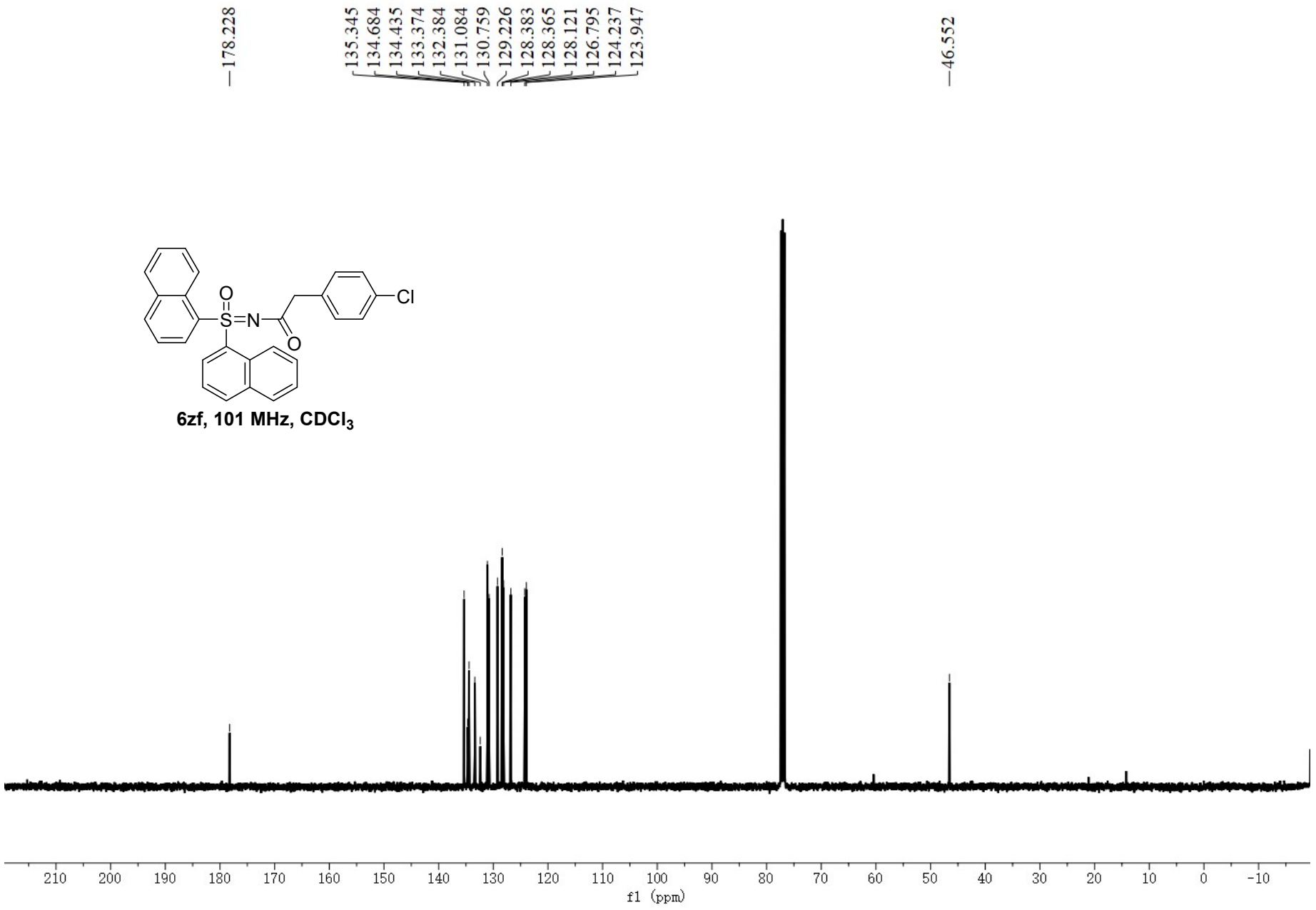




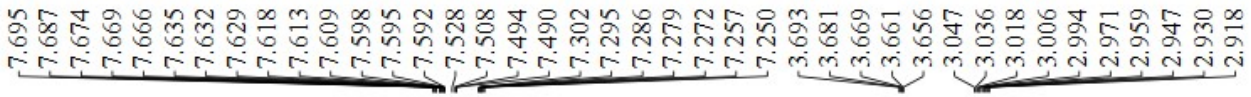


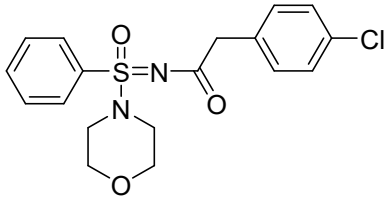
6zf, 400 MHz, $CDCl_3$



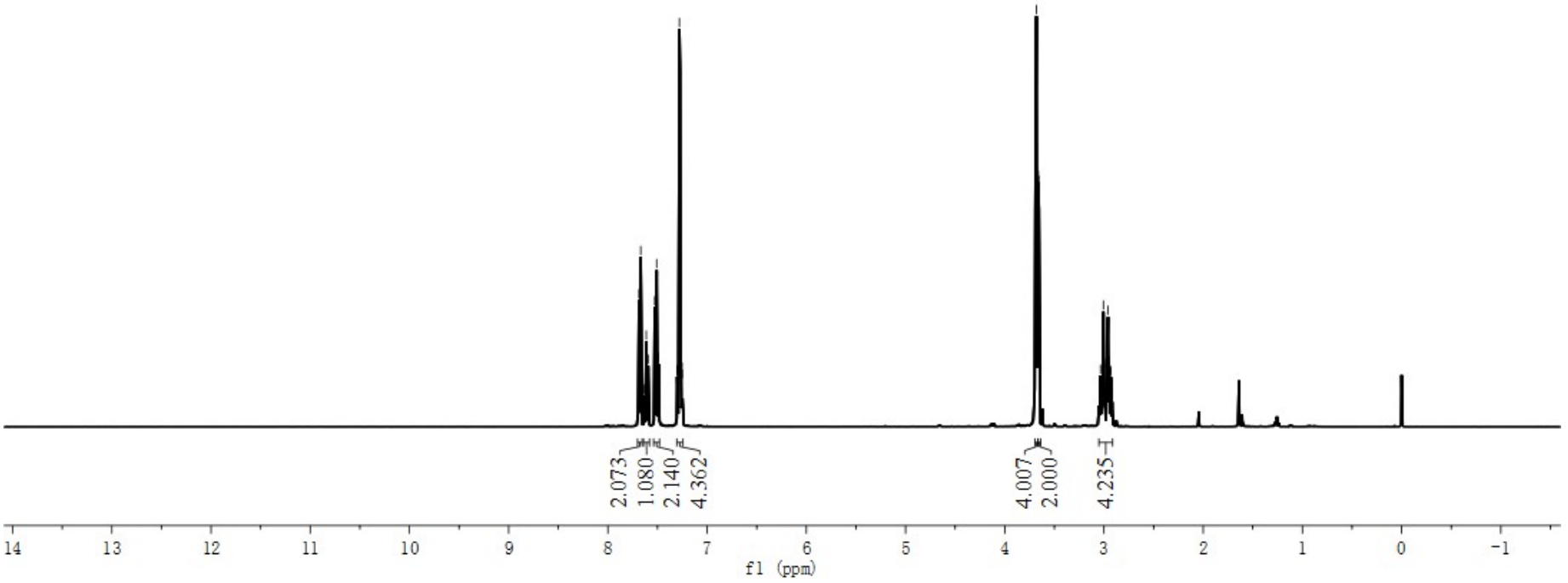


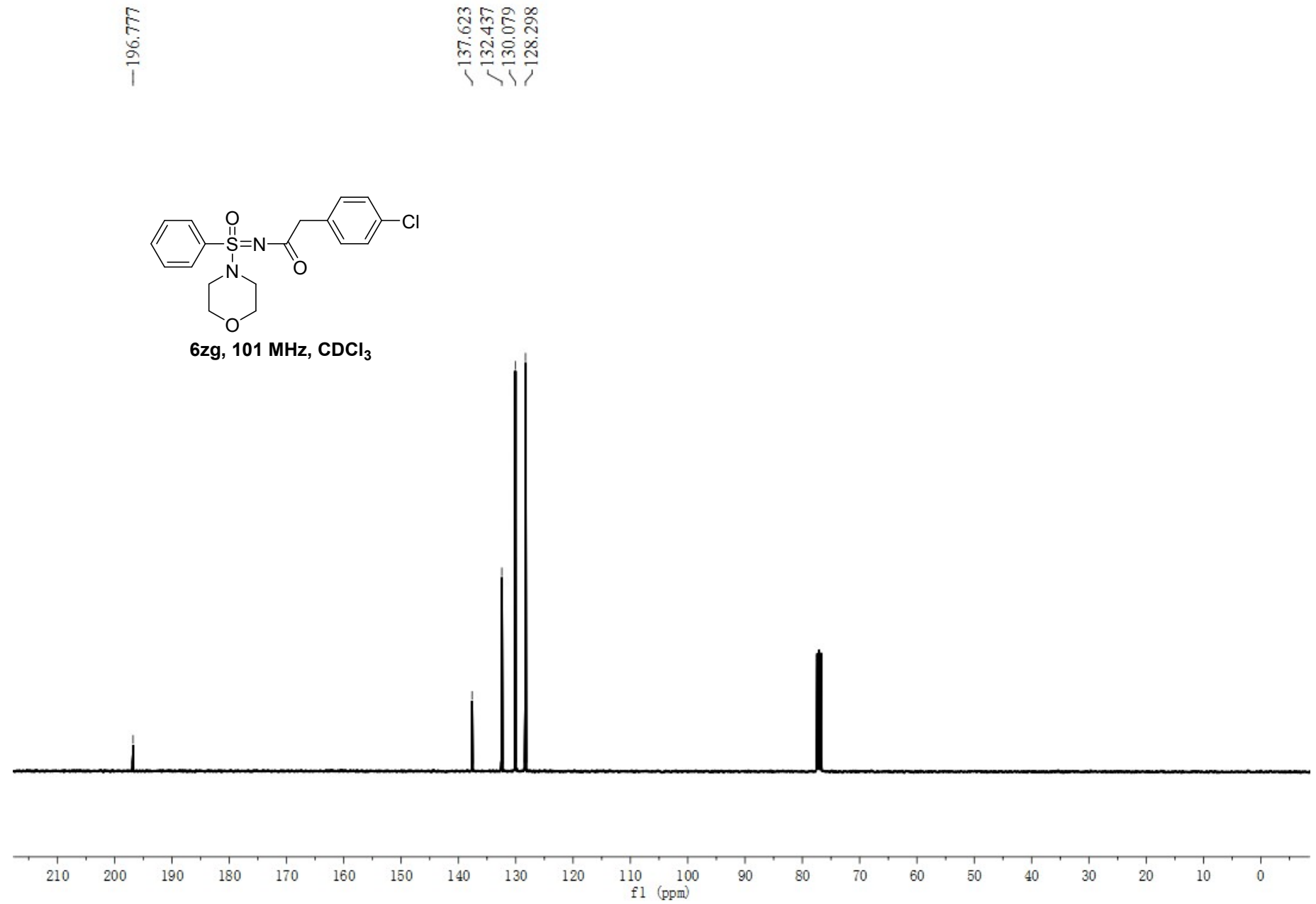
6zf, 101 MHz, $CDCl_3$



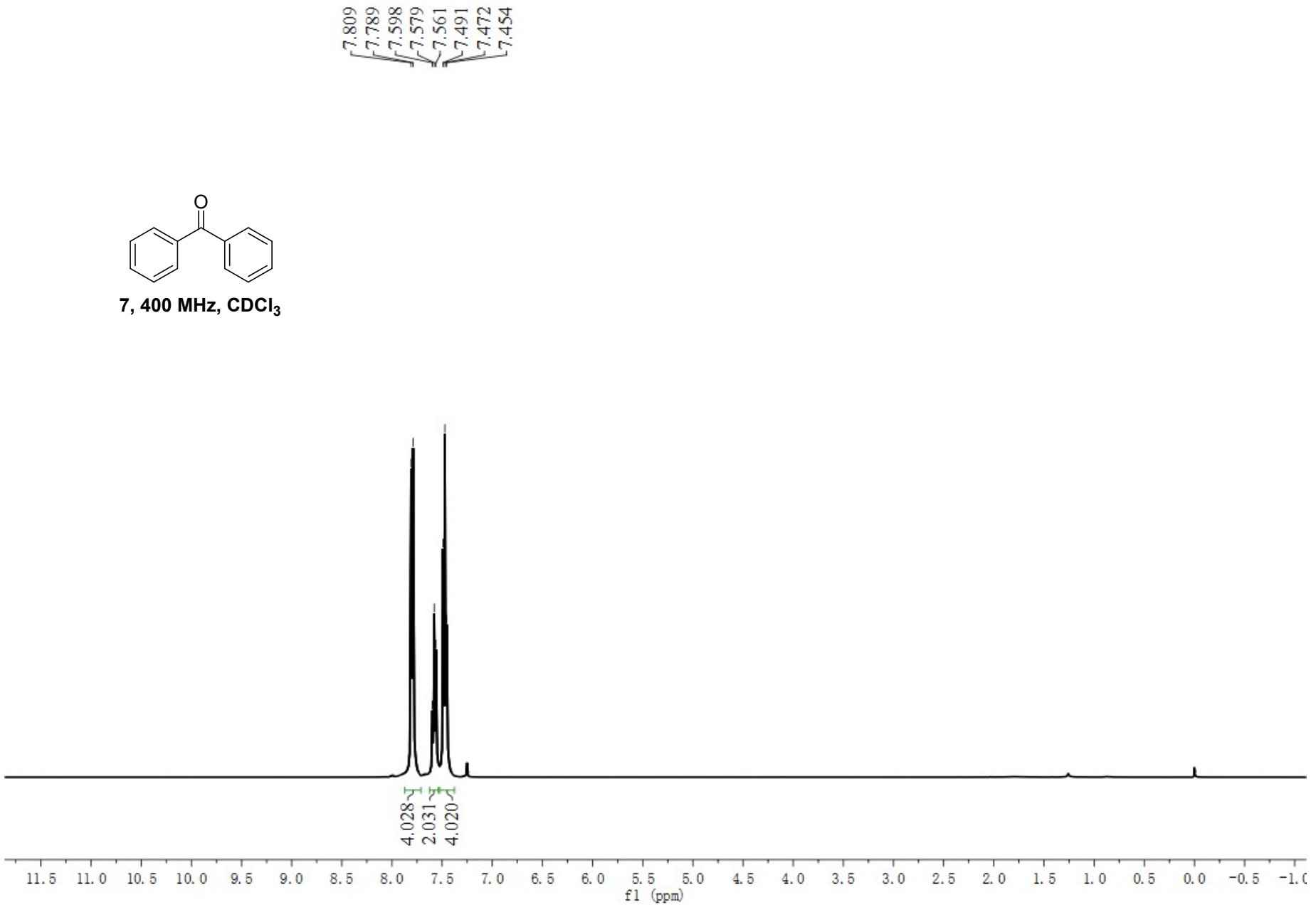


6zg, 400 MHz, $CDCl_3$

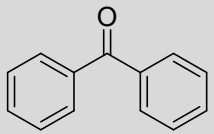




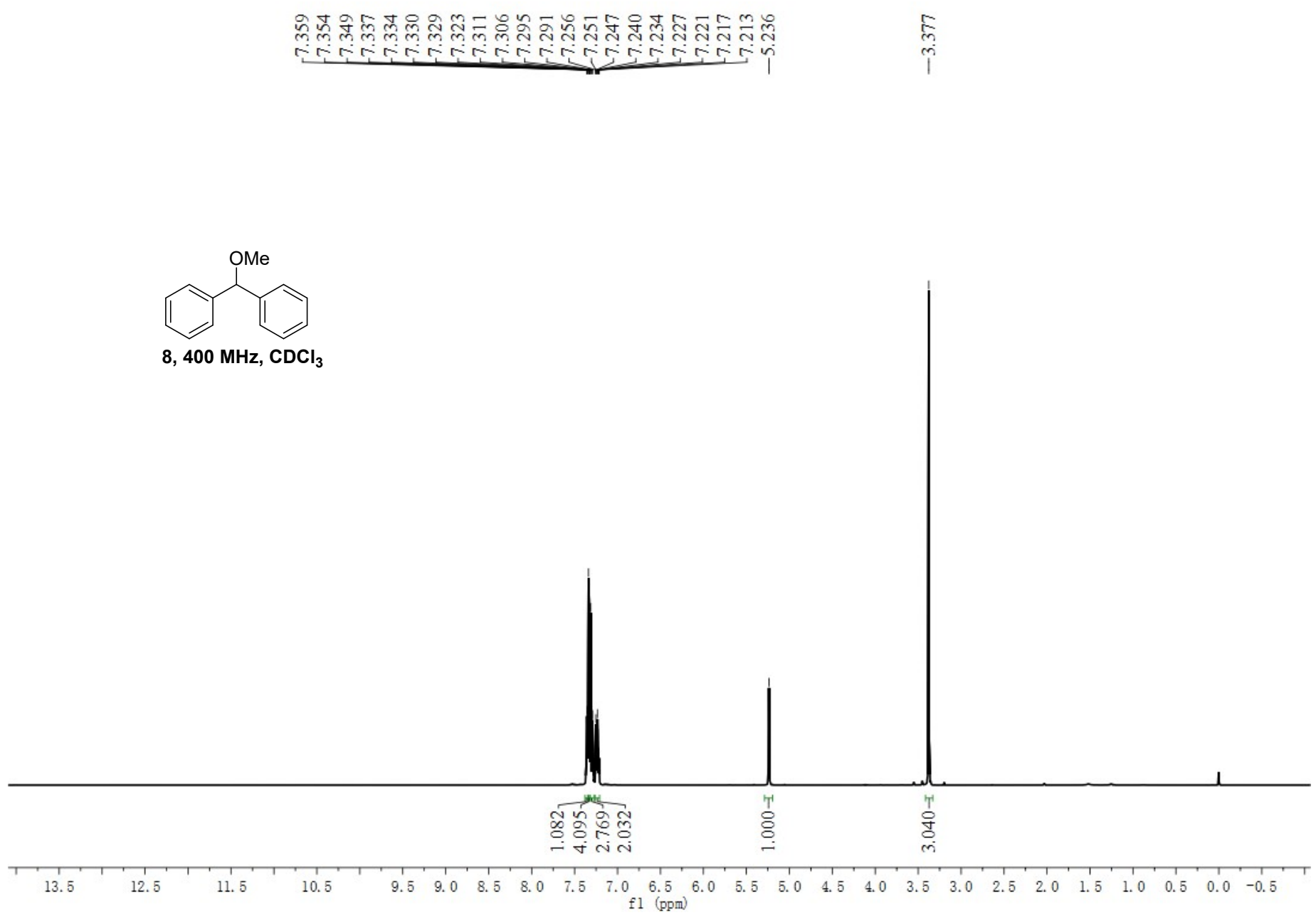
6zg, 101 MHz, $CDCl_3$

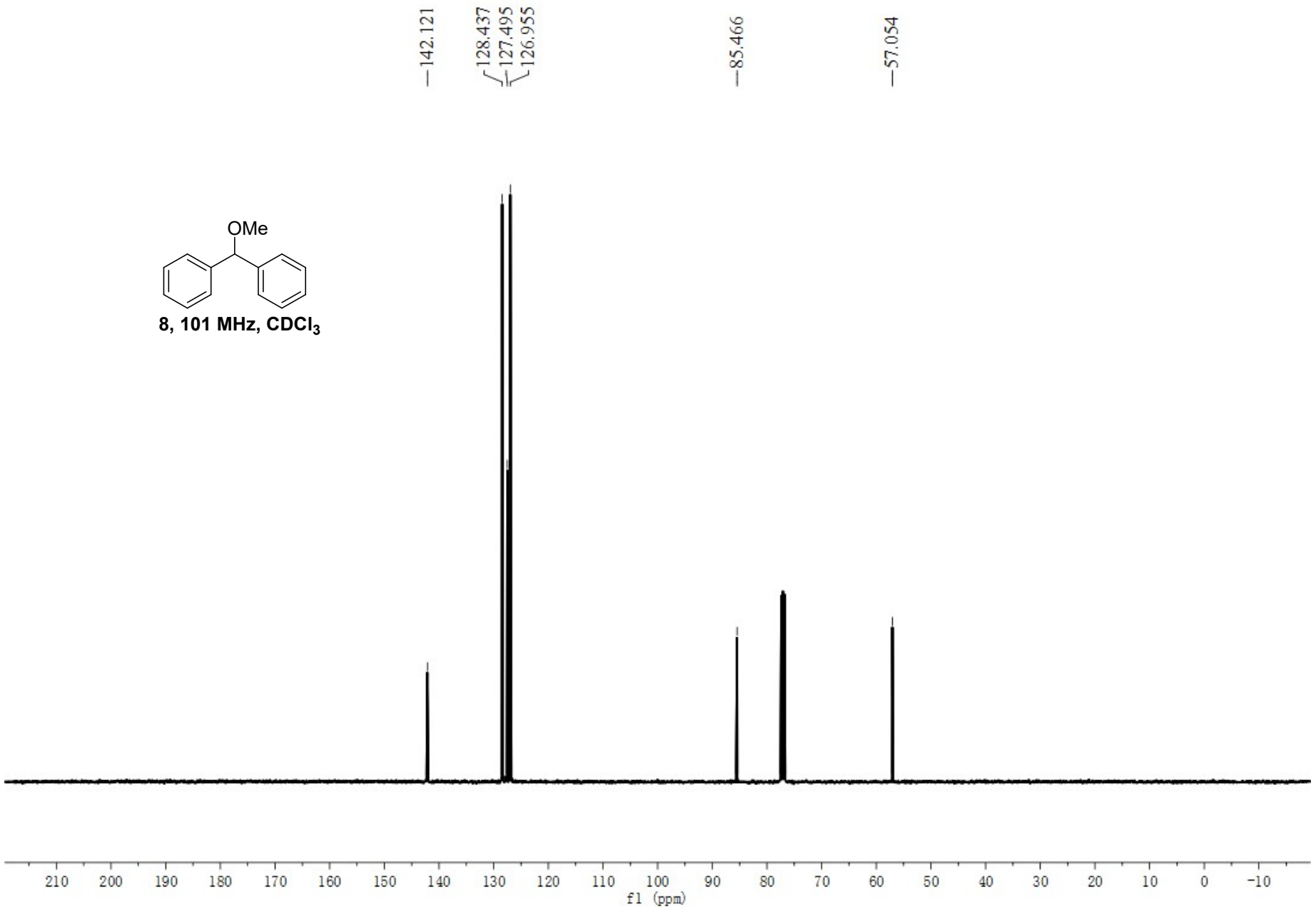


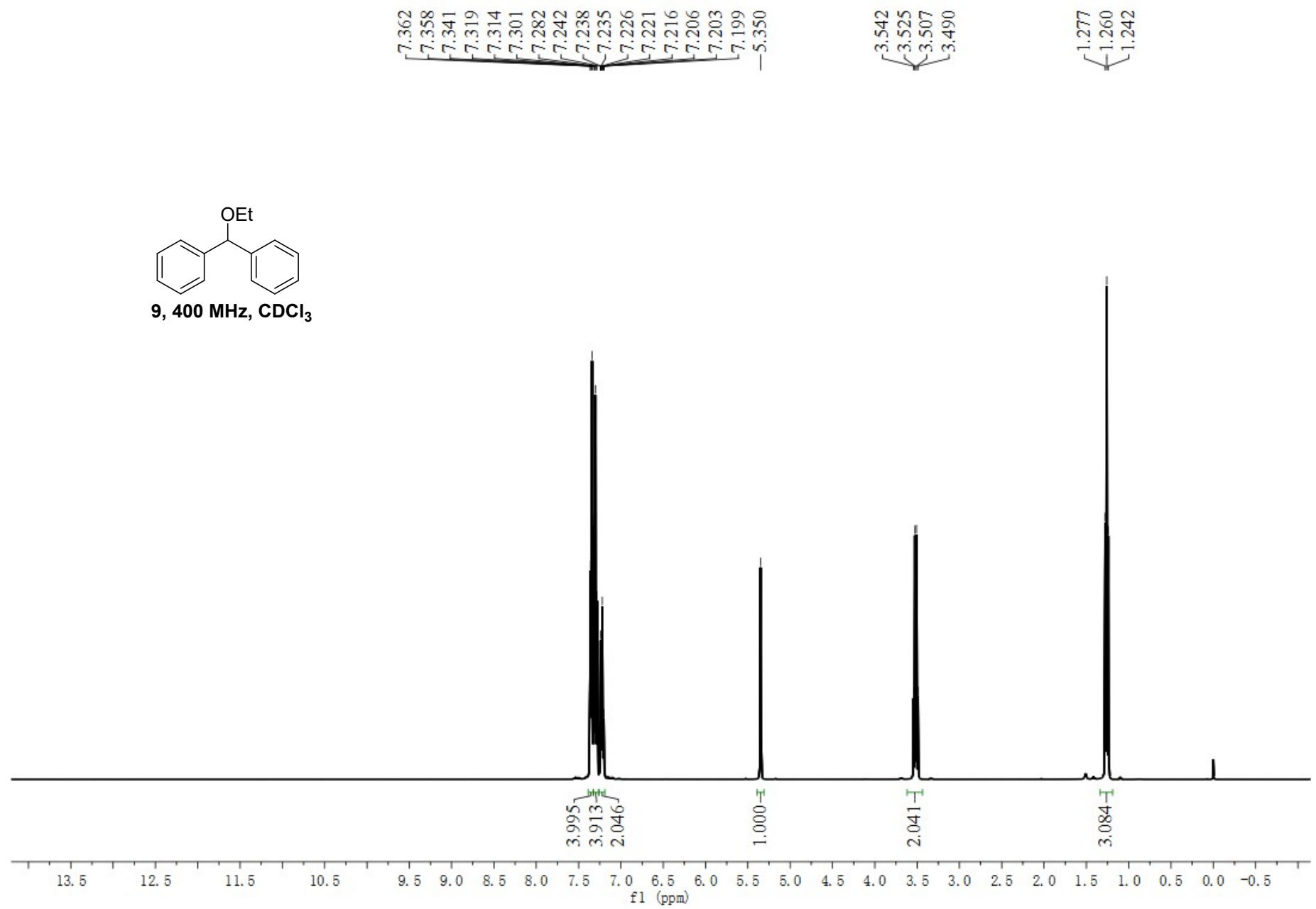
7, 400 MHz, $CDCl_3$

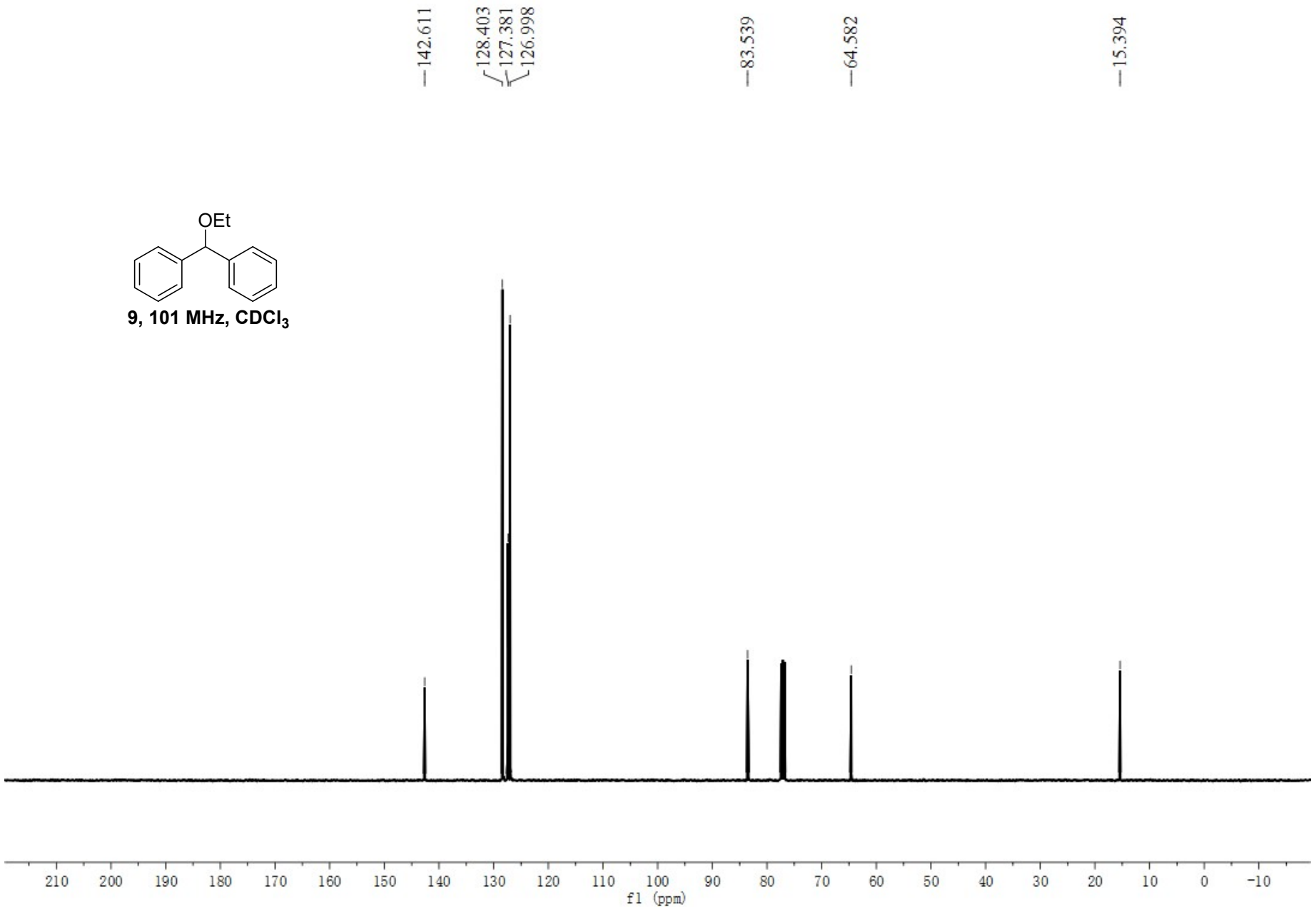


7, 101 MHz, $CDCl_3$


7.359
7.354
7.349
7.337
7.334
7.330
7.329
7.323
7.311
7.306
7.295
7.291
7.256
7.251
7.247
7.240
7.234
7.227
7.221
7.217
7.213
5.236
3.377
OMe
8, 400 MHz, CDCl3
1.082
4.095
2.769
2.032
1.000
3.040
f1 (ppm)


142.121
128.437
127.495
126.955
85.466
57.054
OMe
8, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


7.362
7.358
7.341
7.319
7.314
7.301
7.282
7.242
7.238
7.235
7.226
7.221
7.216
7.206
7.203
7.199
5.350
3.542
3.525
3.507
3.490
1.277
1.260
1.242
OEt
9, 400 MHz, CDCl3
3.995
3.913
2.046
1.000
2.041
3.084
13.5 12.5 11.5 10.5 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


142.611
128.403
127.381
126.998
83.539
64.582
15.394
OEt
9, 101 MHz, CDCl3
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)