Supporting Information

Copper-catalyzed four-component reaction of arylcyclopropanes, nitriles, carboxylic acids and *N*-fluorobenzenesulfonimide: facile synthesis of imide derivatives

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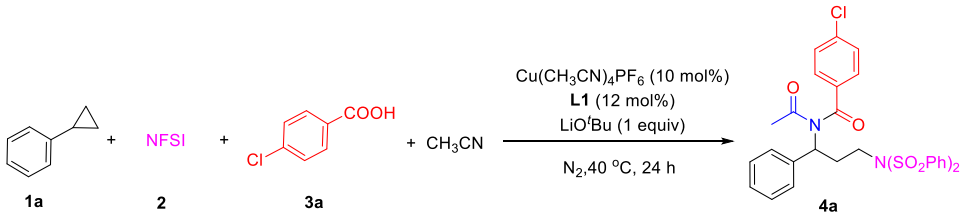
I. General considerations

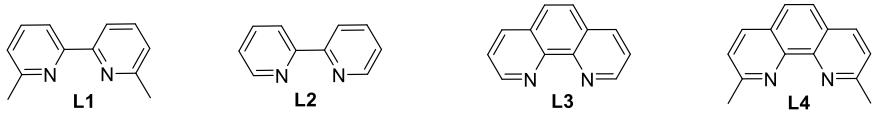
General. All reactions were performed under nitrogen atmosphere in flame dried flasks. All reactions were monitored by thin layer chromatography (TLC) using Macherey-Nagel 0.20 mm silica gel 60 plates. Flash column chromatography was performed on silica gel 60 (particle size 300-400 mesh ASTM, purchased from Taizhou, China). ^{1}H and ^{13}C nuclear magnetic resonance (NMR) spectra were recorded on Bruker AV- 600 NMR spectrometers or Bruker AV- 500 NMR spectrometers. ^{1}H and ^{13}C NMR spectra are reported in parts per million (ppm) downfield from an internal standard, tetramethylsilane (0 ppm for ^{1}H) and $CHCl_3$ (77.0 ppm for ^{13}C), respectively. The chemical shifts are expressed in ppm and coupling constants are given in Hz. Data for ^{1}H NMR are recorded as follows: chemical shift (ppm), multiplicity (s, singlet; d, doublet; t, triplet; q, quarter; m, multiplet; br, broad), coupling constant (Hz), integration. Data for ^{13}C NMR are reported in terms of chemical shift (δ, ppm). High-resolution mass spectra (HRMS) were recorded on Bruker microtof.

Materials. All commercially available compounds were purchased from Aldrich, Alfa Aesar or Adamas. Cyclopropane substrates were synthesized according to procedures described in the literature.[1,2] Reaction solvents CH_3CN, DCM (dichloromethane) and DCE (1,2-dichloroethane) were distilled over CaH_2 and stored under nitrogen atmosphere. While MTBE (methyl *t*-butyl ether) was distilled over sodium and stored under nitrogen atmosphere.

II. Details for condition optimization

Table S1. Variation of reaction parameters [a]



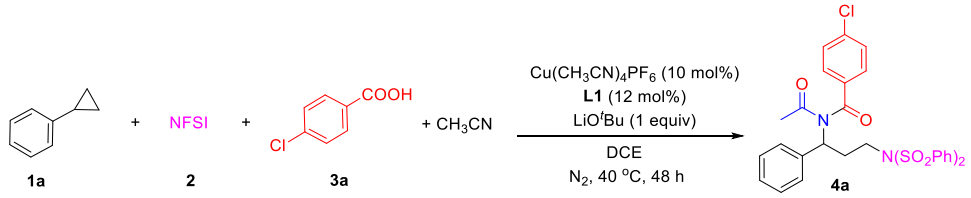


Entry	Variation from the standard conditions	Yield (%) [b]
1	none	99
2	without ligand	trace
3	without LiO^tBu	75
4	LiOMe instead of LiO^tBu	88
5	LiOH instead of LiO^tBu	76
6	NaO^tBu instead of LiO^tBu	55

7	KO^{t}Bu instead of LiO^{t}Bu	n. r.
8	CuBr instead of $Cu(CHCN)_4PF_6$	72
9	CuOAc instead of $Cu(CHCN)_4PF_6$	45
10	CuBr instead of $Cu(CHCN)_4PF_6$	85
11	$Cu(OTf)_2$ instead of $Cu(CHCN)_4PF_6$	91
12	$FeCl_3$ instead of $Cu(CHCN)_4PF_6$	n. r.
13	air instead of N_2	20
14	commercial CH_3CN instead of anhydrous CH_3CN	73
15	25 ℃ instead of 40 ℃	96
16	60 ℃ instead of 40 ℃	40
17	**L2** instead of **L1**	n. r.
18	**L3** instead of **L1**	n. r.
19	**L4** instead of **L1**	73

[a] Reaction was performed with **1a** (0.4 mmol, 2 equiv), NFSI (**2**, 0.5 mmol, 2.5 equiv), **3a** (0.2 mmol), $Cu(CH_3CN)_4PF_6$ (0.02 mmol, 10 mol%), ligand (0.024 mmol, 12 mol%) and LiO^{t}Bu (0.2 mmol, 1 equiv) in CH_3CN (2 mL) under N_2 atmosphere. [b] Yield was determined by ^{1}H NMR with α-methylstyrene as an internal standard. n. r. = not reaction.

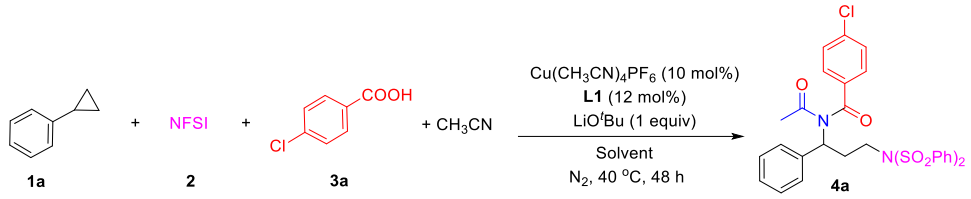
Table S2. Screening of the amount of CH_3CN[a]



Entry	CH_3CN (x equiv)	Yield (%)[b]
1	3	72
2	5	82
3	10	86
4	15	91

[a] Reaction was performed with **1a** (0.4 mmol, 2 equiv), NFSI (**2**, 0.5 mmol, 2.5 equiv), **3a** (0.2 mmol), $Cu(CH_3CN)_4PF_6$ (0.02 mmol, 10 mol%), ligand (0.024 mmol, 12 mol%) and LiO^{t}Bu (0.2 mmol, 1 equiv) in DCE (2 mL) and CH_3CN (x equiv) under N_2 atmosphere. [b] Yield was determined by ^{1}H NMR with α-methylstyrene as an internal standard. DCE = ethylenedichloride.

Table S3. Screening of the solvents[a]



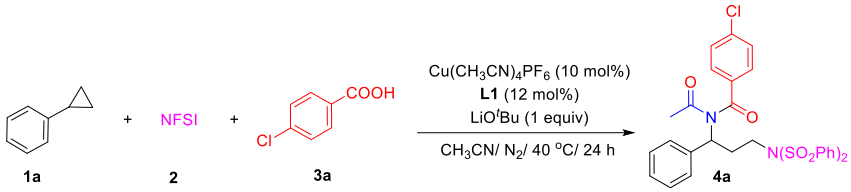
Entry	Solvent	Yield (%) [b]
1	MTBE	trace
2	$PhCF_3$	63
3	DCM	99
4	CCl_4	69
5	DCE	91

[a] Reaction was performed with **1a** (0.4 mmol, 2 equiv), NFSI (**2**, 0.5 mmol, 2.5 equiv), **3a** (0.2 mmol), $Cu(CH_3CN)_4PF_6$ (0.02 mmol, 10 mol%), ligand (0.024 mmol, 12 mol%) and LiO^{t}Bu (0.2 mmol, 1 equiv) in the solvent (2 mL) and CH_3CN (15 equiv) under N_2 atmosphere. [b] Yield was determined by ^{1}H NMR with α-methylstyrene as an internal standard. MTBE = methyl tert-butyl ether. DCM = dichloromethane.

III. Experimental procedures

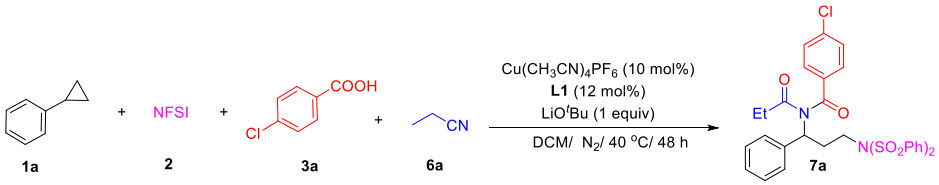
(1) General procedure for copper-catalyzed four-component reaction of arylcyclopropanes

1) The method A: Take 4a as an example



In a nitrogen-filled glove box, a flame-dried screw-cap reaction tube equipped with a Teflon-coated magnetic stir bar was charged with $Cu(CH_3CN)_4PF_6$ (10 mol%), **L1** (12 mol%). Anhydrous acetonitrile (2 mL) was added and the reaction mixture was stirred for 10 min, then cyclopropane **1a** (0.4 mmol, 50 μL, 2 equiv), **3a** (0.2 mmol) and LiO^{t}Bu (1 equiv) were added at room temperature. After stirring for 10 min, NFSI (0.5 mmol, 2.5 equiv) was added. The tube was sealed with a Thermo Scientific PTFE screw cap equipped with a septum, and removed from the glove box. Then, the sealed tube was then stirred at 40 °C. Upon completion (monitored by TLC). The reaction was quenched with water, extracted with DCM (3×10 mL), and the combined organic layers were concentrated in vacuo. The resulting crude product was purified by flash column chromatography on silica gel (ethyl acetate/petroleum ether, 1:4) to obtain product **4a**.

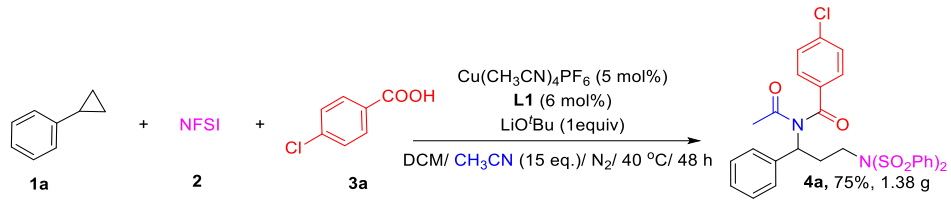
2) The method B: Take 7a as an example



In a nitrogen-filled glove box, a flame-dried screw-cap reaction tube equipped with a Teflon-coated magnetic stir bar was charged with $Cu(CH_3CN)_4PF_6$ (10 mol%), **L1** (12 mol%). Anhydrous DCM (2 mL) and **6a** (15 equiv) were added, the reaction mixture was stirred for 10 min, then cyclopropane **1a** (0.4 mmol, 50 μL, 2 equiv), **3a** (0.2 mmol) and LiO^{t}Bu (1 equiv) were added at room temperature. After stirring for 10 min, NFSI (0.5 mmol, 2.5 equiv) was added. The tube was sealed with a Thermo Scientific PTFE screw cap equipped with a septum, and removed from the glove box. Then, the sealed tube was then stirred at 40 °C. Upon completion (monitored by TLC). The reaction was quenched with water, extracted with DCM (3×10 mL), and the combined organic layers were concentrated

in vacuo. The resulting crude product was purified by flash column chromatography on silica gel (ethyl acetate/petroleum ether, 1:4) to obtain product **7a**.

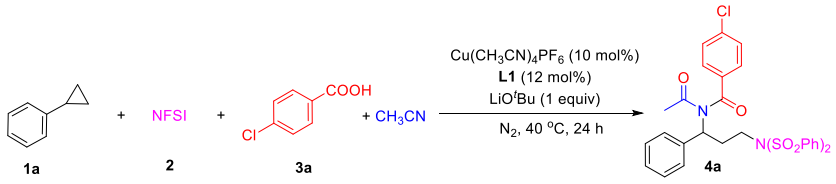
(2) The procedure for gram-scale synthesis of 4a



In a nitrogen-filled glove box, a flame-dried screw-cap reaction tube equipped with a Teflon-coated magnetic stir bar was charged with $Cu(CH_3CN)_4PF_6$ (5 mol%), **L1** (6 mol%). Anhydrous DCM (8 mL) and CH_3CN (15 equiv) were added, the reaction mixture was stirred for 10 min, then cyclopropane **1a** (6 mmol, 750 μL, 2 equiv), **3a** (3 mmol) and LiO^{t}Bu (1 equiv) were added at room temperature. After stirring for 10 min, NFSI (7.5 mmol, 2.5 equiv) was added. The tube was sealed with a Thermo Scientific PTFE screw cap equipped with a septum, and removed from the glove box. Then, the sealed tube was then stirred at 40 °C. Upon completion (monitored by TLC). The reaction was quenched with water, extracted with DCM (3×50 mL), and the combined organic layers were concentrated in vacuo. The resulting crude product was purified by flash column chromatography on silica gel (ethyl acetate/petroleum ether, 1:4) to obtain product **4a** (75%, 1.38 g).

IV. Preliminary mechanistic study

(1) TEMPO or BHT was added at the standard conditions

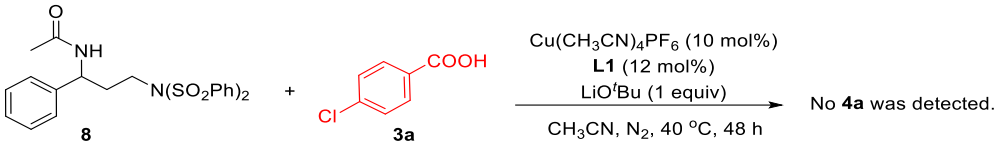


Radical inhibitor (2 equiv)	Yield (%) of **4a**
TEMPO	10
BHT	trace

In a nitrogen-filled glove box, a flame-dried screw-cap reaction tube equipped with a Teflon-coated magnetic stir bar was charged with $Cu(CH_3CN)_4PF_6$ (10 mol%), **L1** (12 mol%). Anhydrous acetonitrile (2 mL) was added and the reaction mixture was stirred for 10 min, then cyclopropane **1a** (0.4 mmol, 50 μL, 2 equiv), **3a** (0.2 mmol) and LiO^{t}Bu (1

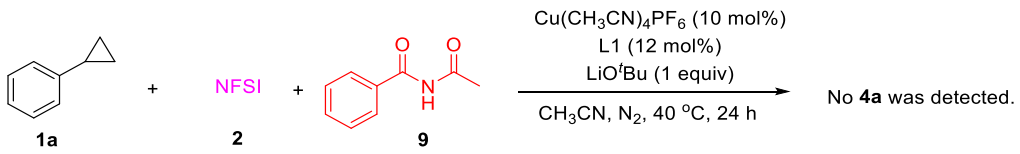
equiv) were added at room temperature. After stirring for 10 min, NFSI (0.5 mmol, 2.5 equiv) was added. Then BHT (0.4 mmol, 2 equiv) or TEMPO (0.4 mmol, 2 equiv) was added. The tube was sealed with a Thermo Scientific PTFE screw cap equipped with a septum, and removed from the glove box. Then, the sealed tube was then stirred at 40 °C. Upon completion (monitored by TLC). The reaction was quenched with water, extracted with DCM (3×10 mL), and the combined organic layers were concentrated in vacuo. The resulting crude product was purified by flash column chromatography on silica gel (ethyl acetate/petroleum ether, 1:4) to obtain product **4a**.

(2) With compound 8 as the substrate



In a nitrogen-filled glove box, a flame-dried screw-cap reaction tube equipped with a Teflon-coated magnetic stir bar was charged with $Cu(CH_3CN)_4PF_6$ (10 mol%), **L1** (12 mol%). Anhydrous acetonitrile (2 mL) was added and the reaction mixture was stirred for 10 min, then **3a** (0.2 mmol) and LiO^{t}Bu (1 equiv) were added at room temperature. After stirring for 10 min, **8** (0.2 mmol) was added. The tube was sealed with a Thermo Scientific PTFE screw cap equipped with a septum, and removed from the glove box. Then, the sealed tube was then stirred at 40 °C. The reaction was quenched with water, extracted with DCM (3×10 mL), and the combined organic layers were concentrated in vacuo. No **4a** was detected.

(3) With compound 9 as the substrate

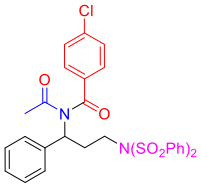


In a nitrogen-filled glove box, a flame-dried screw-cap reaction tube equipped with a Teflon-coated magnetic stir bar was charged with $Cu(CH_3CN)_4PF_6$ (10 mol%), **L1** (12 mol%). Anhydrous acetonitrile (2 mL) was added and the reaction mixture was stirred for 10 min, then **9** (0.2 mmol) and LiO^{t}Bu (1 equiv) were added at room temperature. After stirring for 10 min, cyclopropane **1a** (0.4 mmol, 50 μL, 2 equiv) and NFSI (0.5 mmol, 2.5 equiv) was added. The tube was sealed with a Thermo Scientific PTFE screw cap equipped with a septum, and removed from the glove box. Then, the sealed tube was then stirred at 40 °C.

The reaction was quenched with water, extracted with DCM (3×10 mL), and the combined organic layers were concentrated in vacuo. No **4a** was detected.

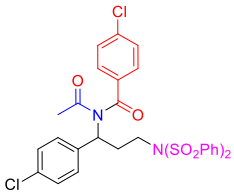
V. Analytical data of new compounds

_N_-acetyl-4-chloro-_N_-(1-phenyl-3-(_N_-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (4a)



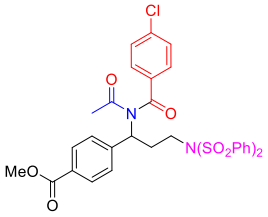
This compound was obtained in 99% (121 mg) yield as white solid by the general procedure. mp. 56 – 57 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.02 (d, J = 7.8 Hz, 4H), 7.65 (t, J = 7.8 Hz, 2H), 7.57 – 7.50 (m, 6H), 7.40 – 7.33 (m, 4H), 7.29 (t, J = 7.2 Hz, 2H), 7.24 (t, J = 7.8 Hz, 1H), 5.65 (t, J = 7.8 Hz, 1H), 3.86 – 3.66 (m, 2H), 2.76 (dd, J = 15.6, 7.8 Hz, 2H), 1.85 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.2, 172.6, 139.5, 139.5, 138.0, 134.6, 133.9, 130.2, 129.3, 129.1, 128.4, 128.2, 128.0, 127.9, 57.5, 47.0, 32.2, 27.4. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{30}H_{27}ClN_2O_6S_2$ ([M + Na]$^+$), 633.0891 found 633.0894.

_N_-acetyl-4-chloro-_N_-(1-(4-chlorophenyl)-3-(_N_-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (4b)



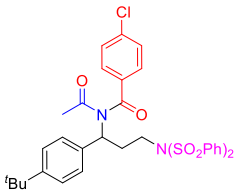
This compound was obtained in 86% (111 mg) yield as white solid by the general procedure, mp 118 – 119 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.01 (d, J = 8.4 Hz, 4H), 7.66 (t, J = 7.8 Hz, 2H), 7.59 – 7.50 (m, 6H), 7.41 (d, J = 8.4 Hz, 2H), 7.32 (d, J = 8.4 Hz, 2H), 7.29 – 7.24 (m, 2H), 5.60 (t, J = 7.8 Hz, 1H), 3.83– 3.73 (m, 1H), 3.73 – 3.64 (m, 1H), 2.78 – 2.65 (m, 2H), 1.84 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.1, 172.6, 139.9, 139.6, 136.7, 134.5, 134.0, 133.9, 130.2, 129.6, 129.5, 129.2, 128.6, 128.2, 56.9, 6.9, 32.1, 27.7.**HRMS** (ESI-TOF) (m/z): Calcd for $C_{30}H_{26}ClN_2O_6S_2$ ([M + Na]$^+$), 667.0502, found 667.0492.

Methyl-4-(1-(_N_-acetyl-4-chlorobenzamido)-3-(_N_-(phenylsulfonyl)phenylsulfonamido)propyl)benzoate (4c)



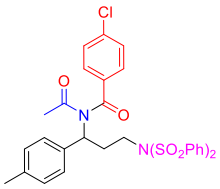
This compound was obtained in 37% (50 mg) yield as colorless oil the general procedure.**^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.02 (d, *J* = 7.8 Hz, 4H), 7.98 (d, *J* = 7.8 Hz, 2H), 7.66 (t, *J* = 7.2 Hz, 2H), 7.59 – 7.52 (m, 6H), 7.44 – 7.39 (m, 4H), 5.73 – 5.62 (m, 1H), 3.90 (s, 3H), 3.83 – 3.68 (m, 2H), 2.84 – 2.65 (m, 2H), 1.85 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.0, 172.7, 166.6, 143.3, 139.9, 139.6, 134.4, 134.0, 130.2, 129.7, 129.7, 129.5, 129.2, 128.2, 128.1, 57.1, 52.1, 46.8, 31.9, 27.6. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{32}H_{29}ClN_2O_8S_2$ ([M + Na]$^+$), 691.0946, found 691.0937.

N-acetyl-*N*-(1-(4-(tert-butyl)phenyl)-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)-4-chlorobenzamide (4d)



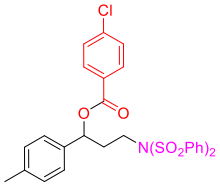
This compound was obtained in 80% (107 mg) yield as white solid by the general procedure. mp. 165 – 166 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.02 (d, *J* = 7.8 Hz, 4H), 7.66 (t, *J* = 7.8 Hz, 2H), 7.55 (t, *J* = 7.8 Hz, 4H), 7.51 (d, *J* = 8.4 Hz, 2H), 7.37 (d, *J* = 8.4 Hz, 2H), 7.30 (d, *J* = 8.4 Hz, 2H), 7.27 – 7.24 (m, 2H), 5.61 (t, *J* = 7.8 Hz, 1H), 3.81 – 3.66 (m, 2H), 2.78 – 2.66 (m, 2H), 1.87 (s, 3H), 1.28 (s, 9H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.4, 172.7, 150.9, 139.7, 139.5, 135.0, 134.7, 133.9, 130.3, 129.3, 129.1, 128.2, 127.8, 125.4, 57.3, 47.1, 34.5, 32.2, 31.2, 27.4. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{34}H_{35}ClN_2O_6S_2$ ([M + Na]$^+$), 689.1517, found 689.1511.

N-acetyl-4-chloro-*N*-(3-(*N*-(phenylsulfonyl)phenylsulfonamido)-1-(*p*-tolyl)propyl)benzamide (4e)



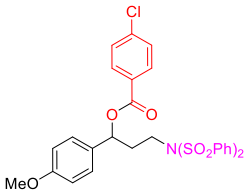
This compound was obtained in 32% (40 mg) yield as white solid by the general procedure. mp. 56 – 57 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.03 (d, *J* = 7.8 Hz, 4H), 7.66 (t, *J* = 7.8 Hz, 2H), 7.55 (t, *J* = 7.8 Hz, 4H), 7.52 (d, *J* = 7.8 Hz, 2H), 7.38 (d, *J* = 8.4 Hz, 2H), 7.23 (d, *J* = 7.8 Hz, 2H), 7.10 (d, *J* = 7.8 Hz, 2H), 5.61 (t, *J* = 7.8 Hz, 1H), 3.83 – 3.66 (m, 2H), 2.73 (dd, *J* = 15.6, 7.8 Hz, 2H), 2.30 (s, 3H), 1.85 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.3, 172.6, 139.7, 139.6, 137.8, 135.0, 134.8, 133.9, 130.3, 129.3, 129.1, 128.2, 128.1, 57.4, 47.1, 32.3, 27.5, 21.1. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{31}H_{29}ClN_2O_6S_2$ ([M + Na]$^+$), 647.1048, found 647.1037.

3-(*N*-(phenylsulfonyl)phenylsulfonamido)-1-(*p*-tolyl)propyl 4-chlorobenzoate (4e')



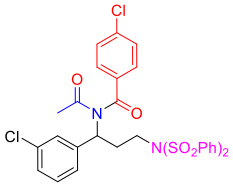
This compound was obtained in 24% (28 mg) yield as white solid by the general procedure. mp. 47 – 48 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ 8.01 = (d, *J* = 7.8 Hz, 2H), 7.93 (d, *J* = 8.4 Hz, 4H), 7.64 (t, *J* = 7.2 Hz, 2H), 7.51 (t, *J* = 7.2 Hz, 4H), 7.43 (d, *J* = 8.4 Hz, 2H), 7.23 (d, *J* = 7.8 Hz, 2H), 7.17 (d, *J* = 7.8 Hz, 2H), 5.90 (dd, *J* = 8.4, 4.8 Hz, 1H), 3.85 – 3.69 (m, 2H), 2.53 – 2.43 (m, 1H), 2.39 – 2.29 (m, 4H). **^{13}C NMR** (125 MHz, $CDCl_3$) *δ* = 164.8, 139.6, 139.5, 138.3, 136.0, 133.9, 131.1, 129.4, 129.1, 128.8, 128.5, 128.2, 126.3, 74.1, 45.7, 36.4, 21.2. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{29}H_{26}ClNO_6S_2$ ([M + Na]$^+$), 606.0782, found 606.0769.

1-(4-methoxyphenyl)-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl 4-chlorobenzoate (4f')



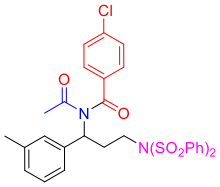
This compound was obtained in 63% (76 mg) yield as white solid by the general procedure. mp. 115 – 116 °C.**^{1}H NMR** (600 MHz, $CDCl_3$) *δ* = 8.00 (d, *J* = 8.4 Hz, 2H), 7.94 (d, *J* = 7.8 Hz, 4H), 7.63 (t, *J* = 7.2 Hz, 2H), 7.51 (t, *J* = 7.8 Hz, 4H), 7.42 (d, *J* = 8.4 Hz, 2H), 7.29 (d, *J* = 8.4 Hz, 2H), 6.89 (d, *J* = 8.4 Hz, 2H), 5.89 (dd, *J* = 8.4, 4.8 Hz, 1H), 3.84 – 3.76 (m, 4H), 3.76 – 3.69 (m, 1H), 2.54 – 2.44 (m, 1H), 2.41 – 2.31 (m, 1H). **^{13}C NMR** (150 MHz, $CDCl_3$) *δ* = 164.8, 159.6, 139.6, 139.5, 133.9, 131.0, 129.1, 128.8, 128.1, 127.8, 114.1, 73.9, 55.3, 45.7, 36.2. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{29}H_{26}ClNO_7S_2$ ([M + Na]$^+$), 622.0731, found 622.0670.

N-acetyl-4-chloro-*N*-(1-(3-chlorophenyl)-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (4g)



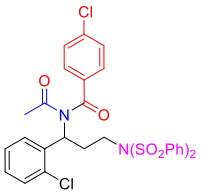
This compound was obtained in 72% (93 mg) yield as colorless oil by the general procedure. **^{1}H NMR** (600 MHz, $CDCl_3$) *δ* = 8.02 (d, *J* = 7.8 Hz, 4H), 7.67 (t, *J* = 7.2 Hz, 2H), 7.59 – 7.53 (m, 6H), 7.42 (d, *J* = 8.4 Hz, 2H), 7.34 (s, 1H), 7.28 – 7.21 (m, 4H), 5.59 (t, *J* = 7.8 Hz, 1H), 3.83 – 3.74 (m, 1H), 3.74 – 3.65 (m, 1H), 2.78 – 2.60 (m, 2H), 1.85 (s, 3H). **^{13}C NMR** (125 MHz, $CDCl_3$) *δ* = 173.0, 172.6, 140.3, 139.9, 139.6, 134.5, 134.4, 134.0, 130.3, 129.7, 129.5, 129.2, 128.4, 128.2, 126.3, 57.0, 46.8, 32.0, 27.6. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{30}H_{26}Cl_2N_2O_6S_2$ ([M + Na]$^+$), 667.0502, found 667.0492.

***N*-acetyl-4-chloro-*N*-(3-(*N*-(phenylsulfonyl)phenylsulfonamido)-1-(*m*-tolyl)propyl)benzamide (4h)**



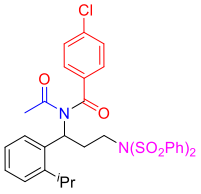
This compound was obtained in 81% (101 mg) yield as white solid by the general procedure. mp. 58 – 59 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.02 (d, *J* = 8.4 Hz, 4H), 7.66 (t, *J* = 7.2 Hz, 2H), 7.56 (t, *J* = 7.8 Hz, 4H), 7.52 (d, *J* = 7.8 Hz, 2H), 7.38 (d, *J* = 7.8 Hz, 2H), 7.18 (t, *J* = 7.8 Hz, 1H), 7.14 (s, 2H), 7.05 (d, *J* = 7.8 Hz, 1H), 5.61 (t, *J* = 7.8 Hz, 1H), 3.85 – 3.65 (m, 2H), 2.73 (dd, *J* = 15.6, 7.8 Hz, 2H), 2.31 (s, 3H), 1.87 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.4, 172.7, 139.7, 139.6, 138.1, 138.0, 134.8, 133.9, 130.3, 129.3, 129.1, 128.8, 128.7, 128.4, 128.3, 125.1, 57.5, 47.1, 32.3, 27.4, 21.4. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{31}H_{29}ClN_2O_6S_2$ ($[M + Na]^+$), 6647.1048, found 647.1017.

***N*-acetyl-4-chloro-*N*-(1-(2-chlorophenyl)-3-(N-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (4i)**



This compound was obtained in 82% (106 mg) yield as white solid by the general procedure. mp. 84 – 85 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.03 (d, *J* = 7.8 Hz, 4H), 7.66 (t, *J* = 7.8 Hz, 2H), 7.62 – 7.53 (m, 7H), 7.38 (d, *J* = 8.4 Hz, 2H), 7.33 (d, *J* = 7.8 Hz, 1H), 7.26 (t, *J* = 7.8 Hz, 1H), 7.20 (t, *J* = 7.8 Hz, 1H), 5.84 (t, *J* = 7.8 Hz, 1H), 3.89 – 3.72 (m, 2H), 2.89 – 2.70 (m, 2H), 1.90 (s, 3H).**^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.3, 171.8, 139.7, 139.6, 134.9, 134.6, 134.2, 133.9, 130.8, 130.4, 129.6, 129.4, 129.2, 129.1, 128.2, 126.6, 54.9, 46.8, 32.1, 27.2. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{30}H_{29}Cl_2N_2O_6S_2$ ($[M + Na]^+$), 667.0502, found 667.0492.

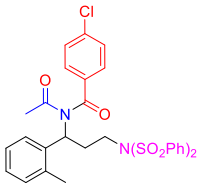
***N*-acetyl-4-chloro-*N*-(1-(2-isopropylphenyl)-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (4j)**



This compound was obtained in 83% (108 mg) yield as white solid by the general procedure. mp. 58 – 59 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.02 (d, *J* = 8.4 Hz, 4H), 7.65 (t, *J* = 7.2 Hz, 2H), 7.55 (t, *J* = 7.8 Hz, 4H), 7.45 (d, *J* = 7.8 Hz, 2H), 7.32 (t, *J* = 8.4 Hz, 3H), 7.26 (d, *J* = 8.4 Hz, 1H), 7.21 (t, *J* = 7.8 Hz, 1H), 7.07 (t, *J* = 7.2 Hz, 1H), 5.99 (t, *J* = 7.8 Hz, 1H), 3.79 – 3.68 (m, 2H), 3.31 – 3.22 (m, 1H), 2.81 – 2.73 (m, 1H), 2.72 – 2.62 (m, 1H), 1.87 (s, 3H), 1.28 (d, *J* = 6.6 Hz, 3H), 1.22 (d, *J* = 6.6 Hz, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.2, 171.9, 147.5, 139.8, 139.7, 134.7, 133.9, 133.4, 130.3,

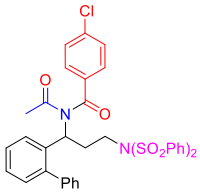
129.18, 129.1, 128.7, 128.5, 128.2, 125.6, 125.5, 53.2, 47.1, 33.7, 28.1, 27.0, 25.4, 23.0. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{33}H_{33Cl}N_2O_6S_2$ ([M + Na]$^+$), 65.1361, found 675.1363.

N-acetyl-4-chloro-*N*-(3-(N-(phenylsulfonyl)phenylsulfonamido)-1-(o-tolyl)propyl)benzamide (4k)



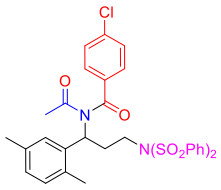
This compound was obtained in 95% (119 mg) yield as white solid by the general procedure. mp. 96 – 97 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.02 (d, J = 7.8 Hz, 4H), 7.65 (t, J = 7.8 Hz, 2H), 7.55 (t, J = 7.8 Hz, 4H), 7.43 (d, J = 8.4 Hz, 2H), 7.33 (d, J = 8.4 Hz, 2H), 7.27 (d, J = 7.8 Hz, 1H), 7.15 – 7.11 (m, 2H), 7.10 – 7.06 (m, 1H), 5.87 (dd, J = 8.4, 6.6 Hz, 1H), 3.82 – 3.69 (m, 2H), 2.81 – 2.71 (m, 1H), 2.69 – 2.62 (m, 1H), 2.35 (s, 3H), 1.90 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.4, 172.2, 139.7, 139.6, 136.8, 135.2, 134.7, 133.9, 130.7, 130.2, 129.2, 129.1, 128.5, 128.2, 128.1, 125.8, 54.0, 47.0, 33.2, 26.8, 19.5. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{31}H_{29}ClN_2O_6S_2$ ([M + Na]$^+$), 647.1048, found 647.1063.

N-(1-([1,1'-biphenyl]-2-yl)-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)-*N*-acetyl-4-chlorobenzamide (4l)



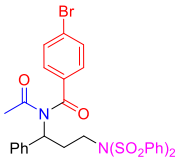
This compound was obtained in 78% (107 mg) yield as white solid by the general procedure. mp. 64 – 65 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 7.98 – 7.92 (m, 4H), 7.66 – 7.61 (m, 3H), 7.52 (t, J = 7.8 Hz, 4H), 7.43 – 7.38 (m, 5H), 7.34 – 7.32 (m, 2H), 7.32 – 7.27 (m, 4H), 7.19 – 7.14 (m, 1H), 5.75 (dd, J = 9.0, 6.0 Hz, 1H), 3.65 – 3.49 (m, 2H), 2.74 – 2.56 (m, 2H), 1.70 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 172.8, 172.5, 142.1, 140.5, 139.5, 139.4, 135.8, 134.4, 133.8, 130.5, 130.3, 129.2, 129.1, 129.0, 128.4, 128.4, 128.1, 127.8, 127.6, 127.4, 55.3, 46.8, 33.2, 26.7. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{36}H_{31}ClN_2O_6S_2$ ([M + Na]$^+$), 709.1204, found 729.1204.

N-acetyl-4-chloro-*N*-(1-(2,5-dimethylphenyl)-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (4m)



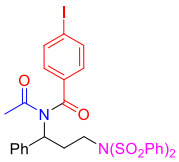
This compound was obtained in 47% (60 mg) yield as white solid by the general procedure. mp. 55 – 56 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.01 (d, *J* = 7.8 Hz, 4H), 7.65 (t, *J* = 7.2 Hz, 2H), 7.55 (t, *J* = 7.8 Hz, 4H), 7.38 (d, *J* = 8.4 Hz, 2H), 7.32 (d, *J* = 8.4 Hz, 2H), 7.00 (d, *J* = 7.8 Hz, 1H), 6.97 (s, 1H), 6.93 (d, *J* = 7.2 Hz, 1H), 5.87 – 5.76 (m, 1H), 3.80 – 3.70 (m, 2H), 2.77 – 2.68 (m, 1H), 2.68 – 2.57 (m, 1H), 2.28 (s, 3H), 2.20 (s, 3H), 1.95 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.6, 172.2, 139.6, 139.4, 135.2, 134.8, 134.8, 133.9, 133.6, 130.6, 130.1, 129.2, 129.1, 129.0, 128.8, 128.2, 53.8, 47.0, 33.2, 26.6, 21.0, 19.0. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{32}H_{31}ClN_2O_6S_2$ ([M + Na]$^+$), 661.1204, found 661.1200.

N-acetyl-4-bromo-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5a)



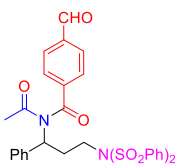
This compound was obtained in 99% (130 mg) yield as white solid by the general procedure. mp. 117 – 118 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.02 (dd, *J* = 8.4, 1.2 Hz, 4H), 7.66 (t, *J* = 7.8 Hz, 2H), 7.59 – 7.53 (m, 6H), 7.46 – 7.41 (m, 2H), 7.35 (d, *J* = 7.2 Hz, 2H), 7.30 (t, *J* = 7.2 Hz, 2H), 7.25– 7.22 (m, 1H), 5.64 (t, *J* = 7.8 Hz, 1H), 3.84 – 3.68 (m, 2H), 2.79 – 2.67 (m, 2H), 1.86 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.4, 172.7, 139.7, 138.1, 135.2, 133.9, 132.3, 130.3, 129.2, 128.5, 128.2, 128.2, 128.1, 128.0, 57.5, 47.0, 32.2, 27.5. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{30}H_{27}BrN_2O_6S$ ([M + Na]$^+$), 678.4690, found 678.4692.

N-acetyl-4-iodo-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5b)



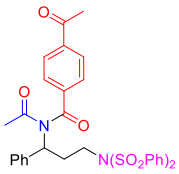
This compound was obtained in 94% (132 mg) yield as white solid by the general procedure. mp. 57 – 58 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.02 (d, *J* = 7.8 Hz, 4H), 7.76 (d, *J* = 7.8 Hz, 2H), 7.65 (t, *J* = 7.2 Hz, 2H), 7.55 (t, *J* = 7.8 Hz, 4H), 7.35 (d, *J* = 7.8 Hz, 2H), 7.32 – 7.27 (m, 4H), 7.24 (t, *J* = 7.8 Hz, 1H), 5.64 (t, *J* = 7.8 Hz, 1H), 3.84 – 3.67 (m, 2H), 2.75 (dd, *J* = 15.6, 7.8 Hz, 2H), 1.86 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.6, 172.6, 139.6, 138.2, 138.1, 135.7, 133.9, 130.1, 129.1, 128.5, 128.2, 128.1, 128.0, 100.8, 57.5, 47.0, 32.2, 27.5. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{30}H_{27}IN_2O_6S_2$ ([M + Na]$^+$), 725.0247, found 725.0258.

N-acetyl-4-formyl-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5c)



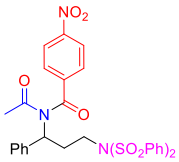
This compound was obtained in 91% (110 mg) yield as white solid by the general procedure. mp. 32 – 33 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 10.06 (s, 1H), 8.02 (d, *J* = 7.8 Hz, 4H), 7.91 (d, *J* = 7.8 Hz, 2H), 7.71 (d, *J* = 7.8 Hz, 2H), 7.66 (t, *J* = 7.2 Hz, 2H), 7.56 (t, *J* = 7.8 Hz, 4H), 7.36 (d, *J* = 7.8 Hz, 2H), 7.31 (t, *J* = 7.2 Hz, 2H), 7.28 – 7.23 (m, 1H), 5.67 (t, *J* = 7.2 Hz, 1H), 3.84 – 3.71 (m, 2H), 2.85 – 2.71 (m, 2H), 1.88 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 191.0, 173.3, 172.9, 141.3, 139.6, 138.7, 138.0, 134.0, 130.0, 129.2, 129.1, 128.5, 128.2, 128.1, 128.0, 57.5, 47.0, 32.2, 27.5. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{31}H_{28}N_2O_7S_2$ ($[M + Na]^+$), 627.1330, found 627.1332.

N,4-diacetyl-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5d)



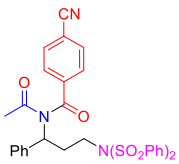
This compound was obtained in 92% (114 mg) yield as colorless oil the general procedure. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.03 (d, *J* = 8.4 Hz, 4H), 7.97 (d, *J* = 8.4 Hz, 2H), 7.69 – 7.63 (m, 4H), 7.56 (t, *J* = 7.8 Hz, 4H), 7.36 (d, *J* = 7.8 Hz, 2H), 7.31 (t, *J* = 7.8 Hz, 2H), 7.25 (t, *J* = 7.2 Hz, 1H), 5.67 (t, *J* = 7.8 Hz, 1H), 3.87 – 3.68 (m, 2H), 2.78 (dd, *J* = 15.6, 7.8 Hz, 2H), 2.61 (s, 3H), 1.86 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 196.9, 173.4, 172.9, 140.1, 139.9, 139.6, 138.0, 133.9, 129.1, 128.8, 128.7, 128.5, 128.2, 128.0, 57.5, 47.0, 32.1, 27.6, 26.8. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{32}H_{30}N_2O_7S_2$ ($[M + Na]^+$), 641.1387, found 641.1392.

N-acetyl-4-nitro-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5e)



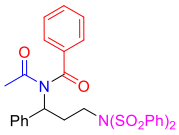
This compound was obtained in 91% (113 mg) yield as white solid by the general procedure. mp. 57 – 58 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.24 (d, *J* = 8.4 Hz, 2H), 8.01 (d, *J* = 7.8 Hz, 4H), 7.74 – 7.63 (m, 4H), 7.56 (t, *J* = 7.8 Hz, 4H), 7.32 (d, *J* = 4.2 Hz, 4H), 7.29 – 7.26 (m, 1H), 5,63(t, *J* = 7.8 Hz, 1H), 3.77 (t, *J* = 7.8 Hz, 2H), 2.89 – 2.68 (m, 2H), 1.95 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.0, 172.5, 149.8, 141.7, 139.5, 137.8, 134.0, 129.3, 129.2, 128.7, 128.2, 128.2, 127.9, 124.0, 57.6, 46.9, 32.3, 27.3. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{30}H_{27}N_3O_8S_2$ ($[M + Na]^+$), 644.1132, found 644.1140.

N-acetyl-4-cyano-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5f)



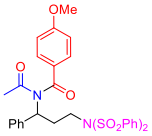
This compound was obtained in 98% (118 mg) yield as white solid by the general procedure. mp. 54 – 55 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.03 – 7.98 (m, 4H), 7.70 – 7.61 (m, 6H), 7.55 (t, *J* = 7.8 Hz, 4H), 7.33 – 7.29 (m, 4H), 7.28 – 7.24 (m, 1H), 5.63 (dd, *J* = 8.4, 6.6 Hz, 1H), 3.76 (t, *J* = 7.8 Hz, 2H), 2.84 – 2.65 (m, 2H), 1.91 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 172.9, 172.7, 140.1, 139.5, 137.8, 134.0, 132.6, 129.2, 128.9, 128.6, 128.2, 127.9, 117.5, 116.0, 57.5, 46.9, 32.2, 27.3. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{31}H_{27}N_3O_6S_2$ ($[M + Na]^+$), 624.1233, found 624.1229.

N-acetyl-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5g)



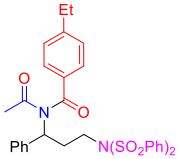
This compound was obtained in 81% (93 mg) yield as colorless oil by the general procedure. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.03 (d, *J* = 8.4 Hz, 4H), 7.64 (t, *J* = 7.8 Hz, 2H), 7.58 (d, *J* = 7.8 Hz, 2H), 7.57 – 7.51 (m, 5H), 7.44 – 7.36 (m, 4H), 7.30 (t, *J* = 7.2 Hz, 2H), 7.24 (t, *J* = 7.8 Hz, 1H), 5.69 (t, *J* = 7.8 Hz, 1H), 3.88 – 3.79 (m, 1H), 3.79 – 3.70 (m, 1H), 2.86 – 2.69 (m, 2H), 1.81 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 174.3, 172.9, 139.7, 138.3, 136.4, 133.9, 133.1, 129.1, 129.0, 128.9, 128.4, 128.2, 128.2, 127.8, 57.4, 47.1, 32.1, 27.6. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{30}H_{28}N_2O_6S_2$ ($[M + Na]^+$), 599.1281, found 599.1285.

N-acetyl-4-methoxy-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5h)



This compound was obtained in 46% (56 mg) yield as colorless oil by the general procedure. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.03 (d, *J* = 7.8 Hz, 4H), 7.65 (t, *J* = 7.2 Hz, 2H), 7.59 – 7.52 (m, 6H), 7.38 (d, *J* = 7.8 Hz, 2H), 7.28 (t, *J* = 7.8 Hz, 2H), 7.23 (t, *J* = 7.2 Hz, 1H), 6.88 (d, *J* = 9.0 Hz, 2H), 5.69 – 5.62 (m, 1H), 3.88 – 3.79 (m, 4H), 3.77 – 3.68 (m, 1H), 2.84 – 2.66 (m, 2H), 1.83 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.7, 172.3, 163.8, 139.8, 138.4, 133.9, 131.6, 129.1, 128.5, 128.4, 128.3, 128.3, 127.8, 114.3, 57.4, 55.5, 47.2, 32.3, 27.2. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{31}H_{30}N_2O_6S_2$ ($[M + Na]^+$), 629.1387, found 629.1376.

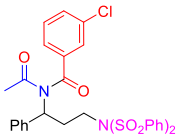
N-acetyl-4-ethyl-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5i)



This compound was obtained in 74% (90 mg) yield as white solid by the general procedure, mp 115 – 116 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.04 (d, *J* = 7.8 Hz, 4H), 7.65 (t, *J* = 7.2 Hz, 2H), 7.59 – 7.48 (m, 6H), 7.39 (d, *J* = 7.2 Hz, 2H), 7.29 (t, *J* = 7.8 Hz, 2H), 7.25 – 7.20 (m, 3H), 5.67 (t, *J* = 7.2 Hz, 1H),

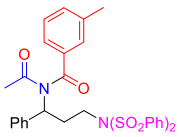
3.88 – 3.78 (m, 1H), 3.78 – 3.68 (m, 1H), 2.85 – 2.72 (m, 2H), 2.68 (q, *J* = 7.2 Hz, 2H), 1.82 (s, 3H), 1.23 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 174.3, 172.8, 150.3, 139.8, 138.4, 133.9, 133.8, 129.2, 129.1, 128.5, 128.4, 128.2, 128.2, 127.8, 57.4, 47.2, 32.2, 28.9, 27.5, 15.0. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{32}H_{32}N_2O_6S_2$ ($[M + Na]^+$), 627.1203, found 627.1205.

N-acetyl-3-chloro-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5j)



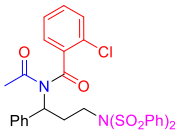
This compound was obtained in 81% (99 mg) yield as white solid by the general procedure. mp. 33 – 34 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.03 (d, *J* = 8.4 Hz, 4H), 7.65 (t, *J* = 7.2 Hz, 2H), 7.58 – 7.53 (m, 5H), 7.50 (d, *J* = 7.8 Hz, 1H), 7.42 (d, *J* = 7.8 Hz, 1H), 7.38 – 7.33 (m, 3H), 7.31 (t, *J* = 7.8 Hz, 2H), 7.27 – 7.23 (m, 1H), 5.66 (t, *J* = 7.8 Hz, 1H), 3.84 – 3.67 (m, 2H), 2.81 – 2.67 (m, 2H), 1.87 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 172.9, 172.7, 139.6, 138.00, 137.99, 135.2, 133.9, 133.0, 130.2, 129.1, 128.8, 128.5, 128.2, 128.1, 128.0, 126.7, 57.5, 47.0, 32.1, 27.5. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{30}H_{27}ClN_2O_6S_2$ ($[M + Na]^+$), 633.0891, found 633.0893.

N-acetyl-3-methyl-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5k)



This compound was obtained in 53% (63 mg) yield as white solid by the general procedure. mp. 77 – 78 °C.**^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.04 (d, *J* = 8.2 Hz, 4H), 7.65 (t, *J* = 7.8 Hz, 2H), 7.55 (t, *J* = 7.8 Hz, 4H), 7.43 – 7.33 (m, 5H), 7.33 – 7.27 (m, 3H), 7.24 (t, *J* = 7.2 Hz, 1H), 5.68 (t, *J* = 7.8 Hz, 1H), 3.89– 3.79 (m, 1H), 3.79 – 3.66 (m, 1H), 2.85 – 2.69 (m, 2H), 2.35 (s, 3H), 1.82 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 174.5, 173.0, 139.7, 139.1, 138.3, 136.4, 133.9, 133.9, 129.4, 129.1, 128.8, 128.4, 128.2, 128.2, 127.8, 126.1, 57.4, 47.2, 32.1, 27.6, 21.2. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{31}H_{32}N_2O_6S_2$ ($[M + Na]^+$), 613.1108, found 627.1105.

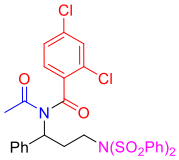
N-acetyl-2-chloro-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5l)



This compound was obtained in 45% (55 mg) yield as white solid by the general procedure. mp. 43 – 44 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.03 (d, *J* = 8.4 Hz, 4H), 7.66 (t, *J* = 7.2 Hz, 2H), 7.56 (t, *J* = 7.8 Hz, 4H), 7.45 – 7.36 (m, 4H), 7.32 (t, *J* = 7.2 Hz, 2H), 7.30 – 7.24 (m, 2H), 7.21 (d, *J* = 7.8 Hz, 1H), 5.61 (t, *J* = 7.2 Hz, 1H), 3.81 – 3.68 (m, 2H), 2.90 – 2.79 (m, 1H), 2.79 – 2.67 (m, 1H), 1.96 (s,

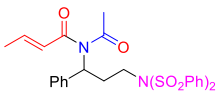
3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.4, 170.5, 139.7, 137.9, 136.4, 133.9, 131.9, 131.3, 130.5, 129.2, 128.6, 128.4, 128.2, 128.2, 127.9, 127.2, 57.0, 47.1, 32.0, 27.2. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{30}H_{27}ClN_2O_6S_2$ ([M + Na]$^+$), 633.0891, found 633.0878.

N-acetyl-2,4-dichloro-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (5m)



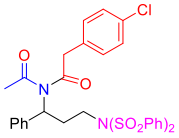
This compound was obtained in 72% (93 mg) yield as colorless oil the general procedure. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.02 (d, J = 7.8 Hz, 4H), 7.66 (t, J = 7.2 Hz, 2H), 7.56 (t, J = 7.8 Hz, 4H), 7.43 (s, 1H), 7.37 – 7.31 (m, 4H), 7.30 – 7.24 (m, 2H), 7.16 (d, J = 8.4 Hz, 1H), 5.58 (t, J = 7.2 Hz, 1H), 3.79 – 3.67 (m, 2H), 2.90 – 2.79 (m, 1H), 2.75 – 2.65 (m, 1H), 2.00 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.3, 169.7, 139.6, 137.7, 137.4, 134.9, 134.0, 132.2, 130.4, 129.5, 129.2, 128.5, 128.2, 128.1, 128.0, 127.6, 57.0, 47.0, 32.0, 27.1. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{30}H_{26}Cl_2N_2O_6S_2$ ([M + Na]$^+$), 667.0502, found 667.0500.

(*E*)-*N*-acetyl-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)but-2-enamide (5n)



This compound was obtained in 57% (62 mg) yield as white solid the general procedure, mp. 110 – 111 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 7.99 (d, J = 7.8 Hz, 4H), 7.66 (t, J = 7.2 Hz, 2H), 7.55 (t, J = 7.8 Hz, 4H), 7.35 – 7.30 (m, 2H), 7.28 – 7.23 (m, 3H), 6.98 – 6.88 (m, 1H), 6.11 (dd, J = 15.0, 1.2 Hz, 1H), 5.61 (dd, J = 9.0, 6.0 Hz, 1H), 3.80 – 3.73 (m, 1H), 3.73 – 3.64 (m, 1H), 2.76 – 2.66 (m, 1H), 2.65 – 2.52 (m, 1H), 2.28 (s, 3H), 1.86 (dd, J = 6.6, 1.2 Hz, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.4, 170.4, 145.7, 139.6, 138.9, 133.9, 129.1, 128.5, 128.2, 127.6, 127.1, 126.3, 55.4, 47.0, 32.0, 26.7, 18.3. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{27}H_{28}N_2O_6S_2$ ([M + Na]$^+$), 563.1281, found 563.1273.

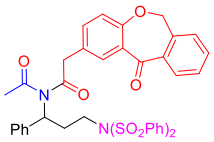
N-acetyl-2-(4-chlorophenyl)-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)acetamide (5o)



This compound was obtained in 65% (81 mg) yield as colorless oil the general procedure. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 7.94 (d, J = 7.8 Hz, 4H), 7.67 (t, J = 7.2 Hz, 2H), 7.54 (t, J = 7.8 Hz, 4H), 7.37 – 7.31 (m, 2H), 7.31 – 7.27 (m, 1H), 7.23 – 7.20 (m, 2H), 7.17 (d, J = 7.8 Hz, 2H), 6.99 (d, J = 8.4 Hz, 2H), 5.60 (dd, J = 9.0, 6.6 Hz, 1H), 3.88 (dd, J = 37.2, 15.6 Hz, 2H), 3.81 – 3.73 (m, 1H), 3.65 – 3.56 (m, 1H), 2.84 – 2.75 (m, 1H), 2.58 – 2.48 (m, 1H), 2.23 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 175.5, 174.5, 139.3, 138.5, 134.1, 133.0, 132.6, 130.9, 129.2, 128.9, 128.6, 128.2, 127.8, 126.7, 55.1,

46.8, 44.3, 32.4, 26.5. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{31}H_{29}ClN_2O_6S_2$ ([M + Na]$^+$), 647.1048, found 647.1019.

N-acetyl-2-(11-oxo-6,11-dihydrodibenzo[*b*,*e*]oxepin-2-yl)-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)acetamide (5p)

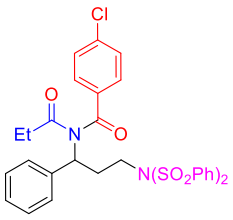


This compound was obtained in 41% (59 mg) yield as white solid by the general procedure. mp. 58 – 59 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 7.96 (d, *J* = 7.8 Hz, 4H), 7.93 (s, 1H), 7.87 (d, *J* = 7.8 Hz, 1H), 7.65 (t, *J* = 7.8 Hz, 2H), 7.57 – 7.52 (m, 5H), 7.46 (t, *J* = 7.8 Hz, 1H), 7.34 (t, *J* = 8.4 Hz, 3H), 7.28 (t, *J* = 7.2 Hz, 1H), 7.24 – 7.18 (m, 3H), 6.96 (d, *J* = 8.4 Hz, 1H), 5.65 – 5.56 (m, 1H), 5.15 (s, 2H), 3.91 (dd, *J* = 27.0, 16.2 Hz, 2H), 3.85 – 3.76 (m, 1H), 3.67 – 3.57 (m, 1H), 2.84 – 2.74 (m, 1H), 2.59 – 2.49 (m, 1H), 2.28 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 190.6, 175.8, 174.5, 160.4, 140.4, 139.4, 138.6, 136.6, 135.5, 134.1, 132.7, 132.6, 129.5, 129.2, 129.2, 128.9, 128.2, 127.9, 127.8, 127.8, 126.7, 125.1, 121.0, 73.6, 55.2, 46.9, 44.1, 32.4, 26.6. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{39}H_{34}N_2O_8S_2$ ([M + Na]$^+$), 745.1649, found 745.1655.

N-acetyl-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)decanamide (5q)

This compound was obtained in 22% (28 mg) yield as colorless oil the general procedure. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.01 – 7.94 (m, 4H), 7.67 (t, *J* = 7.8 Hz, 2H), 7.56 (t, *J* = 7.8 Hz, 4H), 7.34 (t, *J* = 7.8 Hz, 2H), 7.27 (t, *J* = 7.2 Hz, 1H), 7.21 (d, *J* = 7.8 Hz, 2H), 5.64 (dd, *J* = 8.,4 6.6 Hz, 1H), 3.86 – 3.76 (m, 1H), 3.68 – 3.60 (m, 1H), 2.84– 2.72 (m, 1H), 2.57 – 2.40 (m, 3H), 2.28 (s, 3H), 1.57 – 1.43 (m, 2H), 1.33 – 1.11 (m, 12H), 0.87 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 177.9, 174.3, 139.5, 138.9, 134.0, 129.2, 128.7, 128.2, 127.6, 126.7, 54.5, 47.0, 38.7, 32.3, 31.8, 29.4, 29.3, 29.2, 29.0, 26.8, 25.1, 22.6, 14.1. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{33}H_{42}N_2O_6S_2$ ([M + Na]$^+$), 649.2376, found 649.2367.

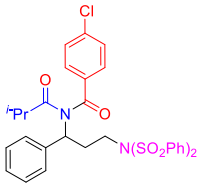
4-chloro-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)-*N*-propionylbenzamide (7a)



This compound was obtained in 82% (103 mg) yield as white solid by the general procedure. mp. 45 – 46 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.03 (d, *J* = 7.8 Hz, 4H), 7.65 (t, *J* = 7.2 Hz, 2H), 7.55 (t, *J* = 7.8 Hz, 4H), 7.51 (d, *J* = 8.4 Hz, 2H), 7.40 – 7.34 (m, 4H), 7.30 (t, *J* = 7.8 Hz, 2H), 7.24 (t, *J* =7.2 Hz, 1H), 5.70 – 5.59 (m, 1H), 3.86 – 3.77 (m, 1H), 3.77 – 3.67 (m, 1H), 2.84 – 2.64 (m, 2H), 2.09 – 1.90

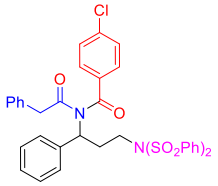
(m, 2H), 0.87 (t, J = 7.3 Hz, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 177.2, 173.1, 139.7, 139.5, 138.1, 134.8, 133.9, 130.1, 129.3, 129.1, 128.4, 128.2, 128.1, 128.0, 57.6, 47.1, 33.5, 32.3, 9.6. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{31}H_{29}ClN_2O_6S_2$ ([M + Na]$^+$), 647.1048, found 647.1049.

4-chloro-*N*-isobutyryl-*N*-(1-phenyl-3-(N-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (7b)



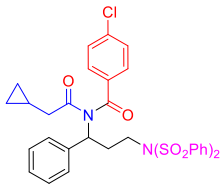
This compound was obtained in 90% (115 mg) yield as white solid by the general procedure. mp. 108 – 109 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.02 (d, J = 7.8 Hz, 4H), 7.64 (t, J = 7.2 Hz, 2H), 7.58 – 7.49 (m, 6H), 7.43 – 7.36 (m, 4H), 7.29 (t, J = 7.5 Hz, 2H), 7.24 (t, J = 7.2 Hz, 1H), 5.68 (t, J = 7.8 Hz, 1H), 3.85 – 3.74 (m, 1H), 3.74 – 3.62 (m, 1H), 2.85 – 2.65 (m, 2H), 2.26 – 2.12 (m, 1H), 0.79 (d, J = 6.6 Hz, 3H), 0.75 (d, J = 6.6 Hz, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 181.1, 172.8, 139.7, 139.5, 137.7, 134.9, 133.9, 130.2, 129.3, 129.1, 128.6, 128.4, 128.2, 128.1, 57.8, 47.1, 38.6, 32.6, 19.5, 18.8. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{32}H_{31}ClN_2O_6S_2$ ([M + Na]$^+$), 661.1204, found 661.1186.

4-chloro-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)-*N*-(2-phenylacetyl)benzamide (7c)



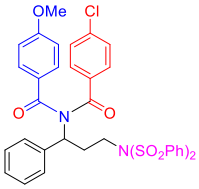
This compound was obtained in 52% (72 mg) yield as white solid by the general procedure. mp. 52 – 53 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 7.99 (d, J = 7.8 Hz, 4H), 7.65 (t, J = 7.2 Hz, 2H), 7.54 (t, J = 7.8 Hz, 4H), 7.44 (d, J = 8.4 Hz, 2H), 7.32 (d, J = 7.8 Hz, 2H), 7.29 (d, J = 7.2 Hz, 2H), 7.26 – 7.21 (m, 3H), 7.18 – 7.12 (m, 3H), 6.82 (d, J = 7.2 Hz, 2H), 5.60 (t, J = 7.8 Hz, 1H), 3.78 – 3.69 (m, 1H), 3.69 – 3.62 (m, 1H), 3.44 (dd, J = 25.8, 9.0 Hz, 2H), 2.77 – 2.66 (m, 2H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 174.2, 173.2, 139.7, 139.6, 137.7, 134.6, 133.9, 133.3, 130.3, 129.3, 129.1, 129.0, 128.5, 128.4, 128.3, 128.2, 128.0, 127.2, 58.0, 47.0, 46.0, 32.4. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{36}H_{31}ClN_2O_6S_2$ ([M + Na]$^+$), 709.1204, found 709.1197.

4-chloro-*N*-(2-cyclopropylacetyl)-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (7d)



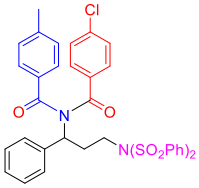
This compound was obtained in 32% (42 mg) yield as colorless oil the general procedure. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.03 (d, *J* = 7.8 Hz, 4H), 7.66 (t, *J* = 7.2 Hz, 2H), 7.56 (t, *J* = 7.8 Hz, 4H), 7.51(d, *J* = 8.4 Hz, 2H), 7.37 (d, *J* = 8.4 Hz, 4H), 7.29 (t, *J* = 7.8 Hz, 2H), 7.24 (t, *J* = 7.2 Hz, 1H), 5.67 (t, *J* = 7.8 Hz, 1H), 3.87 – 3.77 (m, 1H), 3.77 – 3.68 (m, 1H), 2.86 – 2.66 (m, 2H), 2.02 – 1.83 (m, 2H), 0.82 – 0.74 (m, 1H), 0.33 (d, *J* = 7.8 Hz, 2H), -0.14 – -0.23 (m, 2H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 176.3, 173.0, 139.7, 139.6, 138.1, 134.8, 133.9, 130.3, 129.3, 129.2, 128.4, 128.3, 128.2, 128.0, 57.7, 47.1, 45.0, 32.4, 7.6, 4.3, 4.2. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{33}H_{31}ClN_2O_6S_2$ ([M + Na]$^+$), 673.1204, found 673.1200.

4-chloro-*N*-(4-methoxybenzoyl)-*N*-(1-phenyl-3-(N-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (7e)



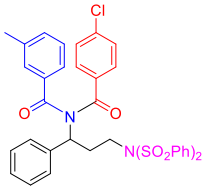
This compound was obtained in 99% (139 mg) yield as white solid by the general procedure. mp. 155 – 156 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.05 (d, *J* = 7.8 Hz, 4H), 7.64 (t, *J* = 7.8 Hz, 2H), 7.57 – 7.50 (m, 6H), 7.34 – 7.28 (m, 4H), 7.28 – 7.23 (m, 3H), 7.07 (d, *J* = 8.4 Hz, 2H), 6.60 (d, *J* = 9.0 Hz, 2H), 5.84 (dd, *J* = 9.0, 6.0 Hz, 1H), 4.01 – 3.92 (m, 1H), 3.84 – 3.76 (m, 1H), 3.71 (s, 3H), 3.09 – 2.99 (m, 1H), 2.86 – 2.75 (m, 1H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.3, 172.5, 162.8, 139.7, 138.2, 137.9, 135.8, 133.9, 131.1, 129.7, 129.5, 129.1, 128.5, 128.5, 128.4, 128.2, 128.1, 113.7, 58.5, 55.4, 47.3, 32.5. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{36}H_{31}ClN_2O_7S_2$ ([M + Na]$^+$), 725.1193, found 725.1190.

4-chloro-*N*-(4-methylbenzoyl)-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (7f)



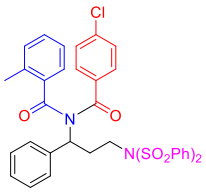
This compound was obtained in 83% (114 mg) yield as white solid by the general procedure. mp. 70 – 71 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.05 (d, *J* = 7.8 Hz, 4H), 7.64 (t, *J* = 7.2 Hz, 2H), 7.57 – 7.48 (m, 6H), 7.32 (t, *J* = 7.8 Hz, 2H), 7.26 – 7.18 (m, 5H), 7.05 (d, *J* = 8.4 Hz, 2H), 6.91 (d, *J* = 7.8 Hz, 2H), 5.85 (dd, *J* = 9.0, 6.0 Hz, 1H), 4.03 – 3.87 (m, 1H), 3.88 – 3.71 (m, 1H), 3.09 – 2.94 (m, 1H), 2.86 – 2.75 (m, 1H), 2.21 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.8, 172.8, 143.1, 139.8, 138.1, 138.0, 135.8, 134.4, 133.9, 129.9, 129.1, 129.1, 128.9, 128.5, 128.4, 128.4, 128.3, 128.1, 58.5, 47.3, 32.5, 21.5. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{36}H_{31}ClN_2O_6S_2$ ([M + Na]$^+$), 709.1204, found 709.1212.

N-(4-chlorobenzoyl)-3-methyl-*N*-(1-phenyl-3-(N-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (7g)



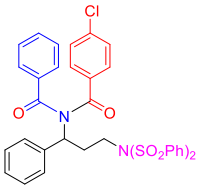
This compound was obtained in 83% (114 mg) yield as white solid by the general procedure. mp. 65 – 66 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.05 (dd, J = 8.4, 1.2 Hz, 4H), 7.64 (t, J = 7.8 Hz, 2H), 7.57 – 7.50 (m, 6H), 7.33 (t, J = 7.8 Hz, 2H), 7.28 – 7.23 (m, 1H), 7.21 – 7.16 (m, 2H), 7.11 – 7.06 (m, 2H), 7.06 – 7.01 (m, 3H), 6.99 (t, J = 7.8 Hz, 1H), 5.86 (dd, J = 9.0, 6.0 Hz, 1H), 4.03 – 3.92 (m, 1H), 3.88 – 3.74 (m, 1H), 3.10 – 2.96 (m, 1H), 2.89 – 2.76 (m, 1H), 2.17 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.9, 172.9, 139.8, 138.3, 138.1, 137.9, 137.1, 135.9, 133.9, 132.9, 129.8, 129.3, 129.1, 128.5, 128.4, 128.4, 128.2, 128.2, 125.8, 58.4, 47.3, 32.5, 21.0. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{36}H_{31}ClN_2O_6S_2$ ($[M + Na]^+$), 709.1204, found 709.1211.

N-(4-chlorobenzoyl)-2-methyl-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (7h)



This compound was obtained in 65% (89 mg) yield as white solid by the general procedure. mp. 96 – 97 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.06 (d, J = 7.8 Hz, 4H), 7.64 (t, J = 7.2 Hz, 2H), 7.59 – 7.51 (m, 6H), 7.35 (t, J = 7.8 Hz, 2H), 7.28 (t, J = 7.2 Hz, 1H), 7.12 (d, J = 8.4 Hz, 2H), 7.07 – 7.02 (m, 3H), 6.97 (d, J = 7.2 Hz, 1H), 6.93 (t, J = 7.8 Hz, 1H), 6.83 (d, J = 7.8 Hz, 1H), 5.86 (t, J = 7.8 Hz, 1H), 4.02 – 3.90 (m, 1H), 3.86 – 3.73 (m, 1H), 3.10 – 2.94 (m, 1H), 2.93 – 2.83 (m, 1H), 2.19 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.5, 172.7, 139.7, 137.8, 137.7, 136.5, 136.5, 133.9, 131.2, 131.1, 129.1, 128.9, 128.7, 128.5, 128.3, 128.2, 127.7, 125.4, 57.9, 47.3, 19.7. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{36}H_{31}ClN_2O_6S_2$ ($[M + Na]^+$), 709.1204, found 709.1196.

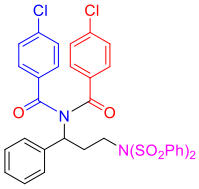
N-benzoyl-4-chloro-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (7i)



This compound was obtained in 86% (116 mg) yield as white solid by the general procedure. mp. 61 – 62 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.05 (d, J = 7.2 Hz, 4H), 7.63 (t, J = 7.8 Hz, 2H), 7.57 – 7.50 (m, 6H), 7.33 (t, J = 7.8 Hz, 2H), 7.30 – 7.19 (m, 6H), 7.10 (t, J = 7.8 Hz, 2H), 7.03 (d, J = 8.4 Hz, 2H), 5.88 (dd, J = 9.0, 6.0 Hz, 1H), 4.05 – 3.90 (m, 1H), 3.86 – 3.75 (m, 1H), 3.10 – 2.97 (m, 1H), 2.91 – 2.78 (m, 1H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 173.7, 172.9, 139.7, 138.1, 138.0, 137.1, 135.7,

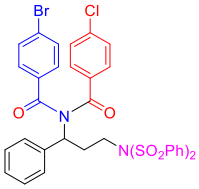
133.9, 132.1, 129.9, 129.1, 128.6, 128.5, 128.4, 128.4, 128.3, 128.2, 128.2, 58.5, 47.2, 32.4. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{35}H_{29}ClN_2O_6S_2$ ([M + Na]$^+$), 695.1048, found 695.1057.

4-chloro-*N*-(4-chlorobenzoyl)-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (7j)



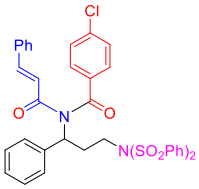
This compound was obtained in 75% (106 mg) yield as white solid by the general procedure. mp. 60 – 61 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.05 (d, J = 7.8 Hz, 4H), 7.64 (t, J = 7.2 Hz, 2H), 7.56 – 7.50 (m, 6H), 7.33 (t, J = 7.8 Hz, 2H), 7.28 – 7.25 (m, 1H), 7.23 (d, J = 8.4 Hz, 4H), 7.09 (d, J = 8.4 Hz, 4H), 5.84 (dd, J = 9.0, 6.0 Hz, 1H), 3.99 – 3.88 (m, 1H), 3.84 – 3.73 (m, 1H), 3.09 – 2.97 (m, 1H), 2.87 – 2.77 (m, 1H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 172.6, 139.7, 138.6, 137.8, 135.5, 133.9, 129.9, 129.1, 128.7, 128.6, 128.4, 128.3, 128.2, 58.7, 47.1, 32.5. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{35}H_{28}Cl_2N_2O_6S_2$ ([M + Na]$^+$), 729.0658, found 729.0670.

4-bromo-*N*-(4-chlorobenzoyl)-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (7k)



This compound was obtained in 74% (111 mg) yield as white solid by the general procedure. mp. 122 – 123 °C.**^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.04 (d, J = 7.2 Hz, 4H), 7.63 (t, J = 7.8 Hz, 2H), 7.56 – 7.50 (m, 6H), 7.32 (t, J = 7.8 Hz, 2H), 7.27 – 7.21 (m, 5H), 7.15 (d, J = 8.4 Hz, 2H), 7.09 (d, J = 8.4 Hz, 2H), 5.84 (dd, J = 9.6, 6.0 Hz, 1H), 3.99 – 3.98 (m, 1H), 3.85 –3.72 (m, 1H), 3.09 – 2.95 (m, 1H), 2.89 – 2.79 (m, 1H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 172.7, 172.6, 139.7, 138.6, 137.8, 135.9, 135.5, 133.9, 131.7, 130.0, 129.9, 129.2, 129.1, 128.7, 128.6, 128.4, 128.3, 128.2, 127.1, 58.7, 47.1, 32.5. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{35}H_{28}BrClN_2O_6S_2$ ([M + Na]$^+$), 773.0153, found 773.0158.

4-chloro-*N*-cinnamoyl-*N*-(1-phenyl-3-(*N*-(phenylsulfonyl)phenylsulfonamido)propyl)benzamide (7l)



This compound was obtained in 92% (129 mg) yield as white solid by the general procedure. mp. 52 – 53 °C. **^{1}H NMR** (600 MHz, $CDCl_3$) δ = 8.03 (d, J = 7.2 Hz, 4H), 7.63 (t, J = 7.2 Hz, 2H), 7.57 – 7.49 (m, 6H), 7.46 – 7.40 (m, 3H), 7.35 – 7.29 (m, 5H), 7.28 – 7.24 (m, 3H), 7.09 (d, J = 7.2 Hz, 2H), 6.04

(d, J = 15.0 Hz, 1H), 5.83 (dd, J = 9.0, 6.0 Hz, 1H), 3.93 – 3.71 (m, 2H), 2.97 – 2.85 (m, 1H), 2.84 – 2.70 (m, 1H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ = 172.1, 169.5, 143.9, 139.7, 139.3, 138.5, 135.2, 134.0, 133.9, 130.6, 130.3, 129.2, 129.1, 128.9, 128.5, 128.2, 128.1, 127.9, 122.4, 57.4, 47.1, 32.1. **HRMS** (ESI-TOF) (m/z): Calcd for $C_{37}H_{31}ClN_2O_6S_2$ ($[M + Na]^+$), 721.1204, found 721.1208.

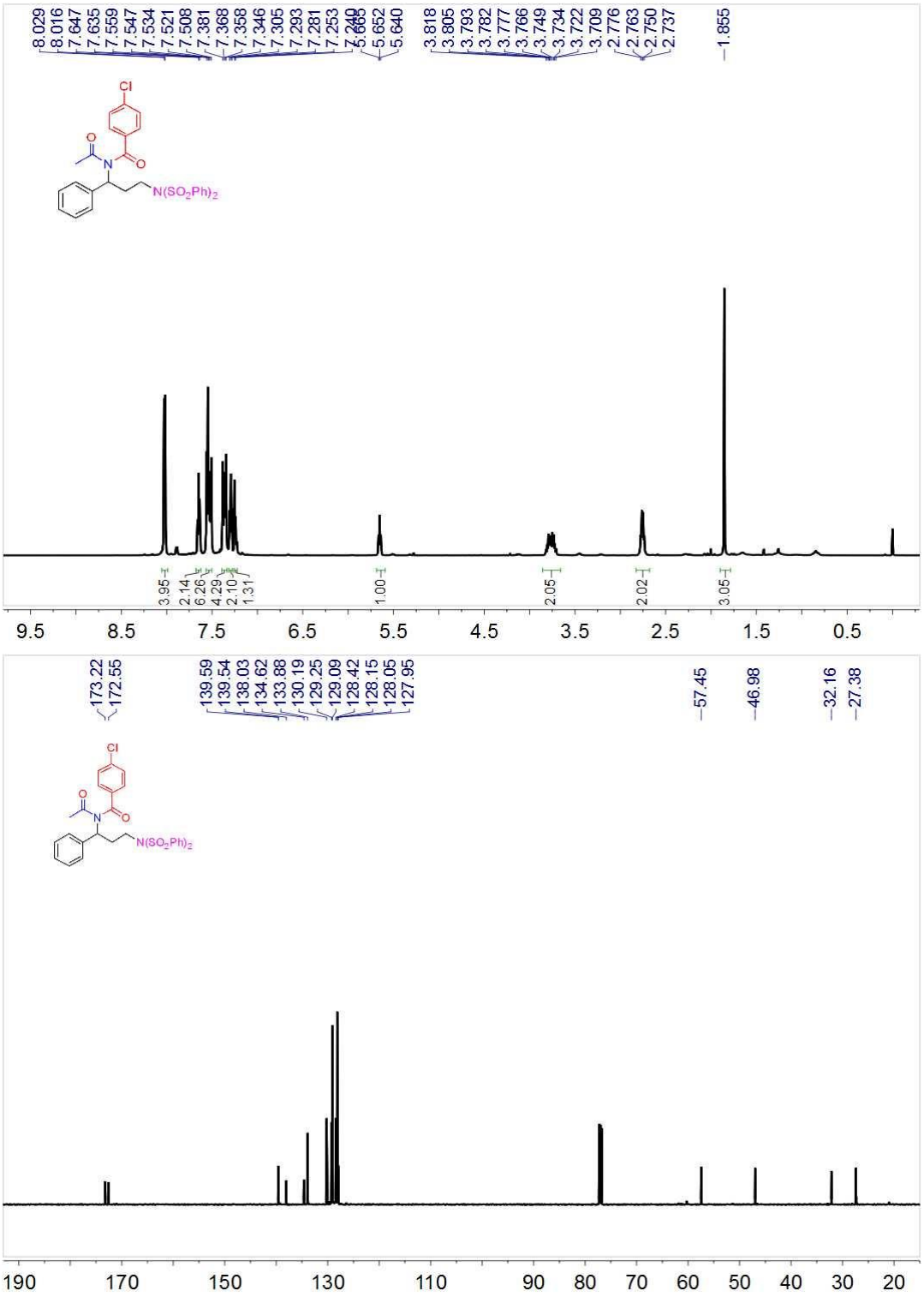
VI. References

1 C. R. Pitts, Arther, B. Ling, J. A. Snyder, A. E. Bragg and T. Lectka, *J. Am. Chem. Soc.* **2016**, *138*, 6598.

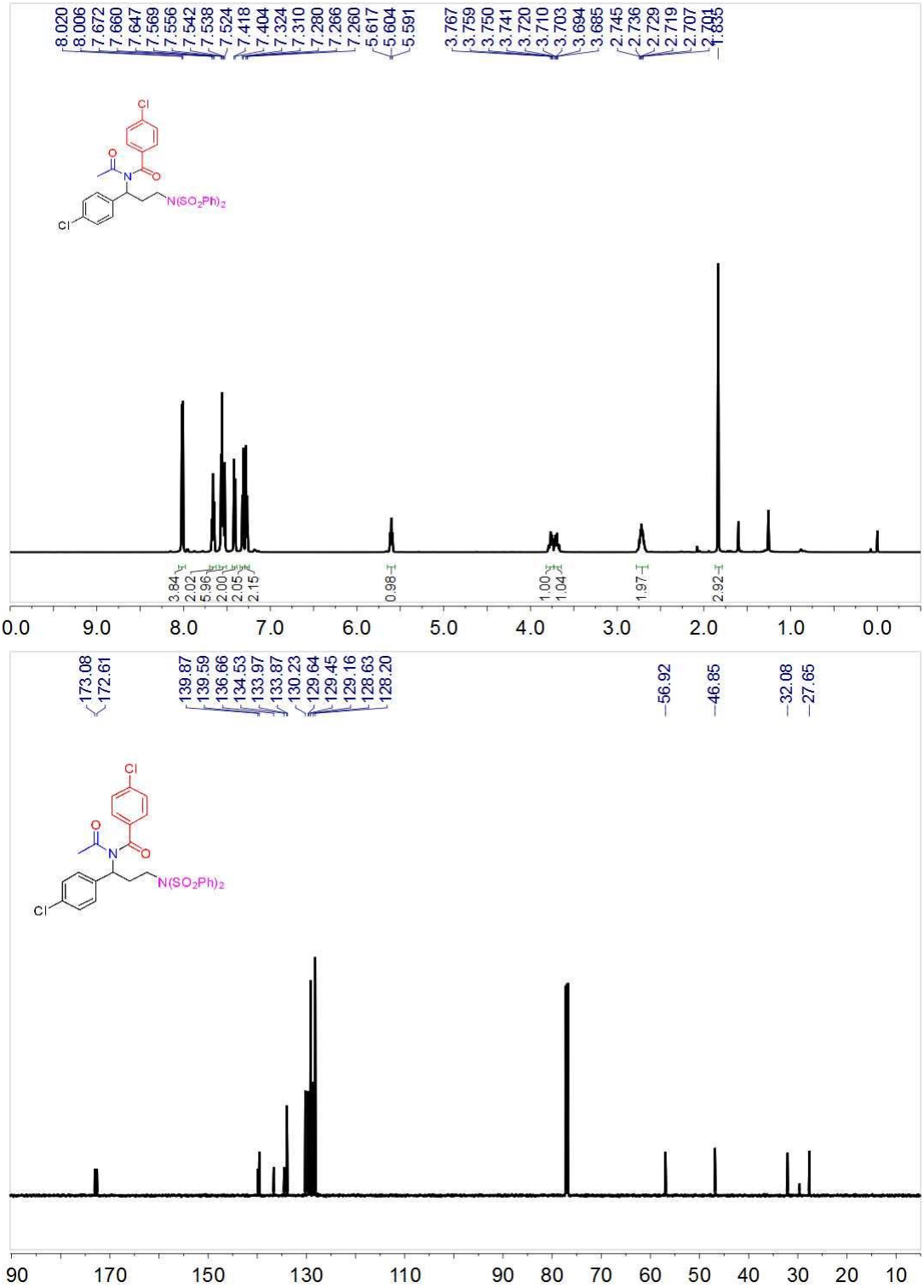
2 Z. Yang, J. C. Lorenz and Y. Shi. *Tetrahedron Lett.* **1998**, *39*, 8621.

VII. ^{1}H and ^{13}C NMR Spectra of new compounds

Compound **4a**



Compound **4b**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Cl
3.84
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2.00
2.05
2.15
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172.61
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130.23
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129.16
128.63
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Cl
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O
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50
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30
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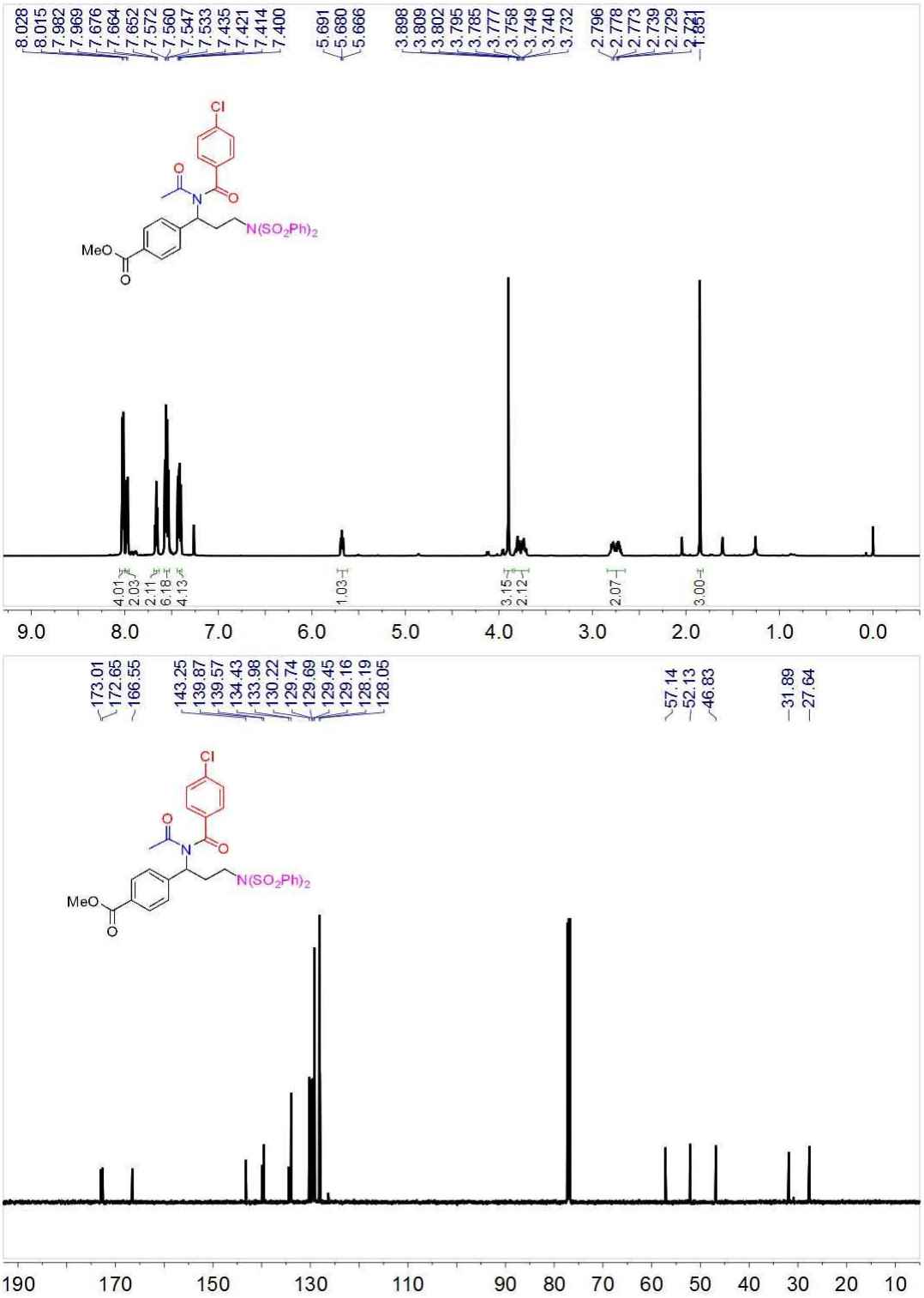
10

Compound **4c**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129.74
129.69
129.45
129.16
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128.05
57.14
52.13
46.83
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150
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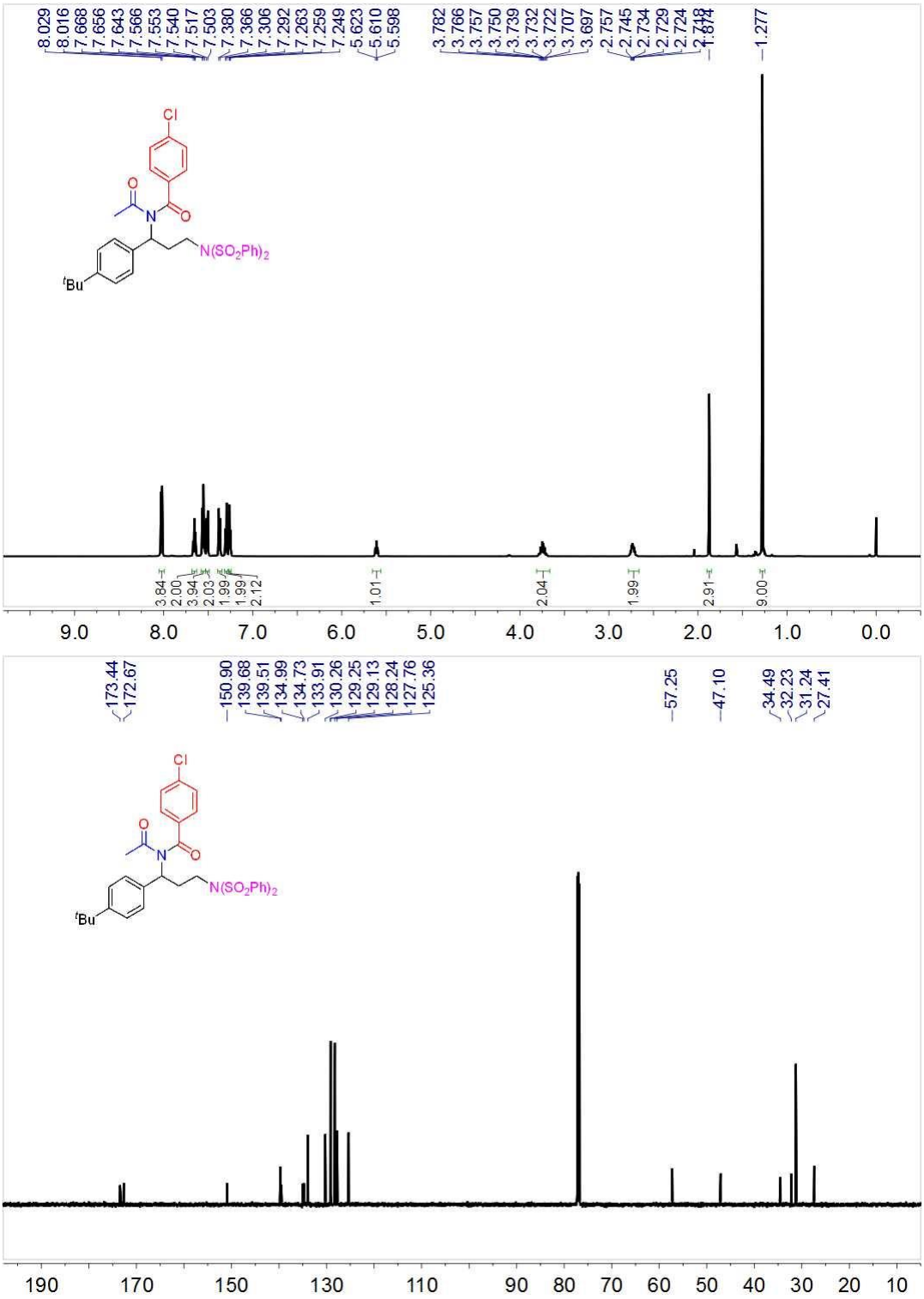
80
70
60
50
40
30
20
10

Compound **4d**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7.306
7.292
7.263
7.259
7.249
5.623
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5.598
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3.766
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3.732
3.722
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129.25
129.13
128.24
127.76
125.36
57.25
47.10
34.49
32.23
31.24
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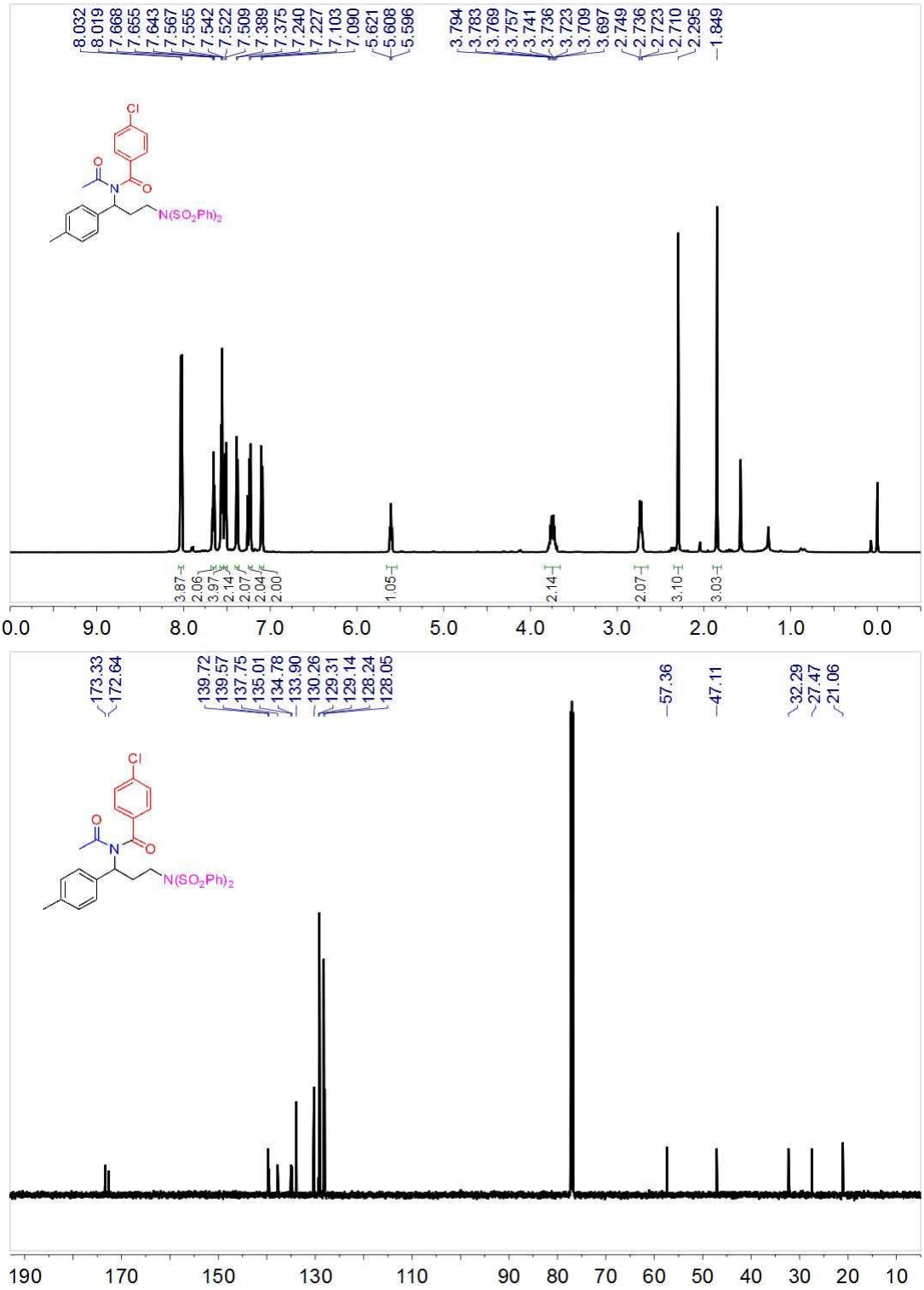
190
170
150
130
110
90
80
70
60
50
40
30
20
10

Compound **4e**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N
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2.00
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2.07
3.10
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8.0
7.0
6.0
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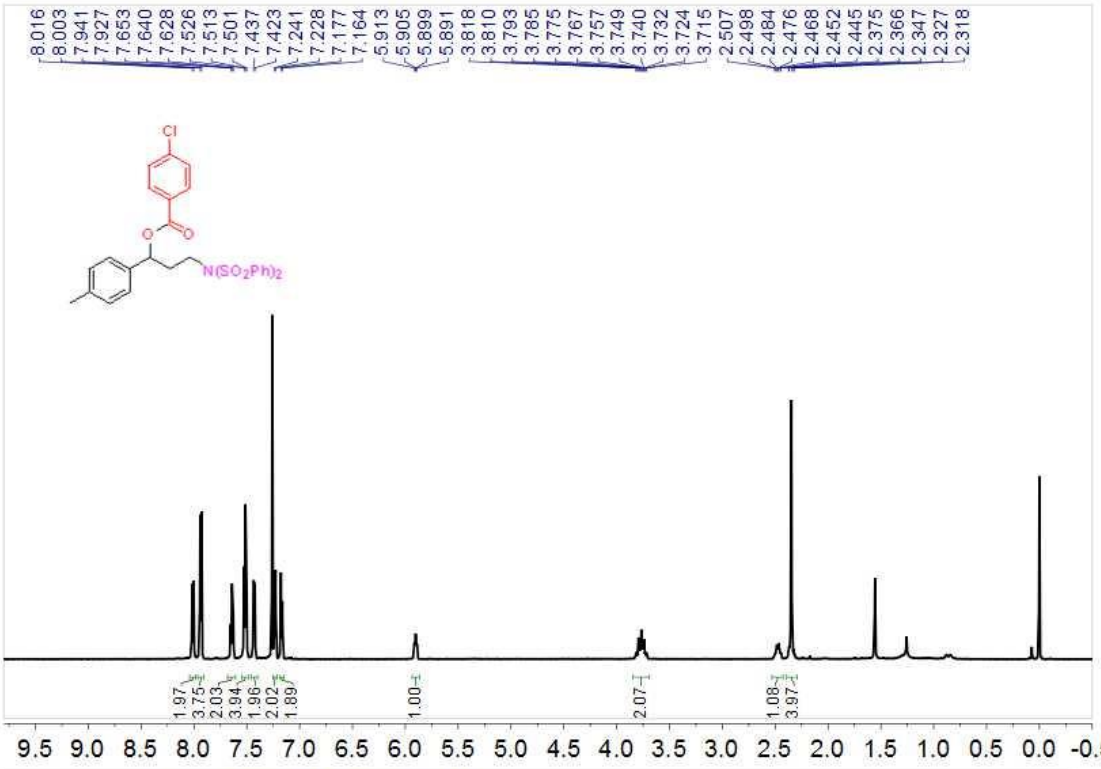
4.0
3.0
2.0
1.0
0.0
173.33
172.64
139.72
139.57
137.75
135.01
134.78
133.90
130.26
129.31
129.14
128.24
128.05
57.36
47.11
32.29
27.47
21.06
Cl
O
N
O
N(SO2Ph)2
190
170
150
130
110
90
80
70
60
50
40
30
20
10

Compound **4e'**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5.899
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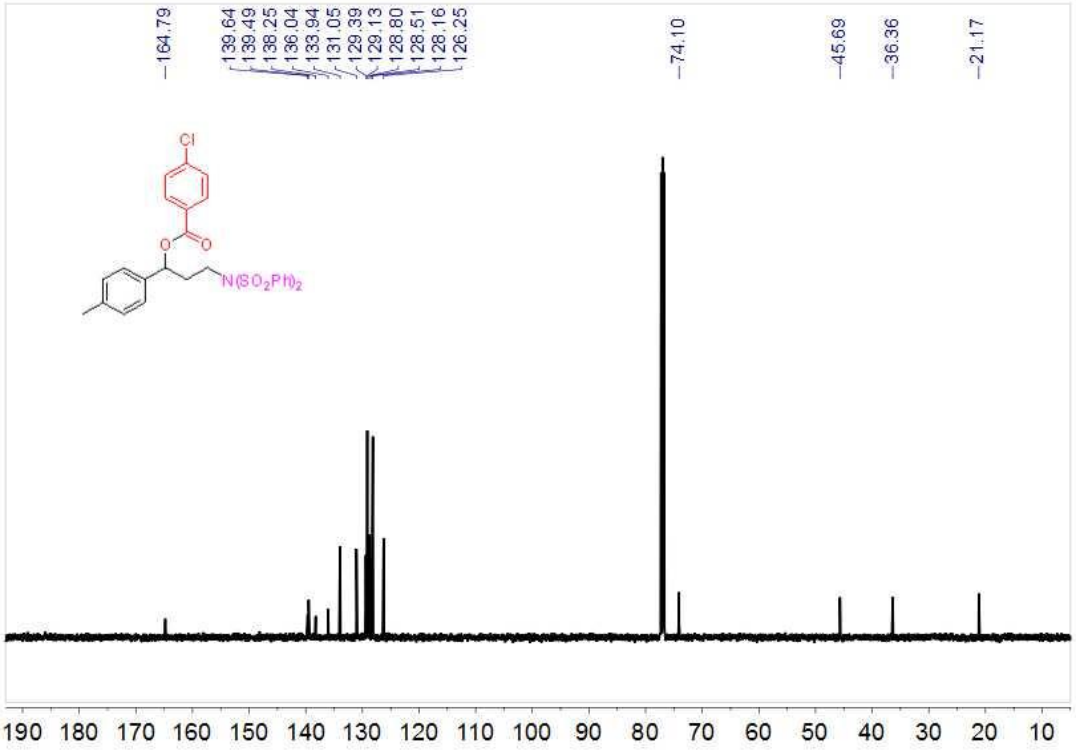
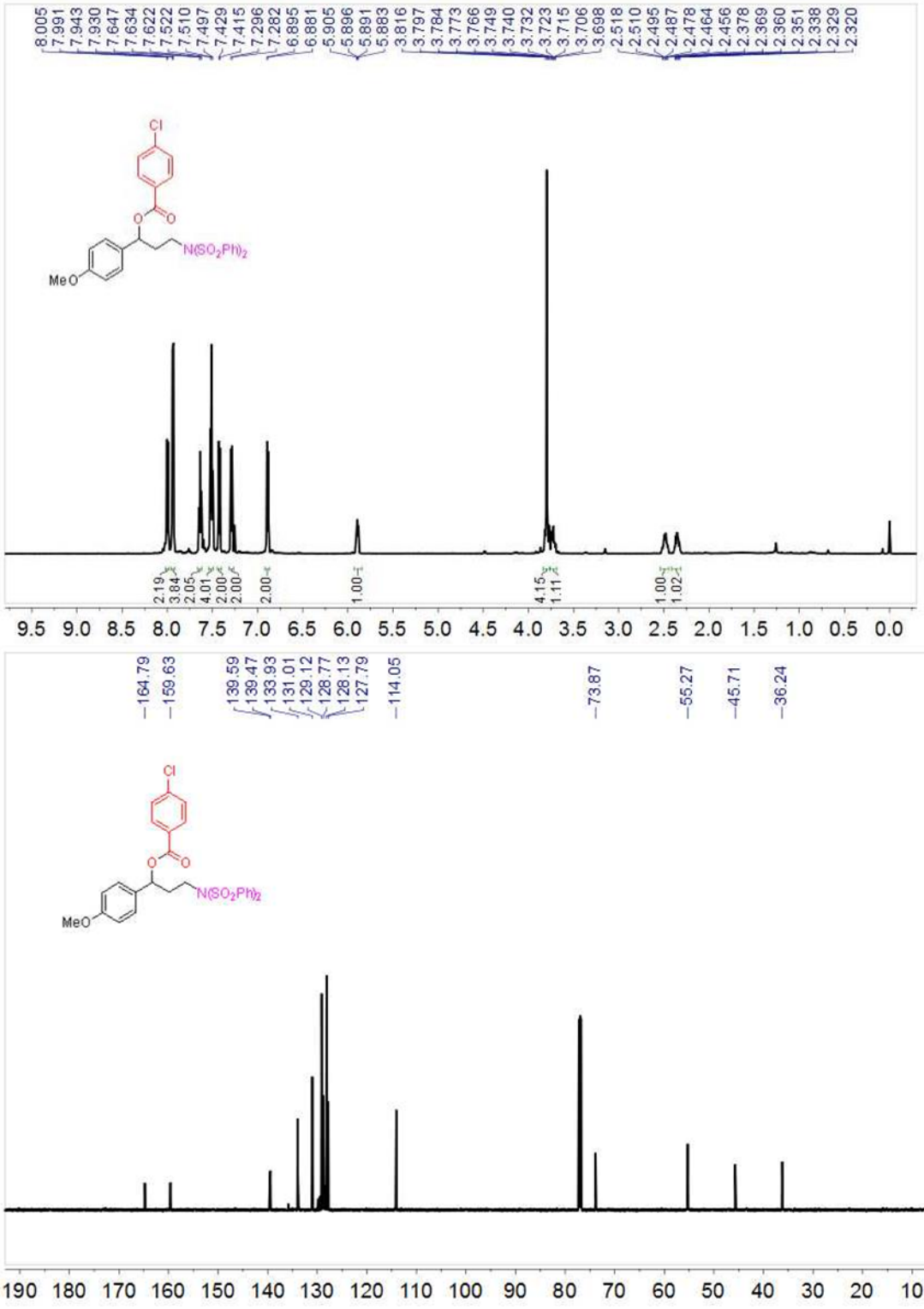
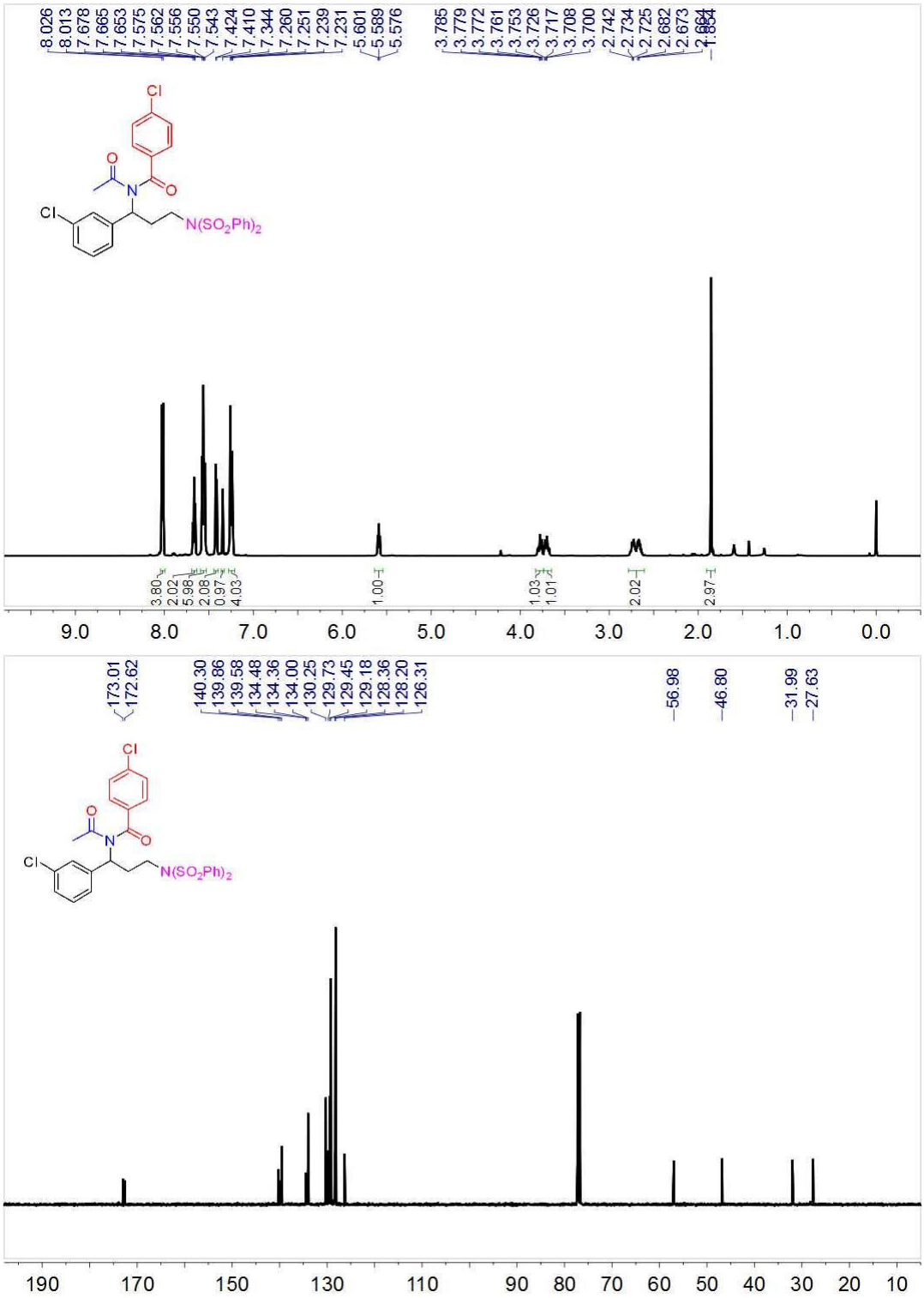
3.818
3.810
3.793
3.785
3.775
3.767
3.757
3.749
3.740
3.732
3.724
3.715
2.507
2.498
2.484
2.476
2.468
2.452
2.445
2.375
2.366
2.347
2.327
2.318
Cl
O
O
N(SO2Ph)2
1.97
3.75
2.03
3.94
1.96
2.02
1.89
1.00
2.07
1.08
3.97
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0


164.79
139.64
139.49
138.25
136.04
133.94
131.05
129.39
129.13
128.80
128.51
128.16
126.25
74.10
45.69
36.36
21.17
Cl
O
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

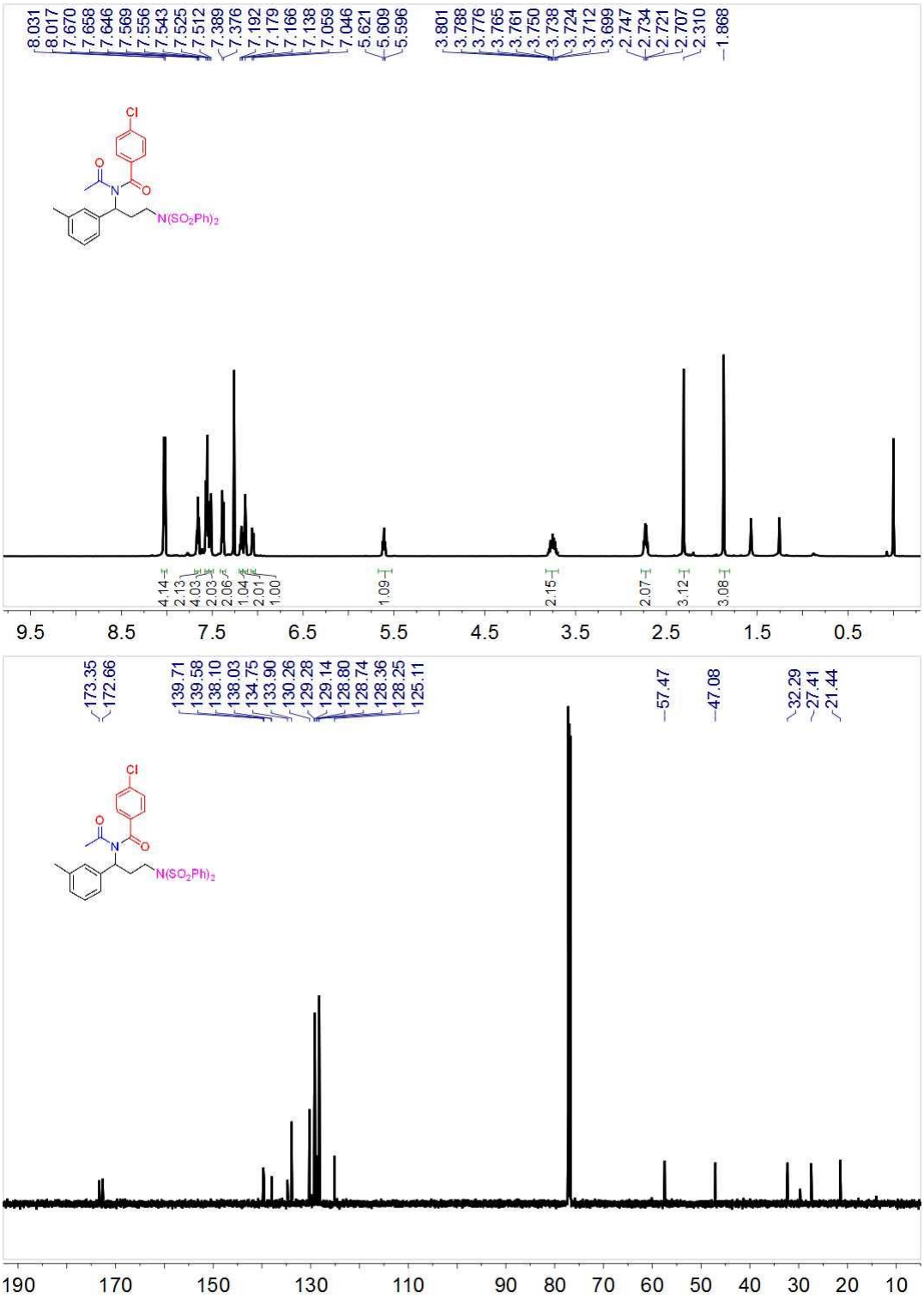
Compound **4f'**


8.005
7.991
7.943
7.930
7.647
7.634
7.622
7.522
7.510
7.497
7.429
7.415
7.296
7.282
6.895
6.881
5.905
5.896
5.891
5.883
3.816
3.797
3.784
3.773
3.766
3.749
3.740
3.732
3.723
3.715
3.706
3.698
2.518
2.510
2.495
2.487
2.478
2.464
2.456
2.378
2.369
2.360
2.351
2.338
2.329
2.320
Cl
O
O
N(SO2Ph)2
MeO
2.19
3.84
2.05
4.01
2.00
2.00
2.00
1.00
4.15
1.11
1.00
1.02
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
164.79
159.63
139.59
139.47
133.93
131.01
129.12
128.77
128.13
127.79
114.05
73.87
55.27
45.71
36.24
Cl
O
O
N(SO2Ph)2
MeO
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

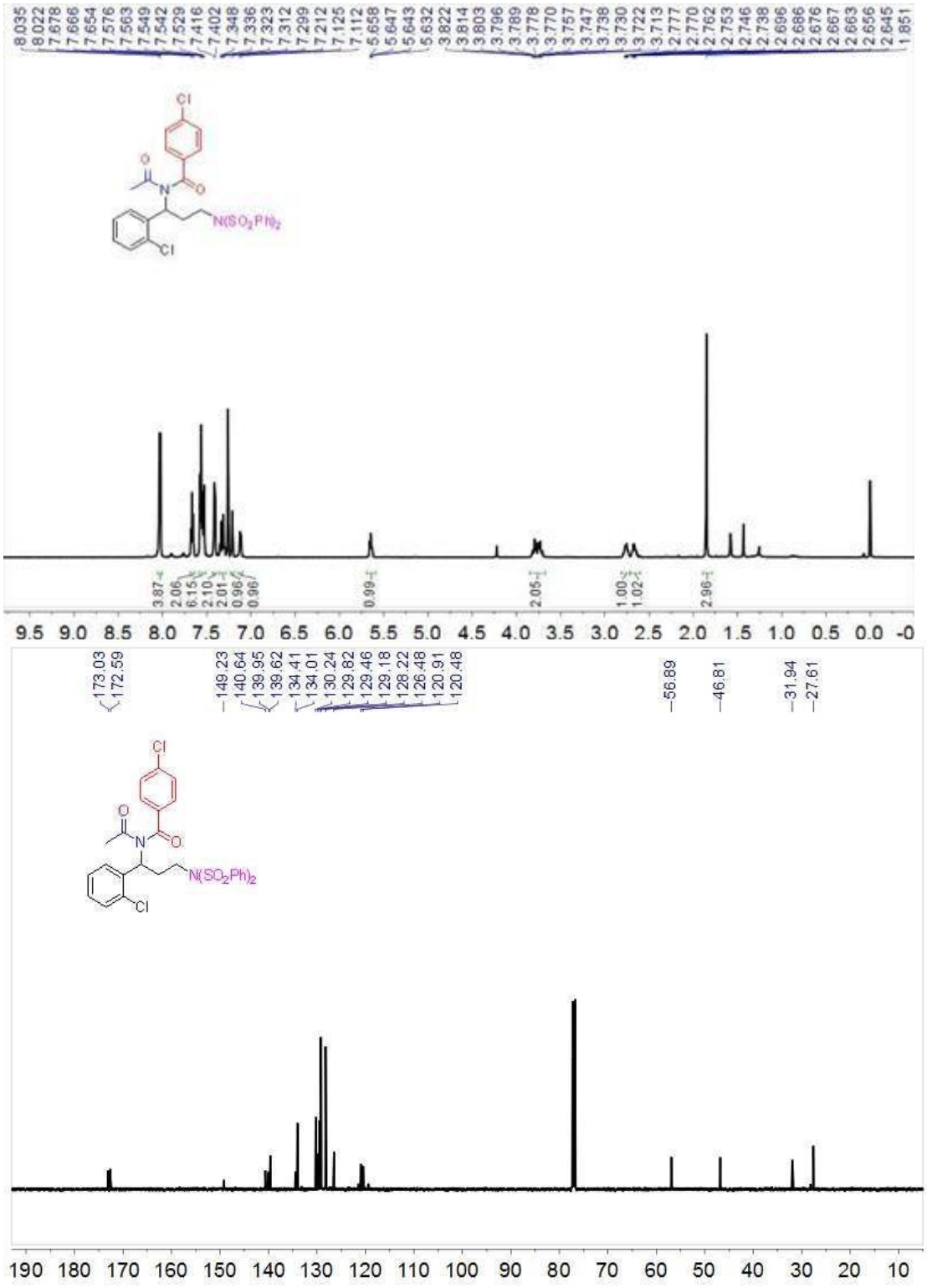
Compound **4g**


8.026
8.013
7.678
7.665
7.653
7.575
7.562
7.556
7.550
7.543
7.424
7.410
7.344
7.260
7.251
7.239
7.231
5.601
5.589
5.576
3.785
3.779
3.772
3.761
3.753
3.726
3.717
3.708
3.700
2.742
2.734
2.725
2.682
2.673
2.664
1.834
Cl
O
N
O
Cl
N(SO2Ph)2
3.80
2.02
5.98
2.08
0.97
4.03
1.00
1.03
1.01
2.02
2.97
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
173.01
172.62
140.30
139.86
139.58
134.48
134.36
134.00
130.25
129.73
129.45
129.18
128.36
128.20
126.31
56.98
46.80
31.99
27.63
190
170
150
130
110
90
80
70
60
50
40
30
20
10

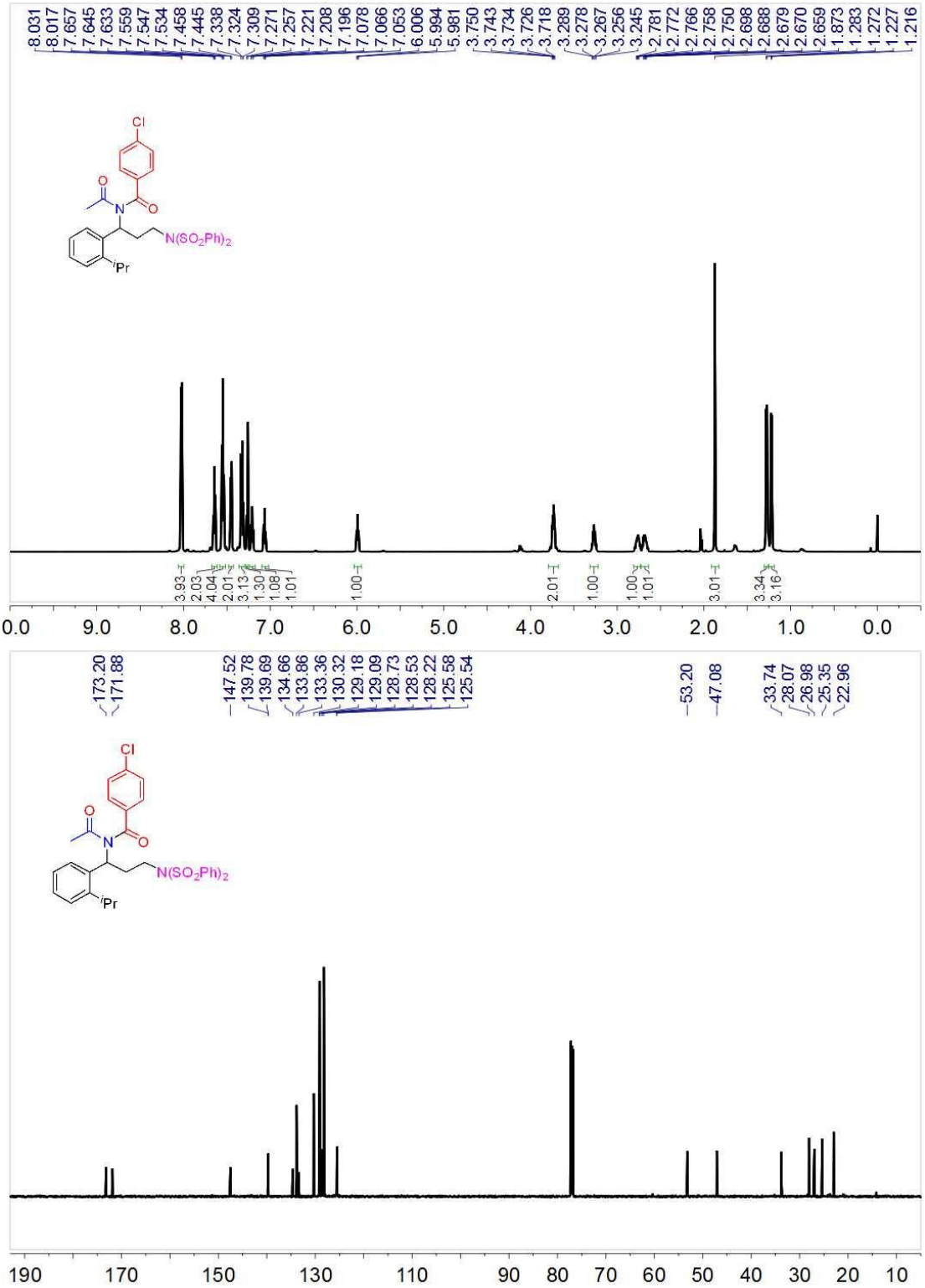
Compound **4h**


8.031
8.017
7.670
7.658
7.646
7.569
7.556
7.543
7.525
7.512
7.389
7.376
7.192
7.179
7.166
7.138
7.059
7.046
5.621
5.609
5.596
3.801
3.788
3.776
3.765
3.761
3.750
3.738
3.724
3.712
3.699
2.747
2.734
2.721
2.707
2.310
1.868
Cl
O
N
O
N(SO2Ph)2
4.14
2.13
4.03
2.03
2.06
1.04
2.01
1.00
1.09
2.15
2.07
3.12
3.08
9.5
8.5
7.5
6.5
5.5
4.5
3.5
2.5
1.5
0.5
173.35
172.66
139.71
139.58
138.10
138.03
134.75
133.90
130.26
129.28
129.14
128.80
128.74
128.36
128.25
125.11
57.47
47.08
32.29
27.41
21.44
190
170
150
130
110
90
80
70
60
50
40
30
20
10

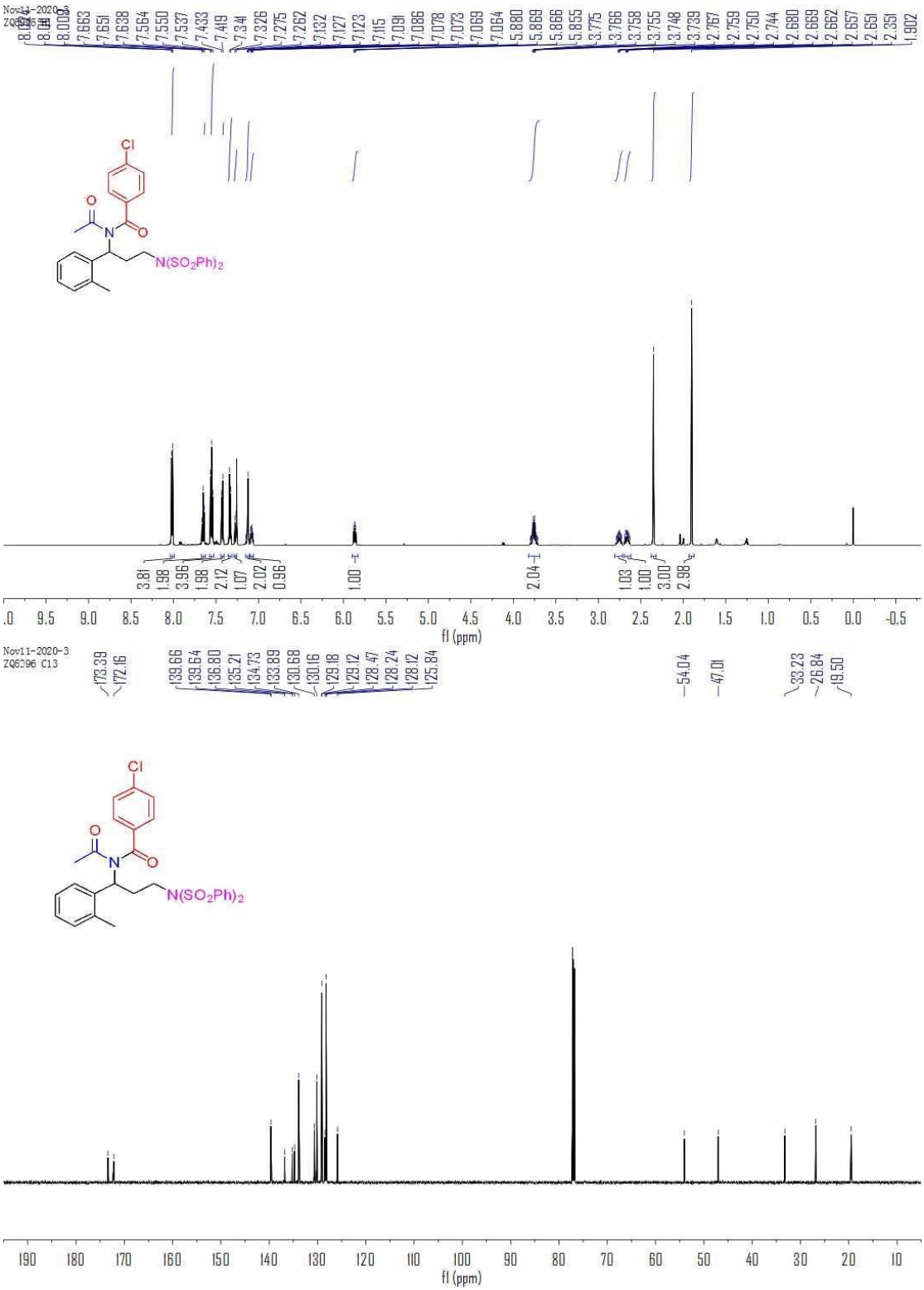
Compound **4i**


8.035
8.022
7.678
7.666
7.654
7.576
7.563
7.549
7.542
7.529
7.416
7.402
7.348
7.336
7.323
7.312
7.299
7.212
7.125
7.112
5.658
5.647
5.643
5.632
3.822
3.814
3.803
3.796
3.789
3.778
3.770
3.757
3.747
3.738
3.730
3.722
3.713
2.777
2.770
2.762
2.753
2.746
2.738
2.696
2.686
2.676
2.667
2.663
2.656
2.645
1.851
Cl
O
N
O
N(SO2Ph)2
Cl
3.87
2.06
6.15
2.10
2.01
0.96
0.96
0.99
2.05
1.00
1.02
2.96
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
173.03
172.59
149.23
140.64
139.95
139.62
134.41
134.01
130.24
129.82
129.46
129.18
128.22
126.48
120.91
120.48
56.89
46.81
31.94
27.61
Cl
O
N
O
N(SO2Ph)2
Cl
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

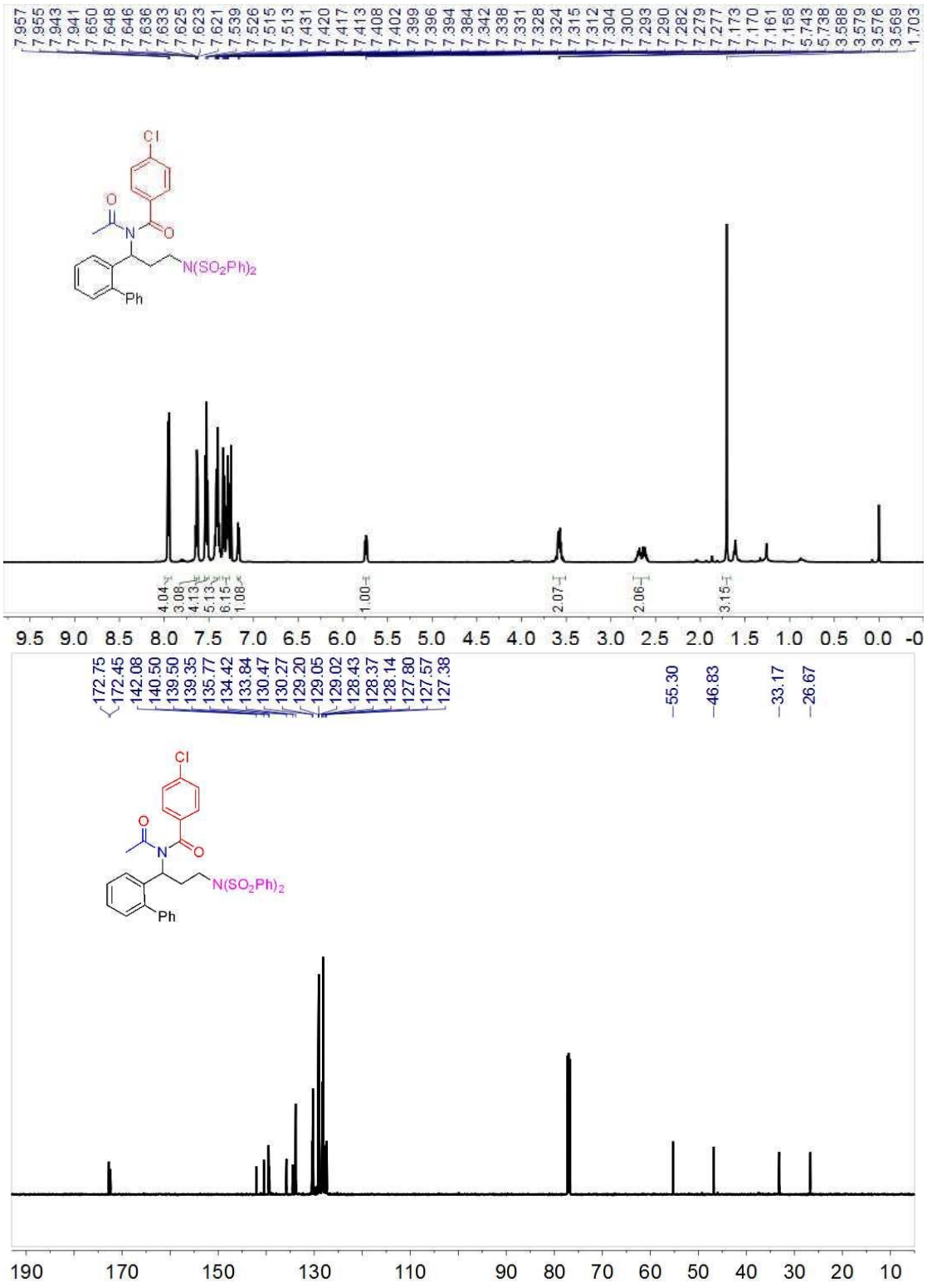
Compound **4j**


8.031
8.017
7.657
7.645
7.633
7.559
7.547
7.534
7.458
7.445
7.338
7.324
7.309
7.271
7.257
7.221
7.208
7.196
7.078
7.066
7.053
6.006
5.994
5.981
3.750
3.743
3.734
3.726
3.718
3.289
3.278
3.267
3.256
3.245
2.781
2.772
2.766
2.758
2.750
2.698
2.688
2.679
2.670
2.659
1.873
1.283
1.272
1.227
1.216
Cl
O
N
O
N(SO2Ph)2
iPr
3.93
2.03
4.04
2.01
3.13
1.30
1.08
1.01
1.00
2.01
1.00
1.00
1.01
3.01
3.34
3.16
0.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
173.20
171.88
147.52
139.78
139.69
134.66
133.86
133.36
130.32
129.18
129.09
128.73
128.53
128.22
125.58
125.54
53.20
47.08
33.74
28.07
26.98
25.35
22.96
Cl
O
N
O
N(SO2Ph)2
iPr
190
170
150
130
110
90
80
70
60
50
40
30
20
10

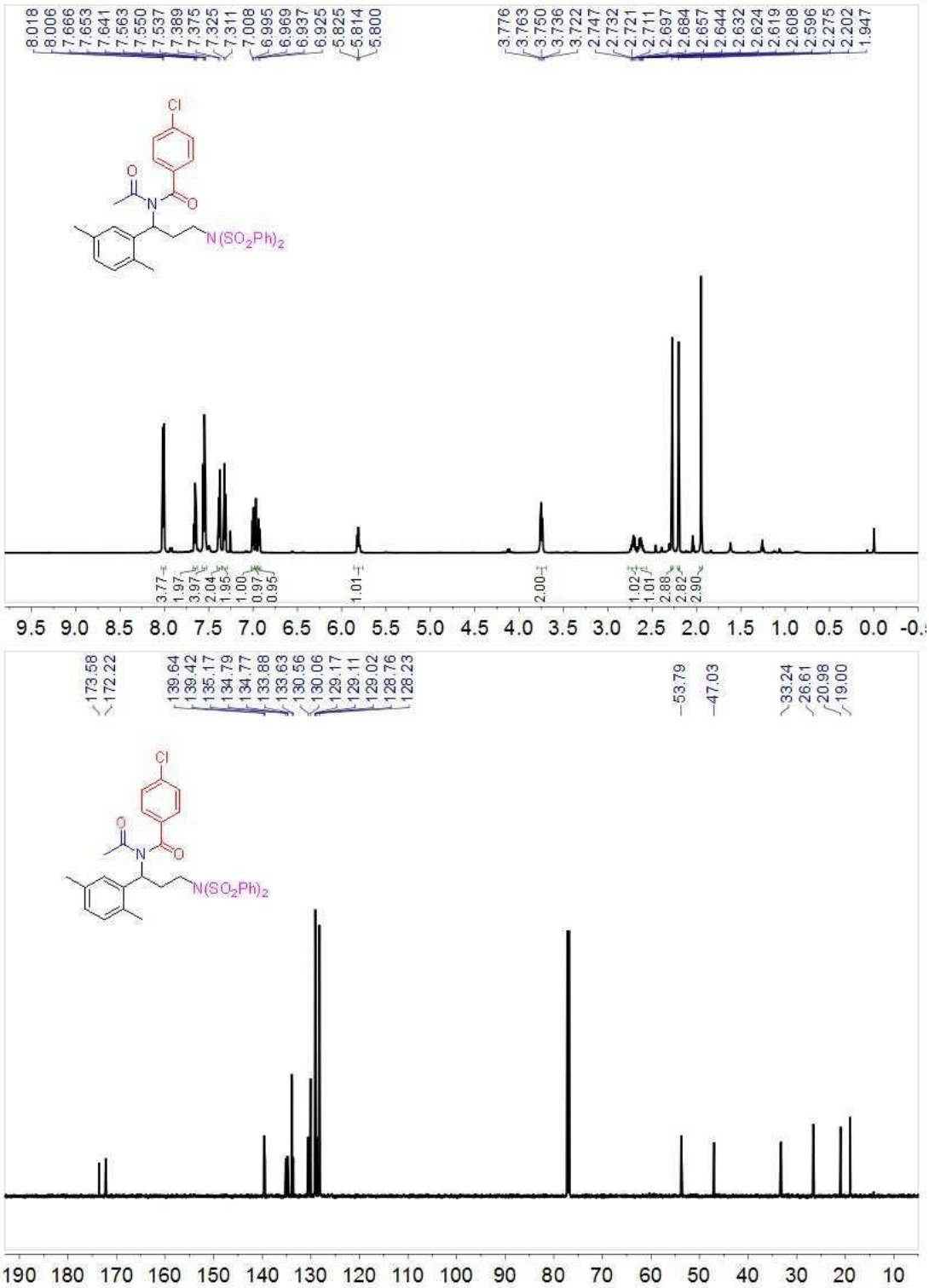
Compound **4k**


Nov11-2020-3
ZQ6096 H1
Cl
O
N
O
N(SO2Ph)2
3.81
1.98
3.96
1.98
2.12
1.07
2.02
0.96
1.00
2.04
1.03
1.00
3.00
2.98
f1 (ppm)
Nov11-2020-3
ZQ6096 C13
173.39
172.16
139.66
139.64
136.80
135.21
134.73
133.89
130.68
130.16
129.18
129.12
128.47
128.24
128.12
125.84
54.04
47.01
33.23
26.84
19.50
Cl
O
N
O
N(SO2Ph)2
f1 (ppm)

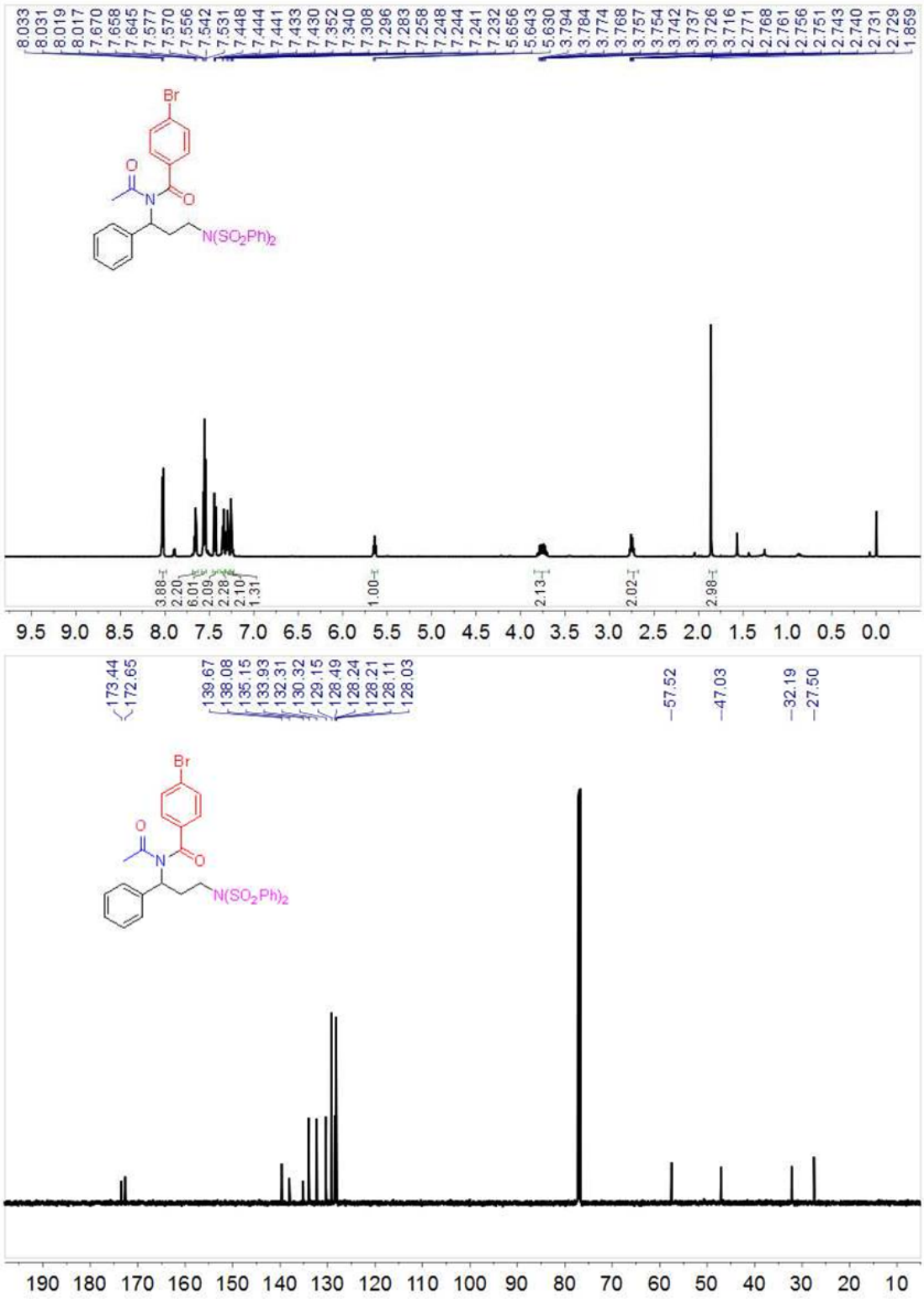
Compound **4l**


7.957
7.955
7.943
7.941
7.650
7.648
7.646
7.636
7.633
7.625
7.623
7.621
7.539
7.526
7.515
7.513
7.431
7.420
7.417
7.413
7.408
7.402
7.399
7.396
7.394
7.384
7.342
7.338
7.331
7.328
7.324
7.315
7.312
7.304
7.300
7.293
7.290
7.282
7.279
7.277
7.173
7.170
7.161
7.158
5.743
5.738
3.588
3.579
3.576
3.569
1.703
Cl
O
N
O
N(SO2Ph)2
Ph
4.04
3.08
4.13
5.13
6.15
1.08
1.00
2.07
2.06
3.15
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
172.75
172.45
142.08
140.50
139.50
139.35
135.77
134.42
133.84
130.47
130.27
129.20
129.05
129.02
128.43
128.37
128.14
127.80
127.57
127.38
55.30
46.83
33.17
26.67
Cl
O
N
O
N(SO2Ph)2
Ph
190 170 150 130 110 90 80 70 60 50 40 30 20 10

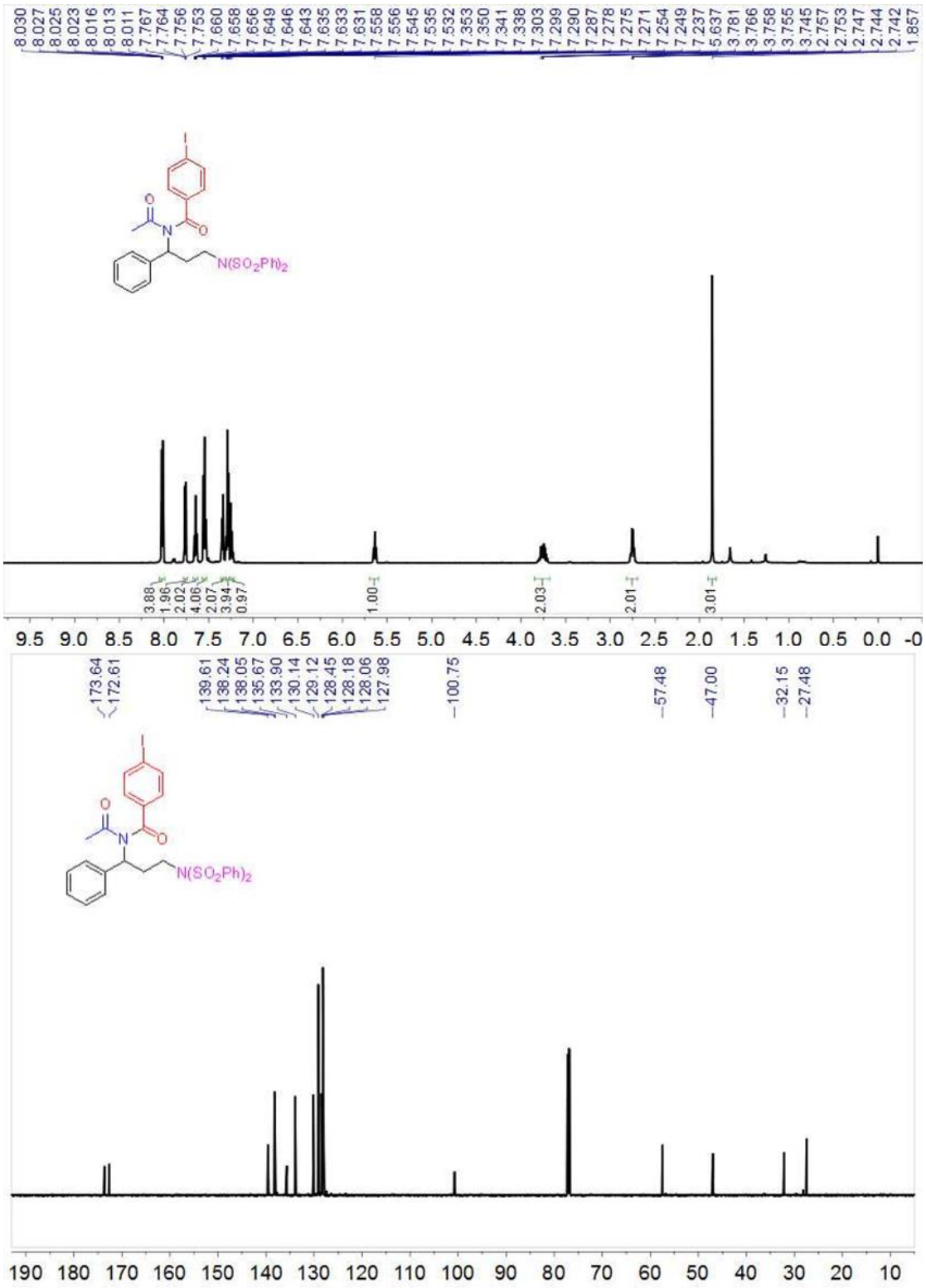
Compound **4m**


8.018
8.006
7.666
7.653
7.641
7.563
7.550
7.537
7.389
7.375
7.325
7.311
7.008
6.995
6.969
6.937
6.925
5.825
5.814
5.800
3.776
3.763
3.750
3.736
3.722
2.747
2.732
2.721
2.711
2.697
2.684
2.657
2.644
2.632
2.624
2.619
2.608
2.596
2.275
2.202
1.947
Cl
O
N
O
N(SO2Ph)2
3.77
1.97
3.97
2.04
1.95
1.00
0.97
0.95
1.01
2.00
1.02
1.01
2.88
2.82
2.90
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
173.58
172.22
139.64
139.42
135.17
134.79
134.77
133.88
133.63
130.56
130.06
129.17
129.11
129.02
128.76
128.23
53.79
47.03
33.24
26.61
20.98
19.00
Cl
O
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

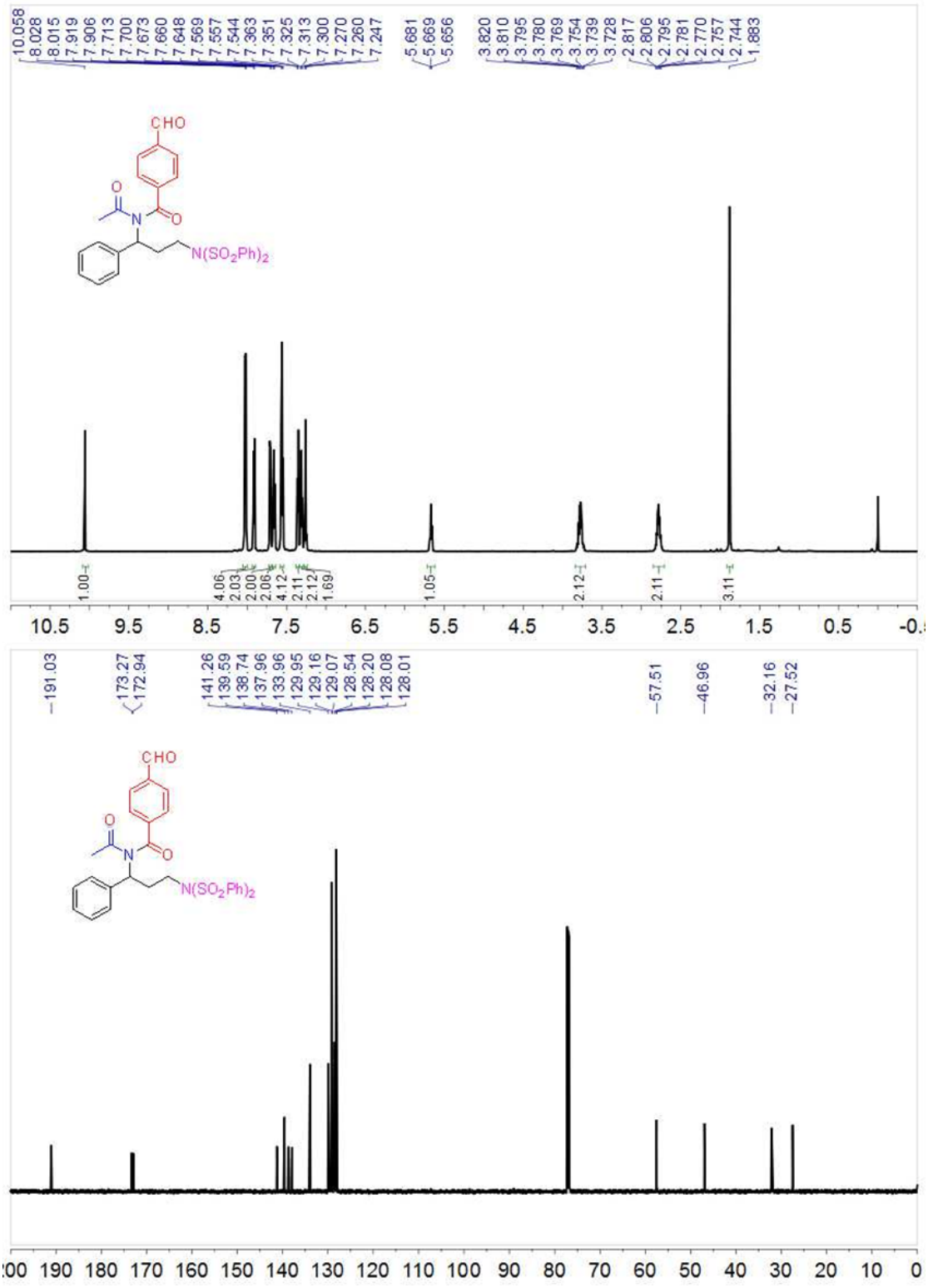
Compound **5a**


8.033
8.031
8.019
8.017
7.670
7.658
7.645
7.577
7.570
7.556
7.542
7.531
7.448
7.444
7.441
7.433
7.430
7.352
7.340
7.308
7.296
7.283
7.258
7.248
7.244
7.241
7.232
5.656
5.643
5.630
3.794
3.784
3.774
3.768
3.757
3.754
3.742
3.737
3.726
3.716
2.771
2.768
2.761
2.756
2.751
2.743
2.740
2.731
2.729
1.859
Br
O
N
O
N(SO2Ph)2
3.88
2.20
6.01
2.09
2.28
2.10
1.31
1.00
2.13
2.02
2.98
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
173.44
172.65
139.67
138.08
135.15
133.93
132.31
130.32
129.15
128.49
128.24
128.21
128.11
128.03
57.52
47.03
32.19
27.50
Br
O
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

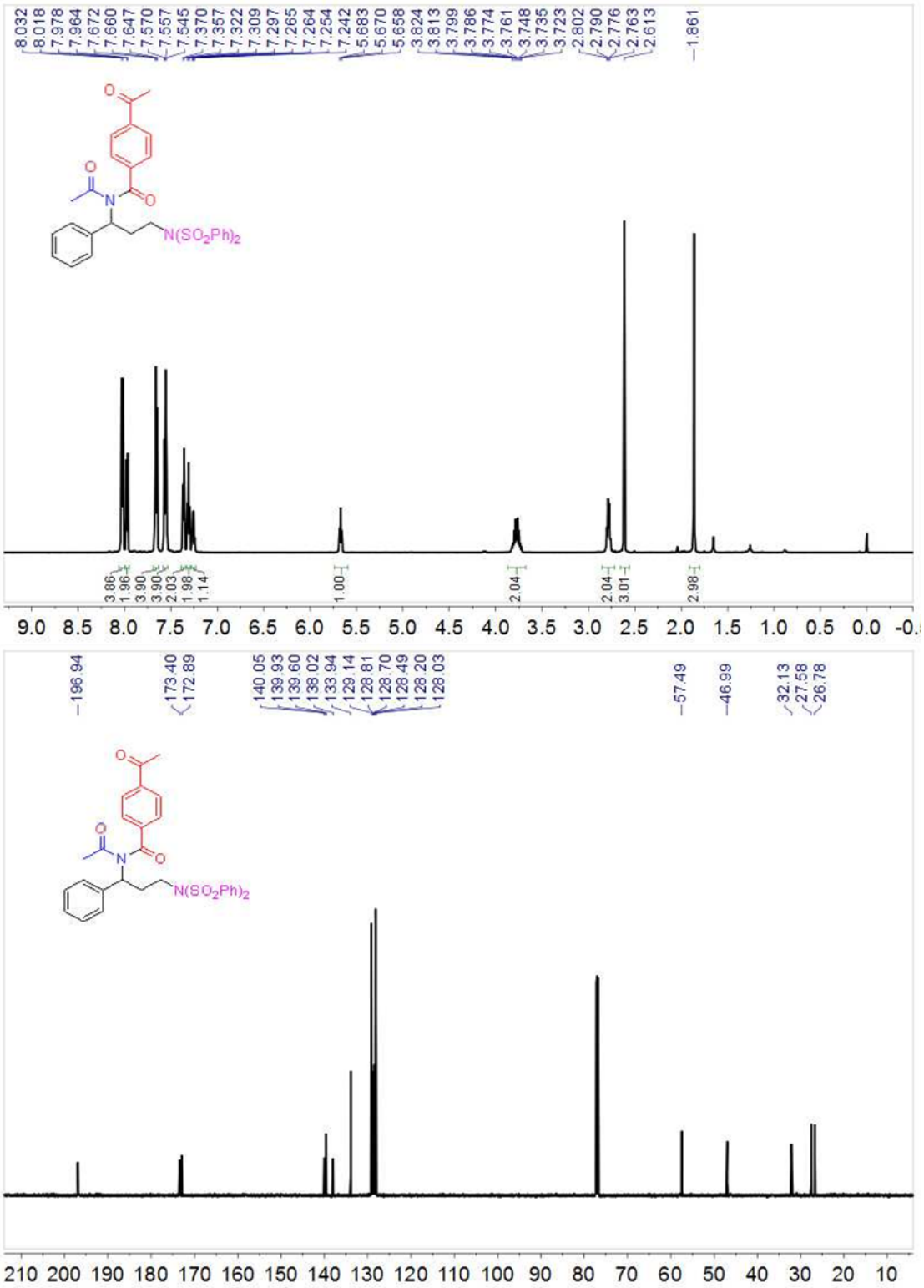
Compound **5b**


8.030
8.027
8.025
8.023
8.016
8.013
8.011
7.767
7.764
7.756
7.753
7.660
7.658
7.656
7.649
7.646
7.643
7.635
7.633
7.631
7.558
7.556
7.545
7.535
7.532
7.353
7.350
7.341
7.338
7.303
7.299
7.290
7.287
7.278
7.275
7.271
7.254
7.249
7.237
5.637
3.781
3.766
3.758
3.755
3.745
2.757
2.753
2.747
2.744
2.742
1.857
N(SO2Ph)2
3.88
1.96
2.02
4.06
2.07
3.94
0.97
1.00
2.03
2.01
3.01
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0
173.64
172.61
139.61
138.24
138.05
135.67
133.90
130.14
129.12
128.45
128.18
128.06
127.98
100.75
57.48
47.00
32.15
27.48
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

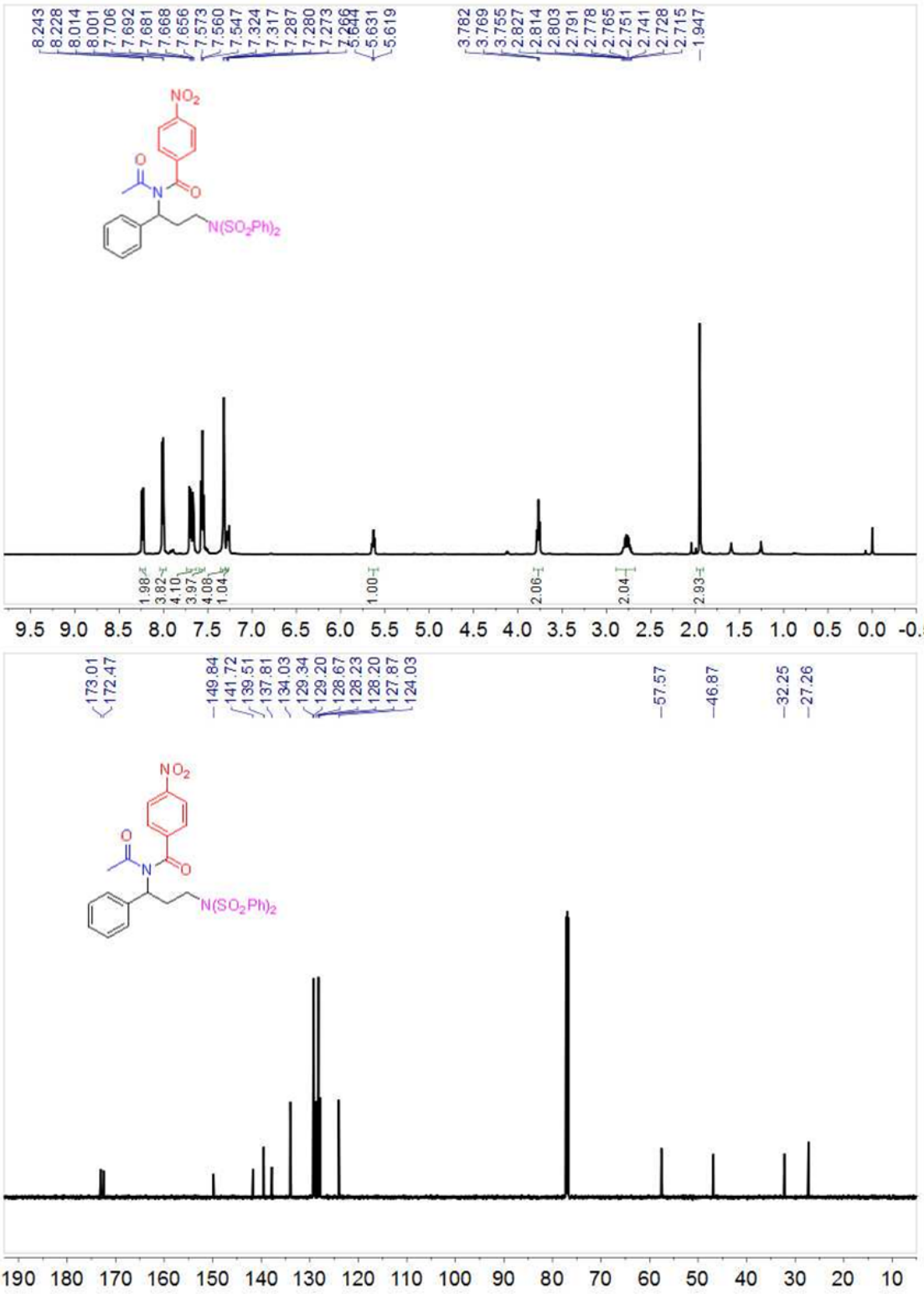
Compound **5c**


10.058
8.028
8.015
7.919
7.906
7.713
7.700
7.673
7.660
7.648
7.569
7.557
7.544
7.363
7.351
7.325
7.313
7.300
7.270
7.260
7.247
5.681
5.669
5.656
3.820
3.810
3.795
3.780
3.769
3.754
3.739
3.728
2.817
2.806
2.795
2.781
2.770
2.757
2.744
1.883
CHO
O
N
O
N(SO2Ph)2
1.00
4.06
2.03
2.00
2.06
4.12
2.11
2.12
1.69
1.05
2.12
2.11
3.11
10.5
9.5
8.5
7.5
6.5
5.5
4.5
3.5
2.5
1.5
0.5
191.03
173.27
172.94
141.26
139.59
138.74
137.96
133.96
129.95
129.16
129.07
128.54
128.20
128.08
128.01
57.51
46.96
32.16
27.52
CHO
O
N
O
N(SO2Ph)2
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Compound **5d**


8.032
8.018
7.978
7.964
7.672
7.660
7.647
7.570
7.557
7.545
7.370
7.357
7.322
7.309
7.297
7.265
7.264
7.254
7.242
5.683
5.670
5.658
3.824
3.813
3.799
3.786
3.774
3.761
3.748
3.735
3.723
2.802
2.790
2.776
2.763
2.613
1.861
N(SO2Ph)2
3.86
1.96
3.90
3.90
2.03
1.98
1.14
1.00
2.04
2.04
3.01
2.98
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
196.94
173.40
172.89
140.05
139.93
139.60
138.02
133.94
129.14
128.81
128.70
128.49
128.20
128.03
57.49
46.99
32.13
27.58
26.78
N(SO2Ph)2
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **5e**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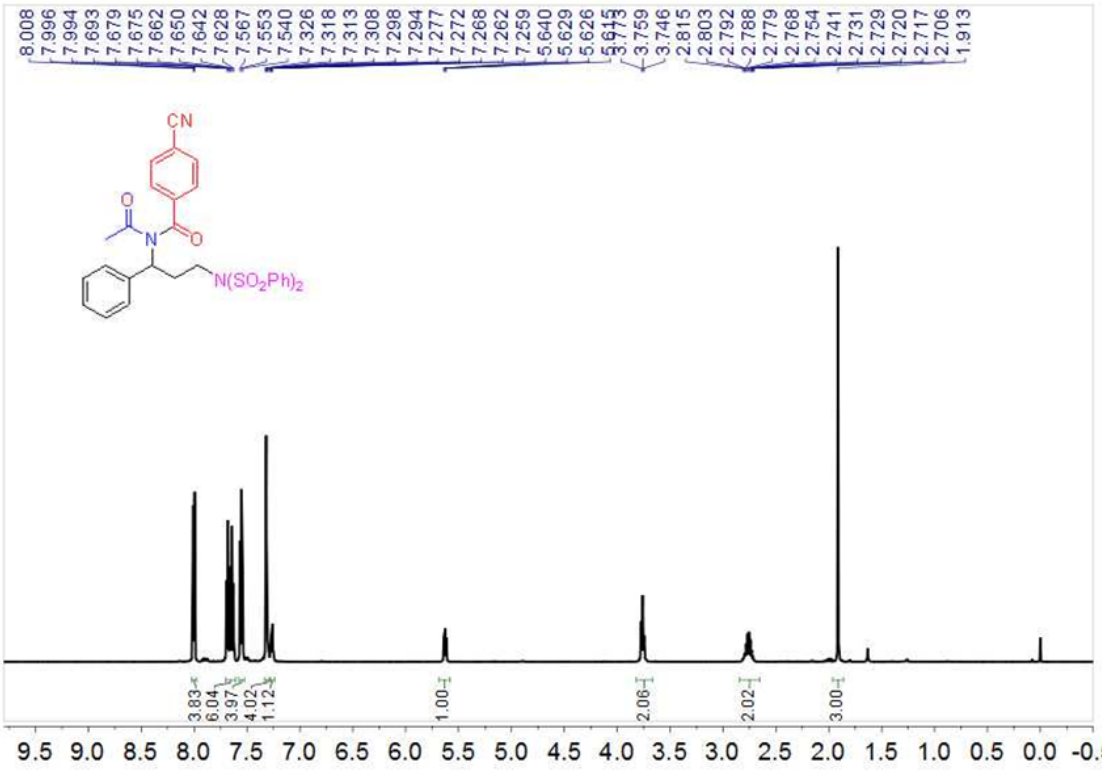
8.014
8.001
7.706
7.692
7.681
7.668
7.656
7.573
7.560
7.547
7.324
7.317
7.287
7.280
7.273
7.266
5.631
5.619
3.782
3.769
3.755
2.827
2.814
2.803
2.791
2.778
2.765
2.751
2.741
2.728
2.715
1.947
NO2
O
N
O
N(SO2Ph)2
1.98
3.82
4.10
3.97
4.08
1.04
1.00
2.06
2.04
2.93
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
173.01
172.47
149.84
141.72
139.51
137.81
134.03
129.34
129.20
128.67
128.23
128.20
127.87
124.03
57.57
46.87
32.25
27.26
NO2
O
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **5f**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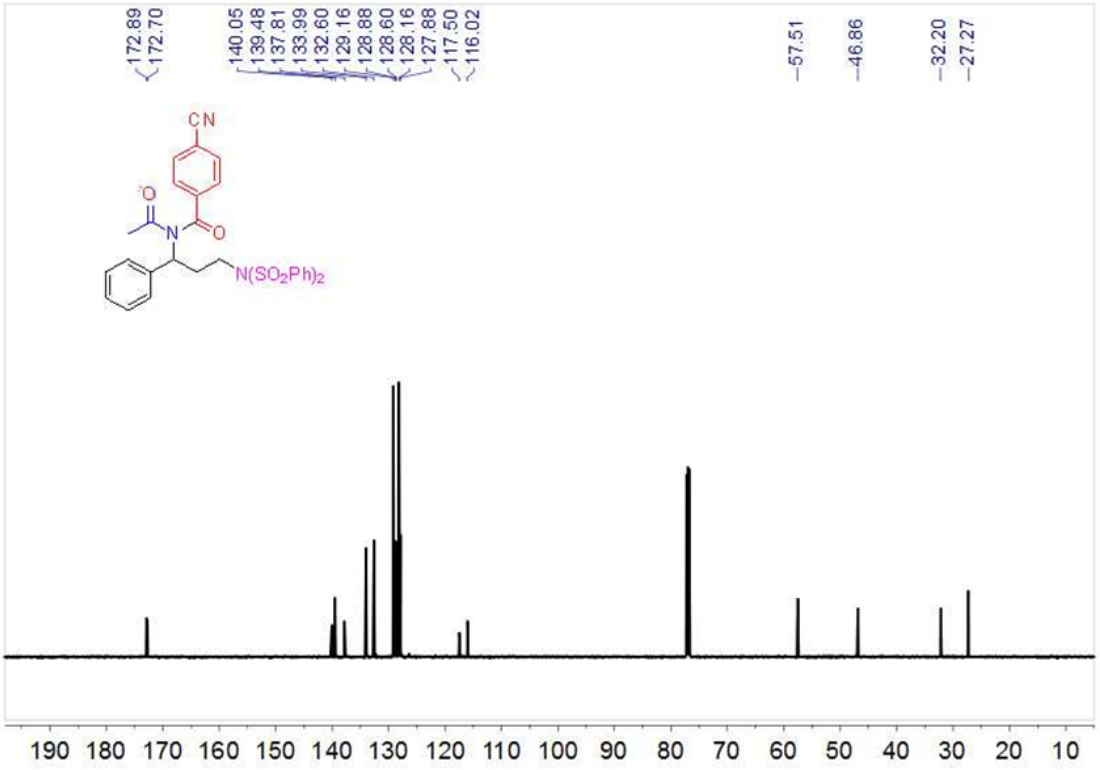
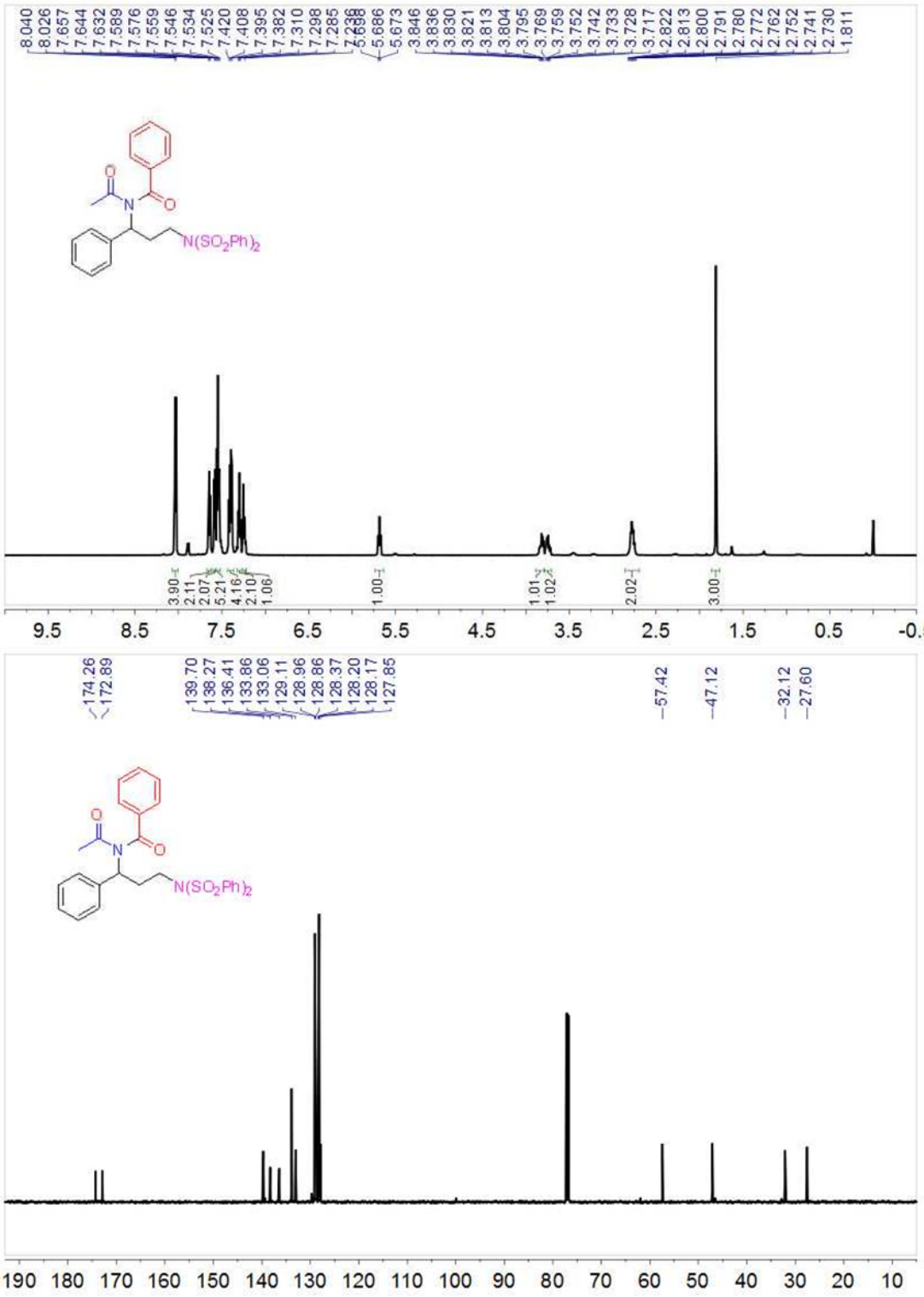
7.996
7.994
7.693
7.679
7.675
7.662
7.650
7.642
7.628
7.567
7.553
7.540
7.326
7.318
7.313
7.308
7.298
7.294
7.277
7.272
7.268
7.262
7.259
5.640
5.629
5.626
3.759
3.746
2.815
2.803
2.792
2.788
2.779
2.768
2.754
2.741
2.731
2.729
2.720
2.717
2.706
1.913
CN
O
N
O
N(SO2Ph)2
3.83
6.04
3.97
4.02
1.12
1.00
2.06
2.02
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0


172.89
172.70
140.05
139.48
137.81
133.99
132.60
129.16
128.88
128.60
128.16
127.88
117.50
116.02
57.51
46.86
32.20
27.27
CN
O
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **5g**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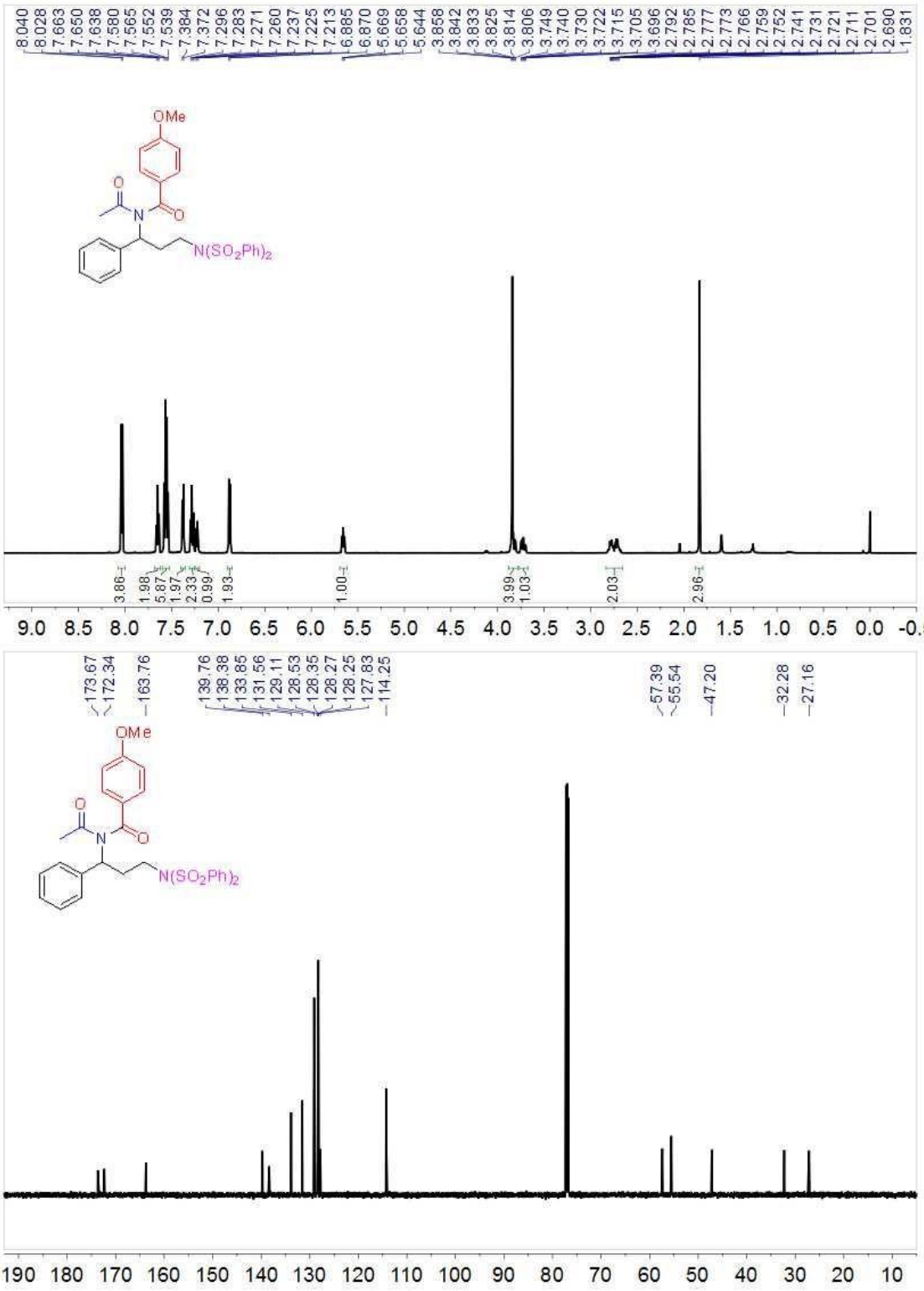
8.026
7.657
7.644
7.632
7.589
7.576
7.559
7.546
7.534
7.525
7.420
7.408
7.395
7.382
7.310
7.298
7.285
5.686
5.673
3.846
3.836
3.830
3.821
3.813
3.804
3.795
3.769
3.759
3.752
3.742
3.733
3.728
3.717
2.822
2.813
2.800
2.791
2.780
2.772
2.762
2.752
2.741
2.730
1.811
N(SO2Ph)2
3.90
2.11
2.07
5.21
4.16
2.10
1.06
1.00
1.01
1.02
2.02
3.00
9.5
8.5
7.5
6.5
5.5
4.5
3.5
2.5
1.5
0.5
174.26
172.89
139.70
138.27
136.41
133.86
133.06
129.11
128.96
128.86
128.37
128.20
128.17
127.85
57.42
47.12
32.12
27.60
N(SO2Ph)2
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10

Compound **5h**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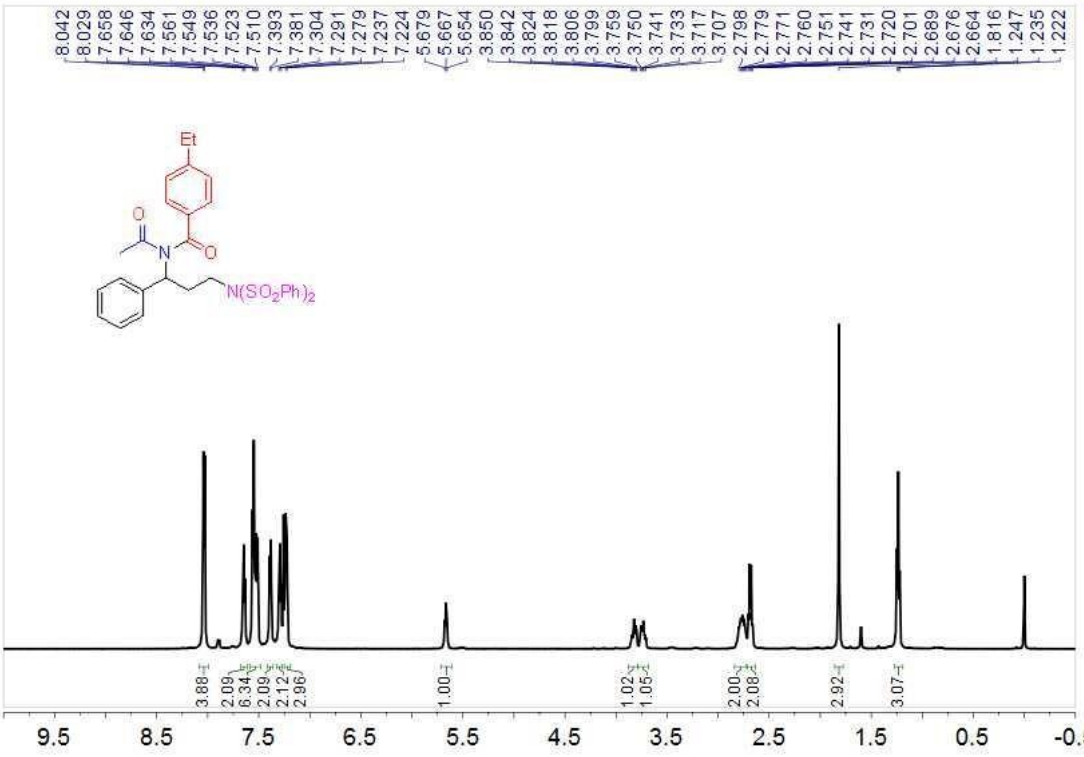
8.028
7.663
7.650
7.638
7.580
7.565
7.552
7.539
7.384
7.372
7.296
7.283
7.271
7.260
7.237
7.225
7.213
6.885
6.870
6.669
6.658
5.644
3.858
3.842
3.833
3.825
3.814
3.806
3.749
3.740
3.730
3.722
3.715
3.705
3.696
2.792
2.785
2.777
2.773
2.766
2.759
2.752
2.741
2.731
2.721
2.711
2.701
2.690
1.831
OMe
O
N
O
N(SO2Ph)2
3.86
1.98
5.87
1.97
2.33
0.99
1.93
1.00
3.99
1.03
2.03
2.96
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
173.67
172.34
163.76
139.76
138.38
133.85
131.56
129.11
128.53
128.35
128.27
128.25
127.83
114.25
57.39
55.54
47.20
32.28
27.16
OMe
O
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **5i**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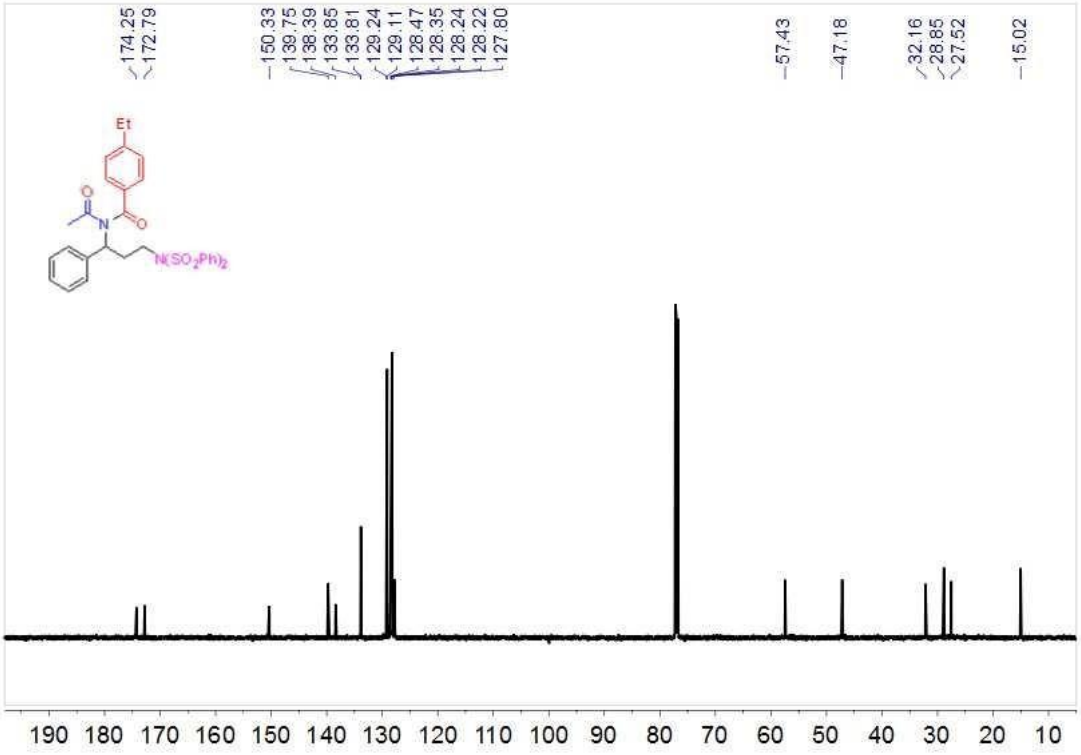
8.029
7.658
7.646
7.634
7.561
7.549
7.536
7.523
7.510
7.393
7.381
7.304
7.291
7.279
7.237
7.224
5.679
5.667
5.654
3.850
3.842
3.824
3.818
3.806
3.799
3.759
3.750
3.741
3.733
3.717
3.707
2.798
2.779
2.771
2.760
2.751
2.741
2.731
2.720
2.701
2.689
2.676
2.664
1.816
1.247
1.235
1.222
Et
O
N
O
N(SO2Ph)2
3.88
2.09
6.34
2.09
2.12
2.96
1.00
1.02
1.05
2.00
2.08
2.92
3.07
9.5
8.5
7.5
6.5
5.5
4.5
3.5
2.5
1.5
0.5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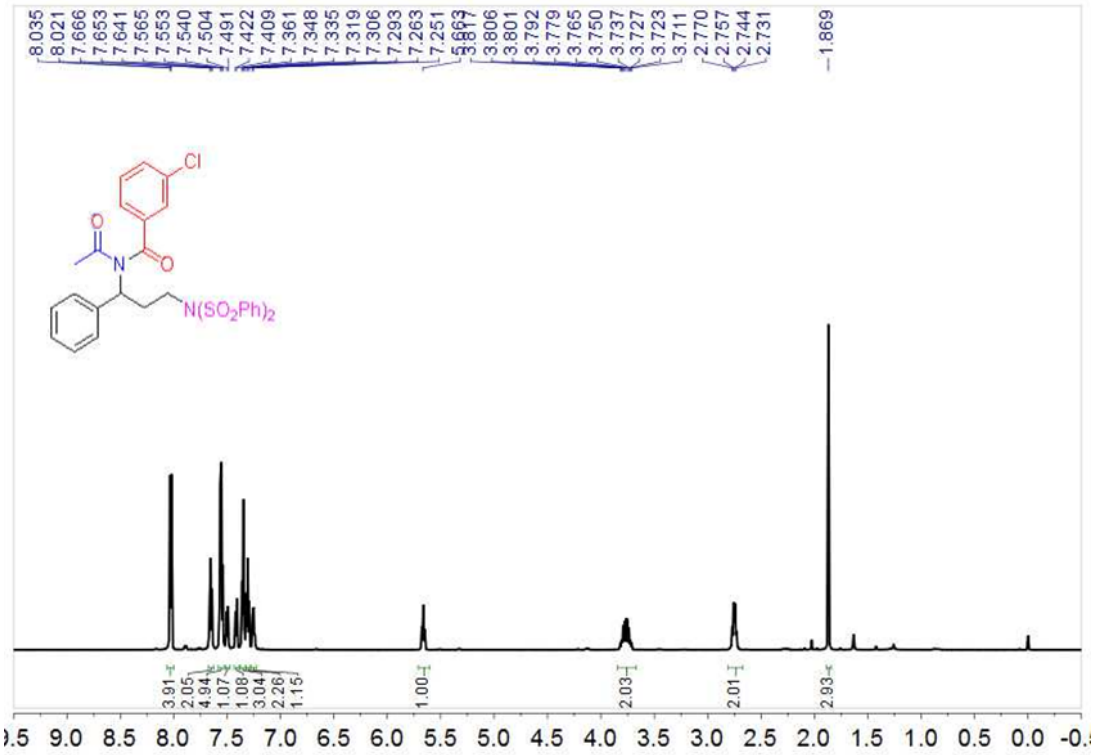
139.75
138.39
133.85
133.81
129.24
129.11
128.47
128.35
128.24
128.22
127.80
57.43
47.18
32.16
28.85
27.52
15.02
Et
O
N
O
N(SO2Ph)2
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10

Compound **5j**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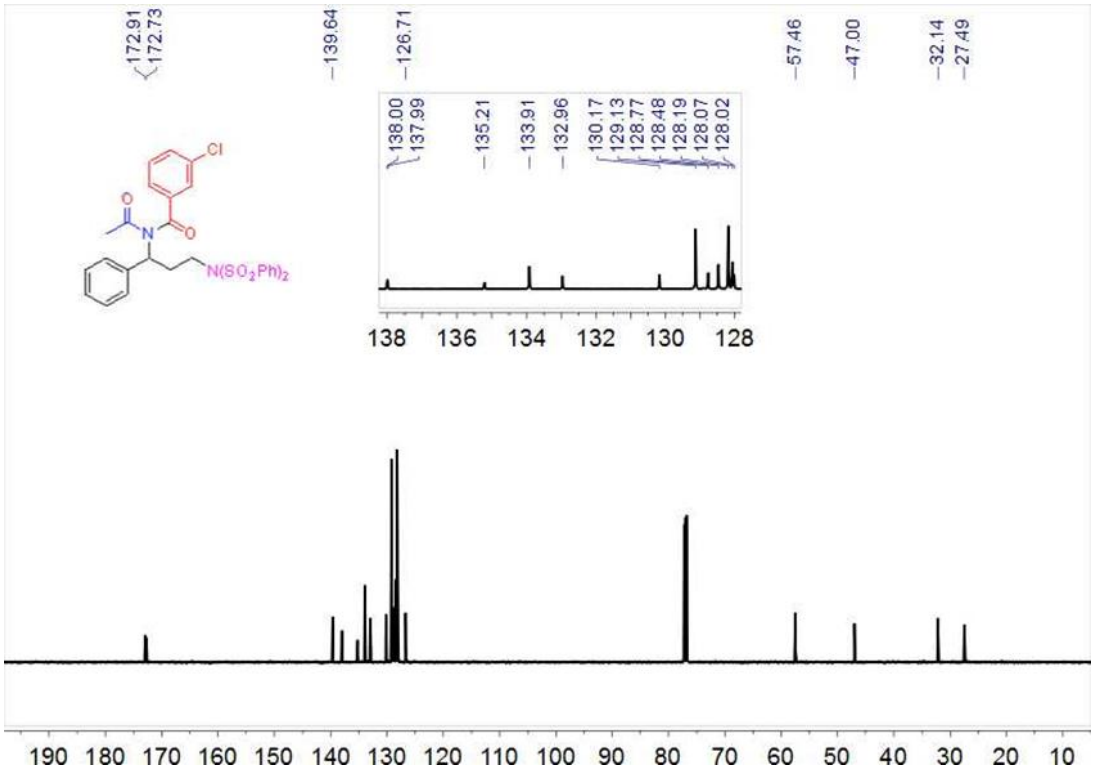
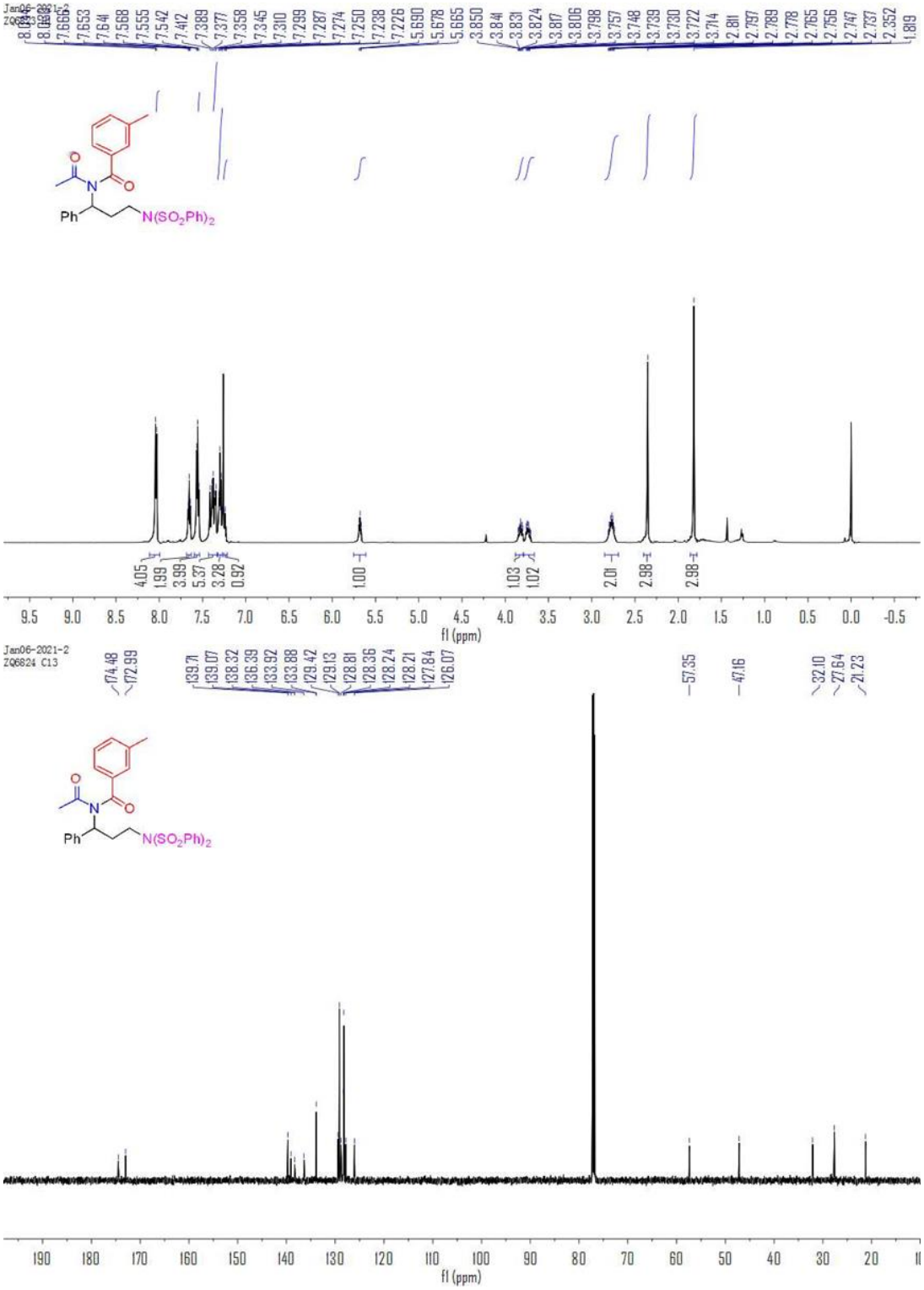
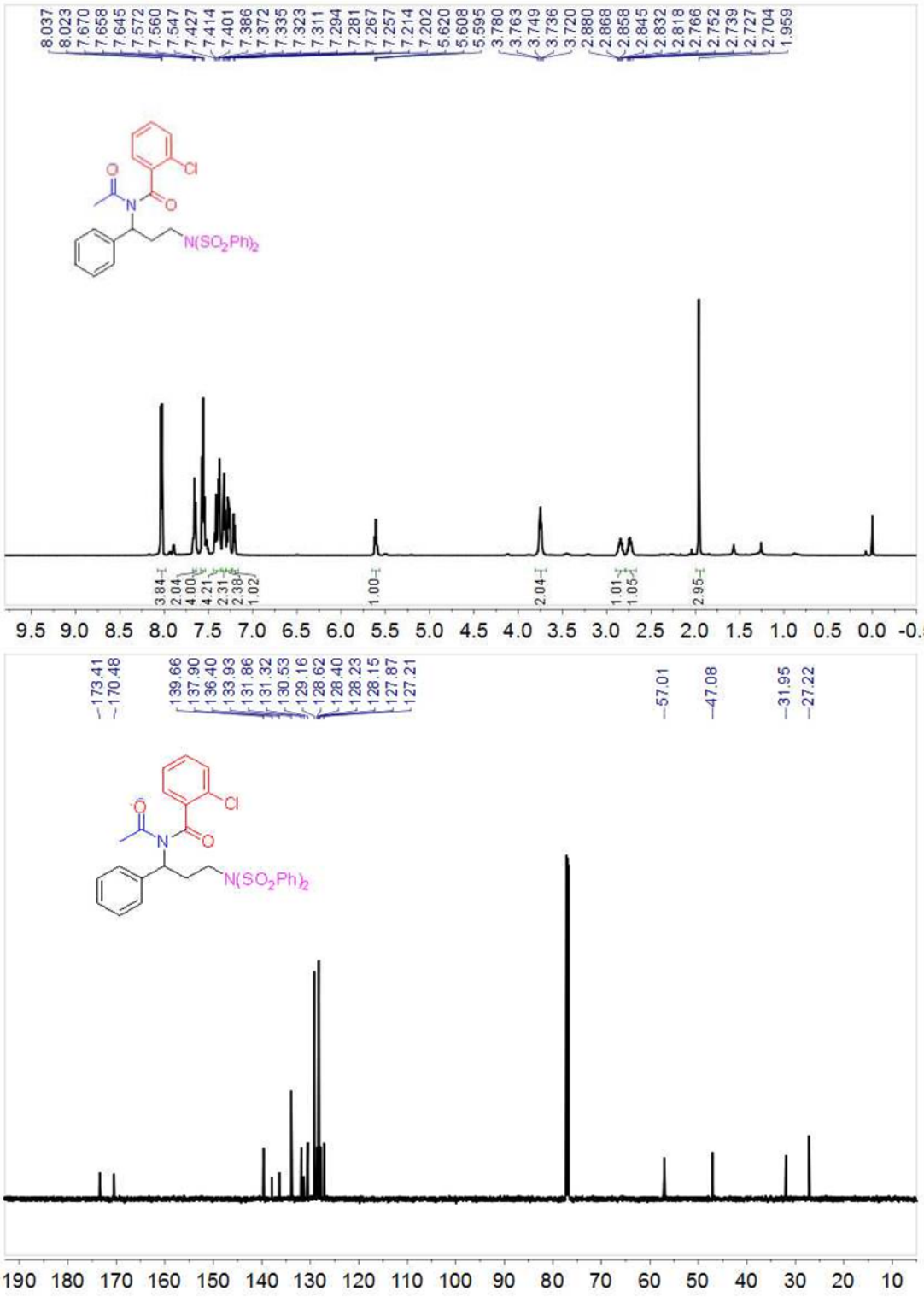
8.021
7.666
7.653
7.641
7.565
7.553
7.540
7.504
7.491
7.422
7.409
7.361
7.348
7.335
7.319
7.306
7.293
7.263
7.251
3.806
3.801
3.792
3.779
3.765
3.750
3.737
3.727
3.723
3.711
2.770
2.757
2.744
2.731
1.869
Cl
O
N
O
N(SO2Ph)2
3.91
2.05
4.94
1.07
1.08
3.04
2.26
1.15
1.00
2.03
2.01
2.93
9.5 9.0 8.5 8.0 7.5 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


172.91
172.73
139.64
126.71
57.46
47.00
32.14
27.49
138.00
137.99
135.21
133.91
132.96
130.17
129.13
128.77
128.48
128.19
128.07
128.02
Cl
O
N
O
N(SO2Ph)2
138 136 134 132 130 128
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **5k**



Compound **5l**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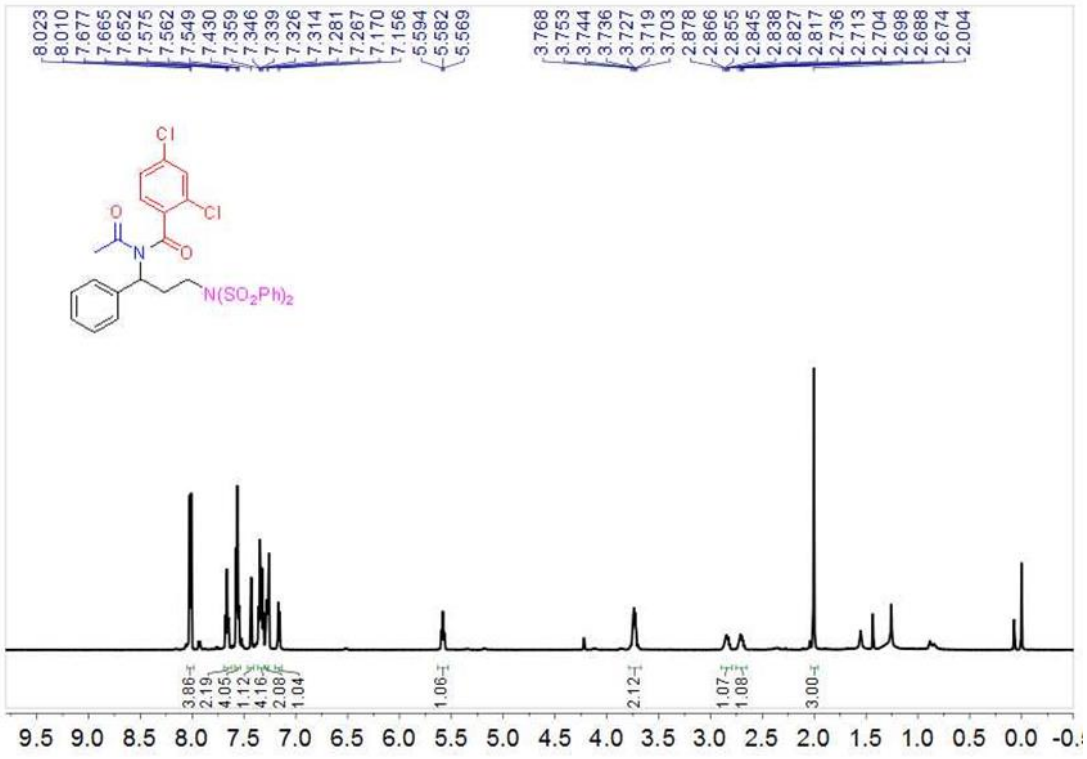
8.023
7.670
7.658
7.645
7.572
7.560
7.547
7.427
7.414
7.401
7.386
7.372
7.335
7.323
7.311
7.294
7.281
7.267
7.257
7.214
7.202
5.620
5.608
5.595
3.780
3.763
3.749
3.736
3.720
2.880
2.868
2.858
2.845
2.832
2.818
2.766
2.752
2.739
2.727
2.704
1.959
O
Cl
N
O
N(SO2Ph)2
3.84
2.04
4.00
4.21
2.31
2.38
1.02
1.00
2.04
1.01
1.05
2.95
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
173.41
170.48
139.66
137.90
136.40
133.93
131.86
131.32
130.53
129.16
128.62
128.40
128.23
128.15
127.87
127.21
57.01
47.08
31.95
27.22
O
Cl
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **5m**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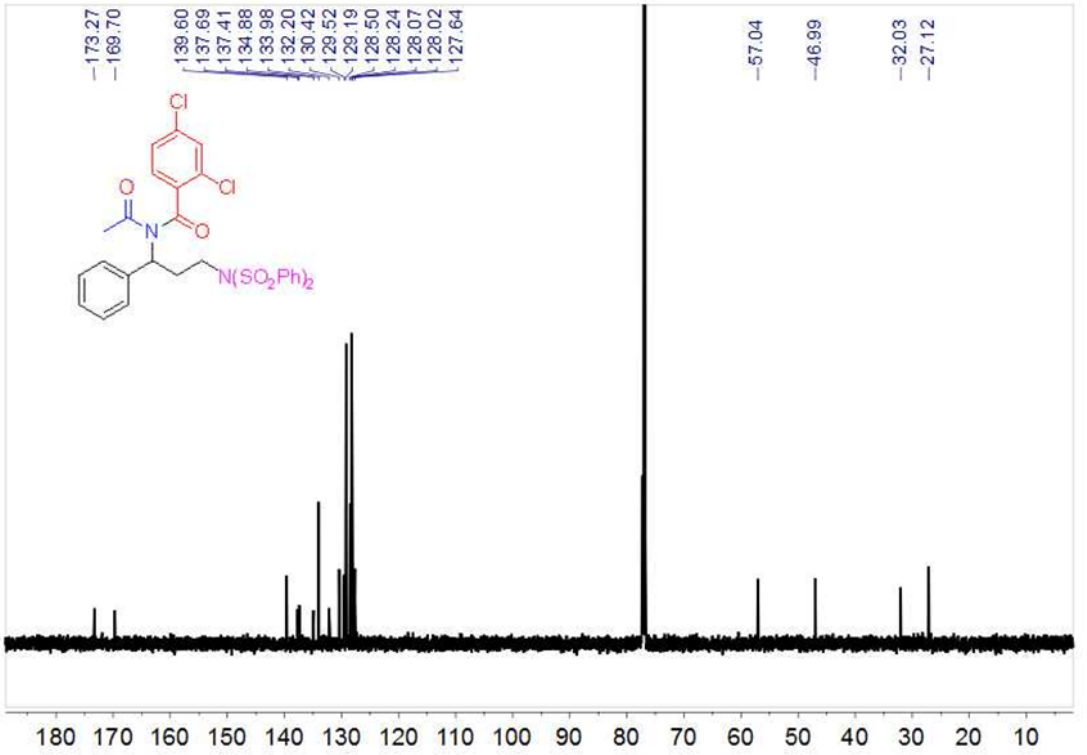
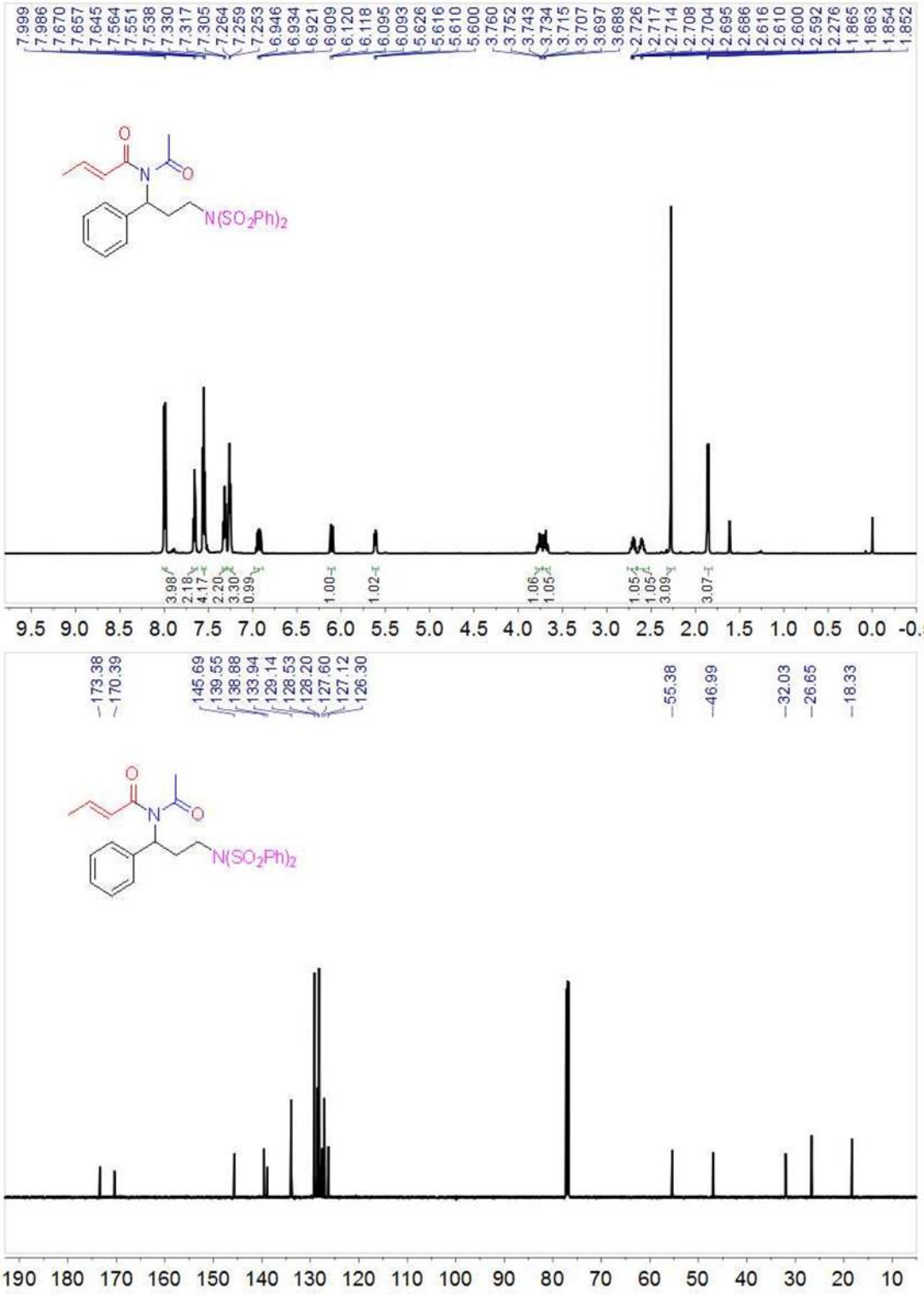
8.010
7.677
7.665
7.652
7.575
7.562
7.549
7.430
7.359
7.346
7.339
7.326
7.314
7.281
7.267
7.170
7.156
5.594
5.582
5.569
3.768
3.753
3.744
3.736
3.727
3.719
3.703
2.878
2.866
2.855
2.845
2.838
2.827
2.817
2.736
2.713
2.704
2.698
2.688
2.674
2.004
Cl
Cl
O
N
O
N(SO2Ph)2
3.86
2.19
4.05
1.12
4.16
2.08
1.04
1.06
2.12
1.07
1.08
3.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0


173.27
169.70
139.60
137.69
137.41
134.88
133.98
132.20
130.42
129.52
129.19
128.50
128.24
128.07
128.02
127.64
57.04
46.99
32.03
27.12
Cl
Cl
O
N
O
N(SO2Ph)2
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **5n**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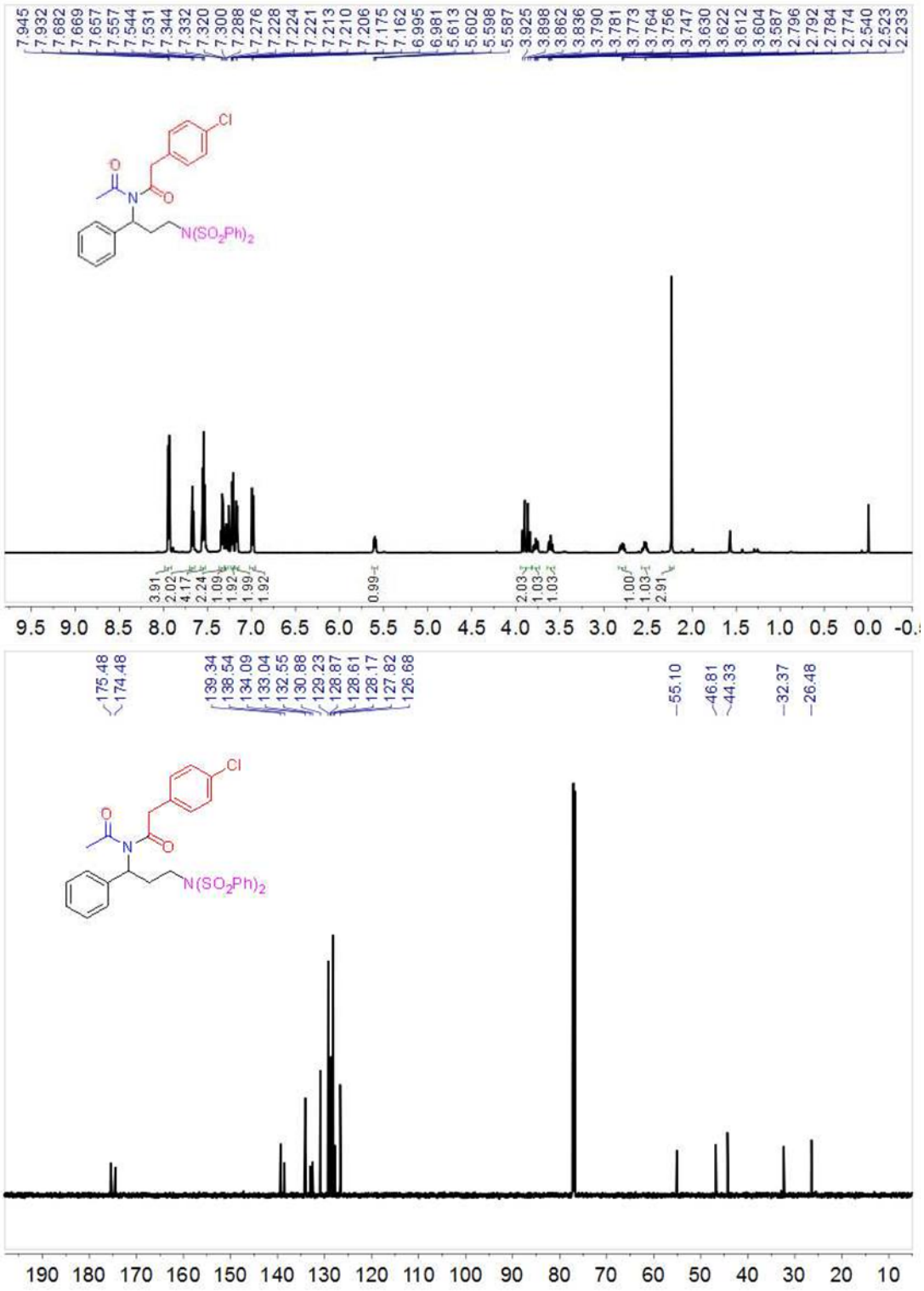
7.670
7.657
7.645
7.564
7.551
7.538
7.330
7.317
7.305
7.264
7.259
7.253
6.946
6.934
6.921
6.909
6.120
6.118
6.095
6.093
5.626
5.616
5.610
5.600
3.760
3.752
3.743
3.734
3.715
3.707
3.697
3.689
2.726
2.717
2.714
2.708
2.704
2.695
2.686
2.616
2.610
2.600
2.592
2.276
1.865
1.863
1.854
1.852
N(SO2Ph)2
3.98
2.18
4.17
2.20
3.30
0.99
1.00
1.02
1.06
1.05
1.05
1.05
3.09
3.07
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
173.38
170.39
145.69
139.55
138.88
133.94
129.14
128.53
128.20
127.60
127.12
126.30
55.38
46.99
32.03
26.65
18.33
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **5o**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7.682
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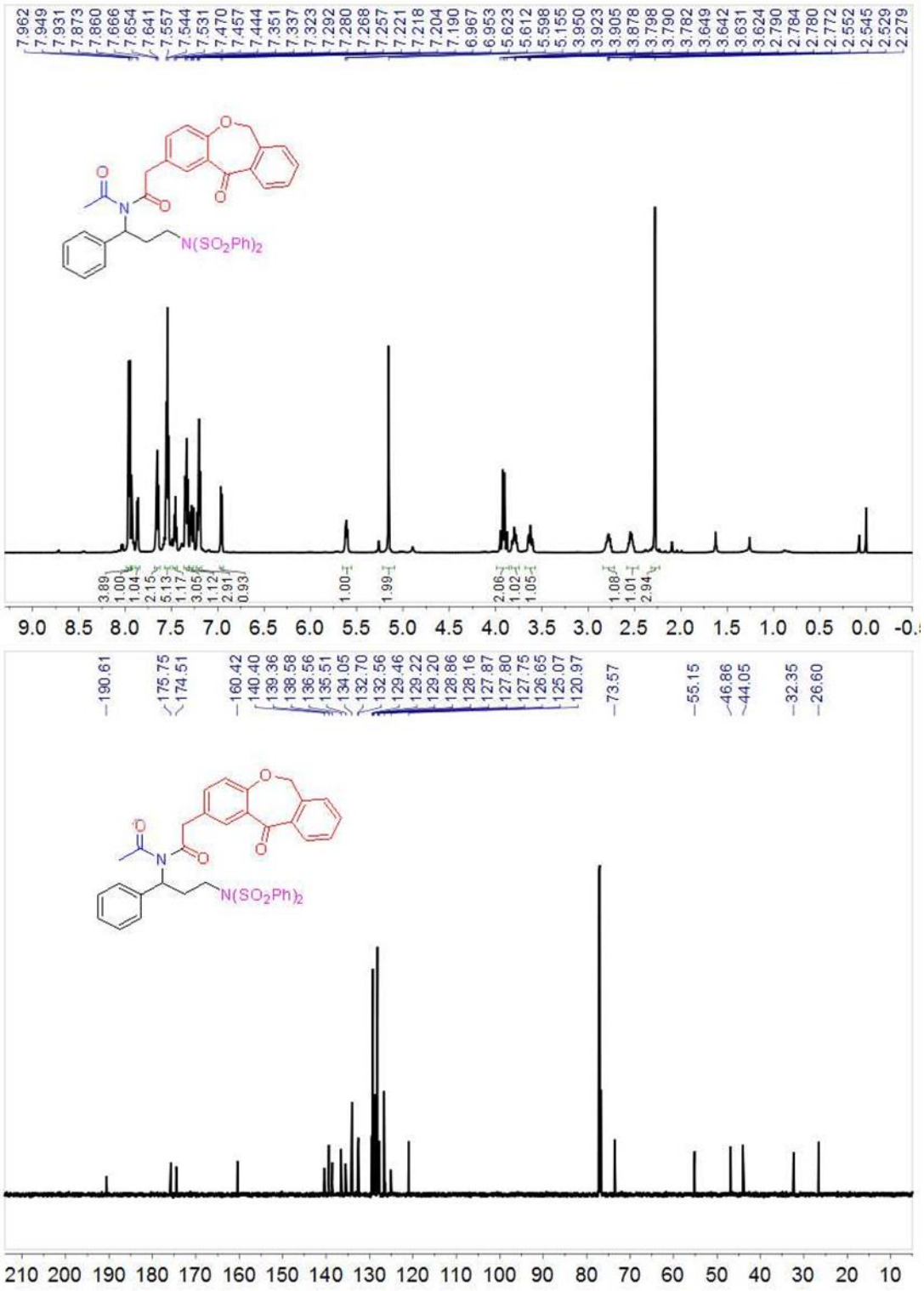
7.657
7.557
7.544
7.531
7.344
7.332
7.320
7.300
7.288
7.276
7.228
7.224
7.221
7.213
7.210
7.206
7.175
7.162
6.995
6.981
5.613
5.602
5.598
5.587
3.925
3.898
3.862
3.836
3.790
3.781
3.773
3.764
3.756
3.747
3.630
3.622
3.612
3.604
3.587
2.796
2.792
2.784
2.774
2.540
2.523
2.233
Cl
O
N
O
N(SO2Ph)2
3.91
2.02
4.17
2.24
1.09
1.92
1.99
1.92
0.99
2.03
1.03
1.03
1.00
1.03
2.91
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
175.48
174.48
139.34
138.54
134.09
133.04
132.55
130.88
129.23
128.87
128.61
128.17
127.82
126.68
55.10
46.81
44.33
32.37
26.48
Cl
O
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **5p**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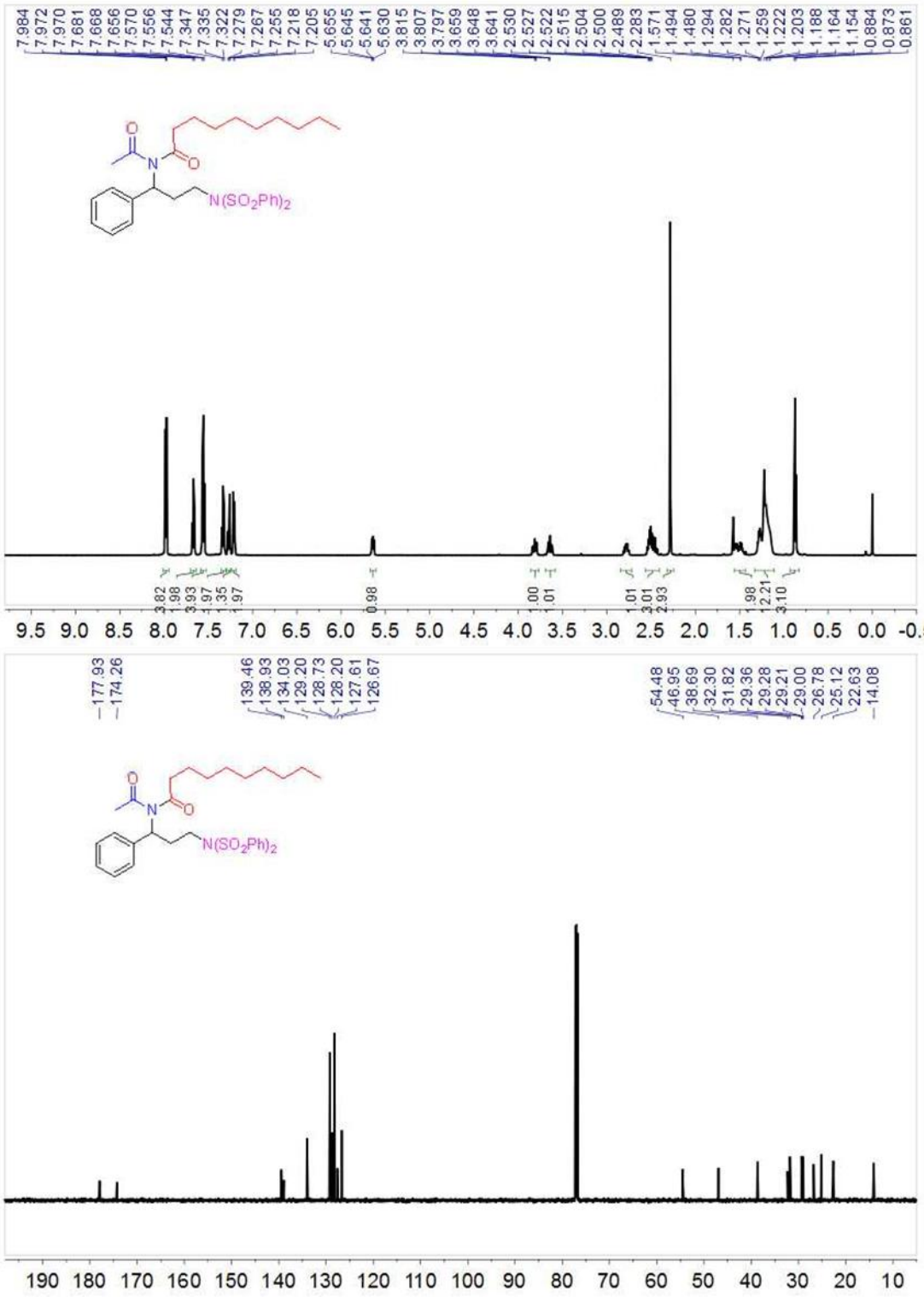
7.873
7.860
7.666
7.654
7.641
7.557
7.544
7.531
7.470
7.457
7.444
7.351
7.337
7.323
7.292
7.280
7.268
7.257
7.221
7.218
7.204
7.190
6.967
6.953
5.623
5.612
5.598
5.155
3.950
3.923
3.905
3.878
3.798
3.790
3.782
3.649
3.642
3.631
3.624
2.790
2.784
2.780
2.772
2.552
2.545
2.529
2.279
N(SO2Ph)2
3.89
1.00
1.04
2.15
5.13
1.17
3.05
1.12
2.91
0.93
1.00
1.99
2.06
1.02
1.05
1.08
1.01
2.94
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
190.61
175.75
174.51
160.42
140.40
139.36
138.58
136.56
135.51
134.05
132.70
132.56
129.46
129.22
129.20
128.86
128.16
127.87
127.80
127.75
126.65
125.07
120.97
73.57
55.15
46.86
44.05
32.35
26.60
N(SO2Ph)2
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **5q**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7.970
7.681
7.668
7.656
7.570
7.556
7.544
7.347
7.335
7.322
7.279
7.267
7.255
7.218
7.205
5.655
5.645
5.641
5.630
3.815
3.807
3.797
3.659
3.648
3.641
2.530
2.527
2.522
2.515
2.504
2.500
2.489
2.283
1.571
1.494
1.480
1.294
1.282
1.271
1.259
1.222
1.203
1.188
1.164
1.154
0.884
0.873
0.861
N(SO2Ph)2
3.82
1.98
3.93
1.97
1.35
1.97
0.98
1.00
1.01
1.01
3.01
2.93
1.98
12.21
3.10
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
177.93
174.26
139.46
138.93
134.03
129.20
128.73
128.20
127.61
126.67
54.48
46.95
38.69
32.30
31.82
29.36
29.28
29.21
29.00
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25.12
22.63
14.08
N(SO2Ph)2
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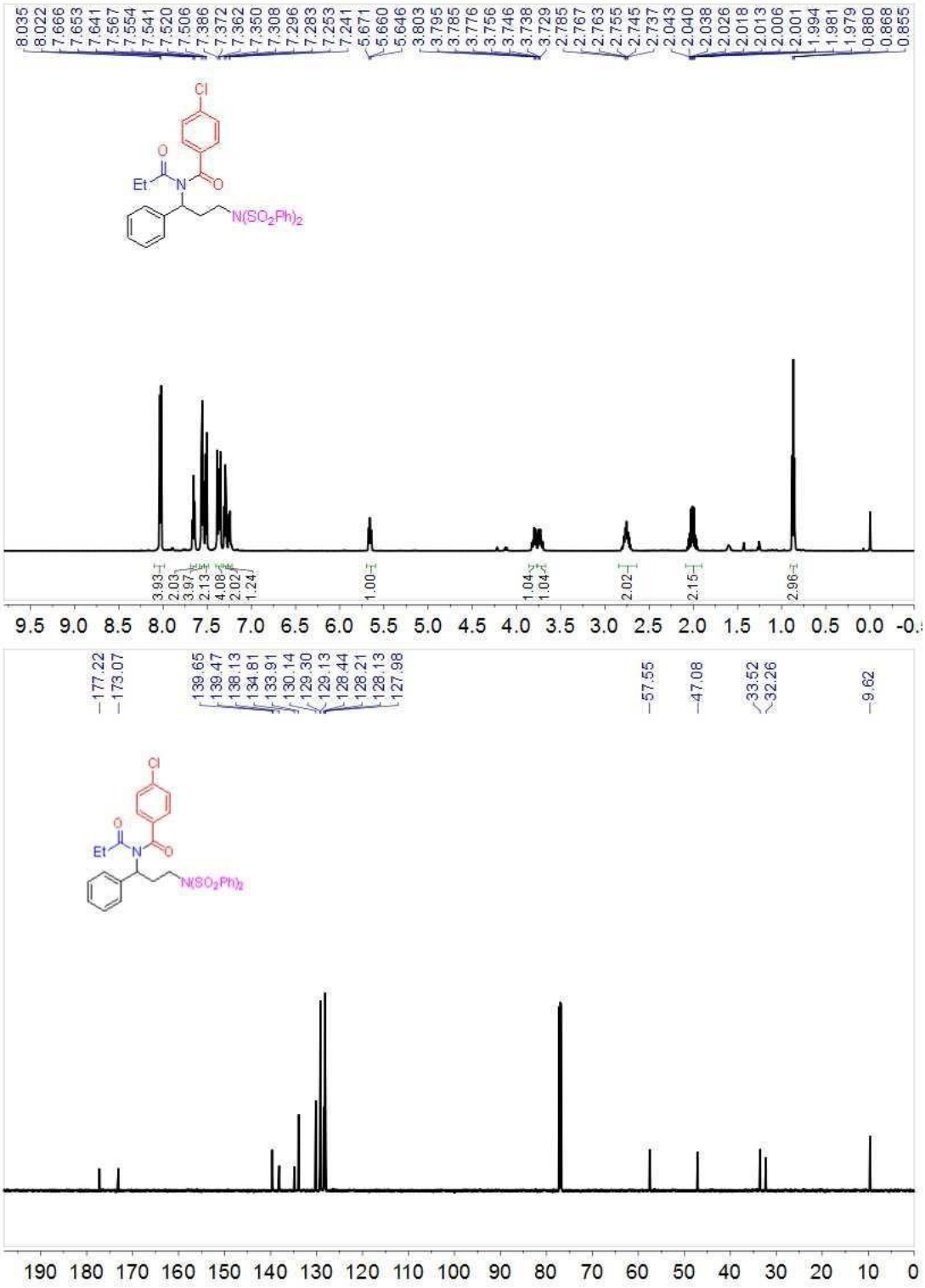
Compound **7a**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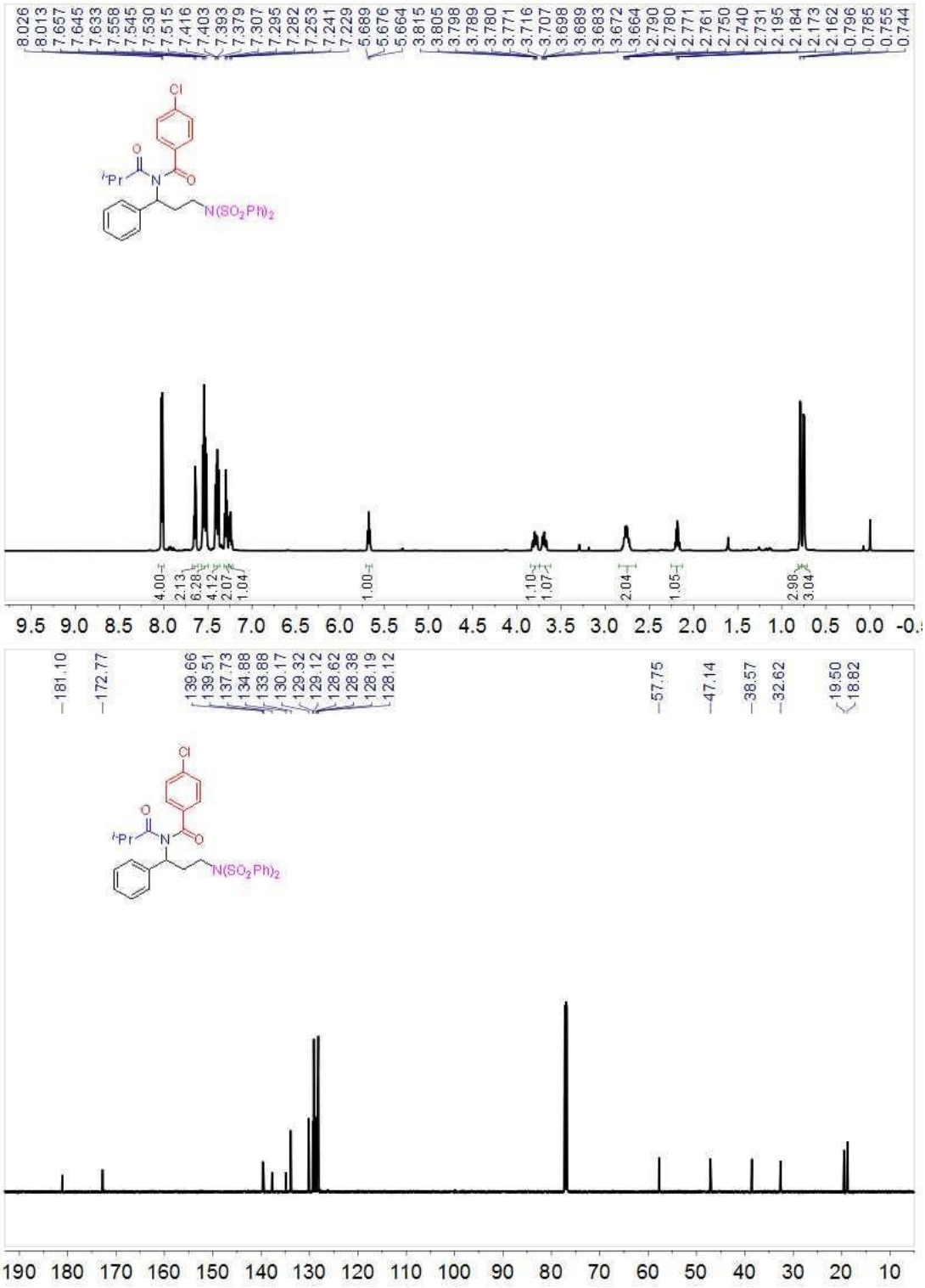
7.362
7.350
7.308
7.296
7.283
7.253
7.241
5.671
5.660
5.646
3.803
3.795
3.785
3.776
3.756
3.746
3.738
3.729
2.785
2.767
2.763
2.755
2.745
2.737
2.043
2.040
2.038
2.026
2.018
2.013
2.006
2.001
1.994
1.981
1.979
0.880
0.868
0.855
Cl
O
Et
N
O
N(SO2Ph)2
3.93
2.03
3.97
2.13
4.08
2.02
1.24
1.00
1.04
1.04
2.02
2.15
2.96
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
177.22
173.07
139.65
139.47
138.13
134.81
133.91
130.14
129.30
129.13
128.44
128.21
128.13
127.98
57.55
47.08
33.52
32.26
9.62
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Compound **7b**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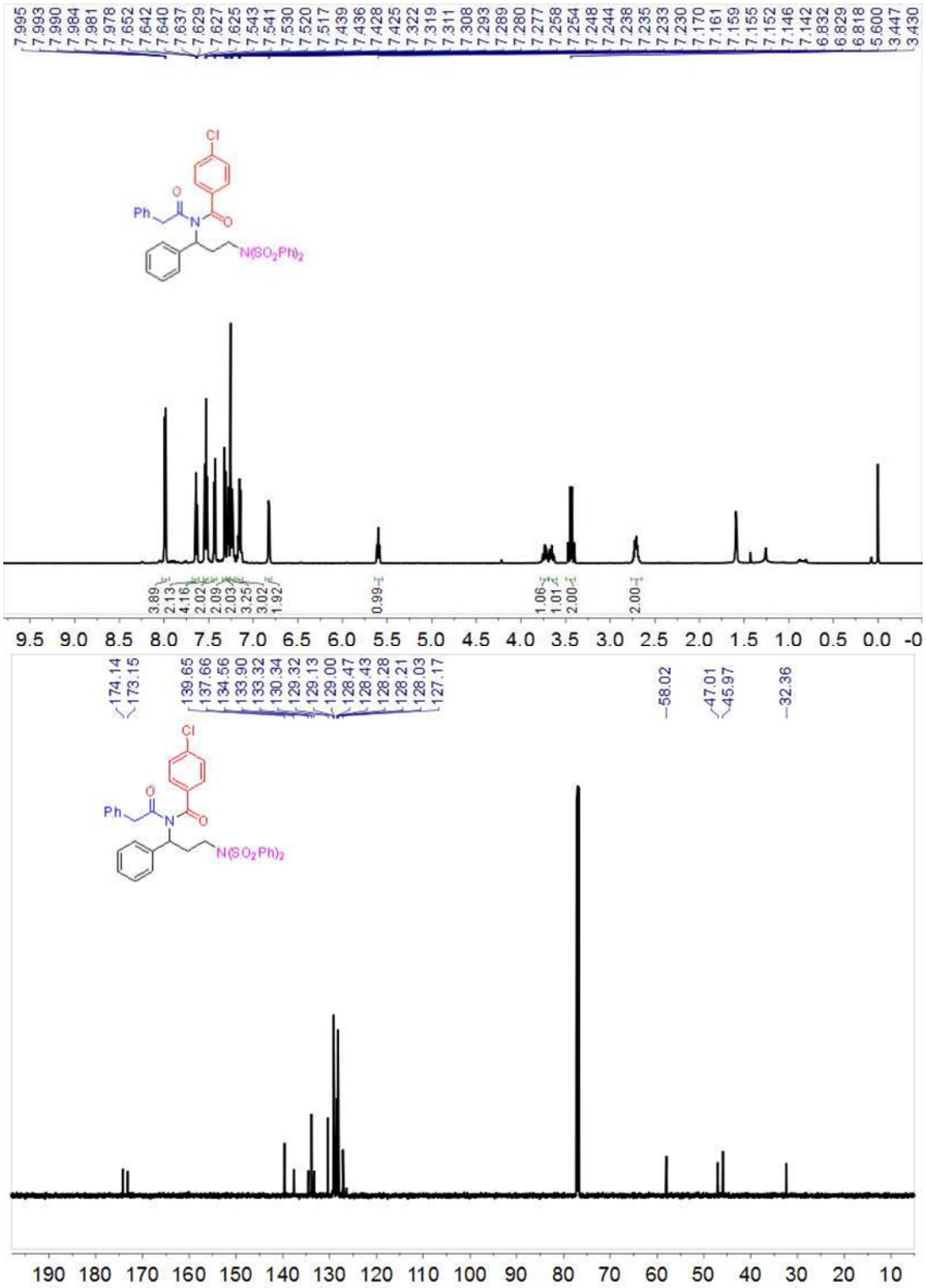
7.530
7.515
7.416
7.403
7.393
7.379
7.307
7.295
7.282
7.253
7.241
7.229
5.689
5.676
5.664
3.815
3.805
3.798
3.789
3.780
3.771
3.716
3.707
3.698
3.689
3.683
3.672
3.664
2.790
2.780
2.771
2.761
2.750
2.740
2.731
2.195
2.184
2.173
2.162
0.796
0.785
0.755
0.744
Cl
O
iPr
N
O
N(SO2Ph)2
4.00
2.13
6.28
4.12
2.07
1.04
1.00
1.10
1.07
2.04
1.05
2.98
3.04
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
181.10
172.77
139.66
139.51
137.73
134.88
133.88
130.17
129.32
129.12
128.62
128.38
128.19
128.12
57.75
47.14
38.57
32.62
19.50
18.82
Cl
O
iPr
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **7c**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7.978
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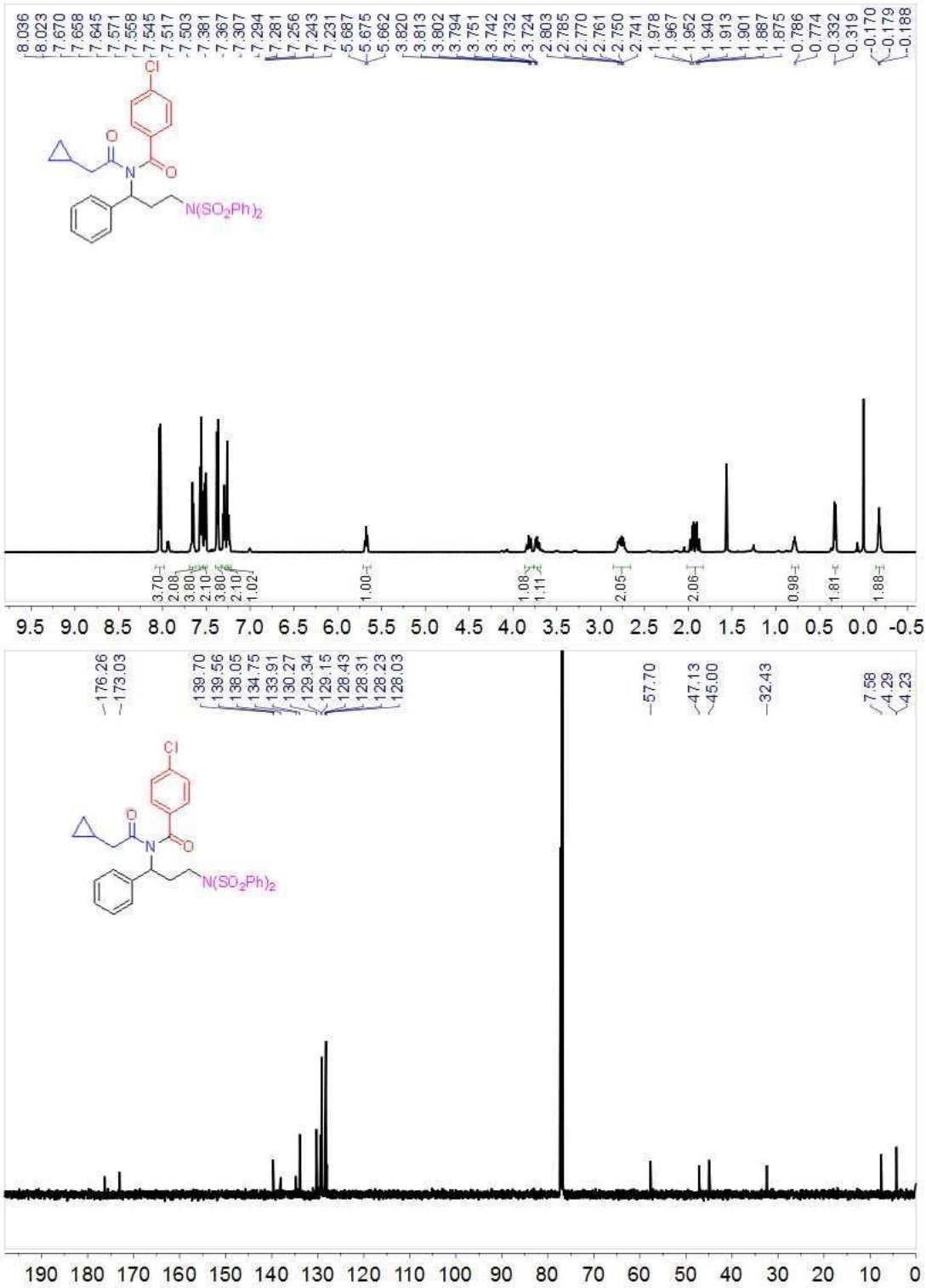
7.637
7.629
7.627
7.625
7.543
7.541
7.530
7.520
7.517
7.439
7.436
7.428
7.425
7.322
7.319
7.311
7.308
7.293
7.289
7.280
7.277
7.258
7.254
7.248
7.244
7.238
7.235
7.233
7.230
7.170
7.161
7.159
7.155
7.152
7.146
7.142
6.832
6.829
6.818
5.600
3.447
3.430
Cl
O
Ph
N
O
N(SO2Ph)2
3.89
2.13
4.16
2.02
2.09
2.03
3.25
3.02
1.92
0.99
1.06
1.01
2.00
2.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0
174.14
173.15
139.65
137.66
134.56
133.90
133.32
130.34
129.32
129.13
129.00
128.47
128.43
128.28
128.21
128.03
127.17
58.02
47.01
45.97
32.36
Cl
O
Ph
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **7d**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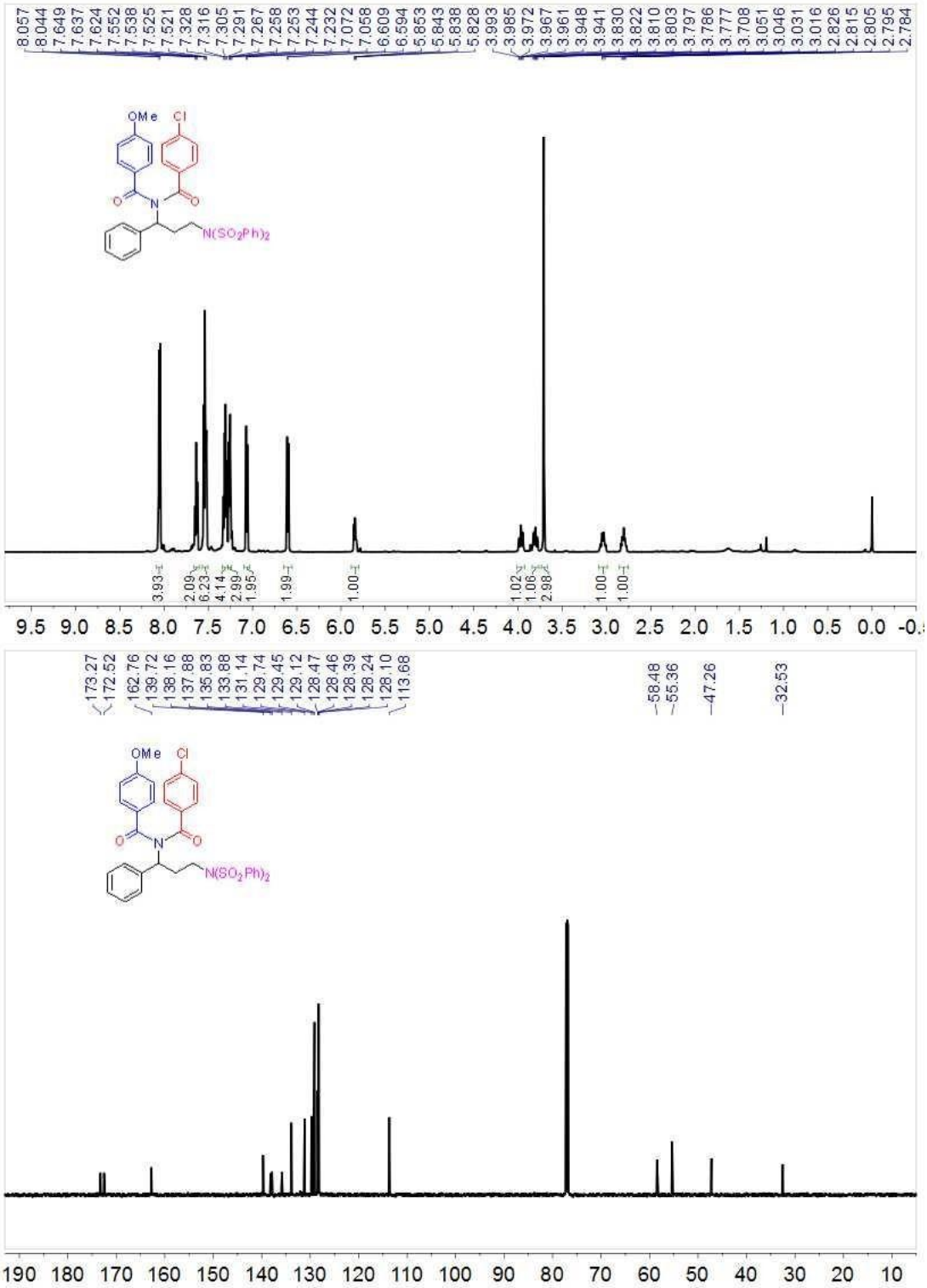
7.571
7.558
7.545
7.517
7.503
7.381
7.367
7.307
7.294
7.281
7.256
7.243
7.231
5.687
5.675
5.662
3.820
3.813
3.802
3.794
3.751
3.742
3.732
3.724
2.803
2.785
2.770
2.761
2.750
2.741
1.978
1.967
1.952
1.940
1.913
1.901
1.887
1.875
0.786
0.774
0.332
0.319
0.170
0.179
0.188
Cl
O
N
O
N(SO2Ph)2
3.70
2.08
3.80
2.10
3.80
2.10
1.02
1.00
1.08
1.11
2.05
2.06
0.98
1.81
1.88
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
176.26
173.03
139.70
139.56
138.05
134.75
133.91
130.27
129.34
129.15
128.43
128.31
128.23
128.03
57.70
47.13
45.00
32.43
7.58
4.29
4.23
Cl
O
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Compound **7e**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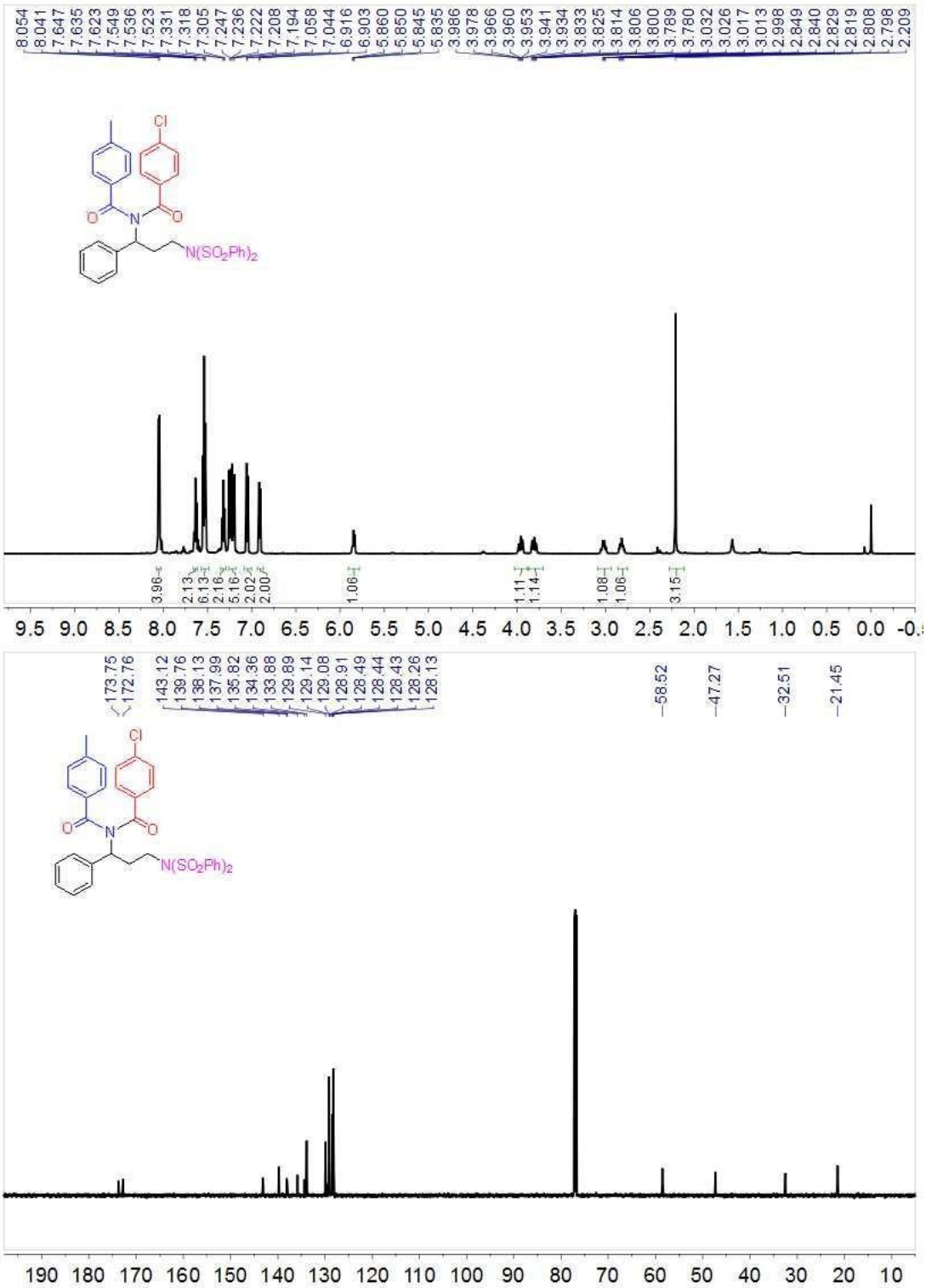
7.624
7.552
7.538
7.525
7.521
7.328
7.316
7.305
7.291
7.267
7.258
7.253
7.244
7.232
7.072
7.058
6.609
6.594
5.853
5.843
5.838
5.828
3.993
3.985
3.972
3.967
3.961
3.948
3.941
3.830
3.822
3.810
3.803
3.797
3.786
3.777
3.708
3.051
3.046
3.031
3.016
2.826
2.815
2.805
2.795
2.784
OMe
Cl
N(SO2Ph)2
3.93
2.09
6.23
4.14
2.99
1.95
1.99
1.00
1.02
1.06
2.98
1.00
1.00
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
173.27
172.52
162.76
139.72
138.16
137.88
135.83
133.88
131.14
129.74
129.45
129.12
128.47
128.46
128.39
128.24
128.10
113.68
58.48
55.36
47.26
32.53
OMe
Cl
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **7f**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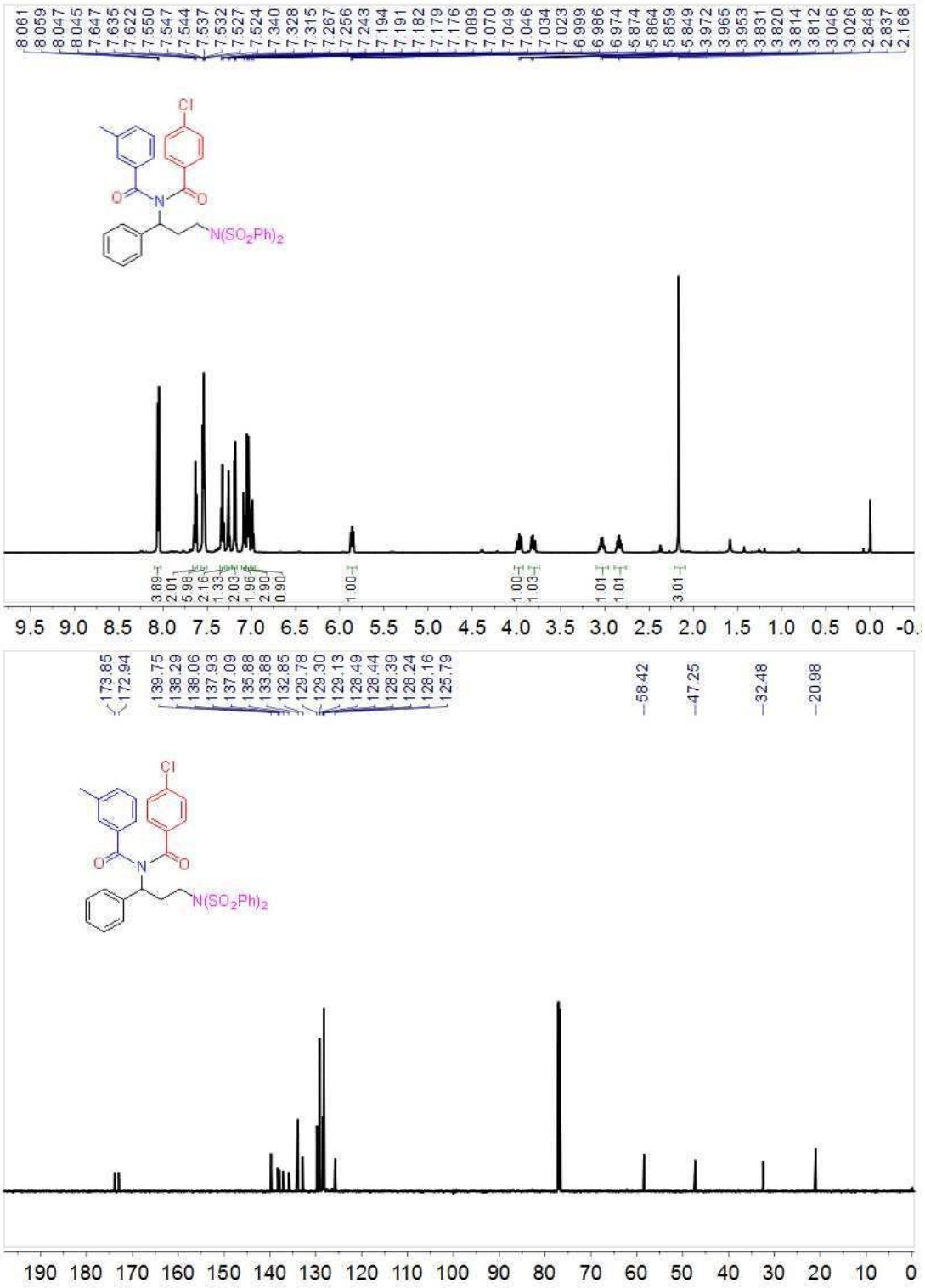
7.635
7.623
7.549
7.536
7.523
7.331
7.318
7.305
7.247
7.236
7.222
7.208
7.194
7.058
7.044
6.916
6.903
5.860
5.850
5.845
5.835
3.986
3.978
3.966
3.960
3.953
3.941
3.934
3.833
3.825
3.814
3.806
3.800
3.789
3.780
3.032
3.026
3.017
3.013
2.998
2.849
2.840
2.829
2.819
2.808
2.798
2.209
Cl
O
N
O
N(SO2Ph)2
3.96
2.13
6.13
2.16
5.16
2.02
2.00
1.06
1.11
1.14
1.08
1.06
3.15
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
173.75
172.76
143.12
139.76
138.13
137.99
135.82
134.36
133.88
129.89
129.14
129.08
128.91
128.49
128.44
128.43
128.26
128.13
58.52
47.27
32.51
21.45
Cl
O
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **7g**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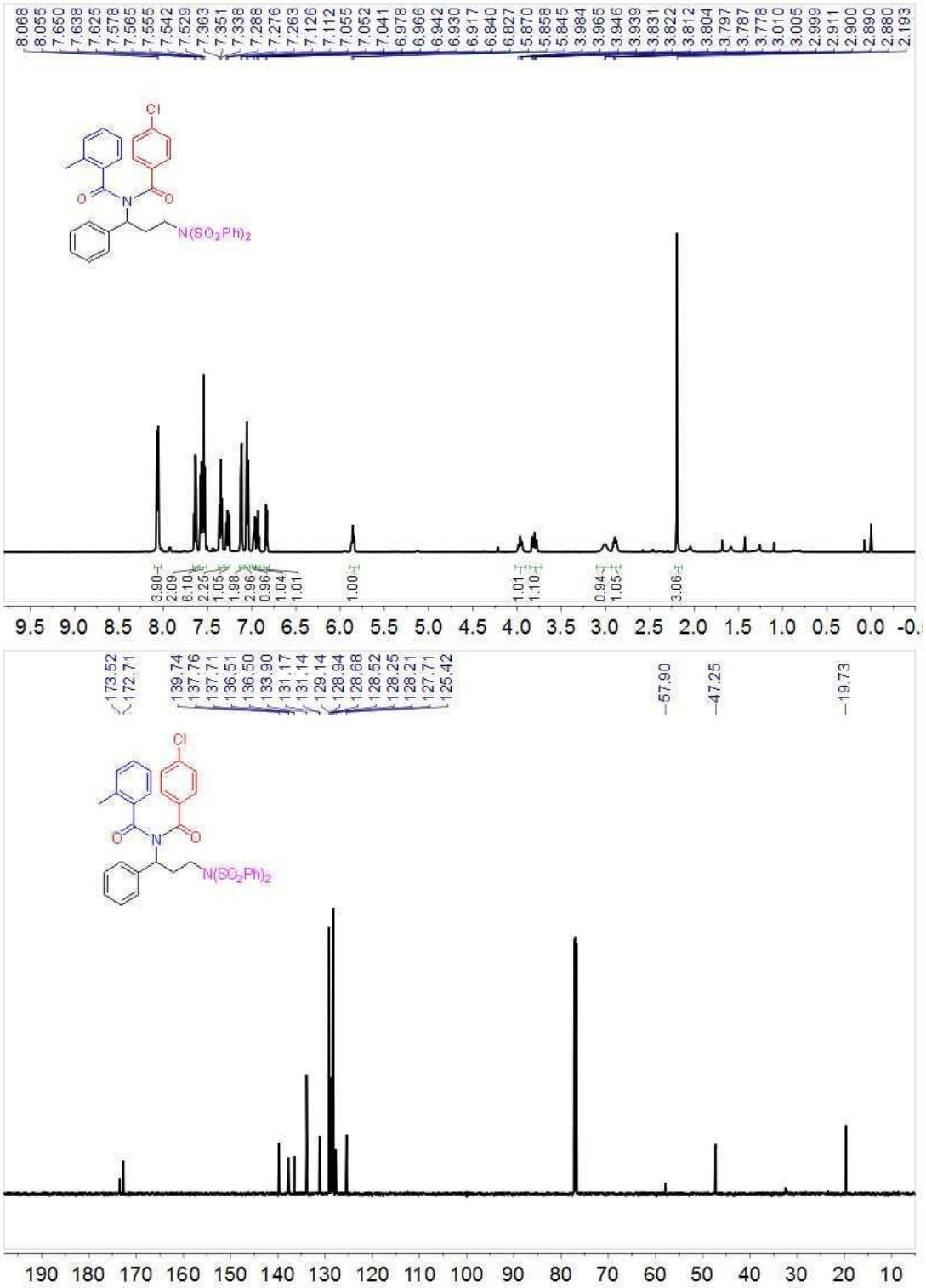
7.537
7.532
7.527
7.524
7.340
7.328
7.315
7.267
7.256
7.243
7.194
7.191
7.182
7.179
7.176
7.089
7.070
7.049
7.046
7.034
7.023
6.999
6.986
6.974
5.874
5.864
5.859
5.849
3.972
3.965
3.953
3.831
3.820
3.814
3.812
3.046
3.026
2.848
2.837
2.168
Cl
O
N
O
N(SO2Ph)2
3.89
2.01
5.98
2.16
1.33
2.03
1.96
2.90
0.90
1.00
1.00
1.03
1.01
1.01
3.01
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
173.85
172.94
139.75
138.29
138.06
137.93
137.09
135.88
133.88
132.85
129.78
129.30
129.13
128.49
128.44
128.39
128.24
128.16
125.79
58.42
47.25
32.48
20.98
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Compound **7h**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7.338
7.288
7.276
7.263
7.126
7.112
7.055
7.052
7.041
6.978
6.966
6.942
6.930
6.917
6.840
6.827
5.870
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5.845
3.984
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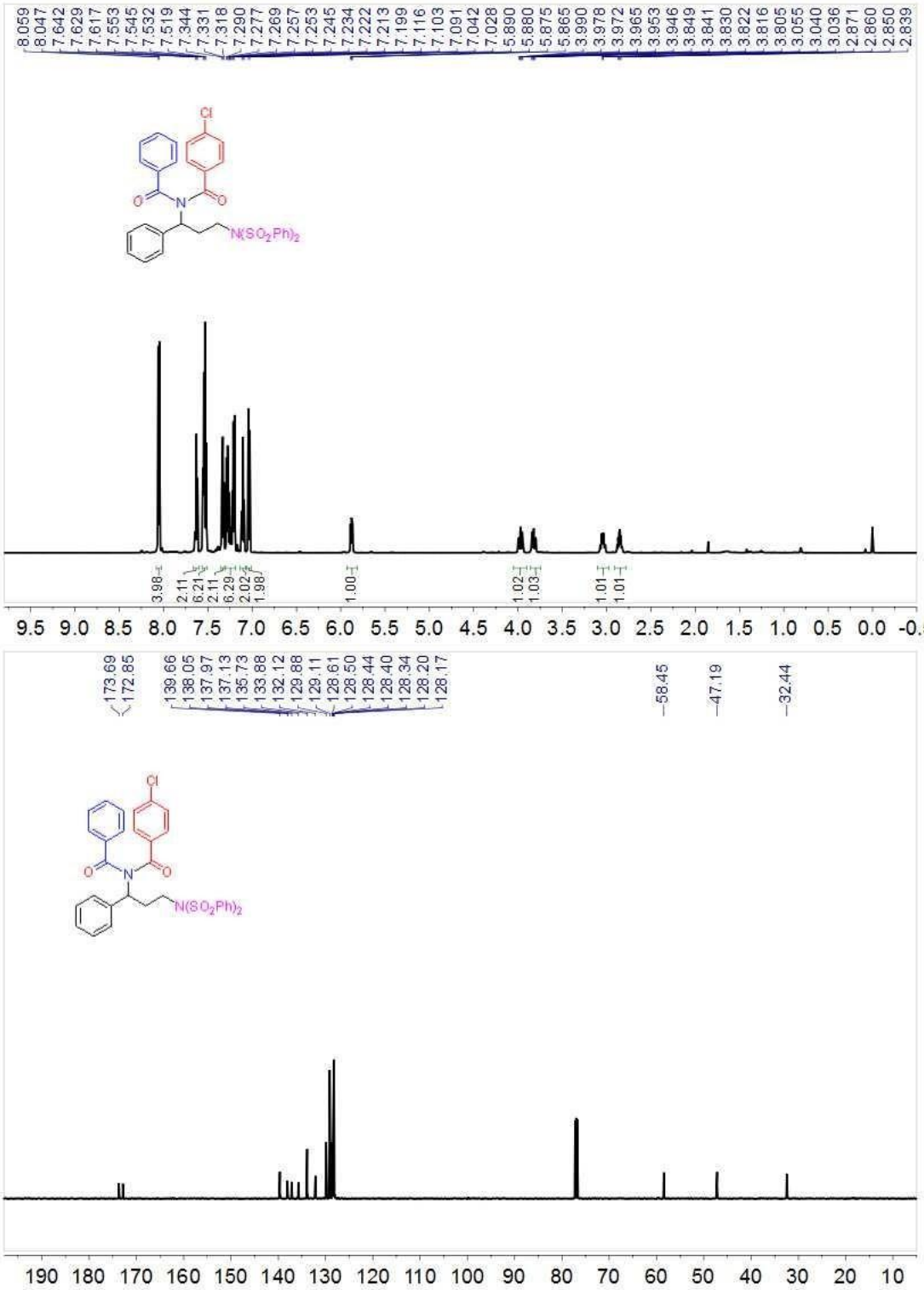
3.812
3.804
3.797
3.787
3.778
3.010
3.005
2.999
2.911
2.900
2.890
2.880
2.193
Cl
O
N
O
N(SO2Ph)2
3.90
2.09
6.10
2.25
1.05
1.98
2.96
0.96
1.04
1.01
1.00
1.01
1.10
0.94
1.05
3.06
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
173.52
172.71
139.74
137.76
137.71
136.51
136.50
133.90
131.17
131.14
129.14
128.94
128.68
128.52
128.25
128.21
127.71
125.42
57.90
47.25
19.73
Cl
O
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **7i**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7.290
7.277
7.269
7.257
7.253
7.245
7.234
7.222
7.213
7.199
7.116
7.103
7.091
7.042
7.028
5.890
5.880
5.875
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3.972
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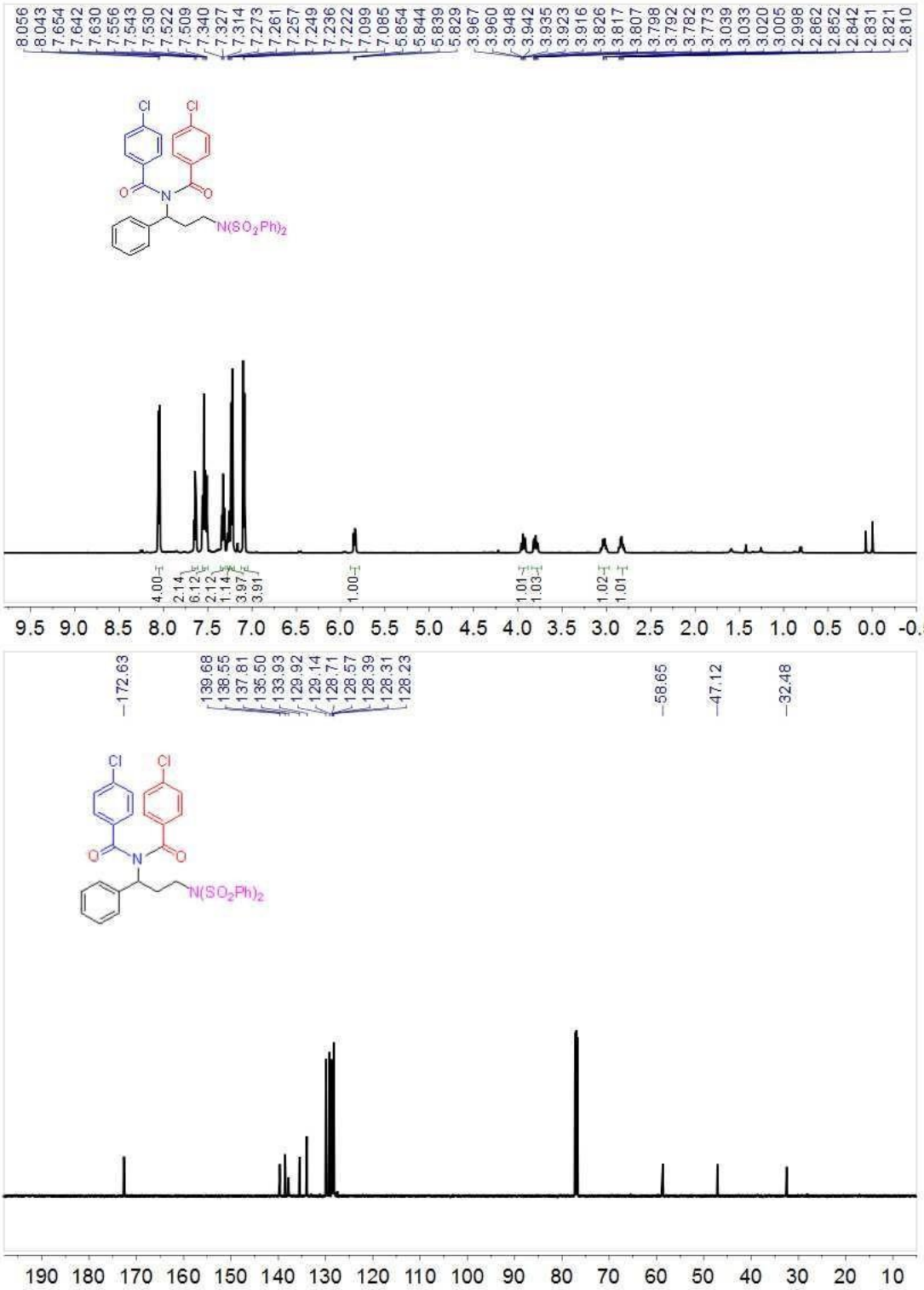
3.849
3.841
3.830
3.822
3.816
3.805
3.055
3.040
3.036
2.871
2.860
2.850
2.839
Cl
O
N
O
N(SO2Ph)2
3.98
2.11
6.21
2.11
6.29
2.02
1.98
1.00
1.02
1.03
1.01
1.01
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
173.69
172.85
139.66
138.05
137.97
137.13
135.73
133.88
132.12
129.88
129.11
128.61
128.50
128.44
128.40
128.34
128.20
128.17
58.45
47.19
32.44
Cl
O
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **7j**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7.340
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7.314
7.273
7.261
7.257
7.249
7.236
7.222
7.099
7.085
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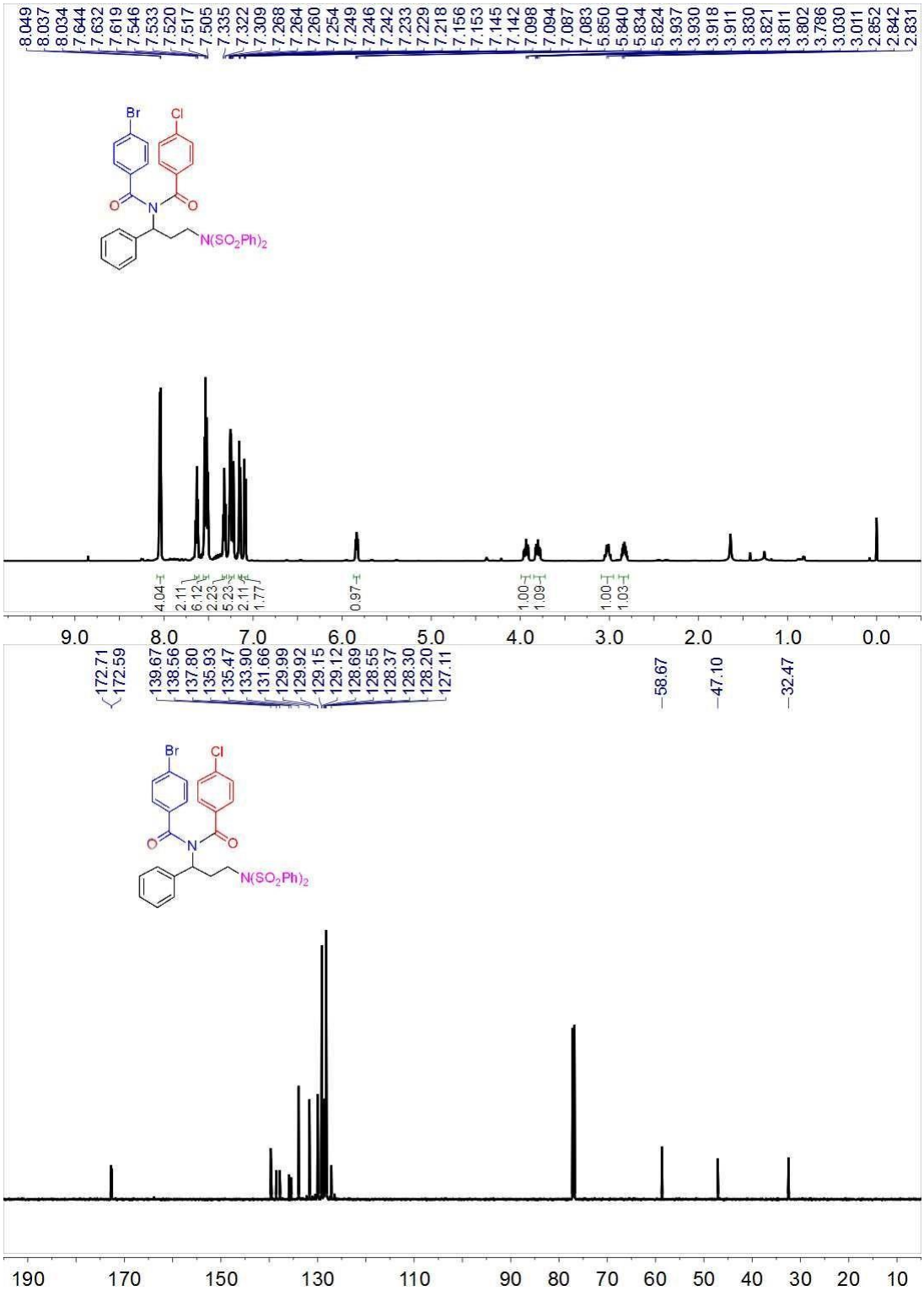
5.844
5.839
5.829
3.967
3.960
3.948
3.942
3.935
3.923
3.916
3.826
3.817
3.807
3.798
3.792
3.782
3.773
3.039
3.033
3.020
3.005
2.998
2.862
2.852
2.842
2.831
2.821
2.810
Cl
Cl
O
N
O
N(SO2Ph)2
4.00
2.14
6.12
2.12
1.14
3.97
3.91
1.00
1.01
1.03
1.02
1.01
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
172.63
139.68
138.55
137.81
135.50
133.93
129.92
129.14
128.71
128.57
128.39
128.31
128.23
58.65
47.12
32.48
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

Compound **7k**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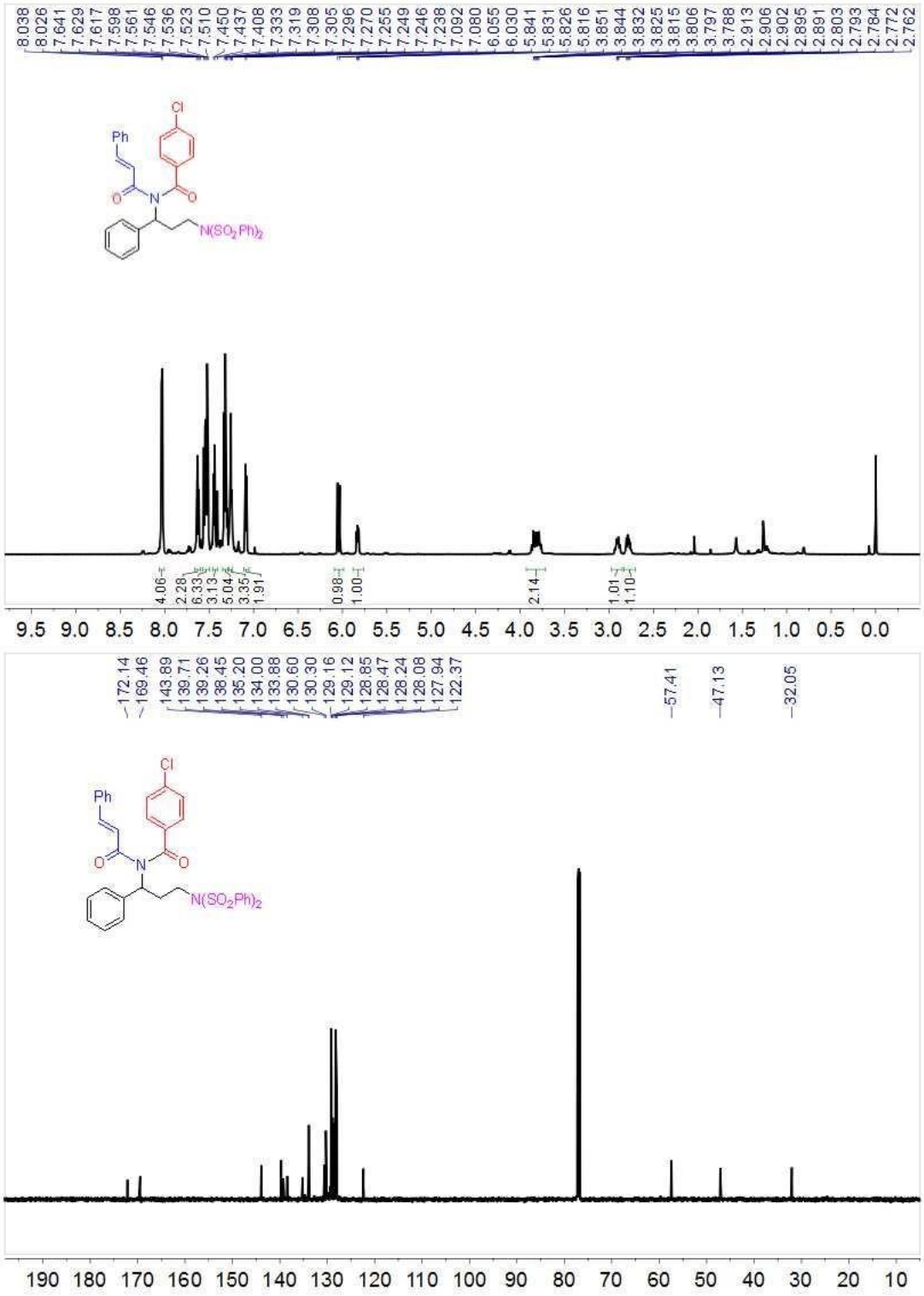
7.322
7.309
7.268
7.264
7.260
7.254
7.249
7.246
7.242
7.233
7.229
7.218
7.156
7.153
7.145
7.142
7.098
7.094
7.087
7.083
5.850
5.840
5.834
5.824
3.937
3.930
3.918
3.911
3.830
3.821
3.811
3.802
3.786
3.030
3.011
2.852
2.842
2.831
Br
Cl
N(SO2Ph)2
4.04
2.11
6.12
2.23
5.23
2.11
1.77
0.97
1.00
1.09
1.00
1.03
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
172.71
172.59
139.67
138.56
137.80
135.93
135.47
133.90
131.66
129.99
129.92
129.15
129.12
128.69
128.55
128.37
128.30
128.20
127.11
58.67
47.10
32.47
190
170
150
130
110
90
80
70
60
50
40
30
20
10

Compound **7l**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5.816
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3.788
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2.772
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Cl
Ph
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N
O
N(SO2Ph)2
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6.33
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3.35
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2.14
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128.08
127.94
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57.41
47.13
32.05
Cl
Ph
O
N
O
N(SO2Ph)2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10