Supporting Information for

Sodium Halide-Switchable Divergent Electrochemical Synthesis of Sulfonyl Chlorides and Thiosulfonates from Thiols

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1. General Information

All reagents and solvents were sourced from commercial vendors and used directly without subsequent purification. Electrochemical transformations were conducted utilizing a Coulometer (ZCM-761) as power DC Supply. Graphite electrodes, fabricated from 2B-grade pencil leads (length: 120 mm; diameter: 2.0 mm; distance between the electrodes: 5.0 mm), were procured from commercial stationery suppliers. Stainless steel (Steel-360) electrodes, measuring 120 mm in length, 5.0 mm in width and 0.6 mm in thickness, also have a 5.0 mm spacing between the two electrodes. NMR spectra were recorded on a BRUKER DRX-500 AVANCE spectrometer operating at 500 MHz, with deuterated chloroform ($CDCl_3$) employed as the solvent.

a)

b)

C)

Figure 1 a) PG and SS electrodes; b) small-scale reaction set-up; c) gram-scale reaction set-up

2. Experimental Procedures

2.1- General Procedure for the Synthesis of products 3 from 1 and NaCl

An aqueous solution was prepared by dissolving 2.5 mmol of NaCl in a specified volume of water (2 ml) with continuous stirring until complete dissolution. Subsequently, a pre-made mixture of 0.5 mmol of **1a** in AcOH (16 ml) was introduced to the NaCl solution, yielding a final solvent system with a ratio of 8:1 AcOH to H_2O (18 ml) at ambient temperature. Electrolysis was performed in an undivided electrochemical cell equipped with pencil graphite (PG) electrodes serving as both the anode and cathode, connected to a Coulometer (ZCM-761) as power DC Supply. The mixture was continuously stirred, and electrolysis proceeded under a constant current of 8 mA at room temperature for 18 hours, corresponding to a total charge of 5.37 F/mol. The progress of the transformation was monitored by thin-layer chromatography (TLC). Upon completion, the solvent was evaporated under reduced pressure (the NaCl and AcOH components are recyclable from the reaction mixture). The resulting residue was subjected to purification by column chromatography on silica gel (230–400 mesh, Merck), using a gradient elution with n-hexane/ethyl acetate (from 15:1 to 5:1) to afford the target products (**3a–3k**).

2.2- General Procedure for the Synthesis of products 4 from 1 and NaBr

An aqueous solution was prepared by dissolving 2.5 mmol of NaBr in a specified volume of water (2 ml) with continuous stirring until complete dissolution. Subsequently, a pre-made mixture of 0.5 mmol of **1a** in AcOH (16 ml) was introduced to the NaBr solution, yielding a final solvent system with a ratio of 8:1 AcOH to H_2O (18 ml) at ambient temperature. Electrolysis was conducted in an undivided electrochemical cell furnished with pencil graphite (PG) electrodes functioning as both anode and cathode, connected to a Coulometer (ZCM-761) as power DC Supply. The reaction mixture was continuously stirred while electrolysis was maintained under a constant current of 8 mA at room temperature for 18 hours, corresponding to a total charge input of 5.37 F/mol. The reaction progress was monitored by thin-layer chromatography (TLC). Upon completion, the reaction solvent was removed under reduced pressure (the NaBr, and AcOH components are recyclable from the reaction mixture), and the crude residue was purified by flash column chromatography on silica gel (230–400 mesh, Merck), employing a gradient elution of *n*-hexane/ethyl acetate (from 15:1 to 5:1) to yield the desired products (**4a–4k**).

2.3- The Procedure for Gram Scale Synthesis of Product 3b from 1b and NaCl

A reaction mixture containing compound **1a** (1.242 g, 10 mmol) and NaCl (2.922 g, 50 mmol) in a solvent system of acetic acid and water (AcOH–H_2O, 8:1 v/v; total volume: 135 mL) was stirred at ambient temperature. Electrolysis was performed in an undivided electrochemical cell equipped with pencil graphite electrodes (PGE) serving as both the anode and cathode, connected to a Coulometer (ZCM-761) as power DC Supply. The reaction mixture was stirred continuously, and electrolysis was conducted at a constant current of 50 mA at room temperature for 50 hours, corresponding to a total charge of 93.2 F/mol. The progress of the reaction was monitored by thin-layer chromatography (TLC). Upon completion, the solvent was removed under reduced pressure, and the crude product was purified by column chromatography on silica gel (230–400 mesh, Merck), eluting with n-hexane/ethyl acetate (15:1), to afford the target compound **4b** in 75% yield (1.429 g).

2.4- The Procedure for Gram Scale Synthesis of Product 3b from 1b and NaBr

A reaction mixture containing compound **1a** (1.242 g, 10 mmol) and NaBr (5.144 g, 50 mmol) in a solvent system of 8:1 ratio of AcOH–H_2O (135 mL) was stirred at ambient temperature. Electrolysis was performed in an undivided electrochemical cell equipped with pencil graphite electrodes (PGE) serving as both the anode and cathode, connected to a Coulometer (ZCM-761) as power DC Supply. The reaction mixture was stirred continuously, and electrolysis was conducted at a constant current of 50 mA at room temperature for 50 hours, corresponding to a total charge of 93.2 F/mol. The progress of the reaction was monitored by thin-layer chromatography (TLC). Upon completion, the solvent was removed under reduced pressure, and the crude product was purified by column chromatography on silica gel (230–400 mesh, Merck), eluting with n-hexane/ethyl acetate (10:1), to afford the target compound **4b** in 80% yield (2.231g).

3- Cyclic Voltammograms

Cyclic voltammetry (C.V.s) experiments were conducted using a Metrohm Autolab B.V. PGSTAT204 at ambient temperature. The supporting electrolyte $LiClO_4$ (212.8 mg, 2 mmol), was dissolved in a 27 mL solvent mixture of AcOH and H_2O (8:1 v/v). A scan rate of 20 mV/s was applied, with a potential window ranging from 0 V to 2.5 V. The electrochemical setup utilized a three-electrode system, comprising an Ag/AgCl reference electrode with saturated KCl, a platinum wire counter electrode, and a glassy carbon working electrode (2.0 mm diameter). Prior to data acquisition, the working electrode was polished with Alumina powder. Detailed mechanistic insights from the cyclic voltammograms are provided in the mechanistic study section of the manuscript (page 5).

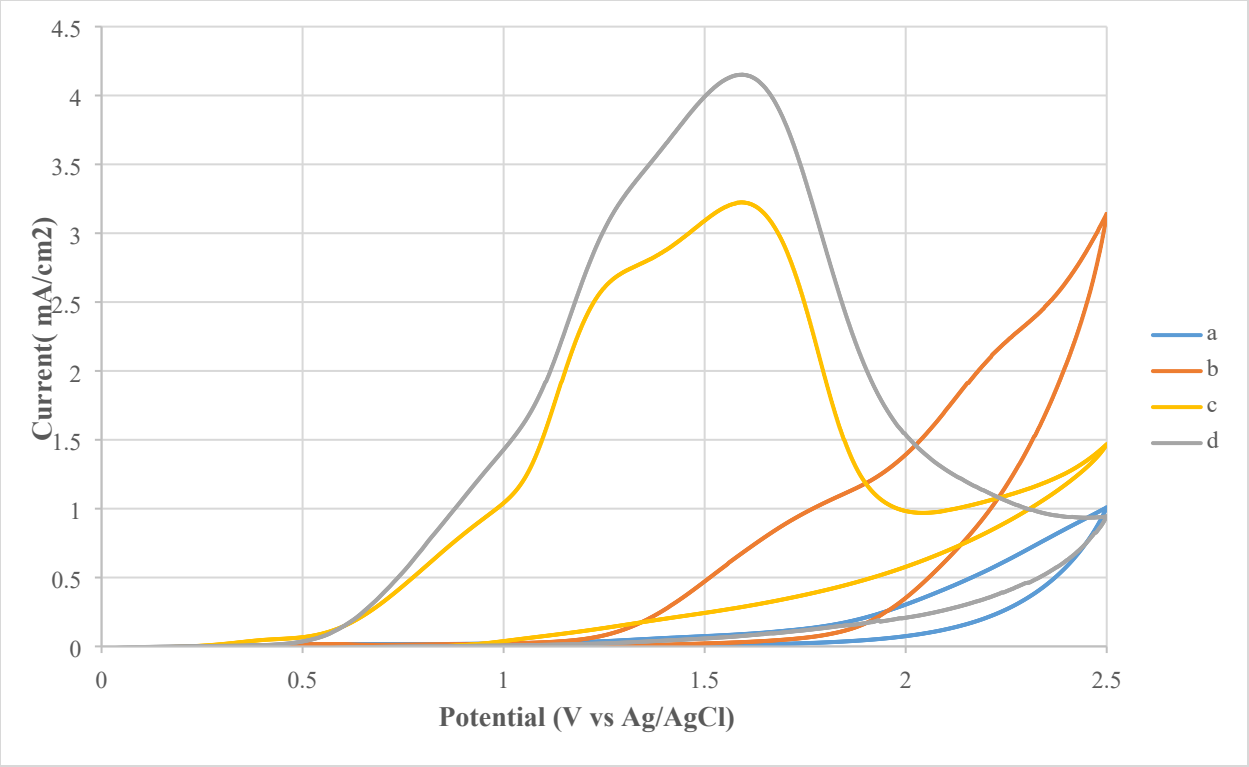


Figure 2 Cyclic voltammograms a) 27mL AcOH-H_2O (8:1) in the presence of LiClO4 (212.8 mg, 2mmol), (b) 5 mmol (292 mg) of NaCl in 27 mL AcOH-H_2O (8:1) in the presence of LiClO4 (212.8 mg, 2mmol), (c) 1 mmol (124 mg) of **1b** in 27 mL AcOH-H_2O (8:1) in the presence of LiClO4 (212.8 mg, 2mmol) and (d) 1 mmol (124 mg) of **1b** and 5 mmol (292 mg) of NaCl in 27 mL AcOH-H_2O (8:1) in the presence of LiClO4 (212.8 mg, 2mmol)recorded at a glassy carbon electrode (2.0 mm diameter), sweep rate: 0.02 V/s, at room temperature. Ag/AgCl as a reference electrode (Scan range: 0 to 2.5 V).

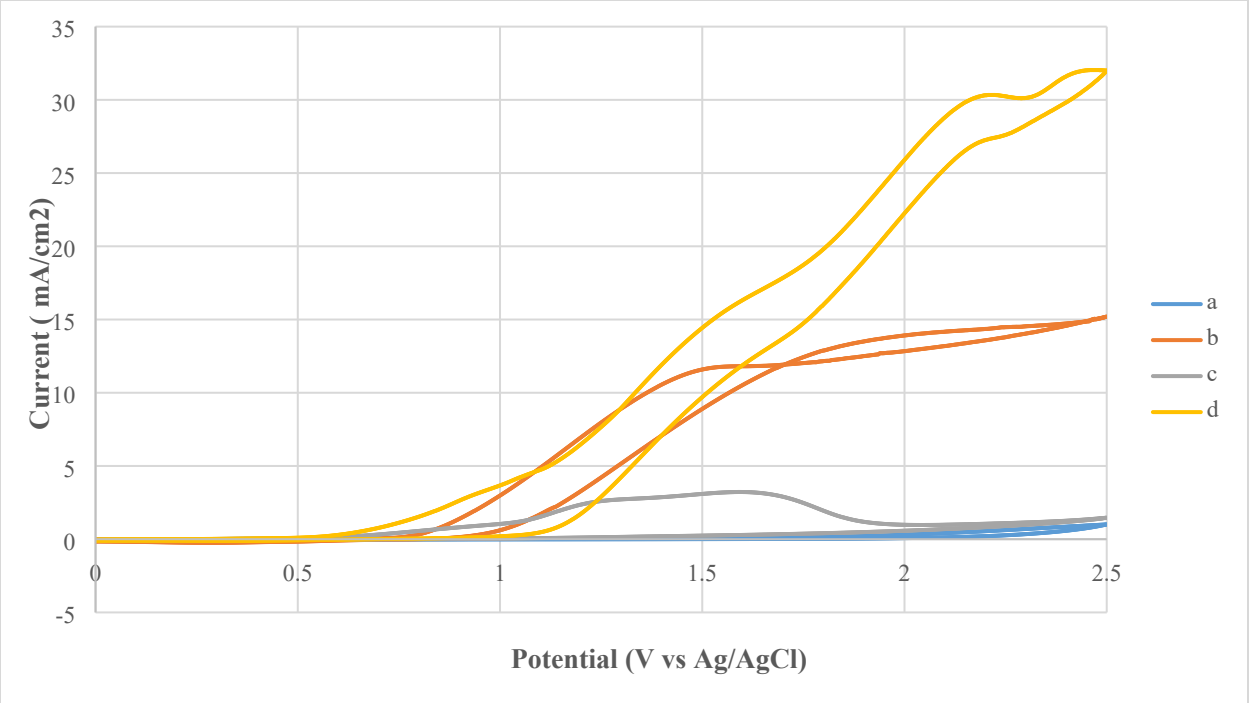


Figure 3 Cyclic voltammograms a) 27mL AcOH-H_2O (8:1) in the presence of LiClO4 (212.8 mg, 2mmol), (b) 5 mmol (514 mg) of NaBr in 27 mL AcOH-H_2O (8:1) in the presence of LiClO4 (212.8 mg, 2mmol), (c) 1 mmol (124 mg) of **1b** in 27 mL AcOH-H_2O (8:1) in the presence of LiClO4 (212.8 mg, 2mmol) and (d) 1 mmol (124 mg) of **1b** and 5 mmol (514 mg) of NaBr in 27 mL AcOH-H_2O (8:1) in the presence of LiClO4 (212.8 mg, 2mmol)recorded at a glassy carbon electrode (2.0 mm diameter), sweep rate: 0.02 V/s, at room temperature. Ag/AgCl as a reference electrode (Scan range: 0 to 2.5 V).

To elucidate the reaction mechanism and confirm the presence of *electro-active* species, cyclic voltammetry was performed at various scan rates. The resulting voltammograms indicated that the magnitude of the peak current increased with an increasing scan rate. This relationship is characteristic of a diffusion-controlled electrochemical process, thereby confirming that the reaction proceeds via electron transfer.

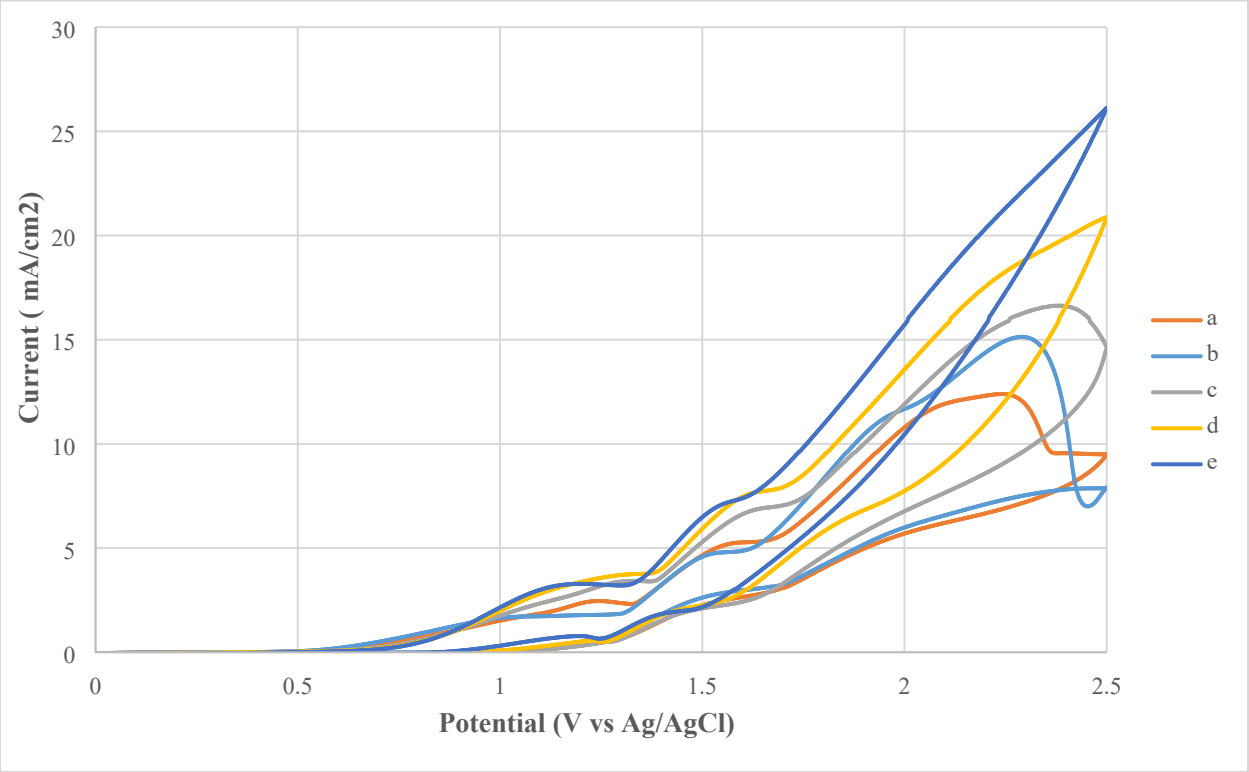


Figure 4 Cyclic voltammograms a) 1 mmol (124 mg) of **1b** and 5 mmol (292 mg) of NaCl in 27 mL AcOH-H_2O (8:1) in the presence of $LiClO_4$ (106 mg, 1mmol) sweep rate: 0.01 V/s , (b) 1 mmol (124 mg) of **1b** and 5 mmol (292 mg) of NaCl in 27 mL AcOH-H_2O (8:1) in the presence of $LiClO_4$ (106 mg, 1mmol) sweep rate: 0.02 V/s, (c) 1 mmol (124 mg) of **1b** and 5 mmol (292 mg) of NaCl in 27 mL AcOH-H_2O (8:1) in the presence of $LiClO_4$ (106 mg, 1mmol) sweep rate: 0.05 V/s (d) 1 mmol (124 mg) of **1b** and 5 mmol (292 mg) of NaCl in 27 mL AcOH-H_2O (8:1) in the presence of $LiClO_4$ (106 mg, 1mmol) sweep rate: 0.08 V/s and e) 1 mmol (124 mg) of **1b** and 5 mmol (292 mg) of NaCl in 27 mL AcOH-H_2O (8:1) in the presence of $LiClO_4$ (106 mg, 1mmol) sweep rate: 0.1 V/s recorded at a glassy carbon electrode (2.0 mm diameter), at room temperature. Ag/AgCl as a reference electrode (Scan range: 0 to 2.5 V).

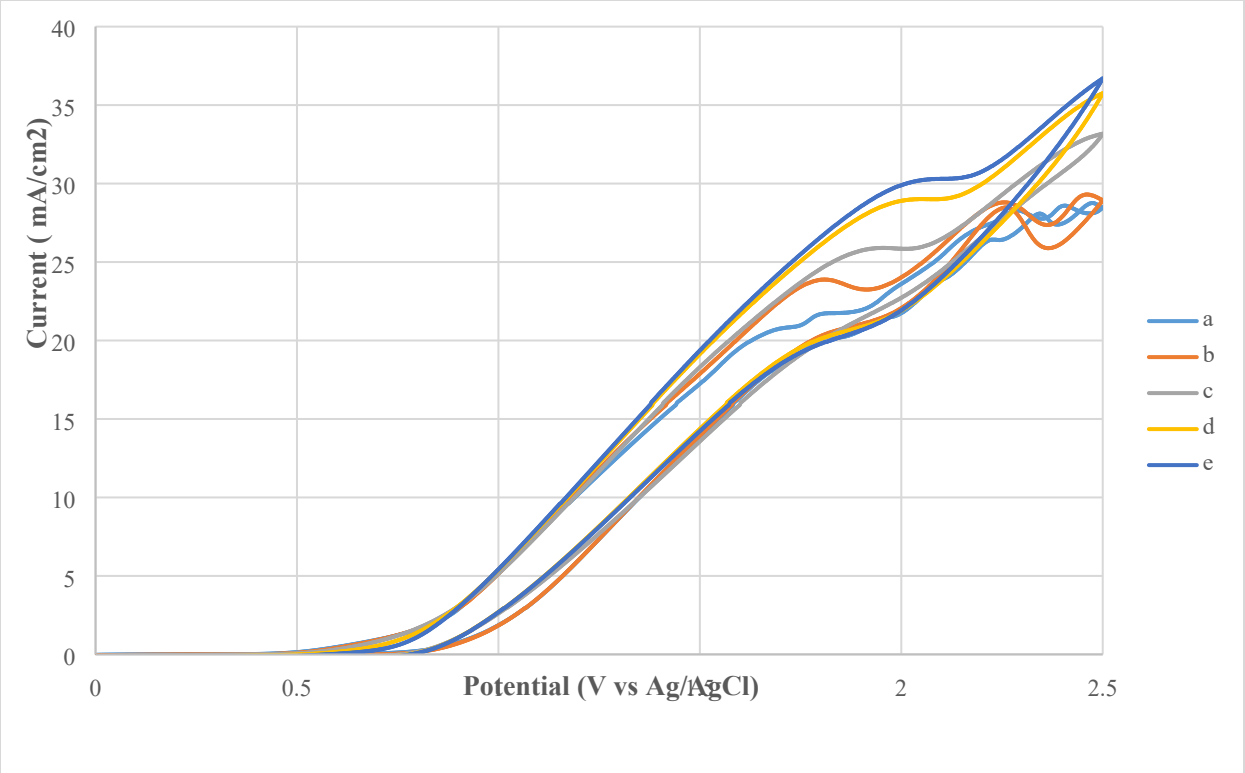
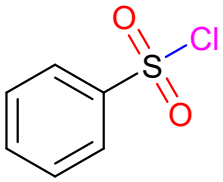


Figure 5 Cyclic voltammograms a) 1 mmol (124 mg) of **1b** and 5 mmol (514 mg) of NaBr in 27 mL AcOH-H_2O (8:1) in the presence of $LiClO_4$ (106 mg, 1mmol) sweep rate: 0.01 V/s , (b) 1 mmol (124 mg) of **1b** and 5 mmol (514 mg) of NaBr in 27 mL AcOH-H_2O (8:1) in the presence of $LiClO_4$ (106 mg, 1mmol) sweep rate: 0.02 V/s, (c) 1 mmol (124 mg) of **1b** and 5 mmol (514 mg) of NaBr in 27 mL AcOH-H_2O (8:1) in the presence of $LiClO_4$ (106 mg, 1mmol) sweep rate: 0.05 V/s (d) 1 mmol (124 mg) of **1b** and 5 mmol (514 mg) of NaBr in 27 mL AcOH-H_2O (8:1) in the presence of $LiClO_4$ (106 mg, 1mmol) sweep rate: 0.08 V/s and e) 1 mmol (124 mg) of **1b** and 5 mmol (514 mg) of NaBr in 27 mL AcOH-H_2O (8:1) in the presence of $LiClO_4$ (106 mg, 1mmol) sweep rate: 0.1 V/s recorded at a glassy carbon electrode (2.0 mm diameter), at room temperature. Ag/AgCl as a reference electrode. (Scan range: 0 to 2.5 V).

4- Spectral Data

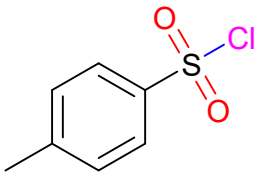


Benzenesulfonyl chloride (3a) *Known compound [1].*

Yield 141 mg (80%); Colorless oil.

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.08 – 8.04 (m, 2H), 7.76 (tt, *J* = 7.0, 1.2 Hz, 1H), 7.66 – 7.62 (m, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 144.3, 135.4, 129.7, 126.9.

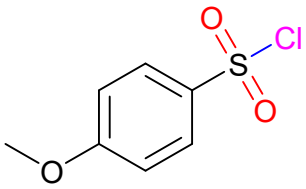


4-Methylbenzenesulfonyl chloride (3b) *Known compound [1].*

Yield 162 mg (85%); white solid; mp: 66-68 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.94 – 7.90 (m, 2H), 7.41 (dd, *J* = 8.6, 0.7 Hz, 2H), 2.50 (s, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 146.8, 141.7, 130.2, 127.0, 21.8.

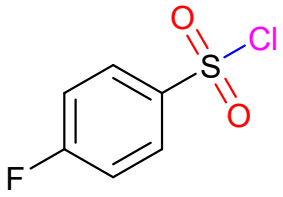


4-Methoxybenzenesulfonyl chloride (3c) *Known compound [1].*

Yield 180 mg (87%); Colorless oil.

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.00 – 7.94 (m, 2H), 7.07 – 7.03 (m, 2H), 3.93 (s, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 164.9, 136.1, 129.5, 114.7, 56.0.



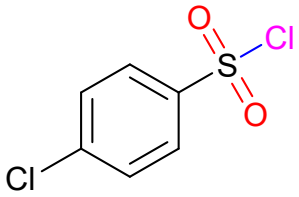
4-Fluorobenzenesulfonyl chloride (3d) *Known compound [1].*

Yield 140 mg (72%); Colorless oil.

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.09 (ddd, *J* = 9.1, 4.8, 1.4 Hz, 2H), 7.35 – 7.25 (m, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 167.4, 165.4, 140.4, 140.3, 130.2, 130.1, 117.2, 117.0.

^{19}F NMR (471 MHz, $CDCl_3$) δ -99.4.

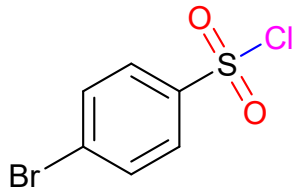


4-Chlorobenzenesulfonyl chloride (3e) *Known compound [1].*

Yield 165 mg (78%); white solid; mp: 51-53 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.02 – 7.97 (m, 2H), 7.63 – 7.59 (m, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 142.6, 142.2, 130.0, 128.4.

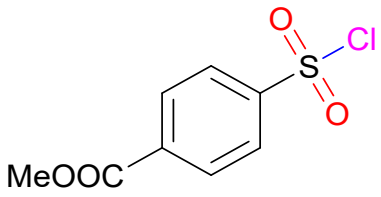


4-Bromobenzenesulfonyl chloride (3f) *Known compound [1c, 2].*

Yield 202 mg (79%); white solid; mp: 73-76 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.94 – 7.89 (m, 2H), 7.81 – 7.76 (m, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 143.2, 133.0, 130.8, 128.4.

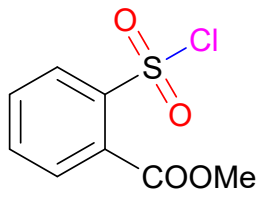


Methyl 4-(chlorosulfonyl) benzoate (3g) *Known compound [3].*

Yield 176mg (75%); white solid; mp: 74-76 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.34 – 8.22 (m, 2H), 8.17 – 8.08(q, *J* = 7.2 Hz, 2H), 3.99 (s, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 165.4, 147.6, 136.1, 131.1, 127.2, 53.3.

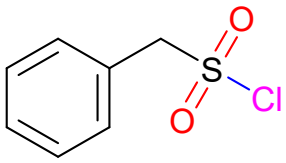


Methyl 2-(chlorosulfonyl) benzoate (3h) *Known compound [4].*

Yield 160mg (68%); white solid; mp: 59-62 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.17 (d, *J* = 8.0 Hz, 1H), 7.85 – 7.66 (m, 3H), 4.00 (s, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 165.4, 147.6, 136.1, 131.1, 127.2, 53.3.

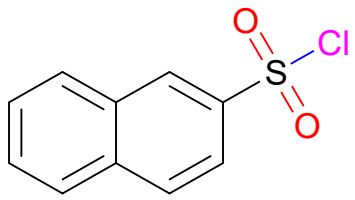


Phenylmethanesulfonyl chloride (3i) *Known compound [2b, 5].*

Yield 133 mg (70%); white solid; mp: 89-91 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.53 – 7.44 (m, 5H), 4.88 (s, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 131.4, 130.3, 129.2, 126.1, 70.9.

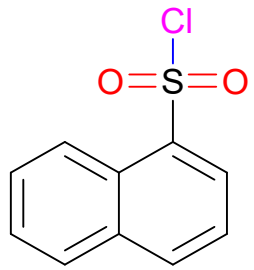


Naphthalene-2-sulfonyl chloride (3j) *Known Compound* [1c, 2b, 6].

Yield 177 mg (78%); white solid; mp: 72-74 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.61 (s, 1H), 8.07 – 7.95 (m, 4H), 7.76 – 7.68 (m, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 141.0, 135.7, 132.3, 131.6, 131.0, 129.5, 129.0, 128.6, 128.1, 121.2.

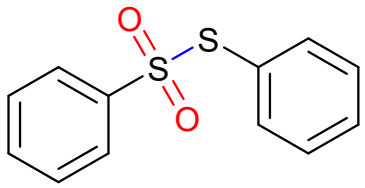


Naphthalene-2-sulfonyl chloride (3k) *Known Compound* [1c, 7].

Yield 170 mg (75%); white solid; mp: 63-65 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.79 (d, *J* = 8.4 Hz, 1H), 8.36 (d, *J* = 15.2 Hz, 1H), 8.21 (d, *J* = 9.2 Hz, 1H), 7.99 (d, *J* = 6.22 Hz, 1H), 7.80 (tt, *J* = 8.0, 1.6 Hz, 1H), 7.70 (tt, J = 7.5, 1.4 Hz, 1H), 7.60 (t, J = 7.3 Hz, 1H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 139.5, 136.8, 134.4, 129.6, 129.4, 129.4, 129.2, 127.7, 127.4, 124.2, 123.7.

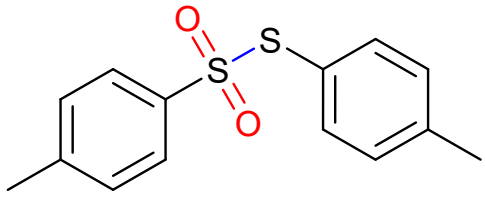


S-phenyl benzenesulfonothioate (4a) *Known Compound* [8,15].

Yield 213 mg (85%); white solid; mp: 38-40 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.57 (d, J = 7.1 Hz, 3H), 7.48 (d, J = 3.3 Hz, 1H), 7.43 (d, J = 7.8 Hz, 2H), 7.34 (d, J = 6.7 Hz, 4H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 142.6, 136.1, 133.1, 130.9, 128.9, 128.3, 127.5, 127.1.

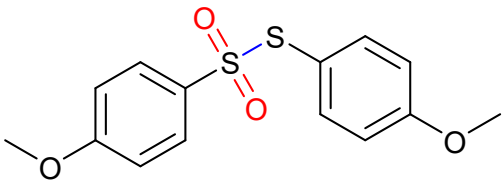


S-(p-tolyl) 4-methylbenzenesulfonothioate (4b) *Known Compound* [8-9, 15].

Yield 242 mg (87%); white solid; mp: 74-76 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.46 (d, *J* = 8.4 Hz, 2H), 7.25 – 7.20 (m, 4H), 7.14 (d, *J* = 8.5 Hz, 2H), 2.43 (s, 3H), 2.39 (s, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 144.5, 142.6, 140.1, 1306.4, 130.5, 129.6, 128.0, 124.7, 21.7, 21.5.

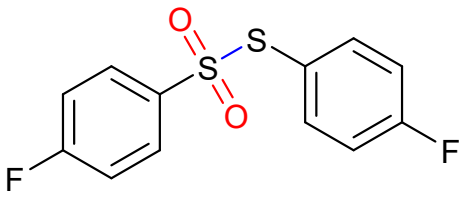


S-(4-methoxyphenyl) 4-methoxybenzenesulfonothioate (4c) *Known Compound* [8-9].

Yield 276 mg (89%); white solid; mp: 89-91 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.84 – 7.80 (m, 3H), 7.64 – 7.60 (m, 1H), 7.02 – 6.97 (m, 4H), 3.85 (d, *J* = 10.3 Hz, 6H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 163.7, 162.6, 130.0, 127.7, 127.0, 114.4, 114.3, 55.7, 55.5.



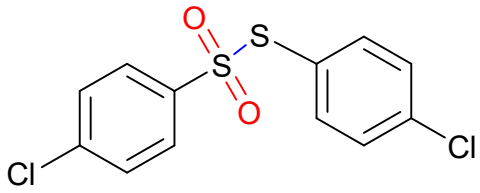
S-(4-fluorophenyl) 4-fluorobenzenesulfonothioate (4d) *Known Compound* [8].

Yield 215 mg (75%); white solid; mp: 64-67 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.96 – 7.94 (m, 2H), 7.94 – 7.92 (m, 2H), 7.27 – 7.24 (m, 2H), 7.24 – 7.21 (m, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 166.7, 165.9, 164.6, 163.9, 140.7, 132.5, 130.6, 130.6, 127.7, 127.6, 116.6, 116.4, 116.3, 116.2.

^{19}F NMR (471 MHz, $CDCl_3$) δ -103.4 (tt, J = 8.4, 4.6 Hz).

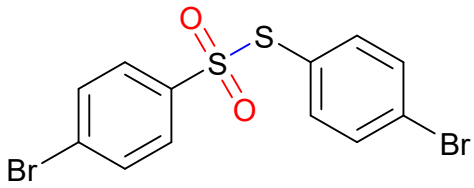


S-(4-chlorophenyl) 4-chlorobenzenesulfonothioate (4e) *Known Compound* [8-9, 15].

Yield 249 mg (78%); white solid; mp: 136-138 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.88 – 7.84 (m, 4H), 7.56 – 7.52 (m, 4H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 143.4, 138.4, 133.6, 129.5, 129.3, 129.2, 127.8, 126.7.

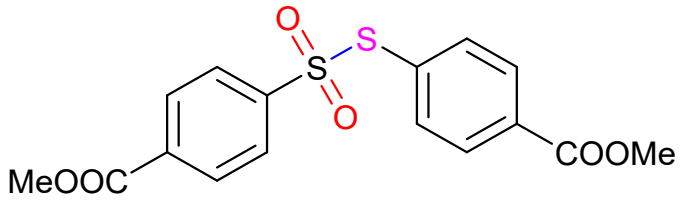


S-(4-bromophenyl) 4-bromobenzenesulfonothioate (4f) *Known Compound* [8a, 8c, 9].

Yield 326 mg (80%); white solid; mp: 149-151 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.63 – 7.58 (m, 2H), 7.54 – 7.50 (m, 2H), 7.47 – 7.43 (m, 2H), 7.26 – 7.23 (m, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 141.9, 137.8, 132.9, 132.3, 129.2, 128.9, 127.0, 126.6.

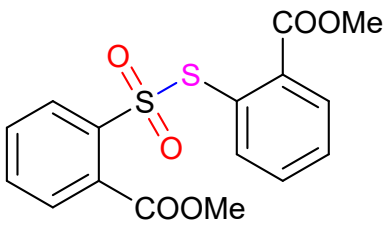


Dimethyl 4-((4-benzoatethio)sulfonyl)benzoate (4g) *Known Compound* [9-10].

Yield 326 mg (78%); yellow solid; mp: 144-146 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.07 (d, *J* = 8.9 Hz, 2H), 8.00 (d, *J* = 8.2 Hz, 2H), 7.61 (d, *J* = 15.4 Hz, 2H), 7.43 (d, *J* = 9.3 Hz, 2H), 3.97 (s, 3H), 3.95 (s, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 165.4, 165.0, 146.1, 136.1, 134.5, 132.6, 132.1, 130.3, 130.1, 127.1, 52.5, 52.4.

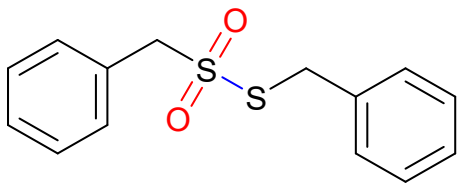


Dimethyl 2-((2-benzoatethio)sulfonyl)benzoate (4h) *Known Compound* [11].

Yield 256 mg (70%); yellow solid; mp: 100-103 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.20 (d, J = 8.9 Hz, 1H), 8.06 (d, J = 8.2 Hz, 1H), 7.73 (t, J = 8.5 Hz, 3H), 7.40 (t, J = 7.7 Hz, 1H), 7.25 (p, J = 7.3 Hz, 3H), 4.08 (s, 3H), 3.98 (s, 3H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 170.4, 166.9, 148.0, 140.3, 135.1, 133.6, 133.1, 132.0, 131.5, 129.0, 127.6, 127.3, 125.8, 125.5, 54.7, 52.4.

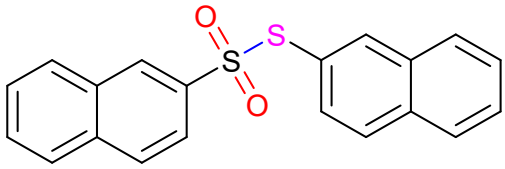


S-benzyl phenylmethanesulfonothioate (4i) *Known Compound* [8b, 12, 15].

Yield 209 mg (75%); white solid; mp: 66-69 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.46 – 7.41 (m, 5H), 7.41 – 7.37 (m, 5H), 4.34 (s, 2H), 4.11 (s, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 134.4, 130.4, 130.2, 129.7, 129.0, 128.9, 128.7, 128.2, 64.5, 40.8.

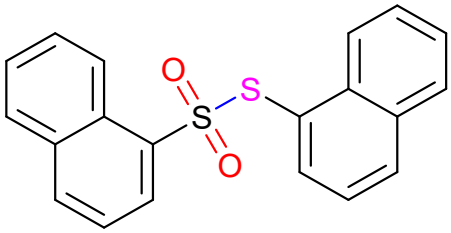


S-(naphthalen-2-yl) naphthalene-2-sulfonothioate (4j) *Known Compound* [9, 13]

Yield 287 mg (82%); white solid; mp: 100-103 °C.

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.94 (s, 1H), 7.89 (d, *J* = 8.8 Hz, 2H), 7.83 (s, 2H), 7.74 (d, *J* = 10.8 Hz, 2H) 7.67 – 7.61 (m, 4H), 7.59 – 7.44 (m, 3H), 7.37 (d, *J* = 8.9, 1H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 139.9, 137.9, 135.6, 134.4, 133.5, 132.2, 132.0, 130.0, 129.9, 129.9, 129.9, 129.9, 128.7, 128.5, 128.1, 127.9, 127.8, 127.2, 125.5, 122.7.



S-(naphthalen-1-yl) naphthalene-1-sulfonothioate (4k) *Known Compound* [8b-d, 9, 14]

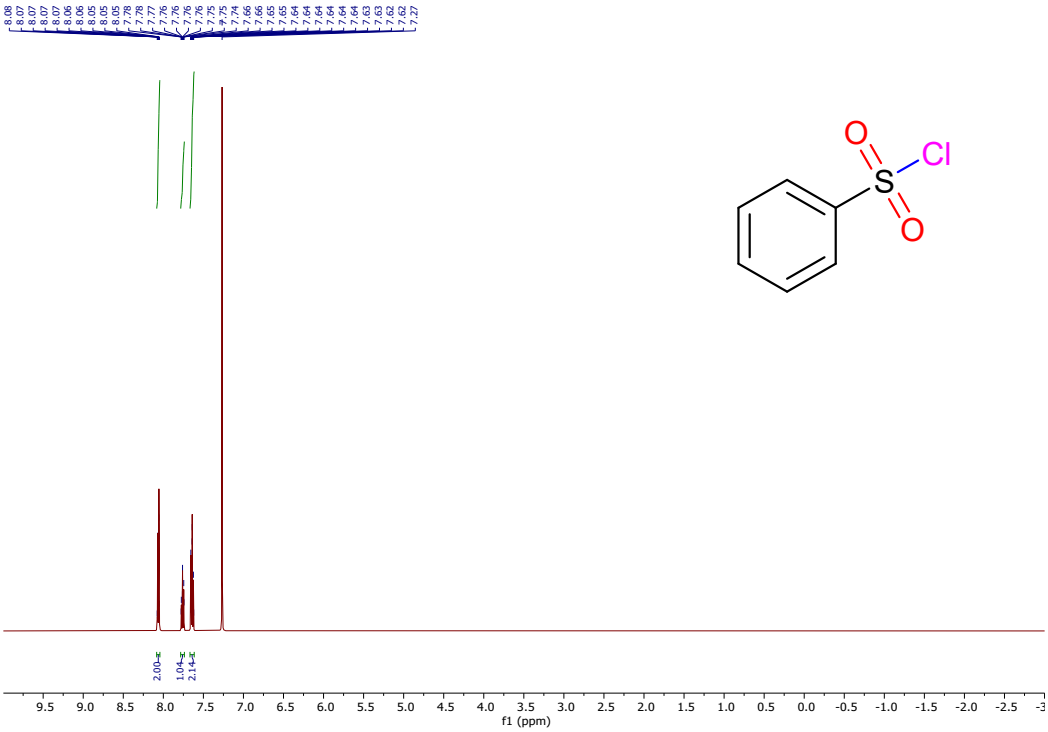
Yield 280 mg (80%); white solid; mp: 110-113 °C.

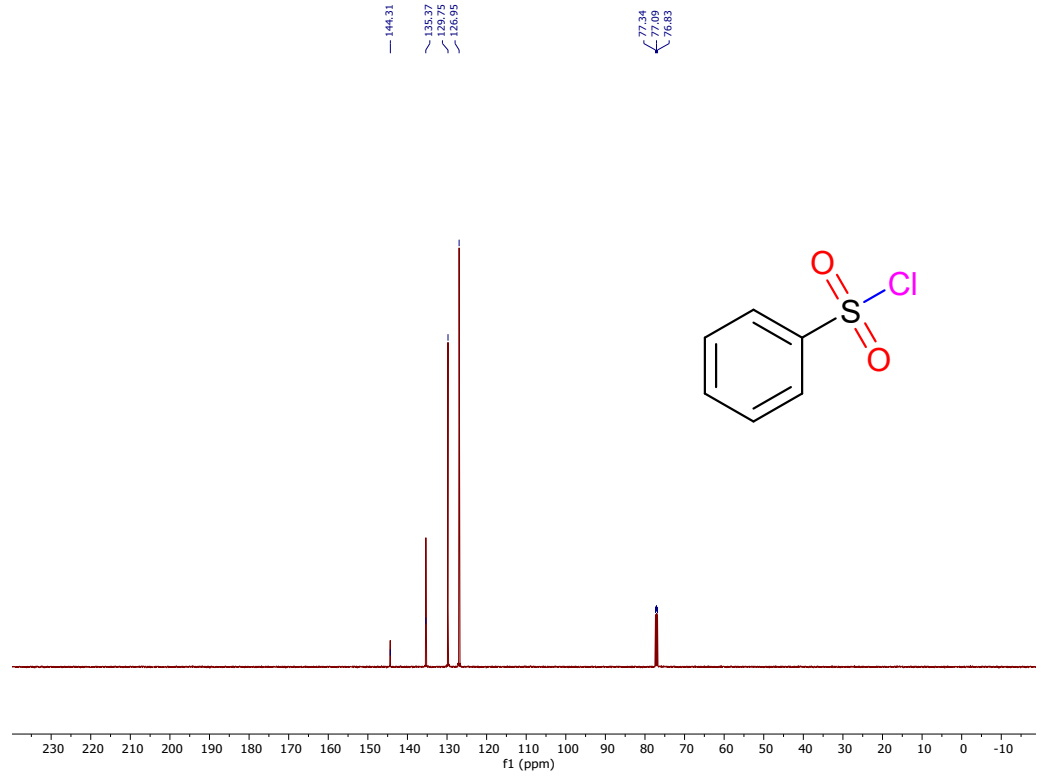
^{1}H NMR (500 MHz, $CDCl_3$) δ 8.87 (d, *J* = 7.1 Hz, 1H), 7.97 – 7.87 (m, 3H), 7.76 – 7.63 (m, 4H), 7.57 (dd, *J* = 15.2, 1.1 Hz, 1H), 7.50 (d, *J* = 6.8 Hz, 1H), 7.39 – 7.32 (m, 2H), 7.14 – 7.02 (m, 2H).

^{13}C NMR (126 MHz, $CDCl_3$) δ 138.0, 137.1, 135.3, 134.5, 134.3, 134.0, 132.7, 130.6, 129.0, 128.6, 128.3, 128.0, 127.0, 127.0, 126.5, 125.6, 125.0, 124.7, 123.5.

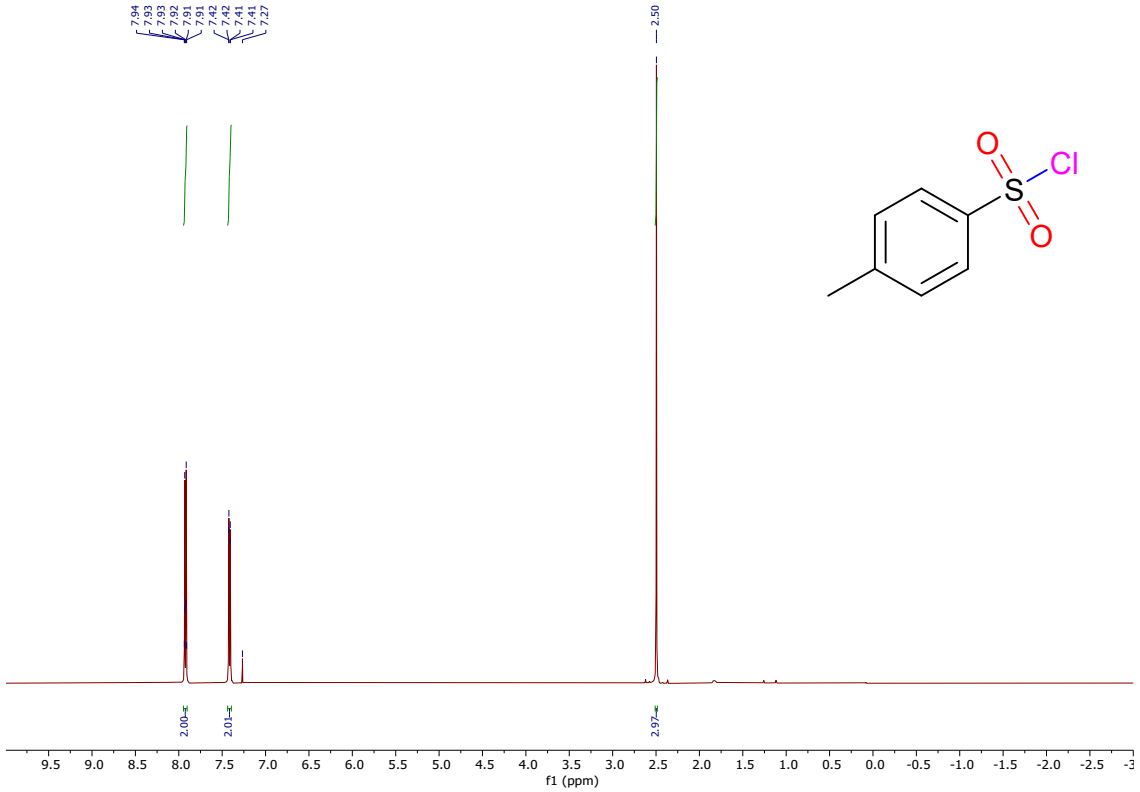
5-NMR Spectra

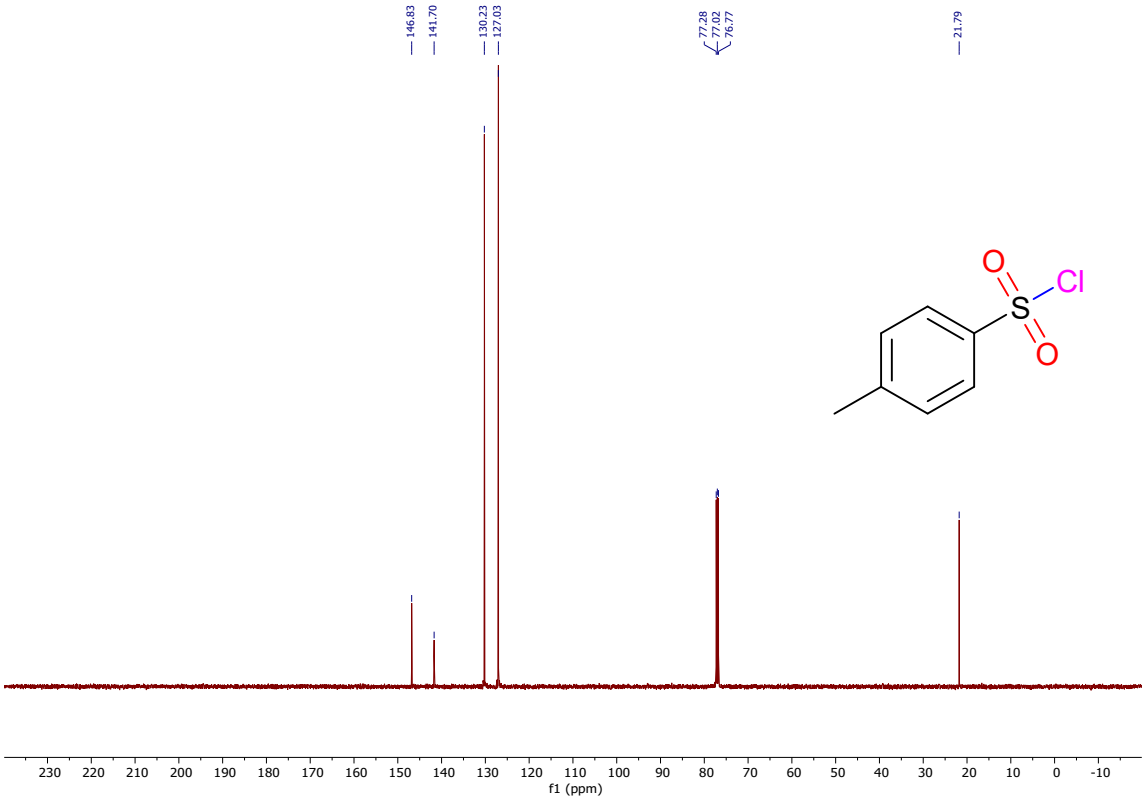
Benzenesulfonyl chloride (3a)



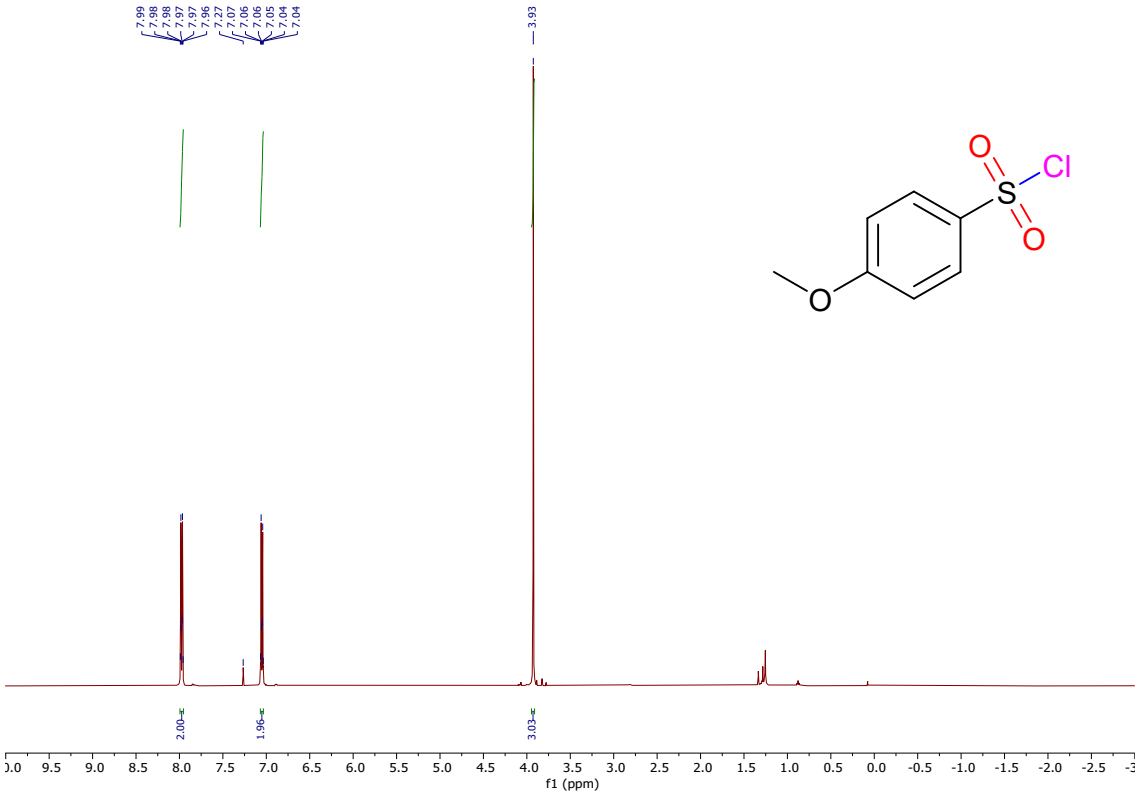


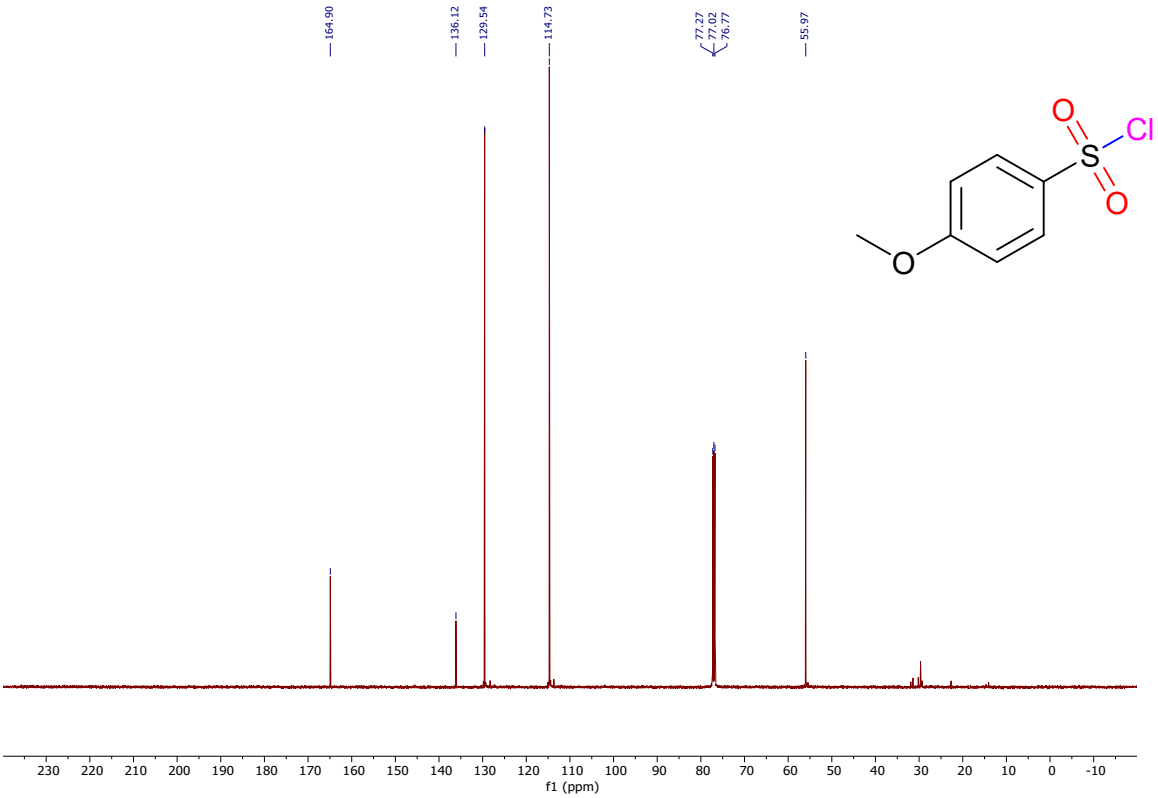
4-Methylbenzenesulfonyl chloride (3b)



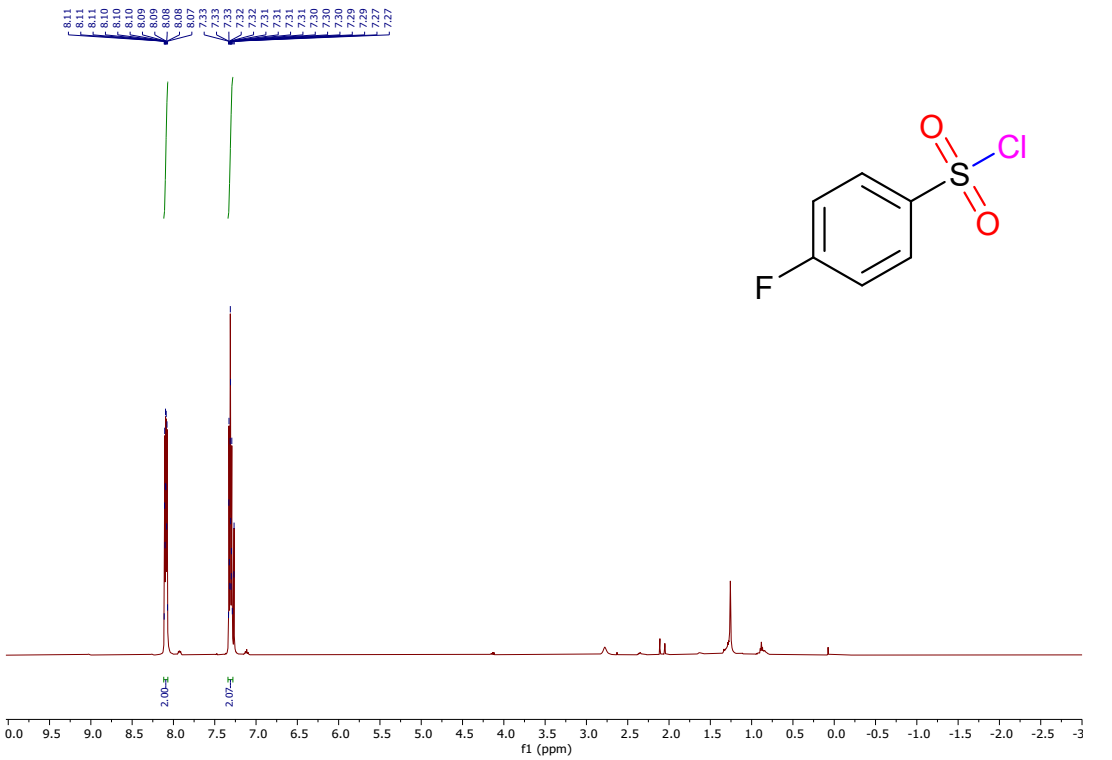


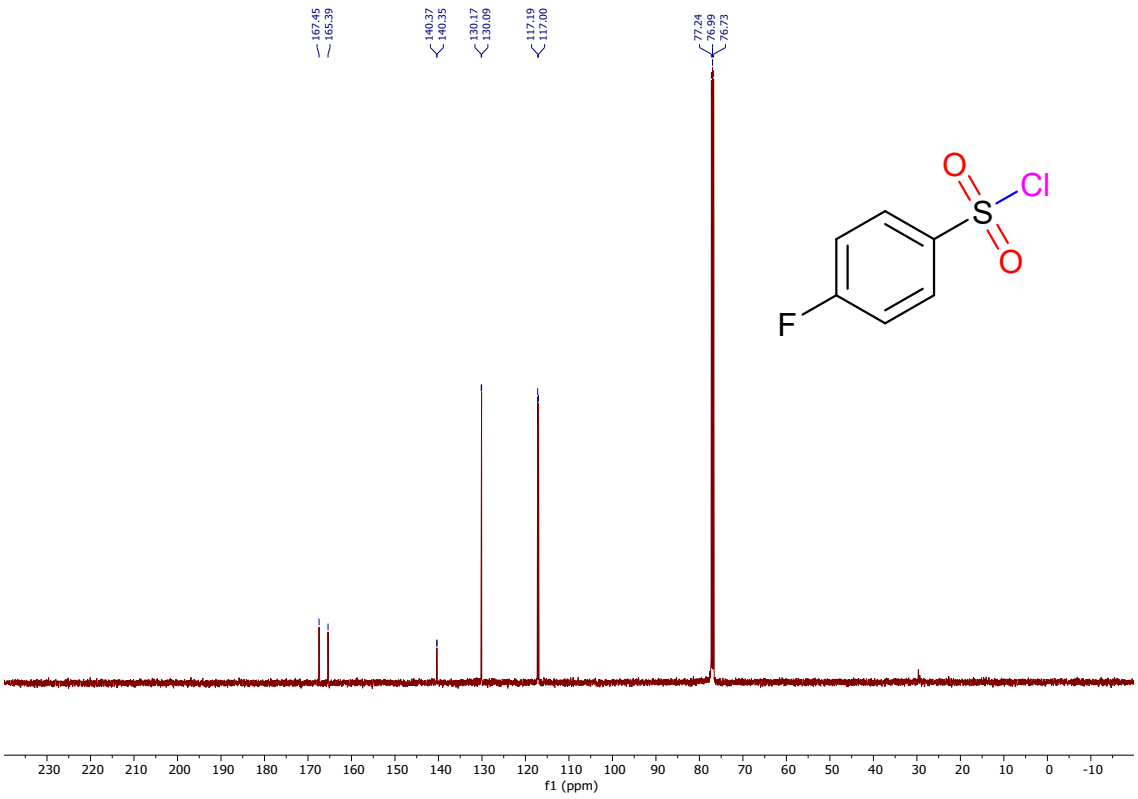
4-Methoxybenzenesulfonyl chloride (3c)

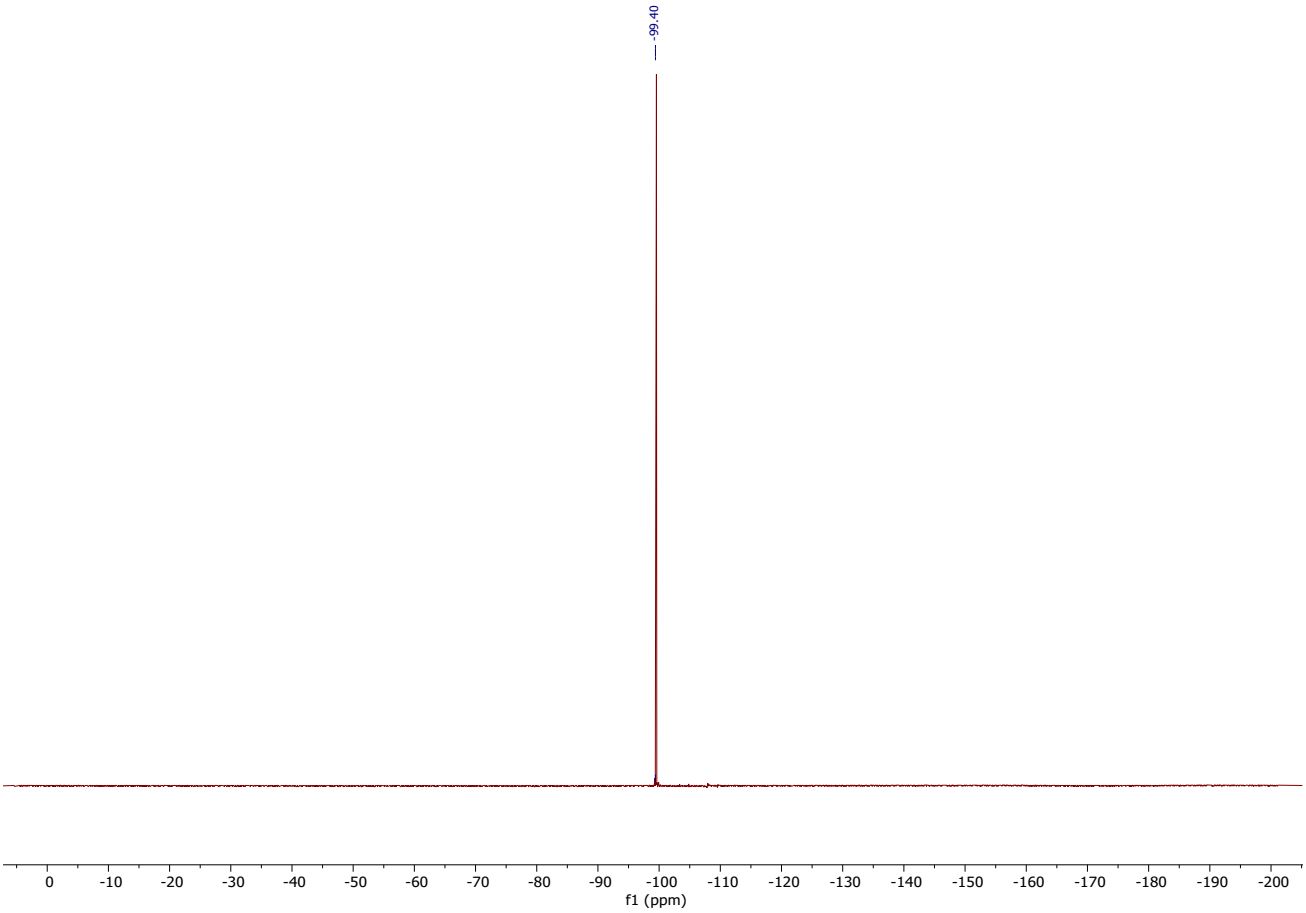




4-Fluorobenzenesulfonyl chloride (3d)



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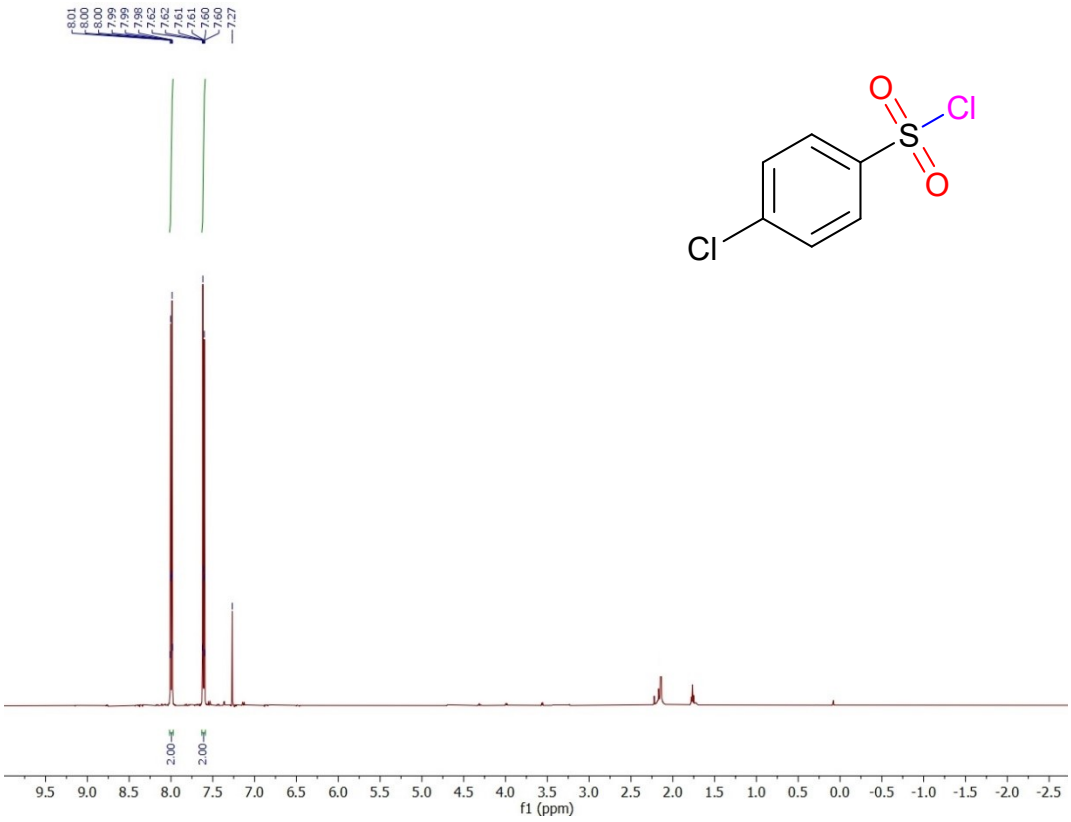
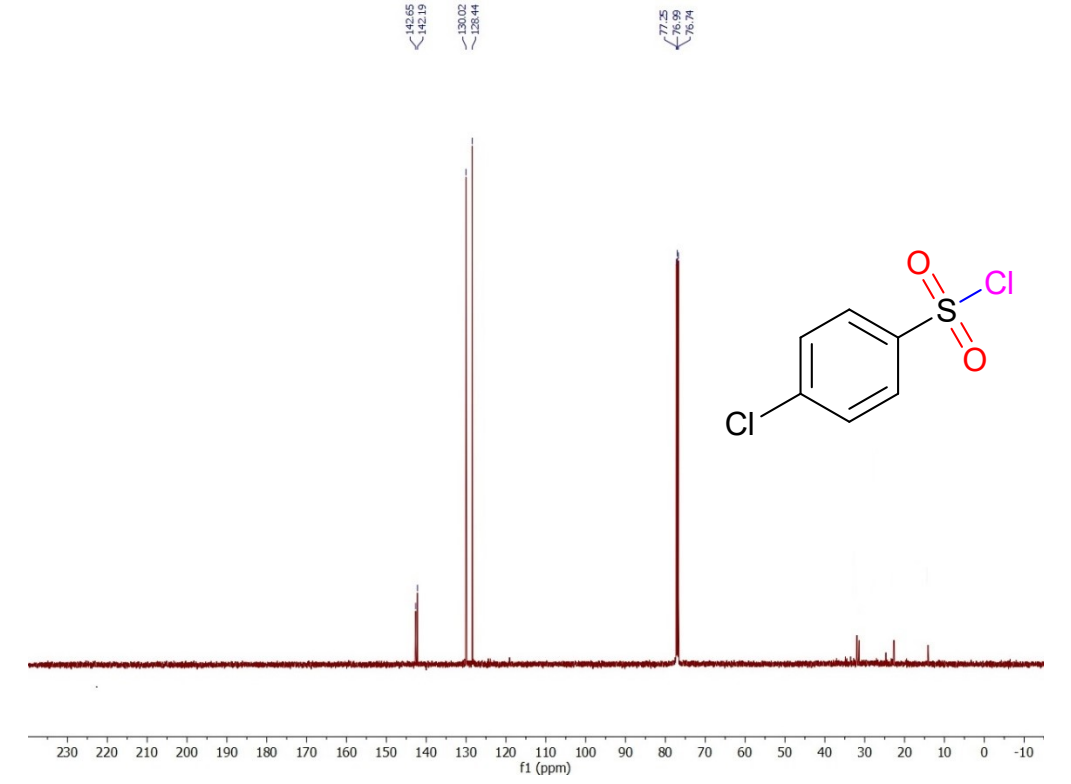
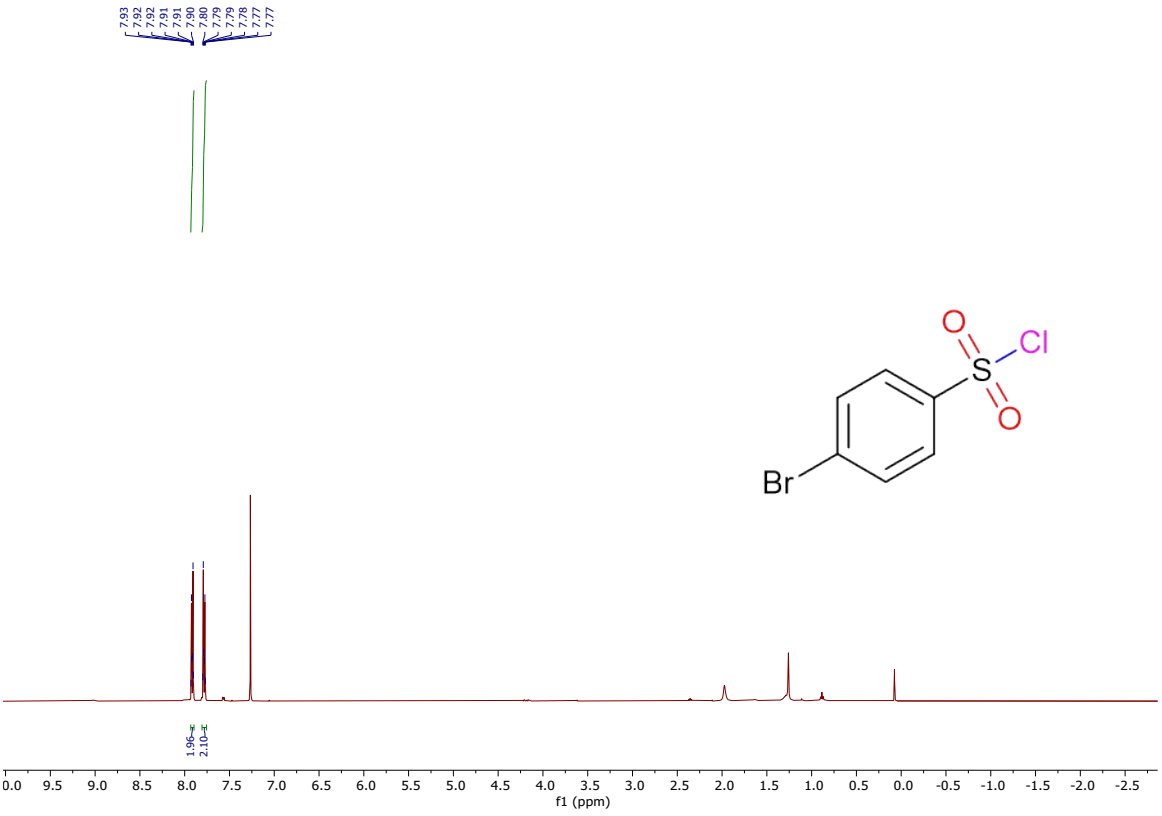
f1 (ppm)

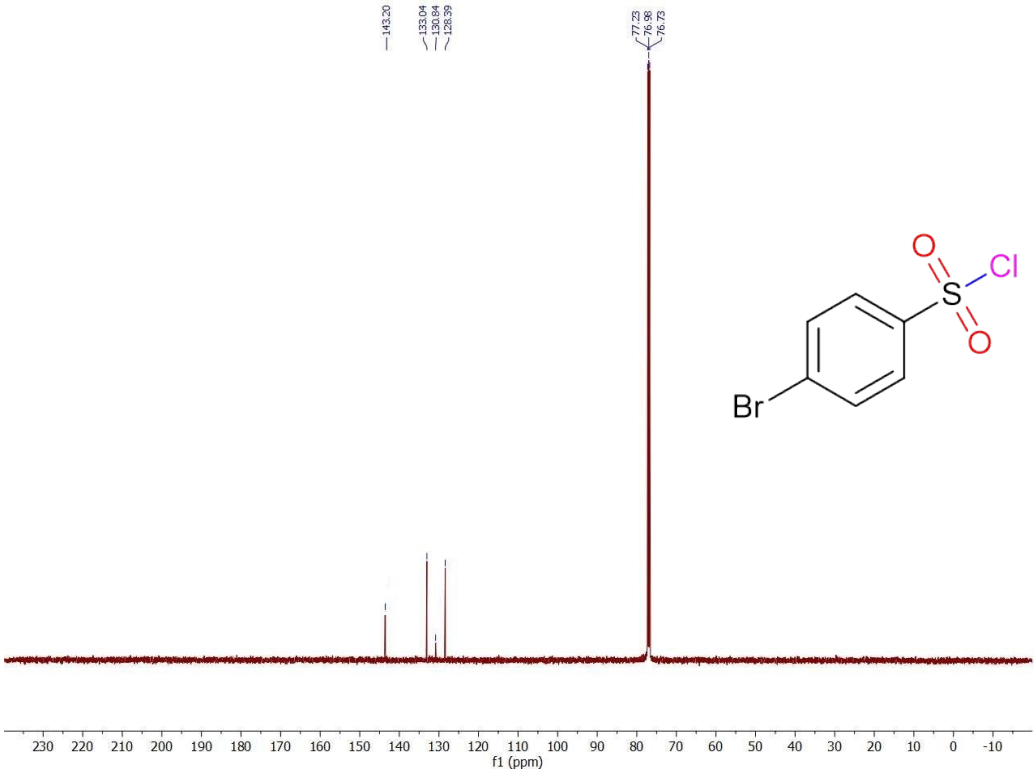
4-Chlorobenzenesulfonyl chloride (3e)



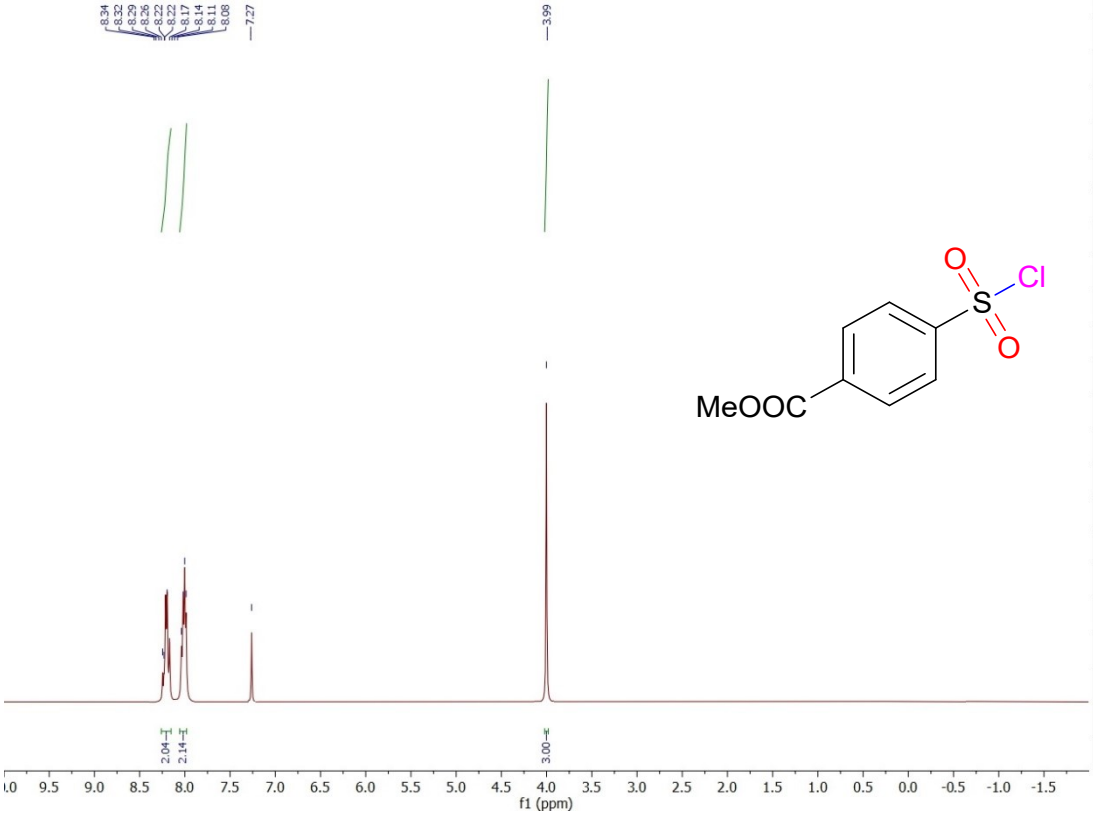


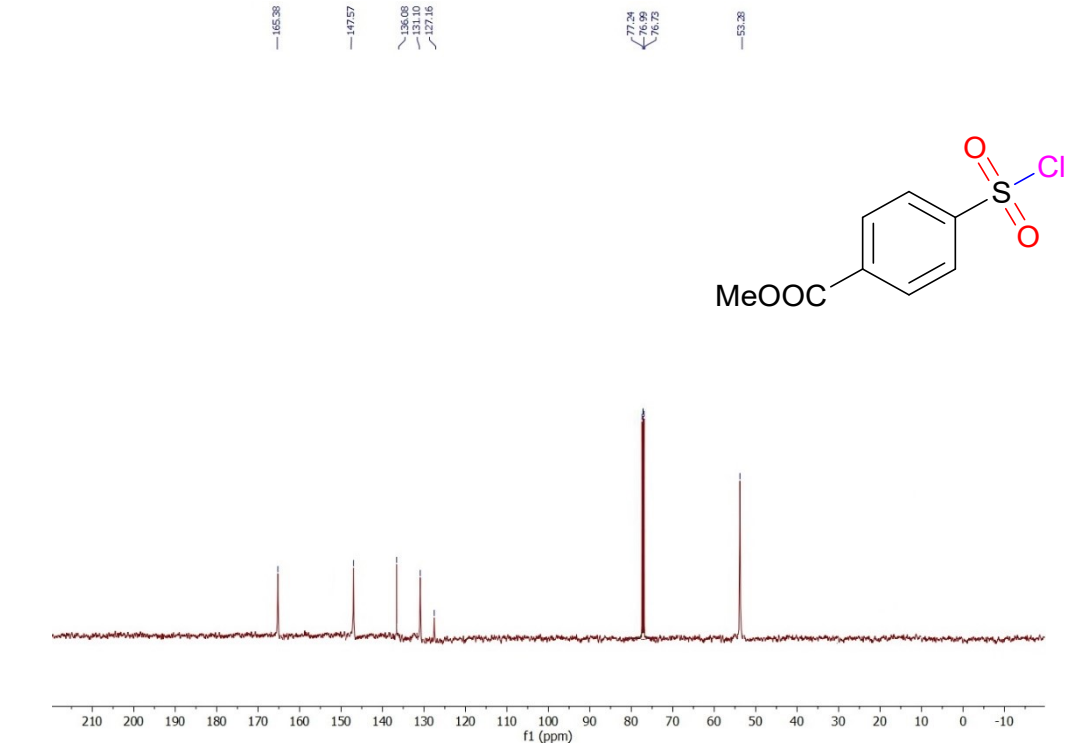
4-Bromobenzenesulfonyl chloride (3f)



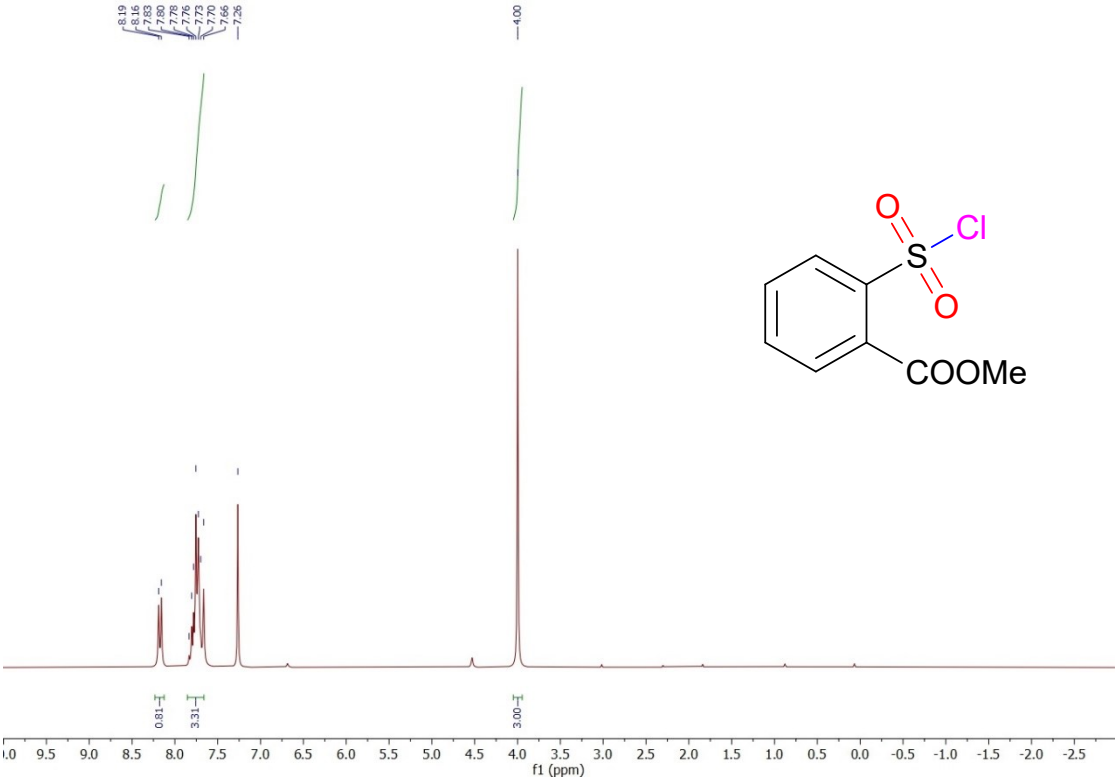


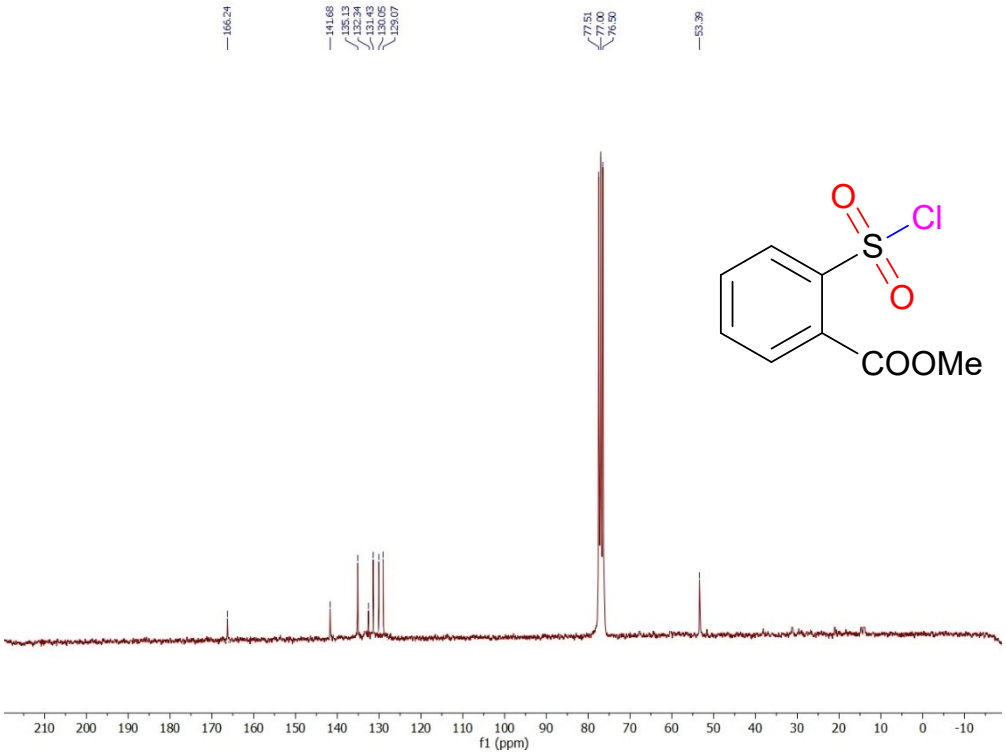
Methyl 4-(chlorosulfonyl) benzoate (3g)



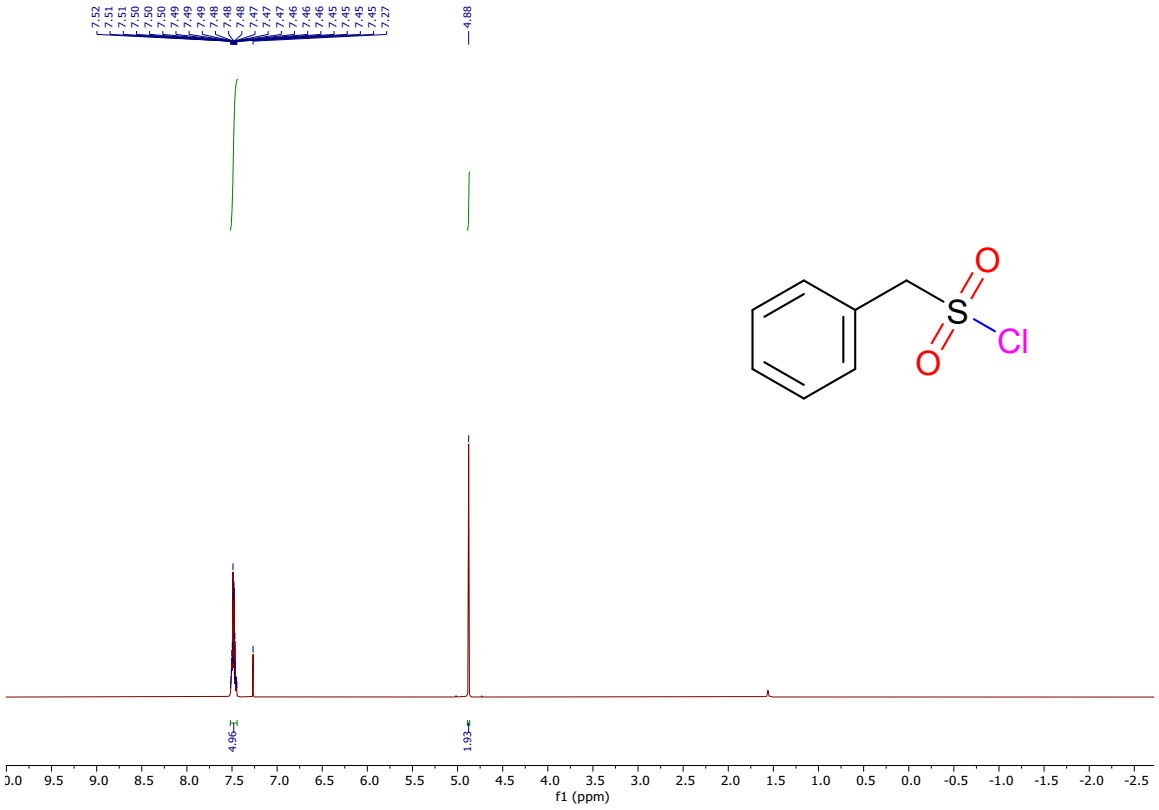


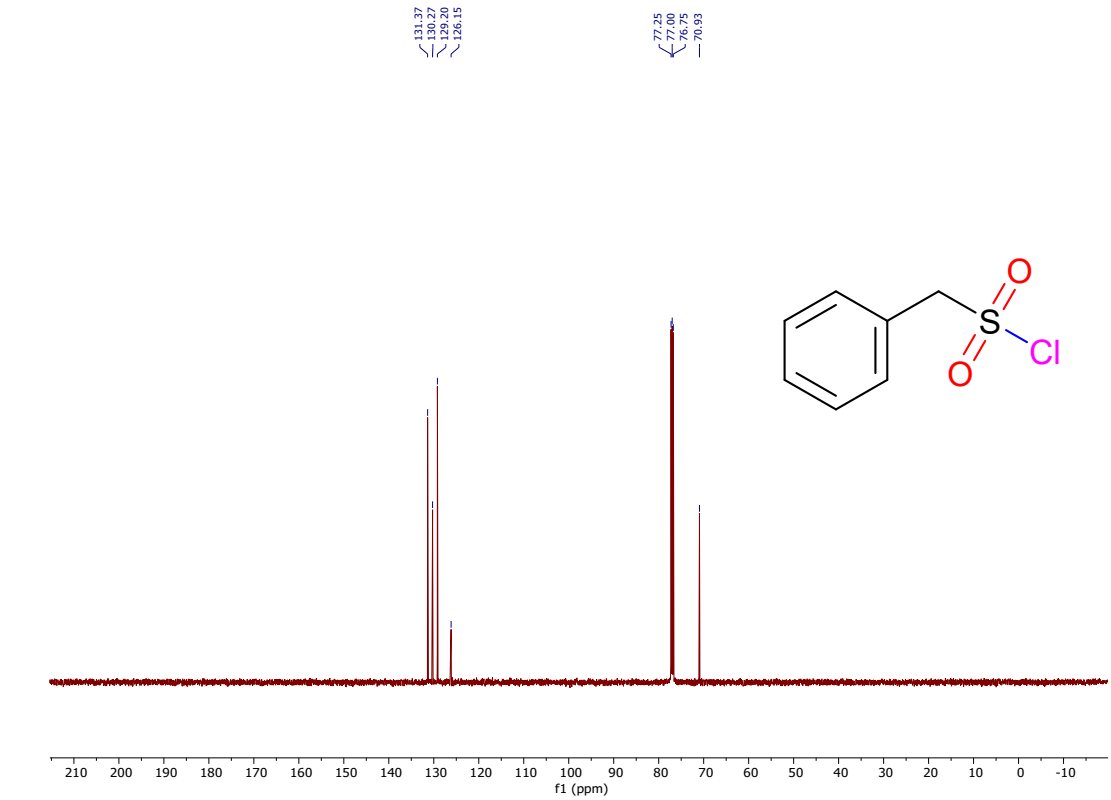
Methyl 2-(chlorosulfonyl) benzoate (3h)



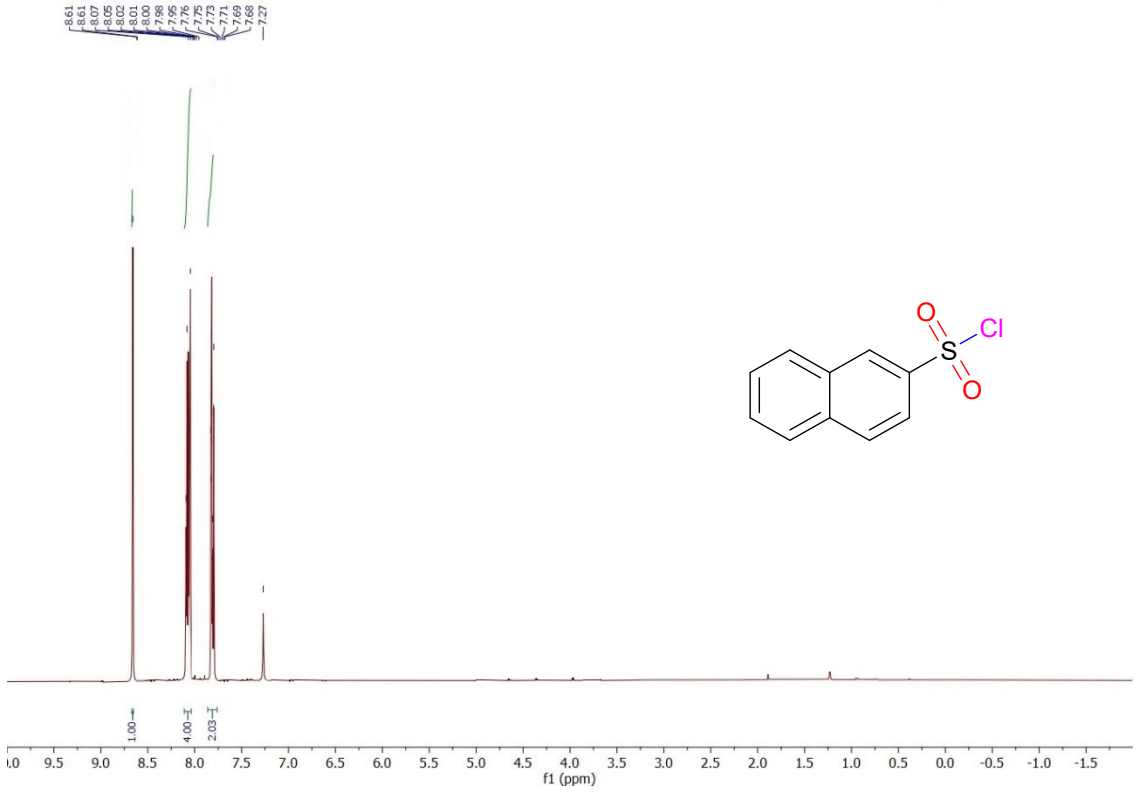


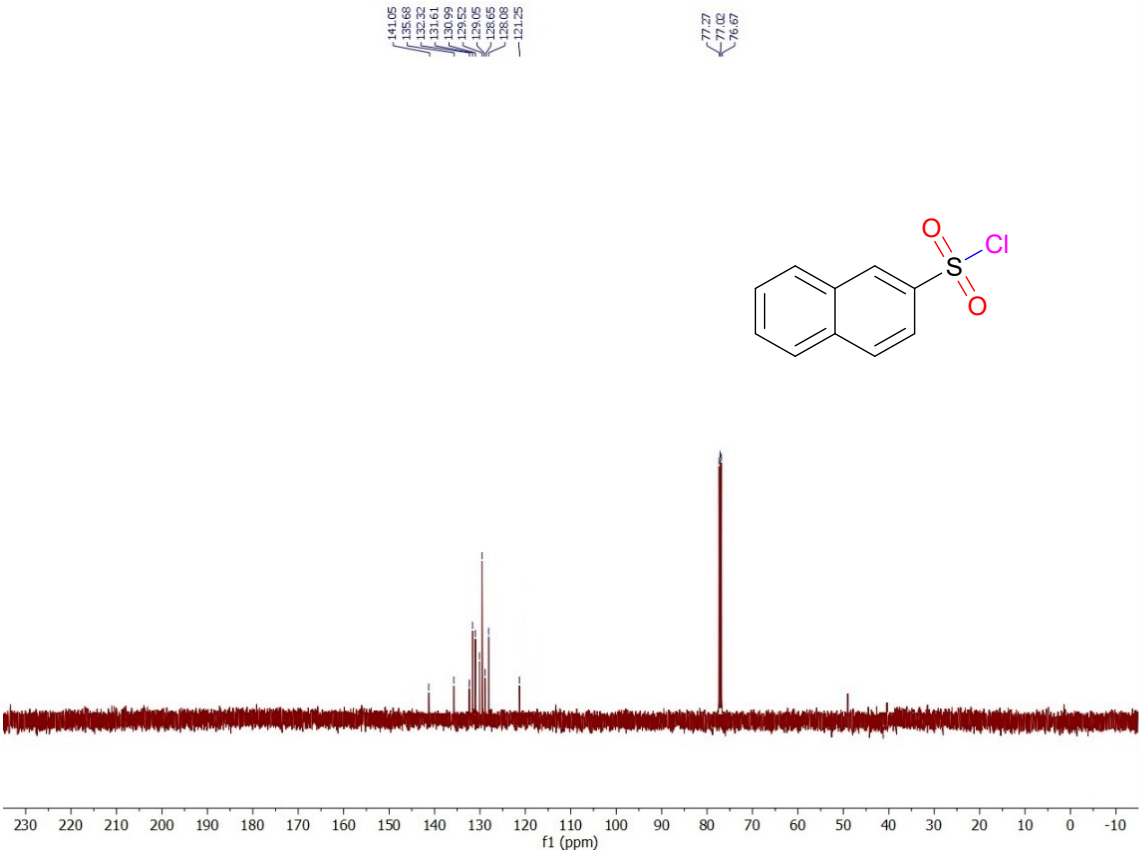
Phenylmethanesulfonyl chloride (3i)



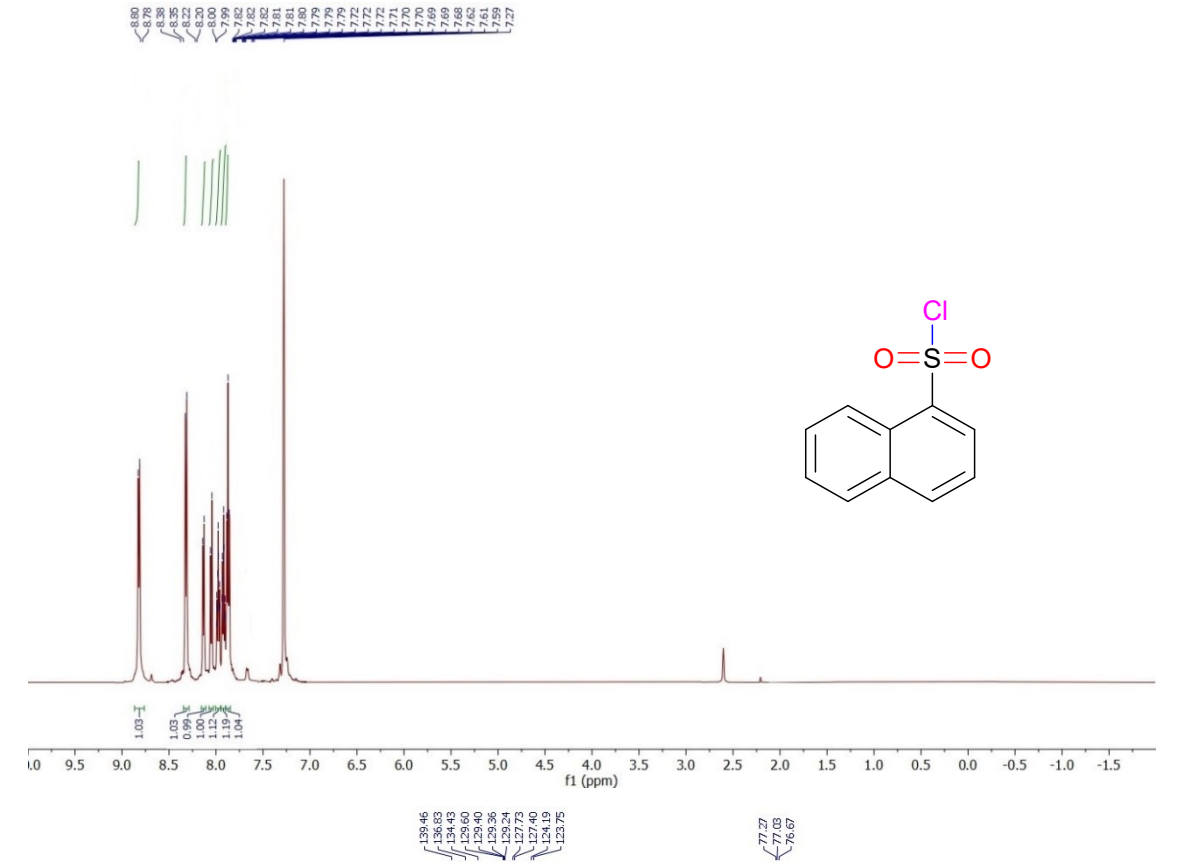


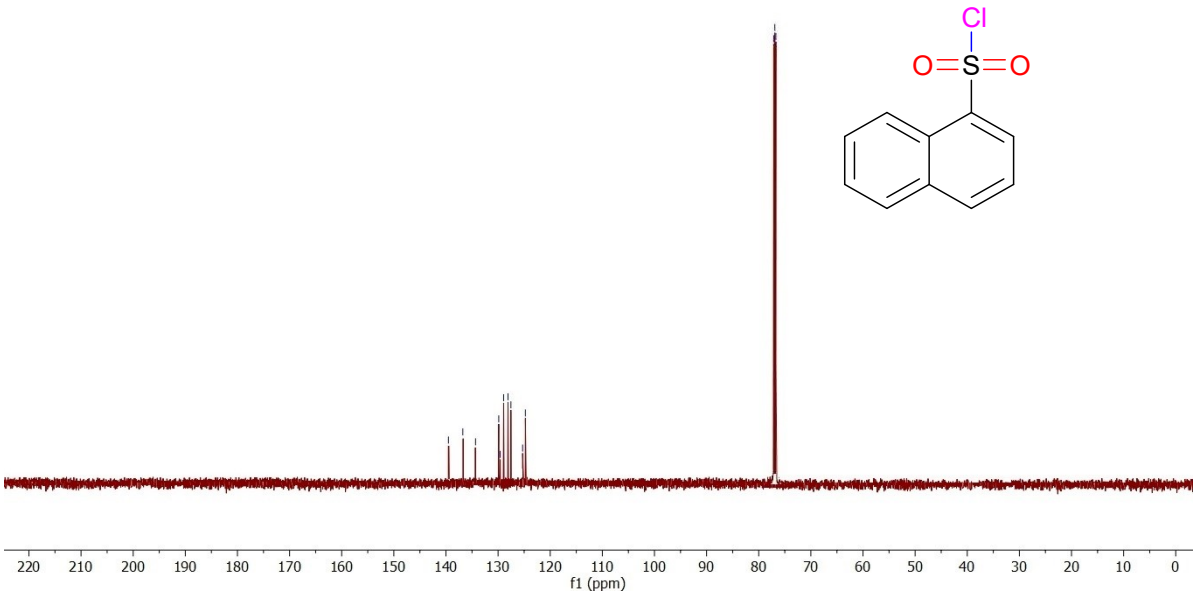
Naphthalene-2-sulfonyl chloride (3j)



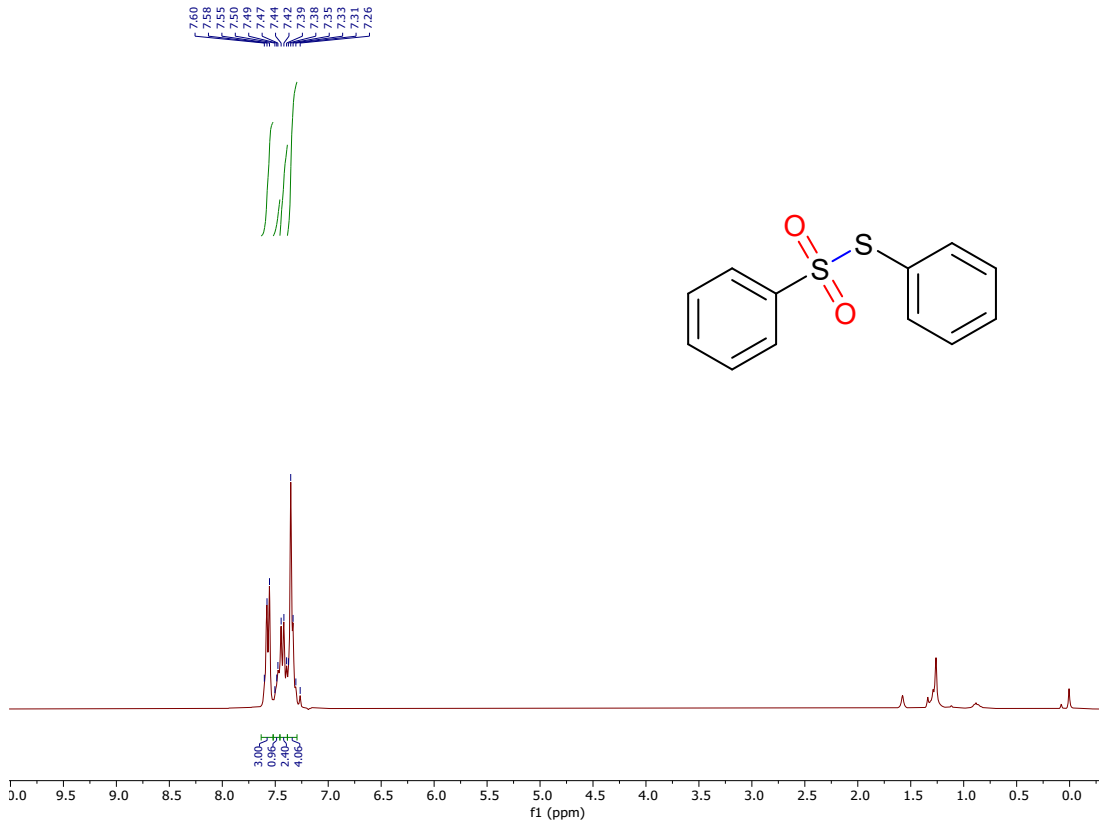


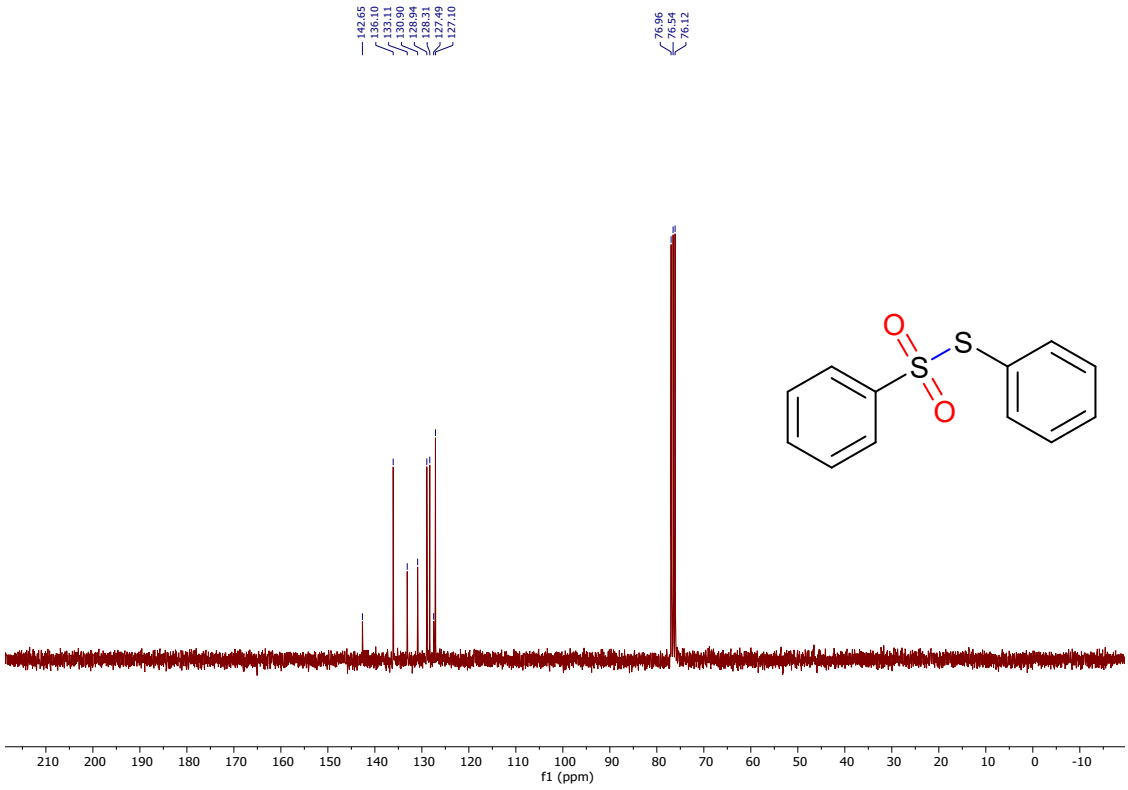
Naphthalene-1-sulfonyl chloride (3k)



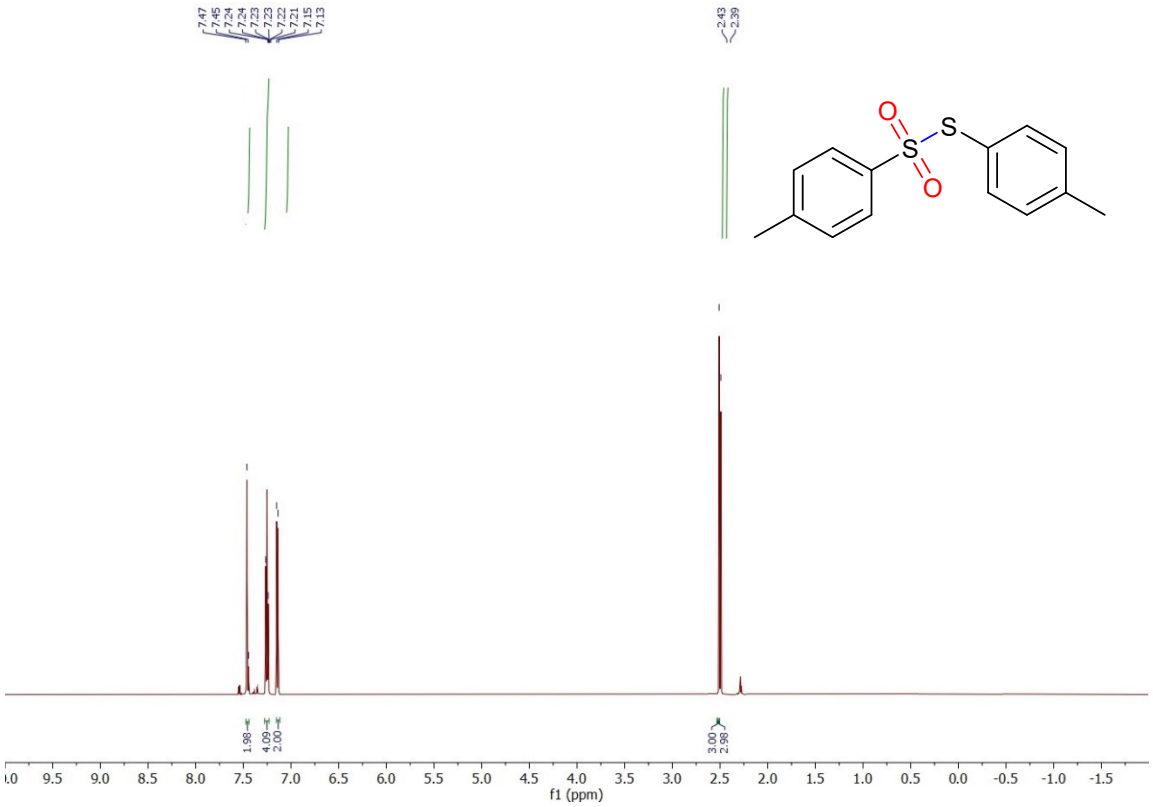


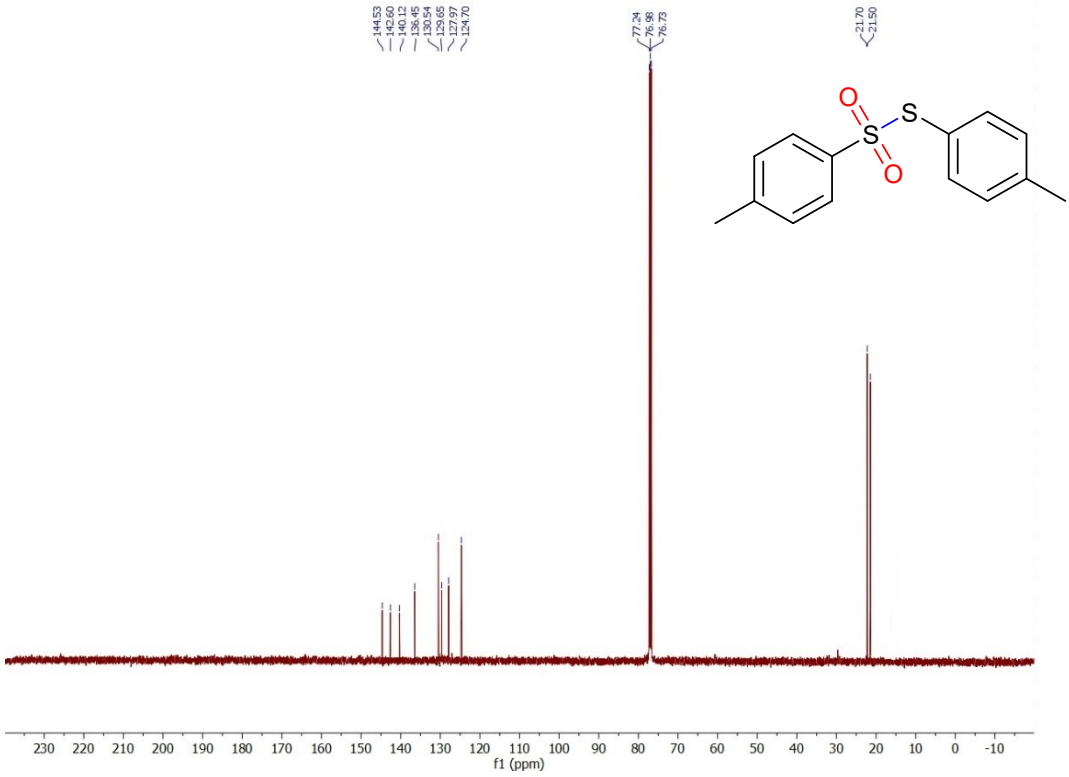
S-phenyl benzenesulfonothioate (4a)



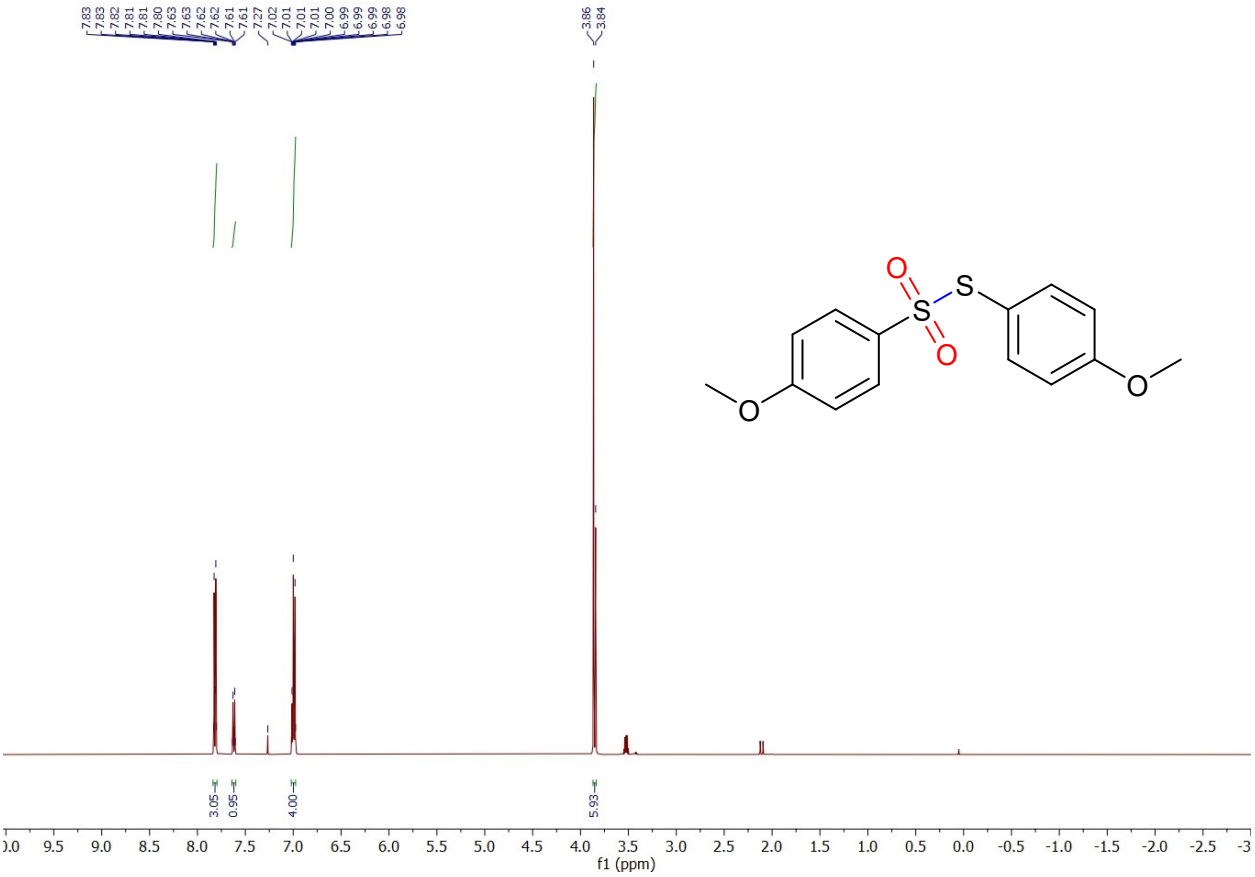


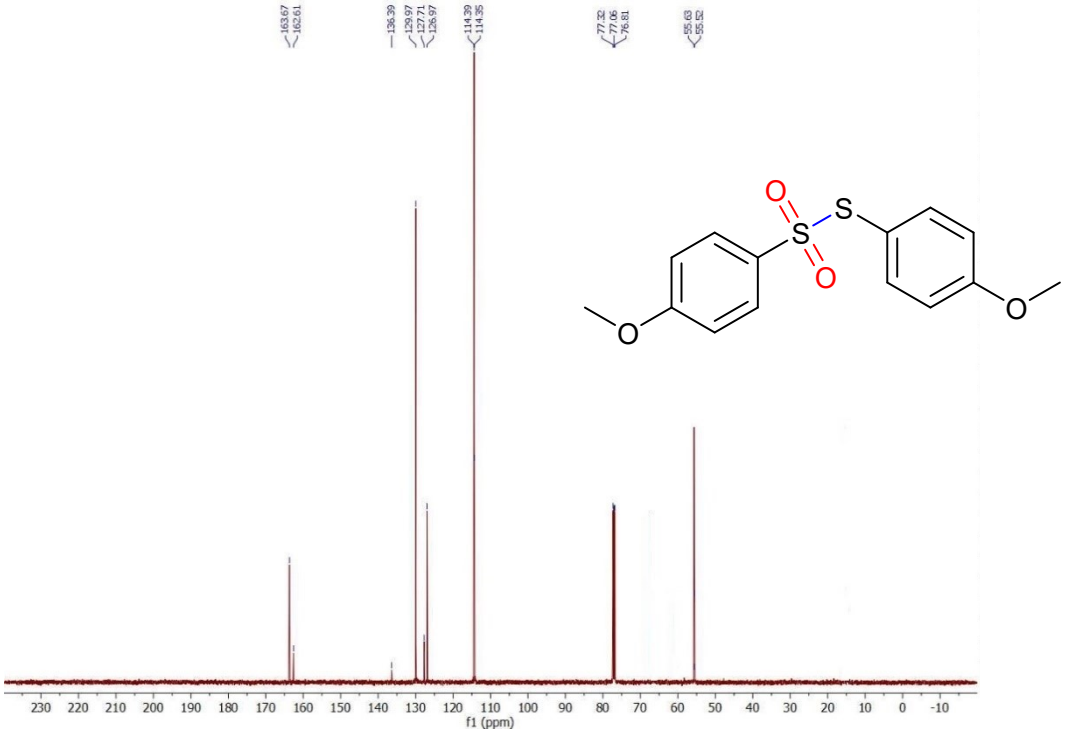
S-(p-tolyl) 4-methylbenzenesulfonothioate (4b)



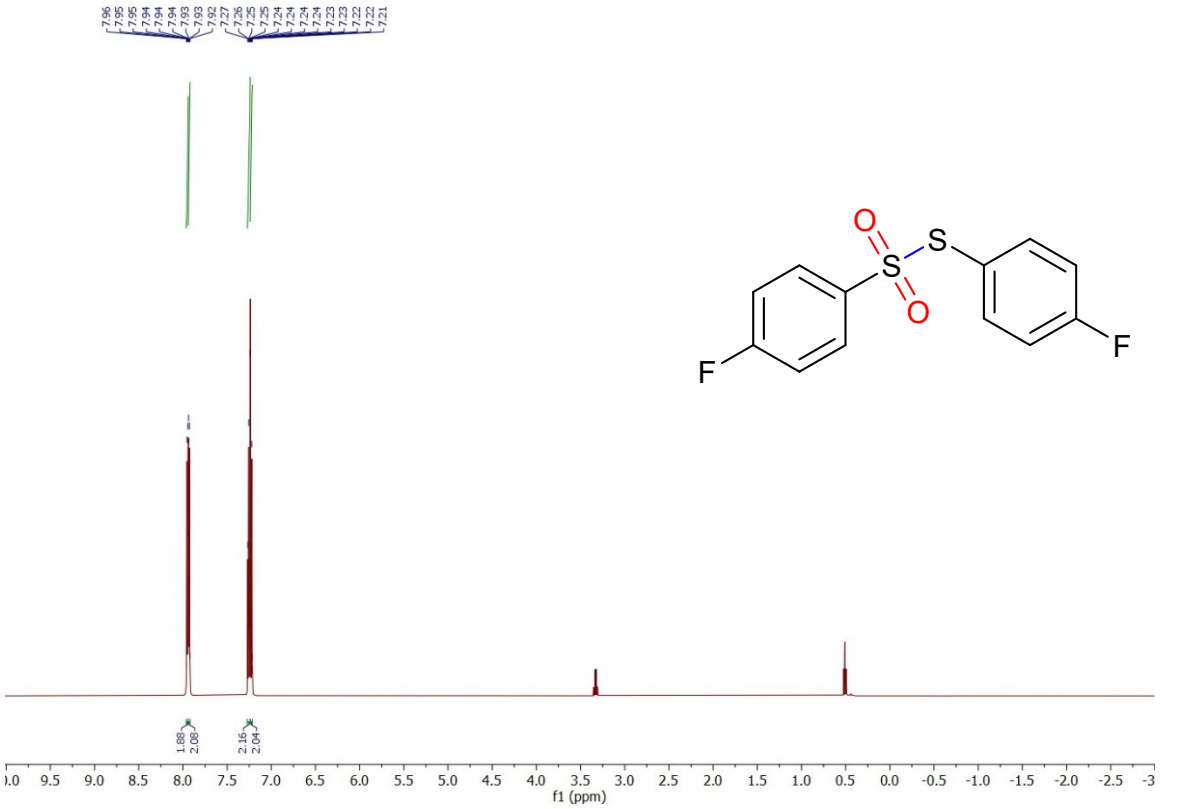


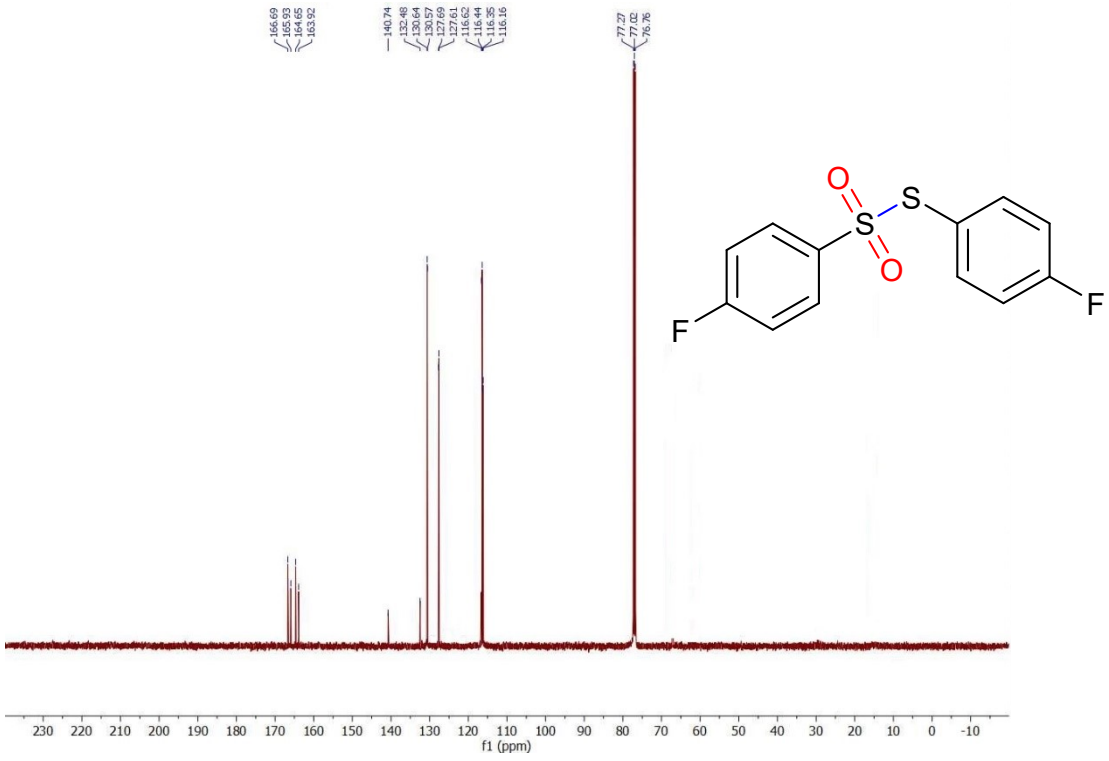
S-(4-methoxyphenyl) 4-methoxybenzenesulfonothioate (4c)

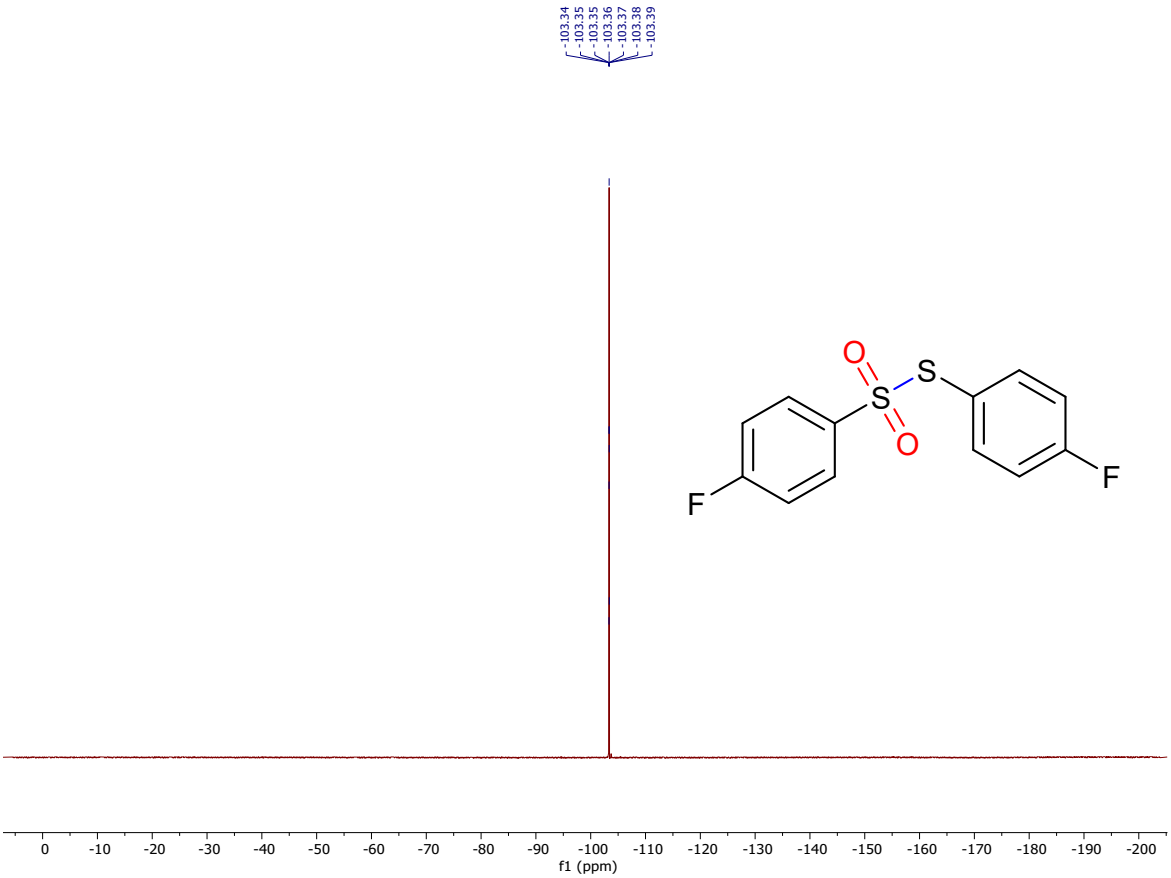




S-(4-fluorophenyl) 4-fluorobenzenesulfonothioate (4d)



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O
F
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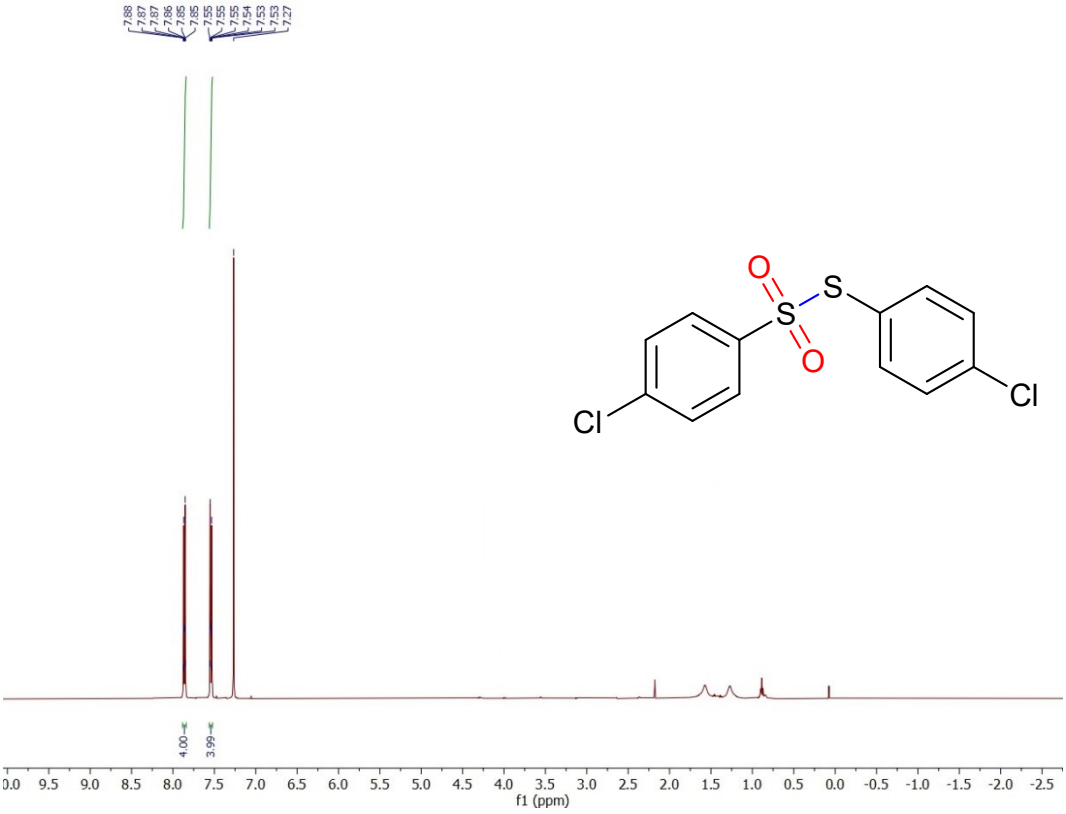
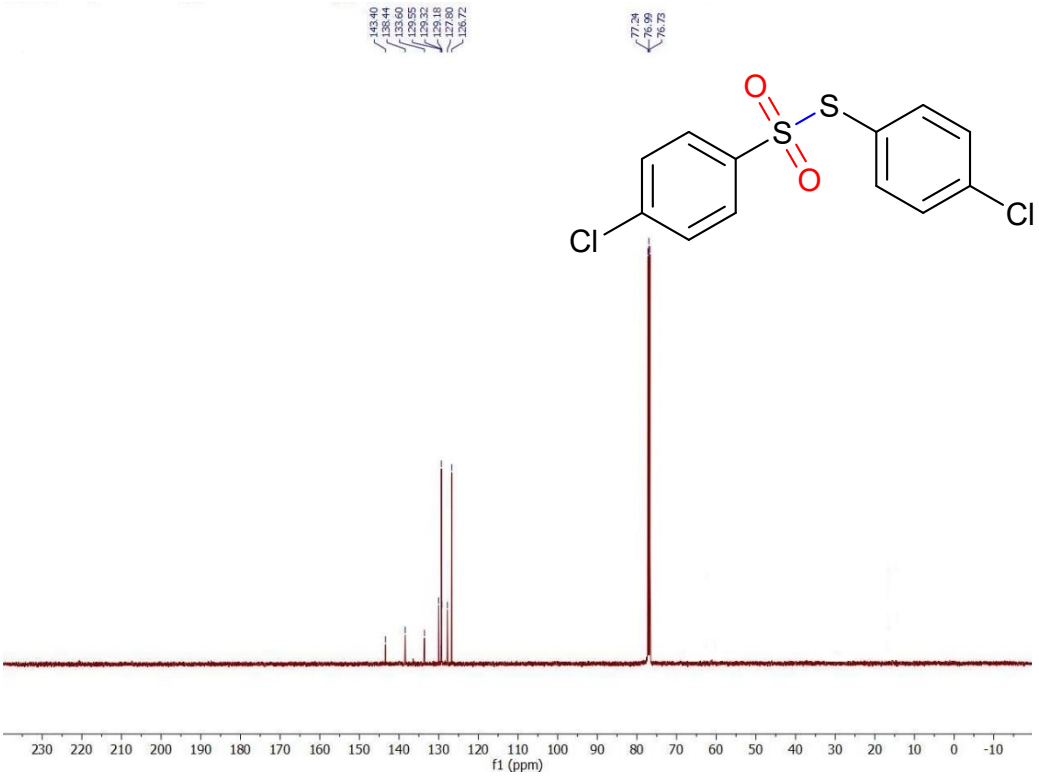
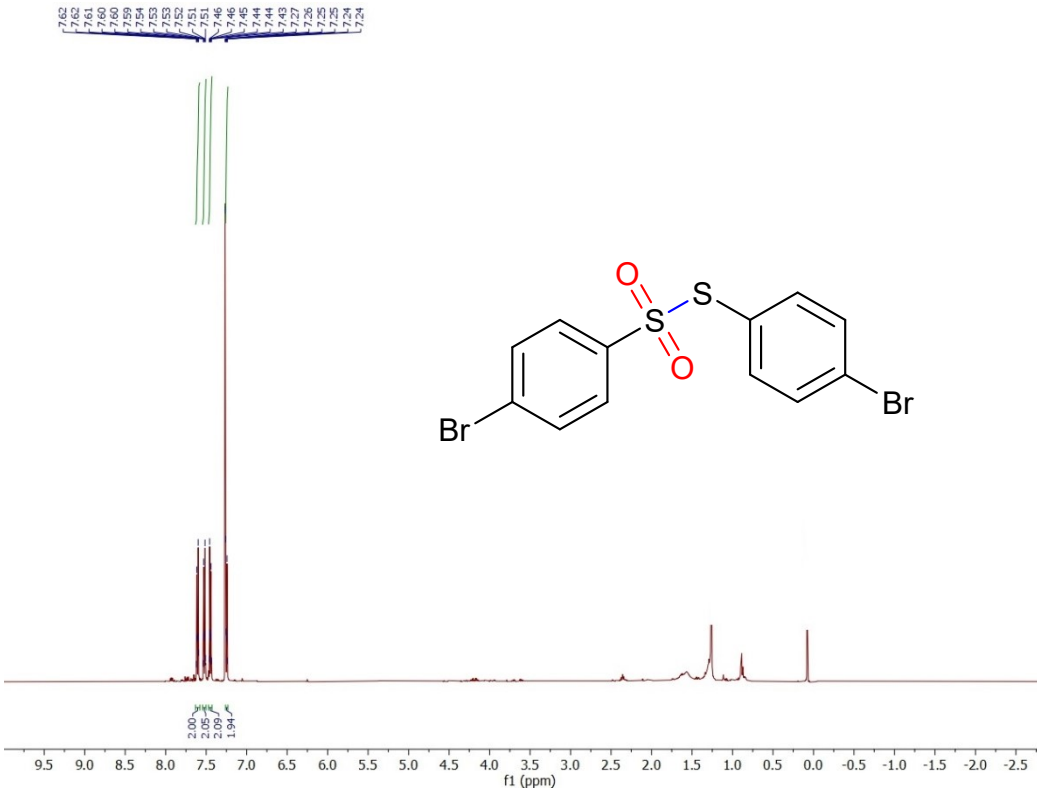
-200
f1 (ppm)

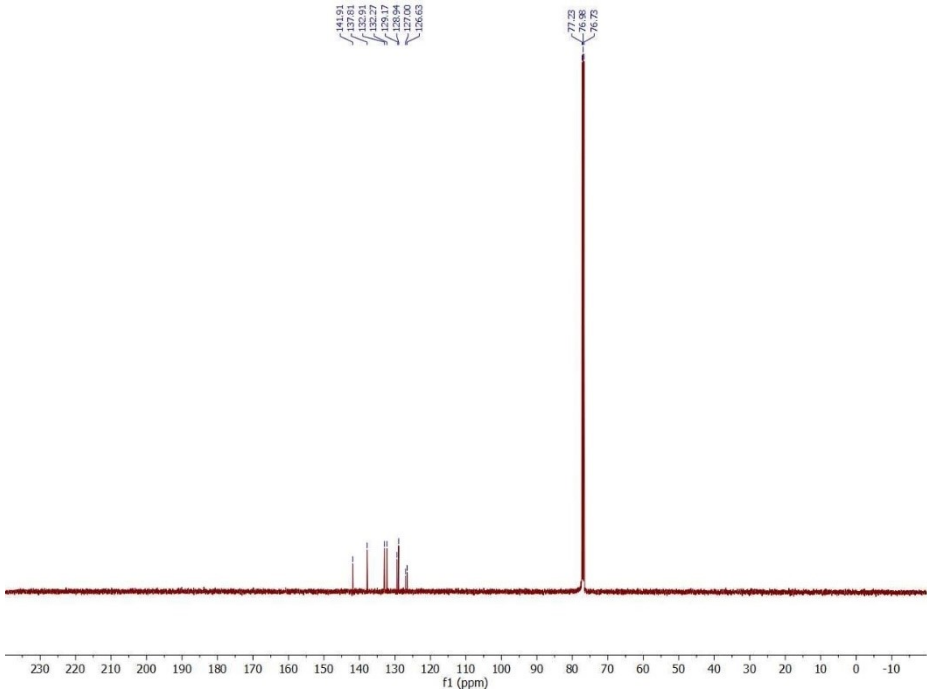
S-(4-chlorophenyl) 4-chlorobenzenesulfonothioate (4e)



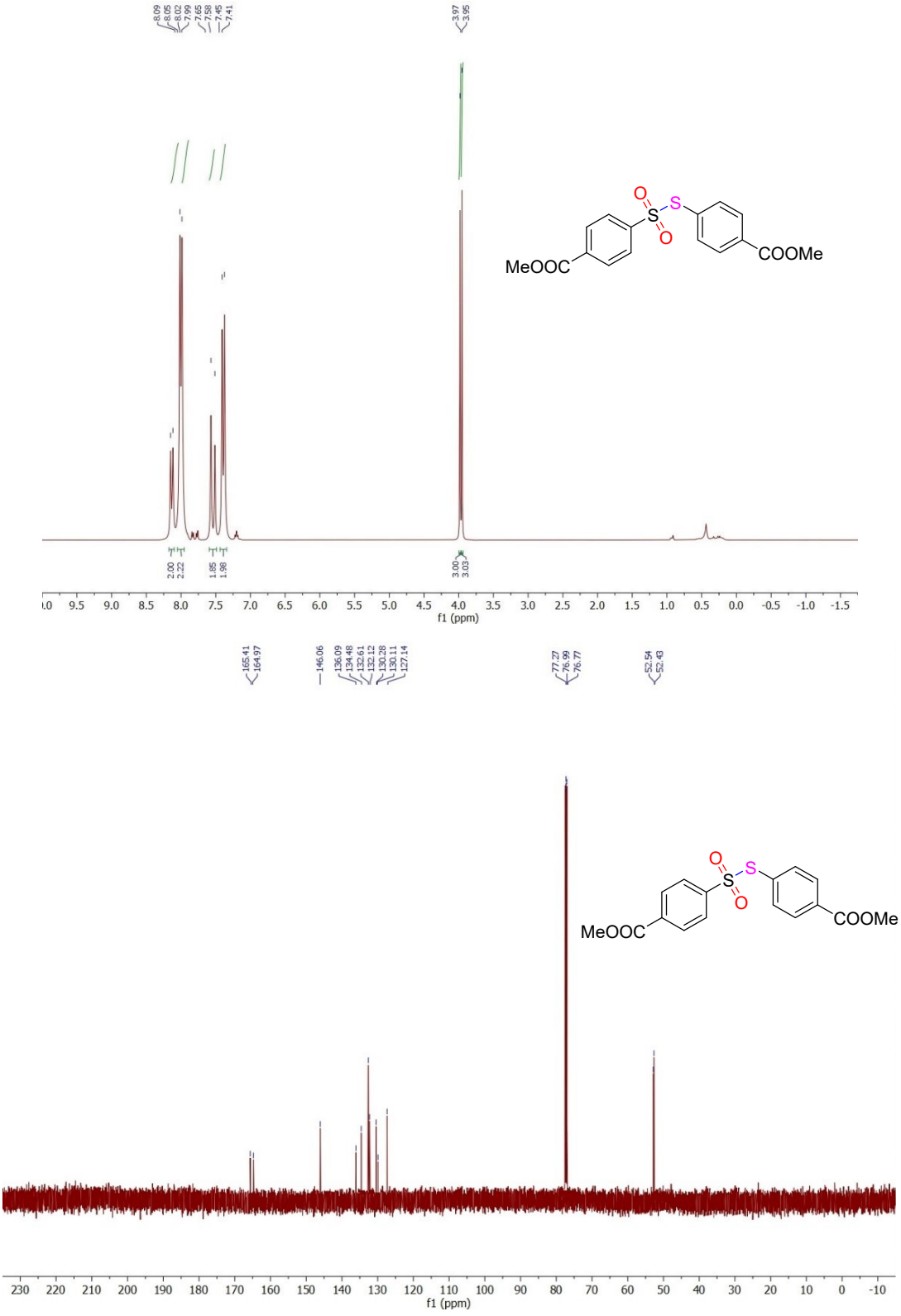


S-(4-bromophenyl) 4-bromobenzenesulfonothioate (4f)

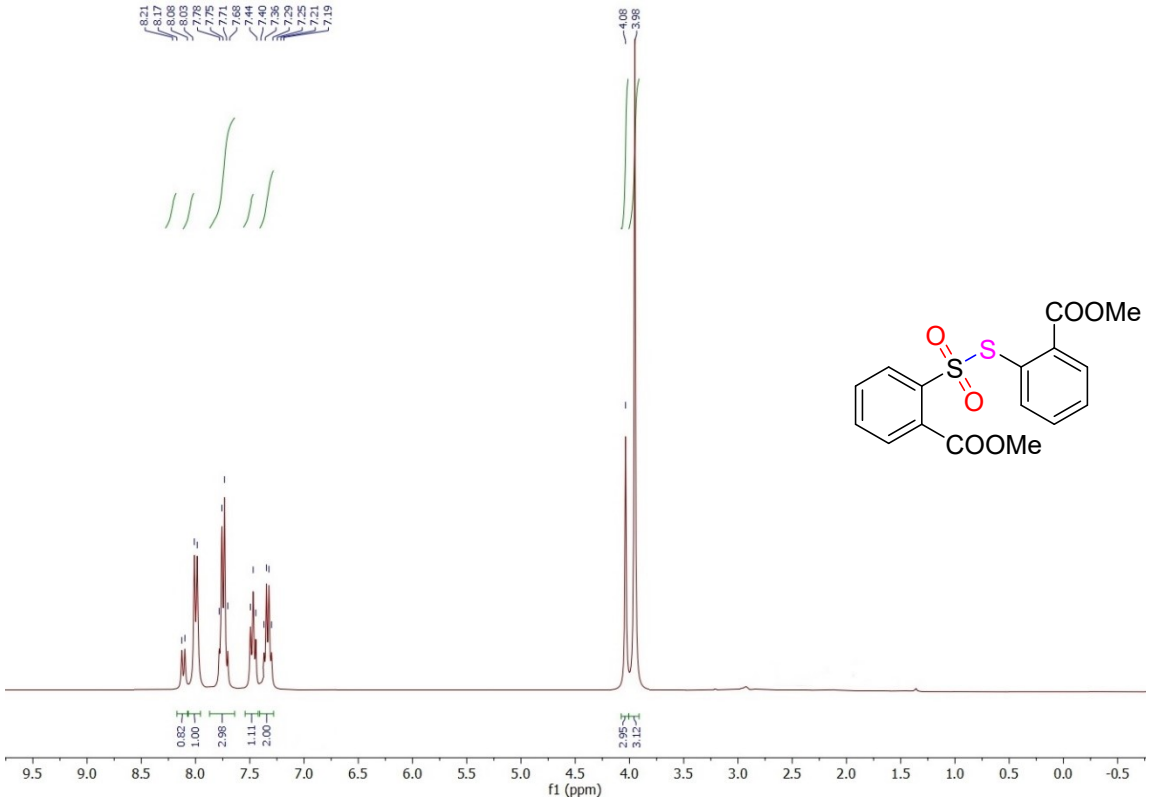


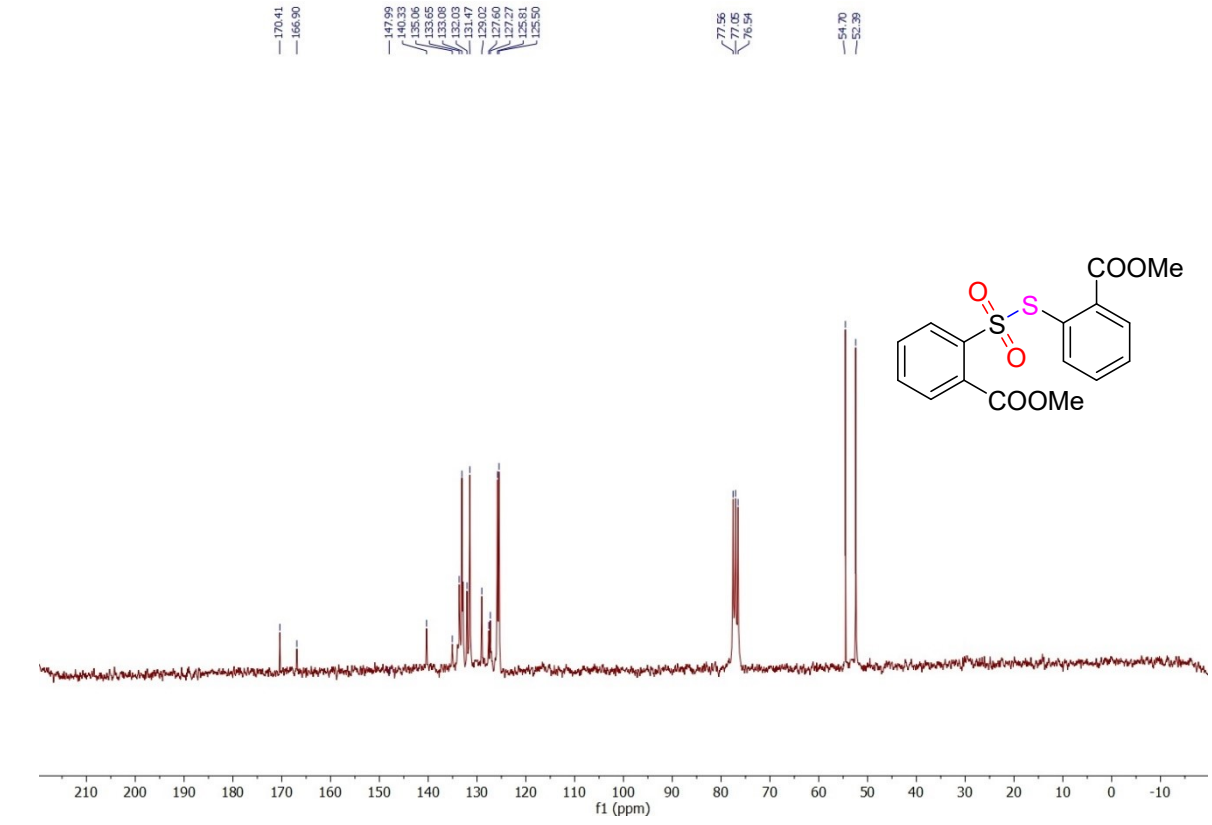


Dimethyl 4-((4-benzoatethio)sulfonyl)benzoate (4g)

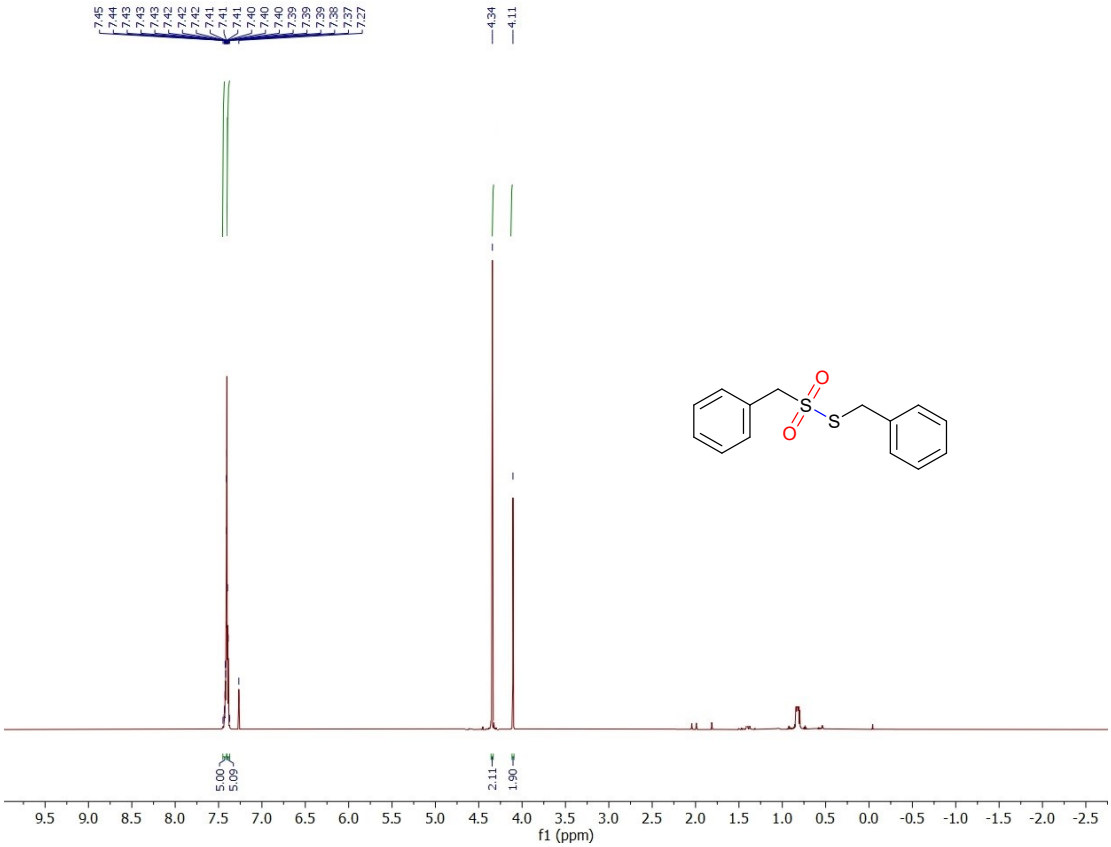


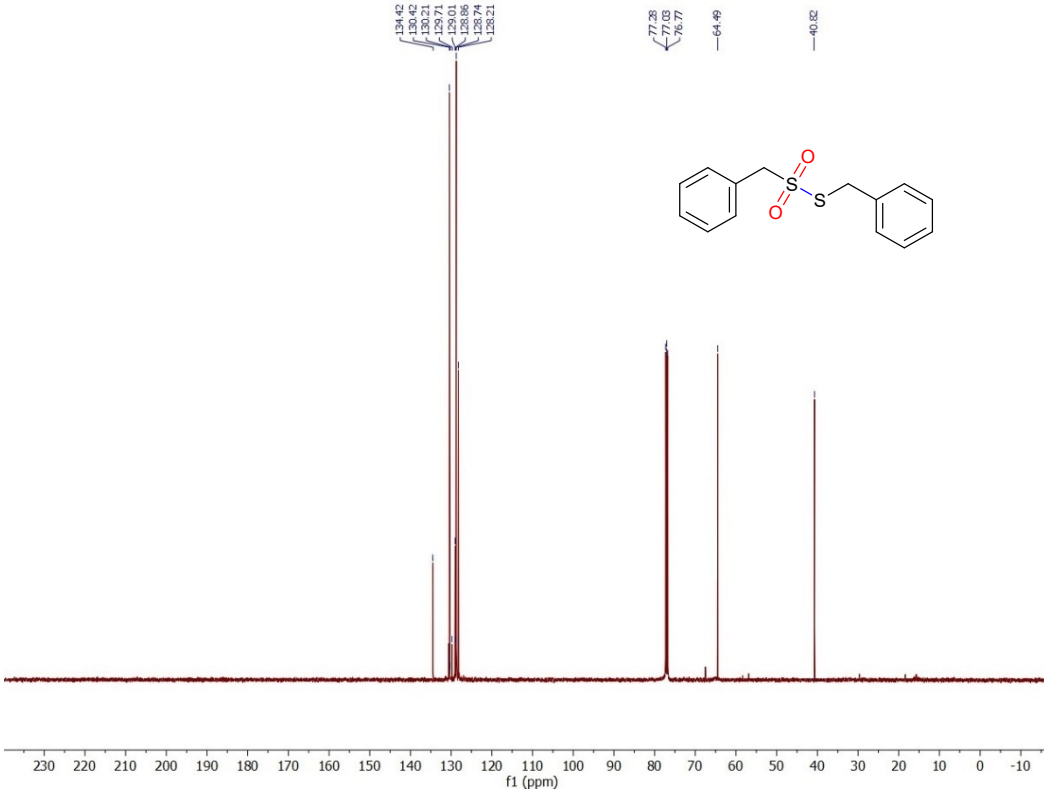
Dimethyl 2-((2-benzoatethio)sulfonyl)benzoate (4h)



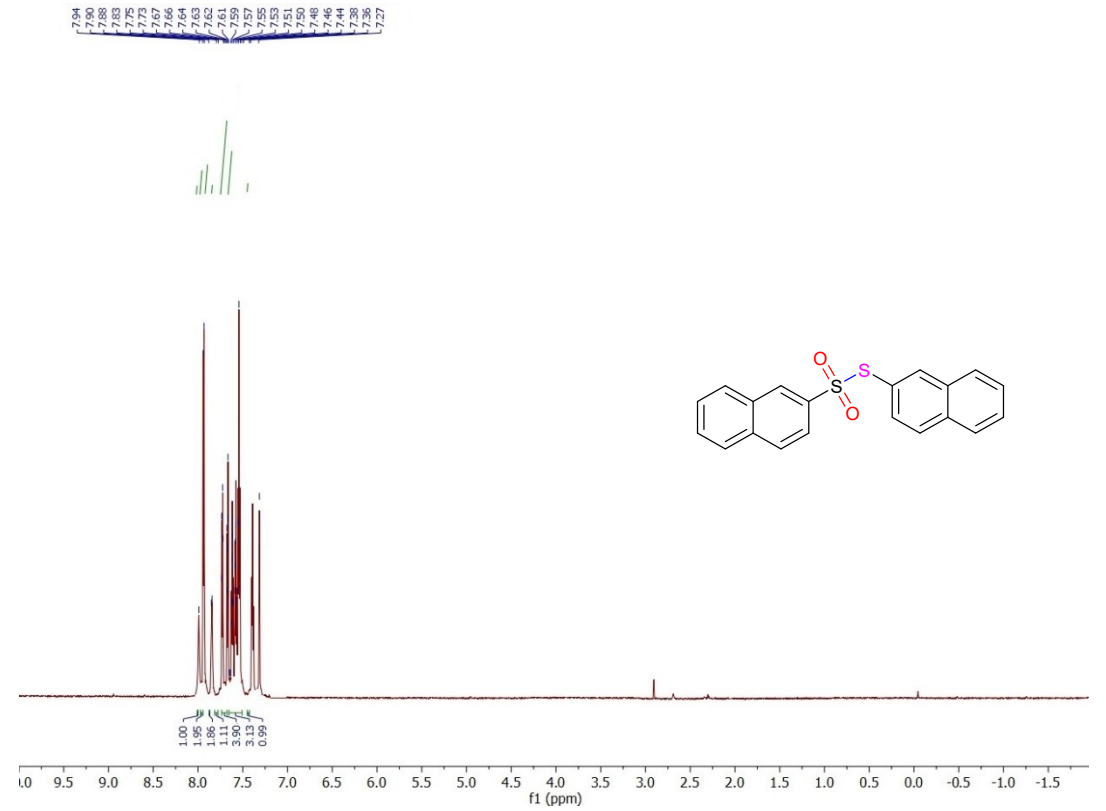


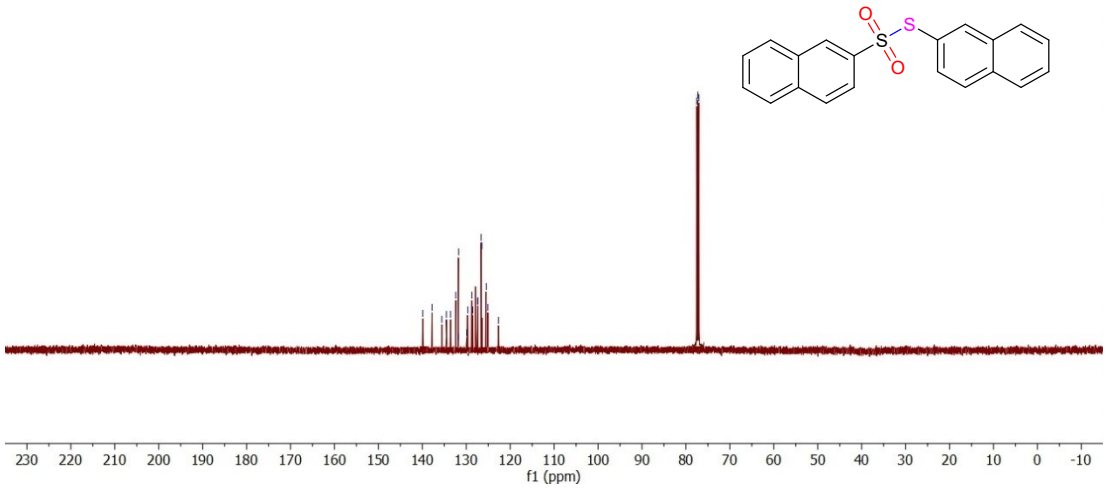
S-benzyl phenylmethanesulfonothioate (4i)



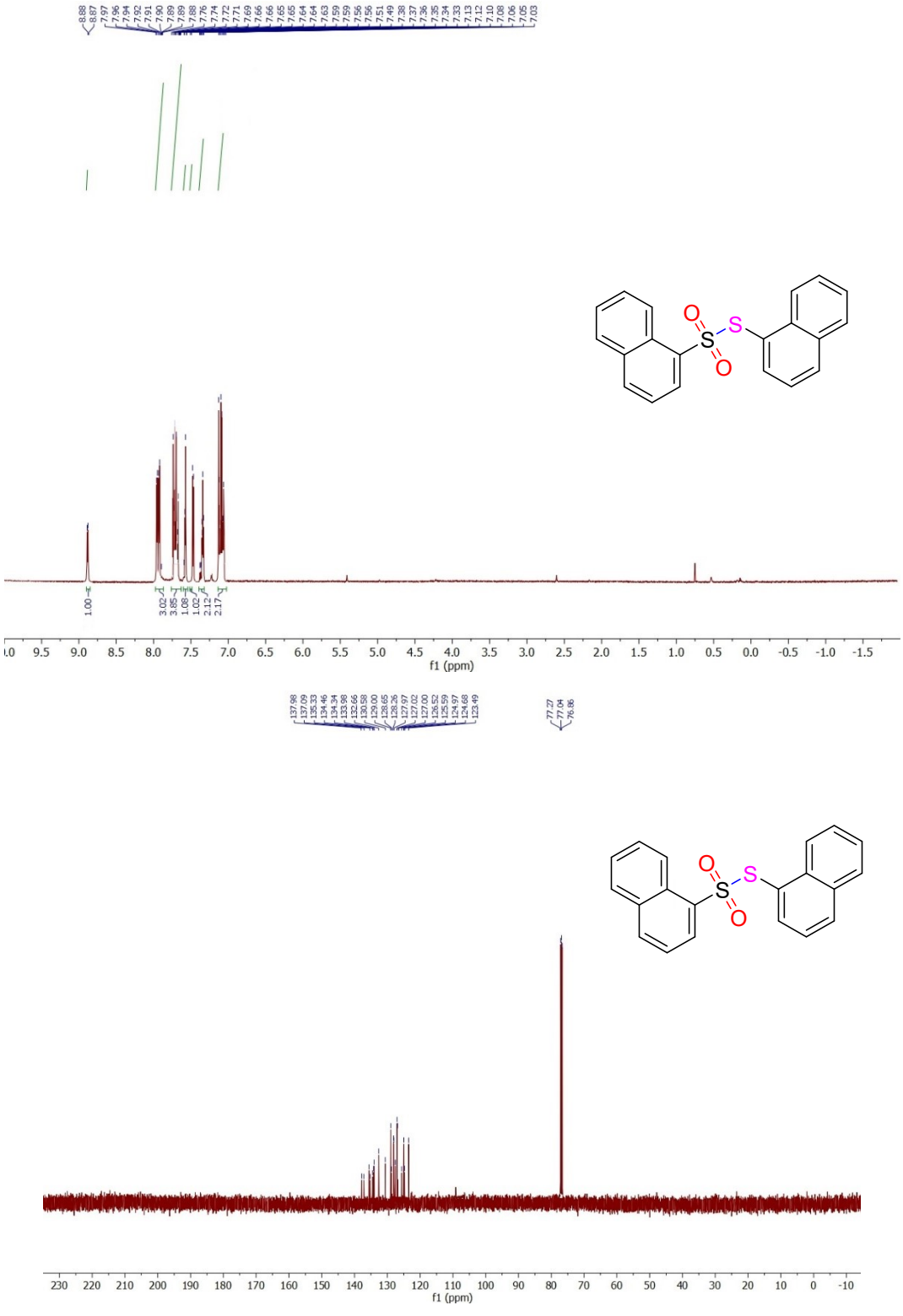


S-(naphthalen-2-yl) naphthalene-2-sulfonothioate (4j)





S-(naphthalen-1-yl) naphthalene-1-sulfonothioate (4k)



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