

## Supporting Information

### **Revealing the Metal-like Behavior of Iodine: An Iodide-Catalyzed Radical Oxidative Alkenylation**

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## General information

Unless otherwise noted, materials were obtained from commercial suppliers and used without further purification. Sulfonyl hydrazines<sup>[1]</sup> and 1-(4-bromophenyl)-2-tosylethanol (**5b**)<sup>[2]</sup> were prepared following literature procedures. KI was dried over 200 °C for 1 h. Thin layer chromatography (TLC) employed glass 0.25 mm silica gel plates. Flash chromatography columns were packed with 200-300 mesh silica gel in petroleum (bp. 60-90 °C). Gas chromatographic analyses were performed on Varian GC 2000 gas chromatography instrument with a FID detector and naphthalene was added as internal standard. For the ReactIR kinetic experiments, the reaction spectra were recorded using an IC 15 from Mettler-Toledo AutoChem. <sup>1</sup>H and <sup>13</sup>C NMR data were recorded with Bruker Advance III (400 MHz) spectrometers with tetramethylsilane as an internal standard. All chemical shifts ( $\delta$ ) are reported in ppm and coupling constants ( $J$ ) in Hz. All chemical shifts are reported relative to tetramethylsilane and d-solvent peaks (77.00 ppm, chloroform), respectively.

## General procedure for the iodide-catalysed Heck-type alkenylation

In a clean tube equipped with a stir bar, KI (19.9 mg, 0.12 mmol) and sulfonyl hydrazine **1** (0.33 mmol) were combined and sealed. An N<sub>2</sub> balloon was fixed and purged for 3 times. DMSO (0.15 mL), HOAc (0.15 mL) and alkene **2** (0.30 mmol) was injected into the tube via syringe. Subsequently, TBHP (77.0 mg, 70% in aqueous solution, 0.60 mmol) was slowly injected into the reaction tube. The reaction was then stirred at 25-30 °C for 10 h. After completion, the reaction was quenched with water. After extraction with ethyl ether (3 x 10 mL), the organic layers were combined and dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>, the pure product was obtained by flash column chromatography on silica gel (petroleum: ethyl acetate = 20:1).

## General procedure for cyclic voltammetry (CV)

Cyclic voltammetry was performed in a three-electrode cell connected to a schlenk line under Nitrogen at room temperature. The working electrode was a steady gold disk (d

= 3 mm), the counter electrode a platinum wire. The reference was a Ag/AgCl electrode submerged in saturated aqueous KCl solution, and separated from reaction by a salt bridge. 10 mL of DMSO containing 0.1 M  $n\text{Bu}_4\text{NBF}_4$  were poured into the electrochemical cell in all experiments.

## Table S1

Effects of reaction parameters.<sup>[a]</sup>

$\text{p-Tol-SO}_2\text{NHNH}_2$  (**1a**) +  $\text{p-Tol-SO}_2\text{NH}_2$  (**2a**)  $\xrightarrow[\text{DMSO / HOAc = 1:1, r.t., 10 h}]{40 \text{ mol\% KI, 2 equiv TBHP}}$   $\text{p-Tol-SO}_2\text{SO}_2\text{NH}_2$  (**3a**)

Entry	Variation from the "standard conditions"	Yield (%) <sup>[b]</sup>
1	none	72
2	no KI	n.d.
3	20 mol% KI, instead of 40 mol% KI	8
4	only DMSO	9
5	only HOAc	11
6	only DMSO, 80 °C	56
7	20 mol% CuBr or FeBr <sub>2</sub> , instead of 40 mol% KI	trace
8	open to air	56
9	1 equiv tempo	n.d.

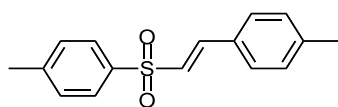
[a] The reactions were carried out with **1a** (0.33 mmol), **2** (0.30 mmol), KI (40 mol%), TBHP (0.60 mmol, 70% in aqueous solution), DMSO (0.15 mL), HOAc (0.15 mL), 20 °C, 10 h. [b] Yields are determined by GC analysis with naphthalin as the internal standard. n.d. = not detected.

The presense and amount of KI were both crucial for the reaction (Table S1, entry 2-3). It's worth noting that both of the solvents are fatal for the successful alkenylation since the yield decreased dramatically with only one solvent (Table S1, entry 4-5). Indeed, a moderate yield could be observed only with DMSO but an increased temperature is need (Table S1 entry 6). Copper and iron catalysts have been reported to initiate radicals from sulfonyl hydrazines under oxidative conditions.<sup>[3]</sup> However, they were ineffective in this transformation, which indicated that iodine might involved in the radical elimination process (Table S1, entry 7). To our pleasure, the reaction was

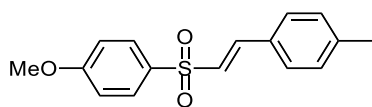
not sensitive to moisture and air since it still proceeded well when conducted open to air (Table S1, entry 8). Addition of tempo totally shut the reaction down, which indicated a radical involvement in this reaction (Table S1, entry 9).

Since  $\beta$ -hydroxysulfones could be generated for some electron-neutral and electron-rich olefins at 20 °C, the substrate scope was conducted under a slightly increase temperature of 25 – 30 °C to ensure the selectivity.

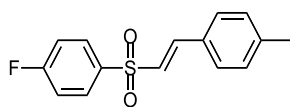
## Detail descriptions for products



**(E)-1-Methyl-4-((4-methylstyryl)sulfonyl)benzene (3a)**<sup>[4]</sup>: <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  7.82 (d,  $J$  = 8.3 Hz, 2H), 7.62 (d,  $J$  = 15.4 Hz, 1H), 7.36 (d,  $J$  = 8.1 Hz, 2H), 7.32 (d,  $J$  = 8.1 Hz, 2H), 7.17 (d,  $J$  = 8.0 Hz, 2H), 6.81 (d,  $J$  = 15.4 Hz, 1H), 2.42 (s, 3H), 2.35 (s, 3H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>)  $\delta$  144.08, 141.79, 141.52, 137.72, 129.75, 129.59, 129.45, 128.35, 127.42, 126.19, 21.42, 21.33.

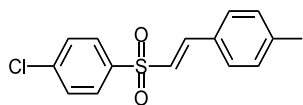


**(E)-1-Methoxy-4-((4-methylstyryl)sulfonyl)benzene (3b)**<sup>[5]</sup>: <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  7.96 – 7.83 (m, 2H), 7.62 (d,  $J$  = 15.4 Hz, 1H), 7.38 (d,  $J$  = 8.1 Hz, 2H), 7.20 (d,  $J$  = 8.0 Hz, 2H), 7.10 – 6.98 (m, 2H), 6.82 (d,  $J$  = 15.4 Hz, 1H), 3.88 (s, 3H), 2.38 (s, 3H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>)  $\delta$  161.97, 144.14, 141.75, 138.16, 130.32, 129.91, 127.58, 125.06, 124.78, 114.49, 55.45, 21.62.

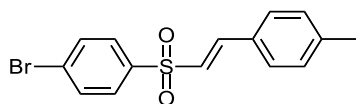


**(E)-1-Fluoro-4-((4-methylstyryl)sulfonyl)benzene (3c)**: <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  8.01 – 7.91 (m, 2H), 7.65 (d,  $J$  = 15.4 Hz, 1H), 7.38 (d,  $J$  = 8.2 Hz, 2H), 7.25 – 7.16 (m, 4H), 6.80 (d,  $J$  = 15.4 Hz, 1H), 2.37 (s, 3H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>)  $\delta$  165.45 (d,  $J$  = 255.8 Hz), 142.67, 141.95, 136.91 (d,  $J$  = 3.1 Hz), 130.36 (d,  $J$  = 9.6 Hz), 129.77,

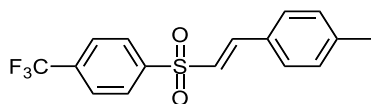
129.37, 128.55, 125.75, 116.52 (d,  $J = 22.6$  Hz), 21.47.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -104.14. HRMS (ESI) calcd for  $\text{C}_{15}\text{H}_{13}\text{FO}_2\text{S}$   $[\text{M}+\text{H}]^+$ : 277.0693; found: 277.0693



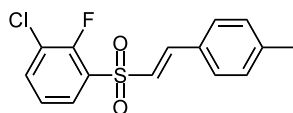
**(E)-1-Chloro-4-((4-methylstyryl)sulfonyl)benzene (3d):**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.91 – 7.84 (m, 2H), 7.66 (d,  $J = 15.4$  Hz, 1H), 7.53 – 7.47 (m, 2H), 7.38 (d,  $J = 8.1$  Hz, 2H), 7.19 (d,  $J = 8.0$  Hz, 2H), 6.79 (d,  $J = 15.4$  Hz, 1H), 2.37 (s, 3H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  143.03, 142.02, 139.82, 139.33, 129.76, 129.52, 129.30, 128.99, 128.57, 125.45, 21.47. HRMS (ESI) calcd for  $\text{C}_{15}\text{H}_{13}\text{ClO}_2\text{S}$   $[\text{M}+\text{H}]^+$ : 293.0398; found: 293.0396.



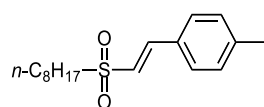
**(E)-1-Bromo-4-((4-methylstyryl)sulfonyl)benzene (3e):**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.83 – 7.75 (m, 2H), 7.70 – 7.63 (m, 2H), 7.38 (d,  $J = 8.1$  Hz, 2H), 7.19 (d,  $J = 8.0$  Hz, 2H), 6.79 (d,  $J = 15.4$  Hz, 1H), 2.37 (s, 3H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  143.09, 142.05, 139.87, 132.51, 129.78, 129.30, 129.07, 128.59, 128.41, 125.40, 21.49. HRMS (ESI) calcd for  $\text{C}_{15}\text{H}_{13}\text{BrO}_2\text{S}$   $[\text{M}+\text{H}]^+$ : 336.9892; found: 336.9893.



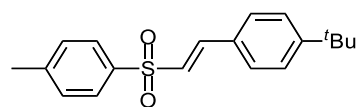
**(E)-1-Methyl-4-(2-((4-(trifluoromethyl)phenyl)sulfonyl)vinyl)benzene (3f):**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.09 (d,  $J = 8.4$  Hz, 2H), 7.80 (d,  $J = 8.4$  Hz, 2H), 7.72 (d,  $J = 15.4$  Hz, 1H), 7.40 (d,  $J = 8.0$  Hz, 2H), 7.21 (d,  $J = 8.0$  Hz, 2H), 6.82 (d,  $J = 15.4$  Hz, 1H), 2.37 (s, 3H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  144.56, 144.15, 142.42, 134.92 ( $J = 23.1$  Hz), 129.92, 129.27, 128.78, 128.19, 126.46 ( $J = 3.7$  Hz), 123.18 ( $J = 274.0$  Hz), 124.95, 21.59.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -63.14. HRMS (ESI) calcd for  $\text{C}_{16}\text{H}_{13}\text{F}_3\text{O}_2\text{S}$   $[\text{M}+\text{H}]^+$ : 327.0661; found: 327.0660.



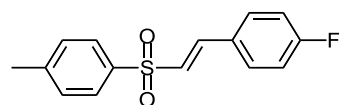
**(E)-1-Chloro-2-fluoro-3-((4-methylstyryl)sulfonyl)benzene (3g):**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.94 – 7.87 (m, 1H), 7.76 (d,  $J = 15.3$  Hz, 1H), 7.68 – 7.62 (m, 1H), 7.43 (d,  $J = 8.1$  Hz, 2H), 7.28 (t,  $J = 8.0$  Hz, 1H), 7.22 (d,  $J = 8.0$  Hz, 2H), 6.97 (d,  $J = 15.3$  Hz, 1H), 2.38 (s, 3H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  155.11 ( $J = 259.0$  Hz), 145.69, 142.51, 135.99, 130.68 ( $J = 14.4$  Hz), 129.92, 129.34, 128.90, 127.77, 124.97 ( $J = 4.9$  Hz), 124.33 ( $J = 17.9$  Hz), 122.97 ( $J = 17.9$  Hz), 21.62.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -110.53. HRMS (ESI) calcd for  $\text{C}_{15}\text{H}_{12}\text{ClFO}_2\text{S}$   $[\text{M}+\text{H}]^+$ : 311.0303; found: 311.0305.



**(E)-1-Methyl-4-(2-(octylsulfonyl)vinyl)benzene (3h):**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.58 (d,  $J = 15.5$  Hz, 1H), 7.43 (d,  $J = 8.1$  Hz, 2H), 7.24 (d,  $J = 7.9$  Hz, 2H), 6.79 (d,  $J = 15.5$  Hz, 1H), 3.16 – 2.98 (m, 2H), 2.41 (s, 3H), 1.90 – 1.74 (m, 2H), 1.46 – 1.33 (m, 2H), 1.36 – 1.24 (m, 8H), 0.88 (t,  $J = 6.9$  Hz, 3H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  144.68, 141.91, 129.79, 129.44, 128.50, 123.38, 55.18, 31.61, 28.96, 28.87, 28.32, 22.51, 21.49, 14.00. HRMS (ESI) calcd for  $\text{C}_{17}\text{H}_{26}\text{O}_2\text{S}$   $[\text{M}+\text{H}]^+$ : 295.1726; found: 295.1723.

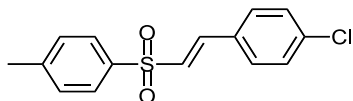


**(E)-1-(tert-Butyl)-4-(2-tosylvinyl)benzene (3i):**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.82 (d,  $J = 8.2$  Hz, 2H), 7.65 (d,  $J = 15.4$  Hz, 1H), 7.41 (d,  $J = 0.9$  Hz, 4H), 7.32 (d,  $J = 8.2$  Hz, 2H), 6.82 (d,  $J = 15.4$  Hz, 1H), 2.42 (s, 3H), 1.30 (s, 9H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  154.84, 144.27, 141.93, 137.95, 129.95, 129.67, 128.44, 127.64, 126.61, 126.07, 34.98, 31.11, 21.64. HRMS (ESI) calcd for  $\text{C}_{19}\text{H}_{22}\text{O}_2\text{S}$   $[\text{M}+\text{H}]^+$ : 315.1413; found: 315.1411.

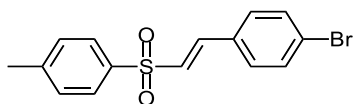


**(E)-1-Fluoro-4-(2-tosylvinyl)benzene (3j):**<sup>[51]</sup>  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.84 (d,  $J = 8.3$  Hz, 2H), 7.63 (d,  $J = 15.4$  Hz, 1H), 7.52 – 7.44 (m, 2H), 7.36 (d,  $J = 8.1$  Hz,

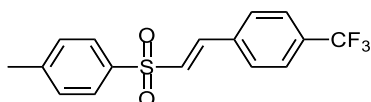
2H), 6.81 (d,  $J = 15.4$  Hz, 1H), 2.44 (s, 3H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  164.28 ( $J = 253.7$  Hz), 144.50, 140.61, 137.63, 130.57 ( $J = 8.7$  Hz), 130.02, 128.71 ( $J = 3.4$  Hz), 127.70, 127.39 ( $J = 2.4$  Hz), 116.30 ( $J = 22.1$  Hz), 21.64.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -107.92.



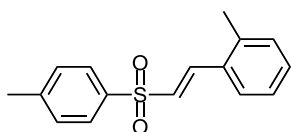
**(E)-1-Chloro-4-(2-tosylvinyl)benzene (3k):**<sup>[4]</sup>  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.88 – 7.81 (m, 2H), 7.62 (d,  $J = 15.4$  Hz, 1H), 7.45 – 7.40 (m, 2H), 7.39 – 7.34 (m, 4H), 6.86 (d,  $J = 15.4$  Hz, 1H), 2.45 (s, 3H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  144.60, 140.43, 137.46, 137.11, 130.93, 130.05, 129.71, 129.37, 128.22, 127.76, 21.66.



**(E)-1-Bromo-4-(2-tosylvinyl)benzene (3l):**<sup>[4]</sup>  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.84 (d,  $J = 8.3$  Hz, 2H), 7.60 (d,  $J = 15.4$  Hz, 1H), 7.53 (d,  $J = 8.5$  Hz, 2H), 7.39 – 7.31 (m, 4H), 6.88 (d,  $J = 15.4$  Hz, 1H), 2.45 (s, 3H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  144.52, 140.40, 137.31, 132.23, 131.26, 129.96, 129.80, 129.65, 128.23, 127.67, 125.41, 21.58.

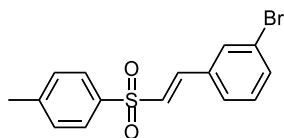


**(E)-1-Methyl-4-((4-(trifluoromethyl)styryl)sulfonyl)benzene (3m):**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.89 (d,  $J = 8.2$  Hz, 2H), 7.72 – 7.60 (m, 5H), 7.41 (d,  $J = 8.2$  Hz, 2H), 7.02 (d,  $J = 15.4$  Hz, 1H), 2.49 (s, 3H);  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  144.75, 139.81, 137.09, 35.82, 132.40 (t,  $J = 32.8$  Hz), 130.34, 130.04, 128.63, 127.79, 125.94 (t,  $J = 3.7$  Hz), 123.56 (t,  $J = 273.4$  Hz), 21.55.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -62.96. HRMS (ESI) calcd for  $\text{C}_{16}\text{H}_{13}\text{F}_3\text{O}_2\text{S}$   $[\text{M}+\text{H}]^+$ : 327.0661; found: 327.0666.

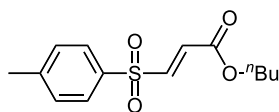


**(E)-1-Methyl-2-(2-tosylvinyl)benzene (3n):**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.94 (d,  $J = 15.3$  Hz, 1H), 7.86 – 7.78 (m, 2H), 7.42 (d,  $J = 7.8$  Hz, 1H), 7.34 (d,  $J = 8.0$  Hz, 2H),

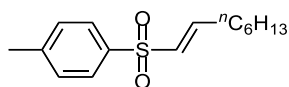
7.31 – 7.24 (m, 1H), 7.23 – 7.14 (m, 2H), 6.78 (d,  $J = 15.3$  Hz, 1H), 2.44 (d,  $J = 2.8$  Hz, 3H), 2.43 (s, 3H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  144.28, 139.48, 138.04, 137.61, 131.22, 130.93, 130.76, 129.89, 128.39, 127.61, 126.73, 126.38, 21.55, 19.69. HRMS (ESI) calcd for  $\text{C}_{16}\text{H}_{16}\text{O}_2\text{S}$   $[\text{M}+\text{H}]^+$ : 273.0944; found: 273.0945.



**(E)-1-Bromo-3-(2-tosylvinyl)benzene (3o):**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.82 (d,  $J = 8.2$  Hz, 2H), 7.62 – 7.54 (m, 2H), 7.51 (d,  $J = 8.0$  Hz, 1H), 7.41 – 7.32 (m, 3H), 7.28 – 7.23 (m, 1H), 6.87 (d,  $J = 15.4$  Hz, 1H), 2.44 (s, 3H).;  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  144.58, 139.96, 137.26, 134.43, 133.74, 130.97, 130.48, 129.97, 129.21, 127.72, 127.11, 123.04, 21.56. HRMS (ESI) calcd for  $\text{C}_{15}\text{H}_{13}\text{BrO}_2\text{S}$   $[\text{M}+\text{H}]^+$ : 336.9892; found: 336.9899

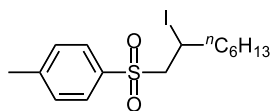


**(E)-Butyl 3-tosylacrylate (3p):**<sup>[4]</sup>  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.80 (d,  $J = 8.3$  Hz, 2H), 7.38 (d,  $J = 8.1$  Hz, 2H), 7.32 (d,  $J = 15.2$  Hz, 1H), 6.80 (d,  $J = 15.2$  Hz, 1H), 4.19 (t,  $J = 6.7$  Hz, 2H), 2.46 (s, 3H), 1.71 – 1.57 (m, 2H), 1.44 – 1.30 (m, 2H), 0.93 (t,  $J = 7.4$  Hz, 3H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  163.54, 145.59, 143.30, 135.32, 130.43, 130.19, 128.30, 65.76, 30.32, 21.65, 18.94, 13.55.



**(E)-1-Methyl-4-(oct-1-en-1-ylsulfonyl)benzene (3q):**<sup>[6]</sup>  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.76 (d,  $J = 8.2$  Hz, 2H), 7.33 (d,  $J = 8.1$  Hz, 2H), 6.96 (dt,  $J = 14.7, 6.8$  Hz, 1H), 6.29 (d,  $J = 15.1$  Hz, 1H), 2.44 (s, 3H), 2.22 (m, 2H), 1.51 – 1.40 (m, 2H), 1.33 – 1.21 (m, 6H), 0.86 (t,  $J = 6.8$  Hz, 3H).  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  146.70, 144.10, 137.70, 130.44, 129.80, 127.53, 31.42, 31.40, 28.65, 27.50, 22.43, 21.56, 13.96.





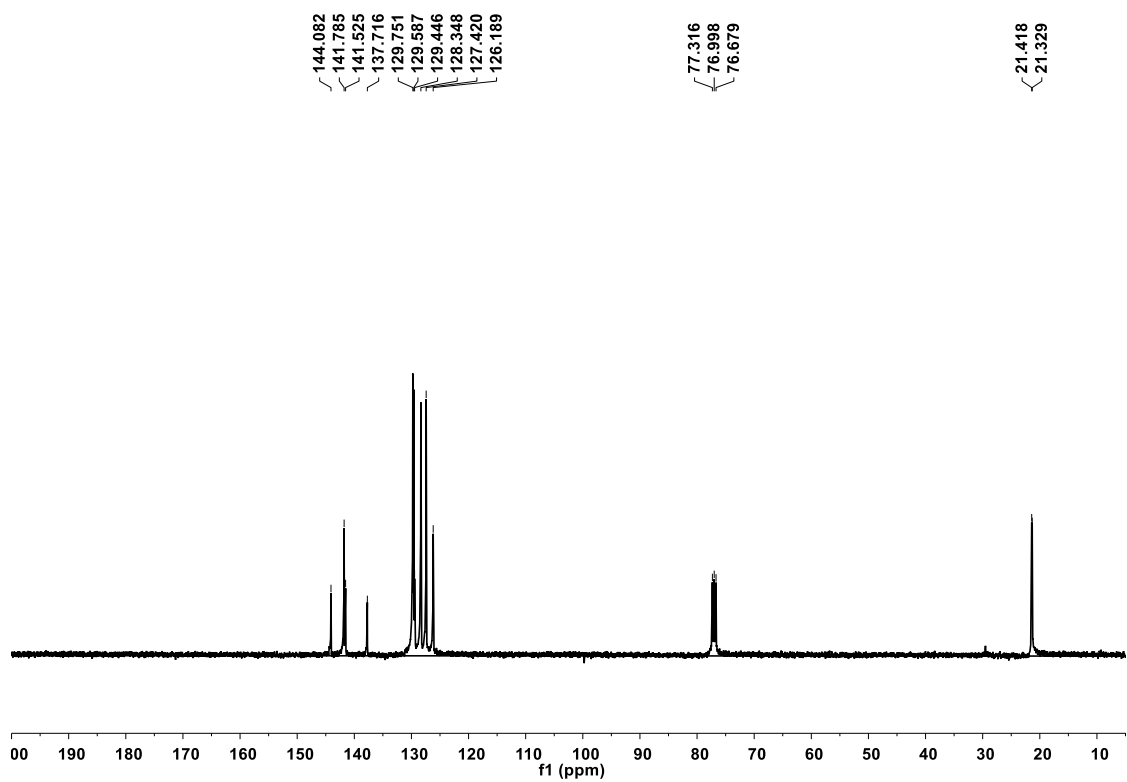
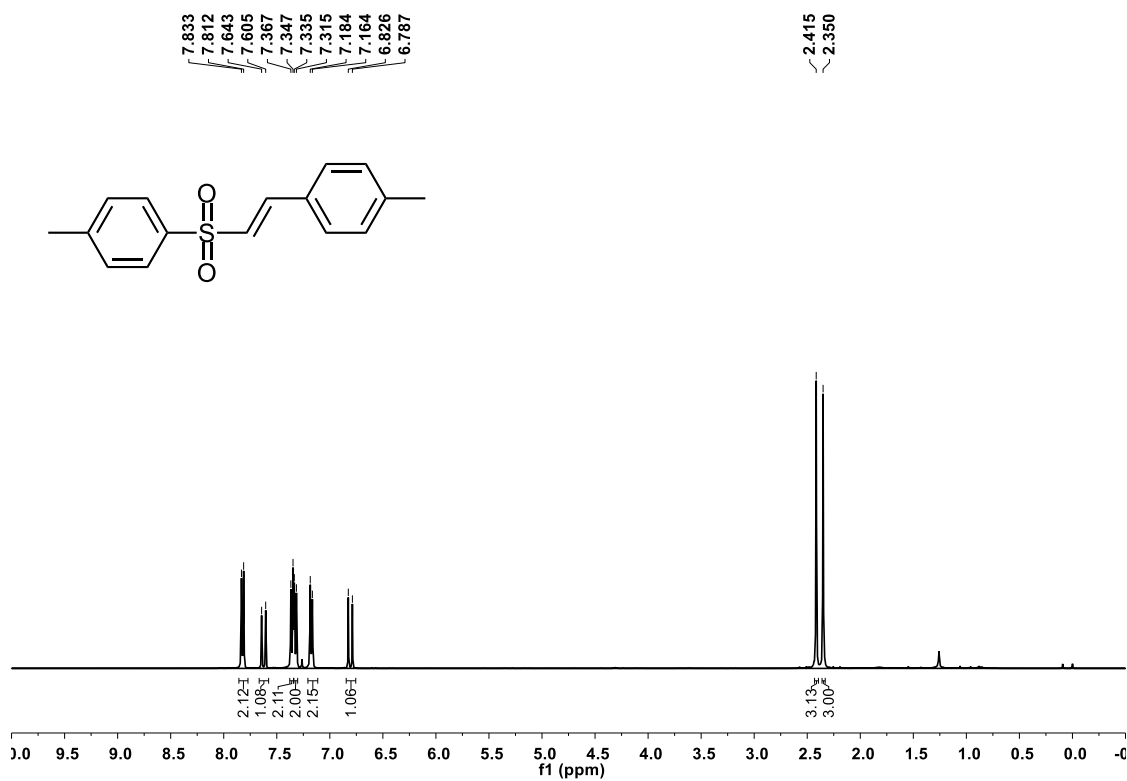
**1-((2-Iodoctyl)sulfonyl)-4-methylbenzene (5):**<sup>[7]</sup> <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.79 (d, *J* = 8.2 Hz, 2H), 7.38 (d, *J* = 8.1 Hz, 2H), 4.48 – 4.36 (m, 1H), 3.83 – 3.66 (m, 2H), 2.47 (s, 3H), 2.04 – 1.89 (m, 1H), 1.89 – 1.74 (m, 1H), 1.55 – 1.42 (m, 1H), 1.33 – 1.22 (m, 7H), 0.89 (t, *J* = 6.7 Hz, 3H). <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 145.28, 136.36, 130.16, 128.04, 65.88, 39.13, 31.59, 29.46, 28.14, 22.64, 22.59, 21.73, 14.09.

## References

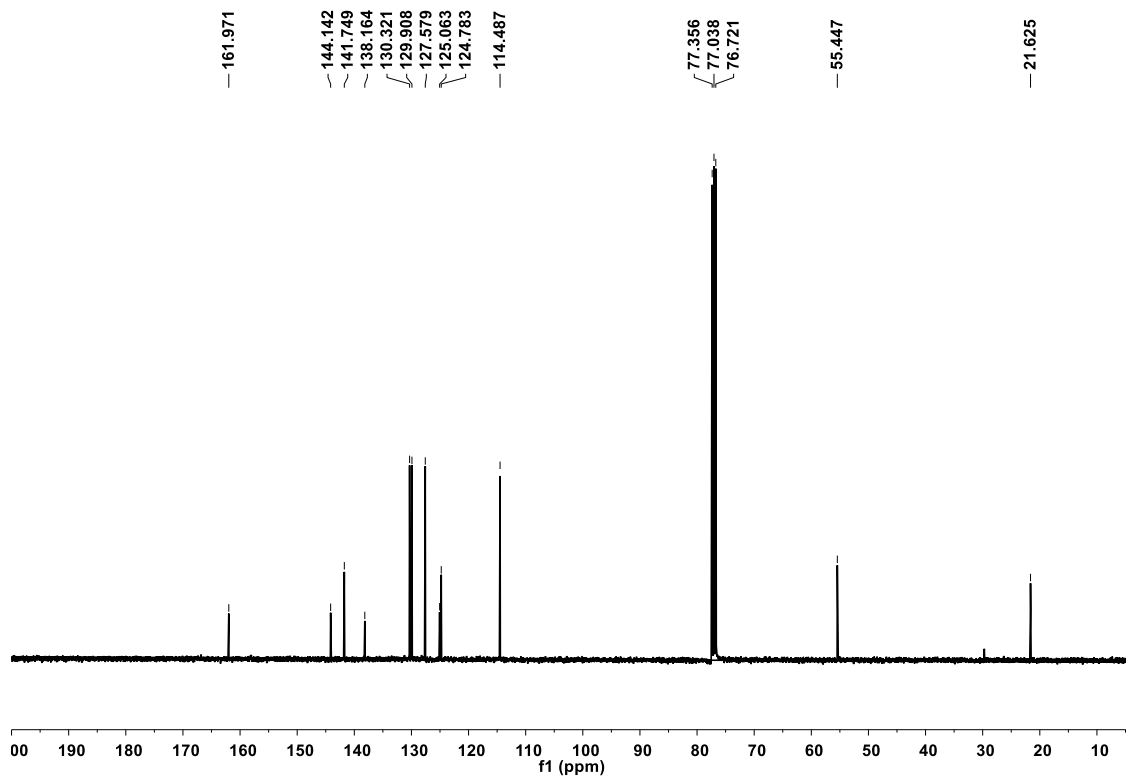
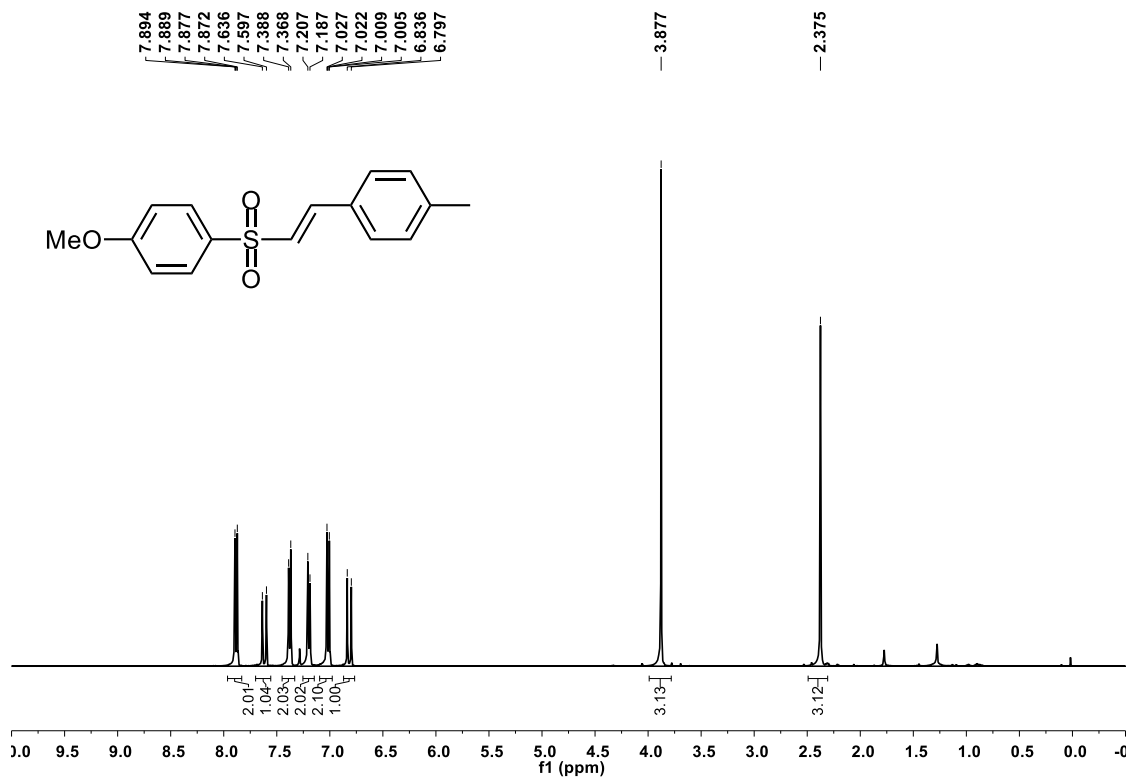
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# Copies of product $^1\text{H}$ NMR, $^{13}\text{C}$ NMR and $^{19}\text{F}$ NMR

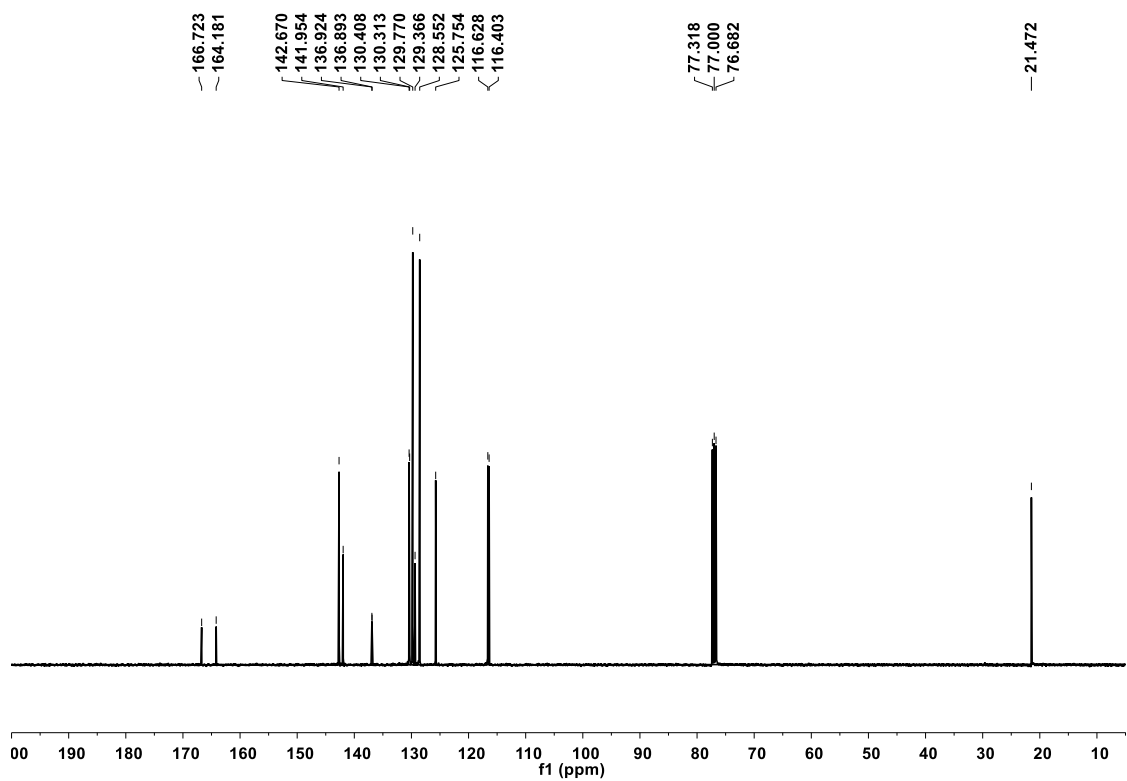
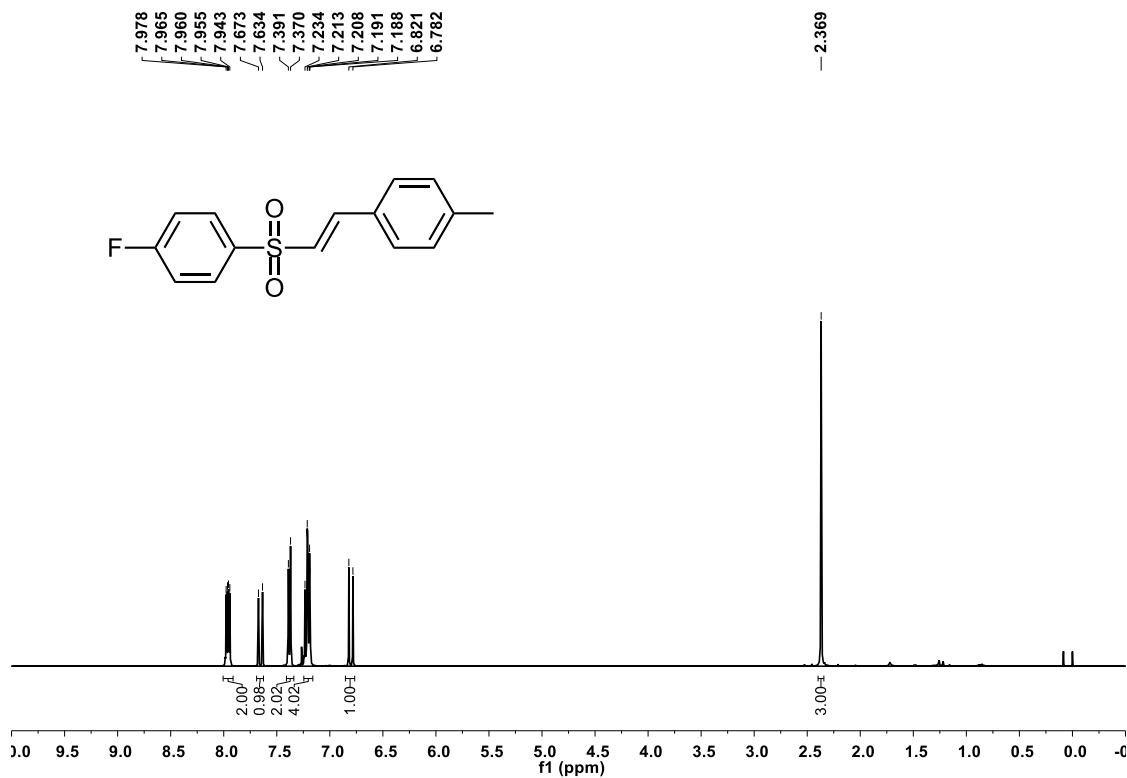
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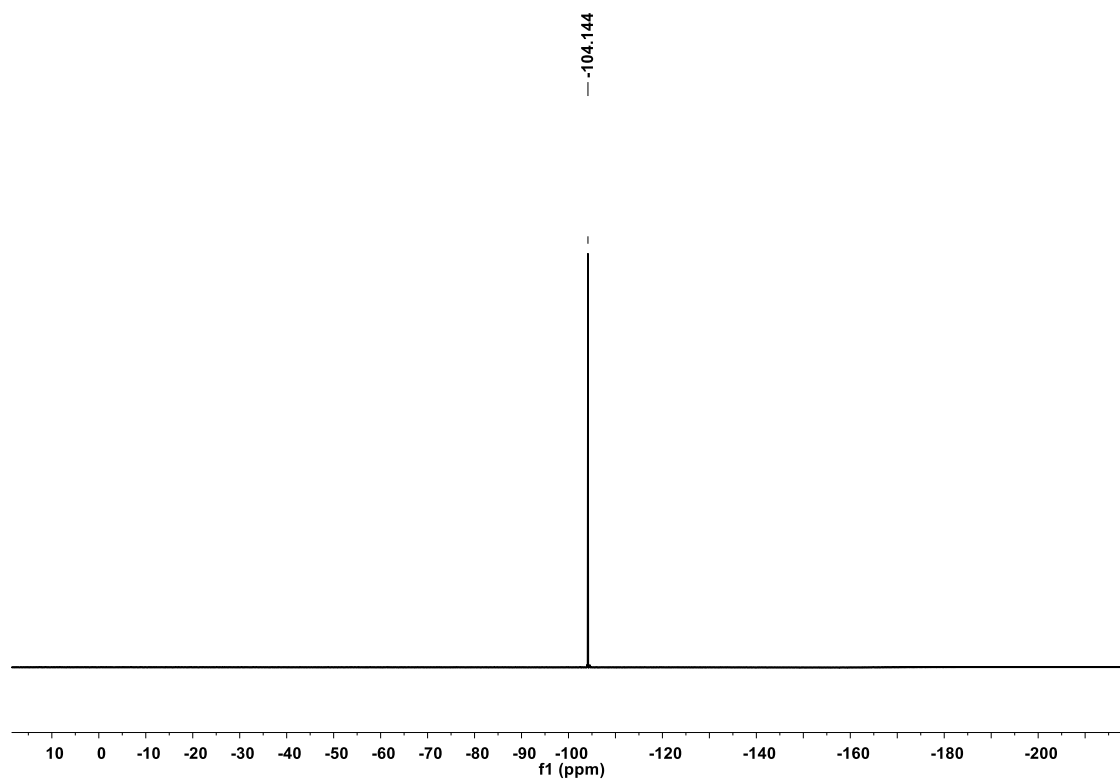


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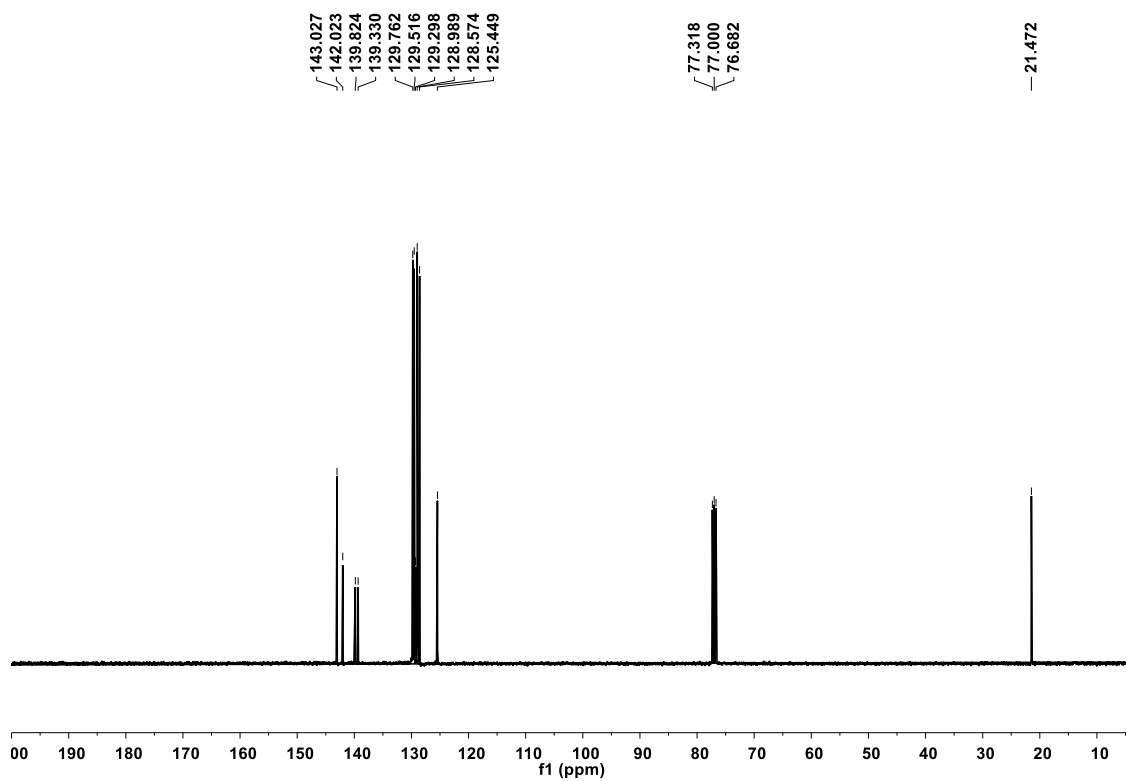
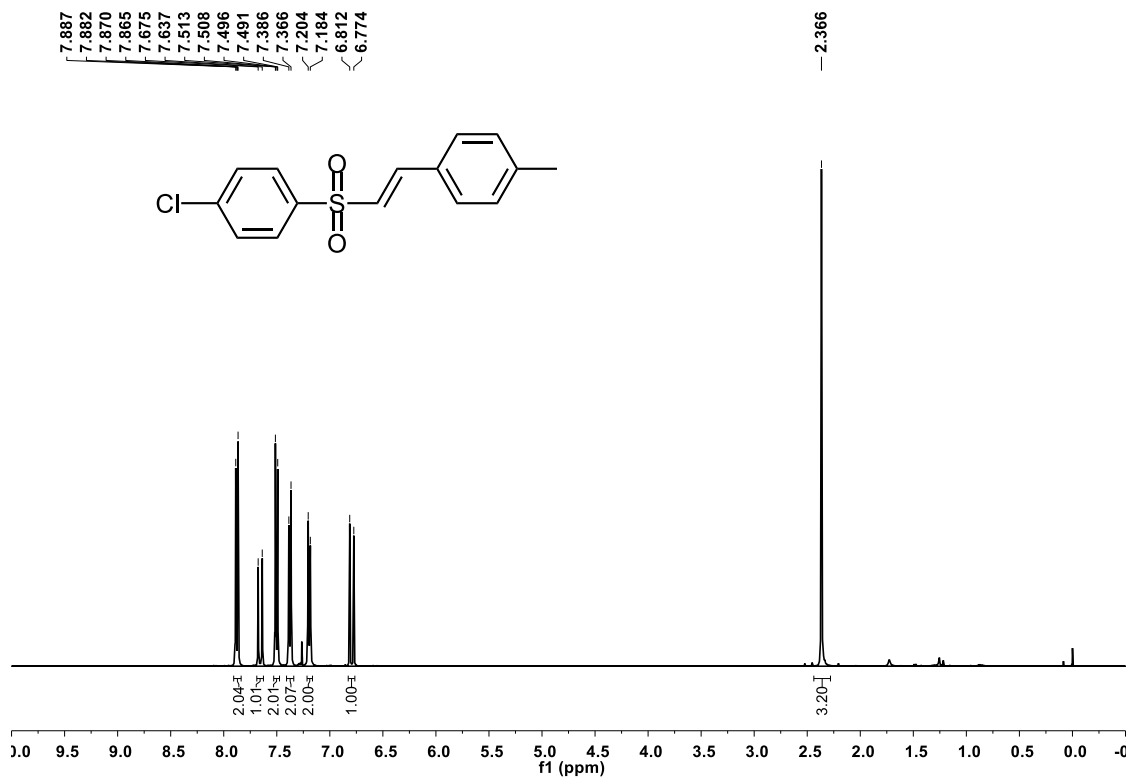


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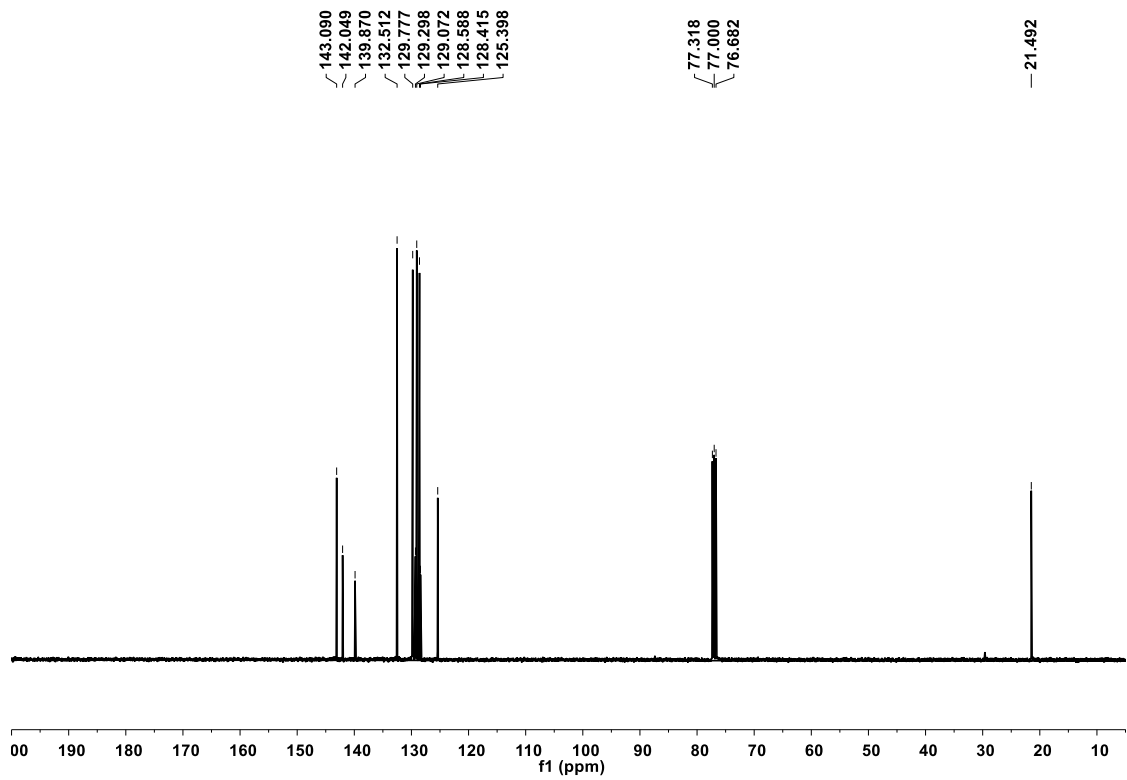
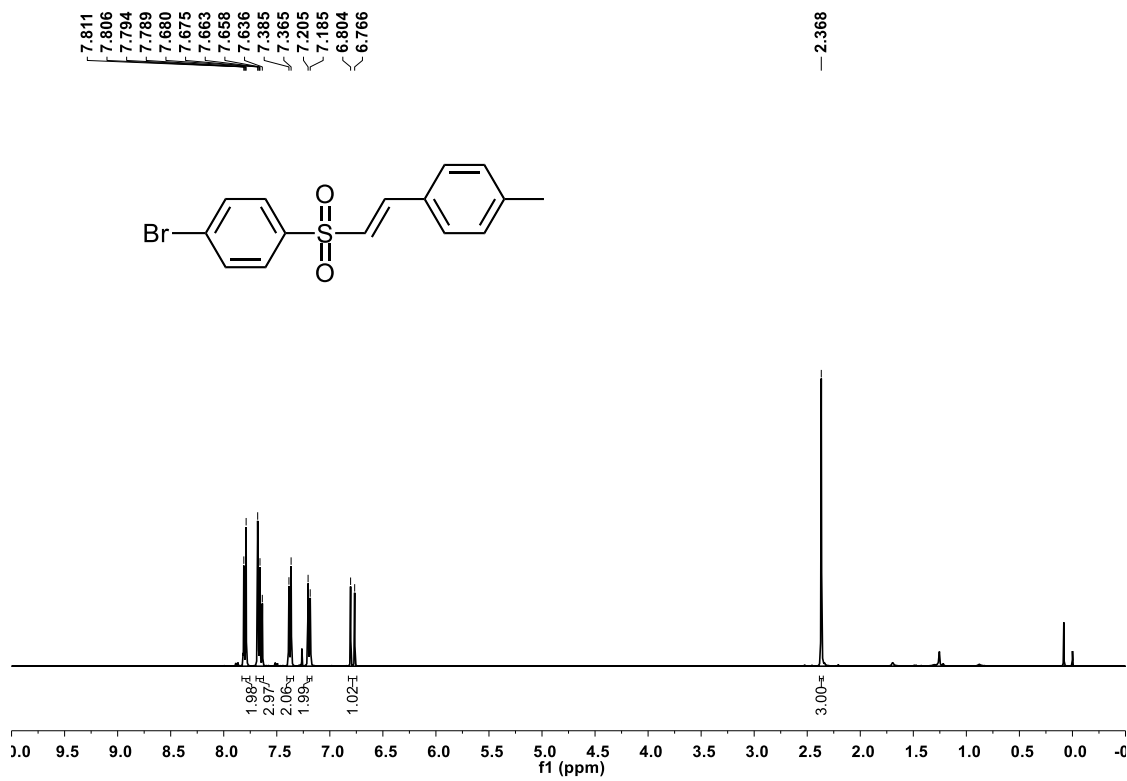




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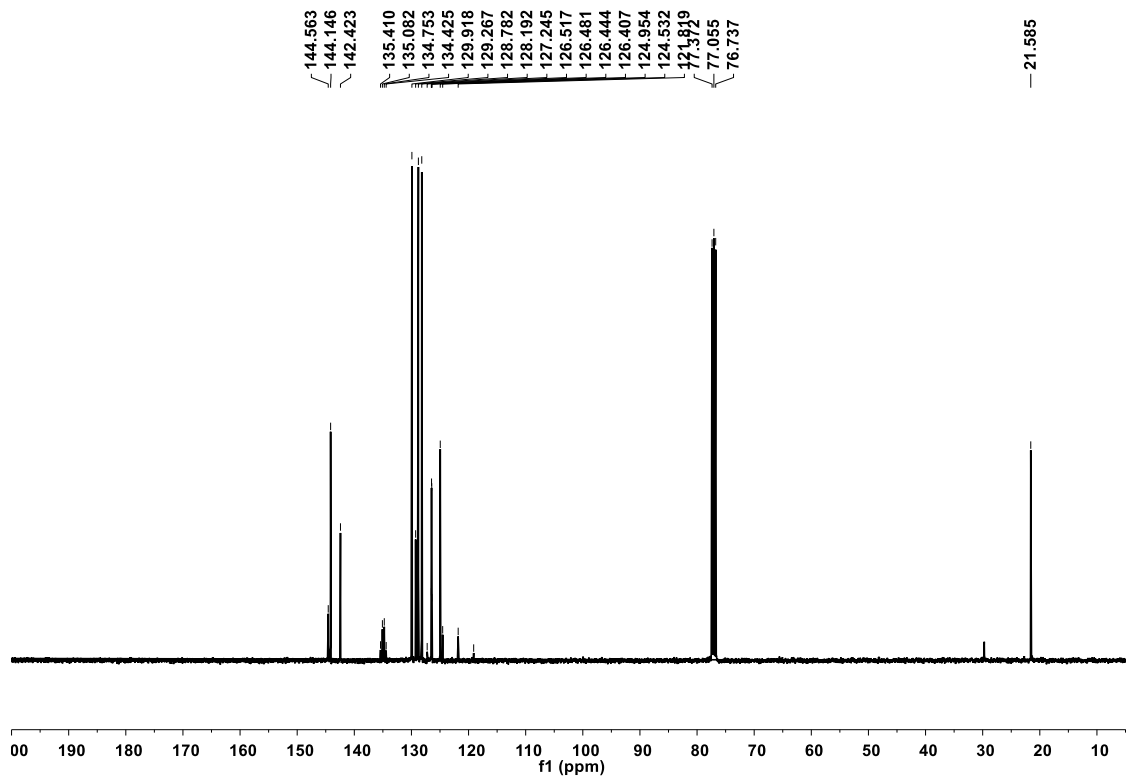
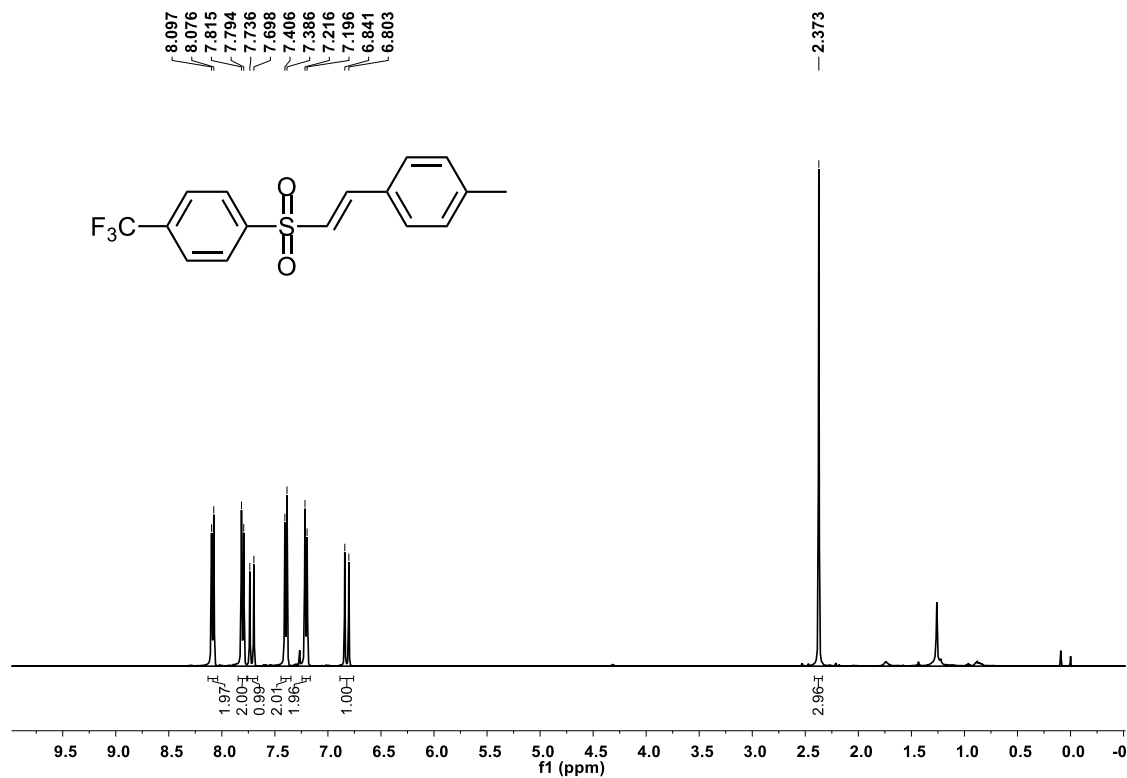


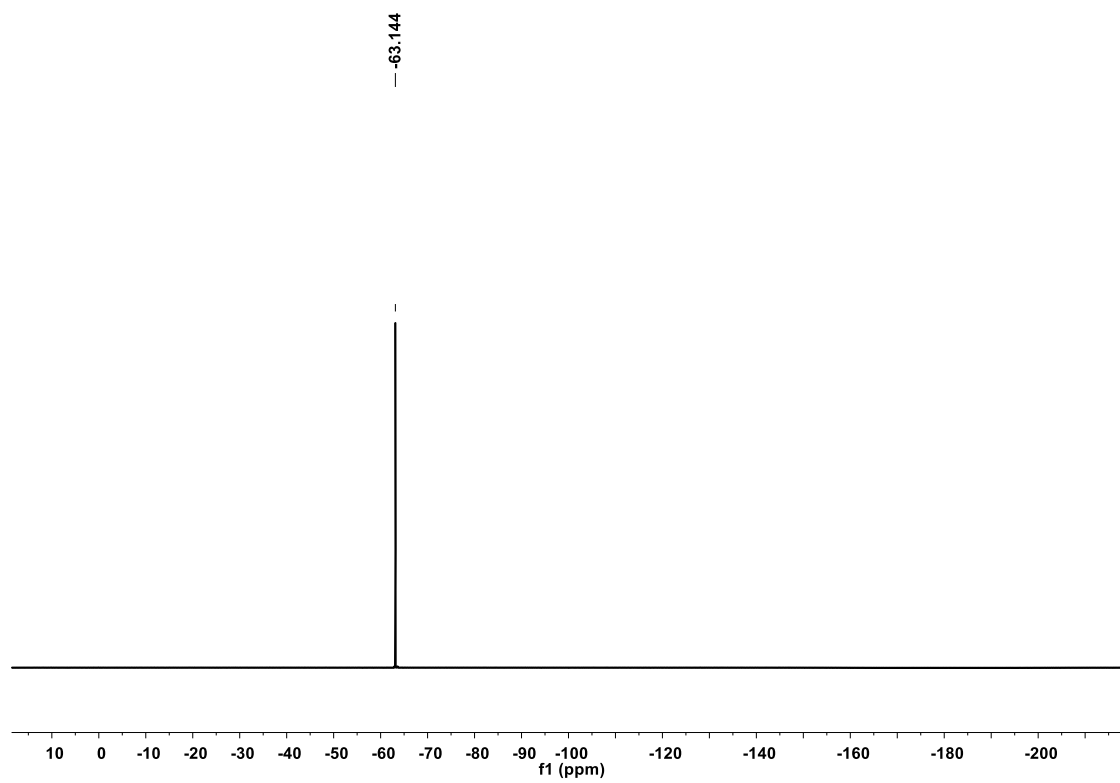
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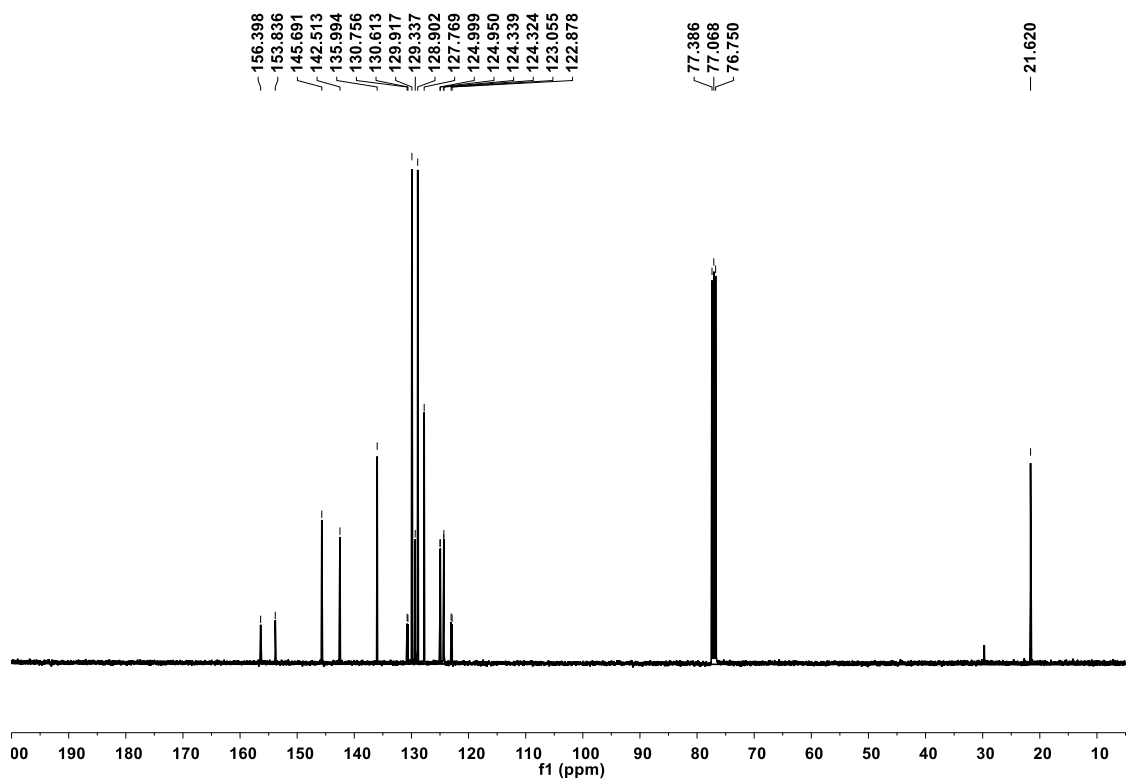
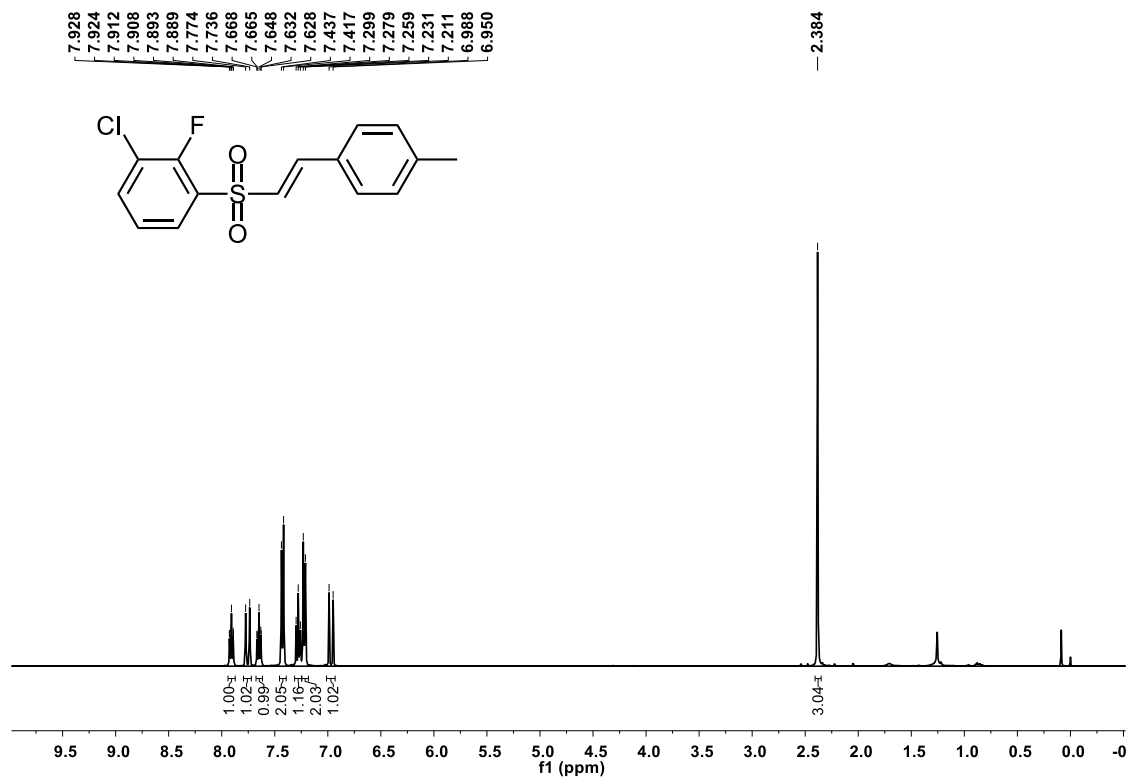


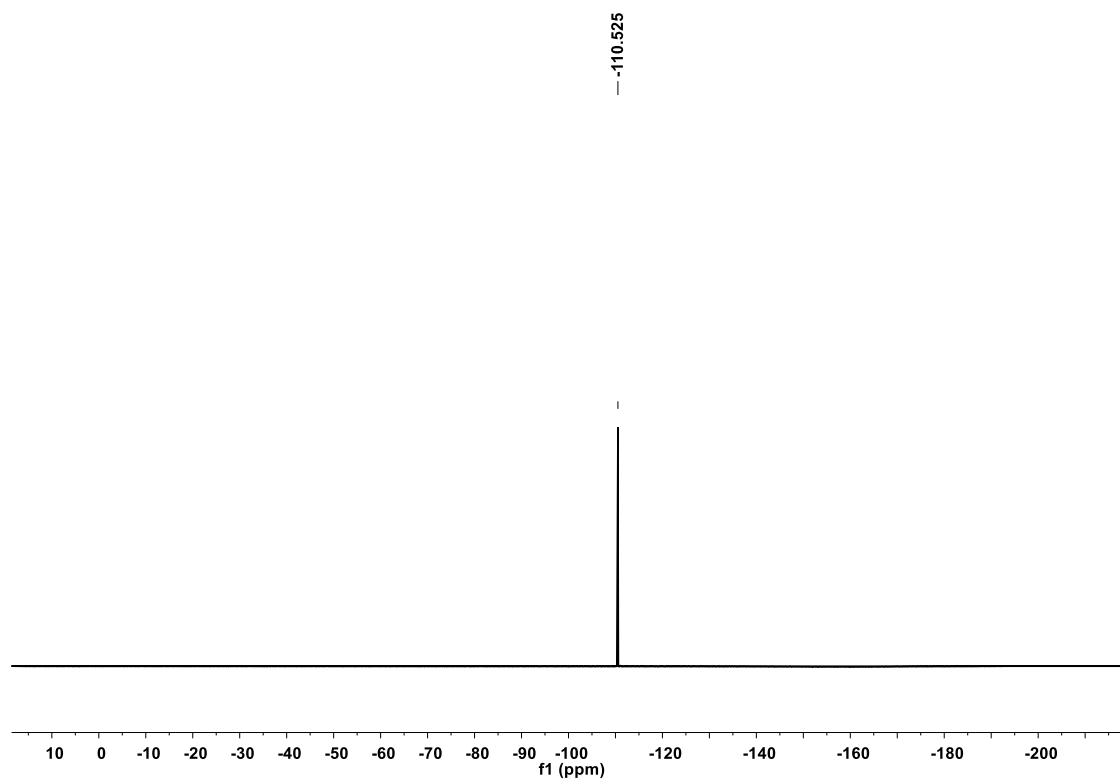
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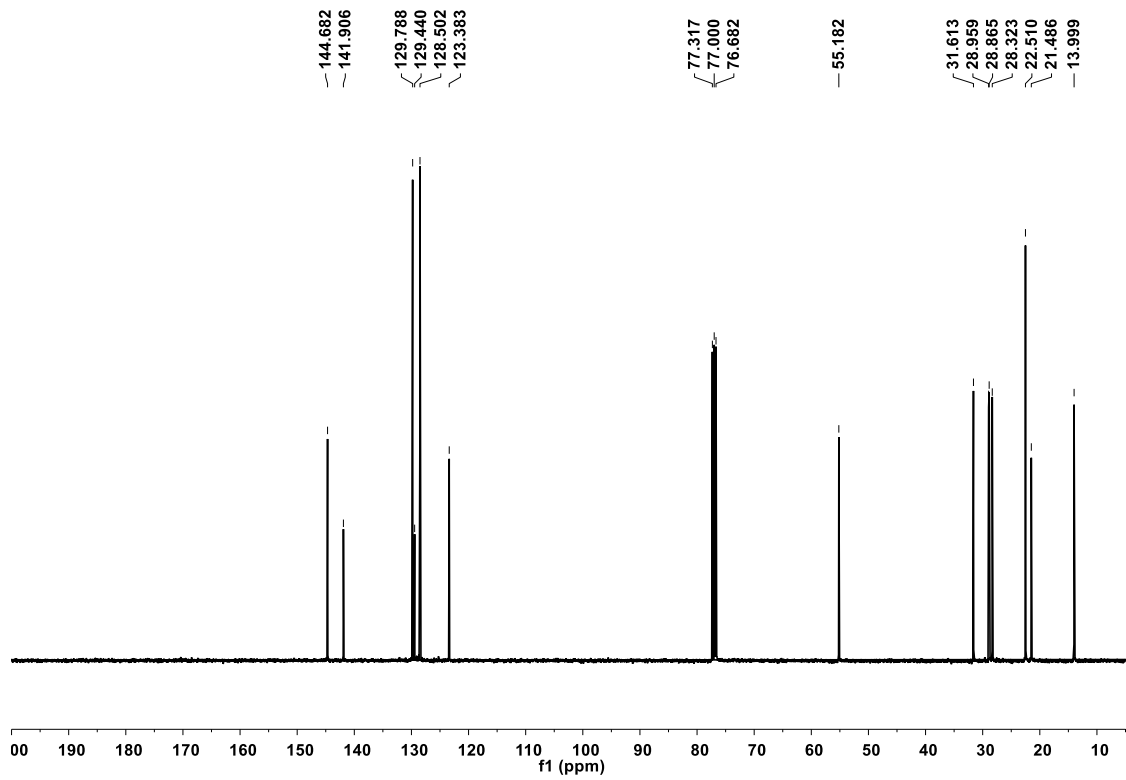
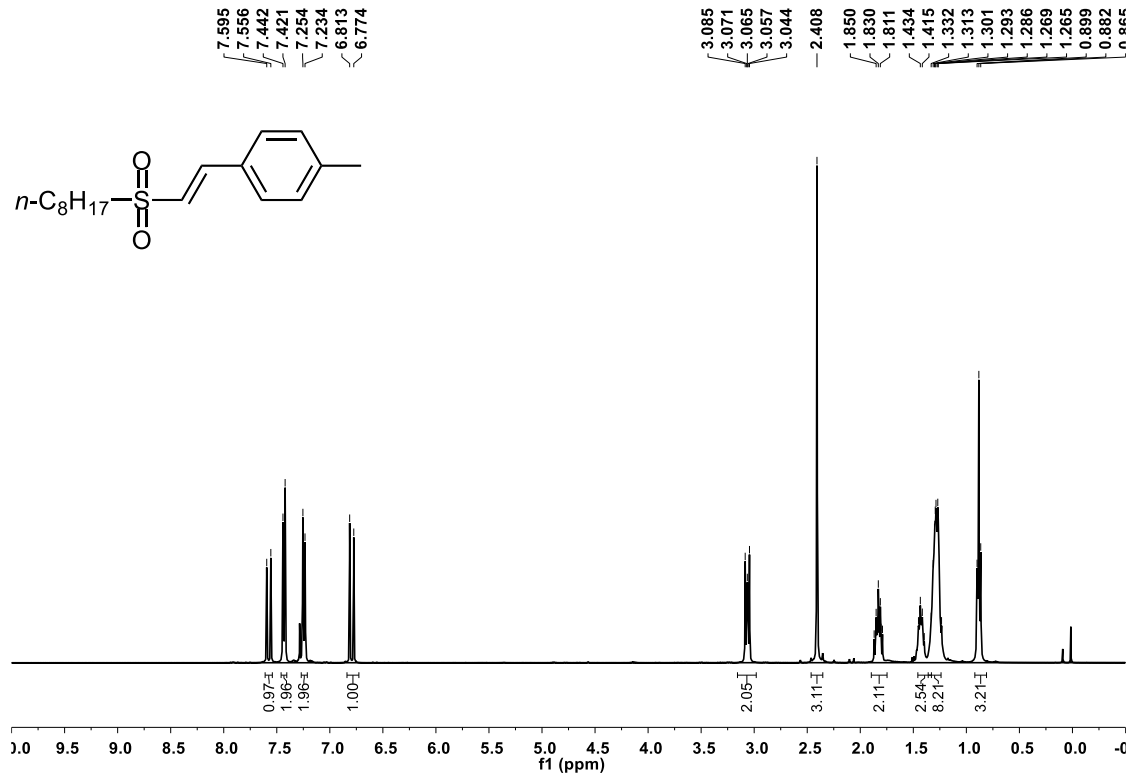


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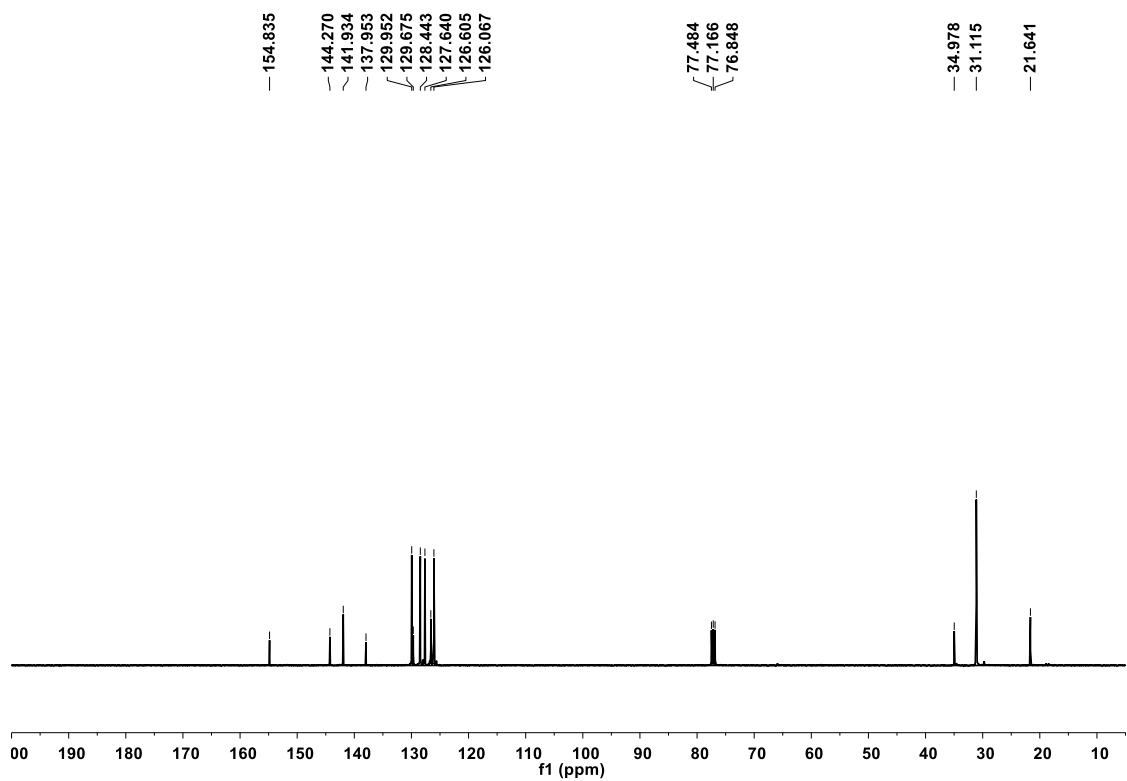
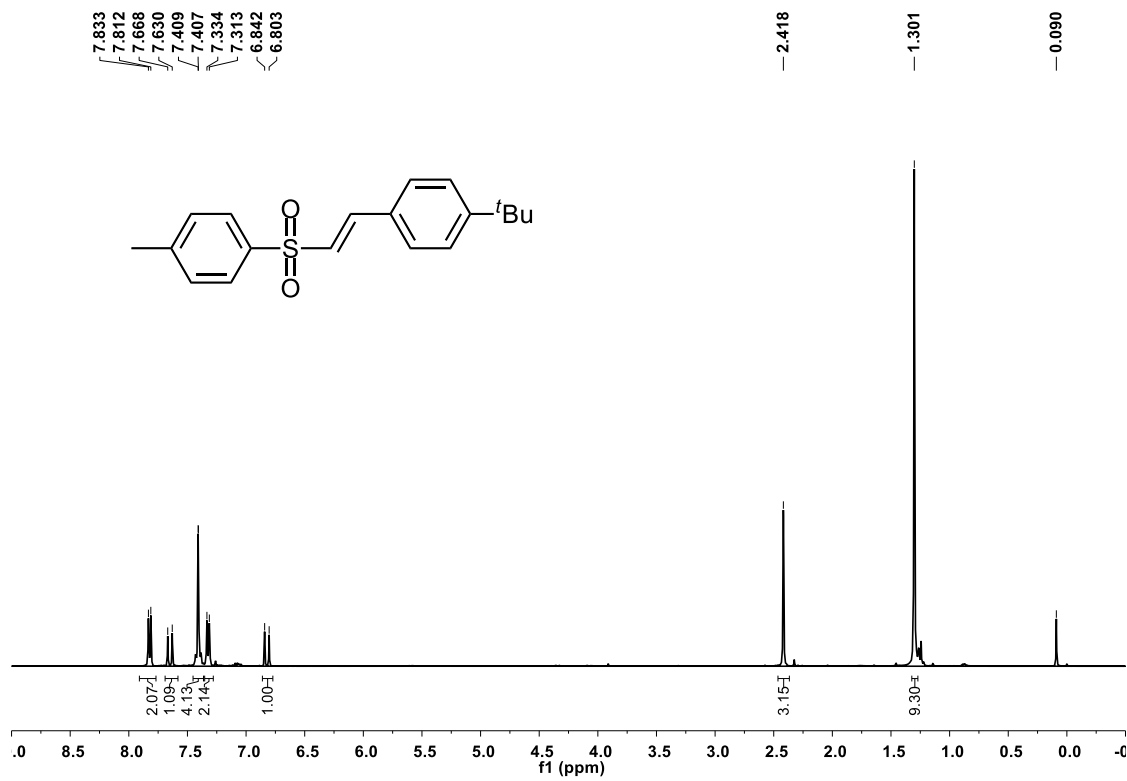




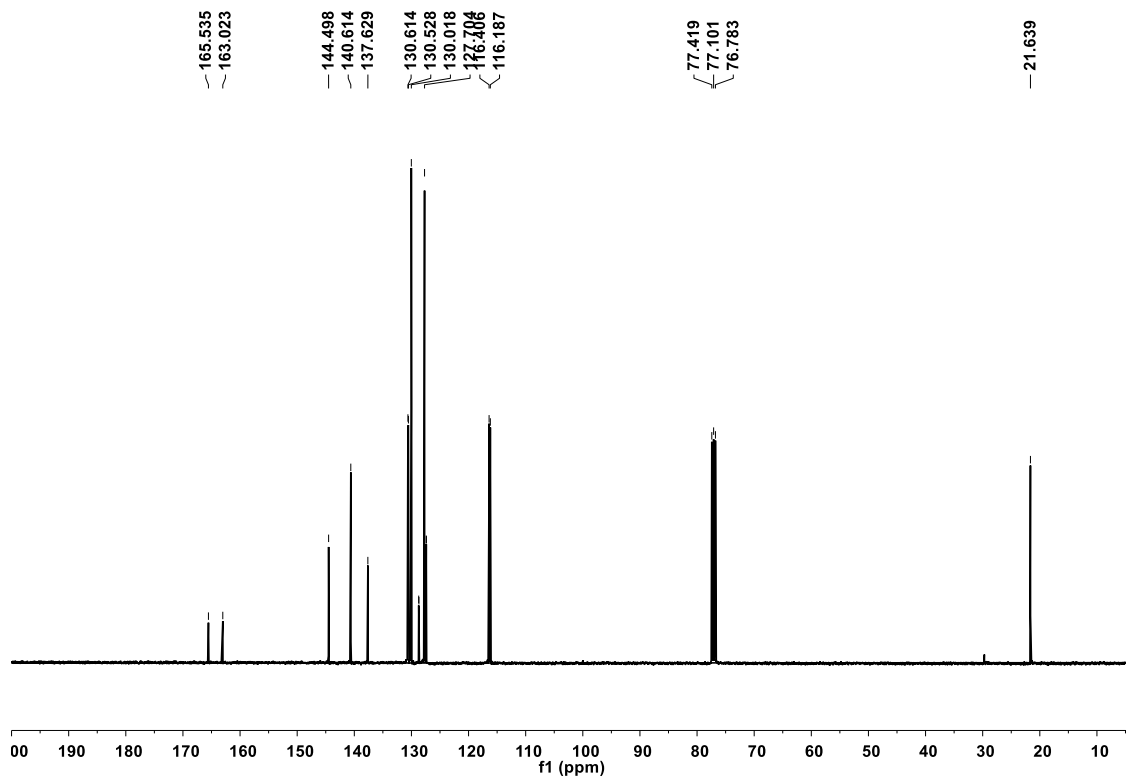
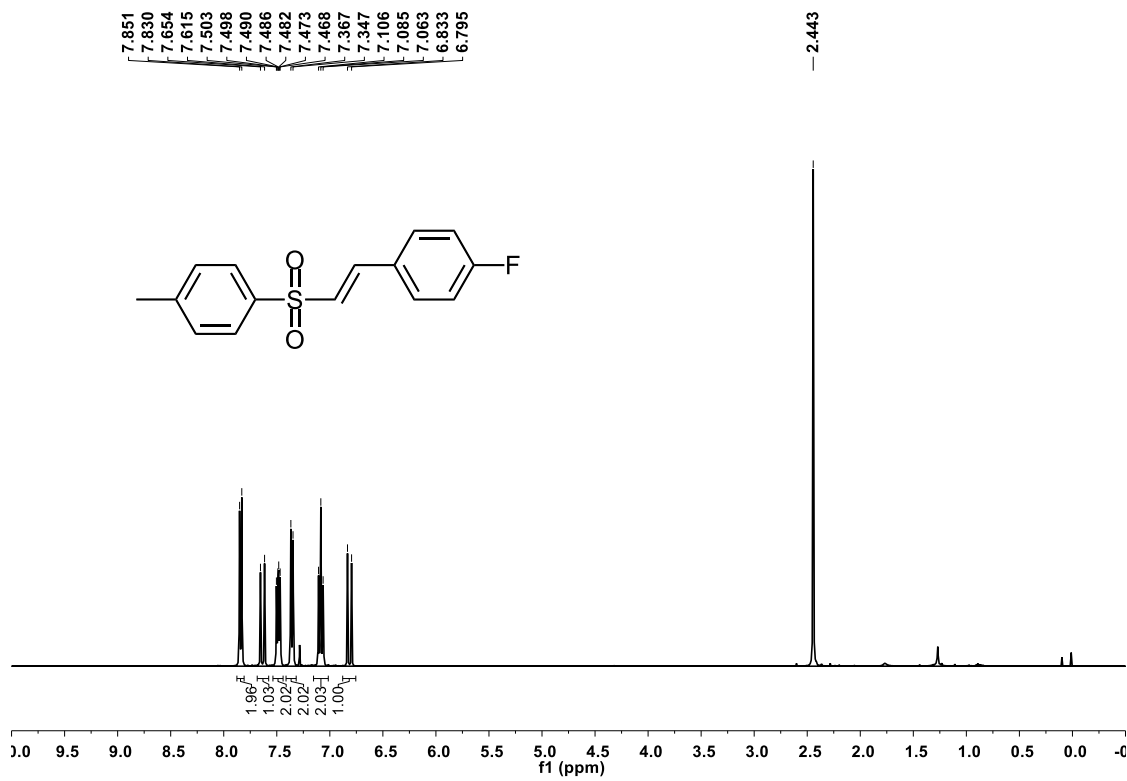
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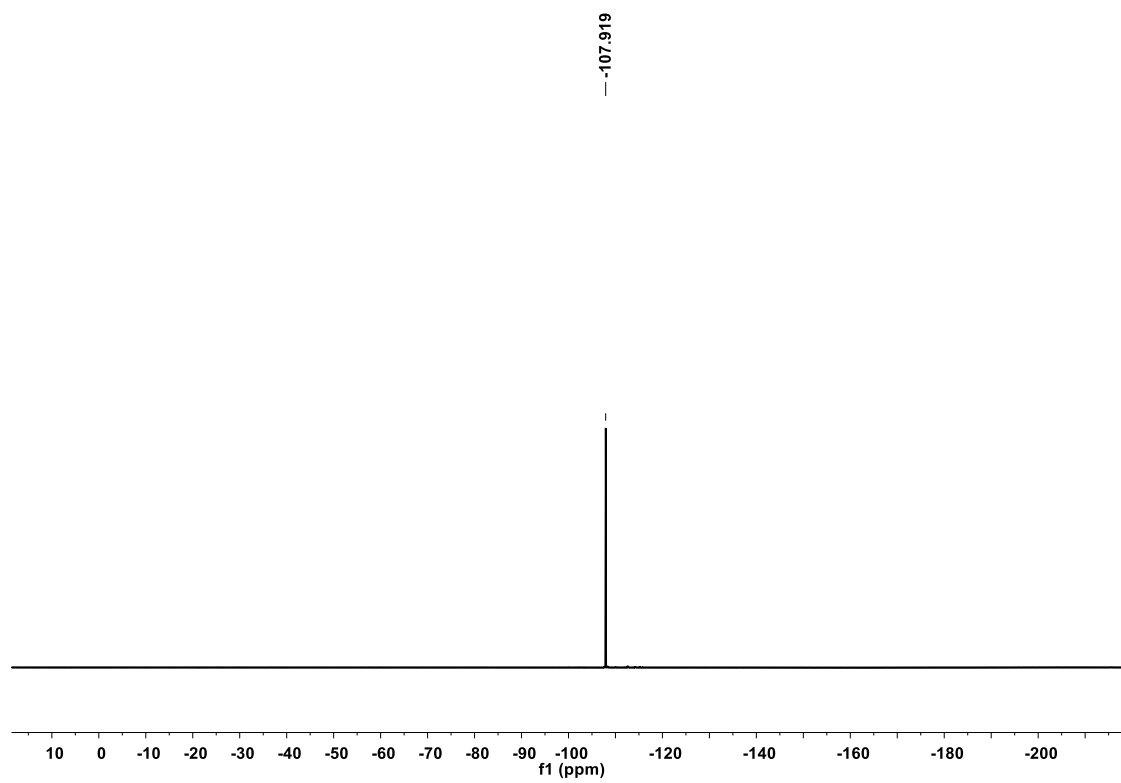


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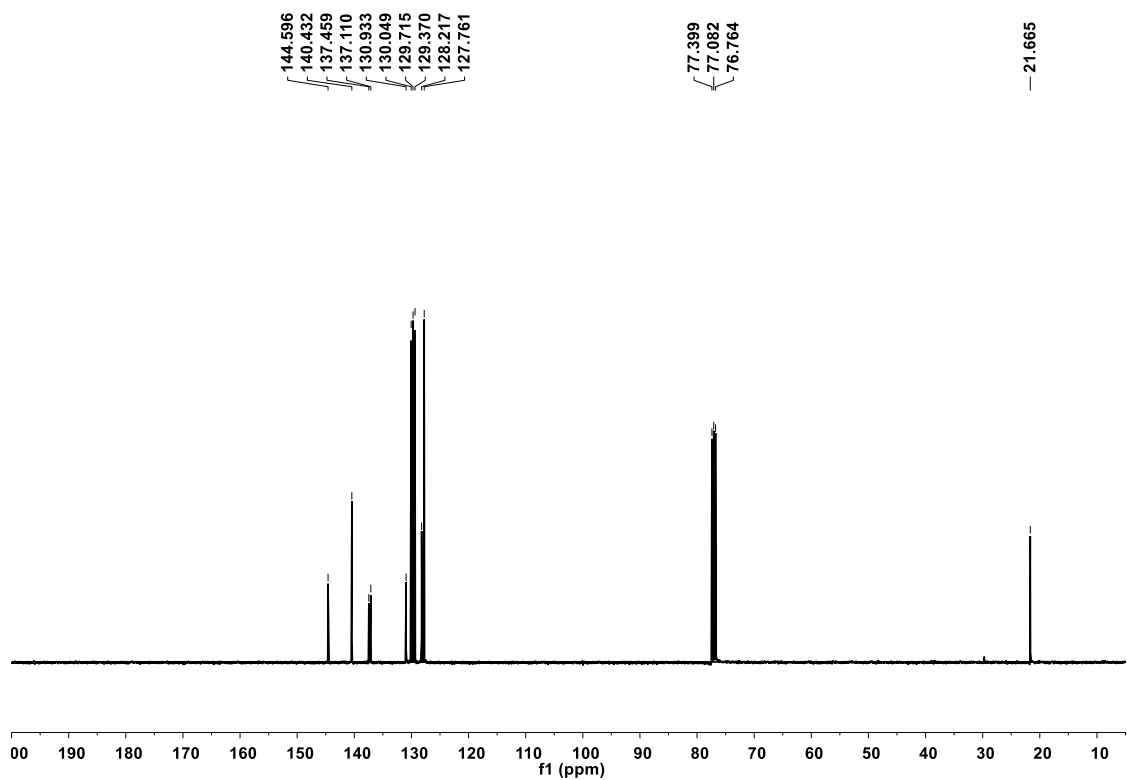
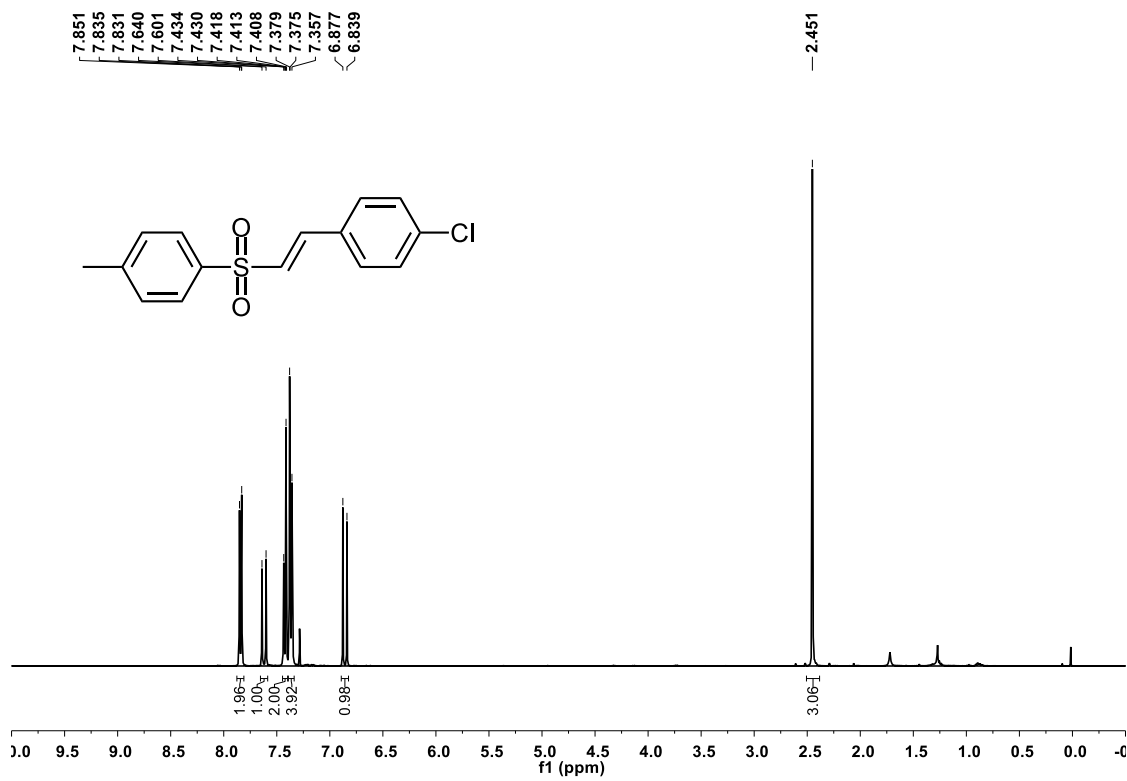
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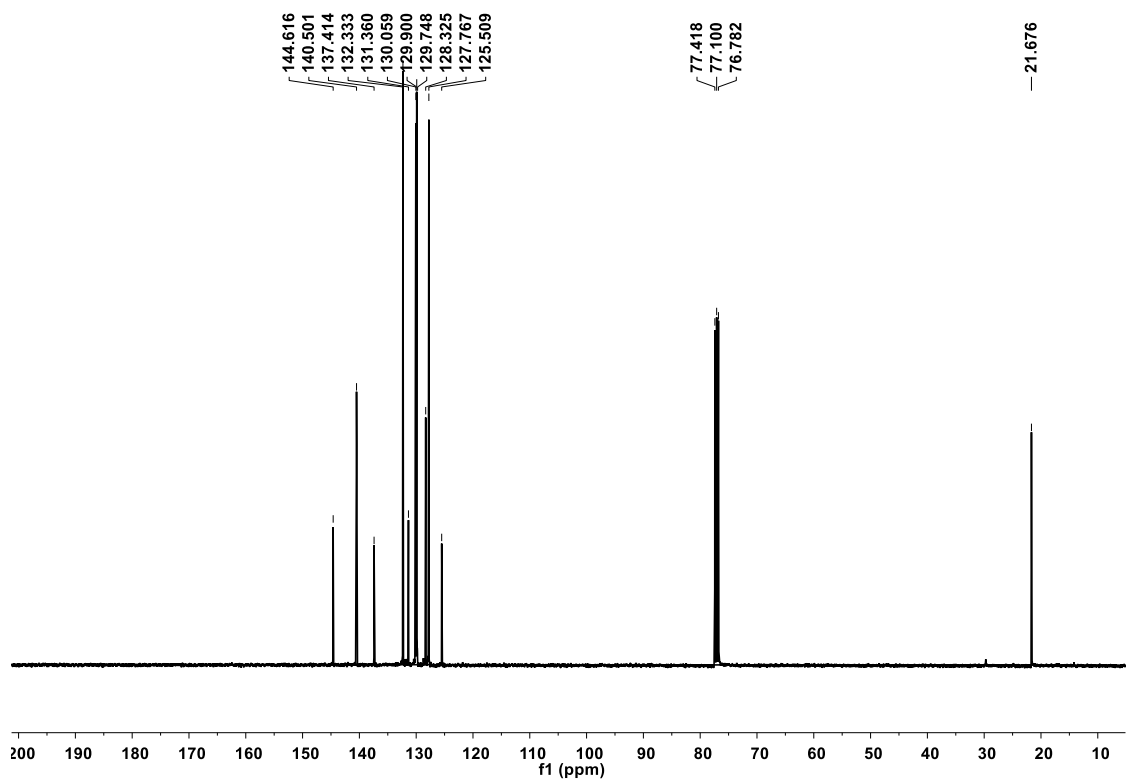
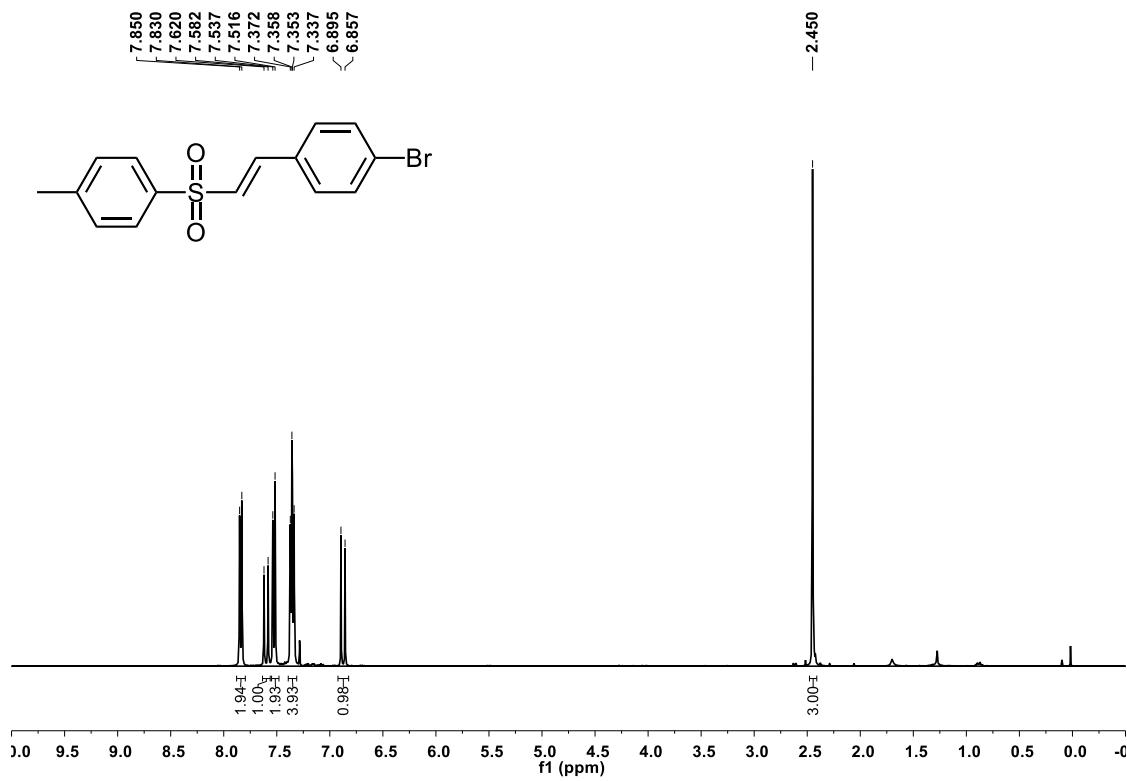




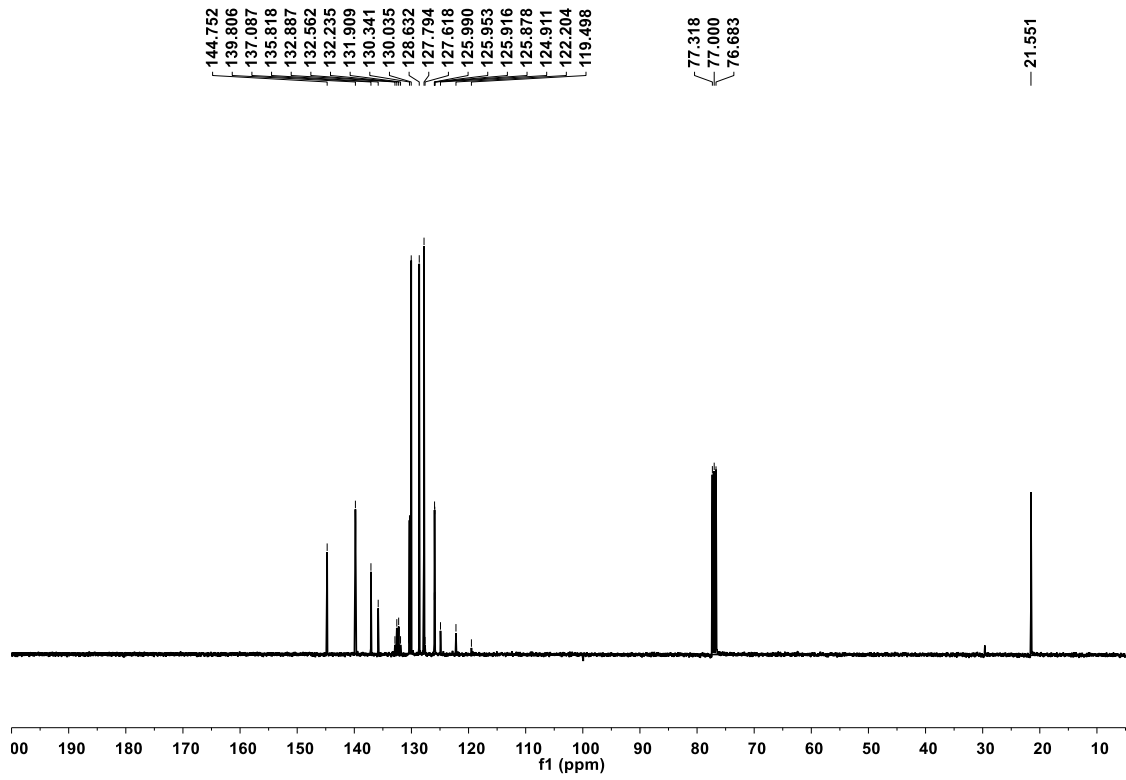
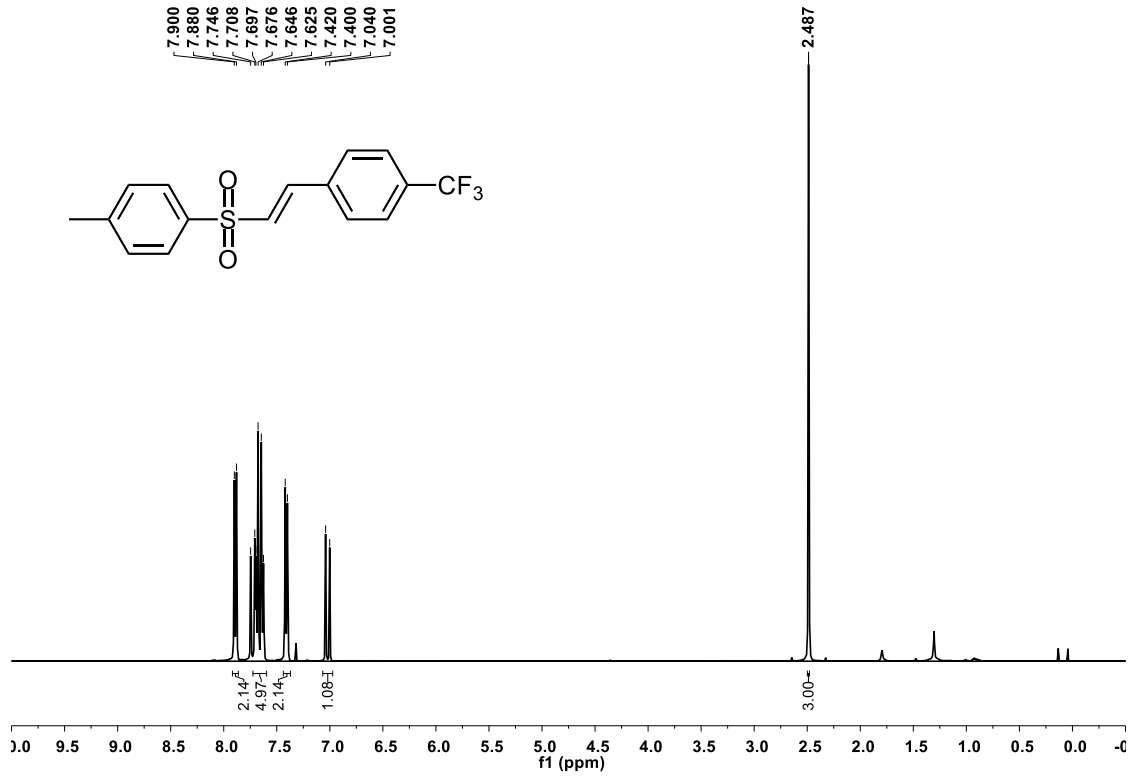
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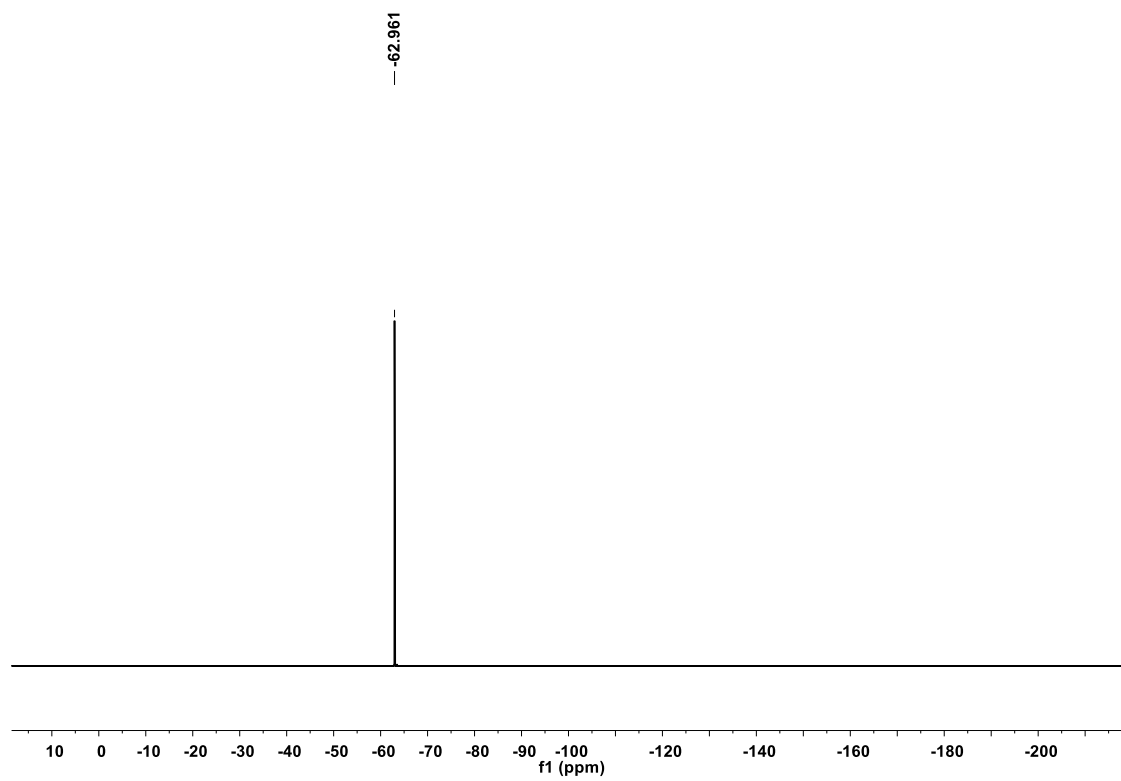


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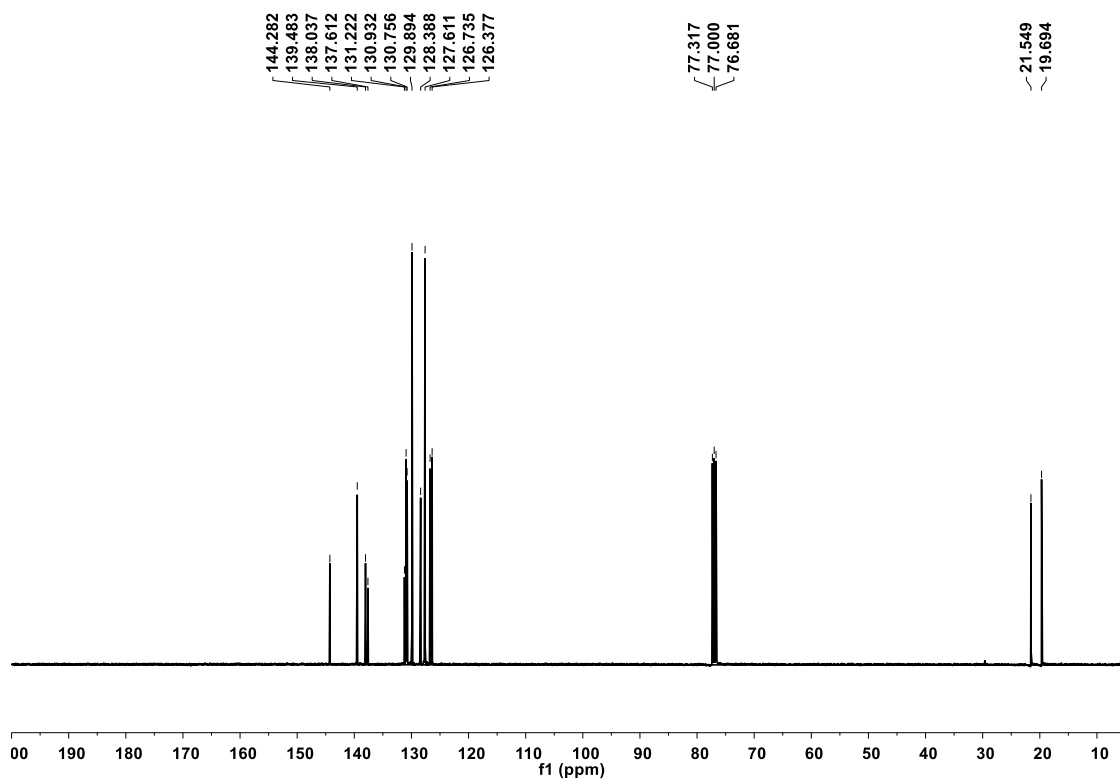
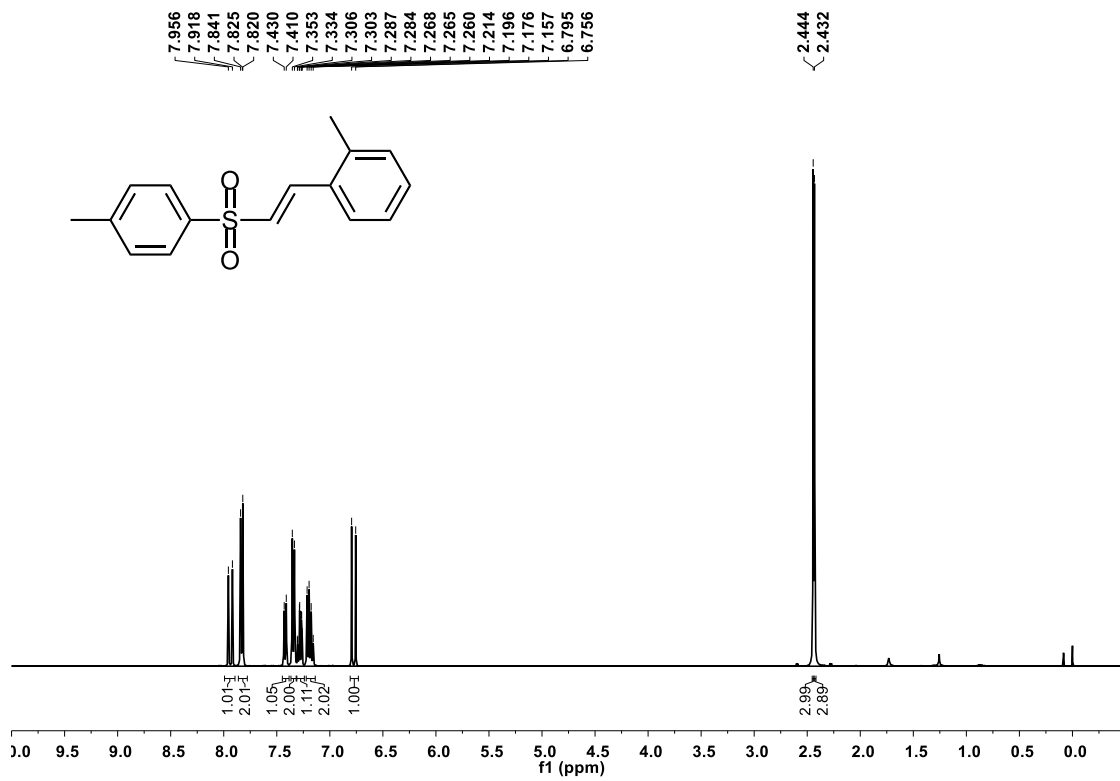


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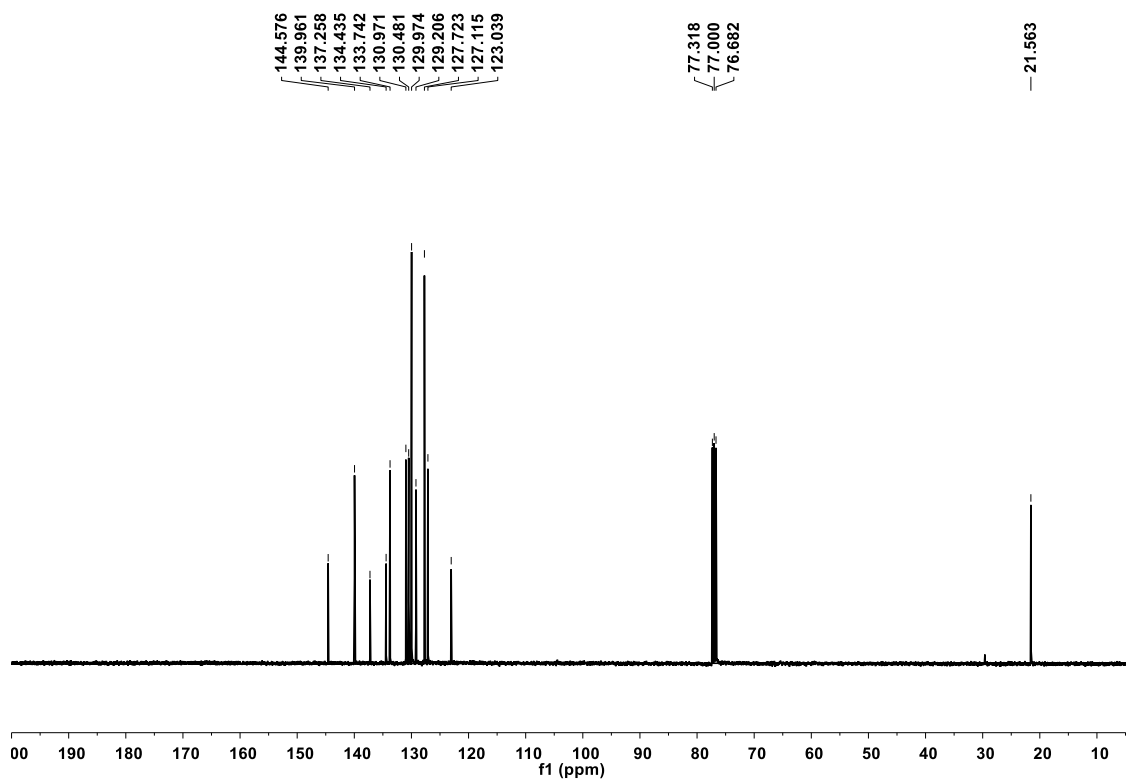
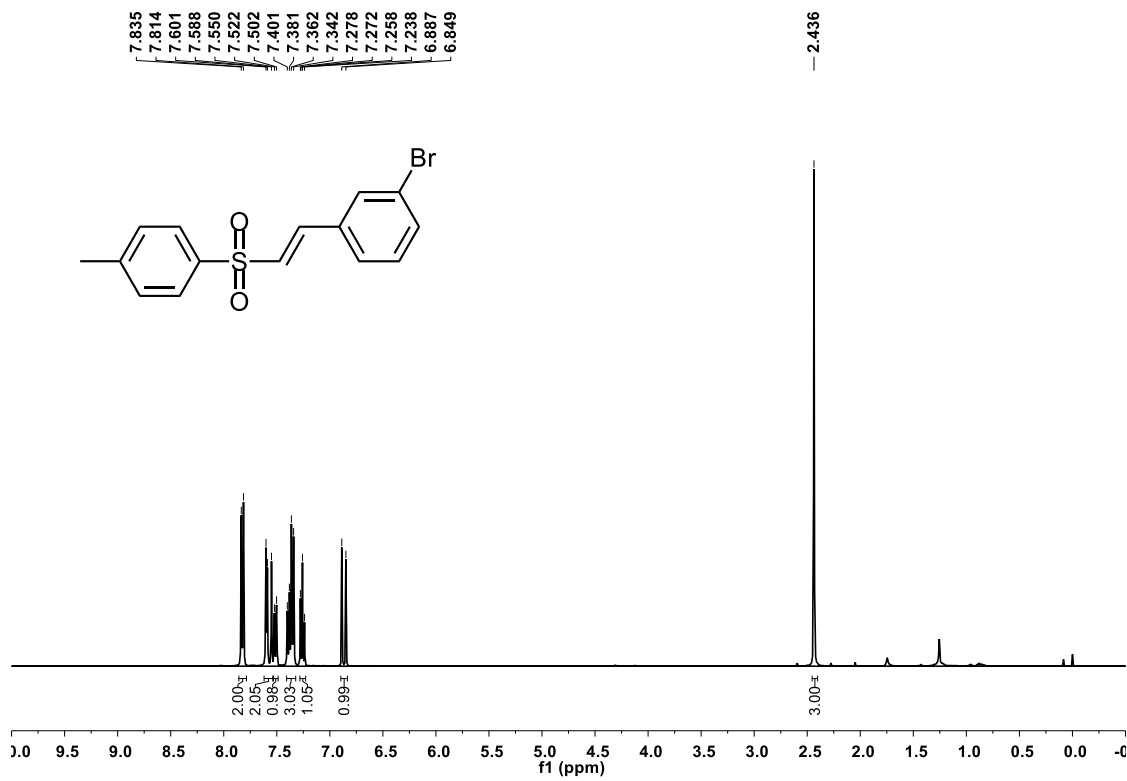




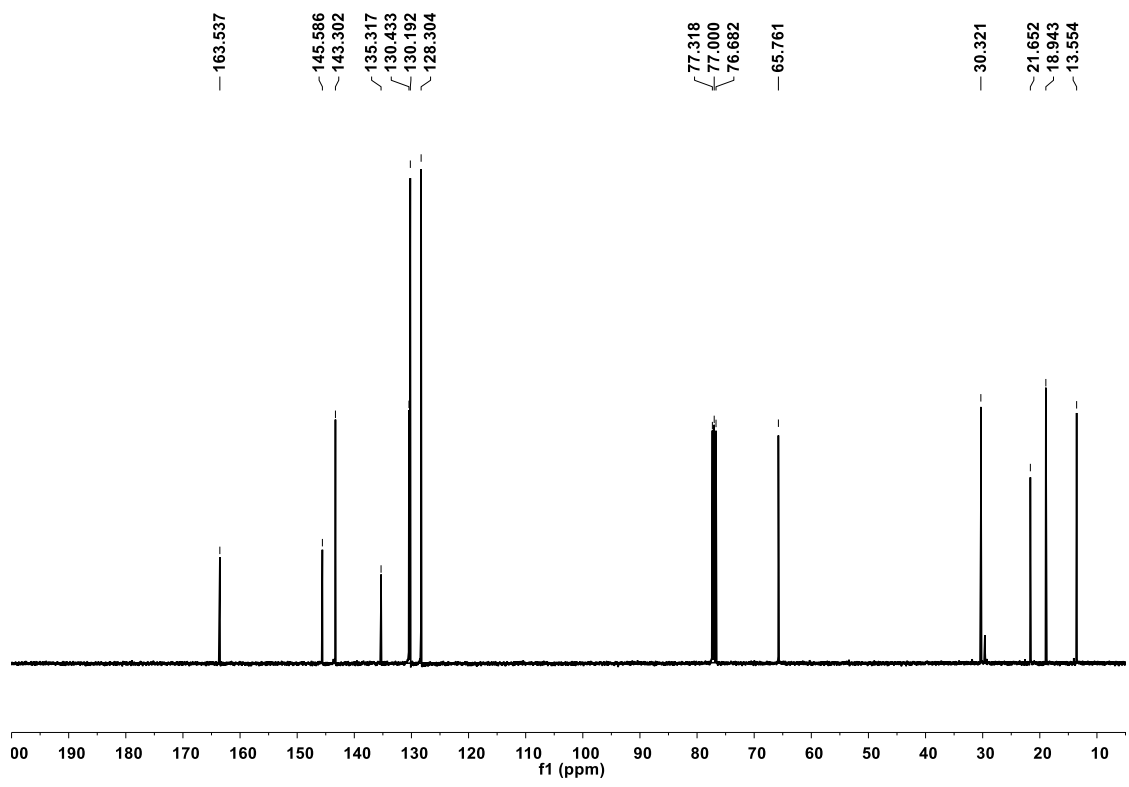
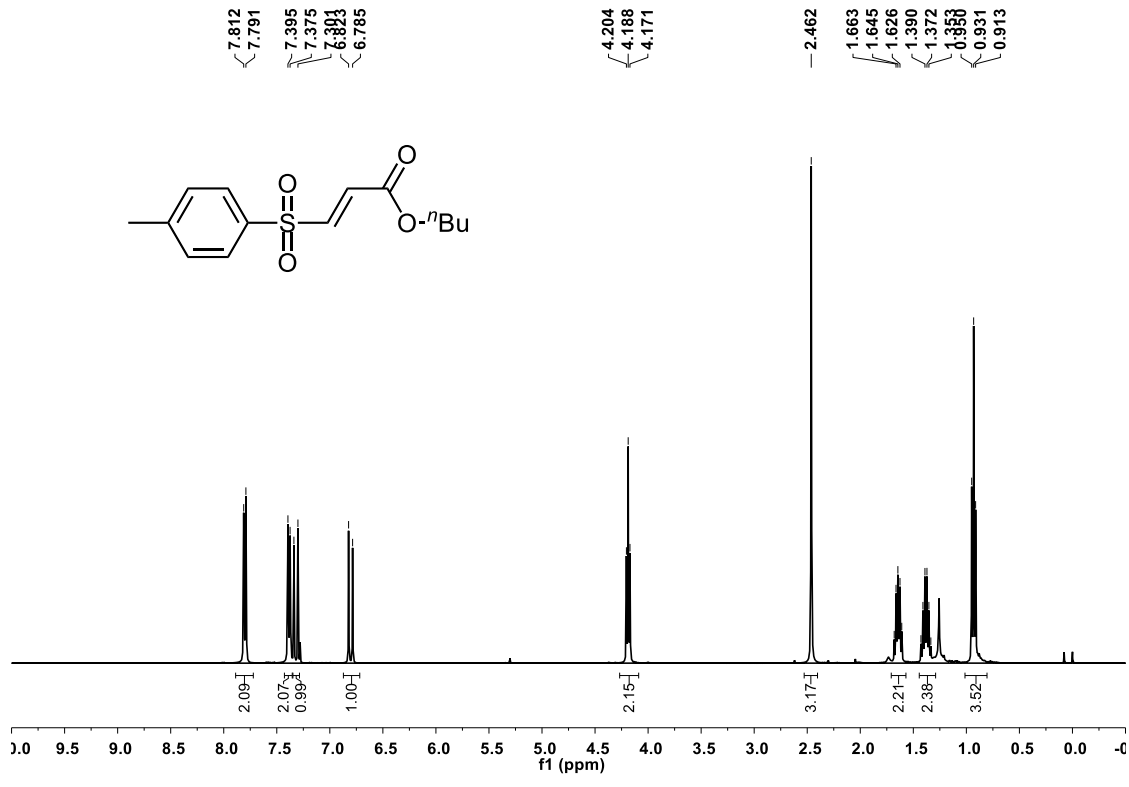
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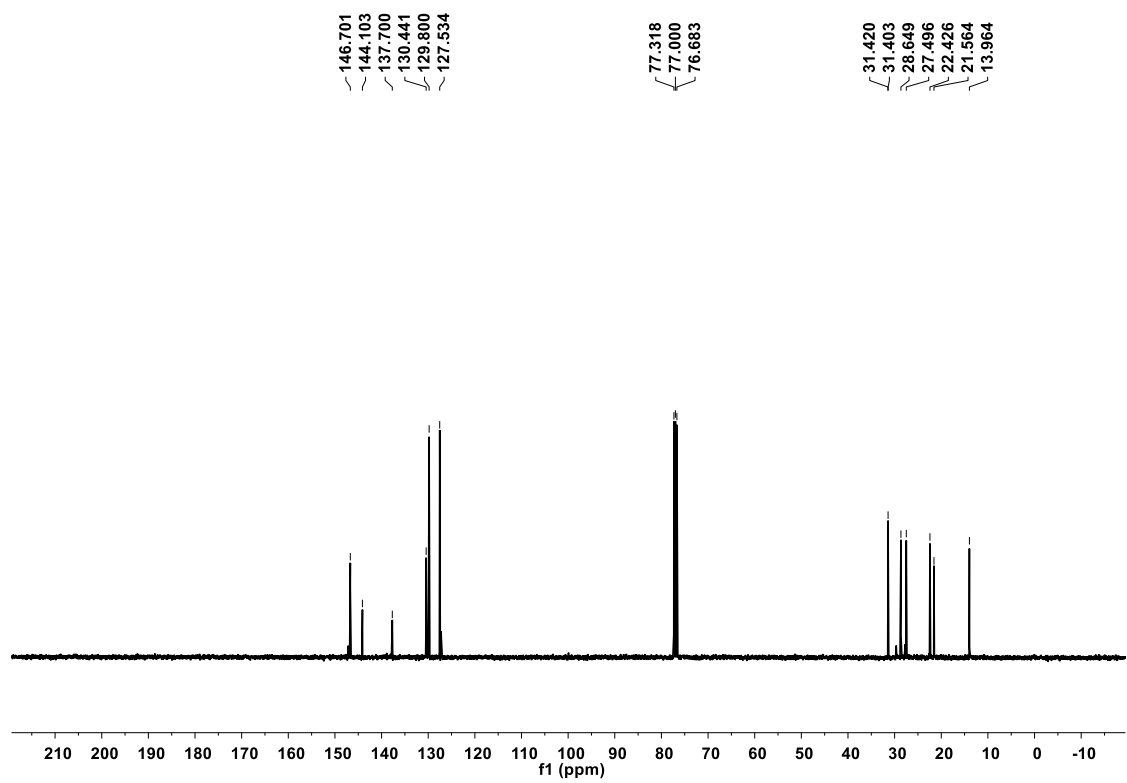
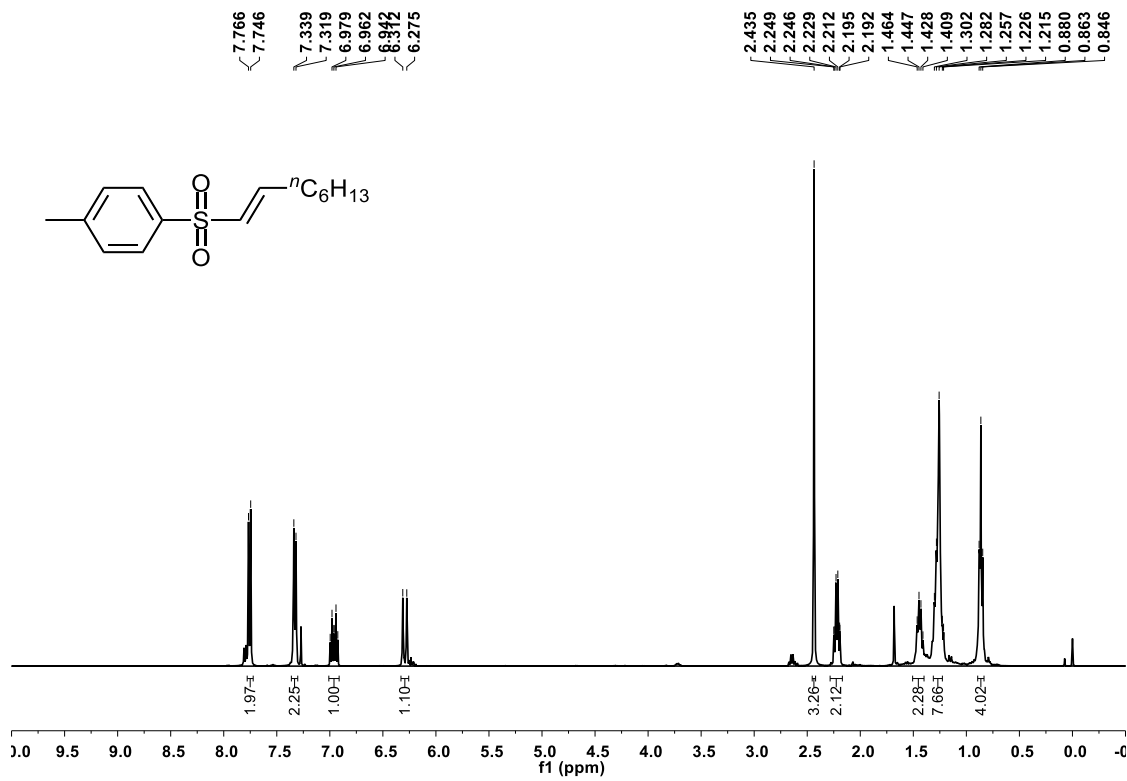
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### 3p



# 3q





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