Supporting Information for:

Asymmetric Synthesis of Either Diastereomer of Trifluoromethylated Allylic Amines by the Selective Reduction of Trifluoromethyl α,β-Unsaturated *N*-*tert*-Butanesulfinyl Ketoimines

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Table of Contents

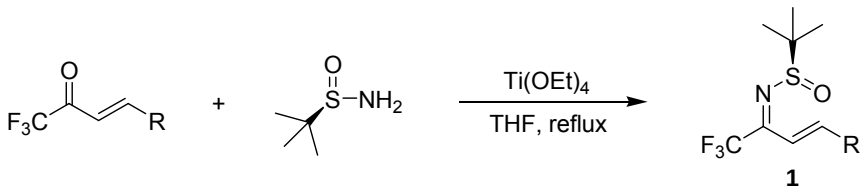
1. Supplementary Data.

Unless otherwise mentioned, solvents and reagents were purchased from commercial sources and used as received. THF was freshly distilled over Na/benzophenone. Melting points were measured on a Melt-Temp apparatus and uncorrected. ^{1}H NMR spectra were recorded on Bruker AM-300 or Mercury 300 (300 MHz) spectrometers with TMS as internal standard. ^{19}F NMR spectra were recorded on Bruker AM-300 or Mercury 300 (282 MHz) spectrometers with $CFCl_3$ as external standard. ^{13}C NMR spectra were recorded on Bruker 300 (75.5 MHz) or DPX-400 (100.7 MHz) spectrometers. IR spectra were obtained with a Nicolet AV-360 spectrophotometer. Mass spectra were taken on a HP5989A spectrometer. High-resolution mass data were obtained on a high-resolution mass spectrometer in the EI or MALDI mode. The trifluoromethyl unsaturated ketones were prepared according to literature.[1]

2. General Procedure for the Preparation of Trifluoromethyl α,β-Unsaturated *N-tert*-Butanesulfinyl Ketoimines.

Into a 25-mL round-bottomed flame-dried flask fitted with a magnetic stirring bar were added 0.9 mmol of trifluoromethyl unsaturated ketones, 1.0 mmol (*R*)-*tert*-butanesulfinyl amide and 2.0-2.5 mmol $Ti(OEt)_4$ in 8 mL of THF under a N_2 atmosphere. The resulting mixture was stirred under reflux and monitored by TLC. After reaction the mixture was poured into an equal volume of brine with rapid stirring and filtered immediately through celite. The filter cake was washed with EtOAc. The combined filtrate was washed twice with EtOAc, dried over Na_2SO_4 and filtered. After the removal of solvents under vacuum, the residue was purified by chromatography on silica gel to give **1**.

Table S1. Preparation of trifluoromethyl α,β-unsaturated *N-tert*-butanesulfinimines **1**

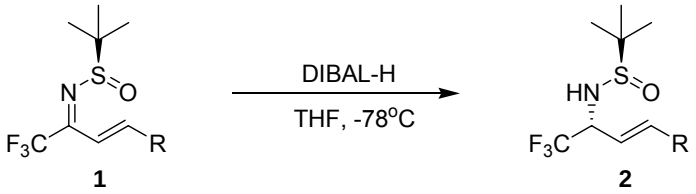


1

entry	R	**1**	yield[a] (%)
1	Ph	**1a**	91
2	4-$MeOC_6H_4$	**1b**	86
3	4-MeC_6H_4	**1c**	85
4	4-ClC_6H_4	**1d**	80
5	4-BrC_6H_4	**1e**	76
6	2-$MeOC_6H_4$	**1f**	86
7	3-BrC_6H_4	**1g**	65
8	1-Naphthyl	**1h**	80
9	2-Furyl	**1i**	72
10	PhC≡C	**1j**	56
11	n-C_8H_{17}	**1k**	51
12	$C_6H_5(CH_2)_3$	**1l**	91

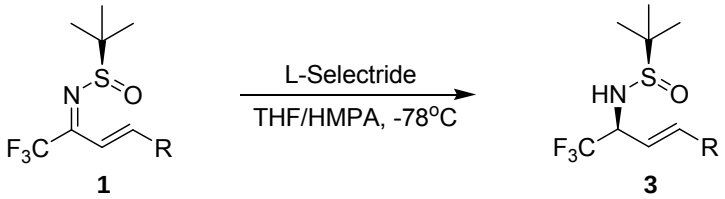
[a] Isolated yield.

3. General Procedure for the Reduction of Trifluoromethyl α,β-Unsaturated *N-tert*-Butanesulfinyl Ketoimines in DIBAL-H System.



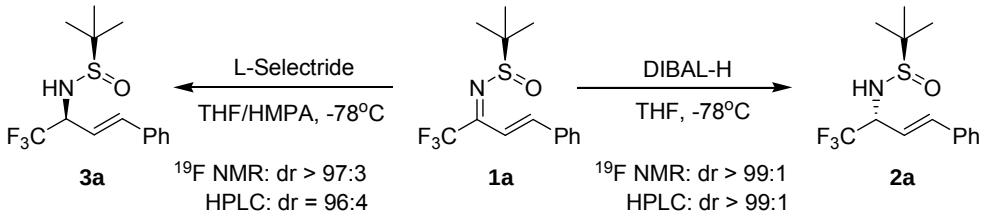
Into a dried 20-mL Schlenk flask containing trifluoromethyl α,β-unsaturated *N-tert*-butanesulfinyl ketoimines (***R***)-**1** (0.25 mmol) in 3 mL THF was slowly added a solution of DIBAL-H (0.75 mL, 0.75 mmol, 1.0 M solution in toluene) at –78 °C under N_2 atmosphere. The reaction mixture was stirred at this temperature for half an hour, followed by adding a saturated aqueous NH_4Cl solution (5 mL) at the same temperature. The resulting mixture was extracted with CH_2Cl_2 (10 mL x 3). The combined organic solution was dried over Na_2SO_4. After the removal of volatile solvents under vacuum, the crude product was further purified by column chromatography on silica gel to give product **2**.

4. General Procedure for the Reduction of Trifluoromethyl α,β-Unsaturated *N-tert*-Butanesulfinyl Ketoimines in L-Selectride System.



Into a dried 20-mL Schlenk flask containing trifluoromethyl α,β-unsaturated *N-tert*-butanesulfinyl ketoimines (***R***)-**1** (0.25 mmol) in 3 mL THF and 0.6 mL HMPA was slowly added a solution of L-Selectride (0.75 mL, 0.75 mmol, 1.0 M solution in THF) at –78 °C under N_2 atmosphere. The reaction mixture was then stirred at this temperature for 0.5-1 h, followed by adding a saturated aqueous NH_4Cl solution (5 mL) at the same temperature. The resulting mixture was extracted with CH_2Cl_2 (10 mL x 3). The combined organic solution was dried over Na_2SO_4. After the removal of volatile solvents under vacuum, the crude product was further purified by column chromatography on silica gel to give product **3**.
[Caution]: HMPA is a suspected human carcinogen.

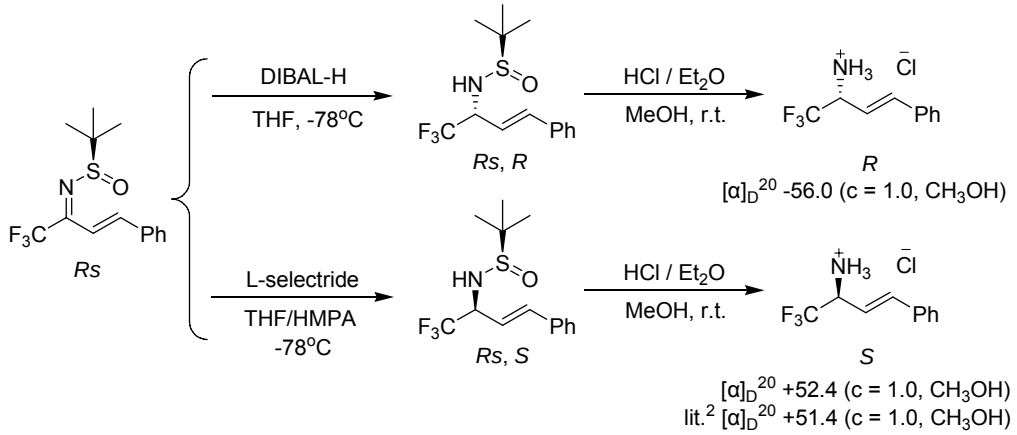
5. Determination of the Diastereoselectivity.
The diastereoselectivity of trifluoromethylated allylic amines was determined according to ^{19}F NMR spectra of the crude reaction mixture. In the case of **1a**, the diastereomeric excess of the product was further measured by chiral HPLC to ensure the accuracy.



HPLC: Chiralpak AD-H column, 90:10 hexane/2-propanol; 0.8 mL/min; 254 nm; (*Rs*, *S*), t_r = 6.23 min, (*Rs*, *R*), t_r = 8.98 min.

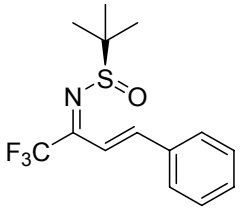
6. The Configuration Assignment.

The configuration of the reduction product was assigned by comparison with literature data of trifluoromethylated allylic amine hydrochlorides.



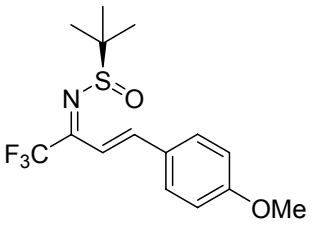
7. Characterization Data of 1-6.

(*R*,*E*)-*N*-((*E*)-1,1,1-trifluoro-4-phenylbut-3-en-2-ylidene)-*tert*-butanesulfinamide (1a)



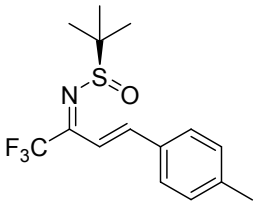
Yellow solid, yield 91%; mp 55-56 °C; $[\alpha]_D^{20}$ -985.76 (c = 0.70, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 2964, 2932, 1617, 1583, 1451, 1197, 1144, 1126, 1079, 977, 762, 698; ^1H NMR ($CDCl_3$): δ 8.00 (d, *J* = 16.8 Hz, 1H), 7.44-7.47 (m, 2H), 7.27-7.30 (m, 3H), 7.23 (d, *J* = 16.8 Hz, 1H), 1.25 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -66.26 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 158.66 (q, *J* = 32.9 Hz), 143.77 (q, *J* = 2.7 Hz), 134.65, 130.86, 128.89, 128.35, 118.88 (q, *J* = 282.4 Hz), 115.09, 60.58, 22.89; EIMS (*m/z*, %): 304 (M^++1, 0.54), 247 (M^+-^{t}Bu+1, 39.62), 198 (38.91), 57 (100.00); HRMS(EI) calcd. for $C_{10}H_7F_3NOS$ [M^+-^{t}Bu]: 246.0200; Found: 246.0206.

(*R*,*E*)-*N*-((*E*)-1,1,1-trifluoro-4-(4-methoxyphenyl)but-3-en-2-ylidene)-*tert*-butane-sulfinamide (1b)



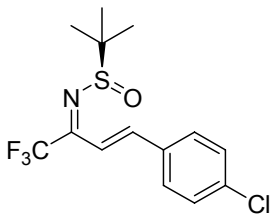
Yellow solid, yield 86%; mp 47-48 °C; $[\alpha]_D^{20}$ -1095.62 (c = 0.89, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 2964, 1618, 1599, 1579, 1512, 1263, 1174, 1129, 1070, 829, 689; ^1H NMR ($CDCl_3$): δ 7.92 (d, *J* = 17.0 Hz, 1H), 7.51 (d, *J* = 8.7 Hz, 2H), 7.28 (d, *J* = 17.0 Hz, 1H), 6.89 (d, *J* = 8.7 Hz, 2H), 3.83 (s, 3H), 1.34 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -65.76 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 161.94, 158.89 (q, *J* = 32.9 Hz), 143.63 (q, *J* = 2.7 Hz), 130.21, 127.41, 118.99 (q, *J* = 282.4 Hz), 114.35, 112.83, 60.26, 55.29, 22.83; EIMS (*m/z*, %): 334 (M^++1, 0.67), 277 (M^+-^{t}Bu+1, 61.34), 228 (89.80), 57 (100.00); HRMS(EI) calcd. for $C_{11}H_{10}F_3NO_2S$ [M^+-^{t}Bu+1]: 277.0384; Found: 277.0390.

(*R*,*E*)-*N*-((*E*)-1,1,1-trifluoro-4-*p*-tolylbut-3-en-2-ylidene)-*tert*-butanesulfinamide (1c)



Yellow solid, yield 85%; mp 85-87 °C; $[\alpha]_D^{20}$ -1072.16 (c = 0.74, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 2988, 2974, 1615, 1578, 1341, 1275, 1183, 1142, 1085, 971, 816, 690; ^1H NMR ($CDCl_3$): δ 8.02 (d, *J* = 17.1 Hz, 1H), 7.46 (d, *J* = 7.8 Hz, 2H), 7.30 (d, *J* = 17.1 Hz, 1H), 7.19 (d, *J* = 7.8 Hz, 2H), 2.38 (s, 3H), 1.34 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -66.15 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 158.88 (q, *J* = 33.0 Hz), 143.95 (q, *J* = 2.8 Hz), 141.57, 131.99, 129.67, 128.43, 118.96 (q, *J* = 282.4 Hz), 114.14, 60.44, 22.90, 21.46; EIMS (*m/z*, %): 318 (M^++1, 0.17), 261 (M^+-^{t}Bu+1, 41.86), 212 (38.84), 57 (100.00); HRMS(EI) calcd. for $C_{11}H_{10}F_3NOS$ [M^+-^{t}Bu+1]: 261.0435; Found: 261.0441.

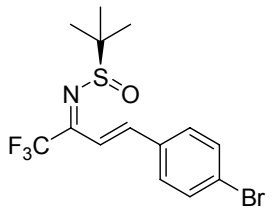
(*R*,*E*)-*N*-((*E*)-4-(4-chlorophenyl)-1,1,1-trifluorobut-3-en-2-ylidene)-*tert*-butane-sulfinamide (1d)



Yellow solid, yield 80%; mp 68-69 °C; $[\alpha]_D^{20}$ -896.59 (c = 0.72, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 2988, 2970, 1615, 1577, 1491, 1344, 1268, 1187, 1144, 1089, 973, 821, 690; ^1H NMR ($CDCl_3$): δ 7.99 (d, *J* = 16.8 Hz, 1H), 7.39 (d, *J* = 8.7 Hz, 2H), 7.26 (d, *J* =

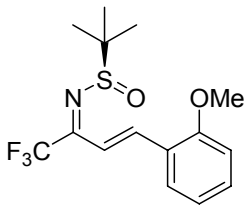
8.7 Hz, 2H), 7.16 (d, *J* = 16.8 Hz, 1H), 1.26 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -66.32 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 158.33 (q, *J* = 32.9 Hz), 142.11 (q, *J* = 2.7 Hz), 136.81, 133.18, 129.46, 129.19, 118.80 (q, *J* = 282.4 Hz), 116.93, 60.78, 22.94; EIMS (*m/z*, %): 338 (M^++1, 0.83), 281 (M^+-^{t}Bu+1, 25.54), 232 (24.34), 57 (100.00); HRMS(EI) calcd. for $C_{10}H_7ClF_3NOS$ [M^+-^{t}Bu+1]: 280.9889; Found: 280.9886.

(*R*,*E*)-*N*-((*E*)-4-(4-bromophenyl)-1,1,1-trifluorobut-3-en-2-ylidene)-*tert*-butanesulfinamide (1e)



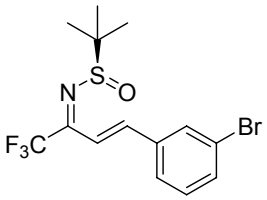
Yellow solid, yield 76%; mp 72-73 °C; $[\alpha]_D^{20}$ -806.16 (c = 0.785, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 2988, 2970, 1614, 1576, 1487, 1339, 1267, 1186, 1143, 1088, 973, 817, 689; ^{1}H NMR ($CDCl_3$): δ 8.09 (d, *J* = 17.1 Hz, 1H), 7.52 (d, *J* = 8.7 Hz, 2H), 7.41 (d, *J* = 8.7 Hz, 2H), 7.24 (d, *J* = 17.1 Hz, 1H), 1.35 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -66.31 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 158.34 (q, *J* = 33.0 Hz), 142.24 (q, *J* = 2.8 Hz), 133.61, 132.18, 129.68, 125.30, 118.81 (q, *J* = 282.4 Hz), 115.59, 60.84, 22.99; EIMS (*m/z*, %): 325 (M^+-^{t}Bu+1, 9.53), 276 (6.45), 57 (100.00); HRMS(EI) calcd. for $C_{10}H_7BrF_3NOS$ [M^+-^{t}Bu+1]: 324.9384; Found: 324.9391.

(*R*,*E*)-*N*-((*E*)-1,1,1-trifluoro-4-(2-methoxyphenyl)but-3-en-2-ylidene)-*tert*-butanesulfinamide (1f)



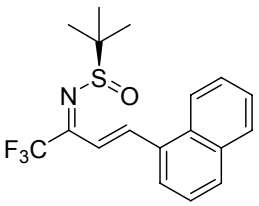
Viscous yellow oil, yield 86%; $[\alpha]_D^{20}$ -860.64 (c = 0.515, $CHCl_3$); FT-IR (film, cm^{-1}): *v* 2966, 1611, 1573, 1488, 1340, 1252, 1191, 1134, 1107, 752, 691; ^{1}H NMR ($CDCl_3$): δ 8.08 (d, *J* = 17.0 Hz, 1H), 7.76 (d, *J* = 17.0 Hz, 1H), 7.59 (d, *J* = 7.8 Hz, 1H), 7.35 (t, *J* = 7.8 Hz, 1H), 6.95 (t, *J* = 7.8 Hz, 1H), 6.88 (d, *J* = 7.8 Hz, 1H), 3.88 (s, 3H), 1.34 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -66.27 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 159.32 (q, *J* = 32.5 Hz), 158.22, 138.98 (q, *J* = 3.3 Hz), 132.29, 128.02, 124.60, 120.77, 118.98 (q, *J* = 282.5 Hz), 115.13, 111.01, 60.29, 55.50, 22.83; EIMS (*m/z*, %): 334 (M^++1, 0.89), 277 (M^+-^{t}Bu+1, 38.28), 228 (11.15), 198 (100.00), 57 (76.19); HRMS(EI) calcd. for $C_{15}H_{18}F_3NO_2S$ [M^+]: 333.1010; Found: 333.1005.

(*R*,*E*)-*N*-((*E*)-4-(3-bromophenyl)-1,1,1-trifluorobut-3-en-2-ylidene)-*tert*-butanesulfinamide (1g)



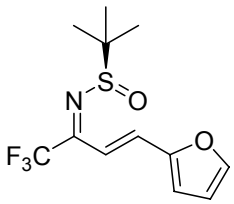
Yellow solid, yield 65%; mp 50-51 ^{o}C; $[\alpha]_D^{20}$ -757.04 (c = 0.605, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 2923, 1619, 1583, 1478, 1344, 1272, 1193, 1127, 1087, 967, 782, 689; ^{1}H NMR ($CDCl_3$): δ 8.05 (d, *J* = 17.4 Hz, 1H), 7.65 (s, 1H), 7.45-7.50 (m, 2H), 7.17-7.26 (m, 2H), 1.33 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -66.76 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 158.18 (q, *J* = 33.0 Hz), 141.90 (q, *J* = 2.2 Hz), 136.73, 133.55, 131.08, 130.35, 126.69, 123.08, 118.77 (q, *J* = 282.4 Hz), 116.25, 60.90, 22.98; EIMS (*m/z*, %): 382 (M^+, 0.21), 325 (M^+-^{t}Bu+1, 9.53), 276 (5.50), 57 (100.00); HRMS(EI) calcd. for $C_{10}H_7BrF_3NOS$ [M^+-^{t}Bu+1]: 324.9384; Found: 324.9396.

(*R*,*E*)-*N*-((*E*)-1,1,1-trifluoro-4-(naphthalen-1-yl)but-3-en-2-ylidene)-*tert*-butanesulfinamide (1h)



Yellow solid, yield 80%; mp 62-63 ^{o}C; $[\alpha]_D^{20}$ -763.29 (c = 0.56, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 2974, 2929, 1606, 1570, 1510, 1459, 1192, 1133, 1076, 975, 771, 686; ^{1}H NMR ($CDCl_3$): δ 8.23 (d, *J* = 17.1 Hz, 1H), 8.08-8.16 (m, 2H), 7.84-7.93 (m, 3H), 7.47-7.63 (m, 3H), 1.37 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -66.12 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 158.67 (q, *J* = 33.0 Hz), 140.52 (q, *J* = 2.8 Hz), 133.55, 131.76, 131.29, 131.23, 128.83, 127.08, 126.22, 125.51, 125.37, 122.66, 119.07 (q, *J* = 282.4 Hz), 117.29, 60.66, 22.94; EIMS (*m/z*, %): 297 (M^+-^{t}Bu+1, 29.09), 248 (62.54), 57 (100.00); HRMS(EI) calcd. for $C_{14}H_{10}F_3NOS$ [M^+-^{t}Bu+1]: 297.0435; Found: 297.0445.

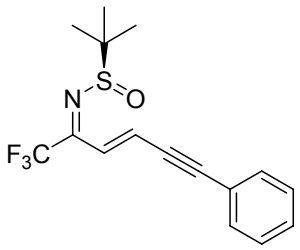
(*R*,*E*)-*N*-((*E*)-1,1,1-trifluoro-4-(furan-2-yl)but-3-en-2-ylidene)-*tert*-butanesulfinamide (1i)



Viscous yellow oil, yield 72%; $[\alpha]_D^{20}$ -1148.04 (c = 1.04, $CHCl_3$); FT-IR (film, cm^{-1}): *v* 2966, 2929, 1617, 1588, 1469, 1343, 1187, 1128, 1084, 969, 689; ^{1}H NMR ($CDCl_3$): δ 7.88 (d, *J* = 16.8 Hz, 1H), 7.53 (d, *J* = 1.8 Hz, 1H), 7.08 (d, *J* = 16.8 Hz, 1H), 6.72 (d, *J* = 3.6 Hz, 1H), 6.50 (dd, J_1 = 3.6 Hz, J_2 = 1.8 Hz, 1H), 1.34 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -66.59 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 158.34 (q, *J* = 33.0 Hz), 150.97, 145.87, 129.60 (q, *J* = 2.8 Hz), 118.92 (q, *J* = 281.9 Hz), 116.56, 112.81, 112.57,

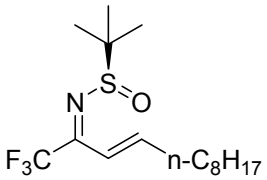
60.43, 22.82; EIMS (*m/z*, %): 293 (M^+, 0.10), 294 (M^++1, 0.11), 237 (M^+-^{t}Bu+1, 25.60), 189 (27.98), 57 (100.00); HRMS(EI) calcd. for $C_8H_6F_3NO_2S$ [M^+-^{t}Bu+1]: 237.0071; Found: 237.0064.

(*R*,*E*)-*N*-((*E*)-1,1,1-trifluoro-6-phenylhex-3-en-5-yn-2-ylidene)-*tert*-butanesulfinamide (1j)



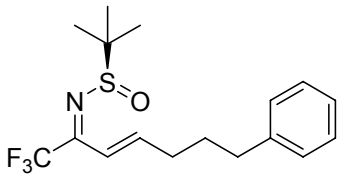
Yellow solid, yield 56%; mp 58-60 ^{o}C; $[\alpha]_D^{20}$ -1021.22 (c = 0.54, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 2964, 2932, 2191, 1600, 1583, 1489, 1336, 1191, 1144, 1129, 1083, 954, 757, 690; ^{1}H NMR ($CDCl_3$): δ 7.86 (d, *J* = 16.8 Hz, 1H), 7.46-7.49 (m, 2H), 7.31-7.39 (m, 3H), 6.63 (d, *J* = 16.8 Hz, 1H), 1.33 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -66.74 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 157.38 (q, *J* = 33.5 Hz), 132.03, 129.59, 128.45, 126.27, 124.61 (q, *J* = 3.3 Hz), 121.91, 118.63 (q, *J* = 282.4 Hz), 102.23, 87.75, 61.16, 23.01; EIMS (*m/z*, %): 271 (M^+-^{t}Bu+1, 15.32), 223 (9.64), 57 (100.00); HRMS(EI) calcd. for $C_{12}H_8F_3NOS$ [M^+-^{t}Bu+1]: 271.0279; Found: 271.0273.

(*R*,*E*)-*N*-((*E*)-1,1,1-trifluorododec-3-en-2-ylidene)-*tert*-butanesulfinamide (1k)



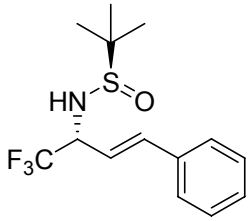
Viscous yellow oil, yield 51%; $[\alpha]_D^{20}$ -331.54 (c = 1.115, $CHCl_3$); FT-IR (film, cm^{-1}): *v* 2959, 2930, 2858, 1631, 1593, 1459, 1340, 1195, 1143, 1113; ^{1}H NMR ($CDCl_3$): δ 7.18 (d, *J* = 15.6 Hz, 1H), 6.54-6.65 (m, 1H), 2.19 (q, *J* = 7.2 Hz, 2H), 1.35-1.44 (m, 2H), 1.23 (s, 9H), 1.15-1.22 (m, 10H), 0.81 (t, *J* = 7.2 Hz, 3H); ^{19}F NMR ($CDCl_3$): δ -66.69 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 159.02 (q, *J* = 32.5 Hz), 150.30 (q, *J* = 2.3 Hz), 118.83 (q, *J* = 282.4 Hz), 118.39, 60.01, 34.20, 31.75, 29.25, 29.15, 29.12, 28.00, 22.78, 22.60, 14.03; EIMS (*m/z*, %): 340 (M^++1, 0.62), 283 (M^+-^{t}Bu+1, 3.90), 235 (4.92), 57 (100.00); HRMS(EI) calcd. for $C_{16}H_{28}F_3NOS$ [M^+]: 339.1844; Found: 339.1856.

(*R*,*E*)-*N*-((*E*)-1,1,1-trifluoro-7-phenylhept-3-en-2-ylidene)-*tert*-butanesulfinamide (1l)



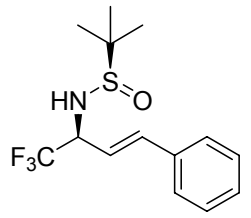
Yellow oil, yield 91%; $[\alpha]_D^{20}$ -388.26 (c = 1.21, $CHCl_3$); FT-IR (film, cm^{-1}): *v* 3029, 2932, 2863, 1631, 1593, 1455, 1340, 1195, 1141, 1123, 700; ^1H NMR ($CDCl_3$): δ 7.15-7.23 (m, 3H), 7.06-7.12 (m, 3H), 6.51-6.63 (m, 1H), 2.55 (t, *J* = 7.5 Hz, 2H), 2.17-2.25 (m, 2H), 1.67-1.77 (m, 2H), 1.22 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -66.61 (s, 3F); ^{13}C NMR ($CDCl_3$): δ 158.78 (q, *J* = 32.7 Hz), 149.40 (q, *J* = 2.3 Hz), 141.40, 128.36, 128.33, 125.90, 118.78 (q, *J* = 282.4 Hz), 118.65, 60.07, 35.25, 33.52, 29.63, 22.77; ESI MS (*m/z*): 346.2 (M^++1), 368.1 (M^++Na); HRMS(MALDI) calcd. for $C_{17}H_{22}F_3NOSNa^{+1}$ [M^++Na]: 368.1266; Found: 368.1280.

(*Rs*,*R*)-*N*-((*E*)-1,1,1-trifluoro-4-phenylbut-3-en-2-yl)-*tert*-butanesulfinamide (2a)



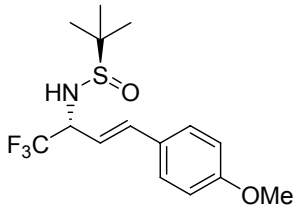
White solid, yield 99%; mp 50-52 °C; $[\alpha]_D^{20}$ -204.43 (c = 0.67, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 3168, 2968, 2868, 1450, 1364, 1267, 1165, 1123, 1053, 970, 751, 693; ^1H NMR ($CDCl_3$): δ 7.31-7.46 (m, 5H), 6.87 (d, *J* = 15.9 Hz, 1H), 6.04 (dd, J_1 = 15.9 Hz, J_2 = 8.4 Hz, 1H), 4.43-4.54 (m, 1H), 3.71 (d, *J* = 4.5 Hz, 1H), 1.26 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -76.17 (d, *J* = 5.4 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 138.58, 135.06, 128.74, 128.57, 126.85, 124.35 (q, *J* = 281.4 Hz), 118.48, 59.22 (q, *J* = 30.8 Hz), 56.23, 22.26; EIMS (*m/z*, %): 306 (M^++1, 0.19), 249 (M^+-^{t}Bu+1, 3.15), 185 (20.92), 57 (100.00); HRMS(EI) calcd. for $C_{14}H_{18}F_3NOS$ [M^+]: 305.1061; Found: 305.1055.

(*Rs*,*S*)-*N*-((*E*)-1,1,1-trifluoro-4-phenylbut-3-en-2-yl)-*tert*-butanesulfinamide (3a)



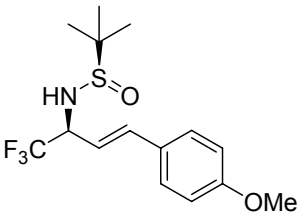
White solid, yield 99%; mp 109-111 °C; $[\alpha]_D^{20}$ -13.88 (c = 0.66, CH_3OH); FT-IR (KBr, cm^{-1}): *v* 3206, 2968, 1656, 1497, 1368, 1262, 1173, 1128, 1068, 969, 748, 692; ^1H NMR ($CDCl_3$): δ 7.40-7.43 (m, 2H), 7.29-7.37 (m, 3H), 6.92 (d, *J* = 16.1 Hz, 1H), 6.22 (dd, J_1 = 16.1 Hz, J_2 = 6.0 Hz, 1H), 4.42-4.54 (m, 1H), 3.47 (d, *J* = 7.5 Hz, 1H), 1.27 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -76.53 (d, *J* = 7.3 Hz, 3F); ^{13}C NMR (CD_3OD): δ 137.76, 137.22, 129.78, 129.62, 127.92, 126.36 (q, *J* = 281.1 Hz), 121.72, 62.73 (q, *J* = 31.0 Hz), 58.20, 23.06; EIMS (*m/z*, %): 306 (M^++1, 0.21), 249 (M^+-^{t}Bu+1, 3.93), 185 (21.10), 57 (100.00); HRMS(EI) calcd. for $C_{10}H_{10}F_3NOS$ [M^+-^{t}Bu+1]: 249.0435; Found: 249.0443.

(*Rs*,*R*)-*N*-((*E*)-1,1,1-trifluoro-4-(4-methoxyphenyl)but-3-en-2-yl)-*tert*-butanesulfin -amide (2b)



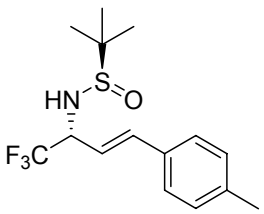
White solid, yield 95%; mp 71-72 ^{o}C; $[\alpha]_D^{20}$ -235.76 (c = 0.61, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 3154, 2961, 2872, 1656, 1611, 1515, 1467, 1365, 1259, 1164, 1122, 1066, 973, 834; ^{1}H NMR ($CDCl_3$): δ 7.37 (d, *J* = 9.0 Hz, 2H), 6.88 (d, *J* = 9.0 Hz, 2H), 6.80 (d, *J* = 15.9 Hz, 1H), 5.89 (dd, J_1 = 15.9 Hz, J_2 = 8.4 Hz, 1H), 4.39-4.50 (m, 1H), 3.82 (s, 3H), 3.72 (d, *J* = 4.2 Hz, 1H), 1.25 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -75.50 (d, *J* = 7.1 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 160.11, 138.32, 128.29, 127.90, 124.47 (q, *J* = 281.4 Hz), 115.97, 114.02, 59.40 (q, *J* = 30.8 Hz), 56.23, 55.24, 22.37; EIMS (*m/z*, %): 279 (M^+-^{t}Bu+1, 14.66), 215 (68.01), 57 (100.00); HRMS(EI) calcd. for $C_{11}H_{12}F_3NO_2S$ [M^+-^{t}Bu+1]: 279.0541; Found: 279.0541.

(*Rs*,*S*)-*N*-((*E*)-1,1,1-trifluoro-4-(4-methoxyphenyl)but-3-en-2-yl)-*tert*-butanesulfin -amide (3b)



White solid, yield 92%; mp 113-114 ^{o}C; $[\alpha]_D^{20}$ -8.09 (c = 0.675, CH_3OH); FT-IR (KBr, cm^{-1}): *v* 3211, 2963, 2870, 1658, 1608, 1514, 1464, 1363, 1257, 1175, 1125, 1033, 970, 804; ^{1}H NMR ($CDCl_3$): δ 7.35 (d, *J* = 8.7 Hz, 2H), 6.86 (d, *J* = 8.7 Hz, 2H), 6.85 (d, *J* = 15.9 Hz, 1H), 6.06 (dd, J_1 = 15.9 Hz, J_2 = 6.6 Hz, 1H), 4.39-4.51 (m, 1H), 3.81 (s, 3H), 3.46 (d, *J* = 7.5 Hz, 1H), 1.27 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -75.81 (d, *J* = 7.3 Hz, 3F); ^{13}C NMR (CD_3OD): δ 160.12, 135.93, 128.48, 127.81, 124.99 (q, *J* = 280.7 Hz), 117.84, 113.72, 61.36 (q, *J* = 30.8 Hz), 56.76, 54.35, 21.63; EIMS (*m/z*, %): 279 (M^+-^{t}Bu+1, 13.07), 215 (56.12), 57 (100.00); HRMS(EI) calcd. for $C_{11}H_{12}F_3NO_2S$ [M^+-^{t}Bu+1]: 279.0541; Found: 279.0531.

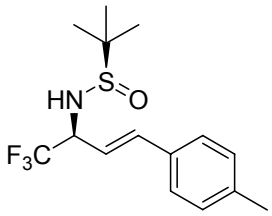
(*Rs*,*R*)-*N*-((*E*)-1,1,1-trifluoro-4-*p*-tolylbut-3-en-2-yl)-*tert*-butanesulfinamide (2c)



White solid, yield 97%; mp 97-98 ^{o}C; $[\alpha]_D^{20}$ -228.64 (c = 0.79, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 3199, 2950, 2925, 1656, 1611, 1516, 1474, 1365, 1261, 1171, 1129, 1075, 972, 797; ^{1}H NMR ($CDCl_3$): δ 7.33 (d, *J* = 8.4 Hz, 2H), 7.16 (d, *J* = 8.4 Hz, 2H), 6.83

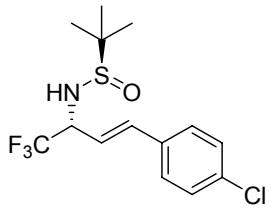
(d, J = 15.9 Hz, 1H), 5.98 (dd, J_1 = 15.9 Hz, J_2 = 8.4 Hz, 1H), 4.41-4.51 (m, 1H), 3.72 (d, J = 3.6 Hz, 1H), 2.36 (s, 3H), 1.25 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -75.45 (d, J = 7.3 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 138.98, 138.79, 132.49, 129.42, 126.42, 124.52 (q, J = 281.3 Hz), 117.49, 59.43 (q, J = 30.7 Hz), 56.33, 22.45, 21.28; EIMS (*m/z*, %): 263 (M^+-^{t}Bu+1, 7.09), 199 (42.44), 57 (100.00); HRMS(EI) calcd. for $C_{15}H_{20}F_3NOS$ [M^+]: 319.1218; Found: 319.1211.

(*Rs*,*S*)-*N*-((*E*)-1,1,1-trifluoro-4-*p*-tolylbut-3-en-2-yl)-*tert*-butanesulfinamide (3c)



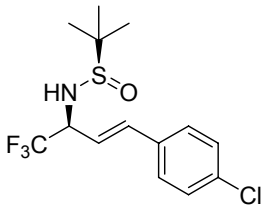
White solid, yield 95%; mp 147-148 °C; $[\alpha]_D^{20}$ -13.03 (c = 0.72, CH_3OH); FT-IR (KBr, cm^{-1}): *v* 3135, 2964, 2866, 1659, 1515, 1363, 1268, 1160, 1124, 1054, 971, 797; ^{1}H NMR (CD_3OD): δ 7.35 (d, J = 8.1 Hz, 2H), 7.16 (d, J = 8.1 Hz, 2H), 6.88 (d, J = 15.9 Hz, 1H), 6.26 (dd, J_1 = 15.9 Hz, J_2 = 7.5 Hz, 1H), 4.53-4.63 (m, 1H), 2.33 (s, 3H), 1.27 (s, 9H); ^{19}F NMR (CD_3OD): δ -78.20 (d, J = 7.3 Hz, 3F); ^{13}C NMR (CD_3OD): δ 138.29, 136.28, 133.06, 128.96, 126.44, 124.97 (q, J = 280.7 Hz), 119.21, 61.32 (q, J = 31.0 Hz), 56.77, 21.62, 19.88; EIMS (*m/z*, %): 263 (M^+-^{t}Bu+1, 6.66), 199 (35.71), 57 (100.00); HRMS(EI) calcd. for $C_{11}H_{12}F_3NOS$ [M^+-^{t}Bu+1]: 263.0592; Found: 263.0595.

(*Rs*,*R*)-*N*-((*E*)-4-(4-chlorophenyl)-1,1,1-trifluorobut-3-en-2-yl)-*tert*-butanesulfinamide (2d)



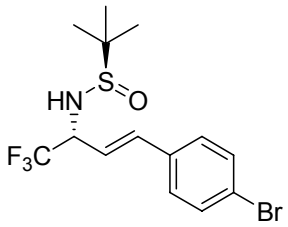
White solid, yield 95%; mp 86-87 °C; $[\alpha]_D^{20}$ -226.13 (c = 0.71, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 3151, 2958, 2932, 1656, 1596, 1493, 1364, 1257, 1166, 1121, 1065, 967, 736; ^{1}H NMR ($CDCl_3$): δ 7.37 (d, J = 8.7 Hz, 2H), 7.32 (d, J = 8.7 Hz, 2H), 6.82 (d, J = 15.9 Hz, 1H), 6.03 (dd, J_1 = 15.9 Hz, J_2 = 8.1 Hz, 1H), 4.41-4.52 (m, 1H), 3.76 (d, J = 3.9 Hz, 1H), 1.26 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -75.50 (d, J = 6.8 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 137.52, 134.68, 133.72, 128.91, 128.21, 124.40 (q, J = 281.5 Hz), 119.34, 59.21 (q, J = 30.9 Hz), 56.47, 22.42; EIMS (*m/z*, %): 283 (M^+-^{t}Bu+1, 0.68), 219 (7.04), 57 (100.00); HRMS(MALDI) calcd. for $C_{14}H_{17}ClF_3NOSNa^{+1}$ [M^++Na]: 362.0564; Found: 362.0573.

(*Rs*,*S*)-*N*-((*E*)-4-(4-chlorophenyl)-1,1,1-trifluorobut-3-en-2-yl)-*tert*-butanesulfinamide (3d)



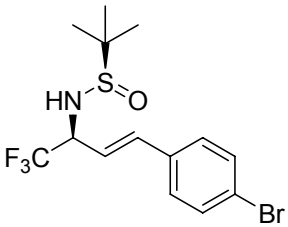
White solid, yield 88%; mp 143-145 ^{o}C; $[\alpha]_D^{20}$ -14.22 (c = 0.58, CH_3OH); FT-IR (KBr, cm^{-1}): *v* 3138, 2983, 2966, 2916, 1659, 1595, 1491, 1363, 1270, 1161, 1127, 1054, 970, 798; ^{1}H NMR ($CDCl_3$): δ 7.35 (d, *J* = 8.7 Hz, 2H), 7.31 (d, *J* = 8.7 Hz, 2H), 6.89 (d, *J* = 16.2 Hz, 1H), 6.20 (dd, J_1 = 16.2 Hz, J_2 = 6.2 Hz, 1H), 4.41-4.53 (m, 1H), 3.48 (d, *J* = 8.1 Hz, 1H), 1.27 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -75.91 (d, *J* = 7.3 Hz, 3F); ^{13}C NMR (CD_3OD): δ 135.00, 134.58, 133.84, 128.48, 127.96, 124.86 (q, *J* = 280.9 Hz), 121.30, 61.20 (q, *J* = 31.0 Hz), 56.83, 21.63; EIMS (*m/z*, %): 283 (M^+-^{t}Bu+1, 0.89), 219 (7.26), 57 (100.00); HRMS(MALDI) calcd. for $C_{14}H_{17}ClF_3NOSNa^{+1}$ [M^++Na]: 362.0564; Found: 362.0559.

(*Rs*,*R*)-*N*-((*E*)-4-(4-bromophenyl)-1,1,1-trifluorobut-3-en-2-yl)-*tert*-butanesulfinamide (2e)



White solid, yield 96%; mp 90-92 ^{o}C; $[\alpha]_D^{20}$ -205.09 (c = 0.71, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 3155, 2960, 2910, 1656, 1590, 1489, 1364, 1256, 1166, 1121, 1069, 968, 735; ^{1}H NMR ($CDCl_3$): δ 7.48 (d, *J* = 8.4 Hz, 2H), 7.30 (d, *J* = 8.4 Hz, 2H), 6.81 (d, *J* = 15.9 Hz, 1H), 6.04 (dd, J_1 = 15.9 Hz, J_2 = 8.4 Hz, 1H), 4.41-4.52 (m, 1H), 3.76 (d, *J* = 4.5 Hz, 1H), 1.26 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -75.29 (d, *J* = 7.1 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 137.66, 134.13, 131.89, 128.50, 124.36 (q, *J* = 281.4 Hz), 122.93, 119.45, 59.21 (q, *J* = 30.8 Hz), 56.45, 22.44; EIMS (*m/z*, %): 327 (M^+-^{t}Bu+1, 0.50), 263 (3.36), 57 (100.00); HRMS(EI) calcd. for $C_{10}H_9BrF_3NOS$ [M^+-^{t}Bu+1]: 326.9540; Found: 326.9545.

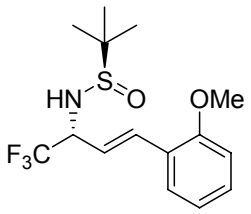
(*Rs*,*S*)-*N*-((*E*)-4-(4-bromophenyl)-1,1,1-trifluorobut-3-en-2-yl)-*tert*-butanesulfinamide (3e)



White solid, yield 93%; mp 141-143 ^{o}C; $[\alpha]_D^{20}$ -9.59 (c = 0.58, CH_3OH); FT-IR (KBr, cm^{-1}): *v* 3209, 2958, 1488, 1364, 1259, 1186, 1131, 1037, 972, 798; ^{1}H NMR

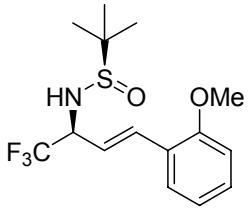
(CD_3OD): δ 7.52 (d, J = 8.4 Hz, 2H), 7.41 (d, J = 8.4 Hz, 2H), 6.92 (d, J = 16.2 Hz, 1H), 6.37 (dd, J_1 = 16.2 Hz, J_2 = 7.4 Hz, 1H), 4.59-4.70 (m, 1H), 1.29 (s, 9H); ^{19}F NMR (CD_3OD): δ -76.86 (d, J = 7.9 Hz, 3F); ^{13}C NMR (CD_3OD): δ 135.06, 134.99, 131.50, 128.22, 124.83 (q, J = 280.9 Hz), 121.91, 121.42, 61.20 (q, J = 31.0 Hz), 56.82, 21.62; EIMS (*m/z*, %): 327 (M^+-^{t}Bu+1, 0.67), 263 (3.47), 57 (100.00); HRMS(EI) calcd. for $C_{10}H_9BrF_3NOS$ [M^+-^{t}Bu+1]: 326.9540; Found: 326.9538.

(*Rs*,*R*)-*N*-((*E*)-1,1,1-trifluoro-4-(2-methoxyphenyl)but-3-en-2-yl)-*tert*-butanesulfin-amide (2f)



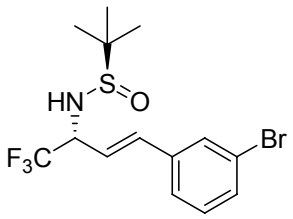
Viscous oil, yield 97%; $[\alpha]_D^{20}$ -151.94 (c = 0.55, $CHCl_3$); FT-IR (film, cm^{-1}): *v* 3193, 2962, 2872, 1650, 1600, 1581, 1491, 1466, 1366, 1249, 1175, 1125, 1068, 977, 753; ^1H NMR ($CDCl_3$): δ 7.37 (dd, J_1 = 7.8 Hz, J_2 = 1.8 Hz, 1H), 7.19 (td, J_1 = 7.8 Hz, J_2 = 1.8 Hz, 1H), 7.10 (d, J = 16.5 Hz, 1H), 6.85 (t, J = 7.8 Hz, 1H), 6.80 (d, J = 7.8 Hz, 1H), 6.01 (dd, J_1 = 16.5 Hz, J_2 = 8.3 Hz, 1H), 4.34-4.45 (m, 1H), 3.75 (s, 3H), 3.73 (d, J = 5.1 Hz, 1H), 1.17 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -75.39 (d, J = 7.3 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 157.17, 133.55, 129.98, 127.38, 124.59 (q, J = 281.6 Hz), 124.25, 120.63, 119.01, 111.06, 59.88 (q, J = 30.7 Hz), 56.40, 55.45, 22.42; EIMS (*m/z*, %): 336 (M^++1, 0.85), 279 (M^+-^{t}Bu+1, 10.00), 215 (91.22), 57 (100.00); HRMS(MALDI) calcd. for $C_{15}H_{20}F_3NO_2SNa^{+1}$ [M^++Na]: 358.1059; Found: 358.1072.

(*Rs*,*S*)-*N*-((*E*)-1,1,1-trifluoro-4-(2-methoxyphenyl)but-3-en-2-yl)-*tert*-butanesulfin-amide (3f)



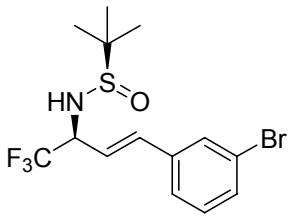
White solid, yield 96%; mp 84-86 ^oC; $[\alpha]_D^{20}$ -50.39 (c = 0.63, CH_3OH); FT-IR (KBr, cm^{-1}): *v* 3144, 2958, 1600, 1492, 1365, 1251, 1163, 1120, 1057, 975, 754; ^1H NMR (CD_3OD): δ 7.46 (dd, J_1 = 7.8 Hz, J_2 = 1.5 Hz, 1H), 7.27 (td, J_1 = 7.8 Hz, J_2 = 1.5 Hz, 1H), 7.16 (d, J = 15.9 Hz, 1H), 6.95 (t, J = 7.8 Hz, 1H), 6.91 (d, J = 7.8 Hz, 1H), 6.35 (dd, J_1 = 15.9 Hz, J_2 = 7.7 Hz, 1H), 4.49-4.59 (m, 1H), 3.85 (s, 3H), 1.26 (s, 9H); ^{19}F NMR (CD_3OD): δ -78.01 (d, J = 6.8 Hz, 3F); ^{13}C NMR (CD_3OD): δ 157.28, 131.65, 129.45, 127.13, 125.00 (q, J = 280.6 Hz), 124.44, 120.81, 120.30, 110.83, 61.65 (q, J = 30.9 Hz), 56.76, 54.58, 21.63; EIMS (*m/z*, %): 279 (M^+-^{t}Bu+1, 9.16), 215 (57.31), 57 (100.00); HRMS(EI) calcd. for $C_{11}H_{12}F_3NO_2S$ [M^+-^{t}Bu+1]: 279.0541; Found: 279.0538.

(*Rs*,*R*)-*N*-((*E*)-4-(3-bromophenyl)-1,1,1-trifluorobut-3-en-2-yl)-*tert*-butanesulfinamide (2g)



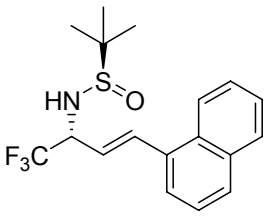
Viscous oil, yield 93%; $[\alpha]_D^{20}$ -176.58 (c = 0.50, $CHCl_3$); FT-IR (film, cm^{-1}): *v* 3192, 2963, 2871, 1654, 1593, 1564, 1474, 1427, 1366, 1264, 1177, 1127, 1072, 968, 757; ^{1}H NMR ($CDCl_3$): δ 7.51 (s, 1H), 7.36 (d, *J* = 7.8 Hz, 1H), 7.26 (d, *J* = 7.8 Hz, 1H), 7.12-7.20 (m, 1H), 6.72 (d, *J* = 15.9 Hz, 1H), 5.99 (dd, J_1 = 15.9 Hz, J_2 = 8.0 Hz, 1H), 4.34-4.45 (m, 1H), 3.75 (d, *J* = 4.5 Hz, 1H), 1.19 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -75.23 (d, *J* = 7.3 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 137.30, 131.77, 130.25, 129.69, 125.81, 124.37 (q, *J* = 281.4 Hz), 122.89, 120.31, 59.15 (q, *J* = 31.0 Hz), 56.50, 22.44; EIMS (*m/z*, %): 384 (M^++1, 0.77), 327 (M^+-^{t}Bu+1, 0.40), 263 (2.81), 57 (100.00); HRMS(MALDI) calcd. for $C_{14}H_{17}BrF_3NOSNa^{+1}$ [M^++Na]: 406.0059; Found: 406.0072.

(*Rs*,*S*)-*N*-((*E*)-4-(3-bromophenyl)-1,1,1-trifluorobut-3-en-2-yl)-*tert*-butanesulfinamide (3g)



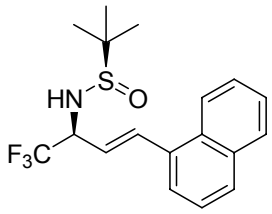
White solid, yield 90%; mp 89-92 ^{o}C; $[\alpha]_D^{20}$ -14.38 (c = 0.62, CH_3OH); FT-IR (KBr, cm^{-1}): *v* 3211, 2958, 2866, 1593, 1565, 1480, 1353, 1272, 1170, 1124, 1048, 964, 777; ^{1}H NMR (CD_3OD): δ 7.64 (d, *J* = 1.5 Hz, 1H), 7.44 (dd, J_1 = 8.1 Hz, J_2 = 1.5 Hz, 2H), 7.27 (t, *J* = 8.1 Hz, 1H), 6.89 (d, *J* = 15.6 Hz, 1H), 6.37 (dd, J_1 = 15.6 Hz, J_2 = 7.2 Hz, 1H), 4.59-4.69 (m, 1H), 1.27 (s, 9H); ^{19}F NMR (CD_3OD): δ -77.99 (d, *J* = 8.5 Hz, 3F); ^{13}C NMR (CD_3OD): δ 138.20, 134.77, 130.99, 130.11, 129.33, 125.24, 124.82 (q, *J* = 280.9 Hz), 122.36, 122.24, 61.11 (q, *J* = 30.1 Hz), 56.84, 21.61; EIMS (*m/z*, %): 327 (M^+-^{t}Bu+1, 0.42), 263 (2.05), 57 (100.00); HRMS(MALDI) calcd. for $C_{14}H_{17}BrF_3NOSNa^{+1}$ [M^++Na]: 406.0059; Found: 406.0056.

(*Rs*,*R*)-*N*-((*E*)-1,1,1-trifluoro-4-(naphthalen-1-yl)but-3-en-2-yl)-*tert*-butanesulfinamide (2h)



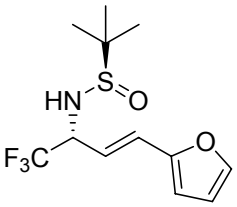
White solid, yield 96%; mp 81-83 °C; $[\alpha]_D^{20}$ -110.35 (c = 0.62, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 3198, 2950, 2866, 1656, 1590, 1508, 1473, 1366, 1266, 1168, 1118, 1077, 963, 780; ^1H NMR ($CDCl_3$): δ 8.07 (d, *J* = 8.1 Hz, 1H), 7.84 (t, *J* = 8.1 Hz, 2H), 7.63 (d, *J* = 15.5 Hz, 1H), 7.43-7.62 (m, 4H), 6.10 (dd, J_1 = 15.5 Hz, J_2 = 8.0 Hz, 1H), 4.57-4.68 (m, 1H), 3.87 (d, *J* = 4.2 Hz, 1H), 1.27 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -75.40 (d, *J* = 6.8 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 136.51, 133.57, 133.22, 131.06, 129.16, 128.60, 126.60, 126.09, 125.49, 124.62, 124.55 (q, *J* = 281.5 Hz), 123.62, 122.10, 59.42 (q, *J* = 30.7 Hz), 56.47, 22.48; EIMS (*m/z*, %): 355 (M^+, 0.24), 299 (M^+-^{t}Bu+1, 14.23), 235 (36.06), 57 (100.00); HRMS(EI) calcd. for $C_{14}H_{12}F_3NOS$ [M^+-^{t}Bu+1]: 299.0592; Found: 299.0588.

(*Rs*,*S*)-*N*-((*E*)-1,1,1-trifluoro-4-(naphthalen-1-yl)but-3-en-2-yl)-*tert*-butanesulfinamide (3h)



White solid, yield 94%; mp 94-96 °C; $[\alpha]_D^{20}$ -76.34 (c = 0.625, CH_3OH); FT-IR (KBr, cm^{-1}): *v* 3173, 2981, 2870, 1593, 1511, 1478, 1394, 1366, 1268, 1171, 1123, 1052, 966, 789; ^1H NMR (CD_3OD): δ 8.21 (d, *J* = 8.1 Hz, 1H), 7.74-7.87 (m, 3H), 7.65 (d, *J* = 7.2 Hz, 1H), 7.42-7.56 (m, 3H), 6.36 (dd, J_1 = 15.9 Hz, J_2 = 6.6 Hz, 1H), 4.72-4.82 (m, 1H), 1.29 (s, 9H); ^{19}F NMR (CD_3OD): δ -77.91 (d, *J* = 7.3 Hz, 3F); ^{13}C NMR (CD_3OD): δ 133.75, 133.46, 131.17, 128.43, 128.13, 126.02, 125.63, 125.19, 124.99 (q, *J* = 280.9 Hz), 123.67, 123.47, 61.41 (q, *J* = 30.7 Hz), 56.85, 21.66; EIMS (*m/z*, %): 355 (M^+, 0.46), 299 (M^+-^{t}Bu+1, 14.35), 235 (35.00), 57 (100.00); HRMS(EI) calcd. for $C_{14}H_{12}F_3NOS$ [M^+-^{t}Bu+1]: 299.0592; Found: 299.0595.

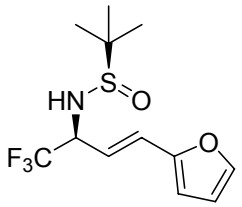
(*Rs*,*R*)-*N*-((*E*)-1,1,1-trifluoro-4-(furan-2-yl)but-3-en-2-yl)-*tert*-butanesulfinamide (2i)



White solid, yield 94%; mp 60-63 °C; $[\alpha]_D^{20}$ -268.38 (c = 2.7, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 3185, 2983, 2870, 1660, 1565, 1492, 1365, 1267, 1176, 1125, 1068, 967, 744; ^1H NMR ($CDCl_3$): δ 7.40 (d, *J* = 1.5 Hz, 1H), 6.65 (d, *J* = 15.9 Hz, 1H), 6.41 (dd, J_1 = 3.3 Hz, J_2 = 1.5 Hz, 1H), 6.38 (d, *J* = 3.3 Hz, 1H), 5.98 (dd, J_1 = 15.9 Hz, J_2 = 8.1 Hz, 1H), 4.37-4.48 (m, 1H), 3.71 (d, *J* = 4.2 Hz, 1H), 1.26 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -75.44 (d, *J* = 8.2 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 150.82, 143.08, 126.24, 124.32 (q, *J* = 281.4 Hz), 116.58, 111.56, 110.76, 59.12 (q, *J* = 30.7 Hz), 56.43, 22.37; EIMS (*m/z*,

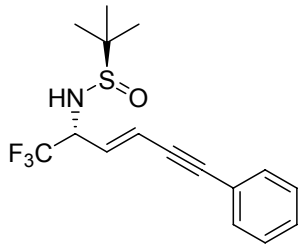
%): 295 (M^+, 0.37), 239 (M^+-^{t}Bu+1, 6.49), 175 (29.76), 57 (100.00); HRMS(EI) calcd. for $C_8H_8F_3NO_2S$ [M^+-^{t}Bu+1]: 239.0228; Found: 239.0230.

(*Rs*,*S*)-*N*-((*E*)-1,1,1-trifluoro-4-(furan-2-yl)but-3-en-2-yl)-*tert*-butanesulfinamide (3i)



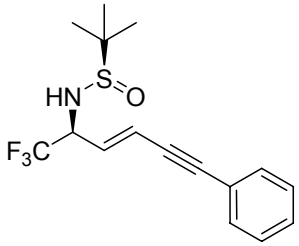
White solid, yield 98%; mp 124-126 ^{o}C; $[\alpha]_D^{20}$ -11.59 (c = 0.87, CH_3OH); FT-IR (KBr, cm^{-1}): *v* 3221, 2985, 2871, 1593, 1365, 1268, 1170, 1122, 1055, 963, 748; ^{1}H NMR (CD_3OD): δ 7.48 (s, 1H), 6.76 (d, *J* = 15.9 Hz, 1H), 6.42-6.45 (m, 2H), 6.20 (dd, J_1 = 15.9 Hz, J_2 = 7.2 Hz, 1H), 4.54-4.64 (m, 1H), 1.26 (s, 9H); ^{19}F NMR (CD_3OD): δ -78.20 (d, *J* = 8.5 Hz, 3F); ^{13}C NMR (CD_3OD): δ 151.47, 142.84, 124.85 (q, *J* = 280.9 Hz), 124.17, 118.47, 111.15, 109.77, 60.96 (q, *J* = 31.1 Hz), 56.80, 21.62; EIMS (*m/z*, %): 295 (M^+, 0.47), 239 (M^+-^{t}Bu+1, 6.23), 175 (28.86), 57 (100.00); HRMS(EI) calcd. for $C_8H_8F_3NO_2S$ [M^+-^{t}Bu+1]: 239.0228; Found: 239.0221.

(*Rs*,*R*)-*N*-((*E*)-1,1,1-trifluoro-6-phenylhex-3-en-5-yn-2-yl)-*tert*-butanesulfinamide (2j)



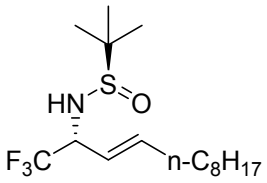
White solid, yield 93%; mp 56-58 ^{o}C; $[\alpha]_D^{20}$ -211.39 (c = 0.65, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 3185, 2982, 2864, 1639, 1596, 1491, 1366, 1270, 1174, 1124, 1047, 951, 757; ^{1}H NMR ($CDCl_3$): δ 7.44-7.47 (m, 2H), 7.31-7.34 (m, 3H), 6.21 (d, *J* = 15.9 Hz, 1H), 6.06 (dd, J_1 = 15.9 Hz, J_2 = 7.5 Hz, 1H), 4.36-4.47 (m, 1H), 3.76 (d, *J* = 4.8 Hz, 1H), 1.27 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -75.05 (d, *J* = 7.1 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 131.69, 131.44, 128.83, 128.40, 124.10 (q, *J* = 281.3 Hz), 122.46, 118.71, 92.98, 85.87, 59.05 (q, *J* = 31.2 Hz), 56.72, 22.42; EIMS (*m/z*, %): 272 (M^+-^{t}Bu, 0.18), 273 (M^+-^{t}Bu+1, 0.55), 209 (12.68), 57 (100.00); HRMS(EI) calcd. for $C_{12}H_{10}F_3NOS$ [M^+-^{t}Bu+1]: 273.0435; Found: 273.0440.

(*Rs*,*S*)-*N*-((*E*)-1,1,1-trifluoro-6-phenylhex-3-en-5-yn-2-yl)-*tert*-butanesulfinamide (3j)



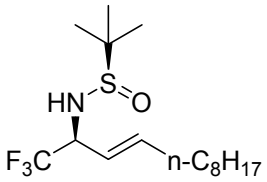
White solid, yield 81%; mp 139-140 ^{o}C; $[\alpha]_D^{20}$ -4.74 (c = 0.59, CH_3OH); FT-IR (KBr, cm^{-1}): *v* 3147, 2985, 2868, 1634, 1490, 1364, 1261, 1168, 1125, 1056, 956, 756; ^{1}H NMR (CD_3OD): δ 7.41-7.45 (m, 2H), 7.32-7.37 (m, 3H), 6.32 (d, *J* = 15.9 Hz, 1H), 6.25 (dd, J_1 = 15.9 Hz, J_2 = 5.7 Hz, 1H), 4.58-4.68 (m, 1H), 1.26 (s, 9H); ^{19}F NMR (CD_3OD): δ -77.90 (d, *J* = 6.2 Hz, 3F); ^{13}C NMR (CD_3OD): δ 133.42, 131.18, 128.40, 128.30 (q, *J* = 280.7 Hz), 128.16, 122.68, 116.43, 91.53, 85.73, 60.80 (q, *J* = 31.2 Hz), 56.86, 21.59; EIMS (*m/z*, %): 272 (M^+-^{t}Bu, 0.19), 273 (M^+-^{t}Bu+1, 0.45), 209 (11.00), 57 (100.00); HRMS(EI) calcd. for $C_{12}H_8F_3N$ [M^+-^{t}Bu-SO-1]: 223.0609; Found: 223.0610.

(*Rs*,*R*)-*N*-((*E*)-1,1,1-trifluorododec-3-en-2-yl)-*tert*-butanesulfinamide (2k)



Viscous oil, yield 87%; $[\alpha]_D^{20}$ -95.09 (c = 0.47, $CHCl_3$); FT-IR (film, cm^{-1}): *v* 3196, 2926, 2856, 1671, 1465, 1366, 1267, 1175, 1120, 1073, 972, 722; ^{1}H NMR ($CDCl_3$): δ 5.93 (dt, J_1 = 15.9 Hz, J_2 = 7.4 Hz, 1H), 5.28 (dd, J_1 = 15.9 Hz, J_2 = 8.4 Hz, 1H), 4.13-4.24 (m, 1H), 3.55 (d, *J* = 3.9 Hz, 1H), 2.06 (q, *J* = 6.8 Hz, 2H), 1.33-1.37 (m, 2H), 1.20-1.24 (m, 10H), 1.17 (s, 9H), 0.81 (t, *J* = 6.8 Hz, 3H); ^{19}F NMR ($CDCl_3$): δ -76.45 (d, *J* = 5.1 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 141.69, 124.53 (q, *J* = 281.1 Hz), 119.60, 59.18 (q, *J* = 30.6 Hz), 56.12, 32.35, 31.83, 29.31, 29.24, 28.98, 28.45, 22.64, 22.42, 14.06; EIMS (*m/z*, %): 342 (M^++1, 5.17), 285 (M^+-^{t}Bu+1, 1.92), 236 (6.60), 57 (100.00); HRMS(MALDI) calcd. for $C_{16}H_{30}F_3NOSNa^{+1}$ [M^++Na]: 364.1892; Found: 364.1899.

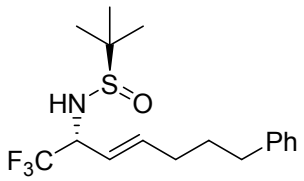
(*Rs*,*S*)-*N*-((*E*)-1,1,1-trifluorododec-3-en-2-yl)-*tert*-butanesulfinamide (3k)



Viscous oil, yield 60%; $[\alpha]_D^{20}$ -53.43 (c = 0.88, $CHCl_3$); FT-IR (film, cm^{-1}): *v* 3197, 2929, 2858, 1673, 1467, 1365, 1265, 1174, 1120, 1071, 971; ^{1}H NMR ($CDCl_3$): δ 6.02 (dt, J_1 = 15.3 Hz, J_2 = 7.3 Hz, 1H), 5.50 (dd, J_1 = 15.3 Hz, J_2 = 6.3 Hz, 1H), 4.18-4.30 (m, 1H), 3.29 (d, *J* = 7.5 Hz, 1H), 2.08 (q, *J* = 6.9 Hz, 2H), 1.34-1.44 (m, 2H), 1.25-1.29 (m, 10H), 1.23 (s, 9H), 0.87 (t, *J* = 6.9 Hz, 3H); ^{19}F NMR ($CDCl_3$): δ

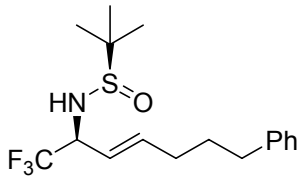
-76.59 (d, J = 5.9 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 139.60, 124.60 (q, J = 281.1 Hz), 121.17, 60.22 (q, J = 30.5 Hz), 56.90, 32.40, 31.85, 29.34, 29.21, 29.10, 28.49, 22.66, 22.35, 14.10; ESI MS (*m/z*): 342.3 (M^++1), 364.3 (M^++Na), 396.3 (M^++Na+MeOH); HRMS(MALDI) calcd. for $C_{16}H_{30}F_3NOSNa^{+1}$ [M^++Na]: 364.1892; Found: 364.1878.

(*Rs*,*R*)-*N*-((*E*)-1,1,1-trifluoro-7-phenylhept-3-en-2-yl)-*tert*-butanesulfinamide (2l)



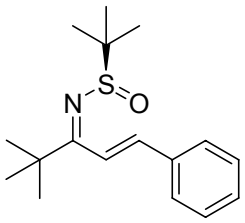
Viscous oil, yield 81%; $[\alpha]_D^{20}$ -100.55 (c = 1.015, $CHCl_3$); FT-IR (film, cm^{-1}): *v* 3196, 2931, 2862, 1671, 1456, 1366, 1266, 1175, 1125, 1070, 971, 747; ^{1}H NMR ($CDCl_3$): δ 7.18-7.23 (m, 2H), 7.08-7.13 (m, 3H), 5.94 (dt, J_1 = 15.3 Hz, J_2 = 6.8 Hz, 1H), 5.31 (dd, J_1 = 15.3 Hz, J_2 = 8.4 Hz, 1H), 4.13-4.24 (m, 1H), 3.61 (s, 1H), 2.55 (t, J = 7.4 Hz, 2H), 2.05-2.13 (m, 2H), 1.63-1.73 (m, 2H), 1.15 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -76.87 (d, J = 7.6 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 141.95, 141.10, 128.46, 128.35, 125.84, 124.54 (q, J = 281.2 Hz), 120.19, 59.17 (q, J = 30.5 Hz), 56.20, 35.11, 31.78, 30.15, 22.44; ESI MS (*m/z*): 348.1 (M^++1), 370.1 (M^++Na), 402.2 (M^++Na+MeOH); HRMS(MALDI) calcd. for $C_{17}H_{24}F_3NOSNa^{+1}$ [M^++Na]: 370.1423; Found: 370.1439.

(*Rs*,*S*)-*N*-((*E*)-1,1,1-trifluoro-7-phenylhept-3-en-2-yl)-*tert*-butanesulfinamide (3l)



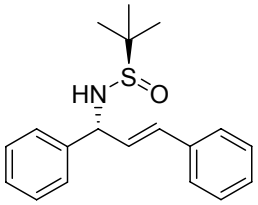
White solid, yield 62%; mp 45-50 ^{o}C; $[\alpha]_D^{20}$ -58.72 (c = 0.775, $CHCl_3$); FT-IR (film, cm^{-1}): *v* 3123, 2922, 2855, 1675, 1456, 1366, 1267, 1177, 1121, 1052, 969, 737; ^{1}H NMR ($CDCl_3$): δ 7.25-7.30 (m, 2H), 7.15-7.20 (m, 3H), 6.04 (dt, J_1 = 15.9 Hz, J_2 = 6.3 Hz, 1H), 5.52 (dd, J_1 = 15.9 Hz, J_2 = 6.5 Hz, 1H), 4.19-4.31 (m, 1H), 3.32 (d, J = 7.5 Hz, 1H), 2.62 (t, J = 7.4 Hz, 2H), 2.10-2.17 (m, 2H), 1.70-1.80 (m, 2H), 1.24 (s, 9H); ^{19}F NMR ($CDCl_3$): δ -76.10 (d, J = 7.6 Hz, 3F); ^{13}C NMR ($CDCl_3$): δ 141.95, 138.93, 128.47, 128.35, 125.83, 124.60 (q, J = 280.9 Hz), 121.79, 60.30 (q, J = 30.9 Hz), 56.93, 35.22, 31.81, 30.14, 22.37; ESI MS (*m/z*): 348.1 (M^++1), 370.1 (M^++Na), 402.1 (M^++Na+MeOH); HRMS(MALDI) calcd. for $C_{17}H_{24}F_3NOSNa^{+1}$ [M^++Na]: 370.1423; Found: 370.1438.

(*R*,*E*)-*N*-((*E*)-4,4-dimethyl-1-phenylpent-1-en-3-ylidene)-*tert*-butanesulfinamide (4b)



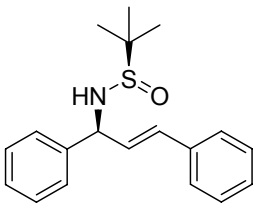
Yellow solid, yield 82%; mp 88-91 °C; $[\alpha]_D^{20}$ -288.15 (c = 1.025, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 2964, 2926, 1634, 1573, 1474, 1449, 1361, 1105, 1072, 977, 725; ^1H NMR ($CDCl_3$): δ 7.48-7.51 (m, 2H), 7.28-7.38 (m, 3H), 7.09 (d, *J* = 16.5 Hz, 1H), 6.96 (d, *J* = 16.5 Hz, 1H), 1.26 (s, 9H), 1.25 (s, 9H); ^{13}C NMR ($CDCl_3$): δ 189.45, 139.10, 135.44, 129.26, 128.79, 127.38, 121.94, 56.46, 42.68, 28.51, 22.26; EIMS (*m/z*, %): 292 (M^++1, 0.76), 235 (M^+-^{t}Bu+1, 90.22), 57 (100.00); HRMS(EI) calcd. for $C_{13}H_{17}NOS$ [M^+-^{t}Bu+1]: 235.1031; Found: 235.1027.

(*Rs*,*R*)-*N*-((*E*)-1,3-diphenylallyl)-*tert*-butanesulfinamide (5a)



White solid, yield 82%; mp 105-111 °C; $[\alpha]_D^{20}$ -95.03 (c = 1.09, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 3028, 2957, 2871, 1598, 1495, 1454, 1362, 1184, 1103, 1060, 969, 753, 697; ^1H NMR ($CDCl_3$): δ 7.23-7.44 (m, 10H), 6.71 (d, *J* = 15.9 Hz, 1H), 6.23 (dd, J_1 = 15.9 Hz, J_2 = 8.1 Hz, 1H), 5.15 (dd, J_1 = 8.1 Hz, J_2 = 2.1 Hz, 1H), 3.59 (d, *J* = 2.1 Hz, 1H), 1.27 (s, 9H); ^{13}C NMR ($CDCl_3$): δ 141.60, 136.36, 132.45, 129.52, 128.88, 128.46, 128.01, 127.78, 127.09, 126.58, 60.99, 55.59, 22.65; EIMS (*m/z*, %): 314 (M^++1, 0.37), 208 (2.68), 194 (16.89), 193 (100.00); HRMS(MALDI) calcd. for $C_{19}H_{23}NOSNa^{+1}$ [M^++Na]: 336.1393; Found: 336.1404; HPLC (Chiralpak AD column, 90:10 hexane/2-propanol; 0.8 mL/min; 230 nm; (*Rs*, *S*), t_r = 8.78 min, (*Rs*, *R*), t_r = 10.48 min).

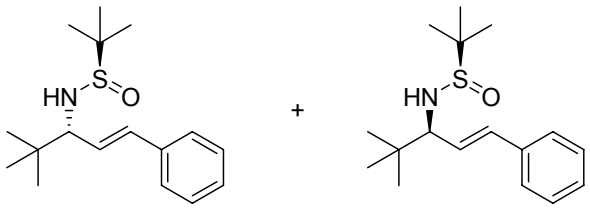
(*Rs*,*S*)-*N*-((*E*)-1,3-diphenylallyl)-*tert*-butanesulfinamide (6a)



White solid, yield 17%; mp 82-85 °C; $[\alpha]_D^{20}$ -46.52 (c = 0.51, $CHCl_3$); FT-IR (KBr, cm^{-1}): *v* 3192, 2924, 2856, 1600, 1494, 1455, 1365, 1267, 1060, 963, 750, 697; ^1H NMR ($CDCl_3$): δ 7.23-7.43 (m, 10H), 6.62 (d, *J* = 15.9 Hz, 1H), 6.36 (dd, J_1 = 15.9 Hz, J_2 = 7.5 Hz, 1H), 5.15 (dd, J_1 = 7.5 Hz, J_2 = 3.0 Hz, 1H), 3.56 (d, *J* = 3.0 Hz, 1H), 1.23 (s, 9H); ^{13}C NMR ($CDCl_3$): δ 140.61, 136.22, 132.03, 130.59, 128.71, 128.57, 128.00, 127.89, 127.82, 126.67, 61.33, 55.82, 22.62; ESI MS (*m/z*): 336.1 (M^++Na), 368.1 (M^++Na+MeOH); HRMS(MALDI) calcd. for $C_{19}H_{23}NOSNa^{+1}$ [M^++Na]:

336.1393; Found: 336.1400; HPLC (Chiralpak AD column, 90:10 hexane/2-propanol; 0.8 mL/min; 230 nm; (*Rs*, *S*), t_r = 8.78 min, (*Rs*, *R*), t_r = 10.48 min).

Mixture of (*Rs*,*R*)-*N*-((*E*)-4,4-dimethyl-1-phenylpent-1-en-3-yl)-*tert*-butanesulfinamide (5b) and (*Rs*,*S*)-*N*-((*E*)-4,4-dimethyl-1-phenylpent-1-en-3-yl)-*tert*-butanesulfinamide (6b)



5b **6b**

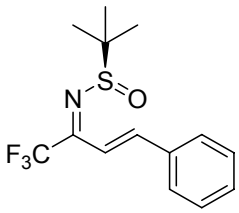
White solid, total yield 96%; FT-IR (KBr, cm^{-1}): *v* 3326, 2953, 2865, 1598, 1498, 1468, 1365, 1233, 1186, 1116, 1068, 984, 744, 696; ^1H NMR ($CDCl_3$): δ 7.22-7.41 (m, 5H), 6.59 (d, *J* = 15.9 Hz, 0.85H), 6.56 (d, *J* = 15.6 Hz, 0.15H), 6.00 (dd, J_1 = 15.9 Hz, J_2 = 9.0 Hz, 0.85H), 5.60 (dd, J_1 = 15.6 Hz, J_2 = 9.3 Hz, 0.15H), 3.67 (dd, J_1 = 9.0 Hz, J_2 = 2.4 Hz, 0.85H), 3.59 (dd, J_1 = 9.3 Hz, J_2 = 2.4 Hz, 0.15H), 3.41 (s, 0.85H), 3.39 (s, 0.15H), 1.22 (s, 9H), 0.99 (s, 9H); ^{13}C NMR ($CDCl_3$): δ 136.79, 134.38, 128.58, 127.69, 127.23, 126.56, 65.95, 55.46, 35.03, 26.51, 22.71; EIMS (*m/z*, %): 294 (M^++1, 1.35), 236 (M^+-^{t}Bu, 4.62), 237 (M^+-^{t}Bu+1, 2.14), 173 (76.34), 131 (61.85), 57 (100.00); HRMS(EI) calcd. for $C_{11}H_{27}NOS$ [M^+]: 293.1813; Found: 293.1809.

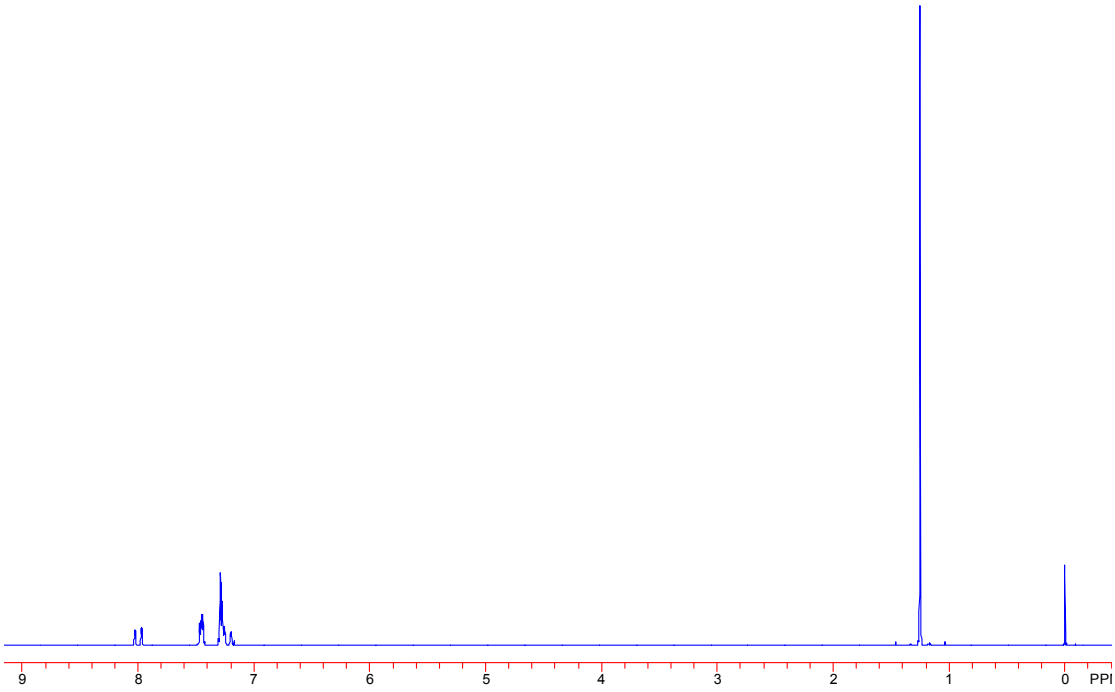
References

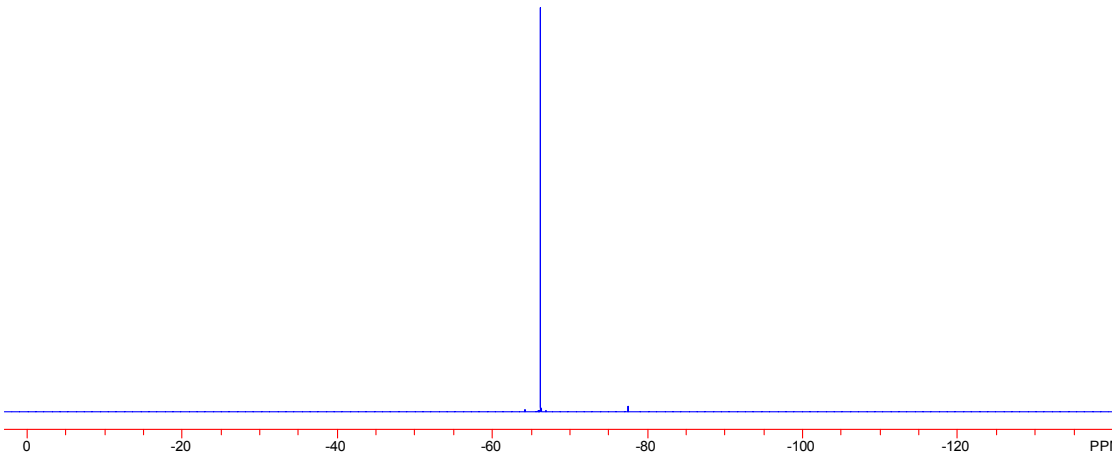
[1] (a) Andrew, R. J.; Mellor, J. M. *Tetrahedron* **2000**, *56*, 7261. (b) Hojo, M.; Masuda, R.; Kokuryo, Y.; Shioda, H.; Matsuo, S. *Chem. Lett.* **1976**, 499. (c) Hojo, M.; Masuda, R.; Okada, E.; Sakaguchi, S.; Narumiya, H.; Morimoto, K. *Tetrahedron Lett.* **1989**, *30*, 6173. (d) Martins, M. A. P.; Emmerich, D. J.; Pereira, C. M. P.; Cunico, W.; Rossato, M.; Zanatta, N.; Bonacorso, H. G. *Tetrahedron Lett.* **2004**, *45*, 4935. (e) Wang, X.-J.; Zhao, Y.; Liu, J.-T. *Org. Lett.* **2007**, *9*, 1343.

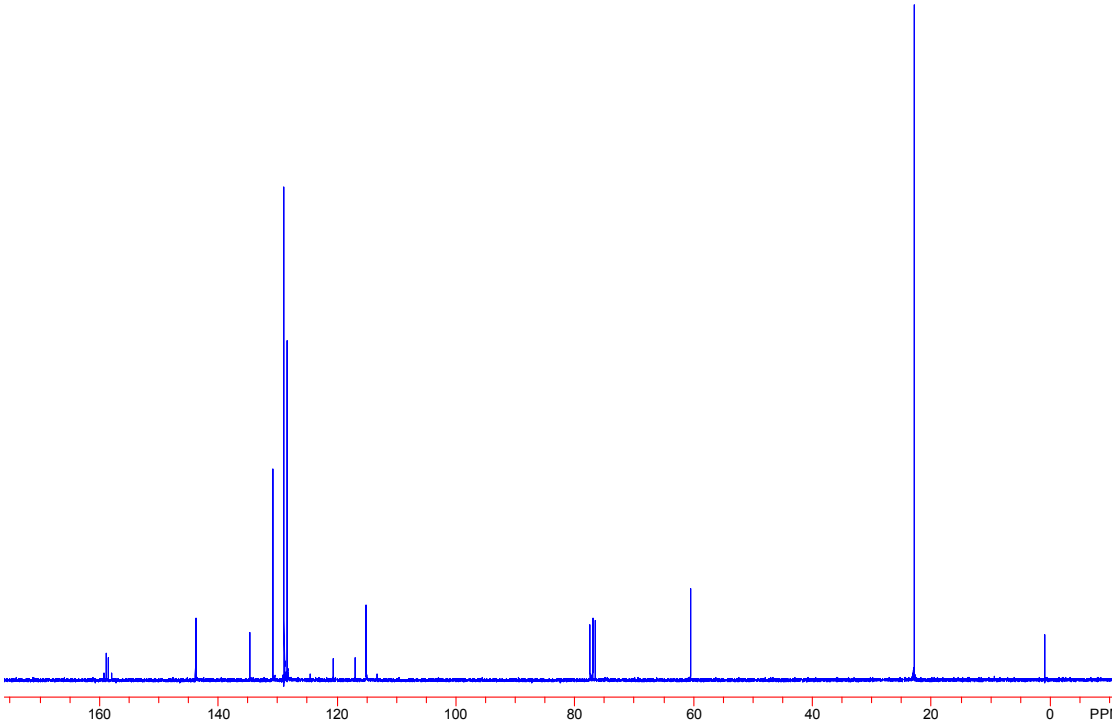
[2] Prakash, G. K. S.; Mandal, M.; Olah, G. A. *Org. Lett.* **2001**, *3*, 2847.

8. Copies of NMR Spectra.





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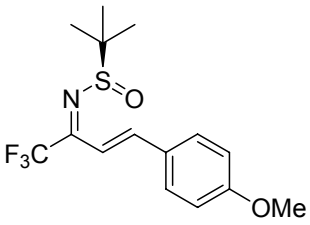
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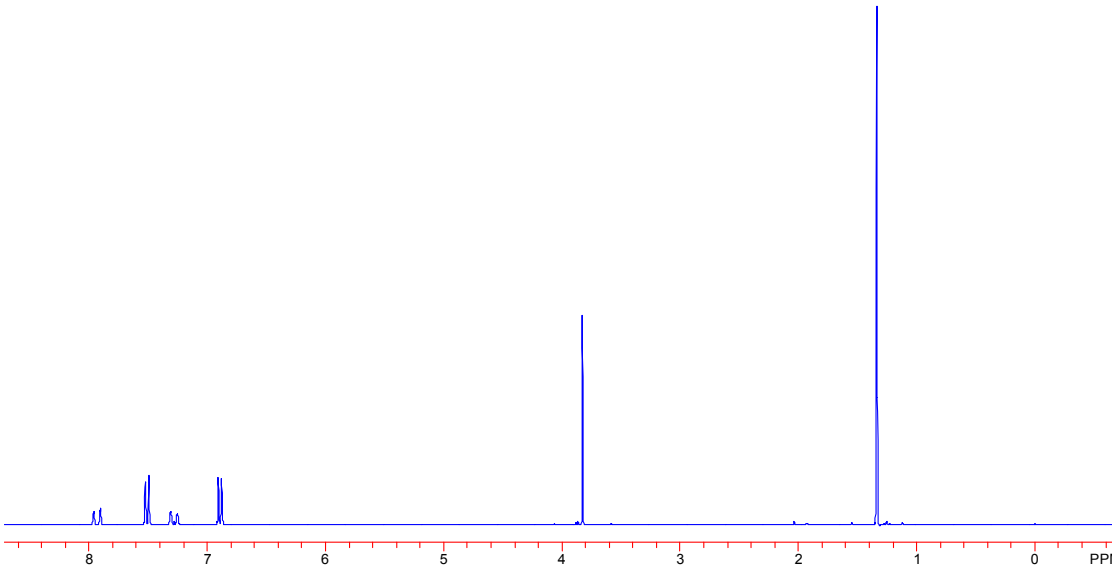
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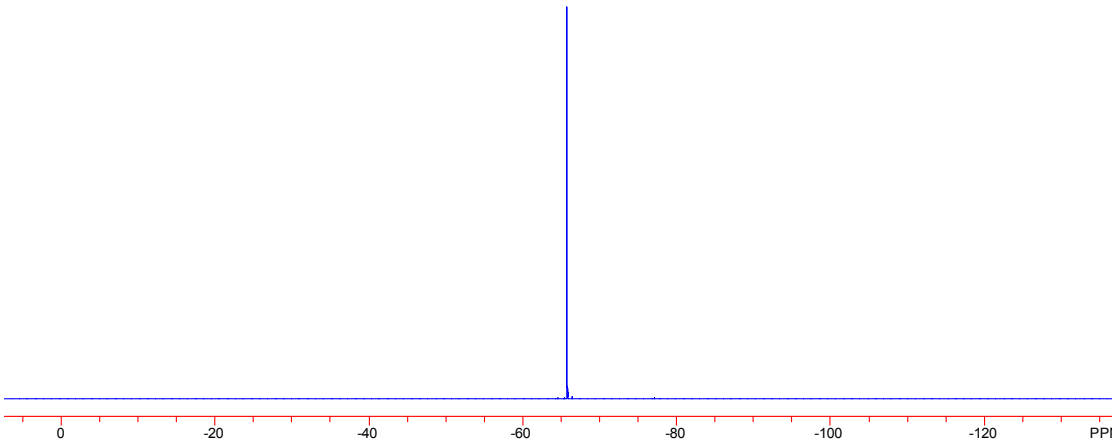
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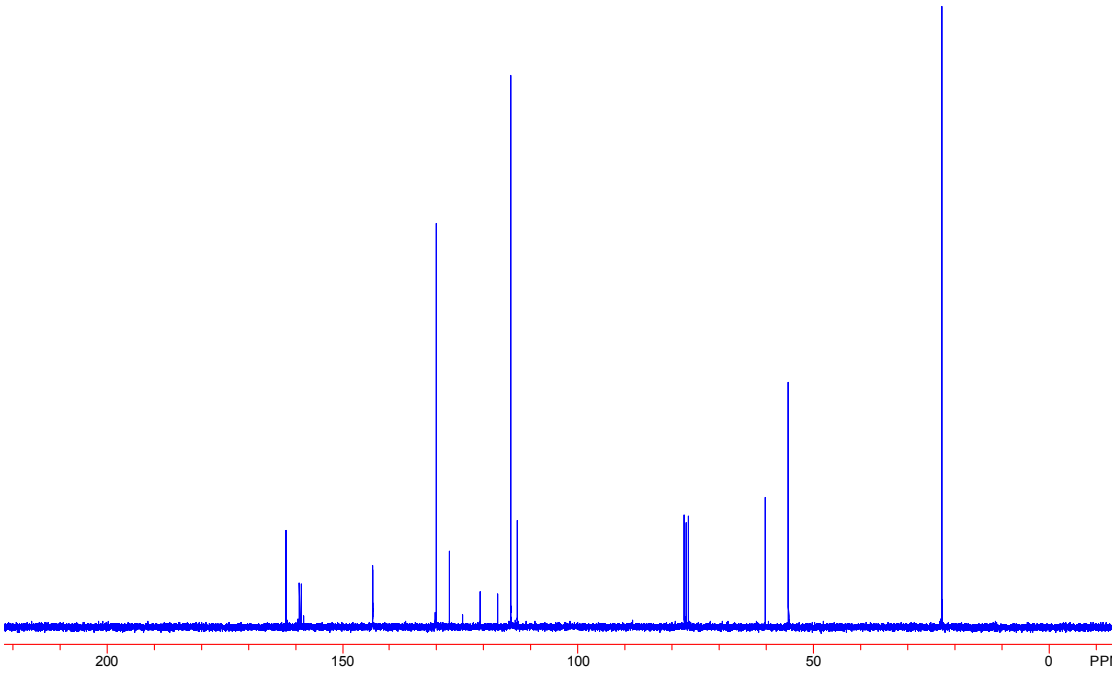
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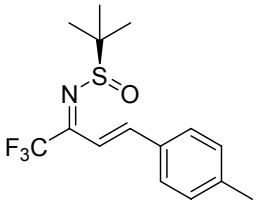
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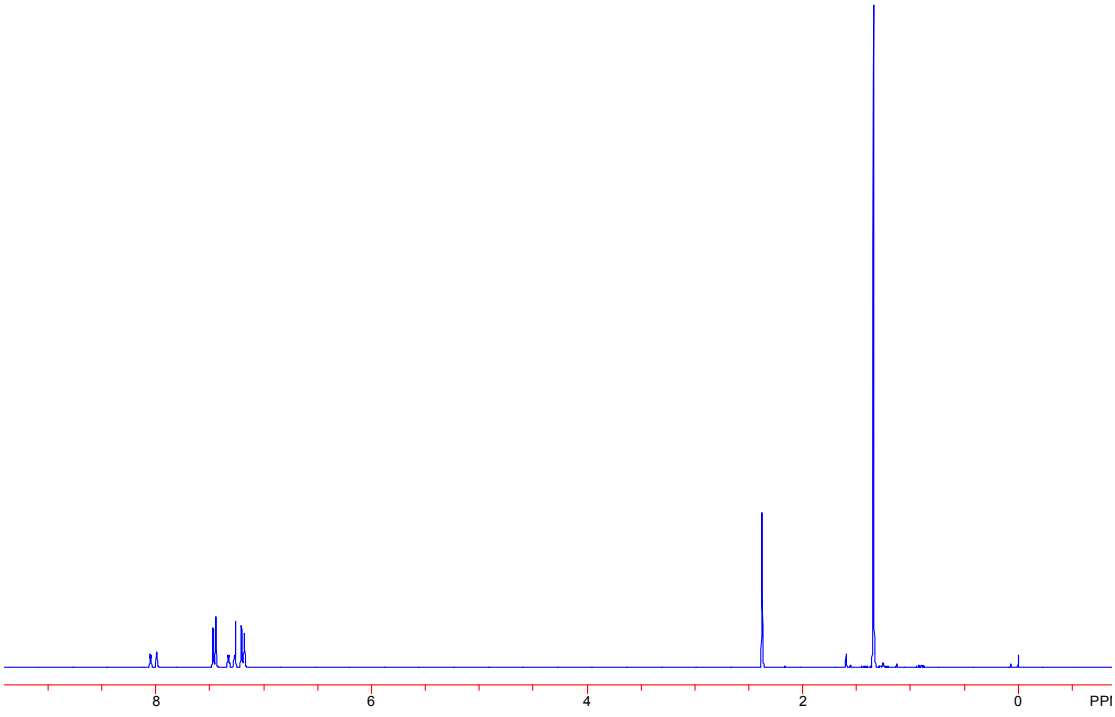
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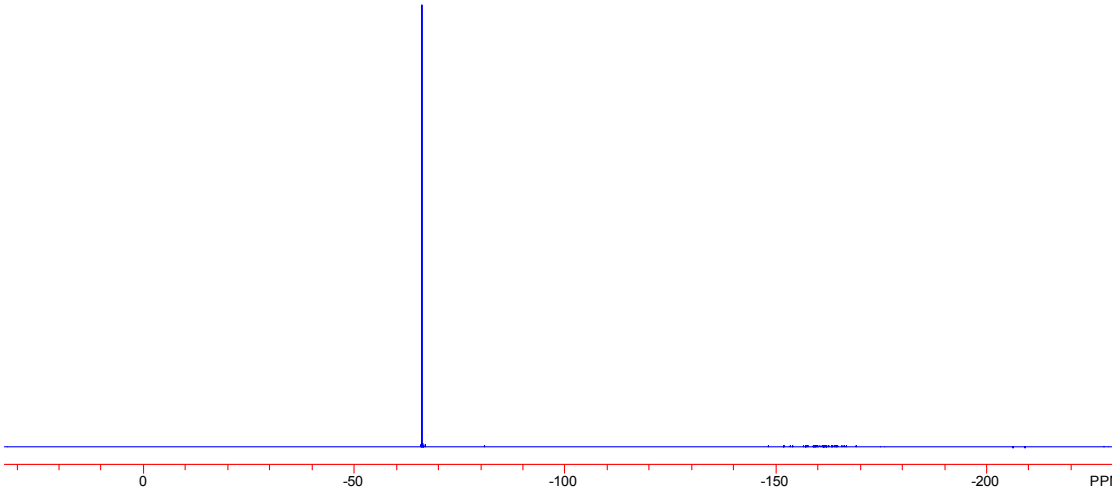
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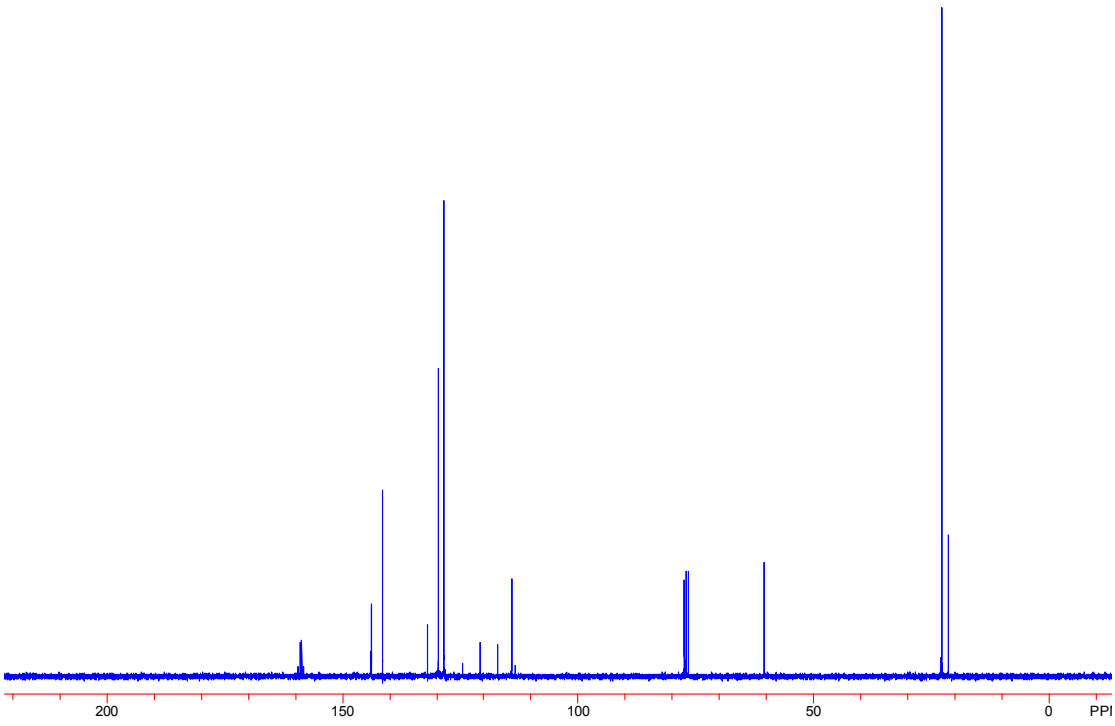
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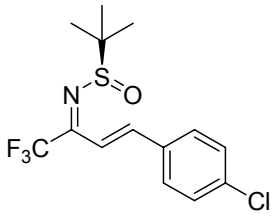
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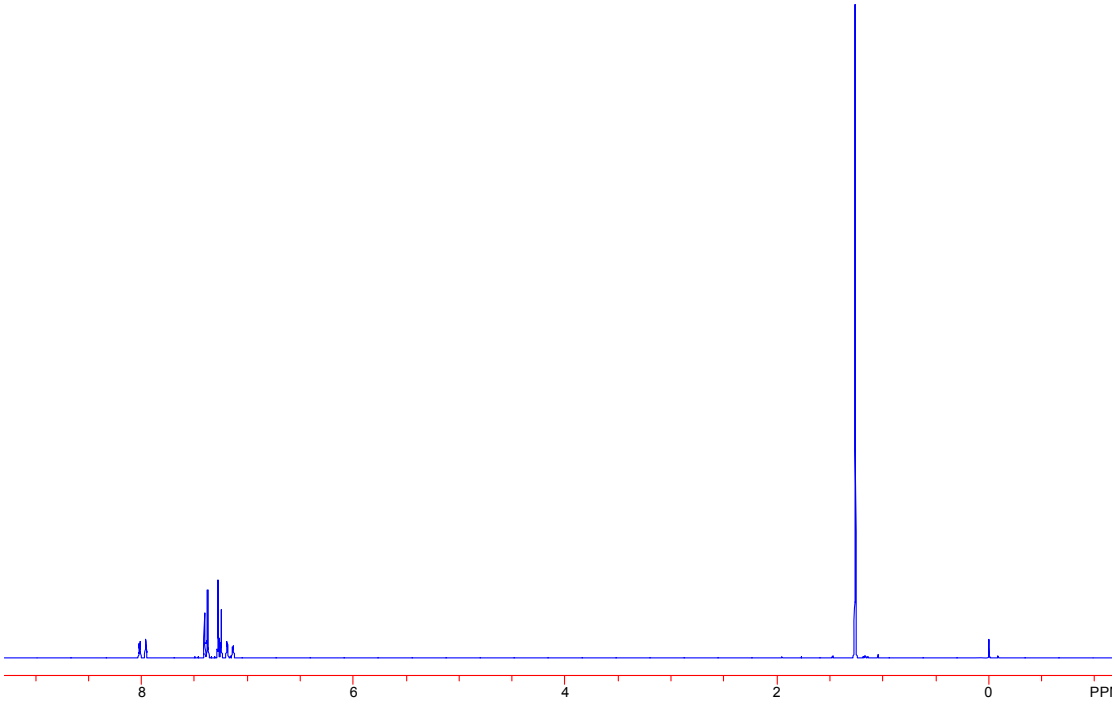
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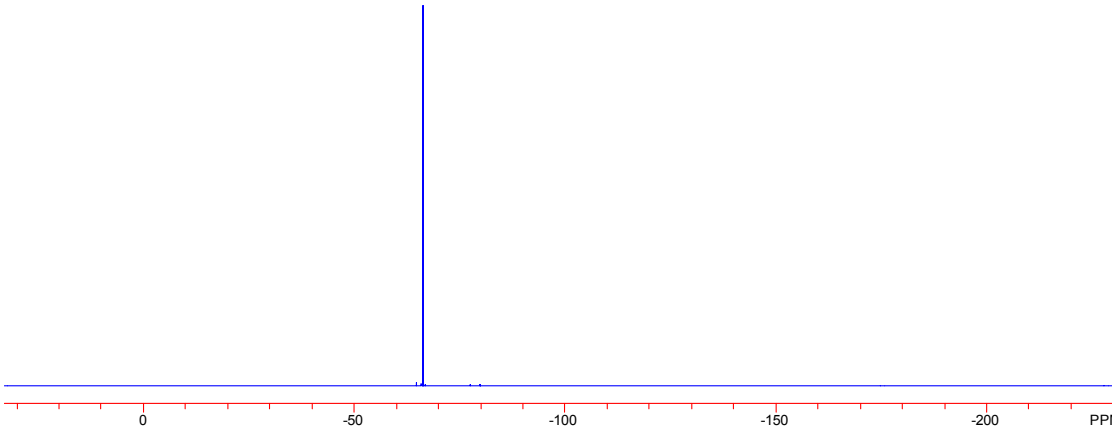
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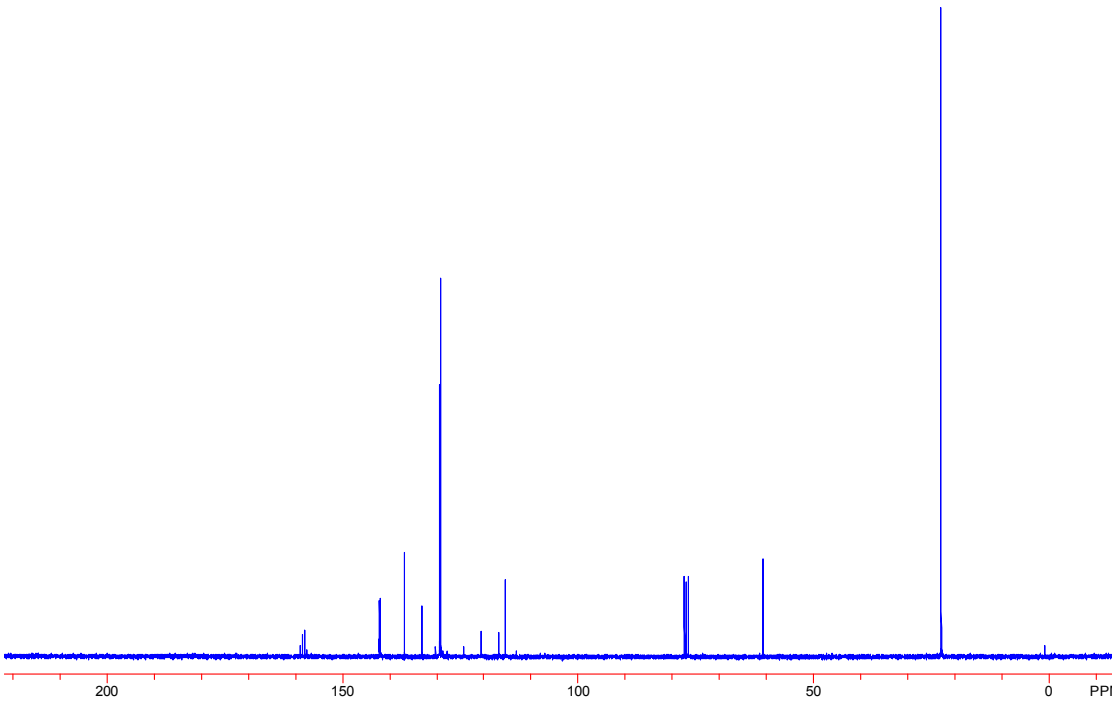
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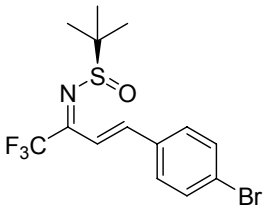
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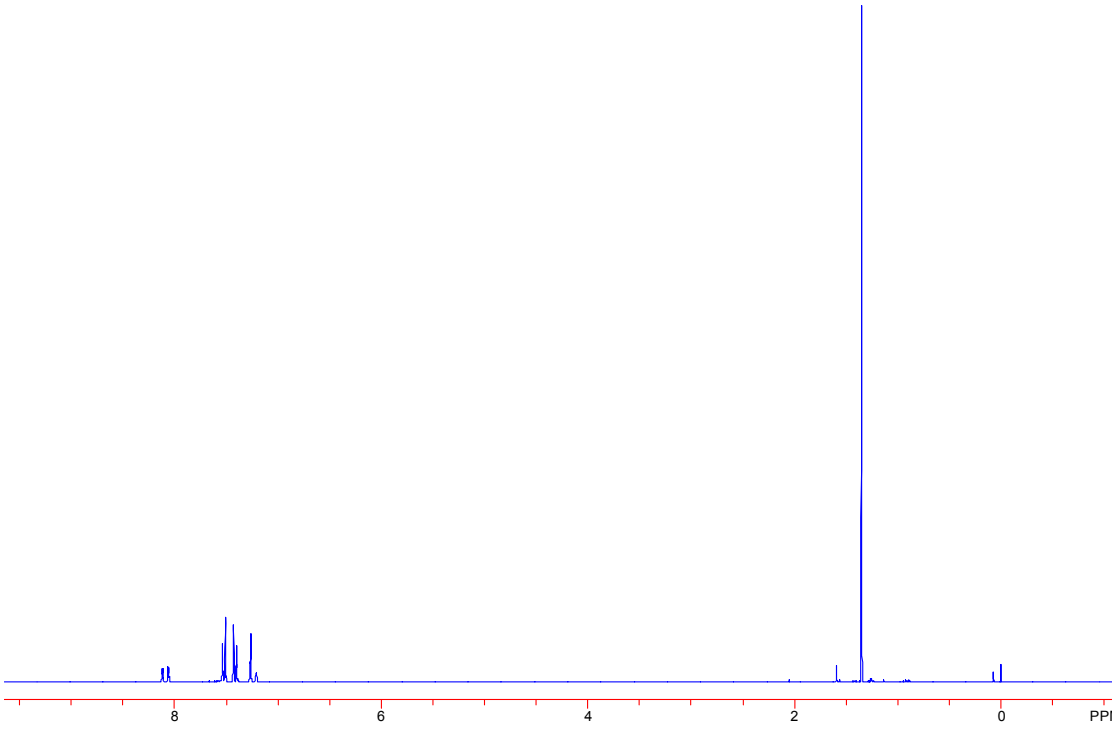
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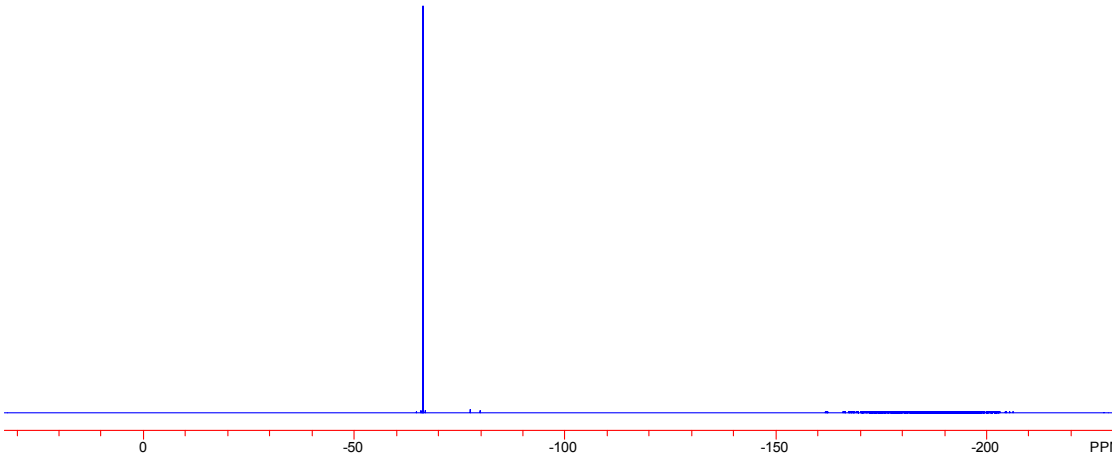
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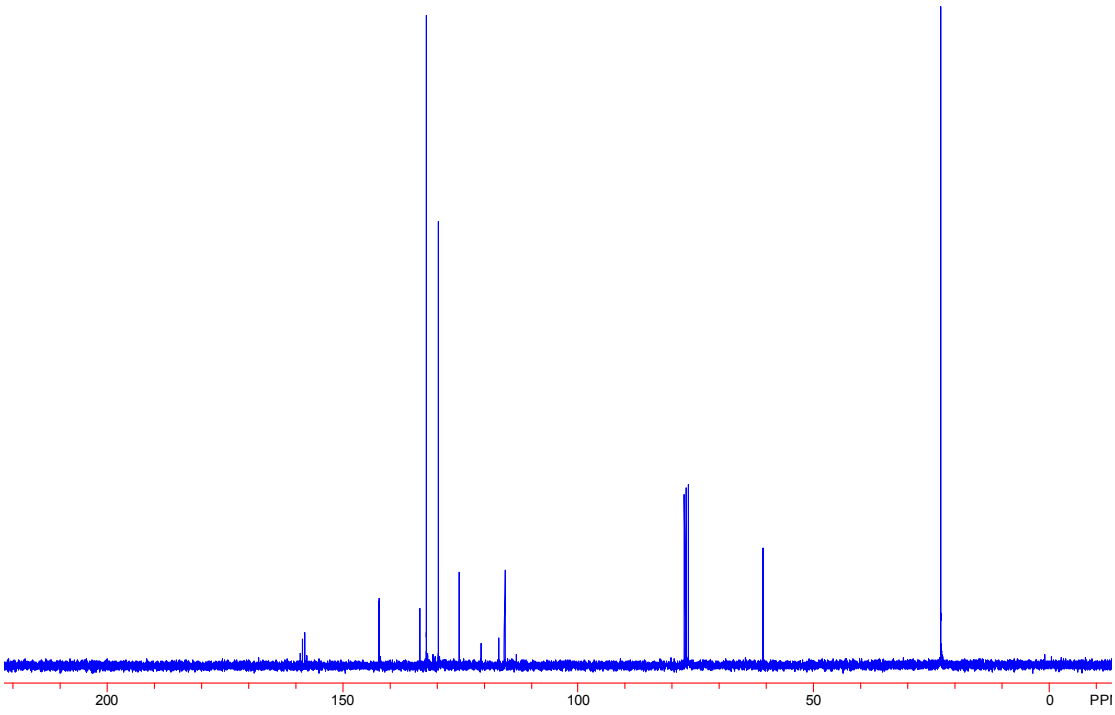
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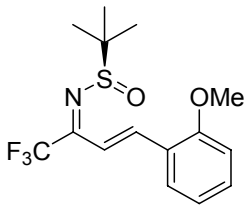
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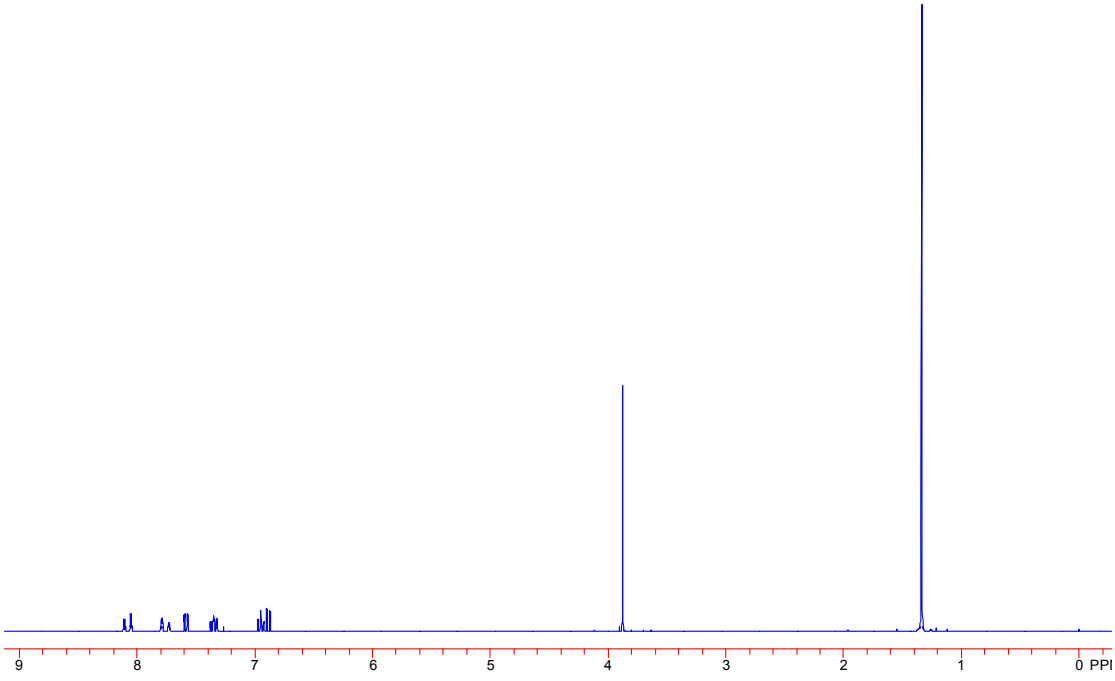
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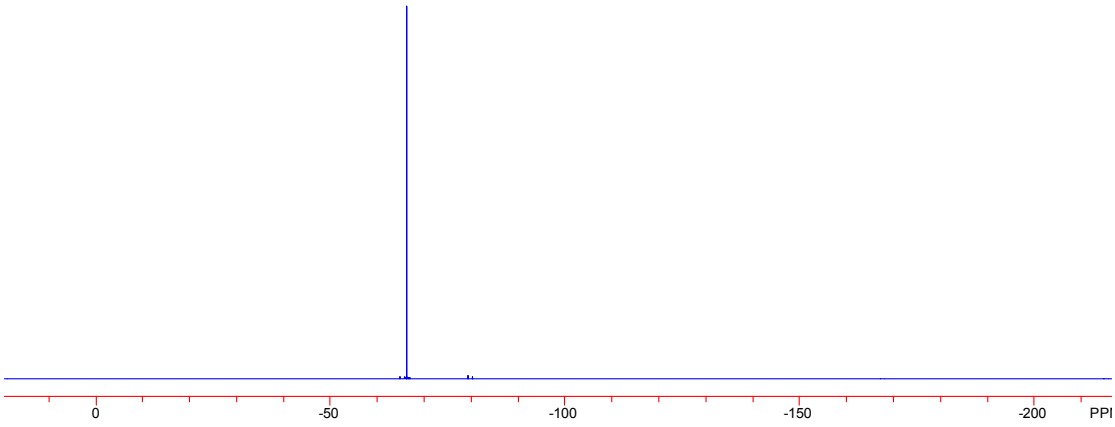
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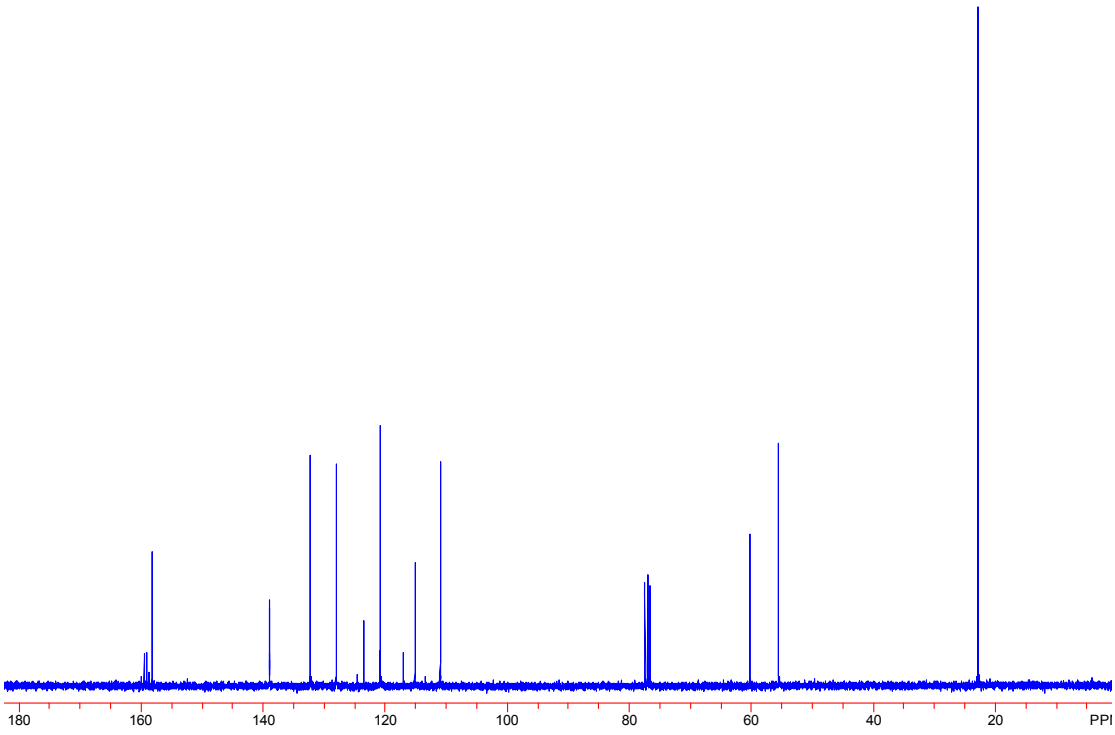
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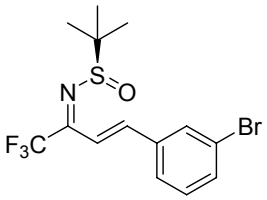
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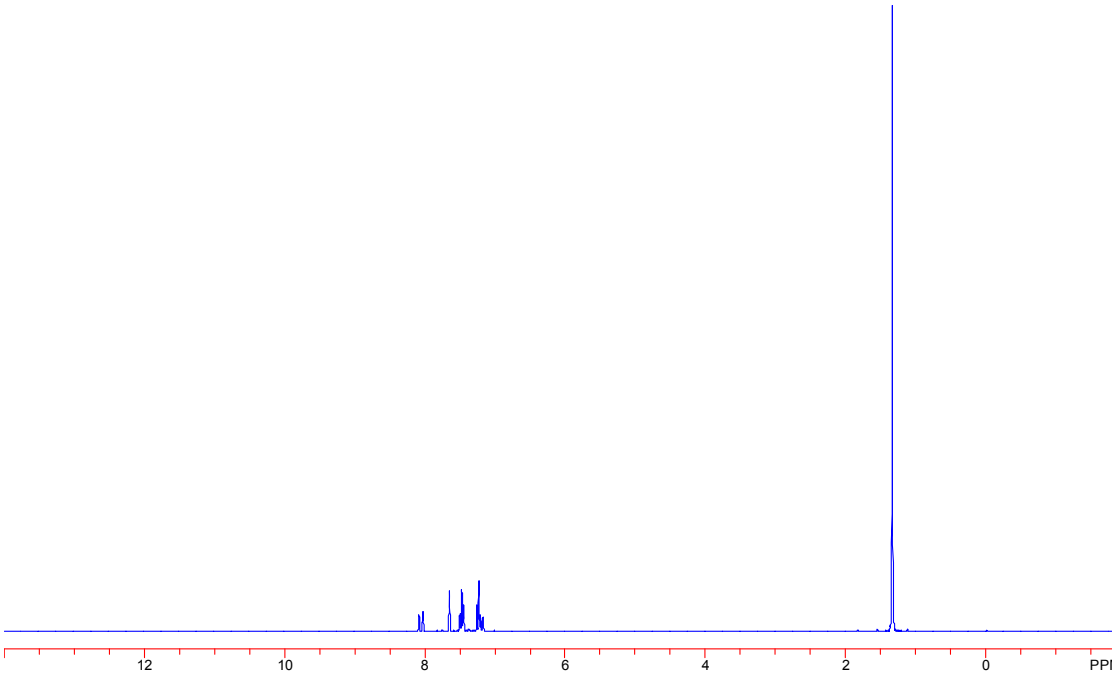
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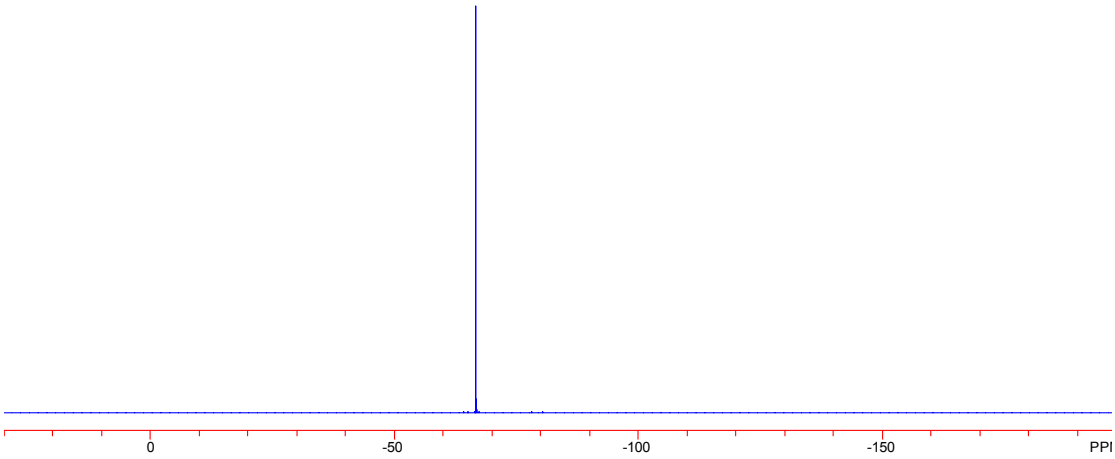
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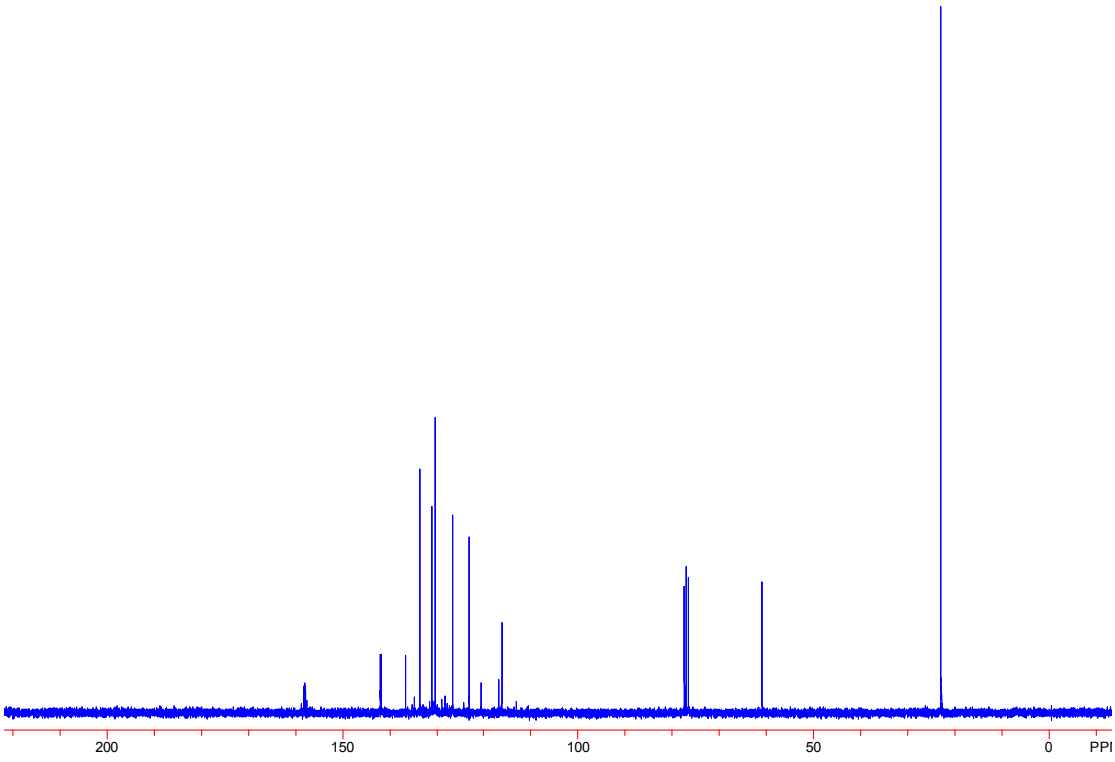
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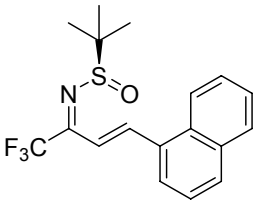
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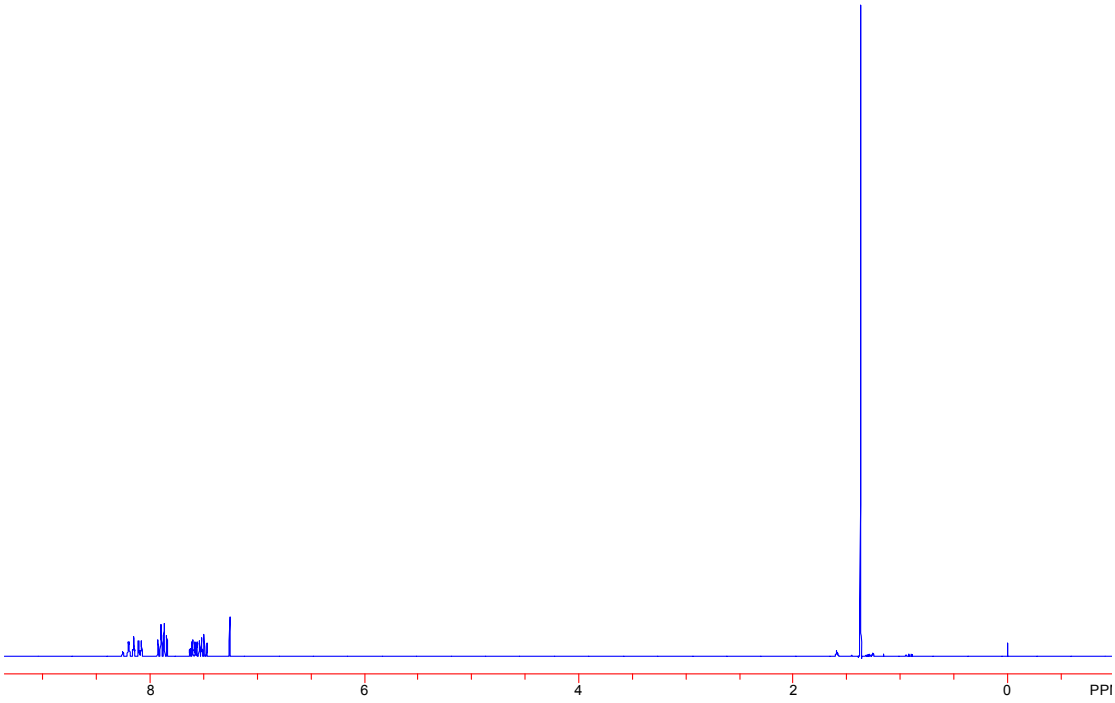
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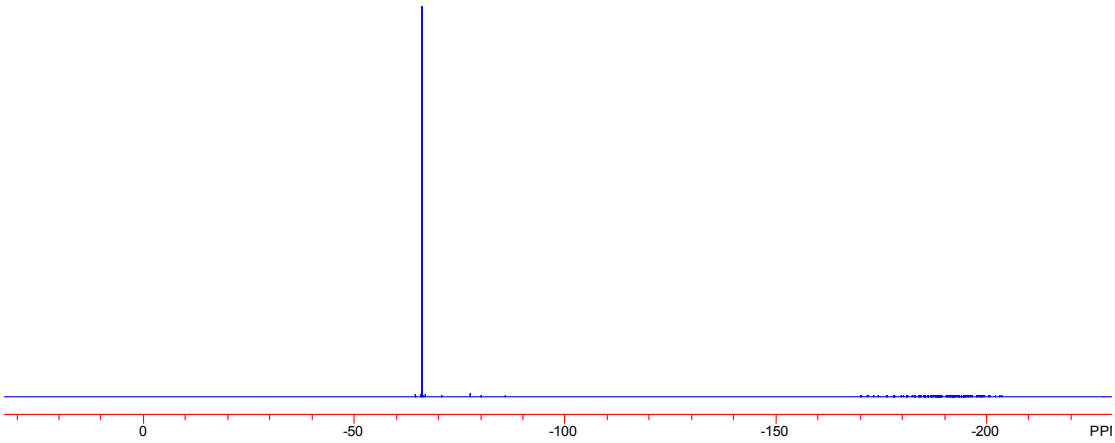
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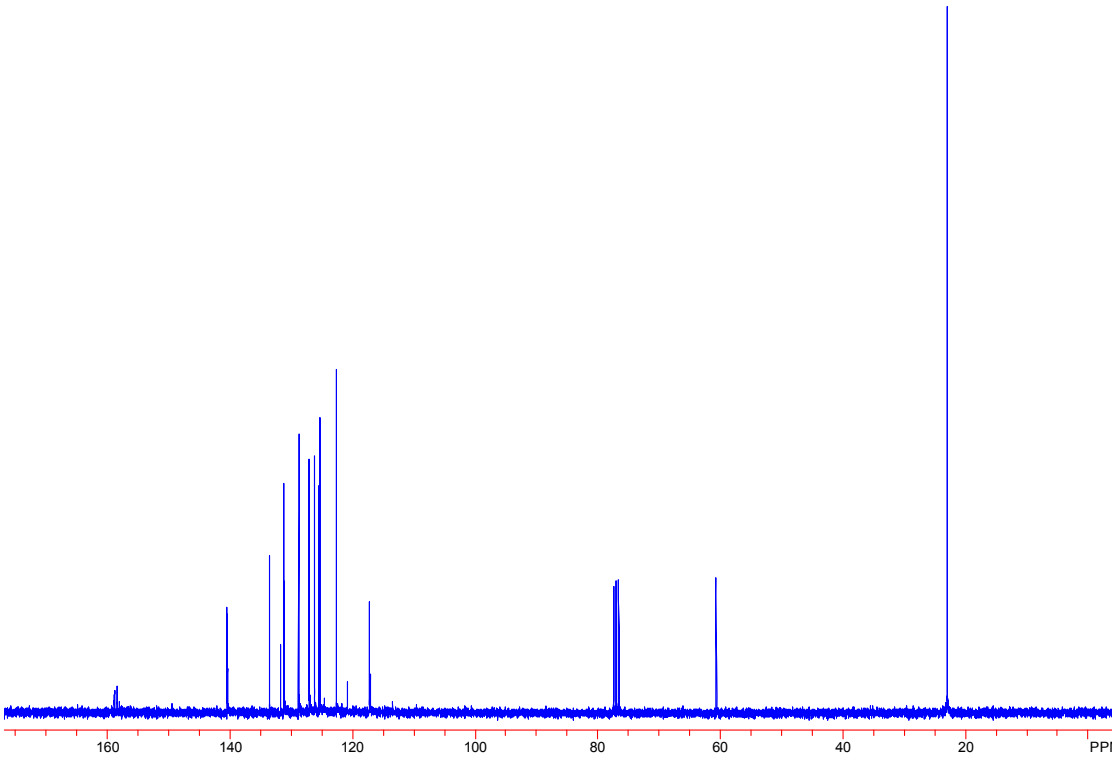
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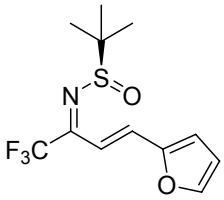
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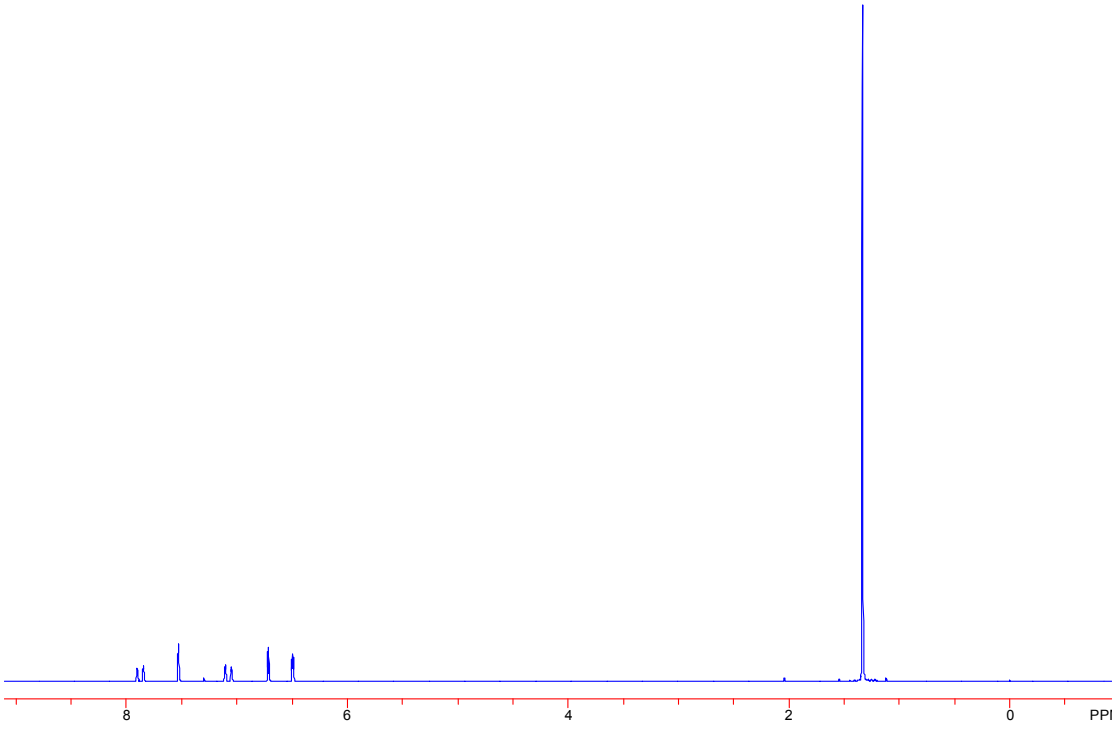
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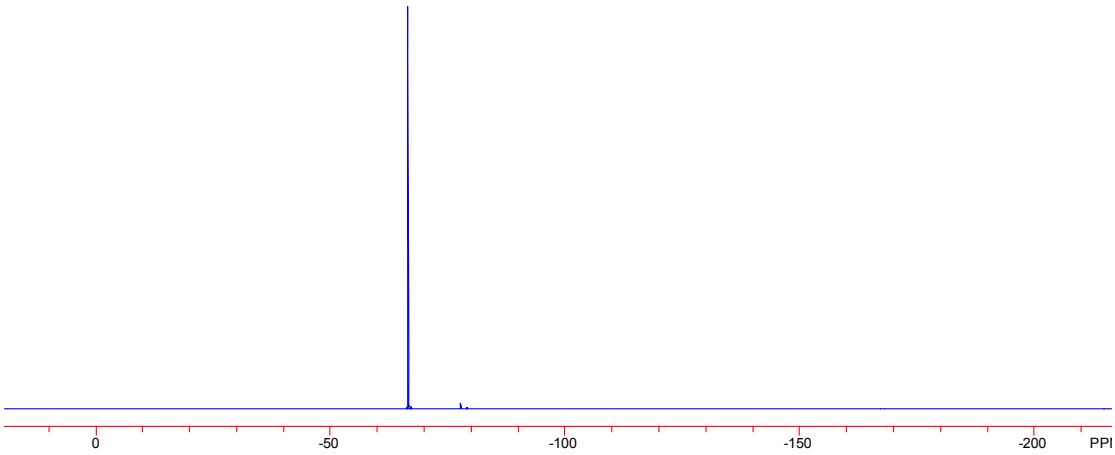
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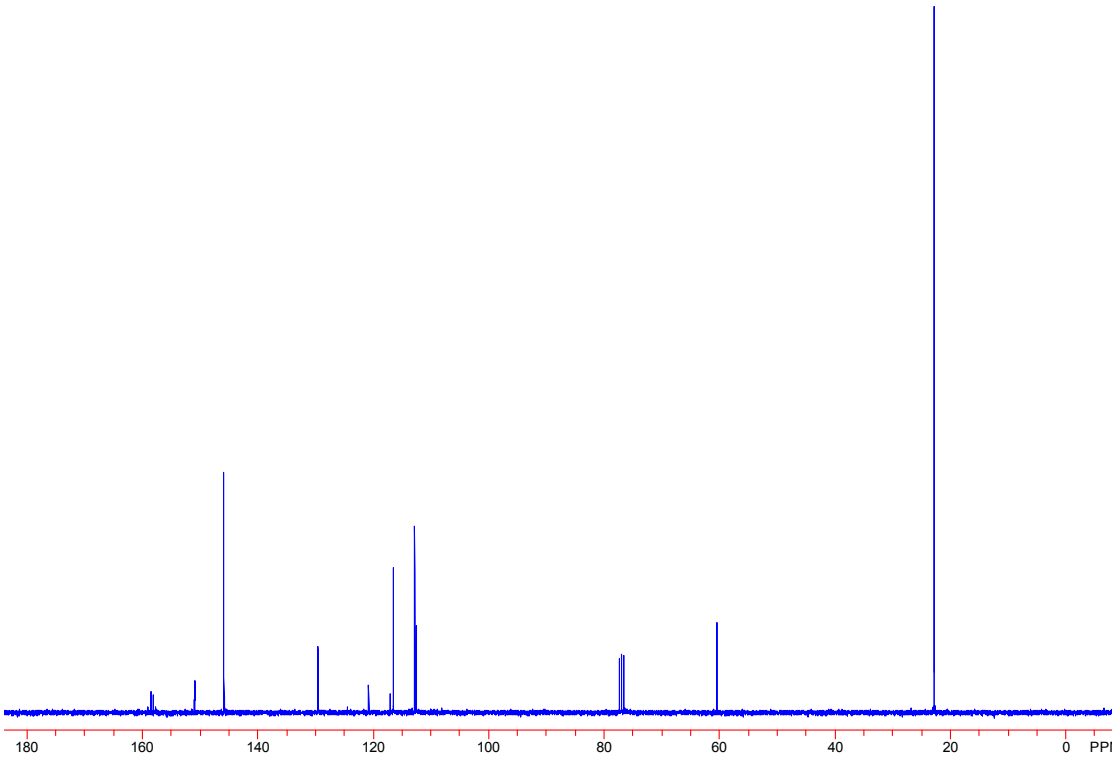
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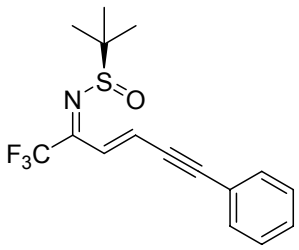
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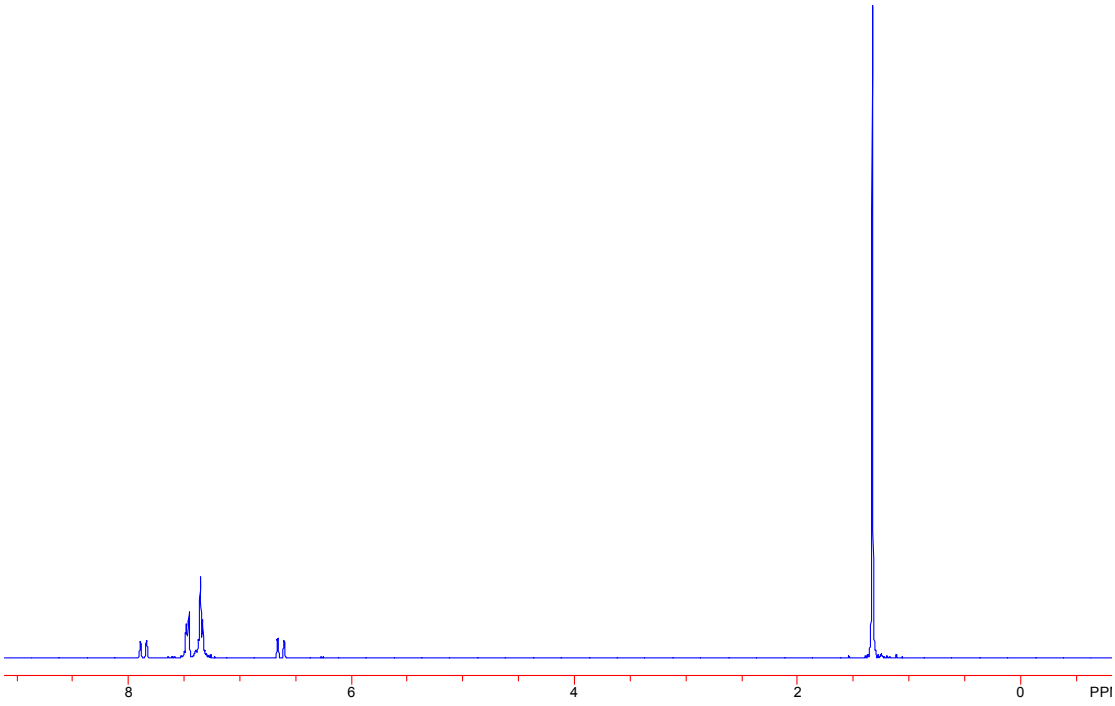
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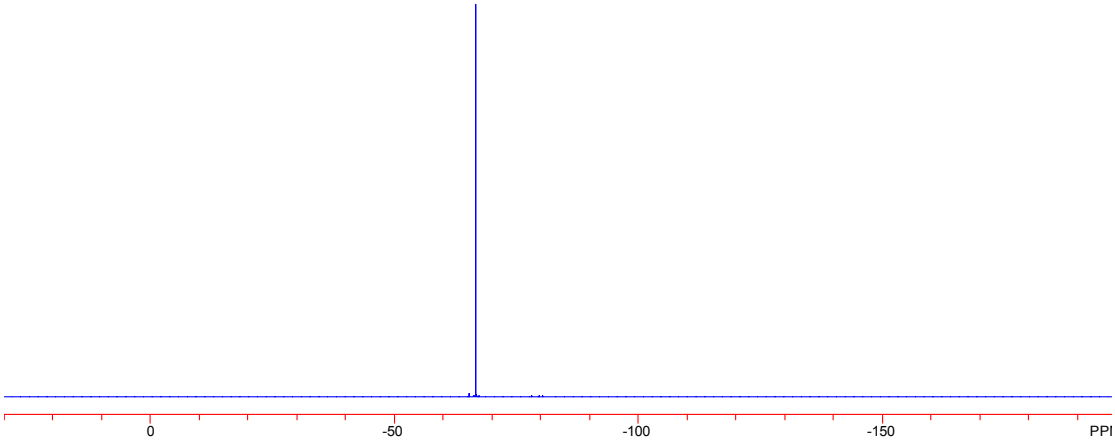
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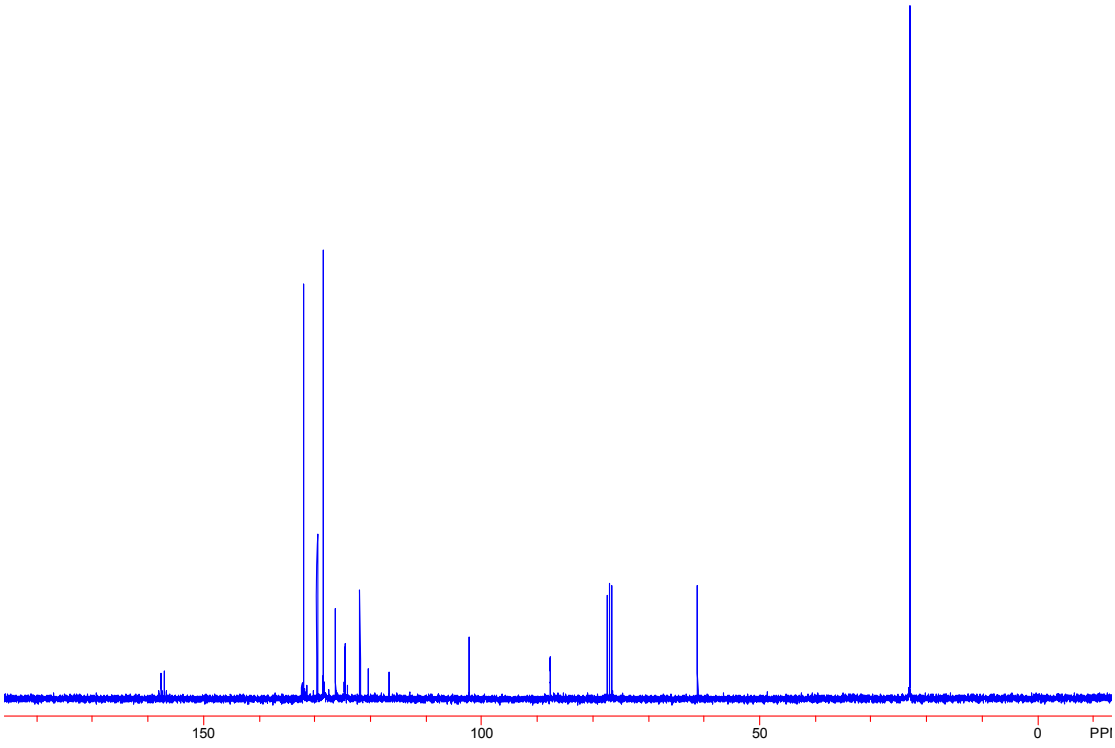
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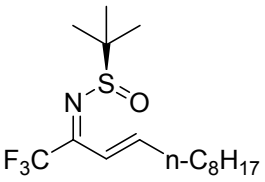
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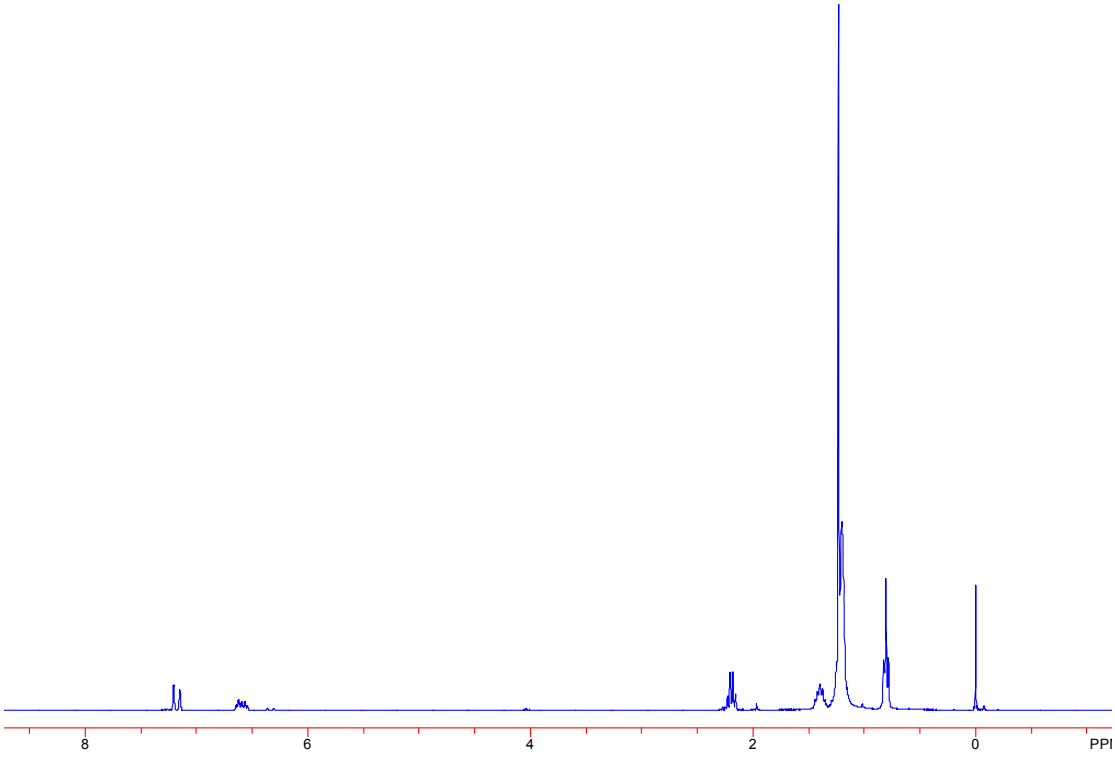
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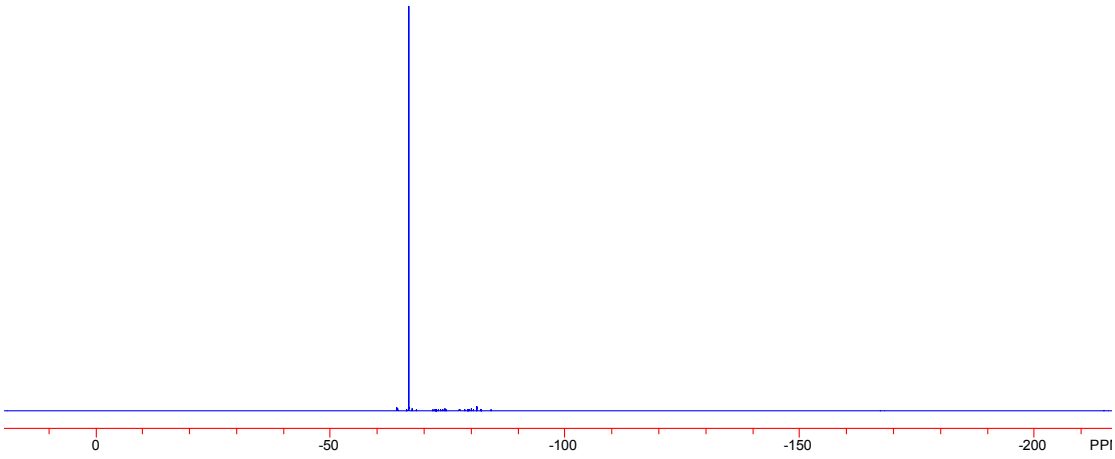
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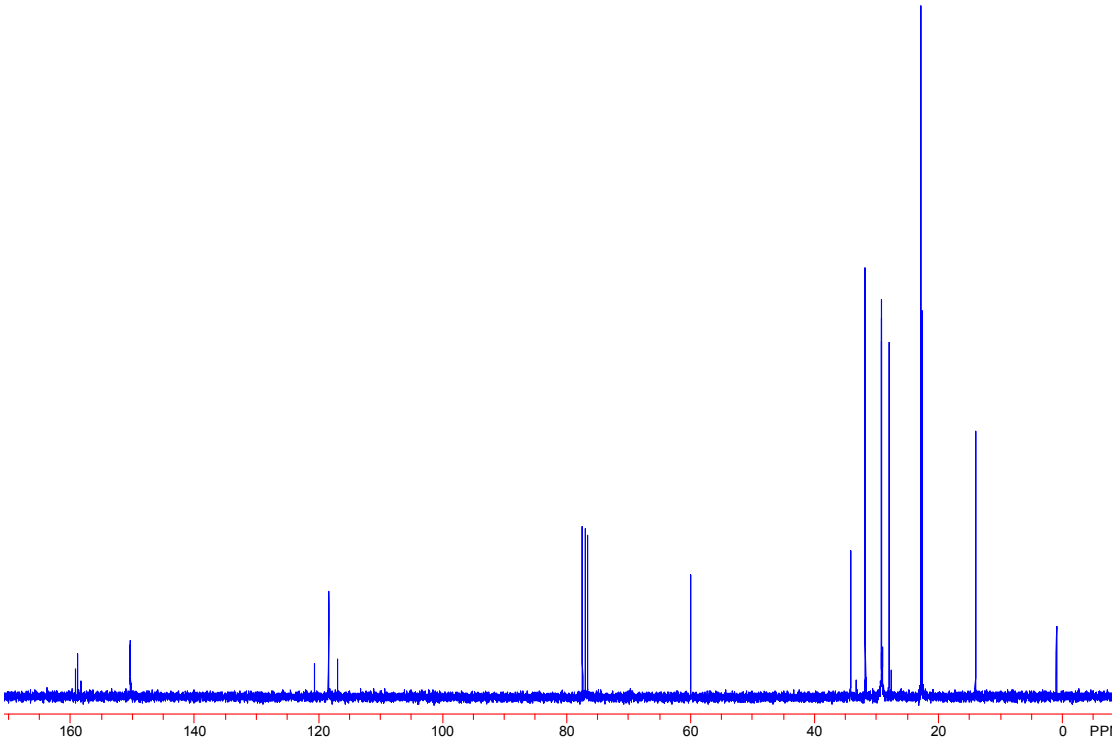
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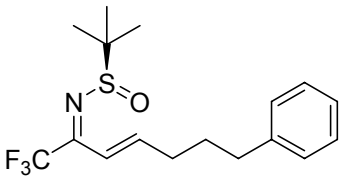
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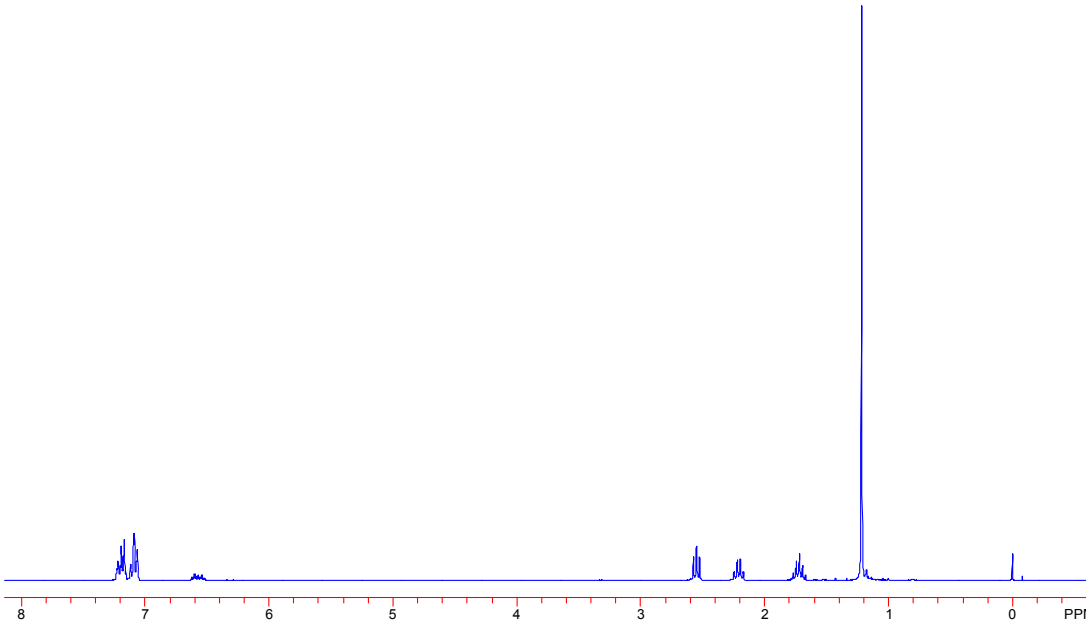
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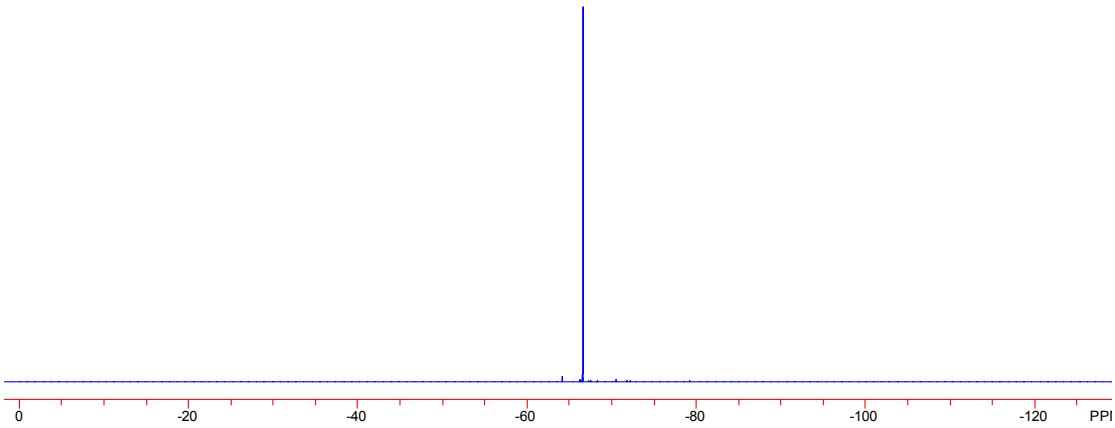
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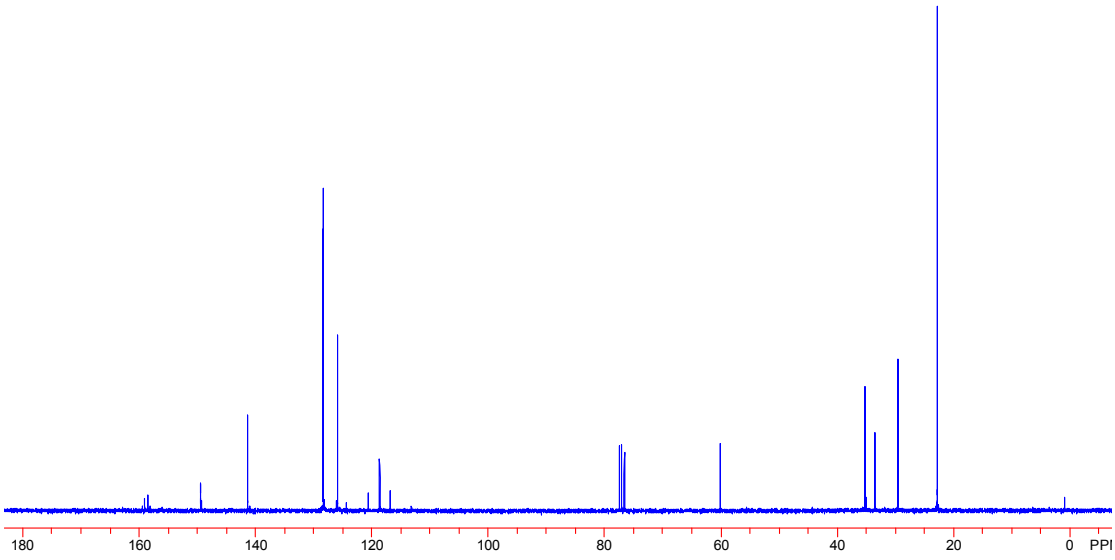
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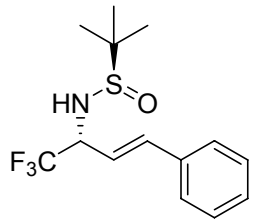
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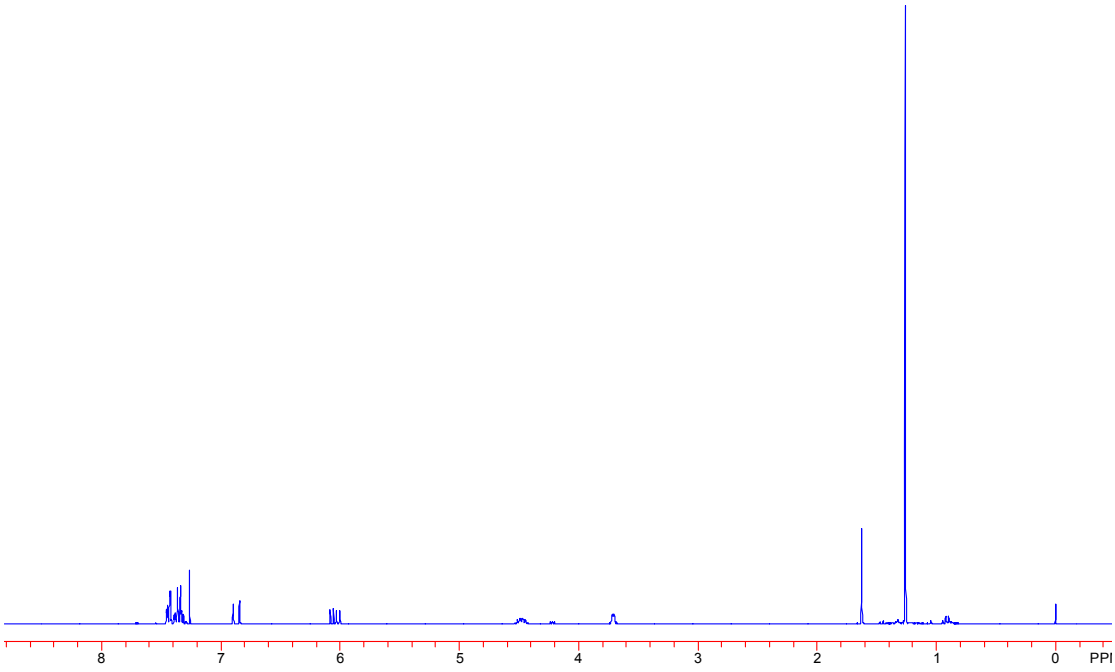
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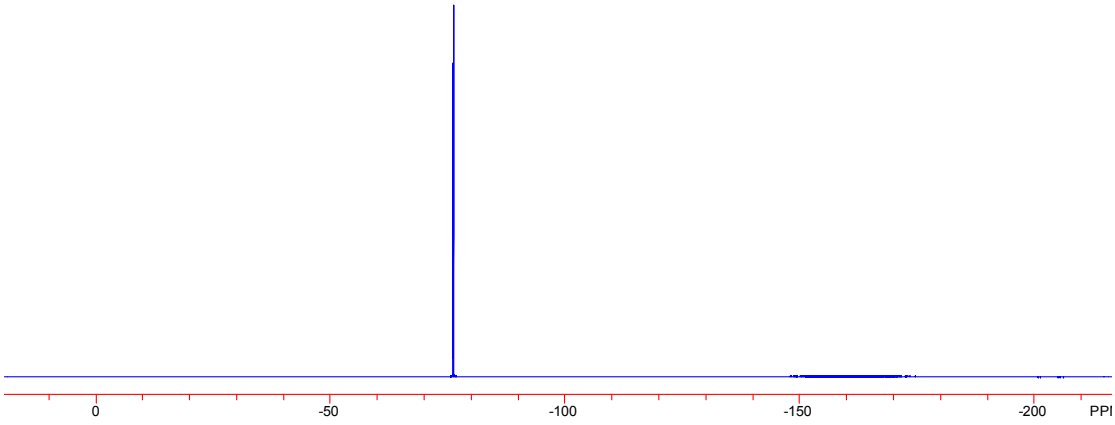
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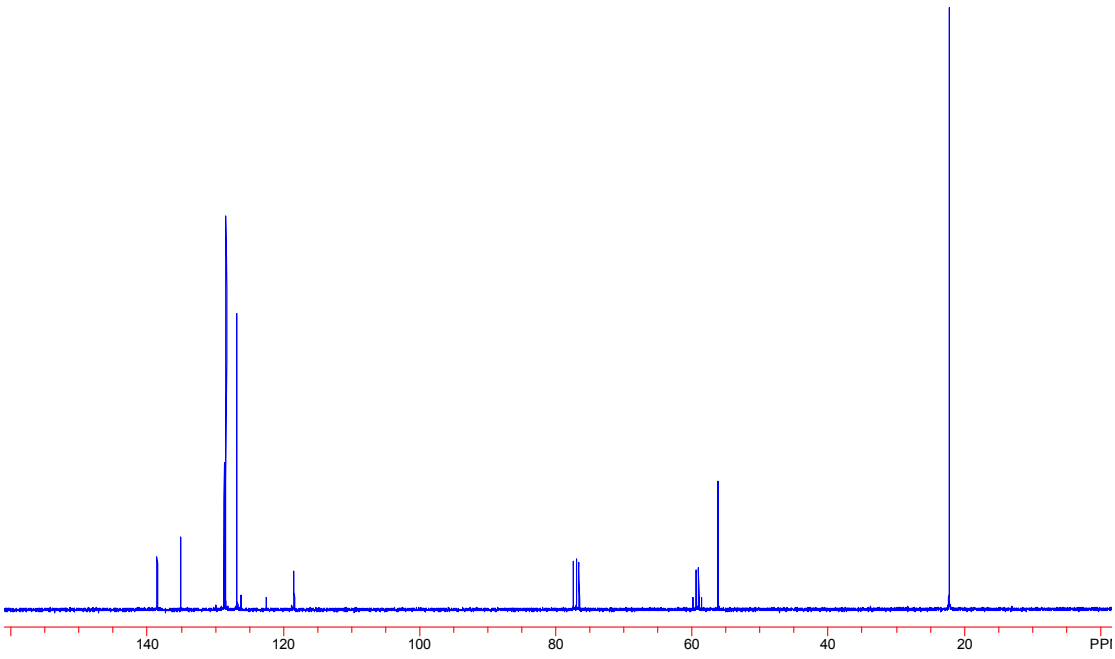
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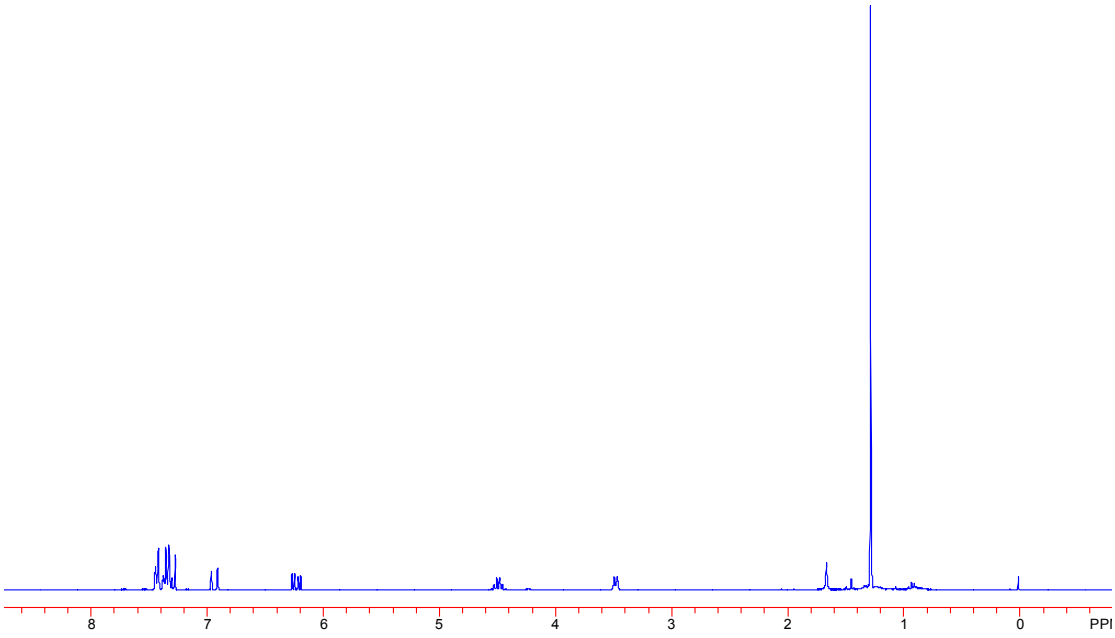
F3C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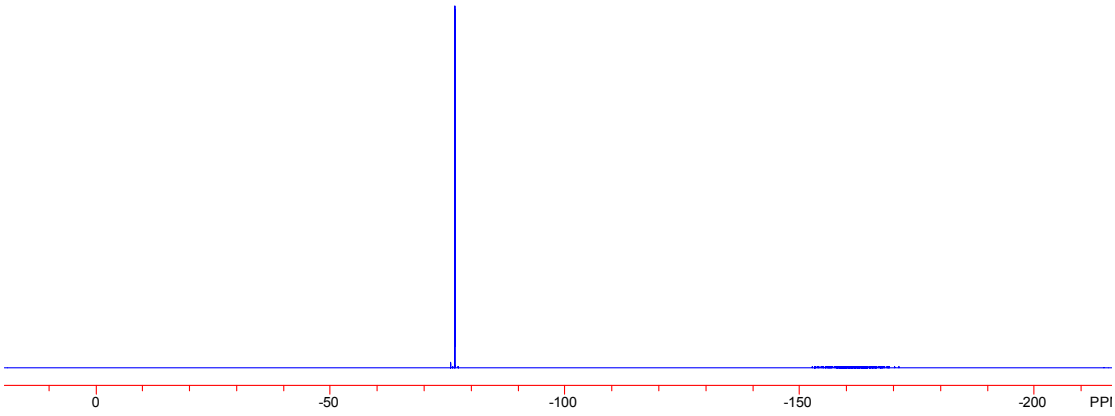
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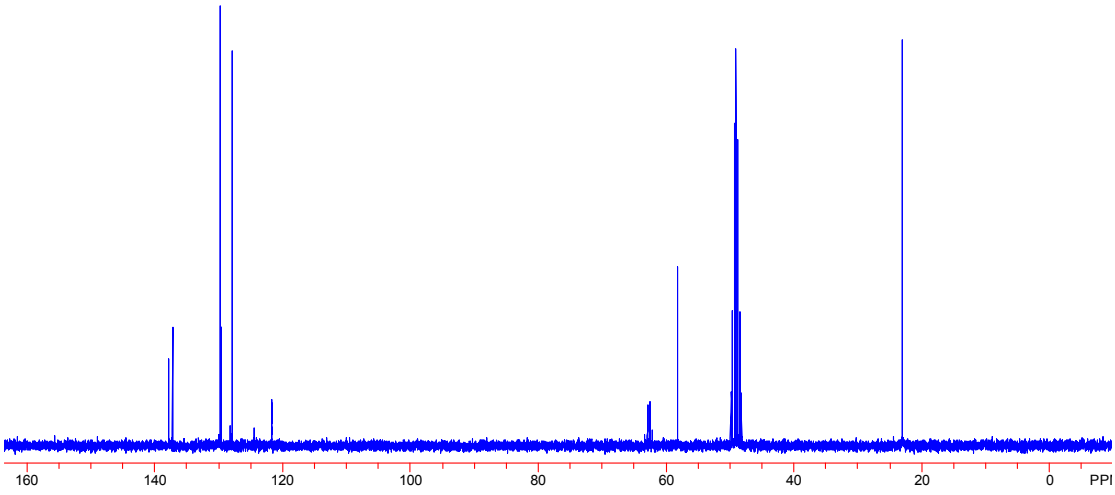
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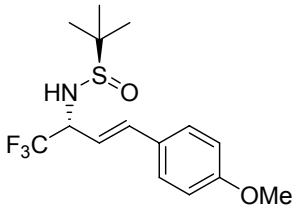
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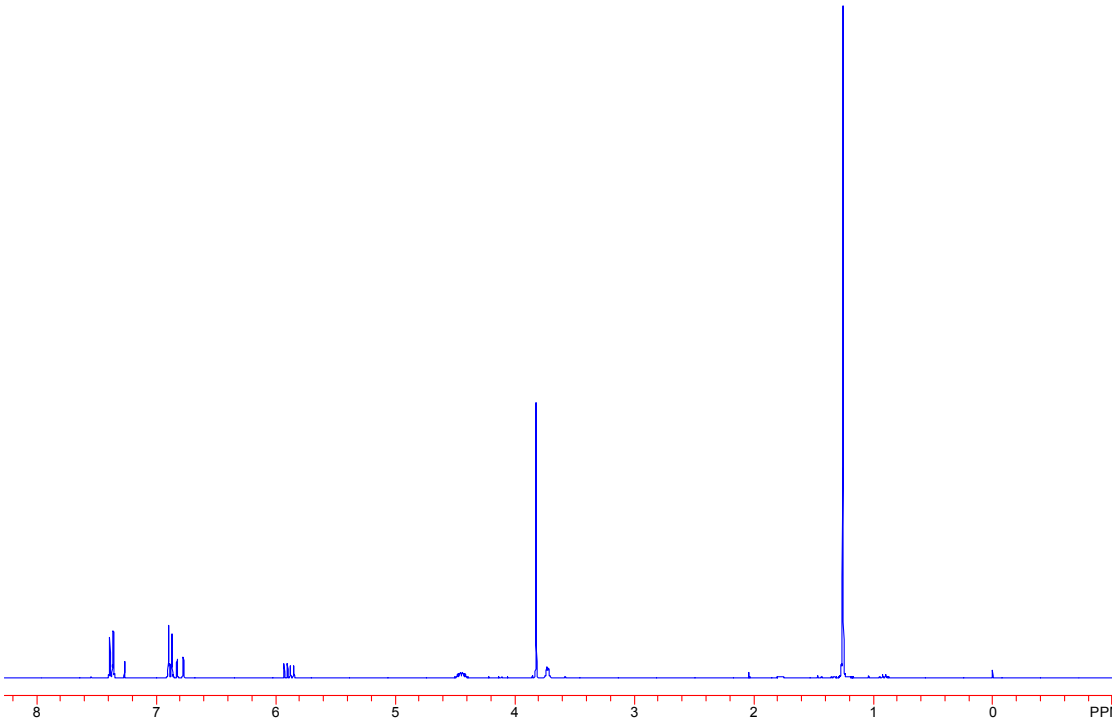
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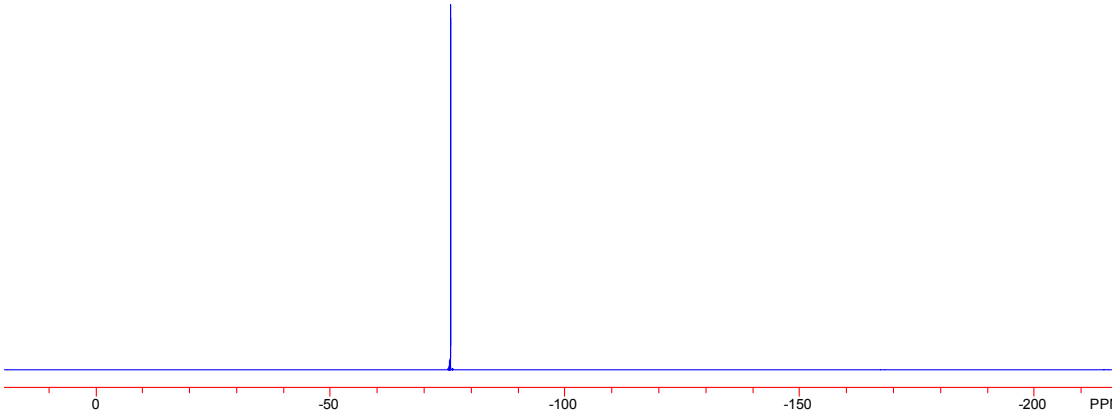
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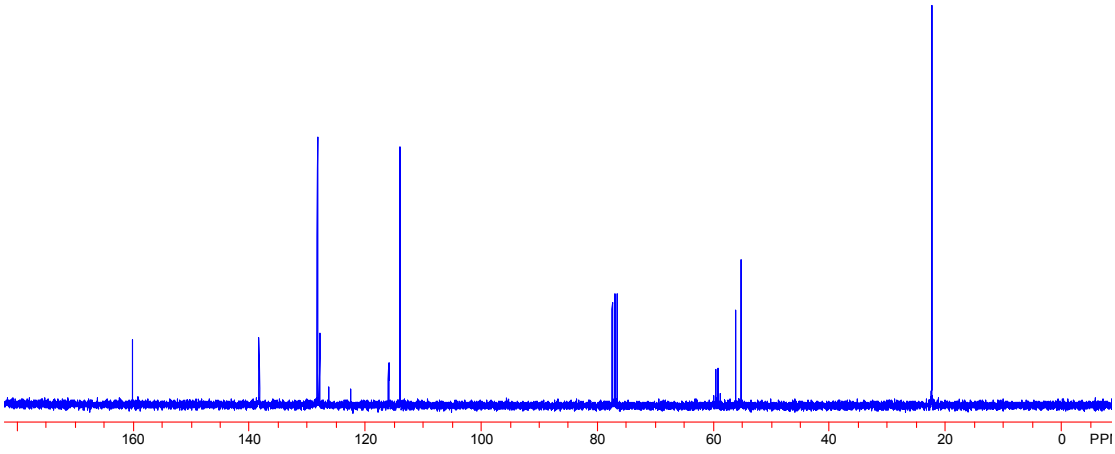
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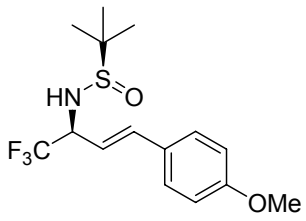
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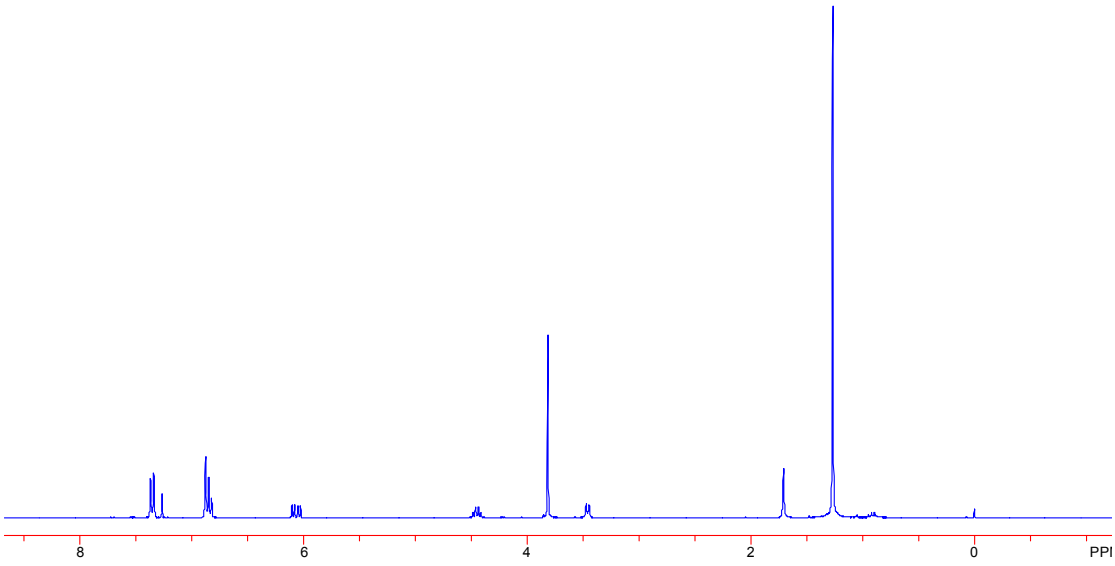
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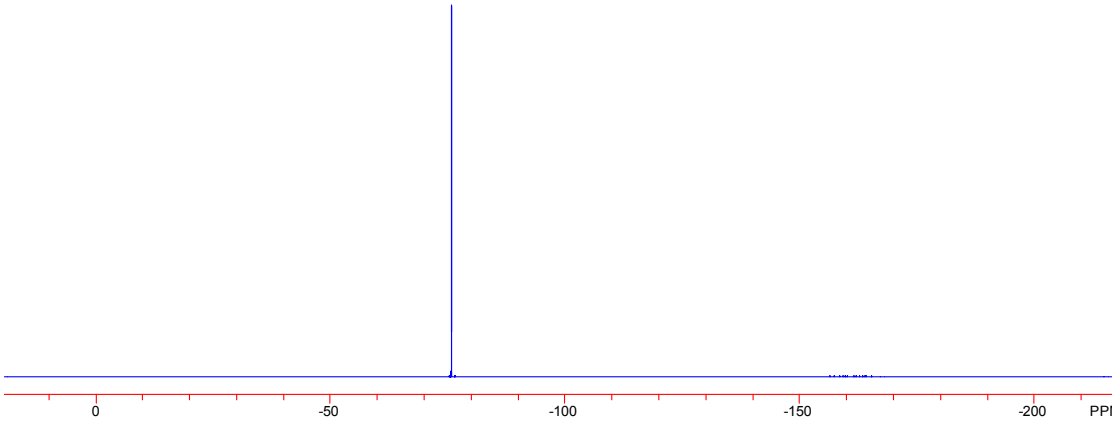
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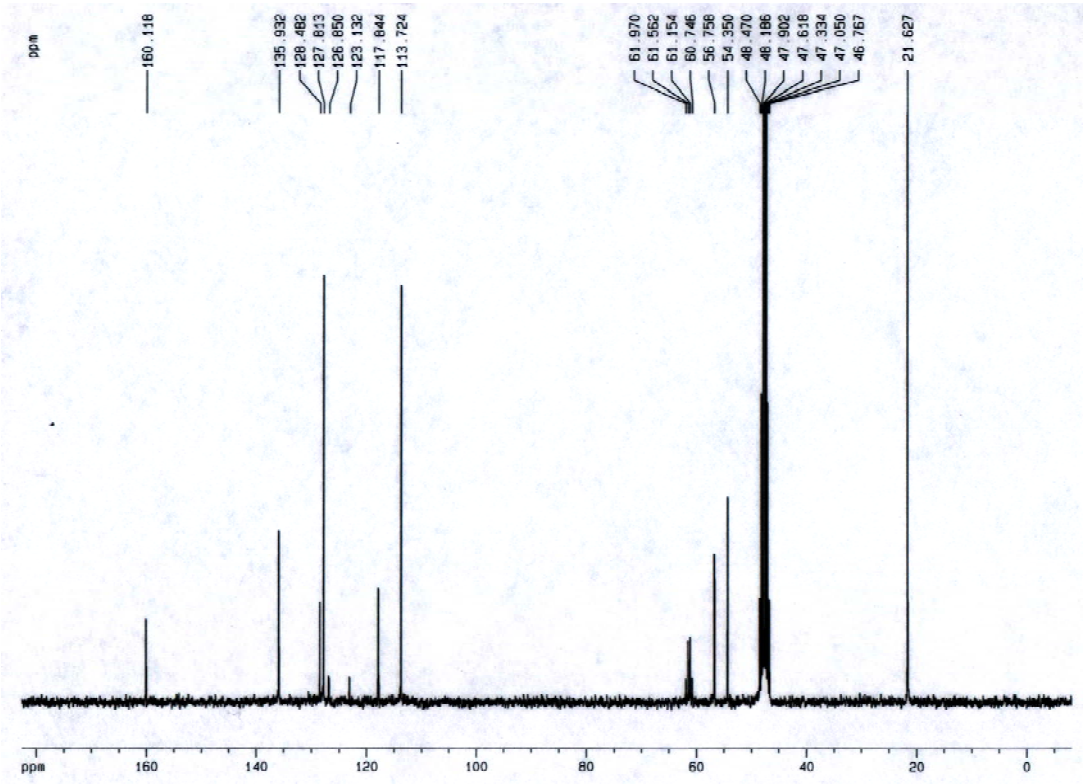
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56.758
54.350
48.470
48.186
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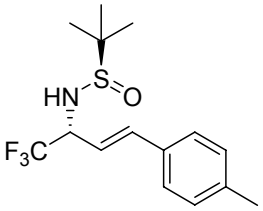
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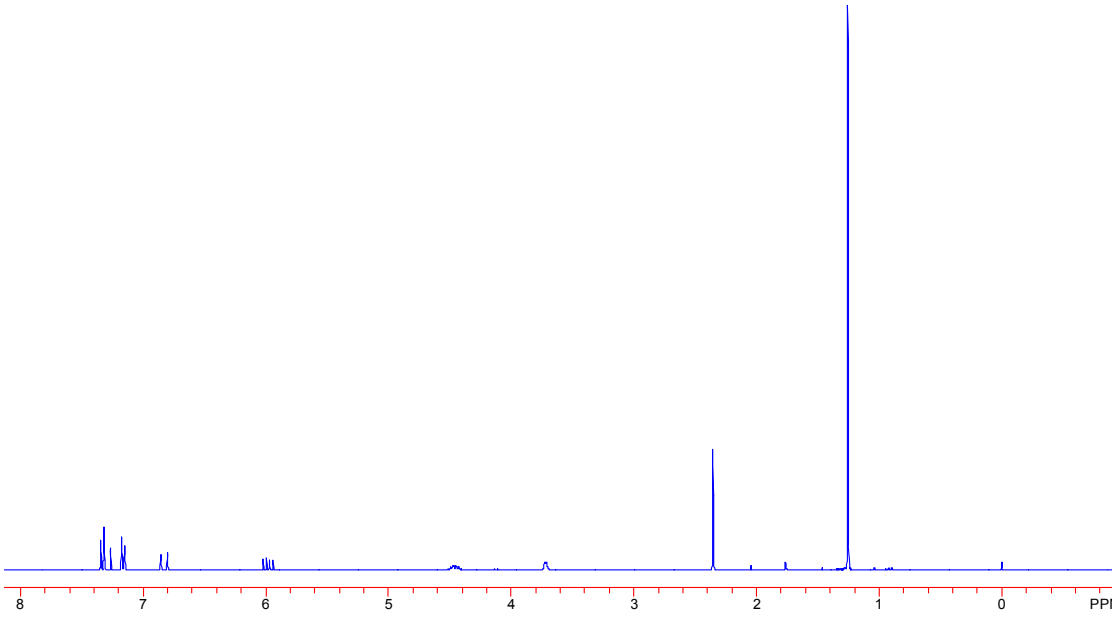
F3C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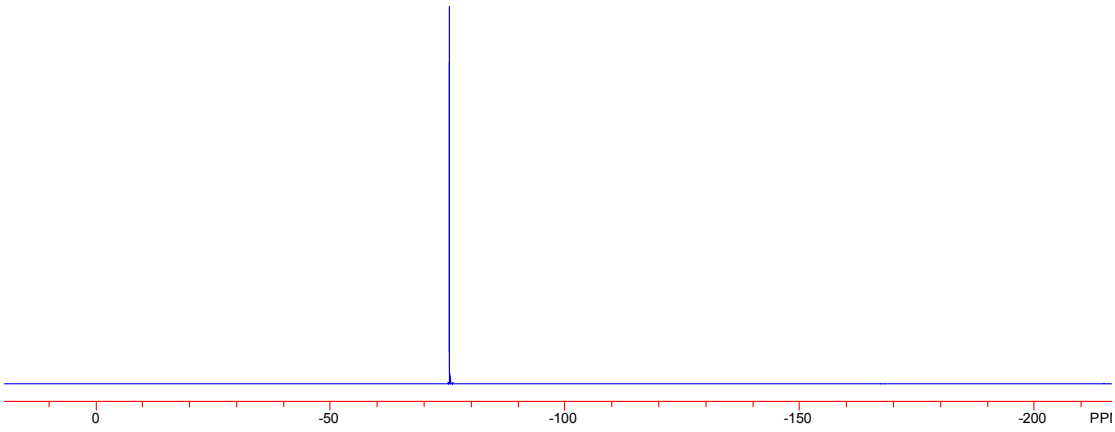
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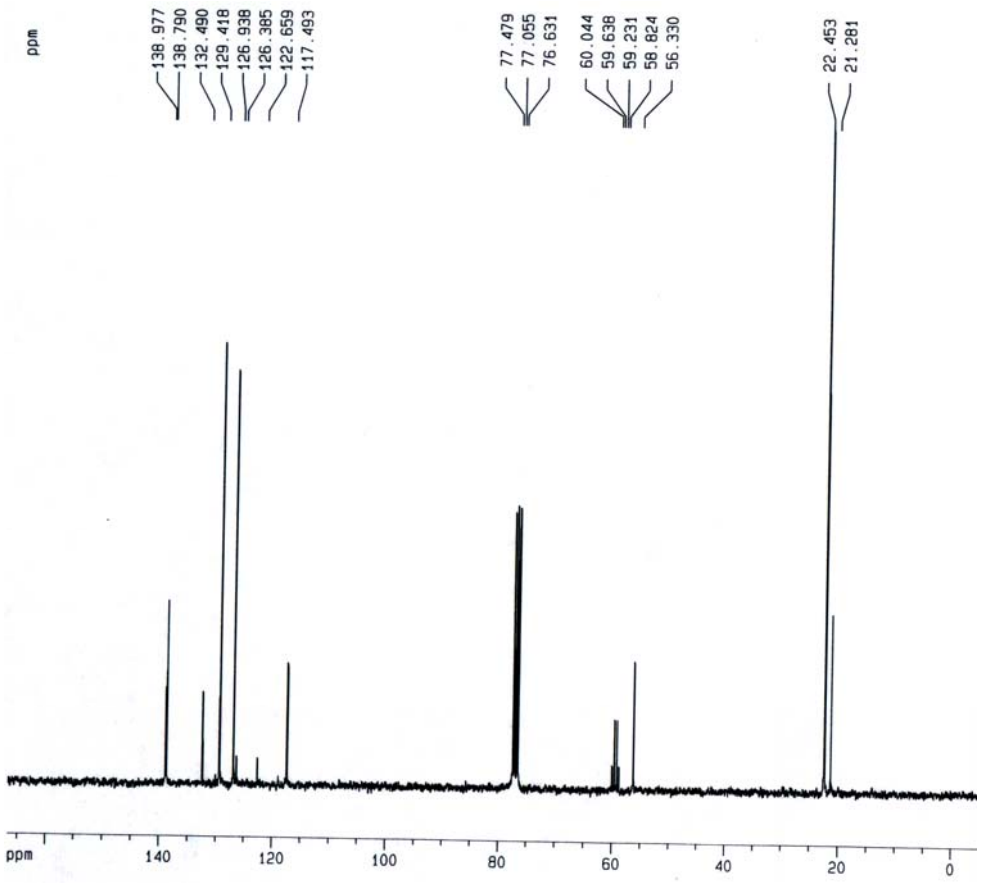
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126.385
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77.055
76.631
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58.824
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60
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20
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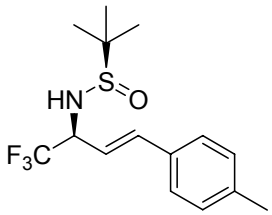
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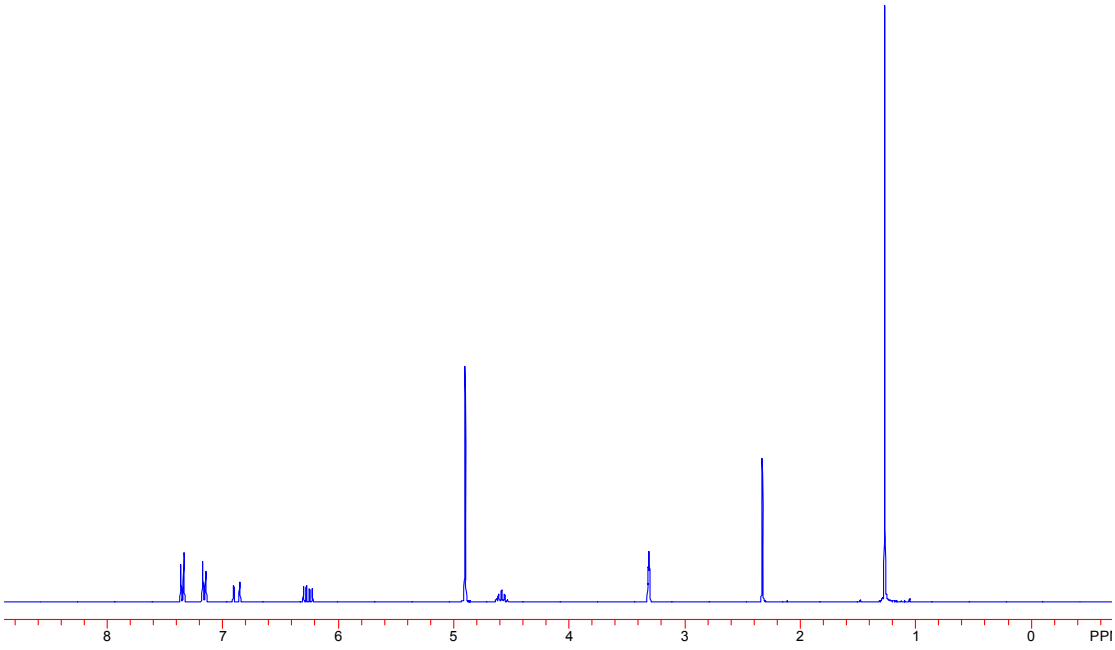
O
F3C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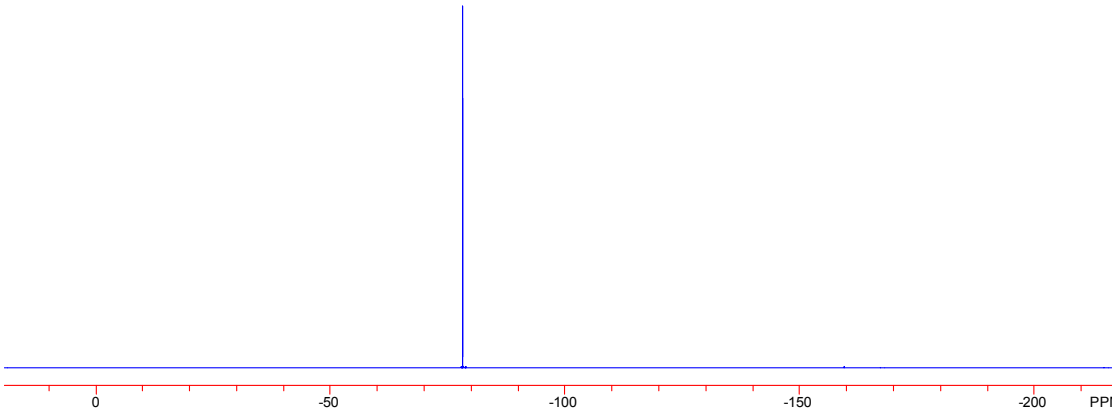
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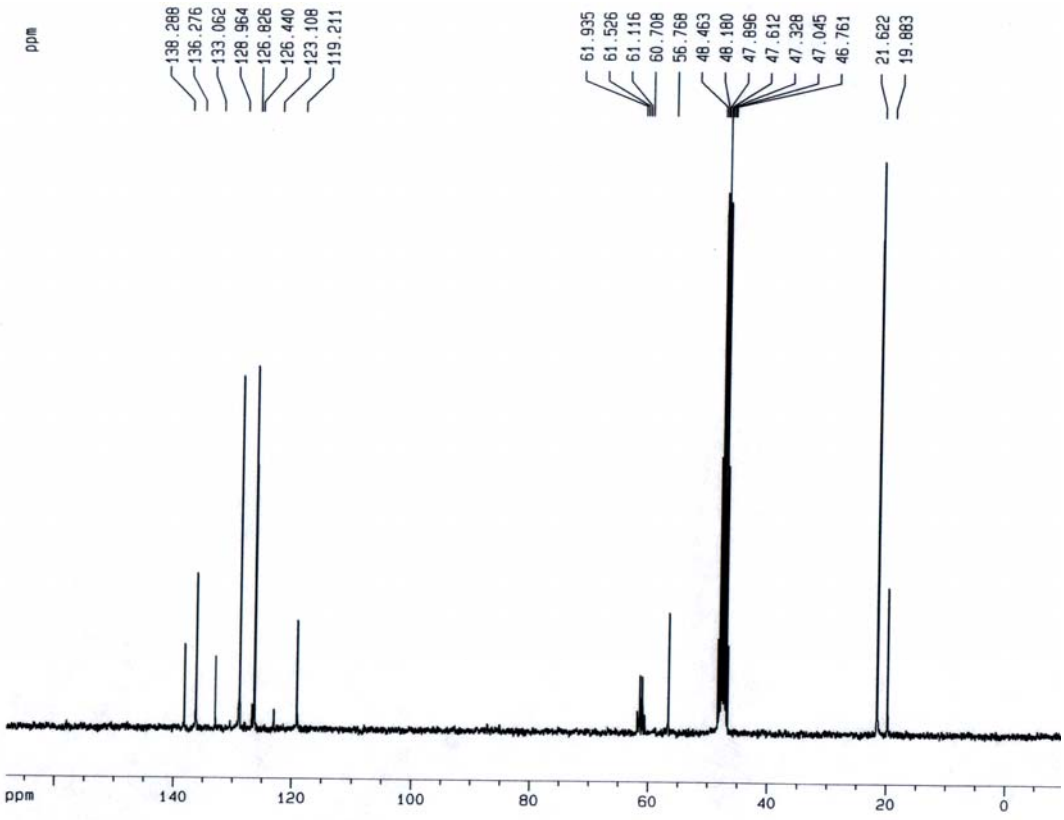
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56.768
48.463
48.180
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60
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20
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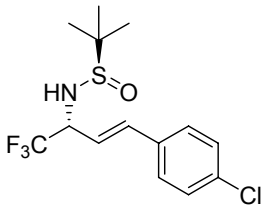
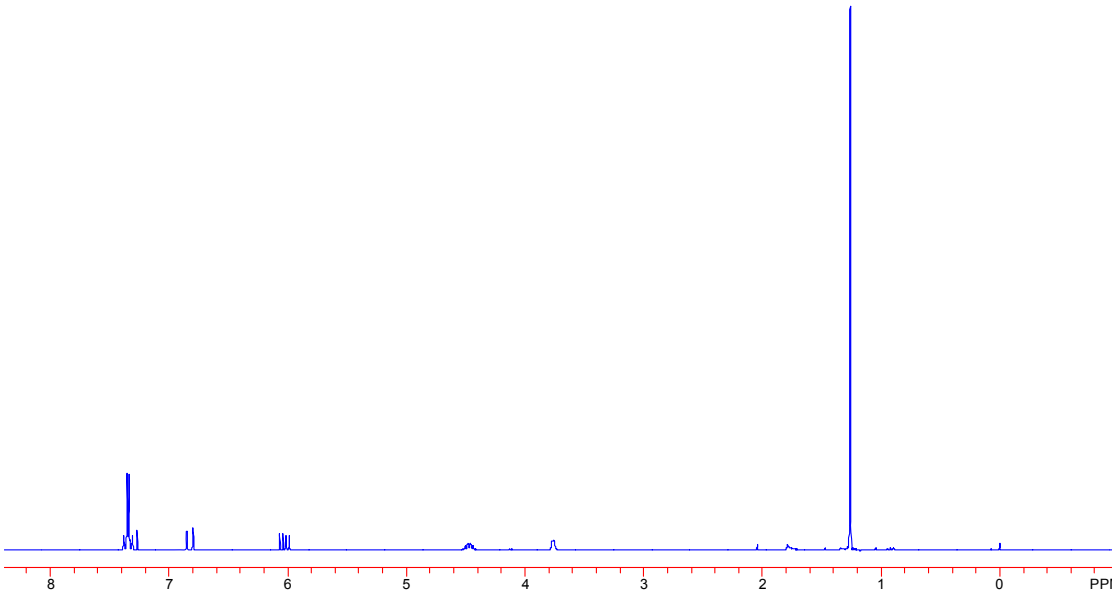

HN
S
O
F3C
Cl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2
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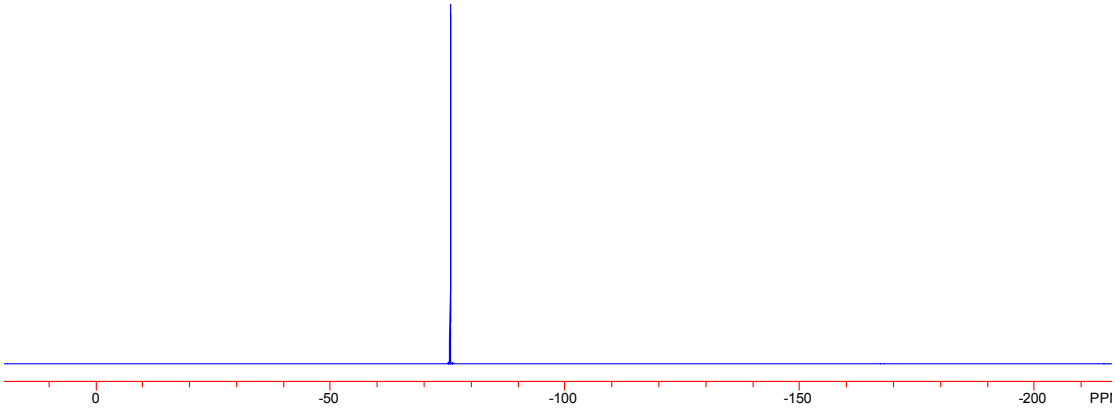
0
PPI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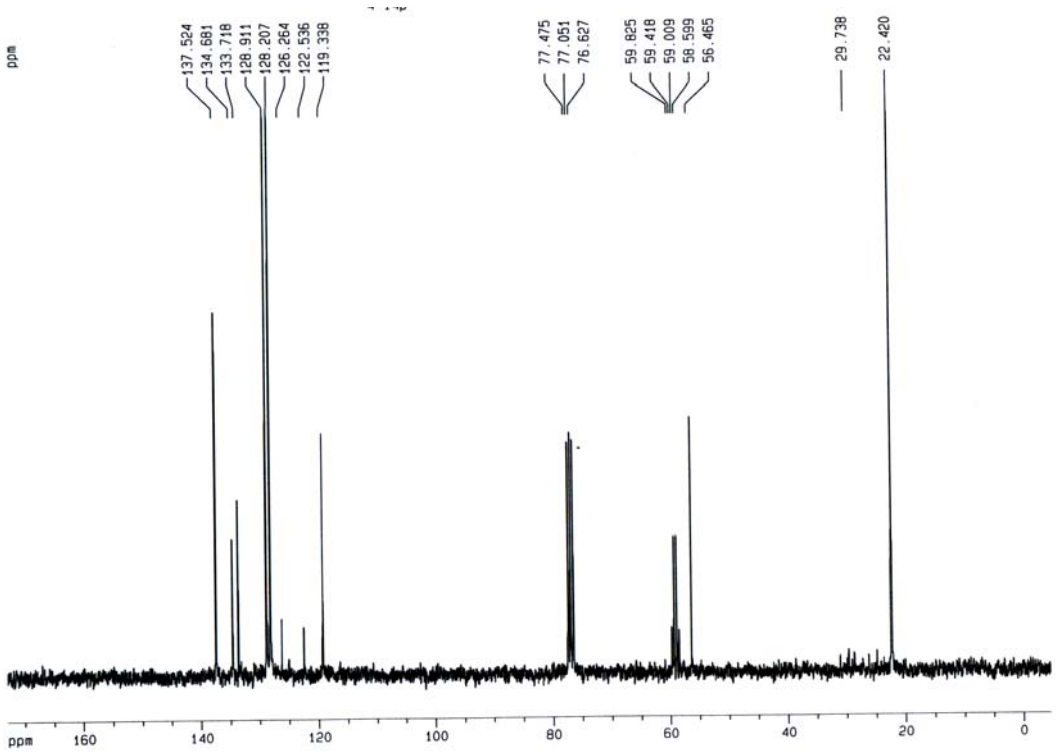
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59.009
58.599
56.465
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22.420
ppm
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60
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20
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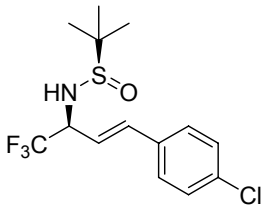
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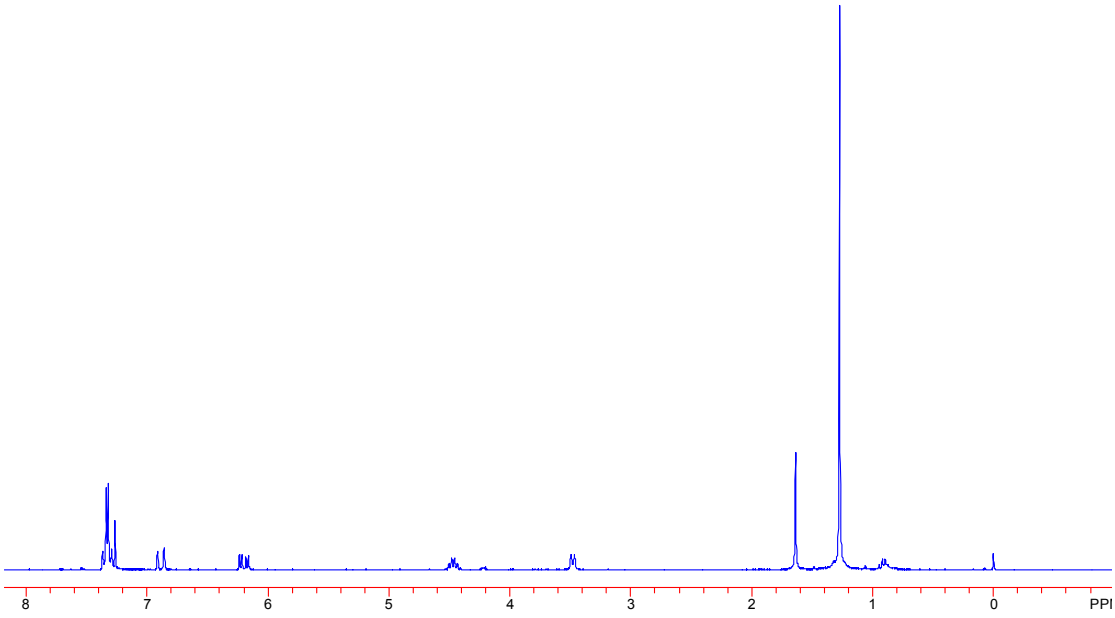
S
O
F3C
Cl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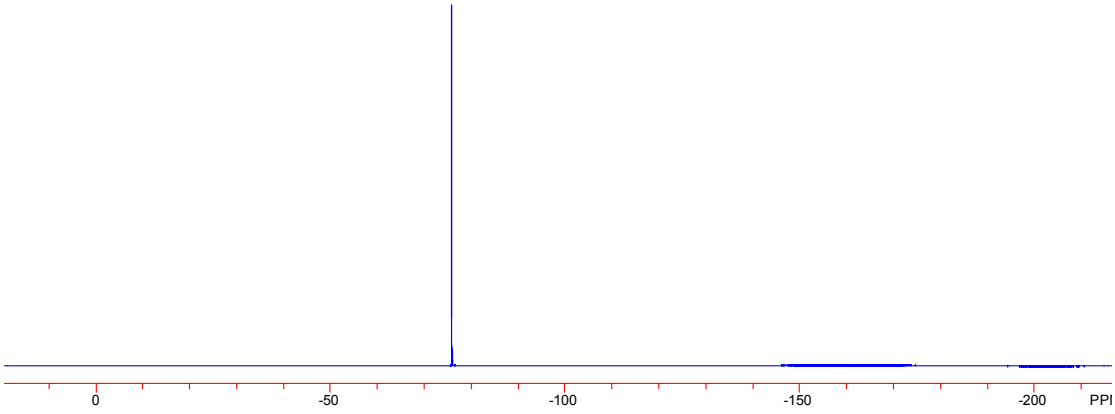
PPI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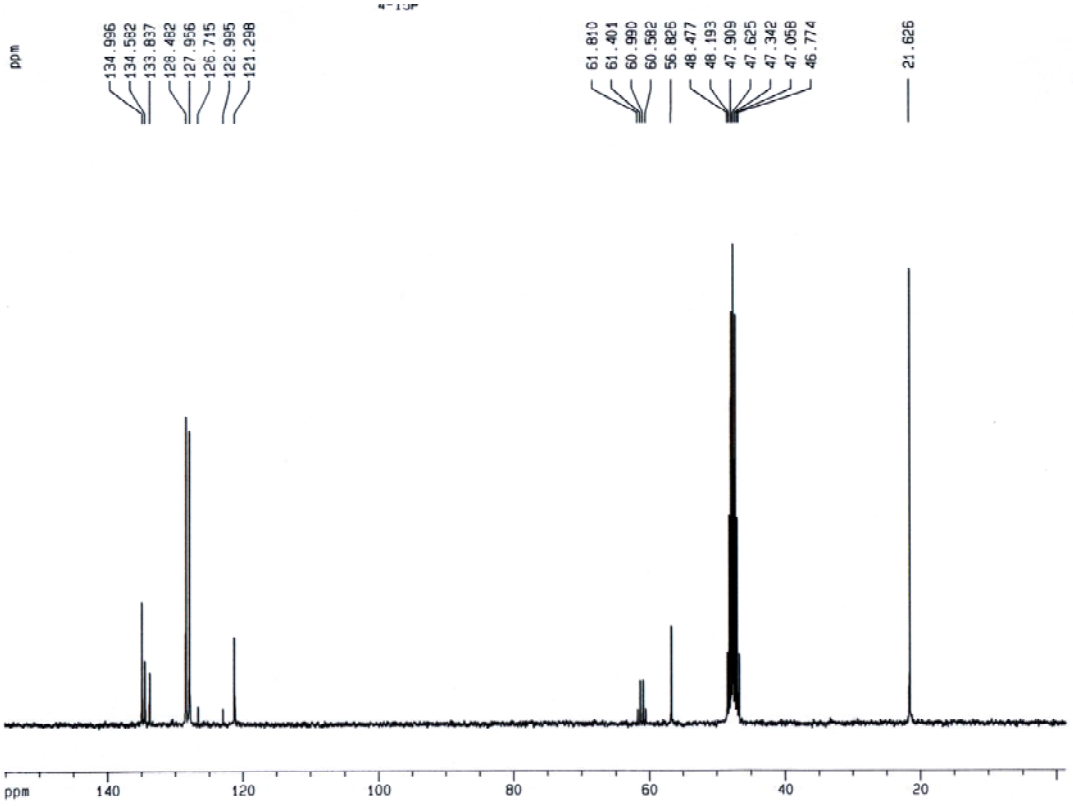
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127.956
126.715
122.995
121.298
61.810
61.401
60.990
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48.477
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47.342
47.058
46.774
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ppm
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80
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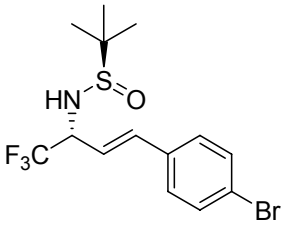
40
20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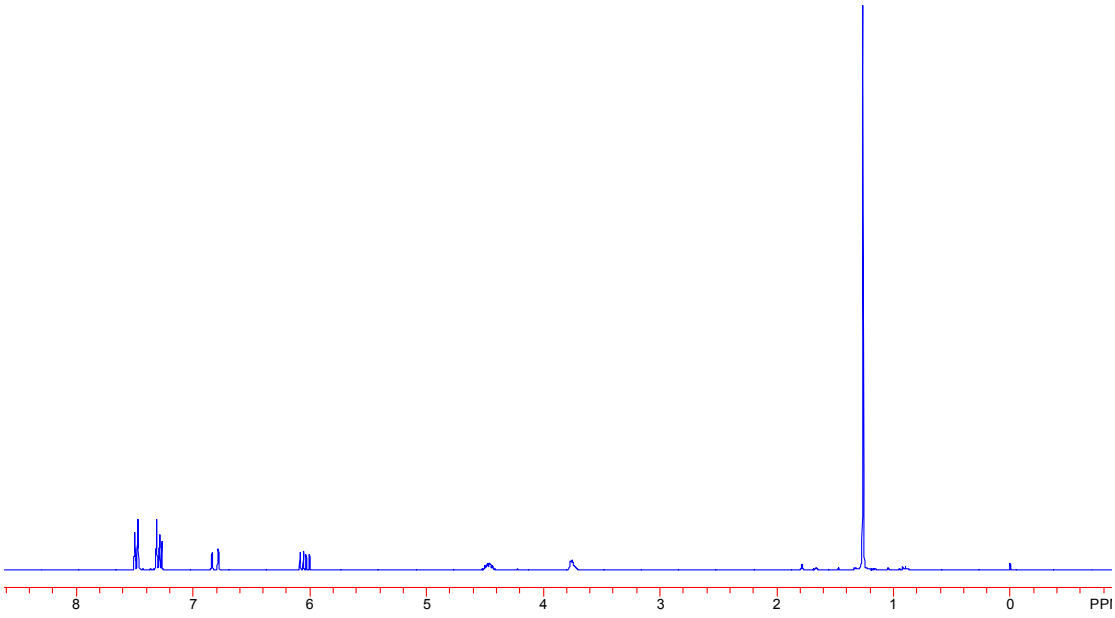
S
O
F3C
Br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4
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2
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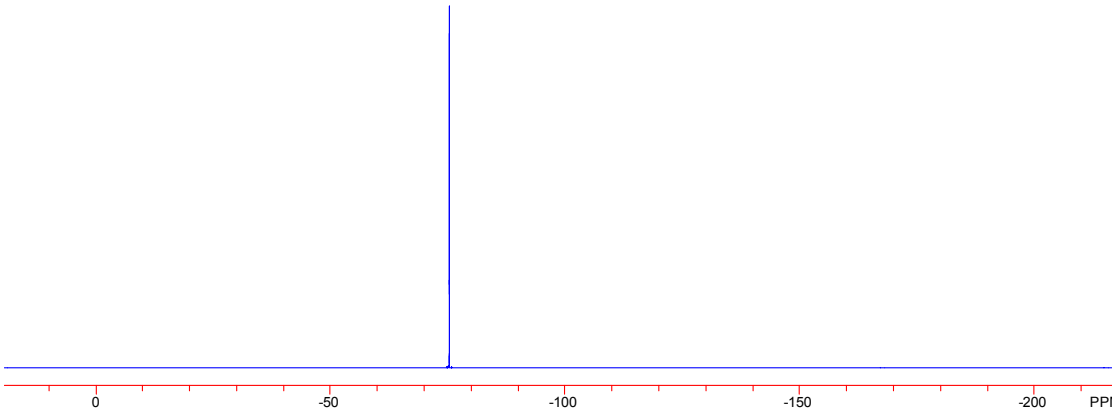
PPI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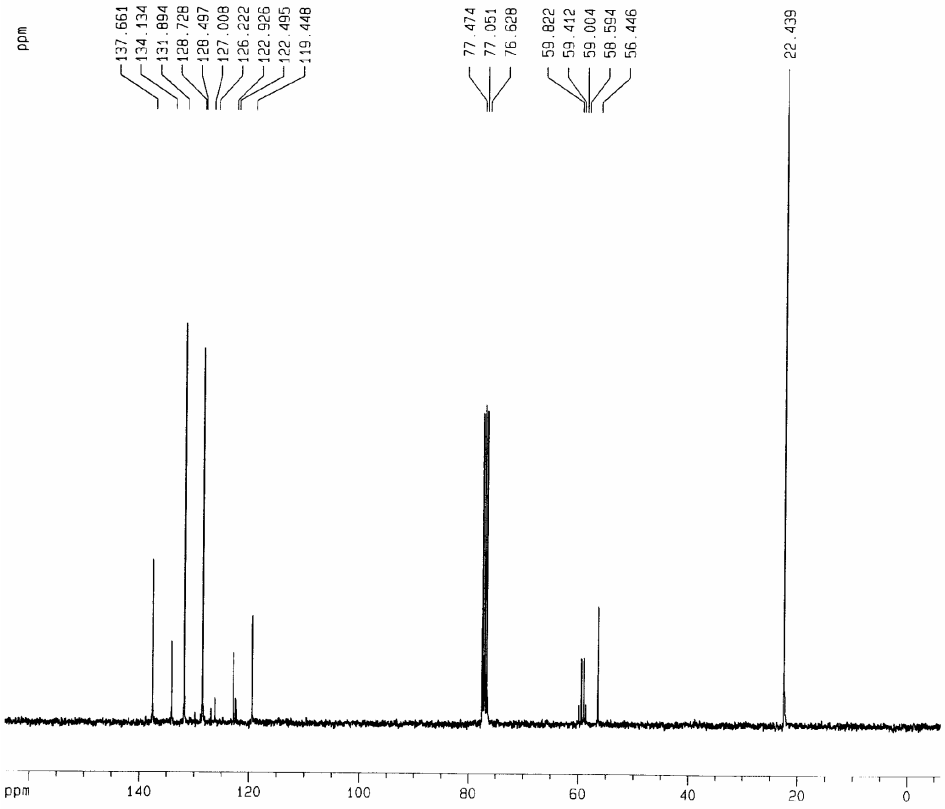
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122.495
119.448
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76.628
59.822
59.412
59.004
58.594
56.446
22.439
ppm
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120
100
80
60
40
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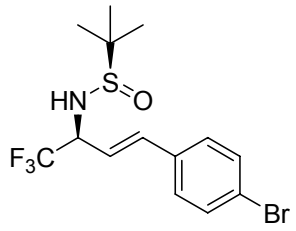
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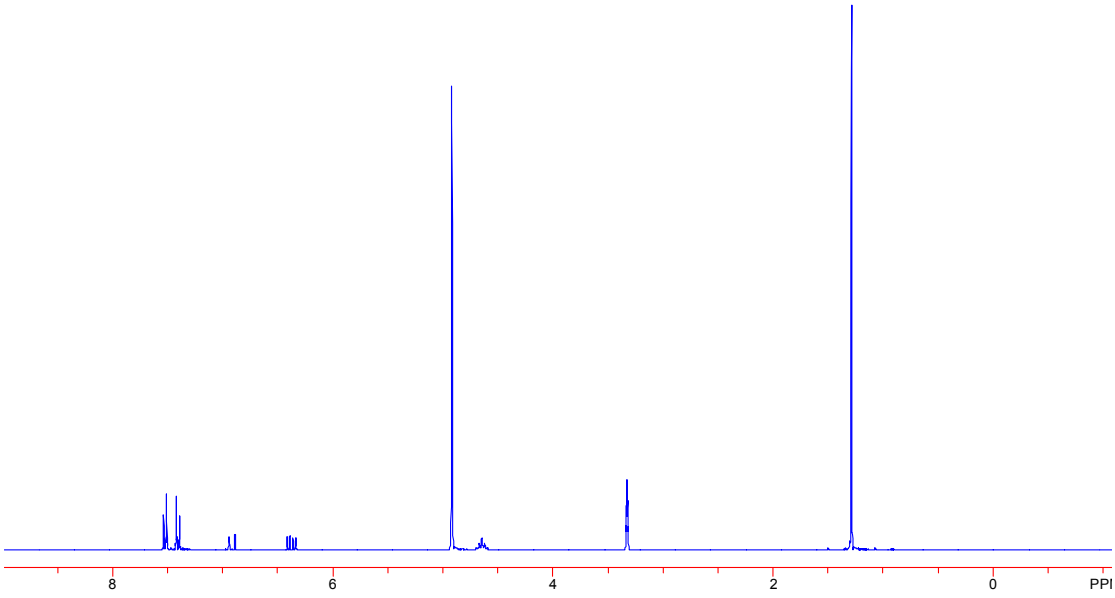
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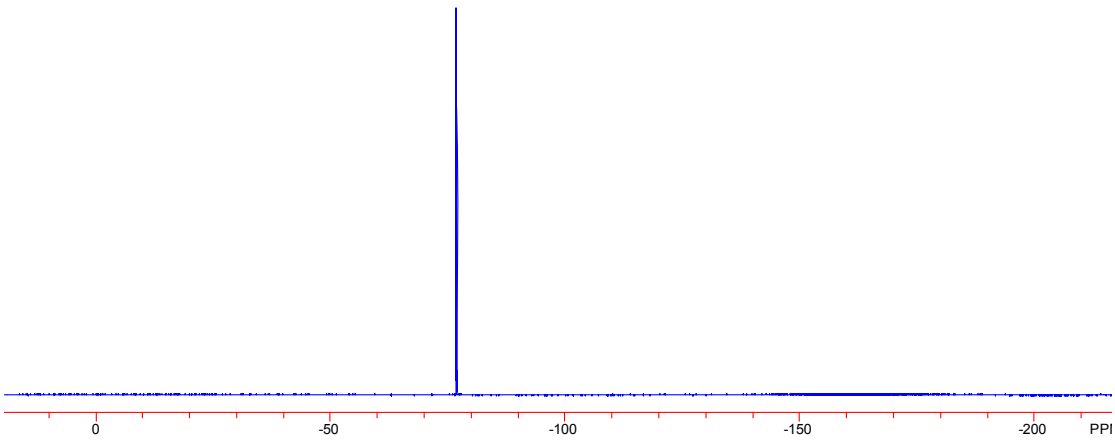
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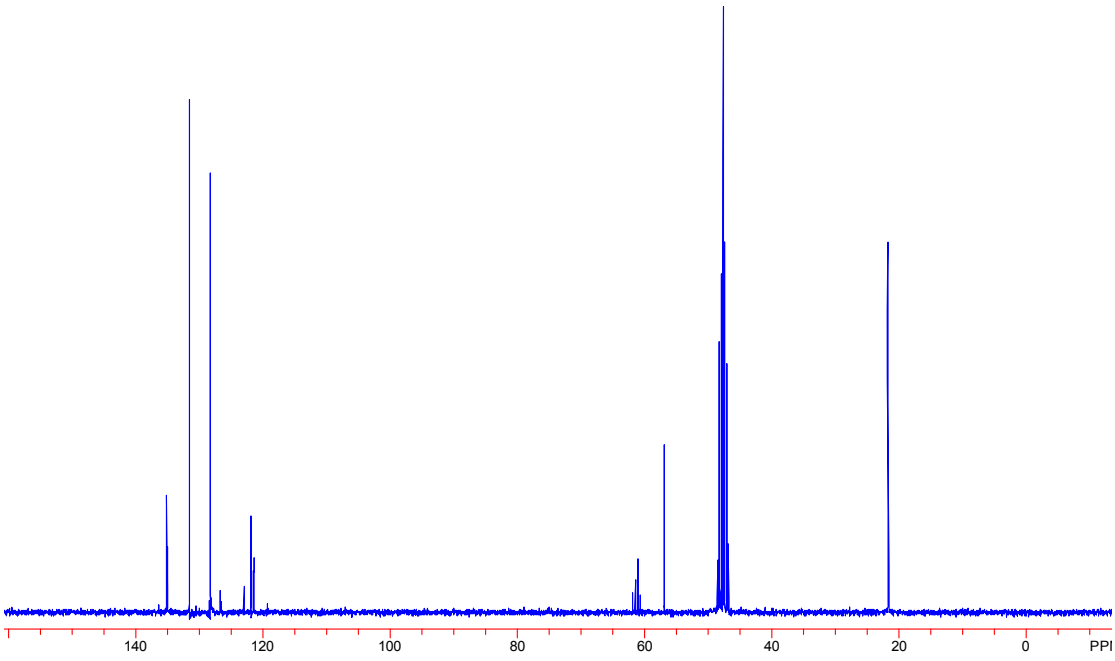
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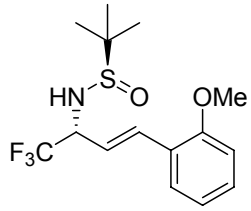
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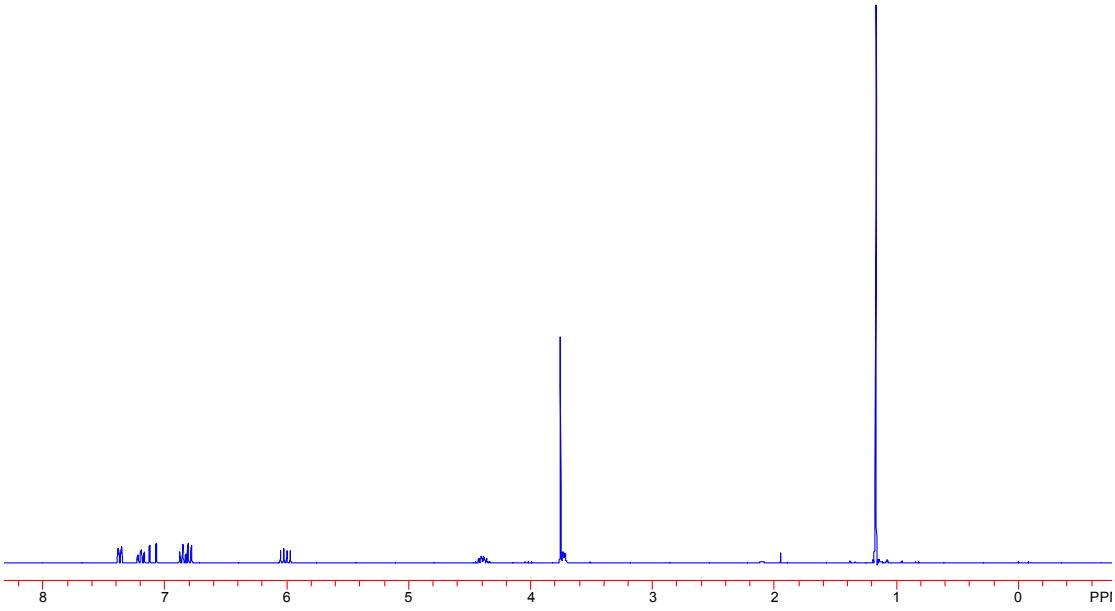
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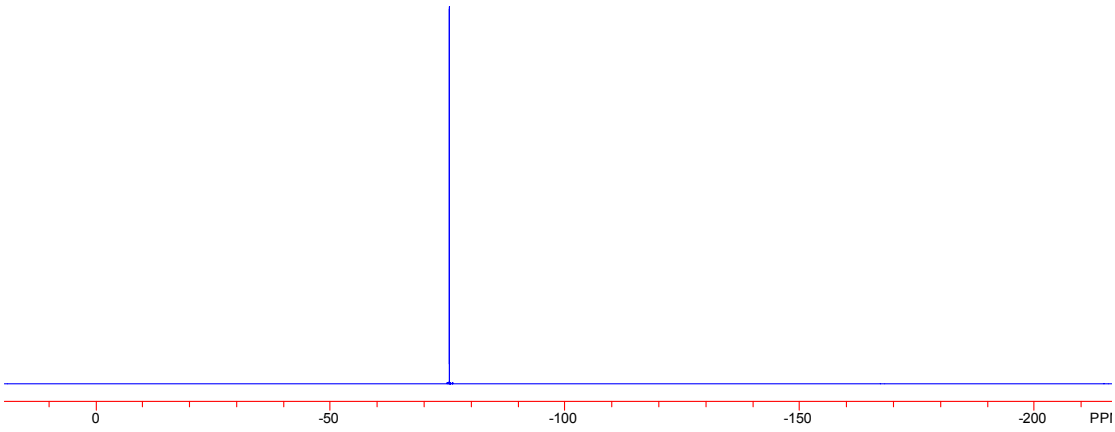
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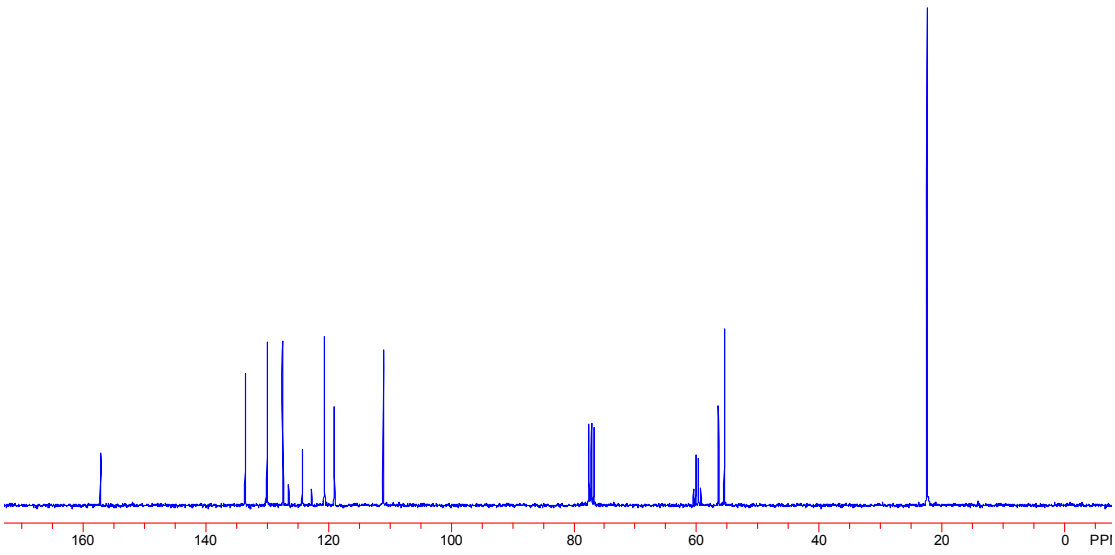
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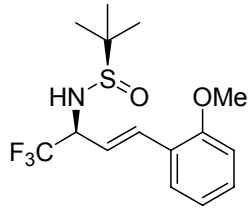
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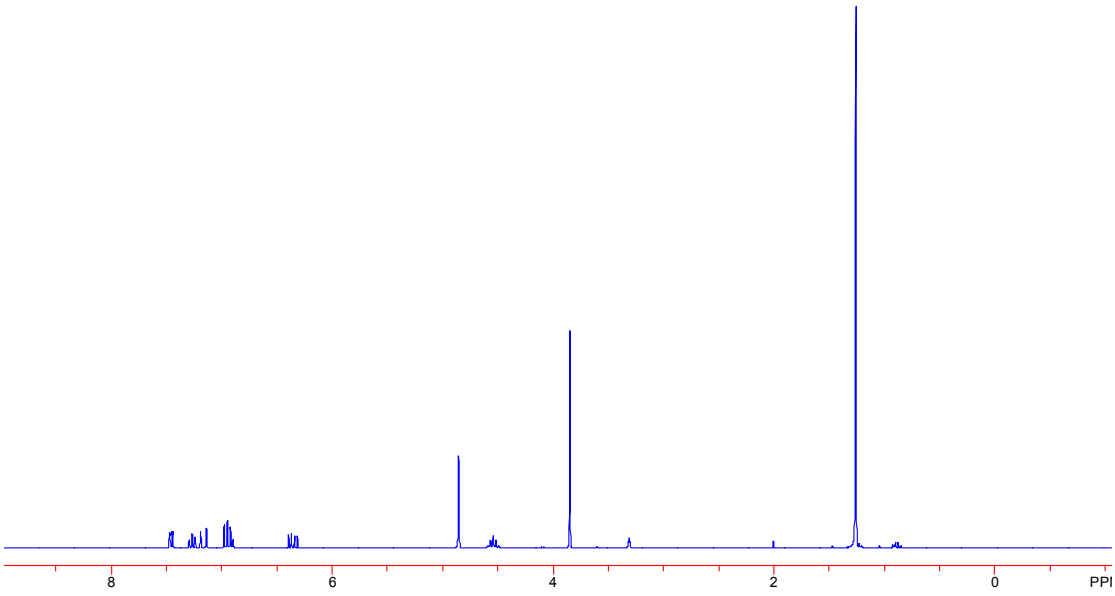
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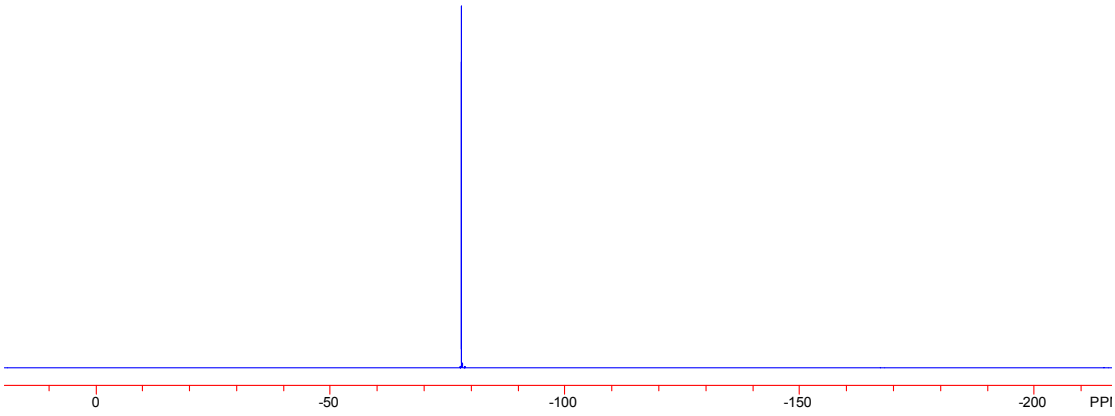
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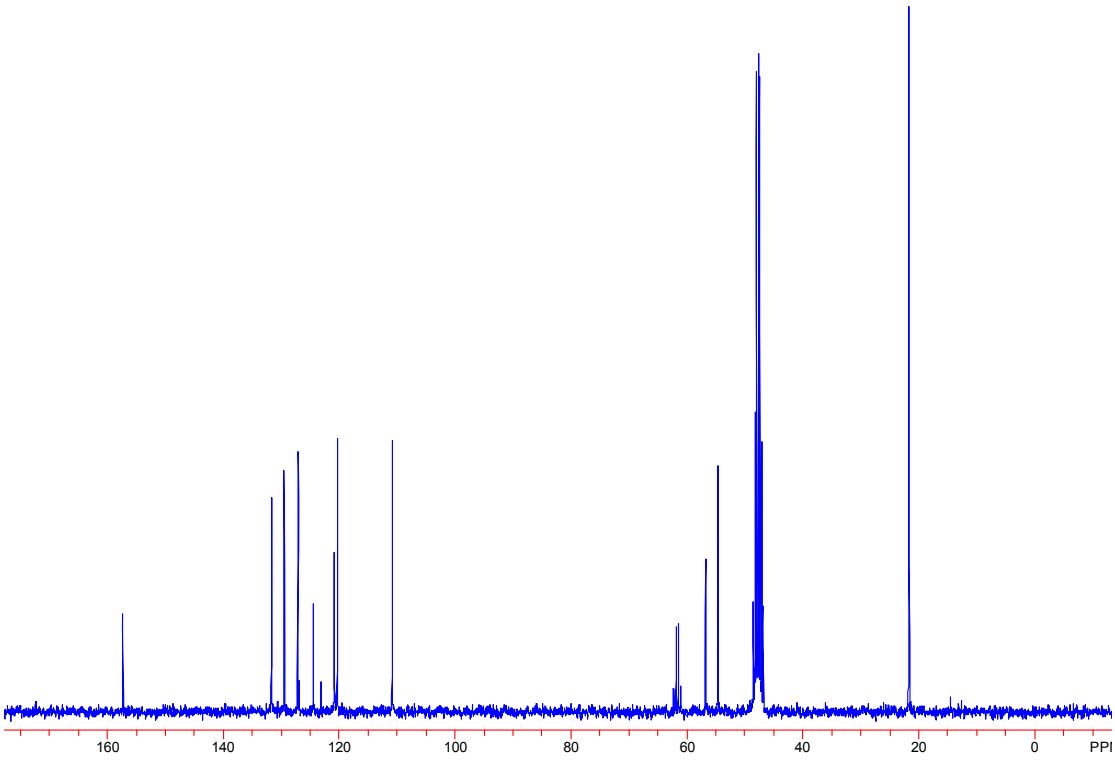
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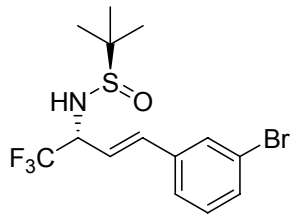
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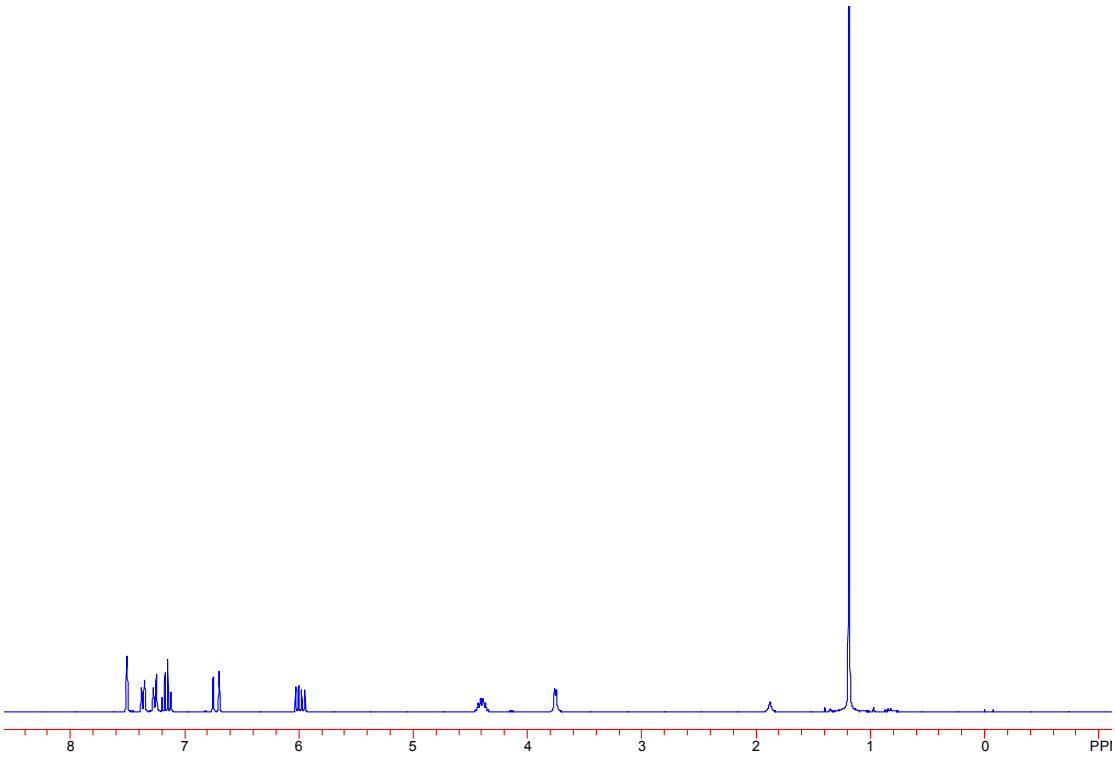
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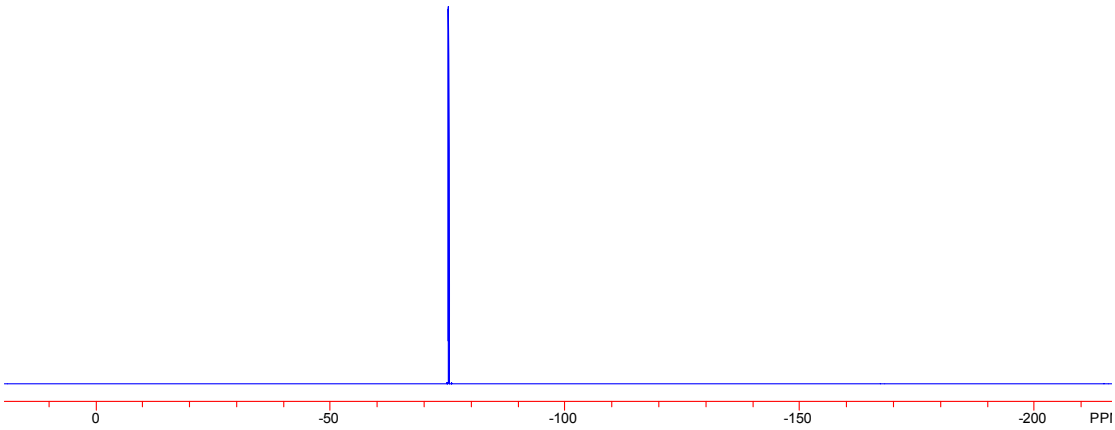
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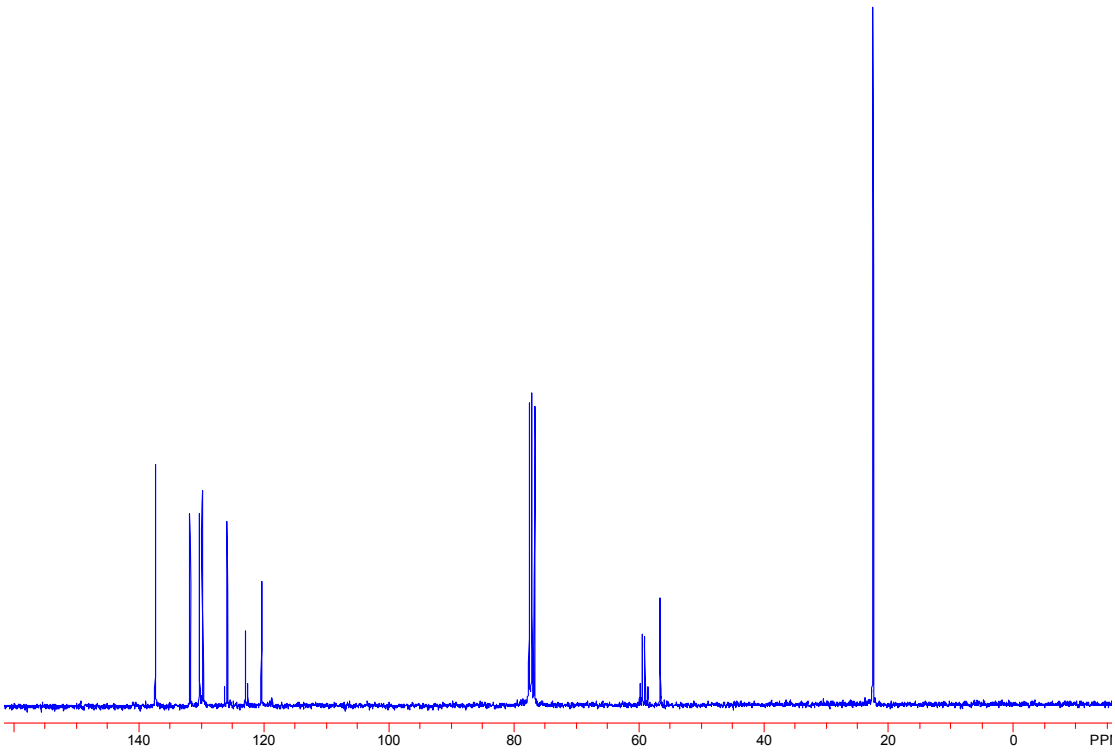
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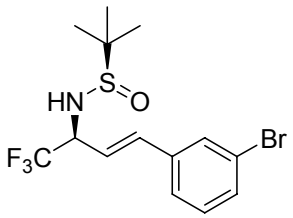
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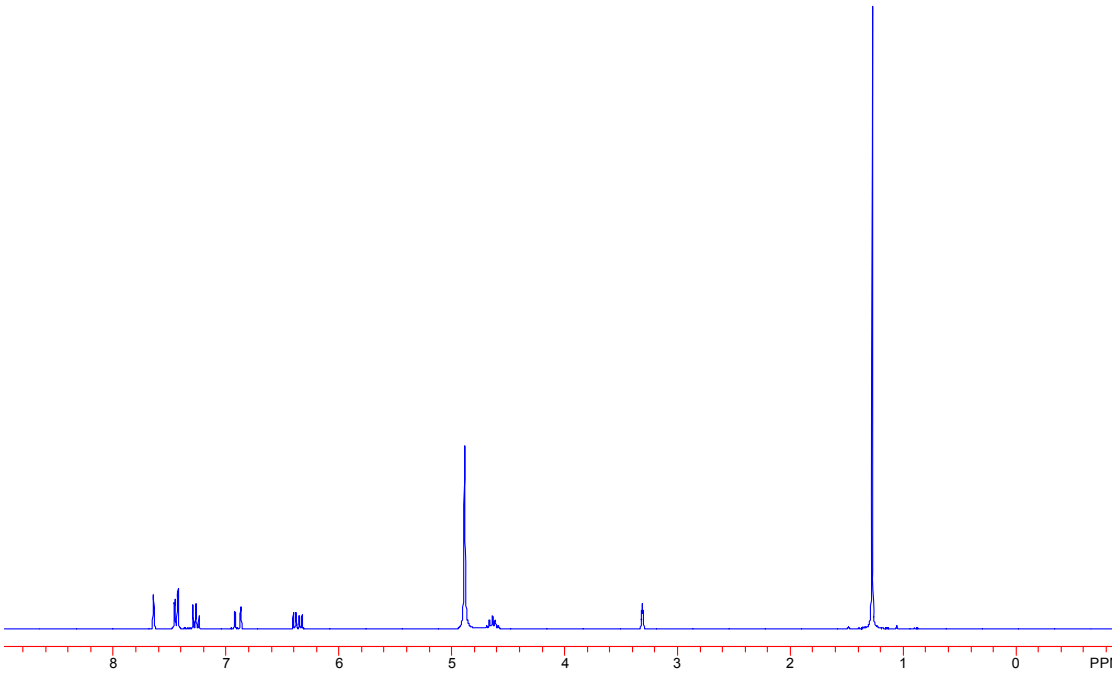
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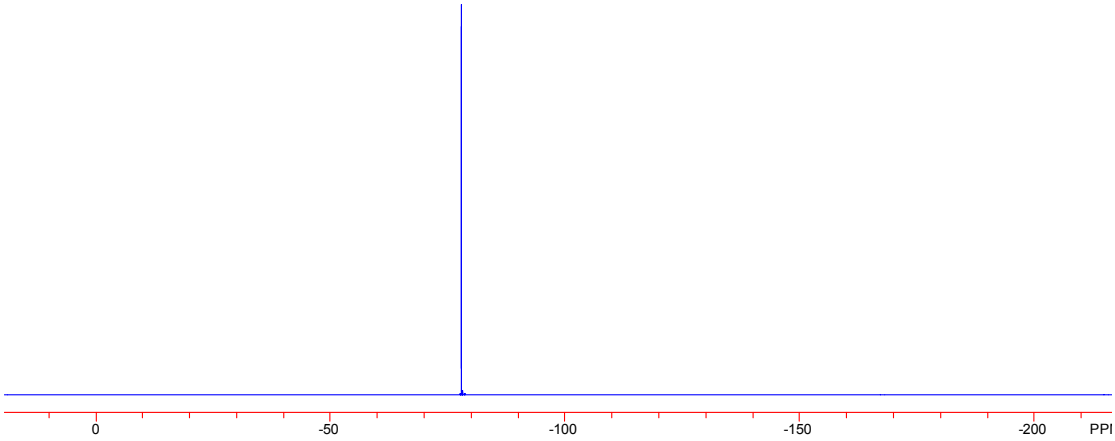
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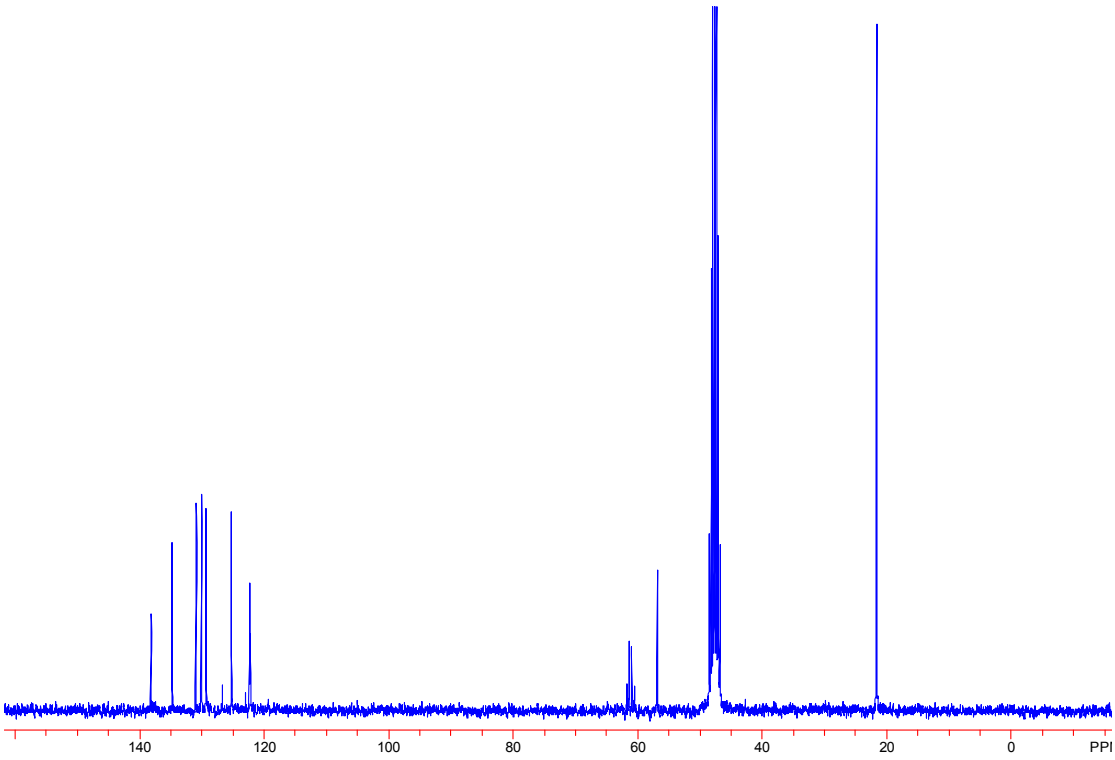
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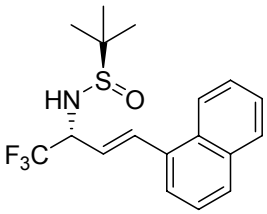
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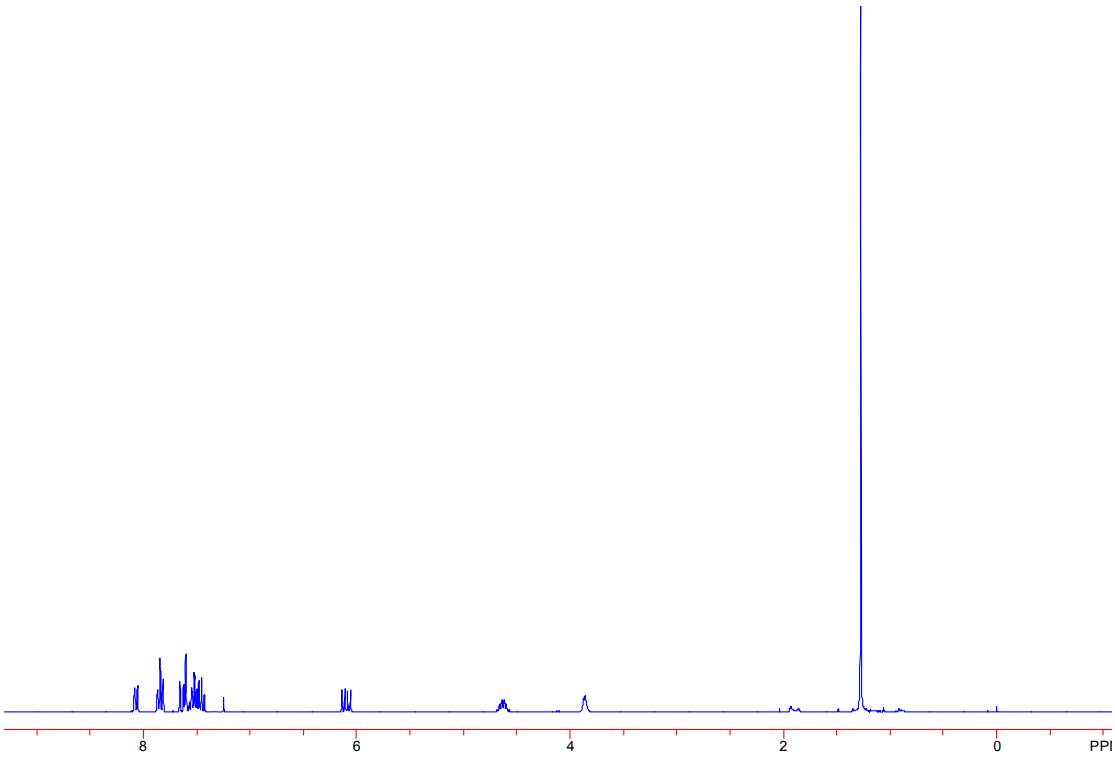
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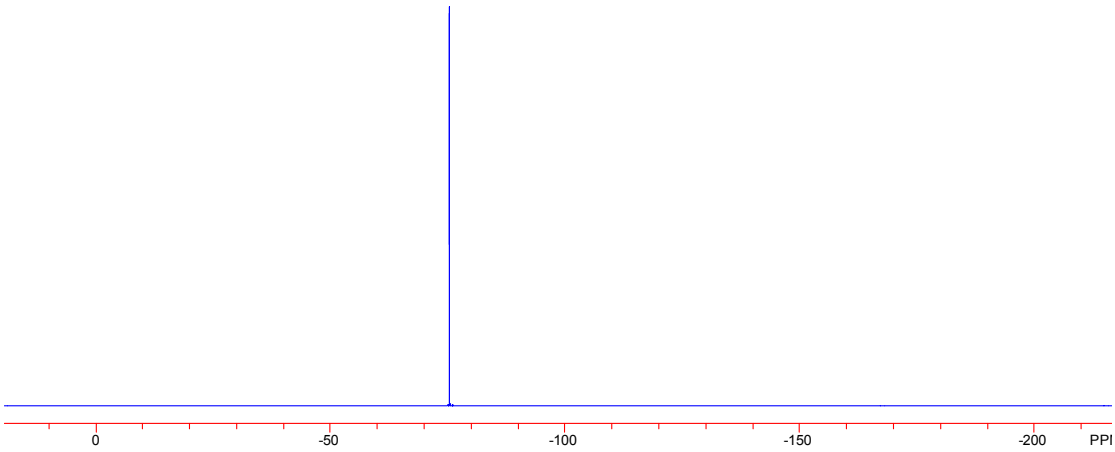
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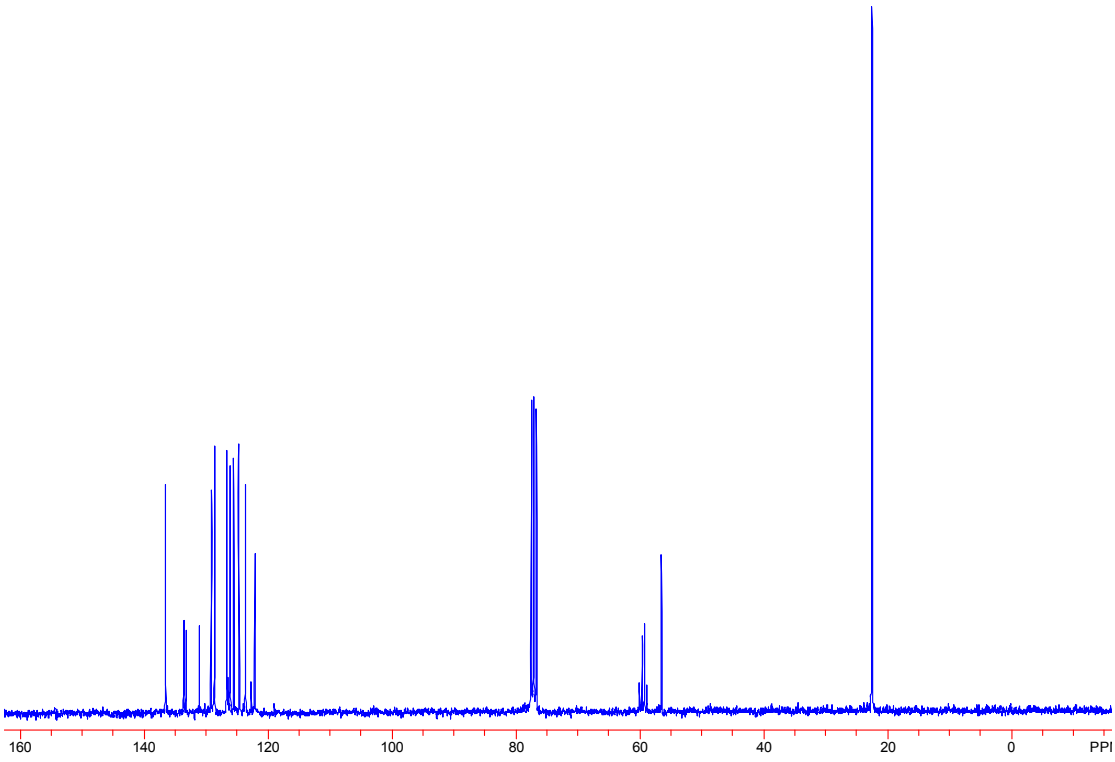
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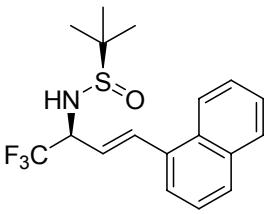
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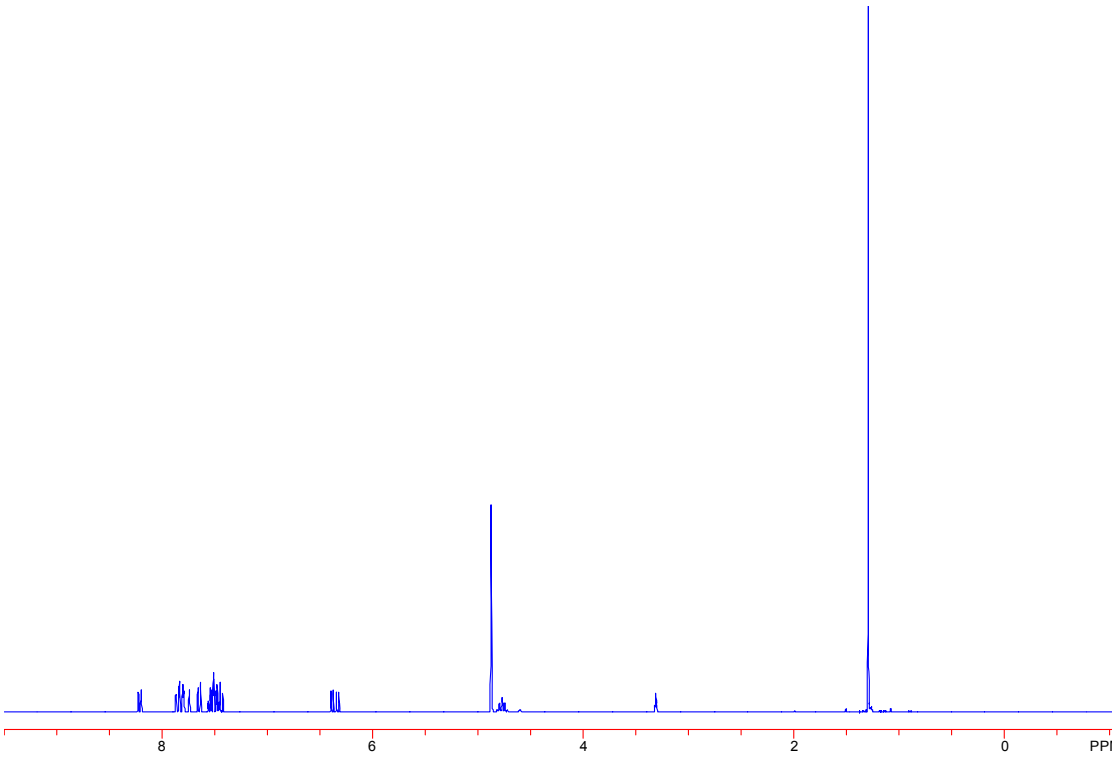
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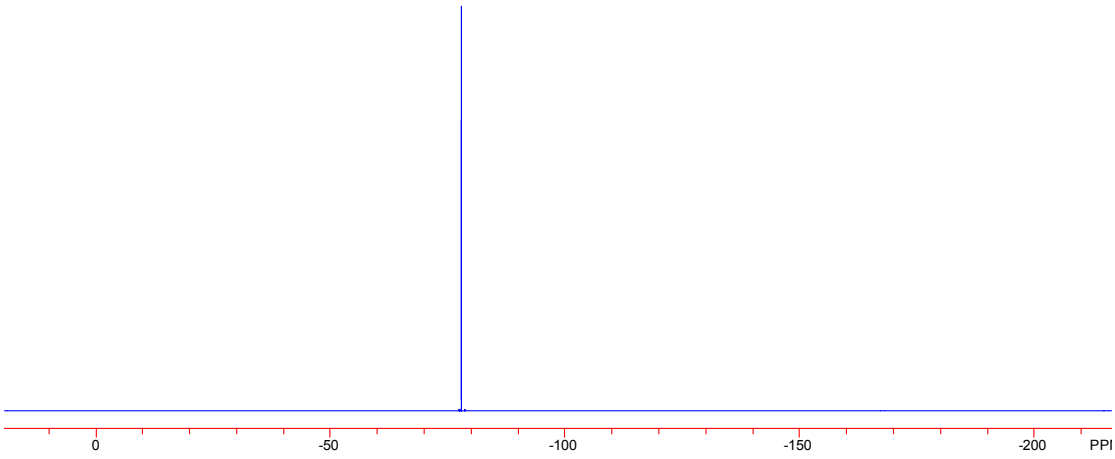
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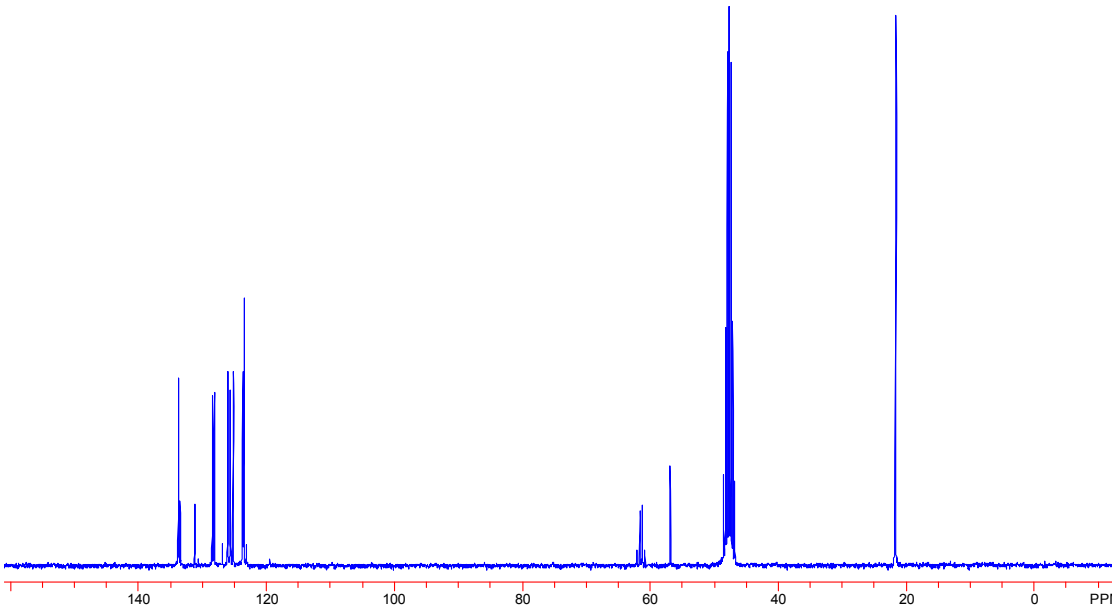
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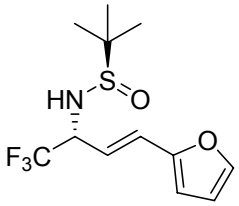
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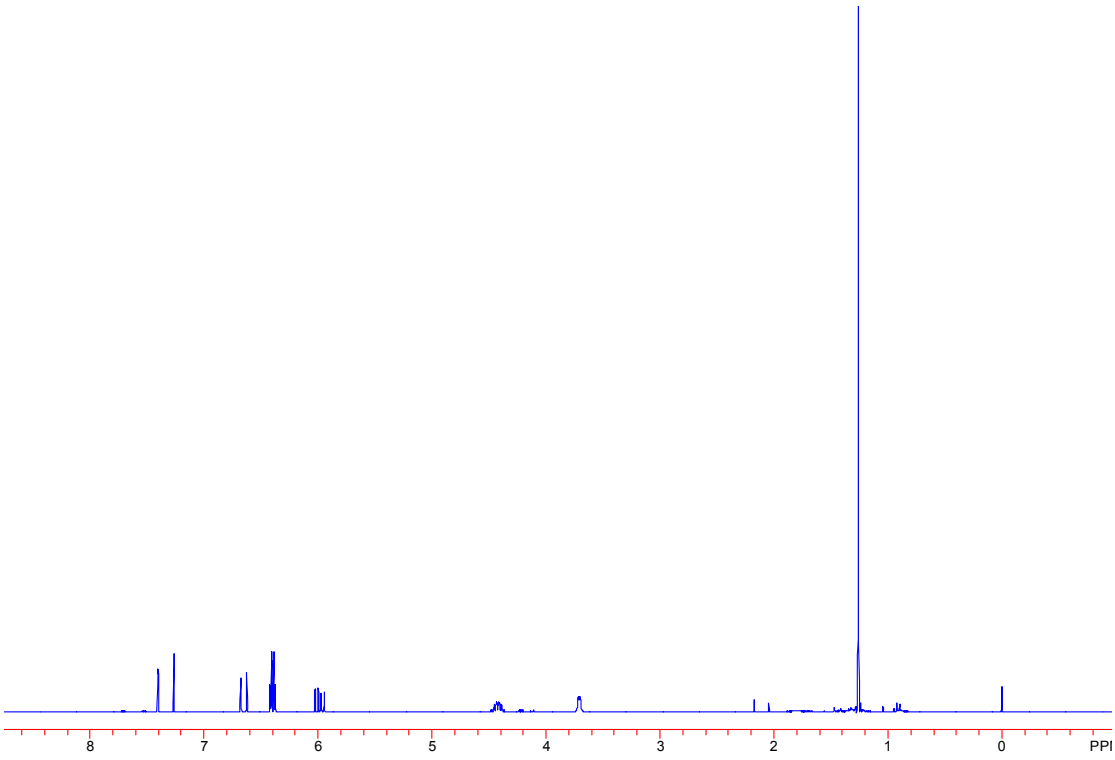
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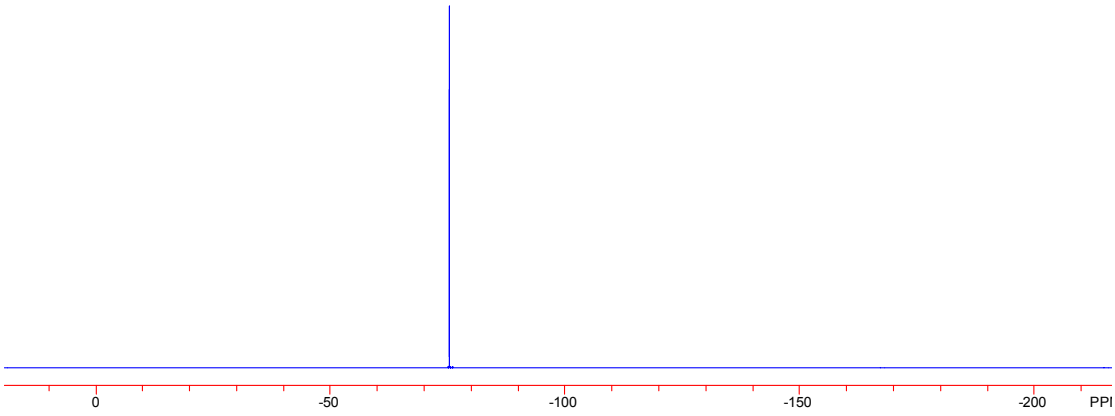
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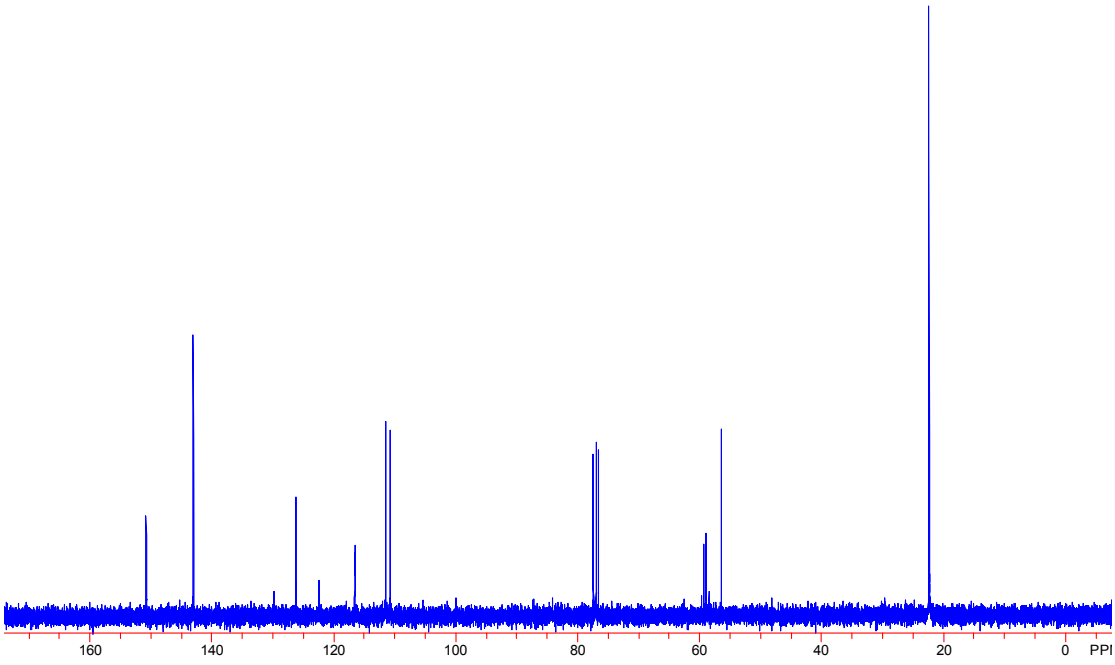
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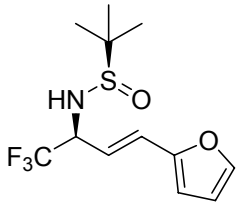
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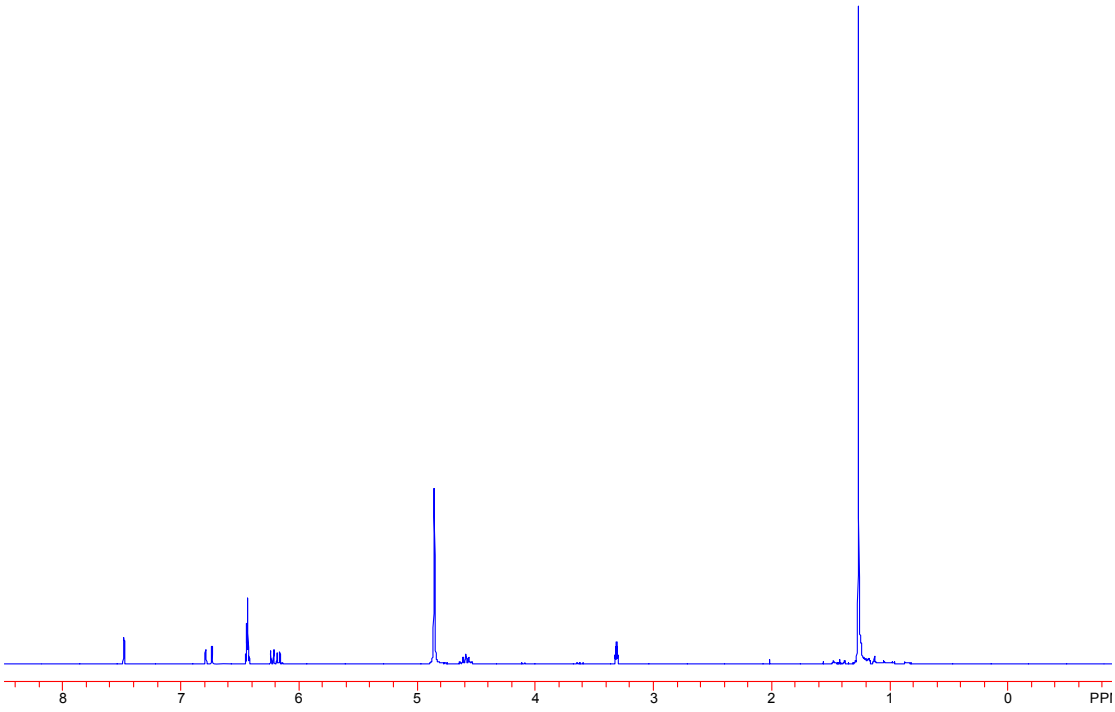
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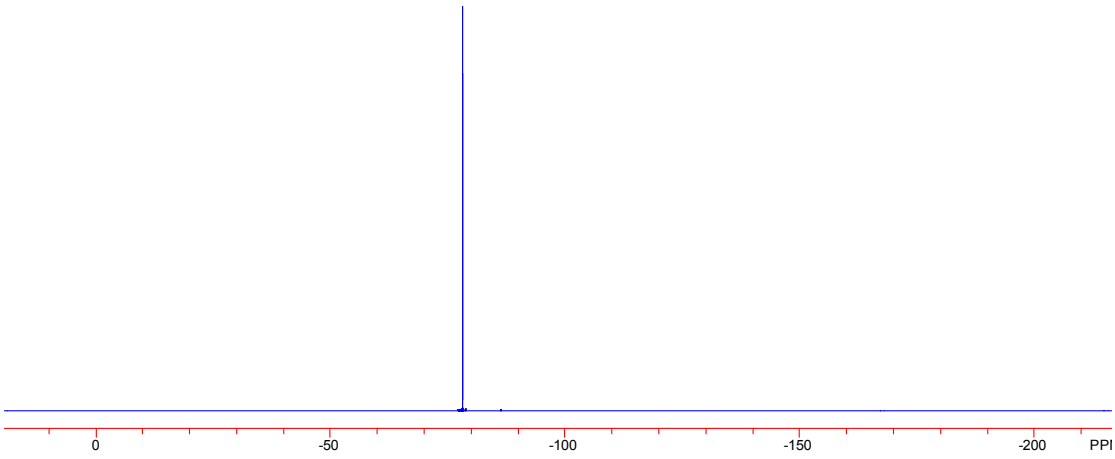
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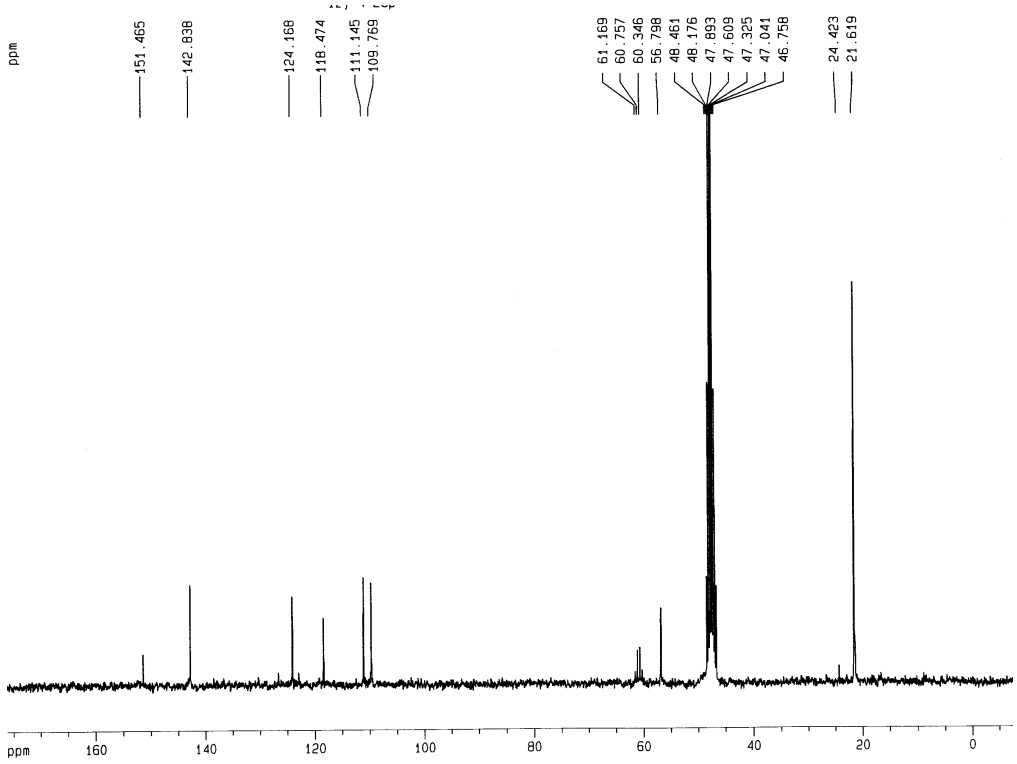
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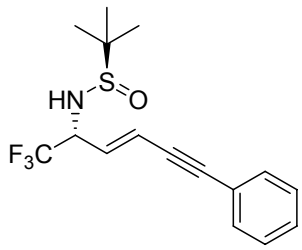
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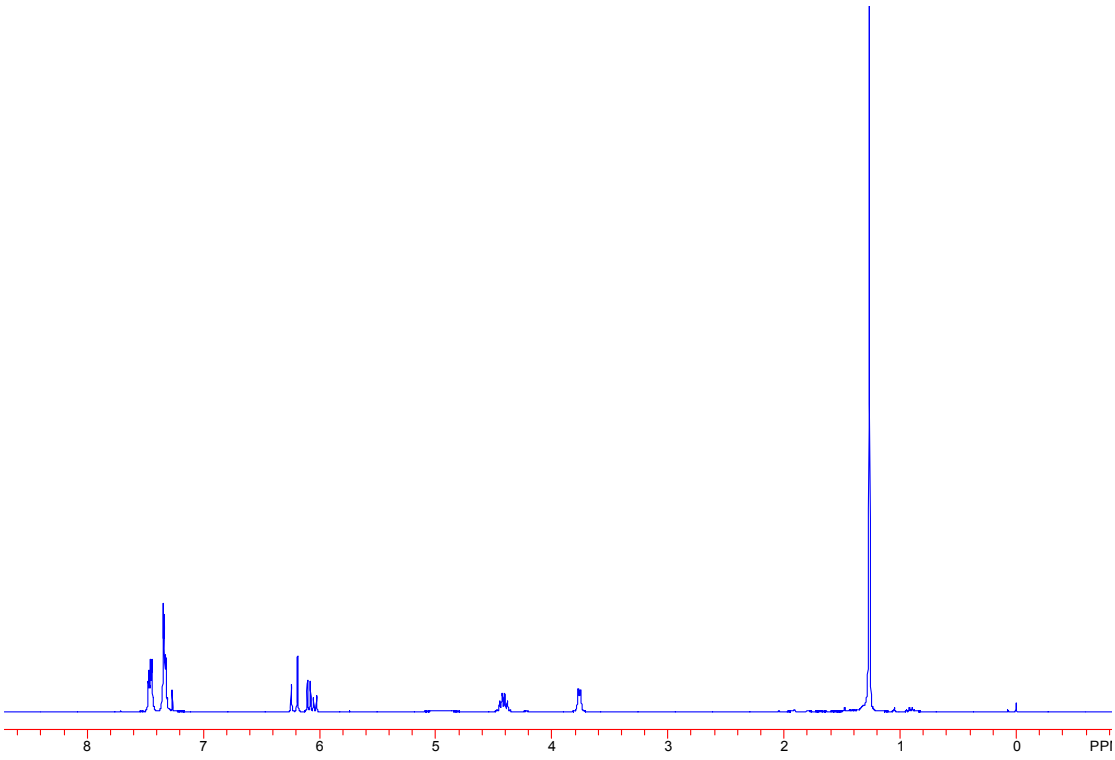
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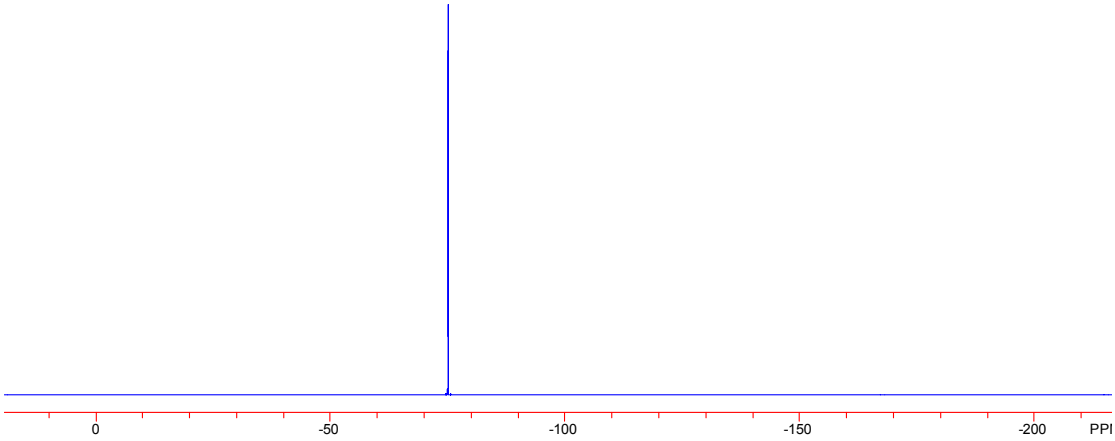
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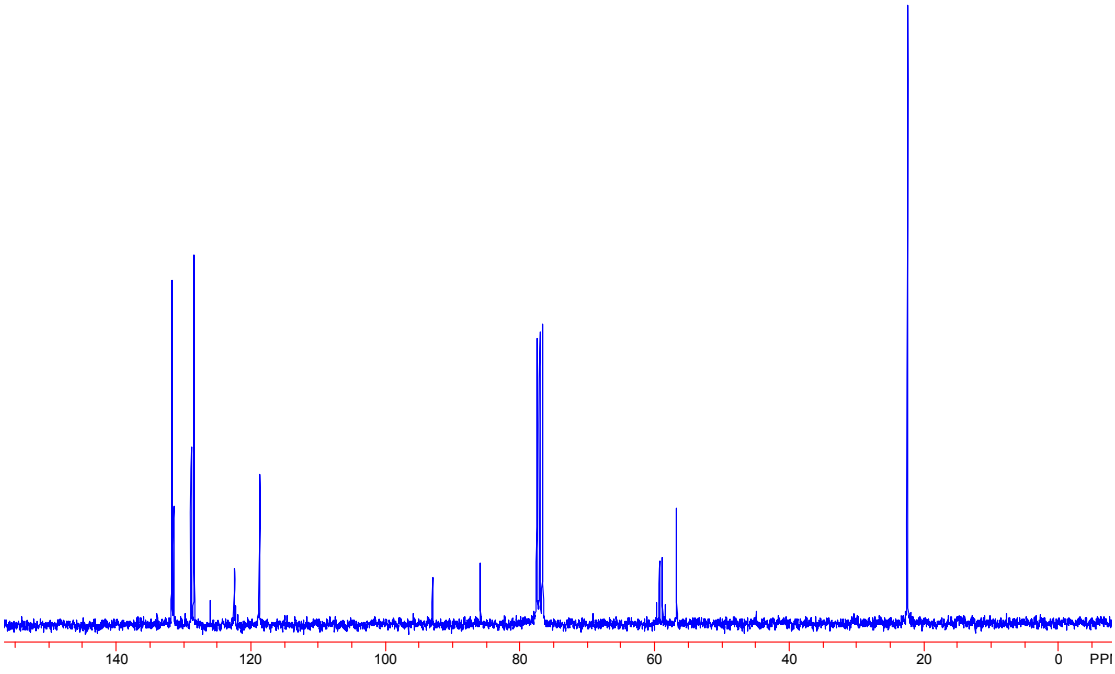
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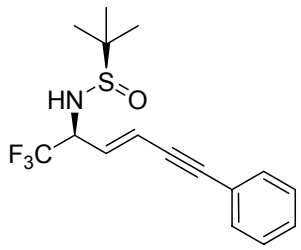
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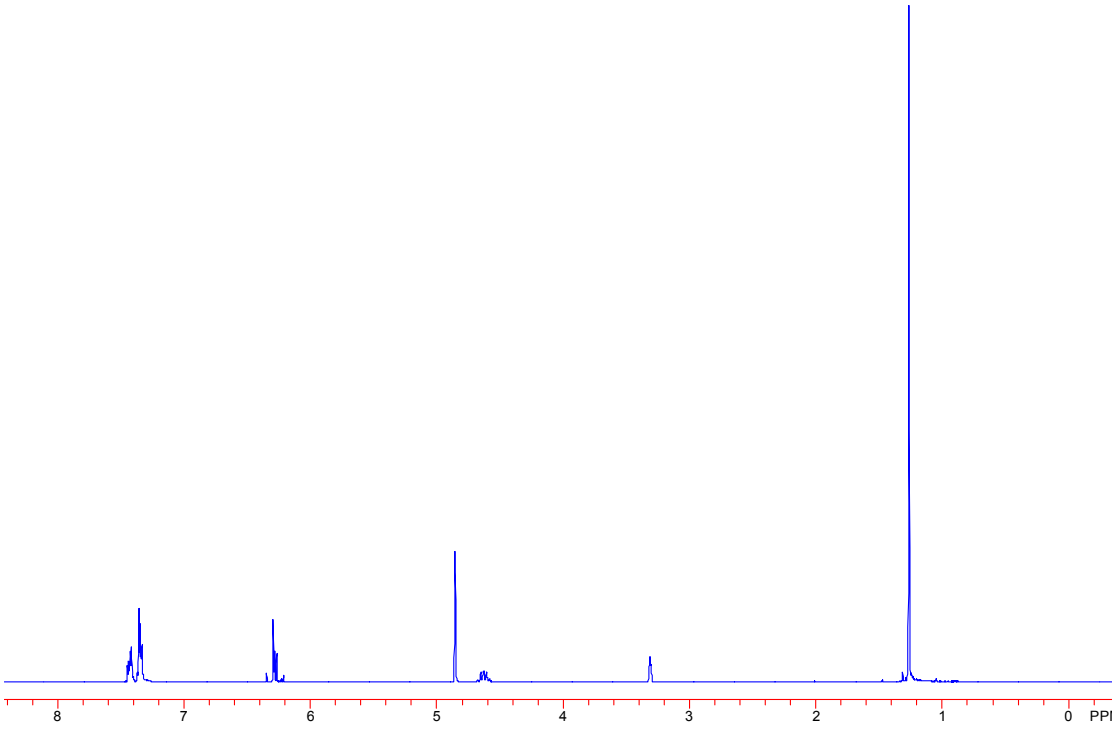
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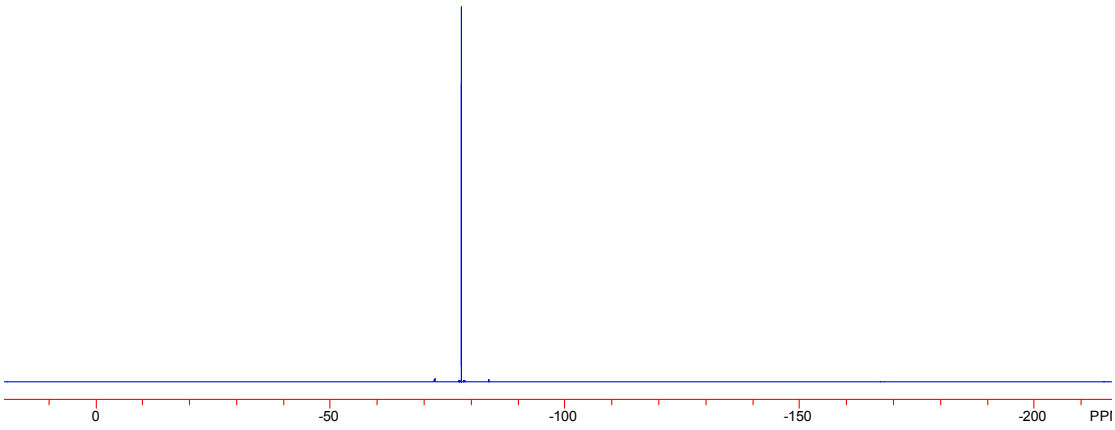
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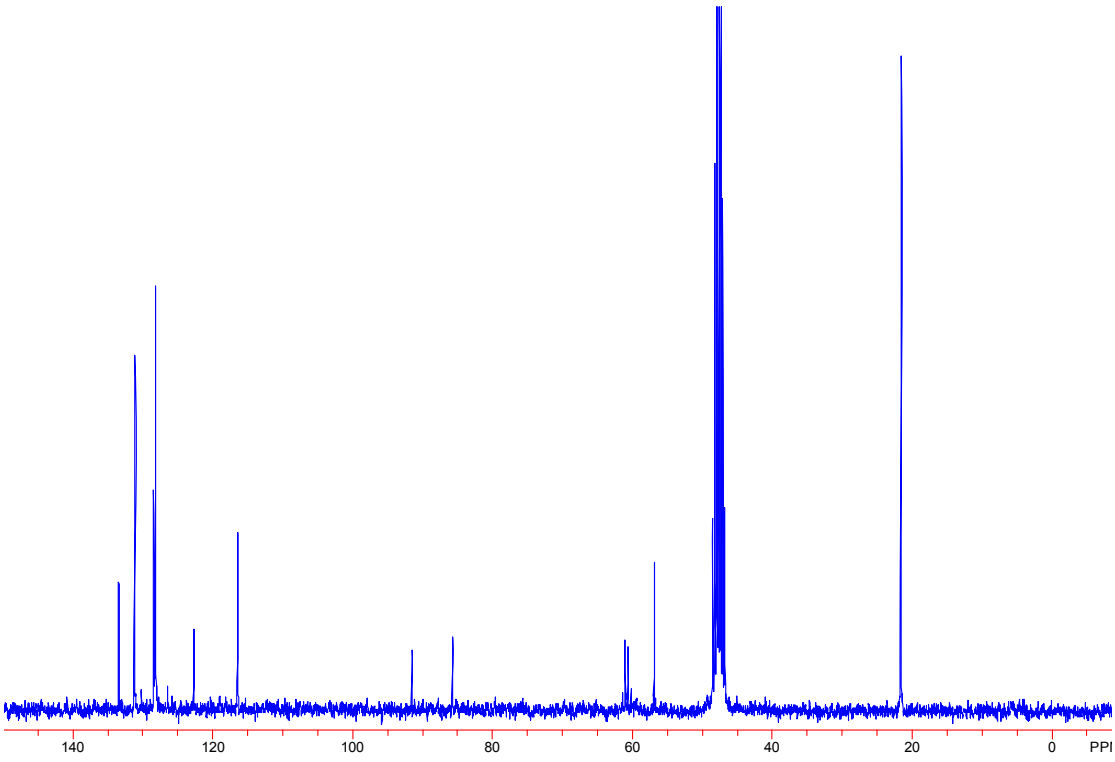
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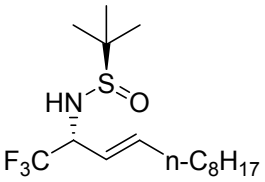
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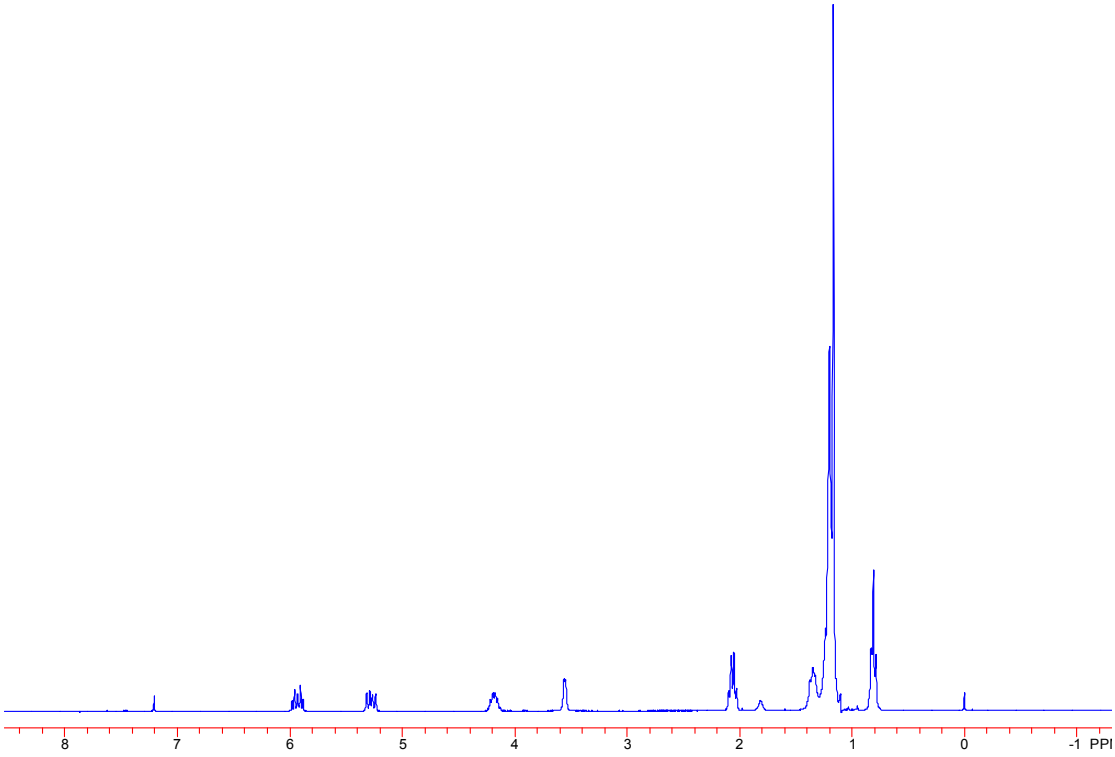
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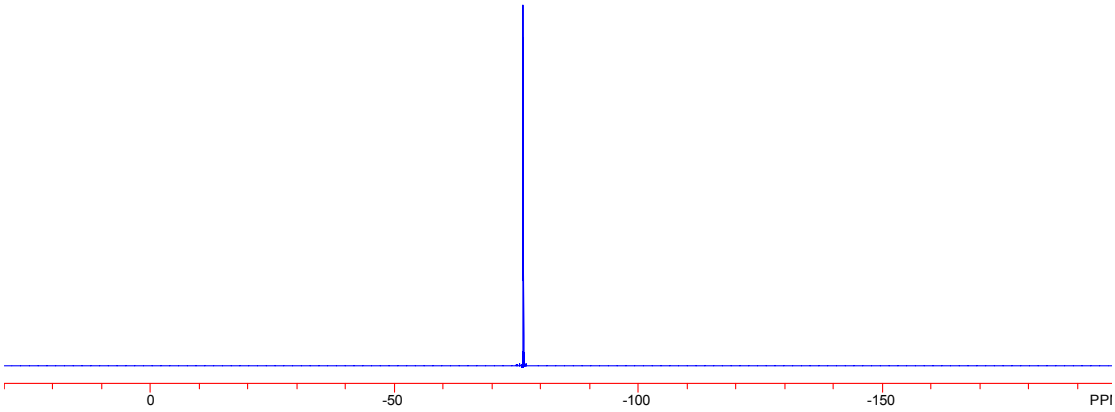
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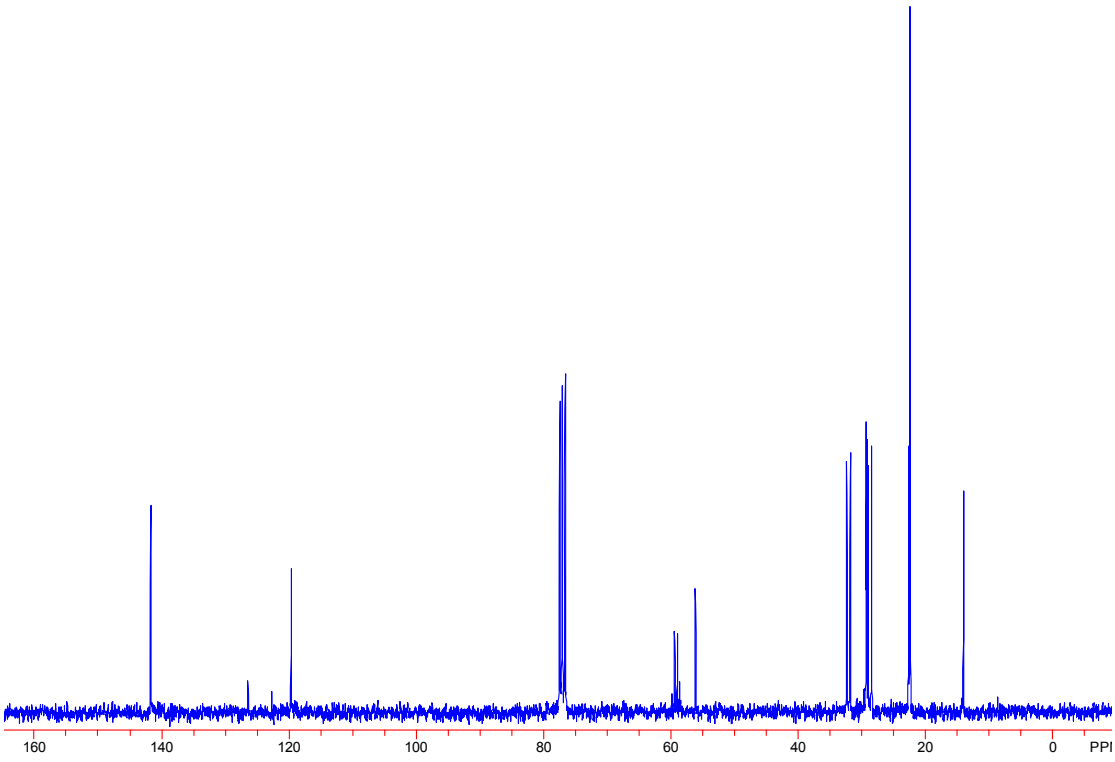
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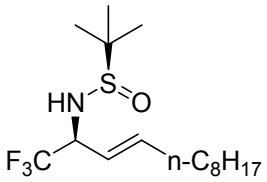
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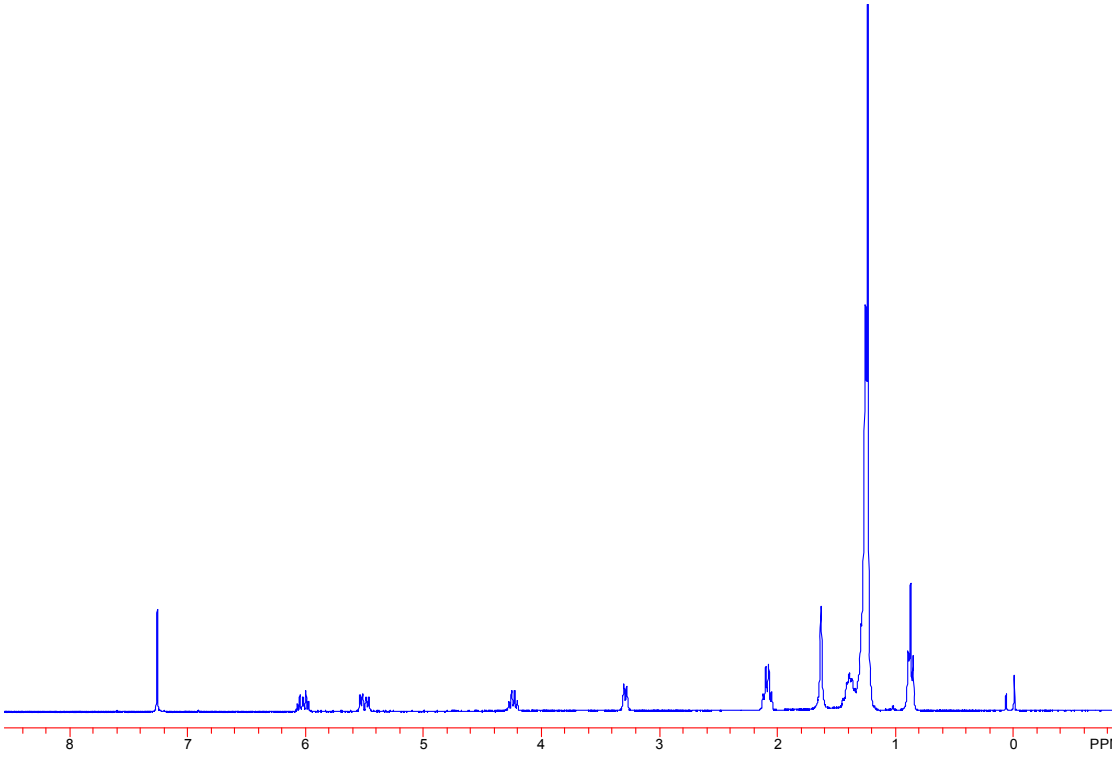
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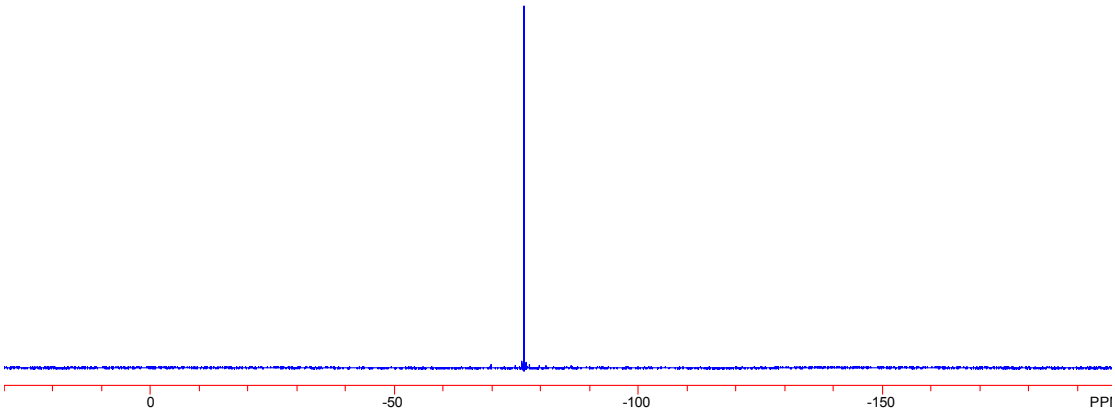
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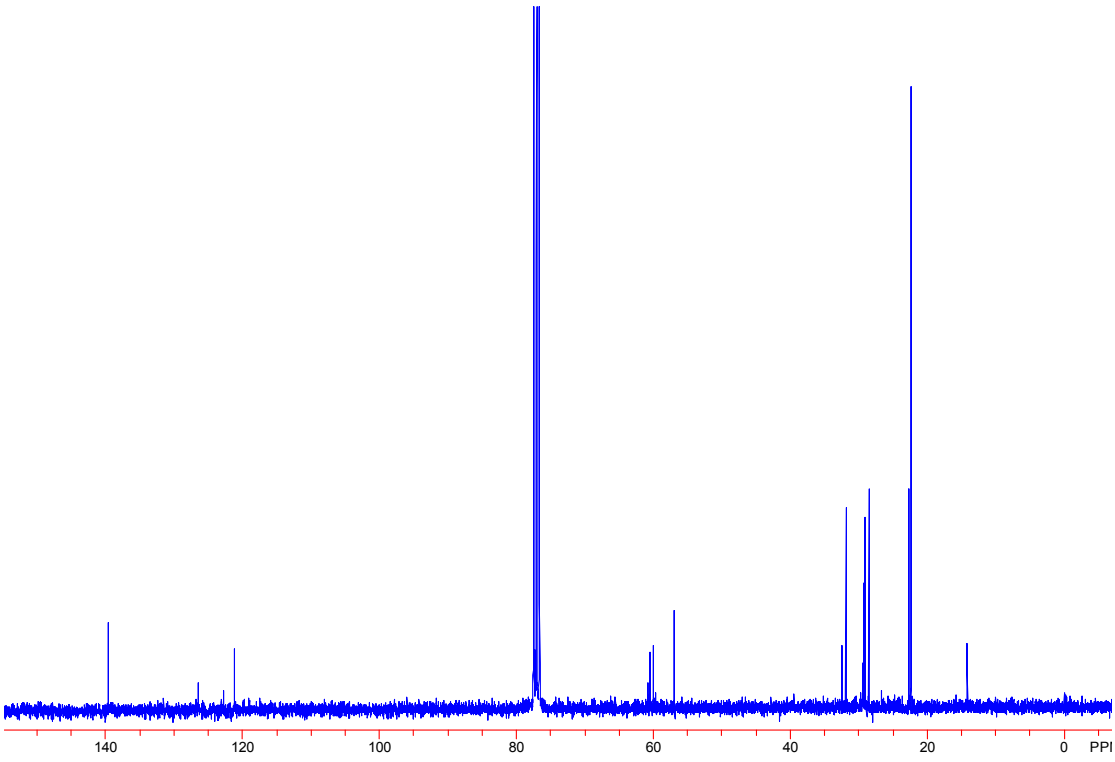
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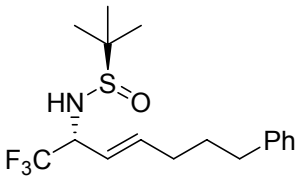
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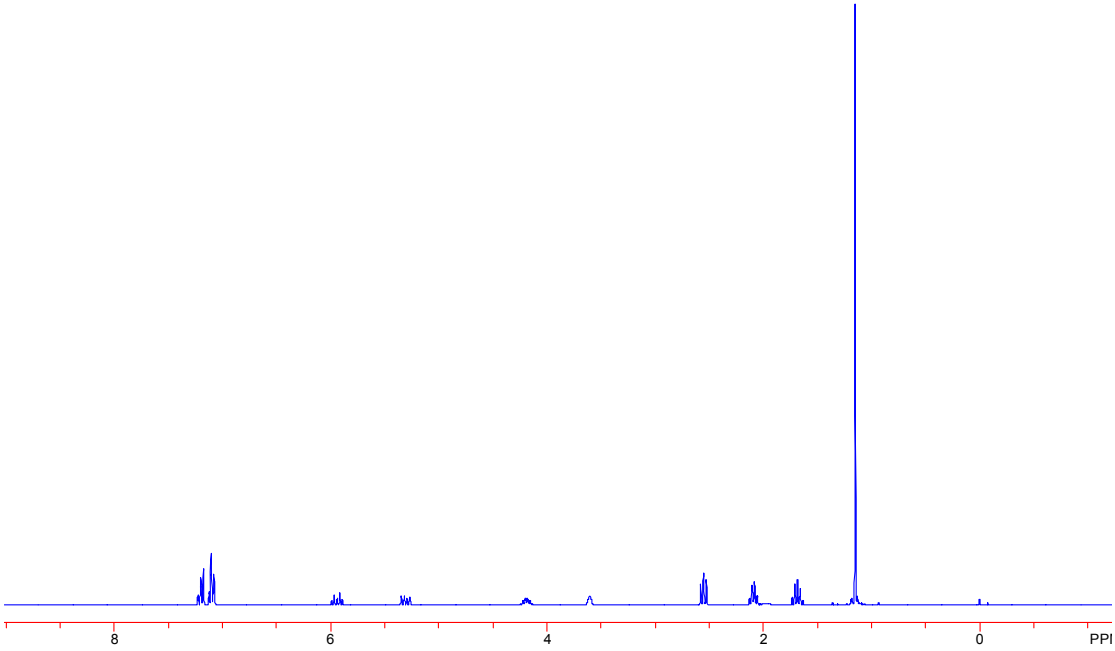
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6
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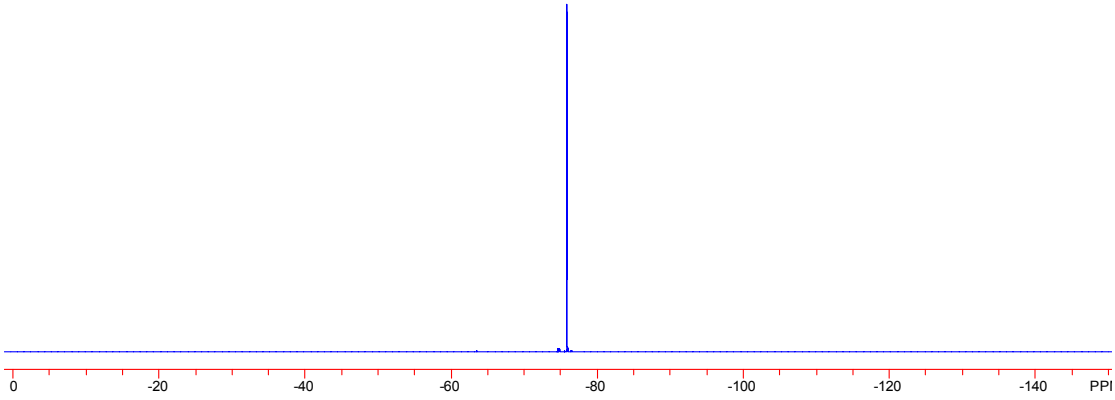
PPI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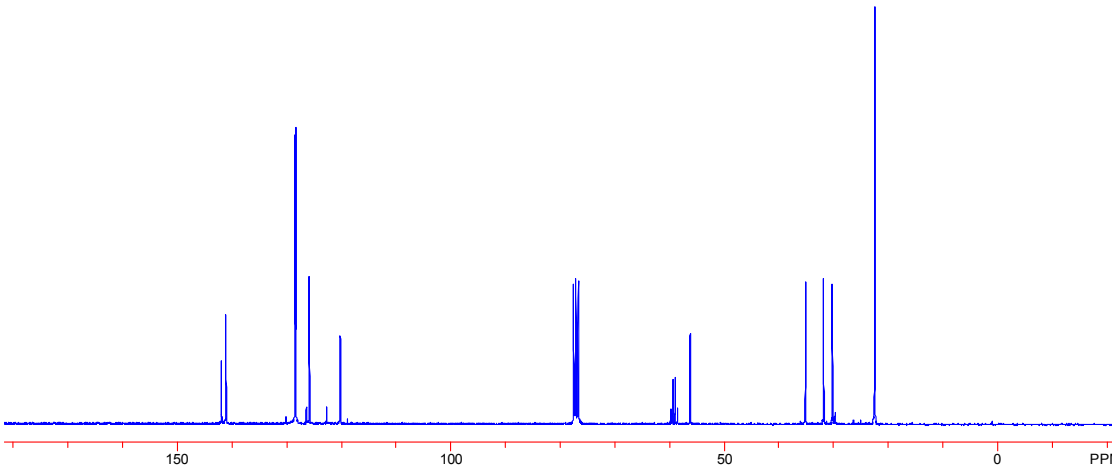
PPI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100
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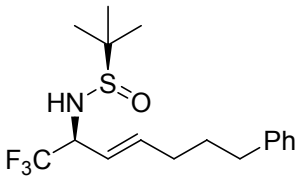
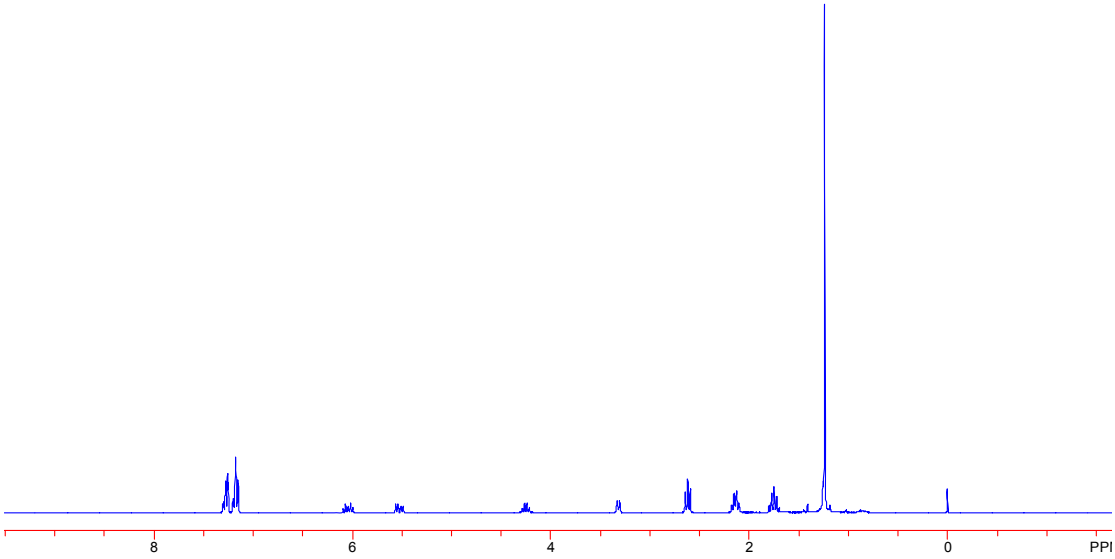
PPI


HN
S
O
F3C
Ph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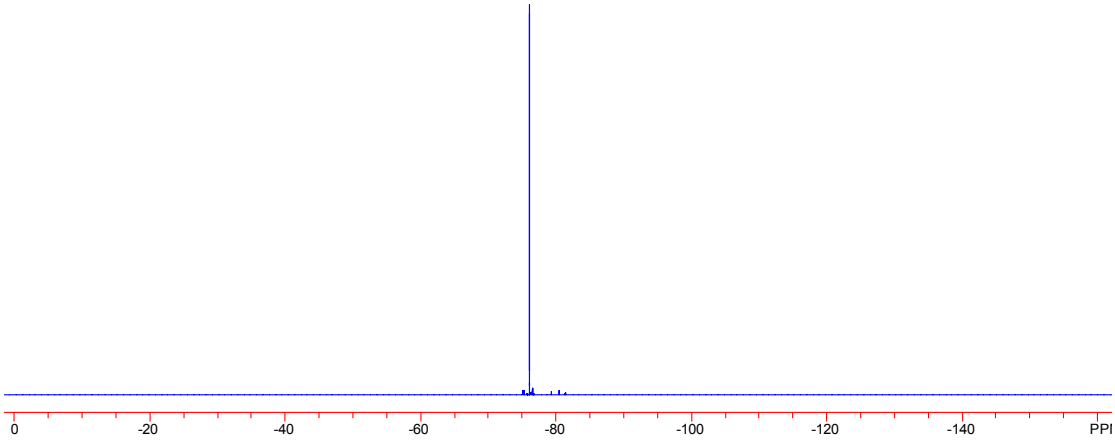
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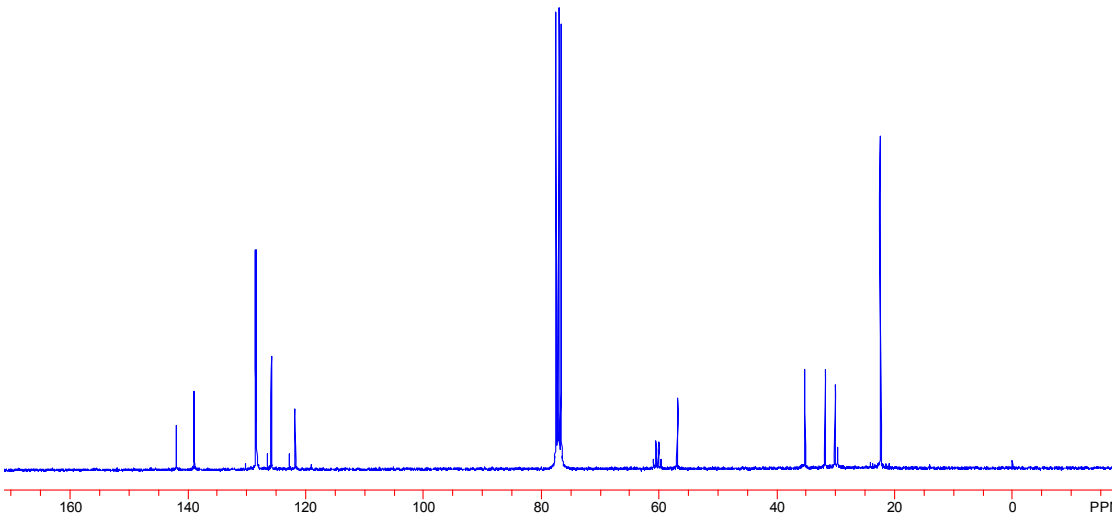
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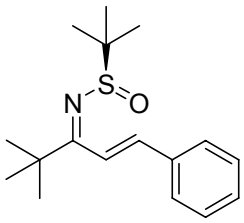
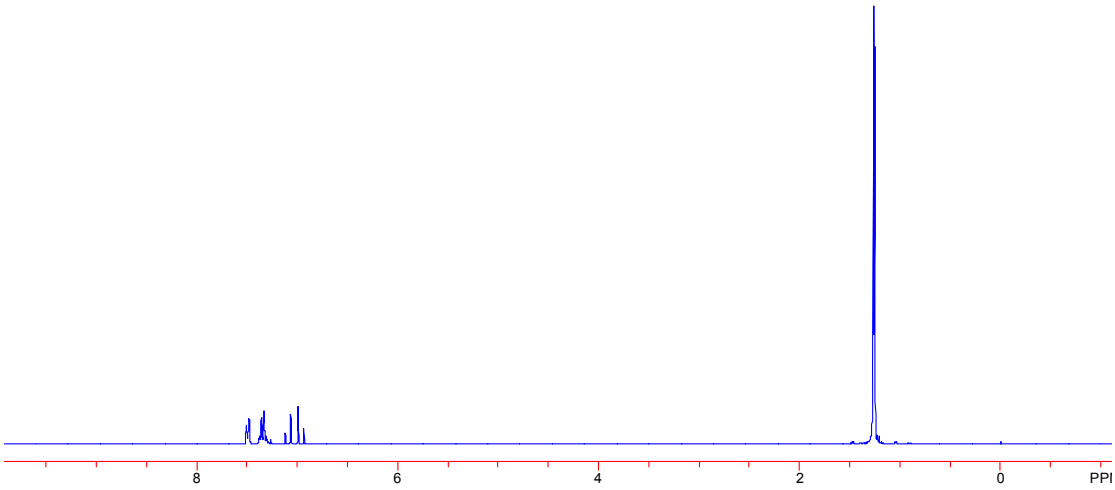
140
120
100
80
60
40
20
0
PPI


N
S
O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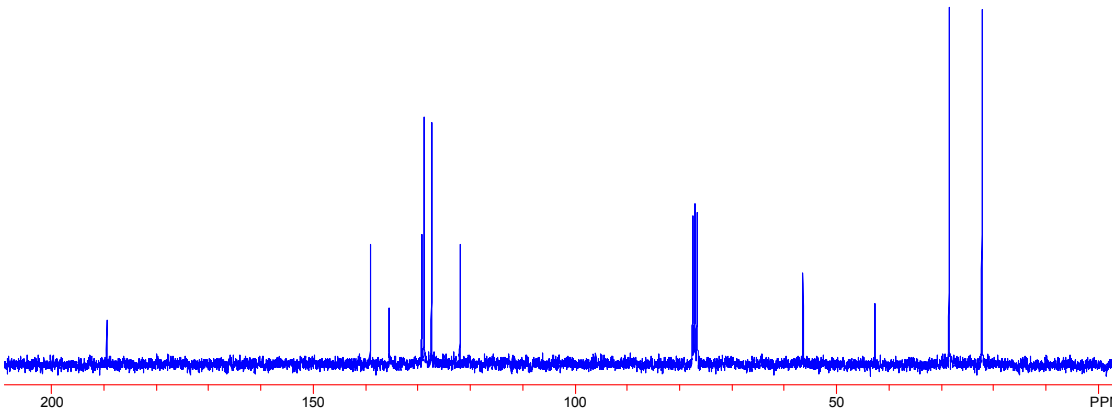
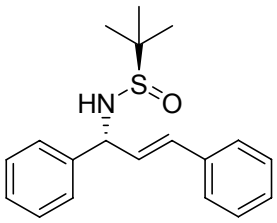
4
2
0
PPI


200
150
100
50
PPI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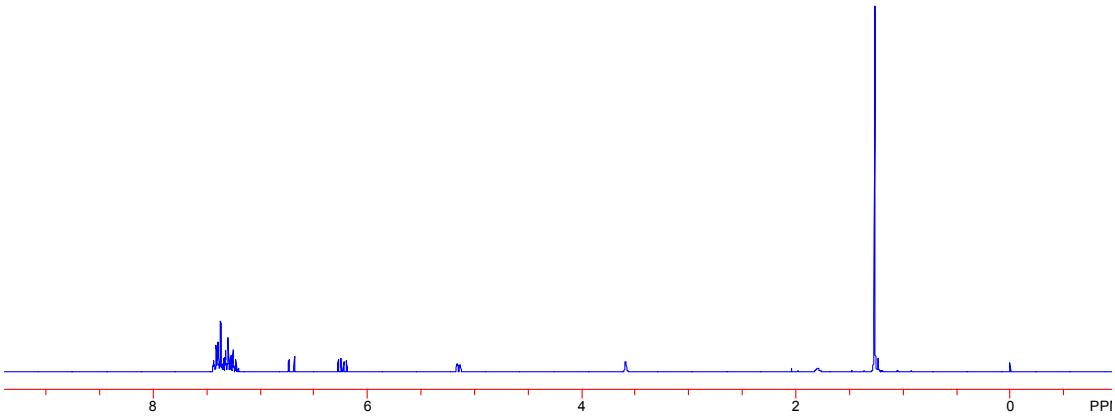
S
O


8
6
4
2
0
PPI


ppm
141.603
136.358
132.446
129.521
128.883
128.460
128.007
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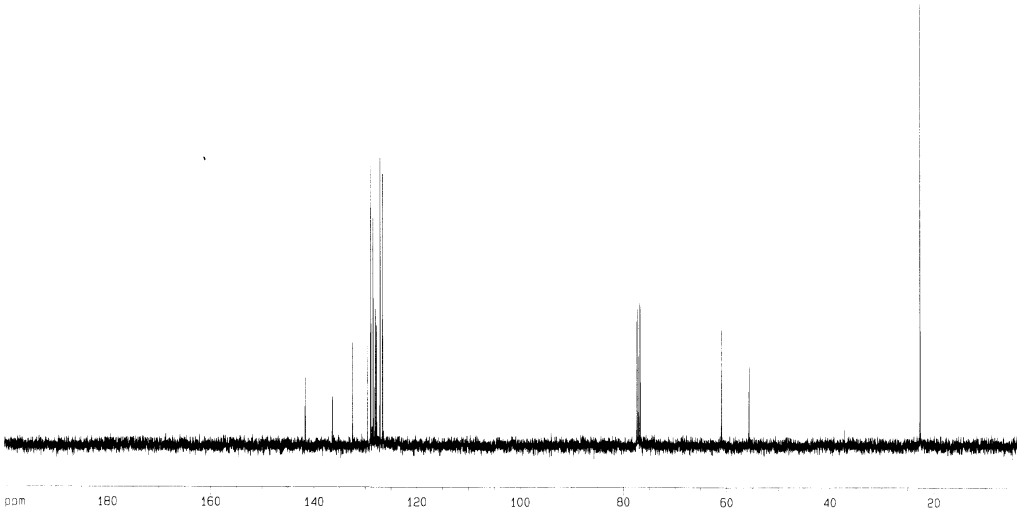
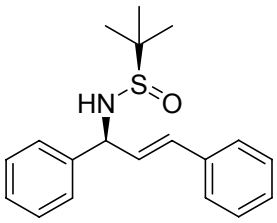
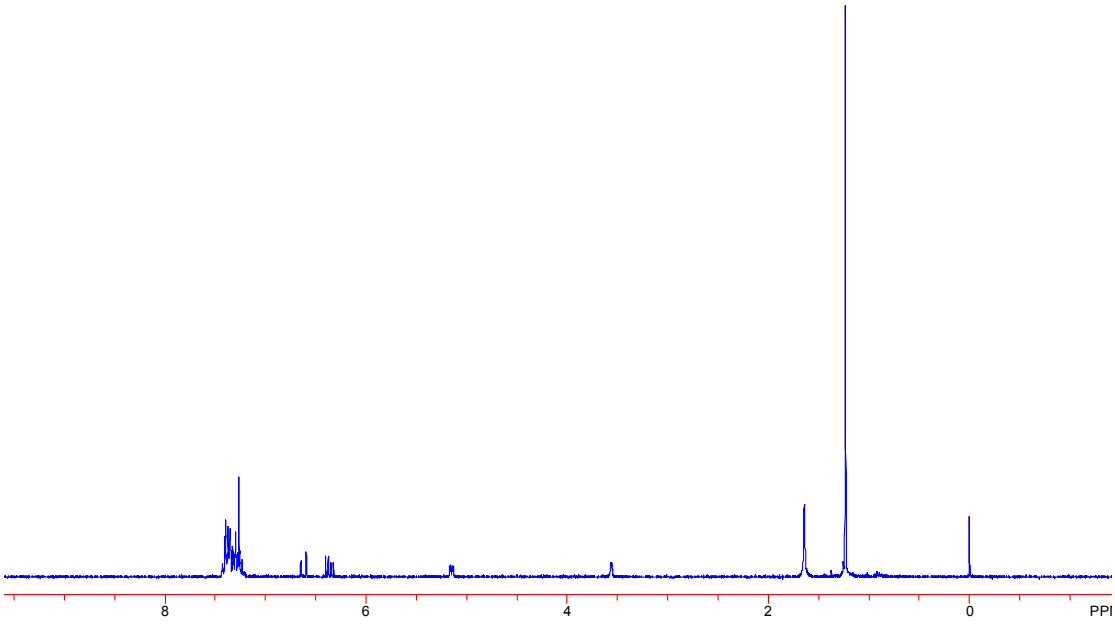
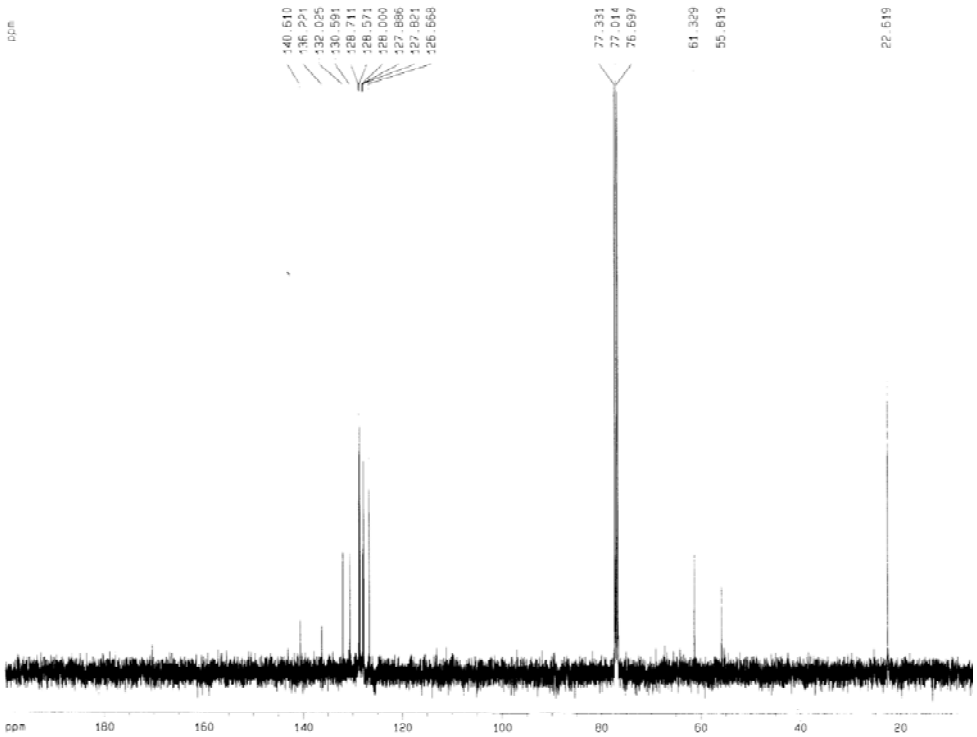
77.342
77.024
76.707
60.991
55.594
22.547


ppm
180
160
140
120
100
80
60
40
20


HN
S
O


8
6
4
2
0
PPI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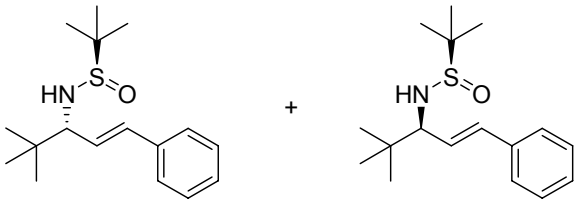
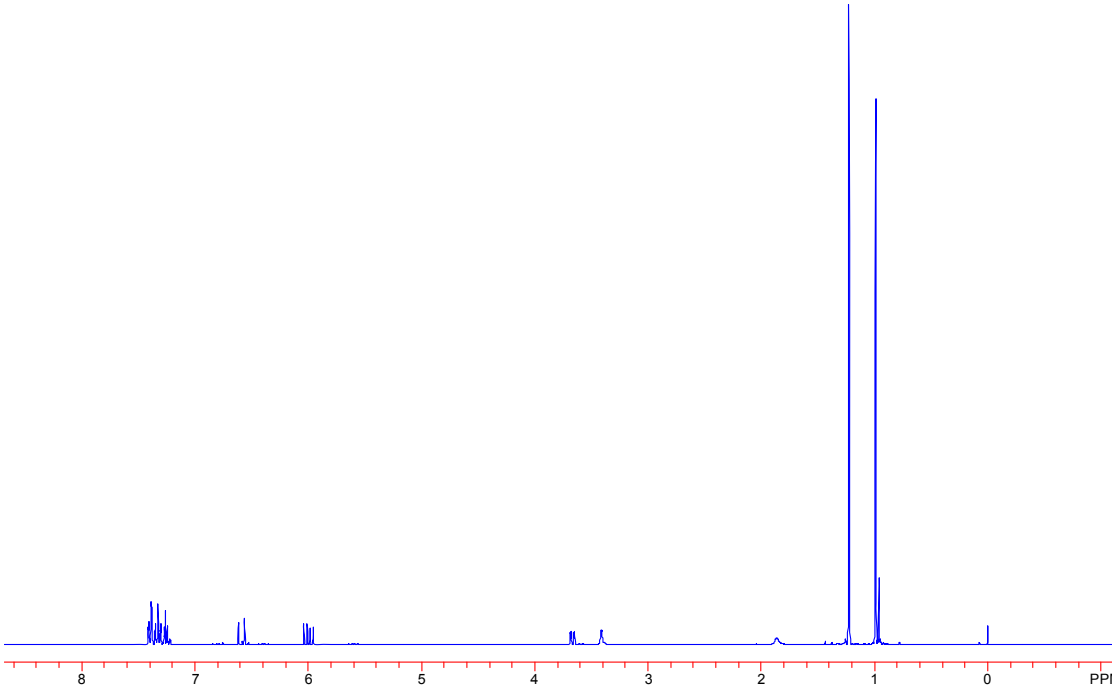
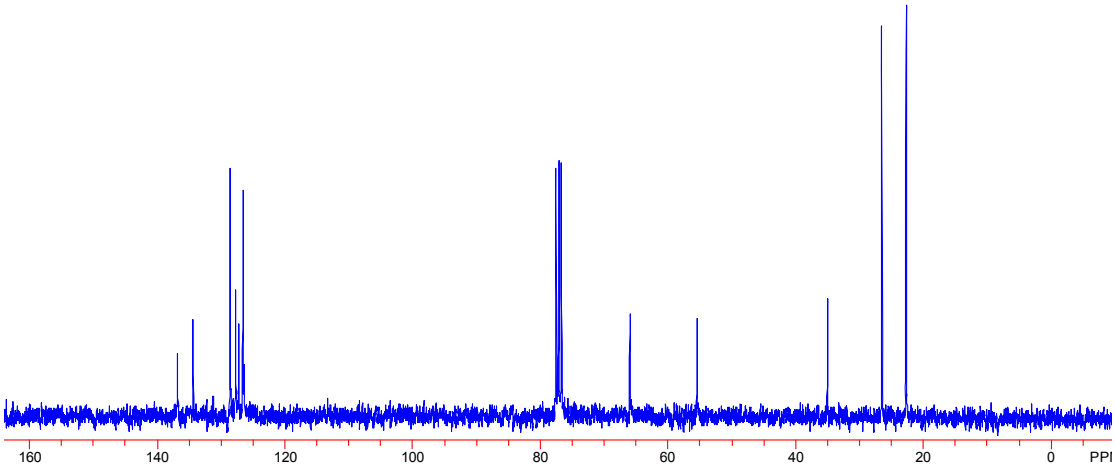
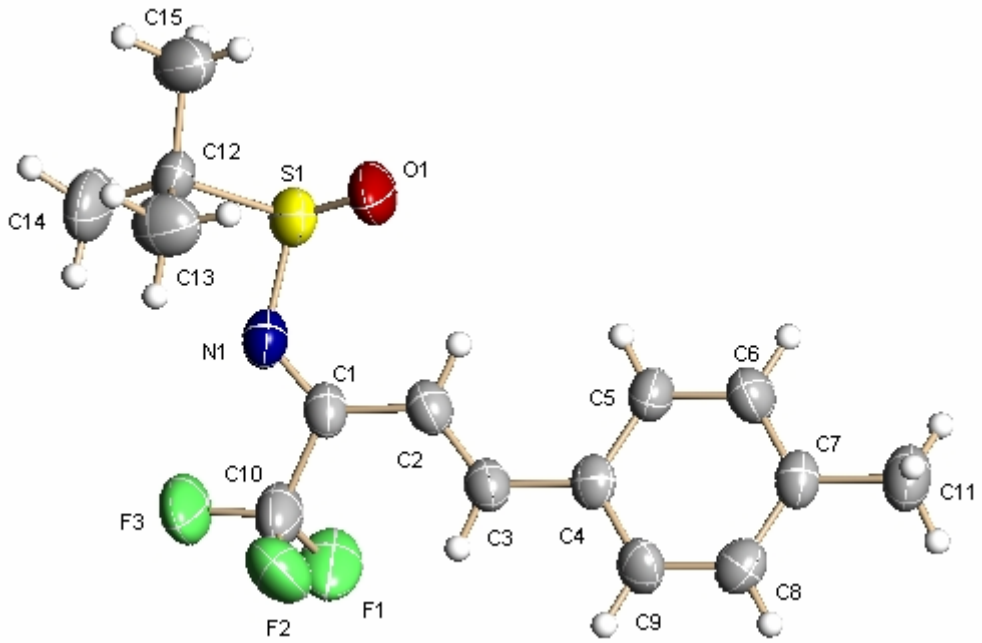
132.025
130.591
128.711
128.571
128.000
127.886
127.821
126.868
77.331
77.014
76.697
61.329
55.819
22.519
ppm
180
160
140
120
100
80
60
40
20


HN
S
O
+
HN
S
O


8
7
6
5
4
3
2
1
0
PPI


160
140
120
100
80
60
40
20
0
PPI

9. ORTEP View of 1c.



10. ORTEP View of 3d.