Supporting Information

Total Synthesis of the Marine Macrolide Amphidinolide F

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Table of Contents

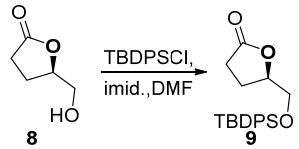
General

All the reactions were performed under inert atmosphere (N_2 or Ar). THF was distilled over sodium/benzophenone mixture. Et_2O, CH_2Cl_2 were purified by filtration over activated molecular sieves. MeOH was purified by filtration over activated alumina. DMF was purchased as anhydrous grade from Acros Organics and used as received. Analytical thin layer chromatography (TLC) was performed on silica gel 60 F_{254} (0.25 mm) plates purchased form Merck. Compounds were visualized by exposure to a UV lamp (λ = 254 and 365 nm), an aqueous solution of $KMnO_4/K_2CO_3$ or an acidic solution of vanillin in EtOH and followed by gentle heating. Flash chromatographies were performed using Merck (230-400 mesh) silica gel.

Melting points were performed on a Buchi melting point B-540. ^1H and ^{13}C NMR spectra were recorded by using a Brucker Advance 300 (300 MHz) or a Brucker Advance 400 (400 MHz) spectrometers in the solvent indicated. For some of the compounds, an optimized sequence for 1D ^{13}C spectra, called UDEFT,[1] was used. Amphidinolide F spectra were recorded on 800 MHz cryocool spectrometer from ICSN at Gif-sur-Yvette, France. Chemical shifts (*δ*) are given in ppm and the coupling constants (*J*) in Hz. The solvent signals were used as reference ($CDCl_3$: δ_C = 77.16 ppm, residual $CHCl_3$ in $CDCl_3$: δ_H = 7.26 ppm. Multiplicities are described by the following abbreviations: s = singlet, d = doublet, t = triplet, q = quartet, quint. = quintet, sext. = sextet, sept. = septet, m = multiplet, br = broad. Infrared spectra were recorded by using a Brucker IRTF Vector 22 spectrometer and wavenumbers (*v*) were given in cm^{-1}. High-resolution mass spectra were obtained on a Waters LCT Premier (ESI-TOF) spectrometer. Optical rotations ($[\alpha]_D$) were measured with an Optical Activity polAAr 32 polarimeter.

Experimental Procedures

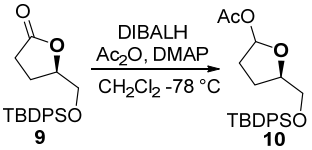
Compound **9**



8 **9**

To a solution of compound **8**[2] (5.87 g, 50.6 mmol, 1 equiv.) in DMF (30 mL), was added imidazole (7.22 g, 106.2 mmol, 2 equiv.), followed by TBDPSCl (14.6 g, 53.1 mmol, 1.05 equiv.). After 16 h at rt, the reaction mixture was quenched with saturated NH_4Cl, extracted with Et_2O (x2), washed with brine (x3), dried over $MgSO_4$, filtered and concentrated under reduced pressure. The residue was purified on a silica gel column chromatography (15% AcOEt in petroleum ether) to afford compound **9** as white crystals. **Mp =** 71-73 °C. **$[\alpha]^{20}_D$** = –27°, (*c* 2.93, $CHCl_3$). **IR** (neat): *v*= 2960, 1775, 1174, 111, 746, 703 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.74 – 7.63 (m, 4H), 7.50 – 7.34 (m, 6H), 4.60 (ddt, *J* = 7.8, 5.6, 3.3 Hz, 1H), 3.88 (dd, *J* = 11.3, 3.3 Hz, 1H), 3.69 (dd, *J* = 11.3, 3.4 Hz, 1H), 2.68 (ddd, *J* = 17.8, 9.7, 6.8 Hz, 1H), 2.51 (ddd, *J* = 17.8, 9.7, 6.8 Hz, 1H), 2.29 (dddd, *J* = 12.0, 9.7, 7.5, 6.8 Hz, 2H), 2.21 (dddd, *J* = 12.8, 9.7, 6.8, 5.6 Hz, 2H), 1.07 (s, 9H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 177.53, 135.77 (2C), 135.67 (2C), 133.10, 132.70, 130.05 (2C), 127.97 (4C), 80.09, 65.62, 28.69, 26.89 (3C), 23.79, 19.34. **HRMS** (ESI) calcd for $C_{21}H_{26}O_3SiNa$ [M + Na]$^+$: 377.1549, found 377.1555.

Compound **10**

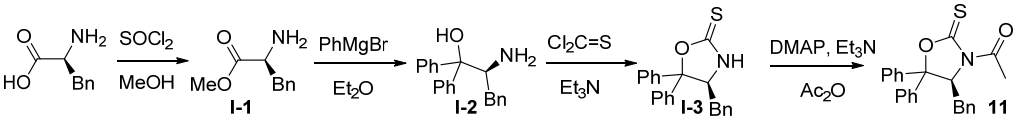


9 **10**

To a solution of compound **9** (8.14 g, 23.0 mmol, 1 equiv) in CH_2Cl_2 (120 mL) at –78 °C was added DIBALH (41.4 mL, 41.4 mmol, 1.8 equiv, 1.0 M in hexanes). After 30 min at –78 °C, Ac_2O (11.7 mL, 115 mmol, 5 equiv) and DMAP (8.35 g, 69 mmol, 3 equiv) were added in this order and the reaction mixture was allowed to warm slowly to 0 °C and was stirred then for 30 min at this temperature. The reaction mixture was then poured slowly into a stirred saturated solution of potassium sodium tartrate, stirred 30 min at rt, diluted with water, extracted with Et_2O (x3), washed with a diluted solution of $NaHCO_3$ and finally with a brine

solution. The organic layer was then dried over solid $NaHCO_3$, concentrated and the residue was filtered over a small plug of silica gel eluting with Et_2O to afford after concentration acetylated lactol **10** (9.16 g, 100%) as a 1:1 mixture of anomers. **IR** (neat): *v*= 2930, 1748, 1235, 1112, 1090, 704 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.77 – 7.62 (m, 4H), 7.48 – 7.32 (m, 6H), 6.34 (d, *J* = 4.1 Hz, 0.5H, 1 diastereomer), 6.28 (t, *J* = 1.9 Hz, 0.5H,1 diastereomer), 4.37 (dq, *J* = 7.4, 4.3 Hz, 0.5H, 1 diastereomer), 4.24 (ddt, *J* = 8.5, 6.0, 5.0 Hz, 0.5H, 1 diastereomer), 3.77 (dd, *J* = 10.8, 5.0 Hz, 0.5H, 1 diastereomer), 3.71 (dd, *J* = 10.8, 5.3 Hz, 0.5H, 1 diastereomer), 3.68 (dd, *J* = 11.2, 4.3 Hz, 0.5H ,1 diastereomer), 3.65 (dd, *J* = 11.2, 4.3 Hz, 0.5H, 1 diastereomer), 2.25-1.85 (m, 4H), 2.04 (s, 1.5H, 1 diastereomer), 1.91 (s, 1.5H, 1 diastereomer), 1.07 (s, 4.5H, 1 diastereomer), 1.05 (s, 4.5H, 1 diastereomer). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 170.74, 170.67, 135.75, 133.59, 133.42, 129.82, 127.82, 99.74, 99.04, 82.32, 80.70, 66.60, 65.77, 32.70, 31.97, 26.95, 25.32, 24.85, 21.55, 19.40. **HRMS** (ESI) calcd for $C_{23}H_{30}O_4SiNa$ $[M + Na]^+$: 421.1811, found 421.1807.

Compound **11**



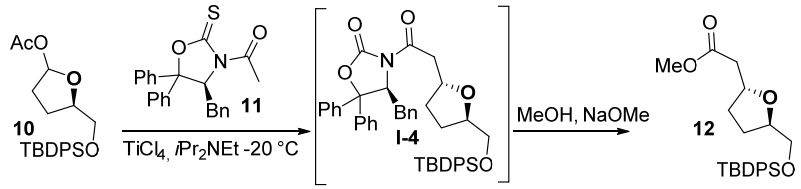
To a solution of (*S*)-phenylalanine (33.0 g, 200 mmol, 1 equiv.) in MeOH (250 mL) at 0 °C in a reaction flask equipped with a bubble outlet was added dropwise $SOCl_2$ (30 mL, 413 mmol, 2.06 equiv.). After stirring overnight at rt, the reaction mixture was concentrated to dryness. To the residue was added CH_2Cl_2 (200 mL) and slowly 30% aqueous K_2CO_3 (200 mL) at 0 °C. The mixture was stirred about 10 min until the residue is fully dissolved. The aqueous layer was extracted with CH_2Cl_2 (2x) and the combined organic phases were dried over $NaHCO_3/K_2CO_3$ mixture, filtered, and concentrated to give crude (*S*)-phenylalanine methyl ester **I-1**.

To a solution of freshly prepared PhMgBr (400 mL, ≈2 mmol, ≈4 equiv., ≈2.0 M in Et_2O) in a 3-neck flask equipped with a condenser was added dropwise a solution of above crude (*S*)-phenylalanine methylester **I-1** in Et_2O (150 mL) over 1 h and the reaction mixture was refluxed overnight. The reaction mixture was pourred slowly into saturated NH_4Cl (300 mL) with ice. And the whole mixture was filtered onto celite, and washed with AcOEt. The aqueous layer was washed with AcOEt (x3) and the combined organic layers were dried over $MgSO_4$, filtered and concentrated. The residue was dissolved in a small amount of AcOEt and petroleum ether was added in order to precipitate the amino-alcool **I-2**. The beige solid was collected by filtration (36.4 g, 55%, 2 steps). Characterization data were in agreement with literature. [3] **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.66 (d, J = 8.0 Hz, 2H), 7.61 (d, J = 8.1 Hz, 2H), 7.37-7.27 (m, 6H), 7.23 (td, J = 6.7, 1.2 Hz, 1H), 7.20 (t, J = 7.2 Hz, 4H), 4.49 (brs, 1H, OH), 4.19 (dd, J = 10.8, 2.4 Hz, 1H), 2.66 (dd, J = 13.8, 2.4 Hz, 1H), 2.45 (dd, J = 13.8, 10.8 Hz, 1H).

To a solution of compound **I-2** (36.4 g, 120 mmol, 1 equiv.) and Et_3N (42 mL, 300 mmol, 2.5 equiv.) in CH_2Cl_2 (150 mL) was added dropwise at 0 °C thiophosgene (10.1 mL, 132 mmol, 1.1 equiv.). After 1 h at 0 °C, the reaction mixture was warmed to rt, hydrolysed with saturated NH_4Cl, extracted with AcOEt, dried over $MgSO_4$, filtered, and concentrated. The residue was roughly purified on a large and short silica gel column (25-30% gradient AcOEt in petroleum ether). The solid residue was then triturated in a small amount of Et_2O to precipitate pure oxazolidinethione **I-3,** which was filtered and collected as a white solid (37.8 g, 90%). Characterization data were in agreement with literature. [4] mp = 128-130 °C. **$[\alpha]^{20}_D$** = –384 (c 0.331, $CHCl_3$). **IR** (neat): v= 3200 (br), 1493, 1162, 1147, 972, 697, 686 cm-1. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.54 (dd, *J* = 8.0, 1.4 Hz, 2H), 7.48 – 7.30 (m, 11H), 7.14 (dd, *J* = 7.2, 1.0 Hz, 2H), 4.95 (brs, 1H, NH), 4.85 (dd, *J* = 11.5, 3.3 Hz, 1H), 2.68 (dd, *J* = 13.8, 3.3 Hz, 1H), 2.21 (dd, *J* = 13.8, 11.5 Hz, 1H). **^{13}C NMR** (50 MHz, $CDCl_3$) δ 187.9, 141.0, 138.2, 136.1, 129.2, 128.8, 128.7, 128.4, 127.5, 126.6, 126.0, 95.5, 65.4, 38.9. **HRMS** (ESI) calcd for $C_{22}H_{20}NOS$ $[M + H]^+$: 346.1268, found 346.1266.

To pure oxazolidinethione **I-3** (11.40 g, 33.0 mmol, 1 equiv.) and DMAP (200 mg, 1.65 mmol, 0.05 equiv.) was added Et_3N (13.8 mL, 99.0 mmol, 3 equiv.) followed by Ac_2O (10 mL, 99.0 mmol, 3 equiv.). The reaction mixture was stirred 2 h at rt, water was added (30 mL) and the reaction mixture was stirred 30 min at rt. The reaction mixture was extracted with Et_2O (x3), and the combined ethereal layers were washed with water, saturated $NaHCO_3$ (x2), dried over $MgSO_4$, filtered on a pad of silica gel (3 cm, washing with Et_2O) to give compound **11** as a sticky and vitreous colourless solid (12.8 g, 100%). Characterization data were in accordance with literature.[4] **$[\alpha]^{20}_D$** = –306 (*c* 0.225, $CHCl_3$). **IR** (neat): v= 1757, 1376, 1355, 1324, 1227, 1204, 1165, 1155, 962, 763, 732, 698 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.45 (dd, *J* = 8.2, 1.6 Hz, 2H), 7.40 – 7.30 (m, 3H), 7.30 – 7.19 (m, 5H), 7.11 (dd, J = 4.9, 1.8 Hz, 3H), 6.74 (m, 2H), 5.62 (dd, *J* = 7.7, 5.2 Hz, 1H), 2.87 (dd, *J* = 14.1, 5.2 Hz, 1H), 2.74 (dd, *J* = 14.1, 7.7 Hz, 1H), 2.39 (s, 3H). **^{13}C NMR** (50 MHz, $CDCl_3$) δ 184.10, 170.51, 140.73, 137.04, 136.18, 129.14 (2C), 129.01 (3C), 128.45 (2C), 128.39, 128.34 (2C), 126.69, 126.59 (2C), 125.93 (2C), 92.73, 77.16, 65.22, 36.50, 25.96. **HRMS** (ESI) calcd for $C_{24}H_{21}NO_2SNa$ $[M + Na]^+$: 410.1191, found 410.1196.

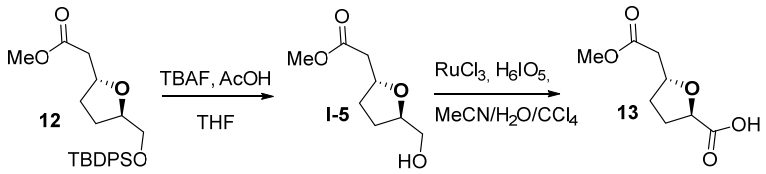
Compound **12**



To a solution of oxazolidinethione **11** (3.1 g, 8.0 mmol, 1.59 equiv.) in dry CH_2Cl_2 (31 mL) at 0 °C was added $TiCl_4$ (880 µL, 8.0 mmol, 1.59 equiv.) over 1 min. The solution turned bright orange and *i*Pr_2NEt (1.39 mL, 8.0 mmol, 1.59 equiv.) was dropwise added over 10 min. The dark red titanium enolate was then cooled down to -20 °C and a solution of lactol acetate **10** (2.0 g, 5.02 mmol, 1 equiv.) in CH_2Cl_2 (10 mL) was added. After 1h at this temperature, the reaction mixture was poured carefully onto a 10% Na_2CO_3 solution (100 mL). The mixture was then filtered over Celite to remove titanium oxide, washed with ether and the organic layer was collected. The aqueous layer was extracted with ether, and the combined organic phases were washed with saturated NH_4Cl, dried over $MgSO_4$, filtered, and concentrated to give a crude oil.

The crude mixture was then dissolved in CH_2Cl_2 (5 mL) and MeOH (30 mL) and. MeONa (1.83 mL, 8.0 mmol, 25% in MeOH) was then added at 0 °C and after 30 min the reaction mixture was quenched with saturated NH_4Cl (50 mL) and diluted with AcOEt (60 mL). The organic phases were separated; the aqueous layer was extracted with AcOEt and the combined organic layers were washed twice with brine. The organic phase was then dried over $MgSO_4$, filtered and concentrated. The residue was triturated with Et_2O/ petroleum ether to precipitate deacylated oxazolidethione **I-3**. The solid was then filtered on a small sintered glass and washed with some small amounts of ether (2.15 g, 78% of recovered oxazolidinethione **I-3**). The filtrate was concentrated and purified on a silica gel column chromatography (AcOEt:Petroleum ether, from 8:92 to 15:85) to afford THF **12** as colorless oil (1.78 g, 86%, dr≥95:5 as judged by ^{1}H NMR). **[α]$^{20}_D$** = –6.7 (*c* 2.67, $CHCl_3$).**IR** (neat): *v*= 2930, 1740, 1428, 1112, 1076, 703 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.77 – 7.57 (m, 4H), 7.49 – 7.29 (m, 6H), 4.38 (tt, *J* = 7.0, 6.6 Hz, 1H), 4.16 (tt, *J* = 6.7, 4.8 Hz, 1H), 3.69 (s, 3H), 3.63 (d, *J* = 4.8 Hz, 2H), 2.61 (dd, *J* = 15.0, 7.1 Hz, 1H), 2.46 (dd, *J* = 15.0, 6.1 Hz, 1H), 2.22 – 2.08 (m, 1H), 2.08 – 1.97 (m, 1H), 1.97 – 1.81 (m, 1H), 1.59 (dq, *J* = 11.7, 8.1 Hz, 2H), 1.06 (s, 9H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 171.33, 77.16, 77.13, 76.62, 51.98, 40.00, 30.99, 29.98. **HRMS** (ESI) calcd for $C_{24}H_{32}O_4SiNa$ [M + Na]$^+$: 435.1968, found 435.1971.

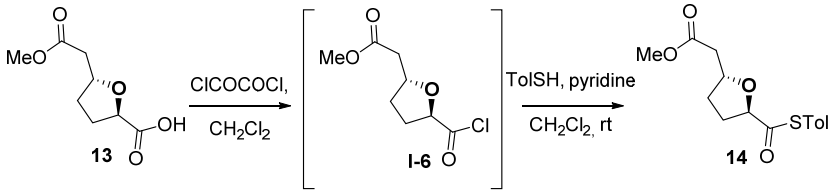
Compound **13**



To a solution of THF **12** (7.1 g, 17.3 mmol, 1 equiv.) in THF (100 mL) was added glacial acetic acid (2.6 mL, 44.8 mmol, 2.6 equiv.) followed by TBAF (22.5 mL, 22.5 mmol, 1.3 equiv., 1.0 M in THF). After 16 h stirring at rt, the reaction mixture was quenched with saturated $NaHCO_3$, extracted with AcOEt, dried over $MgSO_4$, filtered and concentrated. The residue was purified on a silica gel column chromatography (AcOEt: Petroleum ether, from 50:50 to 100:0) to give alcohol **I-5** as colorless oil (3.16 g, 100%). **[α]$^{20}_D$** = –150.0 (*c* 0.72, $CHCl_3$). **IR** (neat): *v*= 3400, 2917, 1738, 1439, 1203, 1066 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 4.35 (quint, *J* = 7.1 Hz, 1H), 4.11 (tdd, *J* = 7.1, 6.0, 3.3 Hz, 1H), 3.67 (s, 3H), 3.62 (dd, *J* = 11.6, 3.3 Hz, 1H), 3.47 (dd, *J* = 11.6, 6.0 Hz, 1H), 2.60 (dd, *J* = 15.4, 7.3 Hz, 1H), 2.46 (dd, *J* = 15.4, 5.9 Hz, 1H), 2.33 (brs, 1H, OH), 2.21 – 2.05 (m, 1H), 2.04 – 1.90 (m, 1H), 1.80 – 1.53 (m, 2H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 171.80, 79.50, 75.51, 64.89, 51.79, 40.49, 31.99, 27.38. **HRMS** (ESI) calcd for $C_8H_{14}O_4Na$ [M + Na]$^+$: 197.0790, found 197.0796.

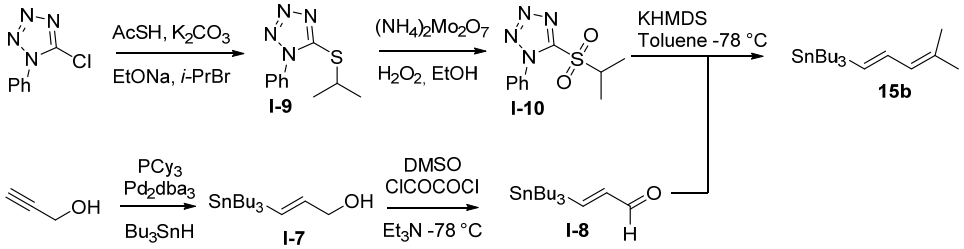
To a solution of alcohol **I-5** (3.0 g, 17.3 mmol, 1 equiv.) in a mixture of H_2O/CCl_4/MeCN (50/30/30 mL) was added $RuCl_3$ hydrate (35 mg, 0.17 mmol, 0.01 equiv.) followed by H_5IO_6 (9.9 g, 43.3 mmol, 2.5 equiv.) in five portions over 30 min. after vigorous stirring for 4 h, the reaction mixture was partitioned by dilution with a mixture of CH_2Cl_2: *i*PrOH (80:20, 40 mL) and extracted 4 times with this mixture of solvants. Combined organic layers were washed with water (10 mL), with a sodium thiosulfate solution (10 mL) and they were dried over $MgSO_4$, filtered, concentrated to give crude carboxylic acid **13** (2.91 g, 89%). The residue was sufficiently pure and was used directly in the next step without further purification. **[α]$^{20}_D$** = +3.7 (*c* 1.08, $CHCl_3$). **IR** (neat): *v*= 3700-2300(br), 2950, 1734, 1439, 1202, 1069 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 8.94 (brs, 1H), 4.69 – 4.47 (m, 2H), 3.69 (s, 3H), 2.68 (dd, *J* = 15.6, 6.9 Hz, 1H), 2.51 (dd, *J* = 15.6, 6.2 Hz, 1H), 2.46 – 2.28 (m, 1H), 2.28 – 1.98 (m, 2H), 1.82 – 1.55 (m, 1H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 171.32, 77.12, 76.60, 51.97, 39.99, 30.97, 29.96. **HRMS** (ESI) calcd for $C_8H_{12}O_5Na$ [M + Na]$^+$: 211.0582, found 211.0582.

Compound **14**



To a solution of crude acid **13** (2.91 g, 15.4 mmol, 1 equiv.) in CH_2Cl_2 (30 mL) in a reaction flask equipped with a bubbler outlet, was added oxalyl chloride (2.64 mL, 30.8 mmol, 2 equiv.) followed by 2 drops of DMF. Some gas evolution was observed and the reaction mixture was stirred 90 min at rt. Some dry toluene was added (10 mL) and the reaction mixture was concentrated to dryness to give crude acyl chloride **I-6**. The crude residue was diluted in a CH_2Cl_2 (30 mL) and a mixture of *p*-toluenethiol (2.9 g, 23.1 mmol, 1.5 equiv.) and anhydrous pyridine (3.7 mL, 46.2 mmol, 3 equiv.) in CH_2Cl_2 (5 mL) was added via syringe at 0 °C. After 30 min at rt, the reaction mixture was quenched with HCl 1N, extracted 3 times with Et_2O, washed with brine and the combined ethereal phases were dried over $MgSO_4$, filtered and concentrated. The residue was ultimately purified by a column chromatography on silica gel (from 15% to 20% Et_2O in Petroleum Ether) to afford thioester **14** as an oil (3.90 g, 86%). **$[\alpha]^{20}_D$** = +93.8 (*c* 1.95, $CHCl_3$). **IR** (neat): *v*= 2950, 1736, 1695, 1436, 1059, 903, 809 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.27 (d, *J* = 8.0 Hz, 2H), 7.20 (d, *J* = 8.0 Hz, 2H), 4.71 (d, *J* = 6.6 Hz, 1H), 4.64 (dd, *J* = 8.0, 5.5 Hz, 1H), 3.72 (s, 3H), 2.73 (dd, *J* = 15.5, 6.7 Hz, 1H), 2.55 (dd, *J* = 15.5, 6.5 Hz, 1H), 2.44 – 2.31 (m, 1H), 2.36 (s, 3H), 2.30 – 2.05 (m, 2H), 1.70 (dq, *J* = 11.3, 7.3 Hz, 1H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 202.69, 171.15, 139.56, 134.65, 130.08, 123.94, 83.78, 77.56, 51.87, 40.15, 30.85, 30.62, 21.39. **HRMS** (ESI) calcd for $C_{15}H_{18}O_4SNa$ $[M + Na]^+$: 317.0823, found 317.0818.

Compound **15b**



To a solution of Pd_2dba_3 (120 mg, 130 µmol, 0.0025 equiv, 0.5 mol% [Pd]) in CH_2Cl_2 (120 mL) was added PCy_3 (1.5 mL, 1.04 mmol, 0.02 equiv, 20% in toluene). The reaction mixture was stirred for 15 min at 0 °C, then propargyl alcohol (3.04 mL, 52.17 mmol, 1 equiv.) was added followed by tributyltin hydride (16.2 mL, 60 mmol, 1.15 equiv.) and the stirring was continued for 3 h at 0 °C. After concentration the residue was purified on a silica gel column (gradient 8 to 15% Et_2O in petroleum ether) to give by order of elution 2-(tributylstannyl)prop-2-en-1-ol (4.35 g, 12.5 mmol, 24%) and (*E*)-3-(tributylstannyl)prop-2-en-1-ol **I-7** (11.55 g, 33.3 mmol, 64%). Spectral data of (*E*)-3-(tributylstannyl)prop-2-en-1-ol **I-7** were in accordance with the literature.[5] **^{1}H NMR** (300 MHz, $CDCl_3$) δ 6.26-6.13 (m, $^3J_{Sn-H}$ = 68.5 Hz, $^2J_{Sn-H}$ = 38.2 Hz, 2H), 4.19 (m, 2H), 1.65-1.50 (m, 1H, OH), 1.52 (quint, *J* = 7.5Hz, 6H), 1.33 (sext, *J* =7.3Hz, 6H), 1.00-0.80 (m, 15H).

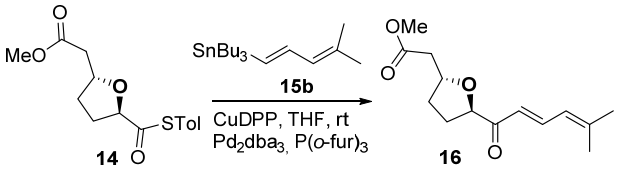
To a solution of DMSO (2.84 mL, 40.0 mmol, 2 equiv.) in CH_2Cl_2 (100 mL) was added oxalyl chloride (2.23 mL, 26 mmol, 1.3 equiv) dropwise at –78 °C. After 30 min at this temperature, (*E*)-3-(tributylstannyl)prop-2-en-1-ol **I-7** (6.94 g, 10 mmol) in CH_2Cl_2 (10 mL) was added, followed by Et_3N (11.1 mL, 80 mmol, 4 equiv.). The reaction mixture was allowed to warm slowly to 0 °C and was then quenched by saturated NH_4Cl. the reaction mixture was then extracted with Et_2O, dried over $MgSO_4$, filtered and concentrated. The residue was then purified on a silica gel column chromatography (2% Et_2O in petroleum ether) to afford (*E*)-3-(tributylstannyl)acrylaldehyde **I-8** (5.42 g, 79%). Characterization data were in agreement with the literature.[6] **IR** (neat): *v*= 2957, 1690, 1463, 1071, 665 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 9.40 (d, *J* = 7.6 Hz, 1H), 7.79 (d, *J* = 19.2 Hz, $^2J_{Sn-H}$ = 52.9 Hz, 1H), 6.62 (dd, *J* = 19.2, 7.6 Hz, $^3J_{Sn-H}$ = 48.5 Hz, 1H), 1.52 (quint, *J* = 7.5Hz, $^3J_{Sn-H}$ = 53.0 Hz, 6H), 1.32 (sext, *J* = 7.2 Hz, 6H) 1.00 (t, *J* = 8.0 Hz, $^2J_{Sn-H}$ = 51.4 Hz, 6H), 0.91 (t, *J* =7.3Hz, 9H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 193.80 ($^4J_{Sn-H}$ = 70.1 Hz), 163.38, 147.76, 29.23 ($^3J_{Sn-C}$ = 21.3 Hz), 27.34 ($^2J_{Sn-C}$ = 55.5 Hz), 13.76, 9.95 ($^1J_{Sn-C}$ = 336 Hz).

To a solution of AcSH (5.9 mL, 83.1 mmol, 1.5 equiv) in DMF (50 mL) was added K_2CO_3 (11.5 g, 83.1 mmol, 1.5 equiv.) followed by *i*-PrBr (8.32 mL, 88.6 mmol, 1.6 equiv.) and the reaction mixture was heated at 100 °C for 30 min. The reaction mixture was slightly cooled down and EtONa (5.64 g, 83.1 mmol, 1.5 equiv) was added. After 30 min at 100 °C, the reaction mixture was then slightly cooled down and 2-chlorophenyltetrazole (10 g, 55.4 mmol, 1.0 equiv.) was added. After 1 h at 100 °C, the reaction mixture was quenched with H_2O, extracted with Et_2O (x3), washed with brine (x3), dried over $MgSO_4$, filtered and concentrated to give crude thioether **I-9**. The residue was dissolved in EtOH (200 mL), and ammonium dimolybdate (1.1 g, 3.24 mmol, 0.06 equiv.) was added, followed by H_2O_2 (19.2 mL, 220 mmol, 4 equiv.). After 16 h stirring at 40 °C, the reaction mixture was diluted with water (200 mL) and extracted with a 50:50 AcOEt/Et_2O mixture (x3). The combined organic layers were washed with water (2x), washed with thiosulfate solution, dried over $MgSO_4$, filtered, and concentrated. The residue was recrystallized from EtOH to afford white crystals of sulfone **I-10** (13.4 g, 95%). Spectral data were in agreement with those reported.[7] **Mp** = 66-68 °C. **IR** (neat): *v*= 1592, 1496, 1460, 1334, 1263, 1173, 1145, 1057, 1042, 763, 733, 714, 692, 674 cm^{-1} **^{1}H NMR** (300 MHz,

$CDCl_3$) δ 7.77 – 7.49 (m, 5H), 4.00 (sept, *J* = 6.9 Hz, 1H), 1.50 (d, *J* = 6.9 Hz, 6H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 152.69, 133.21, 131.52, 129.68, 125.46, 56.94, 15.10. **HRMS** (ESI) calcd for $C_{10}H_{13}O_4N_4O_2S$ $[M + H]^+$: 253.0759, found 253.0756.

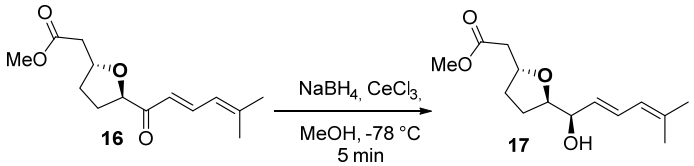
To a solution of sulfone **I-10** (5.06 g, 20.1 mmol, 1.05 equiv.) and aldehyde **I-8** (6.6 g, 19.1 mmol, 1.0 equiv.) in toluene (100 mL) at –78 °C was added dropwise KHMDS (40.2 mL, 20.1 mmol, 1.05 equiv., 0.5 M in toluene) over 20 min. After 20 min at –78 °C, the reaction mixture was allowed to warm at rt, quenched by saturated NH_4Cl, extracted with Et_2O, dried over $MgSO_4$, filtered and concentrated. The residue was further purified on a silica gel column chromatography (100% petroleum ether) to afford stannane **15b** as a clear oil (4.0 g, 61%). **IR** (neat): *v*= 2926, 1463, 1377, 1341, 991, 868, 691, 664, 639 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 6.74 (dd, *J* = 18.6, 10.3 Hz, $^3J_{Sn\text{-}H}$ = 60.6 Hz, 1H), 6.06 (d, *J* = 18.6 Hz, $^2J_{Sn\text{-}H}$ = 74 Hz, 1H), 5.85 (d, *J* = 10.3 Hz, 1H), 1.80 (s, 3H), 1.78 (s, 3H), 1.61 – 1.43 (m, 6H), 1.32 (sext, *J* = 7.2 Hz, 6H), 0.89 (t, *J* = 7.3 Hz, 15H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 143.46, 134.52, 130.34, 128.90, 29.30 ($^3J_{Sn\text{-}C}$ = 19.7 Hz), 27.45 ($^2J_{Sn\text{-}C}$ = 53.4 Hz), 26.06, 18.53, 13.86, 9.70 ($^1J_{Sn\text{-}C}$ = 328, 343 Hz). **HRMS** (ESI) calcd for $C_{15}H_{31}OSn$ $[M–Bu+MeOH]^+$: 347.1397, found 347.1377

Compound **16**



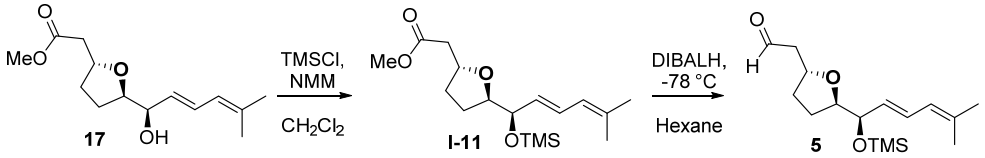
To a solution of thioester **14** (3.7 g, 12.6 mmol, 1 equiv.) and stannane **15b** (5.65 g, 16.38 mmol, 1.3 equiv.) in THF (50 mL) was added in one portion copper diphenylphosphinate[8] (CuDPP) (5.3 g, 18.9 mmol, 1.5 equiv.), Pd_2dba_3 (230 mg, 0.126 mmol, 0.02 equiv), trifurylphosphine (350.8 mg, 0.756 mmol, 0.12 equiv). The reaction mixture was then heated for 2 h in a preheated oil bath at 50 °C. Reaction mixture turned dark brown and was cooled down to rt and diluted with petroleum ether (50 mL). The reaction mixture was then filtered on a pad of silica gel and the filter cake was washed copiously with Et_2O. The filtrate was concentrated and the residue was triturated with small amounts of Et_2O, filtered on cotton and the filtrate concentrated again. The residue was finally purified on a silica gel column chromatography (from 10 to 15% AcOEt in petroleum ether) to afford dienone **16** (2.22 g, 70%). Unreacted thioester **14** was also recovered (232 mg, 6%). **$[\alpha]^{20}_D$** = +58.1 (*c* 1.17, $CHCl_3$). **IR** (neat): *v*= 2950, 1736, 1679, 1628, 1581, 1437, 1354, 1312, 1281, 1199, 1058, 994, 884 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.60 (dd, *J* = 15.1, 11.7 Hz, 1H), 6.40 (d, *J* = 15.1 Hz, 1H), 6.02 (d, *J* = 11.7 Hz, 1H), 4.53 (t, *J* = 7.5 Hz, 1H), 4.46 (quint, *J* = 6.9 Hz, 1H), 3.68 (s, 3H), 2.68 (dd, *J* = 15.4, 6.9 Hz, 1H), 2.50 (dd, *J* = 15.4, 6.2 Hz, 1H), 2.26 (dtd, *J* = 12.5, 8.0, 4.2 Hz, 2H), 2.17 – 2.05 (m, 1H), 1.96 (dtd, *J* = 12.4, 7.9, 6.8 Hz, 1H), 1.89 (s, 3H), 1.87 (s, 3H), 1.62 (dq, *J* = 11.9, 8.0 Hz, 1H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 201.26, 171.45, 149.20, 140.67, 124.70, 121.80, 82.87, 76.74, 51.82, 40.28, 31.26, 29.55, 26.89, 19.26. **HRMS** (ESI) calcd for $C_{14}H_{21}O_4$ $[M + H]^+$: 253.1440, found 253.1433.

Compound **17**



To a solution of dienone **16** in MeOH (50 mL) at –78 °C was added $CeCl_3$ [the hydrate was flame-dried under vaccum] (2.2 g, 246.5 mmol, 1.0 equiv.) in MeOH (20 mL). After 15 min at –78 °C, $NaBH_4$ was added and the reaction mixture was quenched after 5 min (a longer reaction time provided ester reduction side reaction) with saturated NH_4Cl. The reaction mixture was extracted with a petroleum ether: Et_2O mixture (50:50, x2), washed with brine, dried over $MgSO_4$, filtered and concentrated. The residue was purified on a silica gel chromatography to give alcohol **17** as colorless oil (1.60 g, 72%, dr≥90:10 as judged on ^{1}H NMR). **$[\alpha]^{18}_D$** = +20.0 (*c* 0.9, $CHCl_3$). **IR** (neat): *v*= 3400 (br), 2969, 1738, 1660, 1438, 1058, 989, 961 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 6.51 (dd, *J* = 15.1, 11.0 Hz, 1H), 5.80 (d, *J* = 11.0 Hz, 1H), 5.44 (dd, *J* = 15.1, 6.7 Hz, 1H), 4.37 (quint, *J* = 6.5 Hz, 1H), 3.95 (t, *J* = 7.0 Hz, 1H), 3.88 (q, *J* = 6.7 Hz, 1H), 3.68 (s, 3H), 2.64 (dd, *J* = 15.4, 6.9 Hz, 1H), 2.56 (brs, 1H, OH), 2.46 (dd, *J* = 15.4, 6.3 Hz, 1H), 2.21 – 2.07 (m, 1H), 2.04 – 1.90 (m, 1H), 1.76 (s, 3H), 1.75 (s, 3H), 1.74 – 1.44 (m, 2H).**^{13}C NMR** (75 MHz, $CDCl_3$) δ 171.67, 136.65, 129.49, 128.13, 124.49, 82.40, 75.57, 75.49, 51.80, 40.41, 32.06, 27.97, 26.13, 18.47. **HRMS** (ESI) calcd for $C_{14}H_{22}O_4Na$ $[M+Na]^+$: 377.1416, found 377.1409.

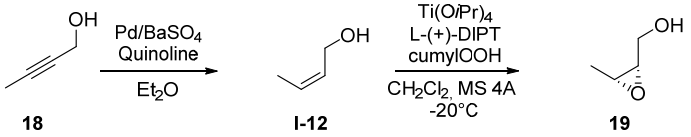
Compound **5**



To a solution of alcohol **17**(1.6 g, 6.3 mmol) in CH_2Cl_2 (20 mL) at 0 °C was added *N*-methyl morpholine (1.04 mL, 9.45 mmol, 1.5 equiv.) followed by TMSCl (1.193 mL, 9.45 mmol, 1.5 equiv.). The reaction mixture was stirred 30 min at rt and was then quenched by water and diluted with pentane (30 mL). The two phases were separated and the aqueous layer was extracted with Et_2O (x2). The combined organic layers were washed with brine, dried over $MgSO_4$, filtered and concentrated. The residue was no further purified and silyl ether **I-11** was collected as colorless oil (2.03 g, 99%). **[α]$^{30}_D$** = +16.3 (*c* 1.47, $CHCl_3$). **IR** (neat): *v*= 2954, 1740, 1659, 1437, 1249, 1060, 990, 960, 839, 751 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 6.42 (t, *J* = 15.0, 11.2 Hz, 1H), 5.81 (d, *J* = 11.2 Hz, 1H), 5.50 (dd, *J* = 15.0, 6.2 Hz, 1H), 4.30 (quint, *J* = 6.5 Hz, 1H), 4.12 (t, *J* = 5.8 Hz, 1H), 3.94 (q, *J* = 6.9 Hz, 1H), 3.66 (s, 3H), 2.62 (dd, *J* = 15.1, 6.8 Hz, 1H), 2.42 (dd, *J* = 15.0, 6.5 Hz, 1H), 2.14 – 1.98 (m, 1H), 1.88 (ddd, *J* = 11.5, 7.8, 3.8 Hz, 1H), 1.76 (s, 3H), 1.75 (s, 3H), 1.76 – 1.60 (m, 1H), 1.52 (dq, *J* = 11.8, 8.3 Hz, 1H), 0.10 (s, 9H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 171.85, 135.43, 129.60, 127.94, 124.75, 82.46, 75.70 (2C), 51.67, 40.65, 32.11, 27.49, 26.09, 18.40, 0.44 (3C). **HRMS** (ESI) calcd for $C_{17}H_{30}O_4NaSi$ $[M+Na]^+$: 349.1811, found 349.1804.

To a solution of methyl ester **I-11** (1.99 g, 6.10 mmol, 1 equiv.) in hexanes (60 mL) at –78 °C was added dropwise DIBAL-H (6.85 mL, 6.85 mmol, 1.1 equiv., 1.0M in hexanes). After 1 h at –78 °C, the reaction mixture was poured into a 25% solution of potassium sodium tartrate (30 mL) under stirring. After 30 min stirring the two layers were separated, the organic phase was extracted with Et_2O (x3). The combined organic layers were washed with a 5% $NaHCO_3$ solution (x2). The ethereal solution was dried over $MgSO_4$, filtered and concentrated. The residue was purified on a silica gel column chromatography (15-20% Et_2O gradient in petroleum ether) to give aldehyde **5** as colorless oil (1.558 g, 86%). **[α]$^{20}_D$** = +6.67 (*c* 2.70, $CHCl_3$) **IR** (neat): *v*= 2958, 1726, 1659, 1380, 1249, 1118, 1080, 988, 968, 839, 751 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 9.79 (t, *J* = 2.3, 1.8 Hz, 1H), 6.42 (dd, *J* = 15.1, 10.9 Hz, 1H), 5.81 (d, *J* = 10.9 Hz, 1H), 5.51 (dd, *J* = 15.1, 6.2 Hz, 1H), 4.36 (quint, *J* = 8.2, 7.4, 5.8 Hz, 1H), 4.12 (t, *J* = 5.8 Hz, 1H), 3.96 (q, *J* = 6.9 Hz, 1H), 2.67 (ddd, *J* = 16.2, 7.2, 2.3 Hz, 1H), 2.53 (ddd, *J* = 16.2, 5.4, 1.8 Hz, 1H), 2.11 (dddd, *J* = 11.8, 8.0, 5.7, 3.4 Hz, 1H), 2.00 – 1.84 (m, 1H), 1.76 (s, 3H), 1.75 (s, 3H), 1.77 – 1.63 (m, 1H), 1.51 (dq, *J* = 11.4, 8.3 Hz, 1H), 0.11 (s, 9H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 201.51, 135.65, 129.57, 128.07, 124.68, 82.57, 75.81, 74.38, 49.63, 32.43, 27.61, 26.11, 18.41, 0.48 (3C). **HRMS** (ESI) calcd for $C_{17}H_{32}O_4NaSi$ $[M+MeOH+Na]^+$: 351.1968, found 351.1960.

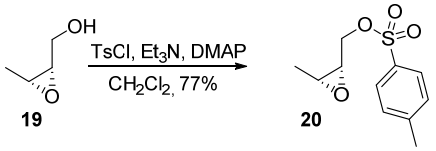
Compound **19**



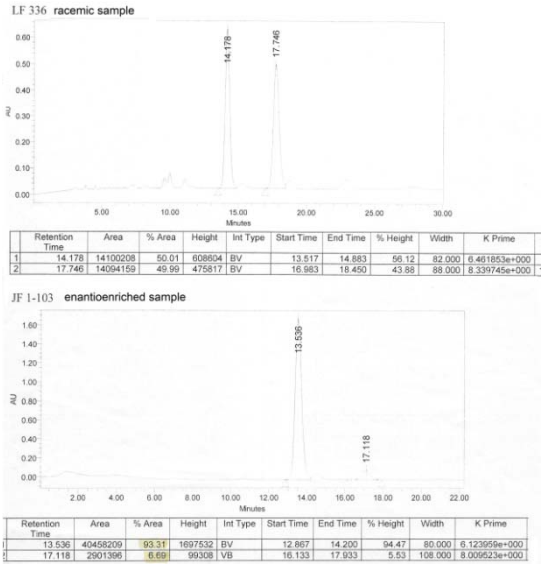
To a solution of 2-butyn-1-ol **18** (14 g, 200 mmol) and quinoline (0.23 mL, 2 mmol, 0.01 equiv.) in Et_2O (100 mL) was added $Pd/BaSO_4$ (2.13 g, 1 mmol, 0.005 equiv.). Then H_2 was bubbled into the solution during 36 h. After completion of the reaction (monitoring by ^{1}H NMR), the reaction was filtered over Celite pad and the solvent was carefully concentrated at atmospheric pressure. The resulting crude mixture was distillated at atmospheric pressure to afford (*Z*)-alcohol **I-12** (11.8 g, 163 mmol, 81%) as a pale yellow oil. **Bp** = 119-120 °C (literature: 119-121 °C).[9] **IR** (neat): ν = 3021, 1025, 968 cm^{-1}.**^{1}H NMR** (300 MHz, $CDCl_3$) δ 5.68 – 5.61 (m, 2H), 4.24 (m, 2H), 1.69 (d, *J* = 5.2 Hz, 1H), 1.39 (brs, 1H, OH) ppm. **^{13}C NMR** (75 MHz, $CDCl_3$) δ 129.34, 127.45, 58.46, 13.16. **MS** (GC-EI): 72.1 ($M^{\bullet+}$, 35), 57.10 (M^+-CH_3, 100), 55 (M^+-HO, 71).

To a cooled (–20 °C) solution of (*Z*)-alcohol **I-12** (5.12 g, 71.125 mmol, 1 equiv.) in dry CH_2Cl_2 (175 mL) was added molecular sieves (2.66 g), L-(+)-DIPT (2.08 mL, 9.95 mmol, 0.14 equiv.) and $Ti(OiPr)_4$ (2.1 mL, 7.11 mmol, 0.1 equiv.). The mixture was stirred at this temperature for 30 minutes. Then cumyl hydroperoxide (25.5 mL, 142.25 mmol, 2 equiv. 80%) was added dropwise over 15 minutes. The reaction mixture was maintained at –20 °C during 48 h in a freezer. After this time a solution of citric acid (1 eq in Et_2O/acetone 1:1) was added, and the resulting mixture was allowed to warm at room temperature during 30 minutes. The crude mixture was then filtered on Celite, concentrated and purified on silica gel (Et_2O/petroleum ether– 50% to 100%) to furnish epoxide **19** (4.935 g, 56.07 mmol, 79%) Enantiomeric excess was determined on tosyl derivative **20**. **[α]$^{20}_D$ =** –8.7 (*c* = 4.0, $CHCl_3$). **IR** (neat): ν = 3320, 1033, 987, 938, 782 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 3.84 (dd, *J* = 12.2, 4.0 Hz, 1H), 3.68 (dd, *J* = 12.2, 6.4 Hz, 1H), 3.20 – 3.07 (m, 2H), 2.07 (brs, 1H, OH), 1.31 (d, *J* = 5.6 Hz, 3H). **^{13}C NMR** (75 MHz, $CDCl_3$): δ 60.82, 56.86, 52.93, 13.46. [10]

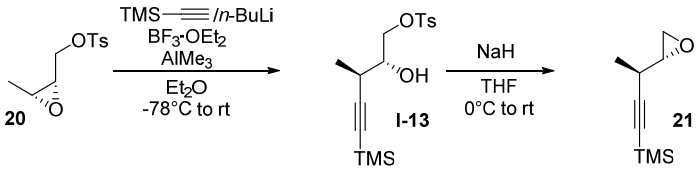
Compound **20**



To a cooled (0 °C) solution of epoxide **19** (3.37 g, 38.31 mmol, 1 equiv.) in dry CH_2Cl_2 (150 mL) was added triethylamine (11.7 mL, 84.12 mmol, 1.5 equiv.), dimethyaminopyridinDMAP (3.39 g, 28.04 mmol, 0.5 equiv.) and tosyl chloride (12.78 g, 67.30 mmol, 1.2 equiv.). The solution was allowed to warm to room temperature, after 1.5 h the reaction was hydrolyzed with saturated NH_4Cl and extracted with Et_2O. The combined organic phase was washed by saturated NH_4Cl (50 mL), water (50 mL), brine (50 mL), dried over $MgSO_4$, filtered and concentrated under reduced pressure. The crude material was purified on silica gel column chromatography (Et_2O/petroleum ether 30% to 40%) to yield tosylate **20** (7.139 g, 29.5 mmol, 77%). Enantiomeric ratio was determined to be 93:7 by chiral HLPC [4.6 X 250 mm, Chiralcel AD column, hexane/ *i*-PrOH 90:10,1.0 mL.min^{-1}, retention times: 14.17 min (major) and 17.74 min (minor)]. **$[\alpha]^{20}_D$ =** –18.2 (*c* = 6.6, $CHCl_3$)**. IR** (neat): ν = 1598, 1360, 1174, 956, 784, 663 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.80 (d, *J* = 8.4 Hz, 2H), 7.35 (d, *J* = 8.4 Hz, 2H), 4.16 (dd, *J* = 11.2, 5.1 Hz, 1H), 4.09 (dd, *J* = 11.2, 6.0 Hz, 1H), 3.16 – 3.05 (m, 2H), 2.44 (s, 3H), 1.22 (d, *J* = 5.6 Hz, 3H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 145.24, 132.88, 130.05, 128.08, 68.04, 53.07, 52.33, 21.77, 13.22. **HRMS** (ESI): *m/z*: calcd for $C_{11}H_{14}O_4SNa$ $[M+Na]^+$: 265.0505, found 265.0502.



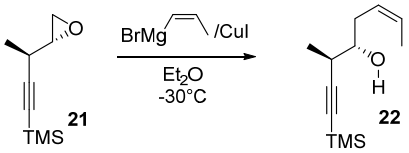
Compound **21**



To a cooled (–78 °C) solution of trimethylacetylene (8.36 mL, 58.75 mmol, 2 equiv.) in Et_2O (150 mL) was added dropwise *n*-BuLi (23 mL, 58.75 mmol, 2 equiv., 2.5 M in hexanes) and the solution was allowed to warm at 0°C for 20 minutes. At –78 °C trimethylaluminium (29.3 mL, 58.75 mmol, 2 equiv. 2 M in hexane) was added dropwise, the mixture was allowed to warm at 0 °C during 20 minutes. At –78 °C a solution of epoxide **20** (7.109 g, 29.37 mmol, 1 equiv.) in Et_2O (25 mL) was added *via* cannula and boron trifluoride diethyl etherate (7.25 mL, 58.75 mmol, 2 equiv.) was then added dropwise. The mixture was allowed to warm at room temperature during 1.5 h. The resulting mixture was poured into a cooled (0 °C) aqueous solution of sodium potassium tartrate (150 mL, 10%) and the stirring was maintained during 20 minutes. The mixture was extracted with ethyl acetate, dried over $MgSO_4$, filtered and concentrated in vaccuo to afford crude compound **I-13**.

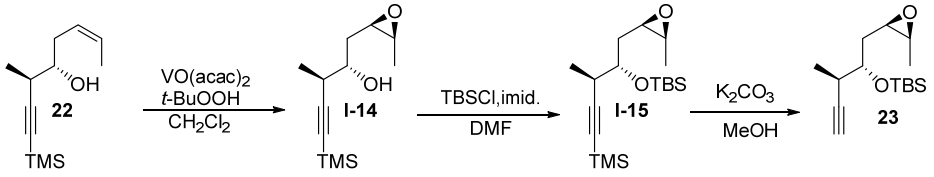
Crude **I-12** was dissolved into anhydrous THF (150 mL) and cooled at 0 °C. Sodium hydride (2.35 g, 58.75 mmol, 2 equiv., 60% in mineral oil) was added by portions, and the solution was allowed to warm to room temperature. After consumption of the starting material, indicated by TLC, the reaction was quenched with saturated NH_4Cl, extracted with Et_2O, dried over $MgSO_4$, filtered and concentrated at reduced pressure. The crude residue was then purified on silica gel (Et_2O/petroleum ether 0% to 5%) to afford epoxide **21** (4.83 g, 28.75 mmol, 98% on two steps) as a clear oil. **$[\alpha]^{20}_D$ =** +12.2 (*c* = 5.0, $CHCl_3$)**. IR** (neat): ν = 2170, 1249, 890, 840, 760 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 2.99 (ddd, *J* = 4.9, 3.8, 2.7 Hz, 1H), 2.75 (dd, *J* = 5.0, 3.8 Hz, 1H), 2.70 (dd, *J* = 5.0, 2.7 Hz, 1H), 2.64 (qd, *J* = 7.1, 5.0 Hz, 1H), 1.23 (d, *J* = 7.1 Hz, 3H), 0.15 (s, 9H). **^{13}C NMR** (75 MHz, $CDCl_3$): δ 106.30, 86.57, 54.55, 45.80, 29.24, 16.93, 0.23 ppm. **HRMS** (ESI): *m/z*: calcd for $C_9H_{17}OSi$ $[M+H]^+$: 169.1049, found 169.1043.

Compound **22**

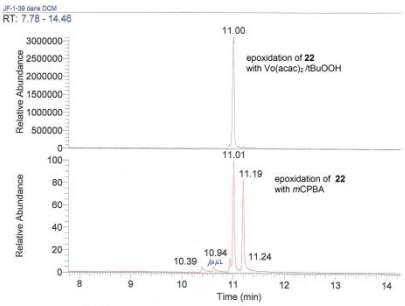


To a cooled (–30 °C) solution of CuI (958 mg, 5.04 mmol, 0.15 equiv.) in Et_2O (50 mL) was added dropwise a solution of (*Z*)-propenylmagnesium bromide (45.6 mL, 50.44 mmol, C=1.10 M in THF, 1.5 equiv.) [Prepared from Mg turning and (*Z*)-1-bromopropene in THF]. After 20 minutes at this temperature epoxide **21** (5.64 g, 33.63 mmol, 1 equiv.) in Et_2O (25 mL) was added *via* cannula. The reaction mixture was stirred for 1 h at –30 °C, hydrolysed by aqueous NH_4Cl/NH_3 (2/1) solution, extracted with Et_2O, dried over $MgSO_4$, filtered and concentrated in vaccuo. The crude residue was purified on silica gel (Et_2O/petroleum ether– 10%) to yield alcohol **22** (5.369 g, 25.56 mmol, 76%) as colorless oil. **$[\alpha]^{20}_D$ =** +23.3 (*c* = 1.3, $CHCl_3$). **IR** (neat): ν = 2163, 1249, 991, 837, 759, 697 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 5.69 – 5.56 (m, 1H), 5.51 – 5.39 (m, 1H), 3.46 (tdd, *J* = 7.0, 6.0, 4.4 Hz, 1H), 2.63 (qd, *J* = 7.0, 4.4 Hz, 1H), 2.45 – 2.22 (m, 2H), 1.84 (d, *J* = 6.9 Hz, 1H, OH), 1.66 (d, *J* = 6.7 Hz, 3H), 1.22 (d, *J* = 7.0 Hz, 3H), 0.16 (d, *J* = 0.5 Hz, 9H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 127.08, 126.05, 107.54, 87.76, 74.11, 33.47, 32.92, 17.54, 13.14, 0.29. **HRMS** (ESI): *m/z*: calcd for $C_{12}H_{22}OSiNa$ $[M+Na]^+$: 233.1332, found 233.1329.

Compound **23**



To a cooled (0 °C) solution of alcohol **22** (5.368 g, 25.56 mmol, 1 equiv.) in dry CH_2Cl_2 (225 mL) was added $VO(acac)_2$ (336 mg, 1.27 mmol, 0.05 equiv.) then *t*-BuOOH (13.1 mL, 51.12 mmol, 2 equiv. 3.90 M in *iso*-octane). The reaction was stirred overnight and aqueous solution of KI (2%) and aqueous 10% $Na_2S_2O_3$ were added. The mixture was stirred for further 15 minutes and the layers were separated. The aqueous phase was extracted with AcOEt and the combined organic layers were dried over $MgSO_4$, filtered and concentrated in vaccuo. The crude mixture was then purified on silica gel (Et_2O/petroleum ether– 30% to 50%) to afford epoxyalcohol **I-14**(4.476 g, 19.80 mmol, 77%) as clear oil. The diastereoselectivity of the reaction was determined to be <99:1 by GC analysis on the crude material in comparison with a pseudo equimolar mixture of diastereomers obtained by epoxidation with mCPBA. **$[\alpha]^{20}_D$ =** +20.4 (*c* = 0.88, $CHCl_3$)**. IR** (neat): ν = 2168, 1249, 994, 837, 759, 698, 650 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ = δ 3.72 (ddt, *J* = 8.3, 5.5, 4.6 Hz, 1H), 3.17 – 3.11 (m, 1H), 3.10 – 3.03 (m, 1H), 2.68 (qd, *J* = 7.0, 4.8 Hz, 1H), 2.24 (d, *J* = 5.6 Hz, 1H), 1.85 (ddd, *J* = 14.5, 5.0, 4.4 Hz, 1H), 1.74 (ddd, J = 14.5, 8.3, 7.2 Hz, 1H), 1.30 (d, *J* = 5.4 Hz, 3H), 1.23 (d, *J* = 7.0 Hz, 3H), 0.16 (s, 9H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 107.32, 87.80, 72.87, 54.78, 52.17, 33.94, 32.15, 16.74, 13.43, 0.23. **HRMS** (ESI): *m/z*: calcd for $C_{12}H_{22}O_2SiNa$ $[M+Na]^+$: 249.1287, found 249.1282.



PEAK LIST
JF-1-39_1.raw
RT: 10.24 - 11.40
Number of detected peaks: 5

Apex RT	Start RT	End RT	Area	%Area	Height	%Height
10.41	10.31	10.56	68519	0.85	8534	0.26
10.66	10.58	10.75	45935	0.57	6734	0.21
10.92	10.86	10.94	174037	2.15	103451	3.15
11	10.94	11.15	7637514	94.25	3129089	95.32
11.2	11.16	11.29	177561	2.19	34883	1.06

PEAK LIST
JF-1-34_2.raw
RT: 10.24 - 11.40
Number of detected peaks: 6

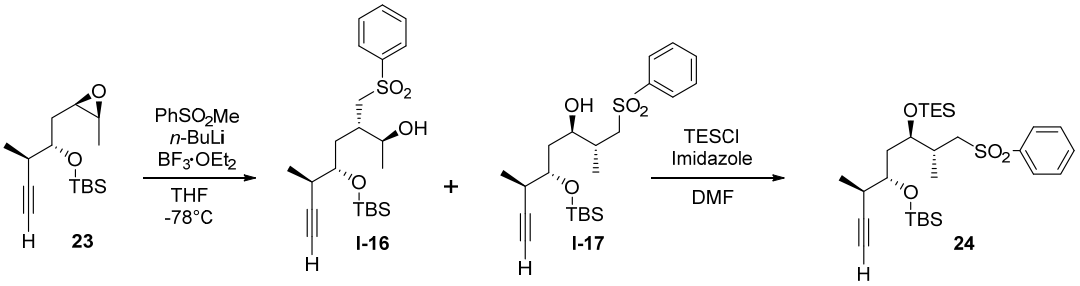
Apex RT	Start RT	End RT	Area	%Area	Height	%Height
10.39	10.32	10.55	247469	3.84	53613	2.13
10.62	10.57	10.68	186405	2.89	60233	2.39
10.7	10.68	10.85	70701	1.1	16848	0.67
10.94	10.88	10.97	296204	4.59	145975	5.8
11.01	10.97	11.14	2887379	44.76	1226981	48.74
11.19	11.15	11.8	2763025	42.83	1013595	40.27

To a solution of epoxyacohol **I-14** (2.772 g, 12.26 mmol, 1 equiv.) in DMF (11 mL) was added TBSCl (2.214 g, 14.71 mmol, 1.2 equiv.) and imidazole (1.66 g, 24.52 mmol, 2 equiv.). The mixture was stirred overnight at rt, and the reaction was quenched with water and extracted with Et_2O. The organic phase was then washed with brine, dried over $MgSO_4$, filtered and concentrated under reduced pressure. The residue was then purified on silica gel (Et_2O/petroleum ether: 0 to 5%) to yield protected alcohol **I-15** (3.391 g, 10.15 mmol, 83%) as colorless oil. **$[\alpha]^{20}_D$ =** –1.8 (*c* = 3.7, $CHCl_3$)**. ^{1}H NMR** (300 MHz, $CDCl_3$) δ = 3.86 (ddd, *J* = 7.3, 4.9, 4.1 Hz, 1H), 3.12 – 2.93 (m, 2H), 2.67 (qd, *J* = 7.0, 4.1 Hz, 1H), 1.91 – 1.70 (m, 2H), 1.30 (d, *J* = 5.5 Hz, 3H), 1.16 (d, *J* = 7.0 Hz, 3H), 0.90 (s, 9H), 0.12 (s, 9H), 0.08 (s, 3H), 0.07 (s, 3H). **^{13}C NMR** (75 MHz, $CDCl_3$): δ = 108.86, 86.30, 72.75, 54.81, 52.55, 33.49, 31.32, 25.90 (3C), 18.16, 14.86, 13.43, 0.25, -4.34, -4.49. **HRMS** (ESI): *m/z*: calcd for $C_{18}H_{37}O_2Si_2$ $[M+H]^+$: 341.2332, found 341.2333.

Protected alkyne **I-15** (137 mg, 0.402 mmol, 1 equiv.) was dissolved into dry MeOH (4 mL) and K_2CO_3 (277 mg, 2.01 mmol, 5 equiv.) was added in one portion at 0 °C. The mixture was stirred at room temperature for 2 h. The reaction was quenched with water, extracted with Et_2O. The combined organics layers were washed with brine, dried over $MgSO_4$, filtered and concentrated under reduced pressure. Chromatography on silica gel (Et_2O/petroleum ether: 5%) yielded the terminal alkyne **23** (103 mg, 0.386 mmol, 96%) as colorless oil. **$[\alpha]^{20}_D$ =** –7.5 (*c* = 5.8, $CHCl_3$)**. IR** (neat): ν = 3313, 2957, 2930, 2857, 1473, 1376, 1253, 1132, 1101,

833, 774, 634 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ = 3.86 (ddd, *J* = 7.0, 5.0, 4.2 Hz, 1H), 3.08 – 2.95 (m, 2H), 2.66 (qdd, *J* = 7.2, 4.2, 2.5 Hz), 2.04 (d, *J* = 2.5 Hz, 1H), 1.90 – 1.69 (m, 2H), 1.27 (d, *J* = 5.7 Hz, 3H), 1.18 (d, *J* = 7.2 Hz, 3H), 0.89 (s, 9H), 0.07 (s, 3H), 0.06 (s, 3H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 86.08, 72.71, 70.21, 54.55, 52.42, 32.21, 31.54, 25.90 (3C), 18.15, 15.11, 13.42, -4.43, -4.49. **HRMS** (ESI): *m/z*: calcd for $C_{15}H_{28}O_2SiNa$ [M+Na]$^+$: 291.1756, found 291.1749.

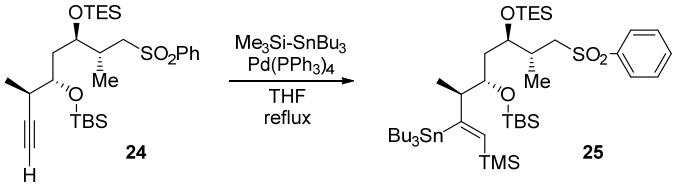
Compound **24**



To a cooled (–78 °C) solution of methylphenylsulfone (3.18 g, 20.36 mmol, 2 equiv.) in dry THF (100 mL), was added dropwise *n*BuLi (8.15 mL, 20.36 mmol, 2 equiv. 2.5 M in hexanes). After 15 minutes at this temperature, solution of epoxide **23** (2.75 g, 10.18 mmol, 1 equiv.) in THF (20 mL) was added, followed by BF_3•OEt_2 (1.29 mL, 10.18 mmol, 1 equiv.). After 30 min, the mixture was quenched with saturated solution of $NaHCO_3$, then extracted with Et_2O, dried over $MgSO_4$, filtered and concentrated on reduced pressure. Pentane was added to the crude mixture and excess of unreacted methylphenylsulfone was removed by filtration. Successive purification on silica gel (AcOEt/petroleum ether– 20%) afforded desired alcohol **I-15** (3.08 g, 7.23 mmol, 71%), and its regioisomer **I-16** (1.27 g, 2.98 mmol, 29%) as colorless oil. Compound **I-16:** **$[\alpha]^{20}_D$ =** +4.6 (*c* = 3.6, $CHCl_3$). **IR** (neat): ν = 3400, 2976, 2930, 1447, 1303, 1148, 1085, 741, 666, 623 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ = 7.92 (m, 2H), 7.67 – 7.60 (m, 1H), 7.55 (m, 2H), 3.93 (m, 1H), 3.87 (ddd, J = 8.6, 7.4, 3.7 Hz, 1H), 3.28 (dd, *J* = 14.5, 5.6 Hz, 1H), 3.16 (dd, *J* = 14.5, 5.2 Hz, 1H), 2.59 (qdd, *J* = 7.0, 3.7, 2.5 Hz, 1H), 2.41 (s, 1H, OH), 2.21 (dqd, *J* = 7.7, 5.3, 4.7 Hz, 1H), 2.05 (d, *J* = 2.5 Hz, 1H), 1.80 (ddd, *J* = 14.3, 7.7, 3.3 Hz, 1H), 1.67 (ddd, *J* = 14.3, 8.6, 4.7 Hz, 1H), 1.14 (d, *J* = 6.3 Hz, 3H), 1.11 (d, *J* = 7.0 Hz, 3H), 0.85 (s, 9H), 0.07 (s, 3H), 0.06 (s, 3H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 140.19, 133.76, 129.41 (2C), 127.89 (2C), 86.03, 72.52, 70.55, 68.79, 57.48, 37.93, 33.94, 32.18, 25.91 (3C), 20.36, 18.08, 13.91, -4.37. **HRMS** (ESI): *m/z*: calcd for $C_{22}H_{36}O_4SiSNa$ [M+Na]$^+$: 447.2001, found 447.1996. Compound **I-17:** **$[\alpha]^{20}_D$ =** –19.6 (*c* = 2.9, $CHCl_3$). **IR** (neat): ν = 3400, 2976, 2930, 1447, 1303, 1148, 1085, 741, 666, 623 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ = 7.96 – 7.89 (m, 2H), 7.68 – 7.60 (m, 1H), 7.59 – 7.52 (m, 2H), 3.99 (dt, *J* = 9.1, 3.7 Hz, 1H), 3.56 (ddd, *J* = 9.4, 5.4, 1.7 Hz, 1H), 3.43 (dd, *J* = 14.3, 2.8 Hz, 1H), 3.02 (bs, 0.6H, OH), 2.93 (dd, *J* = 14.3, 9.1 Hz, 1H), 2.64 (qdd, *J* = 7.0, 3.7, 2.5 Hz, 1H), 2.12 (dqdd, *J* = 9.3, 7.2, 5.4, 2.8 Hz, 1H), 2.07 (d, *J* = 2.5 Hz, 1H), 1.83 (ddd, *J* = 14.3, 3.8, 2.0 Hz, 1H), 1.66 (brs, 0.4H, OH), 1.46 (dt, *J* = 14.3, 9.5 Hz, 1H), 1.16 (d, *J* = 7.0 Hz, 3H), 1.13 (d, *J* = 7.2 Hz, 3H), 0.87 (s, 9H), 0.09 (s, 3H), 0.09 (s, 3H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 140.29, 133.66, 129.39 (2C), 128.00 (2C), 85.55, 74.70, 74.28, 70.75, 58.42, 35.48, 34.99, 31.83, 25.87 (3C), 18.02, 17.02, 13.83, -4.15, -4.68. **HRMS** (ESI): *m/z*: calcd for $C_{22}H_{36}O_4SSiNa$ [M+Na]$^+$: 447.2001, found 447.1996.

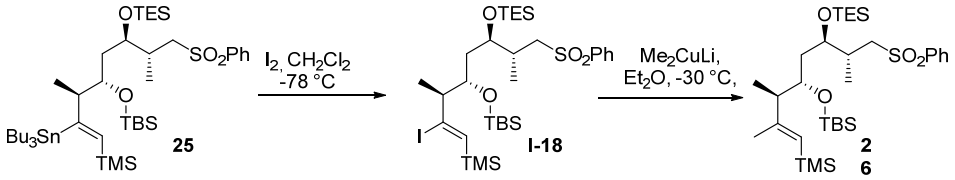
Alcohol **I-15** (3.03 g, 7.113 mmol, 1 equiv.) was dissolved into dry DMF (20 mL) and TESCl (1.6 g, 10.7 mmol, 1.5 equiv.) was added, followed by imidazole (1.93 g, 28.4 mmol, 4 equiv.). After consumption of the starting material as visualized by TLC monitoring, the mixture was hydrolysed with water and extracted with Et_2O. The combined organic phases were washed with brine, dried over $MgSO_4$, filtered then concentrated in vaccuo. Purification on silica gel (Et_2O/petroleum ether: 10%) yielded TES ether **24**(3.68 g, 6.81 mmol, 96%) as colorless oil. **$[\alpha]^{20}_D$** = –29.7 (*c* = 1.6, $CHCl_3$)**. IR** (neat): ν = 2956, 2878, 1447, 1305, 1256, 1149, 1110, 1084, 1004, 955, 833, 774 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ = 7.95 – 7.90 (m, 2H), 7.68 – 7.61 (m, 1H), 7.60 – 7.52 (m, 2H), 3.74 (ddd, *J* = 8.2, 5.7, 2.4 Hz, 1H), 3.57 (dt, *J* = 8.1, 3.7 Hz, 1H), 3.23 (dd, *J* = 14.4, 2.5 Hz, 1H), 2.92 (dd, *J* = 14.4, 9.7 Hz, 1H), 2.53 (qdd, *J* = 6.8, 3.7, 2.4 Hz, 1H), 2.14 (m, 1H), 2.05 (d, *J* = 2.4 Hz, 1H), 1.69 (ddd, *J* = 13.9, 8.1, 4.0 Hz, 1H), 1.58 (ddd, *J* = 13.9, 8.2, 5.7 Hz, 1H), 1.17 (d, *J* = 6.8 Hz, 3H), 1.12 (d, *J* = 7.0 Hz, 3H), 0.92 (t, *J* = 7.9 Hz, 9H), 0.86 (s, 9H), 0.54 (q, *J* = 7.9 Hz, 6H), 0.00 (s, 3H), –0.03 (s, 3H) ppm. **^{13}C NMR** (75 MHz, $CDCl_3$) δ 140.24, 133.61, 129.40 (2C), 128.10 (2C), 85.94, 72.99, 70.56, 70.52, 57.51, 37.14, 32.14, 31.88, 25.88 (3C), 18.09, 17.02, 14.50, 7.02 (3C), 5.16 (3C), -4.32, -4.45. **HRMS** (ESI): *m/z*: calcd for $C_{28}H_{50}O_4Si_2SNa$ [M+Na]$^+$: 561.2866, found 561.2859.

Compound **25**



To a solution of alkyne **24** (3.60 g, 6.607 mmol, 1 equiv.) in THF (20 mL) was added trimetylsilyl-tributylstannane (2.80 mL, 8.00 mmol, 1.2 equiv.) followed by $Pd(PPh_3)_4$ (455 mg, 1.0 mmol, 0.15 equiv.) and warmed to reflux during 12 h. After this, the reaction was cooled to room temperature, concentrated and purified on silica gel (Et_2O/petroleum ether: 5 to 8%) to obtain desired vinylstannane **25** (4.7 g, 5.20 mmol, 78%) as colorless oil. **$[\alpha]^{20}_D$** = –43.6 (*c* = 1.4, $CHCl_3$). **IR** (neat): ν = 2955, 2929, 2855, 1461, 1306, 1247, 1150, 1084, 1002, 832, 773, 744 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ = 7.93 – 7.86 (m, 2H), 7.68 – 7.60 (m, 1H), 7.55 (m, 2H), 6.75 (s, J_{Sn-H} = 187 Hz, 1H), 3.76 – 3.61 (m, 2H), 3.03 (dd, *J* = 14.4, 1.5 Hz, 1H), 2.84 (dd, *J* = 14.4, 9.6 Hz, 1H), 2.42 (qd, *J* = 6.8, 3.8, Hz, 1H), 2.13 (m, 1H), 1.60 (m, 1H), 1.53 – 1.40 (m, 6H), 1.40 – 1.24 (m, 7H), 1.12 (d, *J* = 6.8 Hz, 3H), 1.00 – 0.75 (m, 36H), 0.53 (q, *J* = 7.9 Hz, 6H), 0.06 (s, 9H), 0.05 (s, 3H), 0.02 (s, 3H) ppm. **^{13}C NMR** (75 MHz, $CDCl_3$) δ 166.97, 145.32, 140.39, 133.58, 129.37 (2C), 128.01 (2C), 73.34, 72.42, 57.91, 49.93, 38.73, 32.36, 29.43 ($^3J_{Sn-C}$ = 19.3 Hz, 3C), 27.74 ($^2J_{Sn-C}$ = 71 Hz, 3C), 26.17 (3C), 18.34, 17.52, 17.24, 13.82 (3C), 11.87 (3C), 7.09 (3C), 5.30 (3C), 0.52 (3C), -3.61, -4.04. **HRMS** (ESI): *m/z*: calcd for $C_{43}H_{86}O_4Si_3S^{120}SnNa$ $[M+Na]^+$: 925.4474, found 925.4479.

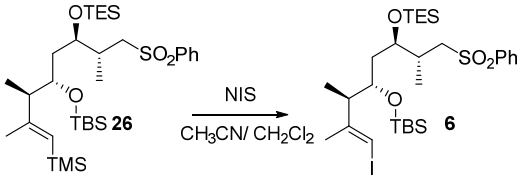
Compound **26**



To a cooled (–78 °C) solution of vinylstannane **25** (4.61 g, 5.19 mmol, 1 equiv.) in CH_2Cl_2 (5 mL) was added dropwise a solution of iodine (5.66 mL, 5.66 mmol, 1.1 equiv. 1 M in CH_2Cl_2). After persistent coloration of the solution and consumption of the starting material, the mixture was quenched by a solution of 10% $Na_2S_2O_3$. After separation of the phases, the aqueous layer was extracted with Et_2O, the organic phases were combined, dried over $MgSO_4$, filtered and concentrated. The residue was then purified on a silica gel column chromatography (Et_2O/petroleum ether–10%) to afford vinyl iodine **I-18** (3.64 g, 4.94 mmol, 96%) as pale yellow oil. **$[\alpha]^{20}_D$ =** –37.1 (*c* = 1.7, $CHCl_3$). **IR** (neat): ν = 2954, 1587, 1147, 1304, 1247, 1147, 1084, 1004, 833, 775, 745 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$): δ = 7.95 (m, 2H), 7.67 – 7.60 (m, 1H), 7.54 (m, 2H), 6.55 (s, 1H), 4.03 (dt, *J* = 9.1, 4.1 Hz, 1H), 3.79 (ddd, *J* = 8.1, 5.6, 2.3 Hz, 1H), 3.09 (dd, *J* = 14.1, 2.0 Hz, 1H), 2.94 (dd, *J* = 14.1, 10.4 Hz, 1H), 2.65 (qd, *J* = 6.8, 4.1 Hz, 1H), 2.29 (m, 1H), 1.47 (ddd, *J* = 14.1, 9.1, 5.6 Hz, 1H), 1.31 (ddd, *J* = 14.1, 8.1, 4.1 Hz, 1H), 1.22 (d, *J* = 6.8 Hz, 3H), 1.05 (d, *J* = 6.8 Hz, 3H), 0.93 (t, *J* = 7.9 Hz, 9H), 0.88 (s, 9H), 0.54 (q, *J* = 7.9 Hz, 6H), 0.13 (s, 9H), 0.09 (s, 3H), 0.06 (s, 3H) ppm. **^{13}C NMR** (75 MHz, $CDCl_3$) δ 140.67, 138.01, 133.52, 129.38 (2C), 128.05 (2C), 124.20, 73.27, 70.95, 57.70, 56.24, 35.59, 32.30, 25.99 (3C), 18.13, 17.02, 14.56, 7.05 (3C), 5.18 (3C), -0.94 (3C), -4.03, -4.28. **HRMS** (ESI): *m/z*: calcd for $C_{31}H_{59}O_4SSi_3INa$ $[M+Na]^+$: 761.2384, found 761.2382.

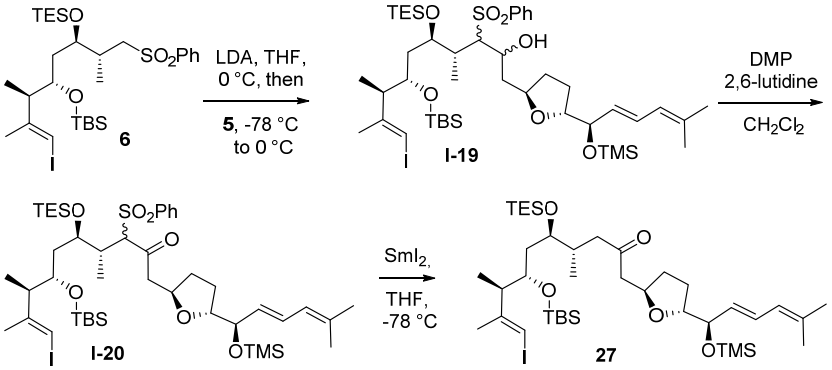
To a cooled (–30 °C) suspension of CuI (3.89 g, 20.47 mmol, 4.2 equiv.) in Et_2O (40 mL) was added dropwise MeLi (24.3 mL, 38.9 mmol, 8 equiv. 1.6 M in Et_2O) over 15 minutes. CuI was dissolving while MeLi was added and the solution turned colorless. After 5 min, a solution of vinyl iodine **I-18** (3.60 g, 4.86 mmol, 1 equiv.) in Et_2O (15 mL) was added. After 20 min, aqueous mixture of saturated NH_4Cl: concentrated NH_3 (2:1) was added to the reaction. The reaction medium was then extracted with Et_2O, dried over $MgSO_4$, filtered and concentrated in vaccuo. The crude mixture was then purified on silica gel (Et_2O/petroleum ether– 10%) to give olefin **26** (2.95 g, 4.69 mmol, 97%) as colorless oil. **$[\alpha]^{20}_D$ =** –33.3 (*c* = 0.9, $CHCl_3$). **IR** (neat): ν = 2955, 2878, 2856, 1611, 1412, 1306, 1248, 1150, 1085, 1043, 953, 746 cm^{-1}.**^{1}H NMR** (300 MHz, $CDCl_3$) δ = 7.92 – 7.87 (m, 2H), 7.68 – 7.61 (m, 1H), 7.59 – 7.52 (m, 2H), 5.17 (s, 1H), 3.80 (ddd, *J* = 8.1, 5.0, 3.8 Hz, 1H), 3.71 (ddd, *J* = 7.4, 6.4, 2.1 Hz, 1H), 2.97 (dd, *J* = 14.4, 2.1 Hz, 1H), 2.83 (dd, *J* = 14.4, 9.7 Hz, 1H), 2.29 (qd, *J* = 7.0, 3.8 Hz, 1H), 2.20 (m, 1H), 1.81 (s, 3H), 1.47 (ddd, *J* = 15.7, 8.1, 6.4 Hz, 1H), 1.24 (m, 1H), 1.13 (d, *J* = 6.8 Hz, 3H), 1.00 (d, *J* = 7.0 Hz, 3H), 0.91 (t, *J* = 8.0 Hz, 9H), 0.89 (s, 9H), 0.52 (q, *J* = 8.0 Hz, 6H), 0.07 (s, 12H), 0.04 (s, 3H) ppm. **^{13}C NMR** (75 MHz, $CDCl_3$) δ 156.51, 140.40, 133.62, 129.35 (2C), 127.97 (2C), 124.84, 73.32, 70.67, 58.11, 49.72, 36.63, 32.41, 26.02 (3C), 21.42, 18.17, 17.02, 13.69, 7.04 (3C), 5.20 (3C), 0.25 (3C), -4.19, -4.31. **HRMS** (ESI): *m/z*: calcd for $C_{32}H_{62}O_4Si_3SNa$ $[M+Na]^+$: 649.3574, found 645.3566.

Compound **6**



To a solution of compound **26** (1.137 g, 1.82 mmol, 1.0 equiv.) in a mixture of $MeCN/CH_2Cl_2$ (15/5 mL) was added *N*-iodosuccinimide (613 mg, 2.73 mmol, 1.5 equiv.) and the reaction mixture was stirred 2 h at rt. The reaction mixture was then quenched with a 10% $Na_2S_2O_3$ solution, extracted with Et_2O (x2), dried over $MgSO_4$ and purified on a silica gel column chromatography (5-8% gradient Et_2O in petroleum ether) to give vinyl iodide **6** as colorless oil (1.21 g, 98%). $[\alpha]^{20}_D$ = –35.3 (*c* 1.6, $CHCl_3$). **IR** (neat): *v*= 2956, 1461, 1305, 1254, 1150, 1069, 1043, 1004, 834, 775, 742, 720, 688 cm^{-1}. ^1H NMR (300 MHz, $CDCl_3$) δ 8.01 – 7.91 (m, 2H), 7.70 – 7.51 (m, 3H), 5.95 (brs, 1H), 3.79 (td, *J* = 7.3, 5.6, 3.6 Hz, 1H), 3.74 (dd, *J* = 6.9, 2.5 Hz, 1H), 2.94 (dd, *J* = 14.2, 3.0 Hz, 1H), 2.78 (dd, *J* = 14.2, 8.6 Hz, 1H), 2.51 (qd, *J* = 6.8, 3.6 Hz, 1H), 2.31 (dqdd, *J* = 8.6, 7.0, 3.0, 2.5 Hz, 1H), 1.88 (d, *J* = 0.5 Hz, 3H), 1.47 (dt, *J* = 14.0, 7.0 Hz, 1H), 1.22 (dd, *J* = 14.0, 7.4 Hz, 1H), 1.16 (d, *J* = 6.8 Hz, 3H), 1.05 (d, *J* = 7.0 Hz, 3H), 0.92 (t, *J* = 8.0 Hz, 9H), 0.89 (s, 9H), 0.55 (q, *J* = 8.0 Hz, 6H), 0.07 (s, 3H), 0.05 (s, 3H). ^{13}C NMR (75 MHz, $CDCl_3$) δ 149.71, 140.33, 133.66, 129.49 (2C), 128.10 (2C), 77.35, 72.64, 70.61, 58.21, 47.94, 36.88, 32.36, 25.98 (3C), 23.82, 18.10, 16.75, 14.12, 7.04 (3C), 5.15 (3C), -4.24, -4.32. **HRMS** (ESI) calcd for $C_{29}H_{53}O_4Si_2SINa$ $[M + Na]^+$: 703.2146, found 703.2159.

Compound **27**



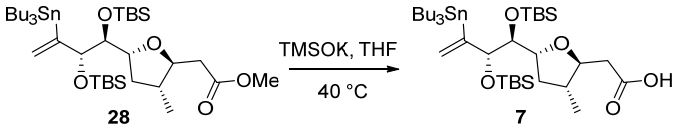
To a solution of sulfone **6** (714 mg, 1.5 mmol, 1.0 equiv., dried by azeotropic distillation with toluene, three time) in THF (7 mL) at 0 °C was added dropwise LDA [2.52 mL, 1.26 mmol, 1.2 equiv., 0.5 M in THF (prepared as followed: dropwise addition of *n*-BuLi (3.125 mL, 5.0 mmol, 1.6M in hexanes) onto diisopropylamine (750 µL, 5.35 mmol) in THF (6.15 mL) at –78°C, followed by slow warming to rt.)]. After 15 min, the yellow reaction mixture was cooled to –78 °C, and aldehyde **5** (373 mg, 1.26 mmol, 1.2 equiv., dried by azeotropic distillation with toluene, three time) in THF (3 mL) was added. The reaction mixture was slowly warmed to 0 °C, stirred 30 min, quenched by saturated NH_4Cl, extracted with Et_2O (x3), dried over $MgSO_4$, filtered and concentrated. The residue was purified on a silica gel chromatography (8-15% gradient Et_2O in petroleum ether) to give, by order of elution, recovered sulfone **6** (140.3 mg, 20%) and sulfone adduct **I-19** (618 mg, 60%, 75% brsm) as a complex mixture of four diastereomers. By consequence, its full characterization was postponed to the next 2 steps. **HRMS** (ESI) calcd for $C_{45}H_{81}O_7Si_2SINa$ $[M + Na]^+$: 999.3953, found 999.3954.

To a solution of sulfone adduct **I-19** (600 mg, 0.744, 1 equiv.), in a CH_2Cl_2/2,6-lutidine mixture (10 mL/2 mL) was added Dess-Martin periodinane (652 mg, 1.54 mmol, 2.5 equiv). After 1 h at rt, the reaction mixture was quenched with saturated $NaHCO_3$ and a solution of 10% $Na_2S_2O_3$. After 15 min the reaction mixture was extracted with Et_2O (x3), washed with saturated $NaHCO_3$, dried over $MgSO_4$, filtered on a pad of silica gel (elution Et_2O) to give crude ketone **I-20**.

The residue containing crude ketone **I-20** was then dissolved in THF (10 mL), cooled to –78 °C and SmI_2 [20 mL, 2.0 mmol, ≈0.1 M in THF, (prepared as followed: addition of CHI_3 (1.31 g, 3.33 mmol) to a suspension of Sm powder (1.2 g, 8.0 mmol) in THF (50 mL), and stirring 18 h at rt] was added dropwise (until a blue/green colour persists in the reaction mixture). The reaction mixture was then quenched with NH_4Cl, extracted with Et_2O (x3), dried over $MgSO_4$, filtered and concentrated. The residue was purified on a silica gel column chromatography to give compound **27** (283 mg, 55%) as colourless oil. $[\alpha]^{20}_D$ = +10.1 (*c* 1.49, $CHCl_3$). **IR** (neat): *v*= 2957, 1713, 1687, 1461, 1379, 1250, 1116, 1068, 1044, 1044, 1005, 959, 838, 775, 745, 724 cm^{-1}. **^1H NMR** (300 MHz, $CDCl_3$) δ 6.41 (dd, *J* = 15.2, 11.1 Hz, 1H), 5.88 (brs, 1H), 5.81 (d, *J* = 11.0 Hz, 1H), 5.50 (dd, *J* = 15.2, 6.2 Hz, 1H), 4.31 (dq, *J* = 8.2, 6.2 Hz, 1H), 4.12 (t, *J* = 5.6 Hz, 1H), 3.92 (q, *J* = 6.7 Hz, 1H), 3.77 (m, 1H), 3.63 (m, 1H), 2.77 (dd, *J* = 15.8, 6.3 Hz, 1H), 2.48 (dd, *J* = 15.8, 6.6 Hz, 2H), 2.34 – 2.14 (m, 2H), 2.23 – 1.99 (m, 2H), 1.92 – 1.64 (m, 2H), 1.82 (s, 3H), 1.76 (s, 3H),

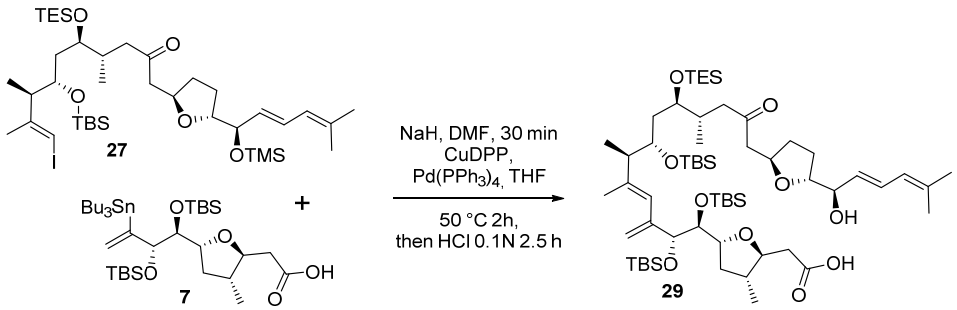
1.75 (s, 3H), 1.53 – 1.38 (m, 2H), 1.35 – 1.19 (m, 1H), 1.06 (d, *J* = 7.0 Hz, 3H), 0.95 (t, *J* = 7.9 Hz, 9H), 0.88 (s, 9H), 0.86 (d, *J* = 6.5 Hz, 3H), 0.59 (q, *J* = 7.7 Hz, 6H), 0.10 (s, 9H), 0.05 (s, 6H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 208.59, 150.01, 135.41, 129.78, 127.93, 124.81, 82.26, 77.35, 75.77, 75.46, 72.37, 71.47, 49.62, 47.59, 45.74, 37.22, 33.33, 3240, 27.60, 26.13, 26.04 (3C), 23.38, 18.44, 18.14, 15.30, 15.10, 7.14 (3C), 5.34 (3C), 0.56 (3C), -4.15, -4.48. **HRMS** (ESI) calcd for $C_{39}H_{75}O_5Si_3INa$ [M + Na]$^+$: 857.3865, found 857.3862.

Compound **7**



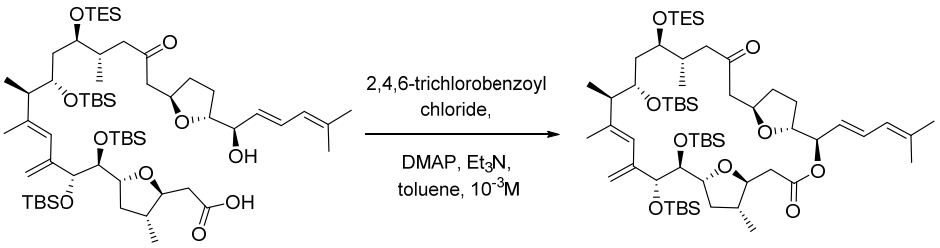
To a solution of stannane **28**[11] (285 mg, 0.354 mmol, 1 equiv.) in THF (2 mL), was added TMSOK (140 mg, 1.06 mmol, 3 equiv.) and the reaction mixture was heated at 40 °C for 90 min. The reaction mixture was quenched by saturated NH_4Cl, extracted with Et_2O (x3), dried over $MgSO_4$, filtered, dried and concentrated under vacuum to afford carboxylic acid **7** as a clear oil (280 mg, 100 %). **$[\alpha]^{20}_D$** = –12.8 (*c* 1.32, $CHCl_3$). **IR** (neat): *v*= 3500-2300 (br), 2928, 1714, 1461, 1251, 1090, 1069, 834, 777, 660 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 11.5-8.0 (brs, 1H, COOH), 6.00 (t, *J* = 2.0 Hz, $^3J_{Sn-H}$ = 131.3 Hz, 1H), 5.26 (t, *J* = 2.0 Hz, $^3J_{Sn-H}$ = 63.8 Hz,1H), 4.37 (t, *J* = 3.5, 2.0 Hz, $^3J_{Sn-H}$ = 21.2 Hz, 1H), 4.11 (dt, *J* = 10.8, 6.0 Hz, 1H), 3.65 (ddd, *J* = 9.5, 6.7, 4.3 Hz, 1H), 3.61 (dd, *J* = 7.1, 1.5 Hz, 1H), 2.64 (dd, *J* = 15.5, 3.6 Hz, 1H), 2.47 (dd, *J* = 15.5, 6.8 Hz, 1H), 2.00 (quint, *J* = 6.1 Hz, 1H), 1.87 (m, 1H), 1.60 – 1.40 (m, 6H), 1.32 (sext, *J* = 7.3 Hz, 6H), 1.25 (m, 1H), 1.07 – 0.82 (m, 15H), 0.91 (s, 9H), 0.90 (s, 9H), 0.88 (d, *J* ≈ 5.5 Hz, 3H), 0.09 (s, 6H), 0.08 (s, 3H), -0.00 (s, 3H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 173.64, 153.27, 125.87, 82.42 ($^2J_{Sn-C}$ = 59.0 Hz), 80.50, 80.14, 78.51, 40.11, 38.99, 38.15, 29.25 ($^3J_{Sn-C}$ = 18.2 Hz, 3C), 27.62 ($^2J_{Sn-C}$ = 59.2 Hz, 3C), 26.41 (3C), 26.25 (3C), 18.65, 18.57, 15.84, 13.85 (3C), 10.19 ($^1J_{Sn-C}$ = 321.4, 337.1 Hz, 3C), -3.73, -3.97, -4.27 (2C). **HRMS** (ESI) calcd for $C_{35}H_{72}O_5Si_2Na$ [M + Na]$^+$: 771.3.3865, found 771.3844.

Compound **29**



To a solution of carboxylic acid **7** (364 mg, 0.487 mmol, 1.5 equiv) in DMF (10 mL) was added NaH (20 mg, 0.487 mmol, 1.5 equiv, 60% in mineral oil) at rt. After 30 min, a solution of vinyl iodide **27** (271 mg, 0.3245 mmol, 1.0 equiv.) in THF (2.5 mL) was added followed by the simultaneous addition of copper (I) diphenylphosphinate (363 mg, 1.298 mmol, 4 equiv.), $Pd(PPh_3)_4$ (168 mg, 0.163 mmol, 0.5 equiv.). After 2 h at 50 °C, the reaction mixture was quenched with HCl 0.1 N (10 mL) and the reaction mixture was vigourously stirred for 2 h at rt. The reaction mixture was filtered on a pad of celite and washed with AcOEt, extracted with AcOEt (x3), washed with brine (x2), dried over $MgSO_4$, filtered and concentrated. The residue was loaded on a silica gel column chromatography (20-50% gradient AcOEt/petroleum ether) to give by order of elution, recovered TMS-cleaved compound derived from **27** (51.1 mg, 14 %) and seco acid **29** (254 mg, 72 %) as light yellow oil. **$[\alpha]^{20}_D$** = +22.7 (*c* 1.98, $CHCl_3$). **IR** (neat): *v*= 3300 (br), 3500-2500 (br), 2956, 1713, 1535, 1461, 1253, 1102, 1072, 1047, 1005, 835, 776 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 6.53 (dd, *J* = 15.1, 10.8 Hz, 1H), 5.83 (d, *J* = 10.8 Hz, 1H), 5.67 (brs, 1H), 5.46 (dd, *J* = 15.1, 6.7 Hz, 1H), 5.31 (brs, 1H), 4.95 (brs, 1H), 4.44 – 4.28 (m, 1H), 4.11 (brs, 1H), 4.19 – 4.01 (m, 1H), 3.97 (t, *J* = 7.0 Hz, 2H), 3.92 – 3.81 (m, 2H), 3.79 – 3.64 (m, 2H), 3.58 (dd, *J* = 7.1, 1.7 Hz, 1H), 2.76 (dd, *J* = 16.3, 5.6 Hz, 1H), 2.65 (dd, *J* = 15.4, 3.8 Hz, 1H), 2.58 – 2.42 (m, 2H), 2.41 – 2.29 (m, 1H), 2.29 – 2.08 (m, 4H), 2.04 – 1.87 (m, 2H), 1.79 (s, 6H), 1.78 (s, 3H), 1.76 – 1.62 (m, 1H), 1.61 – 1.46 (m, 2H), 1.46 – 1.21 (m, 3H), 1.09 (d, *J* = 6.9 Hz, 3H), 1.03 (d, *J* = 7.3 Hz, 8H), 0.99 (t, *J* = 8.0 Hz, 9H), 0.85 (d, J = 6.0 Hz, 3 H), 0.93 (s, 9H), 0.92 (s, 9H), 0.91 (s, 9H), 0.89 (d, *J* = 6.3 Hz, 3H), 0.62 (q, *J* = 8.0 Hz, 6H), 0.10 (s, 3H), 0.09 (s, 6H), 0.07 (s, 3H), 0.06 (s, 3H), 0.03 (s, 3H). **^{13}C NMR** (75 MHz, $CDCl_3$) δ 208.67, 175.42, 145.55, 141.44, 136.49, 129.44, 128.12, 125.51, 124.55, 114.76, 82.28, 80.30, 80.14, 79.13, 78.74, 75.51, 75.06, 72.91, 71.86, 49.12, 47.74, 45.42, 40.20, 38.72, 38.01, 37.63, 33.52, 32.33, 28.07, 26.24 (3C), 26.09 (4C), 26.05 (3C), 23.97, 18.46 (2Cq, 1CH_3), 18.14, 17.30, 16.04, 15.84, 14.35, 7.11, 5.33, -4.16, -4.23, -4.34, -4.40, -4.62 (2C). **HRMS** (ESI) calcd for $C_{59}H_{112}O_{10}Si_4Na$ [M + Na]$^+$: 1115.7230, found 1115.7231.

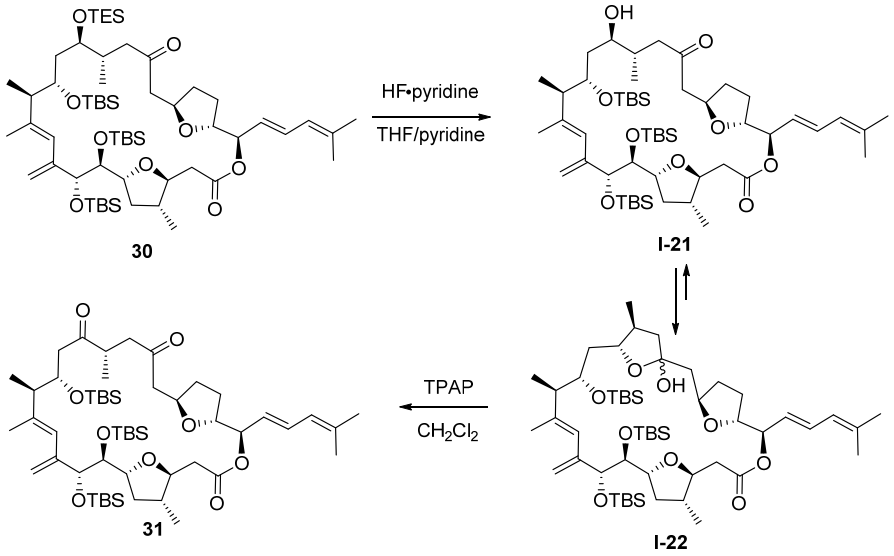
Compound **30**



29 **30**

To a solution of 2,4,6-trichlorobenzoyl chloride (128 µL, 0.815 mmol, 3 equiv.), DMAP (148 mg, 1.22 mmol, 3 equiv.) and Et_3N (170 µL, 1.22 mmol, 6 equiv.) in toluene (200 mL) was added a solution of seco-acid **29** (223 mg, 0.204 mmol, 1 equiv.) in toluene (20 mL) via a syringe pump over 10 h at 50 °C and the stirring was continued for 6 h. The reaction mixture was quenched with water, and the organic layer was washed with NH_4Cl, dried over $MgSO_4$, filtered, and concentrated. The residue was purified on a silica gel chromatography (8-12% gradient Et_2O in petroleum ether) to give macrolactone **30** (89 mg, 41%) as colorless oil. The macrolactone exists as a mixture of at least two major conformers in a 3:1 ratio in solution. **$[\alpha]^{25}_D$** = +37.0 (*c* 0.27, $CHCl_3$). **IR** (neat): *v*= 2958, 1743, 1720, 1253, 1127, 1099, 1069, 1004, 836, 776 cm^{-1}. **^{1}H NMR** (400 MHz, $CDCl_3$, mixture of 2 conformational isomers exists in about 3:1 ratio) δ 6.51 (dd, *J* = 14.8, 11.1 Hz, 1H), 6.04 (brs, 0.75H, major conformer), 6.00 (brs, 0.25H, minor conformer), 5.77 (d, *J* = 11.1 Hz, 1H), 5.36 (m, 1H), 5.24 (brt, *J* = 8.0 Hz, 0.75H, major conformer), 5.17 (t, *J* = 8.5 Hz, 0.25H, minor conformer), 5.05 (brs, 0.75H, major conformer), 4.92 (brs, 0.25H, minor conformer), 4.86 (brs, 1H), 4.15-4.04 (m, 1.75H, 1H + 1 major conformer), 4.00-3.90 (m, 1.25H, 1H +1 minor conformer), 3.90-3.77 (m, 2H), 3.65 (brs, 0.25H, minor conformer), 3.56 (m, 1.75H, 1H + 1 major conformer), 3.47 (m, 1H), 2.96 (dd, *J* = 17.2, 3.0 Hz, 0.25H, minor conformer), 2.87 (d, *J* = 16.4 Hz, 0.75H, major conformer), 2.68 – 2.00 (m, 11H), 1.99 – 1.86 (m, 1H), 1.76 (s, 3H), 1.75 (s, 6H), 1.61 (m, 1H), 1.47 – 1.12 (m, 3H), 1.08 (d, *J* = 6.9 Hz, 3H), 1.00 (d, *J* = 6.5 Hz, 3H), 0.96 (t, *J* = 7.9 Hz, 9H), 0.89 (s, 9H), 0.89 (s, 9H), 0.87 (s, 9H), 0.83 (d, *J* = 6.3 Hz, 2.25H, major conformer), 0.79 (d, *J* = 6.8 Hz, 0.75 H, minor conformer), 0.59 (q, *J* = 7.9 Hz, 6H), 0.09 (s, 3H), 0.07 (s, 3H), 0.05 (s, 6H), 0.04 (s, 3H), -0.01 (s, 3H). **^{13}C NMR** (101 MHz, $CDCl_3$, mixture of 2 conformational isomers exists in about 3:1 ratio) δ 206.95, 206.71 (2 conformers); 170.57, 169.34 (2 conformers); 147.16, 146.55 (2 conformers); 141.09; 138.00, 137.93 (2 conformers); 131.94, 131.89 (2 conformers); 128.94, 128.79 (2 conformers); 124.74; 124.30; 114.00, 113.34 (2 conformers); 83.20, 83.03 (2 conformers); 80.77; 79.59; 79.09, 78.80 (2 conformers); 77.40, 76.78 (2 conformers); 76.64, 75.83 (2 conformers); 74.32, 73.99 (2 conformers); 73.28, 72.94 (2 conformers); 72.65, 72.50 (2 conformers); 49.10, 48.08 (2 conformers); 46.86, 46.29 (2 conformers); 46.49; 38.92, 38.61 (2 conformers); 38.03, 37.86 (2 conformers); 37.74, 35.91 (2 conformers); 37.39; 33.38; 33.06, 32.37 (2 conformers); 28.73, 28.33 (2 conformers), 26.45 (3C); 26.15; 26.07 (6C); 18.71; 18.59; 18.56, 18.44; 18.16; 16.61, 16.35 (2 conformers); 16.02, 15.80 (2 conformers); 13.48; 7.09 (3C); 5.26 (3C); -4.15, -4.18 (2 conformers); -4.42 (2C); -4.55; -4.63, -4.72 (2 conformers); -4.79, -4.93 (2 conformers). **HRMS** (ESI) calcd for $C_{59}H_{110}O_9Si_4Na$ $[M + Na]^+$: 1097.7125, found 1097.7128.

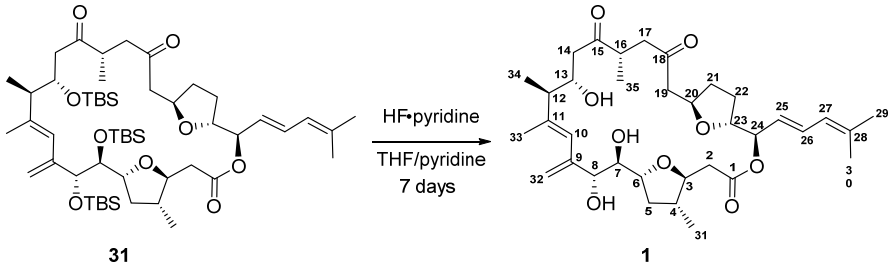
Compound **31**



To a solution of macrolactone **30** (34 mg, 31.7 µmol, 1 equiv.) in THF (600 µL) in a plastic vial was added HF•pyridine [500 µL, 2.2 mmol, 70 equiv., 4.5 M in THF/pyridine (prepared from HF•pyridine complex: pyridine: THF, 0.5:1:2.5 mL)]. After 2 h at rt, the reaction mixture was poured into an erlenmeyer containing saturated $NaHCO_3$. The reaction mixture was then stirred for 5 min and was extracted with Et_2O (x3), dried on $MgSO_4$, filtered and concentrated. The residue was purified on a silica gel chromatography (20% Et_2O in petroleum ether) to afford macrolactone **I-21** (29.1 mg, 96%) as colorless oil. The product is in fact a mixture of three compounds (hydroxylketone **I-21** and two hemi-ketals **I-22**), and each gives probably a mixtures of conformers on NMR spectra. By consequence this compound was hardly characterizable by this technique. Nevertheless, absence of ketone absorption band at ≈1715 cm^{-1} indicates the hemi-ketal is the major form. **IR** (neat): *v*= 3400 (br), 2957, 1738, 1472, 1461, 1361, 1252, 1096, 1077, 835, 775 cm^{-1}. **HRMS** (ESI) calcd for $C_{53}H_{96}O_9Si_3Na$ $[M + Na]^+$: 983.6260, found 983.6273.

To a solution of a mixture of compound **I-21**/**I-22** (14.5 mg, 14 µmol, 1 equiv.) in CH_2Cl_2 was added TPAP (14.7 mg, 42 µmol, 3 equiv.) in 3 portions over 20 min. After 2.5 h at rt the reaction mixture was diluted with Et_2O and filtered on Celite. After concentration the residue was purified on a silica gel column (20% Et_2O in petroleum ether) to give diketone **31** (10.8 mg, 74%) as colorless oil. The macrolactone exists as a mixture of more than two conformers into solution. As a consequence characterization of the compound by ^{13}C NMR was difficult and we were not able to identify and attribute clearly all the peaks. $\mathbf{[\alpha]^{20}_D}$ = +8.6 (*c* 0.7, $CHCl_3$). **IR** (neat): *v*= 2956, 1740, 1706, 1461, 1253, 1073, 1036, 836, 777 cm^{-1}. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 6.51 (dd, *J* = 15.1, 11.0 Hz, 1H), 5.98 (brs, 0.25H), 5.75 (brd, *J* = 11.0 Hz, 1H), 5.65 – 5.24 (m, 1.75H), 5.22 – 4.87 (m, 3H), 4.68 – 4.29 (m, 1H), 4.33 – 4.14 (m, 1H), 4.16 – 4.00 (m, 2H), 4.01 – 3.79 (m, 1H), 3.79 – 3.62 (m, 1H), 3.62 – 3.41 (m, 1H), 3.10 – 2.79 (m, 2H), 2.80 – 2.23 (m, 6H), 2.20 – 1.83 (m, 3H), 1.76 (brs, 9H), 1.68 – 1.50 (m, 3H), 1.39 – 1.04 (m, 3H), 1.08 (d, *J* = 6.6 Hz, 3H), 1.03 – 0.67 (m, 33H), 0.15 – -0.05 (m, 18H). **HRMS** (ESI) calcd for $C_{59}H_{110}O_9Si_4Na$ $[M + Na]^+$: 981.6103, found 981.6099.

Amphidinolide F (1)



31 **1**

Compound **35** (8.0 mg, 8.37 µmol) was placed in a polypropylene vial and HF•pyridine in THF [2 mL (prepared from HF•pyridine complex: pyridine: THF, 1:2:1 mL)] was added. After 7 days at rt, the vial was poured into saturated $NaHCO_3$ and washed with AcOEt. The aqueous layer was extracted with AcOEt (x4), and the combined organic phases were dried over $MgSO_4$, filtered and concentrated. The residue was purified on a silica gel column (20-30% gradient acetone in hexanes) to give **amphidinolide F** (**1**) (1.4 mg, 27%) as a white waxy solid. Spectroscopic data were in agreement with other total syntheses [13,14] and with natural product[15] $[\alpha]^{20}_D$ = –65.0 (*c* 0.065, $CHCl_3$). **IR** (neat): *v*= 3400(br), 2921, 1742, 1710, 1459, 1378, 1261, 1092, 1018, 910, 819, 800, 733 cm^{-1}. **^{1}H NMR** (800 MHz, $CDCl_3$, 1.4 mg in 220 µL) δ 6.52 (dd, *J* = 15.0, 11.1 Hz, 1H, H_{26}), 6.00 (s, 1H, H_{10}), 5.77 (d, *J* = 11.1 Hz, 1H, H_{27}), 5.35 (dd, *J* = 14.9, 8.1 Hz, 1H, H_{25}), 5.21 (t, *J* = 8.2 Hz, 1H, H_{24}), 5.17 (s, 1H, H_{32cis}), 4.96 (s, 1H, $H_{32trans}$), 4.35 (tdd, *J* = 8.0, 6.4, 4.0 Hz, 1H, H_{20}), 4.14 (brs, 1H, H_8), 4.09 (q, *J* = 7.3 Hz, 1H, H_{23}), 3.97 – 3.87 (brs, 1H, OH), 3.94 (td, *J* = 8.9, 2.0 Hz, 1H, H_{13}), 3.84 (m, 1H, H_6), 3.81 (td, *J* = 9.5, 2.3 Hz, 2H, H_3), 3.59 – 3.43 (brs, 1H, OH), 3.55 (brs, 1H, H_7), 3.13 (m, 1H, H_{16}), 3.06 (dd, *J* = 17.6, 8.9 Hz, 1H, H_{17a}), 2.75 (dd, *J* = 15.3, 9.2 Hz, 1H, H_{14a}), 2.71 (dd, *J* = 15.9, 8.5 Hz, 1H, H_{19a}), 2.54 (dd, *J* = 15.3, 1.7 Hz, 1H, H_{14b}), 2.53 (dd, *J* = 15.7, 9.0 Hz, 1H, H_{2a}), 2.50 (dd, *J* = 15.9, 3.1 Hz, 1H, H_{19b}), 2.49 (dd, *J* = 15.7, 2.4 Hz, 1H, H_{2b}), 2.34 (dd, *J* = 17.6, 4.2 Hz, 2H, H_{17b}), 2.28 (quint, *J* = 7.3 Hz, 1H, H_{12}), 2.09 (dt, *J* = 12.1, 6.0 Hz, 1H, H_{5a}), 2.08 (dq, *J* = 12.1, 6.0 Hz, 1H, H_{21a}), 1.93 (dtd, *J* = 11.7, 7.8, 3.8 Hz, 1H, H_{22a}), 1.81 (m, 1H, H_4), 1.77 (s, 3H, H_{29}), 1.75 (s, 3H, H_{30}), 1.72 (s, 3H, H_{33}), 1.70 – 1.59 (m, 1H, OH), 1.60 (m, 1H, H_{22b}), 1.49 (dq, *J* = 12.2, 8.6 Hz, 1H, H_{21a}), 1.46 (m, 1H, H_{5b}), 1.09 (d, *J* = 7.2 Hz, 3H, H_{35}), 1.04 (d, *J* = 6.9 Hz, 3H, H_{34}), 1.00 (d, *J* = 6.5 Hz, 3H, H_{31}). **^{13}C NMR** (201 MHz, $CDCl_3$, reference solvent peak: 77.00 ppm, 1.4 mg in 220 µL) δ 213.76 (C_{15}) , 207.82 (C_{18}), 171.20 (C_1), 144.41 (C_9), 140.00 (C_{11}), 138.25 (C_{28}), 132.02 (C_{26}), 124.54 (C_{10}), 124.15 (C_{25}), 124.01 (C_{27}), 116.10 (C_{32}), 81.42 (C_3), 79.91 (C_{23}), 78.86 (C_6), 77.76 (C_{24}), 77.00 (C_8), 76.44 (C_7), 74.96 (C_{20}), 70.63 (C_{13}), 49.34 (C_{12}), 48.53 (C_{19}), 46.04 (C_{17}), 45.50 (C_{14}), 42.71 (C_{16}), 39.79 (C_4), 38.67 (C_2), 36.74 (C_5), 31.92 (C_{21}), 28.38 (C_{22}), 26.05 (C_{29}), 18.48 (C_{30}), 16.20 (C_{35}), 15.52 (C_{34}), 15.38 (C_{31}), 14.27 (C_{33}). **HRMS** (ESI) calcd for $C_{35}H_{56}O_9NO_9$ $[M + NH_4]^+$: 634.3955, found 634.3946; $C_{35}H_{52}O_9Na$ $[M + Na]^+$: 639.3494, found 639.3509.

SUPPORTING INFORMATION

Table S1. Comparison of ^{1}H NMR spectra[a] of our synthetic sample of amphidinolide F with the reported Carter synthetic sample,[12] Furstner synthetic sample[13] and Kobayashi natural sample.[14]

C-position	Ferrié synthesis[b]		Carter synthesis[c]		Fürstner synthesis[d]		Natural Sample[e]		Δ Nat. sample vs Ferrié	Δ Nat. sample vs Carter	Δ Nat. sample vs Fürstner	Δ Ferrié vs Carter	Δ Ferrié vs Fürstner
	δ (ppm)	multiplicity *J*(Hz)	δ (ppm)	multiplicity *J*(Hz)	δ (ppm)	multiplicity *J*(Hz)	δ (ppm)	multiplicity *J*(Hz)					
1													
2a	2.51	dd 15.7, 9.0	2.50[f]	m	2.51	dd 15.8, 9.0	2.49	m	-0.02	-0.01	-0.02	0.01	0.00
2b	2.47	dd 15.7, 2.4	2.50[f]	m	2.48	dd 15.7, 3.6	2.49	m	0.02	-0.01	0.01	-0.03	-0.01
3	3.79	td 9.5, 2.3	3.80	dt 9.5, 2.6	3.79	td 9.3, 3.1	3.81	td 6.8, 2.4	0.02	0.01	0.02	-0.01	0.00
4	1.79	m	1.79	m	1.79	m	1.81	m	0.02	0.02	0.02	0.00	0.00
5a	2.07	dt 12.1, 6.0	2.07	m	2.08	m	2.11	m	0.04	0.04	0.03	0.00	-0.01
5b	1.44	m	1.47[g]	m	1.43	m	1.39	m	-0.05	-0.08	-0.04	-0.03	0.01
6	3.82	m	3.82	m	3.79	td 9.3, 3.1	3.78	td 7.3, 2.1	-0.04	-0.04	-0.01	0.00	0.03
7	3.53	brs	3.52	brs	3.53	dd 6.0, 3.4	3.53	m	0.00	0.01	0.00	0.01	0.00
8	4.12	brs	4.13	brs	4.12	m	4.05	d 4.0	-0.07	-0.08	-0.07	-0.01	0.00
9													
10	5.98	s	5.98	brs	5.98	s	5.98	brs	0.00	0.00	0.00	0.00	0.00
11													
12	2.26	quint 7.3	2.26	m	2.25	dq, 9.0, 6.8	2.25	m	-0.01	-0.01	0.00	0.00	0.01
13	3.92	td 8.9, 2.0	3.93	brt 9.0	3.92	td 9.0, 1.7	3.93	td 9.8, 2.0	0.01	0.00	0.01	-0.01	0.00
14a	2.73	dd 15.3, 9.2	2.73	dd 15.2, 9.1	2.73	dd 15.2, 9.4	2.74	dd 15.1, 9.3	0.01	0.01	0.01	0.00	0.00
14b	2.52	dd 15.3, 1.7	2.50[f]	m	2.51	dd 15.4, 2.4	2.51	m	-0.01	0.01	0.00	0.02	0.01
15									0.00	0.00	0.00	0.00	0.00
16	3.11	m	3.11	m	3.11	m	3.15	m	0.04	0.04	0.04	0.00	0.00
17a	3.04	dd 17.6, 8.9	3.04	dd 17.5, 8.9	3.02	dd 17.5, 9.0	3.04	dd 17.1, 9.3		0.00	0.02	0.00	0.02
17b	2.32	dd 17.6, 4.2	2.32	m	2.30	dd 17.5, 4.1	2.29	m	-0.03	-0.03	-0.01	0.00	0.02
18													
19a	2.69	dd 15.9, 8.5	2.70	dd 15.8, 8.4	2.69	dd 16.1, 8.4	2.73	dd 16.6, 8.8	0.04	0.03	0.04	-0.01	0.00
19b	2.48	dd 15.9, 3.1	2.50[f]	m	2.46	dd 15.8, 3.0	2.50	m	0.02	0.00	0.04	-0.02	0.02
20	4.33	tdd 8.0, 6.4, 4.0	4.33	m	4.33	tdd 8.2, 6.0, 4.0	4.36	m	0.03	0.03	0.03	0.00	0.00
21a	2.06	dq 12.1, 6.0	2.07	m	2.06	m	2.08	m	0.02	0.01	0.02	-0.01	0.00
21b	1.47	dq 12.1, 6.0	1.47[g]	m	1.48	m	1.47	m	0.00	0.00	-0.01	0.00	-0.01
22a	1.91	dtd 11.7, 7.8, 3.8	1.92	m	1.91	dddd12.8,8.2,7.2,3.8	1.90	m	-0.01	-0.02	-0.01	-0.01	0.00
22b	1.58	m	1.34[h]	m	1.58	m	1.54	m	-0.04	0.20[h]	-0.04	0.24[h]	0.00
23	4.07	q 7.3	4.07	dd 14.9, 7.3	4.06	q 7.7	4.08	dd 14.8, 7.8	0.01	0.01	0.02	0.00	0.01
24	5.19	t 8.2	5.18	t 8.2	5.18	t 8.2	5.17	t 7.8	-0.02	-0.01	-0.01	0.01	0.01
25	5.33	dd 14.9, 8.1	5.33	dd 15.0, 8.4	5.31	dd 15.1, 8.6	5.31	dd 14.7, 7.8	-0.02	-0.02	0.00	0.00	0.02
26	6.50	dd 15.0, 11.1	6.51	dd 14.9, 11.0	6.50	dd 15.1, 11.0	6.50	dd 14.7, 11.2	0.00	-0.01	0.00	-0.01	0.00
27	5.75	d 11.1	5.75	brd 11.0	5.74	d 11.1	5.76	brd 11.2	0.01	0.01	0.02	0.00	0.01
28													
29	1.75	s	1.75	s	1.74	s	1.75	s	0.00	0.00	0.01	0.00	0.01
30	1.73	s	1.74	s	1.73	s	1.73	s	0.00	-0.01	0.00	-0.01	0.00
31	0.98	d 6.5	0.98	d 6.5	0.97	d 6.6	1.00	d 6.3	0.02	0.02	0.03	0.00	0.01
32a	5.15	s	5.16	d 1.3	5.15	d 1.6	5.14	brs	-0.01	-0.02	-0.01	-0.01	0.00
32b	4.94	s	4.94	brs	4.93	t 1.4	4.93	brs	-0.01	-0.01	0.00	0.00	0.01
33	1.70	s	1.70	s	1.69	d 1.3	1.67	s	-0.03	-0.03	-0.02	0.00	0.01
34	1.02	d 6.9	1.02	d 6.9	1.02	d 7.0	1.03	d 7.3	0.01	0.01	0.01	0.00	0.00
35	1.07	d 7.2	1.08	d 7.2	1.07	d 7.2	1.10	d 6.8	0.03	0.02	0.03	-0.01	0.00

[a] solvent $CDCl_3$. [b] Concentration: 1.4 mg in 220 µL, 800 Mhz. All chemical shift were corrected by -0.02 ppm compared to reported values. [c] Concentration: 1.4 mg in 180 µL, 800 MHz. All chemical shift were corrected by -0.04 ppm compared to reported values. Corresponding assignment was deduced from reported chemical shift, multiplicities, and by comparison with our own assignment. [d] Concentration: 5.5 mg in 700 µL, 600 Mhz. [e] Unknow concentration, 500 Mhz. [f] reported as a massif: "2.49-2.58 (m, 4H)", median value was selected for all assigned protons. [g] reported as a massif: "1.47-1.54 (m, 2H)", median value was selected for all assigned protons. [h] Probable misassignment and/or report of H_{22b} at 1.34 ppm.

Table S2. Comparison of ^{13}C NMR spectra[a] of our synthetic sample of amphidinolide F with the reported Carter synthetic sample,[12] Furstner synthetic sample[13] and Kobayashi natural sample.[14]

C-position	Ferrié synthesis[b]	Carter synthesis[c]	Fürstner synthesis[d]	Natural sample[e]	Δ nat. sample vs Ferrié	Δ nat. sample vs Carter	Δ nat. sample vs Fürstner	Δ Ferrie vs Carter	Δ Ferrié vs Fürstner
1	171.20	171.22	171.2	171.16	-0.04	-0.06	-0.04	-0.02	0.00
2	38.67	38.70	38.7	38.65	-0.02	-0.05	-0.05	-0.03	-0.03
3	81.42	81.45	81.5	81.26	-0.16	-0.19	-0.24	-0.03	-0.08
4	39.79	39.79	39.8	39.67	-0.12	-0.12	-0.13	0.00	-0.01
5	36.74	36.77	36.7	36.81	0.07	0.04	0.11	-0.03	0.04
6	78.86	78.94	78.8	79.08	0.22	0.14	0.28	-0.08	0.06
7	76.44	76.51	76.4	76.71	0.27	0.20	0.31	-0.07	0.04
8	77.00	76.51[f]	77.0	76.71	-0.29	0.20[f]	-0.29	0.49[f]	0.00
9	144.41	144.45	144.4	144.37	-0.04	-0.08	-0.03	-0.04	0.01
10	124.54	124.52	124.6	124.62	0.08	0.10	0.02	0.02	-0.06
11	140.00	140.04	140.0	140.00	0.00	-0.04	0.00	-0.04	0.00
12	49.34	49.38	49.3	49.46	0.12	0.08	0.16	-0.04	0.04
13	70.63	70.62	70.7	70.50	-0.13	-0.12	-0.20	0.01	-0.07
14	45.50	45.55	45.5	45.65	0.15	0.10	0.15	-0.05	0.00
15	213.76	213.77	213.8	213.58	-0.18	-0.19	-0.22	-0.01	-0.04
16	42.71	42.79	42.7	42.93	0.22	0.14	0.23	-0.08	0.01
17	46.04	46.03	46.1	45.81	-0.23	-0.22	-0.29	0.01	-0.06
18	207.82	207.77	207.9	207.47	-0.35	-0.30	-0.43	0.05	-0.08
19	48.53	48.57	48.5	48.45	-0.08	-0.12	-0.05	-0.04	0.03
20	74.96	75.01	75.0	74.82	-0.14	-0.19	-0.18	-0.05	-0.04
21	31.92	31.98	32.0	31.84	-0.08	-0.14	-0.16	-0.06	-0.08
22	28.38	28.43	28.4	28.46	0.08	0.03	0.06	-0.05	-0.02
23	79.91	79.90	79.9	79.87	-0.04	-0.03	-0.03	0.01	0.01
24	77.76	77.84	77.7	77.93	0.17	0.09	0.23	-0.08	0.06
25	124.15	124.19	124.2	123.97	-0.18	-0.22	-0.23	-0.04	-0.05
26	132.02	132.06	132.0	132.09	0.07	0.03	0.09	-0.04	0.02
27	124.01	124.04	124.0	124.06	0.05	0.02	0.06	-0.03	0.01
28	138.25	138.29	138.3	138.25	0.00	-0.04	-0.05	-0.04	-0.05
29	26.05	26.08	26.1	26.00	-0.05	-0.08	-0.10	-0.03	-0.05
30	18.48	18.51	18.5	18.43	-0.05	-0.08	-0.07	-0.03	-0.02
31	15.38	15.40	15.4	15.39	0.01	-0.01	-0.01	-0.02	-0.02
32	116.10	116.11	116.1	116.16	0.06	0.05	0.06	-0.01	0.00
33	14.27	13.77[g]	14.3	13.94	-0.33	0.17[g]	-0.36	0.50[g]	-0.03
34	15.52	15.53	15.5	15.29	-0.23	-0.24	-0.21	-0.01	0.02
35	16.20	16.24	16.2	16.20	0.00	-0.04	0.00	-0.04	0.00

[a] solvent $CDCl_3$, reference at 77.0 ppm [b] Concentration: 1.4 mg in 220 µL, 200 Mhz [c] Concentration: 1.4 mg in 180 µL, 175 MHz. Corresponding assignment was deduced from reported chemical shifts, multiplicities, and by comparison with our own assignment [d] Concentration: 5.5 mg in 700 µL, 150 Mhz [e] Unknow concentration, 125 Mhz. [f] misassignment probably due to overlap of C8 with the solvent peak. [g] Probable confusion with a CH_3 grease peak in the assignment of C33.

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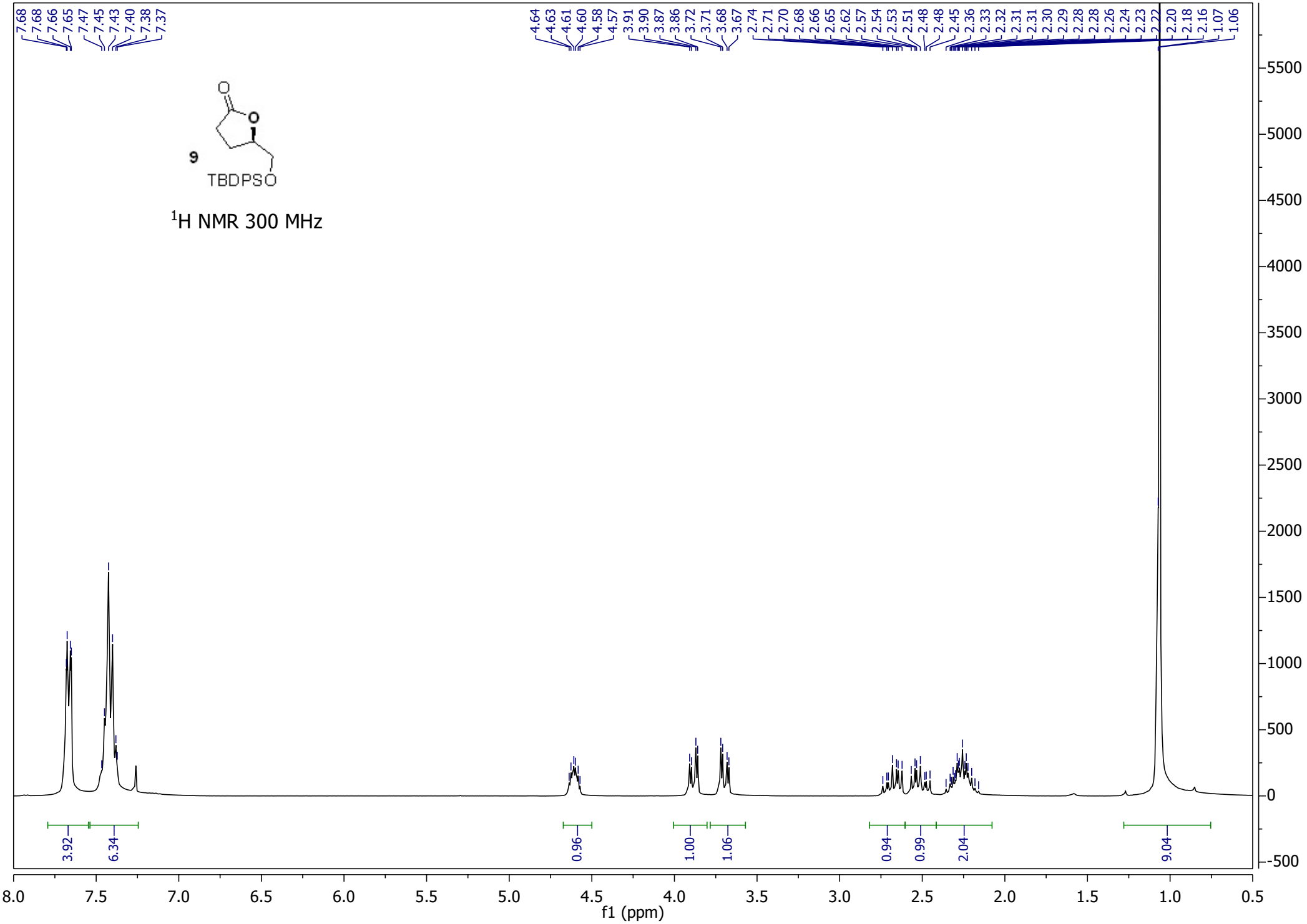
Copy of ^{1}H and ^{13}C NMR spectra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4.64 4.63 4.61 4.60 4.58 4.57 3.91 3.90 3.87 3.86 3.72 3.71 3.68 3.67 2.74 2.71 2.70 2.68 2.66 2.65 2.62 2.57 2.54 2.53 2.51 2.48 2.48 2.45 2.36 2.33 2.32 2.31 2.31 2.30 2.29 2.28 2.28 2.26 2.24 2.23 2.22 2.20 2.18 2.16 1.07 1.06
O
O
9
TBDPSO
1H NMR 300 MHz
3.92
6.34
0.96
1.00
1.06
0.94
0.99
2.04
9.04
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
8.0
7.5
7.0
6.5
6.0
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3.0
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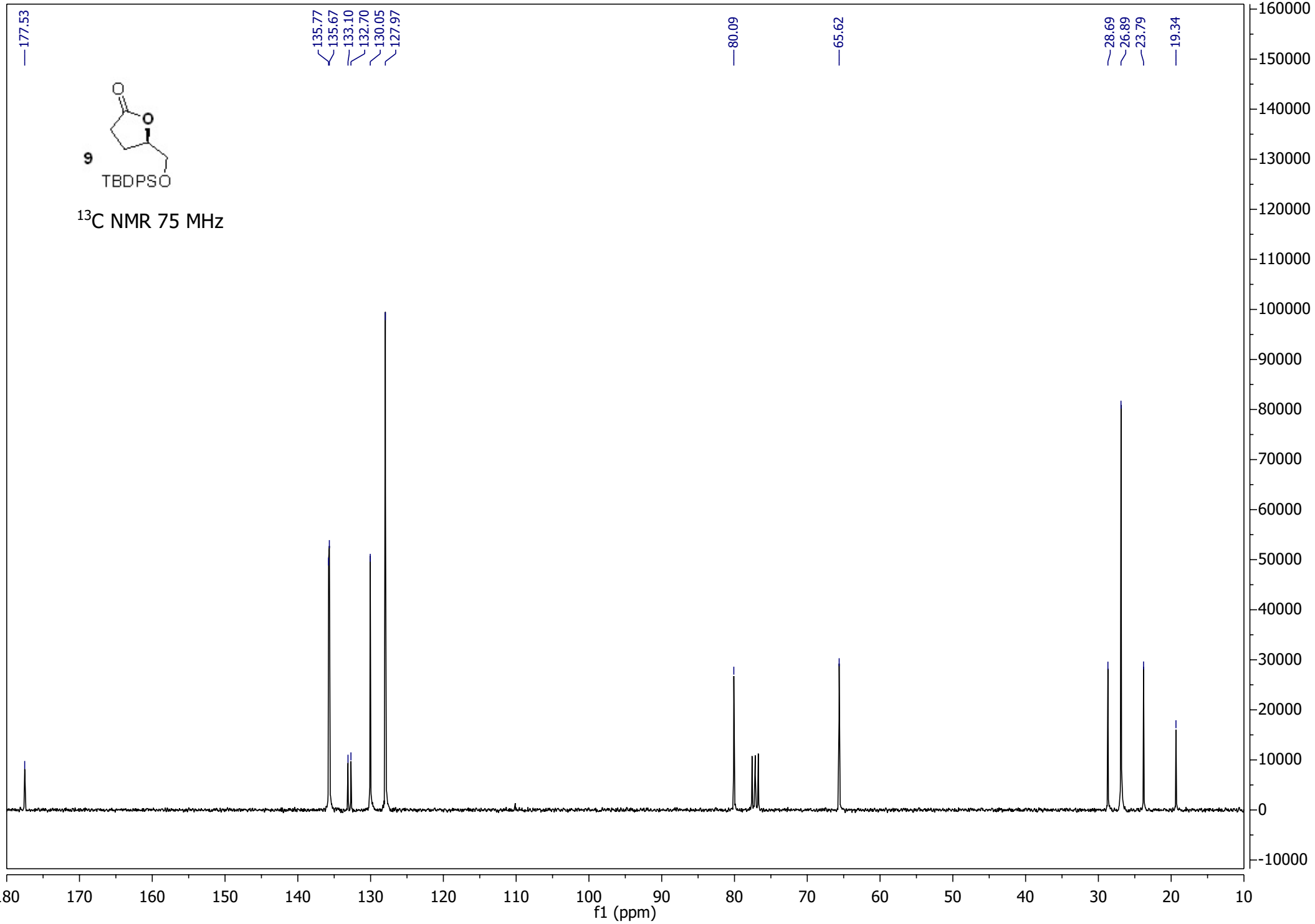
0.5
f1 (ppm)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127.97
80.09
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19.34
9
TBDPSO
13C NMR 75 MHz
160000
150000
140000
130000
120000
110000
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
-10000
180
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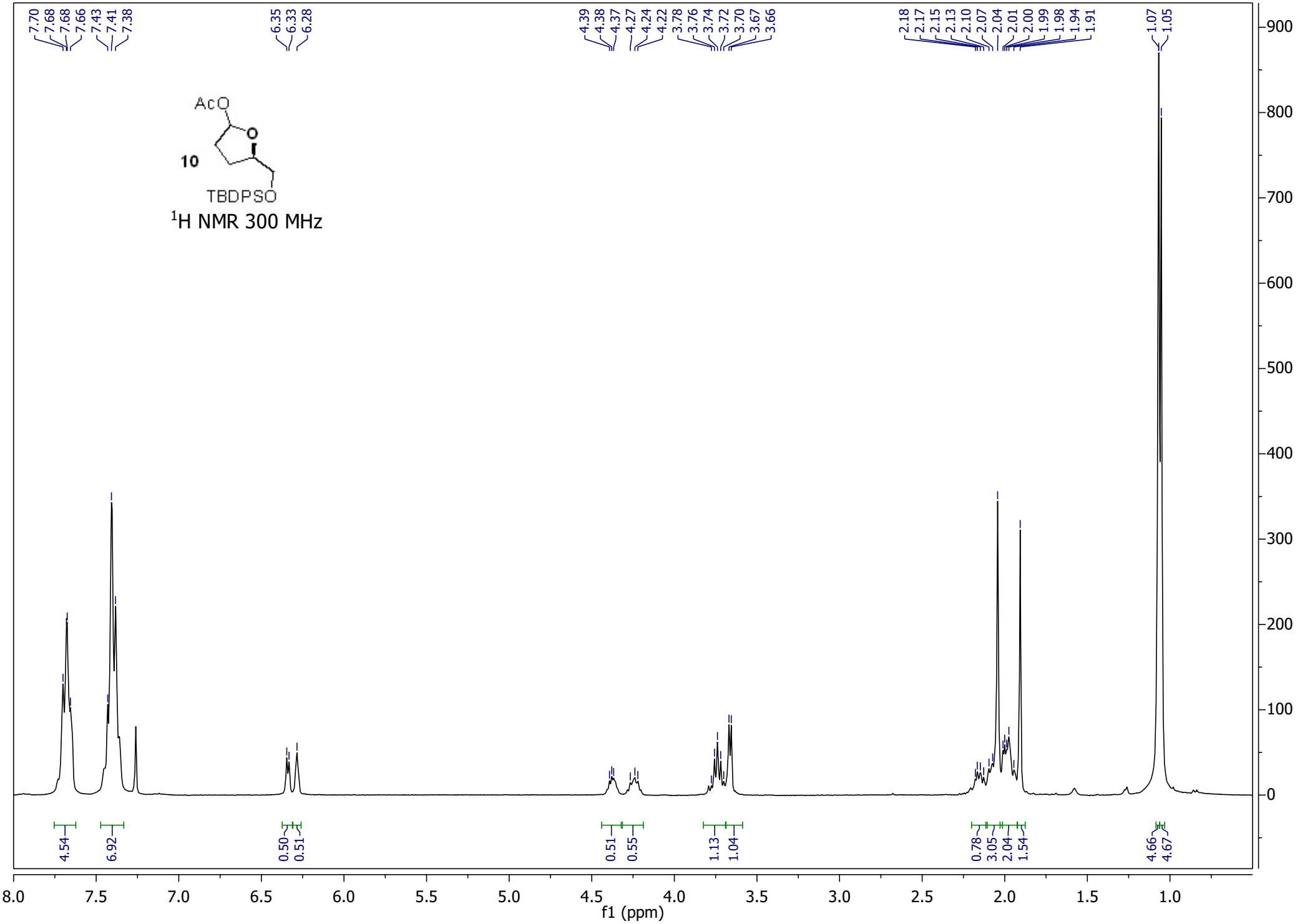
60
50
40
30
20
10
f1 (ppm)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6.28
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4.37
4.27
4.24
4.22
3.78
3.76
3.74
3.72
3.70
3.67
3.66
2.18
2.17
2.15
2.13
2.10
2.07
2.04
2.01
2.00
1.99
1.98
1.94
1.91
1.07
1.05
AcO
O
10
TBDPSO
1H NMR 300 MHz
900
800
700
600
500
400
300
200
100
0
4.54
6.92
0.50
0.51
0.51
0.55
1.13
1.04
0.78
3.05
2.04
1.54
4.66
4.67
8.0
7.5
7.0
6.5
6.0
5.5
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3.5
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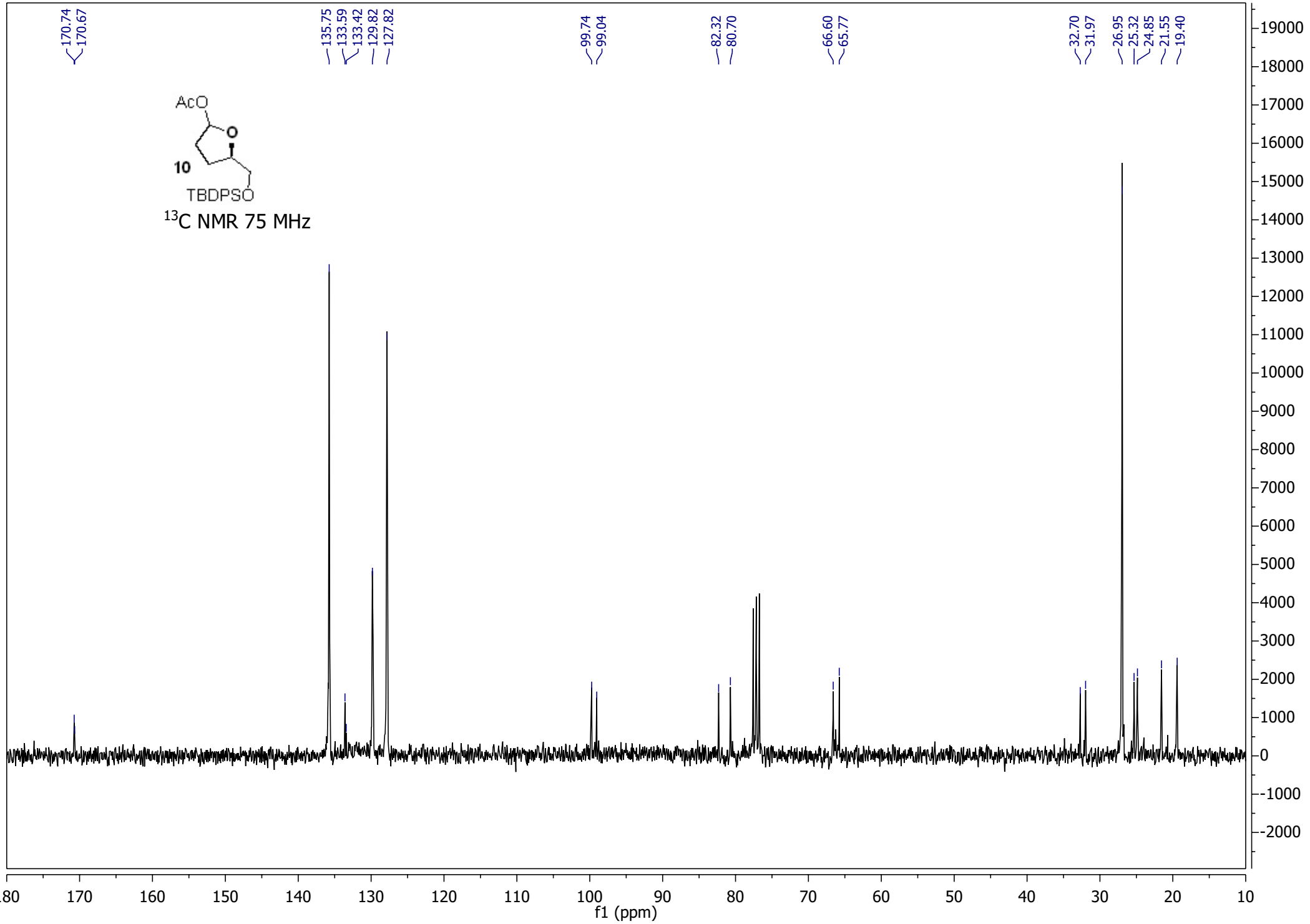
f1 (ppm)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65.77
32.70
31.97
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25.32
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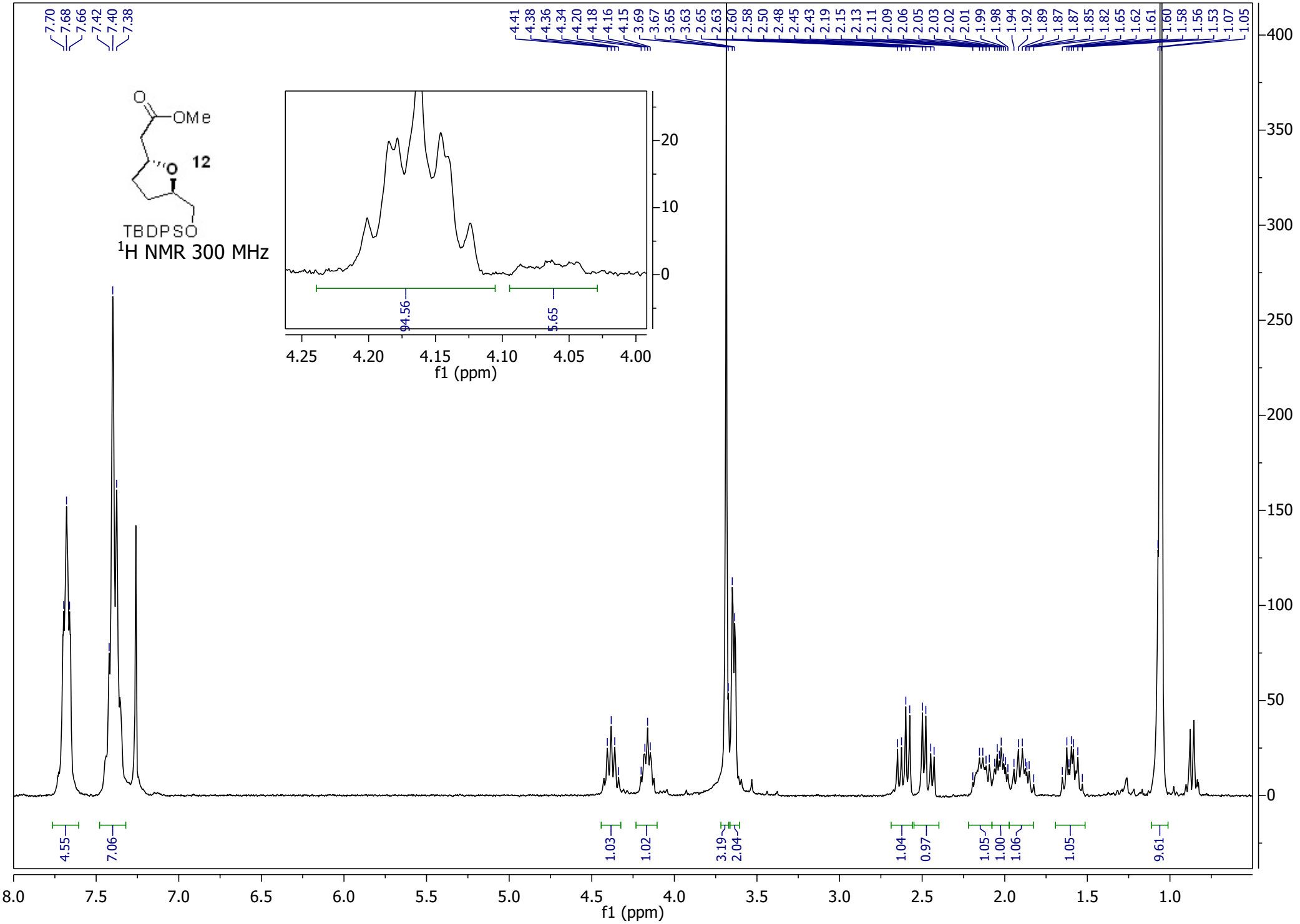
21.55
19.40
AcO
O
10
TBDPSO
13C NMR 75 MHz
f1 (ppm)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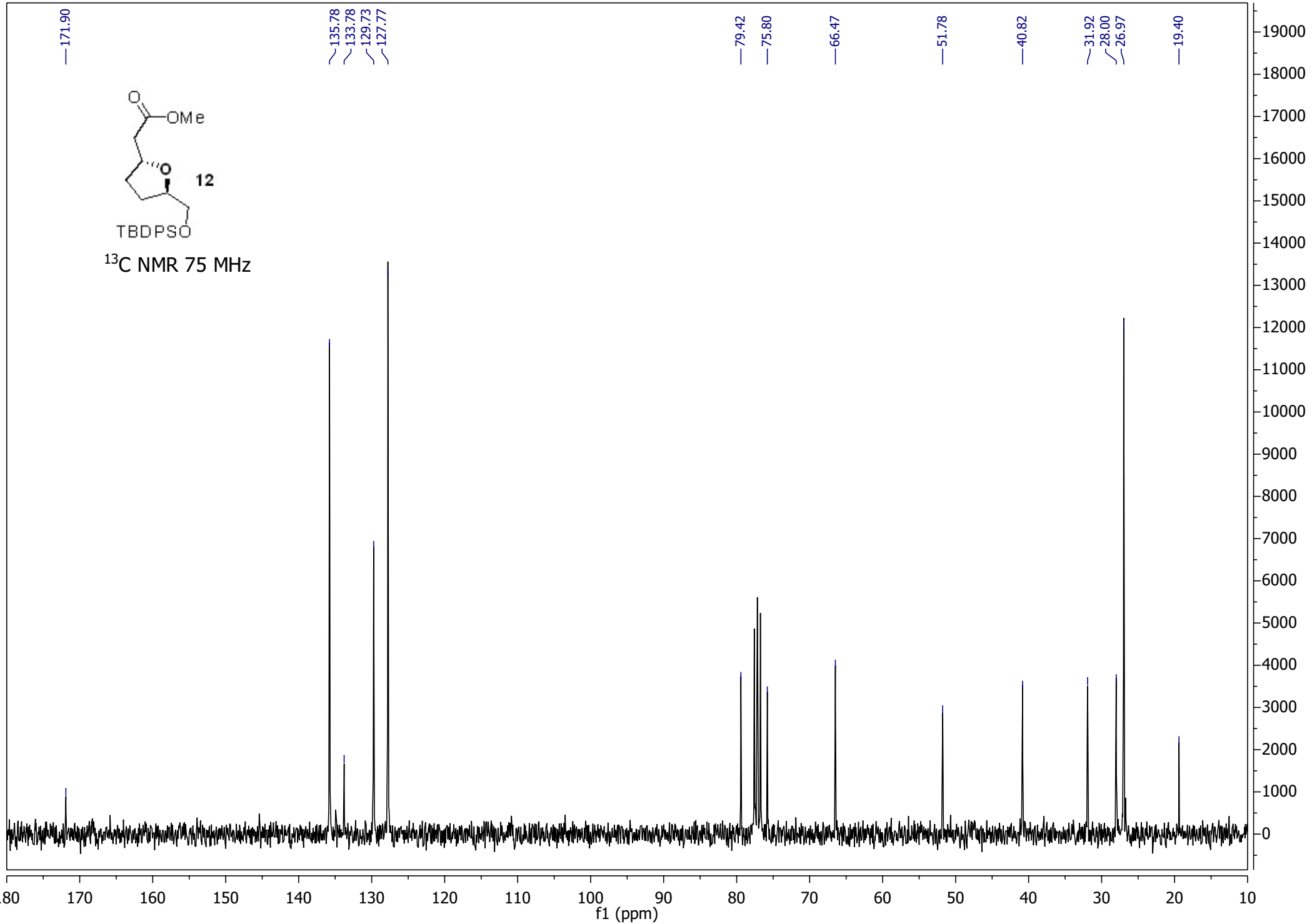
f1 (ppm)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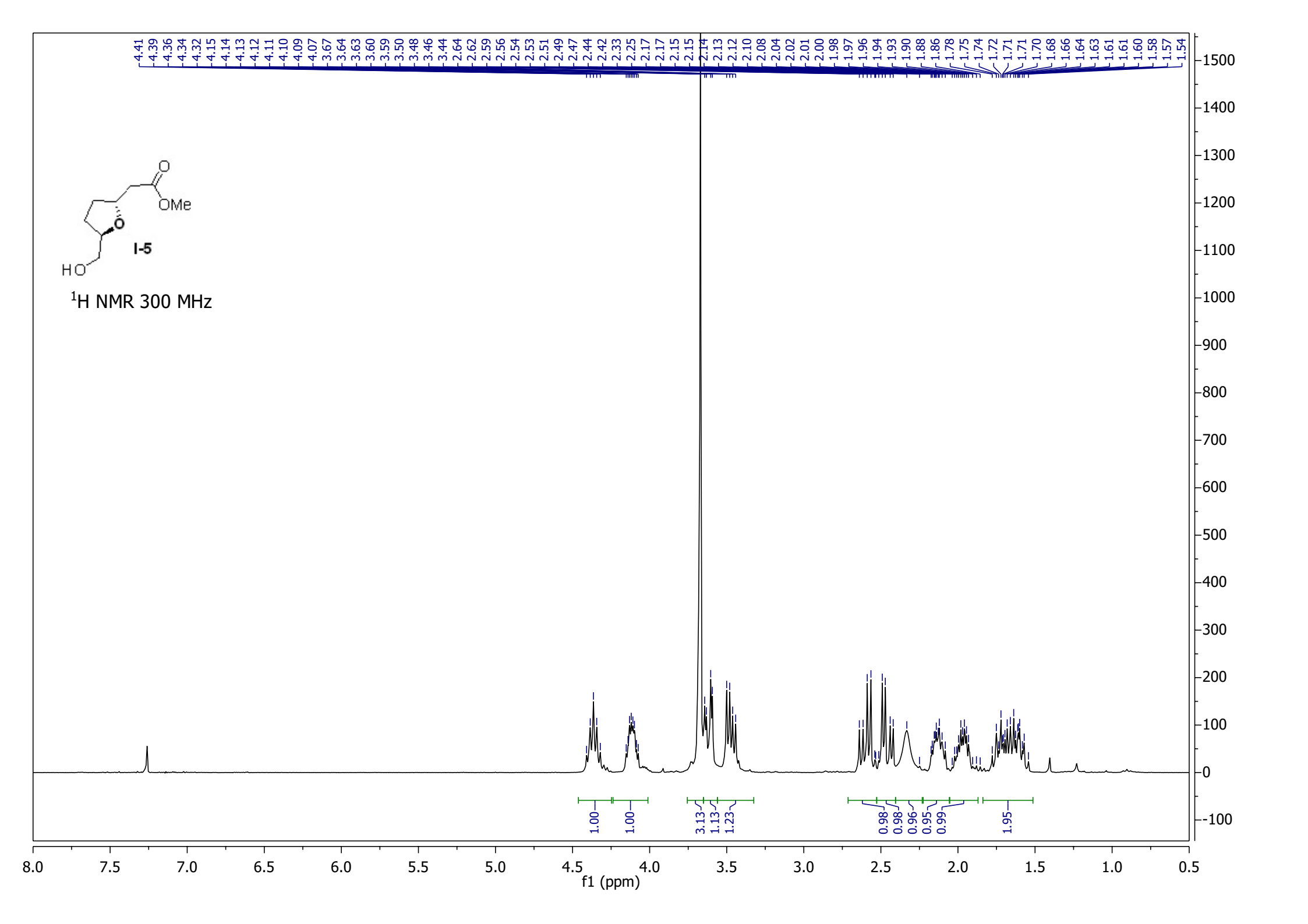
26.97
19.40
OMe
12
TBDPSO
13C NMR 75 MHz
f1 (ppm)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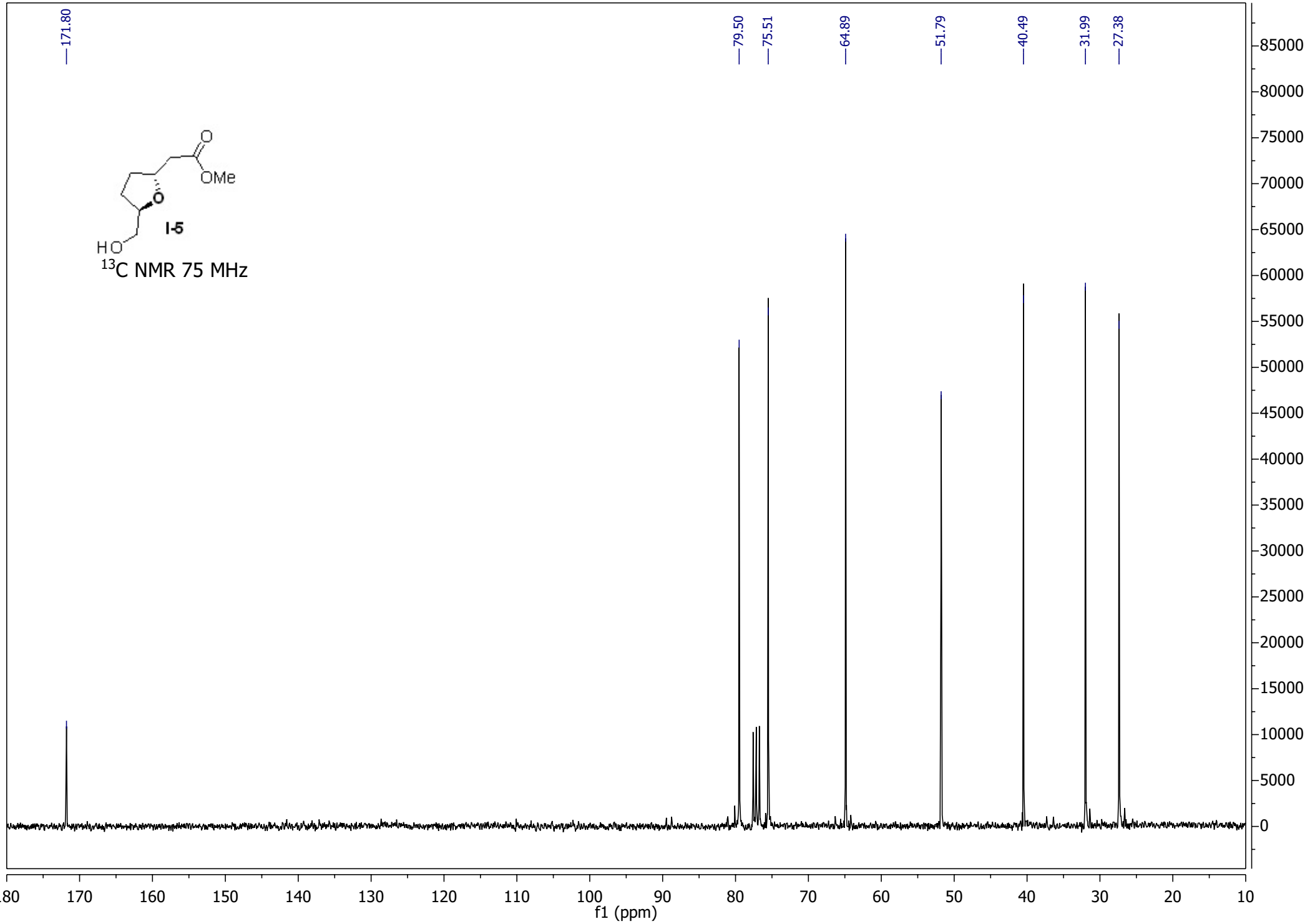
f1 (ppm)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79.50
75.51
64.89
51.79
40.49
31.99
27.38
O
OMe
O
HO
I-5
13C NMR 75 MHz
85000
80000
75000
70000
65000
60000
55000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
180
170
160
150
140
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110
100
90
80
70
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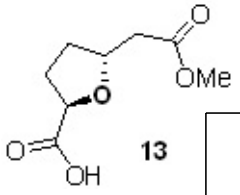
50
40
30
20
10
f1 (ppm)

^{1}H NMR 300 MHz



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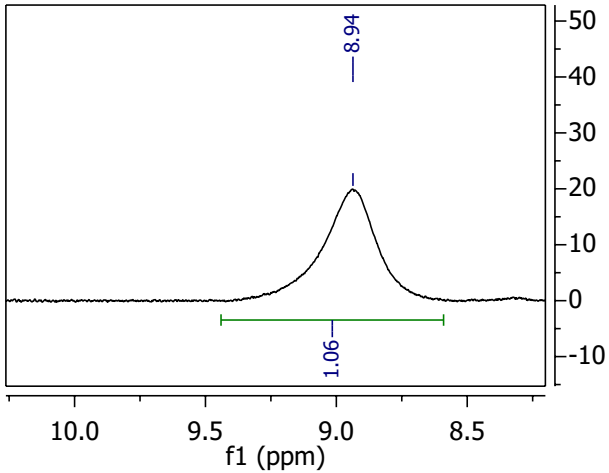

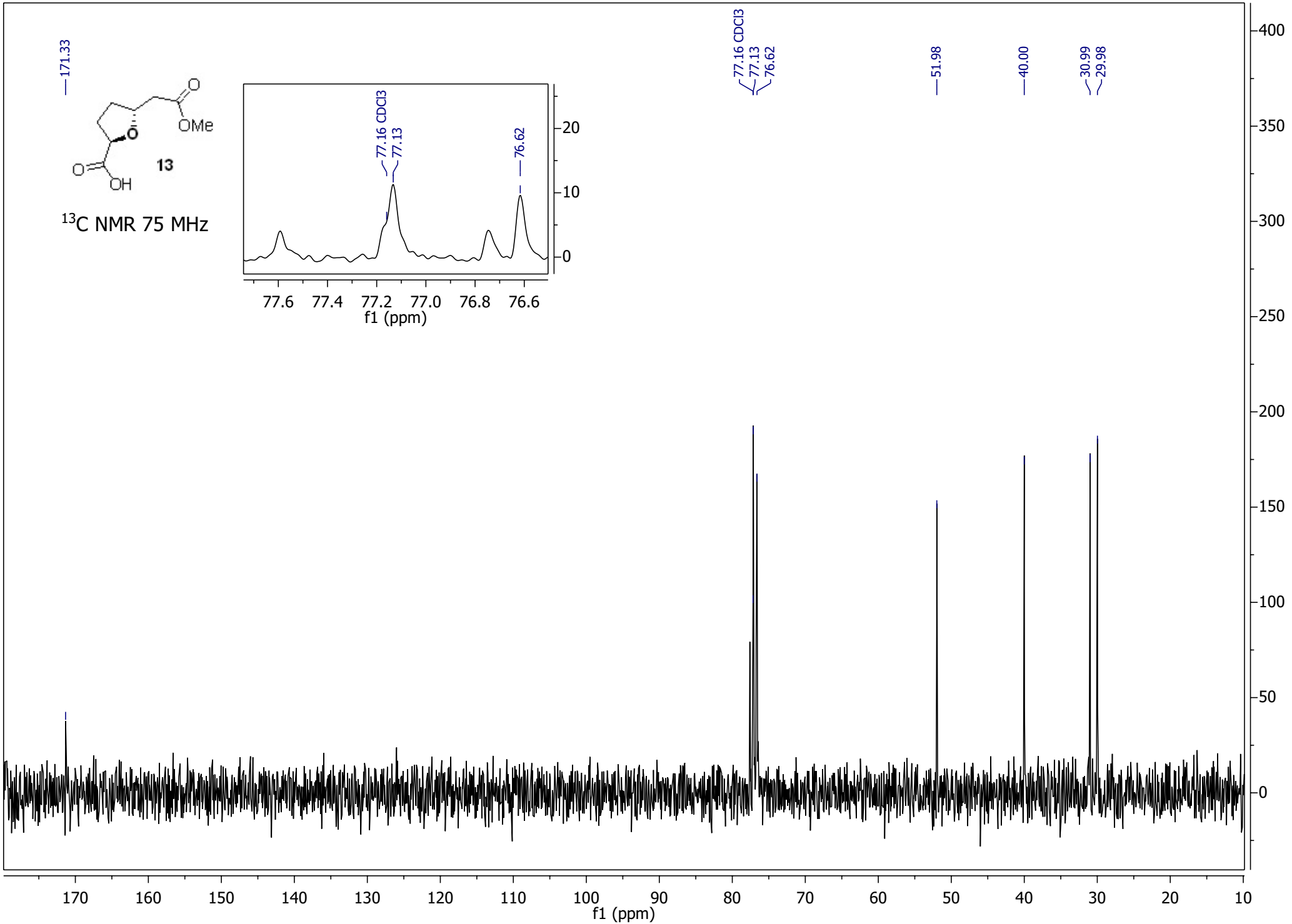
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OMe
13
OH
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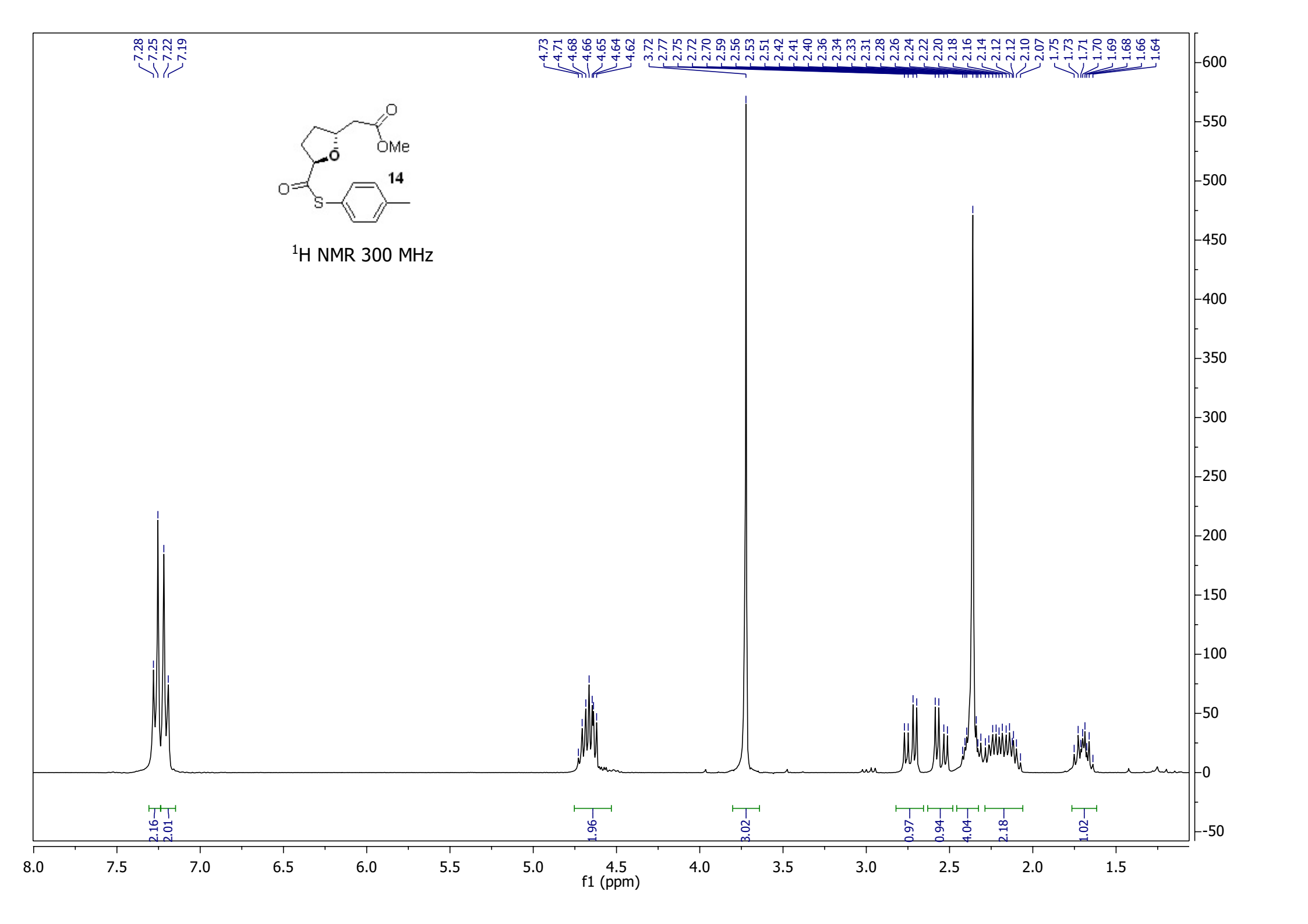
f1 (ppm)
f1 (ppm)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4.64
4.62
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2.72
2.70
2.59
2.56
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2.51
2.42
2.41
2.40
2.36
2.34
2.33
2.31
2.28
2.26
2.24
2.22
2.20
2.18
2.16
2.14
2.12
2.12
2.10
2.07
1.75
1.73
1.71
1.70
1.69
1.68
1.66
1.64
OMe
14
1H NMR 300 MHz
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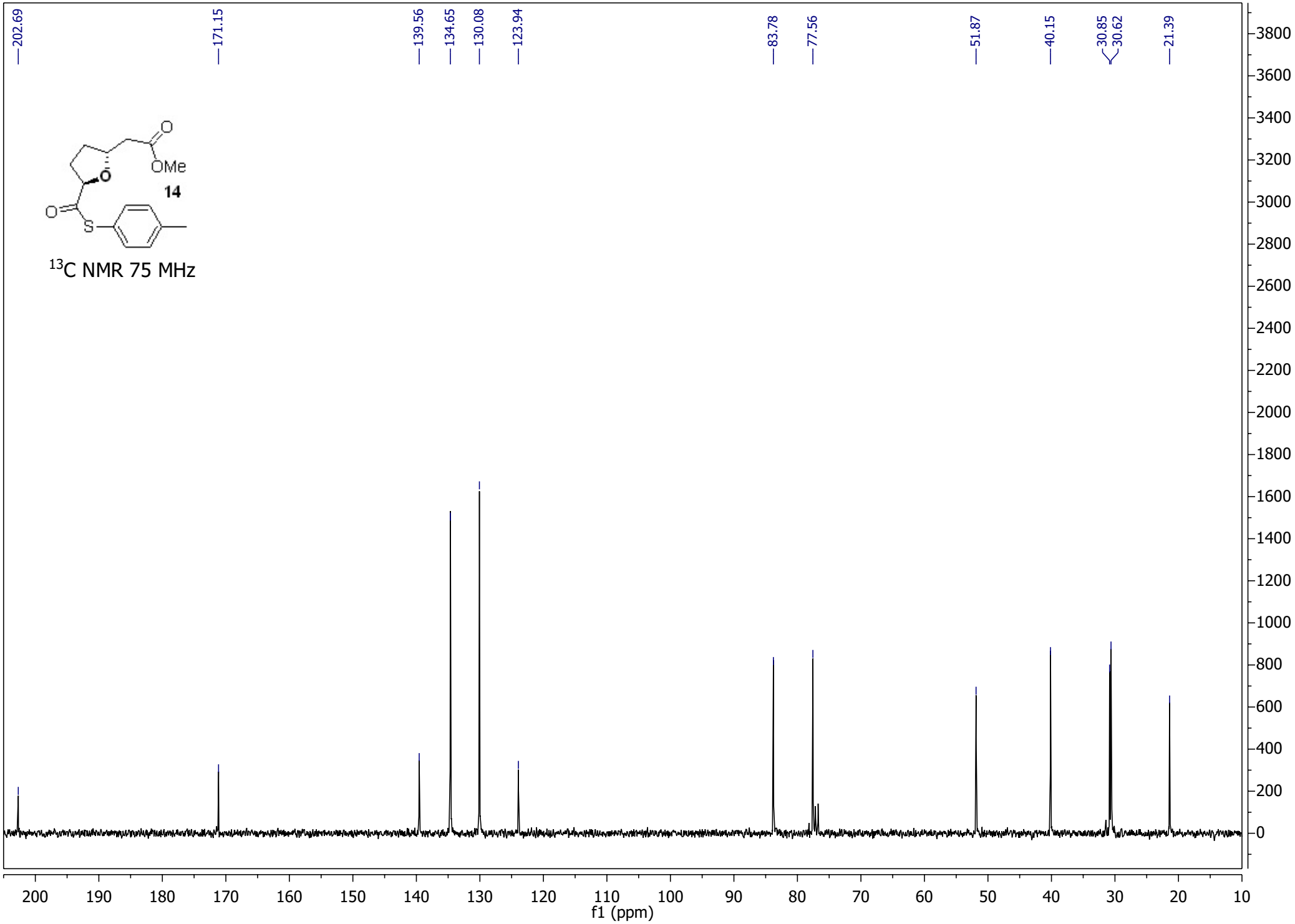
1.96
3.02
0.97
0.94
4.04
2.18
1.02
f1 (ppm)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51.87
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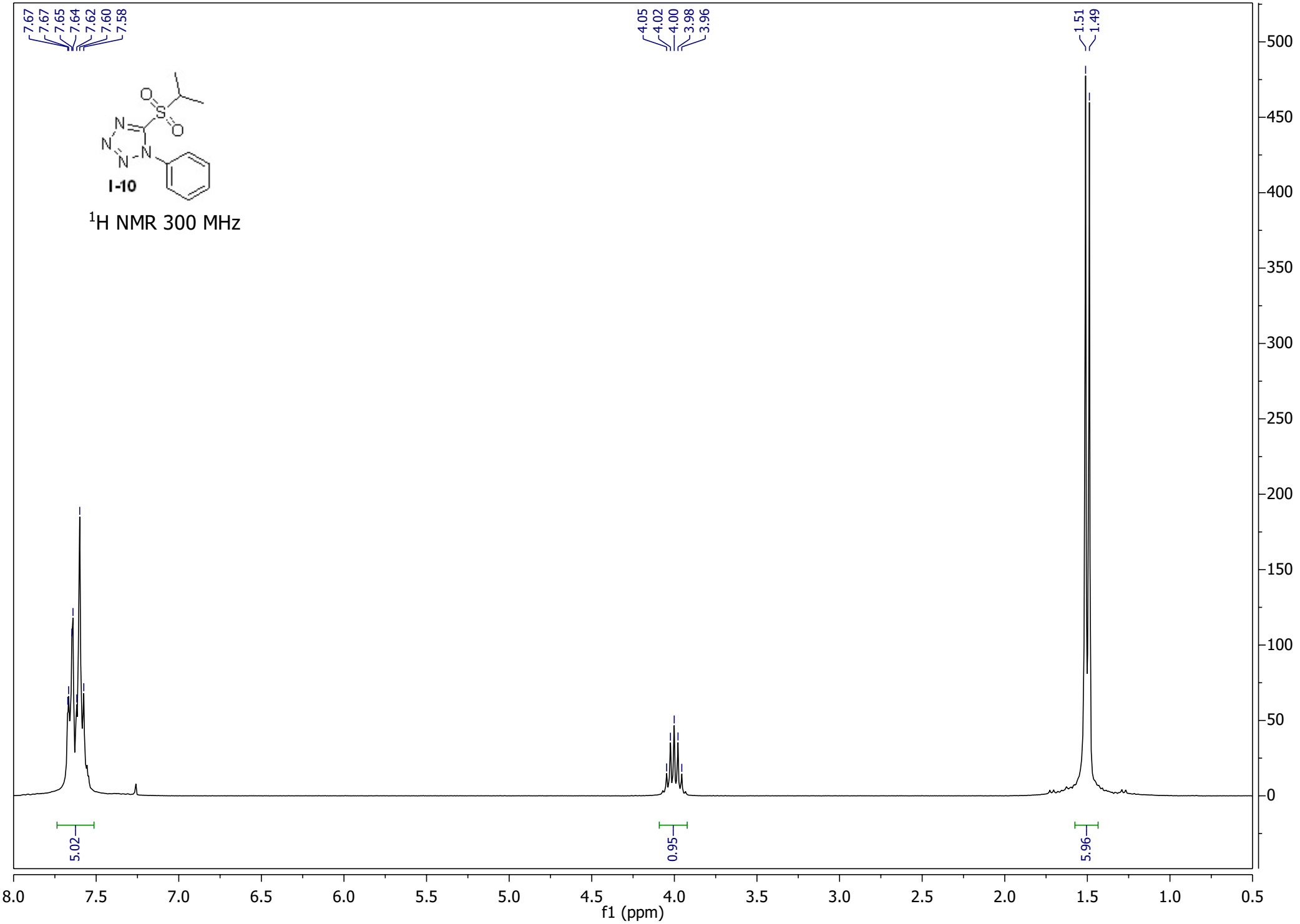
OMe
O
O
S
14
13C NMR 75 MHz
f1 (ppm)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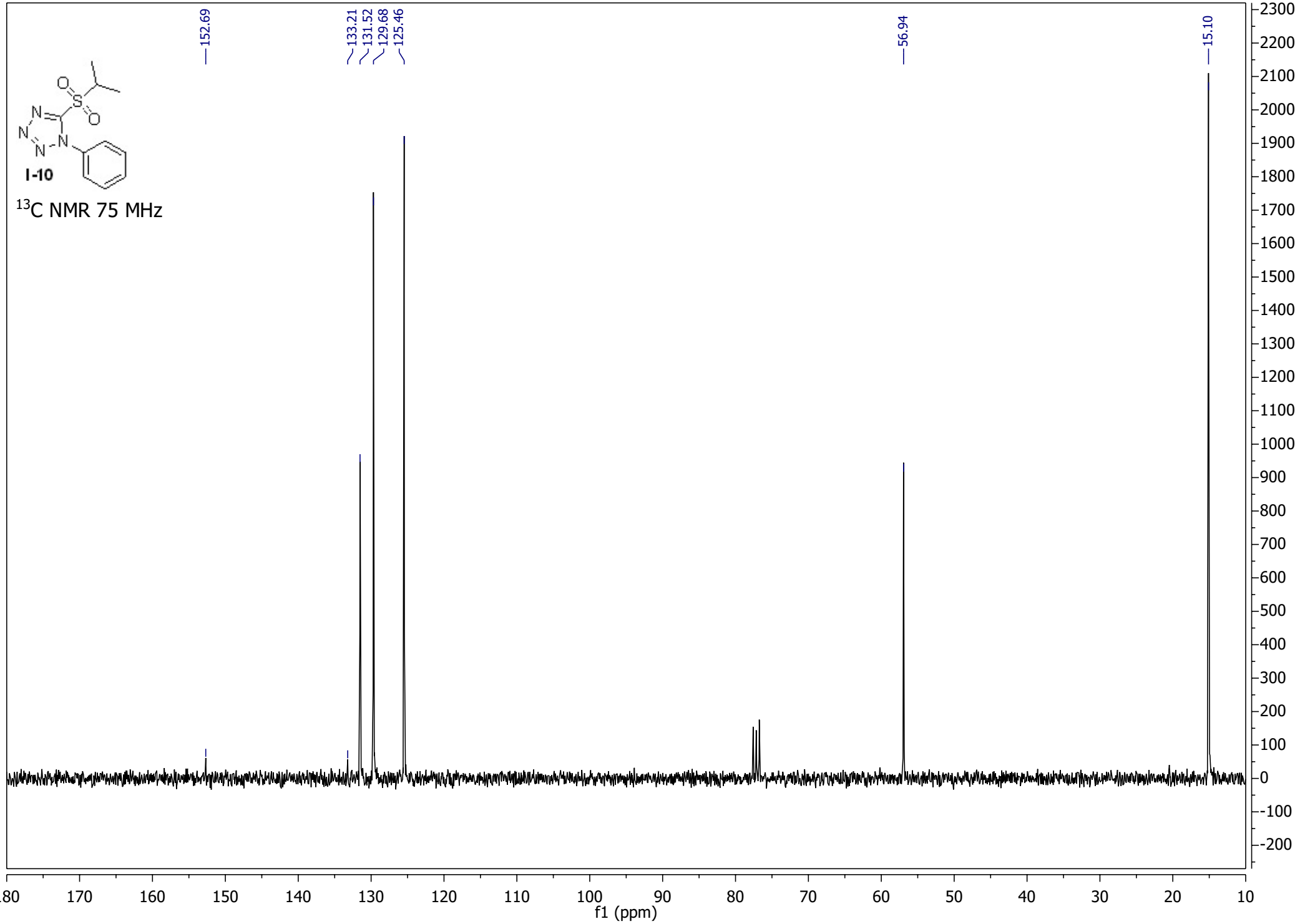
1.51
1.49
I-10
1H NMR 300 MHz
5.02
0.95
5.96
f1 (ppm)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I-10
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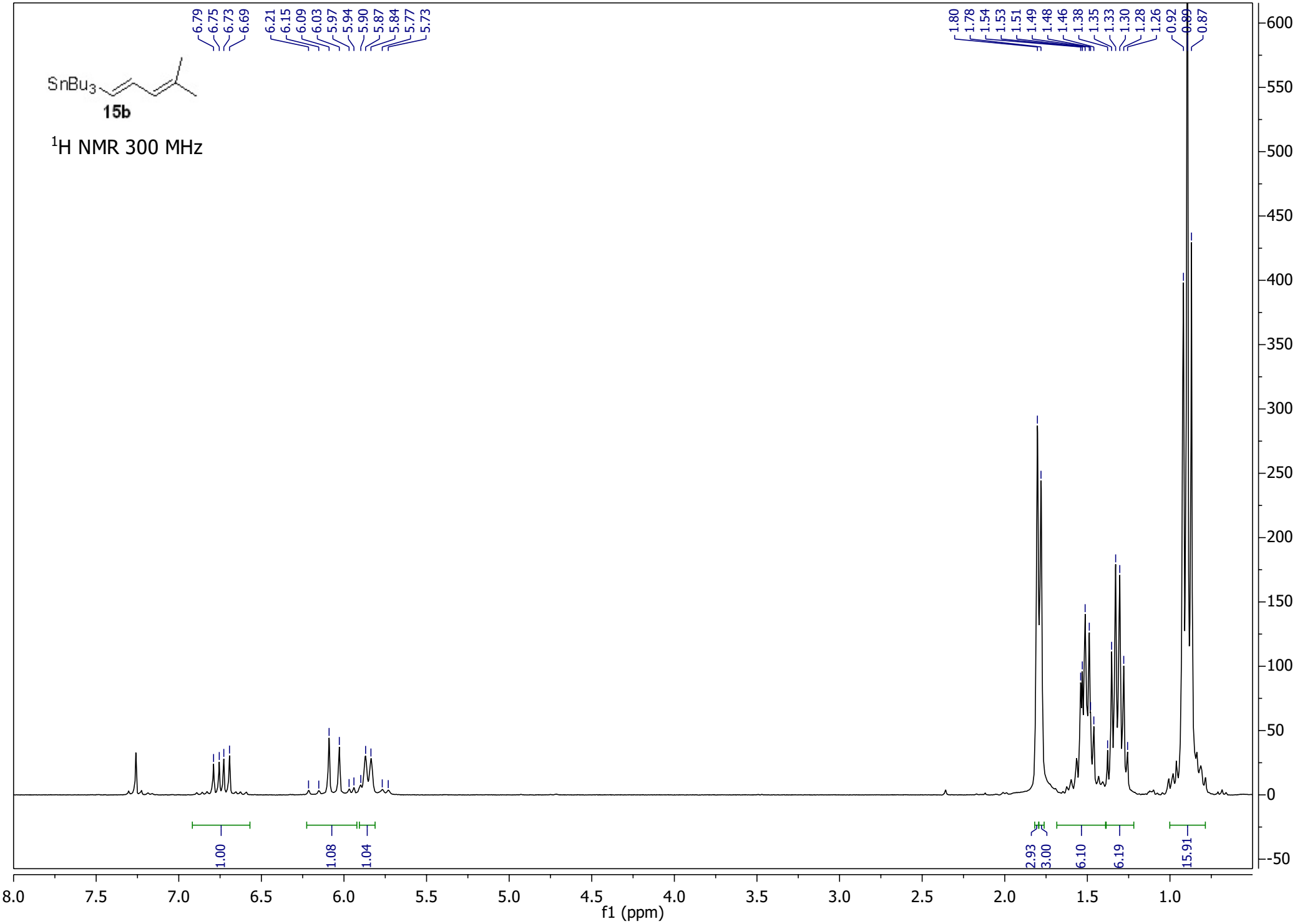
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6.03
5.97
5.94
5.90
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5.84
5.77
5.73
1.80
1.78
1.54
1.53
1.51
1.49
1.48
1.46
1.38
1.35
1.33
1.30
1.28
1.26
0.92
0.89
0.87
SnBu3
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1.04
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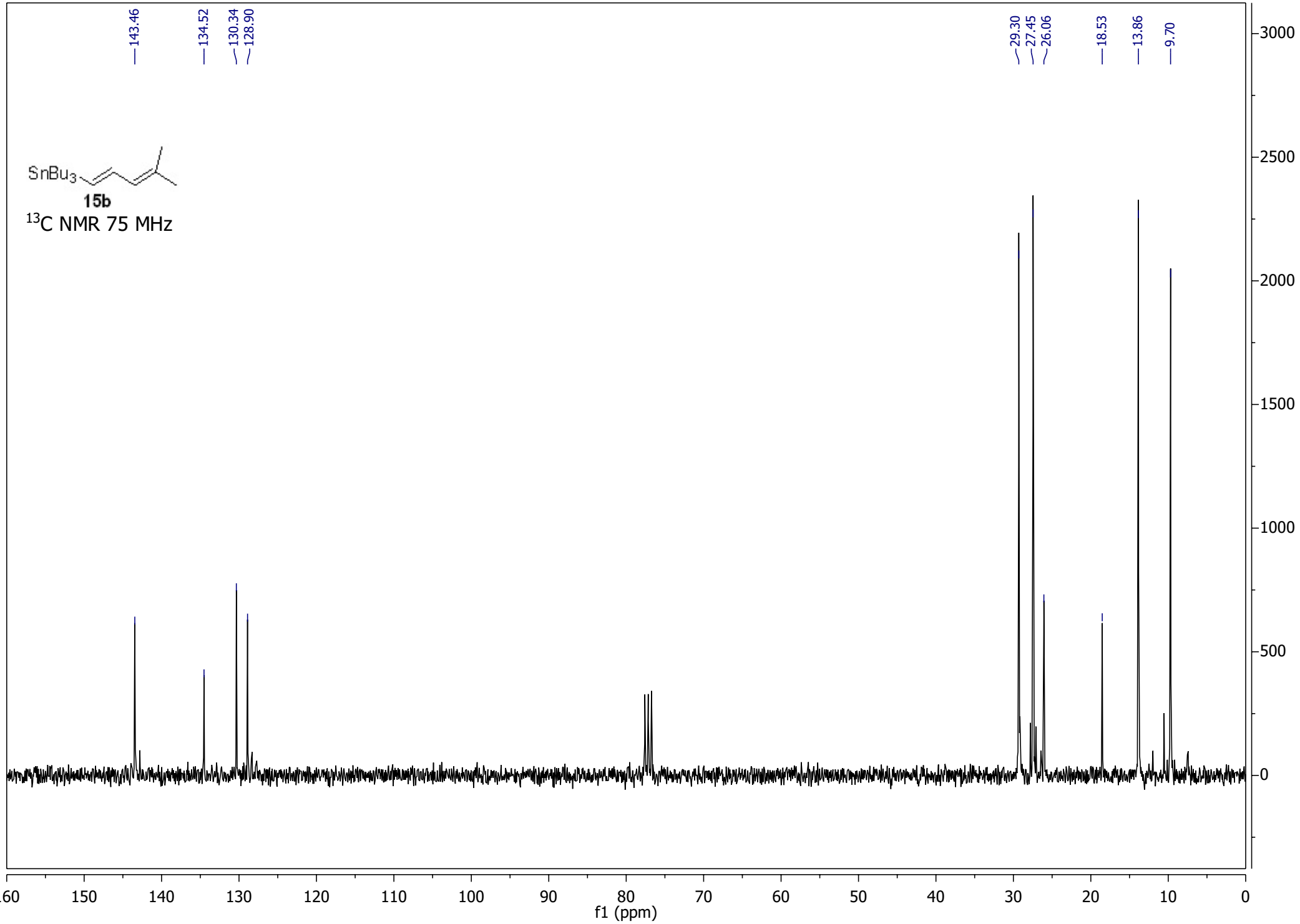
3.00
6.10
6.19
15.91
f1 (ppm)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29.30
27.45
26.06
18.53
13.86
9.70
SnBu3
15b
13C NMR 75 MHz
3000
2500
2000
1500
1000
500
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50
40
30
20
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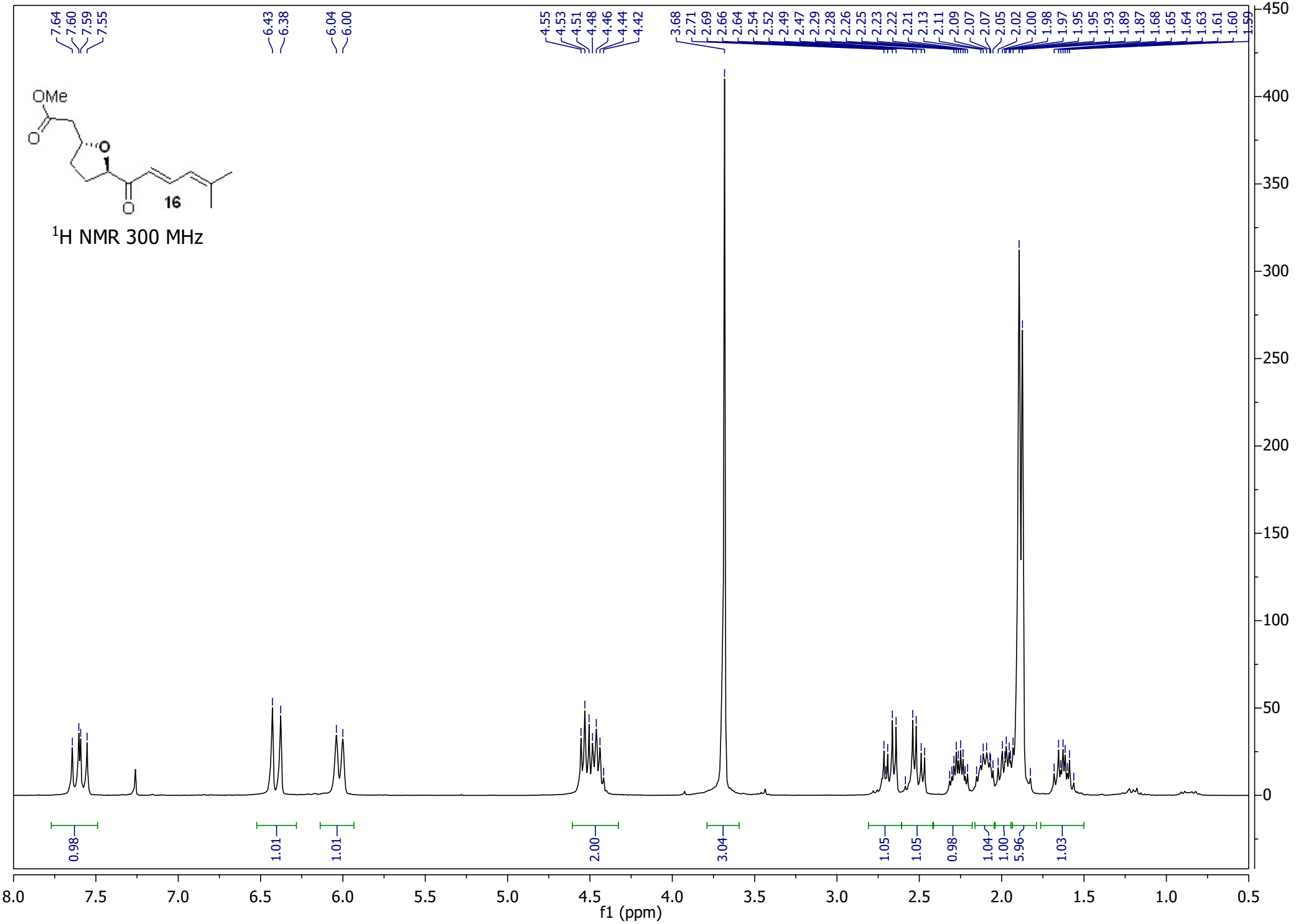
f1 (ppm)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4.46
4.44
4.42
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2.69
2.66
2.64
2.54
2.52
2.49
2.47
2.29
2.28
2.26
2.25
2.23
2.22
2.21
2.13
2.11
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2.07
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1.68
1.65
1.64
1.63
1.61
1.60
1.59
OMe
O
O
1
O
16
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1.01
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0.98
1.04
1.00
5.96
1.03
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
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1.0
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450
400
350
300
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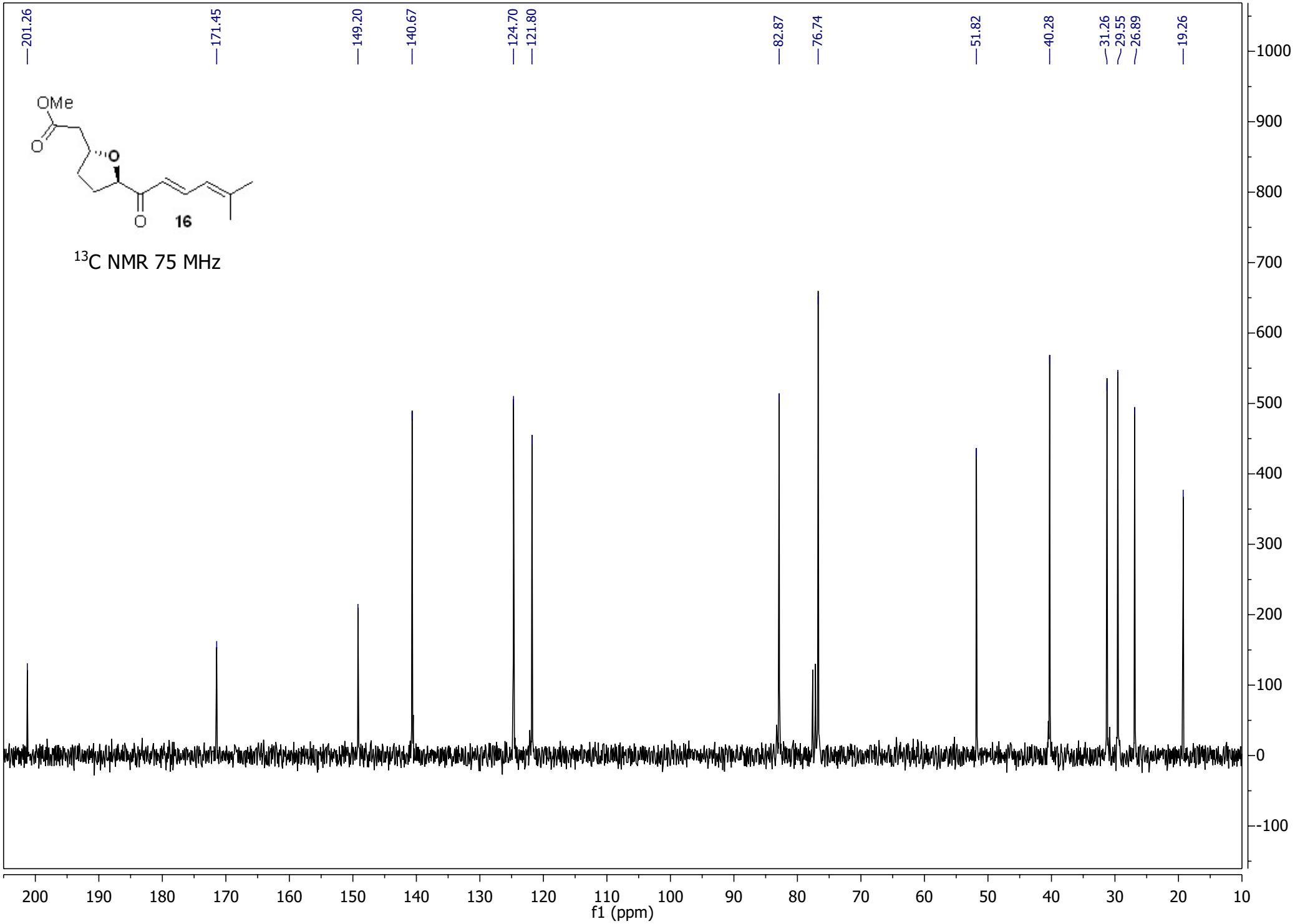
200
150
100
50
0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121.80
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51.82
40.28
31.26
29.55
26.89
19.26
OMe
O
O
1
O
16
13C NMR 75 MHz
1000
900
800
700
600
500
400
300
200
100
0
-100
200
190
180
170
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140
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120
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100
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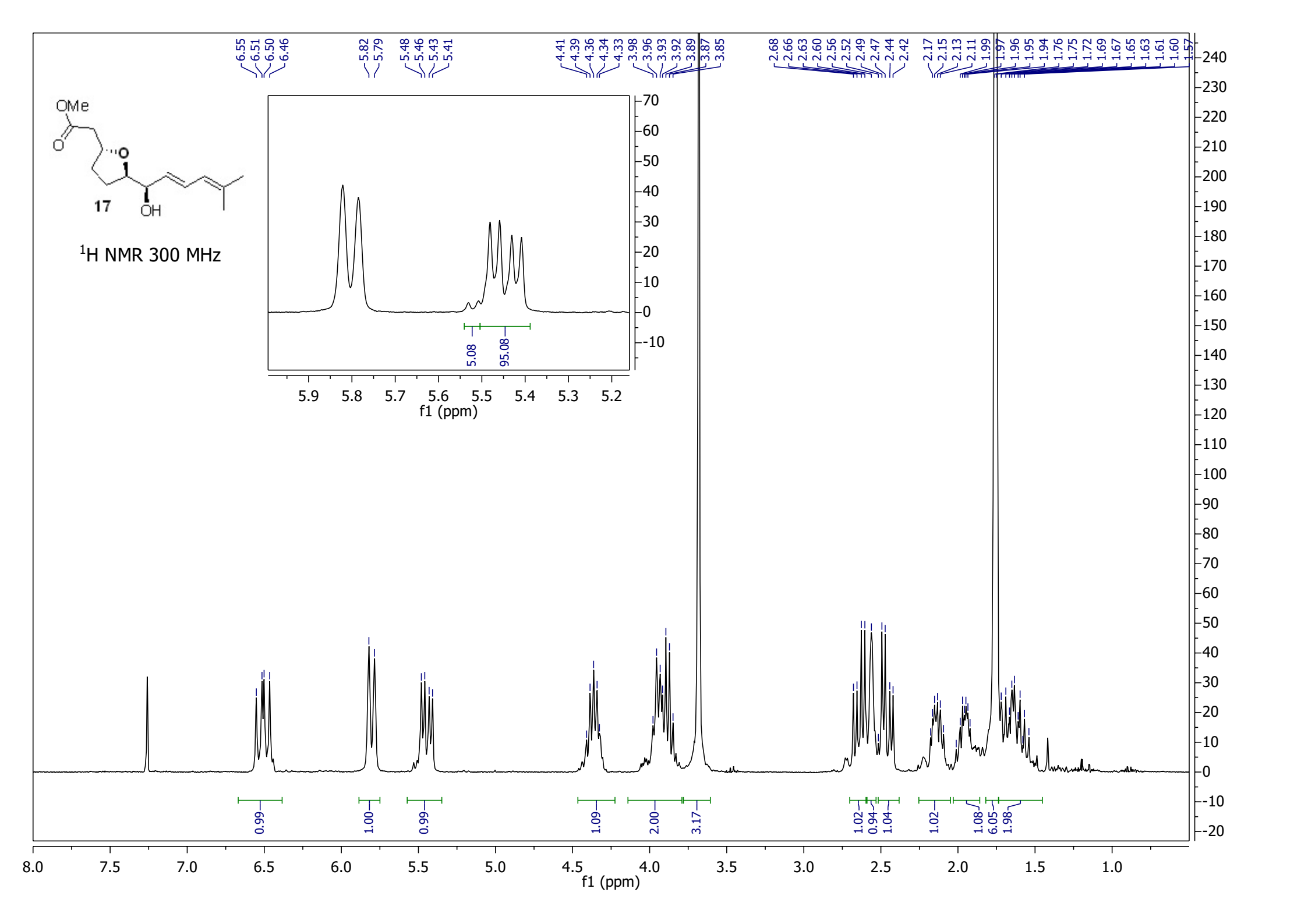
80
70
60
50
40
30
20
10
f1 (ppm)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OH
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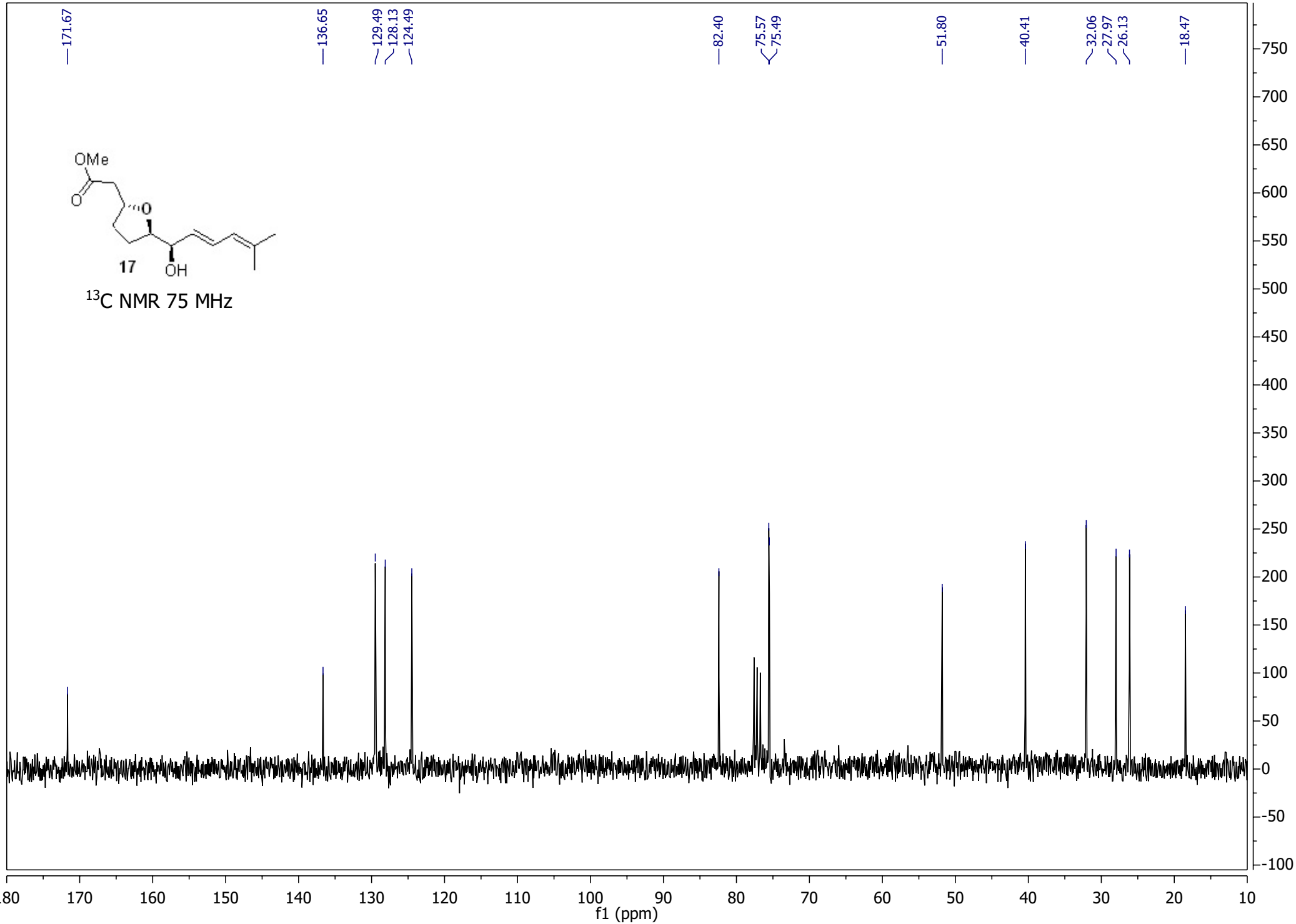
f1 (ppm)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75.49
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40.41
32.06
27.97
26.13
18.47
OMe
O
O
17
OH
13C NMR 75 MHz
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-50
-100
180
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140
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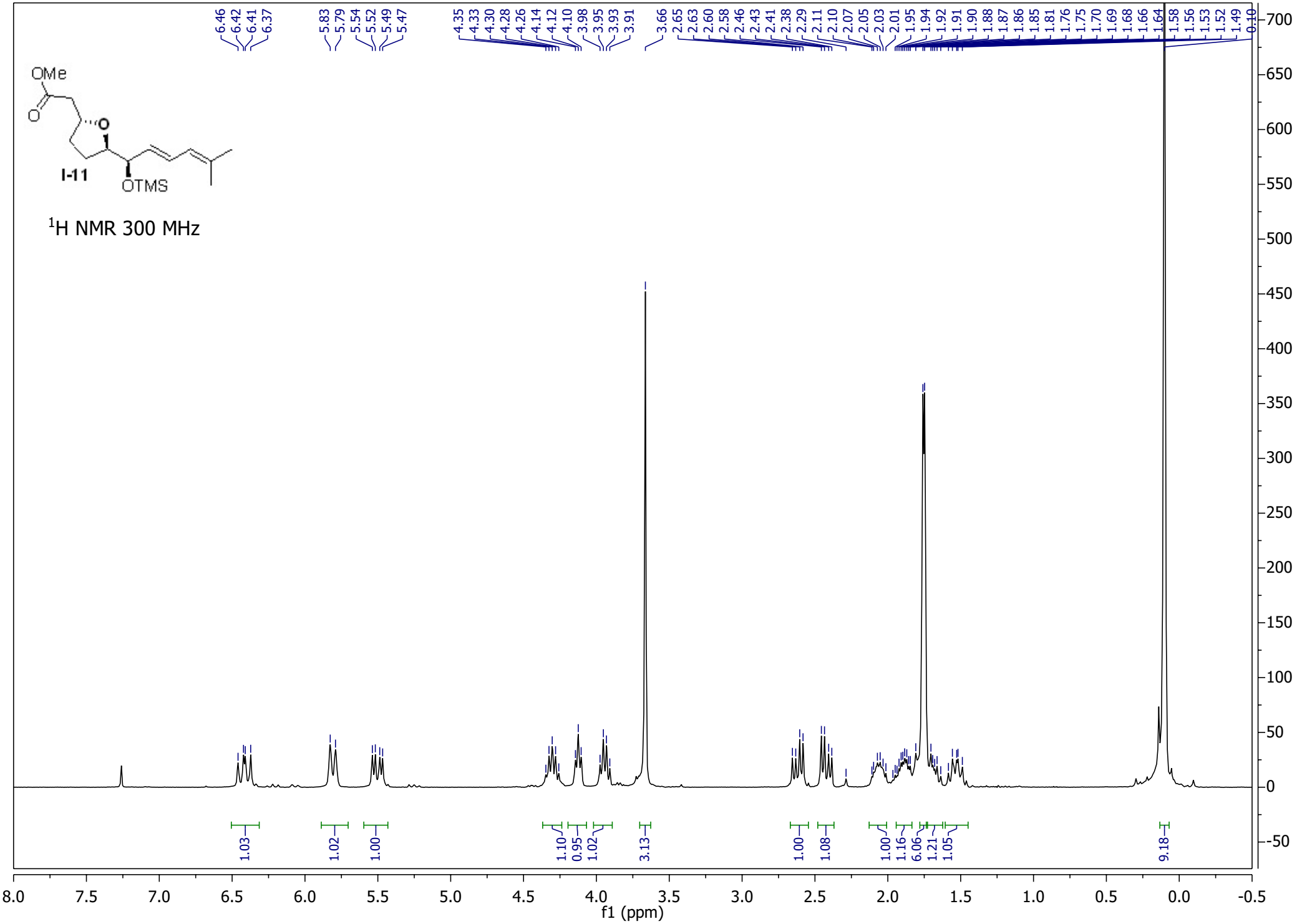
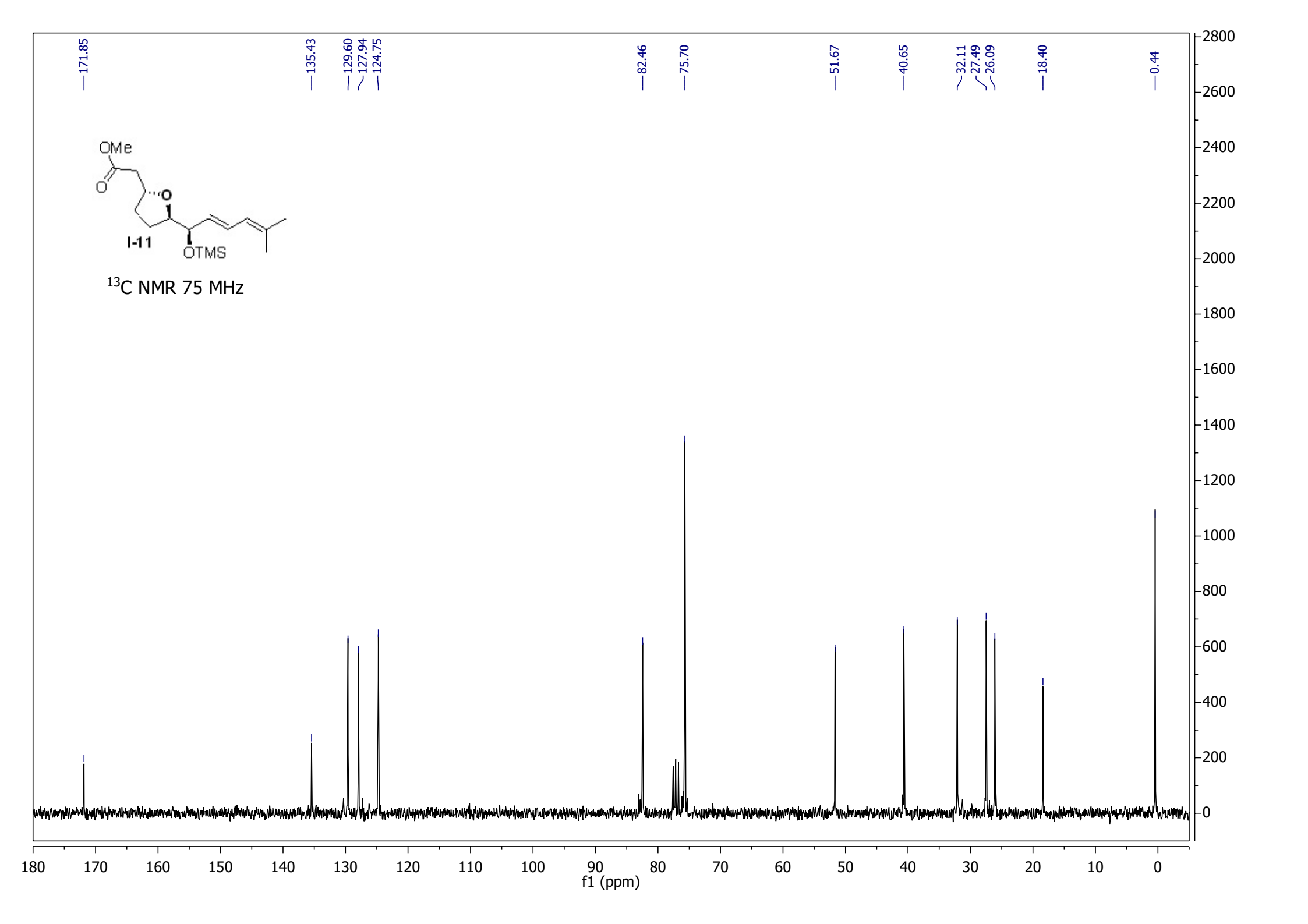
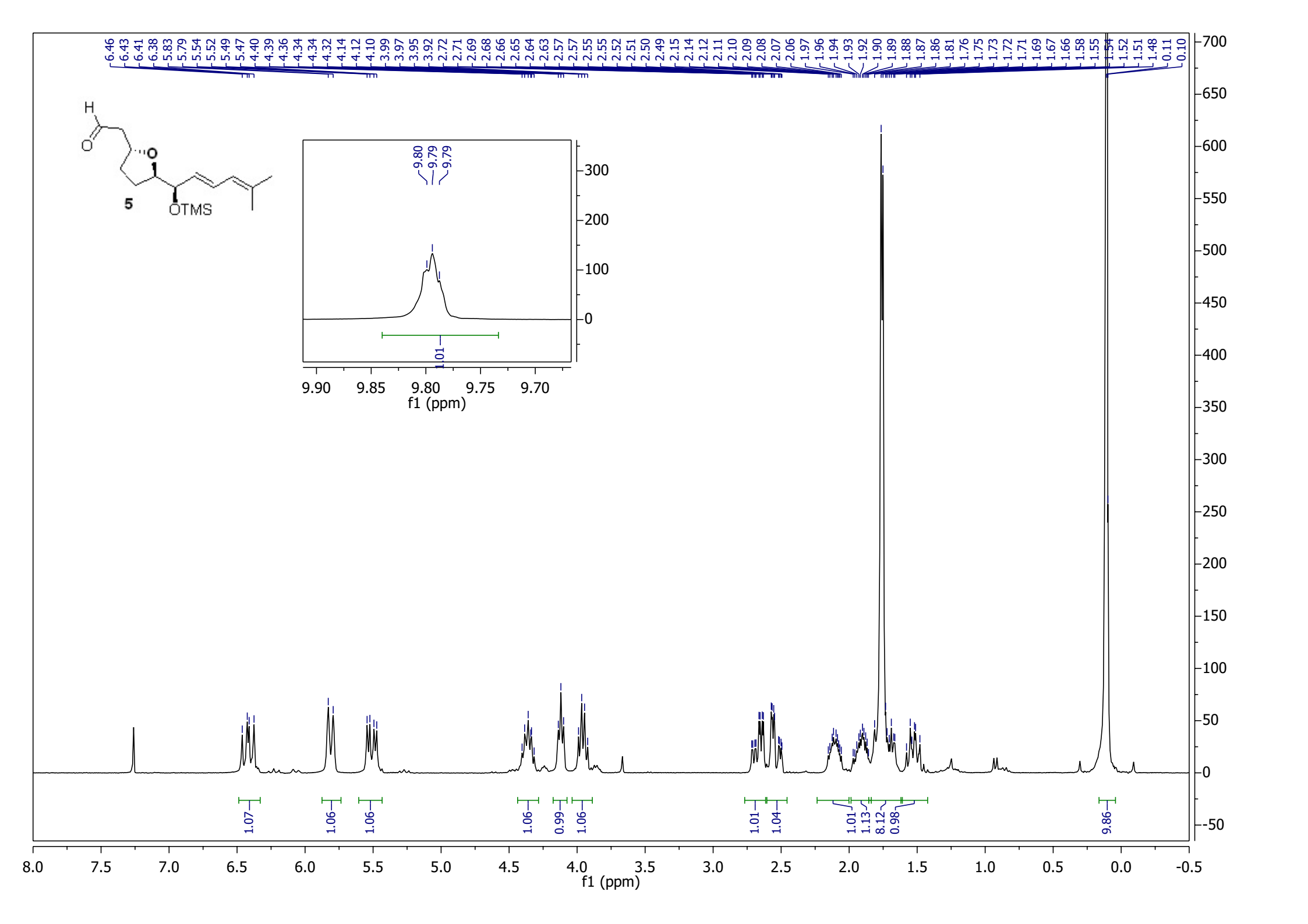
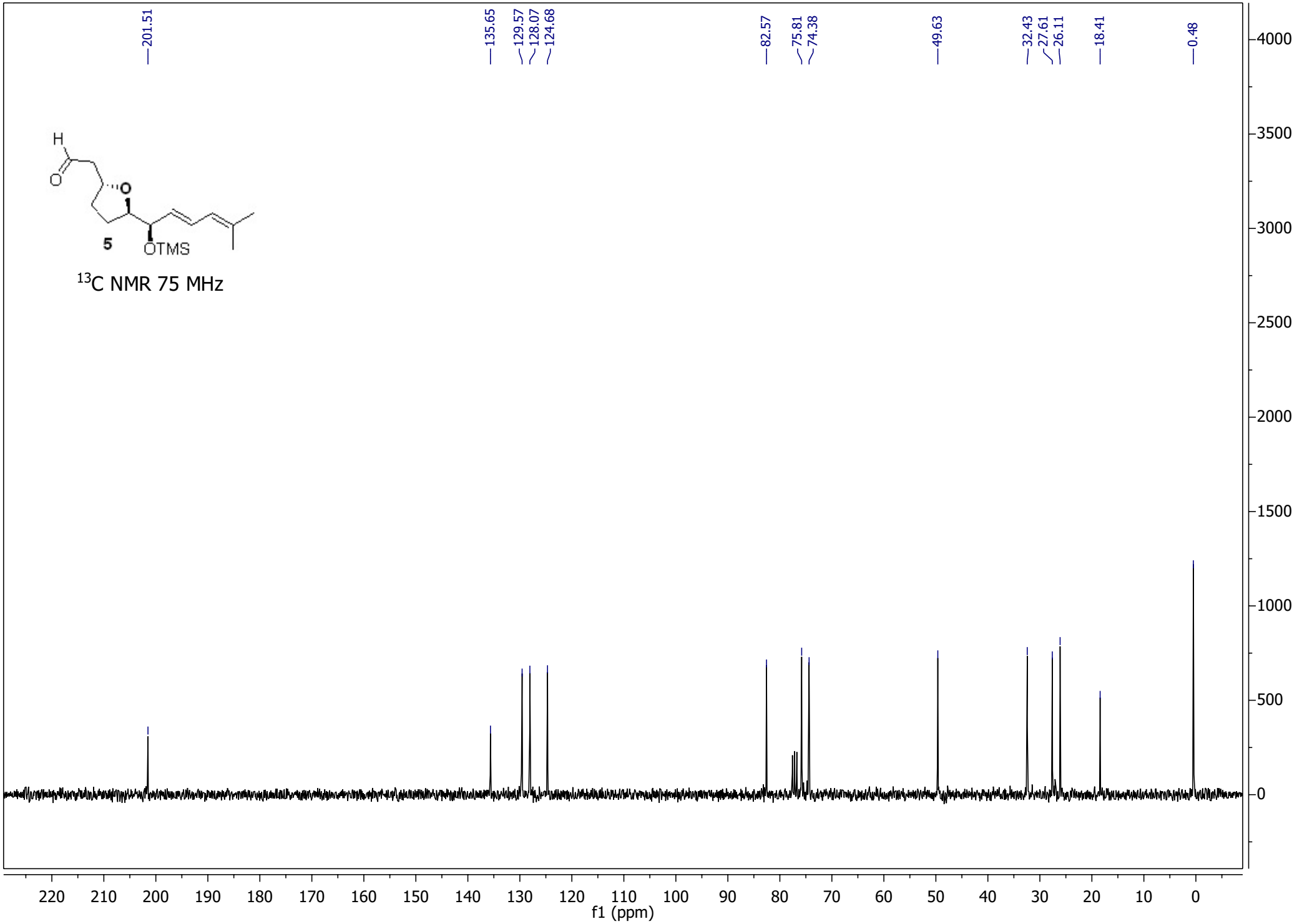
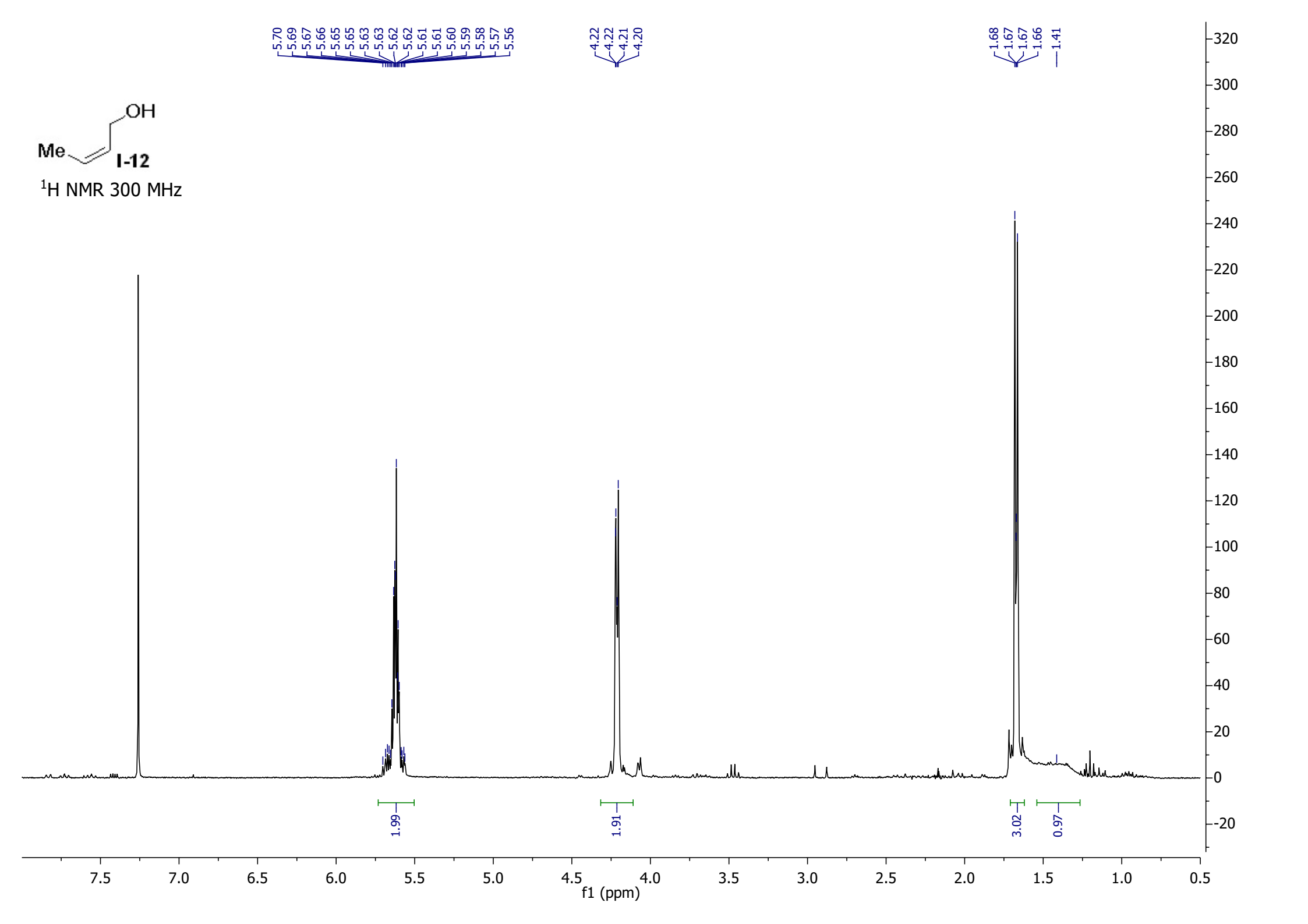
80
70
60
50
40
30
20
10
f1 (ppm)

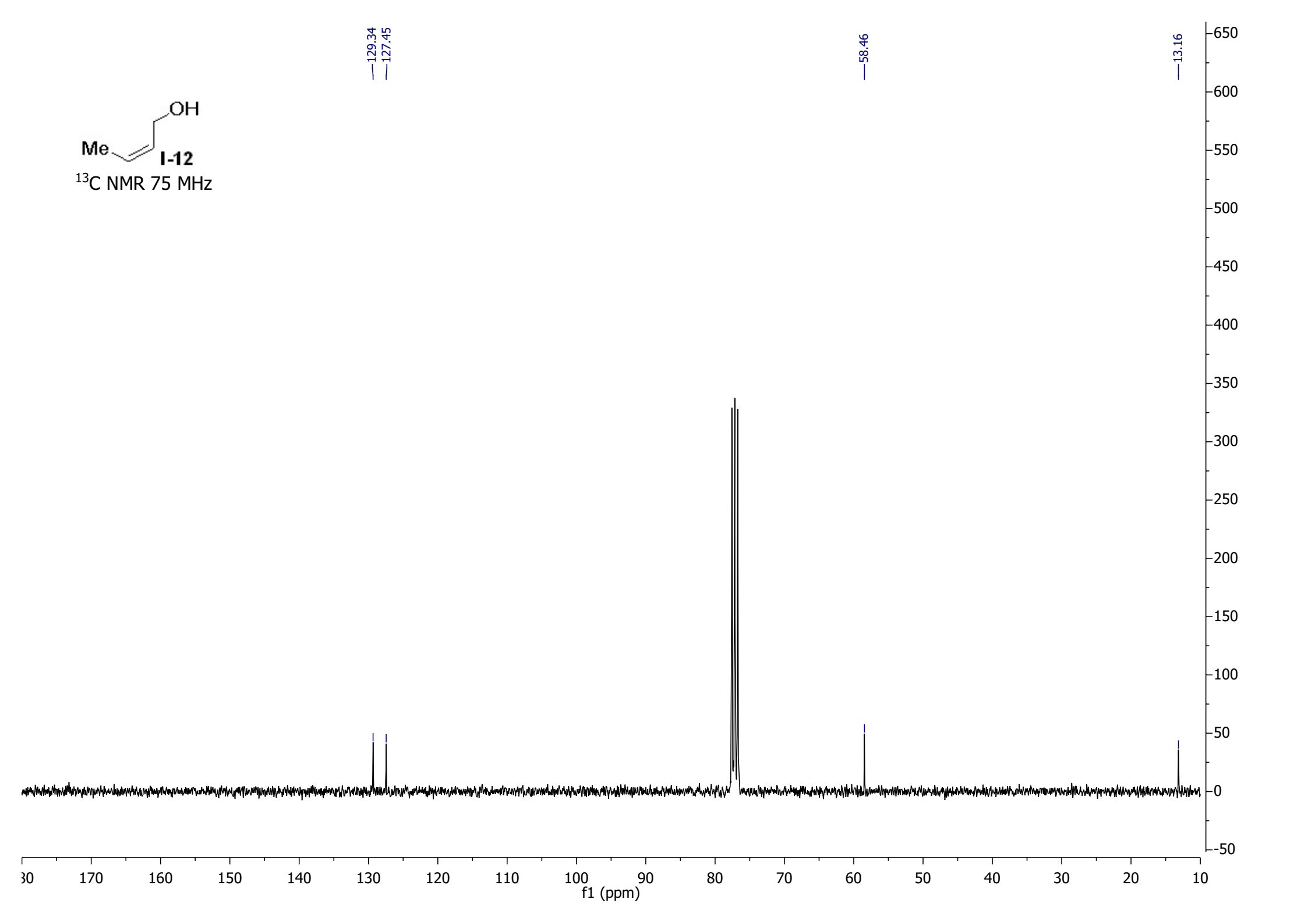

OMe
O
O
I-11
OTMS
^{1}H NMR 300 MHz
6.46 6.42 6.41 6.37 5.83 5.79 5.54 5.52 5.49 5.47 4.35 4.33 4.30 4.28 4.26 4.14 4.12 4.10 3.98 3.95 3.93 3.91 3.66 2.65 2.63 2.60 2.58 2.46 2.43 2.41 2.38 2.29 2.11 2.10 2.07 2.05 2.03 2.01 1.95 1.94 1.92 1.91 1.90 1.88 1.87 1.86 1.85 1.81 1.76 1.75 1.70 1.69 1.68 1.66 1.64 1.58 1.56 1.53 1.52 1.49 0.10
1.03 1.02 1.00 1.10 0.95 1.02 3.13 1.00 1.08 1.00 1.16 6.06 1.21 1.05 9.18
8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)
700 650 600 550 500 450 400 350 300 250 200 150 100 50 0 -50

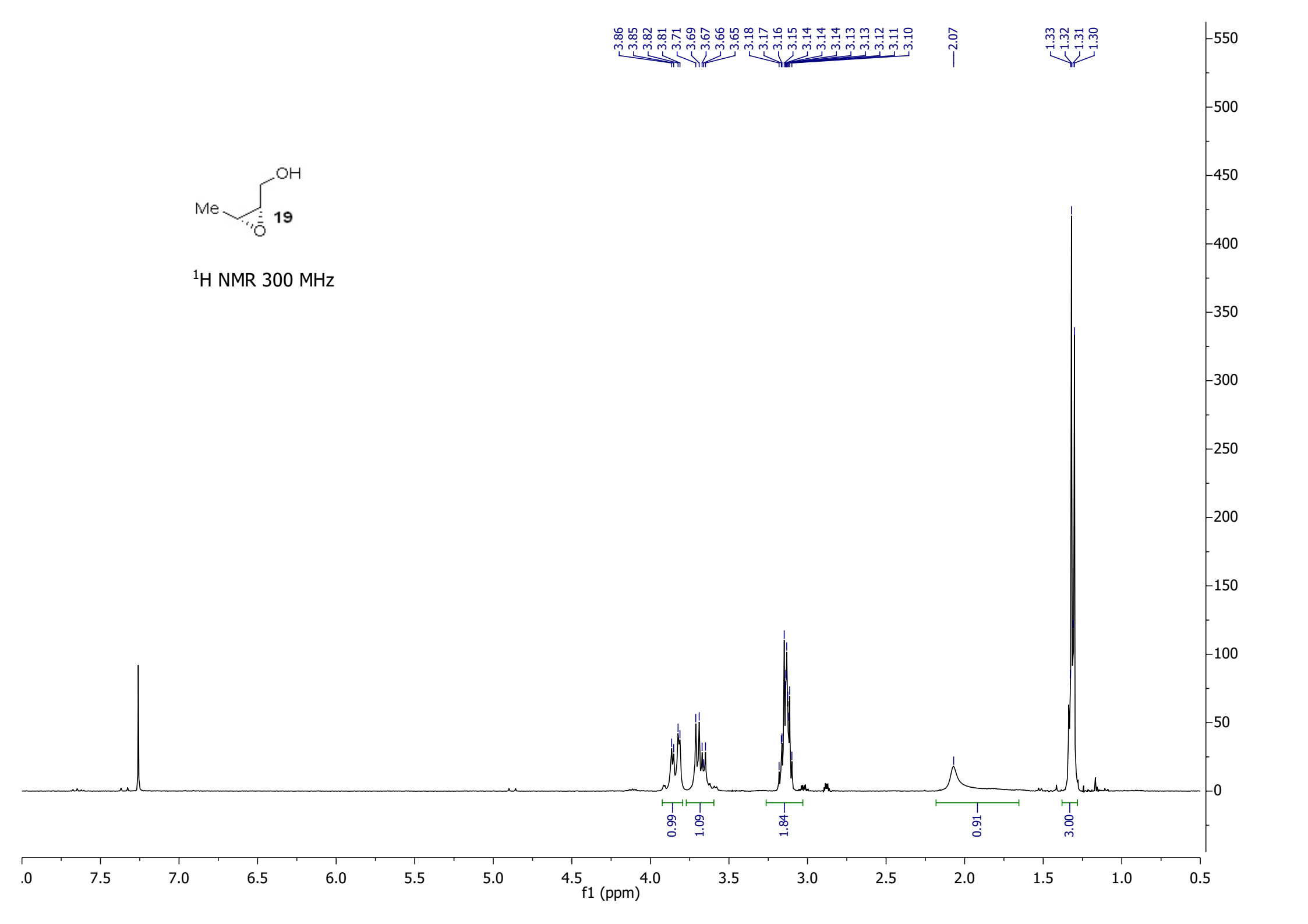

171.85
135.43
129.60
127.94
124.75
82.46
75.70
51.67
40.65
32.11
27.49
26.09
18.40
0.44
OMe
O
O
I-11
OTMS
13C NMR 75 MHz
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

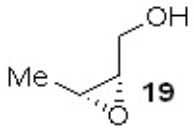

H
O
O
5
OTMS
9.80
9.79
9.79
1.01
9.90
9.85
9.80
9.75
9.70
f1 (ppm)
1.07
1.06
1.06
1.06
0.99
1.06
1.01
1.04
1.01
1.13
8.12
0.98
9.86
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)


201.51
135.65
129.57
128.07
124.68
82.57
75.81
74.38
49.63
32.43
27.61
26.11
18.41
0.48
H
O
O
5
OTMS
13C NMR 75 MHz
4000
3500
3000
2500
2000
1500
1000
500
0
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


OH
Me
I-12
1H NMR 300 MHz
5.70 5.69 5.67 5.66 5.65 5.65 5.63 5.63 5.62 5.62 5.61 5.61 5.60 5.59 5.58 5.57 5.56
4.22 4.22 4.21 4.20
1.68 1.67 1.67 1.66 1.41
1.99
1.91
3.02
0.97
f1 (ppm)

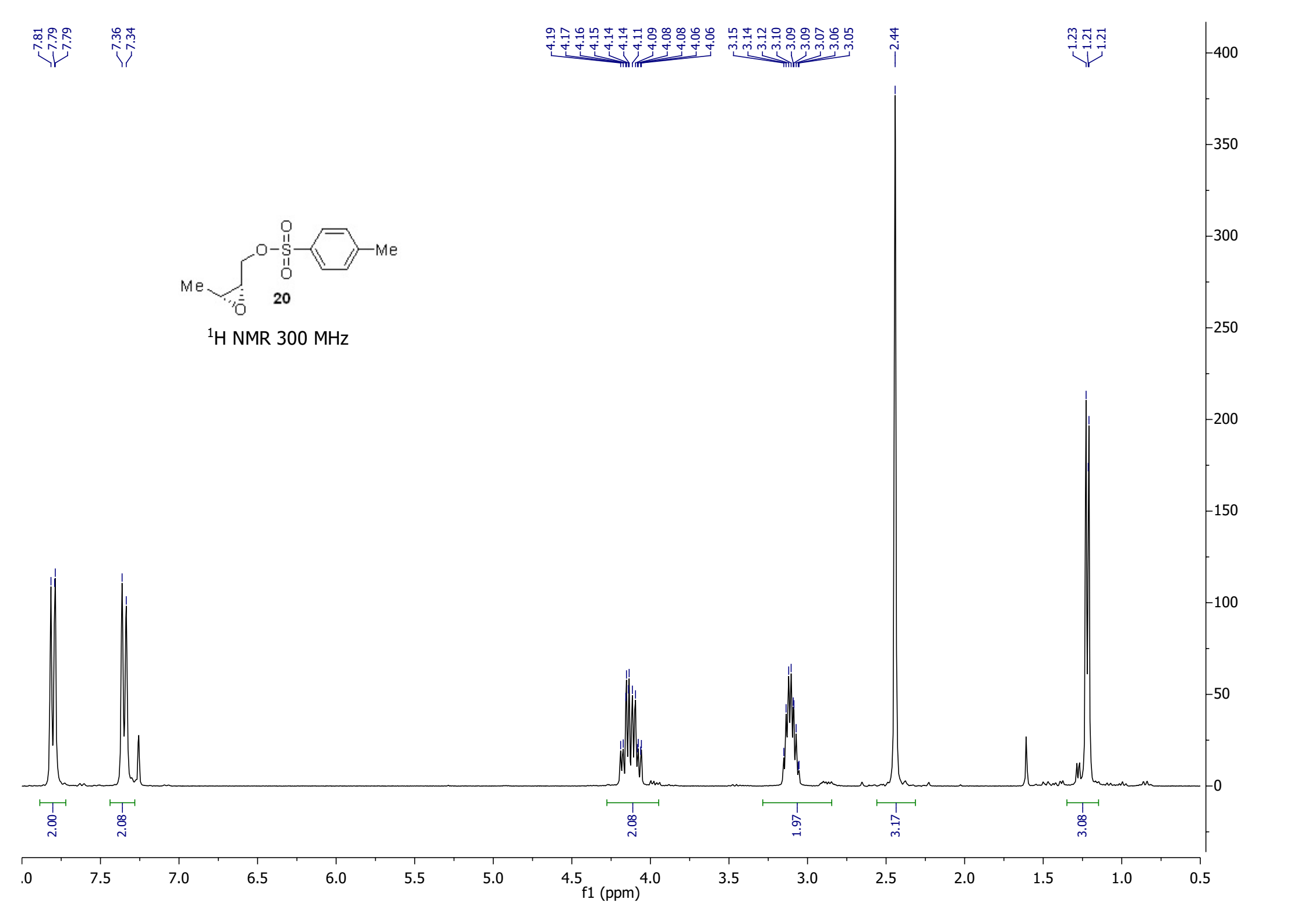

129.34
127.45
58.46
13.16
OH
Me
I-12
13C NMR 75 MHz
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-50
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

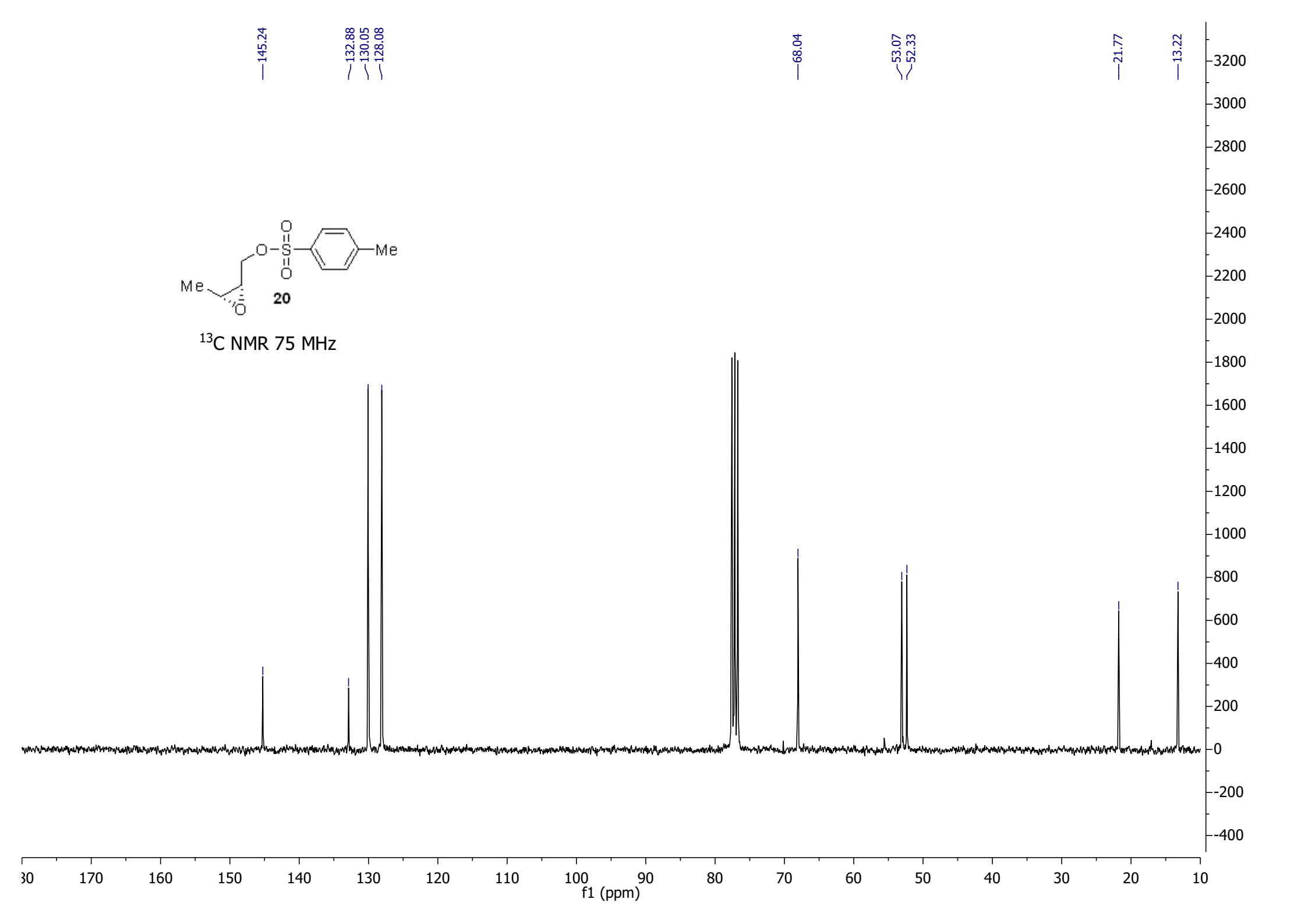

OH
Me
19
1H NMR 300 MHz
3.86
3.85
3.82
3.81
3.71
3.69
3.67
3.66
3.65
3.18
3.17
3.16
3.15
3.14
3.14
3.14
3.13
3.13
3.12
3.11
3.10
2.07
1.33
1.32
1.31
1.30
0.99
1.09
1.84
0.91
3.00
f1 (ppm)

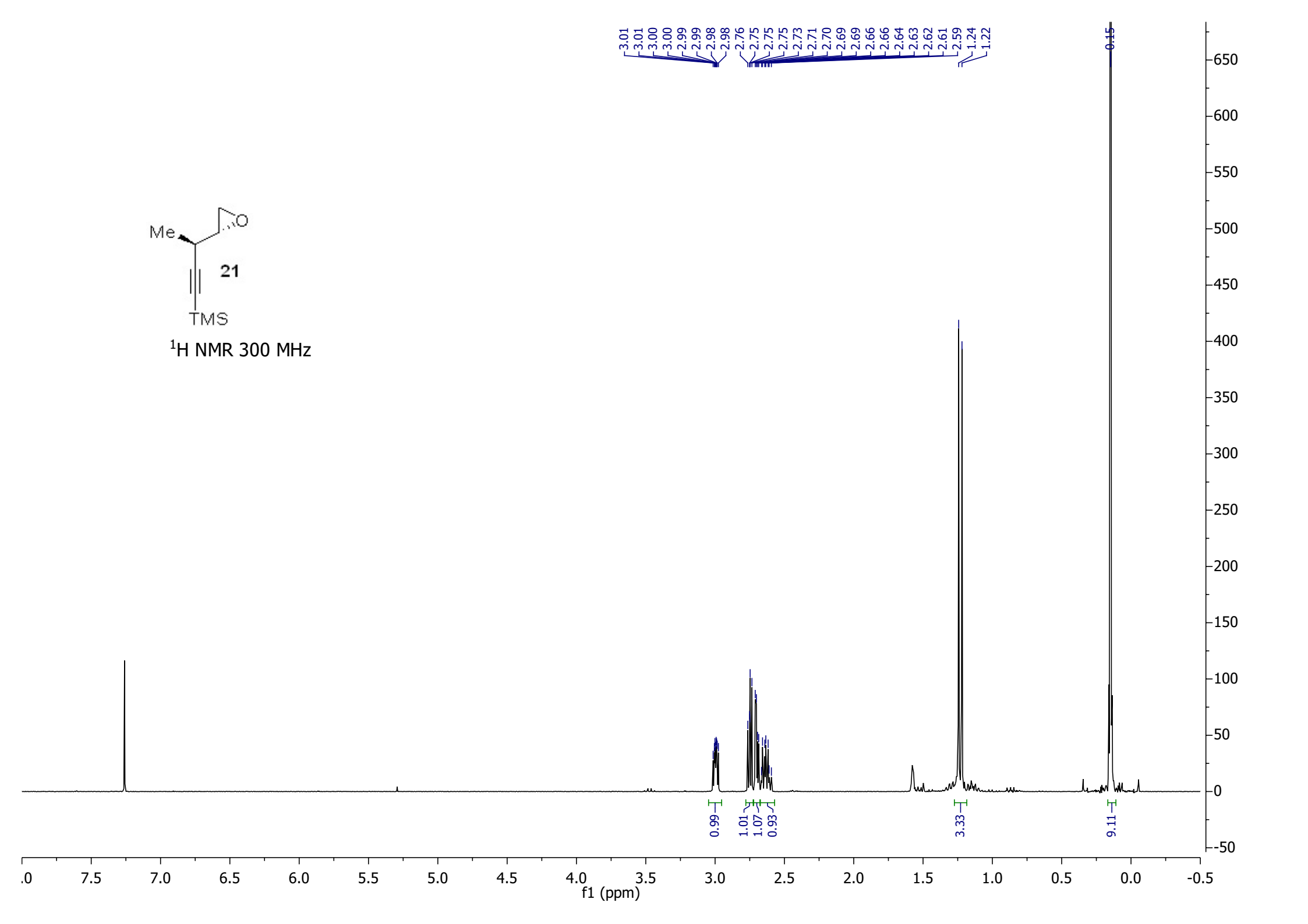


19

^{13}C NMR 75 MHz


7.81
7.79
7.79
7.36
7.34
4.19
4.17
4.16
4.15
4.14
4.14
4.11
4.09
4.08
4.08
4.06
4.06
3.15
3.14
3.12
3.10
3.09
3.09
3.07
3.06
3.05
2.44
1.23
1.21
1.21
Me
O
O
S
O
O
Me
Me
O
20
1H NMR 300 MHz
2.00
2.08
2.08
1.97
3.17
3.08
f1 (ppm)


145.24
132.88
130.05
128.08
68.04
53.07
52.33
21.77
13.22
Me
O
S
O
O
Me
Me
O
20
^{13}C NMR 75 MHz
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
-200
-400
30
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


Me
O
21
TMS
1H NMR 300 MHz
3.01
3.01
3.00
3.00
2.99
2.99
2.98
2.98
2.76
2.75
2.75
2.75
2.73
2.71
2.70
2.69
2.69
2.66
2.66
2.64
2.63
2.62
2.61
2.59
1.24
1.22
0.15
0.99
1.01
1.07
0.93
3.33
9.11
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-50
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)

^{13}C NMR 75 MHz

75

```
Current Data Parameters
NAME          2010-03-23
EXPNO                171
PROCNO                 1

F2 - Acquisition Parameters
Date_           20100324
Time                5.02
INSTRUM            spect
PROBHD   5 mm DUL 13C-1
PULPROG           zgpg30
TD                 65536
SOLVENT            CDCl3
NS                   512
DS                     4
SWH           17985.611 Hz
FIDRES         0.274439 Hz
AQ            1.8219508 sec
RG                 16384
DW               27.800 usec
DE                6.50 usec
TE                296.8 K
D1           2.00000000 sec
d11          0.03000000 sec
MCREST       0.00000000 sec
MCWRK        0.01500000 sec

======== CHANNEL f1 ========
NUC1                13C
P1                10.20 usec
PL1                0.00 dB
SFO1          75.4760505 MHz

======== CHANNEL f2 ========
CPDPRG2          waltz16
NUC2                1H
PCPD2             100.00 usec
PL2                0.00 dB
PL12              18.79 dB
PL13              20.50 dB
SFO2         300.1312005 MHz

F2 - Processing parameters
SI                 32768
SF          75.4677538 MHz
WDW                   EM
SSB                    0
LB                  3.00 Hz
GB                     0
PC                  1.40
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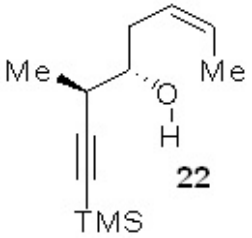
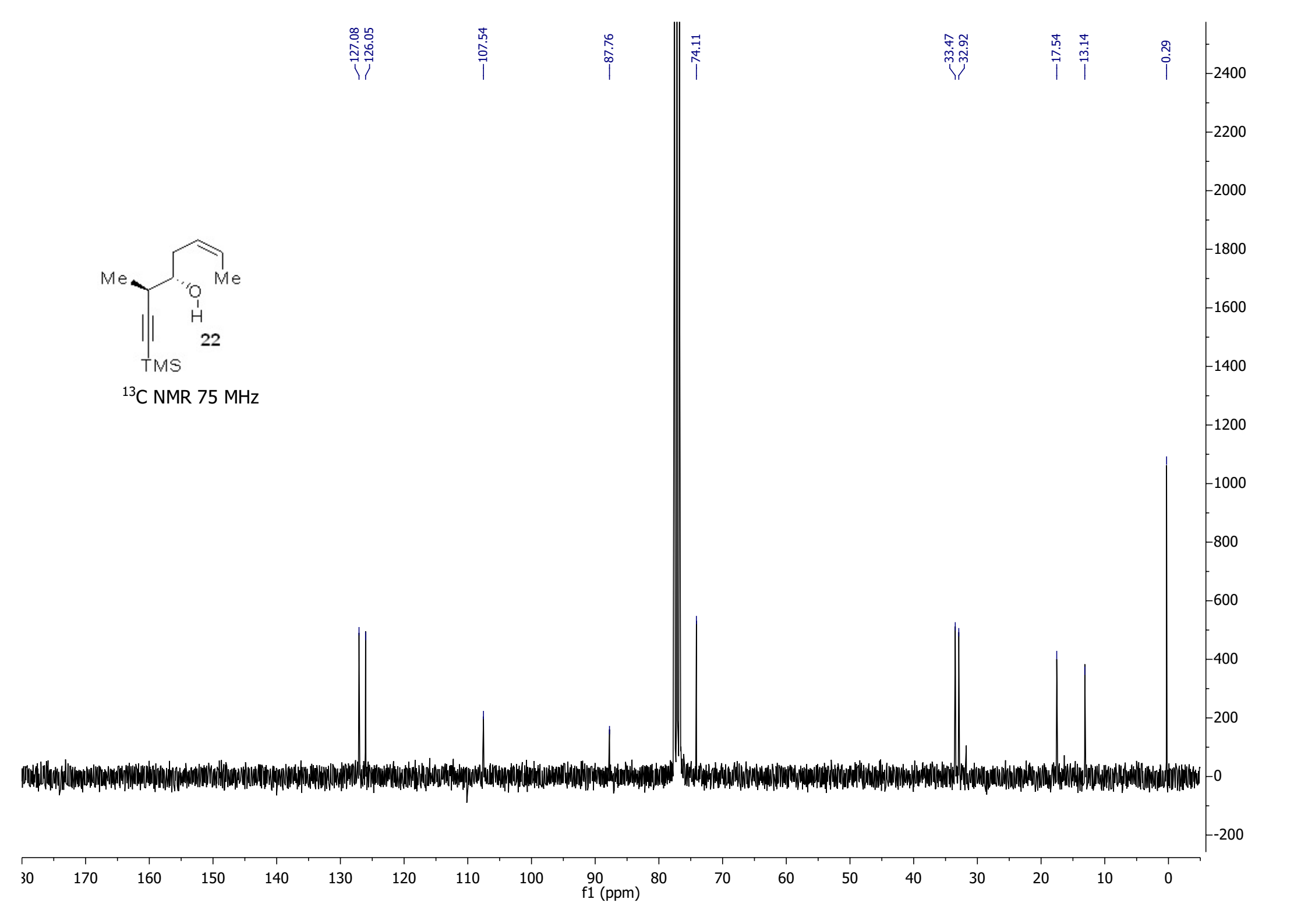
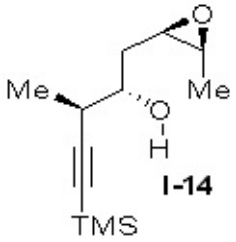
^{1}H NMR 300 MHz



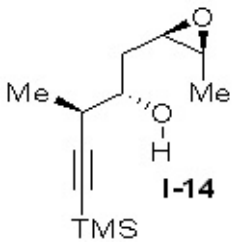
22


127.08
126.05
107.54
87.76
74.11
33.47
32.92
17.54
13.14
0.29
Me
Me
O
H
TMS
22
13C NMR 75 MHz
f1 (ppm)

^{1}H NMR 300 MHz

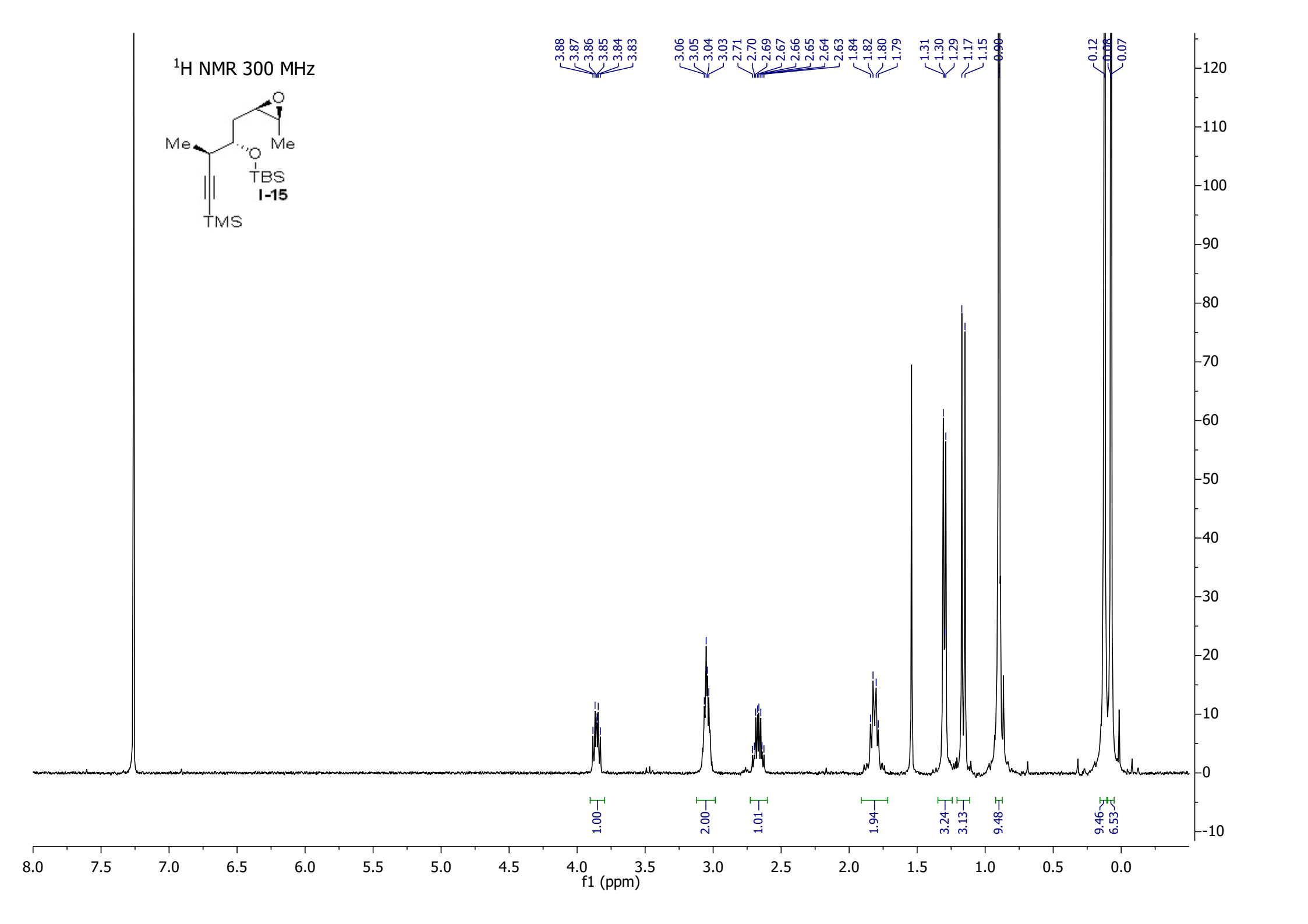


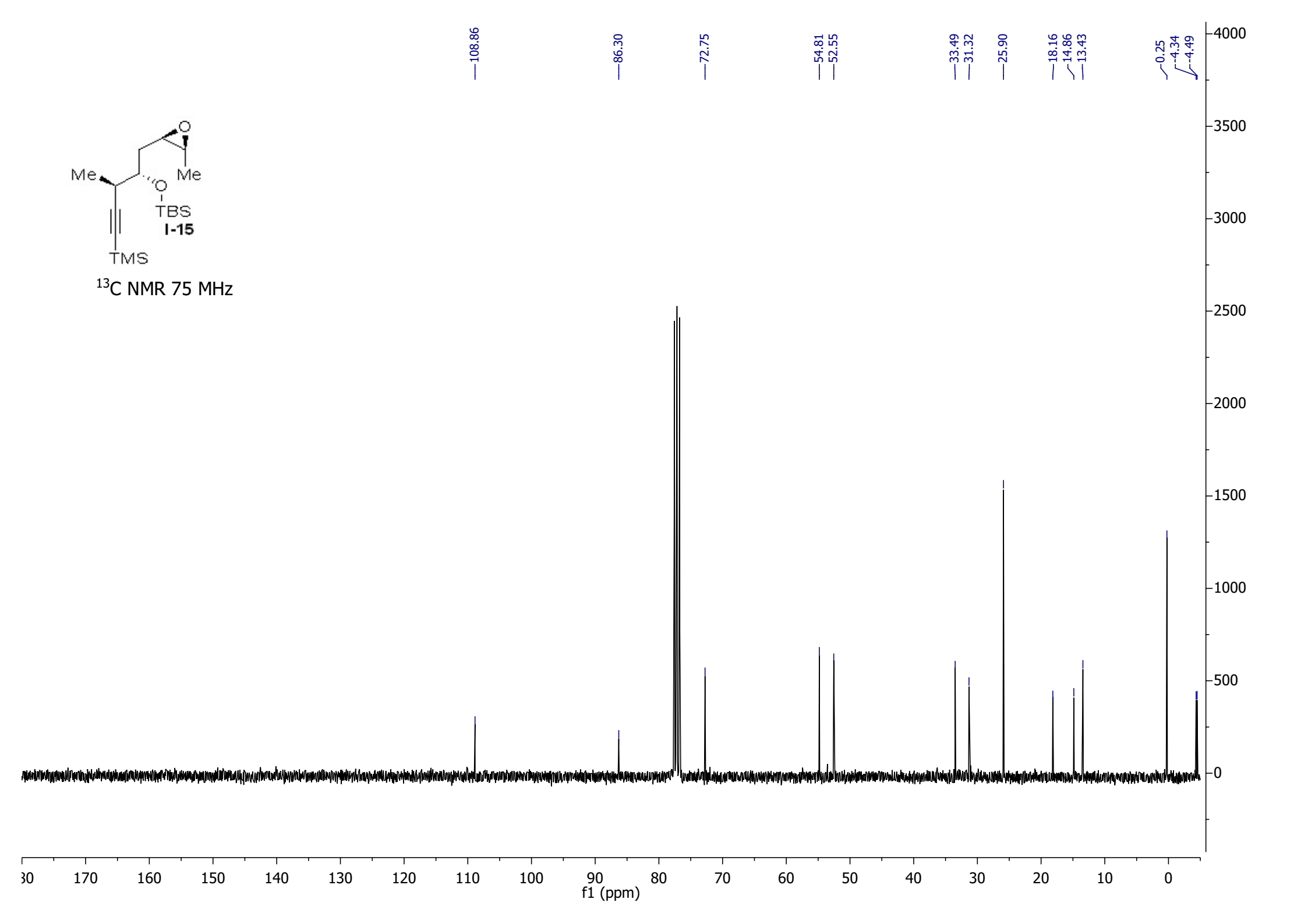
I-14

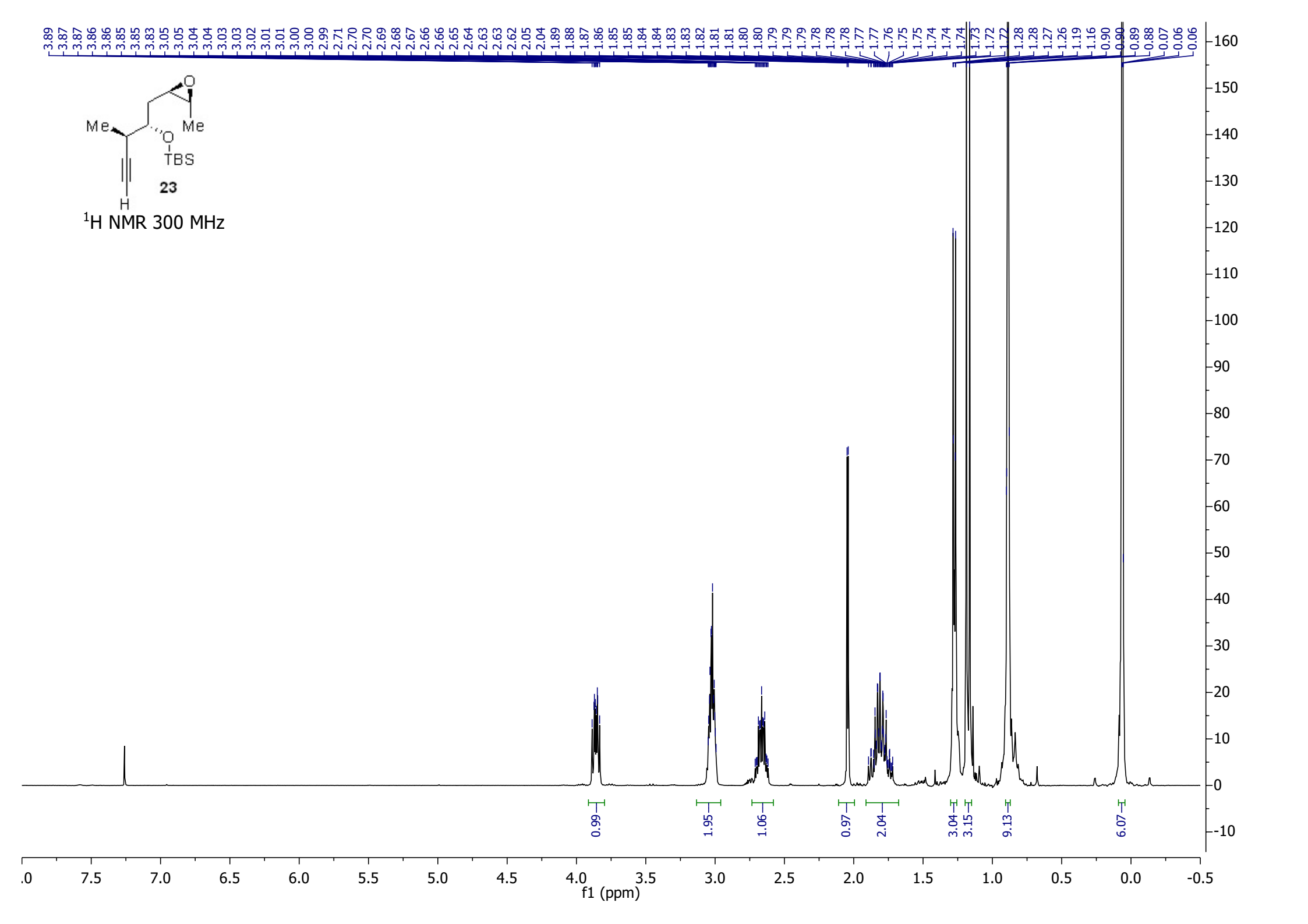


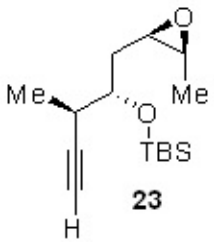
I-14

^{13}C NMR 75 MHz


^{1}H NMR 300 MHz
Me
Me
O
TBS
I-15
TMS
3.88
3.87
3.86
3.85
3.84
3.83
3.06
3.05
3.04
3.03
2.71
2.70
2.69
2.67
2.66
2.65
2.64
2.63
1.84
1.82
1.80
1.79
1.31
1.30
1.29
1.17
1.15
0.90
0.12
0.08
0.07
1.00
2.00
1.01
1.94
3.24
3.13
9.48
9.46
6.53
f1 (ppm)

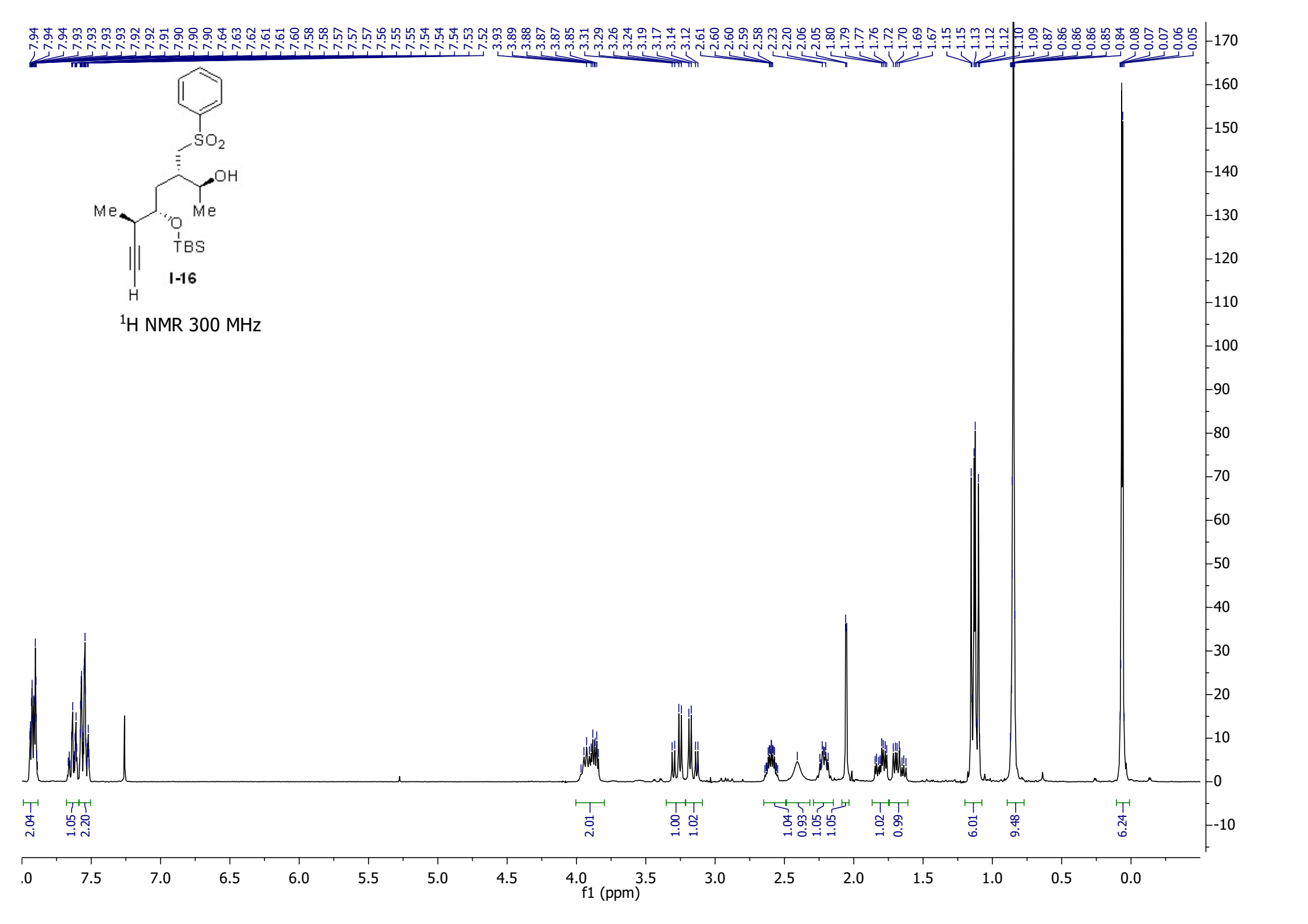

108.86
86.30
72.75
54.81
52.55
33.49
31.32
25.90
18.16
14.86
13.43
0.25
-4.34
-4.49
Me
Me
O
O
TBS
I-15
TMS
13C NMR 75 MHz
4000
3500
3000
2500
2000
1500
1000
500
0
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

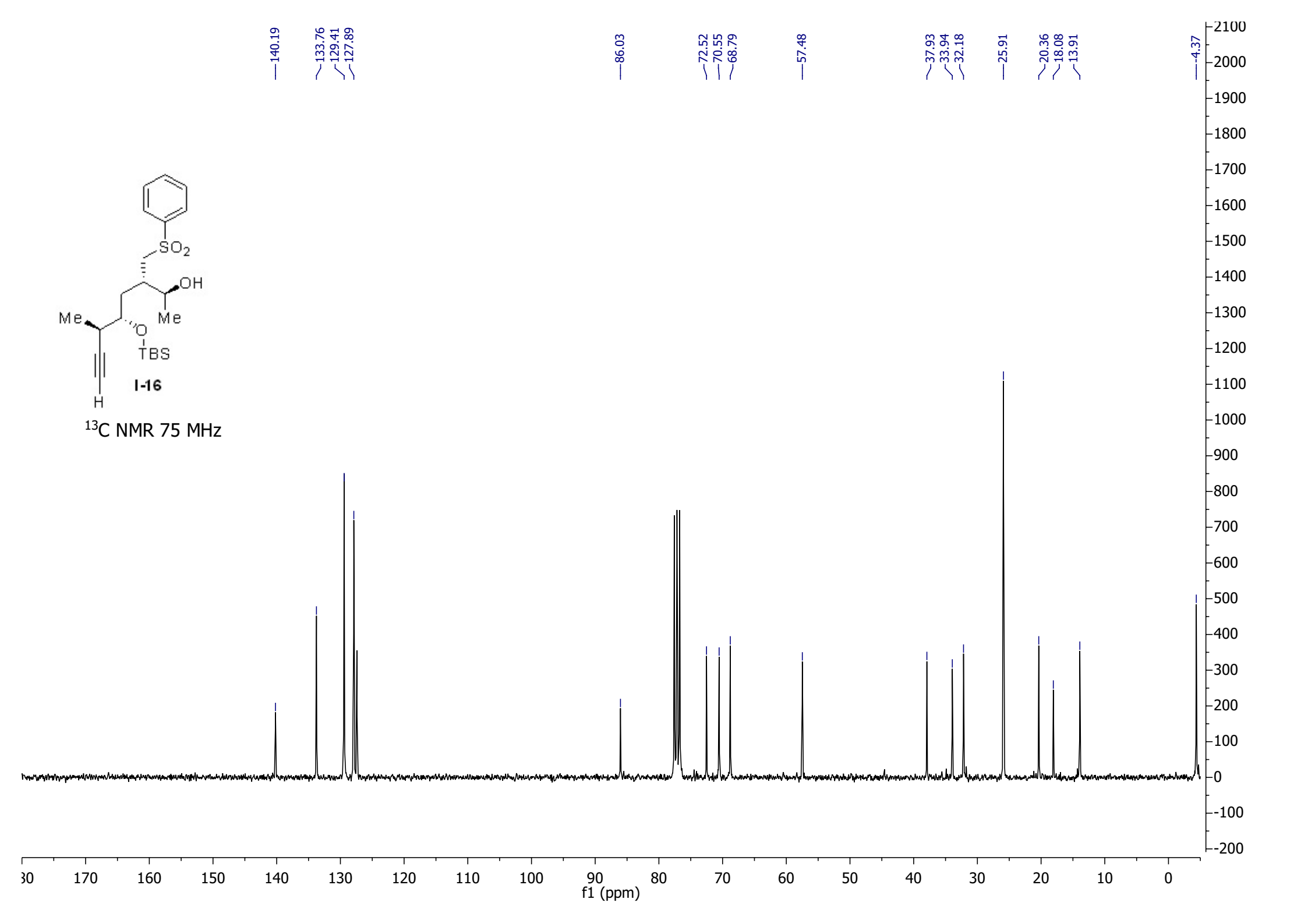

Me
Me
O
TBS
23
H
1H NMR 300 MHz
f1 (ppm)
0.99
1.95
1.06
0.97
2.04
3.04
3.15
9.13
6.07

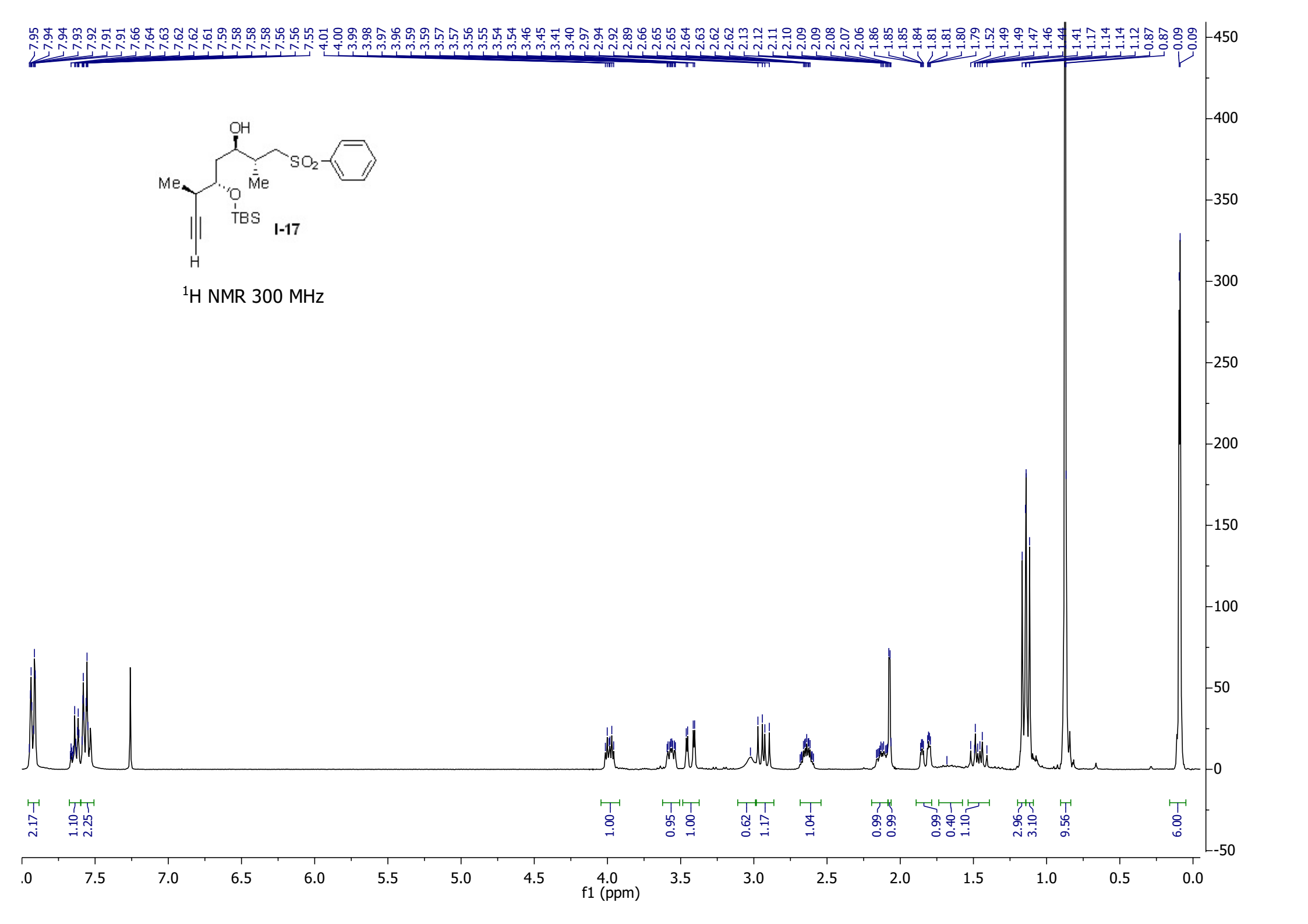


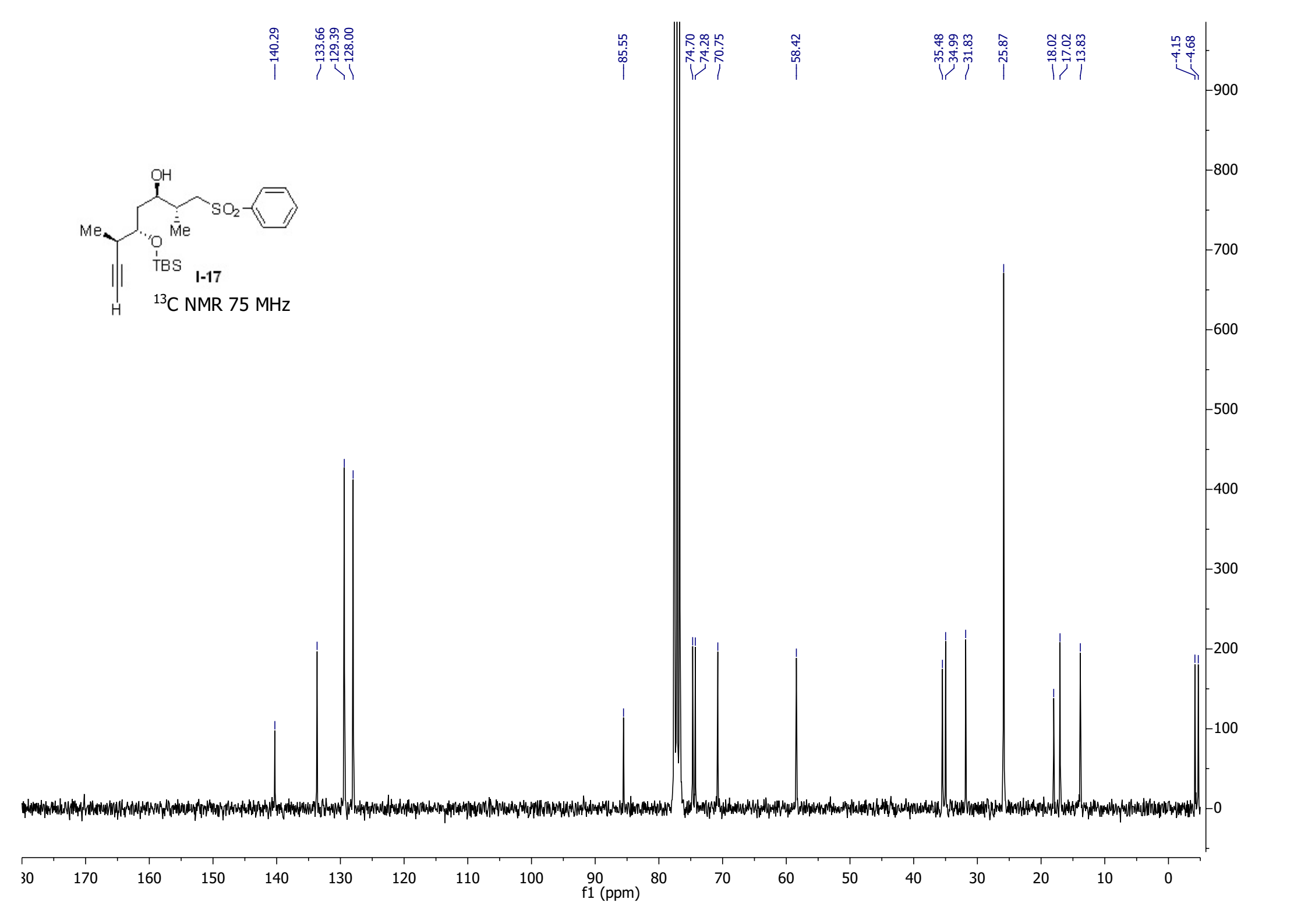
23

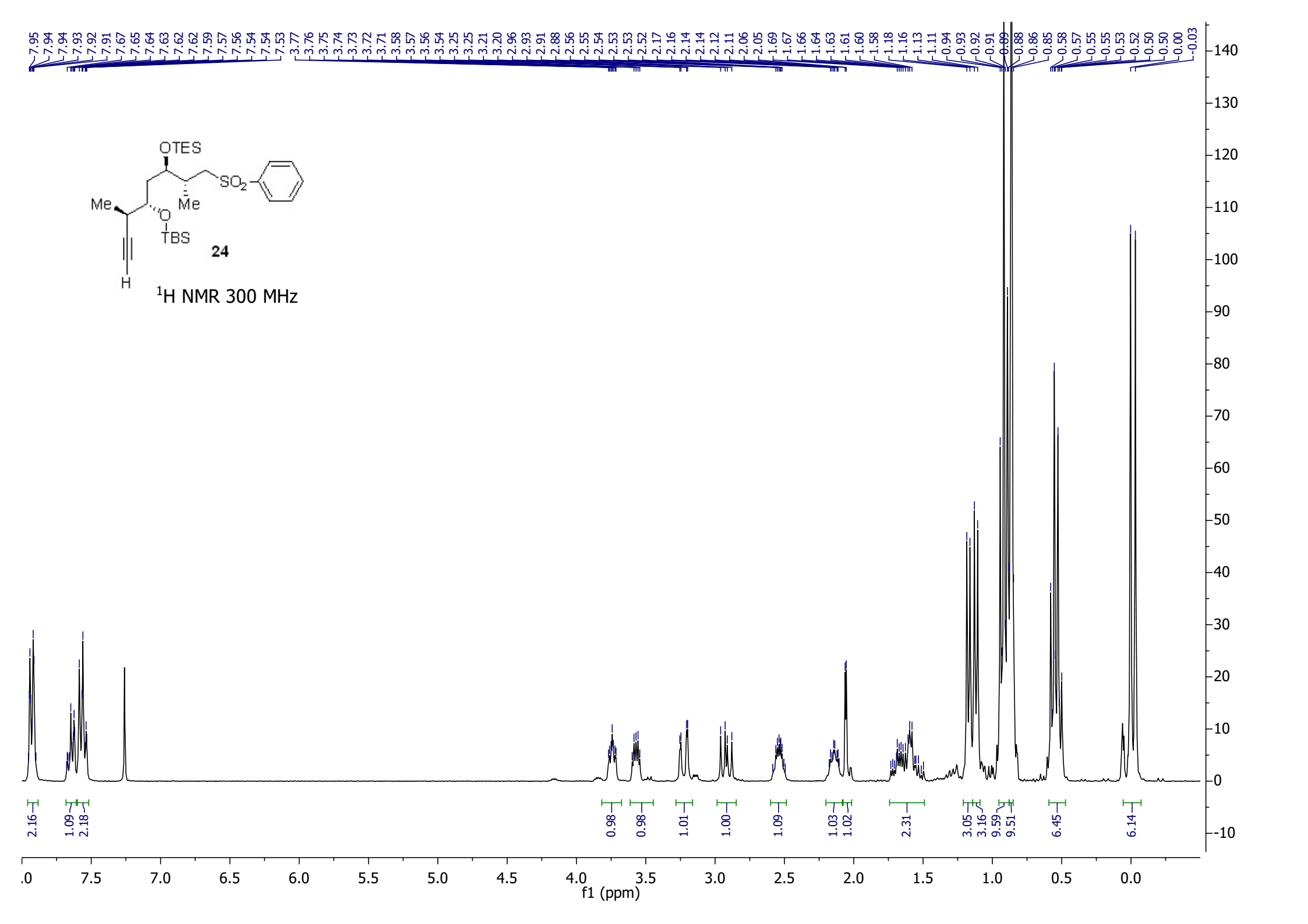
^{13}C NMR 75 MHz

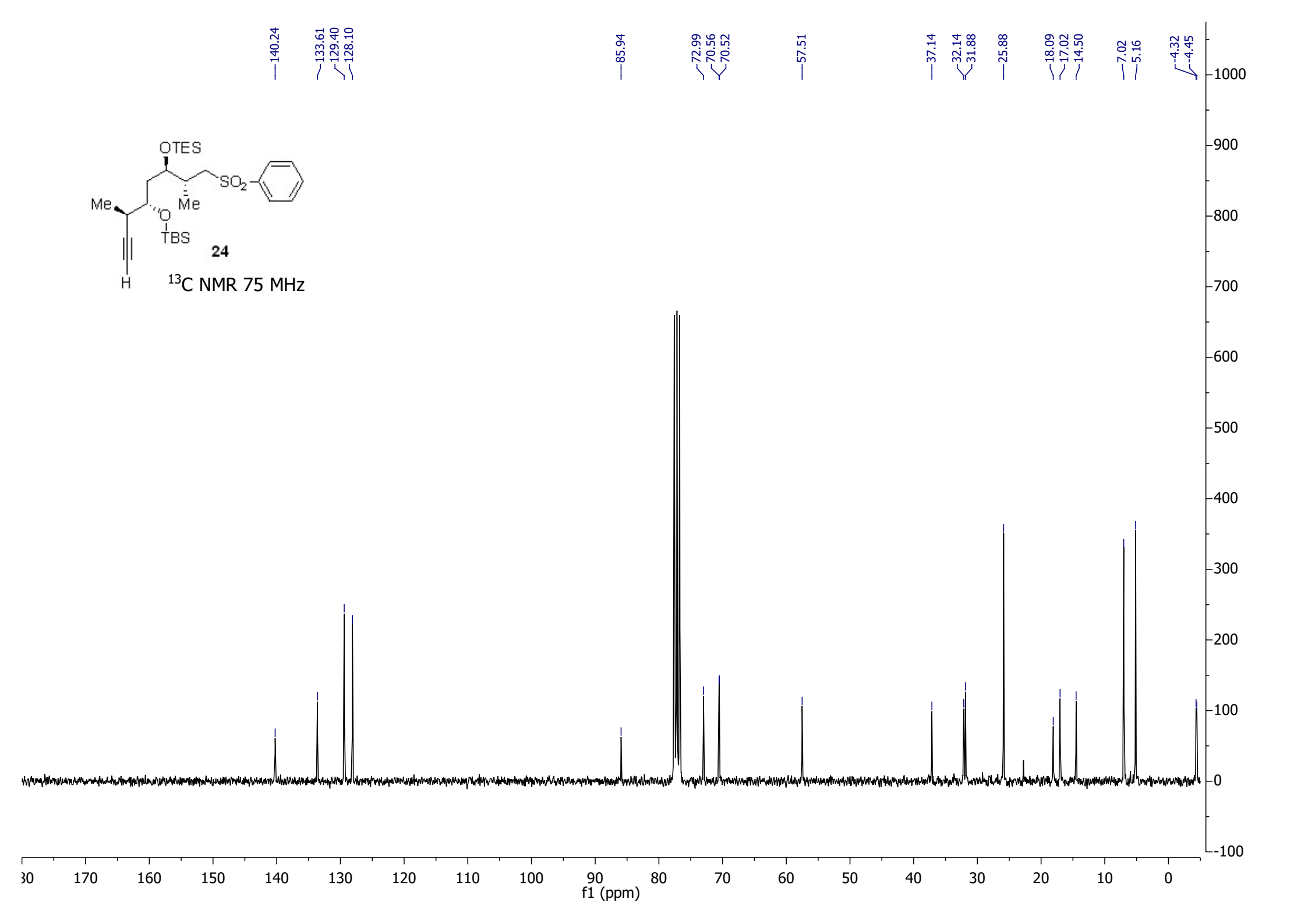

SO2
OH
Me
Me
O
TBS
H
I-16
1H NMR 300 MHz
f1 (ppm)

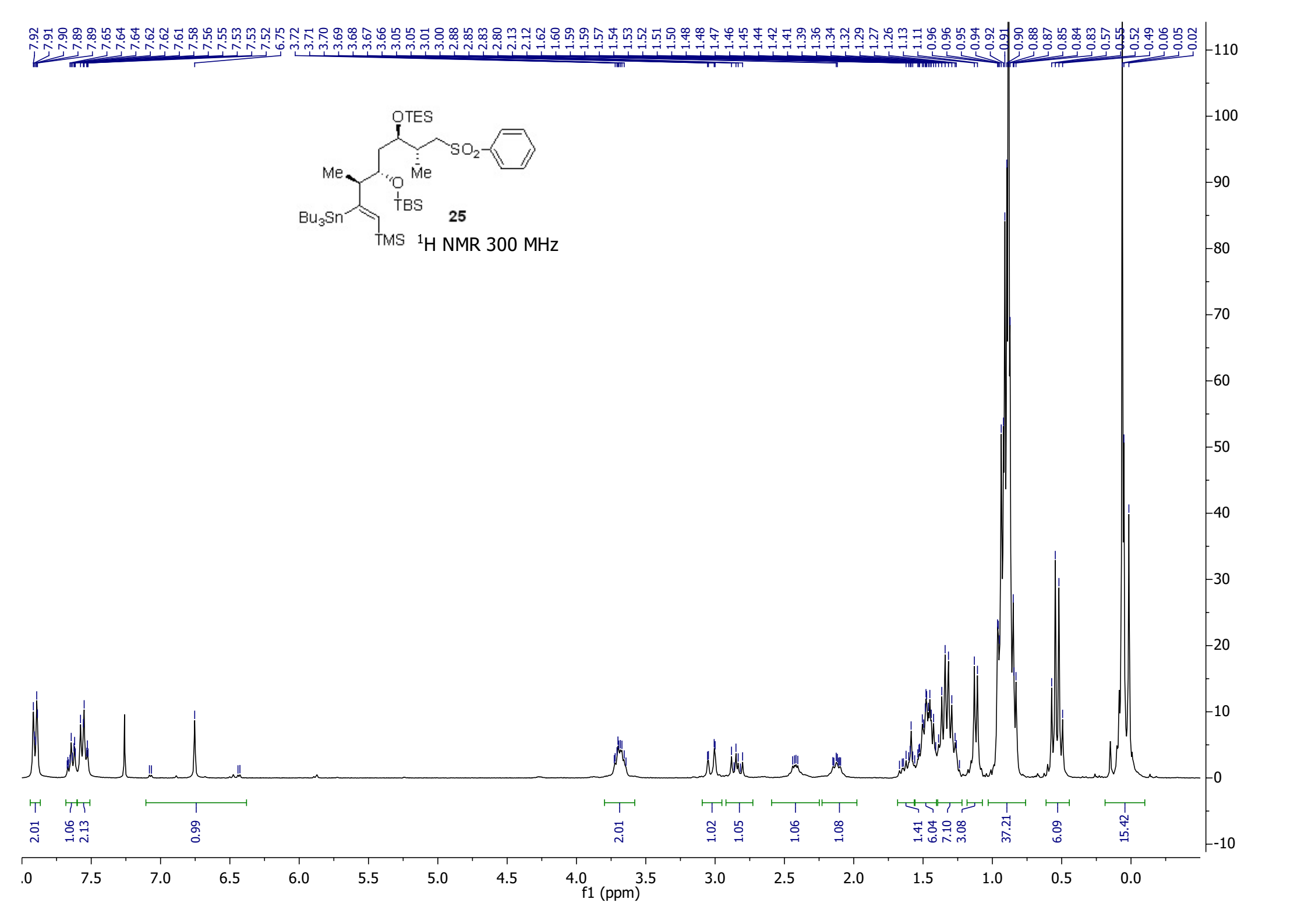

140.19
133.76
129.41
127.89
86.03
72.52
70.55
68.79
57.48
37.93
33.94
32.18
25.91
20.36
18.08
13.91
4.37
SO2
OH
Me
Me
O
TBS
H
I-16
13C NMR 75 MHz
f1 (ppm)

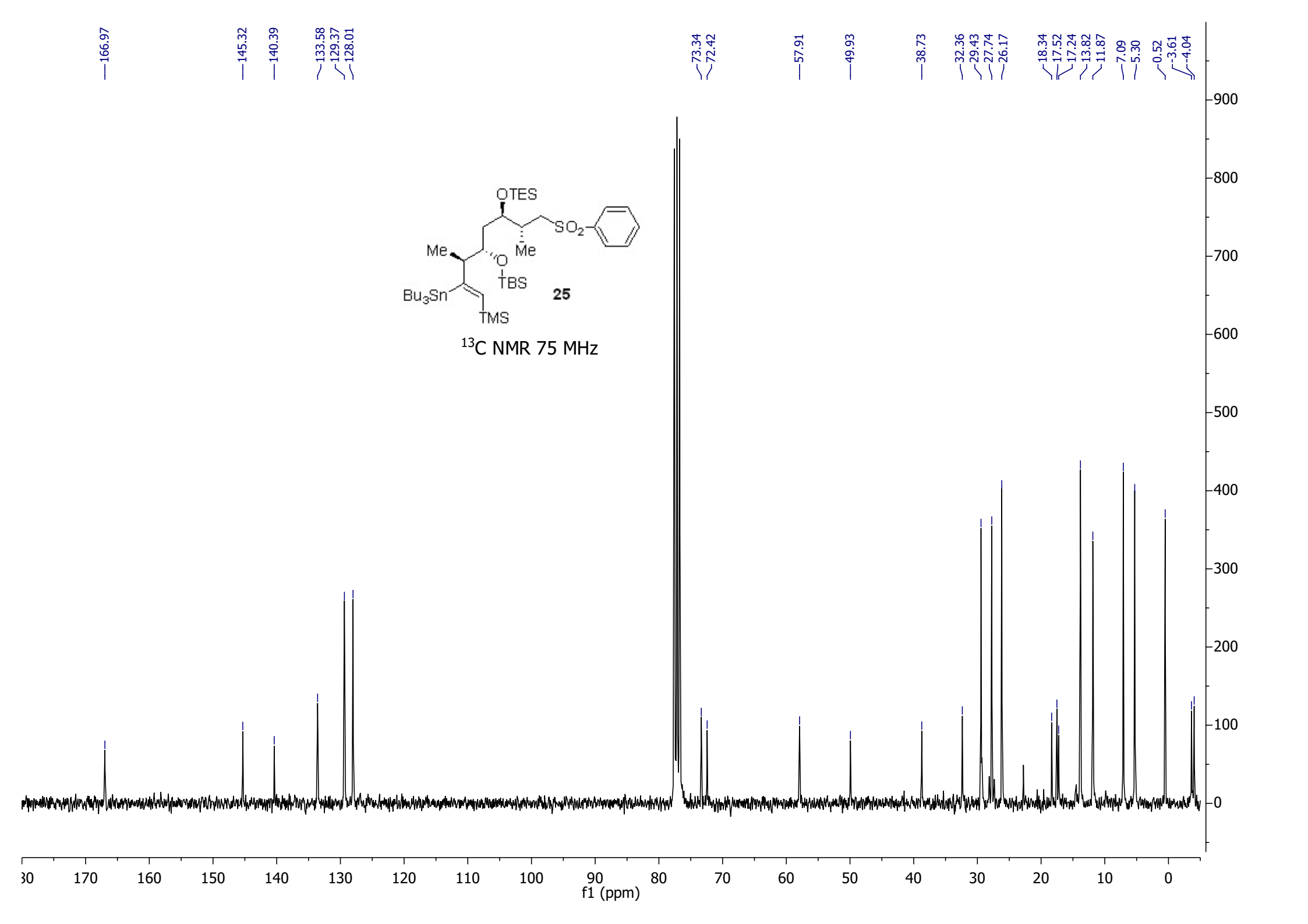

OH
SO2
Me
Me
O
TBS
H
I-17
1H NMR 300 MHz
f1 (ppm)

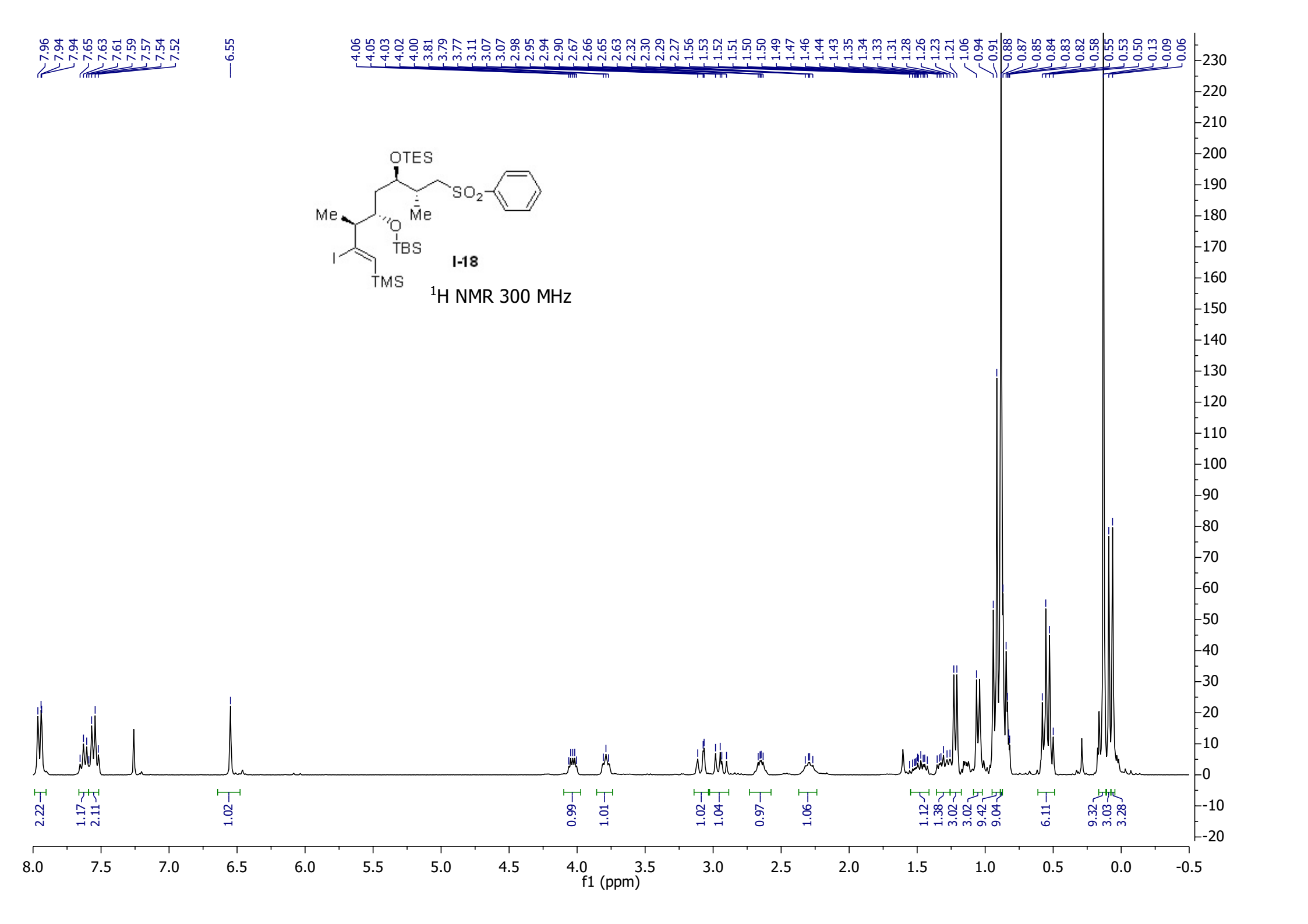

140.29
133.66
129.39
128.00
85.55
74.70
74.28
70.75
58.42
35.48
34.99
31.83
25.87
18.02
17.02
13.83
-4.15
-4.68
OH
SO2
Me
Me
O
TBS
H
I-17
13C NMR 75 MHz
f1 (ppm)

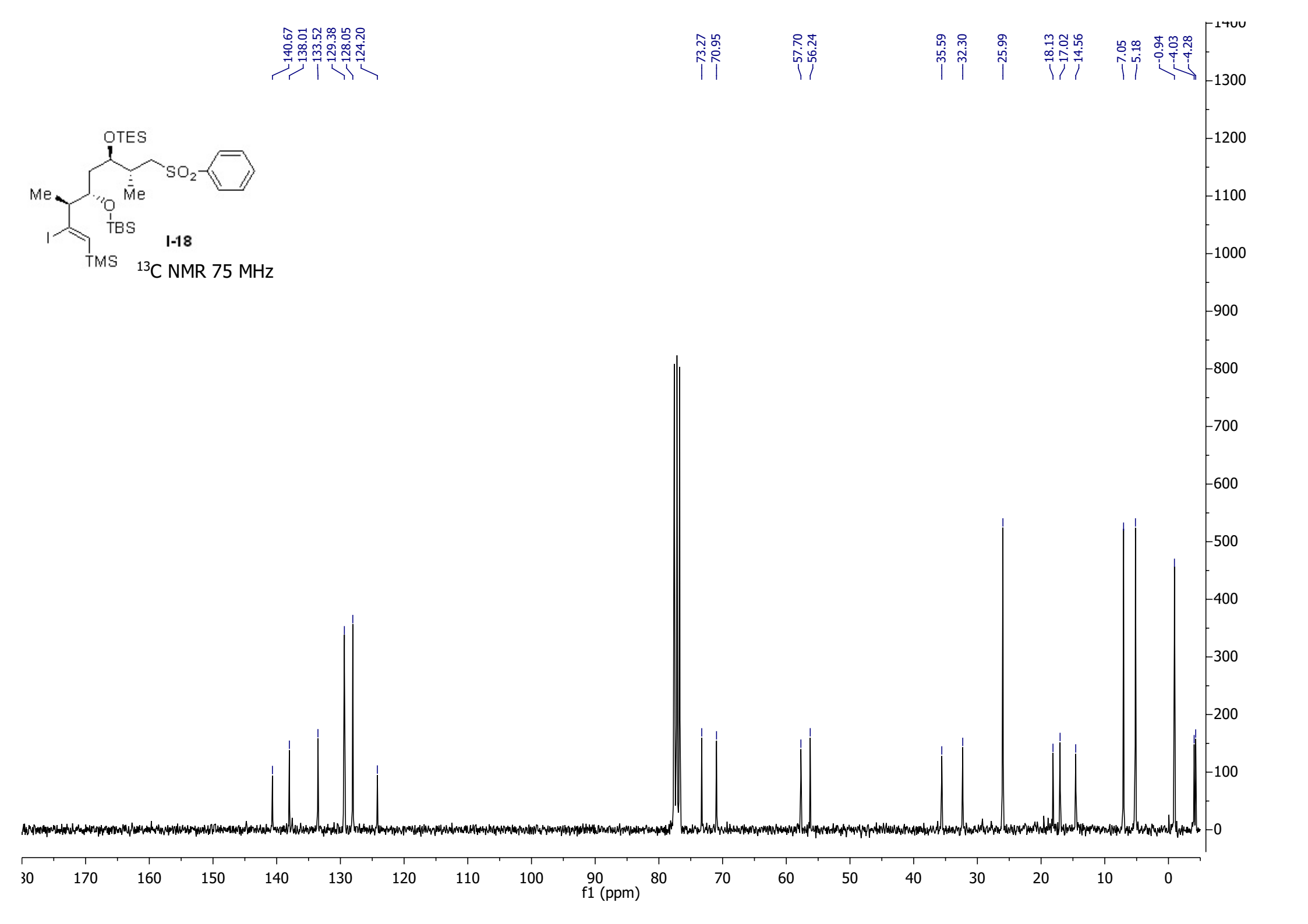

OTES
SO2
Me
Me
O
TBS
H
24
1H NMR 300 MHz
f1 (ppm)

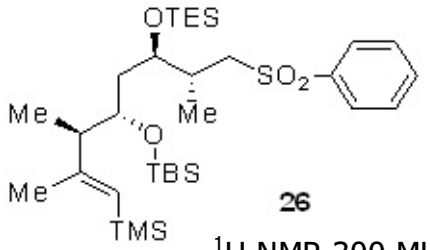

140.24
133.61
129.40
128.10
85.94
72.99
70.56
70.52
57.51
37.14
32.14
31.88
25.88
18.09
17.02
14.50
7.02
5.16
-4.32
-4.45
OTES
SO2
Me
Me
O
TBS
H
24
13C NMR 75 MHz
f1 (ppm)


OTES
SO2
Me
Me
O
TBS
Bu3Sn
TMS
25
1H NMR 300 MHz
f1 (ppm)


166.97
145.32
140.39
133.58
129.37
128.01
73.34
72.42
57.91
49.93
38.73
32.36
29.43
27.74
26.17
18.34
17.52
17.24
13.82
11.87
7.09
5.30
0.52
-3.61
-4.04
OTES
SO2
Me
Me
O
TBS
Bu3Sn
TMS
25
13C NMR 75 MHz
f1 (ppm)


OTES
SO2
Me
Me
O
TBS
I
TMS
I-18
1H NMR 300 MHz
f1 (ppm)

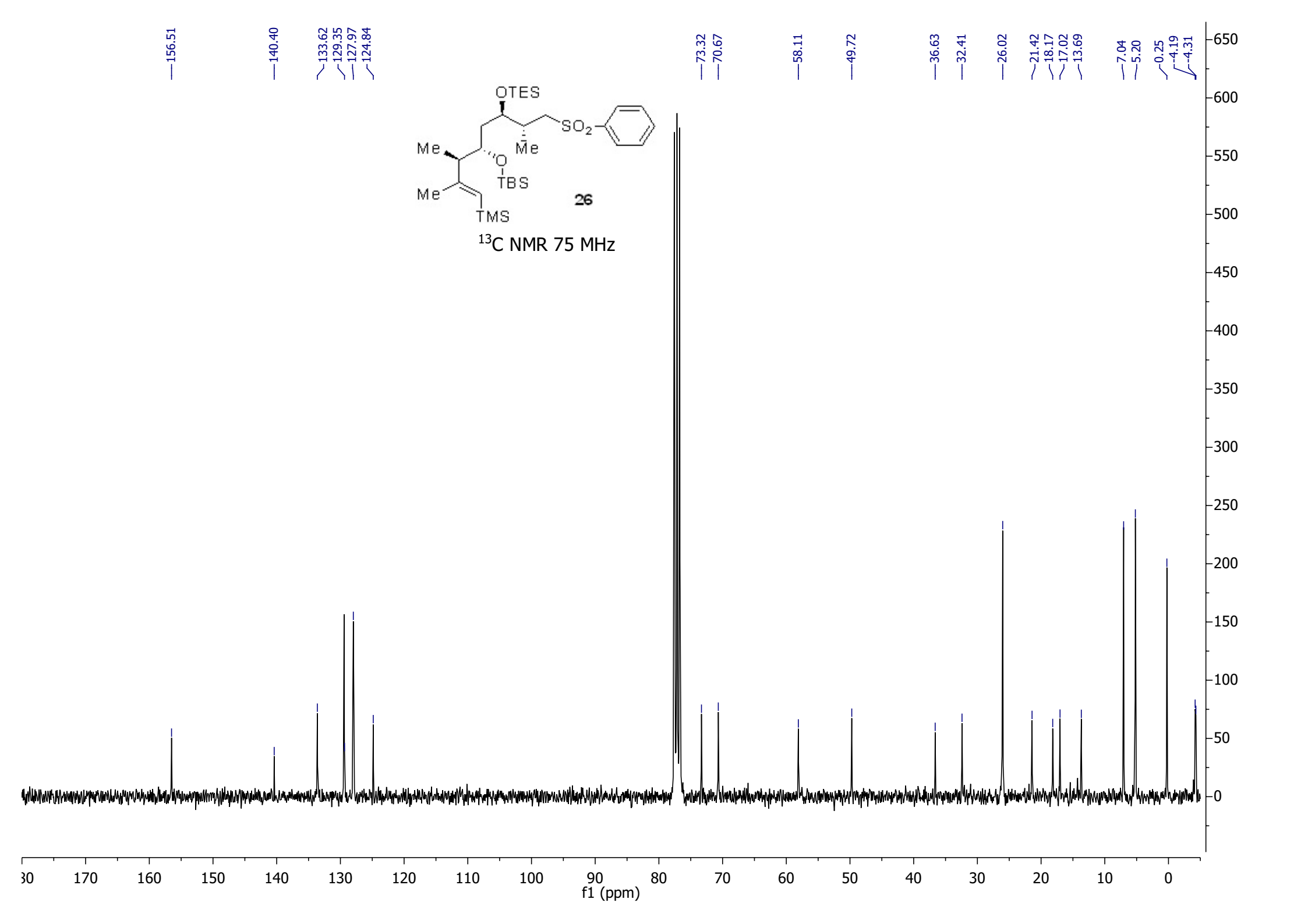

140.67
138.01
133.52
129.38
128.05
124.20
73.27
70.95
57.70
56.24
35.59
32.30
25.99
18.13
17.02
14.56
7.05
5.18
-0.94
-4.03
-4.28
OTES
SO2
Me
Me
O
TBS
I
TMS
I-18
13C NMR 75 MHz
f1 (ppm)

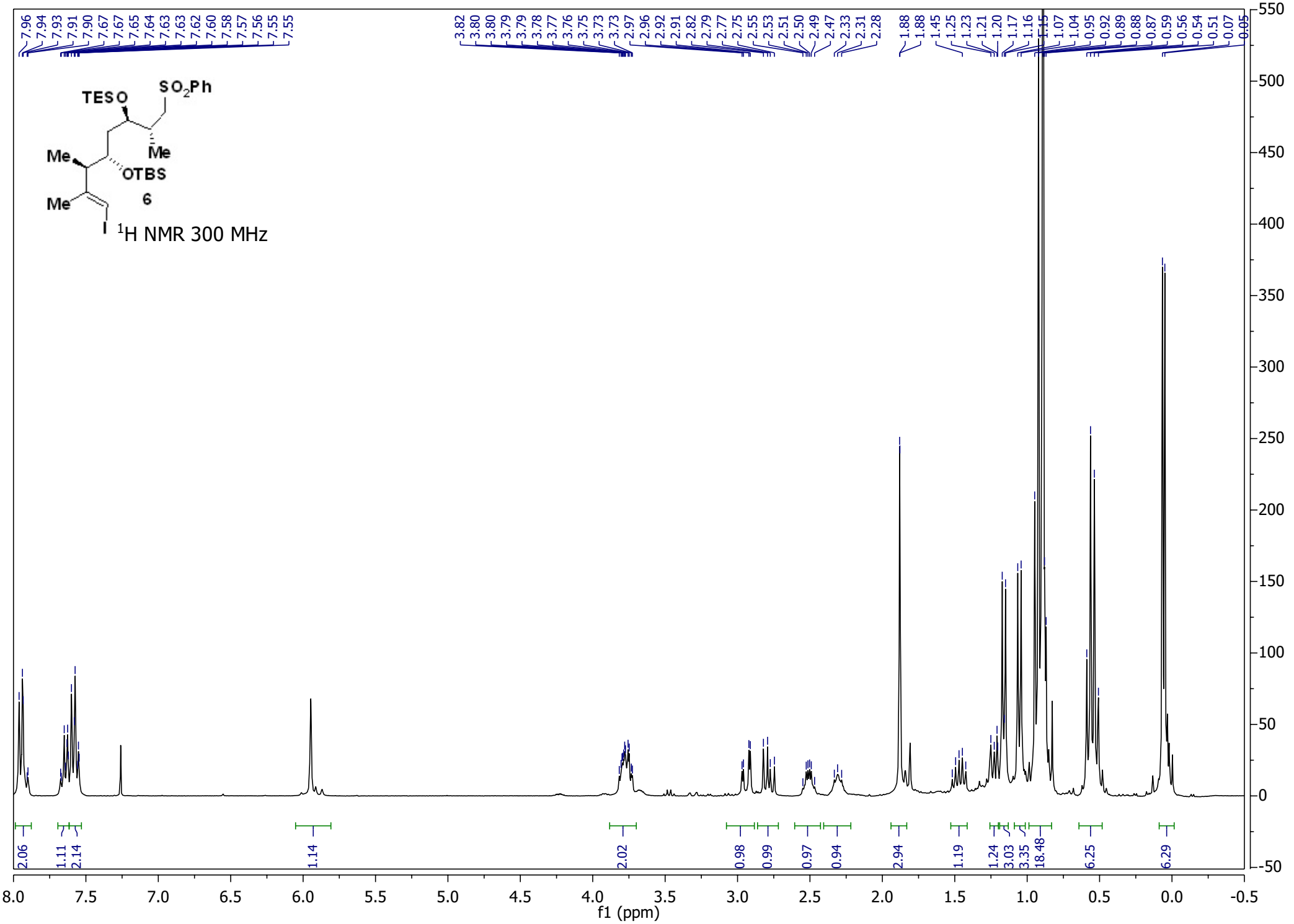


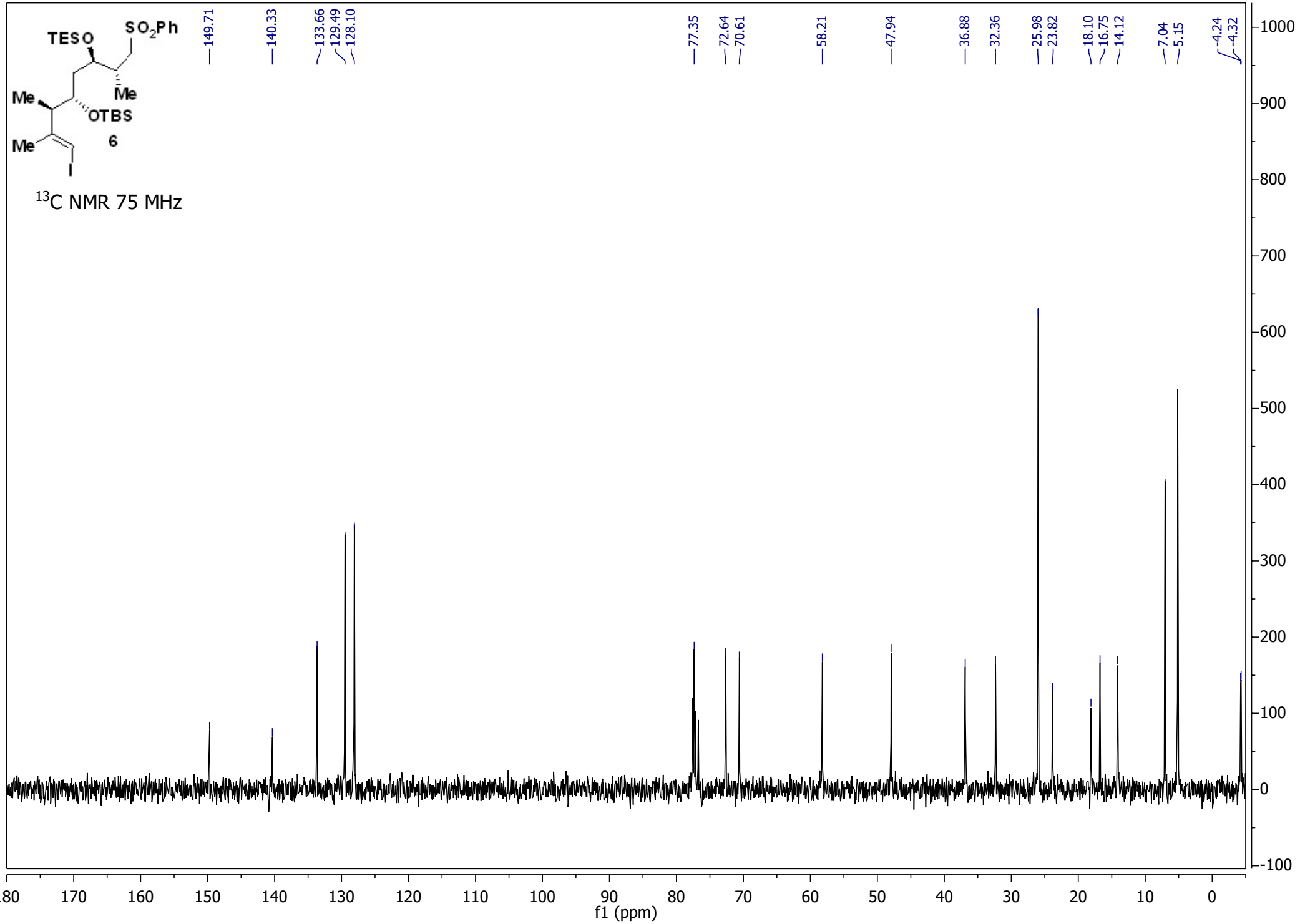
26

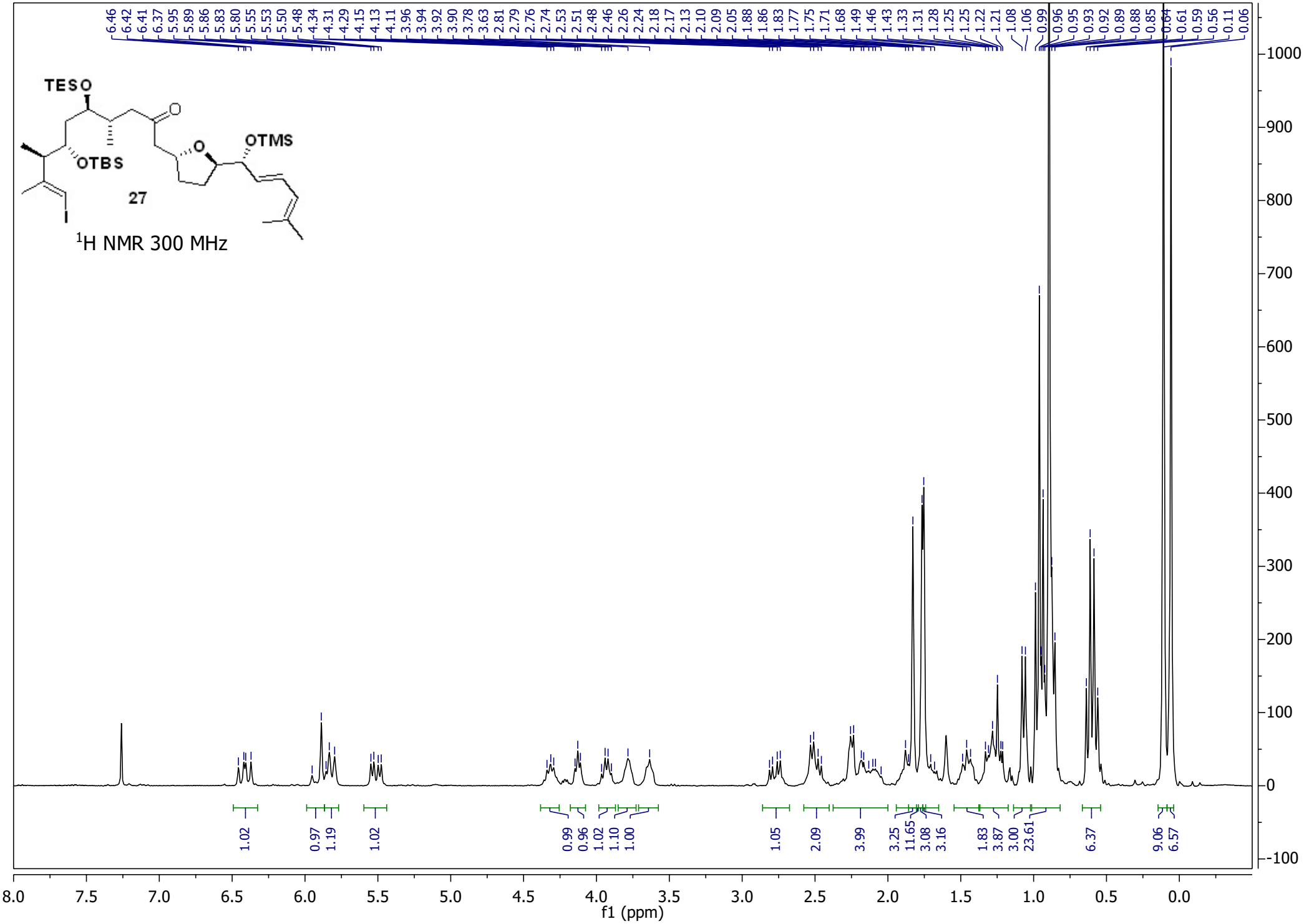
^{1}H NMR 300 MHz

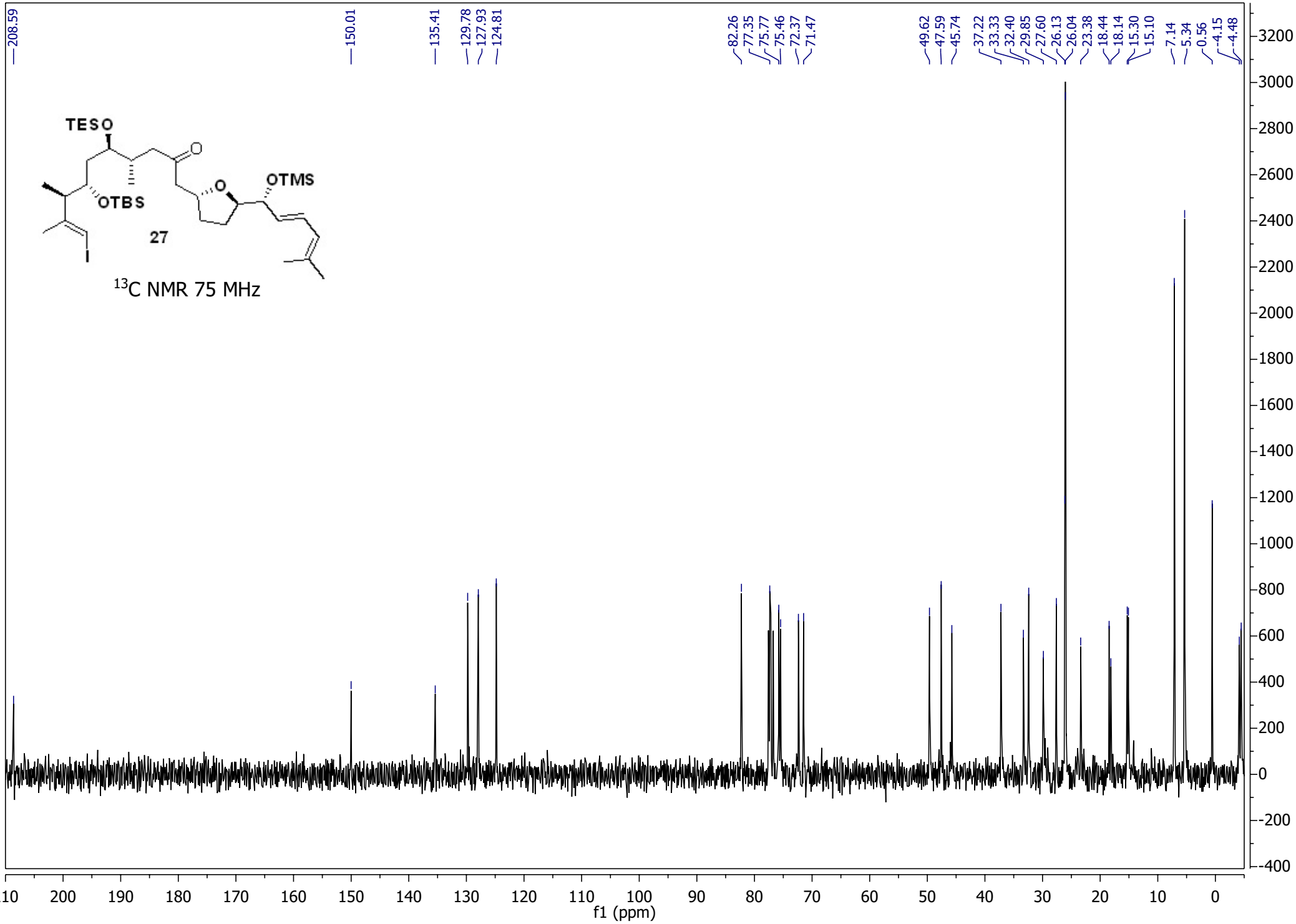
f1 (ppm)

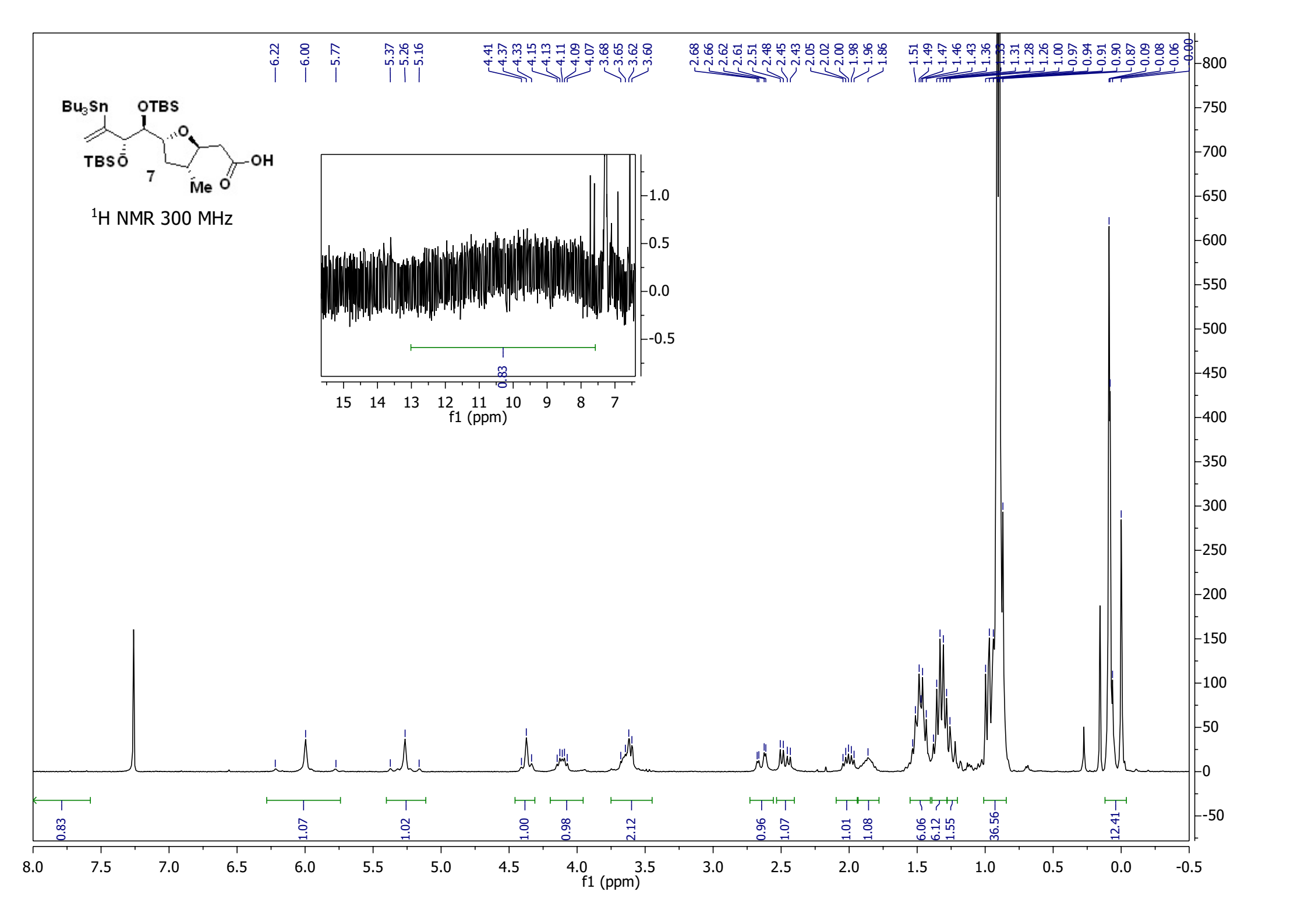

156.51
140.40
133.62
129.35
127.97
124.84
73.32
70.67
58.11
49.72
36.63
32.41
26.02
21.42
18.17
17.02
13.69
7.04
5.20
0.25
-4.19
-4.31
OTES
SO2
Me
Me
O
TBS
Me
TMS
26
13C NMR 75 MHz
650
600
550
500
450
400
350
300
250
200
150
100
50
0
30
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

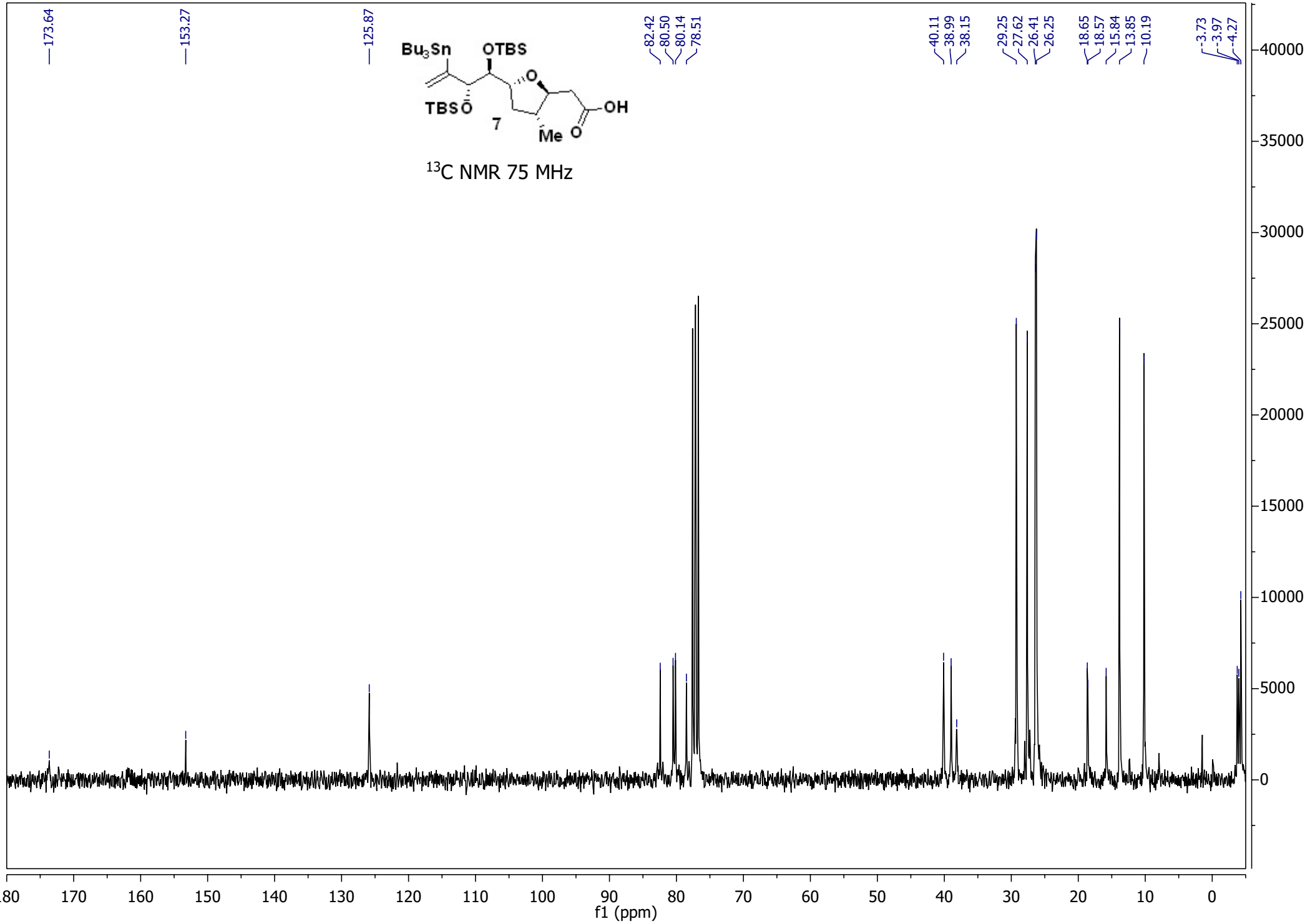

TESO
SO2Ph
Me
Me
OTBS
Me
6
1H NMR 300 MHz
f1 (ppm)

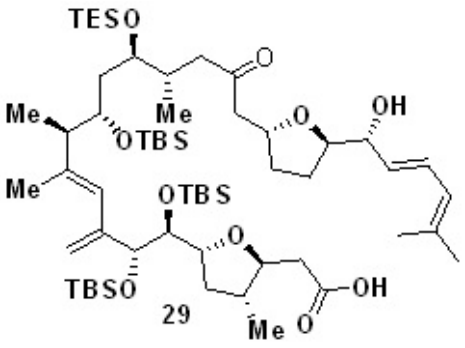

TESO
SO2Ph
Me
Me
OTBS
Me
I
6
13C NMR 75 MHz
149.71
140.33
133.66
129.49
128.10
77.35
72.64
70.61
58.21
47.94
36.88
32.36
25.98
23.82
18.10
16.75
14.12
7.04
5.15
-4.24
-4.32
f1 (ppm)


TESO
OTBS
OTMS
O
O
27
1H NMR 300 MHz
6.46 6.42 6.41 6.37 5.95 5.89 5.86 5.83 5.80 5.55 5.53 5.50 5.48 4.34 4.31 4.29 4.15 4.13 4.11 3.96 3.94 3.92 3.90 3.78 3.63 2.81 2.79 2.76 2.74 2.53 2.51 2.48 2.46 2.26 2.24 2.18 2.17 2.13 2.10 2.09 2.05 1.88 1.86 1.83 1.77 1.75 1.71 1.68 1.49 1.46 1.43 1.33 1.31 1.28 1.25 1.25 1.22 1.21 1.08 1.06 0.99 0.96 0.95 0.93 0.92 0.89 0.88 0.85 0.64 0.61 0.59 0.56 0.11 0.06
1.02 0.97 1.19 1.02 0.99 0.96 1.02 1.10 1.00 1.05 2.09 3.99 3.25 11.65 3.08 3.16 1.83 3.87 3.00 23.61 6.37 9.06 6.57
1000 900 800 700 600 500 400 300 200 100 0 -100
8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)


208.59
150.01
135.41
129.78
127.93
124.81
82.26
77.35
75.77
75.46
72.37
71.47
49.62
47.59
45.74
37.22
33.33
32.40
29.85
27.60
26.13
26.04
23.38
18.44
18.14
15.30
15.10
7.14
5.34
0.56
-4.15
-4.48
TESO
OTBS
OTMS
O
O
27
13C NMR 75 MHz
f1 (ppm)

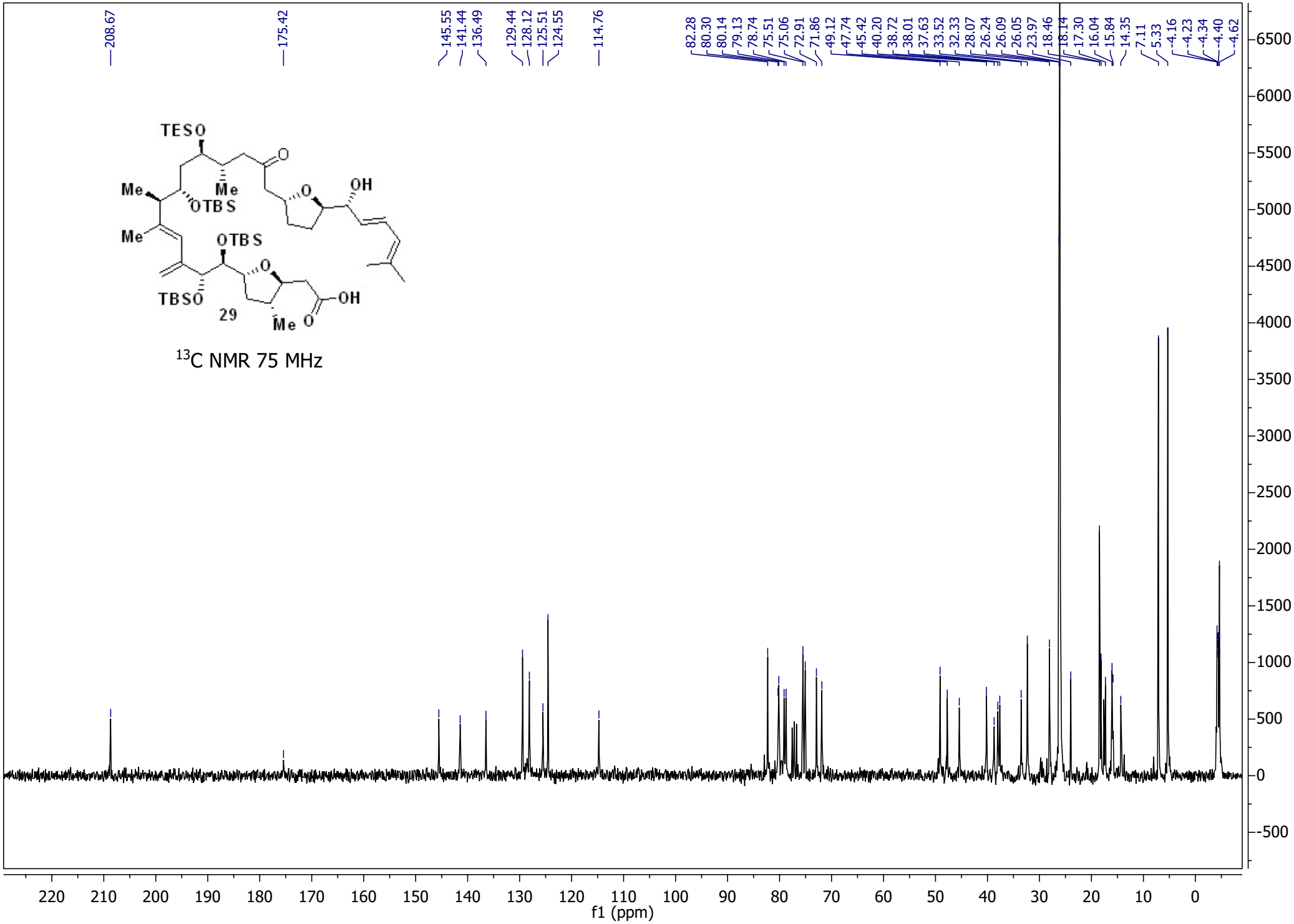

Bu3Sn
OTBS
TBSO
O
OH
O
7
Me
1H NMR 300 MHz
f1 (ppm)
f1 (ppm)


173.64
153.27
125.87
82.42
80.50
80.14
78.51
40.11
38.99
38.15
29.25
27.62
26.41
26.25
18.65
18.57
15.84
13.85
10.19
-3.73
-3.97
-4.27
Bu3Sn
OTBS
TBSO
7
Me
O
OH
13C NMR 75 MHz
40000
35000
30000
25000
20000
15000
10000
5000
0
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

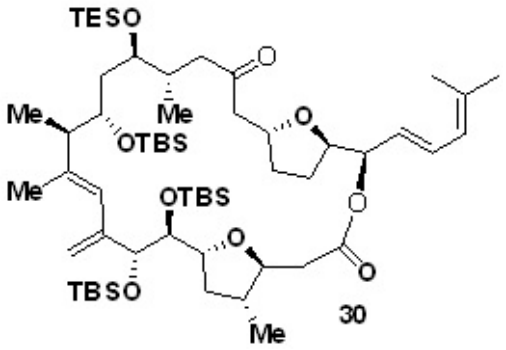


^{1}H NMR 300 MHz

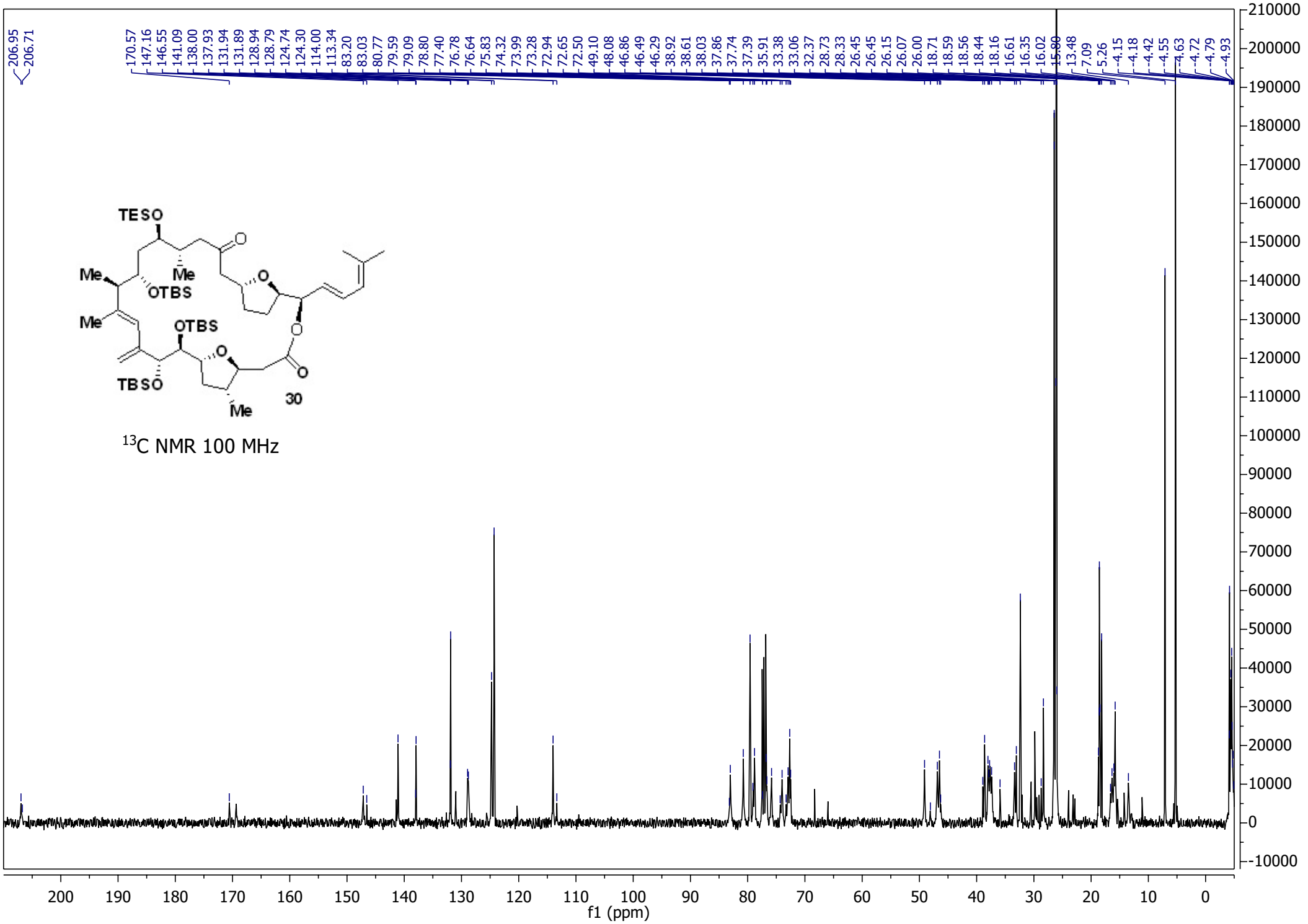
f1 (ppm)

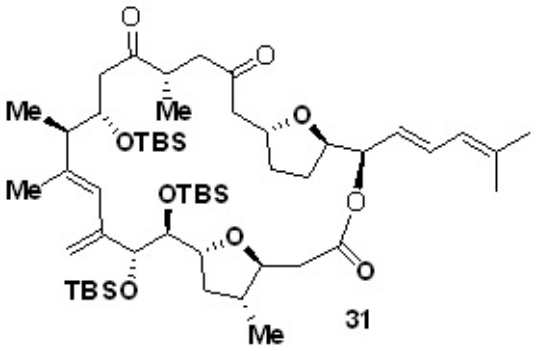


^{13}C NMR 75 MHz



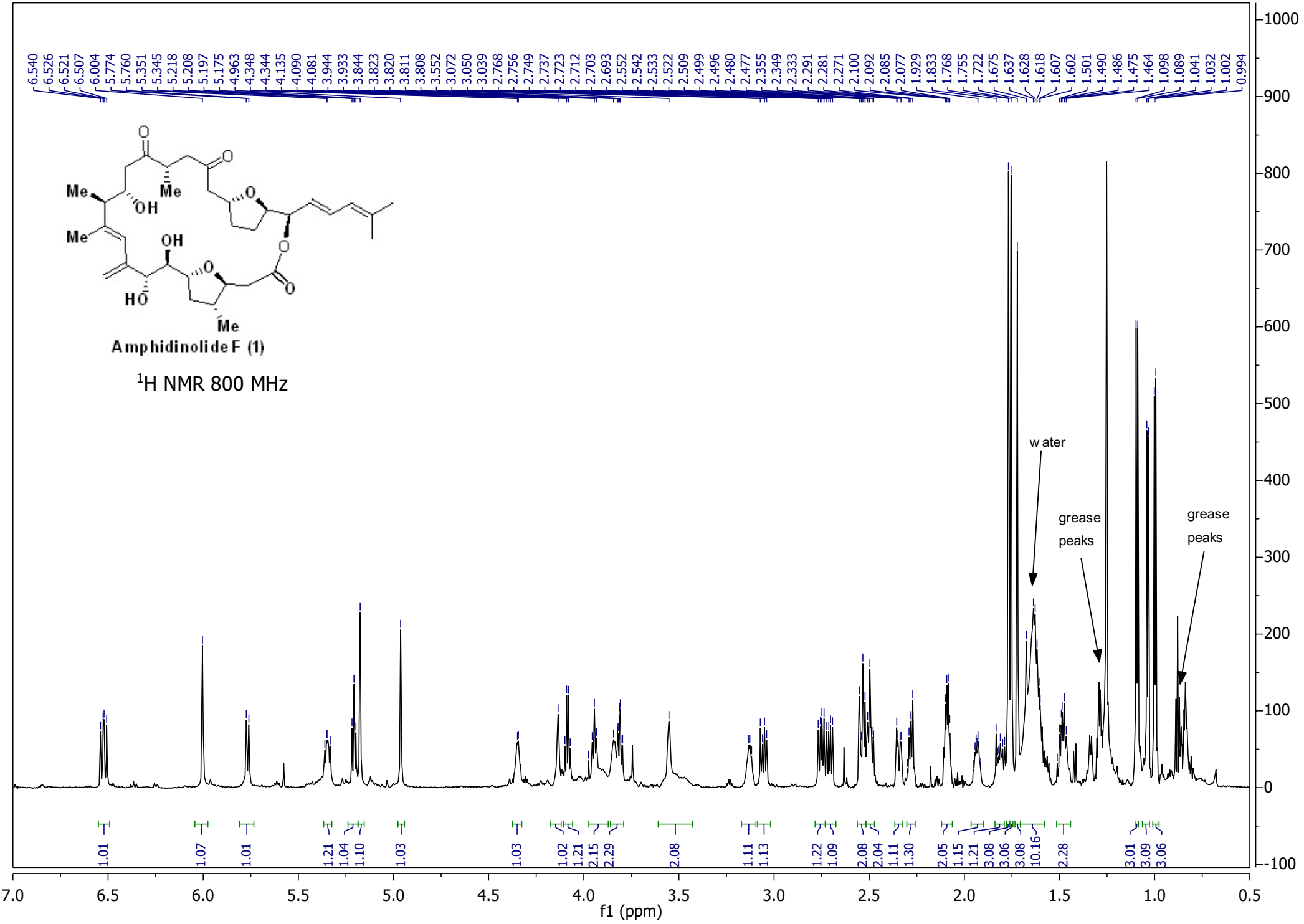
^{1}H NMR 400 MHz

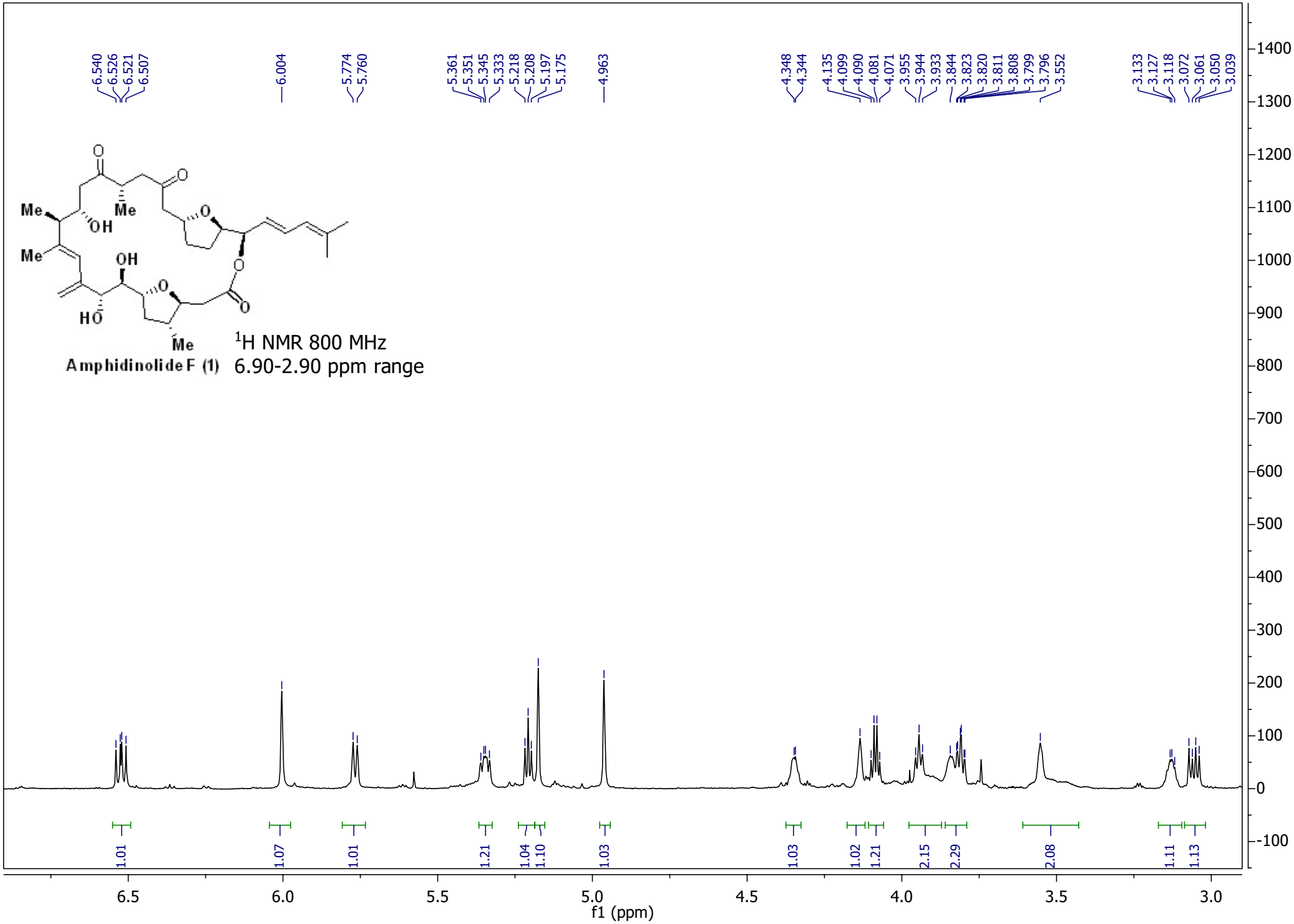

206.95
206.71
170.57
147.16
146.55
141.09
138.00
137.93
131.94
131.89
128.94
128.79
124.74
124.30
114.00
113.34
83.20
83.03
80.77
79.59
79.09
78.80
77.40
76.78
76.64
75.83
74.32
73.99
73.28
72.94
72.65
72.50
49.10
48.08
46.86
46.49
46.29
38.92
38.61
38.03
37.86
37.74
37.39
35.91
33.38
33.06
32.37
28.73
28.33
26.45
26.45
26.15
26.07
26.00
18.71
18.59
18.56
18.44
18.16
16.61
16.35
16.02
15.80
13.48
7.09
5.26
-4.15
-4.18
-4.42
-4.55
-4.63
-4.72
-4.79
-4.93
TESO
Me
Me
OTBS
Me
OTBS
TBSO
Me
30
^{13}C NMR 100 MHz
f1 (ppm)

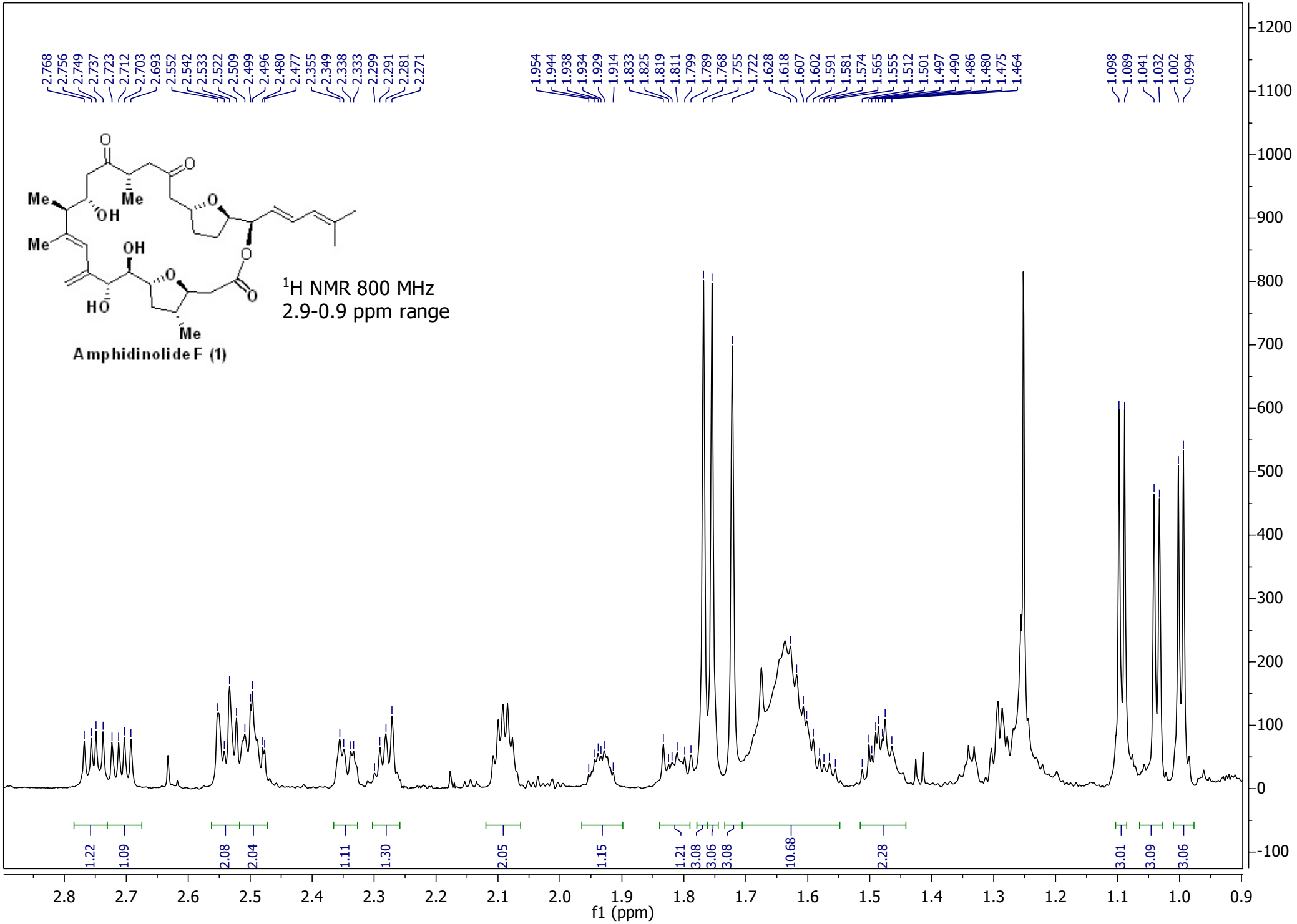


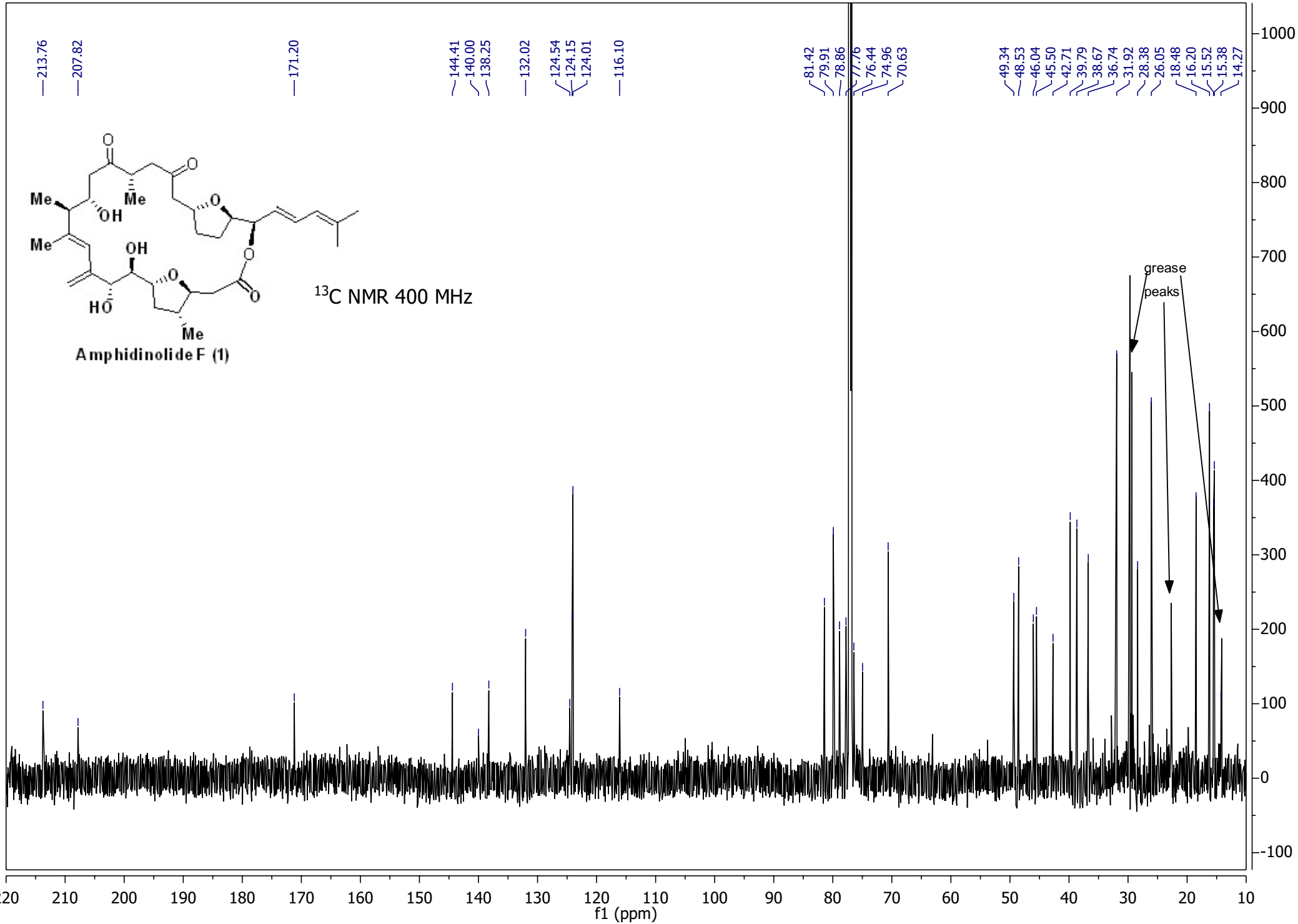
^{1}H NMR 400 MHz

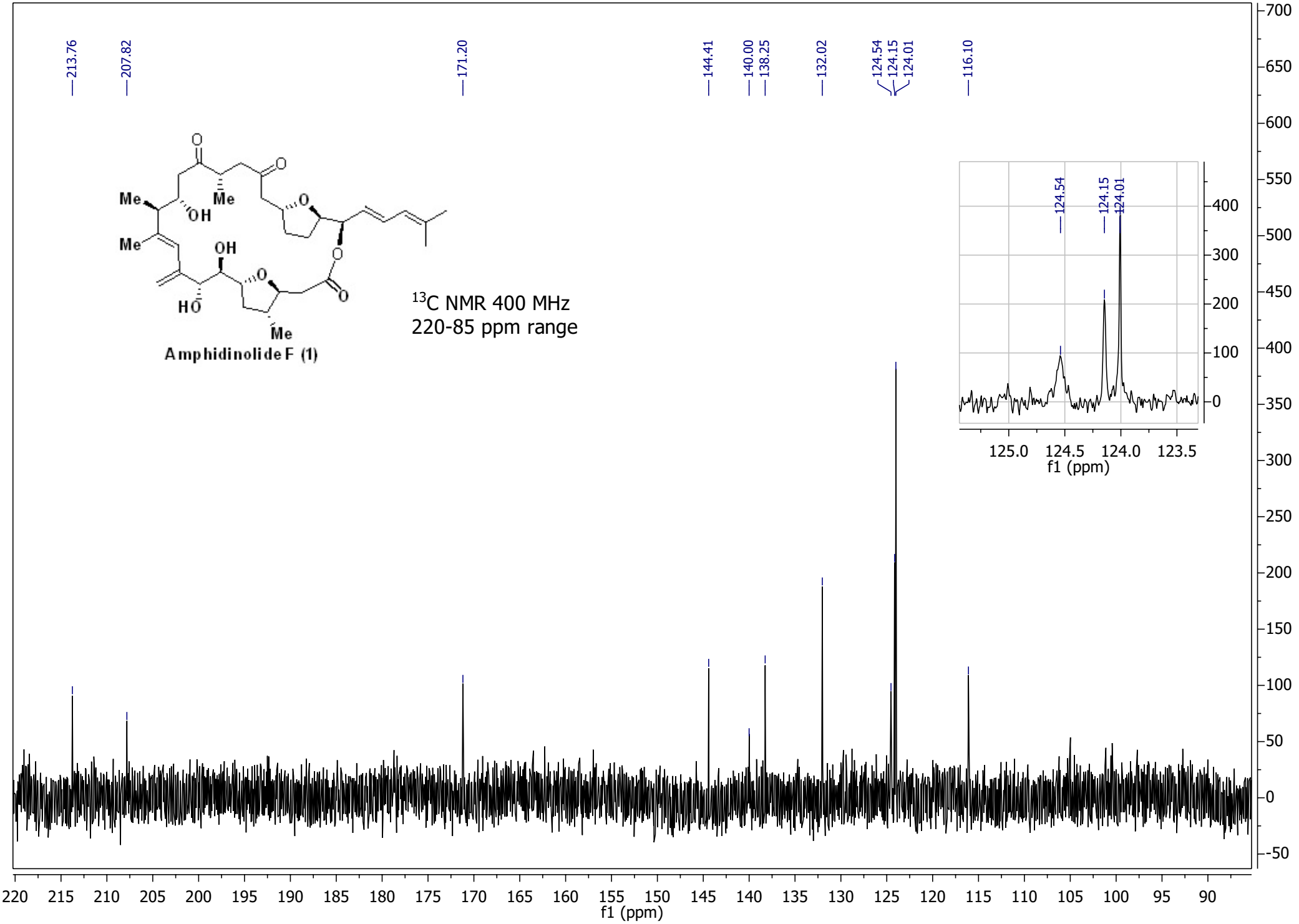
f1 (ppm)

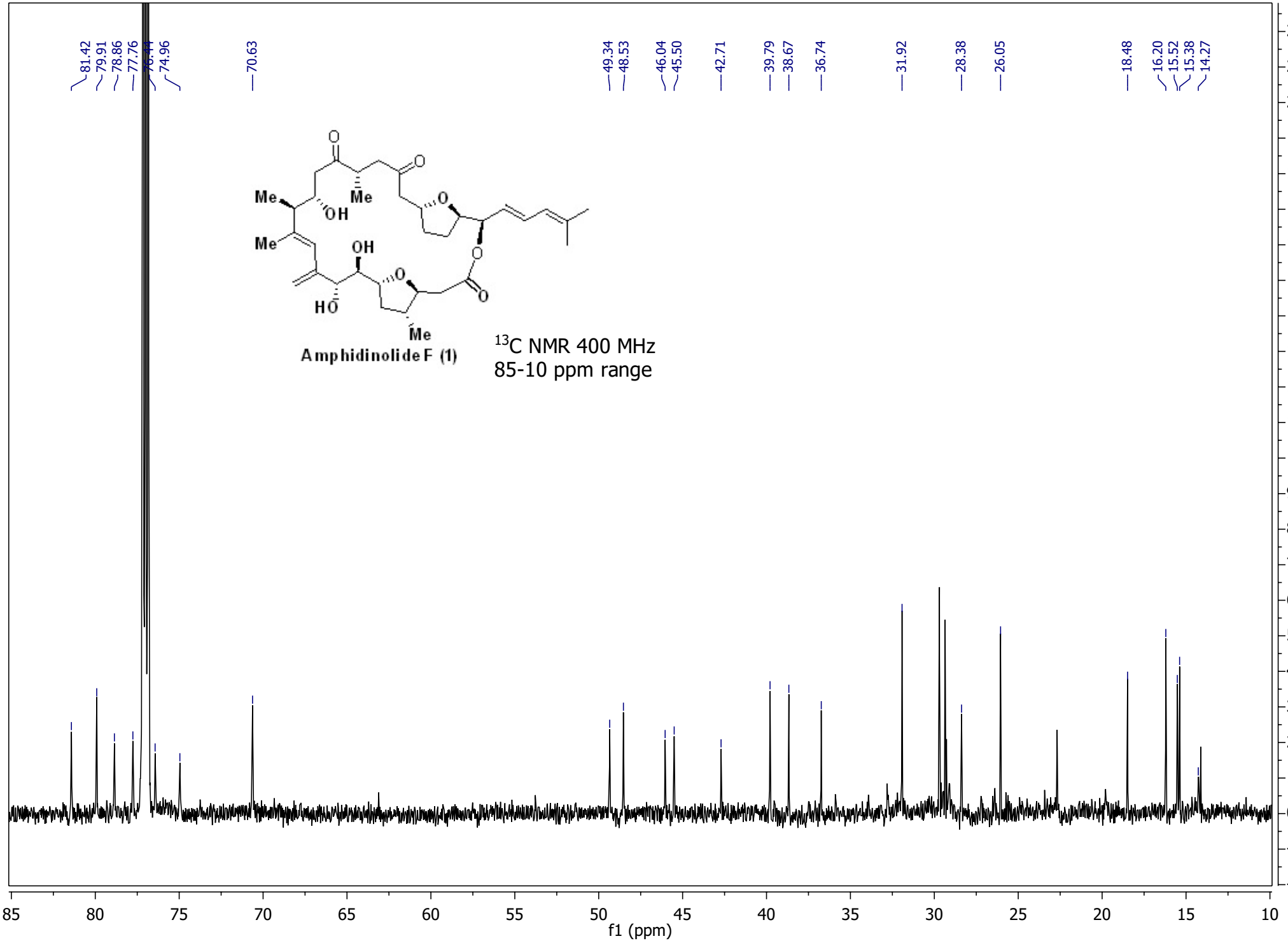

Amphidinolide F (1)
^{1}H NMR 800 MHz
water
grease peaks
grease peaks
f1 (ppm)


6.540
6.526
6.521
6.507
6.004
5.774
5.760
5.361
5.351
5.345
5.333
5.218
5.208
5.197
5.175
4.963
4.348
4.344
4.135
4.099
4.090
4.081
4.071
3.955
3.944
3.933
3.844
3.823
3.820
3.811
3.808
3.799
3.796
3.552
3.133
3.127
3.118
3.072
3.061
3.050
3.039
Me
OH
Me
Me
OH
HO
Me
O
O
O
O
O
O
O
O
Amphidinolide F (1)
1H NMR 800 MHz
6.90-2.90 ppm range
1.01
1.07
1.01
1.21
1.04
1.10
1.03
1.03
1.02
1.21
2.15
2.29
2.08
1.11
1.13
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
f1 (ppm)
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100


2.768
2.756
2.749
2.737
2.723
2.712
2.703
2.693
2.552
2.542
2.533
2.522
2.509
2.499
2.496
2.480
2.477
2.355
2.349
2.338
2.333
2.299
2.291
2.281
2.271
1.954
1.944
1.938
1.934
1.929
1.914
1.833
1.825
1.819
1.811
1.799
1.789
1.768
1.755
1.722
1.628
1.618
1.607
1.602
1.591
1.581
1.574
1.565
1.555
1.512
1.501
1.497
1.490
1.486
1.480
1.475
1.464
1.098
1.089
1.041
1.032
1.002
0.994
Me
Me
OH
Me
OH
HO
Me
Amphidinolide F (1)
1H NMR 800 MHz
2.9-0.9 ppm range
1.22
1.09
2.08
2.04
1.11
1.30
2.05
1.15
1.21
3.08
3.06
3.08
10.68
2.28
3.01
3.09
3.06
f1 (ppm)


213.76
207.82
171.20
144.41
140.00
138.25
132.02
124.54
124.15
124.01
116.10
81.42
79.91
78.86
77.76
76.44
74.96
70.63
49.34
48.53
46.04
45.50
42.71
39.79
38.67
36.74
31.92
28.38
26.05
18.48
16.20
15.52
15.38
14.27
Me
Me
OH
Me
OH
HO
Me
O
O
O
O
O
O
O
^{13}C NMR 400 MHz
Amphidinolide F (1)
grease
peaks
1000
900
800
700
600
500
400
300
200
100
0
-100
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


213.76
207.82
171.20
144.41
140.00
138.25
132.02
124.54
124.15
124.01
116.10
Me
Me
OH
Me
OH
HO
O
O
O
O
O
O
Me
Amphidinolide F (1)
13C NMR 400 MHz
220-85 ppm range
125.0
124.5
124.0
123.5
f1 (ppm)
220
215
210
205
200
195
190
185
180
175
170
165
160
155
150
145
140
135
130
125
120
115
110
105
100
95
90
f1 (ppm)
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-50


81.42
79.91
78.86
77.76
76.44
74.96
70.63
49.34
48.53
46.04
45.50
42.71
39.79
38.67
36.74
31.92
28.38
26.05
18.48
16.20
15.52
15.38
14.27
Me
OH
Me
Me
OH
HO
O
Me
Amphidinolide F (1)
13C NMR 400 MHz
85-10 ppm range
f1 (ppm)