Supporting Information

Total Synthesis of Meayamycin and *O*-Acyl Analogues

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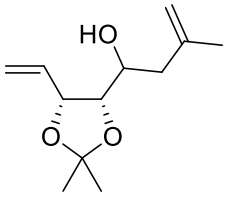
General Methods

All reagents and solvents were used as supplied without further purification unless otherwise noted. All reactions were performed in anhydrous solvents unless otherwise noted. $CHCl_3$ was pre-treated with alumina for at least 24 h prior to use. Preparative TLC (PTLC) and column chromatography were conducted using Millipore SiO_2 60 F_{254} PTLC (0.5 mm) and Zeochem ZEOprep 60 ECO SiO_2 (40–63 μm), respectively. Analytical TLC was conducting using Millipore SiO_2 60 F254 TLC (0.250 mm) plates. ^{1}H and ^{13}C NMR spectra were obtained using a Bruker Avance III HD 600 MHz spectrometer equipped with either a 5 mm QCI or 5 mm CPDCH probe or a Bruker Avance III 500 MHz spectrometer equipped with a 5 mm BBFO probe. IR spectra were obtained using a Thermo Nicolet 380 FT-IR with a SmartOrbit Diamond ATR accessory. Mass spectrometry analysis was performed by direct sample injection on an Agilent G1969A ESI-TOF mass spectrometer. Optical rotations were recorded on a Rudolph Autopol III automatic polarimeter at 589 nm.

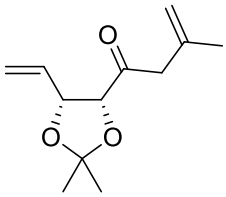
Synthesis of the Right-hand Subunit

1-((4*S*,5*R*)-2,2-dimethyl-5-vinyl-1,3-dioxolan-4-yl)-3-methylbut-3-en-1-ol (3)



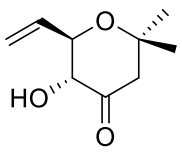
A solution of aldehyde **2**[18] (368 mg, 2.36 mmol 1.0 equiv) in THF (40 mL) at 0 °C was treated with 2-methylallylmagnesium (9.4 mL of a 0.5 M solution, 4.72 mmol, 2.0 equiv) dropwise over 1 h. The mixture was allowed to warm to room temperature and stirred for 4 h before the reaction was quenched with the addition of saturated aqueous NH_4Cl (10 mL) and extracted with EtOAc (3×20 mL). The combined organic phase was dried over Na_2SO_4, filtered, and concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 20% EtOAc in hexanes) to provide **3** (326 mg, 65%) as a yellow oil as a mixture of diastereomers. Major diastereomer: ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.05 (ddd, J = 17.3, 10.4, 7.0 Hz, 1H), 5.42 (dt, J = 17.2, 1.5 Hz, 1H), 5.32 – 5.27 (m, 1H), 4.90 (t, J = 1.7 Hz, 1H), 4.84 – 4.78 (m, 1H), 4.68 (t, J = 6.7 Hz, 1H), 3.97 (dd, J = 8.1, 6.3 Hz, 1H), 3.75 (tt, J = 8.1, 2.5 Hz, 1H), 2.53 – 2.49 (m, 1H), 2.22 – 2.09 (m, 1H), 1.76 (s, 3H), 1.49 (s, 3H), 1.37 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 142.3, 134.5, 118.1, 113.9, 108.9, 80.7, 79.0, 67.4, 42.6, 27.9, 25.5, 22.6; minor diastereomer: ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.01 (ddd, J = 17.3, 10.4, 7.0 Hz, 1H), 5.36 (dt, J = 17.2, 1.5 Hz, 1H), 5.32 – 5.29 (m, 1H), 4.90 (t, J = 1.7 Hz, 1H), 4.84 – 4.78 (m, 1H), 4.57 (dd, J = 8.2, 6.7 Hz, 1H), 4.05 (dd, J = 6.7, 5.1 Hz, 1H), 3.84 – 3.68 (m, 1H), 2.51 (dt, J = 14.1, 1.8 Hz, 1H), 2.27 – 2.04 (m, 1H), 1.75 (s, 2H), 1.53 (s, 3H), 1.40 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 142.1, 134.3, 119.7, 113.5, 108.8, 80.3, 79.3, 67.8, 42.3, 27.6, 25.2, 22.6; IR (neat) ν_{max} 3460, 2985, 2935, 1647, 1374, 1215, 1166, 1050, 875 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + H]^+$ calculated for $C_{12}H_{21}O_3$ 213.1485, found 213.1488.

1-((4*R*,5*R*)-2,2-dimethyl-5-vinyl-1,3-dioxolan-4-yl)-3-methylbut-3-en-1-one (4)



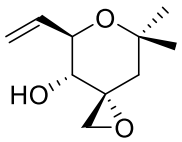
A solution of **3** (200 mg, 0.95 mmol, 1.0 equiv) in CH_2Cl_2 (25 mL) at 0 °C was treated with DMP (605 mg, 1.43 mmol, 1.5 equiv) and the mixture was stirred for 3 h. After this time, the reaction was quenched with the addition of saturated aqueous $NaHCO_3$ (10 mL) and the mixture was extracted with CH_2Cl_2 (3×15 mL). The combined organic phase was washed with saturated aqueous NaCl, dried over Na_2SO_4, filtered, and concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 10% EtOAc in hexanes) to give **4** (176 mg, 88%) as a yellow oil: ^{1}H NMR (600 MHz, $CDCl_3$) δ 5.68 (ddd, J = 17.0, 10.4, 6.5 Hz, 1H), 5.55 – 5.35 (m, 1H), 5.26 – 5.24 (m, 1H), 4.93 (s, 1H), 4.86 – 4.84 (m, 1H), 4.73 (s, 1H), 4.61 (d, J = 8.0 Hz, 1H), 3.32 (d, J = 17.2 Hz, 1H), 3.07 (d, J = 17.2 Hz, 1H), 1.73 (s, 3H), 1.64 (s, 3H), 1.40 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 207.1, 138.6, 132.4, 118.9, 115.3, 110.8, 83.1, 78.7, 49.4, 27.0, 25.0, 22.9; IR (neat) ν_{max} 2987, 1718, 1378, 1260, 1210, 1160, 1065, 872 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + Na]^+$ calculated for $C_{12}H_{18}O_3Na$ 233.1154, found 233.1150.

(5*R*,6*R*)-5-hydroxy-2,2-dimethyl-6-vinyltetrahydro-4*H*-pyran-4-one (6)



A solution of **4** (50 mg, 0.24 mmol, 1.0 equiv) in MeOH (0.3 mL) was treated with PPTS (12 mg, 0.048 mmol, 0.2 equiv) and the mixture was warmed at 60 °C until complete acetonide deprotection was observed by TLC. A solution of aqueous 1 N HCl (0.15 mL) was added and the mixture was stirred for an additional 2 to 4 h. The solvent was removed in vacuo to give the deprotected enone **5**: ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.23 – 5.98 (m, 1H), 5.72 (ddd, *J* = 17.2, 10.5, 5.8 Hz, 1H), 5.30 (dt, *J* = 17.1, 1.5 Hz, 1H), 5.22 (dt, *J* = 10.5, 1.4 Hz, 1H), 4.42 (ddt, *J* = 7.5, 3.0, 1.5 Hz, 1H), 4.36 (d, *J* = 3.6 Hz, 1H), 2.21 (d, *J* = 1.2 Hz, 3H), 1.98 (d, *J* = 1.3 Hz, 3H), already containing substantial amounts of **6**. The material was taken up in $CHCl_3$ (0.5 mL), Amberlyst-15 was added (10 mg) and the mixture was warmed at 80 °C for 12 h. The reaction mixture was filtered, and the solvent removed in vacuo. The crude material was purified by column chromatography (SiO_2, 5% EtOAc in hexanes) to give the **6** (38 mg, 76% overall) as a clear oil. For **6**: $[\alpha]_D^{20}$ +28 (*c* 1.0, CH_2Cl_2) ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.02 (ddd, *J* = 17.3, 10.5, 5.4 Hz, 1H), 5.46 (dt, *J* = 17.2, 1.3 Hz, 1H), 5.33 (dt, *J* = 10.5, 1.2 Hz, 1H), 3.98 – 3.85 (m, 2H), 3.56 (brs, 1H), 2.65 (dt, *J* = 13.1, 1.1 Hz, 1H), 2.50 (d, *J* = 13.1 Hz, 1H), 1.44 (s, 3H), 1.21 (s, 3H); ^{13}C NMR (151 MHz, $CDCl_3$) δ 207.6, 135.7, 118.1, 78.1, 76.5, 51.7, 30.9, 29.9, 23.8; IR (neat) ν_{max} 3451, 2962, 2899, 1721, 1350, 1229, 1105, 1073 cm^{-1}; HRMS-TOF-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_9H_{15}O_3$ 171.1021, found 171.1014.

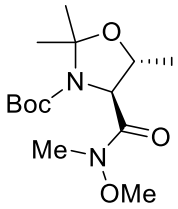
(3*R*,4*R*,5*R*)-7,7-dimethyl-5-vinyl-1,6-dioxaspiro[2.5]octan-4-ol (7)



Compound **7** was synthesized from **6** following a literature procedure.[19] A solution of CH_2Br_2 (246 mg, 1.42 mmol) in THF (6 mL) under Ar was cooled to −78 °C. *n*-BuLi (1.6 mL, 2.6 mmol) was added, followed by a solution of 6 (200 mg, 1.18 mmol) in THF (6 mL) and the mixture was stirred for 7 h, while allowing the mixture to warm to 23 °C. The reaction mixture was quenched with the addition of saturated aqueous NH_4Cl (15 mL) and THF was removed in vacuo. The resulting mixture was extracted with Et_2O (3×15 mL). The combined organic layers were dried over Na_2SO_4, filtered and concentrated in vacuo. The crude residue was purified by chromatography (SiO_2, 5–30% EtOAc in hexanes) to afford 7 as a clear oil (157 mg, 73%). The spectroscopic data for **7** was consistent with that previously reported in the literature:[19] $[\alpha]_D^{20}$ +96 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 5.98 (ddd, *J* = 17.0, 10.5, 6.2 Hz, 1H), 5.41 (dt, *J* = 17.3, 1.5 Hz, 1H), 5.29 (dt, *J* = 10.3, 1.3 Hz, 1H), 3.95 (ddt, *J* = 9.8, 6.2, 1.2 Hz, 1H), 3.51 (d, *J* = 9.8 Hz, 1H), 3.03 (d, *J* = 4.7 Hz, 1H), 2.49 (d, *J* = 4.7 Hz, 1H), 2.19 (dd, *J* = 14.3, 0.9 Hz, 1H), 1.63 (d, *J* = 10.4 Hz, 1H), 1.42 (d, *J* = 14.3 Hz, 1H), 1.40 (s, 3H), 1.28 (s, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 136.7, 118.0, 74.8, 73.0, 68.0, 57.6, 47.7, 42.9, 31.1, 23.7; HRMS-TOF-ESI (*m*/*z*) [M+H]+ calculated for $C_{10}H_{17}O_3$ 185.1178, found 185.1171.

Synthesis of the Central Subunit

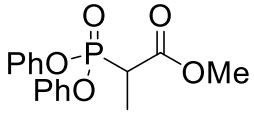
***tert*-butyl (4*S*,5*R*)-4-(methoxy(methyl)carbamoyl)-2,2,5-trimethyloxazolidine-3-carboxylate (8)**



A solution of *N*-Boc-threonine (20.0 g, 0.091 mol, 1.0 equiv) in CH_2Cl_2 (500 mL) was treated with *i*Pr_2NEt (32 mL, 0.184 mol, 2.0 equiv), HOBT (14.8 g, 0.110 mol, 1.2 equiv) and EDCI (21.24 g, 0.111 mol, 1.22 equiv) at 0 °C. The resulting solution was stirred at 23 °C for 22 h under Ar before being slowly quenched with addition of excess aqueous 1 M HCl at 0 °C. The crude mixture was filtered over Celite and the organic layer separated. The aqueous layer was extracted with CH_2Cl_2 (3×150 mL) and the combined organic layer was washed with saturated aqueous $NaHCO_3$, saturated aqueous NaCl, dried over Na_2SO_4, filtrated and concentrated under reduced pressure provided the amide as a yellow oil.

A solution of the amide in THF (250 mL) was treated with PPTS (4.7 g, 0.019 mol, 0.2 equiv) and 2,2-dimethoxypropane (72 mL, 0.588 mol, 6.5 equiv) and the mixture was warmed at reflux for 18 h. After this time, the reaction was cooled and the solvent was removed under reduced pressure. The residue was taken up in EtOAc and H_2O and the aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous NaCl, dried over Na_2SO_4,, filtrated and concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 30% EtOAc in hexanes) to give **8** (23.4 g, 85%) as a colorless solid. All spectral data was consistent with reported data:[20] mp 34–35 °C; $[\alpha]_D^{20}$ –10.2 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 4.49 (d, *J* = 7.0 Hz, 0.4H), 4.37 (d, *J* = 7.0 Hz, 0.6H), 4.14 (dp, *J* = 25.1, 6.3 Hz, 1H), 3.78 (s, 1.5H), 3.72 (s, 1.6H), 3.21 (s, 3H), 1.65 (s, 1.7H), 1.61 (s, 1.6H), 1.59 (d, *J* = 3.4 Hz, 3H), 1.46 (s, 4H), 1.43 – 1.38 (m, 8H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.2, 170.5, 152.1, 151.3, 95.1, 94.6, 80.5, 80.3, 74.6, 74.3, 63.4, 63.3, 61.3 (2C), 61.2 (2C), 32.5, 28.6 (2C), 28.4, 27.0, 25.3, 24.2, 19.7, 19.5; IR (neat) ν_{max} 2976, 1696, 1678, 1363, 1170, 763, 614 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + H]^+$ calculated for $C_{14}H_{27}N_2O_5$ 303.1920, found 303.1921.

methyl 2-(diphenoxyphosphoryl)propanoate (10)

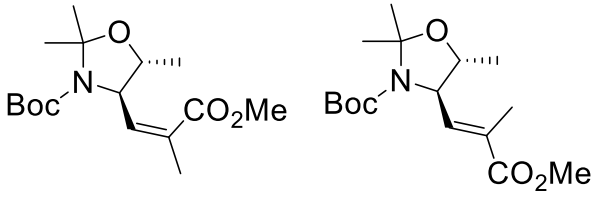


A solution of diphenyl phosphite (15 mL) in THF (10 mL) at 0 °C was treated with NaH (3.14 g of a 60% suspension in mineral oil, 0.079 mol, 1.0 equiv). After an hour at this temperature, methyl 2-bromoacetate (7.42 mL, 0.081 mmol, 1.02 equiv) in THF (20 mL) was added dropwise over 1 h and the mixture allowed to warm to room temperature and stirred for 15 h as 23 °C. The reaction was quenched with the addition of saturated aqueous NH_4Cl (16 mL) and the mixture was diluted with H_2O (20 mL) and Et_2O (40 mL). The layers were separated and the aqueous phase was extracted with EtOAc (3×30 mL). The combined organic phase was washed with saturated aqueous NaCl (40 mL), dried over Na_2SO_4, filtered and concentrated in vacuo.

The crude ester (8.49 g, 0.028 mol, 1.0 equiv) in DMSO (35 mL) and treated with NaH (1.12 g of a 60 % suspension in mineral oil, 0.028 mol, 1.0 equiv) and the mixture was stirred for 1 h.

Methyl iodide (1.75 mL, 0.028 mol, 1.0 equiv) was added dropwise over 1 h and the reaction mixture was stirred for a further 2 h at 23 °C. The reaction was quenched with the addition of saturated aqueous NH_4Cl (30 mL) and diluted with EtOAc (40 mL). The layers were separated, and the aqueous layer was extracted with EtOAc (2×30 mL). The combined organic layer was washed with saturated aqueous NaCl (35 mL), dried over Na_2SO_4, filtered and concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 10–20% EtOAc in hexanes) to give the **10** (4.17 g, 98%) as a colorless oil identical to reported material:[21] ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.34 – 7.28 (m, 4H), 7.21 – 7.15 (m, 6H), 3.75 (s, 3H), 3.38 (dq, J = 23.7, 7.3 Hz, 1H), 1.64 (dd, J = 19.2, 7.3 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 169.3, 150.4, 150.3, 129.8, 125.4, 52.9, 40.0, 30.1, 11.9; IR (neat) ν_{max} 2951, 1736, 1589, 1487, 1182, 1157, 759, 687 cm^{-1}; HRMS-TOF-ESI (*m/z*) [M + H]$^+$ calculated for $C_{16}H_{18}O_5P$ 321.0892, found 321.0894.

tert-butyl (4*R*,5*R*)-4-((*Z*)-3-methoxy-2-methyl-3-oxoprop-1-en-1-yl)-2,2,5-trimethyl-oxazolidine-3-carboxylate (11) and _tert_-butyl (4*R*,5*R*)-4-((*E*)-3-methoxy-2-methyl-3-oxoprop-1-en-1-yl)-2,2,5-trimethyloxazolidine-3-carboxylate (S1)

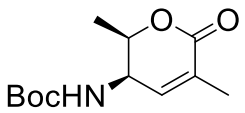


A solution of **8** (907 mg, 3.0 mmol, 1.0 equiv) in CH_2Cl_2 was treated with DIBAL-H (5.02 mL of a 1.2 M solution in toluene, 6.0 mmol, 2.0 equiv) at –78 °C. After 3 h at this temperature, the reaction was quenched with the addition of excess EtOAc. Saturated aqueous potassium sodium tartrate (20 mL) was added and the mixture was stirred for 3 h at 23 °C. The layers were separated, and the aqueous phase was extracted with CH_2Cl_2 (2×15 mL). The combined organic phase was washed with saturated aqueous NaCl (20 mL), dried over Na_2SO_4, filtered and concentrated in vacuo. The crude aldehyde **9** was used without further purification.

A solution of **10** (1.16 g, 3.62 mmol, 1.2 equiv) in THF (5 mL) was treated with NaH (145 mg of a 60% suspension in mineral oil, 3.62 mmol, 1.2 equiv) at 0 °C and stirred for 1 h. After this time, the reaction mixture was cooled to –78 °C and a solution of crude **9** in THF (3 mL) was added dropwise over 30 min. The reaction mixture was warmed to –55 °C and stirred for a further 9 h before being quenched with the addition of saturated aqueous NH_4Cl (4 mL). The organics were removed in vacuo and the residual aqueous phase was extracted with 10% EtOAc/hexanes. The combined organic phase was washed with saturated aqueous NaCl, dried over Na_2SO_4, filtered and concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 5–10% EtOAc in hexanes) to give the desired compound as a separable mixture of isomers, Z-isomer **11** (658 mg) and *E*-isomer **S1** (143 mg) as colorless oils in 86% combined yield. For ***Z*-11**: $[\alpha]_D^{20}$ +63 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 5.82 and 5.71 (br s, 1H), 4.93 and 4.79 (br s,1H), 3.90 – 3.81 (m, 1H), 3.73 (br s, 3H), 1.95 (d, J = 1.5 Hz, 3H), 1.68 – 1.31 (m, 15H), 1.33 (d, J = 6.2 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 167.5, 152.0, 143.2, 142.4, 128.5, 94.2, 93.6, 80.1, 79.5, 76.0, 75.4, 62.0, 61.7, 51.5, 36.7, 29.7, 28.3, 26.8, 26.6, 25.7, 24.7, 23.5, 20.6, 18.6, 18.1; IR (neat) ν_{max} 2978, 1696, 1363, 1210, 1119, 1082, 859 cm^{-1}; HRMS-TOF-ESI (*m/z*) [M + H]$^+$ calculated for $C_{16}H_{28}NO_5$ 314.1967, found 314.1963. For ***E*-S1**: $[\alpha]_D^{20}$ +19 (*c* 0.5, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.49 (br s, 1H), 4.18 and 4.08 (br s, 1H), 3.90 – 3.81 (m, 1H), 3.75 (br

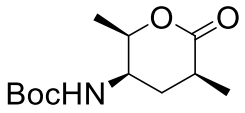
s, 3H), 1.93 and 1.89 (br s, 3H), 1.77 – 1.29 (m, 15H), 1.26 (br d, *J* = 6.0 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 168.1 (2C), 152.0, 151.8, 140.9, 140.0, 129.3, 128.7, 94.5, 94.0, 80.4, 79.9, 74.6, 62.2, 52.0, 36.7 (2C), 29.7, 28.3, 27.8, 26.3, 25.3, 17.5, 13.1, 12.8; IR (neat) ν_{max} 2977, 1697, 1362, 1266, 1238, 1121, 937, 856 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + H]^+$ calculated for $C_{16}H_{28}NO_5$ 314.1967, found 314.1974.

***tert*-butyl ((2*R*,3*R*)-2,5-dimethyl-6-oxo-3,6-dihydro-2*H*-pyran-3-yl)carbamate (12)**



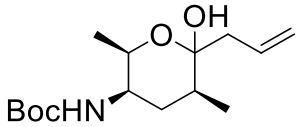
A solution of the *E*/*Z* mixture of **11** and **S1** (15 g, 62.7 mmol, 1.0 equiv) in MeOH (480 mL) was treated with CSA (555 mg, 2.4 mmol, 0.04 equiv) and stirred for 4 days. After this time, the solvent was removed in vacuo and the residue was taken up in CH_2Cl_2 (250 mL), washed with saturated aqueous Na_2CO_3 (100 mL), saturated aqueous NaCl (50 mL), dried over Na_2SO_4, filtered and concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 10–30% EtOAc in hexanes) to give **12** (8.51 g, 74%) as a white solid: mp 149–150 °C; $[\alpha]_D^{20}$ –176 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.61 (d, *J* = 6.3 Hz, 1H), 4.72 (d, *J* = 10.0 Hz, 1H), 4.59 (dq, *J* = 6.6, 2.9 Hz, 1H), 4.28 – 4.21 (m, 1H), 1.91 (s, 3H), 1.42 (s, 9H), 1.35 (d, *J* = 6.5 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 165.5, 155.5, 138.2, 130.4, 80.4, 76.5, 46.3, 28.4, 17.1, 16.3; IR (neat) ν_{max} 2990, 1704, 1507, 1158, 586 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + Na]^+$ calculated for $C_{12}H_{19}NO_4Na$ 264.1212, found 264.1217.

***tert*-butyl ((2*R*,3*R*,5*S*)-2,5-dimethyl-6-oxotetrahydro-2*H*-pyran-3-yl)carbamate (13)**



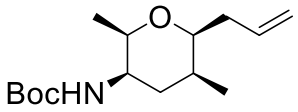
A solution of **12** (1.64 g, 6.8 mmol, 1.0 equiv) in THF (120 mL) was treated with PtO_2 (32.8 mg, 0.14 mmol, 0.02 equiv) and placed under an atmosphere of hydrogen. The reaction mixture was stirred for 15 h at 23 °C before being filtered through Celite and the solvent removed in vacuo to afford **13** (1.66 g, 99%) as a white solid in 10:1 dr. For **13**: mp 121–122 °C; $[\alpha]_D^{20}$ +72 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 4.75 (d, *J* = 9.4 Hz, 1H), 4.50 (dq, *J* = 6.4, 3.0 Hz, 1H), 4.15 – 4.04 (m, 1H), 2.68 – 2.52 (m, 2H), 1.43 (s, 9H), 1.34 (d, *J* = 6.4 Hz, 3H), 1.20 (d, *J* = 6.4 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 175.7, 155.7, 80.0, 75.6, 48.0, 35.7, 32.5, 28.4, 16.2, 15.6; IR (neat) ν_{max} 2972, 1728, 1712, 1515, 1159, 592 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + Na]^+$ calculated for $C_{12}H_{21}NO_4Na$ 266.1363, found 266.1360.

***tert*-butyl ((2*R*,3*R*,5*S*)-6-allyl-6-hydroxy-2,5-dimethyltetrahydro-2*H*-pyran-3-yl)carbamate (14)**



A solution of **13** (100 mg, 0.41 mmol, 1.0 equiv) in 2-methyltetrahydrofuran (2 mL) was treated with allylmagnesium chloride (0.4 mL of a 2 M solution in THF, 0.8 mmol, 1.95 equiv) at –98 °C and the mixture was stirred for 1.5 h before being quenched with the addition of saturated aqueous NH_4Cl (2 mL). The mixture was extracted with EtOAc (3×6 mL) and the combined organic phase was washed with saturated aqueous NaCl, dried over Na_2SO_4, filtered and concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 5–10% EtOAc in hexanes) to give **14** (116 mg, 85%) as a colorless oil: ^{1}H NMR (600 MHz, $CDCl_3$) δ 5.93 (ddt, *J* = 17.1, 10.2, 6.9 Hz, 1H), 5.16 (d, *J* = 10.0 Hz, 1H), 5.13 (dq, *J* = 17.1, 1.6 Hz, 1H), 4.75 (br d, *J* = 9.8 Hz, 1H), 3.75 – 3.65 (m, 1H), 3.40 – 3.23 (m, 1H), 2.80 – 2.67 (m, 1H), 2.27 – 2.14 (m, 1H), 1.96 (ddd, *J* = 14.3, 9.9, 4.7 Hz, 1H), 1.43 (s, 9H), 1.14 (d, *J* = 6.3 Hz, 3H), 1.11 (d, *J* = 7.2 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 212.8, 156.5, 130.9, 118.6, 79.2, 69.2, 53.8, 46.6, 42.5, 35.8, 28.4, 20.3, 18.0; IR (neat) ν_{max} 2973, 1684, 1503, 1365, 1248, 1164, 1048, 917 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + Na]^+$ calculated for $C_{15}H_{27}NO_4Na$ 308.1838, found 308.1838.

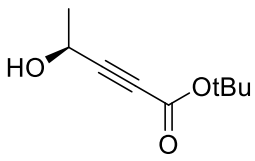
***tert*-butyl ((2*R*,3*R*,5*S*,6*S*)-6-allyl-2,5-dimethyltetrahydro-2*H*-pyran-3-yl)carbamate (15)**



A solution of **14** (1.49 g, 5.22 mmol, 1.0 equiv) in CH_2Cl_2 (22.3 mL) was treated with 3,3,3-trifluoroethanol (TFE, 3.0 mL, 41.8 mmol, 8.0 equiv) and Et_3SiH (8.3 mL, 52.2 mmol, 10.0 equiv) at –78 °C. After 30 min, $BF_3 \cdot OEt_2$ (2.58 mL, 20.9 mmol, 4.0 equiv) was added dropwise and the mixture was stirred for 4 h. After this time, the reaction was quenched with the addition of saturated aqueous $NaHCO_3$ (10 mL) and the mixture was extracted with CH_2Cl_2 (3×15 mL). The combined organic phase was washed with saturated aqueous NaCl, dried over Na_2SO_4, filtered and concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 5–10% EtOAc in hexanes) to give **15** (687 mg, 49%) as a colorless oil: $[\alpha]_D^{20}$ –10.3 (*c* 1.2, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 5.77 (dddd, *J* = 16.6, 10.2, 7.7, 6.1 Hz, 1H), 5.09 (dq, *J* = 17.2, 1.7 Hz, 1H), 5.02 (br d, *J* = 10.2 Hz, 1H), 4.74 (br d, *J* = 9.6 Hz, 1H), 3.62 – 3.52 (m, 2H), 2.34 – 2.26 (m, 1H), 2.14 – 2.06 (m, 1H), 1.96 – 1.83 (m, 2H), 1.77 – 1.69 (m, 1H), 1.42 (s, 9H), 1.13 (d, *J* = 6.4 Hz, 3H), 1.01 (d, *J* = 7.4 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 156.0, 135.0, 116.7, 80.7, 79.1, 76.5, 48.4, 37.6, 36.2, 29.0, 28.5, 17.8, 15.0; IR (neat) ν_{max} 2976, 1714, 1492, 1227, 1055, 990, 913 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + H]^+$ calculated for $C_{15}H_{28}NO_3$ 270.2069, found 270.2071.

Synthesis of Left-hand Subunits

***tert*-butyl (*S*)-4-hydroxypent-2-ynoate (19)**

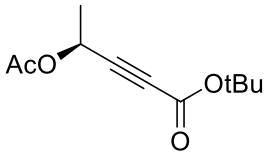


Ethyl vinyl ether (0.75 mL, 7.84 mmol, 1.1 equiv) was added to a solution of (*S*)-(-)-3-butyn-2-ol (500 mg, 7.13 mmol, 1.0 equiv) in CH_2Cl_2 (5.0 mL) followed by PPTS (180 mg, 0.713 mmol, 0.1 equiv). The reaction mixture was stirred for 2 h at 23 °C before being diluted with Et_2O (30 mL) and saturated aqueous NaCl (10 mL). The layers were separated, and the organic phase was dried over Na_2SO_4, filtered and concentrated in vacuo to give **17** as a mixture of diastereomers (972 mg, 96%) as a clear oil. The spectroscopic data was consistent with literature values:[10b] ^{1}H NMR (600 MHz, $CDCl_3$) δ 4.96 (q, *J* = 5.3 Hz, 0.5H), 4.85 (q, *J* = 5.3 Hz, 0.5H), 4.49 (qd, *J* = 6.7, 2.1 Hz, 0.5H), 4.34 (qd, *J* = 6.6, 2.1 Hz, 0.5H), 3.78 – 3.71 (m, 0.5H), 3.66 – 3.57 (m, 0.5H), 3.55 – 3.49 (m, 1H), 2.39 (d, *J* = 2.1 Hz, 0.5H), 2.39 (d, *J* = 2.1 Hz, 0.5H), 1.45 (dd, *J* = 6.6, 2.9 Hz, 3H), 1.34 (dd, *J* = 5.3, 3.0 Hz, 3H), 1.21 (td, *J* = 7.1, 0.9 Hz, 3H); HRMS-TOF-ESI (*m/z*) $[M + Na]^+$ calculated for $C_8H_{14}O_2Na$ 165.0891, found 165.0887.

A solution of **17** (970 mg, 6.8 mmol, 1.0 equiv) in THF (10 mL) at –78 °C was treated dropwise with *n*-butyllithium (2.9 mL of a 2.5 M solution in hexanes, 7.2 mmol, 1.05 equiv). After 15 min at this temperature, di-*tert*-butyl dicarbonate (1.64 mL, 7.2 mmol, 1.05 equiv) was added over 5 min and the mixture was stirred and allowed to warm to room temperature. The reaction mixture was diluted with Et_2O (15 mL) and washed with H_2O (10 mL) and saturated aqueous NaCl (10 mL). The organic phase was dried over Na_2SO_4, filtered and concentrated to give crude **18** as a dark oil. HRMS-TOF-ESI (*m/z*) $[M + Na]^+$ calculated for $C_{13}H_{22}O_4Na$ 265.1416, found 265.1415.

The ester **18** was immediately taken up in MeOH (12 mL), PPTS (170 mg, 0.68 mmol, 0.1 equiv) was added and the mixture was warmed at reflux for 2 h. After this time, the reaction mixture was cooled, diluted with Et_2O (15 mL), washed with saturated aqueous NaCl (5 mL), dried over Na_2SO_4, filtered and concentrated. The crude material was purified by column chromatography (SiO_2, 20% EtOAc in hexanes) to give **19** (926 mg, 80% over 2 steps; typically 80–89%) as a clear oil: $[\alpha]_D^{20}$ –22 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 4.61 (q, *J* = 6.7 Hz, 1H), 1.97 (bs, 1H), 1.50 (d, *J* = 6.7 Hz, 3H), 1.49 (s, 9H)); ^{13}C NMR (150 MHz, $CDCl_3$) δ 152.6, 86.1, 83.9, 77.3, 58.2, 28.1, 23.5; IR (neat) ν_{max} 3386, 1705, 1369, 1257, 1155, 1067 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M+H]^+$ calculated for $C_9H_{15}O_3$ 171.1021, found 171.1020.

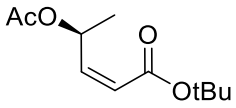
tert-butyl (*S*)-4-acetoxypent-2-ynoate (20)



A stirred solution of **19** (900 mg, 5.29 mmol, 1.0 equiv) in CH_2Cl_2 (18 mL) was treated with acetic anhydride (1.5 mL, 15.9 mmol, 3.0 equiv), Et_3N (3.7 mL, 26.5 mmol, 5 equiv) and DMAP (129 mg, 1.06 mmol, 0.2 equiv). After 12 h, saturated aqueous NH_4Cl was added and the mixture was extracted with EtOAc (3×25 mL). The combined organic phase was washed with saturated aqueous NaCl (20 mL), dried over Na_2SO_4, filtered and concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 10% EtOAc in hexanes) to give **20** (920 mg, 82%) as a clear oil: $[\alpha]_D^{20}$ –122 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 5.51 (q, *J* = 6.8 Hz, 1H), 2.09 (s, 3H), 1.53 (d, *J* = 6.8 Hz, 3H), 1.49 (s, 9H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 169.8, 152.2, 84.0, 82.5, 77.6, 59.6, 28.1, 21.0, 20.6; IR (neat) ν_{max} 1748, 1709, 1370, 1277, 1226, 1157, 1051 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + Na]^+$ calculated for $C_{11}H_{16}O_4Na$ 235.0946, found 235.0942.

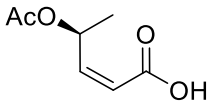
Conducting the conversion of **19** to **20** (4 steps) without intermediate purification can be conducted and provided **20** in yields as high as 81% overall.

***tert*-butyl (*S*,Z)-4-acetoxypent-2-enoate (21)**



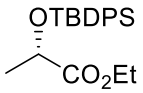
A solution of Lindlar's catalyst (92 mg, 10% w/w) and quinoline (0.056 mL, 0.43 mmol, 0.1 equiv) was stirred in EtOH under an atmosphere of H_2 for 15 min before the addition of **20** (920 mg, 4.34 mmol, 1.0 equiv). After 16 h, the reaction mixture was filtered and concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 10% EtOAc in hexanes) to give **21** (911 mg, 98%) as a pale-yellow oil: $[\alpha]_D^{20}$ +4.8 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.26 – 6.21 (m, 1H), 6.02 (dd, *J* = 11.7, 7.7 Hz, 1H), 5.69 (dd, *J* = 11.7, 1.4 Hz, 1H), 2.04 (s, 3H), 1.49 (s, 9H), 1.36 (d, *J* = 6.5 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.4, 164.9, 146.7, 121.9, 81.1, 68.7, 28.3, 21.4, 19.9; IR (neat) ν_{max} 2978, 1741, 1712, 1368, 1235, 1158, 1117, 1048, 848, 822 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + Na]^+$ calculated for $C_{11}H_{18}O_4Na$ 237.1103, found 237.1101.

(*S*,Z)-4-acetoxypent-2-enoic acid (22)



The ester **21** (210 mg, 0.98 mmol, 1.0 equiv) was stirred in TFA/CH_2Cl_2 (1.5 mL of a 10% solution) for 2 h (2–5 h) before the solvent was removed in vacuo. The crude material was purified by column chromatography (SiO_2, 80% EtOAc in hexanes) to give **22** (152 mg, 98%) as a clear oil: $[\alpha]_D^{20}$ +21 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 10.26 (bs, 1H), 6.26 – 6.20 (m, 2H), 5.80 (d, *J* = 10.4 Hz, 1H), 2.05 (s, 3H), 1.37 (d, *J* = 6.3 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.7, 170.6, 150.8, 119.3, 68.9, 21.3, 19.7; IR (neat) ν_{max} 2983, 1702, 1649, 1429, 1371, 1237, 1095, 1046, 892, 827 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + Na]^+$ calculated for $C_7H_{10}O_4Na$ 181.0478, found 181.0478.

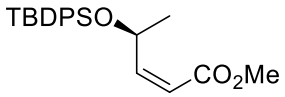
ethyl (*S*)-2-((*tert*-butyldiphenylsilyl)oxy)propanoate (23)



A solution of ethyl-L-lactate (2.0 g, 16.9 mmol) in CH_2Cl_2 (30 mL) was treated with imidazole (1.8 g, 26.4 mmol) and TBDPSCl (4.76 mL, 18.3 mmol, 1.08 equiv) at 0 °C. The reaction mixture was stirred for 12 h at 23 °C before being quenched with the addition of H_2O. The organic layer was separated, and the aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous NaCl, dried over Na_2SO_4, filtered and concentrated under reduced pressure. Flash chromatography (SiO_2, 2–5% EtOAc in hexane) provided **23** (5.94 g, 98%)

as colorless oil. All spectral data of synthetic **23** were identical with reported data:[23c] $[\alpha]^{26}_D$ –45 (*c* 1.0, CH_2Cl_2); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.74 – 7.63 (m, 4H), 7.47 – 7.34 (m, 6H), 4.29 (q, *J* = 6.7 Hz, 1H), 4.04 (dq, *J* = 7.1, 2.4 Hz, 2H), 1.39 (d, *J* = 6.7 Hz, 3H), 1.16 (t, *J* = 7.1 Hz, 3H), 1.11 (s, 9H); ^{13}C NMR (150 MHz, $CDCl_3$) 173.9, 136.0, 135.9, 133.8, 133.4, 129.9 (2C), 127.7 (2C), 69.1 (2C), 60.7, 27.0, 21.4, 19.4, 14.2; IR (neat) ν_{max} 2932, 2858, 1751, 1733, 1106, 699, 609 cm^{-1}.

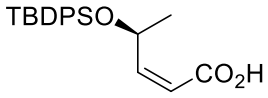
methyl (*S*,*Z*)-4-((*tert*-butyldiphenylsilyl)oxy)pent-2-enoate (26)



A solution of **23** (3.0 g, 8.41 mmol) in Et_2O (30 mL) was treated with 1 M DIBAL-H (12.6 mL, 12.6 mmol) at –78 °C. The reaction mixture was stirred for 3 h at –78 °C before being quenched with the addtion of EtOAc. The resulting mixture was treated with excess saturated aqueous pottassium sodium tartrate, and stirred for 1 h at 23 °C. After separation of organic layer, the aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous NaCl, dried over Na_2SO_4,, filtered and concentrated under reduced pressure. The obtained aldehyde **24** was used next step without purification.

A solution of methyl 2-(diphenoxyphosphoryl)acetate (**25**, 3.10 g, 10.1 mmol) in THF (20 mL) was treated with NaH (60% suspension in mineral oil, 390 mg, 9.75 mmol) at 0 °C and stirred for 1 h. The resulting mixture was treated with **24** in THF (10 mL) dropwised over 0.5 h at –78 °C and stirred for 9 h at –55 °C before being quenched with the addition of saturated aqueous NH_4Cl. After removal of THF under reduced pressure, EtOAc was added and the organic layer was separated. The aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous NaCl, dried over Na_2SO_4,, filtered and concentrated under reduced pressure. Flash chromatography (SiO_2, 2% EtOAc/hexane) provided **26** (2.95 g, 95%, > 99% *Z*) as colorless oil. All spectral data of synthetic **26** were identical with reported data:[23d] $[\alpha]^{26}_D$ +47 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.69 – 7.60 (m, 4H), 7.44 – 7.31 (m, 6H), 6.27 (dd, *J* = 11.7, 7.8 Hz, 1H), 5.52 (dd, *J* = 11.7, 1.4 Hz, 1H), 5.46 – 5.39 (m, 1H), 3.54 (s, 3H), 1.27 (d, *J* = 6.4 Hz, 3H), 1.08 (s, 9H); ^{13}C NMR (150 MHz, $CDCl_3$) δ166.0, 154.1, 135.9 (2C), 134.3, 134.2, 129.7 (2C), 127.6 (2C), 116.6, 66.8, 51.2 (2C), 27.1, 23.4, 19.3; IR (neat) ν_{max} 2857, 1721, 1198, 1110, 1069, 699, 612 cm^{-1}.

(*S*,*Z*)-4-((*tert*-butyldiphenylsilyl)oxy)pent-2-enoic acid (27)

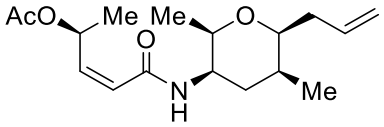


A solution of **26** (2.32 g, 6.29 mmol) in MeOH/H_2O (9:1, 46.4 mL) was treated with LiOH · H_2O (1.32 g, 31.5 mmol, 5 equiv) at 23 °C. The reaction mixture was stirred for 24 h at 23 °C before being quenched with the addition of aqueous 0.5 M HCl. EtOAc was added to the quenched mixture, and the organic layer was separated (aqueous layer pH = 2). The aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous NaCl, dried over Na_2SO_4,, filtered and concentrated under reduced pressure. Flash chromatography (SiO_2, 20% EtOAc in hexane) provided **27** (2.00 g, 90%) as a colorless oil: $[\alpha]^{26}_D$ +40 (*c* 1.0,

$CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.70 – 7.60 (m, 4H), 7.41 – 7.30 (m, 6H), 6.37 (dd, *J* = 11.8, 7.8 Hz, 1H), 5.52 (dd, *J* = 11.8, 1.3 Hz, 1H), 5.41 – 5.34 (m, 1H), 1.27 (d, *J* = 6.3 Hz, 3H), 1.09 (s, 9H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 171.0, 156.2, 135.9, 134.9, 134.2, 133.9, 129.8, 127.9, 127.7, 127.6, 116.5, 66.7, 27.1, 23.3, 19.3; IR (neat) ν_{max} 2857, 1696, 1643, 1249, 1110, 1070, 698, 611 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M–H]^+$ calculated for $[C_{21}H_{25}O_3Si]^+$ 353.1573, found 353.1577.

Synthesis of Meayamycin

(*S*,*Z*)-5-(((2*R*,3*R*,5*S*,6*S*)-6-allyl-2,5-dimethyltetrahydro-2*H*-pyran-3-yl)amino) -5-oxopent-3-en-2-yl acetate (28)



From 15: A solution of **15** (198 mg, 0.736 mmol) in CH_2Cl_2 (10 mL) was treated with trifluoroacetic acid (TFA, 1 mL) by syringe at 0 °C. The reaction mixture was stirred for 3 h at 23 °C. After completion of the deprotection reaction, the solvents were removed under reduced pressure. The residue was dissolved in CH_3CN (5 mL) and evaporated under reduced pressure. This procedure was repeated twice to completely remove TFA. A solution of **22** (140 mg, 0.886 mmol, 1.2 equiv) in CH_3CN (4.4 mL) was treated with *i*Pr_2NEt (518 µL, 2.97 mmol) and *O*-(7-azabenzotriazol-1-yl)-*N*,*N*,*N*',*N*'-tetramethyluronium hexafluorophoshate (HATU, 337 mg, 0.886 mmol, 1.2 equiv) at 0 °C. The resulting mixture was stirred for 1 h at 0 °C before being added to the solution of the liberated free amine TFA salt in CH_3CN (6.6 mL). The reaction mixture was stirred for 15 h at 23 °C, before being quenched with the addition of saturated aqueous NH_4Cl. After separation of the organic layer, the aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous $NaHCO_3$ and saturated aqueous NaCl, dried over Na_2SO_4, filtered and concentrated under reduced pressure. Flash chromatography (SiO_2, 10–30 % EtOAc in hexane) provided **28** (157 mg, 69%) as a colorless oil and the corresponding trans isomer (45 mg, 20%) as a colorless oil. All spectral data of synthetic **28** were identical with reported data:[6] $[\alpha]^{21}_D$ –78 (*c* 0.5, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.25 – 6.17 (m, 1H), 6.00 (br d, *J* = 9.2 Hz, 1H), 5.83 (dd, *J* = 11.6, 7.9 Hz, 1H), 5.77 – 5.69 (m, 1H), 5.67 (d, *J* = 11.5 Hz, 1H), 5.04 (d, *J* = 17.1 Hz, 1H), 4.98 (d, *J* = 10.2 Hz, 1H), 3.93 – 3.87 (m, 1H), 3.60 (dq, *J* = 6.4, 2.2 Hz, 1H), 3.48 (dt, *J* = 7.1, 2.7 Hz, 1H), 2.32 – 2.22 (m, 1H), 2.10 – 2.03 (m, 1H), 1.99 (s, 3H), 1.92 – 1.83 (m, 2H), 1.76 – 1.68 (m, 1H), 1.33 (d, *J* = 6.4 Hz, 3H), 1.09 (d, *J* = 6.5 Hz, 3H), 0.96 (d, *J* = 7.3 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.3, 164.8, 143.6, 134.7, 122.5, 116.7, 80.7, 75.9, 68.9, 47.1, 37.4, 35.9, 28.8, 21.2, 20.0, 17.8, 14.9; IR (neat) ν_{max} 2930, 1738, 1667, 1515, 1239, 1046, 813 cm^{-1}. HRMS-TOF-ESI (*m/z*) $[M+H]^+$ calculated for $[C_{17}H_{28}NO_4]^+$ 310.2018, found 310.2024.

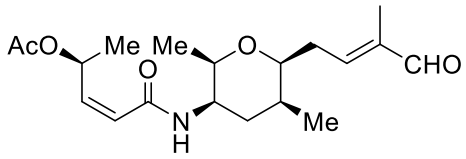
For the trans isomer, (*S*,*E*)-5-(((2*R*,3*R*,5*S*,6*S*)-6-allyl-2,5-dimethyltetrahydro-2*H*-pyran-3-yl)amino)-5-oxopent-3-en-2-yl acetate: $[\alpha]^{26}_D$ –43 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.69 (dd, *J* = 15.3, 5.3 Hz, 1H), 5.90 (dd, *J* = 15.4, 1.6 Hz, 1H), 5.82 (br d, *J* = 9.1 Hz, 1H), 5.76 – 5.68 (m, 1H), 5.48 – 5.40 (m, 1H), 5.06 (dd, *J* = 17.1, 1.7 Hz, 1H), 4.99 (d, *J* = 10.1 Hz, 1H), 3.97 – 3.90 (m, 1H), 3.61 (dq, *J* = 6.5, 2.2 Hz, 1H), 3.49 (dt, *J* = 7.1, 2.7 Hz, 1H), 2.32 – 2.23 (m, 1H), 2.12 – 2.03 (m, 1H), 2.02 (s, 3H), 1.89 (t, *J* = 3.6 Hz, 2H), 1.77 – 1.69 (m, 1H), 1.30 (d, *J* =

6.6 Hz, 3H), 1.08 (d, *J* = 6.5 Hz, 3H), 0.97 (d, *J* = 7.4 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.0, 164.7, 142.1, 134.7, 123.7, 116.8, 80.8, 76.0, 69.1, 47.3, 37.4, 35.9, 28.9, 21.2, 19.9, 17.9, 15.1; IR (neat) ν_{max} 2934, 1738, 1626, 1525, 1233, 1045, 631 cm^{-1}; HRMS-TOFESI (*m/z*) $[M+H]^+$ calculated for $[C_{17}H_{28}NO_4]^+$ 310.2018, found 310.2024.

From 31: A solution of **31** (187 mg, 0.37 mmol) in THF (2.6 mL) was treated with 1.0 M Bu_4NF in THF (1.1 mL, 1.1 mmol) at 0 °C and stirred for 4 h at 23 °C before being quenched with the addition H_2O. EtOAc was added and the organic layer was separated. The aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous NaCl, dried over Na_2SO_4, filtered and concentrated under reduced pressure. The TBDPS byproduct was removed by short flash chromatography (SiO_2, 20% EtOAc/hexane to EtOAc).

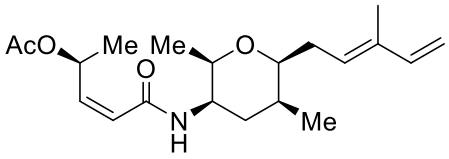
A solution of the pre-purified alcohol intermediate in CH_2Cl_2 (3.0 mL) was treated with Ac_2O (52.3 µL, 0.55 mmol), Et_3N (103 µL, 0.738 mmol) and DMAP (4.5 mg, 0.04 mmol) at 0 °C and stirred for 12 h at 23 °C before being quenched with the addition of saturated aqueous NH_4Cl. After separation of organic layer, the aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous $NaHCO_3$, saturated aqueous NaCl, dried over Na_2SO_4, filtrated and concentrated under reduced pressure. Flash chromatography (SiO_2, 20–30 % EtOAc in hexane) provided **28** (115.3 mg, quant.) as a colorless oil.

(*S*,*Z*)-5-(((2*R*,3*R*,5*S*,6*S*)-2,5-dimethyl-6-((*E*)-3-methyl-4-oxobut-2-en-1-yl)tetrahydro-2*H*-pyran-3-yl)amino)-5-oxopent-3-en-2-yl acetate (29)



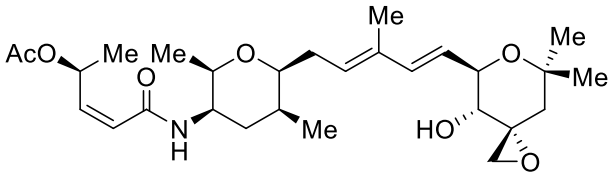
A solution of **28** (500 mg, 1.62 mmol) in CH_2Cl_2 (7.3 mL) was treated with methacrolein (2.68 mL, 32.4 mmol, 20 equiv) and Grubbs 2nd generation catalyst[26] (274 mg, 0.324 mmol, 0.2 equiv) at 23 °C. The reaction mixture was stirred for 36 h at 23 °C. The excess methacrolein and CH_2Cl_2 were removed under reduced pressure. Flash chromatography (SiO_2, 10–40 % EtOAc in hexane) provided **29** (338 mg, 60%; 60–80%) as tan oil. All spectral data of synthetic **29** were identical with reported data:[6] $[\alpha]^{24}_D$ –69 (*c* 0.5, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 9.42 (s, 1H), 6.56 – 6.51 (m, 1H), 6.26 – 6.19 (m, 1H), 6.04 (br d, *J* = 9.0 Hz, 2H), 5.88 (dd, *J* = 11.6, 8.0 Hz, 1H), 5.73 (dd, *J* = 11.7, 1.3 Hz, 1H), 3.99 – 3.93 (m, 1H), 3.69 (dq, *J* = 6.5, 2.3 Hz, 1H), 3.68 – 3.63 (m, 1H), 2.60 – 2.52 (m, 1H), 2.44 – 2.37 (m, 1H), 2.04 (s, 3H), 2.01 – 1.93 (m, 2H), 1,86 – 1.78 (m, 1H), 1.76 (s, 3H), 1.38 (d, *J* = 6.5 Hz, 3H), 1.16 (d, *J* = 6.5 Hz, 3H), 1.06 (d, *J* = 7.4 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 195.0, 170.3, 164.9, 150.6, 143.3, 140.4, 122.5, 79.7, 76.0, 68.8, 46.8, 35.7, 32.7, 29.4, 21.2, 19.9, 17.7, 15.0, 9.4; IR (neat) ν_{max} 2934, 1731, 1668, 1639, 1242, 1047, 909, 729 cm^{-1}; HRMS (ESI+) calculated for $C_{19}H_{29}NO_5$ (M^+) 351.2046, found 351.2041.[6]

(*S*,*Z*)-5-(((2*R*,3*R*,5*S*,6*S*)-2,5-dimethyl-6-((*E*)-3-methylpenta-2,4-dien-1-yl)tetrahydro-2*H*-pyran-3-yl)amino)-5-oxopent-3-en-2-yl acetate (30)



Methyltriphenylphosphonium bromide (687 mg, 1.92 mmol) in THF (1.3 mL) was treated with 1 M KO^{t}Bu in THF (1.73 mL, 1.73 mmol) at 0 °C and the solution was stirred for 1 h at 0 °C. A solution of **29** (338 mg, 0.962 mmol) in THF (3 mL) was add dropwise to the Wittig reagent solution at 0 °C. The reaction mixture was stirred for 12 h at 23 °C before being quenched with the addition of saturated aqueous NH_4Cl. After separation of the organic layer, the aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous NaCl, dried over Na_2SO_4, filtered and concentrated under reduced pressure. Flash chromatography (SiO_2, 10–40% EtOAc in hexane) provided **30** (190 mg, 57%; 57–65%) as colorless oil and recovered **29** (60.9 mg, 18%). All spectral data of synthetic **30** were identical with reported data:[6] $[\alpha]^{26}_D$ –74 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.35 (dd, *J* = 17.3, 10.8 Hz, 1H), 6.29 – 6.21 (m, 1H), 6.02 (br d, *J* = 9.2 Hz, 1H), 5.88 (dd, *J* = 11.6, 7.9 Hz, 1H), 5.70 (dd, *J* = 11.6, 1.3 Hz, 1H), 5.45 (t, *J* = 7.2 Hz, 1H), 5.10 (d, *J* = 17.3 Hz, 1H), 4.94 (d, *J* = 10.6 Hz, 1H), 3.97 – 3.90 (m, 1H), 3.66 (dq, *J* = 6.5, 2.3 Hz, 1H), 3.53 (dt, *J* = 7.2, 2.8 Hz, 1H), 2.42 – 2.34 (m, 1H), 2.28 – 2.20 (m, 1H), 2.03 (s, 3H), 1.97 – 1.89 (m, 2H), 1.82 – 1.75 (m, 1H), 1.76 (s, 3H), 1.38 (d, *J* = 6.5 Hz, 3H), 1.14 (d, *J* = 6.5 Hz, 3H), 1.01 (d, *J* = 7.4 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 170.4, 164.9, 143.6, 141.3, 135.7, 128.2, 122.6, 111.1, 80.9, 76.0, 68.9, 47.1, 35.9, 31.9, 28.9, 21.3, 20.0, 17.9, 15.1, 12.0; IR (neat) ν_{max} 2931, 1736, 1666, 1632,1046, 814 cm^{-1}; LRMS (*m*/*z*) $[M+H]^+$ 350.3.

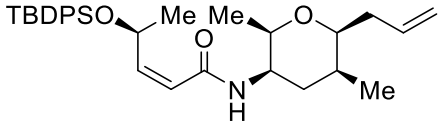
Meayamycin (1)



A solution of **30** (36 mg, 0.1 mmol, 1.0 equiv) in $ClCH_2CH_2Cl$ (0.2 mL) at 45 ˚C was treated with *p*-benzoquinone (3.2 mg, 0.03 mmol, 0.3 equiv), Grela cat.[27] (0.2 mL of 14 mg, 0.02 mmol, 0.2 equiv in 0.6 mL of $ClCH_2CH_2Cl$) and **7** (0.2 mL of 28 mg, 0.152 mmol, 1.5 equiv in 0.6 mL of $ClCH_2CH_2Cl$). The mixture was stirred for 1 h before a second portion of the solution of catalyst (0.2 mL) and **7** (0.2 mL) were added. After an additional 1 h, the final portion of catalyst (0.2 mL) and **7** (0.2 mL) were added. After 12 h, the reaction mixture was cooled and concentrated in vacuo. The crude material was purified by CombiFlash column chromatography (SiO_2, 20–50% EtOAc in hexane) to afford **1** (18.8 mg, 0.0372 mmol, 37%; typically 26–54% on scales up to 130 mg), displaying properties identical in all respects with reported characterization.[6b] For subsequent biological studies, semi-preparative reverse-phase HPLC purification of **1** was performed using a Nacalai Tesque, Inc., COSMOSIL, 5C18-AR-II column, 10 × 250 mm, 4.3 mL/min, 50% acetonitrile/water with 0.07% TFA to 100% acetonitrile, linear gradient from 0.5 min to 22 min, 100% acetonitrile for 3 min, retention time = 8.6 min. For **1**: ^{1}H NMR (400 MHz, CD_2Cl_2) δ 6.35 (dd, *J* = 15.8, 1.0 Hz, 1H), 6.31 – 6.23 (m, 1H), 5.99 (m, 1H), 5.90 (dd, *J* = 11.6, 7.8 Hz, 1H), 5.71 (dd, *J* = 11.6, 1.3 Hz, 1H), 5.65 (dd, *J* = 15.7, 6.6 Hz, 1H), 5.57 – 5.49 (m, 1H), 4.01 – 3.95 (m,

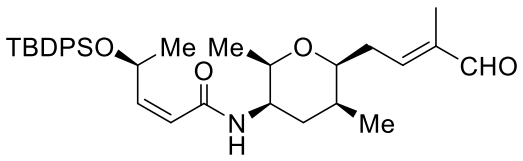
1H), 3.90 (ddq, *J* = 7.5, 3.0, 1.4 Hz, 1H), 3.66 (qd, *J* = 6.5, 2.5 Hz, 1H), 3.56 – 3.52 (m, 1H), 3.52 – 3.44 (m, 1H), 2.96 (d, *J* = 4.7 Hz, 1H), 2.46 (d, *J* = 4.7 Hz, 1H), 2.36 (dt, *J* = 14.5, 7.1 Hz, 1H), 2.28 – 2.20 (m, 1H), 2.16 (ddt, *J* = 14.3, 1.9, 0.9 Hz, 1H), 2.01 (s, 3H), 1.95 – 1.91 (m, 2H), 1.80 (t, *J* = 2.1 Hz, 1H), 1.78 (br s, 3H), 1.64 (d, *J* = 10.7 Hz, 1H), 1.40 (d, *J* = 14.3 Hz, 1H), 1.36 (s, 3H), 1.34 (d, *J* = 6.5 Hz, 3H), 1.24 (s, 3H), 1.11 (d, *J* = 6.4 Hz, 3H), 1.01 (d, *J* = 7.3 Hz, 3H), see side-by-side comparison with literature ^{1}H NMR for **1** (page S68); HRMS-TOF-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{28}H_{44}NO_7$ 506.3118, found 506.3118.

(*S*,*Z*)-*N*-((2*R*,3*R*,5*S*,6*S*)-6-allyl-2,5-dimethyltetrahydro-2*H*-pyran-3-yl)-4-((*tert*-butyldiphenylsilyl)oxy)pent-2-enamide (31)



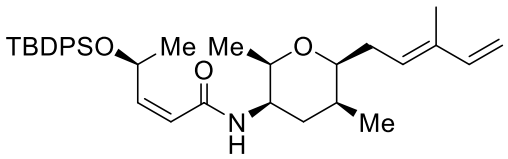
A solution of **15** (525 mg, 1.95 mmol) in CH_2Cl_2 (26 mL) was treated with trifluoroacetic acid (TFA, 2.6 mL) by syringe at 0 °C. The reaction mixture was stirred for 3 h at 23 °C. After completion of the deprotection reaction, the solvents were removed under reduced pressure. The residue was dissolved in CH_3CN (13 mL) and evaporated under reduced pressure. This procedure was repeated twice to completely remove TFA. A solution of **27** (829 mg, 2.34 mmol) in CH_3CN (10.6 mL) was treated with *i*-Pr_2NEt (1.37 mL, 7.86 mmol) and *O*-(7-azabenzotriazol-1-yl)-*N*,*N*,*N*',*N*'-tetramethyluronium hexafluorophoshate (890 mg, 2.34 mmol) at 0 °C. The resulting mixture was stirred for 1 h at 0 °C. This solution was added dropwise to a solution of the TFA salt of the deprotected amine in CH_3CN (15 mL) at 0 °C. The reaction mixture was stirred for 12 h at 23 °C, before being quenched with the addition of saturated aqueous NH_4Cl. After separation of organic layer, the aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous $NaHCO_3$ and saturated aqueous NaCl, dried over Na_2SO_4, filtered and concentrated under reduced pressure. Flash chromatography (SiO_2, 10% EtOAc in hexane) provided **31** (906 mg, 92%) as white amorphous powder: $[\alpha]^{26}_D$ –37 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.68 – 7.63 (m, 4H), 7.41 – 7.29 (m, 6H), 6.10 (dd, *J* = 11.6, 7.4 Hz, 1H), 5.83 – 5.73 (m, 1H), 5.69 – 5.62 (m, 1H), 5.52 (d, *J* = 9.2 Hz, 1H), 5.40 (dd, *J* = 11.6, 1.4 Hz, 1H), 5.12 (dq, *J* = 17.1, 1.6 Hz, 1H), 5.05 (d, *J* = 10.2 Hz, 1H), 3.84 – 3.78 (m, 1H), 3.60 (dq, *J* = 6.5, 2.2 Hz, 1H), 3.51 (dt, *J* = 7.2, 2.8 Hz, 1H), 2.36 – 2.28 (m, 1H), 2.16 – 2.08 (m, 1H), 1.92 – 1.84 (m, 1H), 1.84 – 1.71 (m, 1H), 1.28 (d, *J* = 6.3 Hz, 3H), 1.07 (t, *J* = 6.5 Hz, 3H), 1.06 (s, 9H), 0.95 (d, *J* = 7.4 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 164.9, 151.0, 135.9 (2C), 134.8, 134.7, 134.6, 129.6, 129.5, 127.6, 127.5, 119.1, 116.9, 80.8, 76.1, 67.1, 47.0, 37.5, 36.0, 29.0, 27.2, 23.9, 19.4, 17.9, 15.2; IR (neat) ν_{max} 2855, 1665, 1623, 1066, 822, 699, 612 cm^{-1}; HRMS-TOF-ESI (*m*/*z*) $[M+H]^+$ calculated for $[C_{31}H_{44}NO_3Si]^+$ 506.3090, found 506.3090.

(*S*,*Z*)-4-((*tert*-butyldiphenylsilyl)oxy)-*N*-((2*R*,3*R*,5*S*,6*S*)-2,5-dimethyl-6-((*E*)-3-methyl-4-oxobut-2-en-1-yl)tetrahydro-2*H*-pyran-3-yl)pent-2-enamide (32)



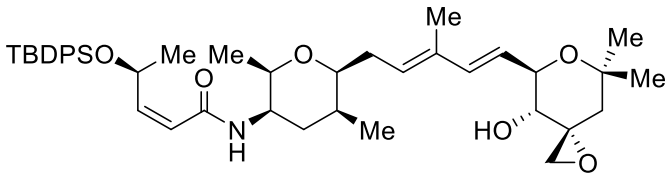
A solution of **31** (900 mg, 1.78 mmol) in CH_2Cl_2 (8 mL) was treated with methacrolein (2.95 mL, 35.6 mmol) and Grubbs 2nd generation catalyst[26] (302 mg, 0.36 mmol, 0.2 equiv) at 23 °C. The reaction mixture was stirred for 48 h at 23 °C. The excess methacrolein and CH_2Cl_2 were removed under reduced pressure. Flash chromatography (SiO_2, 10–20% EtOAc in hexane) provided **32** (714 mg, 73%) as a colorless amorphous powder: $[\alpha]^{26}_D$ –40 (*c* 0.5, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 9.42 (s, 1H), 7.70 – 7.59 (m, 4H), 7.41 – 7.28 (m, 6H), 6.52 (t, *J* = 6.6 Hz, 1H), 6.11 (dd, *J* = 11.6, 7.4 Hz, 1H), 5.70 – 5.61 (m, 1H), 5.53 (d, *J* = 9.2 Hz, 1H), 5.44 (d, *J* = 11.6 Hz, 1H), 3.66 – 3.58 (m, 2H), 2.59 – 2.49 (m, 1H), 2.44 – 2.35 (m, 1H), 1.94 – 1.82 (m, 2H), 1.82 – 1.77 (m, 1H), 1.78 (s, 3H), 1.29 (d, *J* = 6.2 Hz, 3H), 1.10 – 1.04 (m, 12H), 0.98 (d, *J* = 7.4 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 195.1 (2C), 164.9, 151.0, 150.4, 140.6, 135.9, 135.8, 134.6, 134.5, 129.5 (2C), 127.5 (2C), 119.0, 79.8 (2C), 76.3 (2C), 67.0, 46.7, 35.8, 32.8, 29.6, 27.1, 23.8, 19.3, 17.8, 15.3, 9.6; IR (neat) ν_{max} 2855, 1667, 1633, 1504, 1110, 1063, 997, 820, 610 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M+H]^+$ calculated for $[C_{33}H_{46}NO_4Si]^+$ 548.3196, found 548.3198.

(*S*,*Z*)-4-((*tert*-butyldiphenylsilyl)oxy)-*N*-((2*R*,3*R*,5*S*,6*S*)-2,5-dimethyl-6-((*E*)-3-methylpenta-2,4-dien-1-yl)tetrahydro-2*H*-pyran-3-yl)pent-2-enamide (33)



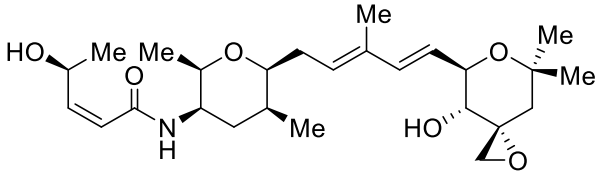
From 32: Methyltriphenylphosphonium bromide (932 mg, 2.61 mmol) in THF was treated with 1 M KO^{t}Bu in THF (2.35 mL, 2.35 mmol) at 0 °C and the mixture was stirred for 1 h at 0 °C. A solution of **32** (714 mg, 1.30 mmol) in THF (7 mL) was added dropwise at 0 °C. The reaction mixture was stirred for 15 h at 23 °C before being quenched with the addition of saturated aqueous NH_4Cl. After separation of organic layer, the aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous NaCl, dried over Na_2SO_4, filtered and concentrated under reduced pressure. Flash chromatography (SiO_2, 5–15 % EtOAc in hexane) provided **33** (528 mg, 74%; 74–80%) as a colorless wax: $[\alpha]^{26}_D$ –33 (*c* 0.5, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.70 – 7.62 (m, 4H), 7.44 – 7.28 (m, 6H), 6.38 (dd, *J* = 17.4, 10.7 Hz, 1H), 6.11 (dd, *J* = 11.6, 7.4 Hz, 1H), 5.71 – 5.63 (m, 1H), 5.54 (d, *J* = 9.2 Hz, 1H), 5.46 (t, *J* = 7.2 Hz, 1H), 5.42 (d, *J* = 11.6 Hz, 1H), 5.12 (d, *J* = 17.4 Hz, 1H), 4.97 (d, *J* = 10.7 Hz, 1H), 3.86 – 3.78 (m, 1H), 3.61 (dq, *J* = 6.5, 2.2 Hz, 1H), 3.51 (dt, *J* = 7.3, 2.8 Hz, 1H), 2.44 – 2.34 (m, 1H), 2.29 – 2.20 (m, 1H), 1.92 – 1.78 (m, 3H), 1.77 (s, 3H), 1.29 (d, *J* = 6.3 Hz, 3H), 1.10 – 1.05 (m, 12H), 0.96 (d, *J* = 7.3 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 164.9, 150.9, 141.4 (2C), 135.9, 135.8 (2C), 134.6 (2C), 129.5 (2C), 128.2, 127.6, 127.5, 119.1, 111.3, 80.9, 76.1 (2C), 67.0, 47.0, 36.0, 32.0, 29.0, 27.1, 23.9, 19.4, 17.9, 15.3, 12.1 (2C); IR (neat) ν_{max} 2929, 2855, 1663, 1628, 1501, 1110, 1063, 699, 610 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M+H]^+$ calculated for $[C_{34}H_{48}NO_3Si]^+$ 546.3403, found 546.3406

Compound 34



A solution of **33** (50 mg, 0.092 mmol, 1.0 equiv) in $ClCH_2CH_2Cl$ (0.2 mL) at 40 ˚C was treated with *p*-benzoquinone (4 mg, 0.037 mmol, 0.4 equiv), Grela cat.[27] (0.2 mL of 24 mg, 0.028 mmol, 0.3 equiv in 0.6 mL of $ClCH_2CH_2Cl$) and **7** (0.2 mL of 25 mg, 0.138 mmol, 1.5 equiv in 0.6 mL of $ClCH_2CH_2Cl$). The mixture was stirred for 1 h before a second portion of the solution of the catalyst (0.2 mL) and **7** (0.2 mL) were added. After an additional 1 h, the final portion of the catalyst (0.2 mL) and **7** (0.2 mL) were added. After 12 h, the reaction mixture was cooled and concentrated in vacuo. The crude material was purified by column chromatography over silica gel to give **34** (28.4 mg, 44%; typically 44-52%): $[\alpha]^{26}_D$ -12 (*c* 1.1, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.70 – 7.60 (m, 4H), 7.41 – 7.28 (m, 6H), 6.39 (d, *J* = 15.7 Hz, 1H), 6.09 (ddd, *J* = 13.4, 7.2, 3.5 Hz, 1H), 5.71 – 5.59 (m, 2H), 5.50 (tt, *J* = 14.6, 8.3 Hz, 1H), 5.41 (ddd, *J* = 11.6, 4.9, 1.5 Hz, 1H), 4.14 – 3.98 (m, 1H) , 3.79 (ddt, *J* = 9.4, 4.7, 2.5 Hz, 1H), 3.63 – 3.57 (m, 1H), 3.54 (t, *J* = 9.9 Hz, 1H), 3.48 (td, *J* = 7.3, 2.8 Hz, 1H), 3.03 (p, *J* = 5.1 Hz, 1H), 2.50 (t, *J* = 5.0 Hz, 1H), 2.37 (dq, *J* = 14.3, 7.7, 6.8 Hz, 1H), 2.25 – 2.16 (m, 1H), 1.85 (td, *J* = 10.1, 4.8 Hz, 2H), 1.80 (t, *J* = 2.3 Hz, 1H), 1.78 (s, 3H), 1.77 – 1.71 (m, 1H), 1.62 (d, *J* = 10.1 Hz, 1H), 1.47 – 1.42 (m, 3H), 1.41 (d, *J* = 5.3 Hz, 3H), 1.28 (d, *J* = 4.2 Hz, 3H), 1.26 (m, 3H), 1.05 (s, 9H), 0.94 (dd, *J* = 10.9, 7.3 Hz, 3H); ^{13}C NMR (151 MHz, $CDCl_3$) δ 165.0, 151.0, 138.2, 135.9 (2C), 134.9, 134.7, 134.6 (2C), 129.6, 129.5, 128.9, 127.6, 127.5, 125.1, 119.1, 81.0, 74.8, 73.0, 68.3, 67.1, 57.7, 47.8, 47.0, 42.9, 36.0, 32.1, 31.2, 29.8, 29.0, 27.1, 23.9, 23.7, 19.4, 17.9, 15.3, 12.8; IR (neat) ν_{max} 3734, 3429, 2934, 2857, 1666, 1638, 1524, 1498, 1377, 1221, 1113, 1075, 999, 824, 796, 772, 743, 705, 631, 614 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M+H]^+$ calculated for $C_{42}H_{60}NO_6Si$ 702.4184, found 702.4190.

(*S*,*Z*)-5-(((2*R*,3*R*,5*S*,6*S*)-6-((2*E*,4*E*)-5-((3*R*,4*R*,5*R*)-4-hydroxy-7,7-dimethyl-1,6-dioxaspiro[2.5]octan-5-yl)-3-methylpenta-2,4-dien-1-yl)-2,5-dimethyltetrahydro-2*H*-pyran-3-yl)amino)-5-oxopent-3-en-2-ol (35)



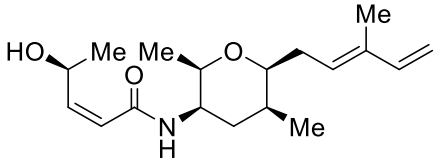
From 34: Tetra-*n*-butylammonium fluoride (Bu_4NF, 1.0 M in THF, 0.017 mL, 0.017 mmol, 1.2 equiv) was added to a solution of **34** (10 mg, 0.014 mmol, 1.0 equiv) in THF (0.5 mL) at 0 ˚C. After stirring for 2 h, the reaction mixture was concentrated in vacuo. The crude material was purified by PTLC (SiO_2, 100% EtOAc) to give **35** (6.4 mg, quant.): ^{1}H NMR (600 MHz, CD_2Cl_2) δ 6.34 (d, *J* = 15.7 Hz, 1H), 6.16 (dd, *J* = 11.9, 5.4 Hz, 1H), 5.97 (d, *J* = 9.0 Hz, 1H), 5.74 (dd, *J* = 11.9, 1.7 Hz, 1H), 5.65 (dd, *J* = 15.7, 6.6 Hz, 1H), 5.57 – 5.45 (m, 2H), 4.69 (ddd, *J* = 6.9, 5.3, 1.6 Hz, 1H), 3.96 (dd, *J* = 9.6, 6.6 Hz, 1H), 3.93 – 3.88 (m, 1H), 3.69 – 3.64 (m, 1H), 3.55 (ddd, *J* = 7.6, 6.3, 2.9 Hz, 1H), 3.48 (d, *J* = 9.5 Hz, 1H), 2.96 (d, *J* = 4.7 Hz, 1H), 2.46 (d, *J* = 4.8 Hz, 1H), 2.35 (dt, *J* = 24.9, 7.6 Hz, 2H), 2.27 – 2.22 (m, 1H), 2.19 – 2.15 (m, 1H), 2.03 – 1.99 (m, 1H), 1.95

– 1.91 (m, 1H), 1.78 (s, 3H), 1.62 (d, *J* = 7.4 Hz, 1H), 1.40 (d, *J* = 14.3 Hz, 1H), 1.36 (s, 3H), 1.28 (d, *J* = 6.7 Hz, 3H), 1.23 (s, 3H), 1.11 (d, *J* = 6.4 Hz, 3H), 1.02 (d, *J* = 7.5 Hz, 3H), see side-by-side comparison with literature ^{1}H NMR for **35** (page S77); HRMS-TOF-ESI (*m/z*) $[M+Na]^+$ calculated for $C_{26}H_{41}NO_6Na$ 486.2826, found 486.2816.

From 1: Compound **1** was dissolved in a mixture of 8:1:1 THF-CH_3OH-H_2O. LiOH-H_2O was added, and the reaction mixture was stirred at 23 °C. The reaction mixture was then acidified to pH 1 with aqueous 1 N HCl, after which it was diluted with EtOAc. The organic layer was separated, washed with H_2O and saturated aqueous NaCl, and dried over Na_2SO_4. The organic extract was concentrated to give **35** (98%)

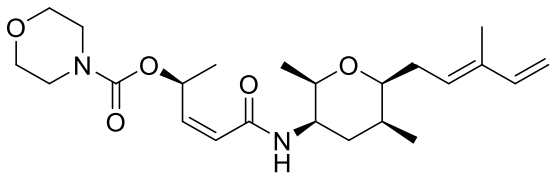
Synthesis of the Meayamycin Derivatives

(*S*,*Z*)-5-(((2*R*,3*R*,5*S*,6*S*)-2,5-dimethyl-6-((*E*)-3-methylpenta-2,4-dien-1-yl)tetrahydro-2*H*-pyran-3-yl)amino)-5-oxopent-3-en-2-o1 (S2)



The alcohol **S2** was prepared following a previously described procedure[19] from **30** (K_2CO_3, MeOH, 0 °C, 95%) or by deprotection of **33** (3 equiv Bu_4NF, THF, 23 °C, 4 h, quant.) and used crude to prepare the following derivatives without further characterization.

(*S*,*Z*)-5-(((2*R*,3*R*,5*S*,6*S*)-6-((2*E*,4*E*)-5-((3*R*,4*R*,5*R*)-4-hydroxy-7,7-dimethyl-1,6-dioxaspiro[2.5]octan-5-yl)-3-methylpenta-2,4-dien-1-yl)-2,5-dimethyltetrahydro-2*H*-pyran-3-yl)amino)-5-oxopent-3-en-2-yl morpholine-4-carboxylate (37a, meayamycin B)

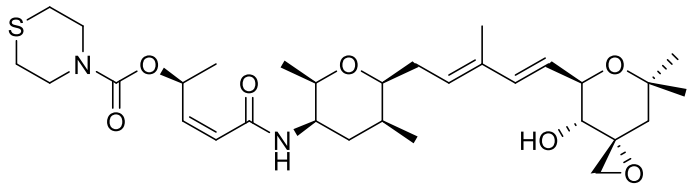


The alcohol **S2**[19] (15 mg, 0.05 mmol, 1.0 equiv) in CH_2Cl_2 (0.25 mL) was treated with CDI (24 mg, 0.15 mmol, 3.0 equiv) and the mixture was stirred for 12 h before the addition of morpholine (0.05 mL, 0.5 mmol, 10 equiv). After an additional 12 h, the reaction mixture was concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 50% EtOAc in hexanes) to give **36a** (19 mg, 86%) as a clear oil, displaying properties consistent in all respects with reported characterization:[12] $[\alpha]^{23}_D$ –18 (*c* 1.0, $CHCl_3$), -6.6 (*c* 1.6, CH_2Cl_2), lit. $[\alpha]^{23}_D$ –6.7 (*c* 1.6, CH_2Cl_2); ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.36 (dd, *J* = 17.4, 10.7 Hz, 1H), 6.24 – 6.06 (m, 2H), 5.91 (dd, *J* = 11.6, 7.8 Hz, 1H), 5.70 (m, 1H), 5.45 (t, *J* = 7.2 Hz, 1H), 5.10 (m, 1H), 4.95 (m, 1H), 3.94 (ddt, *J* = 9.2, 4.5, 2.5 Hz, 1H), 3.72 – 3.65 (m, 1H), 3.65 (m, 4H), 3.53 (td, *J* = 7.2, 2.7 Hz, 1H), 3.46 (t, *J* = 4.9 Hz, 4H), 2.41 – 2.35 (m, 1H), 2.26 – 2.21 (dt, *J* = 15.0, 7.5 Hz, 1H), 1.96 –

1.93 (m, 2H), 1.75 (s, 3H), 1.40 (d, *J* = 6.5 Hz, 3H), 1.15 (d, *J* = 6.4 Hz, 3H), 1.02 (d, *J* = 7.4 Hz, 4H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 165.1, 155.1, 144.3, 141.4, 135.8, 128.3, 122.4, 111.2, 80.9, 76.1, 70.3, 66.8, 47.2, 36.0, 32.0, 29.0, 22.9, 20.3, 18.0, 15.2, 12.1; IR (neat) ν_{max} 3354, 2926, 1690, 1668, 1458, 1276, 1242, 1168 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M+H]^+$ calculated for $C_{23}H_{37}N_2O_5$ 421.2702, found 421.2701.

A solution of **36a** (11 mg, 0.026 mmol, 1.0 equiv) in $ClCH_2CH_2Cl$ (0.25 mL) at 40 °C was treated with *p*-benzoquinone (0.8 mg, 0.008 mmol, 0.3 equiv), Grela cat.[27] (0.2 mL of 3.5 mg, 0.005 mmol, 0.2 equiv in 0.6 mL of $ClCH_2CH_2Cl$) and **7** (0.2 mL of 5.5 mg, 0.031 mmol, 1.2 equiv in 0.6 mL of $ClCH_2CH_2Cl$). The mixture was stirred for 1 h before a second portion of the solution of catalyst (0.2 mL) and **7** (0.2 mL) were added. After an additional 1 h, the final portion of catalyst (0.2 mL) and **7** (0.2 mL) were added. After 5 h, the reaction mixture was concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 80% EtOAc in hexanes) to give **37a** (4.2 mg, 28%) as an off white solid, displaying properties consistent in all respects with reported characterization:[12] $[\alpha]^{26}_D$ +27 (*c* 0.69, CH_2Cl_2); ^{1}H NMR (600 MHz, CD_2Cl_2) δ 6.34 (d, *J* = 15.8 Hz, 1H), 6.15 (dd, *J* = 12.1, 6.3 Hz, 2H), 5.91 (dd, *J* = 11.6, 7.8 Hz, 1H), 5.87 (dd, *J* = 3.4, 1.7 Hz, 1H), 5.70 (d, *J* = 11.8 Hz, 1H), 5.64 (dd, *J* = 15.7, 6.6 Hz, 1H), 5.52 (t, *J* = 7.6 Hz, 1H), 3.97 (dd, *J* = 6.3, 3.4 Hz, 1H), 3.90 (ddd, *J* = 9.3, 4.5, 2.3 Hz, 1H), 3.66 (dt, *J* = 6.4, 3.2 Hz, 1H), 3.62 – 3.60 (m, 4H), 3.53 (dq, *J* = 7.1, 3.1 Hz, 1H), 3.47 (d, *J* = 9.1 Hz, 1H), 3.42 (t, *J* = 4.9 Hz, 4H), 2.95 (d, *J* = 4.7 Hz, 1H), 2.45 (t, *J* = 2.5 Hz, 1H), 2.36 (dt, *J* = 15.1, 7.5 Hz, 1H), 2.27 – 2.18 (m, 1H), 2.17 (s, 1H), 1.95 – 1.91 (m, 2H), 1.82 – 1.76 (m, 4H), 1.65 – 1.63 (m, 4H), 1.35 (s, 3H), 1.24 (s, 3H), 1.11 (d, *J* = 6.5 Hz, 3H), 1.02 (d, *J* = 7.4 Hz, 3H); ^{13}C NMR (151 MHz, CD_2Cl_2) δ 165.1, 155.2, 144.2, 137.8, 135.0, 129.5, 125.8, 122.7, 81.2, 76.3, 74.9, 74.2, 73.2, 69.9, 68.6, 68.2, 66.9, 57.8, 47.8, 47.4 , 43.1, 36.3, 32.4, 31.1, 30.1, 29.6, 23.7, 20.5, 18.0, 15.2, 12.8; IR (neat) ν_{max} 3415, 2973, 2926, 1689, 1669, 1639, 1520, 1427, 1242, 1115, 1059 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M+H]^+$ calculated for $C_{31}H_{49}N_2O_8$, 577.3489 found 577.3491.

(*S*,*Z*)-5-(((2*R*,3*R*,5*S*,6*S*)-6-((2*E*,4*E*)-5-((3*R*,4*R*,5*R*)-4-hydroxy-7,7-dimethyl-1,6-dioxaspiro[2.5]octan-5-yl)-3-methylpenta-2,4-dien-1-yl)-2,5-dimethyltetrahydro-2*H*-pyran-3-yl)amino)-5-oxopent-3-en-2-yl thiomorpholine-4-carboxylate (37b)



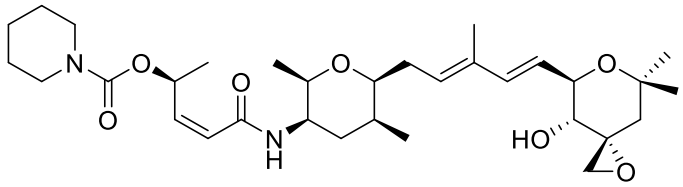
The alcohol **S2**[19] (15 mg, 0.049 mmol, 1.0 equiv) in CH_2Cl_2 (0.25 mL) was treated with CDI (24 mg, 0.15 mmol, 3.0 equiv) and the mixture was stirred for 12 h before the addition of thiomorpholine (0.05 mL, 0.5 mmol, 10 equiv). After an additional 12 h, the reaction mixture was concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 50% EtOAc in hexanes) to give **36b** (19 mg, 70%) as a clear oil: $[\alpha]^{23}_D$ –6.4 (*c* 3.6, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.36 (dd, *J* = 17.4, 10.7 Hz, 1H), 6.22 – 6.07 (m, 2H), 5.90 (dd, *J* = 11.6, 7.8 Hz, 2H), 5.69 (dd, *J* = 11.6, 1.4 Hz, 1H), 5.45 (t, *J* = 7.2 Hz, 1H), 5.10 (d, *J* = 17.4 Hz, 1H), 4.95 (d, *J* = 10.7 Hz, 1H), 4.00 – 3.88 (m, 1H), 3.73 (d, *J* = 4.1 Hz, 4H), 3.67 (td, *J* = 6.4, 2.3 Hz, 1H), 3.53 (dt, *J* = 7.3, 3.6 Hz, 1H), 2.58 (m, 7H), 2.49 – 2.29 (m, 1H), 2.24 (dt, *J* = 15.2, 7.6 Hz, 1H), 1.95 (tq, *J* = 9.4, 5.2, 4.8 Hz, 3H), 1.75 (s, 3H), 1.40 (d, *J* = 6.5 Hz, 5H), 1.15 (d, *J* = 6.4 Hz, 4H),

1.02 (d, *J* = 7.4 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 165.1, 154.8, 144.3, 141.4, 135.8, 128.3, 122.4, 111.2, 80.9, 76.1, 70.3, 47.2, 36.0, 32.1, 29.0, 27.4, 20.4, 18.0, 15.2, 12.1; IR (neat) ν_{max} 3349, 2927, 1688, 1667, 1521, 1422, 1223, 1049 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M+H]^+$ calculated for $C_{23}H_{37}N_2O_4S$ 437.2475, found 437.2474.

A solution of **36b** (11 mg, 0.026 mmol, 1.0 equiv) in $ClCH_2CH_2Cl$ (0.25 mL) at 40 °C was treated with *p*-benzoquinone (0.8 mg, 0.008 mmol, 0.3 equiv), Grela cat.[27] (0.2 mL of 3.5 mg, 0.005 mmol, 0.2 equiv in 0.6 mL of $ClCH_2CH_2Cl$) and **7** (0.2 mL of 5.5 mg, 0.031 mmol, 1.2 equiv in 0.6 mL of $ClCH_2CH_2Cl$). The mixture was stirred for 1 h before a second portion of the solution of catalyst (0.2 mL) and **7** (0.2 mL) were added. After an additional 1 h, the final portion of catalyst (0.2 mL) and **7** (0.2 mL) were added. After 5 h, the reaction mixture was concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 80% EtOAc in hexanes) to give **37b** (2.2 mg, 14%) as an off white solid: $[\alpha]^{26}_D$ +4.7 (*c* 0.18, CH_2Cl_2); ^{1}H NMR (600 MHz, CD_2Cl_2) δ 6.34 (d, *J* = 15.7 Hz, 1H), 6.19 – 6.07 (m, 2H), 5.91 (dd, *J* = 11.6, 7.8 Hz, 1H), 5.70 (dd, *J* = 11.7, 1.3 Hz, 1H), 5.64 (dd, *J* = 15.7, 6.6 Hz, 1H), 5.52 (t, *J* = 7.1 Hz, 1H), 3.96 (dd, *J* = 9.7, 6.6 Hz, 1H), 3.91-3.89 (m 1H), 3.77 – 3.66 (m, 6H), 3.66 (td, *J* = 6.4, 2.3 Hz, 1H), 3.54-3.52 (m, 1H), 3.48 (t, *J* = 9.9 Hz, 1H), 2.96 (d, *J* = 4.7 Hz, 1H), 2.58 – 2.56 (m, 4H), 2.46 (d, *J* = 4.7 Hz, 1H), 2.38-2.34 (m, 1H), 2.25 – 2.19 (m, 1H), 2.17 (d, *J* = 14.3 Hz, 1H), 1.96 – 1.91 (m, 1H), 1.78 (s, 3H), 1.36 (d, *J* = 1.6 Hz, 3H), 1.23 (s, 3H), 1.11 (d, *J* = 6.4 Hz, 3H), 1.02 (d, *J* = 7.3 Hz, 3H); ^{13}C NMR (151 MHz, CD_2Cl_2) δ 165.1, 154.9, 144.2, 137.8, 135.0, 129.5, 125.8, 122.7, 81.2, 76.3, 74.9, 73.0, 70.0, 68.6, 57.8, 47.5, 47.4, 43.1, 36.3, 32.4, 31.2, 30.1, 29.7, 27.6, 23.7, 20.5, 18.0, 15.3, 14.3, 12.8; IR (neat) ν_{max} 3458, 2971, 2921, 1688, 1668, 1515, 1461, 1423, 1256, 1224, 1055, 971 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M+H]^+$ calculated for $C_{31}H_{49}N_2O_7S$, 593.3262 found 593.3260.

From **35**: A solution of **35** (19 mg, 0.04 mmol, 1.0 equiv) in CH_2Cl_2 (0.8 mL) was treated with CDI (9.8 mg, 0.06 mmol, 1.5 equiv) and DMAP (1.0 mg, 0.008 mmol, 0.2 equiv). After 2 h, thiomorpholine (18 µL, 0.16 mmol, 4.0 equiv) was added and the mixture was stirred for an additional 4 h. After this time, the reaction mixture was concentrated and the material purified by column chromatography (SiO_2, 80% EtOAc in hexanes) to provide **37b** (15.3 mg, 65%) as a white solid identical to that described above.

(*S*,*Z*)-5-(((2*R*,3*R*,5*S*,6*S*)-6-((2*E*,4*E*)-5-((3*R*,4*R*,5*R*)-4-hydroxy-7,7-dimethyl-1,6-dioxaspiro[2.5]octan-5-yl)-3-methylpenta-2,4-dien-1-yl)-2,5-dimethyltetrahydro-2*H*-pyran-3-yl)amino)-5-oxopent-3-en-2-yl piperidine-1-carboxylate (37c)



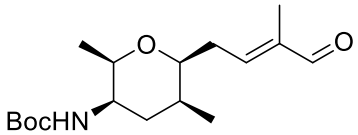
The alcohol **S2**[19] (12 mg, 0.040 mmol, 1.0 equiv) in CH_2Cl_2 (0.25 mL) was treated with CDI (19 mg, 0.12 mmol, 3.0 equiv) and the mixture was stirred for 12 h before the addition of piperidine (0.05 mL, 0.4 mmol, 10 equiv). After an additional 12 h, the reaction mixture was concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 50% EtOAc in hexanes)

to give **36c** (7.5 mg, 0.018 mmol, 45%) as a clear oil that was used without further characterization: HRMS-TOF-ESI (*m/z*) $[M+H]^+$ calculated for $C_{24}H_{39}N_2O_4$ 419.2910, found 419.2910.

A solution of **36c** (7 mg, 0.017 mmol, 1.0 equiv) in $ClCH_2CH_2Cl$ (0.25 mL) at 40 °C was treated with *p*-benzoquinone (0.5 mg, 0.005 mmol, 0.3 equiv), Grela cat.[25] (0.2 mL of 2.1 mg, 0.0034 mmol, 0.2 equiv in 0.6 mL of $ClCH_2CH_2Cl$) and **7** (0.2 mL of 3.6 mg, 0.02 mmol, 1.2 equiv. in 0.6 mL of $ClCH_2CH_2Cl$). The mixture was stirred for 1 h before a second portion of the solution of catalyst (0.2 mL) and **7** (0.2 mL) were added. After an additional 1 h, the final portions of catalyst (0.2 mL) and **7** (0.2 mL) were added. After 5 h, the reaction mixture was concentrated in vacuo. The crude material was purified by column chromatography (SiO_2, 80% EtOAc in hexanes) to give **37c** (1.5 mg, 16%) as an off white solid: $[\alpha]^{26}_D$ +11 (*c* 0.33, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.39 (d, *J* = 15.7 Hz, 1H), 6.31 (d, *J* = 9.1 Hz, 1H), 6.10 – 6.00 (m, 1H), 5.92 – 5.89 (m, 2H), 5.77 (dd, *J* = 15.4, 8.0 Hz, 1H), 5.71 – 5.62 (m, 2H), 5.50 (t, *J* = 7.3 Hz, 1H), 4.15 (t, *J* = 8.6 Hz, 1H), 4.04 – 3.87 (m, 2H), 3.66 – 3.64 (m, 1H), 3.56 – 3.48 (m, 3H), 3.41 – 3.39 (m, 5H), 3.36 (d, *J* = 9.2 Hz, 1H), 3.01 (dd, *J* = 18.3, 4.7 Hz, 1H), 2.58 (d, *J* = 1.8 Hz, 1H), 2.50 (t, *J* = 4.5 Hz, 1H), 2.39 – 2.35 (m, 1H), 2.23 – 2.17 (m, 2H), 2.01 – 1.91 (m, 3H), 1.78 (s, 4H), 1.51 (s, 2H), 1.43 (s, 3H), 1.40 (s, 3H), 1.15 (d, *J* = 6.4 Hz, 3H), 1.02 (d, *J* = 7.2 Hz, 3H); ^{13}C NMR (151 MHz, $CDCl_3$) δ 165.2, 155.2, 144.4, 138.3, 134.8, 129.2, 125.0, 122.4, 76.1, 74.8, 73.0, 69.9, 68.3, 57.6, 47.8, 47.2, 47.2, 43.0, 36.0, 31.2, 29.8, 29.1, 24.5, 23.7, 22.8, 20.4, 18.0, 15.1, 14.2, 12.8; IR (neat) ν_{max} 3413, 2959, 1688, 1668, 1441, 1260, 1057, 1023, 801 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M+H]^+$ calculated for $C_{32}H_{51}N_2O_7$ 575.3696, found 575.3696.

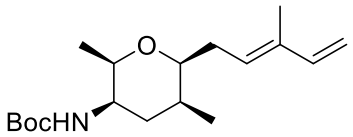
Alternative Order for the Subunit Assemblage

tert-butyl ((2*R*,3*R*,5*S*,6*S*)-2,5-dimethyl-6-((*E*)-3-methyl-4-oxobut-2-en-1-yl)tetrahydro-2*H*-pyran-3-yl)carbamate (38)



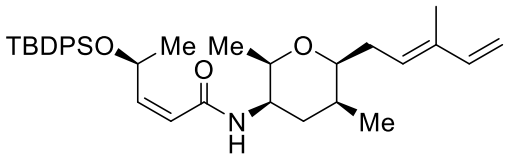
A solution of **15** (200 mg, 1.18 mmol, 1.0 equiv) in degassed CH_2Cl_2 (3.7 mL) was treated with methacrolein (0.98 mL, 11.8 mmol, 10 equiv) and Grubbs 2nd generation catalyst[26] (98 mg, 0.12 mmol, 0.1 equiv) and the reaction mixture was stirred for 46 (46–72) h. The volatiles were removed in vacuo and crude material was purified by column chromatography (SiO_2, 40% EtOAc in hexanes) to give **38** (261 mg, 71%; typically 70–86%) as an off white solid: $[\alpha]_D^{20}$ –29 (*c* 1.0, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 9.42 (s, 1H), 6.54 (ddd, *J* = 7.8, 6.3, 1.4 Hz, 1H), 4.73 (d, *J* = 9.5 Hz, 1H), 3.63 (ddd, *J* = 10.2, 6.0, 2.6 Hz, 2H), 3.59 (dq, *J* = 6.6, 2.3 Hz, 1H), 2.59 – 2.52 (m, 1H), 2.43 – 2.37 (m, 1H), 2.00 – 1.90 (m, 2H), 1.79 (ddd, *J* = 7.6, 3.9, 1.9 Hz, 1H), 1.76 (s, 3H), 1.44 (s, 9H), 1.16 (d, *J* = 6.4 Hz, 3H), 1.07 (d, *J* = 7.4 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 195.2, 156.0, 150.7, 140.7, 79.8, 79.3, 76.7, 48.3, 36.0, 33.0, 29.7, 28.6, 17.8, 15.2, 9.6; IR (neat) ν_{max} 2975, 1710, 1685, 1495, 1364, 1235, 1165, 1061 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + Na]^+$ calculated for $C_{17}H_{29}NO_4Na$ 334.1994, found 334.1987.

tert-butyl ((2*R*,3*R*,5*S*,6*S*)-2,5-dimethyl-6-((*E*)-3-methylpenta-2,4-dien-1-yl)tetrahydro-2*H*-pyran-3-yl)carbamate (39)

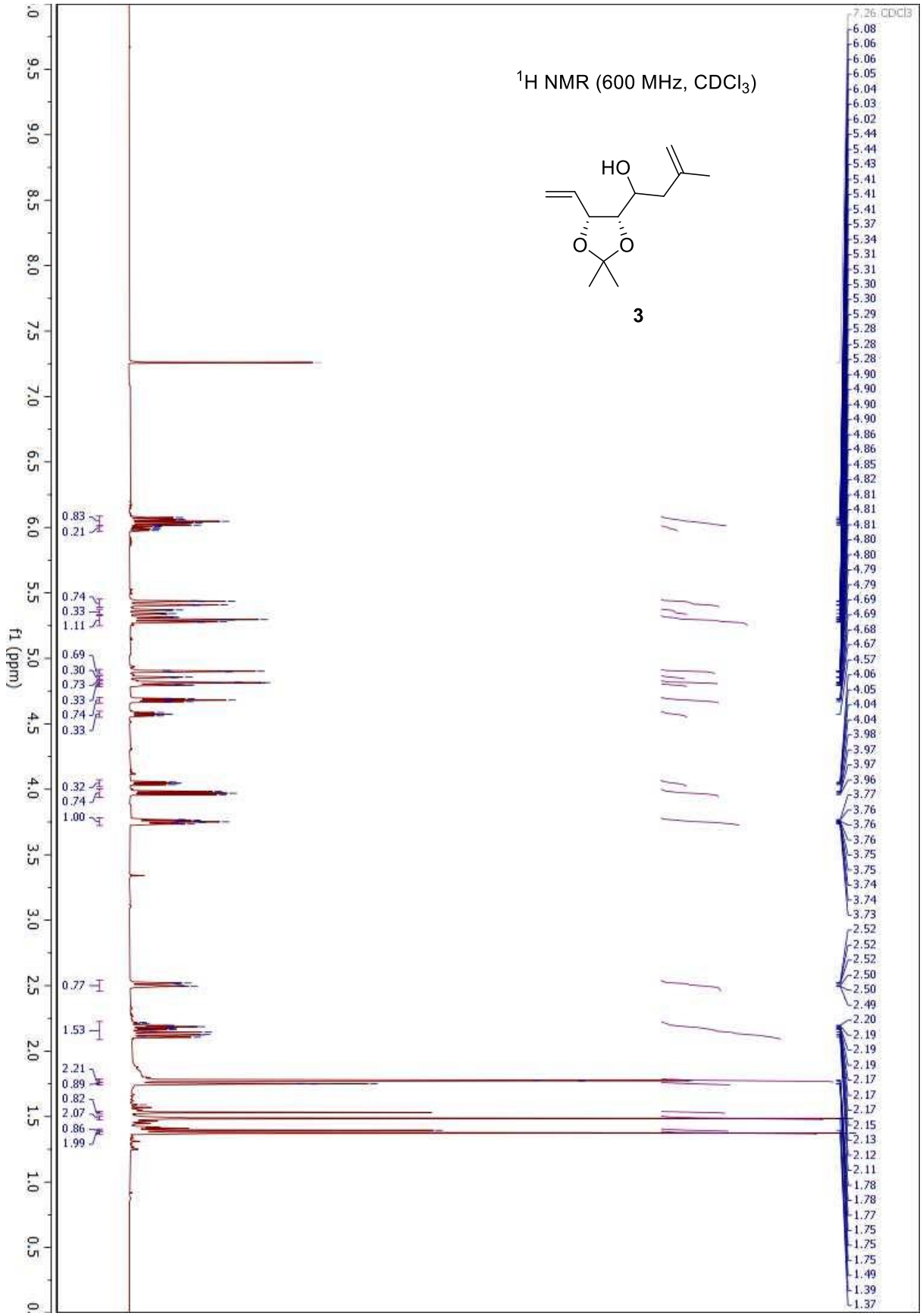


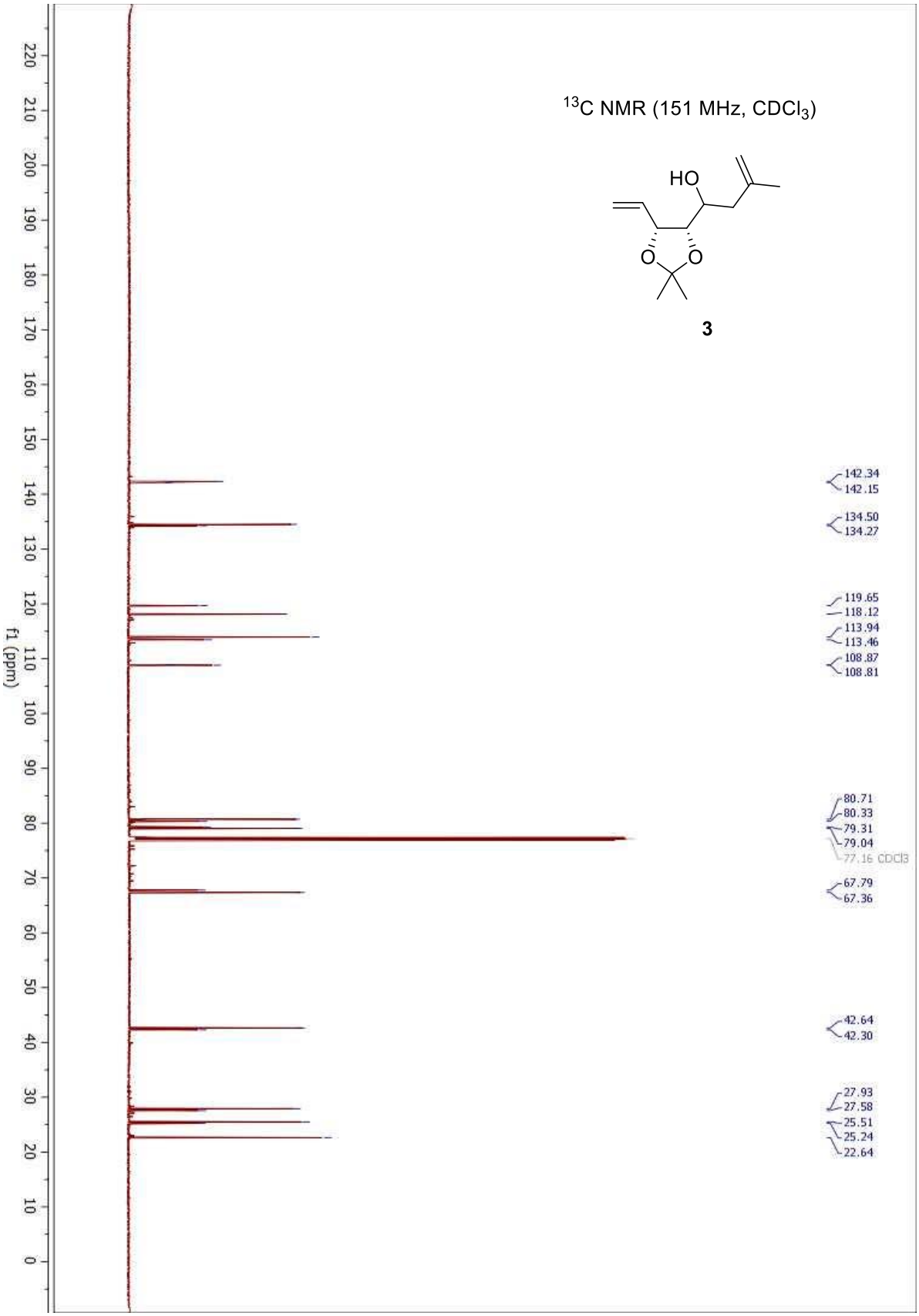
A solution of methyltriphenylphosphonium bromide (687 mg, 1.92 mmol, 2.0 equiv) in THF (1.3 mL) was treated with 1 M KO^{t}Bu in THF (1.73 mL, 1.73 mmol, 1.8 equiv) at 0 °C and stirred for 1 h. The aldehyde **38** (297 mg, 0.962 mmol) in THF (1 mL) was added dropwise. The reaction mixture was stirred for 12 h at 23 °C, before being quenched with the addition of saturated aqueous NH_4Cl. After separation of the organic layer, the aqueous layer was extracted with EtOAc (3×). The combined organic layer was washed with saturated aqueous NaCl, dried over Na_2SO_4, filtered and concentrated under reduced pressure. Flash chromatography (SiO_2, 10–40% EtOAc in hexane) provided **39** (263 mg, 92%) as colorless oil: $[\alpha]^{24}_D$ –15 (*c* 7.2, $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 6.36 (dd, *J* = 17.4, 10.7 Hz, 1H), 5.45 (t, *J* = 7.3 Hz, 1H), 5.10 (d, *J* = 17.4 Hz, 1H), 4.94 (d, *J* = 10.7 Hz, 1H), 4.75 (d, *J* = 9.6 Hz, 1H), 3.60 (qd, *J* = 6.4, 2.2 Hz, 1H), 3.56 (ddd, *J* = 9.6, 4.3, 2.2 Hz, 1H), 3.50 (td, *J* = 7.3, 2.8 Hz, 1H), 2.37 (dt, *J* = 14.3, 6.9 Hz, 1H), 2.23 (dt, *J* = 15.2, 7.6 Hz, 1H), 1.96 – 1.86 (m, 3H), 1.75 (s, 3H), 1.43 (s, 9H), 1.14 (d, *J* = 6.4 Hz, 3H), 1.02 (d, *J* = 7.4 Hz, 3H); ^{13}C NMR (150 MHz, $CDCl_3$) δ 156.0, 141.5, 135.7, 128.4, 111.2, 80.8, 79.1, 76.5, 48.5, 36.2, 32.1, 29.0, 28.6, 17.9, 15.1, 12.1; IR (neat) ν_{max} 1714, 1493, 1364, 1166, 1060 cm^{-1}; HRMS-TOF-ESI (*m/z*) $[M + Na]^+$ calculated for $C_{18}H_{32}NO_3$ 310.2382, found 310.2373.

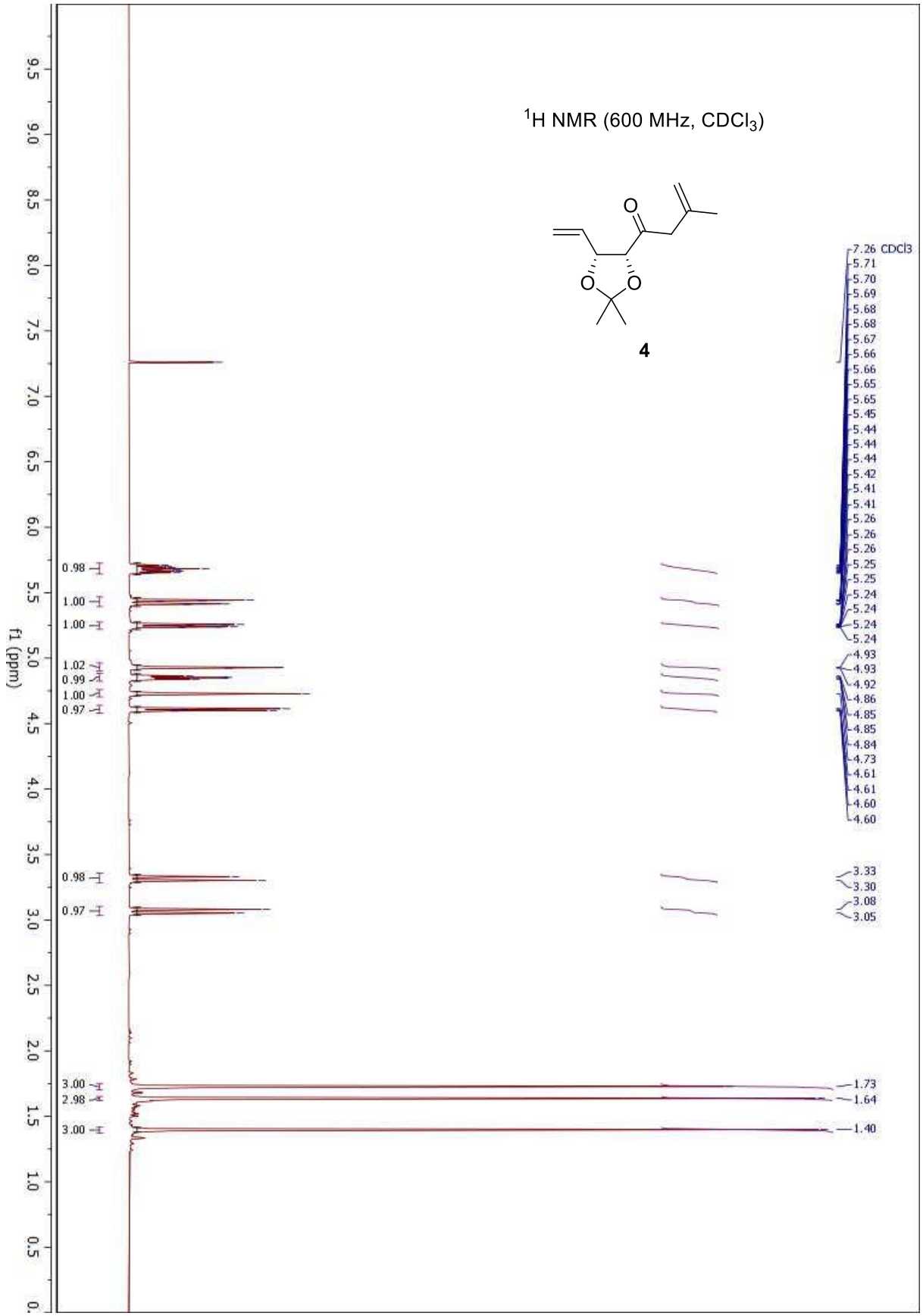
(*S*,*Z*)-4-((*tert*-butyldiphenylsilyl)oxy)-*N*-((2*R*,3*R*,5*S*,6*S*)-2,5-dimethyl-6-((*E*)-3-methylpenta-2,4-dien-1-yl)tetrahydro-2*H*-pyran-3-yl)pent-2-enamide (33)

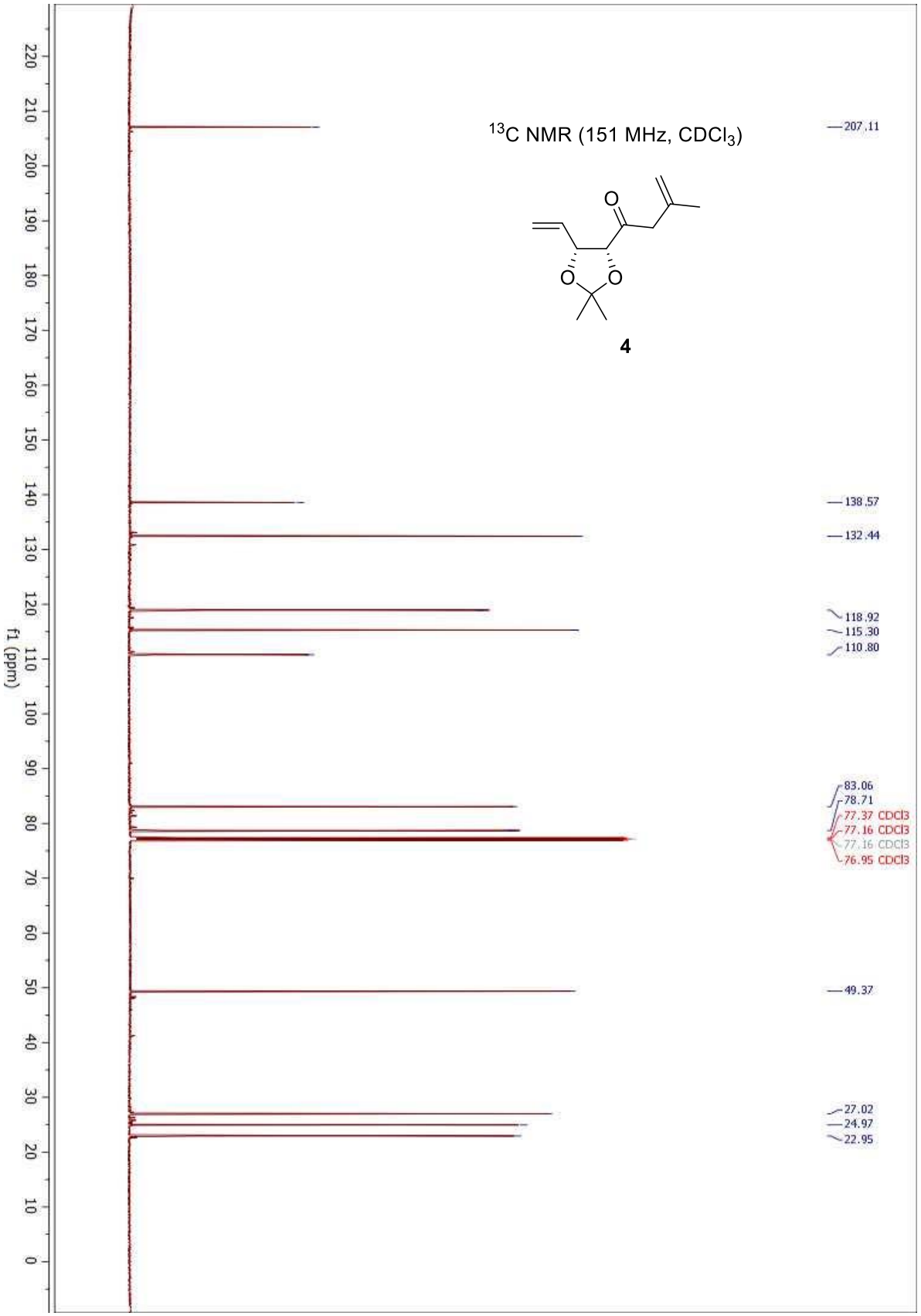


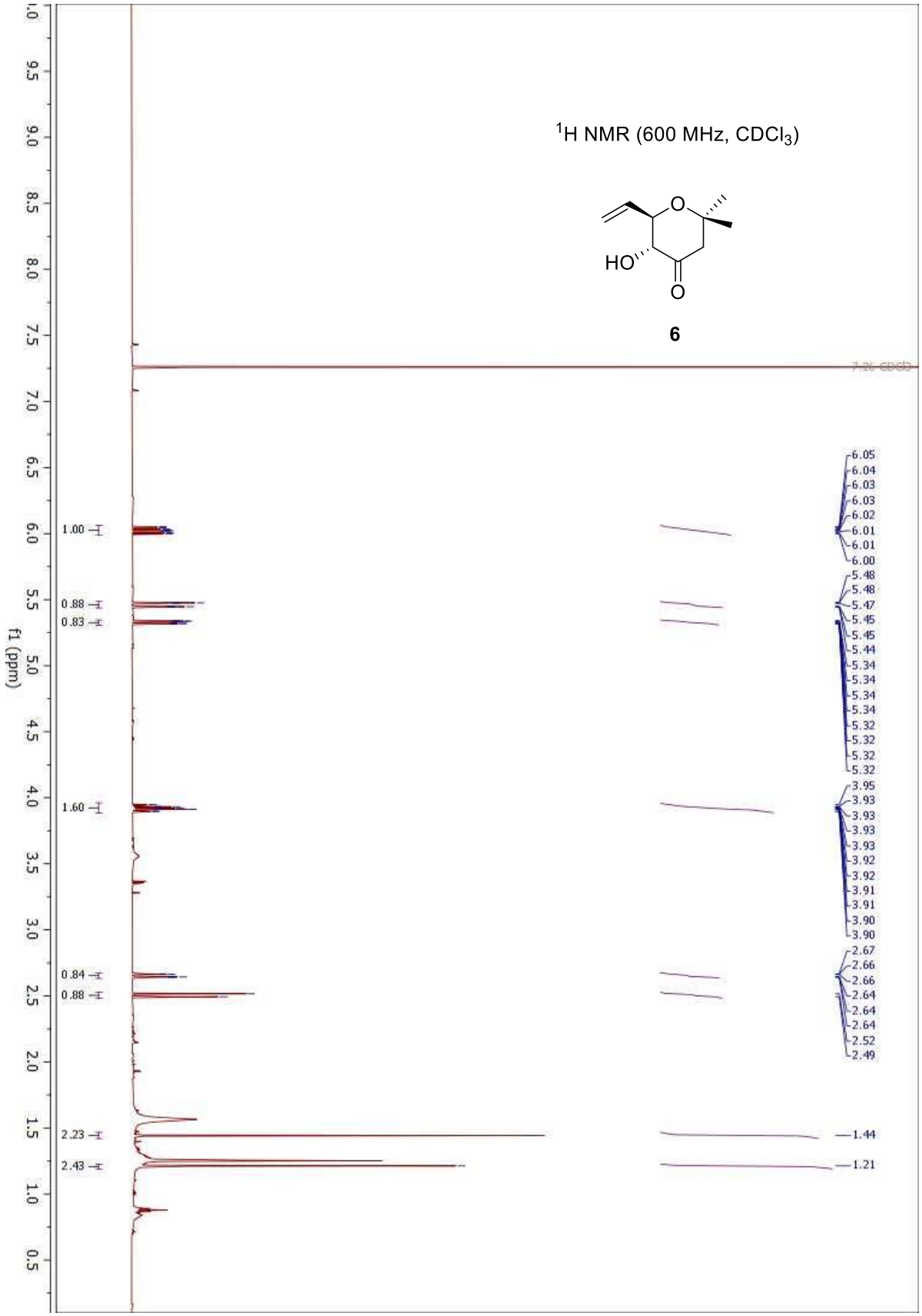
From 39: A sample of **39** (11.8 mg, 0.038 mmol, 1 equiv) was treated with 1 N HCl in EtOAc (1 mL). The solution was stirred at 23 ˚C for 15 min, after which the reaction mixture was concentrated in vacuo. A solution **27** (16 mg, 0.046 mmol, 1.2 equiv) in CH_3CN (1 mL) was treated with *i*-Pr_2NEt (26 µL, 0.152 mmol, 4.0 equiv) and *O*-(7-azabenzotriazol-1-yl)-*N*,*N*,*N*',*N*'-tetramethyluronium hexafluorophoshate (HATU, 17 mg, 0.046 mmol, 1.2 equiv) at 0 °C. The resulting mixture was stirred for 1 h at 0 °C before being added to the solution of the liberated free amine in CH_3CN (1 mL). The reaction mixture was stirred for 15 h at 23 °C, before being quenched with the addition of saturated aqueous NH_4Cl. After separation of the organic layer, the aqueous layer was extracted three times with EtOAc. The combined organic layer was washed with saturated aqueous $NaHCO_3$ and saturated aqueous NaCl, dried over Na_2SO_4, filtered and concentrated under reduced pressure. Flash chromatography (SiO_2, 5–15% EtOAc in hexane) provided **33** (16.6 mg, 80%) as a colorless oil. The spectral data of this material was identical in all aspects to material prepared from **32**.

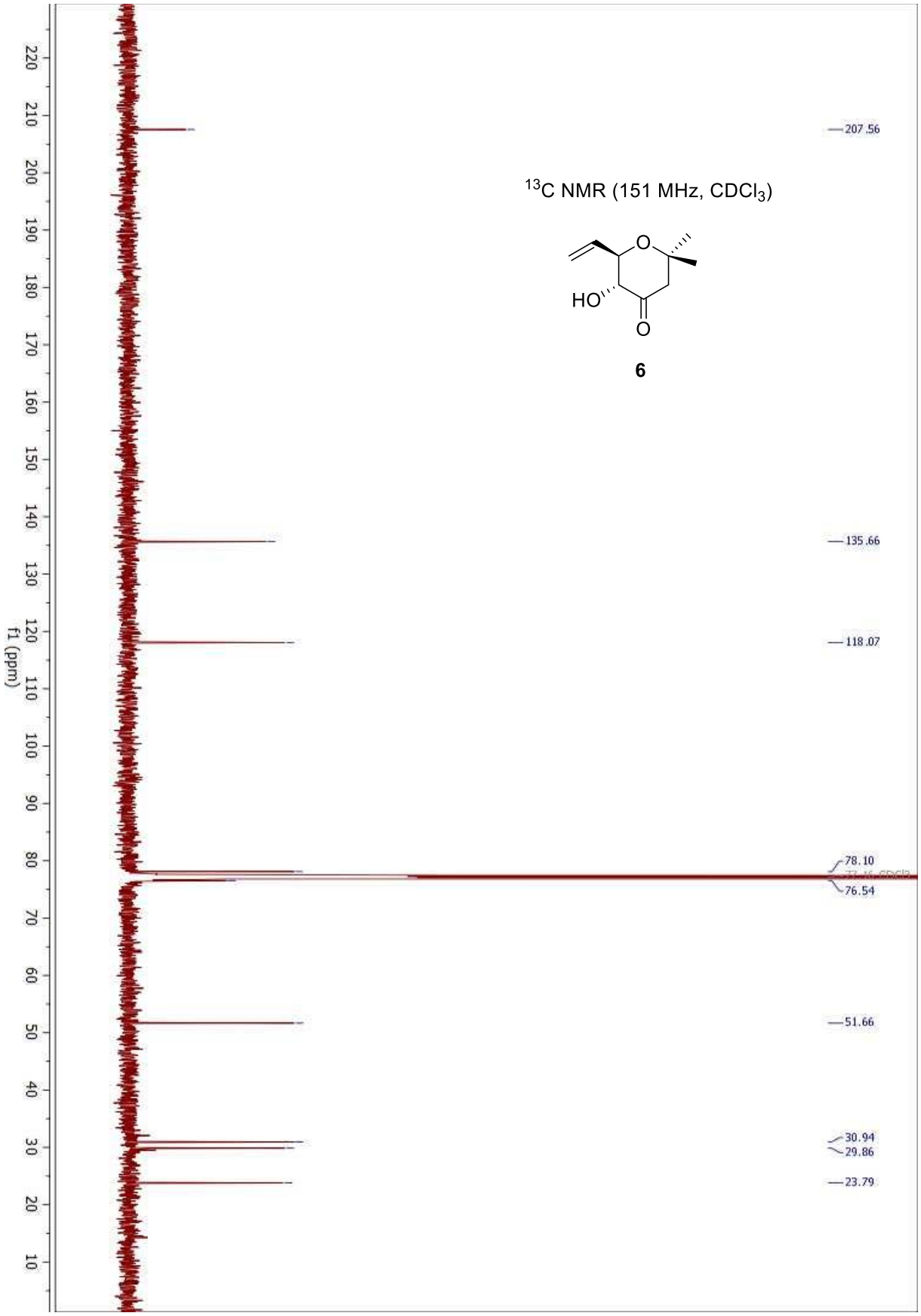

^{1}H NMR (600 MHz, $CDCl_3$)
HO
O
O
3
f1 (ppm)
7.26 CDCl3


^{13}C NMR (151 MHz, $CDCl_3$)
HO
O
O
3
f1 (ppm)
142.34
142.15
134.50
134.27
119.65
118.12
113.94
113.46
108.87
108.81
80.71
80.33
79.31
79.04
77.16 CDCl3
67.79
67.36
42.64
42.30
27.93
27.58
25.51
25.24
22.64


^{1}H NMR (600 MHz, $CDCl_3$)
4
f1 (ppm)
7.26 CDCl3
0.98
1.00
1.00
1.02
0.99
1.00
0.97
0.98
0.97
3.00
2.98
3.00
1.73
1.64
1.40

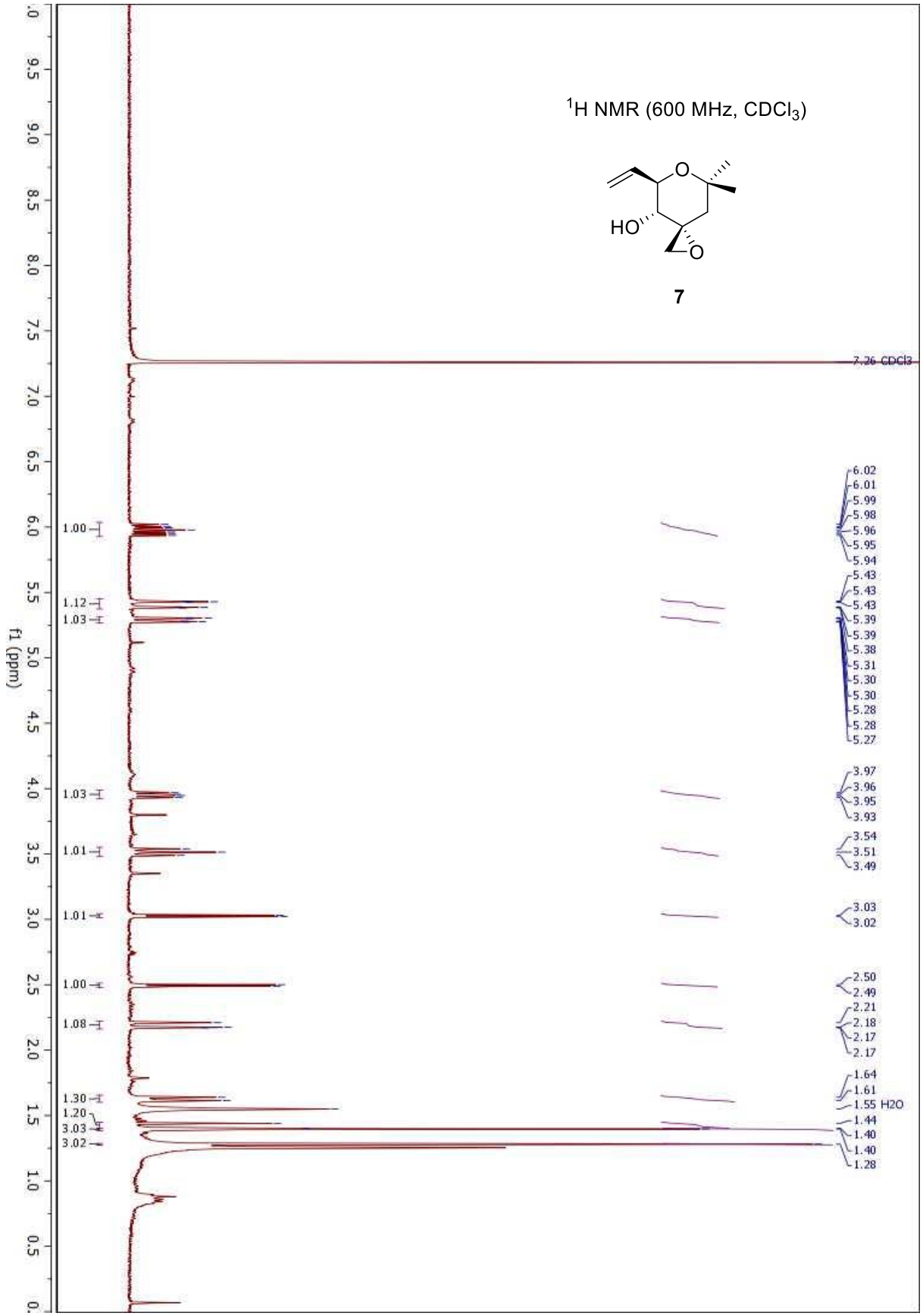

^{13}C NMR (151 MHz, $CDCl_3$)
4
207.11
138.57
132.44
118.92
115.30
110.80
83.06
78.71
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
49.37
27.02
24.97
22.95
f1 (ppm)

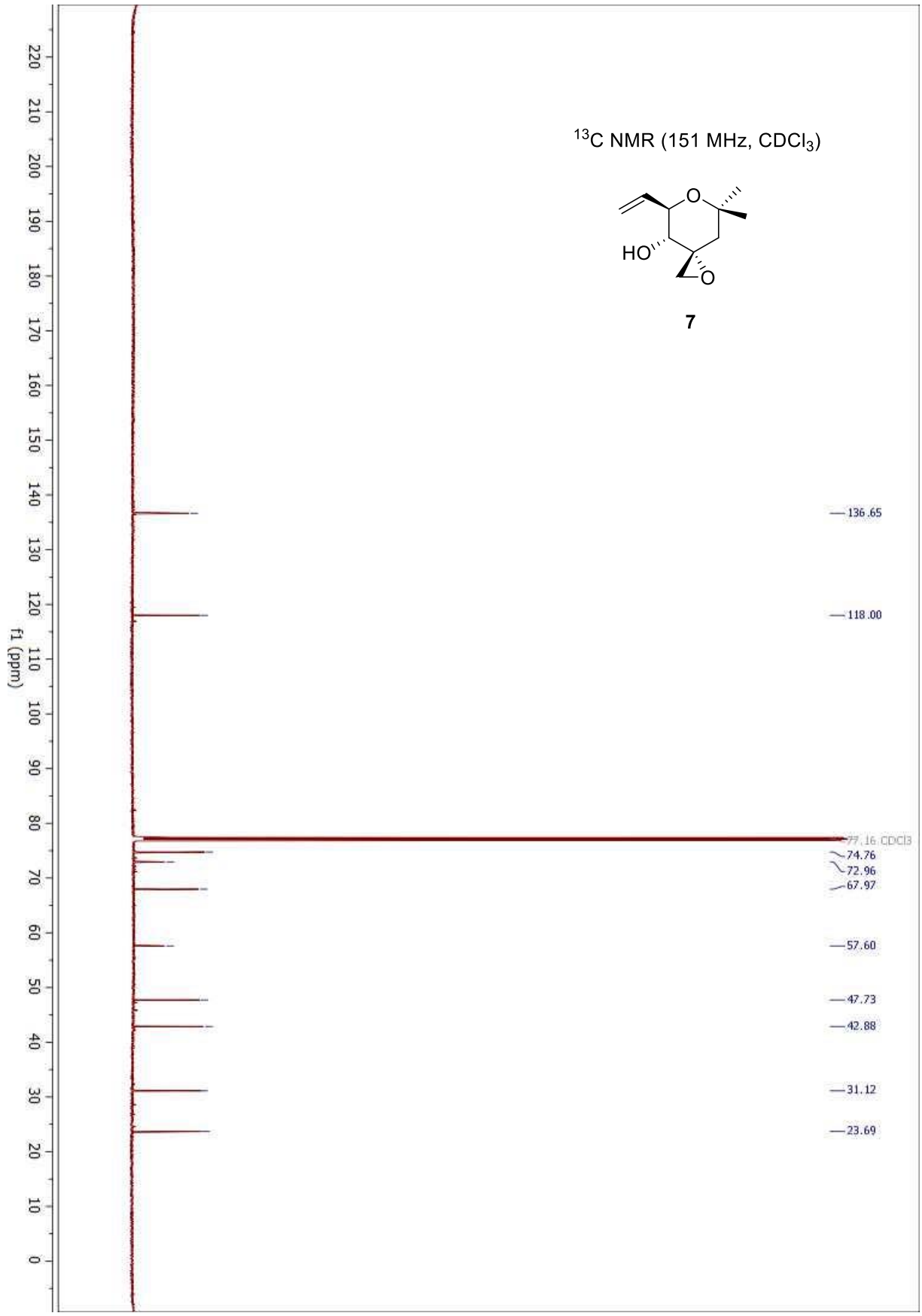

^{1}H NMR (600 MHz, $CDCl_3$)
HO
O
O
6
f1 (ppm)
1.00
0.88
0.83
1.60
0.84
0.88
2.23
2.43
6.05
6.04
6.03
6.03
6.02
6.01
6.01
6.00
5.48
5.48
5.47
5.45
5.45
5.44
5.34
5.34
5.34
5.34
5.32
5.32
5.32
5.32
3.95
3.93
3.93
3.93
3.93
3.92
3.92
3.91
3.91
3.90
3.90
2.67
2.66
2.66
2.64
2.64
2.64
2.52
2.49
1.44
1.21

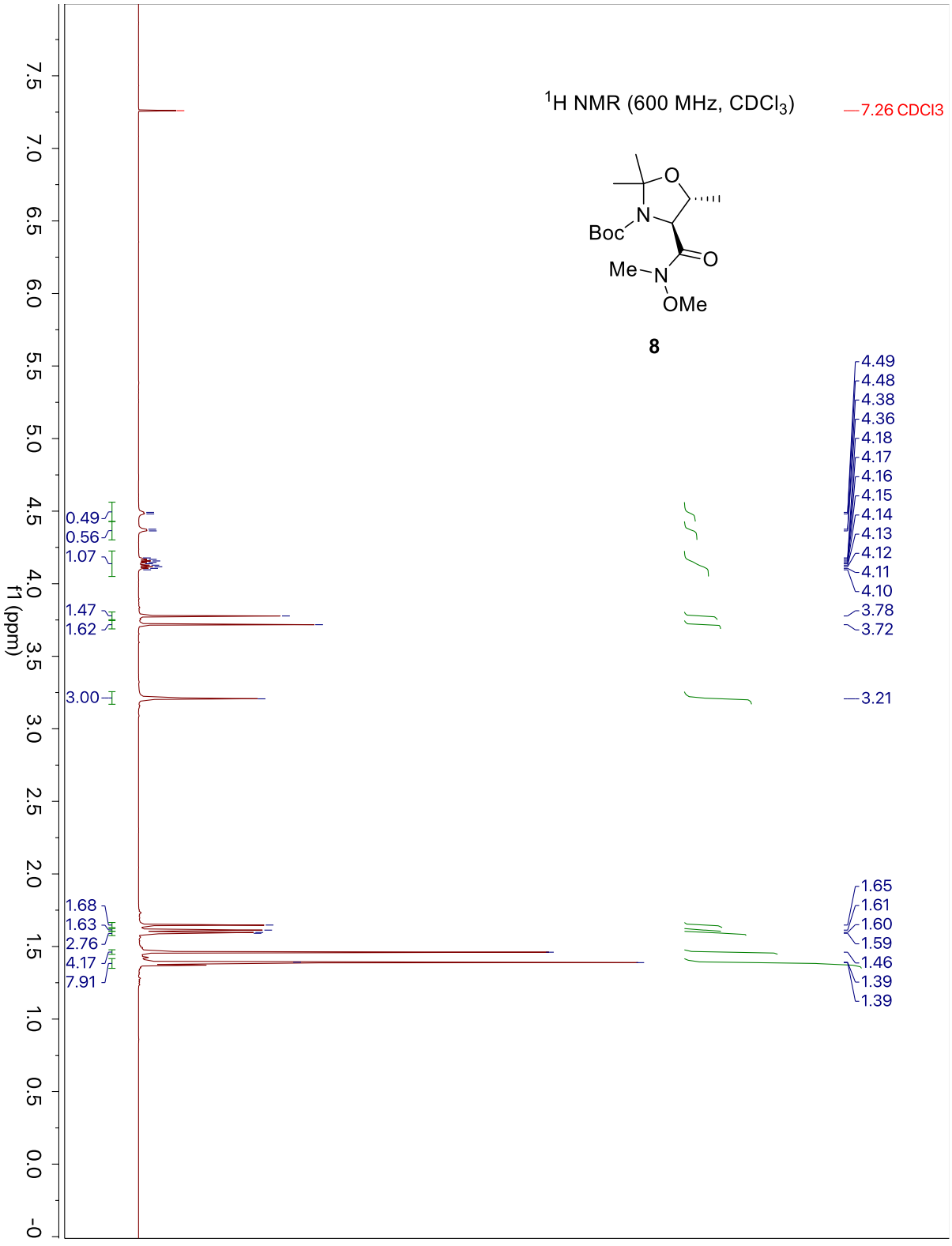


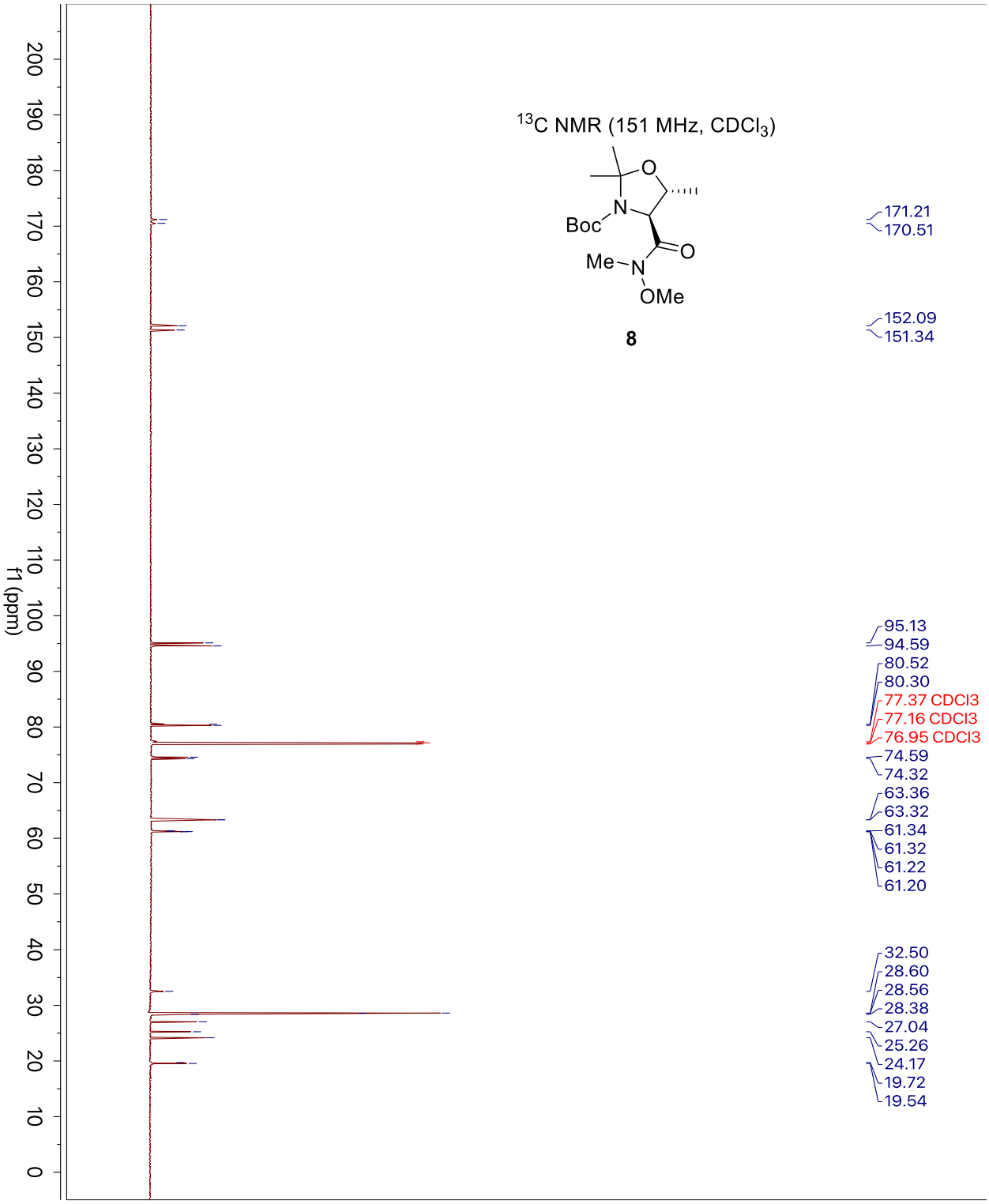
^{13}C NMR (151 MHz, $CDCl_3$)

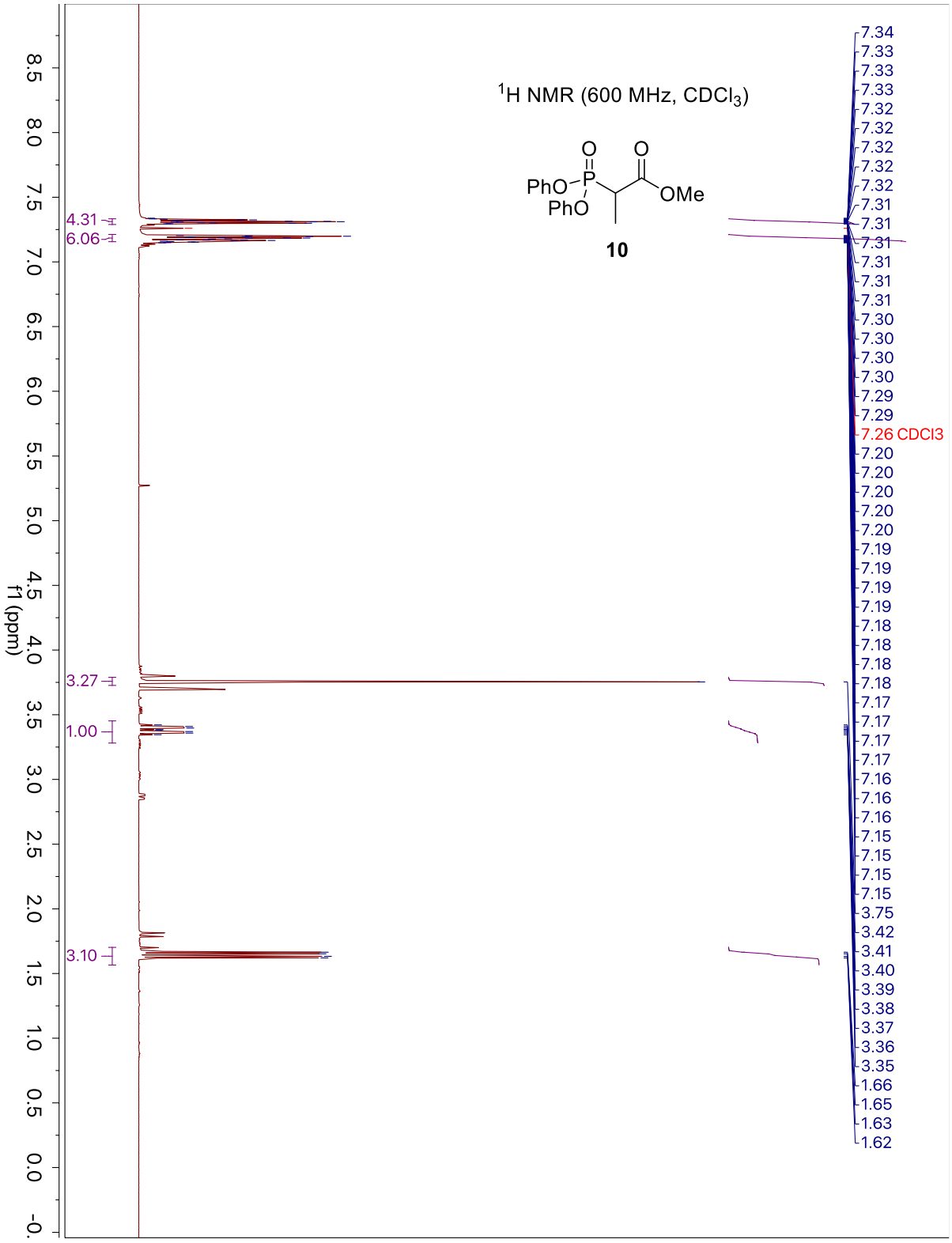
6

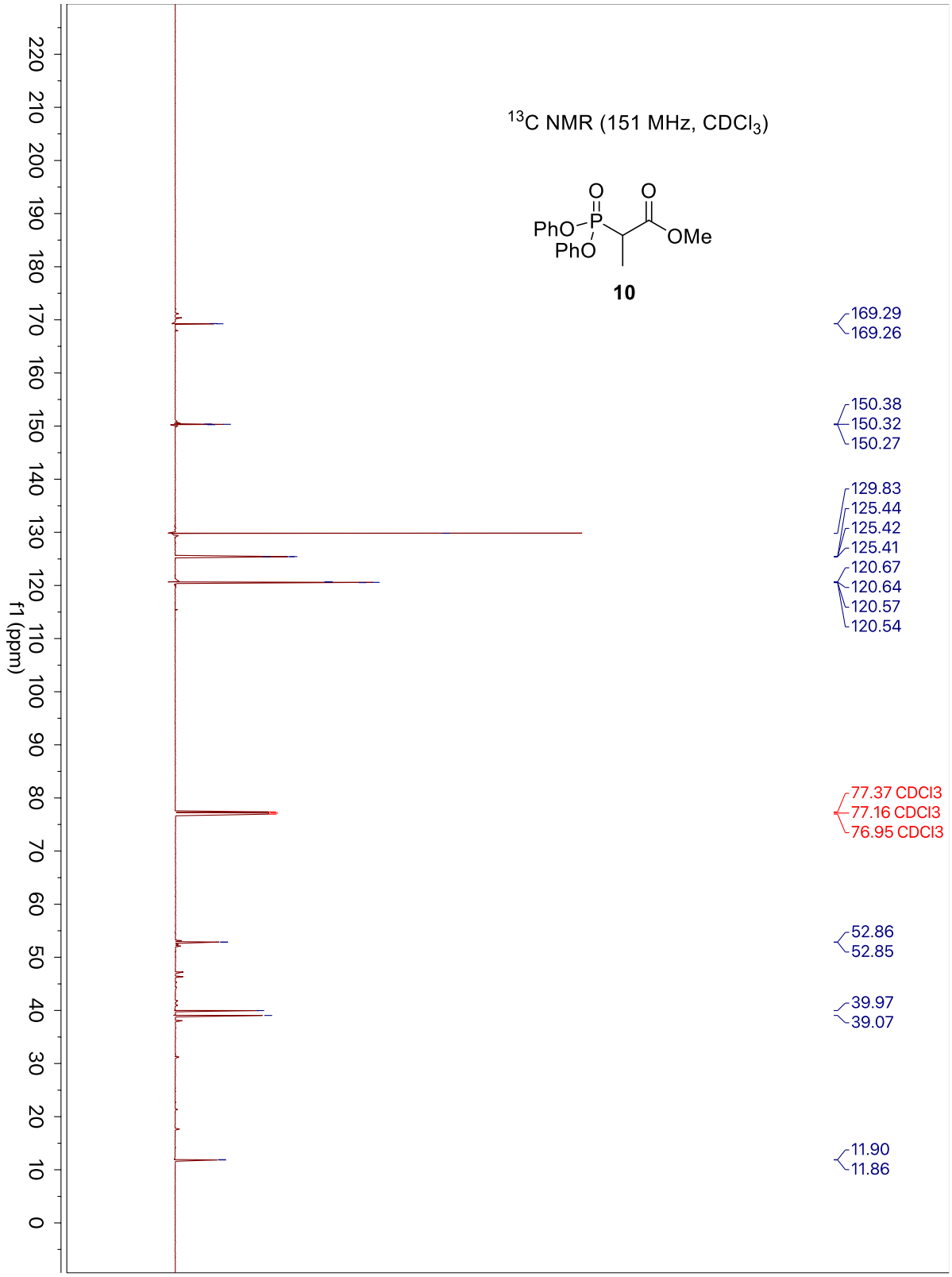

^{1}H NMR (600 MHz, $CDCl_3$)
HO
O
O
7
f1 (ppm)
7.26 CDCl3
6.02
6.01
5.99
5.98
5.96
5.95
5.94
5.43
5.43
5.43
5.39
5.39
5.38
5.31
5.30
5.30
5.28
5.28
5.27
3.97
3.96
3.95
3.93
3.54
3.51
3.49
3.03
3.02
2.50
2.49
2.21
2.18
2.17
2.17
1.64
1.61
1.55 H2O
1.44
1.40
1.40
1.28
1.00
1.12
1.03
1.03
1.01
1.01
1.00
1.08
1.30
1.20
3.03
3.02

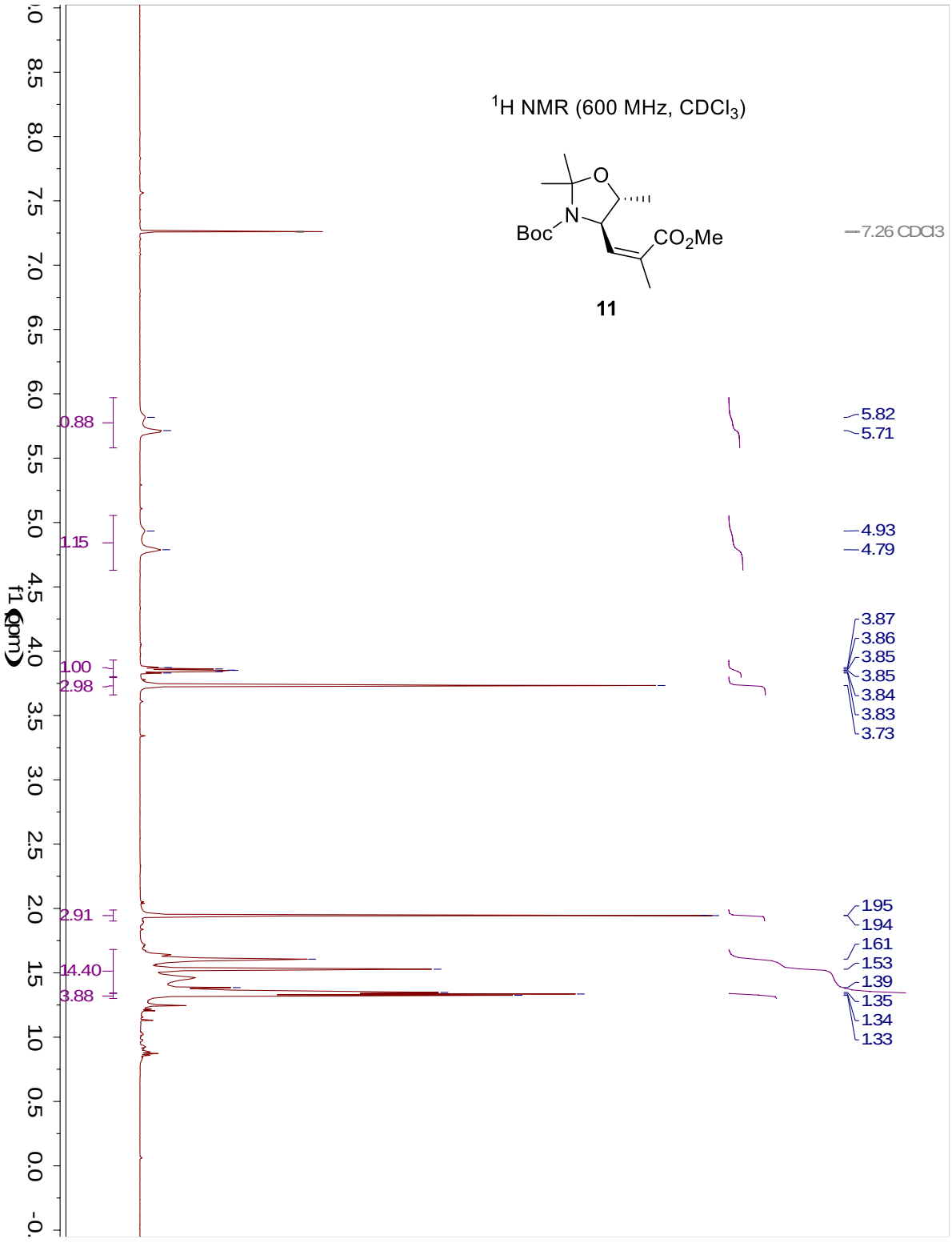

^{13}C NMR (151 MHz, CDCl$_3$)
HO
O
O
7
136.65
118.00
77.16 CDCl3
74.76
72.96
67.97
57.60
47.73
42.88
31.12
23.69
f1 (ppm)

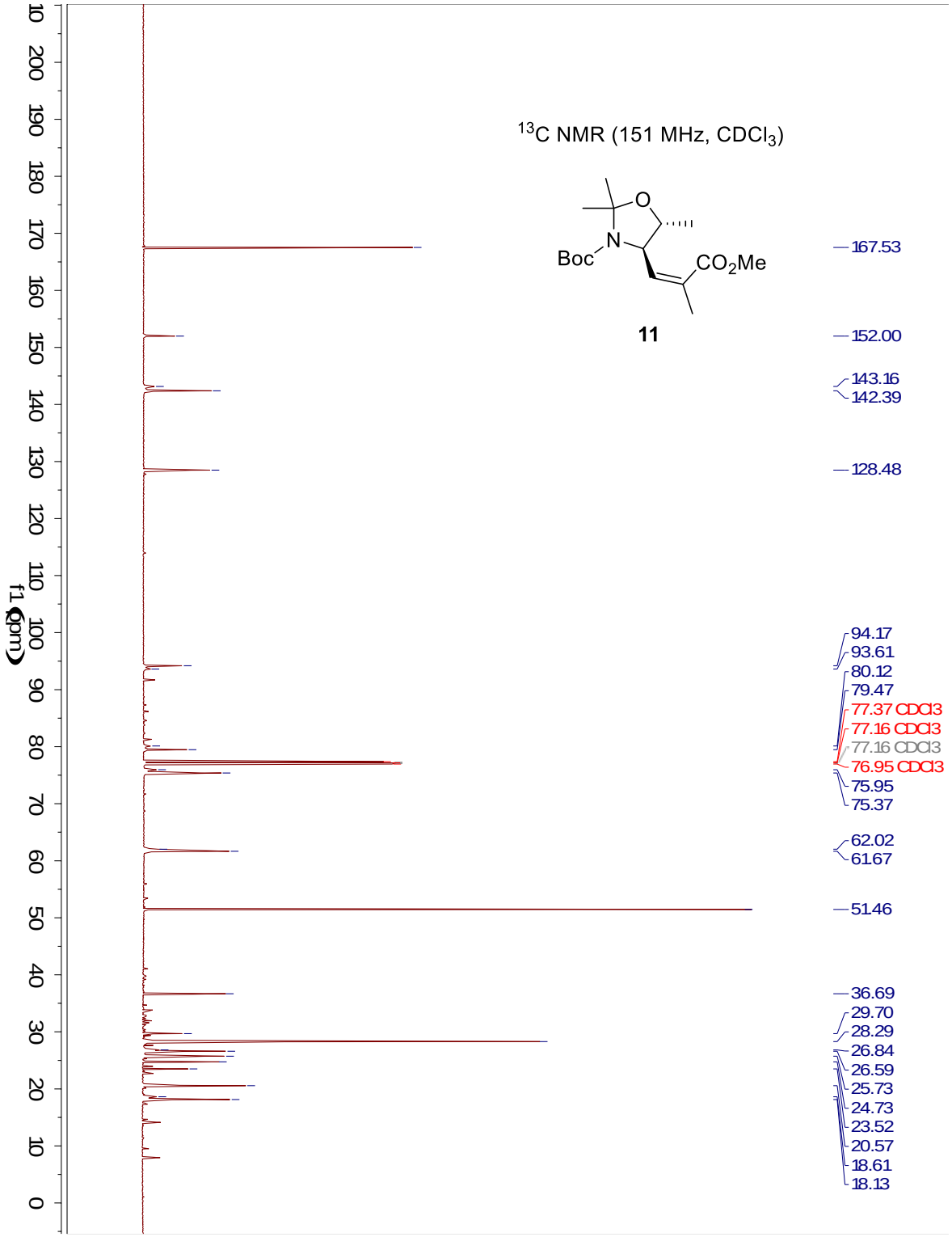

^{1}H NMR (600 MHz, $CDCl_3$)
7.26 CDCl3
Boc
Me
N
OMe
O
8
f1 (ppm)
0.49
0.56
1.07
1.47
1.62
3.00
1.68
1.63
2.76
4.17
7.91
4.49
4.48
4.38
4.36
4.18
4.17
4.16
4.15
4.14
4.13
4.12
4.11
4.10
3.78
3.72
3.21
1.65
1.61
1.60
1.59
1.46
1.39
1.39

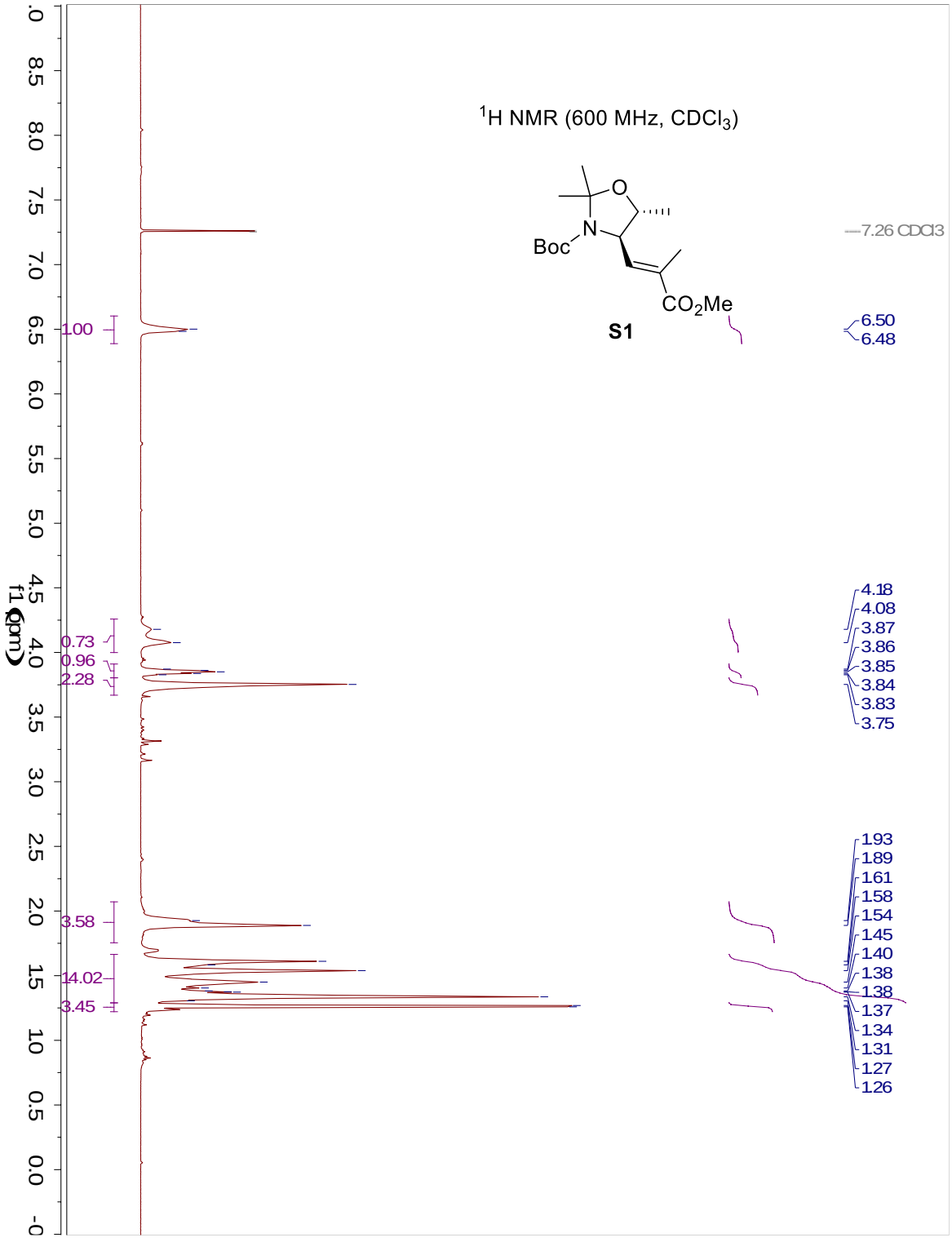

13C NMR (151 MHz, CDCl3)
Boc
N
O
Me
N
O
OMe
8
f1 (ppm)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
171.21
170.51
152.09
151.34
95.13
94.59
80.52
80.30
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
74.59
74.32
63.36
63.32
61.34
61.32
61.22
61.20
32.50
28.60
28.56
28.38
27.04
25.26
24.17
19.72
19.54

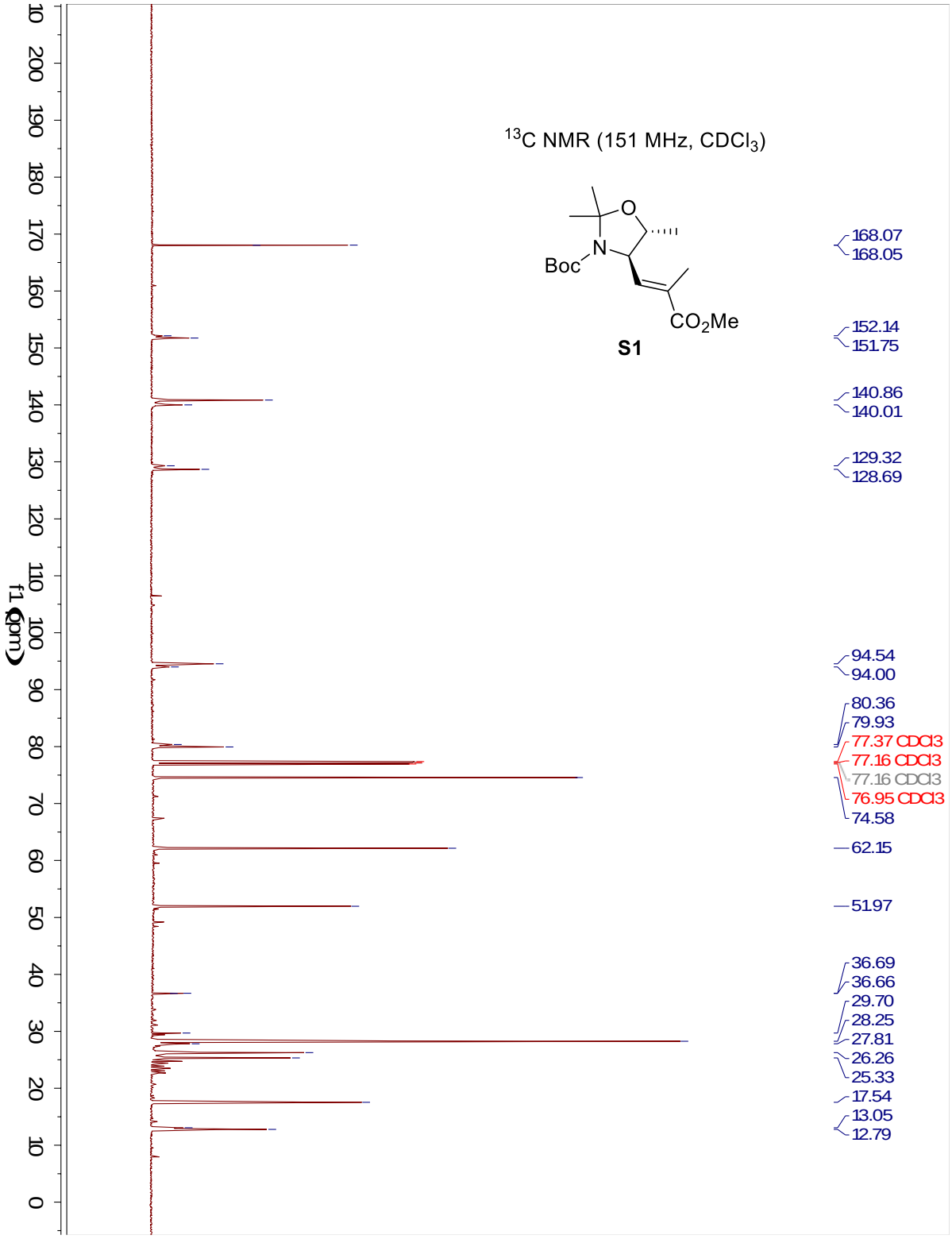

^{1}H NMR (600 MHz, $CDCl_3$)
PhO
PhO
OMe
10
4.31
6.06
3.27
1.00
3.10
f1 (ppm)
7.34
7.33
7.33
7.33
7.32
7.32
7.32
7.32
7.32
7.32
7.31
7.31
7.31
7.31
7.31
7.31
7.30
7.30
7.30
7.30
7.29
7.29
7.26 CDCl3
7.20
7.20
7.20
7.20
7.20
7.19
7.19
7.19
7.19
7.18
7.18
7.18
7.18
7.17
7.17
7.17
7.17
7.16
7.16
7.16
7.15
7.15
7.15
7.15
3.75
3.42
3.41
3.40
3.39
3.38
3.37
3.36
3.35
1.66
1.65
1.63
1.62

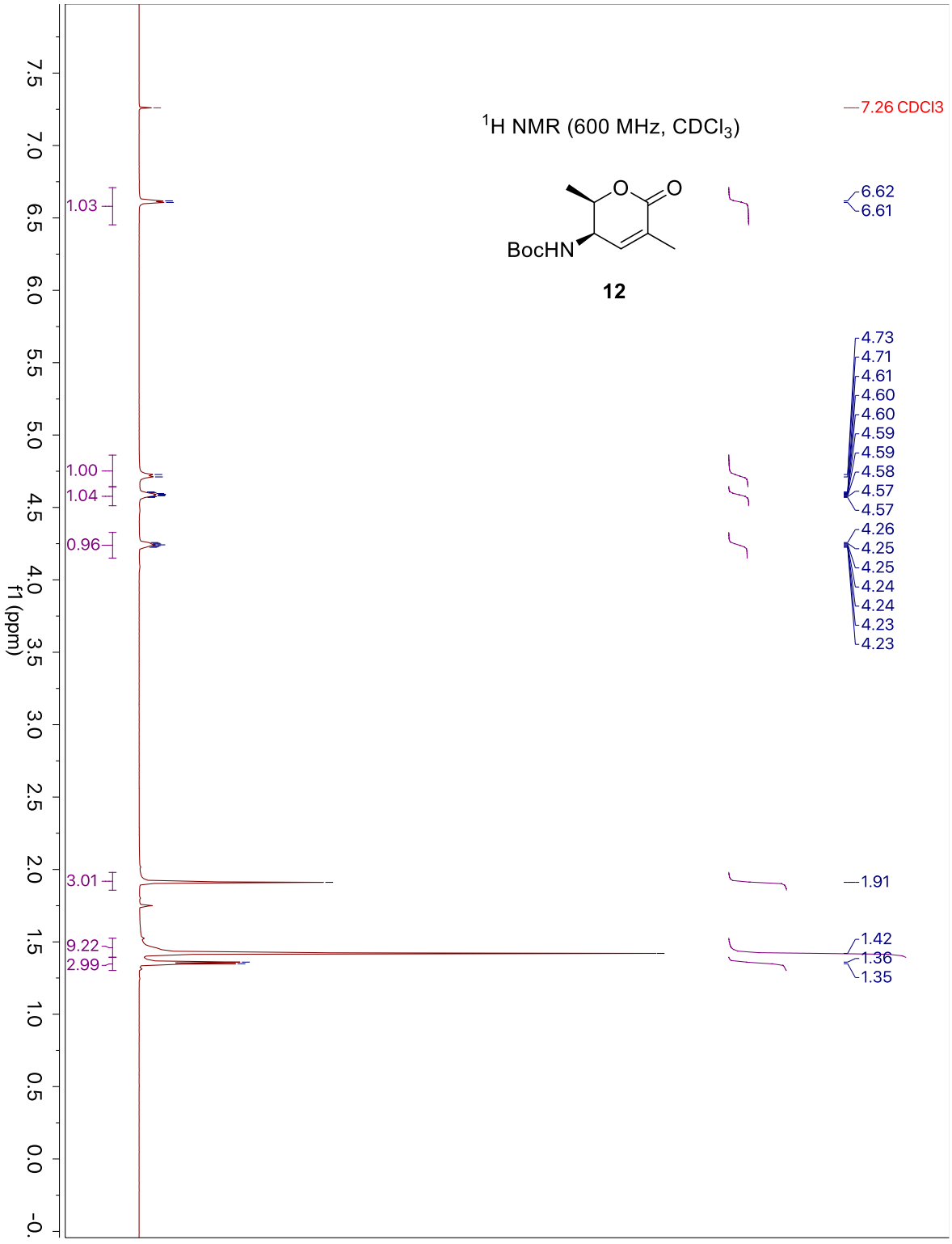

^{13}C NMR (151 MHz, $CDCl_3$)
PhO
PhO
OMe
10
169.29
169.26
150.38
150.32
150.27
129.83
125.44
125.42
125.41
120.67
120.64
120.57
120.54
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
52.86
52.85
39.97
39.07
11.90
11.86
f1 (ppm)

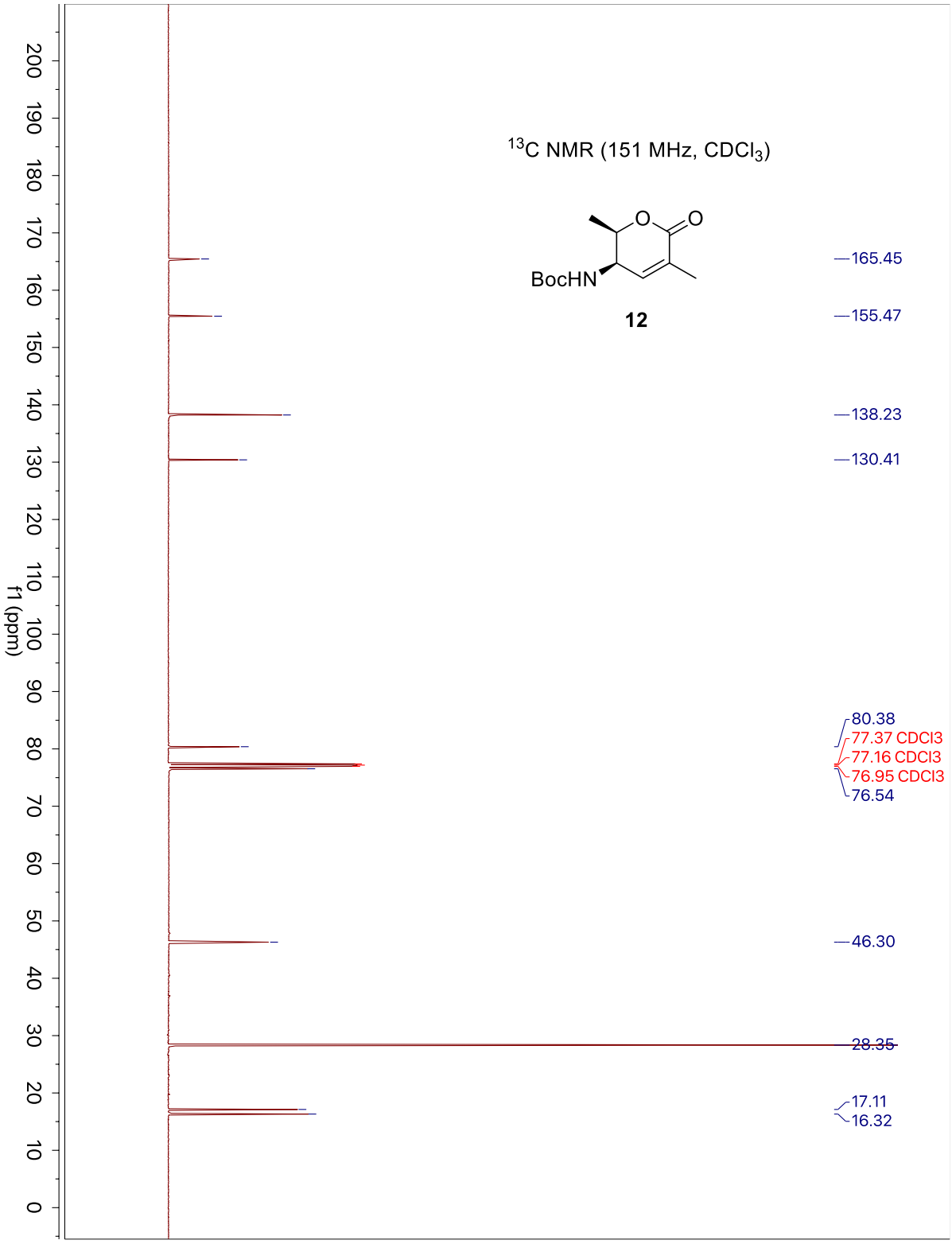

^{1}H NMR (600 MHz, CDCl$_3$)
Boc
N
O
CO$_2$Me
11
7.26 CDCl3
5.82
5.71
4.93
4.79
3.87
3.86
3.85
3.85
3.84
3.83
3.73
1.95
1.94
1.61
1.53
1.39
1.35
1.34
1.33
0.88
1.15
1.00
2.98
2.91
14.40
3.88
f1 (ppm)

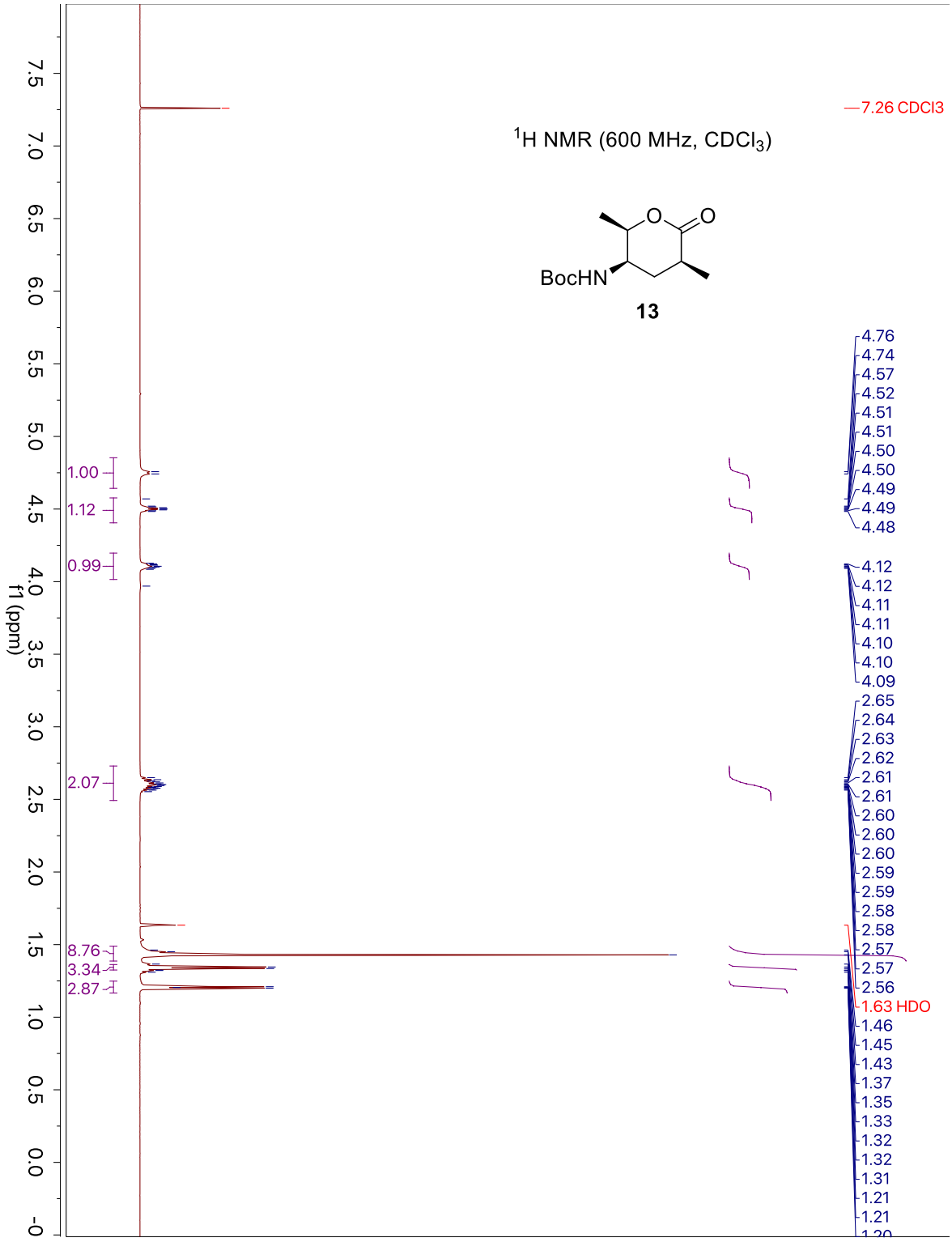

^{13}C NMR (151 MHz, $CDCl_3$)
Boc
N
O
CO_2Me
11
f1 (ppm)
167.53
152.00
143.16
142.39
128.48
94.17
93.61
80.12
79.47
77.37 CDCl3
77.16 CDCl3
77.16 CDCl3
76.95 CDCl3
75.95
75.37
62.02
61.67
51.46
36.69
29.70
28.29
26.84
26.59
25.73
24.73
23.52
20.57
18.61
18.13

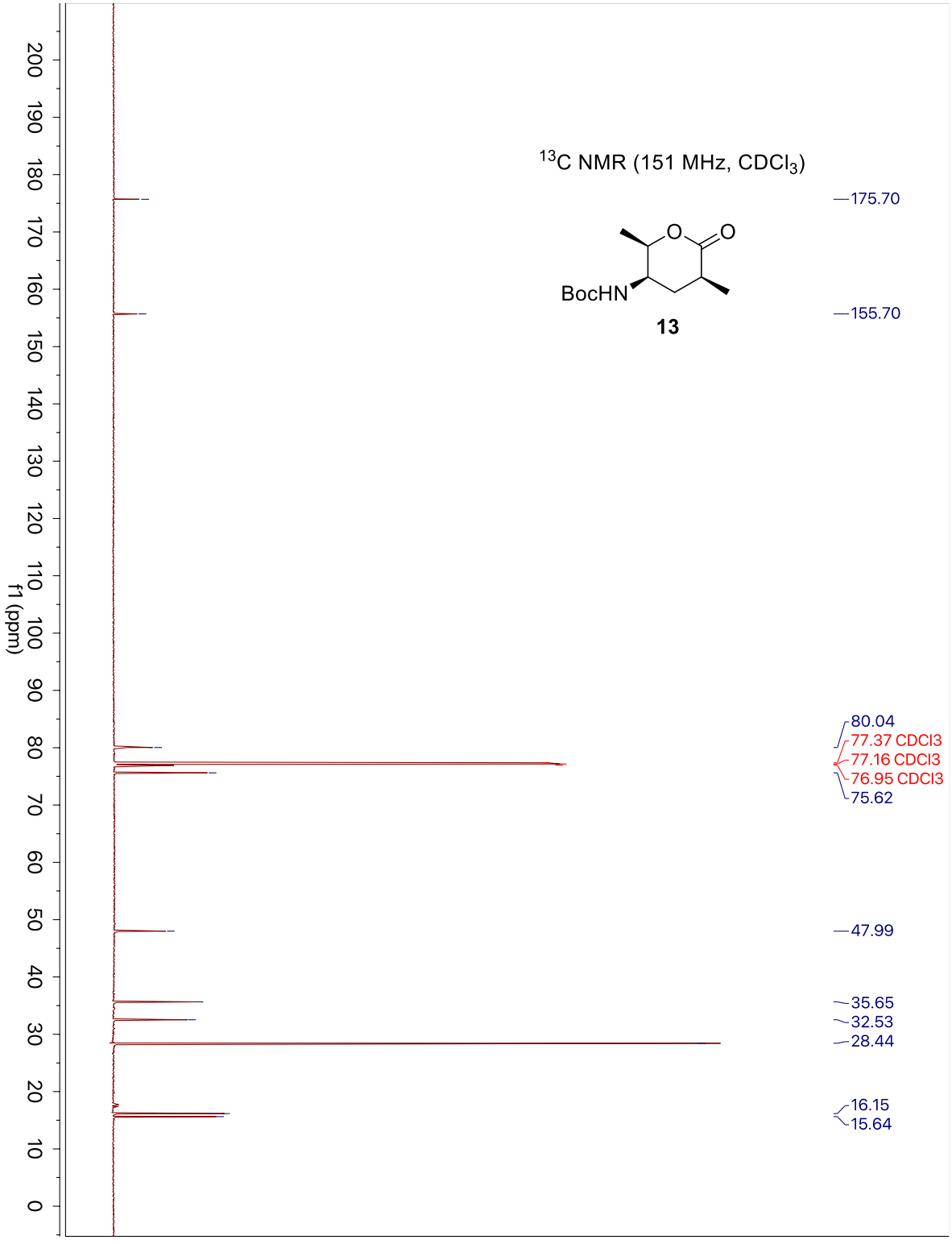

^{1}H NMR (600 MHz, CDCl$_3$)
Boc
N
O
CO$_2$Me
S1
7.26 CDCl3
6.50
6.48
4.18
4.08
3.87
3.86
3.85
3.84
3.83
3.75
1.93
1.89
1.61
1.58
1.54
1.45
1.40
1.38
1.38
1.37
1.34
1.31
1.27
1.26
1.00
0.73
0.96
2.28
3.58
14.02
3.45
f1 (ppm)

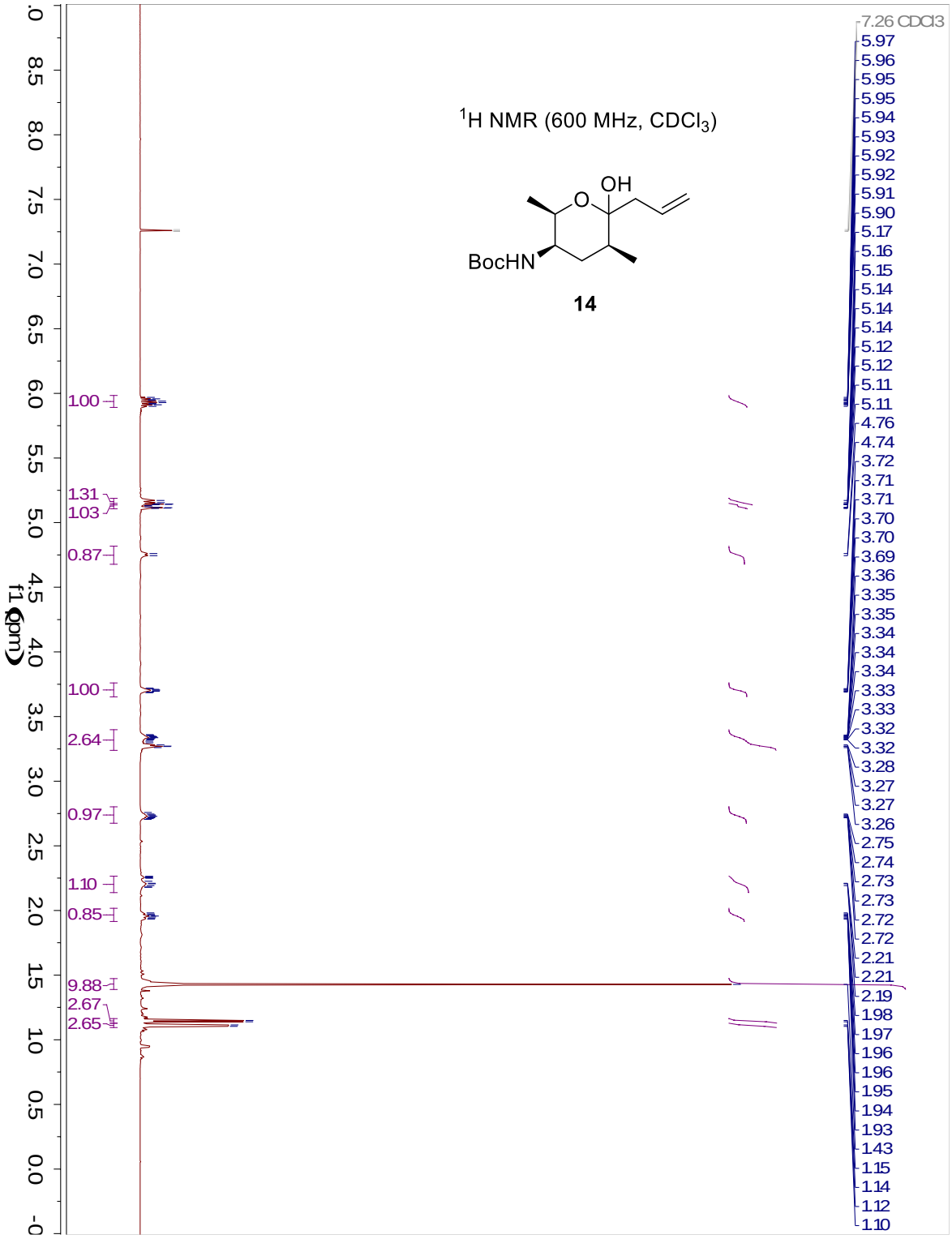

^{13}C NMR (151 MHz, $CDCl_3$)
Boc
N
O
CO_2Me
S1
168.07
168.05
152.14
151.75
140.86
140.01
129.32
128.69
94.54
94.00
80.36
79.93
77.37 CDCl3
77.16 CDCl3
77.16 CDCl3
76.95 CDCl3
74.58
62.15
51.97
36.69
36.66
29.70
28.25
27.81
26.26
25.33
17.54
13.05
12.79
f1 (ppm)

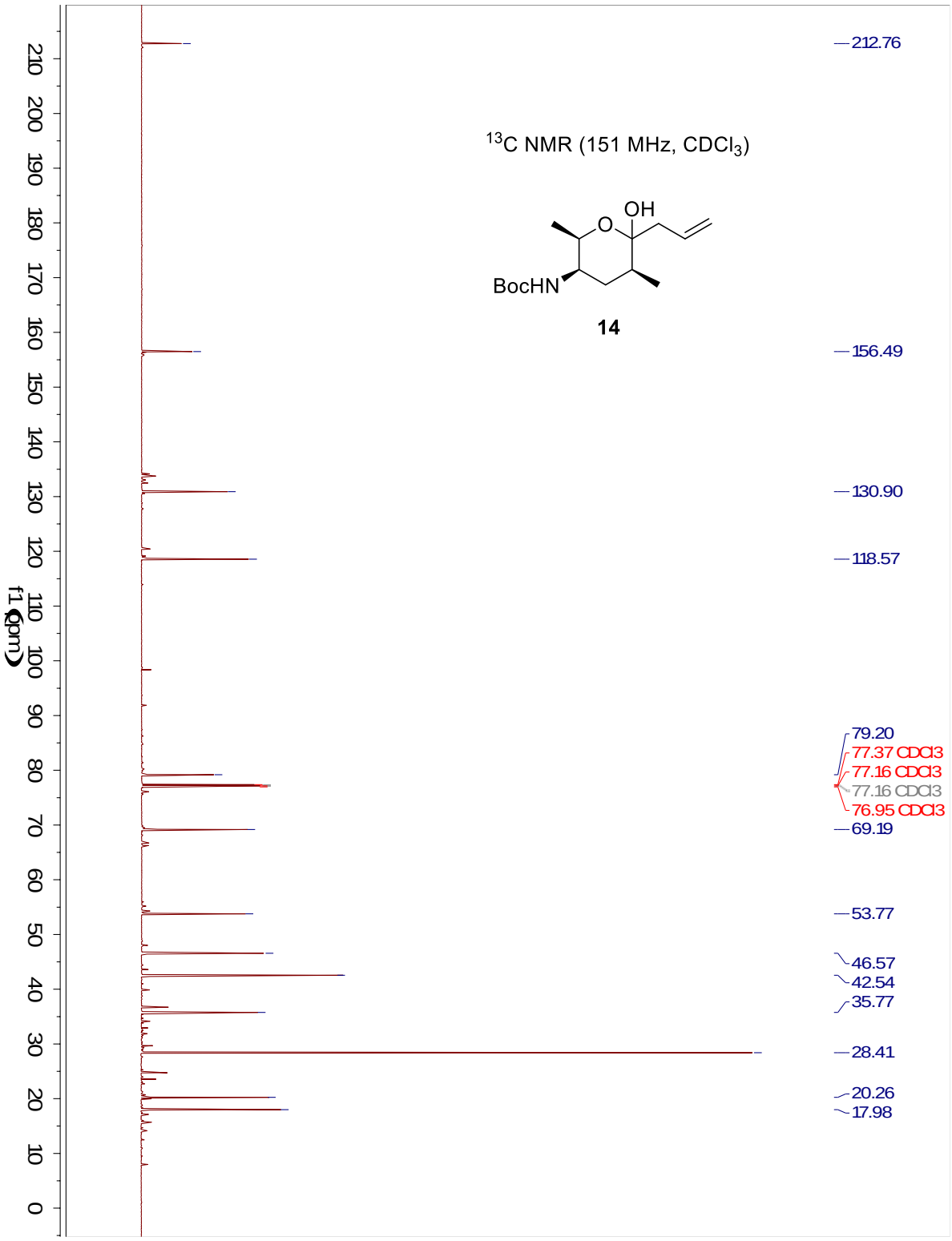

^{1}H NMR (600 MHz, $CDCl_3$)
12
BocHN
O
O
7.26 CDCl3
6.62
6.61
4.73
4.71
4.61
4.60
4.60
4.59
4.59
4.58
4.57
4.57
4.26
4.25
4.25
4.24
4.24
4.23
4.23
1.91
1.42
1.36
1.35
1.03
1.00
1.04
0.96
3.01
9.22
2.99
f1 (ppm)

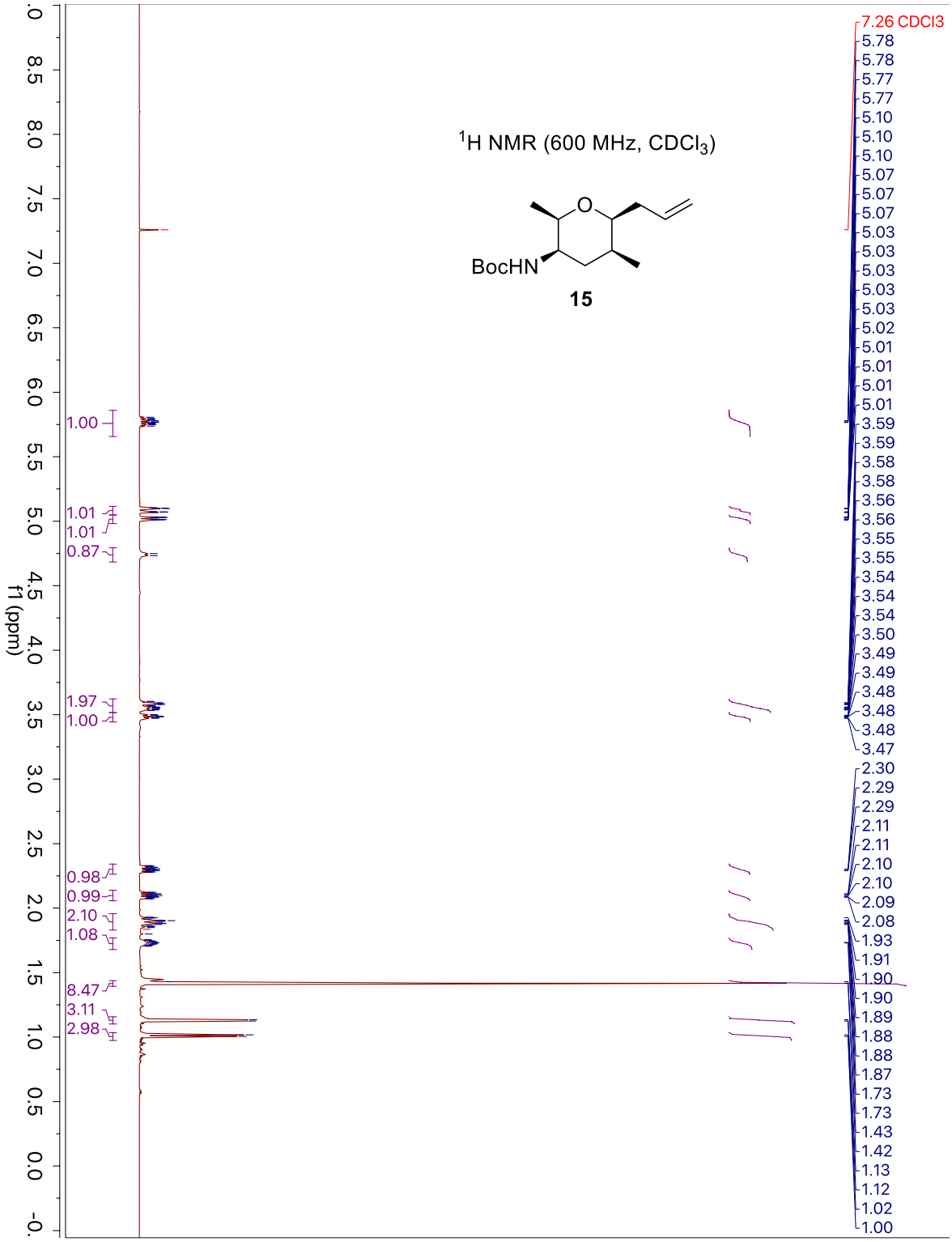

^{13}C NMR (151 MHz, $CDCl_3$)
O
O
BocHN
12
165.45
155.47
138.23
130.41
80.38
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
76.54
46.30
28.35
17.11
16.32
f1 (ppm)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

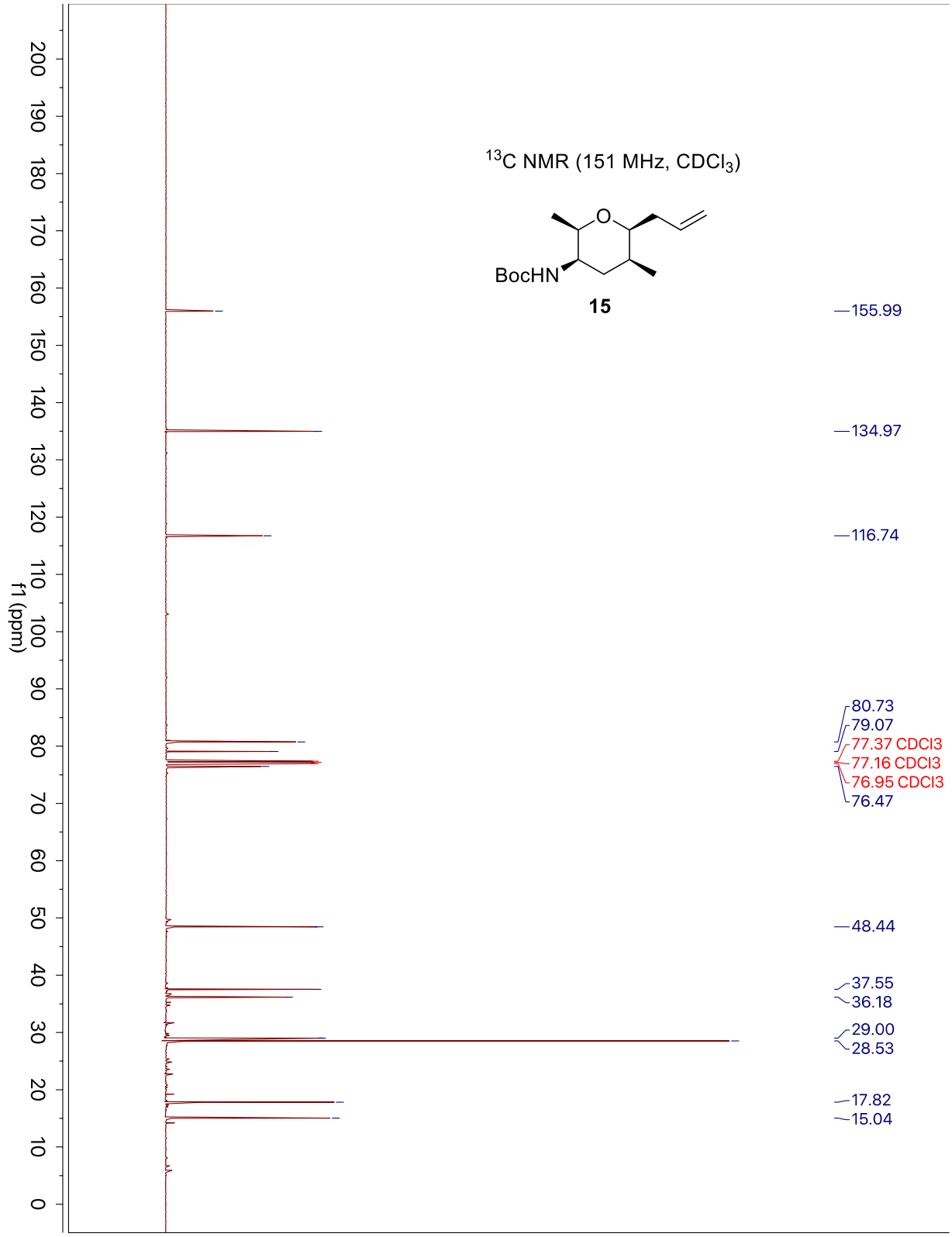

7.26 CDCl3
^{1}H NMR (600 MHz, $CDCl_3$)
BocHN
O
O
13
f1 (ppm)
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0
1.00
1.12
0.99
2.07
8.76
3.34
2.87
4.76
4.74
4.57
4.52
4.51
4.51
4.50
4.50
4.49
4.49
4.48
4.12
4.12
4.11
4.11
4.10
4.10
4.09
2.65
2.64
2.63
2.62
2.61
2.61
2.60
2.60
2.60
2.59
2.59
2.58
2.58
2.57
2.57
2.56
1.63 HDO
1.46
1.45
1.43
1.37
1.35
1.33
1.32
1.32
1.31
1.21
1.21


^{13}C NMR (151 MHz, CDCl$_3$)
BocHN
O
O
13
175.70
155.70
80.04
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
75.62
47.99
35.65
32.53
28.44
16.15
15.64
f1 (ppm)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

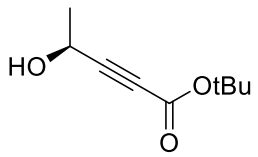

^{1}H NMR (600 MHz, $CDCl_3$)
OH
O
BocHN
14
7.26 CDCl3
5.97
5.96
5.95
5.95
5.94
5.93
5.92
5.92
5.91
5.90
5.17
5.16
5.15
5.14
5.14
5.14
5.12
5.12
5.11
5.11
4.76
4.74
3.72
3.71
3.71
3.70
3.70
3.69
3.36
3.35
3.35
3.34
3.34
3.34
3.33
3.33
3.32
3.32
3.28
3.27
3.27
3.26
2.75
2.74
2.73
2.73
2.72
2.72
2.21
2.21
2.19
1.98
1.97
1.96
1.96
1.95
1.94
1.93
1.43
1.15
1.14
1.12
1.10
1.00
1.31
1.03
0.87
1.00
2.64
0.97
1.10
0.85
9.88
2.67
2.65
f1 (ppm)


^{13}C NMR (151 MHz, CDCl$_3$)
OH
O
BocHN
14
212.76
156.49
130.90
118.57
79.20
77.37 CDCl3
77.16 CDCl3
77.16 CDCl3
76.95 CDCl3
69.19
53.77
46.57
42.54
35.77
28.41
20.26
17.98
f1 (ppm)
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

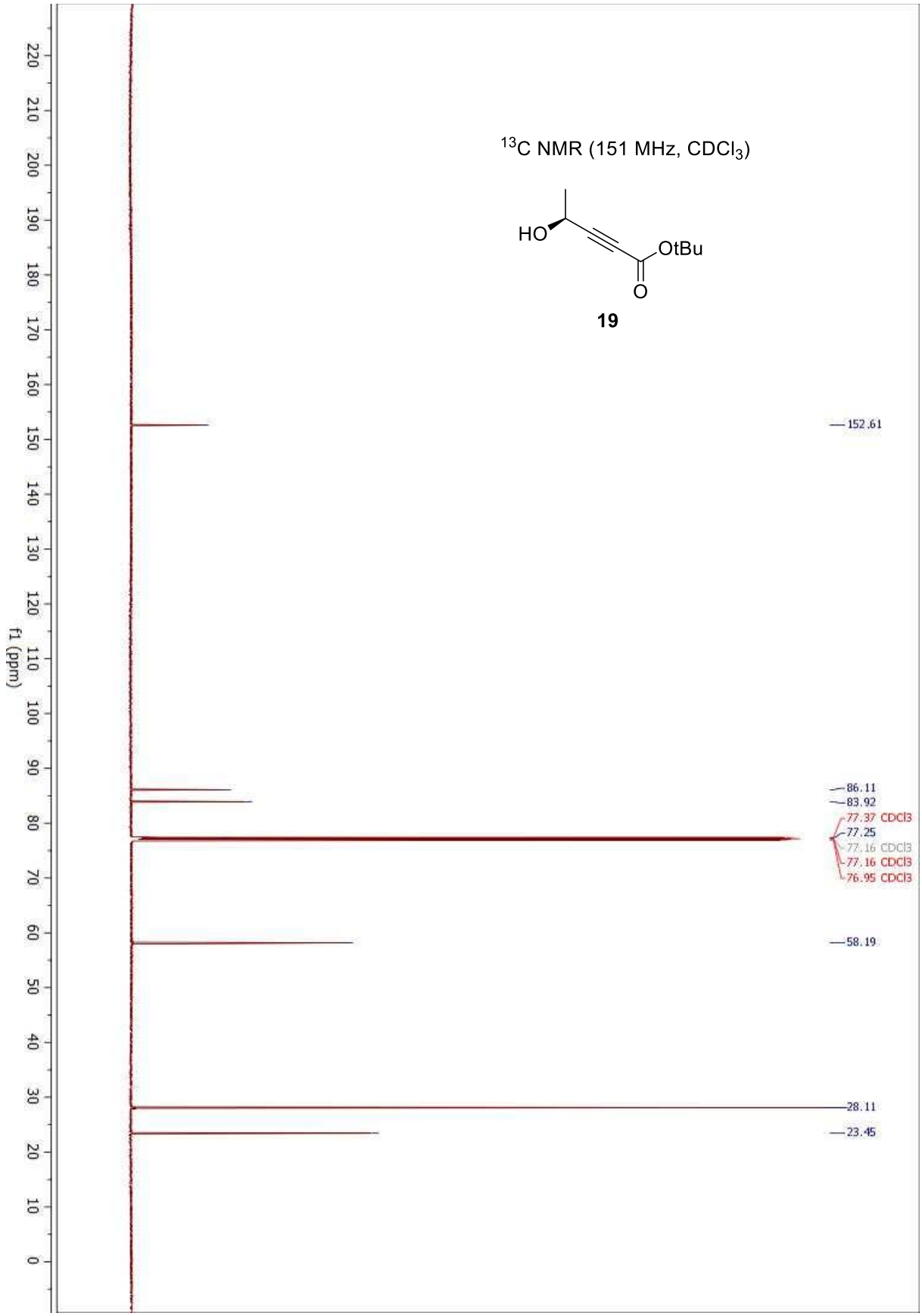

^{1}H NMR (600 MHz, $CDCl_3$)
BocHN
O
15
f1 (ppm)
7.26 CDCl3
1.00
1.01
1.01
0.87
1.97
1.00
0.98
0.99
2.10
1.08
8.47
3.11
2.98

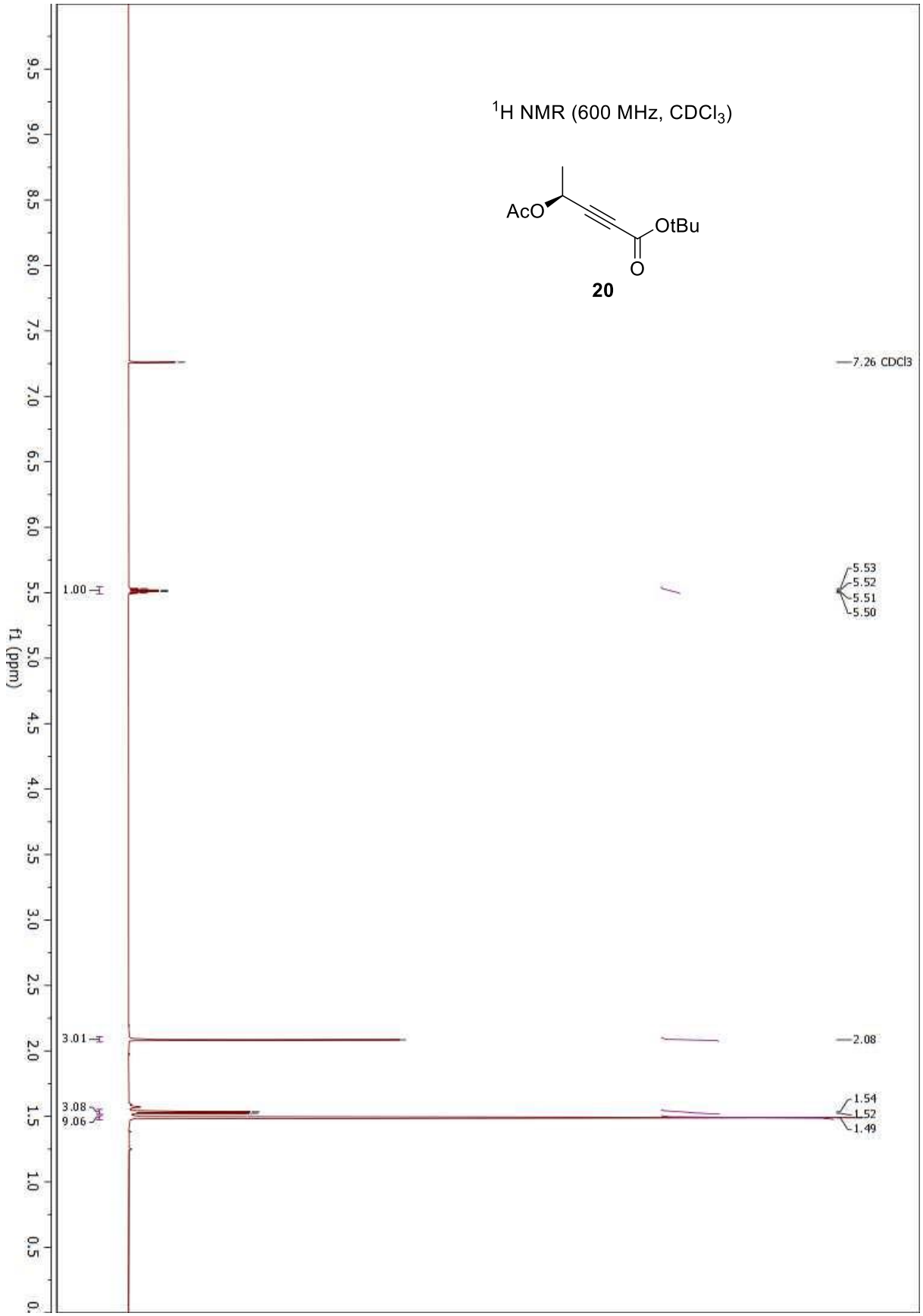

^{13}C NMR (151 MHz, $CDCl_3$)
O
BocHN
15
155.99
134.97
116.74
80.73
79.07
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
76.47
48.44
37.55
36.18
29.00
28.53
17.82
15.04
f1 (ppm)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

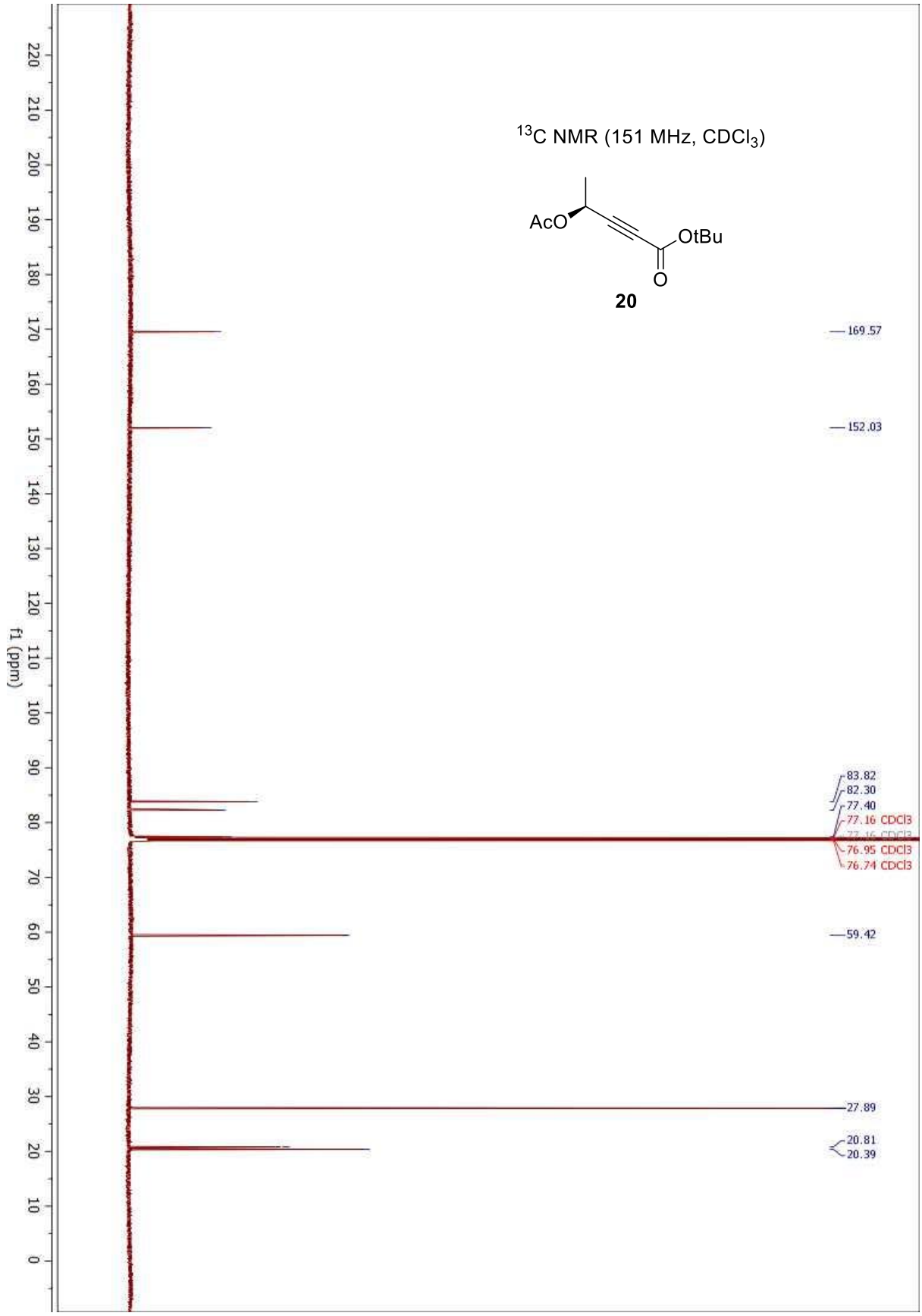
^{1}H NMR (600 MHz, $CDCl_3$)

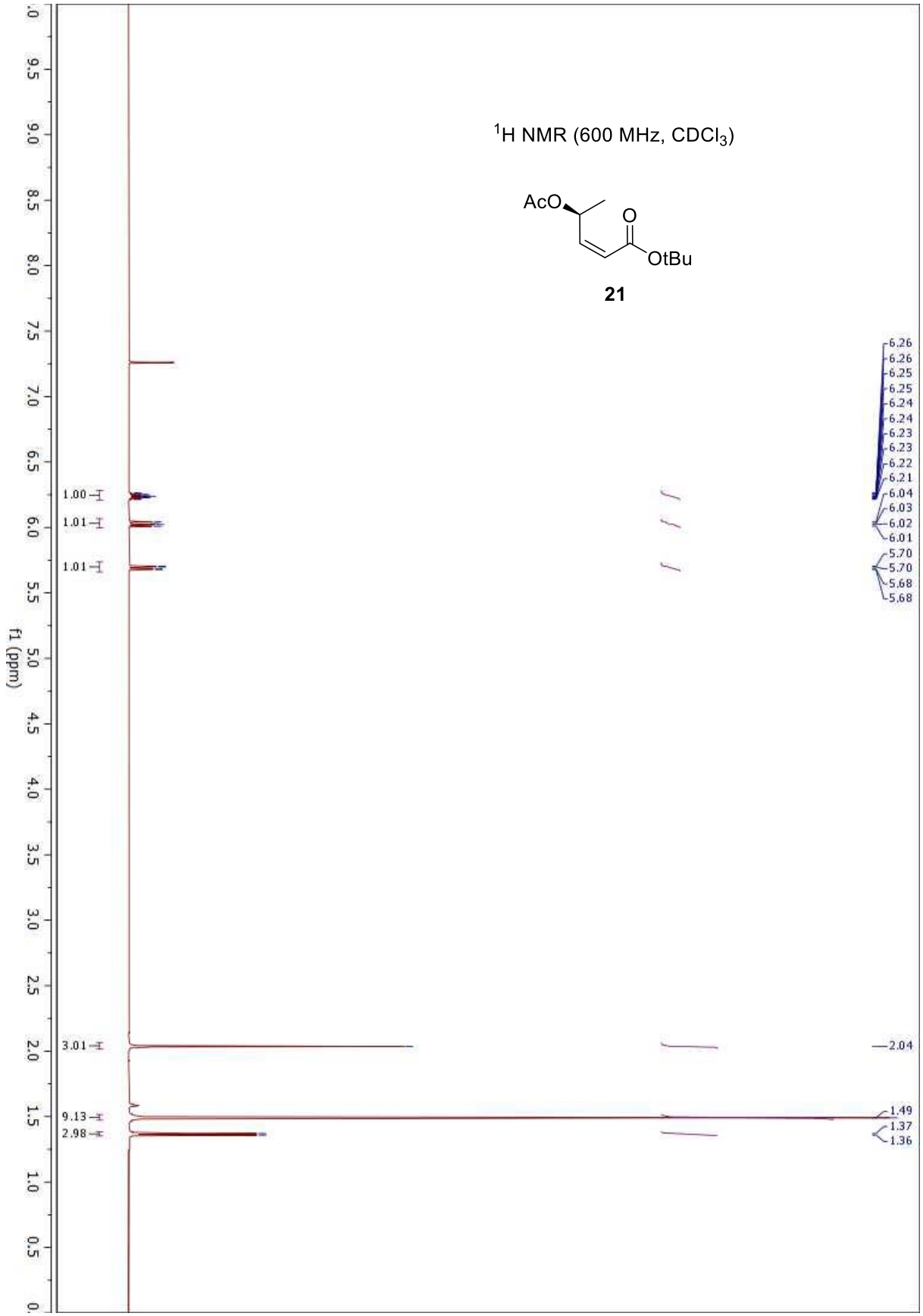


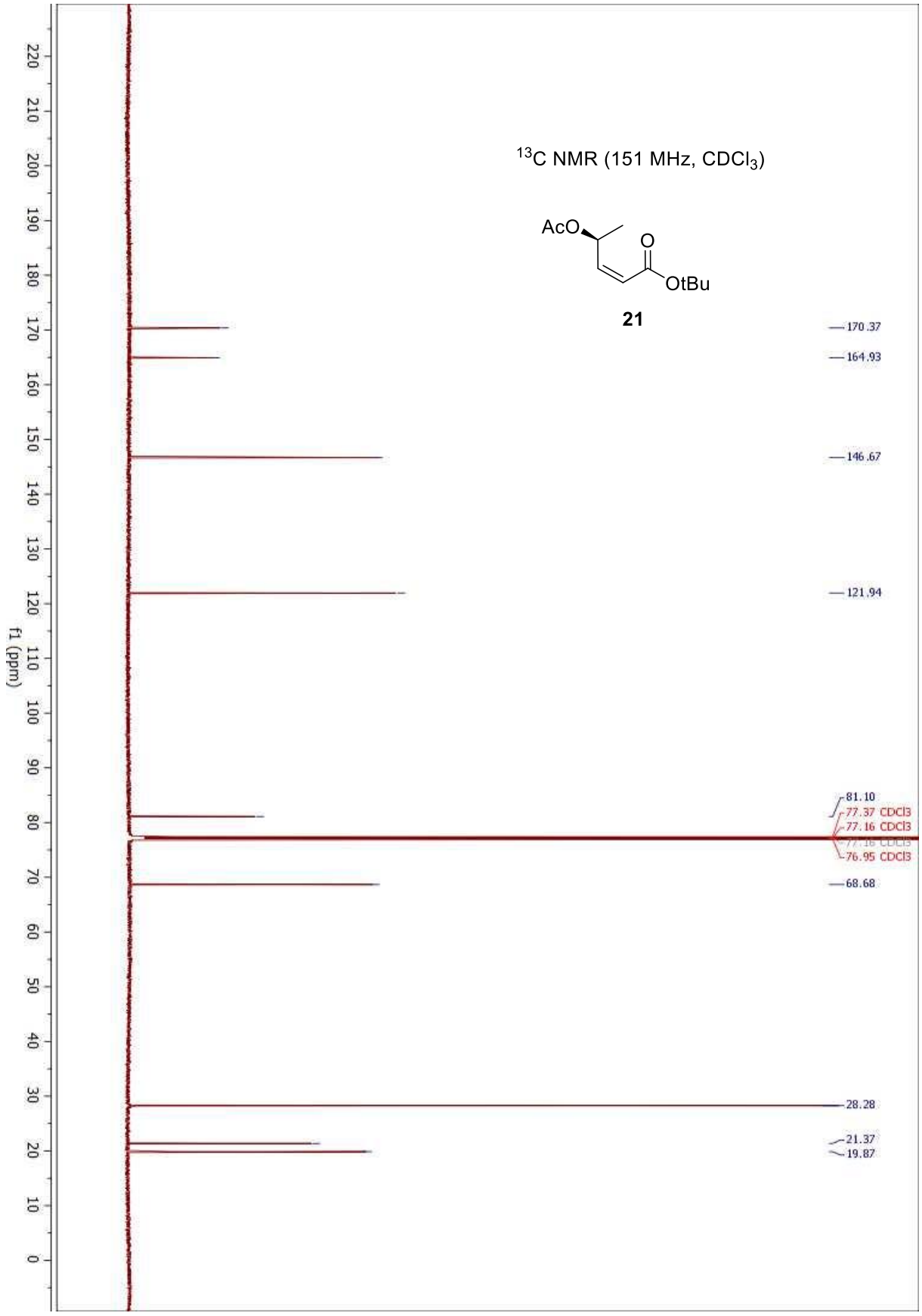
19

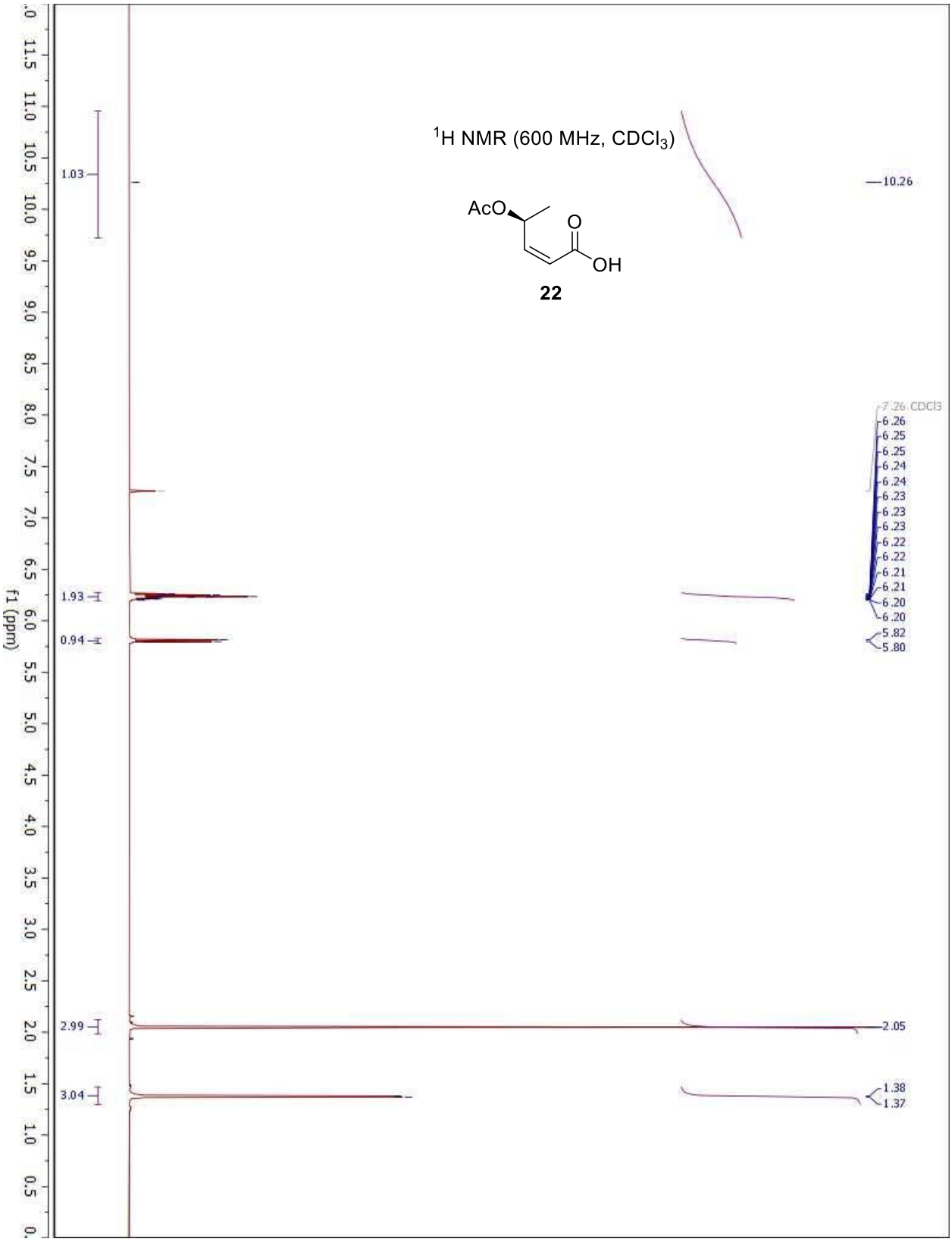

^{13}C NMR (151 MHz, $CDCl_3$)
HO
OtBu
O
19
152.61
86.11
83.92
77.37 CDCl3
77.25
77.16 CDCl3
77.16 CDCl3
76.95 CDCl3
58.19
28.11
23.45
f1 (ppm)

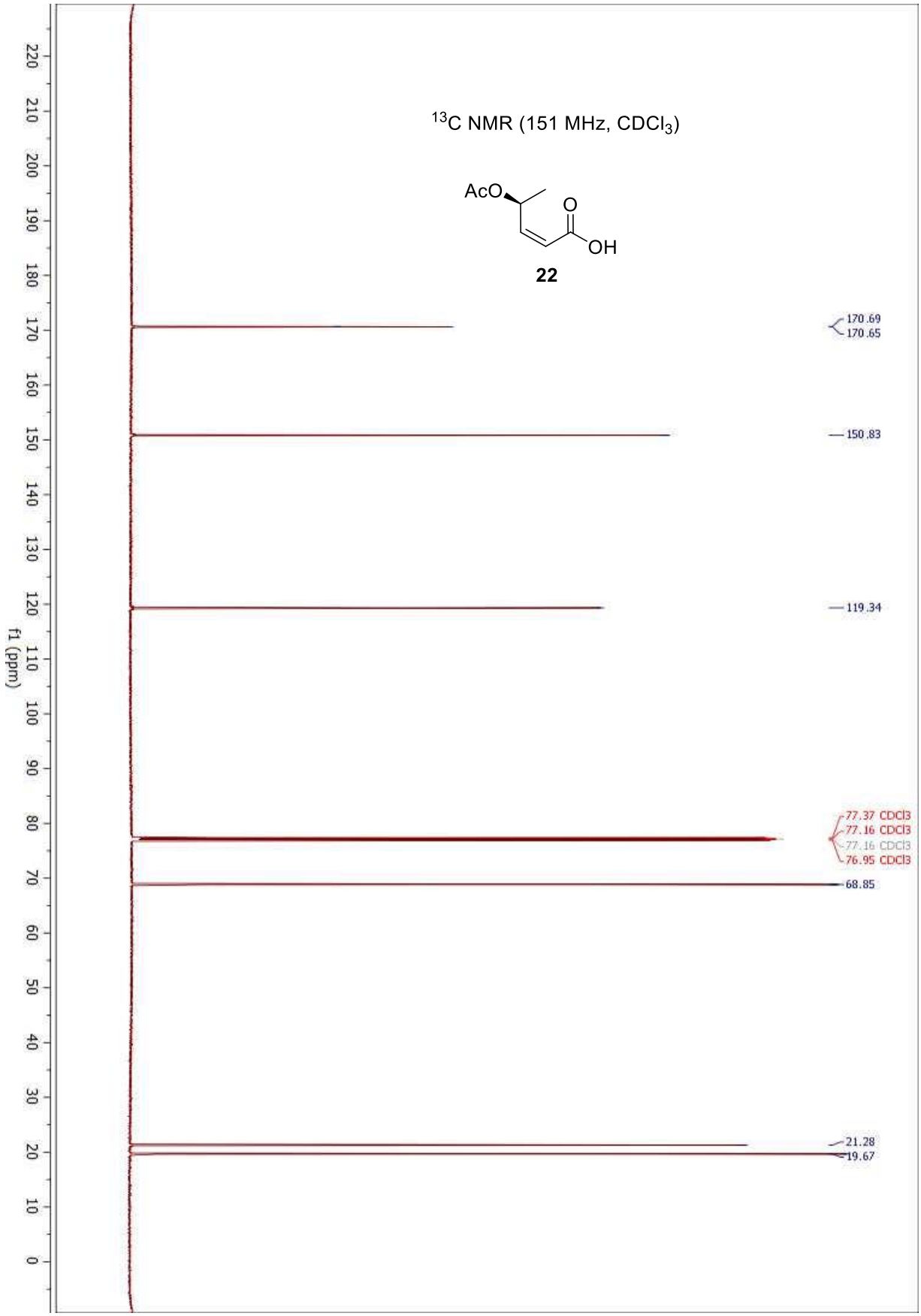

^{1}H NMR (600 MHz, $CDCl_3$)
AcO
OtBu
O
20
7.26 CDCl3
5.53
5.52
5.51
5.50
2.08
1.54
1.52
1.49
1.00
3.01
3.08
9.06
f1 (ppm)

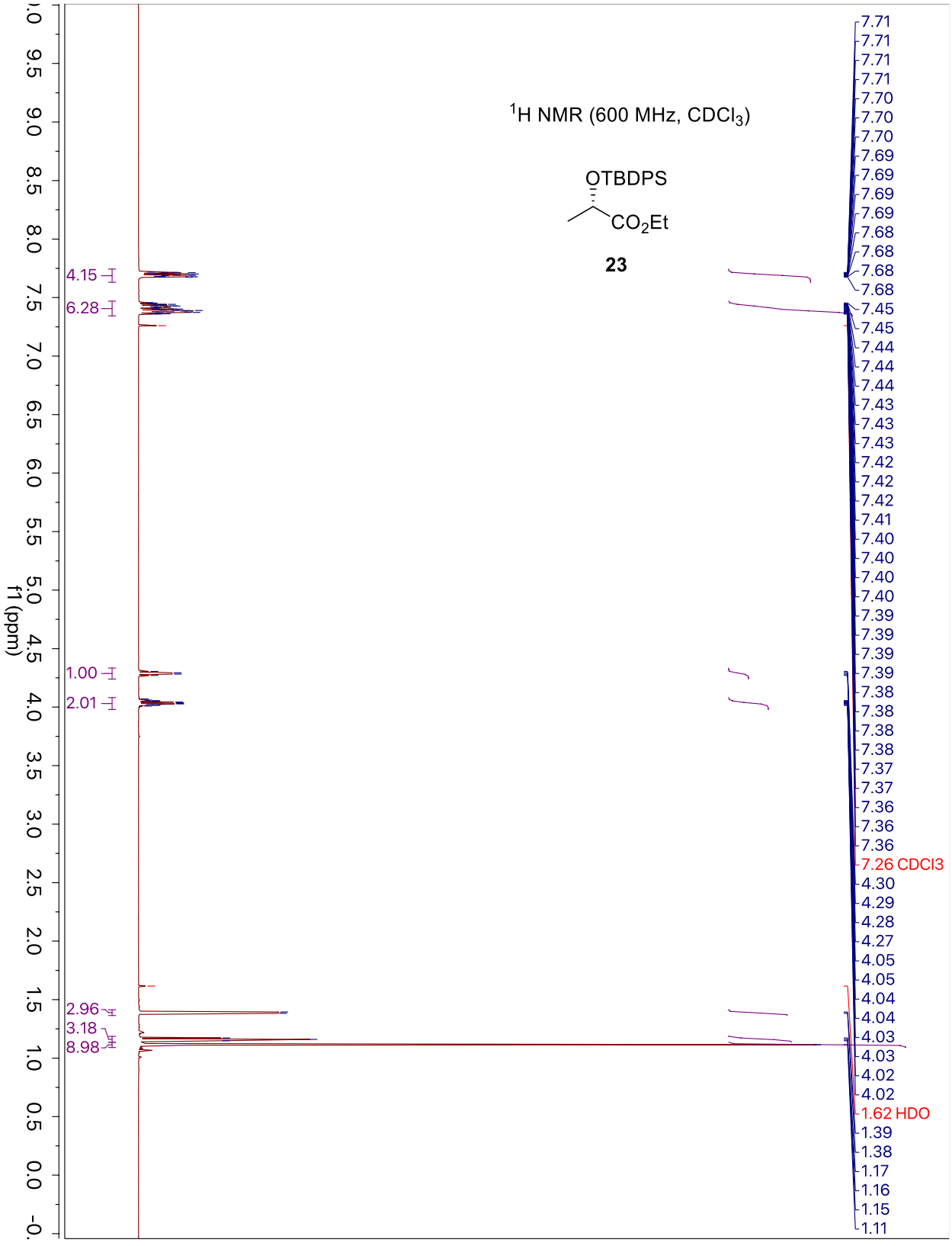

^{13}C NMR (151 MHz, $CDCl_3$)
AcO
OtBu
O
20
169.57
152.03
83.82
82.30
77.40
77.16 CDCl3
76.95 CDCl3
76.74 CDCl3
59.42
27.89
20.81
20.39
f1 (ppm)

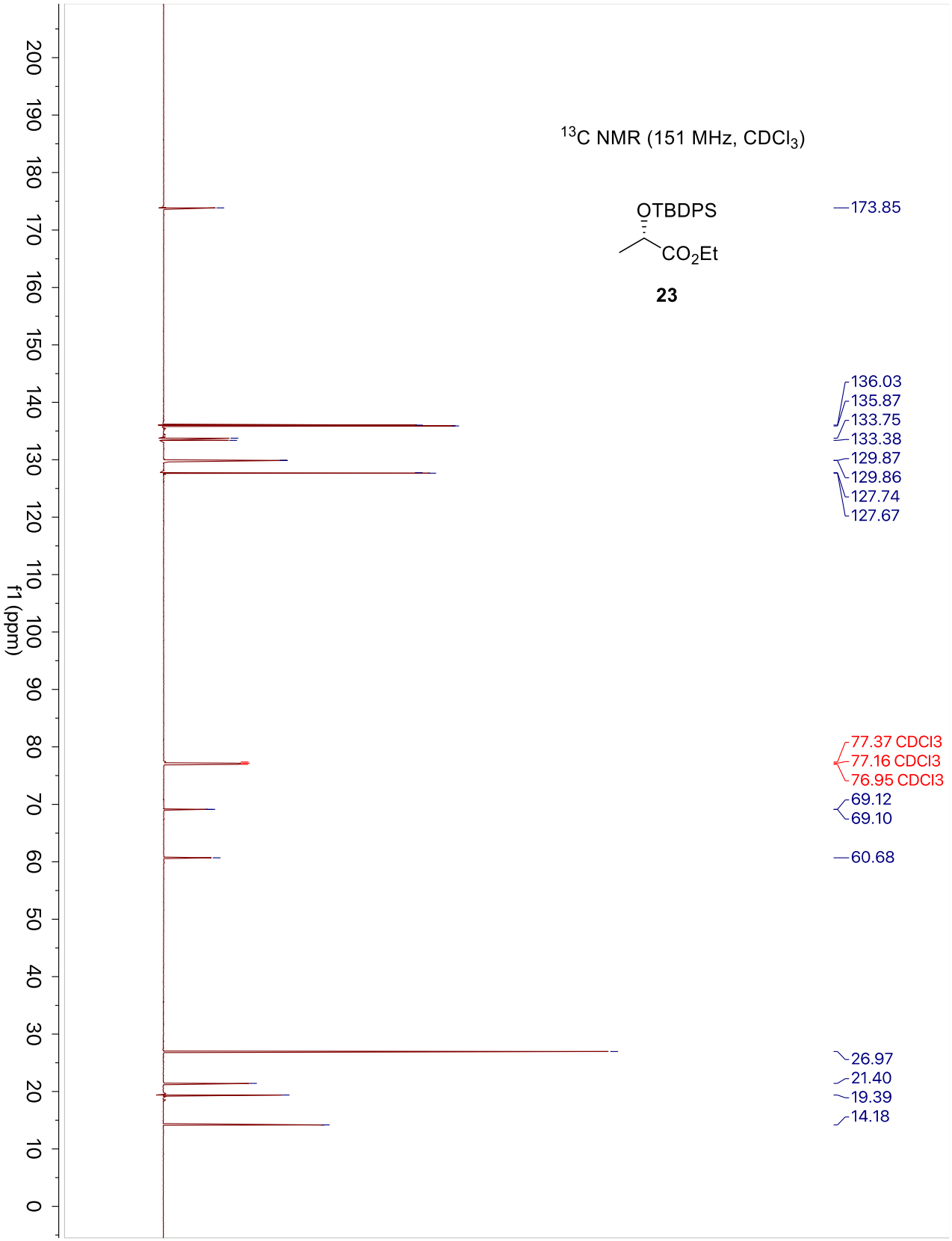

^{1}H NMR (600 MHz, $CDCl_3$)
AcO
O
OtBu
21
f1 (ppm)
1.00
1.01
1.01
3.01
9.13
2.98
6.26
6.26
6.25
6.25
6.24
6.24
6.23
6.23
6.22
6.21
6.04
6.03
6.02
6.01
5.70
5.70
5.68
5.68
2.04
1.49
1.37
1.36

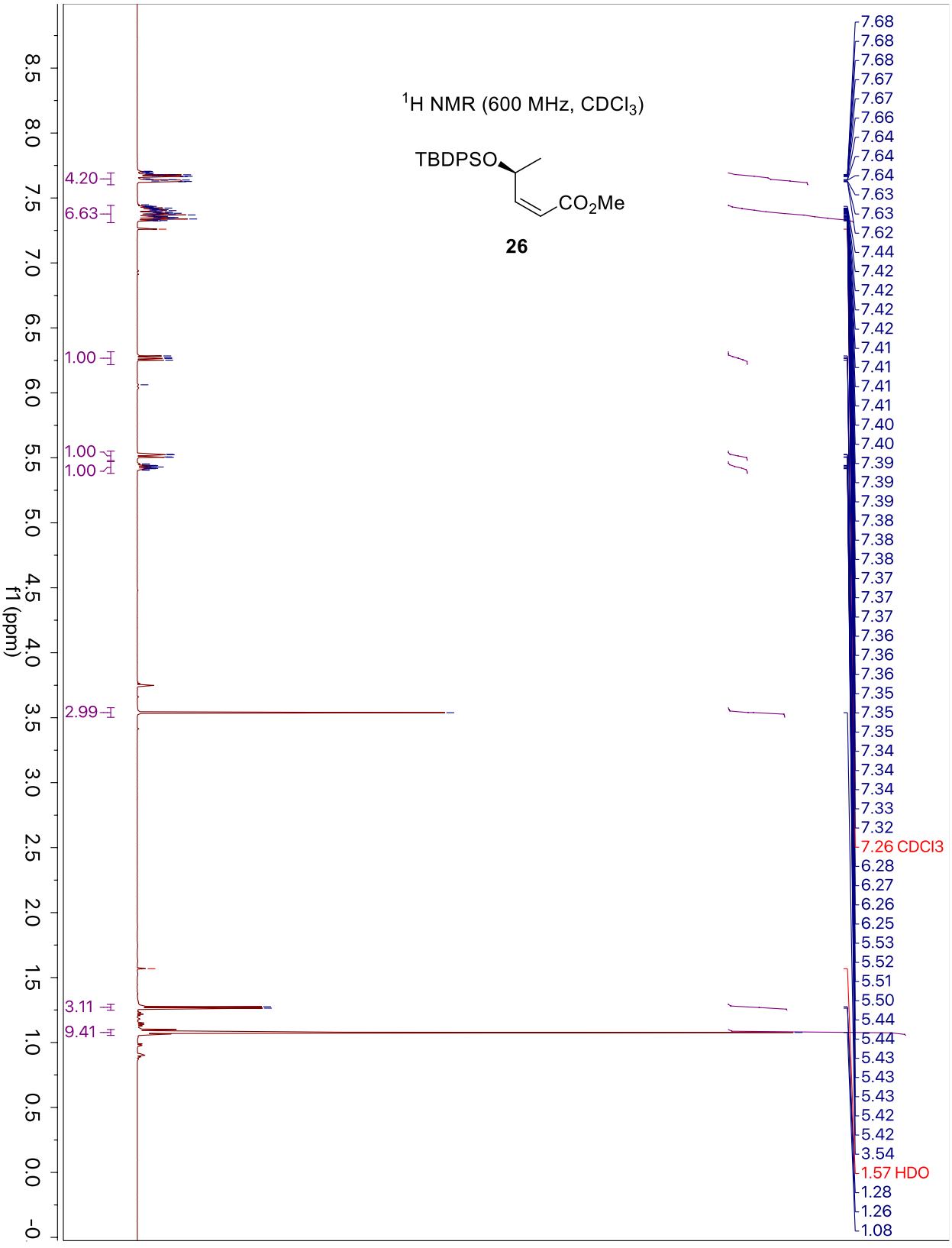

^{13}C NMR (151 MHz, $CDCl_3$)
AcO
O
OtBu
21
170.37
164.93
146.67
121.94
81.10
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
68.68
28.28
21.37
19.87
f1 (ppm)

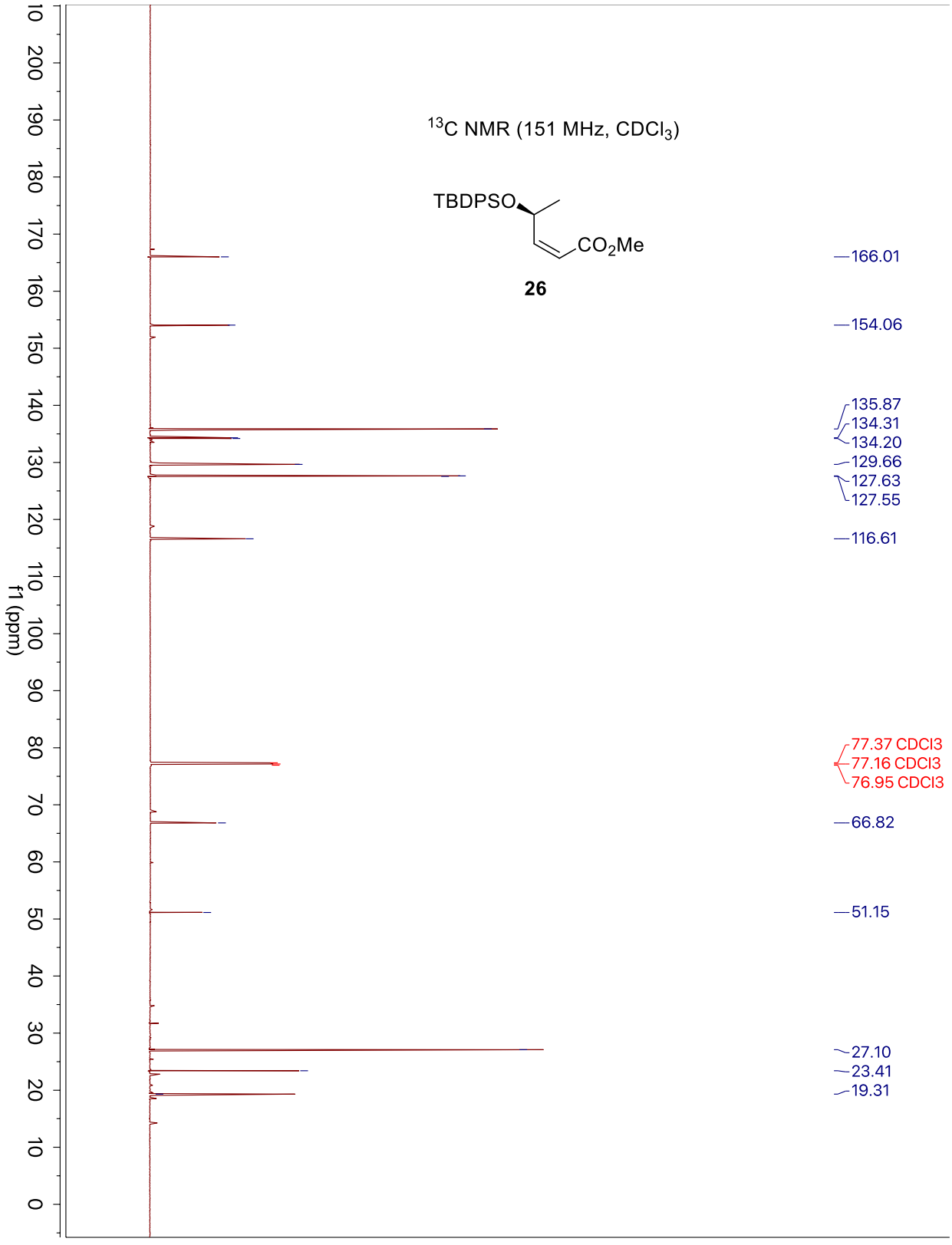

^{1}H NMR (600 MHz, $CDCl_3$)
AcO
O
OH
22
f1 (ppm)
1.03
1.93
0.94
2.99
3.04
10.26
7.26 CDCl3
6.26
6.25
6.25
6.24
6.24
6.23
6.23
6.23
6.22
6.22
6.21
6.21
6.20
6.20
5.82
5.80
2.05
1.38
1.37

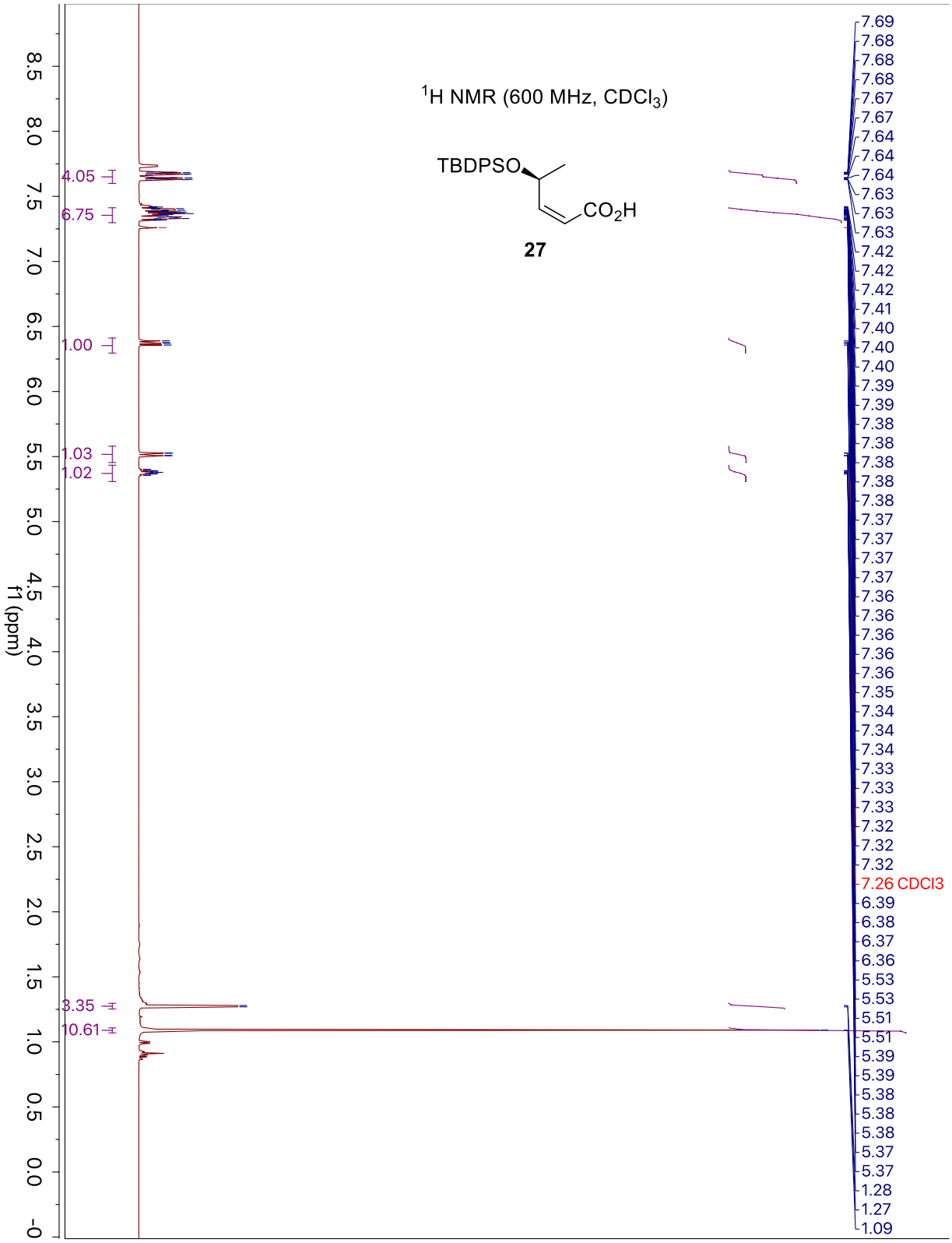

^{13}C NMR (151 MHz, $CDCl_3$)
AcO
O
OH
22
170.69
170.65
150.83
119.34
77.37 CDCl3
77.16 CDCl3
77.16 CDCl3
76.95 CDCl3
68.85
21.28
19.67
f1 (ppm)
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

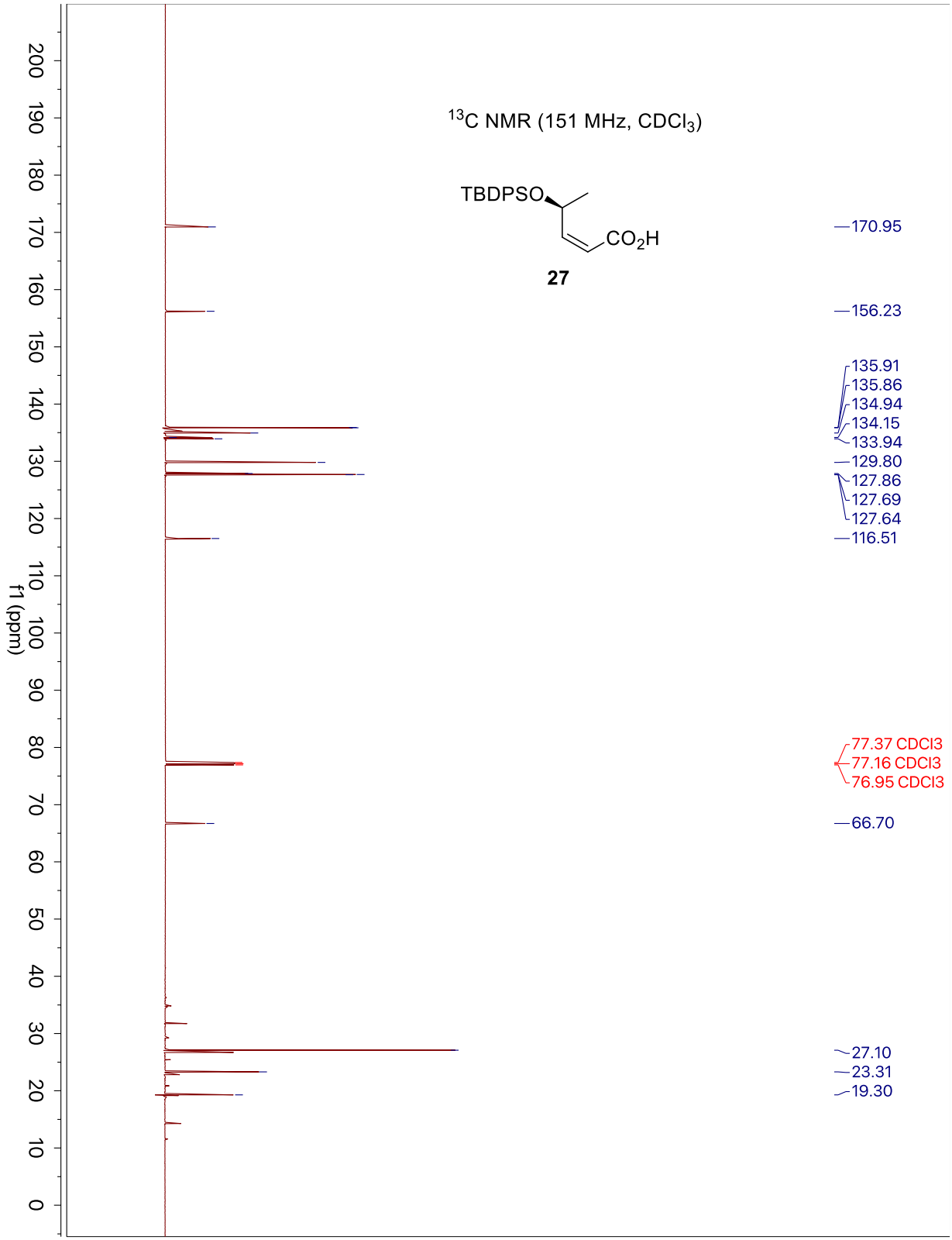

^{1}H NMR (600 MHz, $CDCl_3$)
OTBDPS
CO_2Et
23
f1 (ppm)
4.15
6.28
1.00
2.01
2.96
3.18
8.98
7.26 CDCl3
1.62 HDO

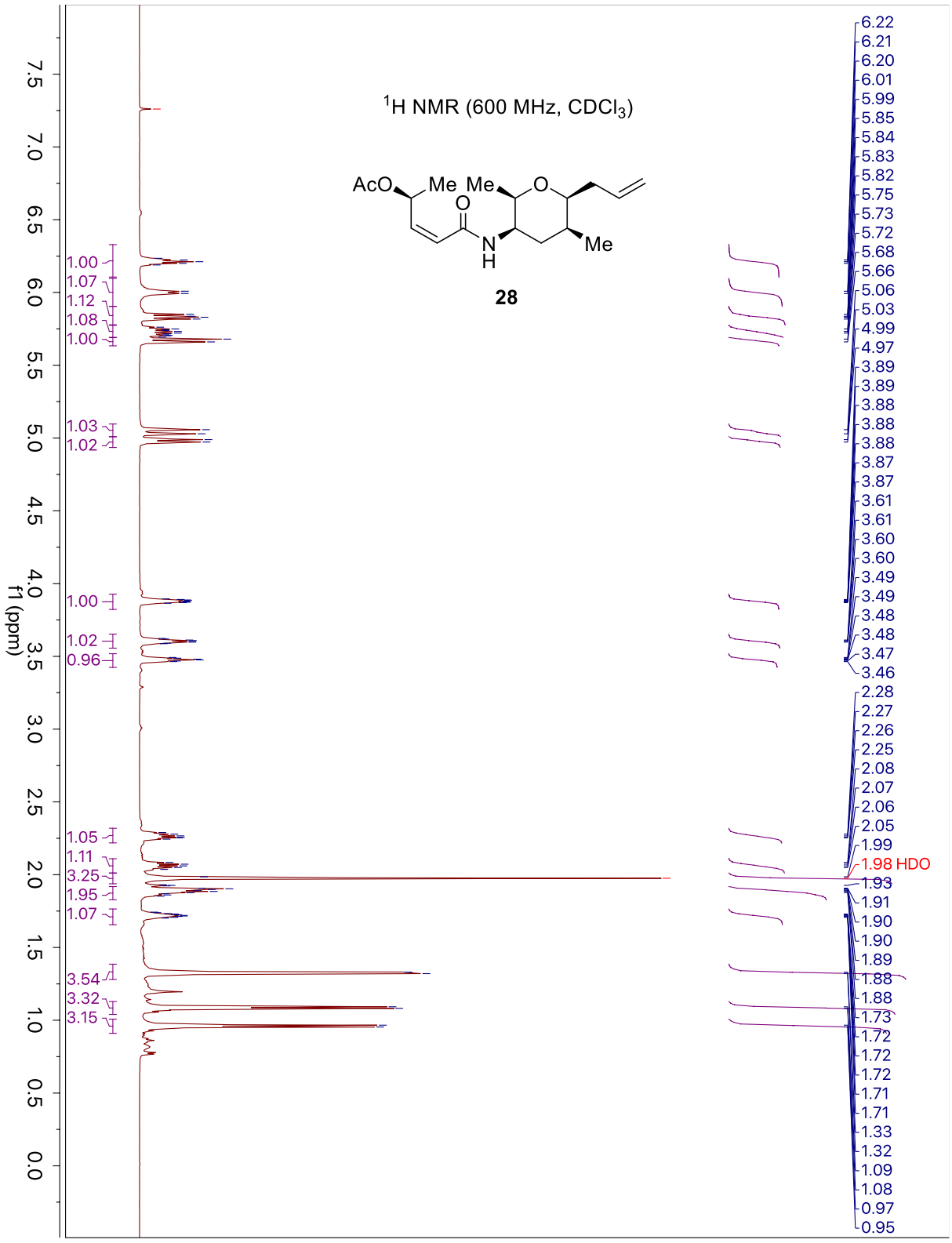

^{13}C NMR (151 MHz, CDCl$_3$)
OTBDPS
CO$_2$Et
23
f1 (ppm)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
173.85
136.03
135.87
133.75
133.38
129.87
129.86
127.74
127.67
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
69.12
69.10
60.68
26.97
21.40
19.39
14.18

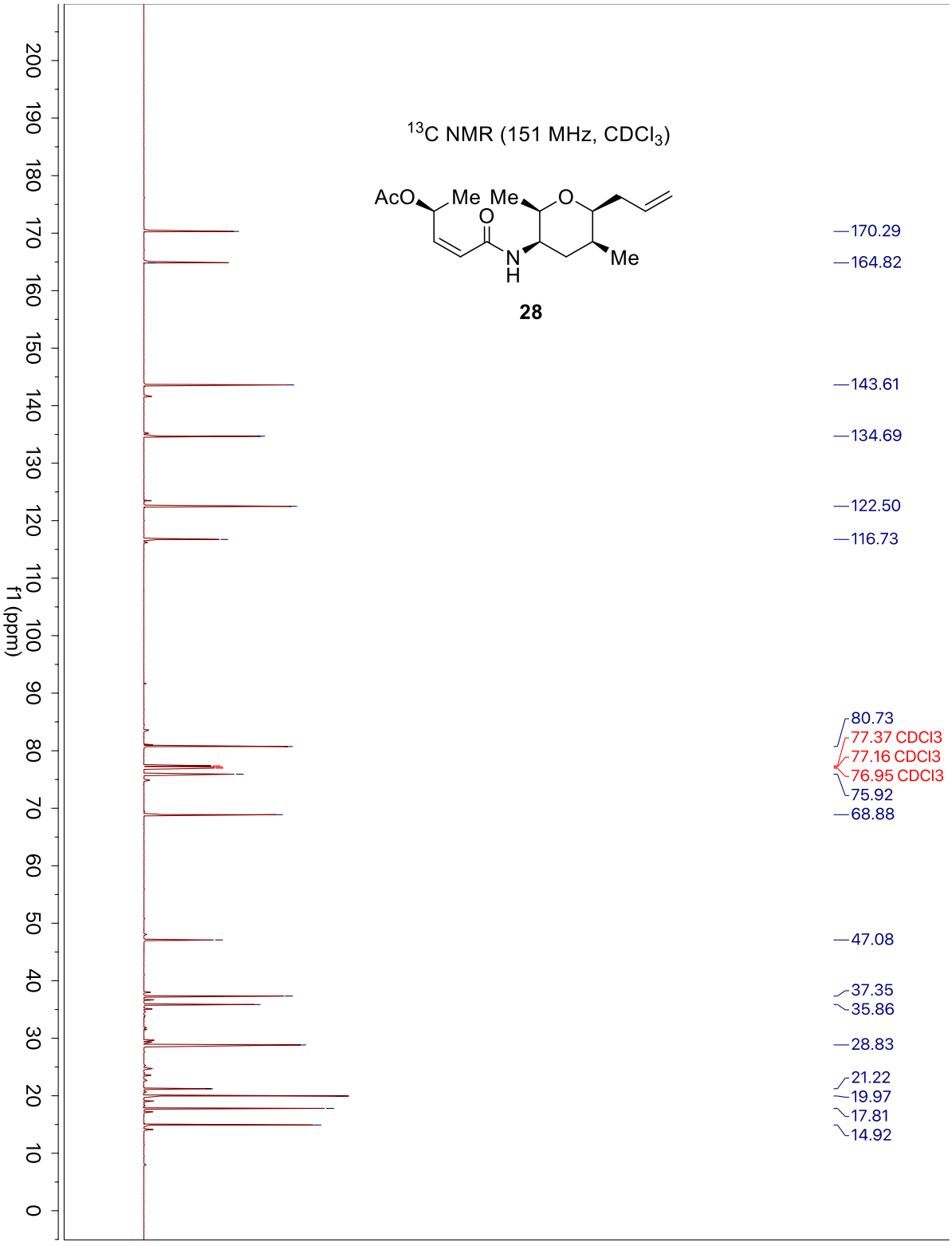

^{1}H NMR (600 MHz, $CDCl_3$)
TBDPSO
CO_2Me
26
f1 (ppm)
4.20
6.63
1.00
1.00
1.00
2.99
3.11
9.41
7.68
7.68
7.68
7.67
7.67
7.66
7.64
7.64
7.64
7.63
7.63
7.62
7.44
7.42
7.42
7.42
7.42
7.41
7.41
7.41
7.41
7.40
7.40
7.39
7.39
7.39
7.38
7.38
7.38
7.37
7.37
7.37
7.36
7.36
7.36
7.35
7.35
7.35
7.34
7.34
7.34
7.33
7.32
7.26 CDCl3
6.28
6.27
6.26
6.25
5.53
5.52
5.51
5.50
5.44
5.44
5.43
5.43
5.43
5.42
5.42
3.54
1.57 HDO
1.28
1.26
1.08

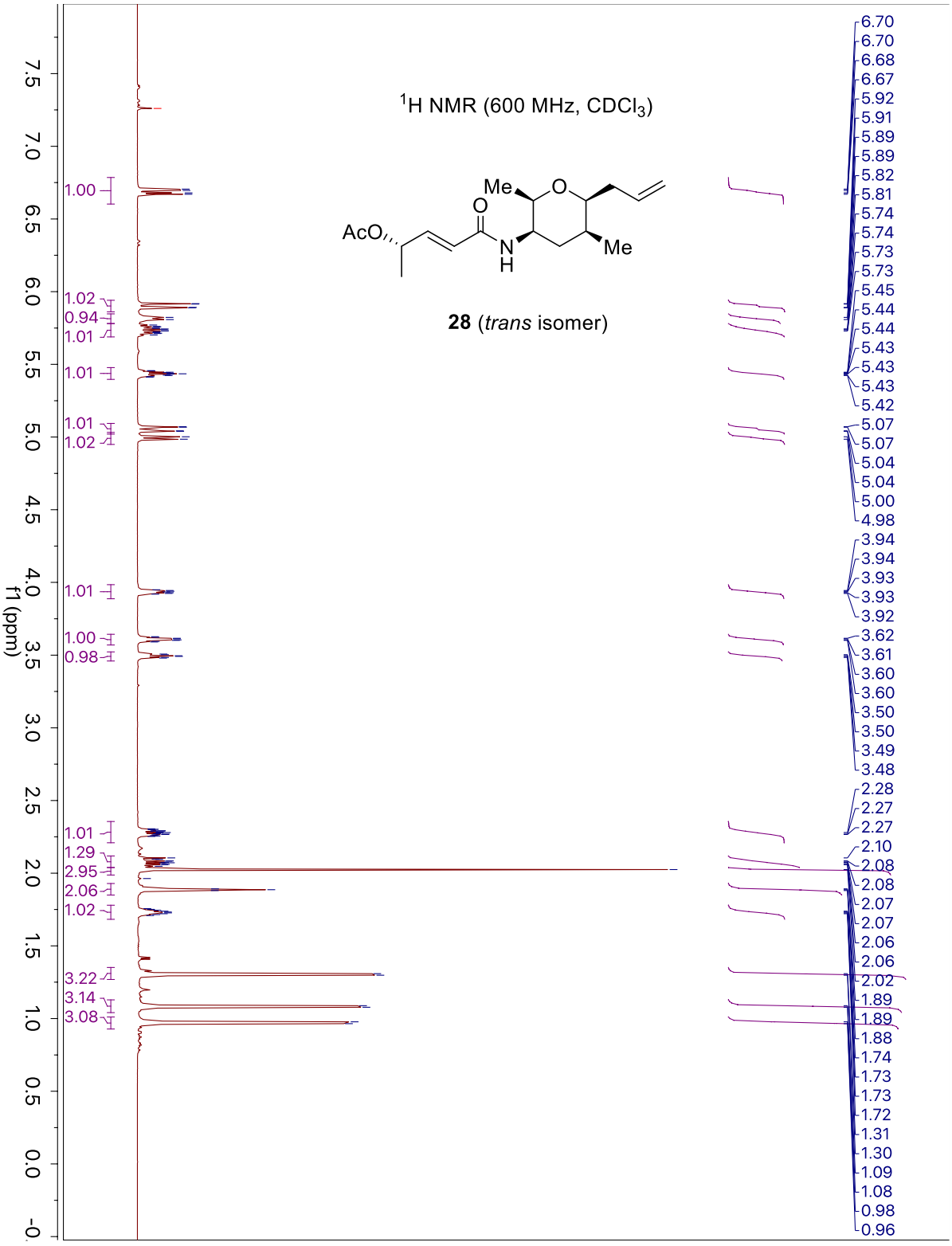

^{13}C NMR (151 MHz, $CDCl_3$)
TBDPSO
CO_2Me
26
166.01
154.06
135.87
134.31
134.20
129.66
127.63
127.55
116.61
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
66.82
51.15
27.10
23.41
19.31
f1 (ppm)

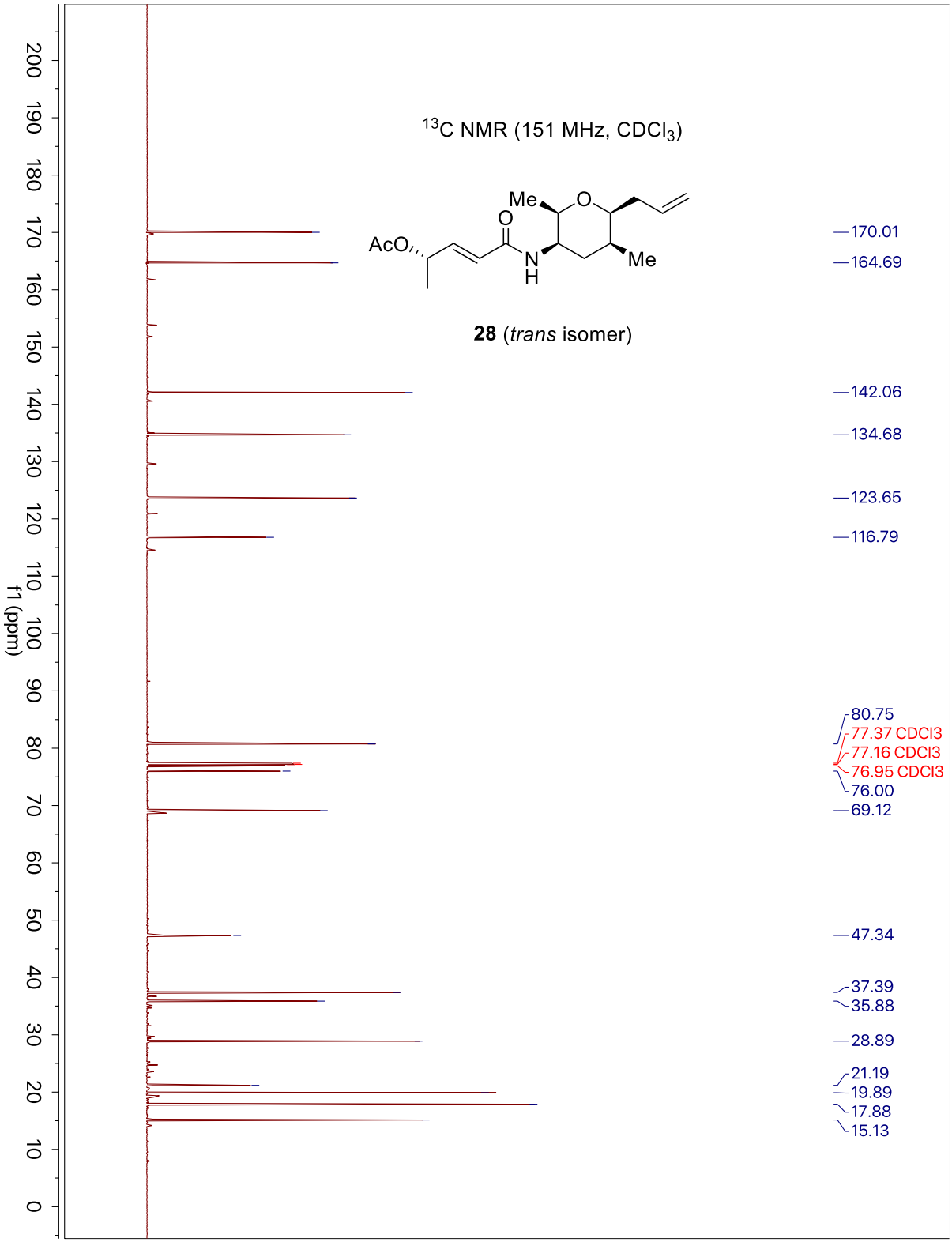

^{1}H NMR (600 MHz, $CDCl_3$)
TBDPSO
CO_2H
27
4.05
6.75
1.00
1.03
1.02
3.35
10.61
f1 (ppm)
7.26 CDCl3

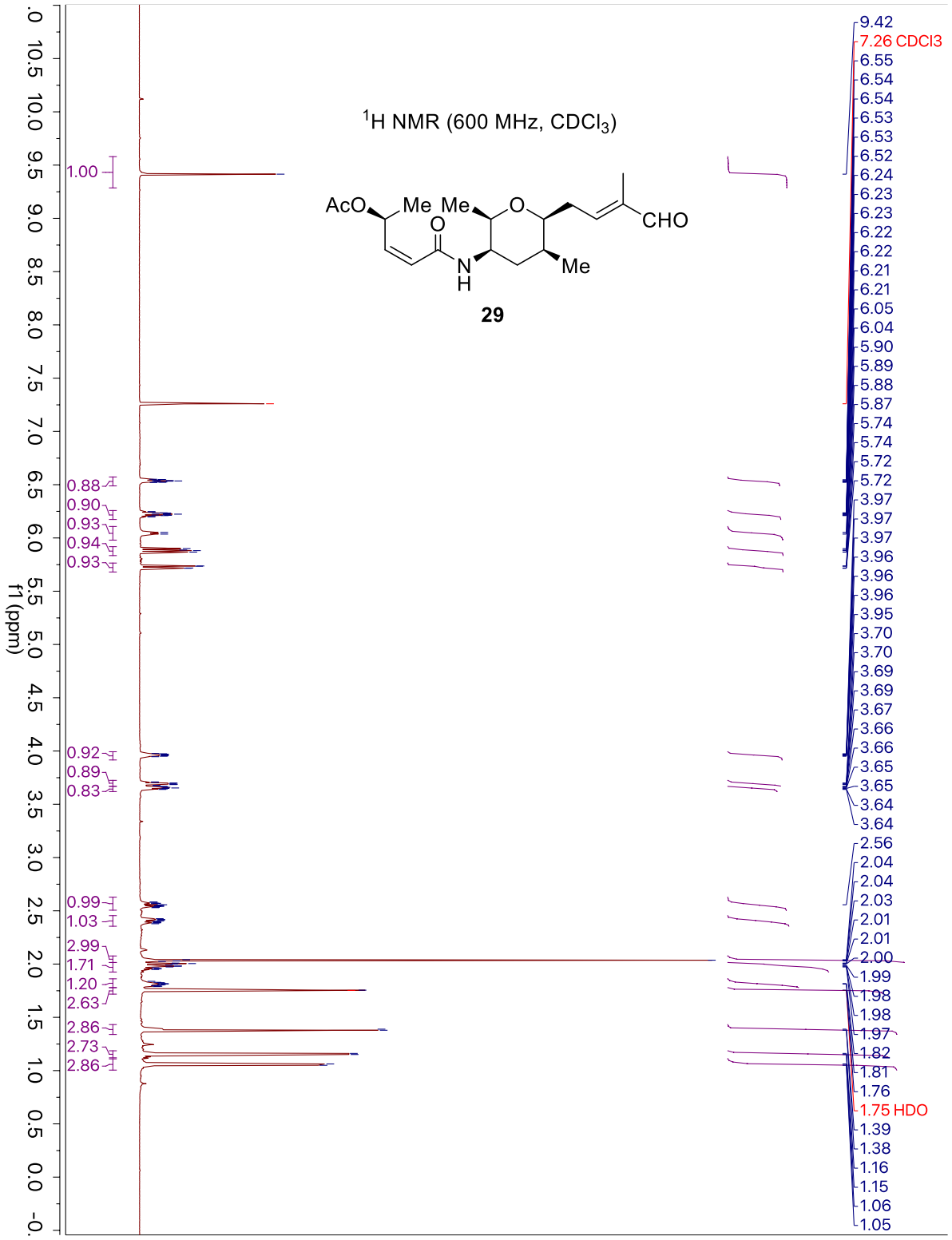

^{13}C NMR (151 MHz, $CDCl_3$)
TBDPSO
CO_2H
27
170.95
156.23
135.91
135.86
134.94
134.15
133.94
129.80
127.86
127.69
127.64
116.51
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
66.70
27.10
23.31
19.30
f1 (ppm)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

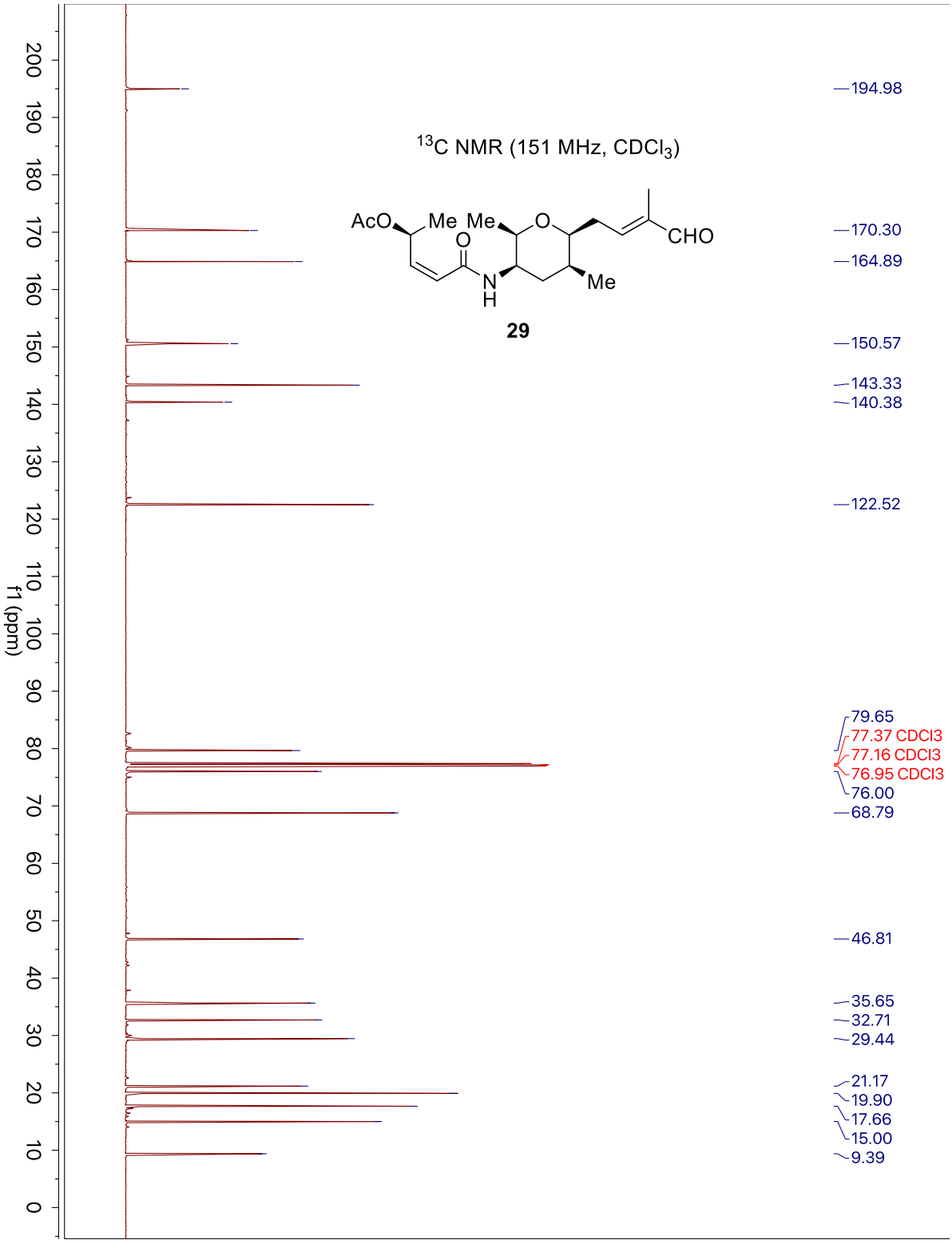

^{1}H NMR (600 MHz, $CDCl_3$)
AcO
Me
Me
O
O
N
H
Me
28
f1 (ppm)
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1.00
1.07
1.12
1.08
1.00
1.03
1.02
1.00
1.02
0.96
1.05
1.11
3.25
1.95
1.07
3.54
3.32
3.15
6.22
6.21
6.20
6.01
5.99
5.85
5.84
5.83
5.82
5.75
5.73
5.72
5.68
5.66
5.06
5.03
4.99
4.97
3.89
3.89
3.88
3.88
3.88
3.87
3.87
3.61
3.61
3.60
3.60
3.49
3.49
3.48
3.48
3.47
3.46
2.28
2.27
2.26
2.25
2.08
2.07
2.06
2.05
1.99
1.98 HDO
1.93
1.91
1.90
1.90
1.89
1.88
1.88
1.73
1.72
1.72
1.72
1.71
1.71
1.33
1.32
1.09
1.08
0.97
0.95

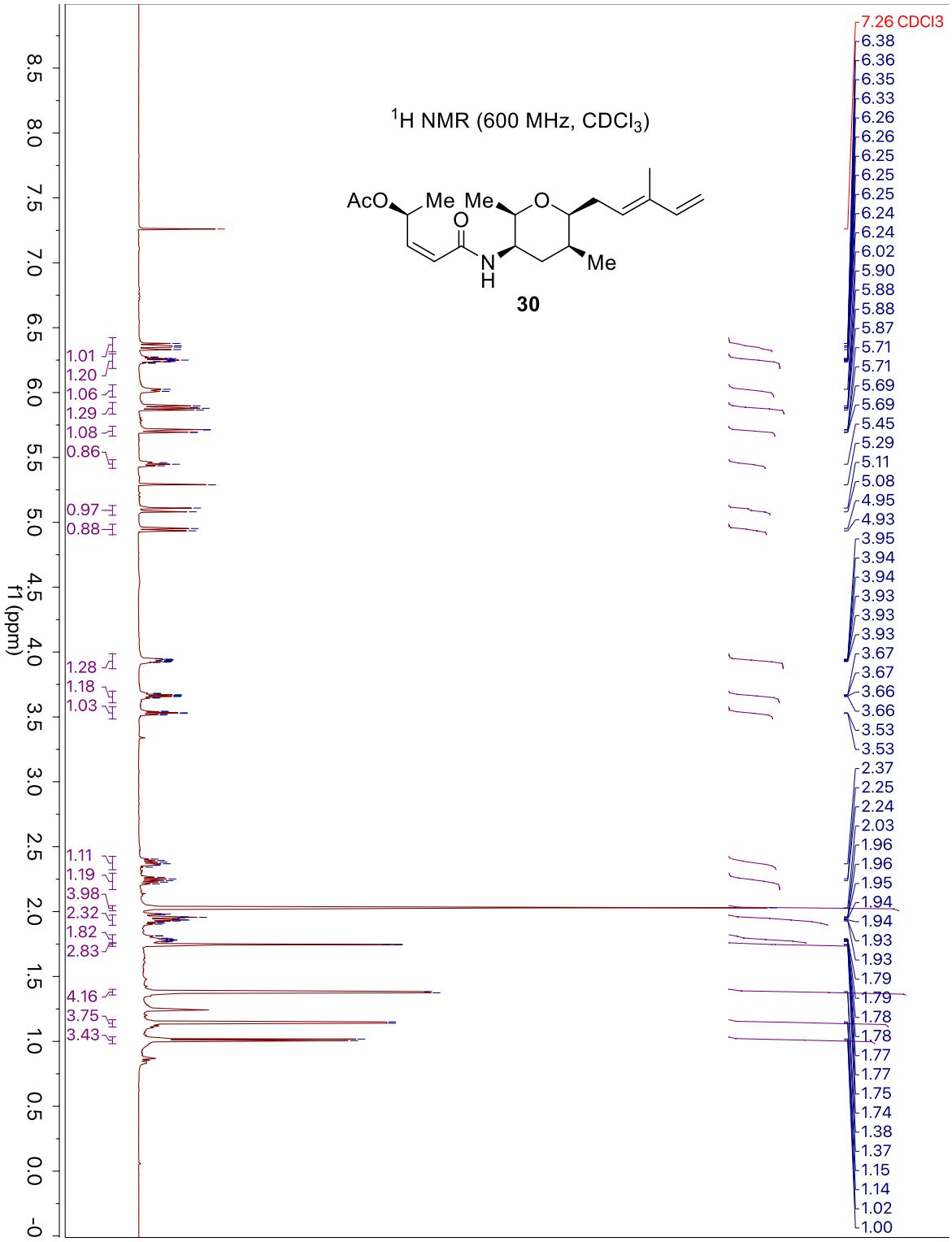

^{13}C NMR (151 MHz, $CDCl_3$)
AcO
Me
Me
O
O
N
H
Me
28
f1 (ppm)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
170.29
164.82
143.61
134.69
122.50
116.73
80.73
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
75.92
68.88
47.08
37.35
35.86
28.83
21.22
19.97
17.81
14.92

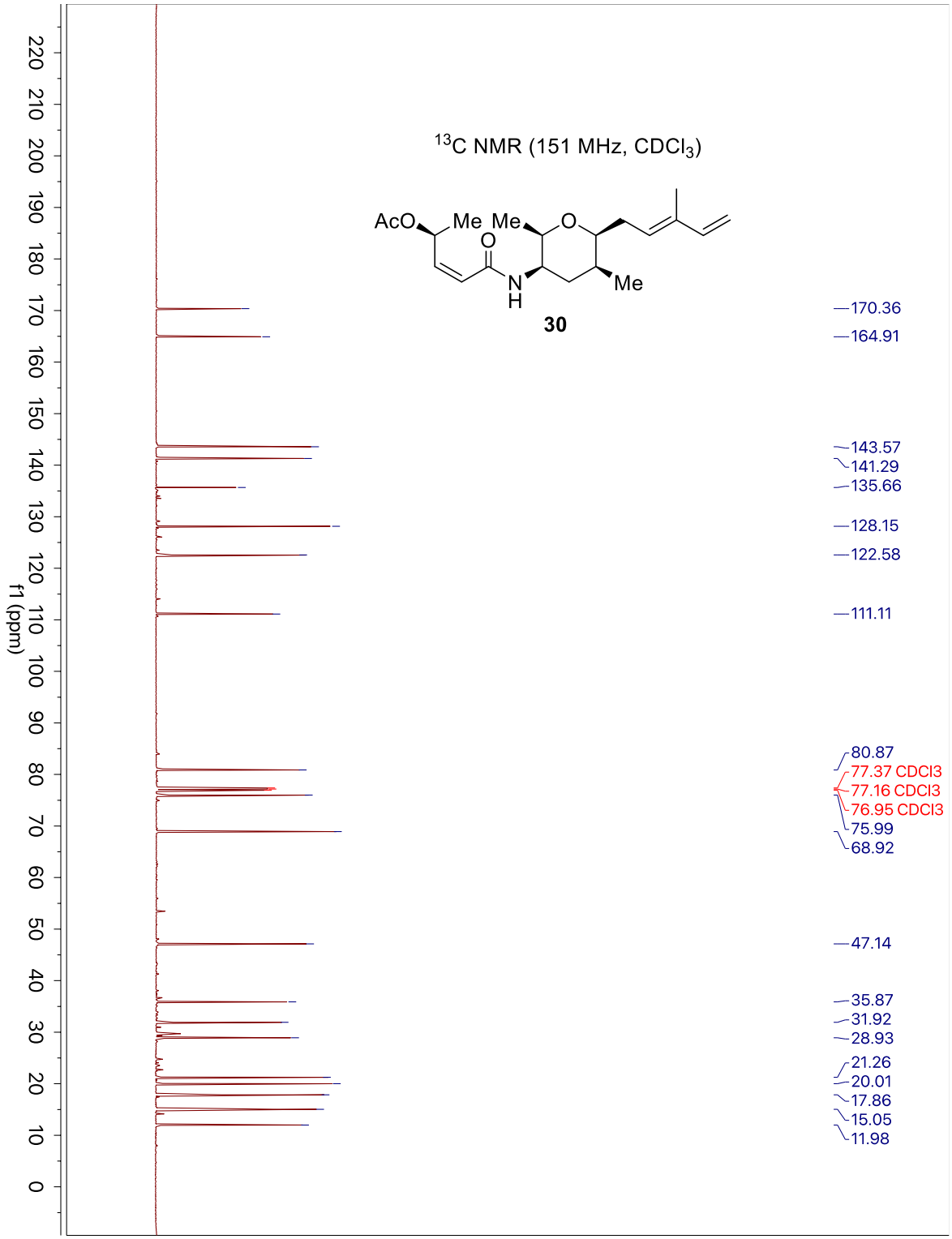

^{1}H NMR (600 MHz, $CDCl_3$)
Me
O
AcO
O
N
H
Me
28 (*trans* isomer)
f1 (ppm)
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.
1.00
1.02
0.94
1.01
1.01
1.01
1.02
1.01
1.00
0.98
1.01
1.29
2.95
2.06
1.02
3.22
3.14
3.08
6.70
6.70
6.68
6.67
5.92
5.91
5.89
5.89
5.82
5.81
5.74
5.74
5.73
5.73
5.45
5.44
5.44
5.43
5.43
5.43
5.42
5.07
5.07
5.04
5.04
5.00
4.98
3.94
3.94
3.93
3.93
3.92
3.62
3.61
3.60
3.60
3.50
3.50
3.49
3.48
2.28
2.27
2.27
2.10
2.08
2.08
2.07
2.07
2.06
2.06
2.02
1.89
1.89
1.88
1.74
1.73
1.73
1.72
1.31
1.30
1.09
1.08
0.98
0.96


^{13}C NMR (151 MHz, $CDCl_3$)
Me
O
O
AcO
N
H
Me
28 (trans isomer)
170.01
164.69
142.06
134.68
123.65
116.79
80.75
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
76.00
69.12
47.34
37.39
35.88
28.89
21.19
19.89
17.88
15.13
f1 (ppm)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

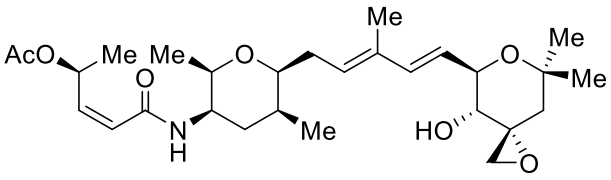

^{1}H NMR (600 MHz, $CDCl_3$)
AcO
Me
Me
O
O
CHO
N
H
Me
29
f1 (ppm)
1.00
0.88
0.90
0.93
0.94
0.93
0.92
0.89
0.83
0.99
1.03
2.99
1.71
1.20
2.63
2.86
2.73
2.86
9.42
7.26 CDCl3
1.75 HDO


^{13}C NMR (151 MHz, CDCl$_3$)
AcO
Me
Me
O
O
CHO
N
H
Me
29
f1 (ppm)
194.98
170.30
164.89
150.57
143.33
140.38
122.52
79.65
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
76.00
68.79
46.81
35.65
32.71
29.44
21.17
19.90
17.66
15.00
9.39


^{1}H NMR (600 MHz, $CDCl_3$)
AcO
Me
Me
O
O
N
H
Me
30
f1 (ppm)
7.26 CDCl3
1.01
1.20
1.06
1.29
1.08
0.86
0.97
0.88
1.28
1.18
1.03
1.11
1.19
3.98
2.32
1.82
2.83
4.16
3.75
3.43

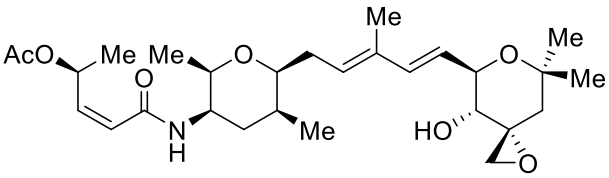

^{13}C NMR (151 MHz, $CDCl_3$)
AcO
Me
Me
O
O
N
H
Me
30
f1 (ppm)
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
170.36
164.91
143.57
141.29
135.66
128.15
122.58
111.11
80.87
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
75.99
68.92
47.14
35.87
31.92
28.93
21.26
20.01
17.86
15.05
11.98

^{1}H NMR (400 MHz, CD_2Cl_2)

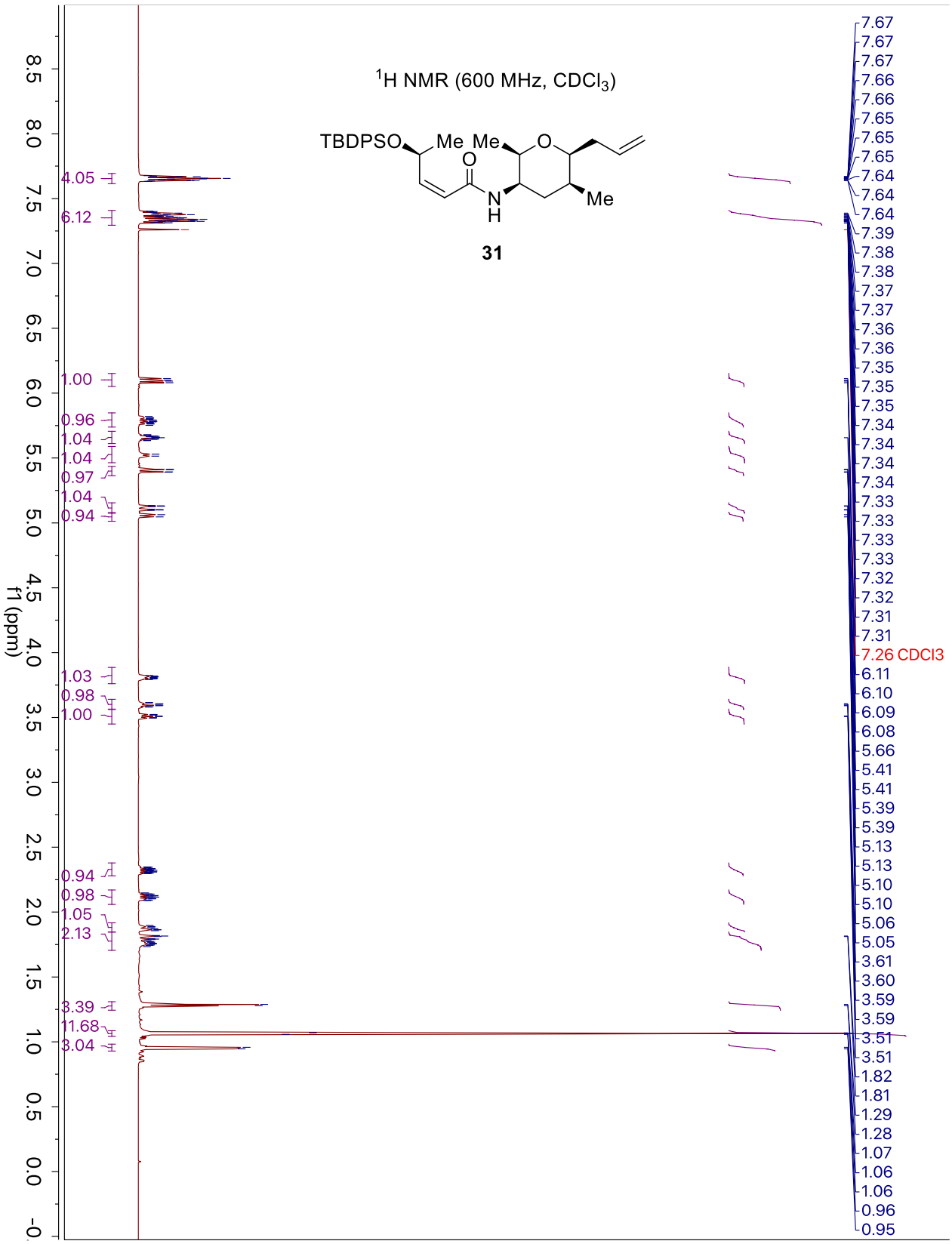


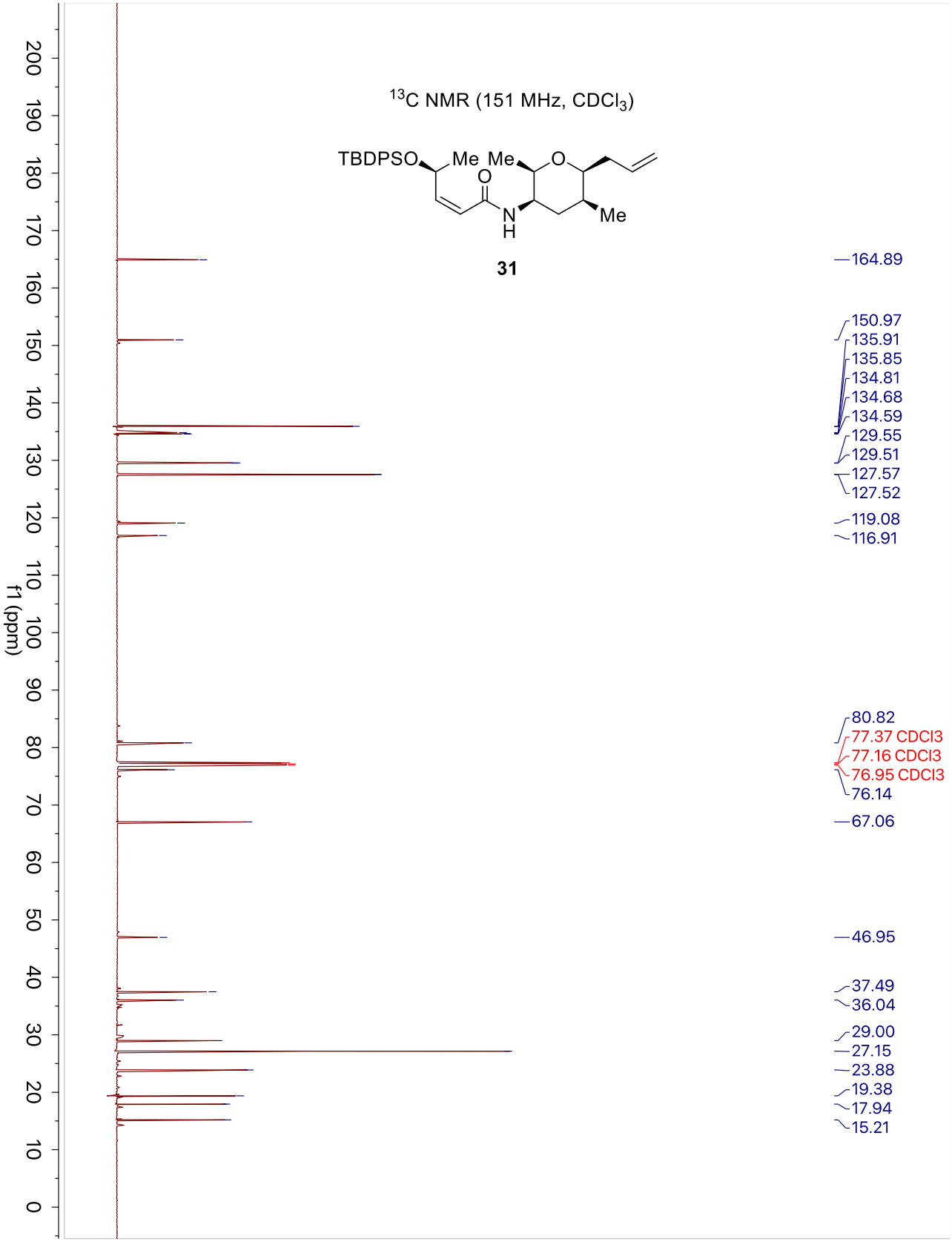
Meayamycin, **1**

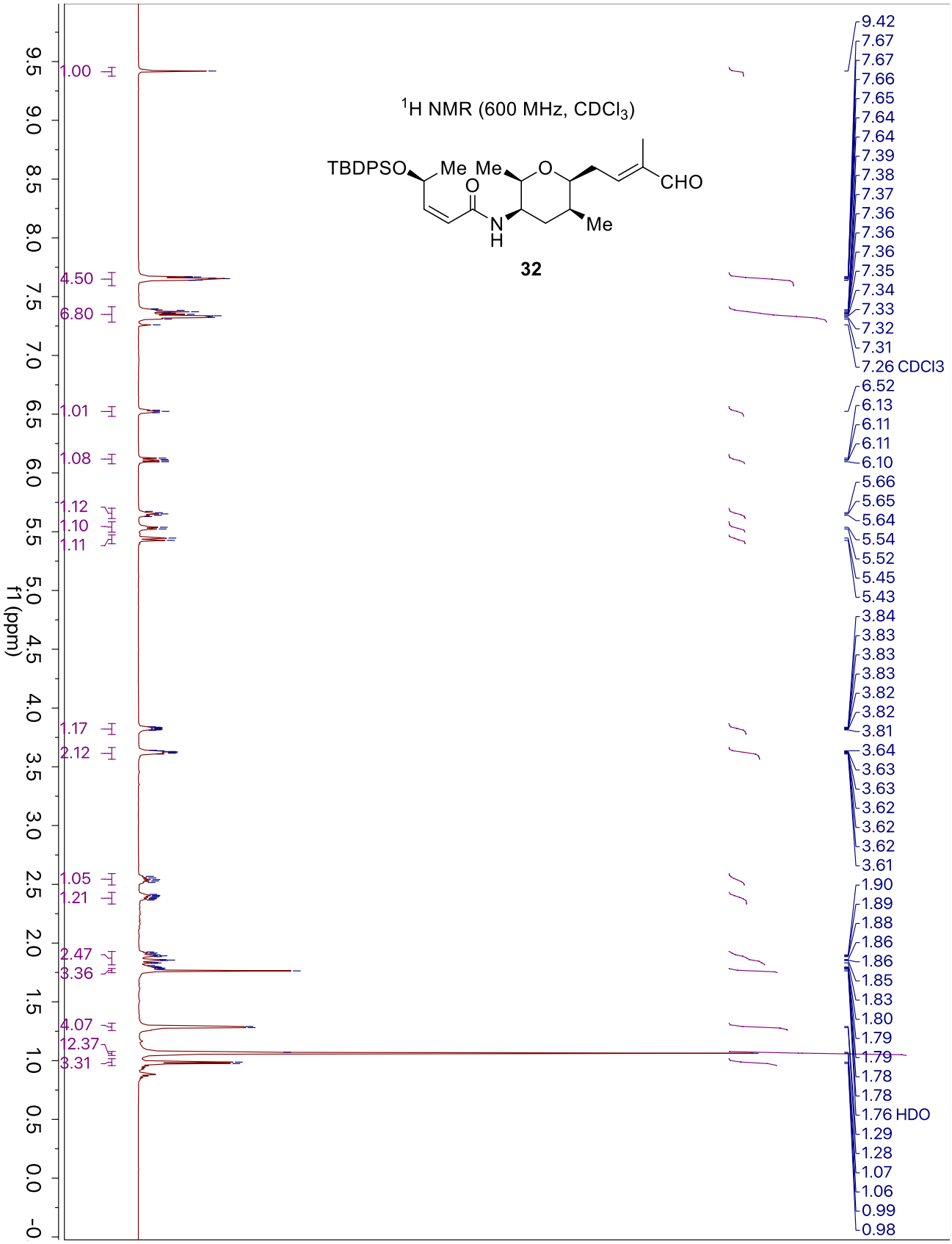
^{1}H NMR (300 MHz, CD_2Cl_2)

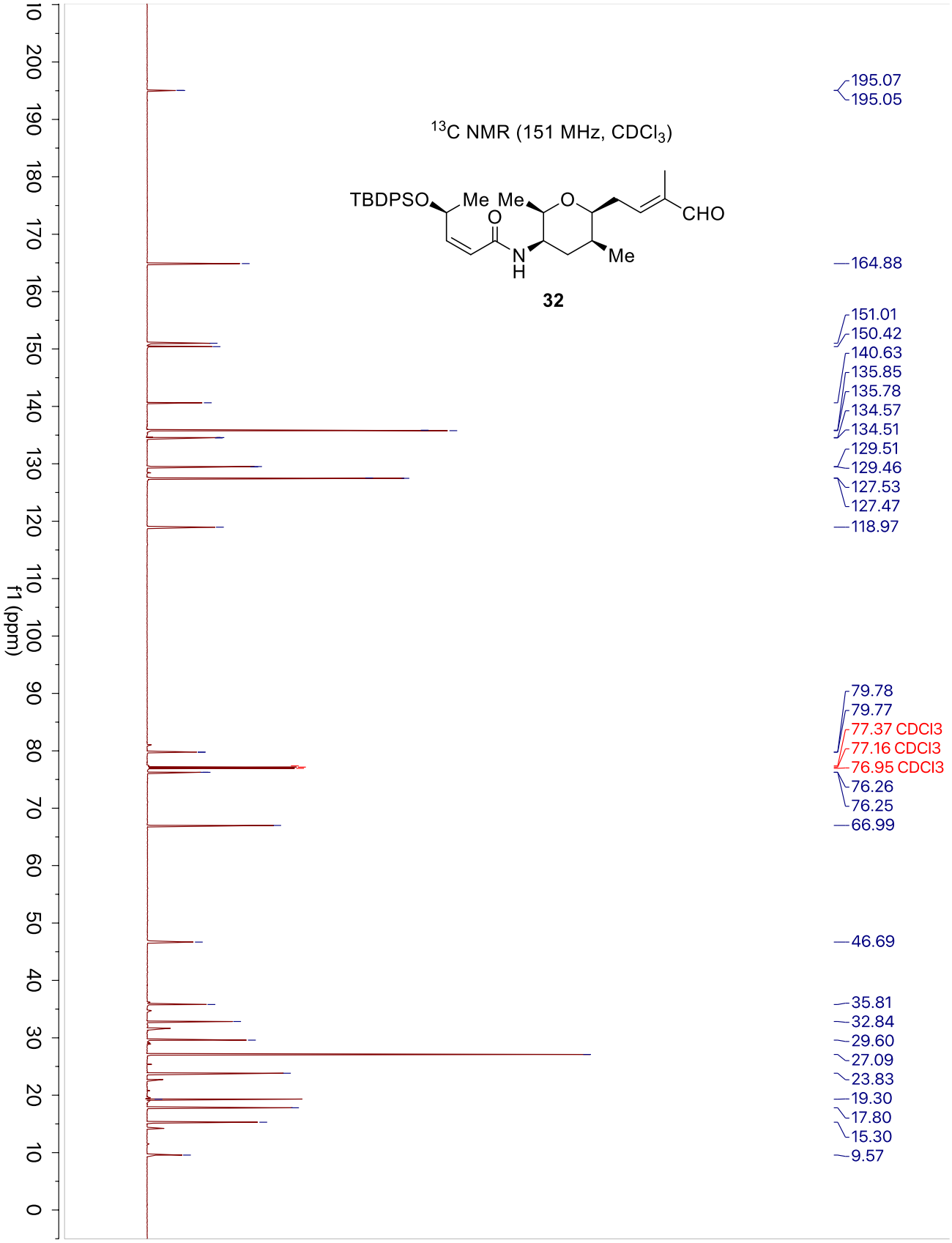


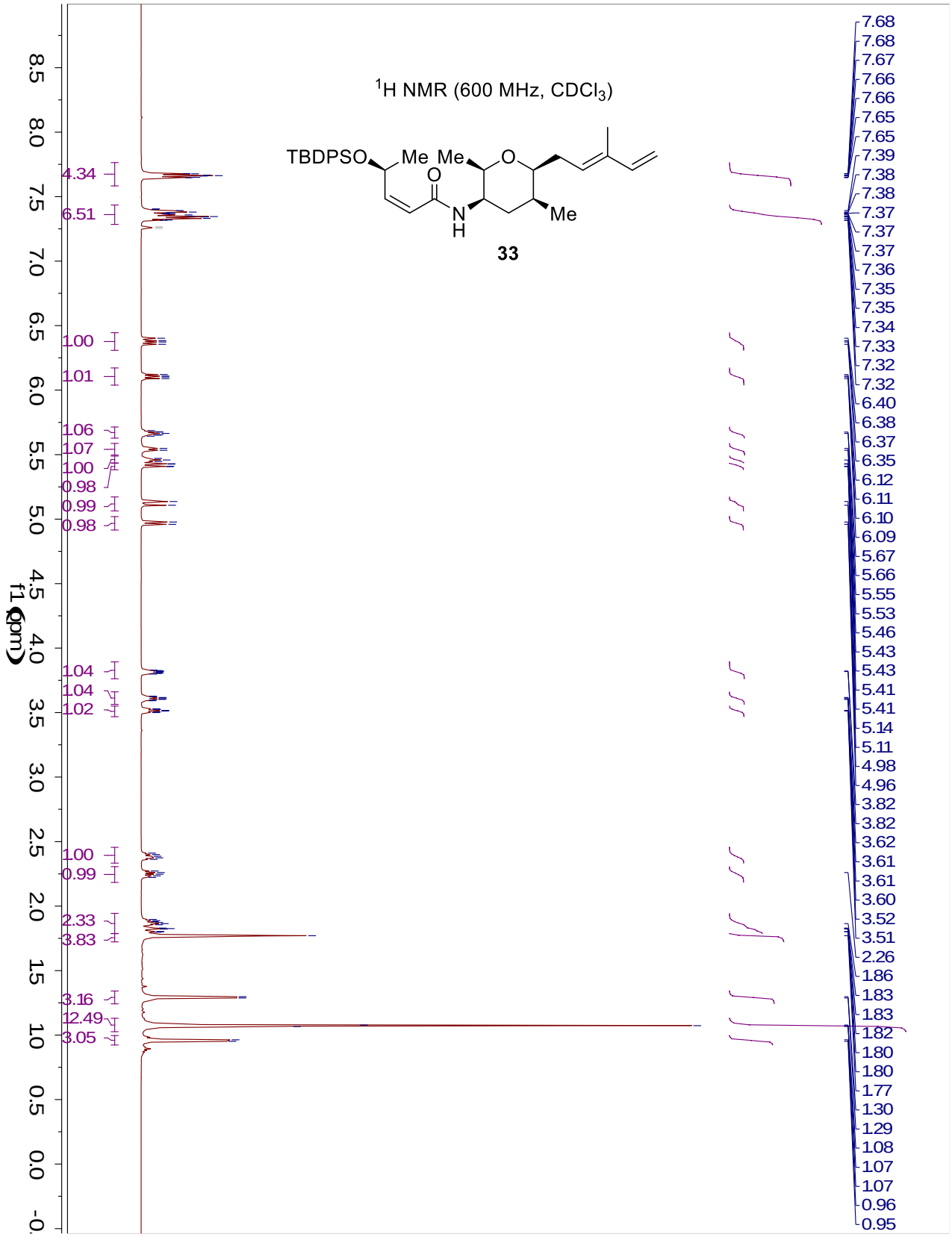
Meayamycin (*JACS* **2007**, *129*, 2648–2659)

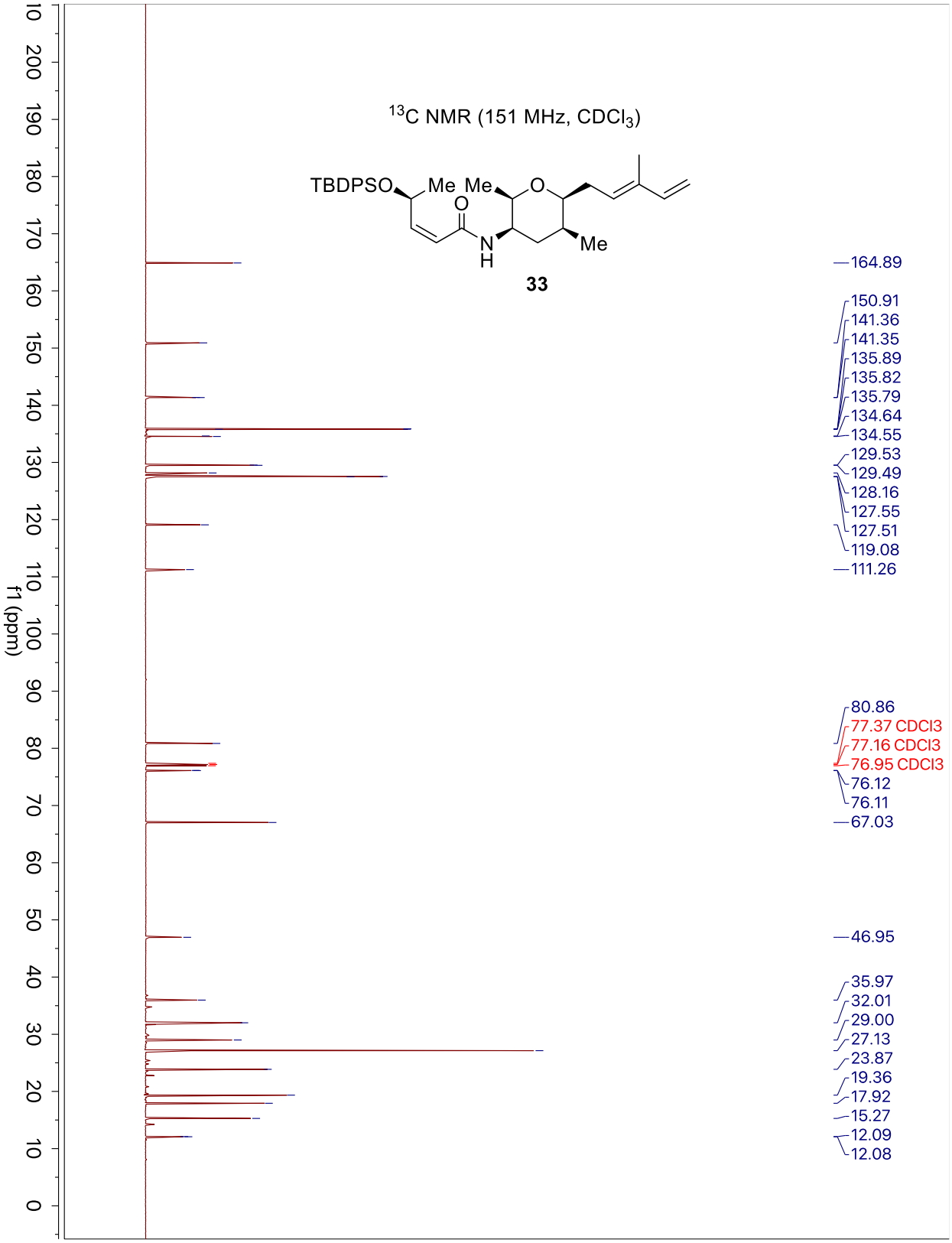

^{1}H NMR (600 MHz, $CDCl_3$)
TBDPSO
Me
Me
O
O
N
H
Me
31
f1 (ppm)
4.05
6.12
1.00
0.96
1.04
1.04
0.97
1.04
0.94
1.03
0.98
1.00
0.94
0.98
1.05
2.13
3.39
11.68
3.04
7.26 CDCl3

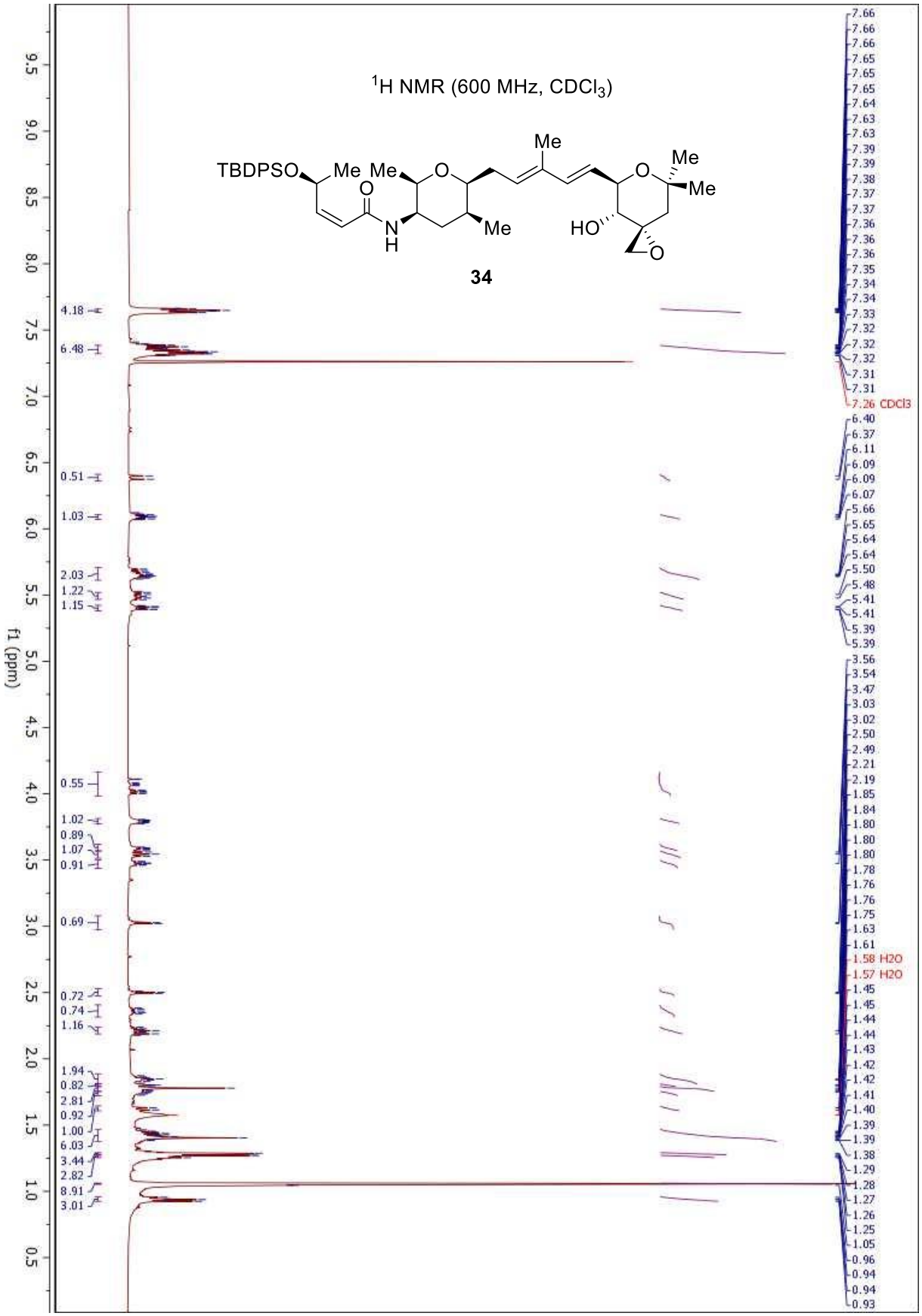

^{13}C NMR (151 MHz, $CDCl_3$)
TBDPSO
Me
Me
O
O
N
H
Me
31
f1 (ppm)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
164.89
150.97
135.91
135.85
134.81
134.68
134.59
129.55
129.51
127.57
127.52
119.08
116.91
80.82
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
76.14
67.06
46.95
37.49
36.04
29.00
27.15
23.88
19.38
17.94
15.21

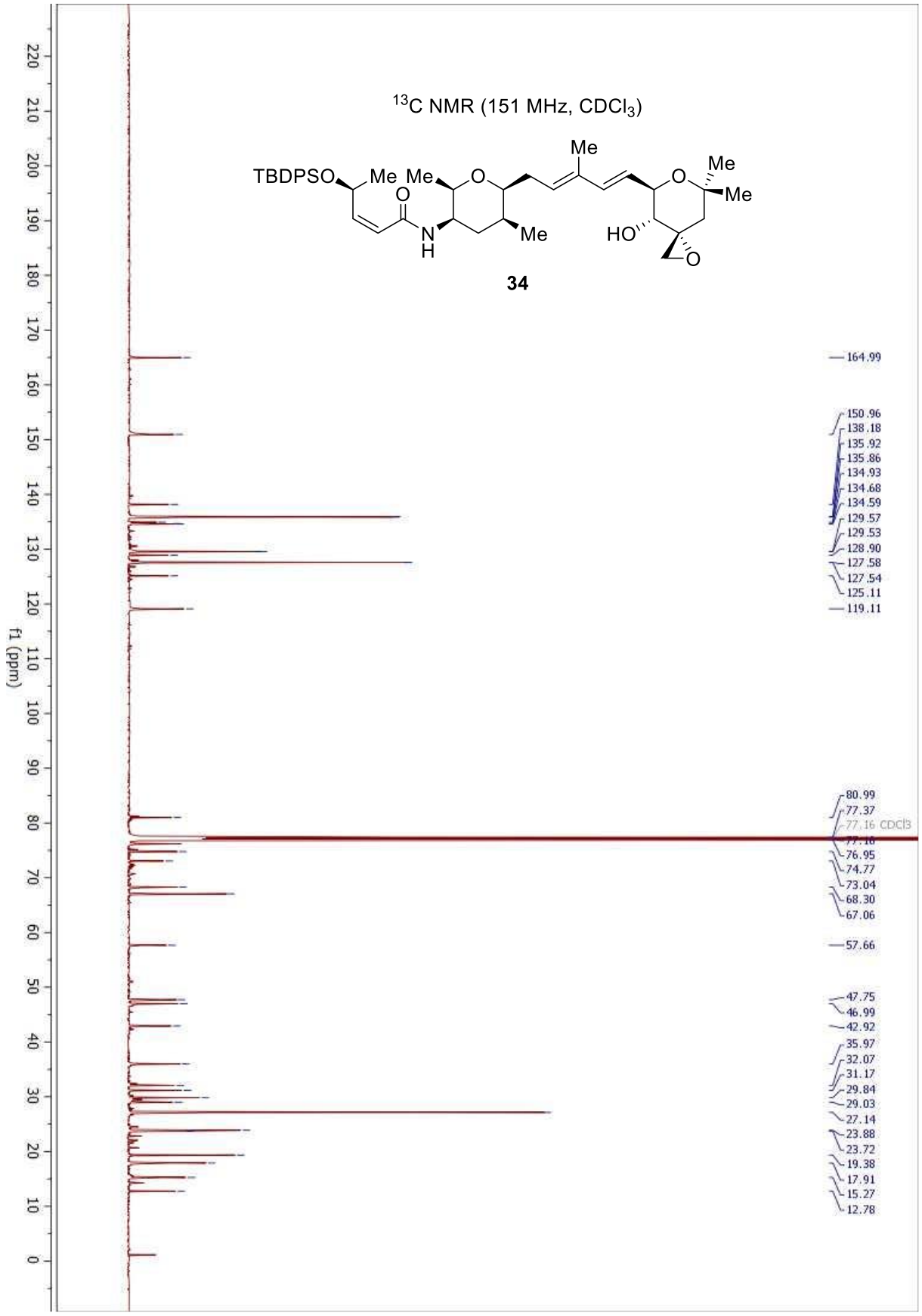

^{1}H NMR (600 MHz, $CDCl_3$)
TBDPSO
Me
Me
O
O
CHO
N
H
Me
32
f1 (ppm)
1.00
4.50
6.80
1.01
1.08
1.12
1.10
1.11
1.17
2.12
1.05
1.21
2.47
3.36
4.07
12.37
3.31
9.42
7.67
7.67
7.66
7.65
7.64
7.64
7.39
7.38
7.37
7.36
7.36
7.36
7.35
7.34
7.33
7.32
7.31
7.26 CDCl3
6.52
6.13
6.11
6.11
6.10
5.66
5.65
5.64
5.54
5.52
5.45
5.43
3.84
3.83
3.83
3.83
3.82
3.82
3.81
3.64
3.63
3.63
3.62
3.62
3.62
3.61
1.90
1.89
1.88
1.86
1.86
1.85
1.83
1.80
1.79
1.79
1.78
1.78
1.76 HDO
1.29
1.28
1.07
1.06
0.99
0.98


^{13}C NMR (151 MHz, $CDCl_3$)
TBDPSO
Me
Me
O
O
CHO
N
H
Me
32
f1 (ppm)
195.07
195.05
164.88
151.01
150.42
140.63
135.85
135.78
134.57
134.51
129.51
129.46
127.53
127.47
118.97
79.78
79.77
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
76.26
76.25
66.99
46.69
35.81
32.84
29.60
27.09
23.83
19.30
17.80
15.30
9.57

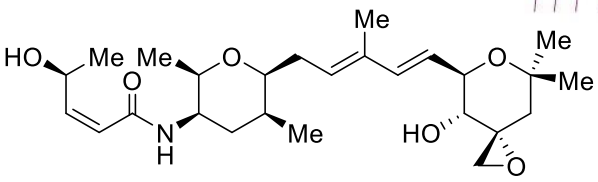

^{1}H NMR (600 MHz, $CDCl_3$)
TBDPSO
Me
Me
O
O
N
H
Me
33
f1 (ppm)
4.34
6.51
1.00
1.01
1.06
1.07
1.00
0.98
0.99
0.98
1.04
1.04
1.02
1.00
0.99
2.33
3.83
3.16
12.49
3.05
7.68
7.68
7.67
7.66
7.66
7.65
7.65
7.39
7.38
7.38
7.37
7.37
7.37
7.36
7.35
7.35
7.34
7.33
7.32
7.32
6.40
6.38
6.37
6.35
6.12
6.11
6.10
6.09
5.67
5.66
5.55
5.53
5.46
5.43
5.43
5.41
5.41
5.14
5.11
4.98
4.96
3.82
3.82
3.62
3.61
3.61
3.60
3.52
3.51
2.26
186
183
183
182
180
180
177
130
129
108
107
107
0.96
0.95


^{13}C NMR (151 MHz, $CDCl_3$)
TBDPSO
Me
Me
O
O
N
H
Me
33
f1 (ppm)
164.89
150.91
141.36
141.35
135.89
135.82
135.79
134.64
134.55
129.53
129.49
128.16
127.55
127.51
119.08
111.26
80.86
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
76.12
76.11
67.03
46.95
35.97
32.01
29.00
27.13
23.87
19.36
17.92
15.27
12.09
12.08


^{1}H NMR (600 MHz, $CDCl_3$)
TBDPSO
Me
Me
O
Me
O
Me
Me
N
H
Me
HO
O
34
f1 (ppm)
7.26 CDCl3
1.58 H2O
1.57 H2O

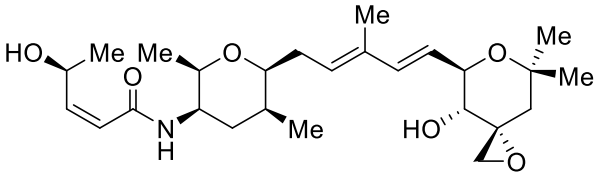

^{13}C NMR (151 MHz, $CDCl_3$)
TBDPSO
Me
Me
O
N
H
Me
O
Me
Me
HO
O
34
f1 (ppm)
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
164.99
150.96
138.18
135.92
135.86
134.93
134.68
134.59
129.57
129.53
128.90
127.58
127.54
125.11
119.11
80.99
77.37
77.16 CDCl3
76.95
74.77
73.04
68.30
67.06
57.66
47.75
46.99
42.92
35.97
32.07
31.17
29.84
29.03
27.14
23.88
23.72
19.38
17.91
15.27
12.78

^{1}H NMR (600 MHz, CD_2Cl_2)



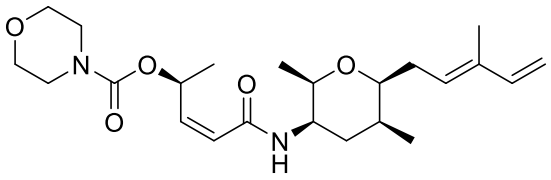
4'-desacetylmeayamycin, **35**

^{1}H NMR (300 MHz, CD_2Cl_2)

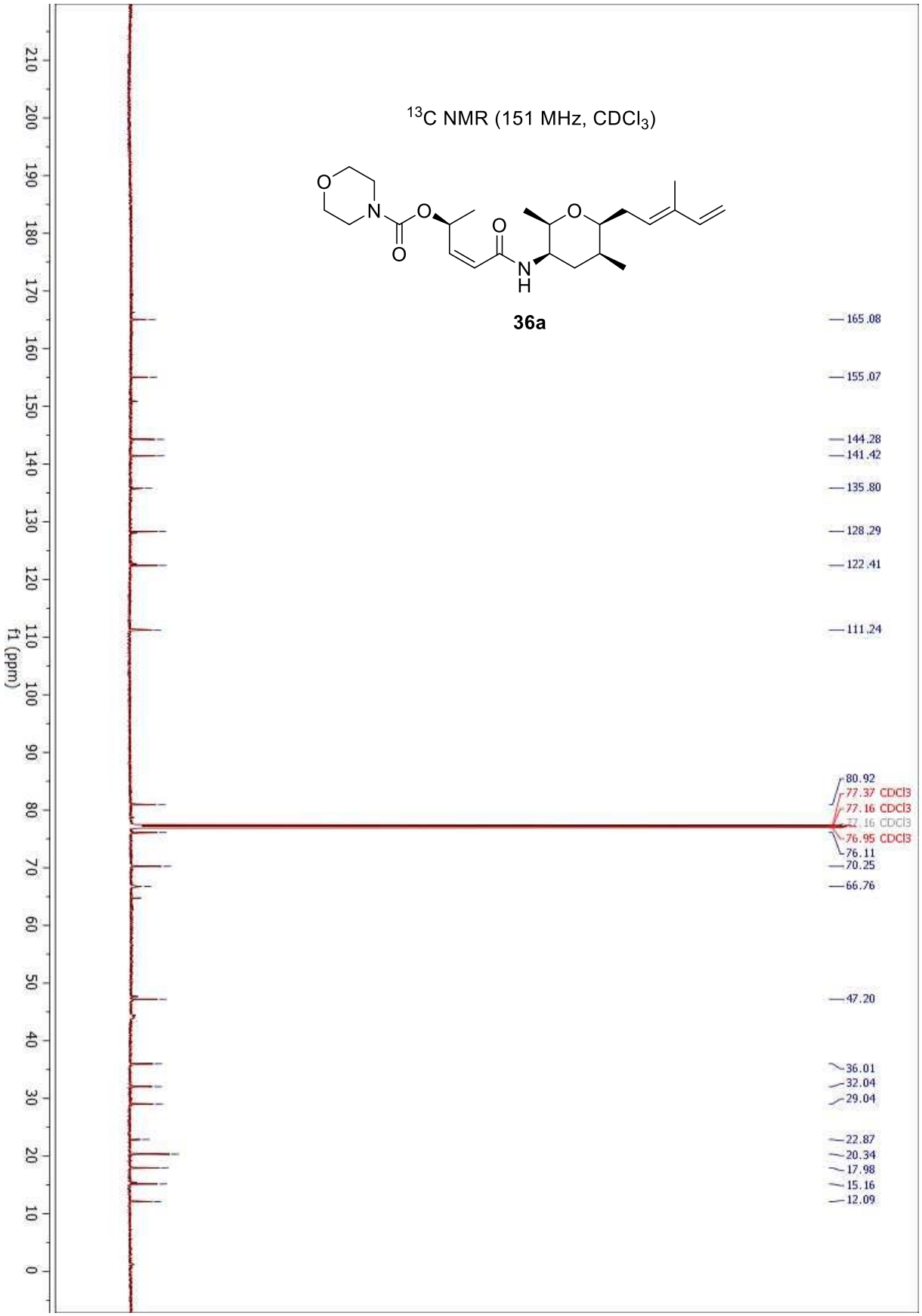


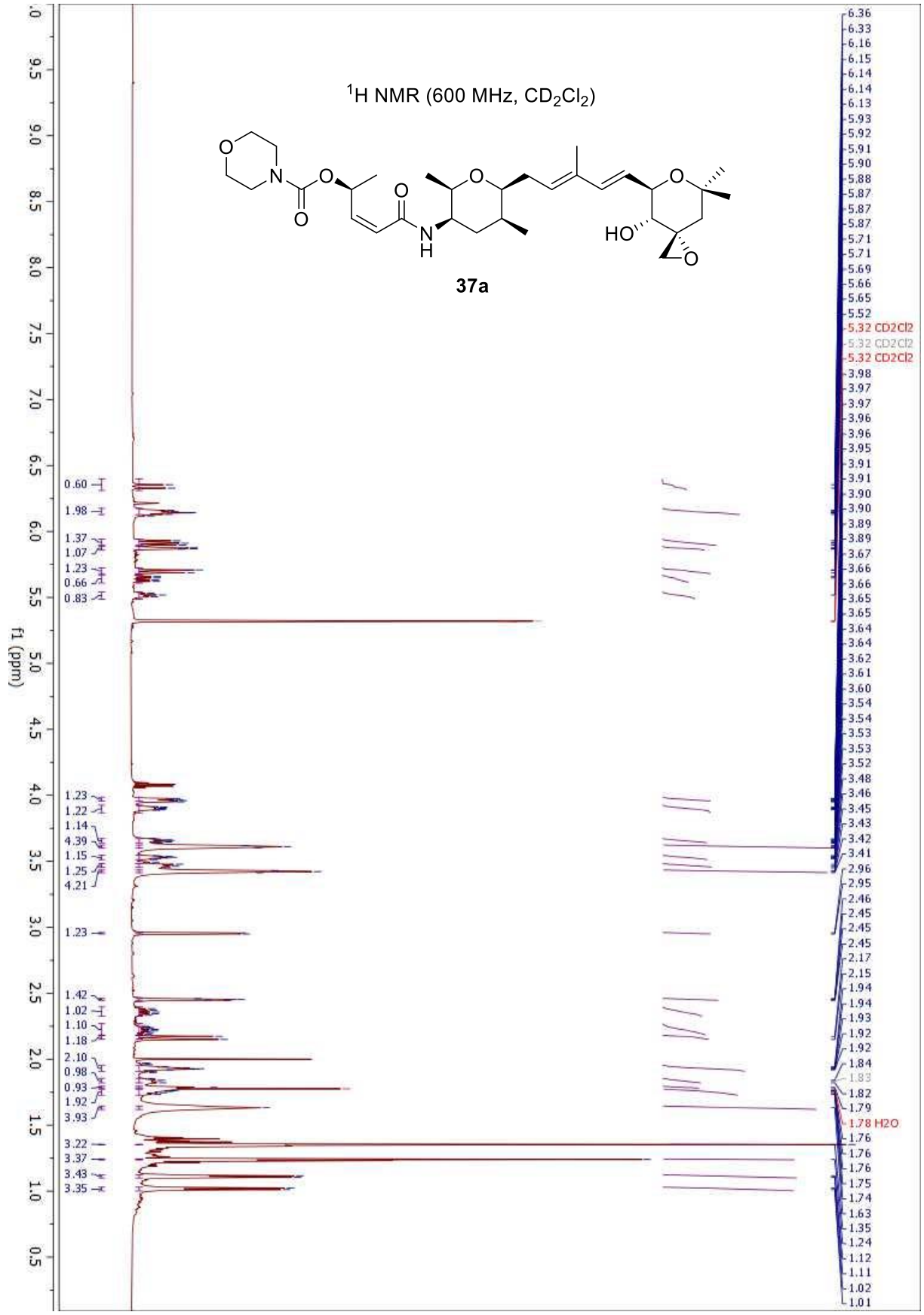
4'-desacetylmeayamycin (*Chem. Eur.* **2011**, *17*, 895-904)

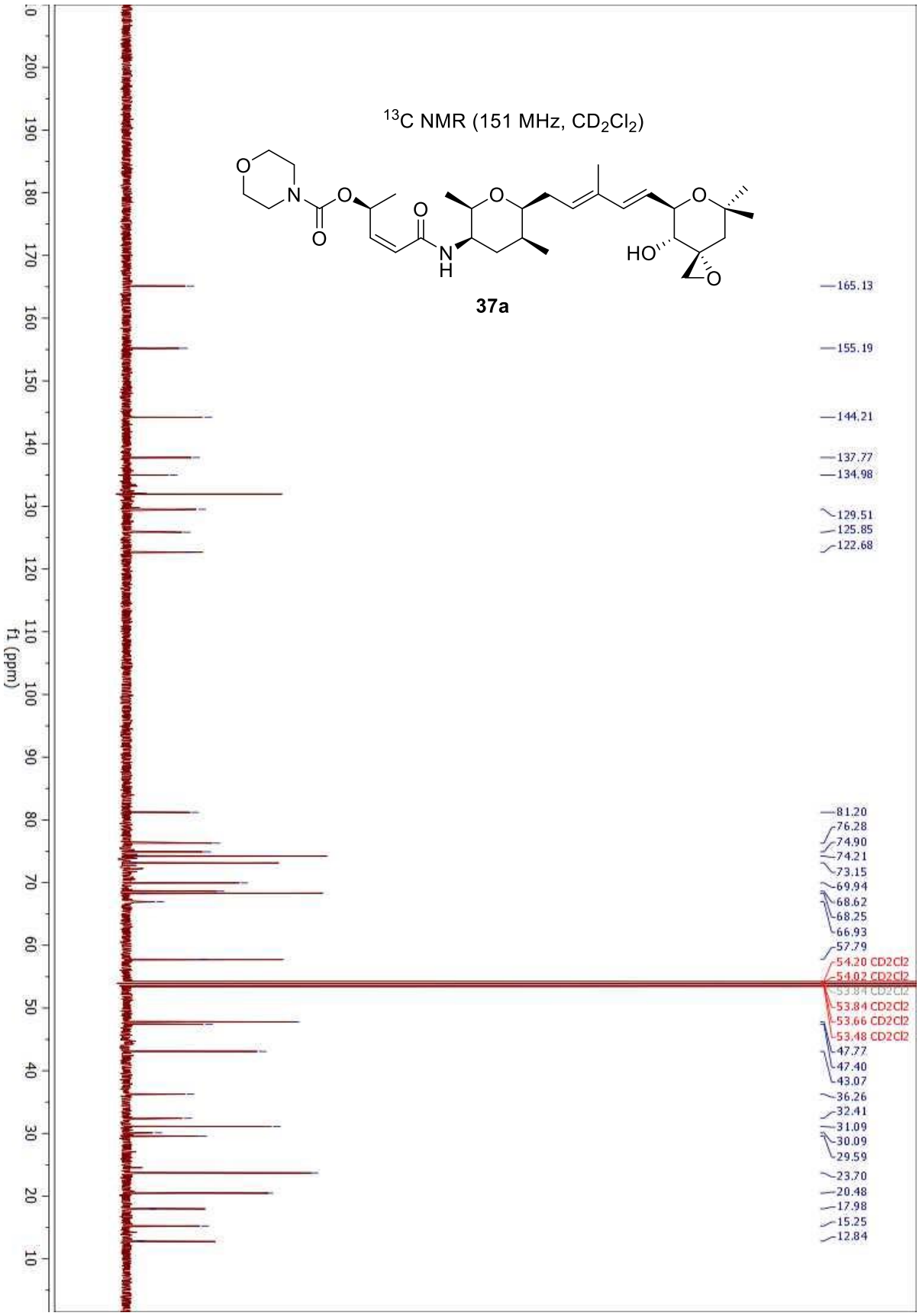
^{1}H NMR (600 MHz, $CDCl_3$)

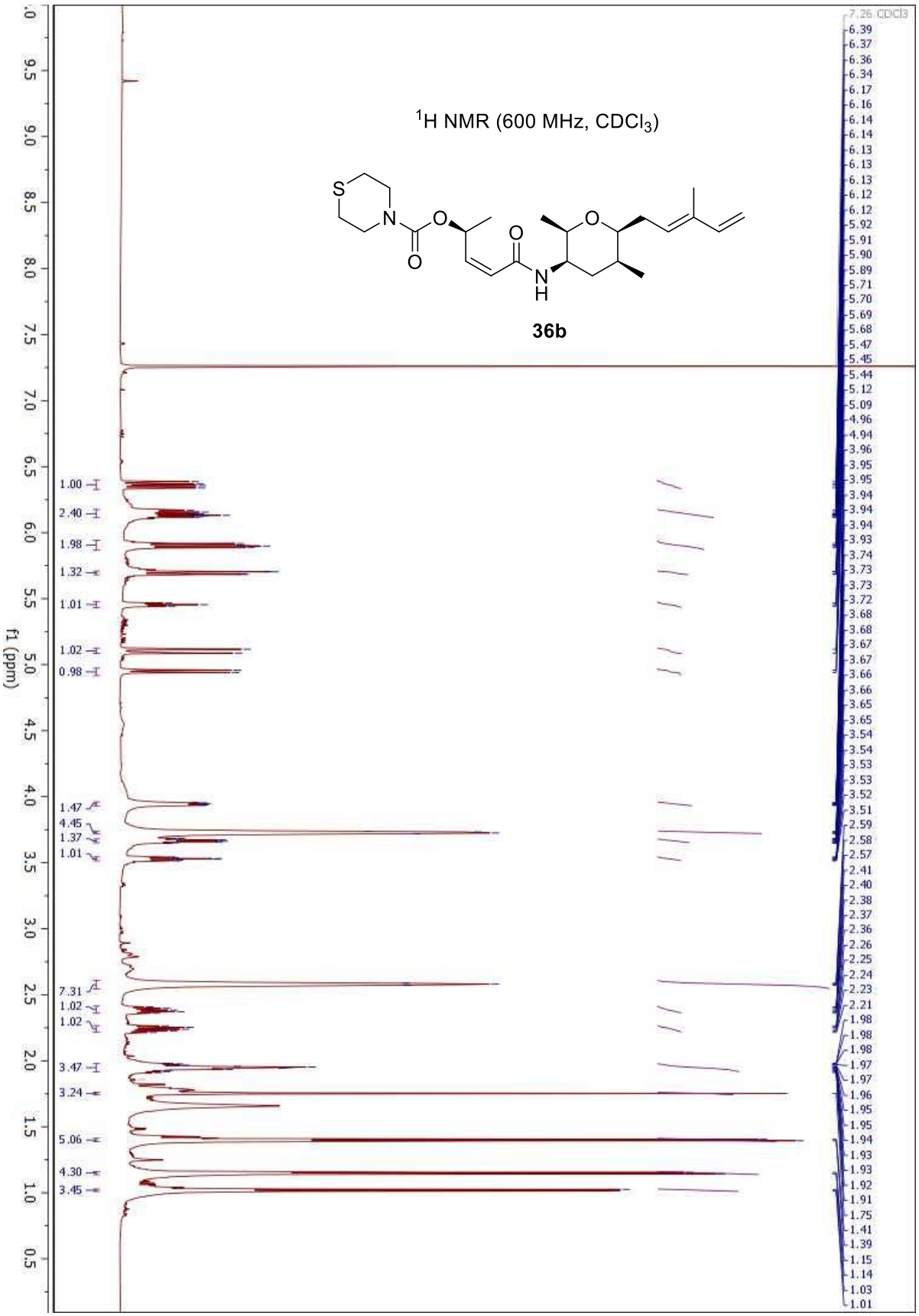


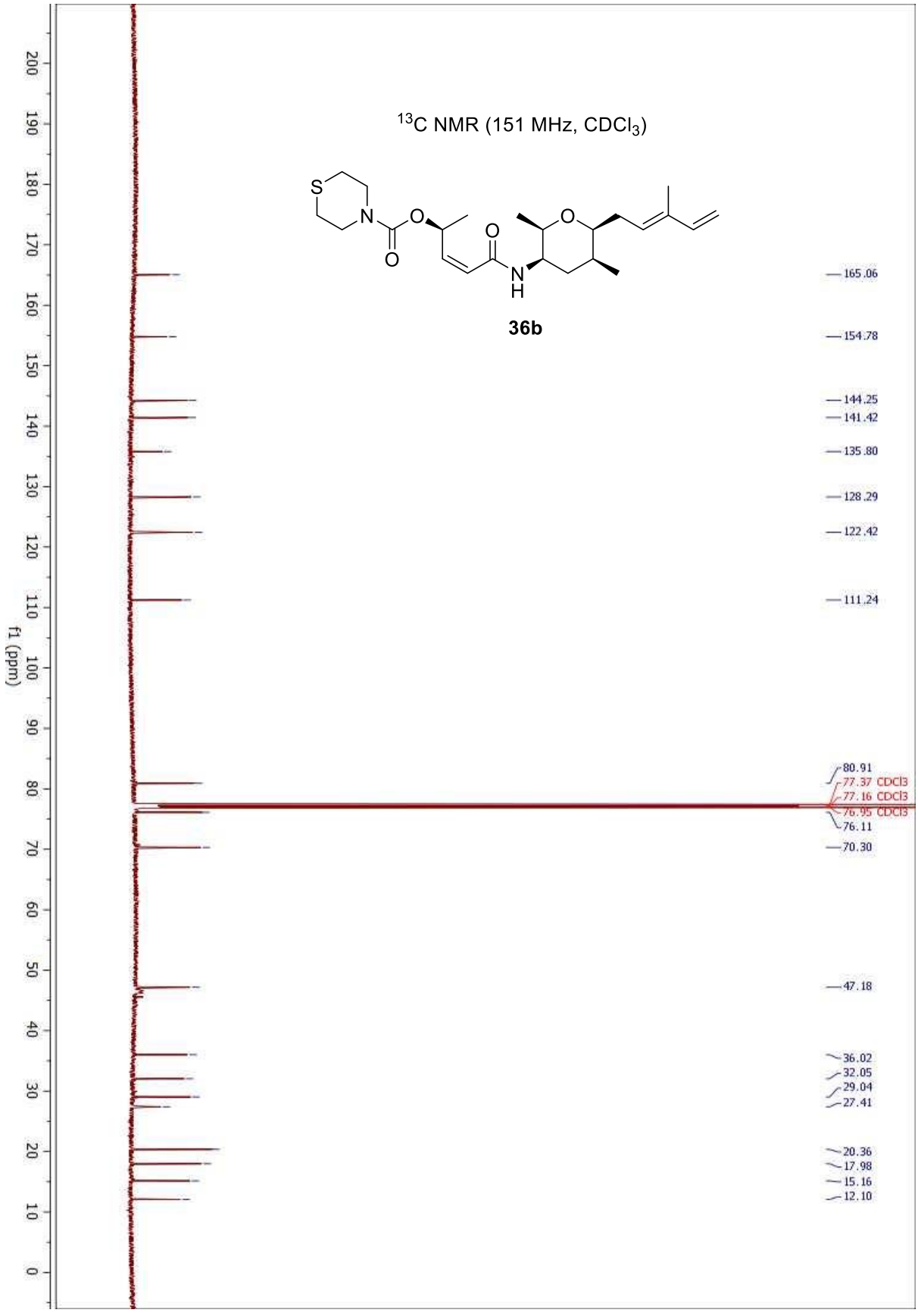
36a

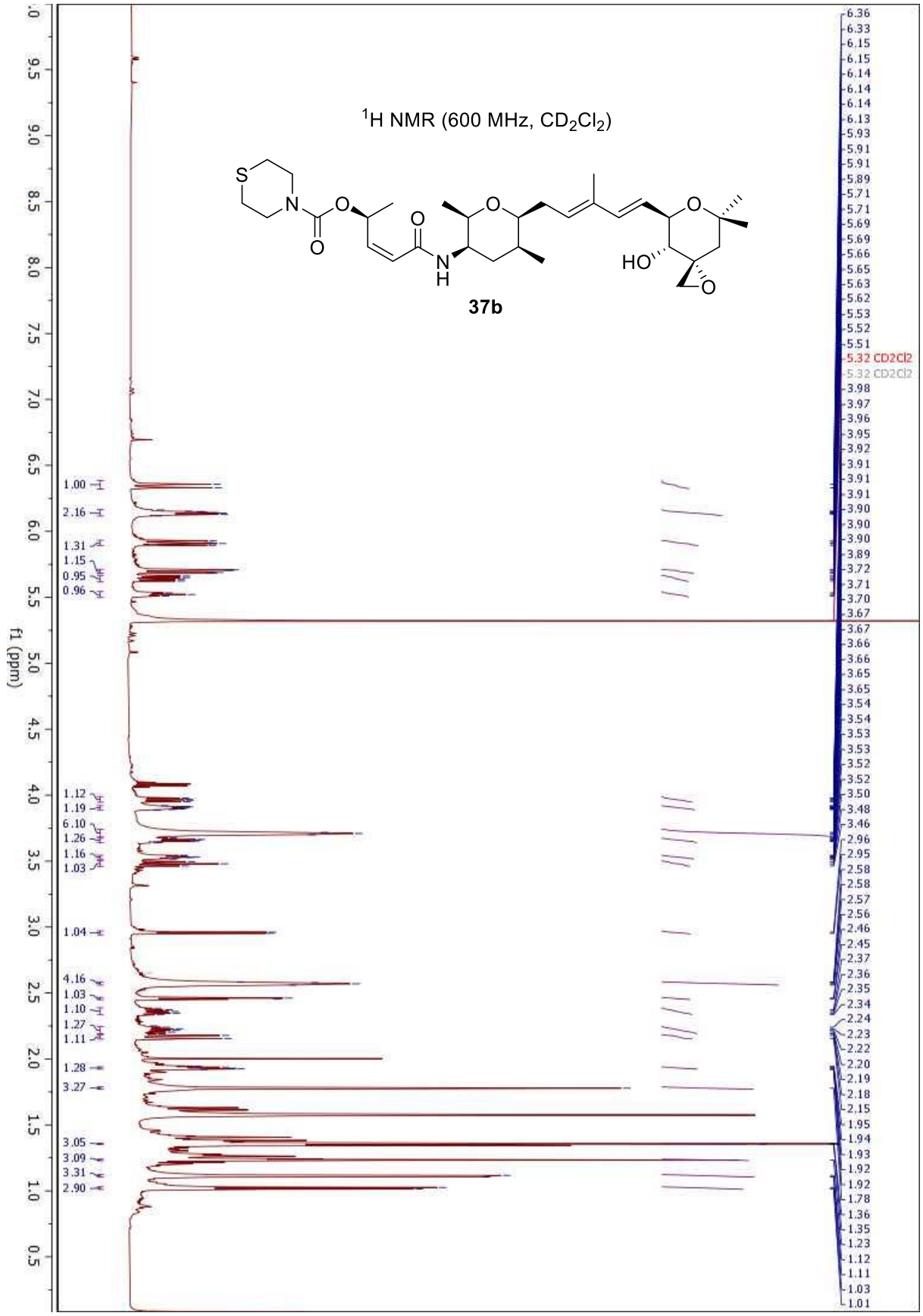

^{13}C NMR (151 MHz, $CDCl_3$)
36a
165.08
155.07
144.28
141.42
135.80
128.29
122.41
111.24
80.92
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
76.11
70.25
66.76
47.20
36.01
32.04
29.04
22.87
20.34
17.98
15.16
12.09
f1 (ppm)

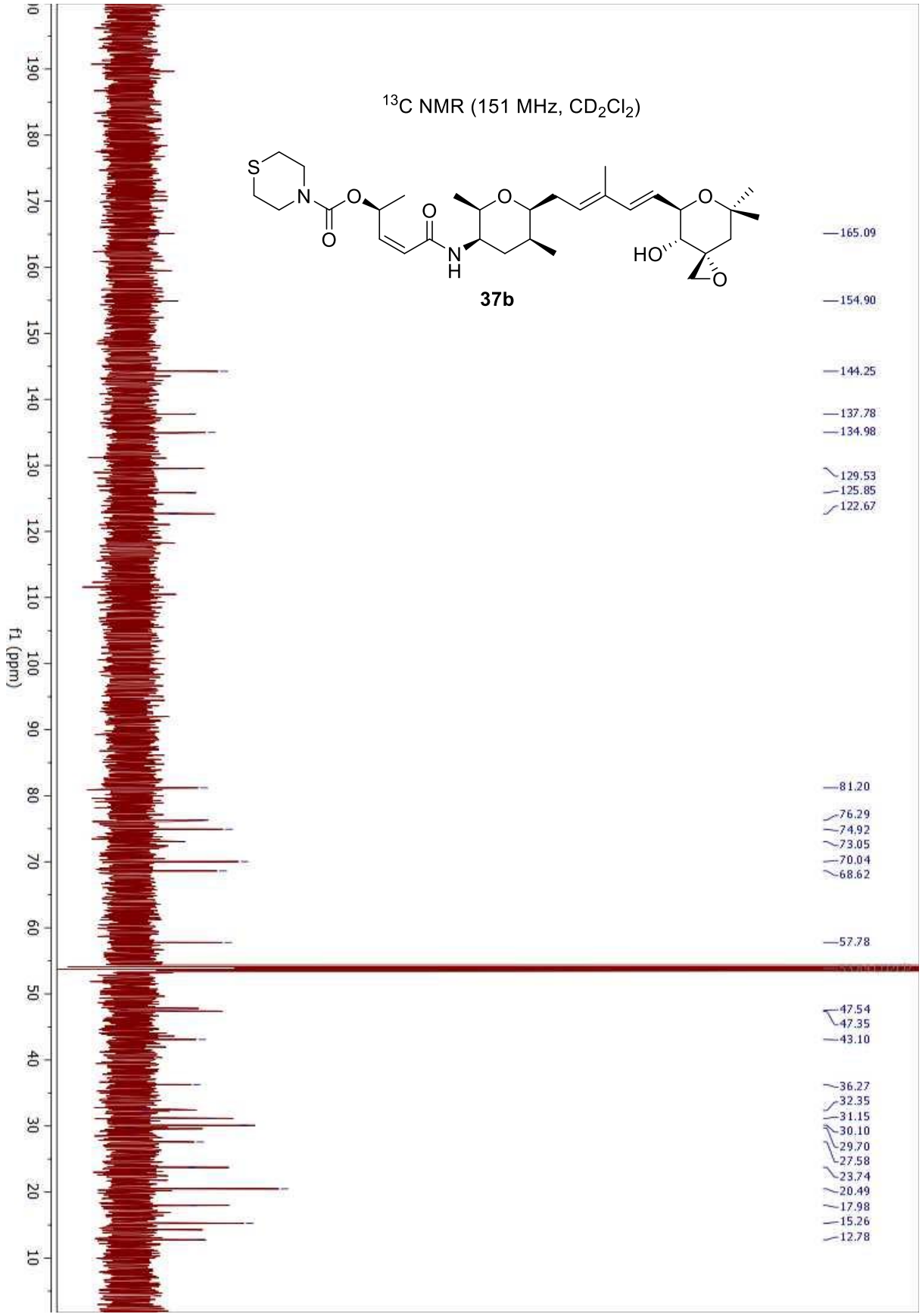

^{1}H NMR (600 MHz, CD_2Cl_2)
37a
f1 (ppm)
5.32 CD2Cl2
1.78 H2O

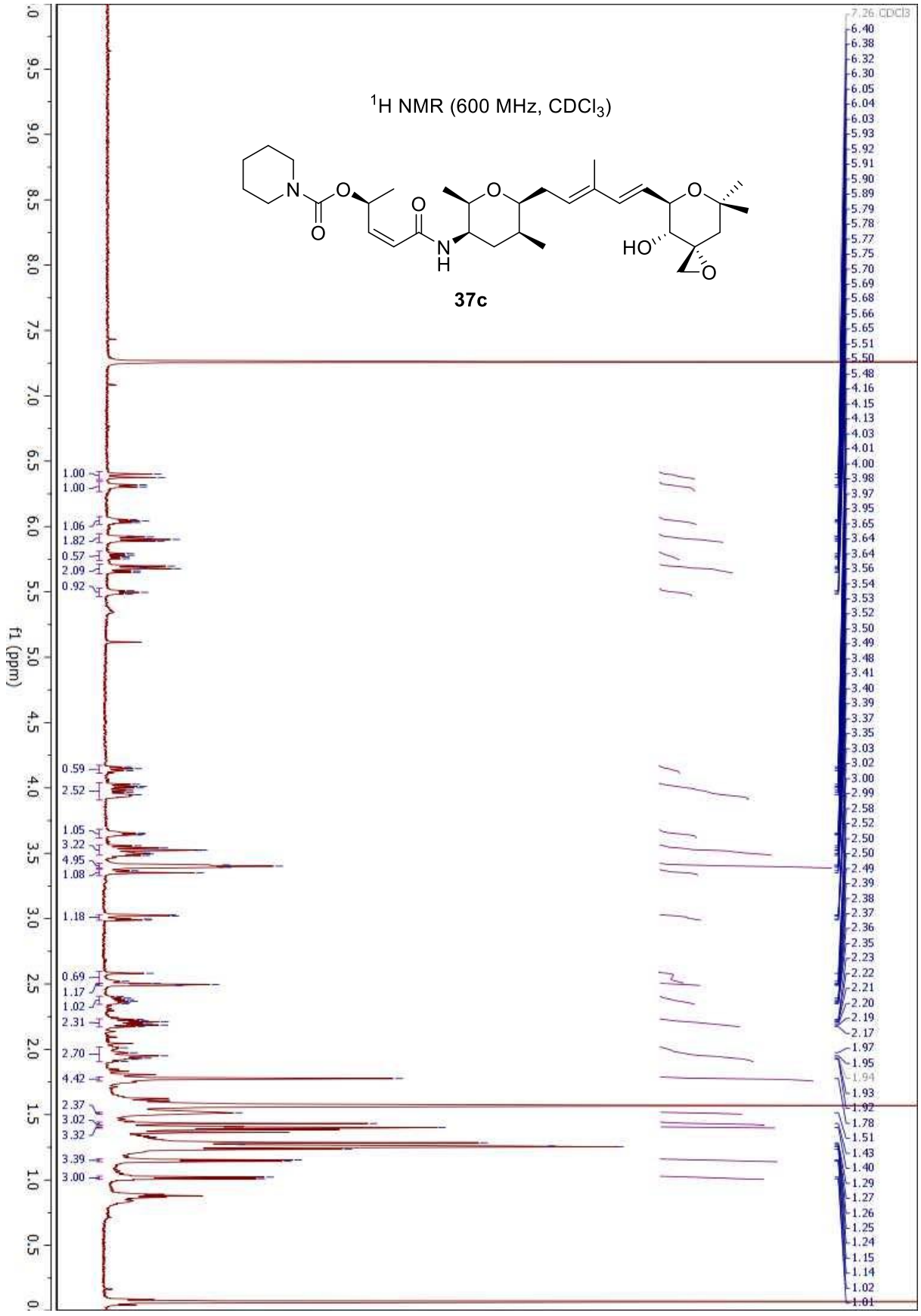

^{13}C NMR (151 MHz, CD_2Cl_2)
37a
f1 (ppm)
165.13
155.19
144.21
137.77
134.98
129.51
125.85
122.68
81.20
76.28
74.90
74.21
73.15
69.94
68.62
68.25
66.93
57.79
54.20 CD2Cl2
54.02 CD2Cl2
53.84 CD2Cl2
53.66 CD2Cl2
53.48 CD2Cl2
47.77
47.40
43.07
36.26
32.41
31.09
30.09
29.59
23.70
20.48
17.98
15.25
12.84


^{1}H NMR (600 MHz, $CDCl_3$)
36b
f1 (ppm)

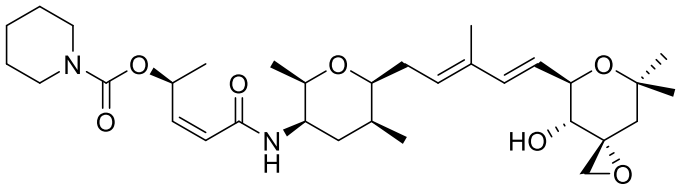

^{13}C NMR (151 MHz, $CDCl_3$)
36b
f1 (ppm)
165.06
154.78
144.25
141.42
135.80
128.29
122.42
111.24
80.91
77.37 CDCl3
77.16 CDCl3
76.95 CDCl3
76.11
70.30
47.18
36.02
32.05
29.04
27.41
20.36
17.98
15.16
12.10


^{1}H NMR (600 MHz, CD_2Cl_2)
37b
f1 (ppm)

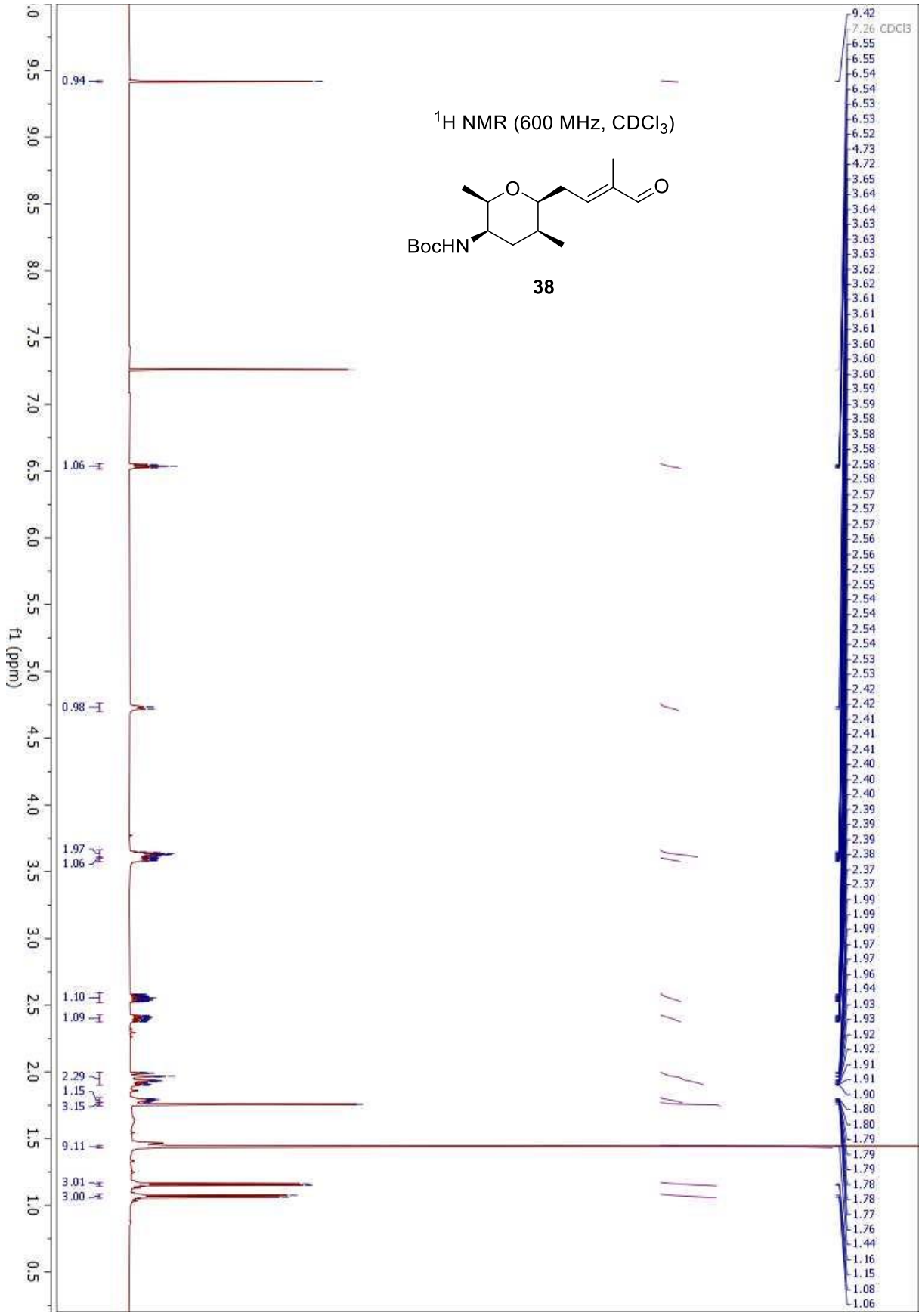

^{13}C NMR (151 MHz, CD_2Cl_2)
37b
165.09
154.90
144.25
137.78
134.98
129.53
125.85
122.67
81.20
76.29
74.92
73.05
70.04
68.62
57.78
47.54
47.35
43.10
36.27
32.35
31.15
30.10
29.70
27.58
23.74
20.49
17.98
15.26
12.78
f1 (ppm)

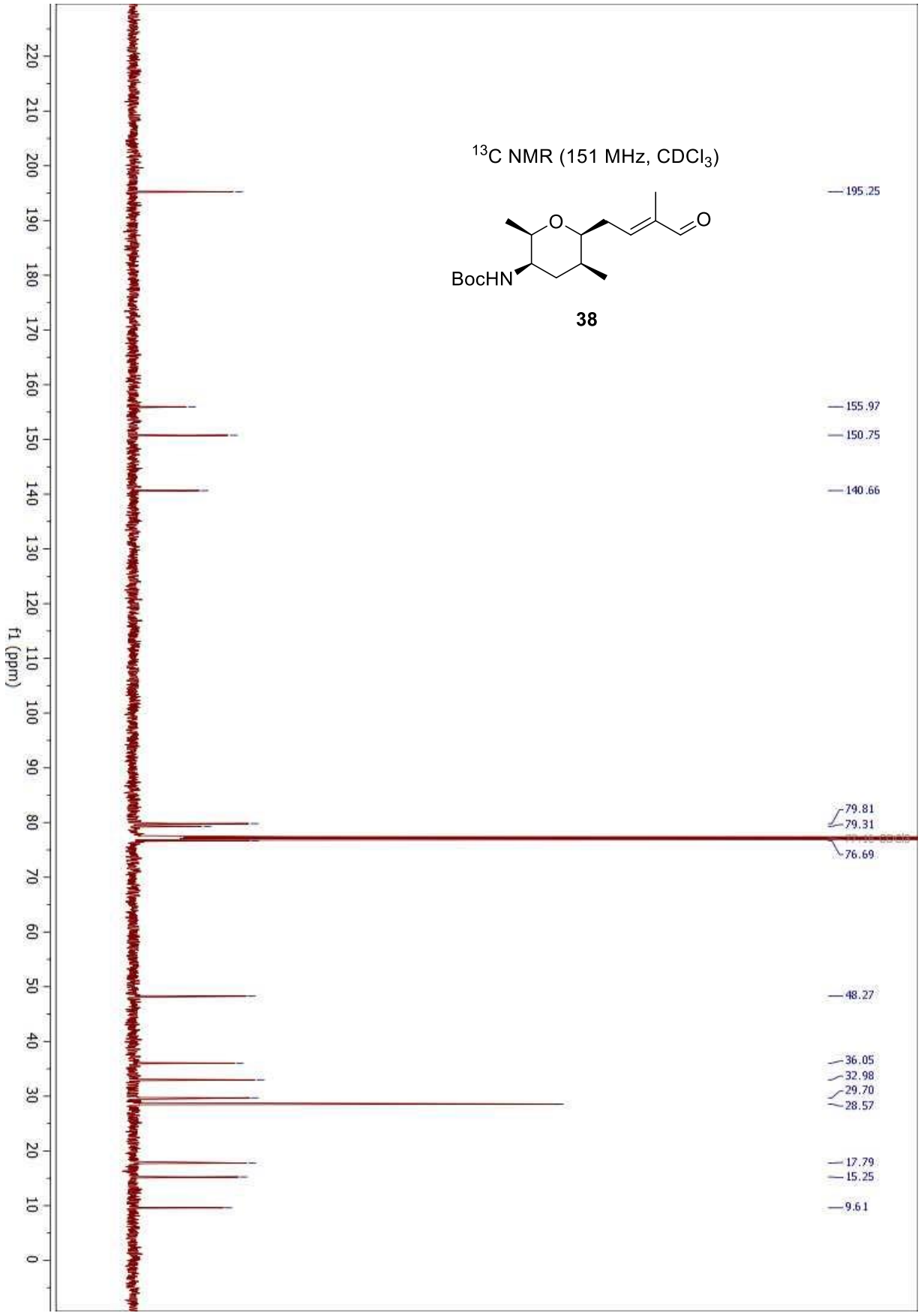

^{1}H NMR (600 MHz, $CDCl_3$)
37c
f1 (ppm)
7.26 CDCl3

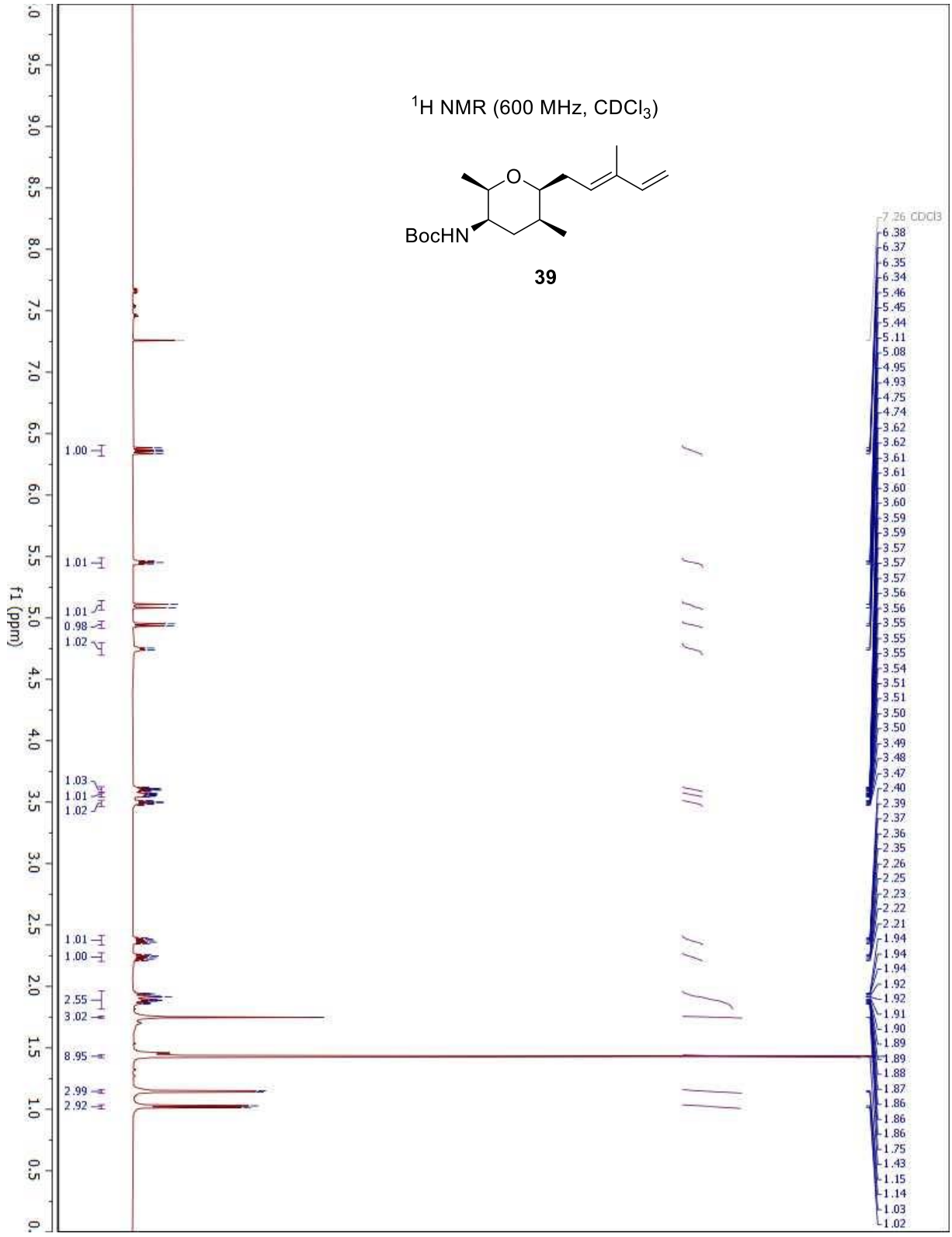
^{13}C NMR (151 MHz, $CDCl_3$)

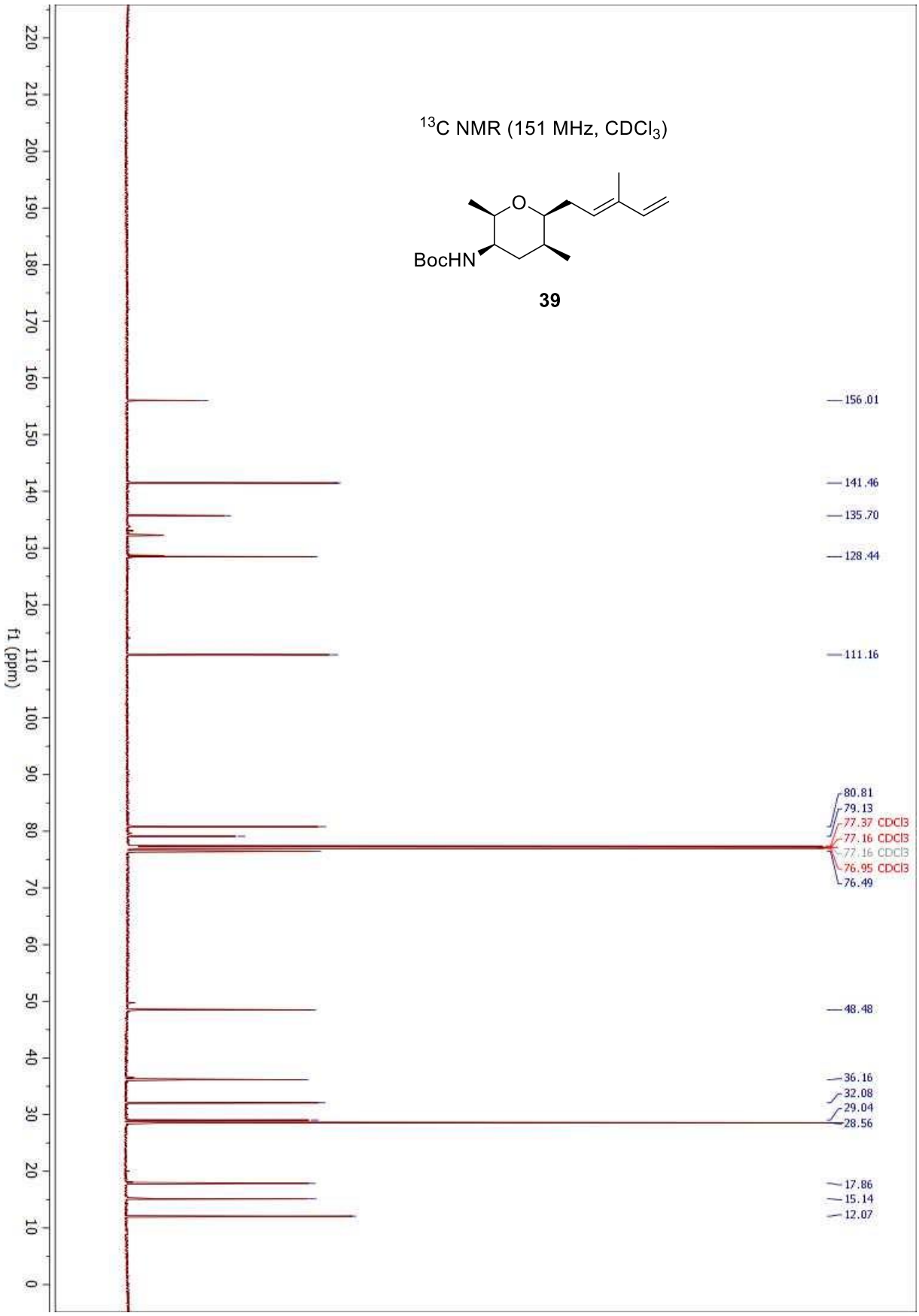


37c


^{1}H NMR (600 MHz, $CDCl_3$)
BocHN
O
O
38
f1 (ppm)
0.94
1.06
0.98
1.97
1.06
1.10
1.09
2.29
1.15
3.15
9.11
3.01
3.00
9.42
7.26 CDCl3


^{13}C NMR (151 MHz, $CDCl_3$)
BocHN
O
O
38
195.25
155.97
150.75
140.66
79.81
79.31
76.69
48.27
36.05
32.98
29.70
28.57
17.79
15.25
9.61
f1 (ppm)


1H NMR (600 MHz, CDCl3)
O
BocHN
39
f1 (ppm)
7.26 CDCl3


^{13}C NMR (151 MHz, $CDCl_3$)
O
BocHN
39
156.01
141.46
135.70
128.44
111.16
80.81
79.13
77.37 CDCl3
77.16 CDCl3
77.16 CDCl3
76.95 CDCl3
76.49
48.48
36.16
32.08
29.04
28.56
17.86
15.14
12.07
f1 (ppm)