

## Supplementary Information

### Expanding Diversity without Protecting Groups: (+)-Sclareolide to Indolosesquiterpene Alkaloid Mycoleptodiscin A and Analogues

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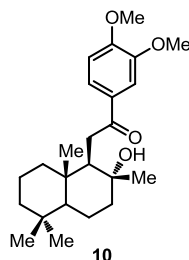
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## I. General details

**General information:** Unless otherwise noted, all reagents were used as received from commercial suppliers. All reactions were performed under nitrogen atmosphere and in flame-dried or oven-dried glassware with magnetic stirring. All solvents were dried before use following the standard procedures. Reactions were monitored using thin-layer chromatography (SiO<sub>2</sub>). TLC plates were visualized with UV light (254 nm), iodine treatment or using *p*-anisaldehyde and  $\beta$ -naphthol stain. Column chromatography was carried out using silica gel (60-120 mesh & 100-200 mesh) packed in glass columns. NMR spectra were recorded at 300, 400, 500MHz (H) and at 75, 100, 125MHz (C), respectively. Chemical shifts ( $\delta$ ) are reported in ppm, using the residual solvent peak in CDCl<sub>3</sub> (H:  $\delta$  = 7.26 and C:  $\delta$  = 77.16 ppm) as internal standard, and coupling constants (*J*) are given in Hz. HRMS were recorded using ESI-TOF techniques.

## II. Experimental Procedures and analytical data

### Ketone 10:



To a stirred solution of 4-bromo veratrole **8** (4.3 mL, 29.95 mmol) in THF (120 mL) under nitrogen at -78 °C was added *n*-BuLi (2.5 M in hexanes, 11.98 mL, 29.95 mmol). The solution was stirred for 30 min at same temperature. A solution of (+)-sclareolide **9** (5 g, 19.96 mmol) in THF (30 mL) was added drop wise at same temperature for 10 min. The reaction mixture was stirred for 3 h before it was quenched with saturated aqueous NH<sub>4</sub>Cl solution and allowed to warm to room temperature. The compound was extracted with ethyl acetate (100 mL x 2) and combined organic layers were washed with water (30mL), brine (30 mL). The organic layer was dried over anhydrous sodium sulphate and filtered. The solvent was removed under reduced pressure and the crude residue was purified by silica gel column chromatography using EtOAc/hexane (1:1) to afford ketone compound **10** (5.0 g, 64%) as a white foam solid.

$R_f = 0.3$  (silica, EtOAc: hexane = 1:1);  $[\alpha]_D^{23} = +23.8$  ( $c = 0.45$  in CHCl<sub>3</sub>).

IR (KBr):  $\nu_{max} = 3461, 2932, 1668, 1591, 1514, 1267, 1025, 757 \text{ cm}^{-1}$ ; M.P = 128 –130 °C.

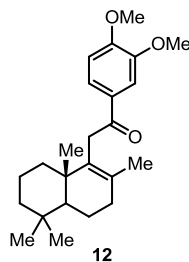
**<sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>):**  $\delta$  7.67 (dd,  $J = 8.3, 1.9$  Hz, 1H), 7.55 (d,  $J = 1.9$  Hz, 1H), 6.89 (d,  $J = 8.3$  Hz, 1H), 3.95 (s, 3H), 3.94 (s, 3H), 3.09 (dd,  $J = 17.3, 4.7$  Hz, 1H), 2.93 (dd,  $J = 17.3, 5.0$  Hz, 1H), 2.20 (t,  $J = 4.8$  Hz, 1H), 1.97 (td,  $J = 12.5, 3.2$  Hz, 1H), 1.75–1.68 (m, 2H),

1.58–1.46 (m, 2H), 1.43–1.29 (m, 3H), 1.19 (s, 3H), 1.18–1.11 (m, 1H), 1.07 (dd,  $J = 12.2, 2.1$  Hz, 1H), 0.97–0.90 (m, 1H), 0.89 (s, 3H), 0.88 (s, 3H), 0.80 (s, 3H).

$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ ):  $\delta$  200.41, 153.12, 149.01, 130.46, 122.66, 110.56, 109.97, 73.23, 56.10 (2C), 56.02, 55.98, 44.74, 41.79, 39.46, 38.76, 33.82, 33.39, 33.29, 23.42, 21.49, 20.69, 18.44, 15.83.

HRMS ( $m/z$ ):  $[\text{M} + \text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{37}\text{O}_4^+$  389.2687, found 389.2697.

### Compound 12:



To a stirred solution of compound **10** (0.1 g, 0.25 mmol, 1 equiv) in anhydrous dichloromethane (2 mL), Lewis acid (0.77 mmol, 3 equiv) was added drop wise and maintained at the temperature as shown in scheme 2. After completion of reaction the reaction (monitored by TLC), it was quenched with saturated sodium bicarbonate solution (2 mL) and allowed to warm to room temperature. The organic phase was separated and the aqueous layer was extracted with dichloromethane (2 x 10 mL). The combined organic layers were washed with water (5 mL) and brine (5 mL) solution, dried over anhydrous sodium sulphate and filtered. The solvent was concentrated and the residue was purified by silica gel column chromatography using EtOAc/hexane (1:10) to afford olefinic compound **12** as colorless liquid.

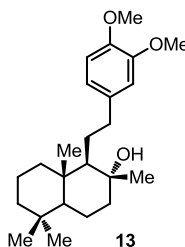
$R_f = 0.6$  (silica, EtOAc: hexane 1:10);  $[\alpha]_D^{20} = +31.2$  ( $c = 0.21$  in  $\text{CHCl}_3$ );

**<sup>1</sup>H NMR (300 MHz, CDCl<sub>3</sub>):** δ 7.67 (dd, *J* = 8.4, 1.8 Hz, 1H), 7.57 (d, *J* = 1.7 Hz, 1H), 6.89 (d, *J* = 8.4 Hz, 1H), 3.94 (s, 3H), 3.93 (s, 3H), 3.83–3.55 (m, 2H), 2.27–2.15 (m, 1H), 2.01–2.08 (m, 1H), 1.74–1.61 (m, 2H), 1.50–1.43 (m, 5H), 1.35–1.29 (m, 2H), 1.27–1.22 (m, 2H), 1.20–1.06 (m, 1H), 0.96 (s, 3H), 0.89 (s, 3H), 0.83 (s, 3H).

**<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>):** δ 197.87, 153.44, 149.21, 148.79, 125.25, 117.92, 110.95, 108.35, 97.18, 86.96, 64.30, 55.95 (2C), 45.98, 42.49, 38.61, 36.24, 34.83, 33.26, 32.95, 28.65, 22.51, 22.04, 18.66.

HRMS (*m/z*): [*M* + *H*]<sup>+</sup> calcd for C<sub>24</sub>H<sub>35</sub>O<sub>3</sub><sup>+</sup> 371.2581, found 371.2565.

### Compound 13:



To a stirred solution of compound **10** (4.0 g, 10.6 mmol) in PEG-400 (50 mL) was added 10% Pd-C (0.4 g) and conc. HCl (0.1 mL) sequentially. The flask was evacuated and pressurized with H<sub>2</sub> (balloon) and the reaction mixture was stirred for 8 h. After completion of reaction (monitored by TLC), diethyl ether (50 mL) was added, cooled to -78 °C (to solidify PEG-400) and decanted the ether layer, repeated the same procedure for three times. The combined ether layers were concentrated and purified by silica gel column chromatography using EtOAc/hexane (1:5) to afford compound **13** (3.3 g, 88%) as a white solid.

*R*<sub>f</sub> = 0.2 (silica, EtOAc: hexane = 1:3); [*α*]<sub>D</sub><sup>20</sup> = +12.0 (*c* = 0.1 in CHCl<sub>3</sub>).

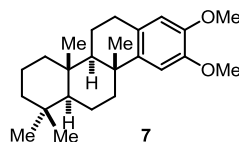
IR (KBr):  $\nu_{\max}$  = 3482, 2935, 1514, 1462, 1260, 1155, 1031, 757  $\text{cm}^{-1}$ ; M.P = 86–88 °C.

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ):  $\delta$  6.82–6.72 (m, 3H), 3.88 (s, 3H), 3.85 (s, 3H), 2.71–2.59 (m, 2H), 1.88 (dt,  $J$  = 12.1, 3.1 Hz, 1H), 1.79–1.63 (m, 3H), 1.62–1.43 (m, 3H), 1.43–1.36 (m, 2H), 1.36–1.24 (m, 2H), 1.23–1.16 (m, 2H), 1.14 (s, 3H), 1.03 (td,  $J$  = 12.9, 3.6 Hz, 1H), 0.94 (dd,  $J$  = 11.9, 2.3 Hz, 1H), 0.88 (s, 3H), 0.80 (s, 3H), 0.80 (s, 3H).

$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ ):  $\delta$  148.86, 147.19, 136.05, 120.27, 112.00, 111.31, 74.30, 61.50, 56.24, 56.01(2C), 44.77, 42.06, 39.97, 39.34, 39.12, 33.49, 33.35, 28.11, 23.94, 21.59, 20.67, 18.58, 15.56.

HRMS ( $m/z$ ):  $[\text{M} + \text{Na}]^+$  calcd for  $\text{C}_{24}\text{H}_{38}\text{NaO}_3^+$  397.2713, found 397.2730.

#### Compound 7:



To a stirred solution of compound **13** (3 g, 8.0 mmol) in anhydrous dichloromethane (50 mL), tin(IV)tetrachloride (1.0 M in dichloromethane, 24 mL, 24 mmol) was added drop wise at -78 °C under nitrogen. The reaction mixture was stirred at the same temperature for 2 h, then it was quenched with saturated sodium bicarbonate solution and allowed to warm to room temperature. The organic phase was separated and the aqueous layer was extracted with dichloromethane (2 x 50 mL). The combined organic layers were washed with water (30

mL) and brine (30 mL) solution, dried over anhydrous sodium sulphate and filtered. The solvent was concentrated and the residue was purified by silica gel column chromatography using EtOAc/hexane (1:10) to afford compound **7** (2.7 g, 94%) as a white solid.

$R_f = 0.7$  (silica, EtOAc: hexane = 1:3);  $[\alpha]_D^{20} = -43.2$  ( $c = 0.1$  in  $\text{CHCl}_3$ ).

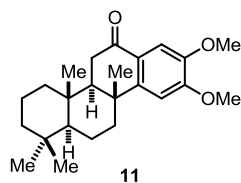
IR (KBr):  $\nu_{\text{max}} = 2933, 1510, 1463, 1256, 756 \text{ cm}^{-1}$ ; M.P = 100–102 °C.

**$^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ):**  $\delta$  6.75 (s, 1H), 6.50 (s, 1H), 3.84 (s, 3H), 3.82 (s, 3H), 2.89–2.70 (m, 2H), 2.35–2.28 (m, 1H), 1.87–1.77 (m, 2H), 1.75–1.60 (m, 4H), 1.58–1.34 (m, 5H), 1.30–1.23 (m, 1H), 1.19 (s, 3H), 1.18–1.10 (m, 1H), 0.92 (s, 3H), 0.87 (s, 3H), 0.85 (s, 3H).

**$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ ):**  $\delta$  147.03, 146.76, 142.57, 127.35, 111.28, 108.14, 56.39, 56.14, 55.80, 55.60, 42.17, 40.96, 39.91, 37.94, 37.69, 33.40(2C), 30.72, 26.13, 21.51, 19.22, 18.71, 18.18, 16.37.

HRMS ( $m/z$ ):  $[\text{M} + \text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{37}\text{O}_2^+$  357.2788, found 357.2799.

#### Compound 11:



To a stirred solution of compound **7** (2.0 g, 5.6 mmol) in anhydrous dichloromethane (40 mL), pyridiniumchlorochromate (6.0 g, 28.0 mmol) and celite (1.5 g) were added under nitrogen atmosphere at room temperature and was allowed to stir for 10 h at the same temperature. After completion of the reaction (monitored by TLC), it was diluted with diethyl ether (100 mL) and stirred for 30 min. The reaction mixture was filtered through celite pad. The filtrate was washed with saturated sodium bicarbonate solution (30 mL), water (30 mL), brine solution, (30

mL) and dried over anhydrous sodium sulphate. Filtered, concentrated and the residue was purified by silica gel column chromatography using EtOAc/hexane (1:7) to afford compound **11** (1.85 g, 89%) as a white solid.

$R_f = 0.5$  (silica, EtOAc: hexane = 1:3);  $[\alpha]_D^{20} = -51.0$  ( $c = 0.1$  in  $\text{CHCl}_3$ ).

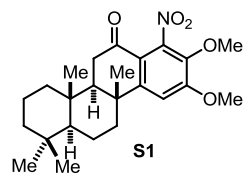
IR (KBr):  $\nu_{\max} = 2933, 1668, 1600, 1508, 1287, 1269, 756 \text{ cm}^{-1}$ ; M.P. = 192–194 °C.

$^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ):  $\delta$  7.47 (s, 1H), 6.78 (s, 1H), 3.94 (s, 3H), 3.90 (s, 3H), 2.72–2.51 (m, 2H), 2.42–2.34 (m, 1H), 1.86–1.75 (m, 2H), 1.74–1.53 (m, 6H), 1.52–1.36 (m, 2H), 1.23 (s, 3H), 1.19–1.07 (m, 1H), 0.99 (s, 3H), 0.87 (s, 3H).

$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ ):  $\delta$  198.62, 153.98, 151.49, 147.40, 124.11, 108.49, 105.87, 56.04(3C), 54.45, 41.87, 40.05, 39.37, 38.31, 37.60, 35.00, 33.31(2C), 24.39, 21.56, 18.95, 18.46, 15.77.

HRMS ( $m/z$ ):  $[\text{M} + \text{H}]^+$  calcd for  $\text{C}_{24}\text{H}_{35}\text{O}_3^+$  371.2581, found 371.2565.

### Compound S1:



The compound **11** (1.2 g, 3.24 mmol) was dissolved in dichloromethane (20 mL) and cooled to 0 °C. Freshly prepared nitrating mixture (to a solution of 0.68 mL of 68%  $\text{HNO}_3$  in round bottom flask was cooled to 0 °C, 0.8 mL of 98%  $\text{H}_2\text{SO}_4$  slowly added) was added drop wise at 0 °C. The reaction mixture was stirred under same temperature for 1.5 h (reaction mixture appeared as brown red color). After completion of the reaction (monitored by TLC), the saturated sodium carbonate solution was added till the reaction become basic ( $\text{P}^{\text{H}} = 9$ ), and the mixture was



extracted by diethyl ether (3 × 100 mL). The combined organic layers were dried over anhydrous sodium sulphate, filtered and then concentrated under vacuum. The resulting residue was purified by silica gel column chromatography using EtOAc/hexane (1:10) to afford nitro compound **S1** (1.1 g, 82%) as a yellow solid.

$R_f = 0.3$  (silica, EtOAc: hexane = 1:3);  $[\alpha]_D^{20} = -136.9$  ( $c = 0.04$  in  $\text{CHCl}_3$ ).

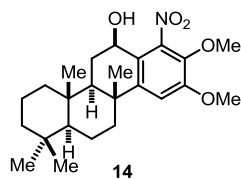
IR (KBr):  $\nu_{\max} = 2935, 1541, 1378, 1270, 1068, 770 \text{ cm}^{-1}$ ; M.P = 235–237 °C.

$^1\text{H NMR}$  (500 MHz,  $\text{CDCl}_3$ ):  $\delta$  6.92 (s, 1H), 3.97 (s, 3H), 3.87 (s, 3H), 2.72–2.52 (m, 2H), 2.42–2.35 (m, 1H), 1.86–1.78 (m, 2H), 1.73–1.53 (m, 6H), 1.52–1.38 (m, 2H), 1.24 (s, 3H), 1.20–1.09 (m, 1H), 0.98 (s, 3H), 0.90 (s, 3H), 0.87 (s, 3H).

$^{13}\text{C NMR}$  (125 MHz,  $\text{CDCl}_3$ ):  $\delta$  194.69, 157.53, 154.34, 144.27, 139.41, 115.76, 107.91, 62.31, 56.36, 55.86, 53.05, 41.68, 40.09, 39.19, 38.91, 37.56, 35.12, 33.23 (2C), 24.34, 21.50, 18.84, 18.30, 15.62.

HRMS ( $m/z$ ):  $[\text{M} + \text{Na}]^+$  calcd for  $\text{C}_{24}\text{H}_{33}\text{NNaO}_5^+$  438.2251, found 438.2255.

#### Compound 14:



To a stirred solution of nitro ketone **S1** (0.6 g, 1.14 mmol) in  $\text{MeOH}/\text{CH}_2\text{Cl}_2$  (20 mL, 1:1) was added  $\text{NaBH}_4$  (0.1 g, 2.89 mmol) at 0 °C. The reaction mixture was stirred at the same temperature for 2 h before it was quenched with saturated sodium bicarbonate (6 mL). The reaction mixture concentrated under reduced pressure to remove methanol. The product was extracted with ethyl acetate (3 x 25 mL) and the

combined organic phases were dried over anhydrous sodium sulphate, filtered and concentrated under reduced pressure. The residue was purified by silica gel column chromatography using EtOAc/hexane (1:2) to afford compound **14** (0.54 g, 90 %) as a white solid.

$R_f = 0.4$  (silica, EtOAc: hexane 1:3);  $[\alpha]_D^{20} = -162.2$  ( $c = 0.1$  in  $\text{CHCl}_3$ );

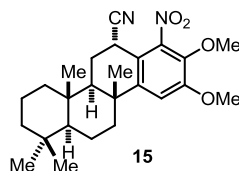
IR (KBr):  $\nu_{\max} = 3578, 2934, 1541, 1380, 762 \text{ cm}^{-1}$ ; M.P = 239-241 °C.

**$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ):**  $\delta$  6.87 (s, 1H), 5.06–5.00 (m, 1H), 3.89 (s, 3H), 3.88 (s, 3H), 2.31 (dt,  $J = 12.2, 3.0 \text{ Hz}$ , 1H), 2.27–2.21 (m, 1H), 2.03–1.99 (m, 1H), 1.80–1.70 (m, 2H), 1.69–1.62 (m, 2H), 1.61–1.51 (m, 2H), 1.50–1.44 (m, 2H), 1.43–1.37 (m, 1H), 1.29 (s, 3H), 1.28–1.24 (m, 1H), 1.18–1.10 (m, 1H), 0.93 (s, 3H), 0.87 (s, 3H), 0.85 (s, 3H).

**$^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ ):**  $\delta$  152.53, 147.84, 145.41, 139.48, 122.12, 110.06, 67.76, 62.17, 56.21, 56.02, 53.08, 41.90, 41.01, 39.58, 39.05, 37.36, 33.28, 33.21, 28.79, 25.91, 21.38, 18.95, 18.47, 16.16.

HRMS ( $m/z$ ):  $[\text{M} + \text{Na}]^+$  calcd for  $\text{C}_{24}\text{H}_{35}\text{NNaO}_5^+$  440.2407, found 440.2392

### Compound 15:



To a stirred solution of compound **14** (0.4 g, 0.959 mmol) in anhydrous acetonitrile (10 mL) was added  $\text{In}(\text{OTf})_3$  (53 mg, 0.0959 mmol) and trimethylsilyl cyanide (0.24 g, 1.918 mmol) successively at room temperature. After completion of reaction (2h), it was quenched with saturated sodium bicarbonate (2 mL) and the product was extracted with ethyl acetate (3 x 20 mL). The combined organic phases were

washed with water (20 mL), brine (20 mL), dried over anhydrous Na<sub>2</sub>SO<sub>4</sub>, filtered and concentrated under vacuum. The crude residue was purified by silica gel chromatography using EtOAc/hexane (1:9) to afford the cyano compound **15** (0.33 g, 82 %) as a white solid.

$R_f = 0.5$  (silica, EtOAc: hexane 1:3);  $[\alpha]_D^{20} = -16.4$  ( $c = 0.04$  in CHCl<sub>3</sub>);

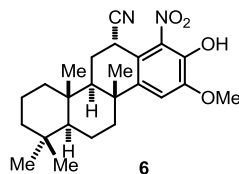
IR (KBr):  $\nu_{max} = 2935, 2280, 1610, 1535, 1502, 1367, 1273, 761 \text{ cm}^{-1}$ ; M.P = 240–243 °C.

**<sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>):**  $\delta$  6.94 (s, 1H), 4.14–4.07 (m, 1H), 3.90 (s, 3H), 3.89 (s, 3H), 2.37–2.31 (m, 1H), 2.20–2.13 (m, 1H), 1.97–1.87 (m, 1H), 1.83–1.72 (m, 2H), 1.71–1.63 (m, 2H), 1.62–1.46 (m, 4H), 1.45–1.37 (m, 1H), 1.21(s, 3H), 1.11–1.01 (m, 1H), 1.00–0.94 (m, 1H), 0.92 (s, 3H), 0.89 (s, 3H), 0.85 (s, 3H).

**<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>):**  $\delta$  153.36, 147.25, 145.92, 139.80, 120.08, 111.59, 111.15, 62.22, 56.24, 55.72, 51.98, 41.66, 40.32, 39.11, 39.00, 37.11, 33.30, 33.12, 27.82, 26.34, 22.24, 21.27, 18.93, 18.28, 16.84.

**HRMS ( $m/z$ ):**  $[M + Na]^+$  calcd for C<sub>25</sub>H<sub>34</sub>N<sub>2</sub>NaO<sub>4</sub><sup>+</sup> 449.2411, found 449.2410.

### Compound 6:



To a stirred solution of compound **15** (0.2 g, 0.469 mmol) in anhydrous dichloromethane (10 mL), BBr<sub>3</sub> (1M solution in dichloromethane, 4.69 mL, 4.69 mmol) was added at -78 °C under nitrogen atmosphere. The reaction mixture was stirred for 2.5 h at the same temperature.

After completion of the reaction, it was quenched with saturated sodium bicarbonate solution (10 mL) and extracted with dichloromethane (2 x 20 mL). The combined organic phases were dried over sodium sulphate, filtered and concentrated under vacuum. The crude residue was purified by silica gel column chromatography using EtOAc/hexane (3:7) to afford the compound **6** (0.164 g, 85%) as a light yellowish solid.

$R_f = 0.5$  (silica, EtOAc: hexane 1:1);  $[\alpha]_D^{20} = -29.3$  (c = 0.25 in  $\text{CHCl}_3$ );

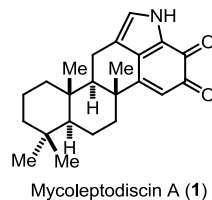
IR (KBr):  $\nu_{\text{max}} = 2931, 1535, 1368, 1218, 764 \text{ cm}^{-1}$ ; M.P = 216 – 218 °C.

**$^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ):**  $\delta$  8.22 (s, 1H), 6.99 (s, 1H), 4.47 (dd, J = 5.4, 1.6 Hz, 1H), 3.94 (s, 3H), 2.35–2.29 (m, 1H), 2.23–2.18 (m, 1H), 1.95–1.87 (m, 1H), 1.82–1.73 (m, 2H), 1.72–1.61 (m, 2H), 1.60–1.48 (m, 5H), 1.44–1.37 (m, 1H), 1.20 (s, 3H), 1.07 (td, J = 12.8, 3.6 Hz, 1H), 1.01–0.95 (m, 1H), 0.92 (s, 3H), 0.89 (s, 3H), 0.86 (s, 3H).

**$^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):**  $\delta$  148.84, 142.96, 141.64, 136.21, 120.49, 114.14, 111.80, 56.57, 55.65, 51.75, 41.67, 40.46, 39.04, 38.99, 36.99, 33.28, 33.08, 29.36, 26.20, 22.43, 21.26, 18.97, 18.29, 16.81.

HRMS ( $m/z$ ):  $[\text{M} + \text{Na}]^+$  calcd for  $\text{C}_{24}\text{H}_{32}\text{N}_2\text{NaO}_4^+$  435.2254, found 435.2253.

#### Mycoleptodiscin A (1):



To a stirred solution of compound **6** (0.120 g, 0.29 mmol) in degassed ethanol (10 mL) was added 10% Pd-C (20 mg) and ammonium formate (0.365 g, 5.8 mmol) at room temperature and then refluxed for 2 h. After completion of the reaction, it was filtered through celite pad. The yellow solution was slowly converted to orange color during filtration process. The filtrate was concentrated and purified by silica gel column chromatography using EtOAc/hexane (2:3) to afford Mycoleptodiscin A (**1**) (0.081 g, 79%) as a orange red solid.

$R_f = 0.3$  (silica, EtOAc: hexane 1:1);  $[\alpha]_D^{20} = -240.0$  (c = 0.1 in MeOH);

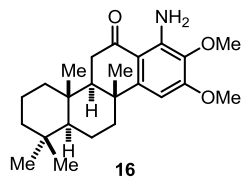
IR (KBr):  $\nu_{max} = 2927, 1644, 1413, 1218, 772 \text{ cm}^{-1}$ ;

**$^1\text{H}$  NMR (500 MHz, MeOH- $d_4$ ):**  $\delta$  7.00 (s, 1H), 5.67 (s, 1H), 2.72 (dd,  $J = 16.3, 3.6$  Hz, 1H), 2.48 (dd,  $J = 16.1, 12.0$  Hz, 1H), 2.16–2.11 (m, 1H), 1.86–1.78 (m, 1H), 1.77–1.72 (m, 1H), 1.72–1.64 (m, 1H), 1.63–1.58 (m, 1H), 1.57–1.49 (m, 2H), 1.49–1.43 (m, 1H), 1.44–1.39 (m, 1H), 1.27 (s, 3H), 1.22–1.14 (m, 1H), 1.08 (s, 3H), 0.97–0.91 (m, 2H), 0.91 (s, 3H), 0.89 (s, 3H);

**$^{13}\text{C}$  NMR (125 MHz, MeOH- $d_4$ ):**  $\delta$  187.11, 167.57, 166.03, 131.51, 128.99, 126.08, 124.92, 115.66, 80.49, 57.89, 57.42, 42.91, 41.34, 39.73, 39.66, 38.34, 34.26, 33.92, 22.33, 22.12, 19.63, 18.86, 17.12.

HRMS ( $m/z$ ):  $[\text{M} + \text{H}]^+$  calcd for  $\text{C}_{23}\text{H}_{30}\text{NO}_2^+$  352.2271, found 352.2269

#### Compound 16:



To a stirred solution of nitro ketone **S1** (0.2 g, 0.481 mmol) in toluene (10 mL), 10% Pd-C (30 mg) was added. The flask was evacuated and pressurized with H<sub>2</sub> (balloon) and the reaction mixture was stirred for 15 h. After completion of reaction, the reaction mixture was diluted with ethyl acetate and filtered through celite pad and concentrated under reduced pressure. The crude residue was purified by silica gel column chromatography using EtOAc /hexane (1:9) to afford aniline **16** (0.16 g, 86%) as a white solid.

$R_f = 0.5$  (silica, EtOAc: hexane = 1:8);  $[\alpha]_D^{20} = +29.5$  (c = 0.2 in CHCl<sub>3</sub>).

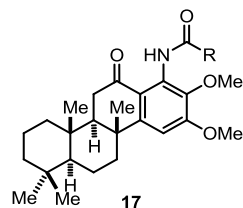
IR (KBr):  $\nu_{max} = 3304, 2924, 1602, 1458, 1373, 776 \text{ cm}^{-1}$ ; M.P =202–204 °C.

**<sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>):**  $\delta$  6.19 (s, 1H), 3.89 (s, 3H), 3.78 (s, 3H), 2.58 (d,  $J = 3.8 \text{ Hz}$ , 1H), 2.57 (s, 1H), 2.30 (dt,  $J = 12.2, 3.0 \text{ Hz}$ , 1H), 1.78–1.73 (m, 1H), 1.73–1.64 (m, 3H), 1.64–1.58 (m, 1H), 1.59–1.49 (m, 1H), 1.47–1.36 (m, 2H), 1.18 (s, 3H), 1.12 (td,  $J = 13.4, 3.9$ , 1H), 0.97 (s, 3H), 0.93–0.90 (m, 1H), 0.88 (s, 3H), 0.86 (s, 3H), 0.84–0.78 (m, 1H).

**<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>):**  $\delta$  200.69, 155.68, 155.09, 145.51, 132.17, 109.56, 95.78, 59.69, 55.90, 55.60, 53.15, 41.83, 40.19, 39.35, 38.66, 37.47, 36.00, 33.31, 33.18, 24.46, 21.57, 19.01, 18.43, 15.74.

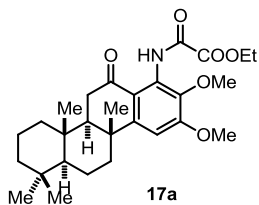
HRMS ( $m/z$ ):  $[M + H]^+$  calcd for C<sub>24</sub>H<sub>36</sub>NO<sub>3</sub><sup>+</sup> 386.2690, found 386.2702.

#### General procedure for amide synthesis (17a-c):



To a stirred solution of compound **16** (0.2 g, 0.48 mmol) in dichloromethane (6 ml) was added Et<sub>3</sub>N (0.2 mL, 1.44 mmol, 3 equiv), stirred for 15 min at room temperature and cooled to 0 °C. Acid chloride (0.576 mmol, 1.2 equiv) in dichloromethane (2 mL) was added drop wise and stirred at same temperature for 2 h. After completion of reaction, it was quenched with saturated NaHCO<sub>3</sub> solution, extracted with dichloromethane (20 mL), dried over anhydrous sodium sulphate, filtered and concentrated. The crude residue was purified by silica gel column chromatography using EtOAc/Hexane (3:7) to afford corresponding amides.

**Compound 17a:**



White solid; (yield = 85 %);  $R_f$  = 0.5 (silica, EtOAc: hexane = 1:2);  $[\alpha]_D^{20} = -85.4$  (c = 0.05 in CHCl<sub>3</sub>).

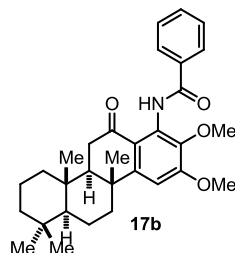
IR (KBr):  $\nu_{max}$  = 2933, 1722, 1649, 1598, 1484, 1268, 1199, 771 cm<sup>-1</sup>. M.P = 166-168°C.

**<sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>):**  $\delta$  11.14 (s, 1H), 6.75 (s, 1H), 4.42 (q,  $J$  = 7.1 Hz, 2H), 3.94 (s, 3H), 3.93 (s, 3H), 2.68–2.54 (m, 2H), 2.34 (dt,  $J$  = 12.2, 3.0 Hz, 1H), 1.82–1.75 (m, 2H), 1.71–1.52 (m, 6H), 1.43 (t,  $J$  = 7.1 Hz, 3H), 1.19 (s, 3H), 1.18–1.10 (m, 1H), 0.98 (s, 3H), 0.93–0.91 (m, 1H), 0.89 (s, 3H), 0.87 (s, 3H), 0.85–0.79 (m, 1H).

**$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ ):**  $\delta$  201.02, 160.40, 157.44, 154.58, 154.16, 141.70, 129.58, 117.76, 104.87, 63.27, 60.30, 55.85, 55.82, 52.75, 41.71, 40.12, 39.18, 38.67, 37.41, 36.03, 33.25, 33.15, 24.27, 21.55, 18.91, 18.33, 15.59, 14.09.

HRMS ( $m/z$ ):  $[\text{M} + \text{Na}]^+$  calcd for  $\text{C}_{28}\text{H}_{39}\text{NNaO}_6^+$  508.2670, found 508.2696.

**Compound 17b:**



White solid; (yield = 85 %);  $R_f$  = 0.5 (silica, EtOAc: hexane = 1:10);  $[\alpha]_D^{20} = +27.3$  ( $c = 0.24$  in  $\text{CHCl}_3$ ).

IR (KBr):  $\nu_{\text{max}} = 2930, 1688, 1641, 1598, 1511, 1472, 1291, 757 \text{ cm}^{-1}$ . M.P = 180–183 °C.

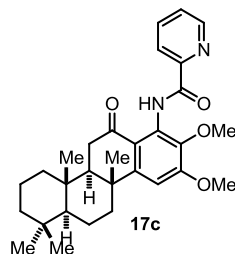
**$^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ):**  $\delta$  10.95 (s, 1H), 8.12–8.09 (m, 1H), 8.05–8.01 (m, 2H), 7.50–7.44 (m, 2H), 6.72 (s, 1H), 3.95 (s, 3H), 3.91 (s, 3H), 2.62–2.56 (m, 2H), 2.35 (dt,  $J = 12.5, 3.2 \text{ Hz}$ , 1H), 1.83–1.76 (m, 2H), 1.72–1.65 (m, 1H), 1.64–1.52 (m, 3H), 1.47–1.36 (m, 2H), 1.20 (s, 3H), 1.18–1.10 (m, 1H), 0.98 (s, 3H), 0.92–0.91 (m, 1H), 0.90 (s, 3H), 0.87 (s, 3H), 0.86–0.79 (m, 1H).

**$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ ):**  $\delta$  202.09, 165.80, 157.71, 154.28, 141.65, 134.69, 133.56, 132.59, 131.81, 130.16, 128.61, 128.45, 127.89, 117.42, 104.15, 60.13, 55.87, 52.65, 41.56, 40.14, 39.16, 38.68, 37.39, 36.12, 33.26, 33.17, 24.33, 21.57, 18.94, 18.34, 15.63.

HRMS ( $m/z$ ):  $[\text{M} + \text{H}]^+$  calcd for  $\text{C}_{31}\text{H}_{40}\text{NO}_4^+$  490.2952, found 490.2960.



**Compound 17c:**



White solid; (yield = 80 %);  $R_f$  = 0.5 (silica, EtOAc: hexane = 1:10);  $[\alpha]_D^{20}$  = +14.7 (c = 0.145 in  $\text{CHCl}_3$ ).

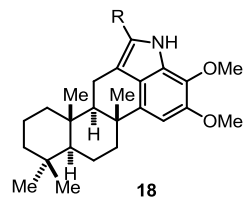
IR (KBr):  $\nu_{\text{max}}$  = 2935, 1691, 1651, 1592, 1505, 1482, 1289, 752  $\text{cm}^{-1}$ . M.P = 212–214°C.

**$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ):**  $\delta$  11.6 (s, 1H), 8.73 (d,  $J$  = 4.6 Hz, 1H), 8.25 (d,  $J$  = 7.8 Hz, 1H), 7.84 (td,  $J$  = 7.7, 1.5 Hz, 1H), 7.44 (ddd,  $J$  = 7.5, 4.7, 1.1 Hz, 1H), 6.75 (s, 1H), 3.94 (s, 3H), 3.86 (s, 3H), 2.70–2.51 (m, 2H), 2.35 (dt,  $J$  = 12.1, 2.9 Hz, 1H), 1.85–1.79 (m, 1H), 1.78–1.72 (m, 1H), 1.72–1.52 (m, 4H), 1.47–1.35 (m, 2H), 1.20 (s, 3H), 1.13 (td,  $J$  = 13.4, 4.8 Hz, 1H), 0.98 (s, 3H), 0.94–0.92 (m, 1H), 0.89 (s, 3H), 0.86 (s, 3H), 0.85–0.79 (m, 1H).

**$^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ ):**  $\delta$  200.75, 162.48, 157.14, 153.87, 150.38, 148.59, 142.07, 137.13, 130.95, 126.02, 122.73, 118.97, 104.43, 60.36, 55.90 (2C), 52.71, 41.75, 40.17, 39.18, 38.66, 37.43, 36.11, 33.28, 33.16, 24.30, 21.58, 18.96, 18.35, 15.59.

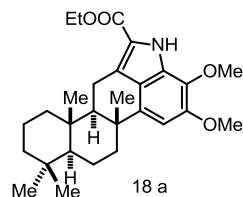
HRMS ( $m/z$ ):  $[\text{M} + \text{H}]^+$  calcd for  $\text{C}_{30}\text{H}_{39}\text{N}_2\text{O}_4^+$  491.2904, found 491.2903.

### General procedure for McMurry cyclization (18a-c):



To a stirred solution of amide (**17a-c**) (0.24 mmol, 1 equiv) in anhydrous THF (5mL), Zn metal (1.2 mmol, 5.0 equiv) and titanium(IV) tetrachloride (1.0 M in dichloromethane, 1.2 mmol, 5.0 equiv) were added under nitrogen, and stirred for 1 h at room temperature. After completion of reaction, it was diluted with ethyl acetate and filtered through celite pad. The filtrate was concentrated and purified by silica gel column chromatography using EtOAc / hexane (1:10) to afford corresponding indoles (**18a-c**).

### Compound 18a:



White solid, (yield = 74 %),  $R_f$  = 0.5 (silica, EtOAc: hexane = 1:10);  $[\alpha]_D^{20}$  = +173.9 ( $c$  = 0.15 in  $\text{CHCl}_3$ ).

IR (KBr):  $\nu_{\text{max}}$  = 3327, 2928, 1694, 1599, 1455, 1268, 1104, 757  $\text{cm}^{-1}$ . M.P = 154-156 °C.

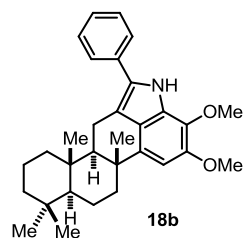
**$^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ):**  $\delta$  8.56 (s, 1H), 6.62 (s, 1H), 4.44–4.34 (m, 2H), 3.95 (s, 3H), 3.93 (s, 3H), 3.32 (dd,  $J$  = 17.0, 3.5 Hz, 1 H), 2.76 (dd,  $J$  = 17.0, 12.5 Hz, 1H), 2.45–2.39 (m, 1H), 1.91 (d,  $J$  = 12.5 Hz, 1H), 1.80–1.74 (m, 2 H), 1.74–1.68 (m, 1H), 1.68–1.63 (m, 1H),

1.62–1.57 (m, 2H), 1.42 (t,  $J = 7.0$  Hz, 3H), 1.26 (s, 3H), 1.15–1.12 (m, 1 H), 1.17 (s, 3H), 1.09 (s, 3H), 1.00–0.91 (m, 2H), 0.89 (s, 3H), 0.87–0.84 (m, 1H).

**$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ ):**  $\delta$  162.39, 151.06, 143.05, 132.14, 128.37, 123.83, 122.15, 120.49, 101.89, 60.91, 60.40, 57.61, 57.27, 56.64, 41.95, 40.23, 38.46, 38.28, 37.81, 33.50, 33.39, 24.64, 21.66, 19.64, 18.80, 18.67, 16.46, 14.63.

HRMS ( $m/z$ ):  $[\text{M} + \text{H}]^+$  calcd for  $\text{C}_{28}\text{H}_{40}\text{NO}_4^+$  454.2952, found 454.2978.

**Compound 18b:**



White solid; (Yield = 77 %);  $R_f = 0.5$  (silica, EtOAc: petroleum ether 1:10);  $[\alpha]_D^{20} = +18.93$  ( $c = 0.1$  in  $\text{CHCl}_3$ ).

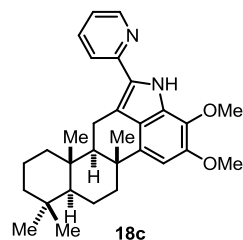
IR (film):  $\nu_{\text{max}} = 3304, 2924, 1602, 1458, 1373, 764 \text{ cm}^{-1}$ . M.P = 172–174 °C.

**$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ):**  $\delta$  8.05 (s, 1H), 7.60 (d,  $J = 7.3$  Hz, 2H), 7.46 (t,  $J = 7.5$  Hz, 2H), 7.30–7.27, (m, 1H), 6.61 (s, 1H), 4.00 (s, 3H), 3.93 (s, 3H), 3.08 (dd,  $J = 15.6, 3.5$  Hz, 1 H), 2.87 (dd,  $J = 15.5, 12.4$  Hz, 1H), 2.47–2.41 (m, 1 H), 1.92–1.85 (m, 1H), 1.82–1.70 (m, 2 H), 1.70–1.64 (m, 1H), 1.64–1.58 (m, 3 H), 1.46–1.34 (m, 2H), 1.24 (s, 3H), 1.12 (s, 3H), 0.95–0.92 (m, 1H), 0.90 (s, 3H), 0.89 (s, 3H), 0.87–0.83 (m, 1H).

**$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ ):**  $\delta$ 148.7, 140.7, 133.2, 132.3, 129.8, 128.8, 127.5, 126.3, 126.1, 125.6, 123.5, 111.9, 101.4, 60.9, 57.8, 57.2, 56.6, 41.8, 40.3, 38.6, 38.2, 37.6, 33.4, 33.3, 29.6, 24.7, 21.6, 19.7, 18.8, 18.6, 16.4.

HRMS ( $m/z$ ):  $[\text{M} + \text{H}]^+$  calcd for  $\text{C}_{31}\text{H}_{40}\text{NO}_2^+$  458.3054, found 458.3079.

**Compound 18c:**



White solid; (yield = 65 %);  $R_f$  = 0.5 (silica, EtOAc: hexane = 1:10);  $[\alpha]_{\text{D}}^{20}$  = +148.1 ( $c$  = 0.075 in  $\text{CHCl}_3$ ). M.P = 186–188 °C.

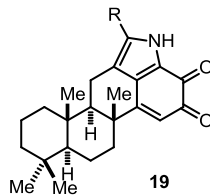
IR (KBr):  $\nu_{\text{max}}$  = 2926, 1646, 1651, 1465, 1280, 1220, 867, 772  $\text{cm}^{-1}$ .

**$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ):**  $\delta$  8.47 (d,  $J$  = 4.8 Hz, 1H), 7.74 (t,  $J$  = 6.4 Hz, 1H), 7.64 (d,  $J$  = 7.6 Hz, 1H), 7.10 (t,  $J$  = 5.7 Hz, 1H), 6.53 (s, 1H), 3.96 (s, 3H), 3.87 (s, 3H), 3.11 (dd,  $J$  = 16.0, 3.5 Hz, 1H), 2.84 (dd,  $J$  = 15.5, 12.5 Hz, 1H), 2.40–2.34 (m, 1 H), 2.12–2.09 (m, 1H), 1.89–1.84 (m, 1 H), 1.78–1.69 (m, 2H), 1.68–1.60 (m, 1 H), 1.60–1.52 (m, 1H), 1.47–1.37 (m, 1H), 1.36–1.30 (m, 1H), 1.19 (s, 3H), 1.14 (s, 3H), 1.08 (s, 3H), 1.06–1.03 (m, 1H), 0.92–0.86 (m, 1H), 0.84 (s, 3H), 0.82–0.78 (m, 1H).

$^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ ):  $\delta$  150.2, 141.5, 137.8, 132.5, 130.5, 128.4, 123.4, 121.9, 120.8, 120.4, 101.7, 60.9, 57.8, 57.1, 56.5, 41.8, 40.3, 38.4, 38.2, 37.5, 36.6, 33.4, 33.3, 31.9, 24.6, 21.6, 20.6, 18.7, 18.6, 16.5.

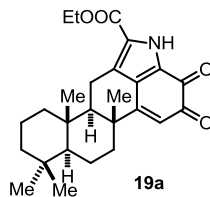
HRMS ( $m/z$ ):  $[\text{M} + \text{H}]^+$  calcd for  $\text{C}_{30}\text{H}_{39}\text{N}_2\text{O}_2^+$  459.3006 found 459.3023.

#### General procedure for compound 19a-b:



To a stirred solution of compound (**18a-b**) (1 equiv) in anhydrous dichloromethane,  $\text{BBr}_3$  (1.0 molar in dichloromethane, 3 equiv) was added at  $-78^\circ\text{C}$  and stirred it for 2.5 h at same temperature. After completion of the reaction, it was quenched with saturated sodium bicarbonate solution, extracted with dichloromethane, dried over sodium sulphate. Filtered and solvent was removed under reduced pressure and crude residue was purified by silica gel column chromatography using EtOAc/hexane (1:4) to afford **19a-b**.

#### Compound 19a:



Reddish orange solid, (yield = 70 %),  $R_f$  = 0.4 (silica, EtOAc: hexane 3:7).  $[\alpha]_D^{20} = -230.4$  ( $c = 0.1$  in  $\text{CHCl}_3$ ).

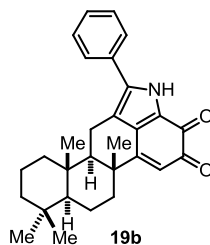
IR (KBr):  $\nu_{\max}$  = 3227, 2927, 1709, 1674, 1654, 1464, 1270, 1104, 756  $\text{cm}^{-1}$ .

**$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ):**  $\delta$  9.92 (s, 1H), 5.85 (s, 1H), 4.40 (q,  $J$  = 7.0 Hz, 2H), 3.08 (dd,  $J$  = 17.4, 3.6 Hz, 1H), 2.56 (dd,  $J$  = 17.3, 12.1 Hz, 1H), 2.36 (t,  $J$  = 7.5 Hz, 1H), 2.13–2.07 (m, 1H), 1.87–1.80 (m, 1H), 1.79–1.71 (m, 1H), 1.69–1.61 (m, 2H), 1.61–1.56 (m, 1H), 1.55–1.47 (m, 3H), 1.41 (t,  $J$  = 7.0 Hz, 3H), 1.22 (s, 3H), 1.19–1.10 (m, 1H), 1.07 (s, 3H), 0.91 (s, 3H), 0.87 (s, 3H), 0.85–0.78 (m, 1H).

**$^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ ):**  $\delta$  183.42, 169.14, 163.11, 160.26, 129.88, 128.13, 126.52, 126.04, 116.01, 61.73, 56.19, 55.32, 41.78, 40.26, 38.65, 37.11, 33.54, 33.44, 32.08, 22.84, 22.03, 21.78, 18.96, 18.57, 16.70, 14.50.

HRMS ( $m/z$ ):  $[\text{M} + \text{Na}]^+$  calcd for  $\text{C}_{26}\text{H}_{33}\text{NNaO}_4^+$  446.2302, found 446.2326.

#### Compound 19b:



Reddish orange solid, (yield = 72 %),  $R_f$  = 0.5 (silica, EtOAc: hexane = 3:7).  $[\alpha]_{\text{D}}^{20}$  = -210.4 ( $c$  = 0.05 in  $\text{CHCl}_3$ ).

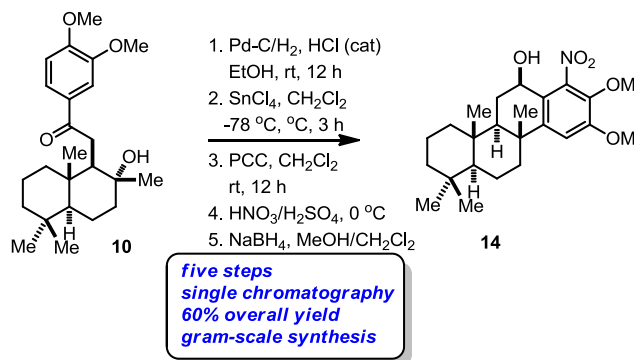
IR (KBr):  $\nu_{\max}$  = 2925, 2846, 1654, 1416, 1218, 1014, 776  $\text{cm}^{-1}$ .

**$^1\text{H}$  NMR (400 MHz, methanol- $\text{d}_4$ ):**  $\delta$  7.67 (d,  $J$  = 7.9 Hz, 2H), 7.50 (t,  $J$  = 7.9 Hz, 2H), 7.42 (t,  $J$  = 7.1 Hz, 1H). 5.73 (s, 1H), 2.80–2.75 (m, 2H), 2.35–2.24 (m, 1H), 2.19–2.12 (m, 2H), 1.83–1.72 (m, 2H), 1.72–1.64 (m, 2H), 1.64–1.56 (m, 2H), 1.56–1.51 (m, 1H), 1.46–1.35 (m, 2H), 1.32 (s, 3H), 1.28 (s, 3H), 1.5 (s, 3H), 0.90 (s, 3H), 0.89–0.84 (m, 1H).

<sup>13</sup>C NMR (125 MHz, methanol-d<sub>4</sub>): δ 187.18, 167.09, 165.43, 141.72, 132.93, 131.78, 130.19 (2C), 130.06, 127.98 (2C), 126.03, 122.88, 116.15, 57.87, 57.33, 42.81, 41.24, 39.68, 39.34, 38.35, 34.23, 33.88, 22.40, 22.11, 20.73, 19.59, 19.53, 17.12.

HRMS (*m/z*): [M + Na]<sup>+</sup> calcd for C<sub>29</sub>H<sub>34</sub>NO<sub>2</sub><sup>+</sup> 428.2584, found 428.2598.

#### Gram scale synthesis of intermediate 14:



To a solution of compound **10** (2 g, 5.15 mmol) in EtOH (30 mL), 10% Pd-C (100 mg) and 0.1 mL of conc. HCl was added at room temperature. The flask was evacuated and pressurized with H<sub>2</sub> (balloon) and the reaction mixture was stirred for overnight. After completion of reaction, it was filtered through celite and concentrated.

The crude compound was dissolved in anhydrous dichloromethane (35 mL) and cooled to -78 °C. To this, SnCl<sub>4</sub> (1 M in dichloromethane, 16 mL) was added drop wise for 5 min and stirred at same temperature for 3 h. After completion of reaction, it was quenched with saturated sodium bicarbonate solution and allowed to warm to room temperature. The reaction mixture was filtered through celite pad and the organic

phase was separated. The aqueous layer was extracted with dichloromethane (30 mL) and the combined organic layers were washed with water (20 mL), dried over anhydrous sodium sulphate, filtered and concentrated under reduced pressure.

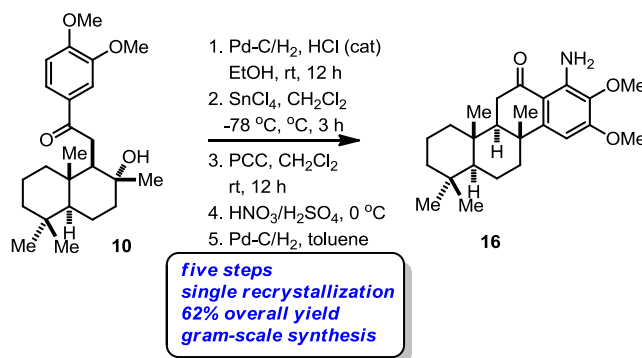
The above crude compound was dissolved in anhydrous dichloromethane (40 mL), PCC (6 g) and celite (1.5 g) were added under nitrogen at room temperature and stirred it for 12 h. After completion of the reaction, it was diluted with diethyl ether (30 ml) and filtered through celite pad. The organic layer was washed with saturated sodium bicarbonate solution, water (20 mL), brine solution (20 mL). The solvent was dried over sodium sulphate, filtered and concentrated under reduced pressure.

The crude compound was dissolved in dichloromethane (30 mL) and cooled to 0 °C. To this, freshly prepared nitrating mixture (1.3 mL HNO<sub>3</sub> and 1.6 mL H<sub>2</sub>SO<sub>4</sub>) was added and stirred for 2 h. After completion of reaction, it was neutralized with saturated sodium carbonate solution, extracted with dichloromethane (3 X 25 mL) and the organic layer washed with water (2 X 25 mL). The combined organic layer was dried over sodium sulphate, filtered and concentrated under reduced pressure. To the crude solid, ether was added and decanted to afford yellow solid.

To the above crude compound dissolved in MeOH/CH<sub>2</sub>Cl<sub>2</sub> (40 mL, 1:1) and NaBH<sub>4</sub> (0.26 g) was added portion wise at 0 °C. The reaction mixture was stirred at the same temperature for 2 h before it was quenched with saturated sodium bicarbonate (20 mL). The reaction mixture concentrated under reduced pressure to remove methanol. The product was extracted with ethyl acetate (3 x 40 mL) and the combined organic phases were dried over anhydrous sodium sulphate, filtered and concentrated under reduced pressure. The residue was purified by silica gel column chromatography using EtOAc/hexane (1:2) to afford compound **14** (1.2 g, 60 % for 5 steps) as a white solid.



### Gram scale synthesis of intermediate 16:



To a solution of compound **10** (2 g, 5.15 mmol) in EtOH (30 mL), 10% Pd-C (100 mg) and 0.1 mL of conc. HCl was added at room temperature. The flask was evacuated and pressurized with H<sub>2</sub> (balloon) and the reaction mixture was stirred for overnight. After completion of reaction, it was filtered through celite and concentrated.

The crude compound was dissolved in anhydrous dichloromethane (35 mL) and cooled to -78 °C. To this, SnCl<sub>4</sub> (1 M in dichloromethane, 16 mL) was added drop wise for 5 min and stirred at same temperature for 3 h. After completion of reaction, it was quenched with saturated sodium bicarbonate solution and allowed to warm to room temperature. The reaction mixture was filtered through celite pad and the organic phase was separated. The aqueous layer was extracted with dichloromethane (30 mL) and the combined organic layers were washed with water (20 mL), dried over anhydrous sodium sulphate, filtered and concentrated under reduced pressure.

The above crude compound was dissolved in anhydrous dichloromethane (40 mL), PCC (6 g) and celite (1.5 g) were added under nitrogen at room temperature and stirred it for 12 h. After completion of the reaction, it was diluted with diethyl ether (30 mL) and filtered through celite

pad .The organic layer was washed with saturated sodium bicarbonate solution, water (20 mL), brine solution (20 mL). The solvent was dried over sodium sulphate, filtered and concentrated under reduced pressure.

The crude compound was dissolved in dichloromethane (30 mL) and cooled to 0 °C. To this, freshly prepared nitrating mixture (1.3 mL HNO<sub>3</sub> and 1.6 mL H<sub>2</sub>SO<sub>4</sub>) was added and stirred for 2 h. After completion of reaction, it was neutralized with saturated sodium carbonate solution, extracted with dichloromethane (3 X 25 mL) and the organic layer washed with water (2 X 25 mL). The combined organic layer was dried over sodium sulphate, filtered and concentrated under reduced pressure. To the crude solid, ether was added and decanted to afford yellow solid.

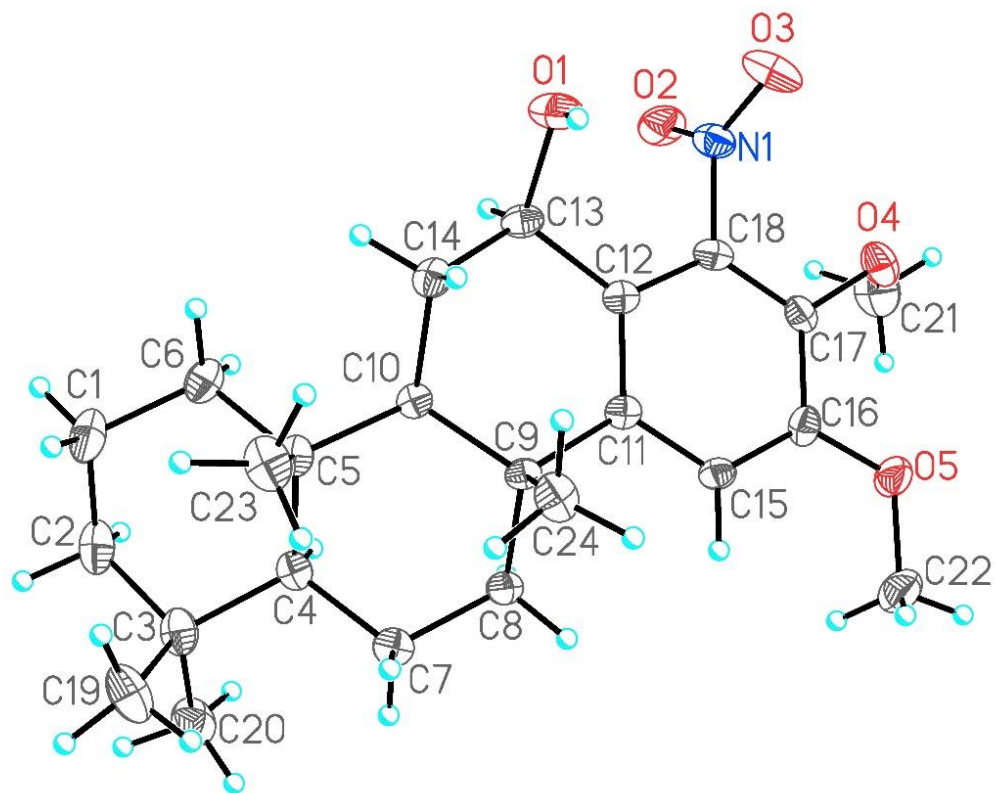
To the above crude compound dissolved in toluene (20 mL) and 10% Pd-C (100 mg) was added at room temperature. The flask was evacuated and pressurized with H<sub>2</sub> (balloon) and the reaction mixture was stirred for 15 h at same temperature. After completion of reaction, it was diluted with ethyl acetate and filtered through celite pad and concentrated under reduced pressure. The crude product was recrystallized from EtOAc gave a pure amine **16** as white solid (1.2 g, 62 % for 5 steps).

### III. X-ray crystallographic data for Compounds 14 and 15:

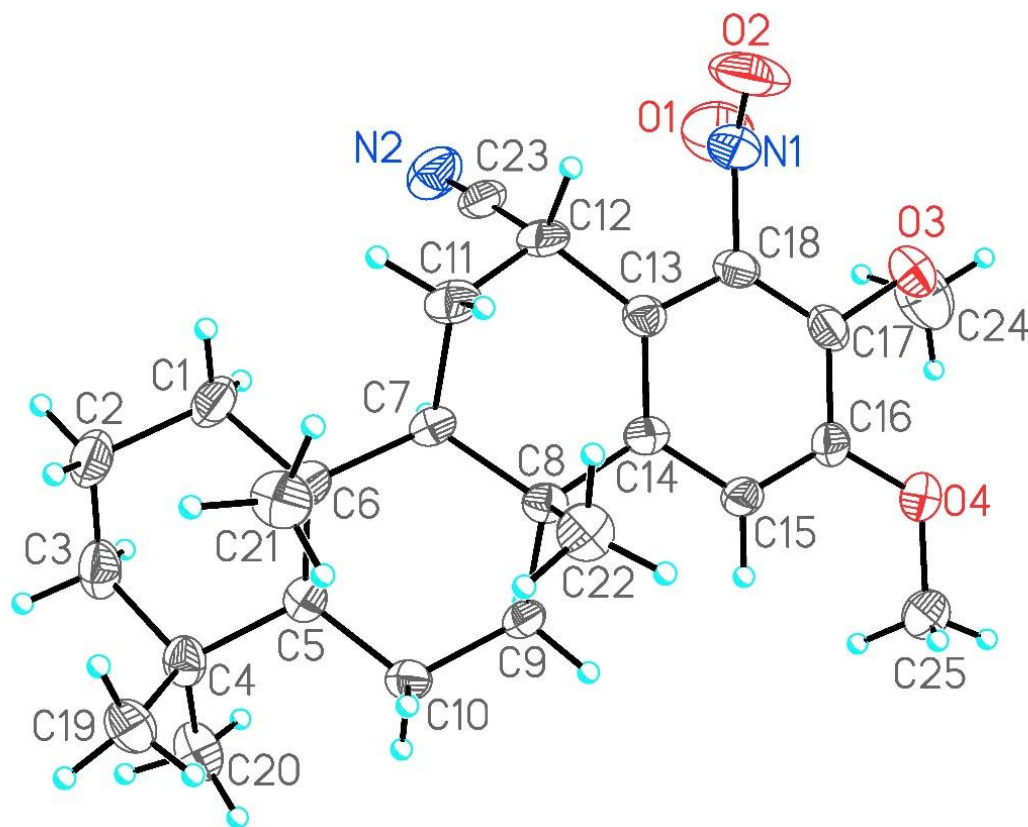
**Table 1:** Crystallographic information table.

	Compound 14	Compound 15
<b>Empirical Formula</b>	C24 H35 N O5	C25 H34 N2 O4
<b>Formula weight</b>	417.53	426.54
<b>Crystal system</b>	P1	<i>P</i> 21 21 21
<b>Space group</b>	Triclinic	Orthorhombic
<b>T (K)</b>	298	298
<b><i>a</i> (Å)</b>	5.9846(16)	6.0956 (2)
<b><i>b</i> (Å)</b>	7.913(2)	15.5691 (7)
<b><i>c</i> (Å)</b>	12.691(3)	24.6358 (11)
<b><i>α</i> (deg)</b>	99.814(10)	90
<b><i>β</i> (deg)</b>	95.953(9)	90
<b><i>γ</i> (deg)</b>	107.509(10)	90
<b><i>V</i> (Å<sup>3</sup>)</b>	557.0(2)	2338.01 (17)
<b><i>D</i><sub>calcd</sub> (gcm<sup>-3</sup>)</b>	1.245	1.212
<b><i>μ</i> (mm<sup>-1</sup>)</b>	0.086	0.082
<b><i>θ</i> range</b>	2.76 to 27.54	2.744 to 25.03
<b><i>Z</i></b>	1	4
<b>Range <i>h</i></b>	−7 to 7	−7 to 7
<b>Range <i>k</i></b>	−10 to 10	−18 to 17
<b>Range <i>l</i></b>	−16 to 16	−29 to 29
<b>Reflections collected</b>	10537	26551
<b>Total reflections</b>	4642	4117
<b>Observed reflections</b>	3362	3204
<b><i>R</i><sub>1</sub> [<i>I</i> &gt; 2 σ (<i>I</i>) ]</b>	0.0617	0.059
<b><i>wR</i><sub>2</sub> (all)</b>	0.1429	0.1581
<b>Goodness-of-fit</b>	1.049	1.185
<b>X-Ray Diffractometer</b>	Bruker D8 Quest	Bruker D8 Quest

**ORTEP Diagrams:**



**Compound 14**



**Compound 15**

### **X-ray Crystallography:**

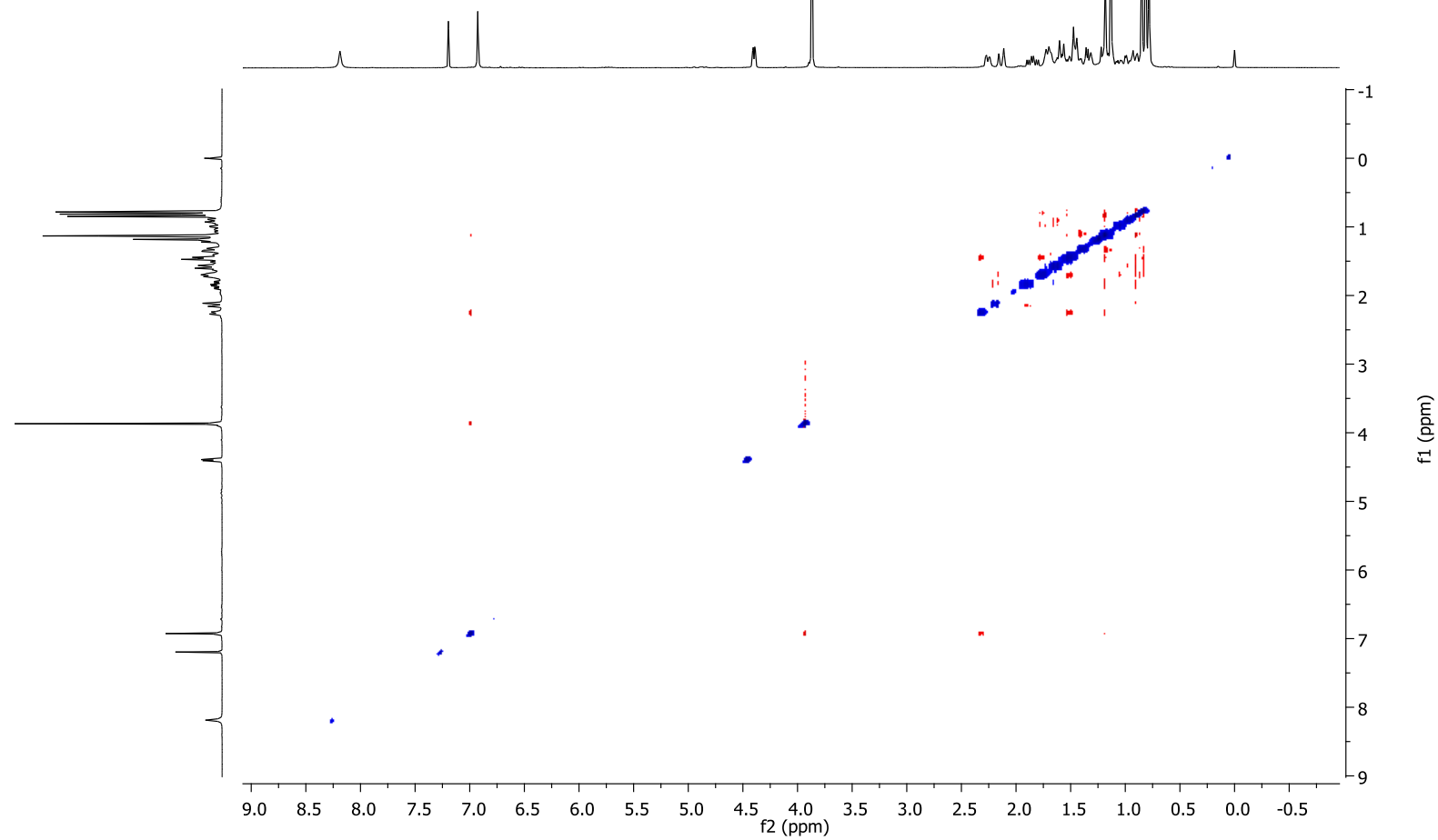
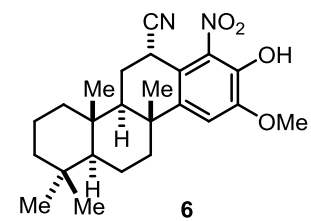
X-ray reflections for the compound **14** and **15** were collected on Bruker D8 Quest diffractometer equipped with a graphite mono chromator and Mo-K $\alpha$  fine-focus sealed tube ( $\lambda=0.71073$  Å). Data reduction was performed using Bruker SAINTS Software.<sup>1</sup> Intensities were corrected

for absorption using SADABS,<sup>2</sup> and the structure was solved and refined using SHELX-97<sup>3</sup> and refinement was carried out by full-matrix least-squares technique using SHELXL-2014/7. All non-hydrogen atoms were refined anisotropically. Hydrogen atoms on hetero atoms were located from difference electron density maps and all C–H hydrogens were fixed geometrically. Hydrogen bond geometries were determined in Platon.<sup>4</sup> Crystal structures are deposited as part of the Supporting Information and may be accessed at [www.ccdc.cam.ac.uk/data\\_request/cif](http://www.ccdc.cam.ac.uk/data_request/cif) (CCDC Nos. 1454907 (**14**) and 1454906 (**15**)).

#### References:

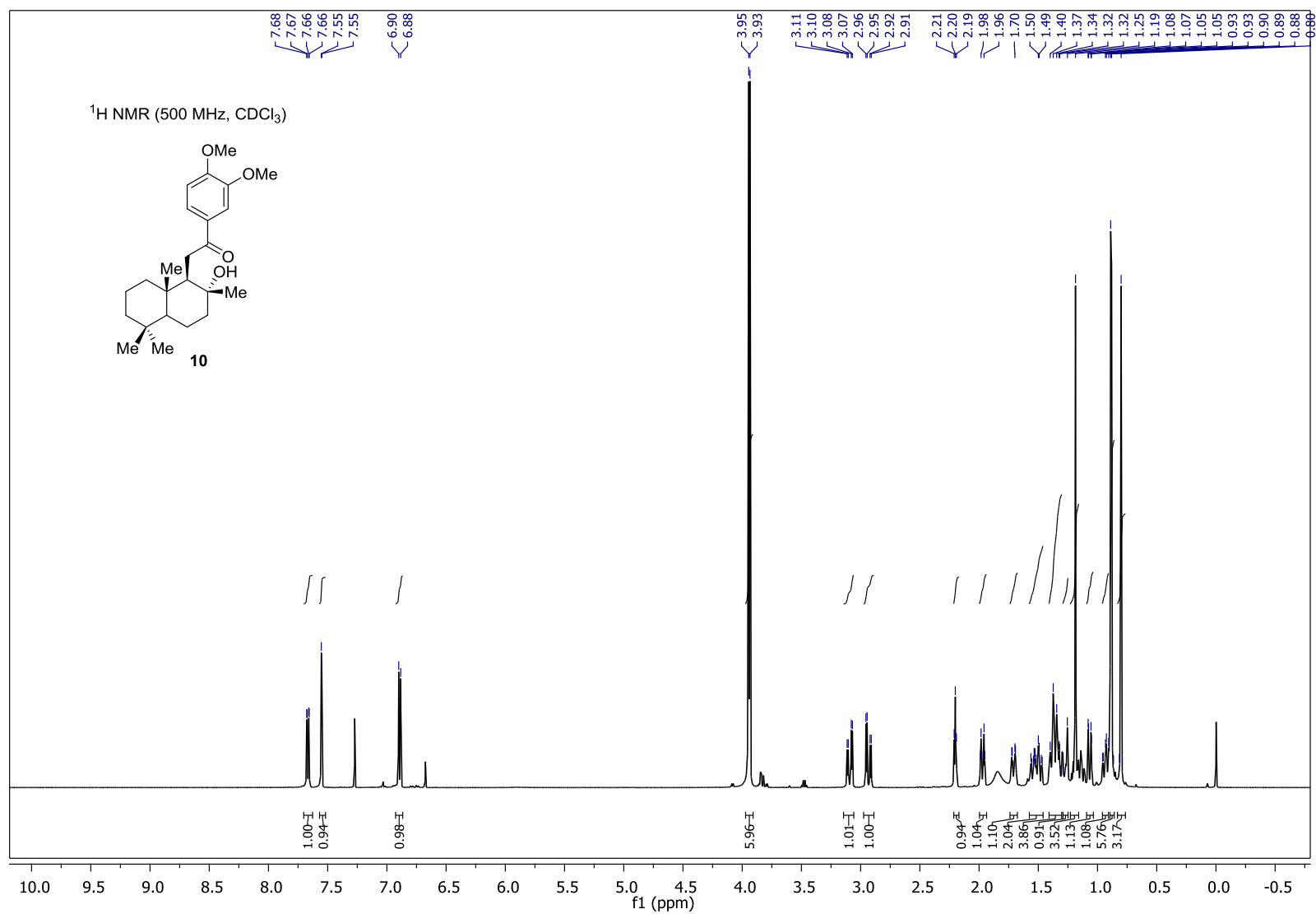
1. *SAINT-Plus*, version 6.45; Bruker AXS Inc.: Madison, Wisconsin, U.S.A., **2003**.
2. SADABS, *Program for Empirical Absorption Correction of Area Detector Data*; Sheldrick, G. M. University of Gottingen: Gottingen, Germany, **1997**.
3. (a) *SMART*, version 5.625 and *SHELX-TL*, version 6.12; Bruker AXS Inc.: Madison, Wisconsin, USA, **2000**. (b) Sheldrick, G. M. *SHELXS-97* and *SHELXL-97*; University of Gottingen: Gottingen, Germany, **1997**.
4. Spek, A. L. *PLATON, A Multipurpose Crystallographic Tool*; Utrecht University: Utrecht, Netherlands, **2002**.

IV. 2D NOESY Spectrum of compound 6 in CDCl<sub>3</sub>:



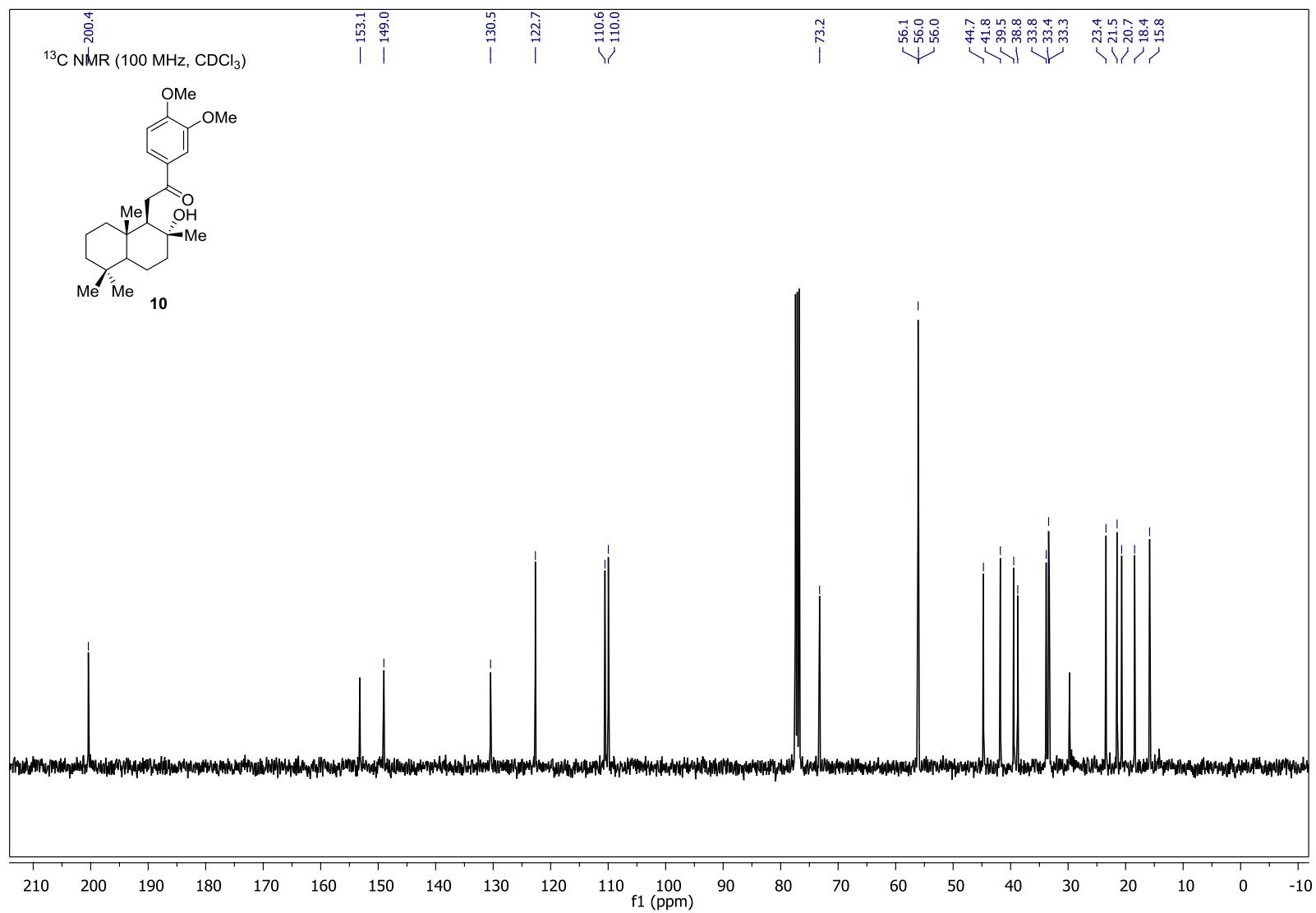
## V. $^1\text{H}$ & $^{13}\text{C}$ Spectra:

### $^1\text{H}$ NMR Spectrum of 10

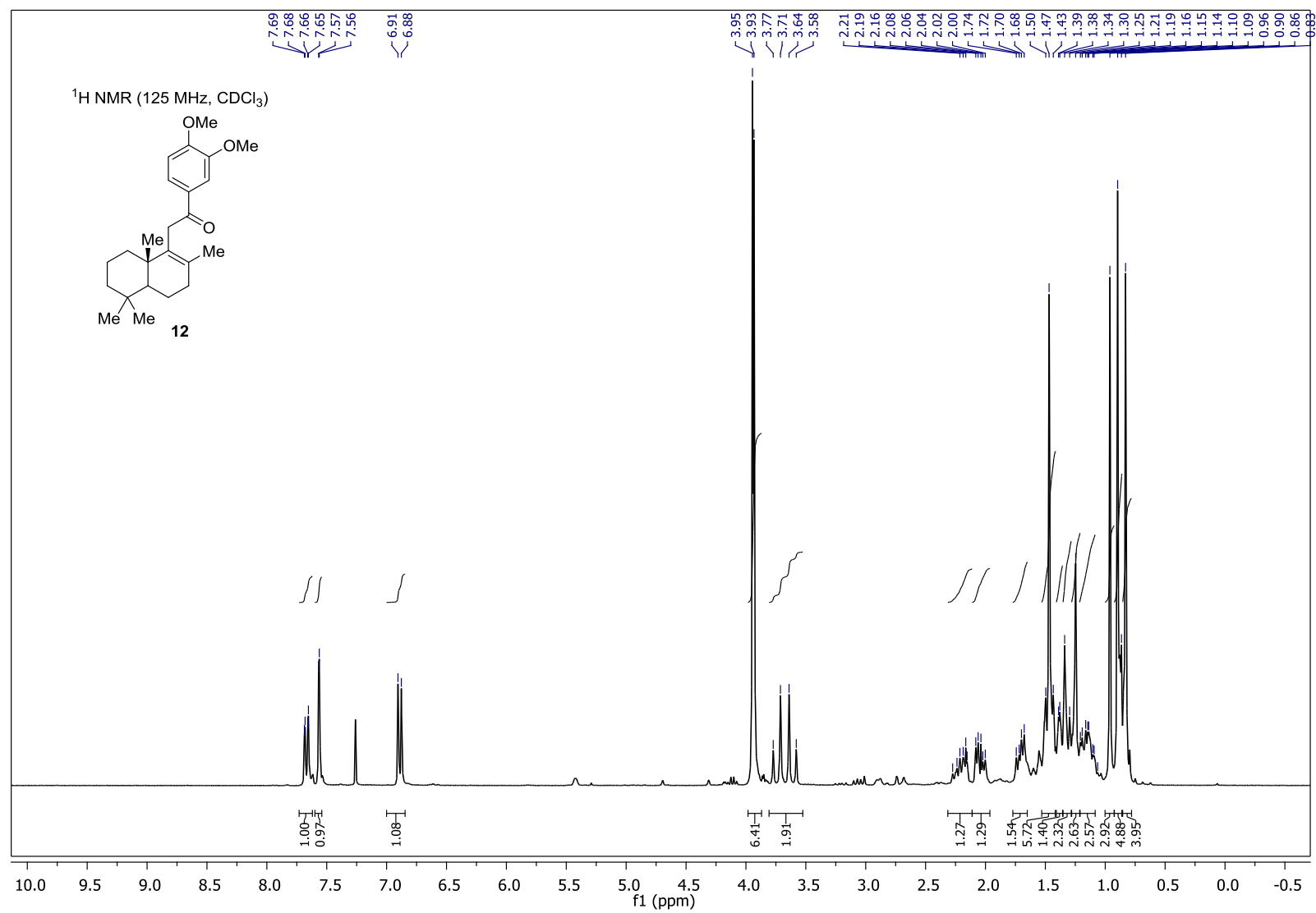




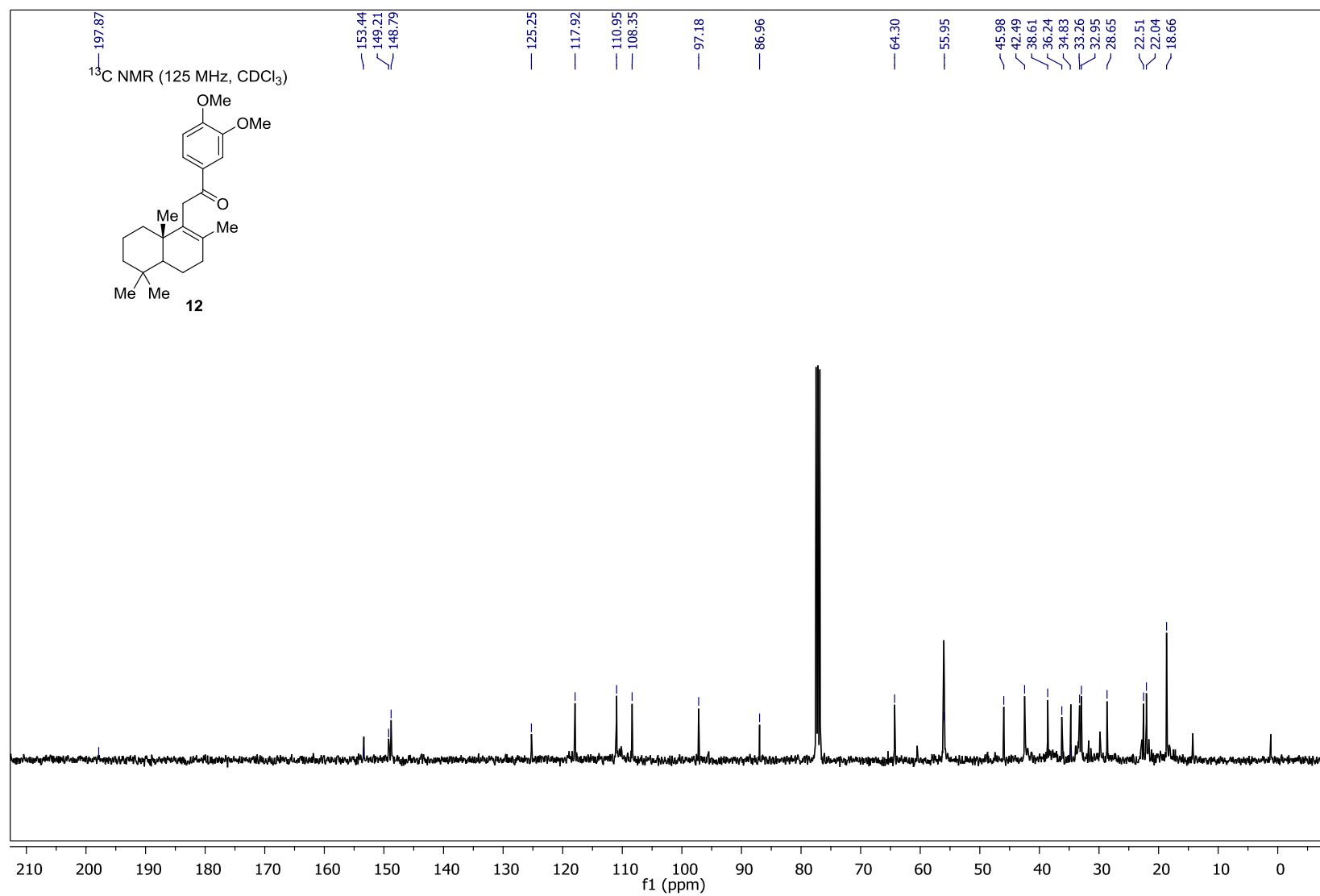
# <sup>13</sup>C NMR Spectrum of 10



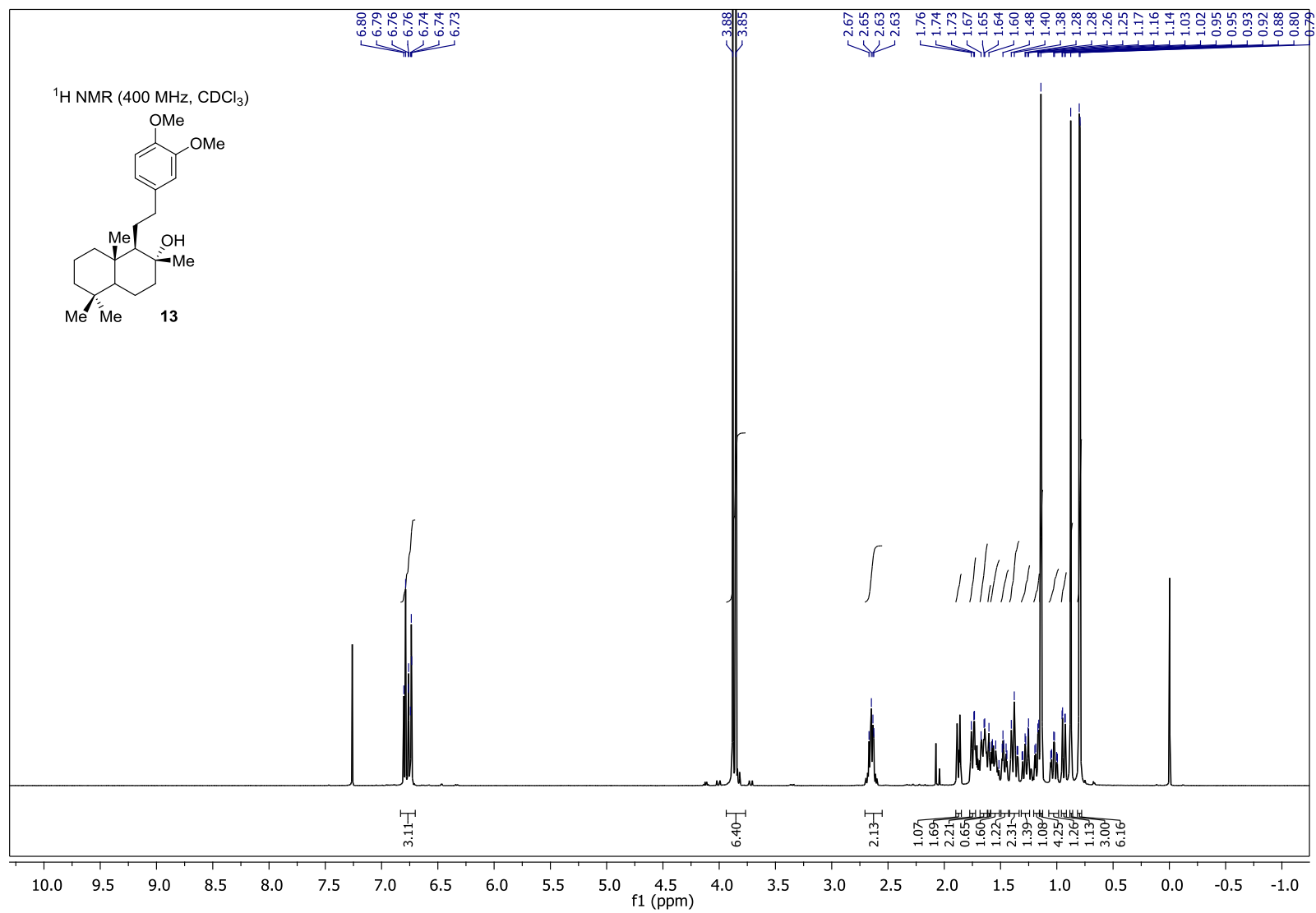
# <sup>1</sup>H NMR Spectrum of 12



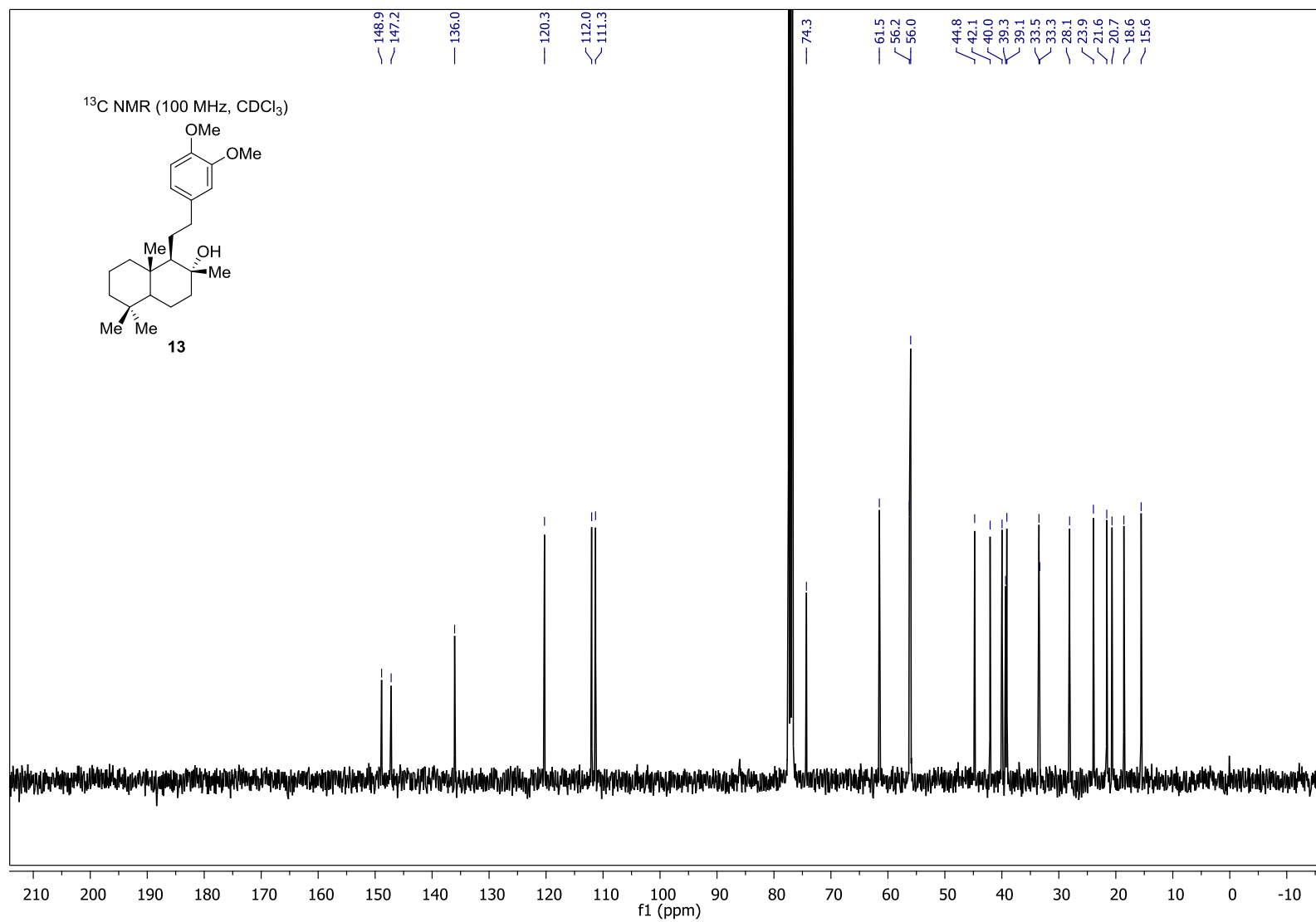
# <sup>13</sup>C NMR Spectrum of 12



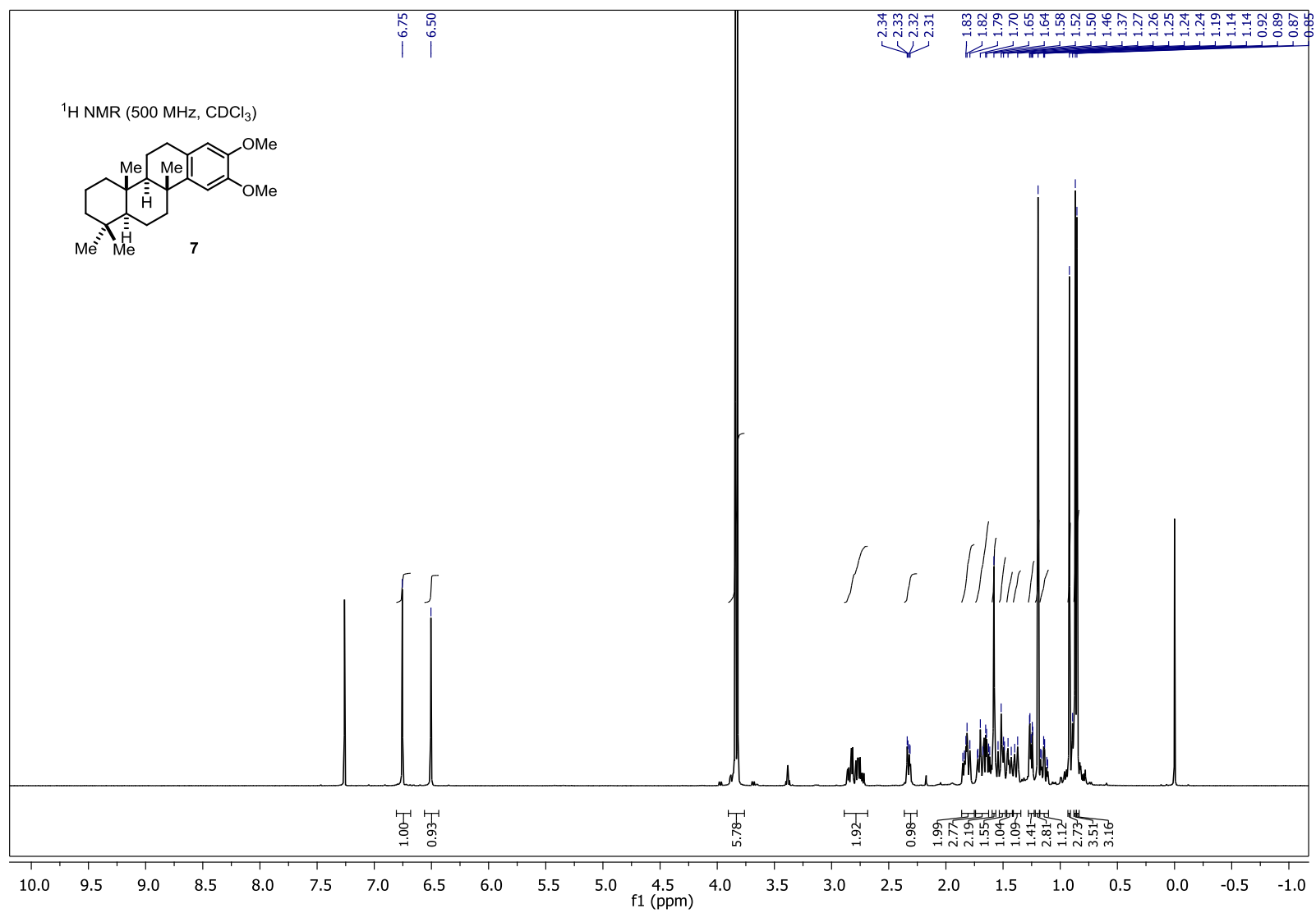
# <sup>1</sup>H NMR Spectrum of 13



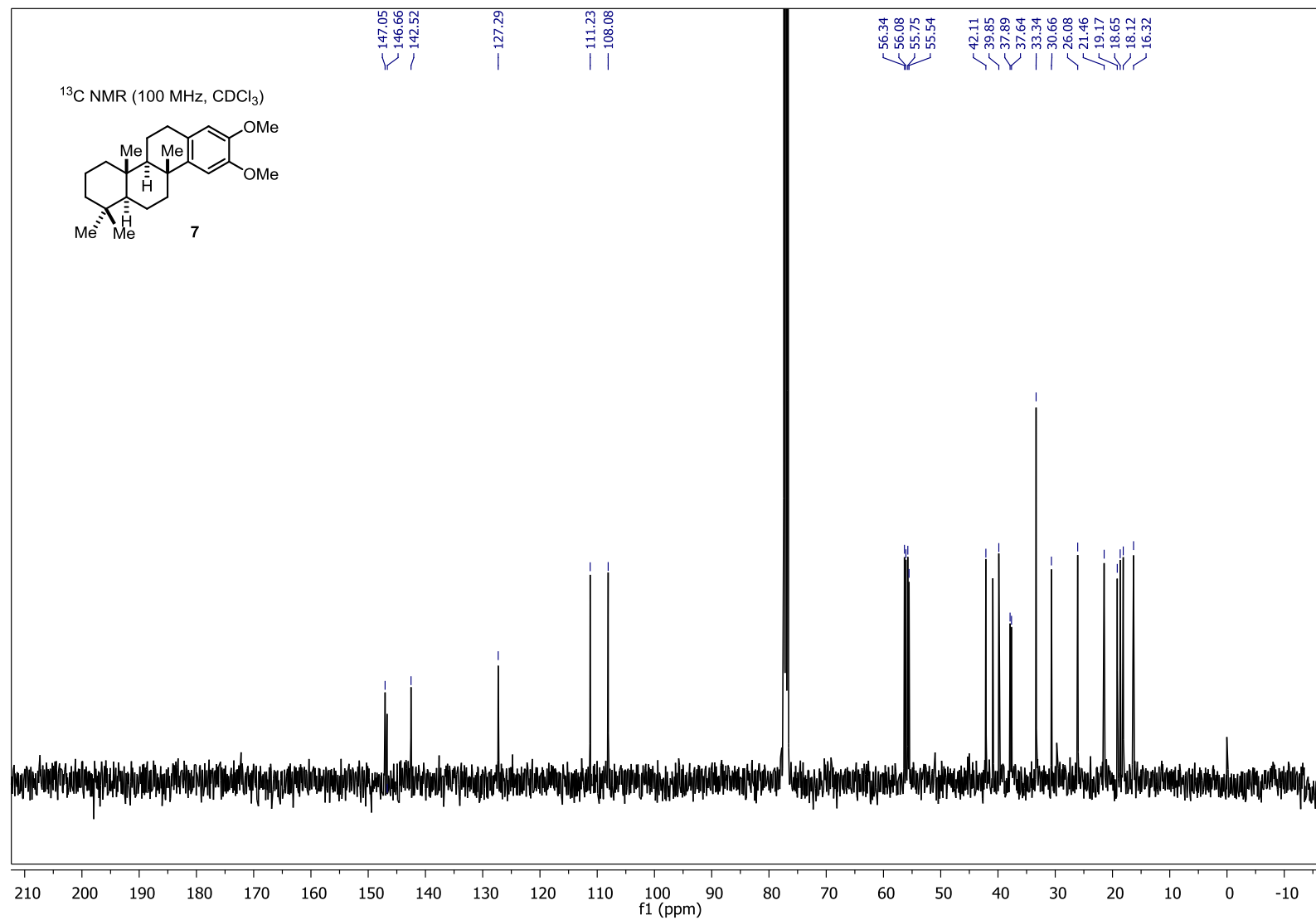
# <sup>13</sup>C NMR Spectrum of 13



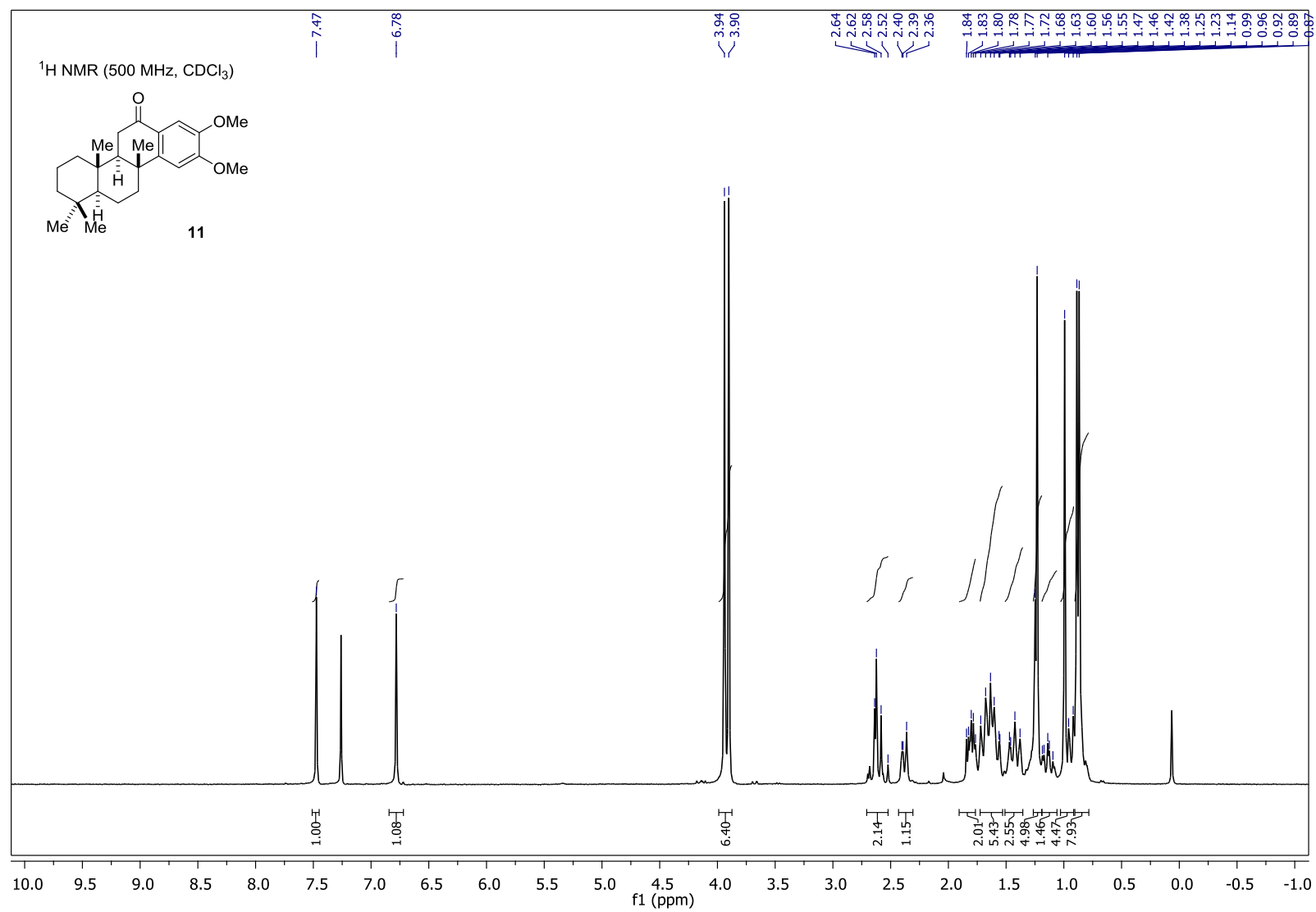
# <sup>1</sup>H NMR Spectrum of 7



# <sup>13</sup>C NMR Spectrum of 7

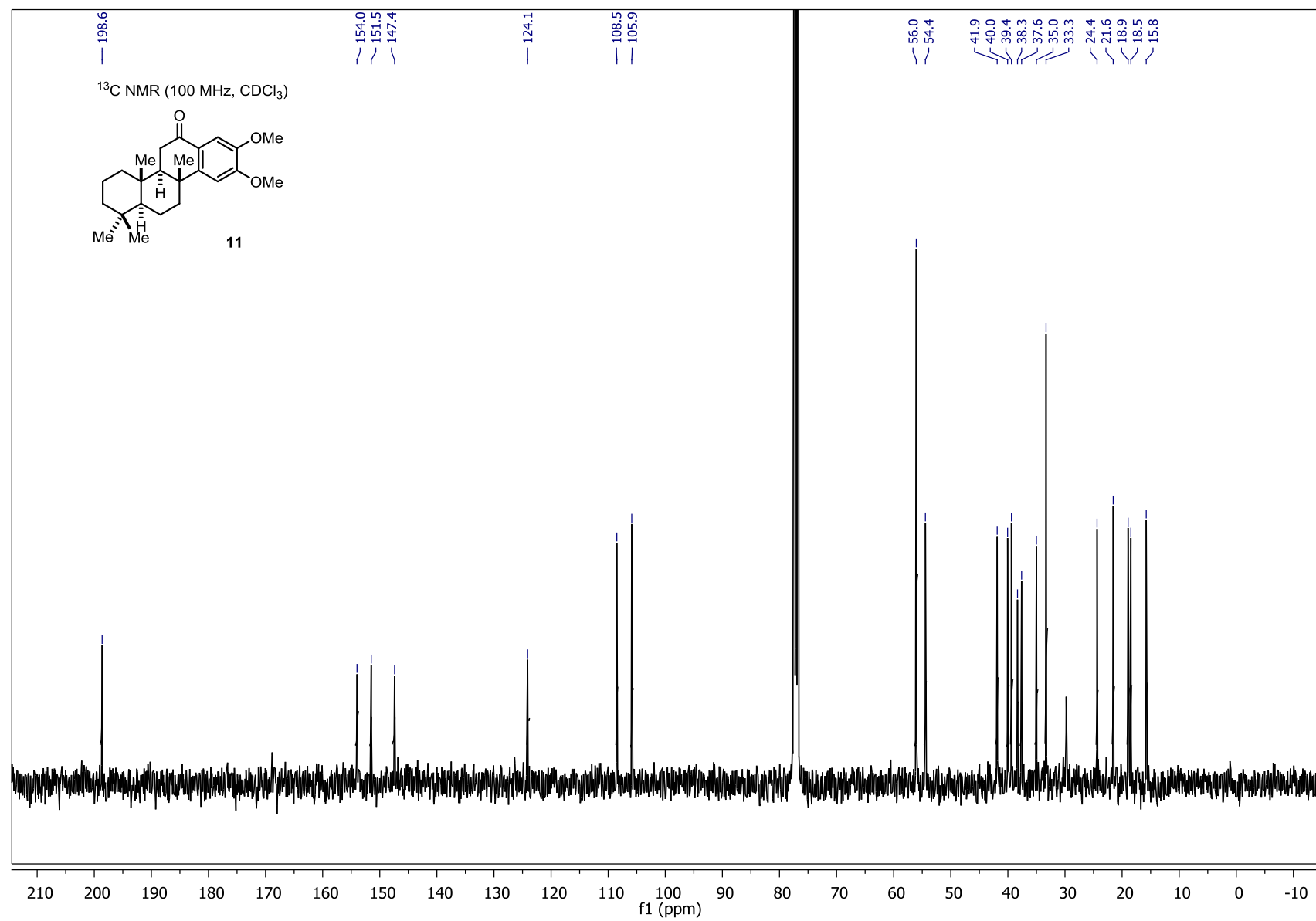


# <sup>1</sup>H NMR Spectrum of 11

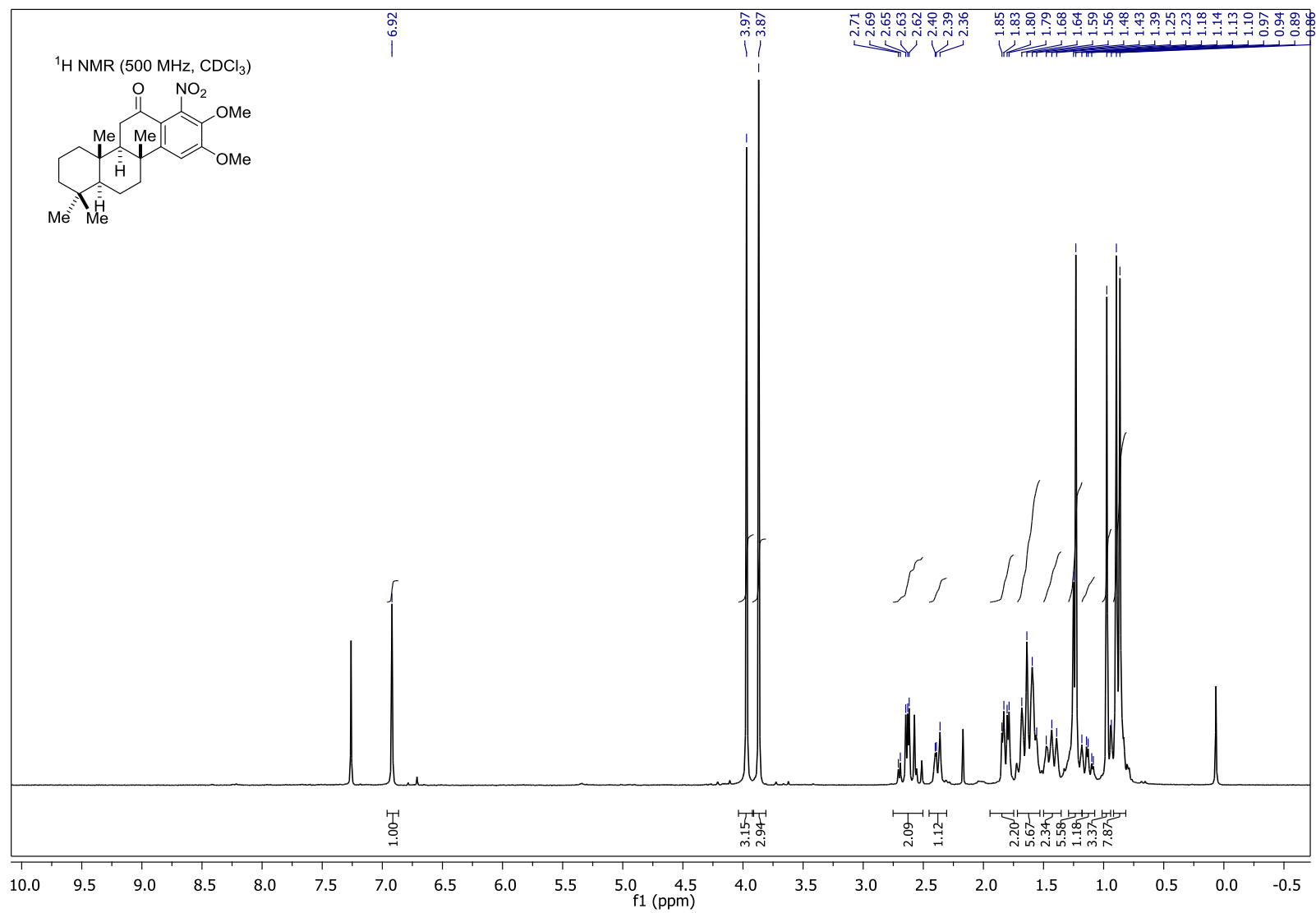




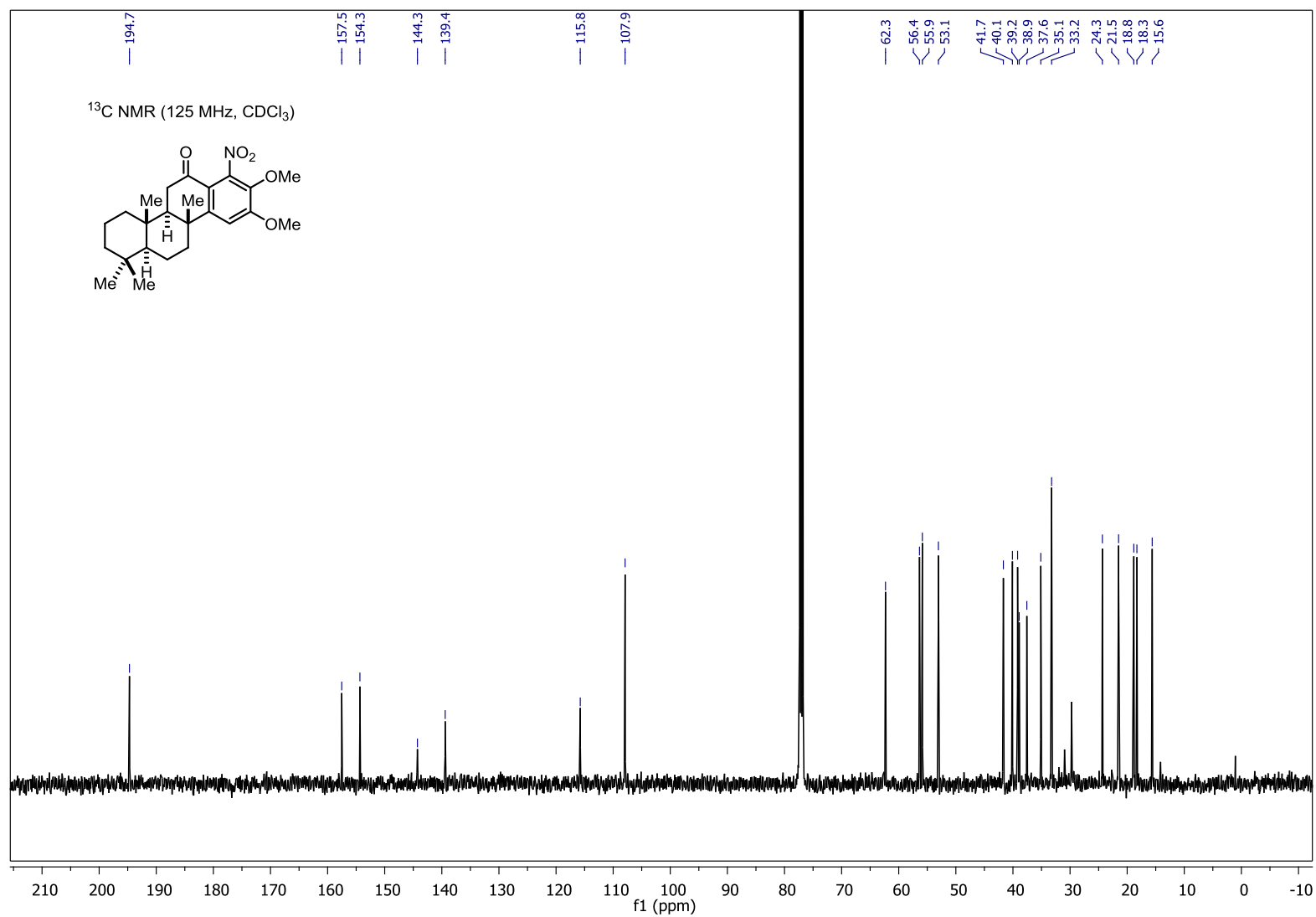
# <sup>13</sup>C NMR Spectrum of 11



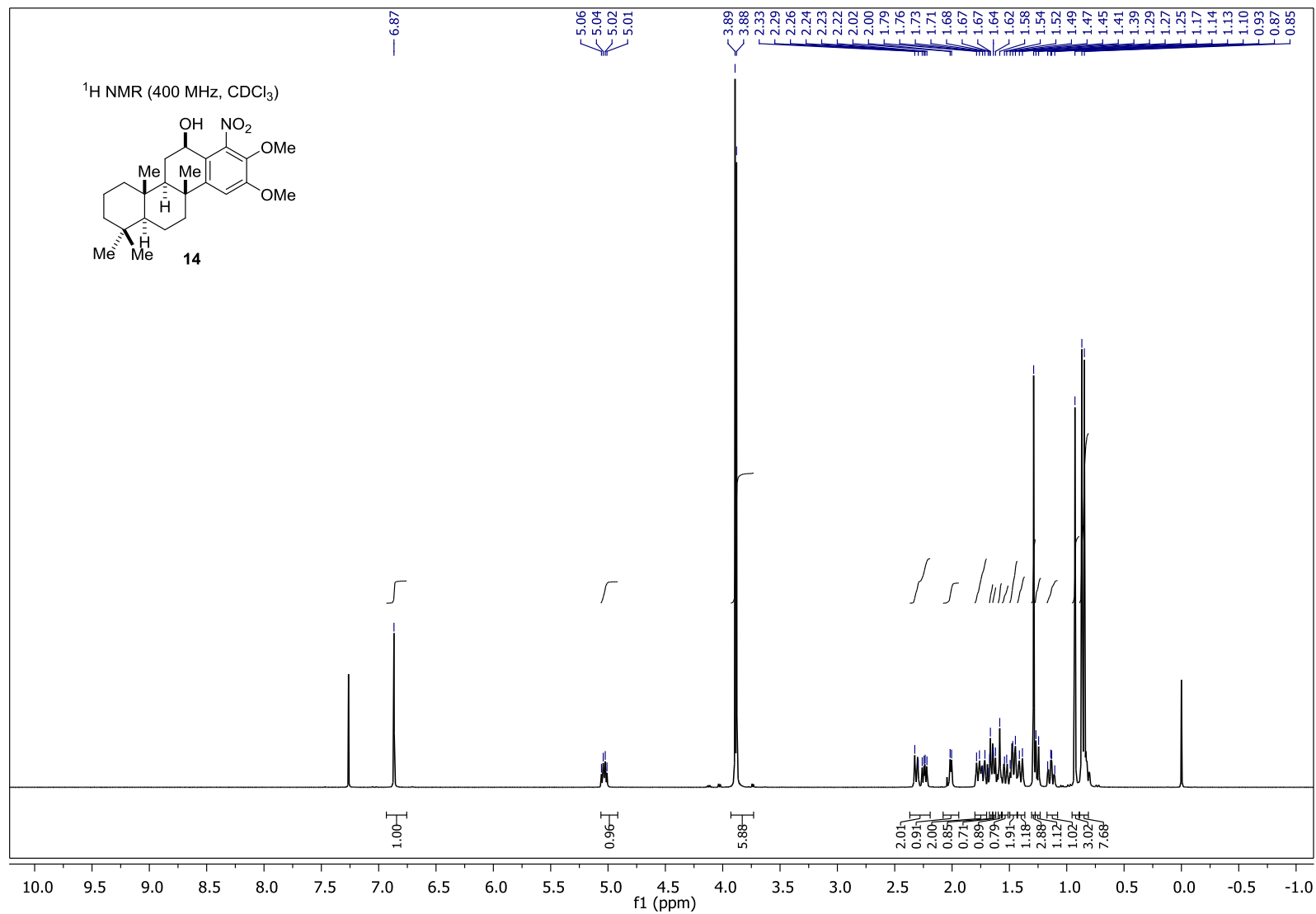
# <sup>1</sup>H NMR Spectrum of S1



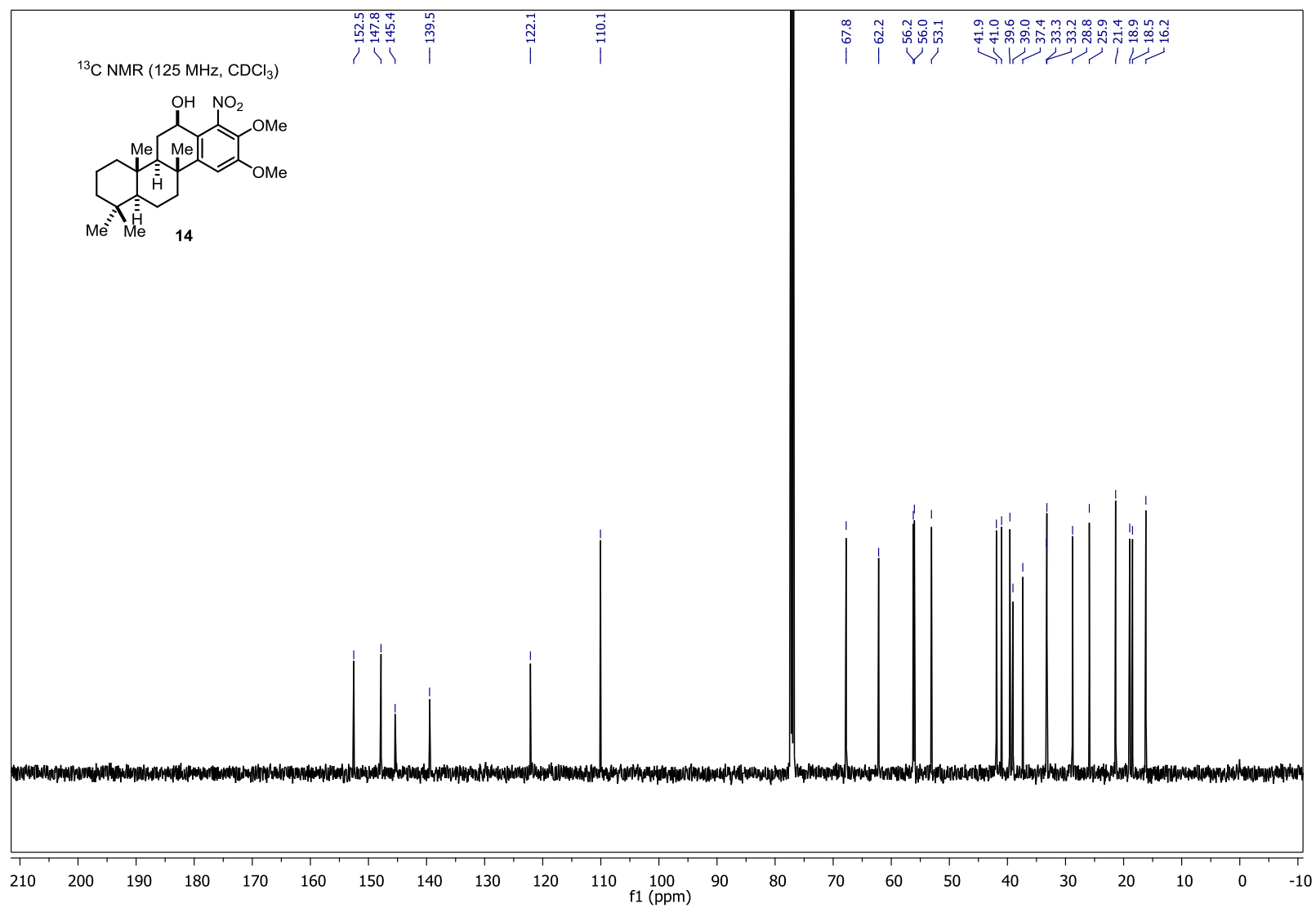
# <sup>13</sup>C Spectrum of S1



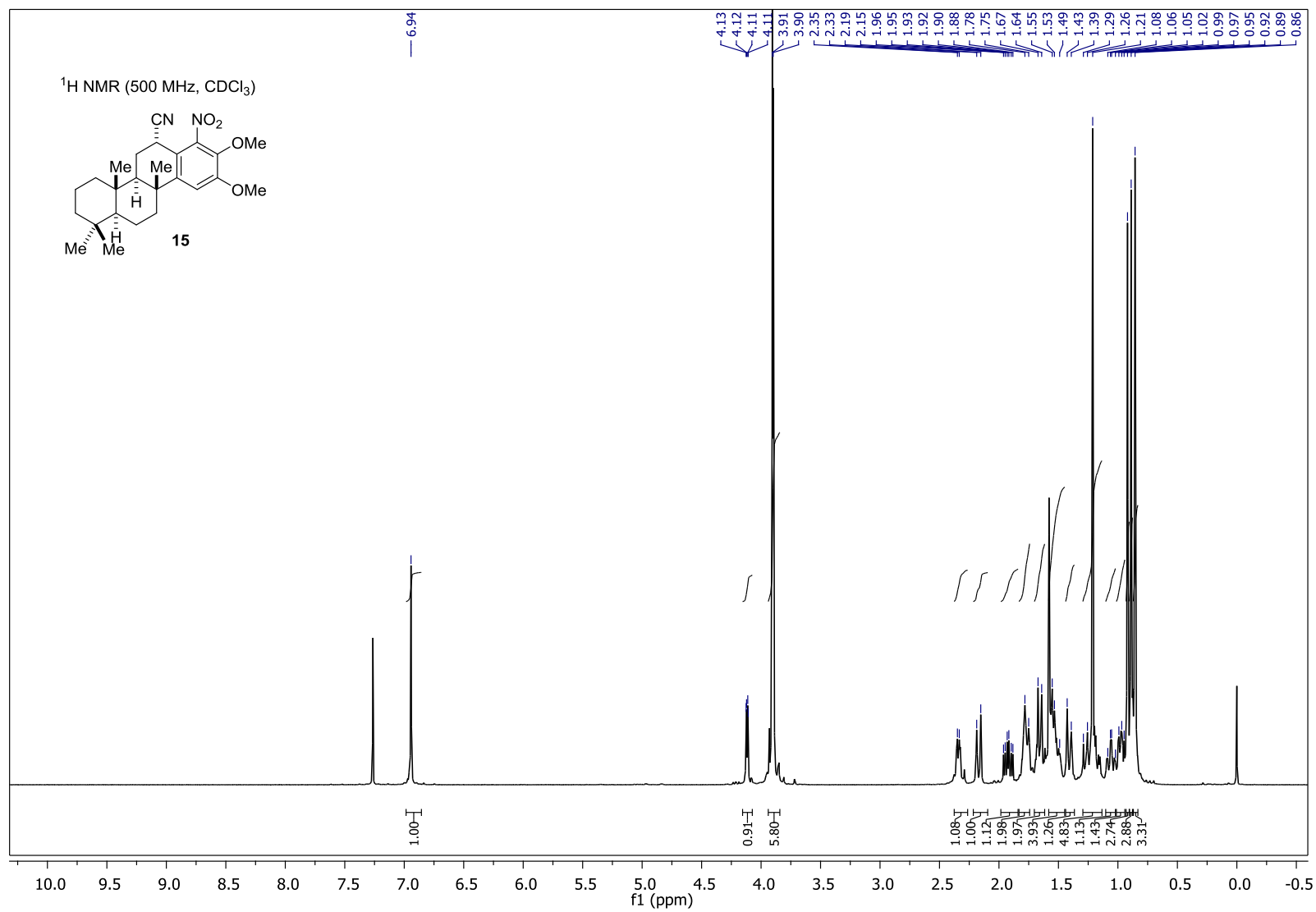
# <sup>1</sup>H NMR Spectrum of 14



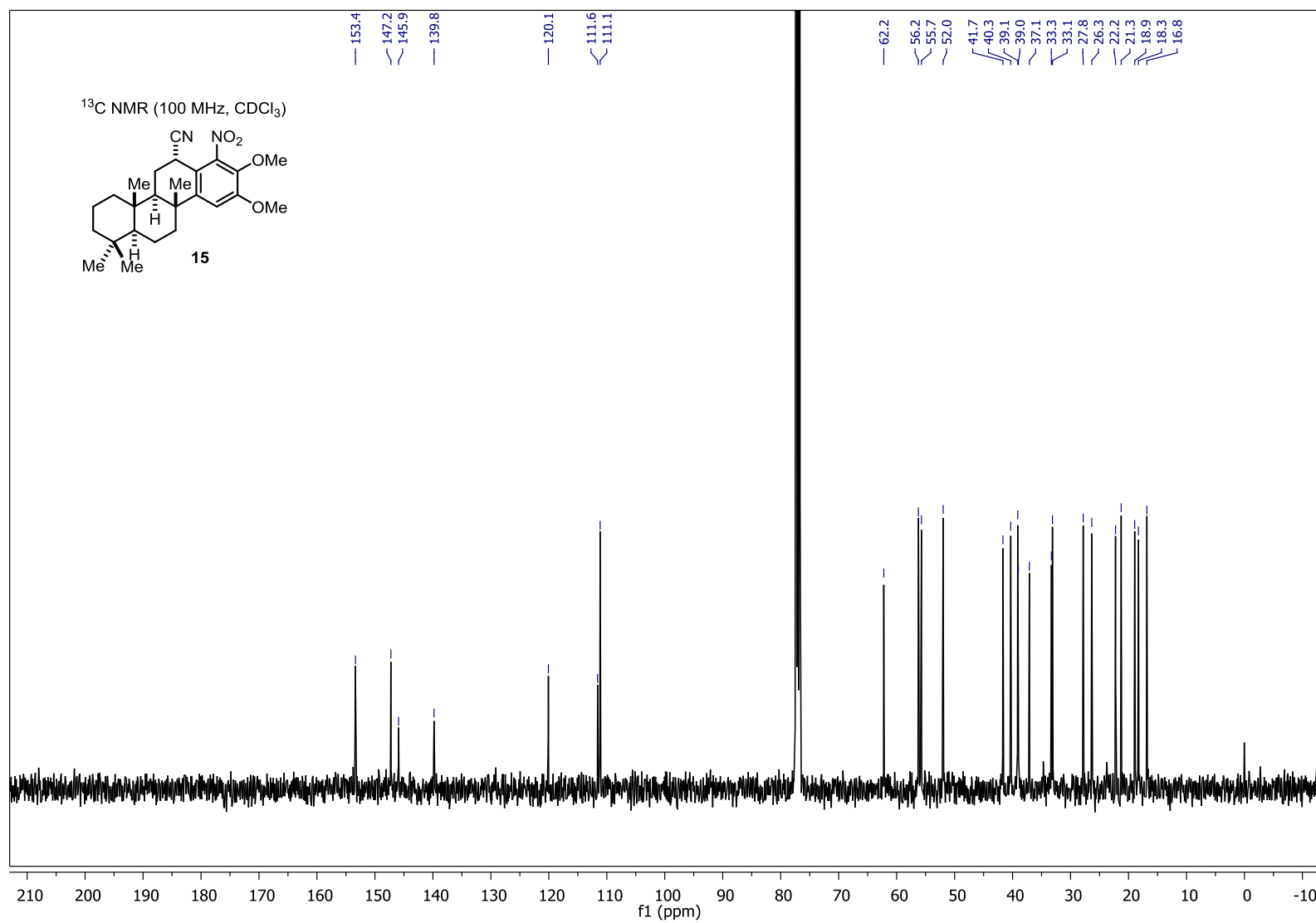
# <sup>13</sup>C NMR Spectrum of 14



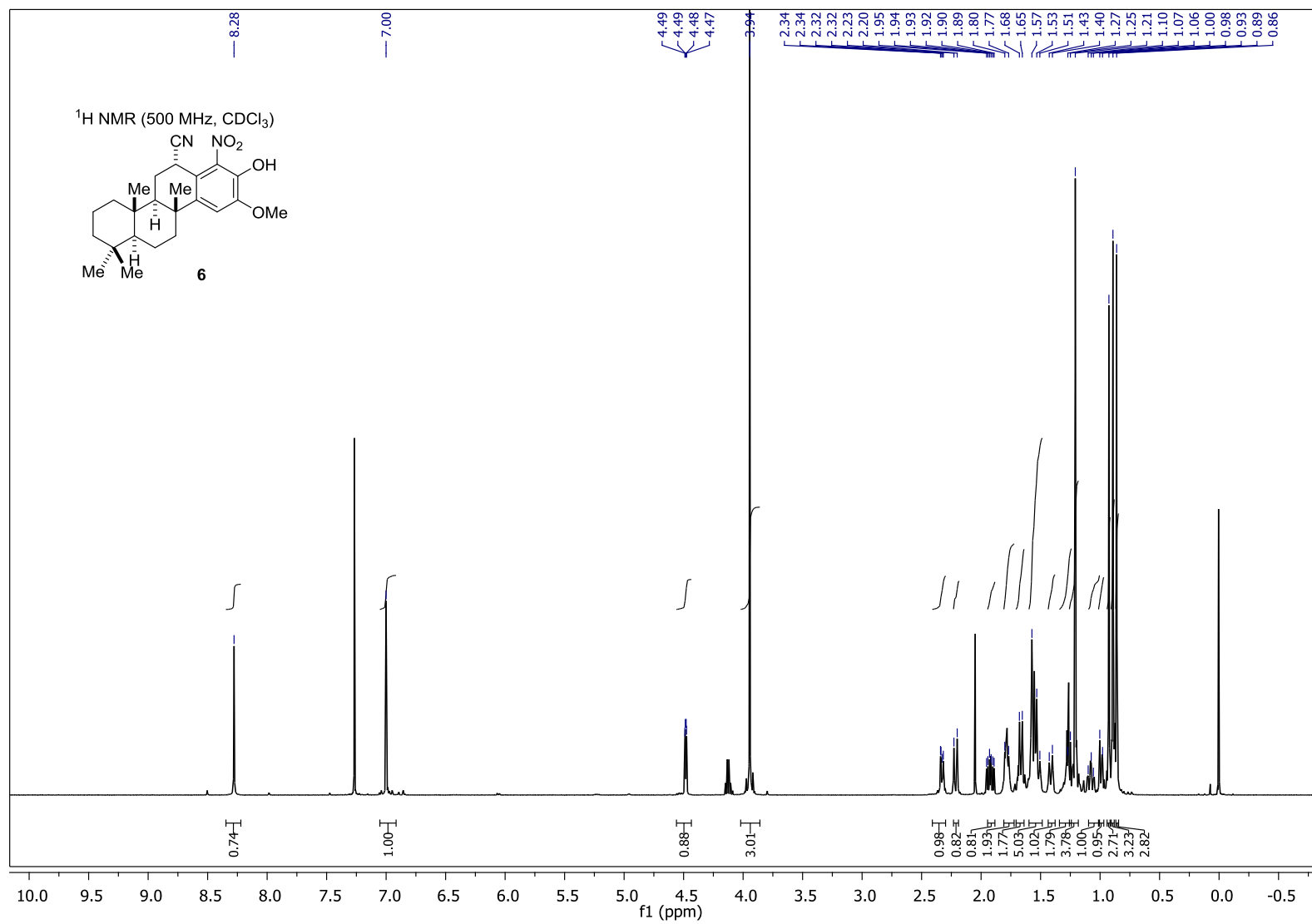
# <sup>1</sup>H NMR Spectrum of 15



# <sup>13</sup>C NMR Spectrum of 15

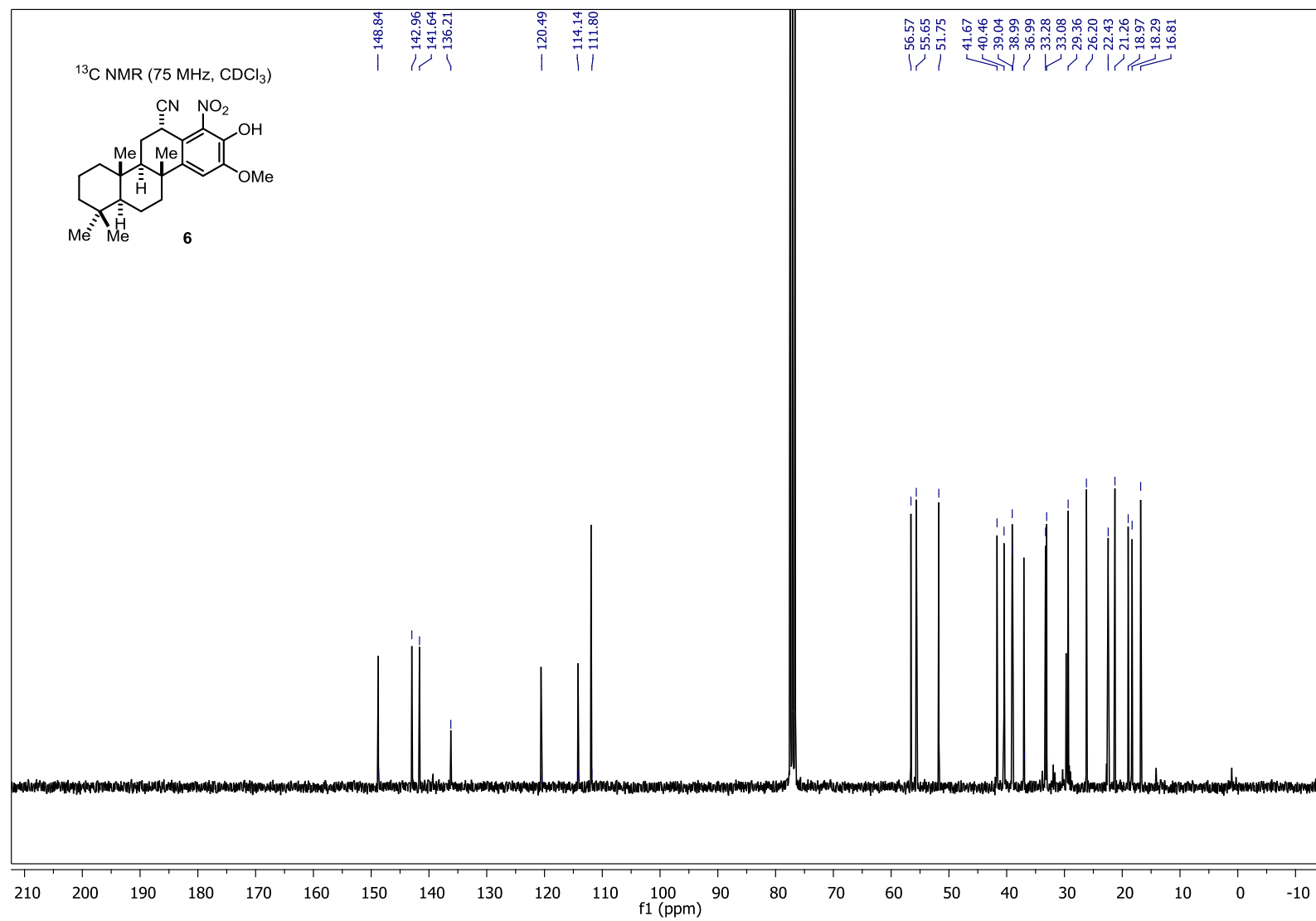


# <sup>1</sup>H NMR Spectrum of 6

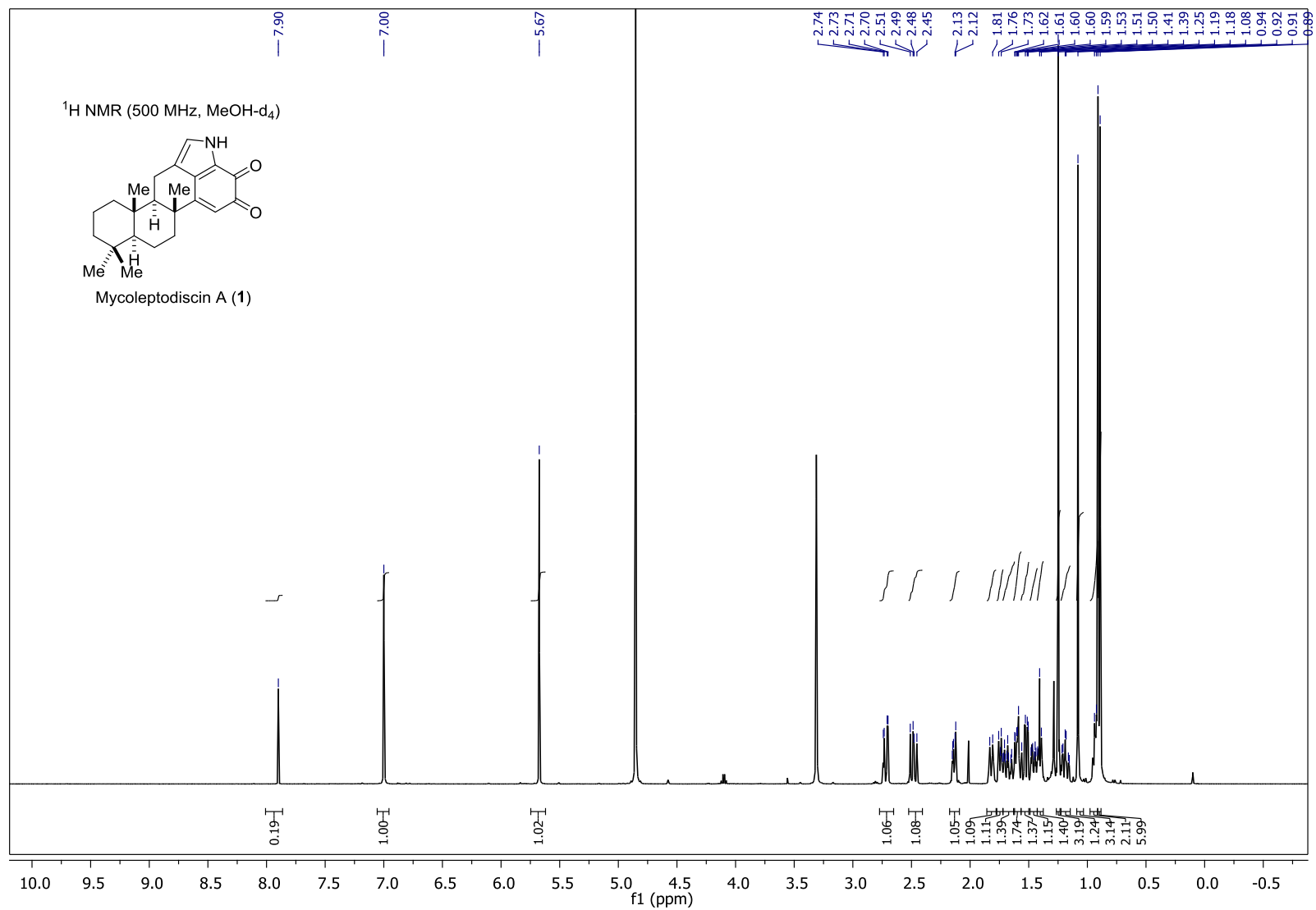




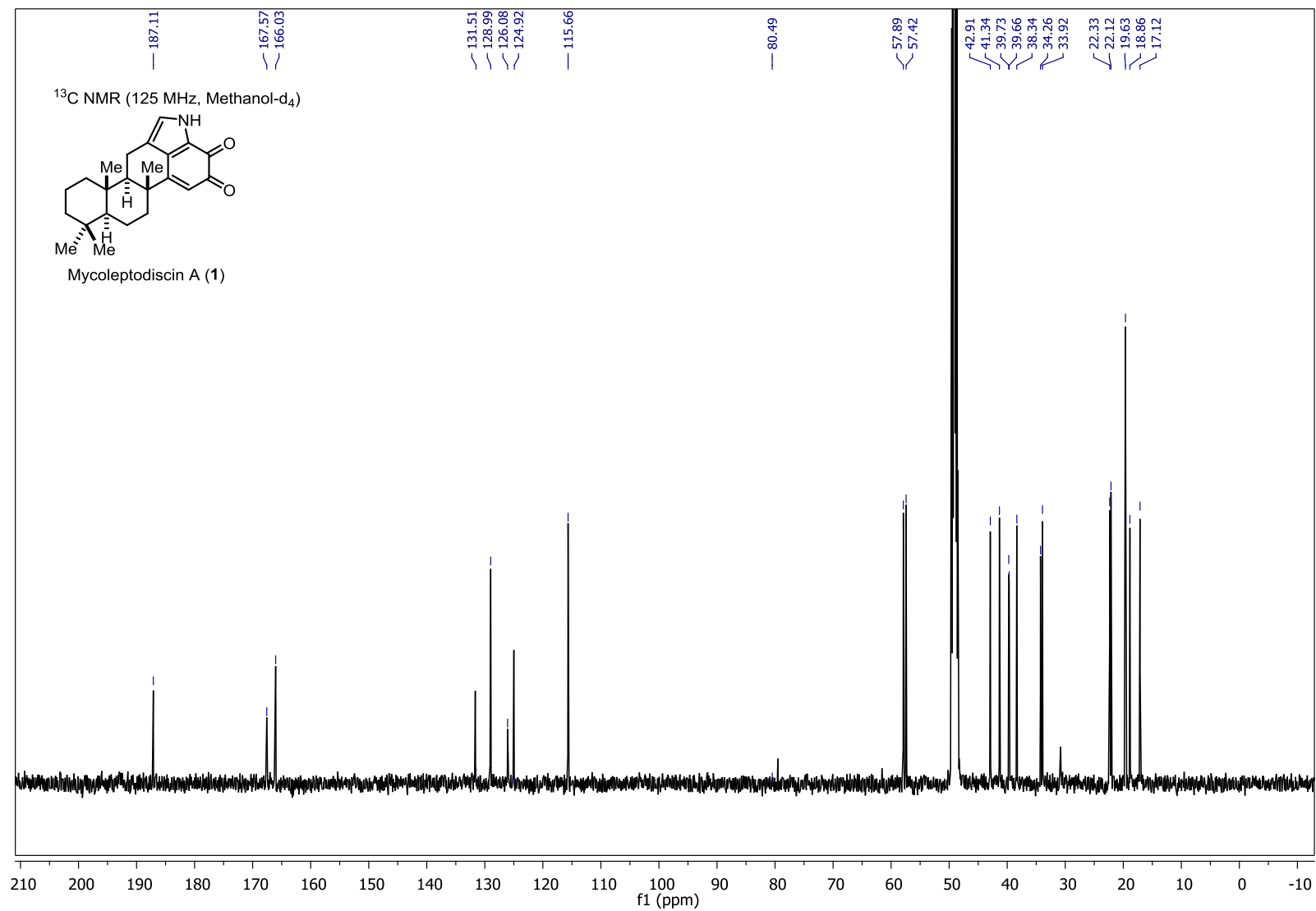
# <sup>13</sup>C NMR Spectrum of 6



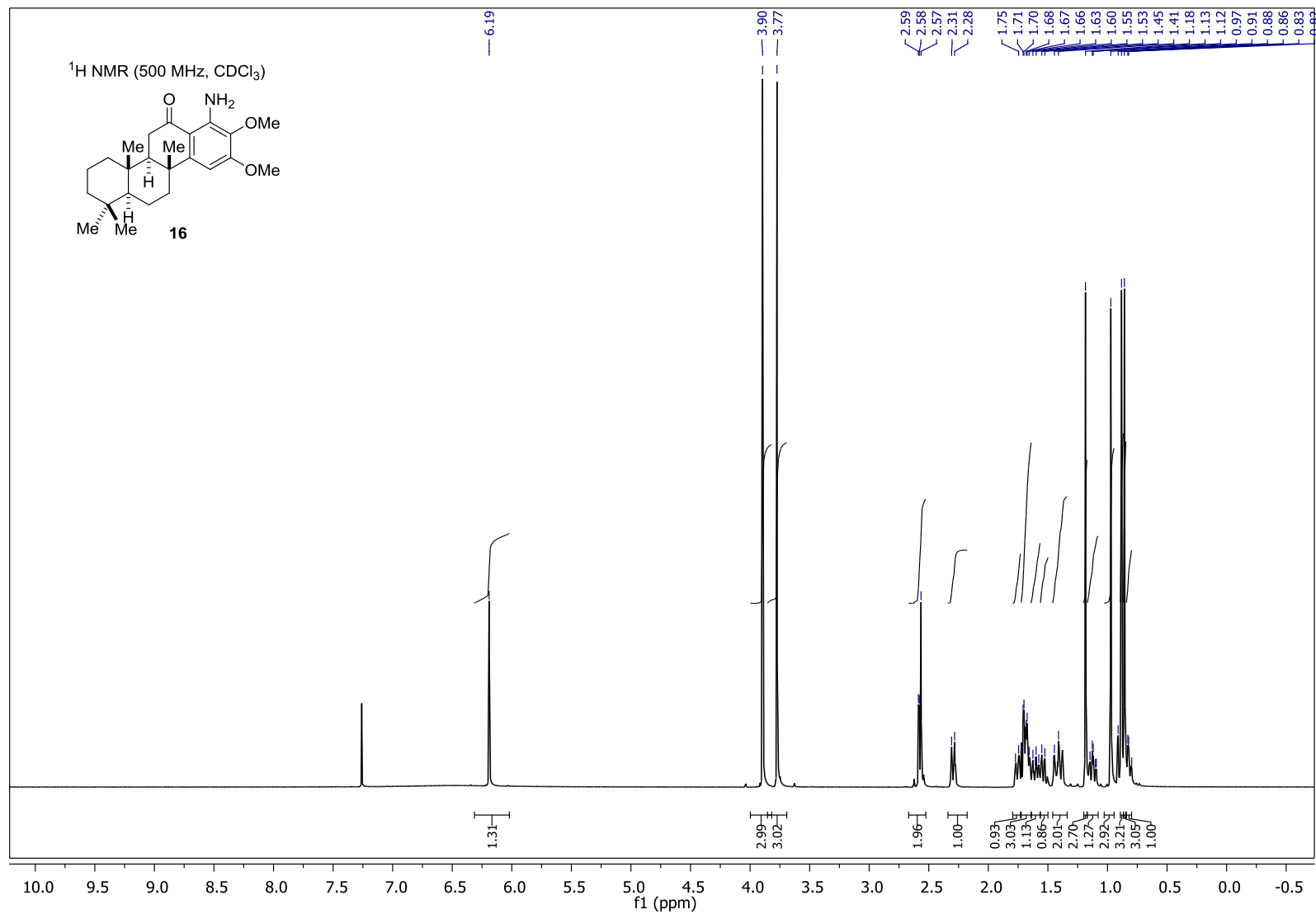
# <sup>1</sup>H NMR Spectrum of Mycoleptodiscin A (1)



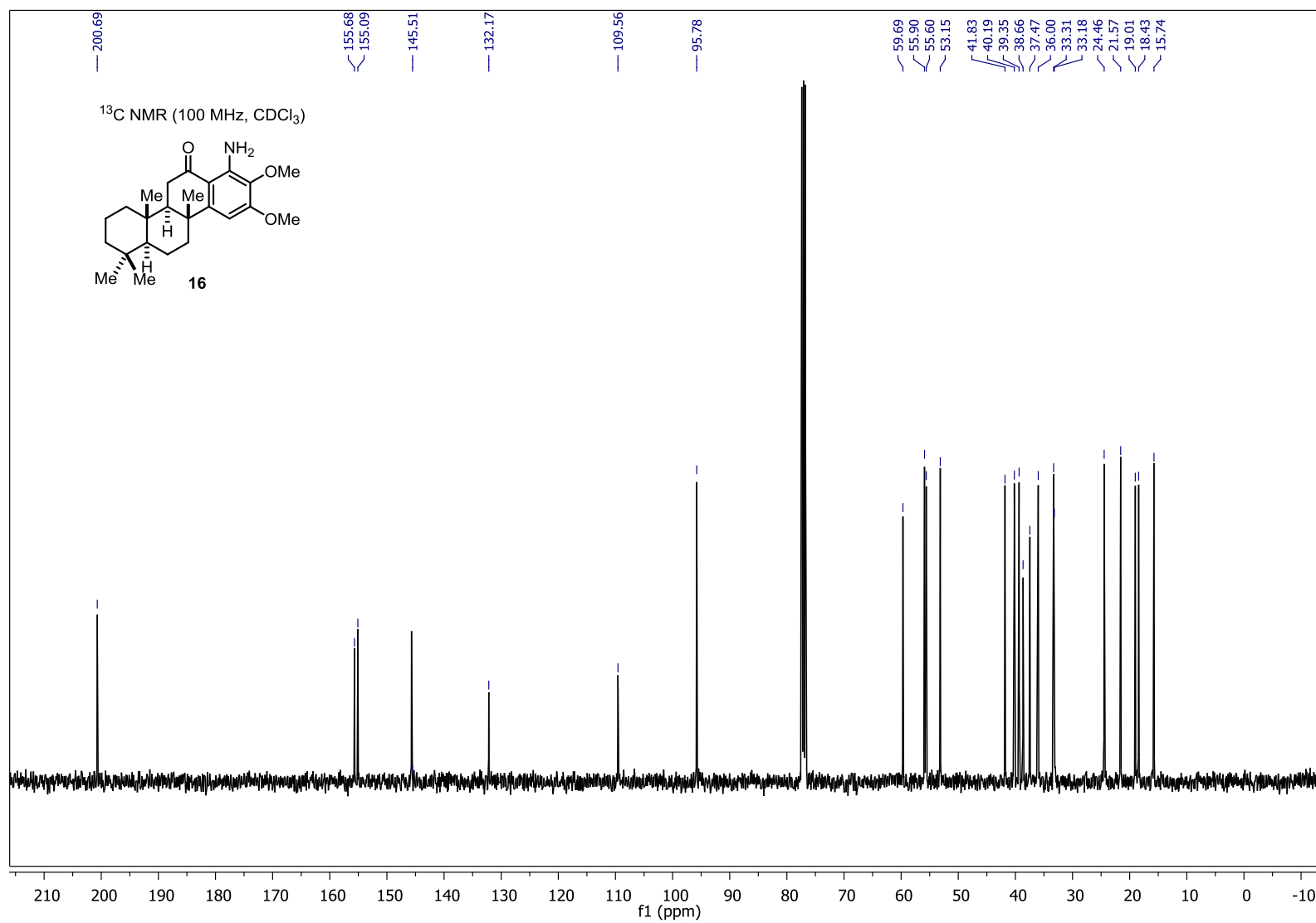
# <sup>13</sup>C NMR Spectrum of Mycoleptodiscin A (1)



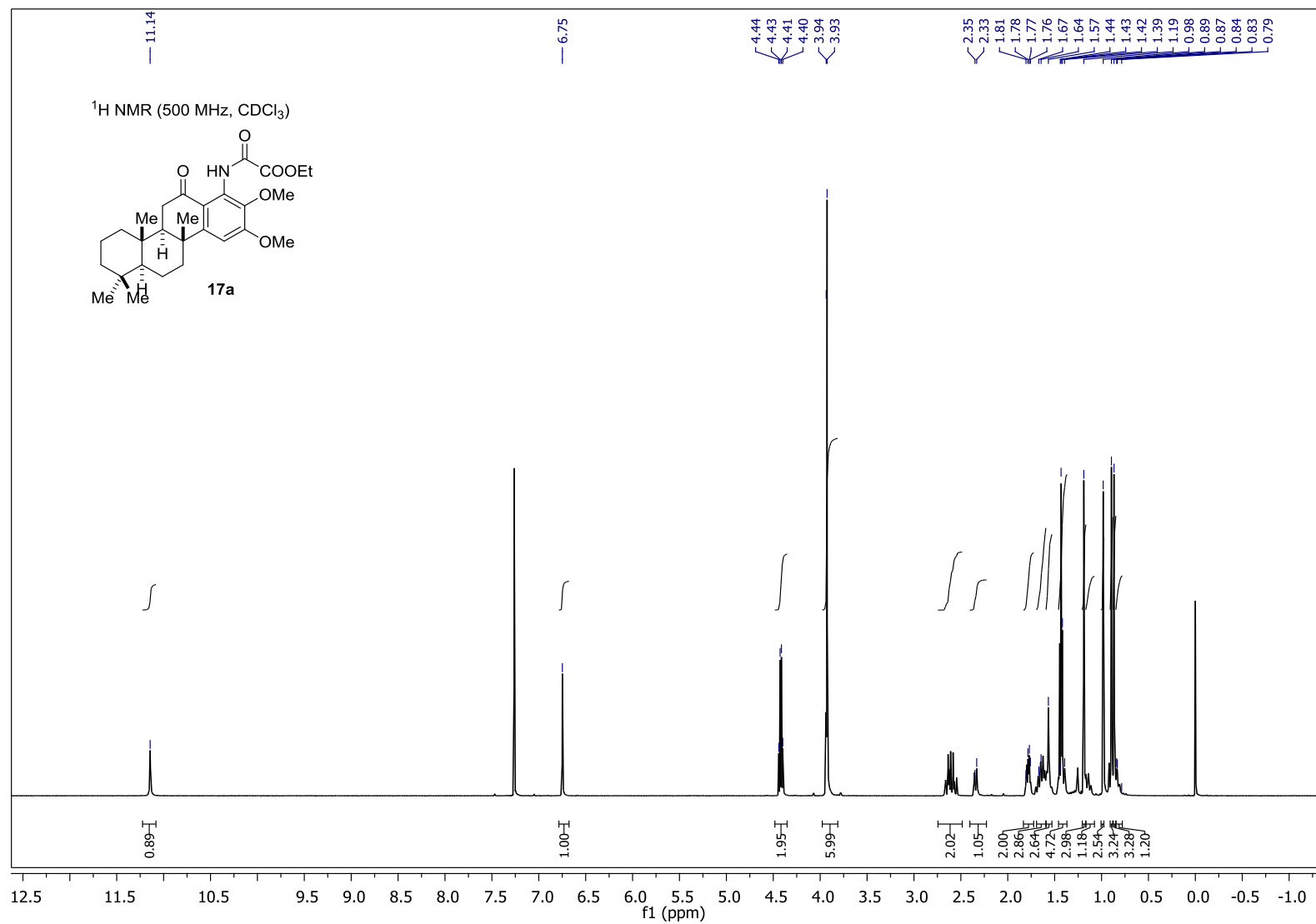
# <sup>1</sup>H NMR Spectrum of 16



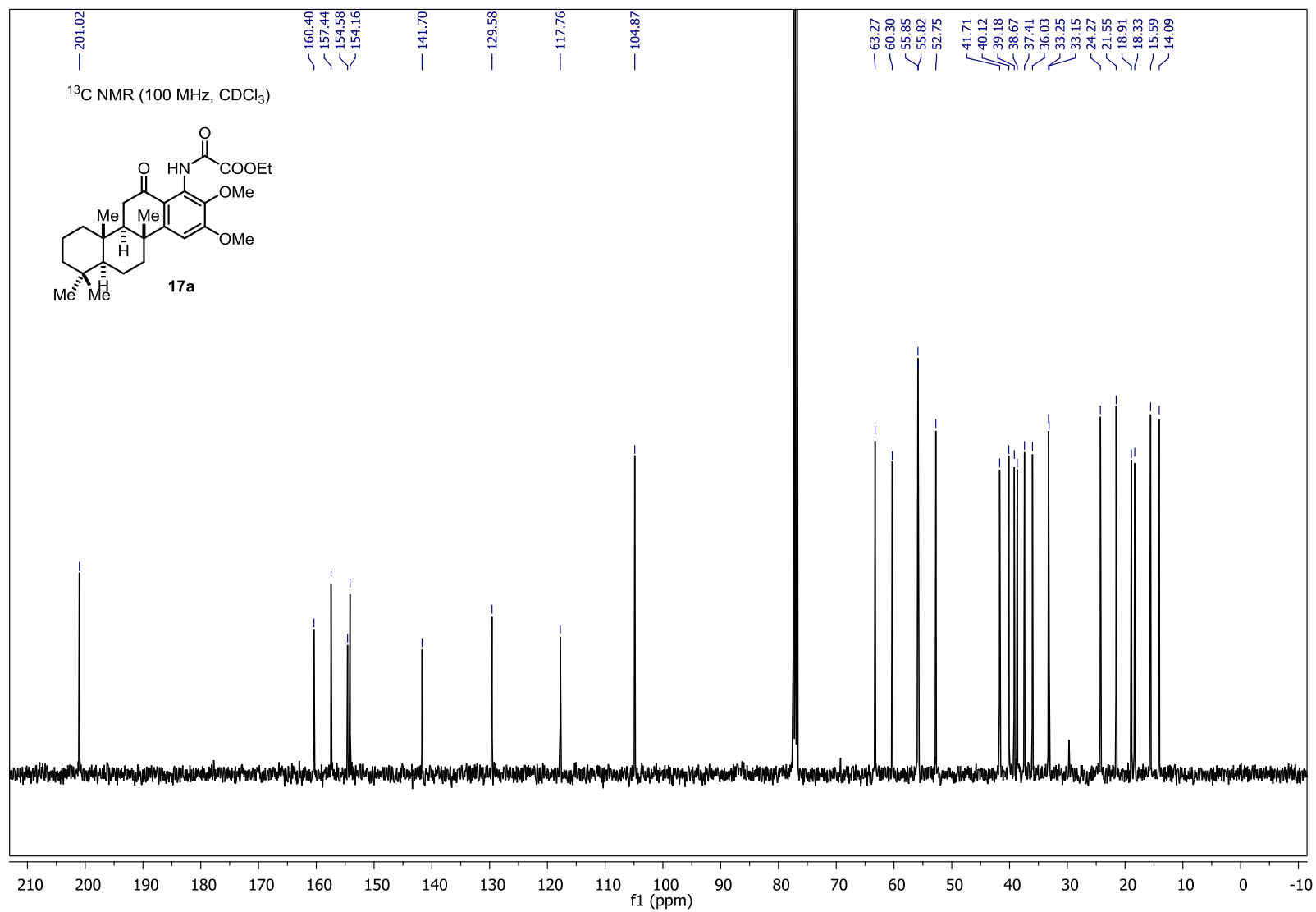
# <sup>13</sup>C NMR Spectrum of 16



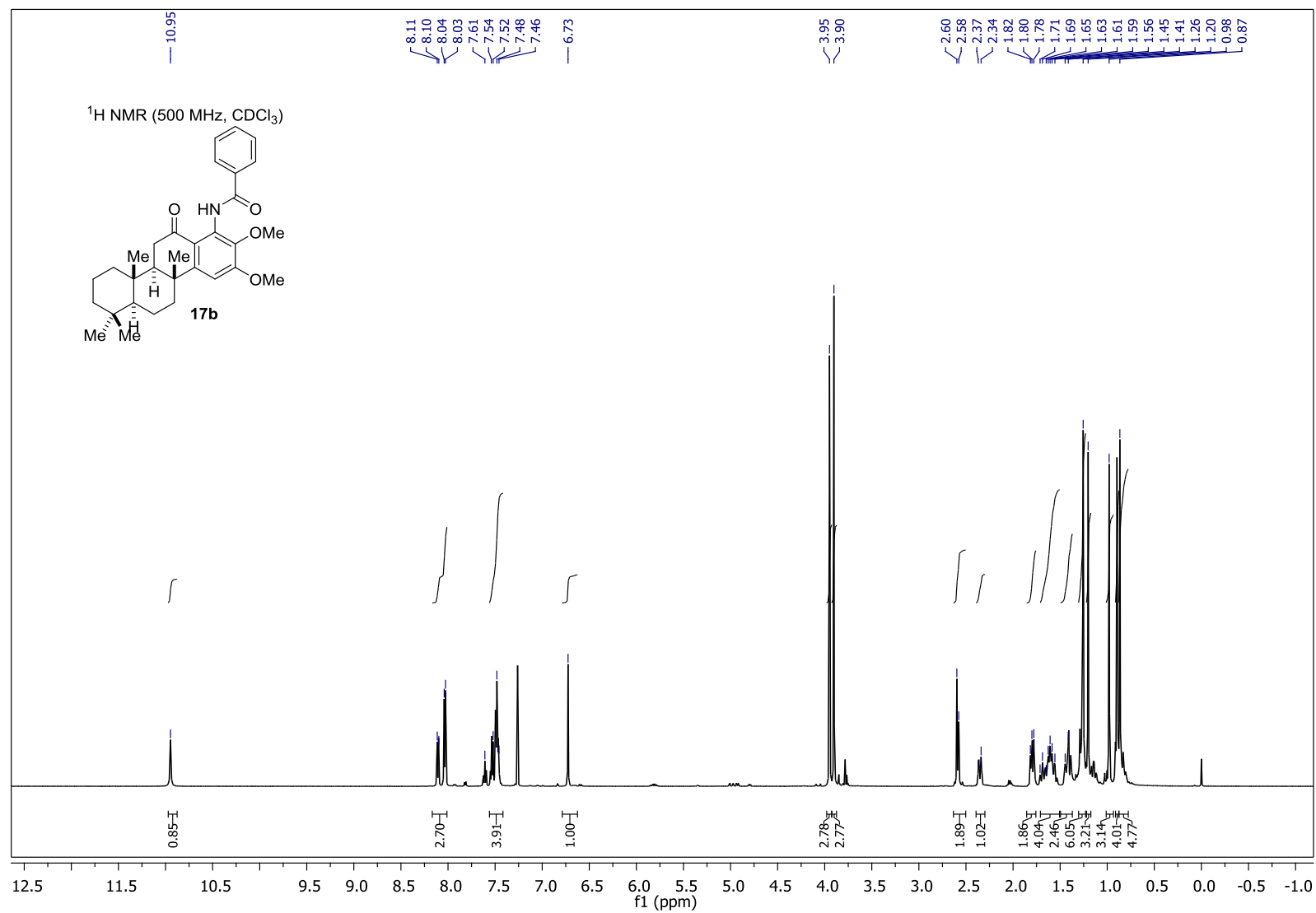
# <sup>1</sup>H NMR Spectrum of 17a



# <sup>13</sup>C NMR Spectrum of 17a

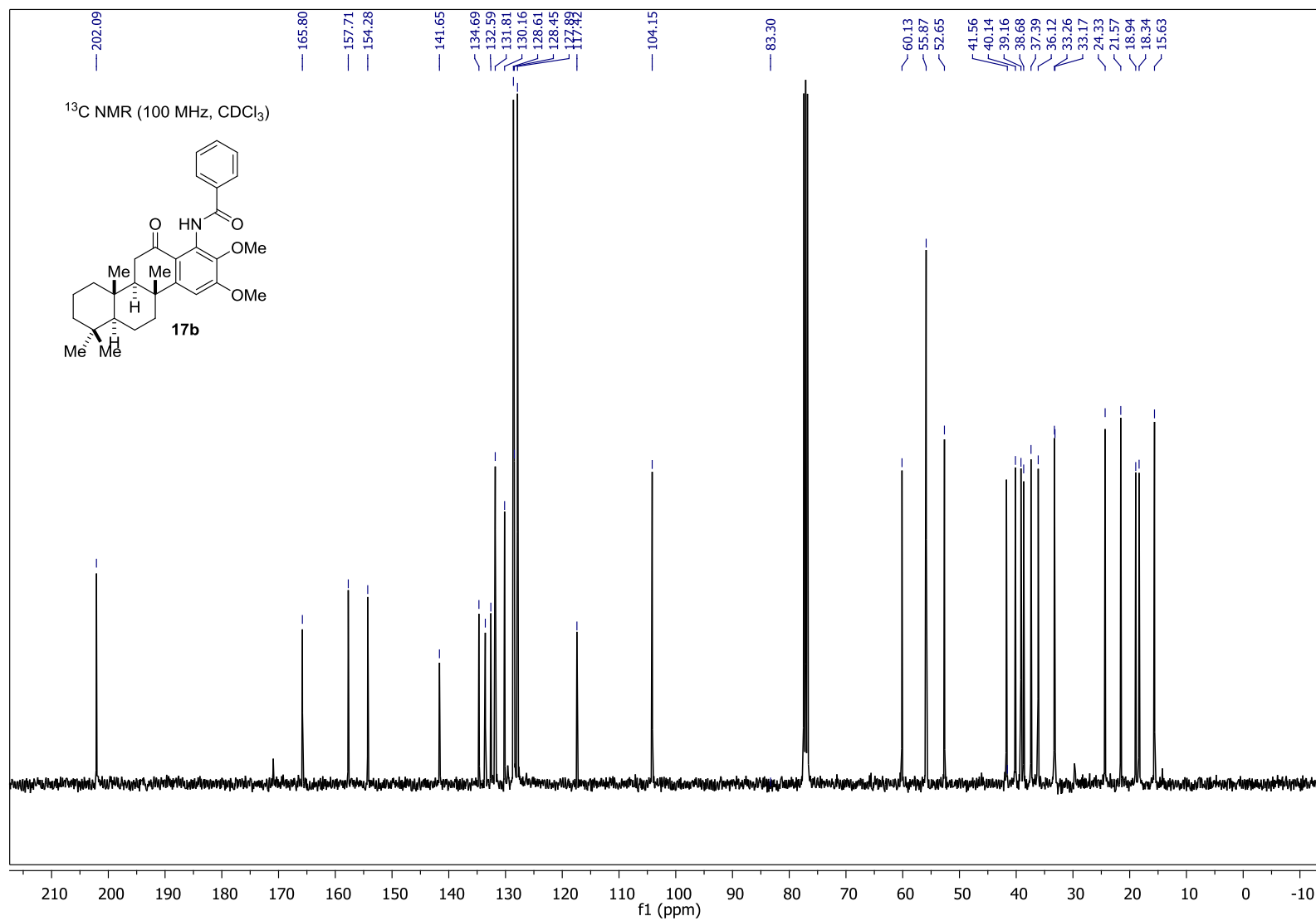


# <sup>1</sup>H NMR Spectrum of 17b

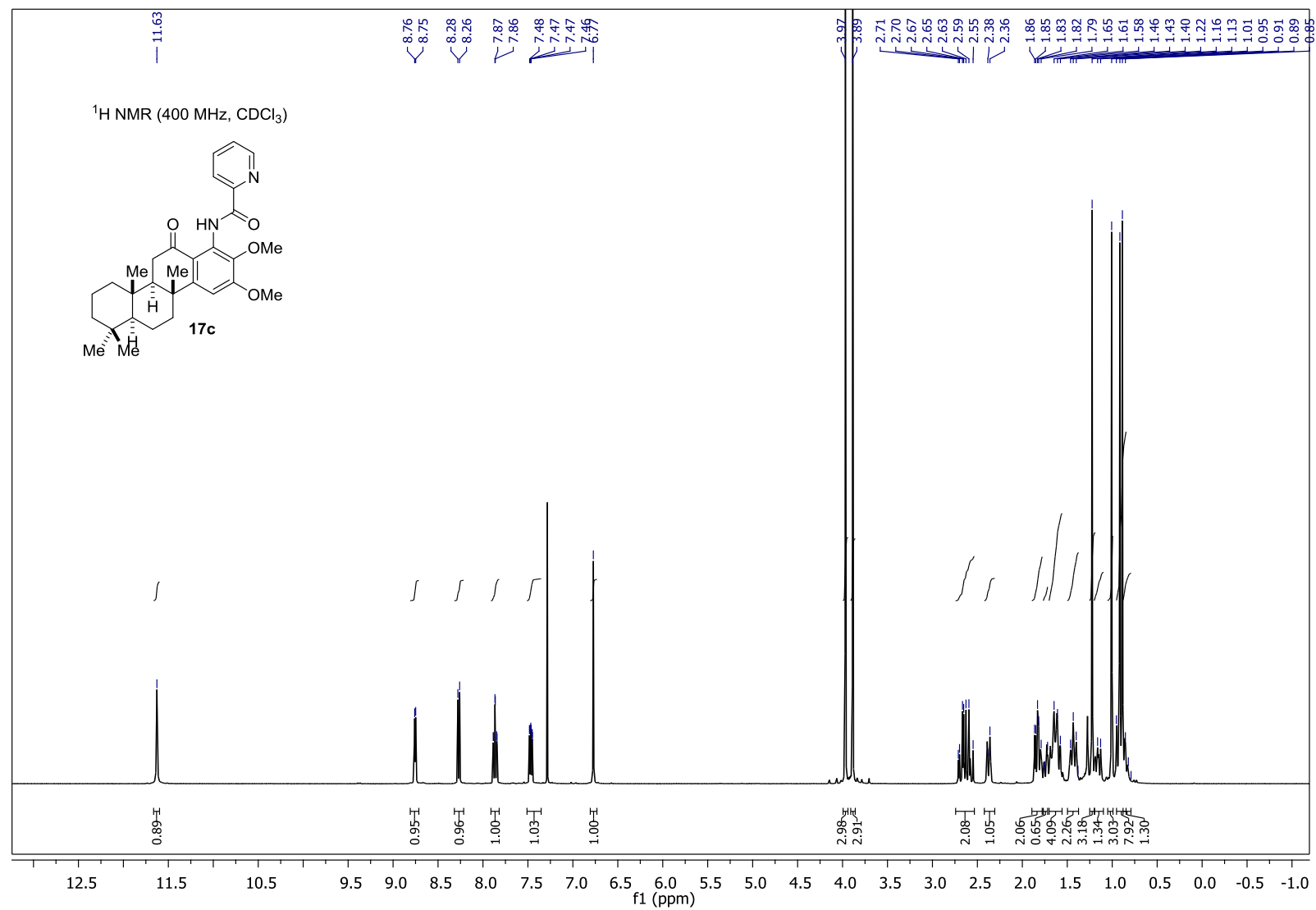




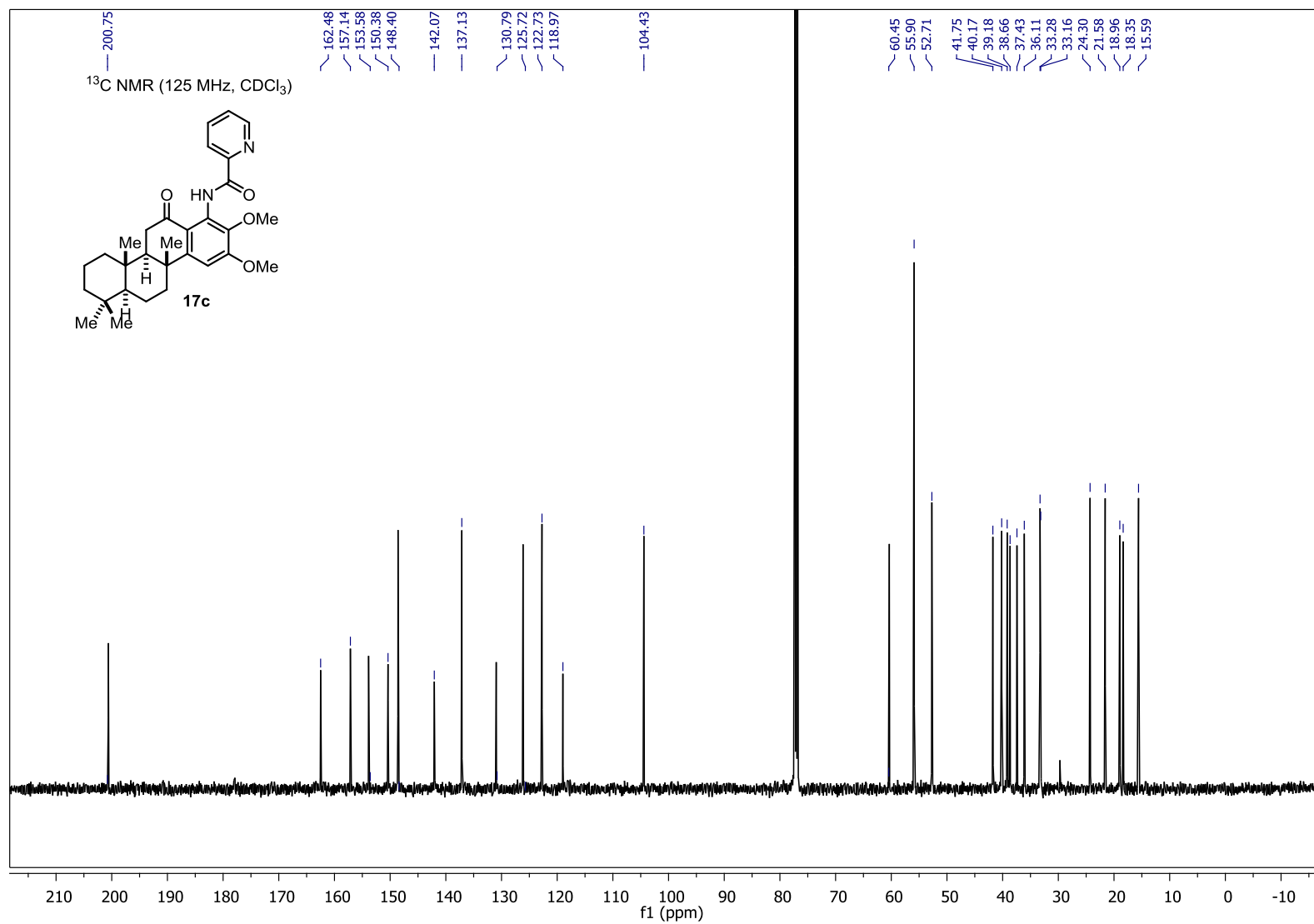
# <sup>13</sup>C NMR Spectrum of 17b



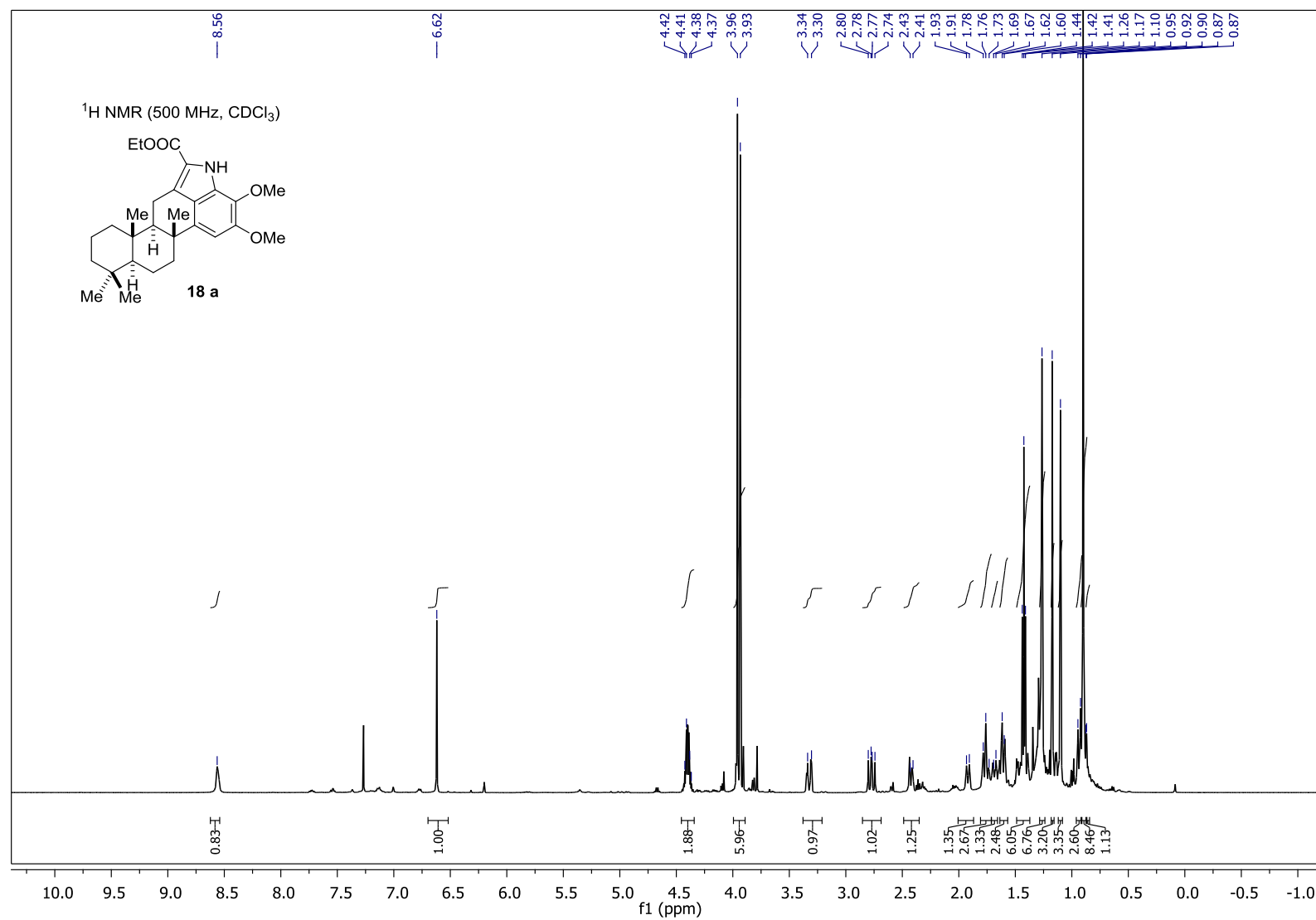
# <sup>1</sup>H NMR Spectrum of 17c



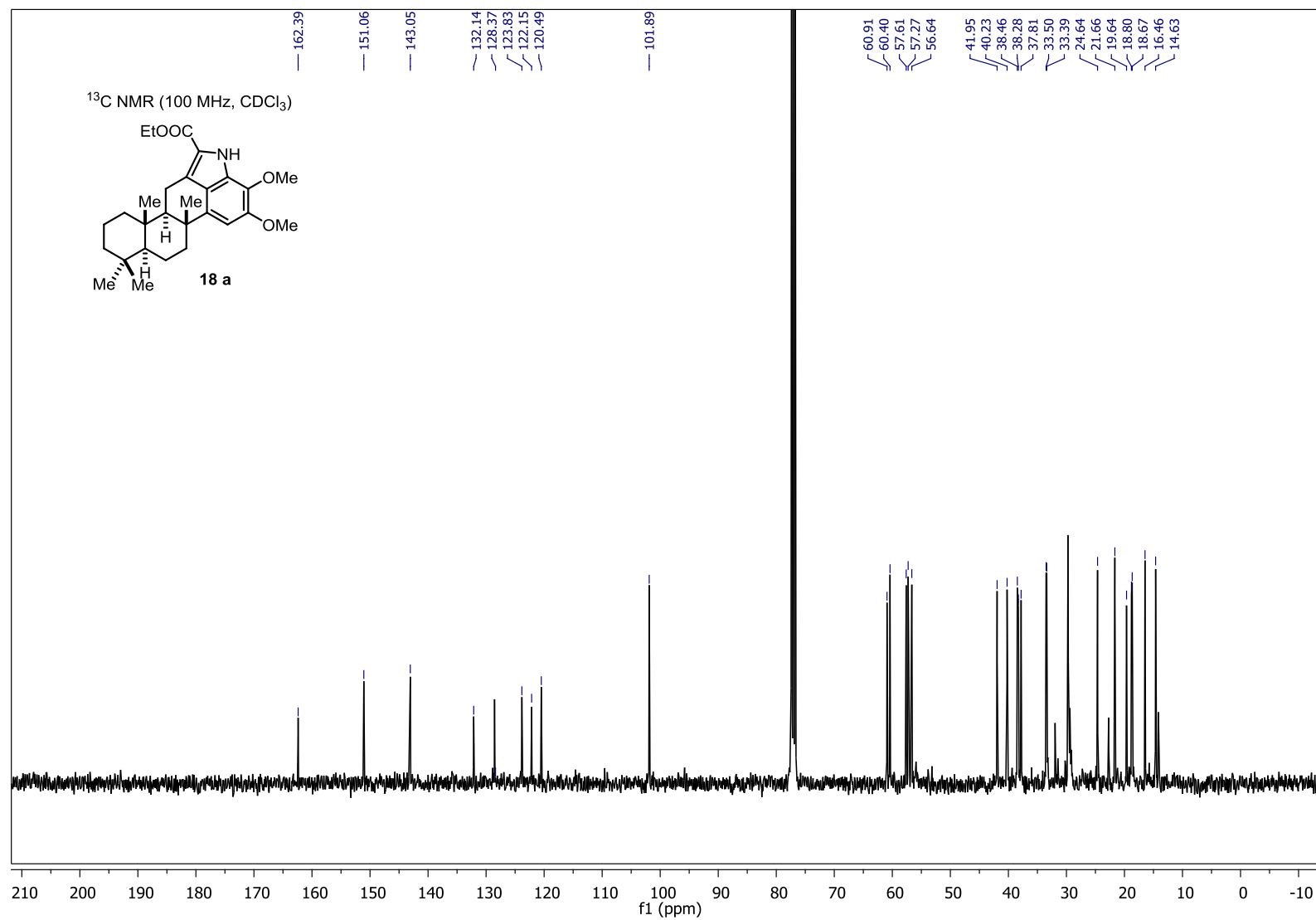
# <sup>13</sup>C NMR Spectrum of 17c



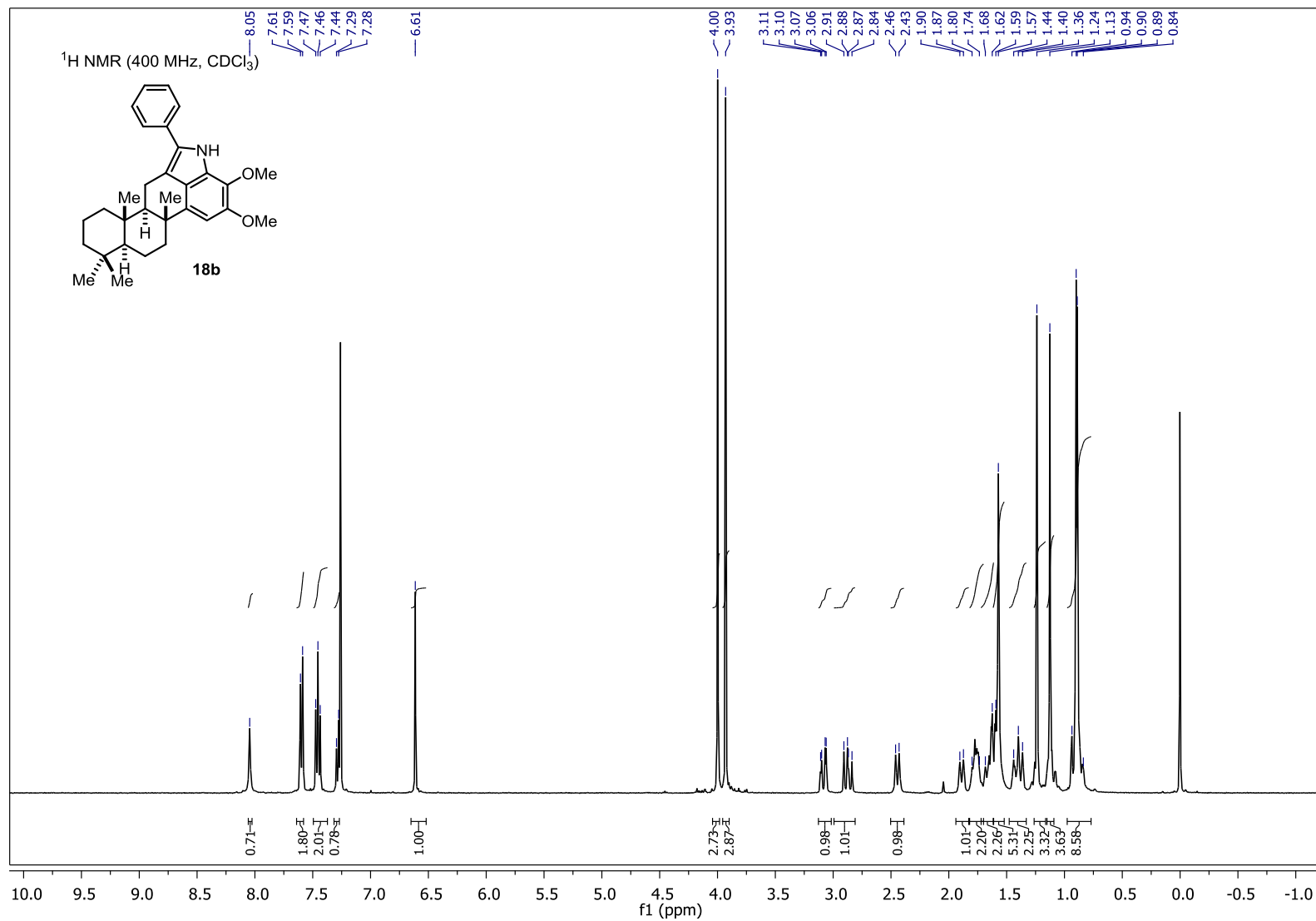
# **<sup>1</sup>H NMR Spectrum of 18a**



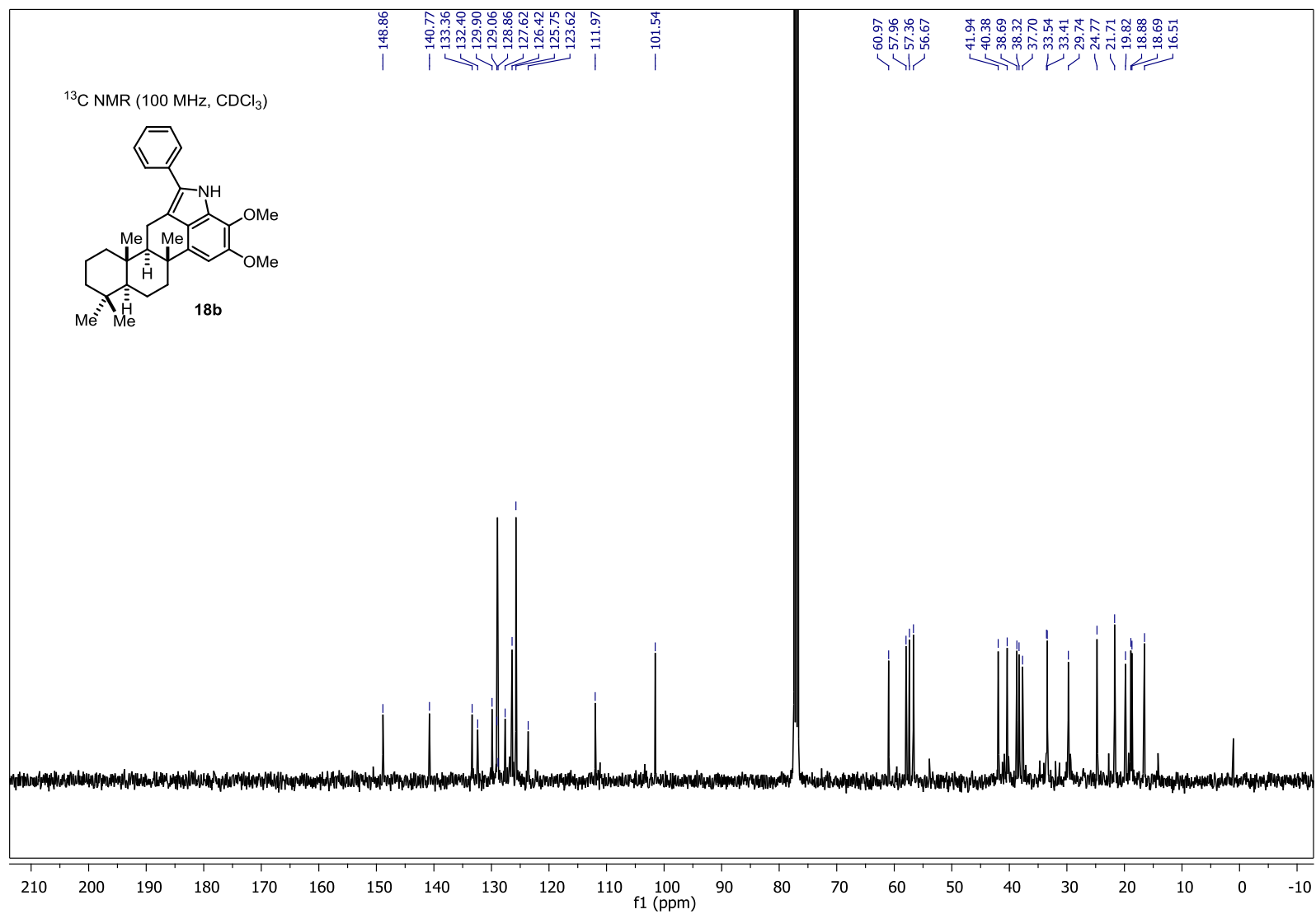
# <sup>13</sup>C NMR Spectrum of 18a



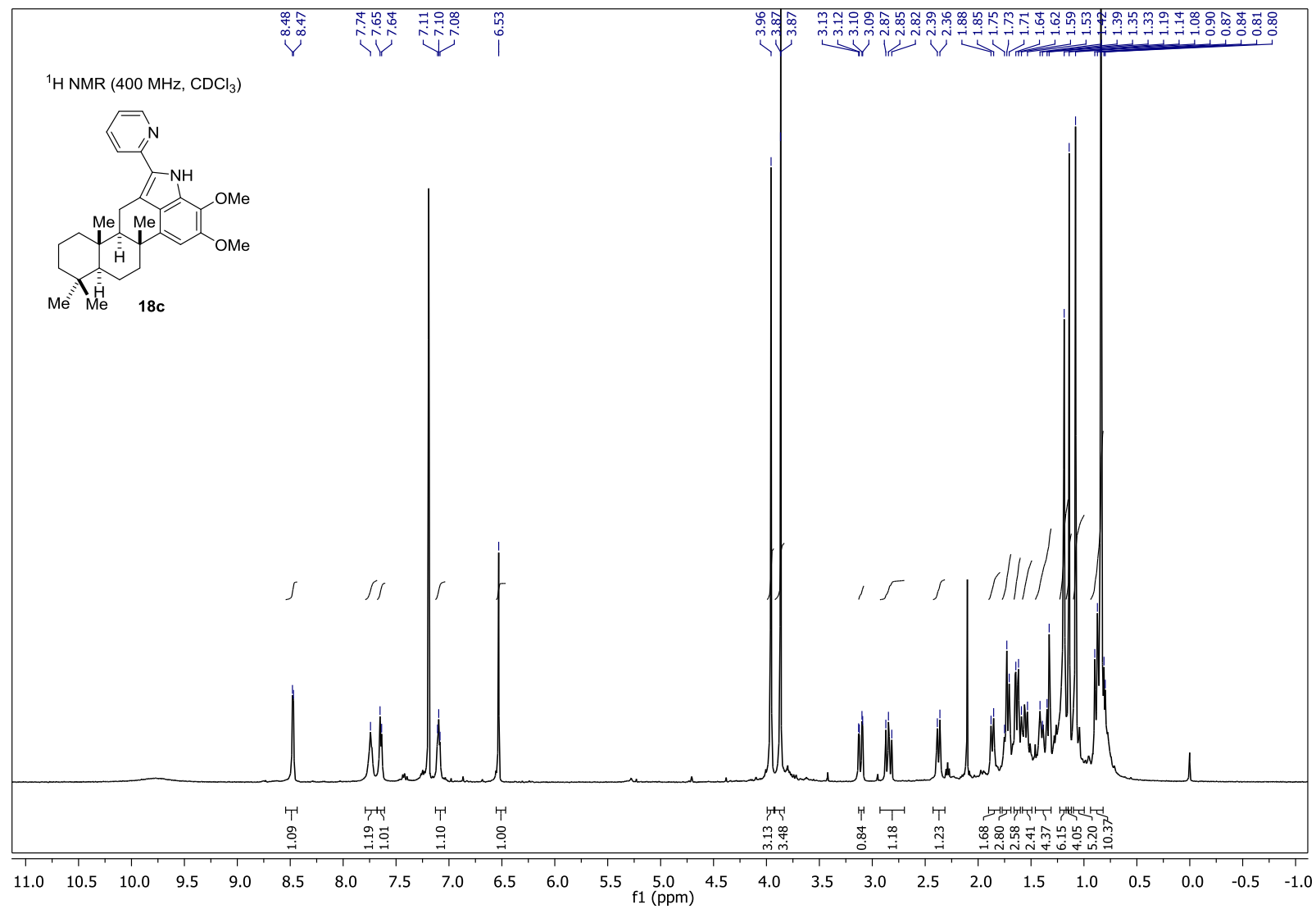
# <sup>1</sup>H NMR Spectrum of 18b



# <sup>13</sup>C NMR Spectrum of 18b

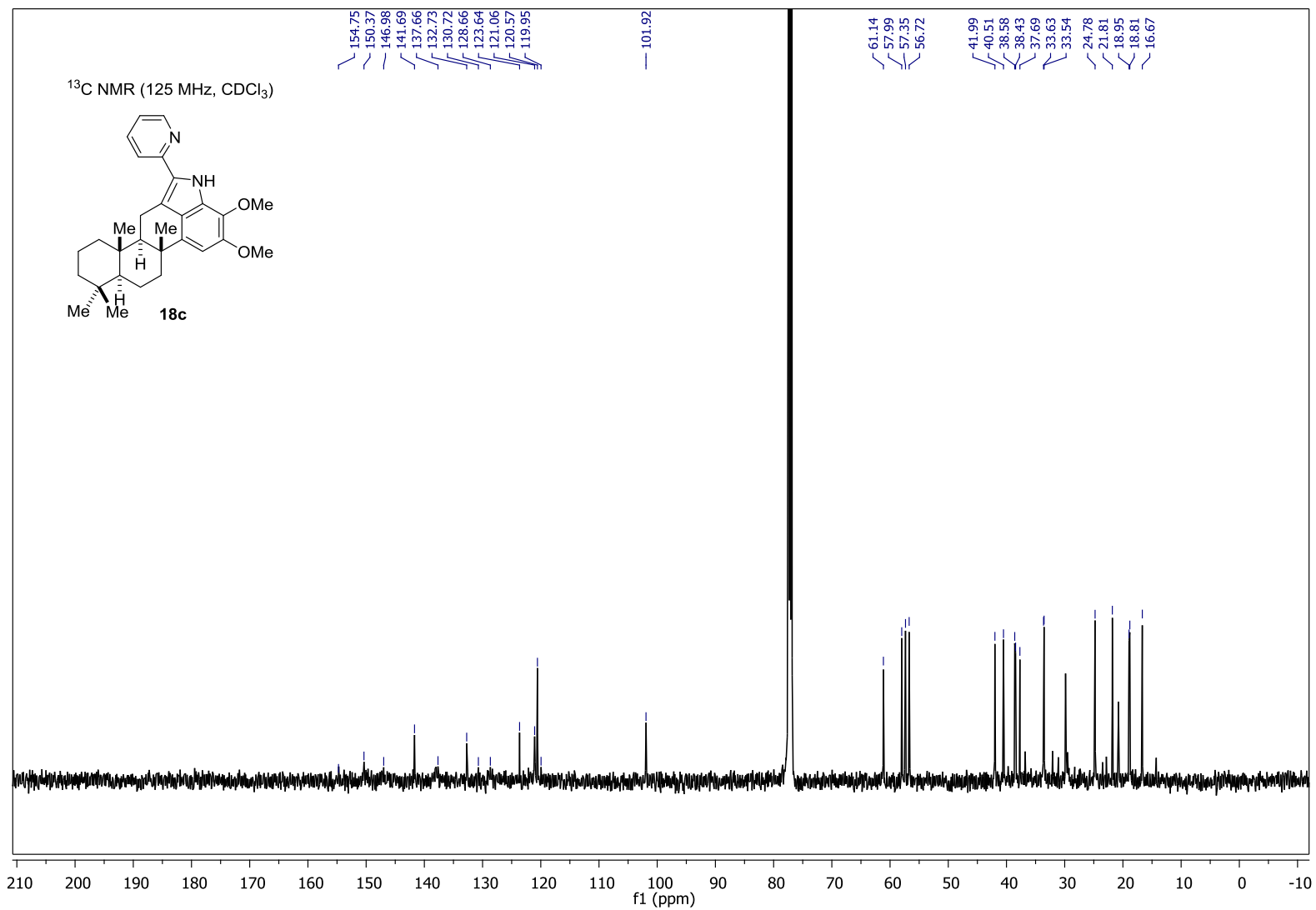


# <sup>1</sup>H NMR Spectrum of 18c

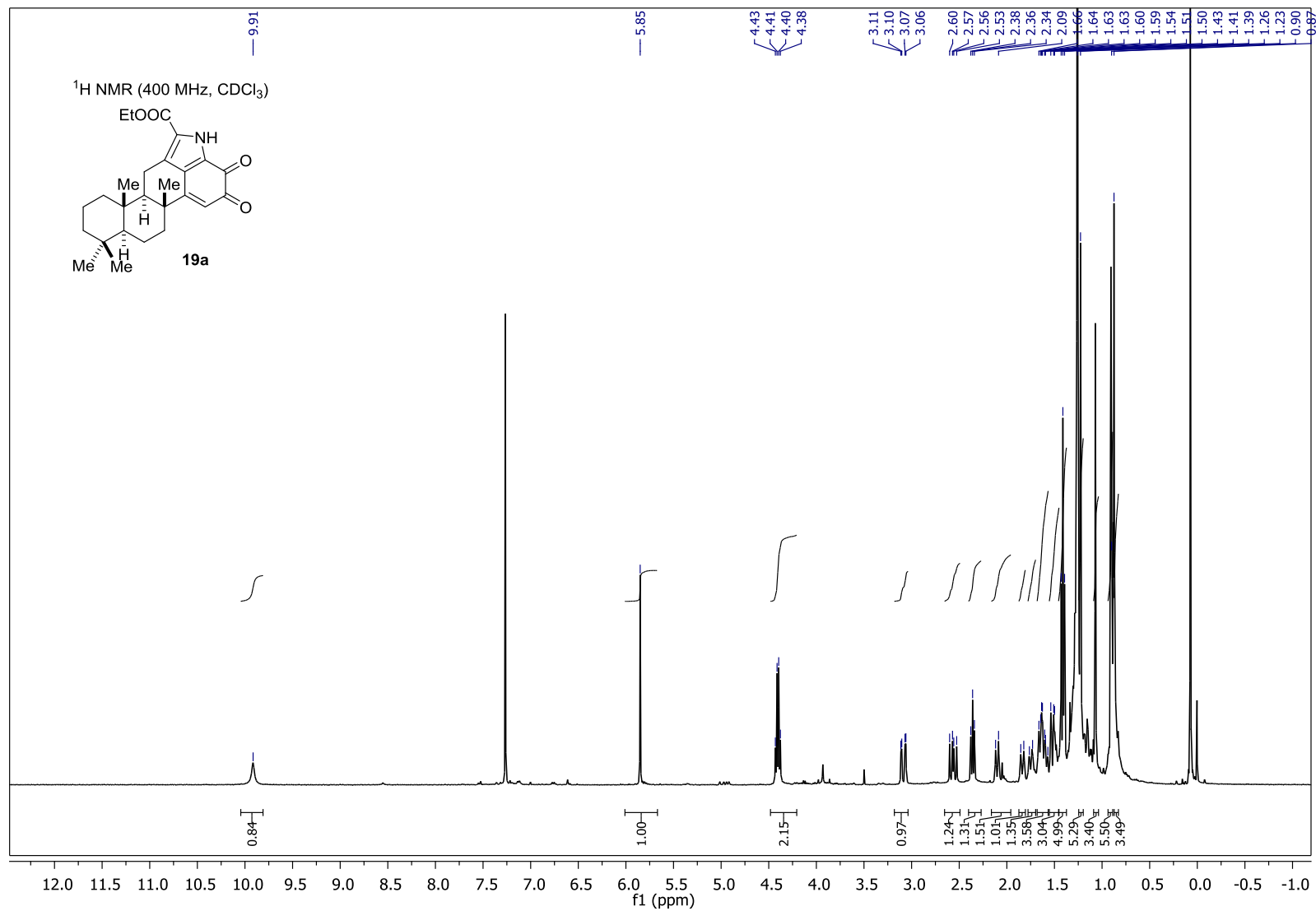




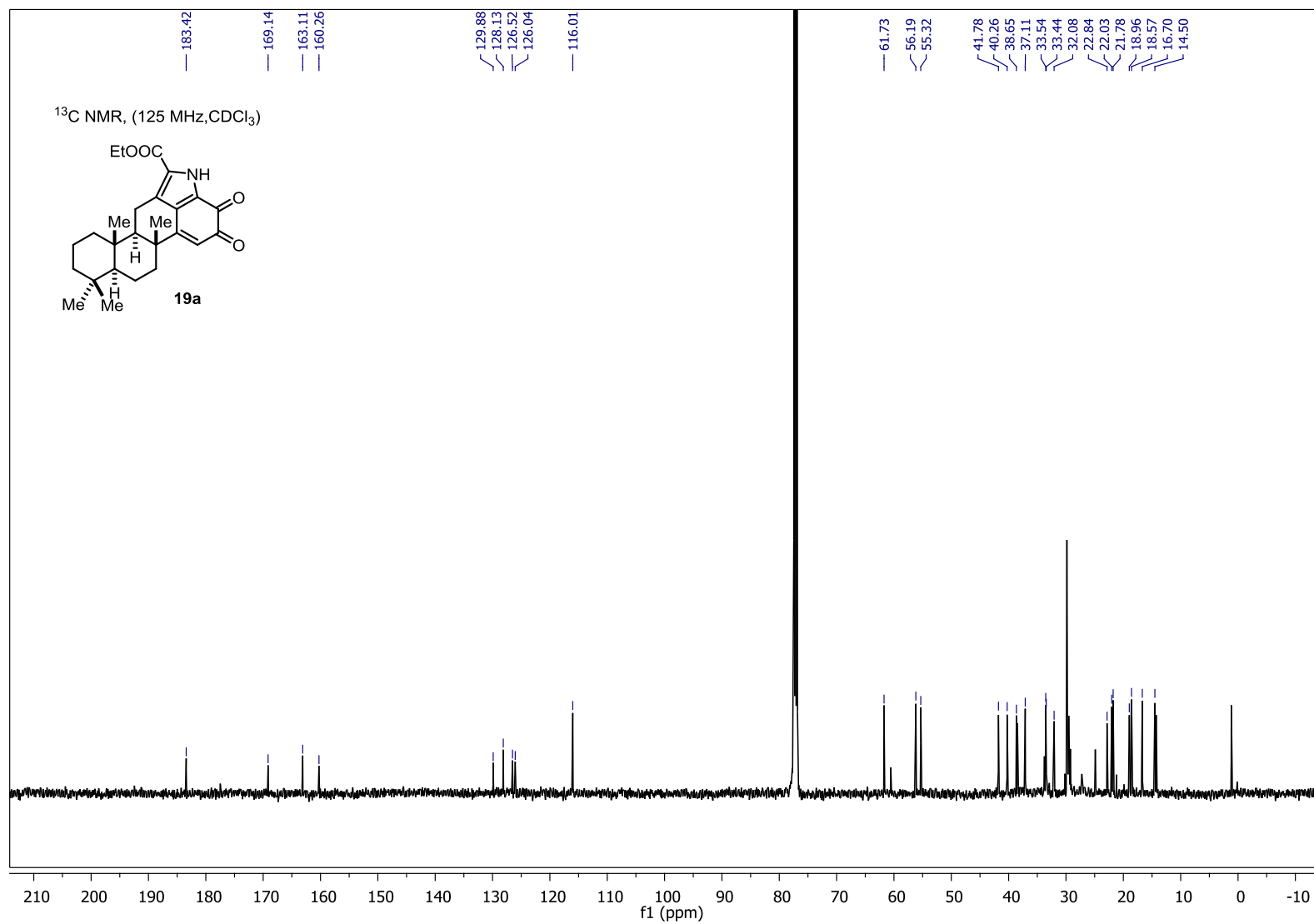
# <sup>13</sup>C NMR Spectrum of 18c



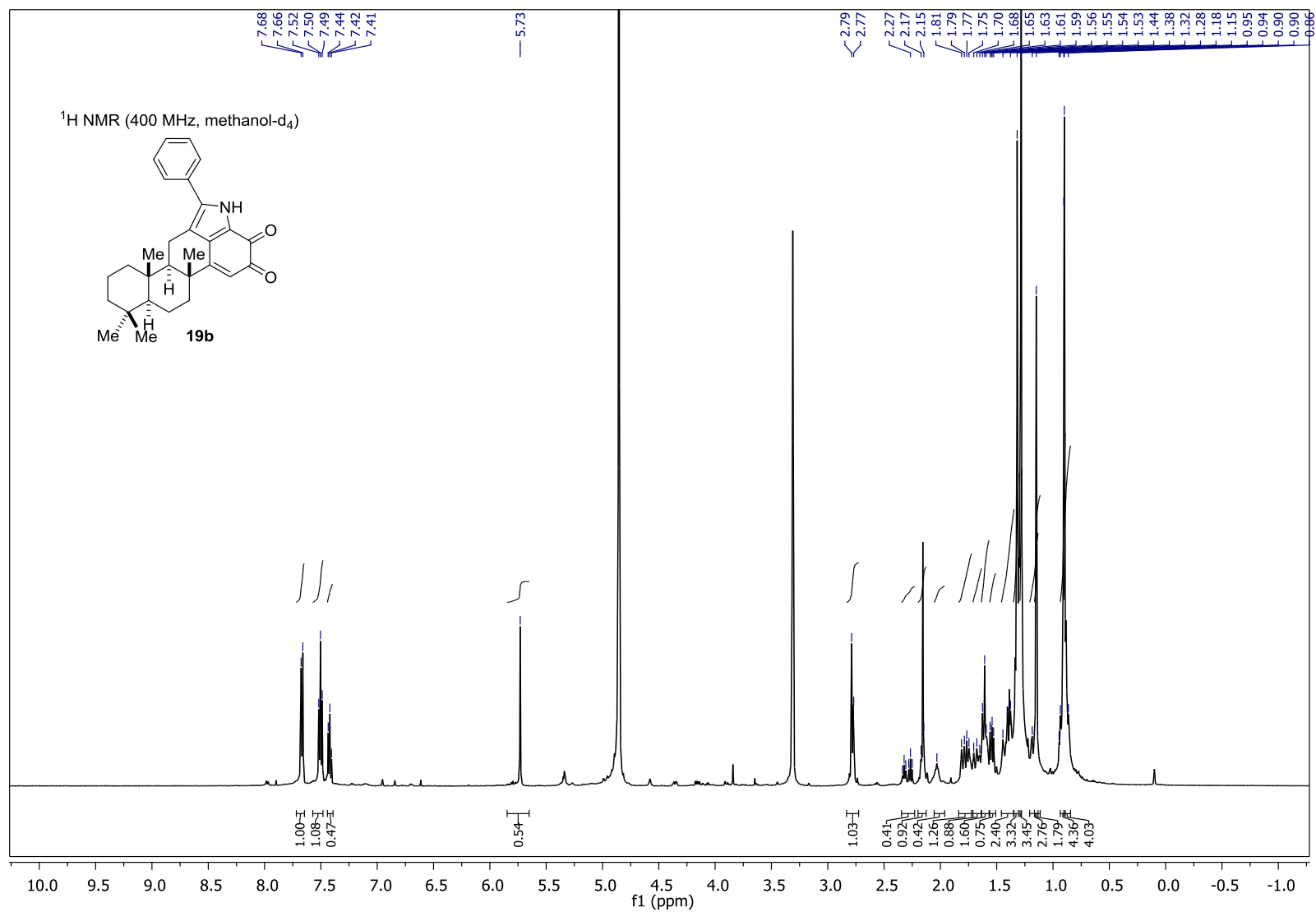
# <sup>1</sup>H NMR Spectrum of 19a



# <sup>13</sup>C NMR of compound 19a



# <sup>1</sup>H NMR Spectrum of 19b



# <sup>13</sup>C NMR Spectrum of 19b

