Supporting Information

Iridium-Catalyzed Asymmetric Hydrogenation of 4,6-Disubstituted 2-Hydroxypyrimidines

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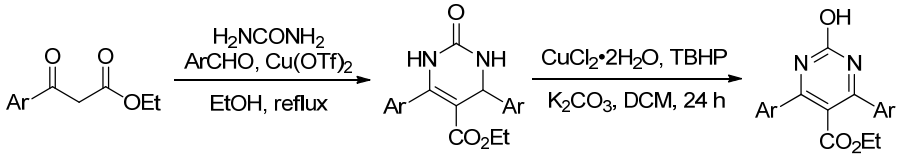
1. General and Materials

General: All reactions were carried out under an atmosphere of nitrogen using standard Schlenk techniques, unless otherwise noted. ^{1}H NMR, ^{13}C NMR and ^{19}F NMR spectra were recorded at room temperature in $CDCl_3$, CD_2Cl_2 on 400 MHz instrument with tetramethylsilane (TMS) as internal standard. Enantiomeric excess was determined by HPLC analysis, using chiral column described below in detail. Optical rotations were measured by polarimeter. Flash column chromatography was performed on silica gel (200-300 mesh). All reactions were monitored by TLC analysis or NMR analysis.

Materials: Commercially available reagents were used throughout without further purification. The solvents for asymmetric hydrogenation reaction were purchased without further purification.

2. Synthesis of Pyrimidin-2-ol Derivatives

4,6-Disubstituted pyrimidin-2-ols can be conveniently synthesized according to the known literature procedure.[1] The **1a**,[1a] **1b**,[1f] **1c**,[1b] **1d-1h**,[1f] **1i-1j**,[1c] **1k**,[1d] **1l**,[1c] **1m**[1e] and **1n-1p**[1f] are all known compounds. The 4,5,6-trisubstituted pyrimidin-2-ols can be synthesized according to the known literature procedure.[2] The **3a**,[2] **3c-3d**[2] are the known compounds.

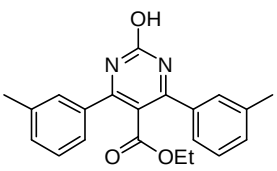


S-1 **3**

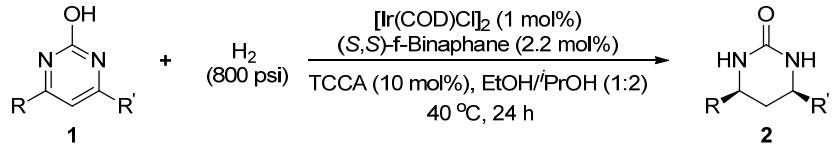
General procedure: Copper(II) trifluoromethanesulfonate (0.271 g, 5.0 mol%) was added into a solution of arylaldehyde (15.0 mmol), urea (1.08 g, 18.0 mmol), ethyl 3-oxo-3-arylpropanoate (15.0 mmol) in 40 mL ethanol. After refluxing for 24 h, the reaction mixture was then cooled to 0 ^{o}C, the precipitation was collected by filtration and dried. The resulting white powder was triturated with cooled ethanol to afford **S-1** as a pale yellow powder.

A solution of the above **S-1** (3.0 mmol), copper(II) chloride dihydrate (5.1 mg, 1.0 mol%), potassium carbonate (41 mg, 10 mol%) in dichloromethane (6.0 mL) was heated at reflux for 30 min, and then 65 wt% tert-butyl hydroperoxide (0.832 g, 6.0 mmol) was added dropwise over a period of 10 minutes. The resulting mixture was stirred at 35 °C for 24 h. The saturated aqueous sodium thiosulfate (10 mL) was added to destroy *tert*-butyl hydroperoxide, then, the mixture was extracted with dichloromethane. The combined organic layer was dried over anhydrous sodium sulfate, concentrated in *vacuo*. The crude product was purified by flash column chromategraphy to afford the products **3**.

Ethyl 2-hydroxy-4,6-di(*m*-tolyl)pyrimidine-5-carboxylate (3b): 1.104 g, 55% yield (2 steps), white solid, mp: 190-191 ^{o}C, R_f = 0.51 (dichloromethane/methanol = 20/1), new compound; ^{1}H NMR (400 MHz, $CDCl_3$) δ 13.04 (s, 1H), 7.42–7.29 (m, 8H), 3.93 (q, *J* = 6.8 Hz, 2H), 2.38 (s, 6H), 0.88 (t, *J* = 6.8 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.9, 157.2, 137.9, 133.7, 131.4, 128.2, 128.1, 124.6, 111.4, 61.2, 20.9, 12.9; HRMS (ESI) *m/z* Calculated for $C_{21}H_{21}N_2O_3$ $[M+H]^+$ 349.1547, found 349.1553.

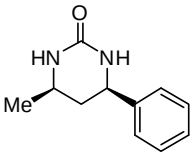


3. General Procedure for Asymmetric Hydrogenation

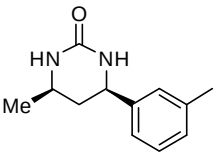


In a nitrogen-filled glove box, a mixture of $[Ir(COD)Cl]_2$ (2.0 mg, 0.003 mmol) and ligand (*S*,*S*)-f-Binaphane (5.3 mg, 0.0066 mmol) in isopropanol (1.0 mL) was stirred at room temperature for 10 min, then substrates **1** (0.3 mmol) and TCCA (7.0 mg, 0.03 mmol) together with ethanol (1.0 mL) and isopropanol (1.0 mL) were added to the above catalyst solution. The hydrogenation was performed at 40 °C under 800 psi of hydrogen for 24 h. After carefully releasing the hydrogen, excess solid sodium bicarbonate was added. The resulted mixture was stirred for 30 min, then filtrated off and concentrated in *vacuo*. Further purification was performed by a silica gel chromatography eluted with ethyl acetate/methanol to give the desired chiral product **2**. The enantiomeric excesses were determined by chiral HPLC for the corresponding benzamides.

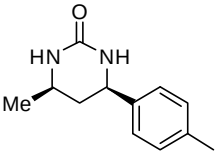
(4*R*,6*R*)-(+)-4-Methyl-6-phenyltetrahydropyrimidin-2(1*H*)-one (2a): 35 mg (0.2 mmol scale), 92% yield, pale yellow solid, known compound, R_f = 0.30 (dichloromethane/methanol = 20:1), 95% ee, $[\alpha]^{20}_D$ = +44.1 (*c* 0.70, MeOH) [lit.[2]: for (*4R,6R*)-isomer $[\alpha]^{20}_D$ = +51.1 (c 0.28, MeOH) for 84% ee]; ^{1}H NMR (400 MHz, CD_2Cl_2) δ 7.35–7.26 (m, 5H), 5.96 (s, 1H), 5.63 (s, 1H), 4.47–4.44 (m, 1H), 3.61–3.57 (m, 1H), 1.98 (d, *J* = 12.8 Hz, 1H), 1.54–1.45 (m, 1H), 1.13 (d, *J* = 6.2 Hz, 3H); ^{13}C NMR (100 MHz, CD_2Cl_2) δ 158.9, 143.9, 130.1, 129.2, 127.6, 56.8, 47.8, 41.7, 22.9; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 75/25, detector: 254 nm, flow rate: 0.80 mL/min, 30 °C), t_1 = 14.9 min (maj), t_2 = 16.8 min.



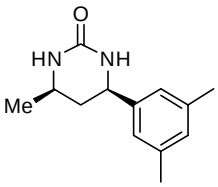
(+)-4-Methyl-6-*m*-tolyltetrahydropyrimidin-2(1*H*)-one (2b): 56 mg, 92% yield, white solid, new compound, mp: 143-144 °C, R_f = 0.35 (dichloromethane/methanol = 15:1), 95% ee, $[\alpha]^{20}_D$ = +62.1 (*c* 0.68, MeOH); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.26–7.23 (m, 1H), 7.16–7.11 (m, 3H), 5.15 (s, 1H), 4.83 (s, 1H), 4.50–4.47 (m, 1H), 3.71–3.63 (m, 1H), 2.35 (s, 3H), 2.04 (d, *J* = 13.2 Hz, 1H), 1.63–1.54 (m, 1H), 1.22 (d, *J* = 6.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 156.9, 141.9, 138.7, 128.9, 128.8, 126.8, 123.2, 55.6, 46.5, 40.2, 21.9, 21.4; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 75/25, detector: 254 nm, flow rate: 0.80 mL/min, 30 °C), t_1 = 12.2 min (maj), t_2 = 15.3 min; HRMS (ESI) *m/z* Calculated for $C_{12}H_{17}N_2O$ $[M+H]^+$ 205.1335, found 205.1335.



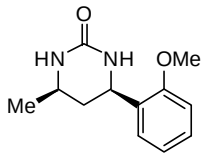
(+)-4-Methyl-6-*p*-tolyltetrahydropyrimidin-2(1*H*)-one (2c): 54 mg, 89% yield, white solid, new compound, mp: 88-89 °C, R_f = 0.35 (dichloromethane/methanol = 15:1); 94% ee, $[\alpha]^{20}_D$ = +63.1 (*c* 0.74, MeOH); ^{1}H NMR (400 MHz, CD_2Cl_2) δ 7.28–7.20 (m, 4H), 5.06 (d, *J* = 29.0 Hz, 2H), 4.53–4.49 (m, 1H), 3.72–3.64 (m, 1H), 2.37 (s, 3H), 2.05–2.02 (m, 1H), 1.60–1.53 (m, 1H), 1.22 (d, *J* = 6.2 Hz, 3H); ^{13}C NMR (100 MHz, CD_2Cl_2) δ 156.8, 139.3, 137.8, 129.4, 126.1, 55.3, 46.5, 40.2, 21.7, 20.8; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 75/25, detector: 254 nm, flow rate: 0.80 mL/min, 30 °C), t_1 = 12.9 min (maj), t_2 = 15.1 min; HRMS (ESI) *m/z* Calculated for $C_{12}H_{17}N_2O$ $[M+H]^+$ 205.1335, found 205.1335.



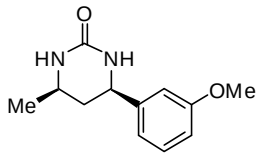
(+)-4-(3,5-Dimethylphenyl)-6-methyltetrahydropyrimidin-2(1*H*)-one (2d): 58 mg, 89% yield, white solid, new compound, mp: 83-84 °C, R_f = 0.36 (dichloromethane/methanol = 15:1), 86% ee, $[\alpha]^{20}_D$ = +41.8 (*c* 0.94, MeOH); ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.95–6.90 (m, 3H), 4.71 (d, *J* = 10.8 Hz, 2H), 4.46–4.42 (m, 1H), 3.69–3.63 (m, 1H), 2.31 (s, 6H), 2.04 (d, *J* = 13.2 Hz, 1H), 1.62–1.53 (m, 1H), 1.21 (d, *J* = 6.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 156.2, 141.3, 138.1, 129.3, 123.4, 55.0, 46.0, 39.6, 21.4, 20.7; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 75/25, detector: 254 nm, flow rate: 0.80 mL/min, 30 °C), t_1 = 8.6 min (maj), t_2 = 14.2 min; HRMS (ESI) m/z Calculated for $C_{13}H_{19}N_2O$ [M+H]+ 219.1492, found 219.1491.



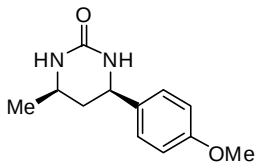
(+)-4-(2-Methoxyphenyl)-6-methyltetrahydropyrimidin-2(1*H*)-one (2e): 59 mg, 89% yield, pale oil, new compound, R_f = 0.30 (dichloromethane/methanol = 15:1), 90% ee, $[\alpha]^{20}_D$ = +87.6 (*c* 0.78, MeOH); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.42–7.40 (m, 1H), 7.29–7.25 (m, 1H), 6.99 (t, *J* = 7.4 Hz, 1H), 6.88 (d, *J* = 8.2 Hz, 1H), 5.31 (s, 1H), 4.97–4.93 (m, 1H), 4.88 (s, 1H), 3.83 (s, 3H), 3.73–3.65 (m, 1H), 2.20–2.12 (m, 1H), 1.53–1.44 (m, 1H), 1.21 (d, *J* = 6.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 159.5, 158.3, 131.8, 130.6, 127.7, 122.9, 112.4, 57.3, 50.5, 48.4, 39.4, 23.7; Enantiomeric excess was determined by HPLC for the corresponding benzamide (IC column, *n*-Hexane/*i*-PrOH = 70/30, detector: 254 nm, flow rate: 0.70 mL/min, 30 °C), t_1 = 21.9 min (maj), t_2 = 29.2 min; HRMS (ESI) *m/z* Calculated for $C_{12}H_{17}N_2O_2$ $[M+H]^+$ 221.1285, found 221.1286.



(-)-4-(3-Methoxyphenyl)-6-methyltetrahydropyrimidin-2(1*H*)-one (2f): 58 mg, 88% yield, white solid, new compound, mp: 184-185 °C, R_f = 0.26 (dichloromethane/methanol = 15:1), 92% ee, $[\alpha]^{20}_D$ = -25.8 (*c* 0.72, MeOH); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28–7.25 (m, 1H), 6.92–6.80 (m, 3H), 5.27 (s, 1H), 4.91 (s, 1H), 4.51–4.48 (m, 1H), 3.80 (s, 3H), 3.71–3.63 (m, 1H), 2.05 (d, *J* = 13.0 Hz, 1H), 1.58 (q, *J* = 12.0 Hz, 1H), 1.21 (d, *J* = 6.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 160.1, 157.1, 143.6, 129.9, 118.4, 113.7, 111.4, 55.6, 55.3, 46.5, 40.1, 21.8; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 75/25, detector: 254 nm, flow rate: 0.70 mL/min, 30 °C), t_1 = 23.6 min, t_2 = 25.6 min (maj); HRMS (ESI) *m/z* Calculated for $C_{12}H_{17}N_2O_2$ $[M+H]^+$ 221.1285, found 221.1286.

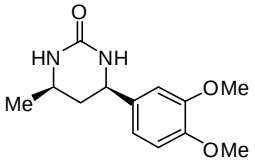


(+)-4-(4-Methoxyphenyl)-6-methyltetrahydropyrimidin-2(1*H*)-one (2g): 62 mg, 94% yield, white solid, new compound, mp: 148-149 °C, R_f = 0.26 (dichloromethane/methanol = 15:1), 93% ee, $[\alpha]^{20}_D$ = +49.3 (*c* 0.86, MeOH); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.25 (d, *J* = 8.8 Hz, 2H), 6.88 (d, *J* = 8.6 Hz, 2H), 5.18 (s, 1H), 4.83 (s, 1H), 4.48–4.44 (m, 1H), 3.80 (s, 3H), 3.68–3.63 (m, 1H), 2.04–1.96 (m, 1H), 1.58–1.55 (m, 1H), 1.20 (d, *J* = 6.4 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 158.9, 156.5, 133.4, 126.8, 113.7, 54.8, 54.5, 46.0, 39.7, 21.3; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 70/30, detector: 254 nm, flow rate: 0.70 mL/min, 30 °C), t_1 = 16.0 min (maj), t_2 = 20.0 min; HRMS (ESI) *m/z* Calculated for $C_{12}H_{17}N_2O_2$ $[M+H]^+$ 221.1285, found 221.1287.

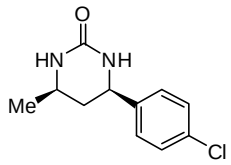


(+)-4-(3,4-Dimethoxyphenyl)-6-methyltetrahydropyrimidin-2(1*H*)-one (2h): 67 mg, 89% yield, pale oil, new compound, R_f = 0.18 (dichloromethane/methanol = 15:1), 90% ee, $[\alpha]^{20}_D$ = +46.8 (*c* 1.16, MeOH); ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.88–6.80 (m, 3H), 5.21 (s, 1H), 4.88 (s, 1H), 4.49–4.46 (m, 1H), 3.89 (s, 3H), 3.88 (s, 3H), 3.70–3.65 (m, 1H), 2.08–1.99 (m, 1H),

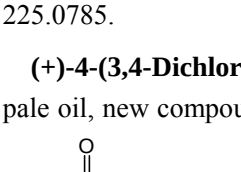
1.64–1.57 (m, 1H), 1.22 (d, J = 6.4 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 157.0, 149.4, 148.8, 134.4, 118.4, 111.2, 108.8, 56.0, 55.4, 46.5, 40.3, 21.8; Enantiomeric excess was determined by HPLC analysis for corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 70/30, detector: 230 nm, flow rate: 0.7 mL/min, 30 °C), t_1 = 23.8 min (maj), t_2 = 29.7 min; HRMS (ESI) *m/z* Calculated for $C_{13}H_{19}N_2O_3$ $[M+H]^+$ 251.1390, found 251.1394.



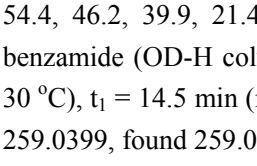
(+)-4-(4-Chlorophenyl)-6-methyltetrahydropyrimidin-2(1*H*)-one (2i): 63 mg, 94% yield, yellowish solid, new compound, mp: 257-258 °C, R_f = 0.35 (dichloromethane/methanol = 15:1), 93% ee, $[\alpha]^{20}_D$ = +49.3 (*c* 0.96, MeOH); ^{1}H NMR (400 MHz, CD_2Cl_2) δ 7.39–7.33 (m, 4H), 5.32 (s, 2H), 4.54–4.52 (m, 1H), 3.74–3.61 (m, 1H), 2.06–2.03 (m, 1H), 1.59–1.50 (m, 1H), 1.21 (d, J = 6.4 Hz, 3H); ^{13}C NMR (100 MHz, CD_2Cl_2) δ 156.9, 141.0, 133.4, 128.8, 127.7, 54.9, 46.4, 40.0, 21.6; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 75/25, detector: 230 nm, flow rate: 0.8 mL/min, 30 °C), t_1 = 14.0 min (maj), t_2 = 18.2 min; HRMS (ESI) *m/z* Calculated for $C_{11}H_{14}N_2OCl$ $[M+H]^+$ 225.0789, found 225.0785.



(+)-4-(3,4-Dichlorophenyl)-6-methyltetrahydropyrimidin-2(1*H*)-one (2j): 70 mg, 90% yield, pale oil, new compound, R_f = 0.38 (dichloromethane/methanol = 15:1), 91% ee, $[\alpha]^{20}_D$ = +46.1 (*c* 0.70, MeOH); ^{1}H NMR (400 MHz, CD_2Cl_2) δ 7.49–7.46 (m, 2H), 7.24 (d, J = 8.0 Hz, 1H), 5.83 (s, 1H), 5.75 (s, 1H), 4.55–4.41 (m, 1H), 3.70–3.55 (m, 1H), 2.12–1.96 (m, 1H), 1.54–1.46 (m, 1H), 1.18 (d, J = 6.0 Hz, 3H); ^{13}C NMR (100 MHz, CD_2Cl_2) δ 157.3, 142.9, 132.6, 131.4, 130.7, 128.3, 125.8, 54.4, 46.2, 39.9, 21.4; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 75/25, detector: 230 nm, flow rate: 0.8 mL/min, 30 °C), t_1 = 14.5 min (maj), t_2 = 20.4 min; HRMS (ESI) *m/z* Calculated for $C_{11}H_{13}N_2OCl_2$ $[M+H]^+$ 259.0399, found 259.0400.



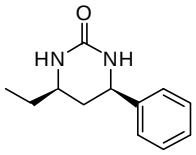
(+)-4-(4-Fluorophenyl)-6-methyltetrahydropyrimidin-2(1*H*)-one (2k): 56 mg, 91% yield, white solid, new compound, mp: 145-146 °C, R_f = 0.30 (dichloromethane/methanol = 15:1), 96% ee, $[\alpha]^{20}_D$ = +69.0 (*c* 0.80, MeOH); ^{1}H NMR (400 MHz, CD_2Cl_2) δ 7.39–7.36 (m, 2H), 7.11–7.07 (m, 2H), 5.39 (s, 1H), 5.29 (s, 1H), 4.56–4.52 (m, 1H), 3.71–3.63 (m, 1H), 2.10–1.99 (m, 1H), 1.60–1.55 (m, 1H), 1.21 (d, J = 6.4 Hz, 3H); ^{13}C NMR (100 MHz, CD_2Cl_2) δ 162.3 (d, J = 245.4 Hz), 156.9, 138.2 (d, J = 3.0 Hz), 127.9 (d, J = 8.2 Hz), 115.5 (d, J = 21.6 Hz), 54.9, 46.4, 40.2, 21.6; ^{19}F NMR (376 MHz, CD_2Cl_2) δ -115.2; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 75/25, detector: 230 nm, flow rate: 0.8 mL/min, 30 °C), t_1 = 12.4 min (maj), t_2 = 17.5 min; HRMS (ESI) *m/z* Calculated for $C_{11}H_{14}N_2OF$ $[M+H]^+$ 209.1085, found 209.1085.



(-)-4-Methyl-6-(4-(trifluoromethyl)phenyl)tetrahydropyrimidin-2(1*H*)-one (2l): 66 mg, 86% yield, yellowish solid, new compound, mp: 191-192 °C, R_f = 0.33 (dichloromethane/methanol = 20:1), 83% ee, $[\alpha]^{20}_D$ = -35.4 (*c* 0.76, MeOH); ^{1}H NMR (400 MHz, CD_2Cl_2) δ 7.65 (d, J = 7.8 Hz, 2H), 7.50 (d, J = 7.8 Hz, 2H), 6.02 (s, 1H), 5.98 (s, 1H), 4.64–4.49 (m, 1H), 3.70–3.52 (m, 1H), 2.12–1.96 (m, 1H), 1.55–1.46 (m, 1H), 1.17 (d, J = 6.2 Hz, 3H); ^{13}C NMR (100 MHz, CD_2Cl_2) δ 157.5, 146.7, 129.7 (q, J = 32.4 Hz), 126.6, 125.6 (q, J = 3.8

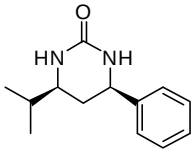
Hz), 124.2 (q, *J* = 272 Hz) 55.0, 46.3, 40.1, 21.4; ^{19}F NMR (376 MHz, CD_2Cl_2) δ -62.8; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 75/25, detector: 254 nm, flow rate: 0.8 mL/min, 30 °C), t_1 =13.3 min (maj), t_2 = 15.8 min; HRMS (ESI) *m/z* Calculated for $C_{12}H_{14}N_2OF_3$ $[M+H]^+$ 259.1053, found 259.1052.

(+)-4-Ethyl-6-phenyltetrahydropyrimidin-2(1*H*)-one (2m): 55 mg, 90% yield, pale oil, new compound, R_f = 0.38 (dichloromethane/methanol = 15:1), 96% ee, $[\alpha]^{20}_D$ = +50.6 (*c* 0.72, MeOH);



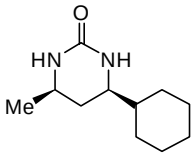
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41–7.29 (m, 5H), 5.39 (s, 1H), 5.00 (s, 1H), 4.53–4.49 (m, 1H), 3.52–3.42 (m, 1H), 2.14–2.04 (m, 1H), 1.57–1.51 (m, 3H), 0.95 (t, *J* = 7.6 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 157.4, 142.1, 128.9, 128.1, 126.1, 55.5, 52.2, 37.8, 28.9, 9.5; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 75/25, detector: 230 nm, flow rate: 0.8 mL/min, 30 °C), t_1 = 12.3 min (maj), t_2 = 15.0 min; HRMS (ESI) *m/z* Calculated for $C_{12}H_{17}N_2O$ $[M+H]^+$ 205.1335, found 205.1336.

(+)-4-Isopropyl-6-phenyltetrahydropyrimidin-2(1*H*)-one (2n): 58 mg, 89% yield, white solid, new compound, mp: 183-184 °C, R_f = 0.35 (dichloromethane/methanol = 15:1), 83% ee,



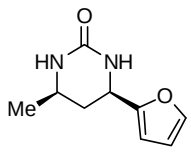
$[\alpha]^{20}_D$ = +13.3 (*c* 0.52, MeOH); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39–7.30 (m, 5H), 5.21 (s, 1H), 5.06 (s, 1H), 4.54–4.46 (m, 1H), 3.42–3.33 (m, 1H), 2.02–1.71 (m, 1H), 1.70–1.68 (m, 1H), 1.65–1.55 (m, 1H), 0.98–0.93 (m, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 158.4, 142.9, 129.7, 129.0, 127.0, 57.2, 56.3, 35.7, 33.1, 19.0, 18.5; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 90/10, detector: 254 nm, flow rate: 0.7 mL/min, 30 °C), t_1 = 17.6 min, t_2 = 19.2 min (maj); HRMS (ESI) *m/z* Calculated for $C_{13}H_{19}N_2O$ $[M+H]^+$ 219.1492, found 219.1496.

(-)-4-Cyclohexyl-6-methyltetrahydropyrimidin-2(1*H*)-one (2o): 48 mg, 81% yield, white solid, new compound, mp: 157-158 °C, R_f = 0.30 (ethyl acetate/methanol = 20:1), 86% ee, $[\alpha]^{20}_D$ =



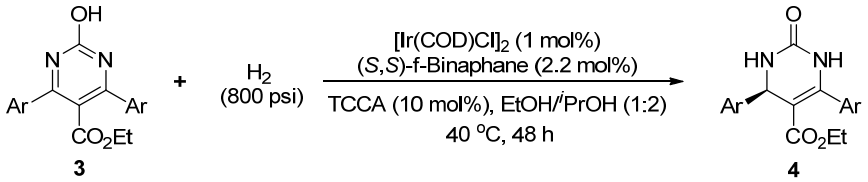
-0.6 (*c* 0.86, MeOH); ^{1}H NMR (400 MHz, $CDCl_3$) δ 4.82 (s, 1H), 4.66 (s, 1H), 3.53–3.45 (m, 1H), 3.23–3.18 (m, 1H), 1.87–1.65 (m, 6H), 1.33–1.21 (m, 4H), 1.18 (d, J = 6.4 Hz, 3H), 1.15–0.94 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 157.3, 55.6, 46.2, 42.4, 33.5, 28.6, 28.3, 26.4, 26.1, 26.0, 22.0; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, Hexanes/*i*-PrOH = 70/30, detector: 254 nm, flow rate: 0.7 mL/min, 30 °C), t_1 = 7.0 min (maj), t_2 = 9.9 min; HRMS (ESI) *m/z* Calculated for $C_{11}H_{21}N_2O$ $[M+H]^+$ 197.1648, found 197.1652.

(+)-4-(Furan-2-yl)-6-methyltetrahydropyrimidin-2(1*H*)-one (2p): 49 mg, 91% yield, pale yellow solid, new compound, mp: 159-160 °C, R_f = 0.20 (ethyl acetate/methanol = 20:1), 83% ee,



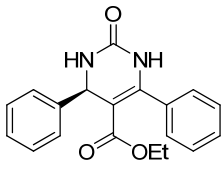
$[\alpha]^{20}_D$ = +6.4 (*c* 0.52, MeOH); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41–7.33 (m, 1H), 6.37–6.31 (m, 1H), 6.29–6.23 (m, 1H), 5.71–5.58 (m, 1H), 5.52–5.40 (m, 1H), 4.67–4.58 (m, 1H), 3.68–3.61 (m, 1H), 2.18 (d, *J* = 12.8 Hz, 1H), 1.78–1.69 (m, 1H), 1.24 (d, *J* = 6.4 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 157.0, 153.8, 142.2, 110.4, 105.6, 48.8, 46.0, 36.0, 21.7; Enantiomeric excess was determined by HPLC for the corresponding benzamide (OD-H column, *n*-Hexane/*i*-PrOH = 70/30, detector: 254 nm, flow rate: 0.7 mL/min, 30 °C), t_1 =12.0 min (maj), t_2 = 13.8 min; HRMS (ESI) *m/z* Calculated for $C_9H_{13}N_2O_2$ $[M+H]^+$ 181.0972, found 181.0971.

General procedure for asymmetric hydrogenation of 4,5,6-trisubstituted pyrimidin-2-ols:

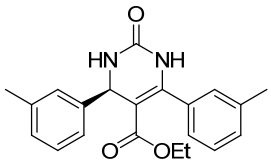


In a nitrogen-filled glove box, a mixture of $[Ir(COD)Cl]_2$ (2.0 mg, 0.003 mmol) and (*S*,*S*)-f-Binaphane (5.3 mg, 0.0066 mmol) in isppropanol (1.0 mL) was stirred at room temperature for 10 min, then substrates **3** (0.3 mmol) and TCCA (7.0 mg, 0.03 mmol) together with isppropanol (1.0 mL) and ethanol (1.0 mL) were added to the mixture. The hydrogenation was performed at 40 °C under 800 psi of hydrogen for 48 h. After carefully releasing the hydrogen, excess solid sodium bicarbonate was added. The resulted mixture was stirred for 30 min, then filtrated off and concentrated in *vacuo.* Further purification was performed by a silica gel column eluted with ethyl acetate/methanol to give the desired chiral product **4**.

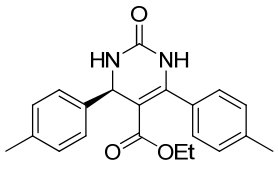
(+)-Ethyl 2-oxo-4,6-diphenyl-1,2,3,4-tetrahydropyrimidine-5-carboxylate (4a): 86 mg, 89% yield, white solid, known compound, R_f = 0.80 (ethyl acetate), 68% ee, $[\alpha]^{20}_D$ = +10.5 (*c* 0.98, MeOH), [Lit.[2] $[\alpha]^{20}_D$ = -31.1 (*c* 0.44, MeOH) for 97% ee]; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45–7.27 (m, 10H), 6.99 (d, *J* = 5.2 Hz, 1H), 5.86 (s, 1H), 5.50 (d, *J* = 2.8 Hz, 1H), 3.89–3.78 (m, 2H), 0.82 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.2, 152.5, 146.8, 143.4, 135.1, 129.6, 128.9, 128.3, 128.1, 128.0, 126.6, 102.5, 60.1, 56.1, 13.5; Enantiomeric excess was determined by HPLC (AD-H column, *n*-Hexane/*i*-PrOH = 80/20, detector: 254 nm, flow rate: 0.70 mL/min, 30 °C) t_1 =14.4 min (maj), t_2 = 17.7 min.



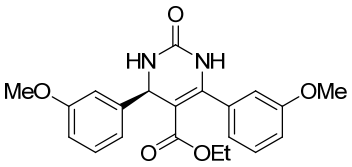
(+)-Ethyl 2-oxo-4,6-di*m*-tolyl-1,2,3,4-tetrahydropyrimidine-5-carboxylate (4b): 95 mg, 90% yield, white solid, new compound, mp: 196-197 °C, R_f = 0.70 (ethyl acetate), 83% ee, $[\alpha]^{20}_D$ = +17.4 (*c* 1.34, MeOH); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29 (d, *J* = 7.6 Hz, 1H), 7.26–7.21 (m, 4H), 7.16–7.11 (m, 3H), 6.68 (s, 1H), 5.62 (s, 1H), 5.47 (d, *J* = 2.8 Hz, 1H), 3.89–3.81 (m, 2H), 2.36 (s, 6H), 0.84 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.2, 152.3, 146.7, 143.3, 138.5, 138.1, 135.1, 130.3, 128.9, 128.8, 128.5, 128.2, 127.4, 125.0, 123.7, 102.5, 60.0, 56.2, 21.6, 21.3, 13.5; Enantiomeric excess was determined by HPLC (AD-H column, *n*-Hexane/*i*-PrOH = 80/20, detector: 254 nm, flow rate: 0.70 mL/min, 30 °C) t_1 =12.1 min (maj), t_2 = 15.2 min; HRMS (ESI) *m/z* Calculated for $C_{21}H_{23}N_2O_3$ $[M+H]^+$ 351.1703, found 351.1705.



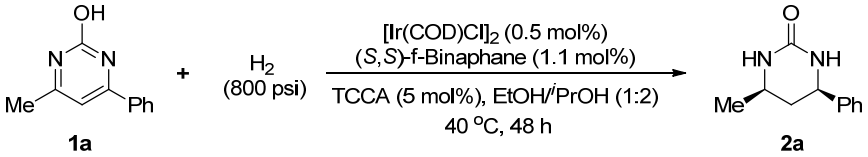
(+)-Ethyl 2-oxo-4,6-di*p*-tolyl-1,2,3,4-tetrahydropyrimidine-5-carboxylate (4c): 94 mg, 90% yield, white solid, known compound, R_f = 0.70 (ethyl acetate), 81% ee, $[\alpha]^{20}_D$ = +32.3 (*c* 0.90, MeOH), [Lit.[2] $[\alpha]^{20}_D$ = -31.9 (*c* 0.26, MeOH) for 93% ee]; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48 (s, 1H), 7.30–7.27 (m, 2H), 7.22–7.19 (m, 2H), 7.17–7.12 (m, 4H), 6.32 (s, 1H), 5.37 (d, *J* = 3.0 Hz, 1H), 3.85 (q, *J* = 7.2 Hz, 2H), 2.34 (s, 3H), 2.33 (s, 3H), 0.87 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.4, 153.1, 147.2, 140.7, 139.6, 137.6, 132.1, 129.5, 128.9, 128.0, 126.5, 102.1, 60.0, 55.5, 21.4, 21.2, 13.7; Enantiomeric excess was determined by HPLC (AD-H column, *n*-Hexane/*i*-PrOH = 80/20, detector: 254 nm, flow rate: 0.70 mL/min, 30 °C) t_1 =16.9 min (maj), t_2 = 18.4 min.



(+)-Ethyl 2-oxo-4,6-bis(3-methoxyphenyl)-1,2,3,4-tetrahydropyrimidine-5-carboxylate (4d): 105 mg, 92% yield, known compound, white solid, R_f = 0.70 (ethyl acetate), 75% ee, $[\alpha]^{20}_D$ = +14.1 (*c* 0.74, MeOH), [Lit.[2] $[\alpha]^{20}_D$ = -22.4 (*c* 0.58, MeOH), for 99% ee]; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28 (dd, *J* = 7.8, 5.0 Hz, 2H), 7.02–6.97 (m, 2H), 6.94–6.90 (m, 2H), 6.87–6.82 (m, 2H), 6.11 (s, 1H), 5.44 (d, *J* = 2.8 Hz, 1H), 3.88–3.81 (m, 2H), 3.79 (s, 3H), 3.79 (s, 3H), 0.85 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.2, 159.9, 159.4, 152.7, 146.7, 144.9, 136.2, 129.9, 129.4, 120.4, 118.8, 115.3, 113.4, 113.3, 112.5, 102.3, 60.1, 55.8, 55.4, 55.2, 13.6; Enantiomeric excess was determined by HPLC (AD-H column, *n*-Hexane/*i*-PrOH = 80/20, detector: 254 nm, flow rate: 0.70 mL/min, 30 ^oC) t_1 =26.9 min (maj), t_2 = 30.2 min.



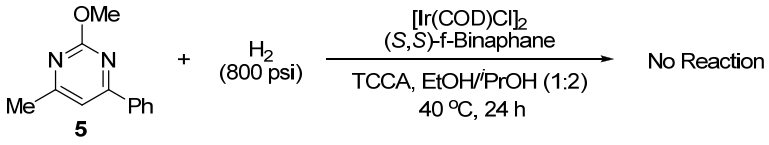
4. Asymmetric Hydrogenation at Gram Scale



In a nitrogen-filled glove box, a mixture of $[Ir(COD)Cl]_2$ (18.1 mg, 0.027 mmol) and (*S,S*)-f-Binaphane (48 mg, 0.059 mmol) in isppropanol (3.0 mL) was stirred at room temperature for 15 min, then substrates **1a** (1.005g, 5.4 mmol) and TCCA (63 mg, 0.27 mmol) together with isppropanol (13.0 mL) and ethanol (8.0 mL) were added to the mixture. The hydrogenation was performed at 40 ^oC under 800 psi of hydrogen for 48 h. After carefully releasing the hydrogen, excess solid sodium bicarbonate was added. The resulted mixture was stirred for 30 min, then filtrated off and concentrated in *vacuo.* Further purification was performed by a silica gel column eluted with ethyl acetate/methanol to give the chiral product **2a** 0.945 g in 92% yield and 95% ee.

5. Mechanistic Investigation

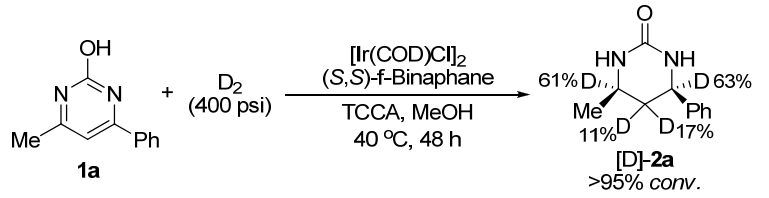
5.1 Control Experiments



In order to further verify our hypothesis that the hydrogenation carried out *via* the oxo form of the 2-hydroxypyrimidine, we synthesized the hydroxyl protected 2-methoxy-4-methyl-6-phenyl pyrimidine **5** according to the literature method.[3] Asymmetric hydrogenation of **5** was proceeded under the standard hydrogenation condition $[Ir(COD)Cl]_2$/(*S*,*S*)-f-Binaphane/TCCA/EtOH:^{i}PrOH (1:2), no reaction occurred.

5.2 Isotopic Labeling Experiments

Asymmetric Hydrogenation with D_2: 4-Methyl-6-phenylpyrimidin-2-ol **1a** was hydrogenated in D_2 (400 psi) with the $[Ir(COD)Cl]_2$/(*S*,*S*)-f-Binaphane/TCCA/MeOH condition.



^{1}H NMR analysis of the crude hydrogenation product showed that deuterium atoms were incorporated to the 4,5,6-position (C4: 61%; C5: 11% and 17%; C6: 63%) of the hydrogenation product 4-methyl-6-phenyltetrahydropyrimidin-2(1*H*)-one [D]-**2a** (Figure S1). These experimental results confirmed that the **1a** might be hydrogenated *via* imine form by the chiral iridium catalyst.

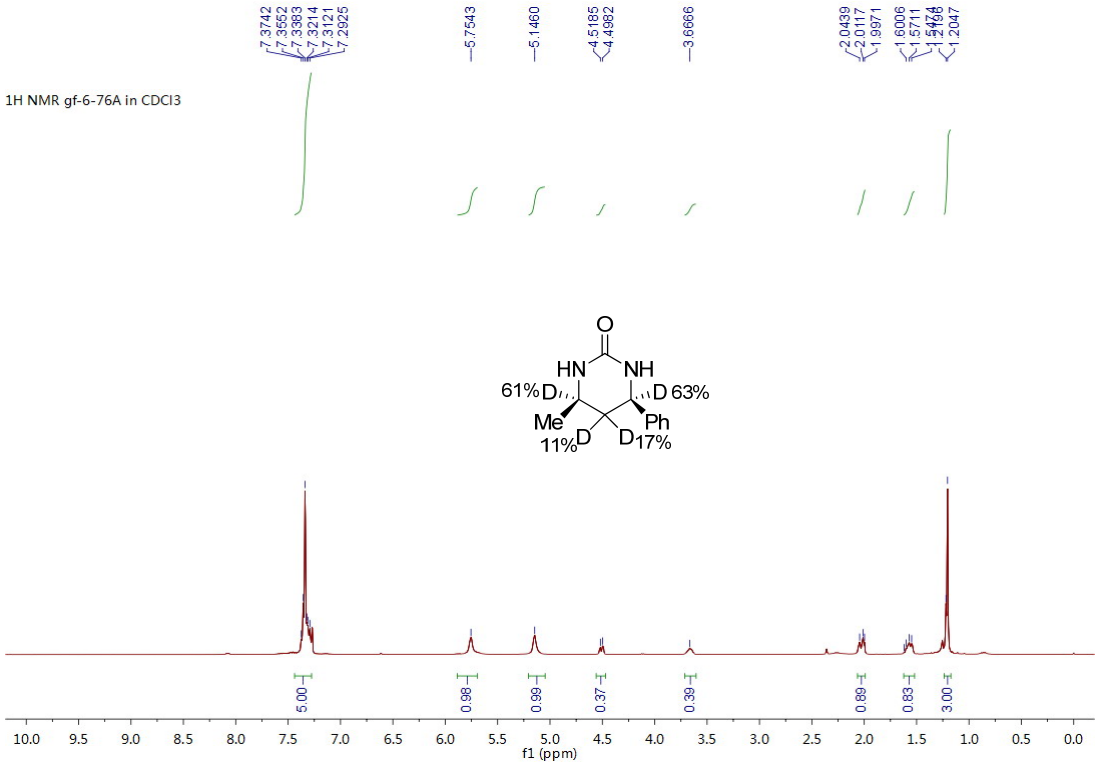
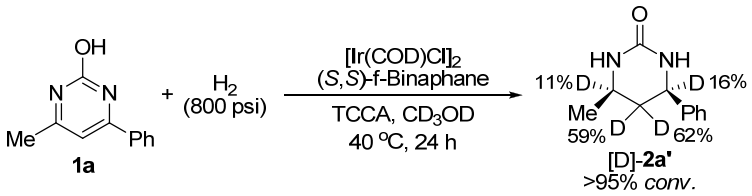


Figure S1. ^{1}H NMR of **[D]-2a**

Asymmetric Hydrogenation in CD_3OD:



^{1}H NMR analysis of the crude hydrogenation product showed that deuterium atoms were incorporated to the 4,5,6-position (C4: 11%; C5: 59% and 62%; C6: 16%) of 4-methyl-6-phenyltetrahydropyrimidin-2(1*H*)-one [D]-**2a'**, which suggested that a rapid reversible process of enmine-imime existed during reaction process (Figure S2).

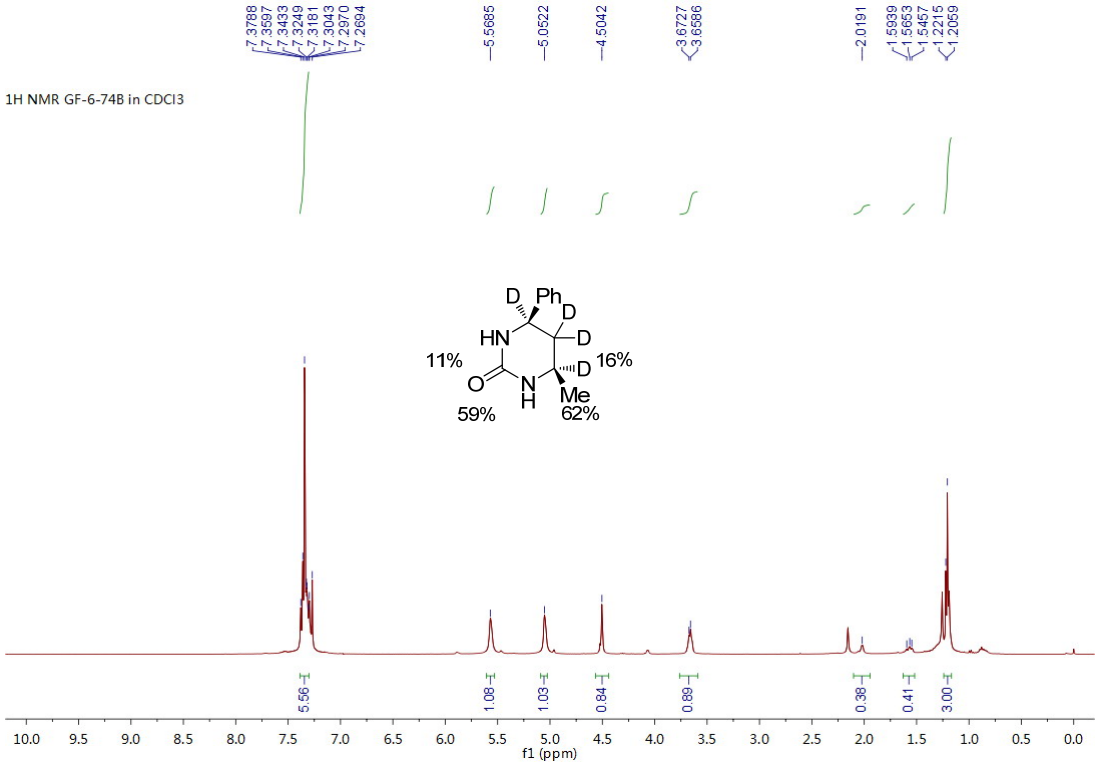
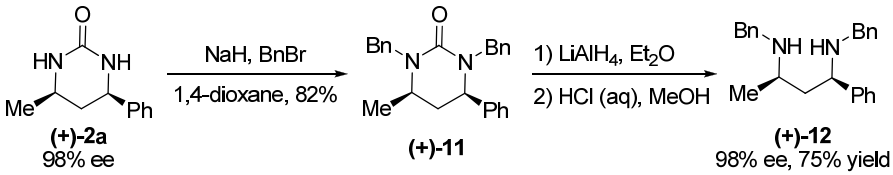


Figure S2. ^{1}H NMR of **[D]-2a'**

6. Product Elaboration



According to the known report[2]: A mixture of chiral cyclic urea (+)-**2a** (98% ee, 76 mg, 0.4 mmol), 60 wt% sodium hydride (40 mg, 1.0 mmol) in 1,4-dioxane (4.0 mL) was refluxed for 15 min. The suspension was cooled to 25 °C, and benzyl bromide (151 mg, 0.88 mmol) was added. The mixture was refluxed for 16 h, cooled and filtered. The solvent was evaporated from the filtrate, to afford the crude product, followed by purification by a silica gel column using hexanes/ ethyl acetate as eluent to give the pure product (+)-**11**.

(+)-**1,3-Dibenzyl-4-methyl-6-phenyltetrahydropyrimidin-2(1*H*)-one (11):** 122 mg, pale oil, 82% yield, new compound, $[\alpha]^{20}_D$ = +45.3 (*c* 1.06, $CHCl_3$), R_f = 0.85 (hexanes/ethyl acetate = 10:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41–7.21 (m, 13H), 7.21 (d, *J* = 7.4 Hz, 2H), 5.60 (d, *J* = 15.2 Hz, 1H), 5.38 (d, *J* = 15.6 Hz, 1H), 4.45 (t, *J* = 6.2 Hz, 1H), 4.24 (d, *J* = 15.8 Hz, 1H), 3.67 (d, *J* = 15.2 Hz, 1H), 3.53–3.46 (m, 1H), 2.24–2.18 (m, 1H), 2.07–2.00 (m, 1H), 0.97 (d, *J* = 6.6 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 156.9, 141.0, 138.5, 138.1, 128.3, 128.0, 127.9, 127.6, 127.1, 127.0, 126.6, 126.4, 126.3, 56.6, 48.6, 48.2, 47.5, 38.1, 19.8; HRMS (ESI) m/z Calculated for $C_{25}H_{27}N_2O$ $[M+H]^+$ 371.2118, found 371.2117.

A mixture of lithium aluminum hydride (63 mg, 1.65 mmol) and **11** (122 mg, 0.33 mmol) in anhydrous ether (5.0 mL) was refluxed for 4 h. The reaction was quenched with water (3.0 mL), and 10% aqueous sodium hydroxide (3.0 mL) was added. After being stirred for 15 minutes, the mixture was diluted with ethyl acetate, filtered through Celite. The filtrate was extracted with ethyl acetate there times. The combined organic layer was dried over anhydrous sodium sulfate and concentrated in *vacuo* to give the crude product, which was subjected to hydrolysis without further purification.

To the crude product obtained above was added 5 % HCl in methanol (3.0 mL). The mixture was stirred at 25 °C until TLC revealed complete conversion. The reaction mixture was adjusted to pH 8~9 with 10 % ammonia solution. After being stirred for 15 minutes，the mixture was extracted with chloroform. The combined organic layer were washed with brine, dried over anhydrous sodium sulfate, filtered and concentrated in *vacuo*. The crude product was purified by silica gel chromatography using dichloromethane/methanol as eluent to give 1,3-diamine (+)-**12**.

(+)-*N*,*N*-Dibenzyl-1-phenylbutane-1,3-diamine (12): 86 mg, pale yellow oil, 75% yield (two steps), 98% ee, new compound, $[\alpha]^{20}_D$ = +26.8 (*c* 0.60, $CHCl_3$), R_f = 0.2 (dichloromethane/ methanol = 15/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37–7.24 (m, 13H), 7.11 (d, *J* = 7.2 Hz, 2H), 4.99 (s, 2H), 4.06 (d, *J* = 13.2 Hz, 1H), 3.71–3.68 (m, 2H), 3.62 (d, *J* = 13.2 Hz, 1H), 3.40 (d, *J* = 13.2 Hz, 1H), 2.94–2.91 (m, 1H), 2.23–2.14 (m, 1H), 1.70–1.68 (m, 1H), 1.22 (d, *J* = 6.4 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.9, 139.2, 128.8, 128.8, 128.6, 128.5, 128.3, 127.8, 127.5, 127.2, 126.9, 126.0, 62.2, 53.5, 50.9, 50.1, 43.5, 19.5; Enantiomeric excess was determined by HPLC (OD-H, elute: *n*-Hexane/*i*-PrOH = 85/15, 0.05% Et_3N, detector: 254 nm, flow rate: 0.6 mL/min, 30 °C), t_1 = 7.3 min (maj), t_2 = 8.5 min; HRMS (ESI) m/z Calculated for $C_{24}H_{29}N_2$ $[M+H]^+$ 345.2325, found 345.2324.

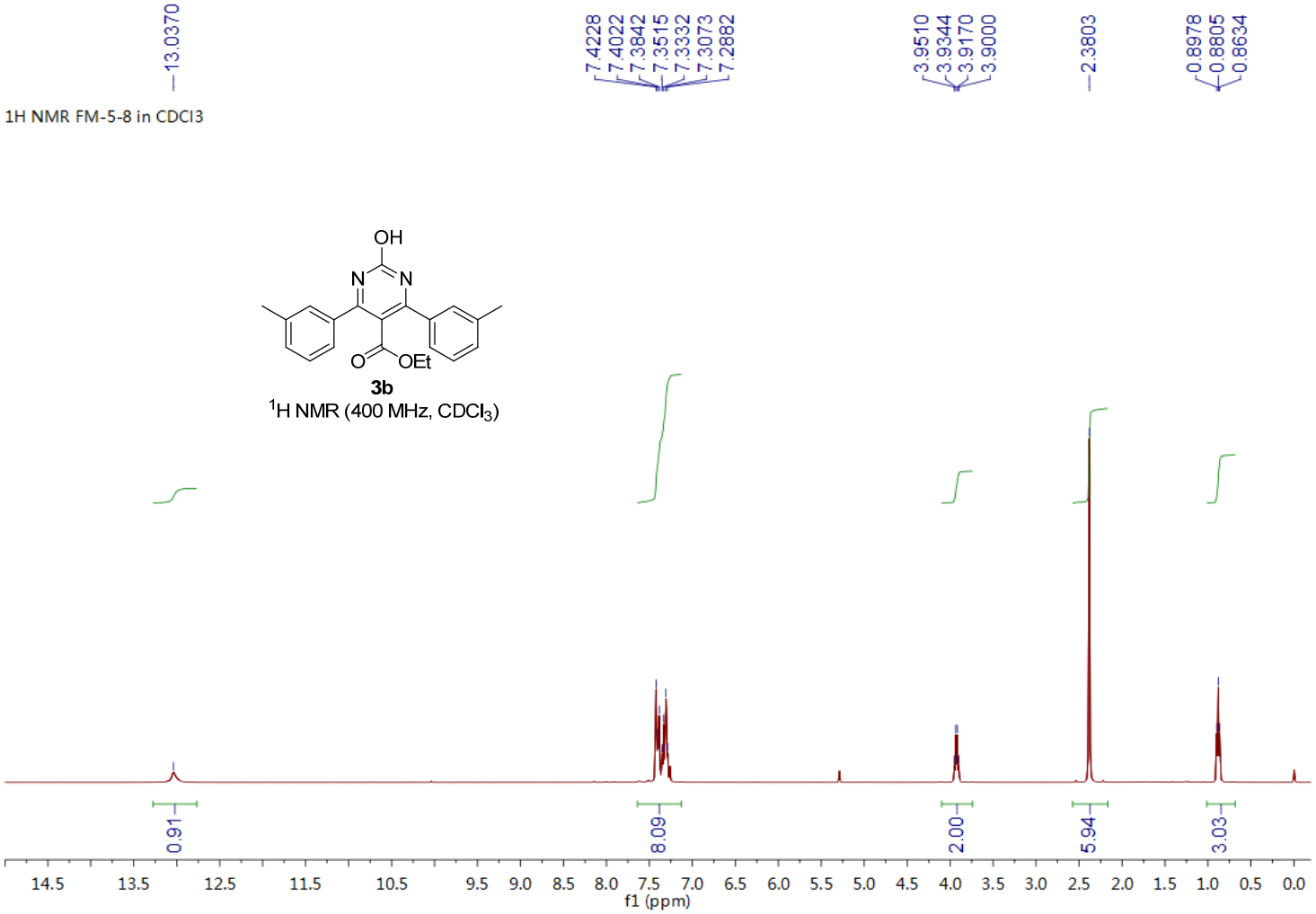
7. References

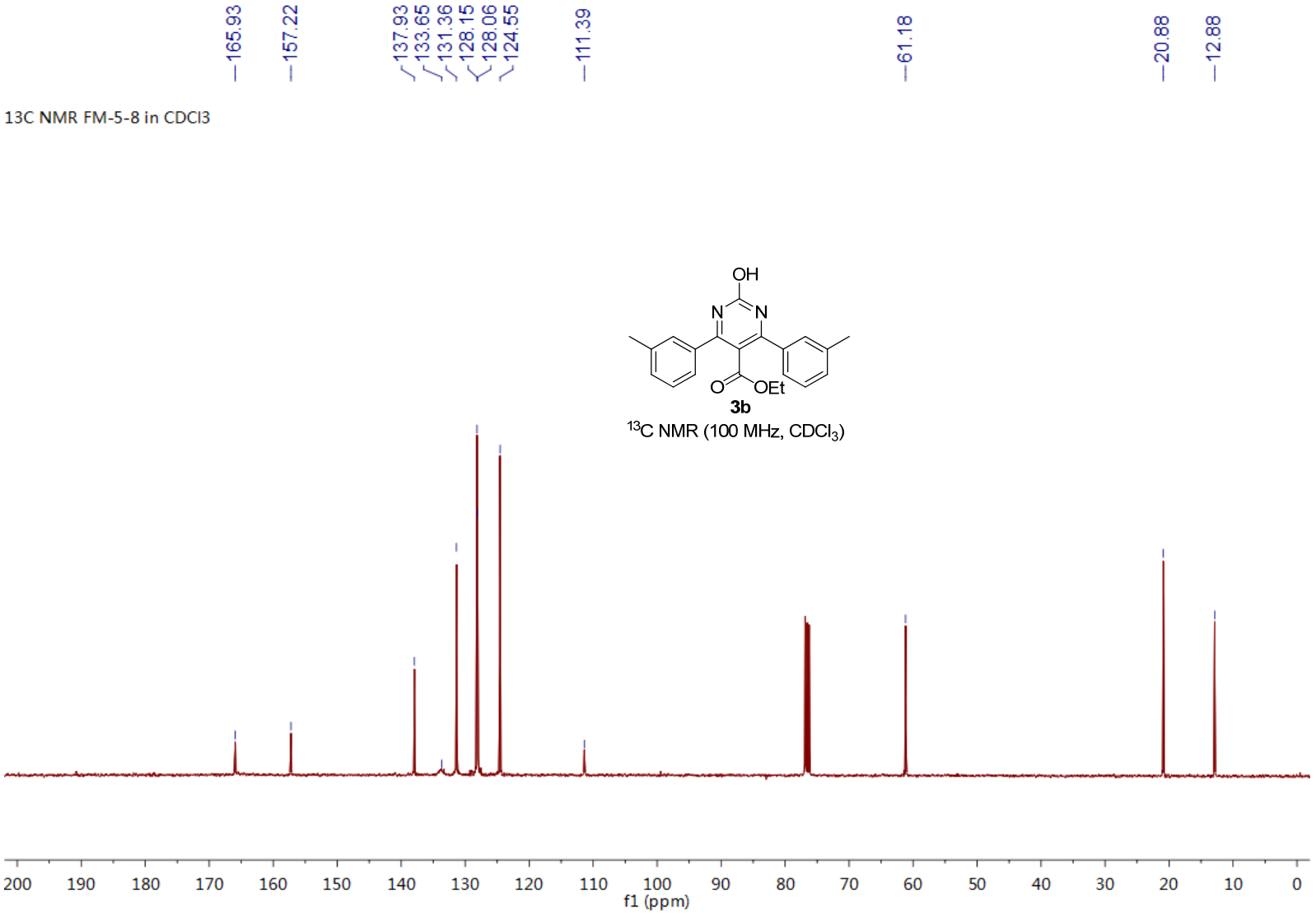
[1] (a) Murray, T. P.; Hay, J. V.; Portlock, D. E.; Wolfe, J. F. *J. Org. Chem.* **1974**, *39*, 595; (b) Nigam, S. C.; Saharia, G. S.; Sharma, H. R. *J. Indian Chem. Soc*. **1982**, *59*, 709; (c) Mcarthur, S. G.; Erwin, G.; Juergen, W.; Woltering, T. WO 2007110337 A1, **2007**; (d) Shoichi, C.; Yojiro, U.; Tomiyosi, A.; Kyoichi, I. WO 9607641 A1, **1996**; (e) Sakamoto, T.; Sakasai, T.; Yoshizawa, H.; Tanji, K.; Nishimura, S.; Yamanaka, H. *Chem. Pharm. Bull*.**1983**, *31*, 4554; (f) **1b** [CAS: 1697101-66-8]; **1d** [CAS: 1698634-89-7]; **1e** [CAS: 1159816-34-8]; **1f** [CAS: 1702115-48-7]; **1g** [CAS: 1695255-01-6]; **1h** [CAS: 1972241-84-1]; **1n** [CAS: 1412958-83-8]; **1o** [CAS: 1412958-07-6], **1p** [CAS: 1412960-34-9], these compounds are commercially available.

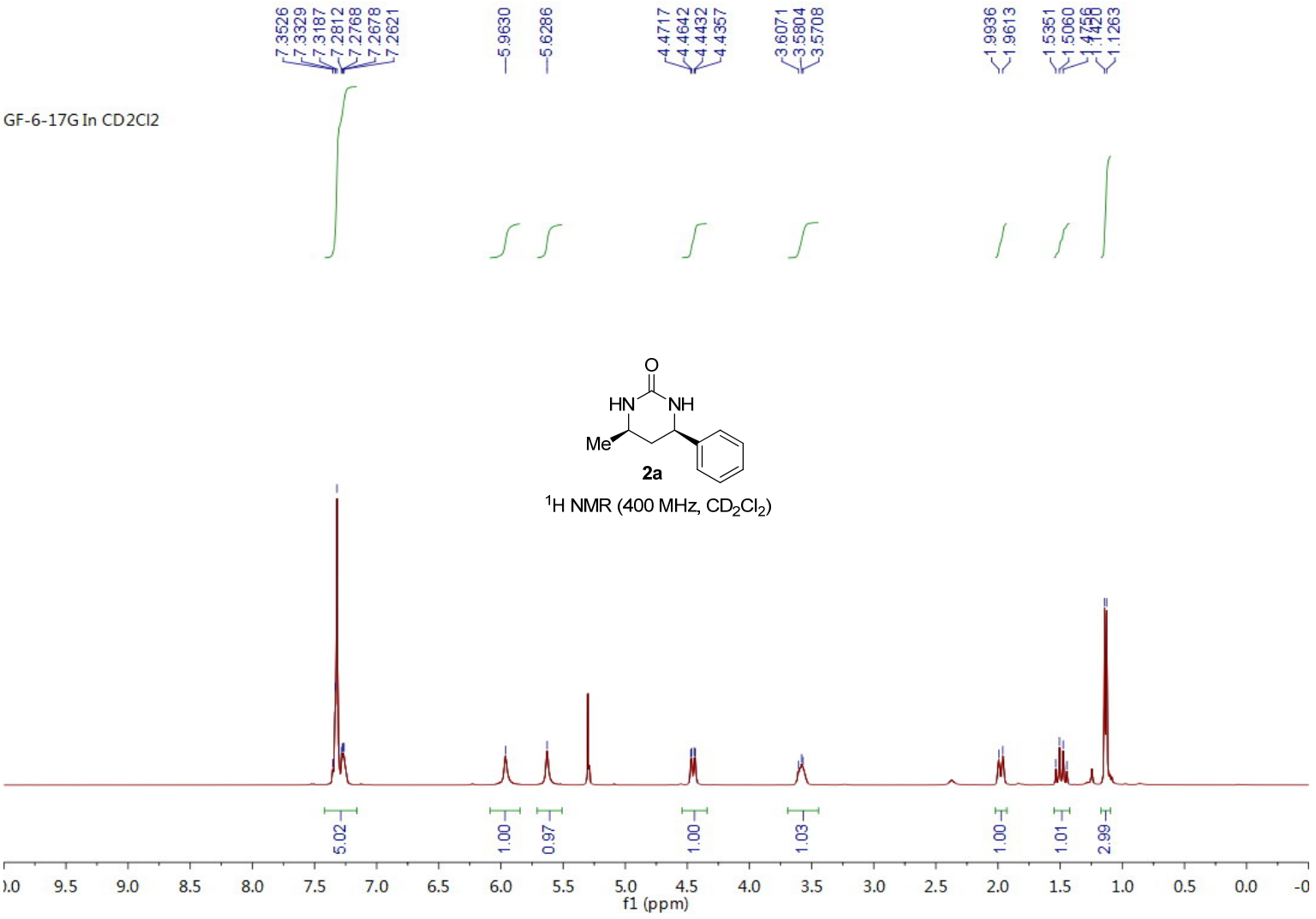
[2] Feng, G.-S.; Chen, M.-W.; Shi, L.; Zhou, Y.-G. *Angew. Chem. Int. Ed.* **2018**, *57*, 5853.

[3] Gompper, R. *Chem. Ber*. **1960**, *93*, 198.

8. Copy of NMR and HPLC




165.93
157.22
137.93
133.65
131.36
128.15
128.06
124.55
111.39
61.18
20.88
12.88
13C NMR FM-5-8 in CDCl3
OH
N
N
O
OEt
3b
13C NMR (100 MHz, CDCl3)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


GF-6-17G In CD2Cl2
7.3526
7.3329
7.3187
7.2812
7.2768
7.2678
7.2621
5.9630
5.6286
4.4717
4.4642
4.4432
4.4357
3.6071
3.5804
3.5708
1.9936
1.9613
1.5351
1.5060
1.1263
O
HN
NH
Me
2a
^{1}H NMR (400 MHz, CD_2Cl_2)
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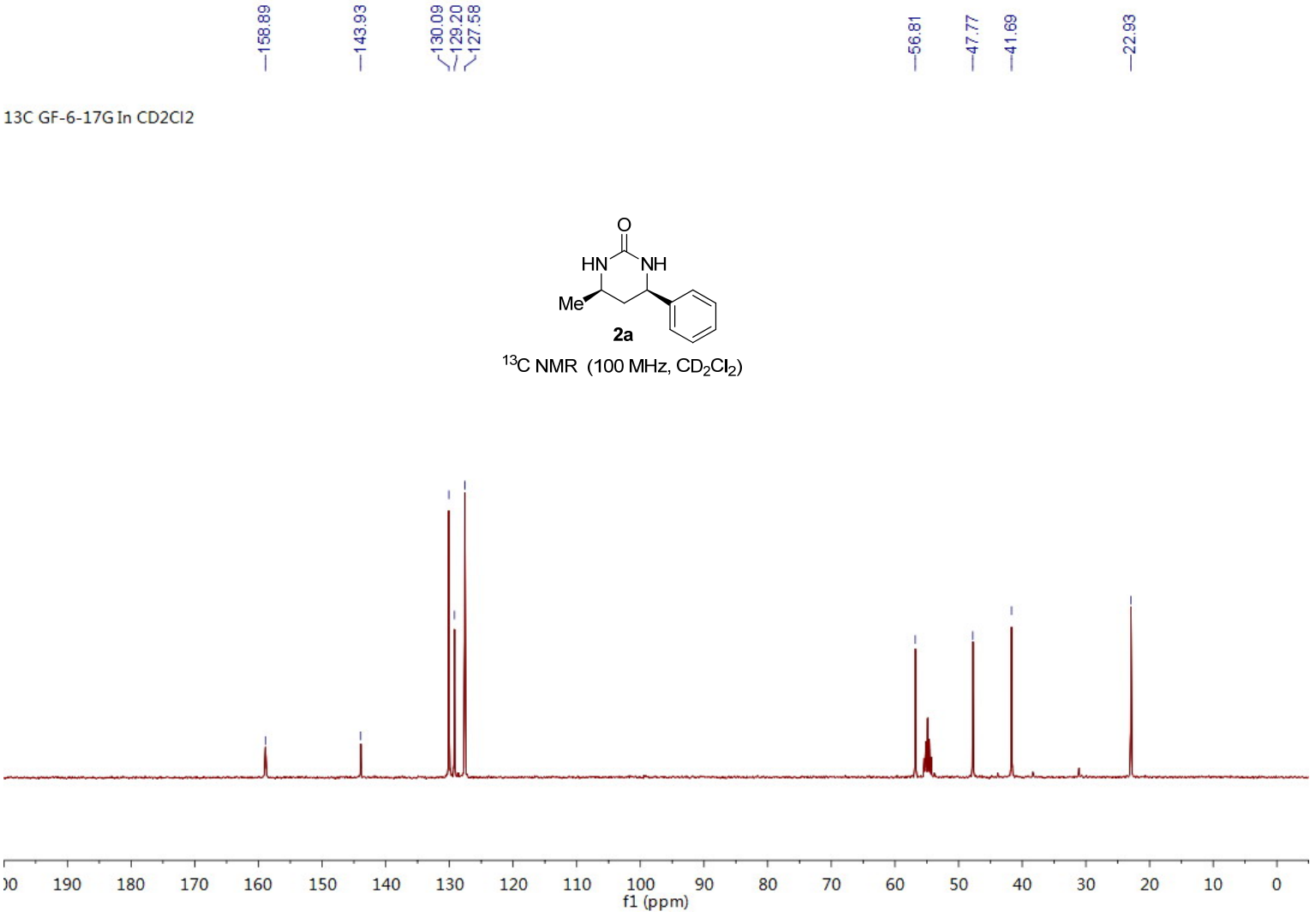
1.00
0.97
1.00
1.03
1.00
1.01
2.99
f1 (ppm)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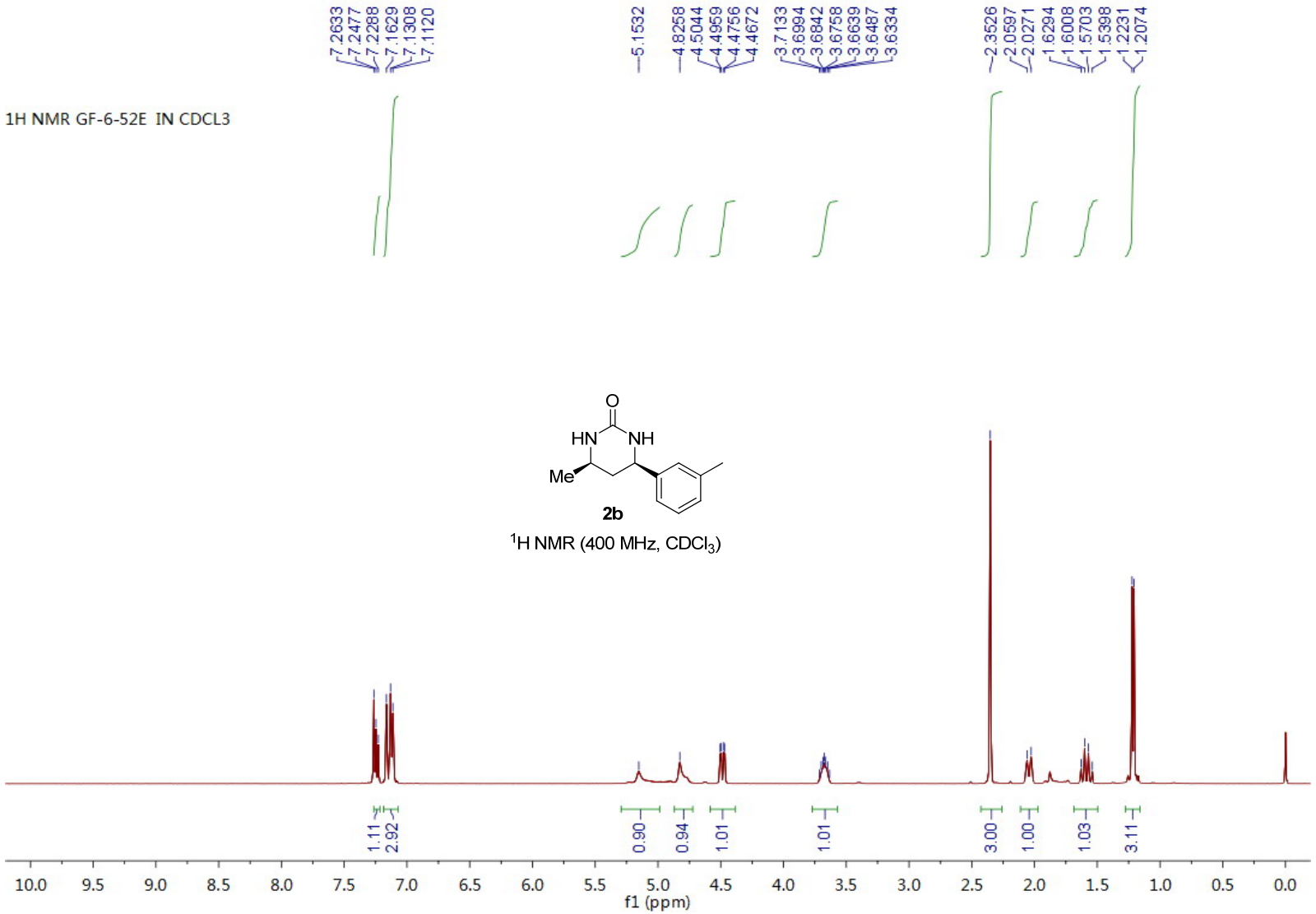
143.93
130.09
129.20
127.58
56.81
47.77
41.69
22.93
13C GF-6-17G In CD2Cl2
O
HN
NH
Me
2a
^{13}C NMR (100 MHz, CD_2Cl_2)
f1 (ppm)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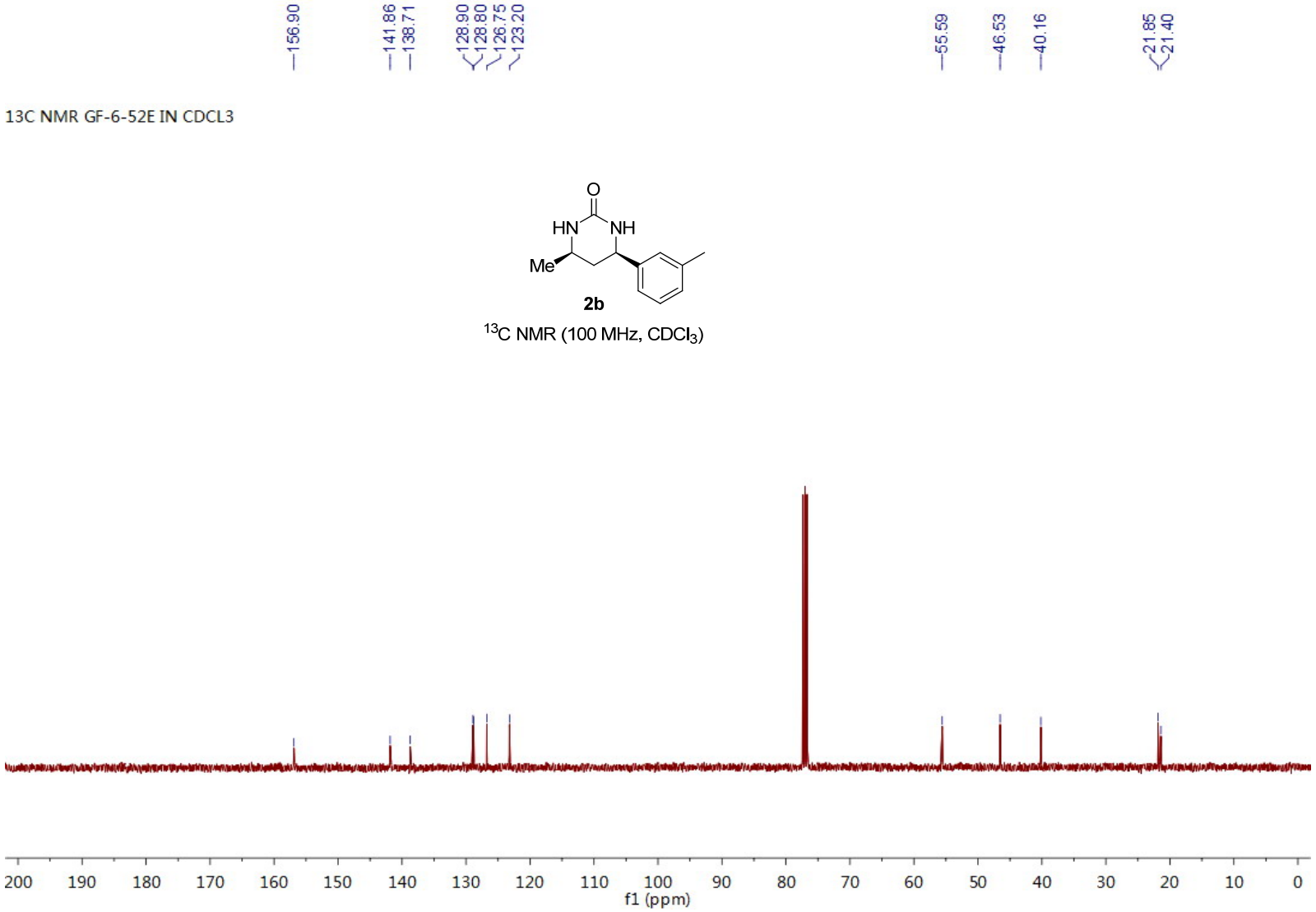
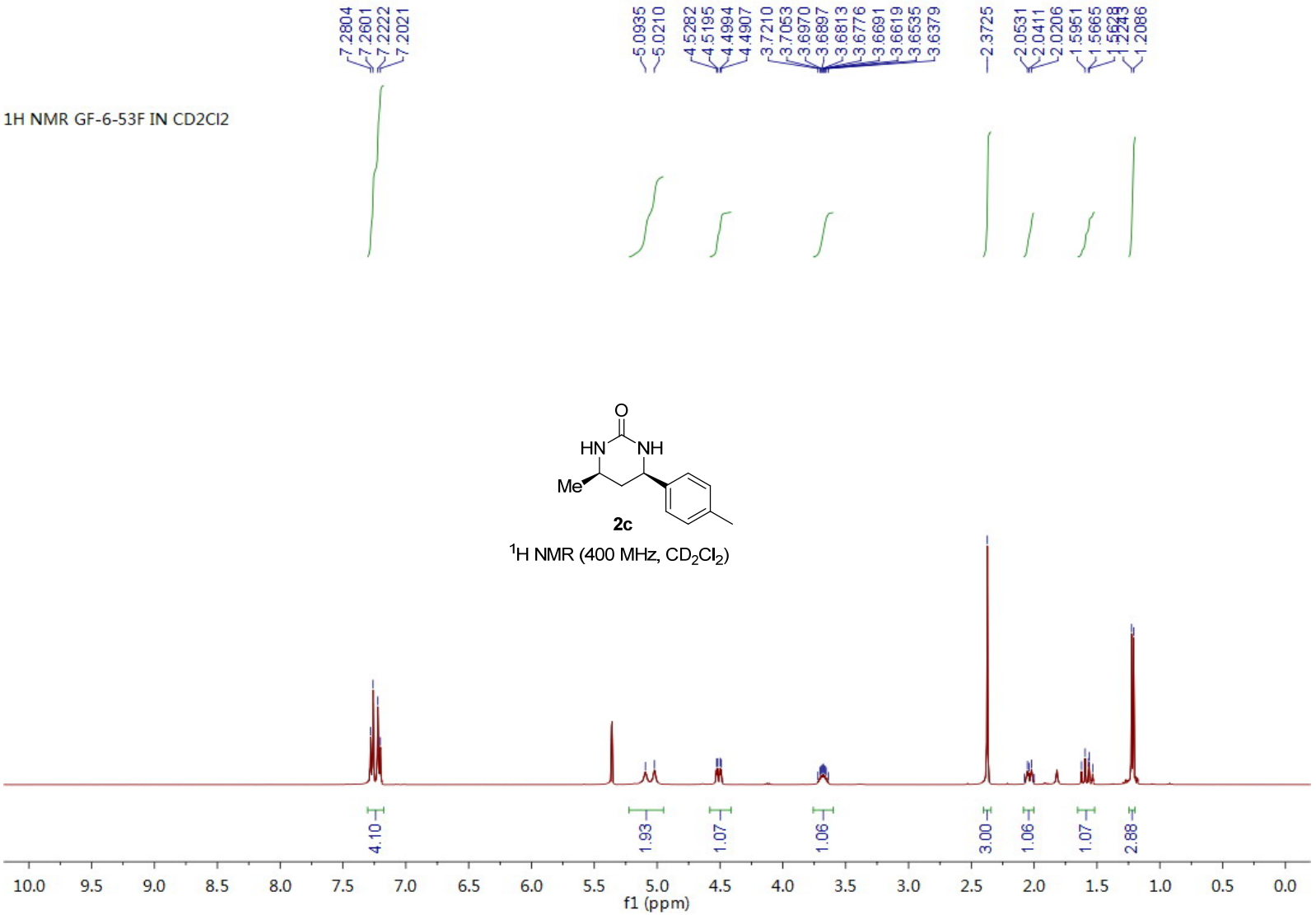
7.2477
7.2288
7.1629
7.1308
7.1120
5.1532
4.8258
4.5044
4.4959
4.4756
4.4672
3.7133
3.6994
3.6842
3.6758
3.6639
3.6487
3.6334
2.3526
2.0597
2.0271
1.6294
1.6008
1.5703
1.5398
1.2231
1.2074
HN
NH
O
Me
2b
1H NMR (400 MHz, CDCl3)
1.11
2.92
0.90
0.94
1.01
1.01
3.00
1.00
1.03
3.11
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


156.90
141.86
138.71
128.90
128.80
126.75
123.20
55.59
46.53
40.16
21.85
21.40
13C NMR GF-6-52E IN CDCL3
O
HN
NH
Me
2b
13C NMR (100 MHz, CDCl3)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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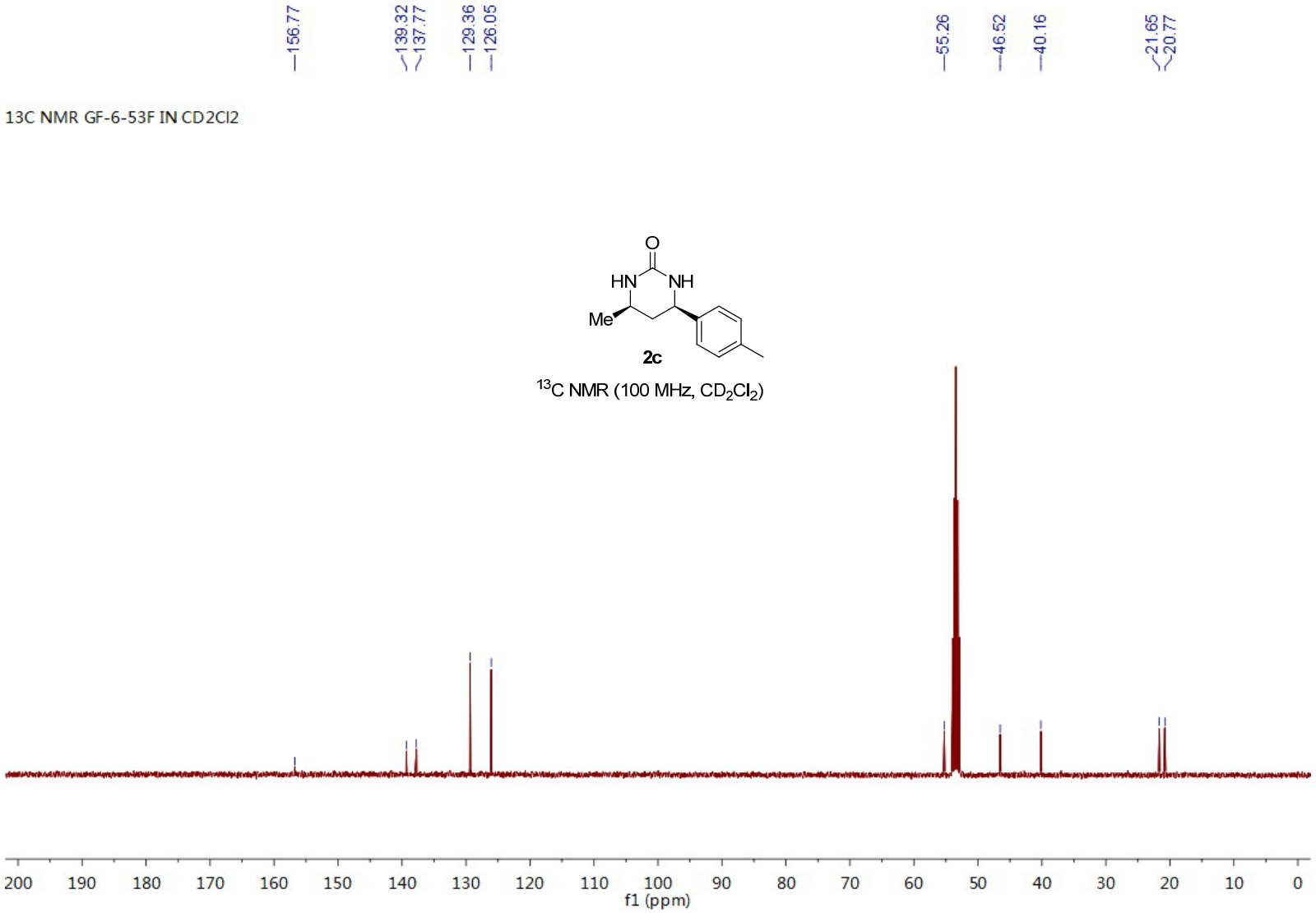
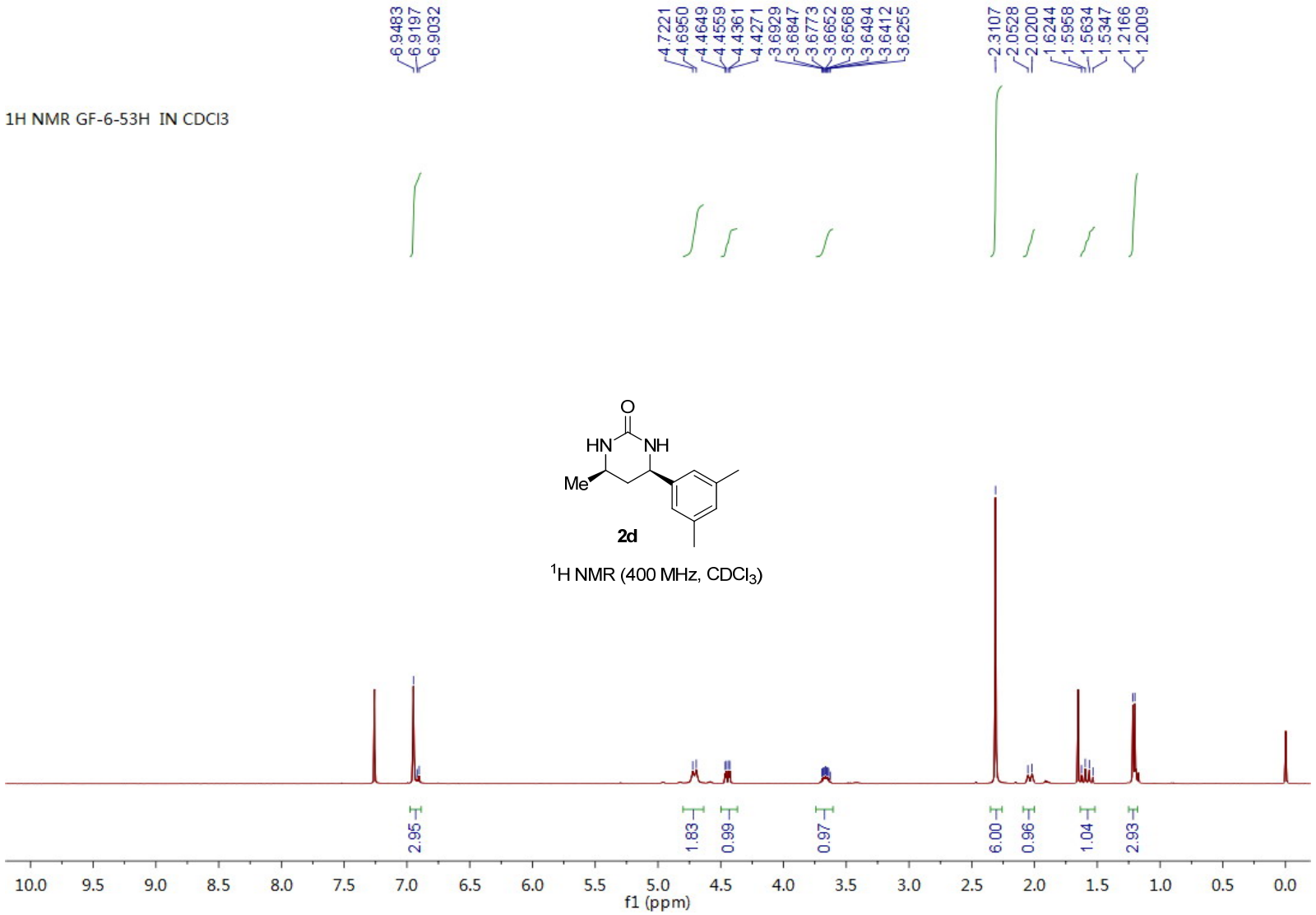
7.2601
7.2222
7.2021
5.0935
5.0210
4.5282
4.5195
4.4994
4.4907
3.7210
3.7053
3.6970
3.6897
3.6813
3.6776
3.6691
3.6619
3.6535
3.6379
2.3725
2.0531
2.0411
2.0206
1.5951
1.5665
1.2243
1.2086
HN
NH
O
Me
2c
1H NMR (400 MHz, CD2Cl2)
4.10
1.93
1.07
1.06
3.00
1.06
1.07
2.88
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


156.77
139.32
137.77
129.36
126.05
55.26
46.52
40.16
21.65
20.77
13C NMR GF-6-53F IN CD2Cl2
O
HN
NH
Me
2c
13C NMR (100 MHz, CD2Cl2)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


1H NMR GF-6-53H IN CDCl3
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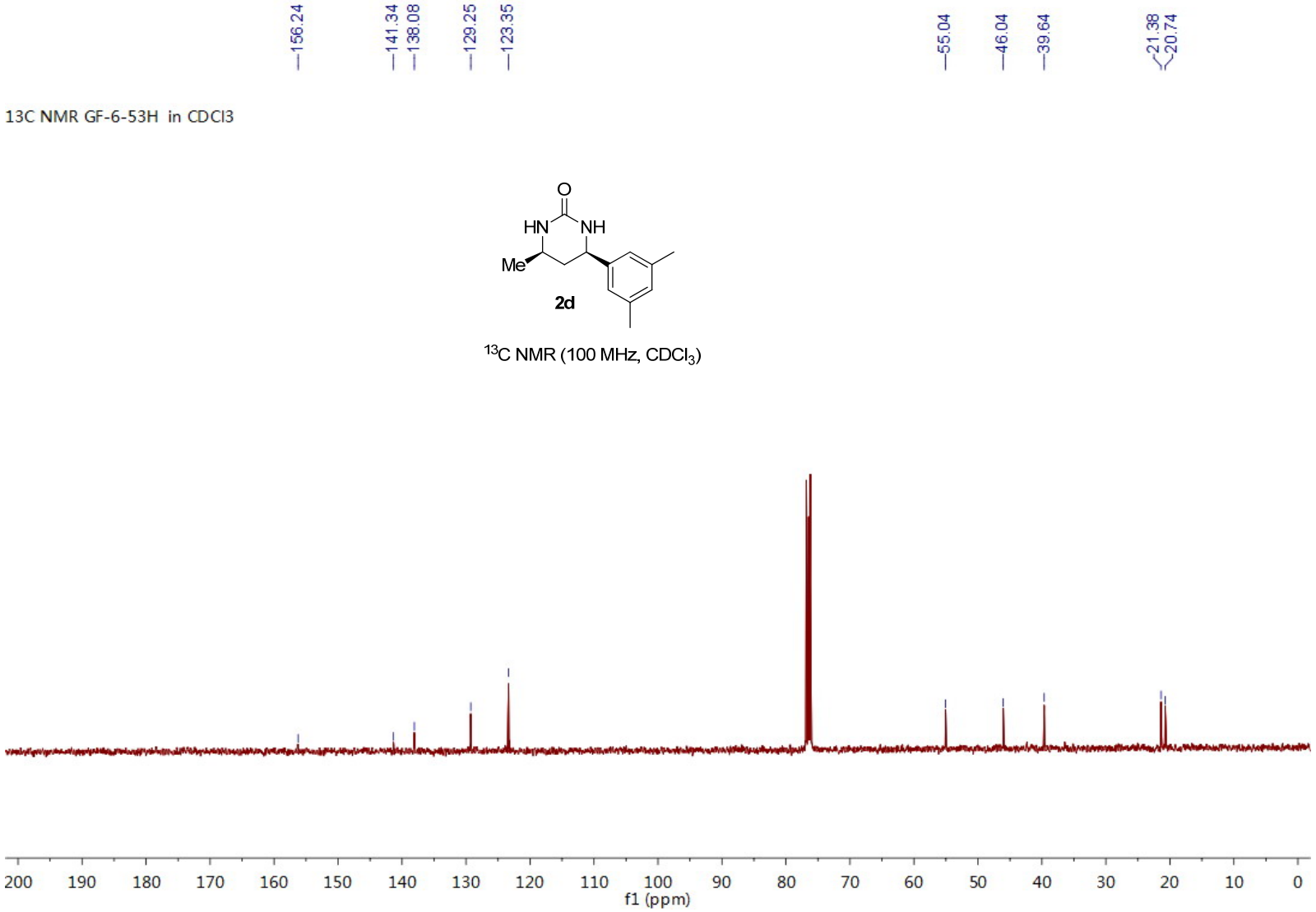
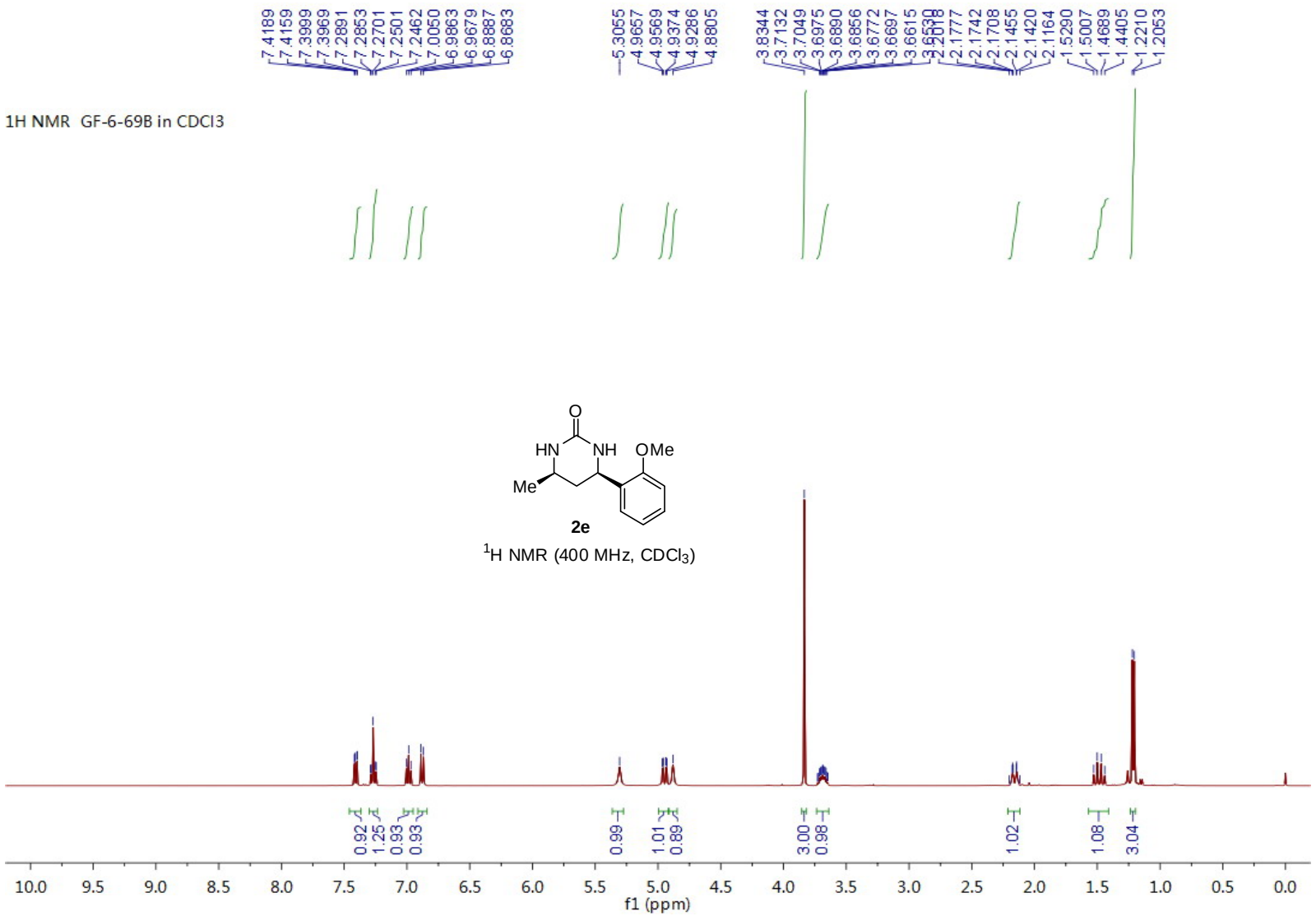
6.9197
6.9032
4.7221
4.6950
4.4649
4.4559
4.4361
4.4271
3.6929
3.6847
3.6773
3.6652
3.6568
3.6494
3.6412
3.6255
2.3107
2.0528
2.0200
1.6244
1.5958
1.5634
1.5347
1.2166
1.2009
O
HN
NH
Me
2d
1H NMR (400 MHz, CDCl3)
2.95
1.83
0.99
0.97
6.00
0.96
1.04
2.93
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


156.24
141.34
138.08
129.25
123.35
55.04
46.04
39.64
21.38
20.74
13C NMR GF-6-53H in CDCl3
O
HN
NH
Me
2d
13C NMR (100 MHz, CDCl3)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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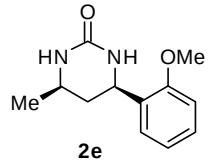
7.4159
7.3999
7.3969
7.2891
7.2853
7.2701
7.2501
7.2462
7.0050
6.9863
6.9679
6.8887
6.8683
5.3055
4.9657
4.9569
4.9374
4.9286
4.8805
3.8344
3.7132
3.7049
3.6975
3.6890
3.6856
3.6772
3.6697
3.6615
2.2018
2.1777
2.1742
2.1708
2.1455
2.1420
2.1164
1.5290
1.5007
1.4689
1.4405
1.2210
1.2053
HN
NH
OMe
Me
2e
1H NMR (400 MHz, CDCl3)
0.92
1.25
0.93
0.93
0.99
1.01
0.89
3.00
0.98
1.02
1.08
3.04
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

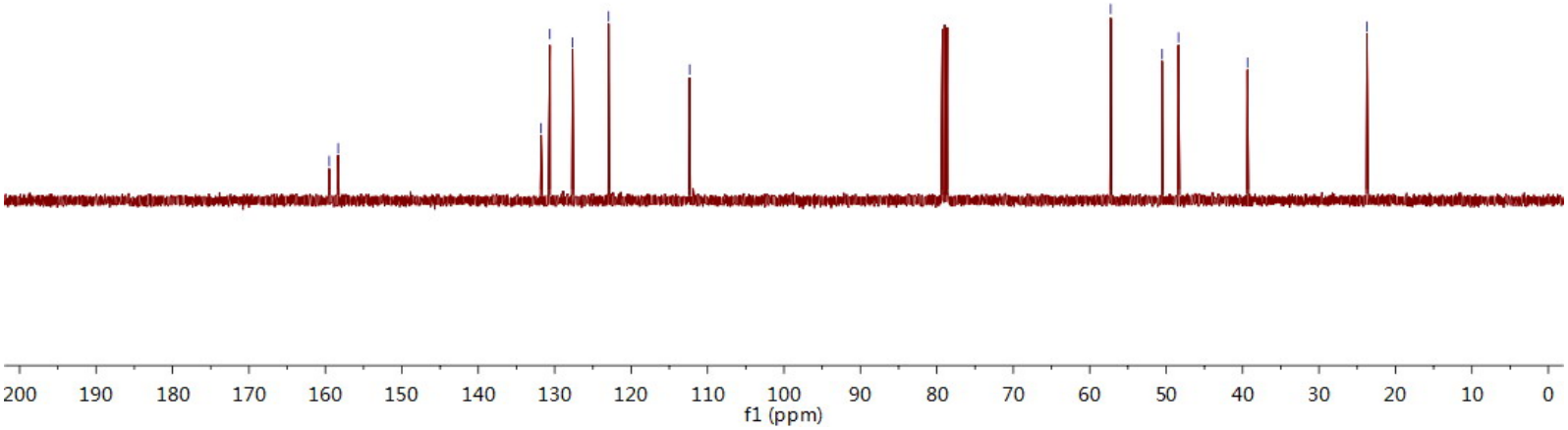
159.49
158.33
131.77
130.63
127.65
122.94
112.35
57.25
50.52
48.38
39.35
23.73

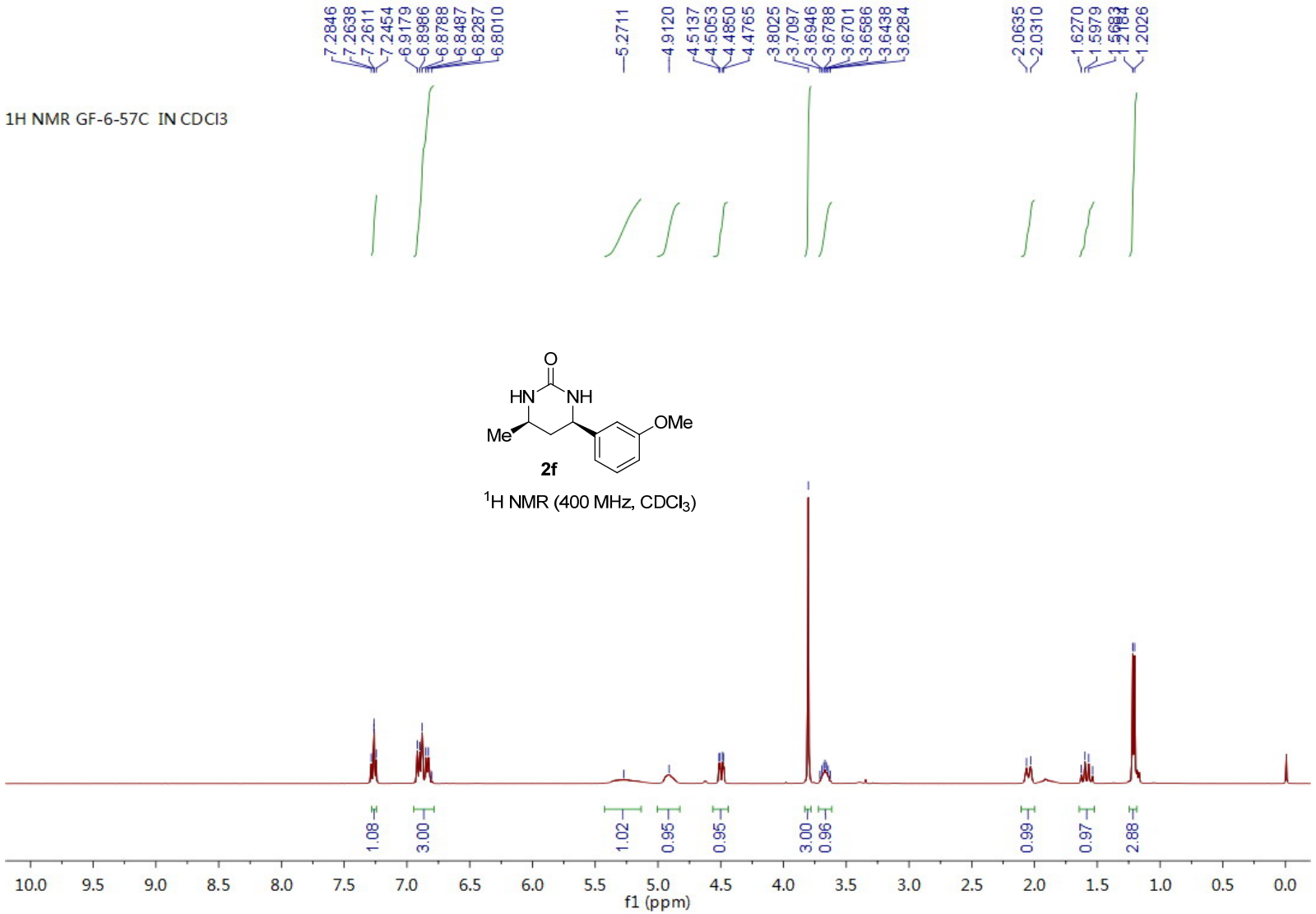
13C NMR GF-6-69B in CDCl3



2e

^{13}C NMR (100 MHz, $CDCl_3$)

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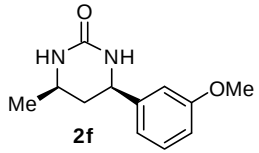
7.2638
7.2611
7.2454
6.9179
6.8986
6.8788
6.8487
6.8287
6.8010
5.2711
4.9120
4.5137
4.5053
4.4850
4.4765
3.8025
3.7097
3.6946
3.6788
3.6701
3.6586
3.6438
3.6284
2.0635
2.0310
1.6270
1.5979
1.2026
O
HN
NH
Me
OMe
2f
1H NMR (400 MHz, CDCl3)
1.08
3.00
1.02
0.95
0.95
3.00
0.96
0.99
0.97
2.88
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

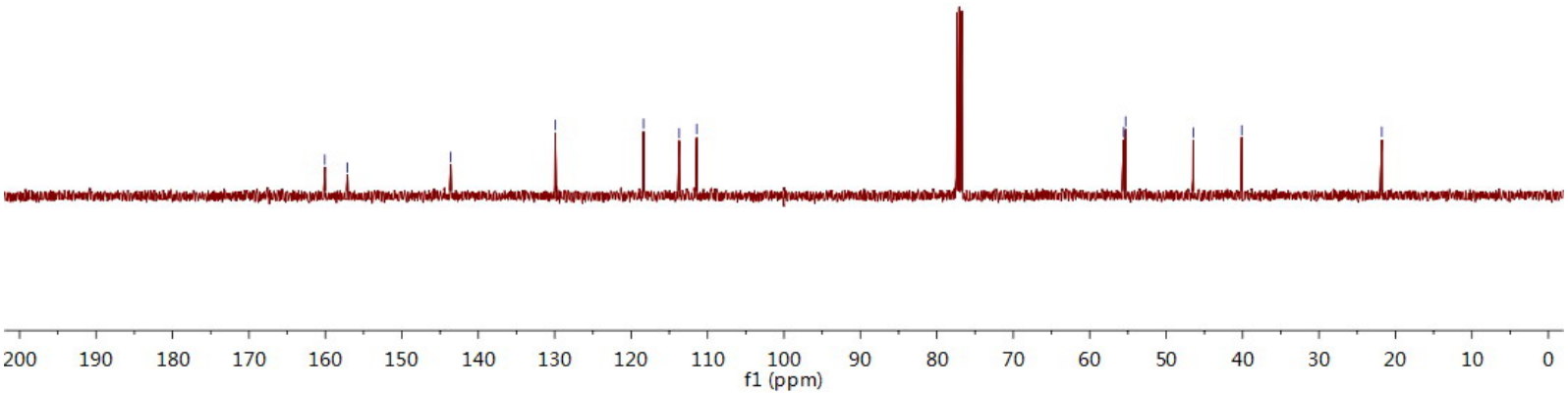
160.07
157.11
143.59
129.94
118.38
113.71
111.41
55.55
55.30
46.46
40.11
21.79

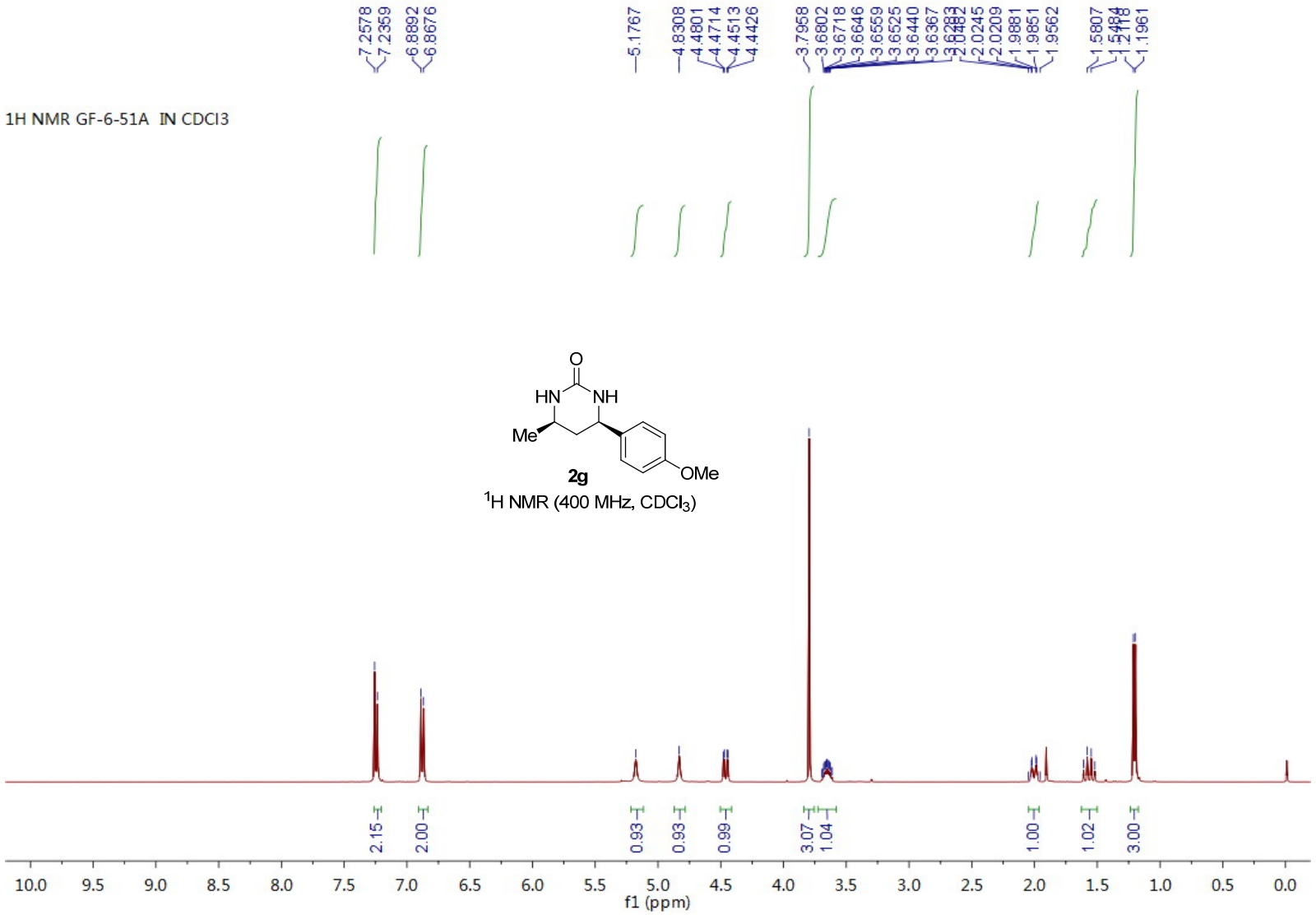
13C NMR GF-6-57C IN CDCl3



2f

^{13}C NMR (100 MHz, $CDCl_3$)

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6.8676
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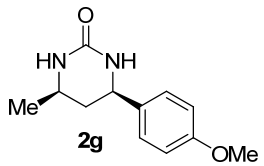
4.4801
4.4714
4.4513
4.4426
3.7958
3.6802
3.6718
3.6646
3.6559
3.6525
3.6440
3.6367
2.0245
2.0209
1.9881
1.9851
1.9562
1.5807
1.1961
O
HN
NH
Me
OMe
2g
1H NMR (400 MHz, CDCl3)
2.15
2.00
0.93
0.93
0.99
3.07
1.04
1.00
1.02
3.00
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

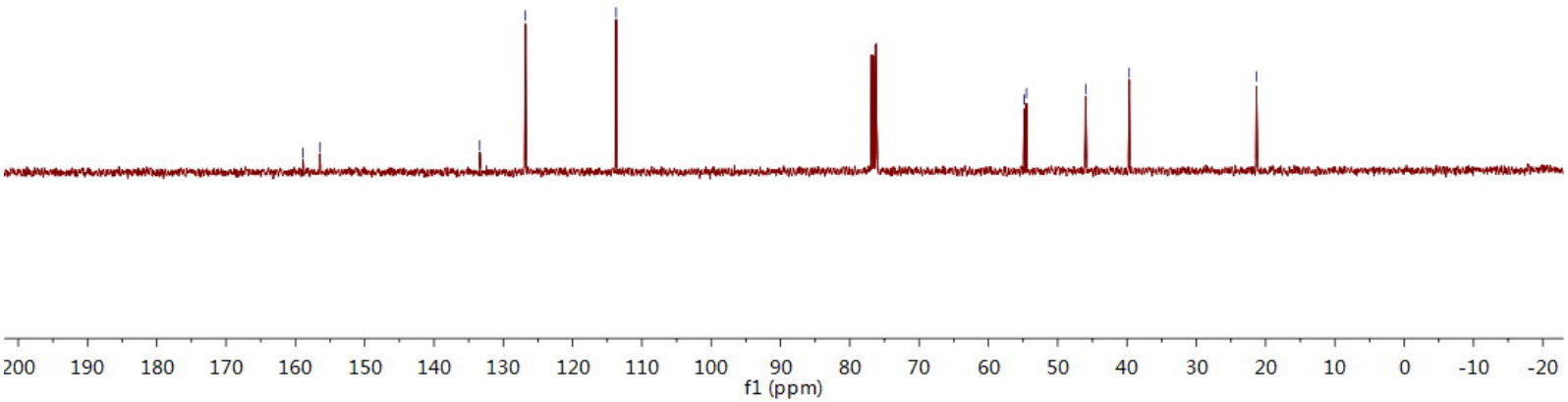
158.91
156.48
133.41
126.81
113.72
54.81
54.52
45.97
39.69
21.33

13C NMR GF-6-51A in CDCl3

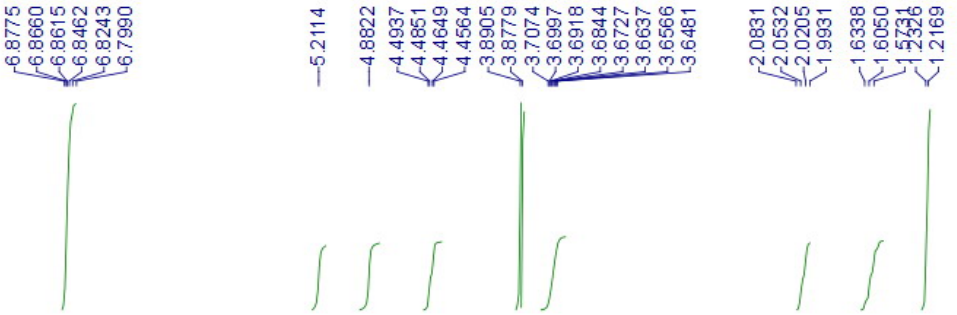


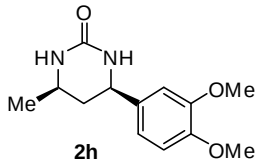
2g

^{13}C NMR (100 MHz, $CDCl_3$)



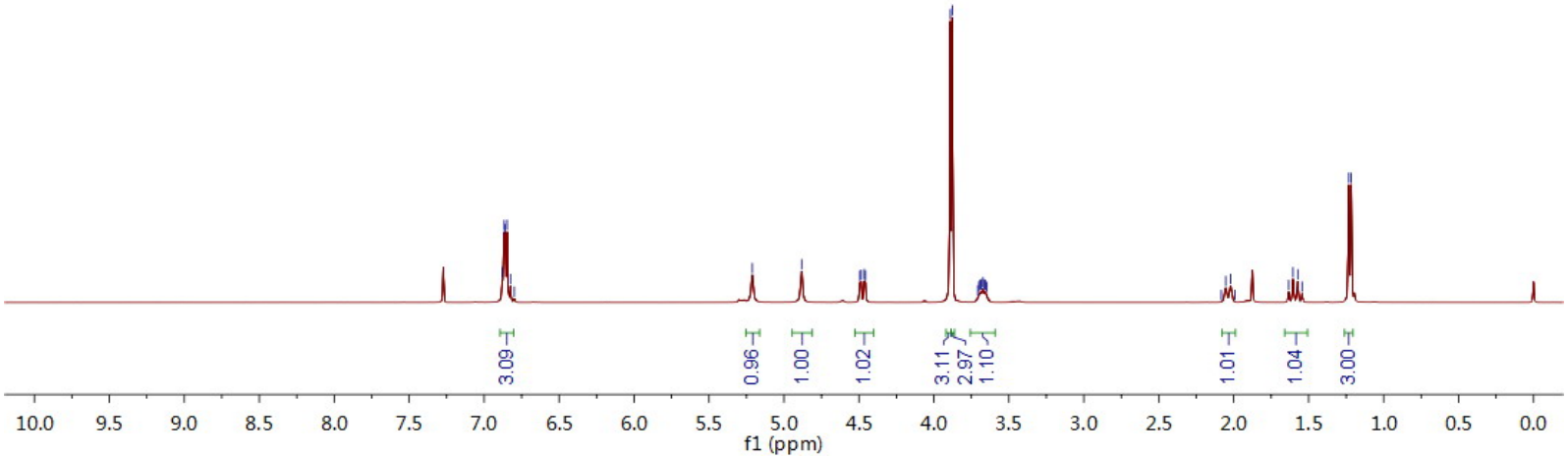
1H NMR GF-6-71G IN CDCl3





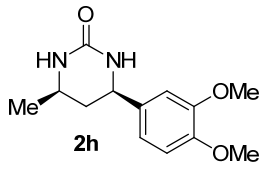
2h

^{1}H NMR (400 MHz, $CDCl_3$)



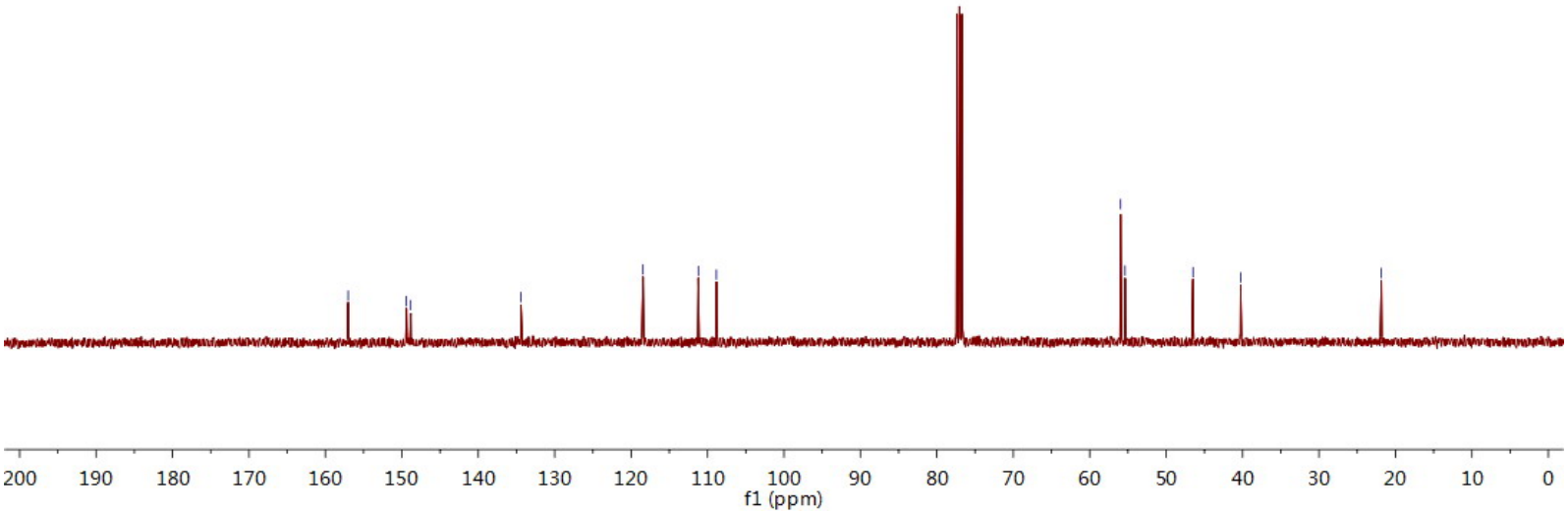
157.02
149.40
148.84
134.42
118.44
111.20
108.84
55.96
55.38
46.48
40.26
21.84

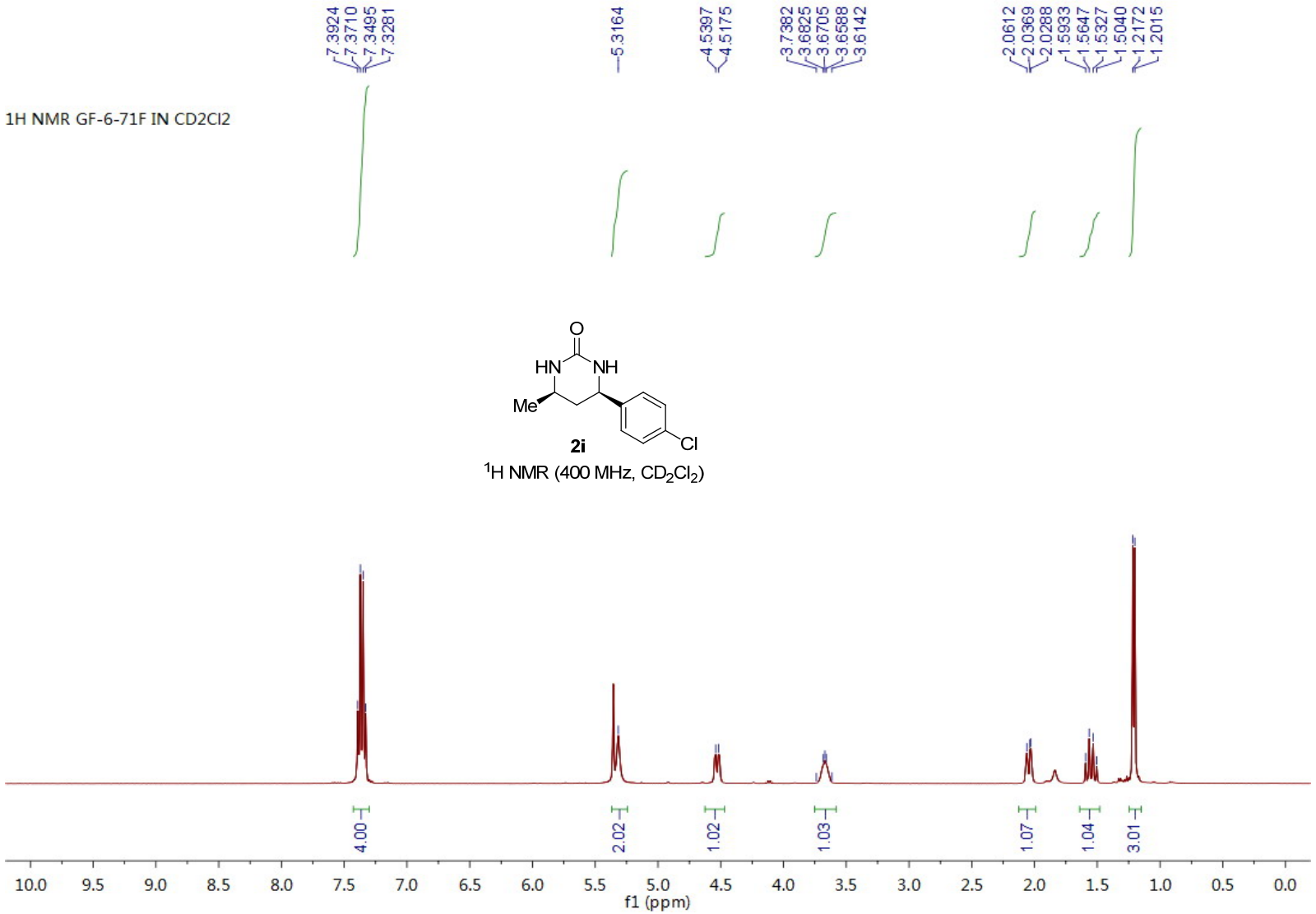
13C NMR GF-6-71G IN CDCl3



2h

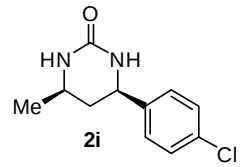
^{13}C NMR (100 MHz, $CDCl_3$)




1H NMR GF-6-71F IN CD2Cl2
7.3924
7.3710
7.3495
7.3281
5.3164
4.5397
4.5175
3.7382
3.6825
3.6705
3.6588
3.6142
2.0612
2.0369
2.0288
1.5933
1.5647
1.5327
1.5040
1.2172
1.2015
O
HN
NH
Me
Cl
2i
1H NMR (400 MHz, CD2Cl2)
4.00
2.02
1.02
1.03
1.07
1.04
3.01
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

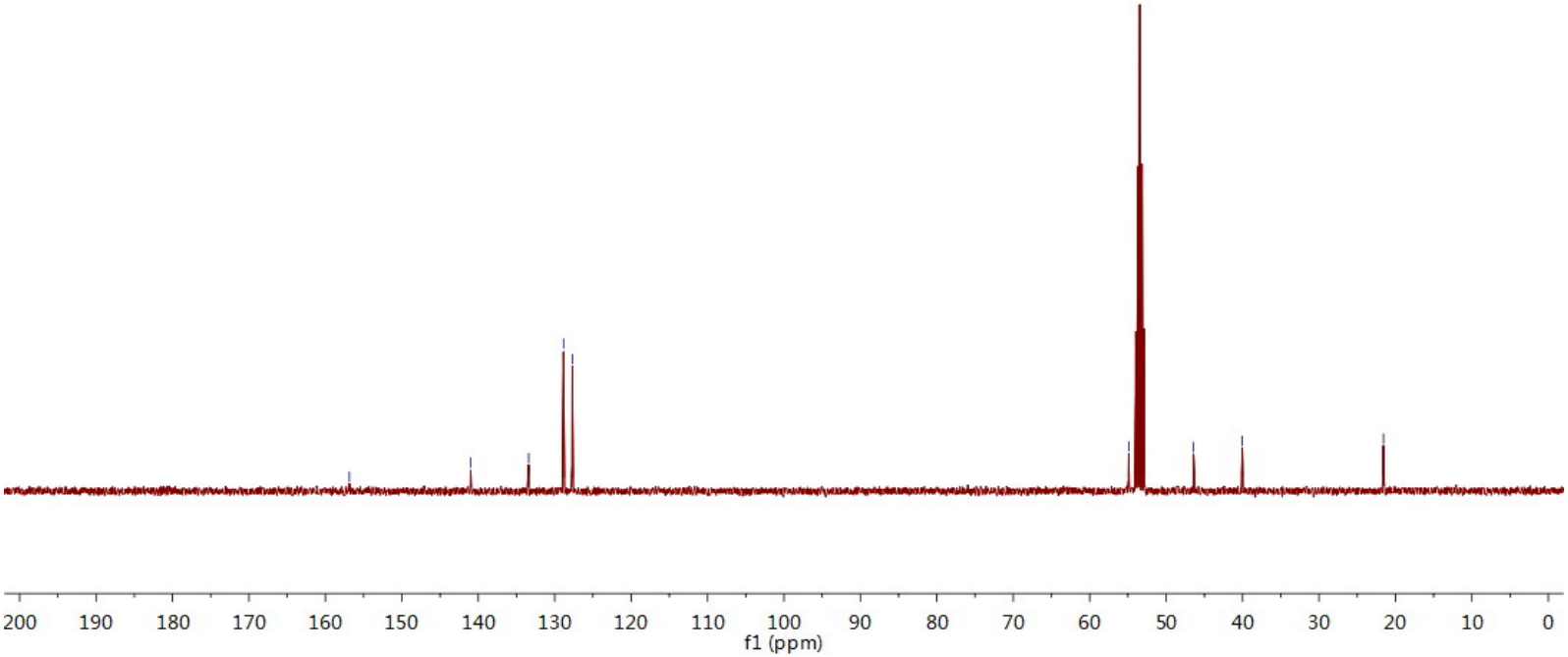
156.87
140.99
133.39
128.84
127.69
54.90
46.41
40.04
21.56

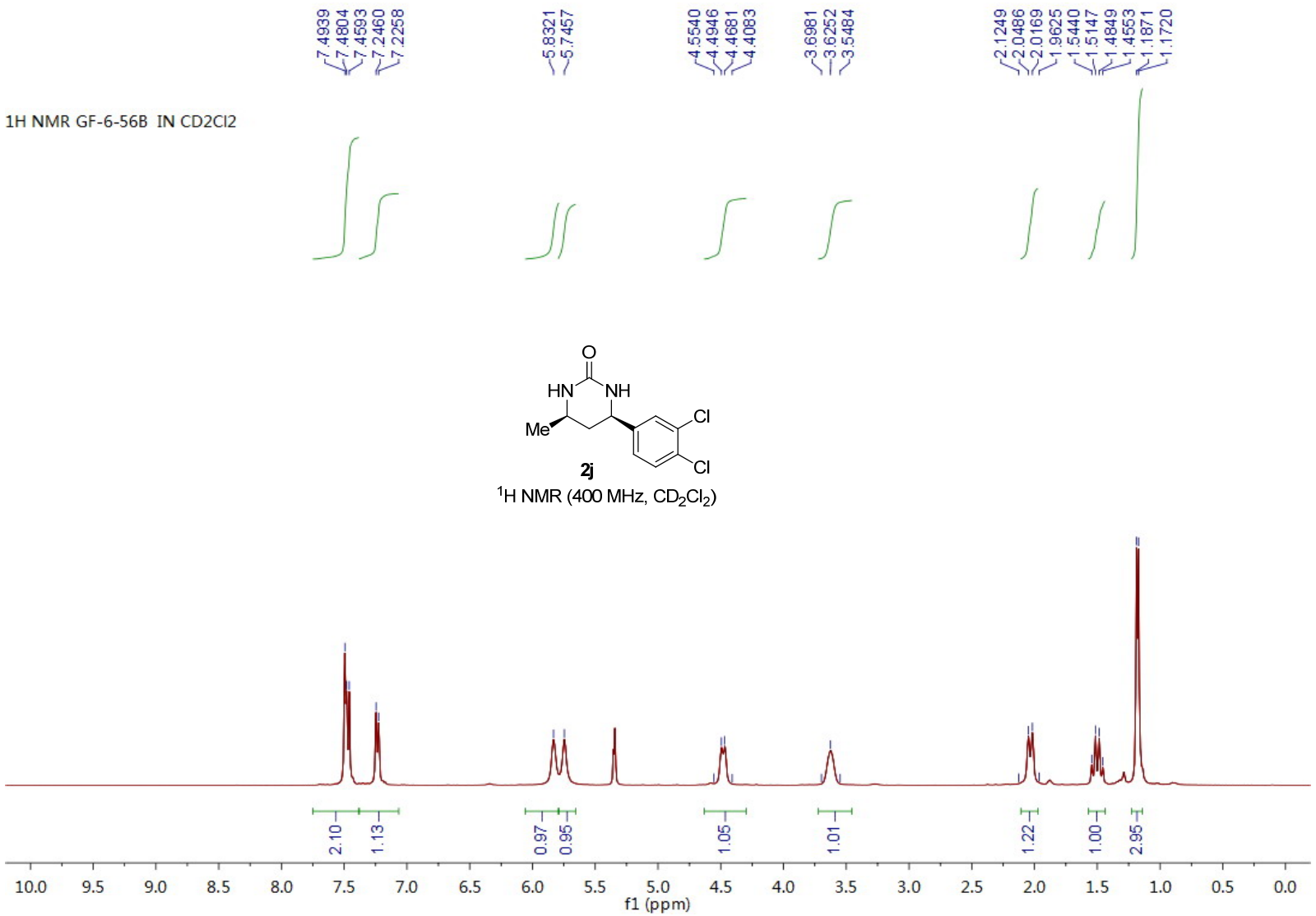
13C NMR GF-6-71F IN CD2Cl2



2i

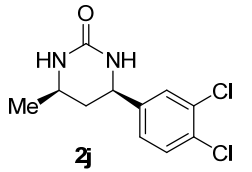
^{13}C NMR (100 MHz, CD_2Cl_2)




1H NMR GF-6-56B IN CD2Cl2
7.4939
7.4804
7.4593
7.2460
7.2258
5.8321
5.7457
4.5540
4.4946
4.4681
4.4083
3.6981
3.6252
3.5484
2.1249
2.0486
2.0169
1.9625
1.5440
1.5147
1.4849
1.4553
1.1871
1.1720
O
HN
NH
Me
Cl
Cl
2j
1H NMR (400 MHz, CD2Cl2)
2.10
1.13
0.97
0.95
1.05
1.01
1.22
1.00
2.95
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

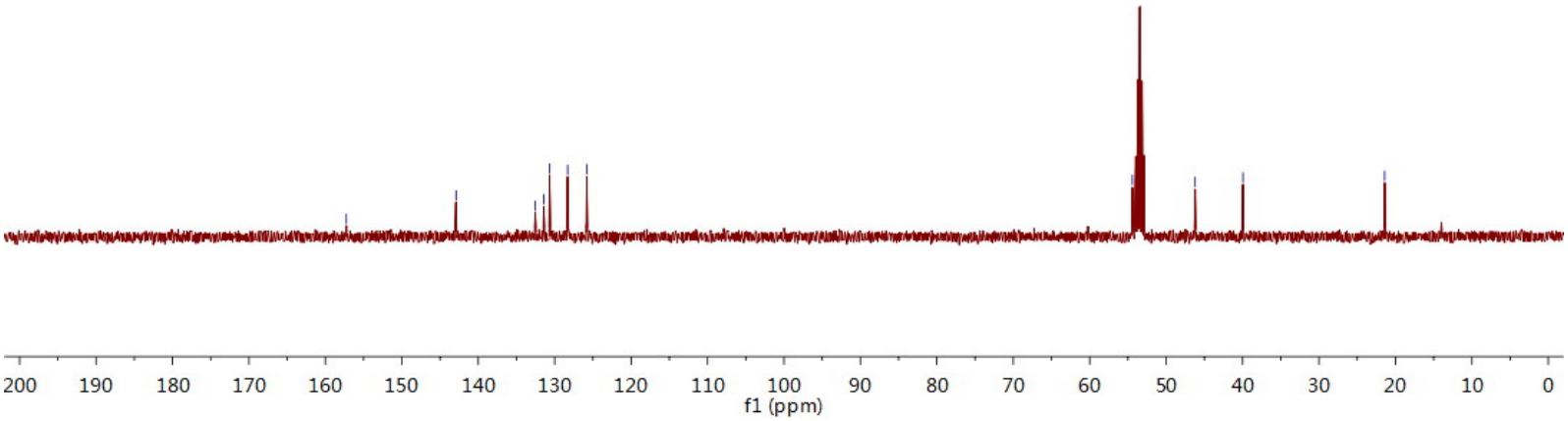
157.26
142.91
132.55
131.44
130.67
128.31
125.81
54.43
46.22
39.94
21.41

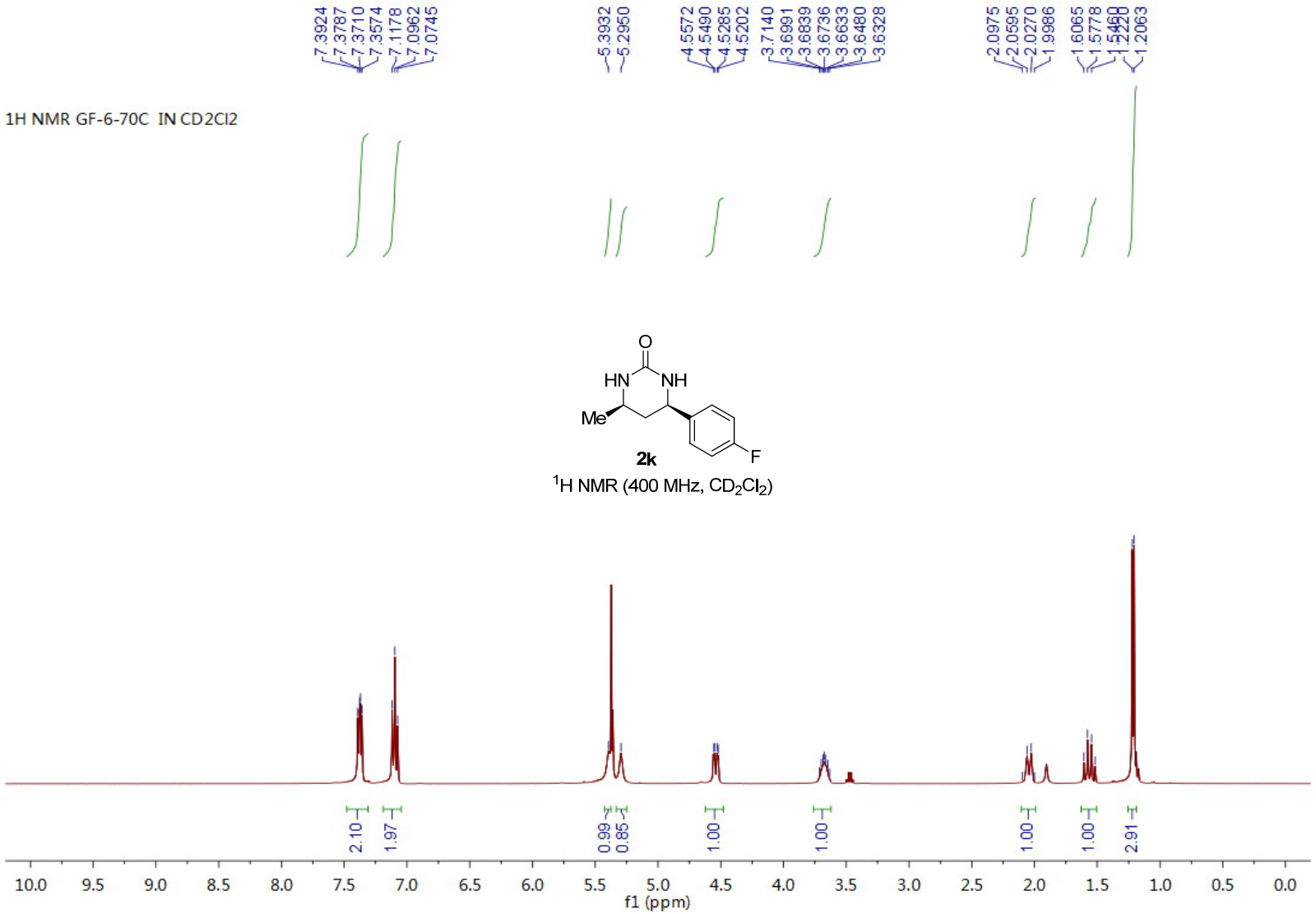
13C NMR GF-6-56B IN CD2Cl2

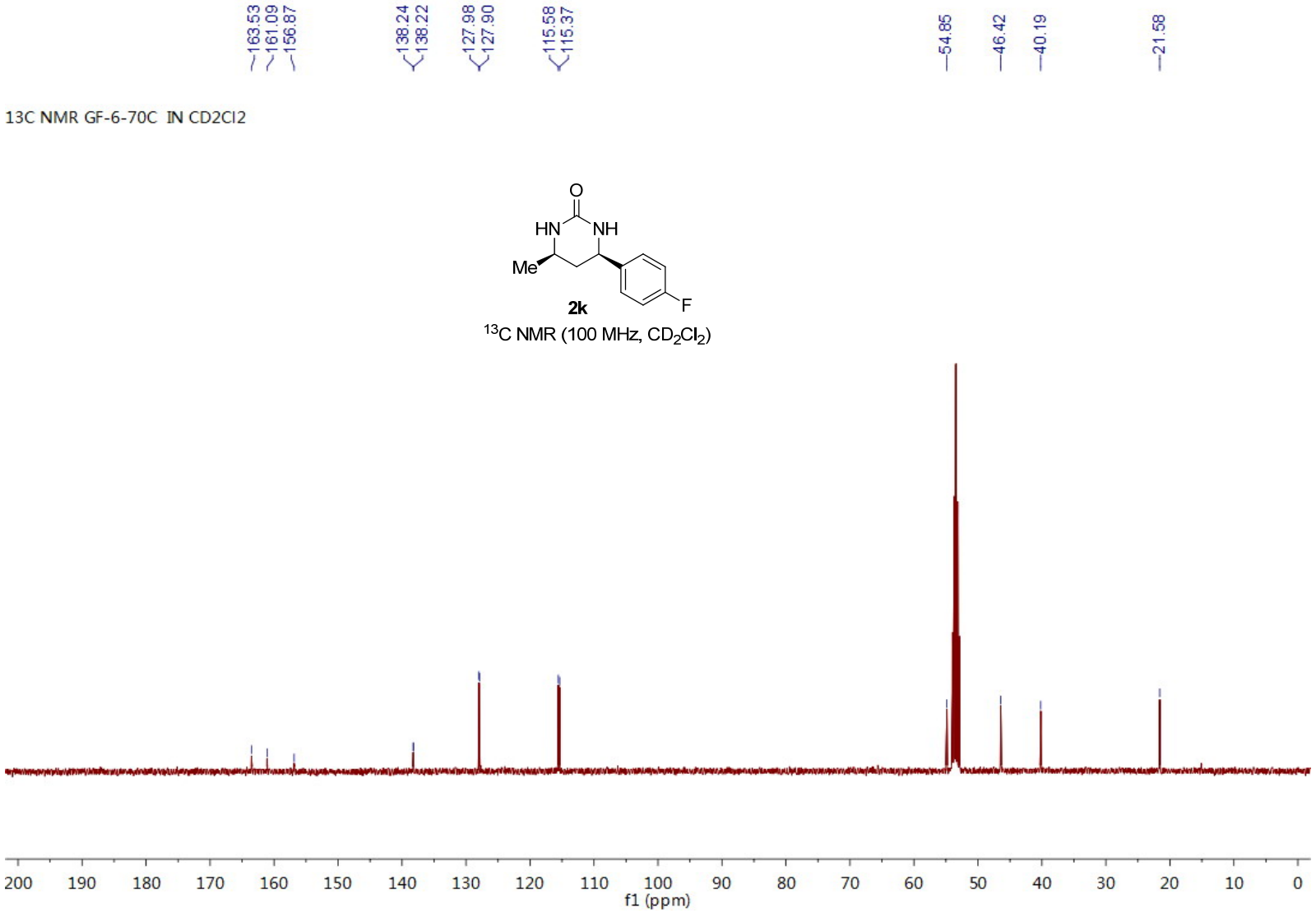


2j

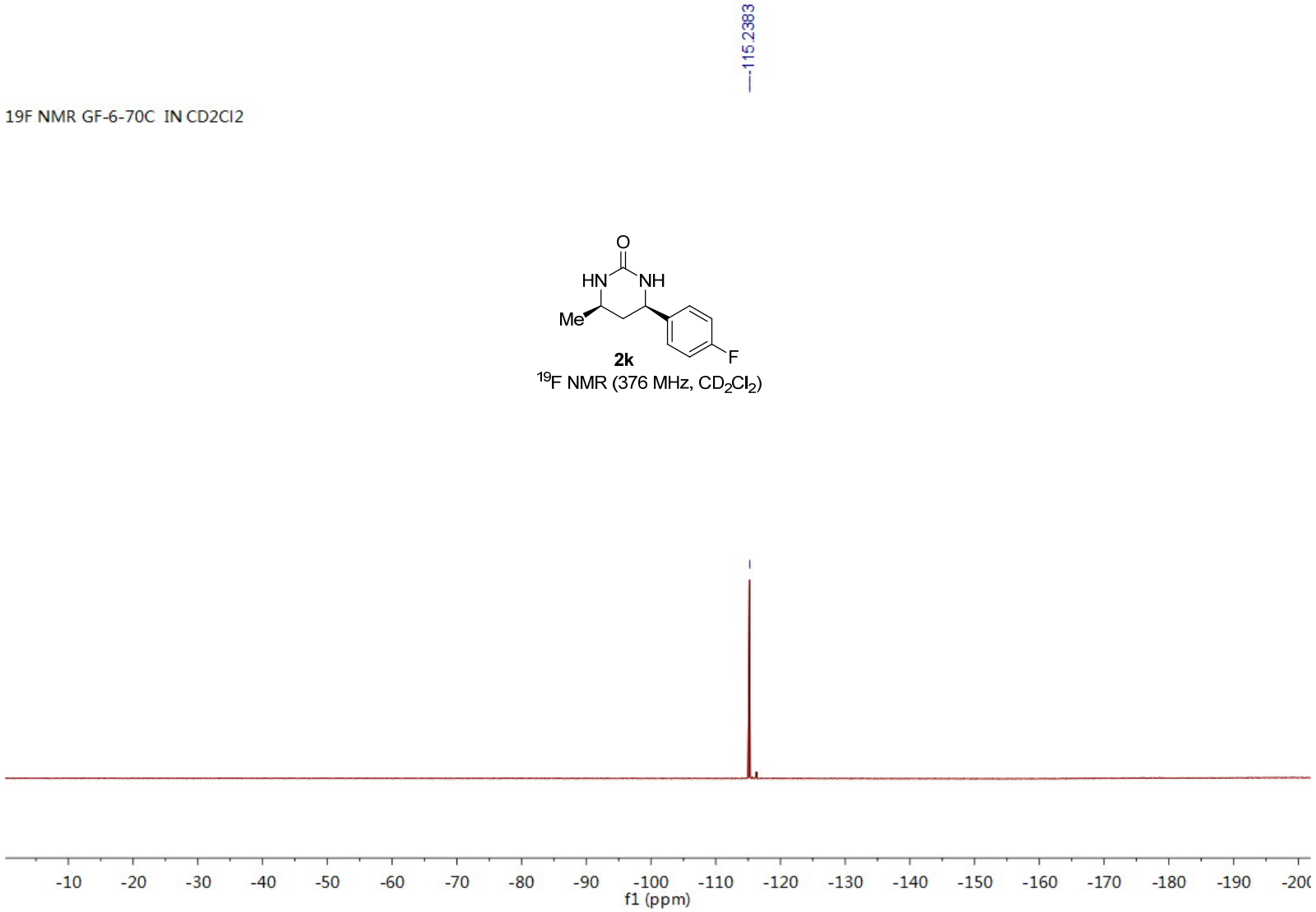
^{13}C NMR (100 MHz, CD_2Cl_2)




1H NMR GF-6-70C IN CD2Cl2
7.3924
7.3787
7.3710
7.3574
7.1178
7.0962
7.0745
5.3932
5.2950
4.5572
4.5490
4.5285
4.5202
3.7140
3.6991
3.6839
3.6736
3.6633
3.6480
3.6328
2.0975
2.0595
2.0270
1.9986
1.6065
1.5778
1.2063
O
HN
NH
Me
F
2k
1H NMR (400 MHz, CD2Cl2)
2.10
1.97
0.99
0.85
1.00
1.00
1.00
1.00
2.91
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

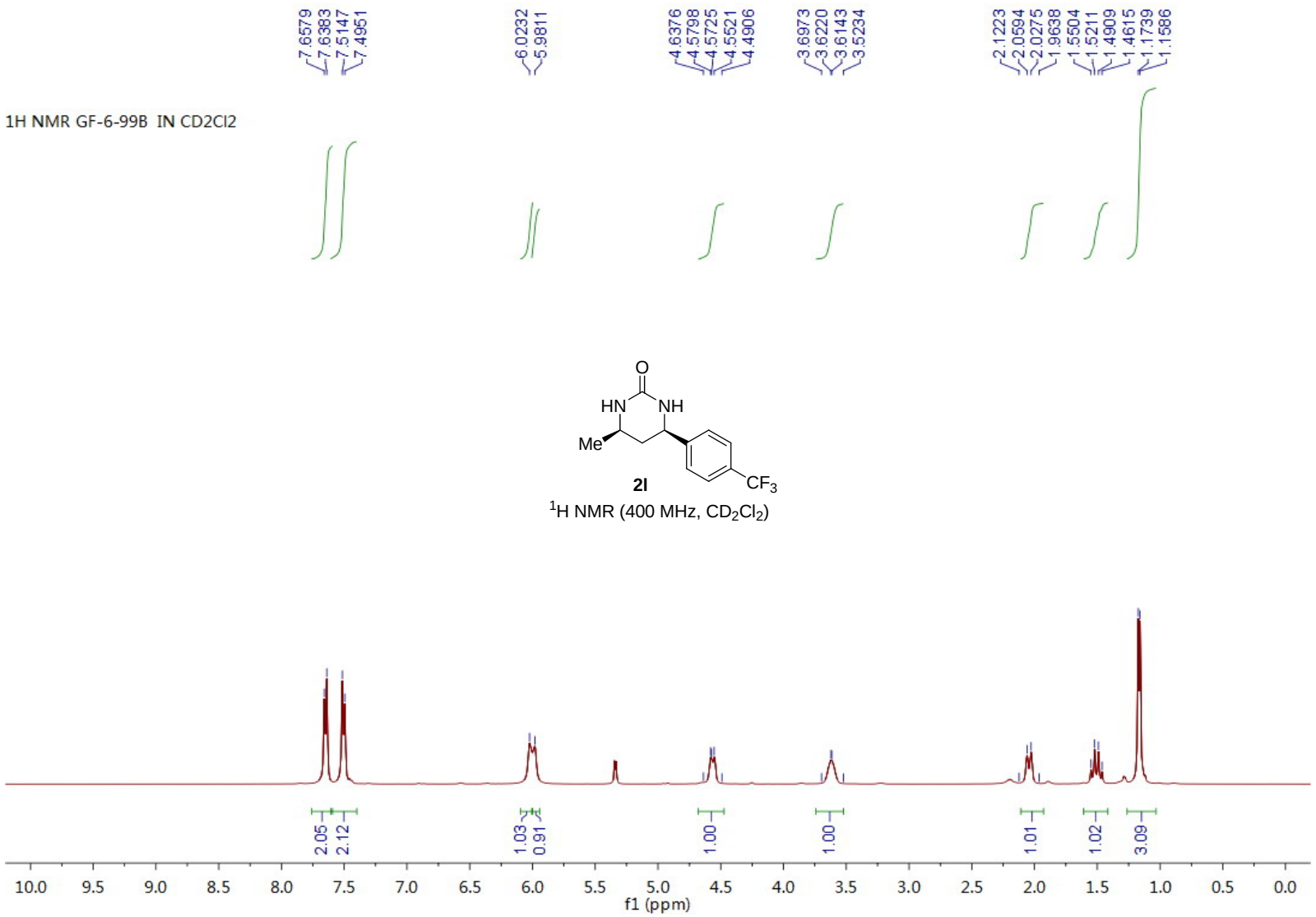

163.53
161.09
156.87
138.24
138.22
127.98
127.90
115.58
115.37
54.85
46.42
40.19
21.58
13C NMR GF-6-70C IN CD2Cl2
O
HN
NH
Me
F
2k
13C NMR (100 MHz, CD2Cl2)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

19F NMR GF-6-70C IN CD2Cl2



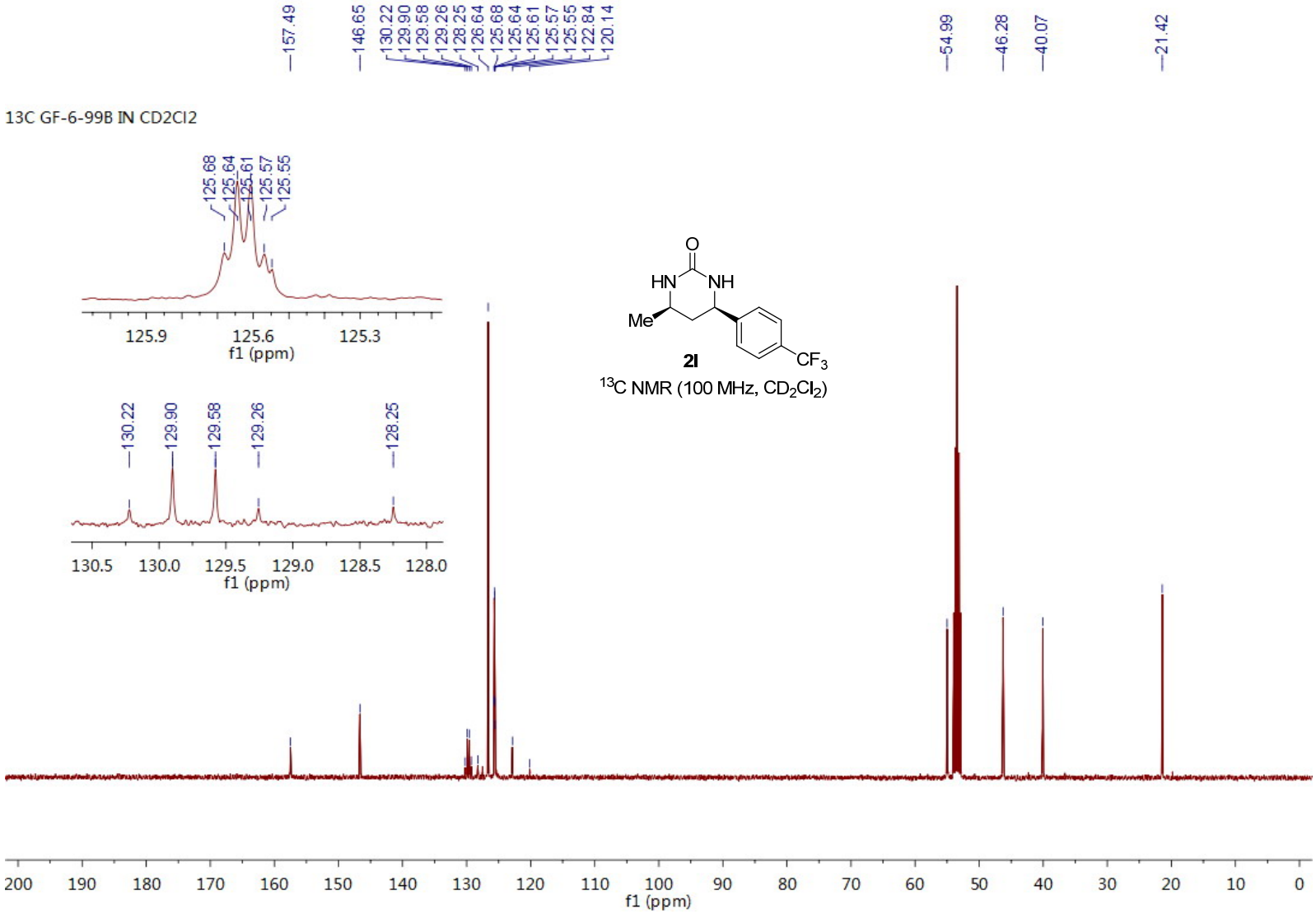
2k

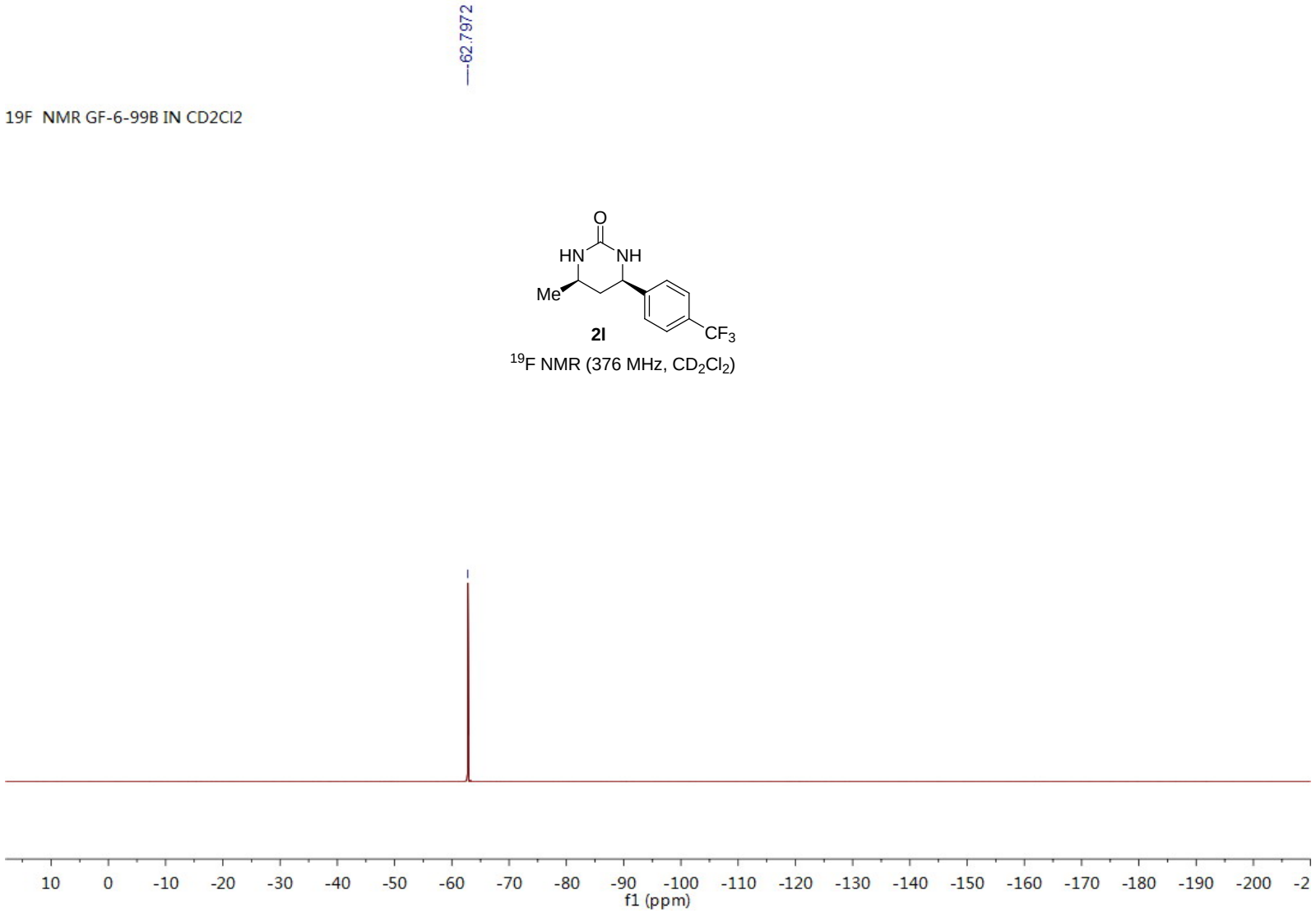
^{19}F NMR (376 MHz, CD_2Cl_2)



2l

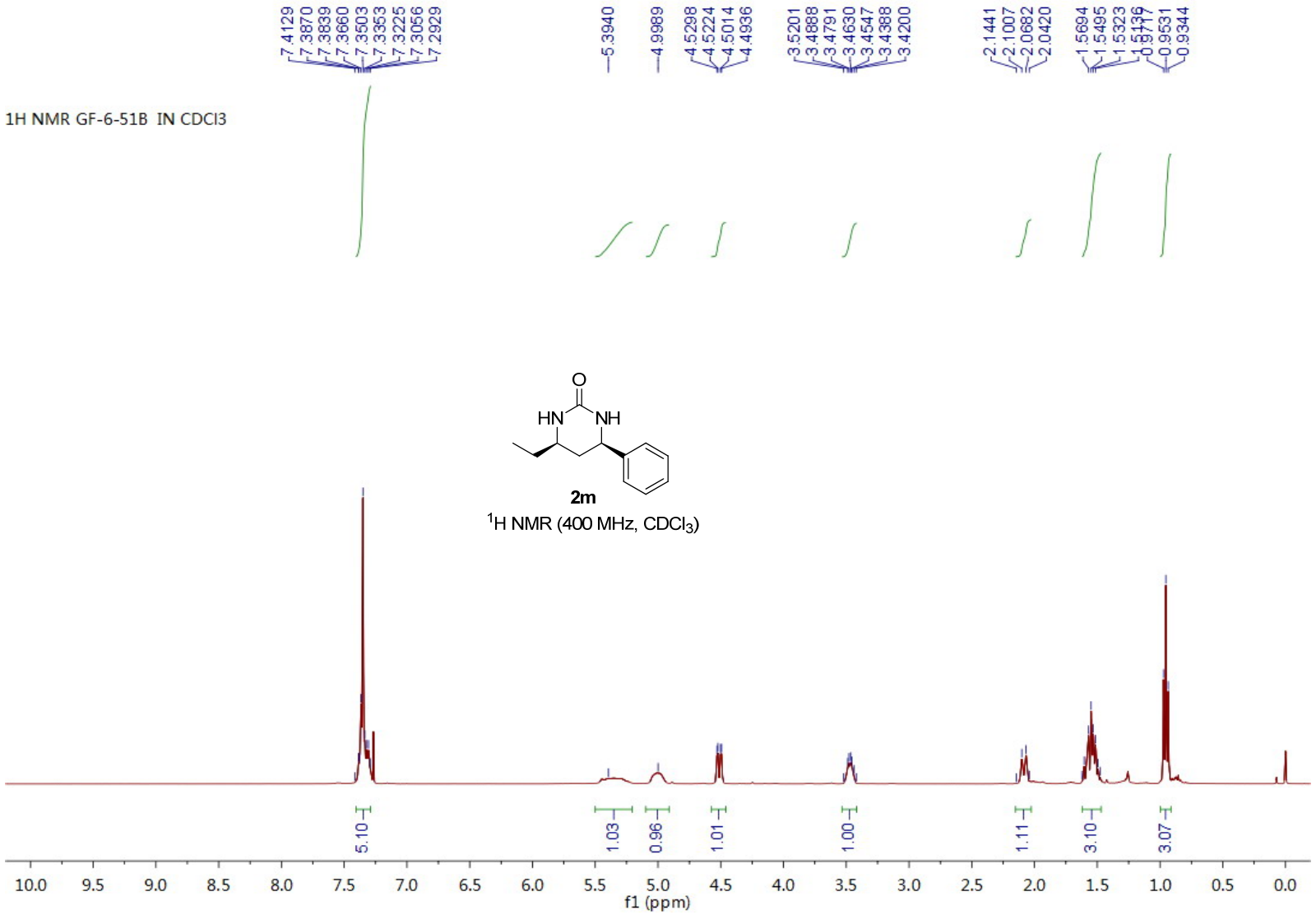
^{1}H NMR (400 MHz, CD_2Cl_2)

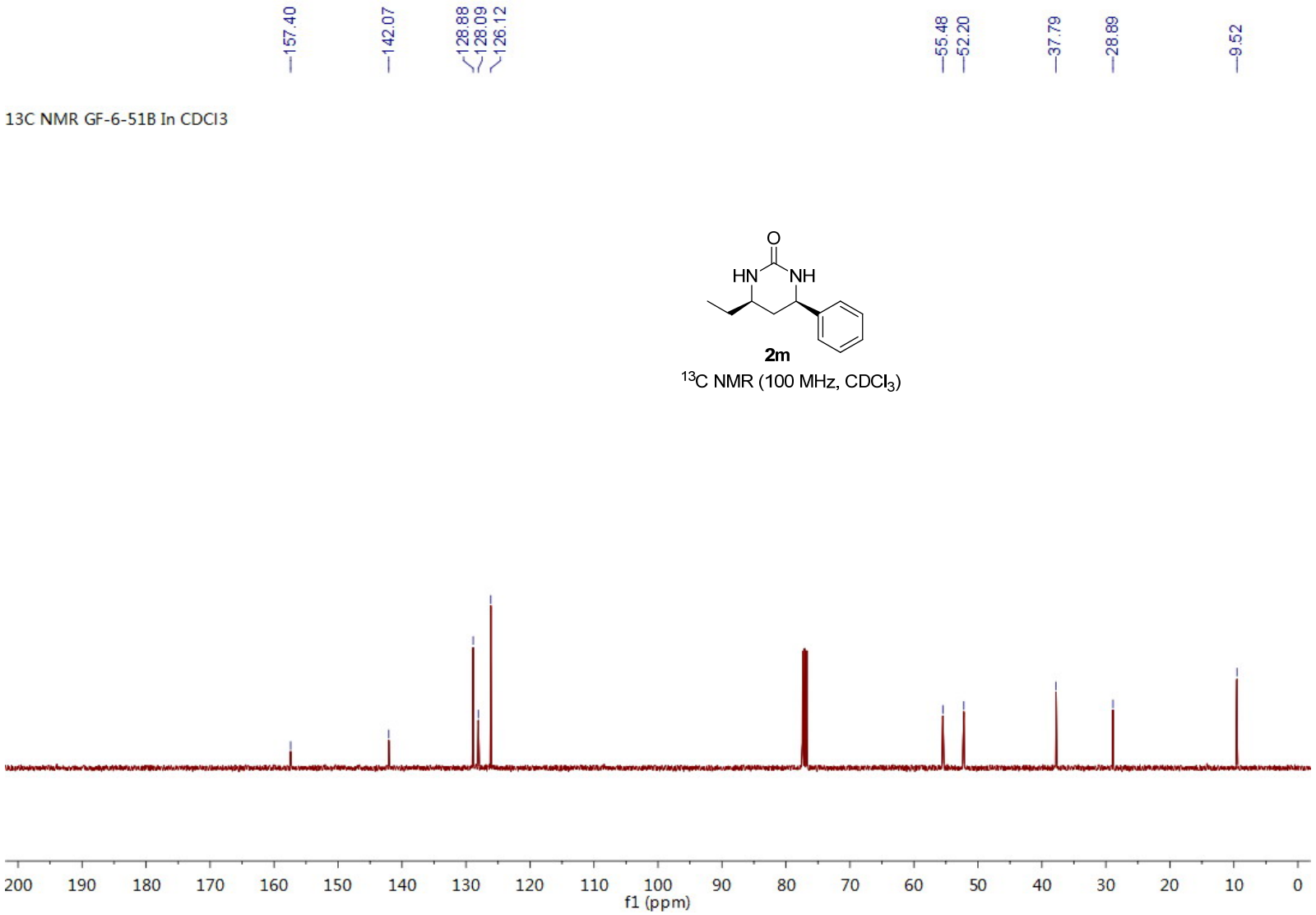

157.49
146.65
130.22
129.90
129.58
129.26
128.25
126.64
125.68
125.64
125.61
125.57
125.55
122.84
120.14
54.99
46.28
40.07
21.42
13C GF-6-99B IN CD2Cl2
125.68
125.64
125.61
125.57
125.55
125.9
125.6
125.3
f1 (ppm)
130.22
129.90
129.58
129.26
128.25
130.5
130.0
129.5
129.0
128.5
128.0
f1 (ppm)
O
HN
NH
Me
CF3
2l
13C NMR (100 MHz, CD2Cl2)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

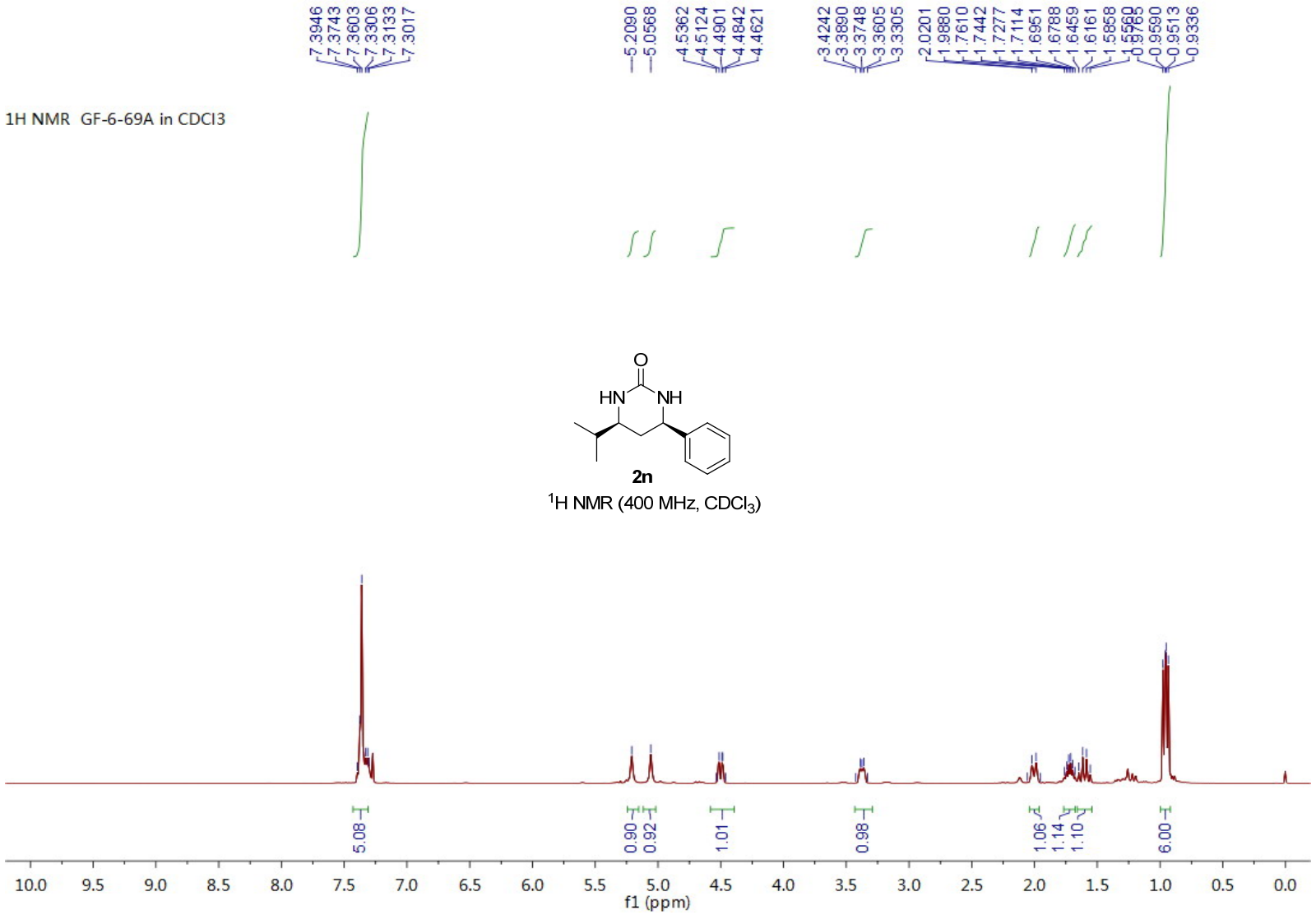


2l

^{19}F NMR (376 MHz, CD_2Cl_2)

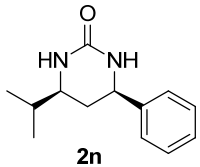

1H NMR GF-6-51B IN CDCl3
7.4129
7.3870
7.3839
7.3660
7.3503
7.3353
7.3225
7.3056
7.2929
5.3940
4.9989
4.5298
4.5224
4.5014
4.4936
3.5201
3.4888
3.4791
3.4630
3.4547
3.4388
3.4200
2.1441
2.1007
2.0682
2.0420
1.5694
1.5495
1.5323
1.5136
0.9717
0.9531
0.9344
HN
NH
O
2m
1H NMR (400 MHz, CDCl3)
5.10
1.03
0.96
1.01
1.00
1.11
3.10
3.07
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


157.40
142.07
128.88
128.09
126.12
55.48
52.20
37.79
28.89
9.52
13C NMR GF-6-51B In CDCl3
O
HN
NH
2m
13C NMR (100 MHz, CDCl3)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


1H NMR GF-6-69A in CDCl3
7.3946
7.3743
7.3603
7.3306
7.3133
7.3017
5.2090
5.0568
4.5362
4.5124
4.4901
4.4842
4.4621
3.4242
3.3890
3.3748
3.3605
3.3305
2.0201
1.9880
1.7610
1.7442
1.7277
1.7114
1.6951
1.6788
1.6459
1.6161
1.5858
1.5560
0.9765
0.9590
0.9513
0.9336
O
HN
NH
2n
1H NMR (400 MHz, CDCl3)
5.08
0.90
0.92
1.01
0.98
1.06
1.14
1.10
6.00
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

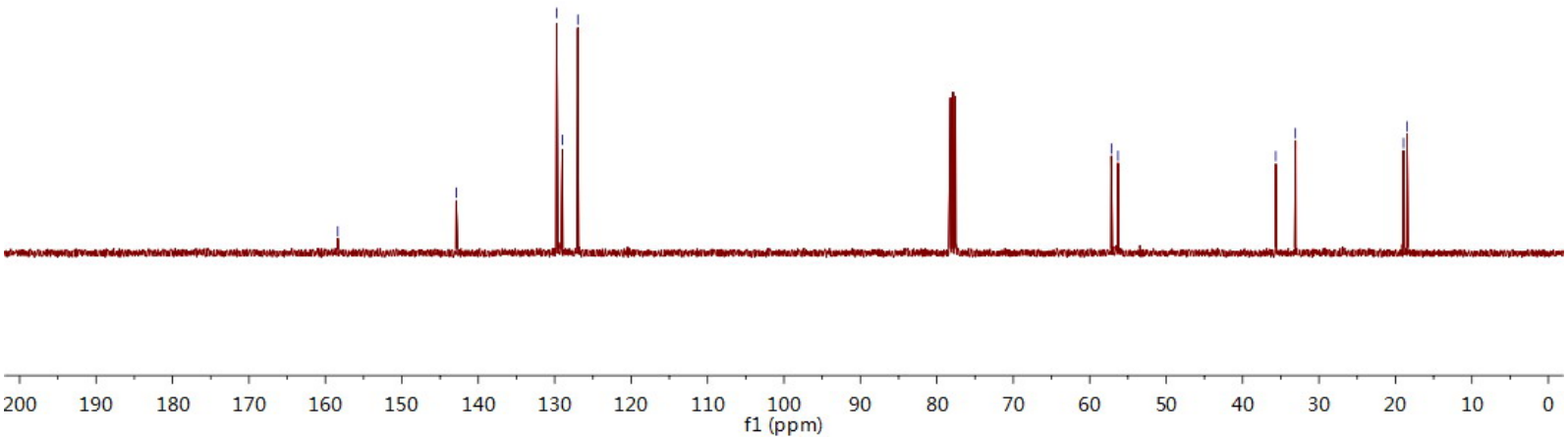
158.38
142.89
129.74
128.99
126.97
57.16
56.30
35.67
33.09
18.95
18.48

13C NMR GF-6-69A CDCl3

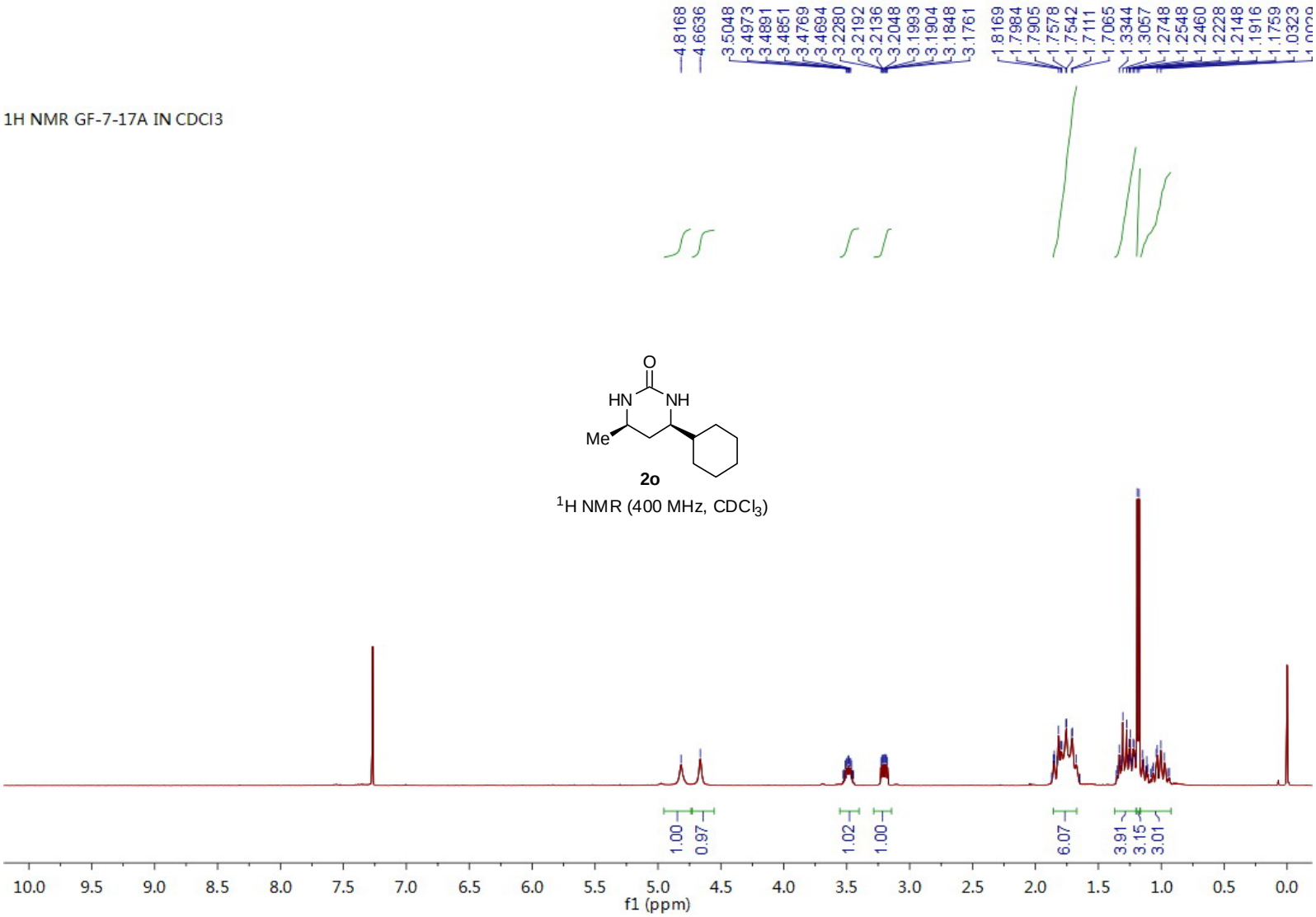


2n

^{13}C NMR (100 MHz, $CDCl_3$)



1H NMR GF-7-17A IN CDCl3



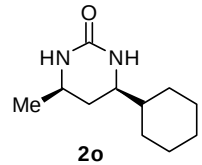
2o

^{1}H NMR (400 MHz, $CDCl_3$)

157.31

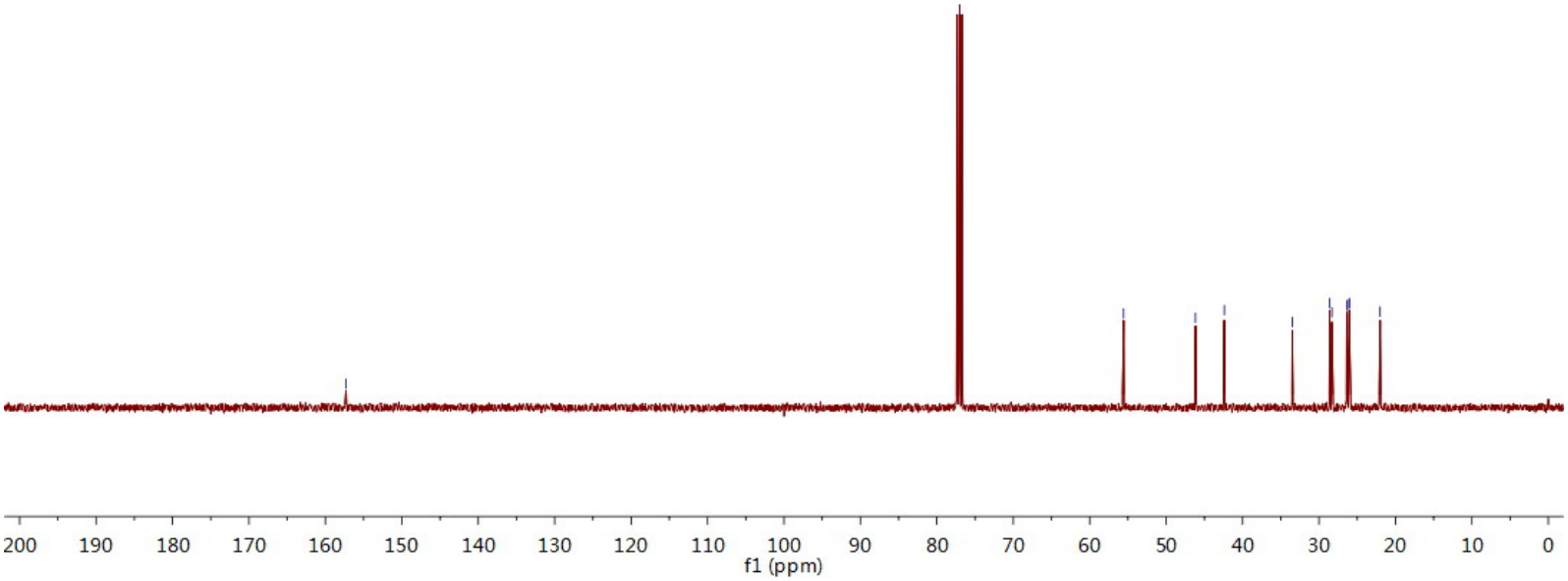
55.58
46.17
42.38
33.50
28.60
28.31
26.38
26.08
26.03
22.01

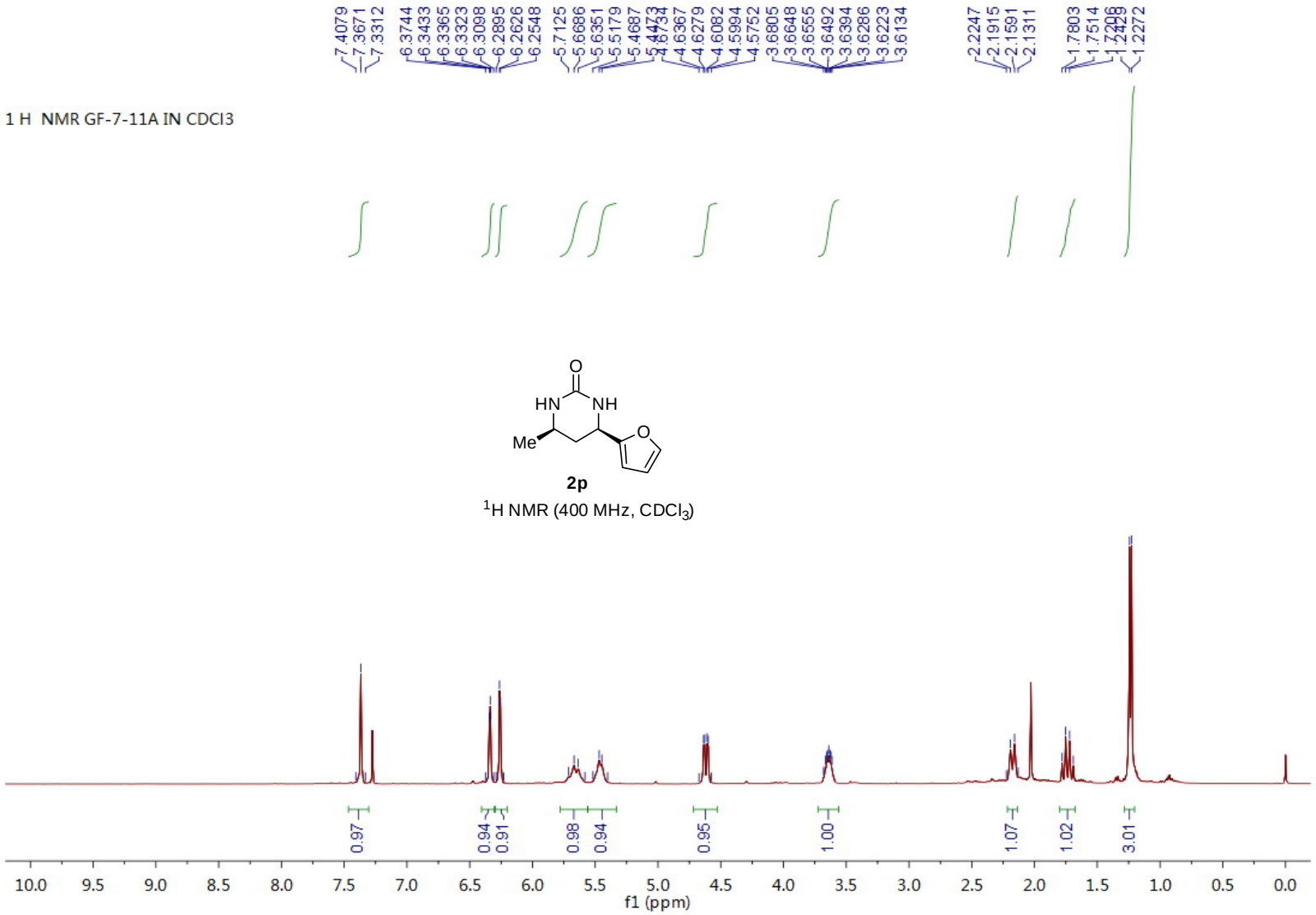
1`3C NMR GF-7-17A IN CDCL3



2o

^{13}C NMR (100 MHz, $CDCl_3$)



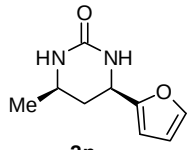


2p

^{1}H NMR (400 MHz, $CDCl_3$)

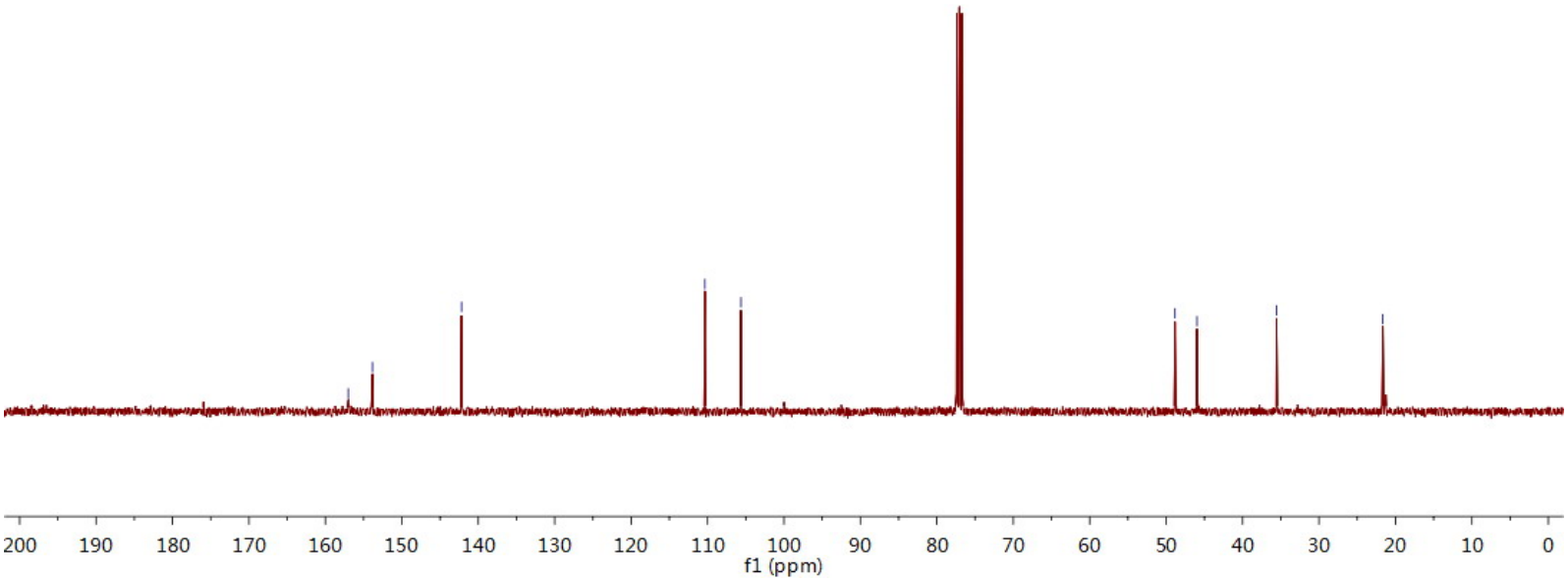
157.01
153.83
142.19
110.35
105.62
48.84
45.96
35.56
21.65

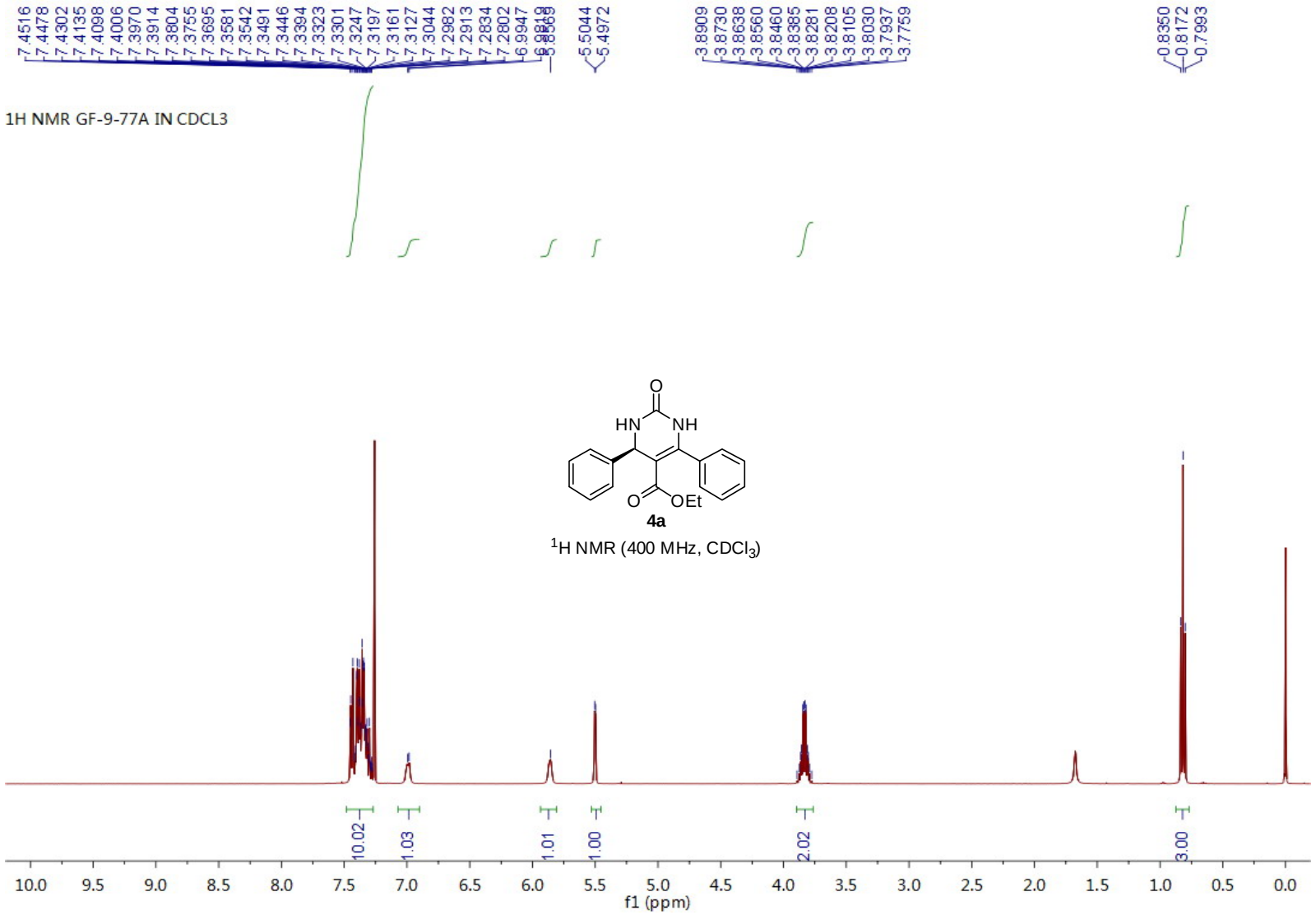
13 C NMR GF-7-11A IN CDCl3

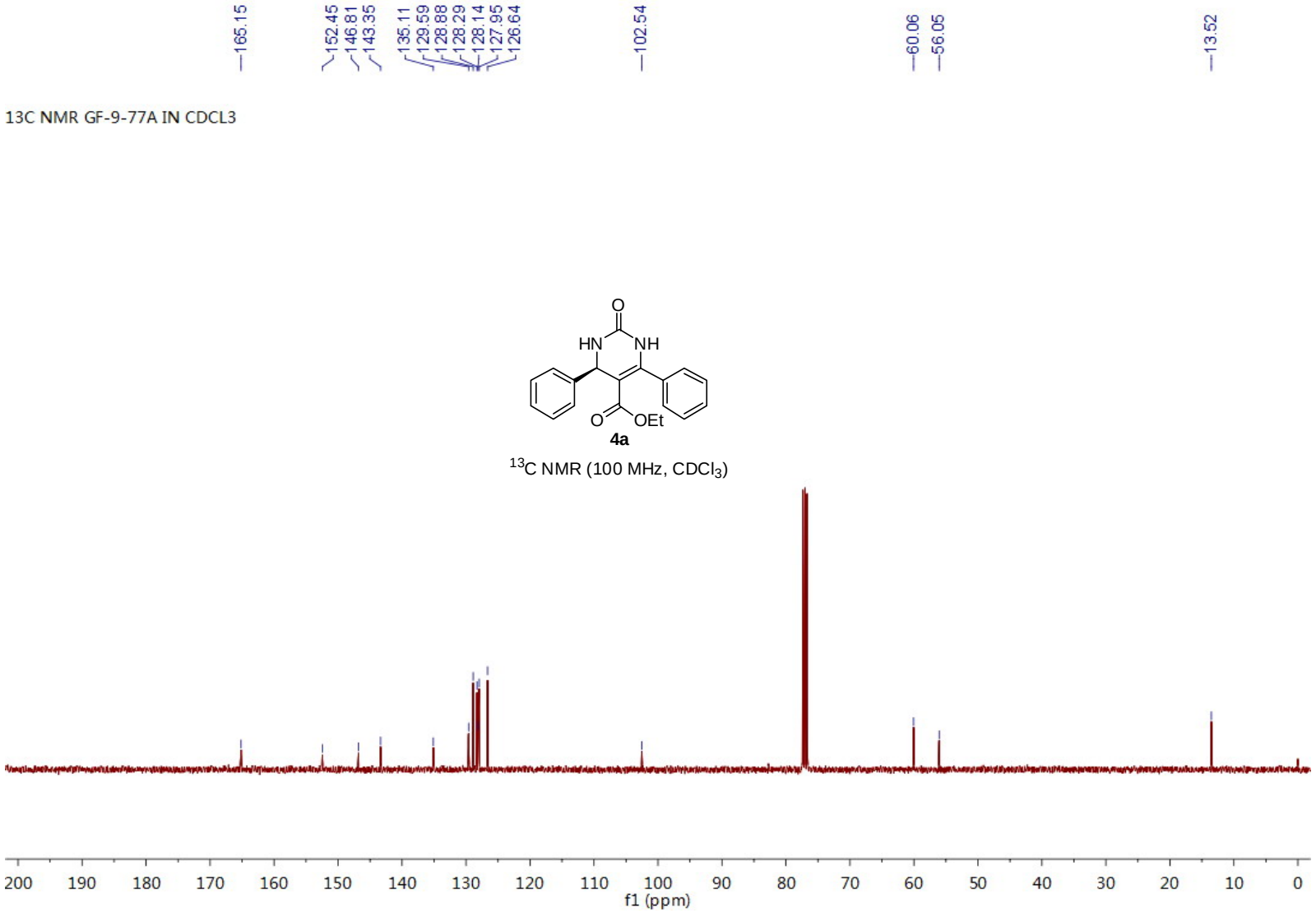


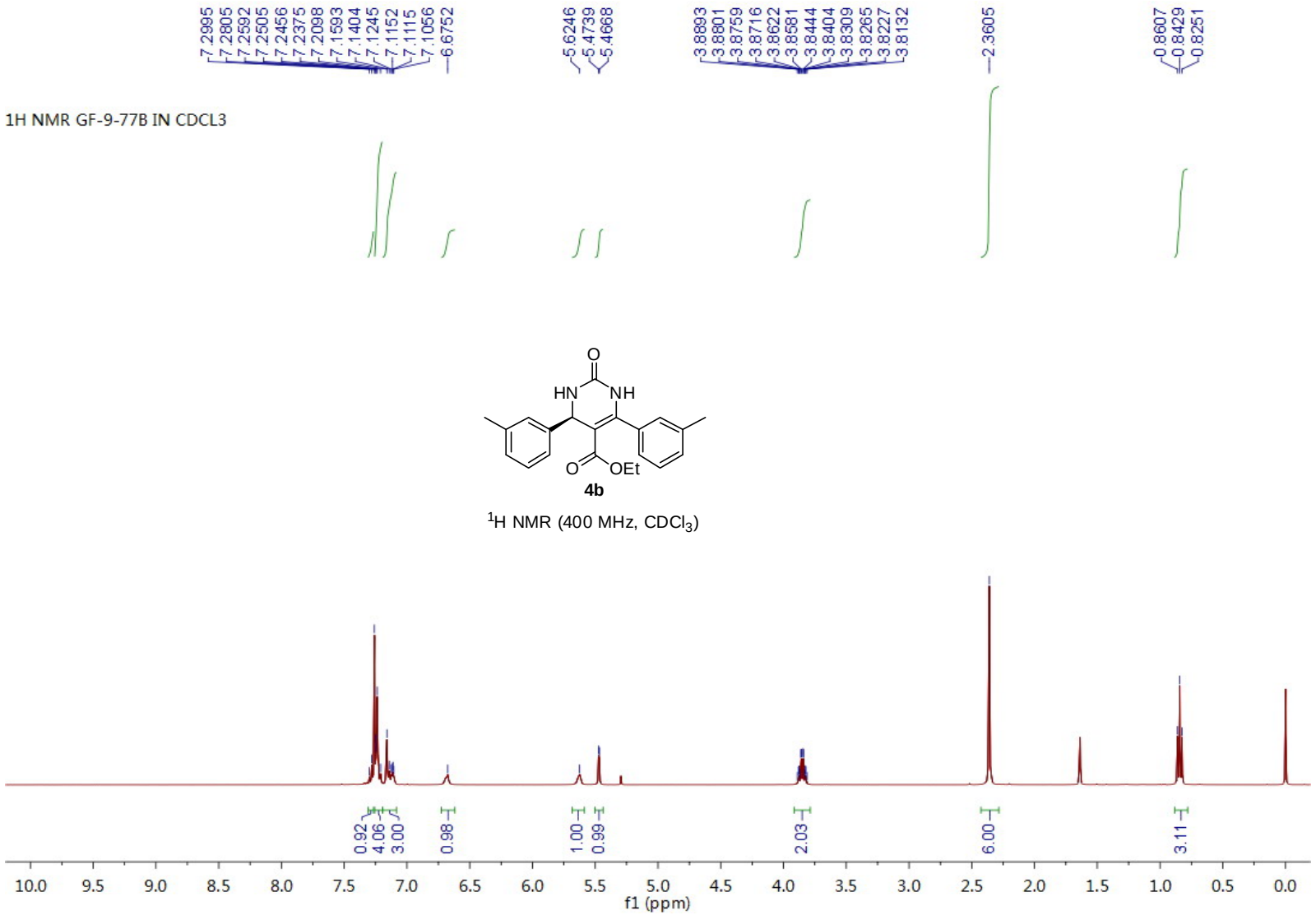
2p

^{13}C NMR (100 MHz, $CDCl_3$)

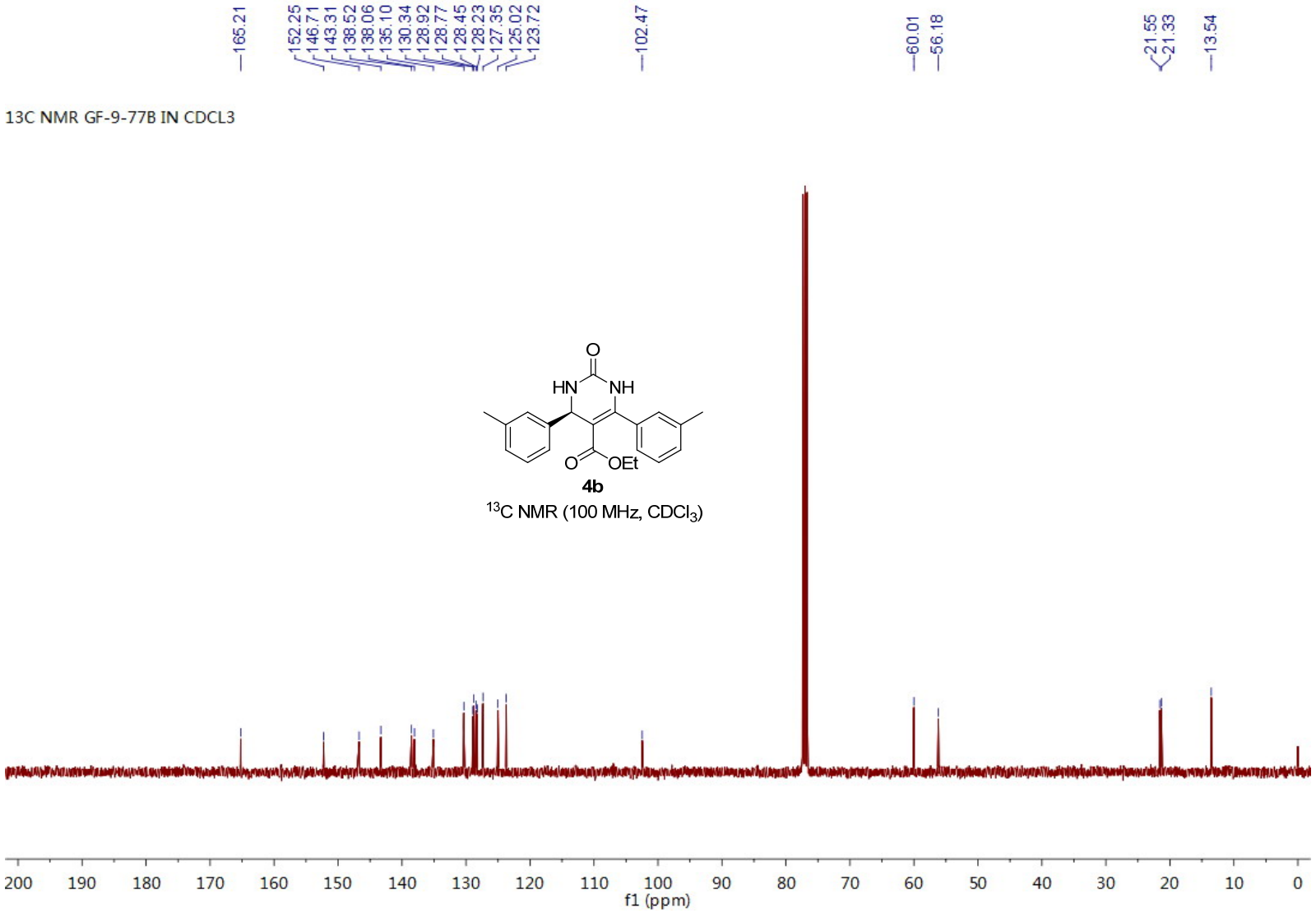


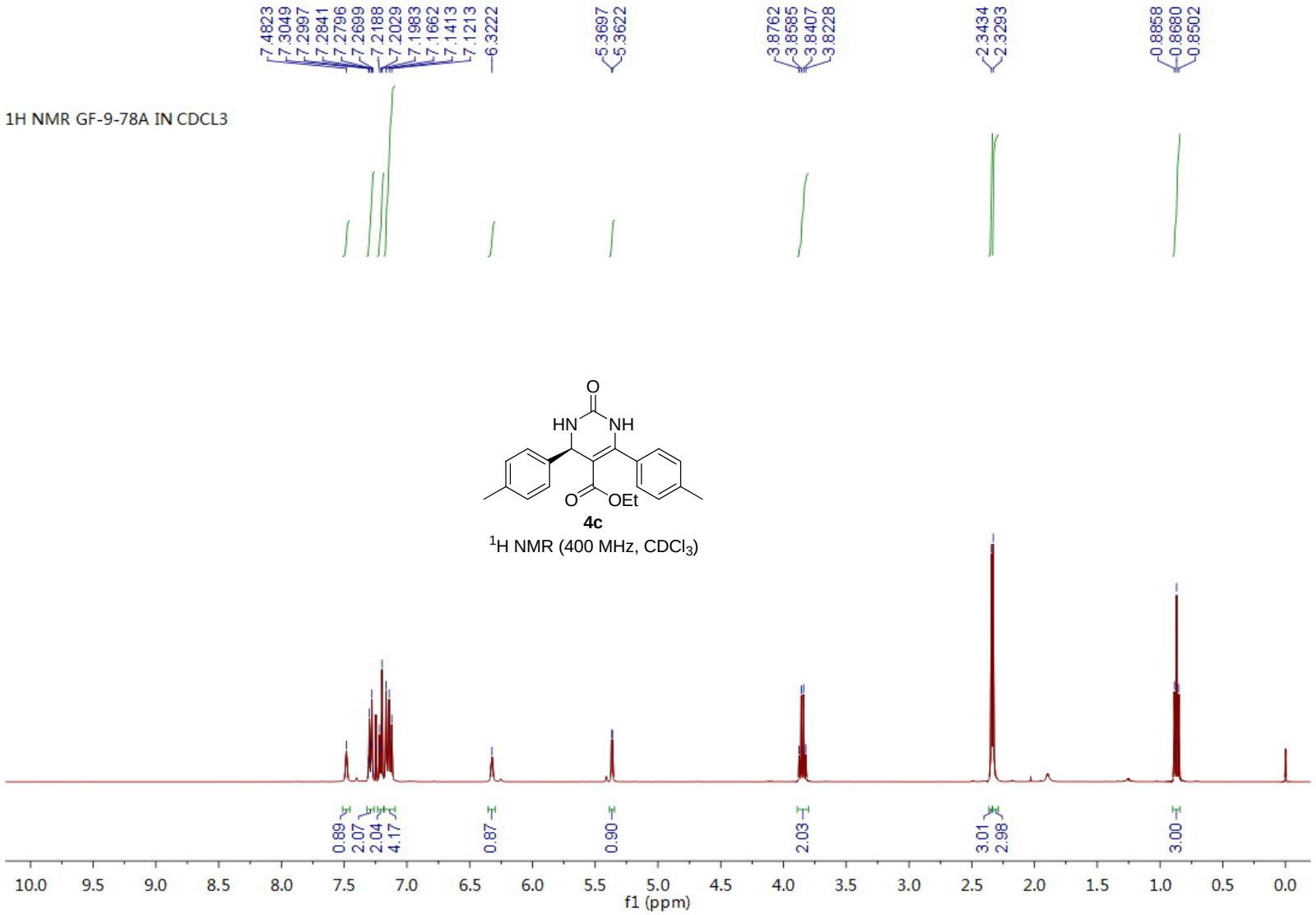

7.4516
7.4478
7.4302
7.4135
7.4098
7.4006
7.3970
7.3914
7.3804
7.3755
7.3695
7.3581
7.3542
7.3491
7.3446
7.3394
7.3323
7.3301
7.3247
7.3197
7.3161
7.3127
7.3044
7.2982
7.2913
7.2834
7.2802
6.9947
5.5044
5.4972
3.8909
3.8730
3.8638
3.8560
3.8460
3.8385
3.8281
3.8208
3.8105
3.8030
3.7937
3.7759
0.8350
0.8172
0.7993
1H NMR GF-9-77A IN CDCL3
HN
NH
O
O
OEt
4a
1H NMR (400 MHz, CDCl3)
10.02
1.03
1.01
1.00
2.02
3.00
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


165.15
152.45
146.81
143.35
135.11
129.59
128.88
128.29
128.14
127.95
126.64
102.54
60.06
56.05
13.52
13C NMR GF-9-77A IN CDCL3
HN
NH
O
O
OEt
4a
13C NMR (100 MHz, CDCl3)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)



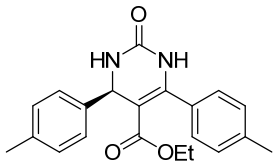
^{1}H NMR (400 MHz, $CDCl_3$)


165.21
152.25
146.71
143.31
138.52
138.06
135.10
130.34
128.92
128.77
128.45
128.23
127.35
125.02
123.72
102.47
60.01
56.18
21.55
21.33
13.54
13C NMR GF-9-77B IN CDCL3
HN
NH
O
O
OEt
4b
13C NMR (100 MHz, CDCl3)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


1H NMR GF-9-78A IN CDCL3
7.4823
7.3049
7.2997
7.2841
7.2796
7.2699
7.2188
7.2029
7.1983
7.1662
7.1413
7.1213
6.3222
5.3697
5.3622
3.8762
3.8585
3.8407
3.8228
2.3434
2.3293
0.8858
0.8680
0.8502
HN
NH
O
O
OEt
4c
1H NMR (400 MHz, CDCl3)
0.89
2.07
2.04
4.17
0.87
0.90
2.03
3.01
2.98
3.00
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

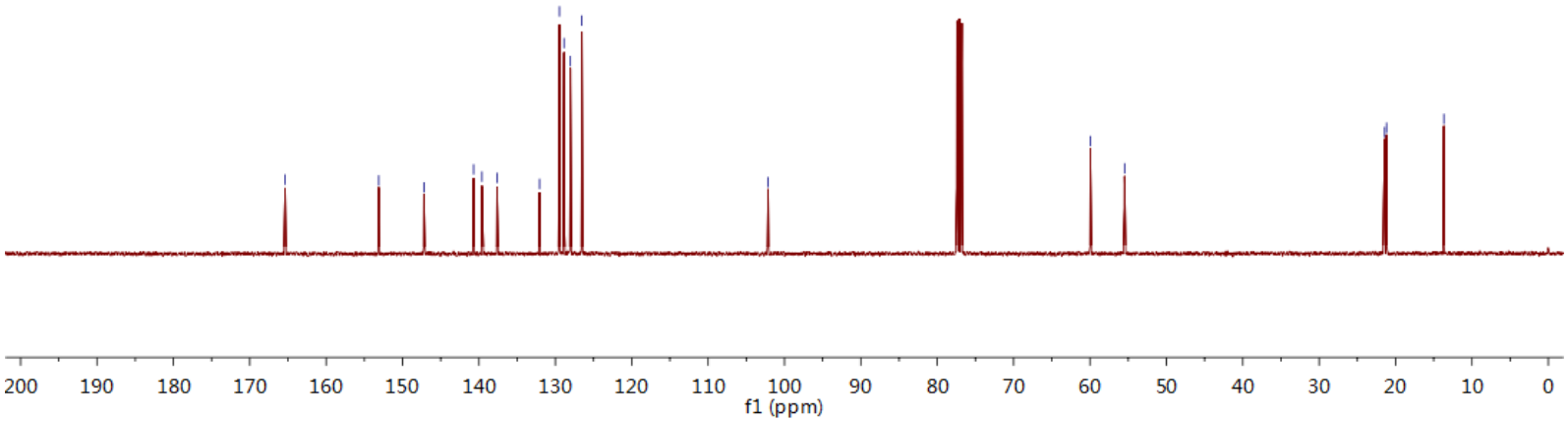
165.37
153.11
147.21
140.71
139.61
137.63
132.07
129.45
128.85
128.02
126.52
102.14
59.95
55.47
21.42
21.17
13.67

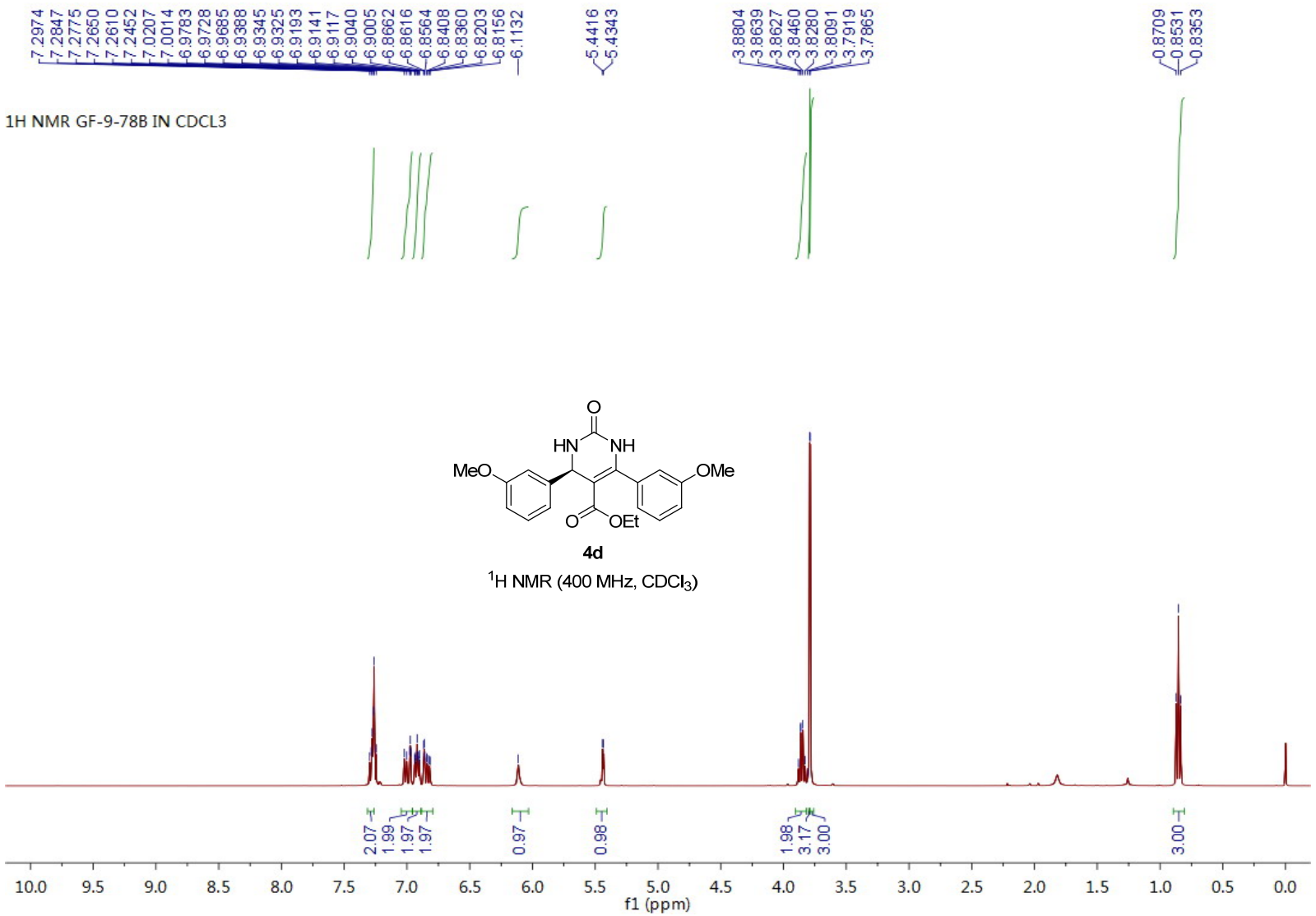
13C NMR GF-9-78A IN CDCL3



4c

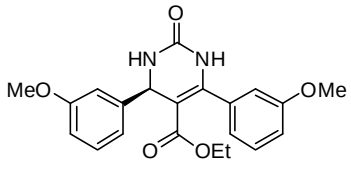
^{13}C NMR (100 MHz, $CDCl_3$)




7.2974
7.2847
7.2775
7.2650
7.2610
7.2452
7.0207
7.0014
6.9783
6.9728
6.9685
6.9388
6.9345
6.9325
6.9193
6.9141
6.9117
6.9040
6.9005
6.8862
6.8616
6.8564
6.8408
6.8360
6.8203
6.8156
6.1132
5.4416
5.4343
3.8804
3.8639
3.8627
3.8460
3.8280
3.8091
3.7919
3.7865
0.8709
0.8531
0.8353
1H NMR GF-9-78B IN CDCL3
O
HN
NH
MeO
OMe
O
OEt
4d
1H NMR (400 MHz, CDCl3)
2.07
1.99
1.97
1.97
0.97
0.98
1.98
3.17
3.00
3.00
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

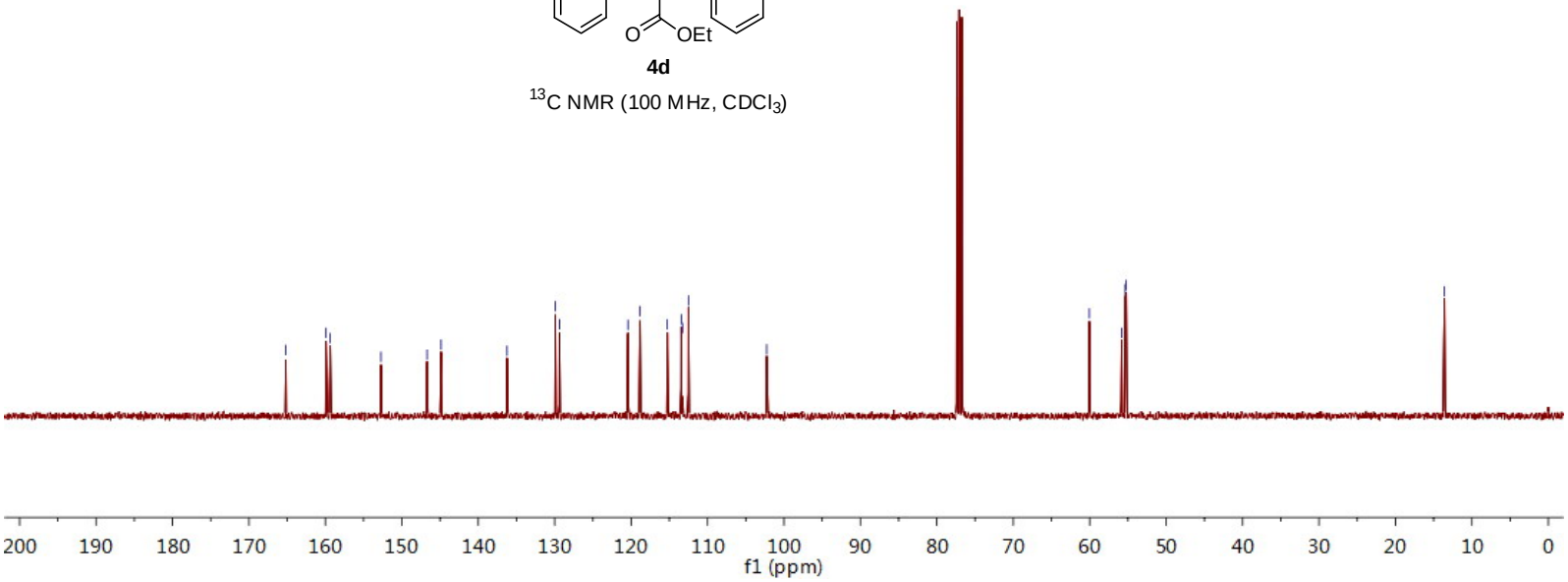
165.18
159.91
159.36
152.73
146.70
144.86
136.23
129.91
129.37
120.41
118.84
115.26
113.44
113.28
112.50
102.26
60.05
55.82
55.36
55.23
13.59

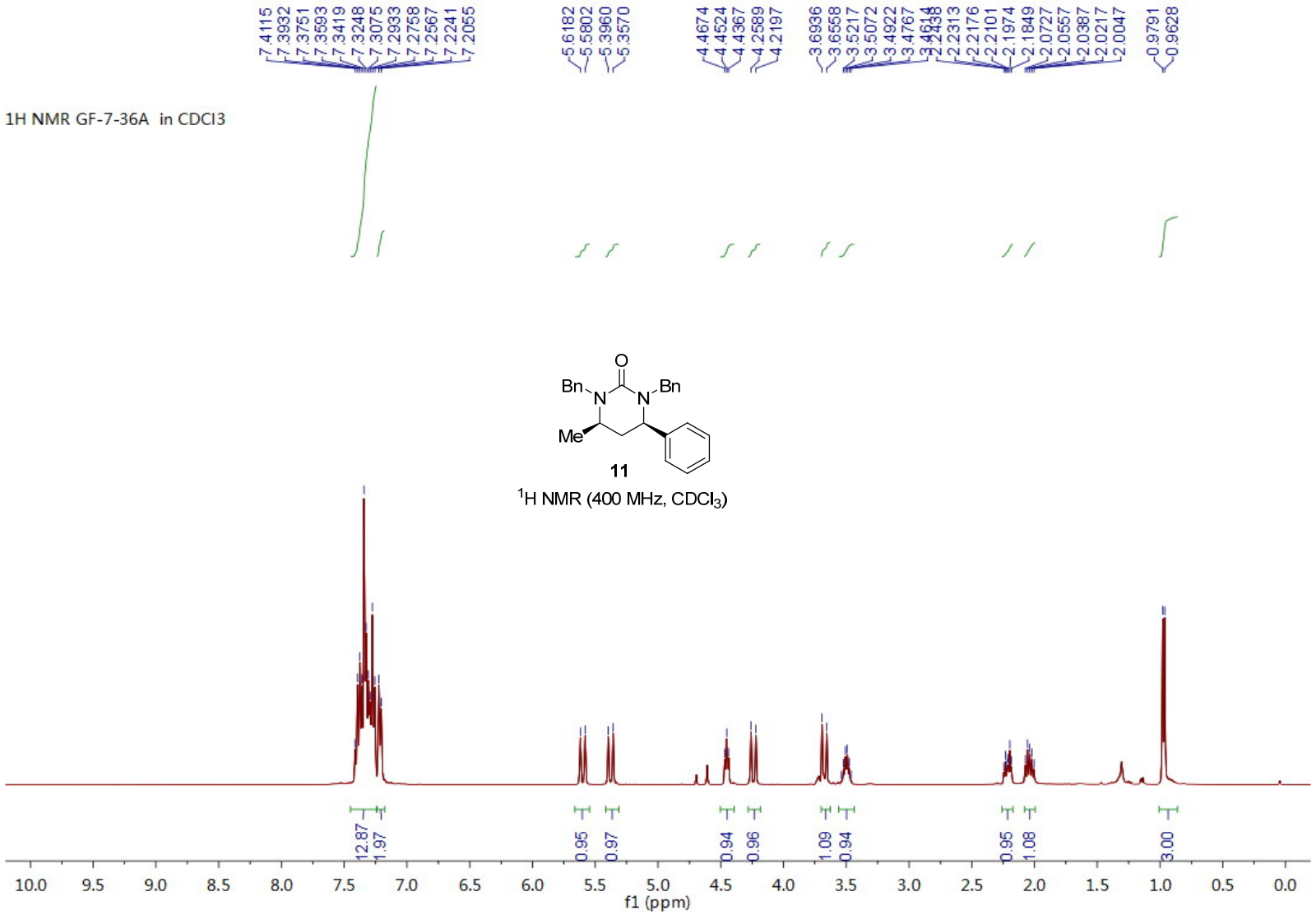
13C NMR GF-9-78B IN CDCL3

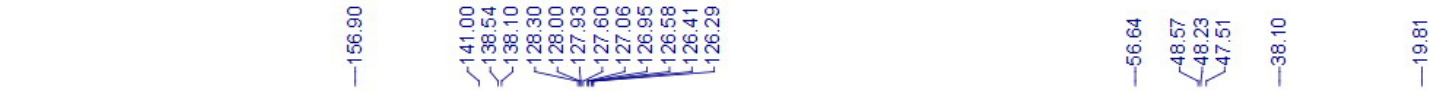


4d

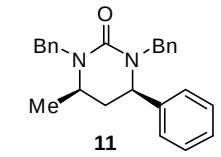
^{13}C NMR (100 MHz, $CDCl_3$)




1H NMR GF-7-36A in CDCl3
7.4115
7.3932
7.3751
7.3593
7.3419
7.3248
7.3075
7.2933
7.2758
7.2567
7.2241
7.2055
5.6182
5.5802
5.3960
5.3570
4.4674
4.4524
4.4367
4.2589
4.2197
3.6936
3.6558
3.5217
3.5072
3.4922
3.4767
2.2313
2.2176
2.2101
2.1974
2.1849
2.0727
2.0557
2.0387
2.0217
2.0047
0.9791
0.9628
Bn
N
O
N
Bn
Me
11
1H NMR (400 MHz, CDCl3)
12.87
1.97
0.95
0.97
0.94
0.96
1.09
0.94
0.95
1.08
3.00
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

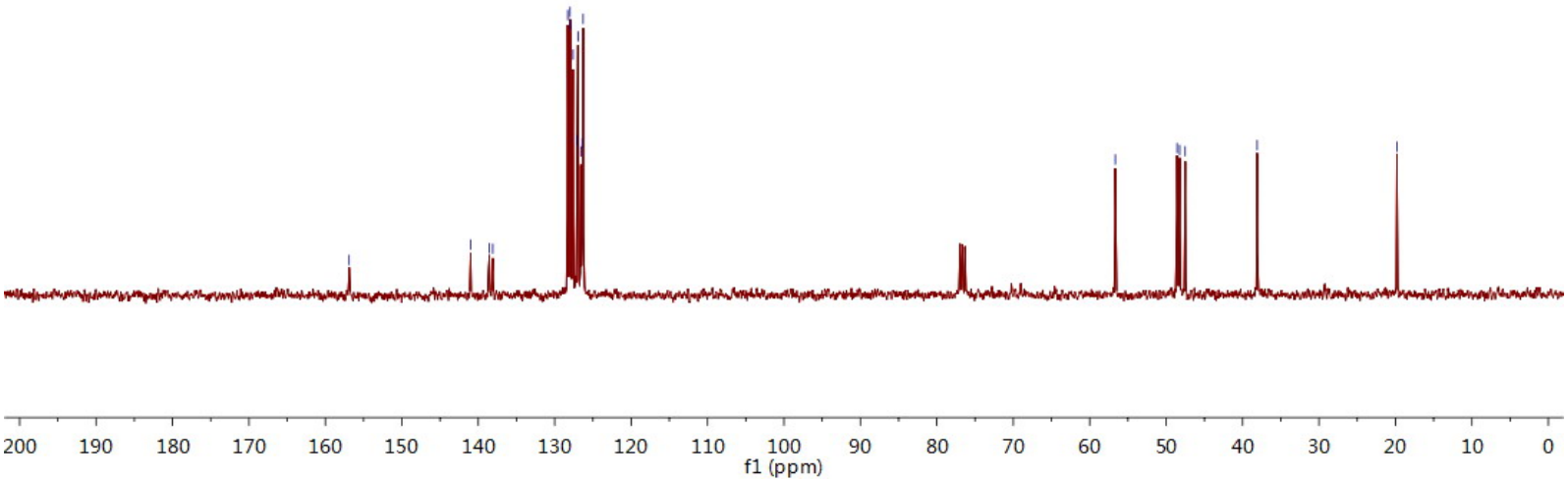


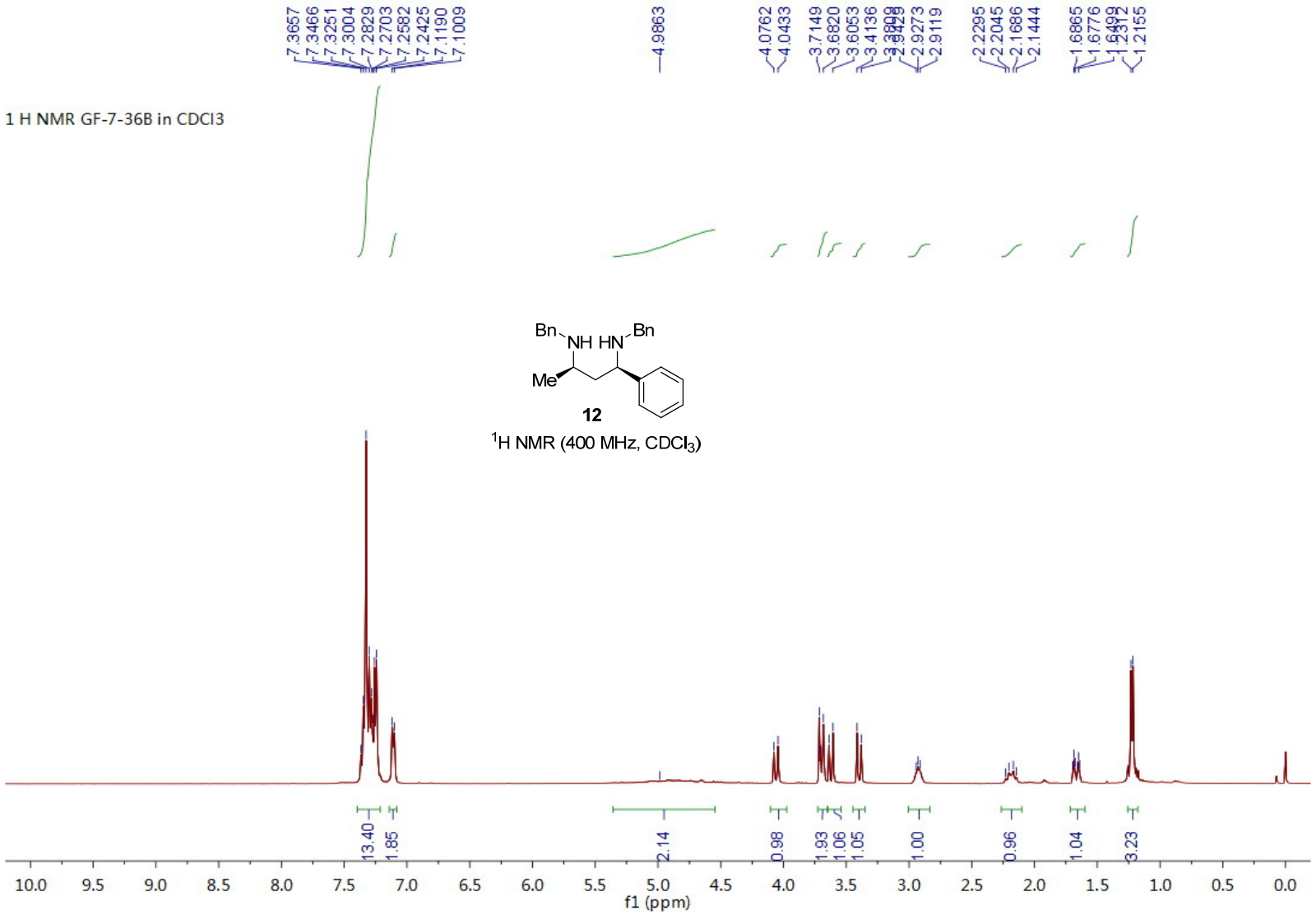
13C NMR GF-6-36A in CDCl3

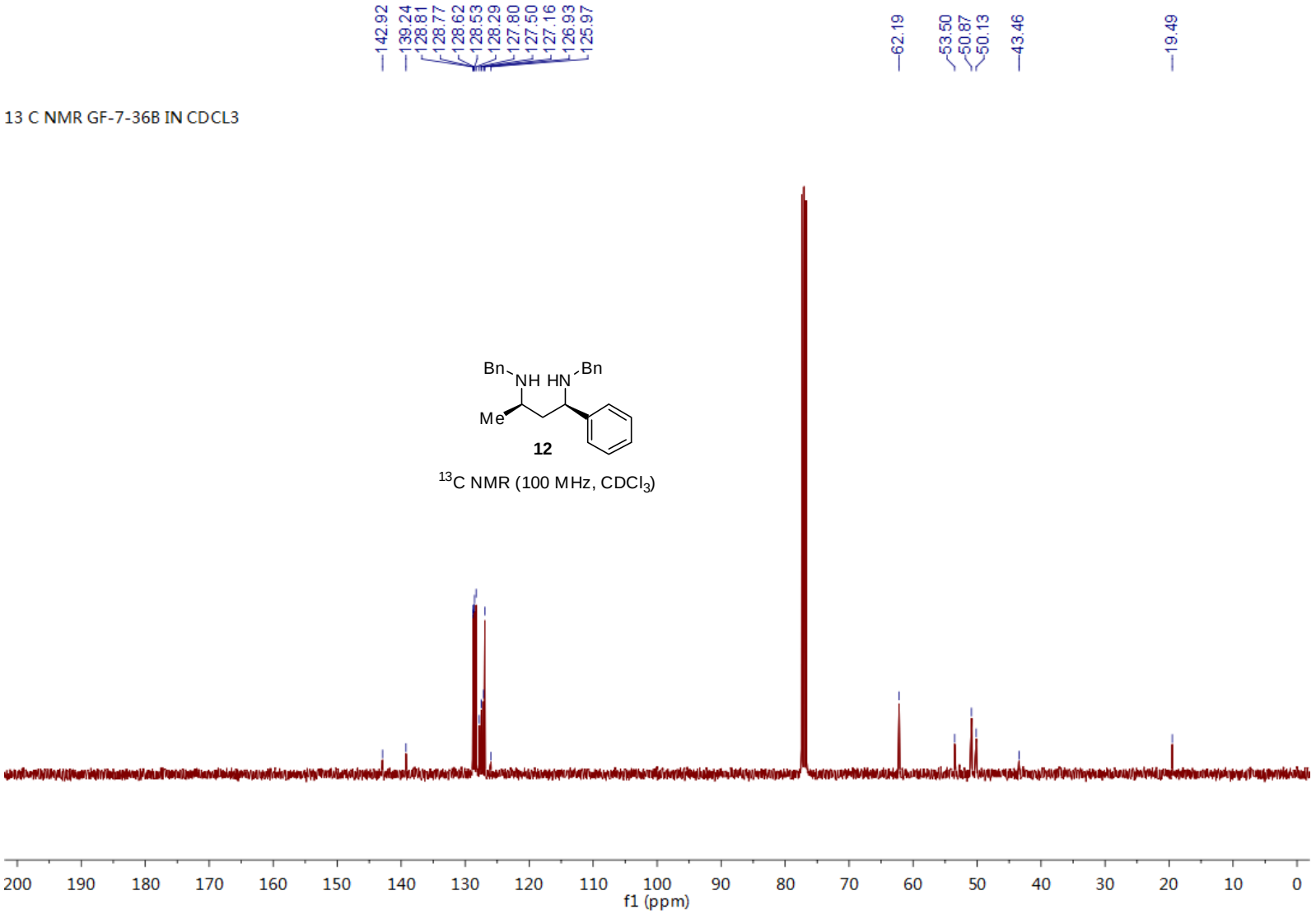


11

^{13}C NMR (100 MHz, $CDCl_3$)

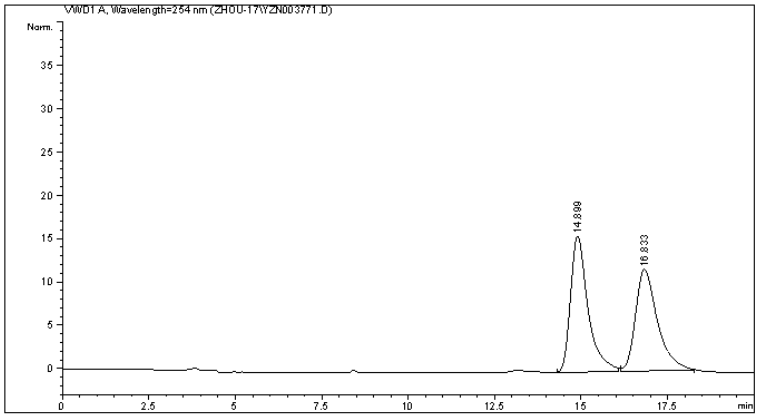



1 H NMR GF-7-36B in CDCl3
7.3657
7.3466
7.3251
7.3004
7.2829
7.2703
7.2582
7.2425
7.1190
7.1009
4.9863
4.0762
4.0433
3.7149
3.6820
3.6053
3.4136
2.9429
2.9273
2.9119
2.2295
2.2045
2.1686
2.1444
1.6865
1.6776
1.2155
Bn
NH HN
Bn
Me
12
1H NMR (400 MHz, CDCl3)
13.40
1.85
2.14
0.98
1.93
1.06
1.05
1.00
0.96
1.04
3.23
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

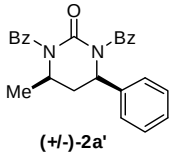

142.92
139.24
128.81
128.77
128.62
128.53
128.29
127.80
127.50
127.16
126.93
125.97
62.19
53.50
50.87
50.13
43.46
19.49
13 C NMR GF-7-36B IN CDCL3
Bn
NH HN
Bn
Me
12
13C NMR (100 MHz, CDCl3)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003771.D
Sample Name: GF-6-17G(+-)

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/31/2017 10:09:47 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/31/2017 10:08:40 AM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 8/17/2017 8:25:50 AM by
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min,  30 oC, 254 nm
```



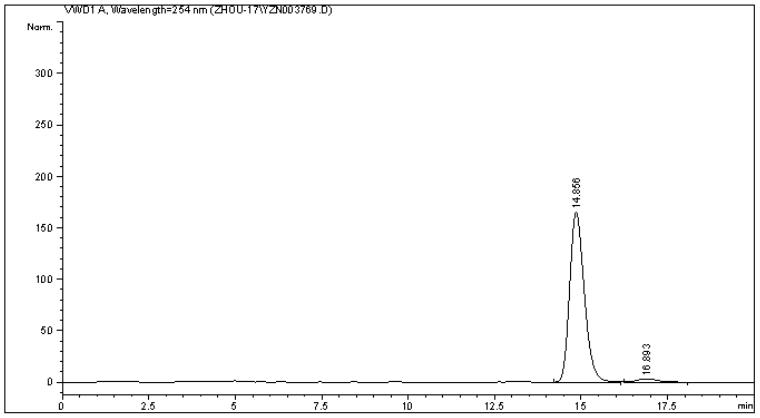

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.899 BB    0.5278  555.73529   15.70902  51.6975
   2  16.833 BB    0.6591  519.24066   11.73090  48.3025

Totals :                  1074.97595   27.43993

                          *** End of Report ***
```



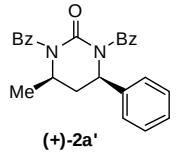
(+/-)-2a'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003769.D
Sample Name: GF-6-17G

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/31/2017 9:36:59 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/31/2017 9:35:45 AM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 8/17/2017 8:27:52 AM by
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min,  30 oC, 254 nm
```



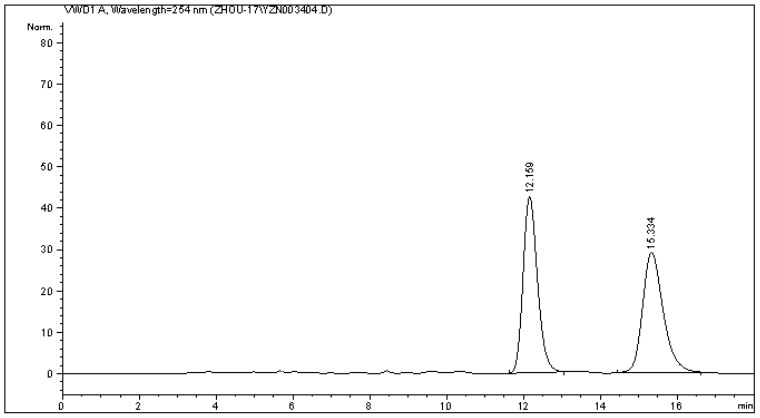

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.856 BB    0.4549 4874.52979  165.18498  97.2231
   2  16.893 BB    0.6106  139.22554    3.34659   2.7769

Totals :                  5013.75533  168.53157

                          *** End of Report ***
```



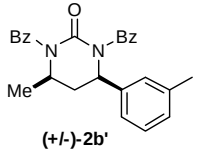
(+)-2a'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003404.D
Sample Name: GF-6-52E

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/24/2017 10:58:19 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/24/2017 10:33:01 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/24/2017 11:19:34 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min, 30oC, 254 nm
```



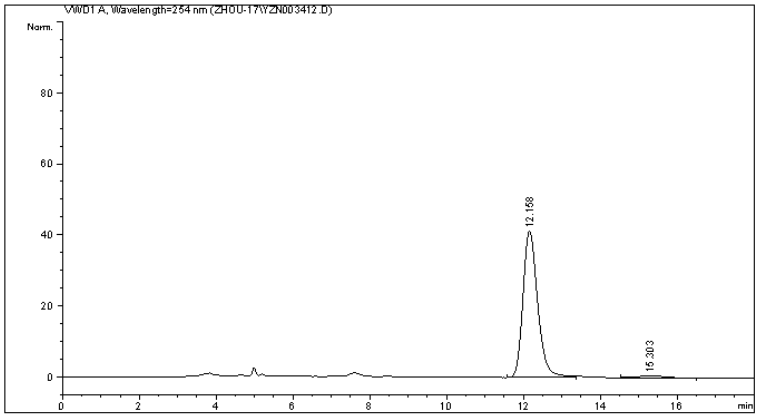

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.159 BB    0.4003 1104.76013   42.57197  50.3169
   2  15.334 BB    0.5683 1090.84644   29.10433  49.6831

Totals :                  2195.60657   71.67630

                          *** End of Report ***
```



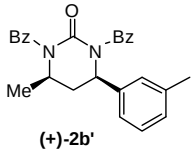
(+/-)-2b'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003412.D
Sample Name: GF-6-52E

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/25/2017 4:43:41 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/25/2017 4:39:46 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 3/29/2018 8:29:29 PM
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min, 30oC, 254 nm
```



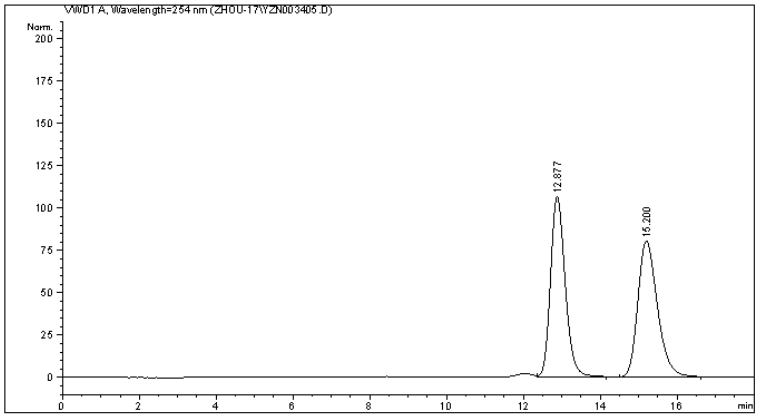

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.158 BB    0.4092 1098.16577   41.29942  97.4913
   2  15.303 BB    0.6219   28.25838 6.67647e-1   2.5087

Totals :                  1126.42415   41.96707

                          *** End of Report ***
```



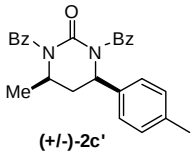
(+)-2b'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003405.D
Sample Name: GF-6-53F

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/24/2017 11:33:59 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/24/2017 11:18:10 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/24/2017 11:54:47 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min, 30oC, 254 nm
```



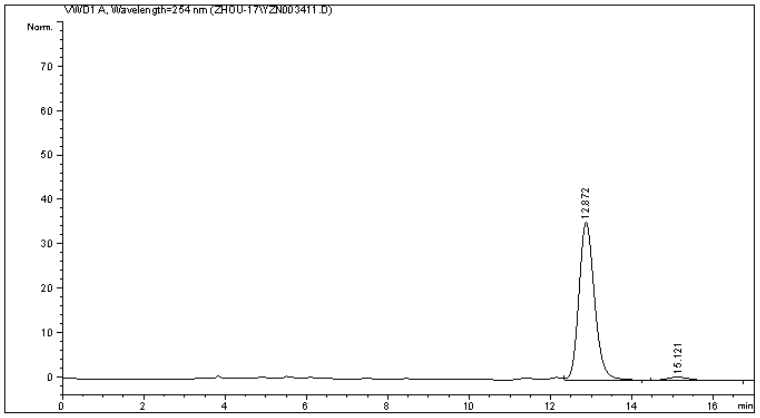

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.877 VB    0.4074 2823.75342  106.81587  49.9127
   2  15.200 BB    0.5414 2833.63159   80.28548  50.0873

Totals :                  5657.38501  187.10135

                          *** End of Report ***
```



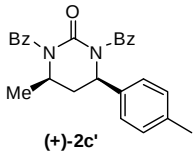
(+/-)-2c'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003411.D
Sample Name: GF-6-53F

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/25/2017 4:22:29 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/25/2017 4:17:29 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/25/2017 8:18:55 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min, 30oC, 254 nm
```



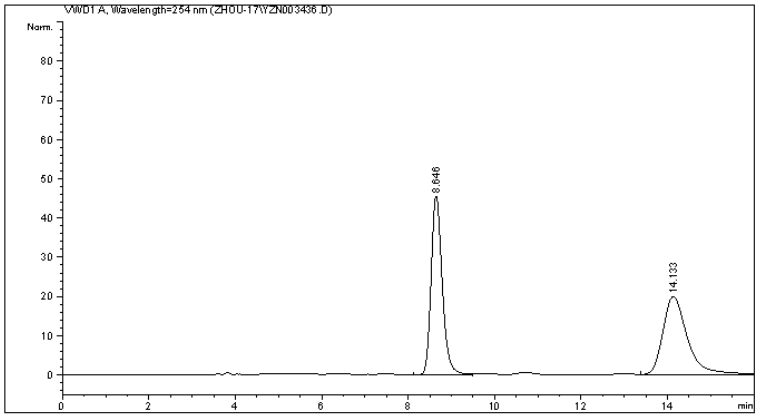

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.872 VB    0.4103  948.34949   35.53985  96.8185
   2  15.121 BB    0.6264   31.16315 7.56229e-1   3.1815

Totals :                   979.51264   36.29608

                          *** End of Report ***
```



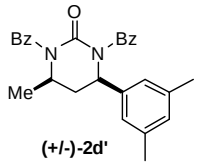
(+)-2c'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003436.D
Sample Name: GF-6-53H(RAC)

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/27/2017 9:40:50 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/27/2017 9:36:48 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/27/2017 10:30:35 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min, 30oC, 254 nm
```




```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   8.646 VB    0.2734  819.16321   45.65867  50.8288
   2  14.133 VB    0.6033  792.45026   19.94520  49.1712

Totals :                  1611.61346   65.60387
```

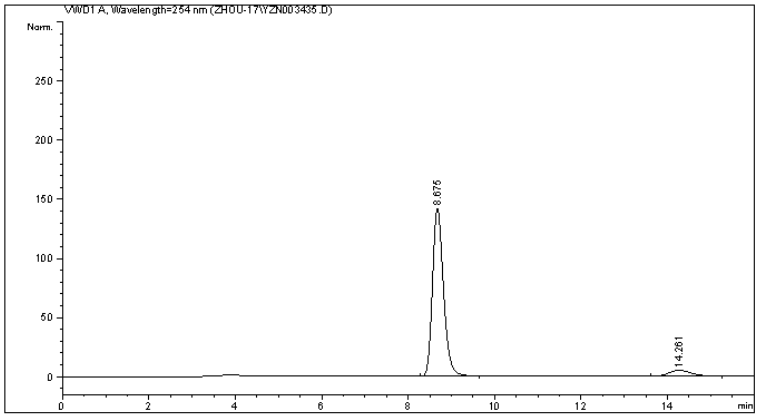


(+/-)-2d'

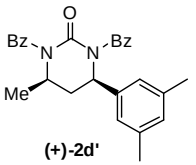
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003435.D
Sample Name: GF-6-53H

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/27/2017 9:08:43 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/27/2017 8:54:07 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/27/2017 10:14:58 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min, 30oC, 254 nm
```




```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   8.675 BB    0.2703 2507.40283  141.86404  92.9509
   2  14.261 BB    0.5546  190.15347    5.03070   7.0491

Totals :                  2697.55630  146.89474
```

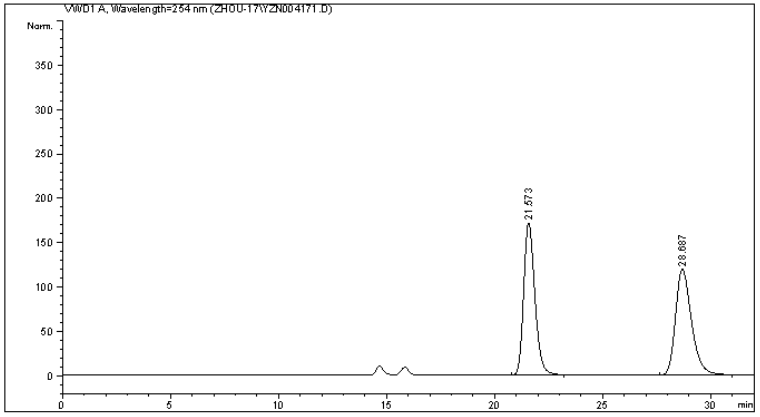


(+)-2d'

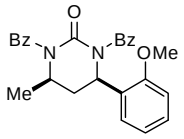
```
                          *** End of Report ***
```

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN004171.D
Sample Name: GF-6-69B(+-)

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/9/2017 5:25:43 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 5/9/2017 5:24:00 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 8/17/2017 8:52:05 AM by
                  (modified after loading)
Sample Info     : IC, Hexane/i-PrOH = 70/30, 0.7 mL/min,  30 oC, 254 nm
```



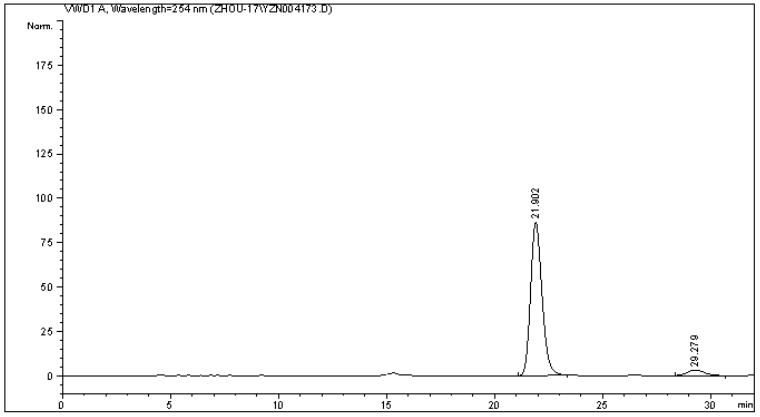

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  21.573 BB    0.5530 6189.74951  171.74852  50.2137
   2  28.687 BB    0.7847 6137.06738  119.36728  49.7863

Totals :                  1.23268e4   291.11580

                          *** End of Report ***
```



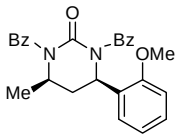
(+/-)-2e'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN004173.D
Sample Name: GF-6-69B

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/9/2017 9:21:57 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 5/9/2017 9:12:32 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 8/17/2017 8:53:30 AM by
                  (modified after loading)
Sample Info     : IC, Hexane/i-PrOH = 70/30, 0.7 mL/min,  30 oC, 254 nm
```



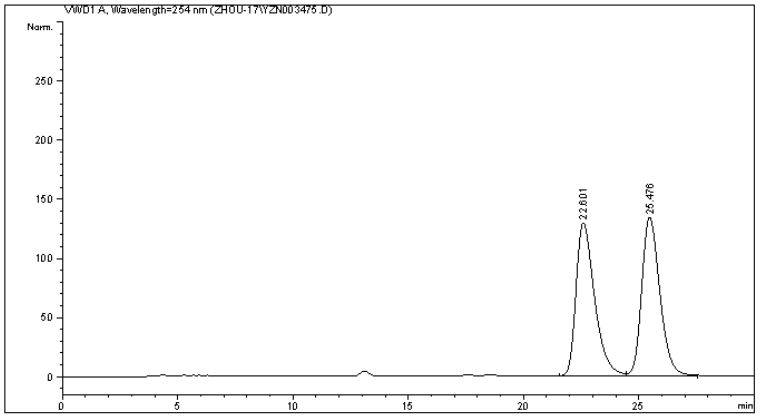

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  21.902 BB    0.5680 3184.55347   86.45995  94.7483
   2  29.279 BB    0.7857  176.51463    3.19521   5.2517

Totals :                  3361.06810   89.65516

                          *** End of Report ***
```



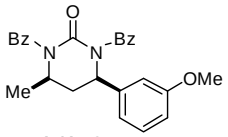
(+)-2e'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003475.D
Sample Name: GF-6-57C (rac)

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/2/2017 8:12:33 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/2/2017 7:58:00 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/2/2017 8:46:52 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.7 mL/min, 30oC, 254 nm
```



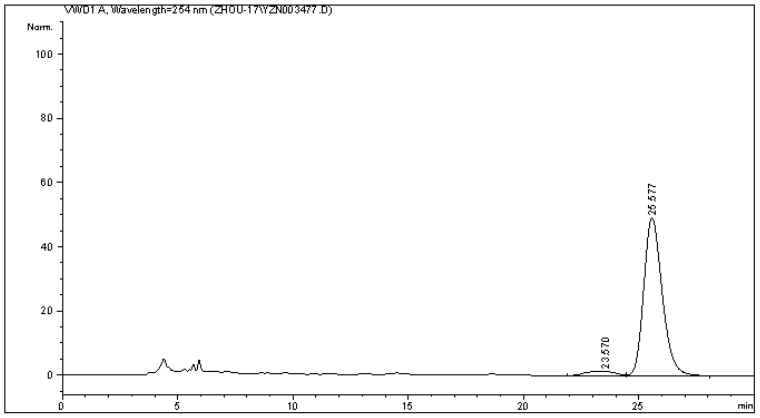

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  22.601 BV    0.8514 7220.00439  129.50433  49.8311
   2  25.476 VB    0.8379 7268.93506  133.73935  50.1689

Totals :                  1.44889e4   263.24368

                          *** End of Report ***
```



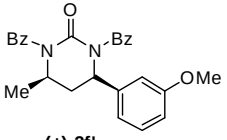
(+/-)-2f'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003477.D
Sample Name: GF-6-57C

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/2/2017 10:08:21 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/2/2017 9:35:56 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/2/2017 10:42:22 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.7 mL/min, 30oC, 254 nm
```



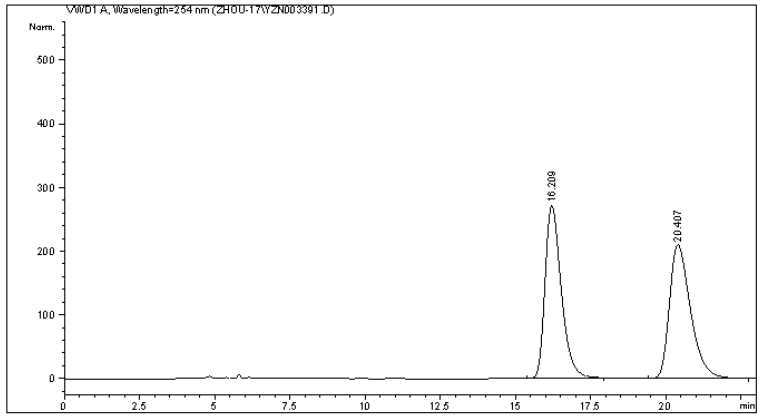

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  23.570 BV    1.1898  119.47680    1.26770   4.1637
   2  25.577 VB    0.8600 2749.97974   49.11591  95.8363

Totals :                  2869.45654   50.38362

                          *** End of Report ***
```



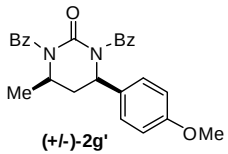
(+)-2f'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003391.D
Sample Name: GF-6-51A(rac)

```
==================================================================
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/24/2017 2:27:46 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/24/2017 2:26:10 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/24/2017 3:04:24 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min, 30oC, 254nm
```



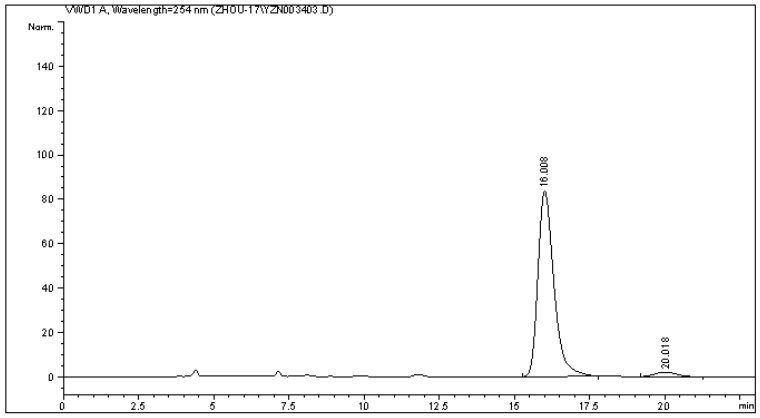

```
==================================================================
                      Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|------|----------|----------|--------|
   1  16.209 VB    0.5738 1.01608e4   271.31473  49.7715
   2  20.407 BB    0.7457 1.0254le4   210.06502  50.2285

Totals :                 2.04149e4   481.37975

==================================================================
                      *** End of Report ***
```



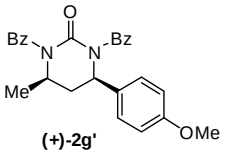
(+/-)-2g'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003403.D
Sample Name: GF-6-51A

```
==================================================================
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/24/2017 10:08:15 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/24/2017 10:07:21 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/24/2017 10:34:21 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min, 30oC, 254 nm
```



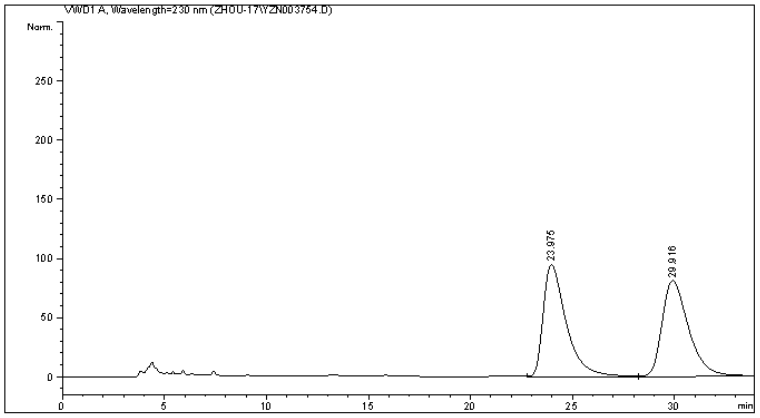

```
==================================================================
                      Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|------|----------|----------|--------|
   1  16.008 BB    0.5657 3097.68018   83.70033  96.6150
   2  20.018 BB    0.6421  108.53011    2.13132   3.3850

Totals :                 3206.21029   85.83165

==================================================================
                      *** End of Report ***
```



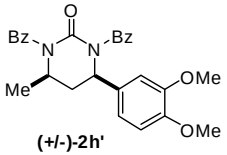
(+)-2g'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003754.D
Sample Name: GF-6-71G(+-)

```
    ======================================================================
    Acq. Operator   : 0
    Acq. Instrument : Instrument 1                  Location : Vial 1
    Injection Date  : 3/30/2017 1:56:39 PM
    Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
    Last changed    : 3/30/2017 1:55:56 PM by 0
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
    Last changed    : 3/29/2018 8:39:28 PM
                      (modified after loading)
    Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min,  30 oC, 230 nm
```



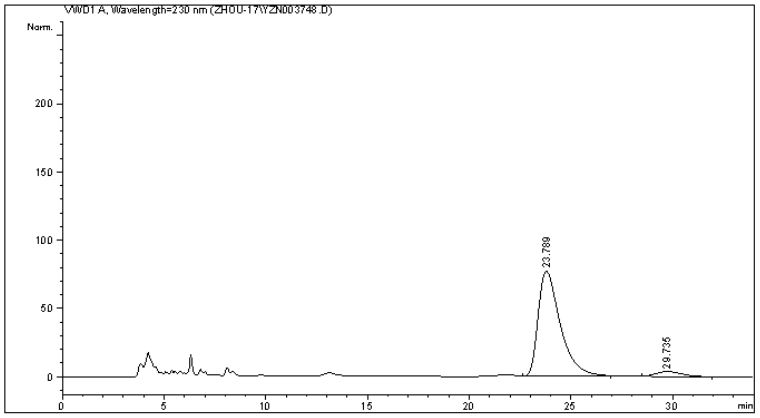

```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=230 nm

    Peak RetTime Type  Width     Area      Height     Area
      #  [min]        [min]  mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1  23.975 VV    1.1771 7432.53564   94.76222  50.1611
       2  29.916 VB    1.3830 7384.78857   81.07512  49.8389

    Totals :                  1.48173e4   175.83734

    ======================================================================
                              *** End of Report ***
```



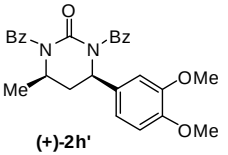
(+/-)-2h'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003748.D
Sample Name: GF-6-71G

```
    ======================================================================
    Acq. Operator   : 0
    Acq. Instrument : Instrument 1                  Location : Vial 1
    Injection Date  : 3/29/2017 1:54:47 PM
    Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
    Last changed    : 3/29/2017 1:53:58 PM by 0
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
    Last changed    : 3/29/2017 3:19:25 PM by 0
                      (modified after loading)
    Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min,  30 oC, 230 nm
```



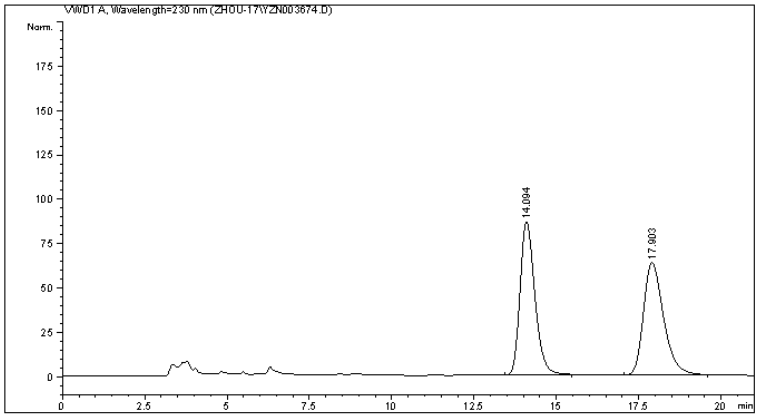

```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=230 nm

    Peak RetTime Type  Width     Area      Height     Area
      #  [min]        [min]  mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1  23.789 VB    1.1381 5806.44092   76.94543  94.7428
       2  29.735 BB    1.1349  322.19147    3.65421   5.2572

    Totals :                  6128.63239   80.59964

    ======================================================================
                              *** End of Report ***
```



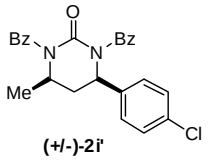
(+)-2h'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003674.D
Sample Name: GF-6-71F(+-)

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/22/2017 4:46:51 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/22/2017 4:17:58 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/22/2017 5:11:18 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min,  30 oC, 230 nm
```



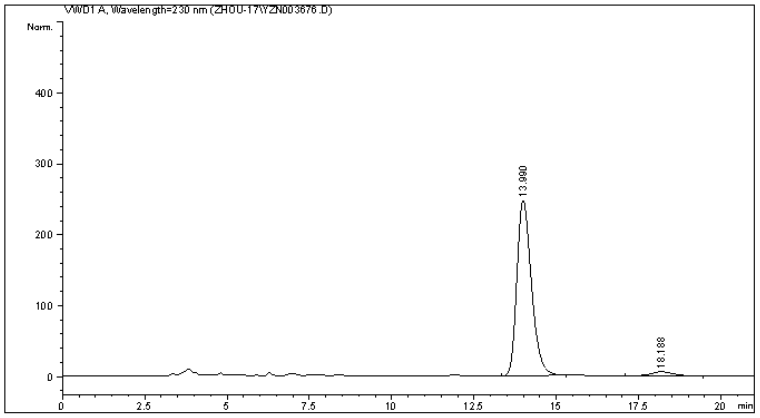

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.094 BB    0.4805 2701.78027   86.24683  50.0277
   2  17.903 BB    0.6517 2698.78760   63.48647  49.9723

Totals :                  5400.56787  149.73330

                          *** End of Report ***
```



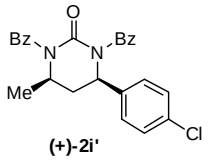
(+/-)-2i'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003676.D
Sample Name: GF-6-71F

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/22/2017 9:08:55 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/22/2017 8:33:13 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/22/2017 9:33:33 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min,  30 oC, 230 nm
```



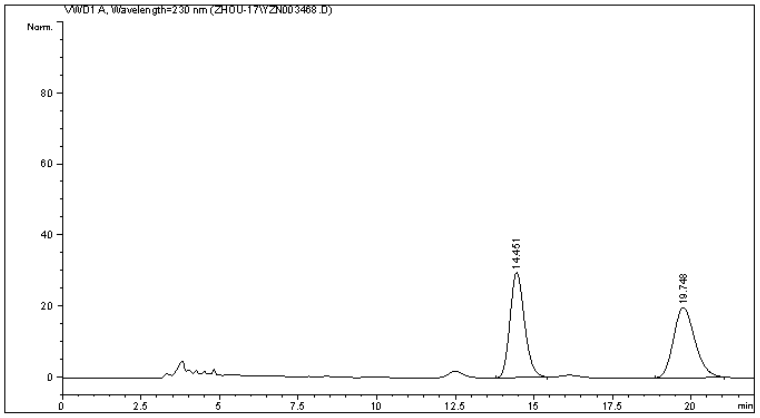

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  13.990 VB    0.4737 7600.73486  247.21846  96.2682
   2  18.188 BB    0.7460  294.63754    5.98611   3.7318

Totals :                  7895.37241  253.20457

                          *** End of Report ***
```



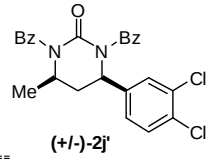
(+)-2i'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003468.D
Sample Name: GF-6-56B(rac)

```
==========================================================================
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/2/2017 10:14:19 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/2/2017 10:12:42 AM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/2/2017 10:39:10 AM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.7 mL/min, 30oC, 230 nm
```



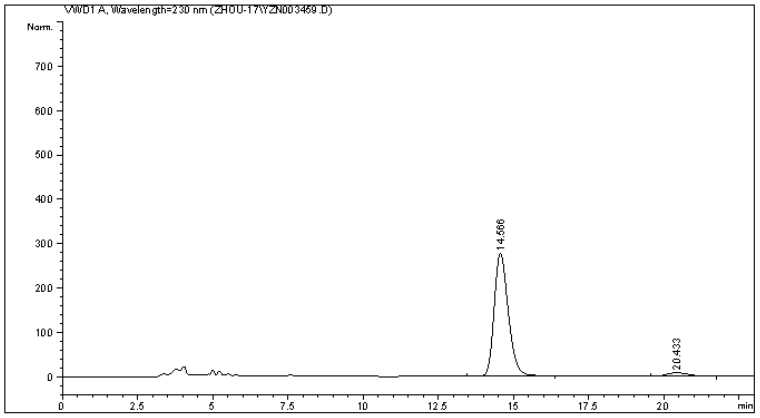

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.451 BB    0.4950  948.41205   29.57308  50.2412
   2  19.748 BB    0.7295  939.30719   19.75191  49.7588

Totals :                  1887.71924   49.32498

==========================================================================
                        *** End of Report ***
```



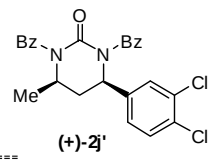
(+/-)-2j'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003459.D
Sample Name: GF-6-56B

```
==========================================================================
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/1/2017 6:16:55 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/1/2017 6:00:47 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/1/2017 6:42:28 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min, 30oC, 230 nm
```



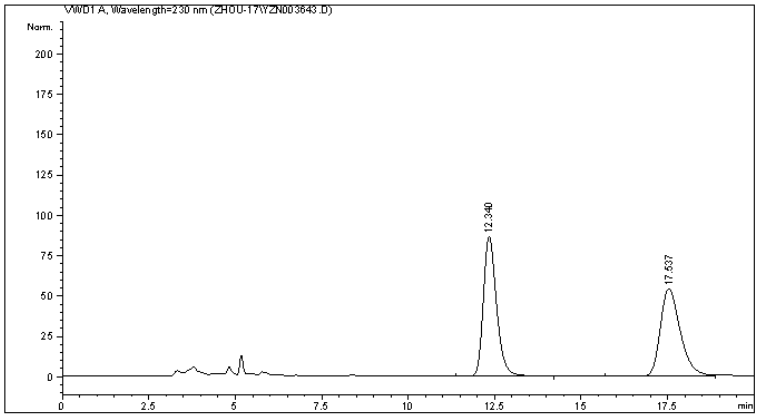

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.566 BB    0.5054 9088.79688  276.80811  95.6367
   2  20.433 BB    0.7747  414.66150    8.18273   4.3633

Totals :                  9503.45837  284.99084

==========================================================================
                        *** End of Report ***
```



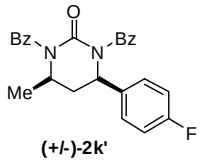
(+)-2j'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003643.D
Sample Name: GF-6-70C(+-)

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/20/2017 9:50:00 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/20/2017 9:49:18 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/20/2017 10:25:02 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min,  30 oC, 230 nm
```



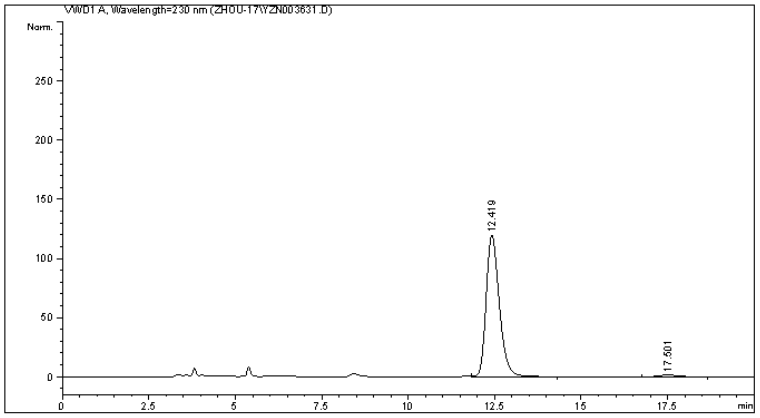

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.340 BB    0.4069 2305.75781   86.55401  51.2165
   2  17.537 BV    0.6173 2196.22168   54.31921  48.7835

Totals :                  4501.97949  140.87322

                          *** End of Report ***
```



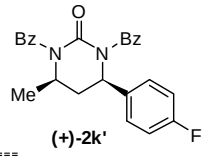
(+/-)-2k'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003631.D
Sample Name: GF-6-70C

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/19/2017 9:35:51 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/19/2017 9:29:24 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/19/2017 10:03:04 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min,  30 oC, 230 nm
```



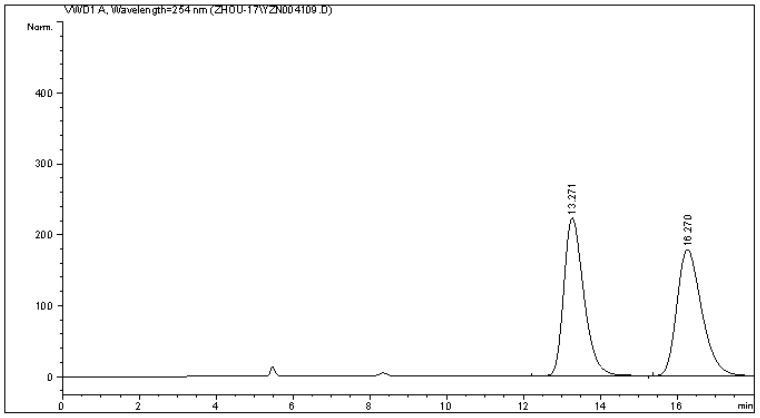

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.419 VB    0.4096 3192.06250  119.88960  97.8643
   2  17.501 BB    0.6501   69.66007    1.62030   2.1357

Totals :                  3261.72257  121.50990

                          *** End of Report ***
```



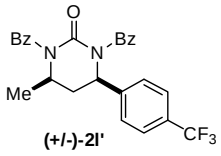
(+)-2k'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN004109.D
Sample Name: GF-6-99B(+-)

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/27/2017 9:16:30 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 4/27/2017 8:48:16 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 4/27/2017 9:44:40 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min,  30 oC, 254 nm
```



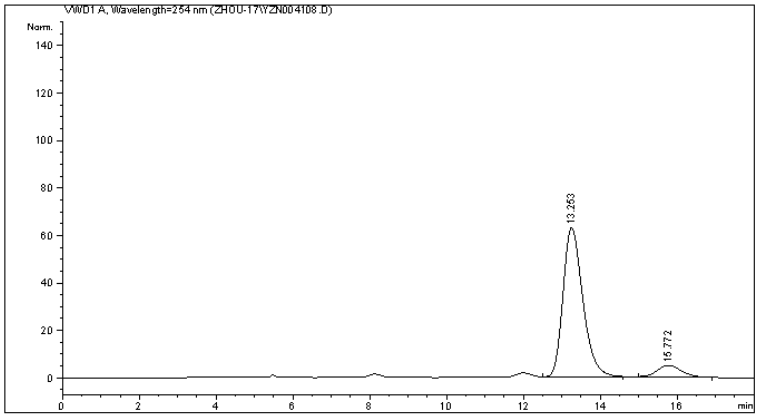

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  13.271 VB    0.5587 8123.19971  223.11726  50.2549
   2  16.270 BB    0.6951 8040.78564  178.28824  49.7451

Totals :                  1.61640e4   401.40550

                          *** End of Report ***
```



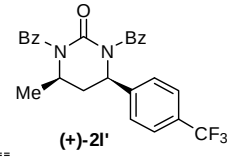
(+/-)-2l'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN004108.D
Sample Name: GF-6-99B

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/27/2017 4:51:42 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 4/27/2017 4:50:21 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 4/27/2017 5:12:38 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 75/25, 0.8 mL/min,  30 oC, 254 nm
```



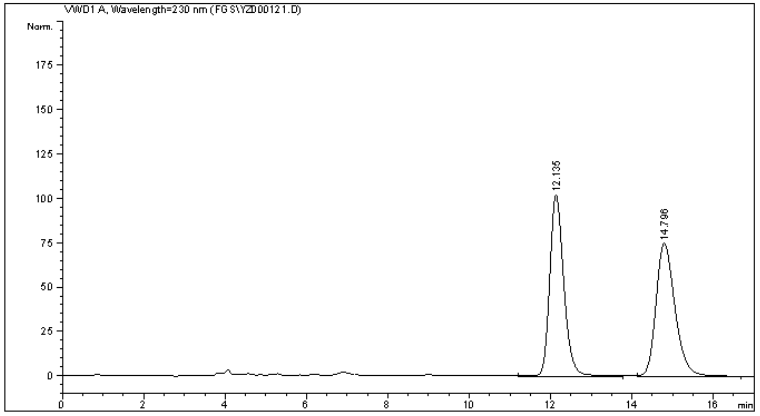

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min] mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  13.253 VB    0.5481 2251.06079   62.97016  91.3564
   2  15.772 BB    0.6412  212.98126    4.88458   8.6436

Totals :                  2464.04205   67.85474

                          *** End of Report ***
```



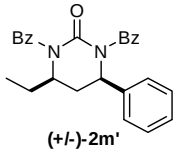
(+)-2l'

Data File C:\CHEM32\1\DATA\FGS\YZ000121.D
Sample Name: GF-6-51B-rac

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/21/2017 2:42:42 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 2/21/2017 2:39:40 AM by
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 8/17/2017 11:00:12 PM by
                  (modified after loading)
Sample Info     : OD-H, Hexane/iPrOH = 75/25, 0.8 mL/min, 30 oC, 230
                  nm
```



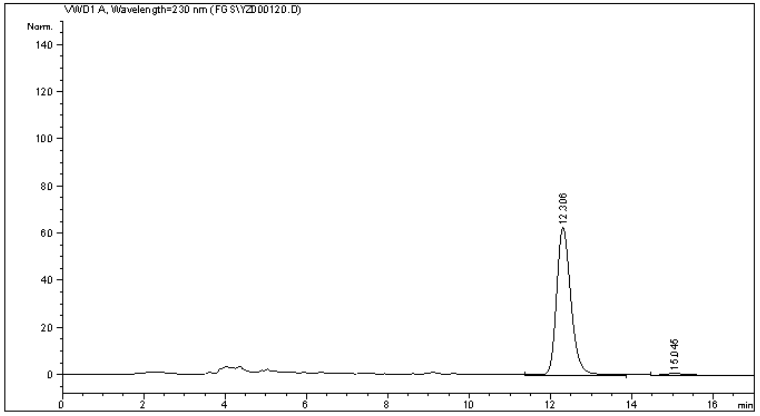

```
                        Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|------|----|------|---------|---------|-------|
   1  12.135 VB    0.3676 2452.95215  102.12515  50.3359
   2  14.796 BB    0.4993 2420.21533   74.89094  49.6641

Totals :                  4873.16748  177.01609

                        *** End of Report ***
```



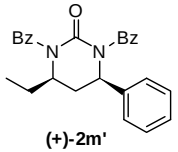
(+/-)-2m'

Data File C:\CHEM32\1\DATA\FGS\YZ000120.D
Sample Name: GF-6-51B

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/21/2017 2:21:28 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 2/21/2017 2:19:51 AM by
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 8/17/2017 11:02:01 PM by
                  (modified after loading)
Sample Info     : OD-H, Hexane/iPrOH = 75/25, 0.8 mL/min, 30 oC, 230
                  nm
```



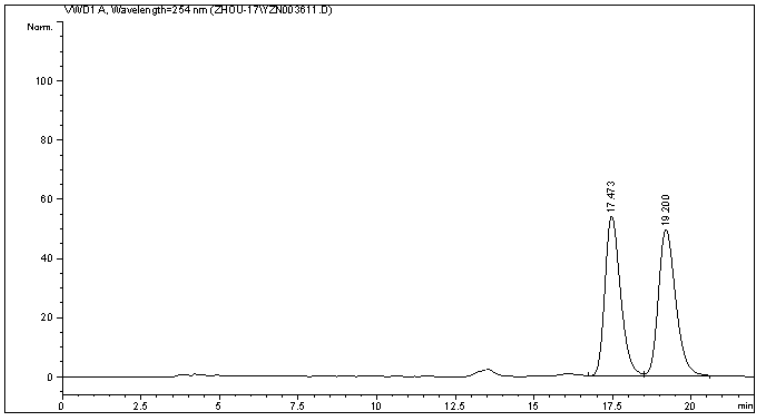

```
                        Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|------|----|------|---------|---------|-------|
   1  12.306 VB    0.3815 1544.88354   62.50751  97.7377
   2  15.045 BB    0.6873   35.75892 7.78581e-1   2.2623

Totals :                  1580.64246   63.28609

                        *** End of Report ***
```



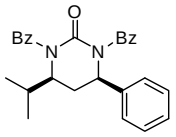
(+)-2m'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003611.D
Sample Name: GF-6-69A(Rac)

```
==========================================================================
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/18/2017 11:33:40 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/18/2017 11:32:08 AM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/18/2017 11:58:35 AM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 90/10, 0.7 mL/min,  30 oC, 254 nm
```



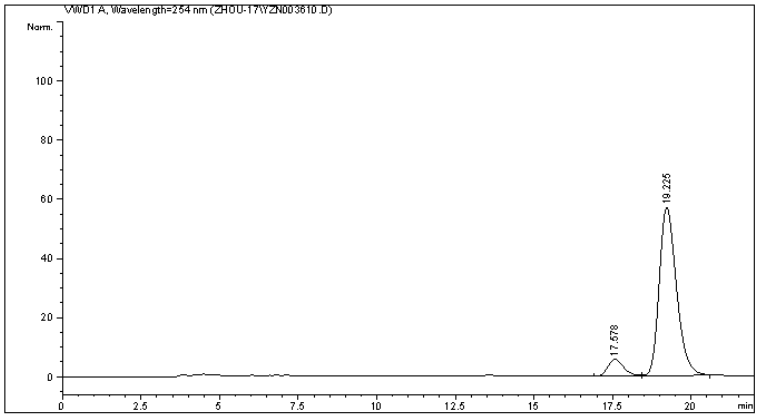

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  17.473 VB    0.5288 1861.64844   54.00675  49.7012
   2  19.200 BB    0.5871 1884.03064   49.46441  50.2988

Totals :                  3745.67908  103.47116

==========================================================================
                        *** End of Report ***
```



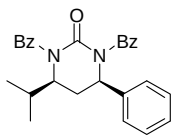
(+/-)-2n'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN003610.D
Sample Name: GF-6-69A

```
==========================================================================
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/18/2017 11:08:07 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/18/2017 10:58:06 AM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/18/2017 11:36:41 AM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 90/10, 0.7 mL/min,  30 oC, 254 nm
```



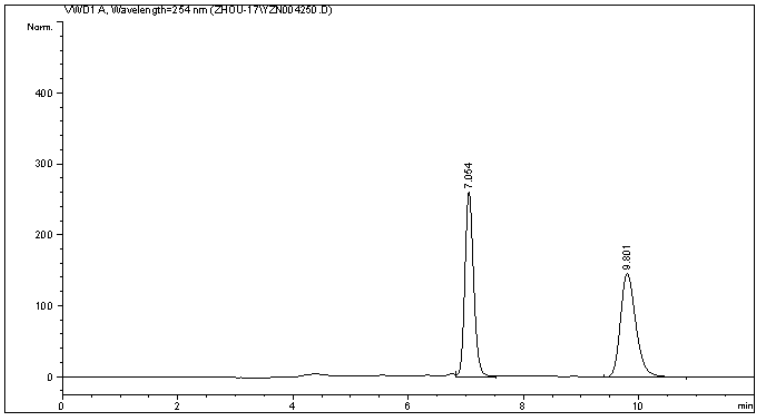

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  17.578 BV    0.5284  196.40308    5.64203   8.3080
   2  19.225 VB    0.5860 2167.62524   56.85307  91.6920

Totals :                  2364.02832   62.49509

==========================================================================
                        *** End of Report ***
```



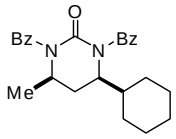
(+)-2n'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN004250.D
Sample Name: GF-7-17A(+-)

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/17/2017 9:06:48 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 5/17/2017 8:52:09 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 5/17/2017 9:25:14 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min,  30 oC, 254 nm
```



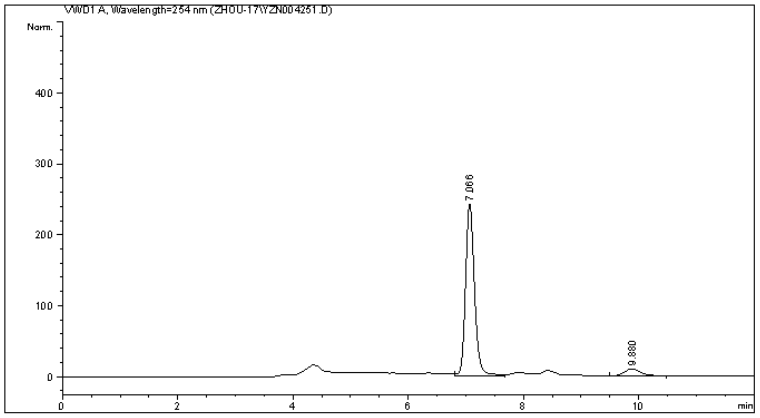

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   7.054 VV    0.1639 2791.10986  261.27496  50.4234
   2   9.801 BB    0.2853 2744.23730  146.61812  49.5766

Totals :                  5535.34717  407.89308

                          *** End of Report ***
```



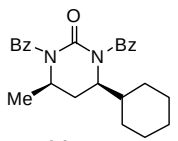
(+/-)-2o'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN004251.D
Sample Name: GF-7-17A

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/17/2017 10:41:23 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 5/17/2017 10:15:38 PM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 5/17/2017 10:55:36 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min,  30 oC, 254 nm
```



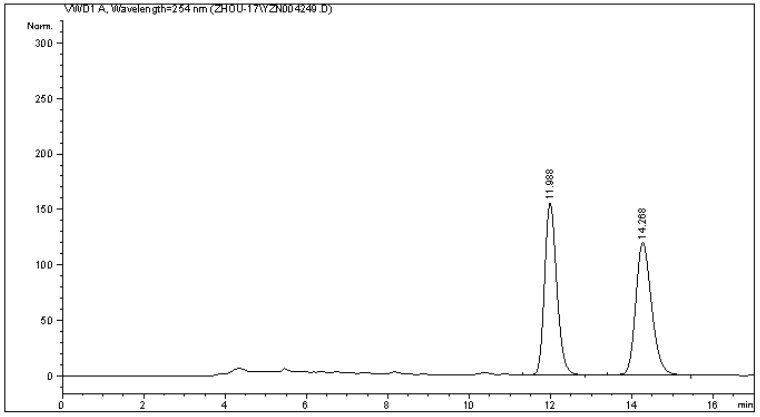

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   7.066 VV    0.1665 2653.20679  243.27797  93.1690
   2   9.880 BB    0.3018  194.52969    9.78569   6.8310

Totals :                  2847.73648  253.06366

                          *** End of Report ***
```



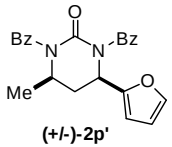
(+)-2o'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN004249.D
Sample Name: GF-7-11A(+-)

```
    ======================================================================
    Acq. Operator   : 0
    Acq. Instrument : Instrument 1                  Location : Vial 1
    Injection Date  : 5/17/2017 8:34:41 PM
    Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
    Last changed    : 5/17/2017 8:26:26 PM by 0
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
    Last changed    : 5/17/2017 8:52:44 PM by 0
                      (modified after loading)
    Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min,  30 oC, 254 nm
```



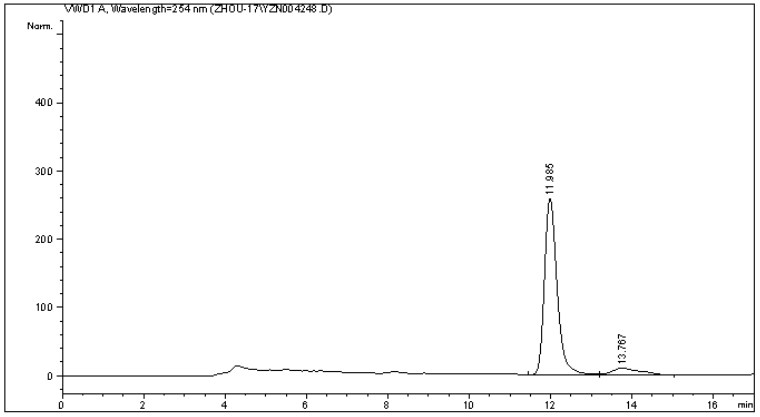

```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #  [min]        [min]  mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1  11.988 VB    0.3199 3224.85986  154.99306  49.8082
       2  14.268 BB    0.4190 3249.69873  119.58072  50.1918

    Totals :                  6474.55859  274.57378

    ======================================================================
                              *** End of Report ***
```



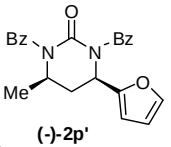
(+/-)-2p'

Data File C:\CHEM32\1\DATA\ZHOU-17\YZN004248.D
Sample Name: GF-7-11A

```
    ======================================================================
    Acq. Operator   : 0
    Acq. Instrument : Instrument 1                  Location : Vial 1
    Injection Date  : 5/17/2017 8:06:08 PM
    Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
    Last changed    : 5/17/2017 7:45:29 PM by 0
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
    Last changed    : 5/17/2017 8:29:41 PM by 0
                      (modified after loading)
    Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min,  30 oC, 254 nm
```



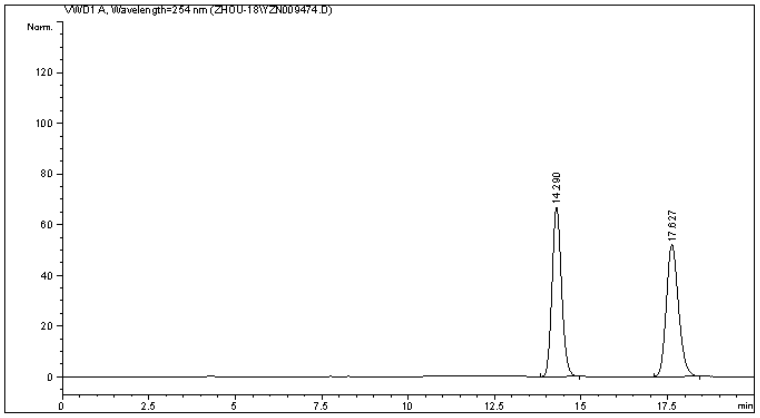

```
    ======================================================================
                              Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Use Multiplier & Dilution Factor with ISTDs


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #  [min]        [min]  mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1  11.985 VV    0.3321 5633.90039  259.29749  92.0322
       2  13.767 VB    0.6861  487.76224   10.09396   7.9678

    Totals :                  6121.66263  269.39145

    ======================================================================
                              *** End of Report ***
```



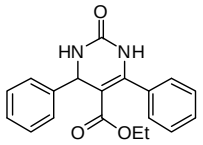
(-)-2p'

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009474.D
Sample Name: GF-9-77A(+-)

```
======================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/25/2018 7:47:05 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/25/2018 7:27:15 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 8/1/2018 2:56:39 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/iPrOH = 80/20, 0.7 mL/min, 30 oC, 254 nm
```



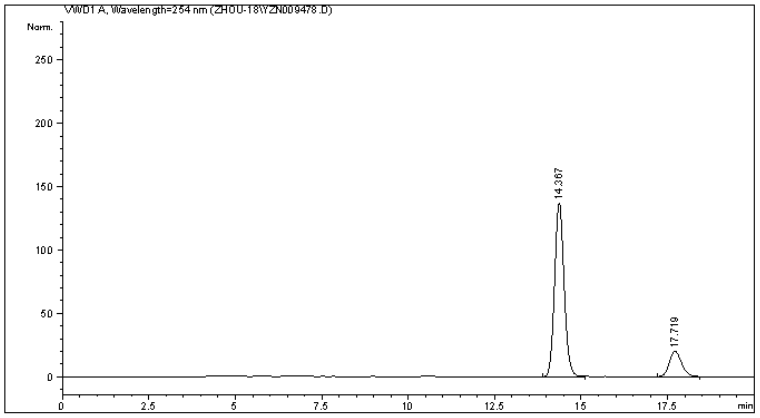

```
======================================================================
                        Area Percent Report
======================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.290 BB    0.2941 1276.25305   66.83783  49.9831
   2  17.627 BB    0.3786 1277.11487   51.93041  50.0169

Totals :                  2553.36792  118.76824

======================================================================
                        *** End of Report ***
```



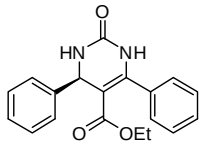
(+/-)-4a

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009478.D
Sample Name: GF-9-77A

```
======================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/25/2018 10:06:24 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/25/2018 10:04:51 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 8/1/2018 2:57:47 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/iPrOH = 80/20, 0.7 mL/min, 30 oC, 254 nm
```



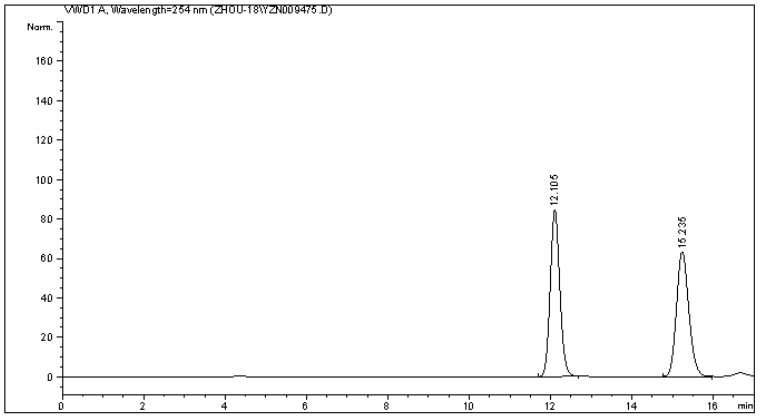

```
======================================================================
                        Area Percent Report
======================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.367 BB    0.2940 2619.87500  137.25410  84.2062
   2  17.719 BB    0.3776  491.38809   20.05382  15.7938

Totals :                  3111.26309  157.30793

======================================================================
                        *** End of Report ***
```



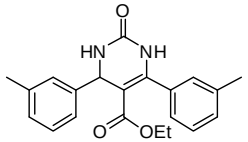
(+)-4a

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009475.D
Sample Name: GF-9-77B(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/25/2018 8:17:33 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/25/2018 8:13:23 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 8/1/2018 2:55:20 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/iPrOH = 80/20, 0.7 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.105 BB    0.2512 1379.69250   84.68136  50.7915
   2  15.235 BB    0.3263 1336.69434   63.34921  49.2085

Totals :                  2716.38684  148.03057
```

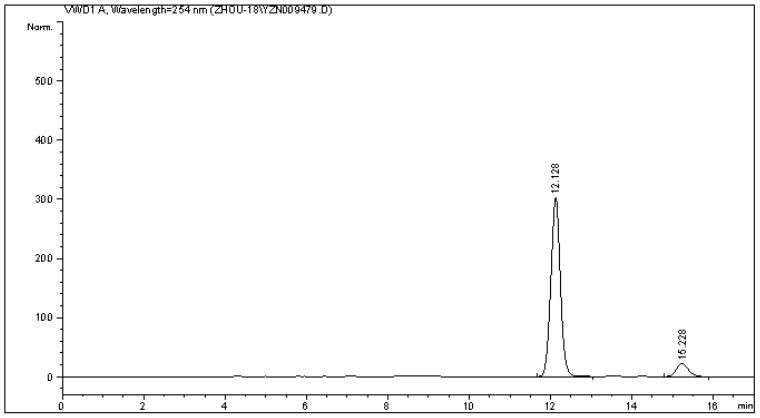


(+/-)-4b

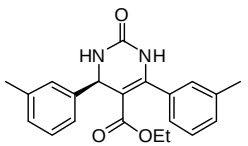
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009479.D
Sample Name: GF-9-77B

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/25/2018 10:28:33 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/25/2018 10:27:29 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 8/1/2018 2:54:14 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/iPrOH = 80/20, 0.7 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.128 BB    0.2498 4925.64209  302.29993  91.4323
   2  15.228 BB    0.3234  461.55756   22.00071   8.5677

Totals :                  5387.19965  324.30064
```

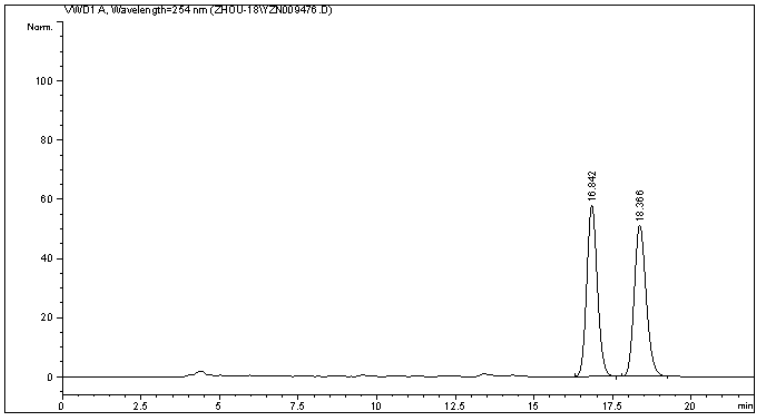


(+)-4b

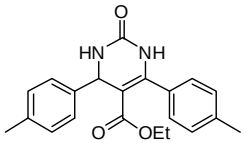
```
                          *** End of Report ***
```

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009476.D
Sample Name: GF-9-78A(+-)

```
==========================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/25/2018 8:49:54 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/25/2018 8:48:24 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 8/1/2018 2:52:41 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/iPrOH = 80/20, 0.7 mL/min, 30 oC, 254 nm
```



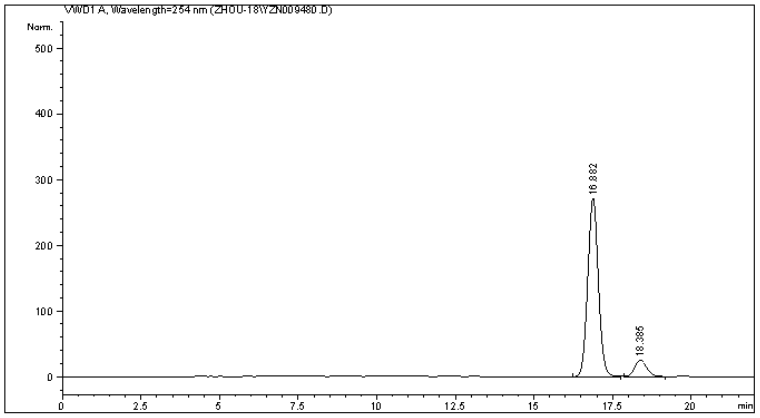

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  16.842 BB    0.3621 1355.86792   57.88870  50.0842
   2  18.366 BB    0.4074 1351.31018   51.11972  49.9158

Totals :                  2707.17810  109.00842

==========================================================================
                        *** End of Report ***
```



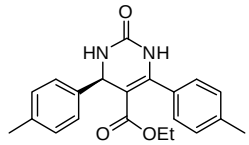
(+/-)-4c

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009480.D
Sample Name: GF-9-78A

```
==========================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/25/2018 10:50:45 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/25/2018 10:48:46 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 8/1/2018 2:51:36 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/iPrOH = 80/20, 0.7 mL/min, 30 oC, 254 nm
```



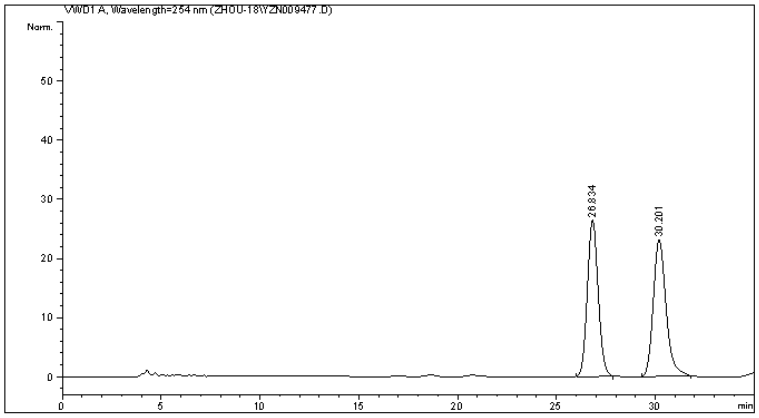

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  16.882 BB    0.3630 6386.17969  271.74756  90.4997
   2  18.385 BB    0.4124  670.39899   25.07199   9.5003

Totals :                  7056.57867  296.81955

==========================================================================
                        *** End of Report ***
```



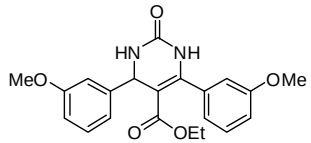
(+)-4c

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009477.D
Sample Name: GF-9-78B(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/25/2018 9:28:48 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/25/2018 9:27:27 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 8/1/2018 2:47:49 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/iPrOH = 80/20, 0.7 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  26.834 BB    0.5917 1009.63599   26.40708  49.1765
   2  30.201 BB    0.6908 1043.45178   23.06831  50.8235

Totals :                  2053.08777   49.47539
```

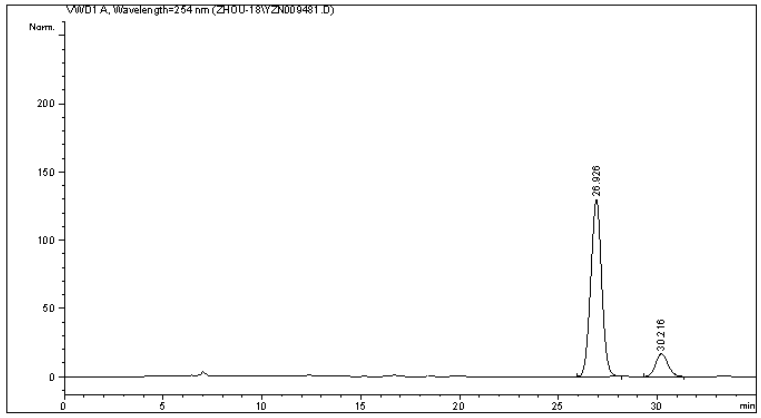


(+/-)-4d

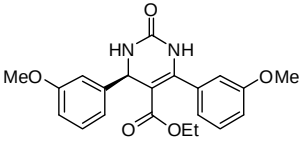
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009481.D
Sample Name: GF-9-78B

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/25/2018 11:17:09 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/25/2018 11:15:33 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 8/1/2018 2:49:51 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/iPrOH = 80/20, 0.7 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  26.926 BB    0.5987 4994.88574  129.45207  87.2827
   2  30.216 BB    0.6834  727.76941   16.64476  12.7173

Totals :                  5722.65515  146.09683
```

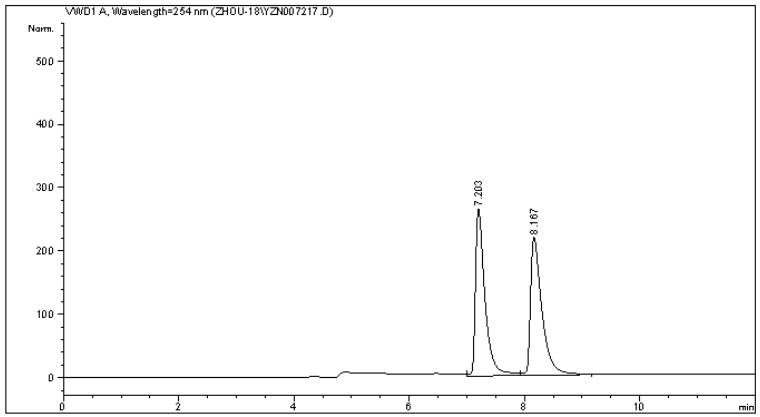


(+)-4d

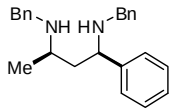
```
                          *** End of Report ***
```

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN007217.D
Sample Name: GF-7-36B-S3(+-)

```
==================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/13/2018 8:40:32 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 1/13/2018 8:45:41 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/8/2018 2:56:12 PM
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 85/15 (0.05% Et3N), 0.6 mL/min, 3
                  0 oC, 254 nm
```



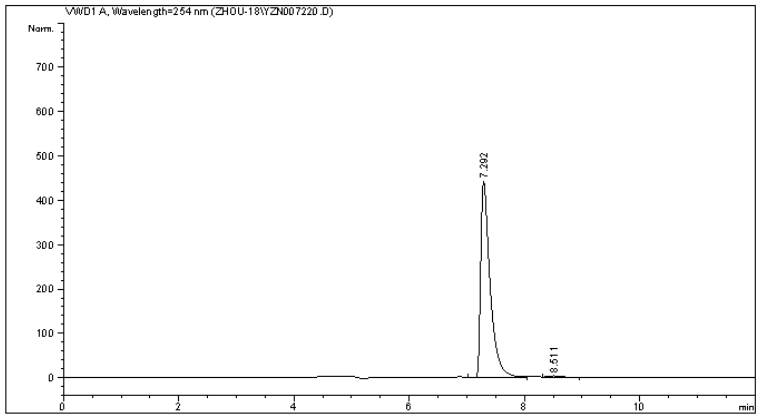

```
==================================================================
                      Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1   7.203 VV    0.1700 3051.06592  263.53506  50.3189
   2   8.167 VV    0.2022 3012.39844  217.75444  49.6811

Totals :                  6063.46436  481.28951

==================================================================
                      *** End of Report ***
```



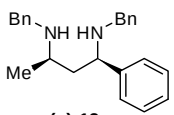
(+/-)-12

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN007220.D
Sample Name: GF-7-36B-S3

```
==================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/13/2018 10:00:47 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 1/13/2018 10:06:01 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/8/2018 2:54:03 PM
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 85/15 (0.05% Et3N), 0.6 mL/min, 3
                  0 oC, 254 nm
```




```
==================================================================
                      Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1   7.292 VV    0.1675 5020.94678  441.91907  98.8832
   2   8.511 VB    0.2314   56.70562    3.63624   1.1168

Totals :                  5077.65239  445.55530

==================================================================
                      *** End of Report ***
```



(+)-12