Electronic Supplementary Material (ESI) for Organic Chemistry Frontiers.

Supporting Information

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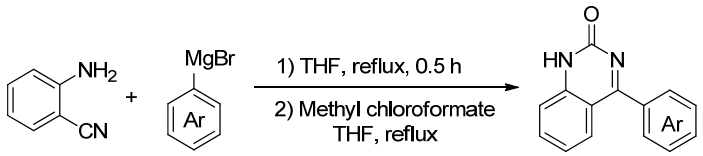
1. General and Materials

General: All reactions were carried out under an atmosphere of nitrogen using the standard Schlenk techniques, unless otherwise noted. ^{1}H NMR and ^{13}C NMR spectra were recorded at room temperature in $CDCl_3$, CD_3OD, DMSO-d_6 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.

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

2. Synthesis of Quinazolinone Derivatives

Quinazolinone derivatives **1** can be conveniently synthesized according to the known literature procedure.[1] Among them, the quinazolinones **1a**,[1] **1d**,[2] **1g**,[3] **1i**,[4] **1j**,[5] **1k**,[6] **1l**,[7] **1m**,[8] **1n**[9] and **1o**[10] are the known compounds.



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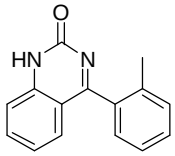
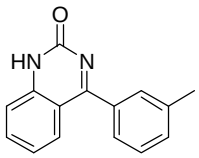
General procedure: the Grignand reagent was prepared by reaction of magnesium (288 mg, 12 mmol) with the corresponding aryl bromide (15.6 mmol) in dry tetrahydrofuran under reflux. Then, the 2-aminobenzonitrile (708 mg, 6.0 mmol) in dry tetrahydrofuran (8 mL) was added dropwise under reflux. After a refluxed period (2 h), the mixture was cooled to 0 ^{o}C, methyl chloroformate (977 mg, 9.0 mmol) was added dropwise, and the solution was refluxed for 14 h. The mixture was cooled to room temperature and poured into the hydrochloric acid solution (2 M), then neutralized with 10% sodium bicarbonate solution and extracted with dichloromethane. The combined organic layer was dried over anhydrous sodium sulfate, concentrated in *vacuo*. The residue was further purified by flash column chromatography using dichloromethane/methanol as eluent to afford the desired quinazolinones **1**.

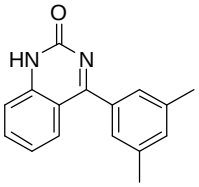
4-*o*-Tolylquinazolin-2(1*H*)-one (1b): 1.066 g, 75% yield, white solid, mp: 262-263 ^{o}C, new compound, R_f = 0.30 (dichloromethane/methanol = 15/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 13.05 (s, 1H), 7.73–7.68 (m, 1H), 7.59 (d, *J* = 8.2 Hz, 1H), 7.45–7.41 (m, 2H), 7.36–7.33 (m, 3H), 7.20–7.16 (m, 1H), 2.26 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 179.4, 159.3, 143.6, 137.0, 136.5, 136.4, 131.4, 130.4, 129.5, 129.4, 126.4, 124.1, 117.5, 117.2, 20.6; HRMS (ESI) *m/z* Calculated for $C_{15}H_{13}N_2O$ $[M+H]^+$ 237.1022, found 237.1027.



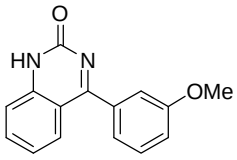
4-*m*-Tolylquinazolin-2(1*H*)-one (1c): 1.134 g, 80% yield, white solid, mp: 232-233 ^{o}C, new compound, R_f = 0.30 (dichloromethane/methanol = 15/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.90 (d, *J* = 8.2 Hz, 1H), 7.73–7.58 (m, 4H), 7.45–7.39 (m, 2H), 7.30–7.16 (m, 1H),, 2.47 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 176.6, 158.2, 143.2, 138.2, 136.3, 135.1, 131.4, 130.3, 128.7, 128.0, 126.8, 122.9, 116.6, 115.3, 21.3; HRMS (ESI) *m/z* Calculated for $C_{15}H_{13}N_2O$ $[M+H]^+$ 237.1022, found 237.1024.



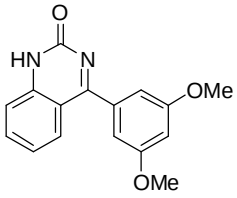
4-(3,5-Dimethylphenyl)quinazolin-2(1*H*)-one (1e): 0.945 g (4.0 mmol scale), 95% yield, white solid, mp: 290-291 °C, new compound, R_f = 0.30 (dichloromethane/methanol = 15/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.91 (d, *J* = 8.2 Hz, 1H), 7.73–7.62 (m, 2H), 7.43 (s, 2H), 7.27–7.21 (m, 2H), 2.43 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 177.8, 159.2, 144.2, 138.9, 137.3, 136.0, 133.3, 129.8, 128.5, 123.8, 117.6, 116.3, 22.1; HRMS (ESI) *m/z* Calculated for $C_{16}H_{15}N_2O$ $[M+H]^+$ 251.1179, found 251.1181.



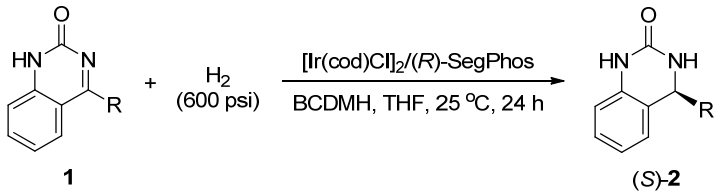
4-(3-Methoxyphenyl)quinazolin-2(1*H*)-one (1f): 0.920 g (4.0 mmol scale), 92% yield, white solid, mp: 254-255 °C, new compound, R_f = 0.32 (dichloromethane/methanol = 15/1); ^{1}H NMR (400 MHz, DMSO-d_6) δ 7.73 (t, *J* = 7.8 Hz, 1H), 7.65 (d, *J* = 8.2 Hz, 1H), 7.48 (t, *J* = 7.8 Hz, 1H), 7.37 (d, *J* = 8.4 Hz, 1H), 7.22–7.15 (m, 4H), 3.82 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 176.1, 160.4, 144.7, 139.1, 136.4, 130.9, 129.6, 123.6, 122.6, 117.4, 116.8, 115.5, 115.5, 110.8, 56.6; HRMS (ESI) *m/z* Calculated for $C_{15}H_{13}N_2O_2$ $[M+H]^+$ 253.0972, found 253.0974.



4-(3,5-Dimethoxyphenyl)quinazolin-2(1*H*)-one (1h): 0.857 g (4.0 mmol scale), 76% yield, white solid, mp: 255-256 °C, new compound, R_f = 0.30 (dichloromethane/methanol = 15/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.94 (d, *J* = 8.2 Hz, 1H), 7.72 (t, *J* = 7.6 Hz, 1H), 7.61 (d, *J* = 8.2 Hz, 1H), 7.26 (d, *J* = 6.3 Hz, 2H), 6.92 (d, *J* = 1.4 Hz, 2H), 6.67 (s, 1H), 3.87 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 177.4, 161.5, 159.0, 144.1, 139.1, 136.2, 129.7, 123.9, 117.5, 116.2, 108.6, 103.9, 56.5; HRMS (ESI) *m/z* Calculated for $C_{16}H_{15}N_2O_3$ $[M+H]^+$ 283.1077, found 283.1079.



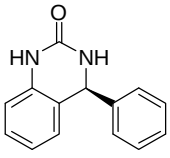
3. General Procedure for Asymmetric Hydrogenation of Quinazolinones



1 (*S*)-**2**

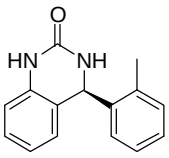
A mixture of $[Ir(cod)Cl]_2$ (1.3 mg, 0.002 mmol) and (*R*)-SegPhos (2.8 mg, 0.0044 mmol) in tetrahydrofuran (1.0 mL) was stirred at room temperature for 10 min in a glovebox, then BCDMH (4.8 mg, 0.02 mmol) and substrates **1** (0.2 mmol) together with tetrahydrofuran (2.0 mL) were added and the mixture was stirred for a further 10 min. The hydrogenation was performed at 25 °C under hydrogen gas (600 psi) in a stainless steel autoclave for 24 h. After carefully releasing the hydrogen gas, saturated aqueous sodium bicarbonate (3.0 mL) was added into the mixture and stirred for 10-15 min. The mixture was extracted with dichloromethane three times and the combined organic extract was dried over anhydrous sodium sulfate. After filtration, the filtrate was concentrated in *vacuo* and further purification was performed by a silica gel column eluted with hexanes/ethyl acetate (or dichloromethane/methanol) to give the desired products **2**.

(*S*)-(-)-4-Phenyl-3,4-dihydroquinazolin-2(1*H*)-one (2a): 41 mg, 91% yield, white solid, the known compound,[10] 98% ee, $[\alpha]^{20}_D$ = -110.4 (*c* 0.92, MeOH), R_f = 0.31 (dichloromethane/methanol = 15/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35–7.28 (m, 5H), 7.14–7.10 (m, 1H), 6.88–6.79 (m, 3H), 5.64 (s, 1H); ^{13}C NMR (100 MHz, CD_3OD) δ 155.4, 144.2, 136.0, 128.4, 127.9, 127.5, 126.7, 126.5, 122.0, 121.5, 114.0, 57.8; Enantiomeric excess was determined by HPLC (OD-H column, *n*-Hexane/

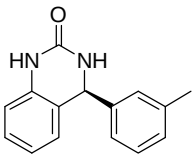


i-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t_1 = 16.9 min (major), t_2 = 20.7 min.

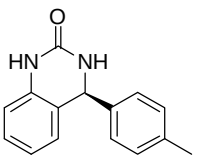
(-)-4-*o*-Tolyl-3,4-dihydroquinazolin-2(1*H*)-one (2b): 46 mg, 97% yield, white solid, mp: 117-118 °C, new compound, 92% ee, $[\alpha]^{20}_D$ = -74.2 (*c* 0.26, MeOH), R_f = 0.35 (dichloromethane /methanol = 15/1); ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.24 (s, 1H), 7.21–7.09 (m, 6H), 6.85–6.82 (m, 1H), 6.79–6.75 (m, 1H), 6.70 (d, *J* = 7.2 Hz, 1H), 5.81 (d, *J* = 1.8 Hz, 1H), 2.39 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 153.7, 143.0, 137.8, 135.5, 131.2, 128.6, 128.3, 127.9, 126.9, 126.8, 121.7, 121.6, 114.3, 54.7, 19.5; Enantiomeric excess was determined by HPLC (OD-H column, *n*-Hexane/*i*-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t_1 = 12.6 min (major), t_2 = 14.7 min; HRMS (ESI) *m/z* Calculated for $C_{15}H_{15}N_2O$ $[M+H]^+$ 239.1179, found 239.1177.



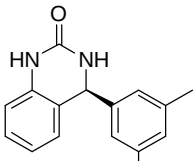
(-)-4-*m*-Tolyl-3,4-dihydroquinazolin-2(1*H*)-one (2c): 42 mg, 90% yield, white solid, mp: 210-211 °C, new compound, 96% ee, $[\alpha]^{20}_D$ = -78.3 (*c* 0.66, MeOH), R_f = 0.35 (dichloromethane /methanol = 15/1); ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.21 (s, 1H), 7.38 (s, 1H), 7.20 (t, *J* = 7.5 Hz, 1H), 7.10–7.00 (m, 5H), 6.80 (t, *J* = 6.8 Hz, 2H), 5.47 (s, 1H), 2.26 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 154.2, 145.5, 138.1, 137.4, 128.9, 128.4, 128.3, 127.2, 123.9, 122.1, 121.5, 114.3, 57.2, 21.6; Enantiomeric excess was determined by HPLC (OD-H column, *n*-Hexane/*i*-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t_1 = 16.5 min (major), t_2 = 19.7 min; HRMS (ESI) *m/z* Calculated for $C_{15}H_{15}N_2O$ $[M+H]^+$ 239.1179, found 239.1177.



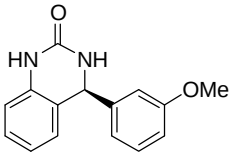
(-)-4-*p*-Tolyl-3,4-dihydroquinazolin-2(1*H*)-one (2d): 45 mg, 97% yield, white solid, known compound,[2] 95% ee, $[\alpha]^{20}_D$ = -135.8 (*c* 0.33, MeOH), R_f = 0.30 (dichloromethane/ methanol = 15/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.96 (s, 1H), 7.26–7.22 (m, 2H), 7.15–7.07 (m, 3H), 6.86–6.78 (m, 3H), 5.93 (s, 1H), 5.60 (s, 1H), 2.31 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.2, 140.1, 138.0, 136.0, 129.6, 128.3, 127.1, 126.9, 122.3, 121.5, 114.6, 58.3, 21.1; Enantiomeric excess was determined by chiral HPLC (OD-H column, *n*-Hexane/*i*-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t_1 = 18.5 min (major), t_2 = 22.6 min.



(-)-4-(3,5-Dimethylphenyl)-3,4-dihydroquinazolin-2(1*H*)-one (2e): 46 mg, 91% yield, white solid, mp: 200-201 °C, new compound, 96% ee, $[\alpha]^{20}_D$ = -140.8 (*c* 0.24, MeOH), R_f = 0.35 (dichloromethane/methanol = 15:1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 (s, 1H), 7.17–7.13 (m, 1H), 6.96 (s, 3H), 6.89–6.82 (m, 2H), 6.76 (d, *J* = 7.8 Hz, 1H), 5.58 (s, 1H), 5.27 (s, 1H), 2.30 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 154.3, 142.7, 138.7, 135.7, 130.0, 128.4, 127.1, 125.0, 122.4, 121.4, 114.3, 58.8, 21.3; Enantiomeric excess was determined by HPLC (OD-H column, *n*-Hexane /*i*-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t_1 = 13.1 min (major), t_2 = 16.8 min; HRMS (ESI) *m/z* Calculated for $C_{16}H_{17}N_2O$ $[M+H]^+$ 253.1335, found 253.1337.

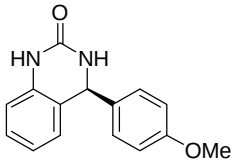


(-)-4-(3-Methoxyphenyl)-3,4-dihydroquinazolin-2(1*H*)-one (2f): 45 mg, 88% yield, white solid, mp: 175-176 °C, new compound, 95% ee, $[\alpha]^{20}_D$ = -70.4 (*c* 0.82, MeOH), R_f = 0.40 (neat ethyl acetate); ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.26 (s, 1H), 7.44 (s, 1H), 7.24 (t, *J* = 7.8 Hz, 1H), 7.13–7.07 (m, 2H), 6.88–6.81 (m, 5H), 5.50 (s, 1H), 3.72 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 159.8, 154.2, 147.0, 137.4, 130.2, 128.3, 127.2, 122.0, 121.6, 118.8, 114.4, 112.8, 112.7, 57.0, 55.5; Enantiomeric excess was determined by HPLC (IC column, *n*-Hexane/*i*-PrOH = 80/20,

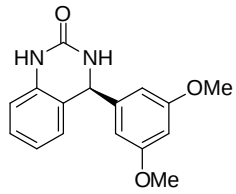


detector: 254 nm, flow rate: 0.80 mL/min, 30 °C), t_1 = 15.7 min, t_2 = 25.8 min (major); HRMS (ESI) *m/z* Calculated for $C_{15}H_{15}N_2O_2$ $[M+H]^+$ 255.1128, found 255.1126.

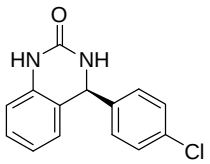
(-)-4-(4-Methoxyphenyl)-3,4-dihydroquinazolin-2(1*H*)-one (2g): 50 mg, 98% yield, white solid, mp: 236-237 °C, new compound, 91% ee, $[\alpha]^{20}_D$ = -85.6 (*c* 0.55, MeOH), R_f = 0.40 (dichloromethane/methanol = 15/1); ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.24 (s, 1H), 7.38 (s, 1H), 7.21 (d, *J* = 8.6 Hz, 2H), 7.11 (t, *J* = 7.6 Hz, 1H), 7.00 (d, *J* = 7.6 Hz, 1H), 6.89 (d, *J* = 8.6 Hz, 2H), 6.82 (t, *J* = 7.4 Hz, 2H), 5.48 (d, *J* = 1.8 Hz, 1H), 3.72 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 159.0, 154.2, 137.6, 137.4, 128.2, 128.0, 127.2, 122.5, 121.5, 114.3, 56.6, 55.6; Enantiomeric excess was determined by HPLC (OD-3 column, *n*-Hexane/*i*-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t_1 = 24.0 min, t_2 = 25.7 min (major); HRMS (ESI) *m/z* Calculated for $C_{15}H_{15}N_2O_2$ $[M+H]^+$ 255.1128, found 255.1133.



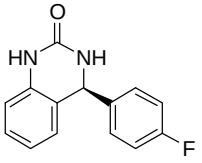
(-)-4-(3,5-Dimethoxyphenyl)-3,4-dihydroquinazolin-2(1*H*)-one (2h): 52 mg, 91% yield, white solid, mp: 115-116 °C, new compound, 95% ee, $[\alpha]^{20}_D$ = -85.5 (*c* 0.60, MeOH), R_f = 0.30 (dichloromethane/methanol = 15/1); ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.19 (s, 1H), 7.36 (s, 1H), 7.10–7.05 (m, 2H), 6.82–6.76 (m, 2H), 6.42 (d, *J* = 1.8 Hz, 2H), 6.36 (s, 1H), 5.40 (d, *J* = 1.8 Hz, 1H), 3.67 (s, 6H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 160.5, 153.7, 147.2, 136.9, 127.8, 126.7, 121.3, 121.0, 113.8, 104.5, 98.4, 56.6, 55.1; Enantiomeric excess was determined by HPLC (IA column, *n*-Hexane/*i*-PrOH = 75/25, detector: 254 nm, flow rate: 0.90 mL/min, 30 °C), t_1 = 12.0 min (major), t_2 = 21.0 min; HRMS (ESI) *m/z* Calculated for $C_{16}H_{17}N_2O_3$ $[M+H]^+$ 285.1234, found 285.1236.



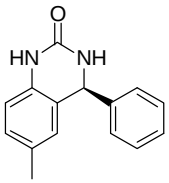
(-)-4-(4-Chlorophenyl)-3,4-dihydroquinazolin-2(1*H*)-one (2i): 50 mg, 97% yield, white solid, the known compound,[11] 98% ee, $[\alpha]^{20}_D$ = -168.9 (*c* 0.54, MeOH), R_f = 0.42 (dichloromethane/methanol = 15/1); ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.27 (s, 1H), 7.47 (s, 1H), 7.40 (d, *J* = 8.6 Hz, 2H), 7.31 (d, *J* = 8.4 Hz, 2H), 7.12 (t, *J* = 7.6 Hz, 1H), 7.05 (d, *J* = 7.4 Hz, 1H), 6.83 (t, *J* = 7.6 Hz, 2H), 5.56 (s, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 154.1, 144.4, 137.4, 132.4, 129.0, 128.6, 128.5, 127.2, 121.7, 121.6, 114.5, 56.4; Enantiomeric excess was determined by HPLC (OD-3 column, *n*-Hexane/*i*-PrOH = 90/10, detector: 254 nm, flow rate: 0.90 mL/min, 30 °C), t_1 = 19.3 min, t_2 = 20.1 min (major).



(-)-4-(4-Fluorophenyl)-3,4-dihydroquinazolin-2(1*H*)-one (2j): 46 mg, 95% yield, white solid, the known compound [CAS: 1781596-98-2], 97% ee, $[\alpha]^{20}_D$ = -88.3 (*c* 0.30, MeOH), R_f = 0.38 (dichloromethane/methanol = 15/1); ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.32 (s, 1H), 7.50 (s, 1H), 7.36–7.32 (m, 2H), 7.19–7.10 (m, 3H), 7.04 (d, *J* = 7.2 Hz, 1H), 6.86–6.82 (m, 2H), 5.58 (d, *J* = 2.4 Hz, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 161.9 (d, *J* = 243.2 Hz), 154.2, 141.7, 141.6, 137.4, 128.8 (d, *J* = 8.3 Hz), 128.4, 127.2, 121.9, 121.7, 115.7 (d, *J* = 21.4 Hz), 114.5, 56.4; ^{19}F NMR (376 MHz, DMSO-d_6) δ -115.36; Enantiomeric excess was determined by HPLC (OD-3 column, *n*-Hexane /*i*-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t_1 = 15.4 min, t_2 = 16.6 min (major).

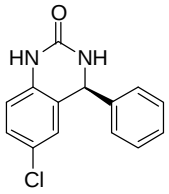


(-)-6-Methyl-4-phenyl-3,4-dihydroquinazolin-2(1*H*)-one (2k): 45 mg, 95% yield, white solid, the known compound,[12] 97% ee, $[\alpha]^{20}_D$ = -31.1 (*c* 0.46, MeOH), R_f = 0.25 (dichloromethane/methanol = 30/1); ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.18 (s, 1H), 7.39–7.22 (m, 6H), 6.92 (d, *J* =

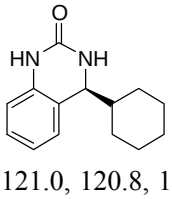


8.0 Hz, 1H), 6.85 (s, 1H), 6.73 (d, *J* = 8.0 Hz, 1H), 5.47 (s, 1H), 2.14 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 154.3, 145.6, 135.0, 130.3, 129.0, 128.8, 127.8, 127.5, 126.7, 121.9, 114.3, 57.3, 20.8; Enantiomeric excess was determined by HPLC (OD-H column, *n*-Hexane/*i*-PrOH = 95/05, detector: 254 nm, flow rate: 0.70 mL/ min, 30 ^{o}C), t_1 = 44.7 min (major), t_2 = 51.8 min.

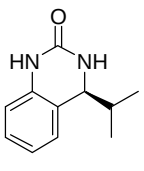
(-)-6-Chloro-4-phenyl-3,4-dihydroquinazolin-2(1*H*)-one (2l): 50 mg, 97% yield, white solid, the known compound,[10] 96% ee, $[\alpha]^{20}_{D}$ = -12.2 (*c* 0.49, MeOH), R_f = 0.23 (dichloromethane/ methanol = 25/1); ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.40 (s, 1H), 7.54 (s, 1H), 7.37–7.25 (m, 5H), 7.18–7.04 (m, 2H), 6.83 (d, *J* = 8.4 Hz, 1H), 5.55 (d, *J* = 2.4 Hz, 1H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 153.9, 145.0, 136.5, 129.2, 128.2, 128.0, 126.8, 126.6, 125.0, 124.1, 116.0, 56.6; Enantiomeric excess was determined by HPLC (OD-H column, *n*-Hexane/*i*-PrOH = 90/10, detector: 254 nm, flow rate: 0.70 mL/min, 30 ^{o}C), t_1 = 21.4 min (major), t_2 = 23.9 min.



(-)-6,7-Dimethoxy-4-phenyl-3,4-dihydroquinazolin-2(1*H*)-one (2m): 48 mg, 85% yield, white solid, mp: 110- 111 ^{o}C, new compound, 93% ee, $[\alpha]^{20}_{D}$ = -53.5 (*c* 0.54, MeOH), R_f = 0.35 (dichloromethane/methanol = 25/1); ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.97 (s, 1H), 7.34–7.28 (m, 5H), 7.25–7.21 (m, 1H), 6.69 (s, 1H), 6.48 (s, 1H), 5.42 (d, *J* = 2.6 Hz, 1H), 3.68 (d, *J* = 4.0 Hz, 3H), 3.60 (s, 3H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 154.2, 149.2, 145.7, 143.9, 131.2, 129.0, 127.6, 126.6, 113.0, 111.6, 99.3, 57.0, 56.6, 55.9; Enantiomeric excess was determined by HPLC (IC column, *n*-Hexane/*i*-PrOH = 72/28, detector: 254 nm, flow rate: 0.80 mL/min, 30 ^{o}C), t_1 = 15.7 min (major), t_2 = 17.2 min; HRMS (ESI) *m/z* Calculated for $C_{16}H_{16}N_2O_3$ $[M+H]^+$ 285.1234, found 285.1235.

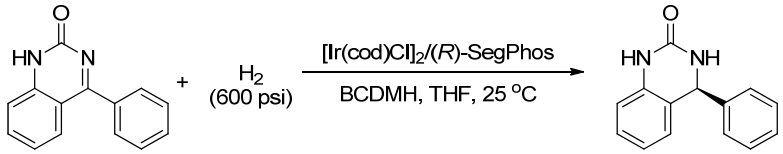


(+)-4-Cyclohexyl-3,4-dihydroquinazolin-2(1*H*)-one (2n): 42 mg, 91% yield, white solid, mp: 130- 131 ^{o}C, new compound, 96% ee, $[\alpha]^{20}_{D}$ = +14.3 (*c* 0.40, MeOH), R_f = 0.33 (dichloromethane /methanol = 15/1); ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.97 (s, 1H), 7.12–7.08 (m, 1H), 7.03–6.95 (m, 2H), 6.87–6.83 (m, 1H), 6.77–6.75 (m, 1H), 4.10 (t, *J* = 3.8 Hz, 1H), 1.66 (t, *J* = 9.0 Hz, 2H), 1.61–1.48 (m, 3H), 1.44–1.36 (m, 1H), 1.19–0.90 (m, 5H); ^{13}C NMR (100 MHz, DMSO-d_6) δ 154.8, 138.6, 127.9, 127.2, 121.0, 120.8, 113.8, 58.6, 46.8, 28.6, 27.1, 26.4, 26.2, 26.1; Enantiomeric excess was determined by HPLC (IC column, *n*-Hexane/*i*-PrOH = 92/08, detector: 254 nm, flow rate: 1.0 mL/min, 30 ^{o}C), t_1 = 21.1 min (major), t_2 = 22.5 min; HRMS (ESI) *m/z* Calculated for $C_{14}H_{19}N_2O$ $[M+H]^+$ 231.1492, found 231.1492.



(+)-4-Isopropyl-3,4-dihydroquinazolin-2(1*H*)-one (2o): 35 mg, 92% yield, white solid, the known compound,[10] 86% ee, $[\alpha]^{20}_{D}$ = +20.2 (*c* 0.56, MeOH), R_f = 0.40 (dichloromethane/ methanol = 15/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09 (s, 1H), 7.17–7.13 (m, 1H), 7.03 (d, *J* = 7.4 Hz, 1H), 6.95 (t, *J* = 7.4 Hz, 1H), 6.73 (d, *J* = 7.8 Hz, 1H), 5.61 (s, 1H), 4.36 (t, *J* = 3.4 Hz, 1H), 2.00–1.91 (m, 1H), 0.99 (d, *J* = 6.8 Hz, 3H), 0.87 (d, *J* = 6.8 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.5, 136.7, 128.1, 126.6, 121.9, 120.3, 114.2, 60.0, 36.7, 18.5, 16.0; Enantiomeric excess was determined by HPLC (IC column, *n*-Hexane/*i*-PrOH = 90/10, detector: 254 nm, flow rate: 1.0 mL/min, 30 ^{o}C), t_1 = 13.2 min (major), t_2 = 14.4 min.

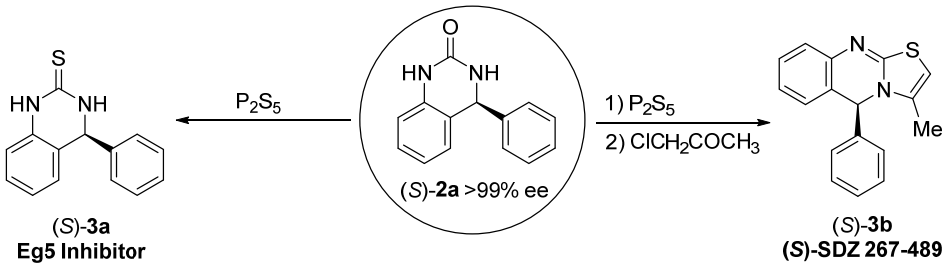
4. Asymmetric Hydrogenation at Gram Scale



1a (*S*)-**2a**

A mixture of $[Ir(cod)Cl]_2$ (15.1 mg, 0.0225 mmol) and (*R*)-SegPhos (30.2 mg, 0.0495 mmol) in tetrahydrofuran (3.0 mL) was stirred at r.t. for 15 min in a glovebox, then BCDMH (108.7 mg, 0.45 mmol) and substrate **1a** (1.000 g, 4.5 mmol) together with tetrahydrofuran (13 mL) were added and the mixture was stirred for a further 10 min. The hydrogenation was performed at 25 °C under hydrogen (600 psi) in a stainless steel autoclave for 36 h. After carefully releasing the hydrogen, saturated aqueous sodium bicarbonate (10 mL) was added into the mixture and stirred for 10-15 min. The mixture was extracted with dichloromethane three times and the combined organic extract was dried over anhydrous sodium sulfate. After filtration, the filtrate was concentrated in *vacuo* and further purification was performed by a silica gel column with dichloromethane/methanol as eluent to give the desired product (*S*)-**2a** 0.931 g in 92% yield and 97% ee.

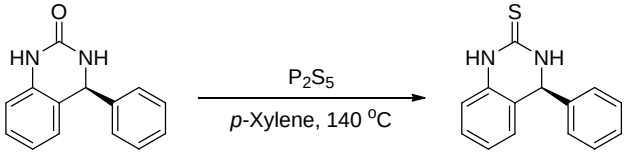
5. Synthesis of Bioactive Moelucules



(*S*)-**3a** Eg5 Inhibitor

(*S*)-**3b** **(*S*)-SDZ 267-489**

The above synthetic methodology has been used as key step for facile syntheses of bioactive molecules. For example, (*S*)-**2a** could be converted into chiral thiourea (*S*)-**3a** with P_2S_5 in 67% yield, which is the Eg5 inhibitor.[13] (*S*)-SDZ 267-489 **3b**, a serum HDL cholesterol raising agent,[14] could be also synthesized in two steps from chiral (*S*)-**2a**.



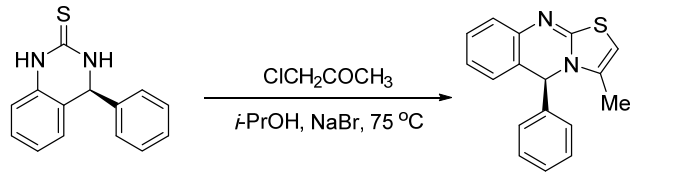
(*S*)-**2a** >99% ee

(*S*)-**3a Eg5 Inhibitor**
67% yield, >99% ee

The Synthesis of Eg5 Inhibitor: A mixture of (*S*)-**2a** (44.9 mg, 0.2 mmol, >99 ee) and P_2S_5 (38.3 mg, 0.2 mmol) in *p*-xylene (3 mL) was heated at 140 °C for 11 h under a nitrogen atmosphere. After being cooled to room temperature, the mixture was concentrated in *vacuo* and further purification was performed by a silica gel column eluted with hexanes/ethyl acetate to give the desired product (*S*)-**3a**.

(*S*)-4-Phenyl-3,4-dihydroquinazoline-2(*1H*)-thione (3a): 32 mg, 67% yield, white solid, the known compound,[13,14] >99% ee, $[\alpha]^{20}_D$ = -160.41 (*c* 0.24, MeOH), R_f = 0.55 (hexanes/ethyl acetate = 3/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.30 (s, 1H), 7.39-7.28 (m, 6H), 7.21-7.14 (m, 1H), 6.99-6.90 (m, 2H), 6.82 (d, J = 7.6 Hz, 1H), 5.66 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 174.6, 141.7, 133.5, 129.1, 128.8, 128.7, 127.5, 127.2, 124.3, 120.8, 114.4, 59.0; Enantiomeric excess

was determined by HPLC (OD-H column, *n*-Hexane/*i*-PrOH = 80/20, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t_1 = 7.5 min (major), t_2 = 9.6 min.



(*S*)-**3a,** >99% ee

(*S*)-**3b (S)-SDZ 267-489**
83% yield, 99% ee

The Synthesis of (*S*)-SDZ 267-489: A mixture of (*S*)-**3a** (48.1 mg, 0.20 mmol) and sodium bromide (4.1 mg, 0.04 mmol) was suspended in *i*-propanol (3 mL) and heated to 75 °C under a nitrogen atmosphere. To the rapidly stirred mixture was added chloroacetone (21 uL, 0.26 mmol) and the reaction was stirred at 75 °C for 3 h. After being cooled to room temperature, the mixture was concentrated in *vacuo* and further purification was performed by a silica gel column eluted with hexanes/ethyl acetate to give the desired product **3b** (*S*)-SDZ 267-489.

(*S*)-3-Methyl-5-phenyl-5*H*-thiazolo[2,3-*b*]quinazoline (3b): 46 mg, 83% yield, pale yellow solid, the known compound,[14] 99% ee, $[\alpha]^{20}_D$ = -117.85 (*c* 0.70, MeOH), [lit.[14] $[\alpha]^{25}_D$ = -181.1 (*c* 1.0, MeOH)], R_f = 0.30 (hexanes/ethyl acetate = 1/1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30-7.21 (m, 5H), 7.16-7.09 (m, 1H), 7.08-7.03 (m, 1H), 7.00-6.95 (m, 1H), 6.92-6.85 (m, 1H), 6.18 (s, 1H), 5.69 (s, 1H), 1.93 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 163.5, 143.6, 141.0, 134.6, 129.3, 128.8, 128.3, 126.6, 125.2, 123.4, 123.2, 121.3, 96.9, 61.0, 14.3; Enantiomeric excess was determined by HPLC (IC column, *n*-Hexane/*i*-PrOH = 80/20, detector: 254 nm, flow rate: 1.0 mL/min, 30 °C), t_1 = 19.1 min, t_2 = 20.5 min (major).

6. The Determination of Absolute Configuration

4-Phenyl-3,4-dihydroquinazolin-2(1*H*)-one (-)-**2a** was recrystallized in dichloromethane and *n*-hexane, optically pure product (> 99% ee) could be obtained. Then, a crystal was grown from dichloromethane and diethyl ether, which is suitable for X-ray diffraction analysis. The structure in **Figure S1** shows that the absolute configuration of (-)-**2a** is (4*S*). [CCDC 1480606] contains the structure and supplementary crystallographic data. These data can be obtained free of charge from the Cambridge Crystallographic Data Centre *via* www. ccdc.com.ac.uk/data_request/cif.

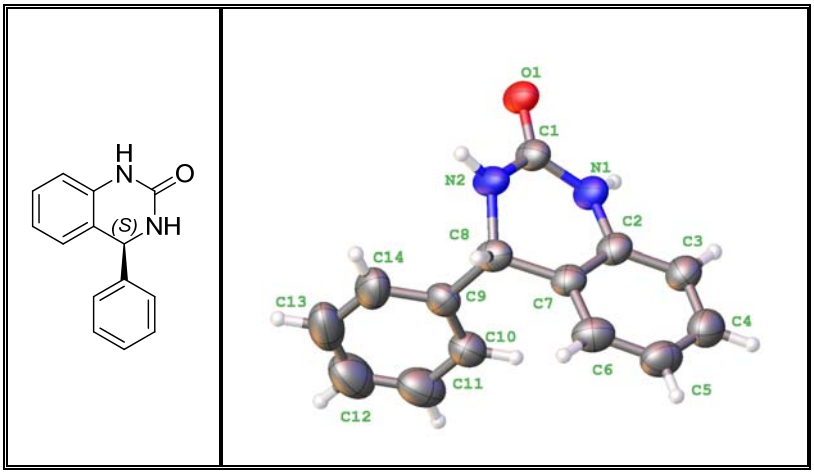


Figure S1. X-ray Crystallographic Analysis of (*4S*)-(-)-**2a**

7. References

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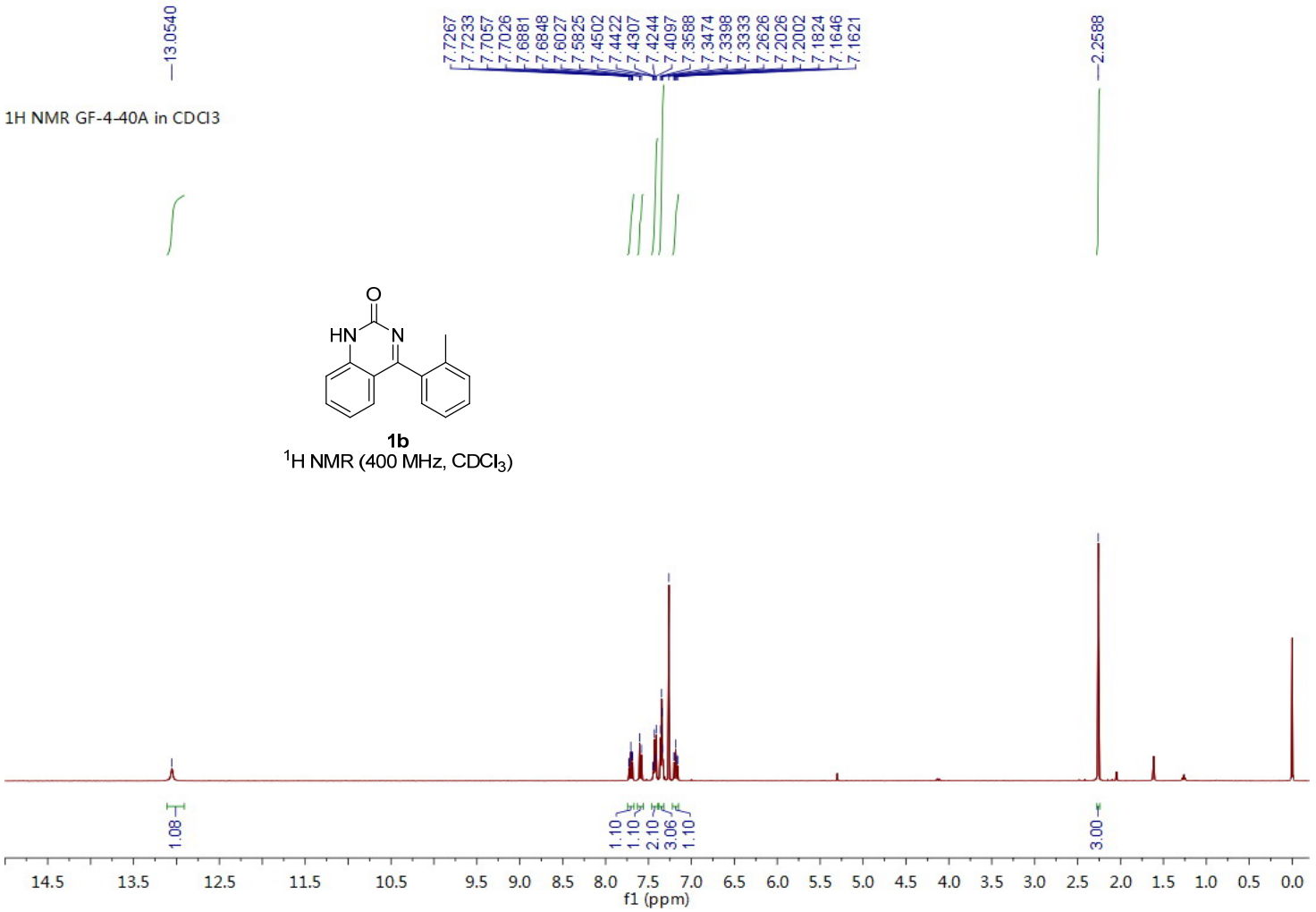
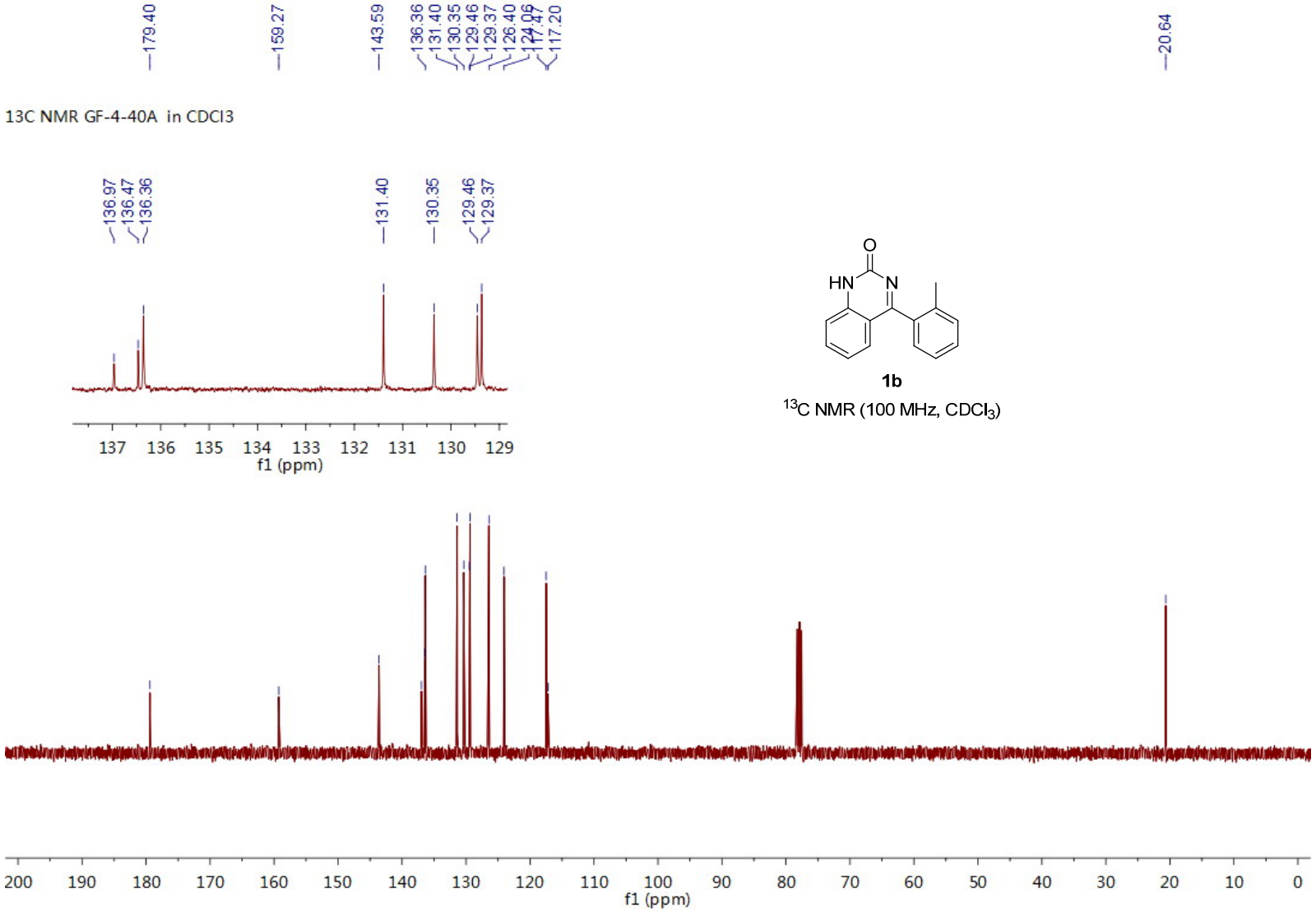
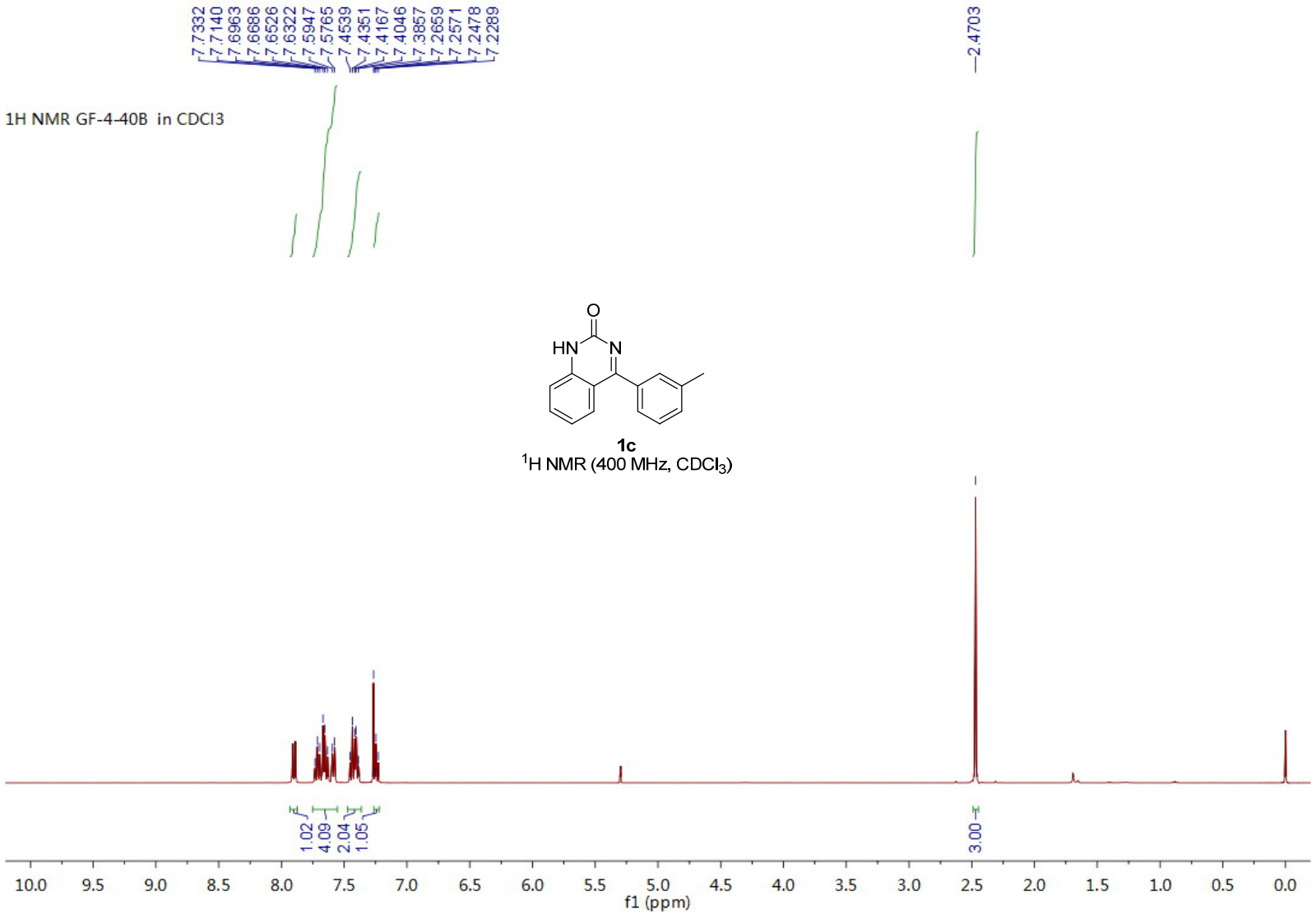
8. Copy of NMR and HPLC

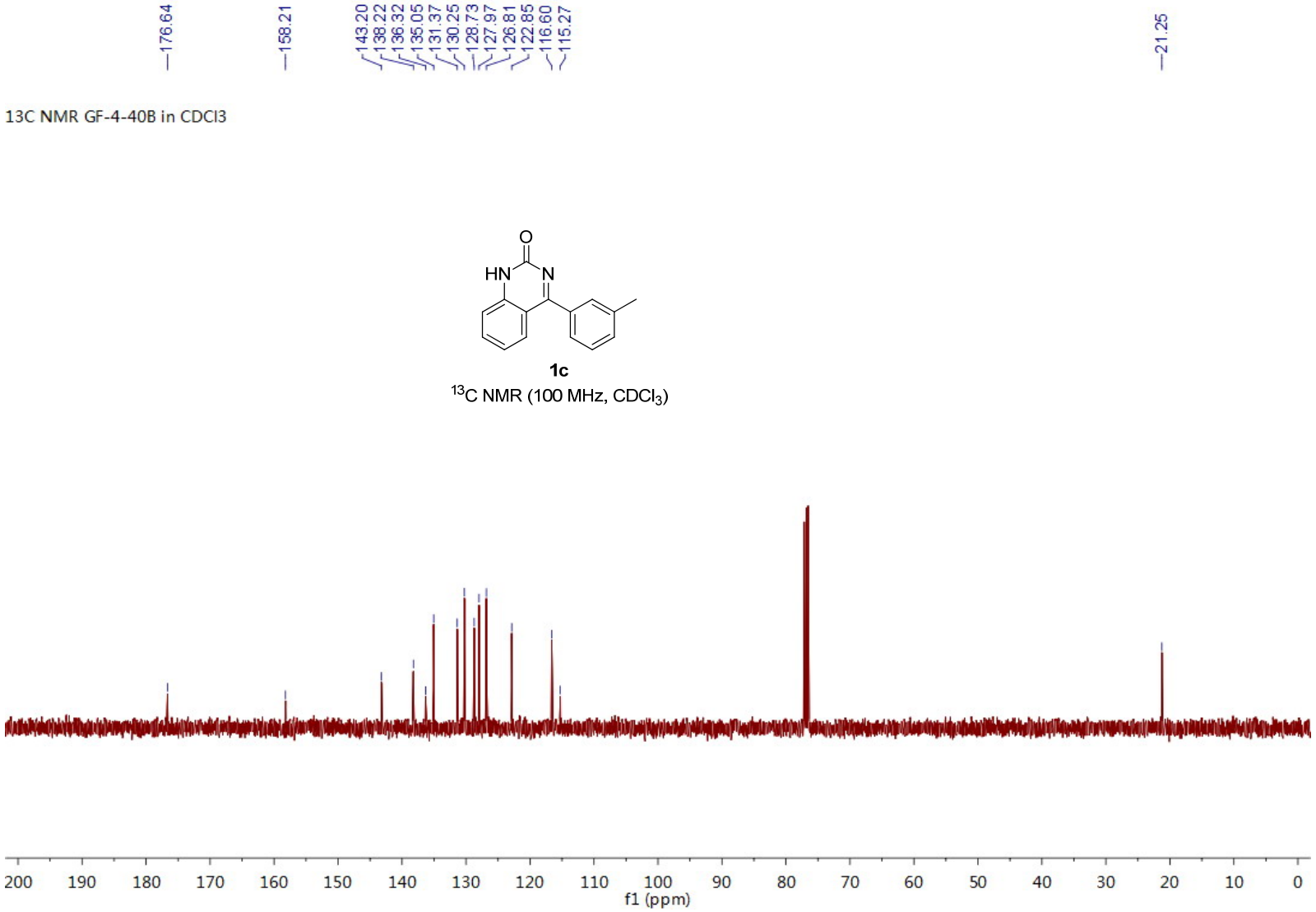


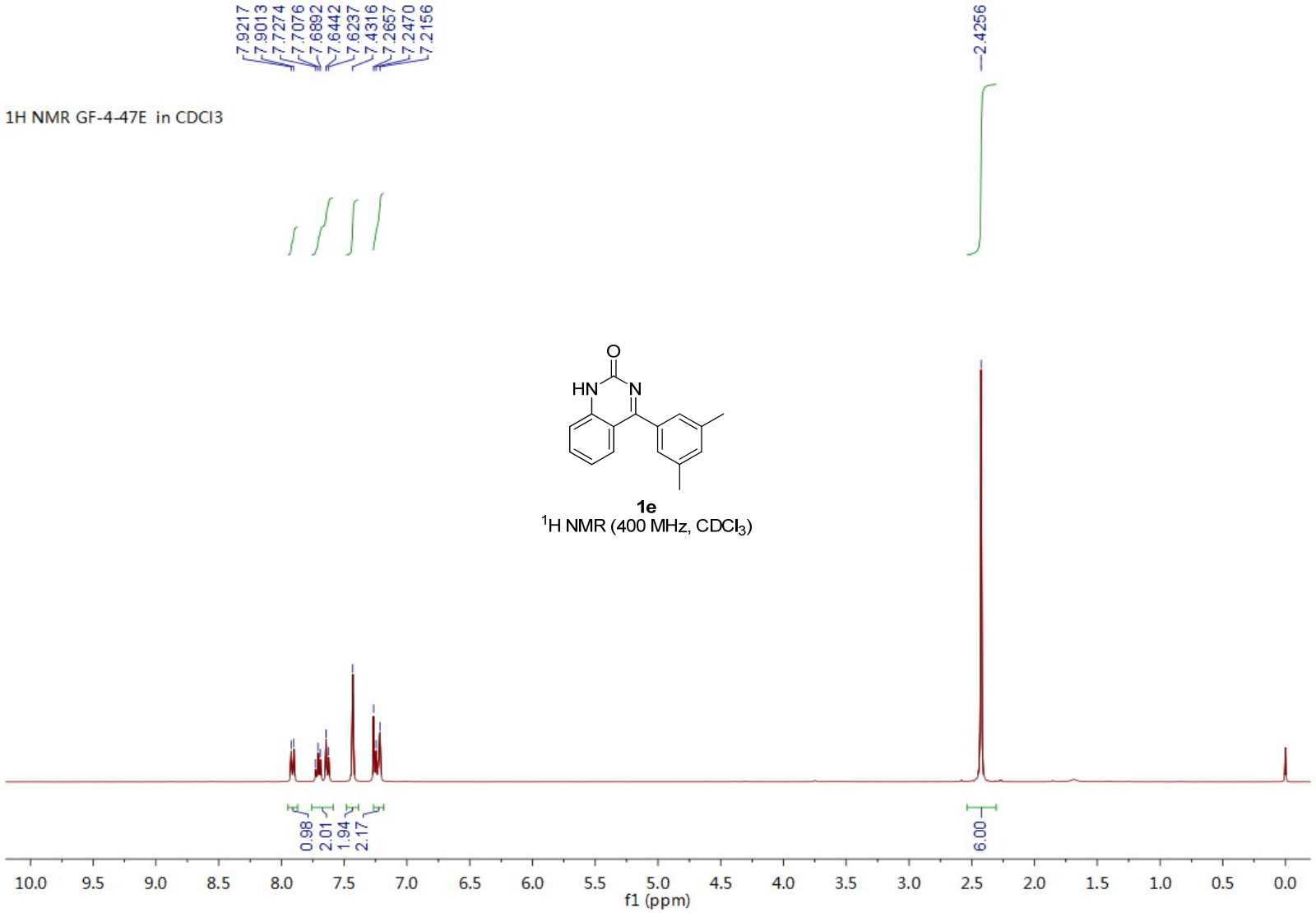

179.40
159.27
143.59
136.36
131.40
130.35
129.46
129.37
126.40
124.06
117.47
117.20
20.64
13C NMR GF-4-40A in CDCl3
136.97
136.47
136.36
131.40
130.35
129.46
129.37
137 136 135 134 133 132 131 130 129
f1 (ppm)
O
HN
N
1b
13C NMR (100 MHz, CDCl3)
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)



1c

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


176.64
158.21
143.20
138.22
136.32
135.05
131.37
130.25
128.73
127.97
126.81
122.85
116.60
115.27
21.25
13C NMR GF-4-40B in CDCl3
O
HN
N
1c
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)

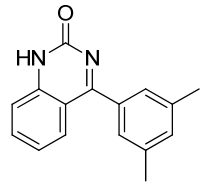


1e

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

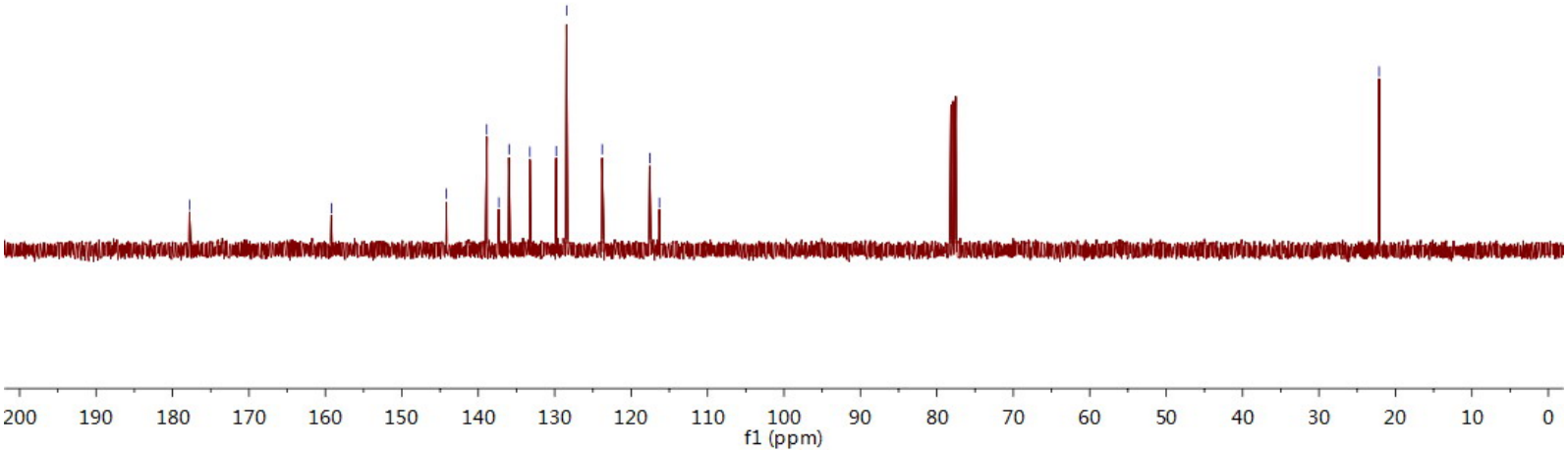
177.78
159.22
144.18
138.89
137.31
135.97
133.25
129.79
128.45
123.79
117.56
116.29
22.14

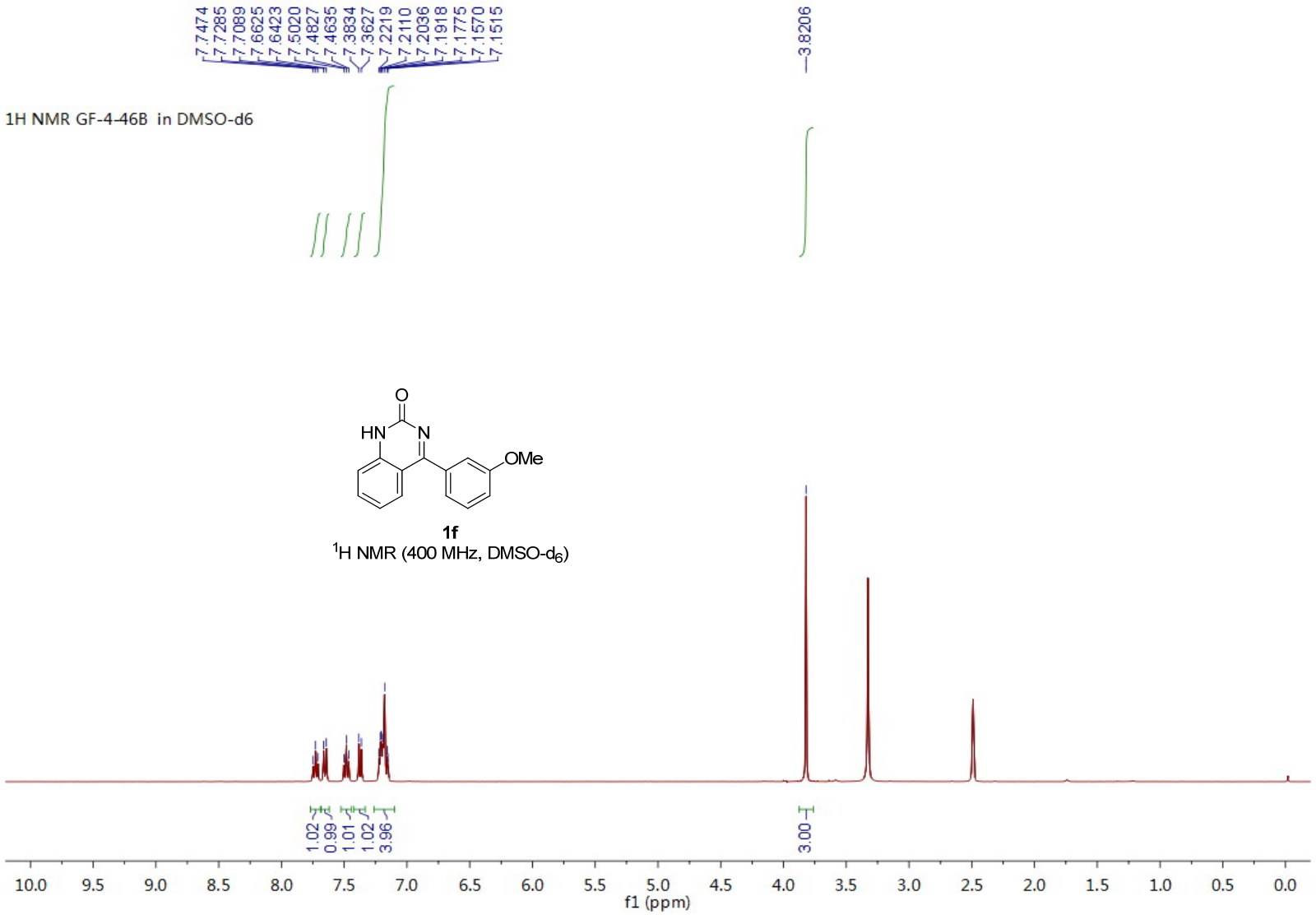
13C NMR GF-4-47E in CDCl3



1e

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

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7.6625
7.6423
7.5020
7.4827
7.4635
7.3834
7.3627
7.2219
7.2110
7.2036
7.1918
7.1775
7.1570
7.1515
3.8206
1H NMR GF-4-46B in DMSO-d6
O
HN
N
OMe
1f
1H NMR (400 MHz, DMSO-d6)
1.02
0.99
1.01
1.02
3.96
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)

176.10
160.41
144.71
139.13
136.43
130.86
129.62
123.62
122.63
117.36
116.78
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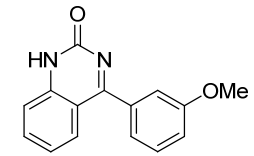
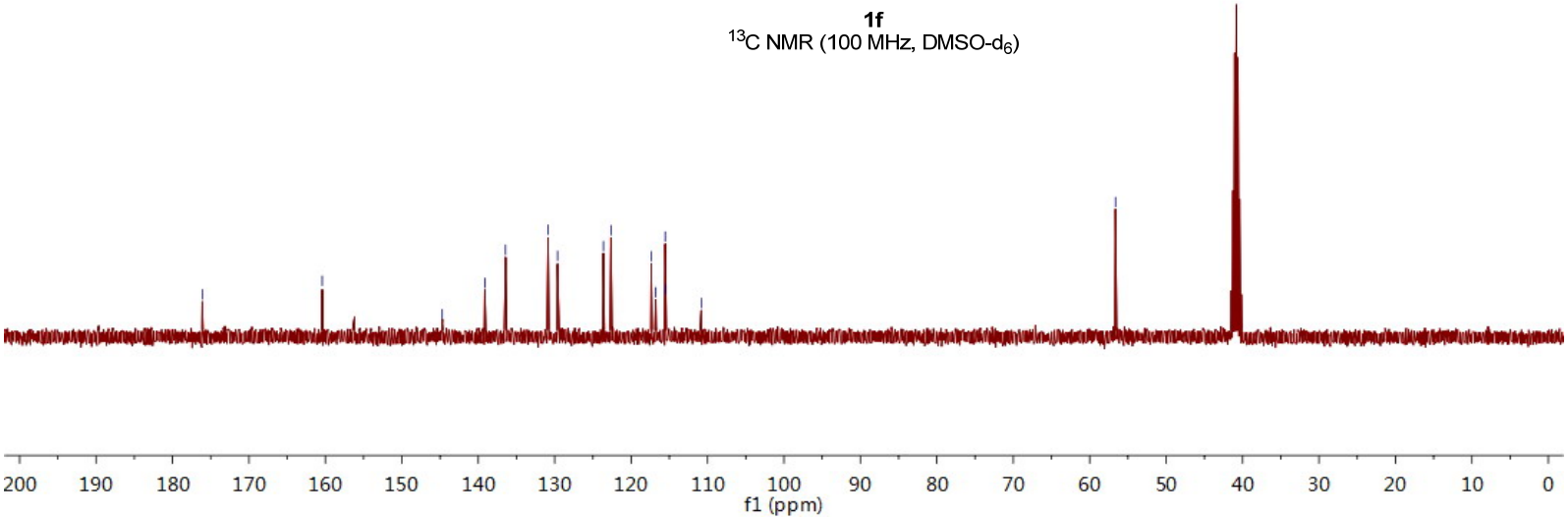
115.45
110.81
56.62

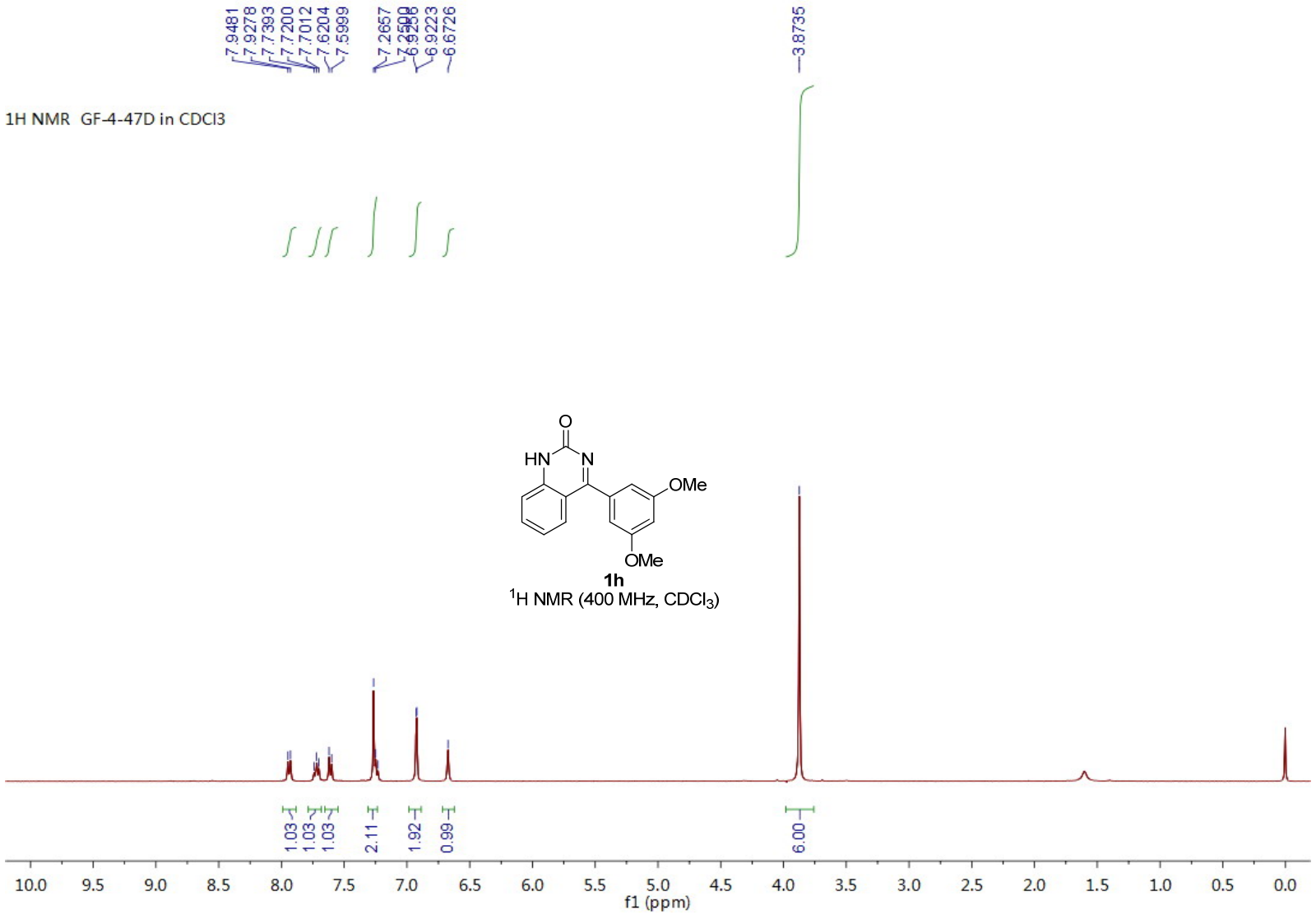
13C NMR GF-4-46B in DMSO-d6



1f

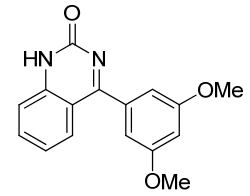
^{13}C NMR (100 MHz, DMSO-d_6)




7.9481
7.9278
7.7393
7.7200
7.7012
7.6204
7.5999
7.2657
6.9223
6.6726
3.8735
1H NMR GF-4-47D in CDCl3
O
HN
N
OMe
OMe
1h
1H NMR (400 MHz, CDCl3)
1.03
1.03
1.03
2.11
1.92
0.99
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)

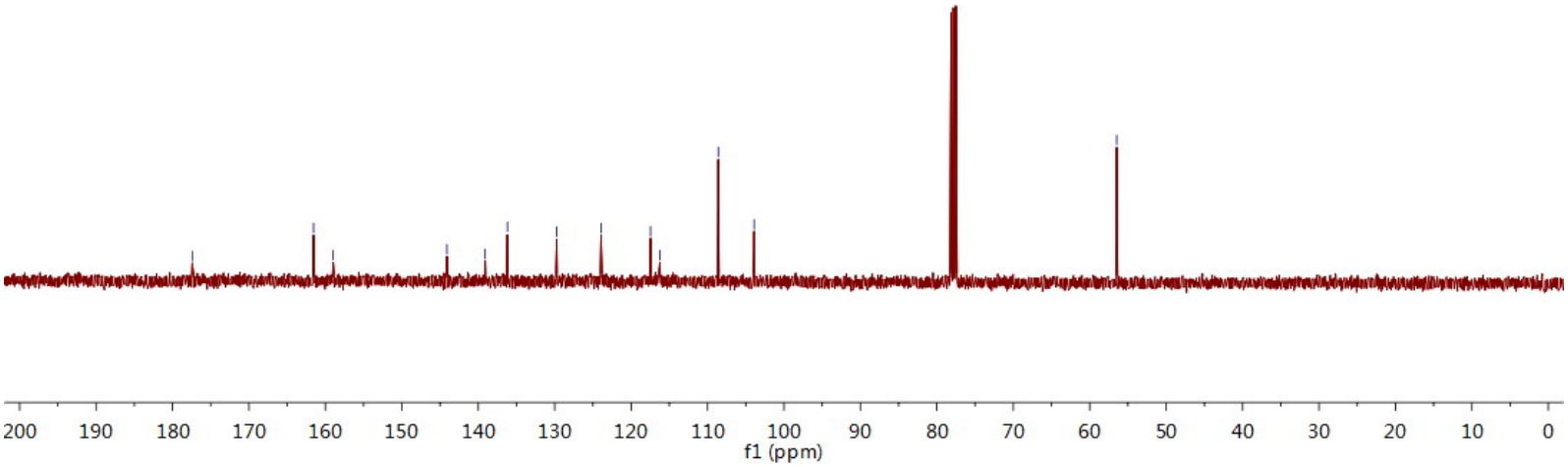
177.42
161.53
158.98
144.10
139.09
136.18
129.73
123.93
117.45
116.22
108.59
103.90
56.47

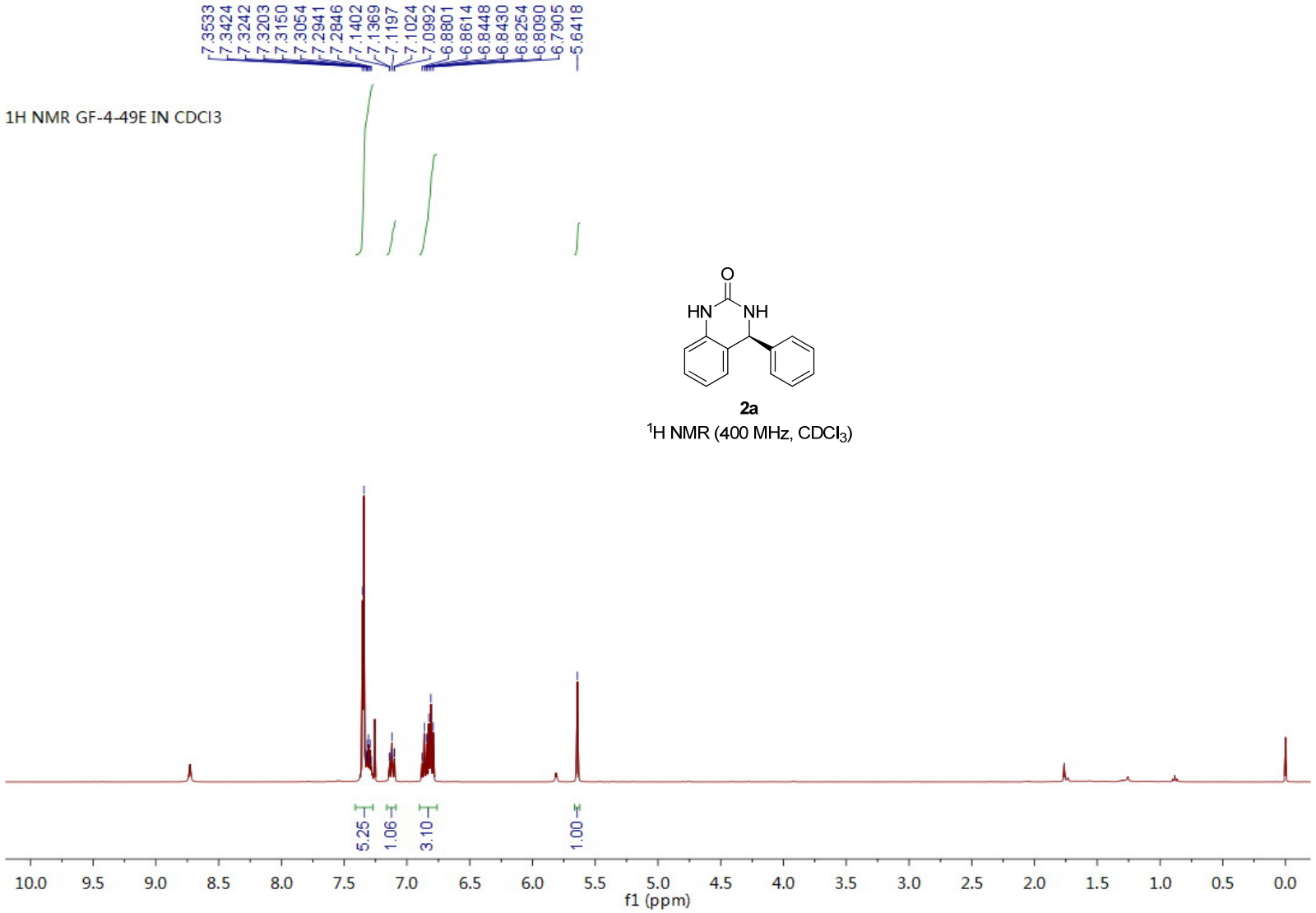
13C NMR GF-4-47D in CDCl3

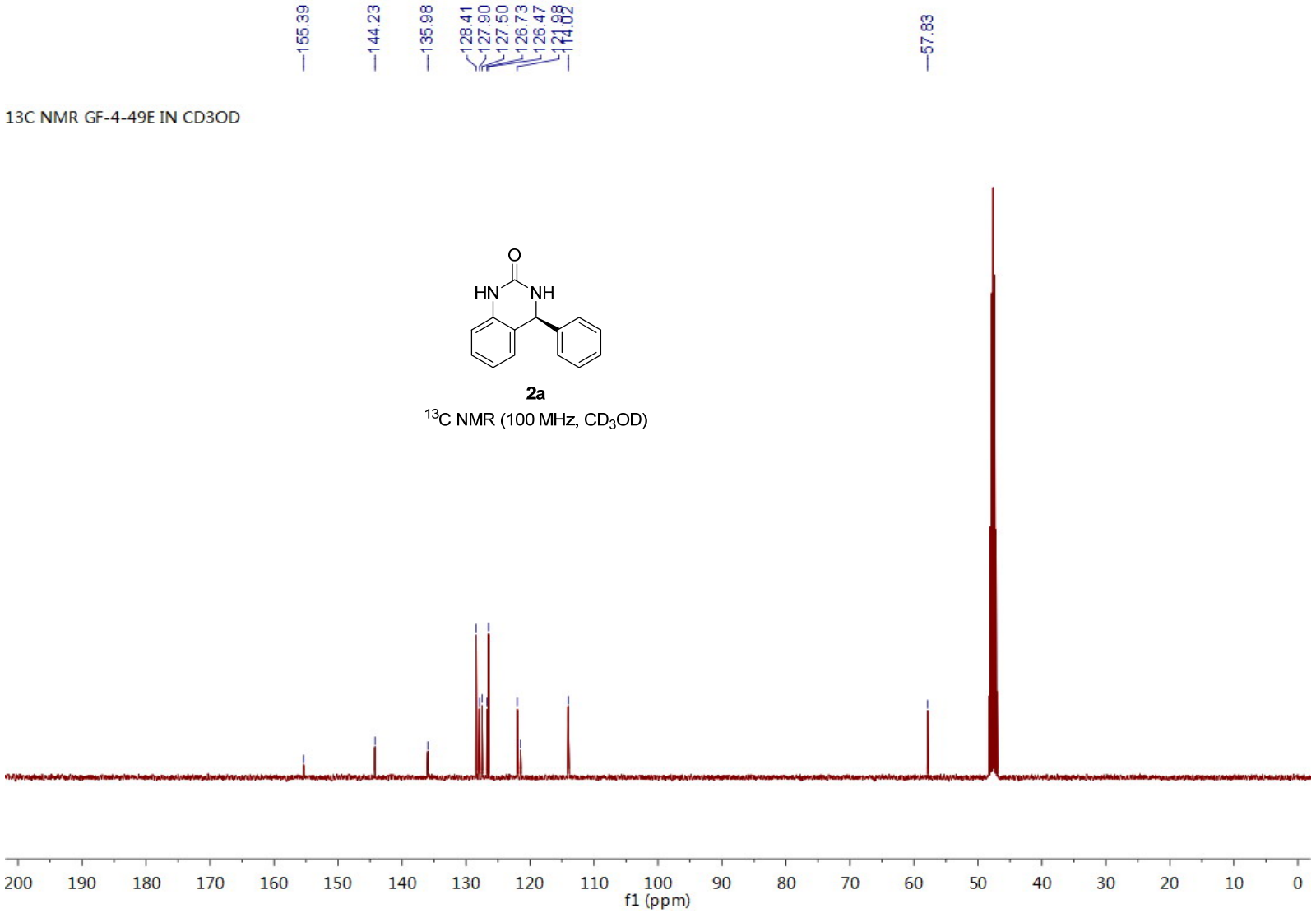


1h

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

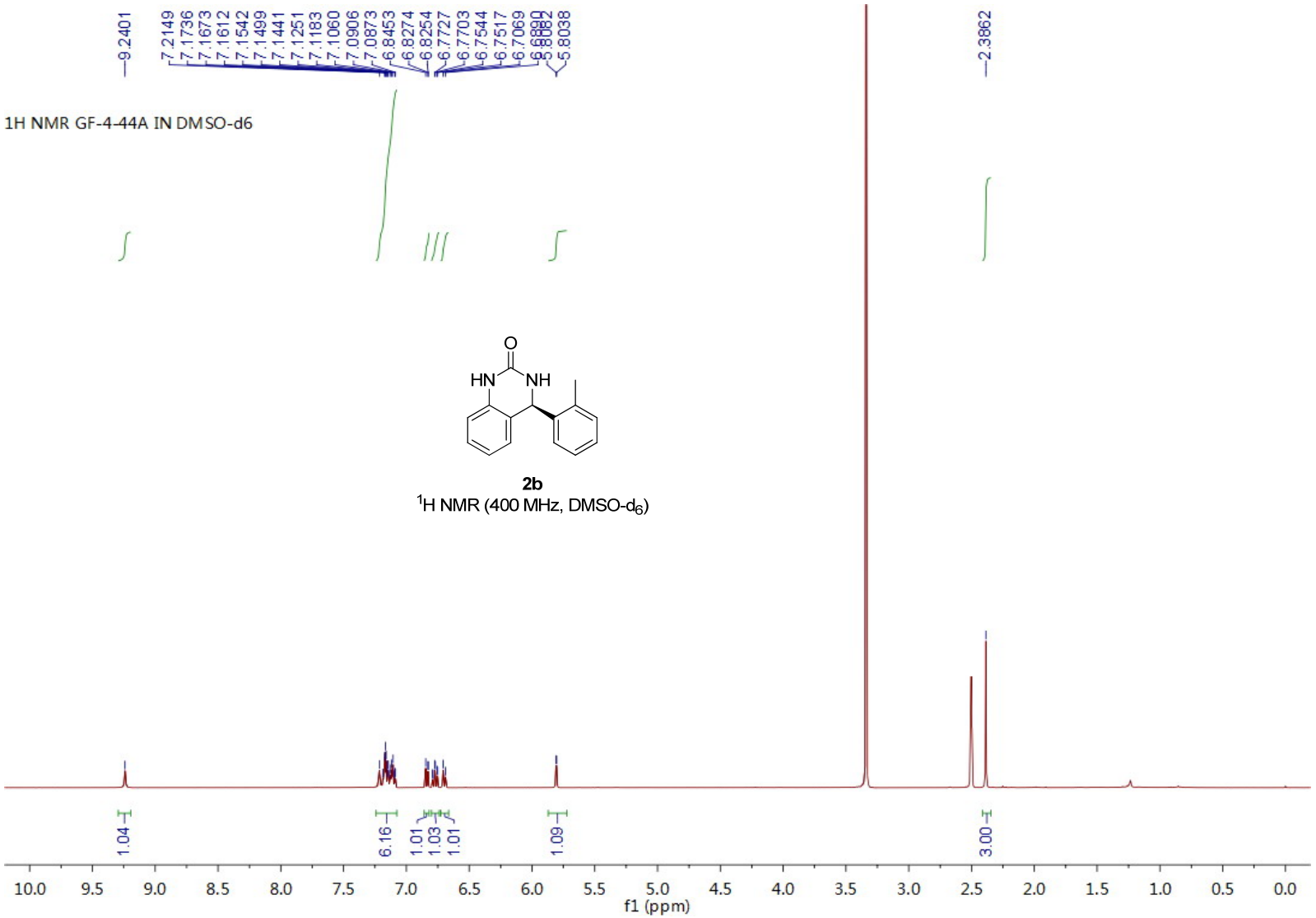



7.3533
7.3424
7.3242
7.3203
7.3150
7.3054
7.2941
7.2846
7.1402
7.1369
7.1197
7.1024
7.0992
6.8801
6.8614
6.8448
6.8430
6.8254
6.8090
6.7905
5.6418
1H NMR GF-4-49E IN CDCl3
O
HN
NH
2a
1H NMR (400 MHz, CDCl3)
5.25
1.06
3.10
1.00
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)



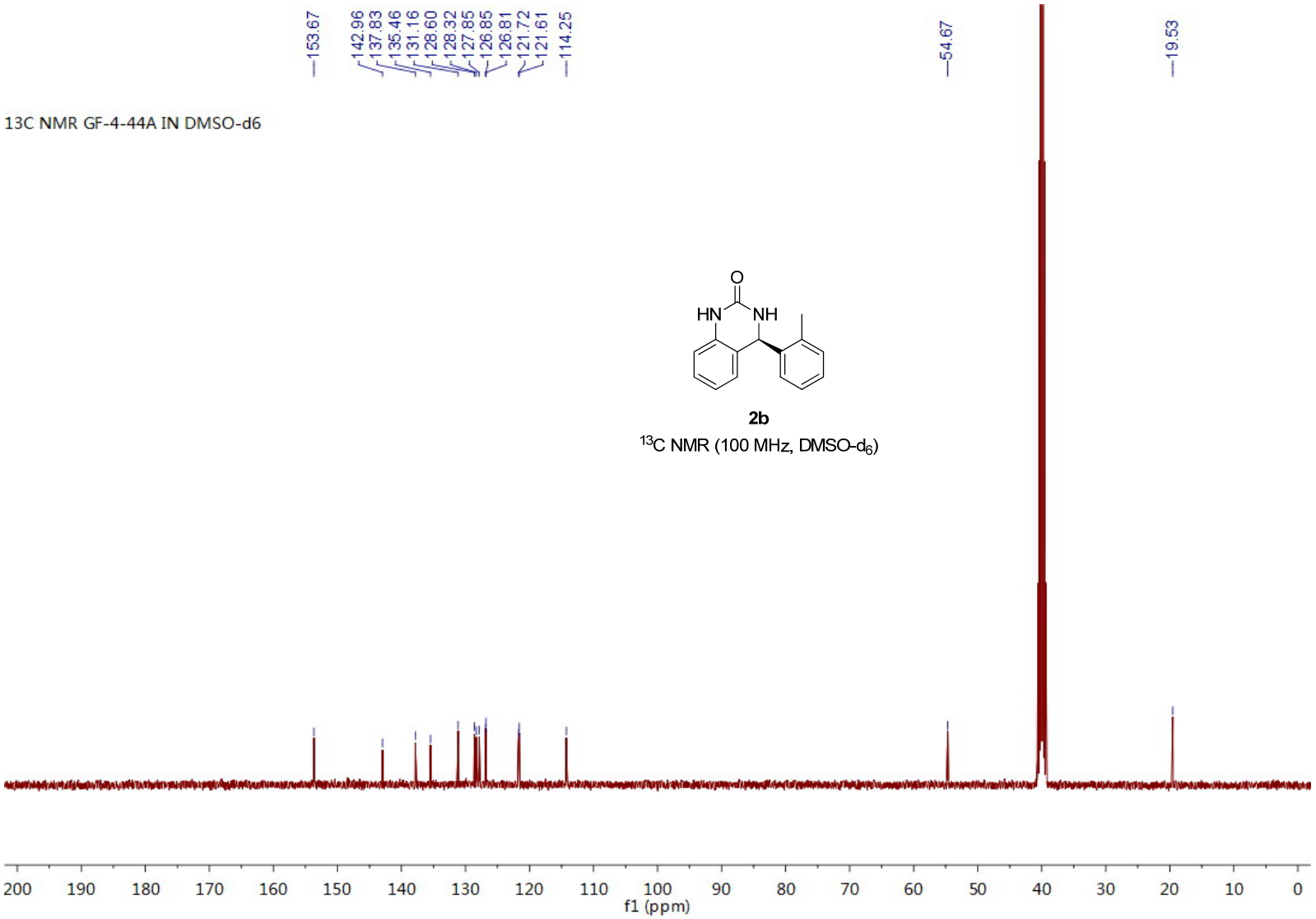
2a

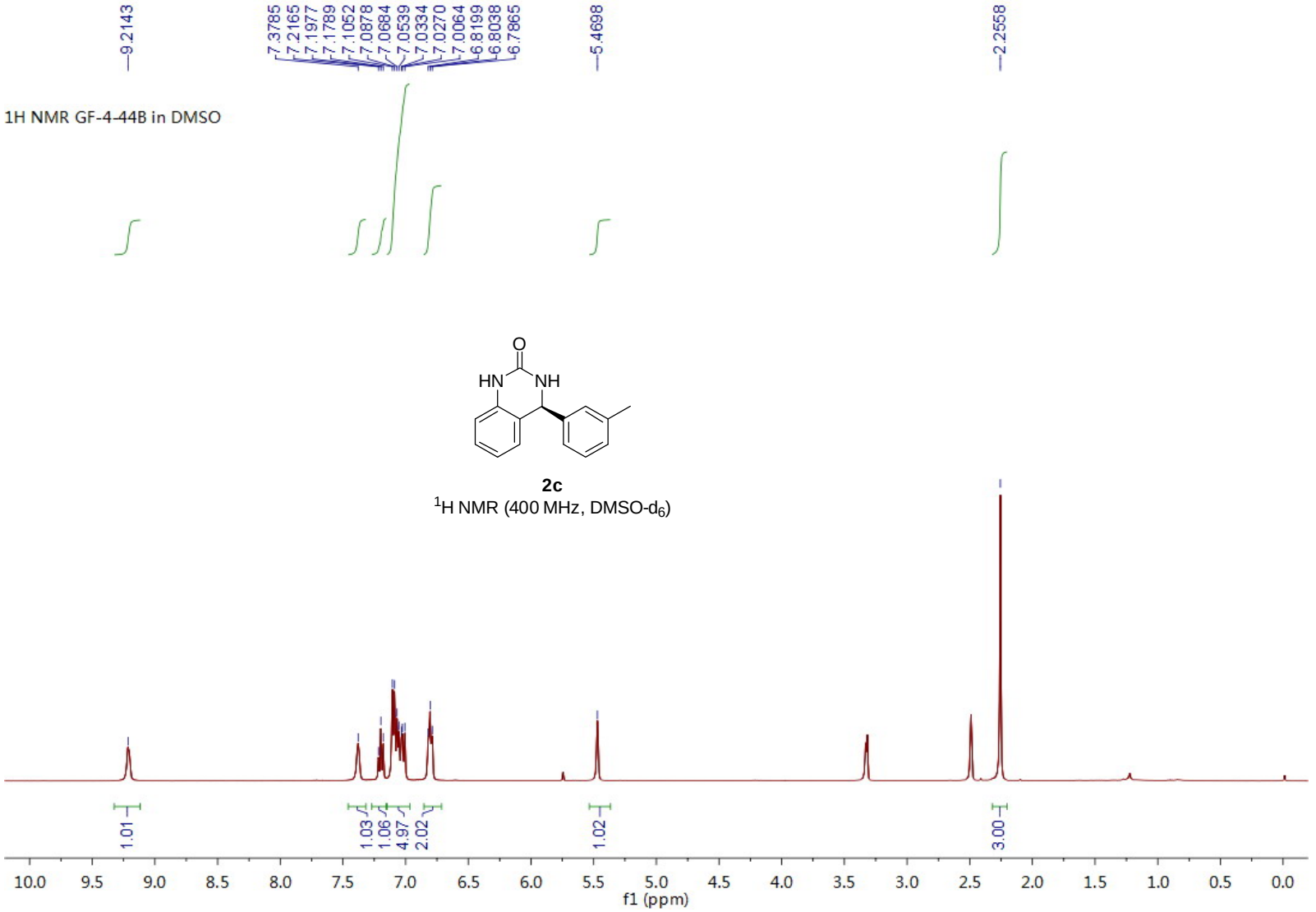
^{13}C NMR (100 MHz, CD_3OD)



2b

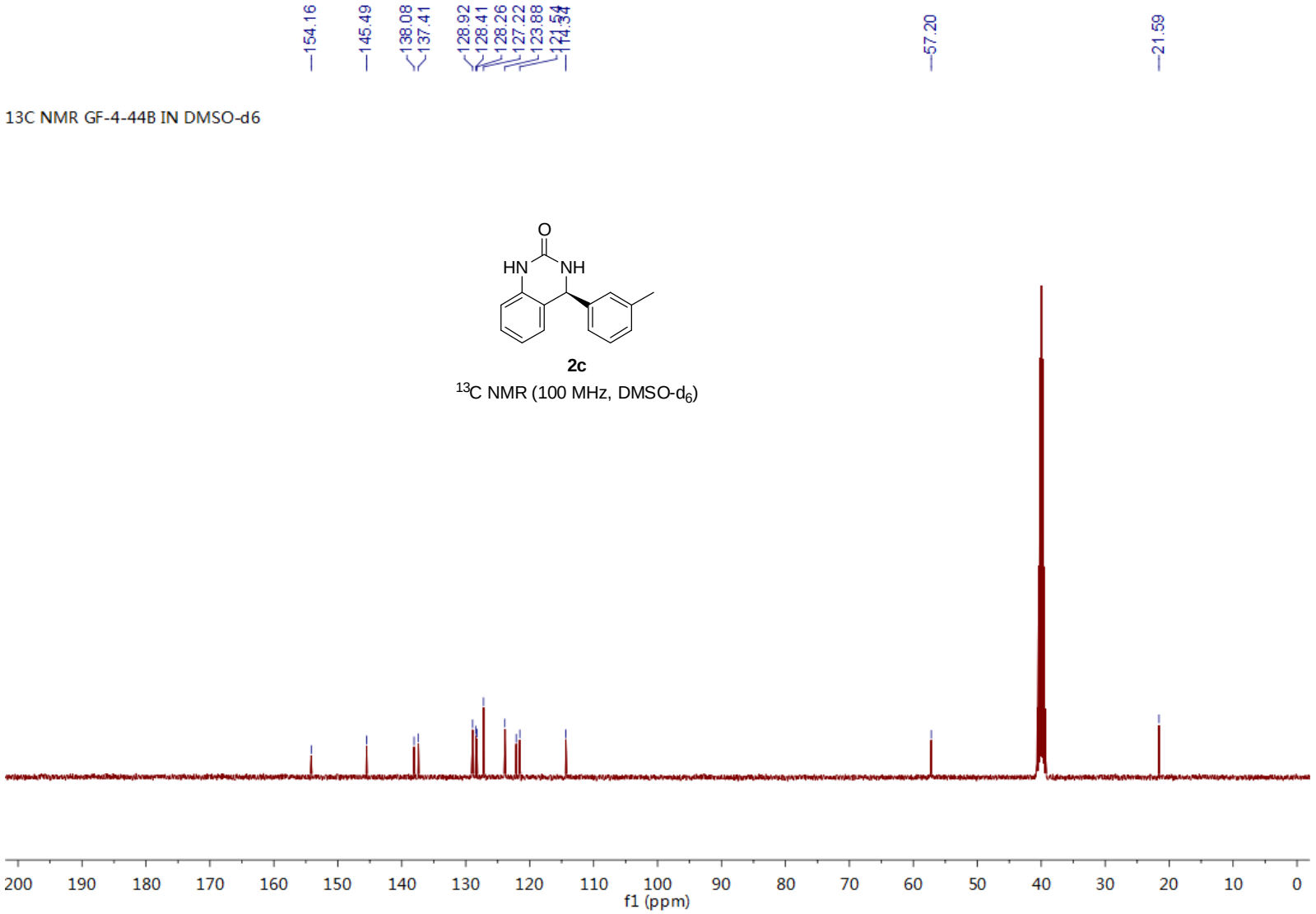
^{1}H NMR (400 MHz, DMSO-d_6)


153.67
142.96
137.83
135.46
131.16
128.60
128.32
127.85
126.85
126.81
121.72
121.61
114.25
54.67
19.53
13C NMR GF-4-44A IN DMSO-d6
O
HN
NH
2b
13C NMR (100 MHz, DMSO-d6)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)



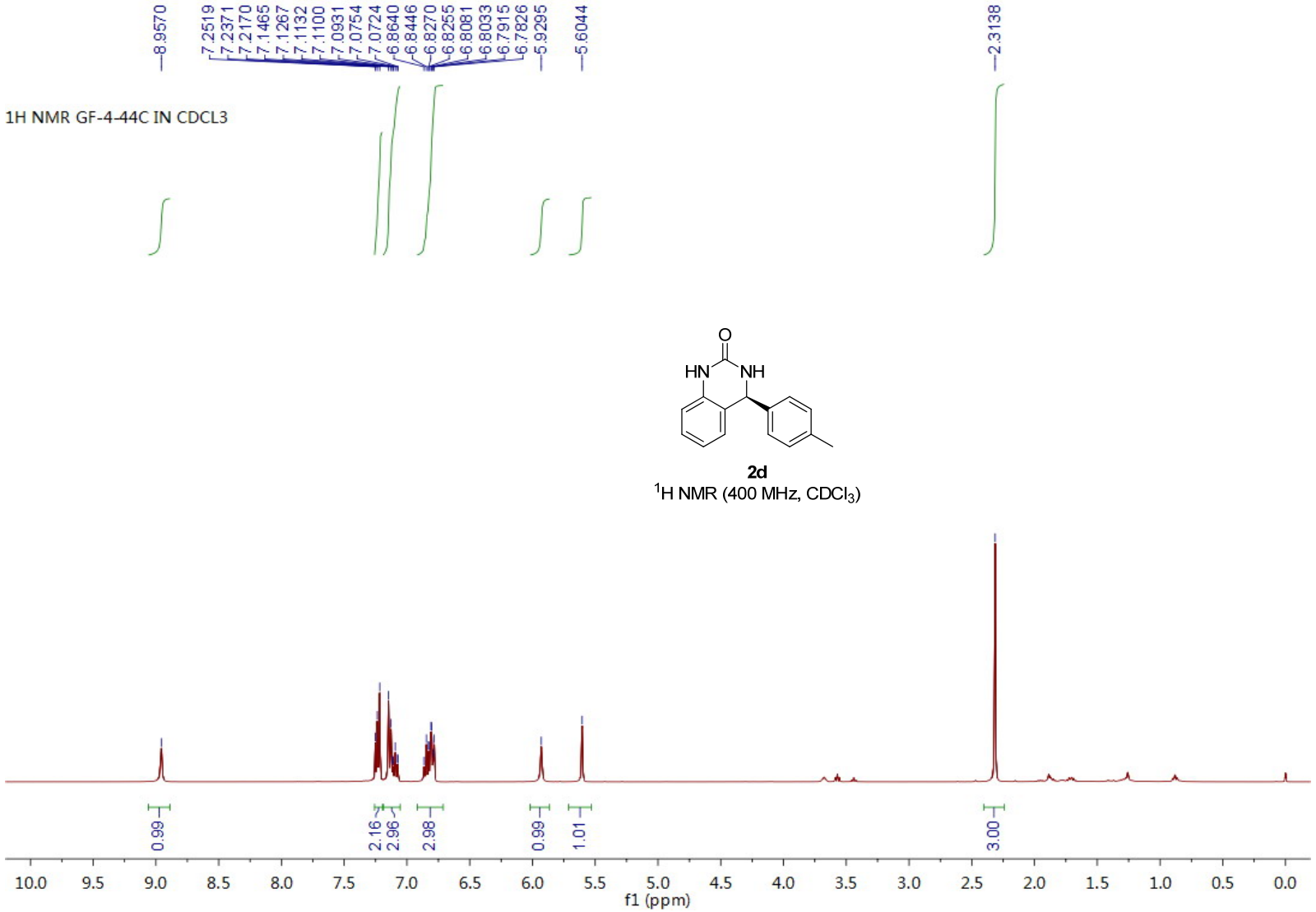
2c

^{1}H NMR (400 MHz, DMSO-d_6)



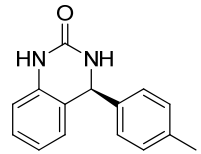
2c

^{13}C NMR (100 MHz, DMSO-d_6)


8.9570
7.2519
7.2371
7.2170
7.1465
7.1267
7.1132
7.1100
7.0931
7.0754
7.0724
6.8640
6.8446
6.8270
6.8255
6.8081
6.8033
6.7915
6.7826
5.9295
5.6044
2.3138
1H NMR GF-4-44C IN CDCL3
HN
NH
O
2d
1H NMR (400 MHz, CDCl3)
0.99
2.16
2.96
2.98
0.99
1.01
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)

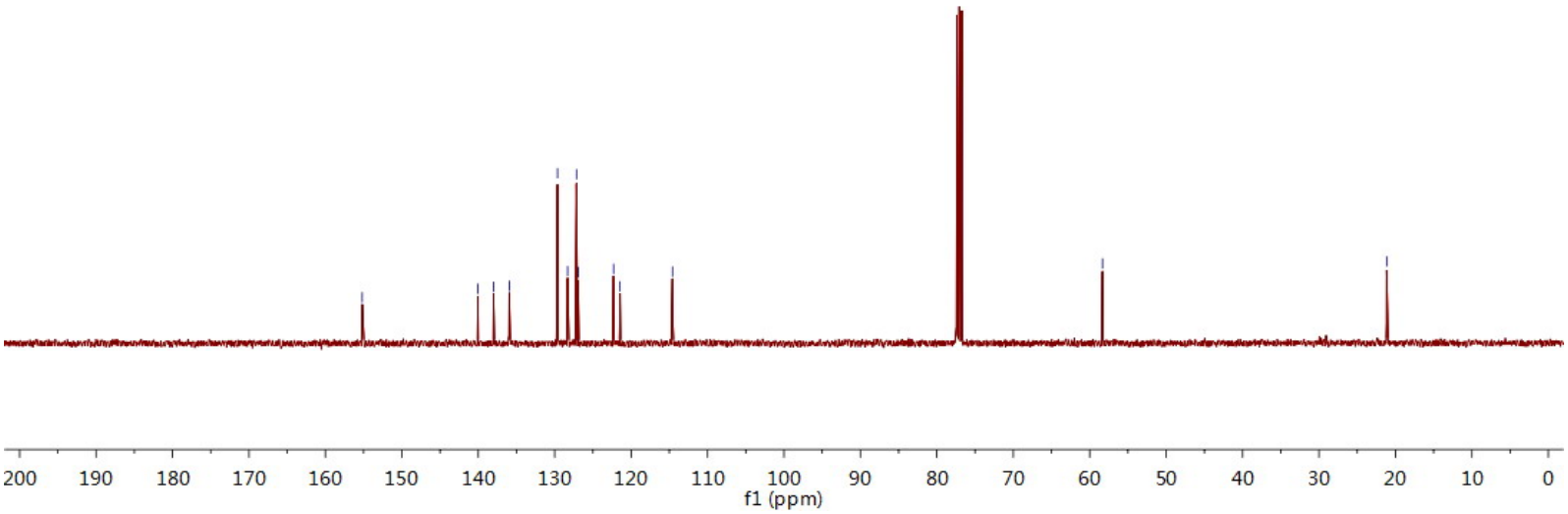
155.19
140.05
138.00
135.95
129.62
128.31
127.14
126.94
122.29
121.45
114.58
58.32
21.14

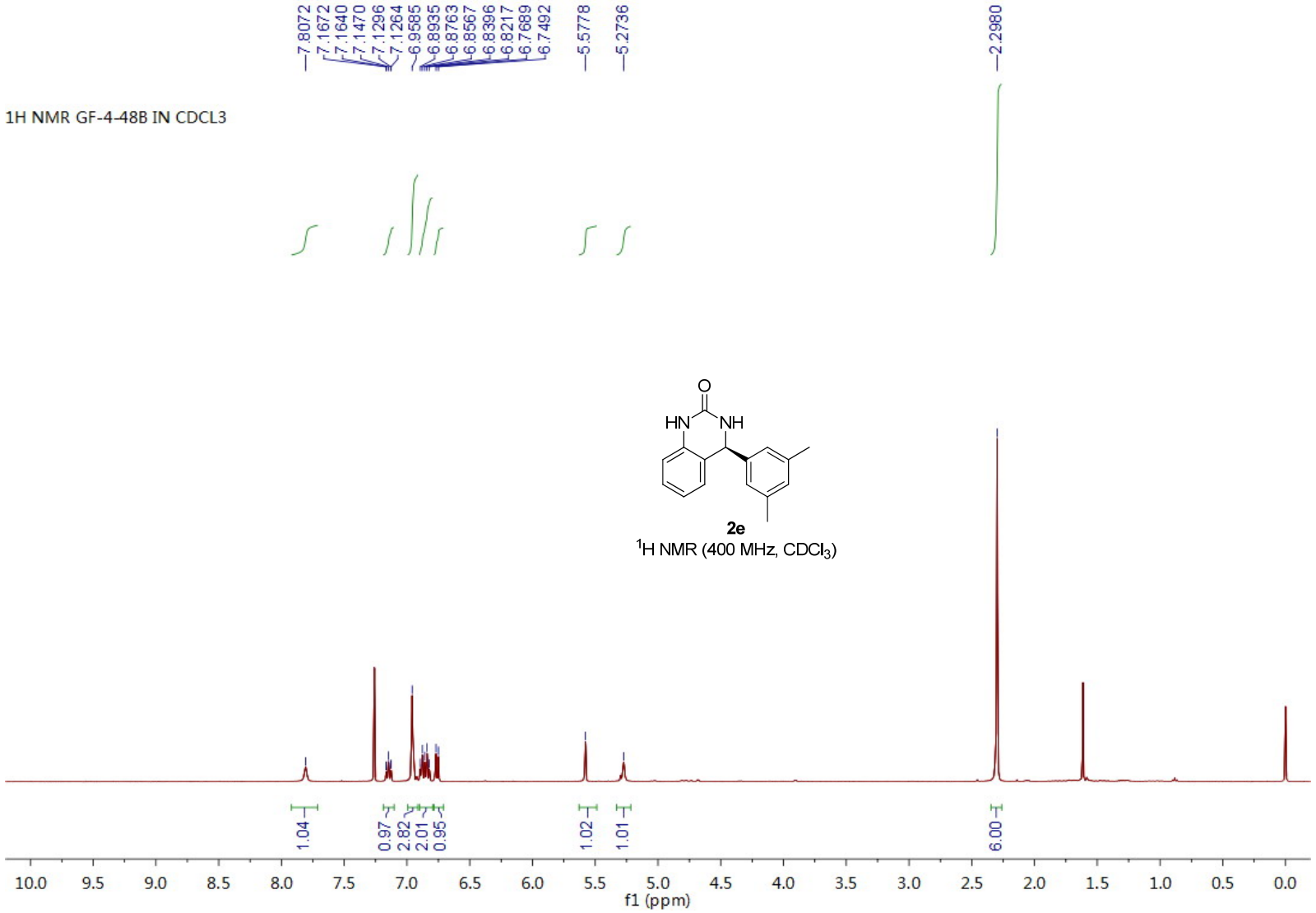
13C NMR GF-4-44C IN CDCL3

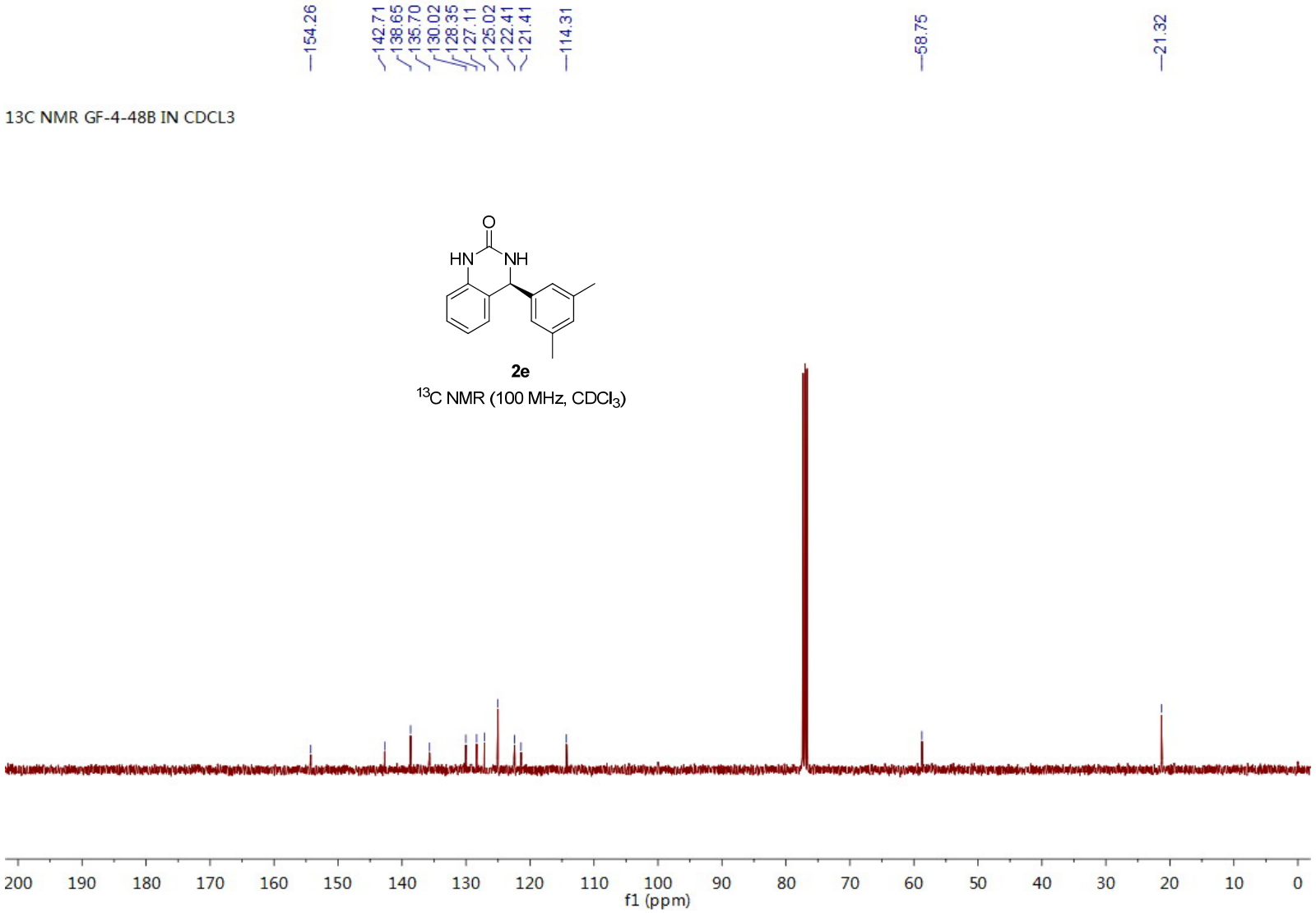


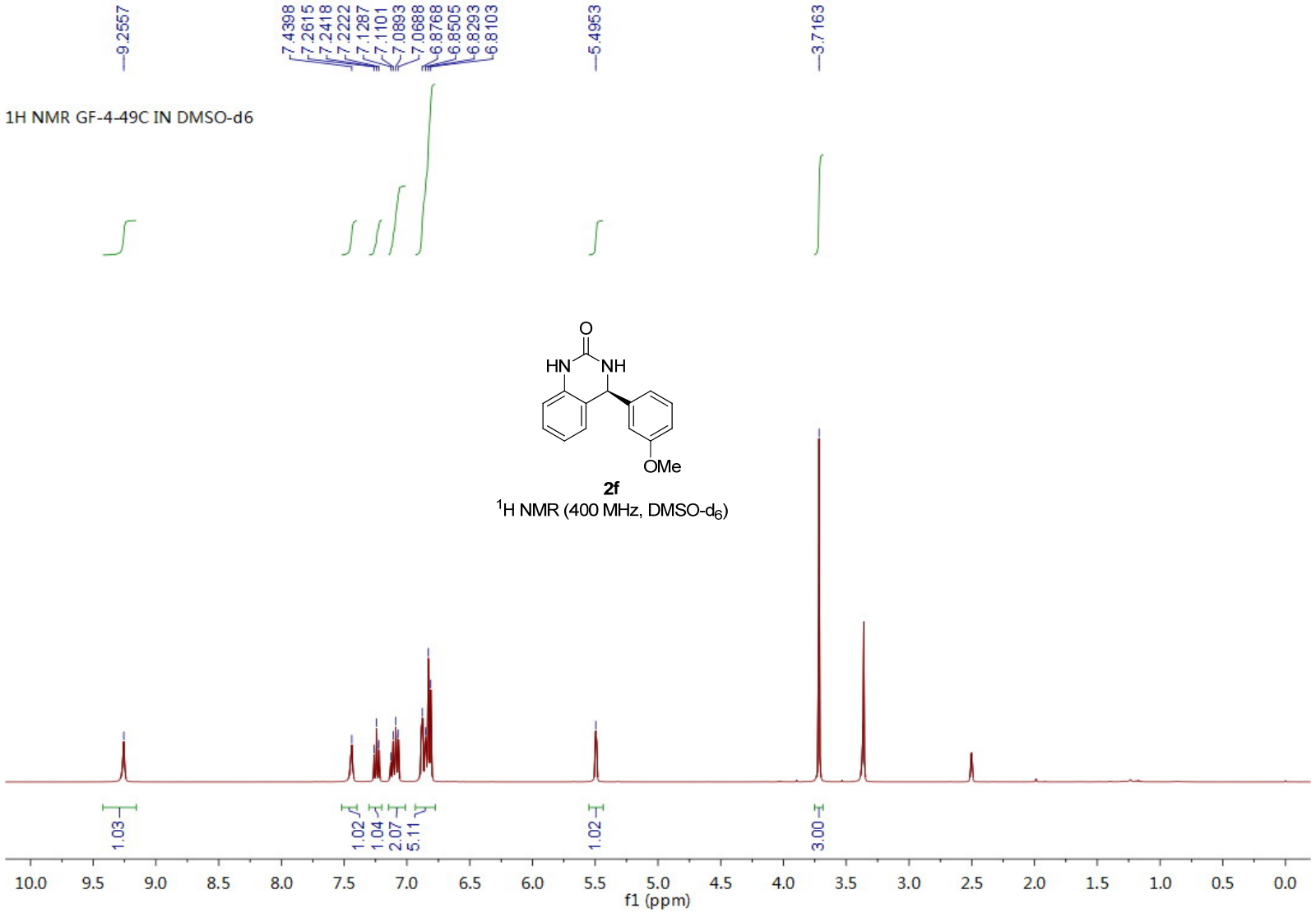
2d

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



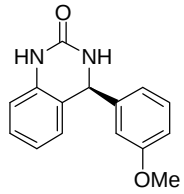

1H NMR GF-4-48B IN CDCL3
7.8072
7.1672
7.1640
7.1470
7.1296
7.1264
6.9585
6.8935
6.8763
6.8567
6.8396
6.8217
6.7689
6.7492
5.5778
5.2736
2.2980
HN
NH
O
2e
1H NMR (400 MHz, CDCl3)
1.04
0.97
2.82
2.01
0.95
1.02
1.01
6.00
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


154.26
142.71
138.65
135.70
130.02
128.35
127.11
125.02
122.41
121.41
114.31
58.75
21.32
13C NMR GF-4-48B IN CDCL3
HN
NH
O
2e
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)


9.2557
7.4398
7.2615
7.2418
7.2222
7.1287
7.1101
7.0893
7.0688
6.8768
6.8505
6.8293
6.8103
5.4953
3.7163
1H NMR GF-4-49C IN DMSO-d6
HN
NH
O
OMe
2f
1H NMR (400 MHz, DMSO-d6)
1.03
1.02
1.04
2.07
5.11
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)

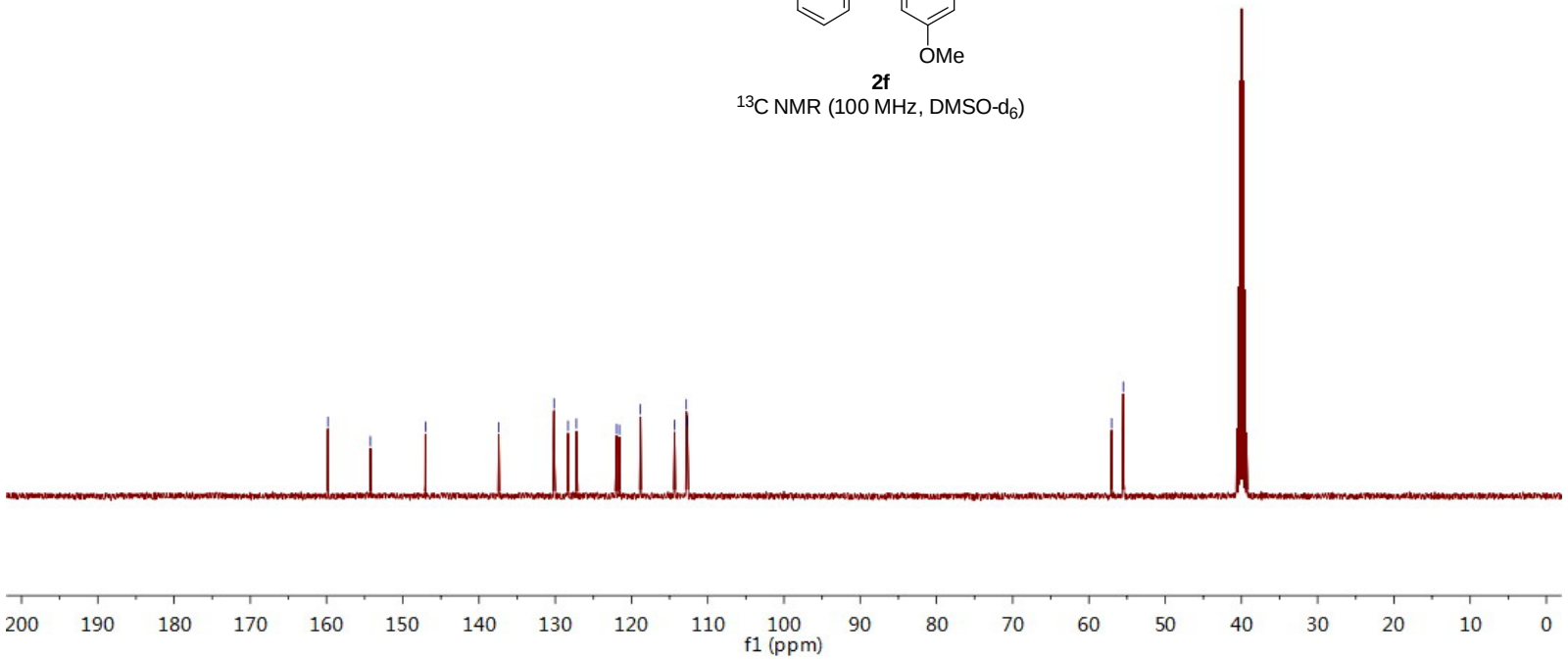
159.81
154.24
147.02
137.42
130.16
128.33
127.22
121.95
121.56
118.83
114.35
112.81
112.67
57.02
55.50

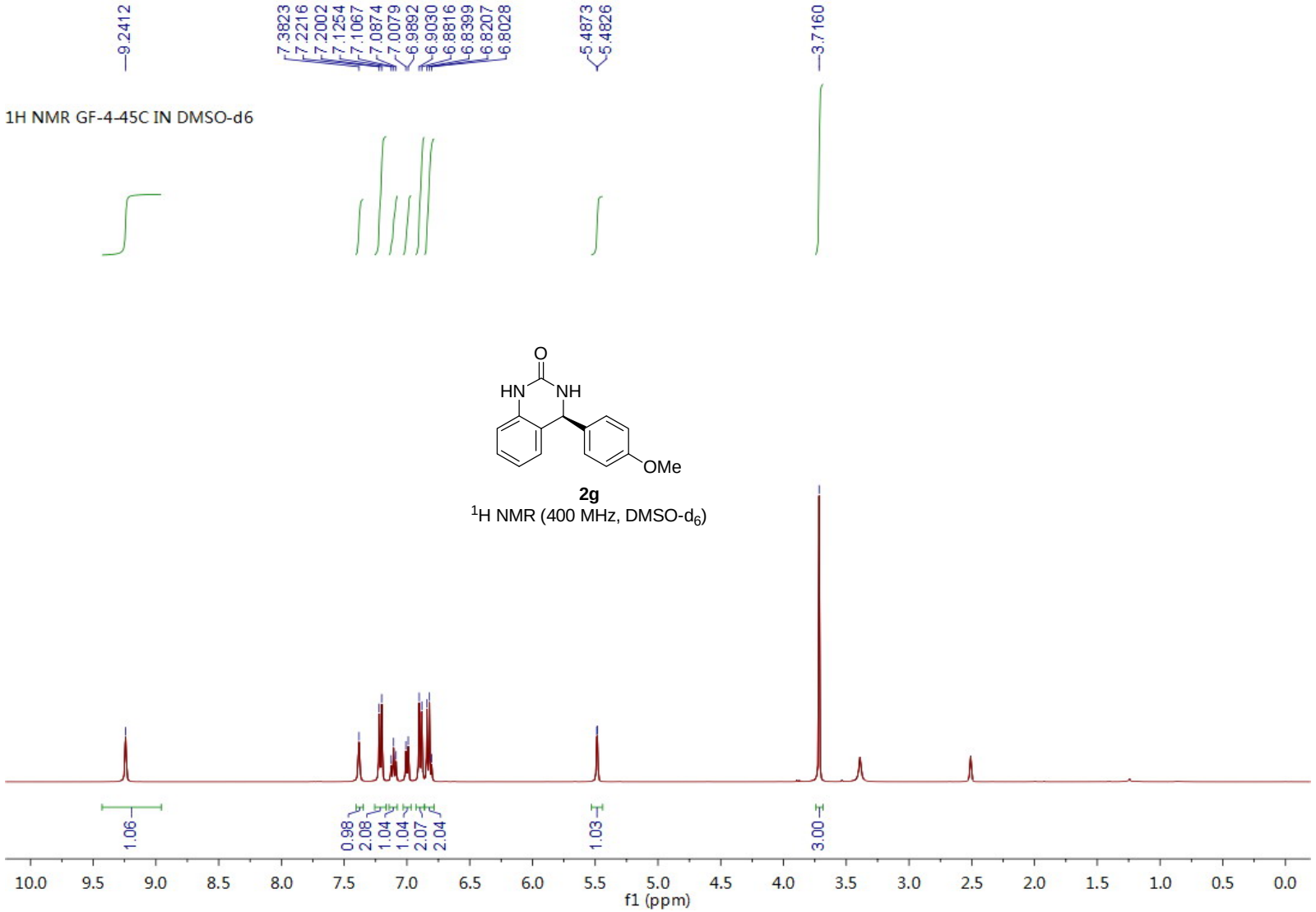
13C NMR GF-4-49C IN DMSO-d6



2f

^{13}C NMR (100 MHz, DMSO-d_6)



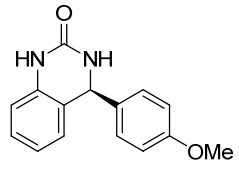


2g

^{1}H NMR (400 MHz, DMSO-d_6)

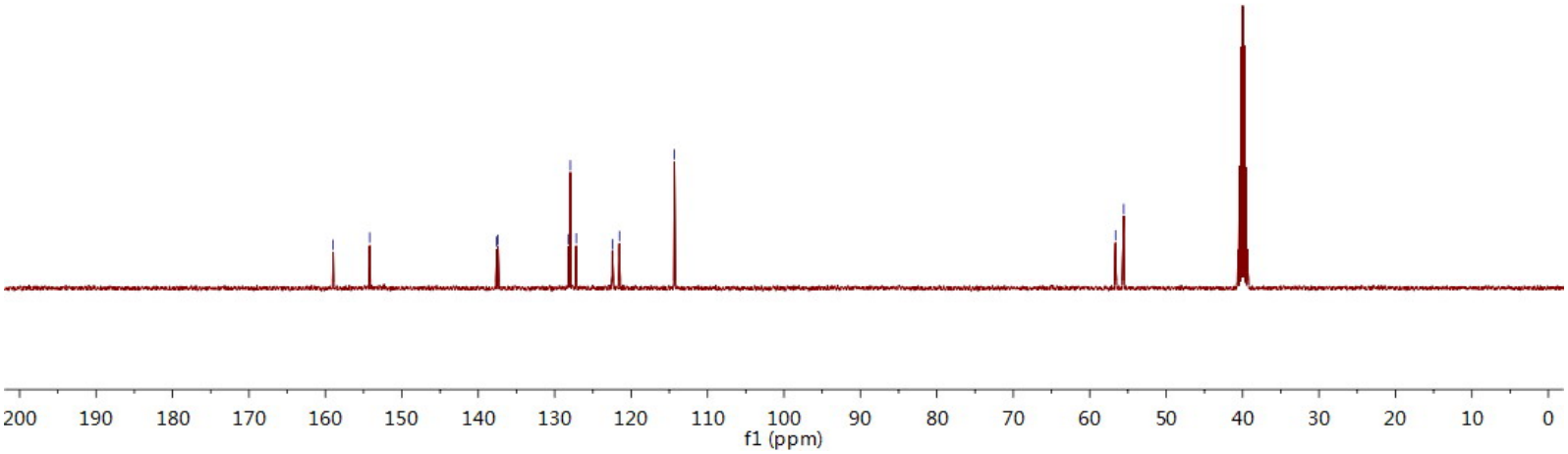
158.98
154.20
137.59
137.41
128.19
127.96
127.17
122.45
121.52
114.34
56.61
55.55

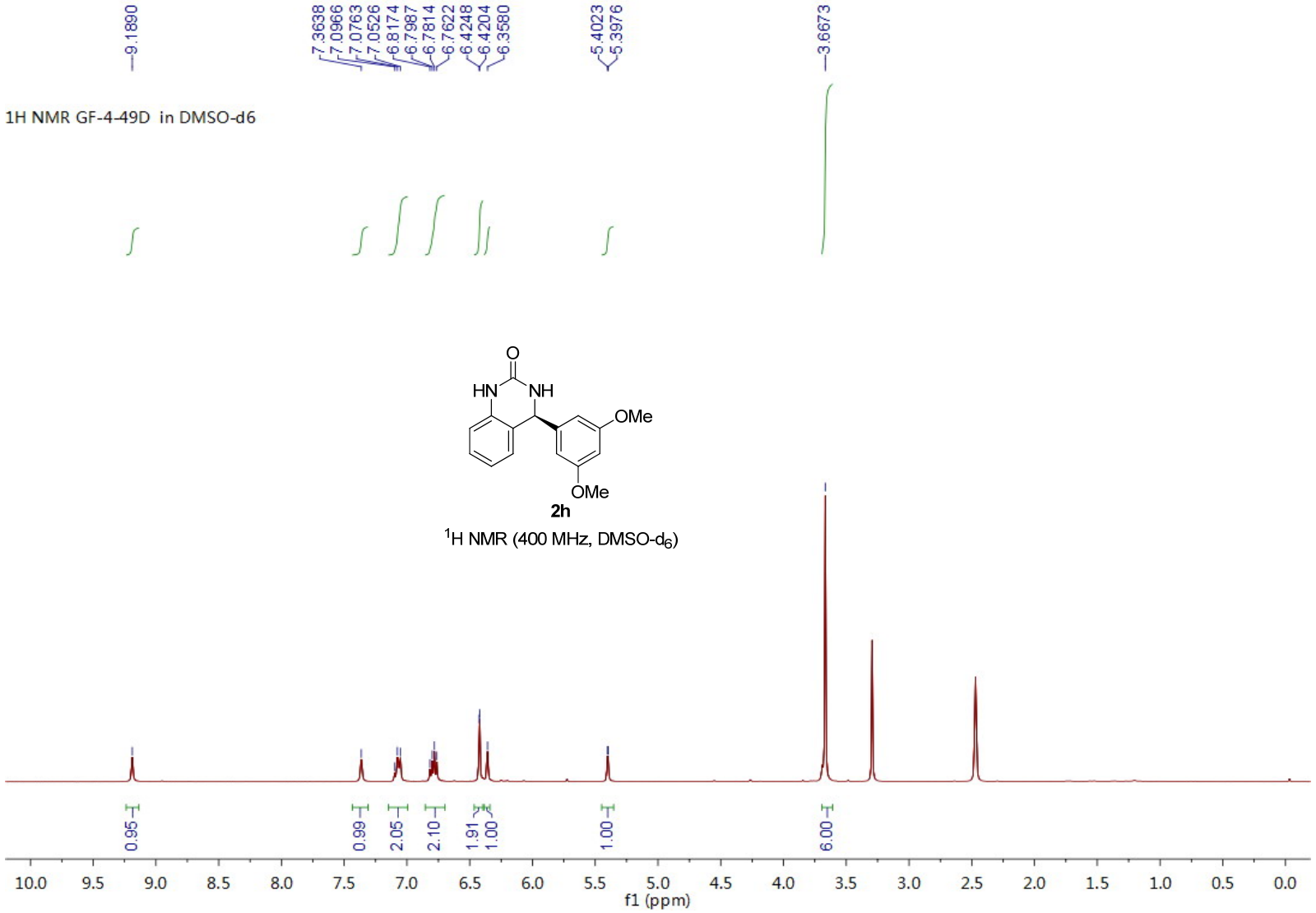
13C NMR GF-4-45C IN DMSO-d6



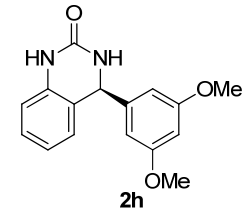
2g

^{13}C NMR (100 MHz, DMSO-d_6)



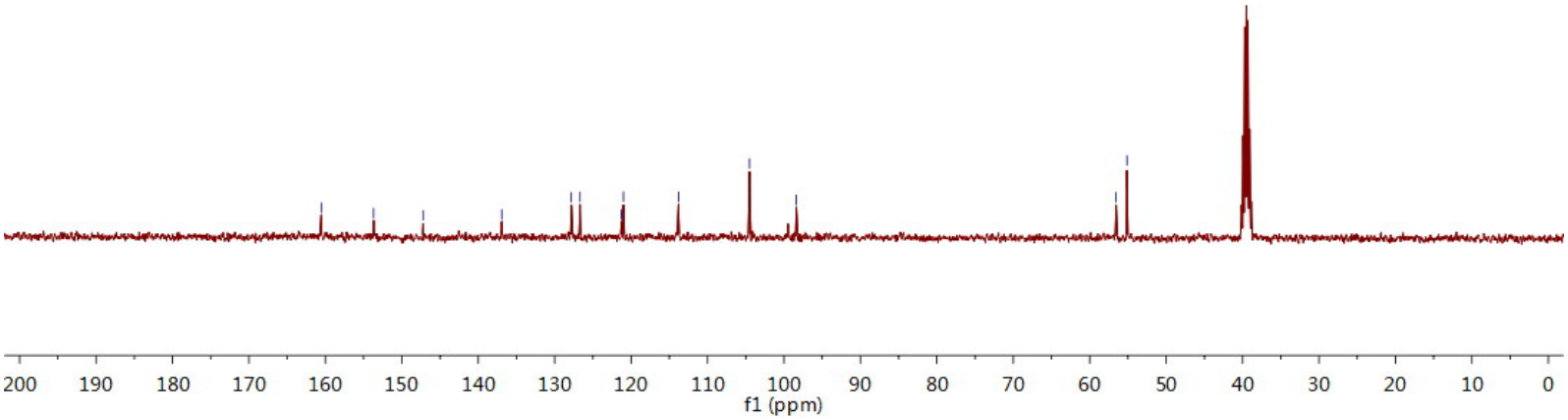

9.1890
7.3638
7.0966
7.0763
7.0526
6.8174
6.7987
6.7814
6.7622
6.4248
6.4204
6.3580
5.4023
5.3976
3.6673
1H NMR GF-4-49D in DMSO-d6
O
HN
NH
OMe
OMe
2h
1H NMR (400 MHz, DMSO-d6)
0.95
0.99
2.05
2.10
1.91
1.00
1.00
6.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

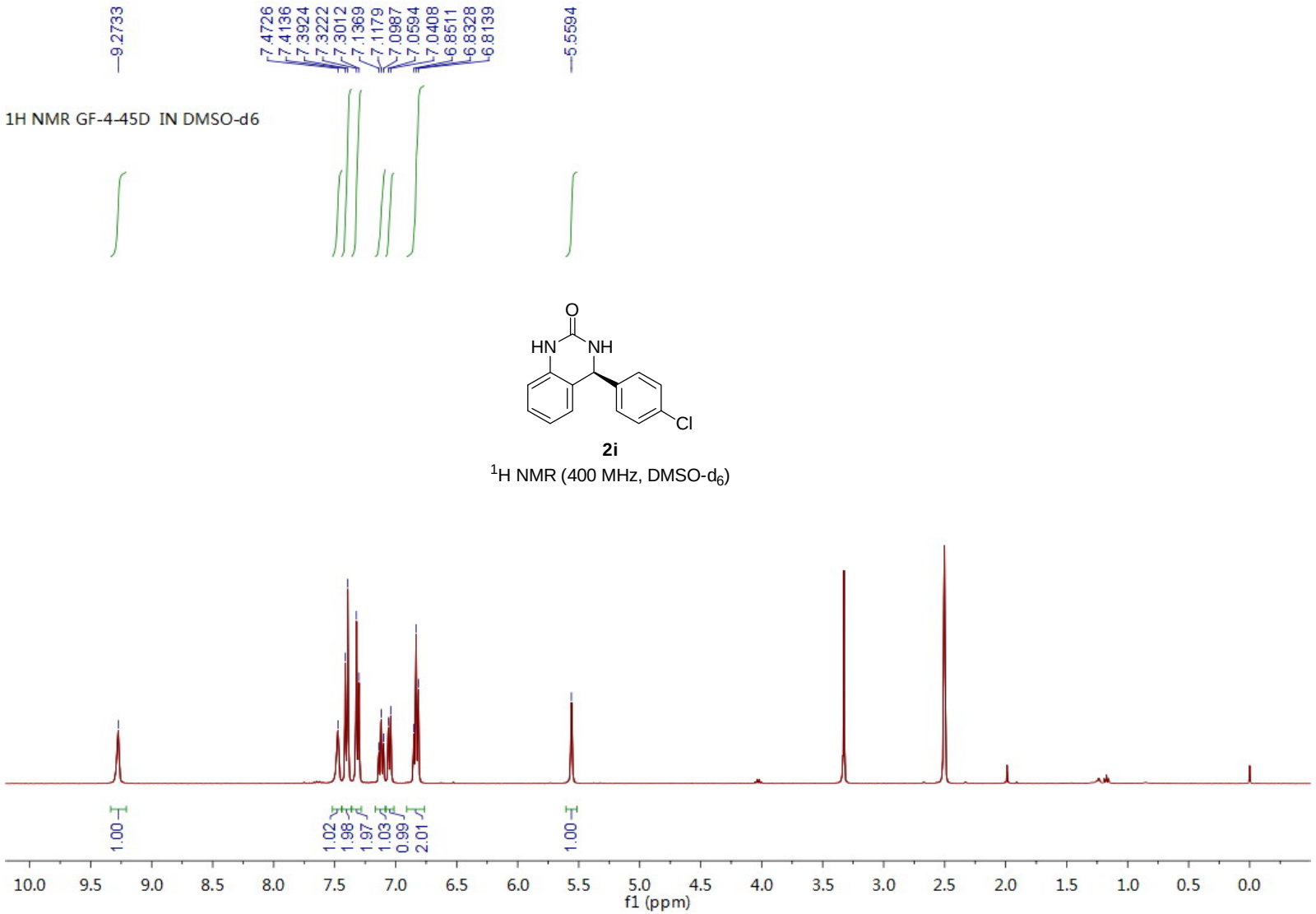
13C NMR GF-4-49D in DMSO-d6



2h

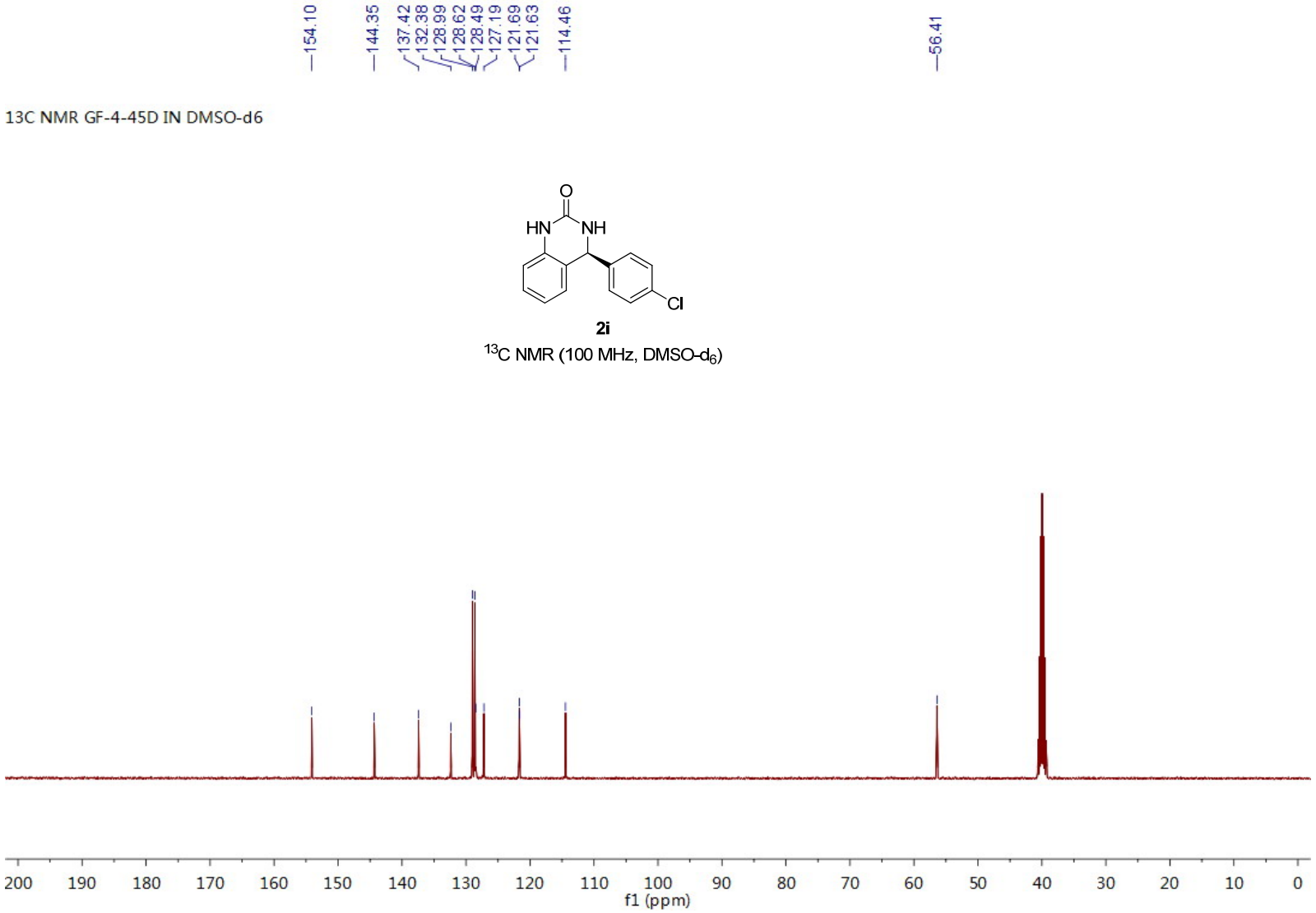
^{13}C NMR (100 MHz, DMSO-d_6)

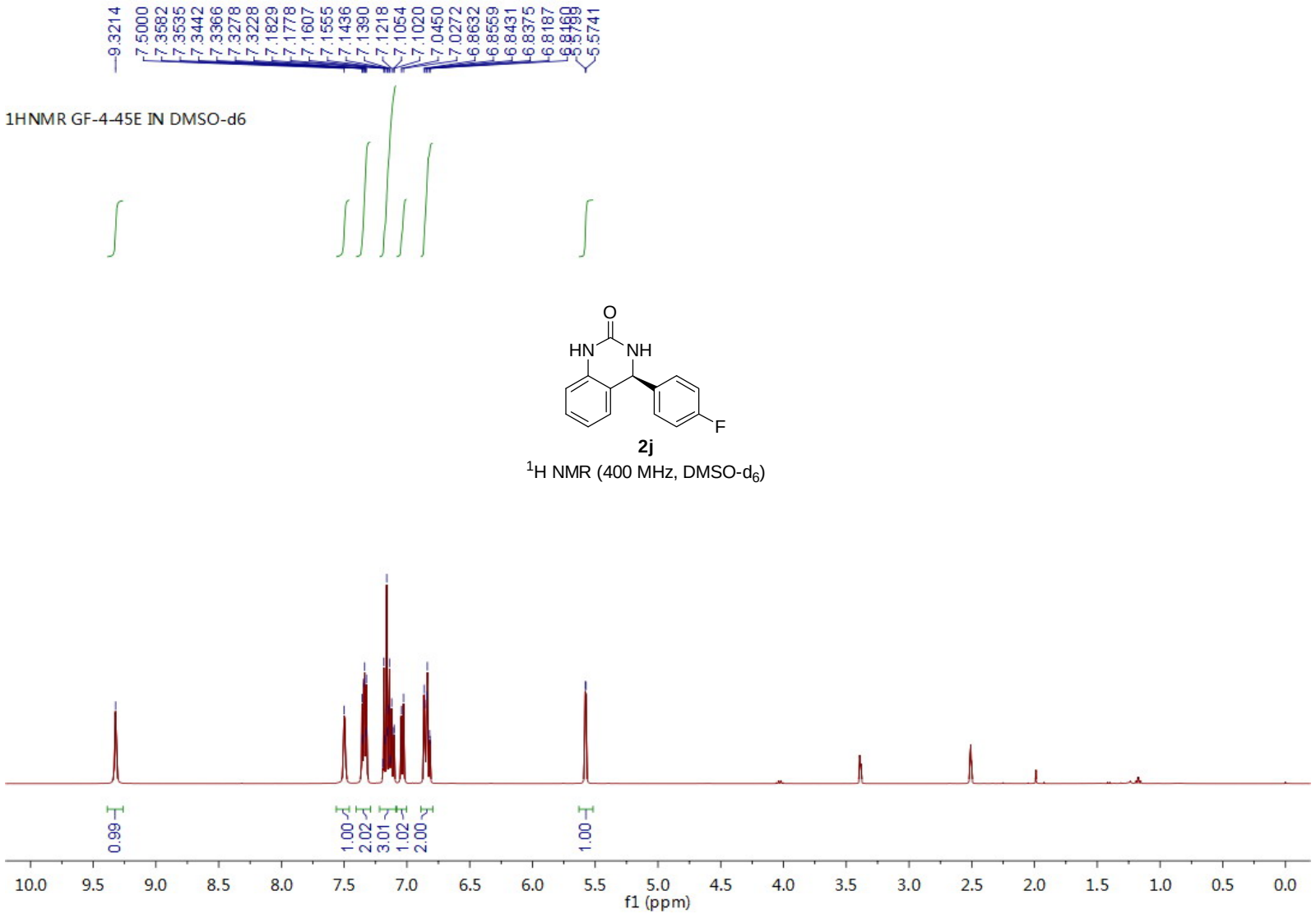




2i

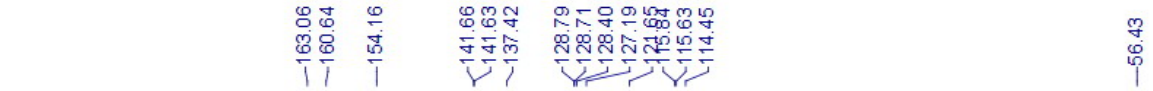
^{1}H NMR (400 MHz, DMSO-d_6)


154.10
144.35
137.42
132.38
128.99
128.62
128.49
127.19
121.69
121.63
114.46
56.41
13C NMR GF-4-45D IN DMSO-d6
O
HN
NH
Cl
2i
13C NMR (100 MHz, DMSO-d6)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

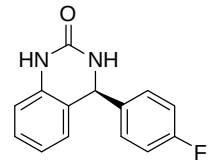


2j

^{1}H NMR (400 MHz, DMSO-d_6)

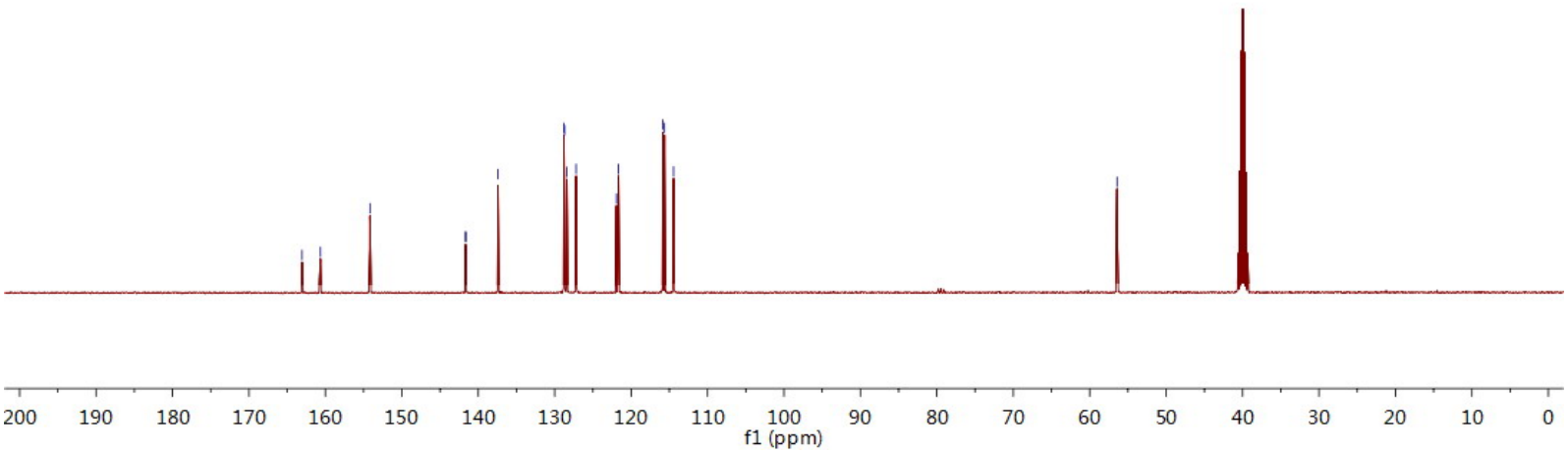


13C NMR GF-4-45E IN DMSO-d6



2j

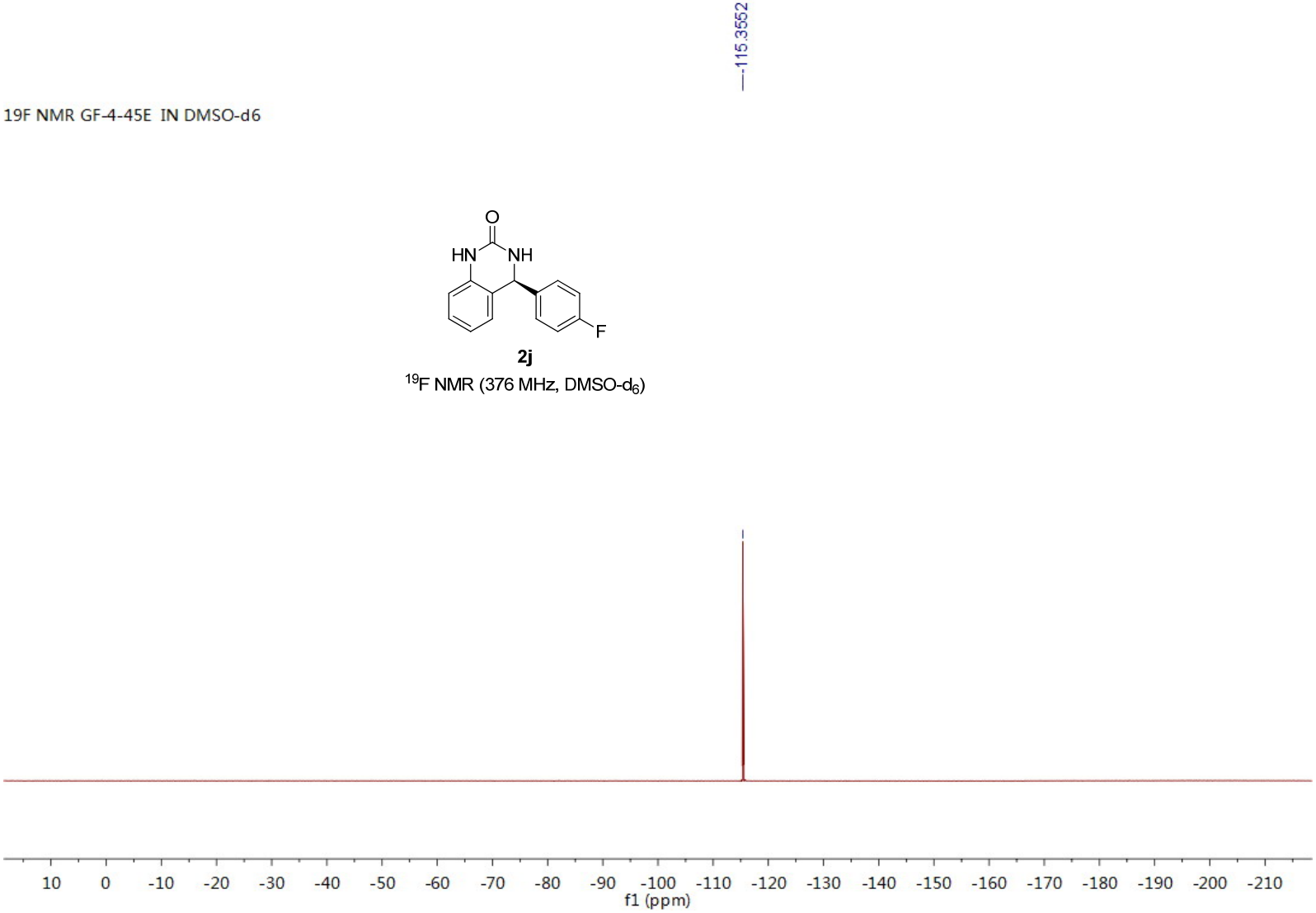
^{13}C NMR (100 MHz, DMSO-d_6)

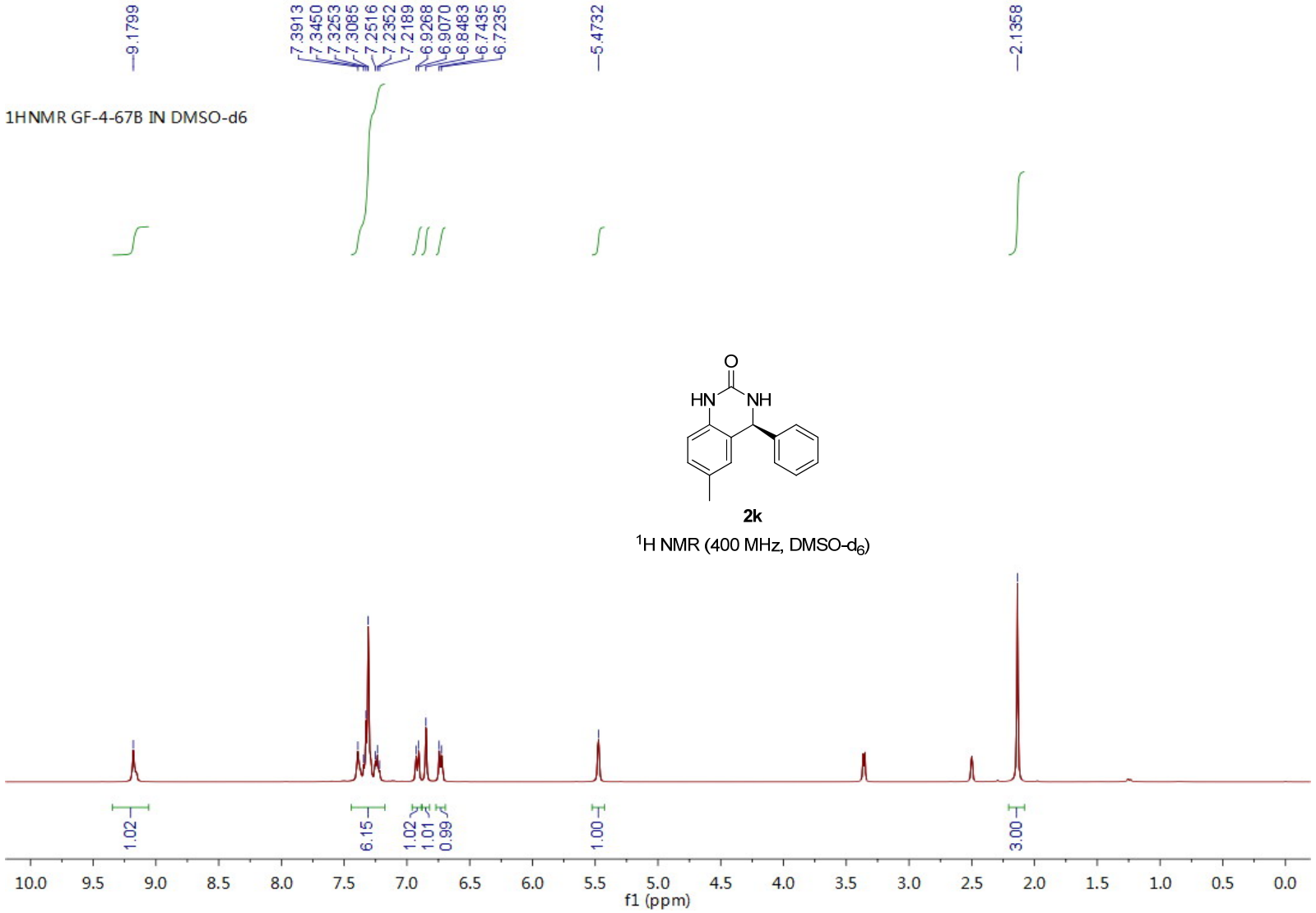


19F NMR GF-4-45E IN DMSO-d6

2j

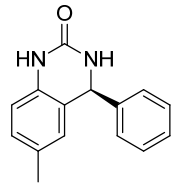
^{19}F NMR (376 MHz, DMSO-d_6)




9.1799
7.3913
7.3450
7.3253
7.3085
7.2516
7.2352
7.2189
6.9268
6.9070
6.8483
6.7435
6.7235
5.4732
2.1358
1HNMR GF-4-67B IN DMSO-d6
HN
NH
O
2k
1H NMR (400 MHz, DMSO-d6)
1.02
6.15
1.02
1.01
0.99
1.00
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)

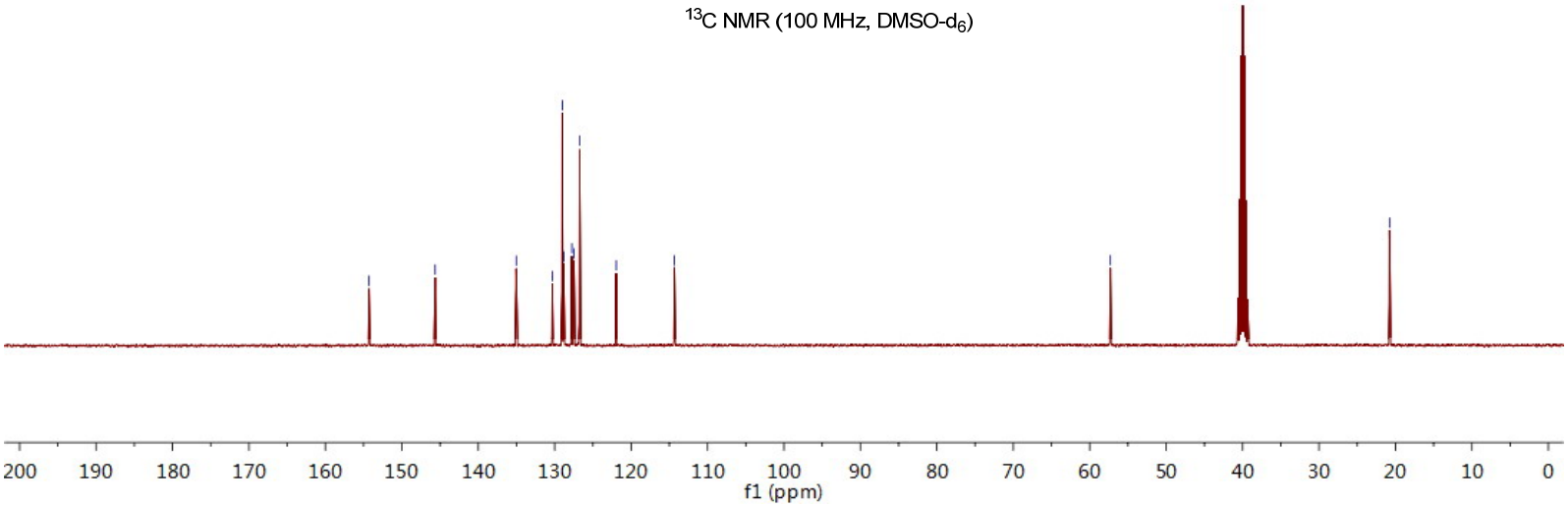
154.29
145.63
135.02
130.31
129.01
128.82
127.75
127.48
126.74
121.94
114.34
57.29
20.76

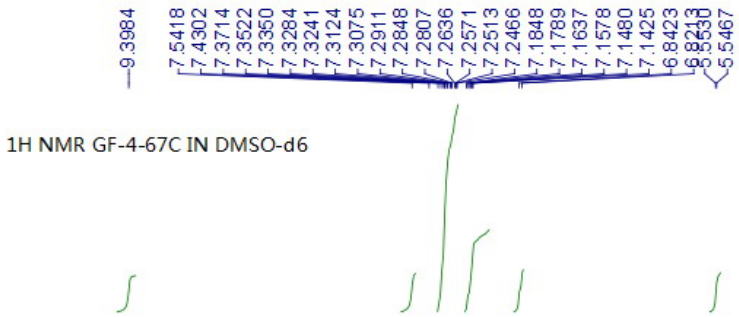
13C NMR GF-4-67B IN DMSO-d6

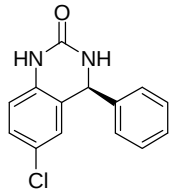


2k

^{13}C NMR (100 MHz, DMSO-d_6)

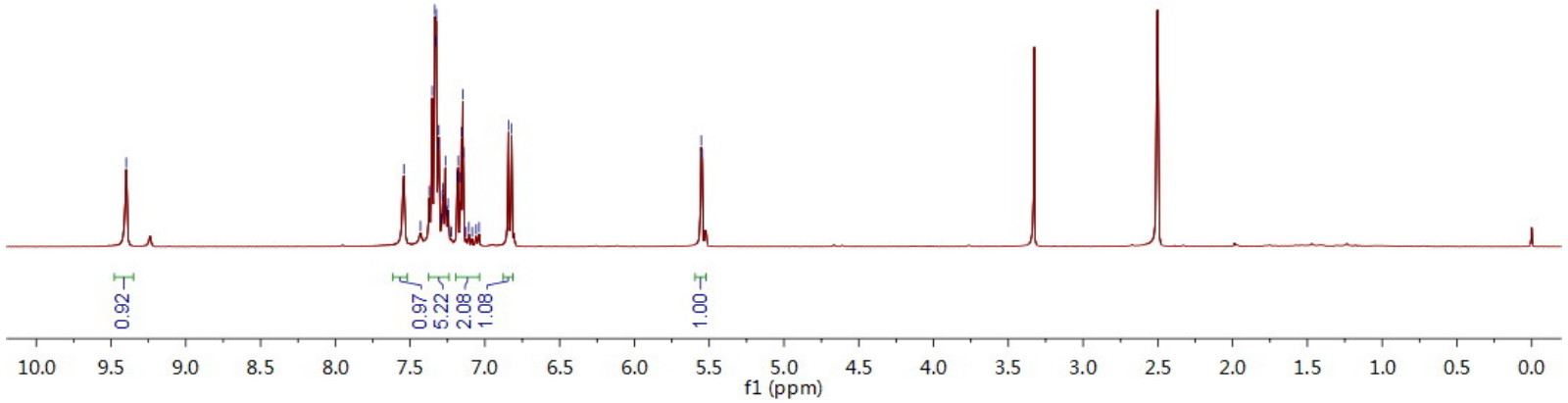


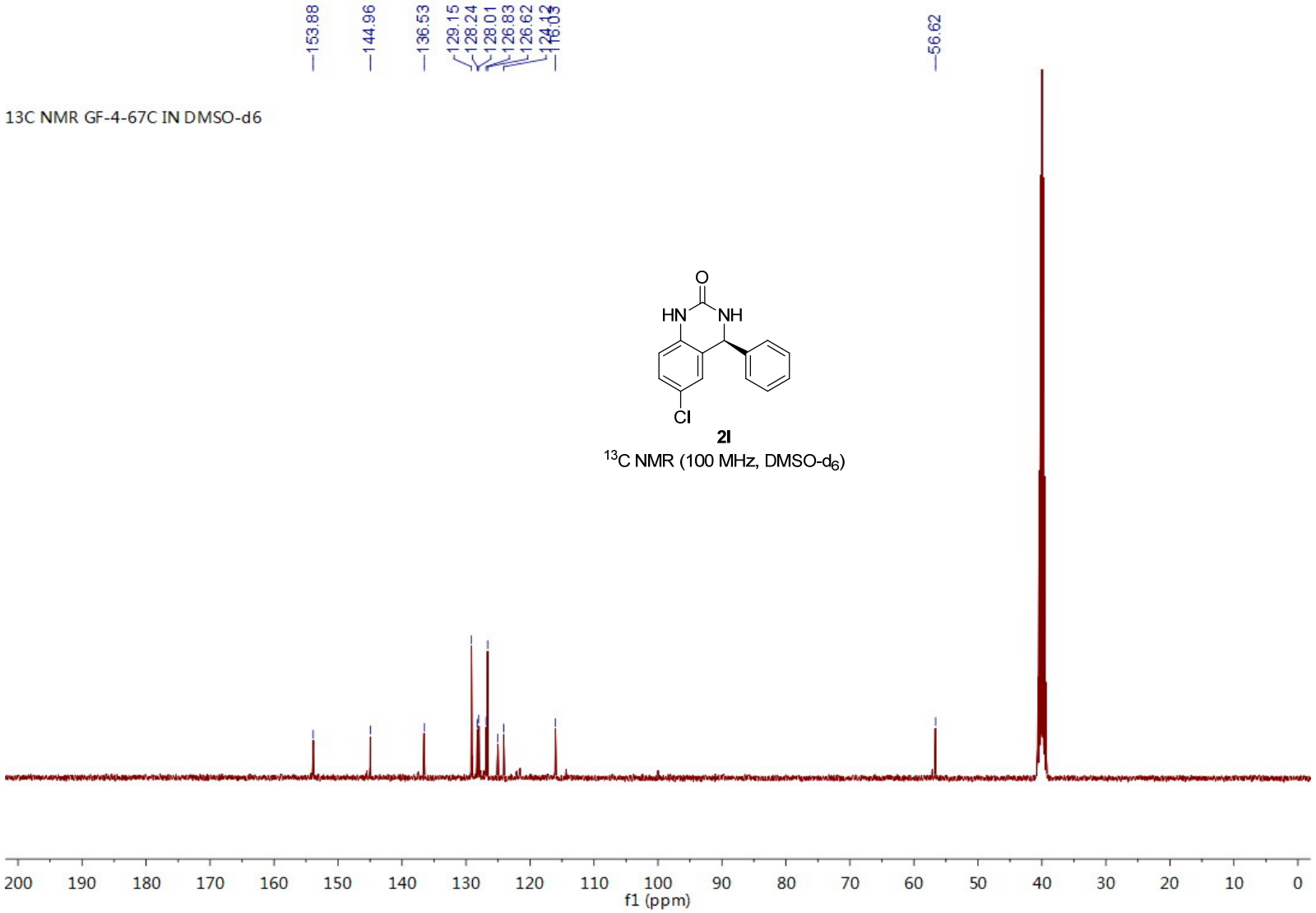




2l

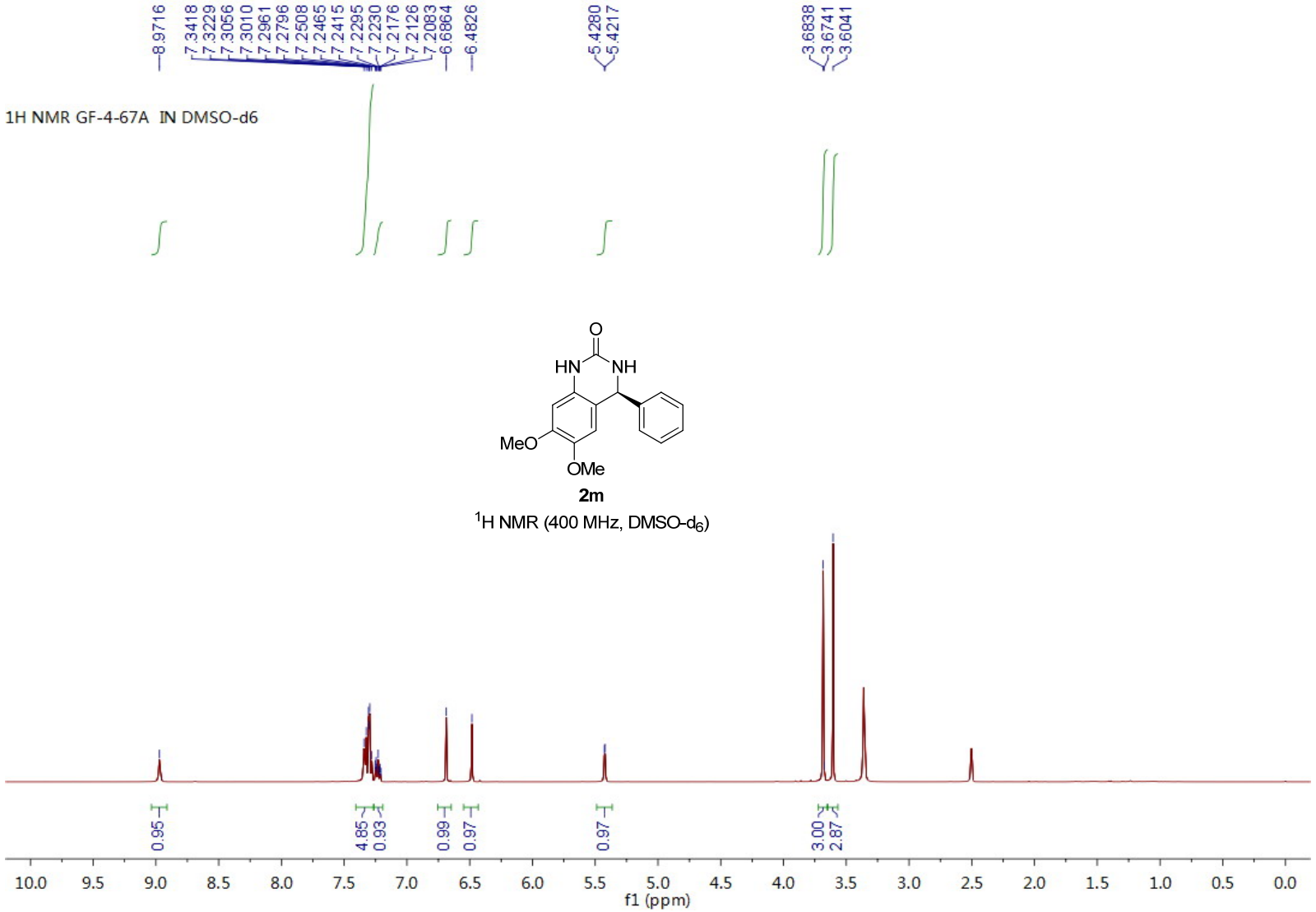
^{1}H NMR (400 MHz, DMSO-d_6)





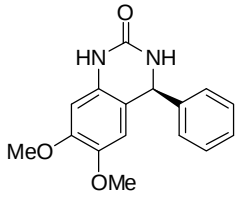
2l

^{13}C NMR (100 MHz, DMSO-d_6)


8.9716
7.3418
7.3229
7.3056
7.3010
7.2961
7.2796
7.2508
7.2465
7.2415
7.2295
7.2230
7.2176
7.2126
7.2083
6.6864
6.4826
5.4280
5.4217
3.6838
3.6741
3.6041
1H NMR GF-4-67A IN DMSO-d6
O
HN
NH
MeO
OMe
2m
1H NMR (400 MHz, DMSO-d6)
0.95
4.85
0.93
0.99
0.97
0.97
3.00
2.87
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)

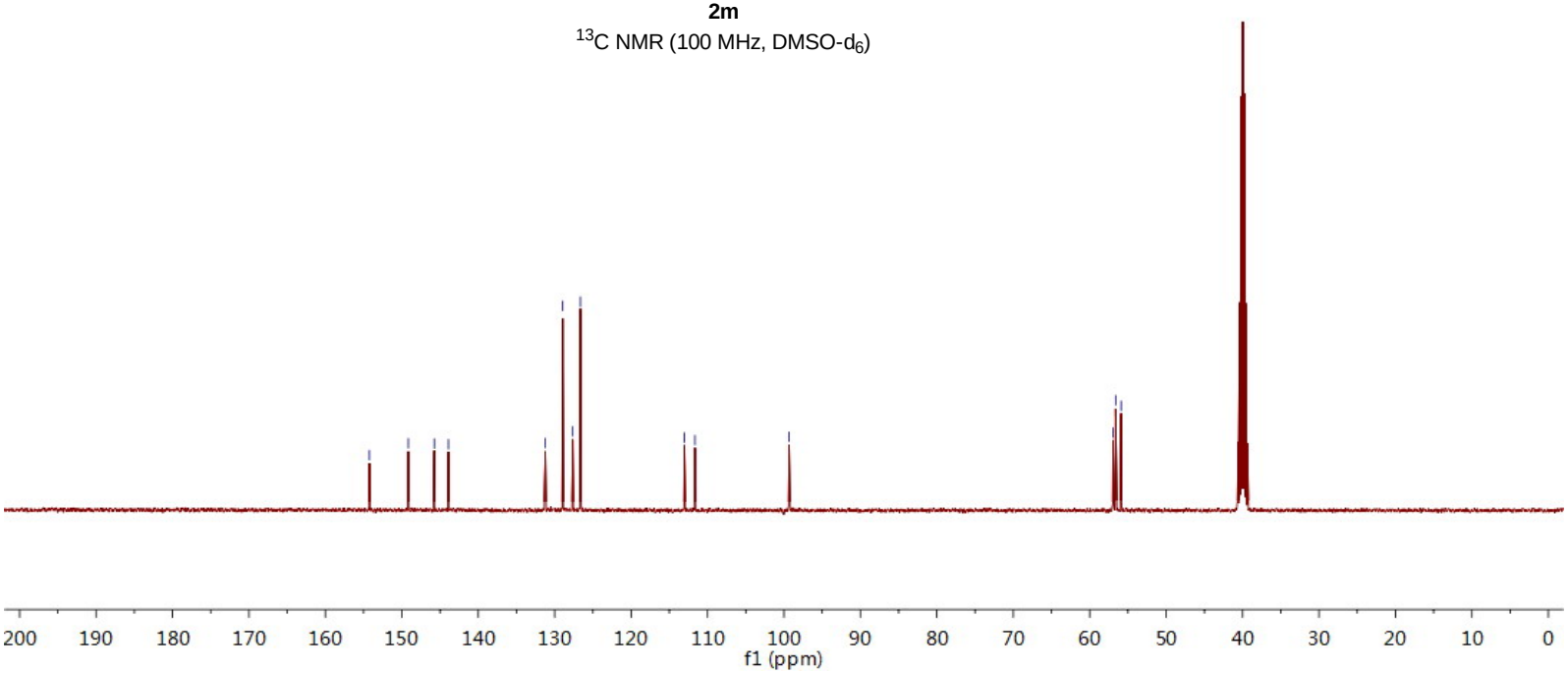
154.24
149.16
145.74
143.90
131.22
128.95
127.64
126.64
113.03
111.64
99.33
56.95
56.60
55.89

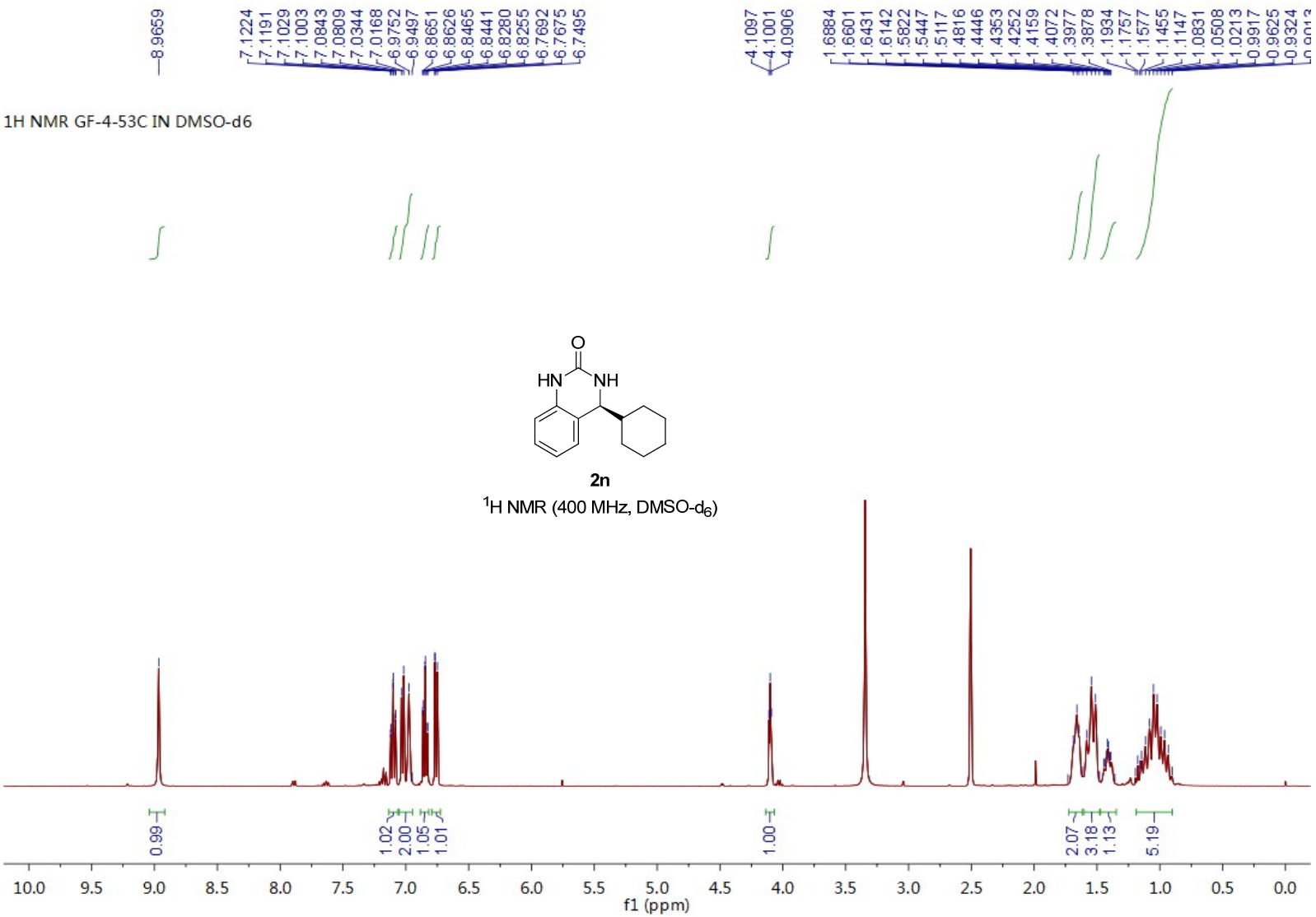
13C NMR GF-4-67A IN DMSO-d6

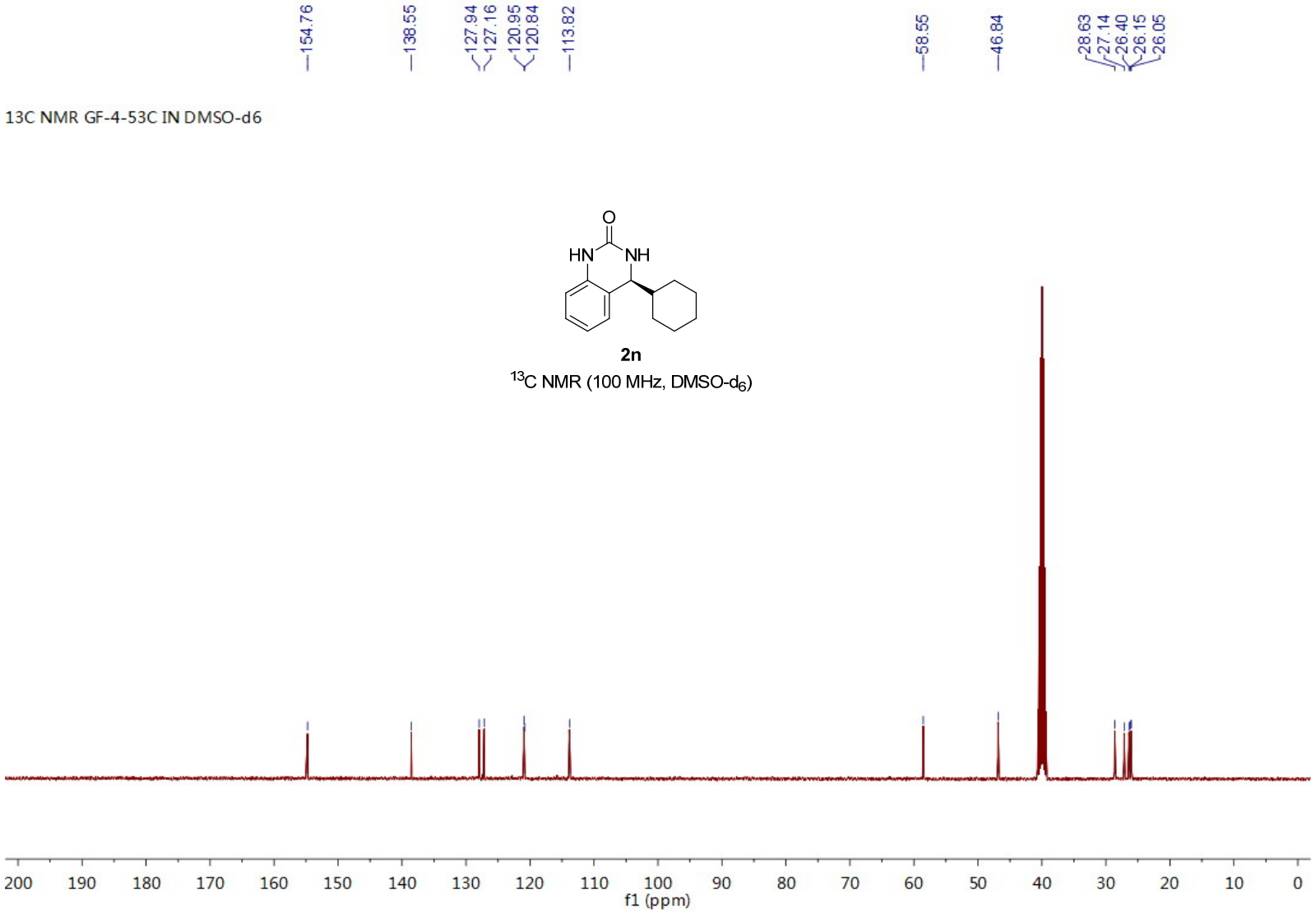


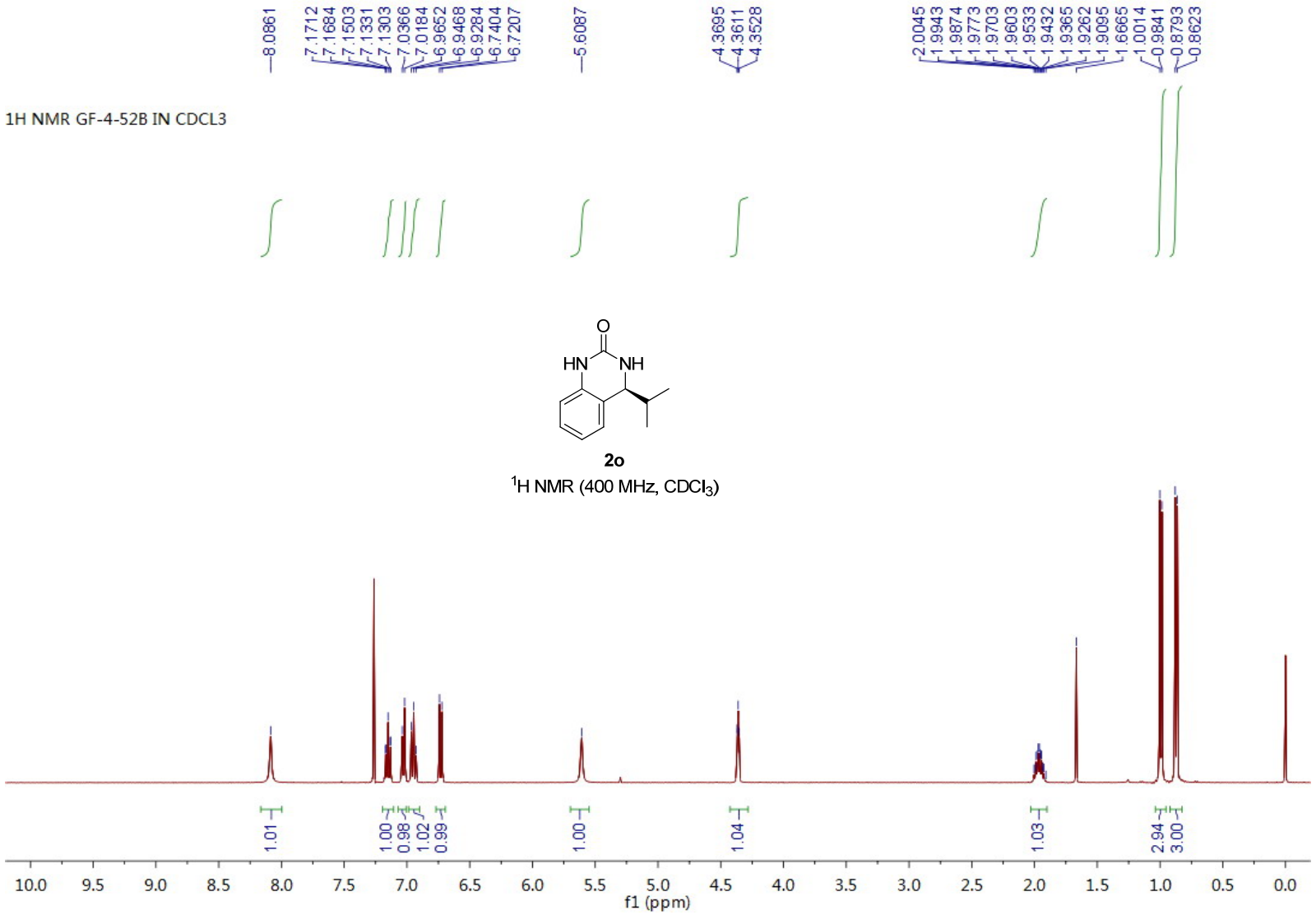
2m

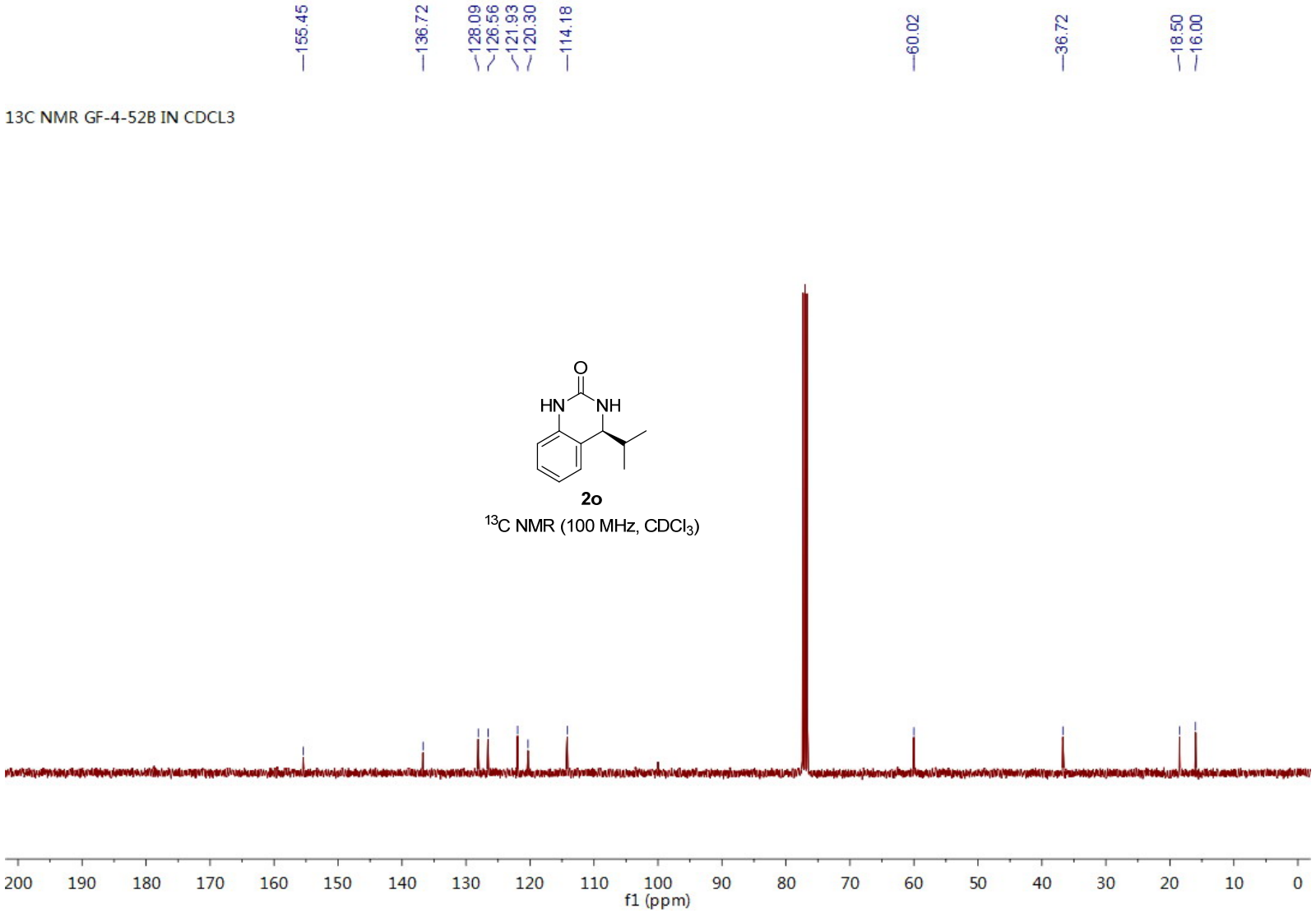
^{13}C NMR (100 MHz, DMSO-d_6)



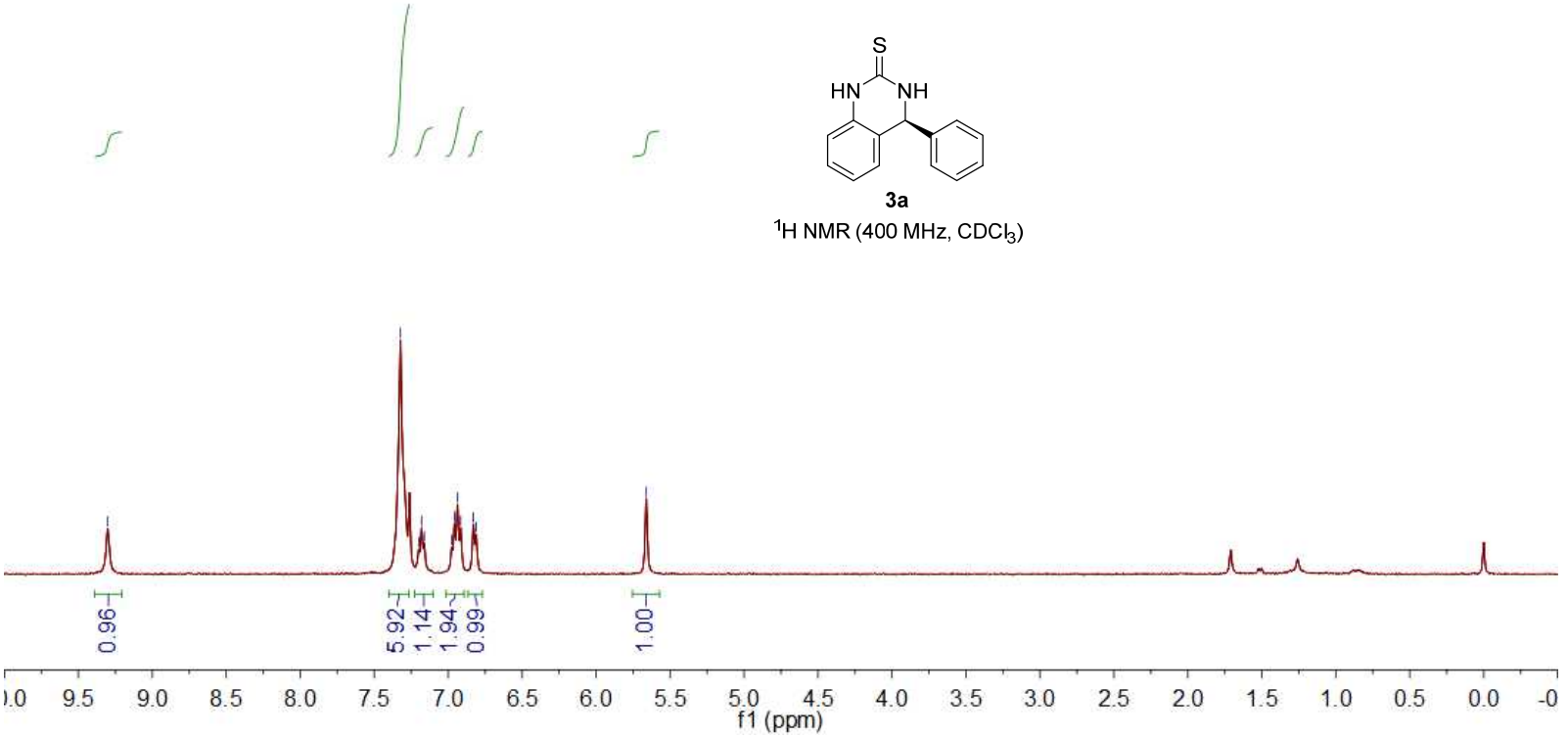

1H NMR GF-4-53C IN DMSO-d6
8.9659
7.1224
7.1191
7.1029
7.1003
7.0843
7.0809
7.0344
7.0168
6.9752
6.9497
6.8651
6.8626
6.8465
6.8441
6.8280
6.8255
6.7692
6.7675
6.7495
4.1097
4.1001
4.0906
1.6884
1.6601
1.6431
1.6142
1.5822
1.5447
1.5117
1.4816
1.4446
1.4353
1.4252
1.4159
1.4072
1.3977
1.3878
1.1934
1.1757
1.1577
1.1455
1.1147
1.0831
1.0508
1.0213
0.9917
0.9625
0.9324
HN
NH
O
2n
1H NMR (400 MHz, DMSO-d6)
0.99
1.02
2.00
1.05
1.01
1.00
2.07
3.18
1.13
5.19
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)


154.76
138.55
127.94
127.16
120.95
120.84
113.82
58.55
46.84
28.63
27.14
26.40
26.15
26.05
13C NMR GF-4-53C IN DMSO-d6
O
HN
NH
2n
13C NMR (100 MHz, DMSO-d6)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


8.0861
7.1712
7.1684
7.1503
7.1331
7.1303
7.0366
7.0184
6.9652
6.9468
6.9284
6.7404
6.7207
5.6087
4.3695
4.3611
4.3528
2.0045
1.9943
1.9874
1.9773
1.9703
1.9603
1.9533
1.9432
1.9365
1.9262
1.9095
1.6665
1.0014
0.9841
0.8793
0.8623
1H NMR GF-4-52B IN CDCL3
O
HN
NH
2o
1H NMR (400 MHz, CDCl3)
1.01
1.00
0.98
1.02
0.99
1.00
1.04
1.03
2.94
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)


155.45
136.72
128.09
126.56
121.93
120.30
114.18
60.02
36.72
18.50
16.00
13C NMR GF-4-52B IN CDCL3
HN
NH
O
2o
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)

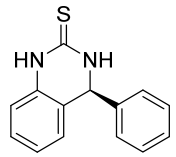
1H NMR ZZ-4-78 in CDCl3



3a

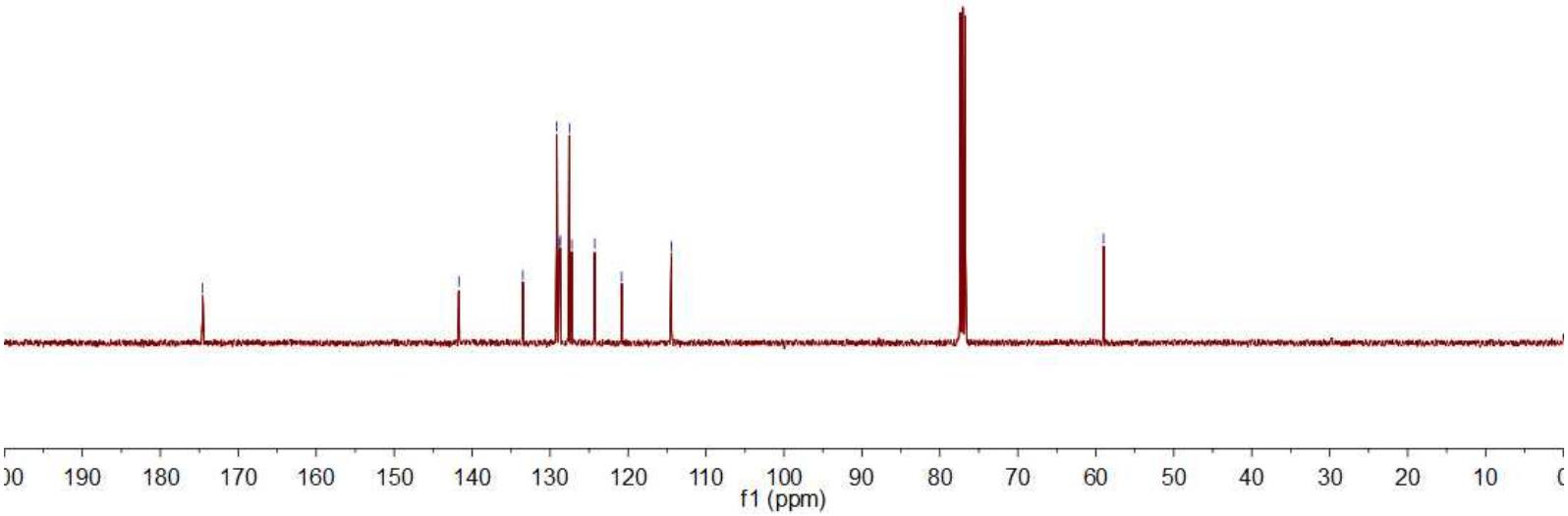
^{1}H NMR (400 MHz, $CDCl_3$)

13C NMR ZZ-4-78 in CDCl3

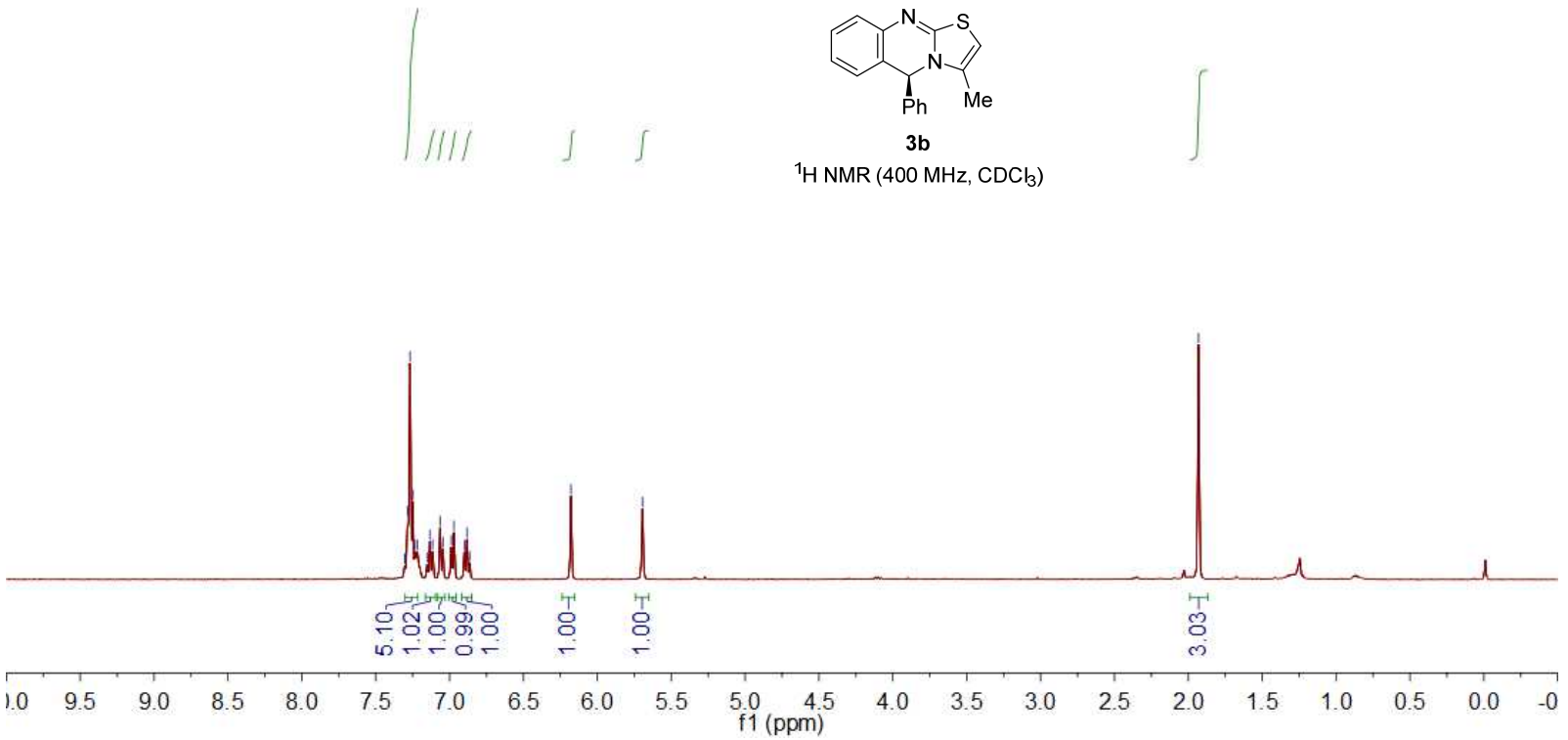


3a

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

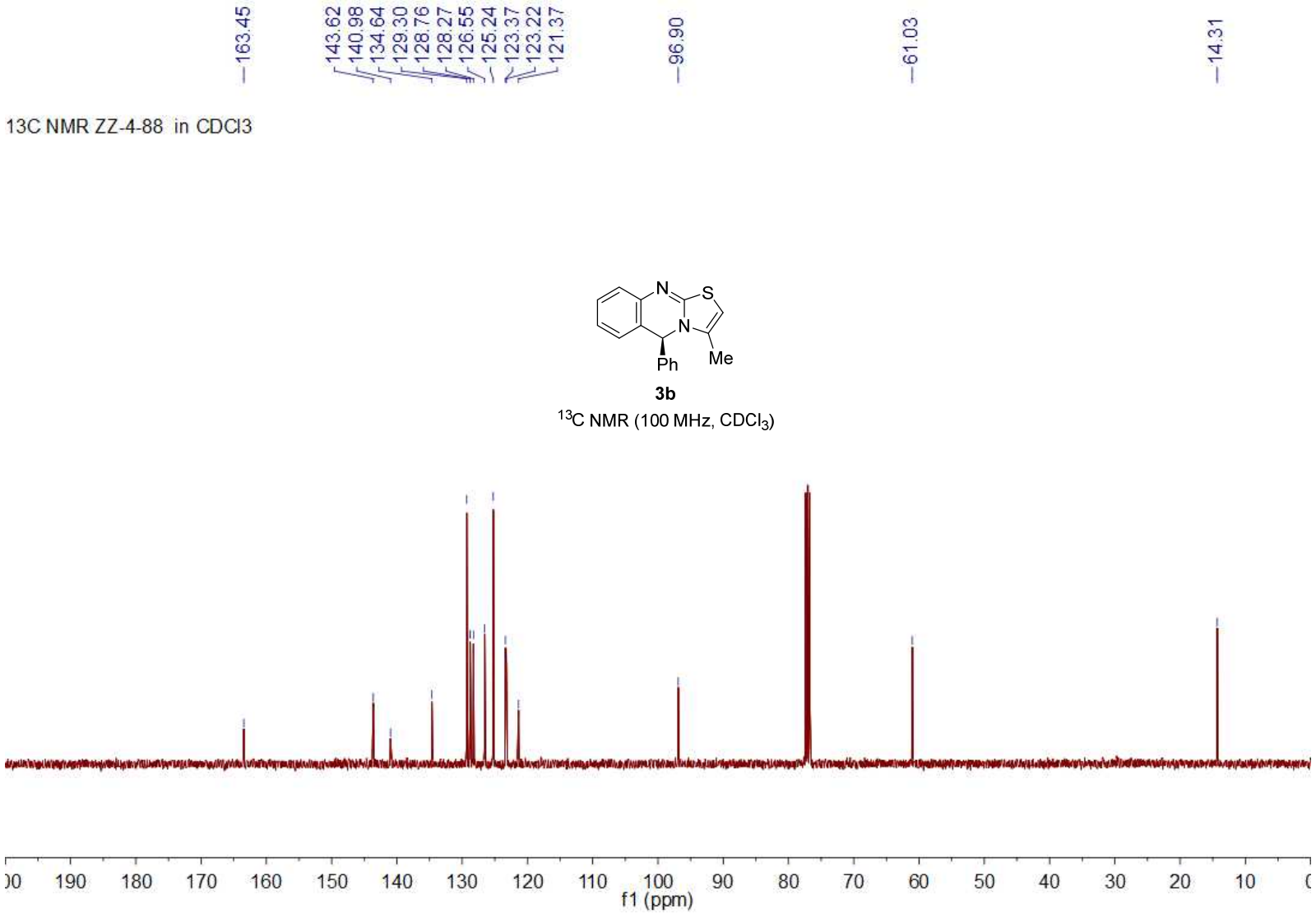


1H NMR ZZ-4-88 in CDCl3



3b

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

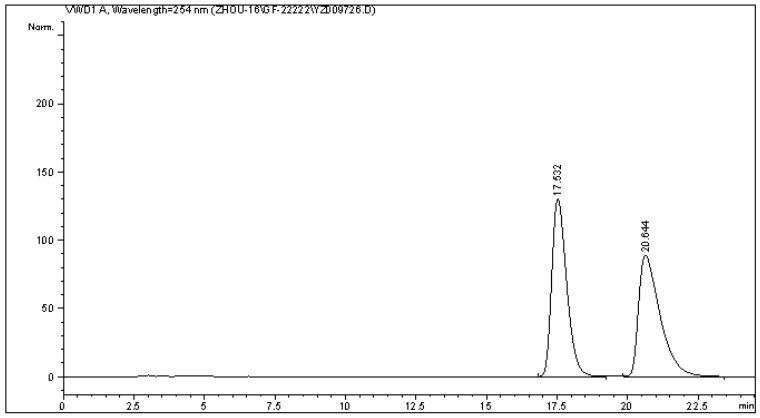


3b

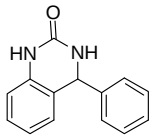
^{13}C NMR (100 MHz, $CDCl_3$)

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ009726.D
Sample Name: GF-4-24E

```
==========================================================================
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/17/2016 9:00:50 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 1/17/2016 6:46:33 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/15/2018 8:57:38 PM
                  (modified after loading)
Sample Info     : OD-H, Hexane/iPrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



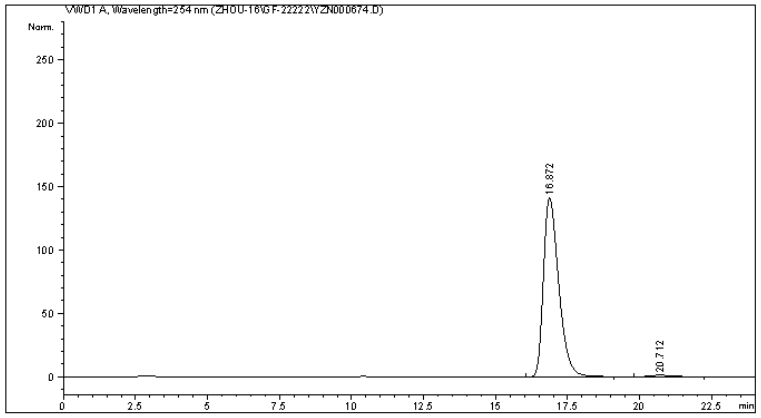

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  17.532 BB    0.5692 4794.04346  130.24326  50.5038
   2  20.644 BB    0.8164 4698.39795   88.63821  49.4962

Totals :                  9492.44141  218.88147

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



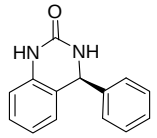
(+/-)-2a

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZN000674.D
Sample Name: GF-4-49E

```
==========================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/20/2016 10:35:00 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 3/20/2016 10:12:51 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:26:00 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



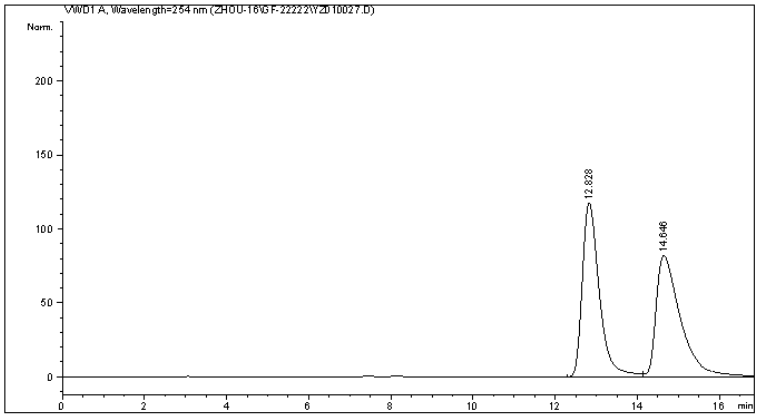

```
==========================================================================
                        Area Percent Report
==========================================================================

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  16.872 VB    0.5676 5212.28223  141.17508  98.7596
   2  20.712 BB    0.6995   65.46461    1.21299   1.2404

Totals :                  5277.74683  142.38807

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



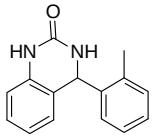
(-)-2a

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010027.D
Sample Name: GF-4-44A+-

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/13/2016 8:41:15 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/13/2016 6:08:33 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 1:36:54 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



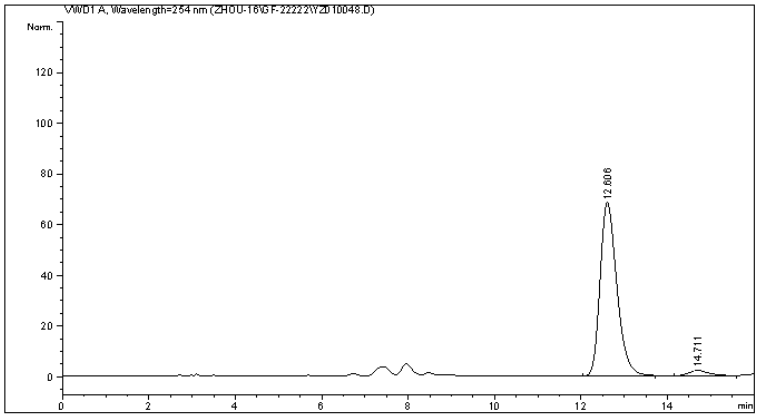

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  12.828 BV    0.4345 3381.49731  117.59226  49.9698
   2  14.646 VBA   0.6183 3385.58105   82.04718  50.0302

Totals :                  6767.07837  199.63944

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



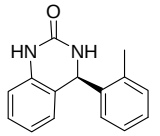
(+/-)-2b

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010048.D
Sample Name: GF-4-44A

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/15/2016 10:59:31 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/15/2016 8:50:00 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 1:51:29 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



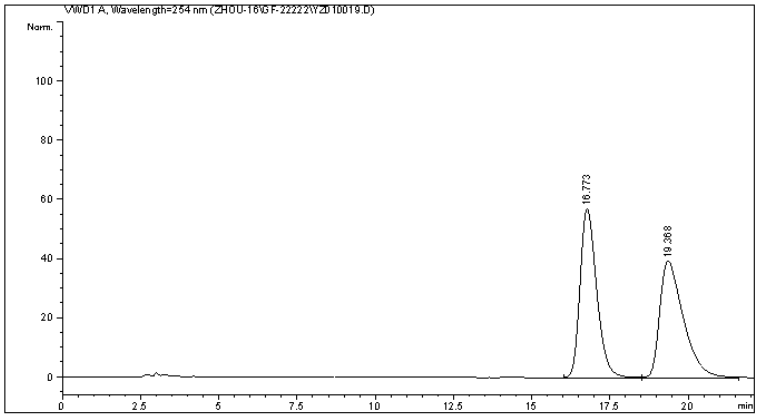

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  12.606 BB    0.4149 1842.30322   68.36278  96.0135
   2  14.711 BB    0.4734   76.49199    2.26079   3.9865

Totals :                  1918.79521   70.62357

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



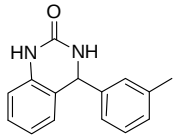
(-)-2b

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010019.D
Sample Name: GF-4-44B+-

```
==========================================================================
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/13/2016 6:09:37 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/13/2016 6:08:33 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 1:41:33 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



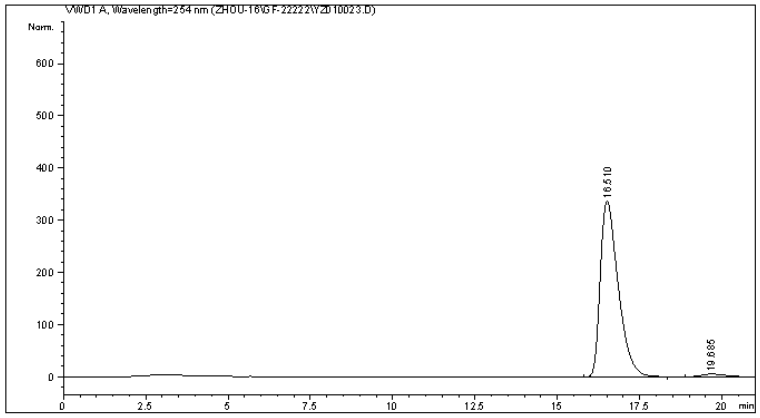

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  16.773 BB    0.5688 2113.48926   57.08342  50.6139
   2  19.368 BB    0.7974 2062.21924   39.56349  49.3861

Totals :                  4175.70850   96.64690

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



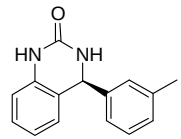
(+/-)-2c

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010023.D
Sample Name: GF-4-44B

```
==========================================================================
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/13/2016 7:22:35 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/13/2016 6:08:33 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 1:53:47 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



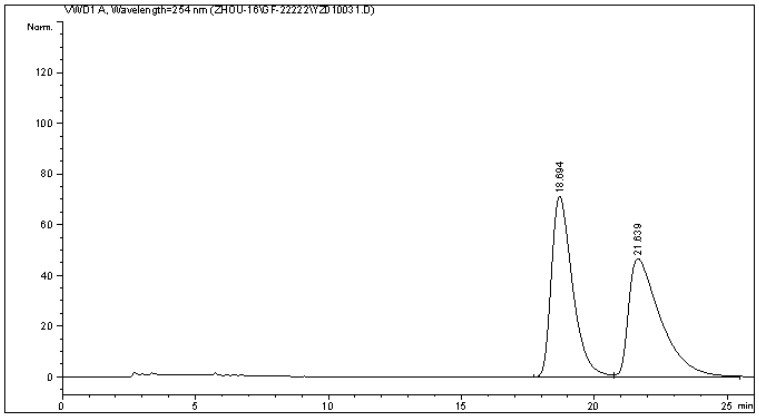

```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  16.510 BB    0.5674 1.27497e4   336.40323  97.9081
   2  19.685 BB    0.7383  272.41663    5.33600   2.0919

Totals :                  1.30222e4   341.73923

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



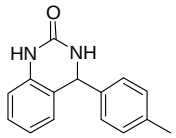
(-)-2c

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010031.D
Sample Name: GF-4-44C+-

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/13/2016 1:03:03 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/13/2016 1:00:26 PM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 1:45:12 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



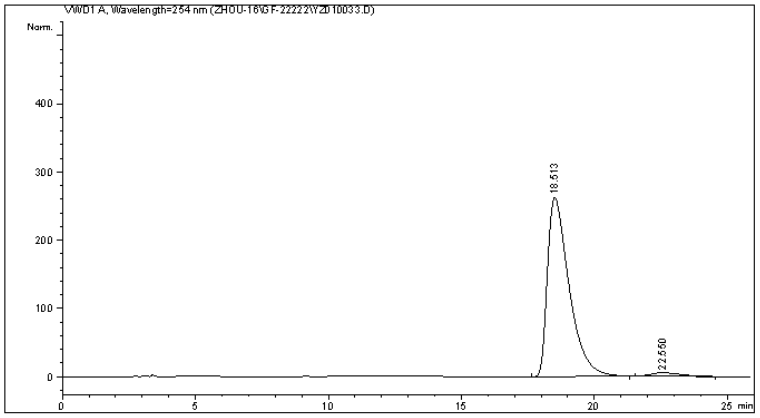

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  18.694 BV    0.8540 3939.36230   71.32286  50.3653
   2  21.639 VB    1.2550 3882.22363   46.71011  49.6347

Totals :                  7821.58594  118.03297

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



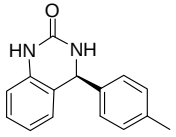
(+/-)-2d

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010033.D
Sample Name: GF-4-44C

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/13/2016 1:37:57 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/13/2016 1:00:26 PM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 1:48:34 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



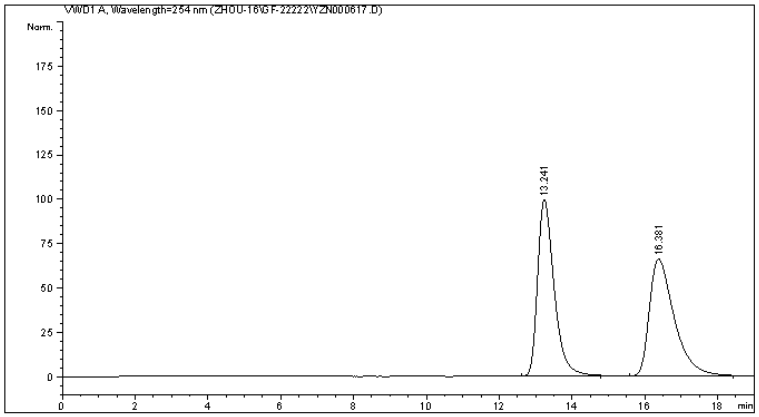

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  18.513 BB    0.8599 1.48586e4   262.49072  97.4400
   2  22.550 BB    1.0069  390.37512    5.00846   2.5600

Totals :                  1.52490e4   267.49918

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



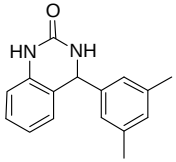
(-)-2d

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZN000617.D
Sample Name: GF-4-48B(+/-)

```
==========================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/17/2016 4:33:01 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 3/17/2016 4:28:44 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:14:46 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254nm
```



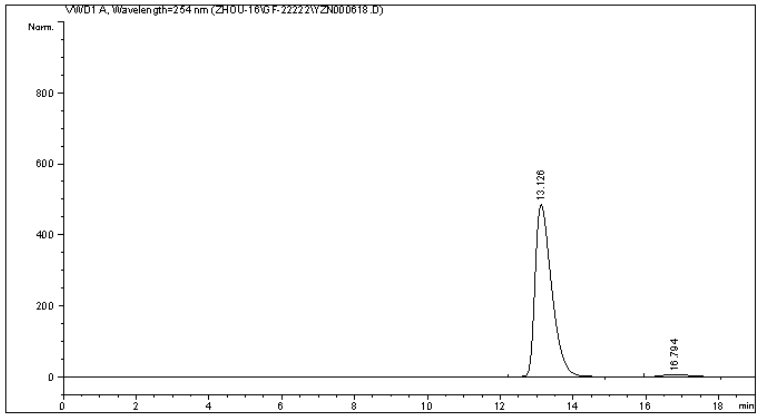

```
==========================================================================
                        Area Percent Report
==========================================================================

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  13.241 BB    0.4818 3134.75220   99.32730  50.0546
   2  16.381 BB    0.7137 3127.91675   65.93073  49.9454

Totals :                  6262.66895  165.25803

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



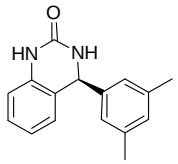
(+/-)-2e

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZN000618.D
Sample Name: GF-4-48B

```
==========================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/17/2016 6:11:39 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 3/17/2016 6:04:47 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:13:43 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254nm
```



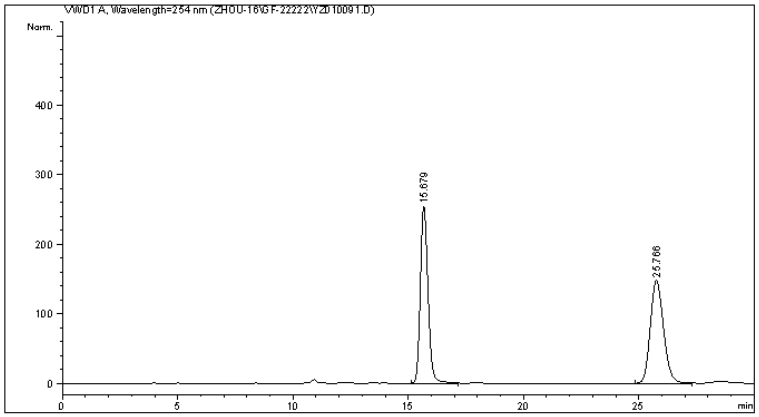

```
==========================================================================
                        Area Percent Report
==========================================================================

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  13.126 VB    0.4811 1.53130e4   486.03174  97.8136
   2  16.794 BB    0.7309  342.29477    7.01452   2.1864

Totals :                  1.56553e4   493.04626

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



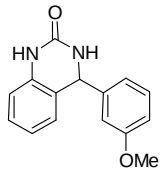
(-)-2e

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010091.D
Sample Name: GF-4-49C(+/-)

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/19/2016 11:46:55 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/19/2016 11:30:07 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:18:45 PM
                  (modified after loading)
Sample Info     : IC, H/i-PrOH = 80/20, 0.8 mL/min, 30 oC, 254 nm
```



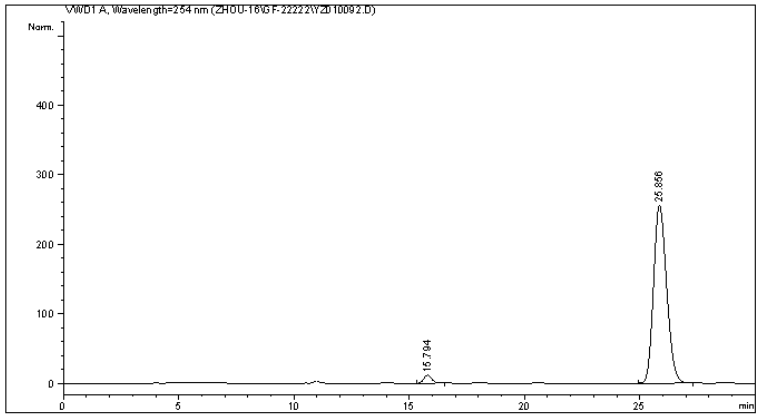

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  15.679 BB    0.3573 5881.99121  254.20068  50.0287
   2  25.766 BB    0.6163 5875.23975  147.92250  49.9713

Totals :                  1.17572e4   402.12318

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



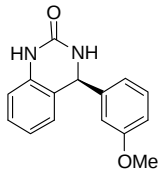
(+/-)-2f

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010092.D
Sample Name: GF-4-49C

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/19/2016 12:28:38 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/19/2016 11:30:07 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:17:25 PM
                  (modified after loading)
Sample Info     : IC, H/i-PrOH = 80/20, 0.8 mL/min, 30 oC, 254 nm
```



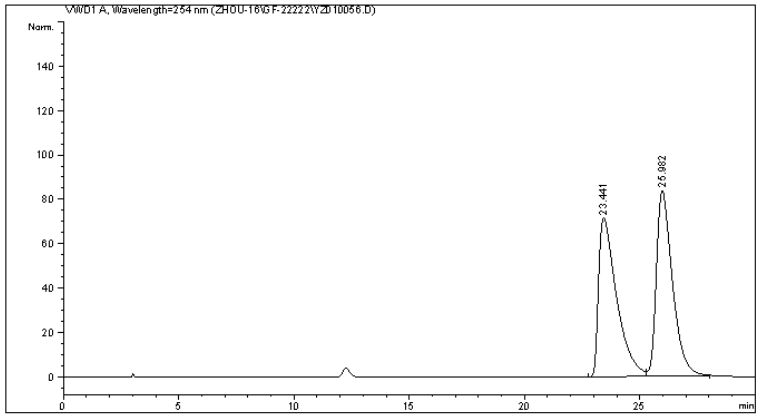

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  15.794 BB    0.3646  275.69019   11.60329   2.6528
   2  25.856 BB    0.6165 1.01169e4   256.17444  97.3472

Totals :                  1.03926e4   267.77773

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



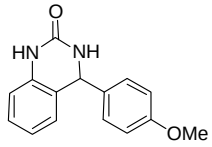
(-)-2f

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010056.D
Sample Name: GF-4-45C(+/-)

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/16/2016 3:01:16 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/16/2016 1:50:49 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 1:58:19 PM
                  (modified after loading)
Sample Info     : OD-3, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



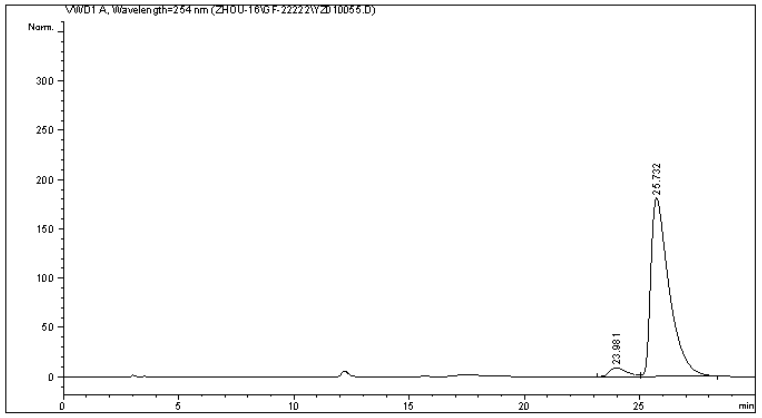

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  23.441 BV    0.8212 3888.69189   71.62736  49.0323
   2  25.982 VB    0.7489 4042.18286   83.82679  50.9677

Totals :                  7930.87476  155.45415

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



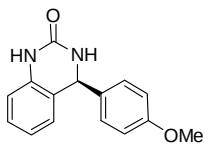
(+/-)-2g

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010055.D
Sample Name: GF-4-45C

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/16/2016 2:28:08 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/16/2016 1:50:49 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 1:57:12 PM
                  (modified after loading)
Sample Info     : OD-3, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



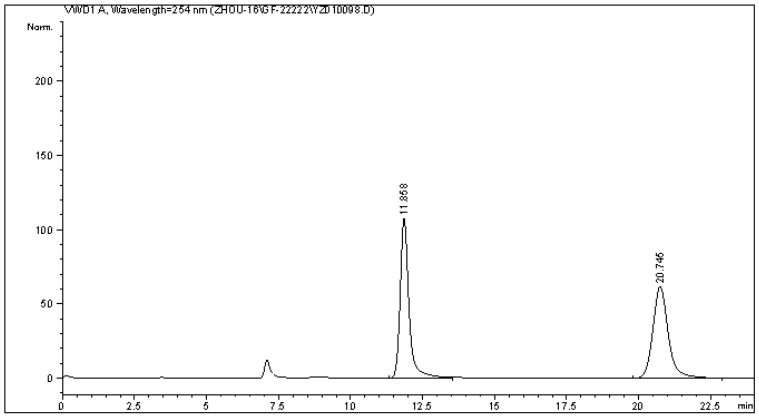

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  23.981 BV    0.7460  462.76947    9.10235   4.4282
   2  25.732 VB    0.8208 9987.68652  181.17450  95.5718

Totals :                  1.04505e4   190.27685

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



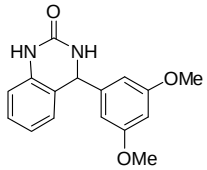
(-)-2g

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010098.D
Sample Name: GF-4-49D(+/-)

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/20/2016 2:05:49 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/20/2016 1:55:38 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:23:00 PM
                  (modified after loading)
Sample Info     : IA, H/i-PrOH = 75/25, 0.9 mL/min, 30 oC, 254 nm
```



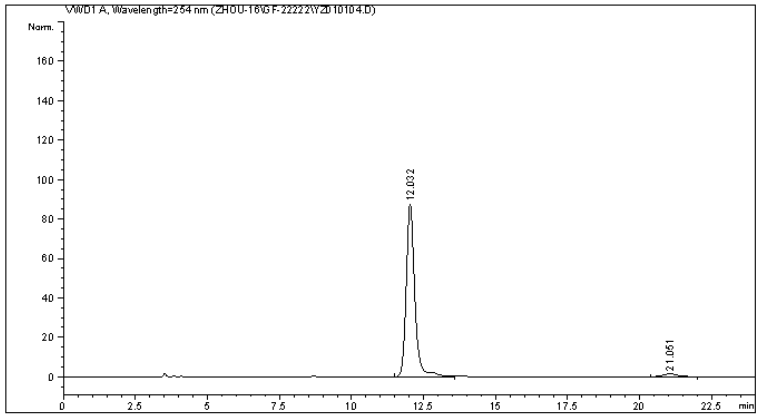

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  11.858 BB    0.3148 2285.31616  107.60020  49.8263
   2  20.745 BB    0.5658 2301.24805   61.74747  50.1737

Totals :                  4586.56421  169.34767

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



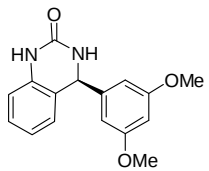
(+/-)-2h

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010104.D
Sample Name: GF-4-49D

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/20/2016 7:37:40 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/20/2016 7:17:27 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:21:35 PM
                  (modified after loading)
Sample Info     : IA, H/i-PrOH = 75/25, 0.9 mL/min, 30 oC, 254 nm
```



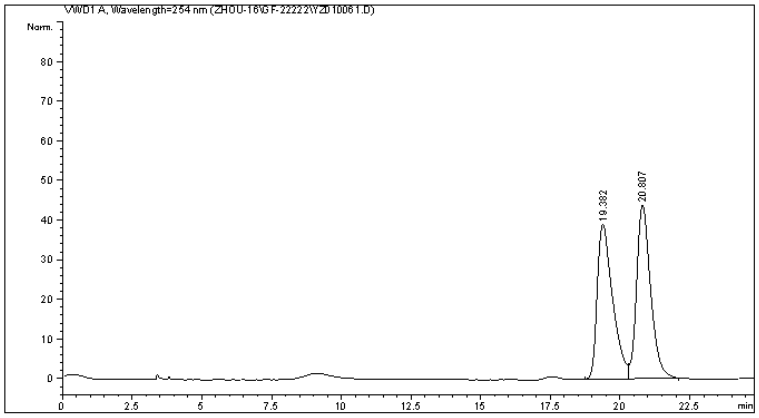

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  12.032 BB    0.3097 1800.86426   87.60635  97.1529
   2  21.051 BB    0.5261   52.77519    1.46172   2.8471

Totals :                  1853.63945   89.06807

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



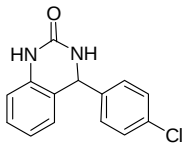
(-)-2h

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010061.D
Sample Name: GF-4-45D(+/-)

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/16/2016 7:12:01 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/16/2016 7:08:44 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:02:18 PM
                  (modified after loading)
Sample Info     : OD-3, H/i-PrOH = 90/10, 0.9 mL/min, 30 oC, 254 nm
```



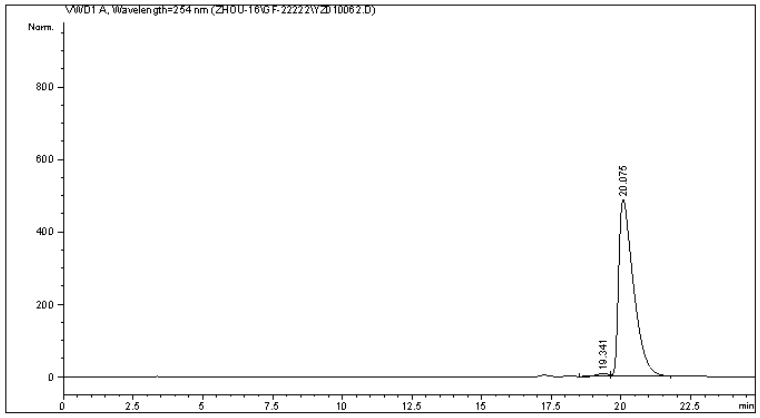

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  19.382 BV    0.5642 1495.59180   38.96954  49.4557
   2  20.807 VB    0.5300 1528.51184   43.73641  50.5443

Totals :                  3024.10364   82.70595

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



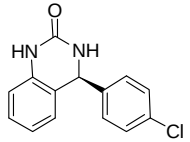
(+/-)-2i

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010062.D
Sample Name: GF-4-45D

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/16/2016 7:39:23 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/16/2016 7:08:44 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:00:59 PM
                  (modified after loading)
Sample Info     : OD-3, H/i-PrOH = 90/10, 0.9 mL/min, 30 oC, 254 nm
```



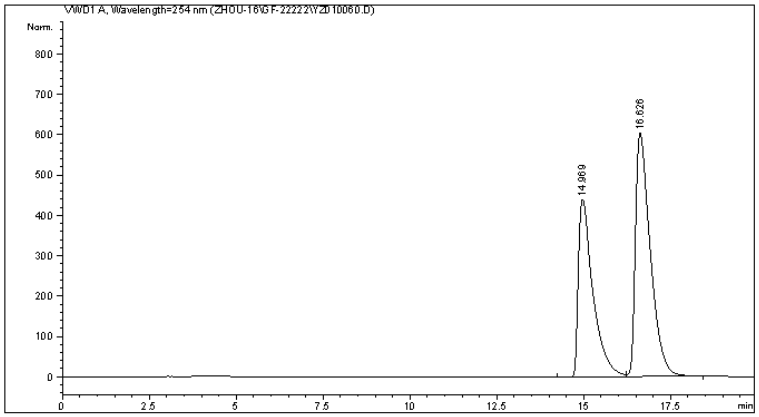

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  19.341 VV    0.5041  234.05428    7.12434   1.2888
   2  20.075 VB    0.5443 1.79271e4   487.26315  98.7112

Totals :                  1.81612e4   494.38749

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



(-)-2i

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010060.D
Sample Name: GF-4-45E(+/-)

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/16/2016 6:46:04 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/16/2016 5:04:34 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:05:49 PM
                  (modified after loading)
Sample Info     : OD-3, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```

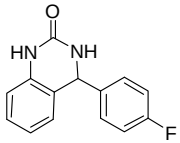


Area Percent Report

```
Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU *s	Height [mAU]	Area %
1	14.969	BV	0.4300	1.28553e4	439.52631	41.7410
2	16.626	VB	0.4412	1.79425e4	603.96655	58.2590
Totals :				3.07979e4	1043.49286	

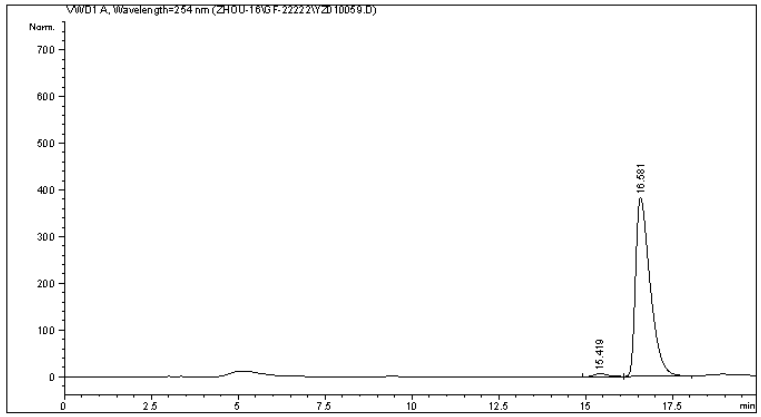


(+/-)-2j

*** End of Report ***

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010059.D
Sample Name: GF-4-45E

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/16/2016 6:03:00 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/16/2016 5:04:34 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:04:37 PM
                  (modified after loading)
Sample Info     : OD-3, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```

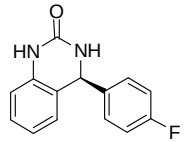


Area Percent Report

```
Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: VWD1 A, Wavelength=254 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU *s	Height [mAU]	Area %
1	15.419	VV	0.3792	171.20261	6.67853	1.5167
2	16.581	VB	0.4361	1.11164e4	383.12131	98.4833
Totals :				1.12876e4	389.79984	

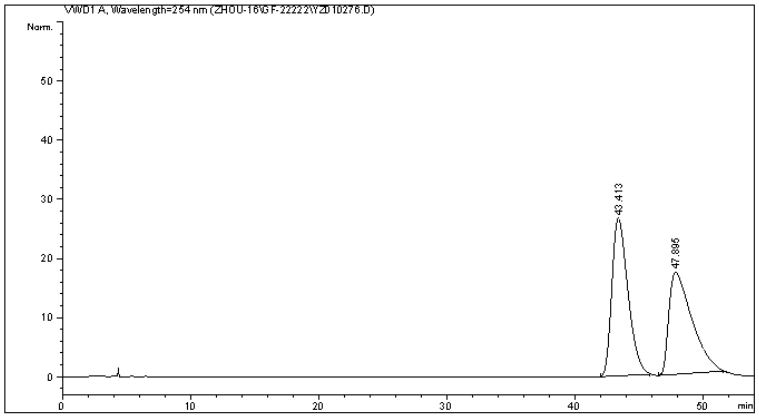


(-)-2j

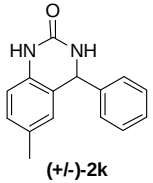
*** End of Report ***

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010276.D
Sample Name: GF-4-67B-Rac

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/4/2016 9:18:36 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 4/4/2016 9:16:30 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:39:35 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 95/05, 0.7 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  43.413 BB    1.2684 2325.61353   26.65312  51.8248
   2  47.895 BB    1.6836 2161.83643   17.23040  48.1752

Totals :                  4487.44995   43.88352
```

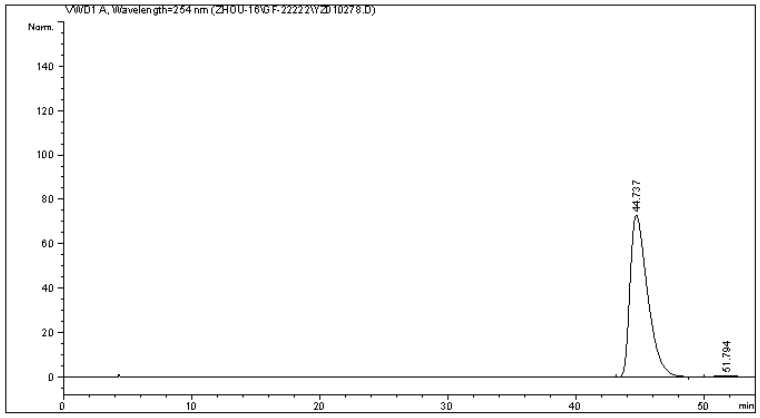


(+/-)-2k

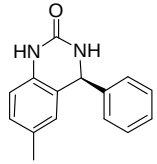
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010278.D
Sample Name: GF-4-67B

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/4/2016 11:37:30 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 4/4/2016 11:36:52 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:42:09 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 95/05, 0.7 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  44.737 BB    1.4540 6960.91895   73.13689  98.9305
   2  51.794 BB    1.5185   75.25316 5.84916e-1   1.0695

Totals :                  7036.17210   73.72180
```

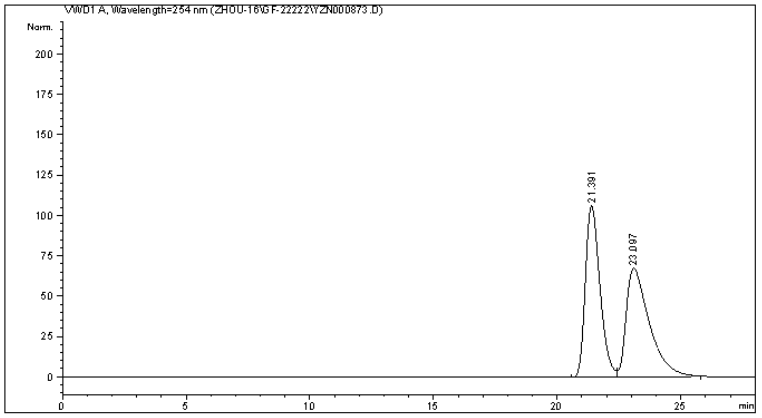


(-)-2k

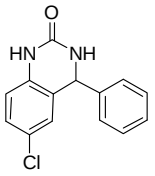
```
                          *** End of Report ***
```

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZN000873.D
Sample Name: GF-4-67C-Rac

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/3/2016 1:53:59 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 4/3/2016 1:49:11 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:45:25 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 0.7mL/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  21.391 BV    0.6320 4353.11182  106.33298  49.9281
   2  23.097 VB    0.9703 4365.64697   67.34595  50.0719

Totals :                  8718.75879  173.67893
```

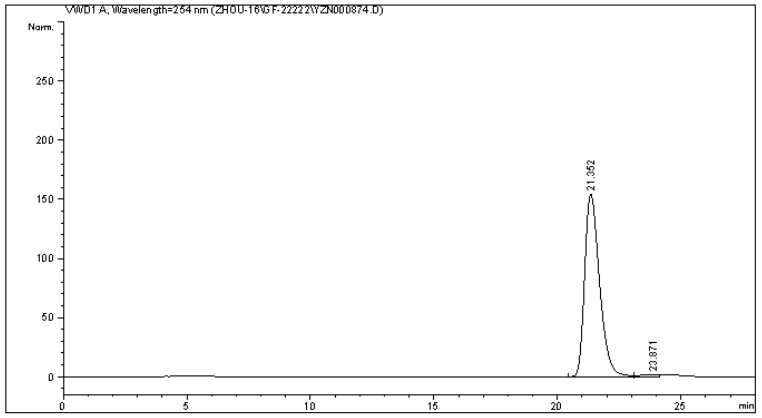


(+/-)-2l

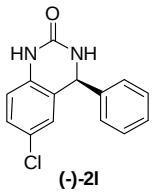
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZN000874.D
Sample Name: GF-4-67C

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/3/2016 2:25:22 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 4/3/2016 2:22:49 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:48:27 PM
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 0.7mL/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  21.352 VV    0.6426 6458.84814  154.32777  98.5385
   2  23.871 VV    0.7282   95.79656    1.88989   1.4615

Totals :                  6554.64471  156.21766
```

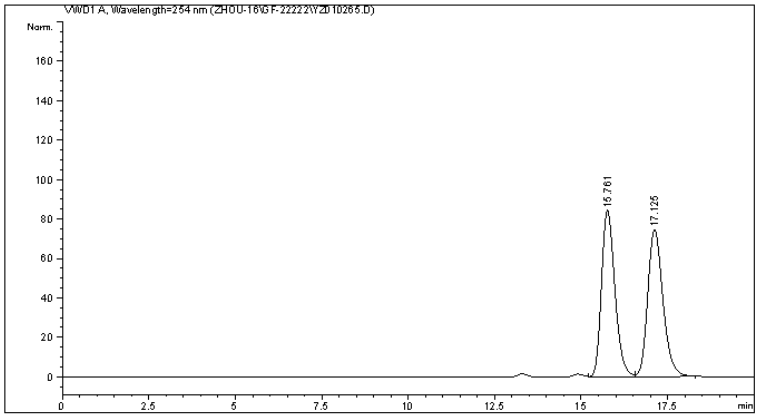


(-)-2l

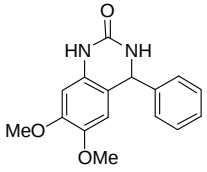
```
                          *** End of Report ***
```

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010265.D
Sample Name: GF-4-67A rac

```
Acq. Operator   : 1
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/4/2016 3:47:59 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 4/4/2016 3:46:29 AM by 1
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:36:06 PM
                  (modified after loading)
Sample Info     : IC, H/i-PrOH = 72/28, 0.8 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  15.761 VV    0.4175 2272.89722   84.40331  49.9074
   2  17.125 VB    0.4707 2281.33325   74.51803  50.0926

Totals :                  4554.23047  158.92133
```

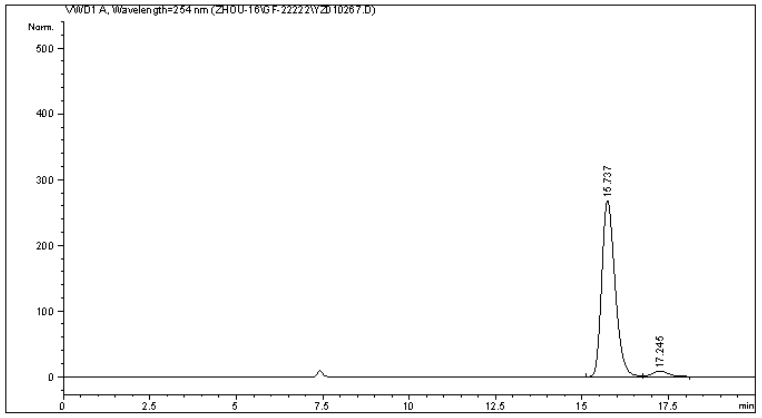


(+/-)-2m

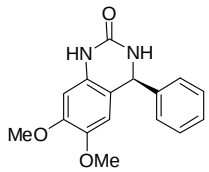
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010267.D
Sample Name: GF-4-67A

```
Acq. Operator   : 1
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/4/2016 4:48:42 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 4/4/2016 3:46:29 AM by 1
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:37:18 PM
                  (modified after loading)
Sample Info     : IC, H/i-PrOH = 72/28, 0.8 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  15.737 BB    0.4131 7150.06738  268.04449  96.2793
   2  17.245 BB    0.4942  276.31470    8.50231   3.7207

Totals :                  7426.38208  276.54681
```

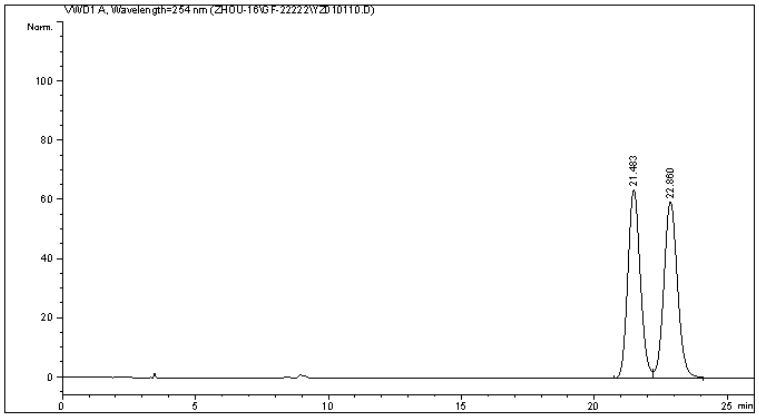


(-)-2m

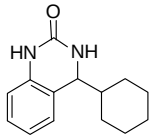
```
                          *** End of Report ***
```

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010110.D
Sample Name: GF-4-52C(+/-)

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/21/2016 12:35:48 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/21/2016 12:34:33 PM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:32:53 PM
                  (modified after loading)
Sample Info     : IC, H/i-PrOH = 92/08, 1.0 mL/min, 30 oC, 254 nm
```



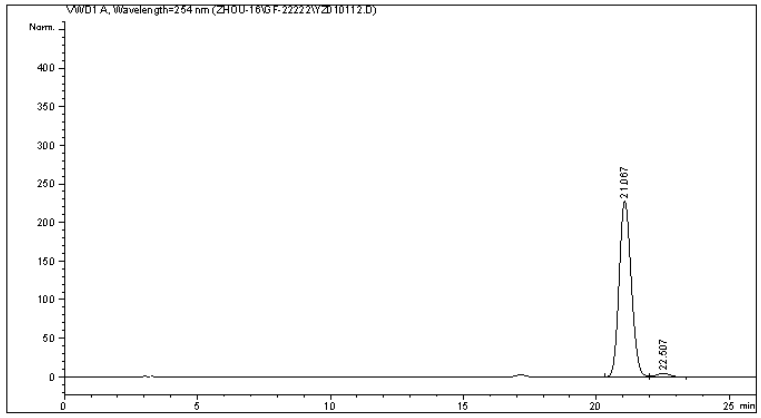

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  21.483 BV    0.5044 2074.29028   63.81608  49.5694
   2  22.860 VB    0.5456 2110.33154   59.59352  50.4306

Totals :                  4184.62183  123.40960


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



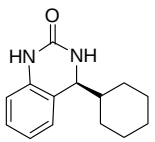
(+/-)-2n

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010112.D
Sample Name: GF-4-52C

```
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/22/2016 1:16:37 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/22/2016 1:13:42 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:34:19 PM
                  (modified after loading)
Sample Info     : IC, H/i-PrOH = 92/08, 1.0 mL/min, 30 oC, 254 nm
```



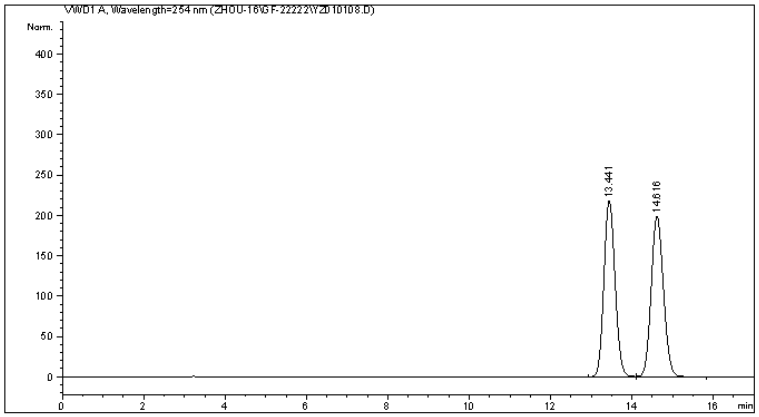

```
                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  21.067 BV    0.4934 7212.34521  227.62305  97.8503
   2  22.507 VB    0.5368  158.44650    4.55595   2.1497

Totals :                  7370.79172  232.17900


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



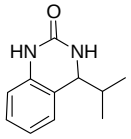
(+)-2n

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010108.D
Sample Name: GF-4-52B(+/-)

```
==========================================================================
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/21/2016 11:50:24 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/21/2016 11:33:47 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:28:21 PM
                  (modified after loading)
Sample Info     : IC, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



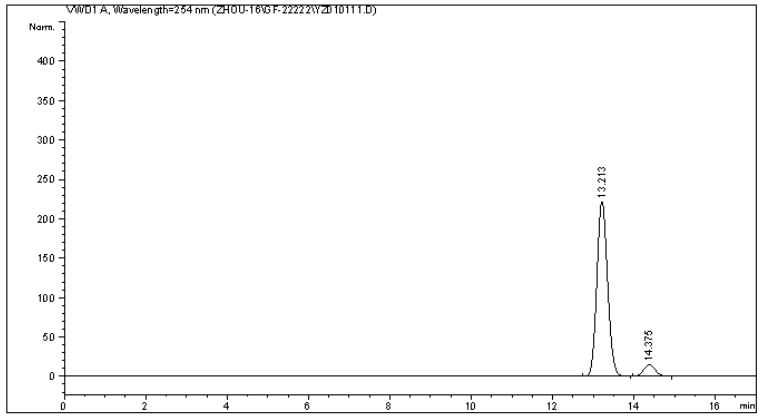

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  13.441 BV    0.2979 4160.84570  218.48232  49.9193
   2  14.616 VB    0.3254 4174.30029  199.66394  50.0807

Totals :                  8335.14600  418.14626

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



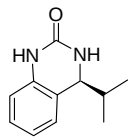
(+/-)-2o

Data File C:\CHEM32\1\DATA\ZHOU-16\GF-22222\YZ010111.D
Sample Name: GF-4-52B

```
==========================================================================
Acq. Operator   : j
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/22/2016 12:52:04 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/22/2016 12:09:58 AM by j
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 2:31:03 PM
                  (modified after loading)
Sample Info     : IC, H/i-PrOH = 90/10, 1.0 mL/min, 30 oC, 254 nm
```



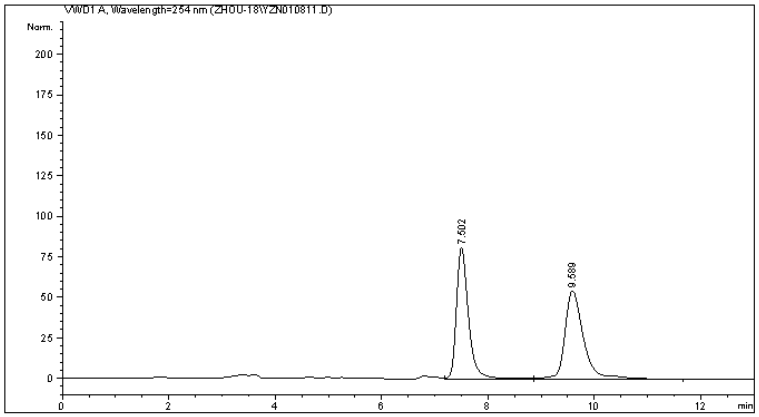

```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Sample Amount:                :      1.00000  [ng/ul]   (not used in calc.)
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  13.213 BB    0.2864 4070.75049  222.33922  93.0745
   2  14.375 BB    0.3157  302.89621   14.90315   6.9255

Totals :                  4373.64670  237.24237

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



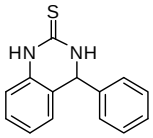
(+)-2o

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN010811.D
Sample Name: zz-4-78(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 11/20/2018 10:31:17 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 11/20/2018 10:24:12 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 11/29/2018 10:32:35 AM
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH =80/20, 1.0 mL/min, 30 oC, 254 nm
```



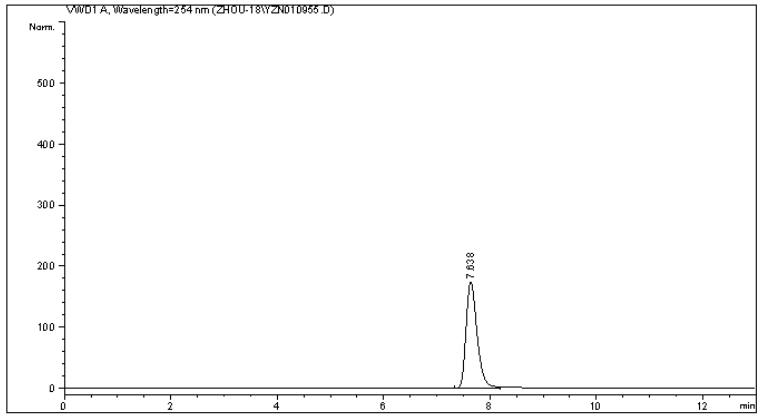

```
                          Area Percent Report

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   7.502 VV    0.2382 1269.43982   80.97906  49.1545
   2   9.589 VB    0.3630 1313.10974   54.42619  50.8455

Totals :                  2582.54956  135.40526

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



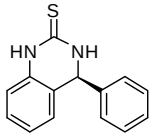
(+/-)-3a

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN010955.D
Sample Name: zz-4-87-2

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 12/4/2018 4:56:43 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 12/4/2018 4:39:39 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 12/7/2018 6:32:56 PM
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



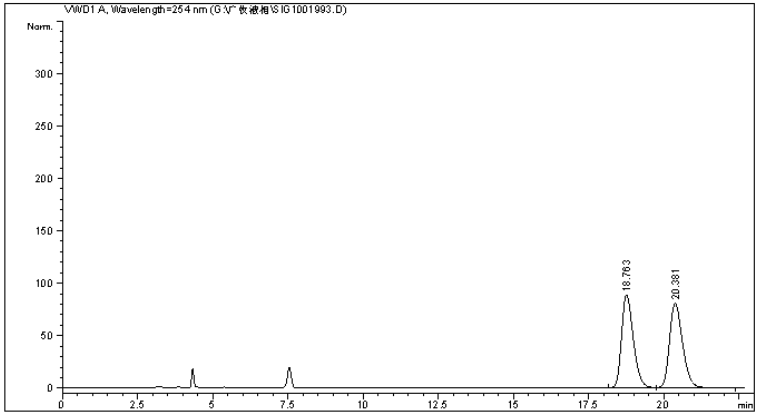

```
                          Area Percent Report

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   7.638 BV    0.2204 2513.78149  174.59627 100.0000

Totals :                  2513.78149  174.59627

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



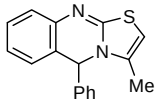
(-)-3a

Data File G:\广收液相\SIG1001993.D
Sample Name: zz-4-83(+-)

```
Acq. Operator   :
Acq. Instrument : 仪器 1                        Location : Vial 91
Injection Date  : 11/27/2018 10:52:36 AM
                                               Inj Volume : 5.000 µl
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 11/27/2018 10:45:12 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 12/7/2018 6:38:18 PM
                  (modified after loading)
Sample Info     : IC, n-hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



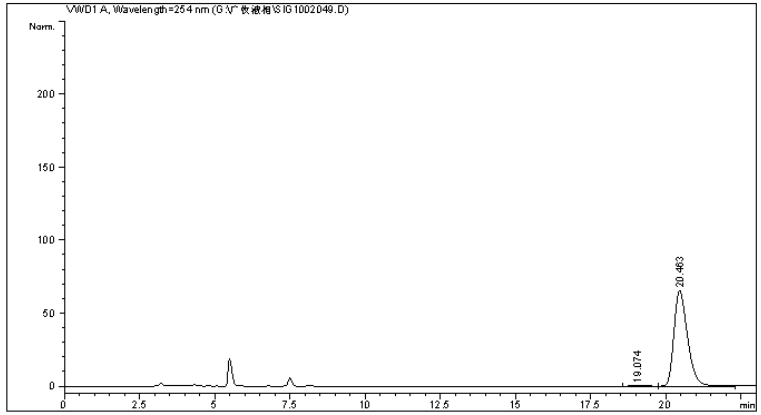

```
                          Area Percent Report

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  18.763 VV    0.4192 2429.51733   88.81035  49.5783
   2  20.381 VB    0.4684 2470.84814   80.88632  50.4217

Totals :                  4900.36548  169.69667


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



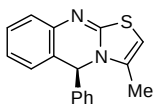
(+/-)-3b

Data File G:\广收液相\SIG1002049.D
Sample Name: zz-3-88

```
Acq. Operator   :
Acq. Instrument : 仪器 1                        Location : Vial 91
Injection Date  : 12/5/2018 7:13:25 PM
                                               Inj Volume : 5.000 µl
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 12/5/2018 6:45:39 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 12/7/2018 6:37:42 PM
                  (modified after loading)
Sample Info     : IC, n-hexane/i-PrOH = 80/20, 1.0 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  19.074 VV    0.4447    9.80341 3.43762e-1   0.4773
   2  20.463 VB    0.4807 2044.18359   65.38577  99.5227

Totals :                  2053.98700   65.72953


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



(-)-3b