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Supporting Information

Synthesis of Chiral Sultams *via* Palladium-Catalyzed Intramolecular Asymmetric Reductive Amination

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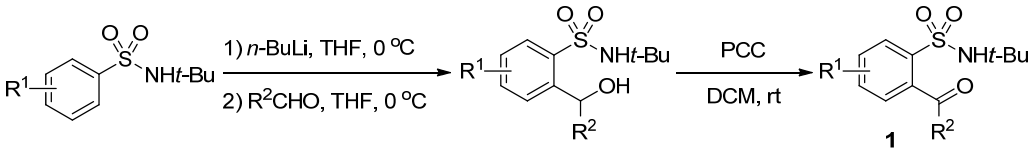
1. General

All reactions were carried out under an atmosphere of nitrogen using the standard Schlenk techniques, unless otherwise noted. Commercially available reagents were used without further purification. Solvents were treated prior to use according to the standard methods. ^{1}H NMR, ^{13}C NMR and ^{19}F NMR spectra were recorded at room temperature in $CDCl_3$ on 400 MHz instrument with tetramethylsilane (TMS) as internal standard. Enantiomeric excess was determined by HPLC analysis using chiral column. Optical rotations were measured by polarimeter. Flash column chromatography was performed on silica gel (200-300 mesh). All reactions were monitored by TLC analysis.

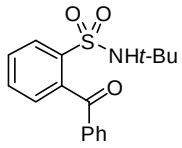
2. The Preparation of Keto Sulfonamides

Keto sulfonamides **1** were prepared from the corresponding aldehydes and *N-tert*-butylbenzenesulfonamide according to the following procedures.

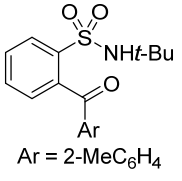


To a cooled (0 °C) solution of *N-tert*-butylbenzenesulfonamide (853 mg, 4.0 mmol) in THF (20 mL) was added *n*-butyl lithium (3.5 mL, 8.8 mmol, 2.5 M in *n*-hexane). After stirring the resulting mixture for 30 min, a solution of aldehyde (4.4 mmol) in THF (5 mL) was added dropwise over a period of 20 min and stirring was continued for additional 2 hours, the mixture was poured into a saturated aqueous ammonium chloride solution (20 mL). The aqueous layer was extracted three times with ethyl acetate (20 mL×3), and the organic extracts were dried over anhydrous sodium sulfate. After concentration in *vacuo*, the residue was finally purified by flash chromatography to afford the corresponding alcohol. To a solution of the entire amount of intermediate alcohol in dichloromethane (25 mL) was added PCC (3.10 g, 13.9 mmol). The resulting dark-brown solution was stirred for overnight at ambient temperature. After addition of diethyl ether (10 mL) and additional stirring (30 min), the mixture was filtered through a pad of silica gel. Concentration in *vacuo* afforded the analytically pure keto sulfonamides **1**. The yields given are overall yields for two steps.

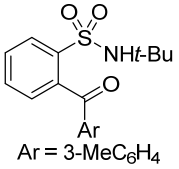
2-Benzoyl-*N-tert*-butylbenzenesulfonamide (1a): 0.951 g, 75% yield (4 mmol scale), white solid, mp 82-83 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.14-8.12 (m, 1H), 7.80-7.78 (m, 2H), 7.61-7.57 (m, 3H), 7.44 (t, *J* = 7.7 Hz, 2H), 7.36 (dd, *J* = 7.1, 1.5 Hz, 1H), 5.24 (br, 1H), 1.30 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 198.1, 142.7 , 137.6, 136.4, 134.1, 131.2, 130.7, 130.3, 129.3, 128.9, 128.6, 55.3, 30.3. HRMS Calculated for $C_{17}H_{20}NO_3S$ $[M+H]^+$ 340.0978, found: 340.0971.



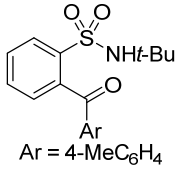
***N-tert*-Butyl-2-(2-methylbenzoyl)-benzenesulfonamide (1b):** 0.857 g, 65% yield (4 mmol scale), white solid, mp 136-137 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.14 (d, *J* = 7.7 Hz, 1H), 7.59 (t, *J* = 7.3 Hz, 1H), 7.52 (t, *J* = 7.3 Hz, 1H), 7.41 (dd, *J* = 13.2, 7.2 Hz, 2H), 7.27 (d, *J* = 7.7 Hz, 2H), 7.20 (t, *J* = 7.5 Hz, 1H), 5.47 (br, 1H), 2.49 (s, 3H), 1.32 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 200.1, 142.6, 140.0, 139.4, 136.7, 132.6, 132.4, 131.8, 131.4, 130.7, 129.9, 129.1, 125.7, 55.3, 30.4, 21.2. HRMS Calculated for $C_{18}H_{22}NO_3S$ $[M+H]^+$ 354.1134, found: 354.1136.



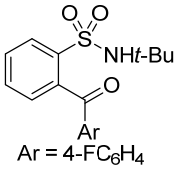
***N-tert*-Butyl-2-(3-methylbenzoyl)-benzenesulfonamide (1c):** 1.127 g, 85% yield (4 mmol scale), white solid, mp 84-85 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.14-8.12 (m, 1H), 7.62-7.56 (m, 4H), 7.40 (d, *J* = 7.6 Hz, 1H), 7.37-7.33 (m, 2H), 5.25 (br, 1H), 2.37 (s, 3H), 1.30 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 198.3, 142.7, 138.5, 137.8, 136.5, 135.0, 131.2, 131.0, 130.3, 129.3, 128.9, 128.5, 128.2, 55.3, 30.3, 21.4. HRMS Calculated for $C_{18}H_{22}NO_3S$ $[M+H]^+$ 354.1134, found: 354.1131.



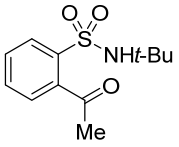
***N-tert*-Butyl-2-(4-methylbenzoyl)-benzenesulfonamide (1d):** 0.805 g, 61% yield (4 mmol scale), white solid, mp 120-121 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.14-8.11 (m, 1H), 7.70 (d, *J* = 8.2 Hz, 2H), 7.62-7.57 (m, 2H), 7.37-7.35 (m, 1H), 7.25 (d, *J* = 8.5 Hz, 2H), 5.26 (br, 1H), 2.42 (s, 3H), 1.30 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.8, 145.3, 142.7, 137.9, 134.0, 131.2, 130.9, 130.2, 129.4, 129.3, 128.9, 55.3, 30.3, 21.9. HRMS Calculated for $C_{18}H_{22}NO_3S$ $[M+H]^+$ 354.1134, found: 354.1140.



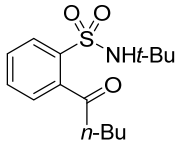
***N-tert*-Butyl-2-(4-fluorobenzoyl)-benzenesulfonamide (1e):** 1.192g, 89% yield (4 mmol scale), white solid, mp 82-83 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.13 (d, *J* = 7.3 Hz, 1H), 7.83 (dd, *J* = 7.9, 5.7 Hz, 2H), 7.65-7.58 (m, 2H), 7.35 (d, *J* = 7.2 Hz, 1H), 7.12 (t, *J* = 8.1 Hz, 2H), 5.19 (br, 1H), 1.29 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 196.5, 166.3 (d, *J* = 256.8 Hz), 142.6, 137.4, 133.4 (d, *J* = 9.7 Hz), 132.9 (d, *J* = 2.9 Hz), 131.3, 130.4, 129.0, 116.0, 115.9 (d, *J* = 22.1 Hz), 55.3, 30.2; ^{19}F NMR (376 MHz, $CDCl_3$) δ -130.17. HRMS Calculated for $C_{17}H_{18}FNO_3SNa$ $[M+Na]^+$ 358.0884, found: 358.0881.



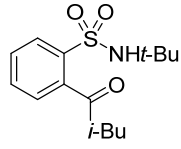
2-Acetyl-*N-tert*-butylbenzenesulfonamide (1f): 0.458 g, 45% yield (4 mmol scale), white solid, mp 84-85 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06 (dd, *J* = 7.8, 1.2 Hz, 1H), 7.62-7.54 (m, 3H), 5.42 (br, 1H), 2.63 (s, 3H), 1.24 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 204.5, 141.4, 139.2, 131.9, 130.8, 129.1, 127.8, 55.2, 30.5, 30.3. HRMS Calculated for $C_{12}H_{17}NO_3SNa$ $[M+Na]^+$ 278.0821, found: 278.0825.



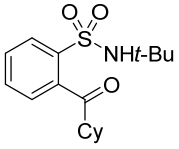
***N-tert*-Butyl-2-pentanoylbenzenesulfonamide (1g):** 0.482 g, 41% yield (4 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.04 (dd, *J* = 7.6, 1.3 Hz, 1H), 7.60-7.52 (m, 2H), 7.48 (dd, *J* = 7.3, 1.4 Hz, 1H), 5.34 (br, 1H), 2.92 (t, *J* = 7.3 Hz, 2H), 1.75-1.67 (m, 2H), 1.44-1.35 (m, 2H), 1.25 (s, 9H), 0.93 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 207.5, 141.4, 139.7, 131.9, 130.4, 129.0, 127.4, 55.2, 42.8, 30.3, 25.8, 22.3, 14.0. HRMS Calculated for $C_{15}H_{23}NO_3SNa$ $[M+Na]^+$ 320.1291, found: 320.1283.



***N-tert*-Butyl-2-(3-methylbutanoyl)-benzenesulfonamide (1h):** 0.508 g, 43% yield (4 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.05 (dd, *J* = 7.7, 1.3 Hz, 1H), 7.60-7.48 (m, 3H), 5.43 (br, 1H), 2.81 (d, *J* = 6.7 Hz, 2H), 2.36-2.26 (m, 1H), 1.25 (s, 9H), 1.00 (d, *J* = 6.7 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 206.6, 141.4, 139.6, 131.8, 130.5, 129.0, 127.8, 55.2, 51.7, 30.3, 24.3, 22.6. HRMS Calculated for $C_{15}H_{23}NO_3SNa$ $[M+Na]^+$ 320.1291, found: 320.1303.

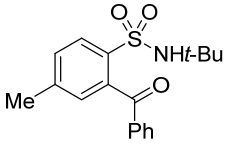


***N-tert*-Butyl-2-(cyclohexanecarbonyl)-benzenesulfonamide (1i):** 0.426 g, 33% yield (4 mmol scale), white solid, mp 110-111 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.07 (dd, *J* = 7.6, 1.3 Hz, 1H), 7.61-7.51 (m, 3H), 5.49 (br, 1H), 3.02-2.94 (m, 1H), 1.91 (d, *J* = 12.4 Hz, 2H), 1.82-1.77 (m, 2H), 1.68-1.66 (m, 1H), 1.54-1.48 (m, 2H), 1.30-1.18 (m, 12H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 209.9, 142.1, 138.9, 131.8,

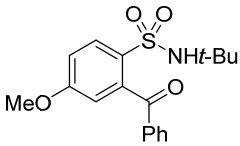


130.5, 129.2, 127.6, 55.2, 50.1, 30.3, 28.7, 25.9, 25.9. HRMS Calculated for $C_{17}H_{25}NO_3SNa$ $[M+Na]^+$ 346.1447, found: 346.1438.

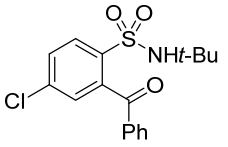
2-Benzoyl-*N*-(*tert*-butyl)-4-methylbenzenesulfonamide (1j): 0.690 g, 52% yield (4 mmol scale), white solid, mp 158-159 °C. ^1H NMR (400 MHz, $CDCl_3$) δ 8.00 (d, *J* = 8.1 Hz, 1H), 7.81-7.79 (m, 2H), 7.62-7.59 (m, 1H), 7.48-7.44 (m, 2H), 7.40 (d, *J* = 8.1 Hz, 1H), 7.15 (s, 1H), 5.14 (s, 1H), 2.42 (s, 3H), 1.29 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 198.2, 142.0, 139.9, 137.7, 136.5, 133.9, 130.7, 130.7, 129.6, 129.0, 128.5, 55.1, 30.2, 21.4. HRMS Calculated for $C_{18}H_{21}NO_3SNa$ $[M+Na]^+$ 354.1134, found: 354.1137.



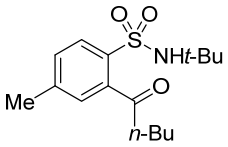
2-Benzoyl-*N*-(*tert*-butyl)-4-methoxybenzenesulfonamide (1k): 1.013 g, 73% yield (4 mmol scale), white solid, mp 142-143 °C. ^1H NMR (400 MHz, $CDCl_3$) δ 8.04 (d, *J* = 8.8 Hz, 1H), 7.82 (d, *J* = 7.5 Hz, 2H), 7.60 (t, *J* = 7.4 Hz, 1H), 7.47-7.43 (m, 2H), 7.05 (dd, *J* = 8.8, 2.4 Hz, 1H), 6.83-6.82 (m, 1H), 5.05 (s, 1H), 3.84 (s, 3H), 1.29 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.5, 161.4, 139.5, 136.2, 134.3, 134.1, 131.1, 130.7, 128.6, 115.3, 114.2, 55.8, 55.0, 30.2. HRMS Calculated for $C_{18}H_{21}NO_4SNa$ $[M+Na]^+$ 370.1083, found: 370.1086.



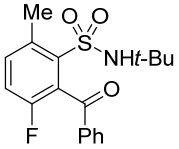
2-Benzoyl-*N*-(*tert*-butyl)-4-chlorobenzenesulfonamide (1l): 0.841 g, 60% yield (4 mmol scale), white solid, mp 103-104 °C. ^1H NMR (400 MHz, $CDCl_3$) δ 8.06 (d, *J* = 8.5 Hz, 1H), 7.80 (d, *J* = 7.3 Hz, 2H), 7.65-7.57 (m, 2H), 7.50-7.46 (m, 2H), 7.34-7.33 (m, 1H), 5.11 (s, 1H), 1.31 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 196.4, 141.2, 139.3, 137.7, 135.8, 134.4, 130.7, 130.4, 130.2, 129.0, 128.7, 55.4, 30.2. HRMS Calculated for $C_{17}H_{18}ClNO_3SNa$ $[M+Na]^+$ 374.0588, found: 374.0592.



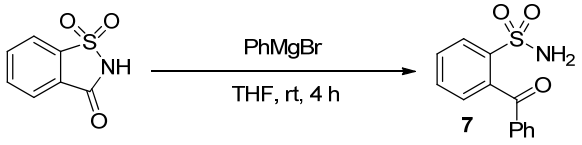
***N*-(*tert*-Butyl)-4-methyl-2-pentanoylbenzenesulfonamide (1m):** 0.469 g, 38% yield (4 mmol scale), white solid, mp 57-58 °C. ^1H NMR (400 MHz, $CDCl_3$) δ 7.92 (d, *J* = 8.1 Hz, 1H), 7.33 (d, *J* = 8.1 Hz, 1H), 7.26 (s, 1H), 5.27 (s, 1H), 2.92 (t, *J* = 7.3 Hz, 2H), 2.45 (s, 3H), 1.75-1.68 (m, 2H), 1.46-1.36 (m, 2H), 1.25 (s, 9H), 0.95 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 207.5, 142.5, 139.7, 138.5, 130.7, 129.0, 127.9, 55.0, 42.7, 30.2, 25.7, 22.2, 21.4, 13.9. HRMS Calculated for $C_{16}H_{25}NO_3SNa$ $[M+Na]^+$ 334.1449, found: 334.1449.



2-Benzoyl-*N*-(*tert*-butyl)-3-fluoro-6-methylbenzenesulfonamide (1n): 0.456 g, 33% yield (4 mmol scale), white solid, mp 179-180 °C. ^1H NMR (400 MHz, $CDCl_3$) δ 7.80 (d, *J* = 7.3 Hz, 2H), 7.58-7.54 (m, 1H), 7.46-7.42 (m, 2H), 7.39-7.36 (m, 1H), 7.26-7.20 (m, 1H), 4.75 (s, 1H), 2.72 (s, 3H), 1.27 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 192.9, 157.7 (d, *J* = 248.0 Hz), 140.9 (d, *J* = 2.3 Hz), 137.5, 134.9 (d, *J* = 7.5 Hz), 133.7, 133.6 (d, *J* = 3.8 Hz), 129.3, 128.7, 128.2 (d, *J* = 20.5 Hz), 119.5 (d, *J* = 21.7 Hz), 55.9, 30.2, 20.7; ^{19}F NMR (376 MHz, $CDCl_3$) δ -115.29. HRMS Calculated for $C_{18}H_{24}FN_2O_3S$ $[M+NH_4]^+$ 367.1486, found: 367.1490.

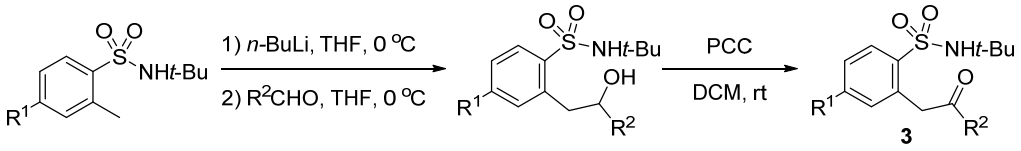


Keto sulfonamide **7** was prepared from saccharin and phenylmagnesium bromide according to the following procedures. The compound **7** is known. [1]



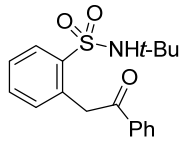
To a degassed THF (20 mL) solution of saccharin (0.915 g, 5.0 mmol) at 25 °C was added fresh prapared phenylmagnesium bromide (15.0 mmol, 1.0 M in THF) dropwise. The resulting mixture was further stirred at the same temperature for 4 hours before being quenched with a saturated aqueous ammonium chloride solution. The aqueous layer was extracted further with dichloromethane (30 mL×3); then the combined organic layer was washed with brine and dried over sodium sulfate. Evaporation of the solvent in ice-water bath gave the crude product. The solid obtained was washed two times with cold *n*-hexane and hot *n*-hexane (60-70 ^{o}C), then, crystallization of the insoluble part from toluene gave 0.146 g keto sulfonamide **7** in 11% yield.

Keto sulfonamides **3** were prepared from the corresponding aldehydes and *N-tert*-butyl-2-methyl benzenesulfonamide according to the following procedures.

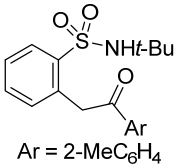


To a cooled (0 ^{o}C) solution of *N-tert*-butyl-2-methylbenzenesulfonamide (4.0 mmol) in THF (15 mL) was added *n*-butyl lithium (3.5 mL, 8.8 mmol, 2.5 M in *n*-hexane). After stirring the resulting mixture for 45 min, a solution of aldehyde (4.4 mmol) in THF (10 mL) was added dropwise over a period of 20 min and stirring was continued for additional 3 hours, the mixture was poured into a saturated aqueous ammonium chloride solution (20 mL). The aqueous layer was extracted three times with ethyl acetate (20 mL×3), and the organic extracts were dried over anhydrous sodium sulfate. After concentration in *vacuo*, the residue was finally purified by flash chromatography to afford the corresponding alcohol. To a solution of the entire amount of intermediate alcohol in dichloromethane (25 mL) was added PCC (1.724 g, 8.0 mmol). The resulting dark-brown solution was stirred for overnight at ambient temperature. After addition of diethyl ether (10 mL) and additional stirring (30 min), the mixture was filtered through a pad of silica gel. Concentration in *vacuo* afforded the analytically pure keto sulfonamide compounds **3**. The yields given are overall yields for two steps.

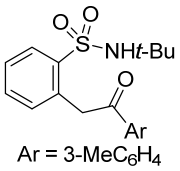
***N-tert*-Butyl-2-(2-*oxo*-2-phenylethyl)-benzenesulfonamide (3a):** 0.873 g, 53% yield (5 mmol scale), white solid, mp 88- 89 ^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12-8.05 (m, 3H), 7.62-7.58 (m, 1H), 7.53-7.48 (m, 3H), 7.41 (td, *J* = 7.8, 1.2 Hz, 1H), 7.30-7.27 (m, 1H), 4.83 (s, 2H), 4.55 (br, 1H), 1.17 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.5, 141.4, 136.6, 133.8, 133.7, 133.5, 132.5, 129.7, 128.9, 128.6, 127.5, 55.5, 43.1, 30.0. HRMS Calculated for $C_{18}H_{22}NO_3S$ $[M+H]^+$ 332.1315, found: 332.1318.



***N-tert*-Butyl-2-(2-*oxo*-2-*o*-tolylethyl)-benzenesulfonamide (3b):** 0.728 g, 53% yield (4 mmol scale), white solid, mp 81-82 ^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09 (dd, *J* = 7.9, 1.3 Hz, 1H), 7.90 (d, *J* = 7.7 Hz, 1H), 7.53-7.49 (m, 1H), 7.43-7.39 (m, 2H), 7.33-7.25 (m, 3H), 4.76 (br, 2H), 2.52 (s, 3H), 1.22 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 201.0, 141.6, 139.1, 137.0, 133.8, 133.5, 132.5, 132.4, 132.0, 129.6, 129.3, 127.6, 126.1, 55.5, 46.1, 30.2, 21.7. HRMS Calculated for $C_{19}H_{24}NO_3S$ $[M+H]^+$ 346.1471, found: 346.1472.

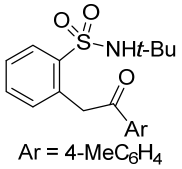


***N-tert*-Butyl-2-(2-*oxo*-2-*m*-tolylethyl)-benzenesulfonamide (3c):** 0.504 g, 37% yield (4 mmol scale), white solid, mp 97-98 ^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.10 (dd, *J* = 7.9, 1.2 Hz, 1H), 7.87-7.85 (m, 2H), 7.51 (td, *J* = 7.5, 1.3 Hz, 1H), 7.42-7.35 (m, 3H), 7.28-7.26 (m, 1H), 4.81 (s,

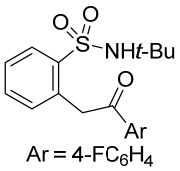


2H), 4.57 (br, 1H), 2.42 (s, 3H), 1.17 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.7, 141.5, 138.8, 136.6, 134.5, 133.9, 133.5, 132.5, 129.6, 129.1, 128.8, 127.5, 125.9, 55.5, 43.2, 30.0, 21.5. HRMS Calculated for $C_{19}H_{24}NO_3S$ $[M+H]^+$ 346.1471, found: 346.1475.

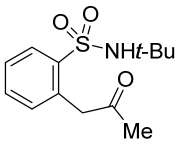
***N-tert*-Butyl-2-(2-*oxo*-2-*p*-tolylethyl)-benzenesulfonamide (3d):** 0.613 g, 44% yield (4 mmol scale), white solid, mp 84-85 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.10 (dd, *J* = 8.0, 1.3 Hz, 1H), 7.96 (d, *J* = 8.2 Hz, 2H), 7.50 (td, *J* = 7.5, 1.4 Hz, 1H), 7.39 (td, *J* = 7.8, 1.3 Hz, 1H), 7.29-7.26 (m, 3H), 4.79 (s, 2H), 4.59 (br, 1H), 2.42 (s, 3H), 1.16 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.1, 144.6, 141.4, 134.1, 134.0, 133.5, 132.5, 129.6, 129.6, 128.8, 127.4, 55.4, 42.9, 30.0, 21.8. HRMS Calculated for $C_{19}H_{24}NO_3S$ $[M+H]^+$ 346.1471, found: 346.1470.



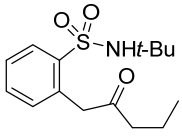
***N-tert*-Butyl-2-(2-(4-fluorophenyl)-2-*oxo*-ethyl)-benzenesulfonamide (3e):** 0.728 g, 52% yield (4 mmol scale), white solid, mp 115-116 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.04-8.00 (m, 3H), 7.45 (td, *J* = 7.5, 1.2 Hz, 1H), 7.35 (td, *J* = 7.8, 1.1 Hz, 1H), 7.21-7.19 (m, 1H), 7.11-7.07 (m, 2H), 4.71 (s, 2H), 4.43 (br, 1H), 1.10 (s, 9H); ^{19}F NMR (376 MHz, $CDCl_3$) δ -104.31; ^{13}C NMR (100 MHz, $CDCl_3$) δ 195.9, 166.1 (d, *J* = 255.6 Hz), 141.3, 133.5, 133.4, 133.0 (d, *J* = 3.1 Hz), 132.6, 131.3 (d, *J* = 9.4 Hz), 129.7, 127.7, 116.1 (d, *J* = 21.9 Hz), 55.5, 43.2, 30.0. HRMS Calculated for $C_{18}H_{20}FNO_3S$ $[M+H]^+$ 350.1221, found: 350.1226.



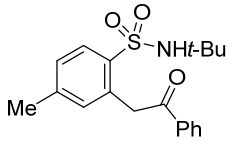
***N-tert*-Butyl-2-(2-*oxo*-propyl)-benzenesulfonamide (3f):** 0.461 g, 57% yield (3 mmol scale), white solid, mp 87-88 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.05 (dd, *J* = 7.9, 1.2 Hz, 1H), 7.51 (td, *J* = 7.5, 1.3 Hz, 1H), 7.40 (td, *J* = 7.8, 1.2 Hz, 1H), 7.27-7.24 (m, 1H), 4.95 (br, 1H), 4.22 (s, 2H), 2.26 (s, 3H), 1.23 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 206.1, 141.5, 133.4, 133.2, 132.5, 129.5, 127.6, 55.4, 48.4, 30.2, 30.1. HRMS Calculated for $C_{13}H_{20}NO_3S$ $[M+H]^+$ 270.1158, found: 270.1158.



***N-tert*-Butyl-2-(2-*oxo*-pentyl)-benzenesulfonamide (3g):** 0.319 g, 36% yield (3 mmol scale), white solid, mp 86-87 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.05 (dd, *J* = 7.9, 1.1 Hz, 1H), 7.50 (td, *J* = 7.5, 1.2 Hz, 1H), 7.39 (td, *J* = 7.8, 1.1 Hz, 1H), 7.24 (d, *J* = 7.5 Hz, 1H), 4.94 (br, 1H), 4.20 (s, 2H), 2.54 (t, *J* = 7.3 Hz, 2H), 1.66-1.61 (m, 2H), 1.24 (s, 9H), 0.93 (t, *J* = 7.4 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 208.4, 141.5, 133.3, 133.3, 132.4, 129.5, 127.5, 55.4, 47.7, 44.7, 30.2, 17.2, 13.8. HRMS Calculated for $C_{15}H_{24}NO_3S$ $[M+H]^+$ 298.1471, found: 298.1472.



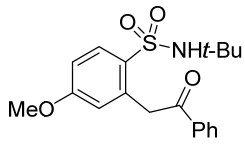
***N-tert*-Butyl-2-(2-cyclohexyl-2-*oxo*-ethyl)-benzenesulfonamide (3h):** 0.516 g, 51% yield (3 mmol scale), white solid, mp 79-80 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.05 (dd, *J* = 7.9, 1.1 Hz, 1H), 7.48 (td, *J* = 7.5, 1.3 Hz, 1H), 7.38 (td, *J* = 7.8, 1.2 Hz, 1H), 7.19 (d, *J* = 7.5 Hz, 1H), 4.81 (s, 1H), 4.29 (s, 2H), 2.58-2.51 (m, 1H), 1.96-1.93 (m, 2H), 1.82-1.79 (m, 2H), 1.70-1.64 (m, 1H), 1.42-1.23 (m, 14H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 211.6, 141.6, 133.6, 133.3, 132.4, 129.6, 127.5, 55.4, 50.8, 46.0, 30.2, 28.7, 25.9, 25.7. HRMS Calculated for $C_{18}H_{28}NO_3S$ $[M+H]^+$ 338.1784, found: 338.1783.



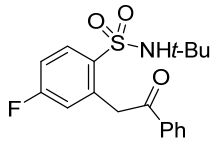
***N*-(*tert*-Butyl)-4-methyl-2-(2-*oxo*-2-phenylethyl)-benzenesulfonamide (3i):** 0.976 g, 71% yield (4 mmol scale), white solid, mp 119-120 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.07 (d, *J* = 7.8 Hz, 2H), 7.97 (d, *J* = 8.1 Hz, 1H), 7.62-7.58 (m, 1H), 7.51-7.48 (m, 2H), 7.20 (d, *J* = 8.1 Hz, 1H), 7.08 (s,

1H), 4.78 (s, 2H), 4.46 (s, 1H), 2.38 (s, 3H), 1.16 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.5, 143.1, 138.4, 136.5, 134.0, 133.5, 133.5, 129.7, 128.8, 128.5, 128.1, 55.3, 43.0, 29.9, 21.3. HRMS Calculated for $C_{19}H_{23}NO_3SNa$ $[M+Na]^+$ 368.1291, found: 368.1294.

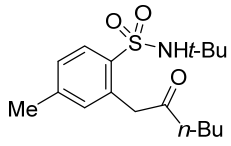
***N*-(*tert*-Butyl)-4-methoxy-2-(2-*oxo*-2-phenylethyl)-benzenesulfonamide (3j):** 0.345 g, 60% yield (1.6 mmol scale), white solid, mp 134-135 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.07-8.02 (m, 3H), 7.62-7.58 (m, 1H), 7.51-7.49 (m, 2H), 6.87 (dd, *J* = 8.9, 2.4 Hz, 1H), 6.78-6.77 (m, 1H), 4.78 (s, 2H), 4.40 (s, 1H), 3.83 (s, 3H), 1.16 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.2, 162.4, 136.5, 135.8, 133.6, 133.1, 131.9, 128.8, 128.5, 118.9, 111.9, 55.5, 55.2, 43.2, 29.9. HRMS Calculated for $C_{19}H_{24}NO_4S$ $[M+H]^+$ 362.1421, found: 362.1424.



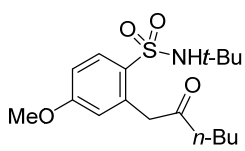
***N*-(*tert*-Butyl)-4-fluoro-2-(2-*oxo*-2-phenylethyl)-benzenesulfonamide (3k):** 0.404 g, 46% yield (2.5 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.11 (dd, *J* = 8.9, 5.7 Hz, 1H), 8.07-8.05 (m, 2H), 7.65-7.61 (m, 1H), 7.53-7.51 (m, 2H), 7.12-7.07 (m, 1H), 7.01 (dd, *J* = 9.1, 2.6 Hz, 1H), 4.81 (s, 2H), 4.39 (br, 1H), 1.16 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 196.6, 164.5 (d, *J* = 254.7 Hz), 137.3 (d, *J* = 3.4 Hz), 137.0 (d, *J* = 8.9 Hz), 136.2, 133.8, 132.3 (d, *J* = 9.3 Hz), 129.0, 128.5, 120.5 (d, *J* = 22.6 Hz), 114.4 (d, *J* = 21.6 Hz), 55.5, 43.0, 29.8; ^{19}F NMR (376 MHz, $CDCl_3$) δ -106.54. HRMS Calculated for $C_{18}H_{24}FN_2O_3S$ $[M+NH_4]^+$ 367.1486, found: 367.1490.



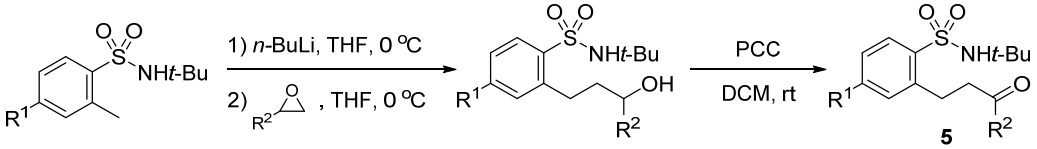
***N*-(*tert*-Butyl)-4-methyl-2-(2-oxohexyl)-benzenesulfonamide (3l):** 0.765 g, 59% yield (4 mmol scale), white solid, mp 99-100 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.92 (d, *J* = 8.1 Hz, 1H), 7.18 (d, *J* = 8.1 Hz, 1H), 7.03 (s, 1H), 4.84 (s, 1H), 4.16 (br, 2H), 2.56 (t, *J* = 7.4 Hz, 2H), 2.39 (s, 3H), 1.62-1.55 (m, 2H), 1.36-1.29 (m, 2H), 1.23 (s, 9H), 0.90 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 208.6, 143.0, 138.5, 133.9, 133.1, 129.6, 128.1, 55.2, 47.5, 42.5, 30.1, 25.7, 22.3, 21.3, 13.9. HRMS Calculated for $C_{17}H_{28}NO_3S$ $[M+H]^+$ 326.1784, found: 326.1787.



***N*-(*tert*-Butyl)-4-methoxy-2-(2-oxohexyl)-benzenesulfonamide (3m):** 0.435 g, 67% yield (1.9 mmol scale), white solid, mp 72-73 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.98 (d, *J* = 8.9 Hz, 1H), 6.85 (dd, *J* = 8.8, 2.4 Hz, 1H), 6.72 (d, *J* = 2.4 Hz, 1H), 4.77 (s, 1H), 4.16 (s, 2H), 3.85 (s, 3H), 2.56 (t, *J* = 7.4 Hz, 2H), 1.62-1.55 (m, 2H), 1.35-1.28 (m, 2H), 1.23 (s, 9H), 0.90 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 208.2, 162.3, 135.4, 133.2, 131.8, 118.7, 111.9, 55.5, 55.1, 47.7, 42.5, 30.1, 25.7, 22.3, 13.9. HRMS Calculated for $C_{17}H_{28}NO_4S$ $[M+H]^+$ 342.1734, found: 342.1734.



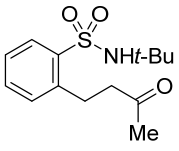
Keto sulfonamides **5** were prepared from the corresponding substituted oxiranes and *N*-*tert*-butyl-2-methylbenzenesulfonamide according to the following procedures.



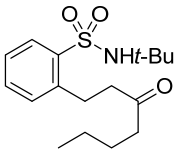
To a cooled (0 °C) solution of *N*-*tert*-butyl-2-methylbenzenesulfonamide (4.0 mmol) in THF (15 mL) was added *n*-butyl lithium (3.5 mL, 8.8 mmol, 2.5 M in *n*-hexane). After stirring the resulting mixture for 30 min, a solution of substituted oxiranes (4.4 mmol) in THF (10 mL) was

added dropwise over a period of 20 min and stirring was continued for additional 3 hours, the mixture was poured into a saturated aqueous ammonium chloride solution (20 mL). The aqueous layer was extracted three times with ethyl acetate (20 mL×3), and the organic extracts were dried over anhydrous sodium sulfate. After concentration in *vacuo*, the residue was finally purified by flash chromatography to afford the corresponding alcohol. To a solution of the entire amount of intermediate alcohol in dichloromethane (25 mL) was added PCC (1.724 g, 8.0 mmol). The resulting dark- brown solution was stirred for overnight at ambient temperature. After addition of diethyl ether (10 mL) and additional stirring (30 min), the mixture was filtered through a pad of silica gel. Concentration in *vacuo* afforded the analytically pure keto sulfonamide compounds **5**. The yields given are overall yields for two steps.

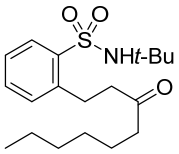
***N-tert*-Butyl-2-(3-*oxo*-butyl)-benzenesulfonamide (5a):** 1.040 g, 61% yield (6 mmol scale), white solid, mp 106-107 ^{o}C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03-8.00 (m, 1H), 7.45 (t, *J* = 7.5 Hz, 1H), 7.32-7.27 (m, 2H), 4.90 (br, 1H), 3.24 (t, *J* = 7.6 Hz, 2H), 2.87 (t, *J* = 7.6 Hz, 2H), 2.15 (s, 3H), 1.22 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 208.2, 141.2, 140.2, 132.6, 131.5, 129.6, 126.6, 55.1, 45.0, 30.3, 30.1, 27.1. HRMS Calculated for $C_{14}H_{21}NO_3S$ $[M+H]^+$ 284.1315, found: 284.1320.



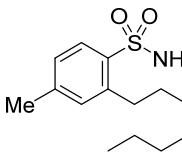
***N-tert*-Butyl-2-(3-*oxo*-heptyl)-benzenesulfonamide (5b):** 0.287 g, 35% yield (2.5 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.01 (d, *J* = 7.8 Hz, 1H), 7.44 (t, *J* = 7.2 Hz, 1H), 7.30-7.28 (m, 2H), 4.86 (br, 1H), 3.24 (t, *J* = 7.4 Hz, 2H), 2.84 (t, *J* = 7.5 Hz, 2H), 2.40 (t, *J* = 7.4 Hz, 2H), 1.55-1.52 (m, 2H), 1.29-1.25 (m, 2H), 1.22 (s, 9H), 0.87 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 210.6, 141.2, 140.4, 132.6, 131.5, 129.6, 126.5, 55.0, 44.0, 42.7, 30.3, 27.1, 26.0, 22.4, 13.9. HRMS Calculated for $C_{17}H_{28}NO_3S$ $[M+H]^+$ 326.1784, found: 326.1786.



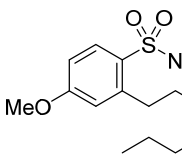
***N-tert*-Butyl-2-(3-*oxo*-nonyl)-benzenesulfonamide (5c):** 0.829 g, 59% yield (4 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03 (d, *J* = 7.7 Hz, 1H), 7.47-7.43 (m, 1H), 7.32-7.28 (m, 2H), 5.25-5.19 (br, 1H), 3.28 (t, *J* = 7.5 Hz, 2H), 2.86 (t, *J* = 7.4 Hz, 2H), 2.41 (t, *J* = 7.3 Hz, 2H), 1.60-1.53 (m, 2H), 1.26-1.24 (m, 16H), 0.87-0.85 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 210.6, 141.2, 140.3, 132.4, 131.4, 129.3, 126.3, 54.8, 43.9, 42.9, 31.6, 30.1, 28.8, 26.9, 23.7, 22.4, 14.0. HRMS Calculated for $C_{19}H_{32}NO_3S$ $[M+H]^+$ 354.2097, found: 354.2101.



***N-tert*-Butyl-4-methyl-2-(3-*oxo*-heptyl)-benzenesulfonamide (5d):** 0.875 g, 65% yield (4 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.90 (d, *J* = 8.5 Hz, 1H), 7.10-7.09 (m, 2H), 4.97 (br, 1H), 3.21 (t, *J* = 7.6 Hz, 2H), 2.85 (t, *J* = 7.5 Hz, 2H), 2.41 (t, *J* = 7.4 Hz, 2H), 2.36 (s, 3H), 1.57-1.53 (m, 2H), 1.32-1.27 (m, 2H), 1.23 (s, 9H), 0.89 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 210.6, 143.0, 140.1, 138.3, 132.1, 129.6, 127.0, 54.8, 44.0, 42.6, 30.1, 27.0, 25.9, 22.3, 21.3, 13.9. HRMS Calculated for $C_{18}H_{30}NO_3S$ $[M+H]^+$ 340.1941, found: 340.1940.

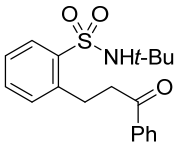


***N-tert*-Butyl-4-methoxy-2-(3-*oxo*-heptyl)-benzenesulfonamide (5e):** 1.071 g, 75% yield (4 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.96 (d, *J* = 8.5 Hz, 1H), 6.80-6.76 (m, 2H), 4.76 (br, 1H), 3.84 (s, 3H), 3.21 (t, *J* = 7.6 Hz, 2H), 2.85 (t, *J* = 7.6 Hz, 2H), 2.41 (t, *J* = 7.5 Hz, 2H), 1.57-1.53 (m, 2H), 1.31-1.26 (m, 2H), 1.22 (s, 9H), 0.89 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 210.5, 162.6, 142.6, 133.0, 132.0, 117.0, 111.0, 55.6, 54.8, 44.0, 42.7, 30.2, 27.3,

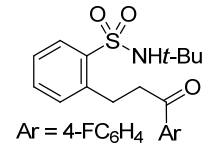


26.0, 22.4, 13.9. HRMS Calculated for $C_{18}H_{30}NO_4S$ $[M+H]^+$ 356.1890, found: 356.1898.

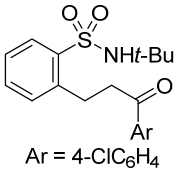
***N-tert*-Butyl-2-(3-*oxo*-3-phenylpropyl)-benzenesulfonamide (5f):** 1.284 g, 62% yield (6 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06 (d, *J* = 7.9 Hz, 1H), 7.96 (d, *J* = 7.5 Hz, 2H), 7.56-7.53 (m, 1H), 7.48-7.30 (m, 5H), 4.92 (br, 1H), 3.43 (s, 4H), 1.24 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.4, 141.2, 140.3, 136.7, 133.2, 132.6, 131.6, 129.5, 128.6, 128.2, 126.5, 55.0, 40.2, 30.2, 27.5. HRMS Calculated for $C_{19}H_{24}NO_3S$ $[M+H]^+$ 346.1471, found: 346.1479.



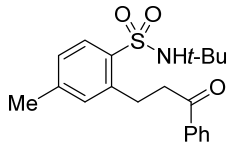
***N-tert*-Butyl-2-(3-(4-fluorophenyl)-3-*oxo*-propyl)-4-methoxybenzenesulfonamide (5g):** 0.317 g, 49% yield (1.8 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.11-7.97 (m, 3H), 7.48-7.45 (m, 1H), 7.38-7.28 (m, 2H), 7.09 (t, *J* = 8.5 Hz, 2H), 5.01 (br, 1H), 3.41 (dd, *J* = 12.0, 5.4 Hz, 4H), 1.24 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.9, 165.8 (d, *J* = 254.7 Hz), 141.2, 140.2, 133.1 (d, *J* = 3.0 Hz), 132.6, 131.7, 130.8 (d, *J* = 9.3 Hz), 129.5, 126.6, 115.7 (d, *J* = 21.9 Hz), 55.0, 40.2, 30.2, 27.6; ^{19}F NMR (376 MHz, $CDCl_3$) δ -105.11. HRMS Calculated for $C_{19}H_{23}FNO_3S$ $[M+H]^+$ 364.1377, found: 364.1375.



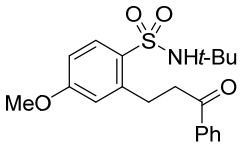
***N-tert*-Butyl-2-(3-(4-chlorophenyl)-3-oxopropyl)-benzenesulfonamide (5h):** 0.489 g, 54% yield (2.4 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.05 (d, *J* = 7.9 Hz, 1H), 7.89 (d, *J* = 8.5 Hz, 2H), 7.48-7.30 (m, 5H), 4.98 (br, 1H), 3.45-3.36 (m, 4H), 1.24 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 198.2, 141.2, 140.1, 139.6, 135.0, 132.6, 131.7, 129.6, 129.5, 128.9, 126.6, 55.0, 40.2, 30.2, 27.6. HRMS Calculated for $C_{19}H_{23}ClNO_3S$ $[M+H]^+$ 380.1082, found: 380.1084.



***N-tert*-Butyl-4-methyl-2-(3-oxo-3-phenylpropyl)-benzenesulfonamide (5i):** 0.714 g, 66% yield (3 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.97-7.91 (m, 3H), 7.55-7.51 (m, 1H), 7.45-7.41 (m, 2H), 7.17-7.15 (m, 1H), 7.11 (d, *J* = 8.1 Hz, 1H), 4.87 (br, 1H), 3.44-3.35 (m, 4H), 2.36 (s, 3H), 1.23 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.6, 143.2, 140.3, 138.4, 136.8, 133.2, 132.4, 129.8, 128.7, 128.2, 127.2, 54.9, 40.4, 30.3, 27.6, 21.4. HRMS Calculated for $C_{20}H_{26}NO_3S$ $[M+H]^+$ 360.1628, found: 360.1626.

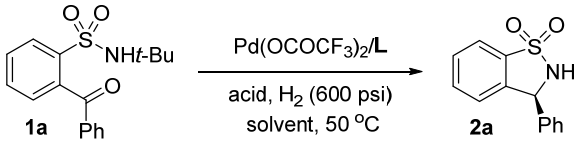


***N-tert*-Butyl-4-methoxy-2-(3-oxo-3-phenylpropyl)-benzenesulfonamide (5j):** 0.735 g, 65% yield (3 mmol scale), colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.01-7.96 (m, 3H), 7.56 (t, *J* = 7.4 Hz, 1H), 7.45 (t, *J* = 7.6 Hz, 2H), 6.87 (d, *J* = 2.6 Hz, 1H), 6.80 (dd, *J* = 8.9, 2.6 Hz, 1H), 4.65 (br, 1H), 3.84 (s, 3H), 3.46-3.36 (m, 4H), 1.23 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 199.5, 162.7, 142.7, 136.8, 133.3, 133.1, 132.2, 128.8, 128.3, 117.2, 111.1, 55.6, 54.9, 40.3, 30.3, 27.9. HRMS Calculated for $C_{20}H_{26}NO_4S$ $[M+H]^+$ 376.1577, found: 376.1583.



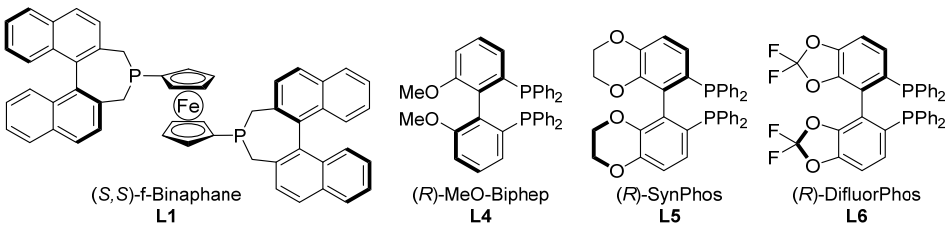
3. The Procedure for Intramolecular Asymmetric Reductive Amination

Table S1. Optimization of the reaction conditions for the synthesis of *γ*-sultams 2a[a]



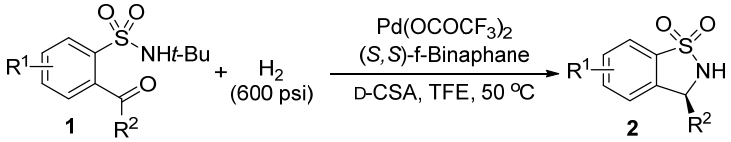
entry	solvent	L	acid	yield (%)[b]	ee (%)[c]
1	TFE	**L4**	--	--	--
2	TFE	**L4**	PhCOOH	--	--
3	TFE	**L4**	TFA	--	--
4	TFE	**L4**	$TsOH·H_2O$	90	88
5	TFE	**L4**	L-CSA	94	88
6	TFE	**L4**	D-CSA	96	89
7	DCM	**L4**	D-CSA	51	86
8	Toluene	**L4**	D-CSA	82	80
9	TFE	**L5**	D-CSA	94	88
10	TFE	**L6**	D-CSA	92	93
11	TFE	**L1**	D-CSA	96	97

[a] Conditions: **1a** (0.2 mmol), $Pd(OCOCF_3)_2$ (3.0 mol %), ligand (3.3 mol %), acid (100 mol %), H_2 (600 psi), solvent (3.0 mL), 50 °C, 24 h. [b] Isolated yield. [c] Determined by HPLC.



The optimal reaction conditions were established: $Pd(OCOCF_3)_2$/(*S*,*S*)-f-Binaphane as the catalyst, D-CSA as the additive, TFE as the solvent and reaction temperature 50 °C.

Intramolecular asymmetric reductive amination of keto sulfonamides **1** were performed according to the following procedures.

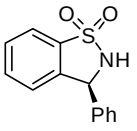


Bisphosphine ligand (*S*,*S*)-f-Binaphane (5.3 mg, 0.0066 mmol) and $Pd(OCOCF_3)_2$ (2.0 mg, 0.006 mmol) were placed in a dried Schlenk tube under nitrogen atmosphere, and degassed anhydrous acetone was added. The mixture was stirred at room temperature for 1 h. The solvent was removed under vacuum to give the catalyst. This catalyst was taken into a glove box filled with nitrogen and dissolved in 2,2,2-trifluoroethanol (TFE, 1.0 mL). To the mixture of keto sulfonamides **1** (0.2 mmol) and D-(-)-camphorsulfonic acid (46 mg, 0.2 mmol) in 2,2,2-trifluoroethanol was added this catalyst solution, and then the mixture was transferred to an autoclave, which was charged hydrogen gas (600 psi). The autoclave was stirred under directed condition (oil bath temperature was showed if it was heated). After release of the hydrogen, the autoclave was

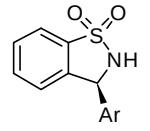
opened and the reaction mixture was evaporated. Purification was performed on silica gel using *n*-hexane/ ethyl acetate as the eluent to give the chiral products **2**. The enantiomeric excesses were determined by chiral HPLC. The absolute configurations of **2** were determined by comparison of rotation sign with literature data.

Racemates of **2** were prepared by the reduction of the corresponding imines using sodium borohydride in methanol.

(+)-3-Phenyl-1,2-benzisothiazoline 1,1-dioxide (2a): (Known compound),[1,2] 47 mg, 96% yield (0.2 mmol scale), 98% ee (*S*), white solid, $[\alpha]^{20}_D$ = +88.33 (*c* 0.54, $CHCl_3$) [lit.[1] $[\alpha]^{20}_D$ = +101.50 (*c* 1.50, $CHCl_3$), 97% ee (*S*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82-7.79 (m, 1H), 7.56-7.50 (m, 2H), 7.40-7.33 (m, 5H), 7.15-7.12 (m, 1H), 5.71 (d, *J* = 4.0 Hz, 1H), 5.10 (br, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 139.9, 138.8, 134.9, 133.4, 129.6, 129.4, 129.2, 127.7, 125.5, 121.2, 61.5. HPLC: Chiracel OJ-H column, 254 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 21.9 min (maj) and 24.3 min.

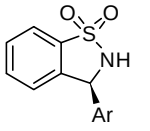


(+)-3-(*o*-Tolyl)-1,2-benzisothiazoline 1,1-dioxide (2b): (Known compound),[1,2] 51 mg, 98% yield (0.2 mmol scale), 94% ee (*S*), white solid, $[\alpha]^{20}_D$ = +10.80 (*c* 1.10, $CHCl_3$) [lit.[1] $[\alpha]^{20}_D$ = +12.50 (*c* 1.00, $CHCl_3$), 99% ee (*S*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83-7.81 (m, 1H), 7.59-7.53 (m, 2H), 7.28-7.23 (m, 2H), 7.19-7.15 (m, 1H), 7.13-7.10 (m, 2H), 6.00 (d, *J* = 4.4 Hz, 1H), 5.00 (d, *J* = 4.2 Hz, 1H), 2.44 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.2, 136.8, 136.3, 135.6, 133.4, 131.3, 129.5, 129.1, 128.2, 127.1, 125.3, 121.3, 58.4, 19.5. HPLC: Chiracel OD-H column, 254 nm, 30 ^{o}C, *n*-hexane /*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 13.9 min (maj) and 16.8 min.



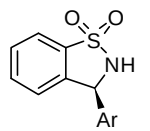
Ar = 2-MeC_6H_4

(+)-3-(*m*-Tolyl)-1,2-benzisothiazoline 1,1-dioxide (2c): (Known compound),[1,2] 47 mg, 90% yield (0.2 mmol scale), 97% ee (*S*), white solid, $[\alpha]^{20}_D$ = +100.27 (*c* 1.10, $CHCl_3$) [lit.[1] $[\alpha]^{20}_D$ = +93.49 (*c* 1.00, $CHCl_3$), 96% ee (*S*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.79-7.77 (m, 1H), 7.55-7.48 (m, 2H), 7.27-7.23 (m, 1H), 7.16-7.12 (m, 4H), 5.67 (s, 1H), 5.30 (s, 1H), 2.32 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.0, 139.1, 138.8, 134.7, 133.3, 129.8, 129.4, 129.1, 128.1, 125.4, 124.7, 121.1, 61.3, 21.4. HPLC: Chiracel OJ-H column, 220 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 18.2 min (maj) and 20.5 min.



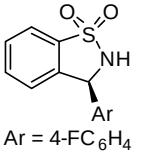
Ar = 3-MeC_6H_4

(+)-3-(*p*-Tolyl)-1,2-benzisothiazoline 1,1-dioxide (2d): (Known compound),[1,2] 48 mg, 92% yield (0.2 mmol scale), 83% ee (*S*), white solid, $[\alpha]^{20}_D$ = +75.54 (*c* 1.10, $CHCl_3$) [lit.[1] $[\alpha]^{20}_D$ = +90.89 (*c* 1.00, $CHCl_3$), 98% ee (*S*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82-7.78 (m, 1H), 7.56-7.50 (m, 2H), 7.27-7.23 (m, 2H), 7.18 (d, *J* = 7.8 Hz, 2H), 7.14-7.12 (d, *J* = 7.9 Hz, 1H), 5.68 (d, *J* = 4.0 Hz, 1H), 5.11 (d, *J* = 3.3 Hz, 1H), 2.34 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.2, 139.1, 135.8, 134.9, 133.4, 130.0, 129.5, 127.6, 125.5, 121.2, 61.3, 21.3. HPLC: Chiracel OD-H column, 254 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 22.1 min and 26.1 min (maj).



Ar = 4-MeC_6H_4

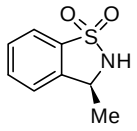
(+)-3-(4-Fluoro-phenyl)-1,2-benzisothiazoline 1,1-dioxide (2e): (Known compound),[1,2] 49 mg, 92% yield (0.2 mmol scale), 96% ee (*S*), white solid, $[\alpha]^{20}_D$ = +94.49 (*c* 1.20, $CHCl_3$) [lit.[1] $[\alpha]^{20}_D$ = +92.10 (*c* 1.00, $CHCl_3$), 97% ee (*S*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.85-7.80 (m, 1H), 7.60-7.53 (m, 2H), 7.38-7.33 (m, 2H), 7.15-7.12 (m, 1H), 7.10-7.04 (m, 2H), 5.73 (d, *J* = 4.2 Hz, 1H), 5.15 (d, *J* = 3.5 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 163.1 (d, *J* = 248.5 Hz), 139.7 (d, $J_{C\text{-}F}$ = 0.9 Hz), 134.9, 134.7 (d, *J* = 3.2 Hz),



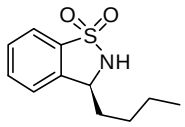
Ar = 4-FC_6H_4

133.6, 129.8, 129.6 (d, $J_{C\text{-}F}$ = 8.4 Hz) , 125.4, 121.3, 116.4 (d, $J_{C\text{-}F}$ =21.8 Hz), 60.7 (d, $J_{C\text{-}F}$ = 0.7 Hz); ^{19}F NMR (376 MHz, $CDCl_3$) δ -112.2. HPLC: Chiracel OD-H column, 220 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 13.1 min (maj) and 20.4 min.

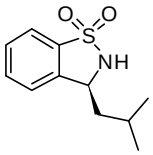
(-)-3-Methyl-1,2-benzisothiazoline 1,1-dioxide (2f): (Known compound),[1,2] 37 mg**,** 95% yield (0.2 mmol scale), 95% ee (*S*), white solid, $[\alpha]^{20}_{D}$ = -18.96 (*c* 1.45, $CHCl_3$) [lit.[2a] $[\alpha]^{20}_{D}$ = -20.70 (*c* 1.00, $CHCl_3$), 93% ee (*S*)].^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (d, *J* = 7.8 Hz, 1H), 7.63-7.59 (m, 1H), 7.52-7.48 (m, 1H), 7.38 (d, *J* = 7.7 Hz, 1H), 5.09 (br, 1H), 4.81-4.75 (m, 1H), 1.59 (d, *J* = 6.7 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.9, 135.5, 133.3, 129.2, 124.0, 121.2, 53.5, 21.5. HPLC: Chiracel OD-H column, 254 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 80/20, flow = 0.8 mL/min, retention time 12.9 min (maj) and 16.7 min.



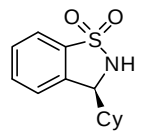
(-)-3-*n*-Butyl-1,2-benzisothiazoline 1,1-dioxide (2g): (Known compound),[1,2] 43 mg, 96% yield (0.2 mmol scale), 94% ee (*S*), colorless oil, $[\alpha]^{20}_{D}$ = -46.92 (*c* 0.78, $CHCl_3$) [lit.[1] $[\alpha]^{20}_{D}$ = -48.70 (*c* 1.00, $CHCl_3$), 94% ee (*S*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75 (d, *J* = 7.8 Hz, 1H), 7.62-7.59 (m, 1H), 7.52-7.50 (m, 1H), 7.38 (d, *J* = 7.8 Hz, 1H), 5.06 (br, 1H), 4.69 (dt, *J* = 8.7, 4.3 Hz, 1H), 1.99-1.93 (m, 1H), 1.76-1.72 (m, 1H), 1.47-1.32 (m, 4H), 0.91 (t, *J* = 6.9 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.8, 135.7, 133.2, 129.3, 124.2, 121.4, 58.0, 35.6, 27.9, 22.5, 14.0. HPLC: Chiracel OD-H column, 220 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 80/20, flow = 0.7 mL/min, retention time 11.3 min (maj) and 21.2 min.



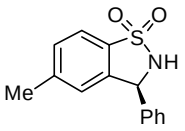
(-)-3-*i*-Butyl-1,2-benzisothiazoline 1,1-dioxide (2h): (Known compound),[1,2] 44 mg, 98% yield (0.2 mmol scale), 96% ee (*S*), white solid, $[\alpha]^{20}_{D}$ = -52.38 (*c* 0.42, $CHCl_3$) [lit.[1] $[\alpha]^{20}_{D}$ = -68.80 (*c* 0.60, $CHCl_3$), 97% ee (*S*)].^{1}H NMR (400 MHz, $CDCl_3$) δ 7.72 (d, *J* = 7.7 Hz, 1H), 7.61-7.57 (m, 1H), 7.50-7.46 (m, 1H), 7.35 (d, *J* = 7.7 Hz, 1H), 5.18 (d, *J* = 4.8 Hz, 1H), 4.72-4.67 (m, 1H), 1.93-1.82 (m, 1H), 1.74-1.63 (m, 2H), 0.99 (dd, *J* = 18.4, 6.6 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.5, 135.6, 133.1, 129.2, 124.2, 121.3, 56.2, 45.2, 25.5, 23.5, 21.4. HPLC: Chiracel OD-H column, 220 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 80/20, flow = 0.7 mL/min, retention time 12.2 min (maj) and 25.9 min.



(-)-3-Cyclohexyl-1,2-benzisothiazoline 1,1-dioxide (2i): (Known compound), [1,2] 49 mg, 96% yield (0.2 mmol scale), 90% ee (*S*), white solid, $[\alpha]^{20}_{D}$ = -46.99 (*c* 1.23, $CHCl_3$), [lit.[1] $[\alpha]^{20}_{D}$ = -34.00 (*c* 0.70, $CHCl_3$), 97% ee (*S*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75 (d, *J* = 7.8 Hz, 1H), 7.62-7.57 (m, 1H), 7.52-7.48 (t, *J* = 7.5 Hz, 1H), 7.37 (d, *J* = 7.8 Hz, 1H), 5.11 (d, *J* = 4.8 Hz, 1H), 4.64-4.62 (m, 1H), 1.86-1.79 (m, 3H), 1.67-1.63 (m, 2H), 1.31-1.12 (m, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 139.1, 135.8, 133.1, 129.3, 124.5, 121.4, 63.0, 42.8, 30.8, 26.4, 26.0, 25.9, 25.8. HPLC: Chiracel OD-H column, 220 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 75/ 25, flow = 0.7 mL/min, retention time 9.6 min (maj) and 24.9 min.

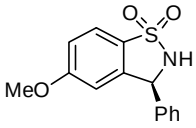


(+)-5-Methyl-3-phenyl-1,2-benzisothiazoline 1,1-dioxide (2j): 49 mg, 94% yield (0.2 mmol), 97% ee (*S*), white solid, 171-172 ^{o}C, $[\alpha]^{20}_{D}$ = +64.54 (*c* 1.23, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.66 (d, *J* = 8.0 Hz, 1H), 7.39-7.34 (m, 5H), 7.30 (d, *J* = 8.0 Hz, 1H), 6.89 (s, 1H), 5.66 (d, *J* = 4.1 Hz, 1H), 5.23 (d, *J* = 3.7 Hz, 1H), 2.34 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.4, 140.2, 139.1, 132.0, 130.5, 129.2, 129.0, 127.6, 125.5, 120.9, 61.2, 21.7. HPLC: Chiracel OD-H column, 220 nm, 30 ^{o}C,

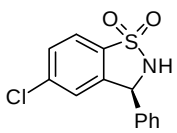


n-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 16.5 min and 17.8 min (maj). HRMS Calculated for $C_{14}H_{14}NO_2S$ $[M+H]^+$ 260.0740, found: 260.0742.

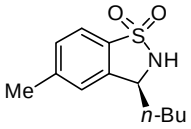
(+)-5-Methoxy-3-phenyl-1,2-benzisothiazoline 1,1-dioxide (2k): 53 mg, 96% yield (0.2 mmol scale), 97% ee (*S*), white solid, 120-121 °C, $[\alpha]^{20}_D$ = +21.93 (*c* 1.40, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.69 (d, *J* = 8.7 Hz, 1H), 7.36-7.33 (m, 5H), 7.01 (dd, *J* = 8.6, 1.9 Hz, 1H), 6.51 (d, *J* = 1.4 Hz, 1H), 5.64 (s, 1H), 5.17 (s, 1H), 3.75 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 163.8, 142.5, 138.9, 129.3, 129.0, 127.6, 126.9, 122.6, 116.5, 109.2, 61.2, 55.8. HPLC: Chiracel OD-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 20.3 min and 22.5 min (maj). HRMS Calculated for $C_{14}H_{14}NO_3S$ $[M+H]^+$ 276.0689, found: 276.0691.



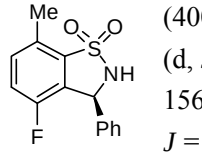
(+)-5-Chloro-3-phenyl-1,2-benzisothiazoline 1,1-dioxide (2l): 53 mg, 95% yield (0.2 mmol scale), 67% ee (*S*), white solid, 143-144 °C, $[\alpha]^{20}_D$ = +16.52 (*c* 1.58, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.73 (d, *J* = 8.3 Hz, 1H), 7.48 (dd, *J* = 8.3, 1.4 Hz, 1H), 7.42-7.34 (m, 5H), 7.09 (s, 1H), 5.67 (s, 1H), 5.28 (s, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.9, 139.8, 138.0, 133.3, 130.1, 129.4, 129.4, 127.6, 125.6, 122.5, 60.9. HPLC: Chiracel OD-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 18.4 min and 22.0 min (maj). HRMS Calculated for $C_{13}H_{11}Cl\ NO_2S$ $[M+H]^+$ 280.0194, found: 280.0194.

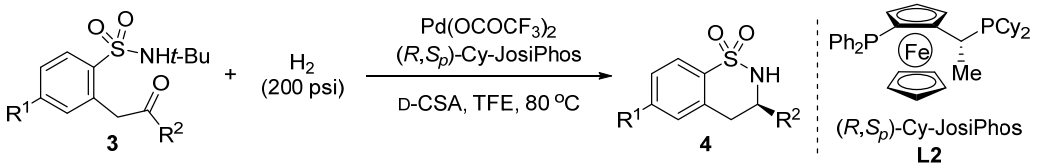


(-)-5-Methyl-3-butyl-1,2-benzisothiazoline 1,1-dioxide (2m): 46 mg, 96% yield (0.2 mmol scale), 95% ee (*S*), white solid, 67-68 °C, $[\alpha]^{20}_D$ = -66.52 (*c* 1.15, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.63 (d, *J* = 8.0 Hz, 1H), 7.30 (d, *J* = 8.0 Hz, 1H), 7.16 (s, 1H), 5.00 (d, *J* = 4.8 Hz, 1H), 4.66-4.62 (m, 1H), 2.45 (s, 3H), 2.00-1.92 (m, 1H), 1.74-1.72 (m, 1H), 1.44-1.35 (m, 4H), 0.93-0.90 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.1, 141.1, 132.9, 130.2, 124.4, 121.0, 57.8, 35.6, 27.9, 22.4, 21.8, 13.9. HPLC: Chiracel OD-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 7.9 min (maj) and 9.4 min. HRMS Calculated for $C_{12}H_{18}NO_2S$ $[M+H]^+$ 240.1053, found: 240.1055.



(+)-4-Fluoro-7-methyl-3-phenyl-1,2-benzisothiazoline 1,1-dioxide (2n): 54 mg, 96% yield (0.2 mmol scale), 89% ee (*S*), white solid, 162-164 °C, $[\alpha]^{20}_D$ = +113.33 (*c* 1.08, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.38-7.33 (m, 5H), 7.29-7.26 (m, 1H), 7.12-7.08 (m, 1H), 5.73 (d, *J* = 3.5 Hz, 1H), 5.14-5.11 (br, 1H), 2.63 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 156.1 (d, *J* = 252.6 Hz), 137.9, 135.2 (d, *J* = 3.2 Hz), 133.3 (d, *J* = 6.5 Hz), 129.9 (d, *J* = 4.4 Hz), 129.1, 129.1, 127.5 (d, *J* = 0.7 Hz), 126.6 (d, *J* = 18.7 Hz), 120.2 (d, *J* = 19.6 Hz), 58.1, 16.3; ^{19}F NMR (376 MHz, $CDCl_3$) δ -119.92. HPLC: Chiracel OD-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 11.5 min and 16.3 min (maj). HRMS Calculated for $C_{14}H_{13}FNO_2S$ $[M+H]^+$ 278.0646, found: 278.0647.



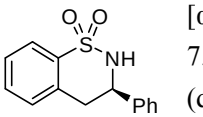


Bisphosphine ligand (*R*,*S*$_p$)-Cy-JosiPhos (3.9 mg, 0.0066 mmol) and $Pd(OCOCF_3)_2$ (2.0 mg, 0.006 mmol) were placed in a dried Schlenk tube under nitrogen atmosphere, and degassed

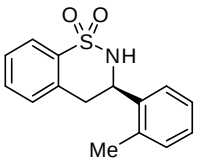
anhydrous acetone was added. The mixture was stirred at room temperature for 1 h. The solvent was removed under vacuum to give the catalyst. This catalyst was taken into a glove box filled with nitrogen and dissolved in 2,2,2-trifluoroethanol (TFE, 1.0 mL). To the mixture of keto sulfonamides **3** (0.2 mmol) and D-(-)-camphorsulfonic acid (46 mg, 0.2 mmol) in 2,2,2-trifluoroethanol was added this catalyst solution, and then the mixture was transferred to an autoclave, which was charged hydrogen gas (200 psi). The autoclave was stirred under directed condition (oil bath temperature was showed if it was heated). After release of the hydrogen, the reaction mixture was evaporated. Purification was performed on silica gel using *n*-hexane/ethyl acetate as the eluent to give the chiral products **4**. The enantiomeric excesses were determined by chiral HPLC. The absolute configurations of aryl substituents of **4** were determined by comparison of rotation sign with literature data. The absolute configurations of alkyl substituents of **4** were based on single-crystal X-ray diffraction analysis.

Racemates of **4** were prepared by the reduction amination of the corresponding keto sulfonamides catalyzed by racemic catalyst.

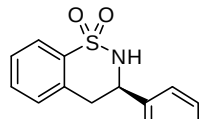
(+)-3,4-Dihydro-3-phenyl-2*H*-1λ^6-benzo[*e*][1,2]thiazine 1,1-dioxide (4a): (Known compound),[3] 50 mg, 96% yield (0.2 mmol scale), 97% ee (*R*), white solid, $[\alpha]^{20}_D$ = +37.28 (*c* 1.25, $CHCl_3$), [lit.[3] $[\alpha]^{25}_D$ = +51.70 (*c* 0.93, $CHCl_3$), 98% ee (*R*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.77-7.75 (m, 1H), 7.44-7.39 (m, 5H), 7.36-7.34 (m, 2H), 7.25-7.21 (m, 1H), 5.03 (d, *J* = 10.5 Hz, 1H), 4.93 (td, *J* = 10.3, 5.7 Hz, 1H), 3.22-3.19 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 139.6, 137.8, 135.1, 132.3, 129.5, 129.1, 128.5, 127.9, 126.3, 123.7, 56.9, 35.7. HPLC: Chiracel OD-H column, 230 nm, 30 °C, *n*-hexane/ *i*-propanol = 70/30, flow = 0.7 mL/min, retention time 14.4 min and 18.1 min (maj).



(+)-3,4-Dihydro-3-(*o*-tolyl)-2*H*-1λ^6-benzo[*e*][1,2]thiazine 1,1-dioxide (4b): (Known compound),[3] 49 mg, 89% yield (0.2 mmol scale), 96% ee (*R*), white solid, $[\alpha]^{20}_D$ = +8.86 (*c* 1.23, $CHCl_3$), [lit.[3] $[\alpha]^{24}_D$ = +11.40 (*c* 0.77, $CHCl_3$), 98% ee (*R*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73 (d, *J* = 7.8 Hz, 1H), 7.43-7.40 (m, 2H), 7.34-7.20 (m, 5H), 5.20 -5.00 (m, 2H), 3.34-3.27 (m, 1H), 3.06-3.01 (m, 1H), 2.41 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 137.5, 137.2, 136.2, 135.3, 132.3, 131.1, 129.6, 128.4, 127.9, 126.7, 125.2, 123.9, 53.4, 34.3, 19.2. HPLC: Chiracel OD-H column, 230 nm, 30 °C, *n*-hexane/ *i*-propanol = 70/30, flow = 0.7 mL/min, retention time 13.9 min and 18.1 min (maj).



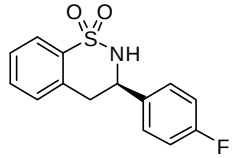
(+)-3,4-Dihydro-3-(*m*-tolyl)-2*H*-1λ^6-benzo[*e*][1,2]thiazine 1,1-dioxide (4c): (Known compound),[3] 52 mg, 95% yield (0.2 mmol scale), 95% ee (*R*), white solid, $[\alpha]^{20}_D$ = +39.15 (*c* 0.94, $CHCl_3$), [lit.[3] $[\alpha]^{24}_D$ = +46.20 (*c* 0.63, $CHCl_3$), 97% ee (*R*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75 (d, *J* = 7.8 Hz, 1H), 7.43 (td, *J* = 7.6, 1.2 Hz, 1H), 7.35-7.28 (m, 2H), 7.27-7.16 (m, 4H), 5.09-5.06 (br, 1H), 4.94-4.87 (m, 1H), 3.25-3.13 (m, 2H), 2.39 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 139.6, 138.9, 137.8, 135.3, 132.4, 129.6, 129.3, 129.1, 127.9, 127.2, 123.8, 123.3, 56.9, 35.7, 21.7. HPLC: Chiracel OD-H column, 230 nm, 30 °C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 12.4 min and 15.5 min (maj).



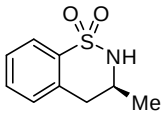
(+)-3,4-Dihydro-3-(*p*-tolyl)-2*H*-1λ^6-benzo[*e*][1,2]thiazine 1,1-dioxide (4d): (Known compou- nd),[3] 52 mg, 95% yield (0.2 mmol scale), 79% ee (*R*), white solid, $[\alpha]^{20}_D$ = +31.44 (*c* 1.04, $CHCl_3$), [lit.[3] $[\alpha]^{24}_D$ = +18.70 (*c* 0.47, $CHCl_3$), 97% ee (*R*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73 (d, *J* = 7.8

Hz, 1H), 7.42 (t, *J* = 7.5 Hz, 1H), 7.34-7.28 (m, 3H), 7.25-7.18 (m, 3H), 5.10-5.07 (br, 1H), 4.91-4.84 (m, 1H), 3.23-3.10 (m, 2H), 2.35 (s, 3H); ^{13}C NMR (10 MHz, $CDCl_3$) δ 138.2, 137.7, 136.7, 135.2, 132.2, 129.7, 129.6, 127.8, 126.2, 123.8, 56.5, 35.6, 21.2. HPLC: Chiracel OD-H column, 230 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 12.9 min and 18.1 min (maj).

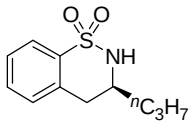
(+)-3,4-Dihydro-3-(4-fluorophenyl)-2*H*-1λ^6-benzo[*e*][1,2]thiazine 1,1-dioxide (4e): (Known compound),[3] 55 mg, 98% yield (0.2 mmol scale), 98% ee (*R*), white solid, $[\alpha]^{20}_D$ = +34.74 (*c* 1.35, $CHCl_3$), [lit.[3] $[\alpha]^{24}_D$ = +59.20 (*c* 0.50, $CHCl_3$), 98% ee (*R*)]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73-7.71 (m, 1H), 7.45-7.40 (m, 3H), 7.34-7.31 (m, 1H), 7.22 (d, *J* = 7.7 Hz, 1H), 7.12-7.06 (m, 2H), 5.19-5.16 (br, 1H), 4.92-4.86 (m, 1H), 3.24-3.14 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 162.5 (d, *J* = 247.2 Hz), 137.5, 135.5 (d, *J* = 3.1 Hz), 134.9, 132.3, 129.4, 128.1 (d, *J* = 8.3 Hz), 127.8, 123.5, 115.9 (d, *J* = 21.6 Hz), 56.2, 35.5; ^{19}F NMR (376 MHz, $CDCl_3$) δ -113.56. HPLC: Chiracel OD-H column, 230 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 12.3 min and 17.4 min (maj).



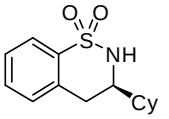
(+)-3-Methyl-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-dioxide (4f): (Known compound),[3] 35 mg, 90% yield (0.2 mmol scale), 94% ee, white solid, $[\alpha]^{20}_D$ = +80.88 (*c* 0.68, $CHCl_3$), [lit.[3] $[\alpha]^{24}_D$ = -69.40 (*c* 0.53, $CHCl_3$), 98% ee]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.70 (d, *J* = 7.7 Hz, 1H), 7.37 (t, *J* = 7.4 Hz, 1H), 7.29 (t, *J* = 7.3 Hz, 1H), 7.12 (d, *J* = 7.6 Hz, 1H), 4.74-4.71 (br, 1H), 4.02-3.93 (m, 1H), 2.90-2.85 (m, 1H), 2.75-2.68 (m, 1H), 1.37 (d, *J* = 6.5 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 137.0, 135.3, 132.0, 129.4, 127.6, 123.8, 49.4, 36.0, 21.7. HPLC: Chiracel OD-H column, 230 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 9.3 min and 17.7 min (maj).



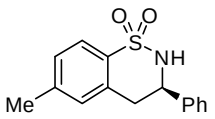
(+)-3-*n*-Propyl-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-dioxide (4g): (Known compound),[3] 42 mg, 93% yield (0.2 mmol scale), 95% ee, white solid, $[\alpha]^{20}_D$ = +57.89 (*c* 0.76, $CHCl_3$), [lit.[3] $[\alpha]^{24}_D$ = -60.40 (*c* 0.87, $CHCl_3$), 96% ee]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.69-7.67 (m, 1H), 7.35 (t, *J* = 7.3 Hz, 1H), 7.29-7.27 (m, 1H), 7.11 (d, *J* = 7.3 Hz, 1H), 4.65 (t, *J* = 11.7 Hz, 1H), 3.83 (br, 1H), 2.88-2.83 (m, 1H), 2.74-2.67 (m, 1H), 1.61-1.54 (m, 4H), 0.96 (t, *J* = 6.8 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 137.4, 135.4, 131.9, 129.5, 127.5, 123.8, 53.2, 37.8, 34.5, 18.6, 13.7. HPLC: Chiracel OD-H column, 230 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 8.3 min & 17.8 min (maj).



(+)-3-Cyclohexyl-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-dioxide (4h): (Known compound),[4] 49 mg, 92% yield (0.2 mmol scale), 96% ee, white solid, $[\alpha]^{20}_D$ = +61.00 (*c* 0.90, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (d, *J* = 7.7 Hz, 1H), 7.34 (t, *J* = 7.4 Hz, 1H), 7.25 (t, *J* = 7.7 Hz, 1H), 7.10 (d, *J* = 7.7 Hz, 1H), 4.73-4.70 (m, 1H), 3.64-3.55 (br, 1H), 2.90-2.73 (m, 2H), 2.03-1.98 (m, 1H), 1.81-1.68 (m, 4H), 1.55-1.48 (m, 1H), 1.37-1.02 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 137.7, 135.8, 132.0, 129.8, 127.6, 123.9, 58.3, 42.5, 31.9, 29.2, 28.9, 26.4, 26.1, 26.0. HPLC: Chiracel OD-H column, 230 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 7.9 min and 14.7 min (maj).

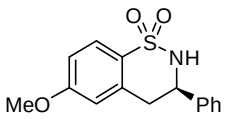


(+)-6-Methyl-3-phenyl-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-dioxide (4i): 50 mg, 91% yield (0.2 mmol scale), 88% ee (*R*), white solid, mp 210-211 ^{o}C, $[\alpha]^{20}_D$ = +42.24 (*c* 1.25, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73 (d, *J* = 8.0 Hz, 1H), 7.47-7.36 (m, 5H), 7.21 (d, *J* = 8.0 Hz,



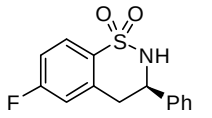
1H), 7.10 (s, 1H), 5.01-4.83 (m, 1H), 4.86-4.83 (br, 1H), 3.29-3.17 (m, 2H), 2.41 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.9, 139.6, 135.0, 134.9, 129.8, 129.0, 128.6, 128.4, 126.2, 123.7, 56.8, 35.7, 21.5. HPLC: Chiracel OD-H column, 220 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 13.0 min and 15.5 min (maj). HRMS Calculated for $C_{15}H_{16}NO_2S$ $[M+H]^+$ 274.0896, found: 274.0896.

(+)-6-Methoxy-3-phenyl-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-dioxide (4j): 54 mg, 93% yield (0.2 mmol scale), 89% ee (*R*), white solid, mp 186-187 ^{o}C, $[\alpha]^{20}_D$ = +42.81 (*c* 1.35, $CHCl_3$).



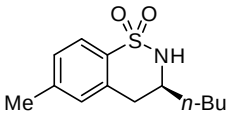
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.70 (d, *J* = 8.7 Hz, 1H), 7.43- 7.32 (m, 5H), 6.83 (dd, *J* = 8.7, 2.4 Hz, 1H), 6.68 (d, *J* = 2.2 Hz, 1H), 5.05-5.02 (br, 1H), 4.93 (td, *J* = 10.9, 4.7 Hz, 1H), 3.82 (s, 3H), 3.23-3.10 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 162.1, 139.5, 137.2, 129.9, 129.0, 128.3, 126.2, 125.7, 114.0, 113.6, 56.7, 55.5, 36.1. HPLC: Chiracel OD-H column, 220 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 17.5 min and 21.9 min (maj). HRMS Calculated for $C_{15}H_{16}NO_3S$ $[M+H]^+$ 290.0845, found: 290.0845.

(+)-6-Fluoro-3-phenyl-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-dioxide (4k): 52 mg, 98% yield (0.2 mmol scale), 96% ee (*R*), white solid, mp 172-174^{o}C, $[\alpha]^{20}_D$ = +55.18 (*c* 1.08, $CHCl_3$).



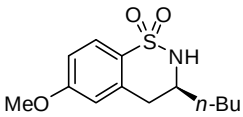
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.77 (dd, *J* = 8.6, 5.4 Hz, 1H), 7.42- 7.34 (m, 5H), 7.07-7.02 (m, 1H), 6.97 (d, *J* = 8.9 Hz, 1H), 5.08-5.06 (br, 1H), 4.95 (td, *J* = 10.8, 4.7 Hz, 1H), 3.30-3.16 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 164.3 (d, *J* = 254.4 Hz), 139.1, 138.3 (d, *J* = 8.7 Hz), 133.9 (d, *J* = 3.3 Hz), 129.1, 128.6, 126.4 (d, *J* = 9.4 Hz), 126.2, 116.2 (d, *J* = 22.4 Hz), 115.4 (d, *J* = 22.6 Hz), 56.6, 35.8; ^{19}F NMR (376 MHz, $CDCl_3$) δ -105.43. HPLC: Chiracel OD-H column, 220 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 13.7 min and 15.6 min (maj). HRMS Calculated for HRMS Calculated for $C_{14}H_{13}FNO_2S$ $[M+H]^+$ 278.0646, found: 278.0646.

(+)-3-Butyl-6-methyl-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-dioxide (4l): 49 mg, 96% yield (0.2 mmol scale), 96% ee (*S*), colorless oil, $[\alpha]^{20}_D$ = +57.26 (*c* 1.50, $CHCl_3$). ^{1}H NMR (400 MHz,



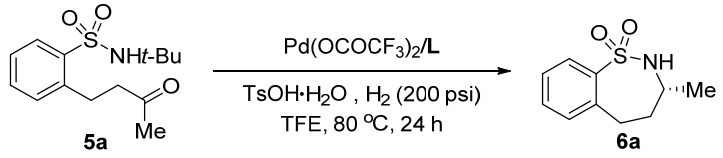
$CDCl_3$) δ 7.61 (d, *J* = 8.0 Hz, 1H), 7.11 (d, *J* = 8.0 Hz, 1H), 6.96 (s, 1H), 4.54 (d, *J* = 11.6 Hz, 1H), 3.85- 3.74 (m, 1H), 2.86-2.81 (m, 1H), 2.74-2.67 (m, 1H), 2.34 (s, 3H), 1.66-1.59 (m, 2H), 1.57-1.29 (m, 4H), 0.92 (t, *J* = 7.1 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.4, 135.4, 134.7, 129.9, 128.3, 123.9, 53.6, 35.5, 34.7, 27.5, 22.3, 21.5, 14.0. HPLC: Chiracel OD-H column, 220 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 6.8 min and 9.9 min (maj). HRMS Calculated for $C_{13}H_{20}NO_2S$ $[M+H]^+$ 254.1209, found: 254.1211.

(+)-3-Butyl-6-methoxy-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-dioxide (4m): 50 mg, 93% yield (0.2 mmol scale), 96% ee (*S*), colorless oil, $[\alpha]^{20}_D$ = +67.81 (*c* 1.28, $CHCl_3$). ^{1}H NMR (400



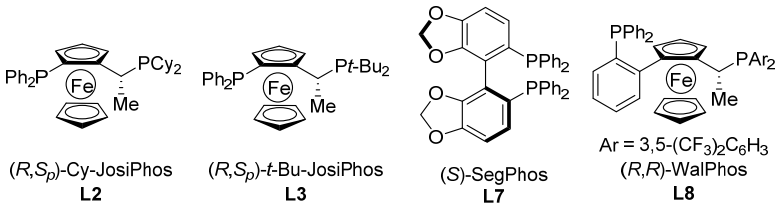
MHz, $CDCl_3$) δ 7.64 (d, *J* = 8.7 Hz, 1H), 6.80 (dd, *J* = 8.7, 2.5 Hz, 1H), 6.59 (d, *J* = 2.3 Hz, 1H), 4.62-4.59 (m, 1H), 3.84-3.74 (m, 4H), 2.85-2.80 (m, 1H), 2.74-2.67 (m, 1H), 1.68-1.57 (m, 2H), 1.53-1.30 (m, 4H), 0.93 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 161.8, 137.6, 129.8, 125.8, 113.7, 113.6, 55.4, 53.5, 35.5, 35.1, 27.5, 22.3, 14.0. HPLC: Chiracel OD-H column, 220 nm, 30 ^{o}C, *n*-hexane/*i*-propanol = 70/30, flow = 0.7 mL/min, retention time 8.3 min and 11.3 min (maj). HRMS Calculated for $C_{13}H_{20}NO_3S$ $[M+H]^+$ 270.1158, found: 270.1161.

Table S2. Ligand screening for the synthesis of *δ*-sultams 6a[a]

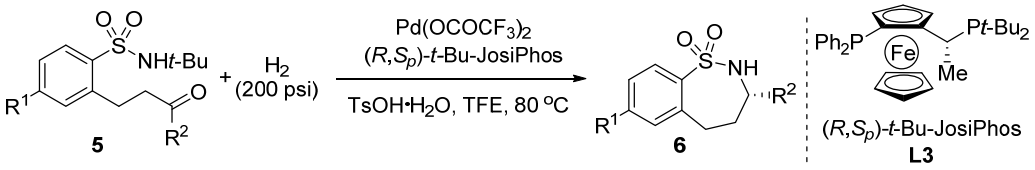


entry	ligand	conv (%)[b]	ee (%)[c]
1	**L2** [(*R*,S_p)-Cy-JosiPhos]	>95	80 (+)
2	**L3** [(*R*,S_p)-*t*-Bu-JosiPhos]	>95	98 (+)
3	**L4** [(*R*)-MeO-Biphep]	>95	36 (+)
4	**L5** [(*R*)-SynPhos]	>95	34 (+)
5	**L6** [(*R*)-DifluorPhos]	>95	29 (+)
6	**L7** [(*S*)-SegPhos]	>95	36 (-)
7	**L8** [(*R*,*R*)-WalPhos]	>95	95 (+)

[a] Conditions: **5a** (0.1 mmol), $Pd(OCOCF_3)_2$ (3.0 mol %), ligand (3.3 mol %), $TsOH·H_2O$ (100 mol %), H_2 (200 psi), TFE (2.0 mL), 80 °C, 24 h. [b] Determined by ^1H NMR. [c] Determined by HPLC.



The optimal reaction conditions were established: $Pd(OCOCF_3)_2$/(*R*,S_p)-*t*-Bu-JosiPhos as the catalyst, $TsOH·H_2O$ as the additive, TFE as the solvent and reaction temperature 80 °C.



Bisphosphine ligand (*R*,S_p)-*t*-Bu-JosiPhos (3.6 mg, 0.0066 mmol) and $Pd(OCOCF_3)_2$ (2.0 mg, 0.006 mmol) were placed in a dried Schlenk tube under nitrogen atmosphere, and degassed anhydrous acetone was added. The mixture was stirred at room temperature for 1 h. The solvent was removed under vacuum to give the catalyst. This catalyst was taken into a glove box filled with nitrogen and dissolved in 2,2,2-trifluoroethanol (TFE, 1.0 mL). To the mixture of keto sulfonamides **5** (0.2 mmol) and *para*-toluenesulfonic acid monohydrate (38 mg, 0.2 mmol) in 2,2,2-trifluoroethanol was added this catalyst solution, and then the mixture was transferred to an autoclave, which was charged hydrogen gas (200 psi). The autoclave was stirred under directed condition. After release of the hydrogen, the reaction mixture was evaporated. Purification was performed on silica gel using *n*-hexane/ethyl acetate as the eluent to give the chiral products **6**. The enantiomeric excesses were determined by chiral HPLC. The absolute configurations of **6** were based on single-crystal X-ray diffraction analysis.

Racemates of **6** were prepared by the reduction amination of the corresponding keto sulfonamides catalyzed by racemic catalyst.

(+)-3-Methyl-2,3,4,5-tetrahydrobenzo[*f*][1,2]thiazepine 1,1-dioxide (6a): 20 mg, 95% yield (0.1 mmol scale), 98% ee (*R*), colorless oil, $[\alpha]^{20}_{D}$ = +28.30 (*c* 1.00, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.90-7.81 (m, 1H), 7.43-7.39 (m, 1H), 7.31-7.23 (m, 2H), 4.27 (br, 1H), 4.04-3.99 (m, 1H), 3.66-3.59 (m, 1H), 2.93-2.88 (m, 1H), 2.08-2.03 (m, 1H), 1.49-1.40 (m, 1H), 1.26 (d, *J* = 6.7 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.4, 139.4, 132.7, 131.3, 127.0, 126.5, 53.1, 35.6, 34.3, 22.1. HPLC: Chiracel OD-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 80/20, flow = 0.7 mL/min, retention time 10.2 min and 13.1 min (maj). HRMS Calculated for $C_{10}H_{14}NO_2S$ $[M+H]^+$ 212.0740, found: 121.0740.

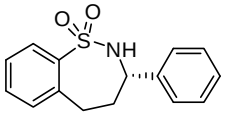
(+)-3-*n*-Butyl-2,3,4,5-tetrahydrobenzo[*f*][1,2]thiazepine 1,1-dioxide (6b): 50 mg, 98% yield (0.2 mmol scale), 99% ee (*R*), colorless oil, $[\alpha]^{20}_{D}$ = +20.46 (*c* 1.93, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.71 (d, *J* = 7.8 Hz, 1H), 7.32 (t, *J* = 7.4 Hz, 1H), 7.19-7.15 (m, 2H), 4.26-4.24 (m, 1H), 3.74 (br, 1H), 3.55-3.48 (m, 1H), 2.87-2.82 (m, 1H), 2.0-1.95 (m, 1H), 1.41-1.18 (m, 7H), 0.83 (t, *J* = 6.8 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.5, 139.4, 132.5, 131.2, 127.0, 126.4, 57.2, 35.7, 34.3, 34.0, 28.0, 22.4, 14.0. HPLC: Chiracel OD-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 90/10, flow = 0.7 mL/min, retention time 9.7 min and 14.2 min (maj). HRMS Calculated for $C_{13}H_{20}NO_2S$ $[M+H]^+$ 254.1209, found: 254.1212.

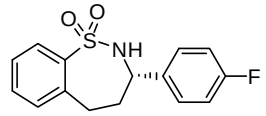
(+)-3-*n*-Hexyl-2,3,4,5-tetrahydrobenzo[*f*][1,2]thiazepine 1,1-dioxide (6c): 54 mg, 96% yield (0.2 mmol scale), 98% ee (*R*), colorless oil, $[\alpha]^{20}_{D}$ = +19.25 (*c* 2.15, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.73 (d, *J* = 7.5 Hz, 1H), 7.33 (t, *J* = 7.2 Hz, 1H), 7.19-7.15 (m, 2H), 4.19-4.17 (m, 1H), 3.75 (br, 1H), 3.56-3.50 (m, 1H), 2.87-2.82 (m, 1H), 2.00-1.95 (m, 1H), 1.41-1.21 (m, 11H), 0.80 (d, *J* = 6.6 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.5, 139.4, 132.5, 131.2, 127.0, 126.4, 57.2, 36.0, 34.3, 34.0, 31.7, 29.0, 25.8, 22.6, 14.1. HPLC: Chiracel OD-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 90/10, flow = 0.7 mL/min, retention time 9.2 min and 15.0 min (maj). HRMS Calculated for $C_{15}H_{24}NO_2S$ $[M+H]^+$ 282.1522, found: 282.1525.

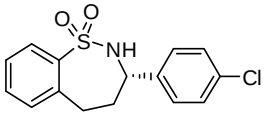
(+)-3-*n*-Butyl-7-methyl-2,3,4,5-tetrahydrobenzo[*f*][1,2]thiazepine 1,1-dioxide (6d): 49 mg, 92% yield (0.2 mmol scale), 98% ee (*R*), white solid, mp 86-88 °C, $[\alpha]^{20}_{D}$ = +25.48 (*c* 0.93, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.69-7.66 (m, 1H), 7.04-7.01 (m, 2H), 4.28-4.20 (m, 1H), 3.81 (br, 1H), 3.59-3.52 (m, 1H), 2.89-2.83 (m, 1H), 2.35 (s, 3H), 2.05-2.01 (m, 1H), 1.48-1.35 (m, 7H), 0.91 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.1, 139.8, 139.3, 132.1, 127.2, 126.9, 57.2, 35.8, 34.3, 34.2, 28.0, 22.4, 21.4, 14.0. HPLC: Chiracel OD-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 85/15, flow = 0.7 mL/min, retention time 8.1 min and 9.7 min (maj). HRMS Calculated for $C_{14}H_{22}NO_2S$ $[M+H]^+$ 268.1366, found: 268.1367.

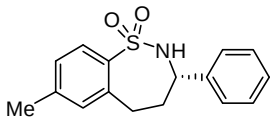
(+)-3-*n*-Butyl-7-methoxy-2,3,4,5-tetrahydrobenzo[*f*][1,2]thiazepine 1,1-dioxide (6e): 56 mg, 98% yield (0.2 mmol scale), >99% ee (*R*), colorless oil, $[\alpha]^{20}_{D}$ = +27.33 (*c* 1.65, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.72 (d, *J* = 8.6 Hz, 1H), 6.73-6.72 (m, 1H), 6.67 (dd, *J* = 8.7, 2.5 Hz, 1H), 4.22-4.19 (m, 1H), 3.82 (s, 3H), 3.79-3.74 (br, 1H), 3.58-3.52 (m, 1H), 2.86-2.81 (m, 1H), 2.07-2.01 (m, 1H), 1.49-1.24 (m, 7H), 0.90 (t, *J* = 7.1 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 162.5, 141.5, 134.7, 129.3, 117.3, 110.3, 57.1, 55.6, 35.8, 34.5, 34.3, 28.1, 22.4, 14.0. HPLC: Chiracel OD-H column,

220 nm, 30 °C, *n*-hexane/*i*-propanol = 85/15, flow = 0.7 mL/min, retention time 12.1 min and 13.6 min (maj). HRMS Calculated for $C_{14}H_{22}NO_3S$ $[M+H]^+$ 284.1315, found: 284.1315.

(+)-3-Phenyl-2,3,4,5-tetrahydrobenzo[*f*][1,2]thiazepine 1,1-dioxide (6f): 24 mg, 89% yield (0.1 mmol scale), 94% ee (*S*), colorless oil, $[\alpha]^{20}_D$ = +25.92 (*c* 0.98, $CHCl_3$). ^1H NMR (400 MHz,  $CDCl_3$) δ 7.92-7.90 (m, 1H), 7.48-7.42 (m, 1H), 7.36-7.25 (m, 7H), 5.03-4.97 (m, 1H), 4.53-4.51 (br, 1H), 3.82-3.75 (m, 1H), 3.06-3.00 (m, 1H), 2.31-2.26 (m, 1H), 2.02-1.90 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.1, 140.5, 138.9, 132.8, 131.4, 129.0, 128.3, 126.9, 126.7, 126.6, 60.7, 34.3, 34.3. HPLC: Chiracel OD-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 85/15, flow = 0.7 mL/min, retention time 17.2 min and 17.9 min (maj). HRMS Calculated for $C_{15}H_{16}NO_2S$ $[M+H]^+$ 274.0896, found: 274.0898.

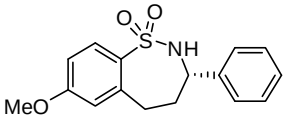
(+)-3-(4-Fluorophenyl)-2,3,4,5-tetrahydrobenzo[*f*][1,2]thiazepine 1,1-dioxide (6g): 56 mg, 95% yield (0.2 mmol scale), 93% ee (*S*), colorless oil, $[\alpha]^{20}_D$ = +13.69 (*c* 1.68, $CHCl_3$). ^1H NMR  (400 MHz, $CDCl_3$) δ 7.86-7.84 (m, 1H), 7.47-7.44 (m, 1H), 7.35-7.25 (m, 4H), 7.03-6.99 (m, 2H), 4.99-4.94 (m, 1H), 4.69-4.62 (m, 1H), 3.78-3.71 (m, 1H), 3.05-2.99 (m, 1H), 2.29-2.24 (m, 1H), 1.97-1.88 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 162.5 (d, *J* = 247.3 Hz), 142.1, 138.9, 136.5 (d, *J* = 3.3 Hz), 132.9, 131.5, 128.5 (d, *J* = 8.2 Hz), 127.0, 126.8, 115.9 (d, *J* = 21.5 Hz), 60.0, 34.4, 34.3; ^{19}F NMR (376 MHz, $CDCl_3$) δ -113.46. HPLC: Chiracel OD-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 80/20, flow = 0.7 mL/min, retention time 12.9 min and 17.5 min (maj). HRMS Calculated for $C_{15}H_{15}FNO_2S$ $[M+H]^+$ 292.0802, found: 292.0803.

(*S*)-(+)-3-(4-Chlorophenyl)-2,3,4,5-tetrahydrobenzo[*f*][1,2]thiazepine 1,1-dioxide (6h): 54 mg, 87% yield (0.2 mmol scale), 97% ee (*S*), white solid, mp 79-80 °C, $[\alpha]^{20}_D$ = +26.53 (*c* 0.98, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.92-7.90 (m, 1H), 7.49-7.45 (m, 1H), 7.36-7.26 (m, 6H),  5.02-4.96 (m, 1H), 4.49-4.47 (m, 1H), 3.80-3.74 (m, 1H), 3.07-3.01 (m, 1H), 2.31-2.25 (m, 1H), 1.97-1.87 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.9, 138.9, 138.7, 134.1, 132.9, 131.4, 129.1, 128.1, 127.0, 126.8, 59.9, 34.2, 34.1. HPLC: Chiracel OD-H column, 210 nm, 30 °C, *n*-hexane/*i*-propanol = 85/15, flow = 0.7 mL/min, retention time 16.4 min and 22.1 min (maj). HRMS Calculated for $C_{15}H_{15}ClNO_2S$ $[M+H]^+$ 308.0507, found: 308.0506.

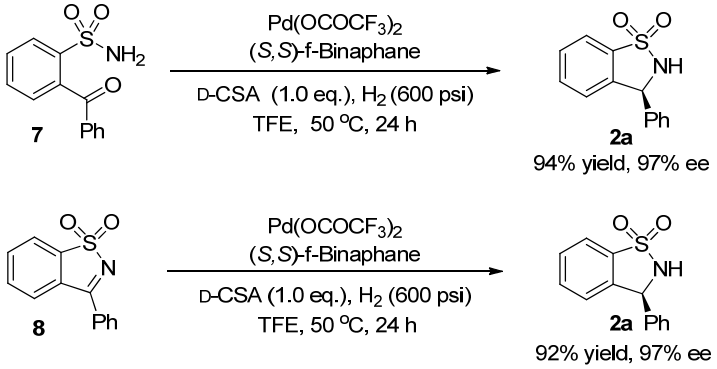
(+)-3-Phenyl-7-methyl-2,3,4,5-tetrahydrobenzo[*f*][1,2]thiazepine 1,1-dioxide (6i): 50 mg, 88% yield (0.2 mmol scale), 94% ee (*S*), colorless oil, $[\alpha]^{20}_D$ = +7.81 (*c* 1.55, $CHCl_3$). ^1H NMR (400  MHz, $CDCl_3$) δ 7.80-7.78 (m, 1H), 7.35-7.25 (m, 5H), 7.11-7.10 (m, 2H), 5.00-4.94 (m, 1H), 4.51-4.49 (m, 1H), 3.77-3.70 (m, 1H), 2.99-2.94 (m, 1H), 2.38 (s, 3H), 2.28-2.24 (m, 1H), 1.97-1.87; ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.4, 140.7, 139.4, 138.8, 132.2, 129.0, 128.3, 127.1, 126.7, 60.7, 34.5, 34.3, 21.5. HPLC: Chiracel OJ-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 85/15, flow = 0.7 mL/min, retention time 30.9 min (maj) and 35.8 min. HRMS Calculated for $C_{16}H_{18}NO_2S$ $[M+H]^+$ 288.1053, found: 288.1053.

(+)-3-Phenyl-7-methoxy-2,3,4,5-tetrahydrobenzo[*f*][1,2]thiazepine 1,1-dioxide (6j): 57 mg, 93% yield (0.2 mmol scale), 95% ee (*S*), colorless oil, $[\alpha]^{20}_D$ = +7.16 (*c* 1.48, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.90-7.88 (m, 1H), 7.37-7.28 (m, 5H), 6.81-6.78 (m, 2H), 5.01-4.95 (m, 1H), 4.38-4.36 (br, 1H), 3.86 (s, 3H), 3.80-3.73 (m, 1H), 2.99-2.93 (m, 1H), 2.32-2.27 (m, 1H),

1.98-1.89 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 162.7, 141.0, 140.6, 134.2, 129.2, 129.0, 128.3, 126.6, 117.5, 110.4, 60.5, 55.6, 34.5, 34.5. HPLC: Chiracel OD-H column, 220 nm, 30 °C, *n*-hexane/*i*-propanol = 85/15, flow = 0.7 mL/min, retention time 22.1 min (maj) and 28.2 min. HRMS Calculated for $C_{16}H_{18}NO_3S$ $[M+H]^+$ 304.1002, found: 304.1001.



4. Control Experiments



The *in situ* prapared bisphosphine ligand and $Pd(OCOCF_3)_2$ (2.0 mg, 0.006 mmol) complex was taken into a glove box and added to the mixture of keto sulfonamide **7** or imine **8** (0.2 mmol) and acid in dochloromethane or 2,2,2-trifluoroethanol. Then, the mixture was transferred to an autoclave, which was charged hydrogen gas (600 psi). The autoclave was stirred for 24 h. After release of the hydrogen, the autoclave was opened and the reaction mixture was evaporated. The reaction mixture was evaporated. Purification was performed on silica gel using *n*-hexane/ethyl acetate as the eluent to give the chiral product **2a**. The enantiomeric excesses were determined by chiral HPLC.

5. Determination of Absolute Configurations of Products

The single crystal of (+)-3-cyclohexyl-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-dioxide **4h** was grown from the solution of *n*-hexane and ethyl acetate, which is suitable for X-ray diffraction analysis. The structure in **Figure S1** showed that the absolute configuration of (+)-**4h** is (*R*). [CCDC 1507240] contains the structure and supplementary crystallographic data for (+)-**4h**. These data can be obtained free of charge from the Cambridge Crystallographic Data Centre via www.ccdc. cam.ac.uk.

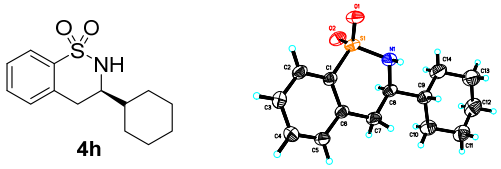


Figure S1. X-ray crystallographic analysis of (*R*)-(+)-**4h**

To determine the absolute configuration of the product (+)-3-(4-chlorophenyl)-2,3,4,5-tetra-hydrobenzo[*f*][1,2]thiazepine 1,1-dioxide (+)-**6h**, *n*-hexane (3.0 mL) was slowly added into the solution of (+)-**6h** in ethyl acetate (1.0 mL) at 50 °C, then the solution was cooled down to room temperature. The crystal of (+)-**6h** was grown from the solution, which is suitable for X-ray diffraction analysis. The structure in **Figure S2** showed that the absolute configuration of (+)-**6h** is

S. [CCDC 1414841] contains the structure and supplementary crystallographic data for (+)-**6h**. These data can be obtained free of charge from the Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk.

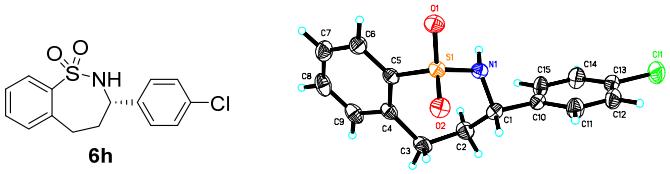
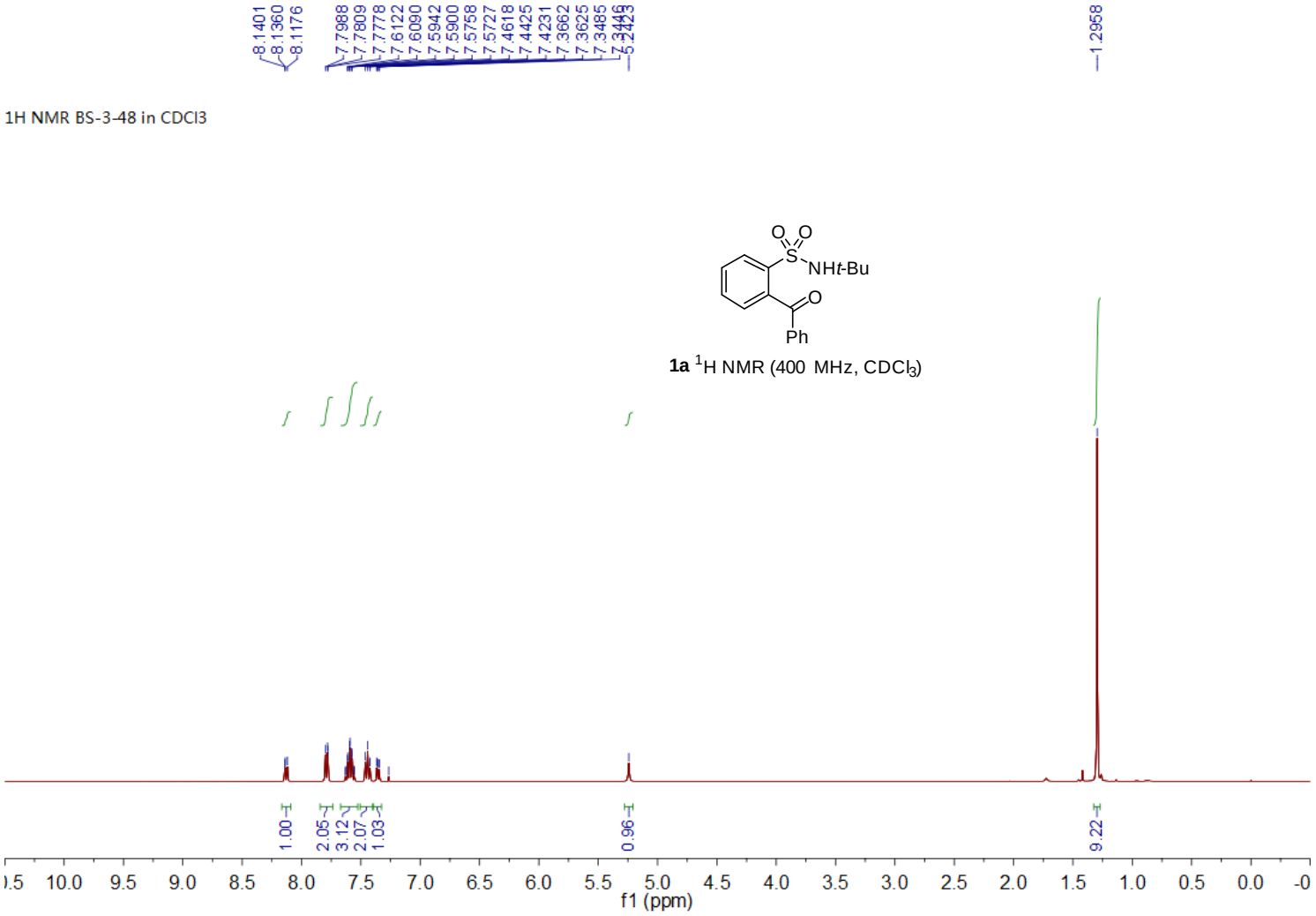


Figure S2. X-ray crystallographic analysis of (*S*)-(+)-**6h**

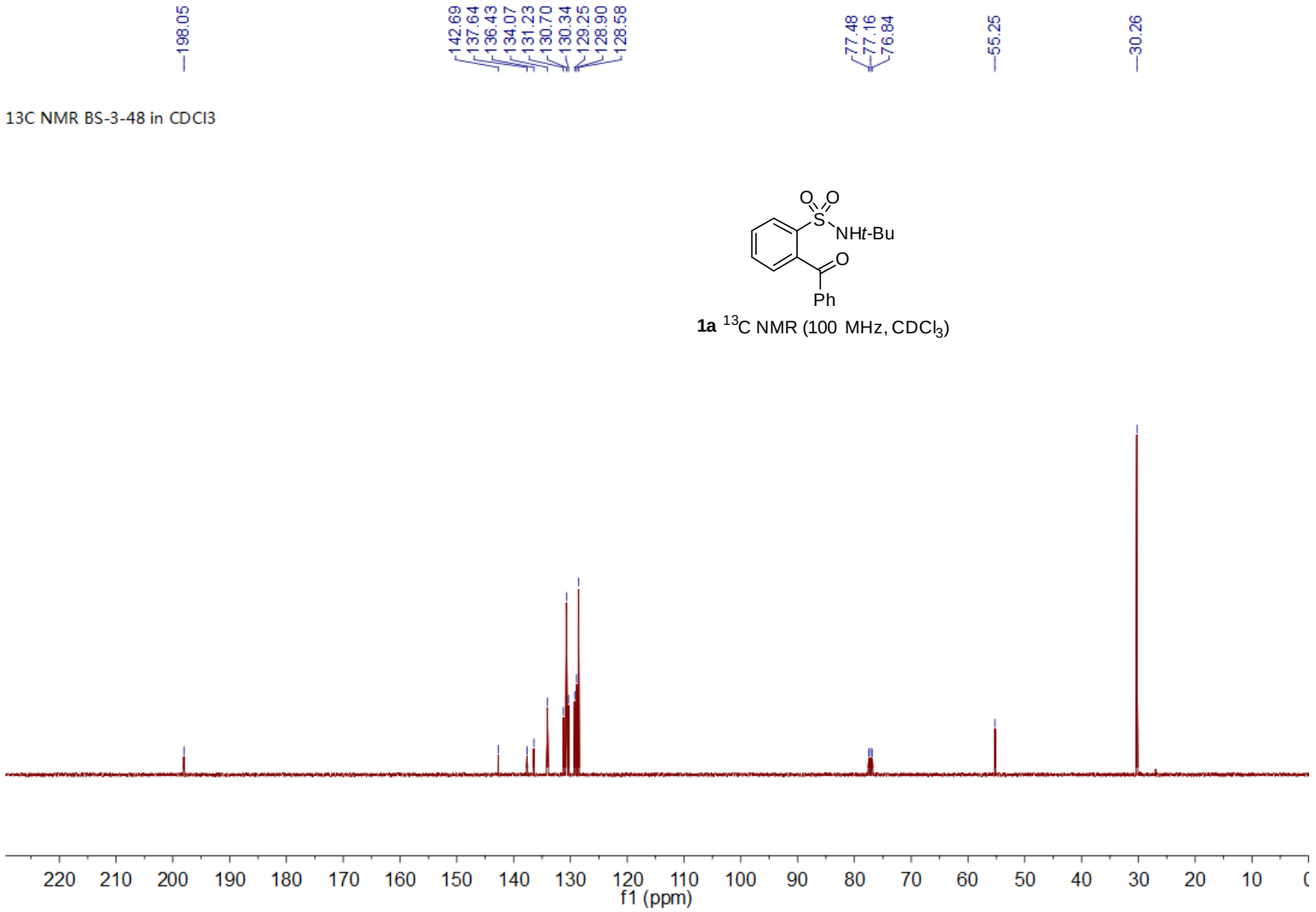
6. References

1) B. Song, C.-B. Yu, W.-X. Huang, M.-W. Chen and Y.-G. Zhou, *Org. Lett.*, 2015, **17**, 190.
2) (a) Y.-Q. Wang, S.-M. Lu and Y.-G. Zhou, *J. Org. Chem.*, 2007, **72**, 3729; (b) C.-B. Yu, D.-W. Wang and Y.-G. Zhou, *J. Org. Chem.*, 2009, **74**, 5633.
3) C.-B. Yu, K. Gao, D.-S. Wang, L. Shi and Y.-G. Zhou, *Chem. Commun.*, 2011, **47**, 5052.
4) F. Fang, R. Wang, Z.-P. Liu and A.-G. Ji, *Heterocycles*, 2007, **71**, 2377.

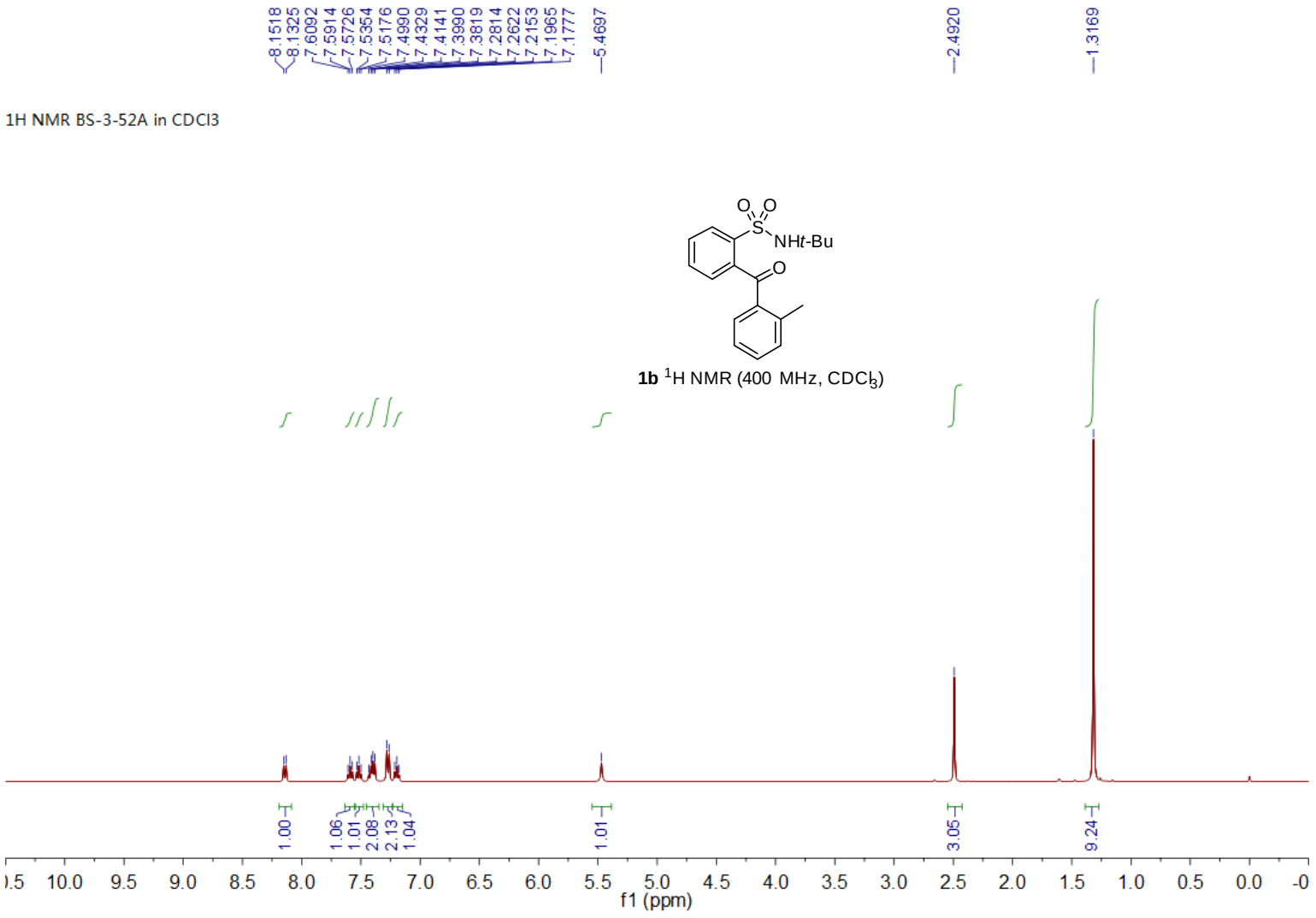
7. Copy of NMR and HPLC for the Compounds

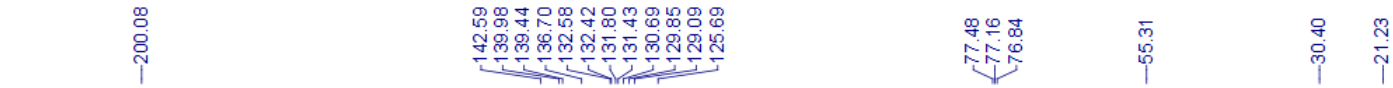


1a ^{1}H NMR (400 MHz, $CDCl_3$)

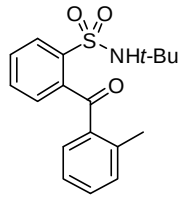


1a ^{13}C NMR (100 MHz, $CDCl_3$)

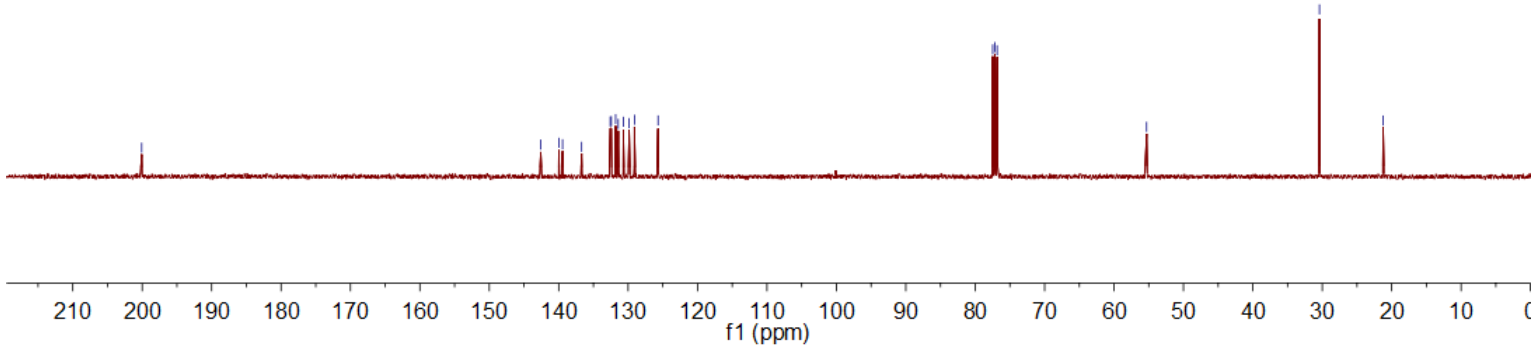

8.1518
8.1325
7.6092
7.5914
7.5726
7.5354
7.5176
7.4990
7.4329
7.4141
7.3990
7.3819
7.2814
7.2622
7.2153
7.1965
7.1777
5.4697
2.4920
1.3169
1H NMR BS-3-52A in CDCl3
O
O
S
NHt-Bu
O
1b 1H NMR (400 MHz, CDCl3)
1.00
1.06
1.01
2.08
2.13
1.04
1.01
3.05
9.24
f1 (ppm)

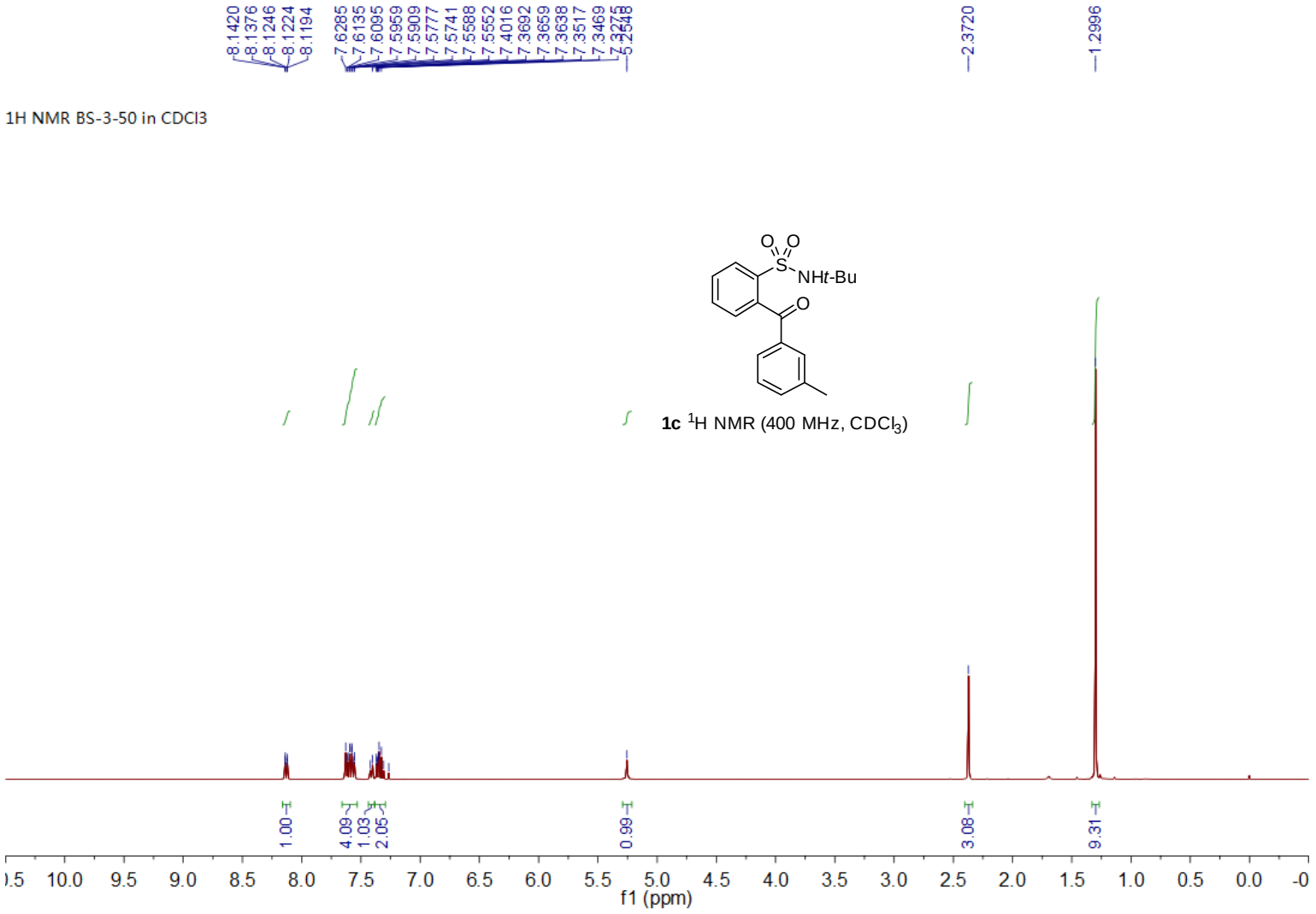


13C NMR BS-3-52A in CDCl3

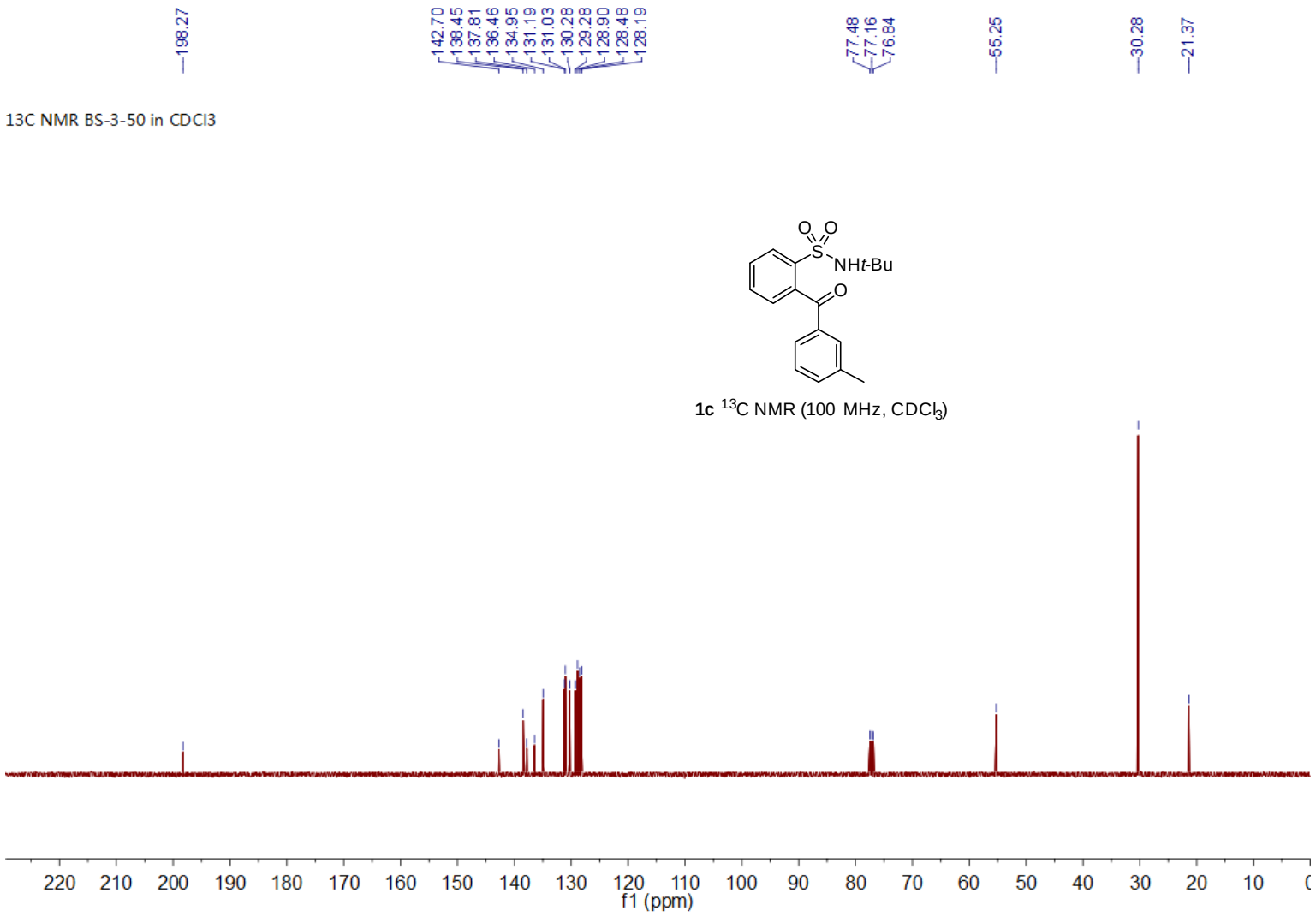


1b ^{13}C NMR (100 MHz, $CDCl_3$)

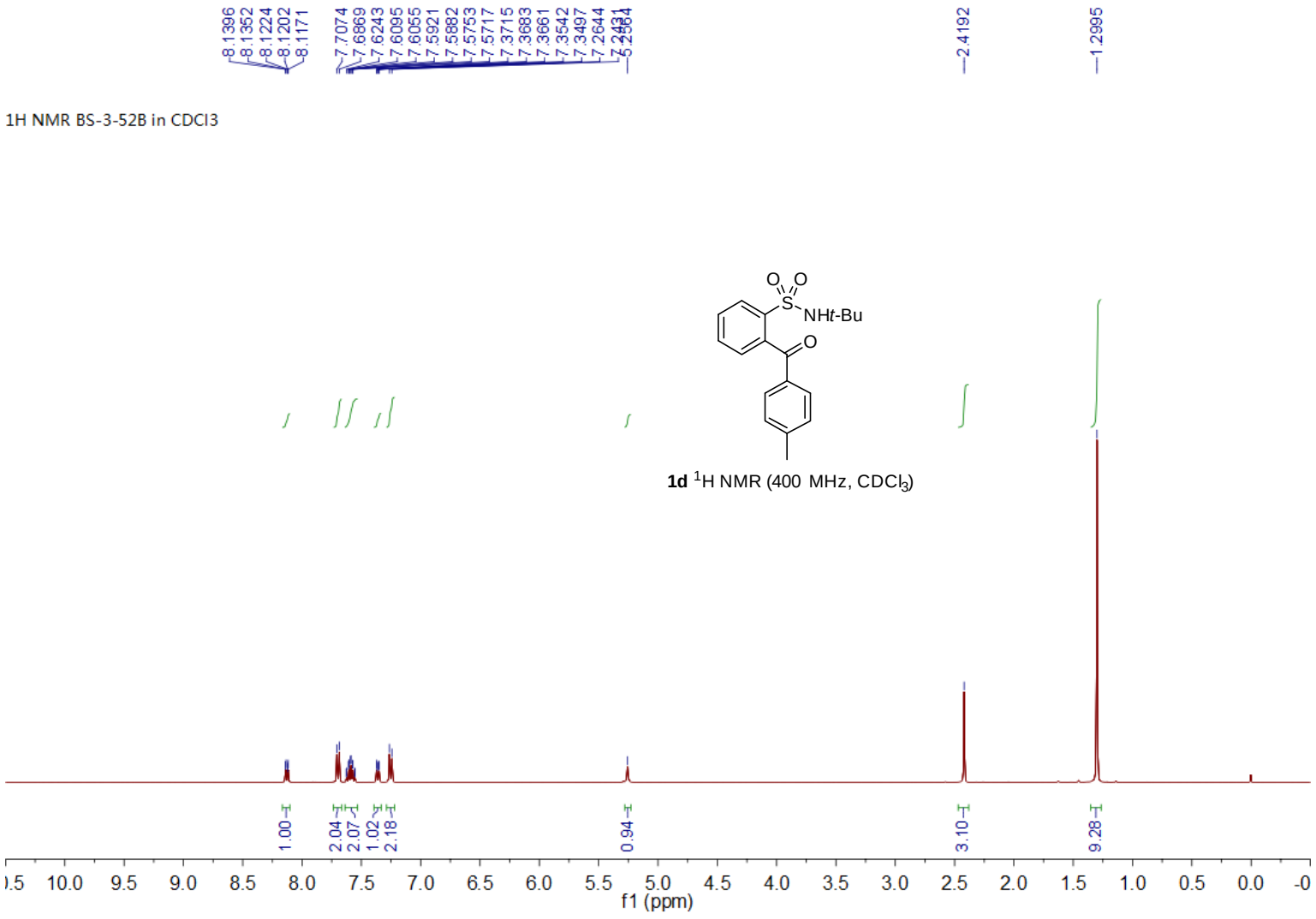




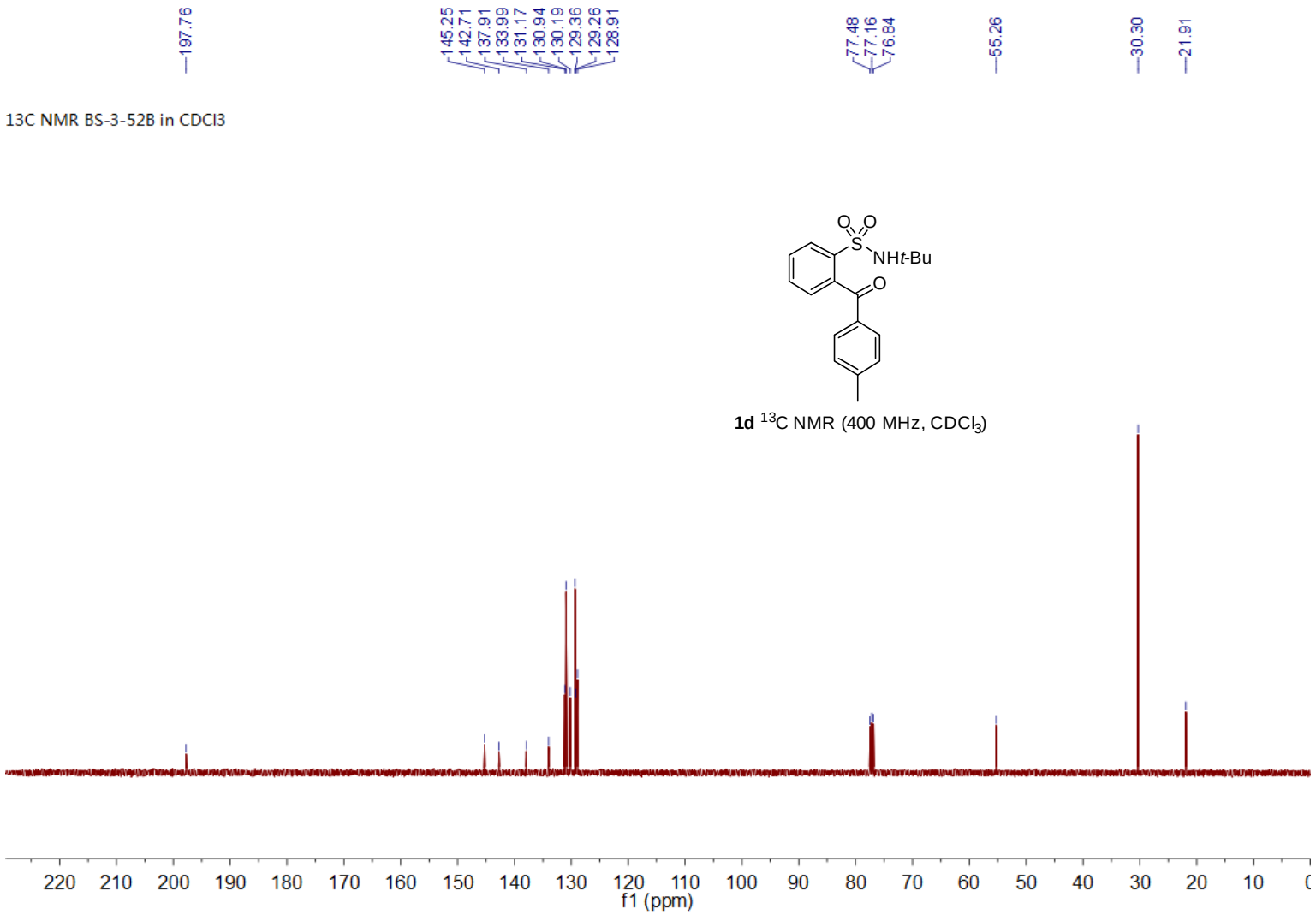
1c ^{1}H NMR (400 MHz, $CDCl_3$)



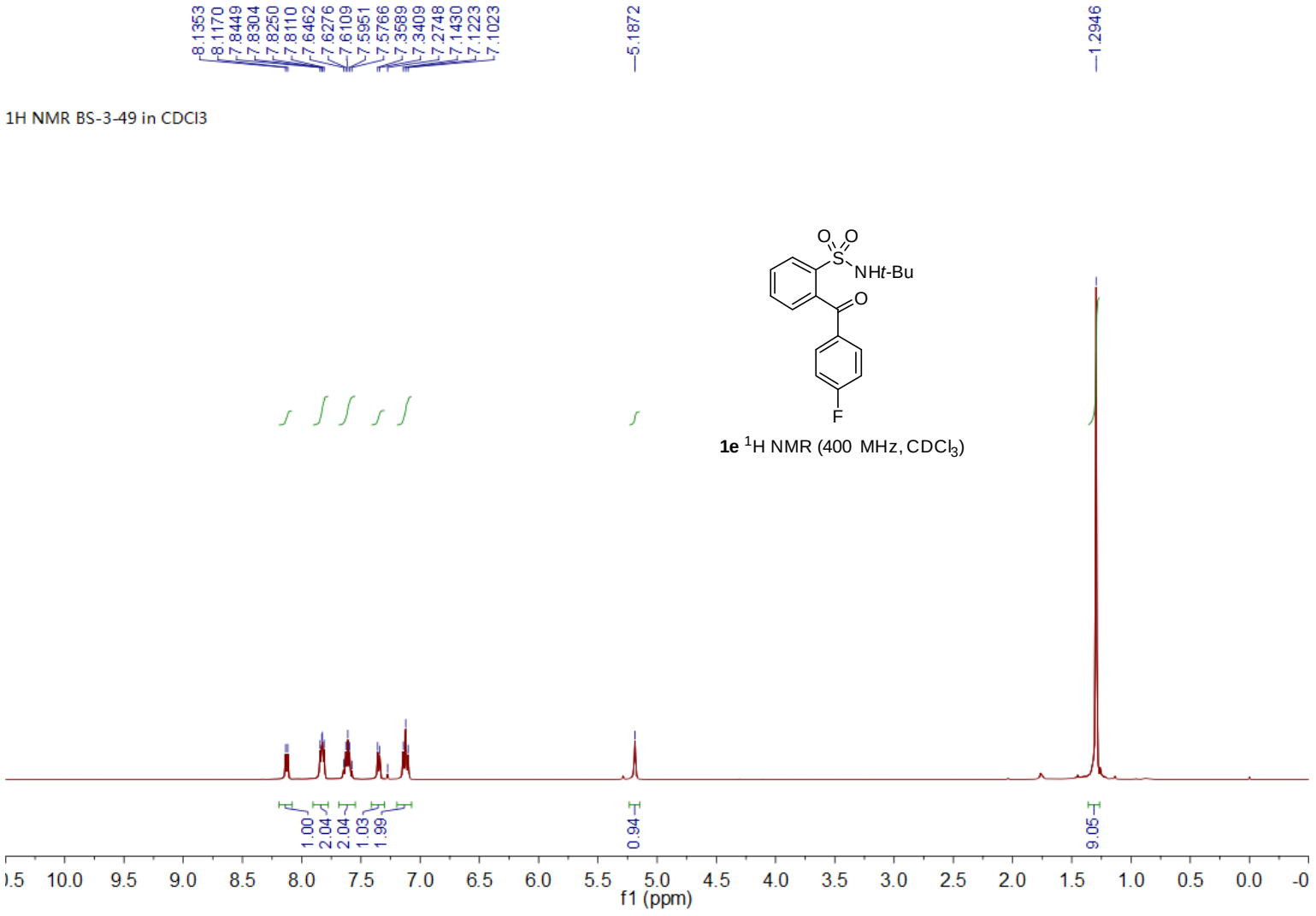
1c ^{13}C NMR (100 MHz, $CDCl_3$)



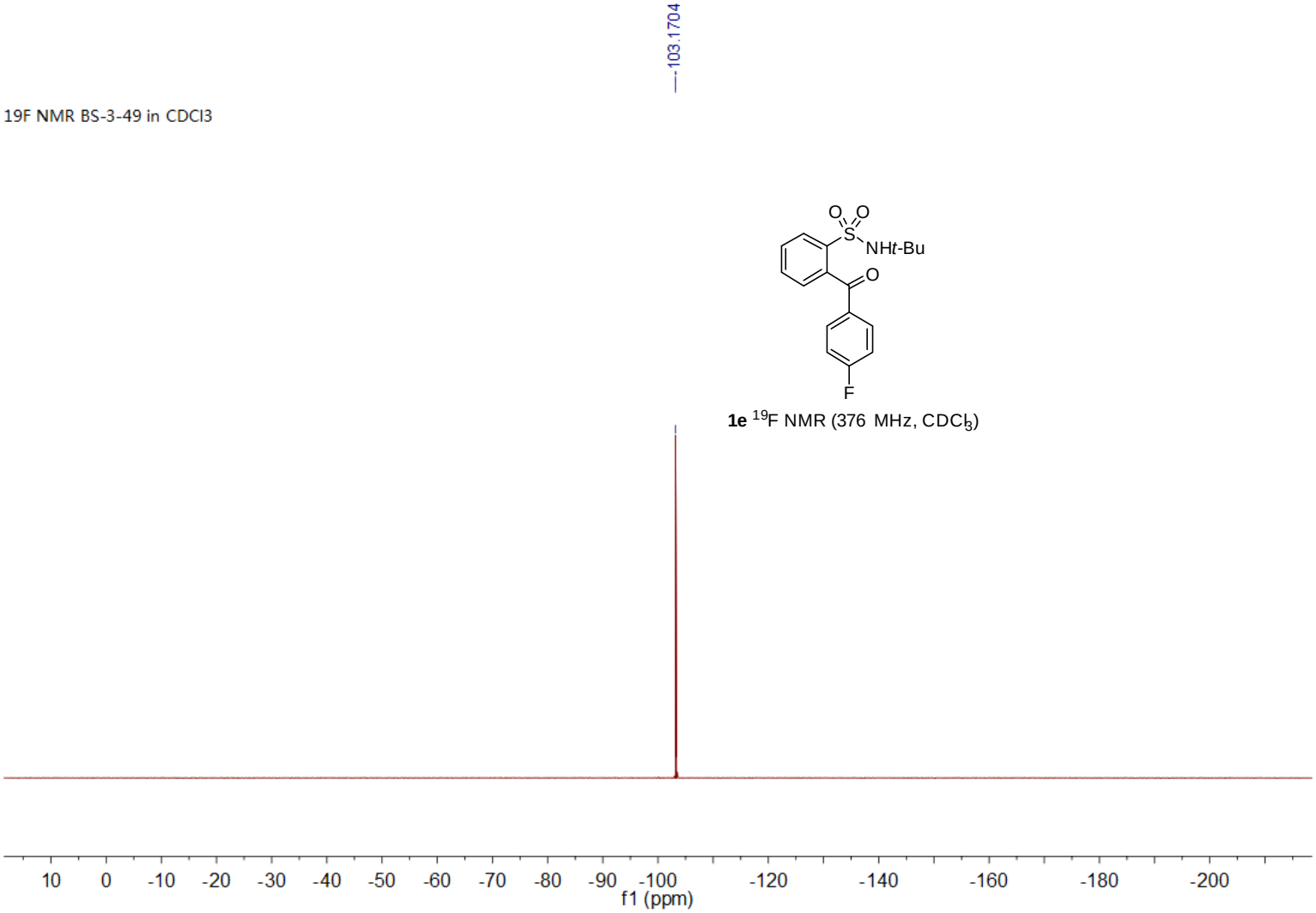
1d ^{1}H NMR (400 MHz, $CDCl_3$)



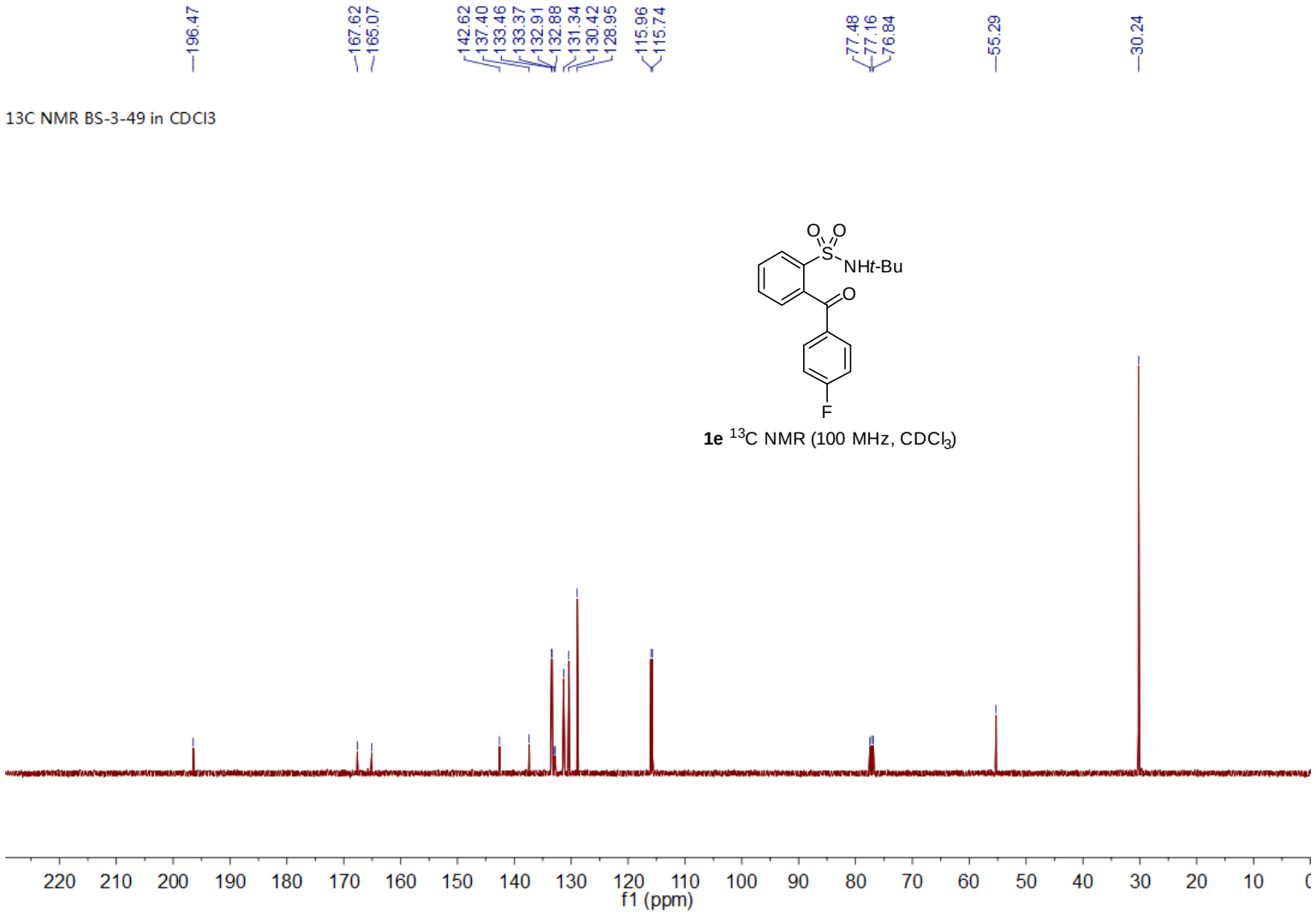
1d ^{13}C NMR (400 MHz, $CDCl_3$)



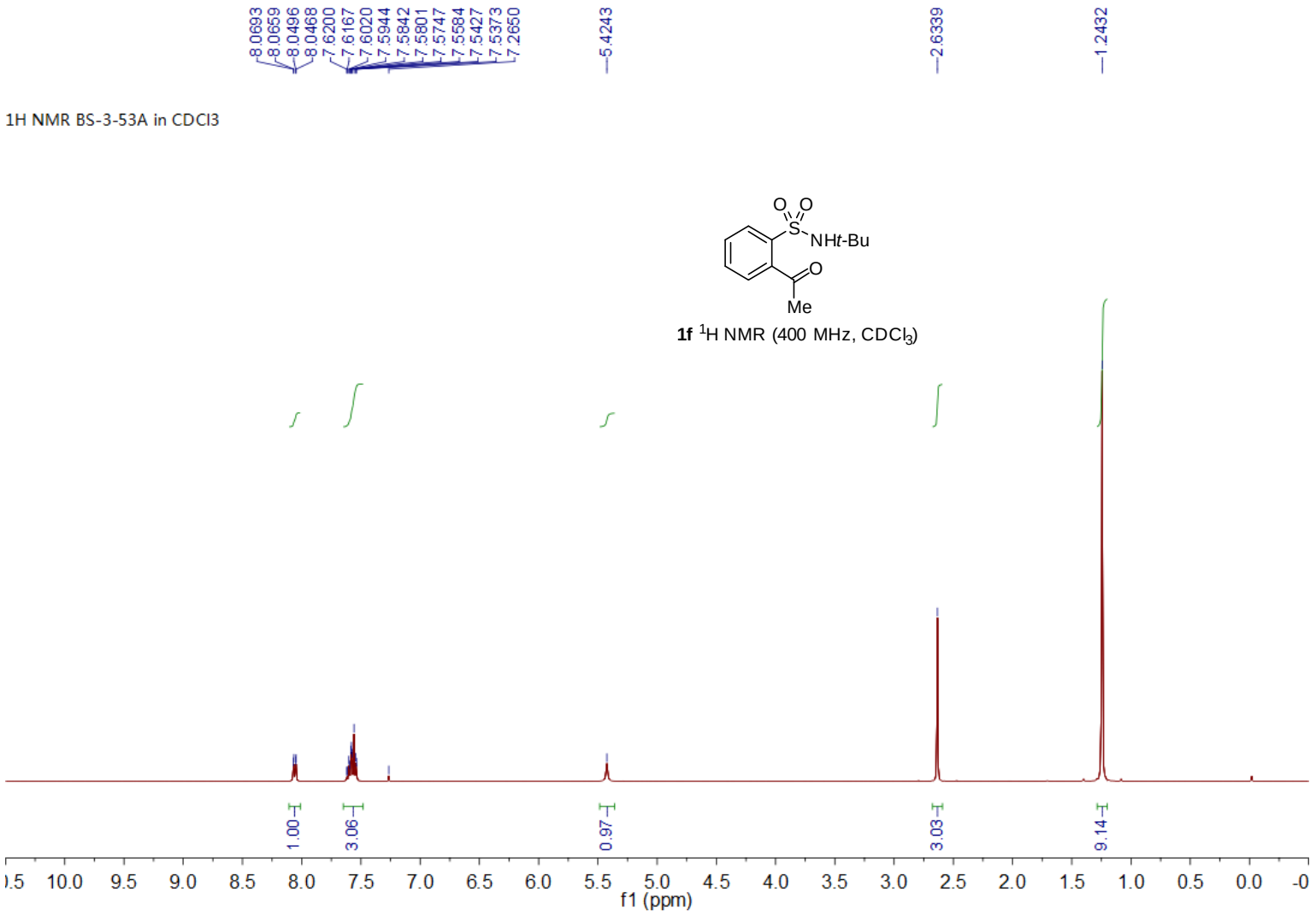
1e ^{1}H NMR (400 MHz, $CDCl_3$)

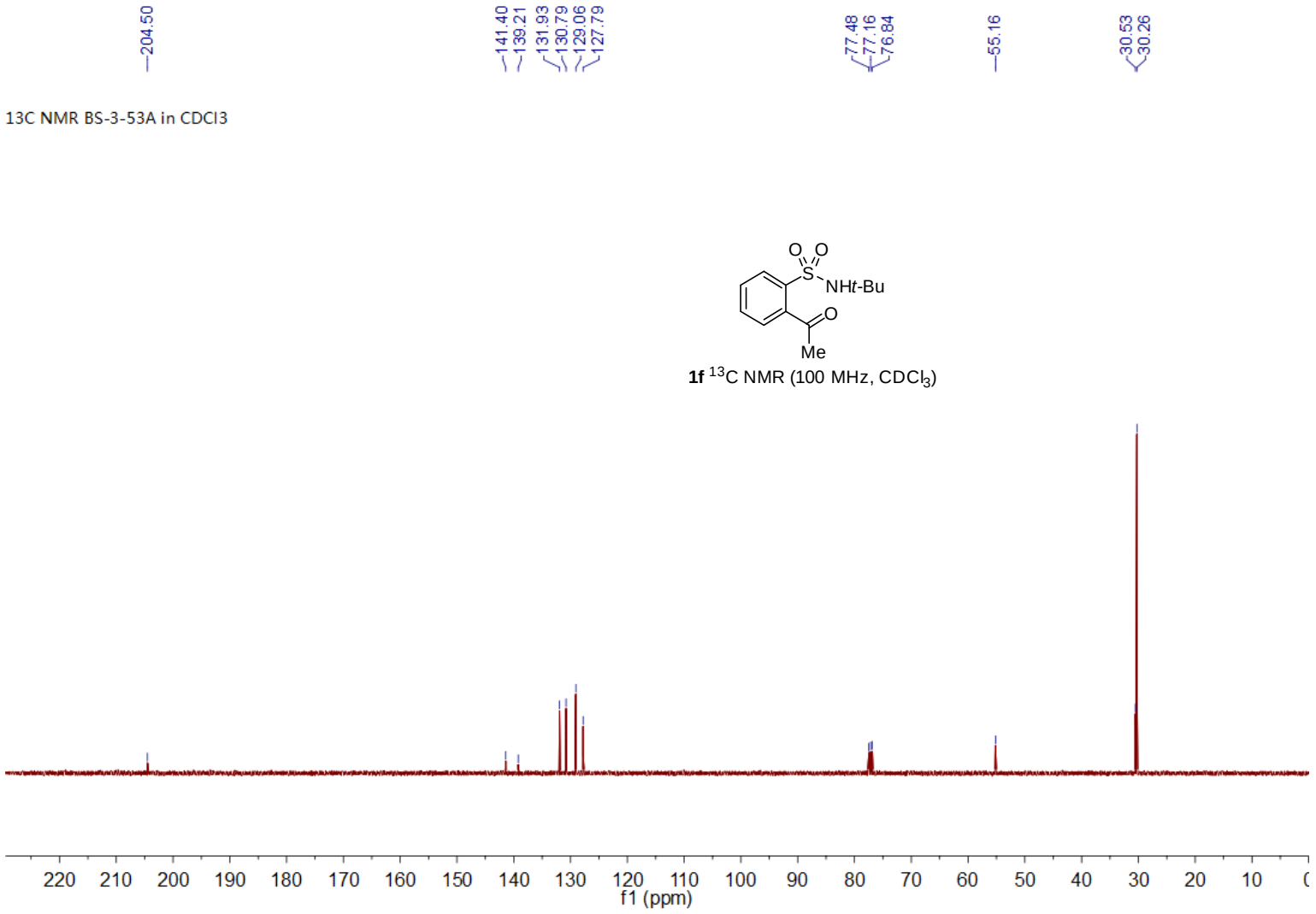


1e ^{19}F NMR (376 MHz, $CDCl_3$)



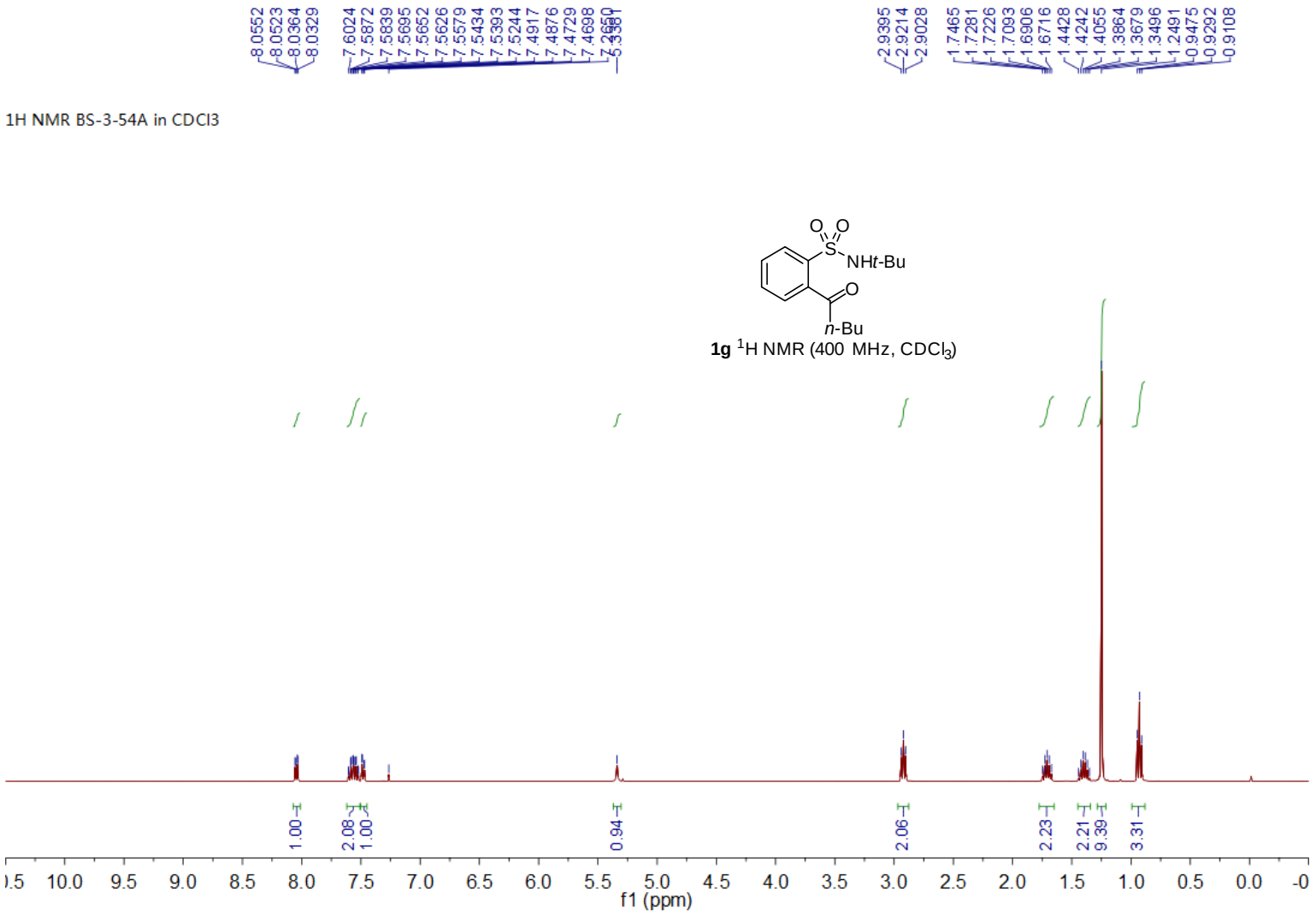
1e ^{13}C NMR (100 MHz, $CDCl_3$)


8.0693
8.0659
8.0496
8.0468
7.6200
7.6167
7.6020
7.5944
7.5842
7.5801
7.5747
7.5584
7.5427
7.5373
7.2650
5.4243
2.6339
1.2432
1H NMR BS-3-53A in CDCl3
O
O
S
NHt-Bu
O
Me
1f 1H NMR (400 MHz, CDCl3)
1.00
3.06
0.97
3.03
9.14
f1 (ppm)

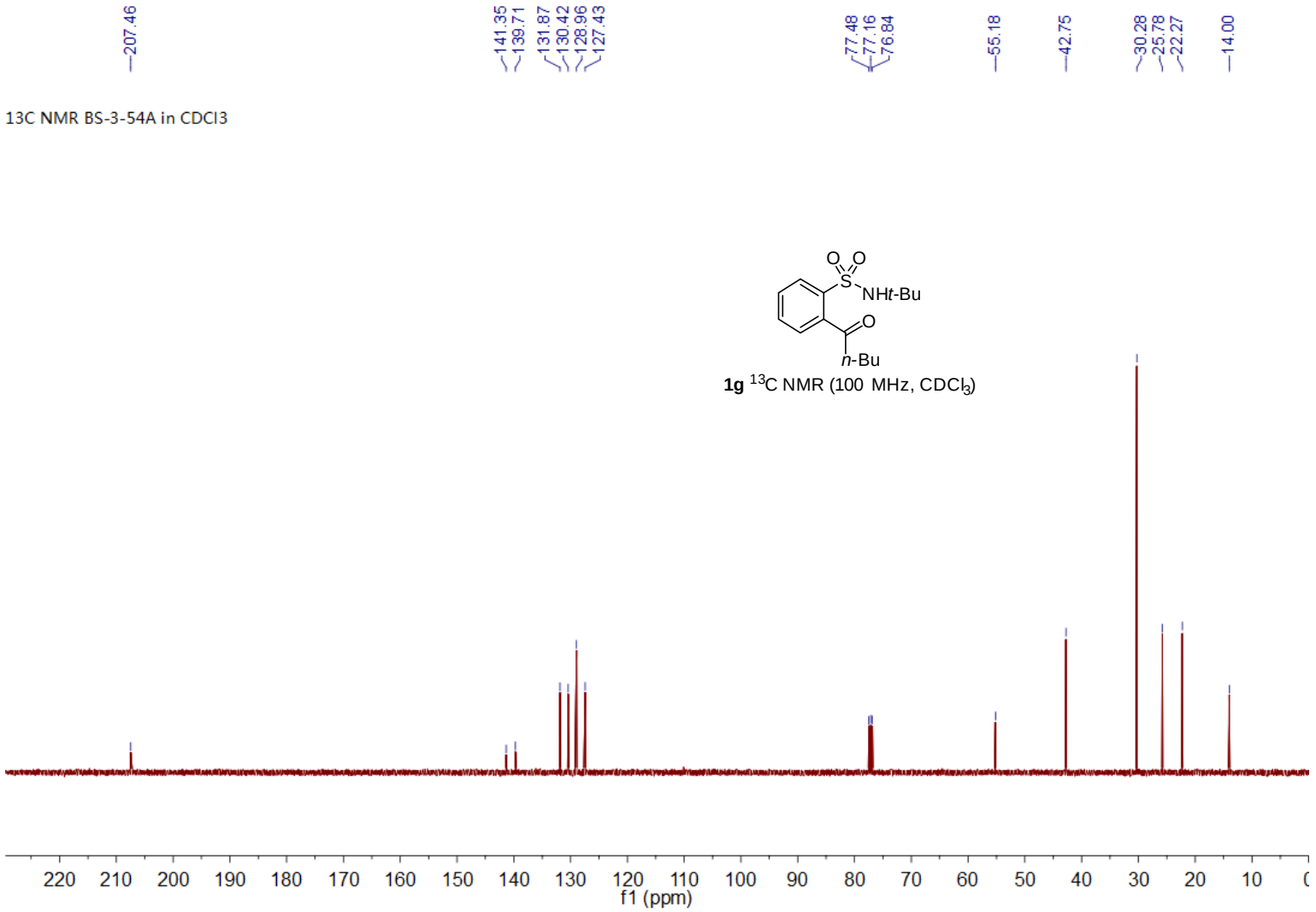


1f ^{13}C NMR (100 MHz, $CDCl_3$)

1H NMR BS-3-54A in CDCl3

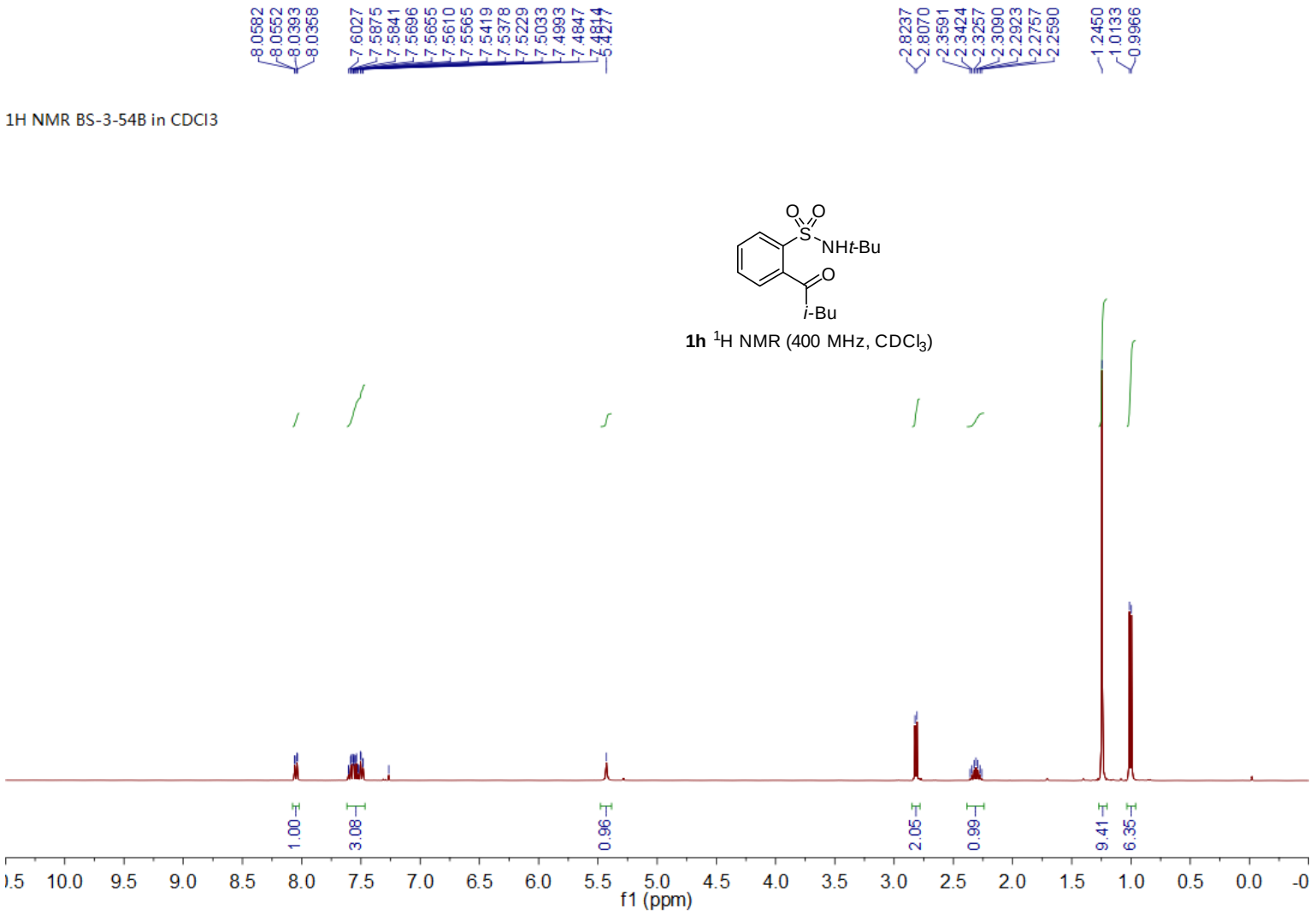


1g ^{1}H NMR (400 MHz, $CDCl_3$)



1g ^{13}C NMR (100 MHz, $CDCl_3$)

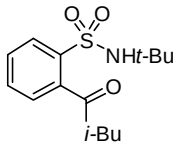
1H NMR BS-3-54B in CDCl3



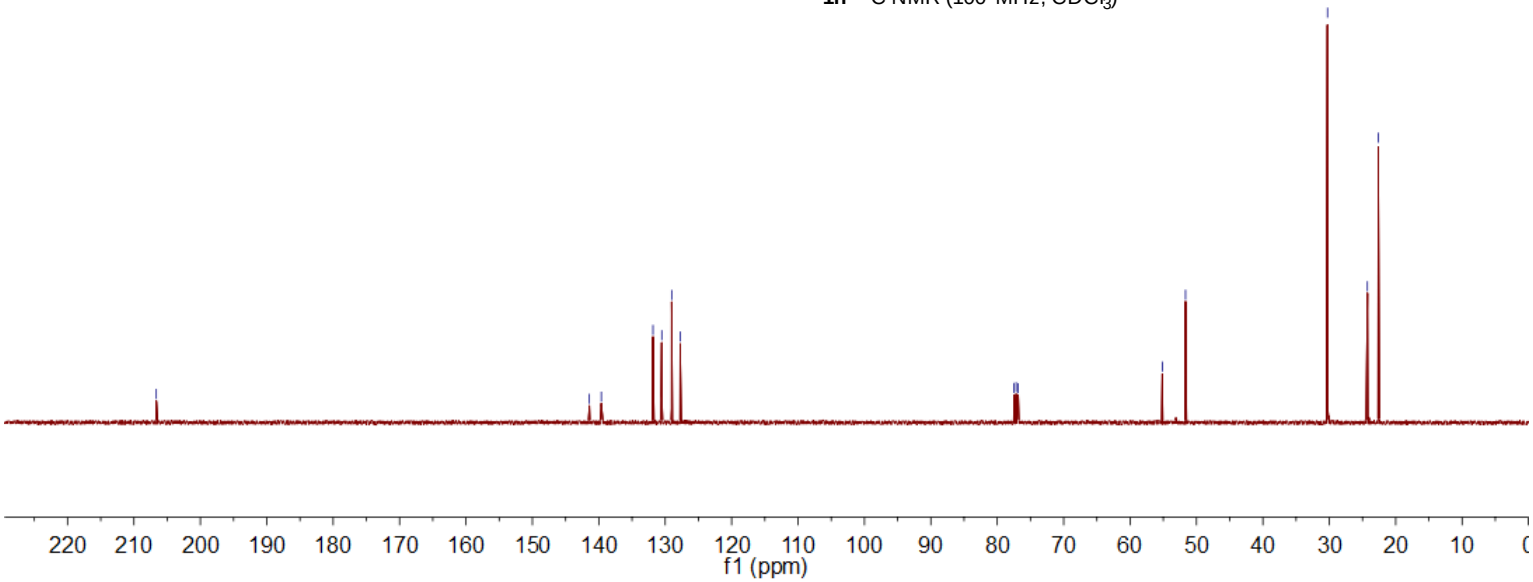
1h ^{1}H NMR (400 MHz, $CDCl_3$)

206.63
141.42
139.63
131.84
130.52
129.03
127.75
77.48
77.16
76.84
55.15
51.65
30.27
24.26
22.63

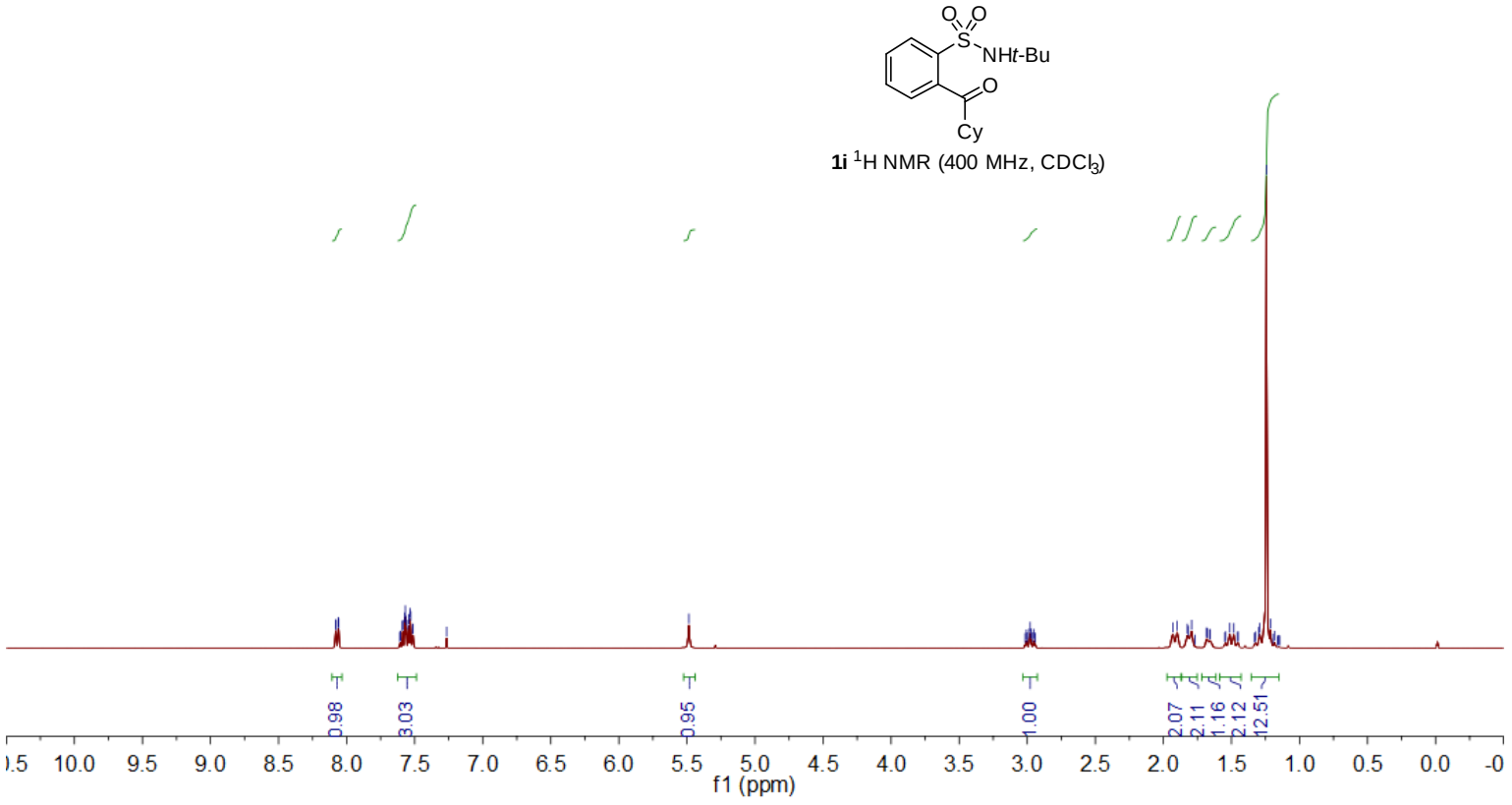
13C NMR BS-3-54B in CDCl3



1h ^{13}C NMR (100 MHz, $CDCl_3$)



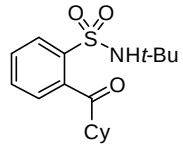
1H NMR BS-3-53B in CDCl3



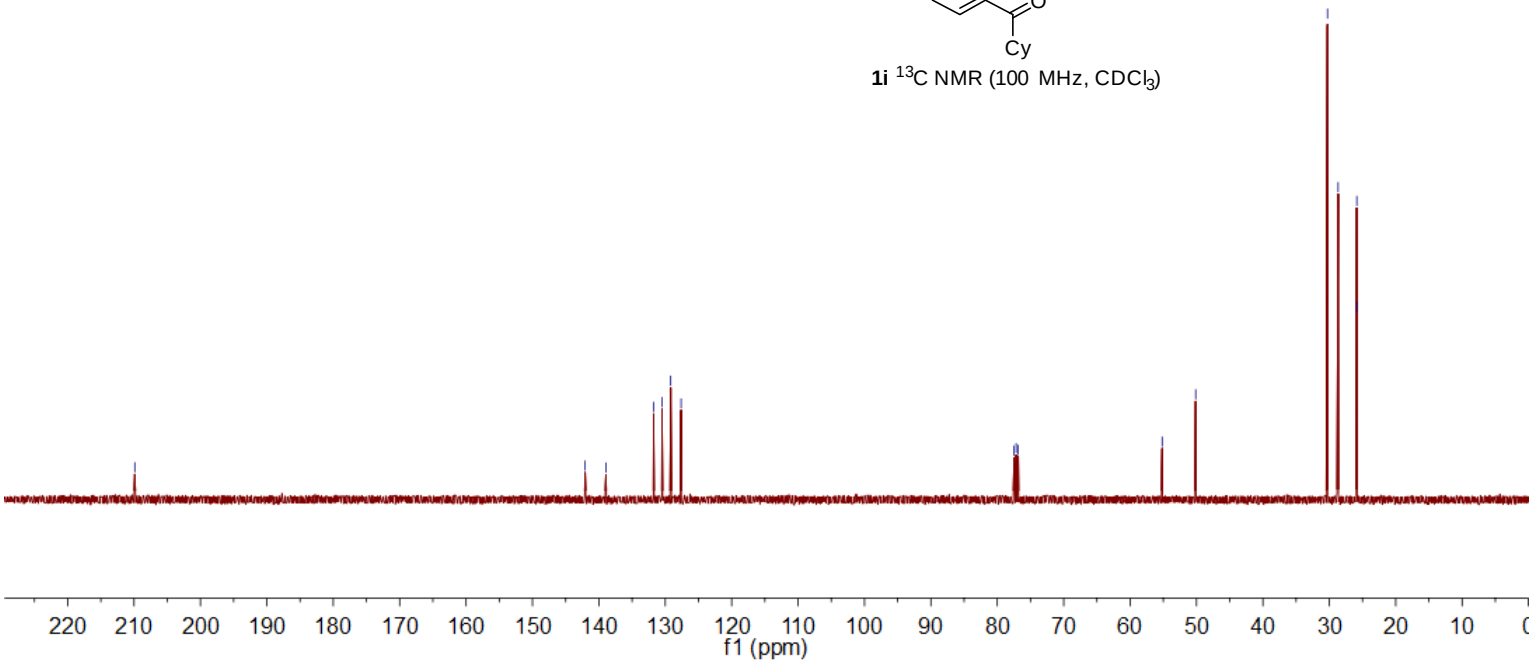
1i ^{1}H NMR (400 MHz, $CDCl_3$)

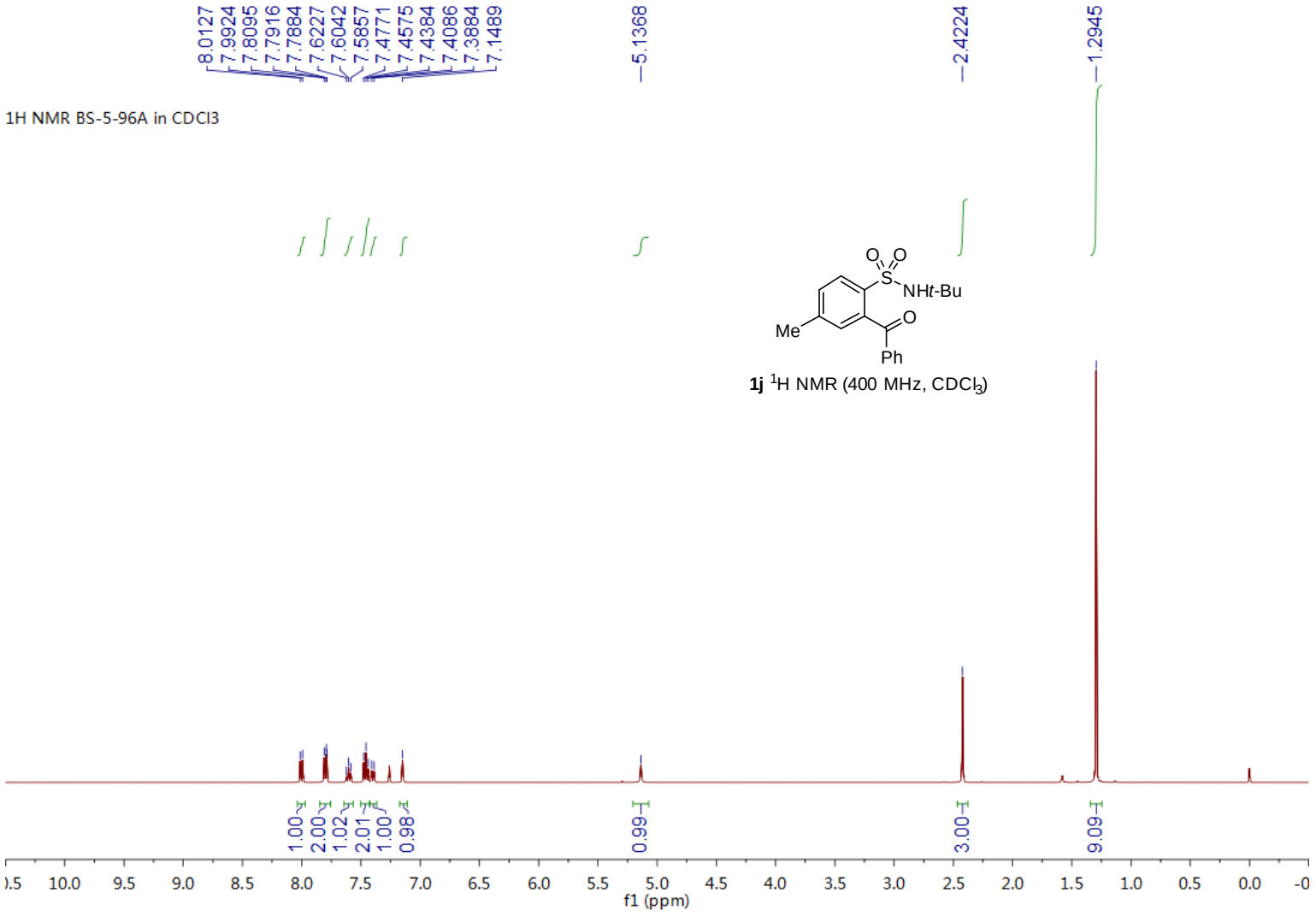
209.89
142.06
138.94
131.75
130.49
129.18
127.62
77.48
77.16
76.84
55.17
50.12
30.28
28.67
25.86
25.85

13C NMR BS-3-53B in CDCl3

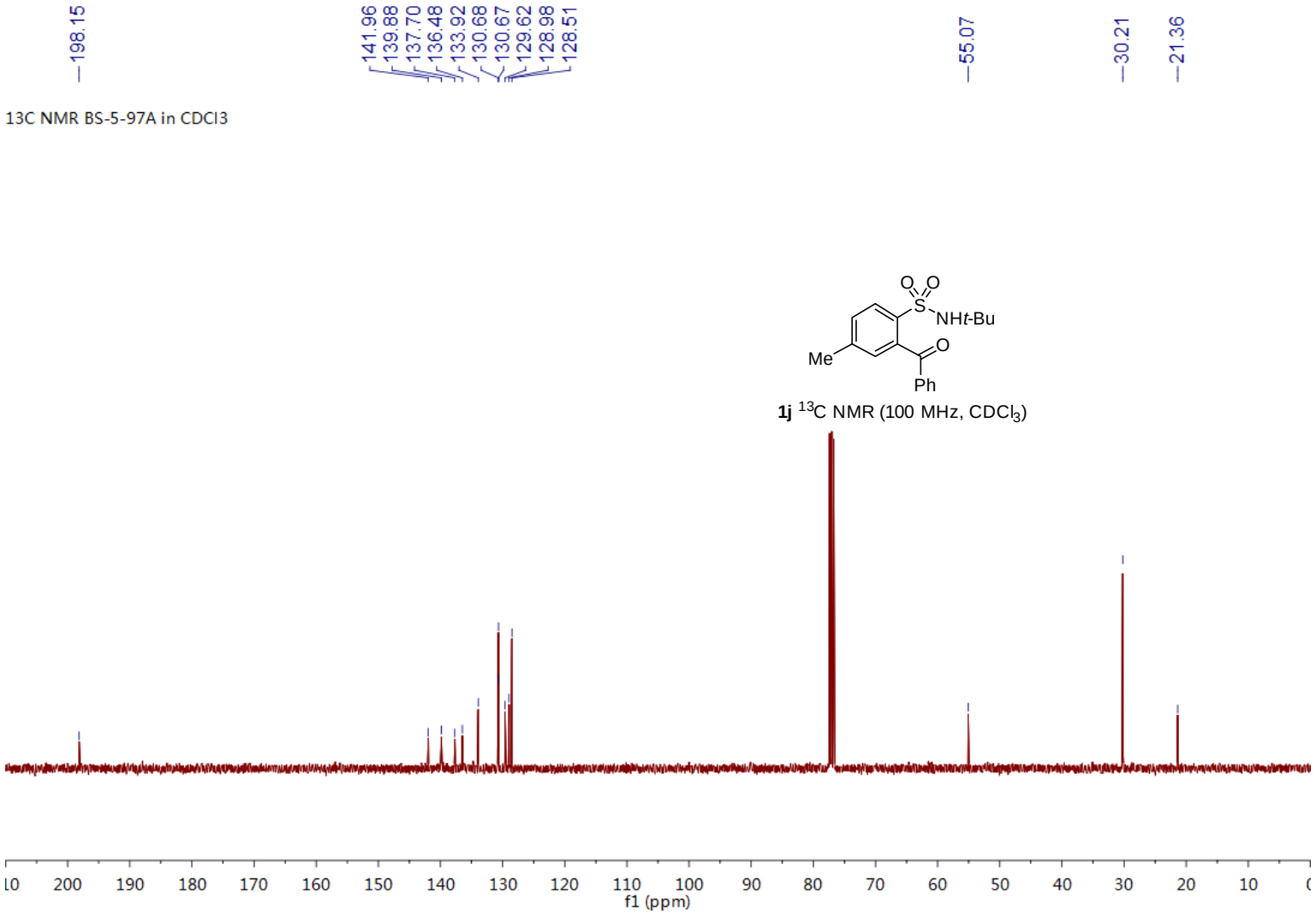


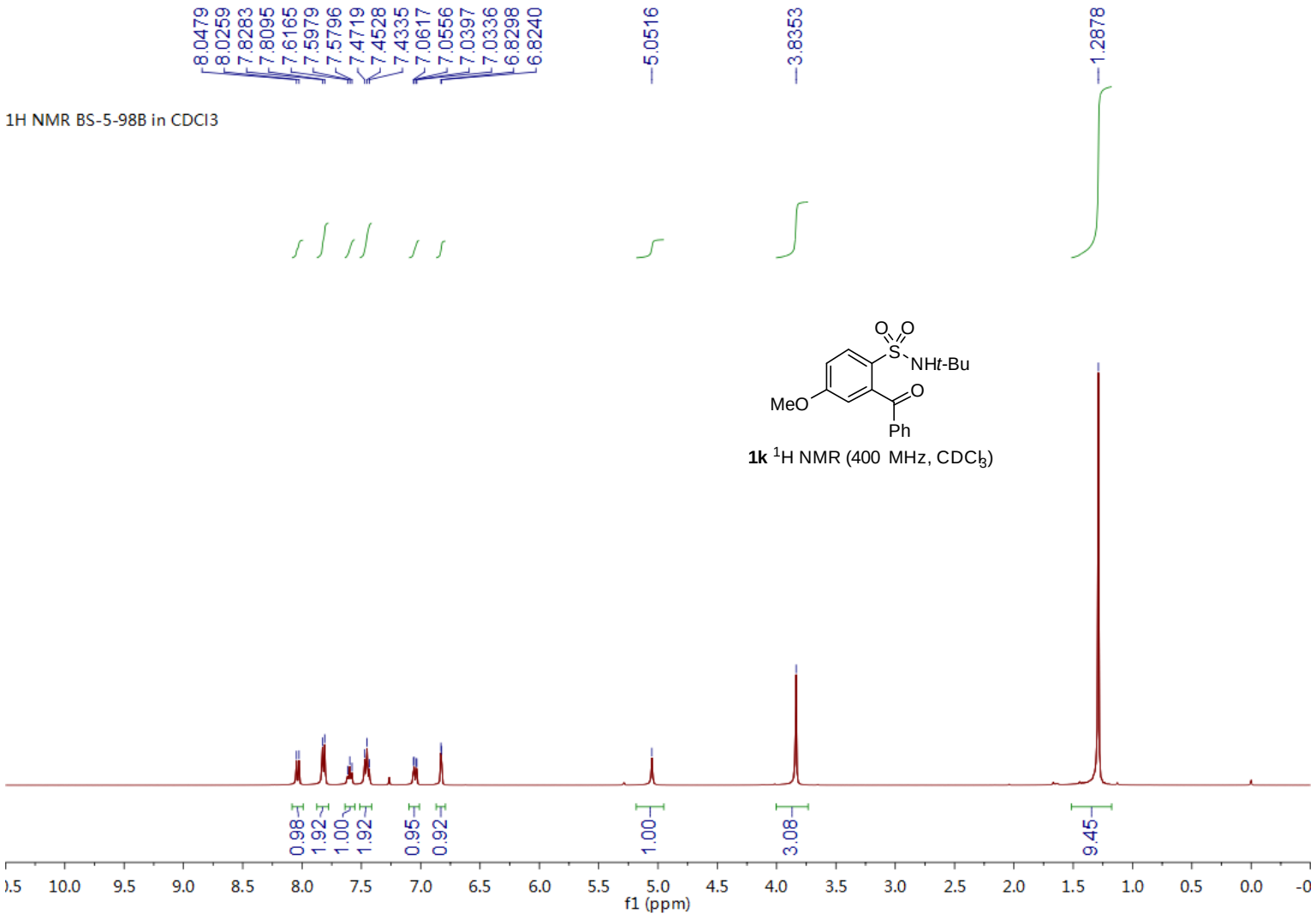
1i ^{13}C NMR (100 MHz, $CDCl_3$)



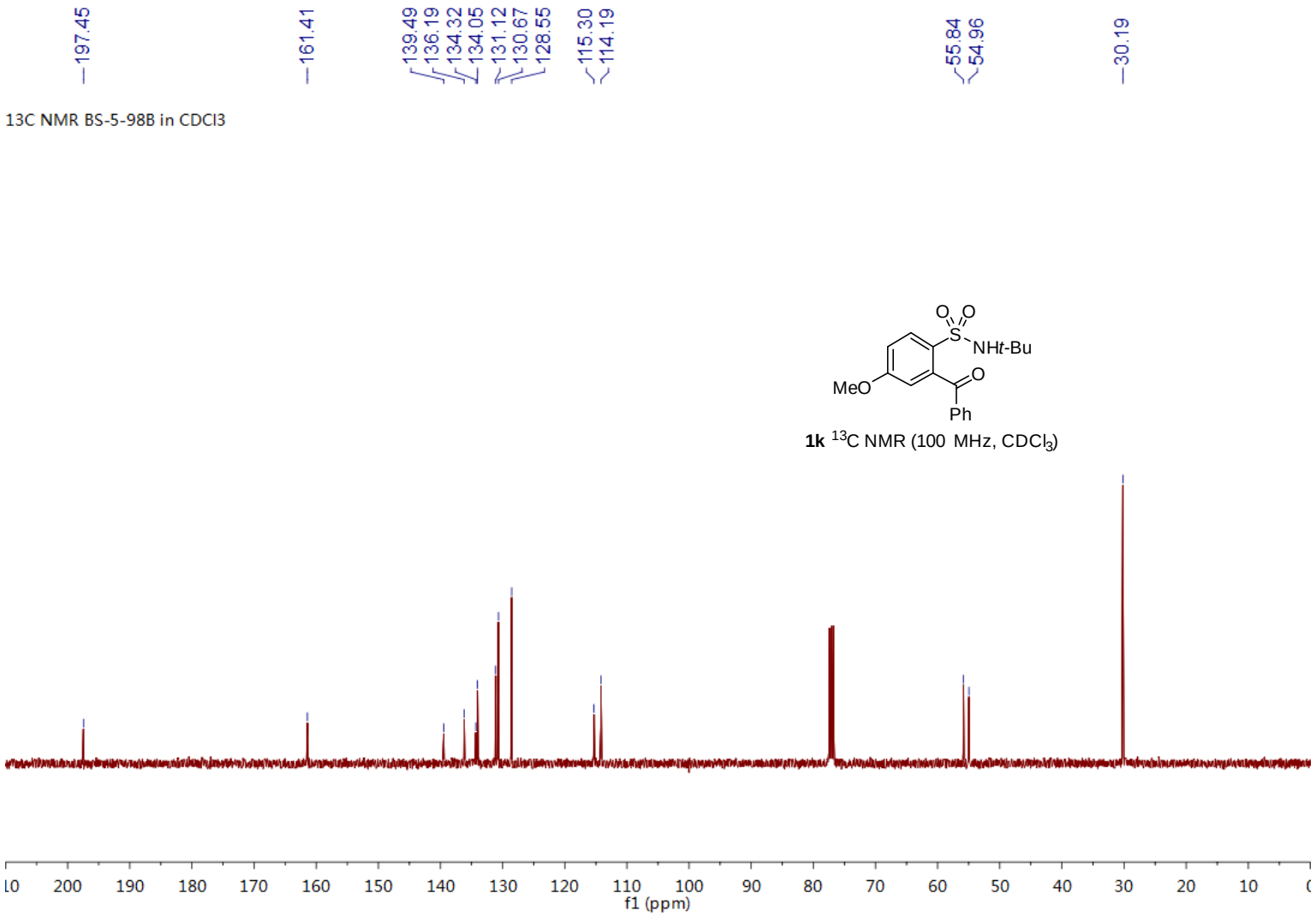


1j ^{1}H NMR (400 MHz, $CDCl_3$)

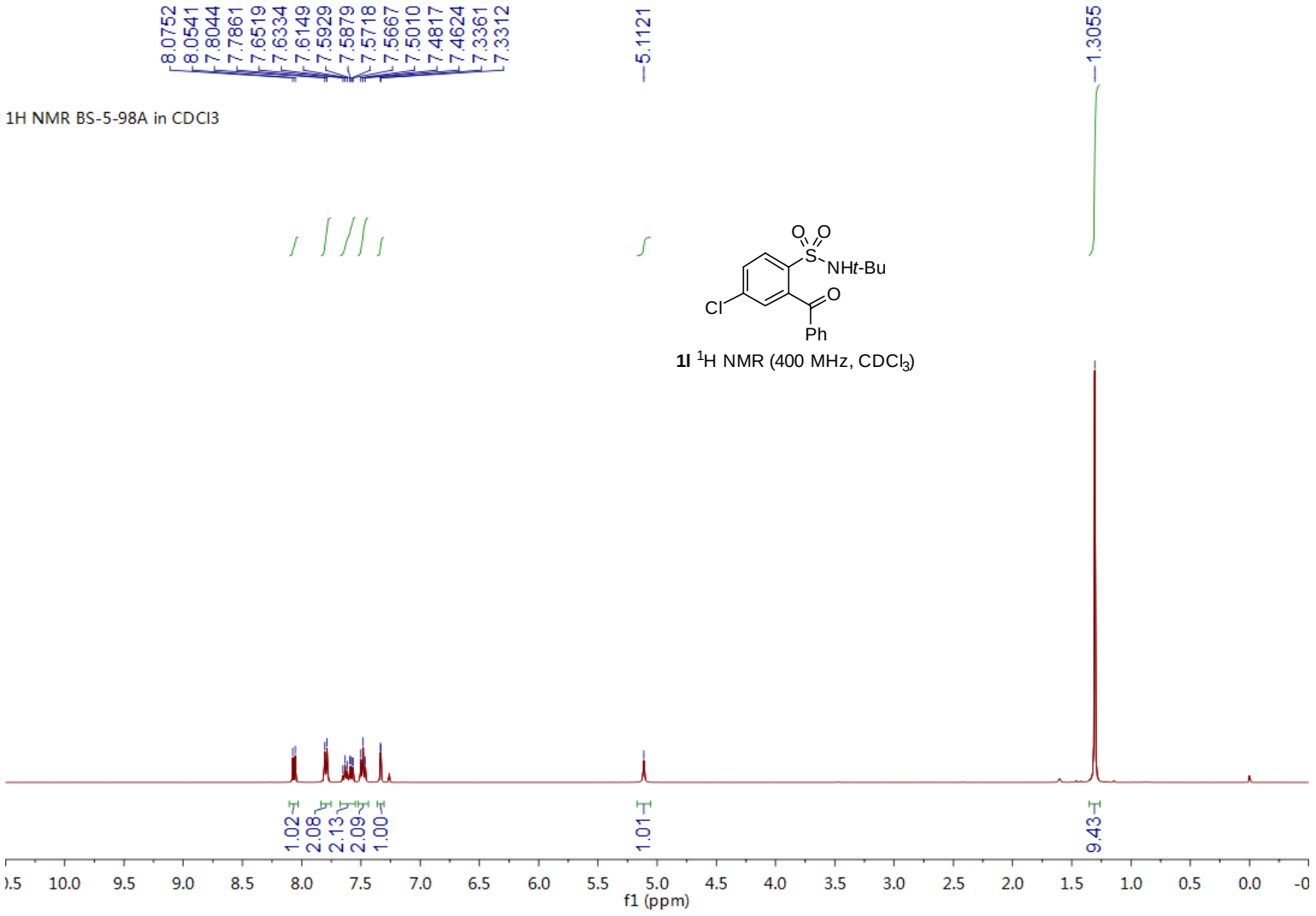

198.15
141.96
139.88
137.70
136.48
133.92
130.68
130.67
129.62
128.98
128.51
55.07
30.21
21.36
13C NMR BS-5-97A in CDCl3
O
O
S
NHt-Bu
Me
O
Ph
1j 13C NMR (100 MHz, CDCl3)
f1 (ppm)



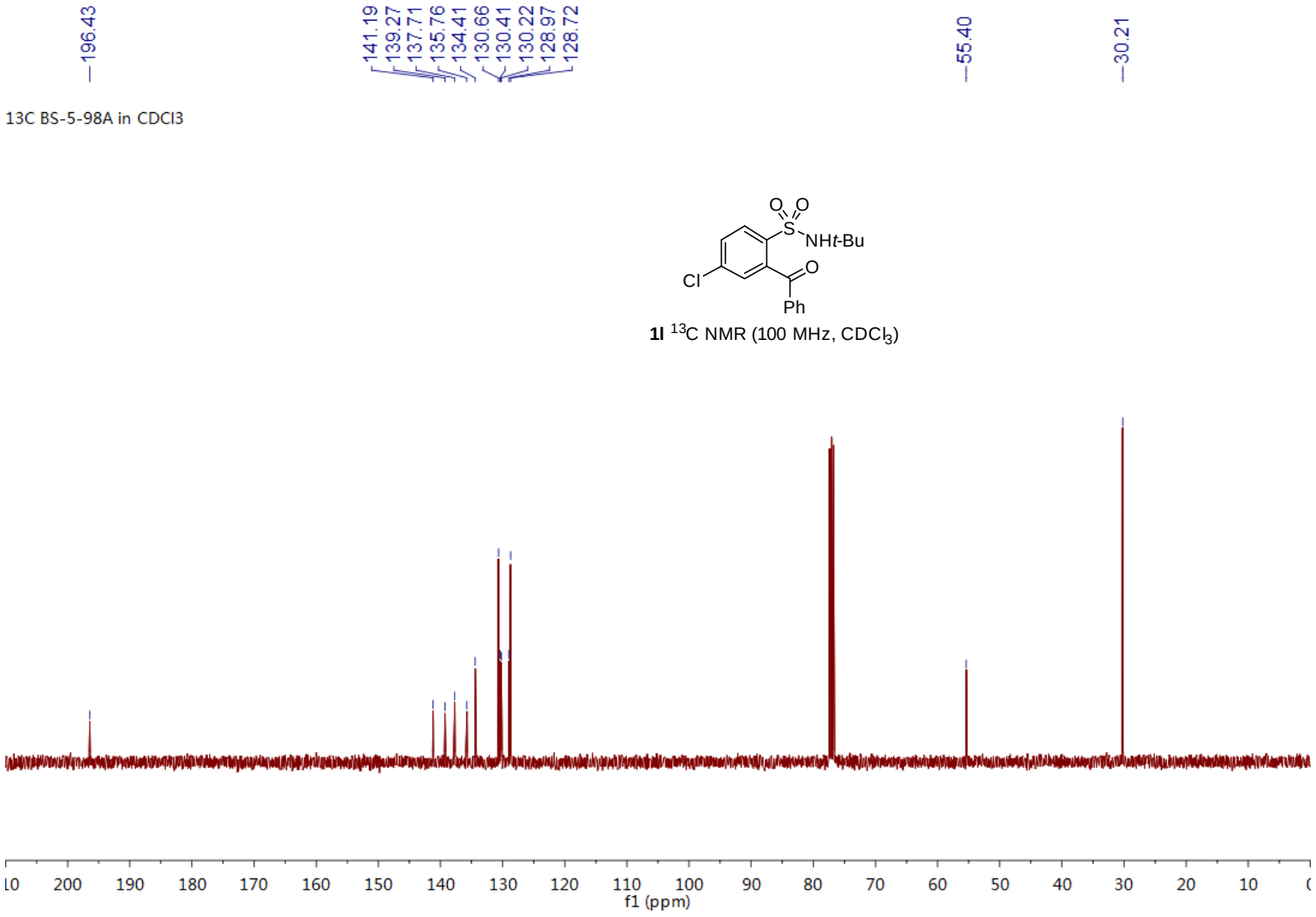
1k ^{1}H NMR (400 MHz, $CDCl_3$)



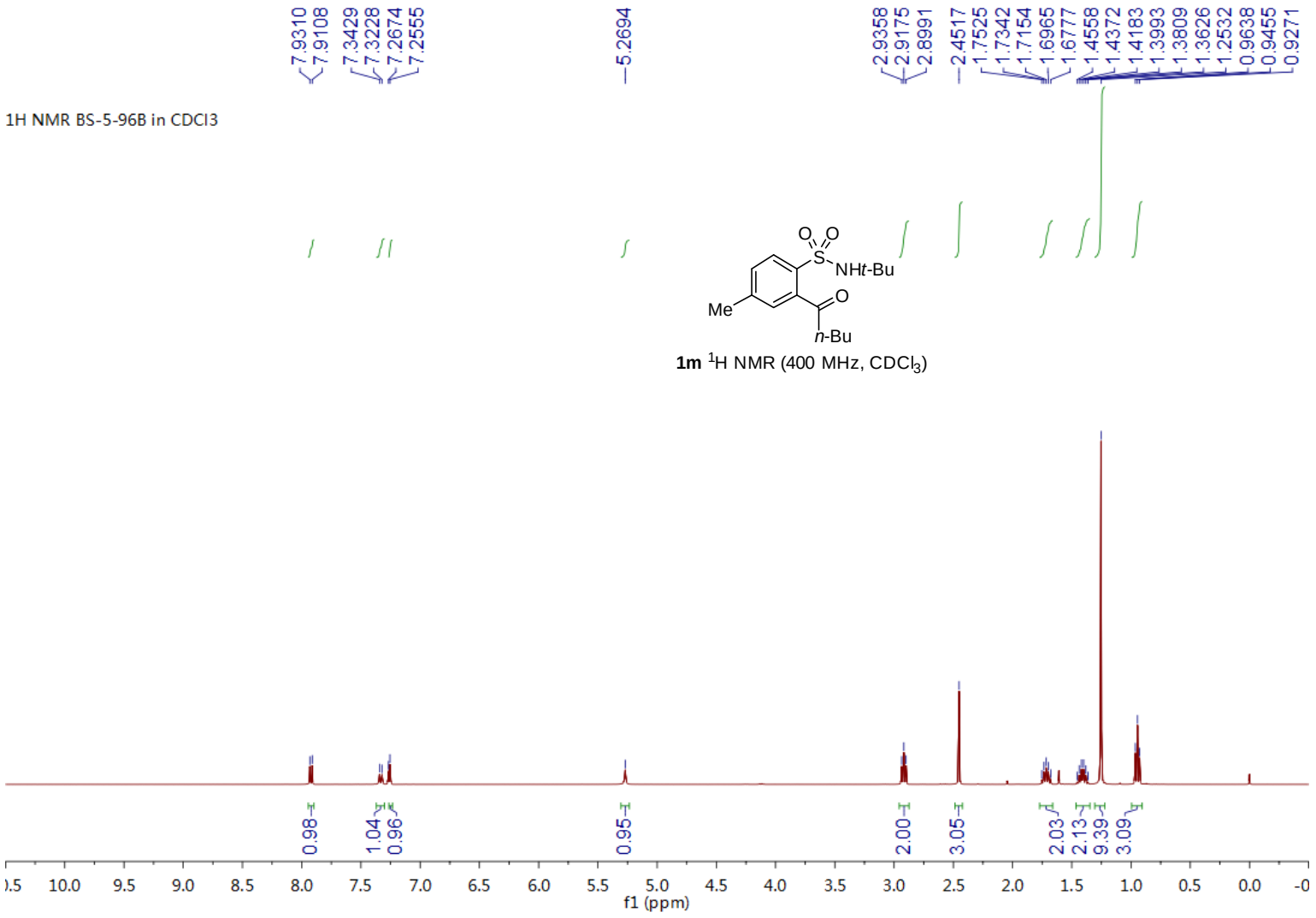
1k ^{13}C NMR (100 MHz, $CDCl_3$)



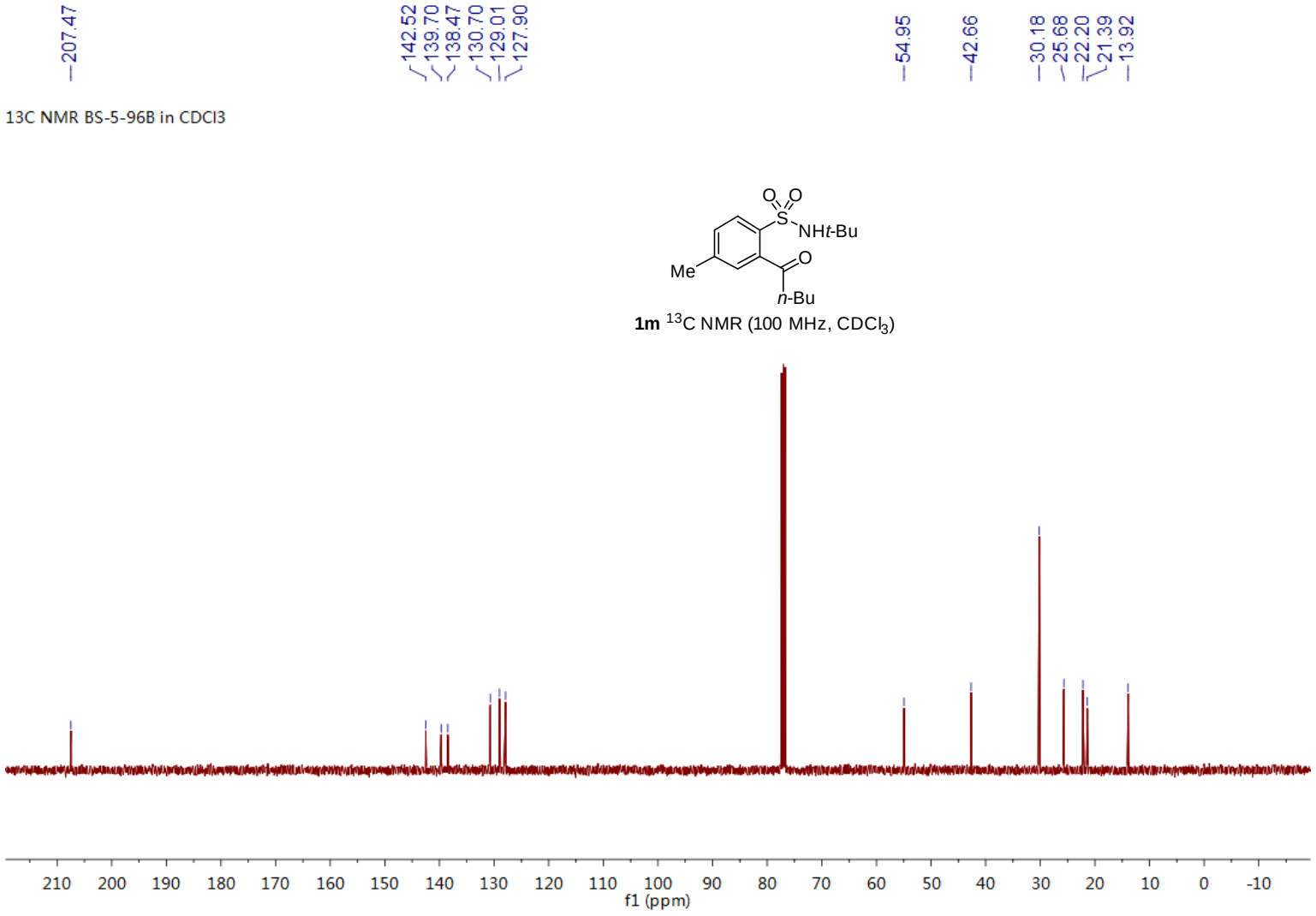
1l ^{1}H NMR (400 MHz, $CDCl_3$)



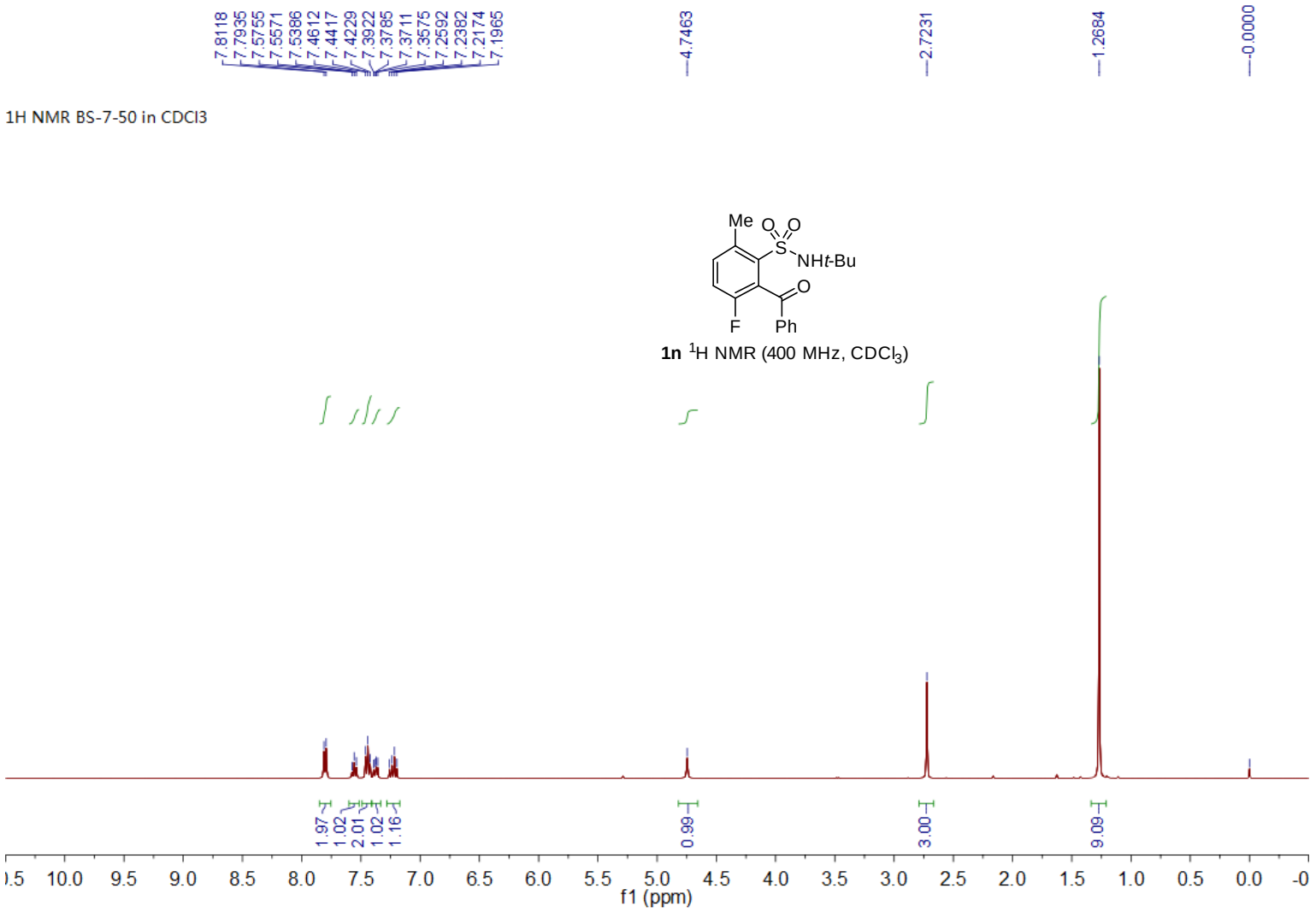
1l ^{13}C NMR (100 MHz, $CDCl_3$)



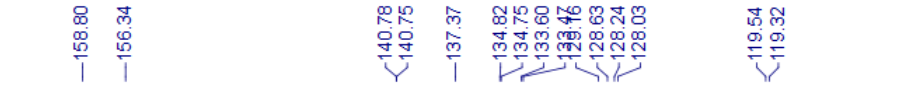
1m ^{1}H NMR (400 MHz, $CDCl_3$)

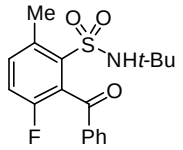


1m ^{13}C NMR (100 MHz, $CDCl_3$)

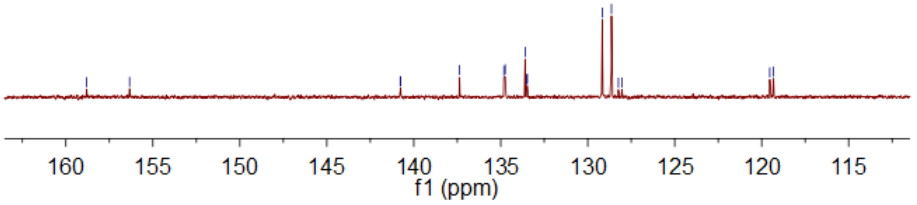

7.8118
7.7935
7.5755
7.5571
7.5386
7.4612
7.4417
7.4229
7.3922
7.3785
7.3711
7.3575
7.2592
7.2382
7.2174
7.1965
4.7463
2.7231
1.2684
0.0000
1H NMR BS-7-50 in CDCl3
Me
O
O
S
NHt-Bu
O
F
Ph
1n 1H NMR (400 MHz, CDCl3)
1.97
1.02
2.01
1.02
1.16
0.99
3.00
9.09
f1 (ppm)

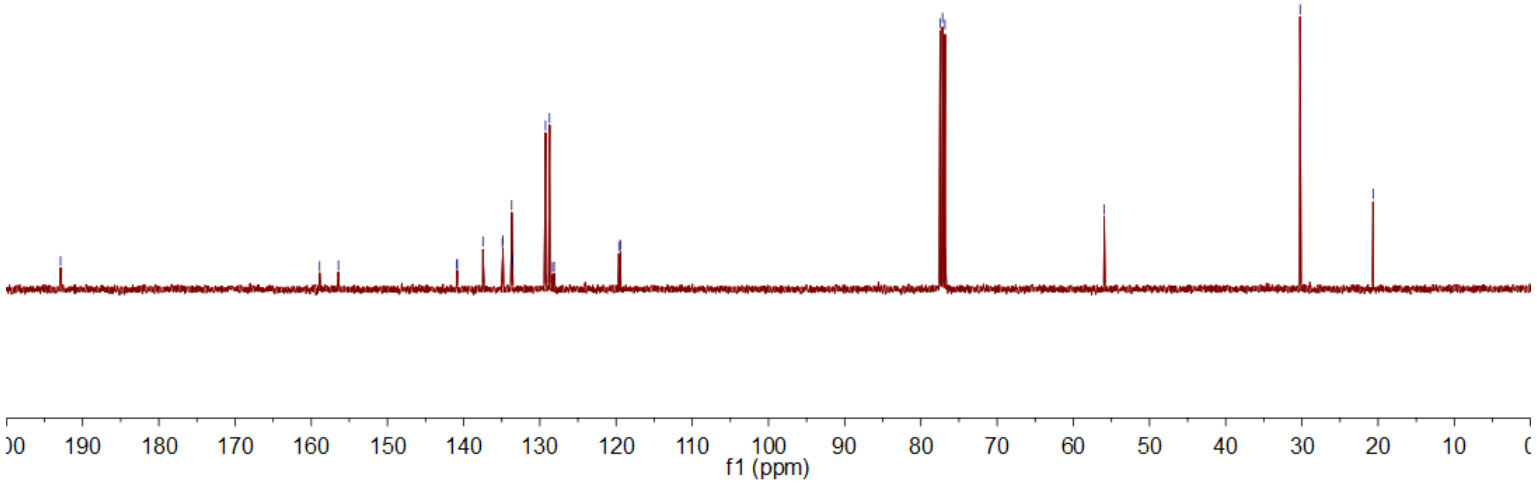
13C NMR BS-7-50 in CDCl3



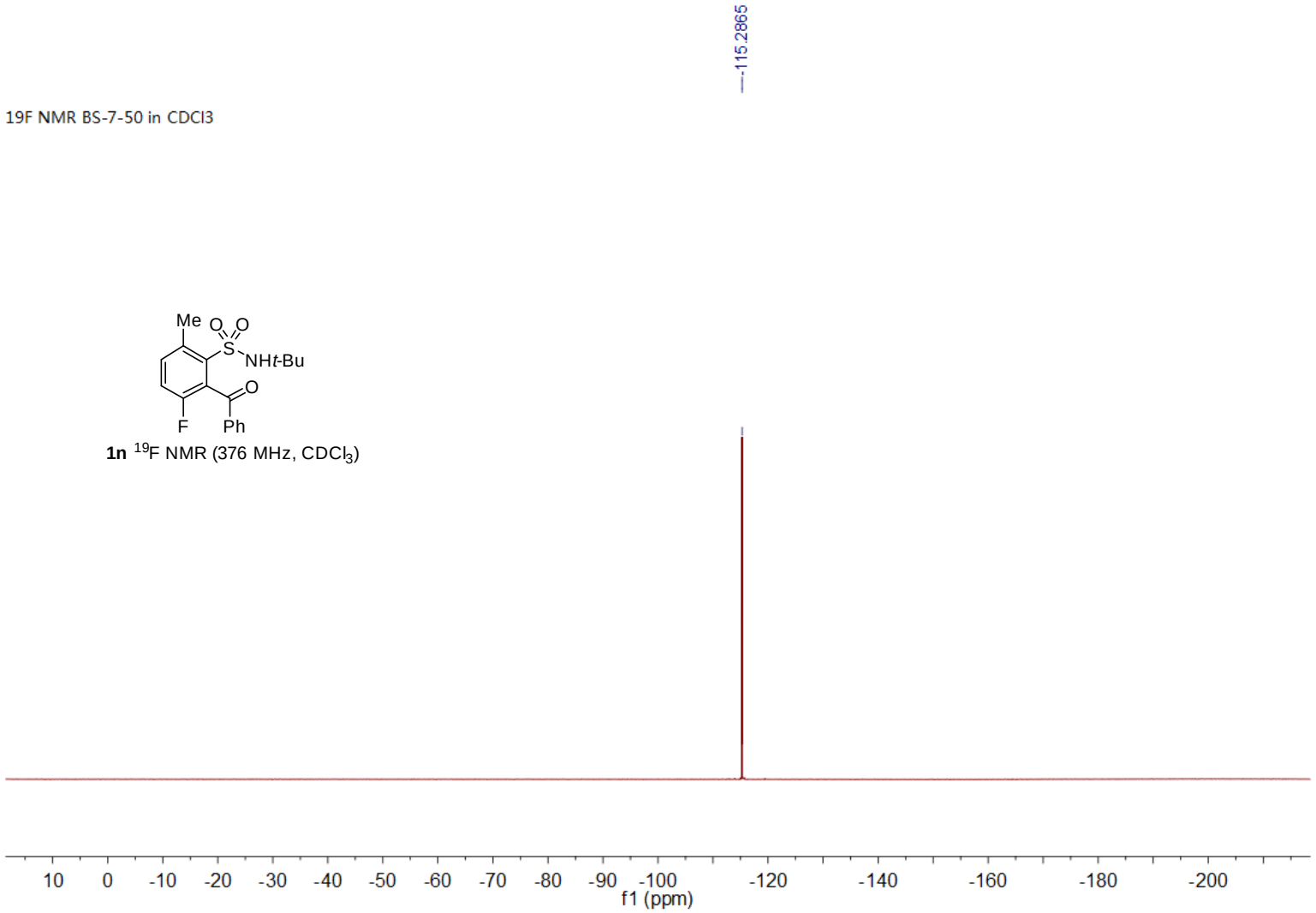


1n ^{13}C NMR (100 MHz, $CDCl_3$)

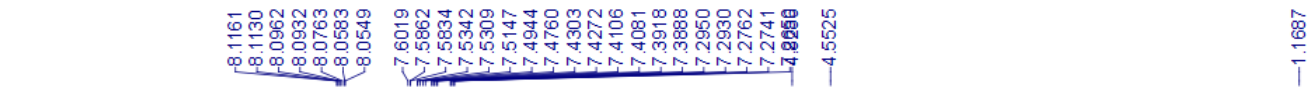




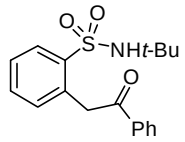
19F NMR BS-7-50 in CDCl3



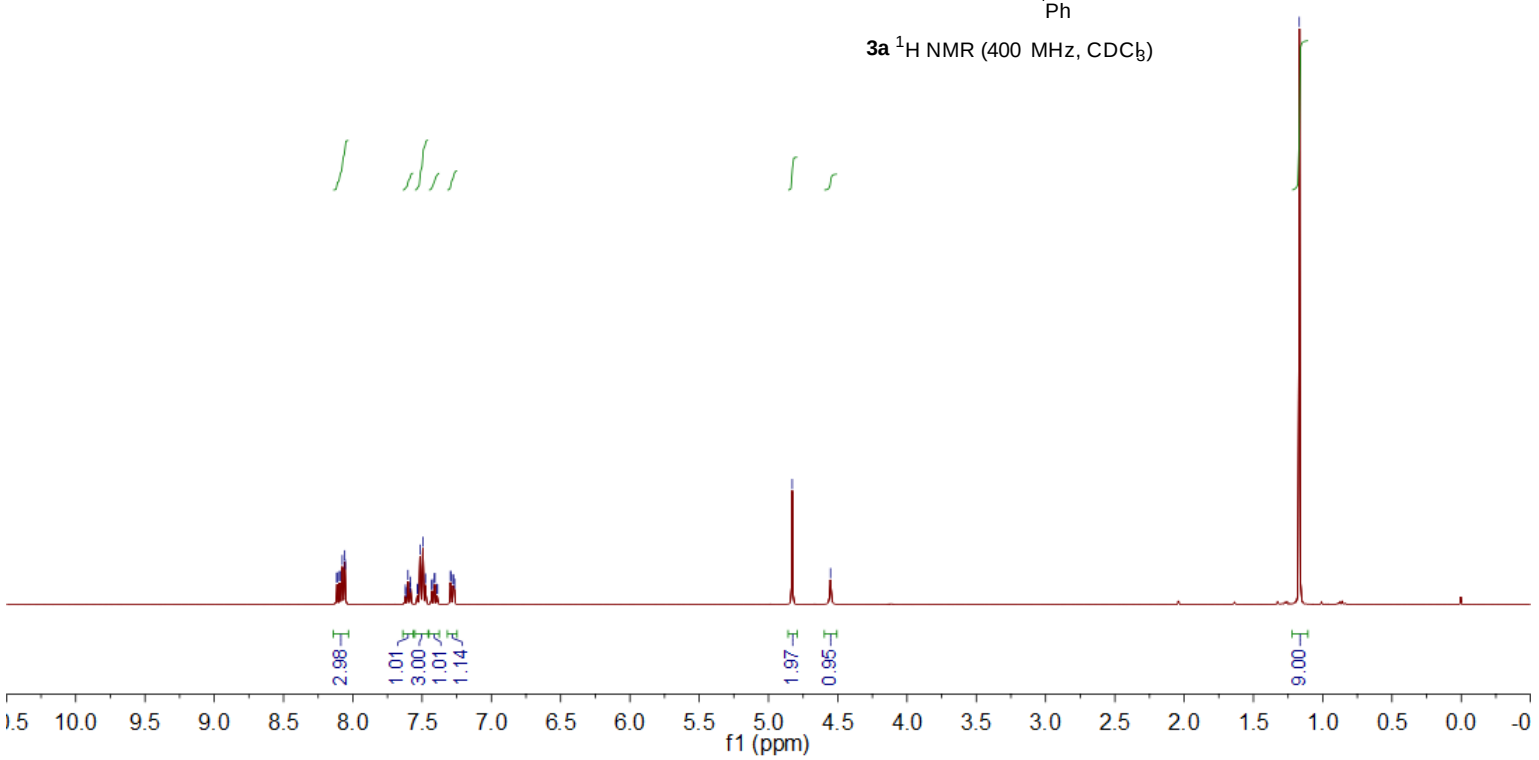
1n ^{19}F NMR (376 MHz, $CDCl_3$)



1H NMR BS-3-68 in CDCl3

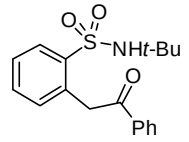


3a ^{1}H NMR (400 MHz, $CDCl_3$)

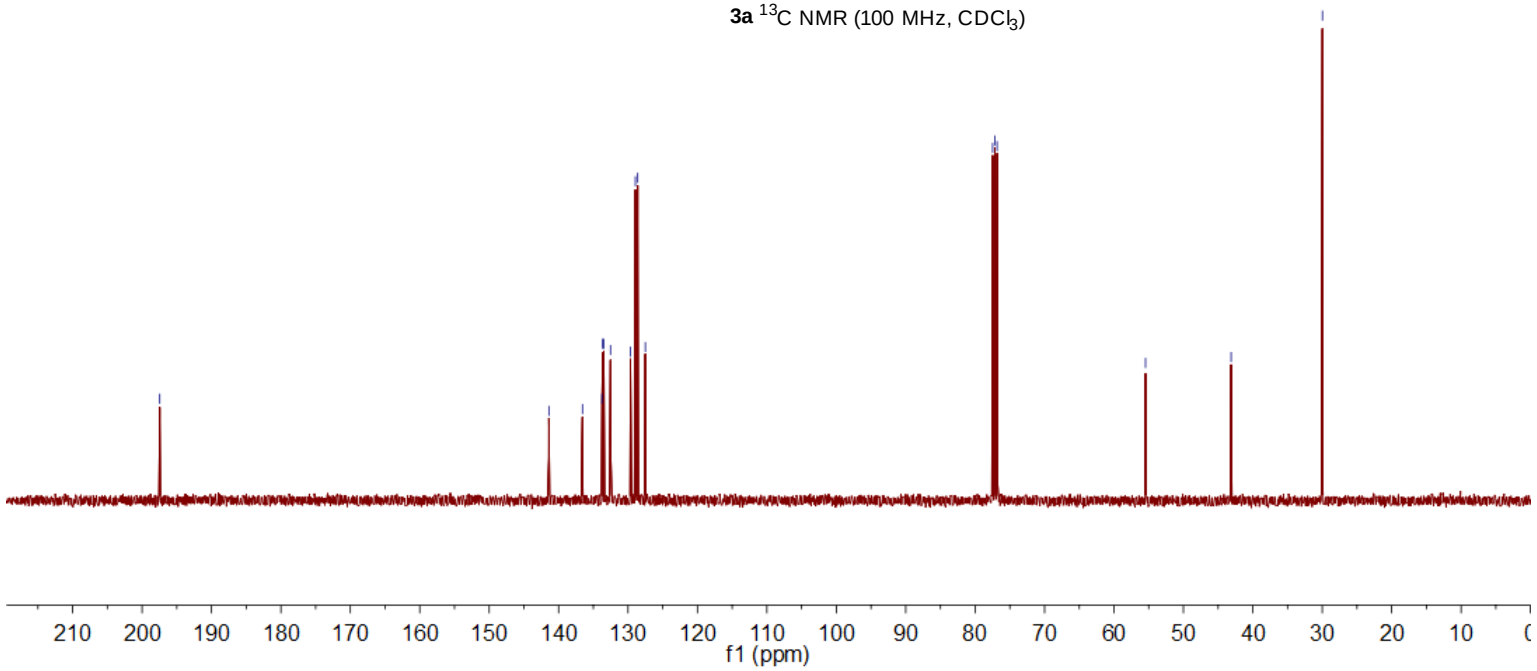


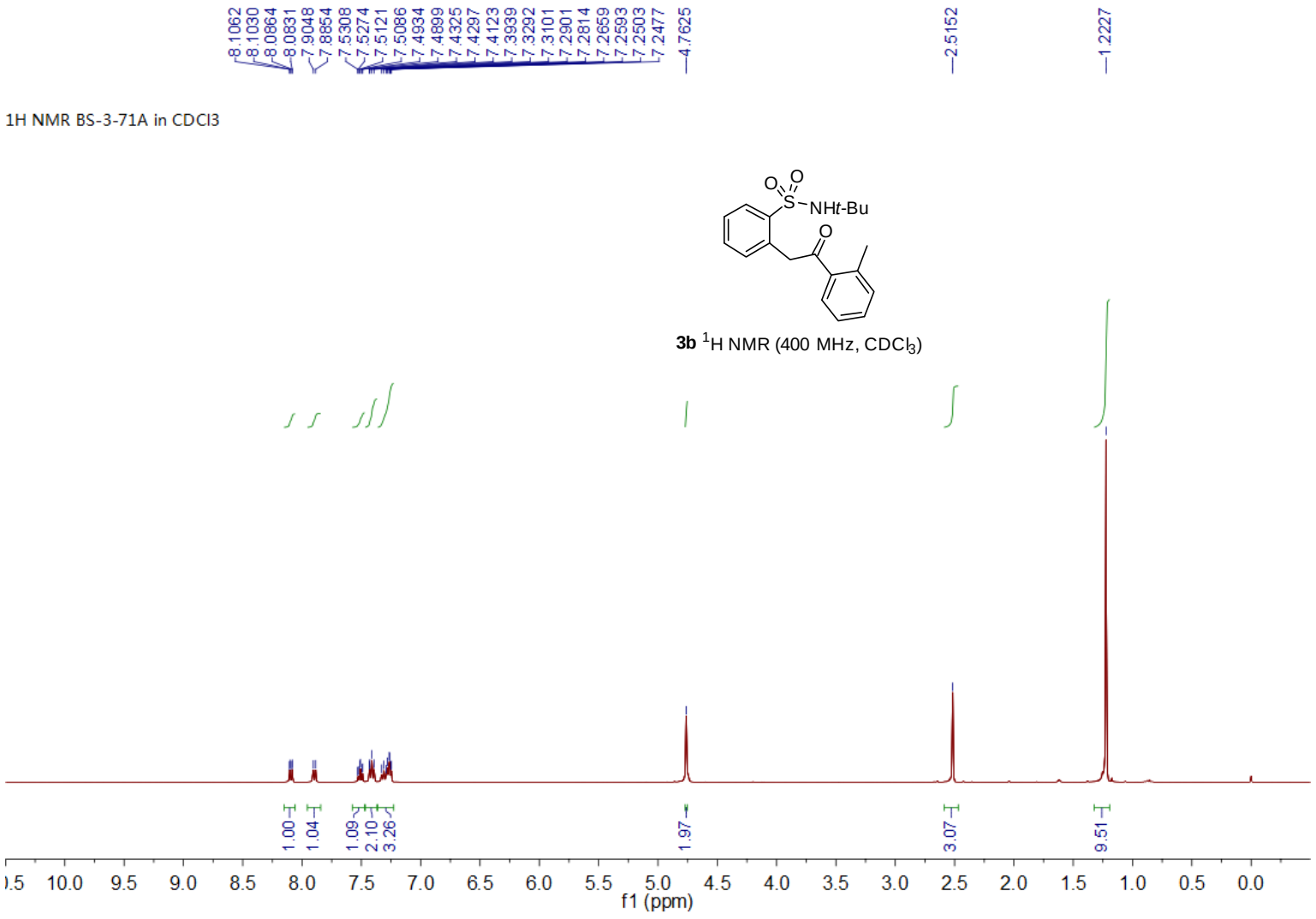
197.45
141.40
136.56
133.75
133.66
133.49
132.53
129.65
128.94
128.61
127.51
77.48
77.16
76.84
55.46
43.13
29.97

13C NMR BS-3-68 in CDCl3

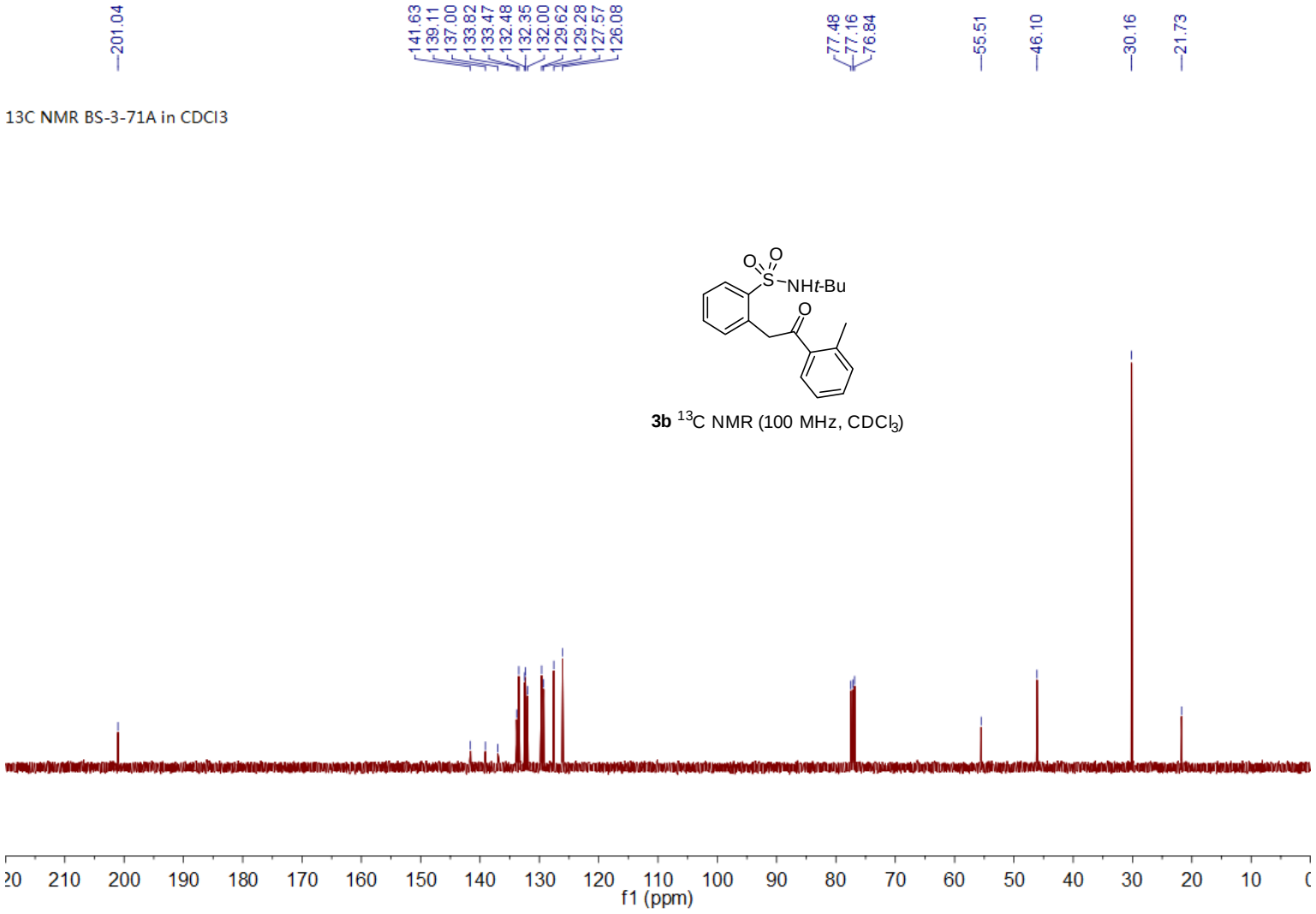


3a ^{13}C NMR (100 MHz, $CDCl_3$)

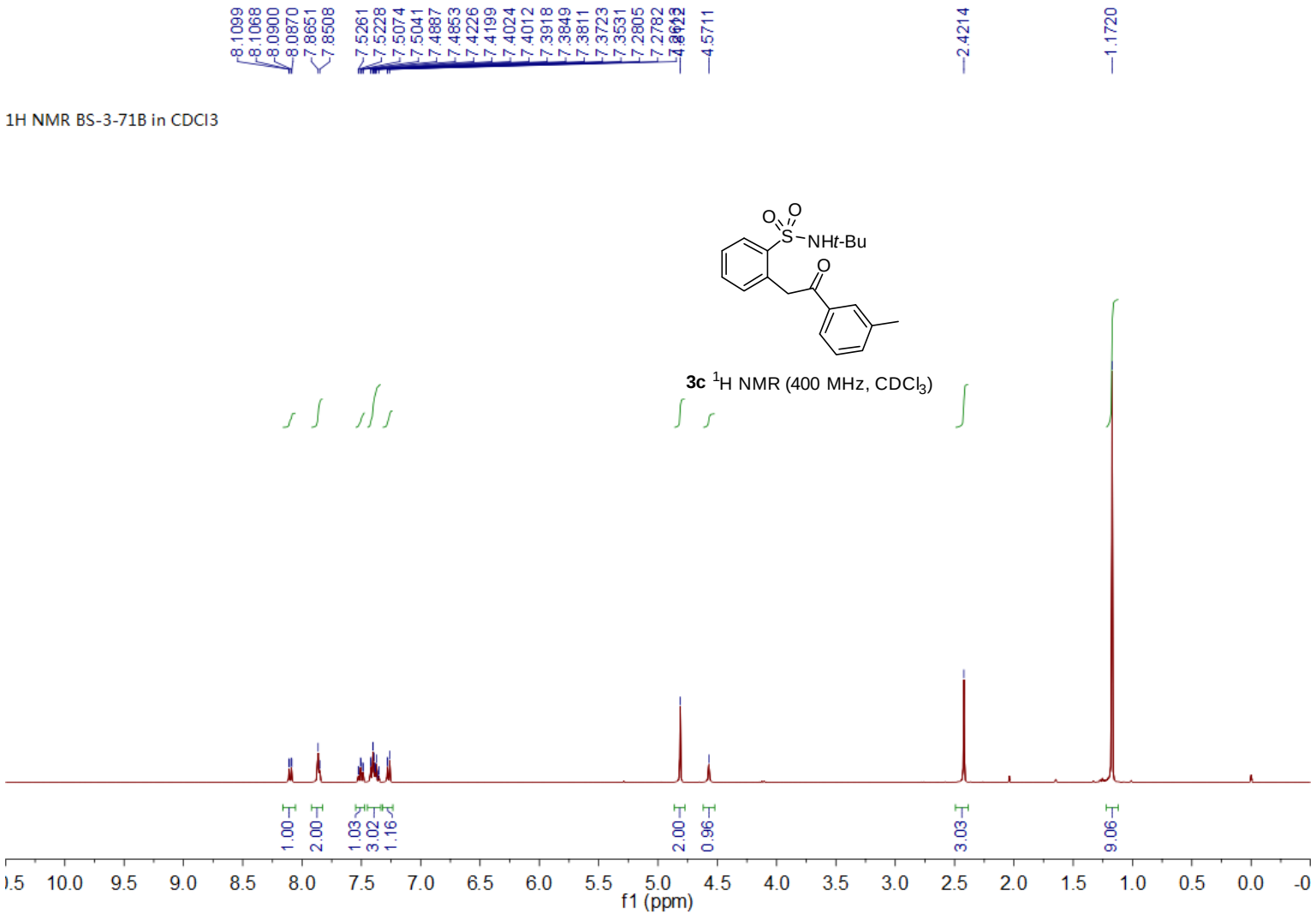


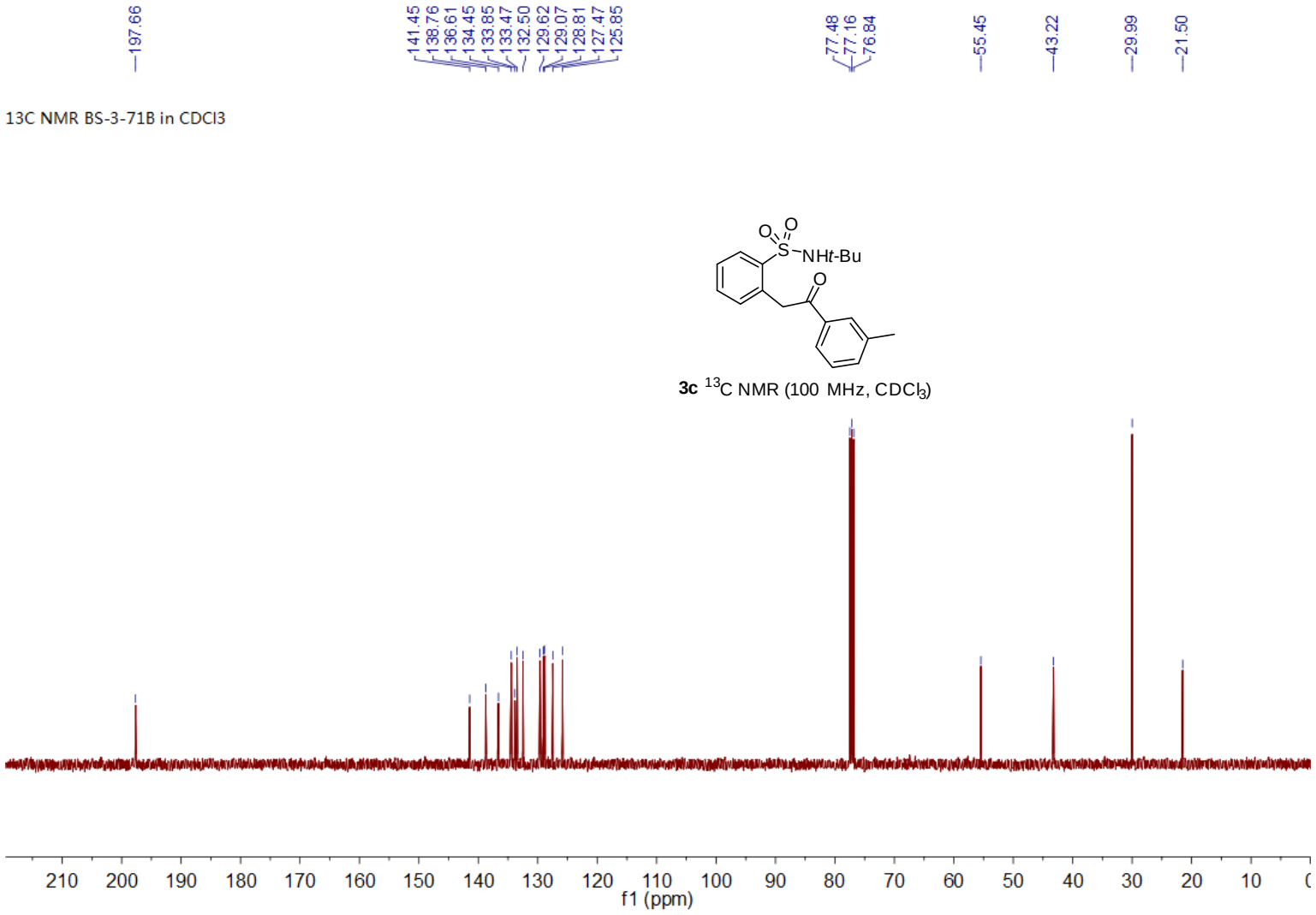


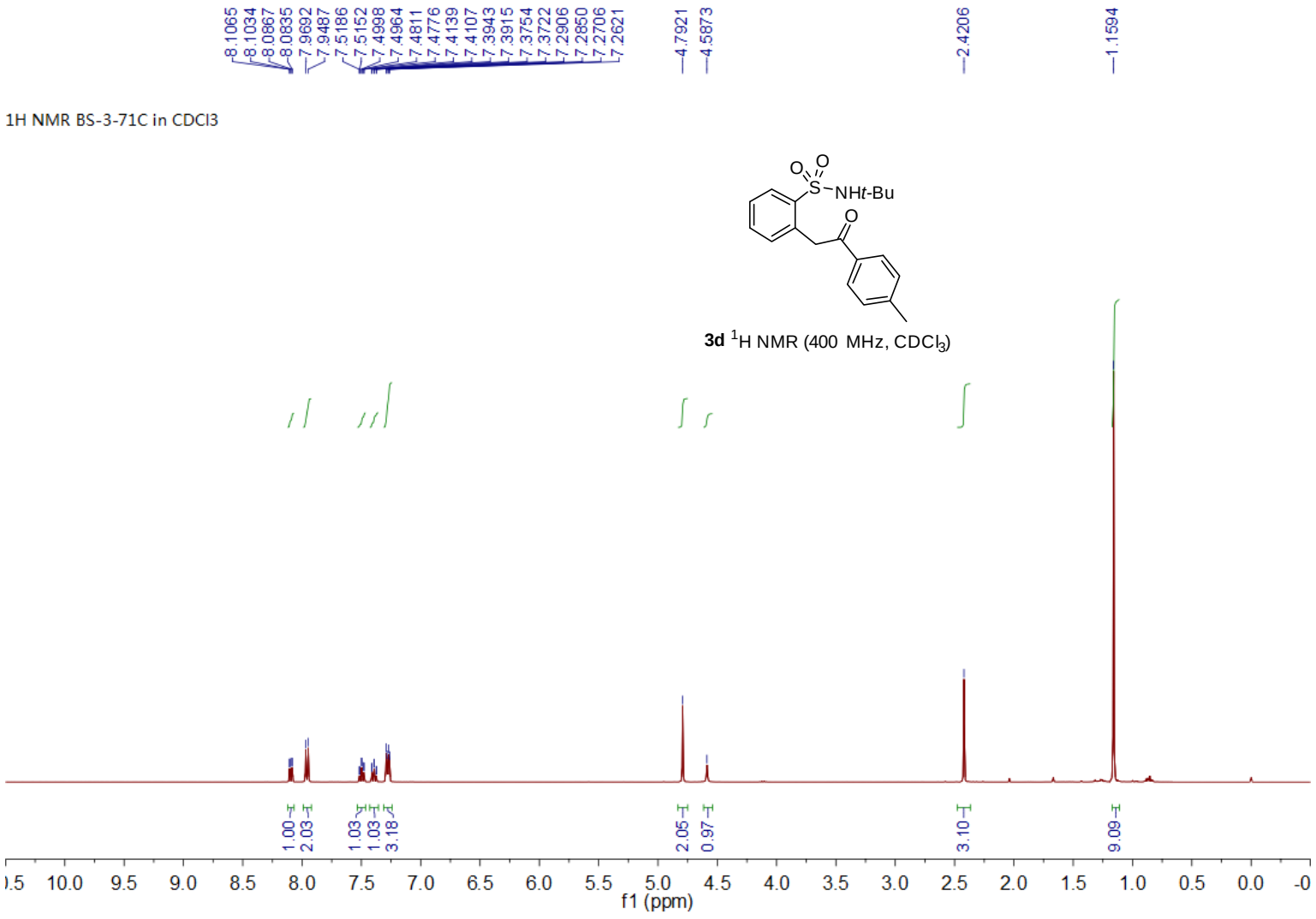
3b ^{1}H NMR (400 MHz, $CDCl_3$)



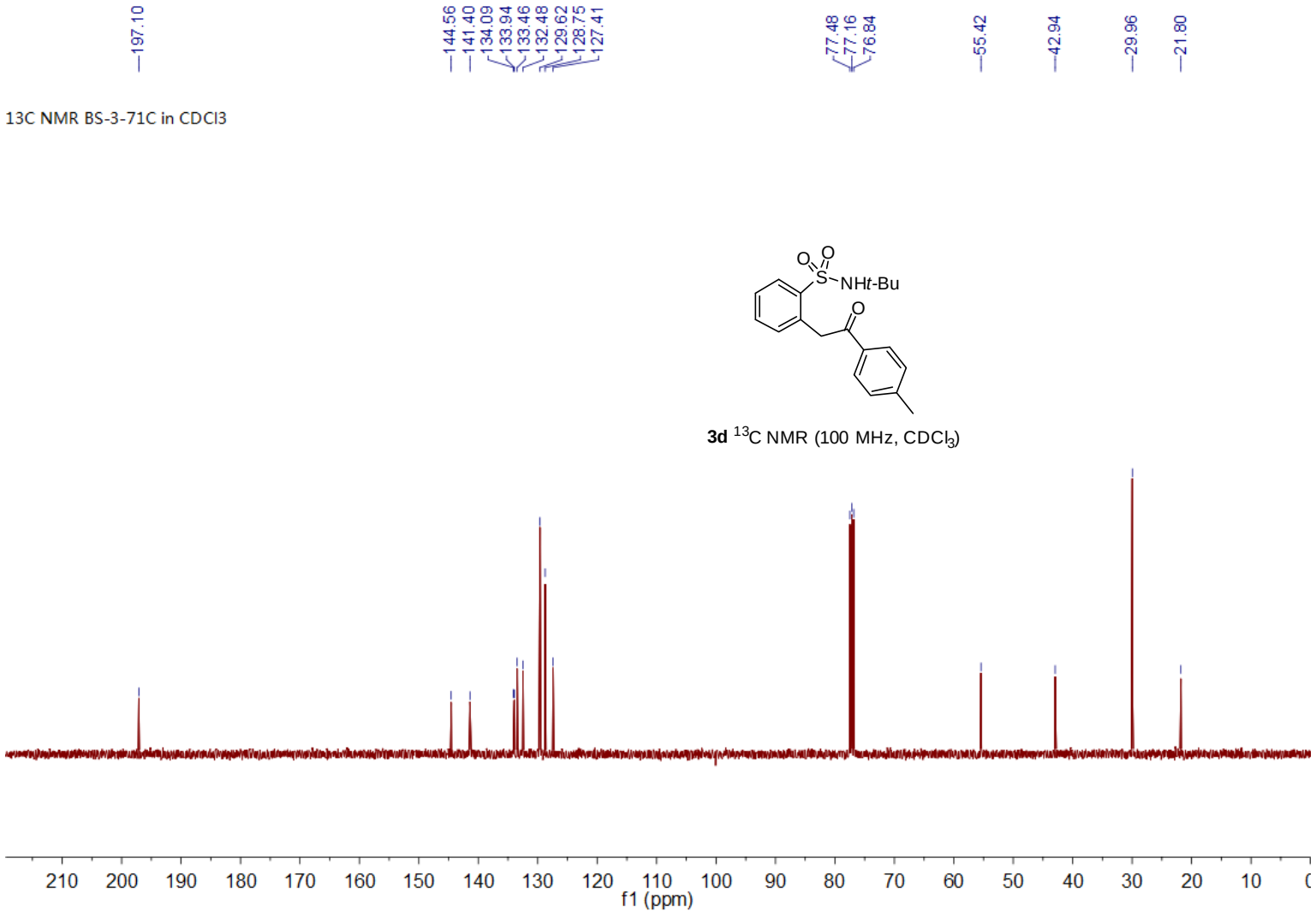
3b ^{13}C NMR (100 MHz, $CDCl_3$)


8.1099
8.1068
8.0900
8.0870
7.8651
7.8508
7.5261
7.5228
7.5074
7.5041
7.4887
7.4853
7.4226
7.4199
7.4024
7.4012
7.3918
7.3849
7.3811
7.3723
7.3531
7.2805
7.2782
4.5711
2.4214
1.1720
1H NMR BS-3-71B in CDCl3
NHt-Bu
3c 1H NMR (400 MHz, CDCl3)
1.00
2.00
1.03
3.02
1.16
2.00
0.96
3.03
9.06
f1 (ppm)

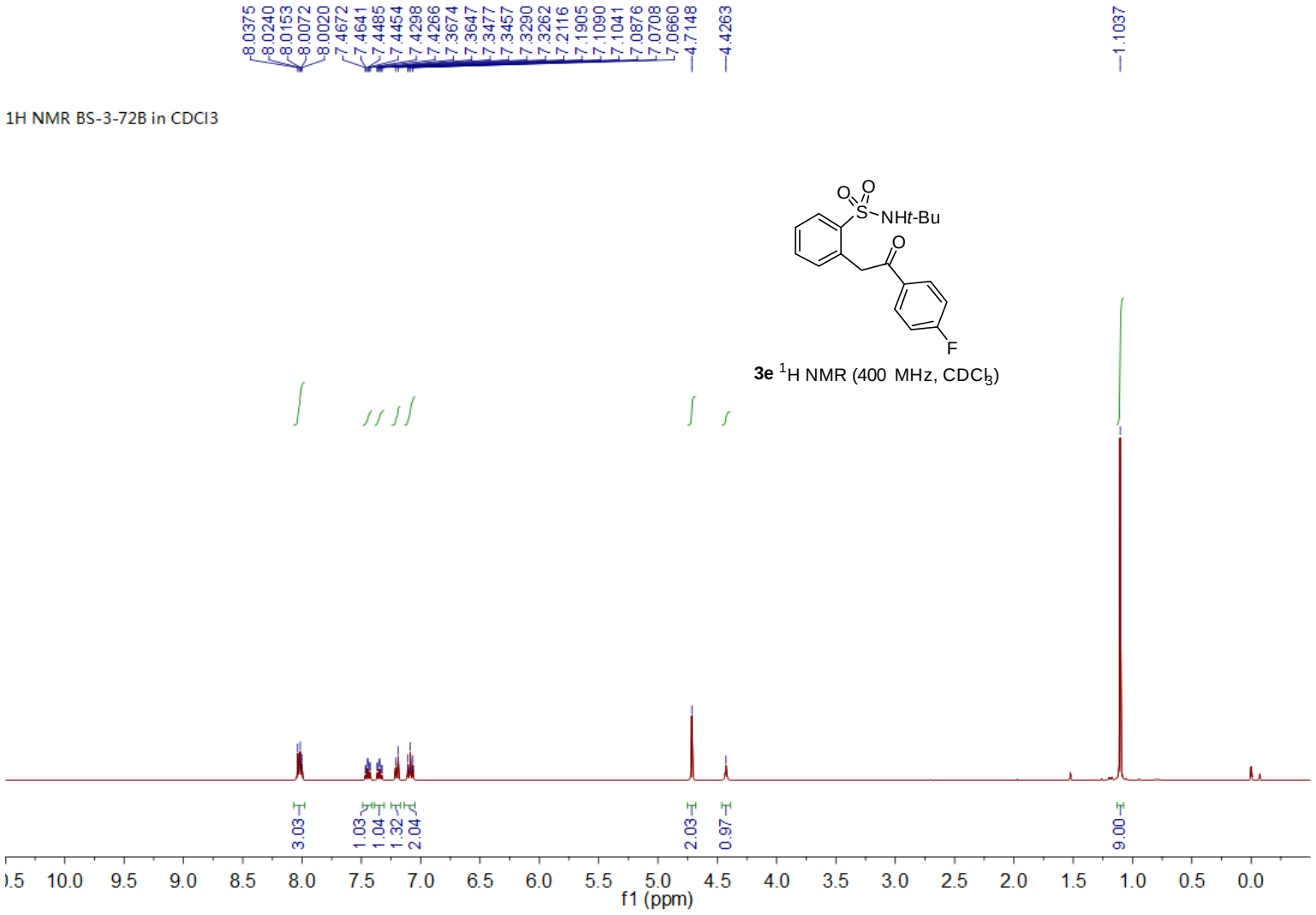

197.66
141.45
138.76
136.61
134.45
133.85
133.47
132.50
129.62
129.07
128.81
127.47
125.85
77.48
77.16
76.84
55.45
43.22
29.99
21.50
13C NMR BS-3-71B in CDCl3
O
O
S
NHt-Bu
O
3c 13C NMR (100 MHz, CDCl3)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)



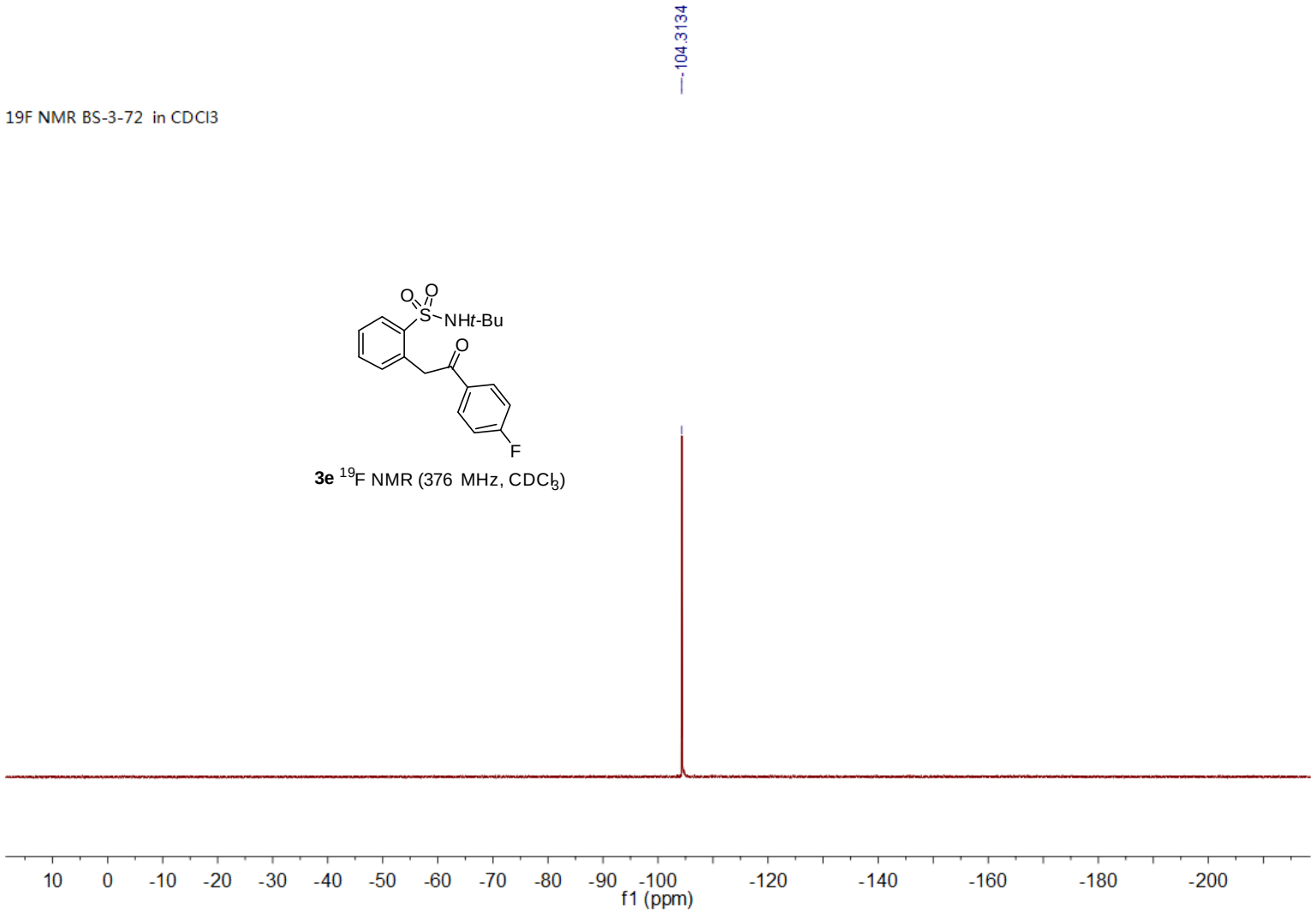
3d ^{1}H NMR (400 MHz, $CDCl_3$)



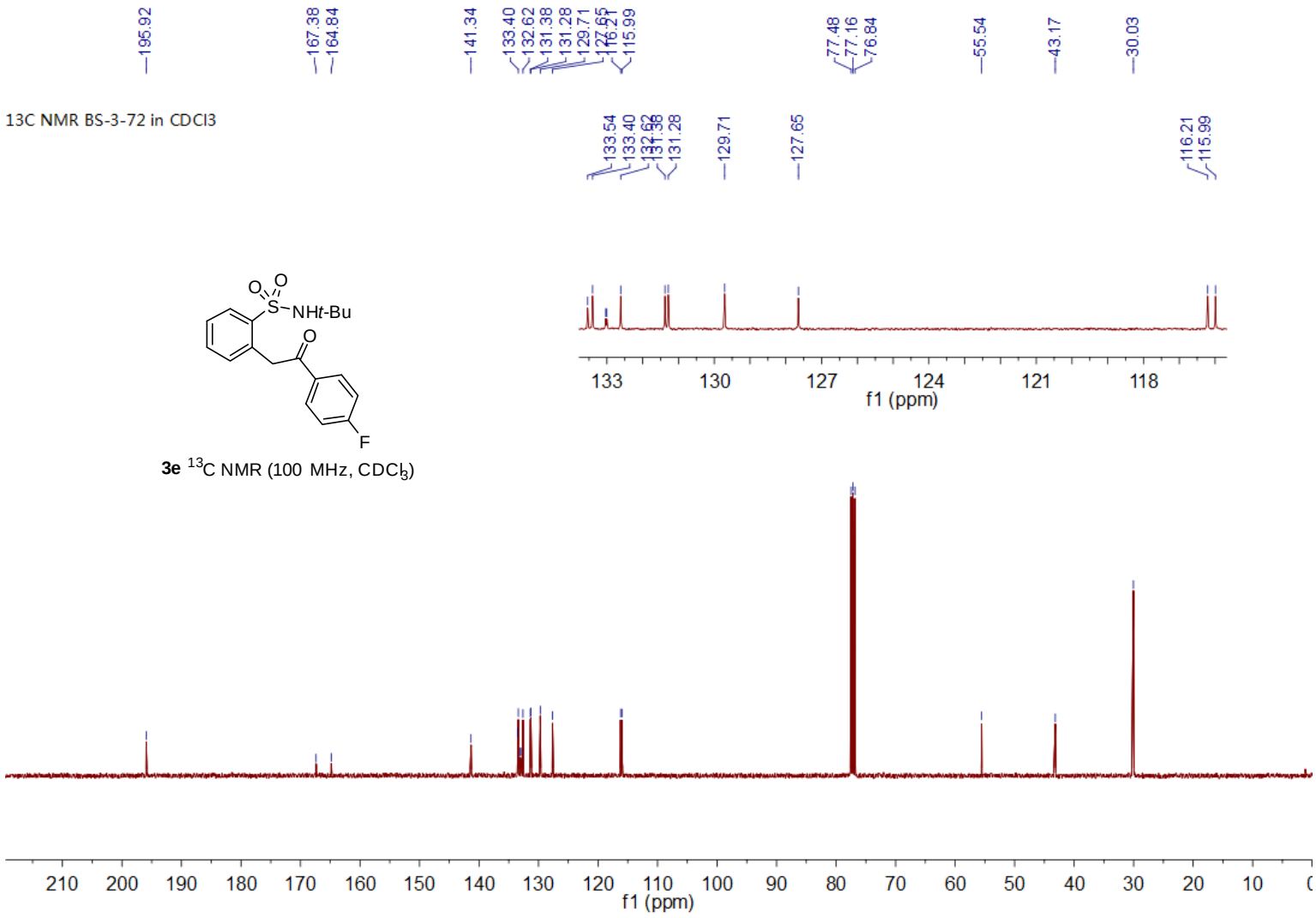
3d ^{13}C NMR (100 MHz, $CDCl_3$)


8.0375
8.0240
8.0153
8.0072
8.0020
7.4672
7.4641
7.4485
7.4454
7.4298
7.4266
7.3674
7.3647
7.3477
7.3457
7.3290
7.3262
7.2116
7.1905
7.1090
7.1041
7.0876
7.0708
7.0660
4.7148
4.4263
1.1037
1H NMR BS-3-72B in CDCl3
NHt-Bu
F
3e 1H NMR (400 MHz, CDCl3)
3.03
1.03
1.04
1.32
2.04
2.03
0.97
9.00
f1 (ppm)

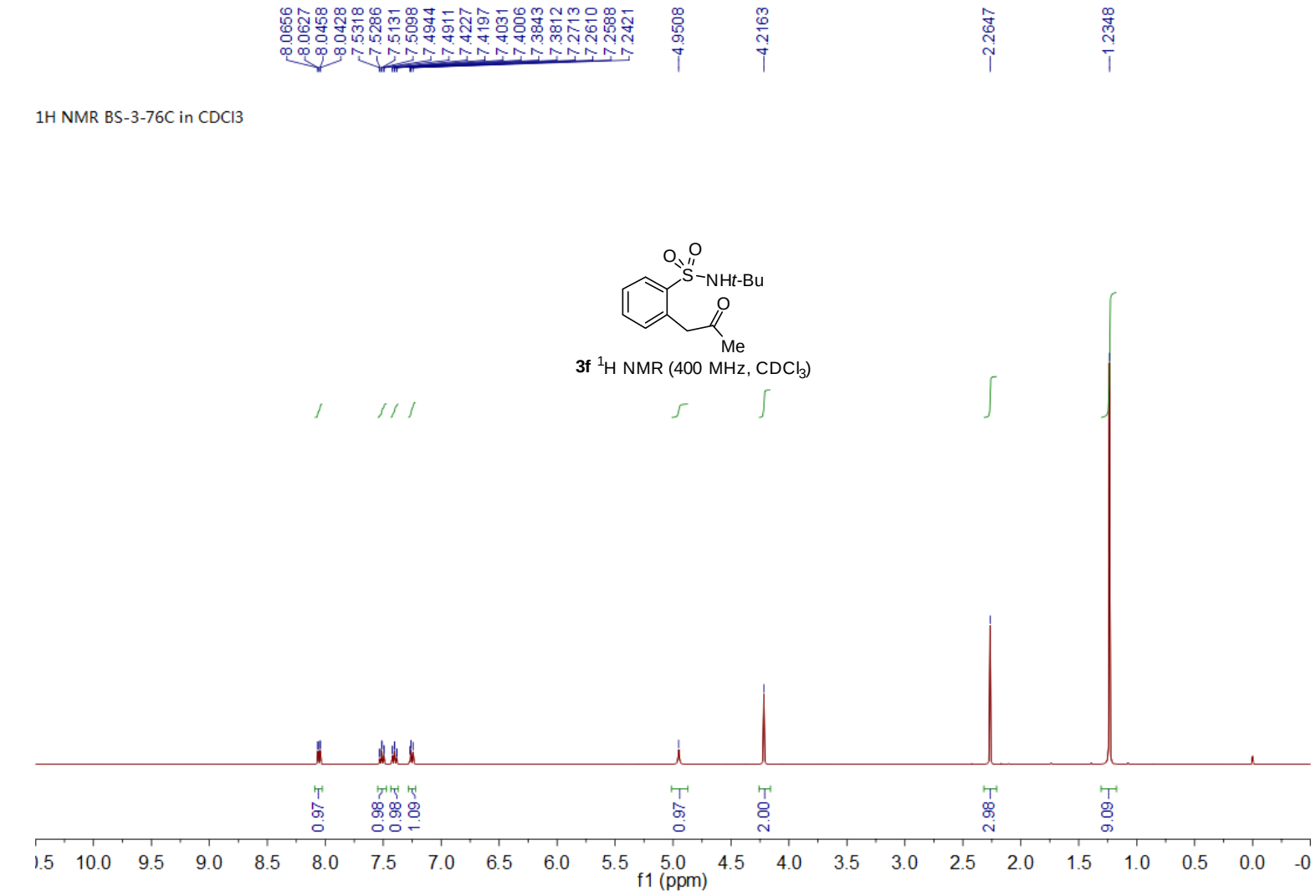
19F NMR BS-3-72 in CDCl3

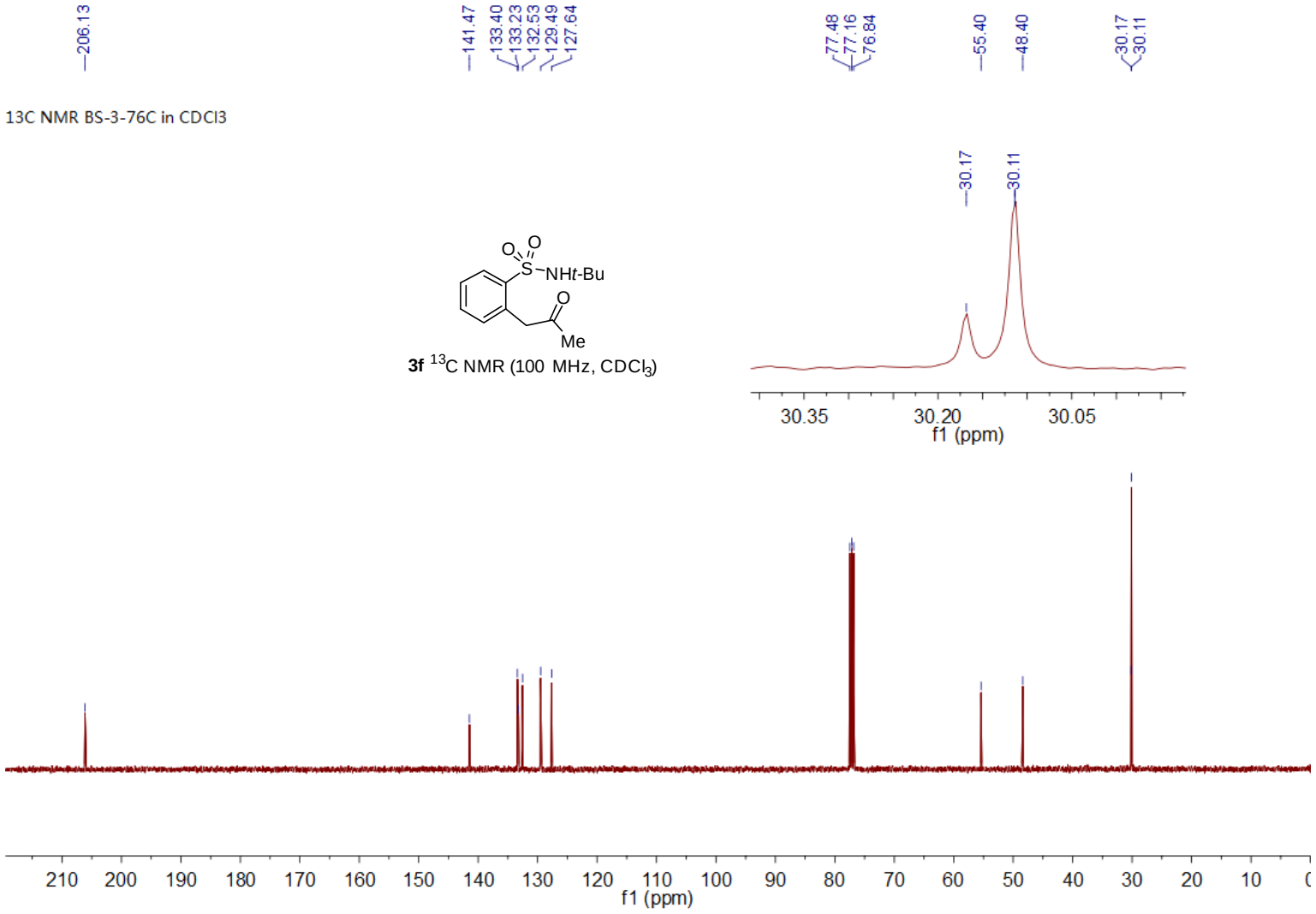


3e ^{19}F NMR (376 MHz, $CDCl_3$)

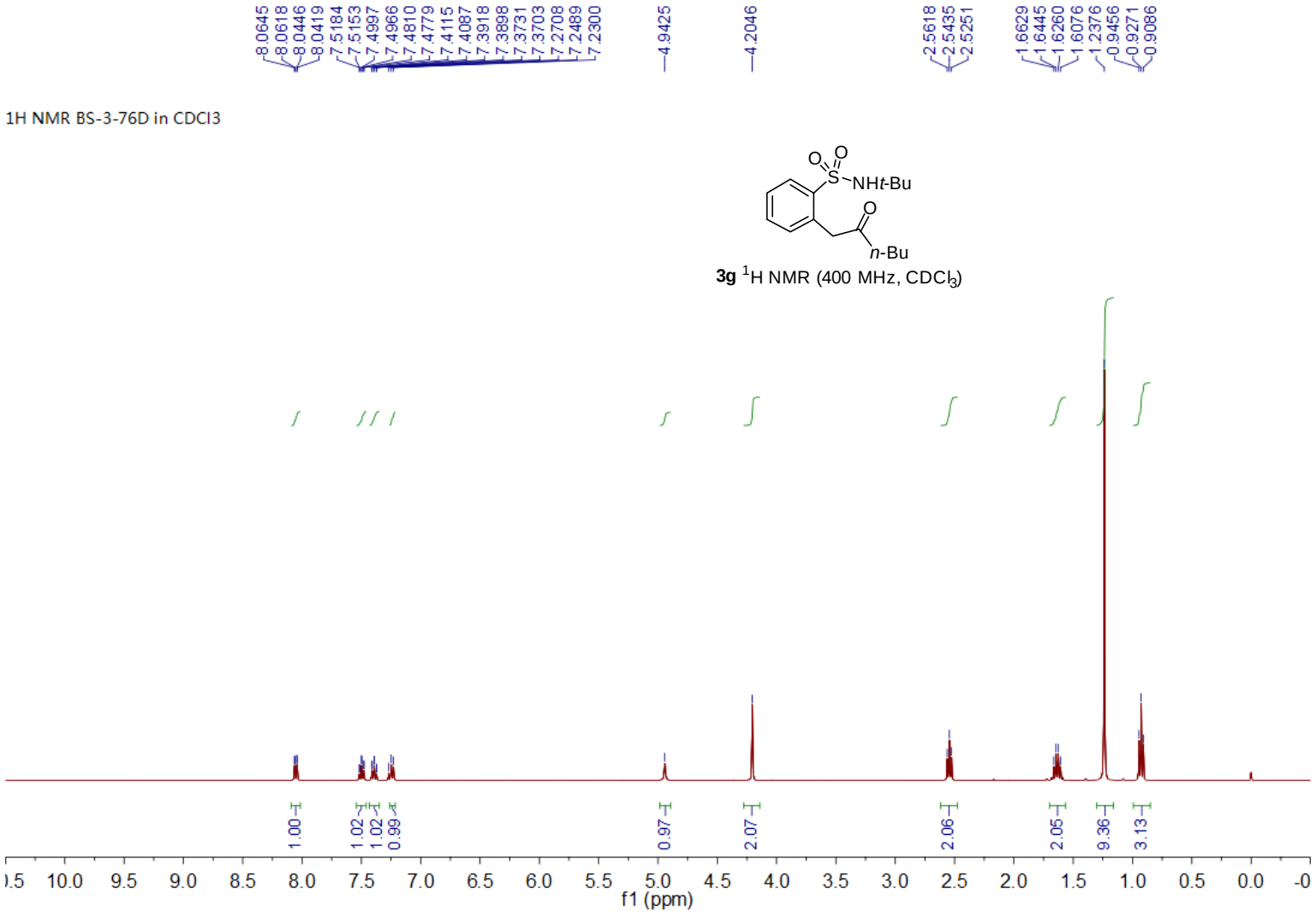


3e ^{13}C NMR (100 MHz, $CDCl_3$)


8.0656
8.0627
8.0458
8.0428
7.5318
7.5286
7.5131
7.5098
7.4944
7.4911
7.4227
7.4197
7.4031
7.4006
7.3843
7.3812
7.2713
7.2610
7.2588
7.2421
4.9508
4.2163
2.2647
1.2348
1H NMR BS-3-76C in CDCl3
O
O
S
NHt-Bu
O
Me
3f 1H NMR (400 MHz, CDCl3)
0.97
0.98
0.98
1.09
0.97
2.00
2.98
9.09
f1 (ppm)



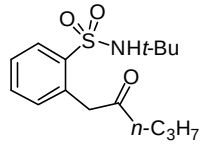
3f ^{13}C NMR (100 MHz, $CDCl_3$)



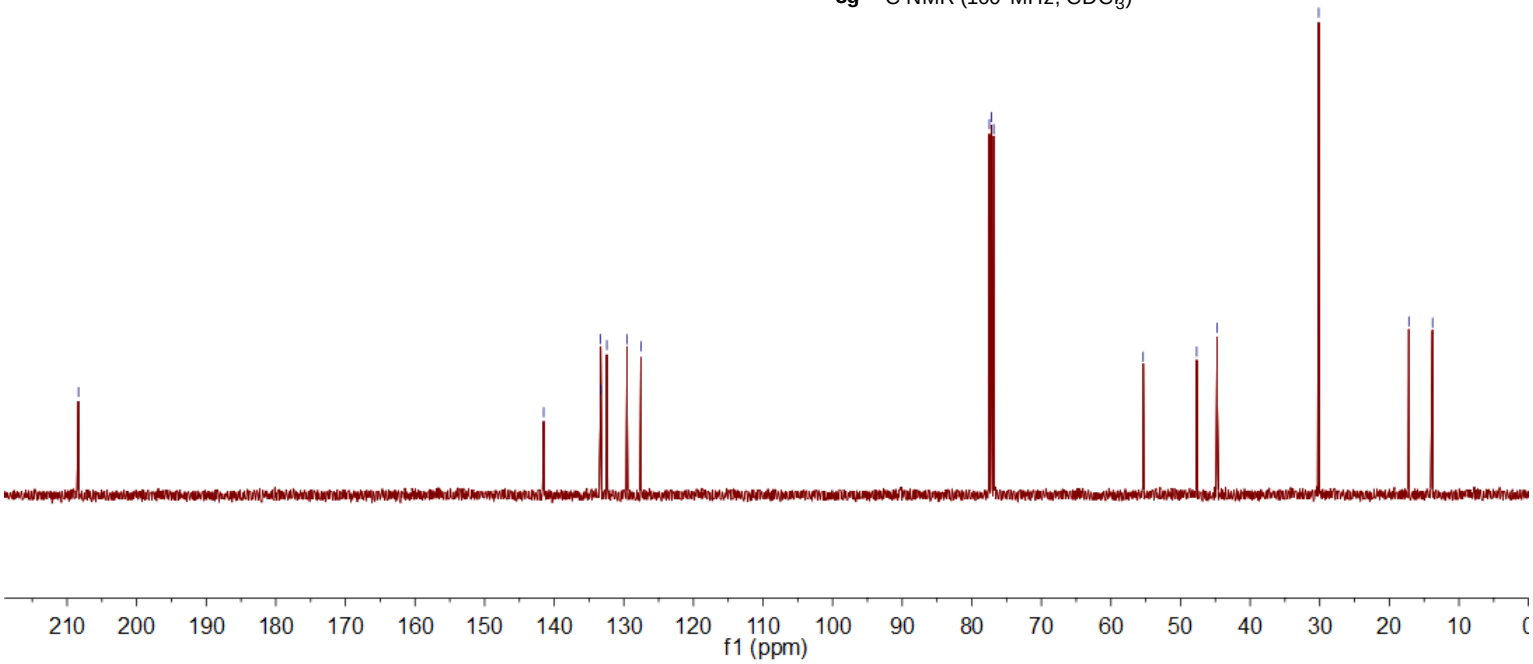
3g ^{1}H NMR (400 MHz, $CDCl_3$)

208.36
141.52
133.34
133.31
132.44
129.52
127.54
77.48
77.16
76.84
55.38
47.69
44.73
30.16
17.19
13.79

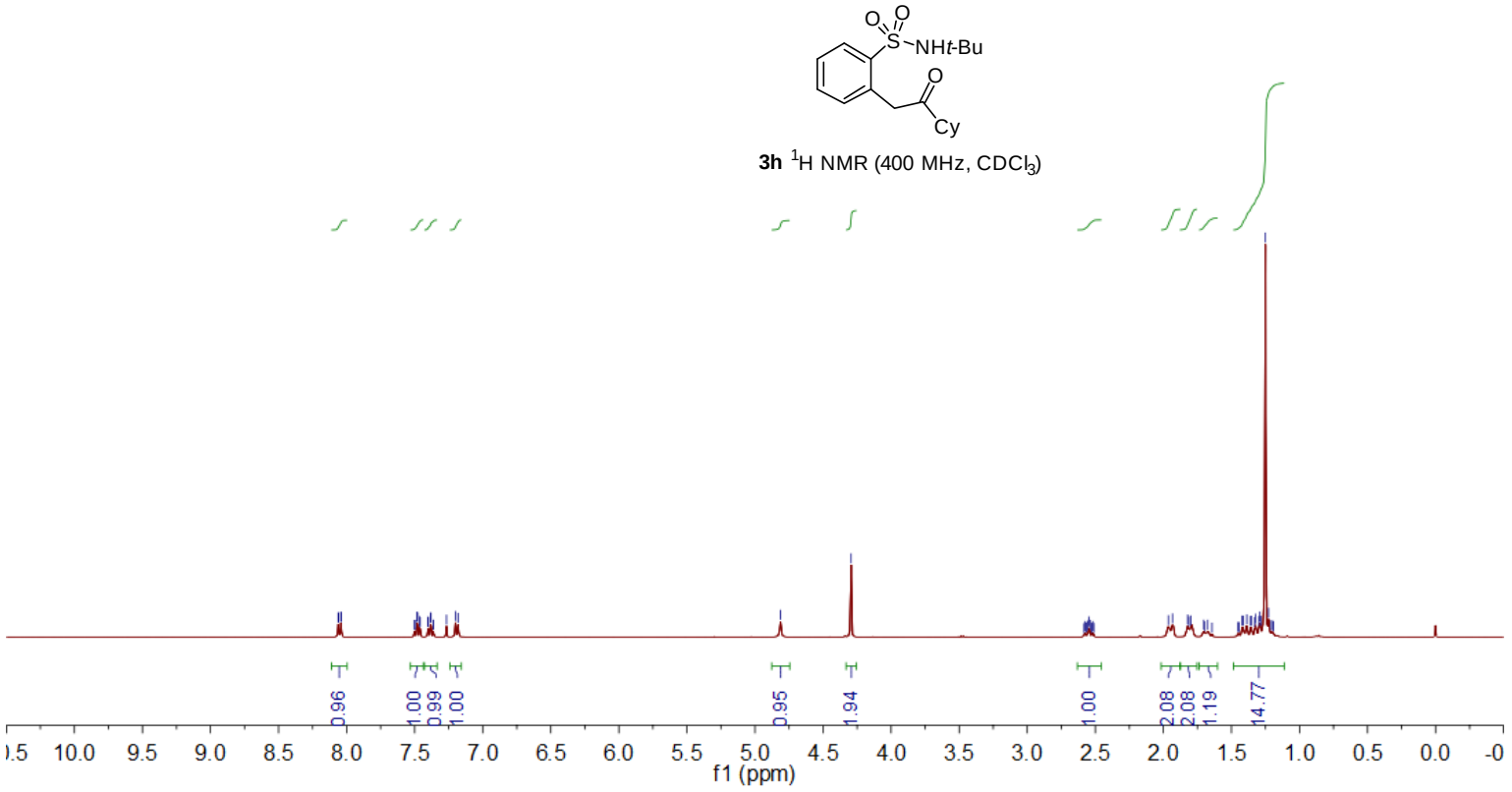
13C NMR BS-3-76D in CDCl3



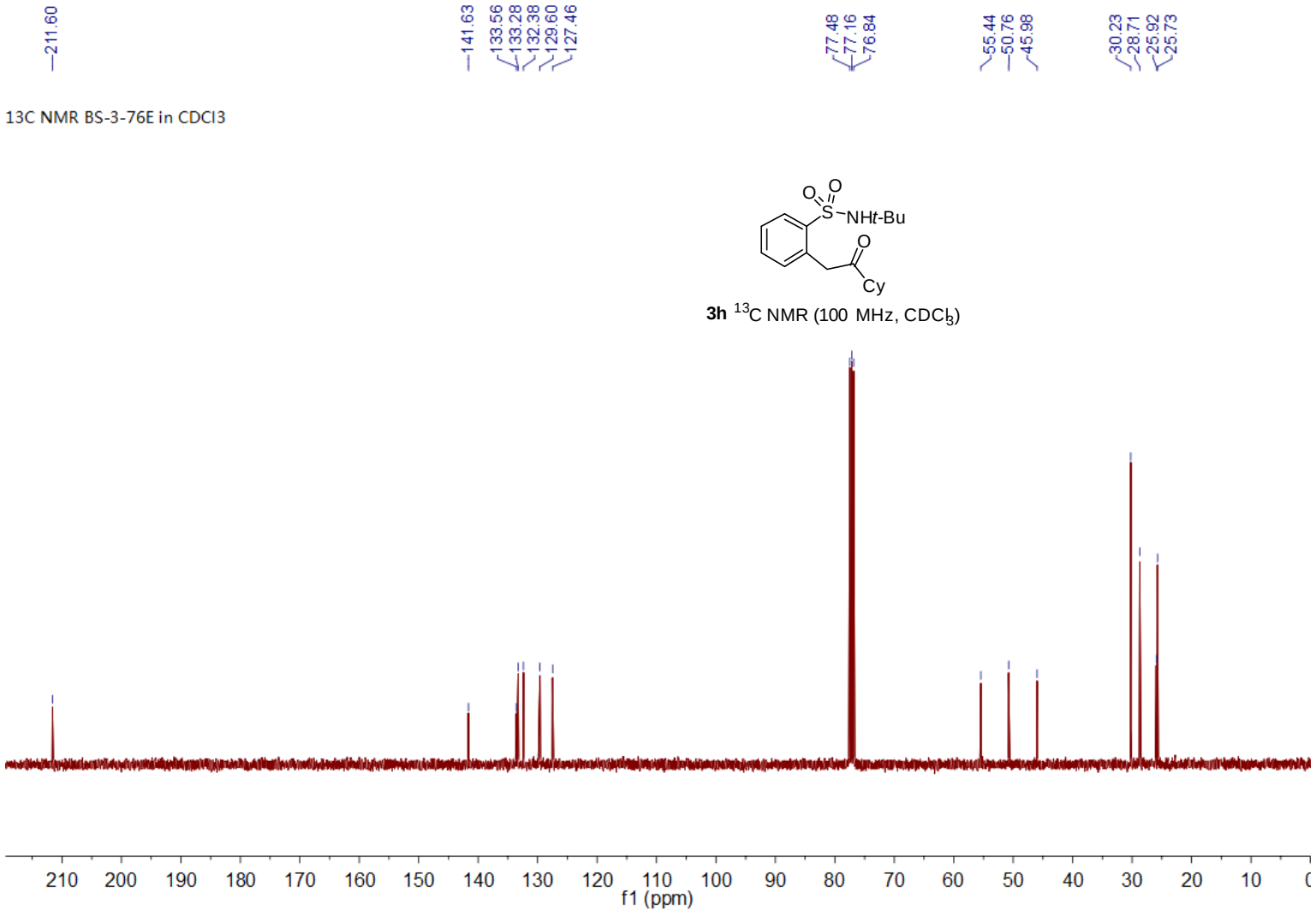
3g ^{13}C NMR (100 MHz, $CDCl_3$)



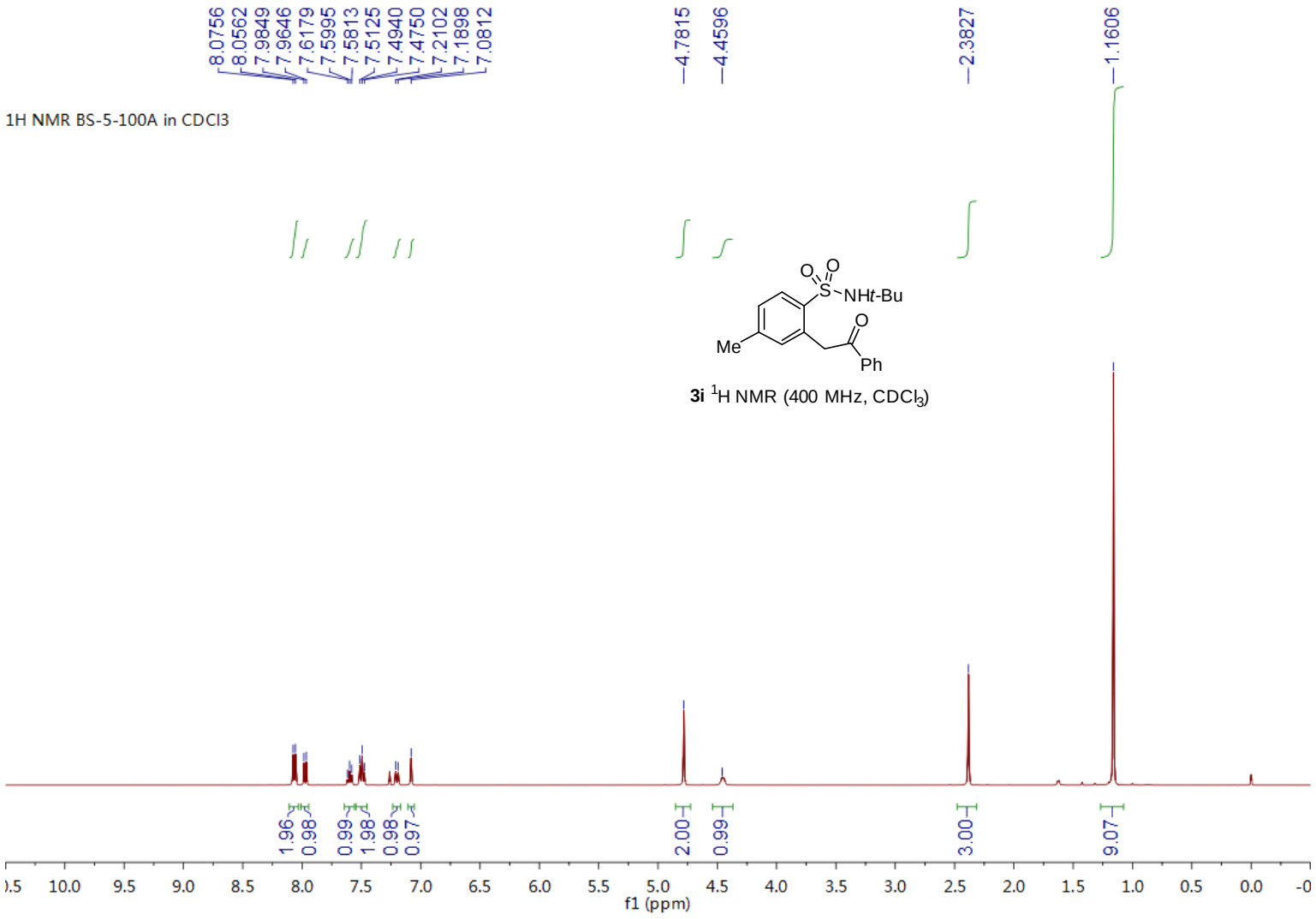
1H NMR BS-3-76E in CDCl3



3h ^{1}H NMR (400 MHz, $CDCl_3$)

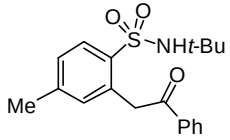


3h ^{13}C NMR (100 MHz, $CDCl_3$)

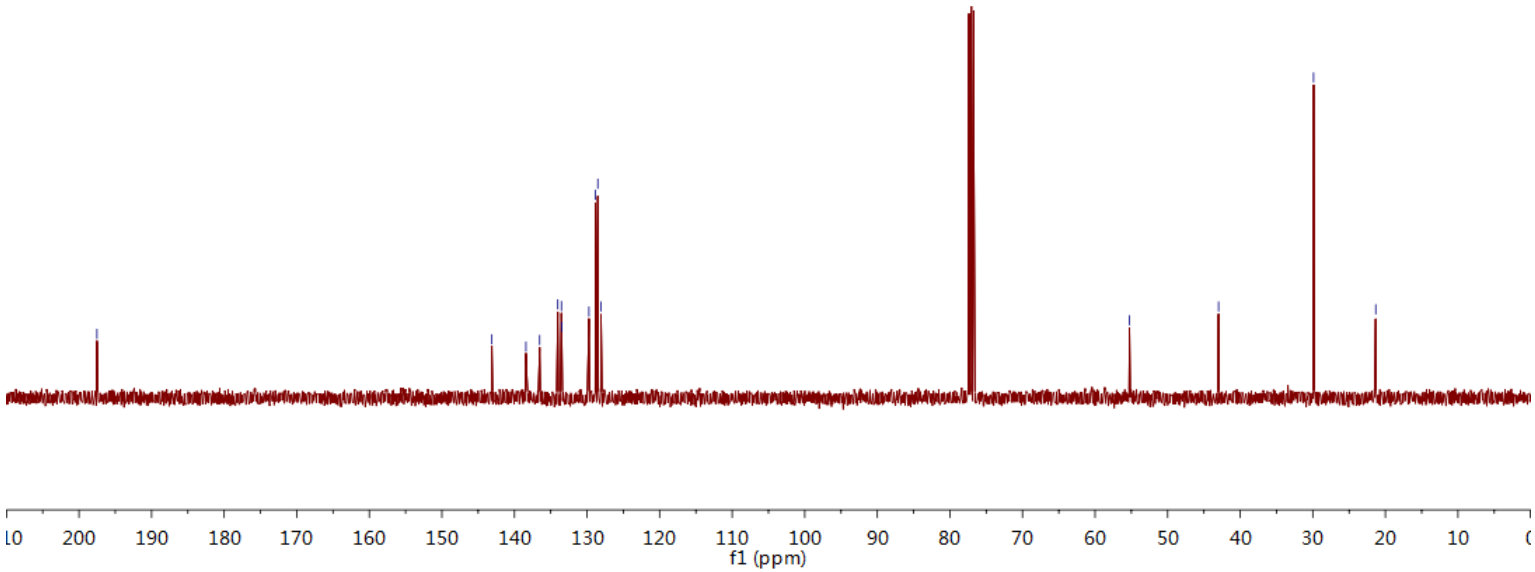


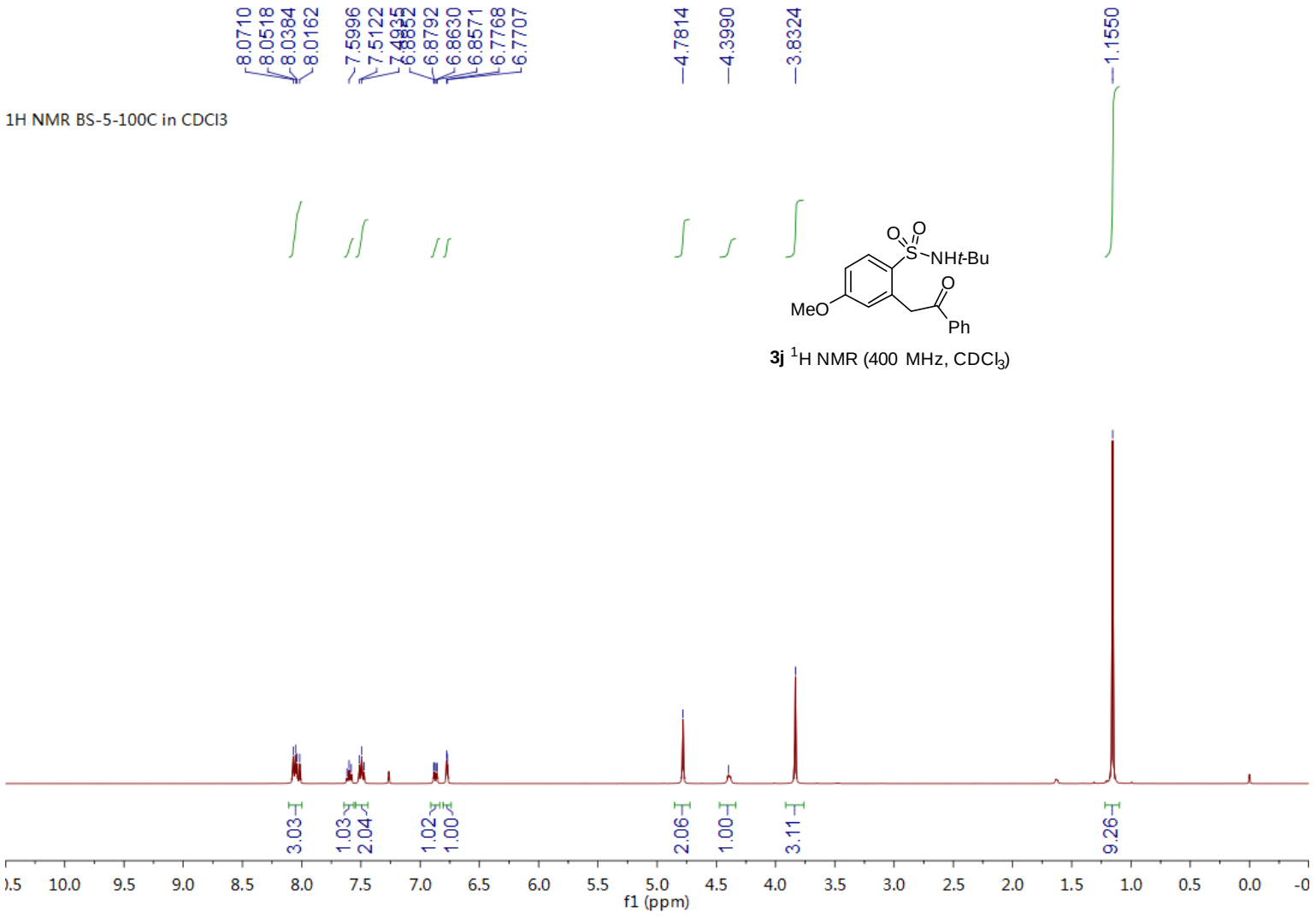
3i ^{1}H NMR (400 MHz, $CDCl_3$)

13C NMR BS-5-100A in CDCl3

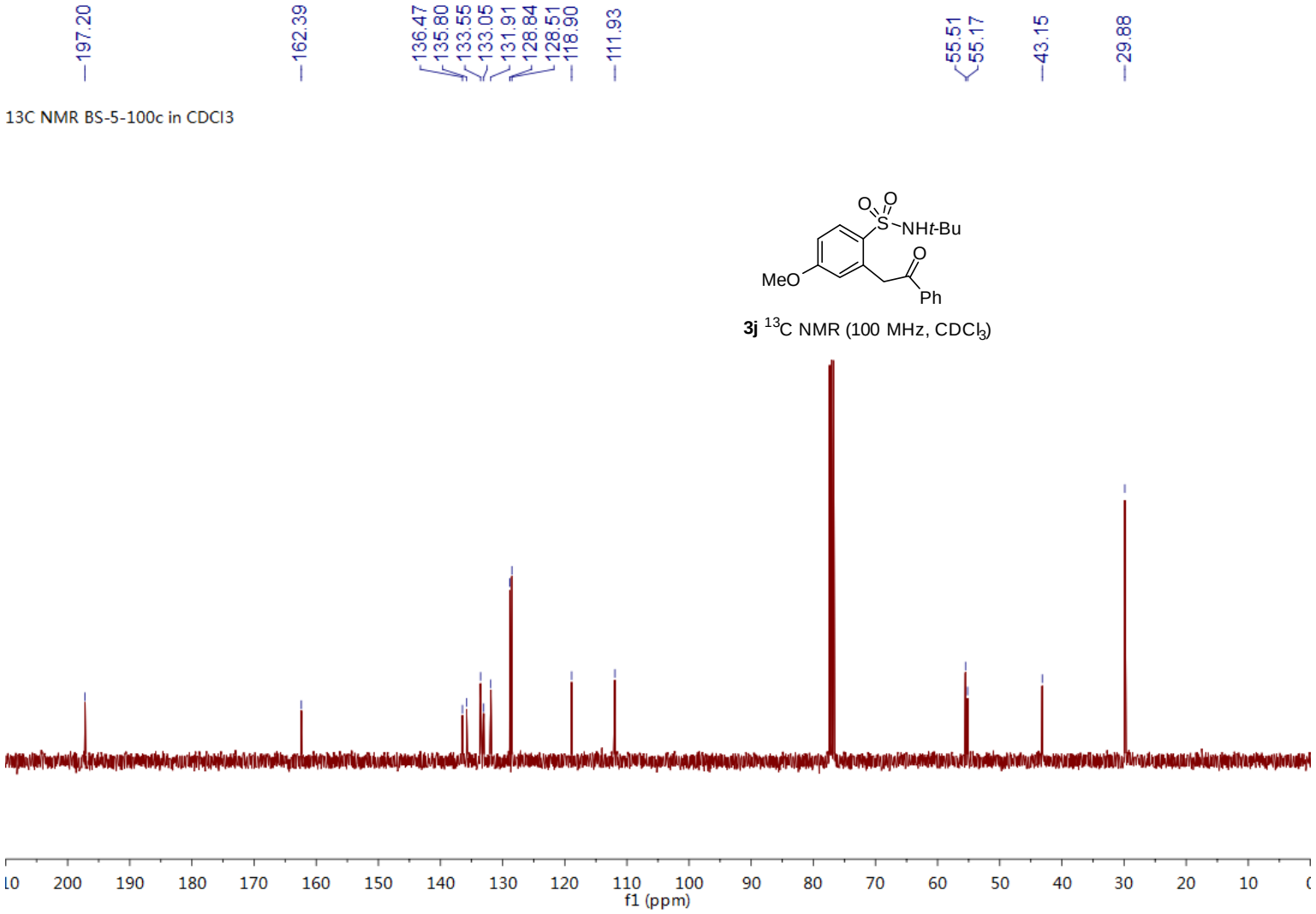


3i ^{13}C NMR (100 MHz, $CDCl_3$)

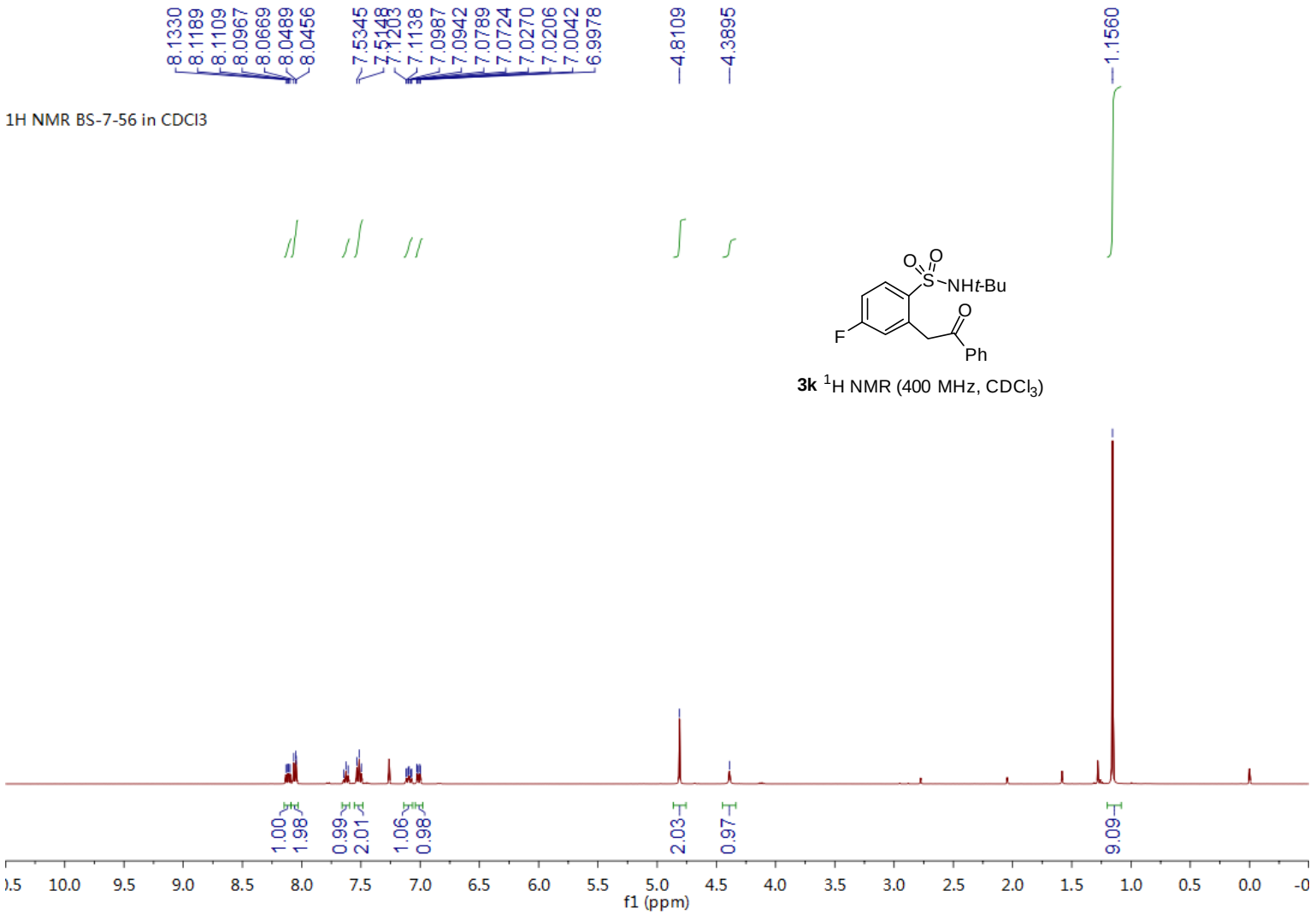




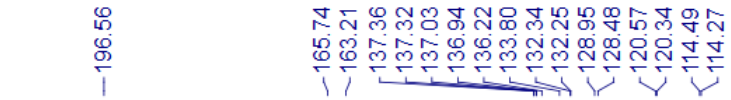
3j ^{1}H NMR (400 MHz, $CDCl_3$)



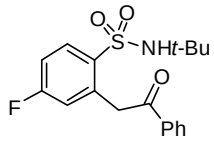
3j ^{13}C NMR (100 MHz, $CDCl_3$)



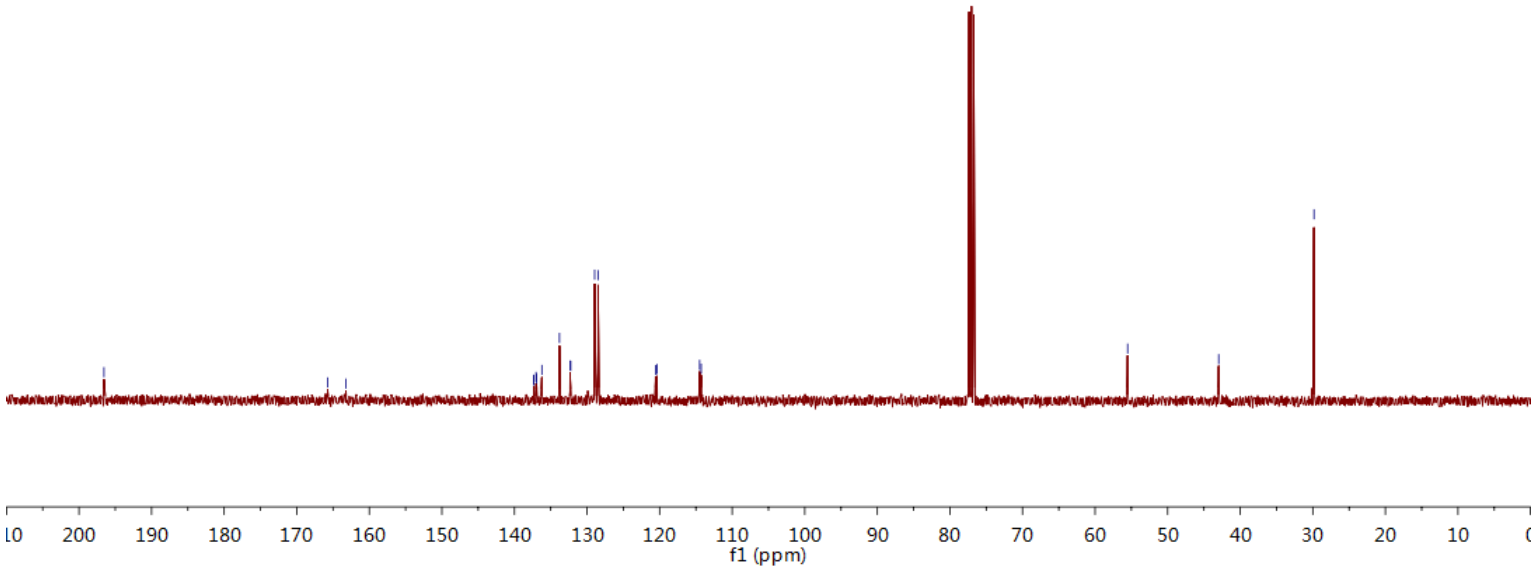
3k ^{1}H NMR (400 MHz, $CDCl_3$)



13C NMR BS-7-56 in CDCl3

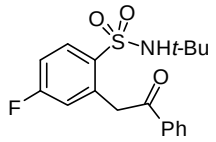


3k ^{13}C NMR (100 MHz, $CDCl_3$)

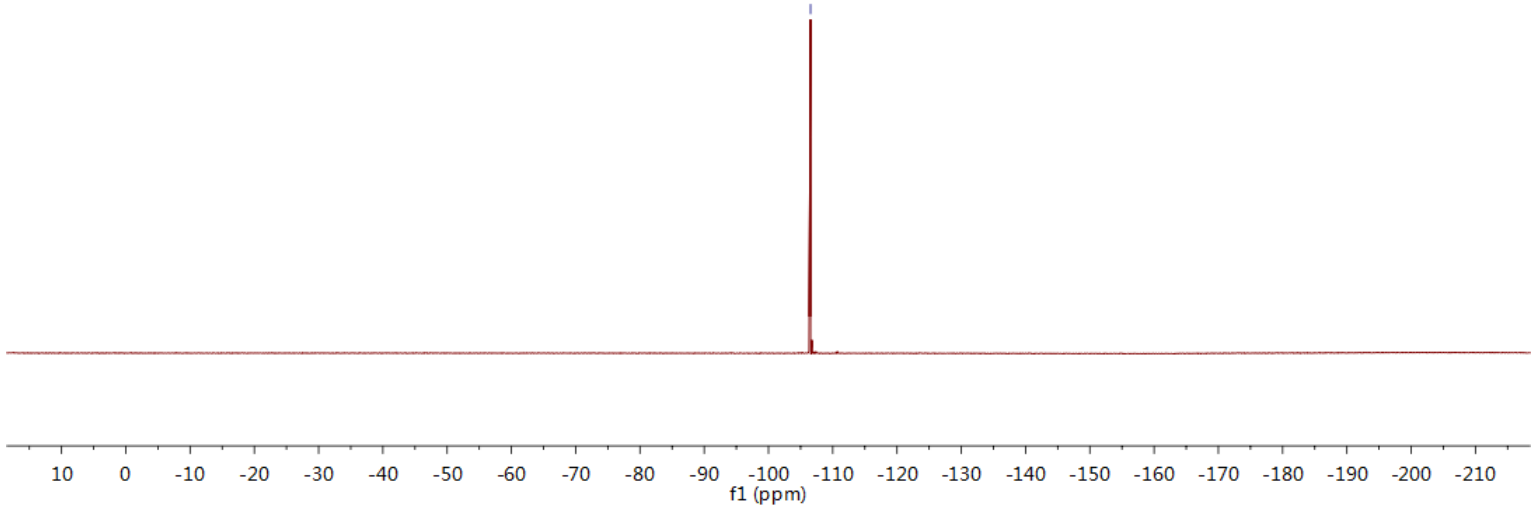


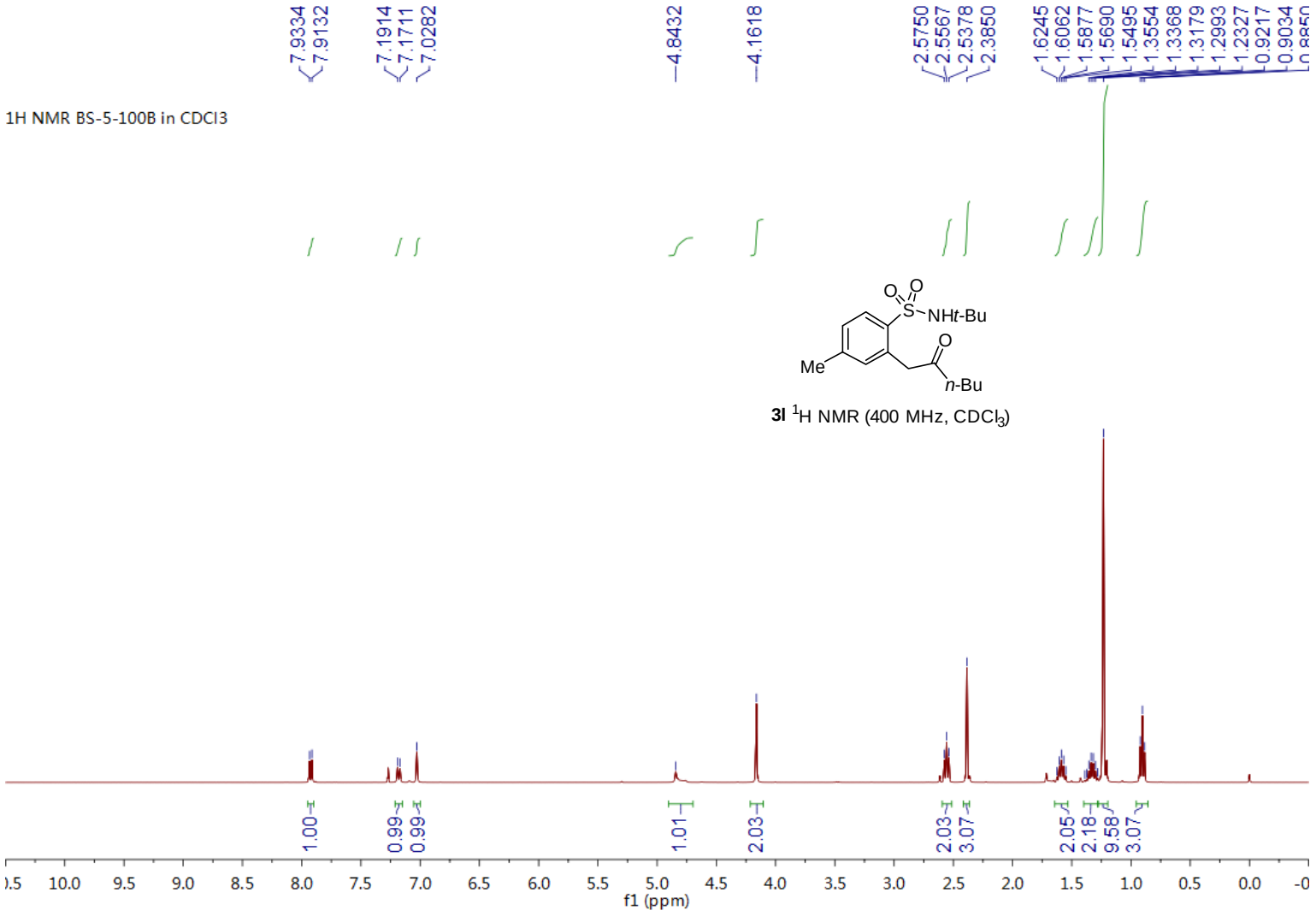
19F NMR BS-7-56 in CDCl3

-106.5440



3k ^{19}F NMR (376 MHz, $CDCl_3$)

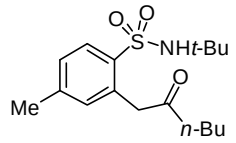




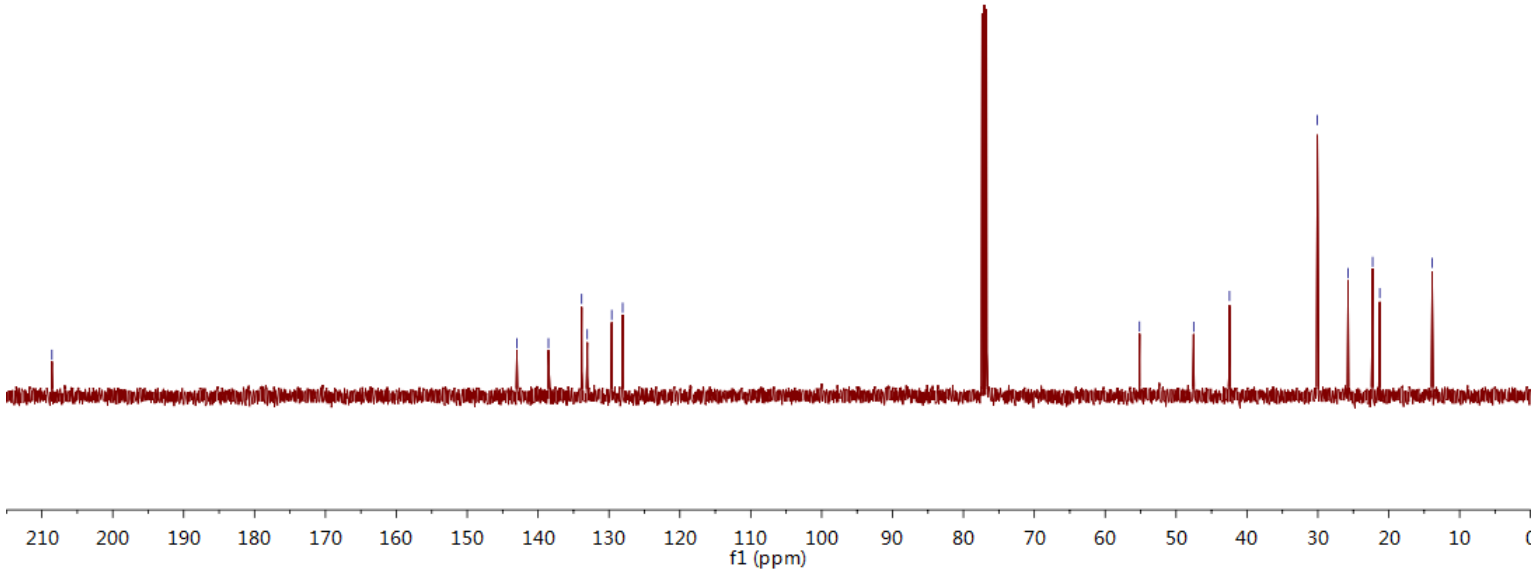
3l ^{1}H NMR (400 MHz, $CDCl_3$)

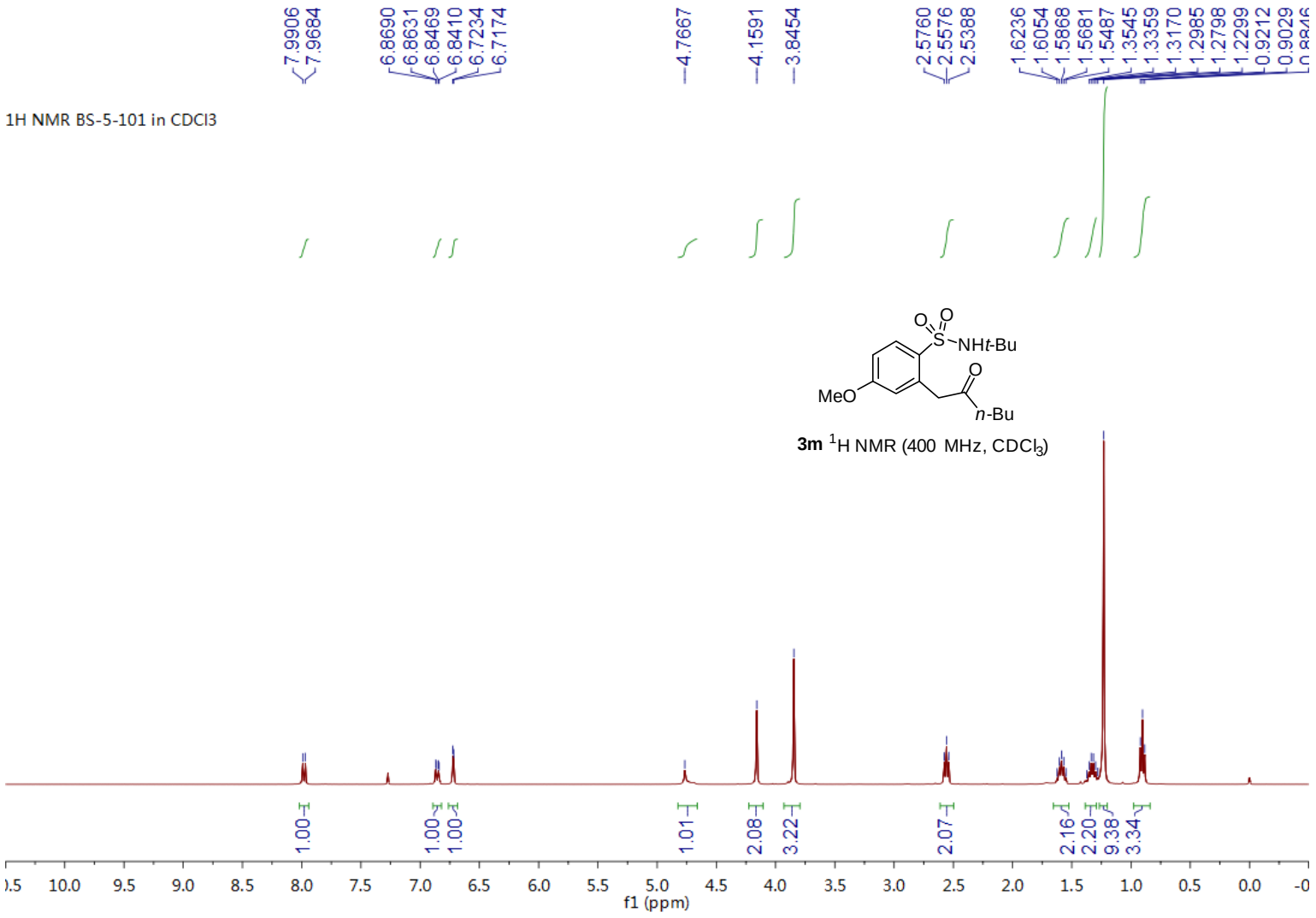
208.58
142.99
138.54
133.85
133.06
129.61
128.07
55.15
47.52
42.47
30.07
25.74
22.27
21.27
13.87

13C NMR BS-5-100B in CDCl3

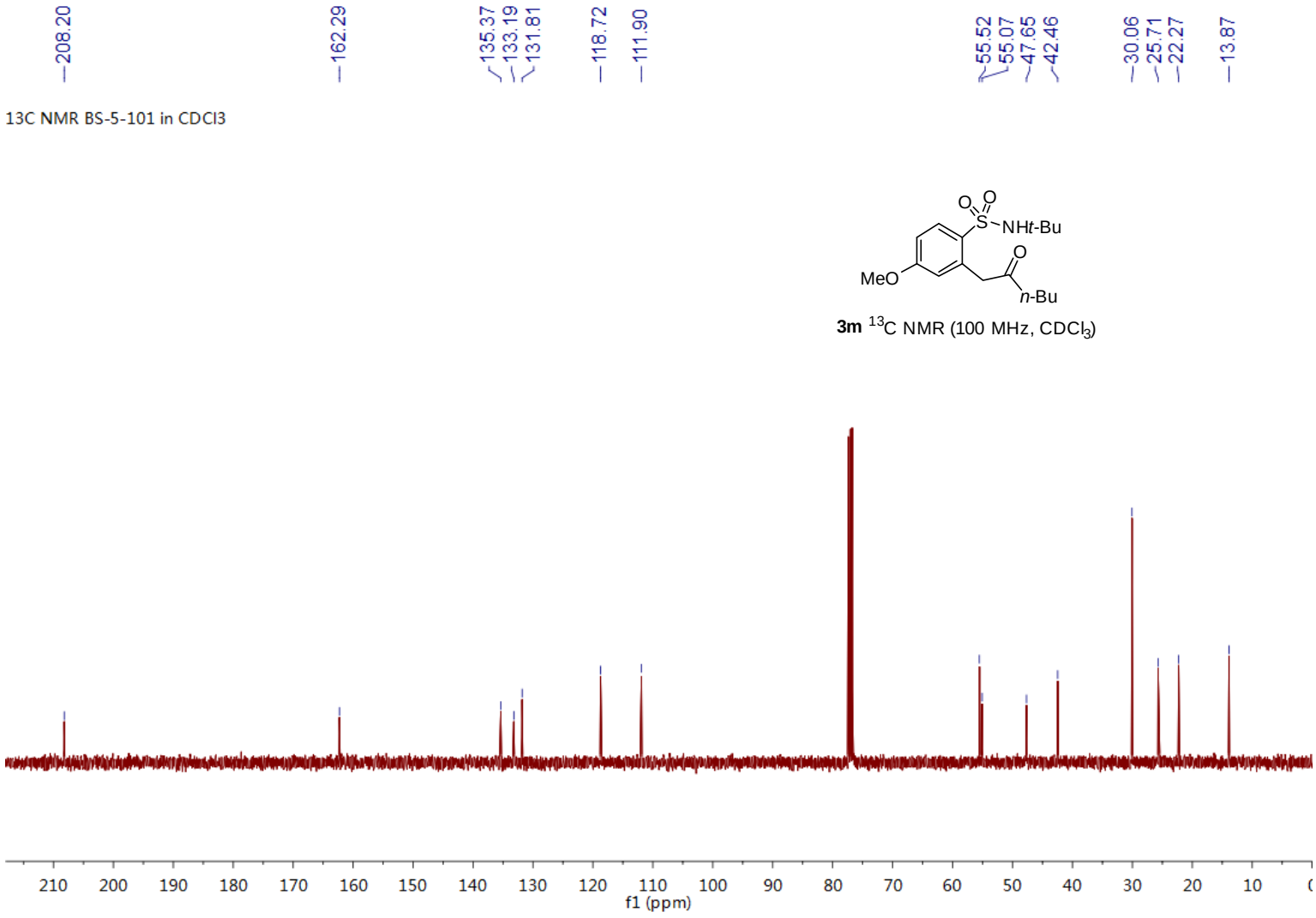


3l ^{13}C NMR (100 MHz, $CDCl_3$)

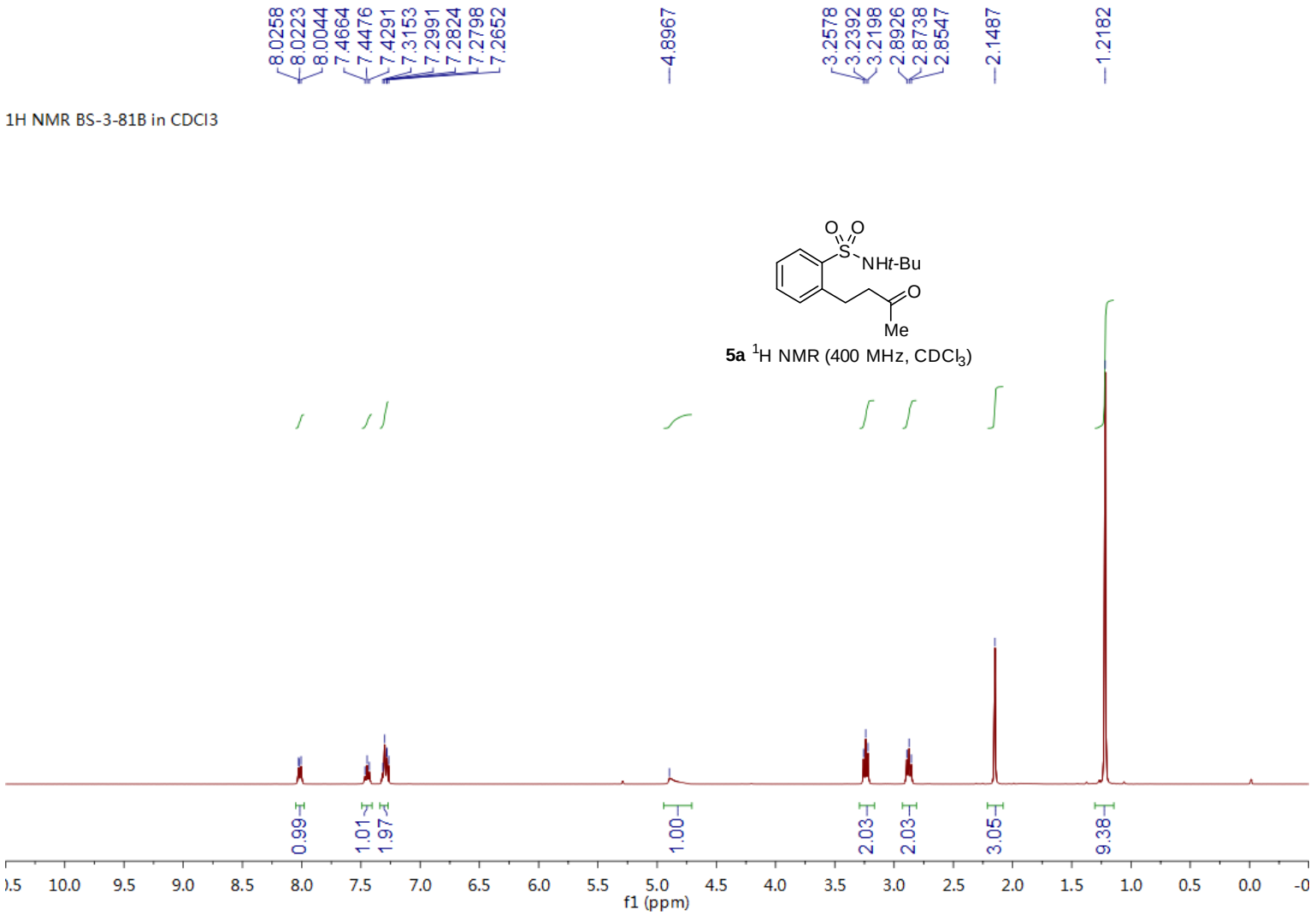




3m ^{1}H NMR (400 MHz, $CDCl_3$)



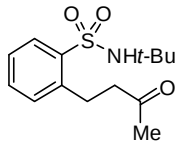
3m ^{13}C NMR (100 MHz, $CDCl_3$)



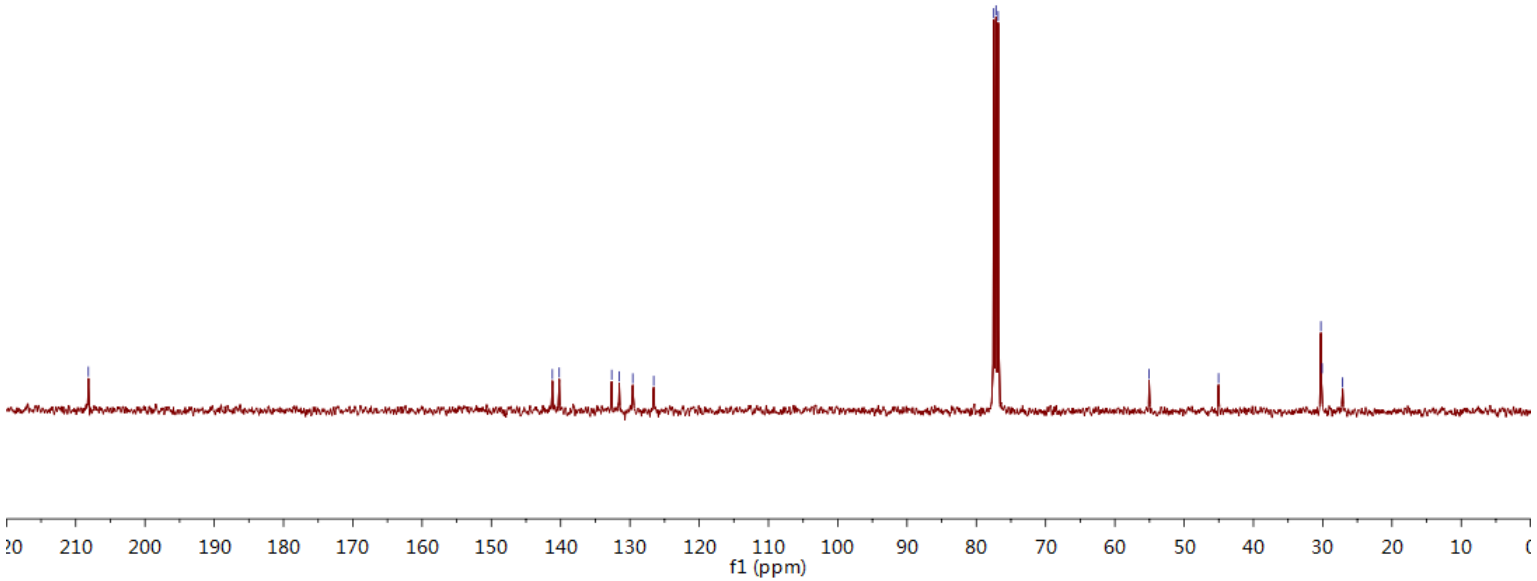
5a ^{1}H NMR (400 MHz, $CDCl_3$)

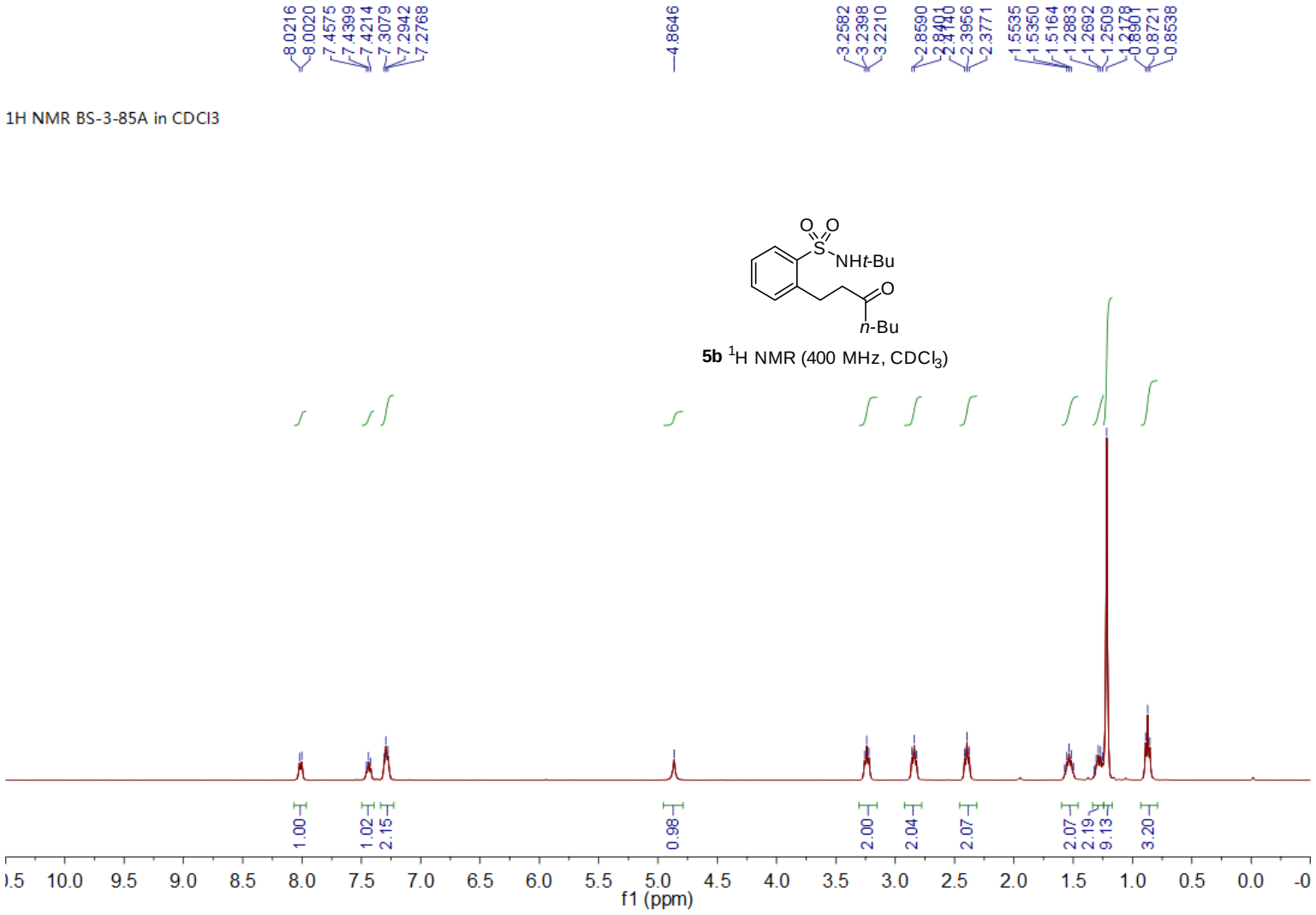
208.17
141.19
140.20
132.63
131.54
129.59
126.57
77.48
77.16
76.84
55.05
45.03
30.27
30.09
27.12

13C NMR BS-3-81B in CDCl3



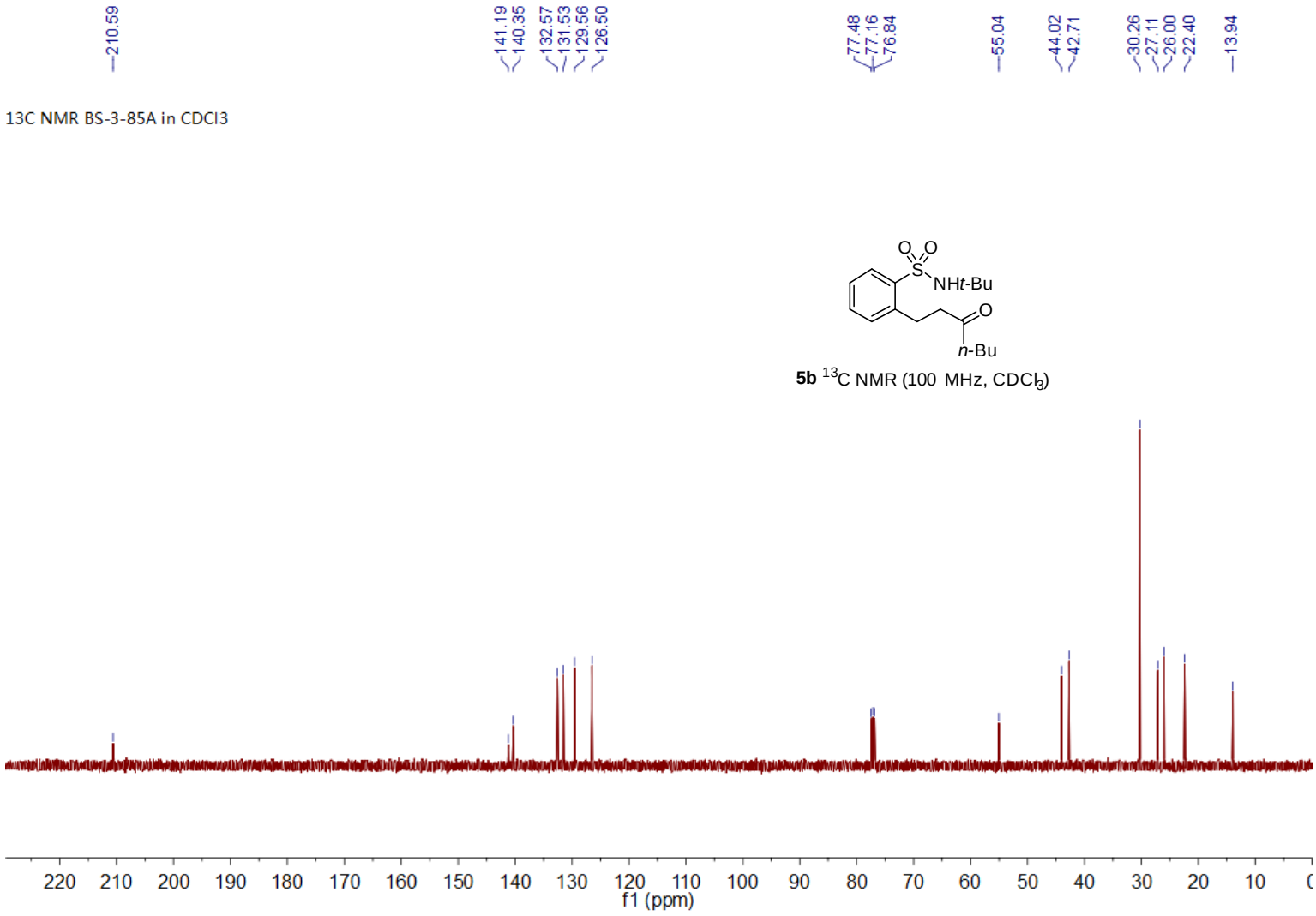
5a ^{13}C NMR (100 MHz, $CDCl_3$)



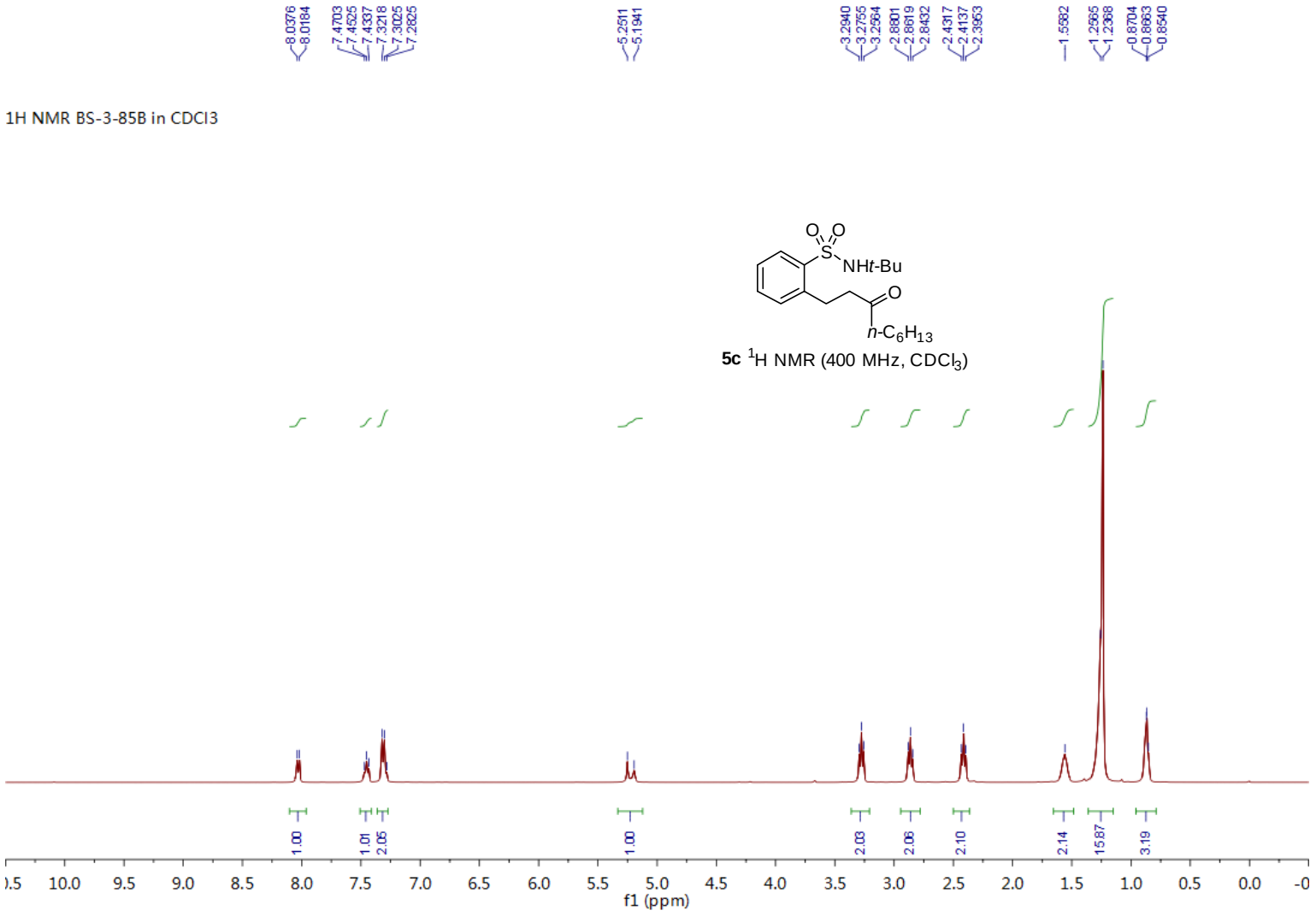


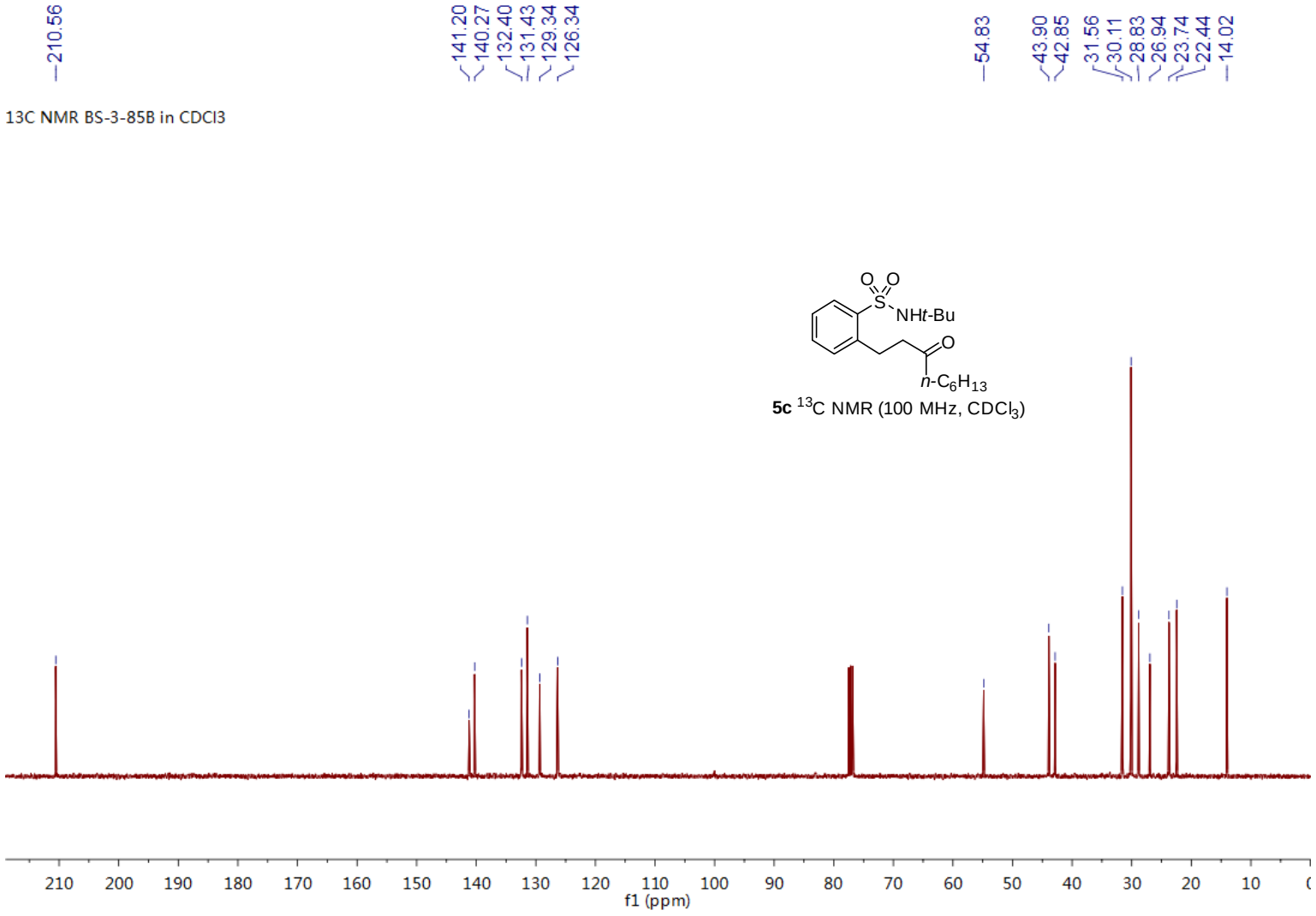
1H NMR BS-3-85A in CDCl3

5b ^{1}H NMR (400 MHz, $CDCl_3$)

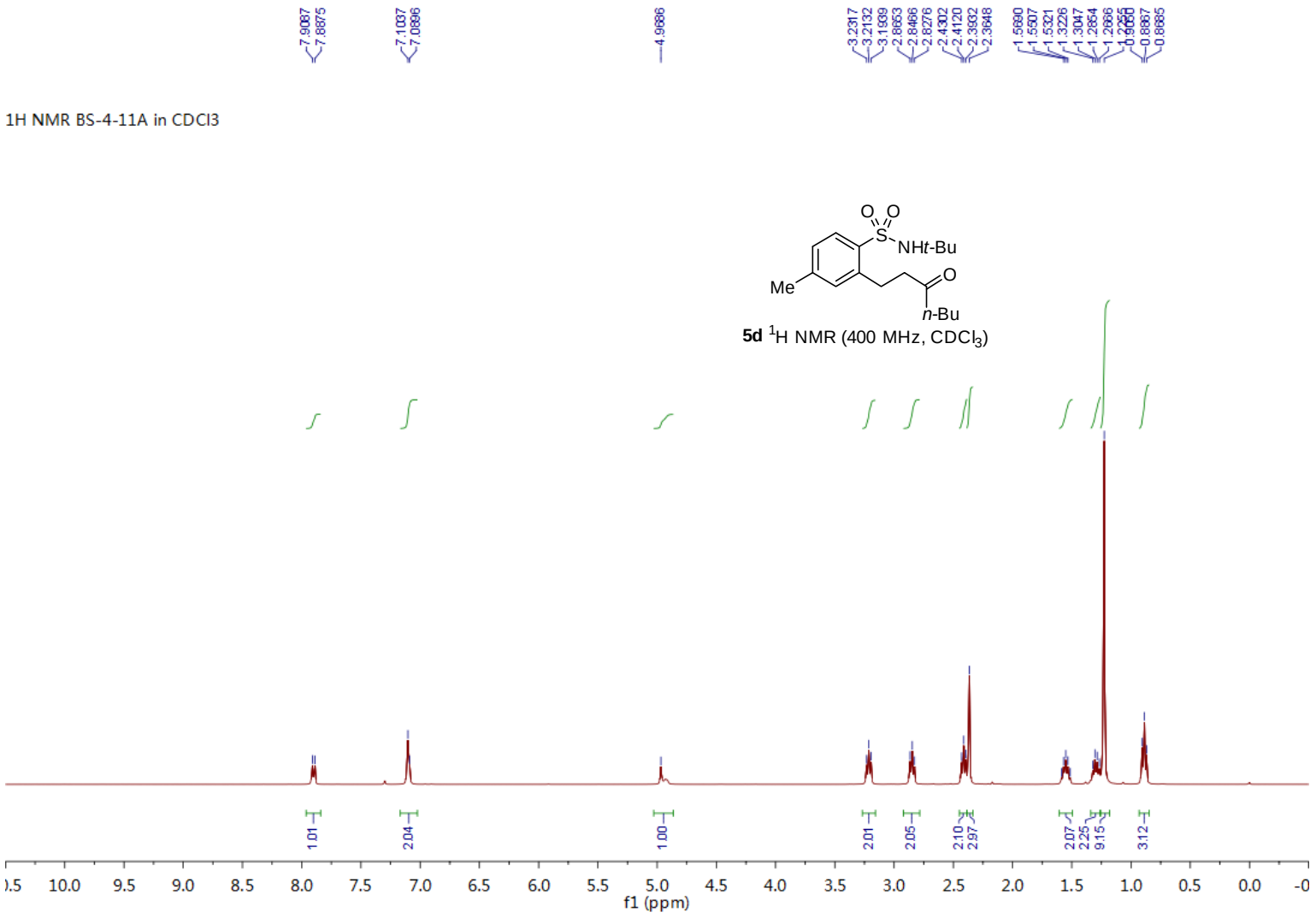


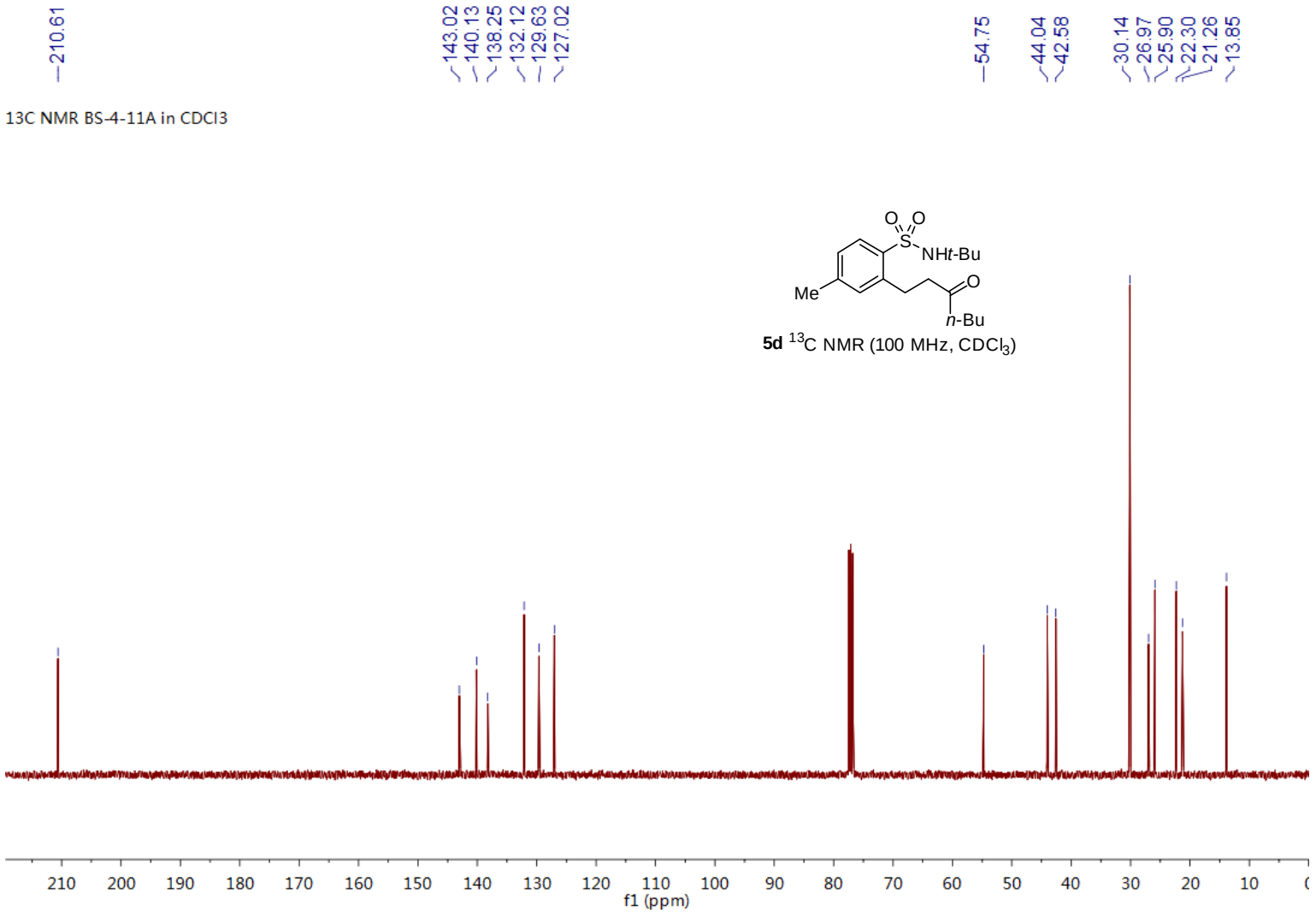
5b ^{13}C NMR (100 MHz, $CDCl_3$)


8.0376
8.0184
7.4703
7.4525
7.4337
7.3218
7.3025
7.2825
5.2511
5.1941
3.2940
3.2755
3.2564
2.8801
2.8619
2.8432
2.4317
2.4137
2.3953
1.5582
1.2565
1.2368
0.8704
0.8663
0.8540
1H NMR BS-3-85B in CDCl3
NHt-Bu
n-C6H13
5c 1H NMR (400 MHz, CDCl3)
1.00
1.01
2.05
1.00
2.03
2.06
2.10
2.14
15.87
3.19
f1 (ppm)



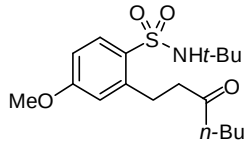
5c ^{13}C NMR (100 MHz, $CDCl_3$)


7.9067
7.8875
7.1037
7.0896
4.9686
3.2317
3.2132
3.1939
2.8653
2.8496
2.8276
2.4302
2.4120
2.3932
2.3648
1.5690
1.5507
1.5321
1.3226
1.3047
1.2854
1.2666
1.2255
0.9055
0.8867
0.8685
1H NMR BS-4-11A in CDCl3
O
O
S
NHt-Bu
Me
O
n-Bu
5d 1H NMR (400 MHz, CDCl3)
1.01
2.04
1.00
2.01
2.05
2.10
2.97
2.07
2.25
9.15
3.12
f1 (ppm)

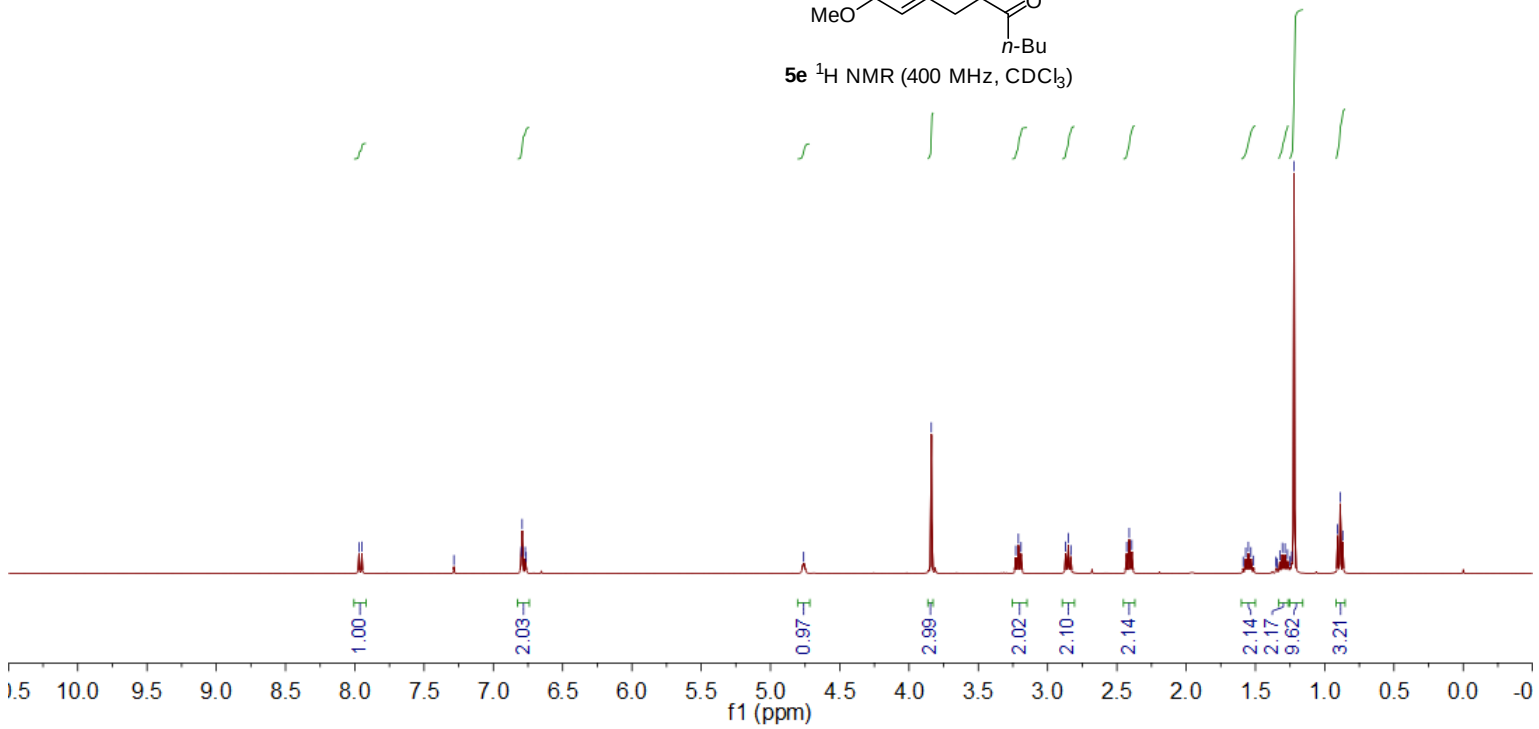


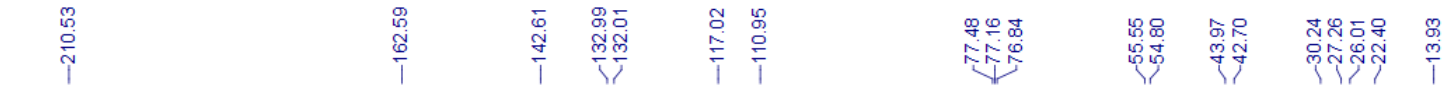
5d ^{13}C NMR (100 MHz, $CDCl_3$)

1H NMR BS-4-14A in CDCl3

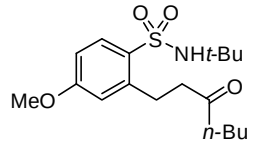


5e ^{1}H NMR (400 MHz, $CDCl_3$)

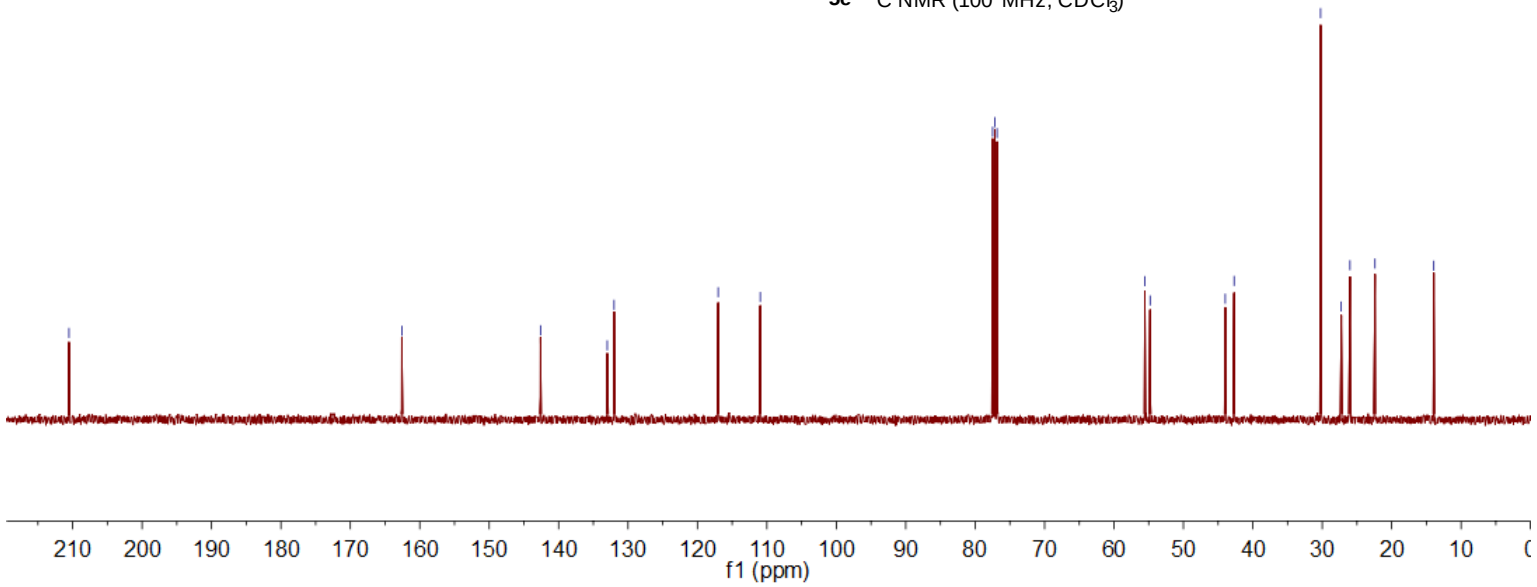


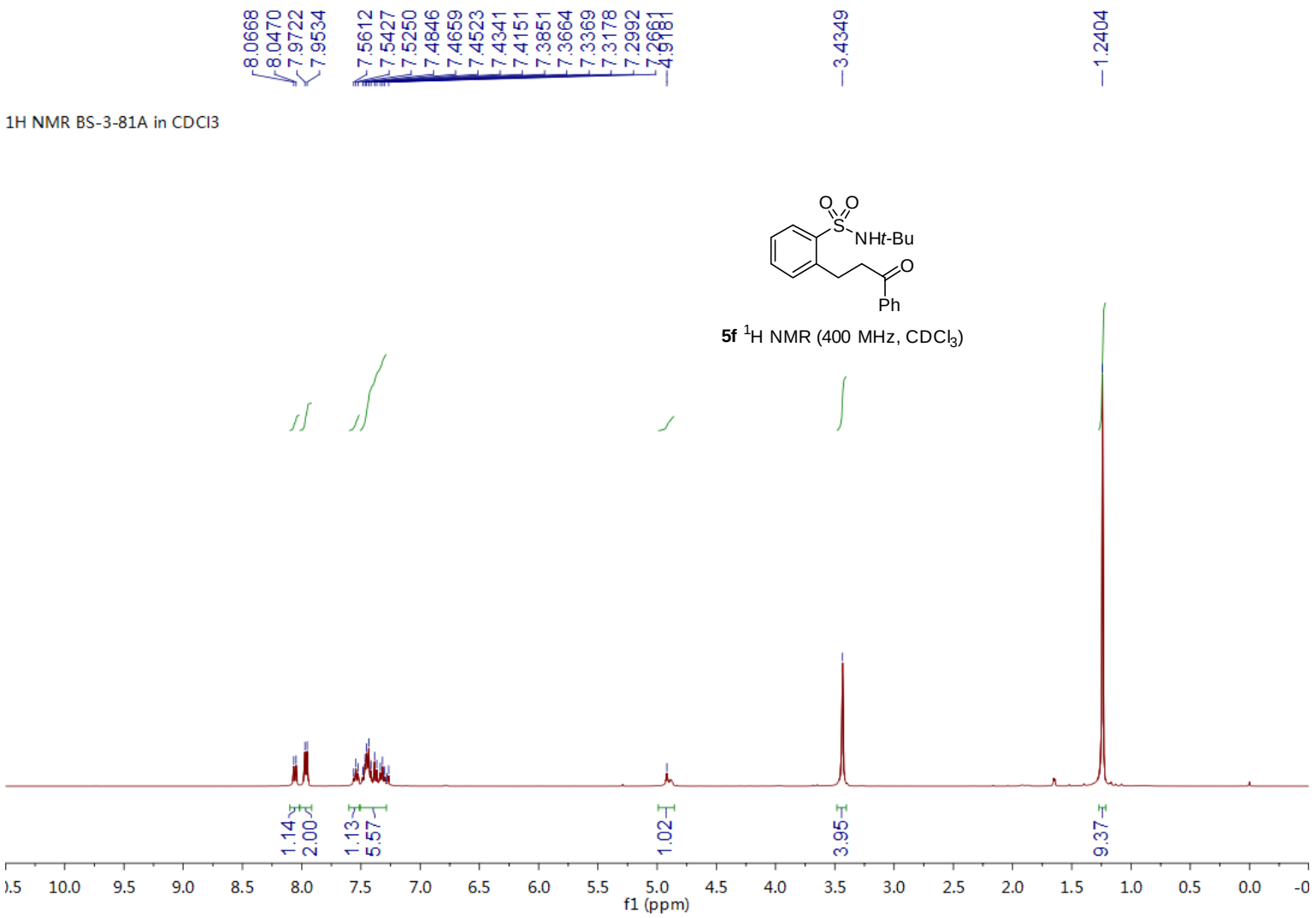


13C NMR BS-4-14A in CDCl3

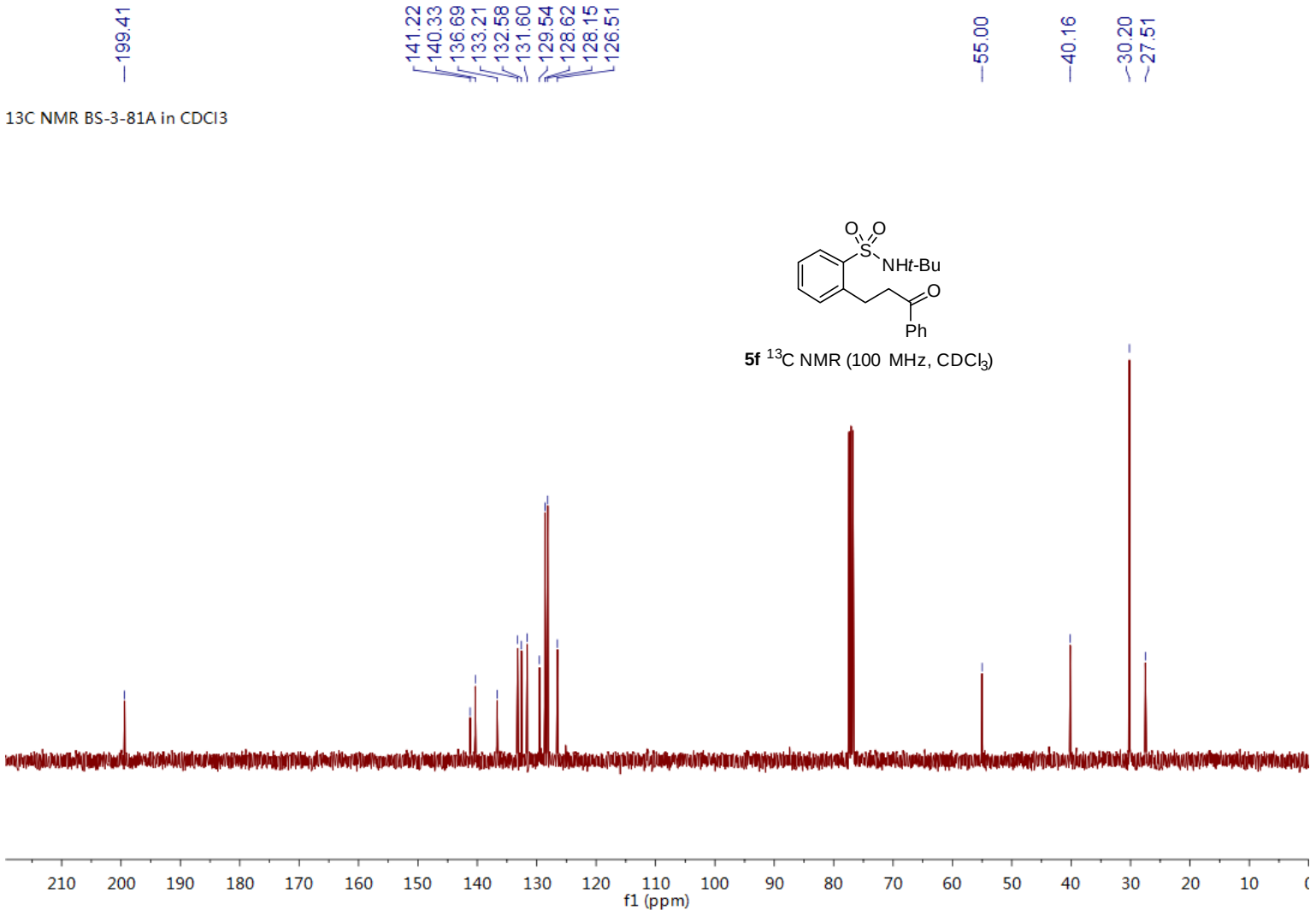


5e ^{13}C NMR (100 MHz, $CDCl_3$)

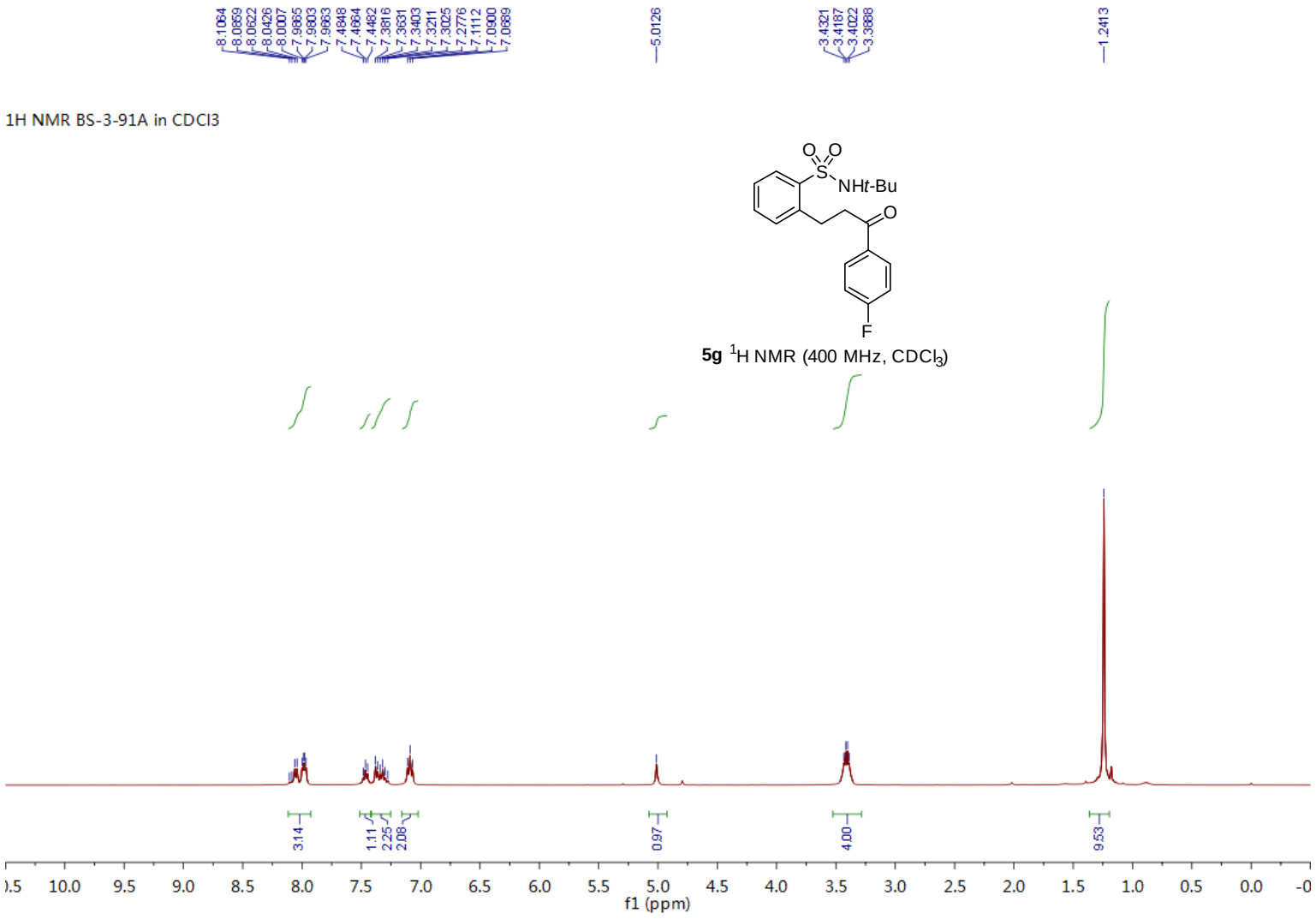


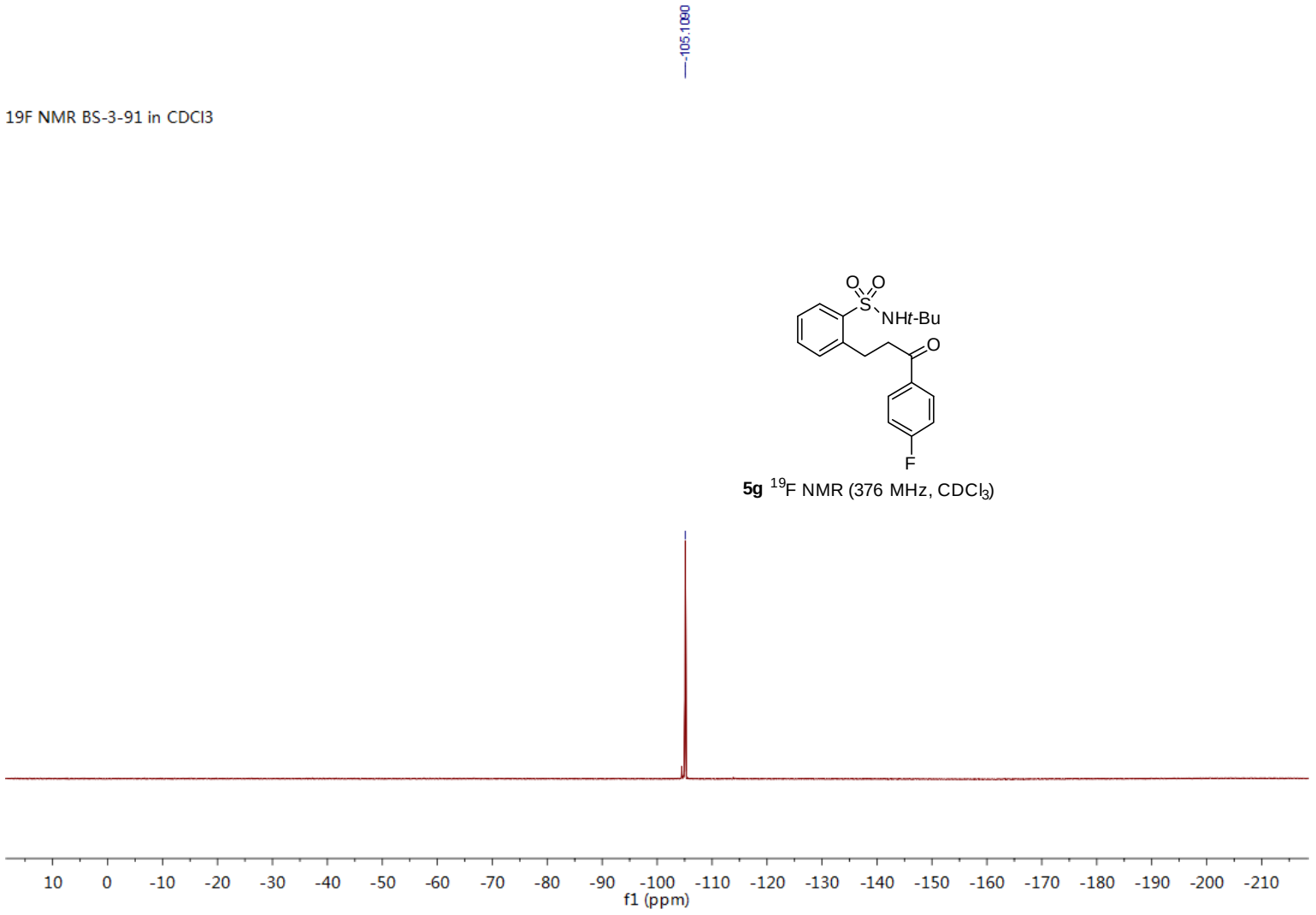


5f ^{1}H NMR (400 MHz, $CDCl_3$)



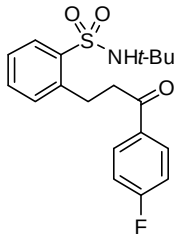
5f ^{13}C NMR (100 MHz, $CDCl_3$)


8.1064
8.0859
8.0622
8.0426
8.0007
7.9865
7.9803
7.9663
7.4848
7.4664
7.4482
7.3816
7.3631
7.3403
7.3211
7.3025
7.2776
7.1112
7.0900
7.0689
5.0126
3.4321
3.4187
3.4022
3.3888
1.2413
1H NMR BS-3-91A in CDCl3
O
O
S
NHt-Bu
O
F
5g 1H NMR (400 MHz, CDCl3)
3.14
1.11
2.25
2.08
0.97
4.00
9.53
f1 (ppm)

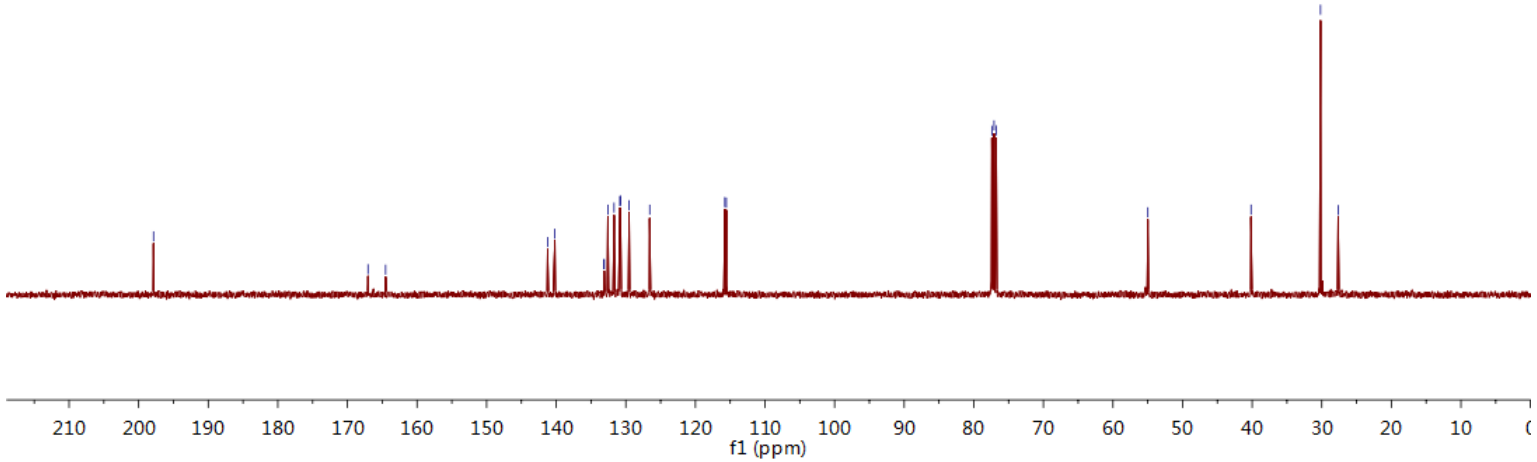


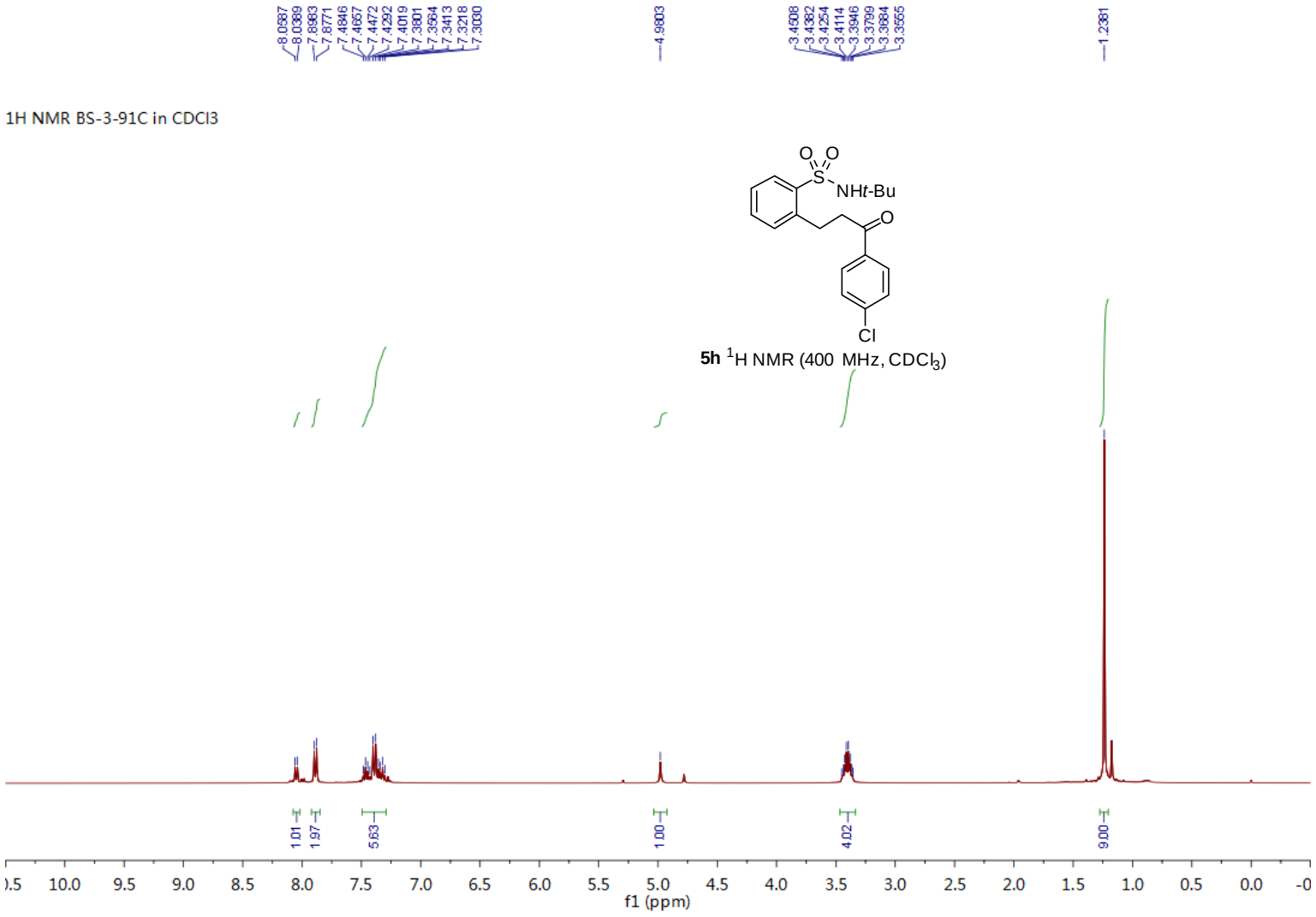
5g ^{19}F NMR (376 MHz, $CDCl_3$)

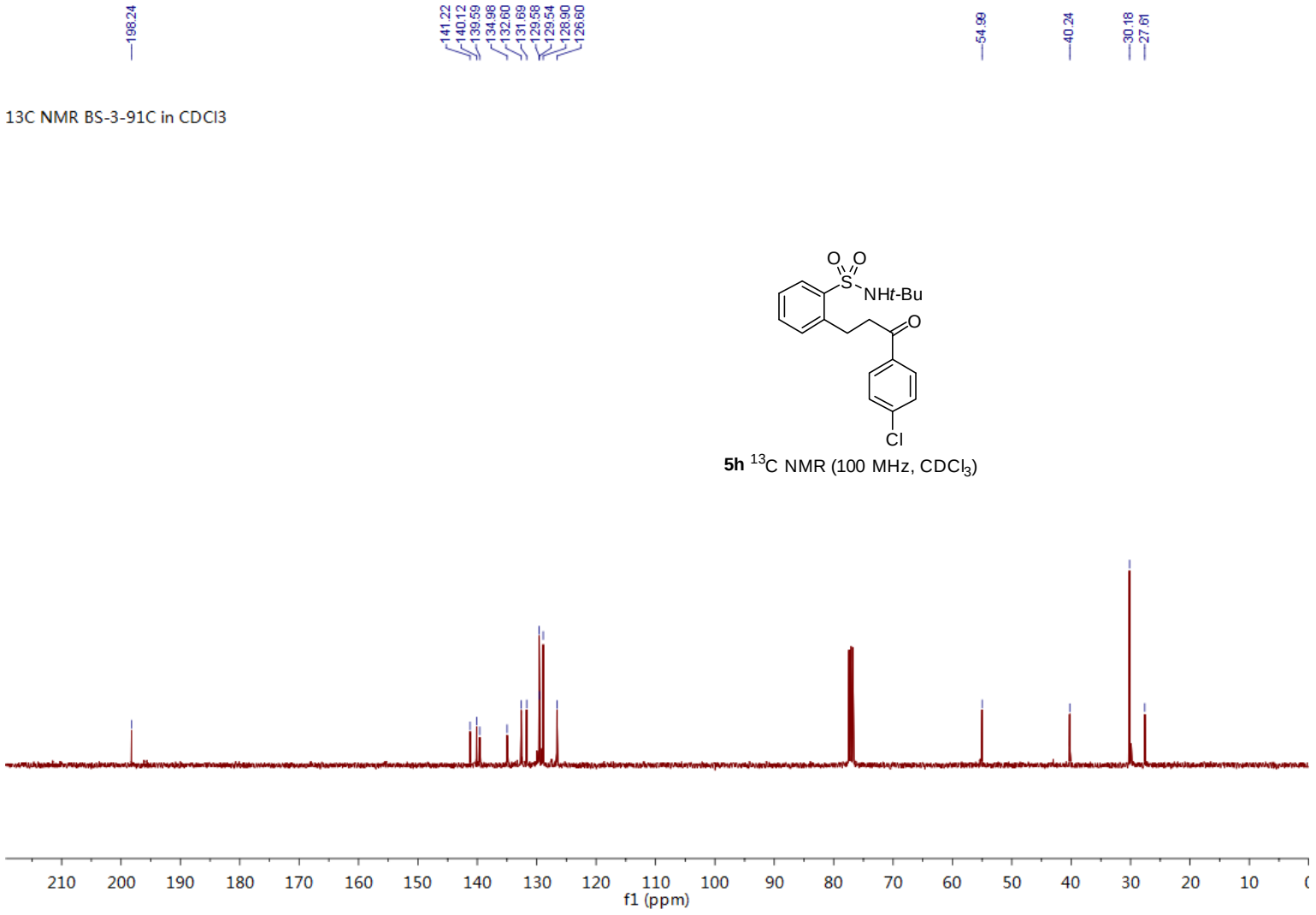
13C NMR BS-3-91A in CDCl3



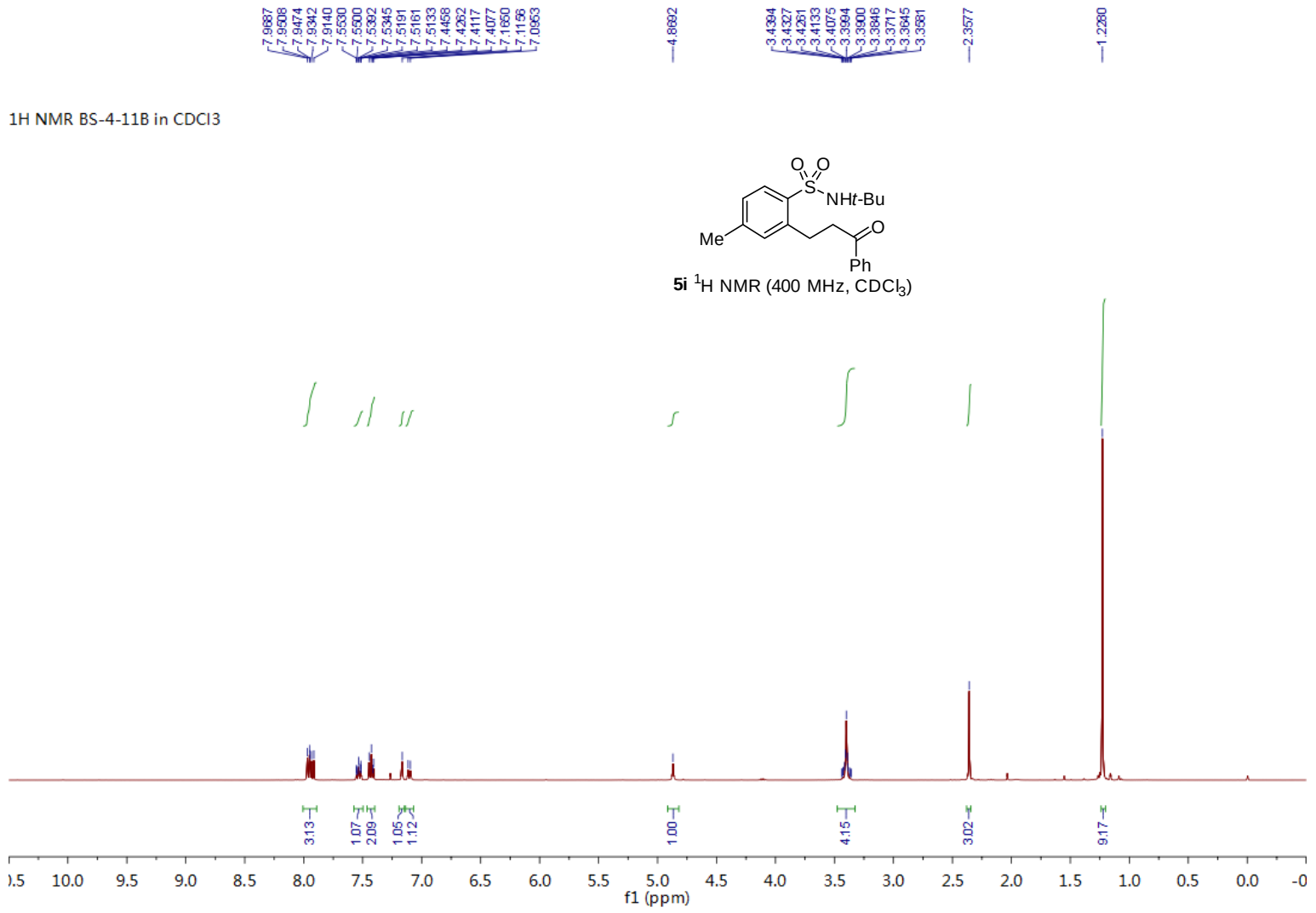
5g ^{13}C NMR (100 MHz, $CDCl_3$)




8.0387
8.0389
7.8963
7.8771
7.4846
7.4657
7.4472
7.4292
7.4019
7.3801
7.3564
7.3413
7.3218
7.3030
4.9803
3.4508
3.4382
3.4254
3.4114
3.3946
3.3799
3.3684
3.3555
1.2361
1H NMR BS-3-91C in CDCl3
O
O
S
NHt-Bu
O
Cl
5h 1H NMR (400 MHz, CDCl3)
1.01
1.97
5.63
1.00
4.02
9.00
f1 (ppm)

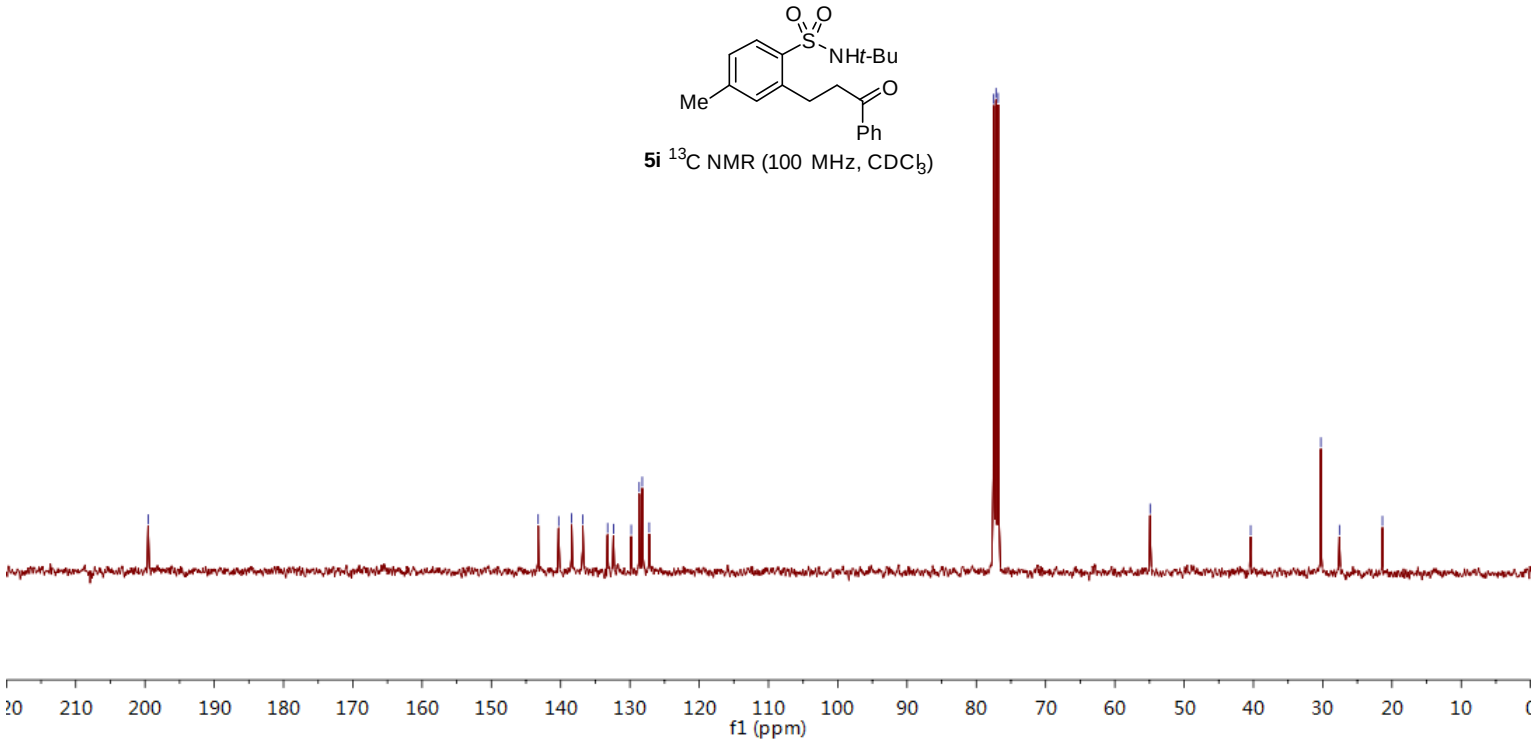


5h ^{13}C NMR (100 MHz, $CDCl_3$)


7.9687
7.9508
7.9474
7.9342
7.9140
7.5530
7.5500
7.5392
7.5345
7.5191
7.5161
7.5133
7.4458
7.4262
7.4117
7.4077
7.1660
7.1156
7.0953
4.8692
3.4394
3.4327
3.4251
3.4133
3.4075
3.3994
3.3900
3.3846
3.3717
3.3645
3.3581
2.3577
1.2280
1H NMR BS-4-11B in CDCl3
O
O
S
NHt-Bu
Me
O
Ph
5i 1H NMR (400 MHz, CDCl3)
3.13
1.07
2.09
1.05
1.12
1.00
4.15
3.02
9.17
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)

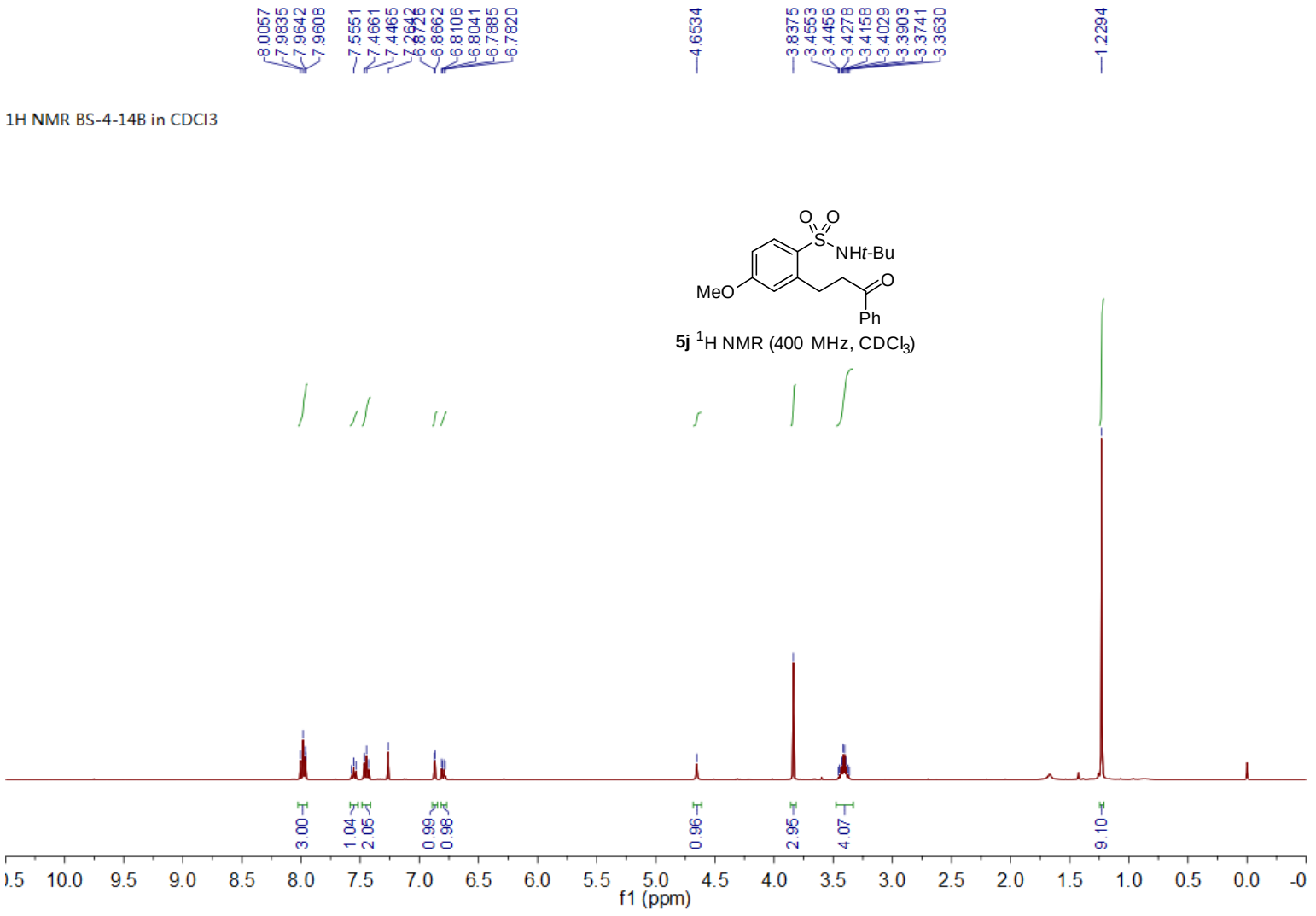
199.55
143.24
140.29
138.41
136.80
133.22
132.38
129.81
128.66
128.22
127.21
77.48
77.16
76.84
54.91
40.40
30.27
27.59
21.38

13C NMR BS-4-11B in CDCl3



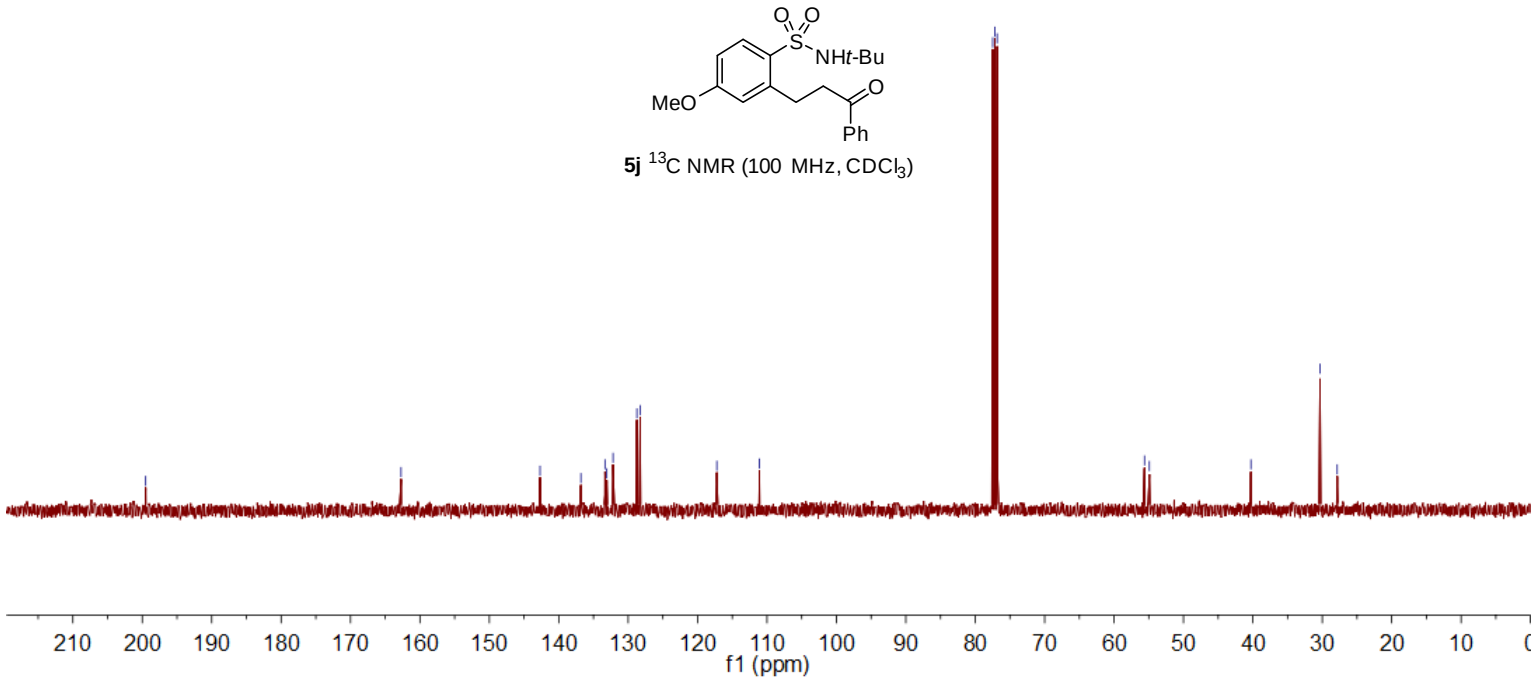
5i ^{13}C NMR (100 MHz, $CDCl_3$)

1H NMR BS-4-14B in CDCl3

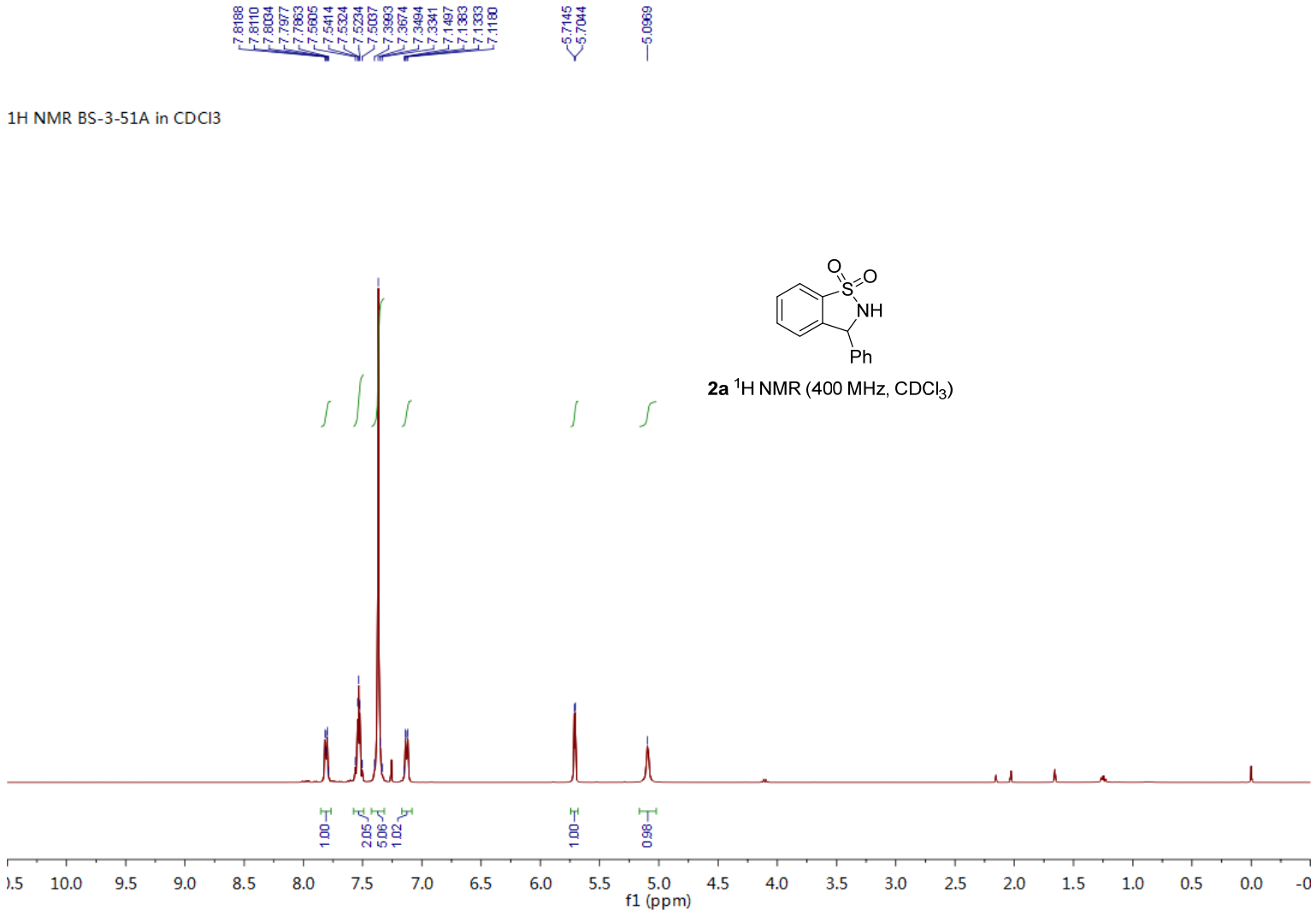


199.51
162.72
142.70
136.81
133.34
133.07
132.18
128.75
128.27
117.23
111.09
77.48
77.16
76.84
55.61
54.91
40.28
30.33
27.85

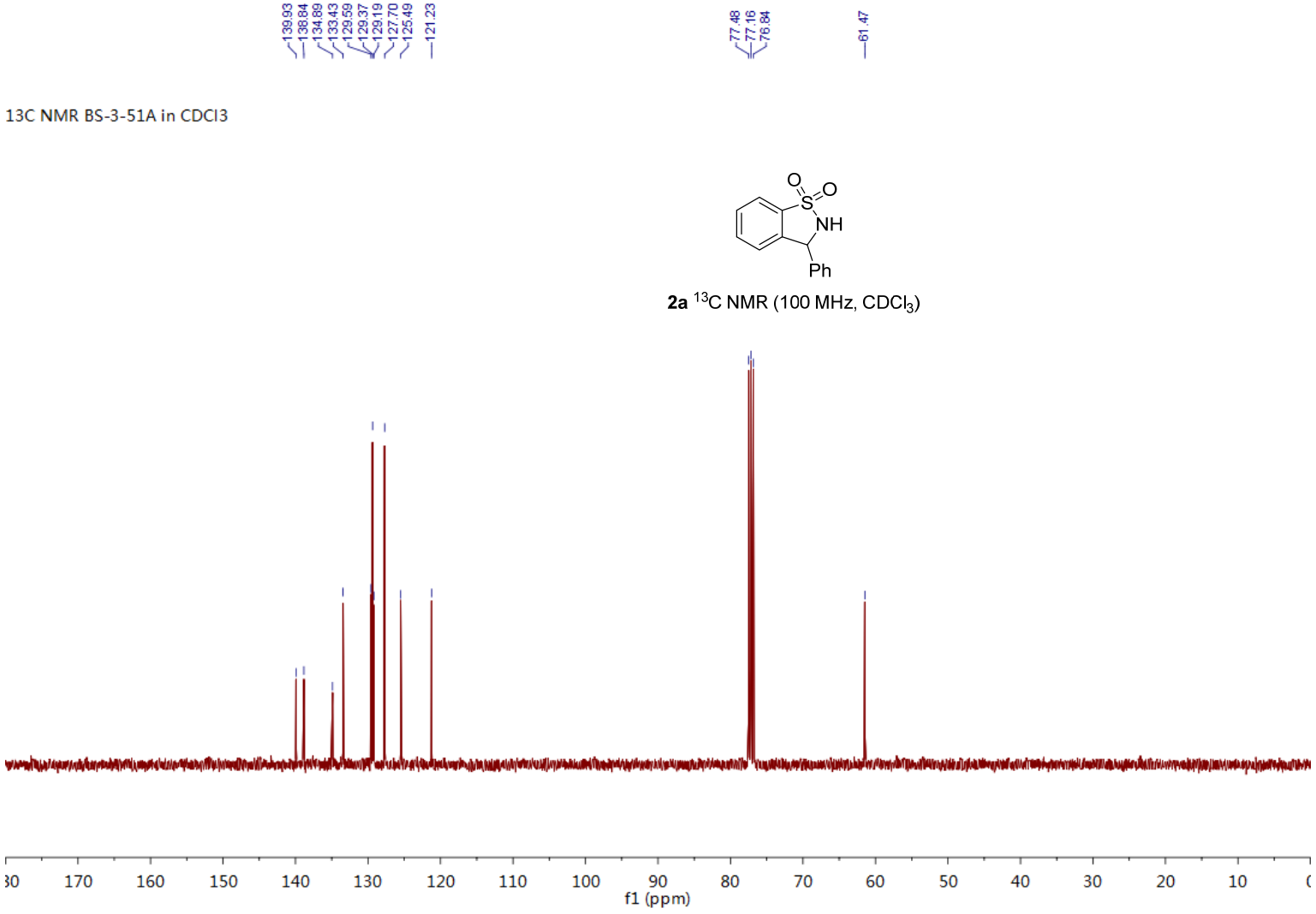
13C NMR BS-4-14B in CDCl3



5j ^{13}C NMR (100 MHz, $CDCl_3$)

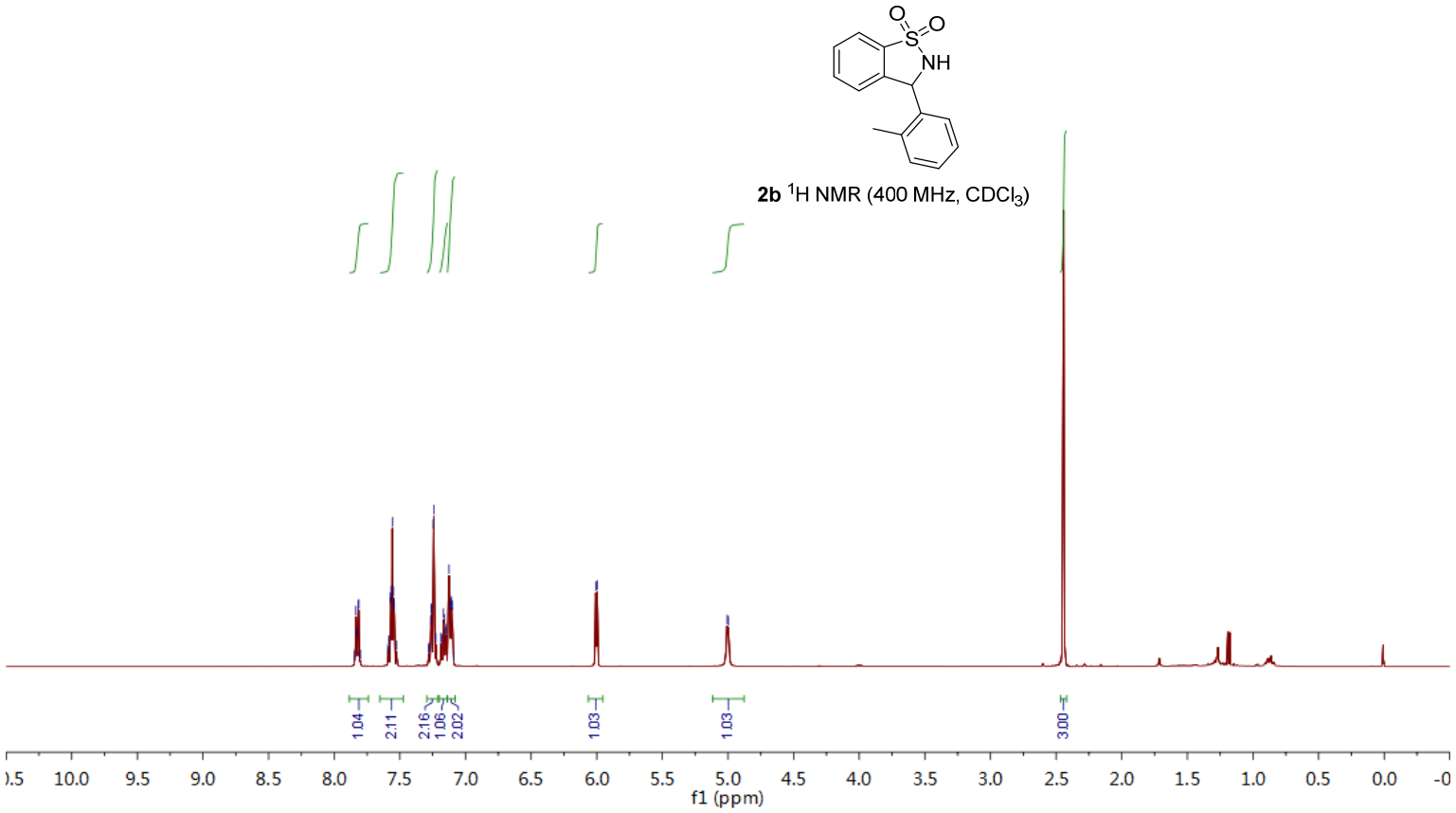


2a ^{1}H NMR (400 MHz, $CDCl_3$)

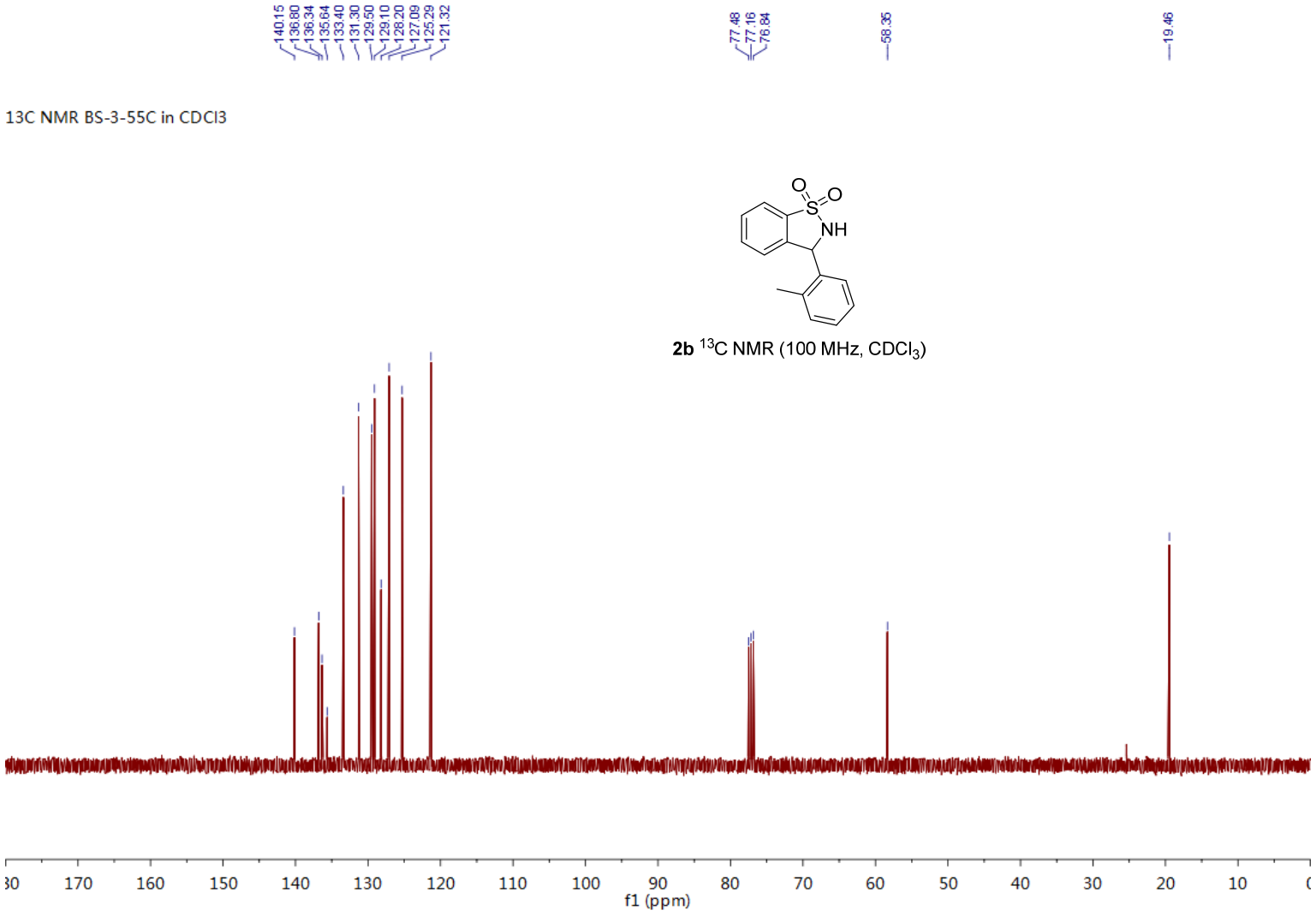


2a ^{13}C NMR (100 MHz, $CDCl_3$)

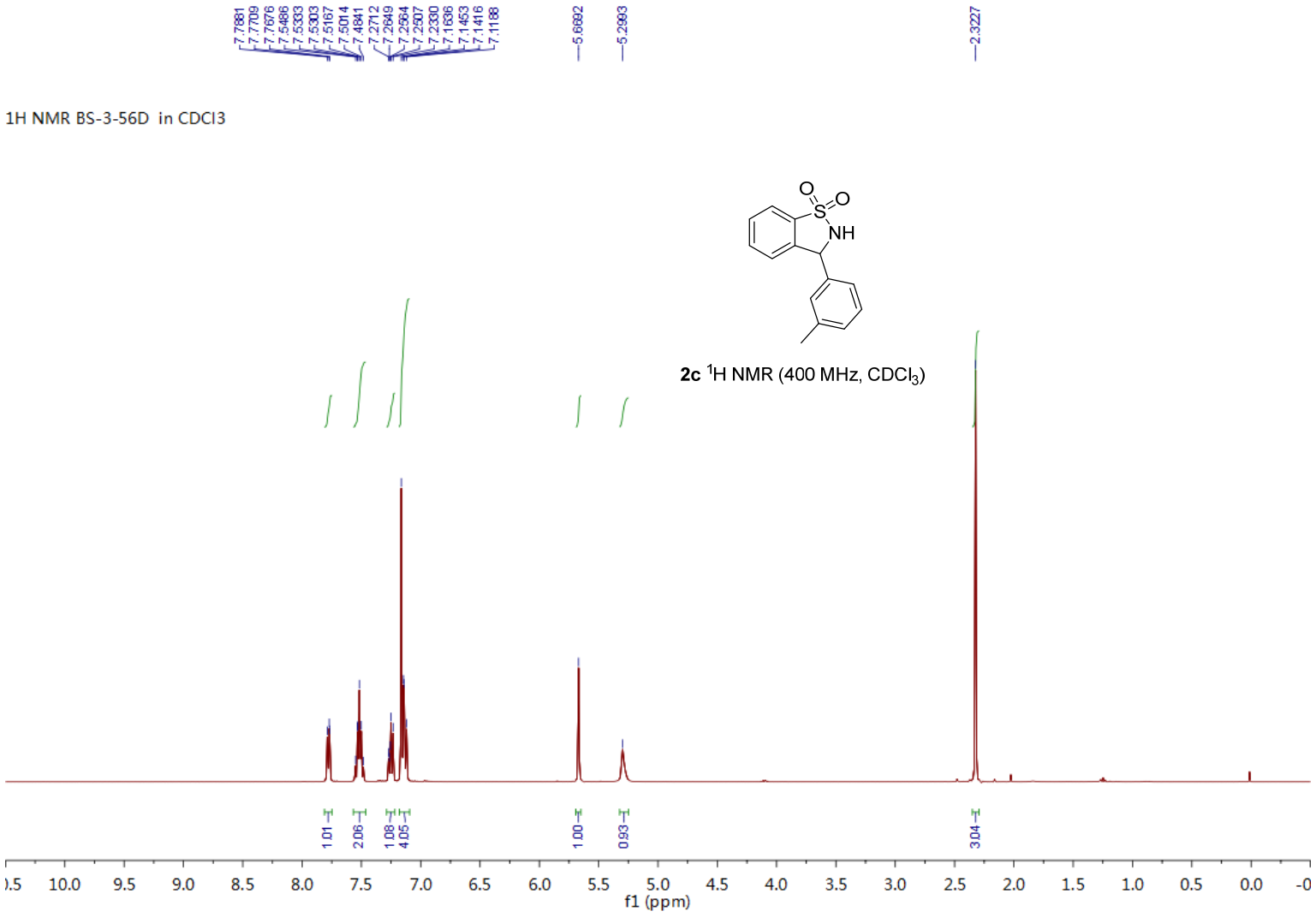
1H NMR BS-3-55C in CDCl3



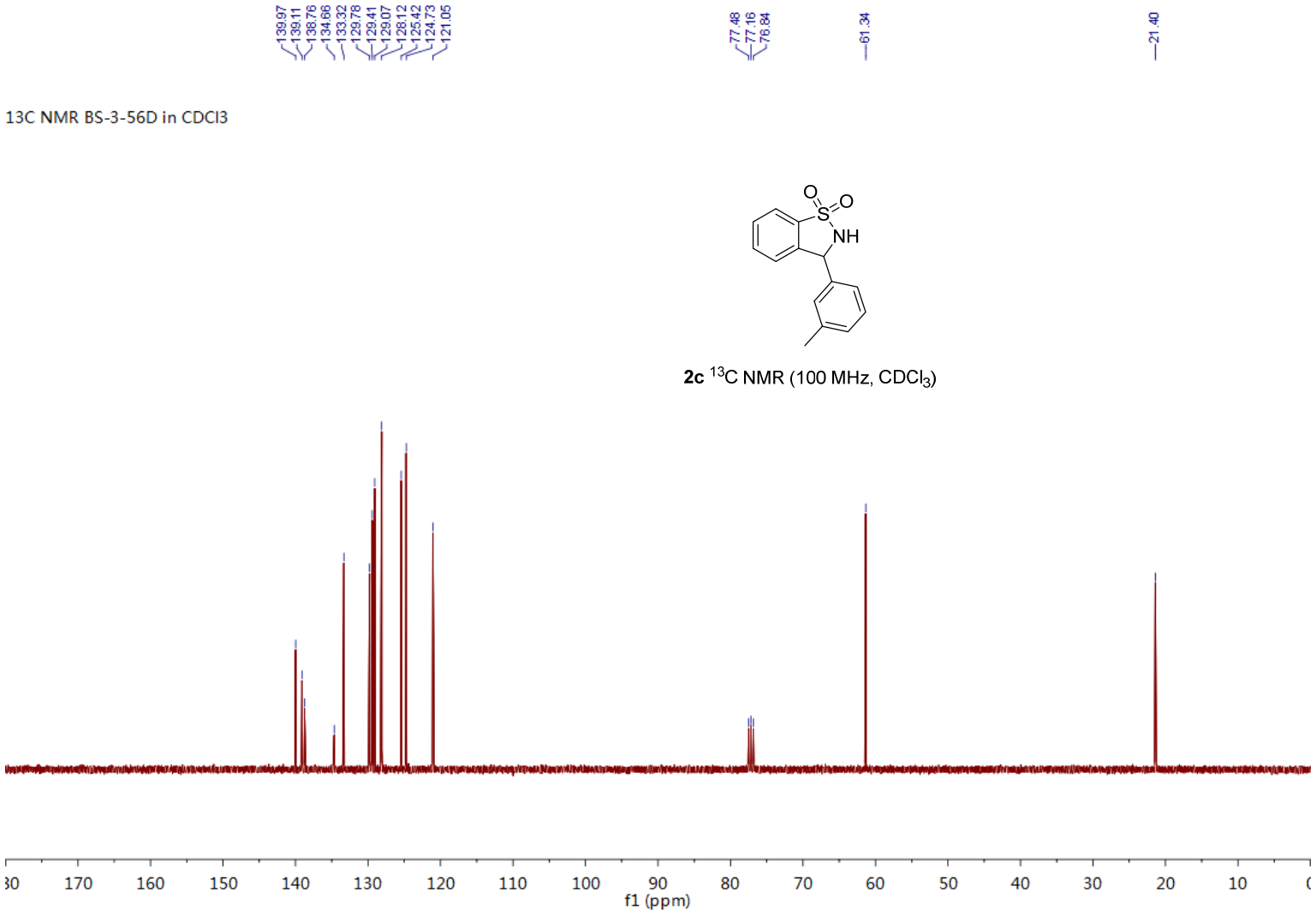
2b ^{1}H NMR (400 MHz, $CDCl_3$)



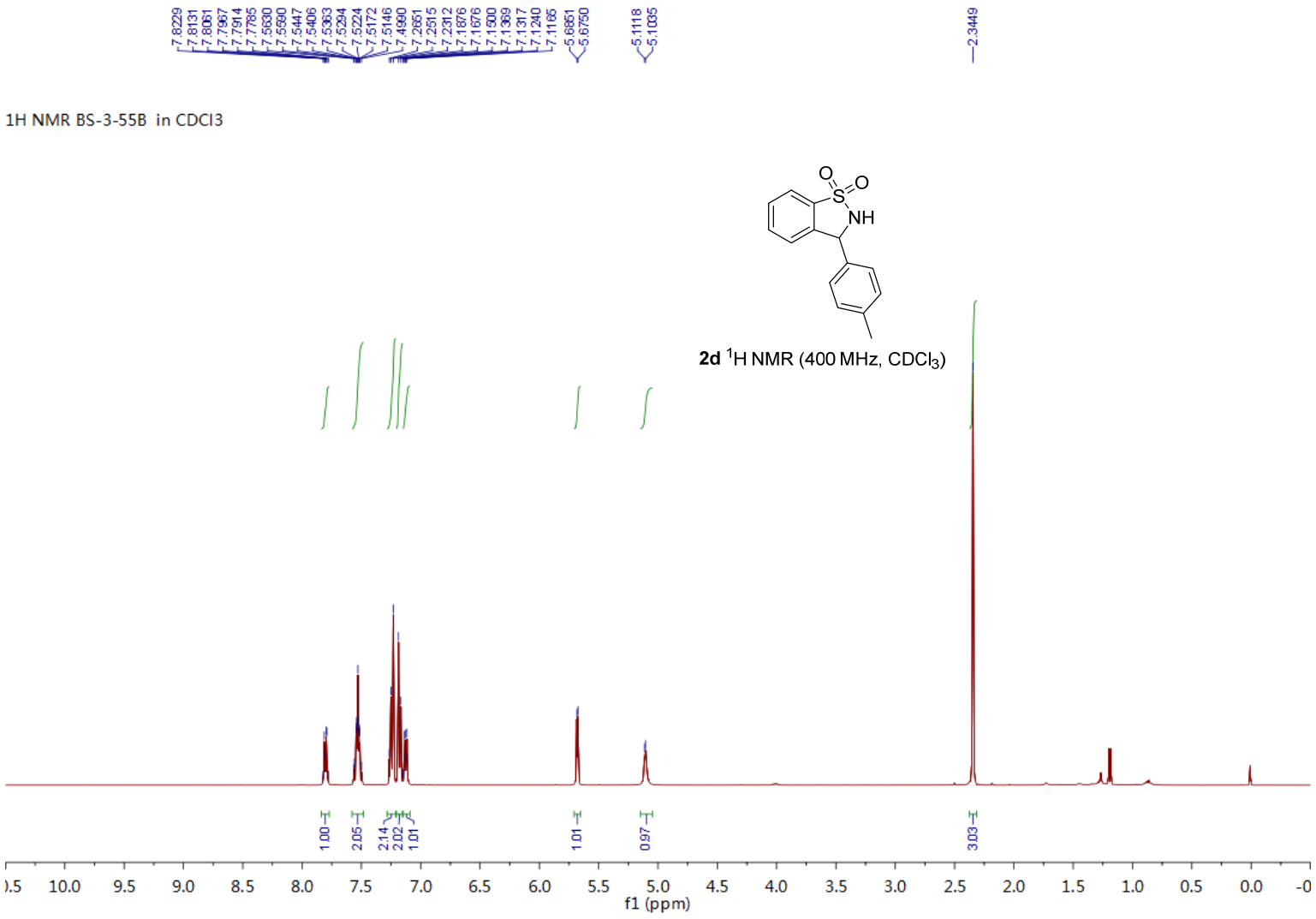
2b ^{13}C NMR (100 MHz, $CDCl_3$)

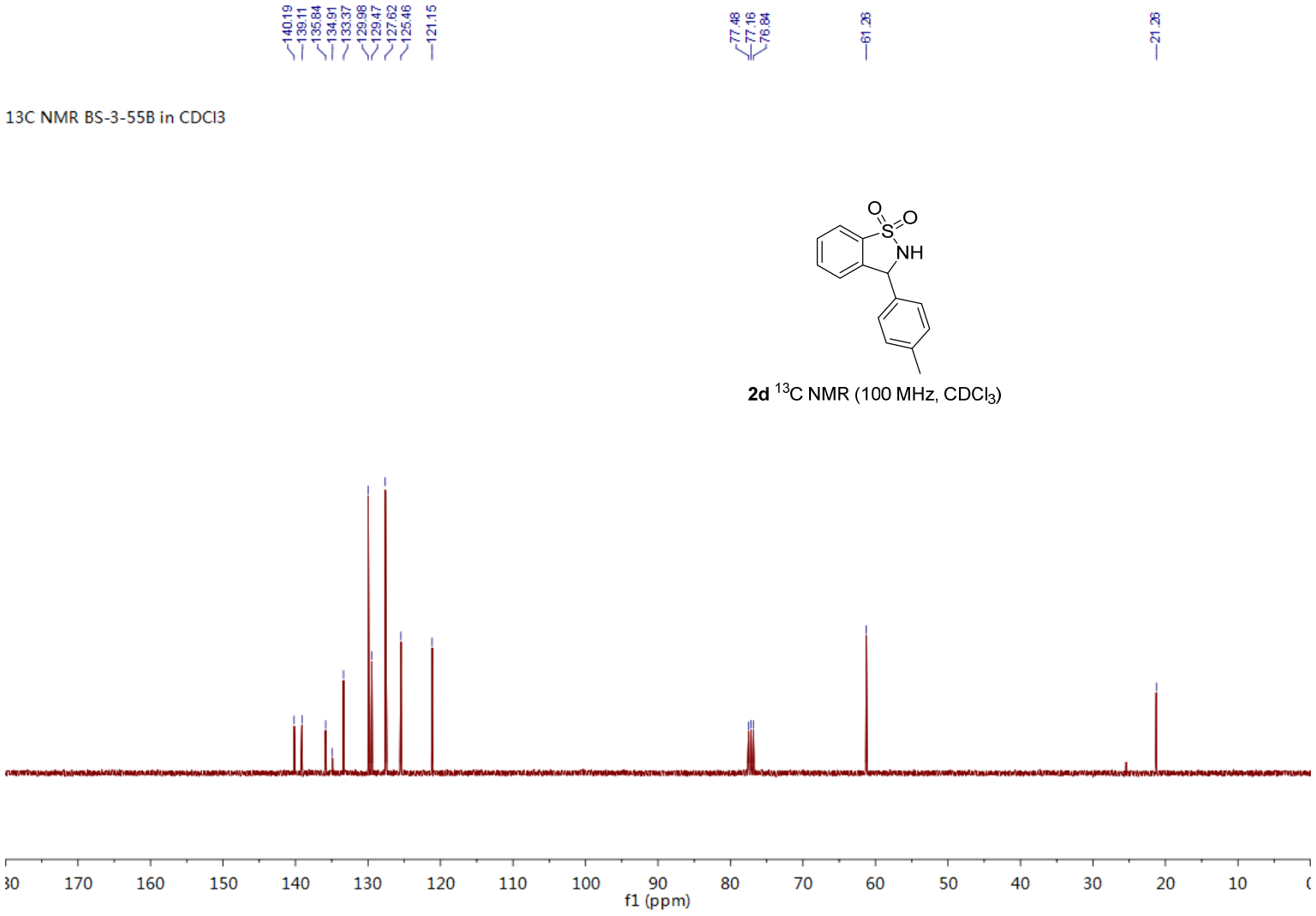


2c ^{1}H NMR (400 MHz, $CDCl_3$)



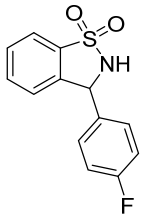
2c ^{13}C NMR (100 MHz, $CDCl_3$)


7.8229
7.8131
7.8061
7.7967
7.7914
7.7785
7.5630
7.5590
7.5447
7.5406
7.5363
7.5294
7.5224
7.5172
7.5146
7.4990
7.2651
7.2515
7.2312
7.1876
7.1676
7.1500
7.1369
7.1317
7.1240
7.1165
5.6851
5.6750
5.1118
5.1035
2.3449
1H NMR BS-3-55B in CDCl3
O
S
O
NH
2d 1H NMR (400 MHz, CDCl3)
1.00
2.05
2.14
2.02
1.01
1.01
0.97
3.03
f1 (ppm)

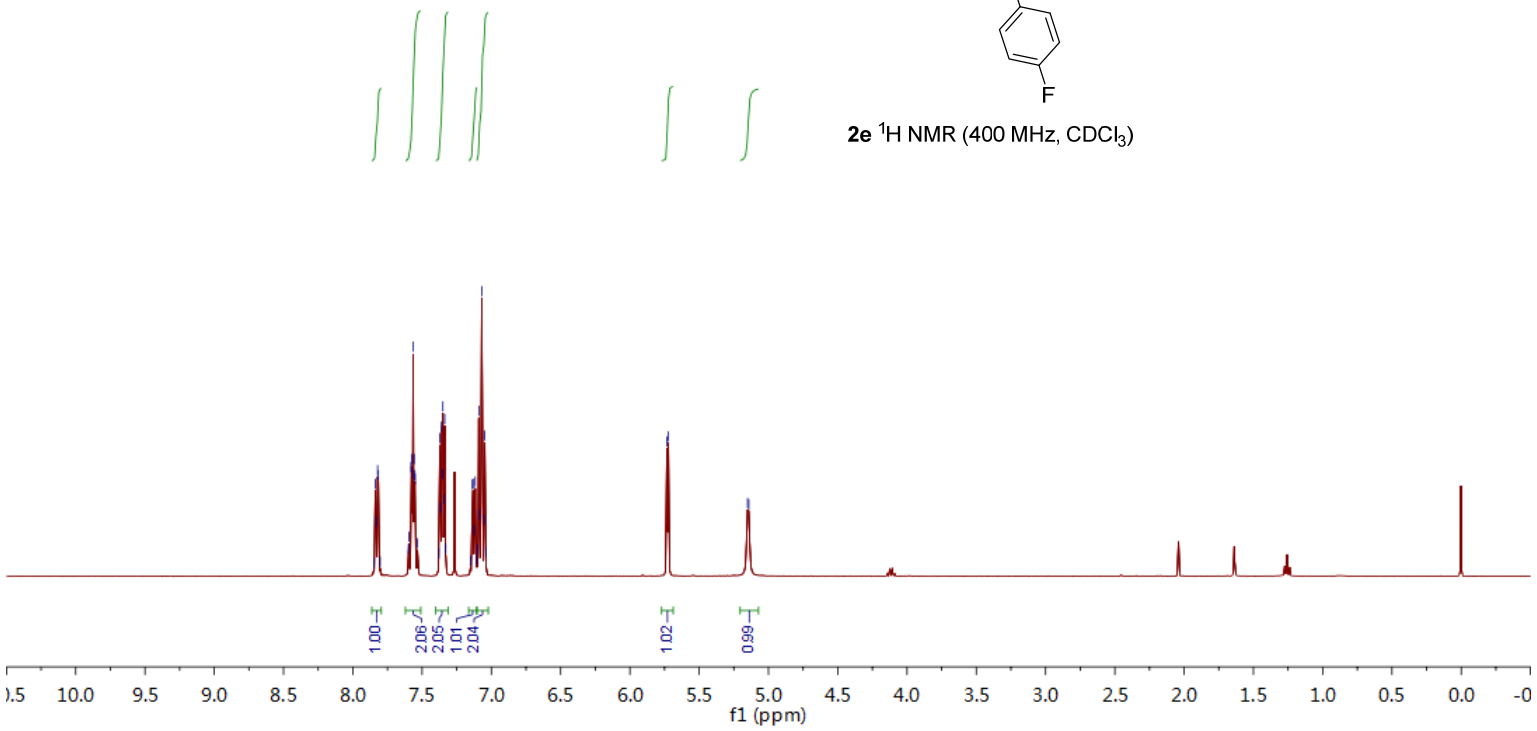


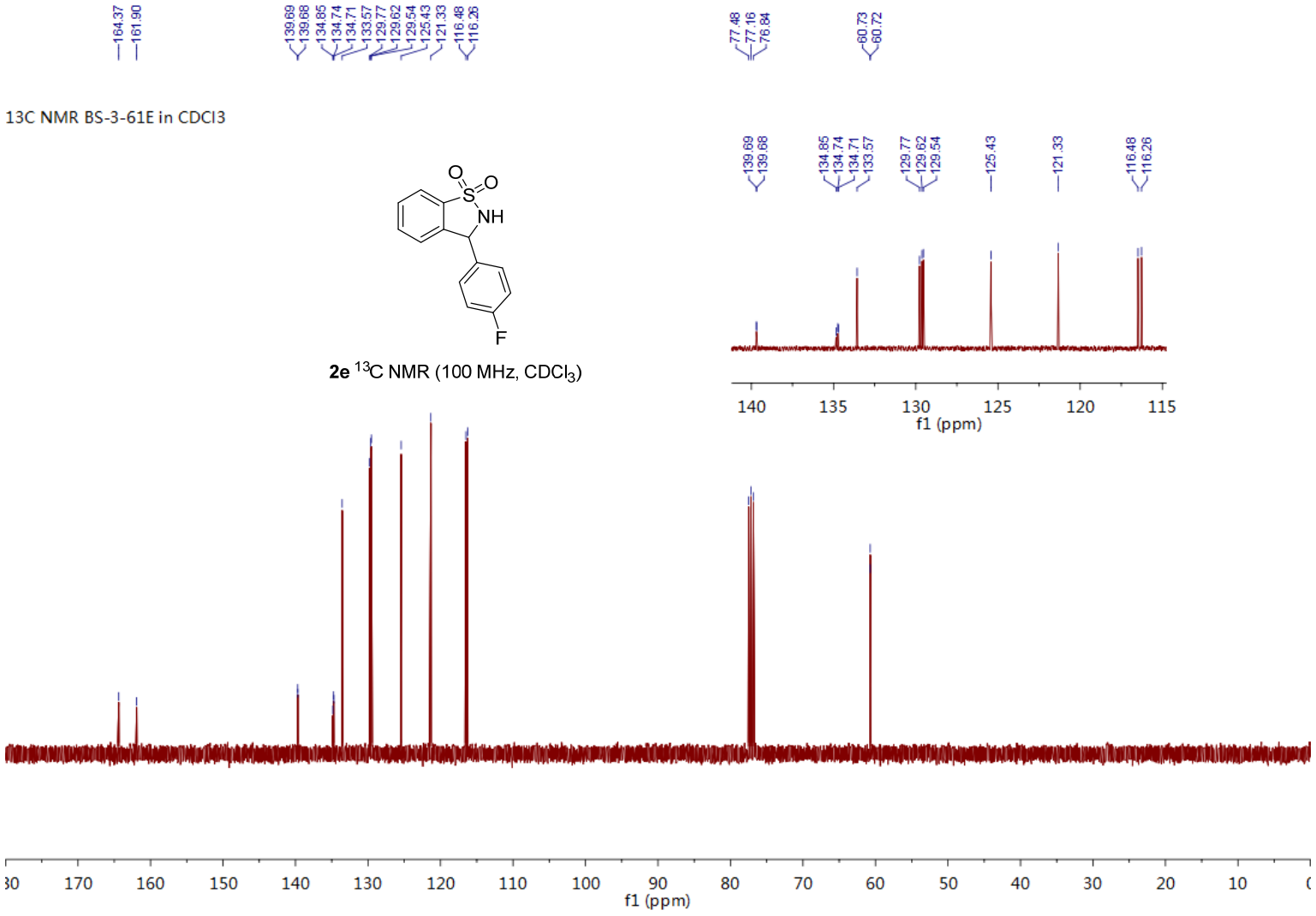
2d ^{13}C NMR (100 MHz, $CDCl_3$)

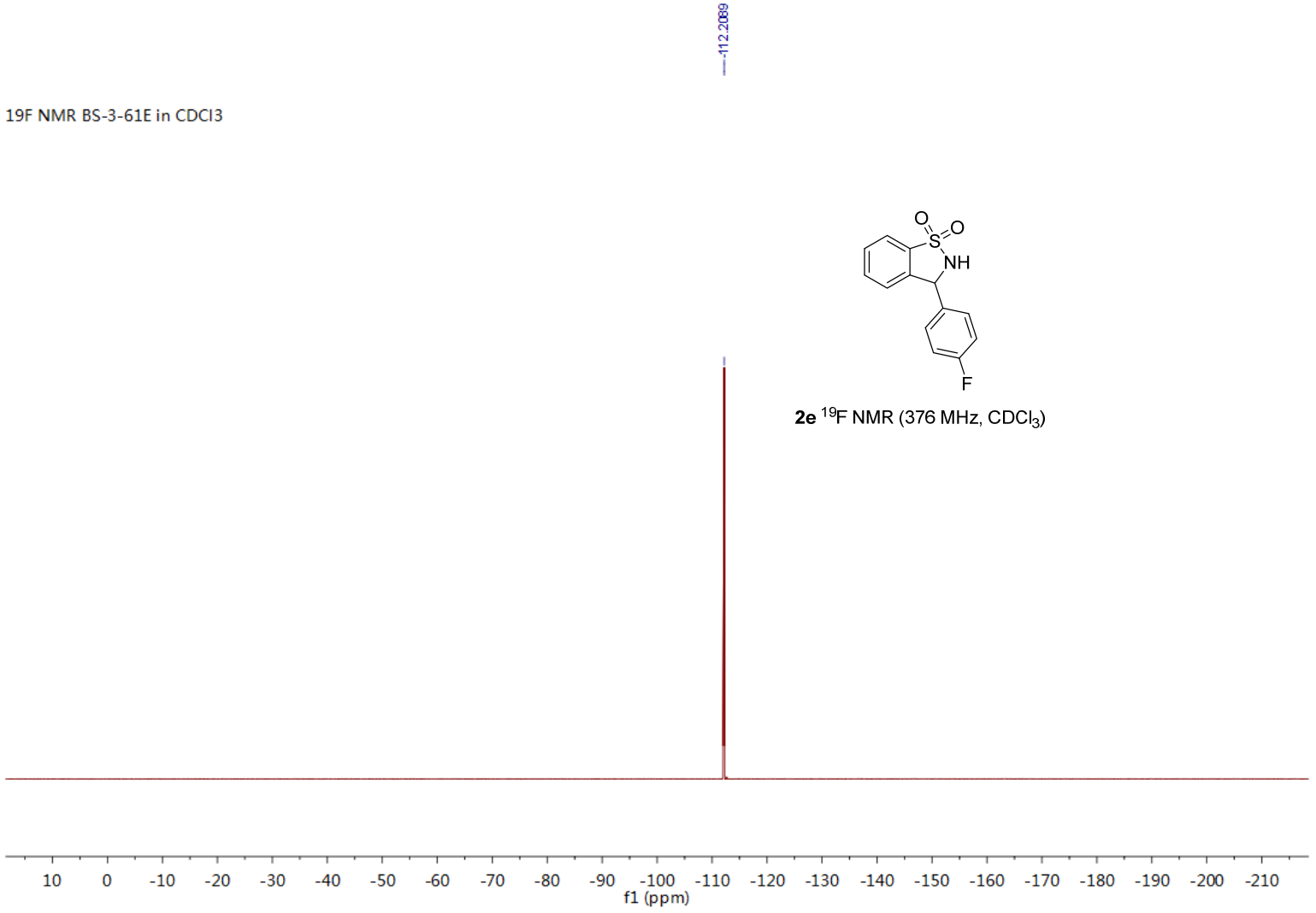
1H NMR BS-3-61E in CDCl3



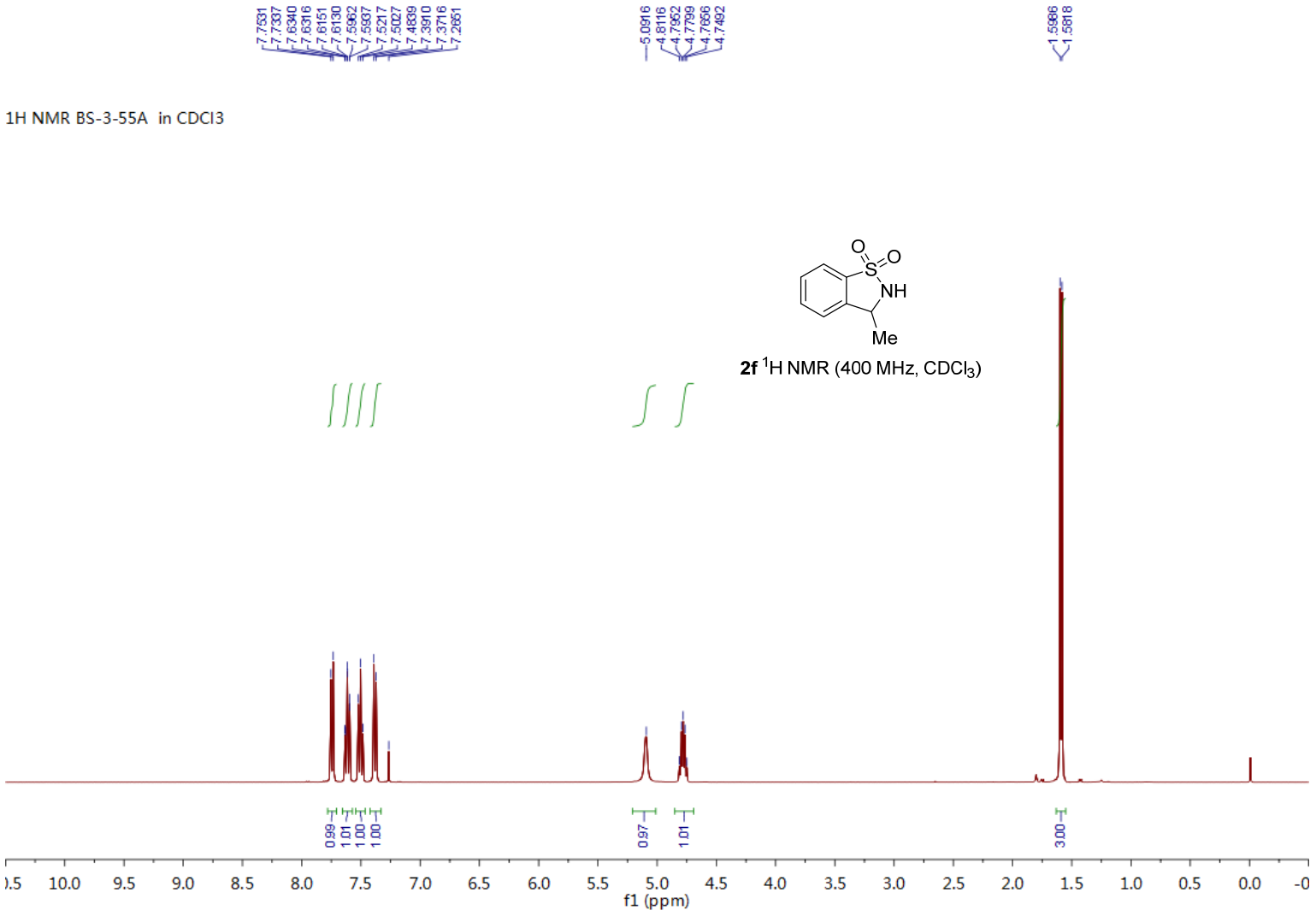
2e ^{1}H NMR (400 MHz, $CDCl_3$)



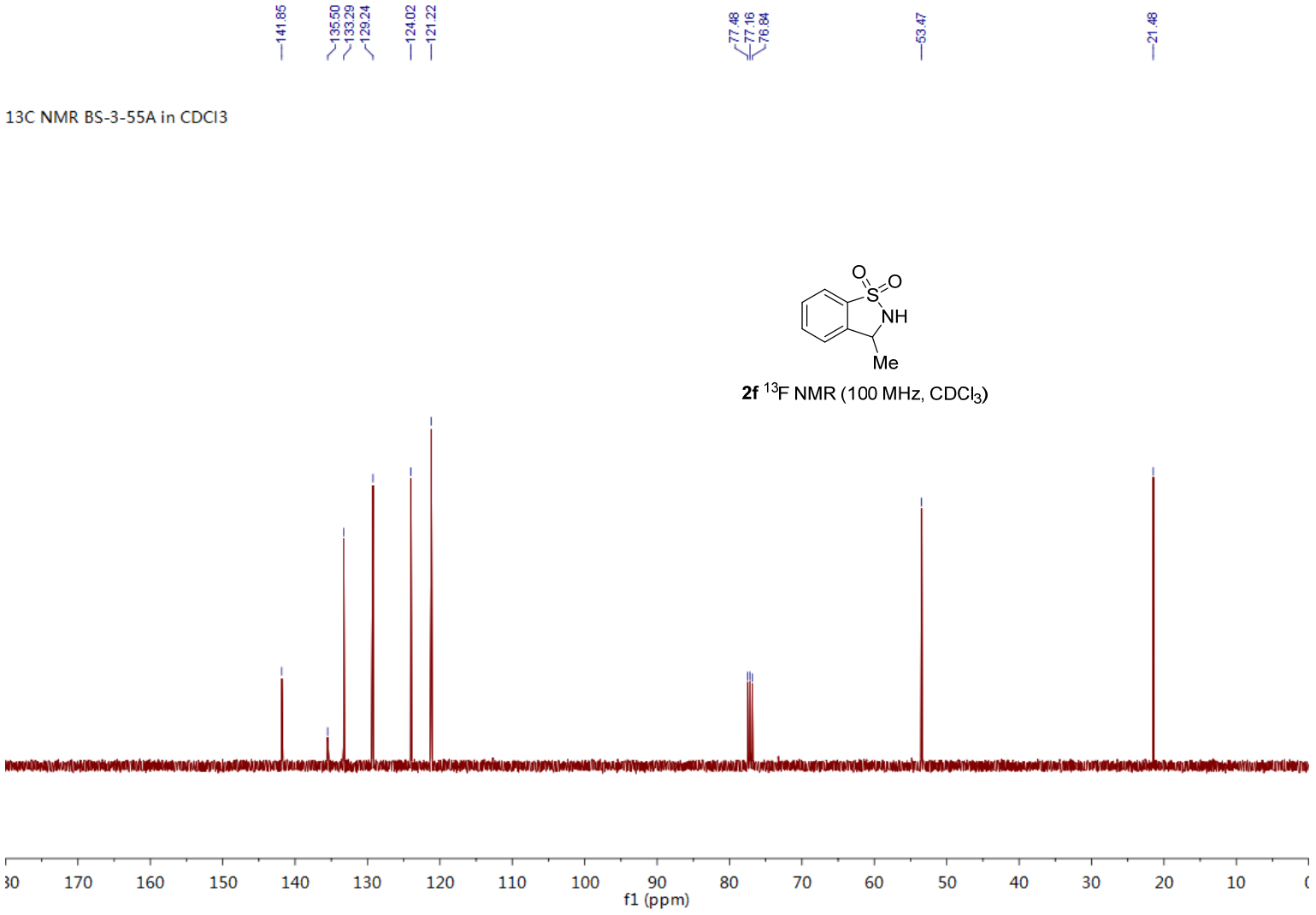

164.37
161.90
139.69
139.68
134.85
134.74
134.71
133.57
129.77
129.62
129.54
125.43
121.33
116.48
116.26
77.48
77.16
76.84
60.73
60.72
13C NMR BS-3-61E in CDCl3
O
O
S
NH
F
2e 13C NMR (100 MHz, CDCl3)
f1 (ppm)
f1 (ppm)



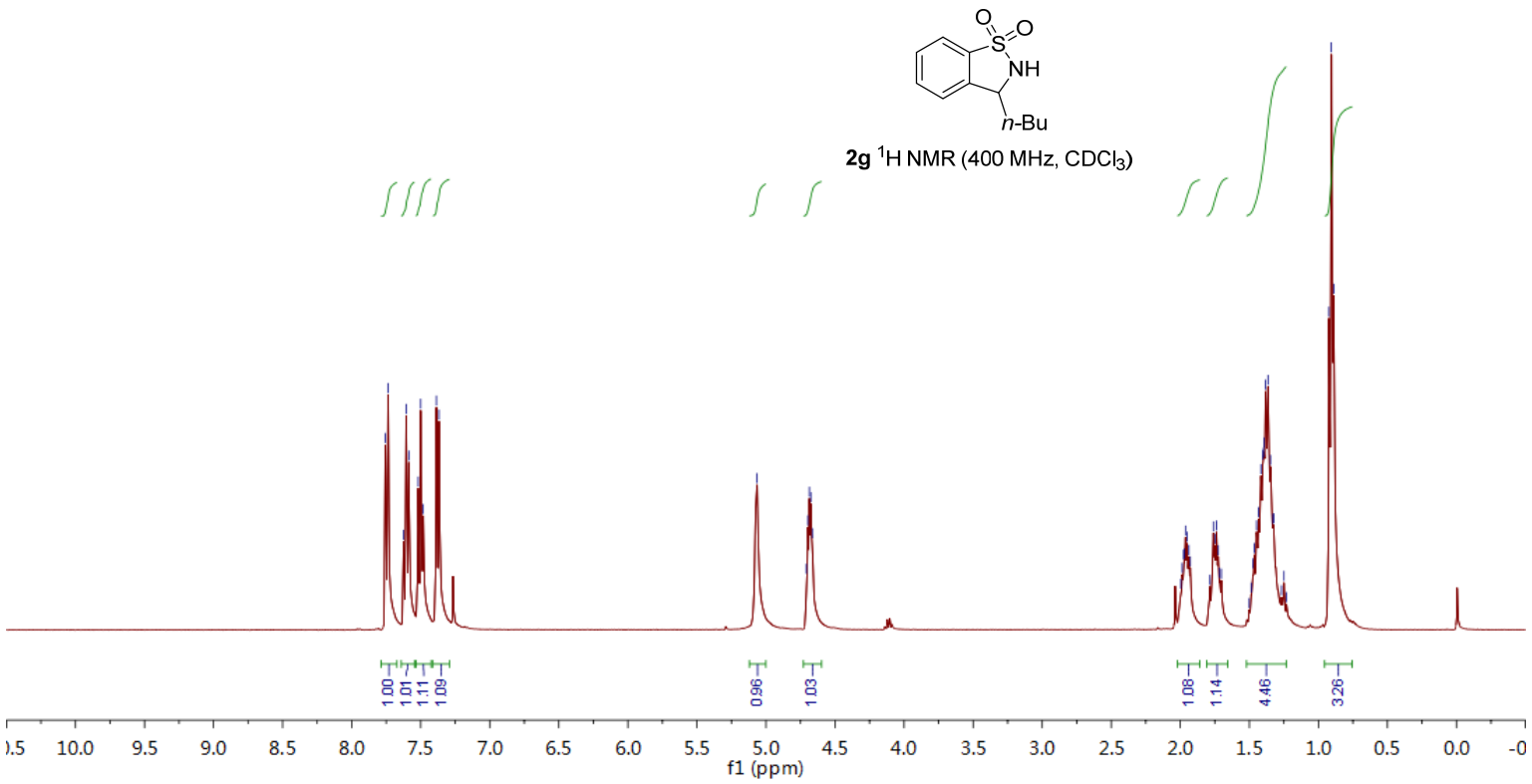
2e ^{19}F NMR (376 MHz, $CDCl_3$)



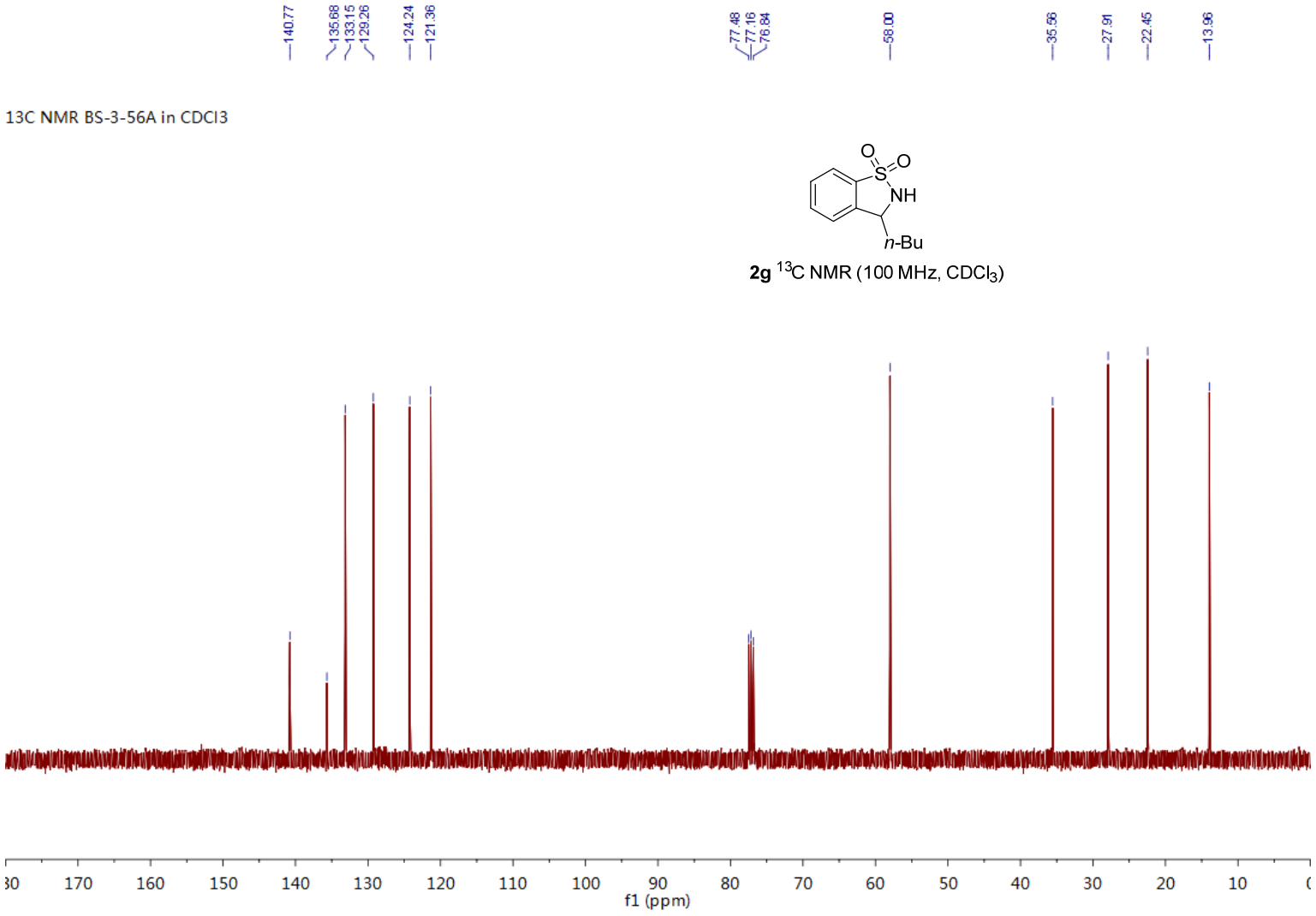
2f ^{1}H NMR (400 MHz, $CDCl_3$)


141.85
135.50
133.29
129.24
124.02
121.22
77.48
77.16
76.84
53.47
21.48
13C NMR BS-3-55A in CDCl3
O
O
S
NH
Me
2f 13F NMR (100 MHz, CDCl3)
f1 (ppm)

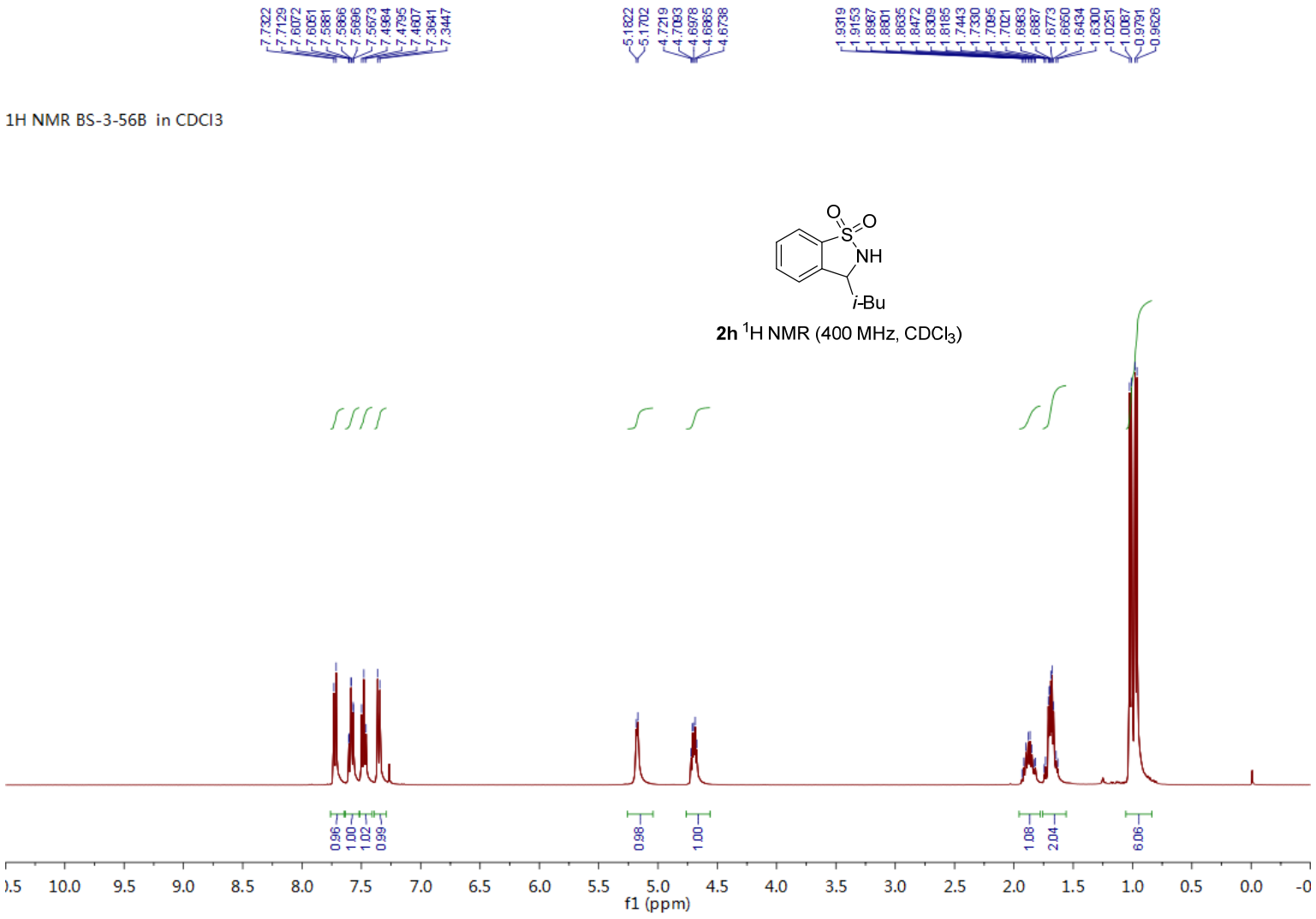
1H NMR BS-3-56A in CDCl3

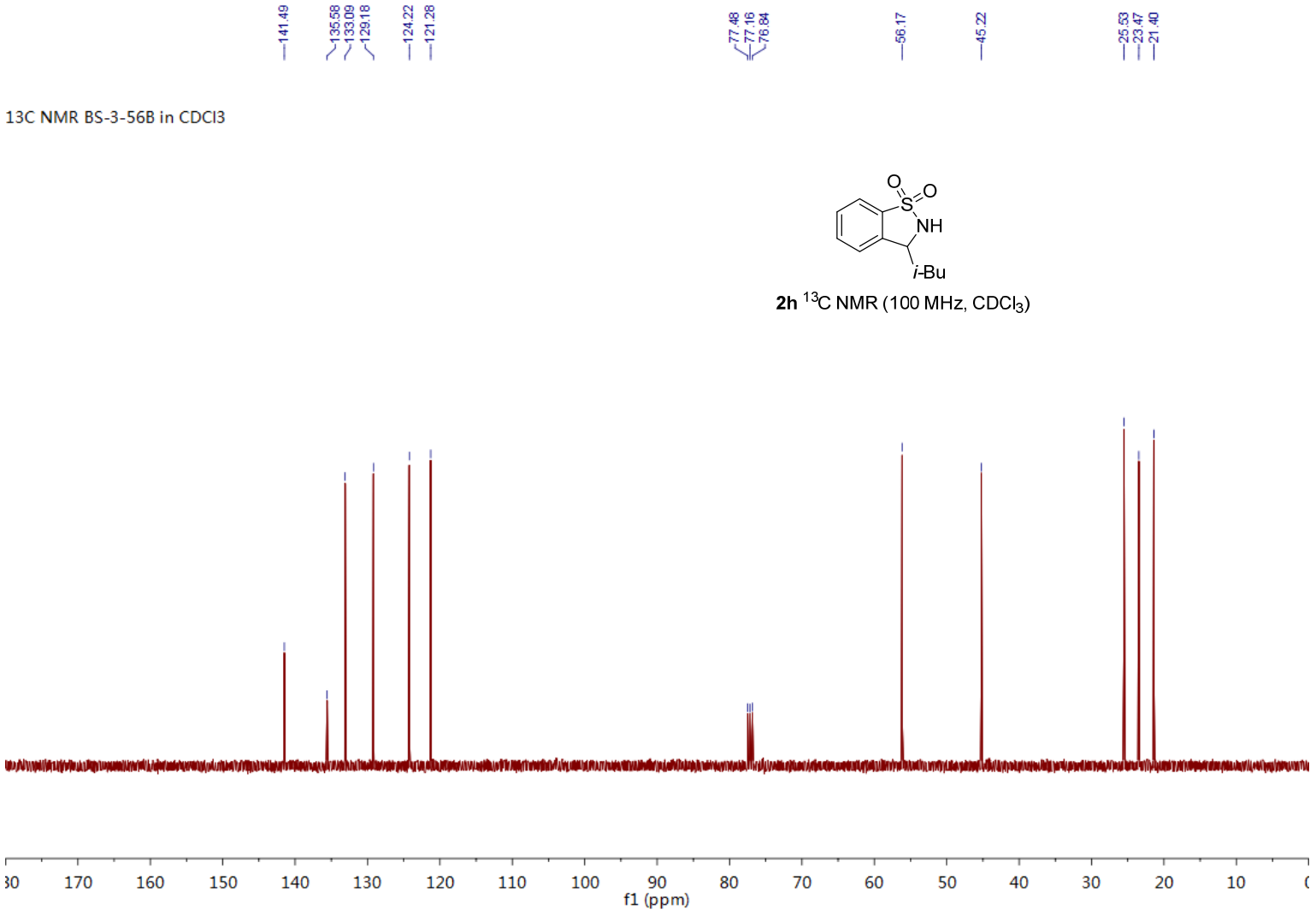


2g ^{1}H NMR (400 MHz, $CDCl_3$)

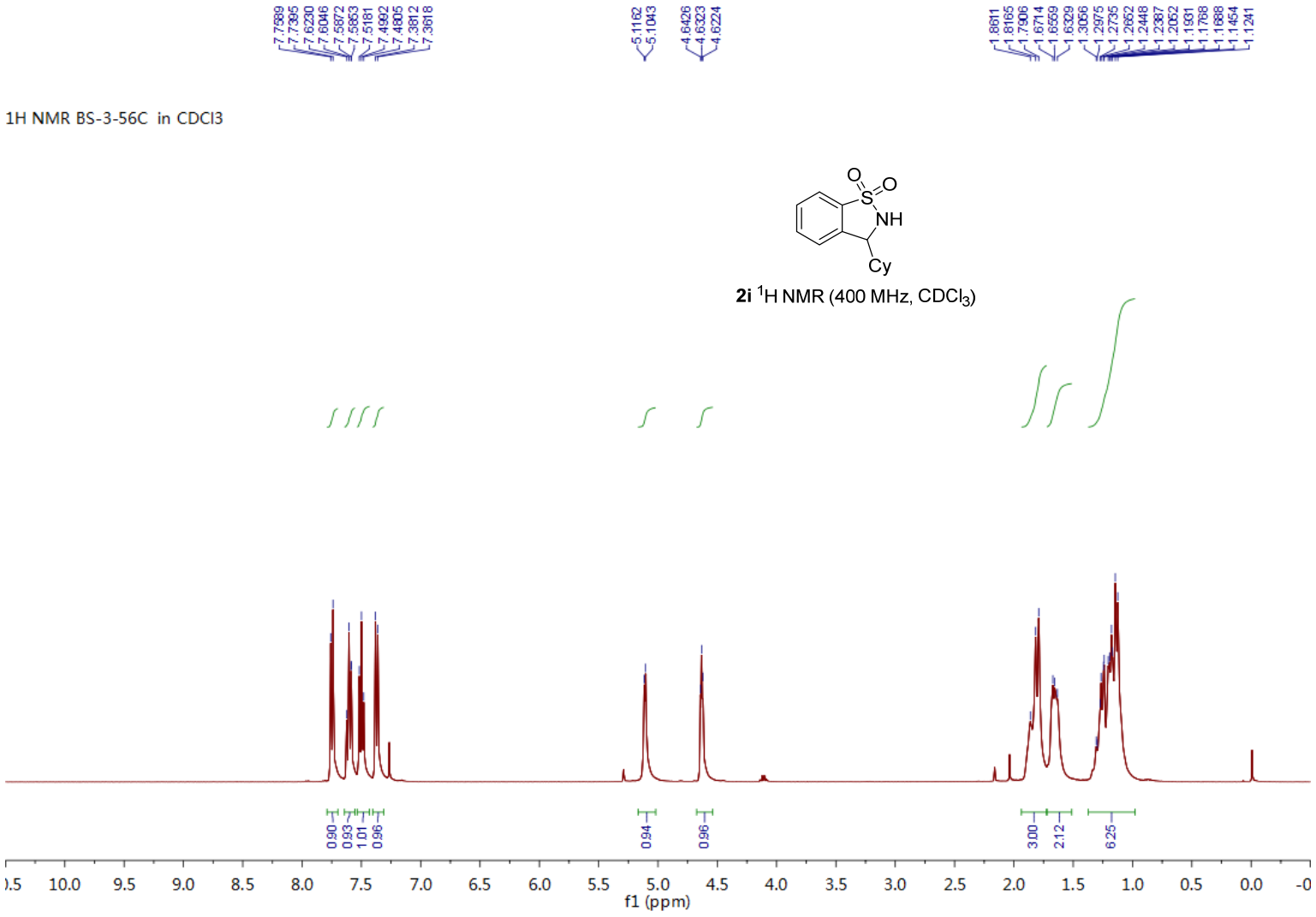


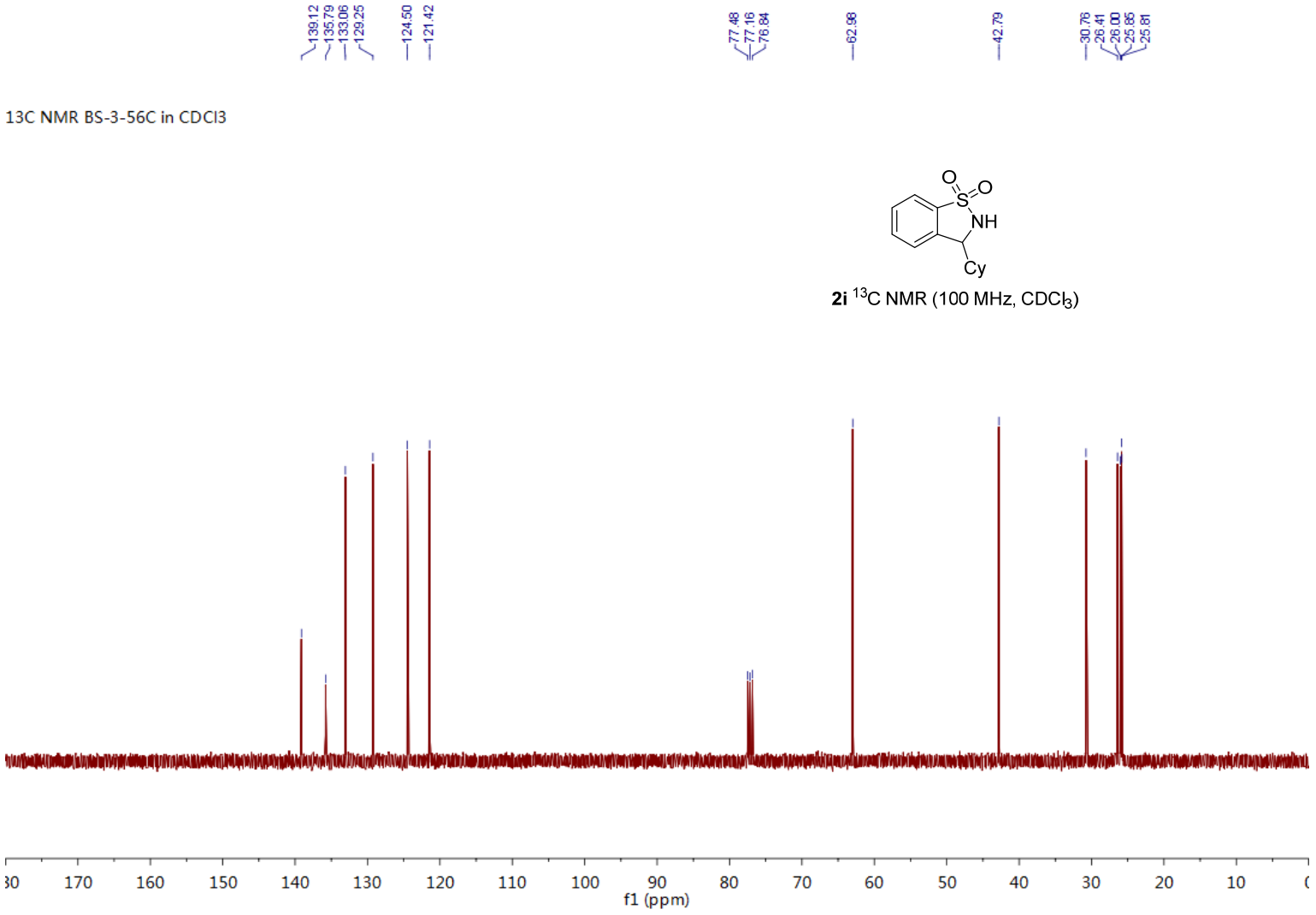
2g ^{13}C NMR (100 MHz, $CDCl_3$)


7.7322
7.7129
7.6072
7.6051
7.5881
7.5866
7.5696
7.5673
7.4984
7.4795
7.4607
7.3641
7.3447
5.1822
5.1702
4.7219
4.7063
4.6978
4.6865
4.6738
1.9319
1.9153
1.8987
1.8801
1.8635
1.8472
1.8309
1.8165
1.7443
1.7330
1.7095
1.7021
1.6963
1.6887
1.6773
1.6650
1.6434
1.6300
1.0251
1.0067
0.9791
0.9626
1H NMR BS-3-56B in CDCl3
O
S
O
NH
i-Bu
2h 1H NMR (400 MHz, CDCl3)
0.96
1.00
1.02
0.99
0.98
1.00
1.08
2.04
6.06
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)

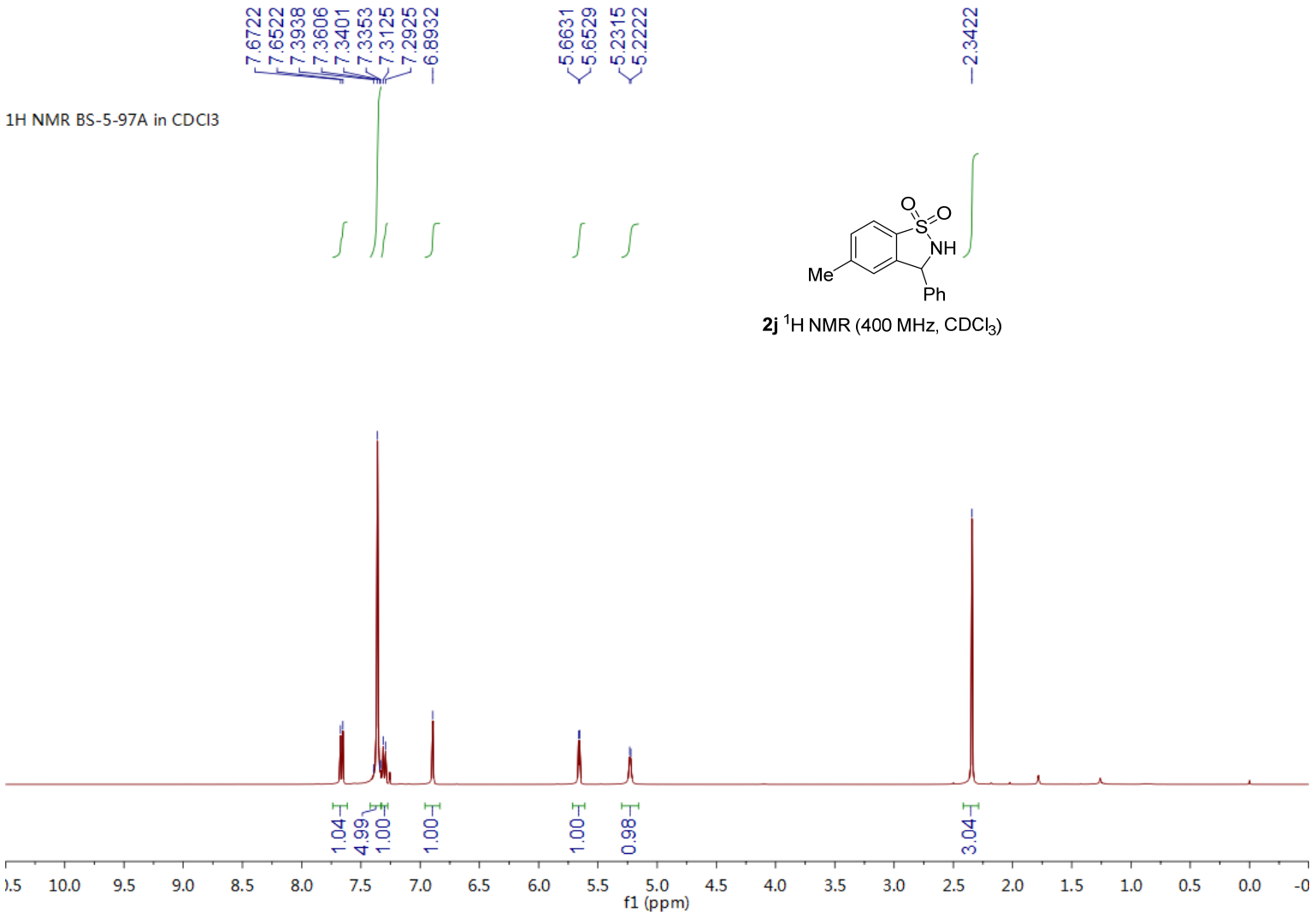


2h ^{13}C NMR (100 MHz, $CDCl_3$)

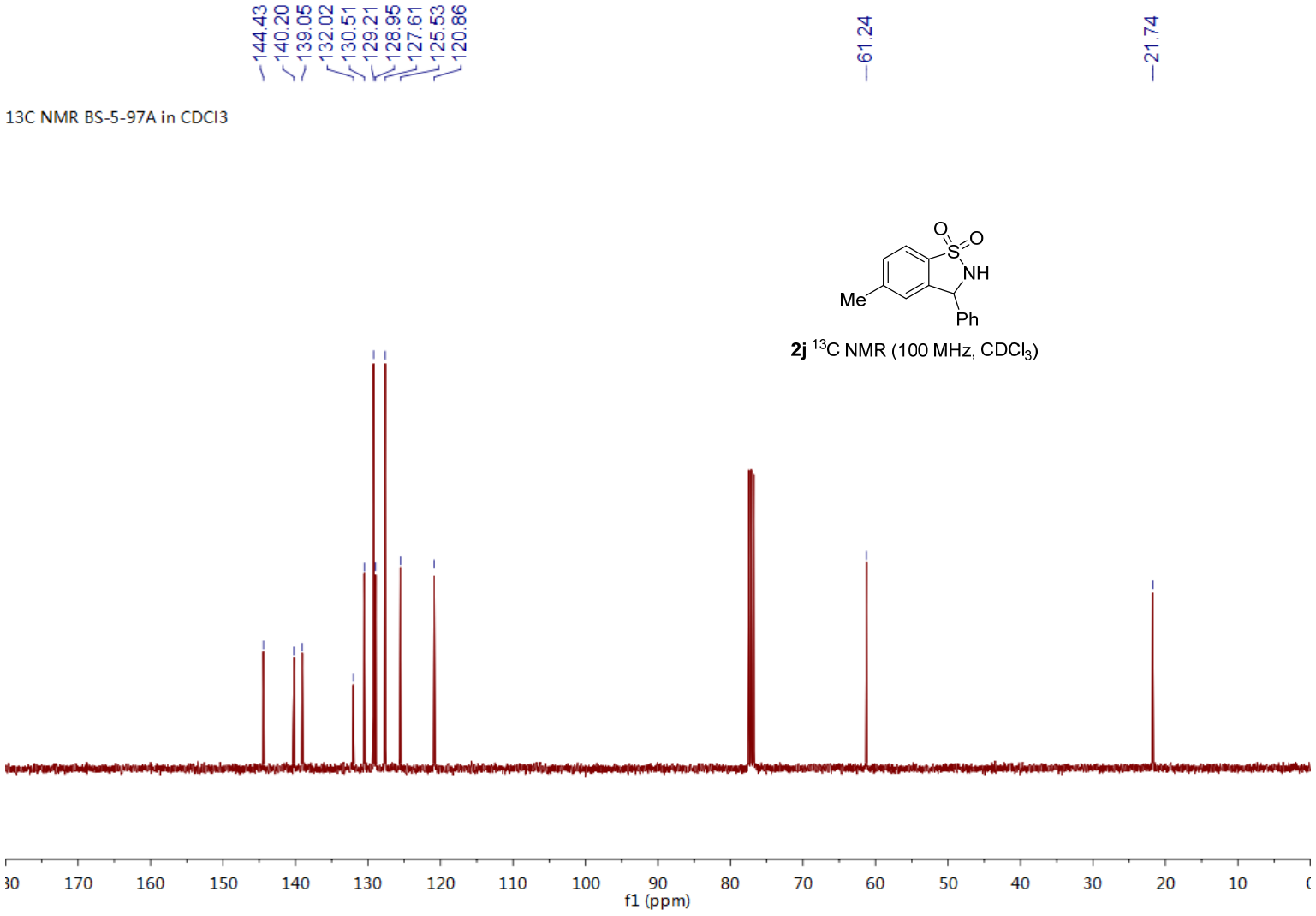

7.7989
7.7395
7.6230
7.6046
7.5872
7.5853
7.5181
7.4992
7.4805
7.3812
7.3618
5.1162
5.1043
4.6426
4.6323
4.6224
1.8611
1.8165
1.7906
1.6714
1.6559
1.6329
1.3056
1.2975
1.2735
1.2652
1.2448
1.2387
1.2052
1.1931
1.1768
1.1688
1.1454
1.1241
1H NMR BS-3-56C in CDCl3
O
O
S
NH
Cy
2i 1H NMR (400 MHz, CDCl3)
0.90
0.93
1.01
0.96
0.94
0.96
3.00
2.12
6.25
f1 (ppm)



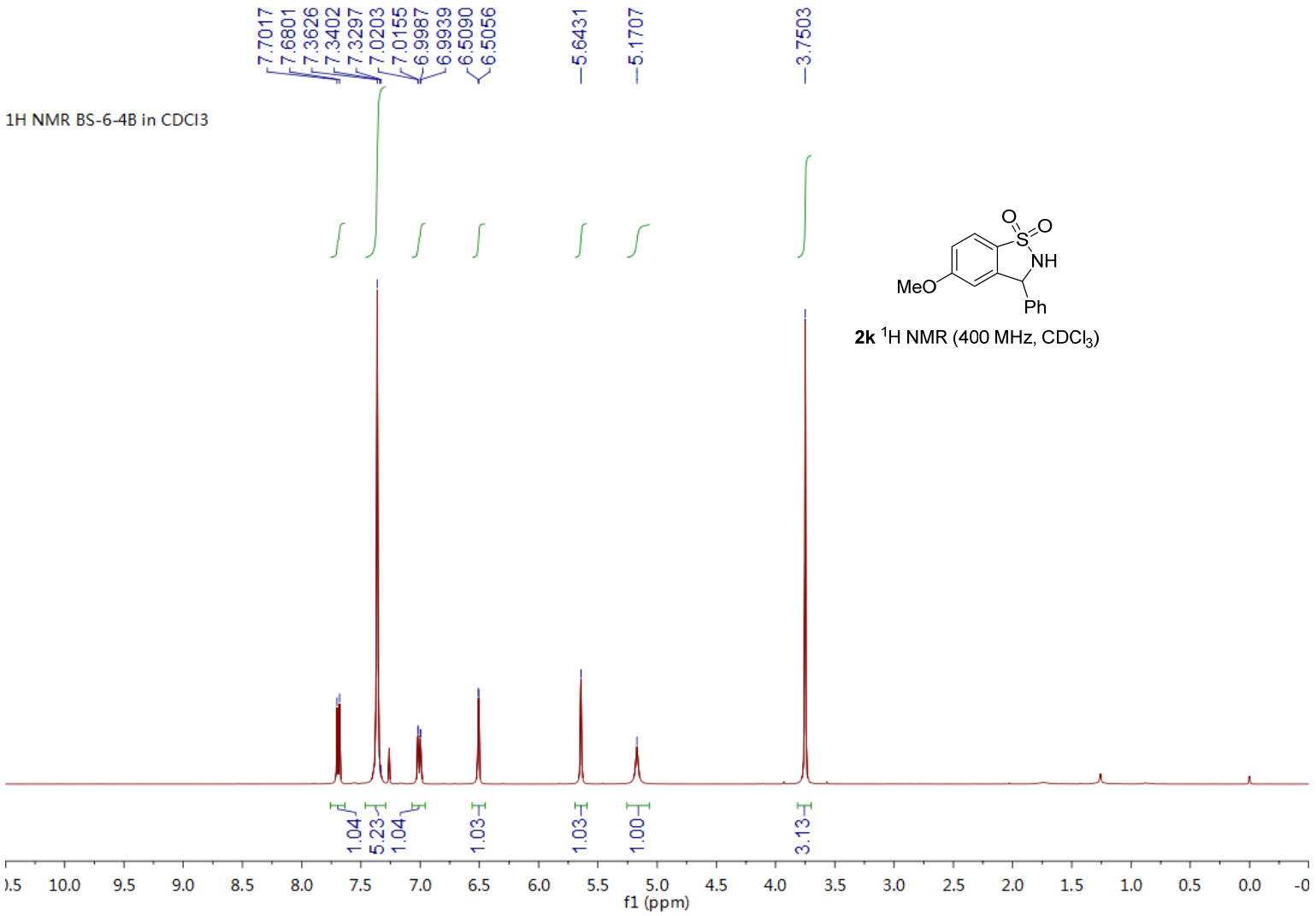
2i ^{13}C NMR (100 MHz, $CDCl_3$)



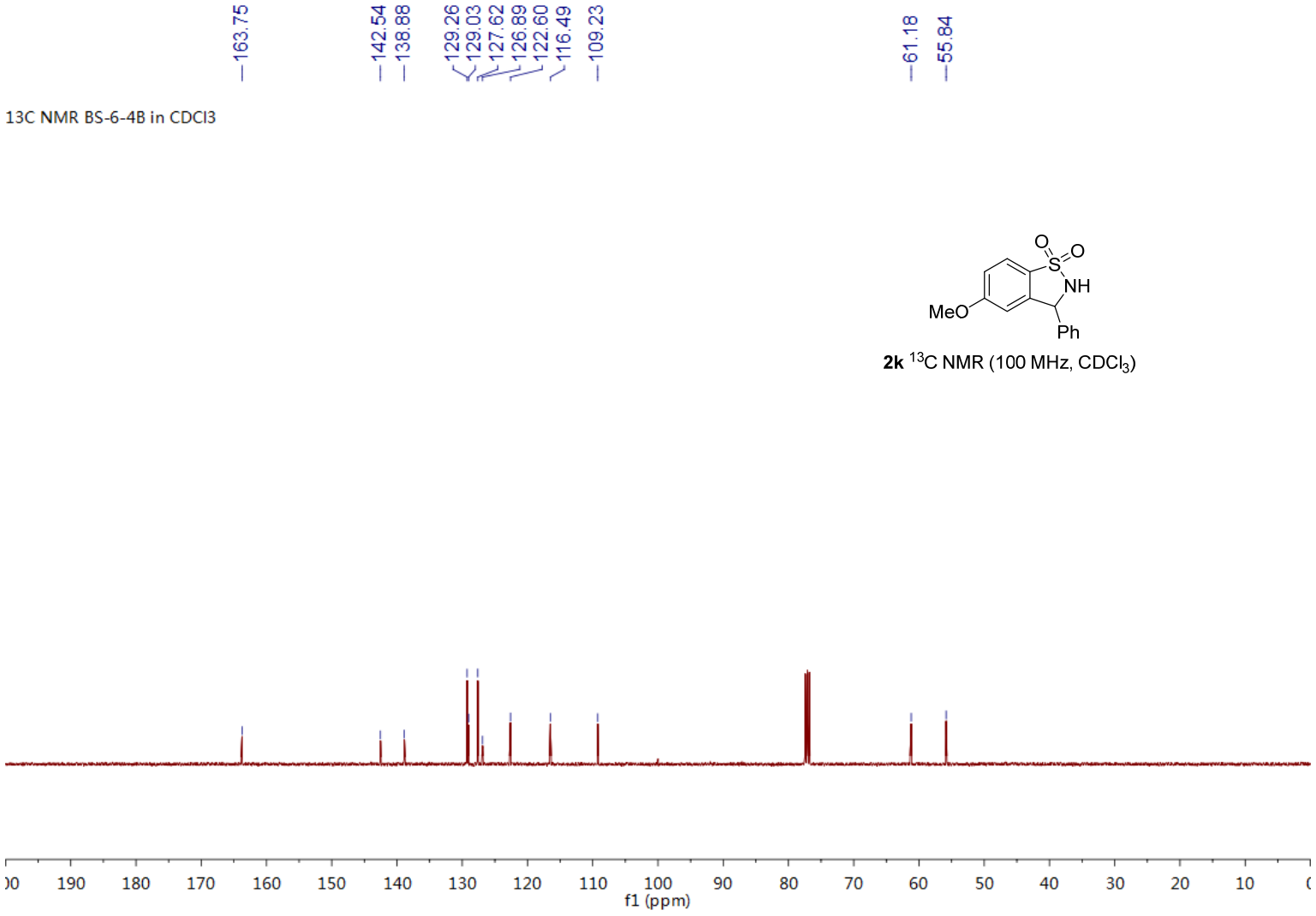
2j ^{1}H NMR (400 MHz, $CDCl_3$)



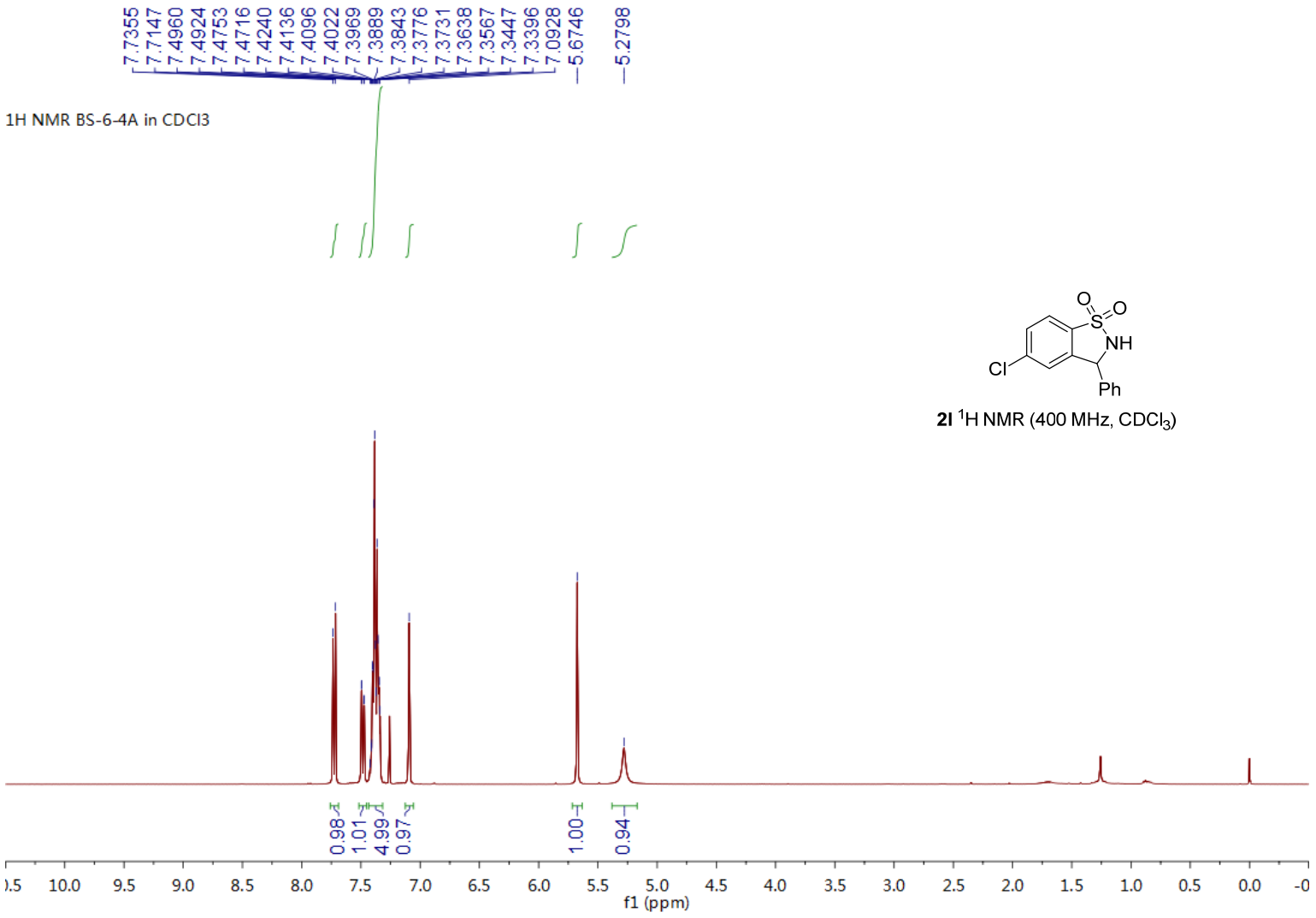
2j ^{13}C NMR (100 MHz, $CDCl_3$)



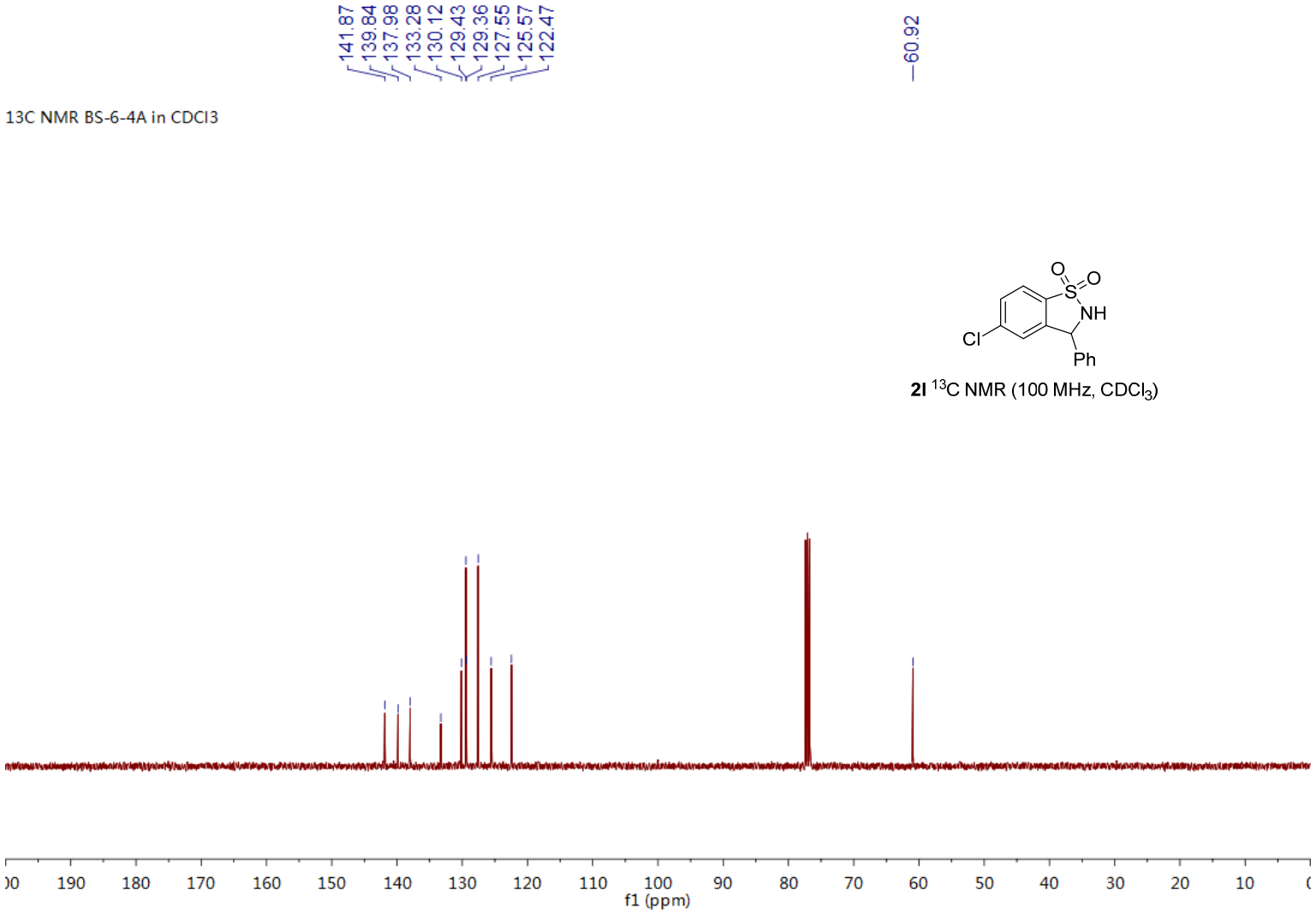
2k ^{1}H NMR (400 MHz, $CDCl_3$)



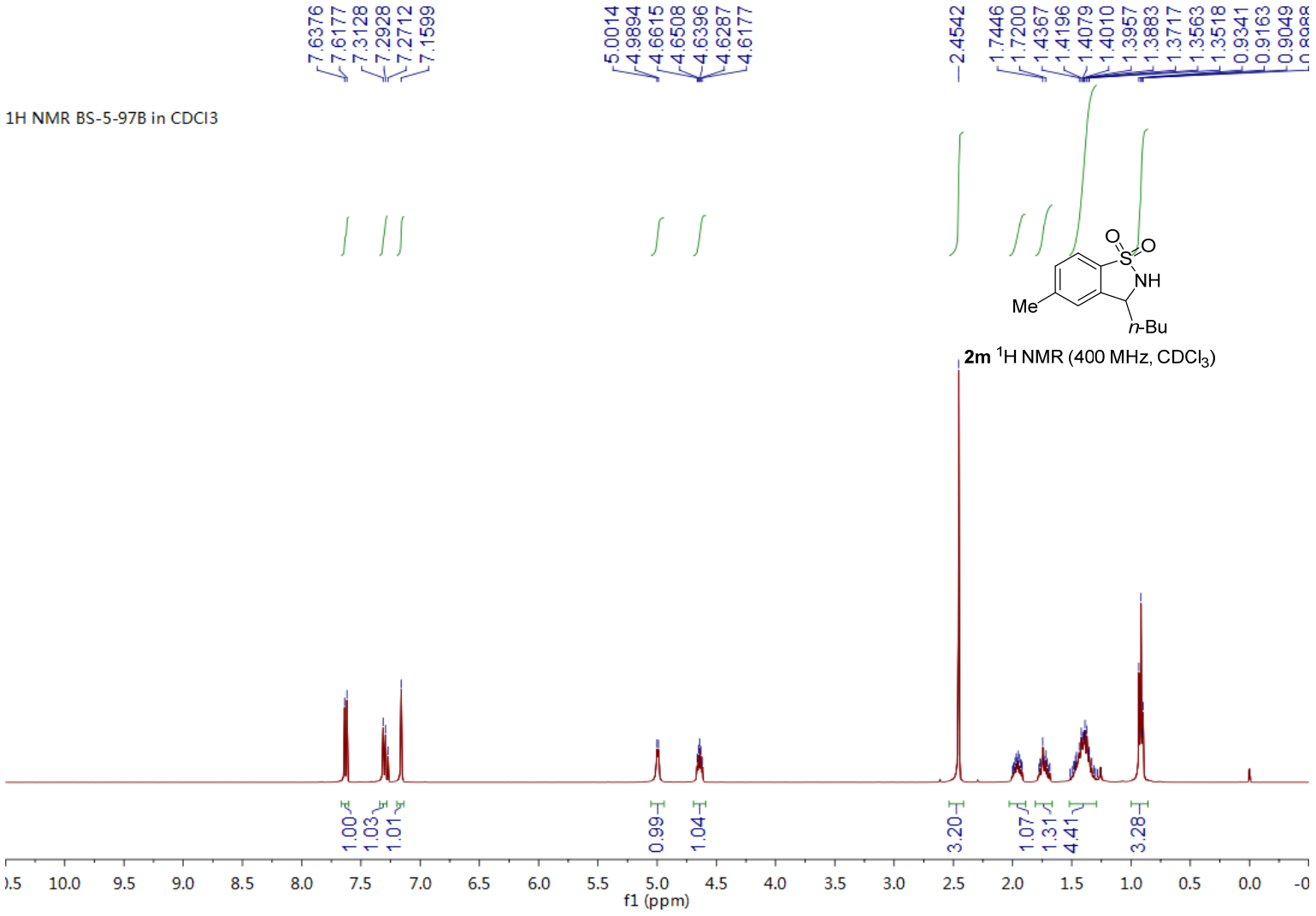
2k ^{13}C NMR (100 MHz, $CDCl_3$)



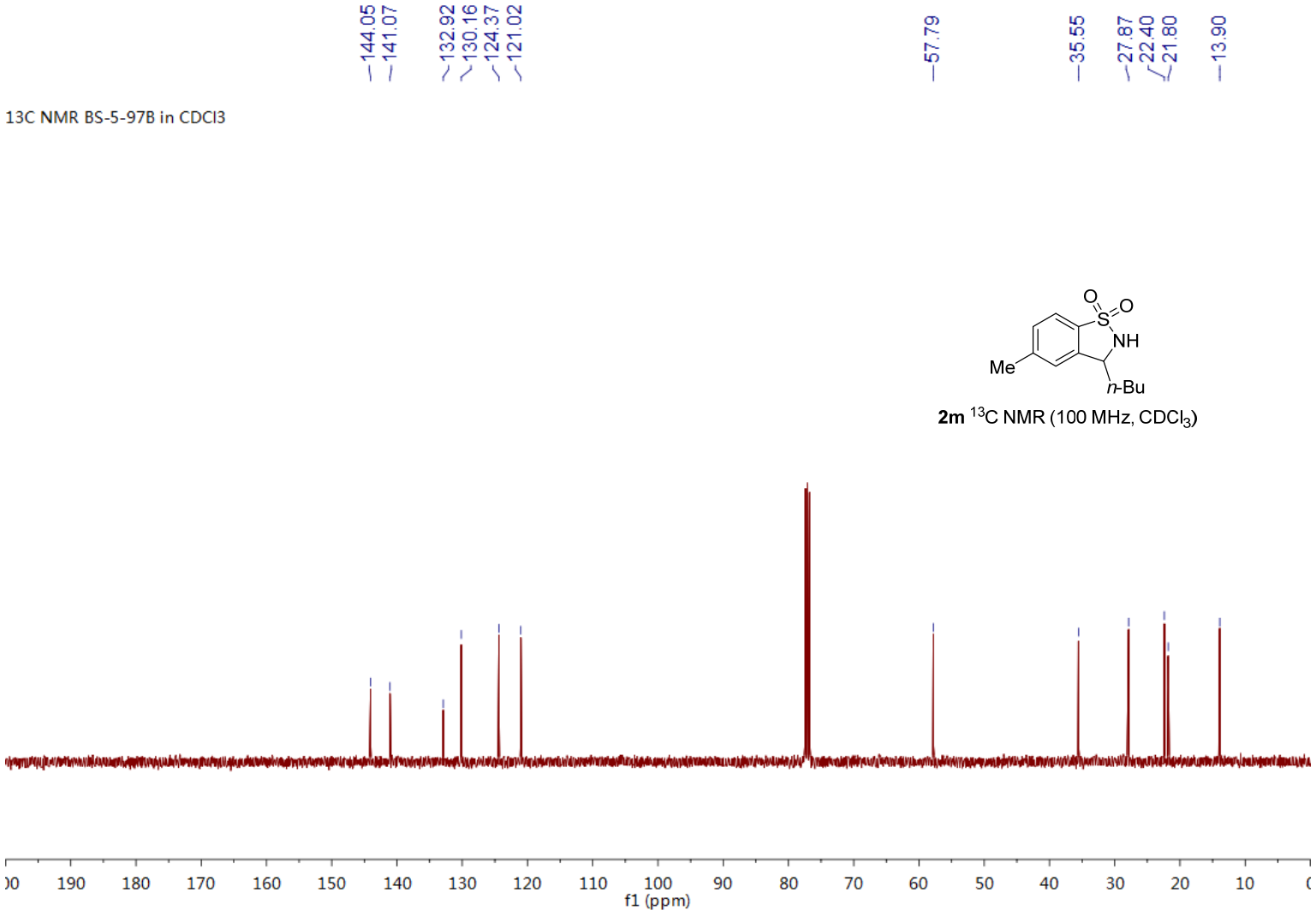
2l ^{1}H NMR (400 MHz, $CDCl_3$)



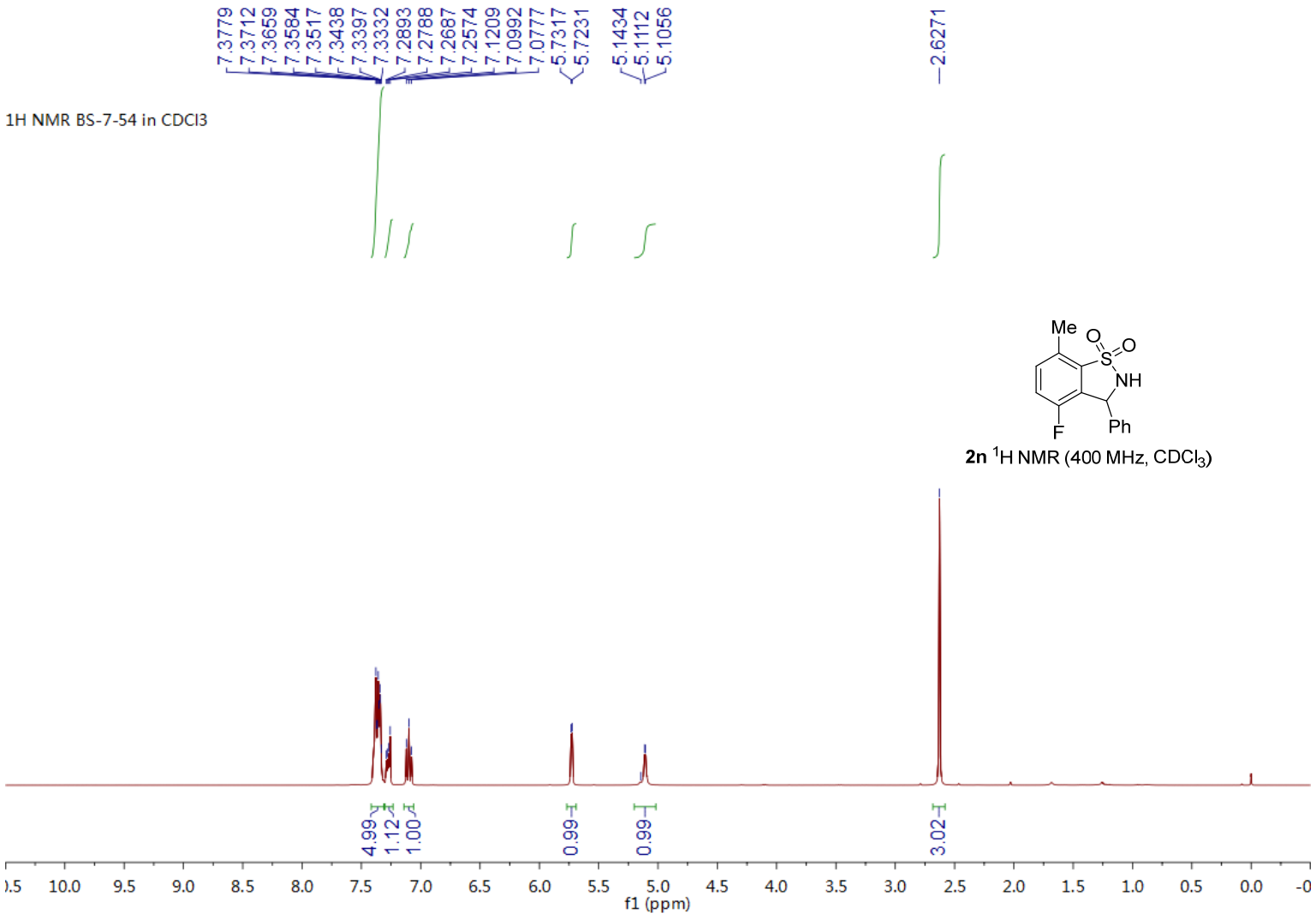
2l ^{13}C NMR (100 MHz, $CDCl_3$)



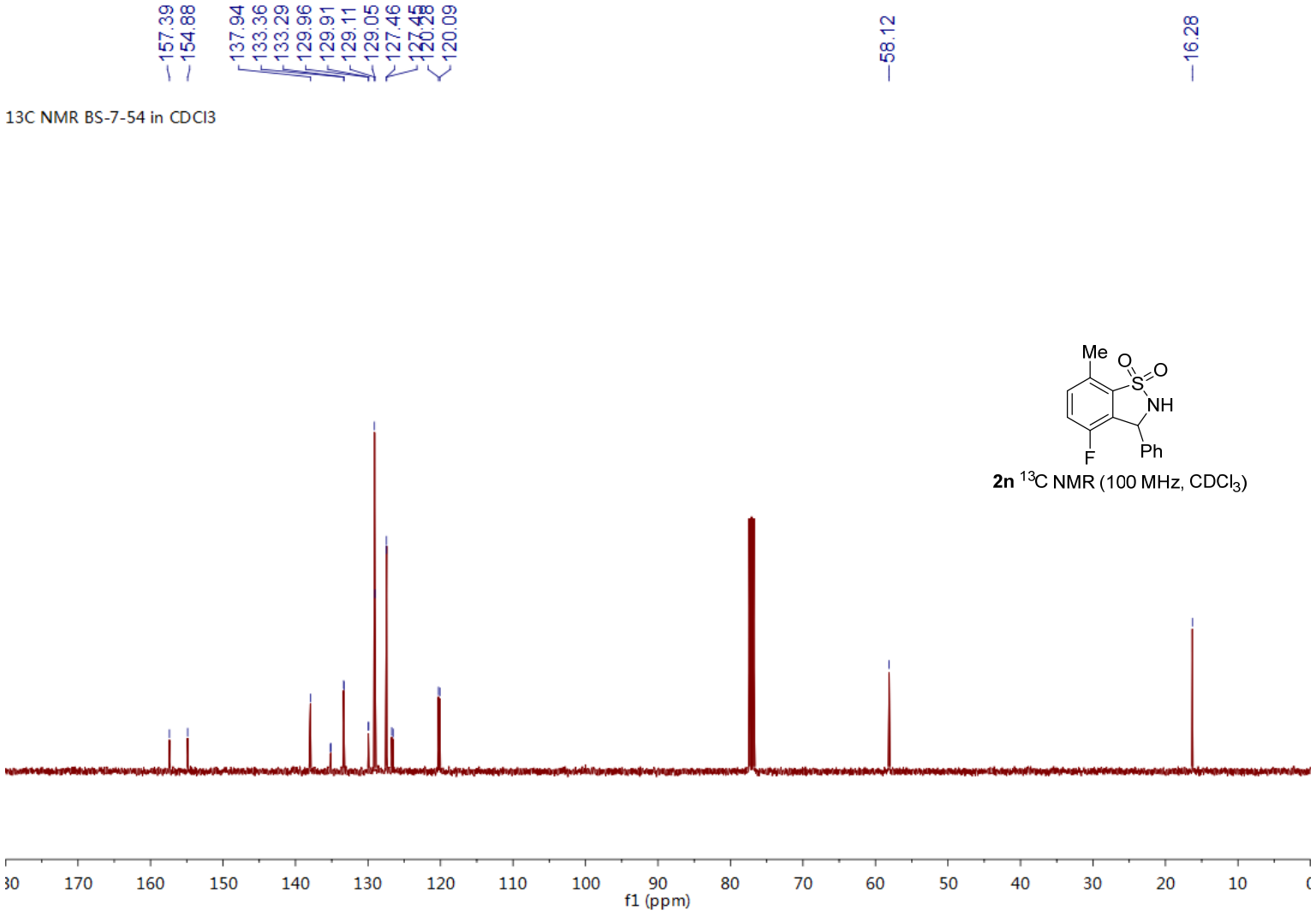
2m ^{1}H NMR (400 MHz, $CDCl_3$)



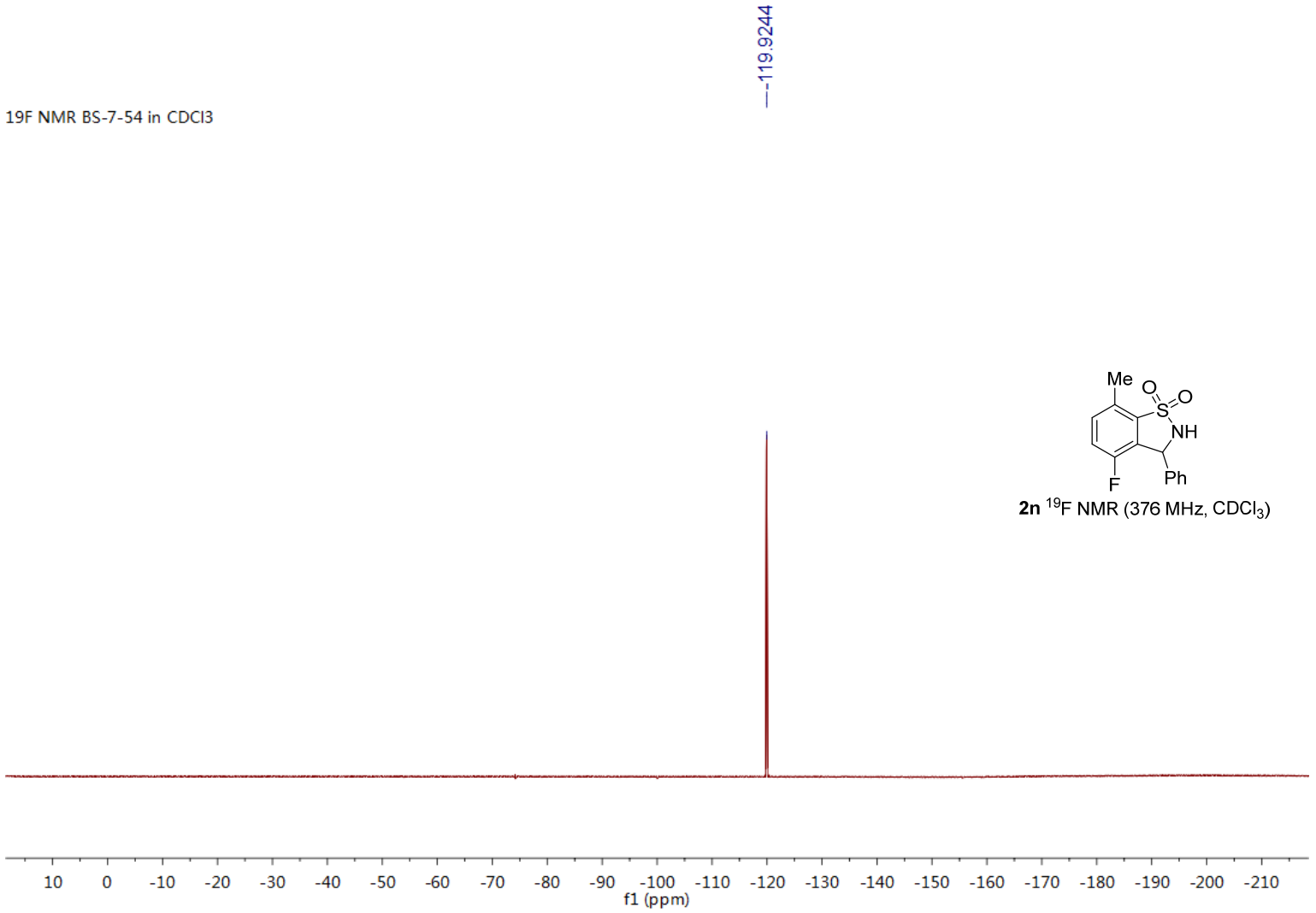
2m ^{13}C NMR (100 MHz, $CDCl_3$)



2n ^{1}H NMR (400 MHz, $CDCl_3$)

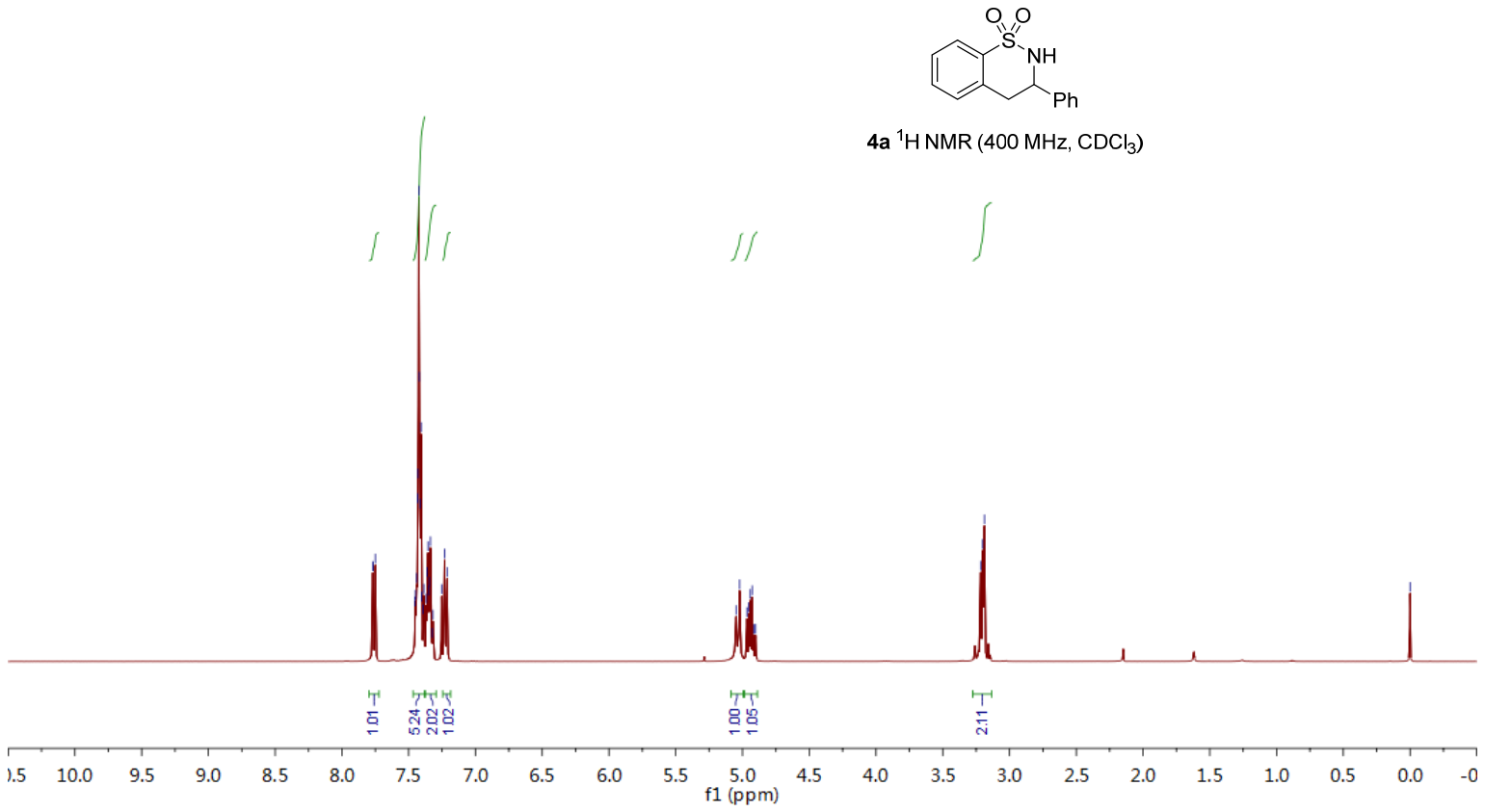


2n ^{13}C NMR (100 MHz, $CDCl_3$)

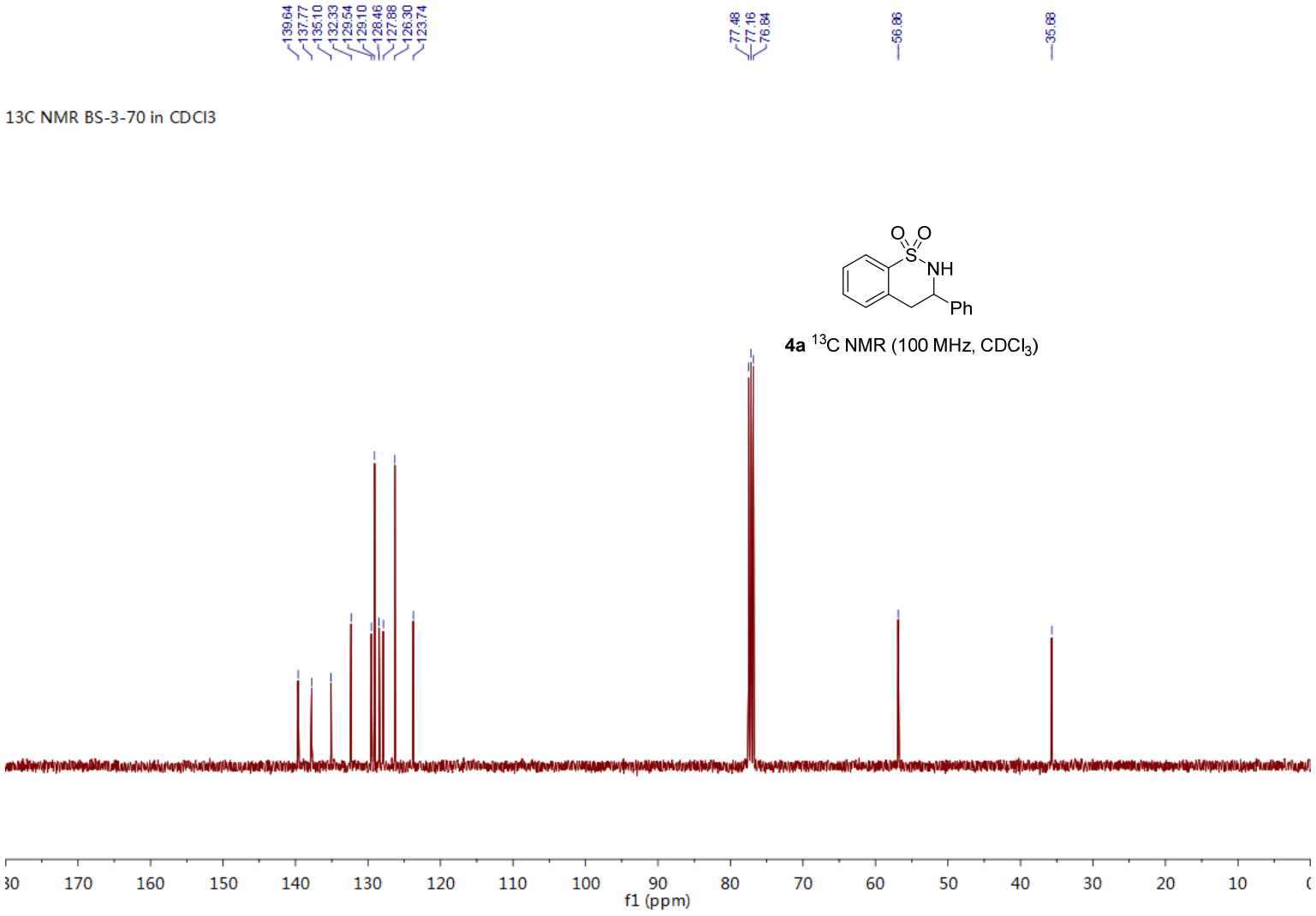


2n ^{19}F NMR (376 MHz, $CDCl_3$)

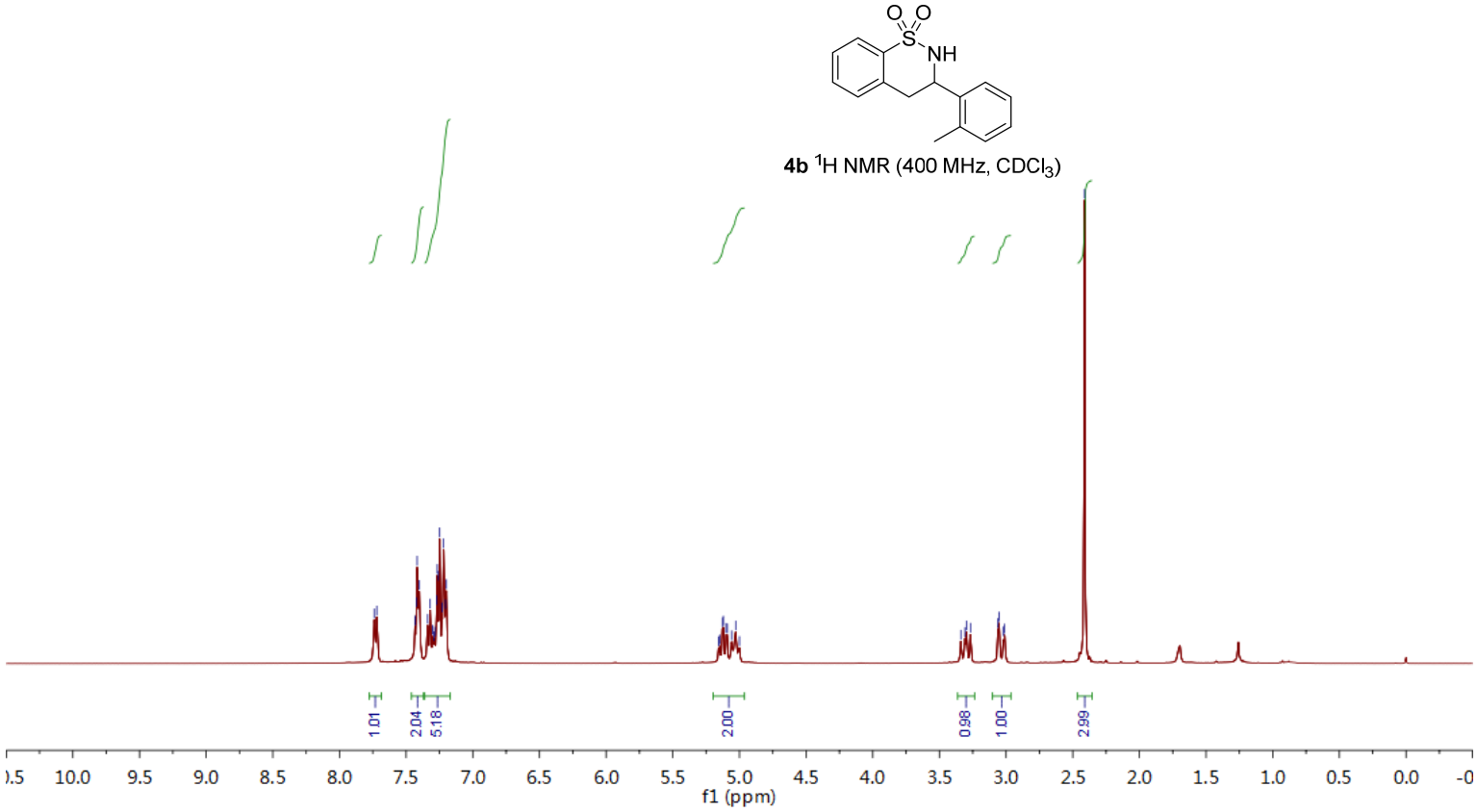
1H NMR BS-3-70 in CDCl3



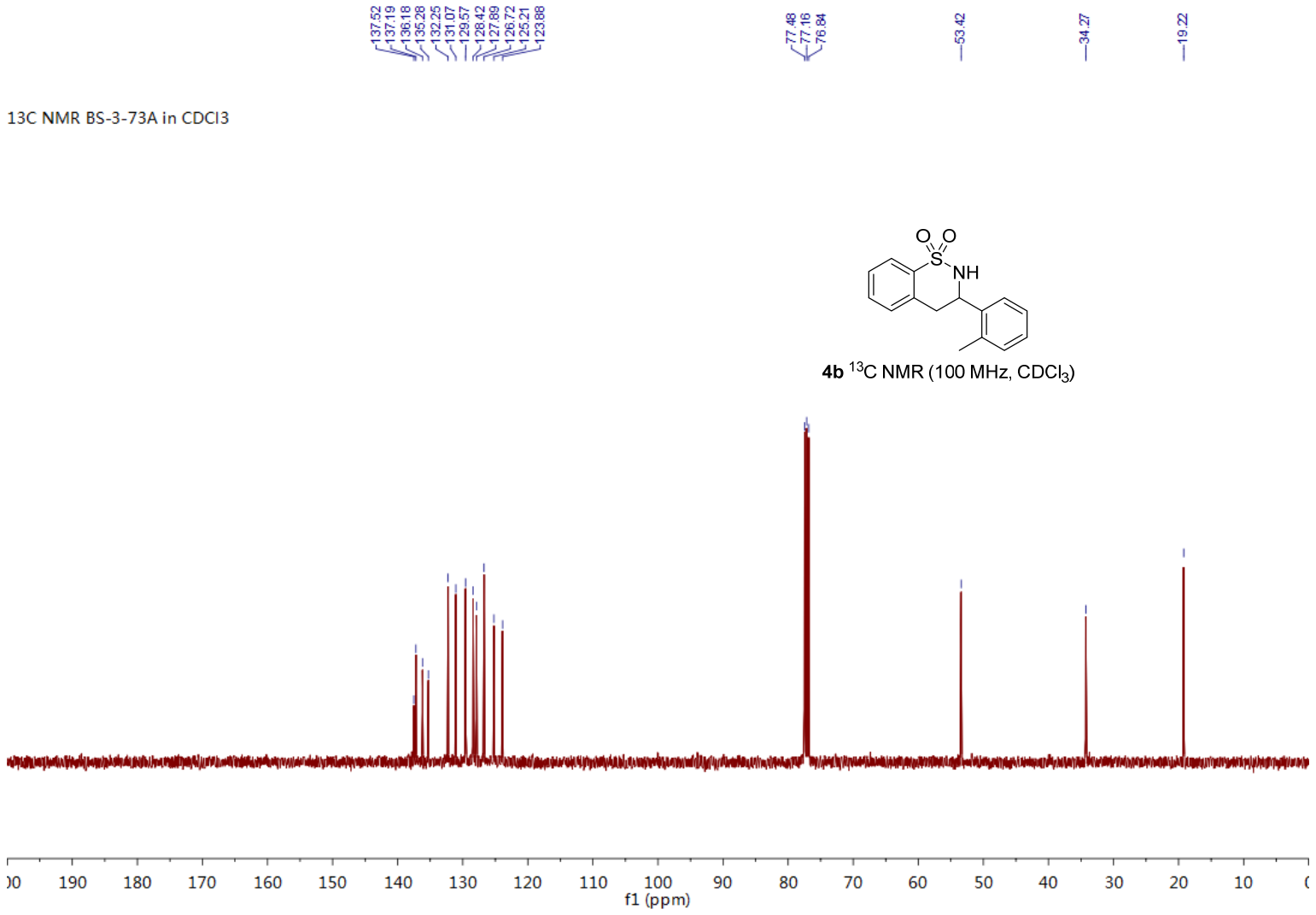
4a ^{1}H NMR (400 MHz, $CDCl_3$)


139.64
137.77
135.10
132.33
129.54
129.10
128.46
127.88
126.30
123.74
77.48
77.16
76.84
56.86
35.68
13C NMR BS-3-70 in CDCl3
O
O
S
NH
Ph
4a 13C NMR (100 MHz, CDCl3)
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

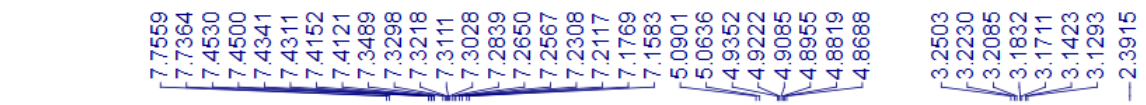
1H NMR BS-3-73A in CDCl3



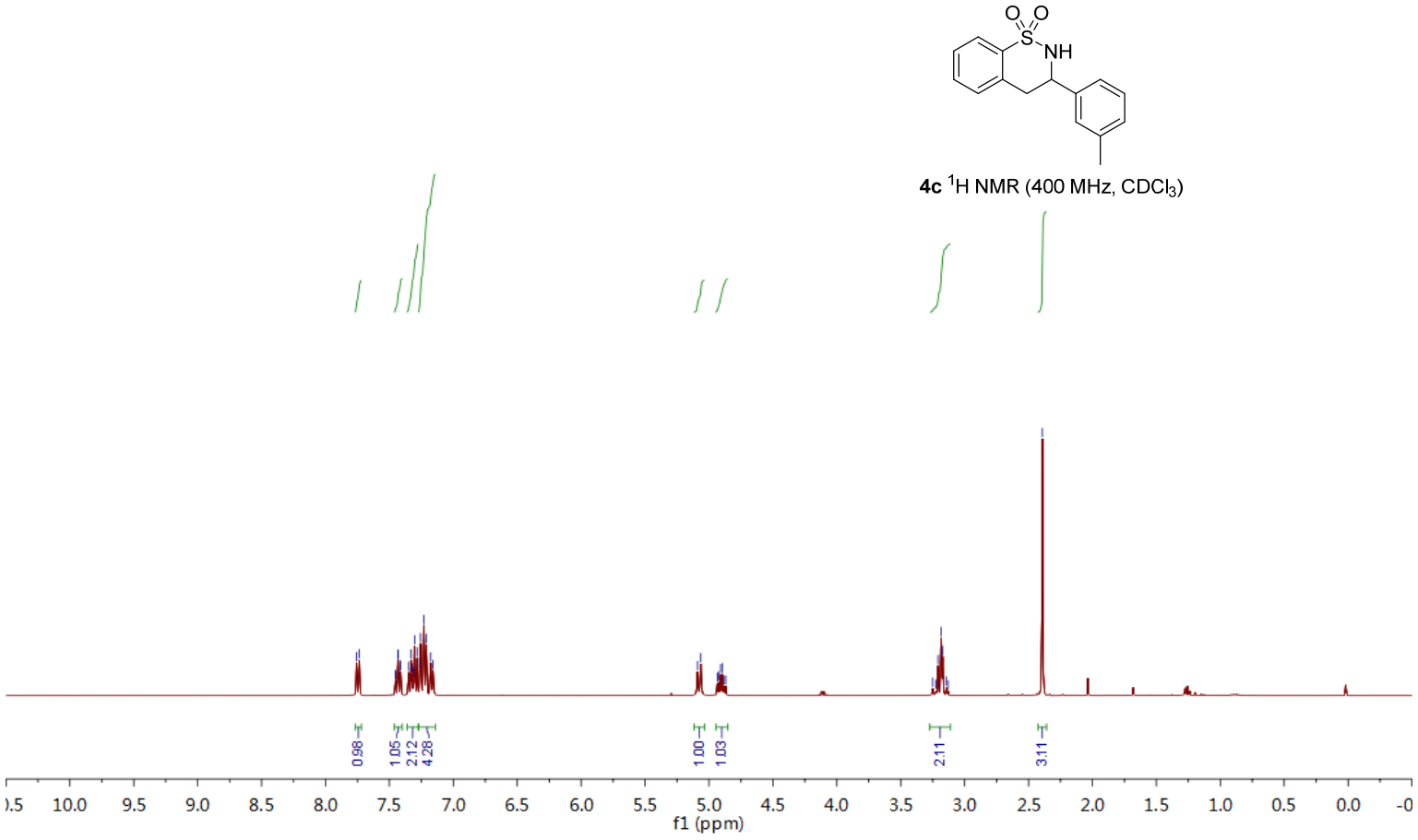
4b ^{1}H NMR (400 MHz, $CDCl_3$)



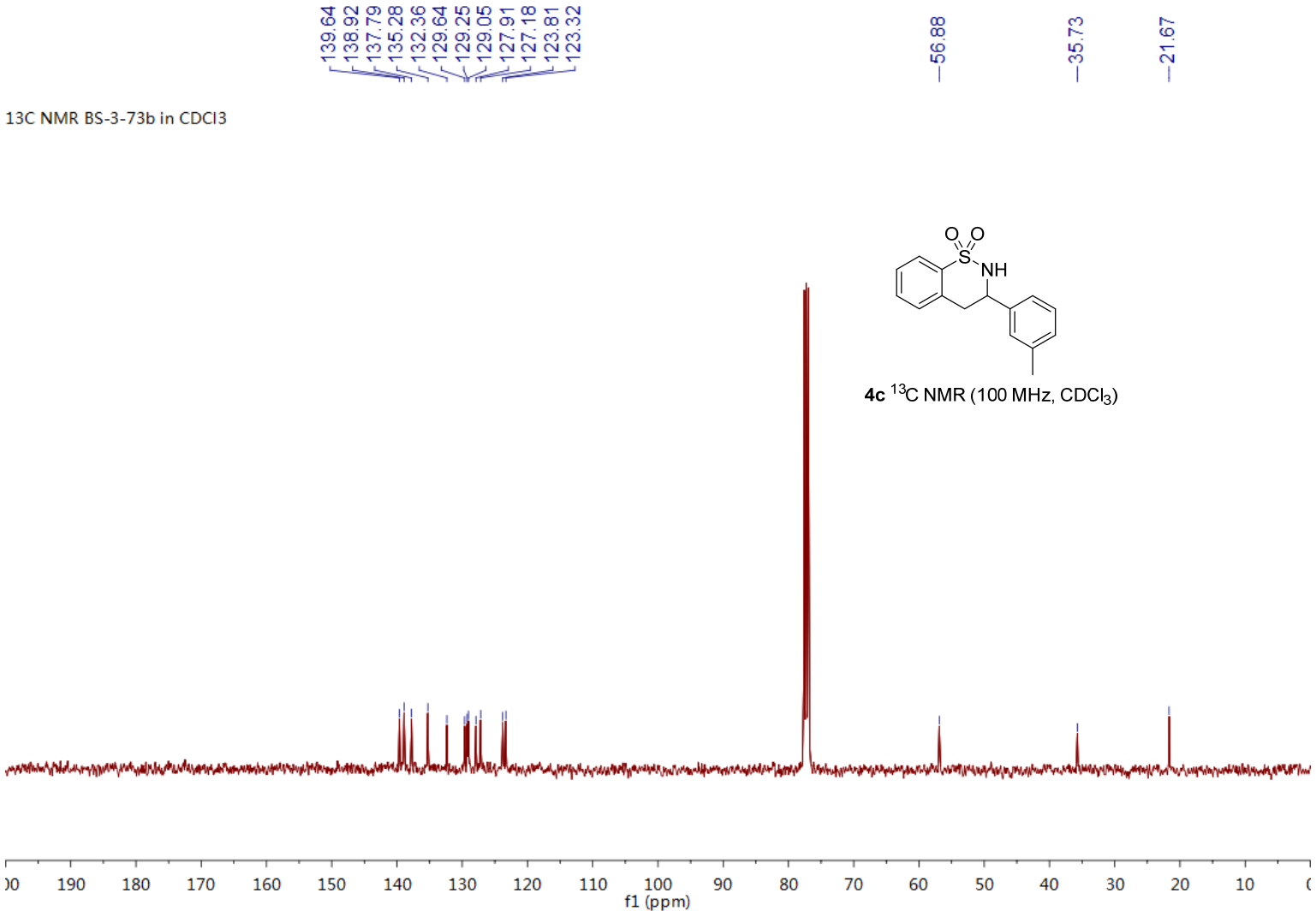
4b ^{13}C NMR (100 MHz, $CDCl_3$)



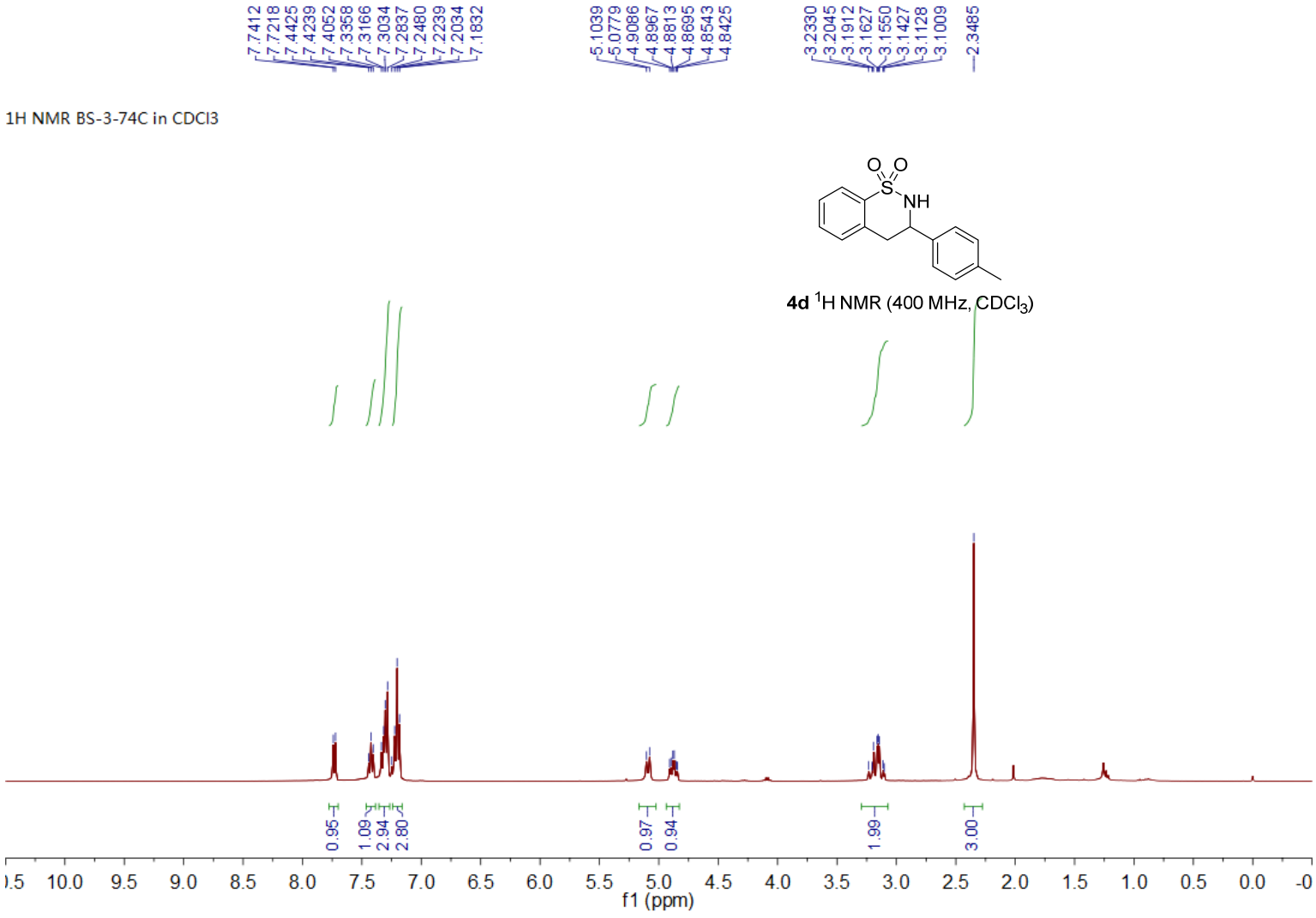
1H NMR BS-3-73b in CDCl3

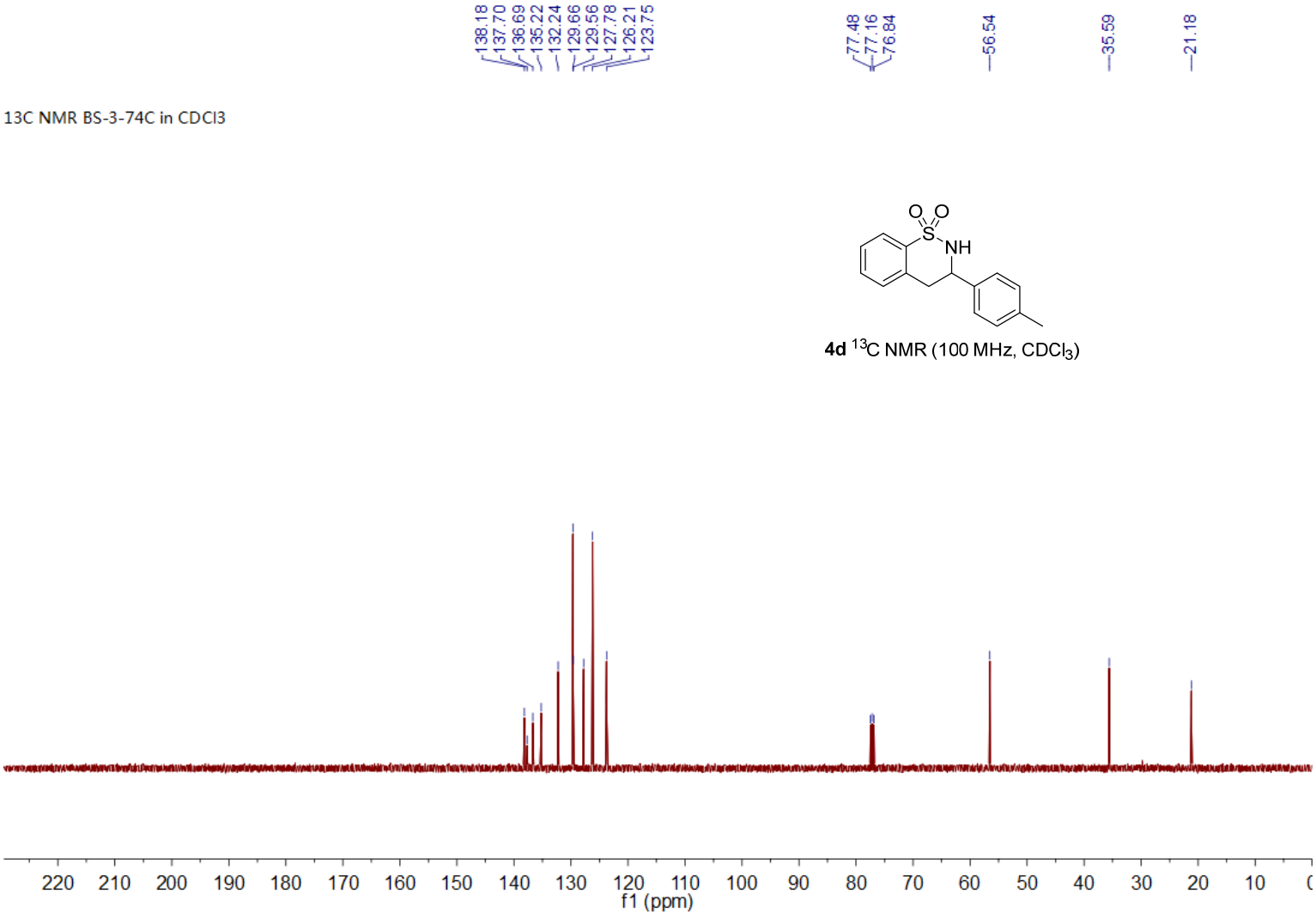


4c ^{1}H NMR (400 MHz, $CDCl_3$)

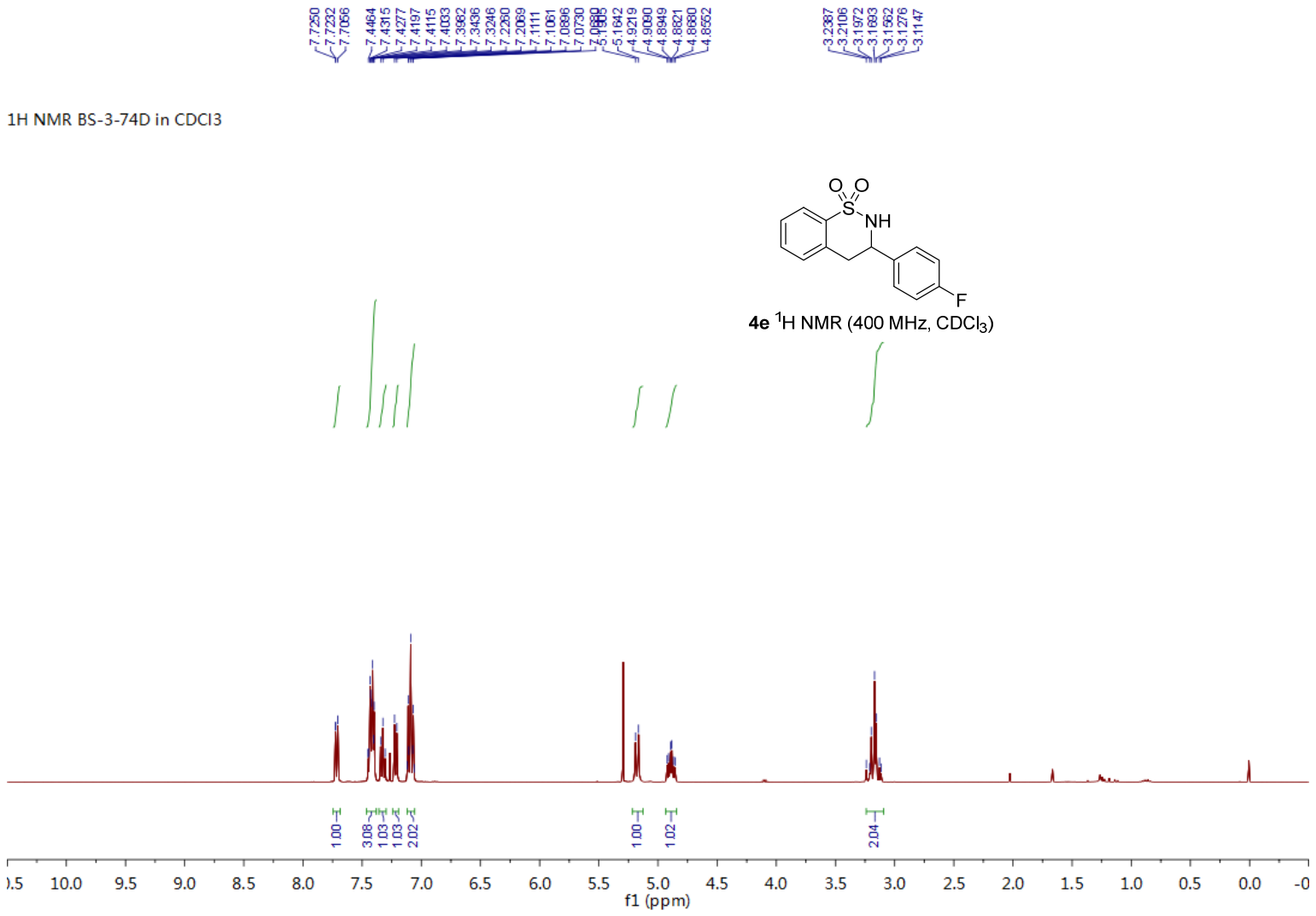


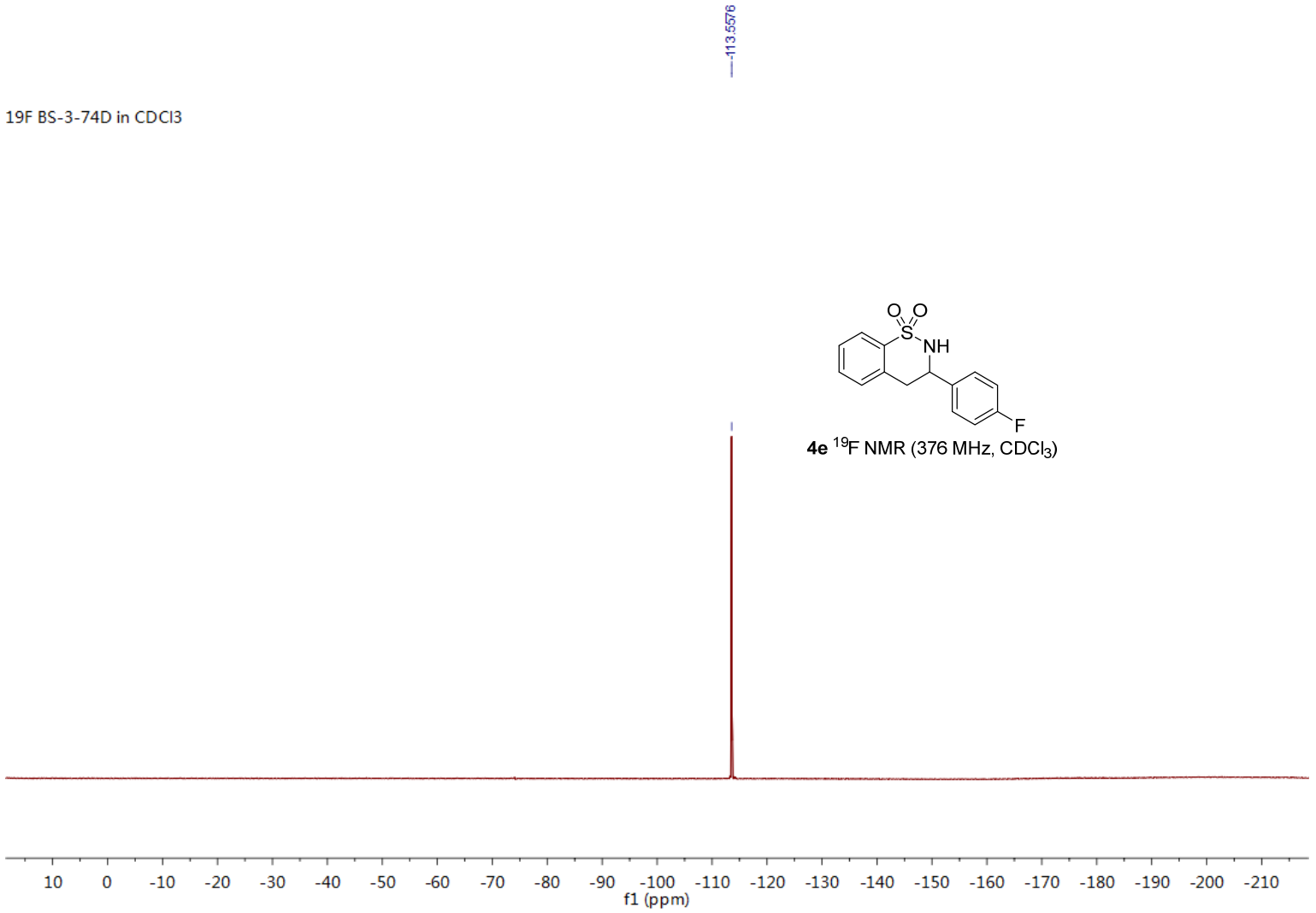
4c ^{13}C NMR (100 MHz, $CDCl_3$)


7.7412
7.7218
7.4425
7.4239
7.4052
7.3358
7.3166
7.3034
7.2837
7.2480
7.2239
7.2034
7.1832
5.1039
5.0779
4.9086
4.8967
4.8813
4.8695
4.8543
4.8425
3.2330
3.2045
3.1912
3.1627
3.1550
3.1427
3.1128
3.1009
2.3485
1H NMR BS-3-74C in CDCl3
O
O
S
NH
4d 1H NMR (400 MHz, CDCl3)
0.95
1.09
2.94
2.80
0.97
0.94
1.99
3.00
f1 (ppm)



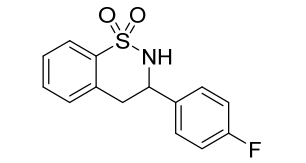
4d ^{13}C NMR (100 MHz, $CDCl_3$)


7.7250
7.7232
7.7056
7.4464
7.4315
7.4277
7.4197
7.4115
7.4033
7.3962
7.3436
7.3246
7.2250
7.2069
7.1111
7.1061
7.0896
7.0730
5.1642
4.9219
4.9090
4.8949
4.8821
4.8680
4.8552
3.2387
3.2106
3.1972
3.1693
3.1562
3.1276
3.1147
1H NMR BS-3-74D in CDCl3
O
O
S
NH
F
4e 1H NMR (400 MHz, CDCl3)
1.00
3.08
1.03
1.03
2.02
1.00
1.02
2.04
f1 (ppm)

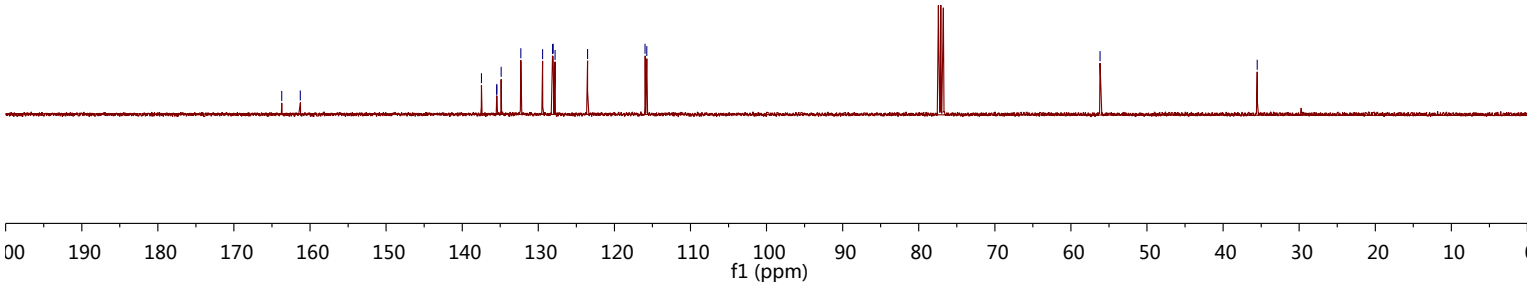


4e ^{19}F NMR (376 MHz, $CDCl_3$)

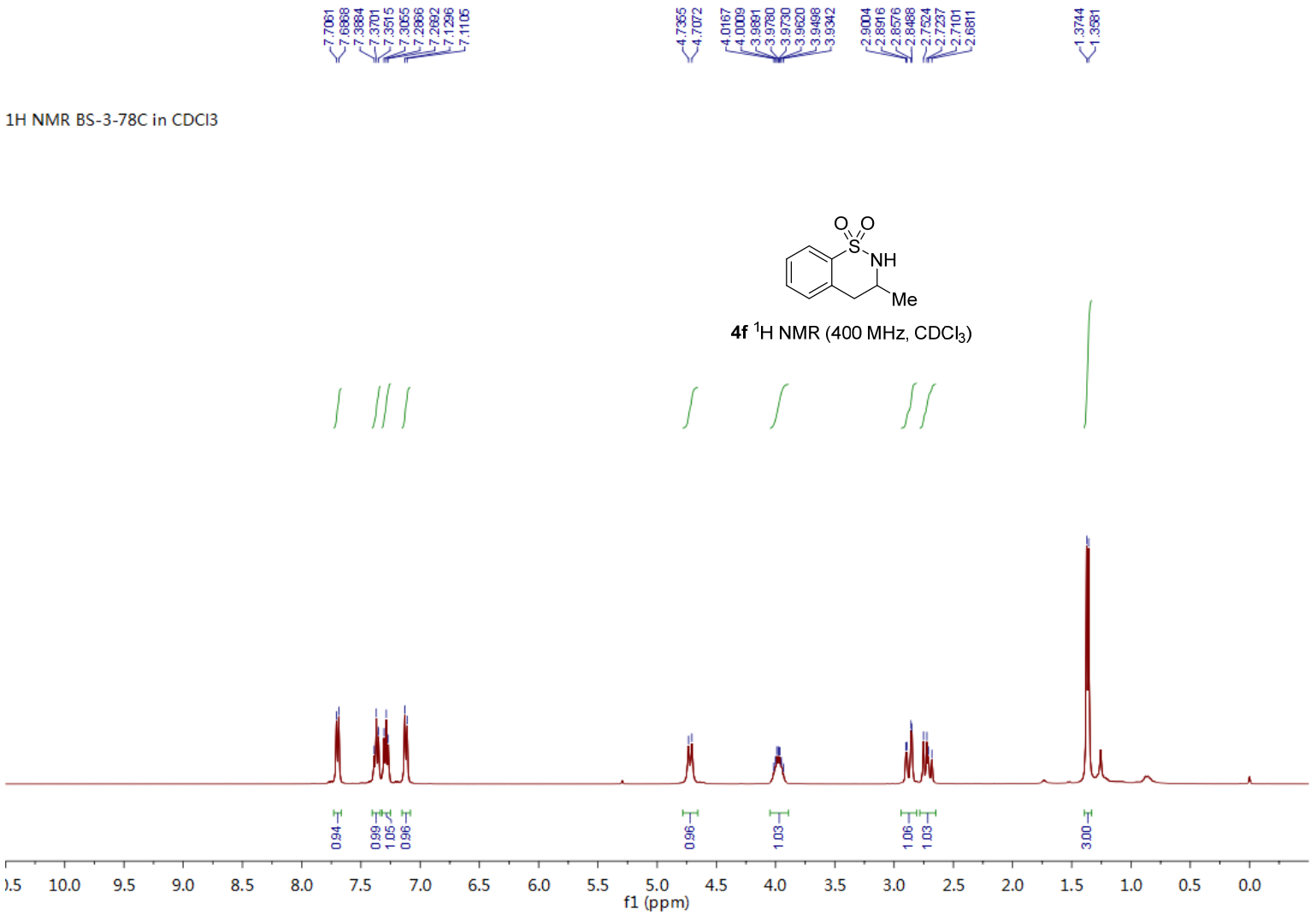
13C NMR BS-3-74D in CDCl3



4e ^{13}C NMR (100 MHz, $CDCl_3$)

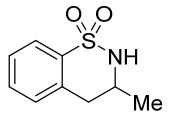


1H NMR BS-3-78C in CDCl3

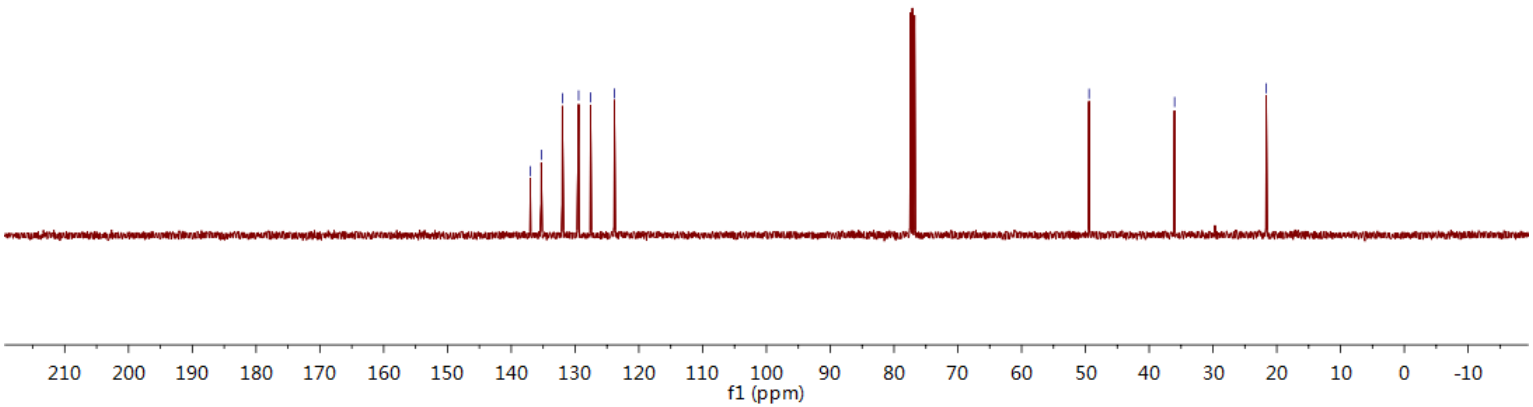


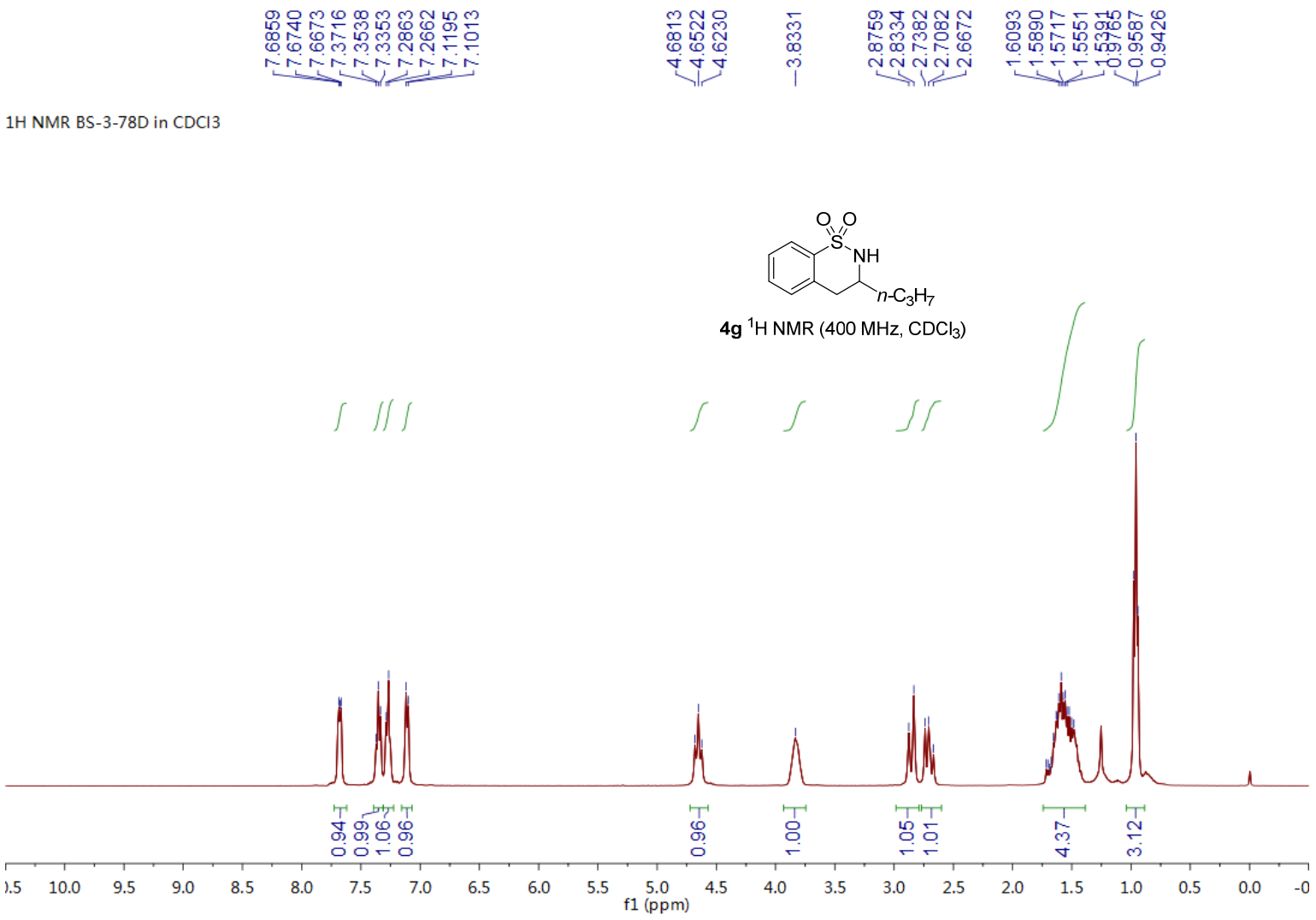
137.01
135.29
131.99
129.44
127.57
123.83
49.42
36.02
21.65

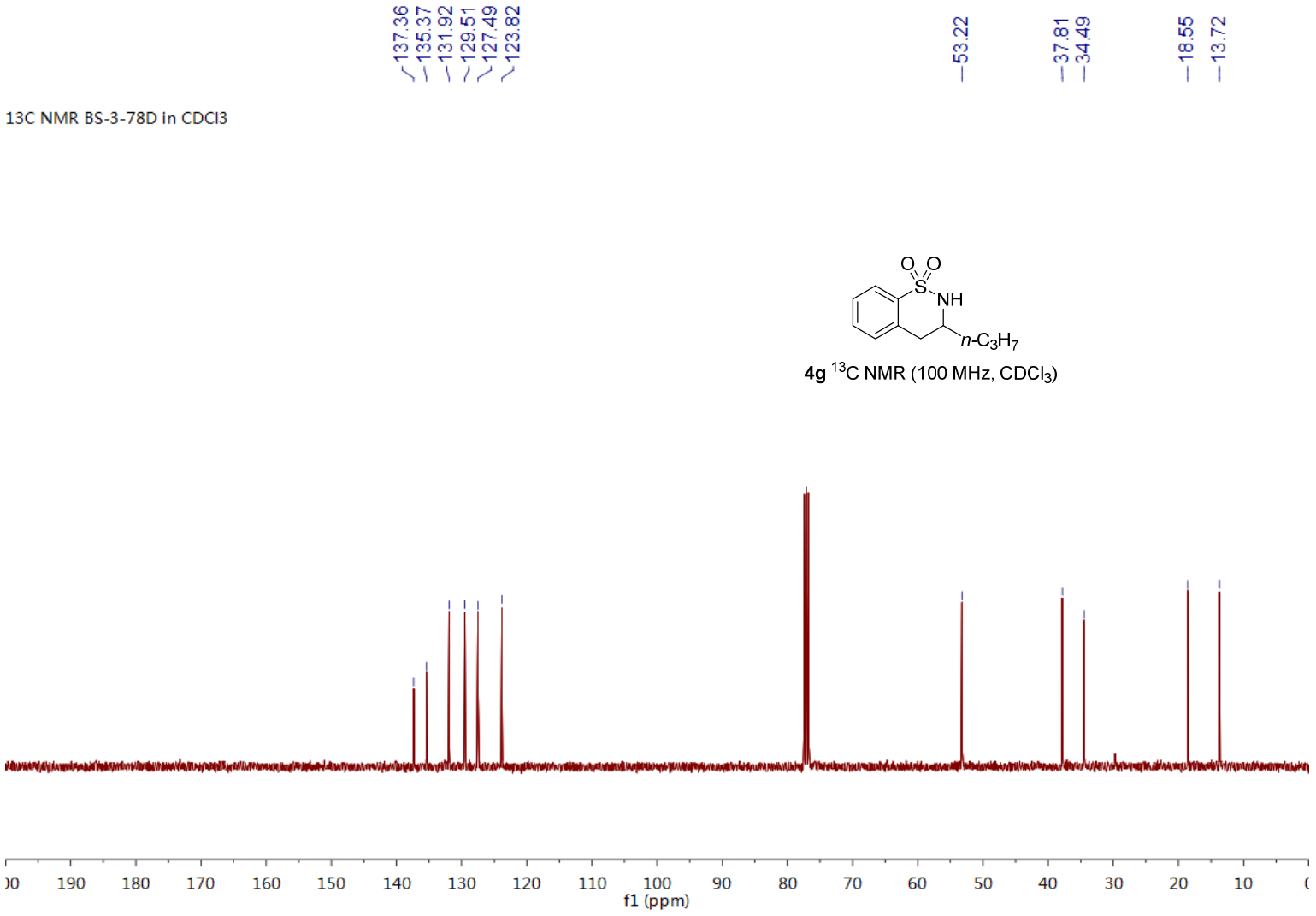
13C NMR BS-3-78C in CDCl3



4f ^{13}C NMR (100 MHz, $CDCl_3$)

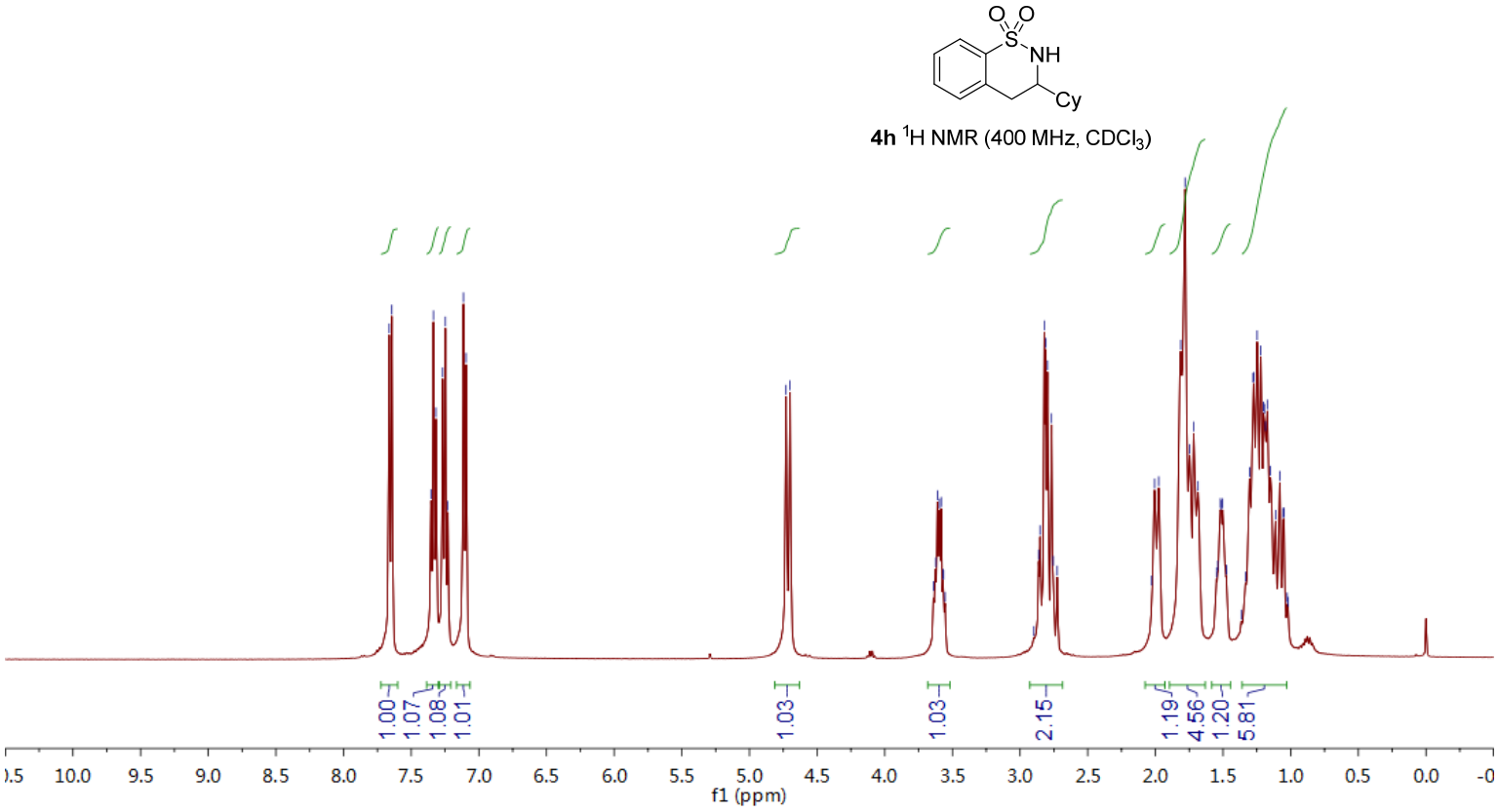


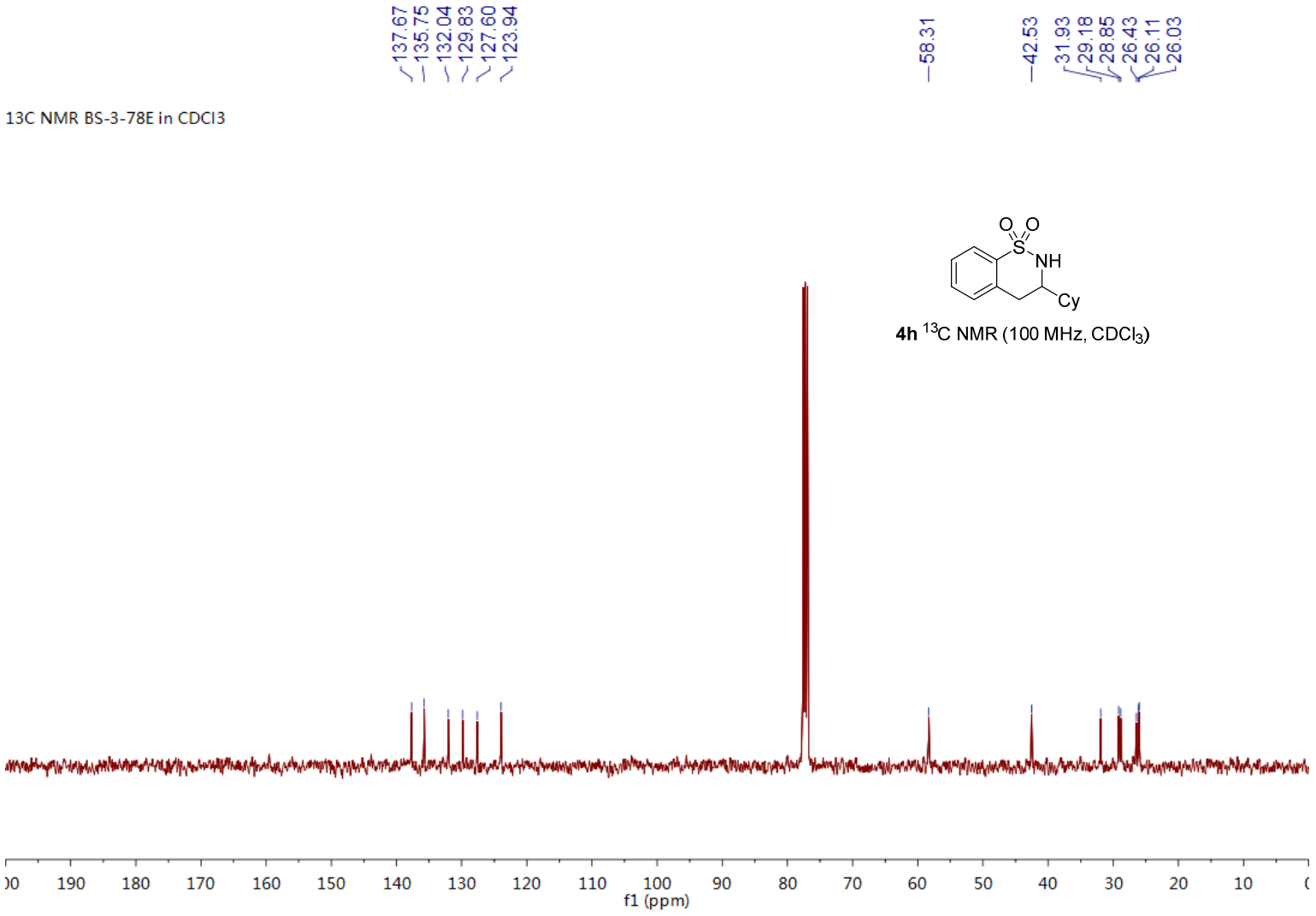

7.6859
7.6740
7.6673
7.3716
7.3538
7.3353
7.2863
7.2662
7.1195
7.1013
4.6813
4.6522
4.6230
3.8331
2.8759
2.8334
2.7382
2.7082
2.6672
1.6093
1.5890
1.5717
1.5551
1.5391
0.9765
0.9587
0.9426
1H NMR BS-3-78D in CDCl3
O
O
S
NH
n-C3H7
4g 1H NMR (400 MHz, CDCl3)
0.94
0.99
1.06
0.96
0.96
1.00
1.05
1.01
4.37
3.12
f1 (ppm)



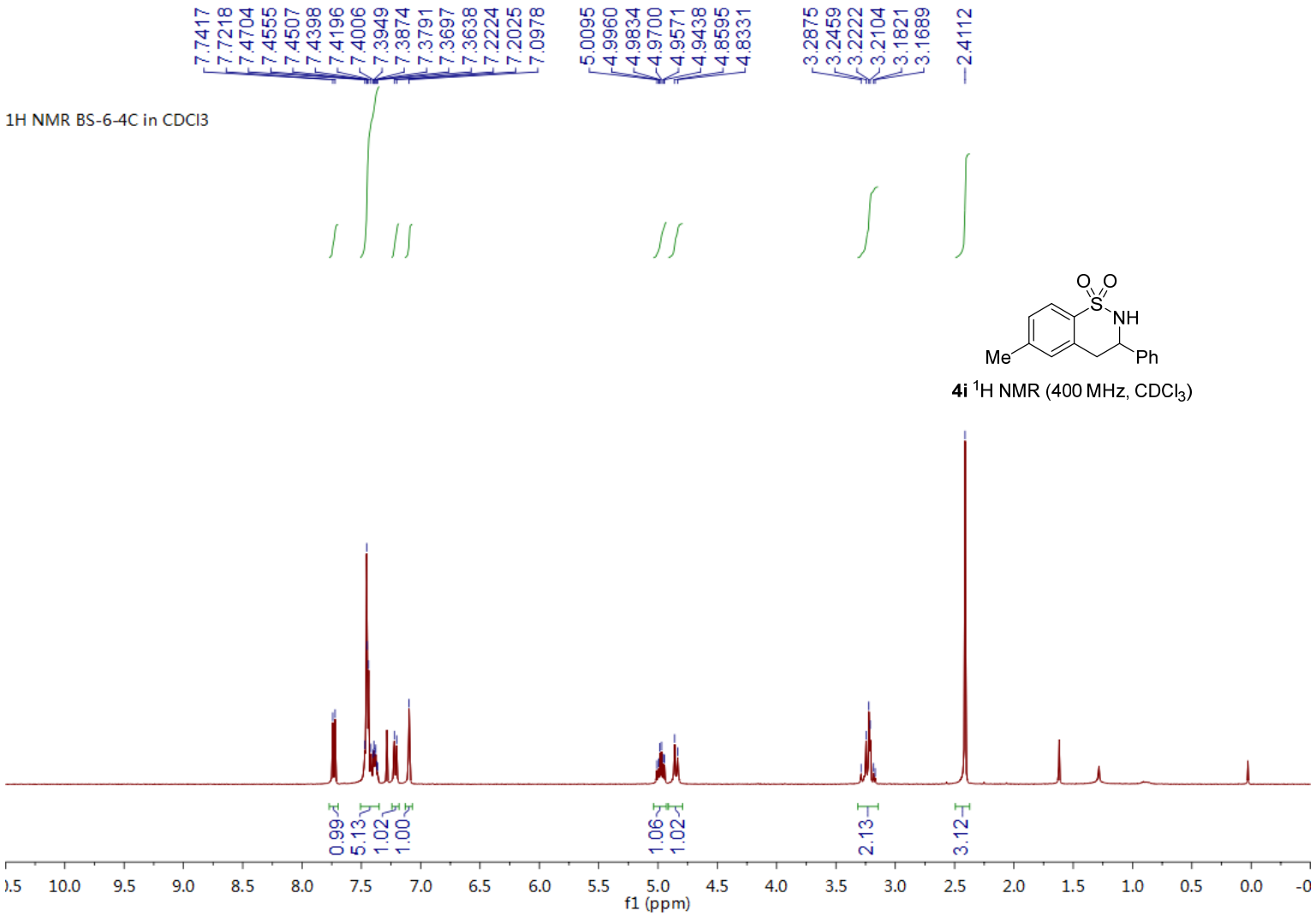
4g ^{13}C NMR (100 MHz, $CDCl_3$)

1H NMR BS-3-78E in CDCl3

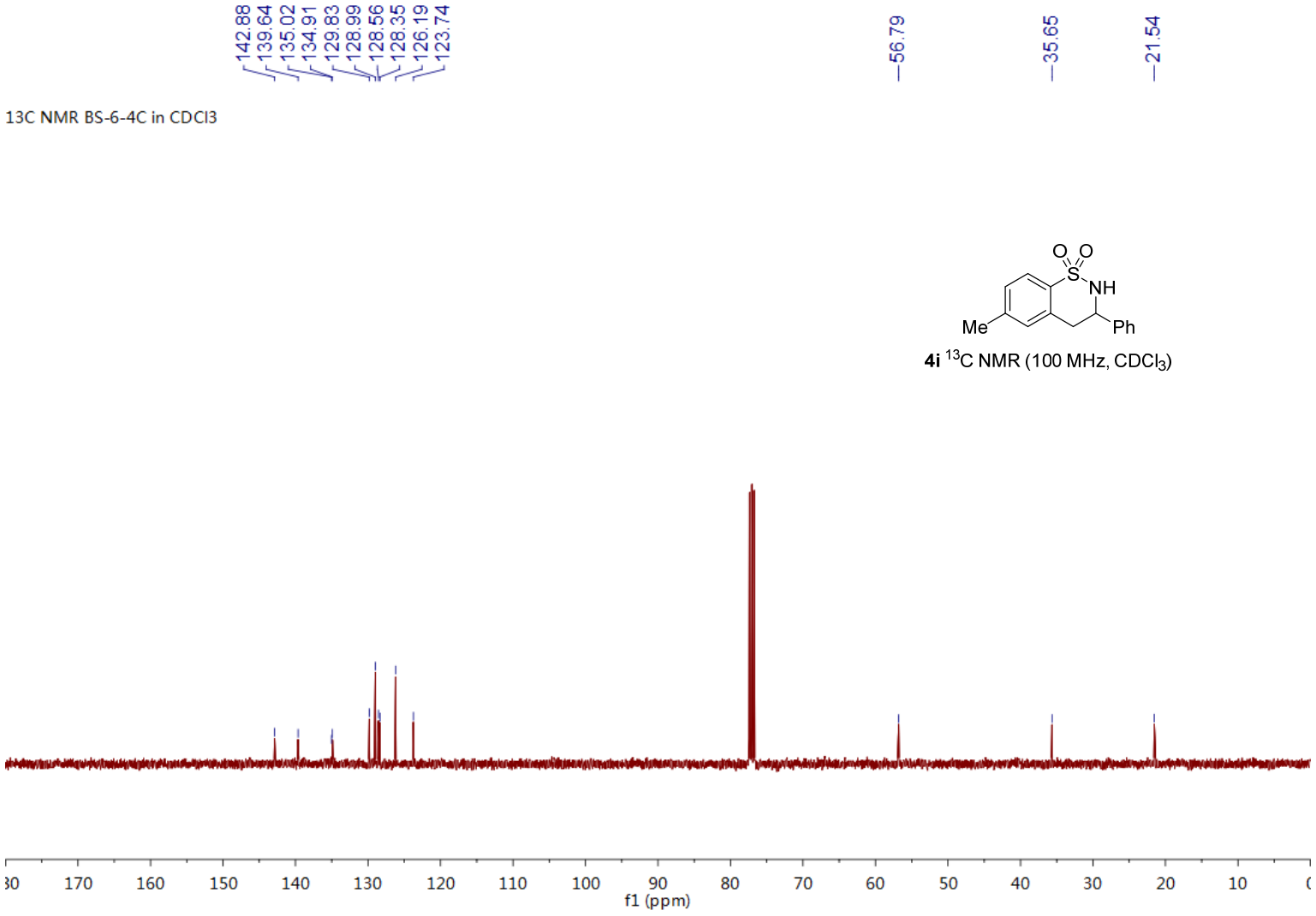




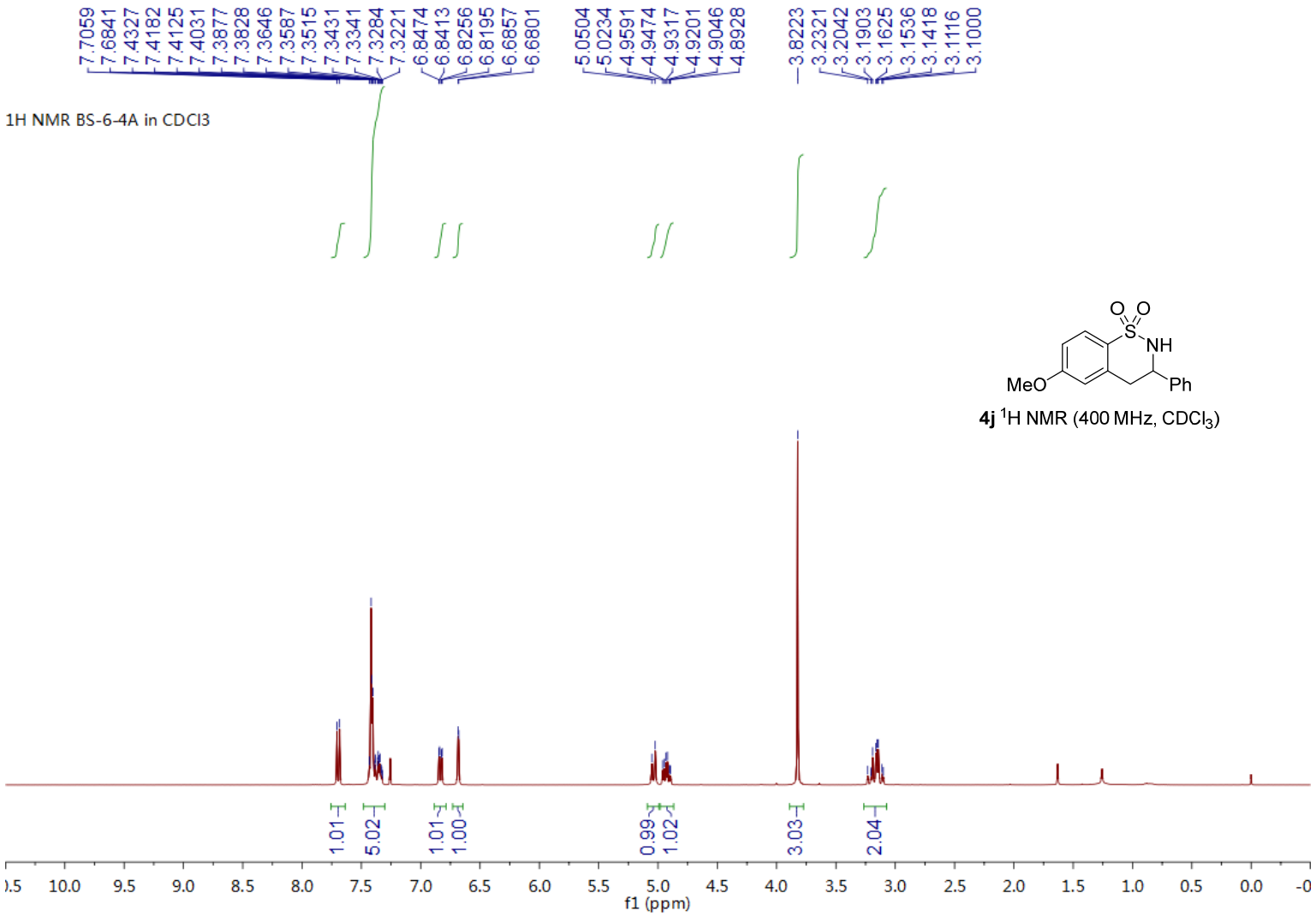
4h ^{13}C NMR (100 MHz, $CDCl_3$)



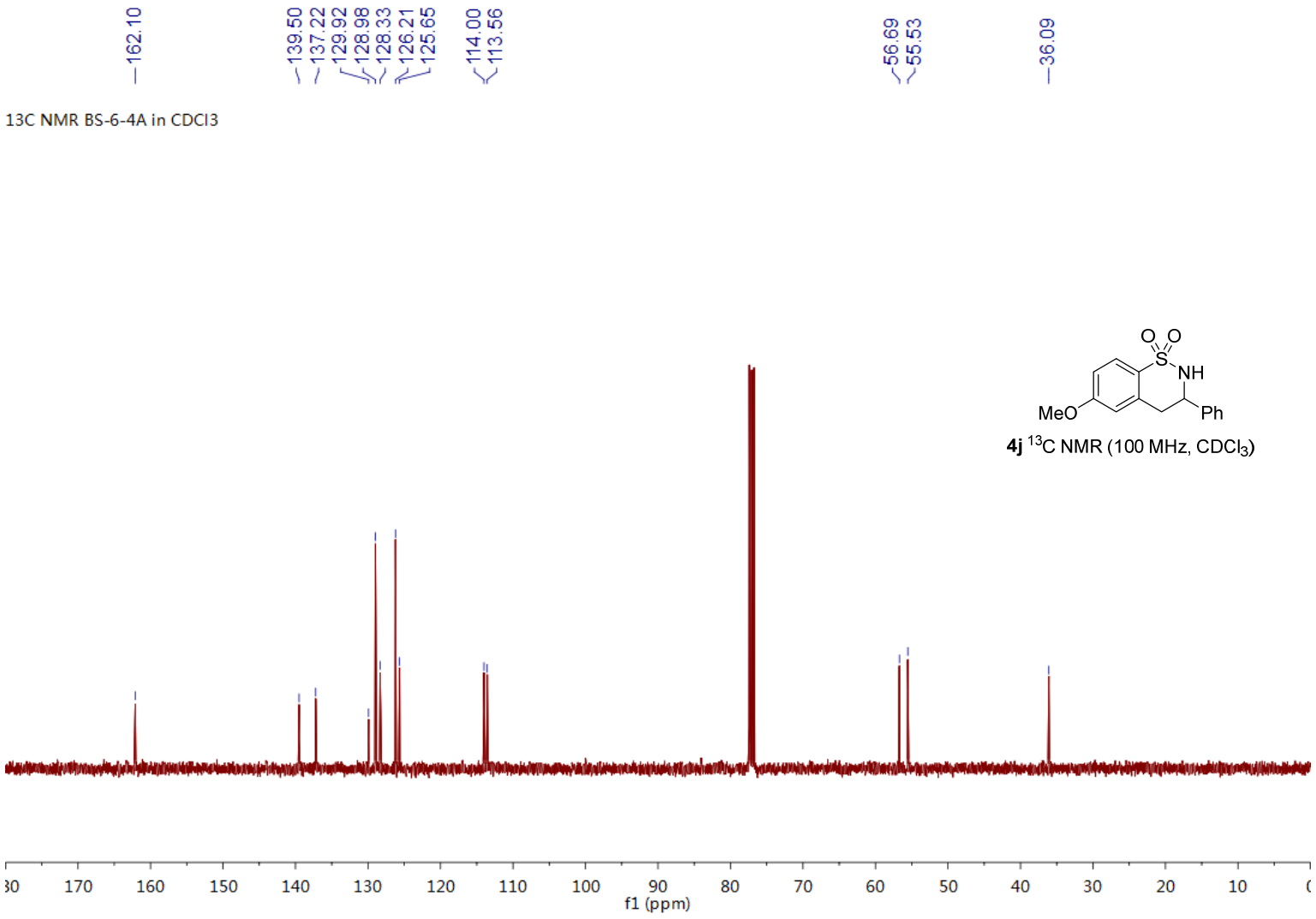
4i ^{1}H NMR (400 MHz, $CDCl_3$)



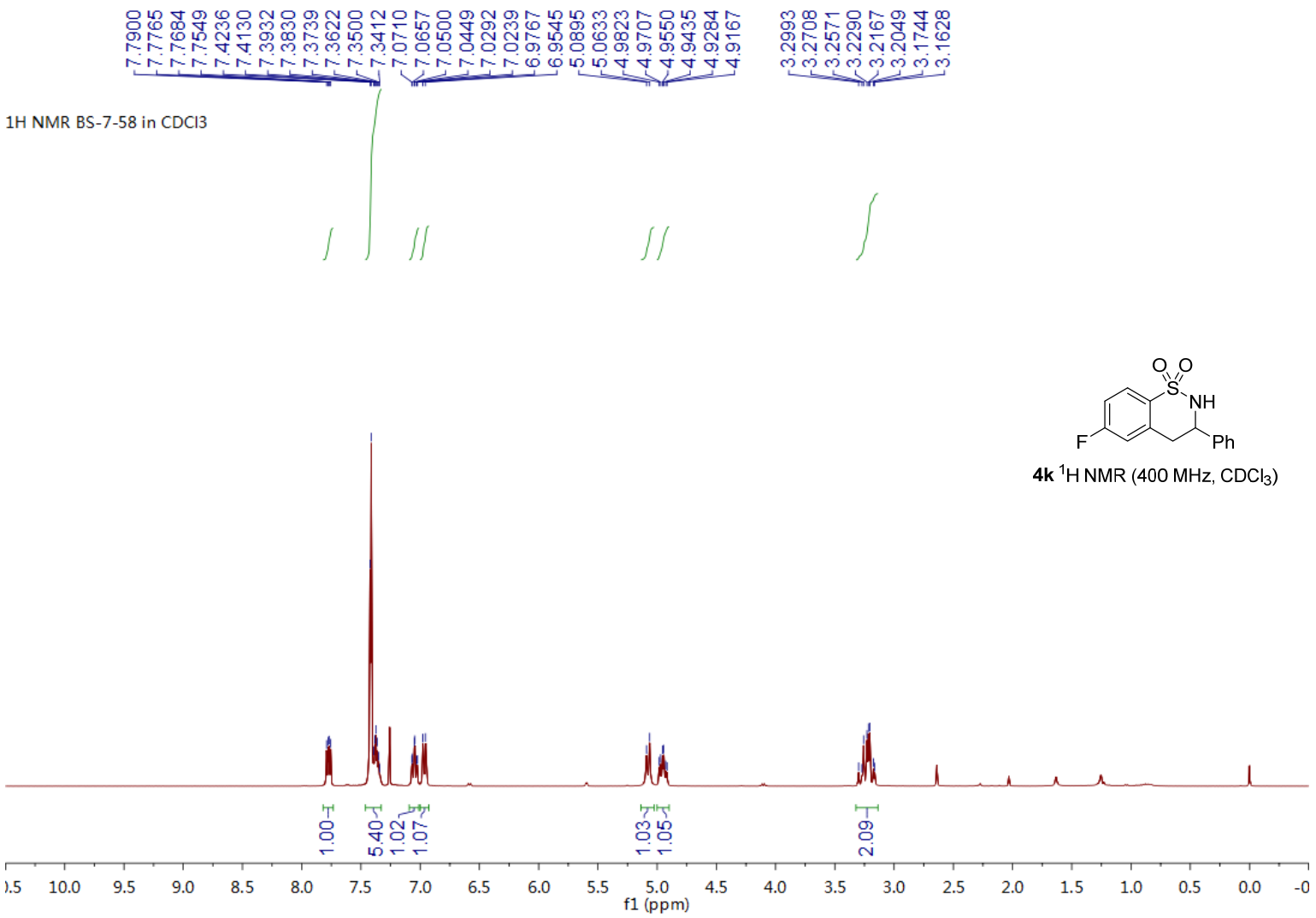
4i ^{13}C NMR (100 MHz, $CDCl_3$)



4j ^{1}H NMR (400 MHz, $CDCl_3$)

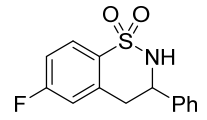


4j ^{13}C NMR (100 MHz, $CDCl_3$)

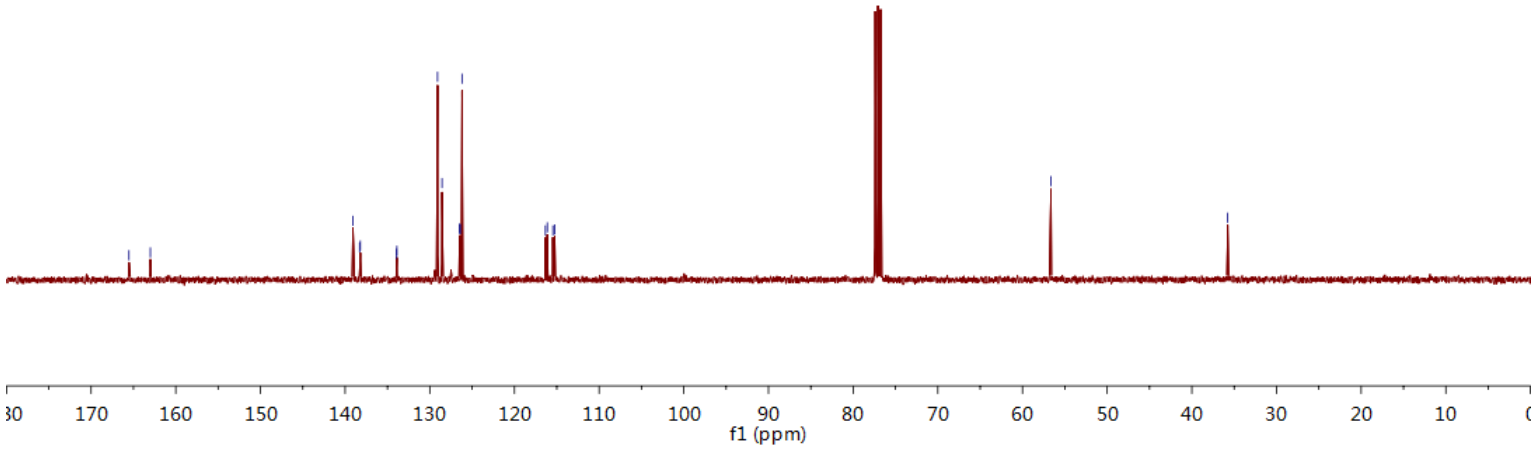


4k ^{1}H NMR (400 MHz, $CDCl_3$)

13C NMR BS-7-58 in CDCl3

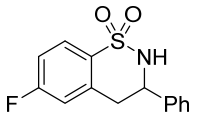


4k ^{13}C NMR (100 MHz, $CDCl_3$)

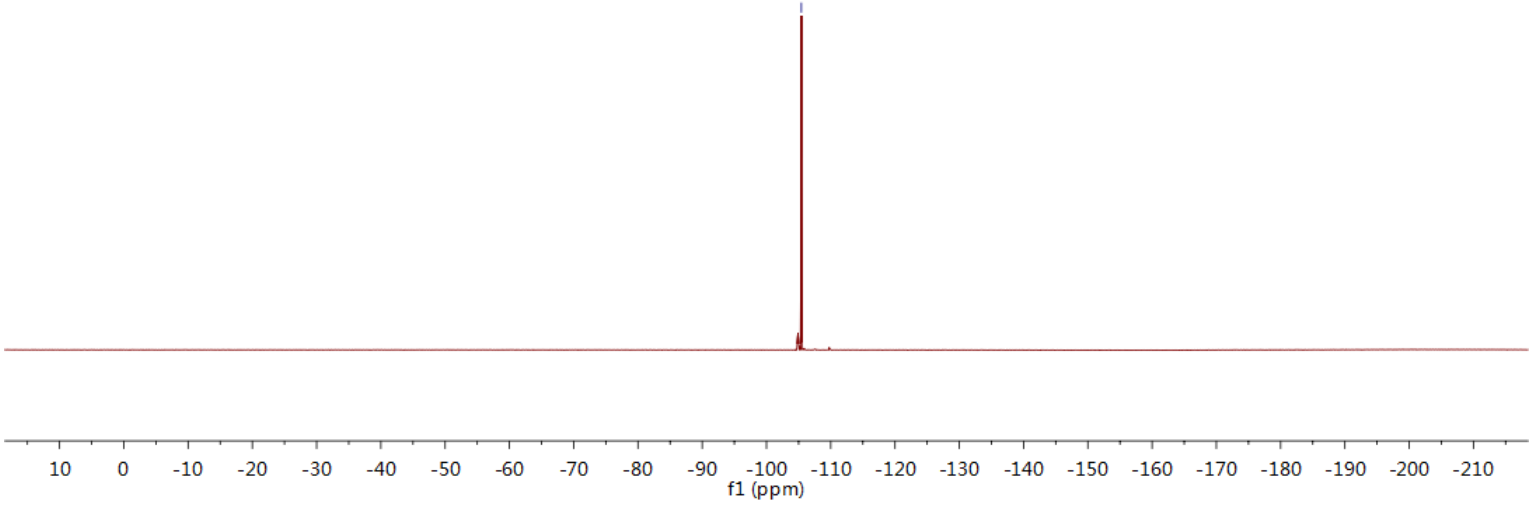


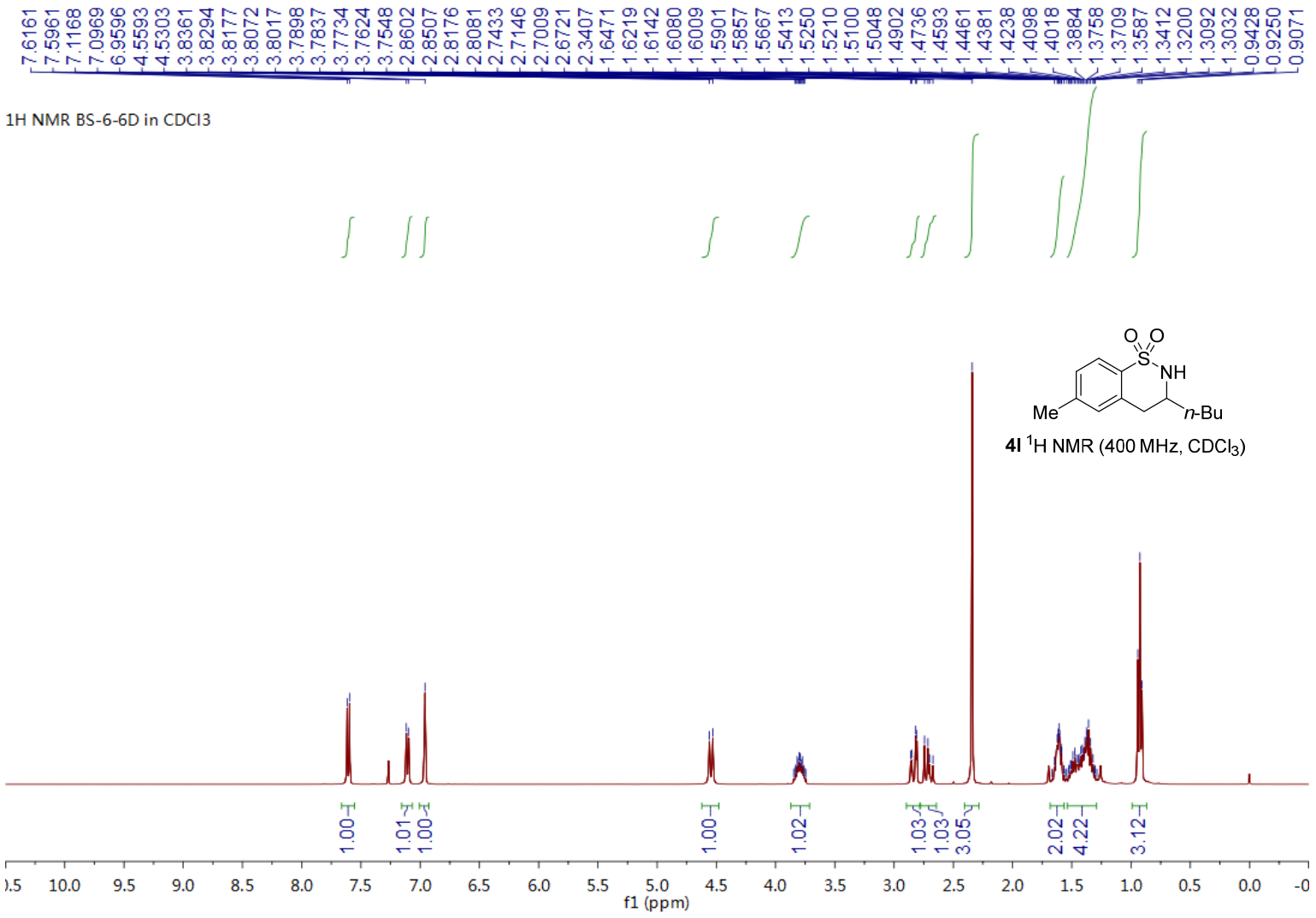
19F NMR BS-7-58 in CDCl3

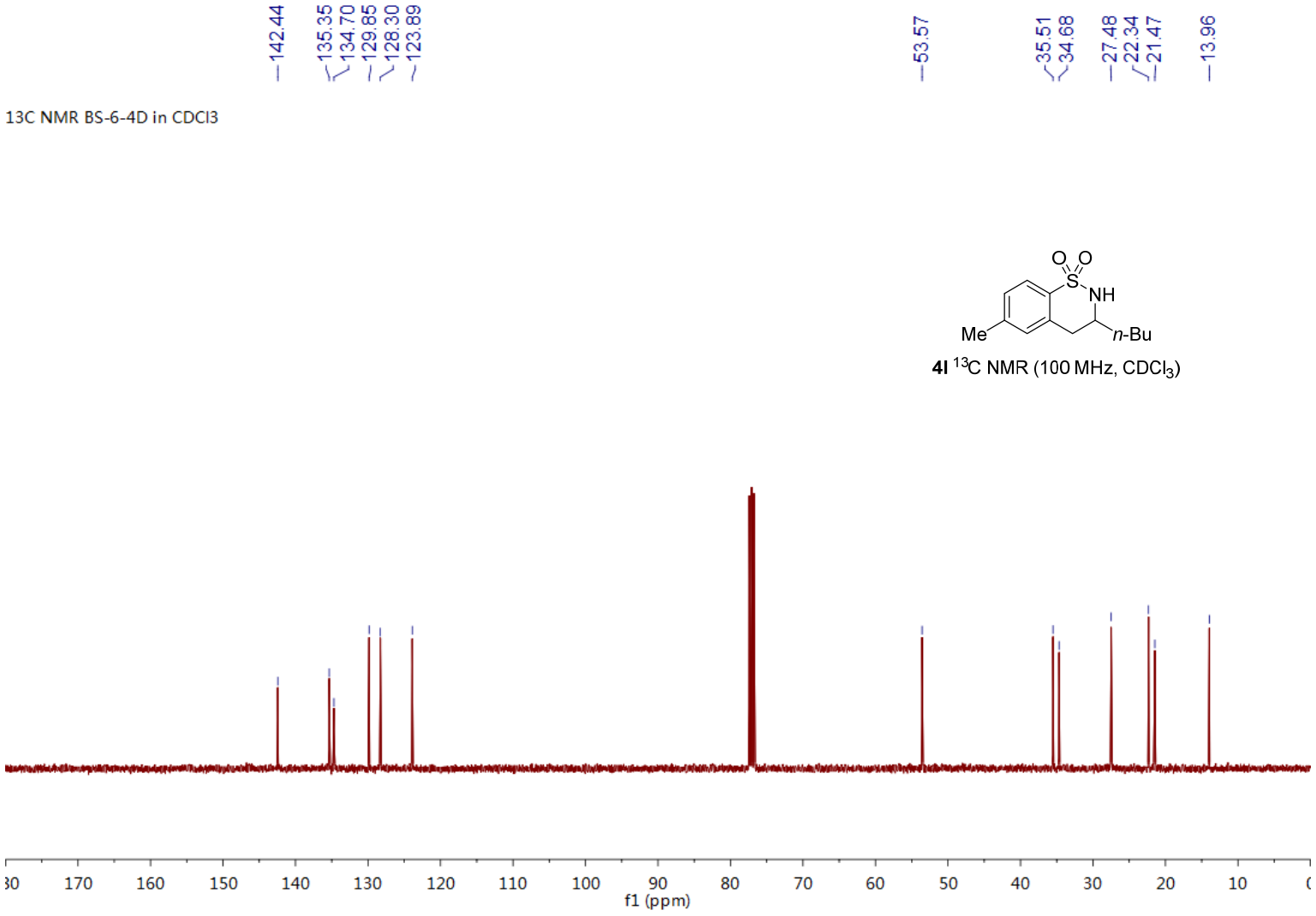
-105.4253



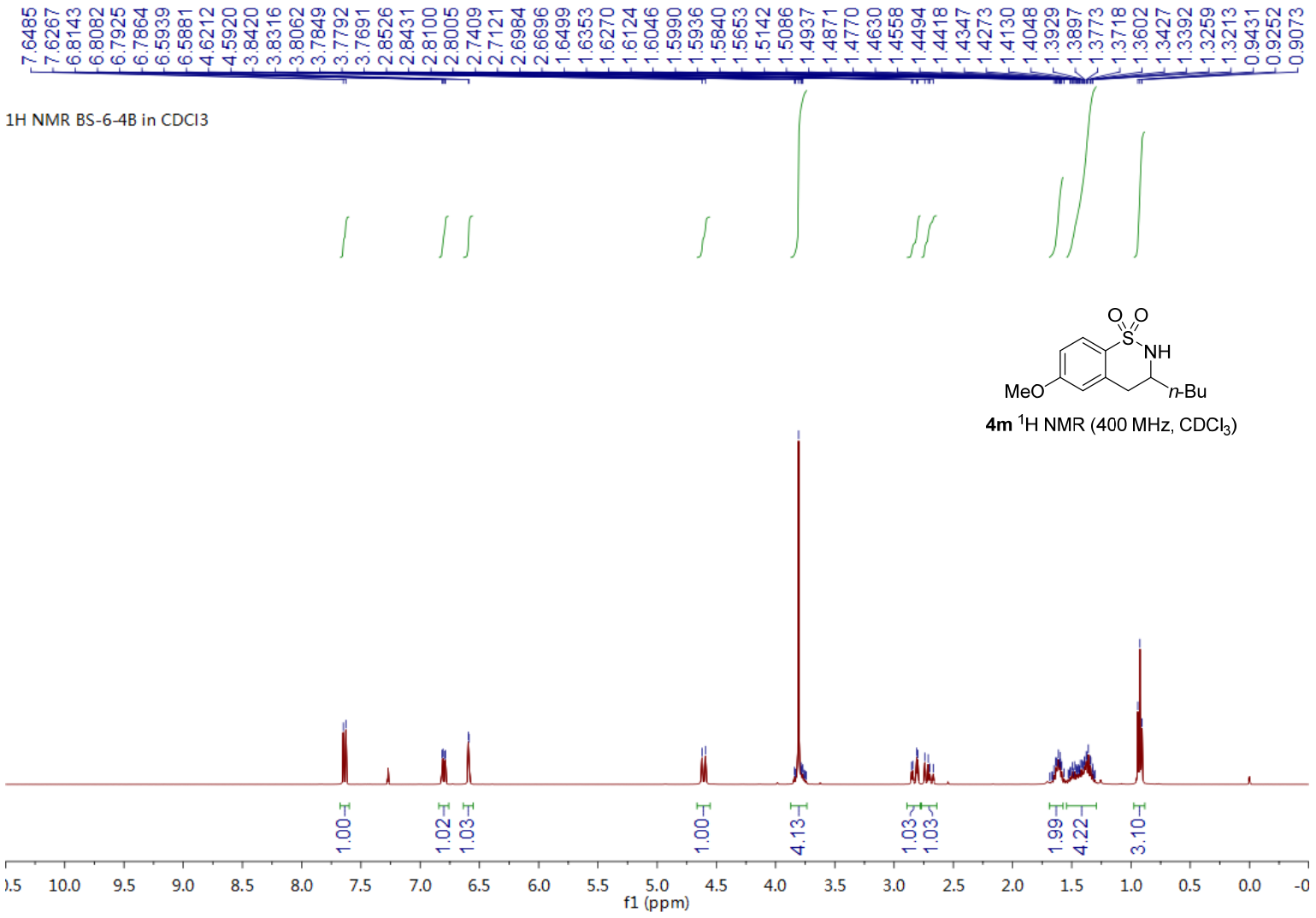
4k ^{19}F NMR (376 MHz, $CDCl_3$)

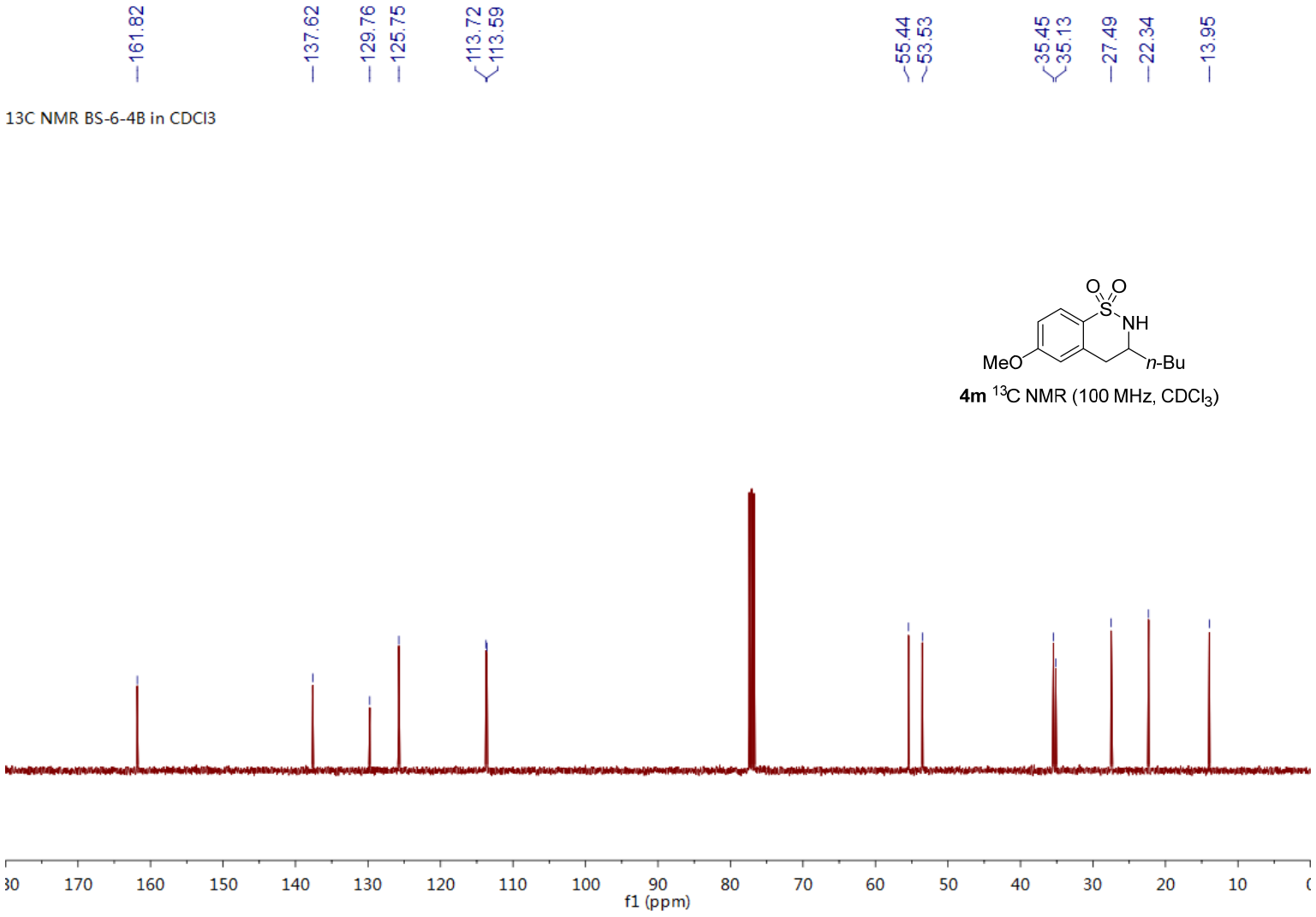



7.6161
7.5961
7.1168
7.0969
6.9596
4.5593
4.5303
3.8361
3.8294
3.8177
3.8072
3.8017
3.7898
3.7837
3.7734
3.7624
3.7548
2.8602
2.8507
2.8176
2.8081
2.7433
2.7146
2.7009
2.6721
2.3407
1.6471
1.6219
1.6142
1.6080
1.6009
1.5901
1.5857
1.5667
1.5413
1.5250
1.5210
1.5100
1.5048
1.4902
1.4736
1.4593
1.4461
1.4381
1.4238
1.4098
1.4018
1.3884
1.3758
1.3709
1.3587
1.3412
1.3200
1.3092
1.3032
0.9428
0.9250
0.9071
1H NMR BS-6-6D in CDCl3
O
O
S
NH
Me
n-Bu
4l 1H NMR (400 MHz, CDCl3)
1.00
1.01
1.00
1.00
1.02
1.03
1.03
3.05
2.02
4.22
3.12
f1 (ppm)

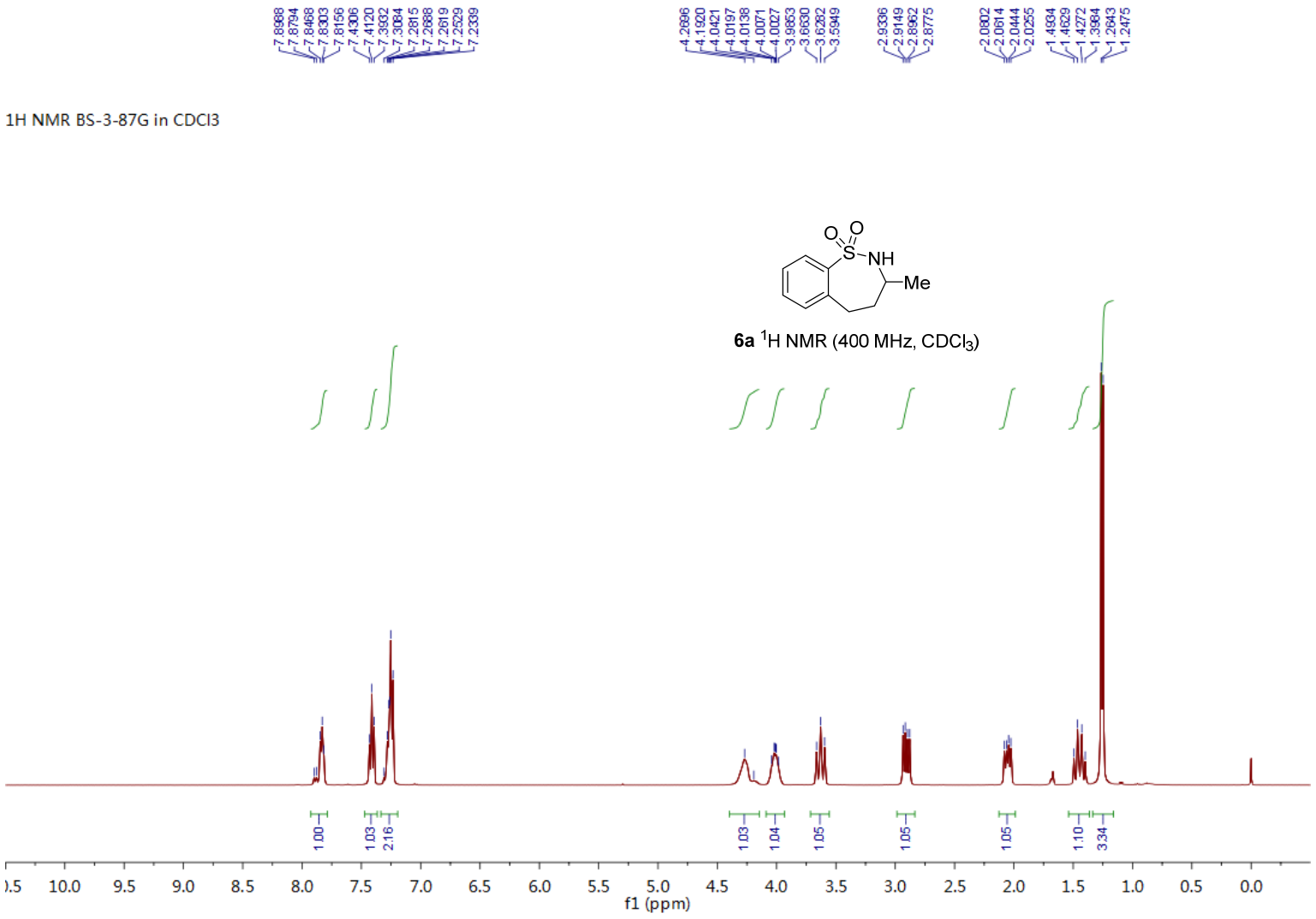


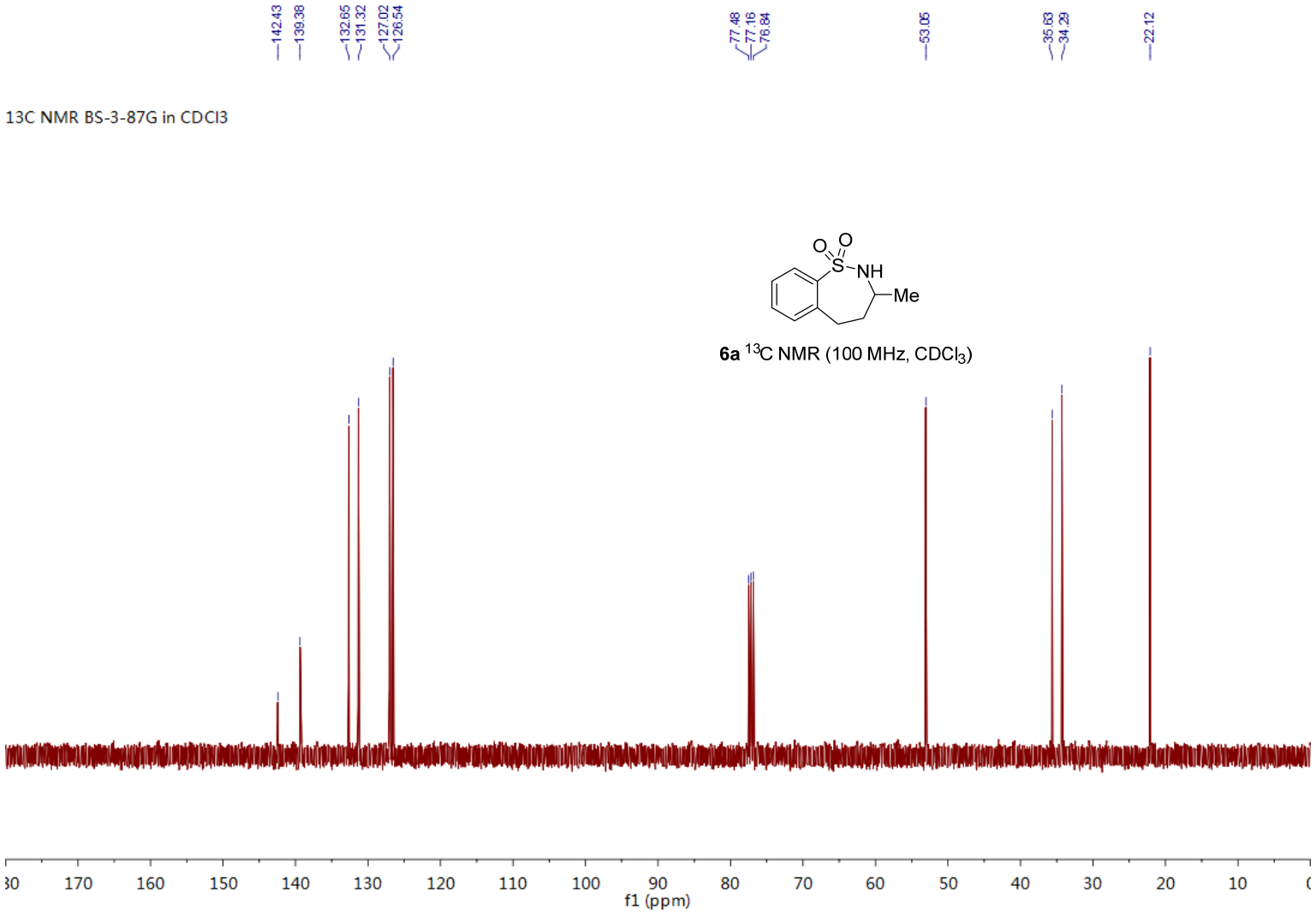
4l ^{13}C NMR (100 MHz, $CDCl_3$)

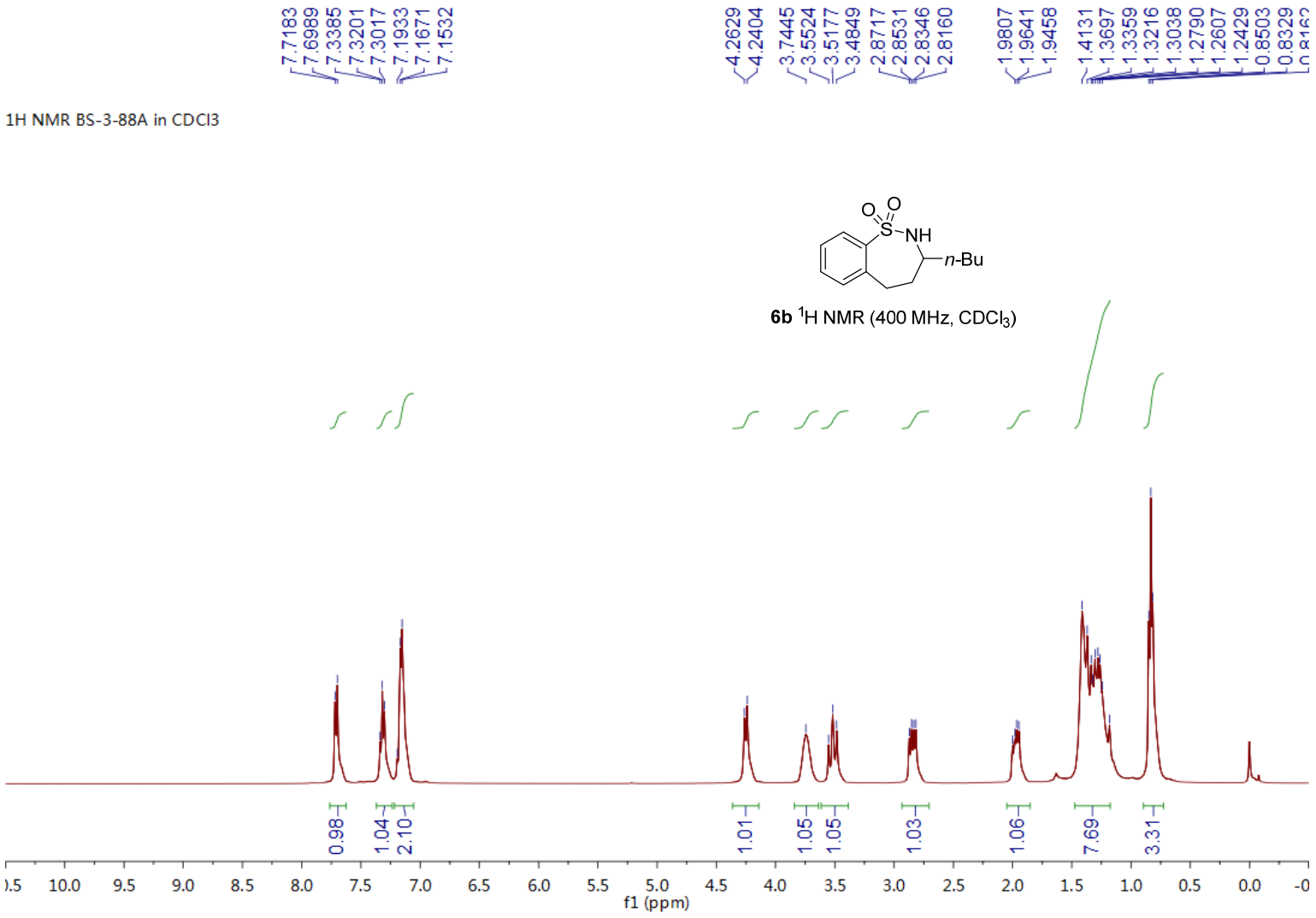

7.6485
7.6267
6.8143
6.8082
6.7925
6.7864
6.5939
6.5881
4.6212
4.5920
3.8420
3.8316
3.8062
3.7849
3.7792
3.7691
2.8526
2.8431
2.8100
2.8005
2.7409
2.7121
2.6984
2.6696
1.6499
1.6353
1.6270
1.6124
1.6046
1.5990
1.5936
1.5840
1.5653
1.5142
1.5086
1.4937
1.4871
1.4770
1.4630
1.4558
1.4494
1.4418
1.4347
1.4273
1.4130
1.4048
1.3929
1.3897
1.3773
1.3718
1.3602
1.3427
1.3392
1.3259
1.3213
0.9431
0.9252
0.9073
1H NMR BS-6-4B in CDCl3
O
O
S
NH
MeO
n-Bu
4m 1H NMR (400 MHz, CDCl3)
1.00
1.02
1.03
1.00
4.13
1.03
1.03
1.99
4.22
3.10
10.5
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
-0
f1 (ppm)

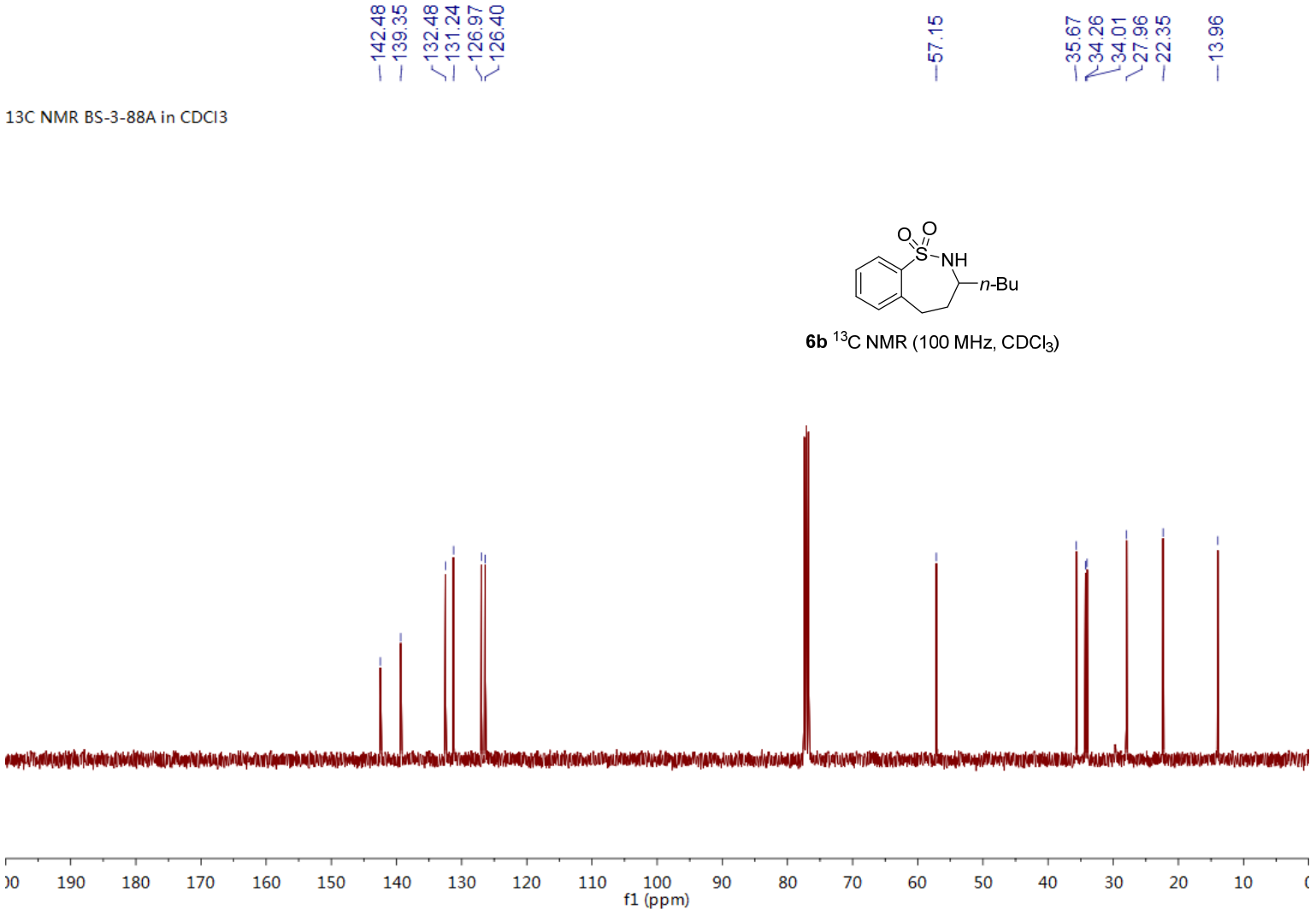


4m ^{13}C NMR (100 MHz, $CDCl_3$)

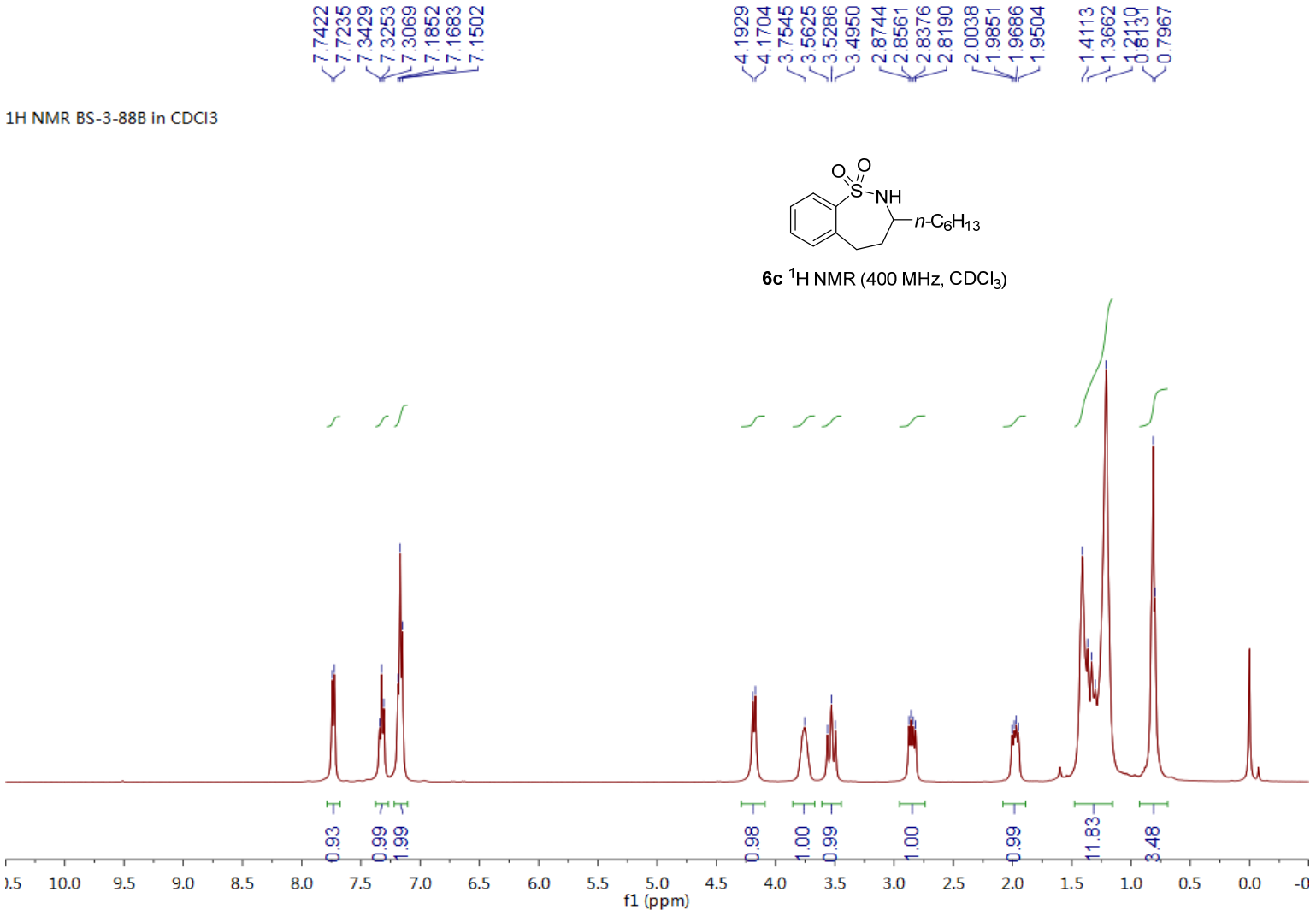

7.8968
7.8794
7.8468
7.8303
7.8156
7.4306
7.4120
7.3892
7.3084
7.2815
7.2688
7.2619
7.2529
7.2339
4.2696
4.1920
4.0421
4.0197
4.0138
4.0071
4.0027
3.9853
3.6630
3.6282
3.5949
2.9336
2.9149
2.8962
2.8775
2.0802
2.0614
2.0444
2.0255
1.4934
1.4629
1.4272
1.3984
1.2643
1.2475
1H NMR BS-3-87G in CDCl3
O
O
S
NH
Me
6a 1H NMR (400 MHz, CDCl3)
1.00
1.03
2.16
1.03
1.04
1.05
1.05
1.05
1.10
3.34
f1 (ppm)


142.43
139.38
132.65
131.32
127.02
126.54
77.48
77.16
76.84
53.05
35.63
34.29
22.12
13C NMR BS-3-87G in CDCl3
O
O
S
NH
Me
6a ^{13}C NMR (100 MHz, $CDCl_3$)
f1 (ppm)

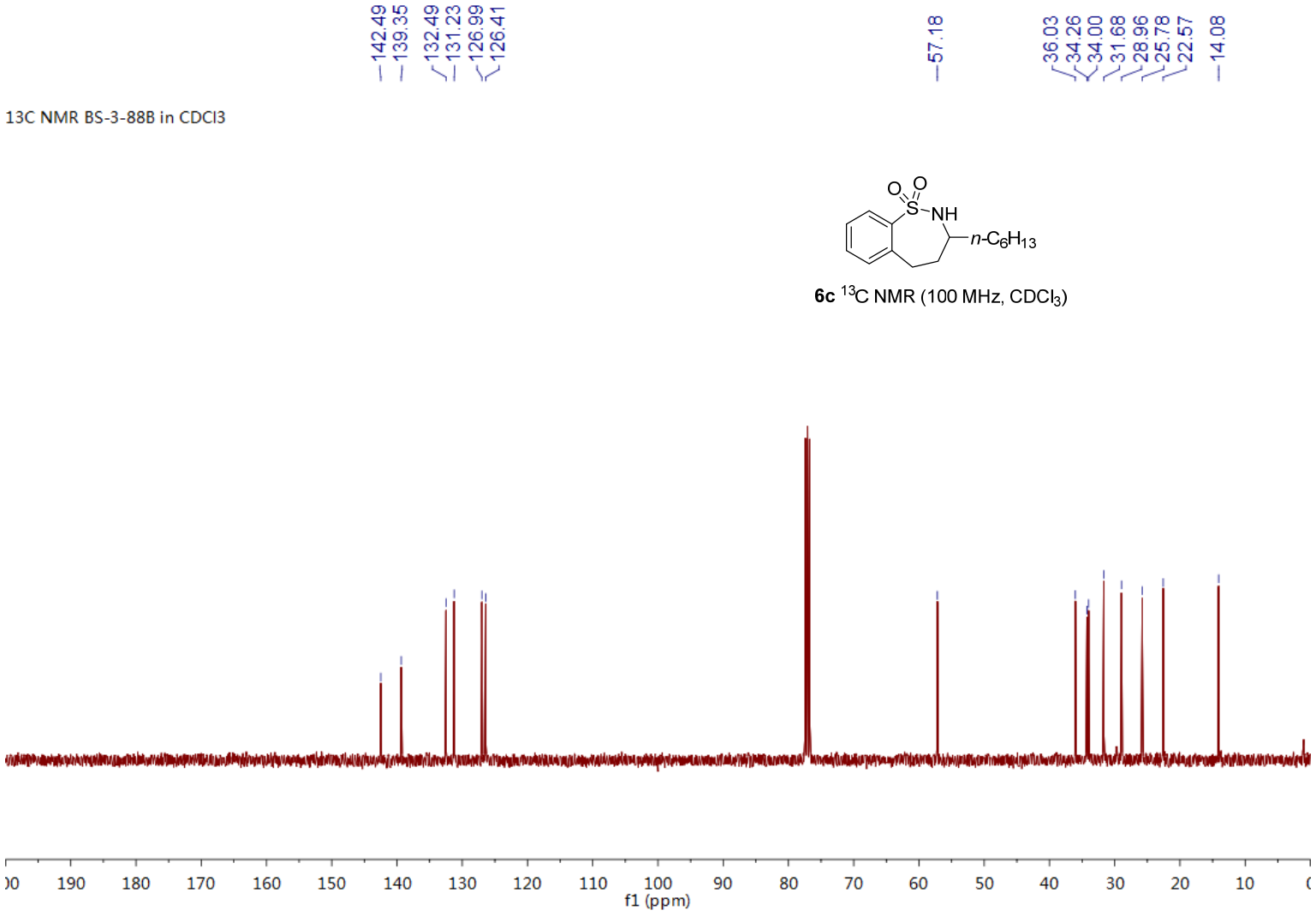

7.7183
7.6989
7.3385
7.3201
7.3017
7.1933
7.1671
7.1532
4.2629
4.2404
3.7445
3.5524
3.5177
3.4849
2.8717
2.8531
2.8346
2.8160
1.9807
1.9641
1.9458
1.4131
1.3697
1.3359
1.3216
1.3038
1.2790
1.2607
1.2429
0.8503
0.8329
1H NMR BS-3-88A in CDCl3
O
O
S
NH
n-Bu
6b 1H NMR (400 MHz, CDCl3)
0.98
1.04
2.10
1.01
1.05
1.05
1.03
1.06
7.69
3.31
10.5
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
-0
f1 (ppm)



6b ^{13}C NMR (100 MHz, $CDCl_3$)

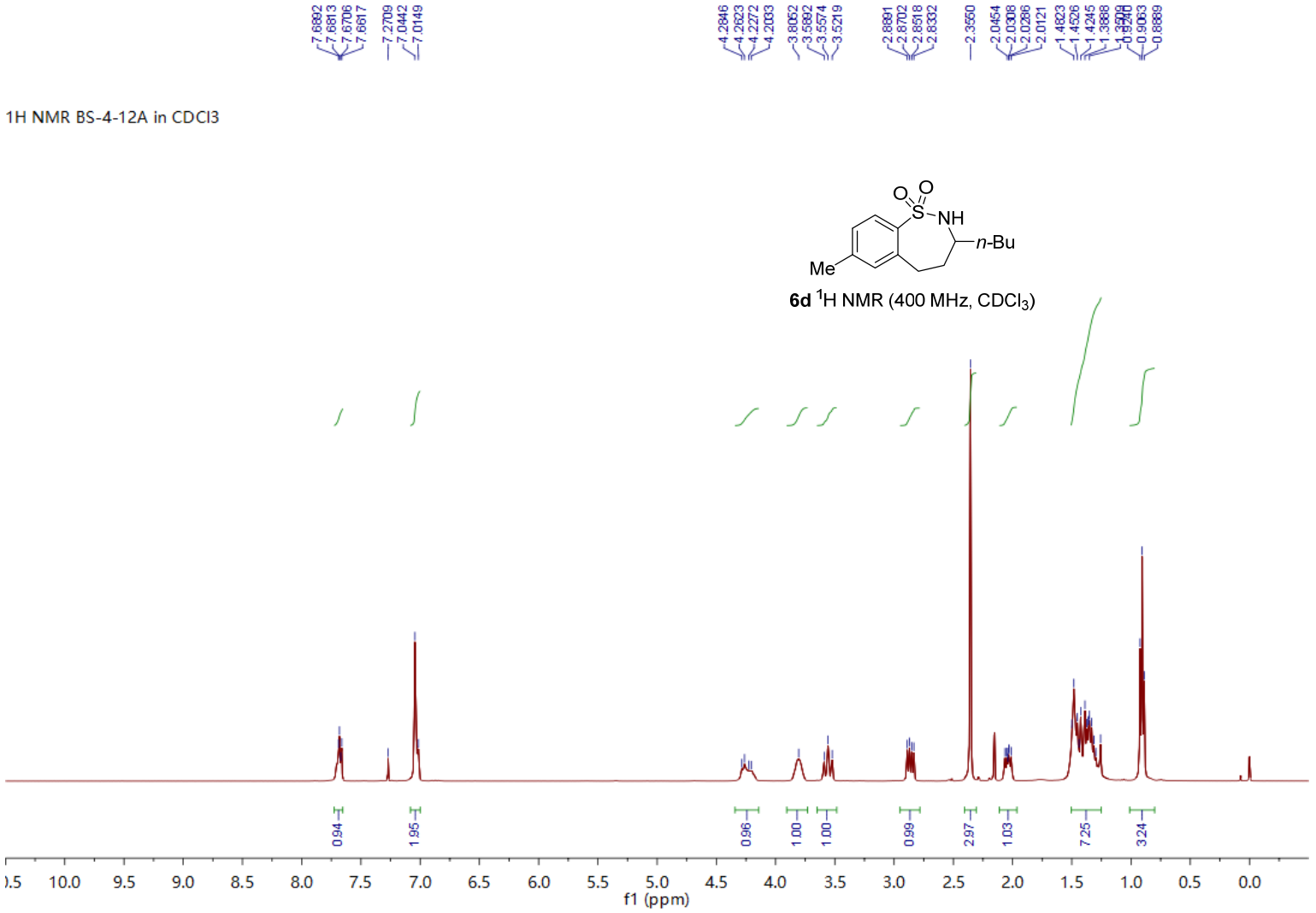


6c ^{1}H NMR (400 MHz, $CDCl_3$)

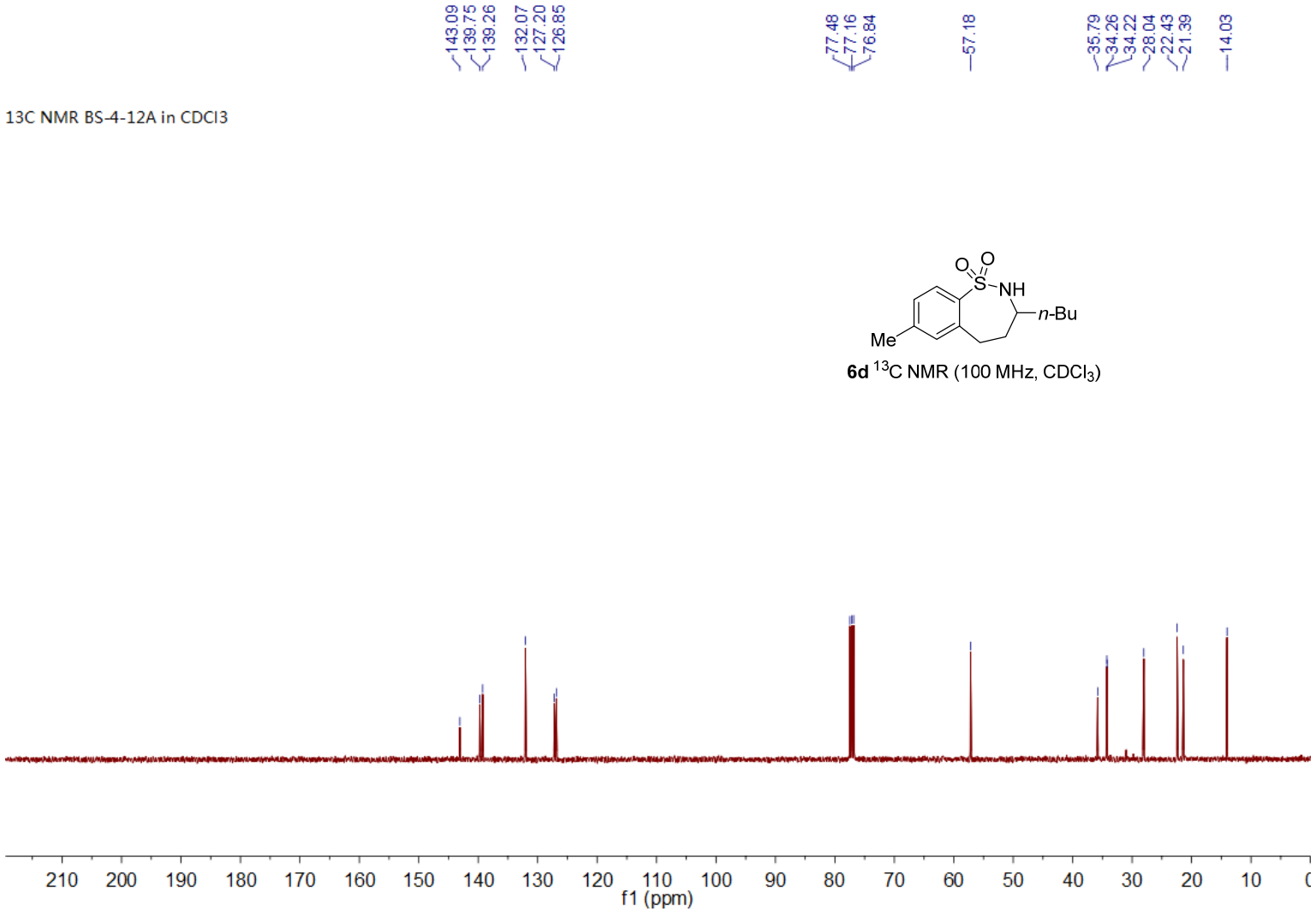


6c ^{13}C NMR (100 MHz, $CDCl_3$)

1H NMR BS-4-12A in CDCl3

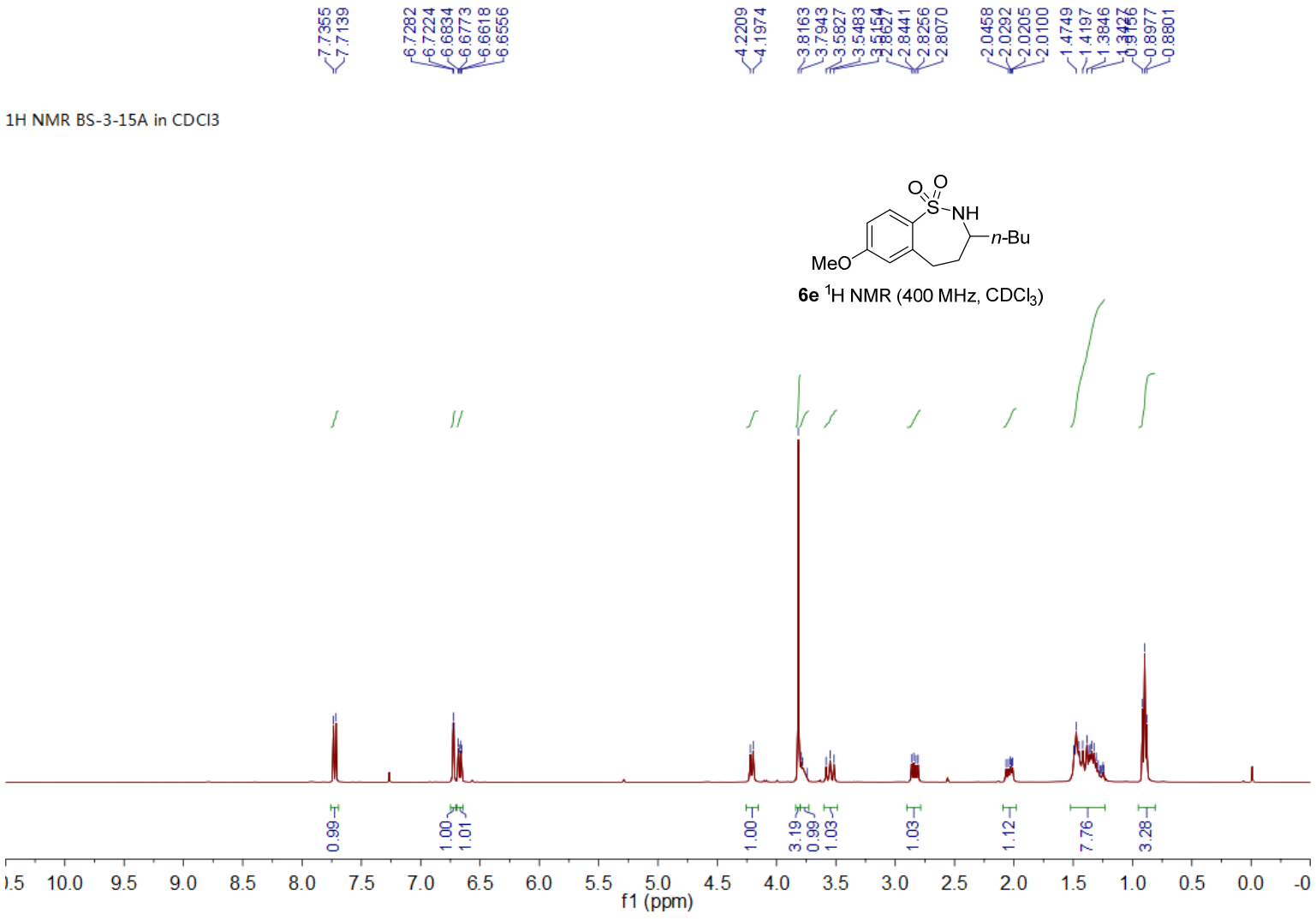


6d ^{1}H NMR (400 MHz, $CDCl_3$)

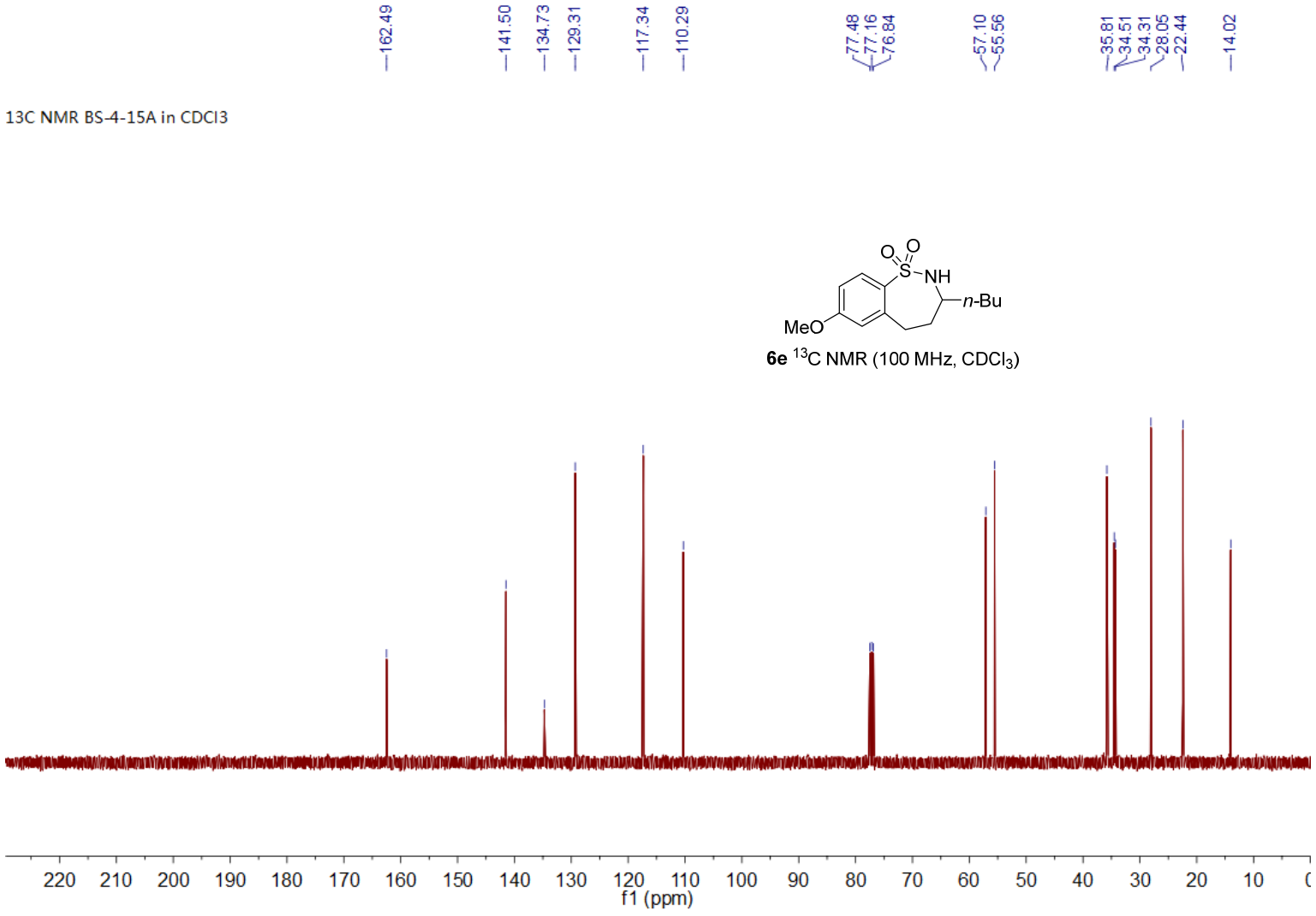


6d ^{13}C NMR (100 MHz, $CDCl_3$)

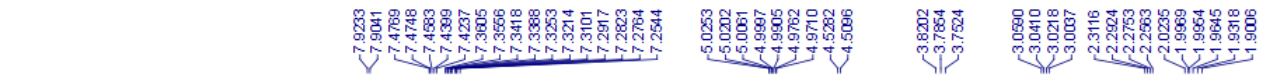
1H NMR BS-3-15A in CDCl3



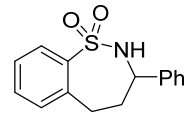
6e ^{1}H NMR (400 MHz, $CDCl_3$)



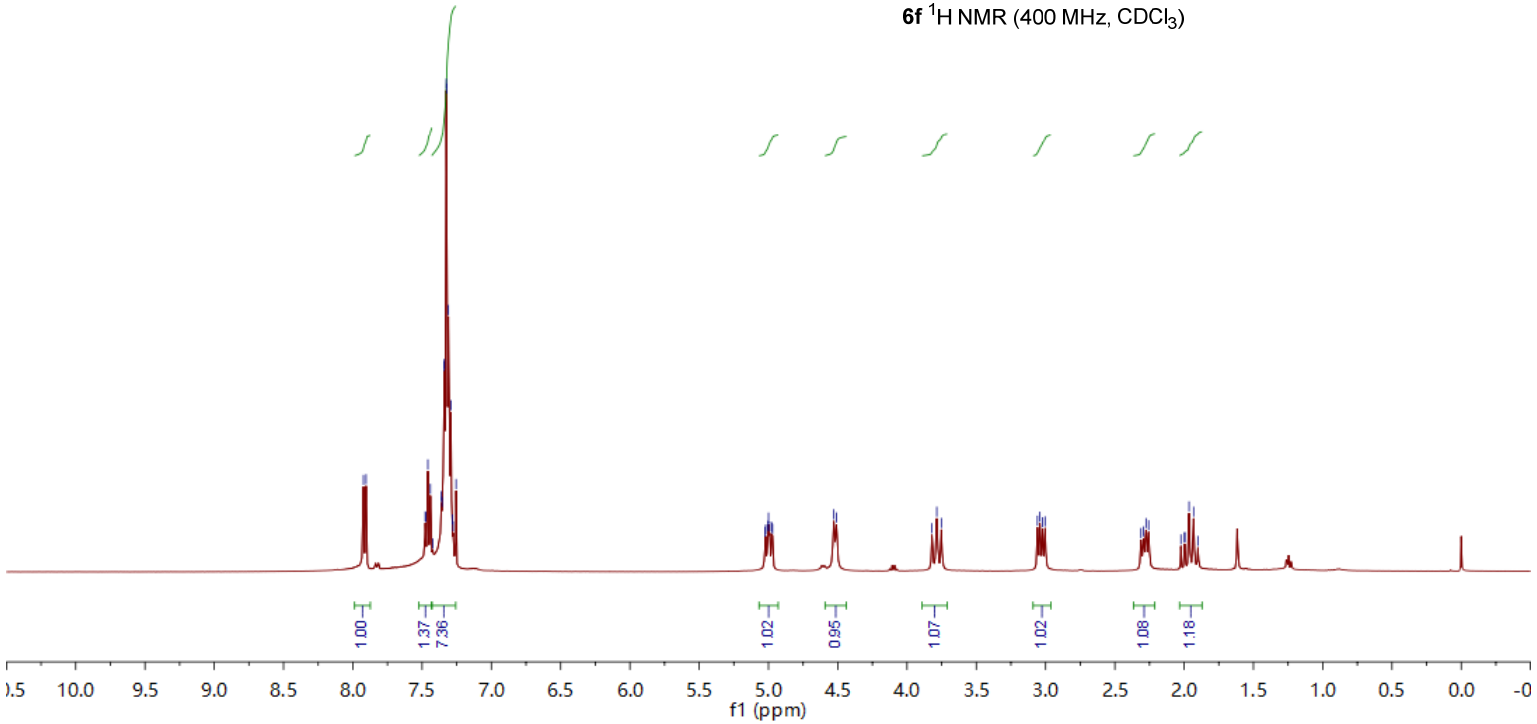
6e ^{13}C NMR (100 MHz, $CDCl_3$)

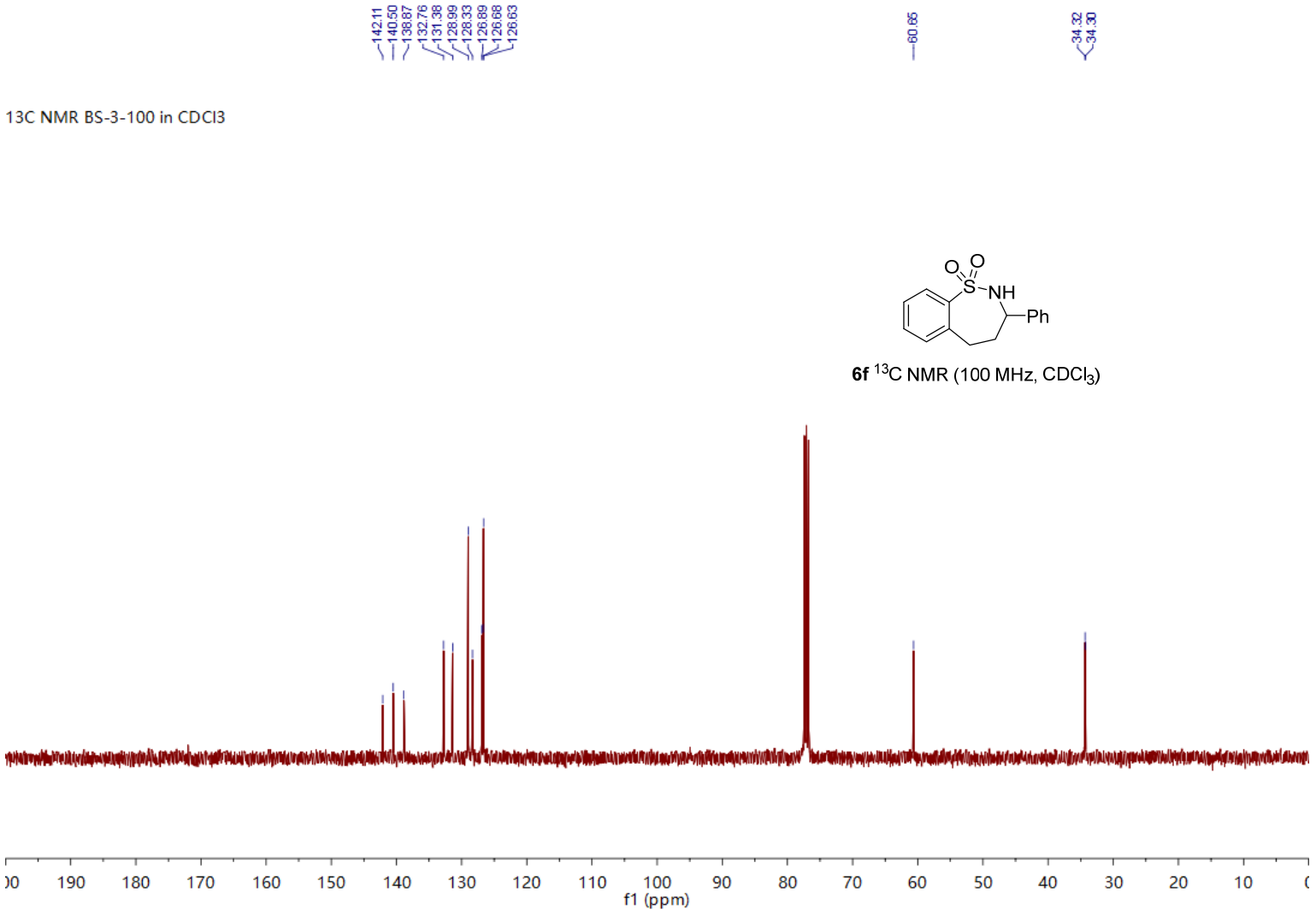


1H NMR BS-3-100 in CDCl3

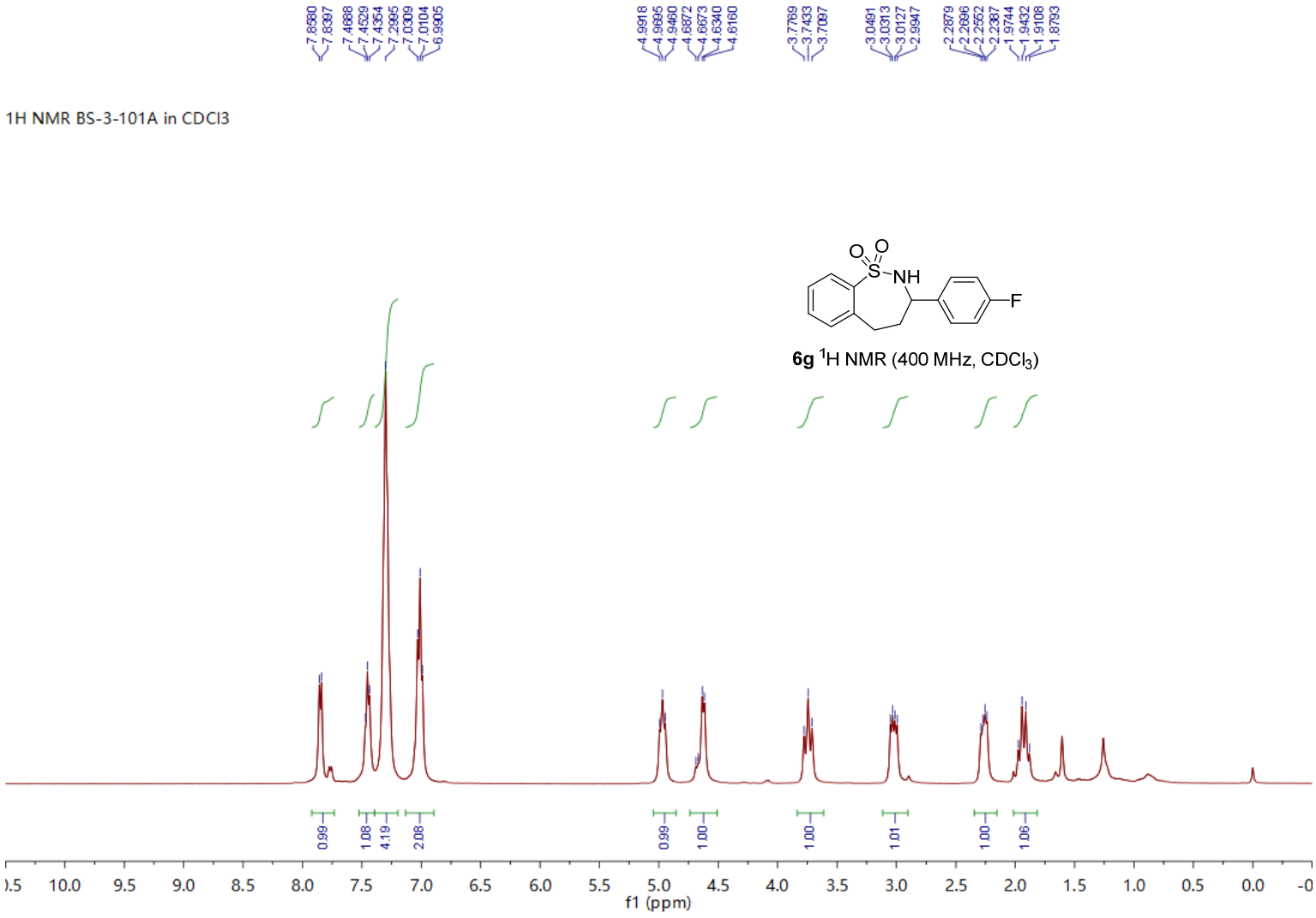


6f ^{1}H NMR (400 MHz, $CDCl_3$)

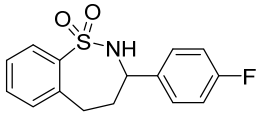




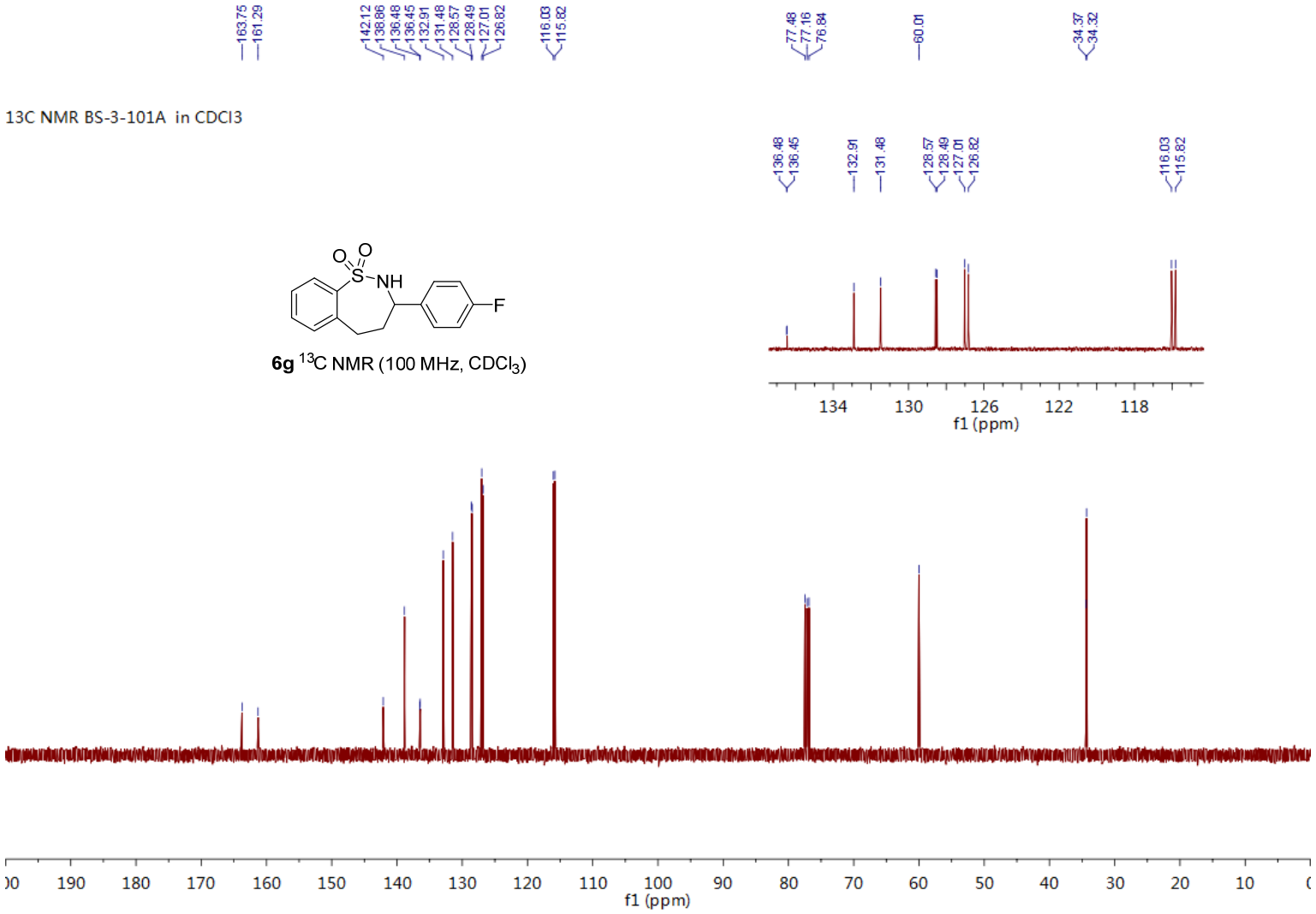
6f ^{13}C NMR (100 MHz, $CDCl_3$)


7.8590
7.8397
7.4698
7.4529
7.4354
7.2995
7.0309
7.0104
6.9905
4.9918
4.9695
4.9460
4.6872
4.6673
4.6340
4.6160
3.7769
3.7433
3.7097
3.0491
3.0313
3.0127
2.9947
2.2879
2.2696
2.2552
2.2387
1.9744
1.9432
1.9108
1.8793
1H NMR BS-3-101A in CDCl3
O
O
S
NH
F
6g 1H NMR (400 MHz, CDCl3)
0.99
1.08
4.19
2.08
0.99
1.00
1.00
1.01
1.00
1.06
f1 (ppm)

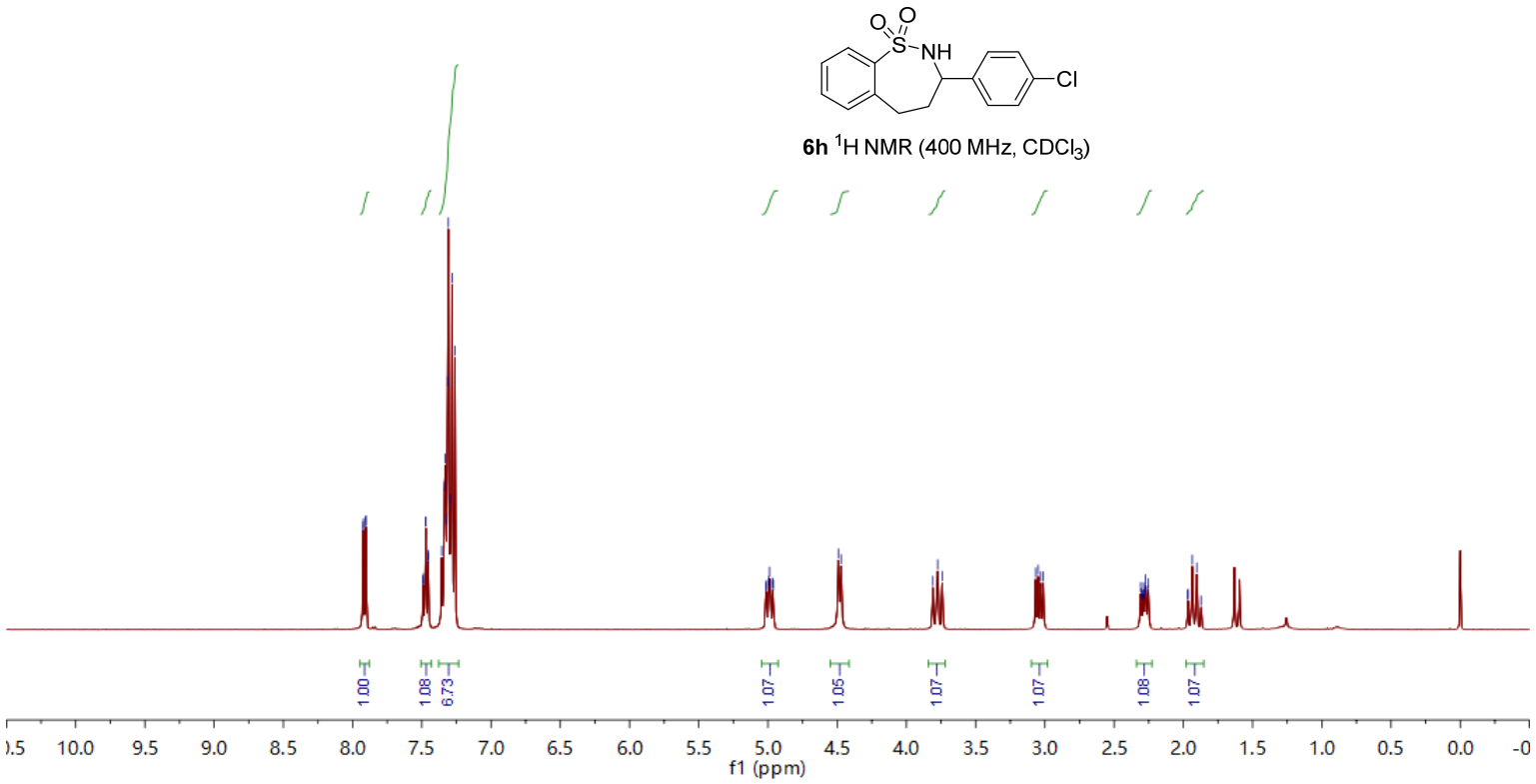
19F NMR BS-3-101A in CDCl3

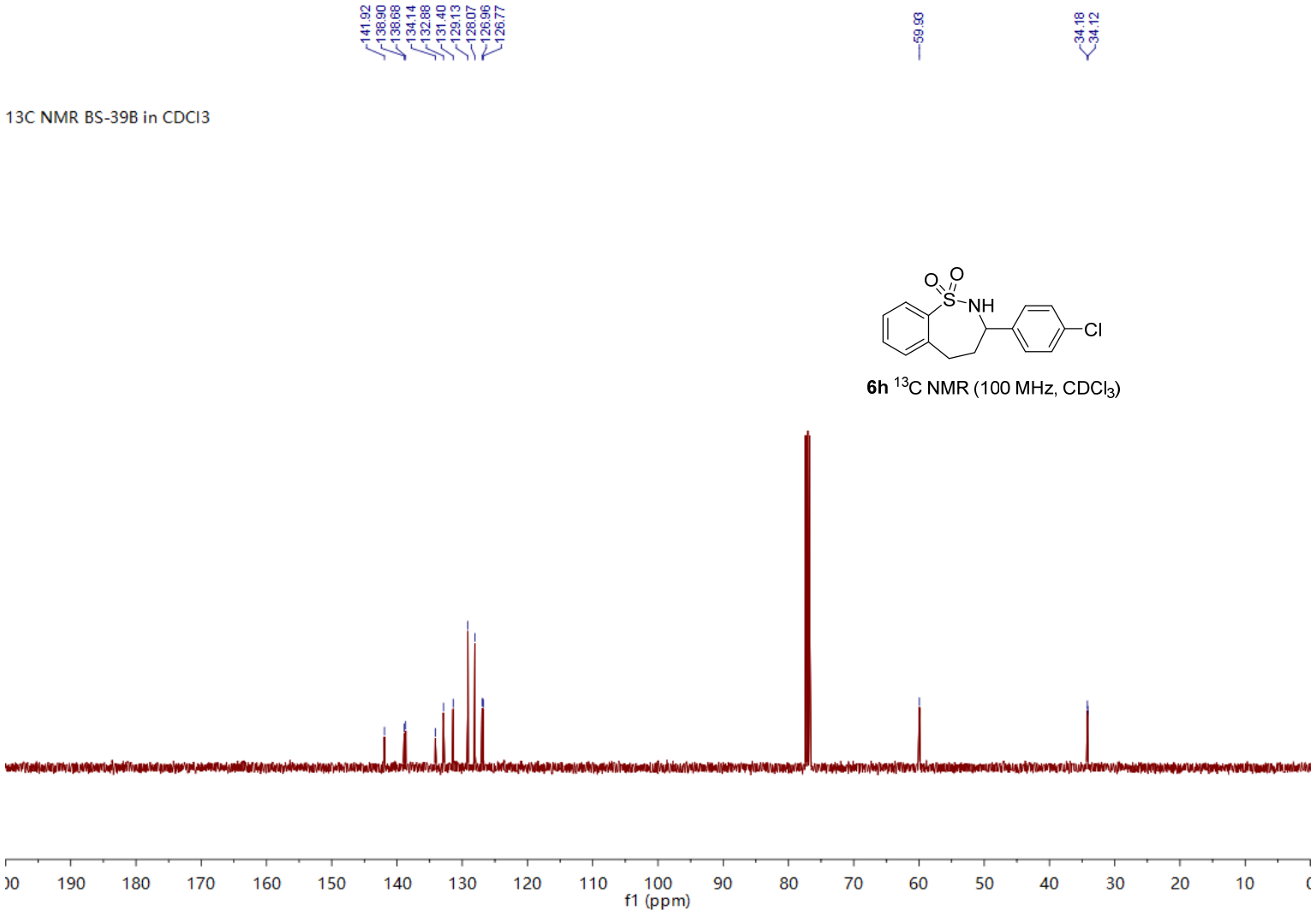


6g ^{13}F NMR (376 MHz, $CDCl_3$)

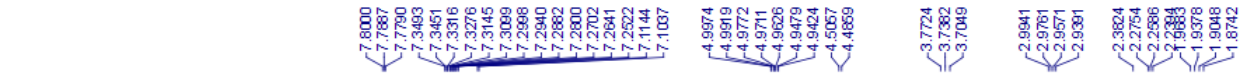

163.75
161.29
142.12
138.86
136.48
136.45
132.91
131.48
128.57
128.49
127.01
126.82
116.03
115.82
77.48
77.16
76.84
60.01
34.37
34.32
13C NMR BS-3-101A in CDCl3
O
O
S
NH
F
6g 13C NMR (100 MHz, CDCl3)
136.48
136.45
132.91
131.48
128.57
128.49
127.01
126.82
116.03
115.82
134
130
126
122
118
f1 (ppm)
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

1H NMR BS-3-93B in CDCl3

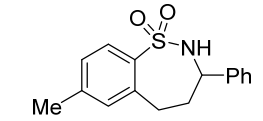




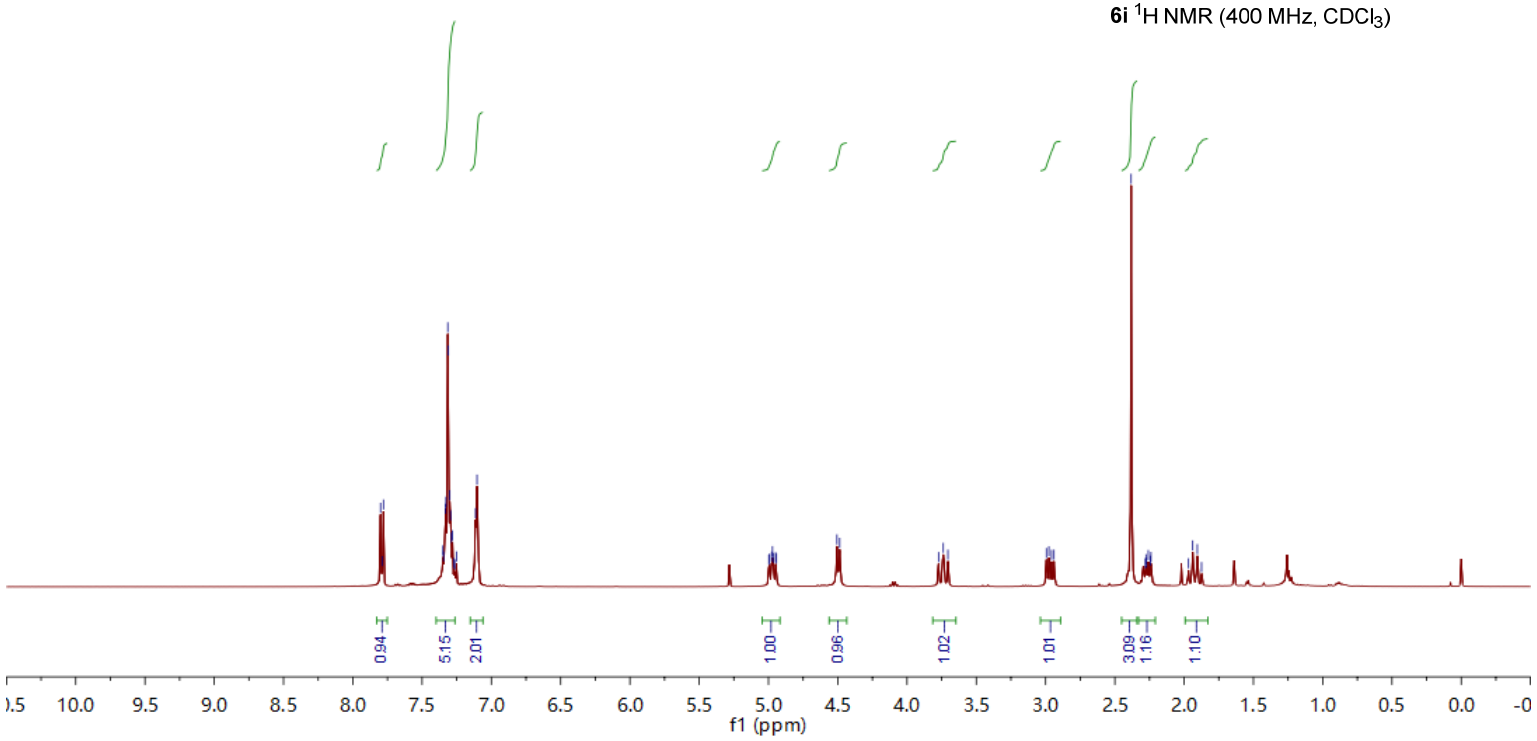
6h ^{13}C NMR (100 MHz, $CDCl_3$)

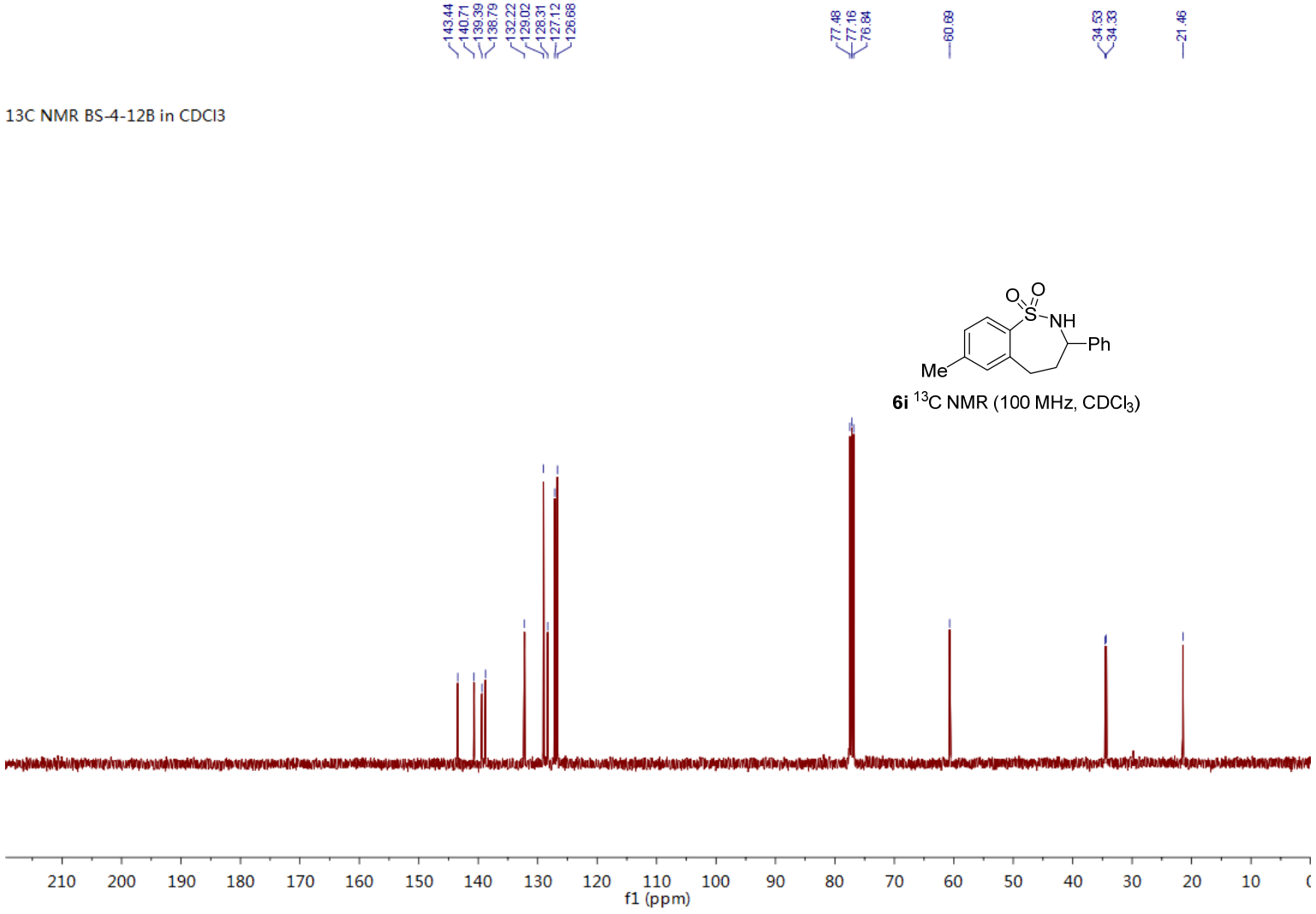


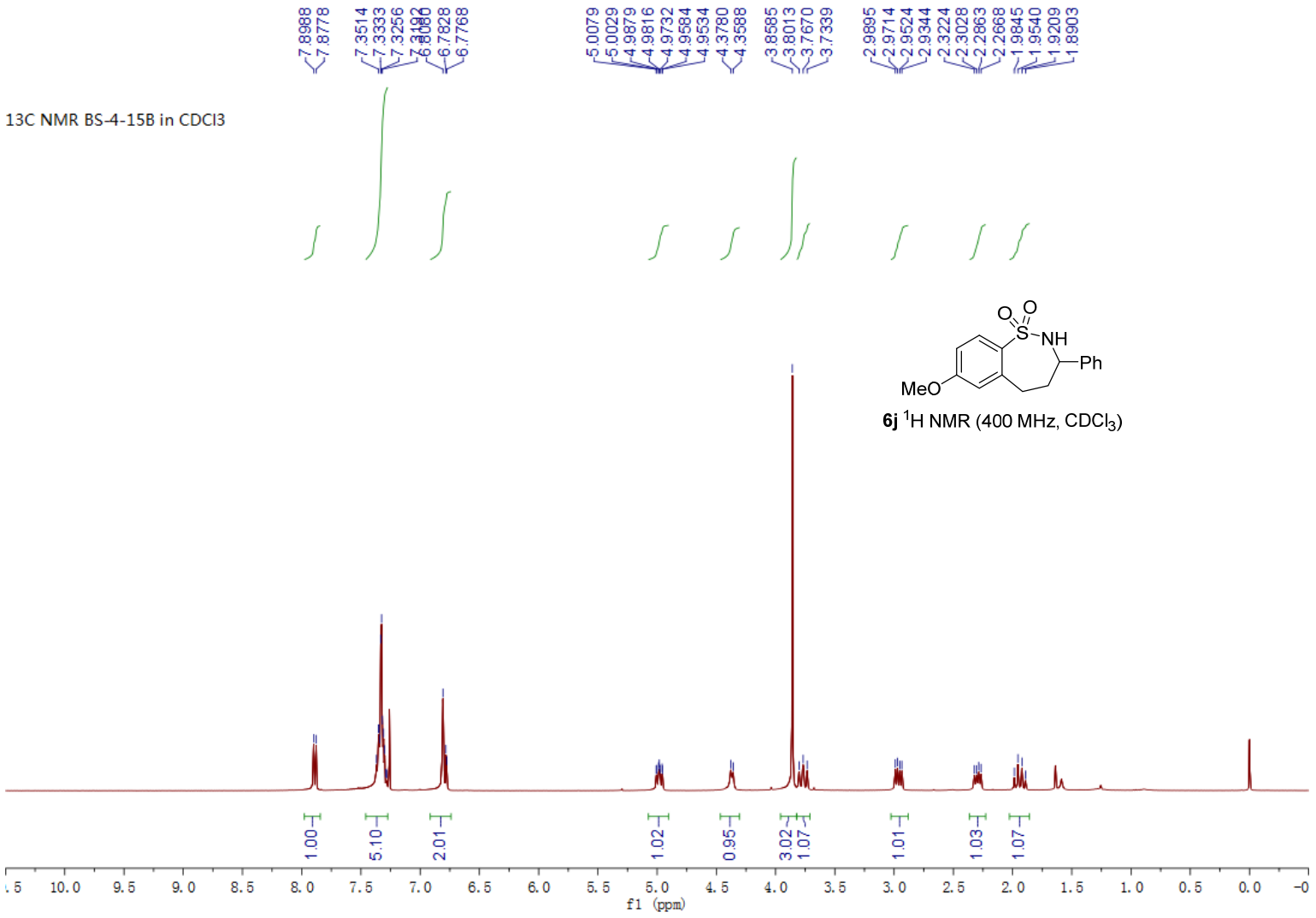
1H NMR BS-4-12B in CDCl3



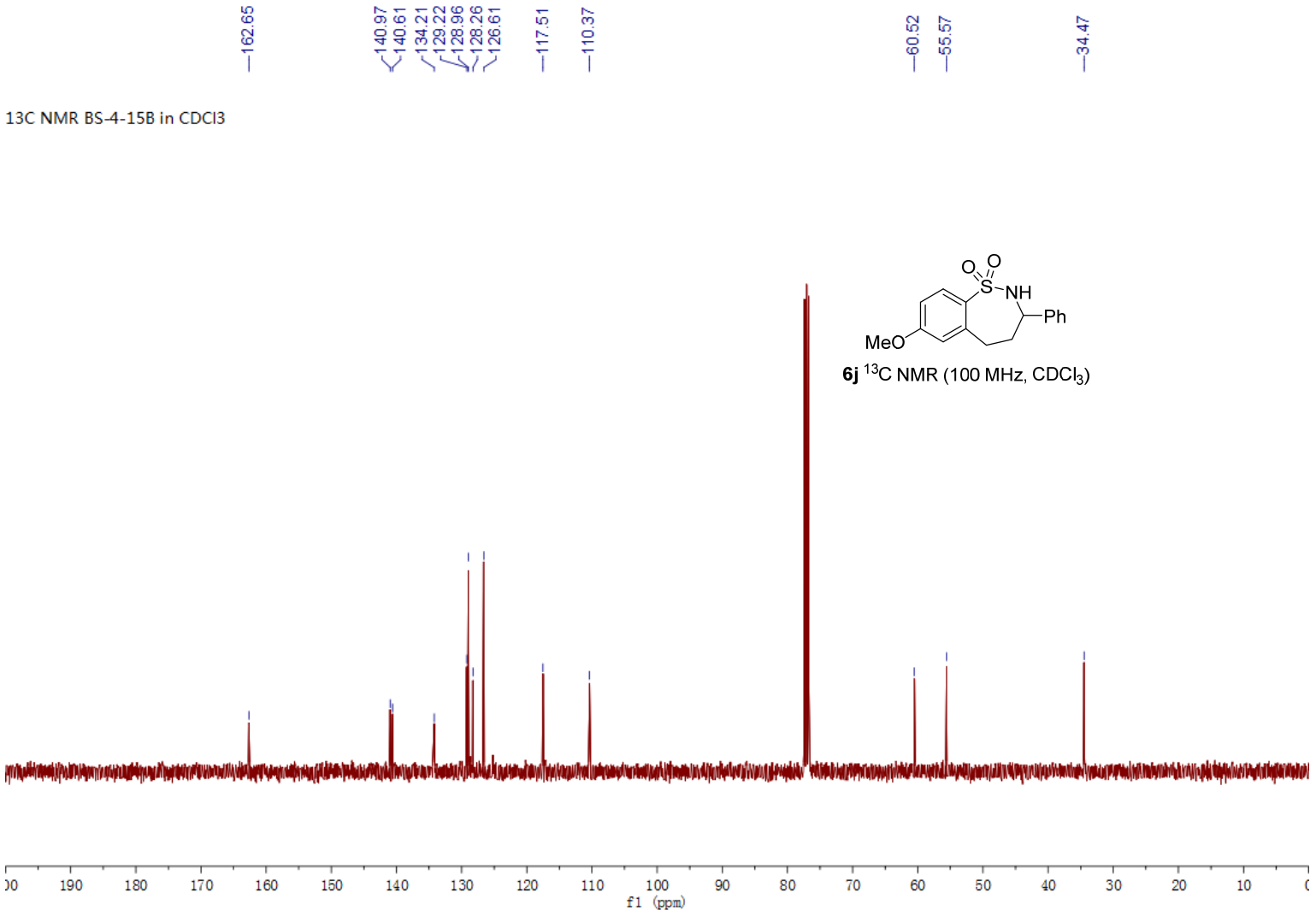
6i ^{1}H NMR (400 MHz, $CDCl_3$)




143.44
140.71
139.39
138.79
132.22
129.02
128.31
127.12
126.68
77.48
77.16
76.84
60.69
34.53
34.33
21.46
13C NMR BS-4-12B in CDCl3
O
O
S
NH
Ph
Me
6i ^{13}C NMR (100 MHz, $CDCl_3$)
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10
f1 (ppm)



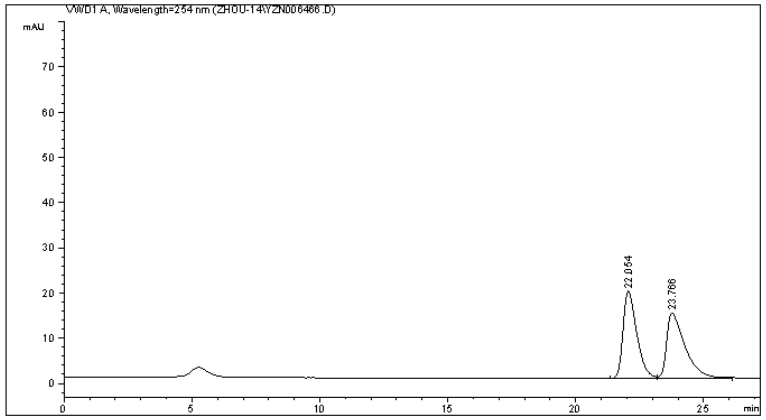
6j ^{1}H NMR (400 MHz, $CDCl_3$)



6j ^{13}C NMR (100 MHz, $CDCl_3$)

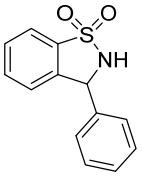
Data File C:\CHEM32\1\DATA\ZHOU-14\YZN006466.D
Sample Name: BS-3-51A(+/-)

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 11/25/2014 10:38:33 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 11/25/2014 10:38:15 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 9:57:57 AM by
                  (modified after loading)
Sample Info     : OJ-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 254 nm
```



Area Percent Report

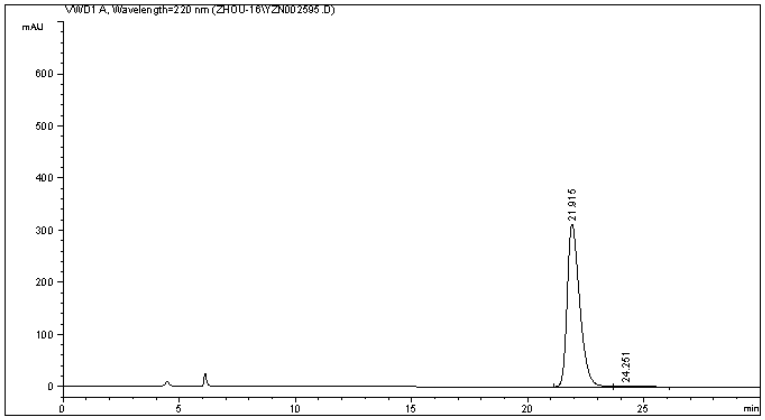
```
Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  22.054 BV    0.5637  713.97363   19.25210  50.2596
   2  23.766 VB    0.7292  706.59686   14.41231  49.7404

Totals :                  1420.57050   33.66440

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



(+/-)-**2a**

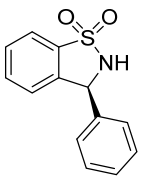
Data File C:\CHEM32\1\DATA\ZHOU-16\YZN002595.D
Sample Name: BS-3-51A

```
Acq. Operator   : O
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 10/13/2016 3:51:12 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 10/13/2016 3:45:28 PM by O
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 10/19/2016 2:17:49 PM by O
                  (modified after loading)
Sample Info     : OJ-H, Hexane/i-PrOH = 70/30, 0.7 mL/min, 30oC, 254 nm
```



Area Percent Report

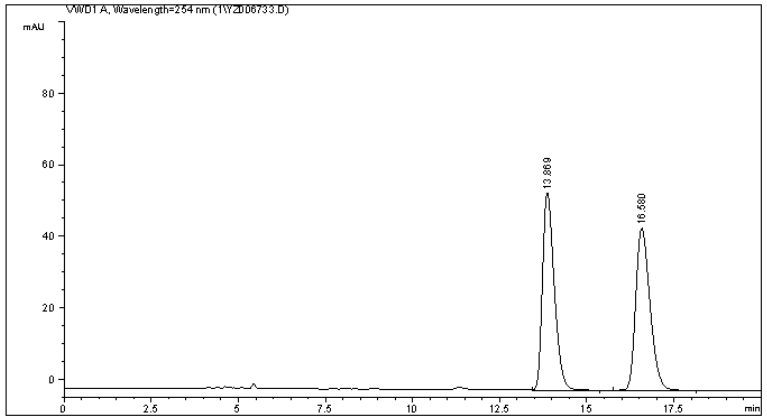
```
Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  21.915 BV    0.5691 1.16454e4   312.24945  99.1750
   2  24.251 VB    0.9524   96.87186    1.39080   0.8250

Totals :                  1.17423e4   313.64025

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



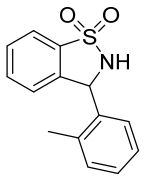
(+)-**2a**

Data File C:\CHEM32\1\DATA\1\YZ006733.D
Sample Name: BS-3-55C(+/-)

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/3/2014 1:31:37 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/3/2014 1:29:16 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:03:06 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 254 nm
```



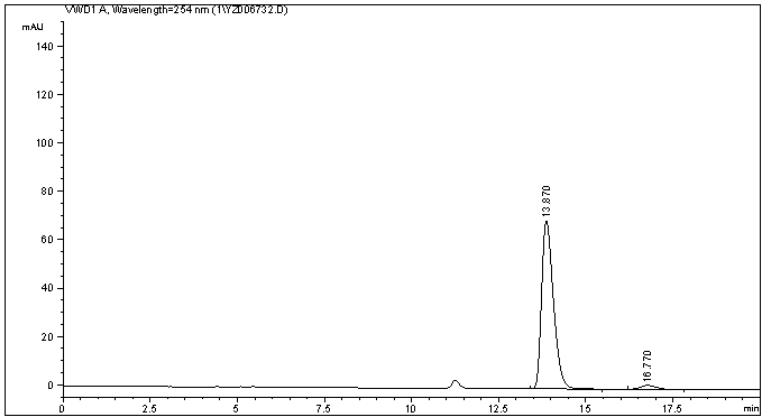

```
                        Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  13.869 BB    0.3647 1300.08997   55.26591  49.9516
   2  16.580 BV    0.4420 1302.60791   45.46571  50.0484

Totals :                  2602.69788  100.73163

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



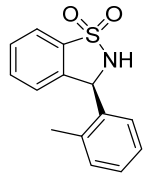
(+/-)-**2b**

Data File C:\CHEM32\1\DATA\1\YZ006732.D
Sample Name: BS-3-55C

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/3/2014 1:03:04 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/3/2014 12:41:15 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:03:28 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 254 nm
```



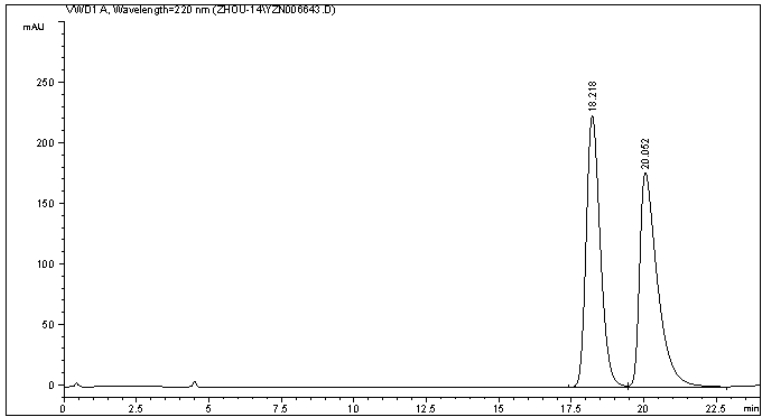

```
                        Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  13.870 BB    0.3654 1638.64014   69.49314  97.0690
   2  16.770 BB    0.4805   49.47792    1.58581   2.9310

Totals :                  1688.11805   71.07895

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



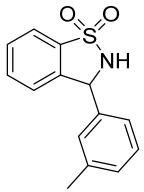
(+)-**2b**

Data File C:\CHEM32\1\DATA\ZHOU-14\YZN006643.D
Sample Name: BS-3-60B(+-)

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/14/2014 9:47:52 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 12/14/2014 9:43:49 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:05:57 AM by
                  (modified after loading)
Sample Info     : OJ-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 220 nm
```




```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s    [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  18.218 BV    0.5192 7586.84619  224.66182  49.8940
   2  20.052 VV    0.6355 7619.08643  177.23303  50.1060

Totals :                  1.52059e4   401.89485

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

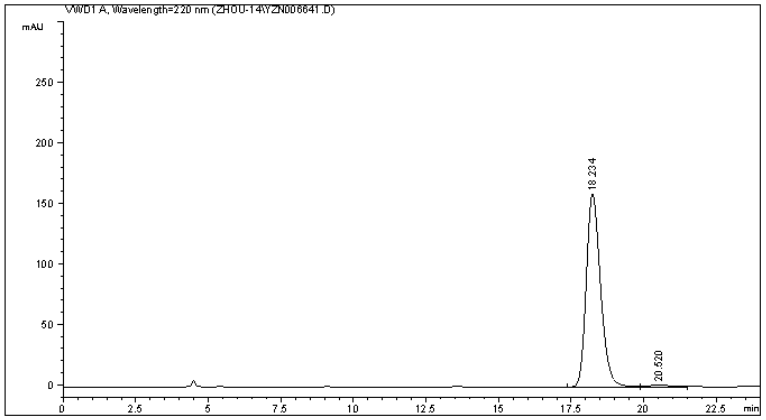


(+/-)-**2c**

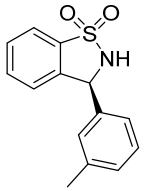
Instrument 1 7/21/2015 10:06:00 AM Page 1 of 1

Data File C:\CHEM32\1\DATA\ZHOU-14\YZN006641.D
Sample Name: BS-3-60B

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/14/2014 8:25:04 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 12/14/2014 8:24:05 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:05:57 AM by
                  (modified after loading)
Sample Info     : OJ-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 220 nm
```




```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s    [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  18.234 BV    0.5266 5451.18945  159.59685  98.4538
   2  20.520 VV    0.7196   85.60725    1.75772   1.5462

Totals :                  5536.79670  161.35456

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

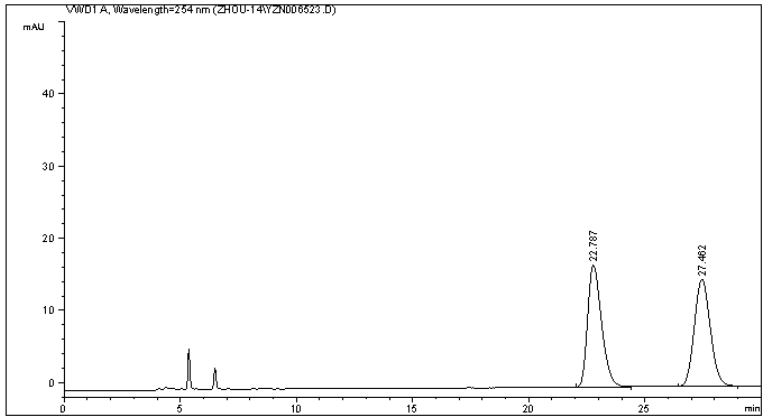


(+)-**2c**

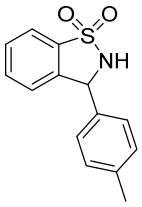
Instrument 1 7/21/2015 10:06:14 AM Page 1 of 1

Data File C:\CHEM32\1\DATA\ZHOU-14\YZN006523.D
Sample Name: BS-3-55B(+/-)

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/2/2014 9:37:12 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 12/2/2014 9:33:22 AM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:16:43 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 254 nm
```



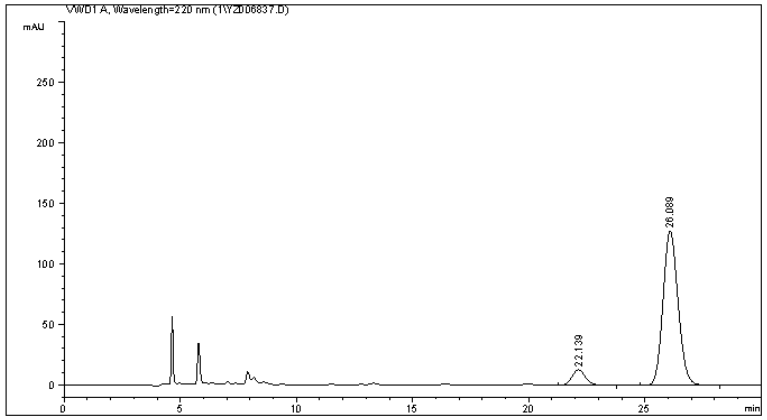

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  22.787 BB    0.6416  706.48566   16.91544  49.8563
   2  27.462 BB    0.7483  710.55811   14.83020  50.1437

Totals :                 1417.04376   31.74564

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



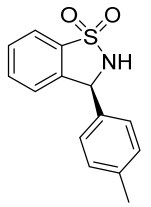
(+/-)-**2d**

Data File C:\CHEM32\1\DATA\1\YZ006837.D
Sample Name: BS-3-55B

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/16/2014 7:41:41 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/16/2014 7:16:38 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:15:25 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 220 nm
```



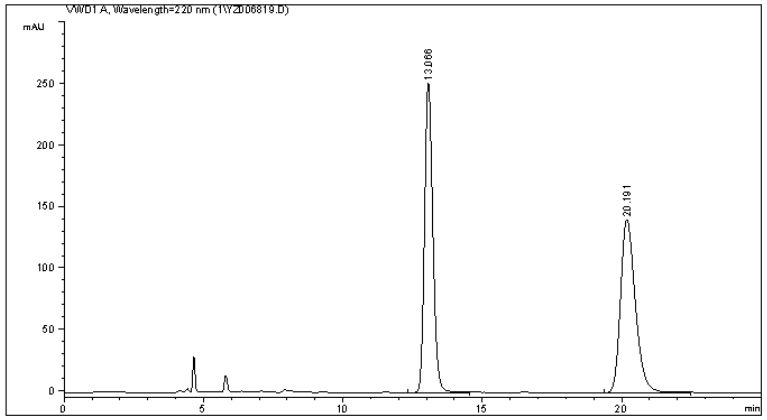

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  22.139 VB    0.6342  528.28247   12.92296   8.4272
   2  26.089 BB    0.7004 5740.51416  127.39679  91.5728

Totals :                 6268.79663  140.31975

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



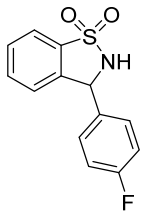
(+)-**2d**

Data File C:\CHEM32\1\DATA\1\YZ006819.D
Sample Name: BS=-3-60E(+/-)

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/14/2014 9:05:52 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/14/2014 9:04:39 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:19:47 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 220 nm
```



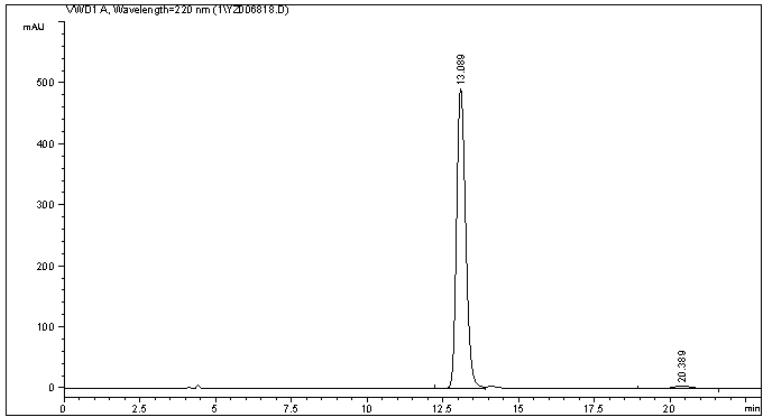

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  13.066 VB    0.3215 5230.54932  251.26656  50.2038
   2  20.191 VB    0.5672 5188.08740  140.64362  49.7962

Totals :                  1.04186e4   391.91017

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



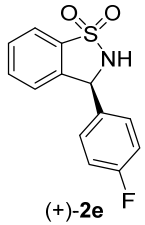
(+/-)-**2e**

Data File C:\CHEM32\1\DATA\1\YZ006818.D
Sample Name: BS=-3-60E

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/14/2014 8:41:00 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/14/2014 8:32:39 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:21:03 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 220 nm
```



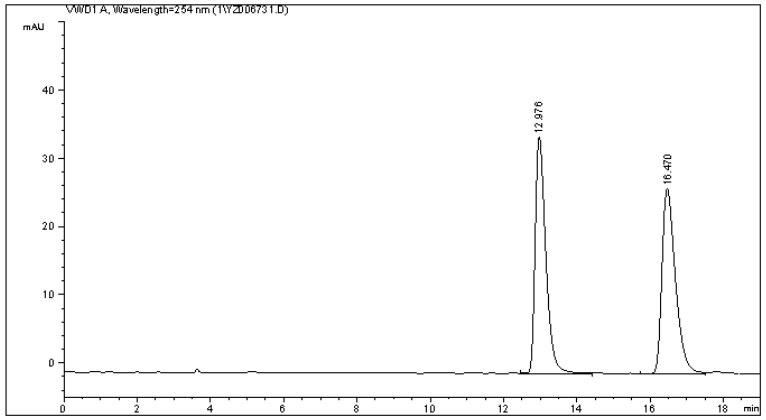

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  13.089 VV    0.3254 1.02738e4   491.50449  98.2261
   2  20.389 VV    0.6009  185.53587    4.66423   1.7739

Totals :                  1.04593e4   496.16872

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



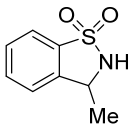
(+)-**2e**

Data File C:\CHEM32\1\DATA\1\YZ006731.D
Sample Name: BS-3-55a

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/2/2014 2:35:03 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/2/2014 2:33:49 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:23:29 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 80/200, 0.8 mL/min, 30 oC, 254 nm
```



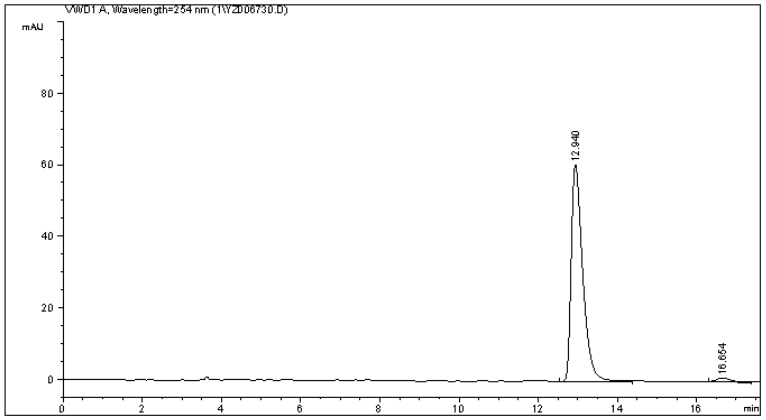

```
                        Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s    [mAU   ]      %
----|------|----|------|---------|---------|-------|
   1  12.976 VB    0.3091  703.49756   34.73988  50.2870
   2  16.470 VV    0.3892  695.46686   27.14727  49.7130

Totals :                  1398.96442   61.88716

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



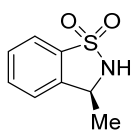
(+/-)-**2f**

Data File C:\CHEM32\1\DATA\1\YZ006730.D
Sample Name: BS-3-55a

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/2/2014 1:54:45 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/2/2014 1:36:58 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:24:15 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 80/200, 0.8 mL/min, 30 oC, 254 nm
```



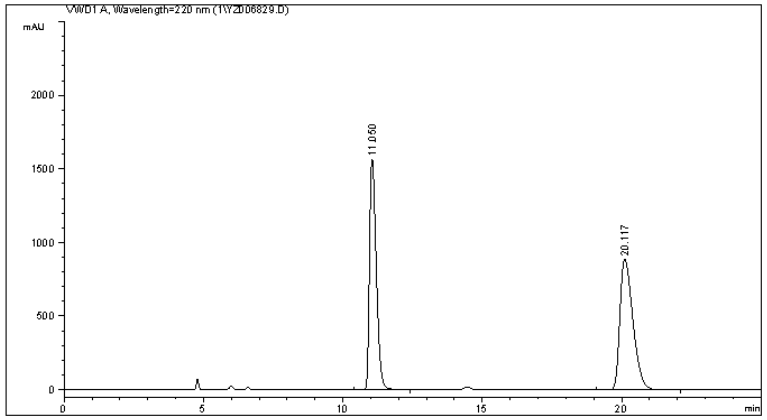

```
                        Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s    [mAU   ]      %
----|------|----|------|---------|---------|-------|
   1  12.940 VV    0.3082 1239.87488   60.70688  97.4320
   2  16.654 VB    0.4318   32.67904    1.14563   2.5680

Totals :                  1272.55391   61.85251

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



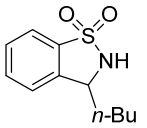
(-)-**2f**

Data File C:\CHEM32\1\DATA\1\YZ006829.D
Sample Name: BS-3-56A(+-)

```
==================================================================
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/15/2014 2:53:11 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/15/2014 2:49:47 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:26:28 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 80/20, 0.7 mL/min, 30 oC, 220 nm
```



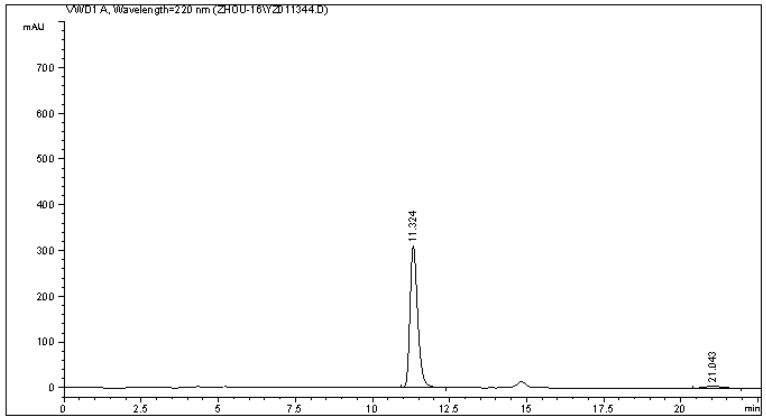

```
==================================================================
                      Area Percent Report
==================================================================

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  11.050 VV    0.2661 2.67985e4  1569.90332  48.0343
   2  20.117 VV    0.5064 2.89919e4   887.39813  51.9657

Totals :                 5.57904e4  2457.30145

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



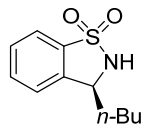
(+/-)-**2g**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZ011344.D
Sample Name: BS-7-5B

```
==================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 10/14/2016 5:34:15 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 10/14/2016 5:10:36 AM by
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 10/19/2016 2:04:06 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/iPrOH = 80/20, 0.7 mL/min, 30 oC,220 nm
```



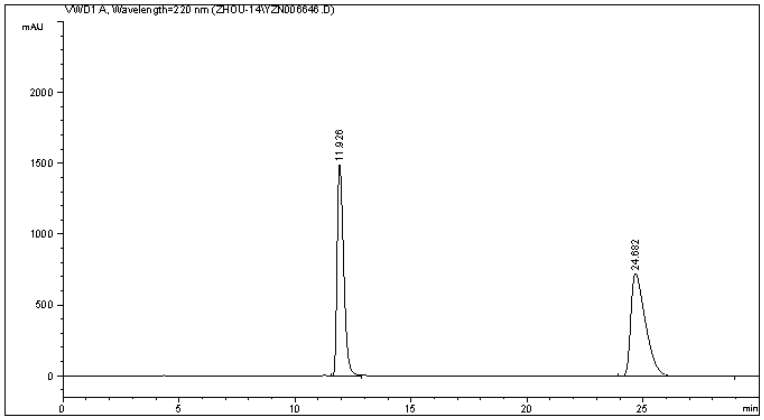

```
==================================================================
                      Area Percent Report
==================================================================

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  11.324 BB    0.2669 5386.62695  309.86606  97.2315
   2  21.043 BB    0.5082  153.37309    4.69052   2.7685

Totals :                 5540.00005  314.55658

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



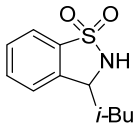
(-)-**2g**

Data File C:\CHEM32\1\DATA\ZHOU-14\YZN006646.D
Sample Name: BS-3-56B(+-)

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/14/2014 10:57:59 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 12/14/2014 10:55:41 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:33:54 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 80/20, 0.7 mL/min, 30 oC, 220 nm
```



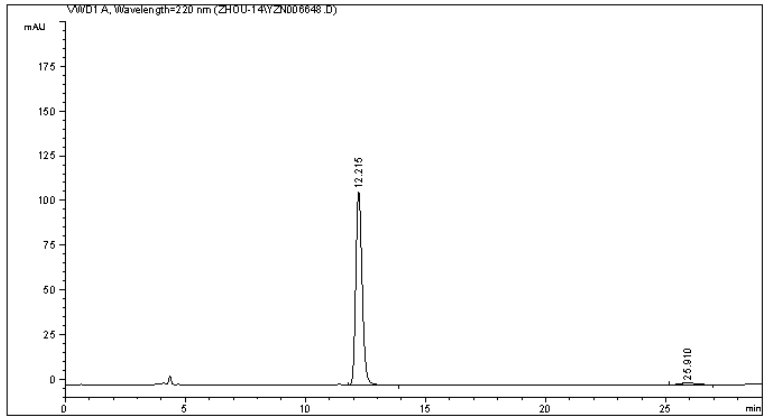

```
                        Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s    [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  11.926 VV    0.3068 2.96570e4  1497.15125  48.2262
   2  24.682 BB    0.6661 3.18387e4   725.80884  51.7738

Totals :                 6.14957e4  2222.96008

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



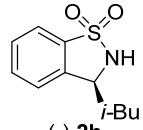
(+/-)-**2h**

Data File C:\CHEM32\1\DATA\ZHOU-14\YZN006648.D
Sample Name: BS-3-56B

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/15/2014 10:40:44 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 12/15/2014 10:37:42 AM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:32:57 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 80/20, 0.7 mL/min, 30 oC, 220 nm
```



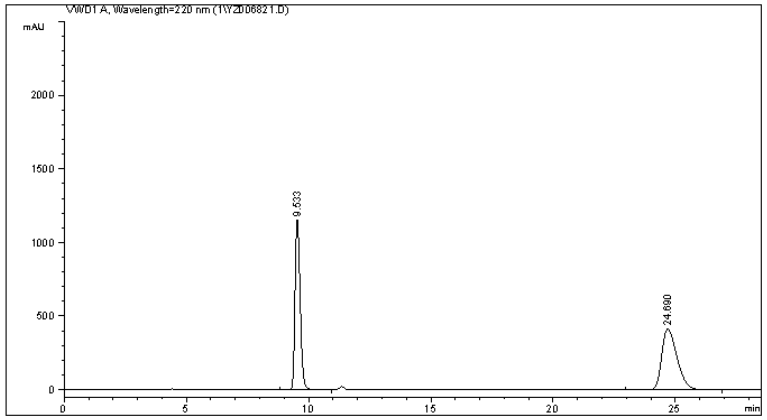

```
                        Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s    [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  12.215 VB    0.2859 2004.83154  108.27026  98.0207
   2  25.910 BB    0.5953   40.48392 9.98608e-1   1.9793

Totals :                 2045.31547  109.26887

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



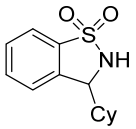
(-)-**2h**

Data File C:\CHEM32\1\DATA\1\YZ006821.D
Sample Name: BS-3-60A(+/-)

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/15/2014 10:06:57 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/15/2014 9:43:16 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:37:53 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 75/25, 0.7 mL/min, 30 oC, 220 nm
```



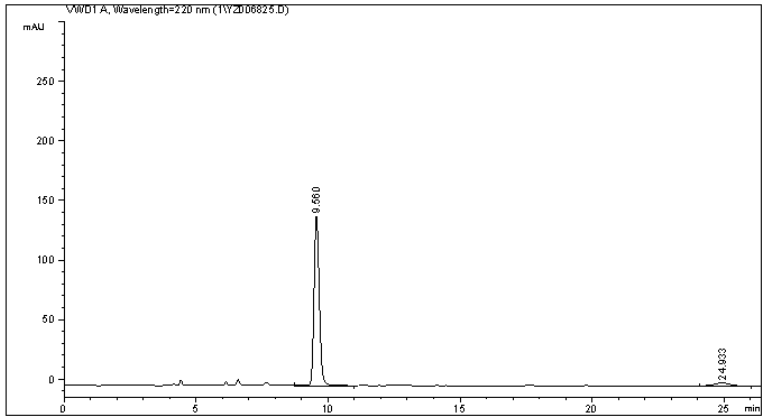

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   9.533 VV    0.2292 1.68887e4  1152.84937  48.5173
   2  24.690 VV    0.6677 1.79209e4   414.34860  51.4827

Totals :                 3.48096e4  1567.19797

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



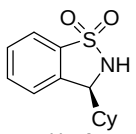
(+/-)-**2i**

Data File C:\CHEM32\1\DATA\1\YZ006825.D
Sample Name: BS-3-60A

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/15/2014 12:19:49 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/15/2014 12:18:13 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:39:27 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 75/25, 0.7 mL/min, 30 oC, 220 nm
```



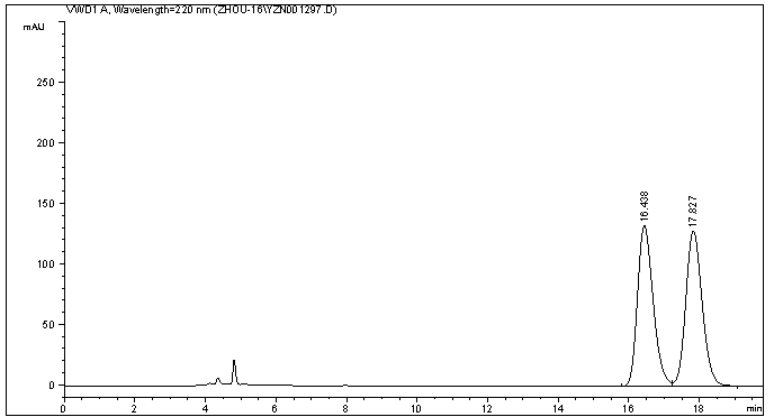

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   9.560 VB    0.2166 2004.62964  142.46884  94.6463
   2  24.933 VV    0.6897  113.39259    2.55459   5.3537

Totals :                 2118.02222  145.02343

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



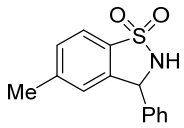
(-)-**2i**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001297.D
Sample Name: BS-5-97A(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 5/9/2016 10:31:53 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/9/2016 10:29:20 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:07:21 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH = 70/30, 0.7 mL/min, 30oC, 220 nm
```



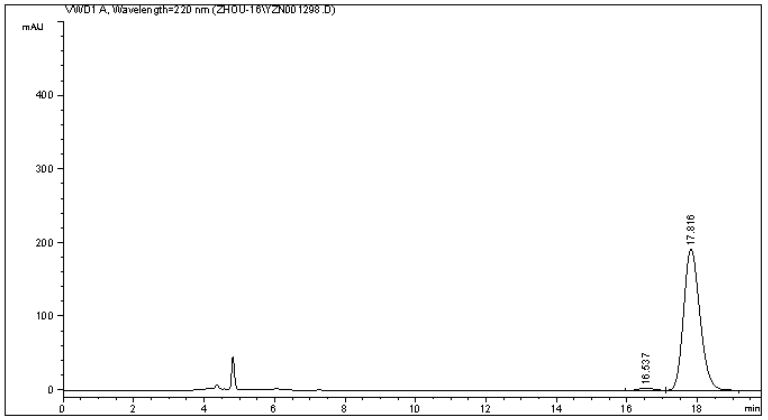

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  16.438 BV    0.4768 4104.67383  132.89256  49.6718
   2  17.827 VB    0.5001 4158.92334  128.44221  50.3282

Totals :                  8263.59717  261.33478

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



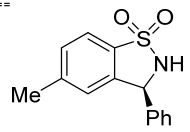
(+/-)-**2j**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001298.D
Sample Name: BS-5-97A

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 5/9/2016 10:54:11 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/9/2016 10:51:54 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:08:52 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH = 70/30, 0.7 mL/min, 30oC, 220 nm
```



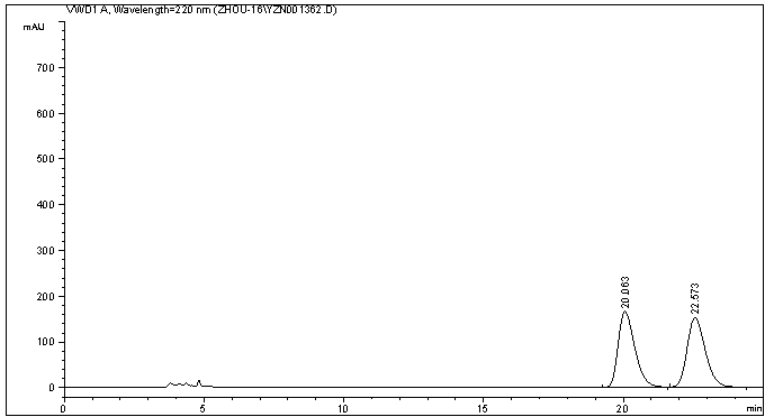

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  16.537 BV    0.4660  105.93079    3.52136   1.6849
   2  17.816 VB    0.4993 6181.00439  191.99762  98.3151

Totals :                  6286.93519  195.51898

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



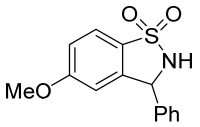
(+)-**2j**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001362.D
Sample Name: BS-6-4B(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 5/15/2016 8:51:00 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/15/2016 8:47:53 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:16:36 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



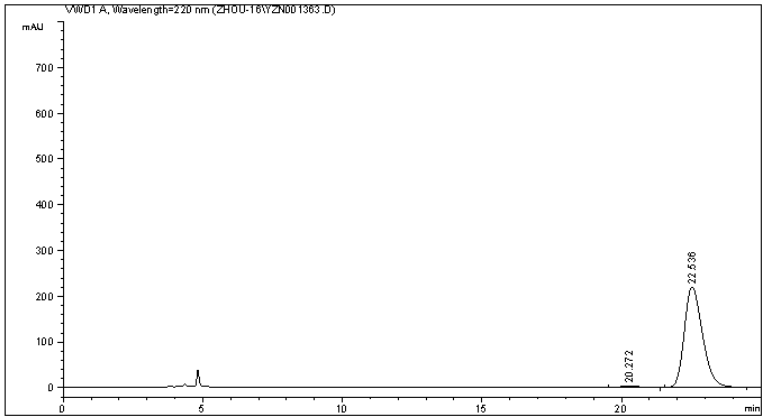

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  20.063 BB    0.6388 6897.40186  166.11380  49.9504
   2  22.573 BB    0.7000 6911.10010  152.66460  50.0496

Totals :                  1.38085e4   318.77840

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



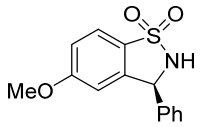
(+/-)-**2k**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001363.D
Sample Name: BS-6-4B

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 5/15/2016 9:18:14 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/15/2016 9:16:55 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:16:36 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



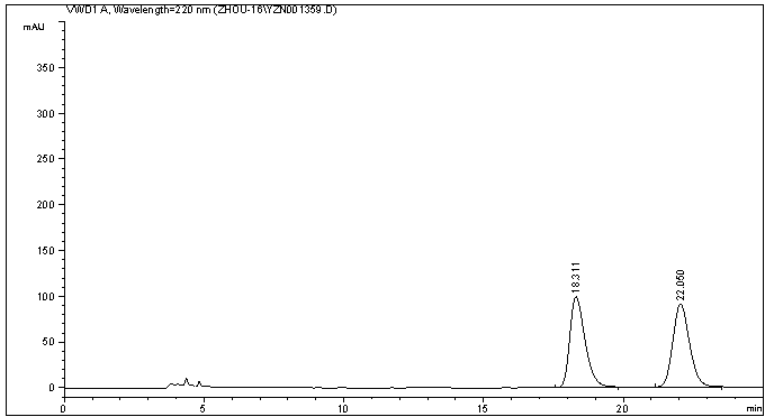

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  20.272 BB    0.6432  159.30930    3.88305   1.5781
   2  22.536 BB    0.7005 9935.75781  219.84697  98.4219

Totals :                  1.00951e4   223.73002

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



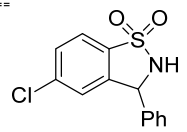
(+)-**2k**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001359.D
Sample Name: BS-6-4A(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 5/15/2016 7:48:00 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/15/2016 7:30:43 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:14:06 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



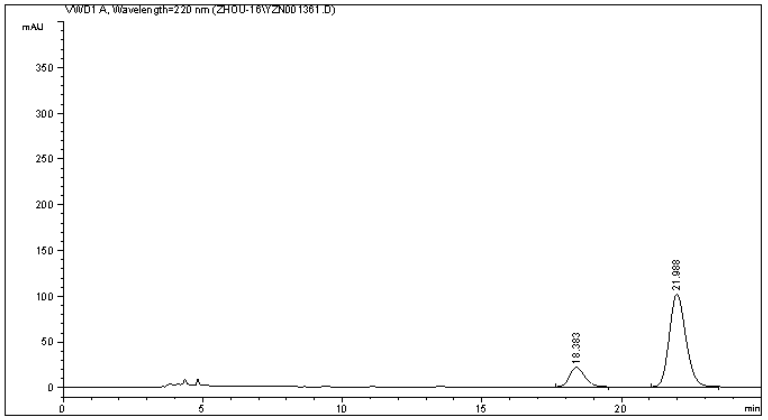

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  18.311 BB    0.5817 3756.95435   99.18011  50.1253
   2  22.050 BB    0.6376 3738.17383   90.51442  49.8747

Totals :                  7495.12817  189.69453

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



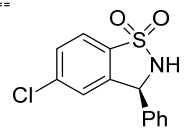
(+/-)-**2l**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001361.D
Sample Name: BS-6-4A

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 5/15/2016 8:14:50 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/15/2016 8:14:12 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:14:06 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



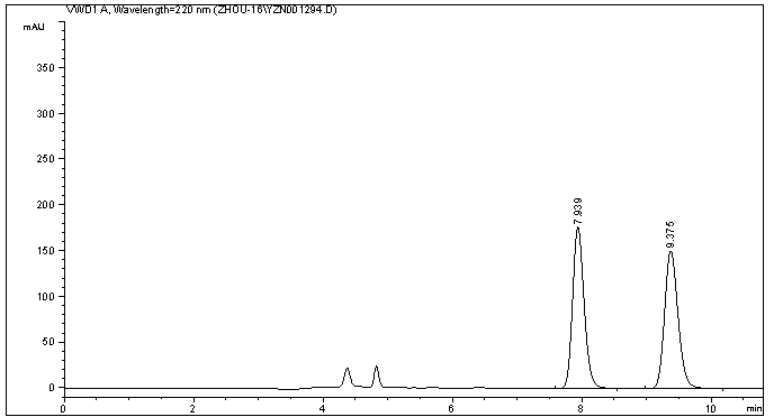

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  18.383 BB    0.5767  808.90118   21.45433  16.2255
   2  21.988 BB    0.6380 4176.46729  101.36083  83.7745

Totals :                  4985.36847  122.81516

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



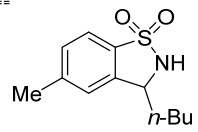
(+)-**2l**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001294.D
Sample Name: BS-5-97B(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/9/2016 9:50:58 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/9/2016 9:22:38 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:10:08 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH = 70/30, 0.7 mL/min, 30oC, 220 nm
```



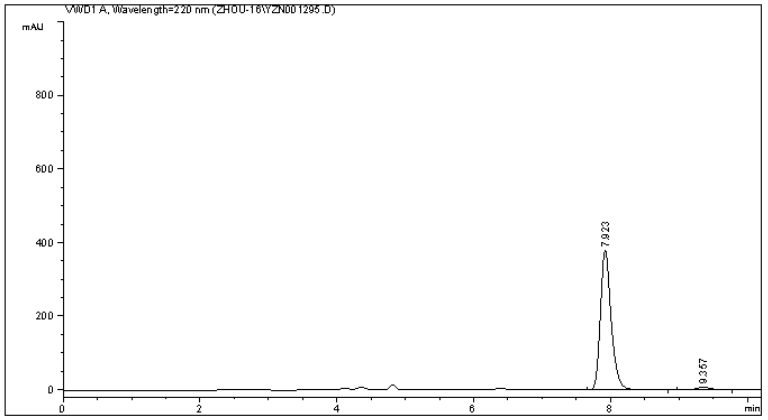

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   7.939 VB    0.1920 2202.93799  176.70711  50.1475
   2   9.375 VB    0.2249 2189.98096  150.63695  49.8525

Totals :                 4392.91895  327.34406

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



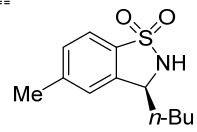
(+/-)-**2m**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001295.D
Sample Name: BS-5-97B

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/9/2016 10:04:55 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/9/2016 10:02:02 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:11:04 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH = 70/30, 0.7 mL/min, 30oC, 220 nm
```



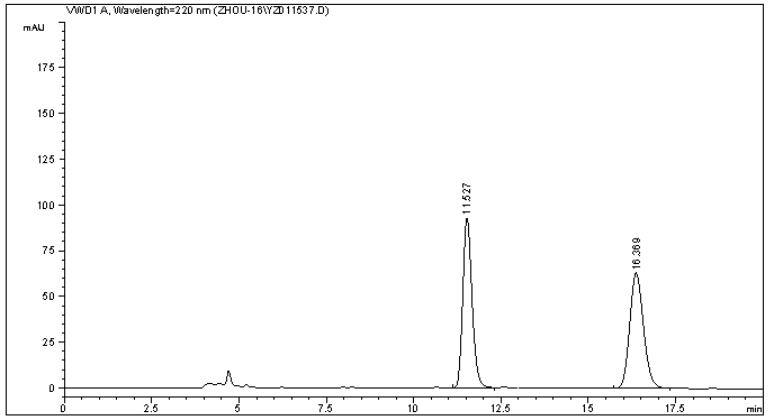

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   7.923 BB    0.1658 4156.40332  379.07272  97.4338
   2   9.357 BB    0.2305  109.46868    7.34994   2.5662

Totals :                 4265.87200  386.42266

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



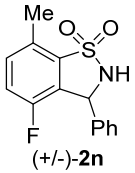
(+)-**2m**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZ011537.D
Sample Name: BS-7-54(-+)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/18/2016 12:47:16 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/18/2016 12:25:22 PM by
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 12/22/2016 10:20:50 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/iPrOH = 70/30, 0.7 mL/min, 30 oC, 220
                  nm
```



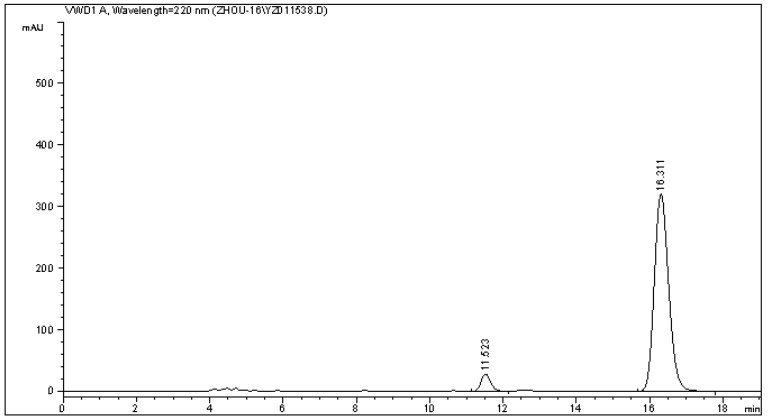

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|----------|--------|
   1  11.527 BB    0.2847 1725.73779   93.11014  49.8718
   2  16.369 BB    0.4258 1734.61121   63.04984  50.1282

Totals :                  3460.34900  156.15998


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



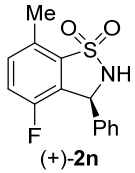
(+/-)-**2n**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZ011538.D
Sample Name: BS-7-54

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/18/2016 1:12:23 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 12/18/2016 1:10:13 PM by
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 12/22/2016 10:22:48 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/iPrOH = 70/30, 0.7 mL/min, 30 oC, 220
                  nm
```



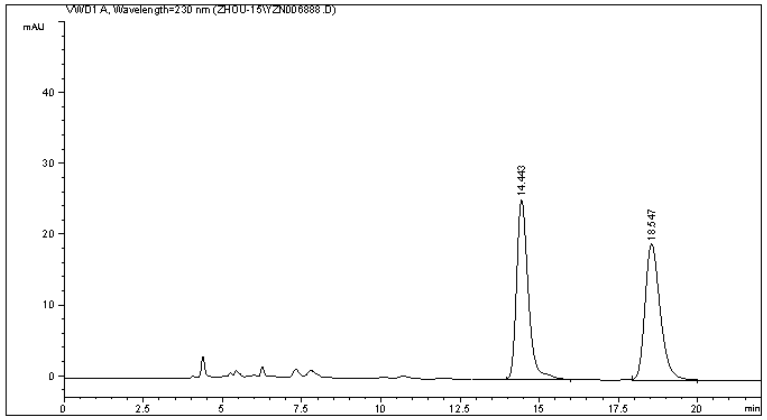

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|----------|--------|
   1  11.523 BB    0.2825  524.53455   28.59326   5.6453
   2  16.311 BB    0.4236 8766.94922  320.81998  94.3547

Totals :                  9291.48376  349.41324


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



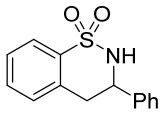
(+)-**2n**

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN006888.D
Sample Name: BS-3-70(+-)

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/6/2015 4:02:24 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 1/6/2015 4:01:40 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 11:20:03 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



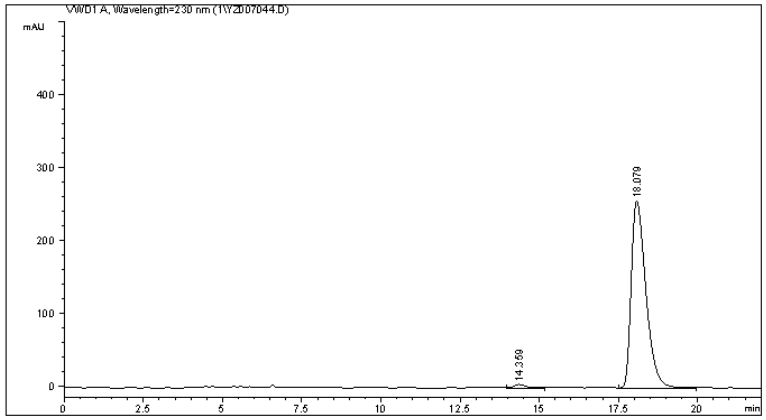

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  14.443 BB    0.3922  649.48096   25.34248  50.3105
   2  18.547 BB    0.5115  641.46539   19.23088  49.6895

Totals :                  1290.94635   44.57335

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



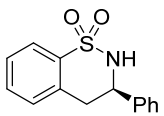
(+/-)-**4a**

Data File C:\CHEM32\1\DATA\1\YZ007044.D
Sample Name: BS-3-70

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/18/2015 7:54:49 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 1/18/2015 7:52:24 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 11:19:15 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



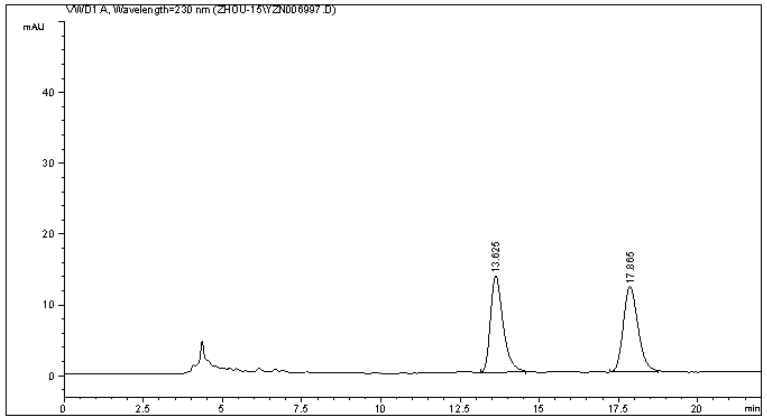

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  14.359 VB    0.3996  141.62616    5.10212   1.6764
   2  18.079 VB    0.5028 8306.72266  256.67084  98.3236

Totals :                  8448.34882  261.77296

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



(+)-**4a**

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN006997.D
Sample Name: BS-3--73A

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/16/2015 11:07:03 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 1/16/2015 11:04:38 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 11:02:52 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```

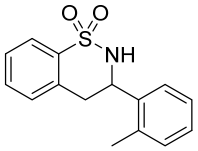


Area Percent Report

```
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=230 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	13.625	BB	0.4233	378.74615	13.62572	49.4854
2	17.865	BB	0.4995	386.62296	12.00429	50.5146
Totals :				765.36911	25.63000	

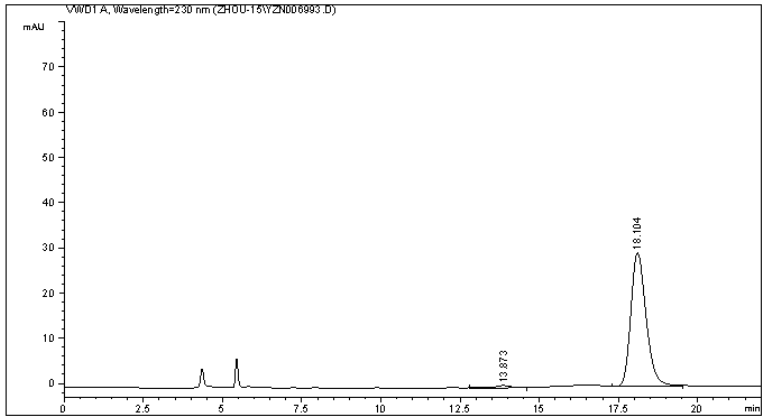


(+/-)-**4b**

*** End of Report ***

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN006993.D
Sample Name: BS-3--73A

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/16/2015 8:54:13 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 1/16/2015 8:35:06 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 11:03:54 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```

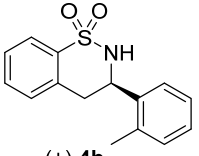


Area Percent Report

```
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=230 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	13.873	BV	0.5808	22.16280	5.11960e-1	2.1823
2	18.104	VB	0.5179	993.40417	29.51423	97.8177
Totals :				1015.56698	30.02619	

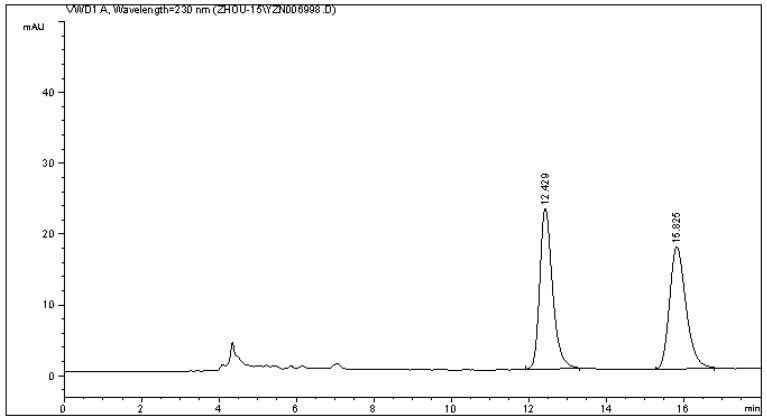


(+)-**4b**

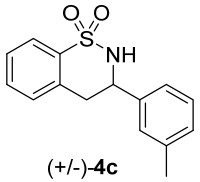
*** End of Report ***

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN006998.D
Sample Name: BS-3--73B(+-)

```
==========================================================================
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/16/2015 11:33:31 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 1/16/2015 11:31:44 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 11:02:08 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



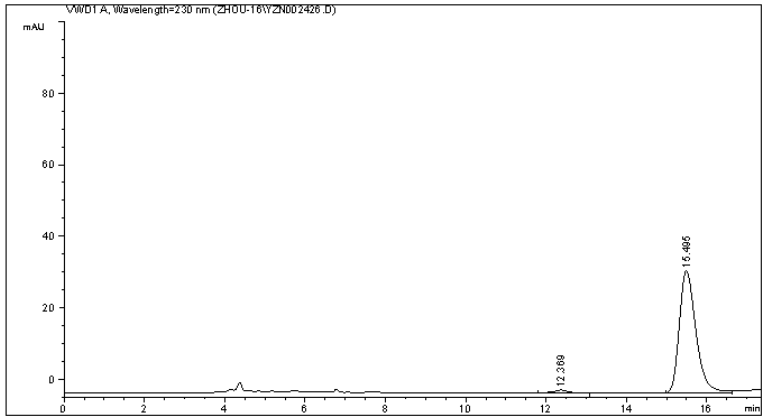

```
==========================================================================
                        Area Percent Report
==========================================================================

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=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|----------|-------|
   1  12.429 BB    0.3480  521.40002   22.70233  50.5637
   2  15.825 BB    0.4507  509.77518   17.27071  49.4363

Totals :                  1031.17520   39.97304

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



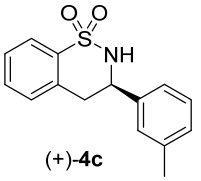
(+/-)-**4c**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN002426.D
Sample Name: BS-3-73B

```
==========================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 9/20/2016 10:34:57 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 9/20/2016 10:32:32 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 10/19/2016 2:22:17 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min, 30oC, 220nm
```



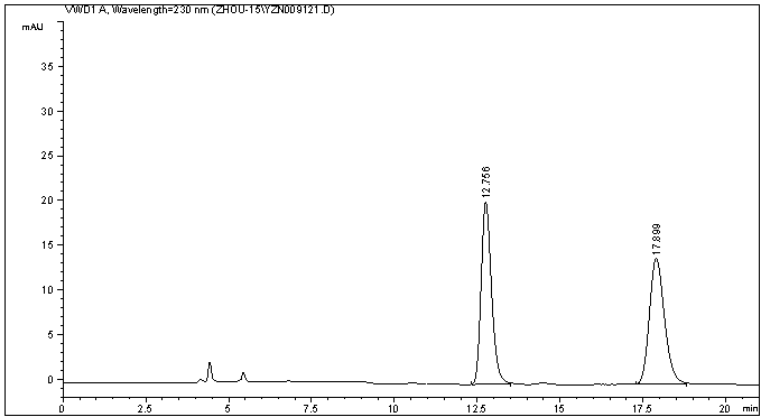

```
==========================================================================
                        Area Percent Report
==========================================================================

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


Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|----------|-------|
   1  12.369 BB    0.4024   24.94381 9.06971e-1   2.4449
   2  15.495 BB    0.4435  995.27411   34.28829  97.5551

Totals :                  1020.21792   35.19526

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



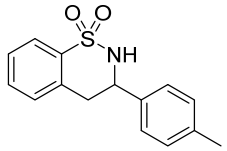
(+)-**4c**

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN009121.D
Sample Name: BS-3-73(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 8/20/2015 8:53:12 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 8/20/2015 8:49:02 PM by
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 8/20/2015 9:20:09 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



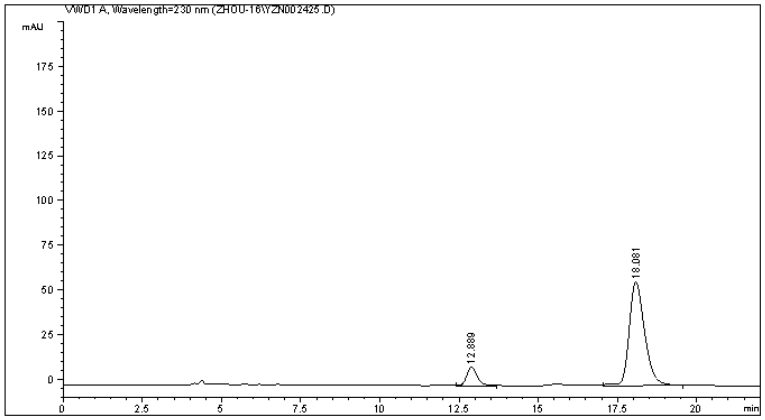

```
                          Area Percent Report

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

Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|------|----|-------|---------|---------|-------|
   1  12.756 BB    0.3342  445.19214   20.43899  50.1805
   2  17.899 BB    0.4825  441.98898   14.03212  49.8195

Totals :                  887.18112   34.47110

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



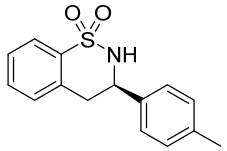
(+/-)-**4d**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN002425.D
Sample Name: BS-3-74C

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 9/20/2016 10:09:46 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 9/20/2016 10:06:18 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 10/19/2016 2:24:09 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min, 30oC, 220nm
```



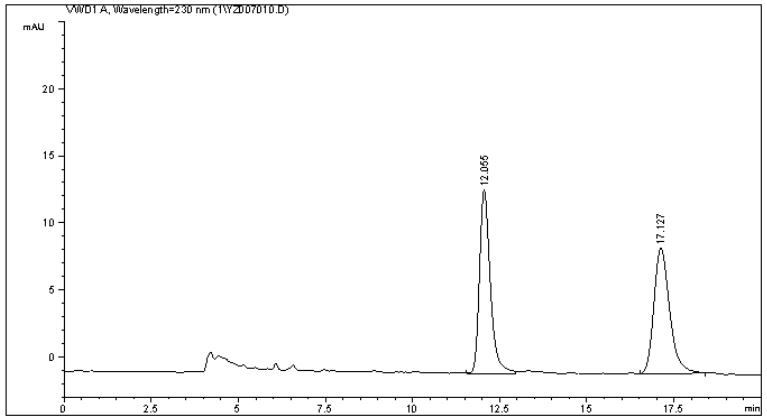

```
                          Area Percent Report

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

Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|------|----|-------|---------|---------|-------|
   1  12.889 VB    0.3490  235.72371   10.28322  10.6701
   2  18.081 BB    0.5196 1973.47937   57.94915  89.3299

Totals :                 2209.20308   68.23237

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



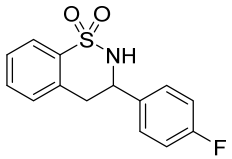
(+)-**4d**

Data File C:\CHEM32\1\DATA\1\YZ007010.D
Sample Name: BS-3-74D(+-)

```
==================================================================
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 1/14/2015 2:00:47 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 1/14/2015 1:58:23 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 11:30:40 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



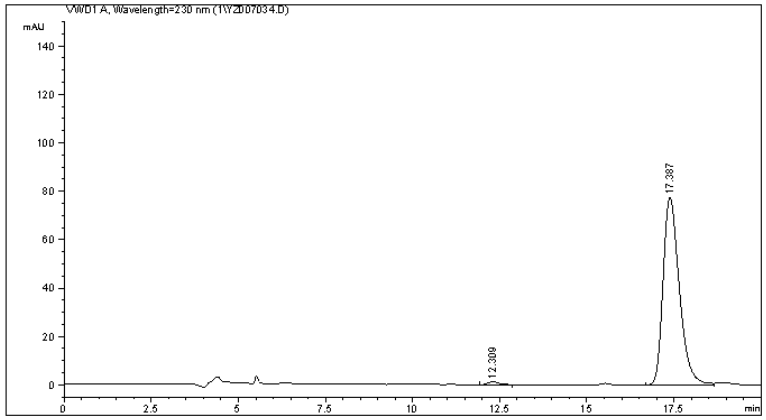

```
==================================================================
                      Area Percent Report
==================================================================

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


Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  12.055 VB    0.3284  296.69174   13.69643  50.2223
   2  17.127 BB    0.4805  294.06473    9.35002  49.7777

Totals :                  590.75647   23.04645

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



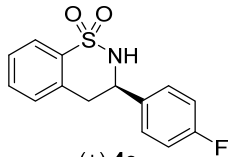
(+/-)-**4e**

Data File C:\CHEM32\1\DATA\1\YZ007034.D
Sample Name: BS-3-74D

```
==================================================================
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 1/17/2015 12:49:58 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 1/17/2015 12:32:55 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 11:33:23 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



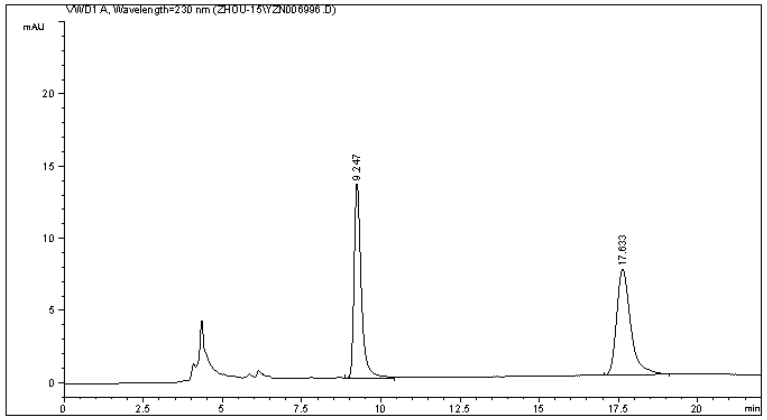

```
==================================================================
                      Area Percent Report
==================================================================

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


Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  12.309 BB    0.3419   29.38605    1.28794   1.1519
   2  17.387 BV    0.4988 2521.75854   77.53453  98.8481

Totals :                  2551.14460   78.82247

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



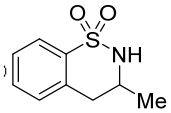
(+)-**4e**

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN006996.D
Sample Name: BS-3--78C(+-)

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/16/2015 10:35:30 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 1/16/2015 10:32:56 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:54:42 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



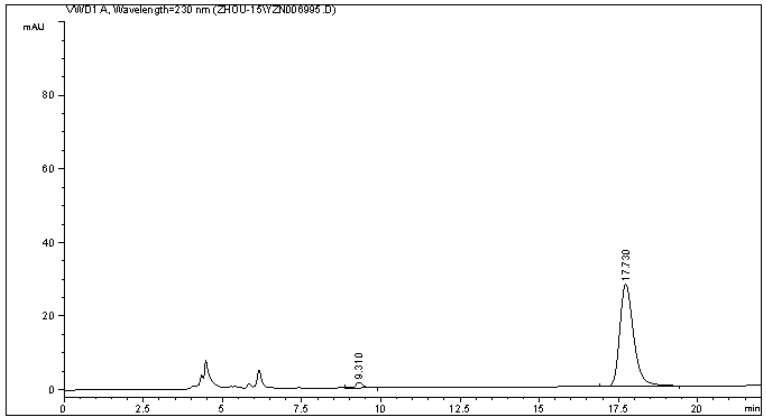

```
                          Area Percent Report

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=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|----------|--------|
   1   9.247 VB    0.2368  213.75076   13.52772  48.7381
   2  17.633 BB    0.4668  224.81955    7.30515  51.2619

Totals :                   438.57031   20.83287

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



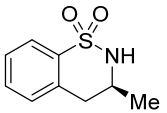
(+/-)-**4f**

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN006995.D
Sample Name: BS-3--78C

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/16/2015 10:01:11 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 1/16/2015 9:57:31 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 10:55:15 AM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



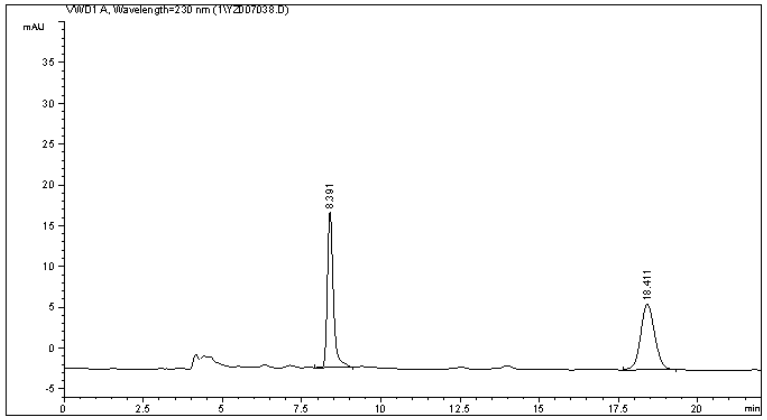

```
                          Area Percent Report

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=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|----------|--------|
   1   9.310 VB    0.2441   24.82518    1.53405   2.8591
   2  17.730 BB    0.4656  843.44727   27.72587  97.1409

Totals :                   868.27244   29.25992

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



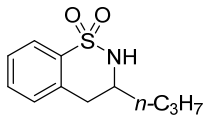
(+)-**4f**

Data File C:\CHEM32\1\DATA\1\YZ007038.D
Sample Name: BS-3-78D(+-)

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 1/17/2015 3:02:10 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 1/17/2015 3:00:26 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:13:12 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



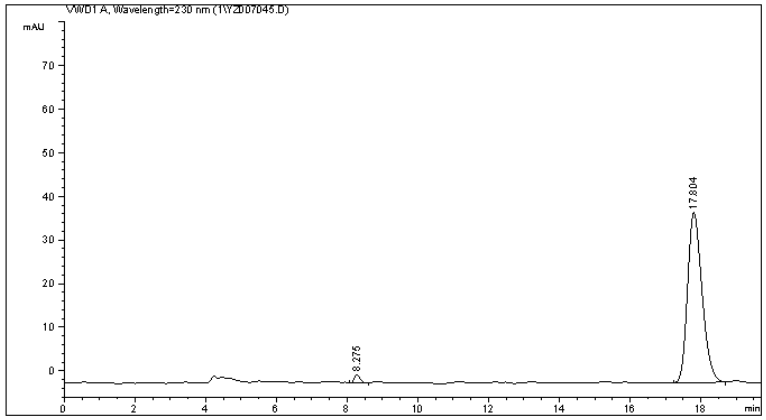

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   8.391 VB    0.1987 250.57877   19.03116  50.3492
   2  18.411 BB    0.4772 247.10324    8.02363  49.6508

Totals :                  497.68201   27.05479

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



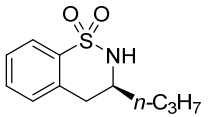
(+/-)-**4g**

Data File C:\CHEM32\1\DATA\1\YZ007045.D
Sample Name: BS-3-78D

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 1/18/2015 8:22:22 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 1/18/2015 8:19:41 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:13:57 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



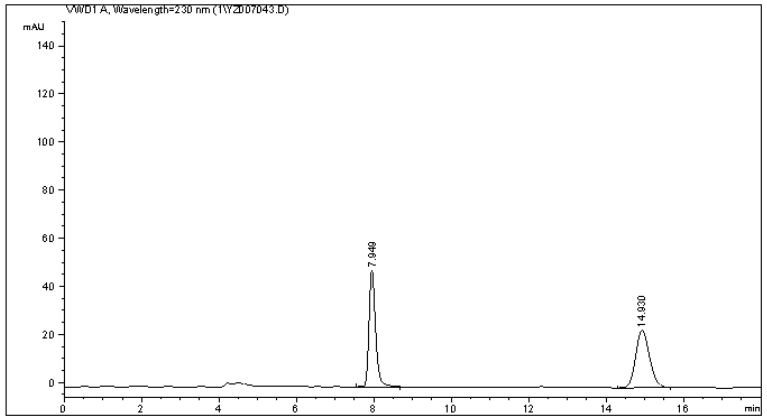

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   8.275 BB    0.1671  19.46494    1.84034   1.7268
   2  17.804 BB    0.4396 1107.76147   38.94886  98.2732

Totals :                  1127.22641   40.78920

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



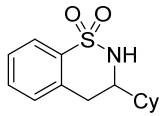
(+)-**4g**

Data File C:\CHEM32\1\DATA\1\YZ007043.D
Sample Name: BS-3-78E(+-)

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/18/2015 7:26:37 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 1/18/2015 7:24:39 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:18:23 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



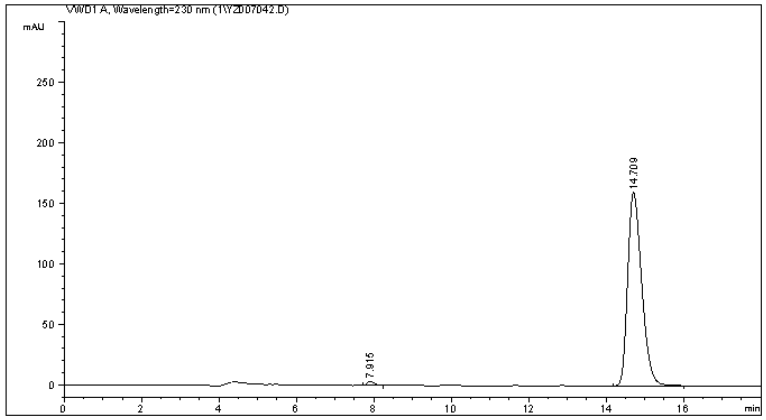

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   7.949 BB    0.1811  575.98853   48.37144  49.2671
   2  14.930 BB    0.3838  593.12500   23.92973  50.7329

Totals :                 1169.11353   72.30117

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



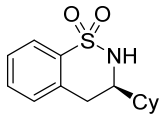
(+/-)-**4h**

Data File C:\CHEM32\1\DATA\1\YZ007042.D
Sample Name: BS-3-78E

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/18/2015 6:38:16 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC1.M
Last changed    : 1/18/2015 5:56:15 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:19:00 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 70/30, 0.7 mL/min, 30 oC, 230 nm
```



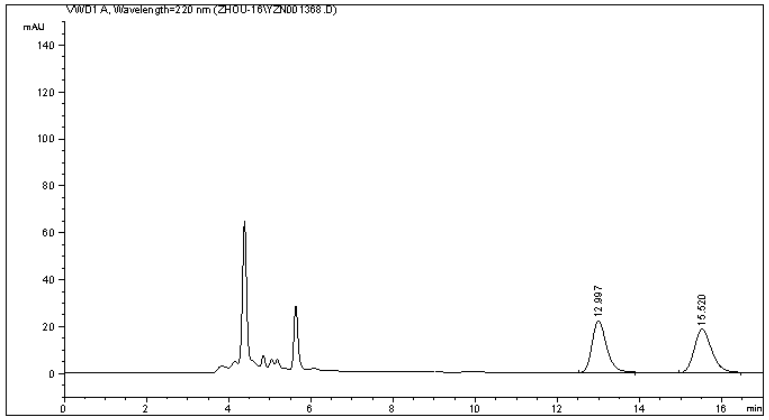

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=230 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   7.915 VB    0.1865   44.31816    3.62127   1.0906
   2  14.709 BB    0.3883 4019.31396  159.67844  98.9094

Totals :                 4063.63212  163.29971

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



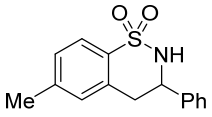
(+)-**4h**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001368.D
Sample Name: BS-6-6C(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/15/2016 11:26:31 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/15/2016 11:23:58 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:23:05 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



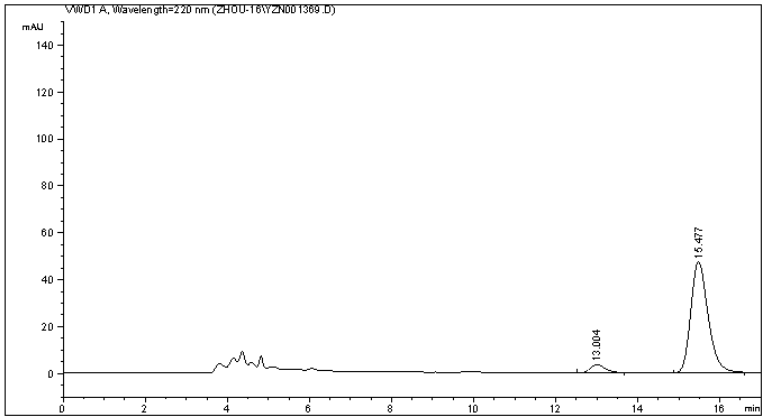

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  12.997 BB    0.3761  545.74561   22.16139  50.1036
   2  15.520 BB    0.4497  543.48840   18.54109  49.8964

Totals :                  1089.23401   40.70248

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



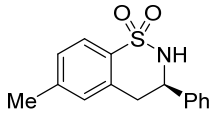
(+/-)-**4i**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001369.D
Sample Name: BS-6-6C

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/15/2016 11:46:01 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/15/2016 11:43:41 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:23:05 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



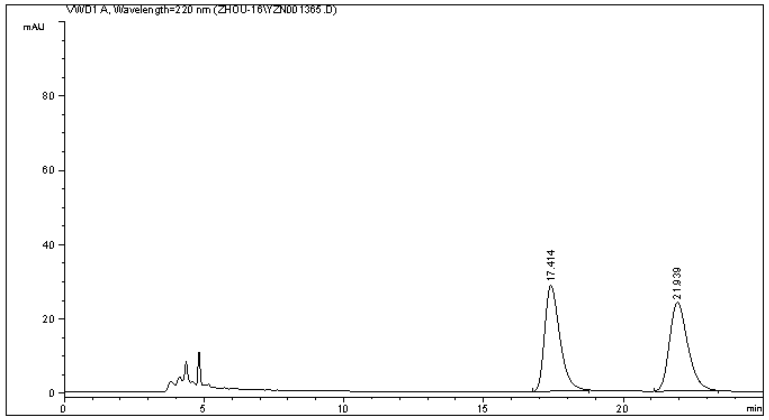

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  13.004 BB    0.3952   85.65388    3.34134   5.8268
   2  15.477 BB    0.4510 1384.35486   47.25777  94.1732

Totals :                  1470.00874   50.59911

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



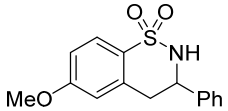
(+)-**4i**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001365.D
Sample Name: BS-6-6A(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/15/2016 10:19:32 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/15/2016 10:16:21 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:18:29 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



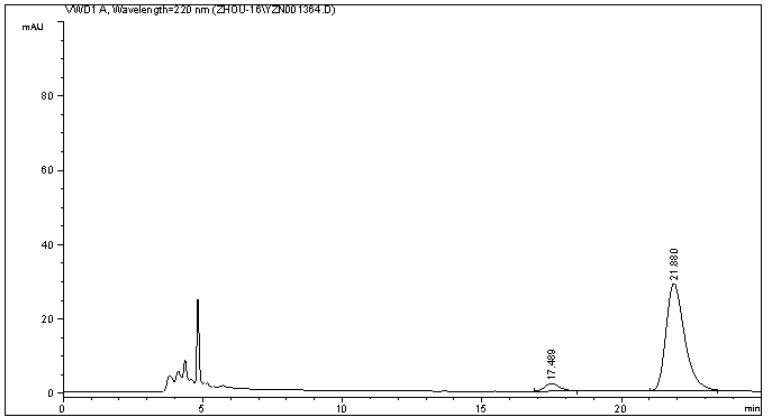

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  17.414 BB    0.5763 1074.66589   28.53231  49.5929
   2  21.939 BB    0.7008 1092.30835   23.89370  50.4071

Totals :                  2166.97424   52.42601

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



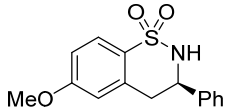
(+/-)-**4j**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001364.D
Sample Name: BS-6-6A

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/15/2016 9:51:06 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/15/2016 9:45:07 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:18:29 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



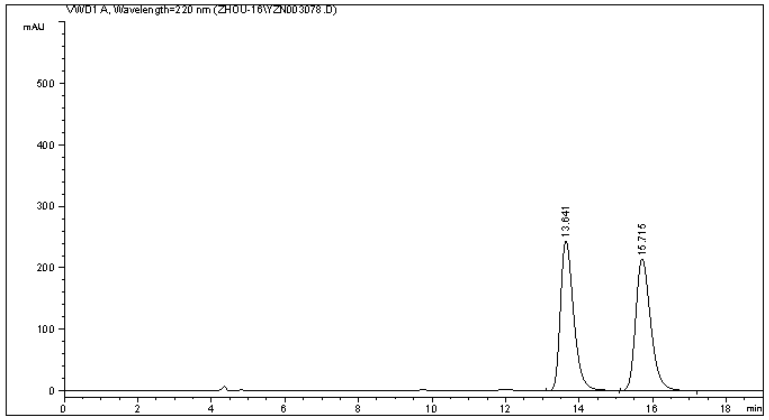

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  17.489 BB    0.5583   76.01335    2.04100   5.3976
   2  21.880 BB    0.7073 1332.27161   28.87073  94.6024

Totals :                  1408.28496   30.91173

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



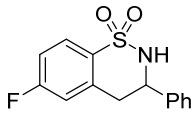
(+)-**4j**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN003078.D
Sample Name: BS-7-58(-+)

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/22/2016 11:04:06 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 12/22/2016 10:49:43 AM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 12/22/2016 10:25:13 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min, 30oC, 220 nm
```



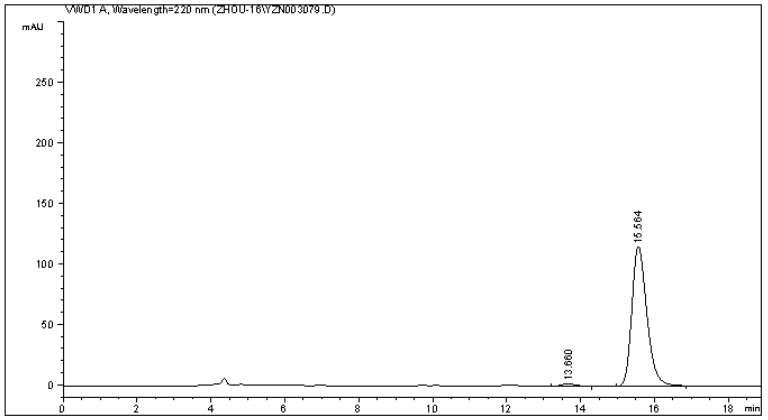

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  13.641 BB    0.3814 6103.41357  244.54706  50.0337
   2  15.715 BB    0.4392 6095.18262  214.51564  49.9663

Totals :                  1.21986e4   459.06270

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



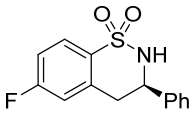
(+/-)-**4k**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN003079.D
Sample Name: BS-7-58

```
Acq. Operator   : 0
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 12/22/2016 11:24:38 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 12/22/2016 11:23:46 AM by 0
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 12/22/2016 10:26:52 PM by 0
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 0.7 mL/min, 30oC, 220 nm
```



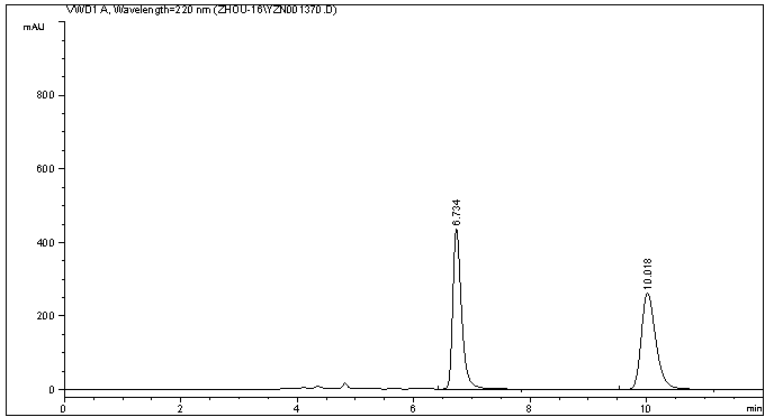

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  13.660 BB    0.3703   47.05296    1.98080   1.4229
   2  15.564 BB    0.4345 3259.68604  115.36879  98.5771

Totals :                  3306.73899  117.34959

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



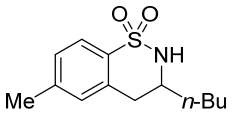
(+)-**4k**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001370.D
Sample Name: BS-6-6D(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/16/2016 12:06:40 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/16/2016 12:04:18 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:25:18 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



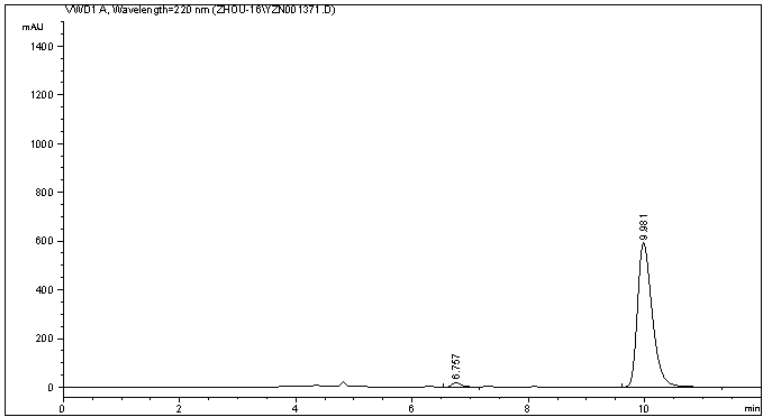

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   6.734 VB    0.1604 4637.92090  436.22708  50.4776
   2  10.018 VB    0.2671 4550.14746  261.48633  49.5224

Totals :                  9188.06836  697.71341


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



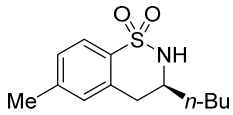
(+/-)-**4l**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001371.D
Sample Name: BS-6-6D

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/16/2016 12:21:28 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/16/2016 12:19:16 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:25:42 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



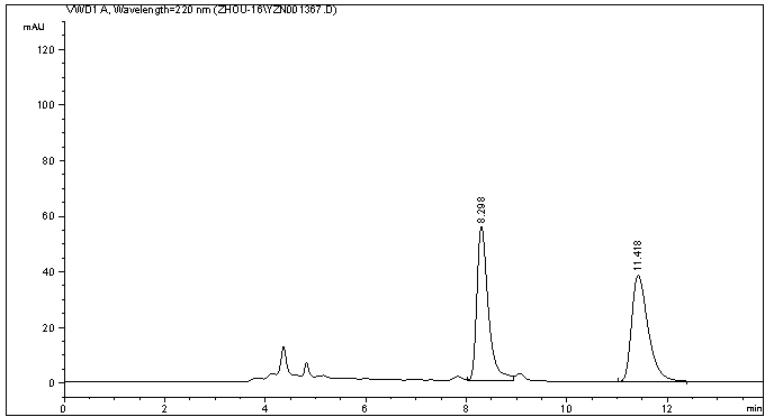

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   6.757 VV    0.1666  213.45477   19.12925   2.0143
   2   9.981 BB    0.2688 1.03836e4   591.72925  97.9857

Totals :                  1.05971e4   610.85850


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



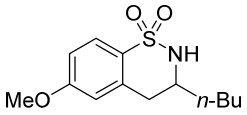
(+)-**4l**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001367.D
Sample Name: BS-6-6B(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/15/2016 11:09:59 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/15/2016 11:08:07 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:20:42 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



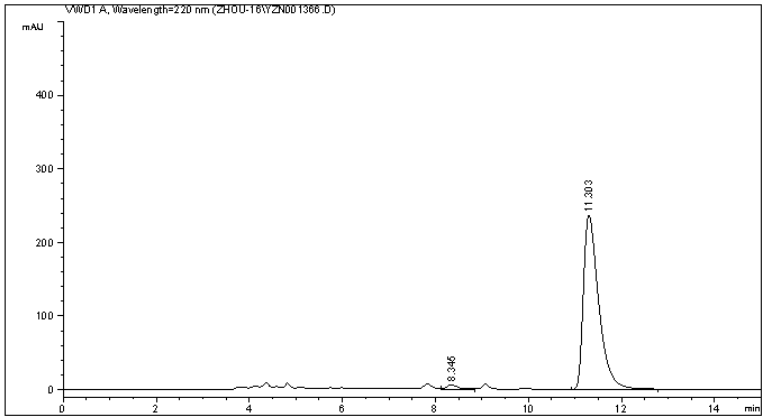

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   8.298 VV    0.2384  879.48865   55.61186  50.1764
   2  11.418 BB    0.3472  873.30591   38.35274  49.8236

Totals :                  1752.79456   93.96460

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



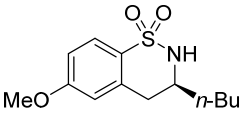
(+/-)-**4m**

Data File C:\CHEM32\1\DATA\ZHOU-16\YZN001366.D
Sample Name: BS-6-6B

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 5/15/2016 10:47:58 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 5/15/2016 10:44:50 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 6/29/2016 3:21:18 PM
                  (modified after loading)
Sample Info     : OD-H, Hex/i-PrOH =70/30, 0.7 mL/min, 30oC, 220 nm
```



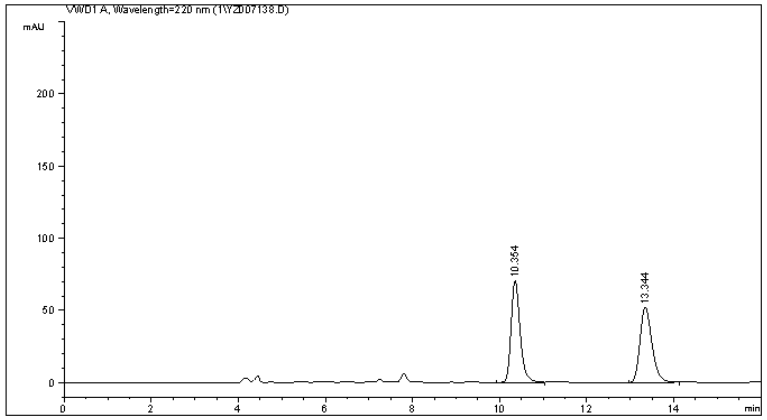

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1   8.345 VB    0.2472   91.52423    5.56619   1.6730
   2  11.303 BB    0.3438 5379.23779  236.68463  98.3270

Totals :                  5470.76202  242.25082

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



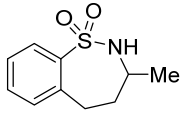
(+)-**4m**

Data File C:\CHEM32\1\DATA\1\YZ007138.D
Sample Name: BS-3-82A(+-)

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/30/2015 8:12:35 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 1/30/2015 7:33:19 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:23:17 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 80/25, 0.7 mL/min, 30 oC, 220 nm
```



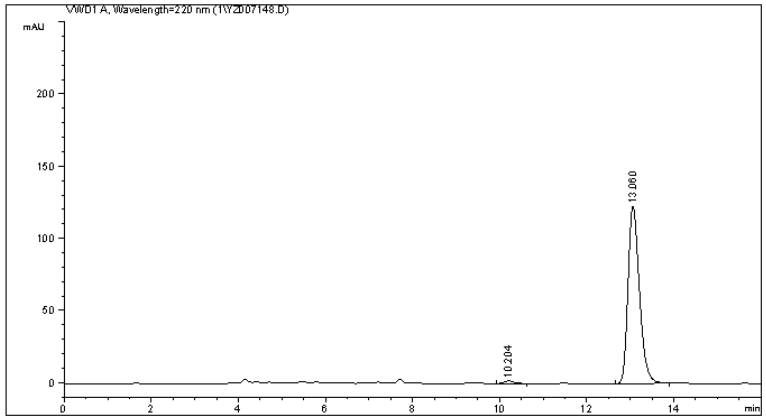

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  10.354 BB    0.2233 1034.59033   70.64894  50.8032
   2  13.344 BB    0.2953 1001.87653   52.18114  49.1968

Totals :                 2036.46686  122.83009

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



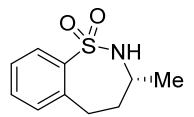
(+/-)-**6a**

Data File C:\CHEM32\1\DATA\1\YZ007148.D
Sample Name: BS-3-86G

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 1/31/2015 10:53:59 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 1/31/2015 9:23:15 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:23:17 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 80/20, 0.7 mL/min, 30 oC, 220 nm
```



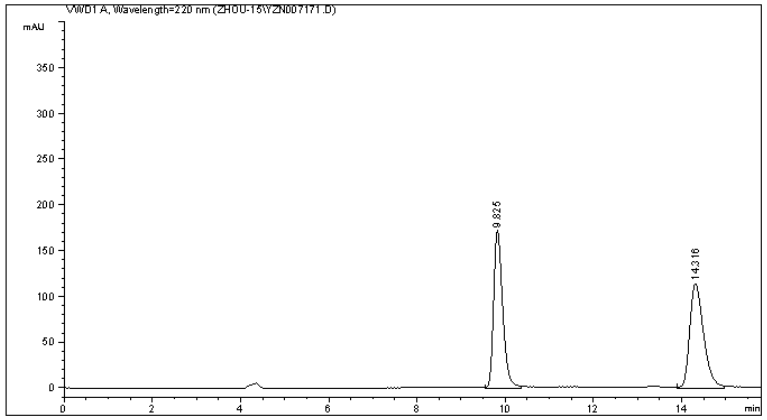

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #  [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  10.204 BB    0.2429   28.78096    1.84744   1.2720
   2  13.060 BB    0.2791 2233.83643  122.87923  98.7280

Totals :                 2262.61739  124.72667

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



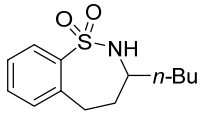
(+)-**6a**

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN007171.D
Sample Name: BS-3-88A(+-)

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/1/2015 8:01:39 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/1/2015 7:39:40 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:27:16 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 0.7 mL/min, 30 oC, 220 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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   9.825 VV    0.2191 2487.97339  172.65929  49.7009
   2  14.316 VV    0.3362 2517.92163  114.69238  50.2991

Totals :                  5005.89502  287.35167
```

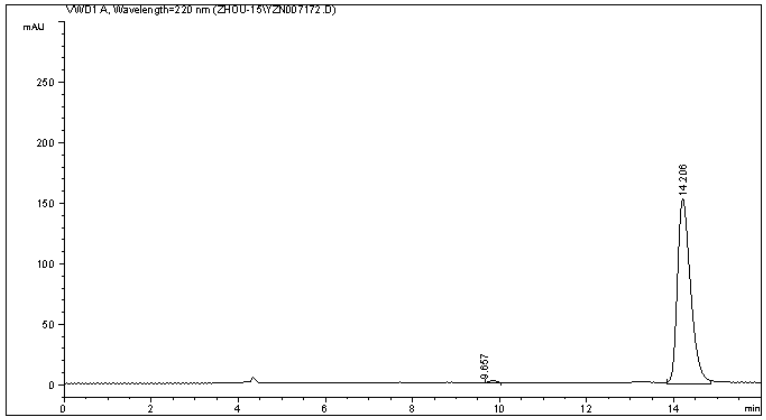


(+/-)-**6b**

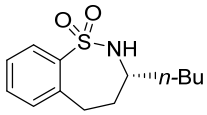
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\ZHOU-15\YZN007172.D
Sample Name: BS-3-88A

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/1/2015 8:25:17 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/1/2015 8:24:33 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:37:39 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 0.7 mL/min, 30 oC, 220 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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1   9.657 MM R  0.2080   18.86502 2.92566e-2   0.5847
   2  14.206 VV    0.3185 3207.59644  152.28621  99.4153

Totals :                  3226.46146  152.31547
```

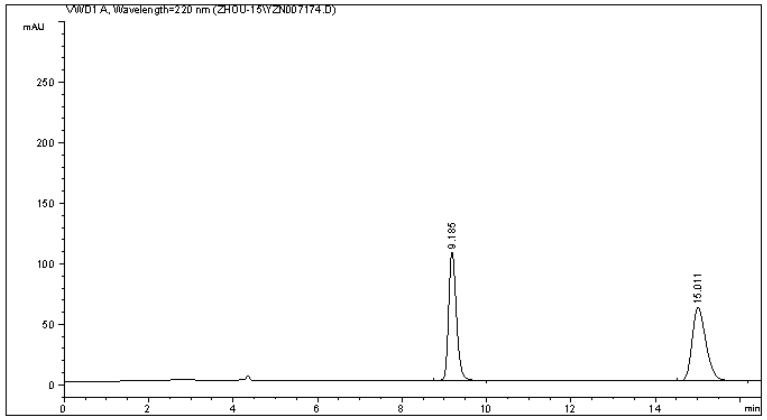


(+)-**6b**

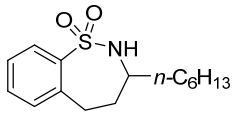
```
                          *** End of Report ***
```

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN007174.D
Sample Name: BS-3-88B(+-)

```
==================================================================
Acq. Operator   : Z
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 2/1/2015 9:12:16 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/1/2015 9:09:53 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:42:22 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 0.7 mL/min, 30 oC, 220 nm
```



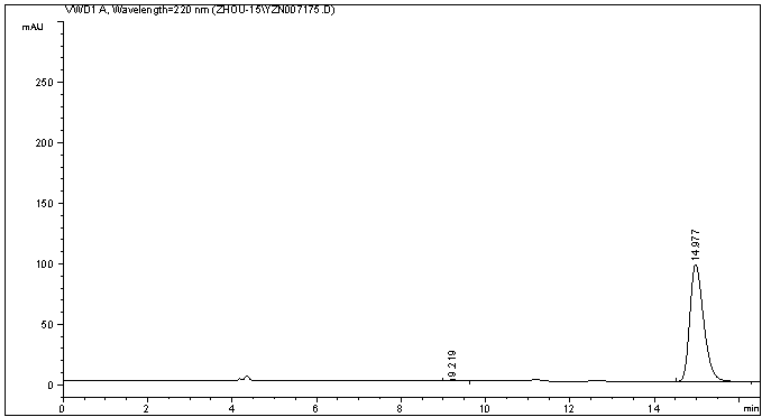

```
==================================================================
                      Area Percent Report
==================================================================

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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|----------|--------|
   1   9.185 VB    0.1960 1364.96655  106.58108  49.7854
   2  15.011 VB    0.3495 1376.73608   60.60932  50.2146

Totals :                  2741.70264  167.19040

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



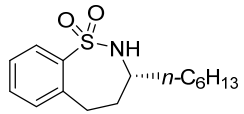
(+/-)-**6c**

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN007175.D
Sample Name: BS-3-88B

```
==================================================================
Acq. Operator   : Z
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 2/1/2015 9:34:02 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 2/1/2015 9:30:18 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:42:22 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 90/10, 0.7 mL/min, 30 oC, 220 nm
```



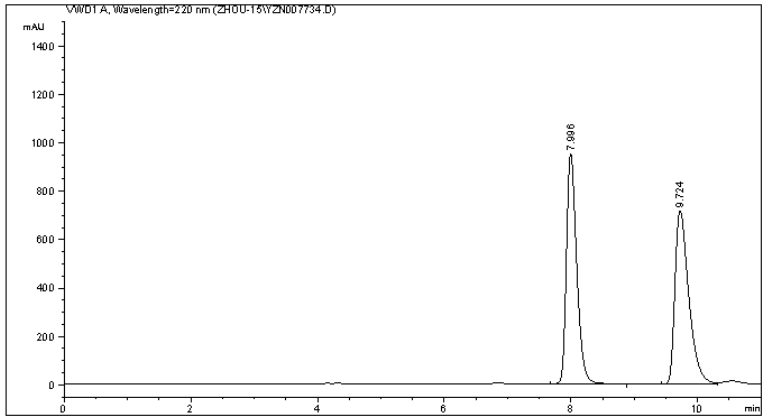

```
==================================================================
                      Area Percent Report
==================================================================

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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|----------|--------|
   1   9.219 VB    0.2109   17.20287    1.20025   0.7804
   2  14.977 VB    0.3484 2187.04907   96.64989  99.2196

Totals :                  2204.25194   97.85014

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



(+)-**6c**

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN007734.D
Sample Name: BS-4-12A(+-)

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/20/2015 7:56:09 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 4/20/2015 7:53:53 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:59:49 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 85/15,  0.7 mL/min, 30 oC, 220 nm
```

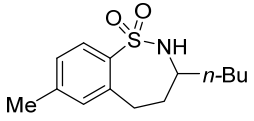


Area Percent Report

```
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=220 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	7.996	VV	0.1747	1.08359e4	953.94543	49.8263
2	9.724	VV	0.2313	1.09114e4	717.46490	50.1737
Totals :				2.17473e4	1671.41034	

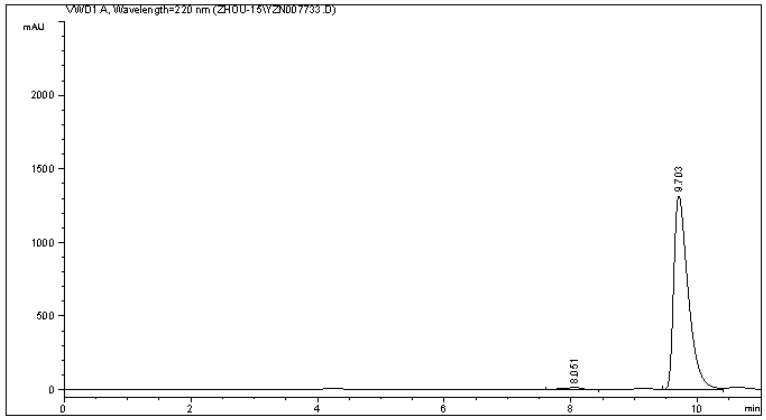


(+/-)-**6d**

*** End of Report ***

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN007733.D
Sample Name: BS-4-12A

```
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/20/2015 7:38:18 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 4/20/2015 7:09:16 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 3:00:33 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 85/15,  0.7 mL/min, 30 oC, 220 nm
```

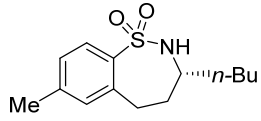


Area Percent Report

```
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=220 nm

Peak #	RetTime [min]	Type	Width [min]	Area mAU*s	Height [mAU]	Area %
1	8.051	VV	0.2357	235.93143	14.33735	1.1275
2	9.703	VV	0.2372	2.06883e4	1316.68762	98.8725
Totals :				2.09243e4	1331.02497	

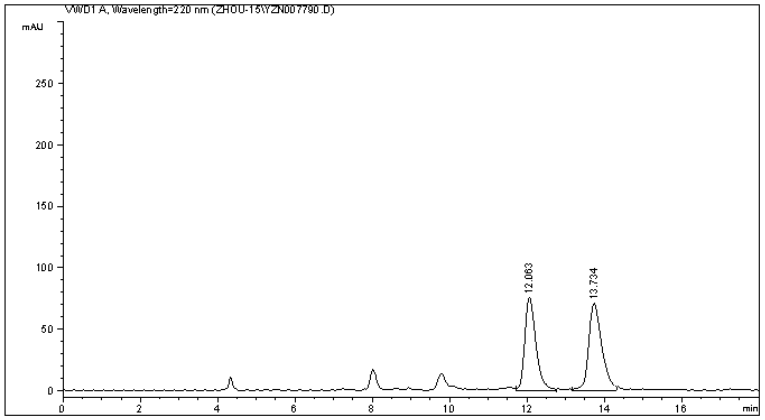


(+)-**6d**

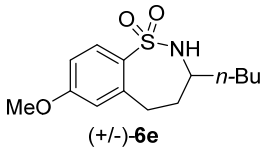
*** End of Report ***

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN007790.D
Sample Name: BS-4-15a(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/23/2015 8:28:33 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 4/23/2015 7:58:59 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 3:03:10 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 85/15,  0.7 mL/min, 30 oC, 220 nm
```



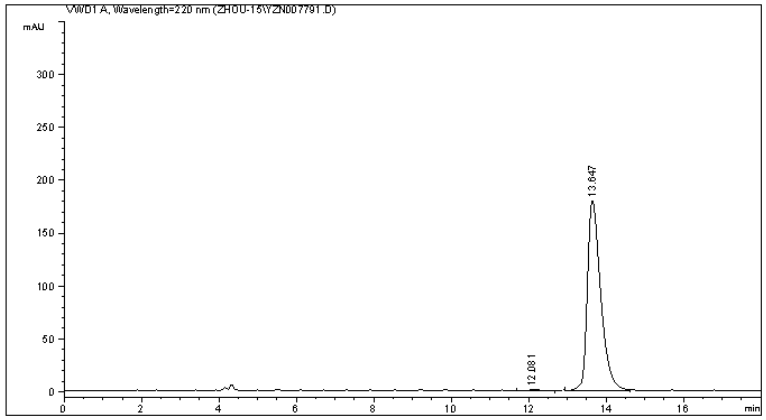

```
                          Area Percent Report

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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.063 VV    0.2939 1505.38696   75.46680  47.6938
   2  13.734 VV    0.3571 1650.96960   70.64191  52.3062

Totals :                  3156.35657  146.10872

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



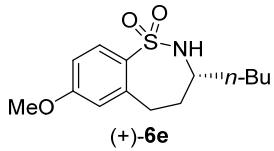
(+/-)-**6e**

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN007791.D
Sample Name: BS-4-15a

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/23/2015 9:01:11 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 4/23/2015 8:57:34 PM by
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 3:04:45 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 85/15,  0.7 mL/min, 30 oC, 220 nm
```



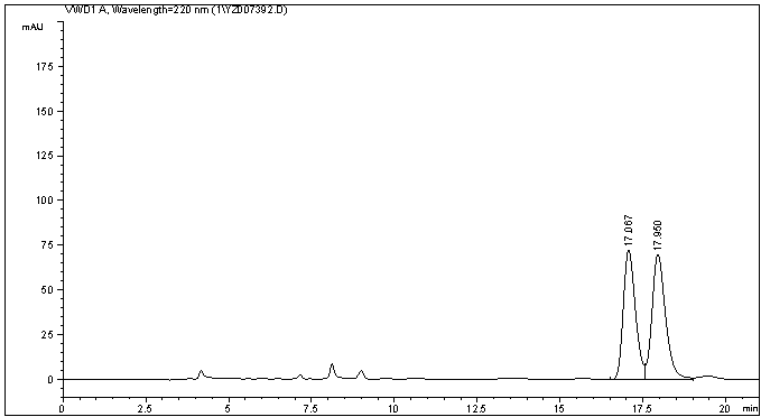

```
                          Area Percent Report

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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.081 BB    0.1690   22.03906    1.66512   0.5079
   2  13.647 VV    0.3594 4316.92188  180.28851  99.4921

Totals :                  4338.96094  181.95363

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



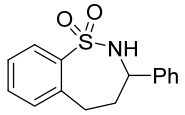
(+)-**6e**

Data File C:\CHEM32\1\DATA\1\YZ007392.D
Sample Name: BS-3-93C+-)

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/27/2015 1:58:49 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/27/2015 12:13:49 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:45:14 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 85/15, 0.7 mL/min, 30 oC, 220 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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  17.067 VV    0.3931 1853.87573   72.82408  47.9332
   2  17.950 VV    0.4368 2013.74890   70.15835  52.0668

Totals :                  3867.62463  142.98243
```

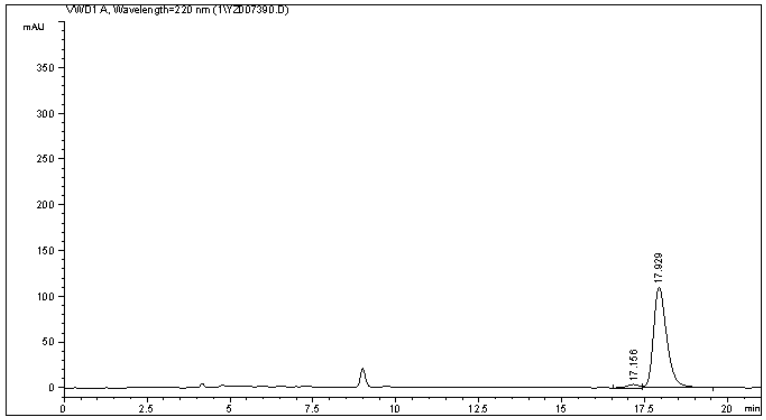


(+/-)-**6f**

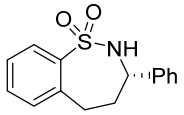
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\1\YZ007390.D
Sample Name: BS-3-100

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/27/2015 1:00:44 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/27/2015 12:13:49 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:46:03 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 85/15, 0.7 mL/min, 30 oC, 220 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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  17.156 VV    0.3757   90.71048    3.68929   2.8918
   2  17.929 VB    0.4260 3046.06055  109.65189  97.1082

Totals :                  3136.77103  113.34118
```

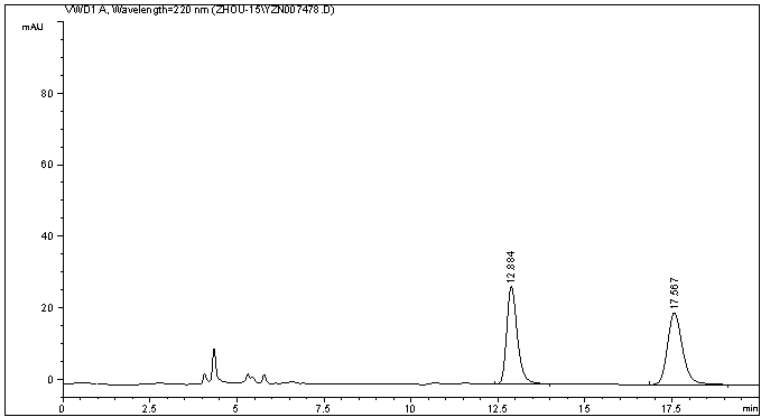


(+)-**6f**

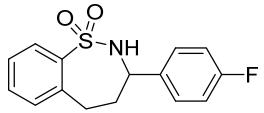
```
                          *** End of Report ***
```

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN007478.D
Sample Name: BS-3-101A(-+)

```
==========================================================================
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/28/2015 4:44:02 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/28/2015 4:41:03 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:56:35 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 80/20,  0.7 mL/min, 30 oC, 220 nm
```



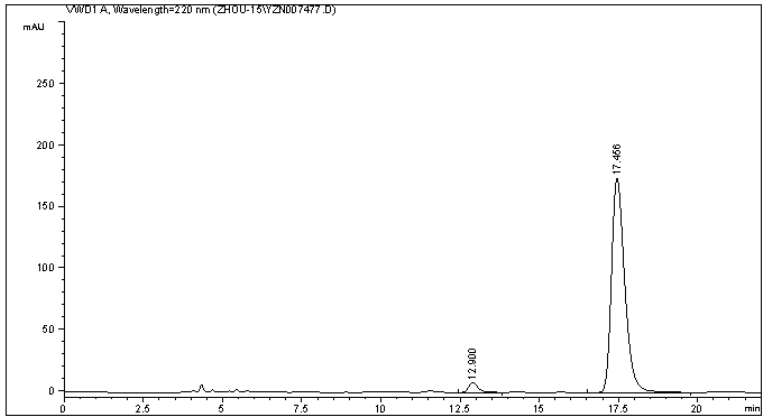

```
==========================================================================
                        Area Percent Report
==========================================================================

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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  12.884 VB    0.3247  582.10510   27.27588  48.8346
   2  17.567 BB    0.4619  609.88812   20.17571  51.1654

Totals :                  1191.99323   47.45159

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



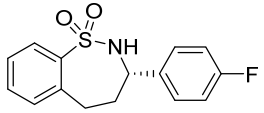
(+/-)-**6g**

Data File C:\CHEM32\1\DATA\ZHOU-15\YZN007477.D
Sample Name: BS-3-101A

```
==========================================================================
Acq. Operator   : Z
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/28/2015 4:18:23 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 3/28/2015 4:15:04 PM by Z
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:56:02 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 80/20,  0.7 mL/min, 30 oC, 220 nm
```



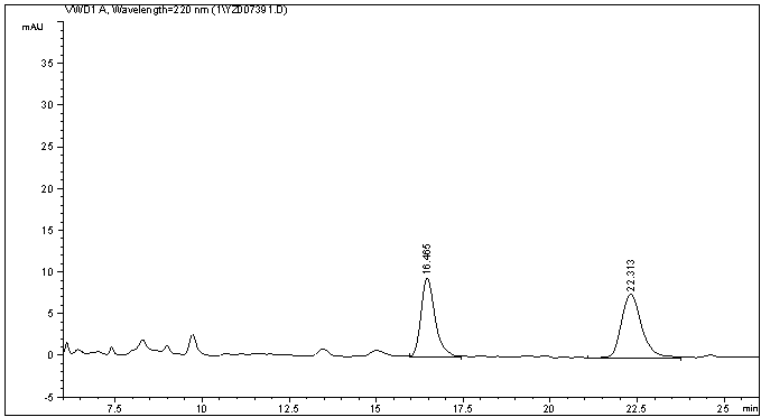

```
==========================================================================
                        Area Percent Report
==========================================================================

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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  12.900 BB    0.3335  170.85477    7.77588   3.2646
   2  17.456 VB    0.4458 5062.65332  173.97386  96.7354

Totals :                  5233.50809  181.74974

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



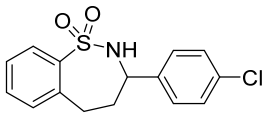
(+)-**6g**

Data File C:\CHEM32\1\DATA\1\YZ007391.D
Sample Name: BS-3-93B(+-)

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/27/2015 1:30:54 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/27/2015 12:13:49 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:52:13 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 85/15, 0.7 mL/min, 30 oC, 220 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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  16.465 VB    0.4302  263.11938    9.39260  45.8103
   2  22.313 VV    0.6263  311.24750    7.64610  54.1897

Totals :                   574.36688   17.03870
```

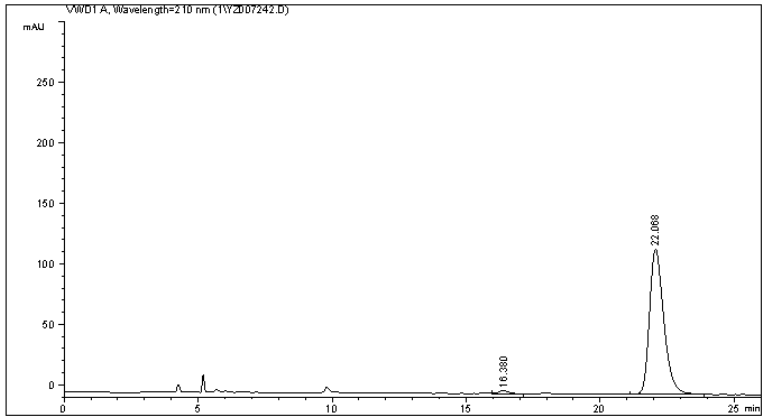


(+/-)-**6h**

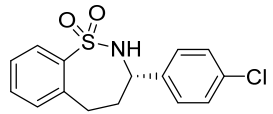
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\1\YZ007242.D
Sample Name: BS-3-93B

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 3/12/2015 2:59:44 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 3/12/2015 1:37:05 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 2:49:43 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 85/15, 0.7 mL/min, 30 oC, 210 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=210 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  16.380 VV    0.4164   74.22246    2.65498   1.6434
   2  22.068 VB    0.5675 4442.09717  119.93791  98.3566

Totals :                  4516.31963  122.59289
```

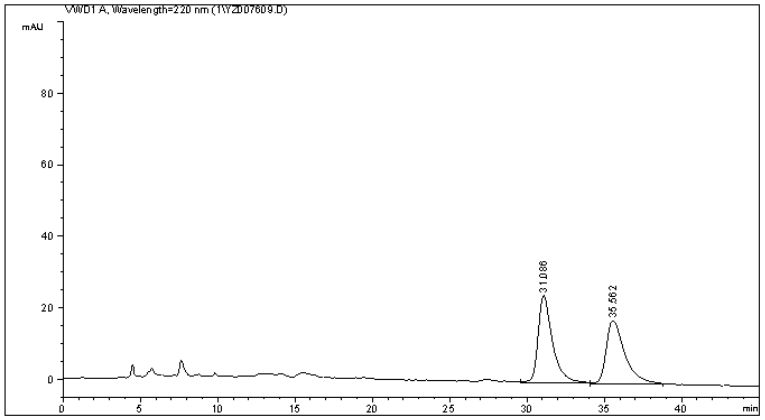


(+)-**6h**

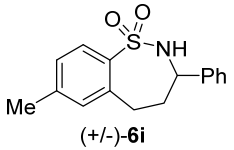
```
                          *** End of Report ***
```

Data File C:\CHEM32\1\DATA\1\YZ007609.D
Sample Name: BS-4-12B(+-)

```
==================================================================
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 4/21/2015 1:17:57 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 4/21/2015 1:04:20 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 3:06:53 PM by
                  (modified after loading)
Sample Info     : OJ-H, H/i-PrOH = 85/15, 0.7 mL/min, 30 oC, 220 nm
```



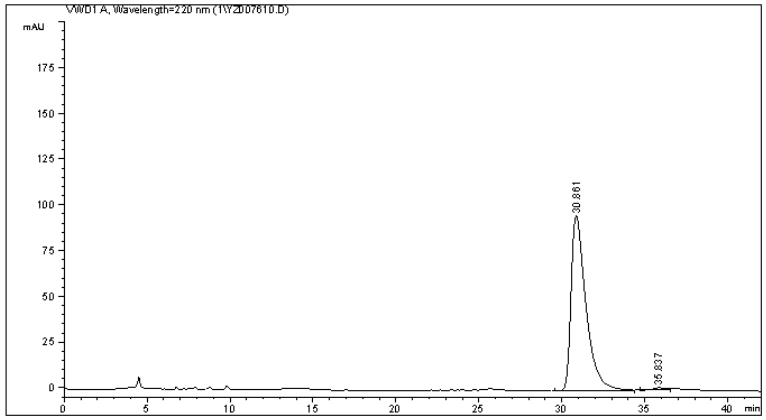

```
==================================================================
                      Area Percent Report
==================================================================

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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  31.086 VB    0.9390 1593.88074   24.42246  51.8170
   2  35.562 BV    1.1891 1482.09924   17.65445  48.1830

Totals :                  3075.97998   42.07691

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



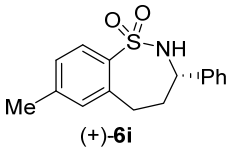
(+/-)-**6i**

Data File C:\CHEM32\1\DATA\1\YZ007610.D
Sample Name: BS-4-12B

```
==================================================================
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 4/21/2015 2:10:05 PM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 4/21/2015 1:04:20 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 3:07:47 PM by
                  (modified after loading)
Sample Info     : OJ-H, H/i-PrOH = 85/15, 0.7 mL/min, 30 oC, 220 nm
```



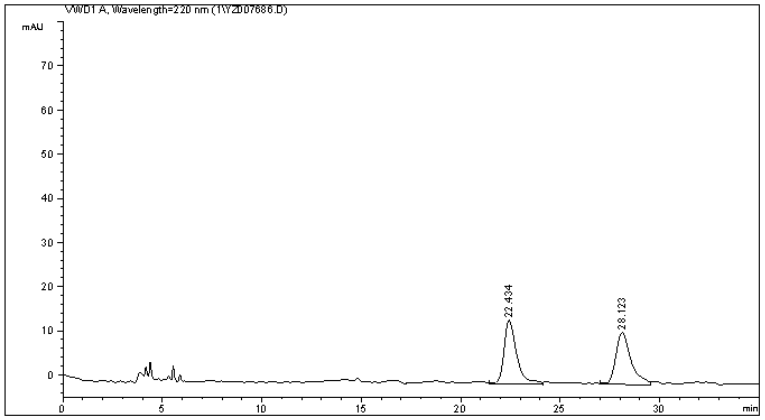

```
==================================================================
                      Area Percent Report
==================================================================

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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|--------|
   1  30.861 VV    0.9154 5946.64941   95.36039  98.8726
   2  35.837 VV    0.8024   67.80735    1.13398   1.1274

Totals :                  6014.45676   96.49437

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



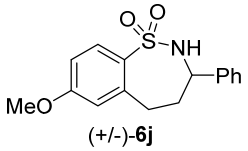
(+)-**6i**

Data File C:\CHEM32\1\DATA\1\YZ007686.D
Sample Name: BS-4-15B

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/30/2015 12:50:16 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 4/29/2015 11:28:53 PM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 3:10:25 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 85/15, 0.7 mL/min, 30 oC, 220 nm
```



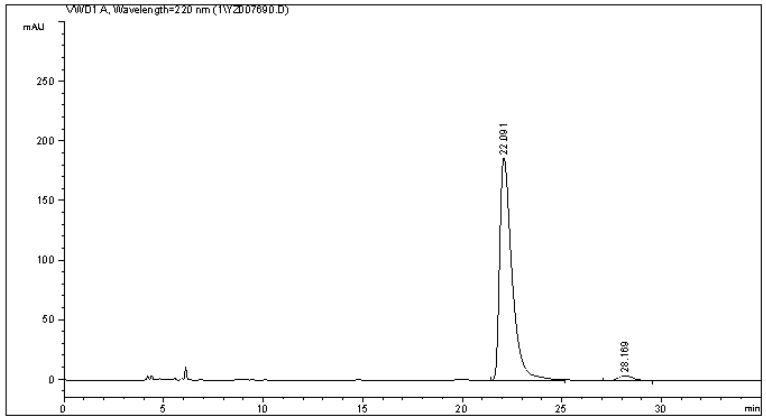

```
                          Area Percent Report

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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  22.434 VV    0.6673  640.29022   14.39853  50.4002
   2  28.123 VV    0.7899  630.12213   11.78327  49.5998

Totals :                  1270.41235   26.18180

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



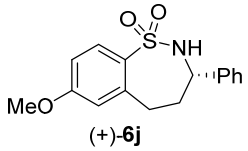
(+/-)-**6j**

Data File C:\CHEM32\1\DATA\1\YZ007690.D
Sample Name: BS-4-15B

```
Acq. Operator   : ZHOU
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 4/30/2015 6:28:31 AM
Acq. Method     : C:\HPCHEM\1\METHODS\DEF LC.M
Last changed    : 4/30/2015 5:01:37 AM by ZHOU
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF LC.M
Last changed    : 7/21/2015 3:11:05 PM by
                  (modified after loading)
Sample Info     : OD-H, H/i-PrOH = 85/15, 0.7 mL/min, 30 oC, 220 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=220 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]       [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|---------|---------|-------|
   1  22.091 VB    0.6519 8123.09717  187.17920  96.8850
   2  28.169 VB    0.8588  261.16965    4.44451   3.1150

Totals :                  8384.26682  191.62371

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



(+)-**6j**