Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry.

Supporting Information

Facile Synthesis of Chiral *ε*-Sultams *via* Organocatalytic Aza-Friedel-Crafts Reaction

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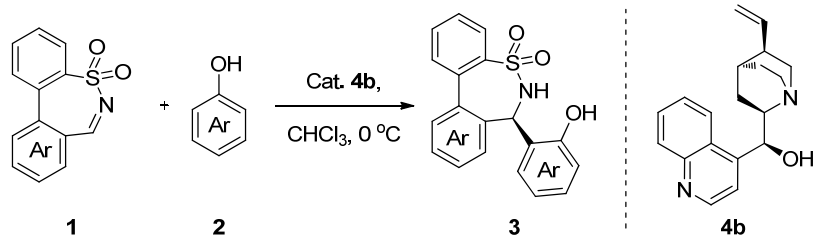
1. General and Materials

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

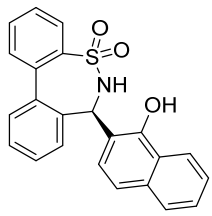
Materials: The seven-membered cyclic *N*-sulfonylimines **1** could be synthesized according to the known literature procedures.[1] A variety of naphthols were synthesized according to the known literature procedures.[2]

2. Organocatalytic Aza-Friedel-Crafts Reaction

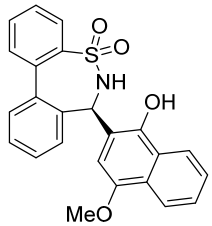


A reaction mixture of seven-membered cyclic *N*-sulfonylimines **1** (0.20 mmol), naphthols or phenols **2** (0.30 mmol) and organocatalyst (0.02 mmol, 10 mol%) in chloroform (12 mL) was stirred at 0 °C for 4-72 h. Then the solvent was removed under the reduced pressure. Flash chromatography on silica gel using hexanes/ethyl acetate as the eluent gave the chiral products **3**.

(*R*)-(-)-7-(1-Hydroxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (**3aa**): 74 mg, 95% yield, yellow solid, mp 169-170 °C, new compound, R_f = 0.60 (hexanes/ethyl acetate 3/1), 89% ee, $[\alpha]^{20}_D$ = -137.90 (*c* 1.72, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.38-8.28 (m, 1H), 8.13 (brs, 1H), 8.04 (d, *J* = 7.7 Hz, 1H), 7.76 (t, *J* = 7.2 Hz, 1H), 7.73-7.66 (m, 1H), 7.65-7.55 (m, 2H), 7.52-7.44 (m, 2H), 7.42-7.36 (m, 2H), 7.24-7.18 (m, 2H), 6.97 (d, *J* = 7.8 Hz, 1H), 6.85 (d, *J* = 8.4 Hz, 1H), 5.61 (d, *J* = 2.7 Hz, 1H), 5.35 (d, *J* = 2.9 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 152.3, 140.0, 139.2, 135.6, 134.6, 134.1, 132.9, 130.4, 129.8, 129.5, 129.4, 129.3, 129.0, 127.5, 127.2, 126.6, 126.5, 125.8, 125.5, 122.5, 120.3, 114.4, 61.2. HPLC: Chiracel AD-H column, 254 nm, 30 °C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 15.0 min and 17.6 min (major). HRMS Calculated for $C_{23}H_{18}NO_3S$ $[M+H]^+$ 388.1002, found: 388.1002.

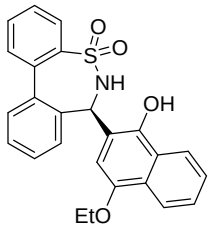


(-)-7-(1-Hydroxy-4-methoxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3ab): 78 mg, 93% yield, brown solid, mp 163-164 °C, new compound, R_f = 0.60 (hexanes/ethyl acetate 3/1), 92% ee, $[\alpha]^{20}_D$ = -129.99 (*c* 0.68, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.32 (d, *J* = 6.2 Hz, 1H), 8.24-8.11 (m, 2H), 7.91-7.83 (m, 1H), 7.77-7.67 (m, 2H), 7.62-7.54 (m, 2H), 7.53-7.46 (m, 2H), 7.38-7.28 (m, 2H), 7.11 (d, *J* = 7.5 Hz, 1H), 6.26 (brs, 1H), 5.72 (s, 1H), 5.37 (s, 1H), 3.83 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 149.2, 145.4, 140.0, 139.2, 135.8, 134.0, 133.0, 130.4, 129.8, 129.5, 129.5, 129.3, 128.9, 126.6,

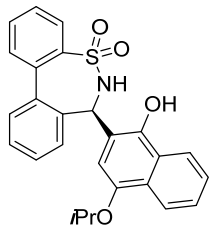


126.4, 126.3, 126.3, 122.1, 121.7, 104.0, 61.1, 55.7. HPLC: Chiracel AD-H column, 254 nm, 30 ^{o}C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 14.5 min and 20.5 min (major). HRMS Calculated for $C_{24}H_{20}NO_4S$ $[M+H]^+$ 418.1108, found: 418.1106.

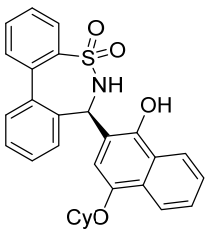
(-)-7-(4-Ethoxy-1-hydroxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3ac): 82 mg, 95% yield, yellow solid, mp 163-164 ^{o}C, new compound, R_f = 0.70 (hexanes/ethyl acetate 3/1), 90% ee, $[\alpha]^{20}_D$ = -136.31 (*c* 0.38, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.18 (d, *J* = 6.9 Hz, 1H), 8.14-8.08 (m, 1H), 8.06-7.99 (m, 1H), 7.79-7.70 (m, 1H), 7.63-7.55 (m, 2H), 7.47-7.40 (m, 2H), 7.39-7.31 (m, 2H), 7.27-7.12 (m, 2H), 6.96 (d, *J* = 7.8 Hz, 1H), 6.11 (brs, 1H), 5.66 (s, 1H), 5.19 (s, 1H), 3.86 (q, *J* = 6.8 Hz, 2H), 1.33 (t, *J* = 6.9 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 148.7, 145.4, 145.4, 140.0, 139.2, 135.9, 134.0, 133.0, 130.4, 129.8, 129.5, 129.5, 129.2, 128.9, 126.6, 126.4, 122.1, 121.9, 105.0, 64.1, 61.0, 14.8. HPLC: Chiracel AD-H column, 254 nm, 30 ^{o}C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 12.4 min and 15.9 min (major). HRMS Calculated for $C_{25}H_{22}NO_4S$ $[M+H]^+$ 432.1264, found: 432.1262.



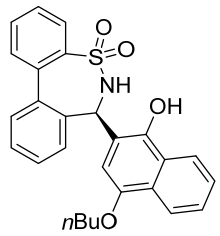
(-)-7-(1-Hydroxy-4-isopropoxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3ad): 87 mg, 98% yield, yellow solid, mp 157-158 ^{o}C, new compound, R_f = 0.65 (hexanes/ethyl acetate 3/1), 92% ee, $[\alpha]^{20}_D$ = -111.59 (*c* 0.50, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.19-8.15 (m, 1H), 8.04 (d, *J* = 8.0 Hz, 1H), 7.97 (d, *J* = 7.8 Hz, 1H), 7.72-7.65 (m, 1H), 7.61-7.48 (m, 2H), 7.45-7.27 (m, 4H), 7.26-6.98 (m, 2H), 6.89 (d, *J* = 7.8 Hz, 1H), 6.13 (brs, 1H), 5.80 (s, 1H), 5.11 (s, 1H), 4.42-4.15 (m, 1H), 1.18 (dd, *J* = 11.5, 6.1 Hz, 6H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 147.4, 145.6, 140.0, 139.2, 135.9, 134.0, 133.1, 130.4, 129.7, 129.5, 129.4, 129.3, 128.9, 127.7, 126.5, 126.4, 126.2, 122.2, 122.0, 108.1, 71.7, 60.9, 22.2, 22.2. HPLC: Chiracel OD-H column, 254 nm, 30 ^{o}C, *n*-Hexane/*i*-PrOH = 90/10, flow = 0.7 mL/min, retention time 26.6 min and 32.2 min (major). HRMS Calculated for $C_{26}H_{24}NO_4S$ $[M+H]^+$ 446.1421, found: 446.1424.



(-)-7-(4-Cyclohexyloxy-1-hydroxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3ae): 87 mg, 90% yield, yellow solid, mp 160-161 ^{o}C, new compound, R_f = 0.50 (hexanes/ethyl acetate 3/1), 92% ee, $[\alpha]^{20}_D$ = -105.59 (*c* 0.50, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.32 (d, *J* = 8.0 Hz, 1H), 8.28-8.22 (m, 1H), 8.17-8.12 (m, 1H), 7.91-7.85 (m, 1H), 7.78-7.66 (m, 2H), 7.62-7.44 (m, 4H), 7.37-7.27 (m, 2H), 7.12 (d, *J* = 7.8 Hz, 1H), 6.37 (brs, 1H), 5.74 (s, 1H), 5.37 (s, 1H), 4.28-4.19 (m, 1H), 1.98-1.87 (m, 2H), 1.84-1.74 (m, 2H), 1.67-1.49 (m, 4H), 1.39-1.31 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 147.2, 145.7, 140.0, 139.2, 135.9, 134.0, 133.0, 130.5, 129.7, 129.6, 129.5, 129.3, 128.9, 127.9, 126.6, 126.5, 126.4, 126.2, 122.3, 122.1, 108.2, 61.1, 31.8, 31.8, 25.6, 23.7. HPLC: Chiracel AD-H column, 254 nm, 30 ^{o}C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 14.6 min and 27.2 min (major). HRMS Calculated for $C_{29}H_{28}NO_4S$ $[M+H]^+$ 486.1734, found: 486.1737.

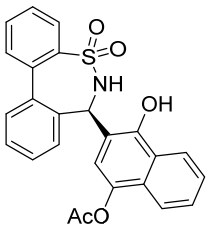


(-)-7-(4-Butoxy-1-hydroxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3af): 87 mg, 95% yield, yellow solid, mp 128-129 ^{o}C, new compound, R_f = 0.80 (hexanes/ethyl acetate 3/1), 91% ee, $[\alpha]^{20}_D$ = -99.24 (*c* 0.40, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.30 (d, *J* = 7.2 Hz, 1H), 8.21 (d, *J* = 8.0 Hz, 1H), 8.14 (d, *J* = 7.7 Hz, 1H), 7.90-7.82 (m, 1H), 7.81-7.60

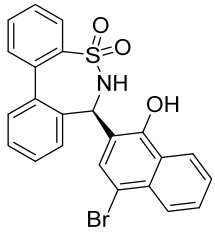


(m, 3H), 7.59-7.43 (m, 4H), 7.34-7.29 (m, 1H), 7.08 (d, *J* = 7.6 Hz, 1H), 6.20 (brs, 1H), 5.85 (s, 1H), 5.30 (s, 1H), 3.98-3.83 (m, 2H), 1.88-1.76 (m, 2H), 1.60-1.48 (m, 2H), 0.99 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 148.9, 145.4, 140.0, 139.3, 135.9, 134.0, 132.9, 130.4, 129.8, 129.5, 129.5, 129.4, 129.4, 129.3, 128.9, 126.6, 126.6, 126.4, 122.2, 121.8, 104.8, 68.3, 61.1, 31.4, 19.4, 13.9. HPLC: Chiracel AD-H column, 254 nm, 30 °C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 10.5 min and 15.7 min (major). HRMS Calculated for $C_{27}H_{26}NO_4S$ $[M+H]^+$ 460.1577, found: 460.1576.

(-)-3-(5,5-Dioxido-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepin-7-yl)-4-hydroxynaphthalen-1-yl acetate (3ag): 87 mg, 98% yield, white solid, mp 175-176 °C, new compound, R_f = 0.50 (hexanes/ethyl acetate 3/1), 86% ee, $[\alpha]^{20}_D$ = -103.39 (*c* 0.50, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.25-8.16 (m, 1H), 7.87 (d, *J* = 7.4 Hz, 1H), 7.67-7.61 (m, 2H), 7.55-7.36 (m, 5H), 7.31-7.25 (m, 2H), 7.15-7.11 (m, 1H), 6.88 (d, *J* = 7.8 Hz, 1H), 6.63 (brs, 1H), 5.81 (s, 1H), 5.17 (d, *J* = 2.7 Hz, 1H), 2.15 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.9, 150.3, 140.0, 139.6, 139.2, 135.7, 134.1, 132.5, 130.3, 129.9, 129.5, 129.4, 129.3, 129.0, 127.7, 127.6, 126.6, 126.3, 126.3, 123.0, 120.9, 118.4, 113.6, 60.8, 20.8. HPLC: Chiracel AD-H column, 254 nm, 30 °C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 11.4 min and 14.6 min (major). HRMS Calculated for $C_{25}H_{20}NO_5S$ $[M+H]^+$ 446.1057, found: 446.1042.



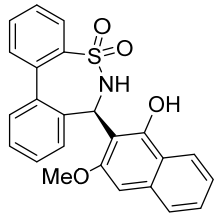
(-)-7-(4-Chloro-1-hydroxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3ah): 80 mg, 95% yield, yellow solid, mp 248-249 °C, new compound, R_f = 0.80 (hexanes/ ethyl acetate 3/1), 78% ee, $[\alpha]^{20}_D$ = -102.78 (*c* 1.58, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.44 (d, *J* = 8.2 Hz, 1H), 8.32 (brs, 1H), 8.18 (d, *J* = 8.2 Hz, 1H), 8.11 (d, *J* = 7.7 Hz, 1H), 7.89-7.82 (m, 1H), 7.74-7.59 (m, 4H), 7.53-7.43 (m, 2H), 7.36-7.29 (m, 1H), 7.08-7.00 (m, 2H), 5.75 (d, *J* = 2.9 Hz, 1H), 5.37 (d, *J* = 3.0 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 151.4, 140.0, 139.0, 135.5, 134.2, 132.4, 131.5, 130.4, 129.9, 129.5, 129.4, 129.3, 129.1, 128.2, 126.7, 126.6, 126.5, 126.2, 124.1, 123.1, 123.0, 114.6, 60.7. HPLC: Chiracel AD-H column, 254 nm, 30 °C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 10.2 min and 12.6 min (major). HRMS Calculated for $C_{23}H_{17}ClNO_3S$ $[M+H]^+$ 422.0609, found: 422.0609.



(-)-7-(4-Bromo-1-hydroxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3ai): 91 mg, 98% yield, yellow solid, mp 247-248 °C, new compound, R_f = 0.80 (hexanes/ethyl acetate 3/1), 74% ee, $[\alpha]^{20}_D$ = -85.73 (*c* 1.62, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.45 (d, *J* = 8.1 Hz, 1H), 8.37 (brs, 1H), 8.19-8.10 (m, 2H), 7.90-7.84 (m, 1H), 7.74-7.61 (m, 4H), 7.55-7.47 (m, 2H), 7.38-7.31 (m, 1H), 7.30-7.23 (m, 1H), 7.06 (d, *J* = 7.8 Hz, 1H), 5.73 (d, *J* = 2.8 Hz, 1H), 5.40 (d, *J* = 3.0 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 152.3, 140.0, 139.1, 135.6, 134.3, 132.7, 132.2, 130.5, 130.0, 129.7, 129.6, 129.4, 129.3, 129.1, 128.6, 126.8, 126.8, 126.7, 126.6, 123.1, 113.1, 60.9. HPLC: Chiracel AD-H column, 254 nm, 30 °C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 10.4 min and 12.3 min (major). HRMS Calculated for $C_{23}H_{17}BrNO_3S$ $[M+H]^+$ 466.0107, found: 466.0106.

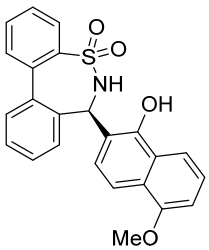
(-)-7-(1-Hydroxy-3-methoxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3aj): 80 mg, 96% yield, yellow solid, mp 168-169 °C, new compound, R_f = 0.55

(hexanes/ethyl acetate 3/1), 89% ee, $[\alpha]^{20}_D$ = -106.92 (*c* 0.52, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$)

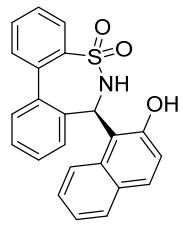


δ 8.82 (s, 1H), 8.33 (d, *J* = 8.4 Hz, 1H), 8.12 (dd, *J* = 7.8, 1.1 Hz, 1H), 7.89-7.82 (m, 1H), 7.75-7.64 (m, 3H), 7.54-7.45 (m, 3H), 7.44-7.38 (m, 1H), 7.35-7.29 (m, 1H), 7.12 (d, *J* = 7.8 Hz, 1H), 6.68 (brs, 1H), 6.03 (d, *J* = 3.1 Hz, 1H), 5.55 (d, *J* = 3.1 Hz, 1H), 3.66 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 154.5, 154.2, 140.3, 139.6, 135.6, 134.8, 134.2, 132.3, 130.3, 129.8, 129.4, 129.3, 129.1, 128.8, 127.8, 126.7, 126.2, 123.4, 122.7, 121.3, 106.8, 97.8, 55.6, 53.9. HPLC: Chiracel AD-H column, 254 nm, 30 °C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 15.8 min and 18.3 min (major). HRMS Calculated for $C_{24}H_{20}NO_4S$ $[M+H]^+$ 418.1108, found: 418.1108.

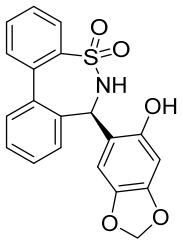
(-)-7-(1-Hydroxy-5-methoxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3ak): 81 mg, 97% yield, yellow solid, mp 276-277 °C, new compound, R_f = 0.50 (hexanes/ethyl acetate 5/1), 89% ee, $[\alpha]^{20}_D$ = -78.46 (*c* 0.52, EtOAc). ^1H NMR (400 MHz, $CDCl_3$) δ 8.12-7.98 (m, 2H), 7.87 (d, *J* = 8.4 Hz, 1H), 7.78-7.72 (m, 1H), 7.67-7.52 (m, 3H), 7.42-7.34 (m, 3H), 7.29-7.08 (m, 1H), 6.95 (d, *J* = 7.8 Hz, 1H), 6.87-6.78 (m, 2H), 5.62 (s, 1H), 5.34 (s, 1H), 3.91 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.2, 152.1, 140.0, 139.3, 135.8, 134.1, 132.8, 130.4, 129.8, 129.5, 129.3, 128.9, 126.9, 126.6, 126.6, 125.9, 125.6, 114.9, 114.6, 114.5, 105.2, 61.3, 55.6.. HPLC: Chiracel OD-H column, 254 nm, 30 °C, *n*-Hexane/*i*-PrOH = 70/30, flow = 1.0 mL/min, retention time 10.9 min (major) and 15.5 min. HRMS Calculated for $C_{24}H_{20}NO_4S$ $[M+H]^+$ 418.1108, found: 418.1104.



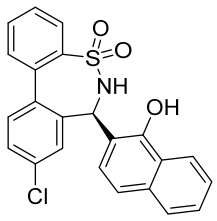
(-)-7-(2-Hydroxynaphthalen-1-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3al): 74 mg, 95% yield, yellow solid, mp 150-151 °C, new compound, R_f = 0.50 (hexanes/ethyl acetate 3/1), 82% ee, $[\alpha]^{20}_D$ = -111.70 (*c* 0.76, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 8.64 (brs, 1H), 8.07 (d, *J* = 7.6 Hz, 1H), 7.91-7.83 (m, 1H), 7.81-7.69 (m, 2H), 7.68-7.61 (m, 2H), 7.48-7.39 (m, 2H), 7.23-7.15 (m, 4H), 7.10-6.98 (m, 2H), 6.06 (s, 1H), 5.58 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.5, 140.1, 139.2, 135.5, 134.4, 132.2, 131.4, 131.3, 130.2, 130.0, 129.7, 129.3, 129.2, 129.1, 129.0, 128.9, 127.2, 126.9, 123.4, 120.6, 119.9, 111.4, 56.3. HPLC: Chiracel AD-H column, 254 nm, 30 °C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 14.8 min (major) and 20.4 min. HRMS Calculated for $C_{23}H_{18}NO_3S$ $[M+H]^+$ 388.1002, found: 388.1000.



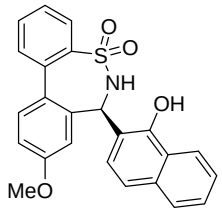
(-)-7-(6-Hydroxybenzo[*d*][1,3]dioxol-5-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3am): 72 mg, 94% yield, yellow solid, mp 167-168 °C, new compound, R_f = 0.45 (hexanes/ethyl acetate 2/1), 63% ee, $[\alpha]^{20}_D$ = -46.87 (*c* 0.64, MeOH) ^1H NMR (400 MHz, DMSO) δ 9.16 (s, 1H), 8.25 (s, 1H), 7.93 (d, *J* = 7.6 Hz, 1H), 7.88-7.82 (m, 1H), 7.78-7.64 (m, 2H), 7.43-7.37 (m, 2H), 7.33-7.23 (m, 1H), 7.03 (s, 1H), 6.76 (d, *J* = 7.6 Hz, 1H), 6.42 (s, 1H), 5.98 (d, *J* = 2.4 Hz, 2H), 5.35 (s, 1H). ^{13}C NMR (100 MHz, DMSO) δ 149.3, 147.3, 140.4, 140.3, 138.8, 138.1, 137.7, 133.8, 130.6, 129.3, 129.3, 128.9, 128.4, 125.5, 117.2, 108.6, 101.4, 98.1, 53.8. HPLC: Chiracel AD-H column, 254 nm, 30 °C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 28.1 min and 34.8 min (major). HRMS Calculated for $C_{20}H_{16}NO_5S$ $[M+H]^+$ 382.0744, found: 382.0740.



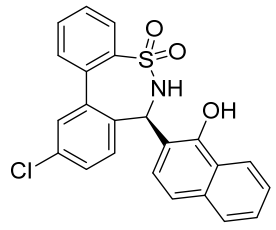
(-)-9-Chloro-7-(1-hydroxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3ba): 80 mg, 95% yield, white solid, mp 237-238 °C, new compound, R_f = 0.75 (hexanes /ethyl acetate 3/1), 86% ee, $[\alpha]^{20}_D$ = -91.38 (*c* 0.36, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.46-8.35 (m, 1H), 8.13 (d, *J* = 7.4 Hz, 1H), 8.05 (brs, 1H), 7.91-7.78 (m, 2H), 7.74-7.67 (m, 2H), 7.64-7.56 (m, 2H), 7.50-7.45 (m, 1H), 7.44-7.35 (m, 2H), 7.02 (d, *J* = 1.8 Hz, 1H), 6.99-6.93 (m, 1H), 5.70 (d, *J* = 2.5 Hz, 1H), 5.40 (d, *J* = 2.7 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 152.1, 138.5, 138.2, 135.7, 135.6, 134.8, 134.8, 134.2, 130.5, 130.3, 130.1, 129.6, 129.3, 127.5, 127.4, 126.7, 126.2, 125.9, 125.5, 122.5, 120.6, 113.6, 60.8. HPLC: Chiracel AD-H column, 254 nm, 30 °C, *n*-Hexane/*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 12.1 min and 21.0 min (major). HRMS Calculated for $C_{23}H_{17}ClNO_3S$ $[M+H]^+$ 422.0612, found: 422.0615.



(-)-7-(1-Hydroxynaphthalen-2-yl)-9-methoxy-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3ca): 82 mg, 98% yield, white solid, mp 276-277 °C, new compound, R_f = 0.70 (hexanes/ethyl acetate 3/1), 90% ee, $[\alpha]^{20}_D$ = -65.19 (*c* 0.52, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.26 (dd, *J* = 6.1, 3.3 Hz, 1H), 8.09 (brs, 1H), 7.97 (d, *J* = 7.7 Hz, 1H), 7.73-7.62 (m, 2H), 7.59-7.47 (m, 2H), 7.46-7.38 (m, 2H), 7.27-7.17 (m, 2H), 6.90-6.75 (m, 2H), 6.49 (d, *J* = 2.5 Hz, 1H), 5.60 (d, *J* = 2.8 Hz, 1H), 5.27 (d, *J* = 2.8 Hz, 1H), 3.53 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 160.5, 152.3, 139.2, 135.5, 134.7, 134.3, 134.1, 132.2, 130.6, 130.3, 128.4, 127.4, 127.2, 126.7, 126.4, 125.8, 125.6, 122.6, 120.3, 116.4, 114.1, 61.3, 55.2. HPLC: Chiracel AD-H column, 254 nm, 30 °C, *n*-Hexane/ *i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 18.2 min and 36.2 min (major). HRMS Calculated for $C_{24}H_{20}NO_4S$ $[M+H]^+$ 418.1108, found: 418.1105.



(+)-10-Chloro-7-(1-hydroxynaphthalen-2-yl)-6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (3da): 76 mg, 90% yield, pink solid, mp 267-268 °C, new compound, R_f = 0.70 (hexanes/ethyl acetate 3/1), 84% ee, $[\alpha]^{20}_D$ = 46.09 (*c* 0.64, DMSO). ^{1}H NMR (400 MHz, DMSO) δ 9.44 (s, 1H), 8.52 (s, 1H), 8.10 (d, *J* = 8.2 Hz, 1H), 7.98 (d, *J* = 7.7 Hz, 1H), 7.94-7.81 (m, 3H), 7.80-7.72 (m, 2H), 7.60 (d, *J* = 8.5 Hz, 1H), 7.56-7.43 (m, 3H), 7.31 (dd, *J* = 8.4, 2.2 Hz, 1H), 6.64 (d, *J* = 8.2 Hz, 1H), 5.70 (s, 1H). ^{13}C NMR (100 MHz, DMSO) δ 149.7, 142.7, 138.2, 137.3, 136.9, 134.3, 133.9, 133.5, 130.8, 130.5, 130.0, 128.8, 128.7, 128.3, 126.7, 126.7, 125.7, 125.5, 122.4, 120.5, 120.0, 53.8. HPLC: Chiracel AD-H column, 254 nm, 30 °C, *n*-Hexane /*i*-PrOH = 80/20, flow = 1.0 mL/min, retention time 14.4 min and 21.7 min (major). HRMS Calculated for $C_{23}H_{17}ClNO_3S$ $[M+H]^+$ 422.0612, found: 422.0613.



3. Determination of Absolute Configuration

To determine the absolute configuration of (-)-7-(1-hydroxynaphthalen-2-yl)- 6,7-dihydrodibenzo[*d*,*f*][1,2]thiazepine 5,5-dioxide (-)-**3aa** (89% ee), firstly, (-)-**3aa** was upgraded to >99% ee by recrystallization with *n*-hexane/ethyl acetate. Then, *n*-hexane was added into the solution of (-)-**3aa** (>99% ee) in dichloromethane, then the solution was slowly evaporated and single crystal of (-)-**3aa** was obtained after 2 days. The crystal was grown from the solution, which is suitable for X-ray diffraction analysis. The structure in **Figure S1** showed that the absolute configuration of (-)-**3aa** is *R* [CCDC 1892454] contains the structure and supplementary crystallographic data for (*R*)-(-)-**3aa**. These data can be obtained free of charge from the Cambridge Crystallographic Data Centre *via* www.ccdc. cam.ac.uk.

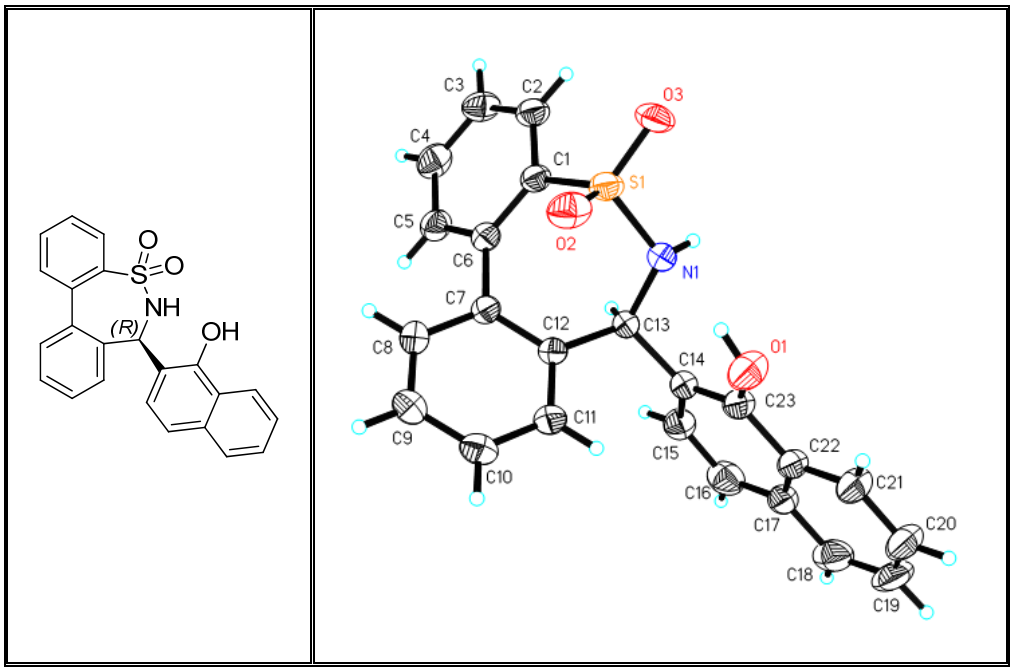


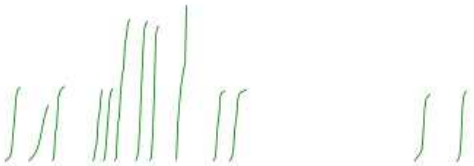
Figure S1. X-ray Crystallographic Analysis of Sultam (*R*)-(-)-**3aa**

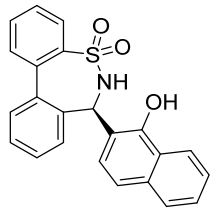
4. References

1. Zhao, Z.-B.; Shi, L.; Meng, F.-J.; Li, Y.; Zhou, Y.-G. Synthesis of Chiral Seven-membered Cyclic Sulfonamides through Palladium-catalyzed Arylation of Cyclic Imines. *Org. Chem. Front*., **2019**, *6*, 1572.
2. (*a*) Kamila, S.; Mukherjee, C.; De, A. *Tetrahedron Lett*. **2001**, *42*, 5955. (*b*) Tanoue, Y.; Sakata, K.; Hashimoto, M.; Morishita, S.; Hamada, M.; Kai, N.; Nagai, T. *Tetrahedron* **2002**, *58*, 99. (*c*) Jiang, Y.-Y.; Li, Q.; Lu, W.; Cai, J.-C. *Tetrahedron Lett*. **2003**, *44*, 2073. (*d*) Higashino, T.; Kumeta, S.; Tamura, S.; Ando, Y.; Ohmori, K.; Suzuki, K.; Mori, T. *J. Mater. Chem. C*, **2015**, *3*, 1588. (*e*) Zhang, M. Y.; Barrow, R. A. *Org. Lett*. **2017**, *19*, 2302.

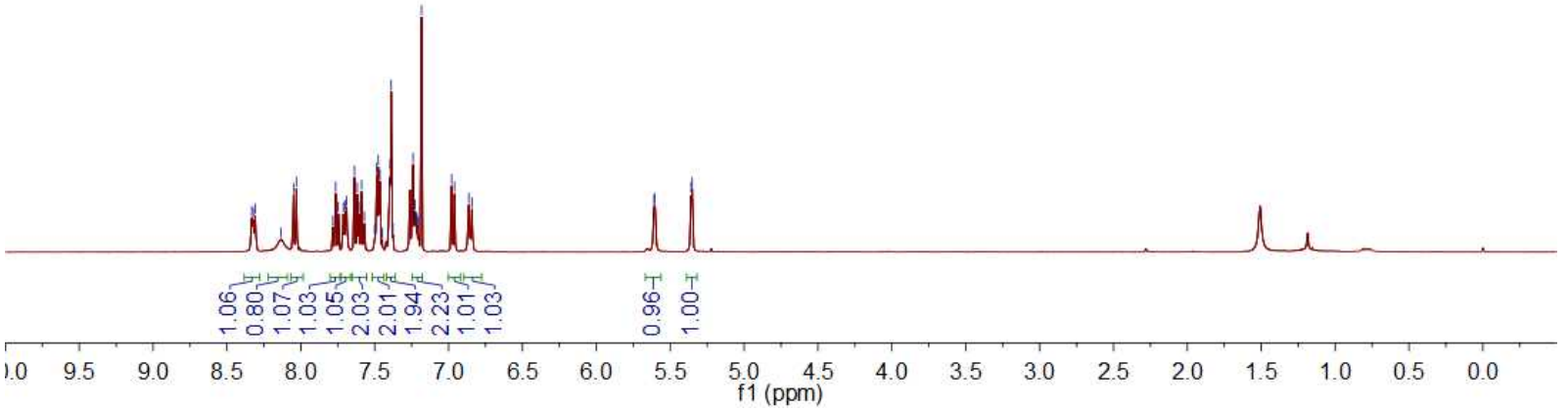
5. Copy of NMR and HPLC

1H NMR ZZ-3-39 in CDCl3

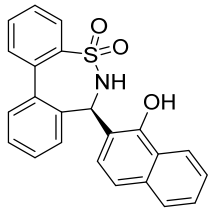




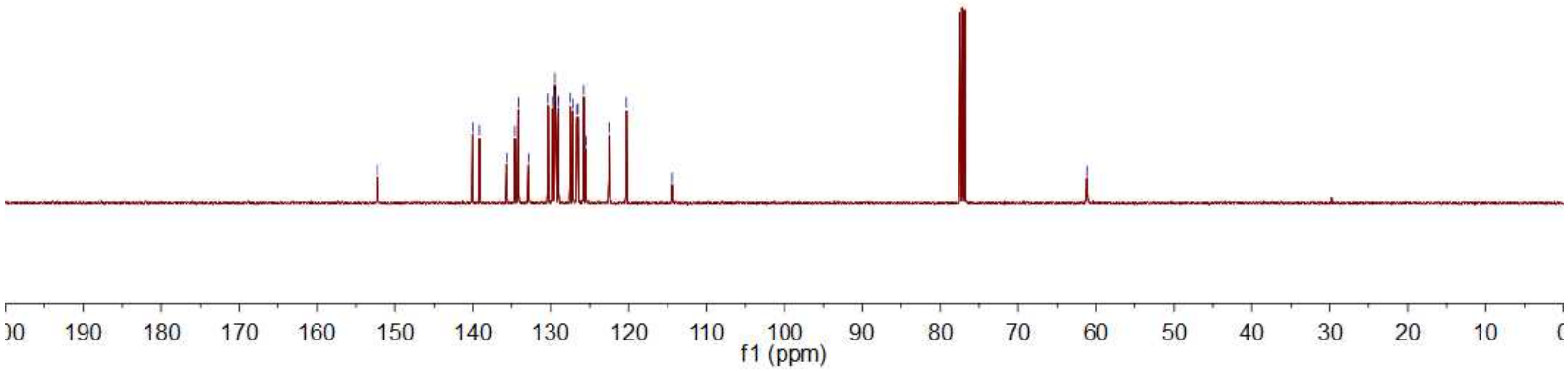
3aa ^{1}H NMR (400 MHz, $CDCl_3$)



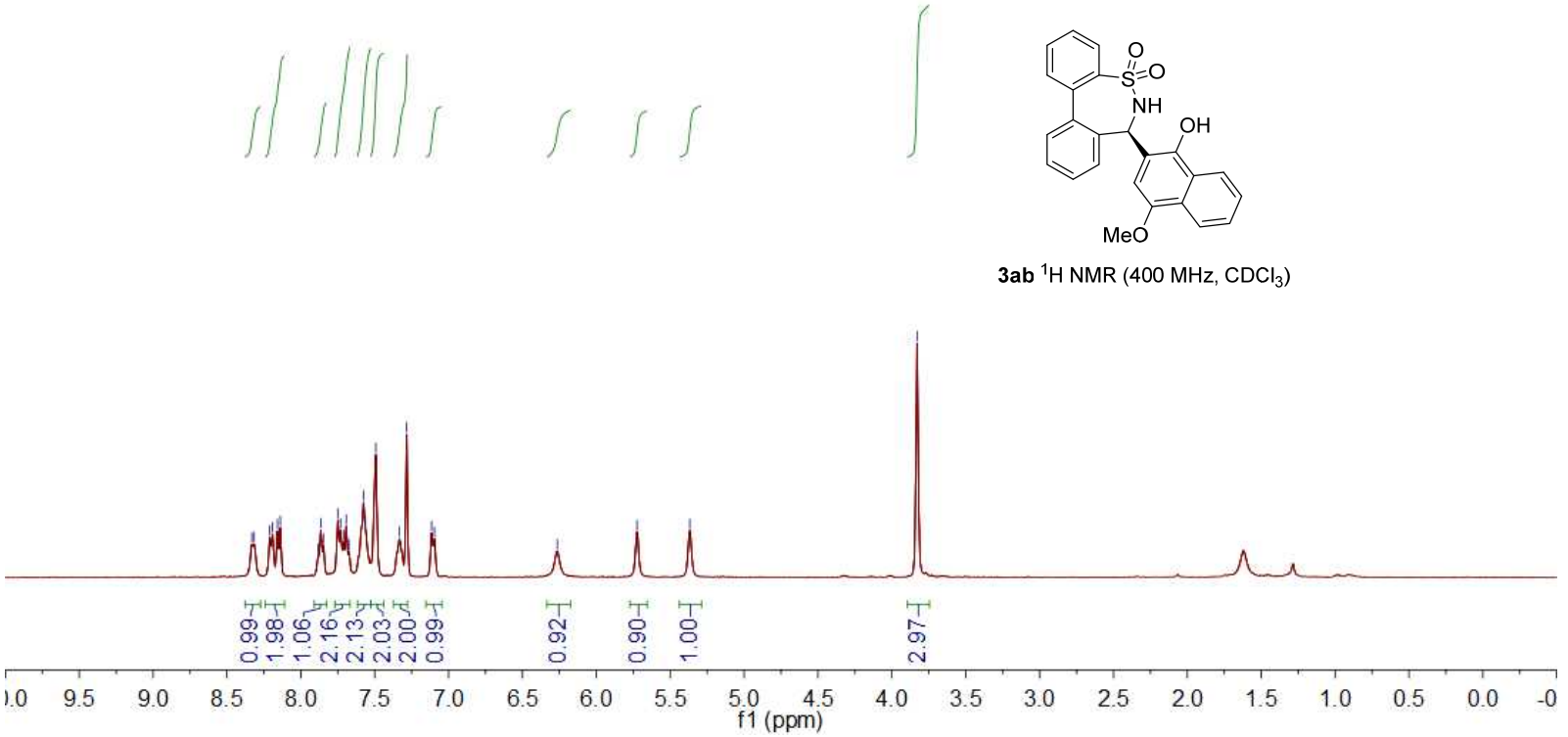
13C NMR ZZ-3-39 IN CDCl3



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

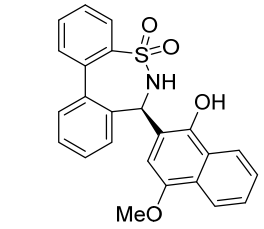


1H NMR ZZ-3-54 in CDCl3

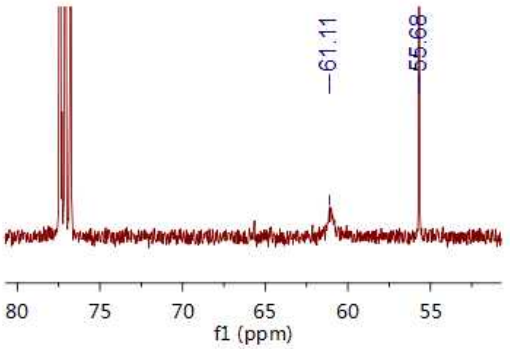


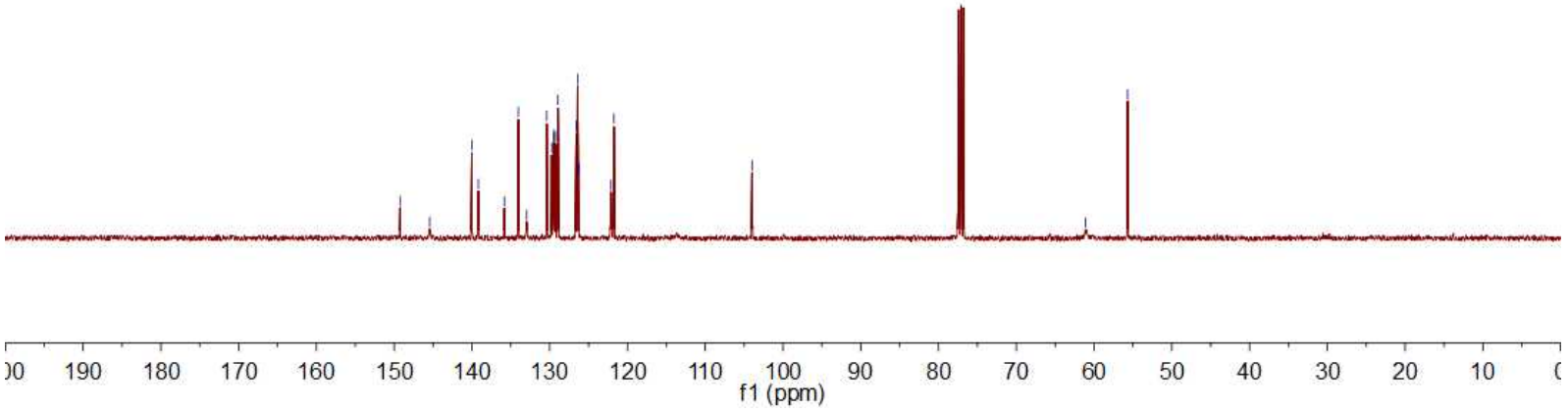
3ab ^{1}H NMR (400 MHz, $CDCl_3$)

13C NMR ZZ-3-54 in CDCl3

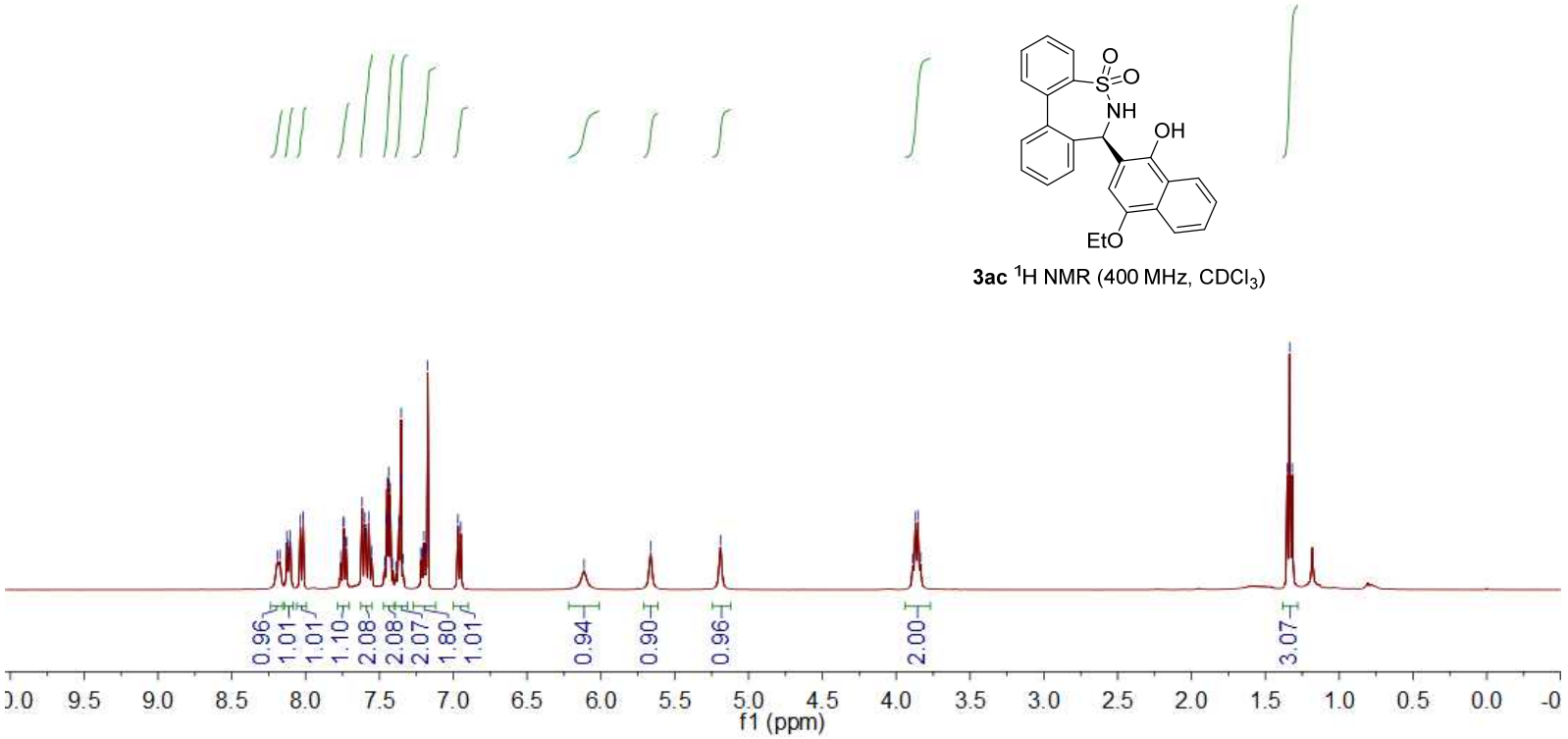


3ab ^{13}C NMR (100 MHz, $CDCl_3$)



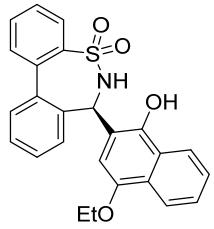


1H NMR ZZ-3-73 IN CDCL3

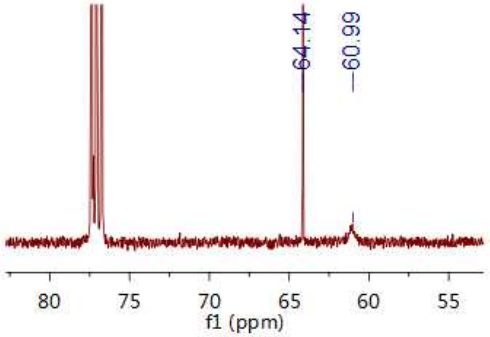


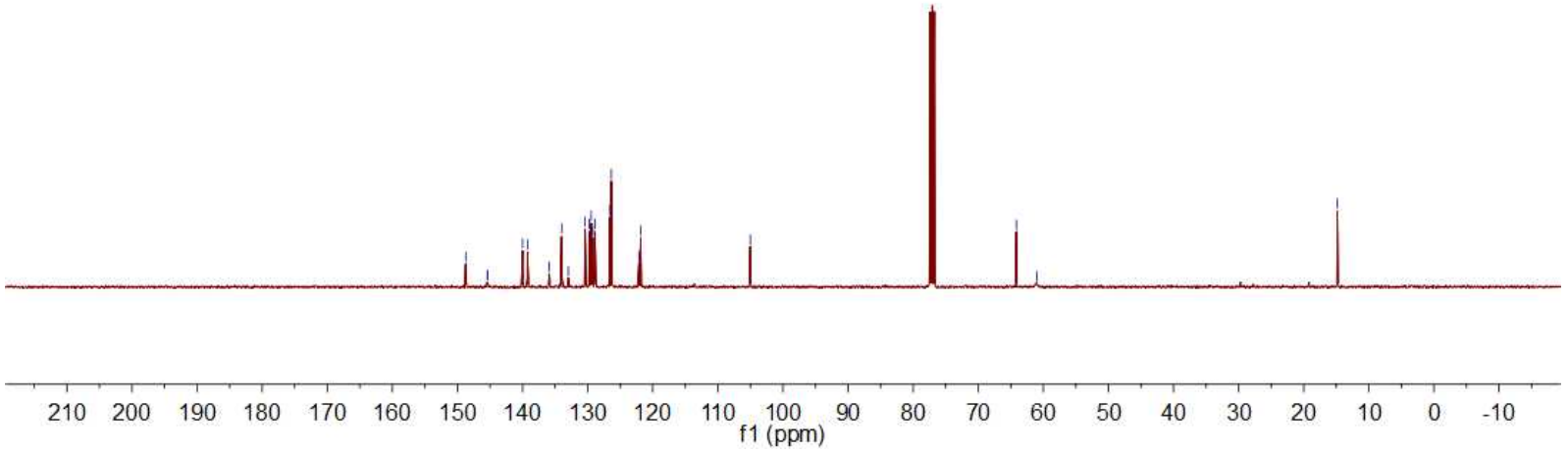
3ac ^{1}H NMR (400 MHz, $CDCl_3$)

13C NMR ZZ-3-73 in CDCl3

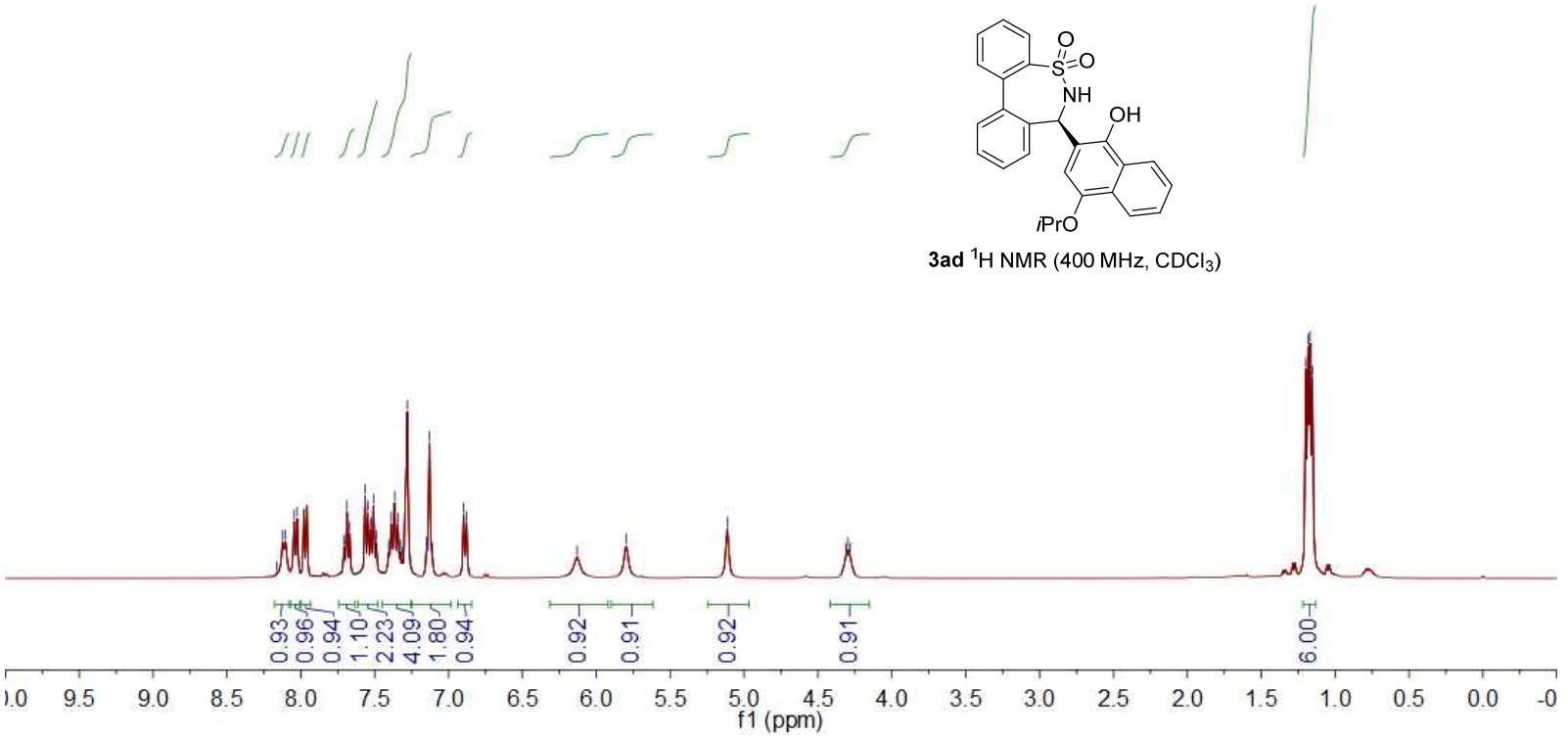


3ac ^{13}C NMR (100 MHz, $CDCl_3$)



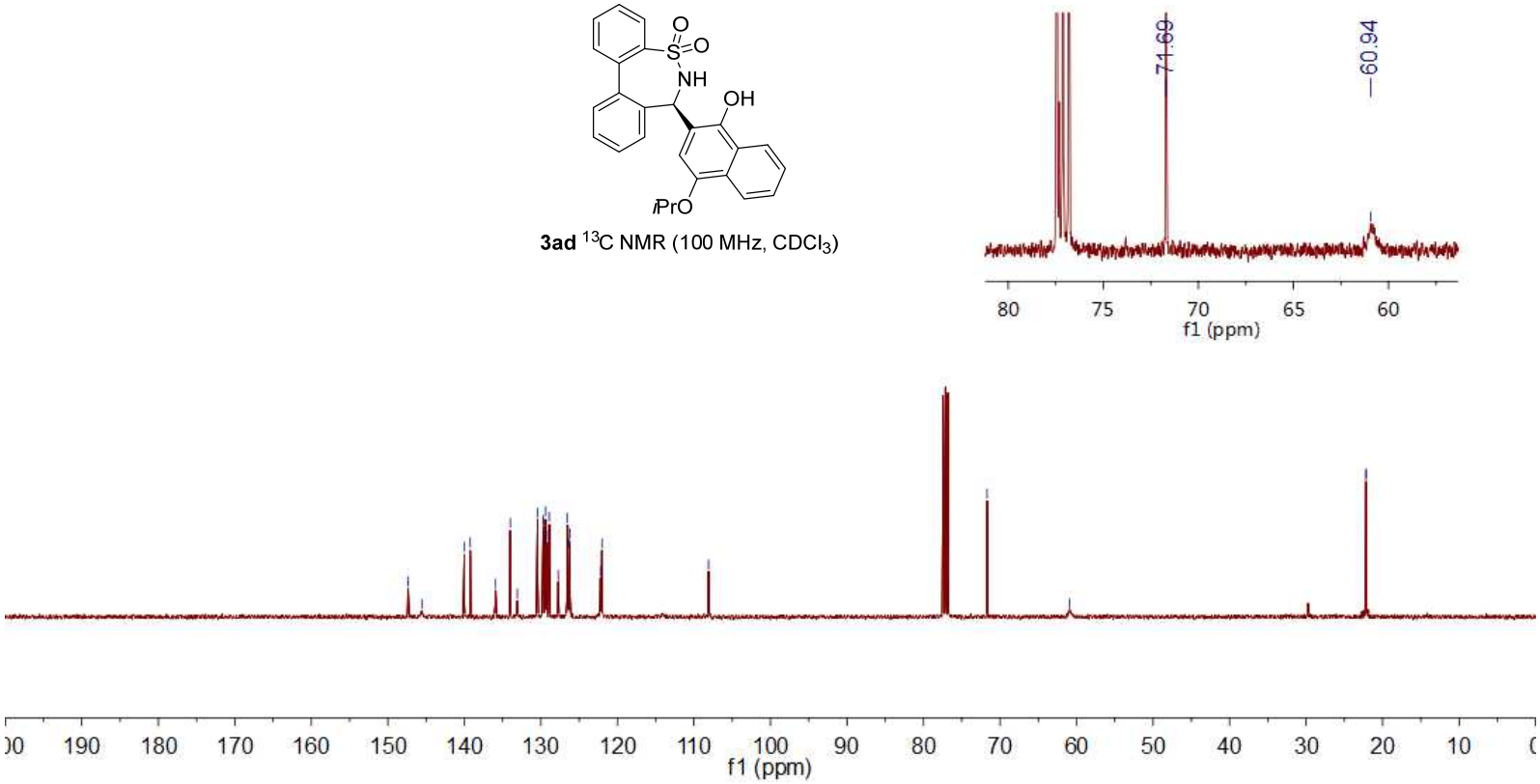


1H NMR ZZ-3-75 in CDCl3

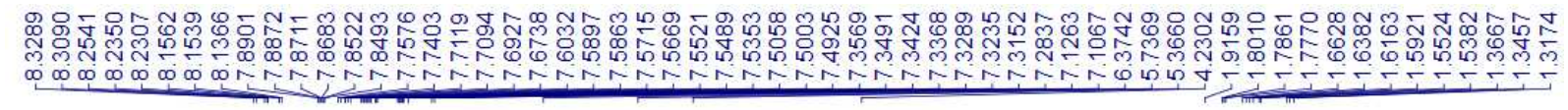


3ad ^{1}H NMR (400 MHz, $CDCl_3$)

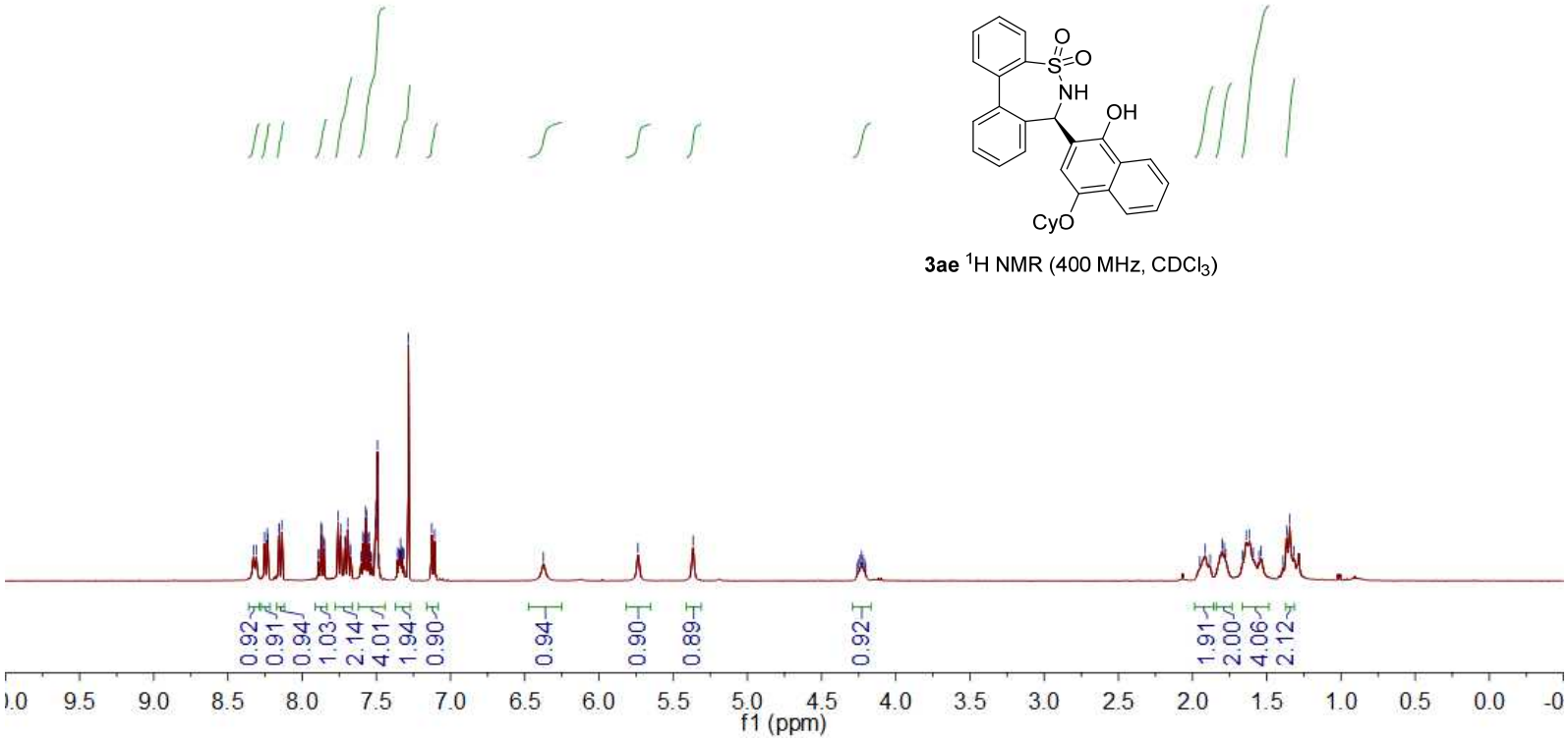
13C NMR ZZ-3-75 in CDCl3



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

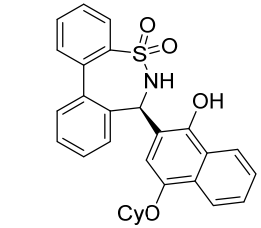


1H NMR ZZ-3-82 in CDCl3

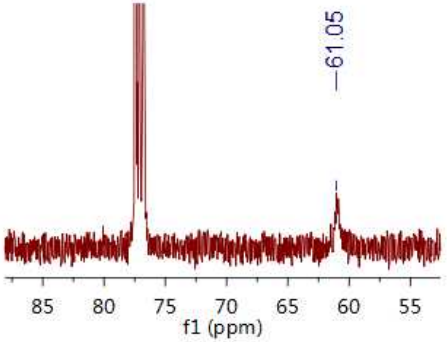


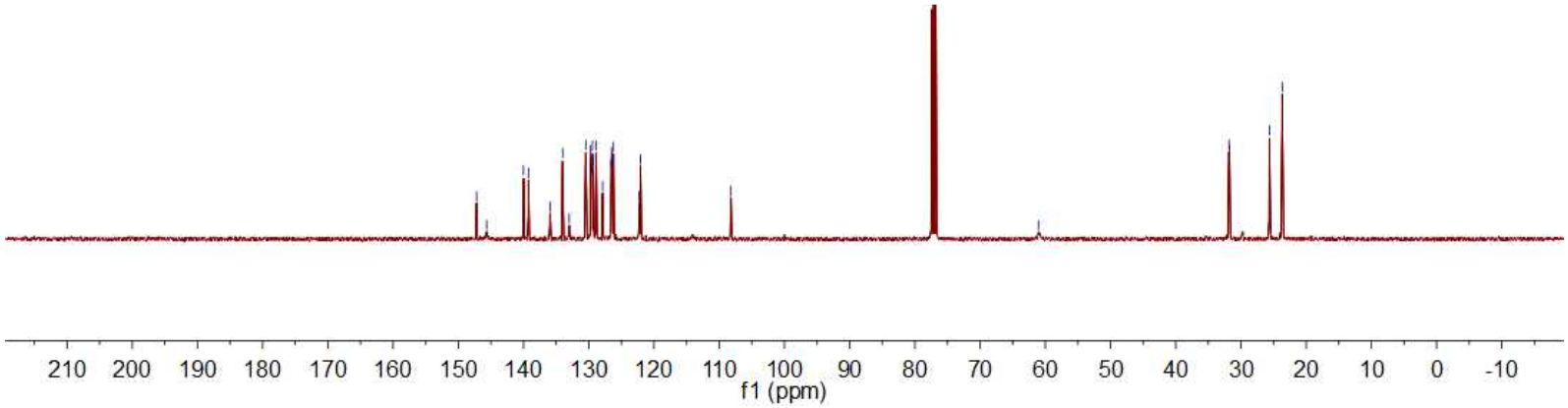
3ae ^{1}H NMR (400 MHz, $CDCl_3$)

13C NMR ZZ-3-82 in CDCl3

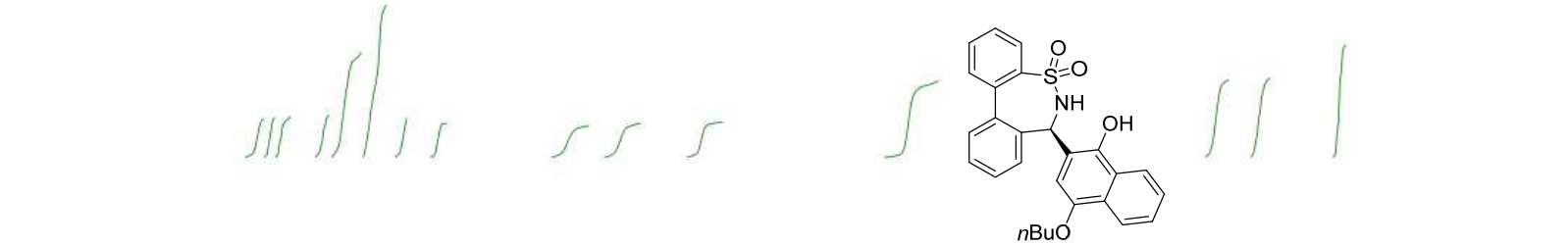


3ae ^{13}C NMR (100 MHz, $CDCl_3$)

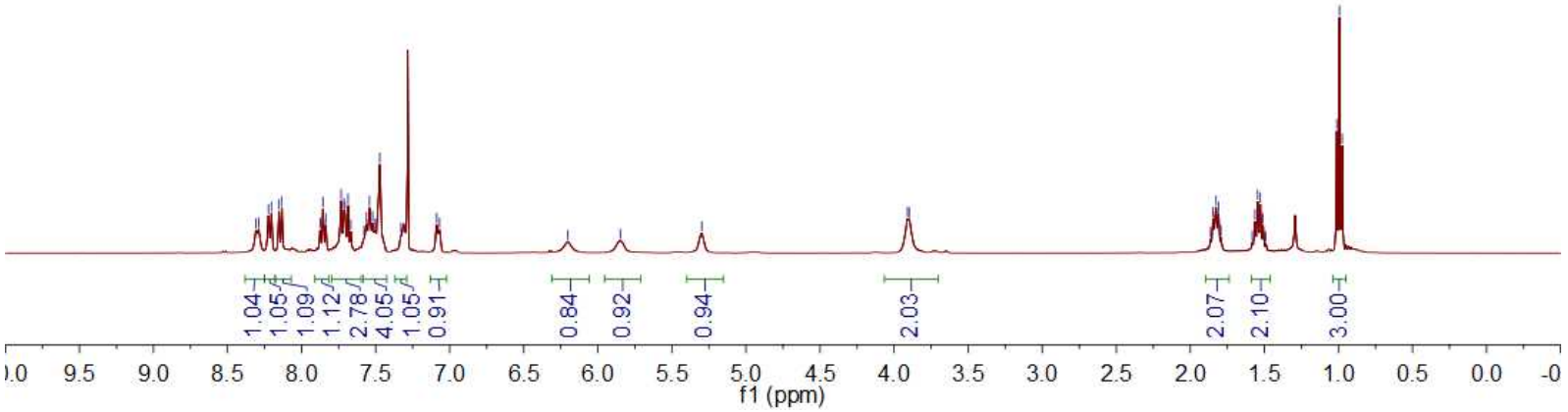




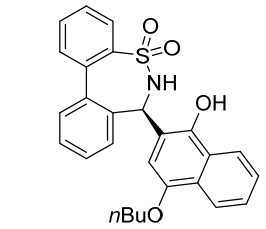
1H NMR ZZ-3-83 in CDCl3



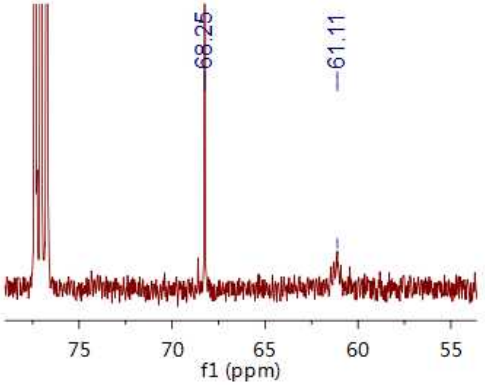
3af ^{1}H NMR (400 MHz, $CDCl_3$)

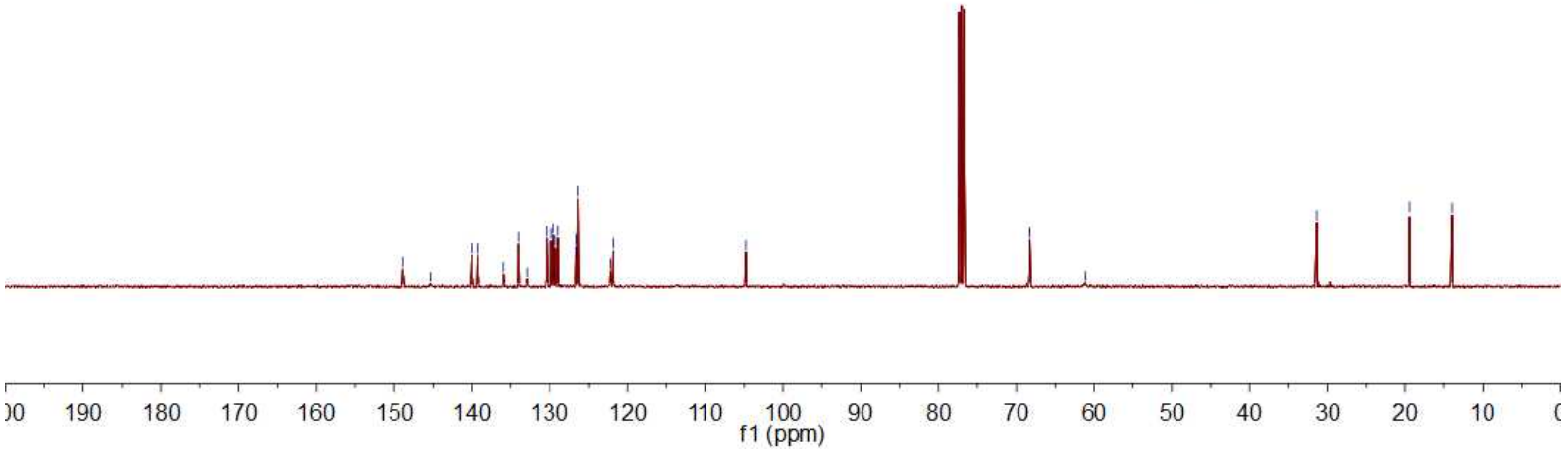


13C NMR ZZ-3-83 in CDCl3

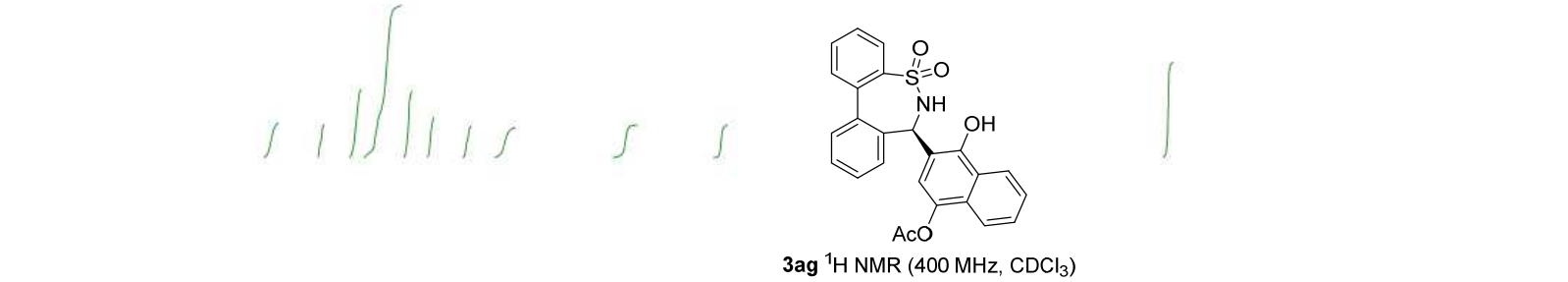


3af ^{13}C NMR (100 MHz, $CDCl_3$)

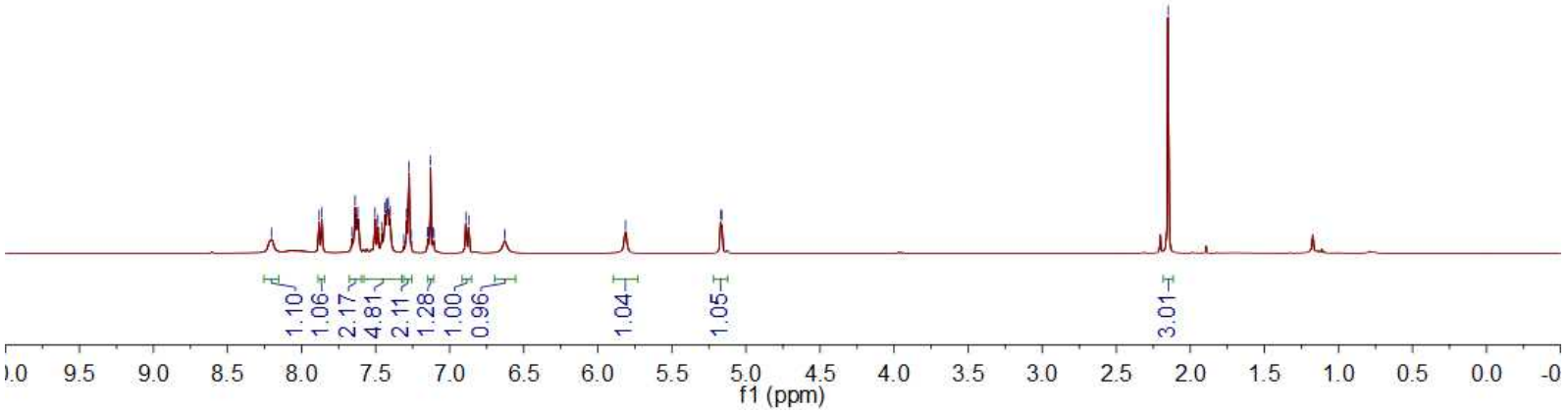


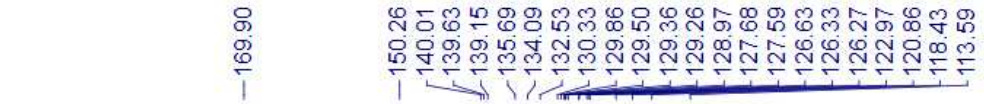


1H NMR ZZ-3-89 in CDCl3

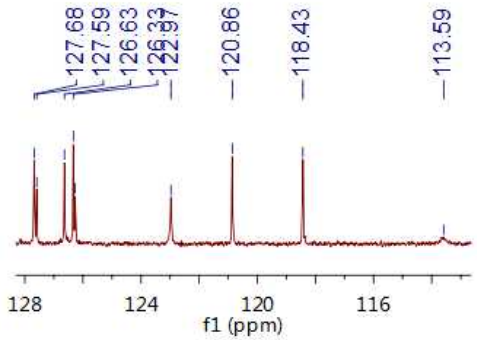


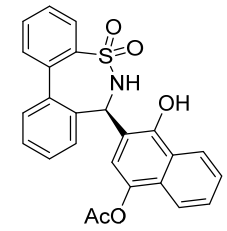
3ag ^{1}H NMR (400 MHz, $CDCl_3$)



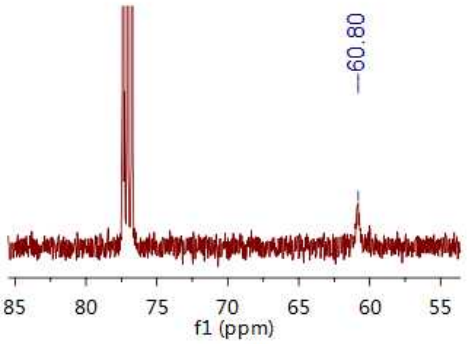


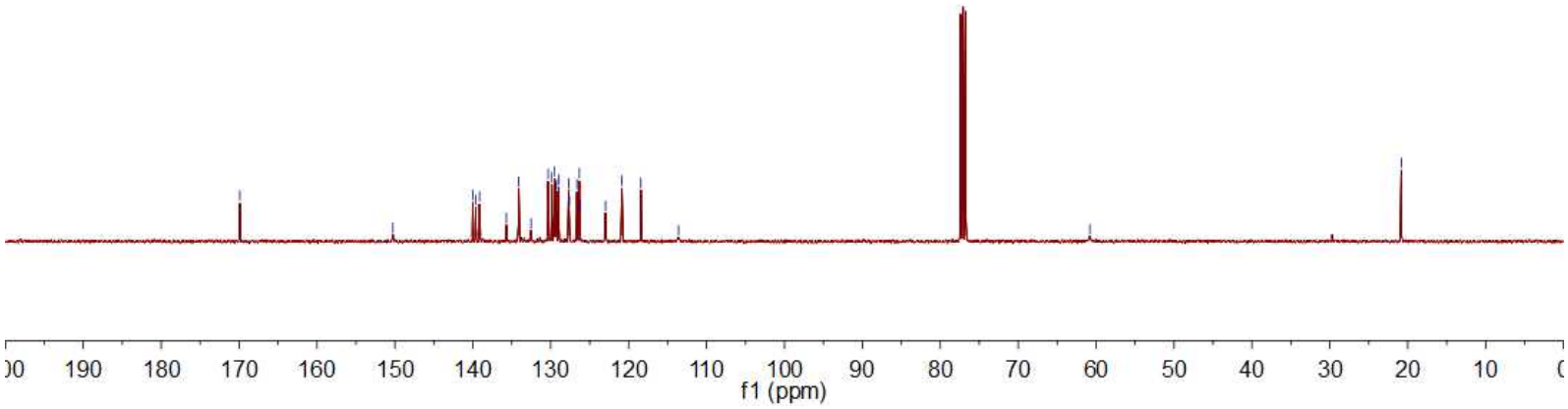
13C NMR ZZ-3-89 in CDCl3



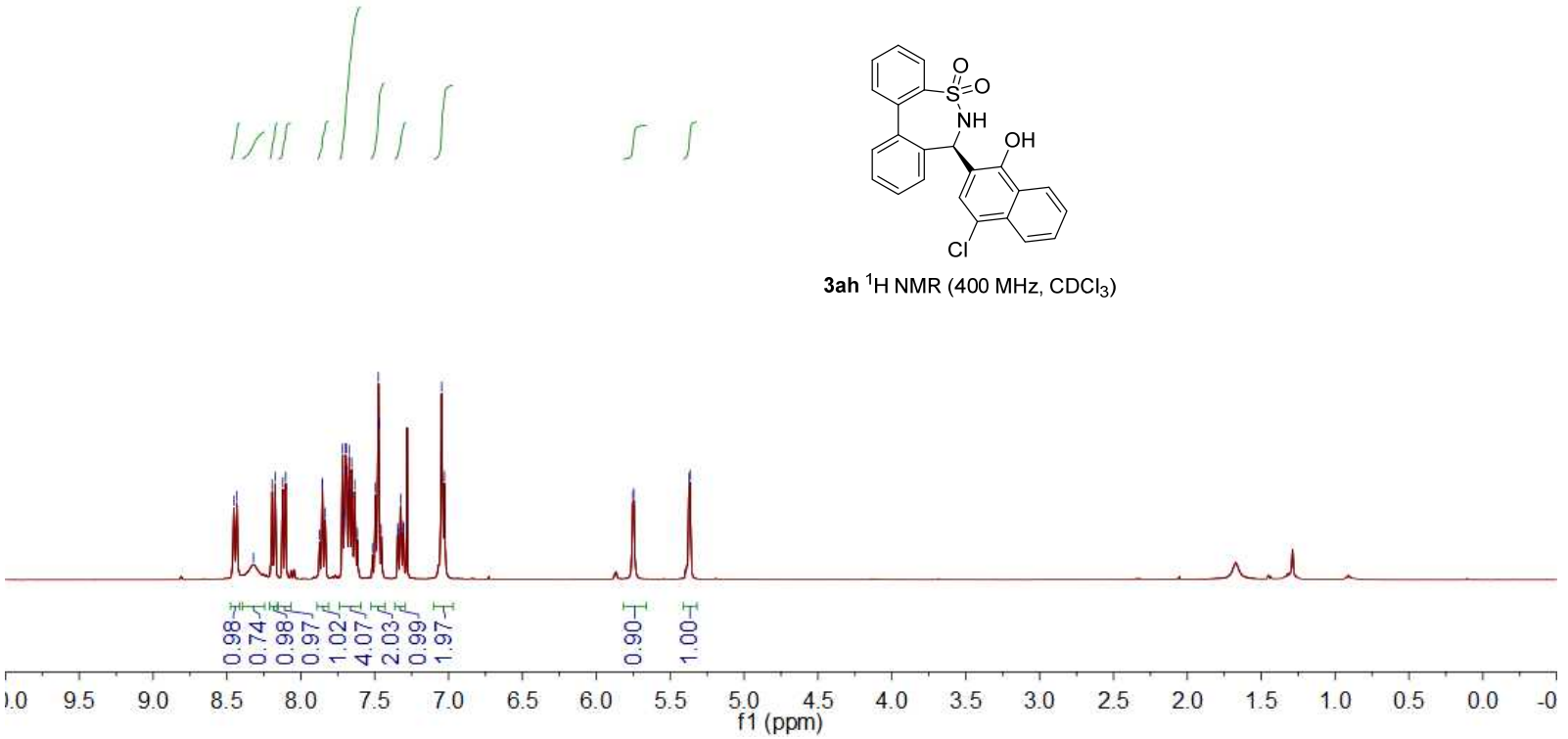


3ag ^{13}C NMR (100 MHz, $CDCl_3$)

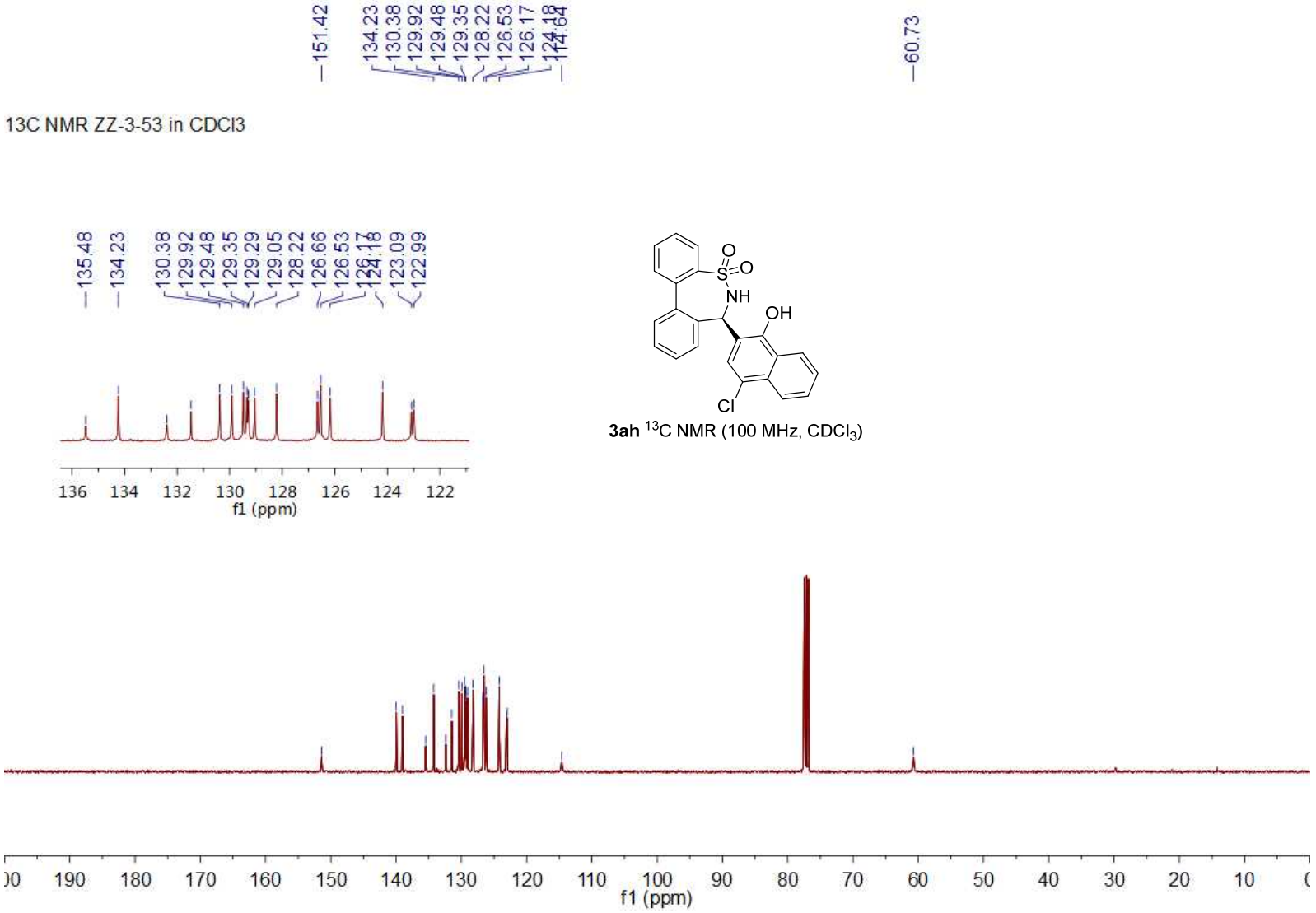




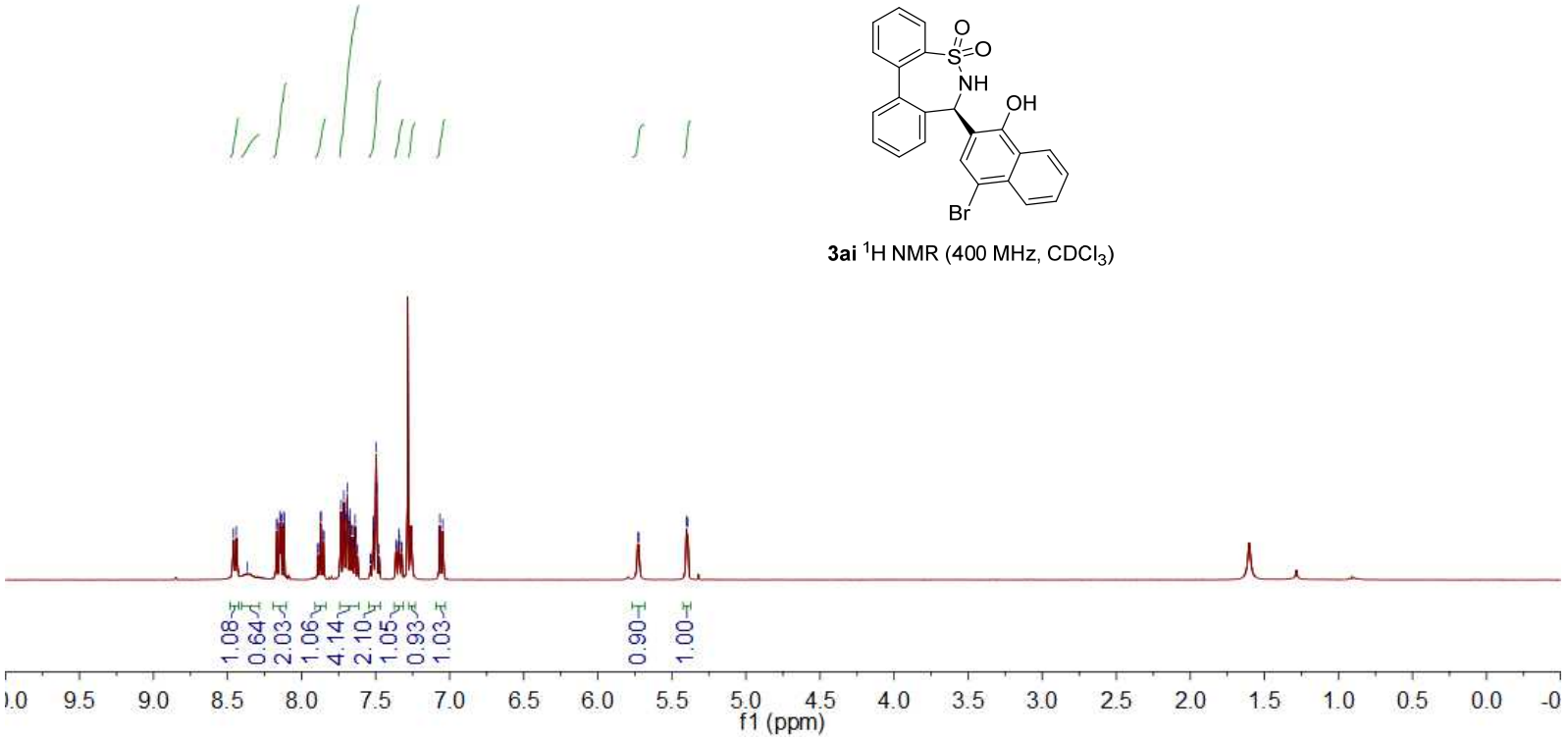
1H NMR ZZ-3-53 in CDCl3



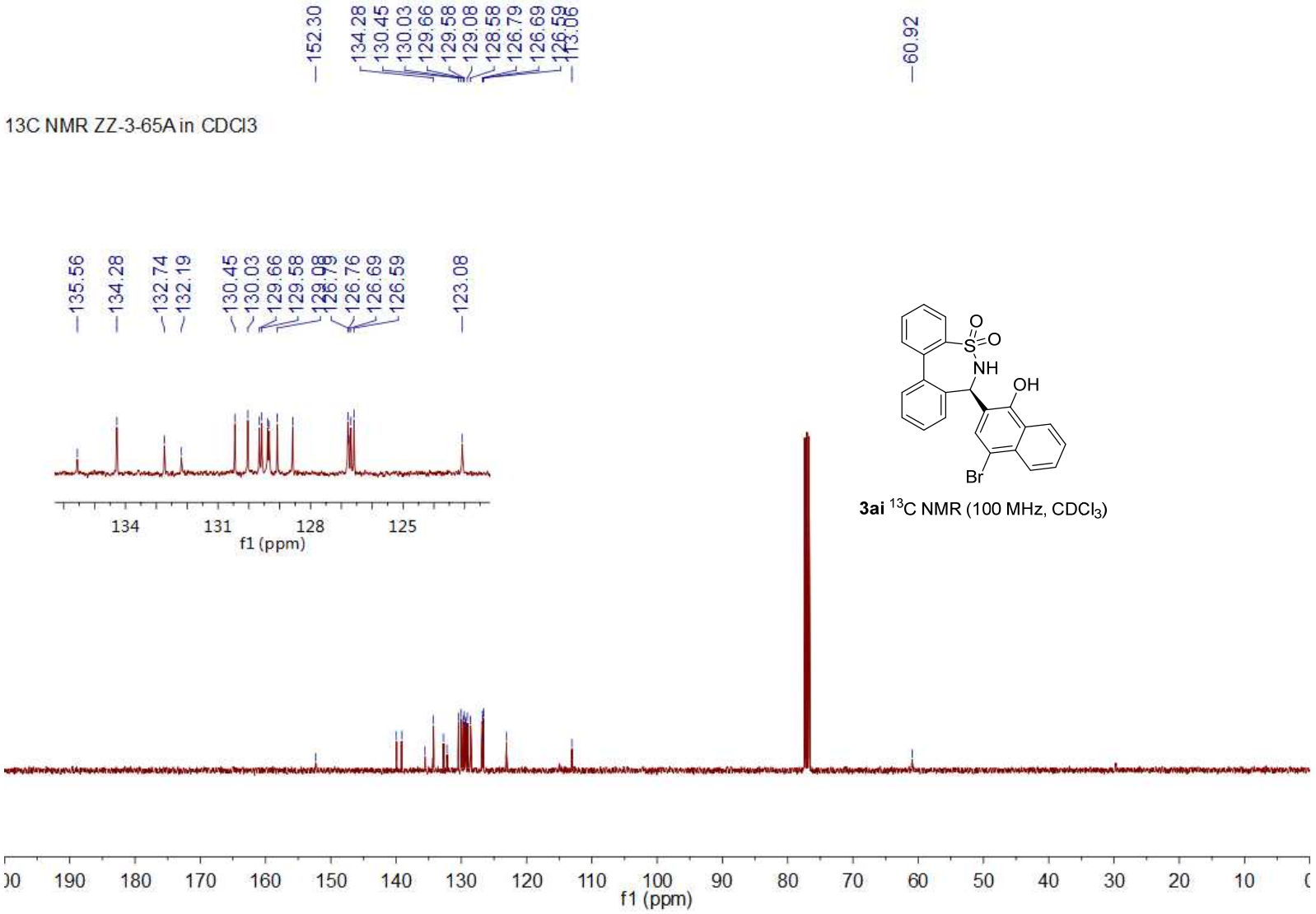
3ah ^{1}H NMR (400 MHz, $CDCl_3$)


151.42
134.23
130.38
129.92
129.48
129.35
128.22
126.53
126.17
60.73
13C NMR ZZ-3-53 in CDCl3
135.48
134.23
130.38
129.92
129.48
129.35
129.29
129.05
128.22
126.66
126.53
123.09
122.99
136
134
132
130
128
126
124
122
f1 (ppm)
O
S
O
NH
OH
Cl
3ah 13C NMR (100 MHz, CDCl3)
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

1H NMR ZZ-3-65A in CDCl3

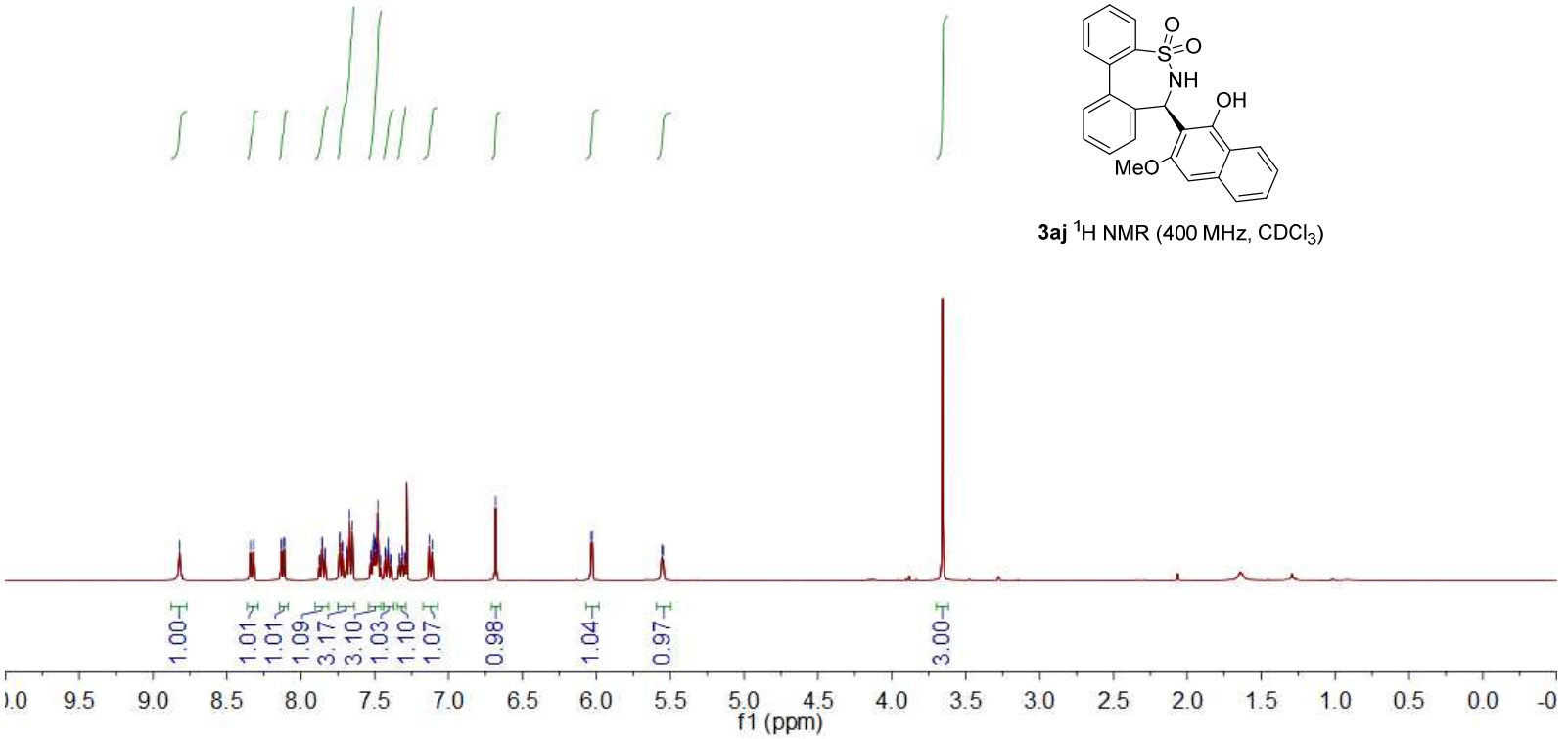


3ai ^{1}H NMR (400 MHz, $CDCl_3$)

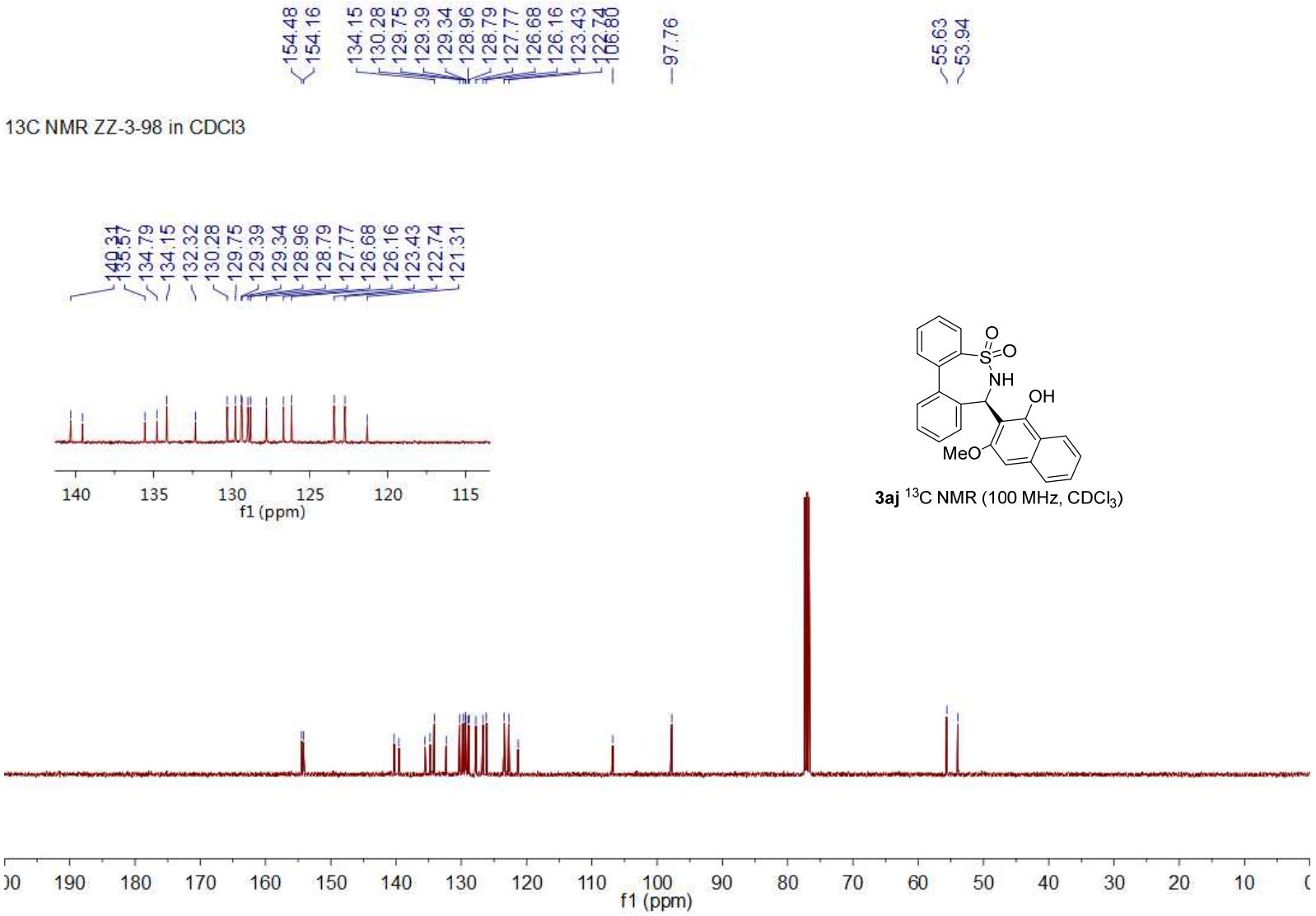


3ai ^{13}C NMR (100 MHz, $CDCl_3$)

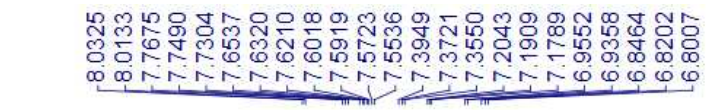
1H NMR ZZ-3-98 in CDCl3



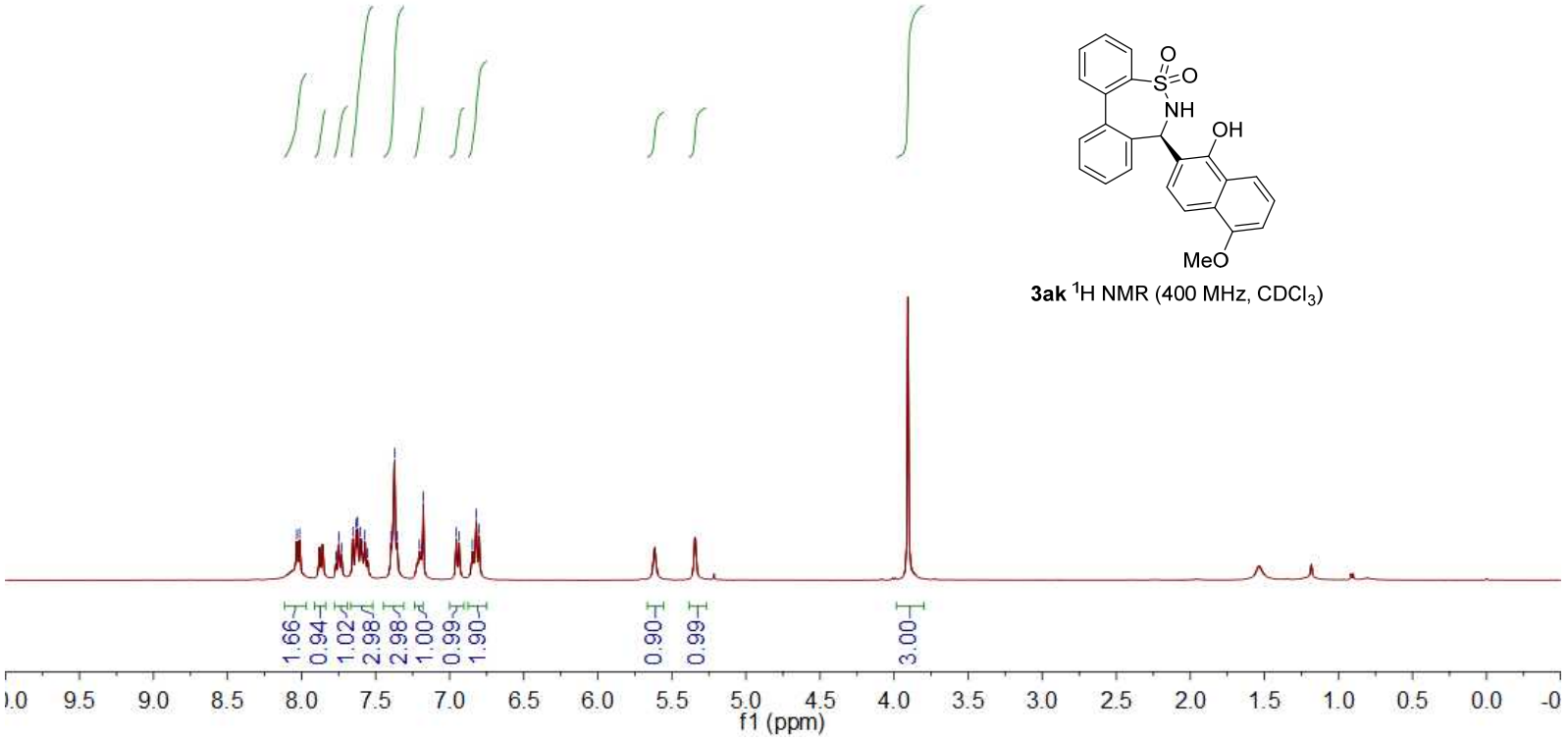
3aj ^{1}H NMR (400 MHz, $CDCl_3$)



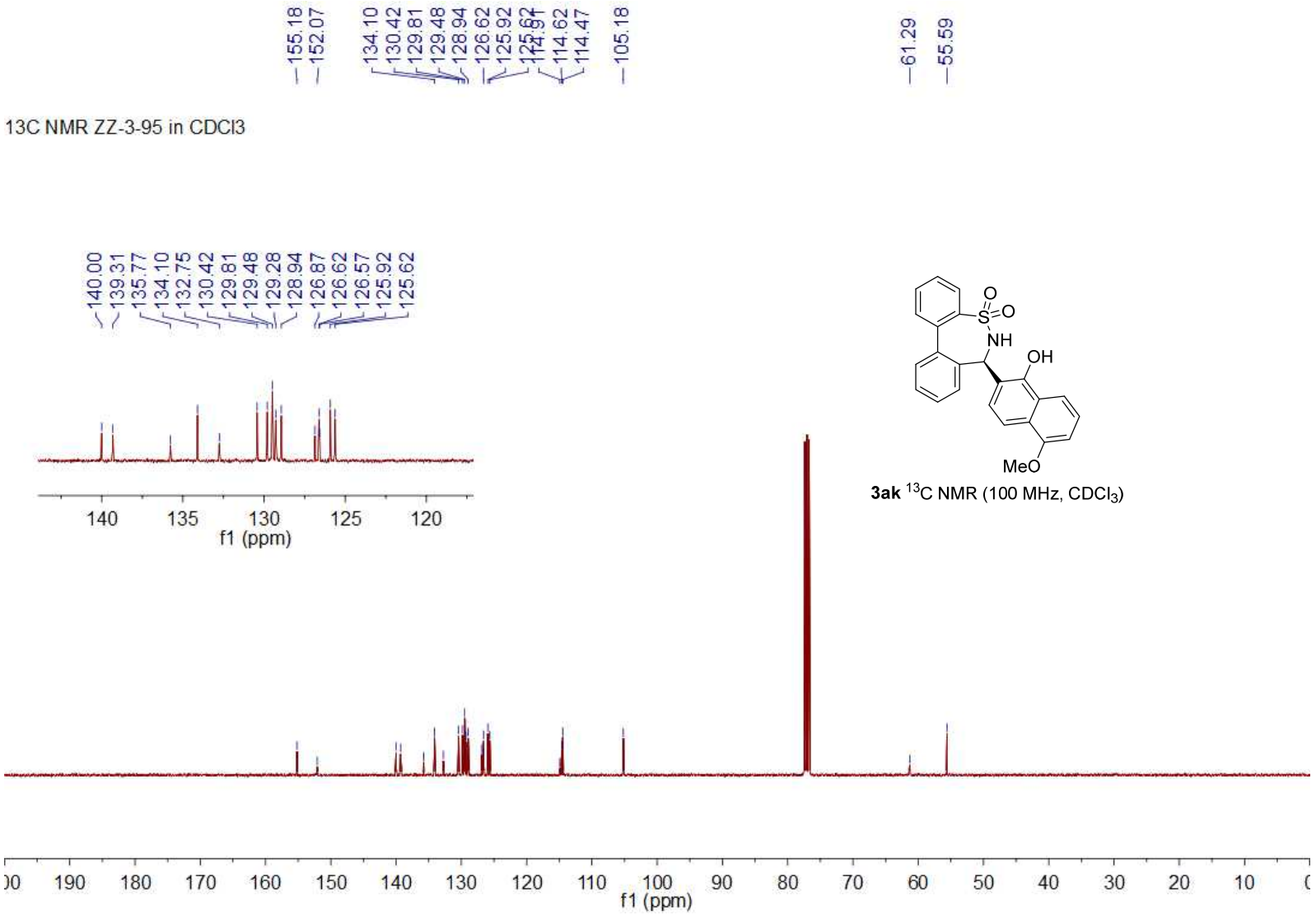
3aj ^{13}C NMR (100 MHz, $CDCl_3$)



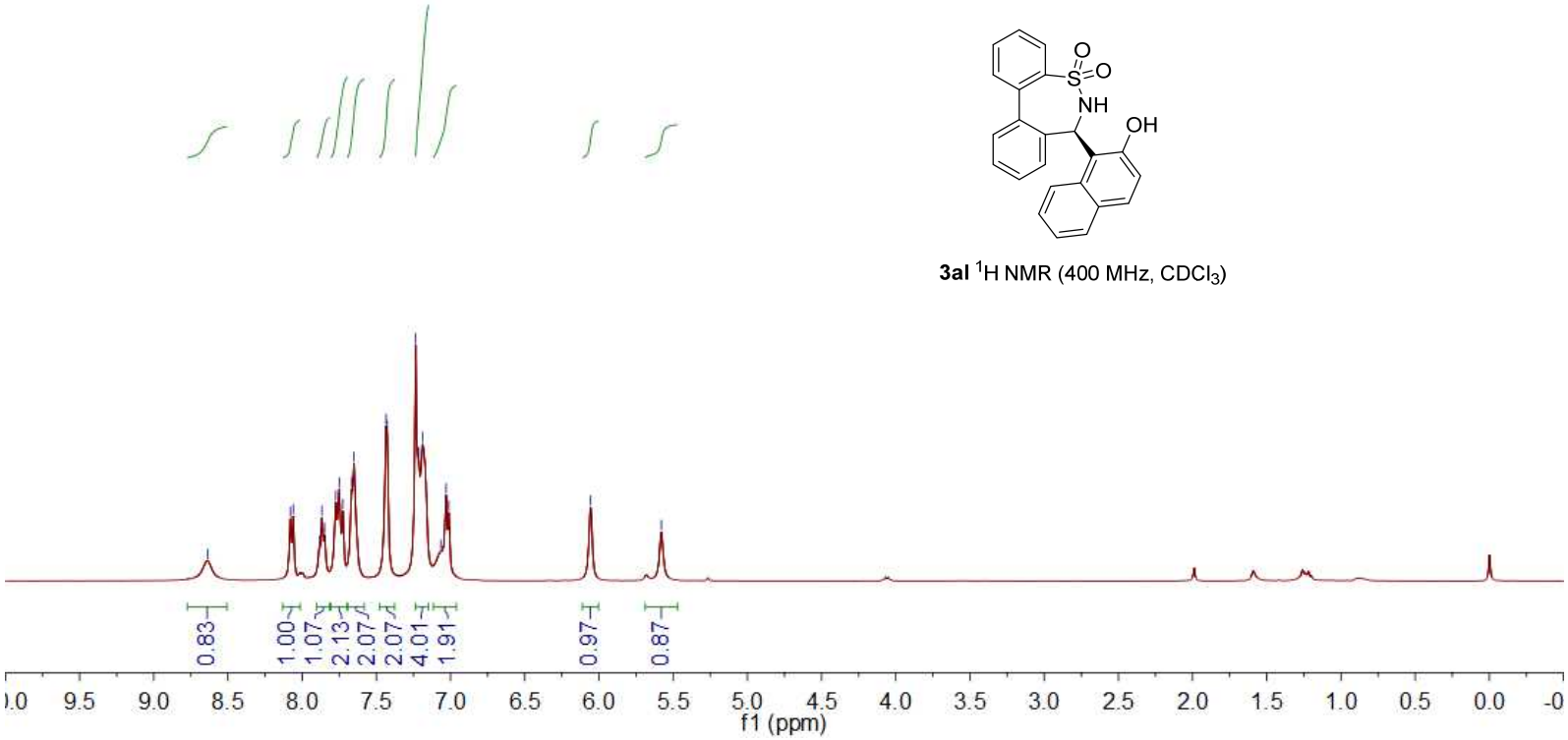
1H NMR ZZ-3-95 in CDCl3



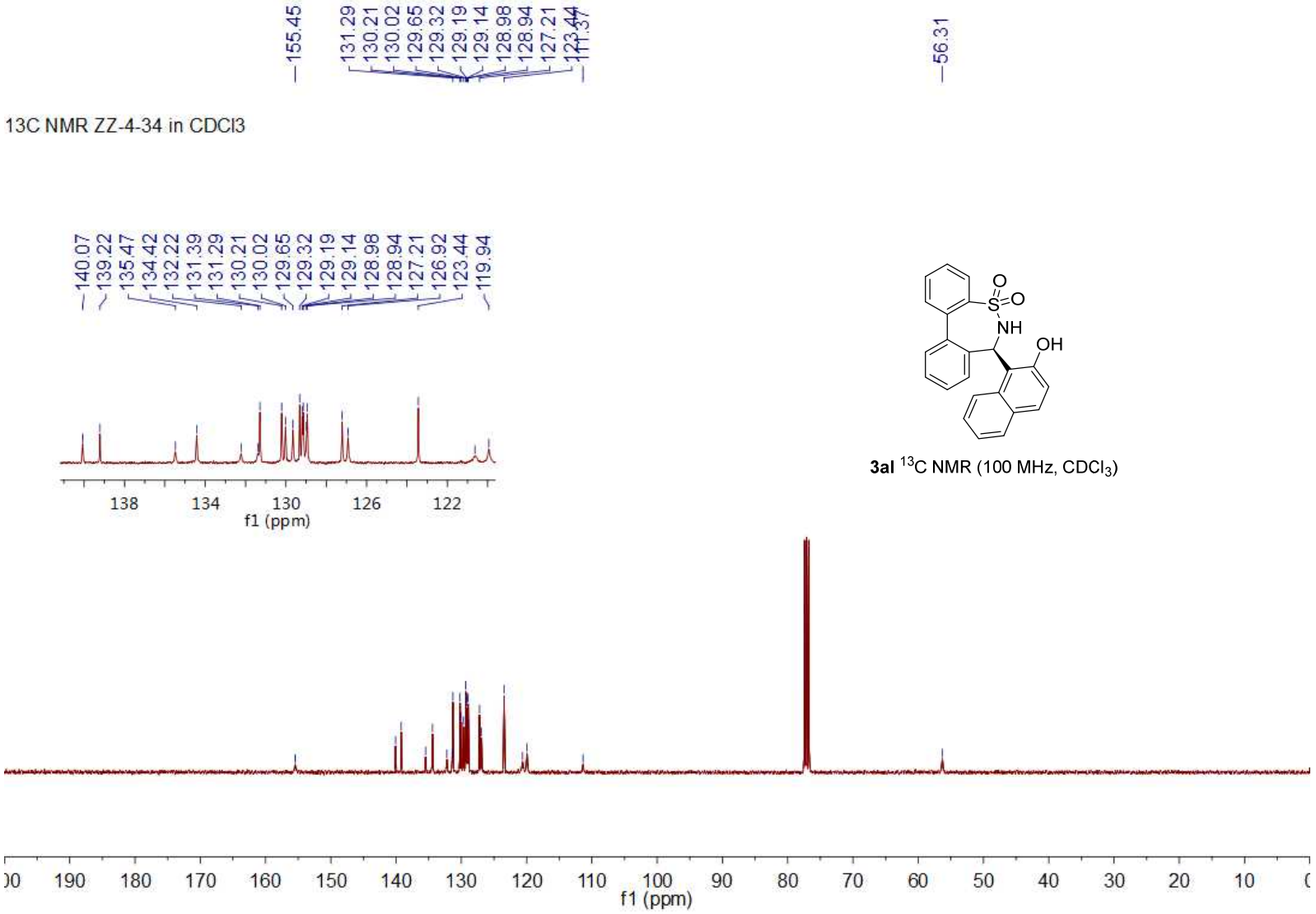
3ak ^{1}H NMR (400 MHz, $CDCl_3$)


155.18
152.07
134.10
130.42
129.81
129.48
128.94
126.62
125.92
114.62
114.47
105.18
61.29
55.59
13C NMR ZZ-3-95 in CDCl3
140.00
139.31
135.77
134.10
132.75
130.42
129.81
129.48
129.28
128.94
126.87
126.62
126.57
125.92
125.62
140
135
130
125
120
f1 (ppm)
O
S
O
NH
OH
MeO
3ak 13C NMR (100 MHz, CDCl3)
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

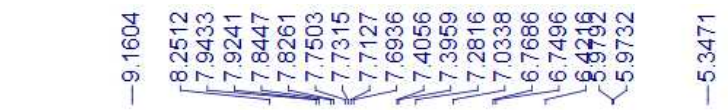
1H NMR ZZ-4-34 in CDCl3



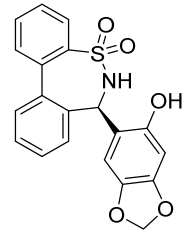
3al ^{1}H NMR (400 MHz, $CDCl_3$)



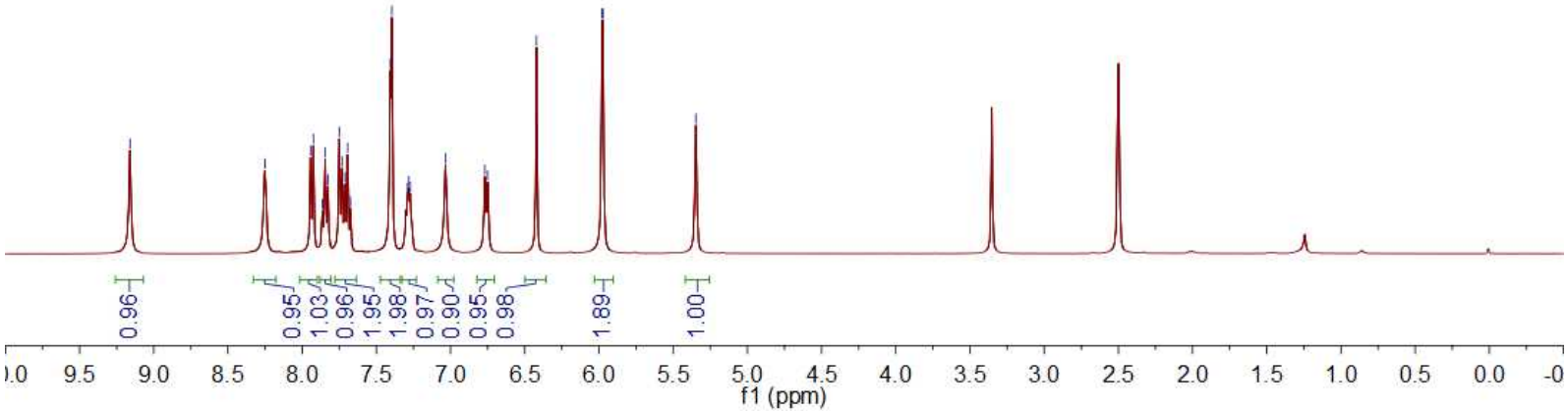
3al ^{13}C NMR (100 MHz, $CDCl_3$)

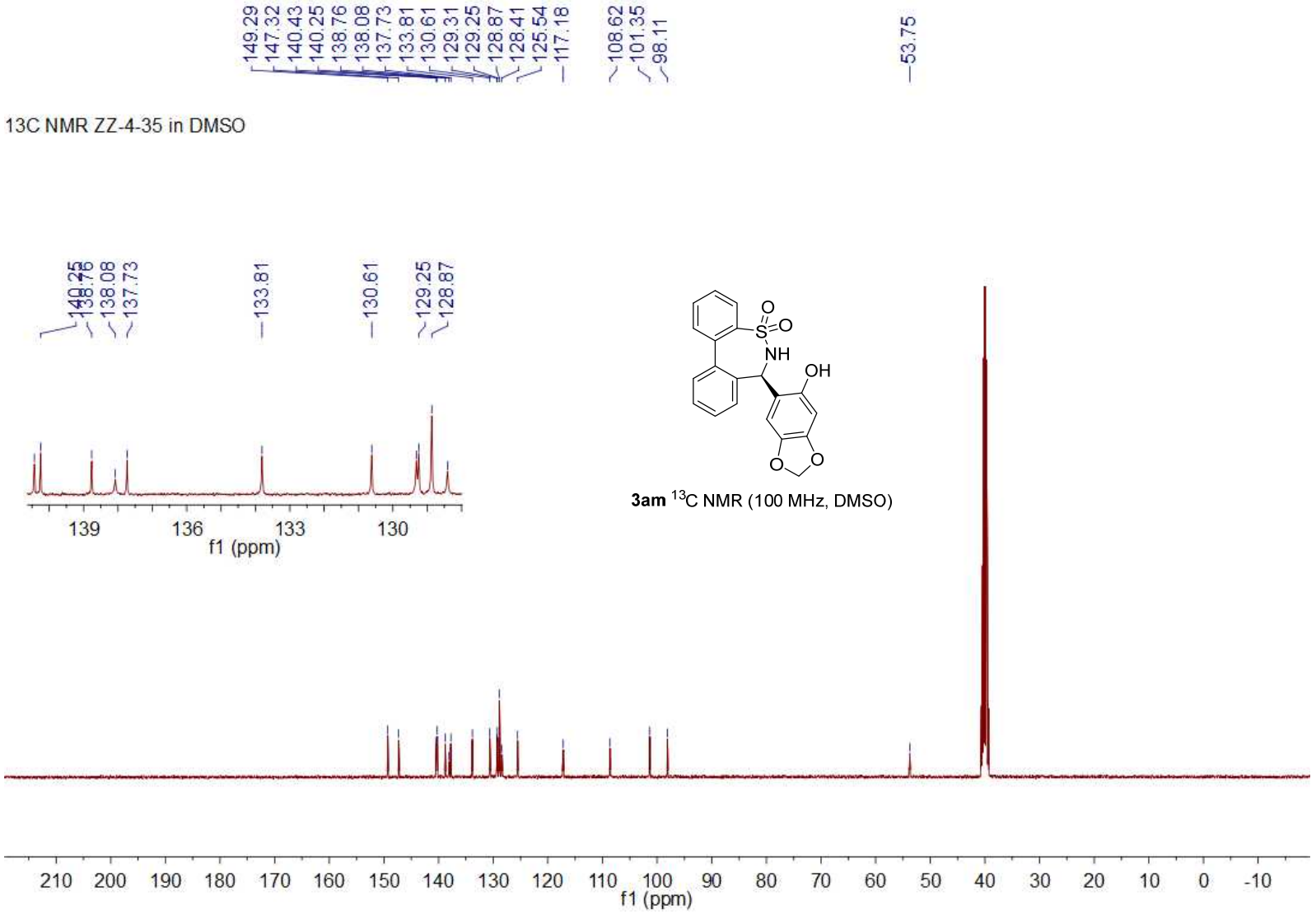


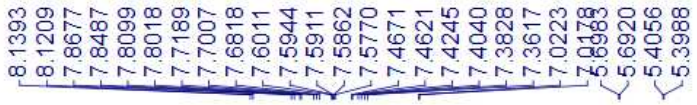
1H NMR ZZ-4-35 in DMSO



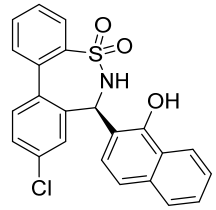
3am ^{1}H NMR (400 MHz, DMSO)



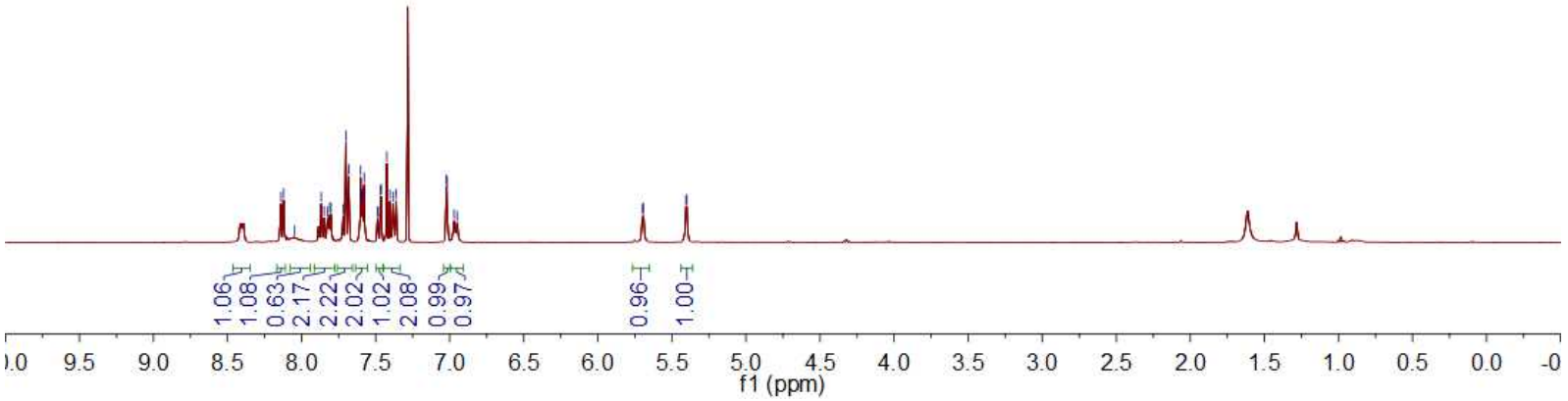

149.29
147.32
140.43
140.25
138.76
138.08
137.73
133.81
130.61
129.31
129.25
128.87
128.41
125.54
117.18
108.62
101.35
98.11
53.75
13C NMR ZZ-4-35 in DMSO
140.25
138.76
138.08
137.73
133.81
130.61
129.25
128.87
139
136
133
130
f1 (ppm)
O
S
O
NH
OH
O
O
3am 13C NMR (100 MHz, DMSO)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

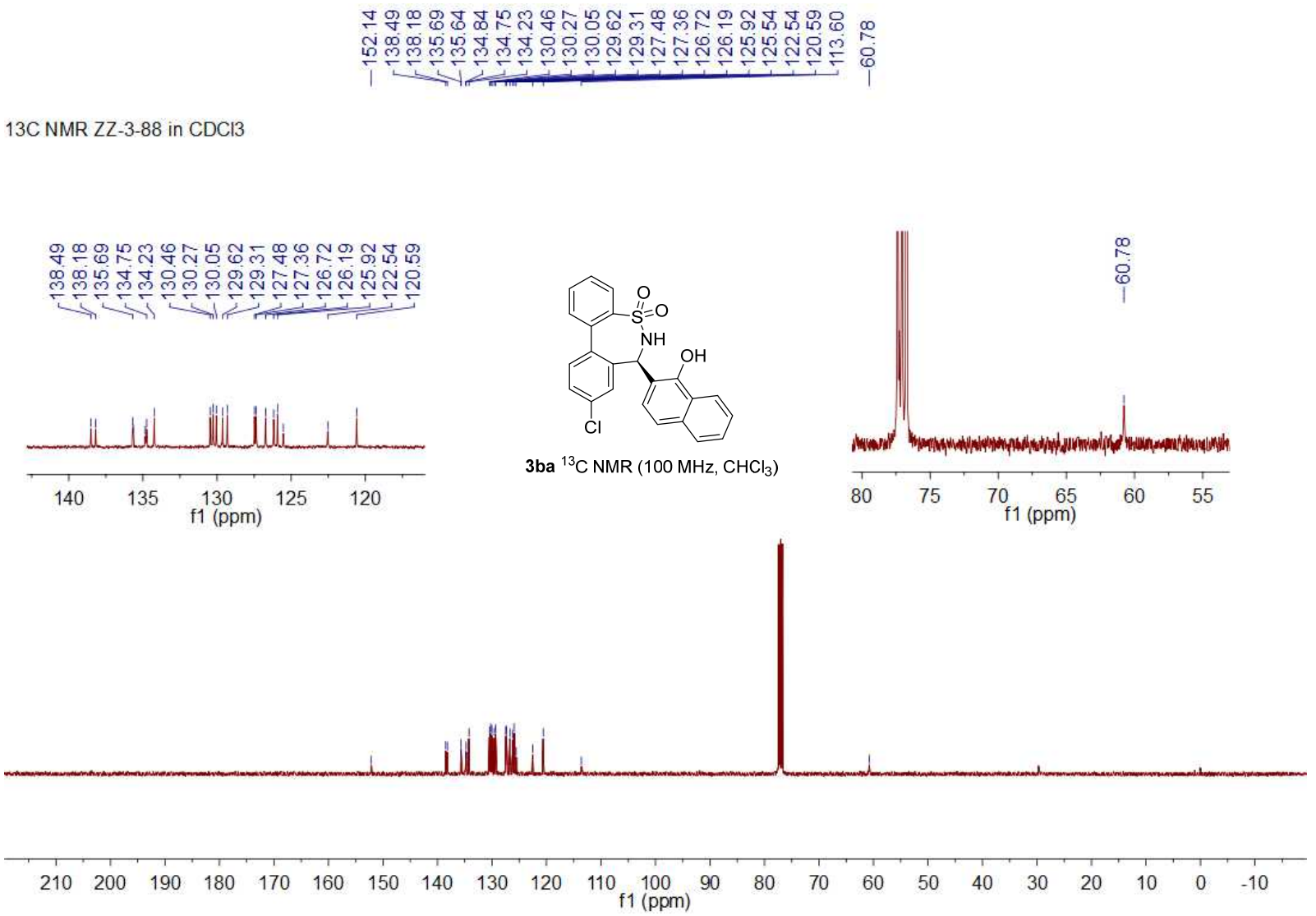


1H NMR ZZ-3-88 in CDCl3

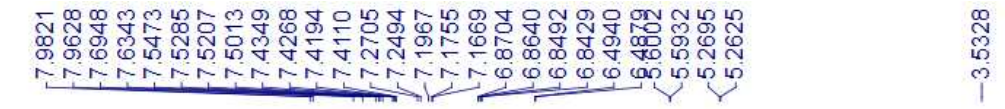


3ba ^{1}H NMR (400 MHz, $CHCl_3$)

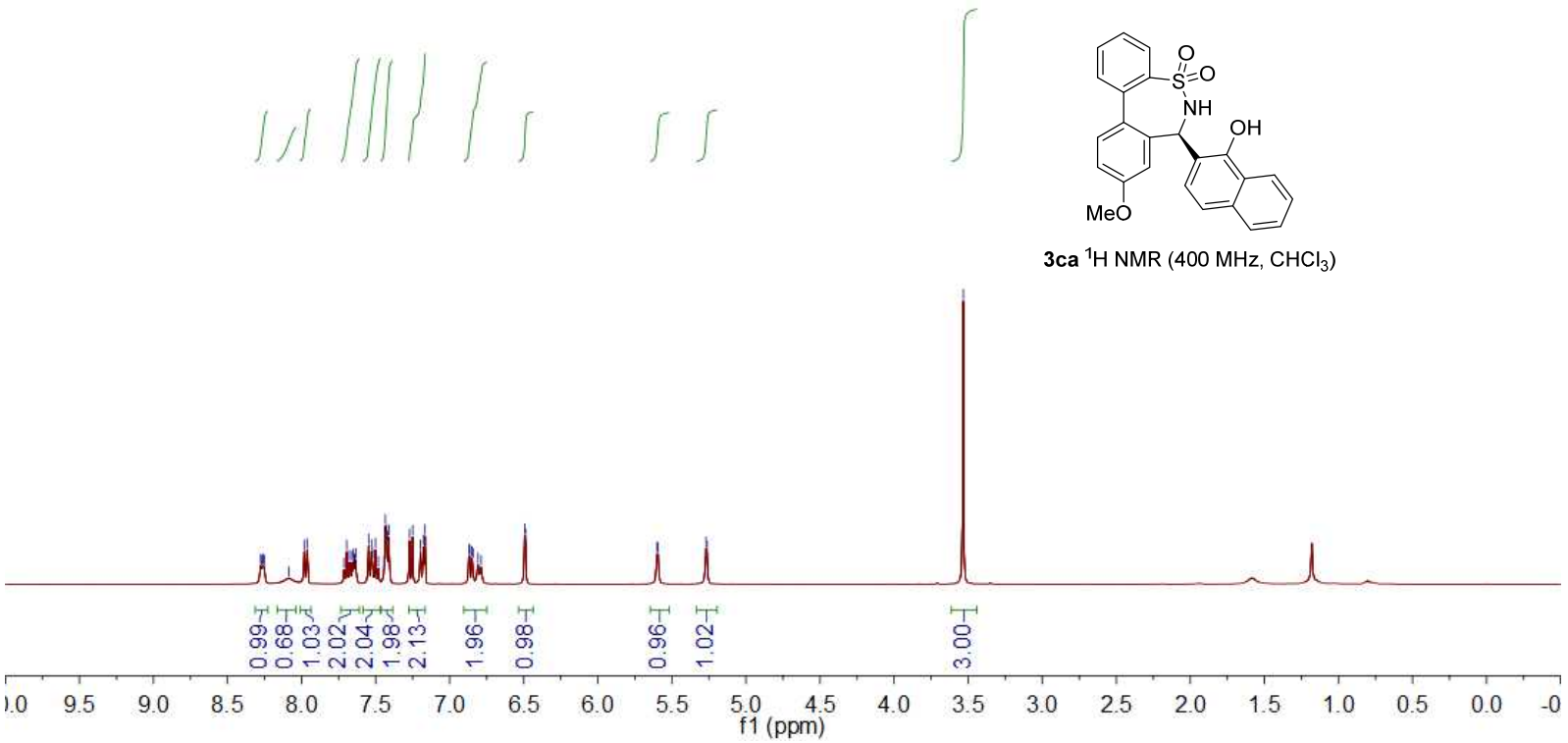




3ba ^{13}C NMR (100 MHz, $CHCl_3$)

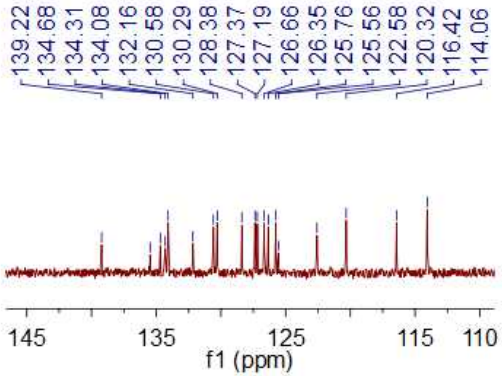


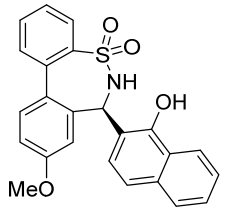
1H NMR ZZ-3-69 in CDCl3



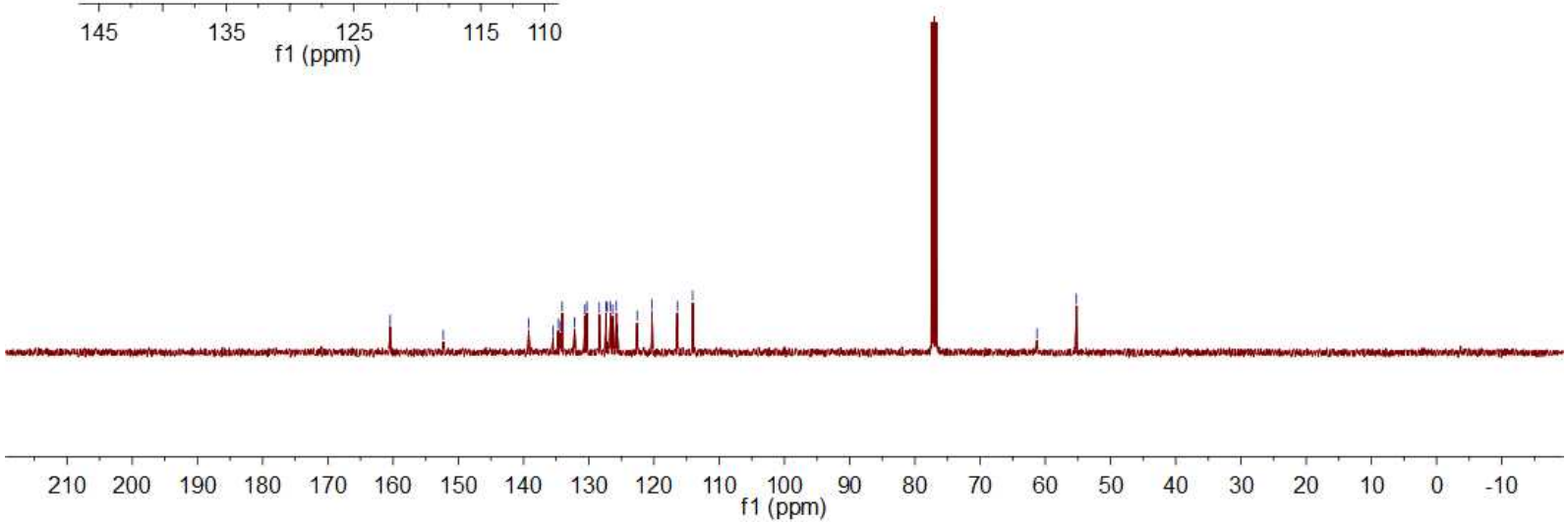
3ca ^{1}H NMR (400 MHz, $CHCl_3$)

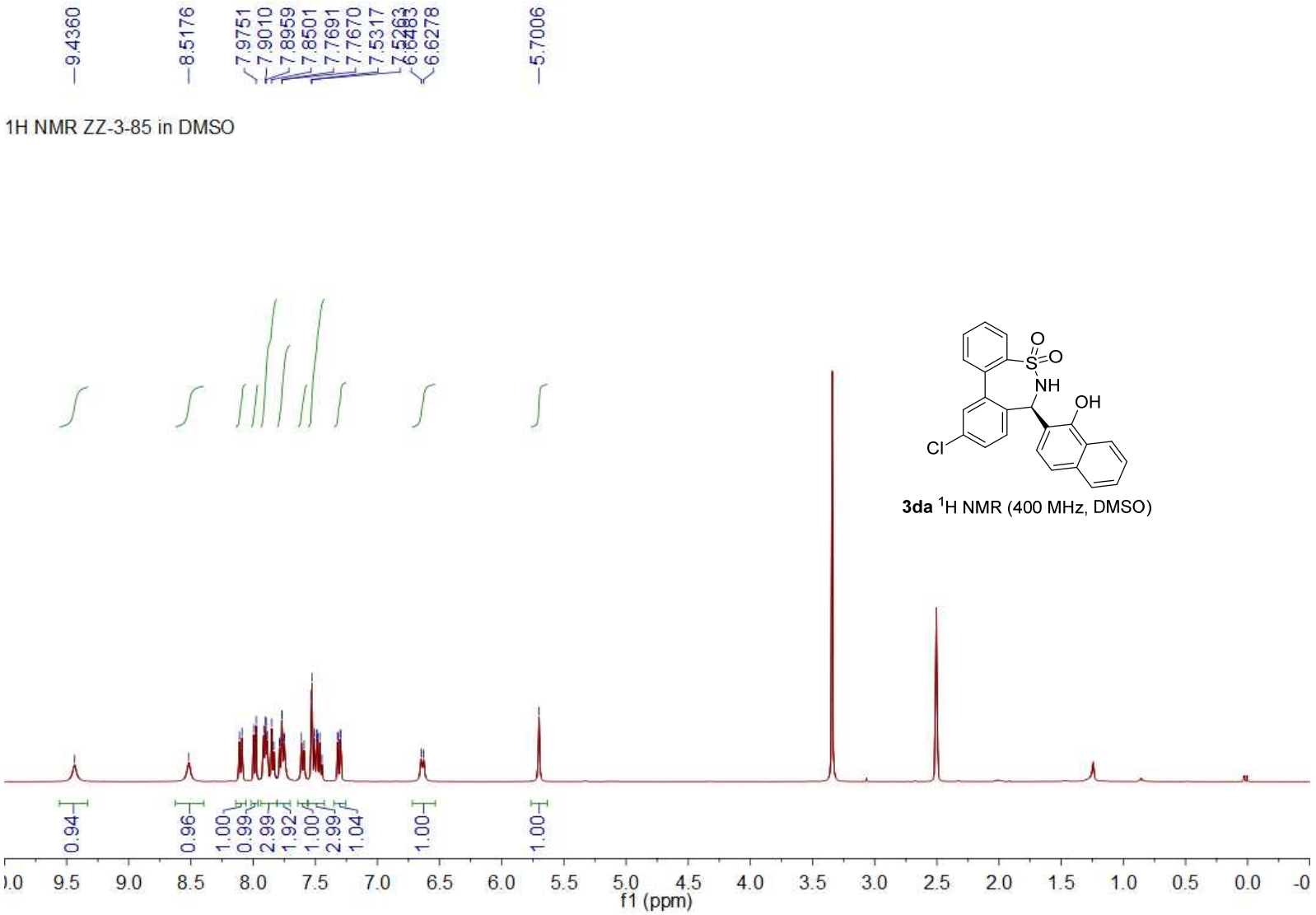
13C NMR ZZ-3-69 in CDCl3

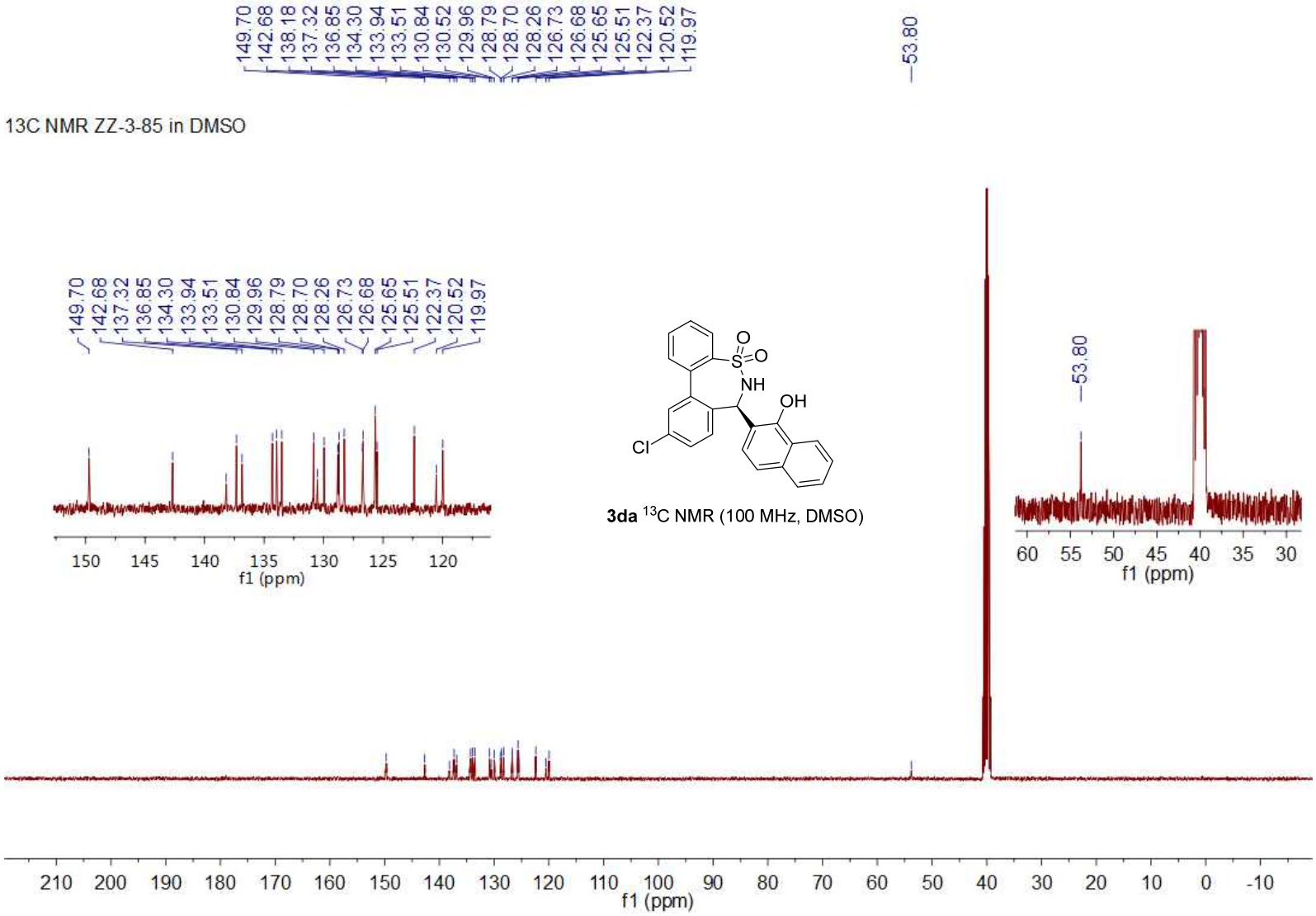




3ca ^{13}C NMR (100 MHz, $CHCl_3$)




9.4360
8.5176
7.9751
7.9010
7.8959
7.8501
7.7691
7.7670
7.5317
6.6278
5.7006
1H NMR ZZ-3-85 in DMSO
0.94
0.96
1.00
0.99
2.99
1.92
1.00
2.99
1.04
1.00
1.00
f1 (ppm)
O
S
O
NH
OH
Cl
3da 1H NMR (400 MHz, DMSO)



3da ^{13}C NMR (100 MHz, DMSO)

Data File G:\ZZ-2\SIG1001066.D
Sample Name: zz-2-93

```
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    Acq. Instrument : 仪器 1                        Location : Vial 91
    Injection Date  : 5/25/2018 2:43:48 PM
                                                    Inj Volume : 2.000 µl
    Acq. Method     : C:\CHEM32\1\METHODS\FM-4-4_LC.M
    Last changed    : 5/25/2018 2:42:13 PM
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 3/22/2019 2:12:28 PM
                      (modified after loading)
    Sample Info     : AD-H, n-hexane / i-PrOH = 80/20 , 1.0 mL/min, 30 oC, 25
                      4 nm
```

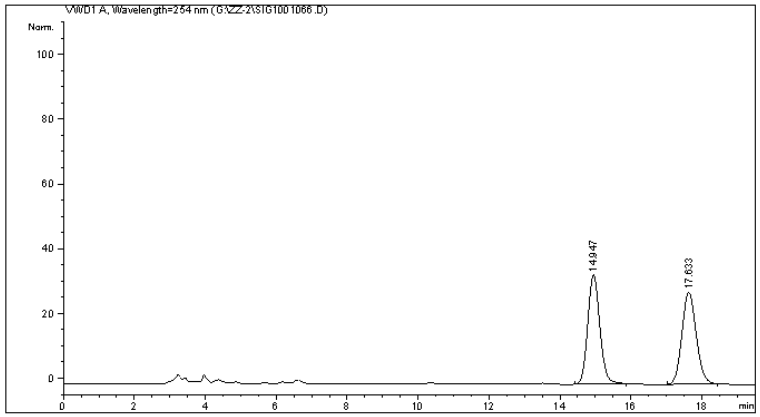


```
    ======================================================================
                               Area Percent Report
    ======================================================================

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


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #  [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  14.947 BB    0.3675  802.42584   33.73377  50.2945
       2  17.633 BB    0.4345  793.02887   28.33646  49.7055

    Totals :                  1595.45471   62.07024

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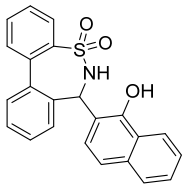

(+/-)-**3aa**

Instrument 1 3/22/2019 2:12:38 PM Page 1 of 1

Data File G:\ZZ-2\SIG1001197.D
Sample Name: zz-3-39A

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    Acq. Instrument : 仪器 1                        Location : Vial 91
    Injection Date  : 6/7/2018 8:07:05 PM
                                                    Inj Volume : 5.000 µl
    Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
    Last changed    : 6/7/2018 8:03:57 PM
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 3/22/2019 2:14:19 PM
                      (modified after loading)
    Sample Info     : AD-H, n-hexane/i-PrOH = 80/20 , 1.0 mL/min, 30 oC, 254
                      nm
```

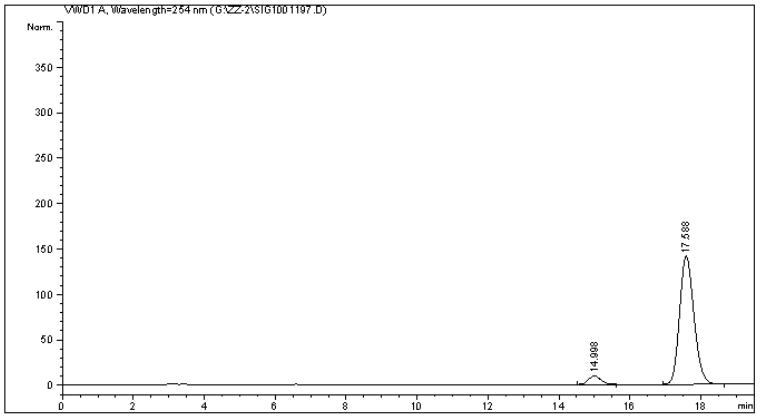


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    ======================================================================
                               Area Percent Report
    ======================================================================

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


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #  [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  14.998 BB    0.3664  226.02524    9.53891   5.3724
       2  17.588 BB    0.4360 3981.14795  141.15918  94.6276

    Totals :                  4207.17319  150.69809

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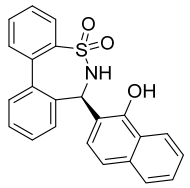

(-)-**3aa**

Instrument 1 3/22/2019 2:14:25 PM Page 1 of 1

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009167.D
Sample Name: zz-3-54(+-)

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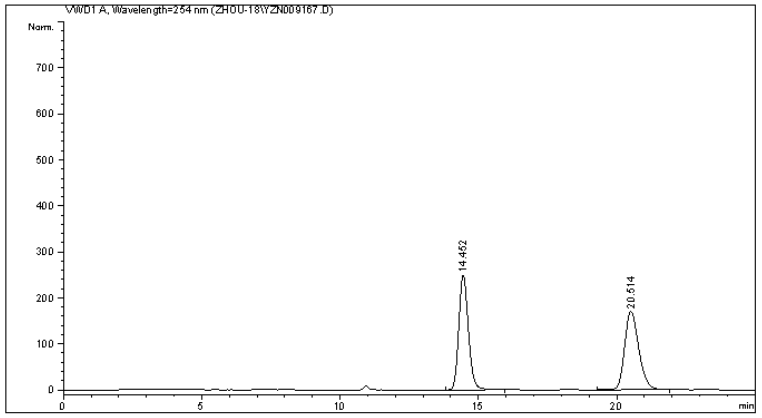
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 7/3/2018 6:41:38 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/3/2018 6:39:25 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:20:55 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH =80/20, 1.0 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.452 BB    0.3725 6041.69385  249.70792  49.9482
   2  20.514 BB    0.5485 6054.22559  170.39500  50.0518

Totals :                  1.20959e4   420.10292

                          *** End of Report ***
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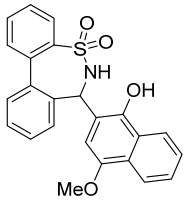

(+/-)-**3ab**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009165.D
Sample Name: zz-3-54

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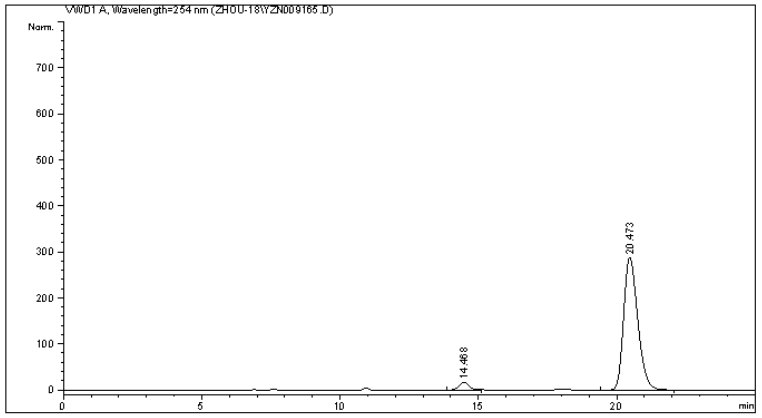
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 7/3/2018 5:00:30 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/3/2018 4:59:38 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:20:55 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH =80/20, 1.0 mL/min, 30 oC, 254 nm
```

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                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.468 BB    0.3758  431.75946   17.46595   4.0419
   2  20.473 BB    0.5493 1.02504e4   288.90268  95.9581

Totals :                  1.06822e4   306.36863

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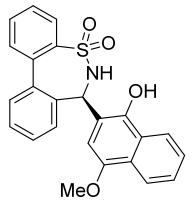
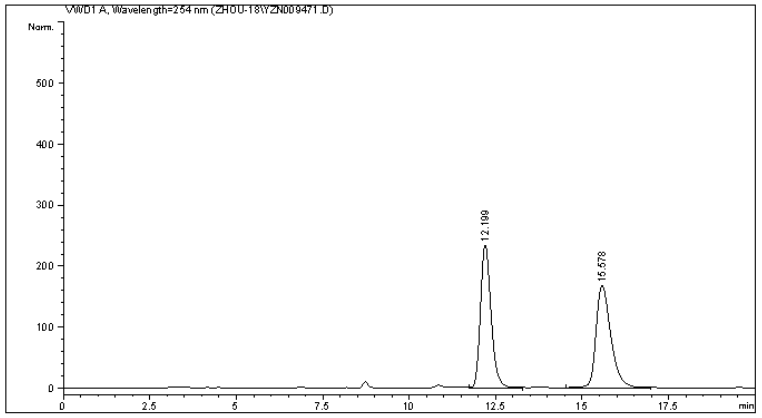



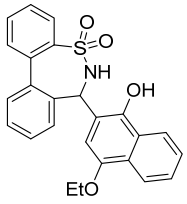
(-)-**3ab**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009471.D
Sample Name: zz-3-73(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location :   -
Injection Date  : 7/25/2018 6:06:30 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/25/2018 5:52:02 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:27:52 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/iPrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



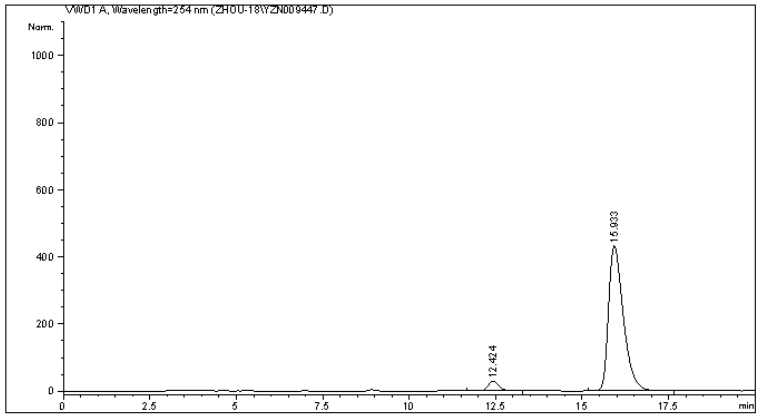

```
Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.199 VB    0.3266 4975.98926  234.13245  49.9767
   2  15.578 BB    0.4546 4980.62207  167.52385  50.0233

Totals :                  9956.61133  401.65630

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



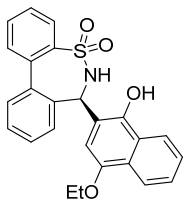
(+/-)-**3ac**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009447.D
Sample Name: zz-3-73

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location :   -
Injection Date  : 7/24/2018 9:00:58 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/24/2018 8:17:31 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:29:14 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/iPrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



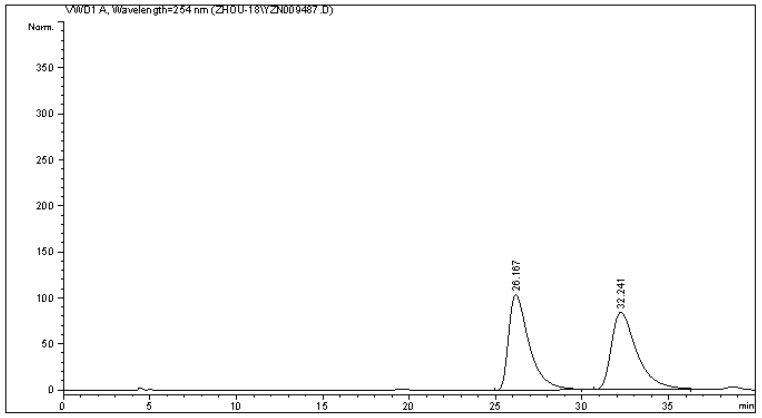

```
Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.424 BB    0.3325  646.55243   29.53986   4.7698
   2  15.933 BB    0.4560 1.29085e4   432.46411  95.2302

Totals :                  1.35551e4   462.00397

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



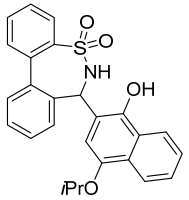
(-)-**3ac**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009487.D
Sample Name: zz-3-75(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/26/2018 1:19:00 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/26/2018 1:10:51 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:31:25 PM
                  (modified after loading)
Sample Info     : OD-H, Hexane/iPrOH = 90/10, 0.7 mL/min, 30 oC, 254 nm
```



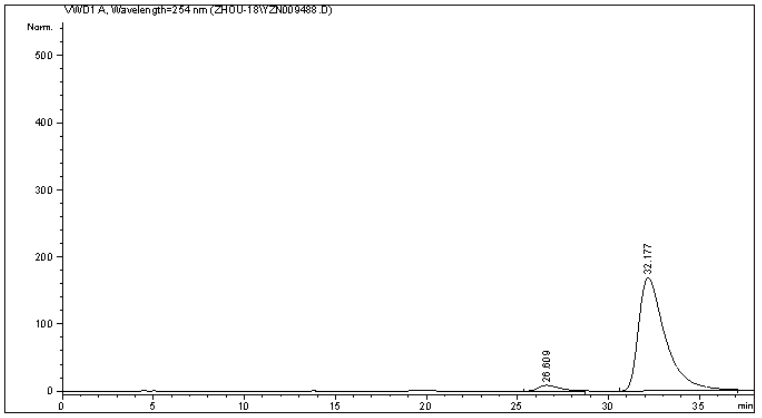

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  26.167 BB    1.2422 8630.10742  104.27705  50.3778
   2  32.241 BB    1.5036 8500.65234   83.91478  49.6222

Totals :                  1.71308e4   188.19183

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



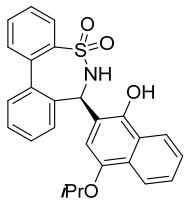
(+/-)-**3ad**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009488.D
Sample Name: zz-3-75

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/26/2018 2:05:08 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/26/2018 2:00:45 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:33:00 PM
                  (modified after loading)
Sample Info     : OD-H, Hexane/iPrOH = 90/10, 0.7 mL/min, 30 oC, 254 nm
```



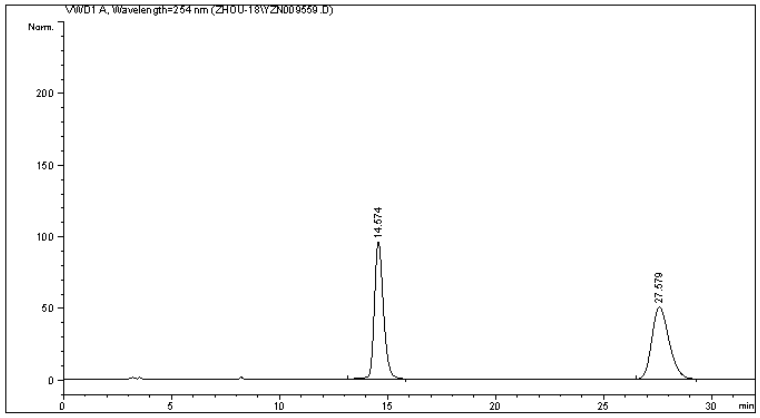

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  26.609 BB    1.1285  708.04602    8.72775   3.9784
   2  32.177 BB    1.5182 1.70894e4   168.27553  96.0216

Totals :                  1.77974e4   177.00328

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



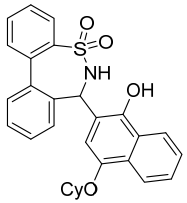
(-)-**3ad**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009559.D
Sample Name: zz-3-82(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location :   -
Injection Date  : 7/30/2018 10:27:09 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/30/2018 10:24:09 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:34:30 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



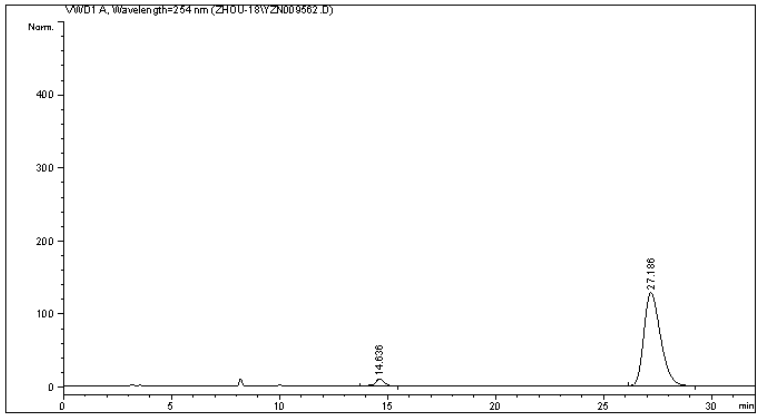

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.574 BB    0.4466 2791.69873   95.69547  50.1009
   2  27.579 BB    0.8465 2780.45898   50.36379  49.8991

Totals :                  5572.15771  146.05925

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



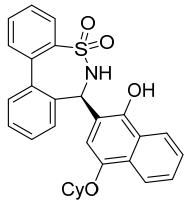
(+/-)-**3ae**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009562.D
Sample Name: zz-3-82

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location :   -
Injection Date  : 7/31/2018 10:52:46 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/31/2018 10:51:33 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:36:02 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



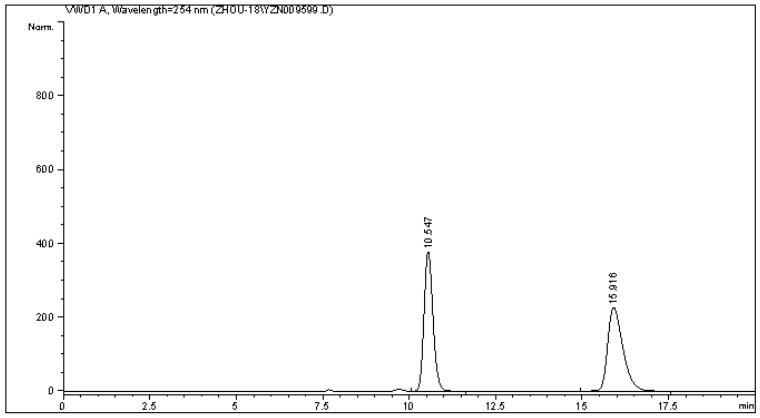

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.636 BB    0.4567  297.49350    9.86466   4.1652
   2  27.186 BB    0.8313 6844.78271  127.56421  95.8348

Totals :                  7142.27621  137.42887

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



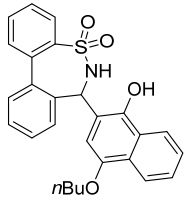
(-)-**3ae**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009599.D
Sample Name: zz-3-83(+-)

```
==========================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 8/3/2018 8:22:30 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 8/3/2018 8:17:49 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:37:26 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



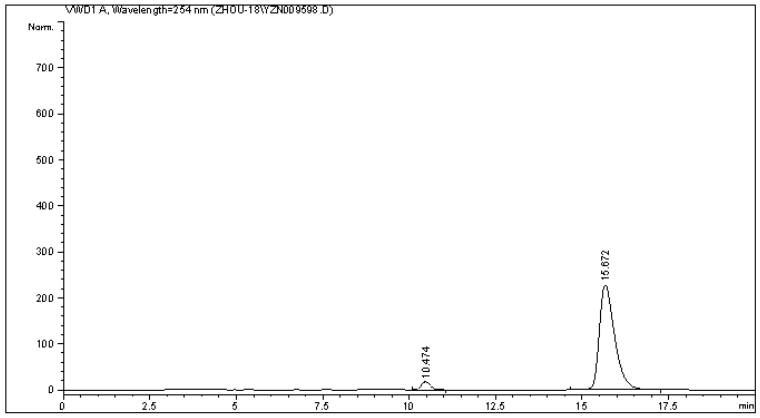

```
==========================================================================
                        Area Percent Report
==========================================================================

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]      [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  10.547 VB    0.2810 6858.18994  379.03226  49.5011
   2  15.916 BB    0.4711 6996.44531  227.34775  50.4989

Totals :                  1.38546e4   606.38000

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



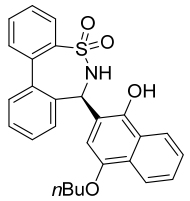
(+/-)-**3af**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009598.D
Sample Name: zz-3-83

```
==========================================================================
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 8/2/2018 11:20:50 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 8/2/2018 11:19:27 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:49:05 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



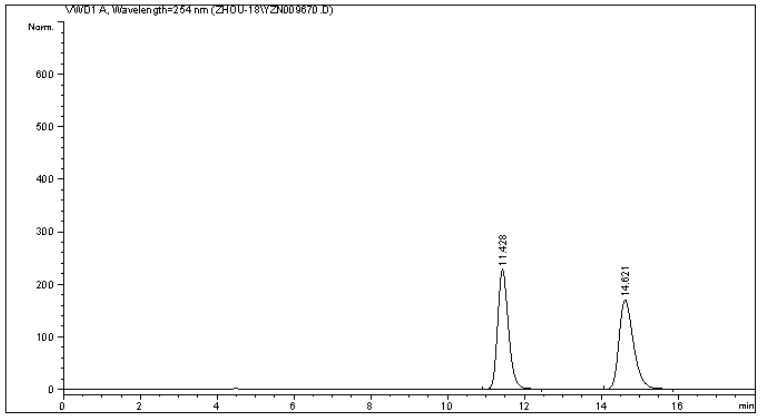

```
==========================================================================
                        Area Percent Report
==========================================================================

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]      [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  10.474 BB    0.2813  318.51801   17.45901   4.3502
   2  15.672 BB    0.4663 7003.44385  228.79437  95.6498

Totals :                  7321.96185  246.25338

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



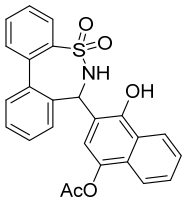
(-)-**3af**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009670.D
Sample Name: zz-3-89(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/30/2018 9:42:07 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 7/30/2018 9:39:55 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:50:53 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254nm
```




```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  11.428 BB    0.2981 4412.83350  228.45880  49.9632
   2  14.621 BB    0.3995 4419.33008  169.94897  50.0368

Totals :                  8832.16357  398.40778
```

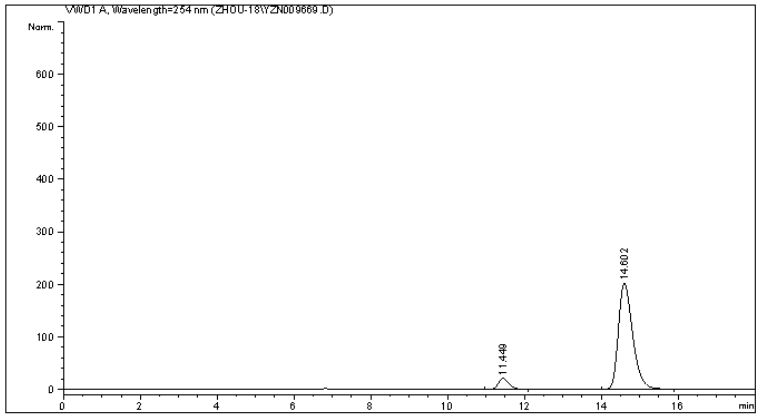


(+/-)-**3ag**

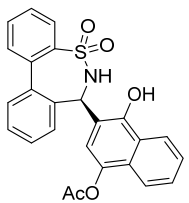
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009669.D
Sample Name: zz-3-89

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/30/2018 9:07:16 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 7/30/2018 9:00:05 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:50:53 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254nm
```




```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  11.449 BB    0.2936  398.91675   20.80318   7.1049
   2  14.602 VB    0.3952 5215.75732  202.45496  92.8951

Totals :                  5614.67407  223.25813
```

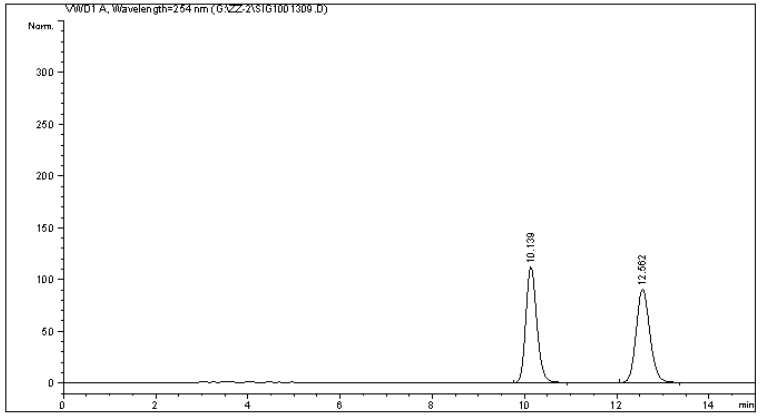


(-)-**3ag**

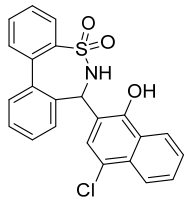
```
                          *** End of Report ***
```

Data File G:\ZZ-2\SIG1001309.D
Sample Name: zz-3-62(+-)

```
    ======================================================================
    Acq. Operator   :
    Acq. Instrument : 仪器 1                        Location : Vial 91
    Injection Date  : 6/30/2018 3:02:11 PM
                                                    Inj Volume : 5.000 µl
    Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 6/30/2018 3:00:32 PM
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 3/22/2019 2:18:17 PM
                      (modified after loading)
    Sample Info     : AD-H, n-hexane/i-PrOH = 80/20 , 1.0 mL/min, 30 oC, 254
                      nm
```



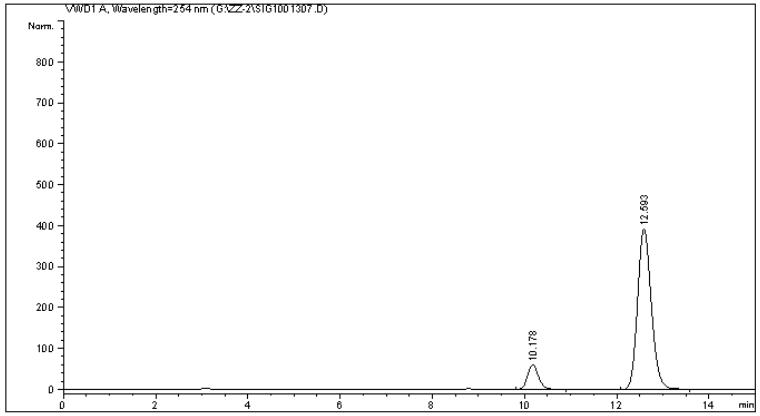

```
    ======================================================================
                               Area Percent Report
    ======================================================================

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


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #  [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  10.139 BB    0.2553 1853.02783  111.81484  49.9175
       2  12.562 BB    0.3182 1859.15173   90.29589  50.0825

    Totals :                  3712.17957  202.11073

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



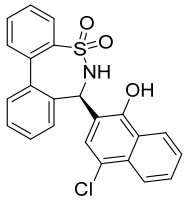
(+/-)-**3ah**

Data File G:\ZZ-2\SIG1001307.D
Sample Name: zz-3-62

```
    ======================================================================
    Acq. Operator   :
    Acq. Instrument : 仪器 1                        Location : Vial 91
    Injection Date  : 6/30/2018 2:28:30 PM
                                                    Inj Volume : 5.000 µl
    Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 6/30/2018 2:19:12 PM
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 3/22/2019 2:16:49 PM
                      (modified after loading)
    Sample Info     : AD-H, n-hexane/i-PrOH = 80/20 , 1.0 mL/min, 30 oC, 254
                      nm
```



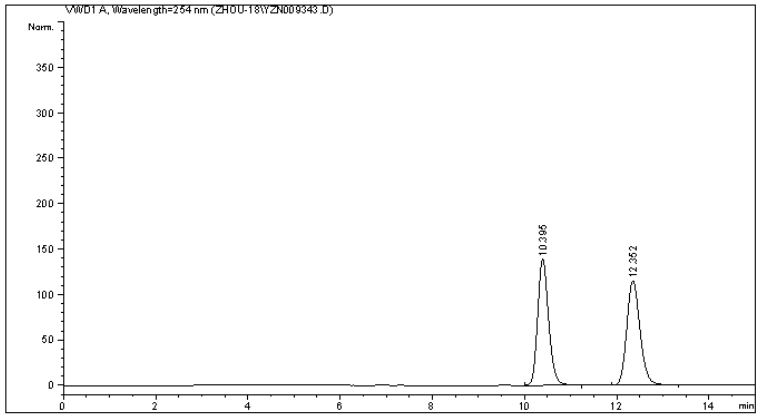

```
    ======================================================================
                               Area Percent Report
    ======================================================================

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


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #  [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1  10.178 BB    0.2560 1000.86188   60.18296  10.9988
       2  12.593 BB    0.3212 8098.89990  391.76123  89.0012

    Totals :                  9099.76178  451.94419

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



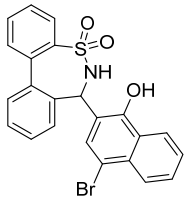
(-)-**3ah**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009343.D
Sample Name: zz-3-65A(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 7/15/2018 10:14:31 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/15/2018 10:03:52 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:53:05 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH =80/20, 1.0 mL/min, 30 oC, 254 nm
```



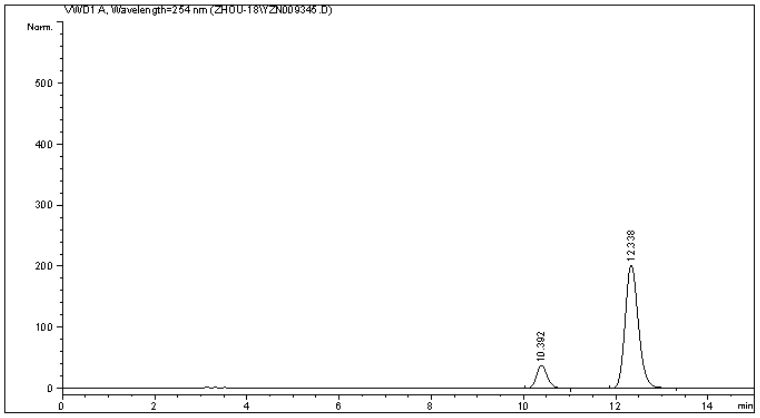

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  10.395 BB    0.2543 2296.65405  138.73311  49.9057
   2  12.352 BB    0.3080 2305.33667  115.04964  50.0943

Totals :                  4601.99072  253.78275

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



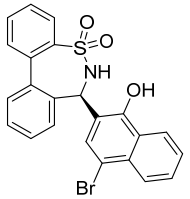
(+/-)-**3ai**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009345.D
Sample Name: zz-3-65A

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 7/15/2018 10:50:18 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/15/2018 10:48:47 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:54:07 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH =80/20, 1.0 mL/min, 30 oC, 254 nm
```



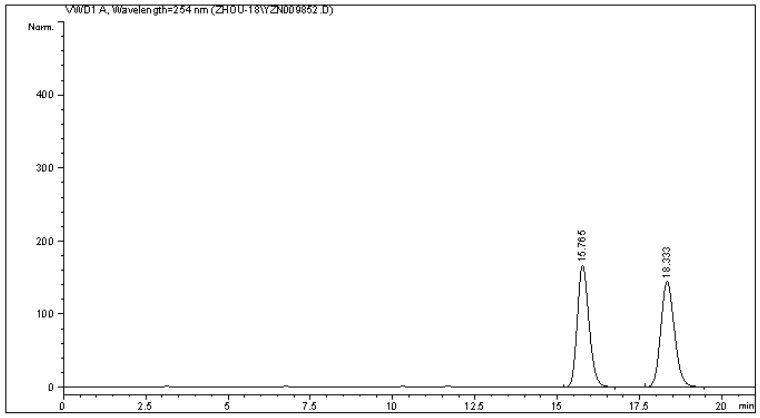

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  10.392 BB    0.2535  615.73816   37.35582  13.2668
   2  12.338 BB    0.3065 4025.45239  202.24893  86.7332

Totals :                  4641.19055  239.60475

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



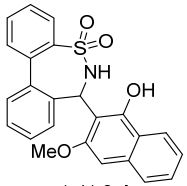
(-)-**3ai**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009852.D
Sample Name: zz-3-98(+-)

```
    ======================================================================
    Acq. Operator   :
    Acq. Instrument : Instrument 1                  Location :   -
    Injection Date  : 8/24/2018 10:00:42 AM
    Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 8/24/2018 9:50:09 AM
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 3/22/2019 2:55:45 PM
                      (modified after loading)
    Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



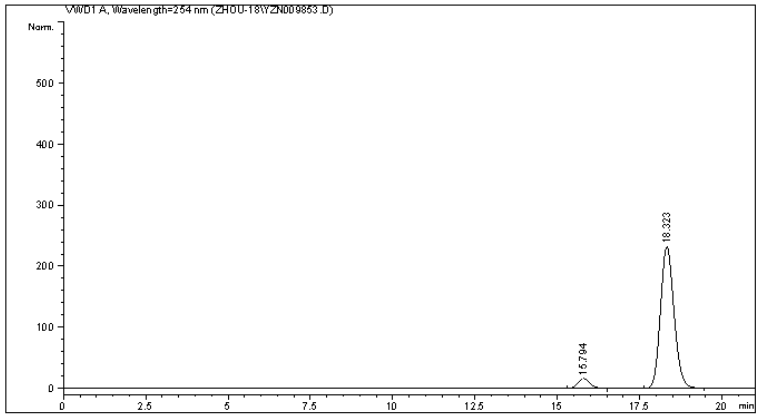

```
    ======================================================================
                              Area Percent Report
    ======================================================================

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


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]  mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1  15.765 BB    0.3811 4115.21094  166.74631  49.7918
       2  18.333 BB    0.4458 4149.62500  144.45842  50.2082

    Totals :                  8264.83594  311.20473

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



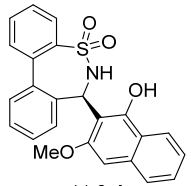
(+/-)-**3aj**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009853.D
Sample Name: zz-3-98

```
    ======================================================================
    Acq. Operator   :
    Acq. Instrument : Instrument 1                  Location :   -
    Injection Date  : 8/24/2018 10:44:56 AM
    Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 8/24/2018 10:42:48 AM
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 3/22/2019 2:56:35 PM
                      (modified after loading)
    Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



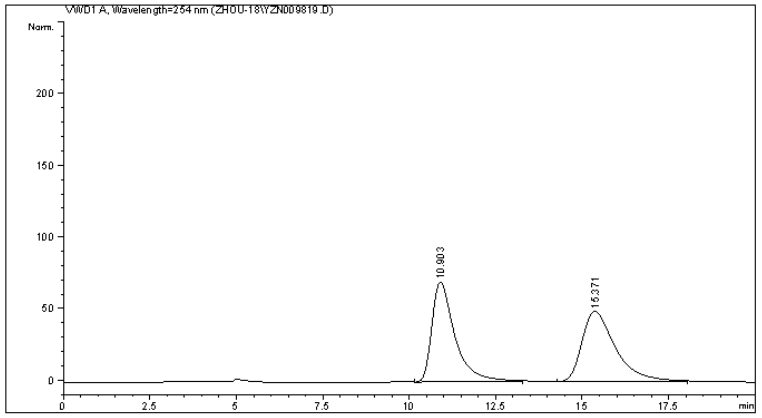

```
    ======================================================================
                              Area Percent Report
    ======================================================================

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


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]  mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1  15.794 BB    0.3804  397.96930   16.16424   5.6510
       2  18.323 BB    0.4437 6644.44141  231.72916  94.3490

    Totals :                  7042.41071  247.89340

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



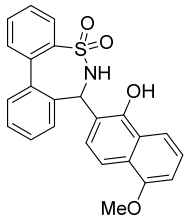
(-)-**3aj**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009819.D
Sample Name: zz-3-95(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location :   -
Injection Date  : 8/22/2018 1:04:57 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/22/2018 1:03:11 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:57:54 PM
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 1.0 mL/min, 30 oC, 254 nm
```



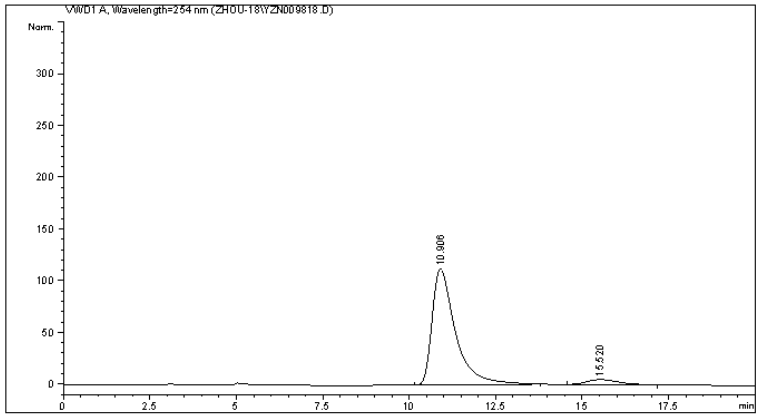

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  10.903 VB    0.6875 3203.55054   69.72103  49.5672
   2  15.371 BB    1.0013 3259.48853   48.75410  50.4328

Totals :                  6463.03906  118.47513

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



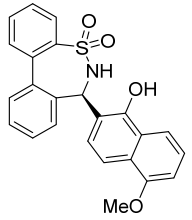
(+/-)-**3ak**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009818.D
Sample Name: zz-3-95

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location :   -
Injection Date  : 8/22/2018 12:42:58 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/22/2018 12:41:09 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 2:58:55 PM
                  (modified after loading)
Sample Info     : OD-H, Hexane/i-PrOH = 70/30, 1.0 mL/min, 30 oC, 254 nm
```



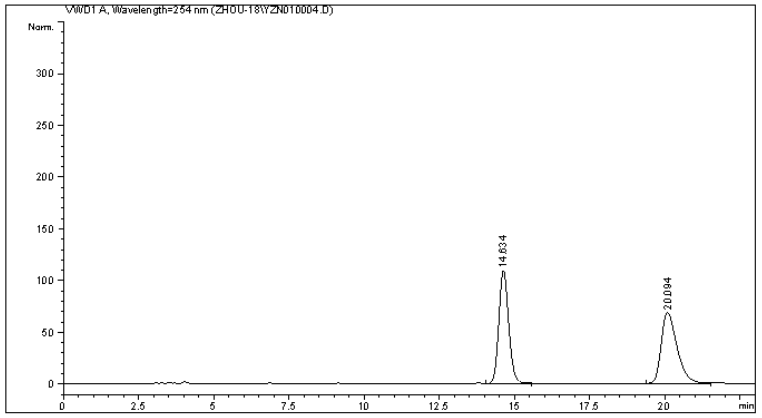

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  10.906 VB    0.7002 5269.96045  112.03716  94.3378
   2  15.520 BB    0.8535  316.30832    4.91024   5.6622

Totals :                  5586.26877  116.94741

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



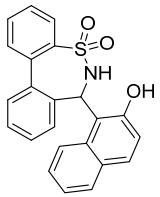
(-)-**3ak**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN010004.D
Sample Name: zz-4-5(+-)

```
    ======================================================================
    Acq. Operator   :
    Acq. Instrument : Instrument 1                    Location :   -
    Injection Date  : 9/3/2018 9:26:37 AM
    Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 9/3/2018 9:08:21 AM
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 3/22/2019 3:00:23 PM
                      (modified after loading)
    Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



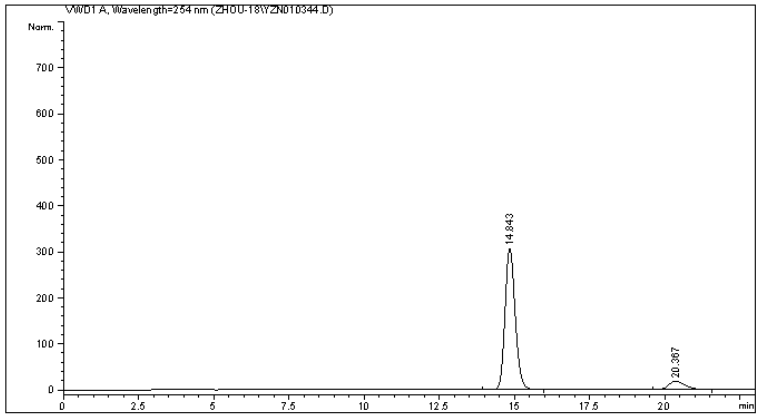

```
    ======================================================================
                               Area Percent Report
    ======================================================================

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


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]  mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1  14.634 VB    0.3532 2481.83984  108.93680  50.0263
       2  20.094 BB    0.5552 2479.23267   68.19409  49.9737

    Totals :                  4961.07251  177.13089

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



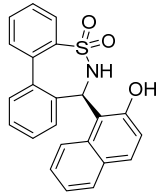
(+/-)-**3al**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN010344.D
Sample Name: zz-4-34

```
    ======================================================================
    Acq. Operator   :
    Acq. Instrument : Instrument 1                    Location :   -
    Injection Date  : 9/27/2018 9:23:37 AM
    Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 9/27/2018 8:51:47 AM
                      (modified after loading)
    Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
    Last changed    : 3/22/2019 3:02:18 PM
                      (modified after loading)
    Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



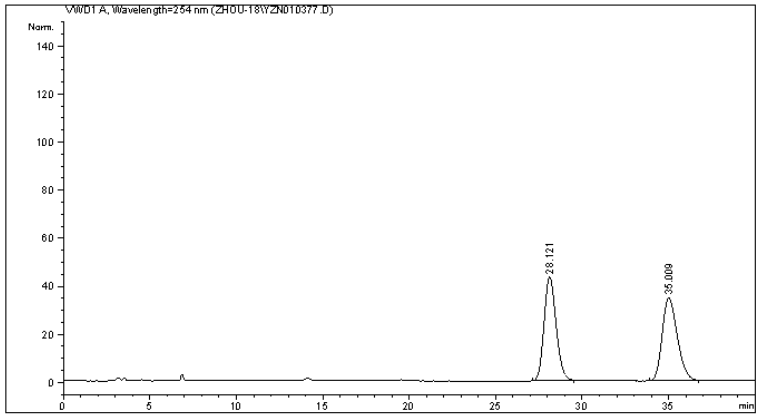

```
    ======================================================================
                               Area Percent Report
    ======================================================================

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


    Signal 1: VWD1 A, Wavelength=254 nm

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]  mAU   *s   [mAU   ]      %
    ----|-------|----|-------|----------|----------|--------|
       1  14.843 BB    0.3641 7203.49756  306.96445  90.9417
       2  20.367 BB    0.5924  717.50732   18.55542   9.0583

    Totals :                  7921.00488  325.51986

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



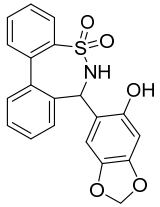
(-)-**3al**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN010377.D
Sample Name: zz-4-35(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location :   -
Injection Date  : 9/29/2018 3:45:35 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 9/29/2018 3:44:16 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 3:04:52 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



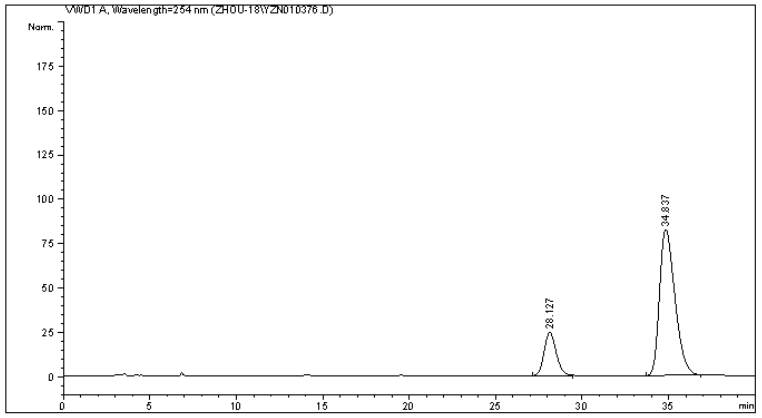

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  28.121 BB    0.7464 2092.48535   43.14143  50.0446
   2  35.009 BB    0.9301 2088.75195   34.52483  49.9554

Totals :                  4181.23730   77.66627

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



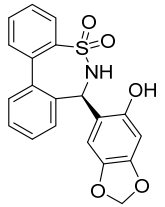
(+/-)-**3am**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN010376.D
Sample Name: zz-4-35

```
Acq. Operator   :
Acq. Instrument : Instrument 1                  Location :   -
Injection Date  : 9/29/2018 2:58:44 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 9/29/2018 2:56:55 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 3:03:36 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```



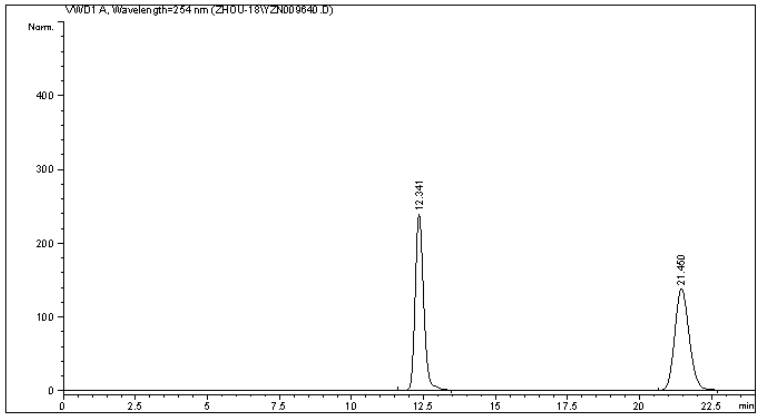

```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  28.127 BB    0.7545 1176.04773   24.27653  18.7748
   2  34.837 BB    0.9483 5087.92578   82.31318  81.2252

Totals :                  6263.97351  106.58970

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



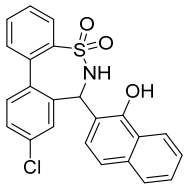
(-)-**3am**

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009640.D
Sample Name: zz-3-88(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 8/7/2018 9:23:43 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/7/2018 9:11:04 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 3:06:19 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.341 BB    0.3122 4824.28076  238.04474  50.3465
   2  21.450 BB    0.5402 4757.86865  137.12610  49.6535

Totals :                  9582.14941  375.17084
```

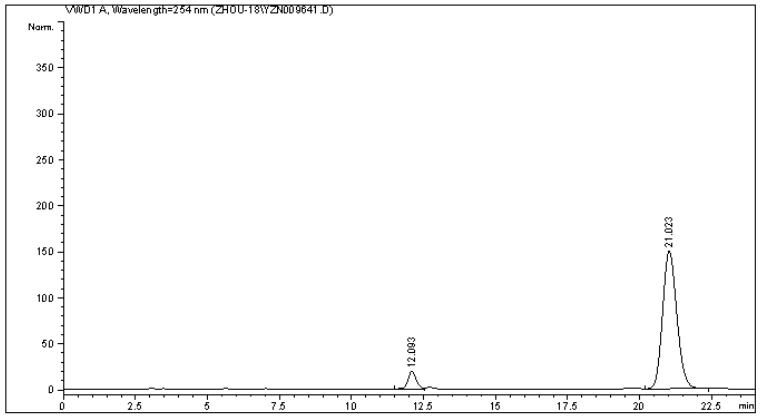


(+/-)-**3ba**

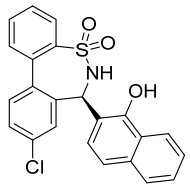
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009641.D
Sample Name: zz-3-88

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 8/7/2018 10:14:16 AM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/7/2018 10:10:40 AM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 3:07:34 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  12.093 BV    0.3027  380.63861   19.31360   6.8997
   2  21.023 VB    0.5327 5136.08203  149.71495  93.1003

Totals :                  5516.72064  169.02855
```

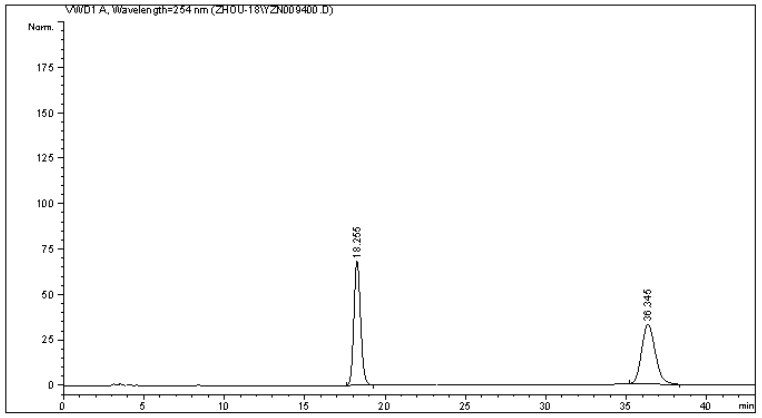


(-)-**3ba**

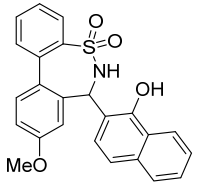
```
                          *** End of Report ***
```

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009400.D
Sample Name: zz-3-69(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/20/2018 1:44:12 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/20/2018 1:34:33 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 3:08:57 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH =80/20, 1.0 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|------|----|-------|---------|---------|-------|
   1  18.255 BB    0.4505 1978.86304   68.21725  50.4317
   2  36.345 BB    0.9157 1944.98071   32.88633  49.5683

Totals :                  3923.84375  101.10358

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

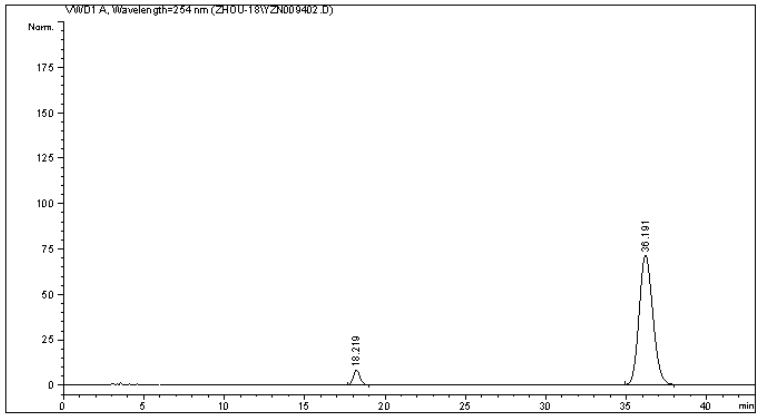


(+/-)-**3ca**

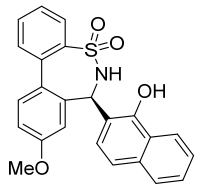
Instrument 1 3/22/2019 3:09:01 PM Page 1 of 1

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009402.D
Sample Name: zz-3-69

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 7/20/2018 2:57:36 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 7/20/2018 2:56:58 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 3:08:57 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH =80/20, 1.0 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|------|----|-------|---------|---------|-------|
   1  18.219 BB    0.4502  234.38101    8.12205   5.2543
   2  36.191 BB    0.9268 4226.34717   71.36069  94.7457

Totals :                  4460.72818   79.48274

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

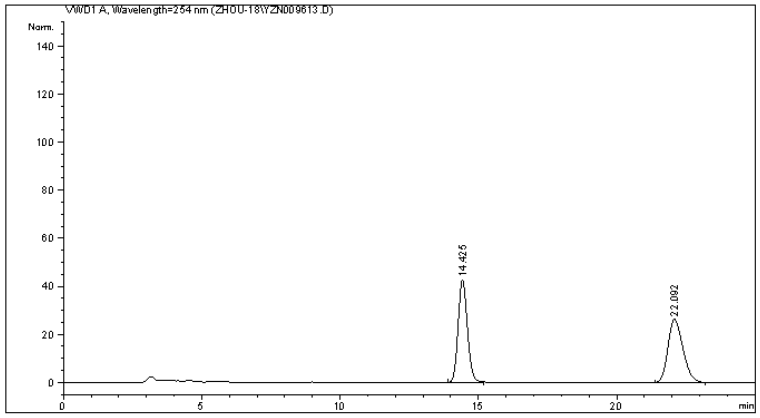


(-)-**3ca**

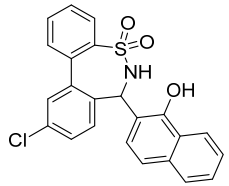
Instrument 1 3/22/2019 3:09:45 PM Page 1 of 1

Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009613.D
Sample Name: zz-3-85(+-)

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 8/4/2018 2:37:44 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC.M
Last changed    : 8/4/2018 2:14:26 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 3:10:55 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.425 BB    0.3596  992.31299   42.75859  49.9973
   2  22.092 BB    0.5899  992.42053   26.31921  50.0027

Totals :                  1984.73352   69.07780
```

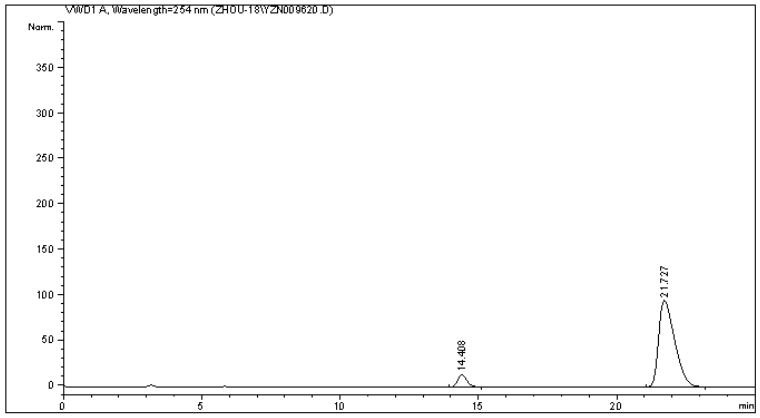


(+/-)-**3da**

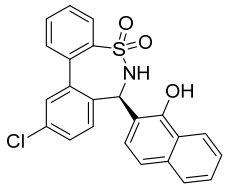
```
                          *** End of Report ***
```


Data File C:\CHEM32\1\DATA\ZHOU-18\YZN009620.D
Sample Name: zz-3-85

```
Acq. Operator   :
Acq. Instrument : Instrument 1                    Location :   -
Injection Date  : 8/4/2018 8:53:27 PM
Acq. Method     : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 8/4/2018 8:50:02 PM
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\DEF_LC11.M
Last changed    : 3/22/2019 3:11:57 PM
                  (modified after loading)
Sample Info     : AD-H, Hexane/i-PrOH = 80/20, 1.0 mL/min, 30 oC, 254 nm
```




```
                          Area Percent Report

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


Signal 1: VWD1 A, Wavelength=254 nm

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  mAU   *s   [mAU   ]      %
----|-------|----|-------|----------|----------|--------|
   1  14.408 BB    0.3621  321.76401   13.66203   7.7492
   2  21.727 BB    0.6166 3830.48462   95.16761  92.2508

Totals :                  4152.24863  108.82964
```



(+)-**3da**

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