

## Supporting Information

### Asymmetric Brønsted Acid-Catalyzed Friedel–Crafts Reaction of Indoles with Cyclic *N*-Sulfimines

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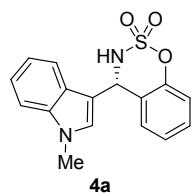
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**General Information.** Organic solvents were distilled prior to use. Organic solutions were concentrated under reduced pressure using a rotary evaporator. Chromatographic purification of products was accomplished using forced-flow chromatography on ICN 60 32-64 mesh silica gel 63. Thin-layer chromatography (TLC) was performed on EM Reagents 0.25 mm silica gel 60-F plates. Developed chromatograms were visualized by fluorescence quenching and with anisaldehyde stain. <sup>1</sup>H and <sup>13</sup>C NMR spectra were recorded (400 MHz for <sup>1</sup>H and 100 MHz for <sup>13</sup>C), and were internally referenced to residual protio solvent signals. Data for <sup>1</sup>H NMR are reported as follows: chemical shift ( $\delta$  ppm), multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet), coupling constant (Hz) and integration. Data for <sup>13</sup>C NMR are reported in terms of chemical shift. IR spectra were recorded on an FT IR spectrometer and are reported in wave numbers. Optical rotations were taken on a digital polarimeter. High-resolution mass spectroscopy (HRMS) was performed by electron impact (EI). Enantiomeric excesses were determined using an HPLC instrument with Chiralpak columns as noted.

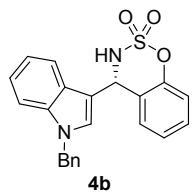
### General Procedure for Friedel–Crafts Reaction of Indoles with Cyclic *N*-Sulfimines.

To a solution of cyclic *N*-sulfimine **2** (0.1 mmol) in toluene (0.75 mL) was added catalyst **3b** (0.01 mmol). The solution was stirred at –40 °C for 10 min, and then indole **1** (0.15 mmol) was added in one portion. The reaction mixture was stirred at –40 °C until cyclic *N*-sulfimine **2** was completely consumed, as determined by TLC. Then, the resulting mixture was diluted with water and extracted with CH<sub>2</sub>Cl<sub>2</sub>. The combined organic layer was washed with brine, dried over anhydrous MgSO<sub>4</sub>, and concentrated in vacuo. The crude residue was purified by flash column chromatography with EtOAc/hexanes as eluent to afford desired product **4**. The enantiomeric excess was determined using HPLC analysis.

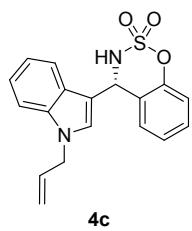


**(S)-4-(1-Methy-1*H*-indol-3-yl)-3,4-dihydrobenzo[*e*][1,2,3]oxathiazine 2,2-dioxide (4a).** 29 mg, yield 93%, White solid; m.p. 84–86 °C;  $[\alpha]_D^{22} = +64.9$  ( $c = 0.44$ , CHCl<sub>3</sub>); 91% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  7.40–7.30 (m, 2H), 7.29–7.24 (m, 1H), 7.21 (d,  $J = 8.0$  Hz, 1H), 7.17 (s, 1H), 7.12–7.02 (m, 4H), 6.23 (d,  $J = 7.8$  Hz, 1H), 4.73 (d,  $J = 7.8$  Hz, 1H), 3.82 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  150.15, 136.46,

128.56, 128.35, 127.41, 124.31, 124.19, 121.63, 120.98, 119.16, 117.84, 117.69, 109.69, 108.99, 54.05, 31.98; IR (neat) 3269, 2921, 2851, 1717, 1614, 1550, 1478, 1450, 1412, 1193, 1164, 1098, 1011 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>16</sub>H<sub>14</sub>N<sub>2</sub>O<sub>3</sub>S: 314.0725 Found: 314.0754; Chiralpak IA column and IA guard column (15% EtOH:hexanes, 1.0 mL/min flow,  $\lambda$  = 254 nm); *major*-isomer  $t_r$  = 17.8 min and *minor*-isomer  $t_r$  = 11.0 min.

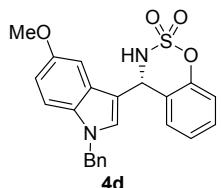


**(S)-4-(1-Benzyl-1*H*-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4b).** 30 mg, yield 76%, White solid; m.p. 85–87 °C;  $[\alpha]_D^{23} = +28.5$  ( $c = 0.38$ , CHCl<sub>3</sub>); 90% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  7.37–7.26 (m, 5H), 7.25–7.18 (m, 3H), 7.17–7.12 (m, 2H), 7.10 (d,  $J$  = 8.2 Hz, 1H), 7.08–7.03 (m, 3H), 6.23 (d,  $J$  = 8.5 Hz, 1H), 5.32 (s, 2H), 4.77 (d,  $J$  = 8.5 Hz, 1H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  151.25, 137.20, 136.60, 129.67, 129.00, 128.77, 128.38, 128.06, 126.96, 125.58, 125.29, 122.94, 121.93, 120.50, 119.07, 118.82, 111.41, 110.58, 55.15, 50.3; IR (neat) 3271, 2922, 2852, 1613, 1551, 1450, 1413, 1354, 1281, 1192, 1164, 1097, 1013 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>22</sub>H<sub>18</sub>N<sub>2</sub>O<sub>3</sub>S: 390.1038 Found: 390.1025; Chiralpak IA column and IA guard column (15% EtOH:hexanes, 1.0 mL/min flow,  $\lambda$  = 254 nm); *major*-isomer  $t_r$  = 18.1 min and *minor*-isomer  $t_r$  = 22.5 min.

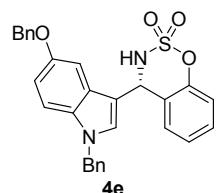


**(S)-4-(1-Allyl-1*H*-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4c).** 29 mg, yield 85%, White solid; m.p. 115–117 °C;  $[\alpha]_D^{21} = +50.4$  ( $c = 0.34$ , CHCl<sub>3</sub>); 92% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  7.36 (d,  $J$  = 8.3 Hz, 1H), 7.32 (ddd,  $J$  = 9.0, 4.8, 0.7 Hz, 1H), 7.26–7.20 (m, 3H), 7.10 (d,  $J$  = 8.2 Hz, 1H), 7.08–7.02 (m, 3H), 6.23 (d,  $J$  = 8.5 Hz, 1H), 6.07–5.95 (m, 1H), 5.26 (dd,  $J$  = 10.2, 1.2 Hz, 1H), 5.14 (ddd,  $J$  = 17.1, 2.7, 1.6 Hz, 1H), 4.79–4.70 (m, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  151.23, 136.98, 132.79, 129.65, 128.41(two peaks overlapping), 125.51, 125.28, 122.77, 121.98, 120.38, 119.02,

118.80, 118.12, 111.15, 110.46, 55.16, 49.03; IR (neat) 3262, 2921, 2851, 1614, 1579, 1551, 1467, 1450, 1412, 1356, 1262, 1193, 1164, 1097, 1011 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>18</sub>H<sub>16</sub>N<sub>2</sub>O<sub>3</sub>S: 340.0882 Found: 340.0896; Chiralpak IA column and IA guard column (10% EtOH:hexanes, 1.0 mL/min flow,  $\lambda$  = 254 nm); *major*-isomer  $t_r$  = 20.1 min and *minor*-isomer  $t_r$  = 26.8 min.

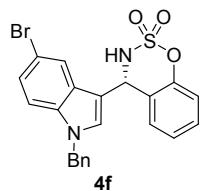


**(S)-4-(1-Benzyl-5-methoxy-1H-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4d).** 40 mg, yield 95%, White solid; m.p. 181–183 °C;  $[\alpha]_D^{21} = +58.8$  ( $c = 0.43$ , CHCl<sub>3</sub>); 94% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  7.36–7.25 (m, 4H), 7.18 (d,  $J$  = 8.9 Hz, 1H), 7.16 (s, 1H), 7.14–7.05 (m, 5H), 6.84 (dd,  $J$  = 8.9, 2.4 Hz, 1H), 6.66 (d,  $J$  = 2.3 Hz, 1H), 6.21 (d,  $J$  = 8.2 Hz, 1H), 5.26 (s, 2H), 4.81 (d,  $J$  = 8.3 Hz, 1H), 3.68 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  154.54, 151.30, 136.72, 132.25, 129.65, 129.13, 128.98, 128.48, 128.01, 126.86, 126.25, 125.30, 121.88, 118.79, 113.09, 111.42, 110.98, 100.67, 55.77, 55.09, 50.54; IR (neat) 3260, 2919, 1622, 1580, 1485, 1449, 1363, 1280, 1210, 1165, 1098, 1037 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>23</sub>H<sub>20</sub>N<sub>2</sub>O<sub>4</sub>S: 420.1144 Found: 420.1156; Chiralpak IA column and IA guard column (20% EtOH:hexanes, 1.0 mL/min flow,  $\lambda$  = 254 nm); *major*-isomer  $t_r$  = 20.2 min and *minor*-isomer  $t_r$  = 24.6 min.

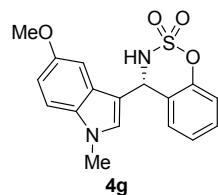


**(S)-4-(5-Benzoyl-1-benzyl-1H-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4e).** 36 mg, yield 73%, White solid; m.p. 130–132 °C;  $[\alpha]_D^{20} = +45.2$  ( $c = 0.34$ , CHCl<sub>3</sub>); 97% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  7.39–7.26 (m, 9H), 7.19 (d,  $J$  = 9.0 Hz, 1H), 7.17 (s, 1H), 7.14–7.03 (m, 5H), 6.92 (dd,  $J$  = 8.9, 2.4 Hz, 1H), 6.71 (d,  $J$  = 2.3 Hz, 1H), 6.18 (d,  $J$  = 8.5 Hz, 1H), 5.26 (s, 2H), 4.92 (s, 2H), 4.71 (d,  $J$  = 8.5 Hz, 1H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  153.61, 151.26, 137.13, 136.67, 132.44, 129.68, 129.22, 128.99, 128.61, 128.42, 128.04, 127.96, 127.63, 126.90, 126.06, 125.31, 121.81, 118.80, 113.79, 111.45, 110.85, 102.27, 70.70, 55.16, 50.53; IR (neat) 3282, 2922, 2864, 1620, 1578, 1482, 1450, 1417, 1357,

1262, 1189, 1163, 1096, 1024  $\text{cm}^{-1}$ ; HRMS (EI) m/z calcd for  $[\text{M}]^+$   $\text{C}_{29}\text{H}_{24}\text{N}_2\text{O}_4\text{S}$ : 496.1457 Found: 496.1457; Chiralpak IA column and IA guard column (30% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 16.9$  min and *minor*-isomer  $t_r = 27.7$  min.

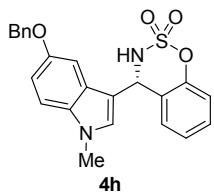


**(S)-4-(1-Benzyl-5-bromo-1H-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4f).** 35 mg, yield 74%, Colorless gum;  $[\alpha]_D^{21} = +54.1$  ( $c = 0.37$ ,  $\text{CHCl}_3$ ); 88% ee;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.41 (d,  $J = 1.5$  Hz, 1H), 7.37–7.26 (m, 5H), 7.20 (s, 1H), 7.18 (d,  $J = 8.7$  Hz, 1H), 7.13–7.02 (m, 5H), 6.18 (d,  $J = 8.3$  Hz, 1H), 5.29 (s, 2H), 4.78 (d,  $J = 8.4$  Hz, 1H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  151.24, 136.14, 135.76, 129.92(two peaks overlapping), 129.09, 128.22, 128.19, 127.45, 126.84, 125.96, 125.37, 121.63, 121.40, 119.00, 113.93, 112.10, 111.14, 54.77, 50.59; IR (neat) 3274, 2921, 2851, 1610, 1580, 1548, 1468, 1450, 1413, 1301, 1192, 1164, 1097, 1026  $\text{cm}^{-1}$ ; HRMS (EI) m/z calcd for  $[\text{M}]^+$   $\text{C}_{22}\text{H}_{17}\text{BrN}_2\text{O}_3\text{S}$ : 468.0143 Found: 468.0114; Chiralpak IA column and IA guard column (15% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 18.4$  min and *minor*-isomer  $t_r = 22.1$  min.

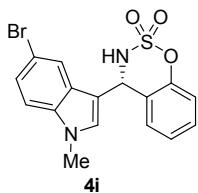


**(S)-4-(5-Methoxy-1-methyl-1H-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4g).** 34 mg, yield 98%, White solid; m.p. 84–86 °C;  $[\alpha]_D^{18} = +86.2$  ( $c = 0.33$ ,  $\text{CHCl}_3$ ); 89% ee;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.38–7.29 (m, 1H), 7.24 (d,  $J = 8.5$  Hz, 1H), 7.14–7.03 (m, 4H), 6.91 (dd,  $J = 8.9, 2.4$  Hz, 1H), 6.64 (d,  $J = 2.3$  Hz, 1H), 6.21 (d,  $J = 8.2$  Hz, 1H), 4.74 (d,  $J = 8.2$  Hz, 1H), 3.77 (s, 3H), 3.71 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  154.43, 151.28, 132.70, 129.68, 129.61, 128.54, 125.96, 125.25, 121.96, 118.76, 112.89, 110.85, 110.32, 100.52, 55.80, 55.08, 33.21; IR (neat) 3262, 2920, 1719, 1623, 1579, 1488, 1450, 1421, 1361, 1262, 1165, 1099, 1062, 1017  $\text{cm}^{-1}$ ; HRMS (EI) m/z calcd for  $[\text{M}]^+$   $\text{C}_{17}\text{H}_{16}\text{N}_2\text{O}_4\text{S}$ :

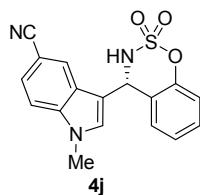
344.0831 Found: 344.0822; Chiralpak IB column and IB guard column (20% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *minor*-isomer  $t_r = 24.5$  min and *major*-isomer  $t_r = 31.2$  min.



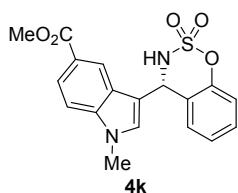
**(S)-4-(5-Benzoyl-1-methyl-1H-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4h).** 41 mg, yield 99%, White solid; m.p. 82–84 °C;  $[\alpha]_D^{19} = +73.7$  ( $c = 0.38$ , CHCl<sub>3</sub>); 89% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.40–7.27 (m, 6H), 7.24 (d,  $J = 8.9$  Hz, 1H), 7.11–7.01 (m, 4H), 6.98 (dd,  $J = 8.9, 2.3$  Hz, 1H), 6.69 (d,  $J = 2.3$  Hz, 1H), 6.16 (d,  $J = 8.4$  Hz, 1H), 4.92 (d,  $J = 6.1$  Hz, 2H), 4.71 (d,  $J = 8.5$  Hz, 1H), 3.75 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 153.44, 151.24, 137.17, 132.89, 129.83, 129.64, 128.60, 128.51, 127.94, 127.63, 125.80, 125.27, 121.91, 118.75, 113.62, 110.90, 110.20, 102.24, 70.74, 55.13, 33.20; IR (neat) 3268, 2922, 1622, 1578, 1547, 1451, 1415, 1390, 1261, 1189, 1165, 1099, 1020 cm<sup>−1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>23</sub>H<sub>20</sub>N<sub>2</sub>O<sub>4</sub>S: 420.1144 Found: 420.1125; Chiralpak IA column and IA guard column (20% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 26.6$  min and *minor*-isomer  $t_r = 46.0$  min.



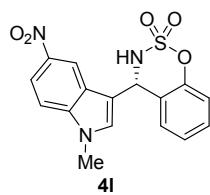
**(S)-4-(5-Bromo-1-methyl-1H-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4i).** 34 mg, yield 87%, White solid; m.p. 164–166 °C;  $[\alpha]_D^{19} = +75.2$  ( $c = 0.26$ , CHCl<sub>3</sub>); 68% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.36 (ddd,  $J = 10.4, 7.2, 1.6$  Hz, 3H), 7.23 (d,  $J = 8.7$  Hz, 1H), 7.15–7.01 (m, 4H), 6.18 (d,  $J = 8.4$  Hz, 1H), 4.71 (d,  $J = 8.4$  Hz, 1H), 3.80 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 151.22, 136.15, 130.47, 129.88, 128.25, 127.15, 125.73, 125.33, 121.48, 121.42, 118.97, 113.73, 111.56, 110.53, 54.77, 33.27; IR (neat) 3265, 2923, 1729, 1613, 1580, 1545, 1422, 1402, 1359, 1302, 1197, 1072, 1047, 1007 cm<sup>−1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>16</sub>H<sub>13</sub>BrN<sub>2</sub>O<sub>3</sub>S: 391.9830 Found: 391.9811; Chiralpak IA column and IA guard column (7% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 37.6$  min and *minor*-isomer  $t_r = 42.2$  min.



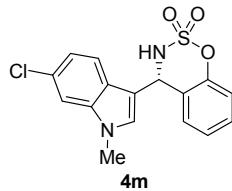
**(S)-4-(5-Cyano-1-methyl-1H-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4j).** 15 mg, yield 45%, White solid; m.p. 227–229 °C;  $[\alpha]_D^{19} = +115.6$  ( $c = 0.15$ , CHCl<sub>3</sub>); 84% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.61 (s, 1H), 7.49 (dd,  $J = 8.6, 1.4$  Hz, 1H), 7.45–7.35 (m, 2H), 7.29 (s, 1H), 7.17–7.07 (m, 2H), 7.02 (d,  $J = 7.7$  Hz, 1H), 6.23 (d,  $J = 8.3$  Hz, 1H), 4.87 (d,  $J = 8.3$  Hz, 1H), 3.86 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 151.23, 138.95, 131.79, 130.15, 128.06, 125.65, 125.42, 125.32, 124.67, 121.05, 120.09, 119.18, 112.24, 110.99, 103.51, 54.49, 33.38; IR (neat) 3188, 2221, 1615, 1581, 1485, 1453, 1433, 1381, 1363, 1281, 1164, 1098, 1015 cm<sup>−1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>17</sub>H<sub>13</sub>N<sub>3</sub>O<sub>3</sub>S: 339.0678 Found: 339.0674; Chiralpak IA column and IA guard column (13% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 35.8$  min and *minor*-isomer  $t_r = 61.6$  min.



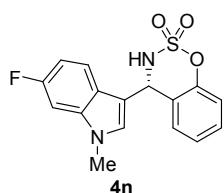
**(S)-4-(5-Methoxycarbonyl-1-methyl-1H-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4k).** 32 mg, yield 85%, White solid; m.p. 210–212 °C;  $[\alpha]_D^{19} = +97.38$  ( $c = 0.41$ , CHCl<sub>3</sub>); 88% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.08 (d,  $J = 0.9$  Hz, 1H), 7.96 (dd,  $J = 8.7, 1.4$  Hz, 1H), 7.43–7.32 (m, 2H), 7.17 (s, 1H), 7.15–7.02 (m, 3H), 6.28 (d,  $J = 8.5$  Hz, 1H), 4.91 (d,  $J = 8.6$  Hz, 1H), 3.87 (s, 3H), 3.83 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 167.68, 151.32, 139.77, 130.76, 129.85, 128.24, 125.28, 125.23, 124.11, 122.35, 121.65, 121.59, 118.98, 112.76, 109.71, 54.57, 52.01, 33.29; IR (neat) 3152, 2948, 2923, 2849, 1684, 1612, 1453, 1411, 1369, 1246, 1196, 1173, 1096, 1021 cm<sup>−1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>18</sub>H<sub>16</sub>N<sub>2</sub>O<sub>5</sub>S: 372.0780 Found: 372.0764; Chiralpak IA column and IA guard column (20% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 23.9$  min and *minor*-isomer  $t_r = 27.8$  min.



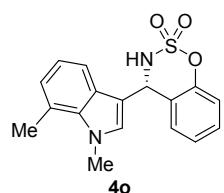
**(S)-4-(1-Methyl-5-nitro-1H-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4l).** 32 mg, yield 88%, White solid; m.p. 227–229 °C;  $[\alpha]_{\text{D}}^{19} = -169.3$  ( $c = 0.22, \text{CHCl}_3$ ); 78% ee;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.29 (d,  $J = 2.1$  Hz, 1H), 8.15 (dd,  $J = 9.1, 2.2$  Hz, 1H), 7.45–7.35 (m, 2H), 7.27 (s, 1H), 7.16–7.09 (m, 2H), 7.05 (d,  $J = 7.6$  Hz, 1H), 6.28 (d,  $J = 7.9$  Hz, 1H), 4.96 (d,  $J = 8.1$  Hz, 1H), 3.88 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  151.30, 141.99, 140.06, 132.64, 130.15, 128.08, 125.38, 125.07, 120.94, 119.21, 118.31, 116.19, 114.06, 110.12, 54.28, 33.61; IR (neat) 3253, 2922, 2852, 1728, 1578, 1548, 1516, 1483, 1450, 1363, 1331, 1196, 1090, 1044  $\text{cm}^{-1}$ ; HRMS (EI) m/z calcd for  $[\text{M}]^+$   $\text{C}_{16}\text{H}_{13}\text{N}_3\text{O}_5\text{S}$ : 359.0576 Found: 359.0570; Chiralpak IA column and IA guard column (20% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 21.9$  min and *minor*-isomer  $t_r = 29.6$  min.



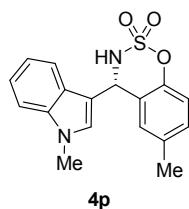
**(S)-4-(6-Chloro-1-methyl-1H-indol-3-yl)-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4m).** 17 mg, yield 48%, White solid; m.p. 100–102 °C;  $[\alpha]_{\text{D}}^{19} = +71.5$  ( $c = 0.12, \text{CHCl}_3$ ); 78% ee;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.38–7.31 (m, 2H), 7.16 (s, 1H), 7.11 (dd,  $J = 8.4, 6.2$  Hz, 2H), 7.09–7.00 (m, 3H), 6.20 (d,  $J = 8.4$  Hz, 1H), 4.70 (d,  $J = 8.4$  Hz, 1H), 3.78 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  151.22, 137.97, 130.02, 129.80, 128.94, 128.29, 125.29, 123.93, 121.67, 121.01, 119.86, 118.90, 111.17, 110.14, 54.88, 33.16; IR (neat) 3270, 2923, 2853, 1716, 1580, 1477, 1451, 1416, 1360, 1329, 1256, 1192, 1165, 1099, 1067, 1010  $\text{cm}^{-1}$ ; HRMS (EI) m/z calcd for  $[\text{M}]^+$   $\text{C}_{16}\text{H}_{13}\text{ClN}_2\text{O}_3\text{S}$ : 348.0335 Found: 348.0332; Chiralpak IA column and IA guard column (10% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 27.4$  min and *minor*-isomer  $t_r = 32.7$  min.



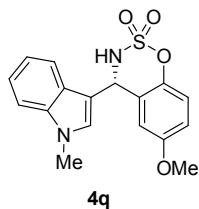
**(S)-4-(6-Fluoro-1-methyl-1*H*-indol-3-yl)-3,4-dihydrobenzo[*e*][1,2,3]oxathiazine 2,2-dioxide (4n).** 29 mg, yield 88%, White solid; m.p. 182–184 °C;  $[\alpha]_D^{19} = -11.2$  ( $c = 0.28$ , CHCl<sub>3</sub>); 85% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.38–7.31 (m, 1H), 7.16–7.04 (m, 5H), 7.03 (dd,  $J = 9.5, 2.2$  Hz, 1H), 6.83 (td,  $J = 9.3, 2.3$  Hz, 1H), 6.20 (d,  $J = 8.3$  Hz, 1H), 4.72 (d,  $J = 8.2$  Hz, 1H), 3.77 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 160.23 (d,  $J^1 = 240.0$  Hz), 159.04, 151.21, 137.68 (d,  $J^3 = 11.9$  Hz), 129.76, 128.35, 125.28, 121.86, 121.76, 119.92, 119.82, 118.86, 111.12, 109.12 (d,  $J^2 = 24.7$  Hz), 96.53 (d,  $J^2 = 26.2$  Hz), 54.97, 33.18; IR (neat) 3251, 2959, 2923, 1730, 1625, 1578, 1547, 1477, 1413, 1338, 1287, 1205, 1163, 1103, 1002 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>16</sub>H<sub>13</sub>FN<sub>2</sub>O<sub>3</sub>S: 332.0631 Found: 332.0636; Chiralpak IA column and IA guard column (15% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 16.7$  min and *minor*-isomer  $t_r = 19.4$  min.



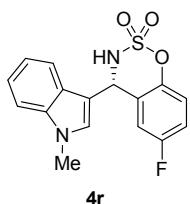
**(S)-4-(1,7-Dimethyl-1*H*-indol-3-yl)-3,4-dihydrobenzo[*e*][1,2,3]oxathiazine 2,2-dioxide (4o).** 26 mg, yield 79%, White solid; m.p. 148–150 °C;  $[\alpha]_D^{19} = +43.8$  ( $c = 0.37$ , CHCl<sub>3</sub>); 88% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.32 (dtd,  $J = 8.2, 4.2, 2.2$  Hz, 1H), 7.10 (d,  $J = 8.2$  Hz, 1H), 7.08–7.02 (m, 4H), 6.98–6.88 (m, 2H), 6.19 (d,  $J = 8.4$  Hz, 1H), 4.71 (d,  $J = 8.4$  Hz, 1H), 4.07 (s, 3H), 2.77 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 151.22, 136.29, 130.94, 129.60, 128.41, 126.42, 125.35, 125.27, 122.20, 122.01, 120.53, 118.78, 116.88, 110.37, 55.08, 37.09, 19.72; IR (neat) 3256, 2925, 1605, 1580, 1480, 1450, 1406, 1372, 1253, 1195, 1165, 1095, 1011 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>17</sub>H<sub>16</sub>N<sub>2</sub>O<sub>3</sub>S: 328.0882 Found: 328.0898; Chiralpak IA column and IA guard column (15% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 18.9$  min and *minor*-isomer  $t_r = 23.8$  min.



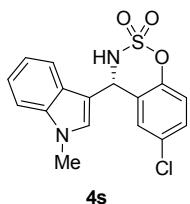
**(S)-4-(1-Methyl-1*H*-indol-3-yl)-6-methyl-3,4-dihydrobenzo[*e*][1,2,3]oxathiazine 2,2-dioxide (4p).** 31 mg, yield 95%, White solid; m.p. 104–106 °C;  $[\alpha]_D^{20} = +61.2$  ( $c = 0.36$ , CHCl<sub>3</sub>); 91% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.40–7.34 (m, 1H), 7.29–7.24 (m, 2H), 7.15 (s, 1H), 7.13–7.04 (m, 2H), 6.98 (d,  $J = 8.4$  Hz, 1H), 6.85 (s, 1H), 6.17 (d,  $J = 8.4$  Hz, 1H), 4.68 (d,  $J = 8.4$  Hz, 1H), 3.82 (s, 3H), 2.17 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 149.13, 137.51, 135.03, 130.27, 129.29, 128.51, 125.42, 122.67, 121.59, 120.22, 118.92, 118.53, 111.02, 110.02, 55.11, 33.06, 20.77; IR (neat) 3267, 2921, 1550, 1486, 1411, 1376, 1333, 1280, 1257, 1203, 1173, 1106, 1064, 1014 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>17</sub>H<sub>16</sub>N<sub>2</sub>O<sub>3</sub>S: 328.0882 Found: 328.0894; Chiralpak IA column and IA guard column (10% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 25.6$  min and *minor*-isomer  $t_r = 32.9$  min.



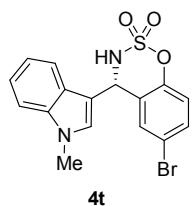
**(S)-4-(1-Methyl-1*H*-indol-3-yl)-6-methoxy-3,4-dihydrobenzo[*e*][1,2,3]oxathiazine 2,2-dioxide (4q).** 34 mg, yield 99%, White solid; m.p. 167–169 °C;  $[\alpha]_D^{20} = +71.5$  ( $c = 0.31$ , CHCl<sub>3</sub>); 93% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.36 (d,  $J = 8.2$  Hz, 1H), 7.30–7.24 (m, 2H), 7.15 (s, 1H), 7.11–7.05 (m, 1H), 7.03 (d,  $J = 9.0$  Hz, 1H), 6.85 (dd,  $J = 9.0, 3.0$  Hz, 1H), 6.58–6.53 (m, 1H), 6.18 (d,  $J = 8.4$  Hz, 1H), 4.67 (d,  $J = 8.4$  Hz, 1H), 3.81 (s, 3H), 3.61 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 156.57, 145.03, 137.51, 129.27, 125.39, 122.91, 122.72, 120.27, 119.68, 118.88, 115.10, 113.12, 110.79, 110.03, 55.71, 55.21, 33.06; IR (neat) 3246, 2928, 2842, 1615, 1551, 1490, 1415, 1390, 1335, 1286, 1253, 1160, 1066, 1008 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>17</sub>H<sub>16</sub>N<sub>2</sub>O<sub>4</sub>S: 344.0831 Found: 344.00798; Chiralpak IA column and IA guard column (15% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 19.4$  min and *minor*-isomer  $t_r = 22.8$  min.



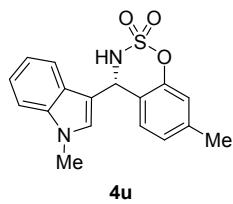
**(S)-4-(1-Methyl-1*H*-indol-3-yl)-6-fluoro-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4r).** 32 mg, yield 96%, White solid; m.p. 91–93 °C;  $[\alpha]_D^{20} = +21.7$  ( $c = 0.38$ , CHCl<sub>3</sub>); 84% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.38 (d,  $J = 8.3$  Hz, 1H), 7.31–7.26 (m, 1H), 7.22 (d,  $J = 8.0$  Hz, 1H), 7.19 (s, 1H), 7.12–7.06 (m, 2H), 7.06–6.99 (m, 1H), 6.77 (dd,  $J = 8.7, 2.4$  Hz, 1H), 6.18 (d,  $J = 8.4$  Hz, 1H), 4.73 (d,  $J = 8.4$  Hz, 1H), 3.83 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 159.26 (d,  $J^1 = 245.3$  Hz), 147.06, 137.57, 129.40, 125.12, 123.86 (d,  $J^3 = 7.2$  Hz), 120.43, 120.3 (d,  $J^3 = 8.3$  Hz), 118.69, 116.77 (d,  $J^2 = 23.9$  Hz), 114.89 (d,  $J^2 = 25.0$  Hz), 110.19, 110.02, 55.10, 33.10; IR (neat) 3266, 2920, 1617, 1550, 1480, 1415, 1388, 1334, 1254, 1200, 1156, 1095, 1065 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>16</sub>H<sub>13</sub>FN<sub>2</sub>O<sub>3</sub>S: 332.0631 Found: 332.0659; Chiraldak IA column and IA guard column (10% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 20.1$  min and *minor*-isomer  $t_r = 22.9$  min.



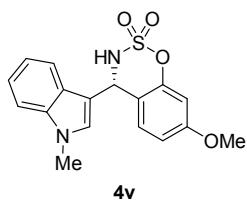
**(S)-4-(1-Methyl-1*H*-indol-3-yl)-6-chloro-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4s).** 34 mg, yield 99%, White solid; m.p. 144–146 °C;  $[\alpha]_D^{20} = +78.0$  ( $c = 0.38$ , CHCl<sub>3</sub>); 84% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.38 (d,  $J = 8.3$  Hz, 1H), 7.33–7.26 (m, 2H), 7.23 (d,  $J = 8.0$  Hz, 1H), 7.18 (s, 1H), 7.09 (t,  $J = 7.5$  Hz, 1H), 7.07–7.01 (m, 2H), 6.17 (d,  $J = 8.4$  Hz, 1H), 4.76 (d,  $J = 8.4$  Hz, 1H), 3.83 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 149.68, 137.56, 130.51, 129.79, 129.40, 128.19, 125.14, 123.81, 122.88, 120.47, 120.24, 118.65, 110.21, 109.95, 54.96, 33.13; IR (neat) 3270, 2930, 1550, 1471, 1414, 1388, 1334, 1293, 1273, 1252, 1192, 1162, 1108, 1064 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>16</sub>H<sub>13</sub>ClN<sub>2</sub>O<sub>3</sub>S: 348.0335 Found: 348.0345; Chiraldak IB column and IB guard column (20% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 14.2$  min and *minor*-isomer  $t_r = 17.6$  min.



**(S)-4-(1-Methyl-1*H*-indol-3-yl)-6-bromo-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4t).** 36 mg, yield 92%, White solid; m.p. 108–110 °C;  $[\alpha]_D^{20} = +88.6$  ( $c = 0.19$ , CHCl<sub>3</sub>); 83% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.43 (ddd,  $J = 8.7, 2.4, 0.7$  Hz, 1H), 7.38 (d,  $J = 8.3$  Hz, 1H), 7.31–7.26 (m, 1H), 7.25–7.21 (m, 1H), 7.19 (dd,  $J = 2.3, 0.9$  Hz, 1H), 7.17 (s, 1H), 7.12–7.06 (m, 1H), 6.98 (d,  $J = 8.8$  Hz, 1H), 6.17 (d,  $J = 8.1$  Hz, 1H), 4.77 (d,  $J = 8.2$  Hz, 1H), 3.83 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 150.25, 137.56, 132.71, 131.09, 129.38, 125.13, 124.19, 122.90, 120.58, 120.48, 118.64, 118.00, 110.21, 109.96, 54.87, 33.13; IR (neat) 3264, 2919, 1549, 1468, 1414, 1388, 1322, 1254, 1189, 1163, 1107, 1077, 1030, 1014 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>16</sub>H<sub>13</sub>BrN<sub>2</sub>O<sub>3</sub>S: 391.9830 Found: 391.9814; Chiraldak IA column and IA guard column (7% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 30.9$  min and *minor*-isomer  $t_r = 37.6$  min.

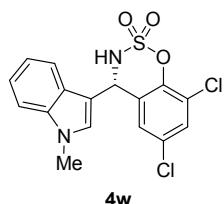


**(S)-4-(1-Methyl-1*H*-indol-3-yl)-7-methyl-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4u).** 30 mg, yield 93%, White solid; m.p. 94–96 °C;  $[\alpha]_D^{20} = +41.3$  ( $c = 0.36$ , CHCl<sub>3</sub>); 89% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.36 (d,  $J = 8.3$  Hz, 1H), 7.25 (td,  $J = 8.0, 3.1$  Hz, 2H), 7.14 (s, 1H), 7.09–7.02 (m, 1H), 6.95–6.89 (m, 2H), 6.86 (d,  $J = 8.0$  Hz, 1H), 6.17 (d,  $J = 8.4$  Hz, 1H), 4.68 (d,  $J = 8.5$  Hz, 1H), 3.80 (s, 3H), 2.34 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 151.02, 140.14, 137.53, 129.36, 128.16, 126.19, 125.41, 122.67, 120.18, 118.97(two peaks overlapping), 118.89, 110.95, 110.02, 54.96, 33.04, 21.04; IR (neat) 3262, 2920, 1624, 1550, 1501, 1475, 1410, 1261, 1188, 1149, 1099, 1065, 1012 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>17</sub>H<sub>15</sub>N<sub>2</sub>O<sub>3</sub>S: 328.0882 Found: 328.0880; Chiraldak IA column and IA guard column (15% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 13.6$  min and *minor*-isomer  $t_r = 18.2$  min.

**4v**

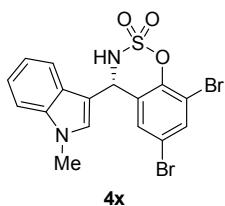
**(S)-4-(1-Methyl-1*H*-indol-3-yl)-7-methoxy-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4v).**

15 mg, yield 45%, White solid; m.p. 144–146 °C;  $[\alpha]_D^{20} = +36.7$  ( $c = 0.22$ , CHCl<sub>3</sub>); 80% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.37 (d,  $J = 8.3$  Hz, 1H), 7.30–7.26 (m, 1H), 7.25–7.22 (m, 1H), 7.17 (s, 1H), 7.08 (dd,  $J = 11.0, 4.0$  Hz, 1H), 6.95 (d,  $J = 8.1$  Hz, 1H), 6.65–6.60 (m, 2H), 6.17 (d,  $J = 8.5$  Hz, 1H), 4.66 (d,  $J = 8.6$  Hz, 1H), 3.82 (s, 3H), 3.81 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 160.37, 151.87, 137.55, 129.35, 129.08, 125.33, 122.69, 120.21, 119.00, 113.69, 112.18, 110.95, 110.03, 103.35, 55.64, 54.75, 33.06; IR (neat) 3255, 2920, 2850, 1734, 1622, 1575, 1502, 1466, 1416, 1357, 1269, 1235, 1200, 1187, 1152, 1088, 1029 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>17</sub>H<sub>16</sub>N<sub>2</sub>O<sub>4</sub>S: 344.0831 Found: 344.0851; Chiralpak IA column and IA guard column (20% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 13.5$  min and *minor*-isomer  $t_r = 18.0$  min.

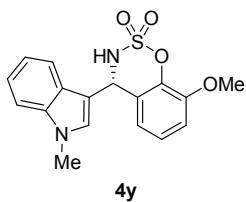
**4w**

**(S)-4-(1-Methyl-1*H*-indol-3-yl)-6,8-dichloro-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4w).**

35 mg, yield 91%, White solid; m.p. 101–103 °C;  $[\alpha]_D^{24} = +64.4$  ( $c = 0.26$ , CHCl<sub>3</sub>); 81% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.44–7.36 (m, 2H), 7.33–7.26 (m, 1H), 7.23 (d,  $J = 8.0$  Hz, 1H), 7.20 (s, 1H), 7.15–7.08 (m, 1H), 6.95 (dd,  $J = 2.4, 1.0$  Hz, 1H), 6.17 (d,  $J = 8.4$  Hz, 1H), 4.90 (d,  $J = 8.5$  Hz, 1H), 3.84 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 145.89, 137.56, 130.20, 130.16, 129.45, 126.63, 125.25, 124.94, 124.71, 123.02, 120.62, 118.55, 110.29, 109.48, 55.20, 33.17; IR (neat) 3272, 2923, 1550, 1444, 1423, 1389, 1335, 1267, 1199, 1156, 1093, 1033, 1015 cm<sup>-1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>16</sub>H<sub>12</sub>Cl<sub>2</sub>N<sub>2</sub>O<sub>3</sub>S: 381.9946 Found: 381.9930; Chiralpak IB column and IB guard column (10% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 32.1$  min and *minor*-isomer  $t_r = 42.5$  min.



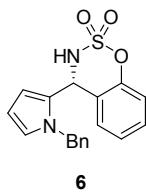
**(S)-4-(1-Methyl-1*H*-indol-3-yl)-6,8-dibromo-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4x).** 44 mg, yield 94%, White solid; m.p. 113–115 °C;  $[\alpha]_D^{22} = +59.4$  ( $c = 0.39$ ,  $\text{CHCl}_3$ ); 84% ee;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.70 (dd,  $J = 2.3, 0.8$  Hz, 1H), 7.39 (d,  $J = 8.3$  Hz, 1H), 7.32–7.26 (m, 1H), 7.26–7.22 (m, 1H), 7.19 (s, 1H), 7.12 (ddd,  $J = 15.1, 5.1, 0.9$  Hz, 2H), 6.17 (d,  $J = 6.7$  Hz, 1H), 4.92 (d,  $J = 7.1$  Hz, 1H), 3.84 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  147.34, 137.55, 135.83, 130.26, 129.46, 125.70, 124.97, 123.01, 120.62, 118.57, 117.85, 113.55, 110.28, 109.51, 55.12, 33.18; IR (neat) 3268, 2924, 1707, 1616, 1552, 1475, 1420, 1388, 1291, 1266, 1192, 1146, 1089, 1066  $\text{cm}^{-1}$ ; HRMS (EI)  $m/z$  calcd for  $[\text{M}]^+$   $\text{C}_{16}\text{H}_{12}\text{Br}_2\text{N}_2\text{O}_3\text{S}$ : 469.8935 Found: 469.8945; Chiralpak AD-H column and AD-H guard column (10% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 220$  nm); *major*-isomer  $t_r = 20.5$  min and *minor*-isomer  $t_r = 25.4$  min.



**(S)-4-(1-Methyl-1*H*-indol-3-yl)-8-methoxy-3,4-dihydrobenzo[e][1,2,3]oxathiazine 2,2-dioxide (4y).** 33 mg, yield 96%, White solid; m.p. 169–171 °C;  $[\alpha]_D^{25} = +64.2$  ( $c = 0.32$ ,  $\text{CHCl}_3$ ); 85% ee;  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.38–7.34 (m, 1H), 7.28–7.23 (m, 2H), 7.16 (s, 1H), 7.06 (td,  $J = 7.3, 0.9$  Hz, 1H), 6.97 (t,  $J = 8.0$  Hz, 1H), 6.90 (d,  $J = 7.6$  Hz, 1H), 6.66–6.58 (m, 1H), 6.22 (d,  $J = 8.5$  Hz, 1H), 4.75 (d,  $J = 8.5$  Hz, 1H), 3.91 (s, 3H), 3.81 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  148.77, 140.92, 137.48, 129.36, 125.36, 124.72, 123.04, 122.66, 120.19, 119.53, 118.93, 111.73, 110.83, 110.03, 56.25, 55.25, 33.06; IR (neat) 3299, 3237, 2932, 1614, 1581, 1550, 1475, 1403, 1354, 1272, 1200, 1151, 1079, 1009  $\text{cm}^{-1}$ ; HRMS (EI)  $m/z$  calcd for  $[\text{M}]^+$   $\text{C}_{17}\text{H}_{16}\text{N}_2\text{O}_4\text{S}$ : 344.0831 Found: 344.0831; Chiralpak IA column and IA guard column (20% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 16.2$  min and *minor*-isomer  $t_r = 20.5$  min.

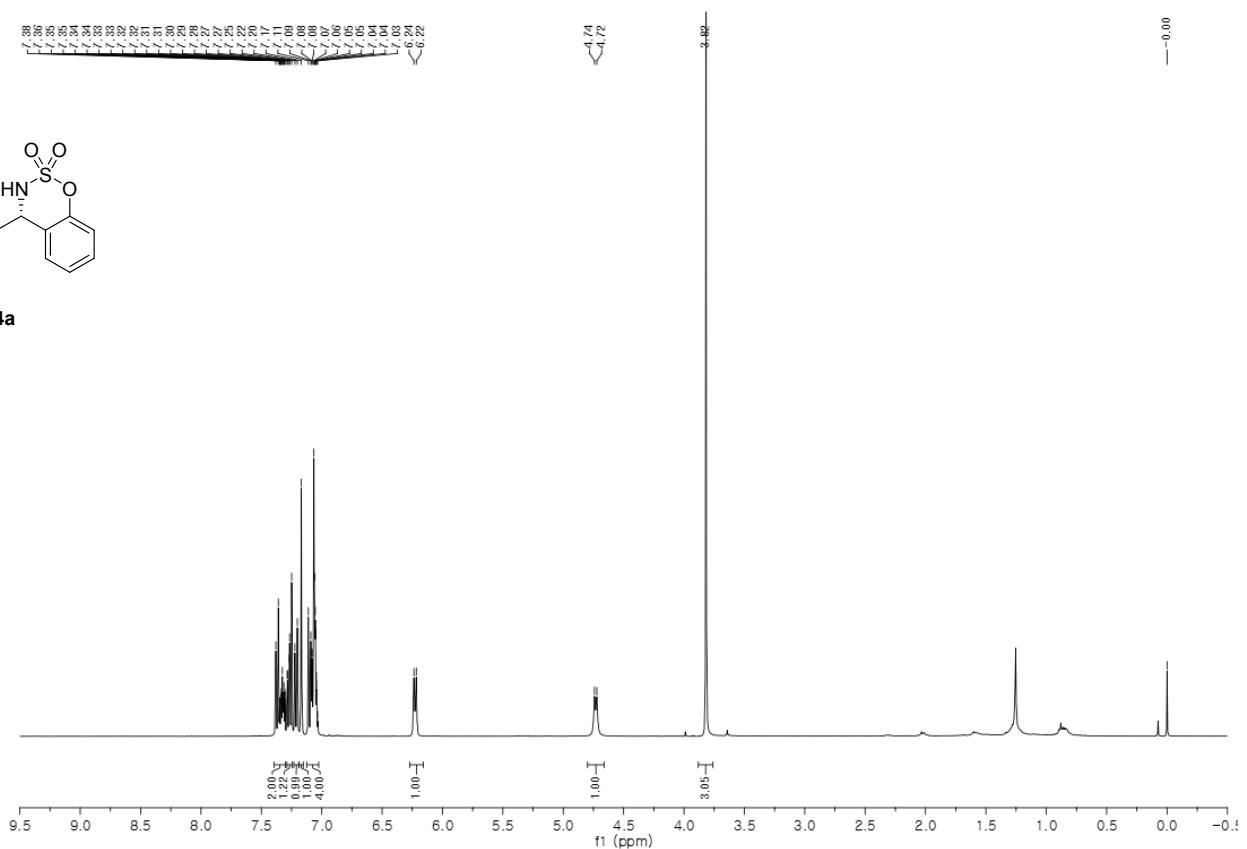
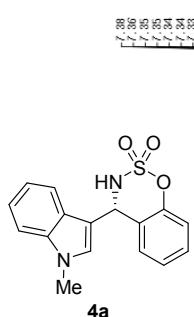
## Enantioselective Friedel–Crafts Reaction of *N*-Benzylpyrrole **5** with Cyclic *N*-Sulfimine **2a**.

To a solution of cyclic *N*-sulfimine **2** (0.1 mmol) in toluene (0.75 mL) was added catalyst **3d** (0.01 mmol). The solution was stirred at –20 °C for 10 min, and then *N*-benzylpyrrole **5** (0.15 mmol) was added in one portion. The reaction mixture was stirred at –20 °C for 72 h. Then, the resulting mixture was diluted with water and extracted with CH<sub>2</sub>Cl<sub>2</sub>. The combined organic layer was washed with brine, dried over anhydrous MgSO<sub>4</sub>, and concentrated in vacuo. The crude residue was purified by flash column chromatography with EtOAc/hexanes as eluent to afford desired product **6**. The enantiomeric excess was determined using HPLC analysis.

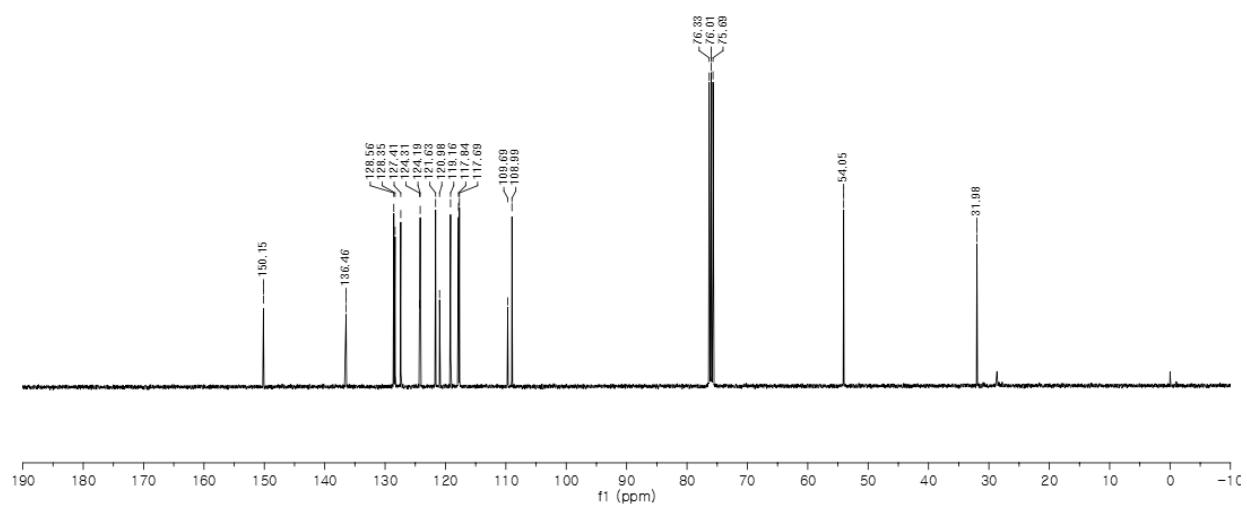


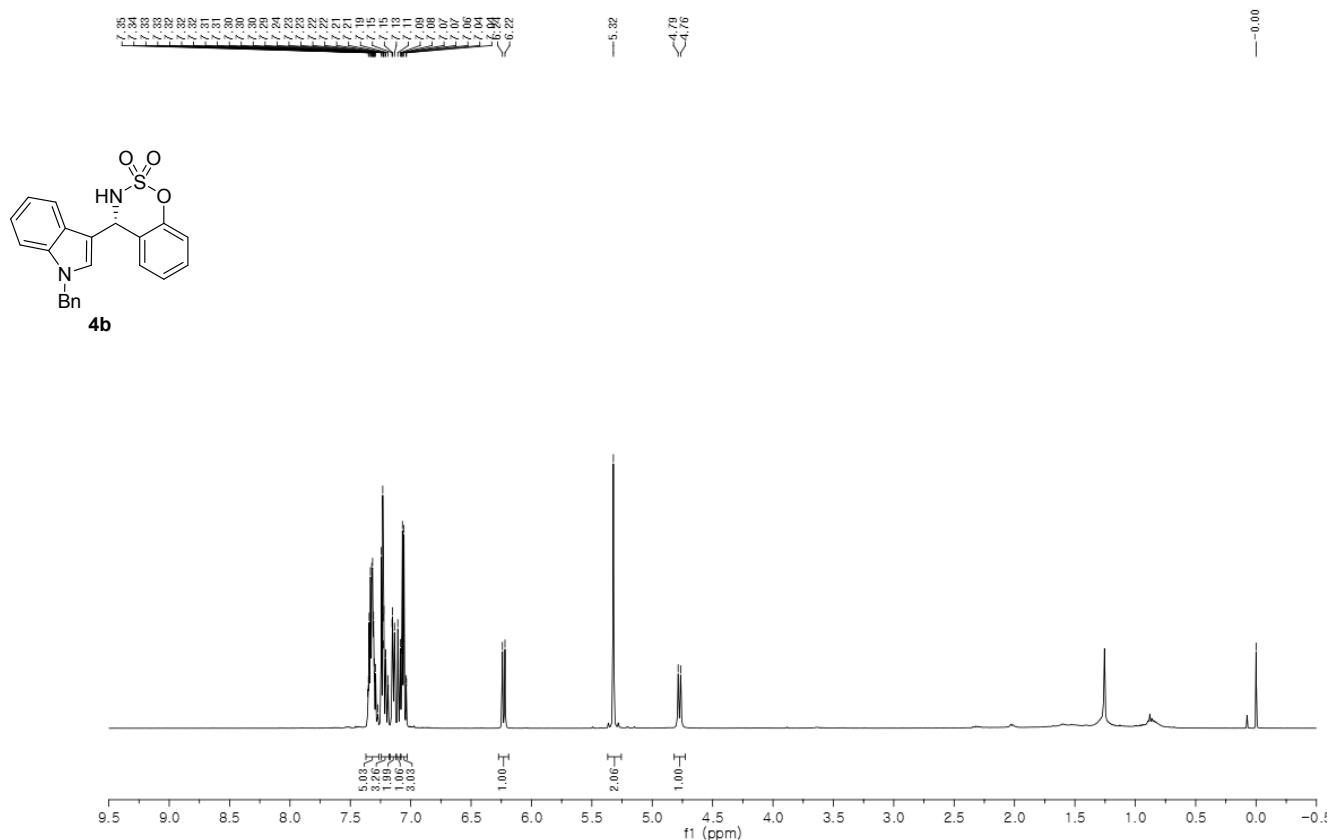
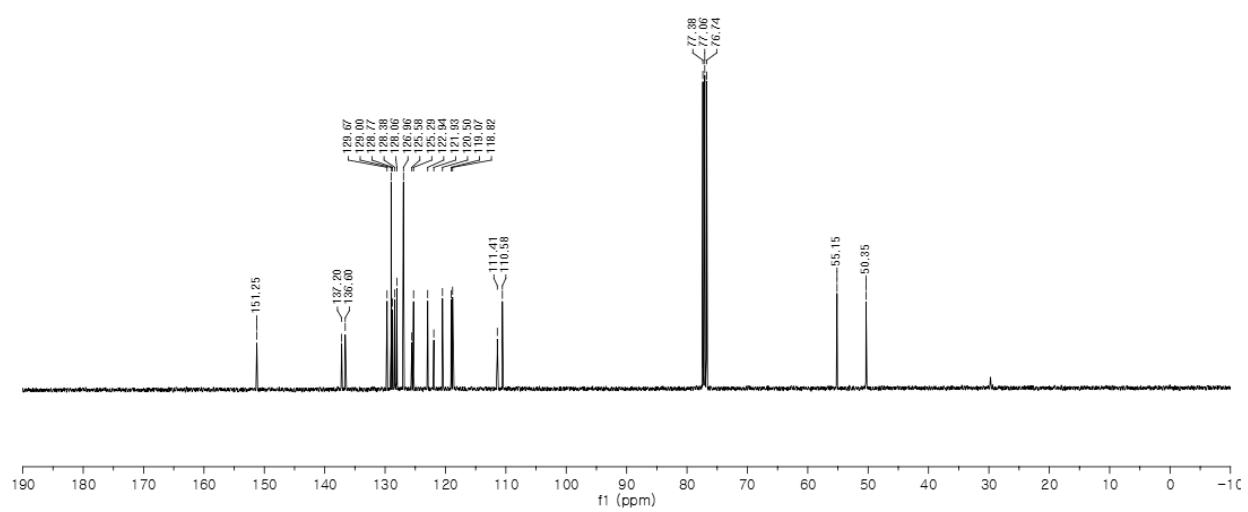
**(S)-4-(1-Benzyl-1*H*-pyrrol-2-yl)-3,4-dihydrobenzo[*e*][1,2,3]oxathiazine 2,2-dioxide (6).** 19 mg, yield 57%, Colorless gum;  $[\alpha]_D^{22} = +91.9$  ( $c = 0.24$ , CHCl<sub>3</sub>); 74% ee; <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.42–7.27 (m, 4H), 7.16–7.01 (m, 5H), 6.85 (dd,  $J = 2.6, 1.8$  Hz, 1H), 6.24–6.15 (m, 1H), 6.10 (dd,  $J = 3.6, 1.6$  Hz, 1H), 5.94 (s, 1H), 5.13 (q,  $J = 16.2$  Hz, 2H), 4.30 (s, 1H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 151.43, 137.32, 129.94, 129.20, 128.33, 128.20, 127.64, 126.46, 125.09, 124.80, 120.42, 118.90, 111.83, 108.00, 77.35, 77.03, 76.72, 54.47, 51.0; IR (neat) 3274, 2924, 2853, 1481, 1451, 1417, 1362, 1286, 1197, 1166, 1099 cm<sup>−1</sup>; HRMS (EI) m/z calcd for [M]<sup>+</sup> C<sub>18</sub>H<sub>16</sub>N<sub>2</sub>O<sub>3</sub>S: 340.0882 Found: 340.0874; Chiralpak IB column and IB guard column (3% EtOH:hexanes, 1.0 mL/min flow,  $\lambda = 254$  nm); *major*-isomer  $t_r = 21.6$  min and *minor*-isomer  $t_r = 20.7$  min.

**<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>**

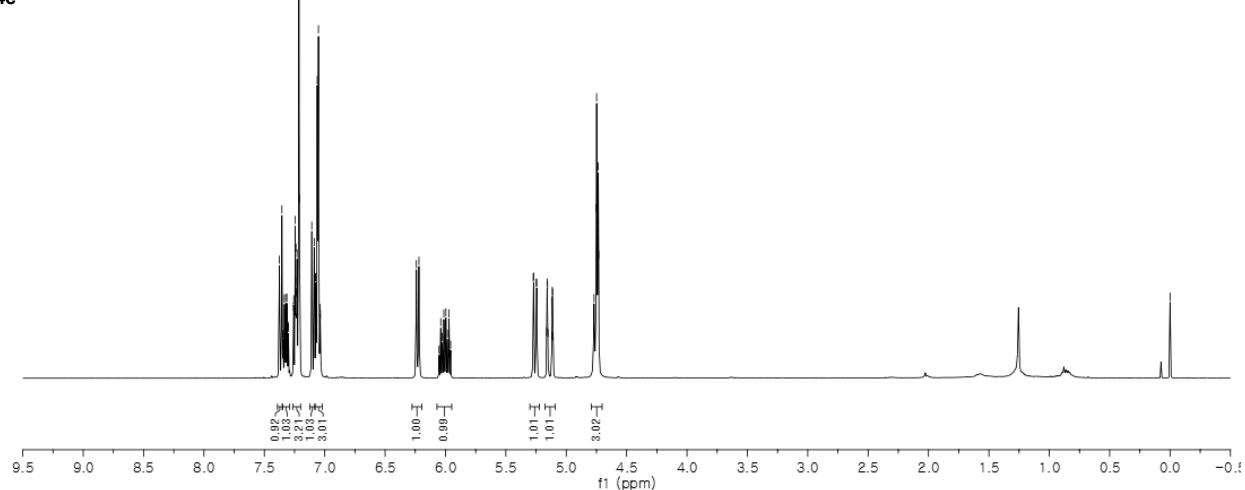
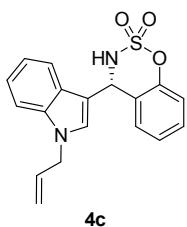


### <sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

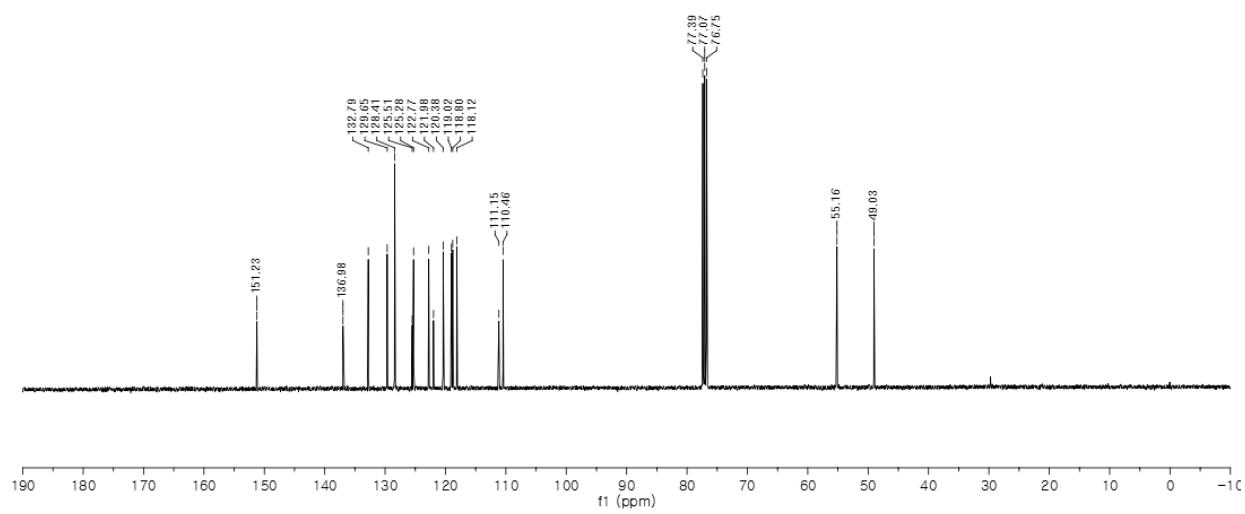


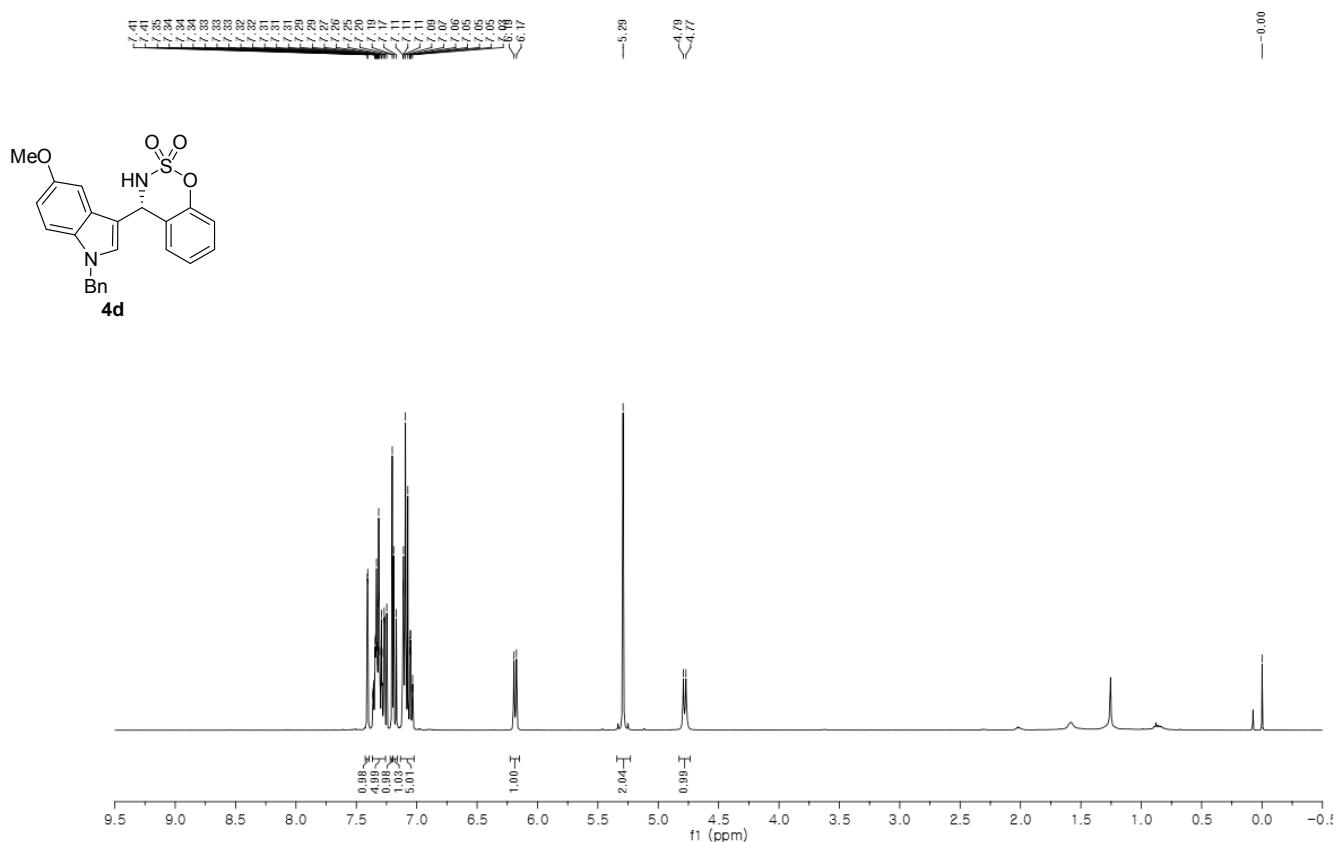
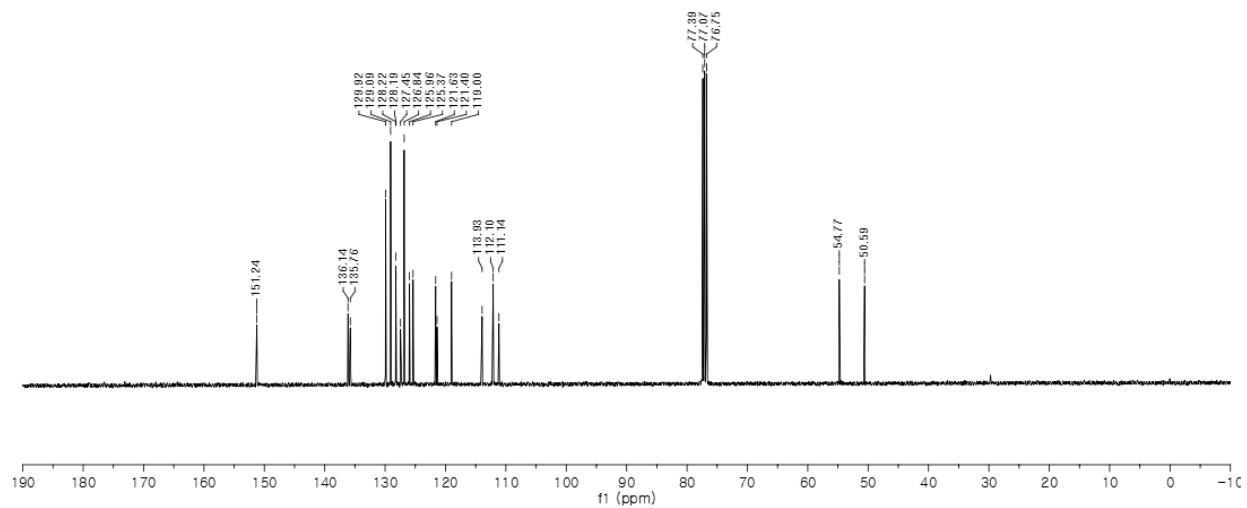
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub><sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

**<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>**

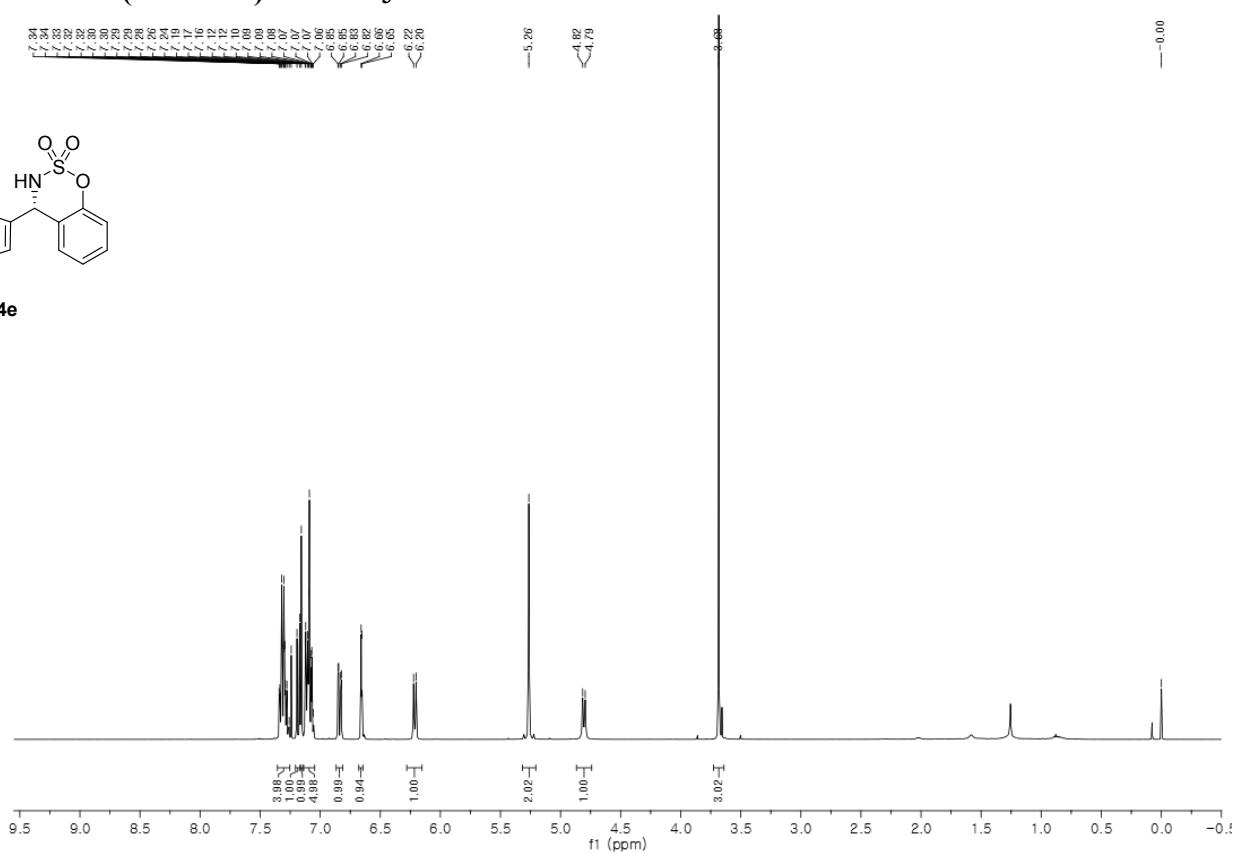
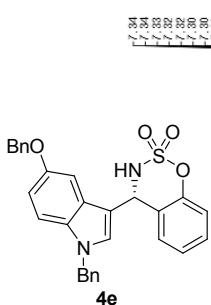


### <sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

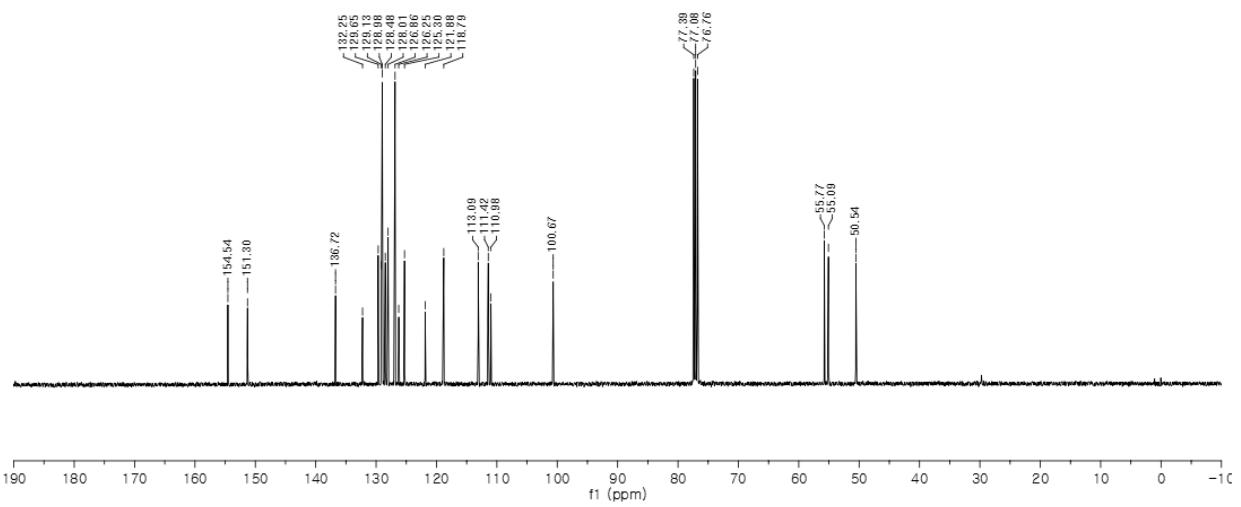


<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub><sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

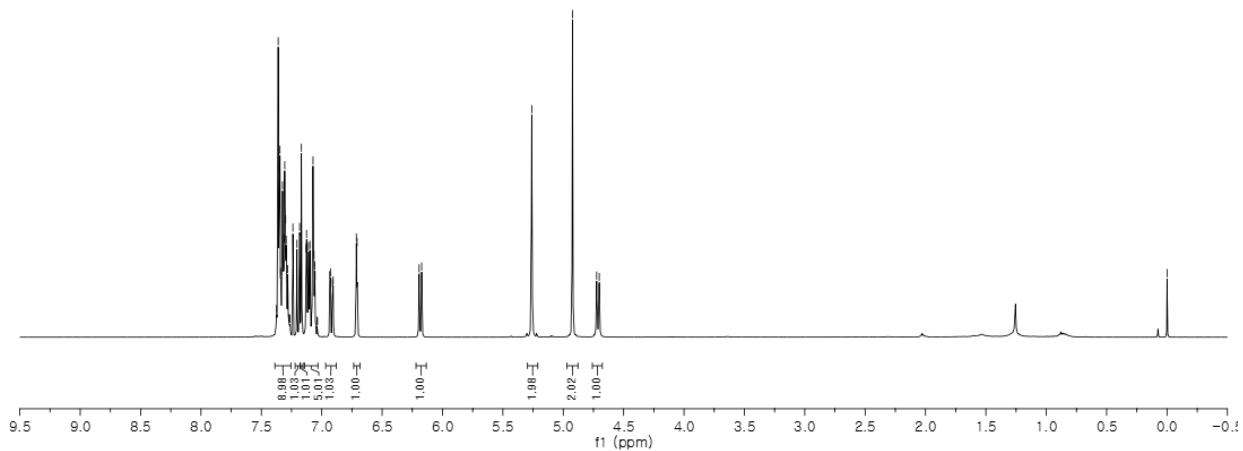
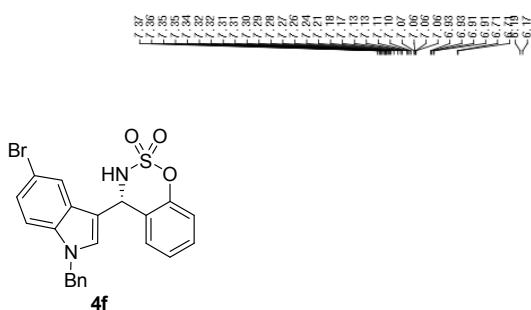
**<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>**



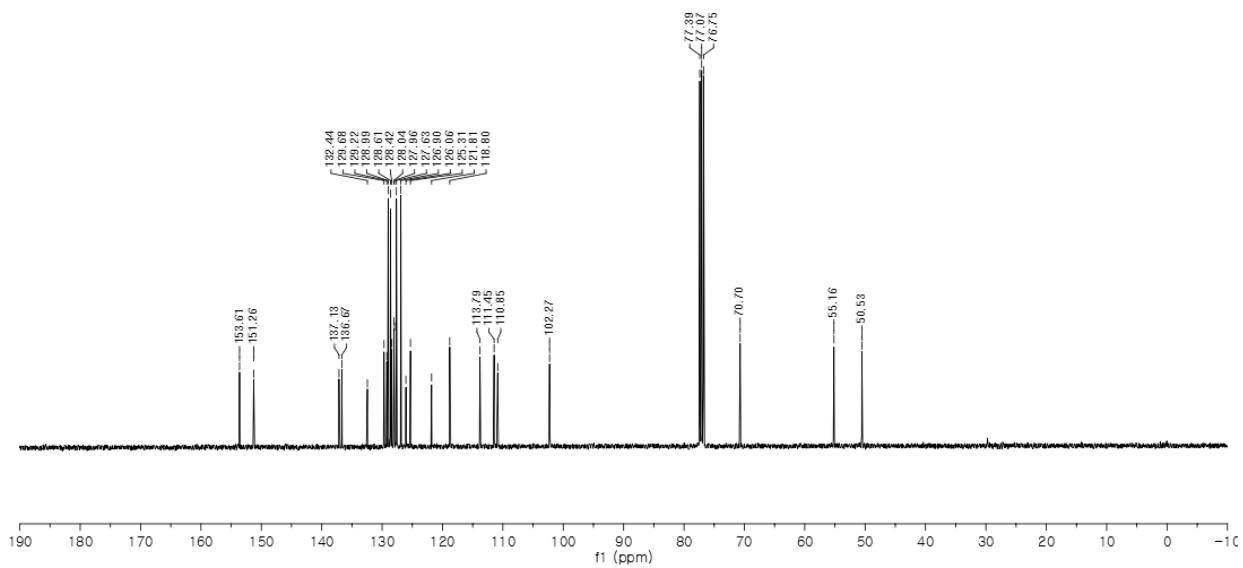
### <sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>



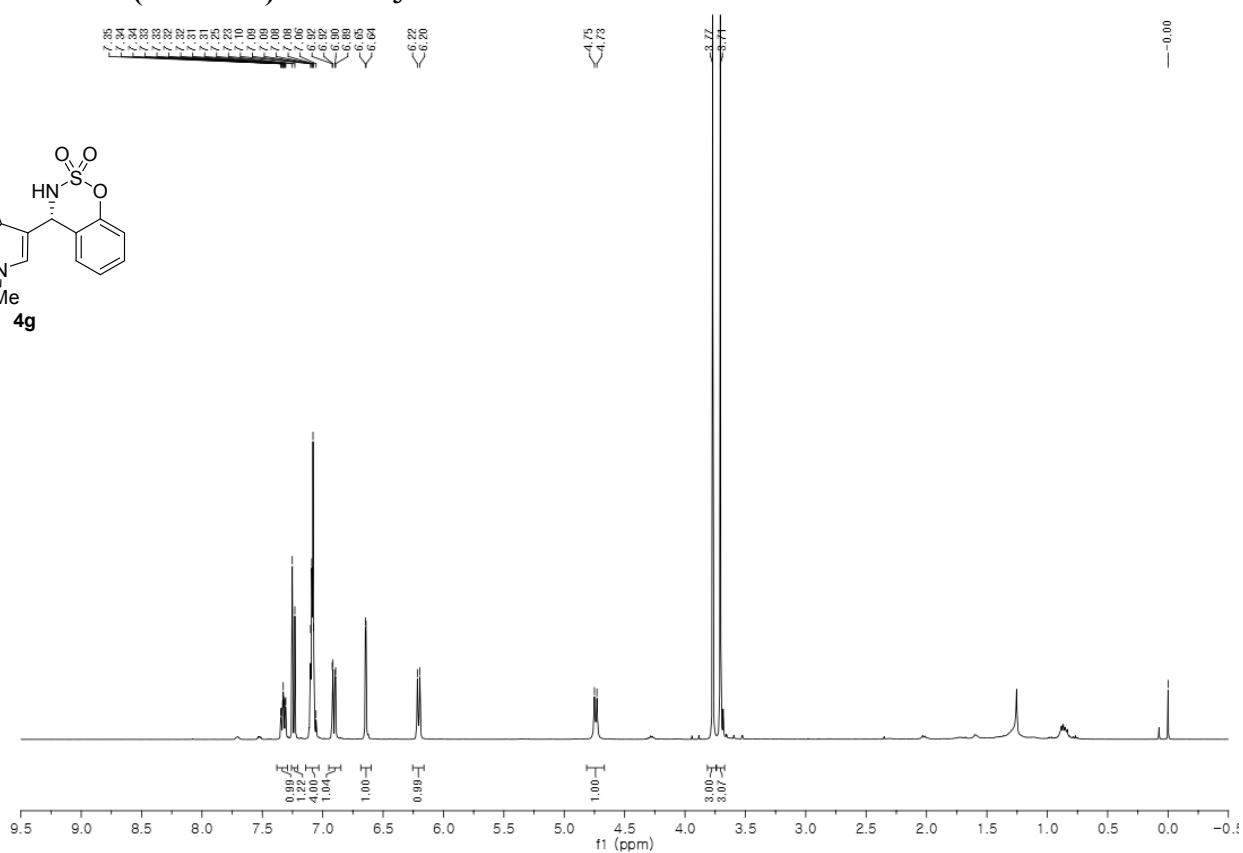
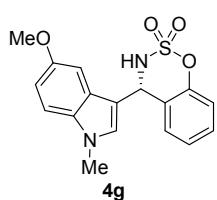
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>



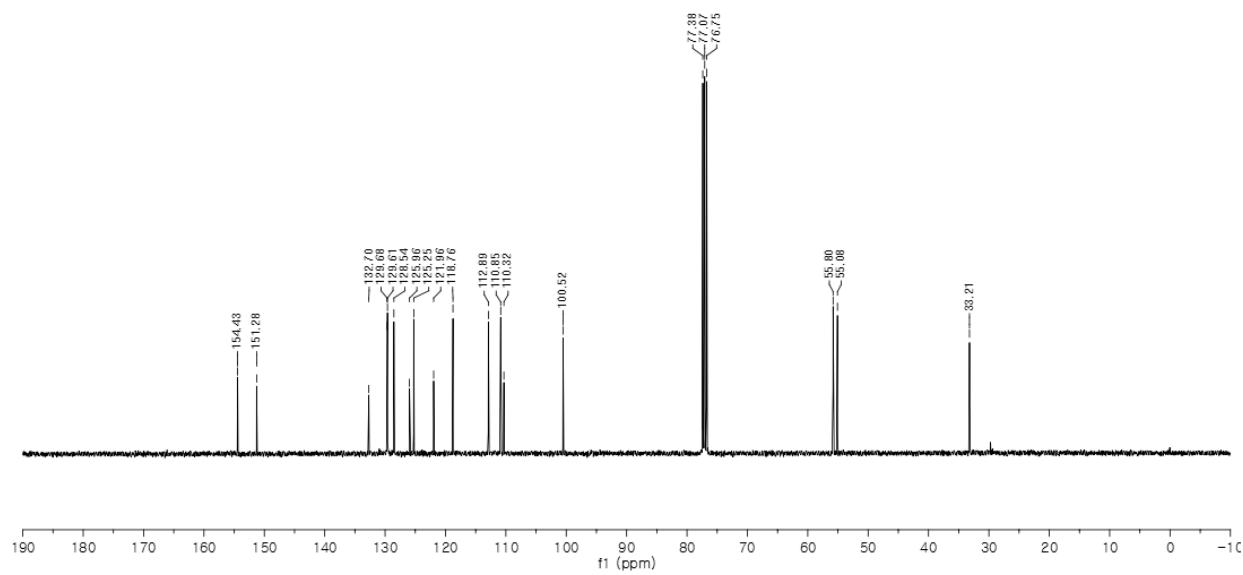
### <sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

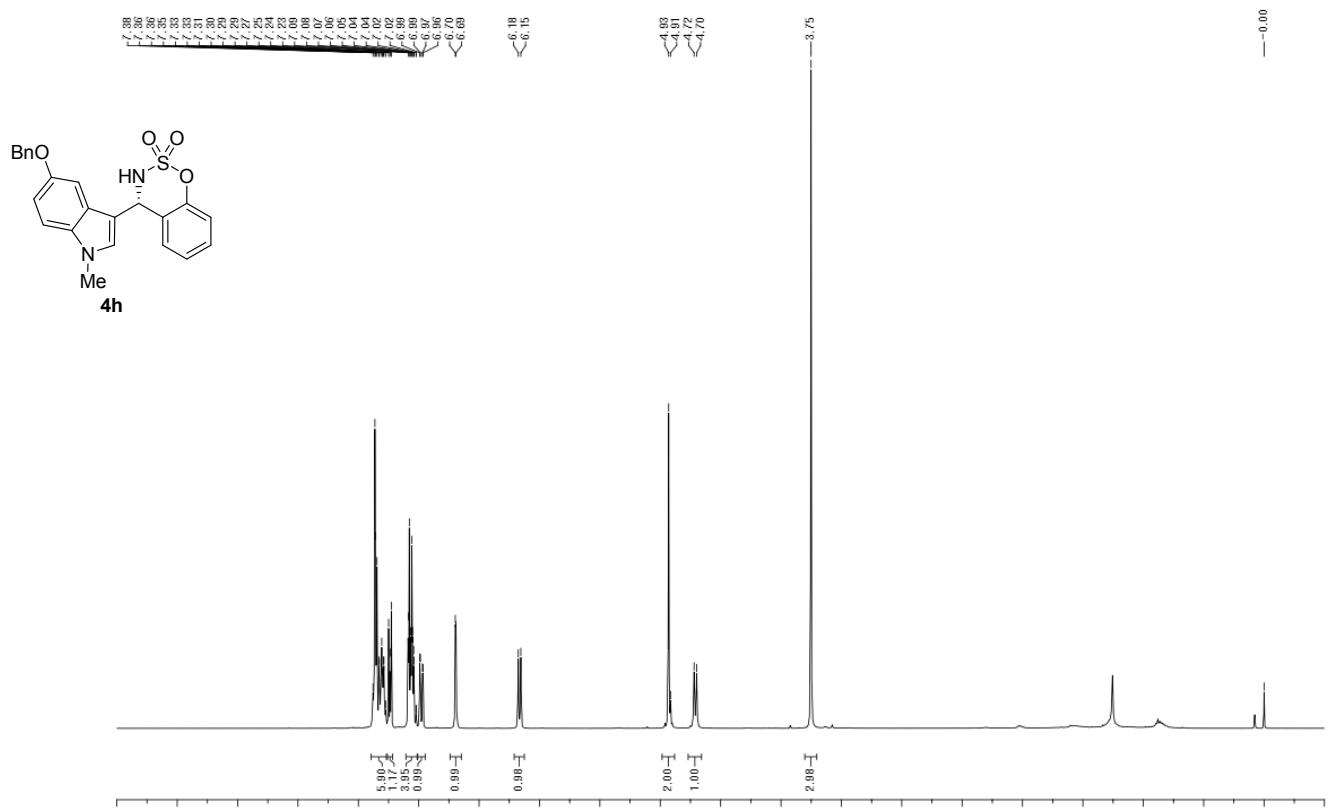


**<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>**

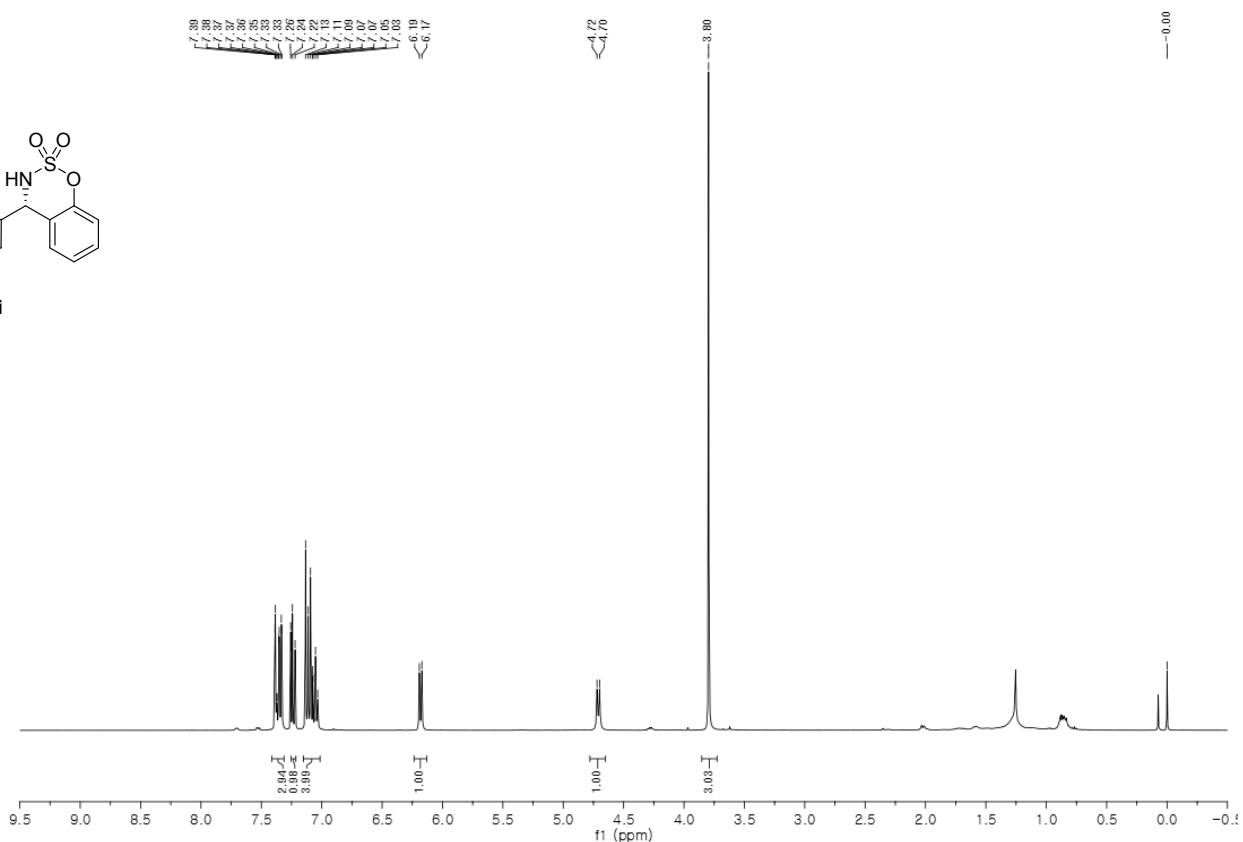
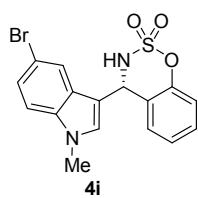


### <sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

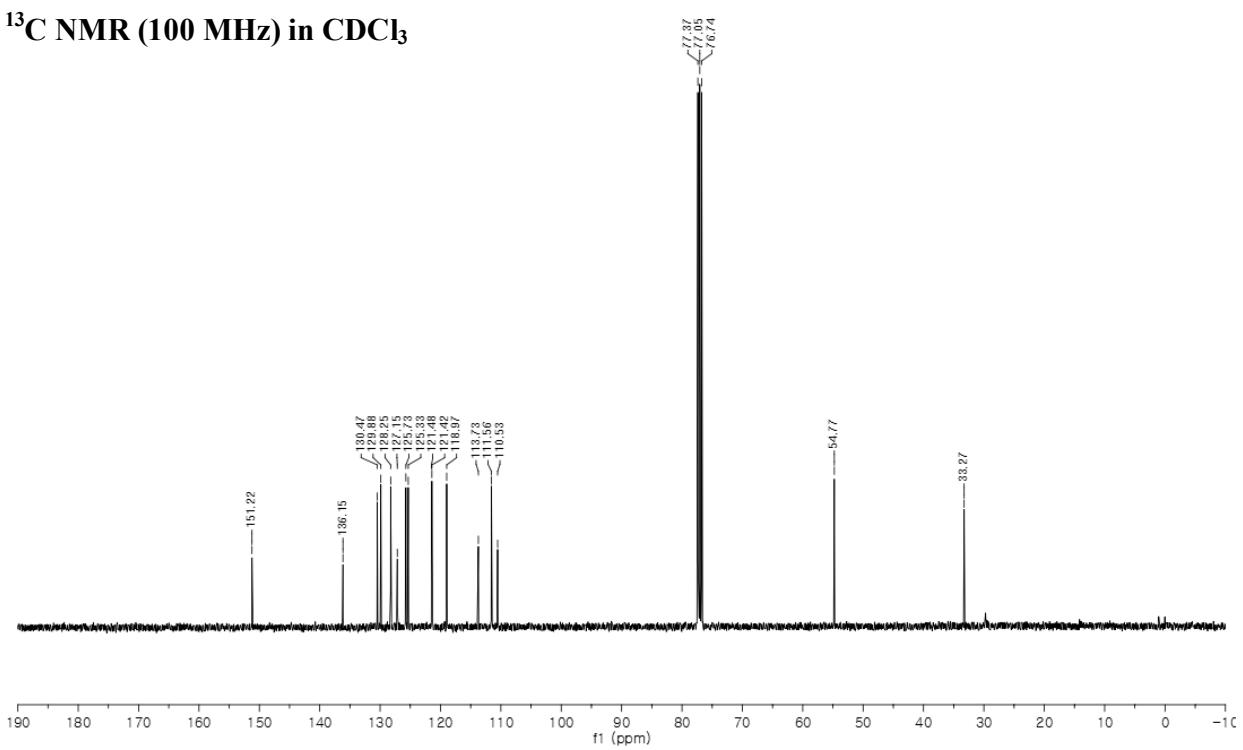


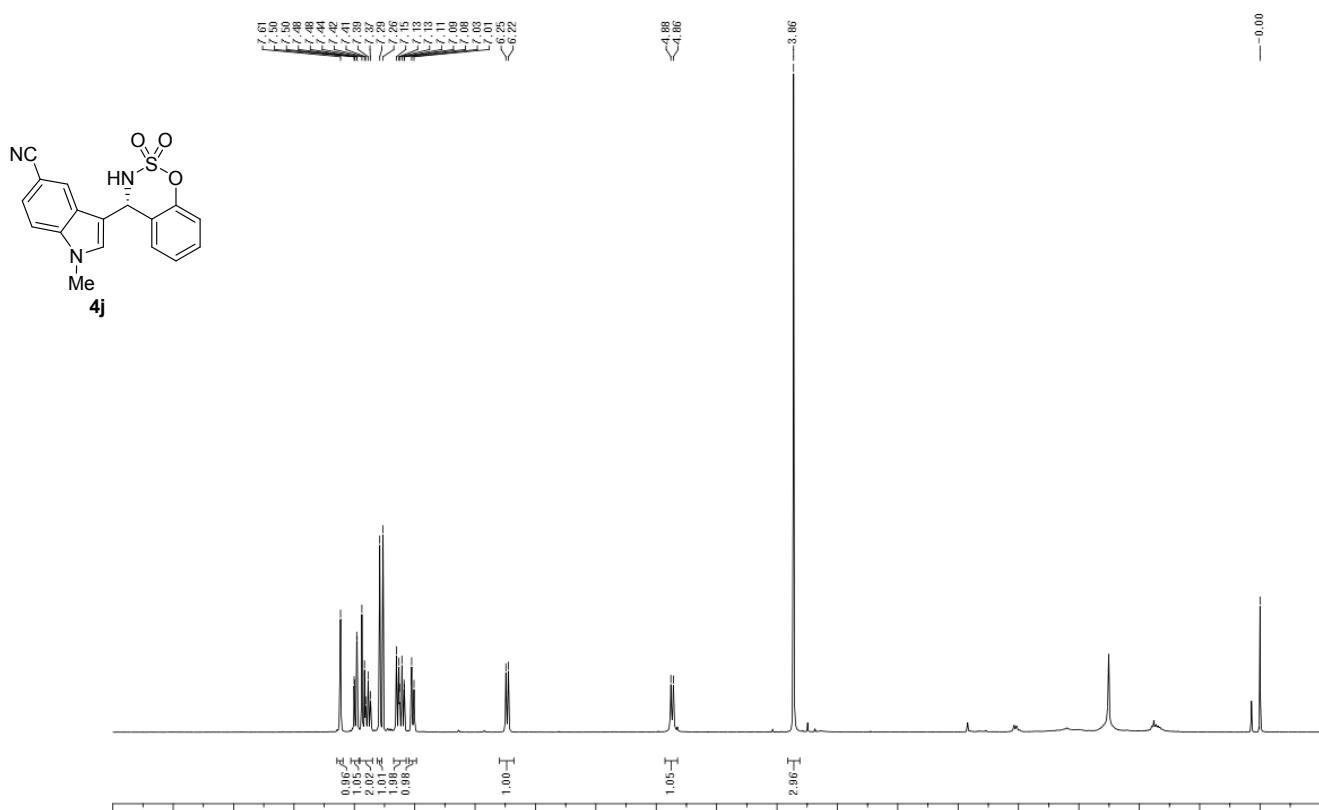
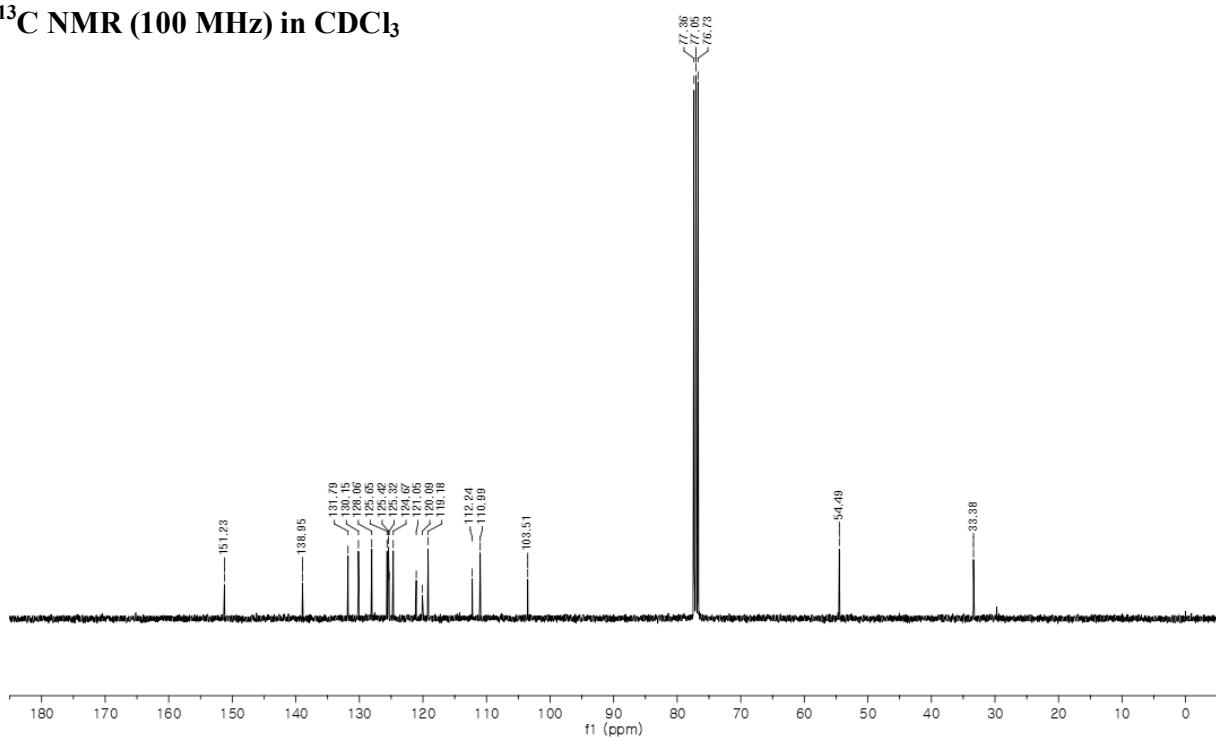
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>

<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>

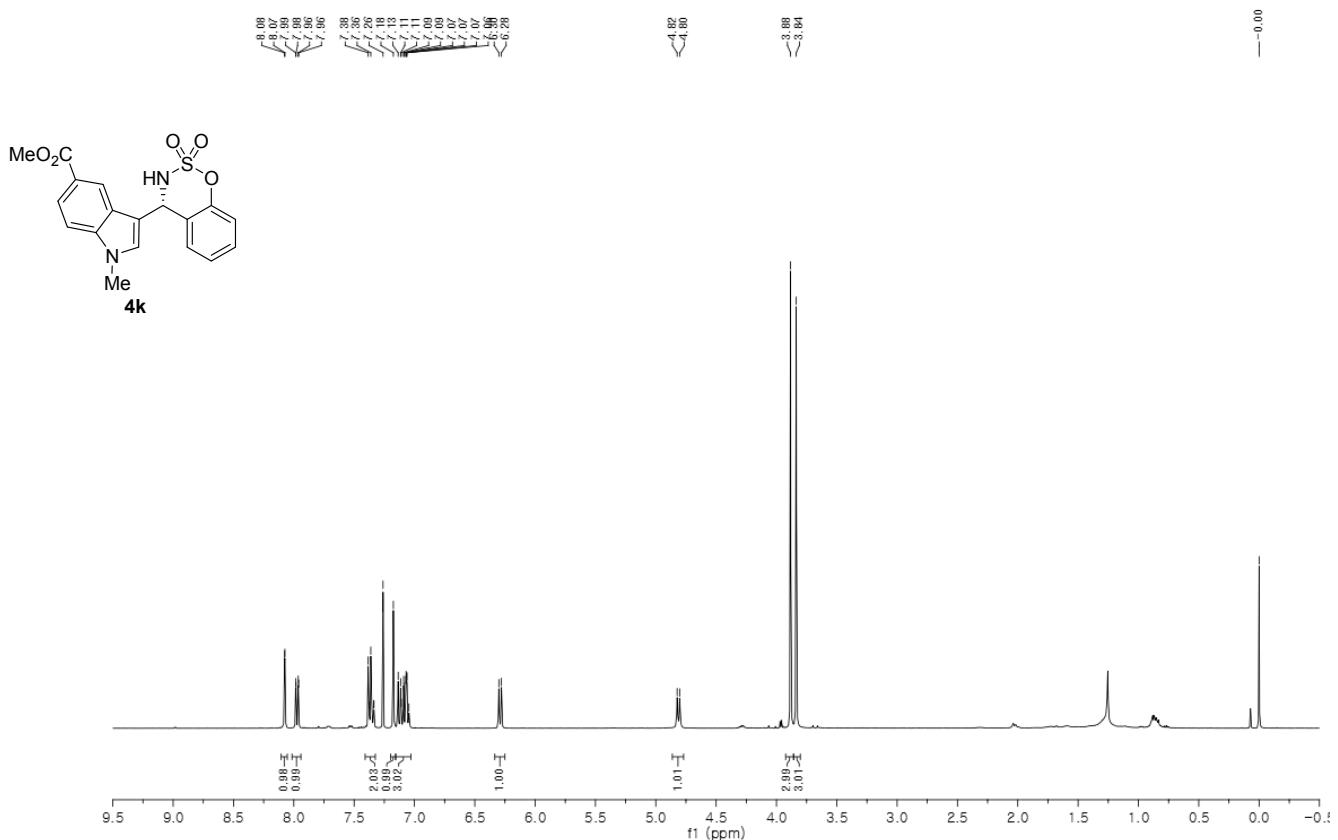


### <sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

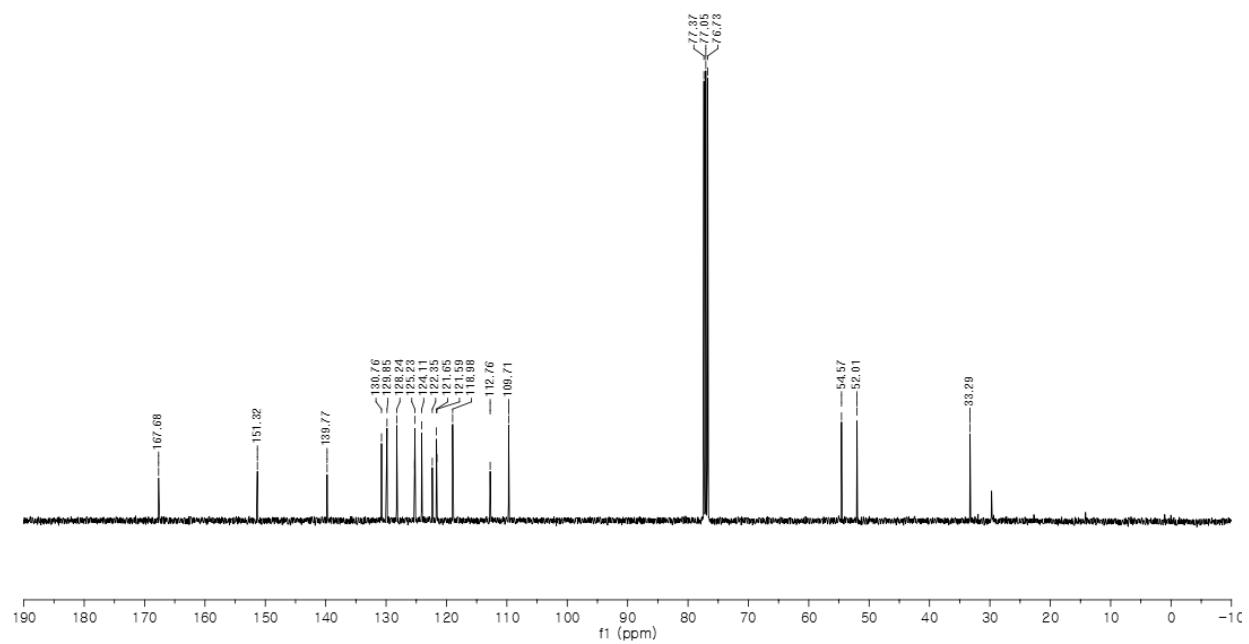


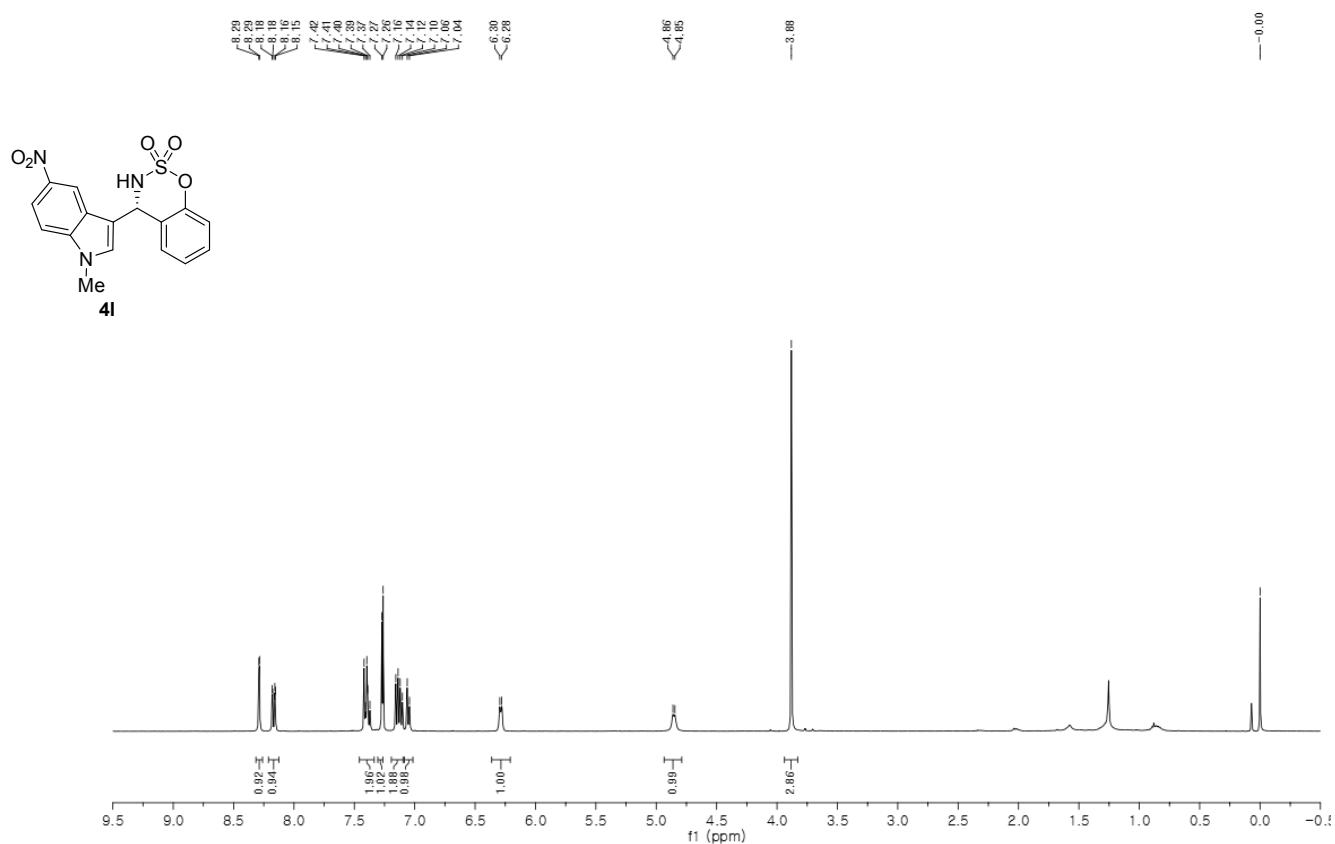
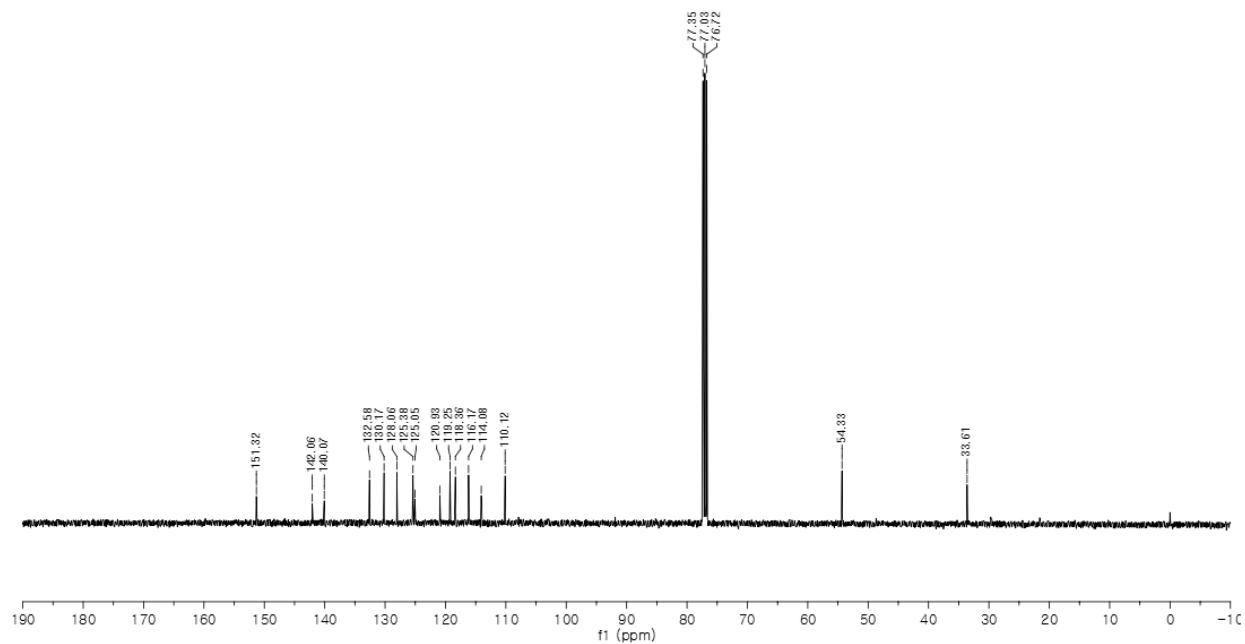
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub><sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>

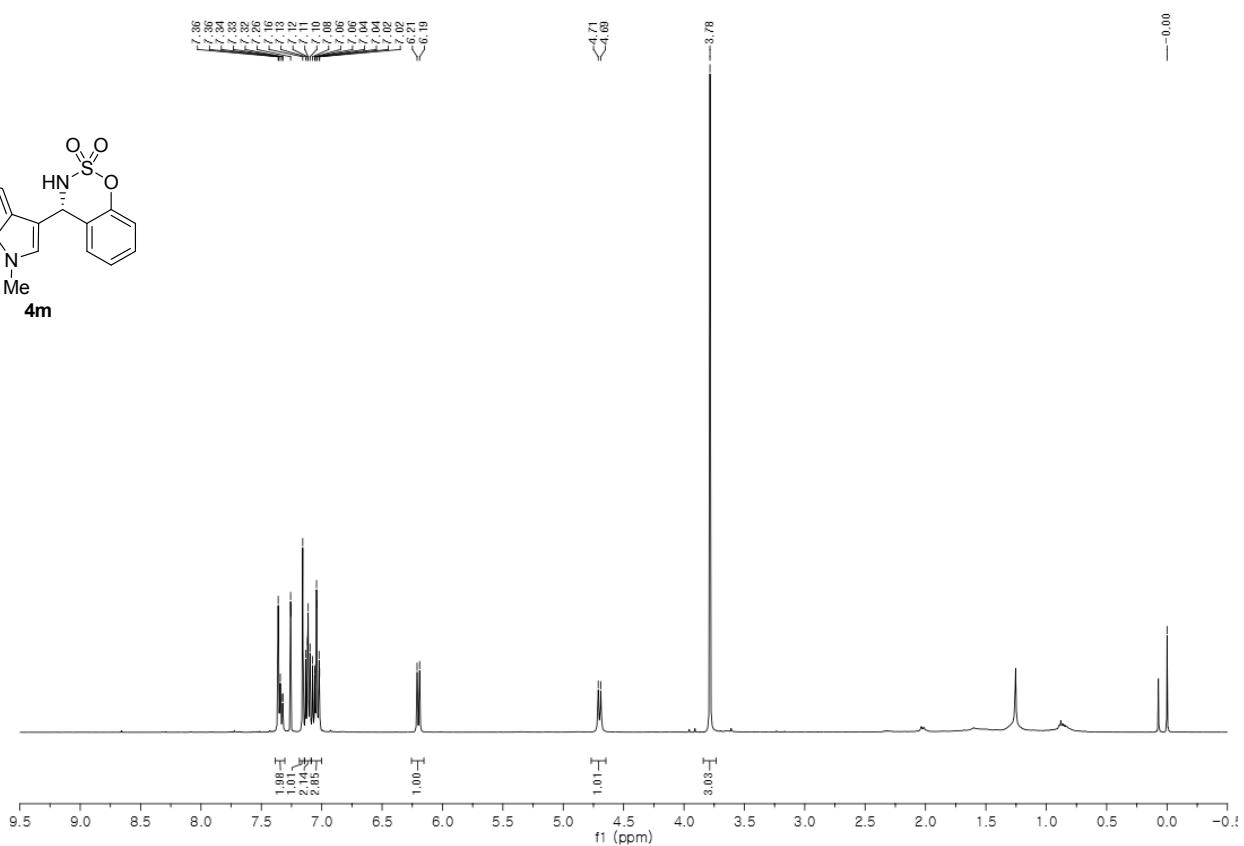
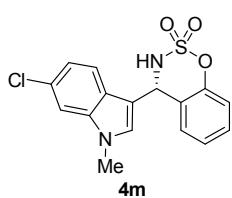


### <sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

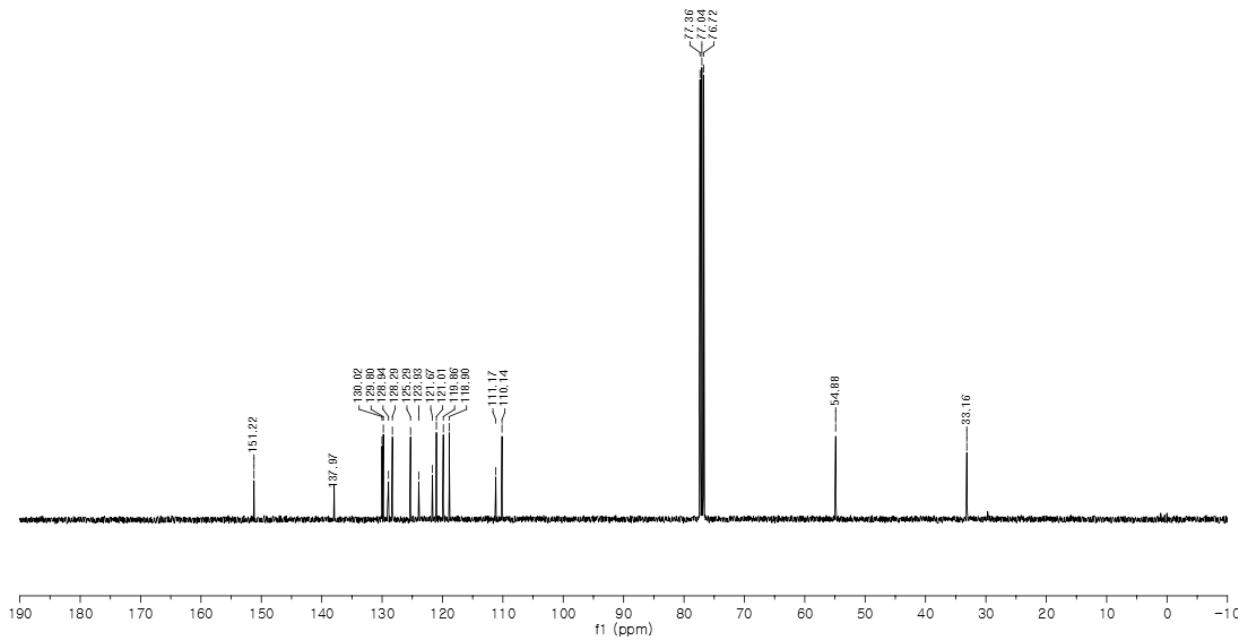


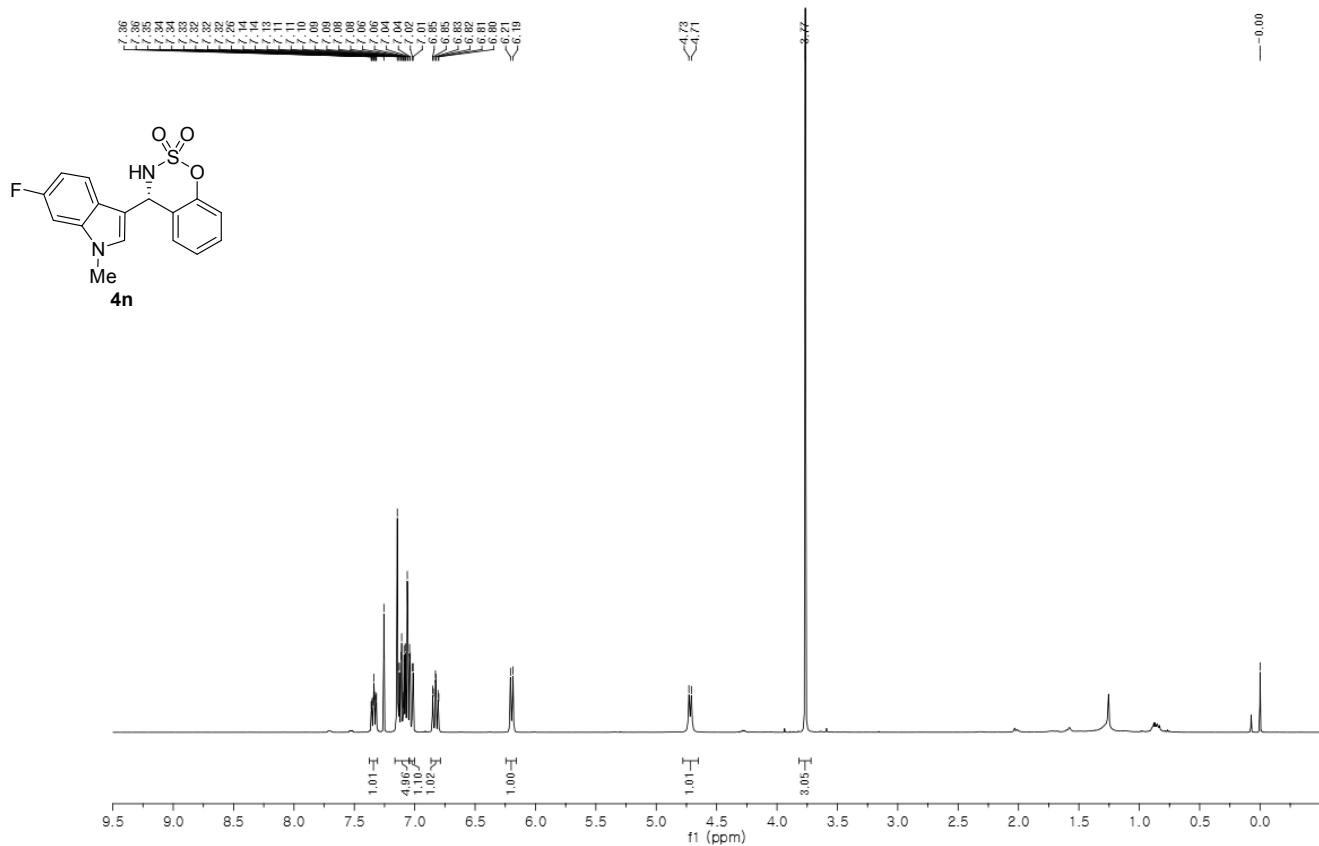
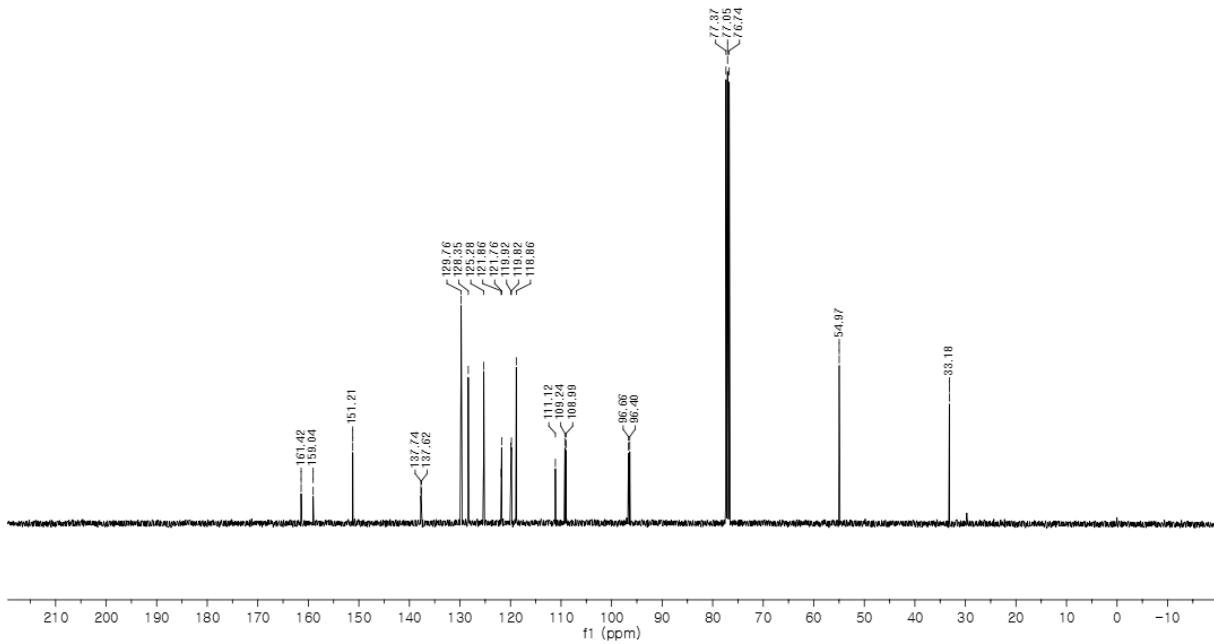
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub><sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

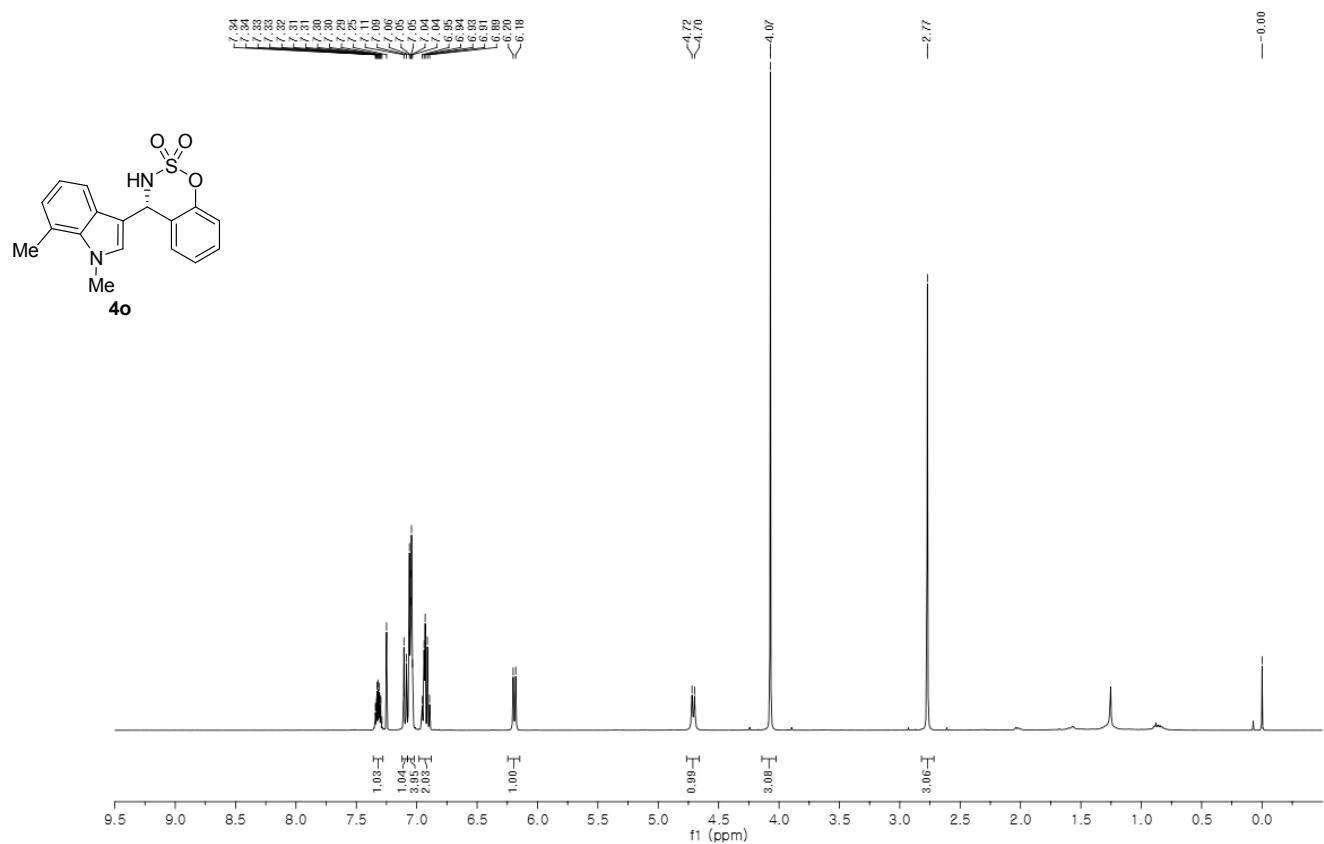
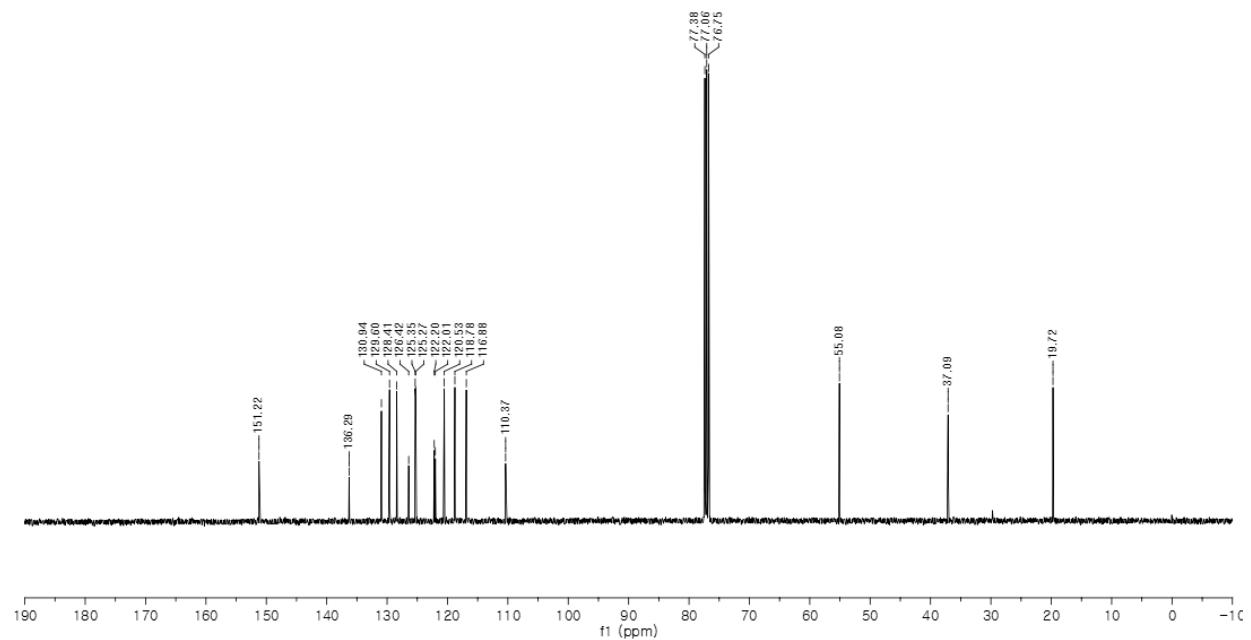
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>



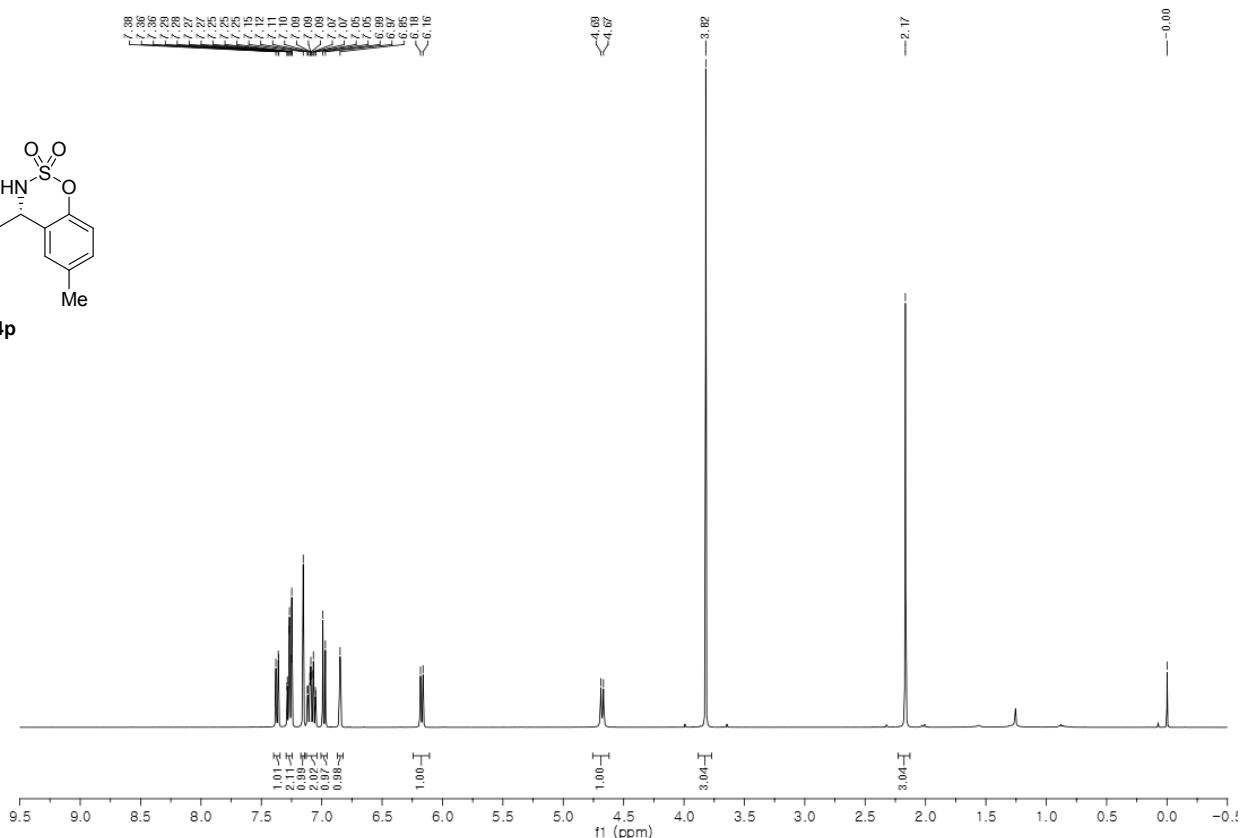
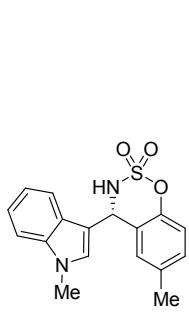
### <sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>



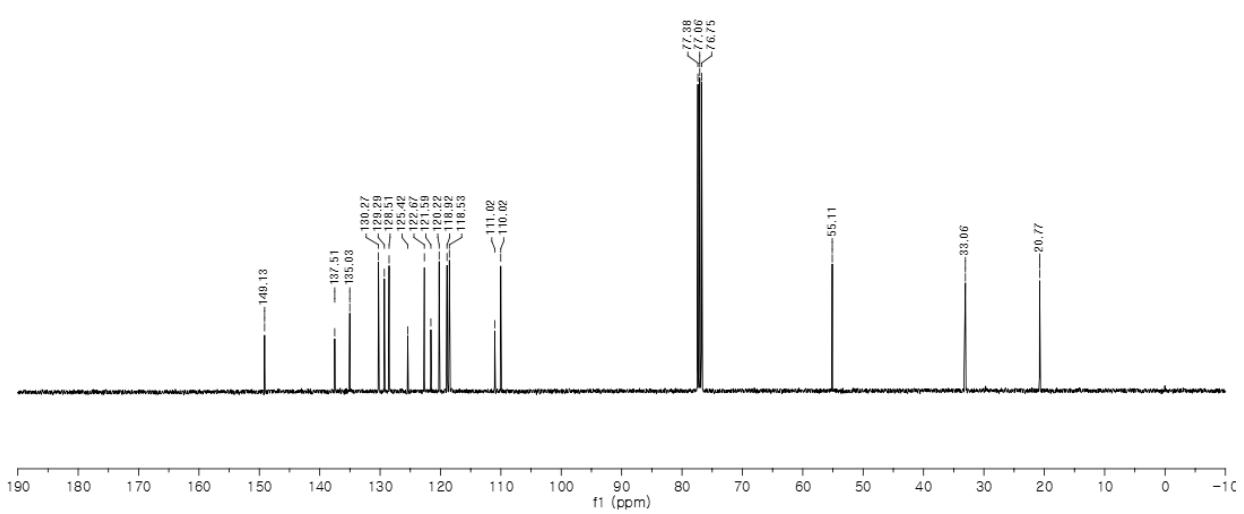
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub><sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

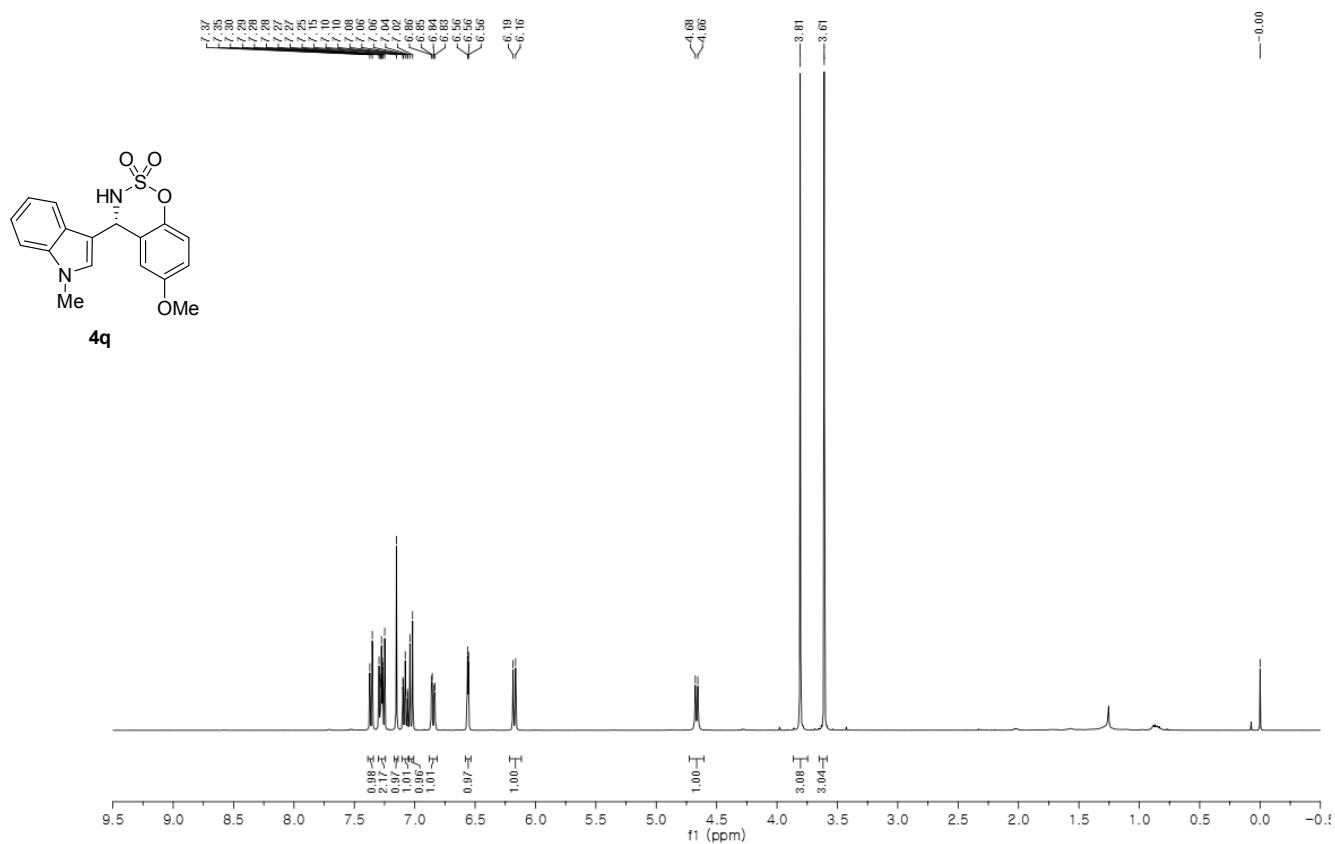
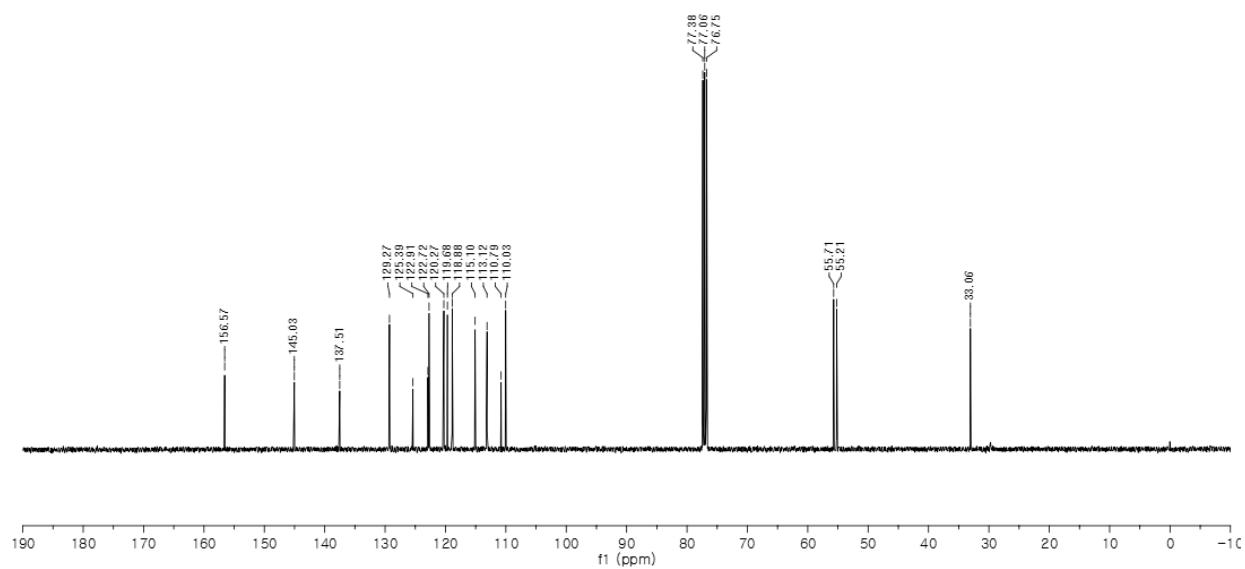
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub><sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

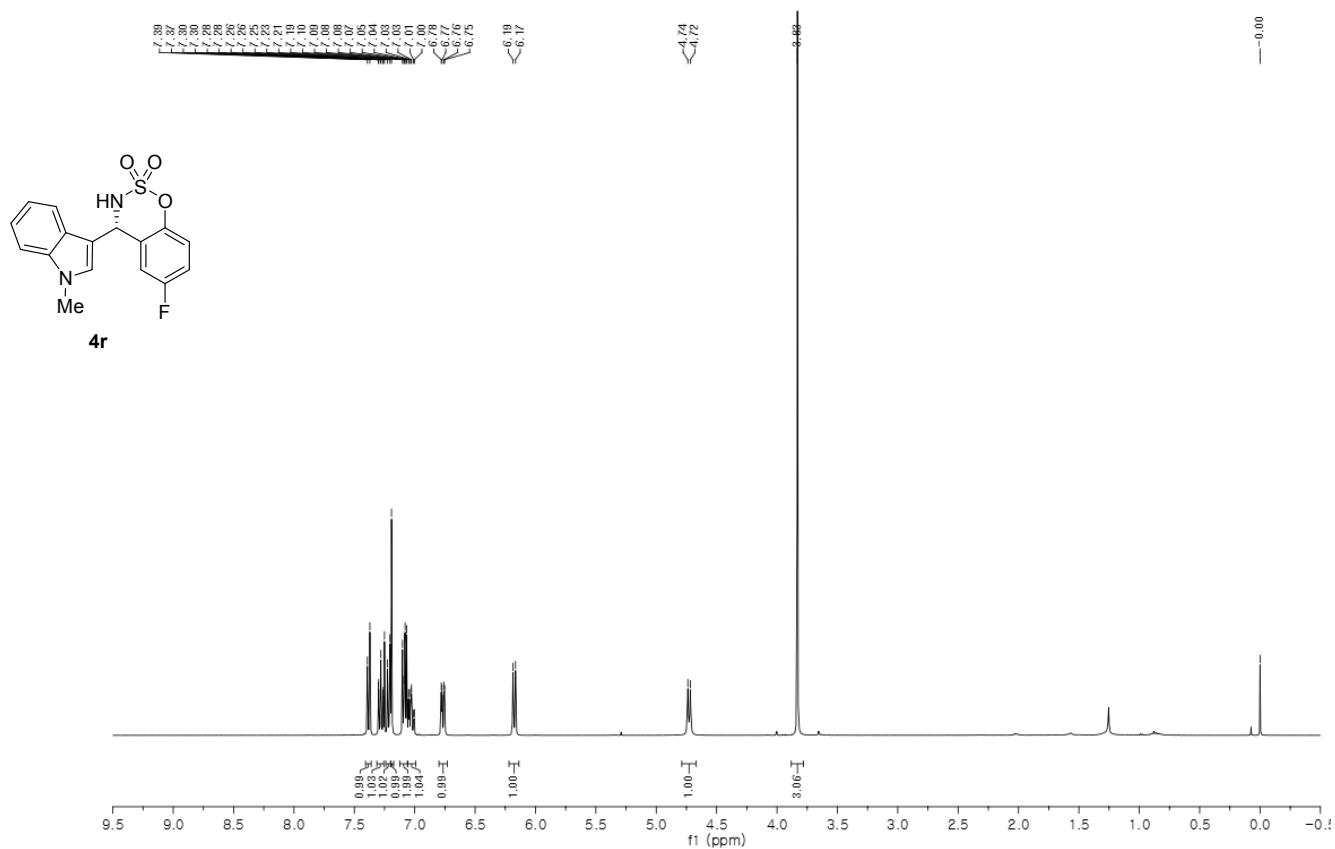
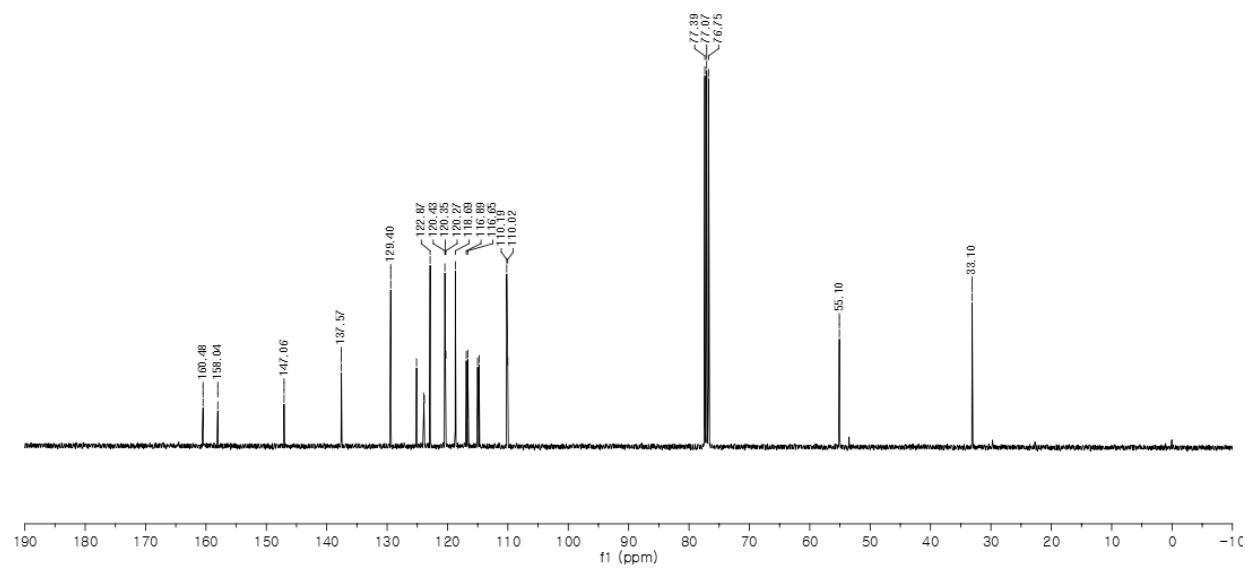
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>

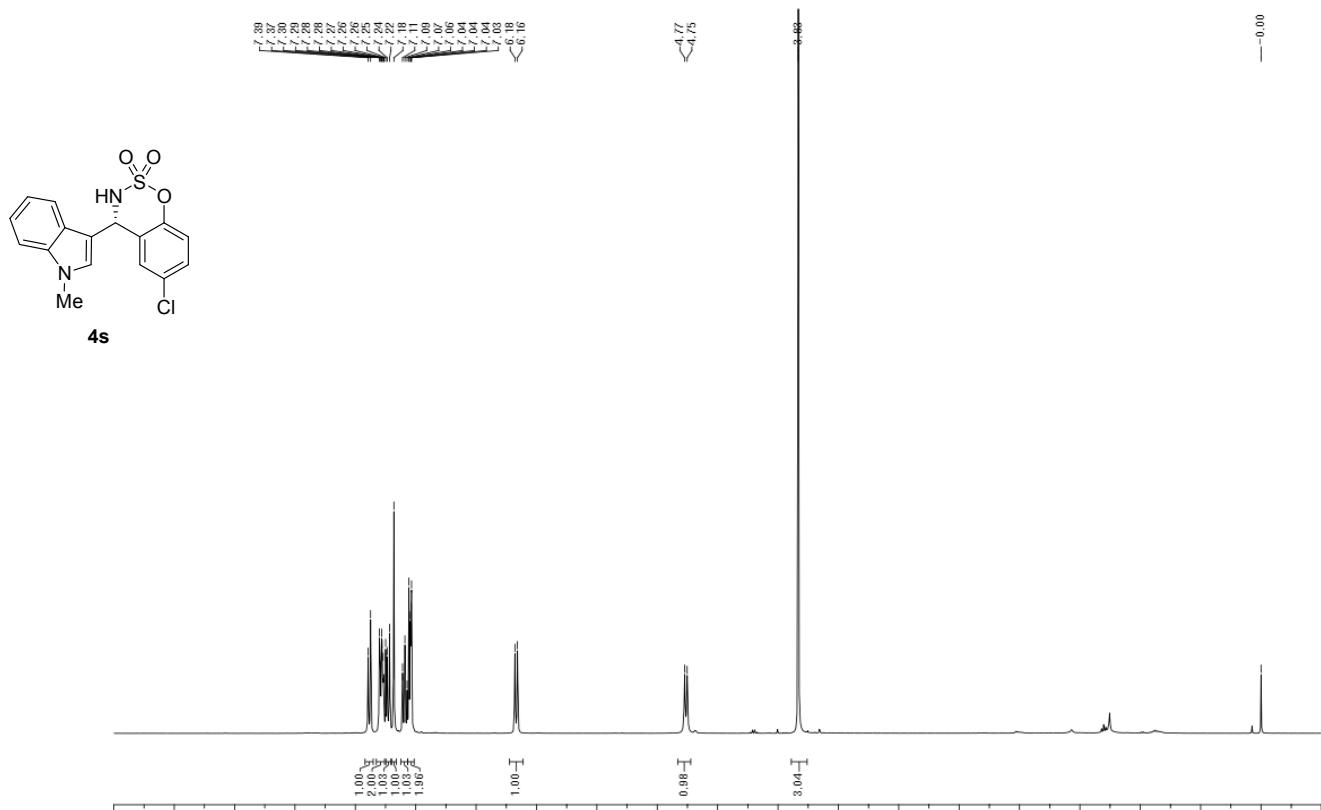
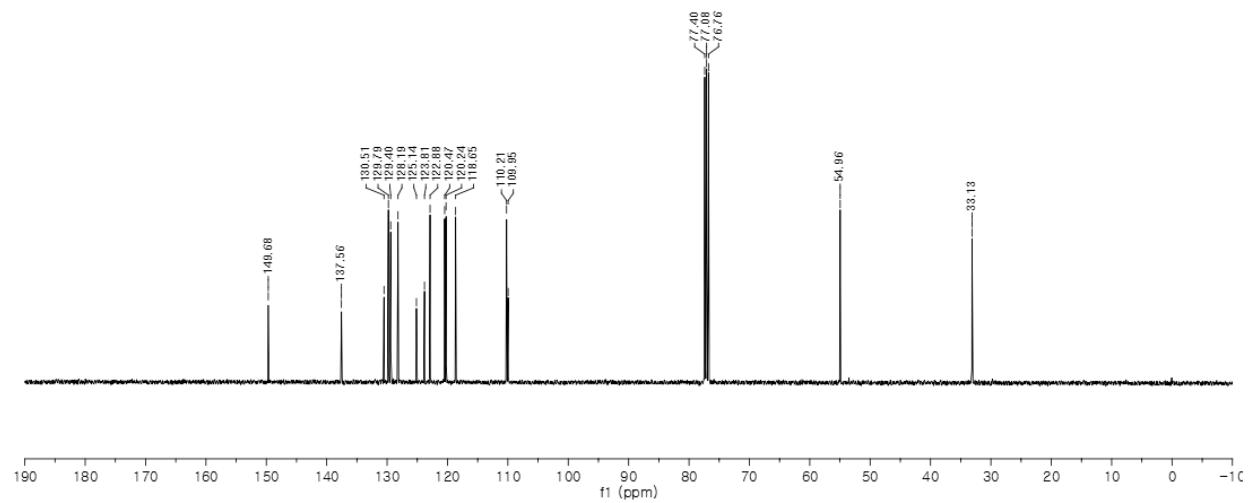


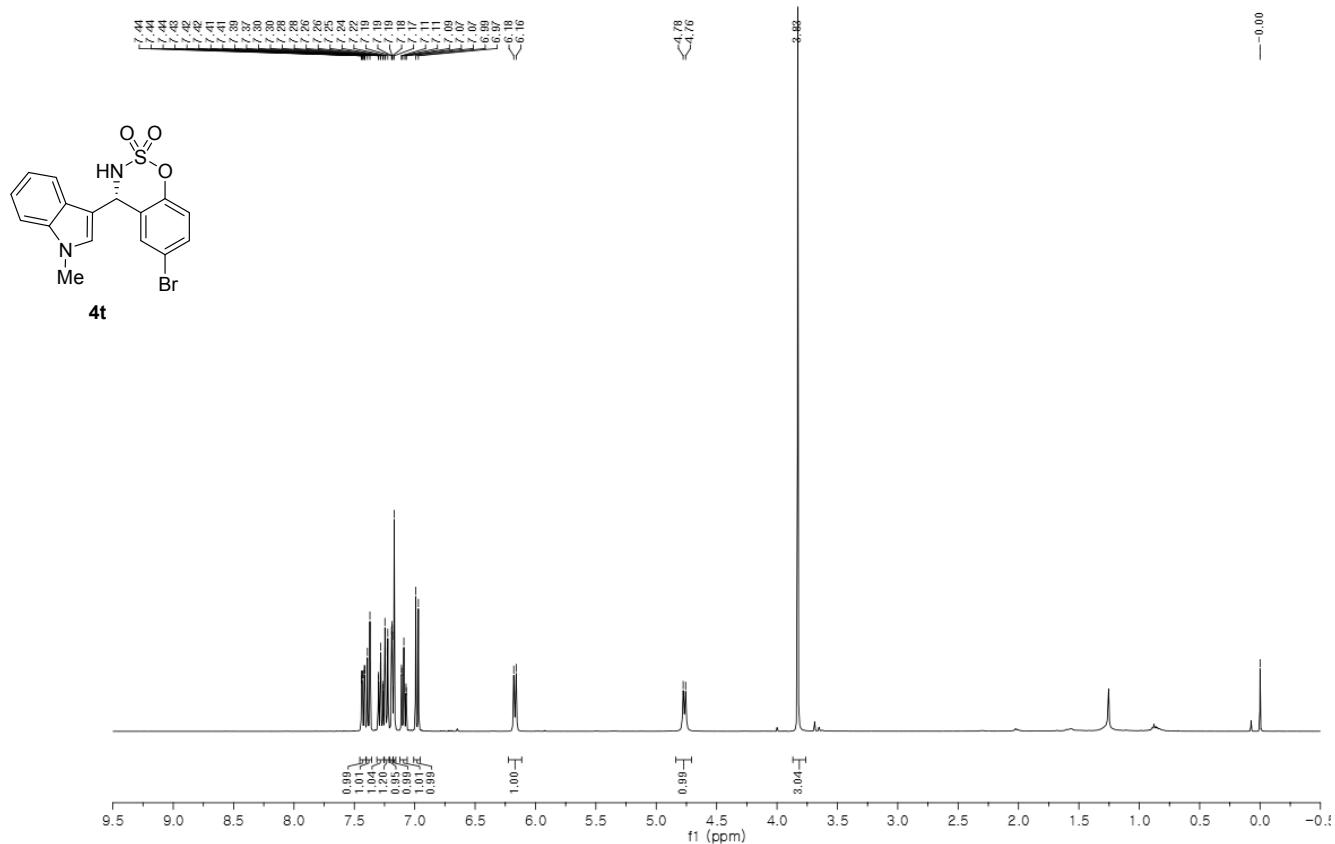
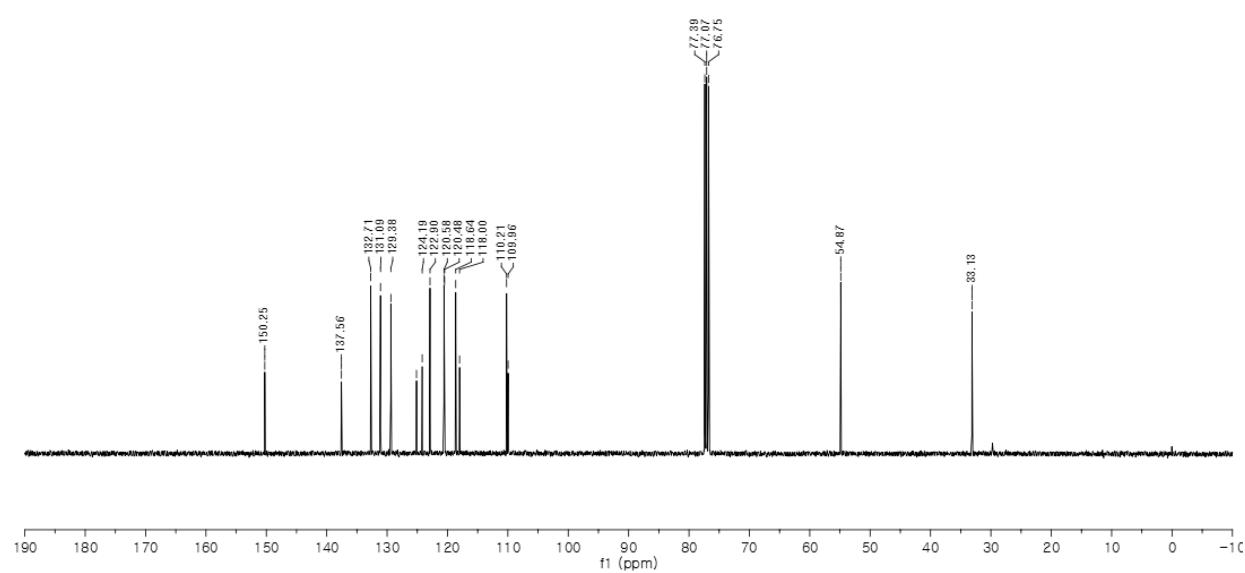
### <sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>



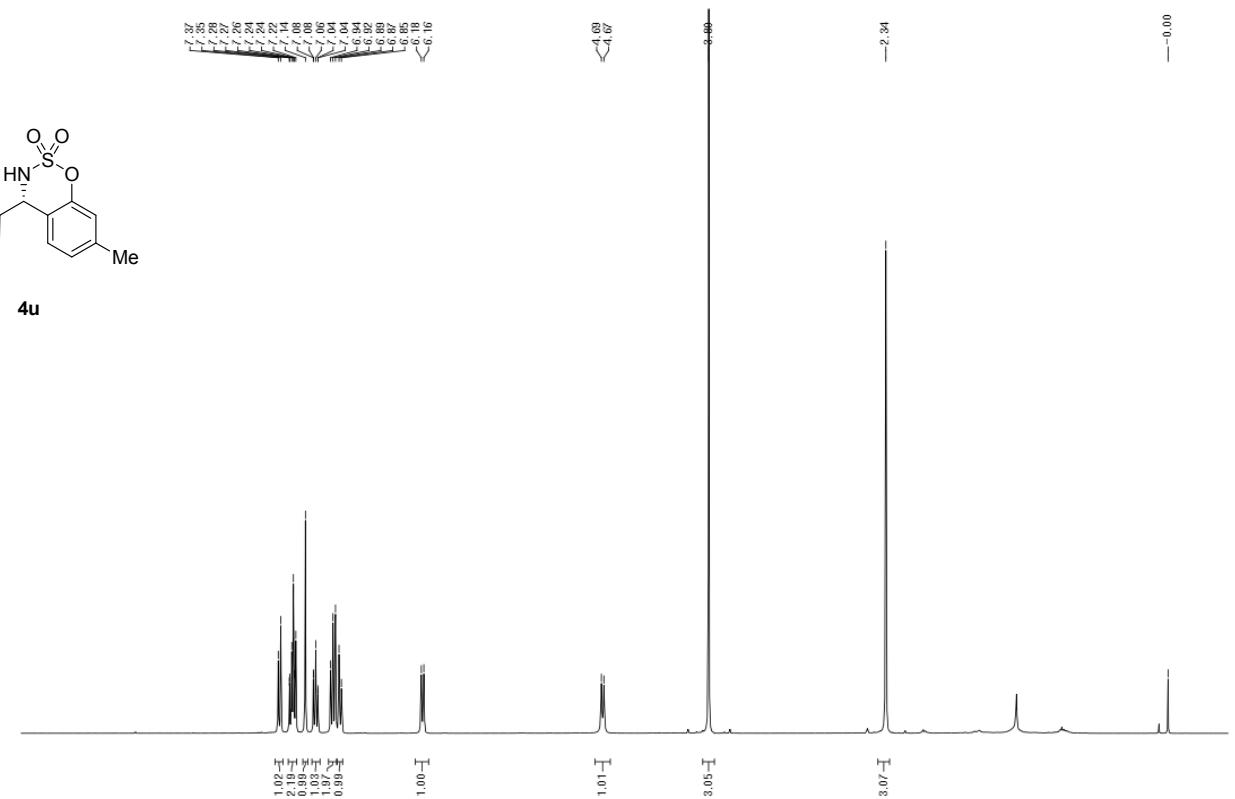
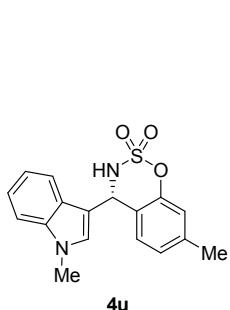
**<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>****<sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>**

**<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>****<sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>**

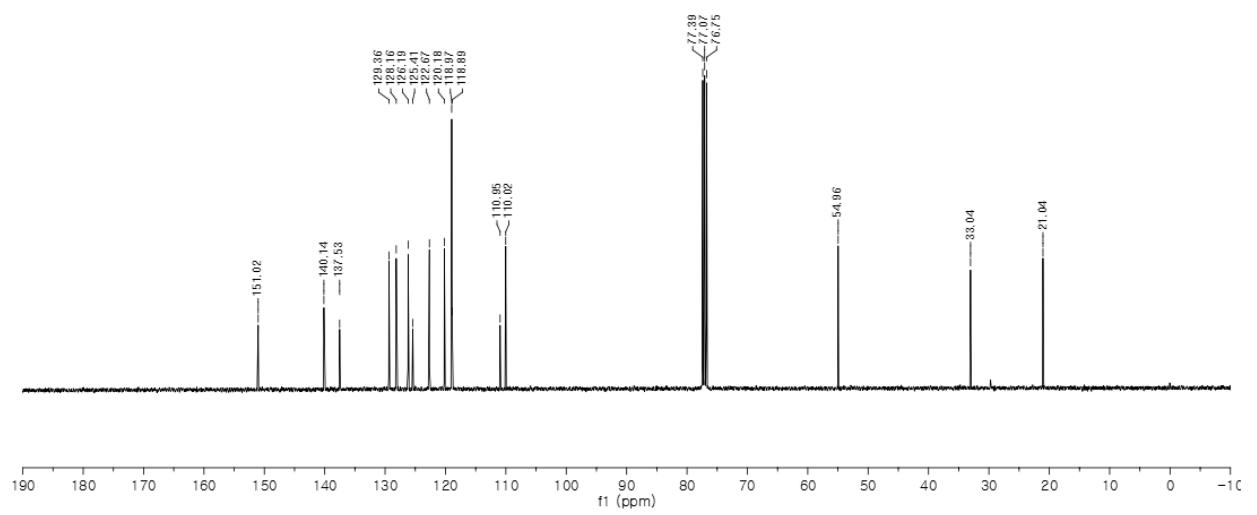
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub><sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

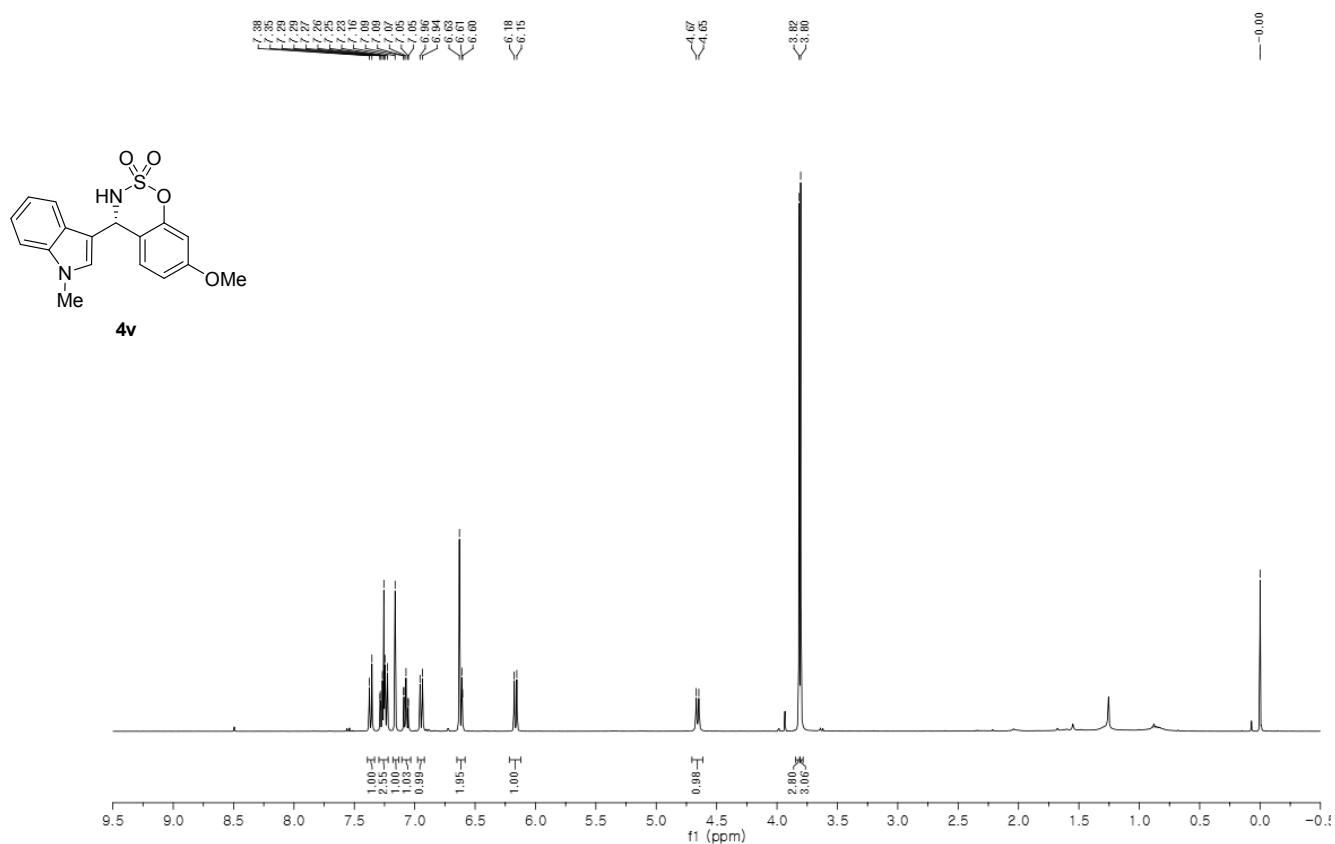
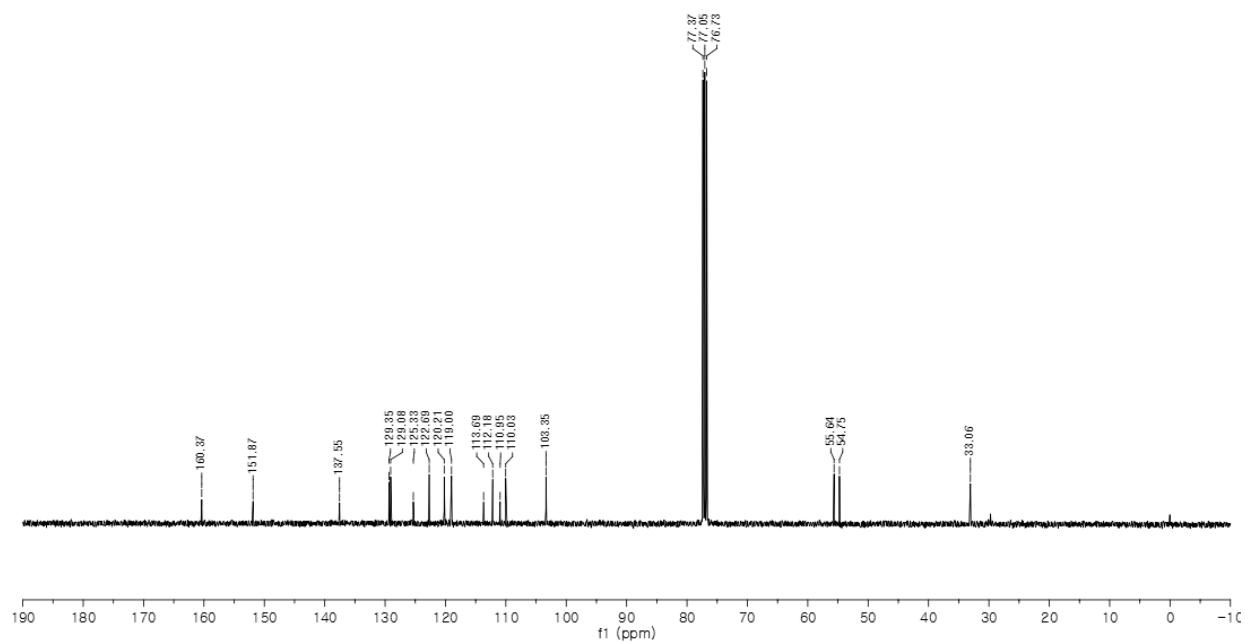
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub><sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>

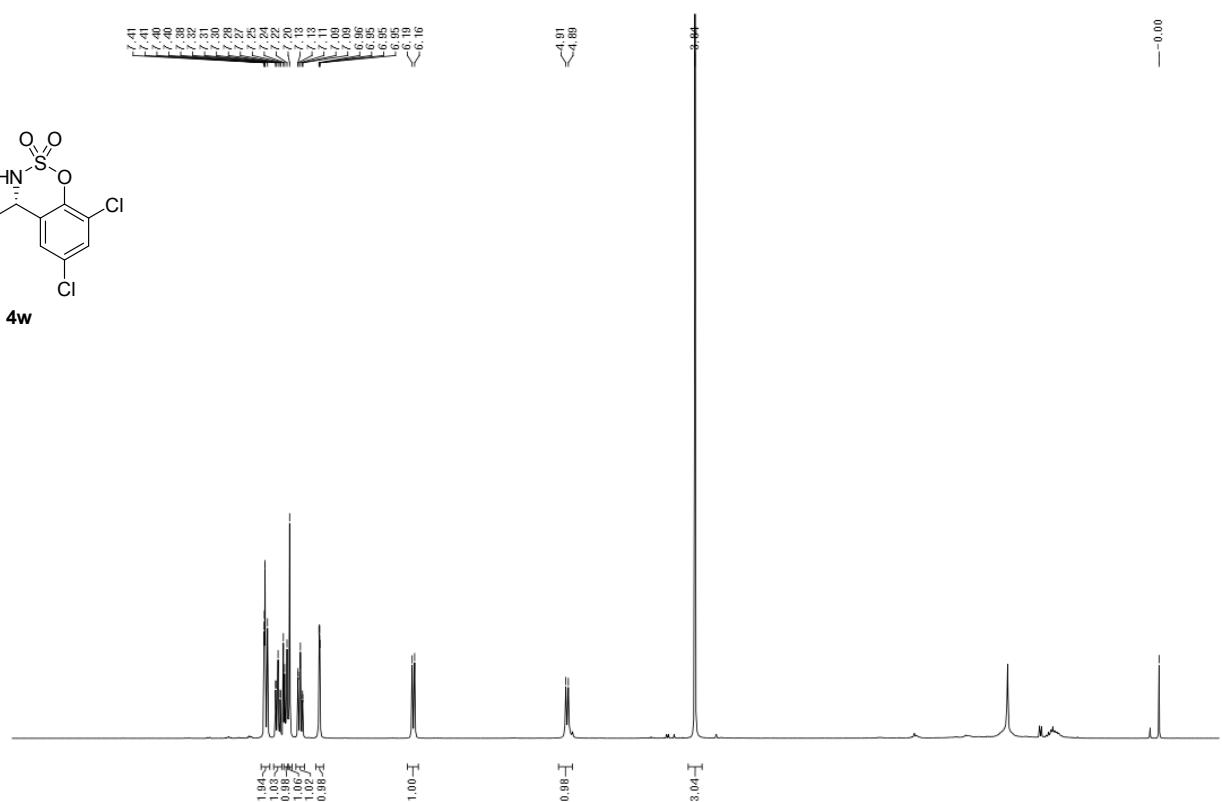
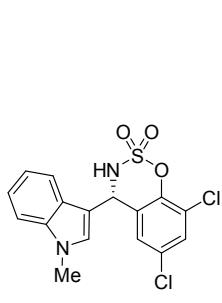


### <sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

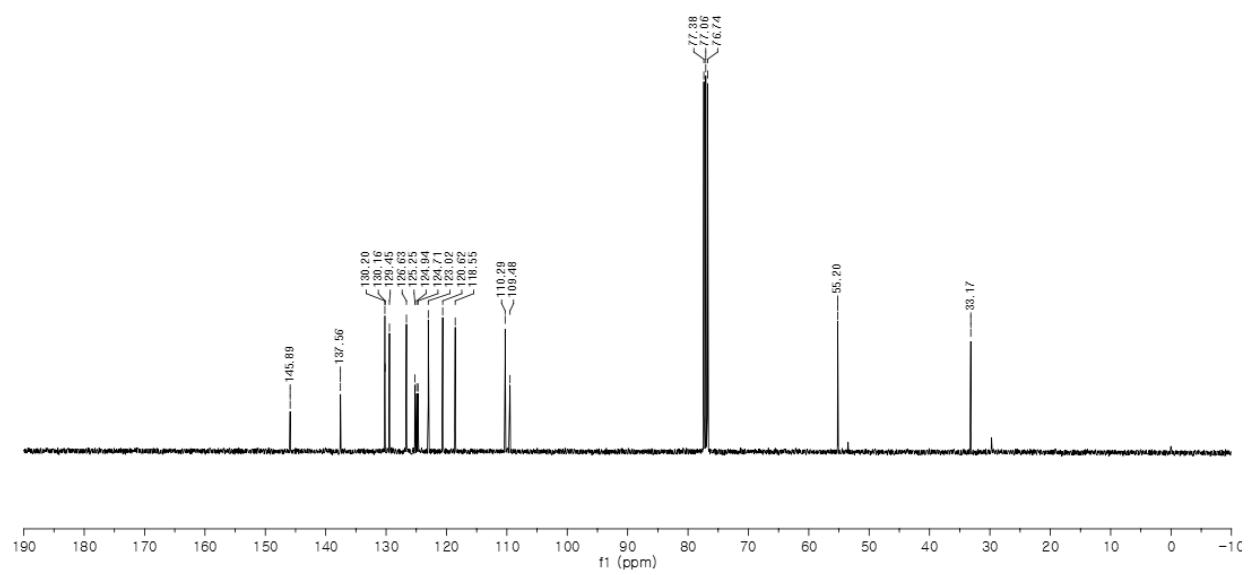


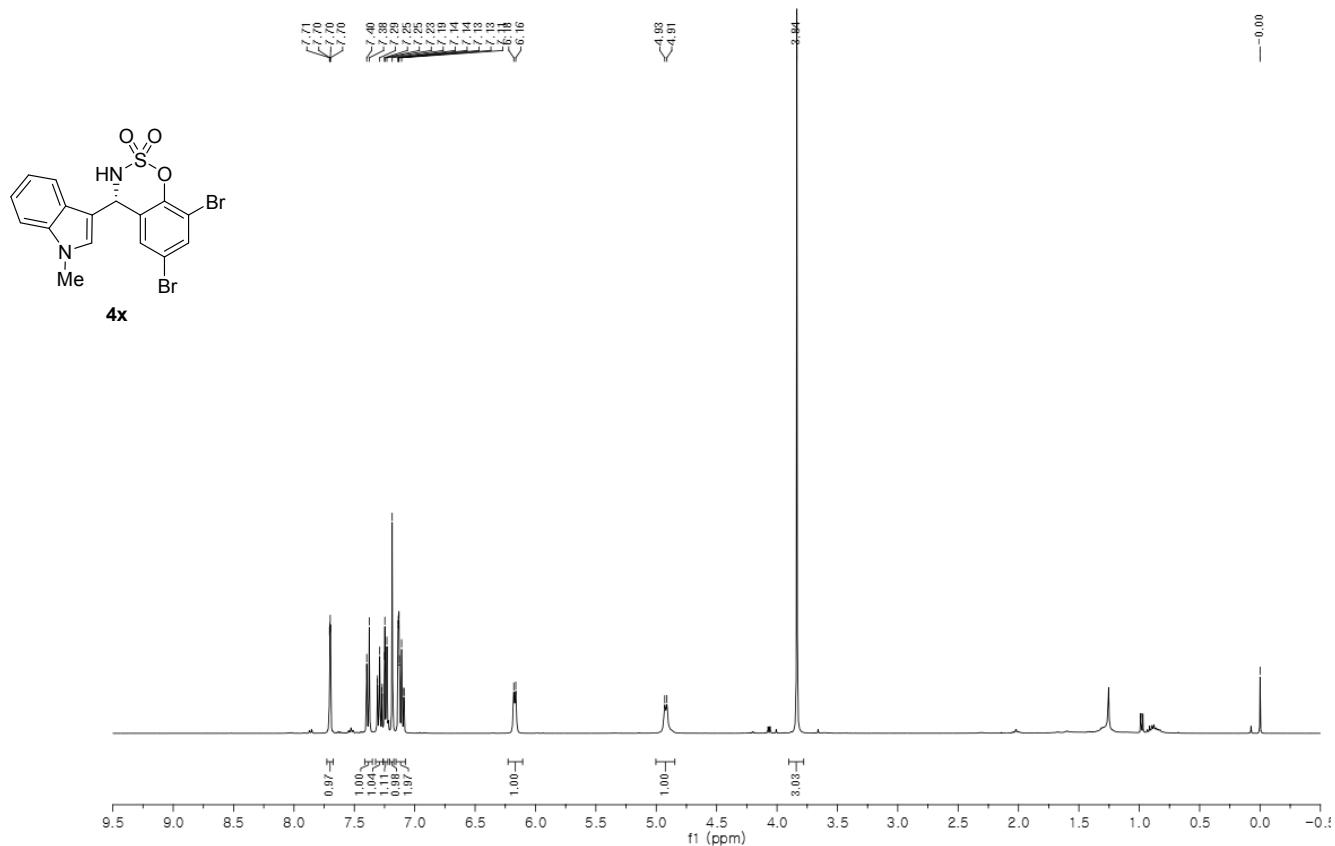
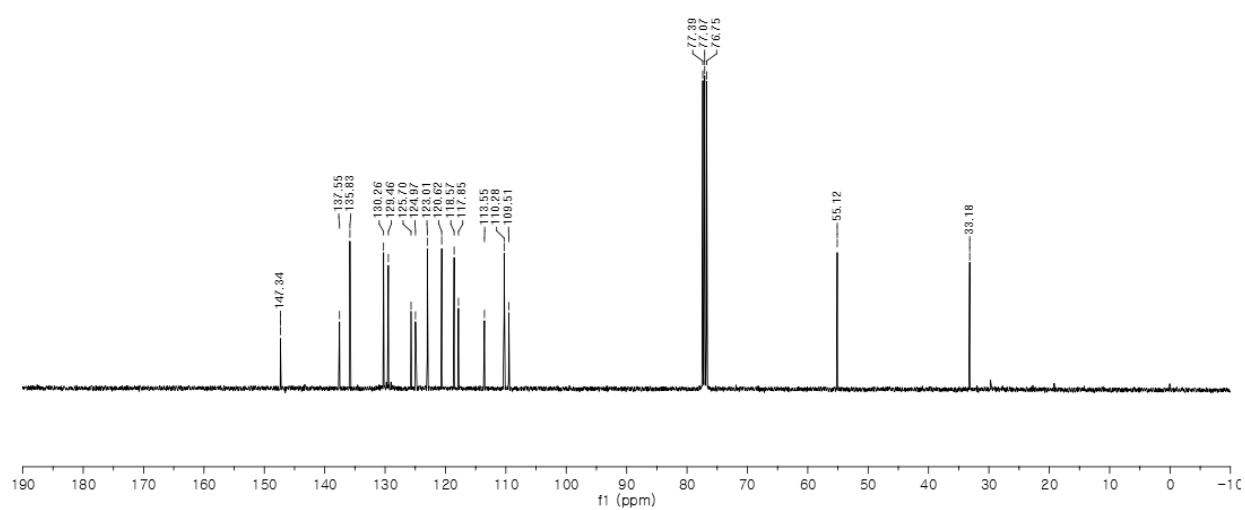
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub><sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

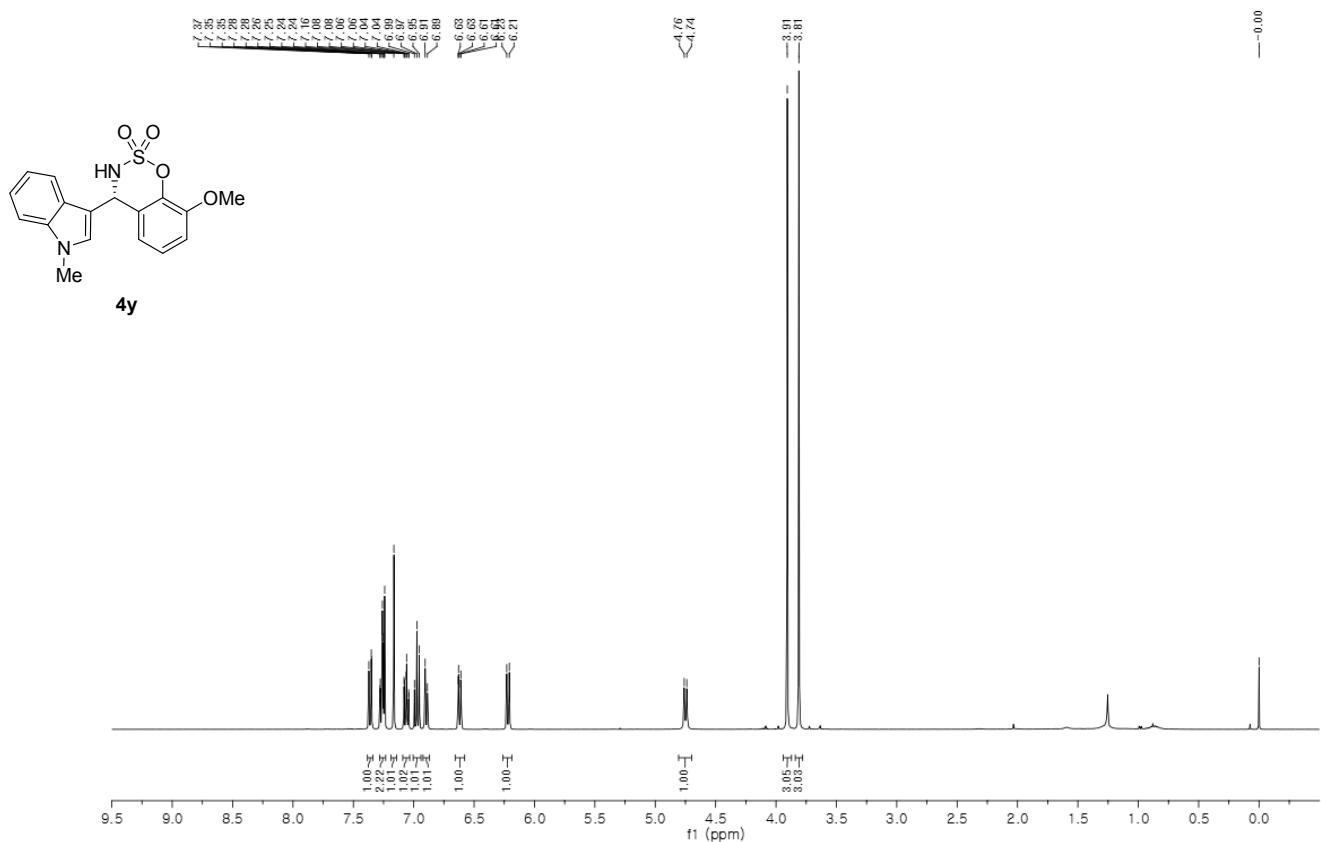
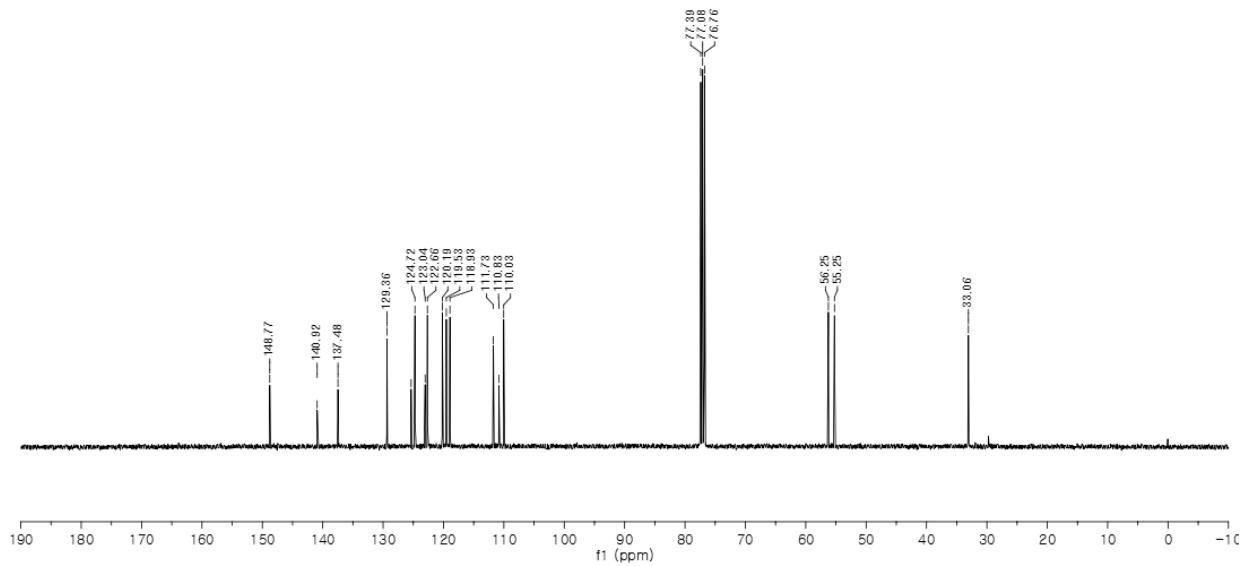
**<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>**



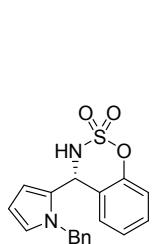
<sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>



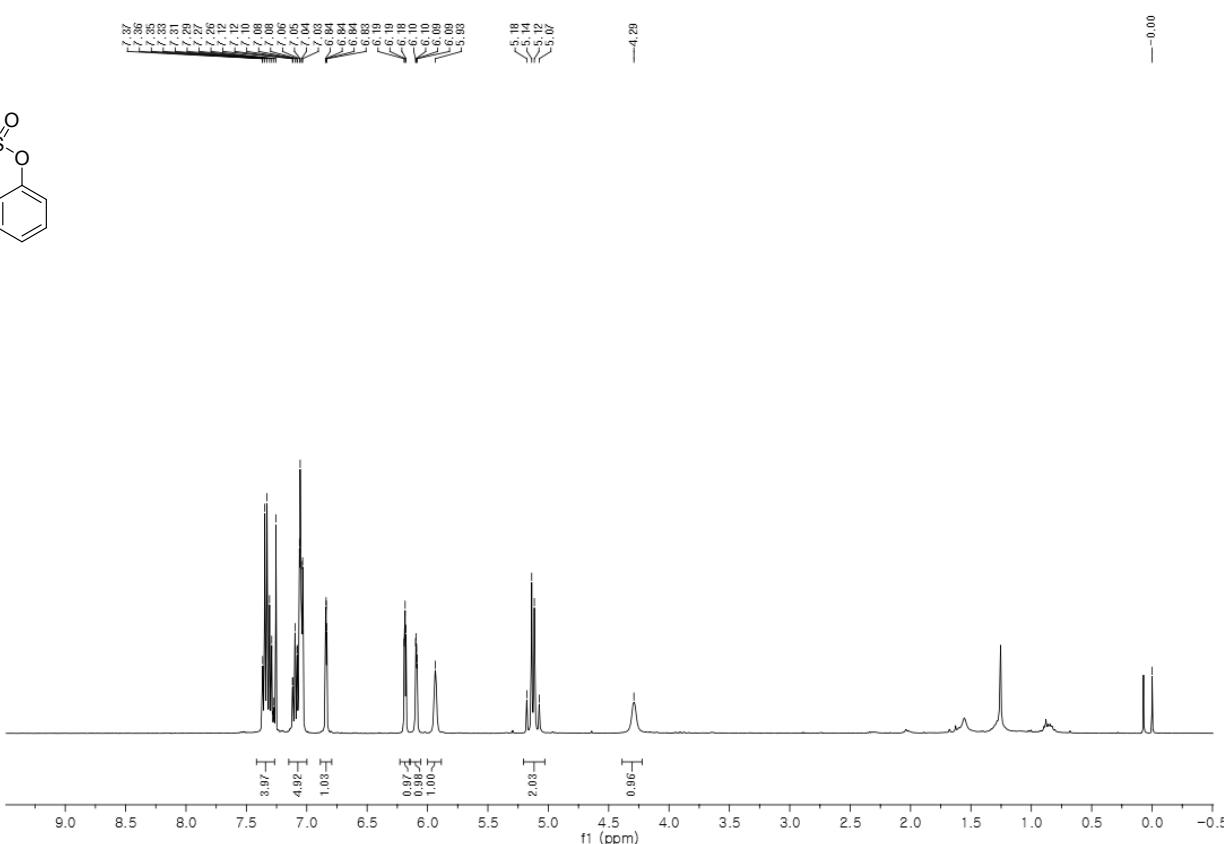
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub><sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub><sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

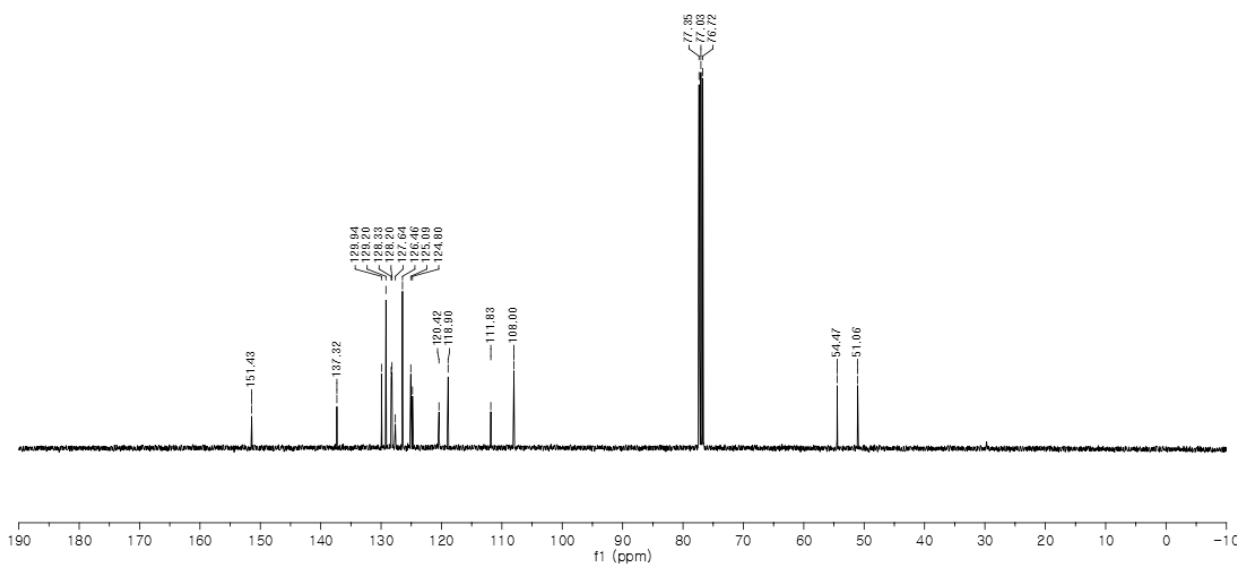
<sup>1</sup>H NMR (400 MHz) in CDCl<sub>3</sub>



6

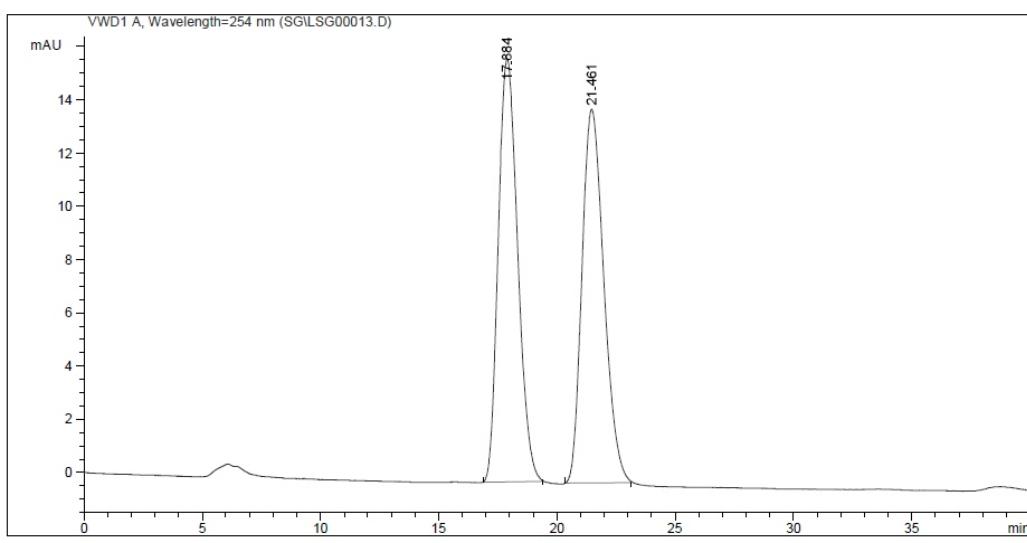
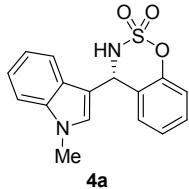


### <sup>13</sup>C NMR (100 MHz) in CDCl<sub>3</sub>

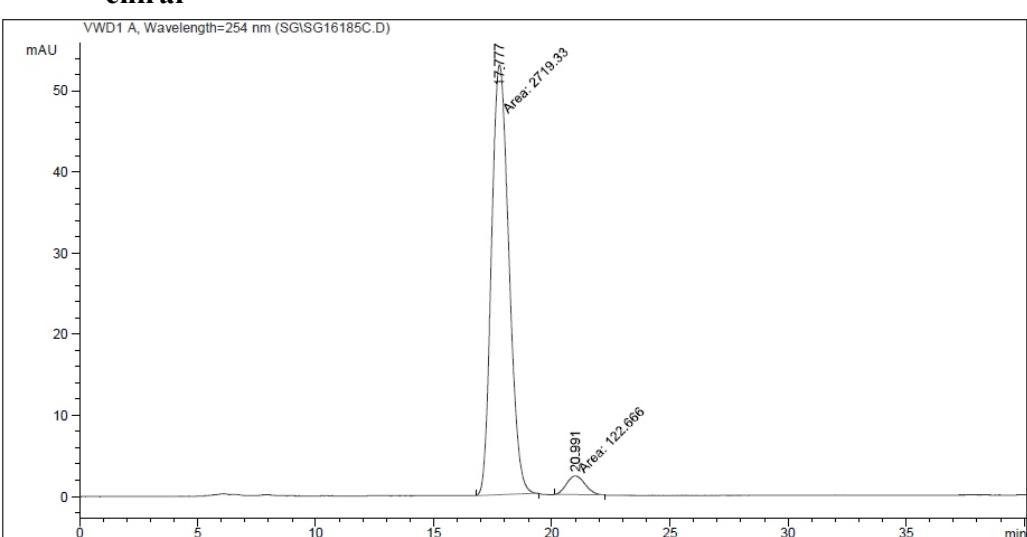


## HPLC analysis

### racemic



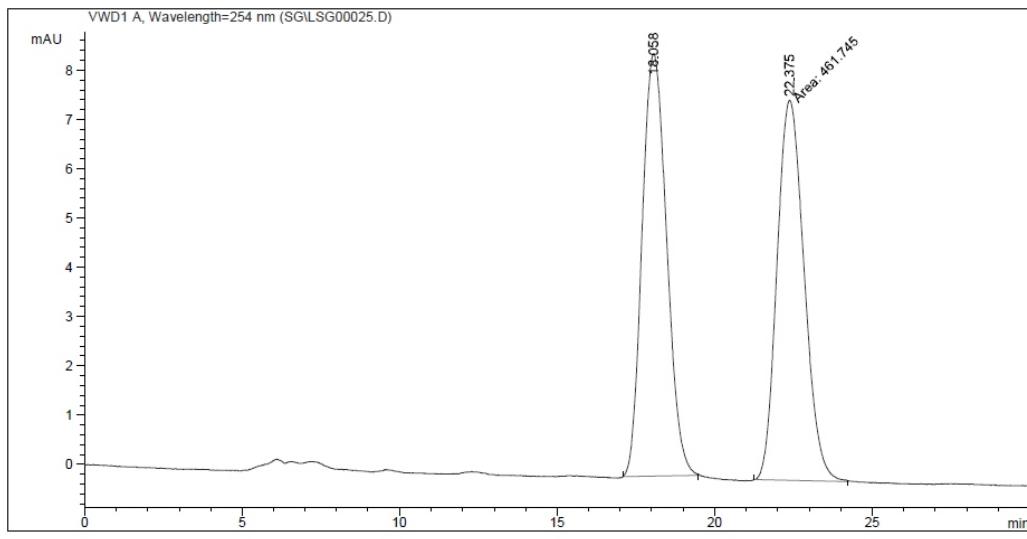
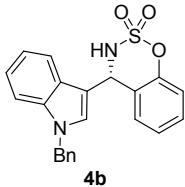
### chiral



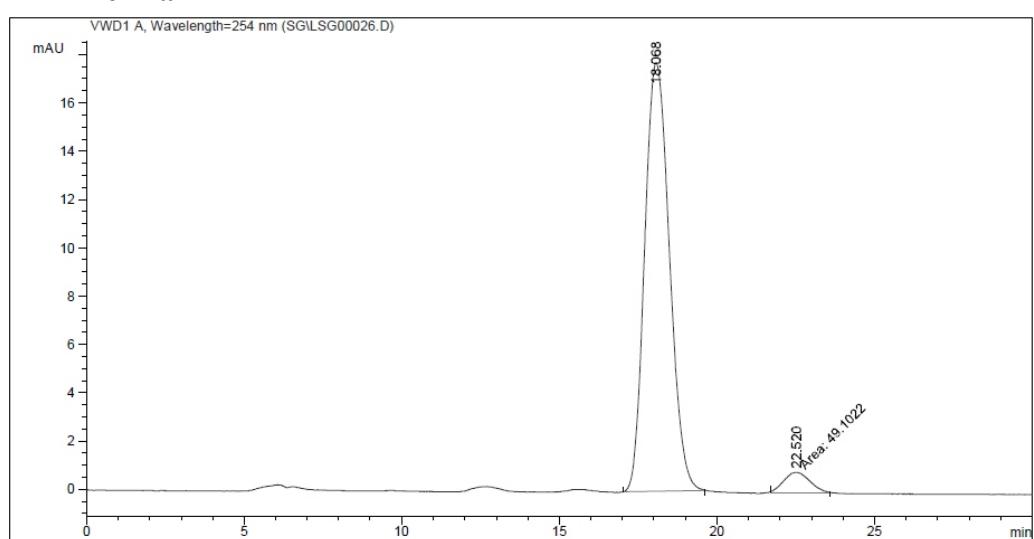
Totals : 2842.00017 55.30556

## HPLC analysis

## **racemic**



## chiral



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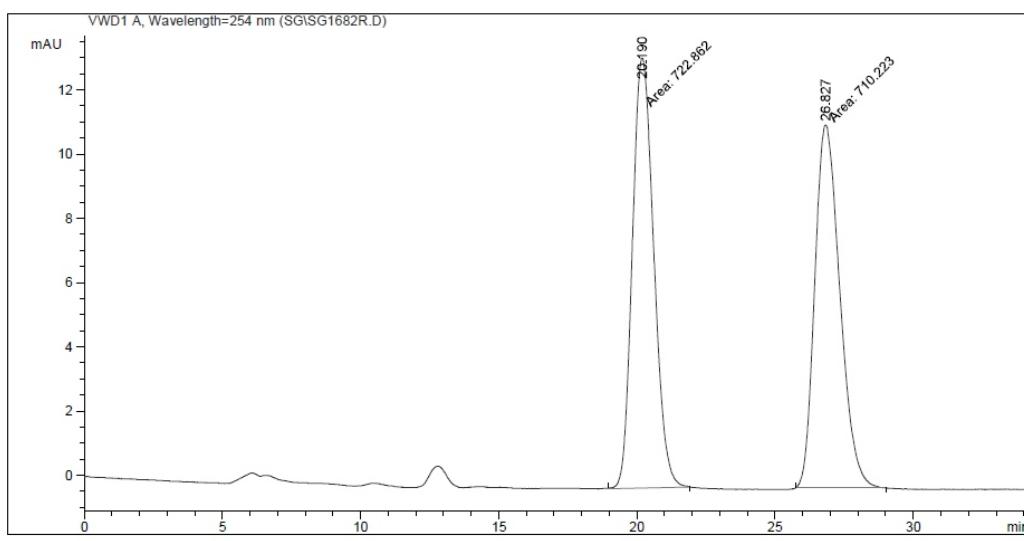
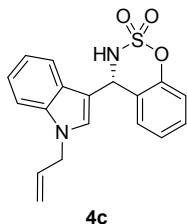
Area Percent Report

Peak #	RetTime [min]	Type	Width [min]	Area mAU	*s	Height [mAU]	Area %
1	18.068	BB	0.8642	966.98730		17.74891	95.1675

Total: 1,016,00054 12,68121

## HPLC analysis

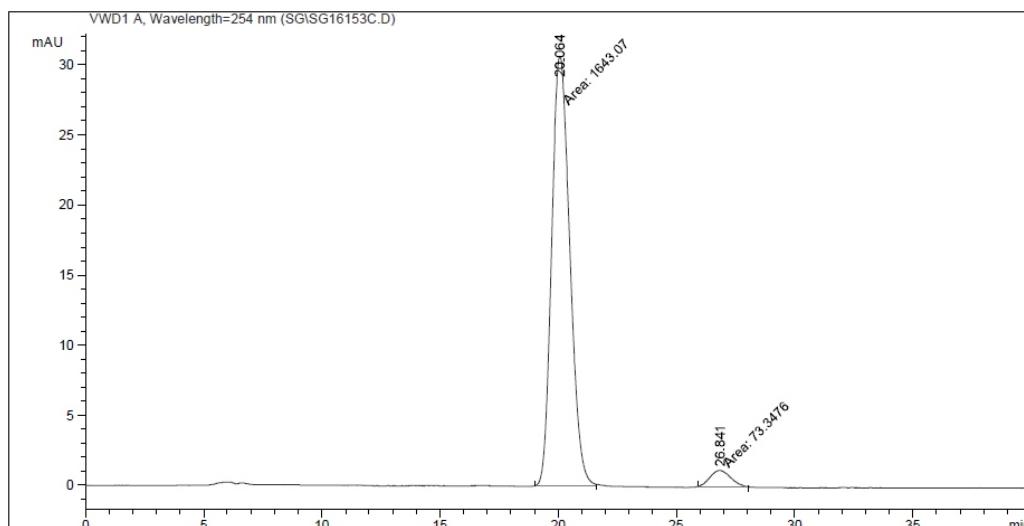
**racemic**



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Area Percent Report  
=====

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	Area [mAU ]	Area %
1	20.190	MM	0.8992	722.86212	13.39838	50.4410	
2	26.827	MM	1.0486	710.22308	11.28810	49.5590	
Totals :						1433.08521	24.68648

**chiral**

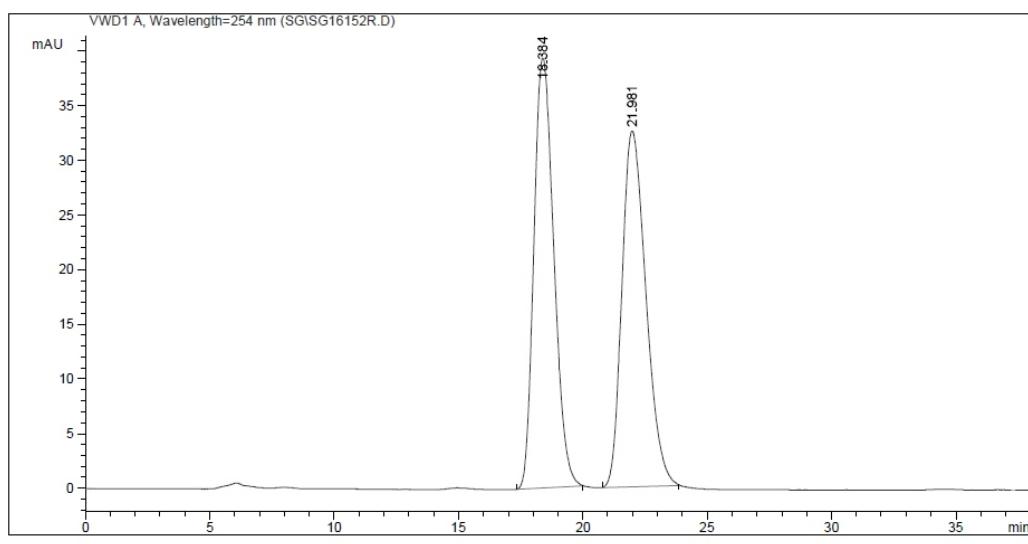
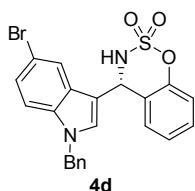


=====  
Area Percent Report  
=====

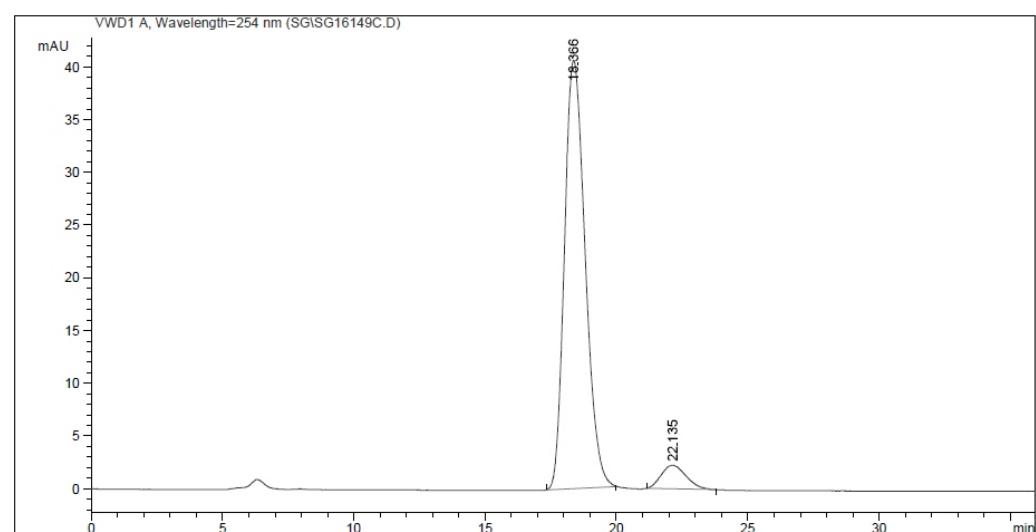
Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	Area [mAU ]	Area %
1	20.064	MM	0.8928	1643.07434	30.67374	95.7267	
2	26.841	MM	1.0289	73.34764	1.18809	4.2733	
Totals :						1716.42198	31.86183

## HPLC analysis

### racemic



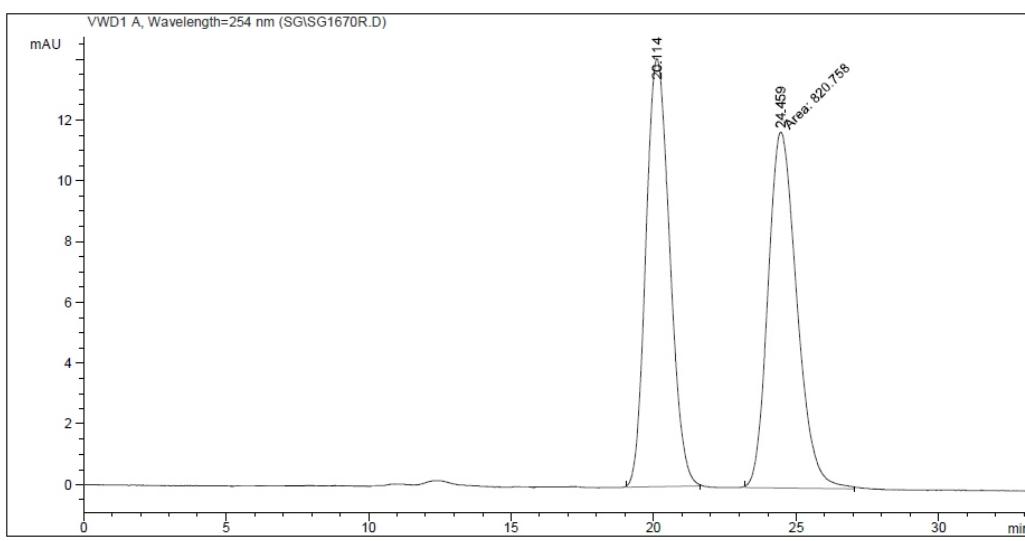
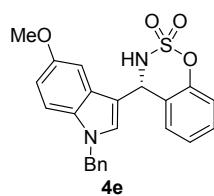
### chiral



Totals : 2382.42464 42.88182

## HPLC analysis

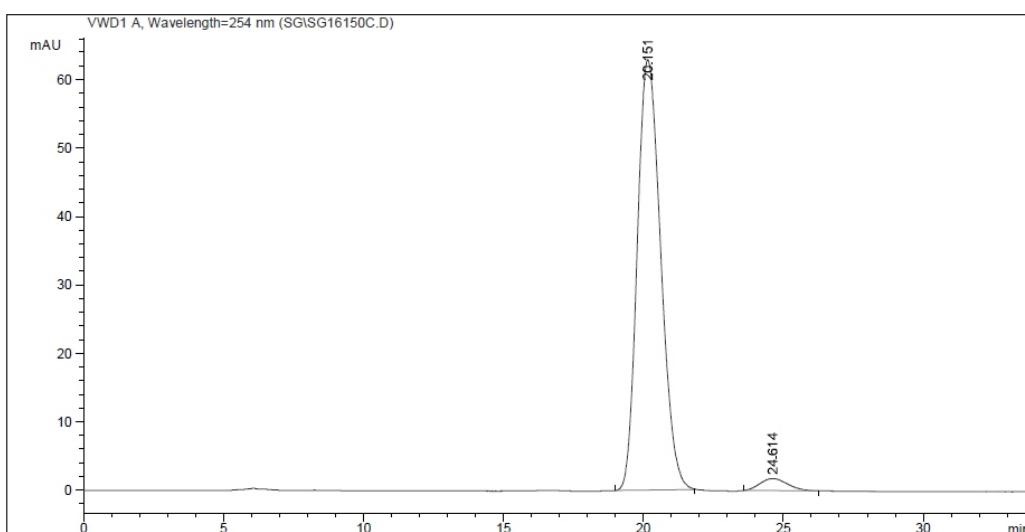
**racemic**



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Area Percent Report  
=====

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	[mAU ]	Area %
1	20.114	BB	0.8946	817.61609	14.07588	49.9041	
2	24.459	MM	1.1684	820.75842	11.70733	50.0959	
Totals :						1638.37451	25.78321

**chiral**

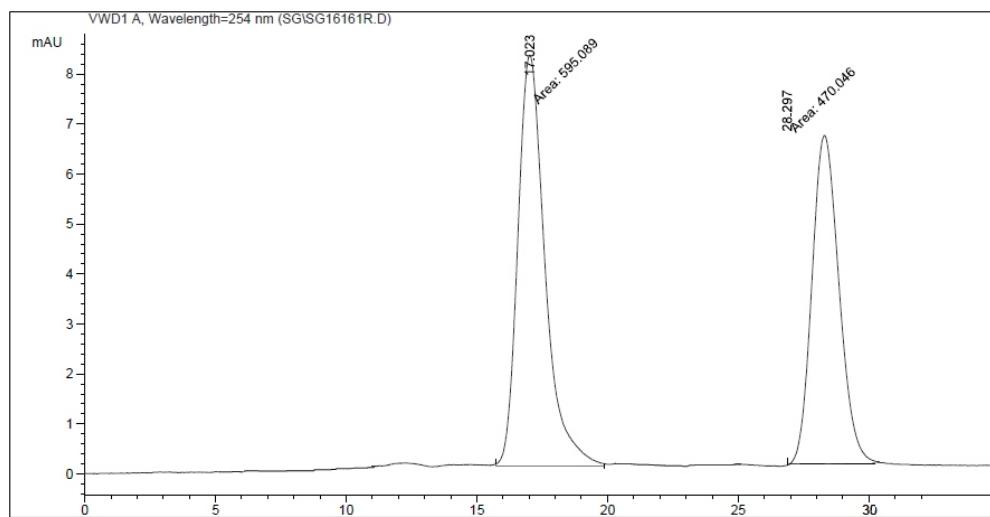
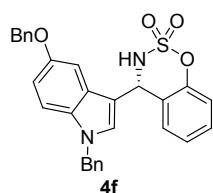


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Area Percent Report  
=====

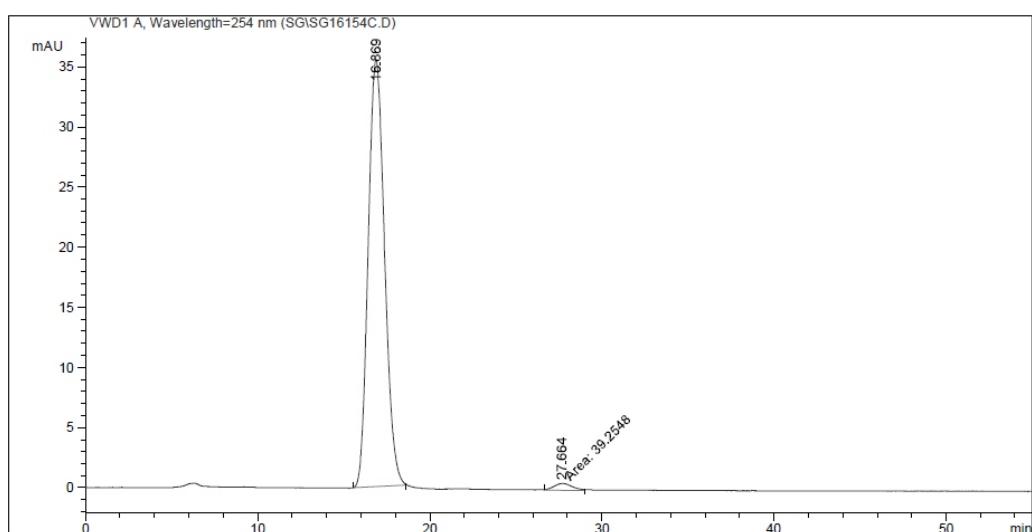
Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	[mAU ]	Area %
1	20.151	BB	0.9139	3666.11230	62.94955	96.7582	
2	24.614	BB	0.8167	122.82885	1.78002	3.2418	
Totals :						3788.94115	64.72957

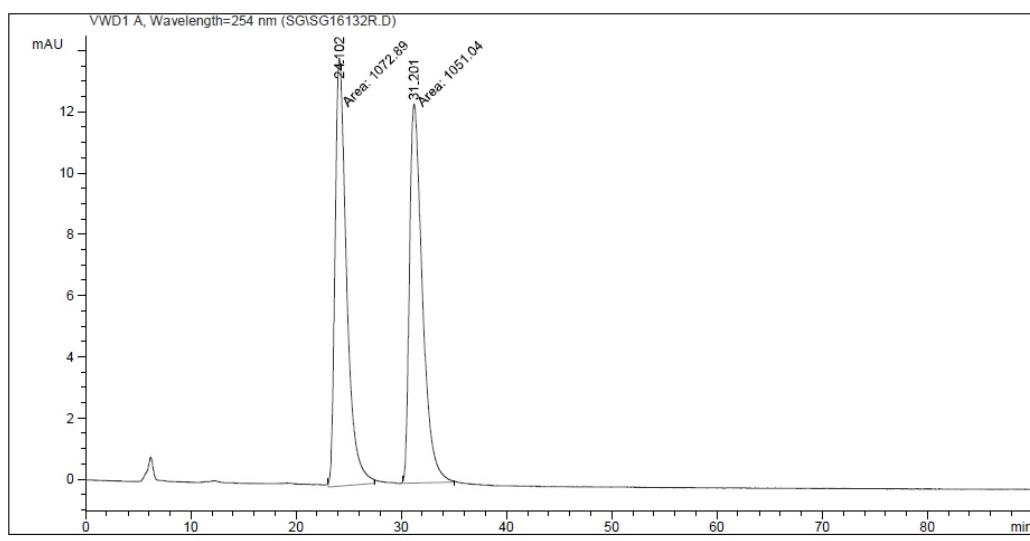
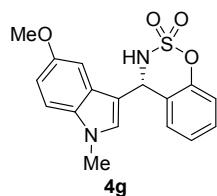
## HPLC analysis

### racemic

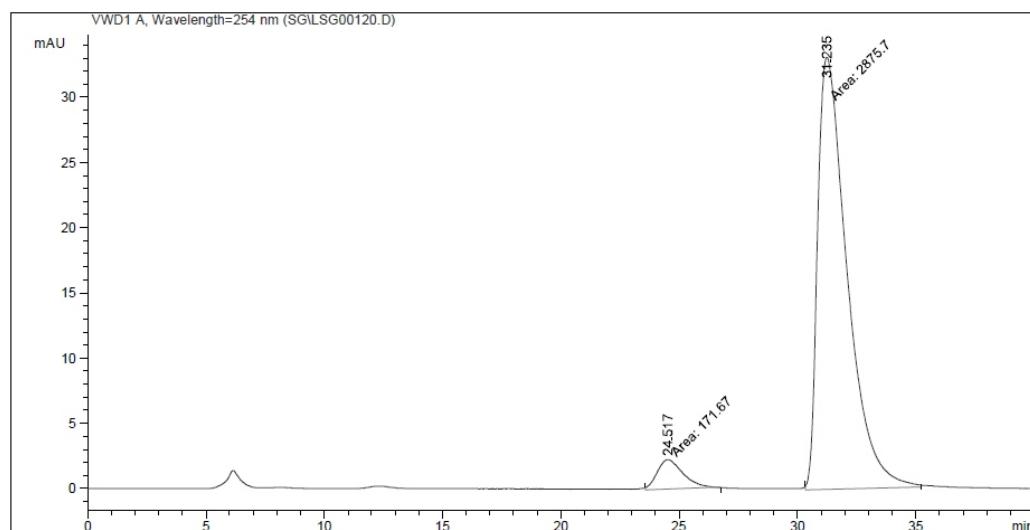


### chiral



**HPLC analysis****racemic****Area Percent Report**

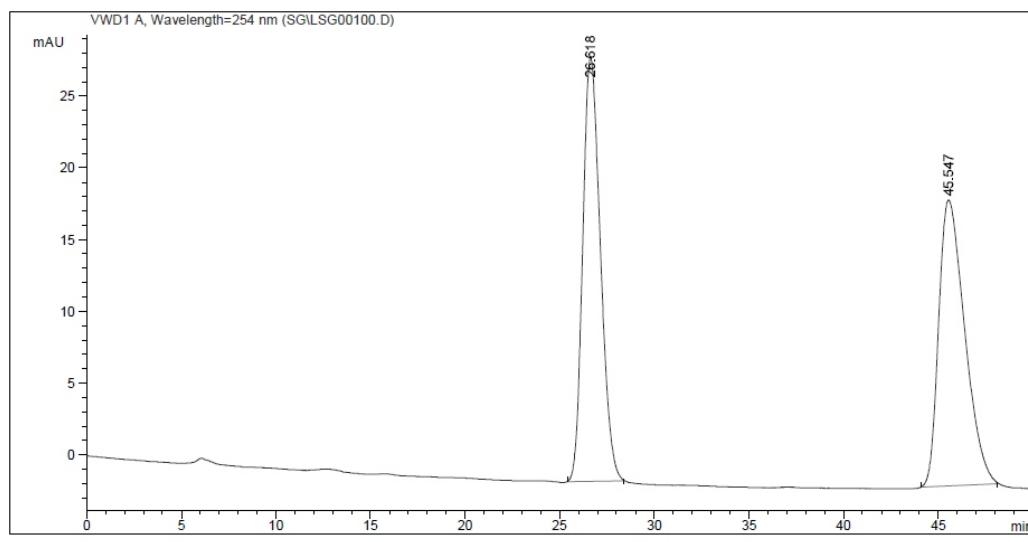
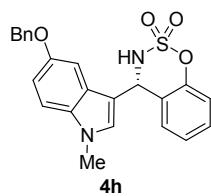
Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	[mAU ]	Area %
1	24.102	MM	1.2790	1072.89246	13.98033	50.5144	
2	31.201	MM	1.4162	1051.04004	12.36967	49.4856	
Totals :						2123.93250	26.35000

**chiral****Area Percent Report**

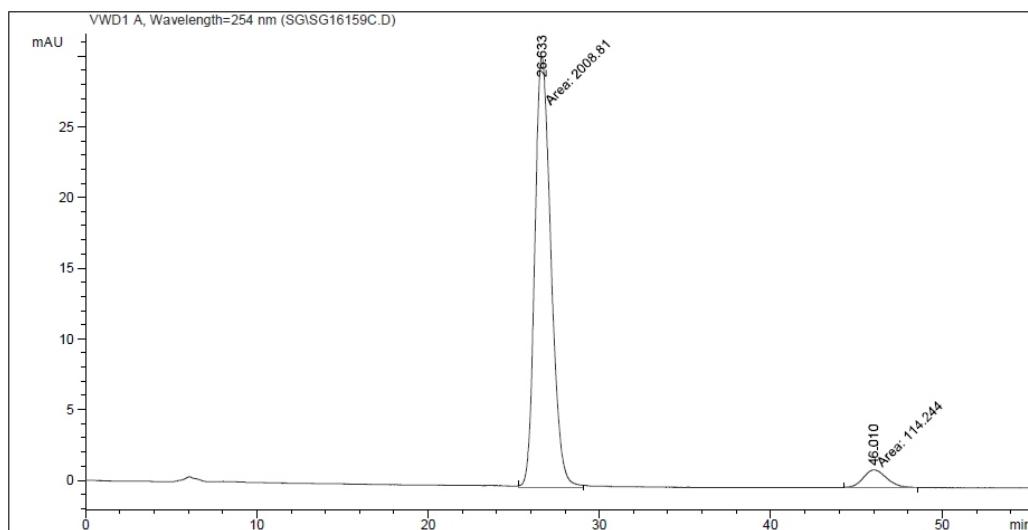
Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	[mAU ]	Area %
1	24.517	MM	1.2724	171.66986	2.24861	5.6334	
2	31.235	MM	1.4455	2875.69824	33.15803	94.3666	
Totals :						3047.36810	35.40664

## HPLC analysis

**racemic**

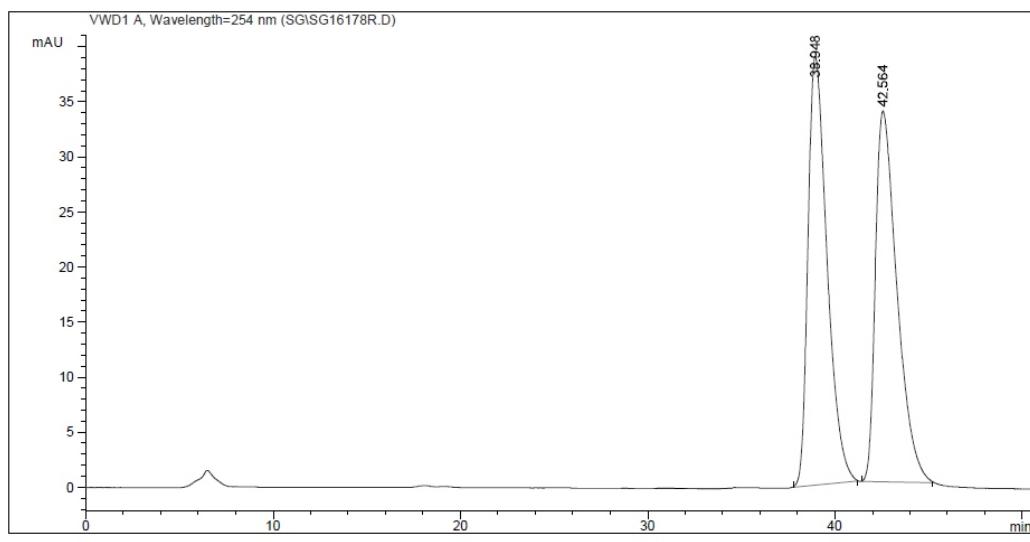
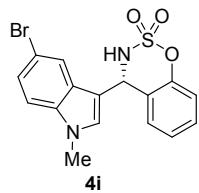


**chiral**



## HPLC analysis

### racemic

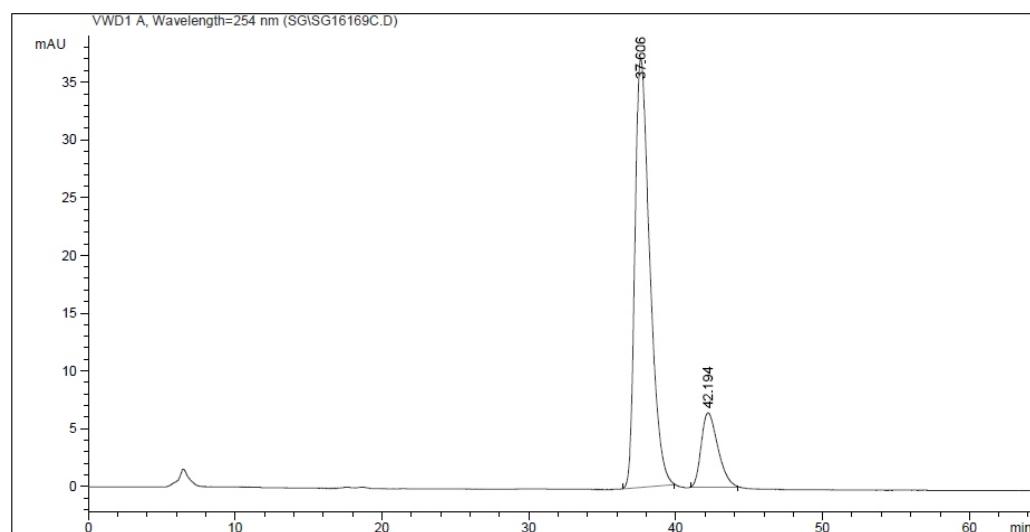


```
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Area Percent Report
=====

Peak RetTime Type Width Area Height Area
# [min] [min] mAU *s [mAU ] %
-----|-----|-----|-----|-----|-----|
1 38.948 BB 1.0664 2760.70435 38.91726 50.6102
2 42.564 BB 1.1741 2694.13135 33.65879 49.3898

Totals : 5454.83569 72.57605
```

### chiral



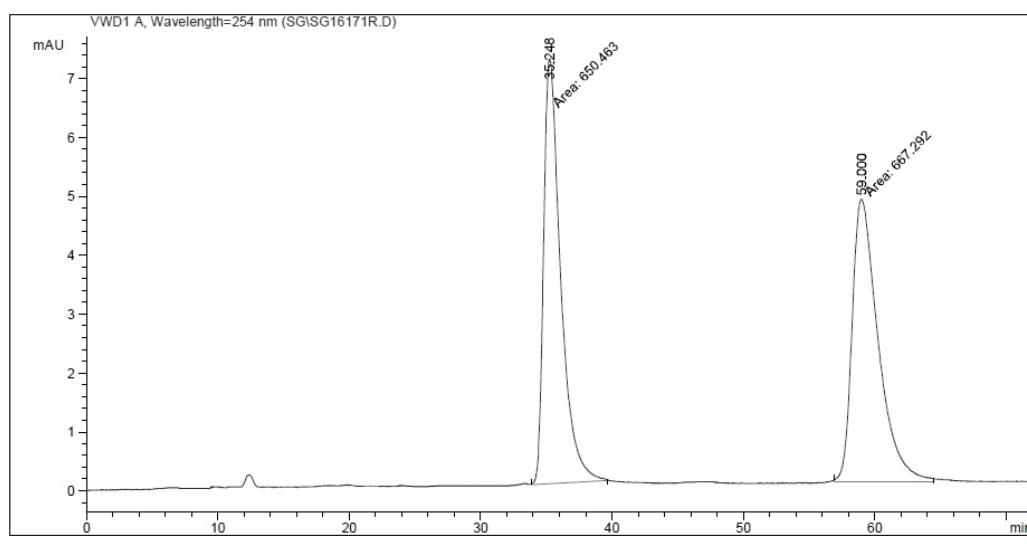
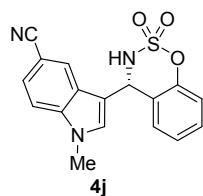
```
=====
Area Percent Report
=====

Peak RetTime Type Width Area Height Area
# [min] [min] mAU *s [mAU ] %
-----|-----|-----|-----|-----|
1 37.606 BB 1.0714 2614.87378 37.15883 83.8056
2 42.194 BB 1.0491 505.29242 6.43131 16.1944

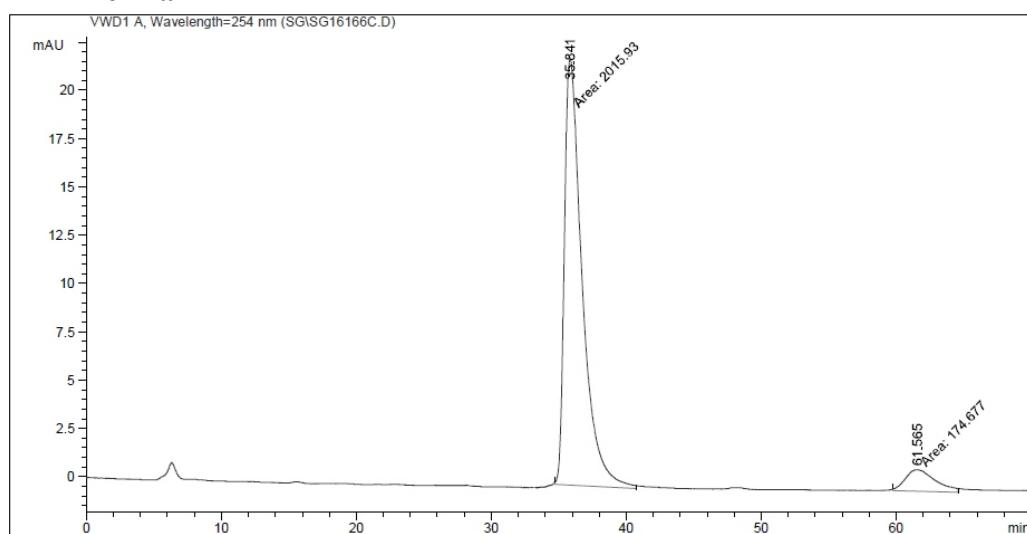
Totals : 3120.16620 43.59014
```

## HPLC analysis

### racemic

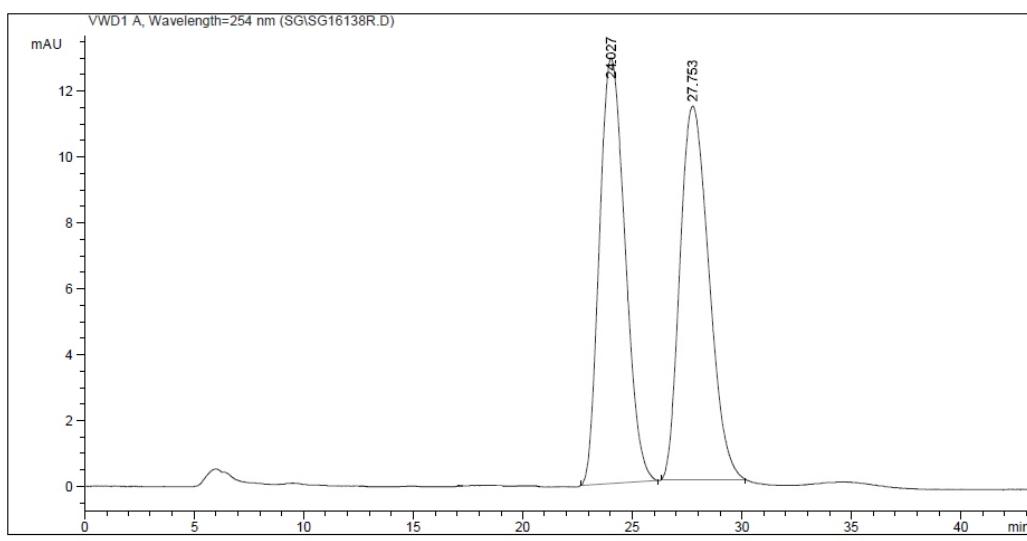
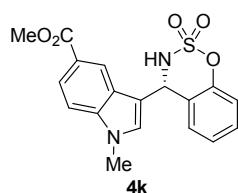


### chiral

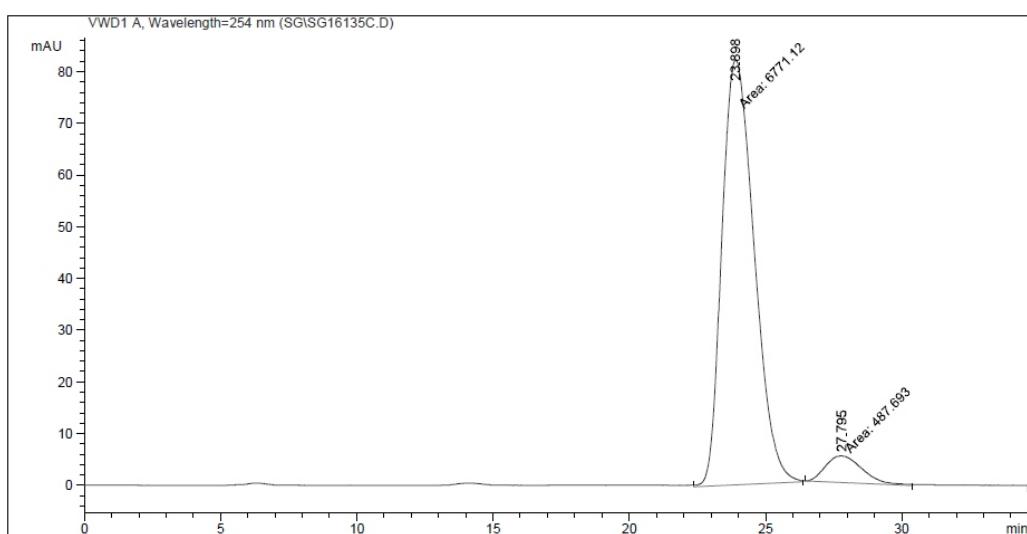


## HPLC analysis

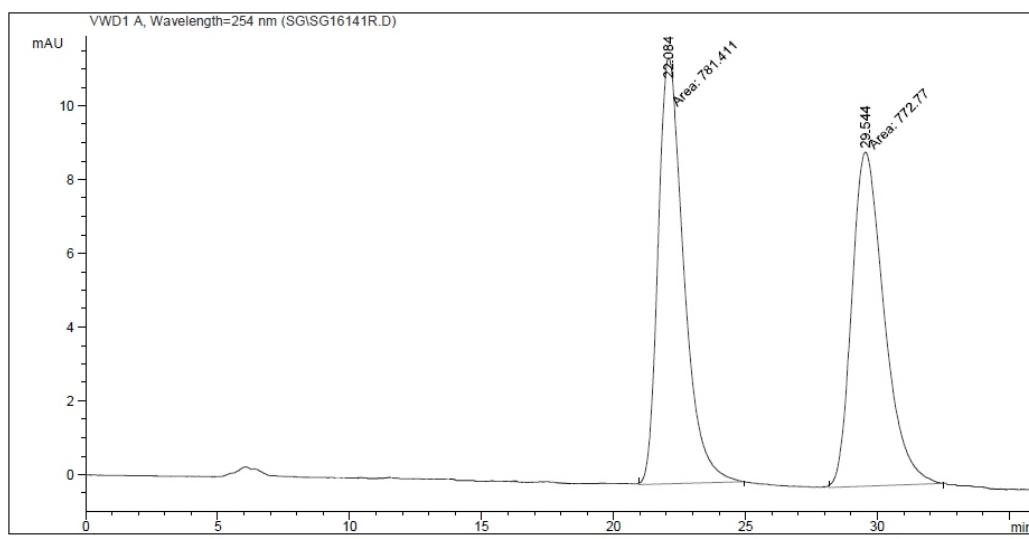
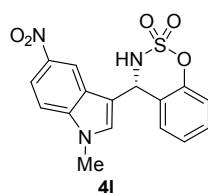
**racemic**



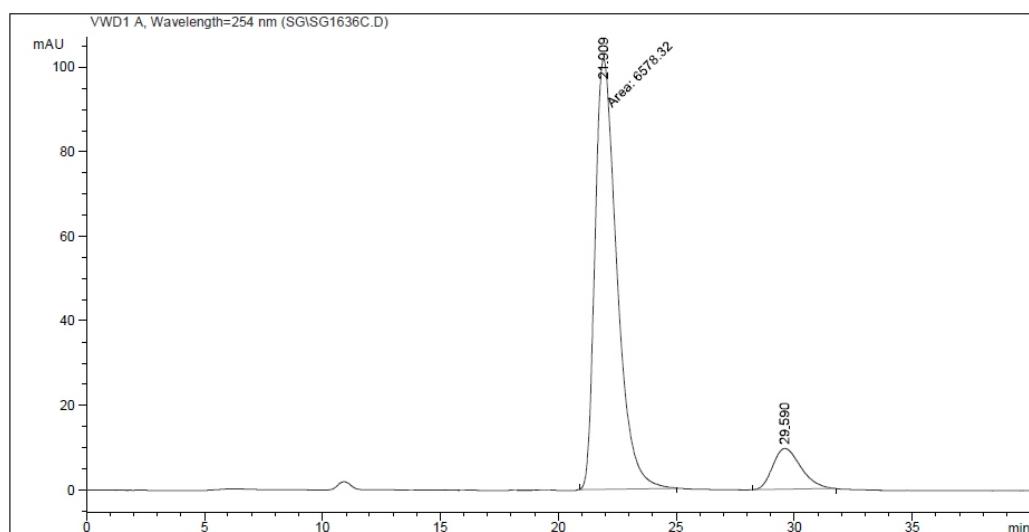
**chiral**



Totals : 7258.81741 87.31052

**HPLC analysis****racemic****Area Percent Report**

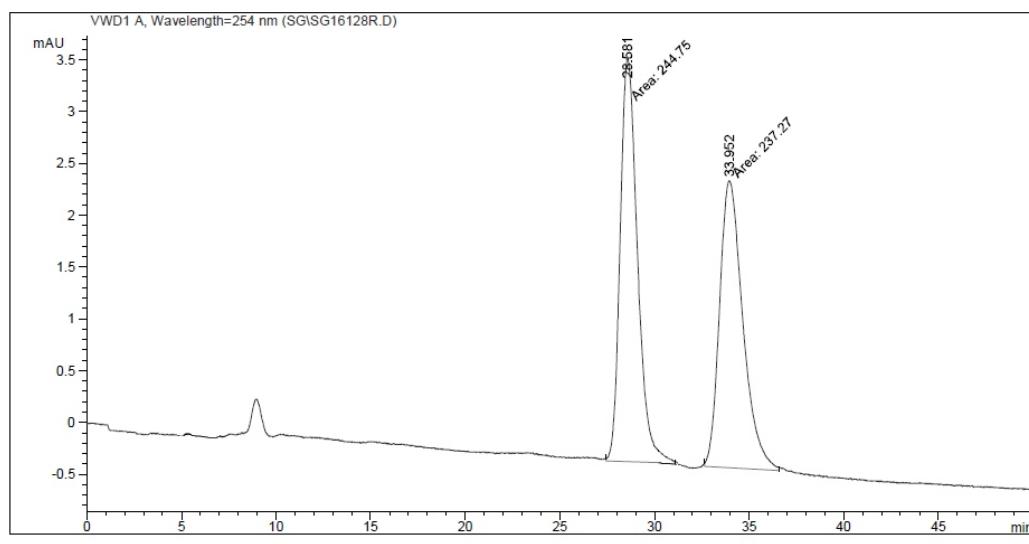
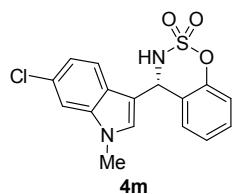
Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	[mAU ]	Area %
1	22.084	MM	1.1273	781.41144	11.55333	50.2780	
2	29.544	MM	1.4213	772.77026	9.06188	49.7220	
Totals :						1554.18170	20.61521

**chiral****Area Percent Report**

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	[mAU ]	Area %
1	21.909	MM	1.0750	6578.31787	101.98546	89.0282	
2	29.590	BB	1.1417	810.71136	9.70799	10.9718	
Totals :						7389.02924	111.69345

## HPLC analysis

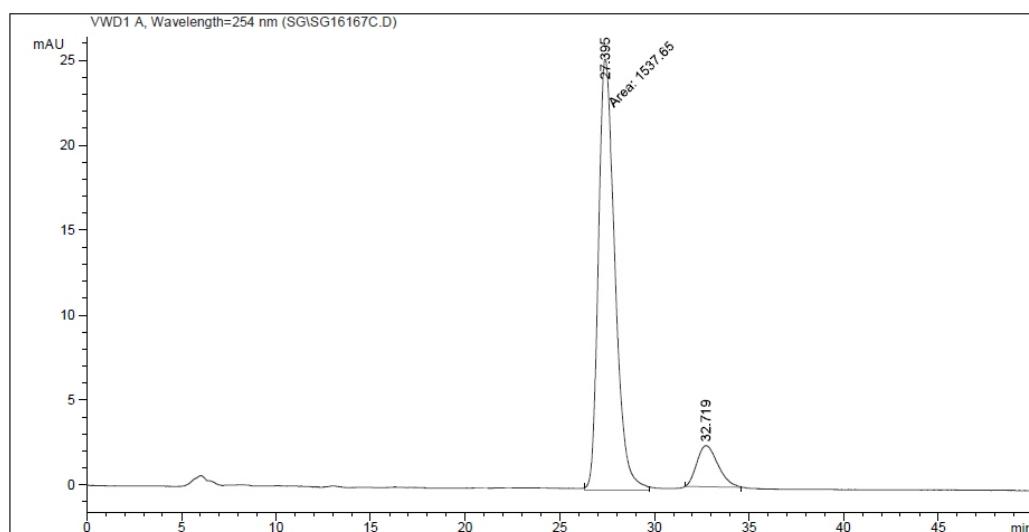
**racemic**



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

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	[mAU ]	Area %
1	28.581	MM	1.0459	244.74998	3.90019	50.7759	
2	33.952	MM	1.4271	237.26993	2.77093	49.2241	
Totals :						482.01991	6.67112

**chiral**

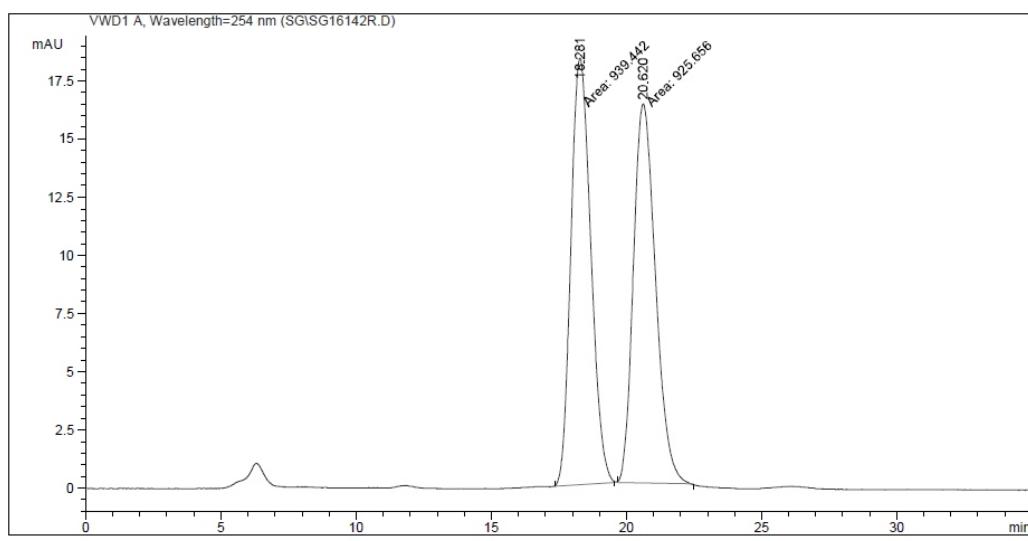
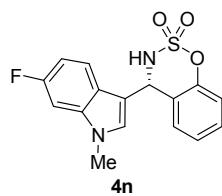


=====  
Area Percent Report  
=====

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	[mAU ]	Area %
1	27.395	MM	1.0101	1537.64856	25.37234	89.0850	
2	32.719	BB	0.9300	188.39717	2.42807	10.9150	
Totals :						1726.04573	27.80041

## HPLC analysis

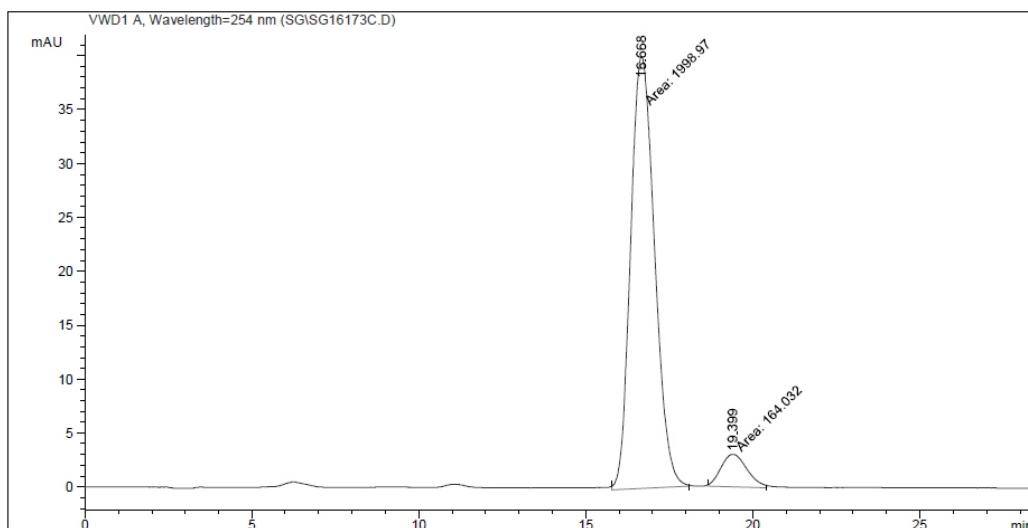
### racemic



### Area Percent Report

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	Area [mAU ]	Area %
1	18.281	MM	0.8538	939.44244	18.33799	50.3696	
2	20.620	MM	0.9469	925.65601	16.29332	49.6304	
Totals :						1865.09845	34.63132

### chiral

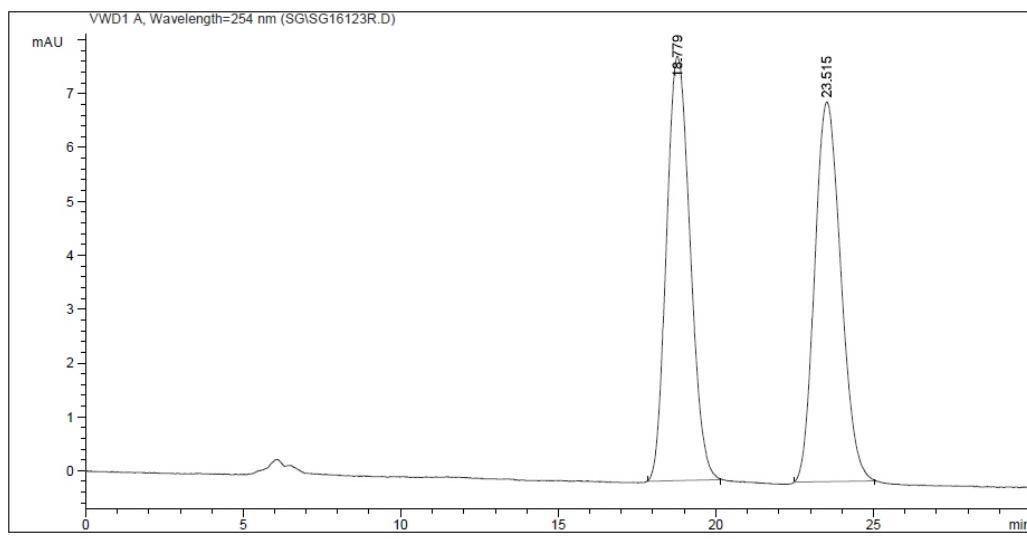
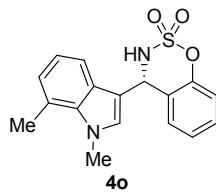


### Area Percent Report

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	Area [mAU ]	Area %
1	16.668	MM	0.8317	1998.96997	40.05807	92.4165	
2	19.399	MM	0.9024	164.03189	3.02956	7.5835	
Totals :						2163.00186	43.08763

### HPLC analysis

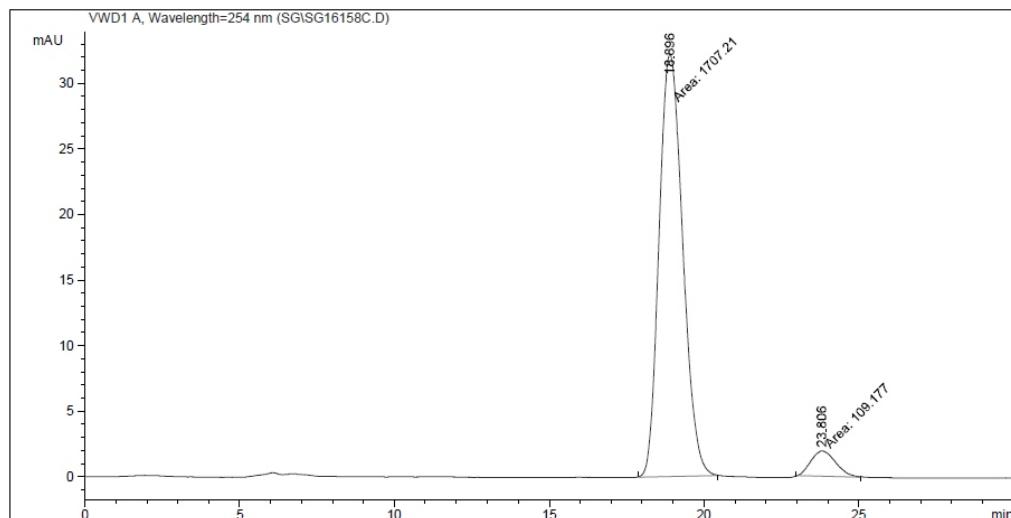
## racemic



Area Percent Report

Peak #	RetTime [min]	Type	Width [min]	Area *s	Height [mAU ]	Area %
1	18.779	BB	0.8046	411.64883	7.87951	50.3126
2	23.515	BB	0.8459	406.53339	7.05131	49.6874
Totals :				818.18222	14.93082	

## chiral

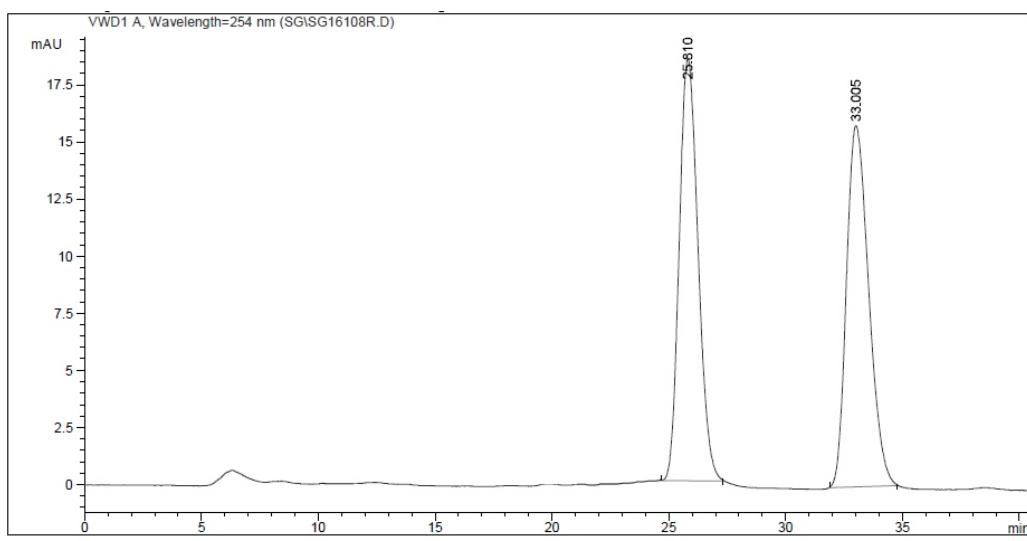
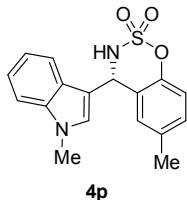


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Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	Area [mAU]	Area %
1	18.896	MM	0.8823	1707.21240	32.25107	93.9893	
2	23.806	MM	0.9403	109.17730	1.93517		6.0107
<b>Totals :</b>				1816.38970	34.18623		

## HPLC analysis

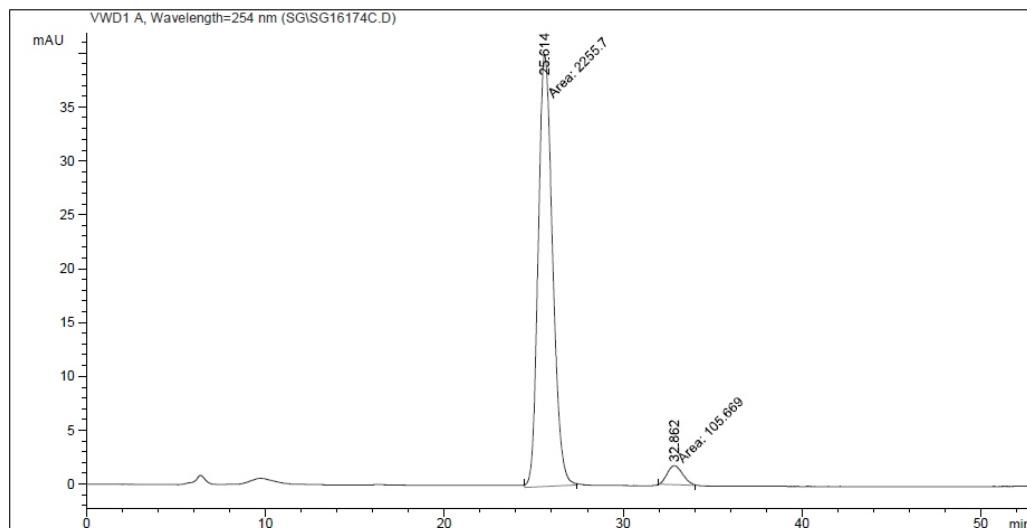
### racemic



### Area Percent Report

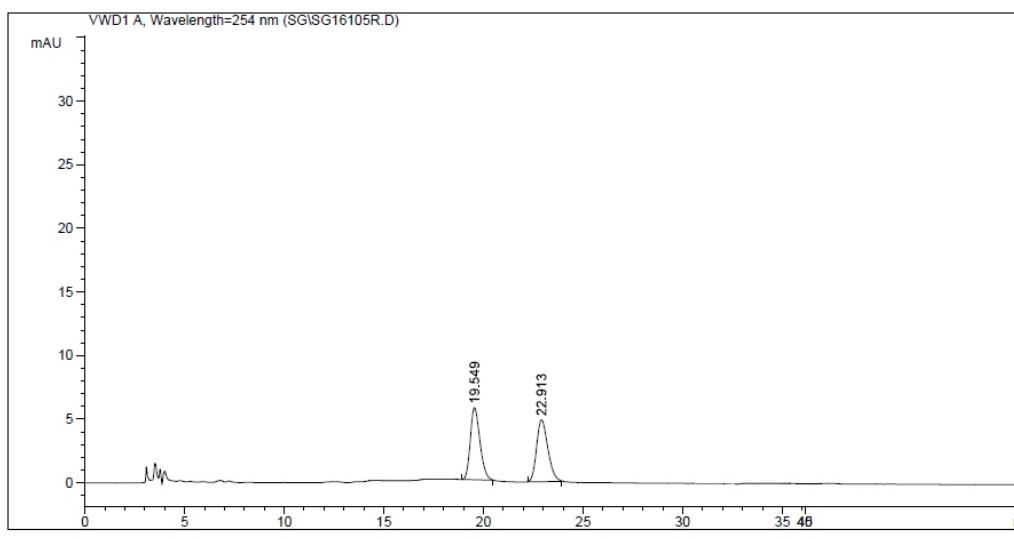
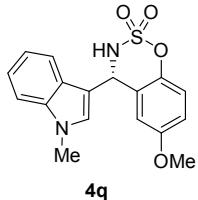
Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	[mAU ]	Area %
1	25.810	VB	0.8713	1035.79529	18.46844	49.8698	
2	33.005	BB	1.0082	1041.20203	15.81833	50.1302	
Totals :						2076.99731	34.28676

### chiral

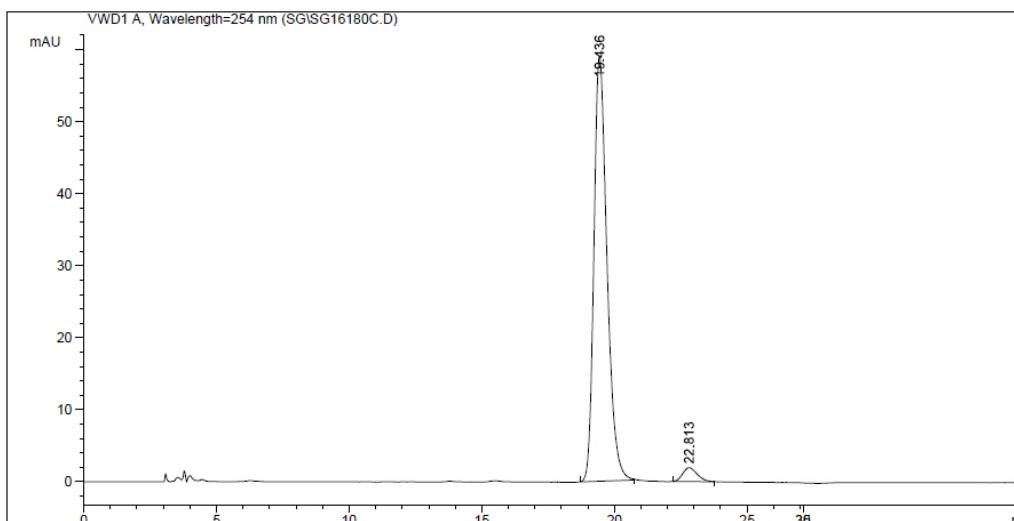


### Area Percent Report

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	[mAU ]	Area %
1	25.614	MM	0.9378	2255.69849	40.09018	95.5251	
2	32.862	MM	0.9970	105.66940	1.76648	4.4749	
Totals :						2361.36789	41.85666

**HPLC analysis****racemic**=====  
Area Percent Report  
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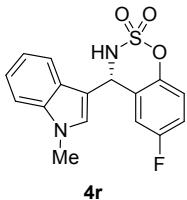
Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	Area [mAU ]	Area %
1	19.549	BB	0.5148	190.29594	5.67816	49.8645	
2	22.913	BB	0.6021	191.32988	4.87440	50.1355	
Totals :						381.62582	10.55255

**chiral**=====  
Area Percent Report  
=====

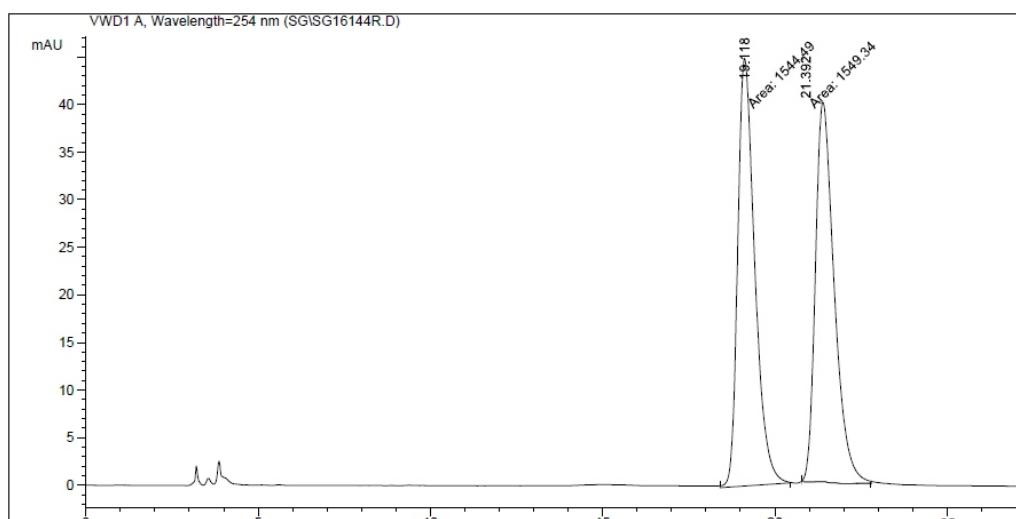
Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	Area [mAU ]	Area %
1	19.436	BB	0.5234	2023.01636	59.06198	96.5158	
2	22.813	BB	0.5720	73.03020	1.91959	3.4842	
Totals :						2096.04656	60.98158

### HPLC analysis

## **racemic**



4r



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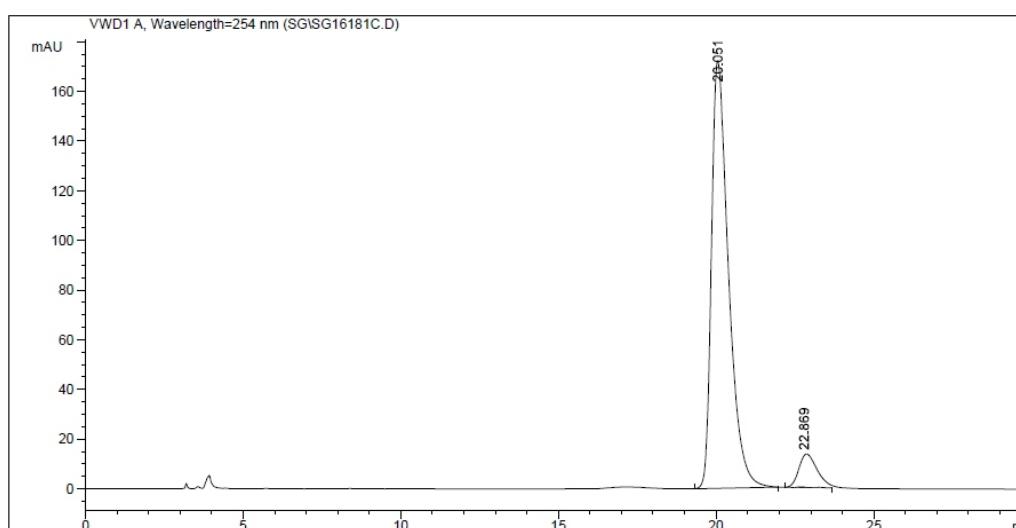
=====
                         Area Percent Report
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=====

Peak RetTime Type    Width      Area       Height     Area
#   [min]    [min]   mAU   *s   [mAU]   %
----|-----|-----|-----|-----|-----|-----|
  1  19.118 MM    0.5730 1544.48645  44.92115 49.9216
  2  21.392 MM    0.6429 1549.33569  40.16604 50.0784

Totals :           3093.82214  85.08119

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## chiral



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          Area Percent Report  

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Peak RetTime Type    Width      Area       Height      Area  

#   [min]      [min]     [mAU]    *s     [mAU]    %  

----+-----+-----+-----+-----+-----+-----+-----+  

  1  20.051  BB    0.5694  6470.82861  172.22542  92.1623  

  2  22.869  BB    0.6158   550.29614   13.52716   7.8377  

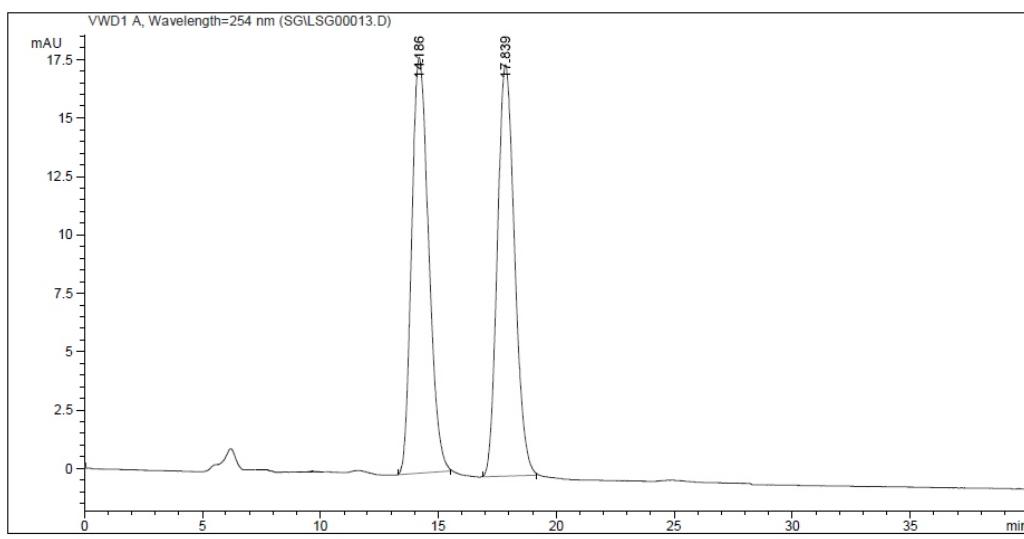
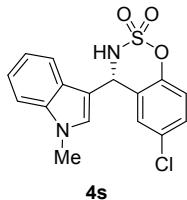
  

Totals :           7021.12476  185.75258

```

## HPLC analysis

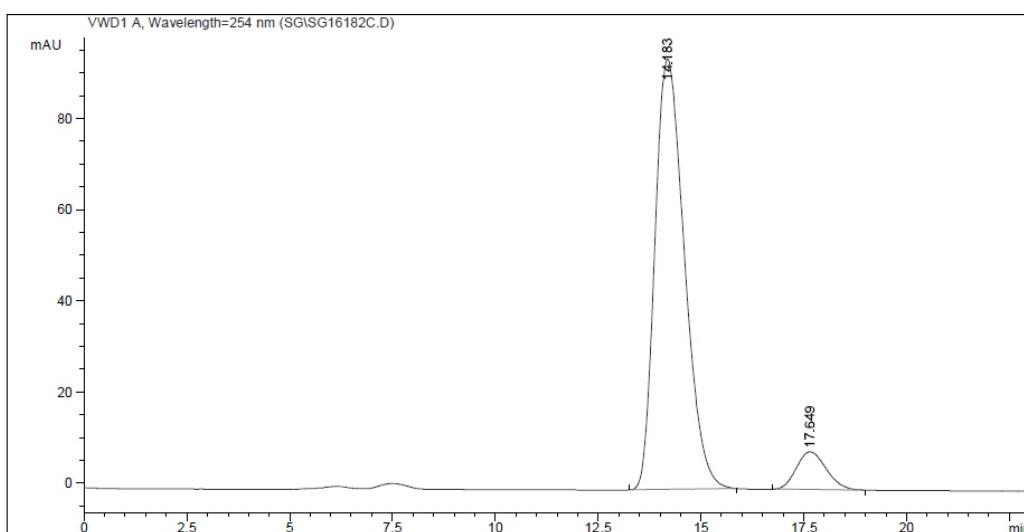
### racemic



### Area Percent Report

Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	Area [mAU ]	Area %
1	14.186	BB	0.7737	893.74347	17.79776	49.9531	
2	17.839	BB	0.7871	895.42322	17.60254	50.0469	
Totals :						1789.16669	35.40031

### chiral

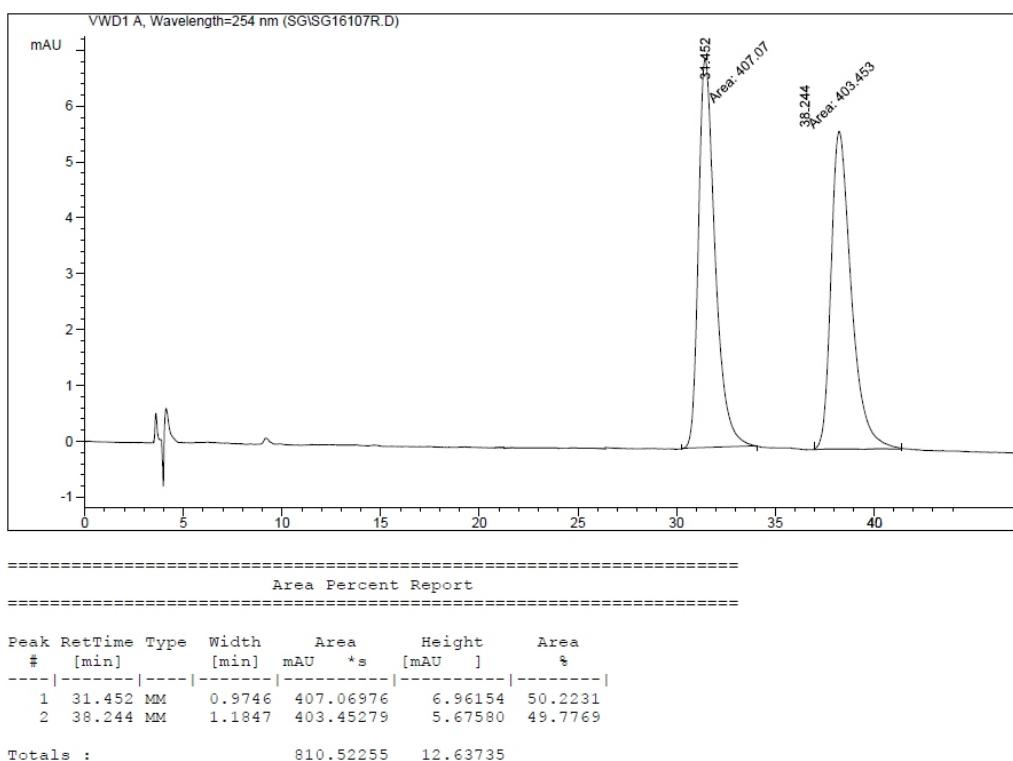
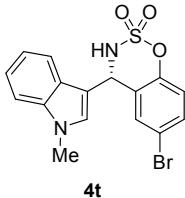


### Area Percent Report

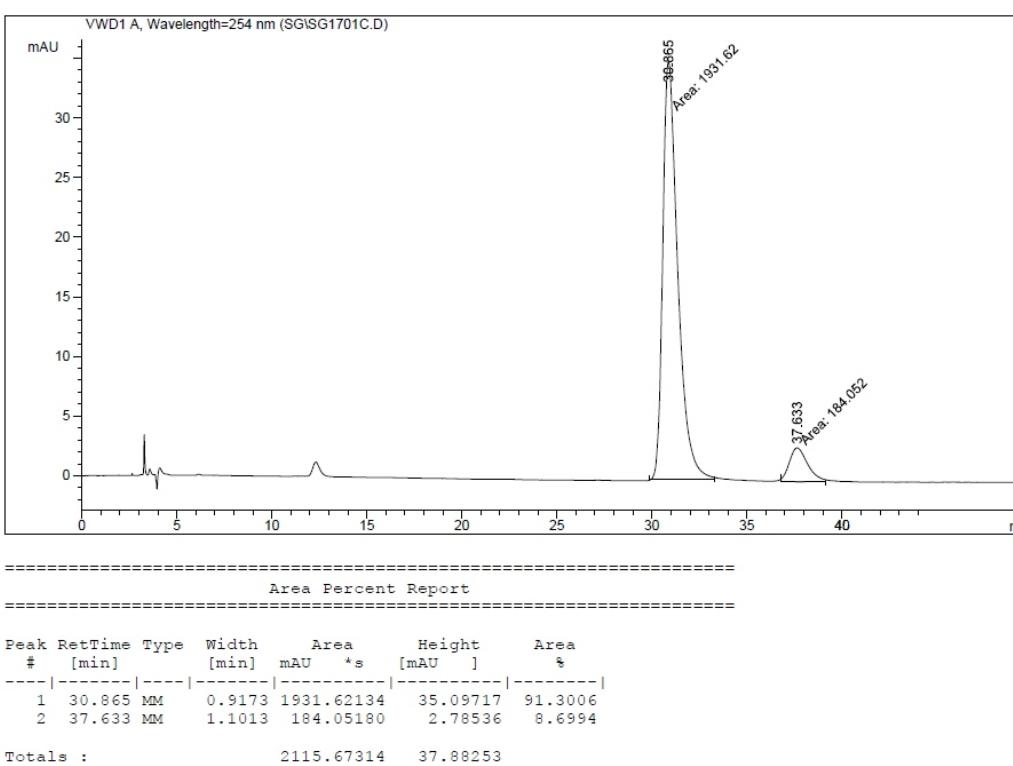
Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	Area [mAU ]	Area %
1	14.183	BB	0.7836	4714.30420	94.39548	91.8068	
2	17.649	BB	0.7552	420.72095	8.31007	8.1932	
Totals :						5135.02515	102.70555

### HPLC analysis

## **racemic**

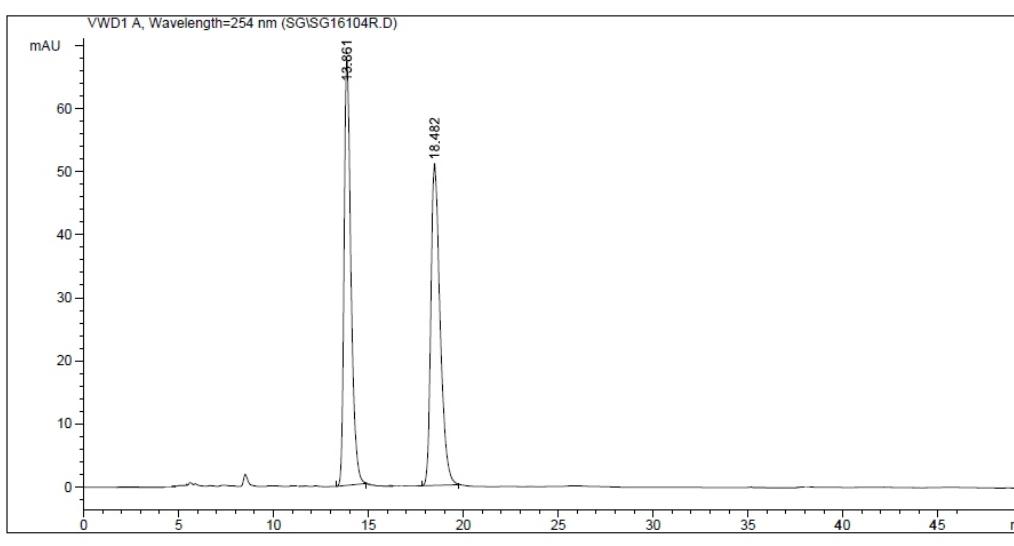
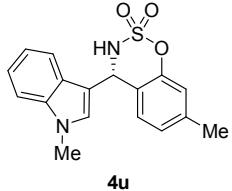


## chiral



## HPLC analysis

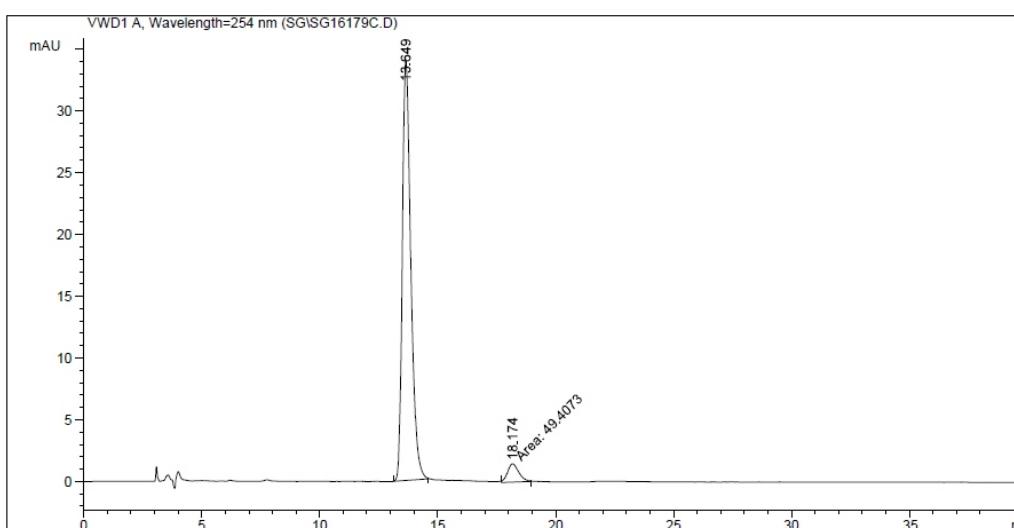
### racemic



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Area Percent Report
=====

Peak RetTime Type Width Area Height Area
# [min] [min] mAU *s [mAU] %
-----|-----|-----|-----|-----|-----|
1 13.861 BB 0.3838 1705.01843 67.43079 49.8751
2 18.482 BB 0.5067 1713.55762 51.04656 50.1249
Totals : 3418.57605 118.47734
```

### chiral

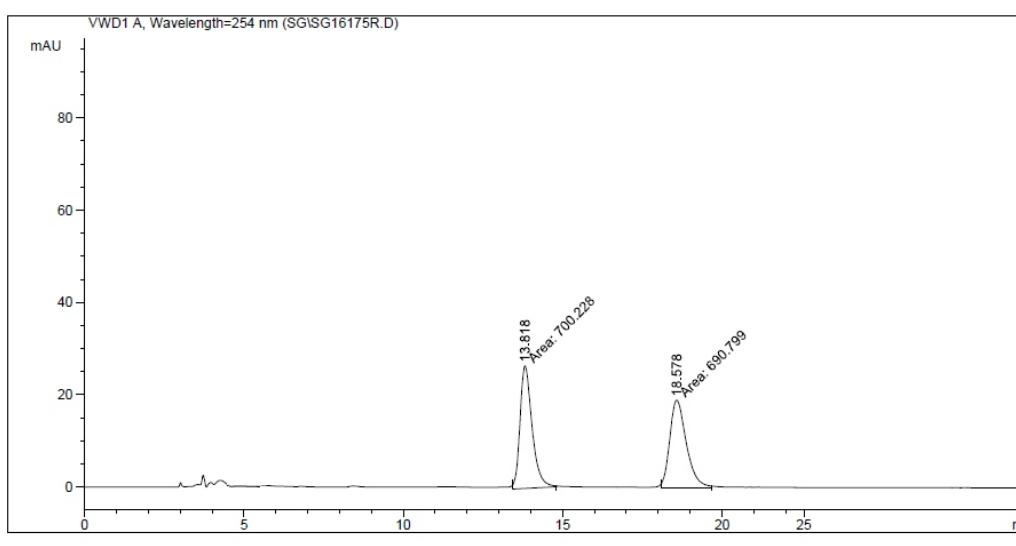
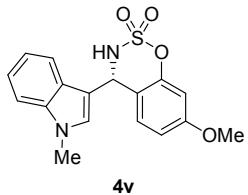


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Area Percent Report
=====

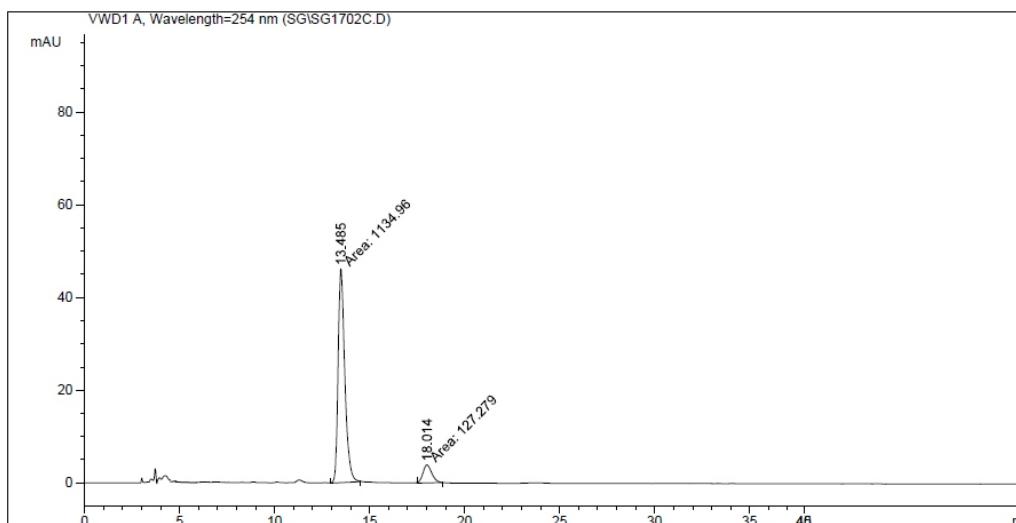
Peak RetTime Type Width Area Height Area
# [min] [min] mAU *s [mAU] %
-----|-----|-----|-----|-----|
1 13.649 BB 0.3776 846.85669 34.03638 94.4874
2 18.174 MM 0.5545 49.40727 1.48498 5.5126
Totals : 896.26396 35.52136
```

## HPLC analysis

**racemic**



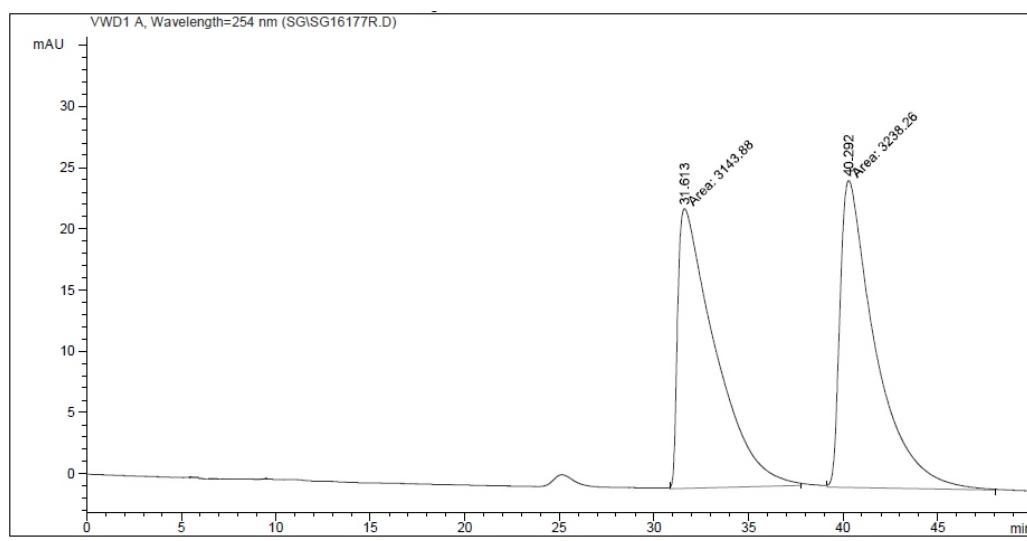
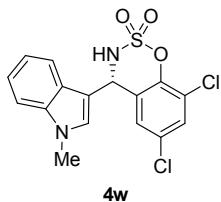
**chiral**



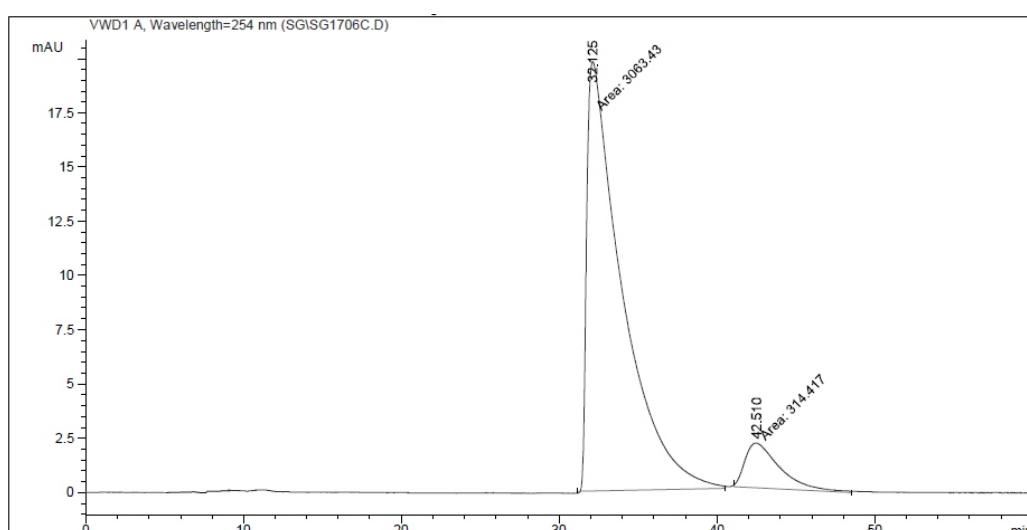
Totals : 1262.23454 50.02746

## HPLC analysis

**racemic**



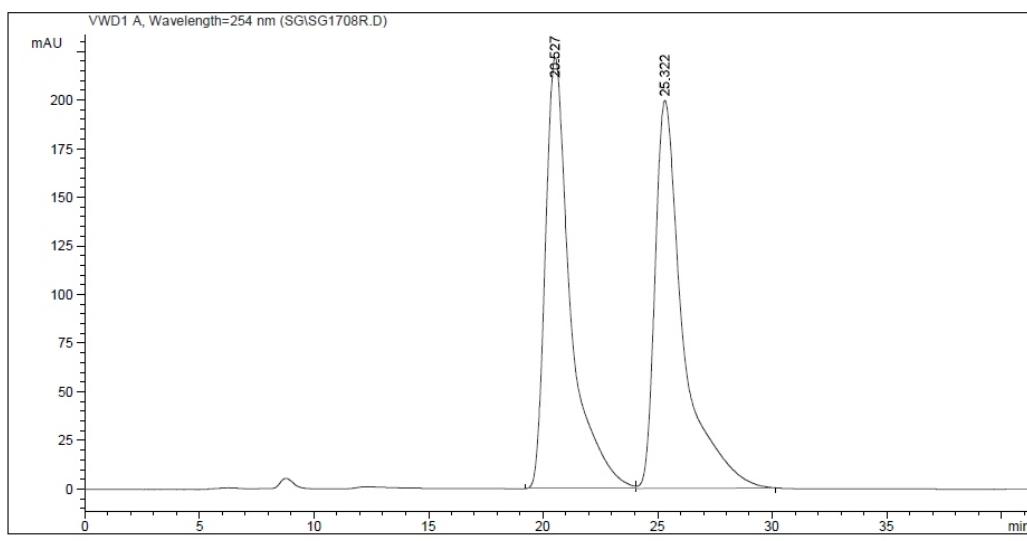
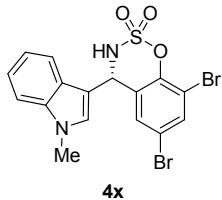
**chiral**



Totals : 3377.84631 21.82969

## HPLC analysis

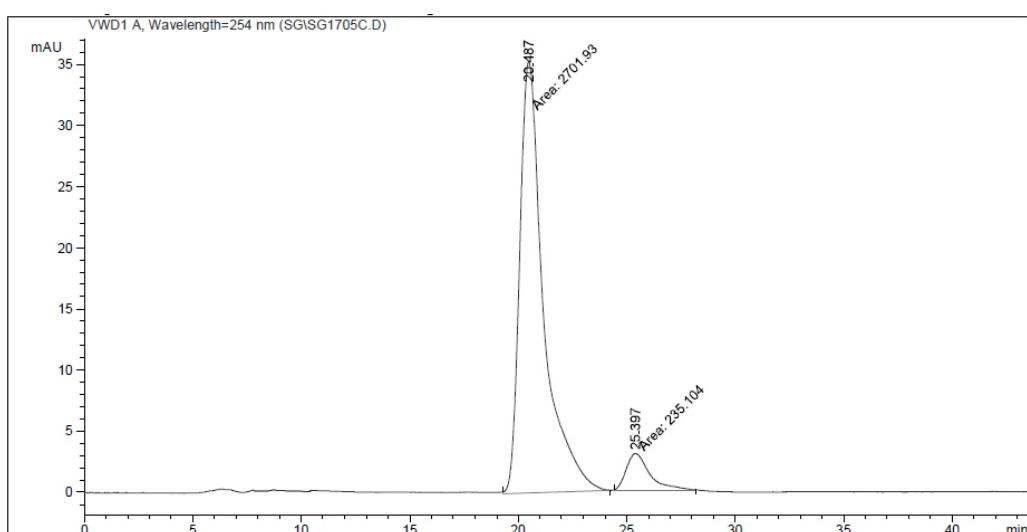
**racemic**



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Area Percent Report  
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Peak #	RetTime [min]	Type	Width [min]	Area mAU	*s	Height [mAU ]	Area %
1	20.527	BB	1.1368	1.69323e4		221.77463	50.0425
2	25.322	BB	1.2423	1.69035e4		199.41176	49.9575
Totals :							3.38358e4 421.18639

**chiral**

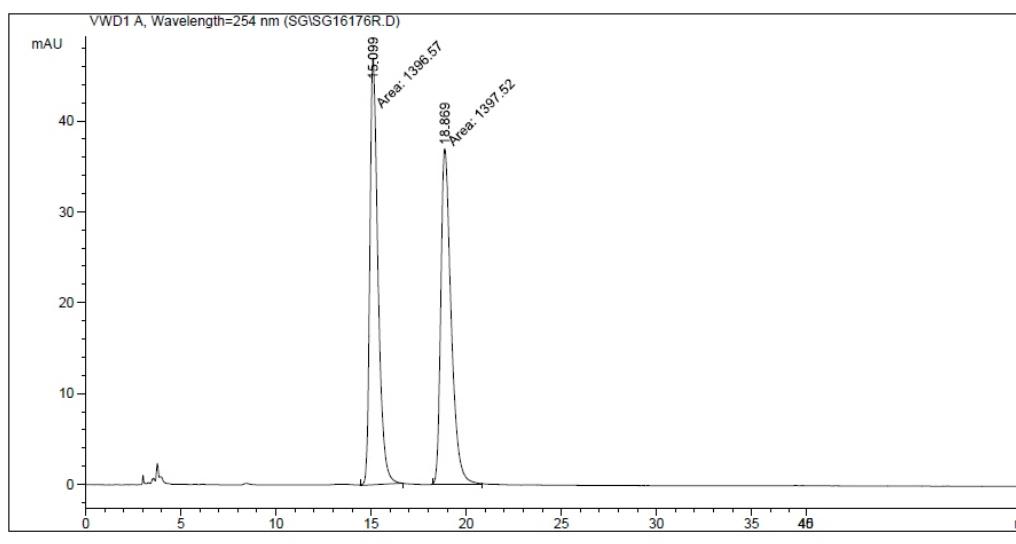
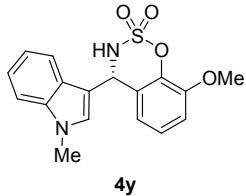


=====  
Area Percent Report  
=====

Peak #	RetTime [min]	Type	Width [min]	Area mAU	*s	Height [mAU ]	Area %
1	20.487	MM	1.2757	2701.9384		35.29946	91.9952
2	25.397	MM	1.2948	235.10400		3.02632	8.0048
Totals :							2937.03784 38.32578

## HPLC analysis

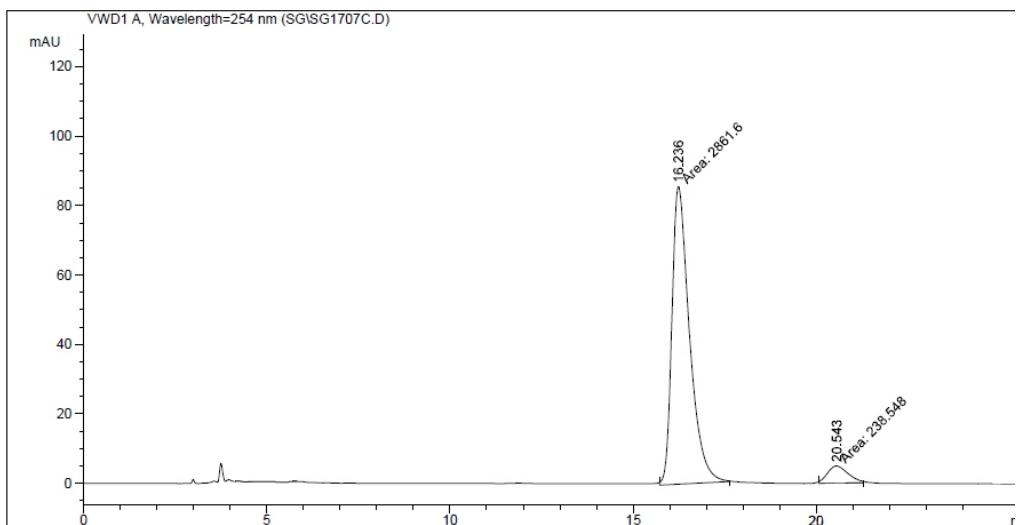
### racemic



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Area Percent Report
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Peak RetTime Type Width Area Height Area
# [min] [min] mAU *s [mAU ] %
-----+-----+-----+-----+-----+
1 15.099 MM 0.4958 1396.56616 46.94920 49.9829
2 18.869 MM 0.6305 1397.52307 36.94078 50.0171
Totals : 2794.08923 83.88998
```

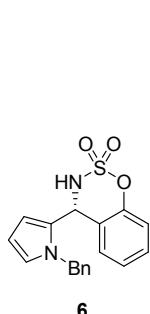
### chiral



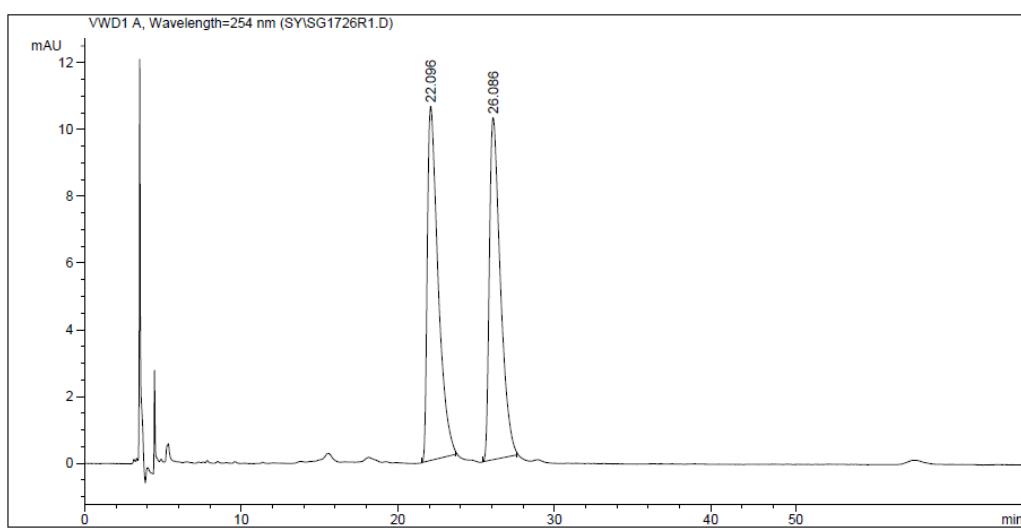
```
=====
Area Percent Report
=====

Peak RetTime Type Width Area Height Area
# [min] [min] mAU *s [mAU ] %
-----+-----+-----+-----+-----+
1 16.236 MM 0.5560 2861.60376 85.77186 92.3053
2 20.543 MM 0.7355 238.54846 5.40554 7.6947
Totals : 3100.15222 91.17740
```

## HPLC analysis



### racemic



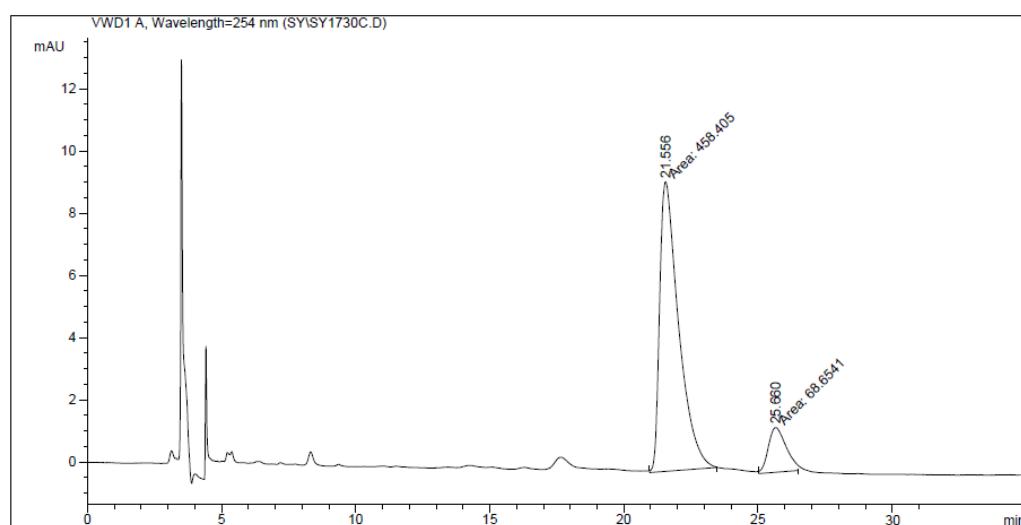
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Area Percent Report

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Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	Area [mAU]	Area %
1	22.096	BB	0.6892	507.46777	10.60673	50.3242	
2	26.086	BB	0.7234	500.93005	10.24447	49.6758	
<b>Totals :</b>						<b>1008.39783</b>	<b>20.85120</b>

### chiral



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Area Percent Report

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Peak #	RetTime [min]	Type	Width [min]	Area mAU	Height *s	Area [mAU]	Area %
1	21.556	MM	0.8204	458.40491	9.31218	86.9741	
2	25.660	MM	0.7926	68.65408	1.44371	13.0259	
<b>Totals :</b>						<b>527.05898</b>	<b>10.75589</b>