Supplementary Material (ESI) for Chemical Communications

Supporting Information for

Asymmetric Organocatalytic Formal Double-Arylation of Azomethines for the Synthesis of Highly Enantiomerically Enriched Isoindolines

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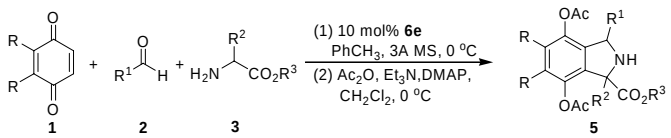
General Information: NMR spectra were recorded on a Brucker-400 MHz spectrometer. HRMS (Bio TOF Q) spectra were recorded on P-SIMS-Gly of Bruker Daltonics Inc. Infrared spectra were recorded on a Nicolet MX-1E FT-IR spectromter. Optical rotations were measured on Perkin Elmer Model 343 Polarimeter. HPLC analysis was performed on Waters-Breeze (2487 Dual Absorbance Detector and 1525 Binary HPLC Pump). Chiralpak AD, AS, and OD columns were purchased from Daicel Chemical Industries, LTD. X-ray crystallography analysis was performed on an Oxford Diffraction Gemini S Ultra CCD diffractionmeter equipped with mirror Cu Kα (λ = 1.54184 Å) radiation at room temperature. All structures were solved by direct methods and refined by full-matrix least-squares methods with SHELXL-97 programs. Elemental analysis was performed using an Elementar Vario EL III instrument. Solvents for the column chromatography were distilled before use. All starting materials commercially available were used directly. Quinones **1c** and **1d** were prepared according to the methods reported in the literature.[1] Catalyst **6e** was prepared according to previously described precedures[2] and was acidified with 4N HCl before use.

General Procedure for the Asymmetric Organocatalytic Formal Double-Arylation of Azomethines:



To a solution of an aldehyde **2** (0.24 mmol), the catalyst **6e** (0.02 mmol), and 3Å molecular sieves (300 mg) in $PhCH_3$ (2.0 mL) was added the amino ester (0.2 mmol). After the mixture was stirred at 25 ^oC

for 1 hour, the reaction mixture was cooled down to 0 ^{o}C and quinone **1** was added. The reaction mixture was stirred for ca. 12 hours until the reaction was complete (monitored by TLC). The reaction mixture was directly charged to a short column chromatography on silica gel (petroleum ether/EtOAc = 5/1) to remove the quinone, giving the crude **4** (when quinone **1b** and **1d** was used, **4** was partially isomerized), which was direct transferred to a test tube. The atmosphere was replaced with argon and CH_2Cl_2 (2 mL) was added. The test tube was placed in an ice-water bath, and then DMAP (0.2 mmol), Ac_2O (1.0 mmol) and Et_3N (1.0 mmol) were added, sequentially. After the consumption of the starting material (monitored by TLC), the reaction mixture was directly charged to column chromatography on silica gel (petroleum ether/ ethyl acetate = 4/1) to give pure product **5**.

Diethyl 3-(4-nitrophenyl)-4,9-dioxo-2,3,3a,4-tetrahydro-1H-benzo[f]isoindole-1,1(9H,9aH)-dicarboxylate (4a): Yield: 95%; $[\alpha]_D^{20}$ = -57.3 (c 1.5, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.31-1.40 (m, 6H), 3.31 (s, 1H), 4.25 (dd, J_1 = 7.9 Hz, J_2 = 10.5 Hz, 1H), 4.30-4.48 (m, 5H), 4.98 (d, J = 10.5 Hz, 1H), 7.34 (d, J = 8.8 Hz, 2H), 7.5-7.6 (m, 3H), 7.82 (d, J = 8.8 Hz, 2H), 7.87-7.90 (m, 1H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.06, 14.10, 54.09, 54.84, 61.29, 62.32, 62.83, 75.04, 122.99, 126.28, 126.94, 128.59, 134.47, 134.71, 134.86, 134.92, 146.58, 147.24, 168.36, 170.12, 192.72, 193.55; Enantiomeric excess: 97%, determined by HPLC (Daicel Chirapak AD-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 25 ^{o}C, 254 nm): t_R = 14.69 min (minor), t_R = 23.41 min (major); IR (KBr): γ 3358, 2957, 2923, 2869, 2852, 2361, 2345, 1757, 1729, 1685, 1591, 1518, 1465, 1345, 1254, 1097, 855, 749 cm^{-1}; HRMS: exact mass calcd for ($C_{24}H_{22}N_2O_8$) requires m/z 466.1376, found m/z 466.1376.

Diethyl 4,9-diacetoxy-3-(4-nitrophenyl)-2,3-dihydro-1H-benzo[f]isoindole-1,1-dicarboxylate (5a): Yield: 94%; m.p. 185-187 ^{o}C; $[\alpha]_D^{20}$ = +88.3 (c 2.1, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.29-1.33 (m, 6H), 1.93 (s, 3H), 2.45 (s, 3H), 3.97 (s, 1H), 4.13-4.43 (m, 4H), 5.79 (s, 1H), 7.50-7.56 (m, 4H), 7.67-7.74 (m, 2H), 8.17 (d, J = 8.5 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.02, 14.09, 20.11, 20.94, 62.46, 63.11, 64.96, 76.24, 121.54, 122.92, 123.61, 126.93, 127.08, 127.50, 128.57, 128.90, 129.62, 132.50, 139.29, 141.43, 147.69, 149.21, 167.40, 168.39, 168.73, 169.57; Enantiomeric excess: 97%, determined by HPLC (Daicel Chirapak AD-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 7.23 min(minor), t_R = 21.32 min(major); IR (KBr): γ 3435, 2959, 2922, 2852, 1755, 1736, 1636, 1608, 1523, 1429, 1348, 1197, 1173, 1093, 860 cm^{-1}; HRMS: exact mass calcd for $(C_{28}H_{26}N_2O_{10}+H)^+$ requires m/z 551.1666, found m/z 551.1660; Anal. Calcd for

$C_{28}H_{26}N_2O_{10}$: C, 61.09; H, 4.76; N, 5.09. Found: C, 60.84; H, 4.82; N, 4.68.

Diethyl 4,9-diacetoxy-3-(4-bromophenyl)-2,3-dihydro-1H-benzo[f]isoindole-1,1-dicarboxylate(5b): Yield: 98%; m.p. 187-189 ^oC; $[\alpha]_D^{20}$ = +77.0 (c 2.4, $CHCl_3$); ^1H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.26-1.32 (m, 6H), 1.90 (s, 3H), 2.43 (s, 3H), 3.85 (s, 1H), 4.12-4.40 (m, 4H), 5.63 (s, 1H), 7.20 (d, *J* = 7.1 Hz, 2H), 7.44-7.46 (m, 2H), 7.51-7.53 (m, 2H), 7.71 (d, *J*= 7.1 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.06, 14.10, 20.08, 20.10, 62.41, 62.96, 65.32, 76.13, 121.64, 122.05, 122.86, 126.87, 127.31, 128.42, 129.00, 130.47, 131.61, 132.94, 139.27, 140.57, 141.25, 167.54, 168.47, 168.83, 169.69; Enantiomeric excess: 95%, determined by HPLC (Daicel Chirapak AS-H, hexane/ isopropanol = 85/ 15, flow rate 1.0 mL/min, T = 30 ^oC, 254 nm): t_R = 7.94 min(major), t_R = 10.22 min(minor); IR (KBr): γ 3434, 3345, 2983, 2934, 1774, 1727, 1360, 1198, 1174, 1093, 1046, 1012, 766 cm^{-1}; HRMS: exact mass calcd for $(C_{28}H_{26}BrNO_8+H)^+$ requires m/z 584.0920, found m/z 584.0916; Anal. Calcd for $C_{28}H_{26}BrNO_8$: C, 57.54; H, 4.48; N, 2.40. Found: C, 57.65; H, 4.62; N, 2.23.

Diethyl 4,9-diacetoxy-3-(4-chlorophenyl)-2,3-dihydro-1H-benzo[f]isoindole-1,1-dicarboxylate (5c): Yield: 98%; m.p. 197-199 ^oC; $[\alpha]_D^{20}$ = +73.3 (c 2.2, $CHCl_3$); ^1H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.27-1.32 (m, 6H), 1.90 (s, 3H), 2.43 (s, 3H), 3.84 (s, 1H), 4.11-4.41 (m, 4H), 5.64 (s, 1H), 7.25-7.31 (m, 4H), 7.49-7.53 (m, 2H), 7.71 (d, *J* = 7.0 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.08, 14.11, 20.10, 21.00, 62.43, 62.97, 65.29, 76.14, 121.65, 122.88, 126.88, 127.32, 128.44, 128.67, 129.02, 130.14, 133.02, 133.94, 139.30, 140.07, 141.27, 167.54, 168.48, 168.86, 169.71; Enantiomeric excess: 91%, determined by HPLC (Daicel Chirapak AS-H, hexane/ isopropanol = 90/ 10, flow rate 1.0 mL/min, T = 30 ^oC, 254 nm): t_R = 11.74 min(major), t_R = 15.28 min(minor); IR (KBr): γ 3435, 3342, 2984, 2936, 1774, 1727, 1609, 1490, 1431, 1359, 1198, 1174, 1093, 1046, 1016, 767 cm^{-1}; HRMS: exact mass calcd for $(C_{28}H_{26}ClNO_8+H)^+$ requires m/z 540.1425, found m/z 540.1424; Anal. Calcd for $C_{28}H_{26}ClNO_8$: C, 62.28; H, 4.85; N,2.59. Found: C, 62.47; H, 5.02; N, 2.43.

Diethyl 4,9-diacetoxy-3-(4-cyanophenyl)-2,3-dihydro-1H-benzo[f]isoindole-1,1-dicarboxylate (5d): Yield: 95%; m.p. 173-175 ^oC; $[\alpha]_D^{20}$ = +79.7 (c 2.0, $CHCl_3$); ^1H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.25-1.33 (m, 6H), 1.91 (s, 3H), 2.44 (s, 3H), 3.94 (s, 1H), 4.11-4.42 (m, 4H), 5.73 (s, 1H), 7.46 (d, *J* = 8.3 Hz, 2H), 7.51-7.55 (m, 2H), 7.62 (d, *J* = 8.3 Hz, 2H) ,7.68-7.72 (m, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.05, 14.11, 20.08, 20.98, 62.47, 63.12, 65.33, 76.23, 111.93, 118.73, 121.59, 122.93, 127.08, 127.50, 128.57, 128.93, 129.57, 132.28, 132.52, 139.30, 141.41, 147.16, 167.39, 168.42,

168.74, 169.60; Enantiomeric excess: 93%, determined by HPLC (Daicel Chirapak AS-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 9.38 min(major), t_R = 20.82 min(minor); IR (KBr): γ 3434, 2983, 2932, 2228, 1773, 1731, 1608, 1446, 1360, 1198, 1174, 1093, 1047, 883, 768 cm^{-1}; HRMS: exact mass calcd for $(C_{29}H_{26}N_2O_8+H)^+$ requires m/z 531.1767, found m/z 531.1768; Anal. Calcd for $C_{29}H_{26}N_2O_8$: C, 65.65; H, 4.94; N, 5.28. Found: C, 65.34; H, 5.01; N, 5.02.

Diethyl 4,9-diacetoxy-3-(4-(methoxycarbonyl)phenyl)-2,3-dihydro-1H-benzo[f]isoindole-1,1-dicarboxylate (5e): Yield: 91%; m.p. 174-176 ^{o}C; $[\alpha]_D^{20}$ = +77.2 (c 2.3, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.26-1.33 (m, 6H), 1.87 (s, 3H), 2.44 (s, 3H), 3.91 (s, 3H), 3.9 (s, 1H), 4.14-4.41 (m, 4H), 5.73 (s, 1H), 7.46 (d, *J* = 7.4Hz, 2H), 7.48-7.55 (m, 2H), 7.69-7.73 (m, 2H), 8.01 (d, *J* = 7.4 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.06, 14.09, 20.09, 20.98, 52.16, 62.43, 62.98, 65.56, 76.27, 121.63, 122.88, 126.89, 127.33, 128.46, 128.80, 128.99, 129.82, 129.93, 132.98, 139.30, 141.29, 146.69, 166.86, 167.51, 168.46, 168.84, 169.68; Enantiomeric excess: 95%, determined by HPLC (Daicel Chirapak AS-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 6.65 min(major), t_R = 11.52 min(minor); IR (KBr): γ 3435, 2959, 2922, 2852, 1769, 1732, 1631, 1442, 1360, 1199, 1175, 1095, 771 cm^{-1}; HRMS: exact mass calcd for $(C_{30}H_{29}NO_{10}+H)^+$ requires m/z 564.1870, found m/z 564.1868; Anal. Calcd for $C_{30}H_{29}NO_{10}$: C, 63.94; H,5.19; N, 2.49. Found: C, 63.72; H, 5.30; N, 2.25.

Diethyl 4,9-diacetoxy-3-phenyl-2,3-dihydro-1H-benzo[f]isoindole-1,1-dicarboxylate (5f): Yield: 98%; m.p. 136-138 ^{o}C; $[\alpha]_D^{20}$ = +157.7 (c 0.8, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.27-1.32 (m, 6H), 1.82 (s, 3H), 2.43 (s, 3H), 3.9 (s, 1H), 4.13-4.40 (m, 4H), 5.66 (s, 1H), 7.25-7.34 (m, 5H), 7.48-7.52 (m, 2H), 7.70-7.72 (m, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.08, 14.10, 19.97, 21.01, 62.39, 62.87, 66.09, 76.22, 121.70, 122.84, 126.71, 127.16, 127.57, 128.19, 128.35, 128.55, 128.79, 129.06, 133.43, 139.32, 141.17, 141.27, 167.58, 168.51, 168.92, 169.78; Enantiomeric excess: 83%, determined by HPLC (Daicel Chirapak AD-H, hexane/ isopropanol = 85/ 15, flow rate 1.0 mL/min, T = 25 ^{o}C, 254 nm): t_R = 7.73 min(minor), t_R = 9.79 min(major); IR (KBr): γ 3335, 2982, 2358, 2331, 1759, 1727, 1358, 1239, 1195, 1171, 1094, 1028, 855, 772, 754 cm^{-1}; HRMS: exact mass calcd for $(C_{28}H_{27}NO_8+H)^+$ requires m/z 506.1815, found m/z 506.1822; Anal. Calcd for $C_{28}H_{27}NO_8$: C, 66.53; H, 5.38; N, 2.77. Found: C, 66.53; H, 5.46; N, 2.55.

Diethyl 4,9-diacetoxy-3-p-tolyl-2,3-dihydro-1H-benzo[f]isoindole-1,1-dicarboxylate (5g): Yield:

95%; m.p. 173-175 ^{o}C; $[\alpha]_D^{20}$ = +84.3 (c 1.6, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.26-1.32 (m, 6H), 1.84 (s, 3H), 2.34 (s, 3H), 2.43 (s, 3H), 3.8 (s, 1H), 4.11-4.40 (m, 4H), 5.62 (s, 1H), 7.13 (d, *J* = 7.8 Hz, 2H), 7.20 (d, *J* = 7.8 Hz, 2H), 7.48-7.52 (m, 2H), 7.70-7.72 (m, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.09, 20.04, 21.02, 21.26, 62.38, 62.83, 65.85, 76.20, 121.70, 122.83, 126.67, 127.13, 127.64, 128.32, 128.64, 129.08, 129.21, 133.57, 137.86, 138.26, 139.29, 141.14, 167.62, 168.55, 168.95, 169.82; Enantiomeric excess: 86%, determined by HPLC (Daicel Chirapak AD-H, hexane/ isopropanol = 85/ 15, flow rate 1.0 mL/min, T = 25 ^{o}C, 254 nm): t_R = 7.57 min (minor), t_R = 11.56 min (major); IR (KBr): γ 3341, 2985, 2923, 2856, 1774, 1731, 1430, 1359, 1261, 1197, 1173, 1093, 1044, 1022, 765 cm^{-1}; HRMS: exact mass calcd for $(C_{29}H_{29}NO_8+H)^+$ requires m/z 520.1971, found m/z 520.1970; Anal. Calcd for $C_{29}H_{29}NO_8$: C, 67.04; H, 5.63; N, 2.70. Found: C, 67.02; H, 5.76; N, 2.45.

Diethyl 4,9-diacetoxy-3-(3-chlorophenyl)-2,3-dihydro-1H-benzo[f]isoindole-1,1-dicarboxylate (5h): Yield: 98%; m.p. 180-182 ^{o}C; $[\alpha]_D^{20}$ = +57.0 (c 2.1, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.26-1.33 (m, 6H), 1.95 (s, 3H), 2.44 (s, 3H), 3.9 (s, 1H), 4.11-4.41 (m, 4H), 5.65 (s, 1H), 7.24-7.27 (m, 3H), 7.34 (s, 1H), 7.51-7.53 (m, 2H), 7.70-7.72 (m, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.07, 14.11, 20.08, 20.99, 62.45, 63.00, 65.42, 76.19, 121.66, 122.89, 126.89, 127.19, 127.32, 128.26, 128.46, 128.94, 129.03, 129.82, 132.96, 134.26, 139.35, 141.27, 143.78, 167.56, 168.48, 168.89, 169.72; Enantiomeric excess: 94%, determined by HPLC (Daicel Chirapak AD-H, hexane/ isopropanol = 85/ 15, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 7.71 min(minor), t_R = 9.08 min(major); IR (KBr): γ 3439, 3338, 2987, 2928, 1771, 1728, 1439, 1359, 1200, 1176, 1016, 767 cm^{-1}; HRMS: exact mass calcd for $(C_{28}H_{26}ClNO_8+H)^+$ requires m/z 540.1425, found m/z 540.1426; Anal. Calcd for $C_{28}H_{26}ClNO_8$: C, 62.28; H, 4.85; N, 2.59. Found: C, 62.44; H, 4.94; N, 2.44.

Diethyl 4,9-diacetoxy-3-(3-methoxyphenyl)-2,3-dihydro-1H-benzo[f]isoindole-1,1-dicarboxylate (5i): Yield: 98%; m.p. 128-130 ^{o}C; $[\alpha]_D^{20}$ = +81.6 (c 2.1, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.27-1.32 (m, 6H), 1.88 (s, 3H), 2.43 (s, 3H), 3.74 (s, 3H), 3.85 (s, 1H), 4.13-4.40 (m, 4H), 5.64 (s, 1H), 6.84-6.87 (m, 2H), 6.92-6.94 (m, 1H), 7.22-7.24 (m, 1H), 7.48-7.52 (m, 2H) , 7.70-7.72 (m, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.09, 14.12, 20.03, 21.02, 55.30, 62.39, 62.90, 66.05, 76.20, 113.97, 114.10, 121.11, 121.74, 122.86, 126.73, 127.18, 127.52, 128.36, 129.10, 129.46, 133.34, 139.38, 141.18, 142.91, 159.85, 167.66, 168.54, 168.95, 169.81; Enantiomeric excess: 97%, determined by HPLC (Daicel Chirapak AS-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 5.61 min(major), t_R = 7.24 min(minor); IR (KBr): γ 3351, 2982, 2938, 1770, 1732,

1608, 1360, 1240, 1198, 1173, 1044, 766 cm^{-1}; HRMS: exact mass calcd for $(C_{29}H_{29}NO_9+H)^+$ requires m/z 536.1921, found m/z 536.1917; Anal. Calcd for $C_{29}H_{29}NO_9$: C, 65.04; H, 5.46; N, 2.62. Found: C, 65.04; H, 5.60; N, 2.40.

Diethyl 4,9-diacetoxy-3-(2,3-dichlorophenyl)-2,3-dihydro-1H-benzo[f]isoindole-1,1- dicarboxylate (5j): Yield: 96%; m.p. 68-70 ^oC; $[\alpha]_D^{20}$ = -15.1 (c 2.2, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.27-1.33 (m, 6H), 2.00 (s, 3H), 2.43 (s, 3H), 3.97 (s, 1H), 4.13-4.42 (m, 4H), 6.37 (s, 1H), 7.10-7.14 (m, 1H), 7.12-7.24 (m, 1H), 7.38-7.40 (m, 1H), 7.48-7.55 (m, 2H) , 7.62-7.64 (m, 1H), 7.70-7.73(m, 1H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.06, 14.10, 19.94, 20.99, 61.77, 62.39, 63.09, 76.23, 121.71, 122.99, 126.89, 127.03, 127.39, 127.81, 128.55, 128.98, 129.53, 129.82, 131.75, 132.80, 139.40, 141.45, 167.58, 168.42, 168.84, 169.62; Enantiomeric excess: 91%, determined by HPLC (Daicel Chirapak AS-H, hexane/ isopropanol = 90/ 10, flow rate 1.0 mL/min, T = 30 ^oC, 254 nm): t_R = 7.83 min(major), t_R = 10.35 min(minor); IR (KBr): γ 3349, 3074, 2982, 2937, 1773, 1735, 1427, 1360, 1241 1197, 1172, 1094, 1046, 764 cm^{-1}; HRMS: exact mass calcd for $(C_{28}H_{25}Cl_2NO_8+H)^+$ requires m/z 574.1035, found m/z 574.1042; Anal. Calcd for $C_{28}H_{25}Cl_2NO_8$: C, 58.55; H, 4.39; N, 2.44. Found: C, 58.58; H, 4.52; N, 2.17.

Diethyl 4,9-diacetoxy-3-(thiophen-3-yl)-2,3-dihydro-1H-benzo[f]isoindole-1,1-dicarb oxylate (5k): Yield: 96%; m.p. 140-142 ^oC; $[\alpha]_D^{20}$ = +62.3 (c 2.0, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.25-1.31(m, 6H), 1.95 (s, 3H), 2.42 (s, 3H), 3.80 (s, 1H), 4.13-4.38 (m, 4H), 5.80 (s, 1H), 6.93-6.95 (m, 1H), 7.24-7.26 (m, 2H), 7.47-7.53 (m, 2H), 7.70-7.76 (m, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 13.98, 19.94, 20.90, 60.92, 62.35, 62.76, 75.92, 121.61, 122.75, 123.30, 126.24, 126.68, 127.14, 127.23, 127.55, 128.27, 128.95, 132.50, 139.28, 141.13, 142.15, 167.56, 168.42, 168.81, 169.59; Enantiomeric excess: 94%, determined by HPLC (Daicel Chirapak AD-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 30 ^oC, 254 nm): t_R = 5.54 min(minor), t_R = 8.13 min(major); IR (KBr): γ 3436, 3343, 2980, 2924, 1773, 1731, 1610, 1429, 1359, 1241, 1198, 1174, 1094, 767 cm^{-1}; HRMS: exact mass calcd for $(C_{26}H_{25}NO_8S+H)^+$ requires m/z 512.1379, found m/z 512.1371; Anal. Calcd for $C_{26}H_{25}NO_8S$: C, 61.05; H, 4.93; N, 2.74. Found: C, 61.11; H, 5.04; N, 2.58.

Diethyl 4,9-diacetoxy-3-(furan-2-yl)-2,3-dihydro-1H-benzo[f]isoindole-1,1-dicarboxylate (5l): Yield: 90%; m.p. 116-118 ^oC; $[\alpha]_D^{20}$ = +78.1 (c 1.7, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.26-1.31 (m, 6H), 2.14 (s, 3H), 2.42 (s, 3H), 3.81 (s, 1H), 4.16-4.37 (m, 4H), 5.78 (s, 1H), 6.28-6.34

(m, 2H), 7.36-7.37 (m, 1H), 7.51-7.53 (m, 2H), 7.69-7.80 (m, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.02, 20.27, 20.95, 58.88, 62.53, 62.85, 75.97, 108.35, 110.31, 121.69, 122.86, 126.83, 127.26, 128.50, 128.97, 130.76, 139.36, 141.28, 142.84, 153.16, 167.80, 168.44, 168.71, 169.52; Enantiomeric excess: 90%, determined by HPLC (Daicel Chirapak AD-H, hexane/ isopropanol = 85/ 15, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 8.96 min(minor), t_R = 11.27 min(major); IR (KBr): γ 3348, 2984, 2937, 1771, 1732, 1360, 1241, 1198, 1174, 1095, 1045, 767 cm^{-1}; HRMS: exact mass calcd for $(C_{26}H_{25}NO_9+H)^+$ requires m/z 496.1608, found m/z 496.1606; Anal. Calcd for $C_{26}H_{25}NO_9$: C, 63.03; H, 5.09; N, 2.83. Found: C, 63.13; H, 5.19; N, 2.63.

Diethyl 4,7-diacetoxy-3-(4-nitrophenyl)isoindoline-1,1-dicarboxylate (5m): Yield: 89%; m.p. 122-125 ^{o}C; $[\alpha]_D^{20}$ = -50.1 (c 1.8, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.27-1.33 (m, 6H), 1.80 (s, 3H), 2.28 (s, 3H), 3.95 (d, *J* = 6.1Hz, 1H), 4.13-4.39 (m, 4H), 5.70 (d, *J* = 6.1 Hz, 1H), 7.05 (d, *J* = 8.8 Hz, 1H), 7.20 (d, *J* = 8.8 Hz, 1H), 7.48 (d, *J* = 9.1 Hz, 2H), 8.17 (d, *J* = 9.1 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm):14.03, 14.16, 20.30, 21.10, 62.50, 63.12, 65.27, 76.77, 123.67, 124.51, 124.71, 129.38, 130.36, 136.73, 143.03, 144.26, 147.71, 149.44, 167.75, 168.45, 168.84, 169.71; Enantiomeric excess: 94%, determined by HPLC (Daicel Chirapak AS-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 11.15 min(major), t_R = 22.60 min(minor); IR (KBr): γ 3351, 2983, 2938, 1770, 1737, 1598, 1522, 1485, 1369, 1348, 1244, 1184, 1046, 1016, 938, 894, 858, 833, 650 cm^{-1}; HRMS: exact mass calcd for $(C_{24}H_{24}N_2O_{10}+H)^+$ requires m/z 501.1509, found m/z 501.1504; Anal. Calcd for $C_{24}H_{24}N_2O_{10}$: C, 57.60; H, 4.83; N, 5.60. Found: C, 57.86; H, 4.98; N, 5.26.

Diethyl 4,7-diacetoxy-3-(4-bromophenyl)isoindoline-1,1-dicarboxylate (5n): Yield: 86%; m.p. 128-130 ^{o}C; $[\alpha]_D^{20}$ = -53.2 (c 1.8, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.26-1.31 (m, 6H), 1.77 (s, 3H), 2.27 (s, 3H), 3.83 (s, 1H), 4.12-4.37 (m, 4H), 5.54 (s, 1H), 7.05 (d, *J* = 8.7 Hz, 1H), 7.14-7.18 (m, 3H), 7.44 (d, *J* = 9.0 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.03, 14.12, 20.18, 21.11, 62.40, 62.91, 65.55, 76.48, 122.00, 124.25, 124.39, 130.14, 130.47, 131.61, 137.32, 140.90, 143.09, 144.15, 167.93, 168.52, 168.95, 169.82; Enantiomeric excess: 94%, determined by HPLC (Daicel Chirapak AD-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 7.07 min(minor), t_R = 12.39 min(major); IR (KBr): γ 3443, 3355, 2982, 2924, 2852, 1769, 1736, 1486, 1368, 1244, 1184, 1093, 1046, 1013, 892, 859, 651 cm^{-1}; HRMS: exact mass calcd for $(C_{24}H_{24}BrNO_8+H)^+$ requires m/z 534.0764, found m/z 534.0757; Anal. Calcd for $C_{24}H_{24}BrNO_8$: C, 53.94; H, 4.53; N, 2.62. Found: C, 54.17; H, 4.59; N, 2.45.

Diethyl 4,7-diacetoxy-3-(4-chlorophenyl)isoindoline-1,1-dicarboxylate (5o): Yield: 89%; m.p. 113-115 ^{o}C; $[\alpha]_D^{20}$ = -52.7 (c 1.7, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.26-1.32 (m, 6H), 1.76 (s, 3H), 2.27 (s, 3H), 3.83 (s, 1H), 4.15-4.34 (m, 4H), 5.56 (s, 1H), 7.04 (d, *J* = 8.8 Hz, 1H), 7.17 (d, *J* = 8.8 Hz, 1H), 7.22 (d, *J* = 8.4 Hz, 2H), 7.28 (d, *J* = 8.4 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.02, 14.11, 20.16, 21.10, 62.38, 62.89, 65.49, 76.47, 124.22, 124.37, 128.64, 129.78, 130.46, 133.85, 137.38, 140.38, 143.09, 144.15, 167.90, 168.50, 168.96, 169.82; Enantiomeric excess: 91%, determined by HPLC (Daicel Chirapak AS-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 25 ^{o}C, 254 nm): t_R = 6.76 min(major), t_R = 8.36 min(minor); IR (KBr): γ 3353, 3072, 2983, 2935, 2896, 1770, 1737, 1485, 1369, 1244, 1180, 1049, 1015, 841, 735, 651, 593 cm^{-1}; HRMS: exact mass calcd for $(C_{24}H_{24}ClNO_8+H)^+$ requires m/z 490.1269, found m/z 490.1275; Anal. Calcd for $C_{24}H_{24}ClNO_8$: C, 58.84; H, 4.94; N, 2.86. Found: C, 58.82; H, 4.97; N, 2.50.

Diethyl 4,7-diacetoxy-3-(3-methoxyphenyl)isoindoline-1,1-dicarboxylate (5p): Yield: 92%; m.p. 138-140 ^{o}C; $[\alpha]_D^{20}$ = -49.3 (c 1.8, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.26-1.31 (m, 6H), 1.74 (s, 3H), 2.27 (s, 3H), 3.74 (s, 3H), 3.83 (s, 1H), 4.12-4.37 (m, 4H), 5.55 (s, 1H), 6.81-6.83 (m, 2H), 6.85-6.87 (m, 1H), 7.03 (d, *J* = 8.7 Hz, 1H), 7.16 (d, *J* = 8.7 Hz, 1H), 7.21-7.26 (m, 1H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.05, 14.12, 20.11, 21.12, 55.29, 62.35, 62.83, 66.26, 76.55, 113.70, 113.90, 120.75, 123.99, 124.37, 129.46, 130.55, 137.76, 143.24, 144.11, 159.84, 168.03, 168.56, 169.08, 169.94; Enantiomeric excess: 94%, determined by HPLC (Daicel Chirapak AS-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 5.84 min(major), t_R = 7.43 min(minor); IR (KBr): γ 3443, 3350, 3074, 2980, 2934, 2851, 1770, 1734, 1609, 1486, 1368, 1245, 1210, 1183, 1047, 896, 738, 599 cm^{-1}; HRMS: exact mass calcd for $(C_{25}H_{27}NO_9+H)^+$ requires m/z 486.1764, found m/z 486.1758; Anal. Calcd for $C_{25}H_{27}NO_9$: C, 61.85; H, 5.61; N, 2.89. Found: C, 61.85; H, 5.66; N, 2.64.

Diethyl 4,7-diacetoxy-5,6-dimethyl-3-(4-nitrophenyl)isoindoline-1,1-dicarboxylate (5q): Yield: 89%; m.p. 159-161 ^{o}C; $[\alpha]_D^{20}$ = -14.4 (c 1.9, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.26-1.33 (m, 6H), 1.82 (s, 3H), 1.98 (s, 3H), 2.07 (s, 3H), 2.30 (s, 3H), 3.89 (s, 1H), 4.10-4.40 (m, 4H), 5.65 (s, 1H), 7.47 (d, *J* = 9.2 Hz, 2H), 8.16 (d, *J* = 9.2 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 13.51, 14.06, 14.14, 14.35, 20.04, 20.89, 62.37, 62.99, 65.35, 77.30, 123.61, 127.99, 129.45, 132.82, 133.10, 134.40, 141.90, 143.02, 147. 65, 149.85, 167.35, 167.93, 169.11, 169.81; Enantiomeric excess: 94%,

determined by HPLC (Daicel Chirapak IA-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 25 ^{o}C, 254 nm): t_R = 6.53 min(minor), t_R = 21.54 min(major); IR (KBr): γ 3434, 3367, 2982, 2926, 1768, 1736, 1521, 1347, 1189, 1086, 857, 702, 592 cm^{-1}; HRMS: exact mass calcd for $(C_{26}H_{28}N_2O_{10}+H)^+$ requires m/z 529.1822, found m/z 529.1827; Anal. Calcd for $C_{26}H_{28}N_2O_{10}$: C, 59.09; H, 5.34; N, 5.30. Found: C, 59.51; H, 5.52; N, 4.93.

Diethyl 4,7-diacetoxy-5,6-dichloro-3-(4-nitrophenyl)isoindoline-1,1-dicarboxylate (5r): Yield: 78%; m.p. 124-126 ^{o}C; $[\alpha]_D^{20}$ = +5.5 (c 1.8, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.29-1.34 (m, 6H), 1.88 (s, 3H), 2.33 (s, 3H), 3.93 (d, *J* = 6.0 Hz, 1H), 4.11-4.42 (m, 4H), 5.70 (d, *J* = 6.0 Hz, 1H), 7.48 (d, *J* = 9.1 Hz, 2H), 8.18 (d, *J* = 9.1 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.03, 14.12, 19.83, 20.64, 62.76, 63.41, 65.42, 77.30, 123.73, 129.19, 129.48, 129.58, 130.12, 136.57, 140.99, 142.43, 147.92, 148.33, 166.17, 166.39, 168.14, 168.93; Enantiomeric excess: 85%, determined by HPLC (Daicel Chirapak AS-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 8.53 min(major), t_R = 14.53 min(minor); IR (KBr): γ 3435, 3357, 2983, 2925, 1782, 1735, 1522, 1429, 1369, 1348, 1170, 1016, 917, 861, 843, 699 cm^{-1}; HRMS: exact mass calcd for $(C_{24}H_{22}Cl_2N_2O_{10}+H)^+$ requires m/z 569.0730, found m/z 569.0725; Anal. Calcd for $C_{24}H_{22}Cl_2N_2O_{10}$: C, 50.63; H, 3.89; N, 4.92. Found: C, 50.75; H, 3.97; N, 4.53.

1-(Methoxycarbonyl)-3-(4-nitrophenyl)-1-phenyl-2,3-dihydro-1H-benzo[f]isoindole-4,9-diyldiacetate (5s): Yield: 76%; $[\alpha]_D^{20}$ = +82.8 (c 0.9, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.94 (s, 3H), 2.19 (s, 3H), 3.49 (s, 1H), 3.76 (s, 3H), 5.61 (s, 1H), 7.32-7.35 (m, 5H), 7.46 (d, *J* = 8.7 Hz, 2H), 7.53-7.57 (m, 2H), 7.69-7.77 (m, 2H), 8.21 (d, *J* = 8.7 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 20.13, 20.54, 53.31, 64.89, 77.00, 121.69, 122.59, 123.96, 127.29, 127.52, 128.19, 128.48, 128.83, 129.35, 132.28, 132.94, 139.38, 140.70, 140.75, 147.80, 148.36, 167.59, 168.63, 172.58; Enantiomeric excess: 89%, determined by HPLC (Daicel Chirapak OD-H, hexane/ isopropanol = 85/ 15, flow rate 1.0 mL/min, T = 25 ^{o}C, 254 nm): t_R = 17.56 min(minor), t_R = 26.96 min(major); IR (KBr): γ 3073, 2950, 2359, 2341, 1770, 1732, 1520, 1348, 1196, 1169, 1030, 858, 765, 698 cm^{-1}; HRMS: exact mass calcd for $(C_{30}H_{24}N_2O_8+H)^+$ requires m/z 541.1611, found m/z 541.1614.

1-(4-Chlorophenyl)-1-(methoxycarbonyl)-3-(4-nitrophenyl)-2,3-dihydro-1H-benzo[f]isoindole-4,9-diyl diacetate (5t): Yield: 80%; $[\alpha]_D^{20}$ = +108.2 (c 0.9, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.91 (s, 3H), 2.26 (s, 3H), 3.50 (s, 1H), 3.76 (s, 3H), 5.50 (s, 1H), 7.28-7.34 (m, 4H), 7.47 (d, *J* = 8.8

Hz, 2H), 7.54-7.61 (m, 2H), 7.71-7.79 (m, 2H), 8.22 (d, *J* = 8.8 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 20.50, 20.58, 53.51, 64.95, 76.38, 121.75, 122.50, 124.01, 127.49, 127.68, 128.57, 128.74, 128.91, 128.97, 129.44, 132.26, 133.00, 134.12, 138.99, 139.36, 140.47, 147.79, 147.89, 167.50, 168.69, 172.07; Enantiomeric excess: 95%, determined by HPLC (Daicel Chirapak OD-H, hexane/ isopropanol = 85/ 15, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 11.80 min(minor), t_R = 19.34 min(major); IR (KBr): γ 3357, 3074, 2953, 2856, 2360, 2342, 1770, 1734, 1521, 1490, 1348, 1195, 1168, 1091, 1029, 1013, 829, 769, 591 cm^{-1}; HRMS: exact mass calcd for $(C_{30}H_{23}ClN_2O_8+H)^+$ requires m/z 575.1221, found m/z 575.1224.

1-(2-Chlorophenyl)-1-(methoxycarbonyl)-3-(4-nitrophenyl)-2,3-dihydro-1H-benzo[f]isoindole-4,9-diyl diacetate (5u): Yield: 79%; $[\alpha]_D^{20}$ = +127.3 (c 0.9, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.90 (s, 3H), 2.28 (s, 3H), 3.81 (s, 3H), 5.43 (s, 1H), 6.94 (d, *J* = 8.0 Hz, 1H), 7.11-7.16 (m, 1H), 7.26-7.30 (m, 1H), 7.47 (d, *J* = 8.0 Hz, 1H), 7.57-7.62 (m, 4H), 7.74-7.79 (m, 2H), 8.23 (d, *J* = 8.8 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm):20.10, 20.66, 53.82, 64.87, 77.30, 121.73, 122.48, 123.92, 126.70, 127.57, 127.88, 128.59, 128.98, 129.11, 129.45, 129.98, 131.03, 133.51, 133.98, 139.57, 141.02, 147.92, 148.34, 167.48, 172.01; Enantiomeric excess: 85%, determined by HPLC (Daicel Chirapak OD-H, hexane/ isopropanol = 90/ 10, flow rate 1.0 mL/min, T = 30 ^{o}C, 254 nm): t_R = 13.82 min(minor), t_R = 17.58 min(major); IR (KBr): γ 3353, 2972, 2922, 2355, 2330, 1770, 1732, 1520, 1348, 1195, 1169, 1090, 1049, 881, 760 cm^{-1}; HRMS: exact mass calcd for $(C_{30}H_{23}ClN_2O_8+H)^+$ requires m/z 575.1221, found m/z 575.1223.

1-(4-Chlorophenyl)-1-(methoxycarbonyl)-3-(4-nitrophenyl)isoindoline-4,7-diyl diacetate (5v): Yield: 76%; m.p. 177-179 ^{o}C; $[\alpha]_D^{20}$ = -21.3 (c 0.8, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.81 (s, 3H), 2.06 (s, 3H), 3.34 (s, 1H), 3.76 (s, 3H), 5.57 (s, 1H), 7.13 (d, *J* = 8.7 Hz, 1H), 7.18 (d, *J* = 8.7 Hz, 1H), 7.24 (d, *J* = 8.8 Hz, 2H), 7.31 (d, *J* = 8.8 Hz, 2H), 7.39 (d, *J* = 8.8 Hz, 2H), 8.19 (d, *J* = 8.8 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 20.27, 20.71, 53.35, 65.27, 76.69, 124.00, 124.24, 124.94, 128.45, 128.59, 128.97, 134.08, 135.26, 136.53, 139.61, 143.30, 143.99, 147.80, 148.40, 167.83, 168.49, 172.48; Enantiomeric excess: 86%, determined by HPLC (Daicel Chirapak OD-H, hexane/ isopropanol = 70/ 30, flow rate 1.0 mL/min, T = 25 ^{o}C, 254 nm): t_R = 9.04 min(minor), t_R = 11.67 min(major); IR (KBr): γ 3436, 2922, 2852, 1766, 1738, 1520, 1485, 1348, 1178, 1014, 872, 593, 567 cm^{-1}; HRMS: exact mass calcd for $(C_{26}H_{21}ClN_2O_8+H)^+$ requires m/z 525.1065, found m/z 525.1072; Anal. Calcd for $C_{26}H_{21}ClN_2O_8$: C, 59.49; H, 4.03; N, 5.34. Found: C, 59.51; H, 4.19; N,

4.93.

Diethyl 3-(4-chlorophenyl)-4,7-bis(trifluoromethylsulfonyloxy)isoindoline-1,1-dicarboxylate (7): **4p** (partially isomerized) was transferred to a test tube. The atmosphere was replaced with argon and pyridine (2 mL) was added. The test tube was placed in an ice-water bath, and then Tf_2O (0.30 mL) was added. The reaction mixture was allowed to warm up to room temperature and stirred overnight. The reaction was quenched with water (10 mL) and the aqueous layer was extracted with CH_2Cl_2. The combined organic layers were washed with 1 N HCl and saturated NaCl aqueous solution. After removal of the solvent, the residue was purified through column chromatography on a silica gel (eluent: petroleum ether/ethyl acetate = 25/1)to give pure product **7** (97.6 mg, 73%); $[\alpha]_D^{20}$ = -32.0 (c 1.6, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.28-1.33 (m, 6H), 3.93 (d, *J* = 5.3 Hz, 1H), 4.24-4.43 (m, 4H), 5.77 (d, *J* = 5.3 Hz, 1H), 7.21 (d, *J* = 6.6 Hz, 2H), 7.29-7.34 (m, 3H), 7.42 (d, *J* = 9.1 Hz, 1H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 13.80, 13.83, 63.22, 63.56, 65.58, 76.88, 118.35 (q, J_{C-F} = 319 Hz), 118.40 (q, J_{C-F} = 318 Hz), 122.24, 124.41, 128.99, 129.67, 132.70, 134.60, 138.71, 140.28, 142.91, 145.01, 167.93, 168.65; Enantiomeric excess: 93%, determined by HPLC (Daicel Chirapak AD-H, hexane/ isopropanol = 90/ 10, flow rate 1.0 mL/min, T = 25 ^{o}C, 254 nm): t_R = 6.42 min(minor), t_R = 8.80 min(major); IR (KBr): γ 3427, 2922, 2852, 1740, 1637, 1478, 1430, 1222, 1140, 1091, 930, 880, 602 cm^{-1}; HRMS: exact mass calcd for $(C_{22}H_{18}ClF_6NO_{10}S_2+H)^+$ requires m/z 670.0043, found m/z 670.0046.

Diethyl 3-(4-chlorophenyl)isoindoline-1,1-dicarboxylate (8): To a dry test tube was added **7** (82.9 mg, 0.12 mmol), $Pd(OAc)_2$ (9.3 mg, 0.024 mmol) and dppp (2.7 mg, 0.012 mmol). The atmosphere was replaced with argon and DMF (1.0 ml) was added. The mixture was stirred and was added with Et_3N (167 μL, 1.2 mmol) and HCOOH (36 μL, 0.96 mmol). The reaction was heated to 90 ^{o}C for 12 hours. Then water (10 mL) was added to the reaction and extracted with ethyl acetate. The organic phase was combined and dried with anhydrous Na_2SO_4. After removal of the solvent, the residue was purified through column chromatography on a silica gel (eluent: petroleum ether/ethyl acetate = 20/1) to give **8** (32.1 mg, 69%). $[\alpha]_D^{20}$ = -113.3 (c 0.4, $CHCl_3$); ^{1}H-NMR ($CDCl_3$, 400 MHz) δ (ppm): 1.26-1.33 (m, 6H), 3.72 (s, 1H), 4.23-4.35 (m, 4H), 5.62 (s, 1H), 6.88 (d, *J* = 7.7 Hz, 1H), 7.28-7.33 (m, 6H), 7.64 (d, *J* = 7.3 Hz, 1H); ^{13}C-NMR ($CDCl_3$, 100 MHz) δ (ppm): 14.11, 14.13, 62.14, 62.42, 66.12, 76.91, 123.29, 125.63, 127.73, 128.75, 129.23, 129.37, 133.48, 135.95, 142.23, 144.35, 169.83, 170.72; Enantiomeric excess: 93%, determined by HPLC (Daicel Chirapak AS-H, hexane/ isopropanol = 90/ 10,

flow rate 1.0 mL/min, T = 25 ^{o}C, 254 nm): t_R = 7.43 min(minor), t_R = 15.26 min(major); IR (KBr): γ 3438, 2981, 2923, 2852, 1736, 1459, 1258, 1224, 1123, 1088, 881, 748, 643, 603 cm^{-1}; HRMS: exact mass calcd for $(C_{20}H_{20}ClNO_4+H)^+$ requires m/z 374.1159, found m/z 374.1153.

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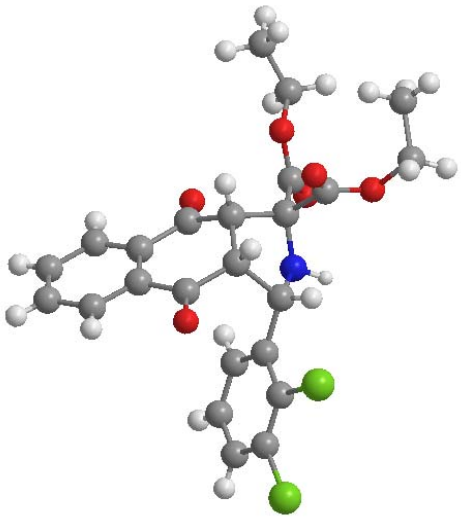
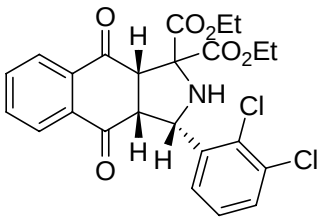
[2]. Itoh, K.; Fuchibe, K.; Akiyama, T. *Angew. Chem. Int. Ed.* **2006**, *45*, 4796 –4798.

X-ray single crystal data for 4j (CCDC 704878)



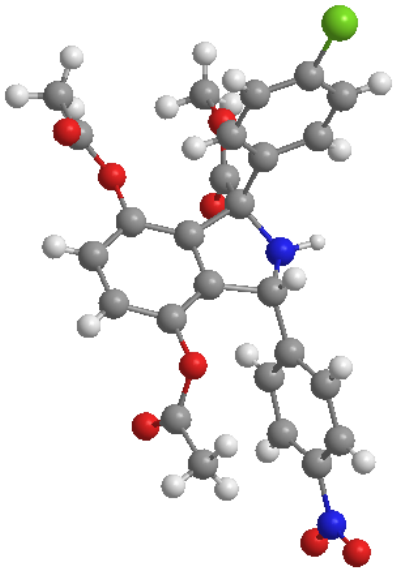


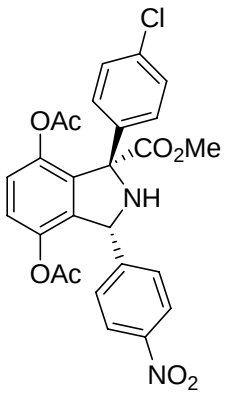
4j

Chemical formula	C24 H21 Cl2 N O6
Formula weight	490.32
Space group	P 21
Z	2
α, Å	8.314(5)
b, Å	22.630(5)
c, Å	12.582(5)
α, °	90
β, °	94.055(5)
γ, °	90
V, Å^3	2361.3(18)
T, K	293
ρ,g/cm^3	1.379

Reflections collected / unique: 29413 / 7332 (R_{int} = 0.0201), number of observations [$I > 2\,\sigma\,(I)$] 6900, parameters 603. Final R indices [$I > 2\,\sigma\,(I)$]: R_1=0.0571, wR_2=0.1429; R indices (all data): R_1=0.0594, wR_2=0.1447.

X-ray single crystal data for 5v (CCDC 742913)



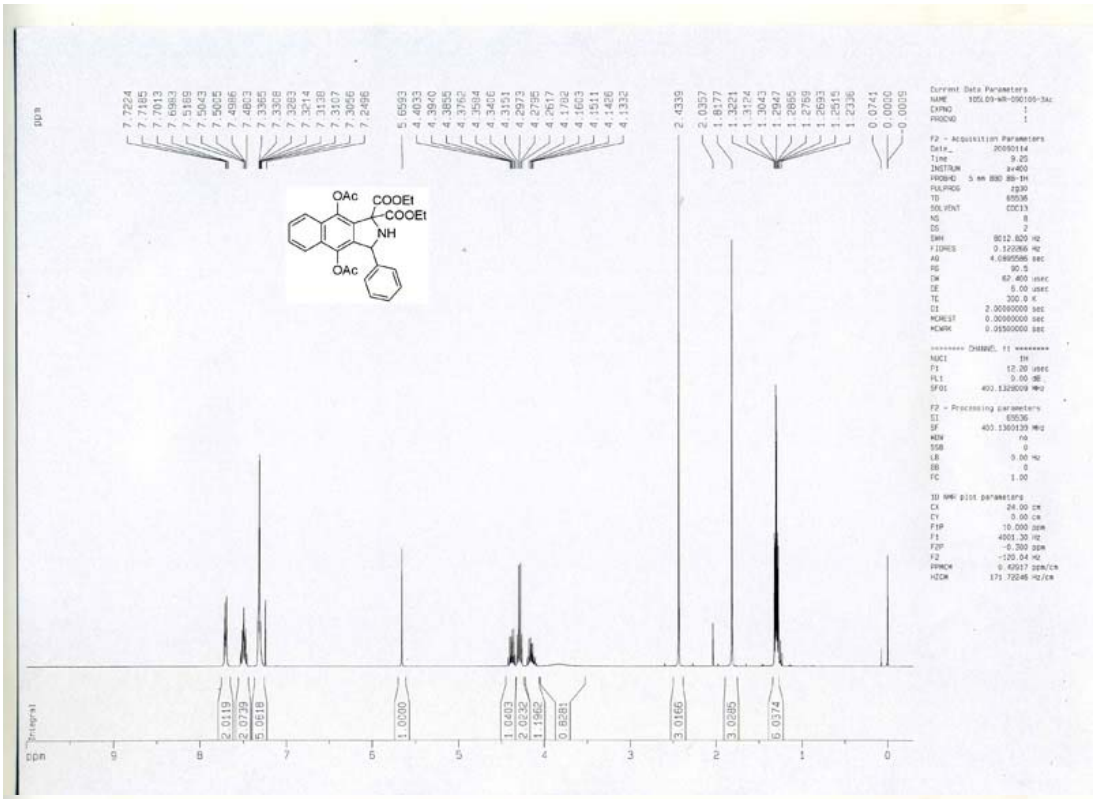


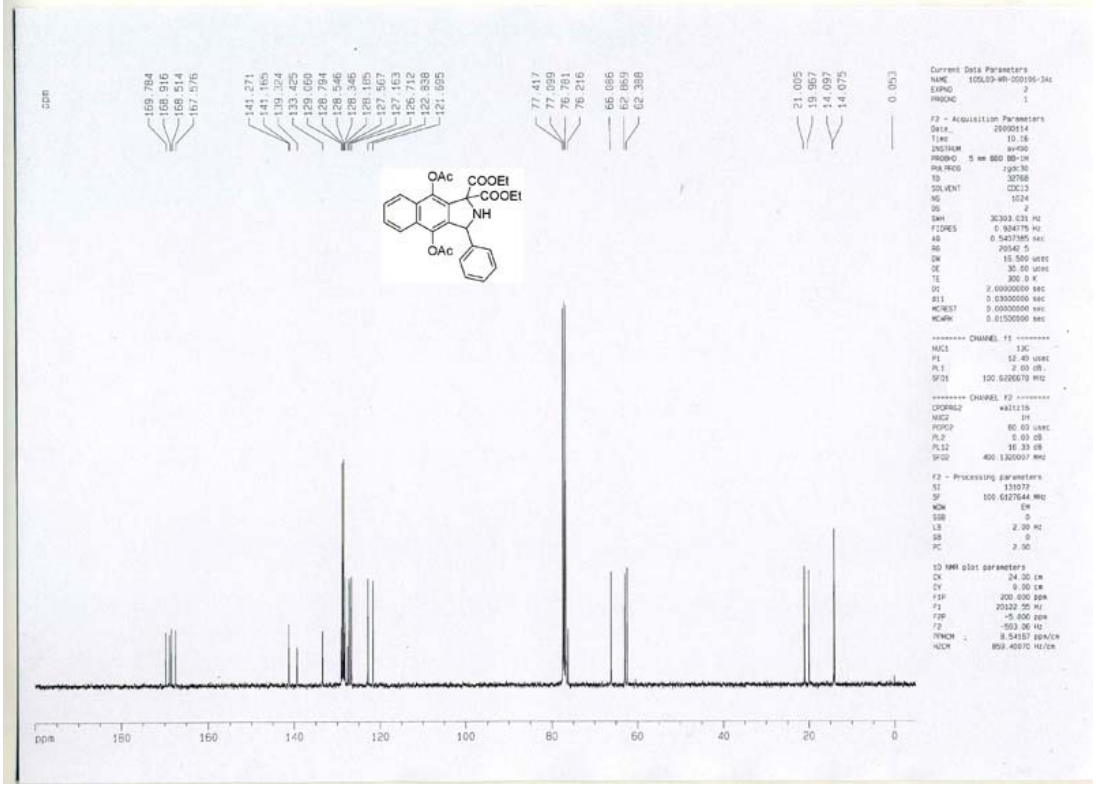
5v

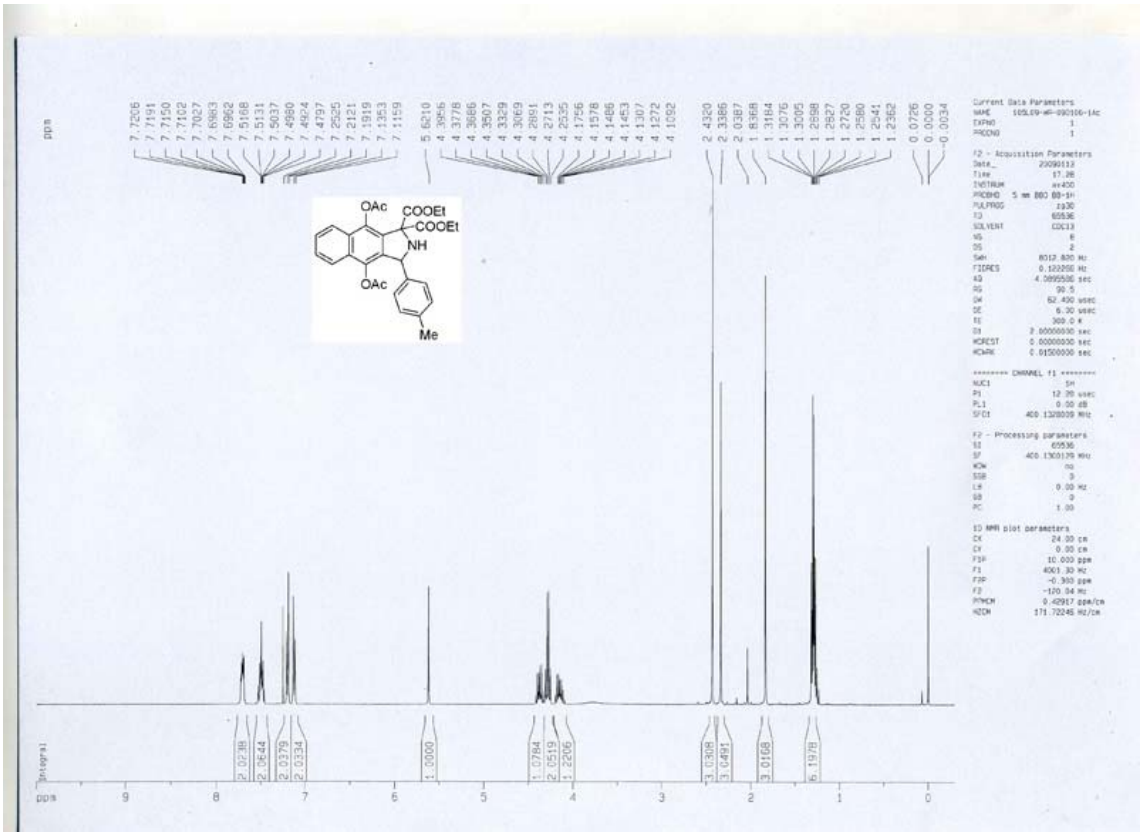
Chemical formula	C26 H21 Cl1 N2 O8
Formula weight	524.90
Space group	P 21
Z	2
α, Å	7.965(5)
b, Å	30.381(5)
c, Å	10.583(5)
α, °	90
β, °	101.631(5)
γ, °	90
V, Å^3	2508(2)
T, K	295
ρ,g/cm^3	1.390

Reflections collected / unique: 14302 / 7313 (R_{int} = 0.0289), number of observations [$I > 2\,\sigma\,(I)$] 5182, parameters 676. Final R indices [$I > 2\,\sigma\,(I)$]: R_1=0.0425, wR_2=0.0868; R indices (all data): R_1=0.0651, wR_2=0.0934.

Selected NMR and HPLC



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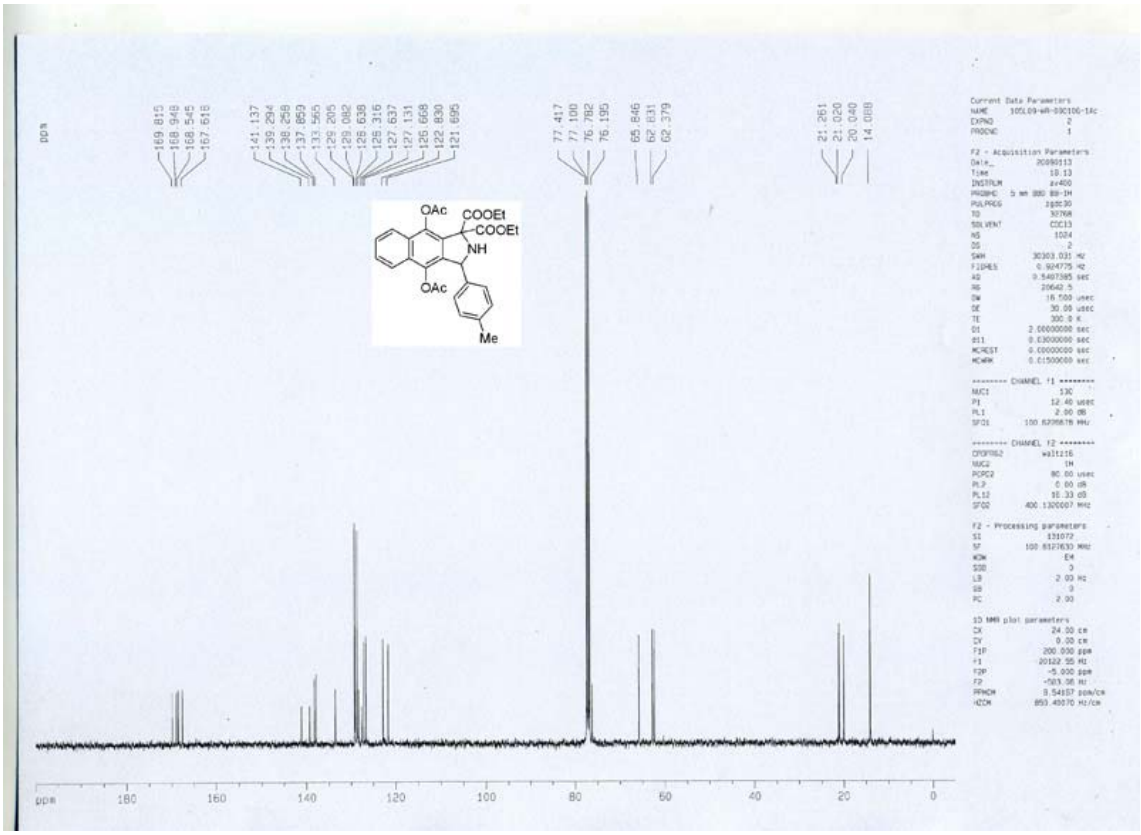
COOEt
NH
OAc
Me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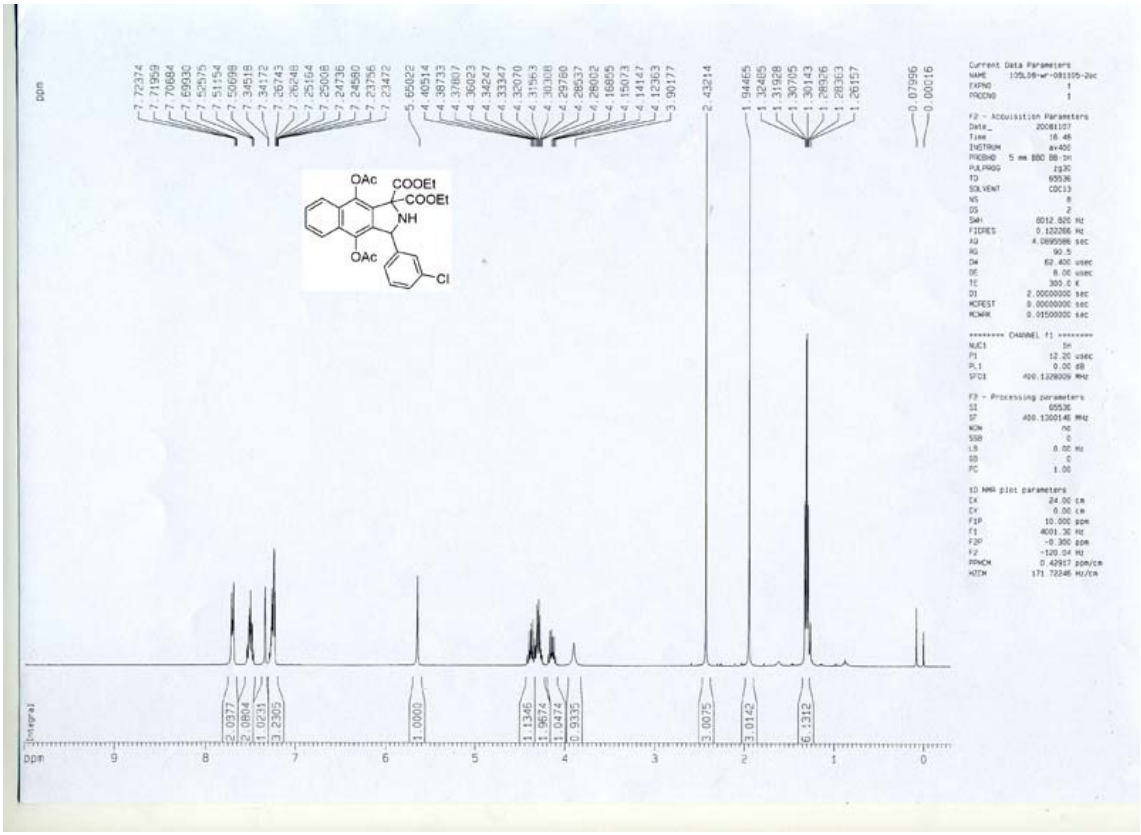
COOEt
COOEt
NH
OAc
Me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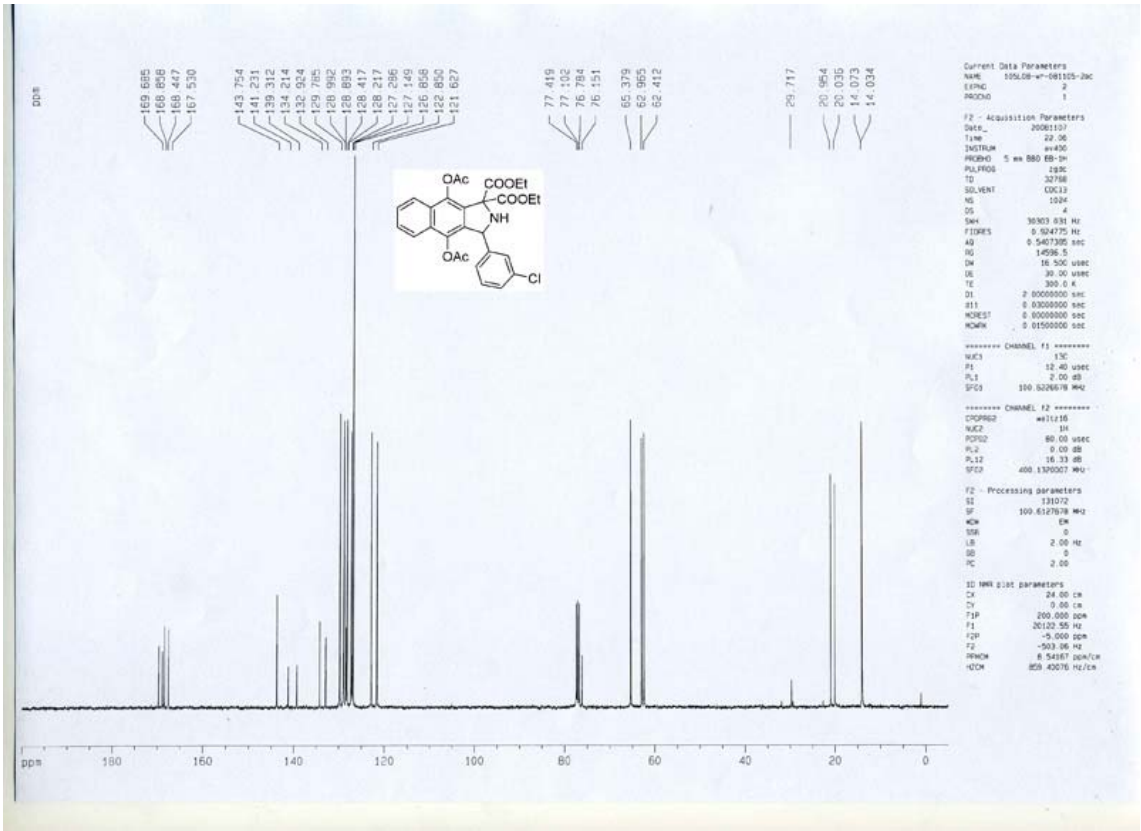
COOEt
COOEt
NH
OAc
Cl
ppm
Integral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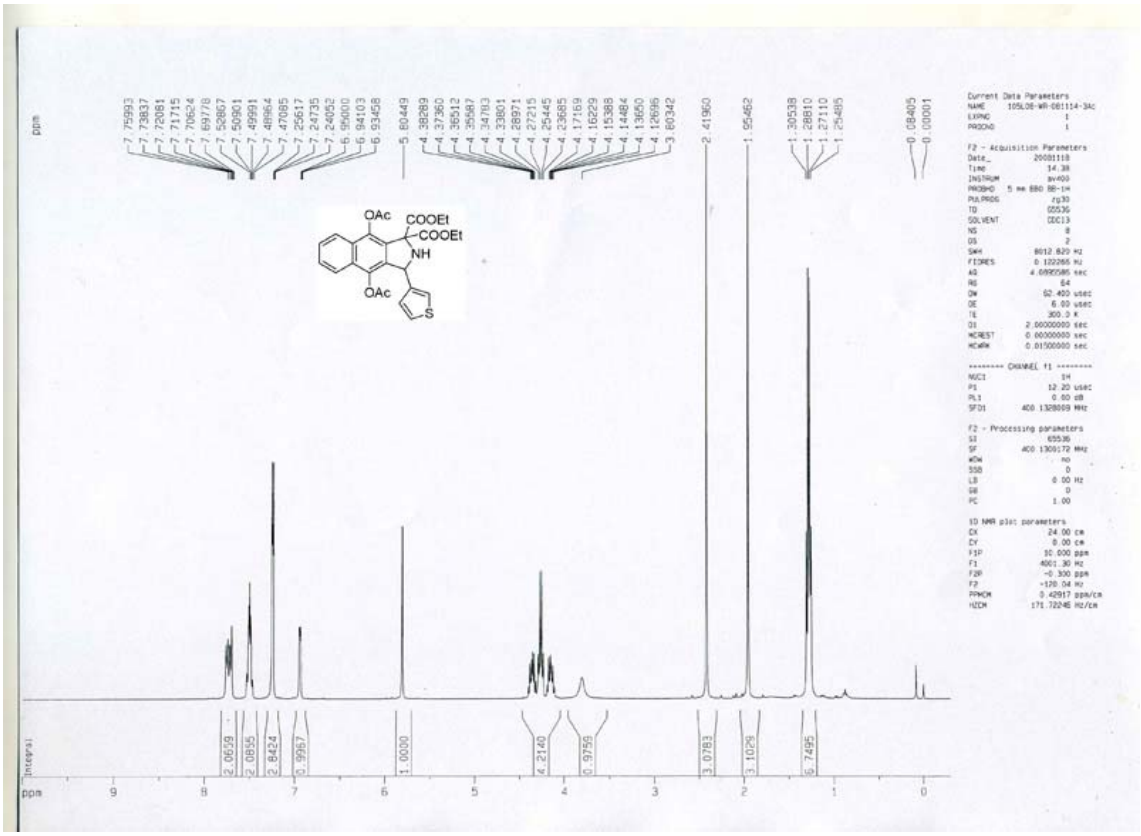
COOEt
COOEt
NH
OAc
Cl
ppm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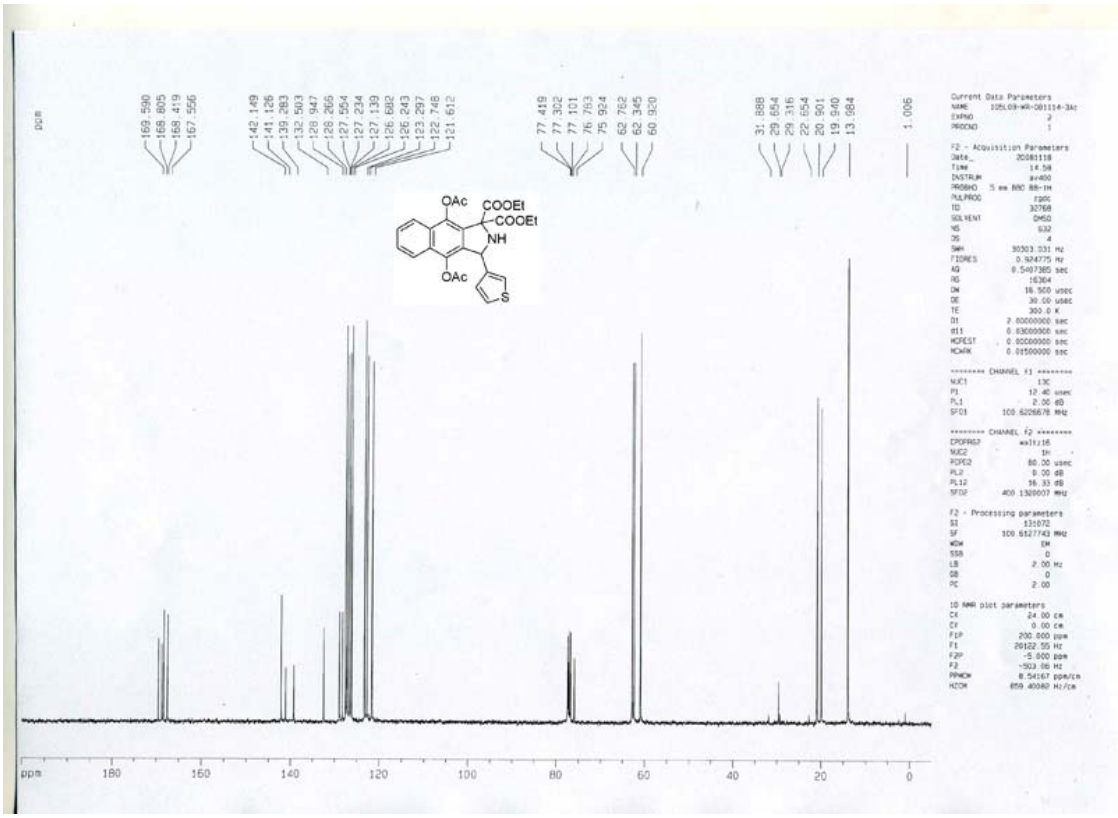
COOEt
NH
OAc
S
ppm
Integral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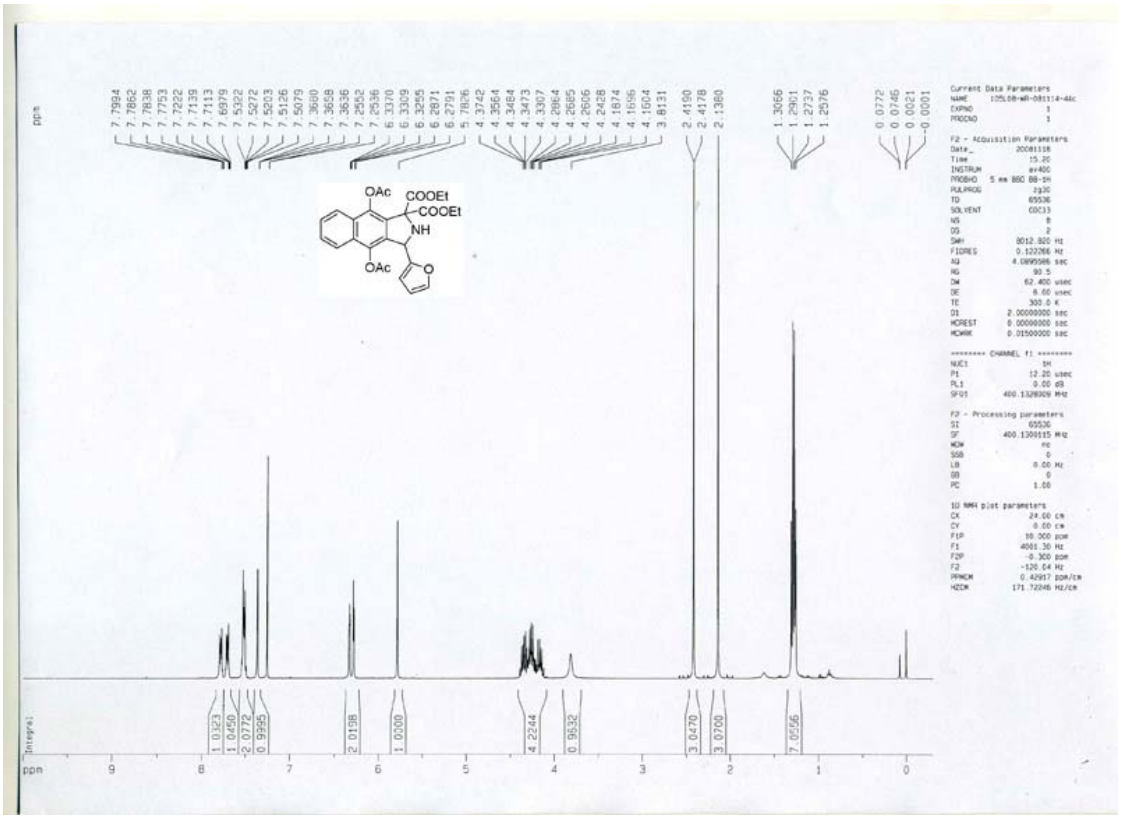
COOEt
NH
OAc
S
ppm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COOEt
COOEt
NH
OAc
O
ppm
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0.9995
2.0198
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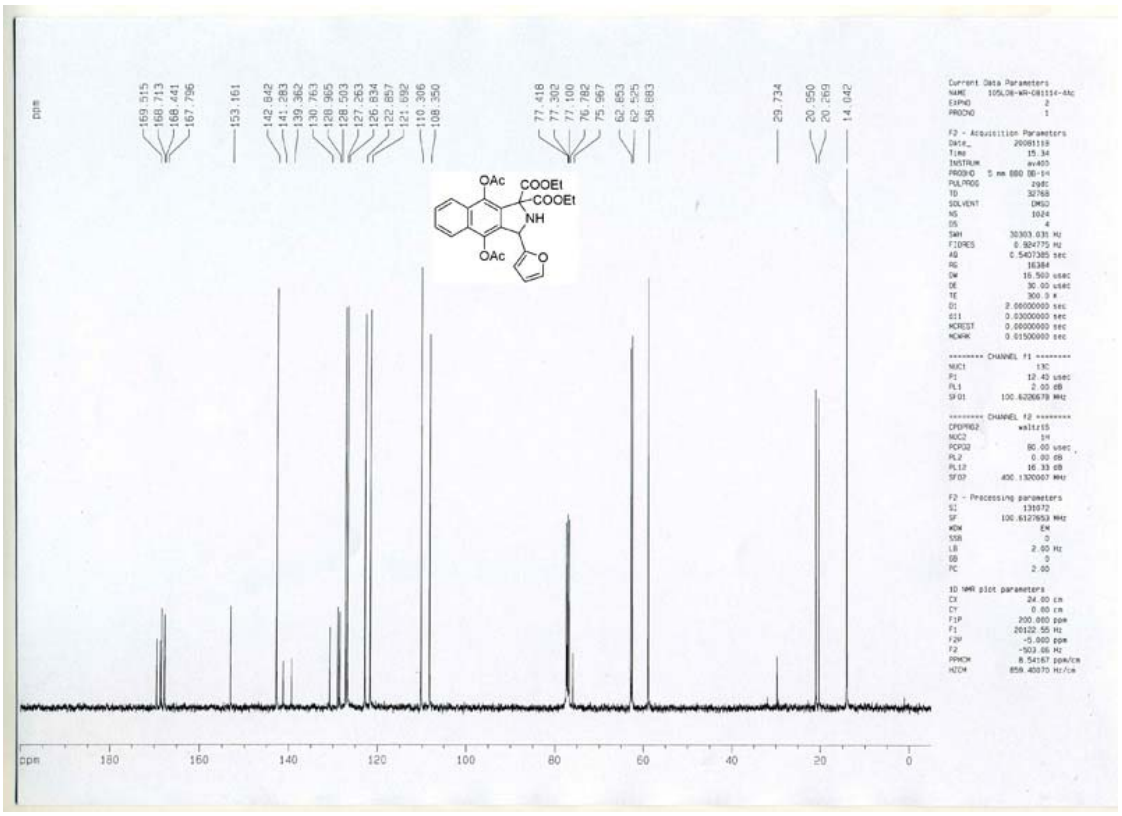
4.2244
0.9632
3.0470
3.0700
7.0556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COOEt
COOEt
NH
OAc
O
ppm
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141.283
139.362
130.763
128.965
128.503
127.263
126.834
122.857
121.692
110.306
108.350
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77.302
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56.883
29.734
20.950
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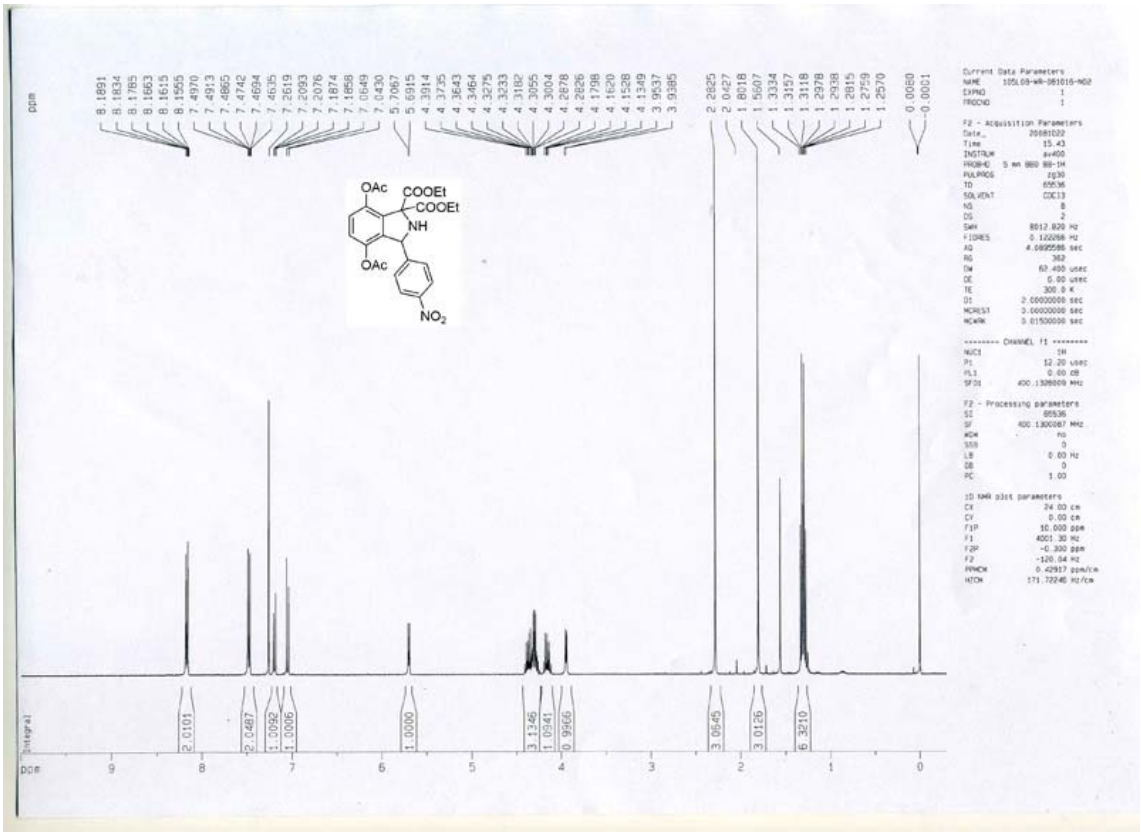
14.042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COOEt
NH
OAc
NO2
ppm
Integral
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1.0000
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0.9966
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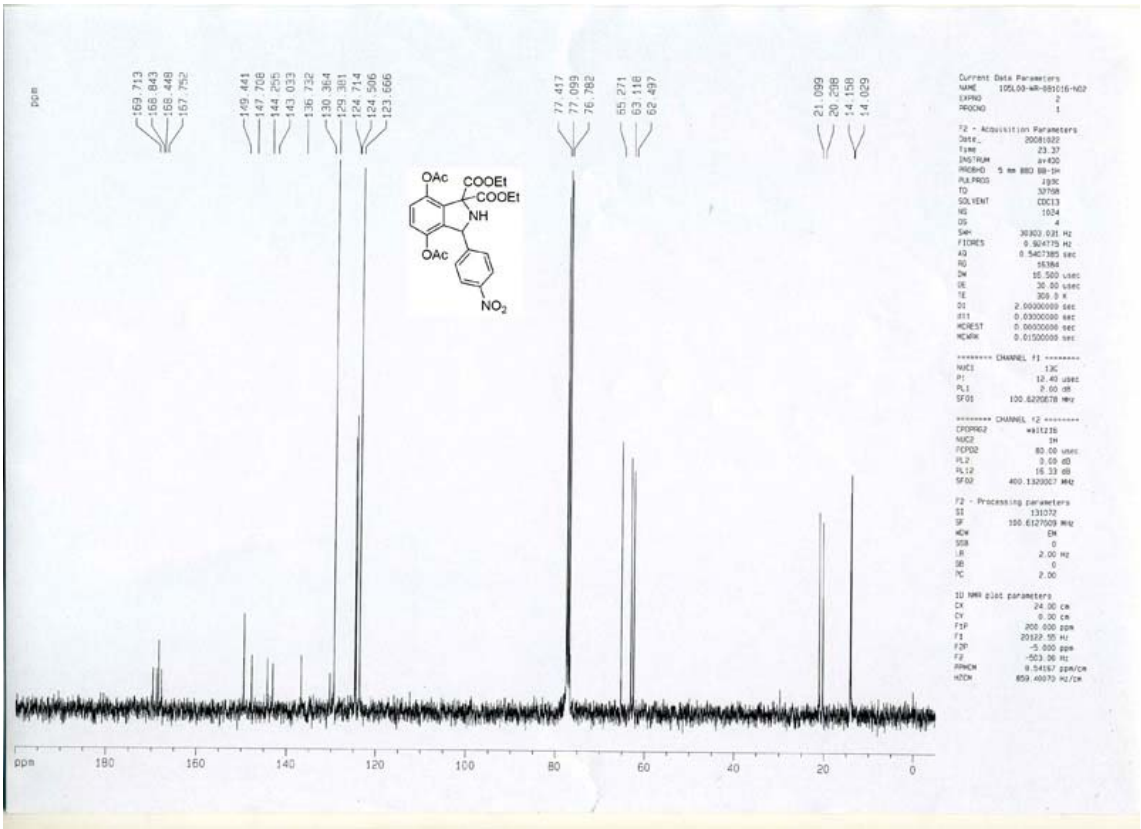
3.0126
6.3210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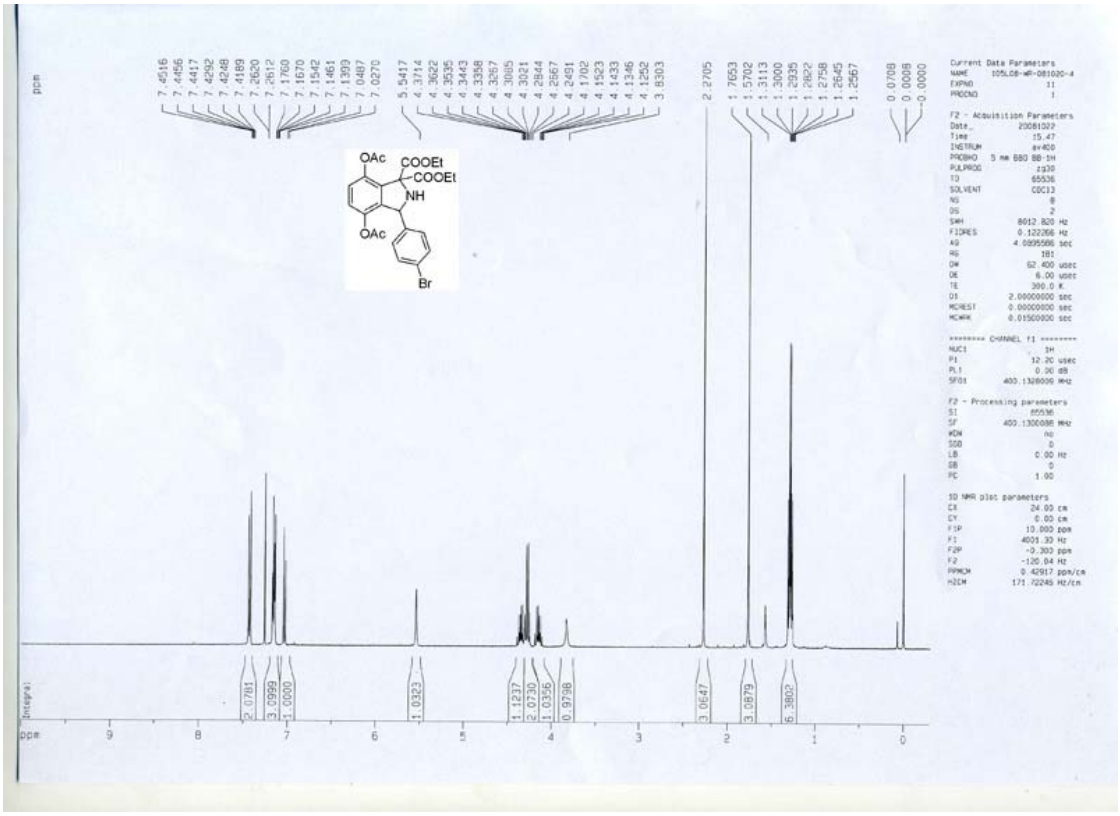
COOEt
COOEt
NH
OAc
NO2
ppm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7.1760
7.1670
7.1542
7.1461
7.1393
7.0487
7.0270
5.5417
4.3714
4.3622
4.3535
4.3443
4.3358
4.3267
4.3085
4.3021
4.2844
4.2667
4.2491
4.1702
4.1523
4.1433
4.1346
4.1252
3.8303
2.2705
1.7653
1.5702
1.3113
1.3000
1.2935
1.2822
1.2758
1.2645
1.2567
0.0708
0.0008
-0.0000
OAc
COOEt
COOEt
NH
OAc
Br
Integral
2.0781
3.0999
1.0000
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1.1237
2.0730
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3.0879
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EXPNO 11
PROCNO 1
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Time 15.47
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PULPROG zg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 8012.820 Hz
FIDRES 0.122266 Hz
AQ 4.0895586 sec
RG 181
DW 62.400 usec
DE 6.00 usec
TE 300.0 K
D1 2.00000000 sec
MCREST 0.00000000 sec
MCWRK 0.01500000 sec
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P1 12.20 usec
PL1 0.00 dB
SFO1 400.1328006 MHz
F2 - Processing parameters
SI 65536
SF 400.1300086 MHz
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LB 0.00 Hz
GB 0
PC 1.00
1D NMR plot parameters
CX 24.00 cm
CY 0.00 cm
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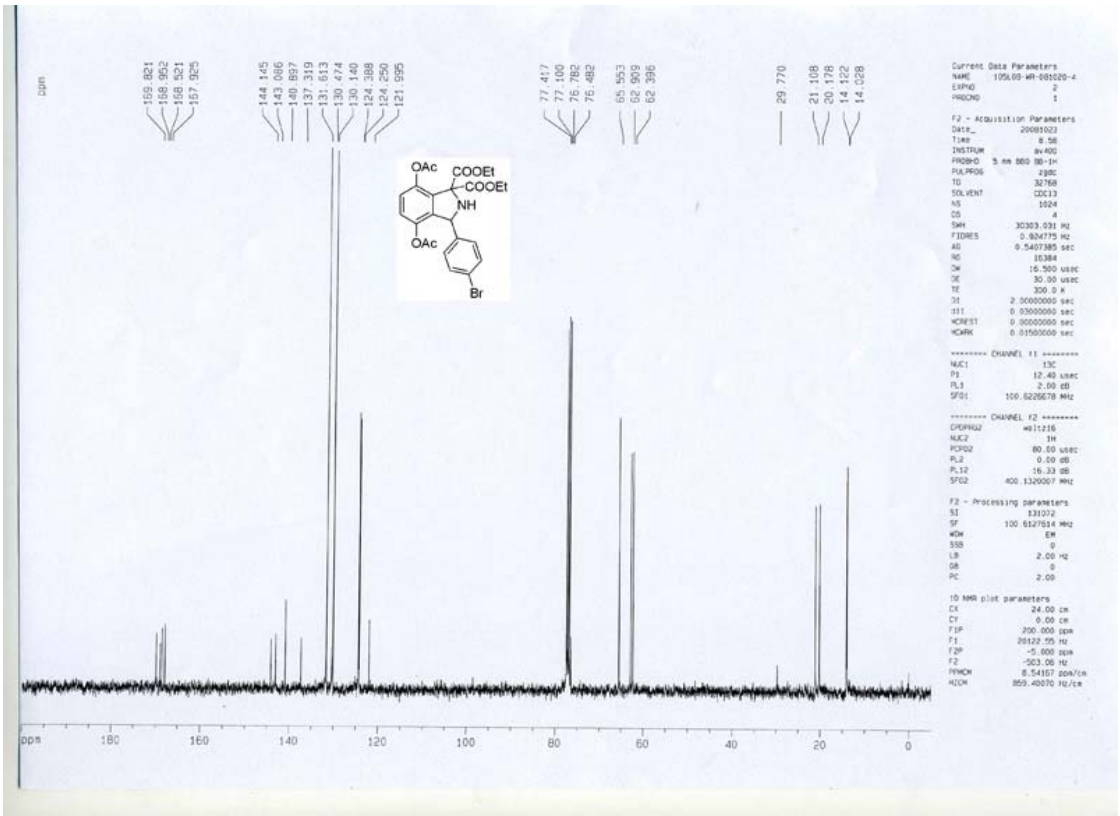
F2P -0.300 ppm
F2 -120.04 Hz
PPMCM 0.42917 ppm/cm
HZCM 171.72245 Hz/cm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130.474
130.140
124.388
124.250
121.995
77.417
77.100
76.782
76.482
65.553
62.909
62.396
29.770
21.108
20.178
14.122
14.028
OAc
COOEt
COOEt
NH
OAc
Br
Current Data Parameters
NAME 105L08-HR-081020-4
EXPNO 2
PROCNO 1
F2 - Acquisition Parameters
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Time 8.58
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FIDRES 0.924775 Hz
AQ 0.5407385 sec
RG 16384
DW 16.500 usec
DE 30.00 usec
TE 300.0 K
D1 2.00000000 sec
D11 0.03000000 sec
MCREST 0.00000000 sec
MCWRK 0.01500000 sec
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P1 12.40 usec
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SFO1 100.6226678 MHz
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PCPD2 80.00 usec
PL2 0.00 dB
PL12 16.33 dB
SFO2 400.1320007 MHz
F2 - Processing parameters
SI 131072
SF 100.6127614 MHz
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SSB 0
LB 2.00 Hz
GB 0
PC 2.00
1D NMR plot parameters
CX 24.00 cm
CY 0.00 cm
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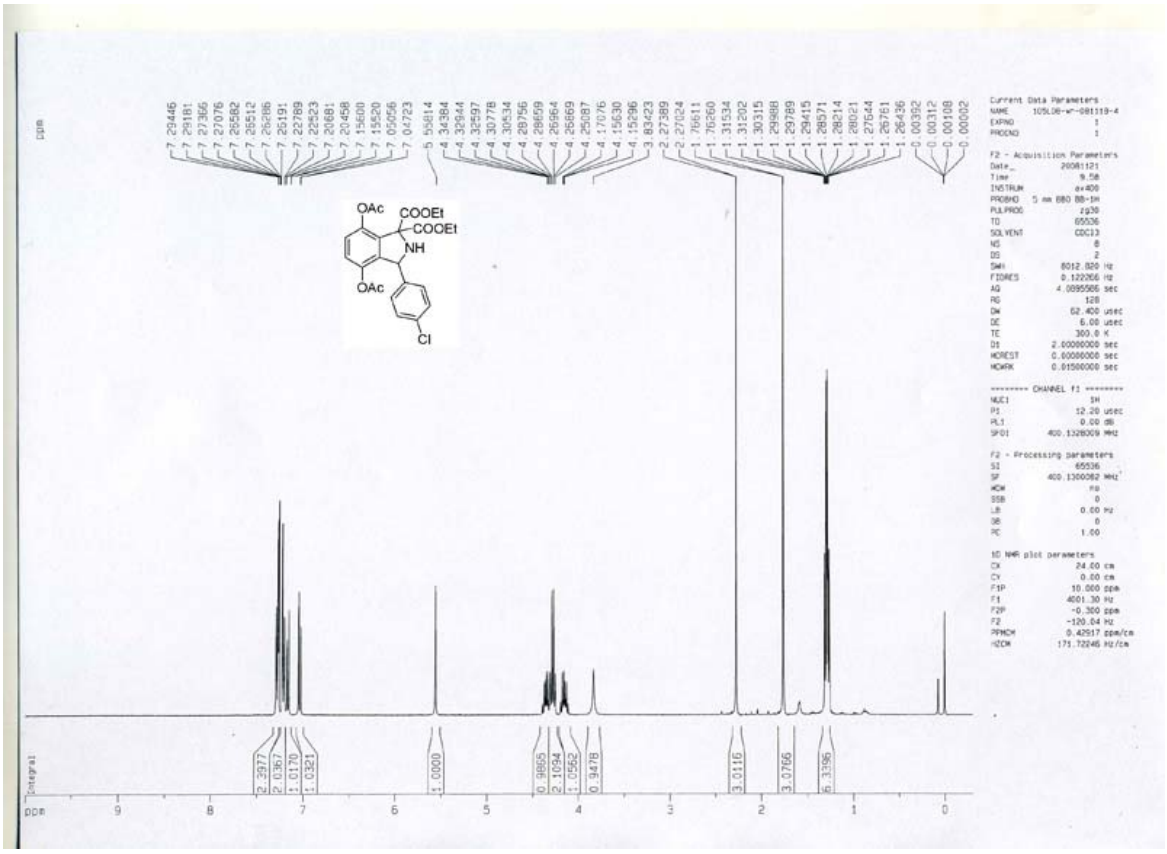
F2P -5.000 ppm
F2 -503.06 Hz
PPMCM 8.54167 ppm/cm
HZCM 859.40070 Hz/cm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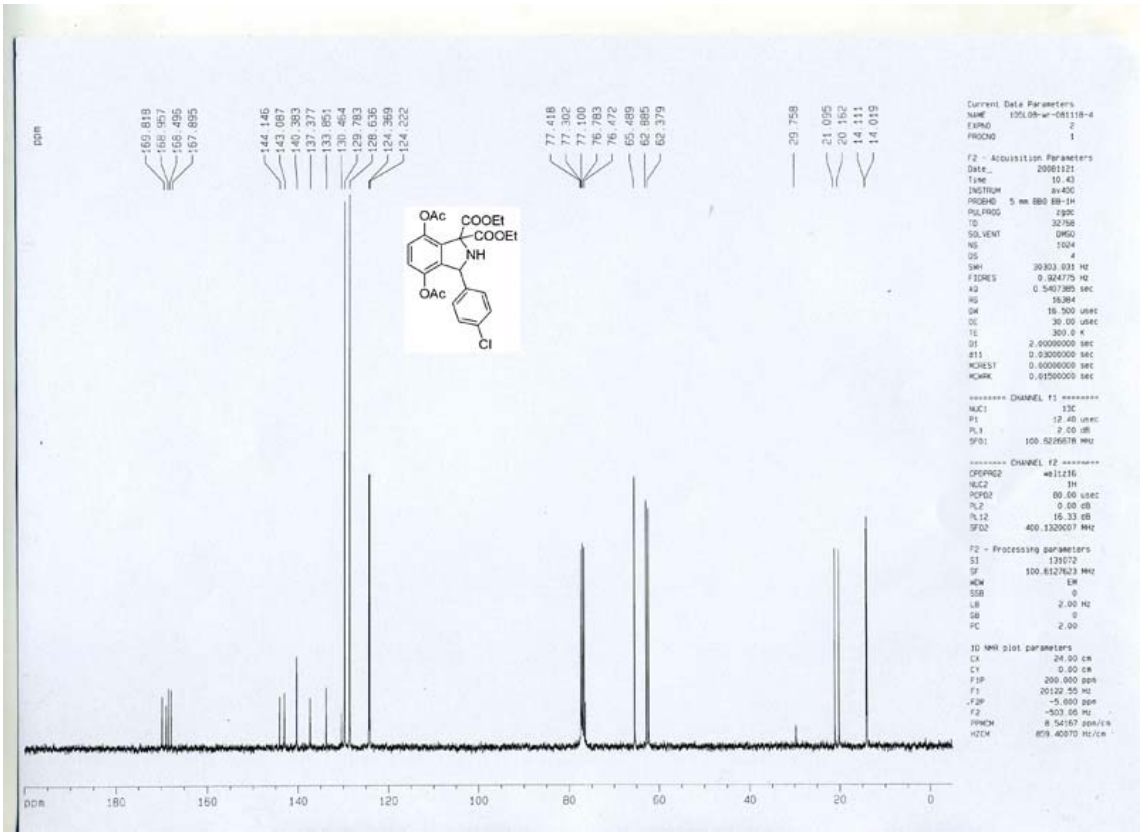
COOEt
COOEt
NH
OAc
Cl
ppm
Integral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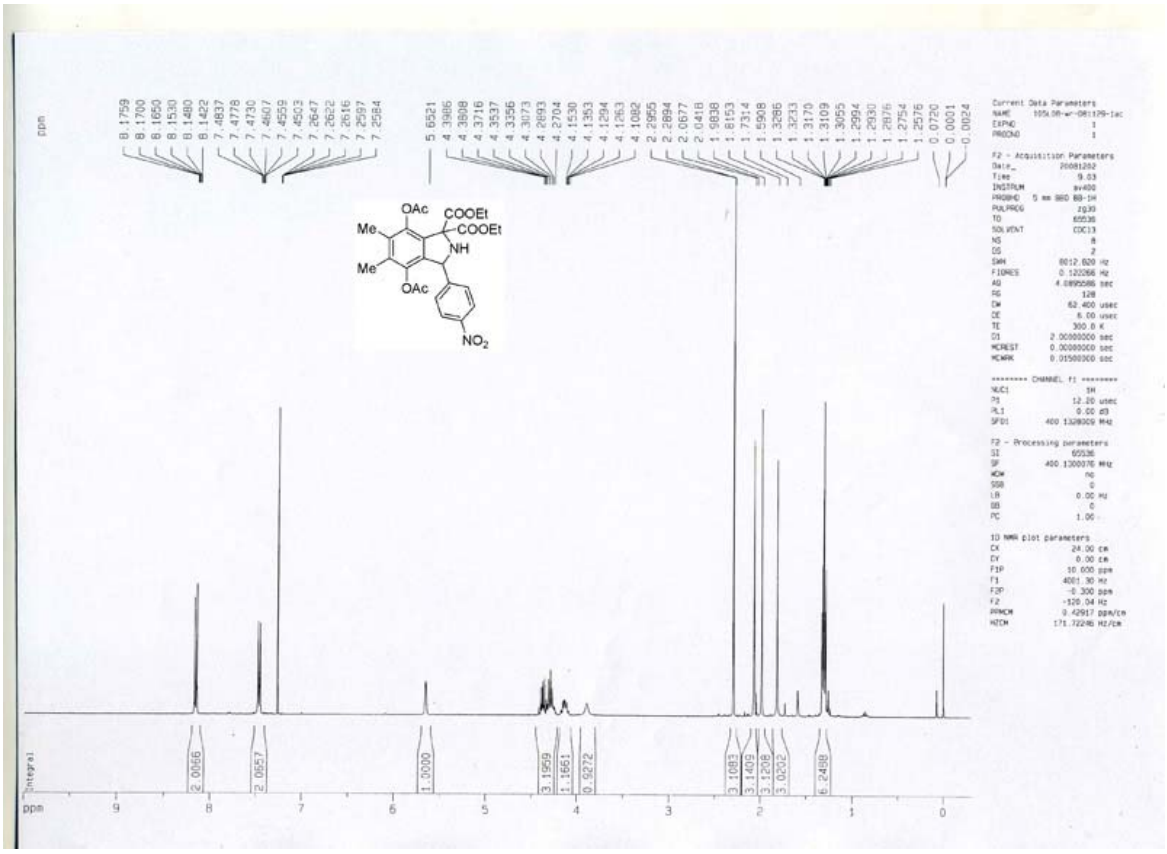
ppm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COOEt
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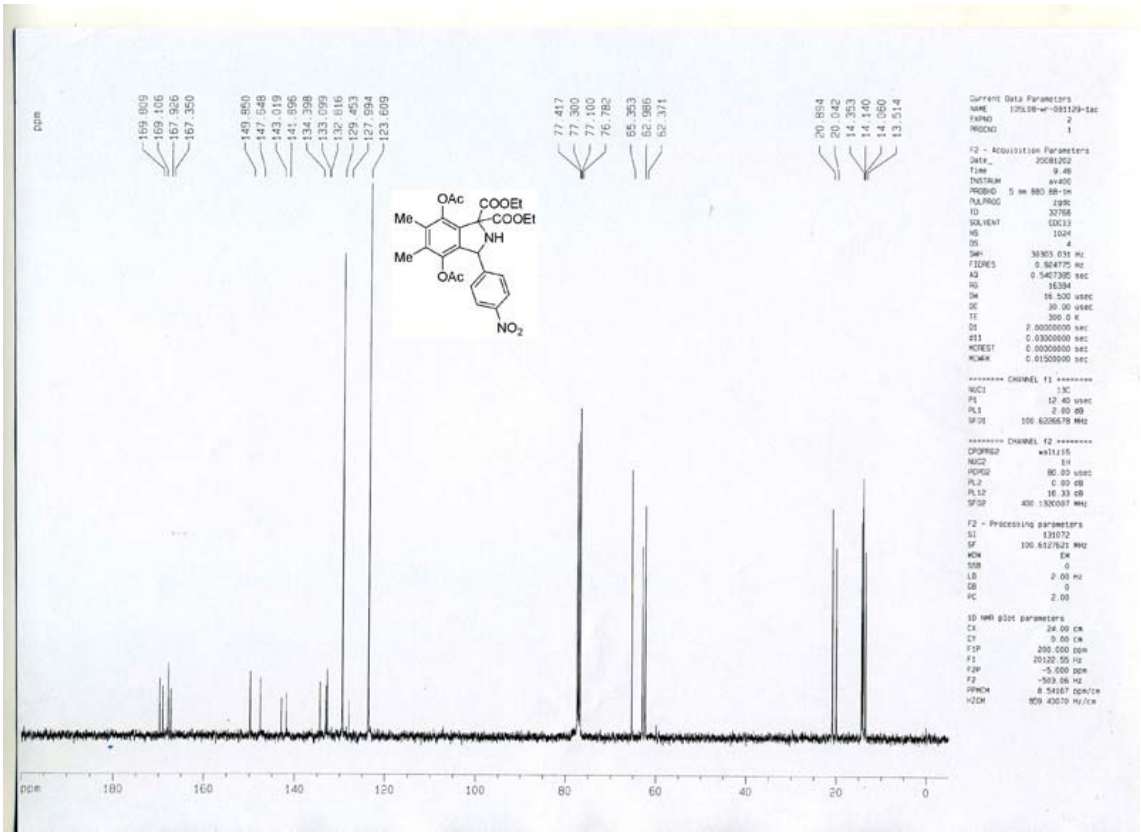
NH
Me
OAc
NO2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COOEt
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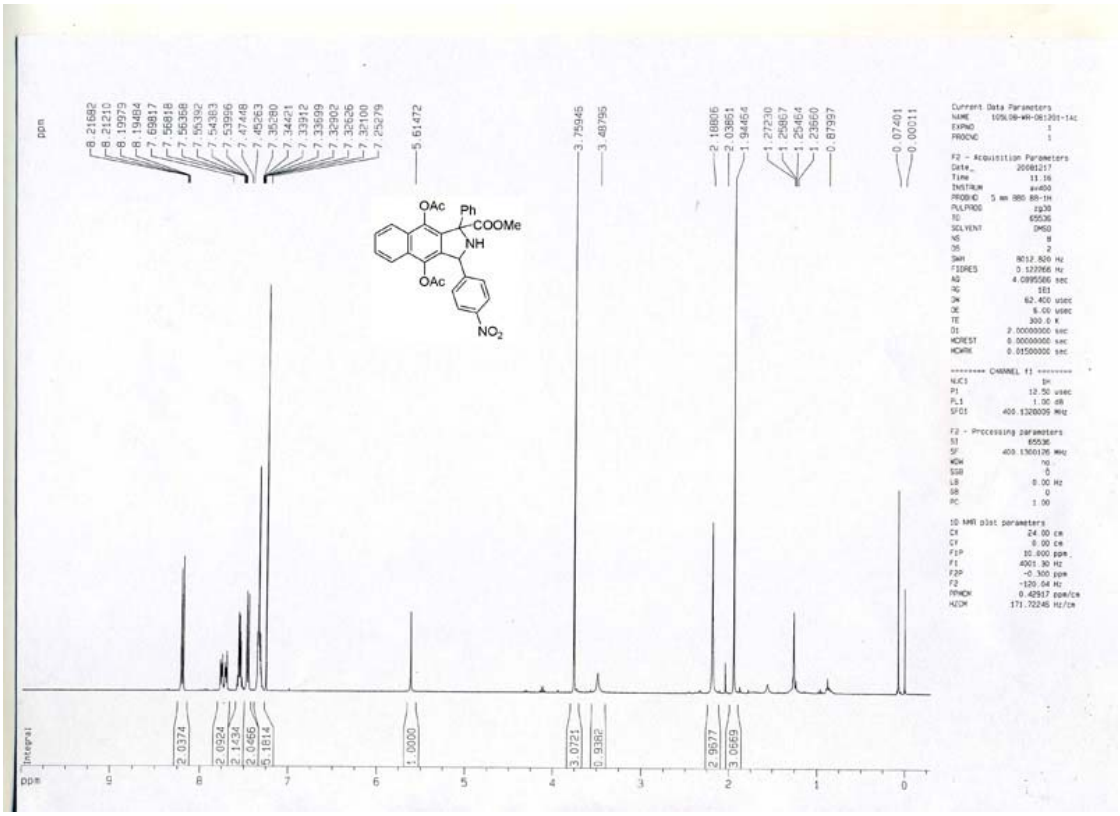
NH
Me
OAc
NO2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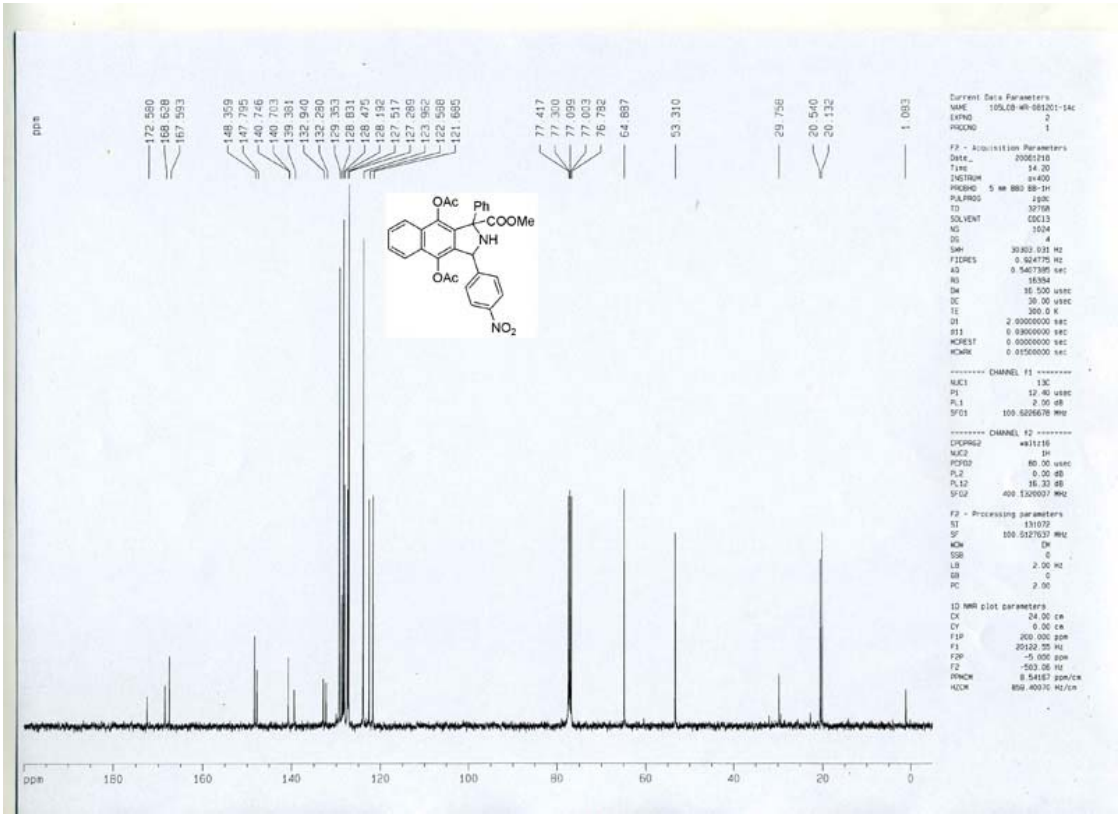
Ph
COOMe
NH
OAc
NO2
ppm
Integral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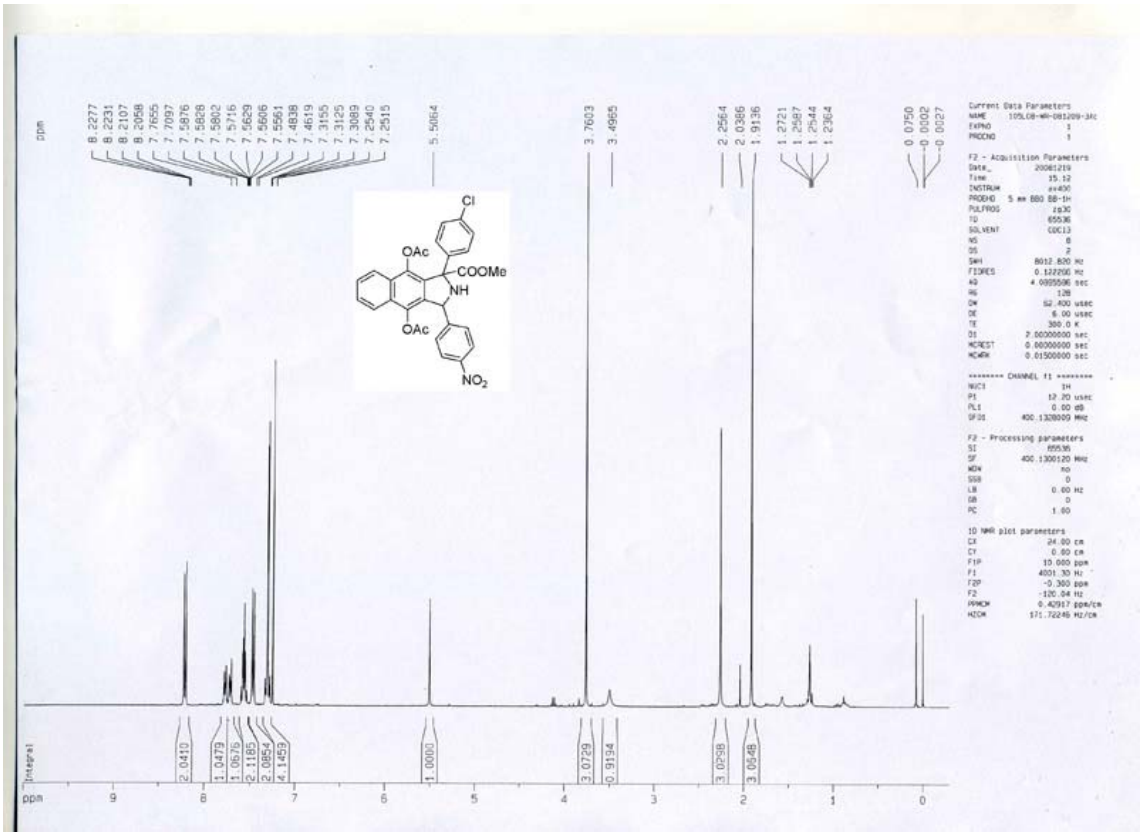
Ph
COOMe
NH
OAc
NO2
ppm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7.5629
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7.5561
7.4838
7.4619
7.3155
7.3125
7.3089
7.2540
7.2515
5.5064
3.7603
3.4965
2.2564
2.0386
1.9136
1.2721
1.2587
1.2544
1.2364
0.0750
0.0002
-0.0027
Cl
OAc
COOMe
NH
OAc
NO2
Integral
2.0410
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2.1185
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Current Data Parameters
NAME 105L08-wk-081209-1H
EXPNO 1
PROCNO 1
F2 - Acquisition Parameters
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Time 15.12
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PROBHD 5 mm BBO BB-1H
PULPROG zg30
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SOLVENT CDCl3
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DS 2
SWH 8012.820 Hz
FIDRES 0.122256 Hz
AQ 4.0905536 sec
RG 128
DW 62.400 usec
DE 6.00 usec
TE 300.0 K
D1 2.00000000 sec
MCREST 0.00000000 sec
MCWRK 0.01500000 sec
CHANNEL f1
NUC1 1H
P1 12.20 usec
PL1 0.00 dB
SFO1 400.1328009 MHz
F2 - Processing parameters
SI 65536
SF 400.1300120 MHz
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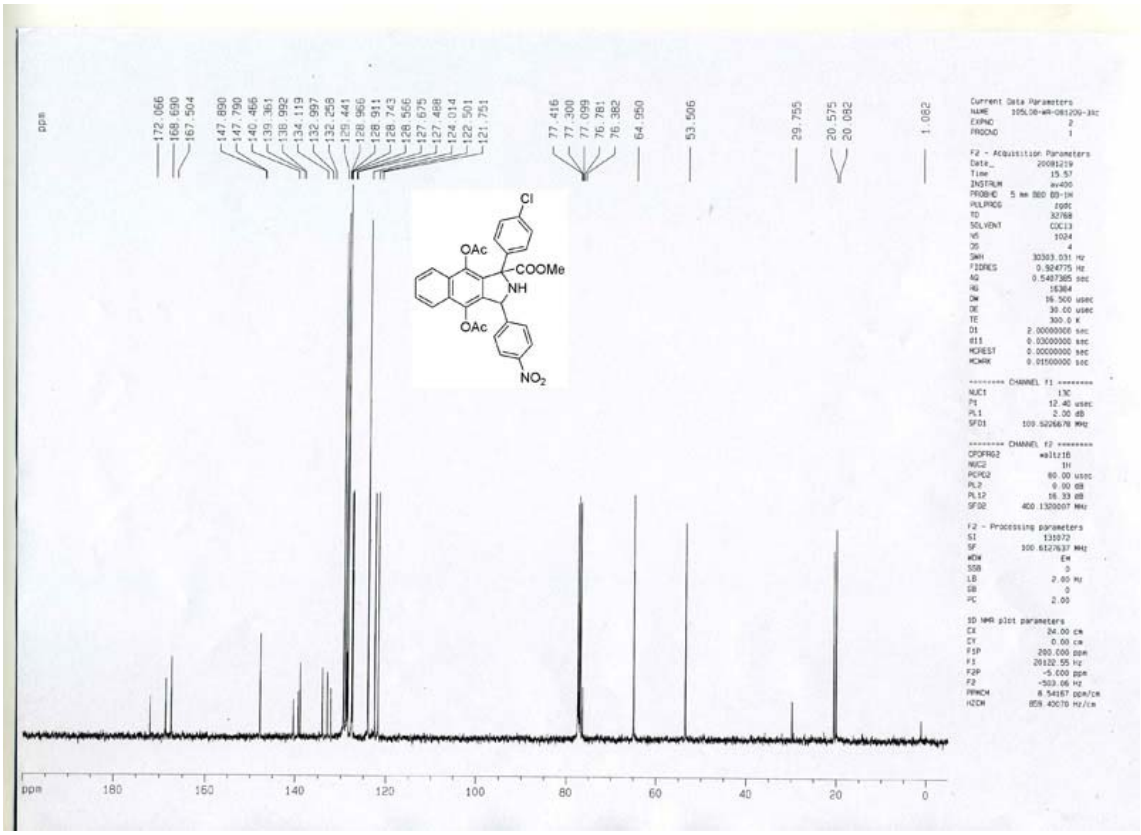
SSB 0
LB 0.00 Hz
GB 0
PC 1.00
1D NMR plot parameters
CX 24.00 cm
CY 0.00 cm
F1P 10.000 ppm
F1 4001.30 Hz
F2P -0.300 ppm
F2 -120.04 Hz
PPMCM 0.42917 ppm/cm
HZCM 171.72246 Hz/cm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128.911
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127.675
127.488
124.014
122.501
121.751
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77.099
76.781
76.382
64.060
53.506
29.755
20.575
20.082
1.062
Cl
OAc
COOMe
NH
OAc
NO2
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EXPNO 2
PROCNO 1
F2 - Acquisition Parameters
Date_ 20081219
Time 15.57
INSTRUM av400
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PULPROG zgpg
TD 32768
SOLVENT CDCl3
NS 1024
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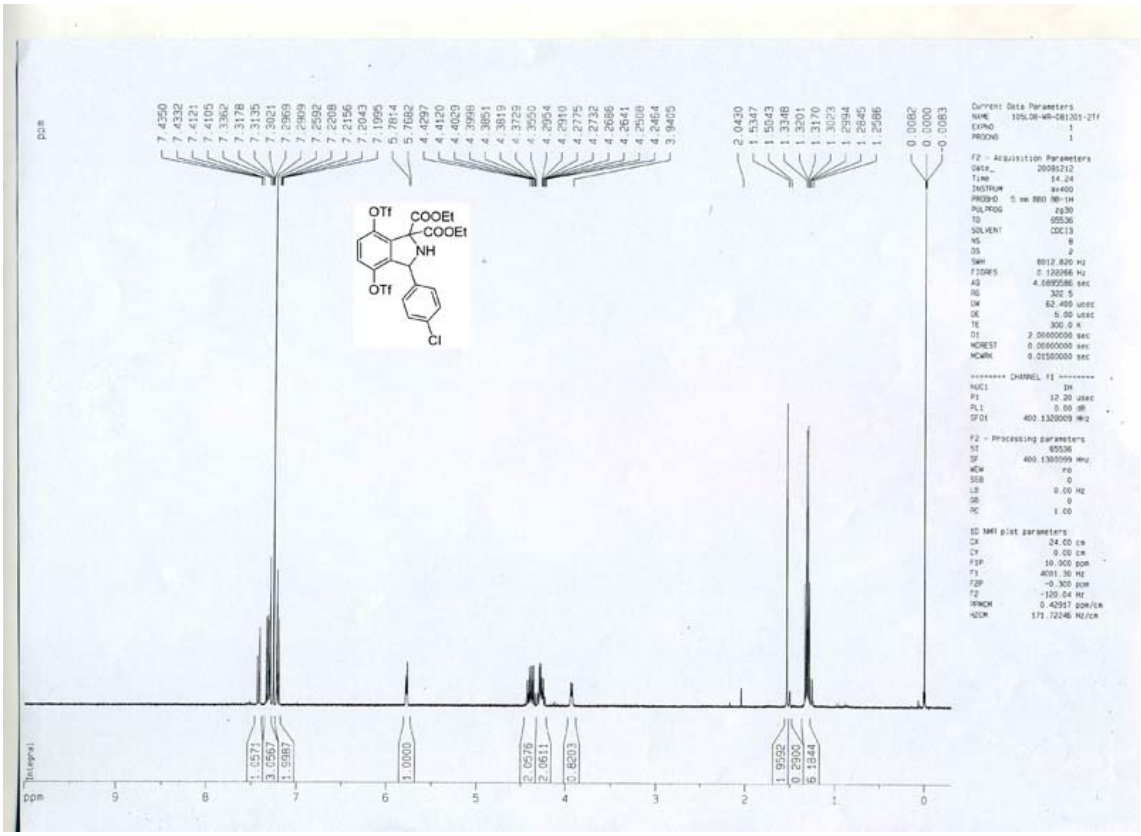
SWH 30303.031 Hz
FIDRES 0.924775 Hz
AQ 0.5407305 sec
RG 16384
DW 16.500 usec
DE 30.00 usec
TE 300.0 K
D1 2.00000000 sec
d11 0.03000000 sec
MCREST 0.00000000 sec
MCWRK 0.01500000 sec
CHANNEL f1
NUC1 13C
P1 12.40 usec
PL1 2.00 dB
SFO1 100.5226678 MHz
CHANNEL f2
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 0.00 dB
PL12 16.33 dB
SFO2 400.1320007 MHz
F2 - Processing parameters
SI 131072
SF 100.6127637 MHz
WDW Em
SSB 2
LB 2.00 Hz
GB 0
PC 2.00
1D NMR plot parameters
CX 24.00 cm
CY 0.00 cm
F1P 200.000 ppm
F1 20122.55 Hz
F2P -5.000 ppm
F2 -503.06 Hz
PPMCM 8.54167 ppm/cm
HZCM 859.40070 Hz/cm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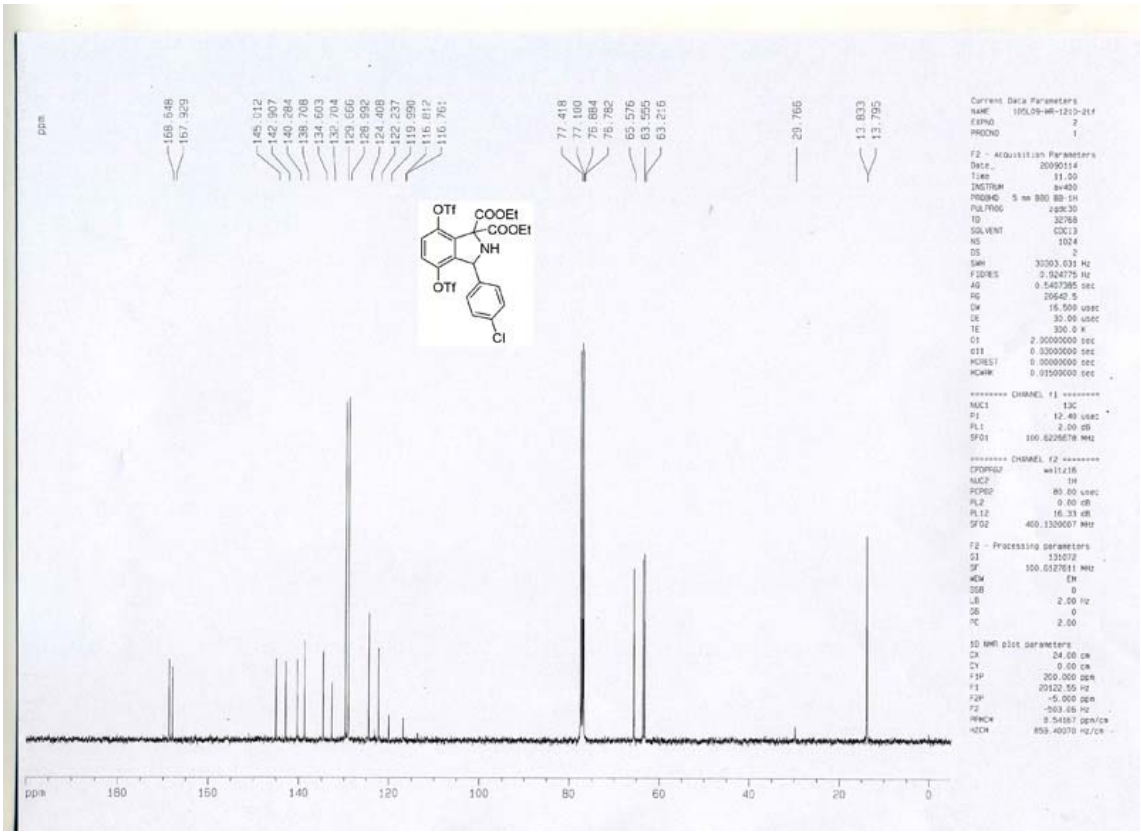
COOEt
COOEt
NH
OTf
Cl
ppm
Integral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Cl
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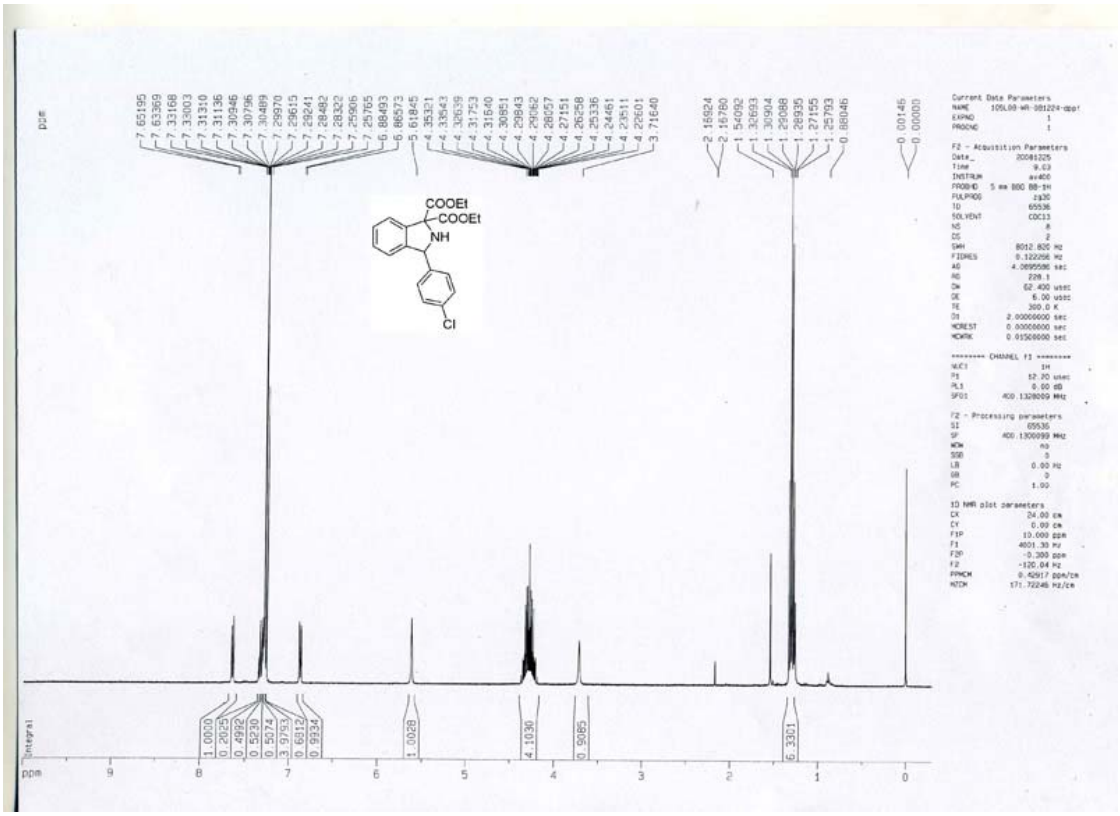
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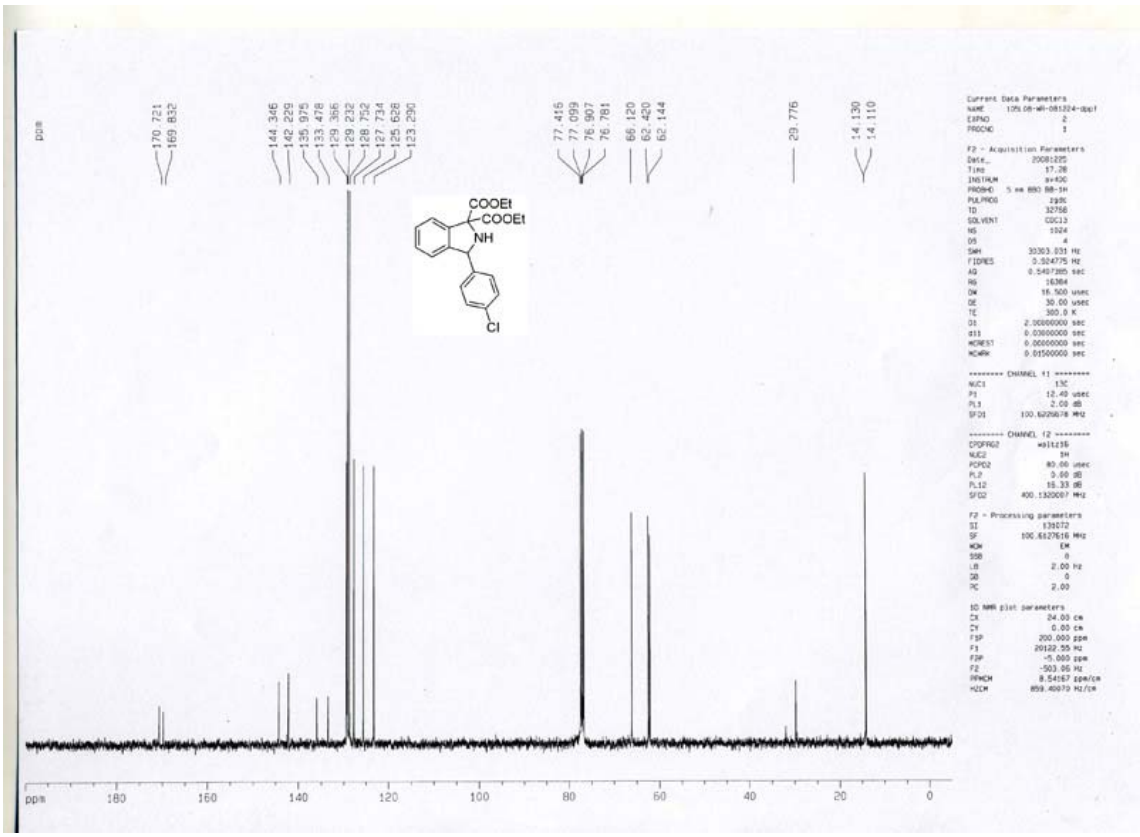
NH
Cl
ppm
Integral


COOEt
COOEt
NH
Cl
ppm

USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

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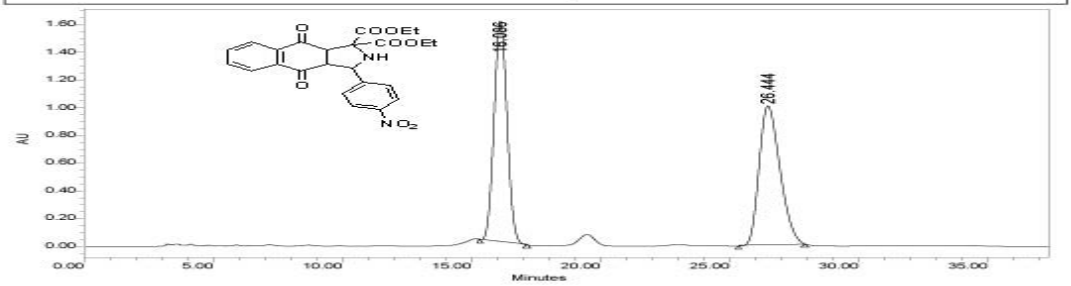
Sample Type:	Unknown	Date Acquired:	4/25/2008 10:12:54 PM
Vial:	1	Acq. Method:	wchao1
Injection #:	3	Date Processed:	4/25/2008 10:50:27 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	60.00 Minutes	Sample Set Name:	



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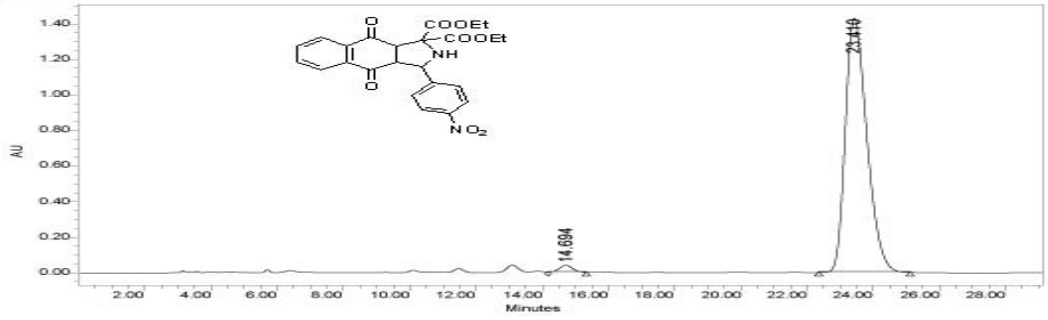
2	26.444	56593280	50.34	1006880	38.73

USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr080617-3	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	6/19/2008 12:14:50 PM
Vial:	1	Acq. Method:	wchao1
Injection #:	1	Date Processed:	6/19/2008 12:45:01 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	60.00 Minutes	Sample Set Name:	



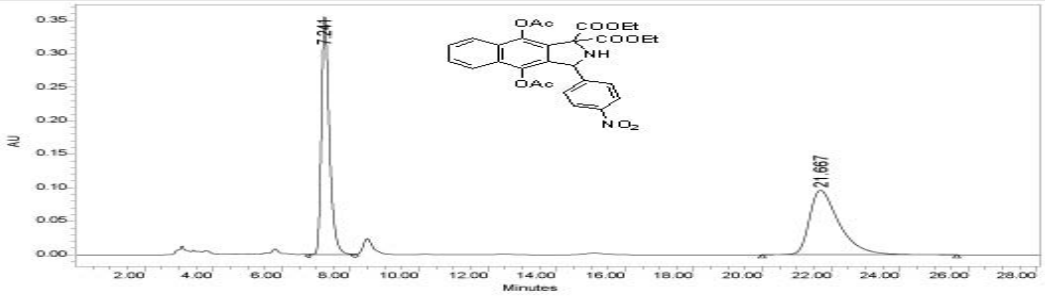
	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	14.694	1078053	1.64	39569	2.69
2	23.410	64592048	98.36	1431000	97.31

USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081107-2-Ac-AD30%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	11/11/2008 6:00:51 PM
Vial:	1	Acq. Method:	wchao30%t30
Injection #:	1	Date Processed:	11/11/2008 6:31:59 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	7.241	5765302	49.91	355946	78.68
2	21.667	5785813	50.09	96476	21.32

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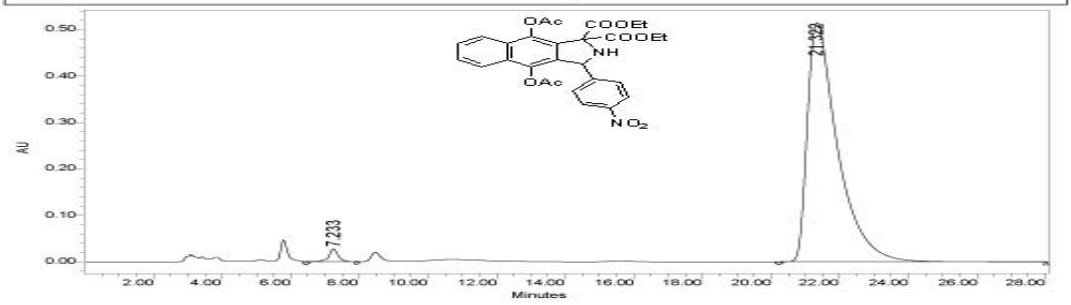
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081114-1-Ac-AD30%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	11/16/2008 3:13:19 AM
Vial:	1	Acq. Method:	wchao30%t30
Injection #:	3	Date Processed:	11/16/2008 3:41:51 AM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	7.233	547058	1.70	27854	5.13
2	21.322	31557529	98.30	515064	94.87

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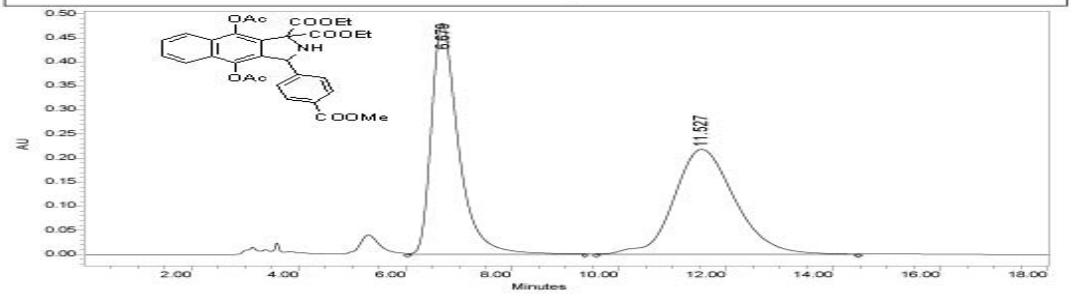
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081119-1-Ac-rac-AS30%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	11/20/2008 10:55:10 PM
Vial:	1	Acq. Method:	wchao30%t30
Injection #:	1	Date Processed:	11/20/2008 11:26:09 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	6.679	16930336	49.36	480512	68.74
2	11.527	17372838	50.64	218554	31.26

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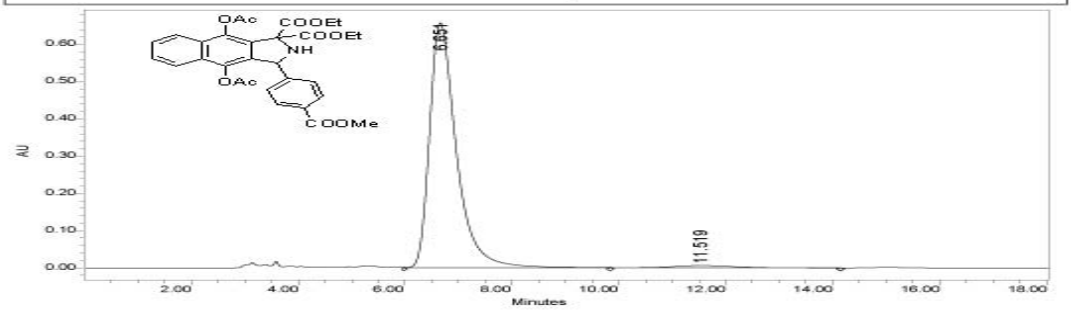
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081119-1-Ac-AS30%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	11/20/2008 11:17:24 PM
Vial:	1	Acq. Method:	wchao30%t30
Injection #:	2	Date Processed:	11/23/2008 3:24:30 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	6.651	22960365	97.74	658124	99.05
2	11.519	530124	2.26	6287	0.95

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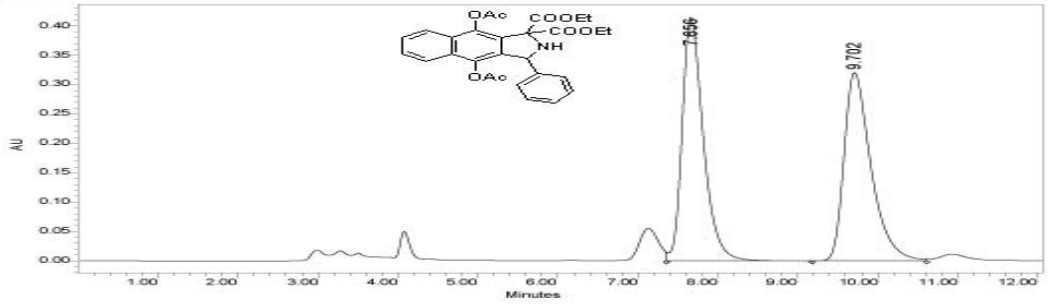
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr080805-1-Ac-AD15%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	1/8/2009 12:37:39 AM
Vial:	1	Acq. Method:	wrchao2
Injection #:	1	Date Processed:	1/8/2009 1:04:36 AM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



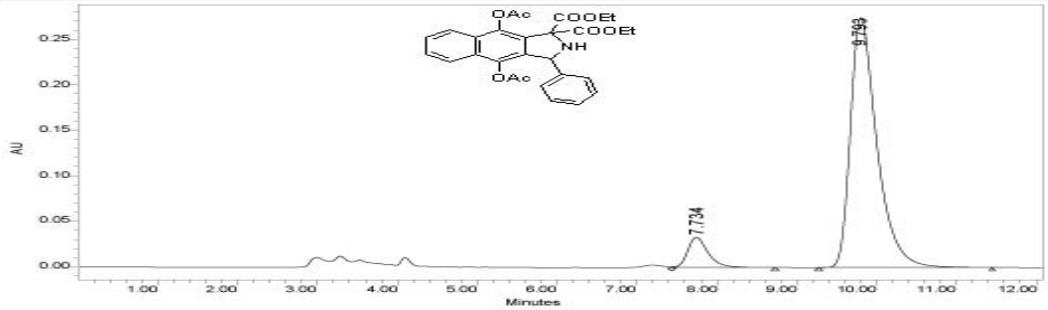
	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	7.656	7598441	50.28	415506	56.43
2	9.702	7514744	49.72	320844	43.57

USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr090106-3-Ac-AD15%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	1/8/2009 12:51:54 AM
Vial:	1	Acq. Method:	wrchao2
Injection #:	2	Date Processed:	1/8/2009 1:04:34 AM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



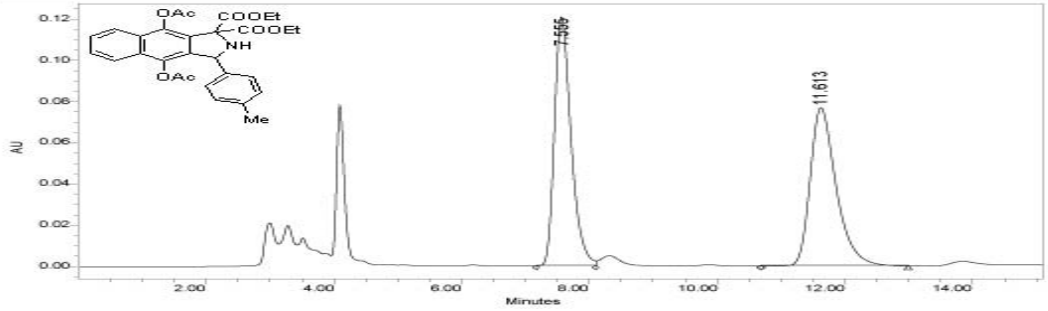
	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	7.734	586896	8.49	33227	10.78
2	9.793	6325995	91.51	274868	89.22

USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr080711-4-Ac-AD15%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	1/8/2009 1:11:33 AM
Vial:	1	Acq. Method:	wrchao2
Injection #:	3	Date Processed:	1/16/2009 11:38:40 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	7.555	2186751	50.13	121127	61.18
2	11.613	2175225	49.87	76871	38.82

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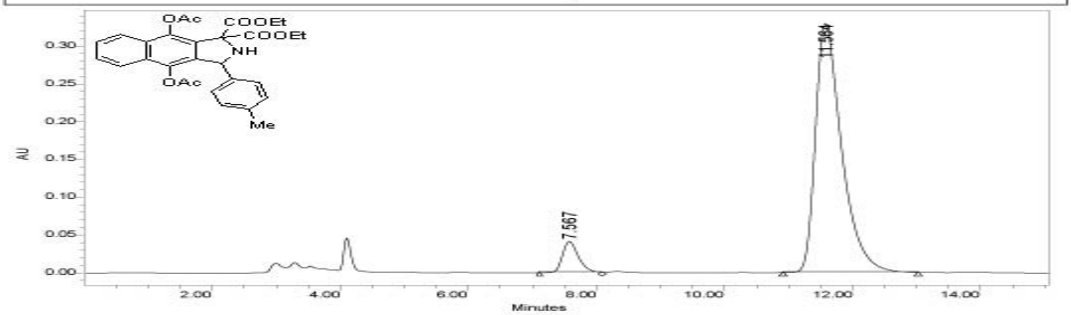
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr090106-1-Ac-AD15%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	1/8/2009 1:29:16 AM
Vial:	1	Acq. Method:	wrchao2
Injection #:	4	Date Processed:	1/8/2009 1:44:35 AM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	7.567	721473	7.15	41343	11.15
2	11.564	9375272	92.85	329380	88.85

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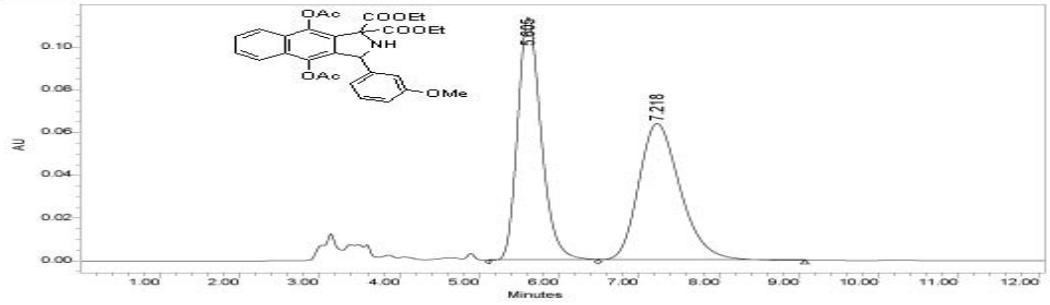
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081111-1-Ac-AS30%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	11/13/2008 6:20:02 PM
Vial:	1	Acq. Method:	wchao30%t30
Injection #:	1	Date Processed:	11/13/2008 6:32:28 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



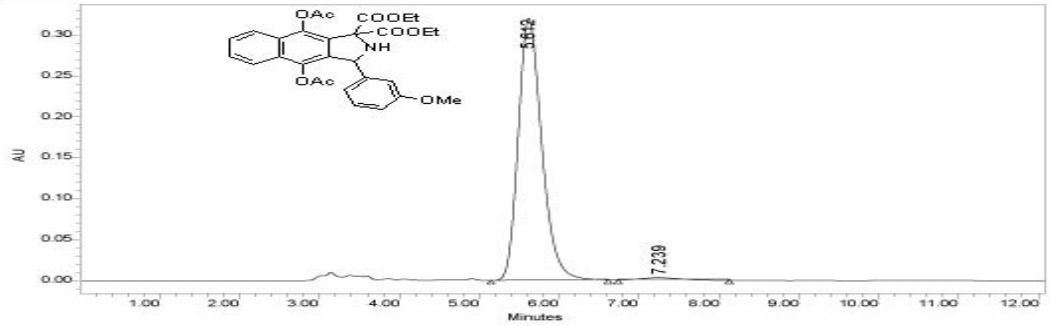
	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	5.605	2338150	50.05	113909	63.99
2	7.218	2333569	49.95	64108	36.01

USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081111-2-Ac-AS30%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	11/13/2008 6:38:43 PM
Vial:	1	Acq. Method:	wchao30%t30
Injection #:	2	Date Processed:	11/13/2008 6:51:50 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



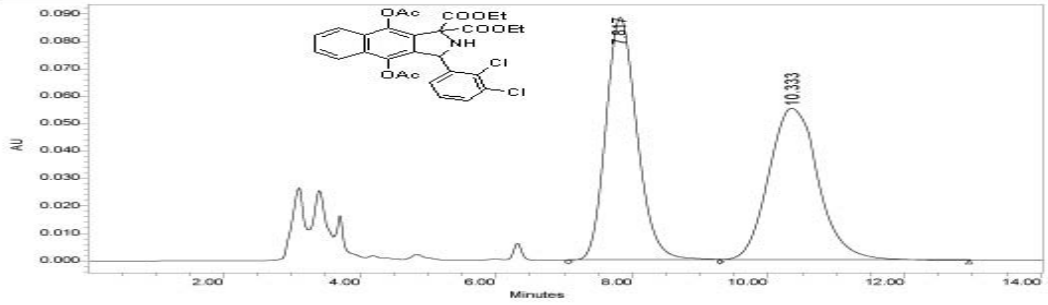
	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	5.612	6541047	98.65	320401	99.14
2	7.239	89655	1.35	2790	0.86

USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081129-2-Ac-rac-AS10%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	12/1/2008 12:55:18 AM
Vial:	1	Acq. Method:	wchao10%t30
Injection #:	1	Date Processed:	12/1/2008 1:09:26 AM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



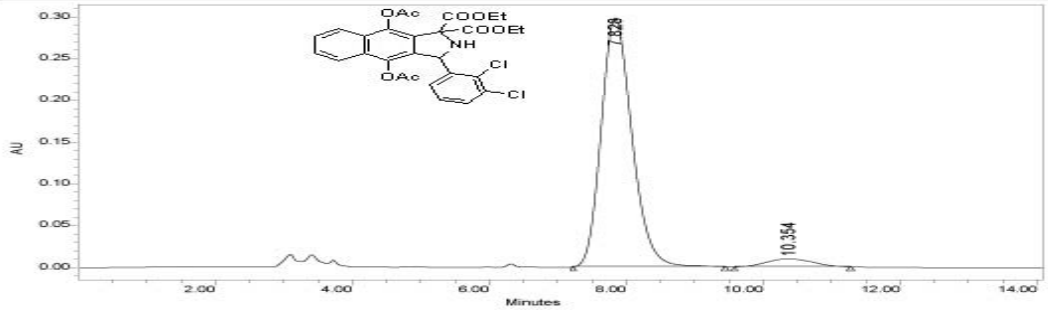
	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	7.817	2840338	50.07	88667	61.51
2	10.333	2832012	49.93	55494	38.49

USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081129-2-Ac-AS10%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	12/1/2008 1:10:17 AM
Vial:	1	Acq. Method:	wchao10%t30
Injection #:	2	Date Processed:	12/1/2008 1:25:20 AM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



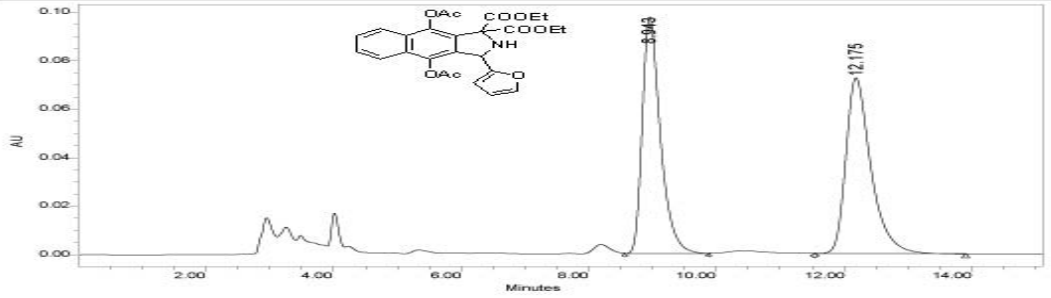
	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	7.828	9305787	95.41	298097	96.89
2	10.354	447445	4.59	9556	3.11

USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081114-4-Ac-rac-AD15%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	11/17/2008 10:40:12 PM
Vial:	1	Acq. Method:	wchao15%t30
Injection #:	1	Date Processed:	11/17/2008 10:55:33 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	8.943	1931300	49.22	97791	57.36
2	12.175	1992341	50.78	72709	42.64

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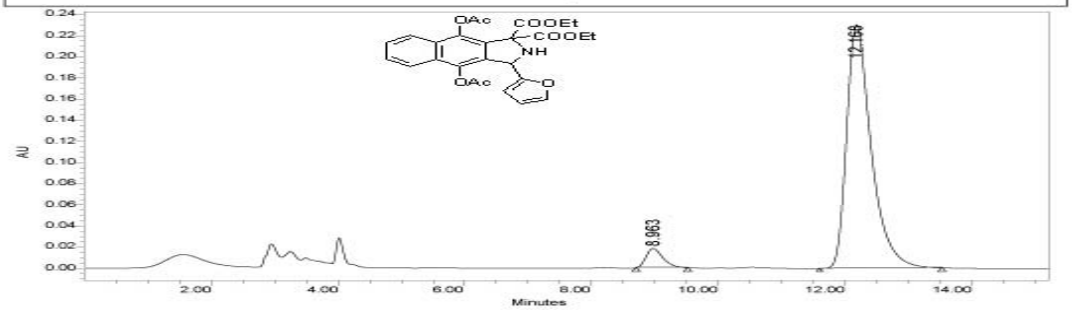
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081114-4-Ac-AD15%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	11/17/2008 10:59:57 PM
Vial:	1	Acq. Method:	wchao15%t30
Injection #:	2	Date Processed:	11/17/2008 11:16:38 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	8.963	336717	5.15	18311	7.36
2	12.168	6205184	94.85	230505	92.64

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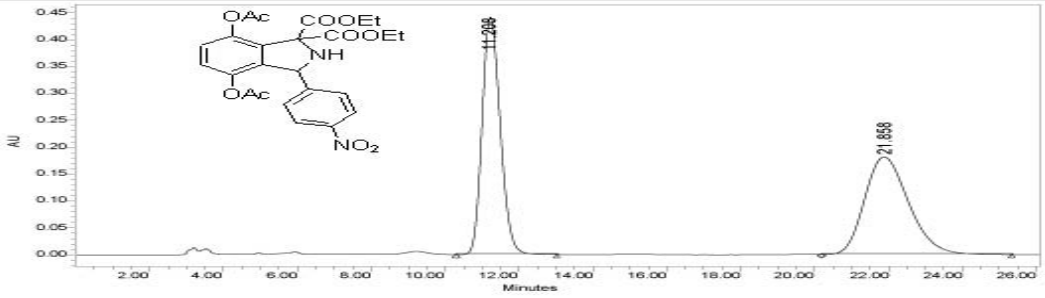
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr080908-1-Ac-AS30%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	9/17/2008 5:33:16 PM
Vial:	1	Acq. Method:	wchao1
Injection #:	2	Date Processed:	9/17/2008 6:03:55 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	60.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	11.208	15040039	50.01	441874	70.86
2	21.858	15031625	49.99	181730	29.14

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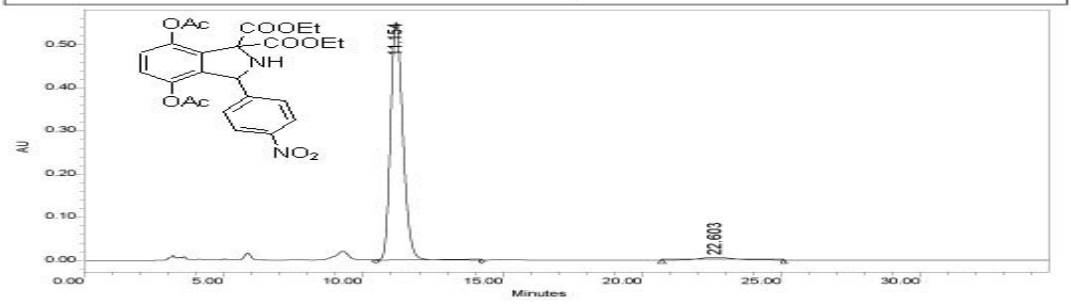
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081103-1-Ac-AS30%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	11/6/2008 5:03:17 PM
Vial:	1	Acq. Method:	wchao30%t30
Injection #:	1	Date Processed:	11/6/2008 5:38:39 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	11.154	17086579	96.96	551457	98.82
2	22.603	535772	3.04	6591	1.18

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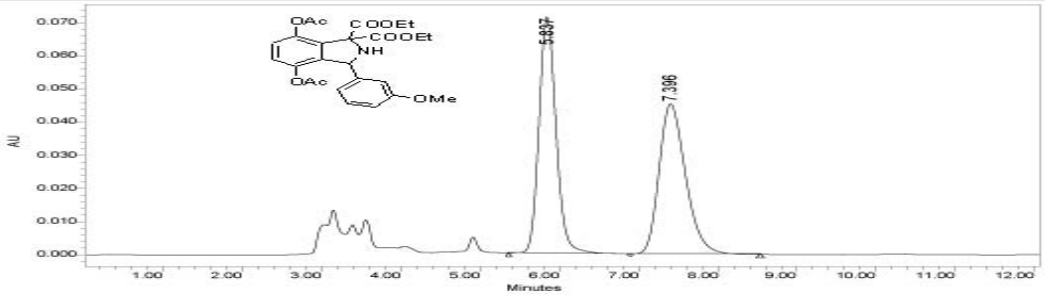
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081111-3-Ac-AS30%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	11/13/2008 8:08:15 PM
Vial:	1	Acq. Method:	wchao30%t30
Injection #:	6	Date Processed:	11/13/2008 8:21:00 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



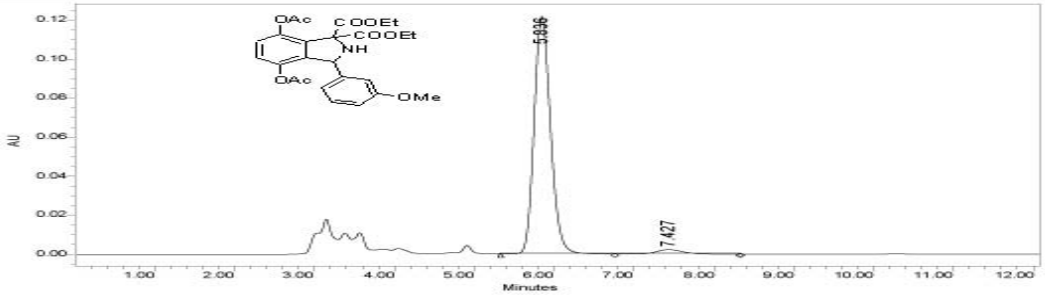
	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	5.837	1066837	50.38	71342	61.16
2	7.396	1050816	49.62	45300	38.84

USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081111-4-Ac-AS30%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	11/13/2008 7:48:23 PM
Vial:	1	Acq. Method:	wchao30%t30
Injection #:	5	Date Processed:	11/13/2008 8:01:29 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



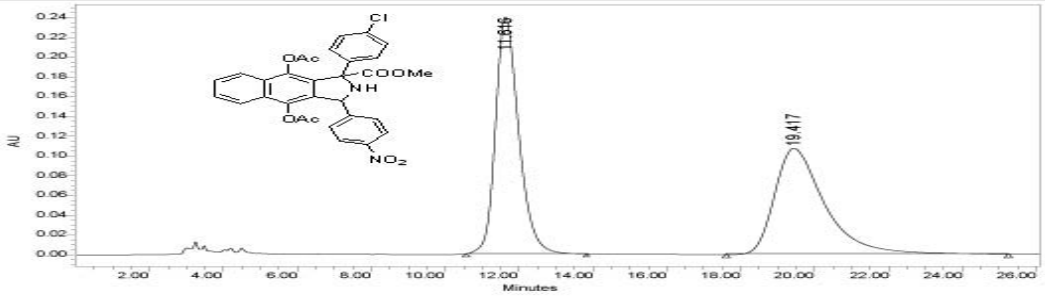
	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	5.836	1736944	97.01	121715	98.15
2	7.427	53453	2.99	2296	1.85

USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081201-2-Ac-OD15%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	12/17/2008 3:04:54 PM
Vial:	1	Acq. Method:	wchao15%t30
Injection #:	3	Date Processed:	12/17/2008 3:31:24 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	11.616	10444257	50.73	239485	69.04
2	19.417	10143196	49.27	107375	30.96

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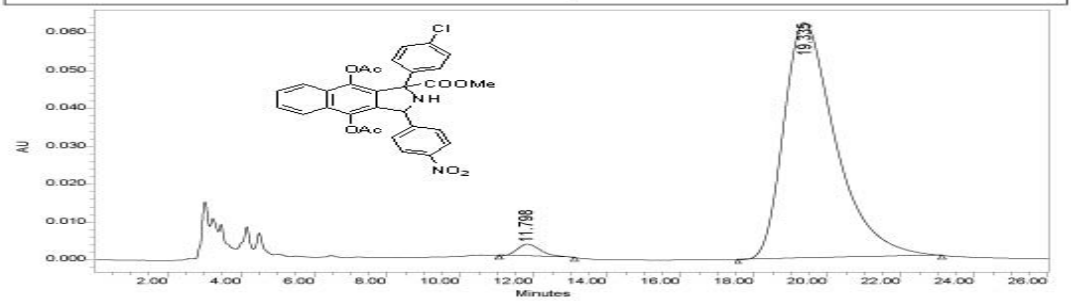
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081209-3-Ac-OD15%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	12/13/2008 6:50:44 PM
Vial:	1	Acq. Method:	wchao15%t30
Injection #:	1	Date Processed:	12/13/2008 7:17:14 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	11.798	151610	2.41	3249	4.95
2	19.335	6129786	97.59	62373	95.05

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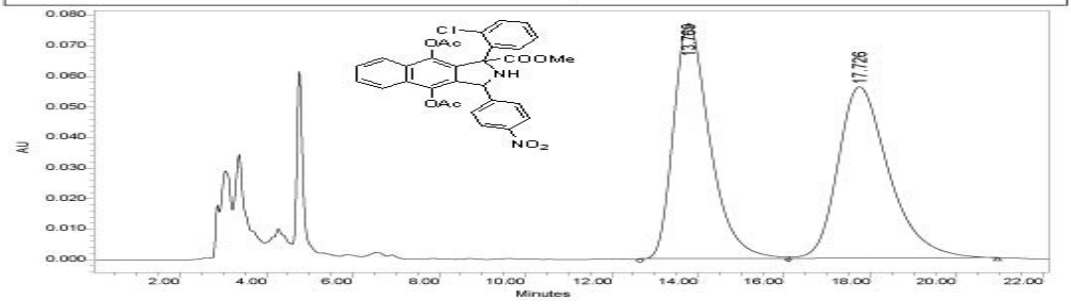
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081206-1-Ac-OD10%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	12/13/2008 5:48:19 PM
Vial:	1	Acq. Method:	wchao10%t30
Injection #:	1	Date Processed:	12/13/2008 6:12:55 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	13.769	4512419	49.52	77257	57.89
2	17.726	4600519	50.48	56193	42.11

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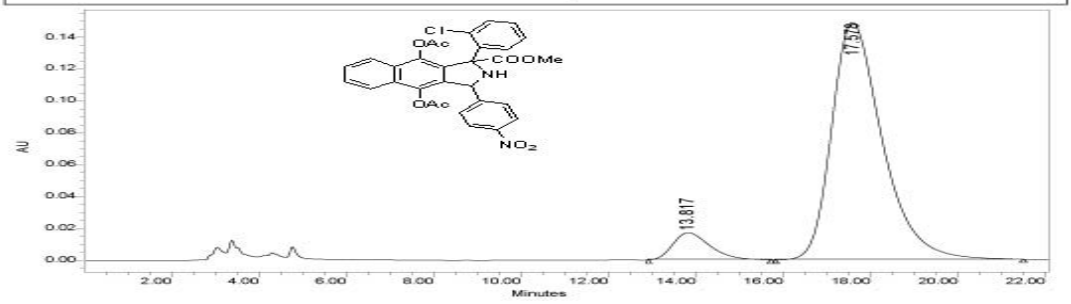
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081208-1-Ac-OD10%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	12/13/2008 6:13:36 PM
Vial:	1	Acq. Method:	wchao10%t30
Injection #:	2	Date Processed:	12/13/2008 6:41:14 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	13.817	1001451	7.71	17001	10.25
2	17.578	11982708	92.29	148895	89.75

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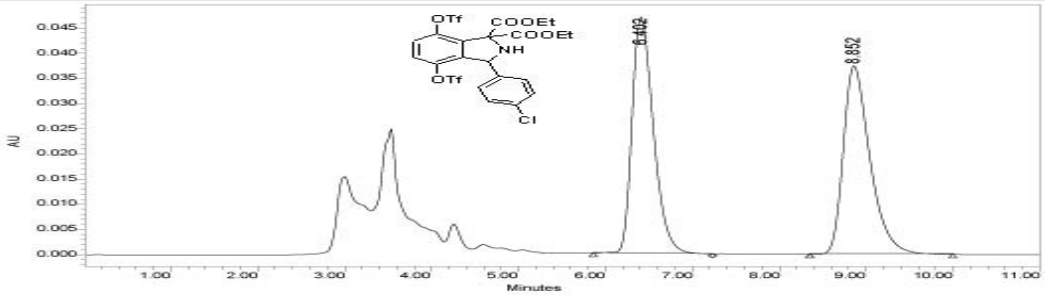
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081227-p-Cl-Tf-rac-AD10%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	12/30/2008 9:01:53 PM
Vial:	1	Acq. Method:	wrchao10%
Injection #:	1	Date Processed:	12/30/2008 9:13:47 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	6.402	801519	50.03	46896	55.62
2	8.852	800417	49.97	37412	44.38

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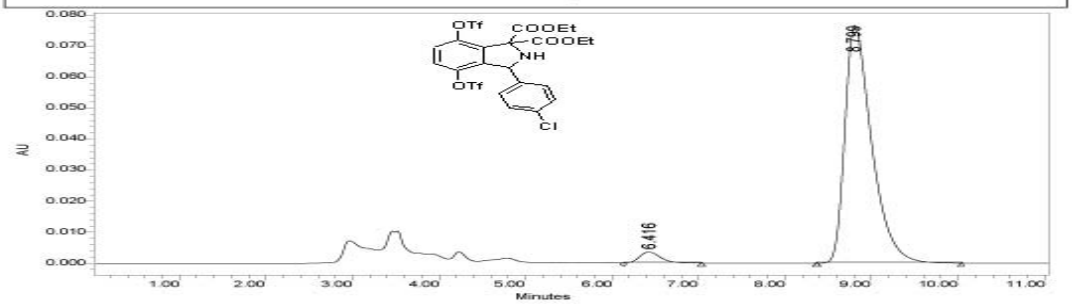
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081230-1-Tf-AD10%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	1/1/2009 10:05:58 PM
Vial:	1	Acq. Method:	wrchao10%
Injection #:	1	Date Processed:	1/1/2009 10:17:12 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	6.416	60545	3.53	3578	4.46
2	8.799	1652723	96.47	76592	95.54

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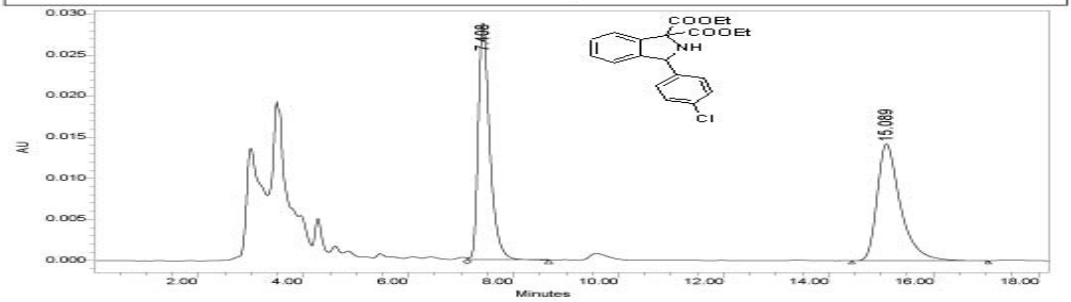
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081227-p-Cl-2H-rac-AD10%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	12/30/2008 10:26:23 PM
Vial:	1	Acq. Method:	wrchao10%
Injection #:	1	Date Processed:	1/16/2009 11:34:02 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	7.408	440382	50.27	28965	67.09
2	15.089	435599	49.73	14211	32.91

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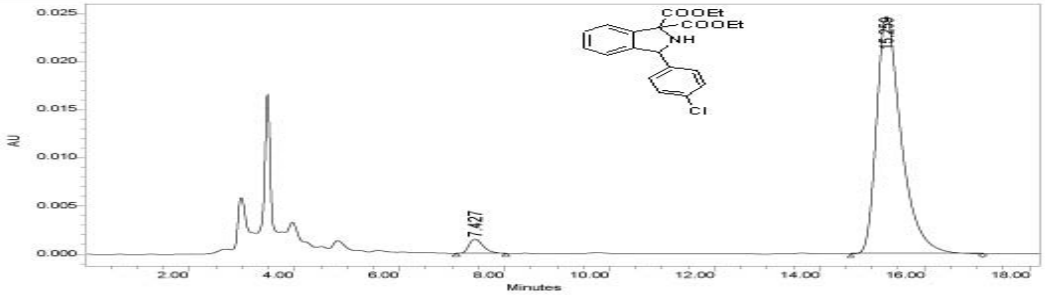
USTC
Project Name: wchao
Reported by User: System

Breeze

SAMPLE INFORMATION

Sample Name:	wr081230-1-2H-AD10%	Acquired By:	System
Sample Type:	Unknown	Date Acquired:	1/15/2009 10:36:35 PM
Vial:	1	Acq. Method:	wrchao10%
Injection #:	1	Date Processed:	1/15/2009 10:55:29 PM
Injection Volume:	20.00 ul	Channel Name:	2487Channel 1
Run Time:	100.00 Minutes	Sample Set Name:	



	RT (min)	Area (V*sec)	% Area	Height (V)	% Height
1	7.427	27872	3.33	1470	5.62
2	15.259	808068	96.67	24681	94.38

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