

Eantioselective Mannich reaction of a highly reactive Horner-Wadsworth-Emmons reagent with imines catalyzed by a bifunctional thiourea

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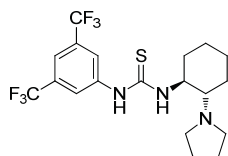
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General remarks

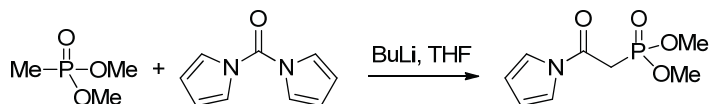
^1H , ^{13}C , ^{31}P NMR spectra were recorded on Bruker Avance 300. The chemical shifts are reported in ppm relative to internal standard TMS (^1H NMR), to residual signals of the solvents (CHCl_3 , 7.26 ppm for ^1H NMR and 77.0 ppm for ^{13}C NMR) and to external standard 85% H_3PO_4 (^{31}P NMR). IR spectra were recorded on Nicolet NEXUS 670 FT-IR and only major peaks were reported. Optical rotations were measured on a Perkin-Elmer 341 polarimeter at rt. HRMS was measured with an APEX II 47e mass spectrometer. The enantiomeric excess was determined by HPLC analysis.

Materials

The catalyst **3e** was synthesized according to the procedures reported by Yoshiji Takemoto and coworkers by using (1S,2S)-2-Pyrrolidin-1-yl-cyclohexylamine and 3,5-bis(trifluoromethyl)phenyl isothiocyanate.^[1] The substrate **1e** and **1c** were synthesized according to the procedures reported by Shibasaki and co-workers.^[2]

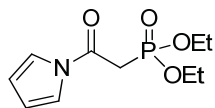


3e yellow solid; ^1H NMR (300 MHz, $\text{DMSO}-d_6$) δ 10.09 (brs, 1H), 8.24 (brs, 1H), 8.21 (s, 2H), 7.68 (s, 1H), 4.24 (s, 1H), 3.44 (brs, 1H), 2.81 – 2.51 (m, 4H), 2.12 (d, $J = 9.3$ Hz, 1H), 1.83 (d, $J = 12.1$ Hz, 1H), 1.68 (m, 6H), 1.47 – 1.06 (m, 4H) ppm; ^{13}C NMR (75 MHz, $\text{DMSO}-d_6$) δ 178.8, 141.9, 130.4 (q, $J = 32.6$ Hz), 123.3 (q, $J = 271.1$ Hz), 121.2 (m), 115.5 (m), 60.8, 55.5, 47.4, 30.4, 23.9, 23.7, 23.4, 22.5 ppm.



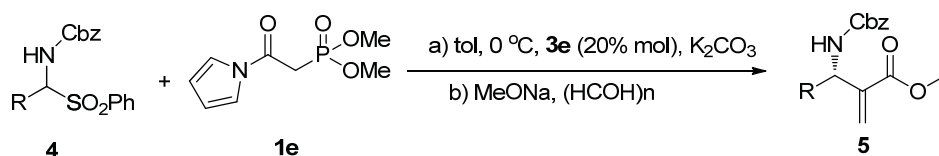
To a stirred solution of dimethyl methylphosphonate (1.06 g, 8.49 mmol) in THF (30 mL) at -78 °C was added BuLi (8.5 mmol, 5.3 mL, 1.6 M in hexane) slowly over 30 min. The mixture was stirred at -65 °C for 90 min, and then carbonyl dipyrrole (1.25 g, 7.76 mmol) in THF (5 mL) was added slowly over 20 min. The mixture was stirred at the same temperature for 1 h, and then was gradually warmed to room temperature over 2 h. The reaction mixture was quenched with sat. aq. NH_4Cl and the aqueous phase was extracted with ethyl acetate. The organic layer was washed with brine,

and dried over Na_2SO_4 . After removing the solvent, the residue was purified by silica gel flash column chromatography to give the HWE reagent **3e** in 70% yield; ^1H NMR (300 MHz, CDCl_3) δ 7.34 (brs, 2H), 6.32-6.30 (m, 2H), 3.82-3.74 (m, 6H), 3.09 (d, $J = 22.2$ Hz, 2H) ppm; ^{13}C NMR (75 MHz, CDCl_3) δ 162.3, 119.3, 113.4, 52.9, 33.6 (d, $J_{\text{C-P}} = 133$ Hz) ppm; ^{31}P NMR (121 MHz, CDCl_3) δ 21 ppm.

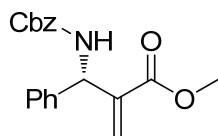


3d ^1H NMR (300 MHz, CDCl_3) δ , 7.35 (brs, 2H), 6.32 (t, $J = 2.4$ Hz, 2H), 4.23-4.13 (m, 4H), 3.46 (d, $J = 22.2$ Hz, 2H) 1.32 (t, $J = 6.9$ Hz, 6H) ppm; ^{31}P NMR (121 MHz, CDCl_3) δ 18 ppm.

General procedure for the reaction of the HWE reagent with α -amido sulfones

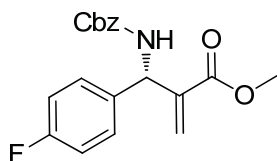


Catalyst **3e** (21.9 mg, 0.05 mmol, 20 mol %), HWE reagent **1e** (81.3 mg, 0.375 mmol) were dissolved in toluene (4 mL) at 0 °C. Then α -amidosulfones **4** (0.25 mmol) was added followed by addition of an aqueous solution of K_2CO_3 (1.5 M, 0.2 mL). After the stated reaction time, the intermediate product was quickly isolated by column chromatography. Then it was dissolved in THF (2 mL), and a precooled solution of MeONa (2.2 equiv) in MeOH (0.5 mL) was added at -10 °C. After the reaction was stirred 30 min 0 °C, paraformaldehyde (5 equiv) was added, and the mixture was stirred for another 4 hours. The reaction process was monitored by TLC. Upon completion, the reaction was quenched with sat. aq. NaCl and extracted with ethyl acetate and dried over Na_2SO_4 . After concentration of the solvents, the residue was purified on a silica gel column to give the corresponding product

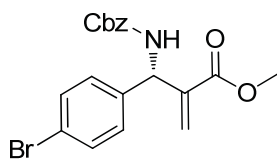


5a Colorless oil; 87% yield; 91% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 85/15, flow rate = 1.0 mL/min, $t_{\text{major}} = 16.0$ min, $t_{\text{minor}} = 20.3$ min); $[\alpha]_{\text{D}}^{20} = +16.0$ ($c = 1.25$, CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ 7.40-7.31 (m, 6H), 7.30 – 7.24 (m, 4H), 6.38 (s, 1H), 5.93 (s, 1H), 5.87 – 5.65 (m, 2H), 5.13 (s, 2H), 3.66 (s, 3H) ppm; ^{13}C NMR (75 MHz, CDCl_3) δ 165.9, 155.5, 139.6, 139.5, 136.3, 128.6, 128.5, 128.1, 127.6, 127.0, 126.4, 67.0,

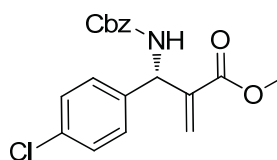
56.7, 51.9 ppm; **IR** (neat): 3334, 2952, 1723, 1500, 1233, 1042, 700 cm^{-1} ; **HRMS** (ESI): $\text{C}_{19}\text{H}_{19}\text{NO}_4$ $[\text{M}+\text{H}]^+$ calcd: 326.1387, found: 326.1376.



5b Colorless oil; 87% yield; 90% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, t_{major} = 11.6 min, t_{minor} = 15.2 min); $[\alpha]_{\text{D}}^{20}$ = +1.8 (c = 1.14, CHCl_3); **^1H NMR** (300 MHz, CDCl_3) δ 7.44 – 7.23 (m, 5H), 7.17 (dd, J = 8.4, 5.5 Hz, 2H), 6.91 (t, J = 8.7 Hz 2H), 6.29 (s, 1H), 5.84 (s, 1H), 5.75 (d, J = 8.2 Hz, 1H), 5.65 (d, J = 8.9 Hz, 1H), 5.05 (s, 2H), 3.59 (s, 3H) ppm; **^{13}C NMR** (75 MHz, CDCl_3) δ 165.9, 162.1 (d, $J_{\text{C-F}}$ = 244.5 Hz), 155.5, 139.4, 136.2, 135.3 (d, $J_{\text{C-F}}$ = 3.1 Hz), 128.5, 128.2, 128.1, 128.0, 127.2, 115.5 (d, $J_{\text{C-F}}$ = 21 Hz), 67.1, 56.2, 52.0 ppm; **IR** (neat): 3333, 2953, 1722, 1507, 1225, 1043, 837, 699 cm^{-1} ; **HRMS** (ESI): $\text{C}_{19}\text{H}_{18}\text{FNO}_4$ $[\text{M}+\text{H}]^+$ calcd: 344.1293, found: 344.1282.

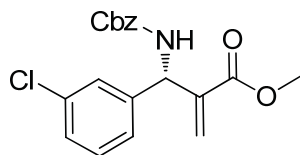


5c Colorless oil; 87% yield; 91% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, t_{major} = 14.9 min, t_{minor} = 19.3 min); $[\alpha]_{\text{D}}^{20}$ = +22 (c = 1.0, CHCl_3); **^1H NMR** (300 MHz, CDCl_3) δ 7.53 – 7.42 (d, J = 8.5 Hz, 2H), 7.42 – 7.27 (m, 5H), 7.16 (d, J = 8.4 Hz, 2H), 6.38 (s, 1H), 5.94 (s, 1H), 5.84 (d, J = 8.4 Hz, 1H), 5.69 (d, J = 9.2 Hz, 1H), 5.13 (s, 2H), 3.68 (s, 3H) ppm; **^{13}C NMR** (75 MHz, CDCl_3) δ 165.84, 155.57, 139.1, 138.7, 136.2, 131.7, 128.6, 128.3, 128.2 (overlapped), 129.1, 127.7, 121.6, 67.2, 56.4, 52.1 ppm; **IR** (neat): 3331, 2920, 2851, 1720, 1511, 1261, 1041, 812, 698 cm^{-1} ; **HRMS** (ESI): $\text{C}_{19}\text{H}_{18}\text{BrNO}_4$ $[\text{M}+\text{H}]^+$ calcd: 404.0492, found: 404.0495.

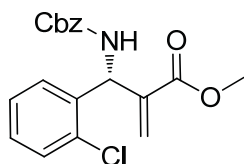


5d Colorless oil; 86% yield; 86% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, t_{major} = 15.3 min, t_{minor} = 20.1 min); $[\alpha]_{\text{D}}^{20}$ = -6.14 (c = 1.14, CHCl_3); **^1H NMR** (300 MHz, CDCl_3) δ 7.42 – 7.31 (m, 5H), 7.28 (d, J = 8.6 Hz, 2H), 7.21 (d, J = 8.6 Hz, 2H), 6.38 (s, 1H), 5.92 (s, 1H), 5.84 (d, J =

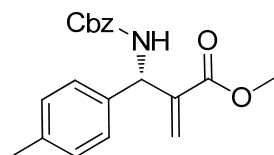
9.2 Hz, 1H), 5.71 (d, $J = 9.1$ Hz, 1H), 5.13 (s, 2H), 3.67 (s, 3H) ppm; ^{13}C NMR (75 MHz, CDCl_3) δ 165.8, 155.5, 139.2, 138.2, 136.2, 133.4, 128.8, 128.6, 128.3, 128.2 (overlapped), 127.8, 127.7, 67.1, 56.3, 52.1 ppm; IR (neat): 3333, 2952, 1721, 1494, 1233, 1043, 819, 698 cm^{-1} ; HRMS (ESI): $\text{C}_{19}\text{H}_{18}\text{ClNO}_4$ $[\text{M}+\text{H}]^+$ calcd: 360.0997, found: 360.0990.



5e Colorless oil; 80% yield; 92% *ee* determined by HPLC on a Chiracel OD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $t_{\text{major}} = 8.0$ min, $t_{\text{minor}} = 9.1$ min); $[\alpha]_{\text{D}}^{20} = -14.6$ ($c = 0.96$, CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ 7.38-7.22 (m, 5H), 7.21 – 7.00 (m, 4H), 6.32 (s, 1H), 5.86 (s, 1H), 5.81 (d, $J = 9.0$ Hz, 1H), 5.64 (d, $J = 9.3$ Hz, 1H), 5.06 (s, 2H), 3.60 (s, 3H) ppm; ^{13}C NMR (75 MHz, CDCl_3) δ 165.8, 155.6, 141.7, 138.9, 136.2, 134.6, 129.9, 128.6, 128.3, 128.2 (overlapped), 128.0, 127.8, 126.5, 124.5, 67.2, 56.4, 52.1 ppm; IR (neat): 3331, 2952, 1719, 1506, 1230, 1042, 697 cm^{-1} ; HRMS (ESI): $\text{C}_{19}\text{H}_{18}\text{ClNO}_{44}$ $[\text{M}+\text{Na}]^+$ calcd: 382.0817, found: 382.0830.

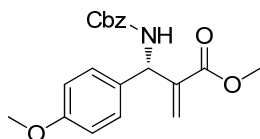


5f Colorless oil; 84% yield; 91% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $t_{\text{major}} = 11.7$ min, $t_{\text{minor}} = 17.1$ min); $[\alpha]_{\text{D}}^{20} = +12.5$ ($c = 1.20$, CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ 7.42 – 7.29 (m, 6H), 7.29 – 7.14 (m, 3H), 6.40 (s, 1H), 6.15 (d, $J = 8.6$ Hz, 1H), 5.92 (s, 1H), 5.69 (d, $J = 8.3$ Hz, 1H), 5.11 (s, 2H), 3.67 (s, 3H) ppm; ^{13}C NMR (75 MHz, CDCl_3) δ 166.0, 155.2, 138.6, 136.9, 136.3, 133.6, 130.1, 129.1, 128.5, 128.2 (multi-shifts overlapped), 127.7, 127.0, 67.1, 53.5, 52.1 ppm; IR (neat): 3332, 2952, 1724, 1522, 1237, 1040, 816, 757, 700 cm^{-1} ; HRMS (ESI): $\text{C}_{19}\text{H}_{18}\text{ClNO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 382.0817, found: 382.0828.

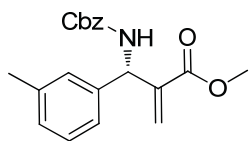


5g Colorless oil; 79% yield; 88% *ee* determined by HPLC on a Chiralpak AD-H column, (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $t_{\text{major}} = 14.4$ min, $t_{\text{minor}} = 19.0$ min); $[\alpha]_{\text{D}}^{20} = +13.8$ ($c = 1.45$, CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ 7.45 – 7.27 (m, 5H), 7.24 – 7.04 (q, $J = 8.2$ Hz, 4H), 6.36 (s, 1H), 5.91 (s, 1H), 5.80 – 5.56 (m, 2H), 5.12 (s,

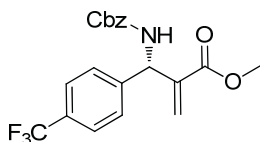
2H), 3.66 (s, 3H), 2.31 (s, 3H) ppm; ^{13}C NMR (75 MHz, CDCl_3) δ 166.0, 155.5, 139.7, 137.3, 136.5, 136.3, 129.3, 128.5, 128.2(overlapped), 126.7, 126.3, 67.0, 56.4, 51.9, 21.0 ppm; IR (neat): 3336, 2951, 1721, 1508, 1230, 1042, 815, 699 cm^{-1} ; HRMS (ESI): $\text{C}_{20}\text{H}_{21}\text{NO}_4$ $[\text{M}+\text{H}]^+$ calcd: 340.1543, found: 340.1537.



5h Colorless oil; 76% yield; 83% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, t_{major} = 22.7 min, t_{minor} = 28.5 min); $[\alpha]_{\text{D}}^{20}$ = +15.1 (c = 1.26, CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ 7.46 – 7.27 (m, 5H), 7.19 (d, J = 8.6 Hz, 2H), 6.84 (d, J = 8.7 Hz, 2H), 6.35 (s, 1H), 5.90 (s, 1H), 5.83 – 5.52 (m, 2H), 5.12 (s, 2H), 3.77 (s, 3H), 3.66 (s, 3H) ppm. ^{13}C NMR (75 MHz, CDCl_3) δ 166.1, 159.0, 155.5, 139.9, 136.3, 131.6, 128.5, 128.2, 127.7, 126.5, 114.0, 67.0, 56.2, 55.2, 52.0 ppm; IR (neat): 3340, 2953, 1722, 1511, 1248, 1037, 826, 699 cm^{-1} ; HRMS (ESI): $\text{C}_{20}\text{H}_{21}\text{NO}_5$ $[\text{M}+\text{Na}]^+$ calcd: 378.1312, found: 378.1310.

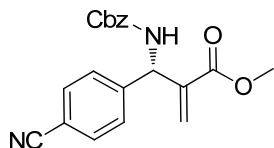


5i Colorless oil; 87% yield; 89% *ee* determined by HPLC on a Chiralpak OJ-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, t_{major} = 12.8 min, t_{minor} = 16.6 min); $[\alpha]_{\text{D}}^{20}$ = +11.9 (c = 1.18, CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ 7.46 – 7.27 (m, 5H), 7.20 (dd, J = 14.3, 6.6 Hz, 1H), 7.14 – 6.98 (m, 3H), 6.36 (s, 1H), 5.91 (s, 1H), 5.79 (d, J = 8.6 Hz, 1H), 5.71 (d, J = 8.9 Hz, 1H), 5.12 (s, 2H), 3.65 (s, 3H), 2.31 (s, 3H) ppm; ^{13}C NMR (75 MHz, CDCl_3) δ 166.0, 155.5, 139.6, 139.3, 138.2, 136.3, 128.5, 128.4 (overlapped), 128.3, 128.1, 127.1, 126.8, 123.4, 66.9, 56.6, 51.9, 21.4 ppm; IR (neat): 3335, 2952, 1724, 1502, 1237, 1043, 700 cm^{-1} ; HRMS (ESI): $\text{C}_{20}\text{H}_{21}\text{NO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 362.1363, found: 362.1355.

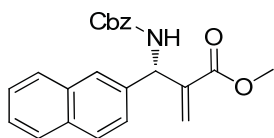


5j Colorless oil; 81% yield; 92% *ee* determined by HPLC on a Chiralcel OD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, t_{major} = 10.3 min, t_{mino} = 13.7 min); $[\alpha]_{\text{D}}^{20}$ = -24.7 (c = 1.30, CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ 7.58 (d, J = 8.2 Hz, 2H), 7.49 – 7.27 (m, 7H), 6.42 (s, 1H), 6.20 – 5.86 (m, 2H), 5.80 (d, J = 9.2 Hz, 1H), 5.15 (s, 2H), 3.68 (s, 3H) ppm; ^{13}C NMR (75 MHz, CDCl_3) δ 165.8, 155.7, 143.7, 138.9, 136.1, 130.0 (q, $J_{\text{C-F}}$ = 32.3 Hz), 128.6,

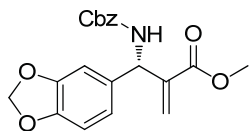
128.3, 128.2, 126.7, 124.0 (q, $J_{C-F} = 270.0$ Hz), 125.6 (q, $J_{C-F} = 4.1$ Hz), 67.2, 56.7, 52.3 ppm; **IR** (neat): 3331, 2954, 1729, 1503, 1327, 1067, 843, 737, 699, 616 cm^{-1} ; **HRMS** (ESI): $\text{C}_{20}\text{H}_{18}\text{F}_3\text{NO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 416.1080, found: 416.1072.



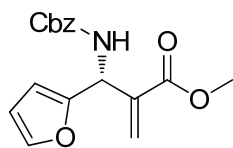
5k Colorless oil; 88% yield; 93% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $t_{\text{major}} = 26.4$ min, $t_{\text{minor}} = 35.7$ min); $[\alpha]_{\text{D}}^{20} = -37.0$ ($c = 1.0$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.61 (d, $J = 8.3$ Hz, 2H), 7.53 – 7.27 (m, 7H), 6.42 (s, 1H), 6.01 – 5.95 (m, 2H), 5.77 (d, $J = 9.4$ Hz, 1H), 5.14 (s, 2H), 3.68 (s, 3H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 165.6, 155.7, 145.1, 138.5, 136.0, 132.4, 128.8, 128.6, 128.3, 128.3, 127.0, 118.6, 111.5, 67.3, 56.8, 52.2 ppm; **IR** (neat): 3341, 2920, 2229, 1721, 1506, 1261, 1043, 818, 699 cm^{-1} ; **HRMS** (ESI): $\text{C}_{20}\text{H}_{18}\text{N}_2\text{O}_4$ $[\text{M}+\text{H}]^+$ calcd: 351.1339, found: 351.1334.



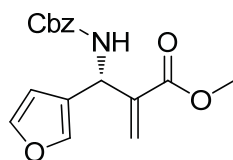
5l Colorless oil; 80% yield; 87% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $t_{\text{major}} = 14.6$ min, $t_{\text{minor}} = 18.2$ min); $[\alpha]_{\text{D}}^{20} = +11.8$ ($c = 1.36$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.89 – 7.76 (m, 3H), 7.73 (s, 1H), 7.53 – 7.45 (m, 2H), 7.45 – 7.27 (m, 6H), 6.44 (s, 1H), 6.00 (s, 1H), 5.97 – 5.80 (m, 2H), 5.16 (s, 2H), 3.66 (s, 3H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 166.0, 155.6, 139.6, 136.9, 136.3, 133.2, 132.8, 128.6, 128.5, 128.2, 128.0, 127.6, 127.3, 126.3, 126.1, 125.1, 124.7, 67.1, 56.8, 52.0 ppm; **IR** (neat): 3333, 2953, 1721, 1504, 1235, 1043, 818, 747, 699, 478 cm^{-1} ; **HRMS** (ESI): $\text{C}_{23}\text{H}_{21}\text{NO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 398.1363, found: 398.1355.



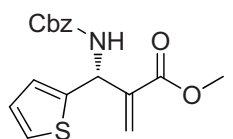
5m Colorless oil; 78% yield; 96% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $t_{\text{major}} = 22.0$ min, $t_{\text{minor}} = 24.1$ min); $[\alpha]_{\text{D}}^{20} = +10.8$ ($c = 1.20$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.41 – 7.29 (m, 5H), 6.77 (s, 1H), 6.76 – 6.70 (m, 2H), 6.36 (s, 1H), 5.93 (s, 2H), 5.90 (s, 1H), 5.73 (d, $J = 8.7$ Hz, 1H), 5.65 (d, $J = 8.8$ Hz, 1H), 5.12 (s, 2H), 3.68 (s, 3H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 166.0, 155.4, 147.9, 147.0, 139.6, 136.2, 133.4, 128.5, 128.2, 126.8, 119.7, 108.3, 107.1, 101.1, 67.0, 56.4, 52.0 ppm; **IR** (neat): 3358, 2955, 1716, 1491, 1227, 1039, 816, 699, 531 cm^{-1} ; **HRMS** (ESI): $\text{C}_{20}\text{H}_{19}\text{NO}_6$ $[\text{M}+\text{Na}]^+$ calcd: 392.1115, found: 392.1115.



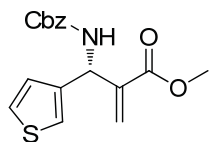
5n Colorless oil; 72% yield; 84% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $t_{\text{major}} = 9.7$ min, $t_{\text{minor}} = 10.6$ min); $[\alpha]_{\text{D}}^{20} = +3.6$ ($c = 1.38$, CHCl_3); $^1\text{H NMR}$ (300 MHz, CDCl_3) δ 7.41 – 7.27 (m, 6H), 6.40 (s, 1H), 6.30 (dd, $J = 3.2, 1.9$ Hz, 1H), 6.18 (d, $J = 3.2$ Hz, 1H), 5.92 (s, 1H), 5.82 (s, 2H), 5.13 (s, 2H), 3.73 (s, 3H) ppm; $^{13}\text{C NMR}$ (75 MHz, CDCl_3) δ 165.8, 155.4, 152.2, 142.2, 137.7, 136.2, 128.6 (overlapped), 128.5, 128.2, 127.7, 110.5, 110.3, 106.8, 67.1, 52.1, 51.3 ppm; **IR** (neat): 3340, 2953, 1723, 1505, 1234, 1043, 820, 742, 699, 599 cm^{-1} ; **HRMS** (ESI): $\text{C}_{17}\text{H}_{17}\text{NO}_5$ $[\text{M}+\text{Na}]^+$ calcd: 338.0999, found: 338.1002.



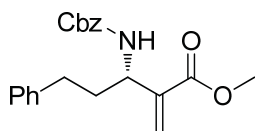
5o Colorless oil; 71% yield; 81% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $t_{\text{major}} = 11.1$ min, $t_{\text{minor}} = 12.5$ min); $[\alpha]_{\text{D}}^{20} = +4.7$ ($c = 0.85$, CHCl_3); $^1\text{H NMR}$ (300 MHz, CDCl_3) δ 7.34 – 7.50 (m, 6H), 7.27 (s, 1H), 6.30 (s, 1H), 6.29 (s, 1H), 5.88 (s, 1H), 5.82 (d, $J = 8.6$ Hz, 1H), 5.65 (d, $J = 9.1$ Hz, 1H), 5.12 (s, 2H), 3.71 (s, 3H) ppm; $^{13}\text{C NMR}$ (75 MHz, CDCl_3) δ 166.0, 155.4, 143.4, 139.5, 139.2, 136.2, 128.5, 128.1, 126.7, 125.2, 109.3, 66.9, 52.0, 49.8 ppm. **IR** (neat): 3340, 2953, 1724, 1504, 1235, 1028, 734 cm^{-1} ; **HRMS** (ESI): $\text{C}_{17}\text{H}_{17}\text{NO}_5$ $[\text{M}+\text{H}]^+$ calcd: 316.1179, found: 316.1185.



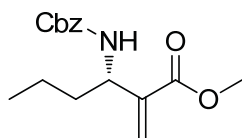
5p Colorless oil; 80% yield; 94% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $t_{\text{major}} = 11.4$ min, $t_{\text{minor}} = 14.2$ min); $[\alpha]_{\text{D}}^{20} = +1.8$ ($c = 1.14$, CHCl_3); $^1\text{H NMR}$ (300 MHz, CDCl_3) δ 7.42 – 7.25 (m, 5H), 7.19 (d, $J = 4.2$ Hz, 1H), 6.93 (dd, $J = 5.0, 3.6$ Hz, 1H), 6.88 (d, $J = 3.2$ Hz, 1H), 6.36 (s, 1H), 6.14 – 5.84 (m, 3H), 5.14 (s, 2H), 3.72 (s, 3H) ppm; $^{13}\text{C NMR}$ (75 MHz, CDCl_3) δ 165.8, 155.3, 143.8, 139.1, 136.1, 128.5, 128.2, 128.1, 127.3, 127.0, 125.0, 124.6, 67.1, 53.2, 52.1 ppm; **IR** (neat): 3336, 2952, 1721, 1503, 1223, 1040, 755 cm^{-1} **HRMS** (ESI): $\text{C}_{17}\text{H}_{17}\text{NO}_4\text{S}$ $[\text{M}+\text{NH}_4]^+$ calcd: 349.1217, found: 349.1212.



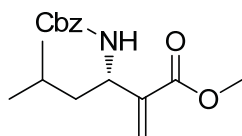
5q Colorless oil; 85% yield; 86% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $t_{\text{major}} = 12.7$ min, $t_{\text{minor}} = 17.5$ min); $[\alpha]_{\text{D}}^{20} = +6.3$ ($c = 1.05$, CHCl₃); **¹H NMR** (300 MHz, CDCl₃) δ 7.43 – 7.29 (m, 5H), 7.25 (dd, $J = 3.3, 0.9$ Hz, 1H), 7.07 (d, $J = 3.0$ Hz, 1H), 6.97 (dd, $J = 5.1, 0.9$ Hz, 1H), 6.34 (s, 1H), 5.95 – 5.85 (m, 2H), 5.78 (d, $J = 9.0$ Hz, 1H), 5.13 (s, 2H), 3.69 (s, 3H) ppm; **¹³C NMR** (75 MHz, CDCl₃) δ 166.0, 155.4, 141.0, 139.5, 136.2, 128.5, 128.2, 128.1(overlapped), 126.9, 126.3, 125.5, 121.4, 67.0, 53.3, 52.0 ppm; **IR** (neat): 3344, 2953, 1721, 1503, 1225, 1043, 736 cm⁻¹; **HRMS** (ESI): C₁₇H₁₇NO₄S [M+H]⁺ calcd: 332.0951, found: 332.0947.



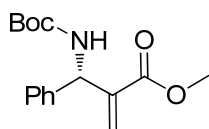
5r Colorless oil; 65% yield; 63% *ee* determined by HPLC on a Chiralcel OJ-H column (hexane/2-propanol = 80/20, flow rate = 1.0 mL/min, $t_{\text{major}} = 19.7$ min, $t_{\text{minor}} = 23.0$ min); $[\alpha]_{\text{D}}^{20} = -2$ ($c = 1.0$, CHCl₃); **¹H NMR** (300 MHz, CDCl₃) δ 7.32 – 7.24 (m, 4H), 7.24 – 7.13 (m, 3H), 7.13 – 7.01 (m, 3H), 6.14 (s, 1H), 5.67 (s, 1H), 5.50 (d, $J = 9.5$ Hz, 1H), 5.08 – 4.92 (m, 2H), 4.43 (q, $J = 7.5$ Hz, 1H), 3.66 (s, 3H), 2.65 – 2.44 (m, 2H), 2.00 – 1.82 (m, 2H) ppm; **¹³C NMR** (75 MHz, CDCl₃) δ 166.2, 155.6, 141.0, 139.5, 136.3, 128.5, 128.3, 128.3, 128.1, 127.1, 125.9, 66.7, 54.1, 51.9, 36.0, 32.6 ppm; **IR** (neat): 3336, 3029, 2951, 1719, 1522, 1451, 1240, 1045, 699 cm⁻¹; **HRMS** (ESI): C₂₁H₂₃NO₄ [M+Na]⁺ calcd: 376.1519, found: 376.1526.



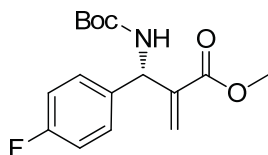
5s Colorless oil; 69% yield; 70% *ee* determined by HPLC on a Chiralpak OD-H column (hexane/2-propanol = 95/5, flow rate = 0.75 mL/min, $t_{\text{major}} = 11.8$ min, $t_{\text{minor}} = 12.6$ min); $[\alpha]_{\text{D}}^{20} = +2.1$ ($c = 0.96$, CHCl₃); **¹H NMR** (300 MHz, CDCl₃) δ 7.45 – 7.28 (m, 5H), 6.20 (s, 1H), 5.74 (s, 1H), 5.50 (d, $J = 9.2$ Hz, 1H), 5.19 – 4.98 (m, 2H), 4.46 (q, $J = 7.5$ Hz, 1H), 3.75 (s, 3H), 1.64 (q, $J = 7.5$ Hz, 2H), 1.44 – 1.19 (m, 2H), 0.91 (t, $J = 7.3$ Hz, 3H) ppm; **¹³C NMR** (75 MHz, CDCl₃) δ 166.3, 155.6, 139.8, 136.4, 128.4, 128.0, 128.04 (overlapped), 126.6, 66.6, 54.0, 51.8, 36.5, 19.5 13.6 ppm; **IR** (neat): 3339, 2958, 1729, 1506, 1250, 740, 689 cm⁻¹; **HRMS** (ESI): C₁₆H₂₁NO₄ [M+Na]⁺ calcd: 314.1363, found: 314.1354.



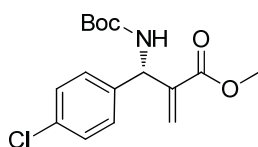
5t Colorless oil; 57% yield; 57% *ee* determined by HPLC on a Chiralpak AS column (hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, $t_{\text{minor}} = 5.3$ min, $t_{\text{major}} = 9.3$ min); $[\alpha]_{\text{D}}^{20} = +2.1$ ($c = 0.96$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.44 – 7.25 (m, 5H), 6.19 (s, 1H), 5.76 (s, 1H), 5.44 (d, $J = 9.3$ Hz, 1H), 5.20 – 4.96 (m, 2H), 4.54 (q, $J = 8.1$ Hz, 1H), 3.75 (s, 3H), 1.69 – 1.38 (m, 3H), 0.93 (d, $J = 6.3$ Hz, 3H), 0.91 (d, $J = 6.3$ Hz, 3H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 166.3, 155.6, 140.2, 136.5, 128.4, 128.1, 126.4, 66.6, 52.5, 51.8, 43.6, 25.0, 22.5, 22.2 ppm; **IR** (neat): 3339, 2956, 1720, 1524, 1229, 1046, 698 cm^{-1} ; **MS** (ESI): $\text{C}_{17}\text{H}_{23}\text{NO}_4$ $[\text{M}+\text{H}]^+$ calcd: 306.2, found: 306.3.



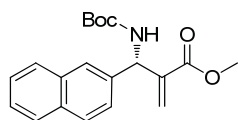
5aa White solid, mp: 74 - 77 °C; 86% yield; 86% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 95/5, flow rate = 0.75 mL/min, $t_{\text{major}} = 17.0$ min, $t_{\text{minor}} = 20.8$ min). $[\alpha]_{\text{D}}^{20} = +17.5$ ($c = 0.8$, CHCl_3) for 78% *ee*. **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.36 – 7.22 (m, 5H), 6.38 (s, 1H), 5.92 (s, 1H), 5.69 (d, $J = 8.7$ Hz, 1H), 5.50 (d, $J = 8.0$ Hz, 1H), 3.67 (s, 3H), 1.45 (s, 9H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 166.1, 154.9, 140.0, 139.8, 128.5, 127.5, 126.5, 79.8, 56.1, 51.9, 28.3 ppm. **HRMS** (ESI): $\text{C}_{16}\text{H}_{21}\text{NO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 314.1363, found: 314.1354.



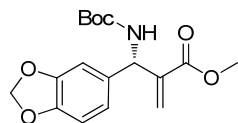
5ab Colorless oil; 89% yield; 86% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 95/5, flow rate = 0.75 mL/min, $t_{\text{major}} = 13.7$ min, $t_{\text{minor}} = 16.3$ min); $[\alpha]_{\text{D}}^{20} = +3.5$ ($c = 0.85$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.31 – 7.18 (m, 2H), 7.07 – 6.92 (t, $J = 7.5$ Hz, 2H), 6.37 (s, 1H), 5.92 (s, 1H), 5.66 (d, $J = 8.4$ Hz, 1H), 5.52 (brs, 1H), 3.68 (s, 3H), 1.45 (s, 9H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 166.0, 162.1 (d, $J_{\text{C-F}} = 244.5$ Hz), 154.9, 139.8, 135.7 (d, $J_{\text{C-F}} = 3.2$ Hz), 128.2 (d, $J_{\text{C-F}} = 8.2$ Hz), 126.8, 115.4 (d, $J_{\text{C-F}} = 21.0$ Hz), 80.0, 55.6, 51.9, 28.3 ppm; **IR** (neat): 3360, 2978, 1721, 1506, 1228, 1164, 838 cm^{-1} ; **HRMS** (ESI): $\text{C}_{16}\text{H}_{20}\text{FNO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 332.1269, found: 332.1260.



5ad Colorless oil; 84% yield; 89% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 95/5, flow rate = 1.0 mL/min, $t_{\text{major}} = 16.3$ min, $t_{\text{minor}} = 20.2$ min); $[\alpha]_{\text{D}}^{20} = +2.1$ ($c = 0.96$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.29 (d, $J = 8.7$ Hz, 2H), 7.22 (d, $J = 8.7$ Hz, 2H), 6.37 (s, 1H), 5.92 (s, 1H), 5.65 (d, $J = 8.5$ Hz, 1H), 5.55 (brs, 1H), 3.68 (s, 3H), 1.45 (s, 9H) ppm. **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 165.9, 154.9, 139.5, 138.5, 133.2, 128.7, 127.8, 127.1, 80.0, 55.7, 52.0, 28.3 ppm; **IR** (neat): 3363, 2977, 1717, 1493, 1166, 757 cm^{-1} ; **HRMS** (ESI): $\text{C}_{16}\text{H}_{20}\text{ClNO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 348.0973, found: 348.0983.

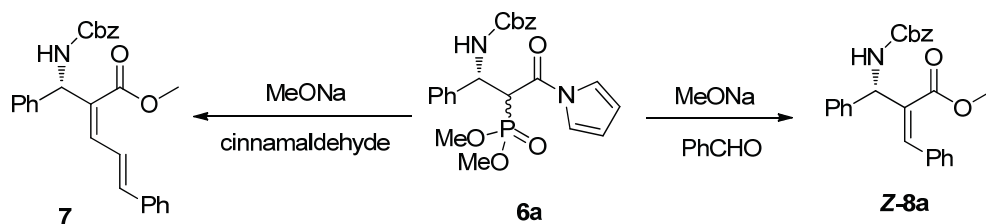


5al Colorless oil; 72% yield; 83% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 95/5, flow rate = 1.0 mL/min, $t_{\text{major}} = 18.1$ min, $t_{\text{minor}} = 23.3$ min); $[\alpha]_{\text{D}}^{20} = +5.7$ ($c = 1.05$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.97 – 7.74 (m, 3H), 7.72 (s, 1H), 7.55 – 7.30 (m, 3H), 6.43 (s, 1H), 5.98 (s, 1H), 5.85 (d, $J = 8.8$ Hz, 1H), 5.58 (d, $J = 6.7$ Hz, 1H), 3.67 (s, 3H), 1.47 (s, 9H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 166.1, 154.9, 139.9, 137.3, 133.2, 132.7, 128.4, 128.0, 127.6, 126.7, 126.2, 126.0, 125.2, 124.9, 79.9, 56.20, 51.9, 28.4 ppm; **IR** (neat): 3362, 2977, 1717, 1494, 1165, 815 cm^{-1} ; **HRMS** (ESI): $\text{C}_{20}\text{H}_{23}\text{NO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 364.1519, found: 364.1530.



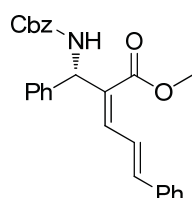
5am Colorless oil; 79% yield; 87% *ee* determined by HPLC on a Chiralpak AD-H column (hexane/2-propanol = 90/10, flow rate = 1.0 mL/min, $t_{\text{major}} = 12.4$ min, $t_{\text{minor}} = 17.5$ min); $[\alpha]_{\text{D}}^{20} = +11.1$ ($c = 1.08$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 6.78 (s, 1H), 6.76 – 6.65 (m, 2H), 6.35 (s, 1H), 5.93 (s, 2H), 5.89 (s, 1H), 5.59 (d, $J = 7.9$ Hz, 1H), 5.44 (brs, 1H), 3.69 (s, 3H), 1.45 (s, 9H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 166.1, 154.8, 147.8, 146.9, 140.0, 133.8, 126.3, 119.8, 108.2, 107.3, 101.1, 79.8, 55.8, 51.9, 28.3 ppm; **IR** (neat): 3381, 2978, 1719, 1491, 1243, 1166, 1041, 735 cm^{-1} ; **HRMS** (ESI): $\text{C}_{17}\text{H}_{21}\text{NO}_6$ $[\text{M}+\text{Na}]^+$ calcd: 358.1261, found: 358.1264.

Transformations of the Mannich products

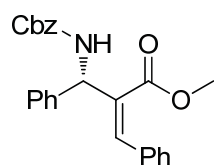


The intermediate product **6** was prepared according the above mentioned general procedure. Then phosphonate **6** (104.5 mg, 0.23 mmol) was dissolved in THF (2 mL), and a precooled solution of MeONa (2.2 equiv, 78 mg, 0.506 mmol) in

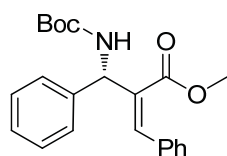
MeOH (2 mL) was added at -10 °C. After the reaction was stirred 30 min 0 °C, the corresponding aldehyde (1.5 equiv) was added. And the reaction was stirred at the same temperature for another 20 hours. The reaction process was monitored by TLC. Upon completion, the reaction was quenched with sat. aq. NaCl and extracted with EA and dried over Na₂SO₄. After concentration of the solvents, the residue was purified on a silica gel column to give the corresponding product.



7 Following the above procedure, the product (72.1 mg, 73% yield), and the corresponding value of *Z*: *E* was 4.5 : 1. White solid, mp: 102-104 °C; $[\alpha]_{\text{D}}^{20} = -12.8$ ($c = 1.09$, CHCl₃); **¹H NMR** (300 MHz, CDCl₃) δ 7.85 (dd, $J = 15.6, 11.1$ Hz, 1H), 7.49 (d, $J = 6.9$ Hz, 2H), 7.50 – 7.26 (m, 13H), 6.91 (d, $J = 11.4$, 1H), 6.85 (d, $J = 15.7$, 1H), 5.89 (d, $J = 9.0$ Hz, 1H), 5.77 (d, $J = 9.3$ Hz, 1H), 5.14 (s, 2H), 3.66 (s, 3H) ppm; **¹³C NMR** (75 MHz, CDCl₃) δ 166.5, 155.6, 142.3, 141.6, 140.2, 136.3, 128.9, 128.7, 128.5, 128.2, 128.15 (overlapped), 127.4, 127.3 (overlapped), 126.1, 124.9, 67.0, 58.5, 51.5 ppm; **IR** (neat): 3335, 3004, 2952, 1710, 1497, 1228, 1152, 1032, 752, 697 cm⁻¹; **HRMS** (ESI): C₂₇H₂₅NO₄ [M+Na]⁺ calcd: 450.1676, found: 450.1675.

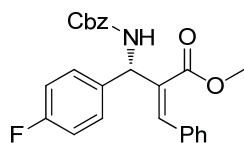


Z-8a Colorless oil; 81% yield, *Z*: *E* = 3.5 : 1; $[\alpha]_{\text{D}}^{20} = 2.8$ ($c = 1.44$, CHCl₃); **¹H NMR** (300 MHz, CDCl₃) δ 7.35 – 7.21 (m, 15H), 6.97 (s, 1H), 5.97 (d, $J = 9.5$ Hz, 1H), 5.80 (d, $J = 9.0$ Hz, 1H), 5.13 (s, 2H), 3.45 (s, 3H) ppm; **¹³C NMR** (75 MHz, CDCl₃) δ 168.3, 155.5, 139.0, 136.8, 136.2, 134.9, 132.8, 128.6, 128.4, 128.1, 127.7, 126.5, 67.0 58.8, 51.6 ppm; **IR** (neat): 3327, 3031, 2951, 1722, 1499, 1229, 1036, 750, 699 cm⁻¹; **MS** (ESI): C₂₅H₂₃NO₄ [M+NH₄]⁺ calcd: 419.2, found: 419.1.

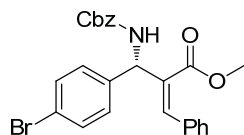


Z-8aa Colorless oil; 76% yield, *Z*: *E* = 6.6 : 1; $[\alpha]_{\text{D}}^{20} = -53.6$ ($c = 0.97$, CHCl₃); **¹H NMR** (300 MHz, CDCl₃) δ 7.45 – 7.25 (m, 10H), 6.95 (s, 1H), 5.74 (d, $J = 7.8$ Hz, 1H), 5.65 (brs, 1H), 3.50 (s, 3H), 1.46 (s, 9H) ppm; **¹³C NMR** (75 MHz, CDCl₃) δ

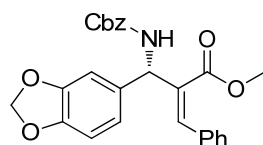
168.5, 154.9, 139.4, 136.2, 135.1, 133.4, 128.6, 128.4, 128.3, 128.1, 127.6, 126.6, 79.8, 58.2, 51.6, 28.3 ppm; **IR** (neat): 3432, 2976, 1714, 1492, 1166, 752, 699 cm^{-1} ; **HRMS** (ESI): $\text{C}_{22}\text{H}_{25}\text{NO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 390.1676, found: 390.1686.



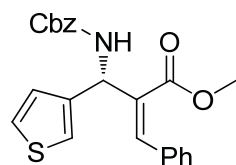
Z-8b Colorless oil; 75% yield, $Z : E = 3.8 : 1$; $[\alpha]_{\text{D}}^{20} = -57.8$ ($c = 0.97$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.48 – 7.29 (m, 12H), 7.09 – 6.92 (m, 3H), 5.97 (d, $J = 8.6$ Hz, 1H), 5.77 (d, $J = 9.0$ Hz, 1H), 5.14 (s, 2H), 3.48 (s, 3H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 168.3, 162.2 (d, $J_{\text{C-F}} = 244.5$ Hz), 155.5, 137.1, 136.2, 134.9 (d, $J_{\text{C-F}} = 3.0$ Hz), 134.8, 132.5, 128.6 (overlapped), 128.5, 128.2 (m), 115.5 (d, $J_{\text{C-F}} = 21.8$ Hz), 67.1, 58.4, 51.7 ppm; **IR** (neat): 3333, 2952, 1719, 1506, 1225, 1038, 752, 698 cm^{-1} ; **HRMS** (ESI): $\text{C}_{25}\text{H}_{22}\text{FNO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 442.1425, found: 442.1422.



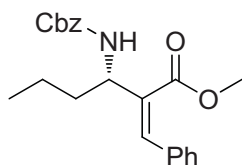
Z-8c Colorless oil; 90% yield, $Z : E = 2.9 : 1$; $[\alpha]_{\text{D}}^{20} = -52.0$ ($c = 0.98$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.43 (d, $J = 8.5$ Hz, 2H), 7.39 – 7.27 (m, 8H), 7.28 – 7.17 (m, 4H), 6.99 (s, 1H), 6.04 (d, $J = 8.9$ Hz, 1H), 5.74 (d, $J = 9.1$ Hz, 1H), 5.13 (s, 2H), 3.47 (s, 3H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 168.2, 155.5, 138.2, 137.6, 136.1, 134.7, 132.1, 131.7, 128.6, 128.5, 128.2 (overlapped), 128.1, , 121.6, 67.1, 58.5, 51.7 ppm; **IR** (neat): 3327, 2955, 1709, 1494, 1226, 1036, 697 cm^{-1} ; **HRMS** (ESI): $\text{C}_{25}\text{H}_{22}\text{BrNO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 502.0624, found: 502.0611.



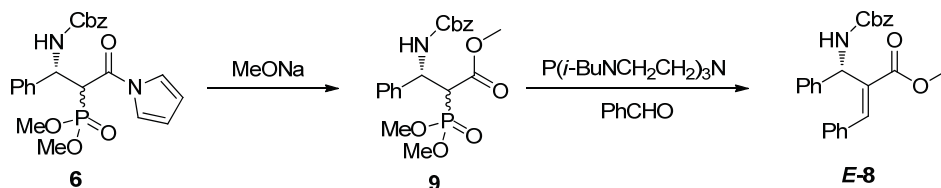
Z-8m Colorless oil; 72% yield, $Z : E = 3.2 : 1$; $[\alpha]_{\text{D}}^{20} = -23.4$ ($c = 0.93$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.55 – 7.13 (m, 10H), 6.96 (s, 1H), 6.68 – 7.13 (m, 3H), 5.94 (s, 2H), 5.87 (d, $J = 7.2$ Hz, 1H), 5.70 (d, $J = 7.9$ Hz, 1H), 5.14 (s, 2H), 3.51 (s, 3H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 168.4, 155.5, 147.9, 147.1, 136.6, 136.2, 134.9, 133.0, 132.8, 128.5¹, 128.5 (overlapped), 128.2, 119.90, 108.3, 107.2, 101.1, 67.1, 58.6, 51.7 ppm; **IR** (neat): 3333, 2951, 1719, 1495, 1235, 1037, 697 cm^{-1} ; **HRMS** (ESI): $\text{C}_{26}\text{H}_{23}\text{NO}_6$ $[\text{M}+\text{Na}]^+$ calcd: 468.1418, found: 468.1408.



Z-8q Colorless oil; 93% yield, $Z : E = 4.8 : 1$; $[\alpha]_D^{20} = -34.8$ ($c = 0.89$, CHCl_3); $^1\text{H NMR}$ (300 MHz, CDCl_3) δ 7.48 – 7.20 (m, 11H), 7.18 (s, 1H), 7.02 (d, $J = 4.7$ Hz, 2H), 5.94 (d, $J = 8.7$ Hz, 1H), 5.81 (d, $J = 9.0$ Hz, 1H), 5.15 (s, 2H), 3.52 (s, 3H) ppm; $^{13}\text{C NMR}$ (75 MHz, CDCl_3) δ 168.4, 155.5, 140.6, 136.9, 136.2, 134.9, 132.4, 128.5, 128.2, 126.44 (overlapped), 126.4, 121.7, 67.0, 55.7, 51.7 ppm; **IR** (neat): 3332, 2951, 1717, 1501, 1226, 1037, 697 cm^{-1} ; **HRMS** (ESI): $\text{C}_{23}\text{H}_{21}\text{NO}_4\text{S}$ $[\text{M}+\text{Na}]^+$ calcd: 430.1083, found: 430.1072.



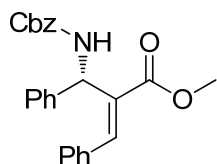
Z-8s Colorless oil; 91% yield, $Z : E = 2.0 : 1$; $[\alpha]_D^{20} = -13.7$ ($c = 1.02$, CHCl_3); $^1\text{H NMR}$ (300 MHz, CDCl_3) δ 7.41 – 7.15 (m, 10H), 6.88 (s, 1H), 5.50 (d, $J = 9.1$ Hz, 1H), 5.24 – 4.90 (m, 2H), 4.49 (q, $J = 7.8$ Hz, 1H), 3.60 (s, 3H), 1.65 (q, $J = 7.5$ Hz, 2H), 1.39 – 1.60 (m, 2H), 0.93 (t, $J = 7.3$ Hz, 3H) ppm; $^{13}\text{C NMR}$ (75 MHz, CDCl_3) δ 168.9, 155.6, 136.4, 135.5, 135.2, 133.4, 128.4, 128.2, 128.1, 128.0, 127.9, 66.6, 55.9, 51.5, 36.2, 19.3, 13.6 ppm; **IR** (neat): 3334, 2957, 1723, 1504, 1219, 750, 697 cm^{-1} ; **MS** (ESI): $\text{C}_{22}\text{H}_{25}\text{NO}_4$ $[\text{M}+\text{H}]^+$ calcd: 368.2, found: 368.0.



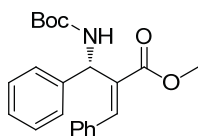
To the intermediate product **6a** (104.5 mg, 0.23 mmol) in THF (2 mL) was added a precooled solution of MeONa (1.1 equiv, 39 mg, 0.25 mmol) in MeOH (2 mL) at -10 °C. And the reaction was allowed to gradually warm to 0 °C. After 12 hours at this temperature, the reaction was then quenched with sat. aq. NaCl and extracted with EtOAc. The combined extract was dried over Na_2SO_4 and concentrated. The residue was purified on a silica gel column to give the methyl ester **9a** (96.8 mg, quantitative). The diastereomeric ratio was determined to be 51:49 by ^{31}P NMR spectroscopy analyses of the crude mixture. $^1\text{H NMR}$ [signals of both diastereoisomers] (300 MHz, CDCl_3) δ 7.50 – 7.05 (m, 10H), 6.73 (d, $J = 9.2$ Hz, 0.47H), 6.45 (brs, 0.42H), 5.57 – 5.25 (m, 1H), 5.23 – 4.92 (m, 2H), 3.84 – 3.34 (m, 10H). $^{13}\text{C NMR}$ [signals of both diastereoisomers] (75 MHz, CDCl_3) δ 168.30, 167.11 (d, $J = 4.3$ Hz), 155.4, 155.3, 139.84 (d, $J = 12.3$ Hz), 136.4 (d, $J = 5.0$ Hz), 128.6, 128.5, 128.4, 128.3, 128.1, 128.0, 127.9⁵, 127.9, 127.7, 126.6, 126.0, 66.8, 66.7, 53.7 (d, $J = 7.0$ Hz), 53.6 (d, $J = 6.0$ Hz), 53.4 (d, $J = 6.8$ Hz), 53.1 (d, $J = 6.3$ Hz), 52.7 (d, $J = 8.8$ Hz), 52.4 (d, $J = 4.5$ Hz), 51.1 (d, $J = 130.3$ Hz), 50.3 (d, $J = 130.3$ Hz) $^{31}\text{P NMR}$ (121 MHz, CDCl_3) δ 22.0 (s, 0.49P), 20.1 (s, 0.51P). **HRMS** (ESI): $\text{C}_{20}\text{H}_{24}\text{NO}_7\text{P}$ $[\text{M}+\text{NH}_4]^+$ calcd:

444.1183, found: 444.1193.

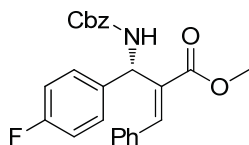
Then methyl ester **9a** was dissolved in THF and P[N(*i*-Bu)CH₂CH₂]₃N was added (1.5 equiv, 118 mg, 0.345 mmol) under an argon atmosphere at rt. Then benzaldehyde (1.5 equiv, 33 μ L, 0.34 mmol) was added, and the reaction was stirred for 24 hours at the same temperature. Then the mixture was purified by silica gel column to give the product.



E-8a Colorless oil; 64% yield, *E* : *Z* = 4.5 : 1; $[\alpha]_{\text{D}}^{20} = -39$ ($c = 1.05$, CHCl₃); **¹H NMR** (300 MHz, CDCl₃) δ 7.98 (s, 1H), 7.49 (d, $J = 6.9$ Hz, 2H), 7.38 – 7.21 (m, 13H), 6.40 (m, 2H), 5.21 – 5.09 (m, 2H), 3.71 (s, 3H) ppm; **¹³C NMR** (75 MHz, CDCl₃) δ 167.2, 155.9, 142.2, 140.3, 136.4, 134.1, 130.6, 129.3, 129.1, 128.8, 128.5, 128.4, 128.1, 128.1 (overlapped), 128.07, 125.6, 66.9, 52.0, 51.4 ppm; **IR** (neat): 3327, 3061, 2951, 1723, 1498, 1230, 699 cm⁻¹; **HRMS** (ESI): C₂₅H₂₃NO₄ [M+NH₄]⁺ calcd: 419.1965, found: 419.1967.

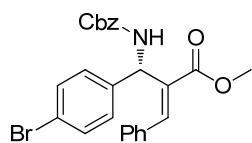


E-8aa Colorless oil; 72% yield, *E* : *Z* = 3.2 : 1; $[\alpha]_{\text{D}}^{20} = -67.1$ ($c = 0.97$, CHCl₃); **¹H NMR** [some signals show multiple resonances for the presence of two rotamers] (300 MHz, CDCl₃) δ 7.95 (s, 1H), 7.55 – 7.14 (m, 10H), 6.32 (d, $J = 10.2$ Hz, 0.8H), 6.23 – 6.09 (m, 1H), 5.75 (d, $J = 10.2$ Hz, 0.2H), 3.73 (s, 2.3H), 3.69 (s, 0.7H), 1.48 (s, 7.1H), 1.22 (s, 2.2H) ppm; **¹³C NMR** [some signals show multiple resonances for the presence of two rotamers] (75 MHz, CDCl₃) δ 167.4, 155.3, 141.8, 140.9, 134.1, 130.8, 129.3, 129.2 (overlapped), 128.8, 128.4, 126.9, 125.7/125.5, 79.5, 52.0, 50.7, 28.4/28.0 ppm; **IR** (neat): 3440, 2975, 1711, 1491, 1166, 698 cm⁻¹; **HRMS** (ESI): C₂₂H₂₅NO₄ [M+Na]⁺ calcd: 390.1676, found: 390.1679.

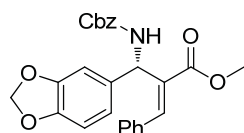


E-8b Colorless oil; 73% yield, *E* : *Z* = 5.7 : 1; $[\alpha]_{\text{D}}^{20} = -28.7$ ($c = 1.08$, CHCl₃); **¹H NMR** (300 MHz, CDCl₃) δ 7.96 (s, 1H), 7.51 – 7.29 (m, 9H), 7.26 – 7.15 (m, 3H), 6.96 (t, $J = 8.6$ Hz, 2H), 6.42 (d, $J = 9.6$ Hz, 1H), 6.34 (d, $J = 9.6$ Hz, 1H), 5.26 – 4.96 (m, 2H), 3.72 (s, 3H) ppm; **¹³C NMR** (75 MHz, CDCl₃) δ 167.2, 161.9 ($J_{\text{C-F}} = 243.8$ Hz), 155.8, 142.3, 136.3, 136.1 ($J_{\text{C-F}} = 3.0$ Hz), 133.9, 130.4, 129.4, 129.1, 129.0, 128.5, 128.2, 128.1, 127.34 (d, $J_{\text{C-F}} = 8.1$ Hz), 115.3 (d, $J_{\text{C-F}} = 28.1$ Hz), 67.0, 52.1,

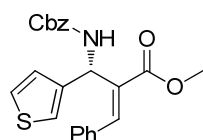
50.9 ppm; **IR** (neat): 3430, 2953, 1715, 1502, 1245, 1038, 761, 698 cm^{-1} ; **HRMS** (ESI): $\text{C}_{25}\text{H}_{22}\text{FNO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 442.1425, found: 442.1420.



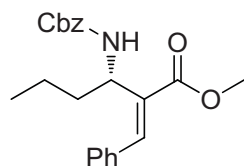
E-8c Colorless oil; 74% yield, $E : Z = 10.4 : 1$; $[\alpha]_{\text{D}}^{20} = -61.1$ ($c = 0.95$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.97 (s, 1H), 7.53 – 7.26 (m, 12H), 7.12 (d, $J = 9.4$ Hz, 2H), 6.39 (d, $J = 10.1$ Hz, 1H), 6.31 (d, $J = 10.0$ Hz, 1H), 5.22 – 4.97 (m, 2H), 3.73 (s, 3H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 167.1, 155.9, 142.6, 139.5, 136.3, 133.9, 131.5, 130.1, 129.5, 129.1, 128.9, 128.5, 128.2, 128.1, 127.5, 121.1, 67.0, 52.2, 51.0 ppm; **IR** (neat): 3326, 2951, 1717, 1492, 1245, 1037, 697 cm^{-1} ; **HRMS** (ESI): $\text{C}_{25}\text{H}_{22}\text{BrNO}_4$ $[\text{M}+\text{Na}]^+$ calcd: 502.0624, found: 502.0614.



E-8m Colorless oil; 83% yield, $E : Z = 6.0 : 1$; $[\alpha]_{\text{D}}^{20} = -40.8$ ($c = 0.98$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.94 (s, 1H), 7.53 – 7.42 (m, 2H), 7.42 – 7.19 (m, 8H), 6.82 – 6.64 (m, 3H), 6.39 (d, $J = 10.0$ Hz, 1H), 6.27 (d, $J = 10.0$ Hz, 1H), 5.91 (s, 2H), 5.23 – 4.94 (m, 2H), 3.74 (s, 3H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 167.3, 155.8, 147.9, 146.6, 142.1, 136.3, 134.3, 133.9, 130.5, 129.3, 129.1, 128.8, 128.5, 128.12, 128.07, 118.8, 108.1, 106.5, 101.0, 66.9, 52.1, 51.2 ppm; **IR** (neat): 3426, 2955, 1715, 1494, 1244, 1037, 758, 698 cm^{-1} ; **HRMS** (ESI): $\text{C}_{26}\text{H}_{23}\text{NO}_6$ $[\text{M}+\text{Na}]^+$ calcd: 468.1418, found: 468.1422.

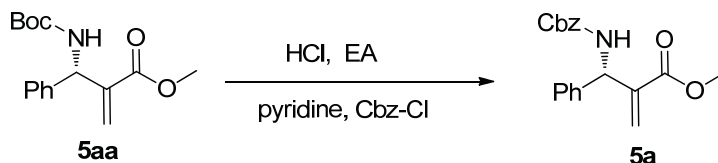


E-8q Colorless oil; 74% yield, $E : Z = 8.8 : 1$; $[\alpha]_{\text{D}}^{20} = -44.1$ ($c = 1.02$, CHCl_3); **$^1\text{H NMR}$** (300 MHz, CDCl_3) δ 7.92 (s, 1H), 7.50 – 7.27 (m, 9H), 7.24 (dd, $J = 5.2, 2.8$ Hz, 2H), 7.11 – 6.99 (m, 1H), 6.93 (d, $J = 6.0$ Hz, 1H), 6.46 (d, $J = 10.0$ Hz, 1H), 6.32 (d, $J = 9.9$ Hz, 1H), 5.23 – 4.96 (m, 2H), 3.75 (s, 3H) ppm; **$^{13}\text{C NMR}$** (75 MHz, CDCl_3) δ 167.2, 155.7, 142.0, 141.8, 136.4, 133.9, 130.5, 129.3, 129.1, 128.8, 128.5, 128.1, 128.0, 126.2, 126.1, 120.7, 66.8, 52.1, 48.8 ppm; **IR** (neat): 3425, 2951, 1717, 1498, 1221, 1037, 696 cm^{-1} ; **HRMS** (ESI): $\text{C}_{23}\text{H}_{21}\text{NO}_4\text{S}$ $[\text{M}+\text{Na}]^+$ calcd: 430.1083, found: 430.1071.



E-8s Colorless oil; 77% yield, *E* : *Z* = 4.7 : 1; $[\alpha]_{\text{D}}^{20} = +59.8$ ($c = 1.02$, CHCl_3); $^1\text{H NMR}$ (300 MHz, CDCl_3) δ 7.75 (s, 1H), 7.56 – 7.04 (m, 10H), 5.91 (d, $J = 10.0$ Hz, 1H), 5.20 – 4.99 (m, 3H), 3.80 (s, 3H), 1.88 – 1.70 (m, 1H), 1.68 – 1.48 (m, 1H), 1.35 – 1.08 (m, 2H), 0.78 (t, $J = 7.3$ Hz, 3H) ppm; $^{13}\text{C NMR}$ (75 MHz, CDCl_3) δ 167.4, 155.7, 141.0, 136.5, 134.4, 131.8, 129.0, 128.7, 128.6, 128.4, 127.9, 127.8, 66.5, 51.9, 48.6, 37.2, 19.4, 13.6 ppm; **IR** (neat): 3435, 2957, 1719, 1501, 1250, 1082, 776, 699 cm^{-1} ; **MS** (ESI): $\text{C}_{22}\text{H}_{25}\text{NO}_4$ $[\text{M}+\text{H}]^+$ calcd: 368.2, found: 368.1.

Determination of the absolute configuration of compound **5aa** and **5a**.



The absolute configuration of compound **5aa** was determined to be *S* by comparison of the optical rotation $[[\alpha]_{\text{D}}^{20} = +17.5$ ($c = 0.8$, CHCl_3 , 78% ee)] with a literature value $[[\alpha]_{\text{D}}^{20} = +21$ ($c = 0.68$, CHCl_3) for the *S*-isomer (91% ee)].³ In order to determine the absolute configuration of compound **5a**, **5aa** was converted to **5a**. The resulting product **5a** in this transformation has a concordant value $[[\alpha]_{\text{D}}^{20} = +10.6$ ($c = 1.03$, CHCl_3), 78% ee] to our previous result $[[\alpha]_{\text{D}}^{20} = +16.0$ ($c = 1.25$, CHCl_3), 91% ee]. So the absolute configuration of compound **5a** in our experiments was determined to be *S*.

To a solution of **5aa** (97 mg, 0.33 mmol) in EA (1.5 mL) was added concentrated HCl (0.28 mL) at 0 °C. And the mixture was stirred at rt for 2 h. Then the reaction was diluted with water and the aqueous phase was washed with ether. The aqueous phase was then neutralized with $\text{NH}_3 \cdot \text{H}_2\text{O}$ and extracted with EA. The organic phase was dried over NaSO_4 and evaporated under reduced pressure. The residue was then dissolved in CH_2Cl_2 , and pyridine (27 μL , 0.33 mmol) and Cbz-Cl (97 μL , 0.33 mmol) were added at 0 °C. And the reaction was stirred overnight at rt. Then solvent was then evaporated under reduced pressure. The residue was purified by column chromatography and **5a** was obtained in 63% yield (61.5 mg).

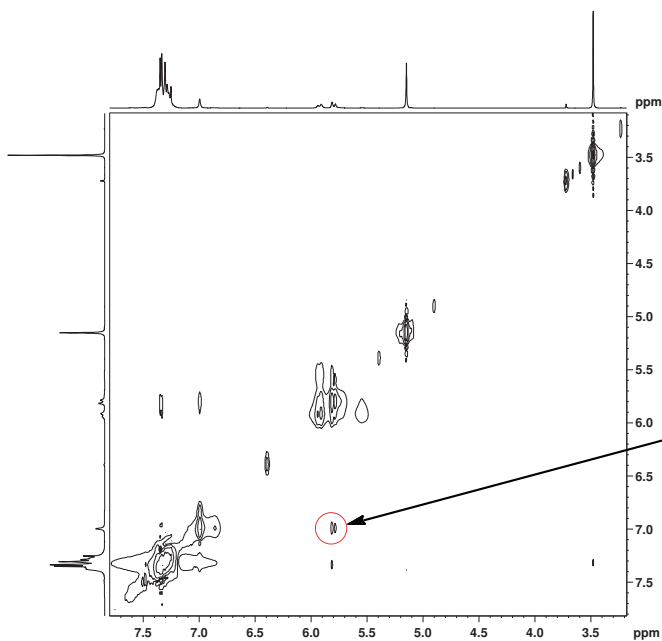
Determination of the relative configuration of *E*-8, *Z*-8 and 7 by ¹H-¹H NOESY

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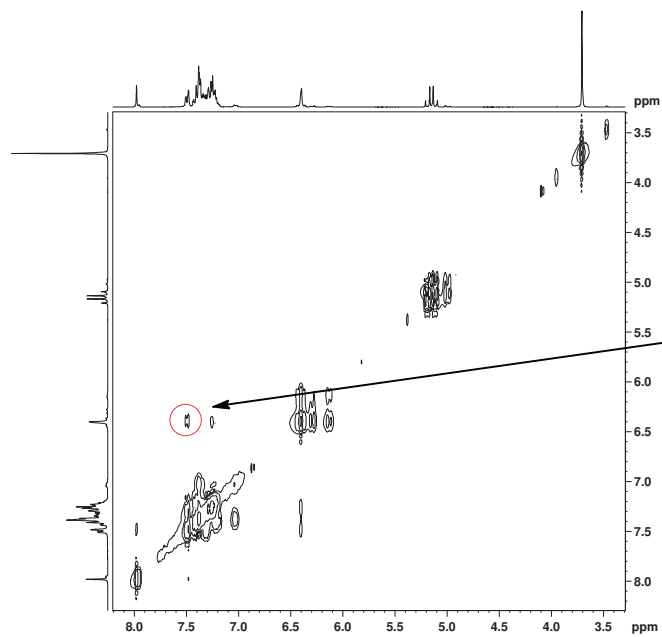


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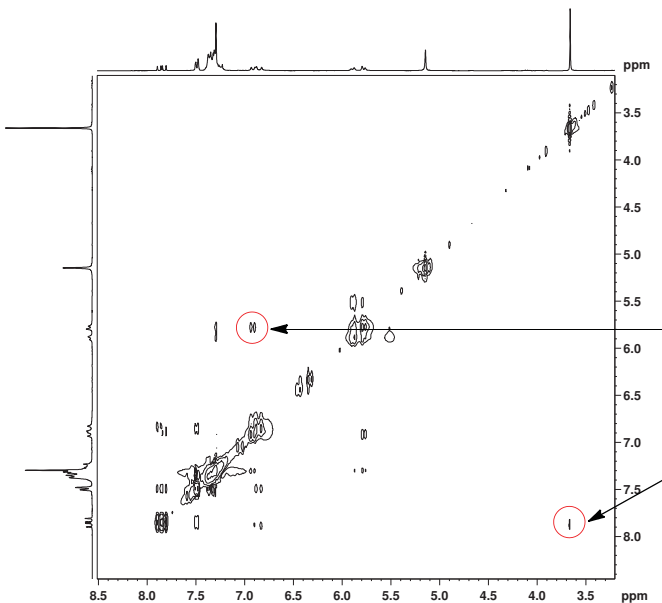


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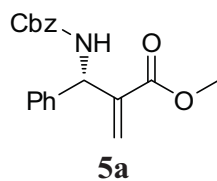
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P1        11.80 ussec
PC1       0.00 dB
PL1W     11.55467796 W
SFO1     300.1312612 MHz
WDW       Q5
SSB       0
GB        0.00 Hz
PC        1.00
SI        1024
MC2      States-TF01
SF        300.1300035 MHz
WDW       Q5
SSB       0
LB        0.00 Hz
GB        0
    
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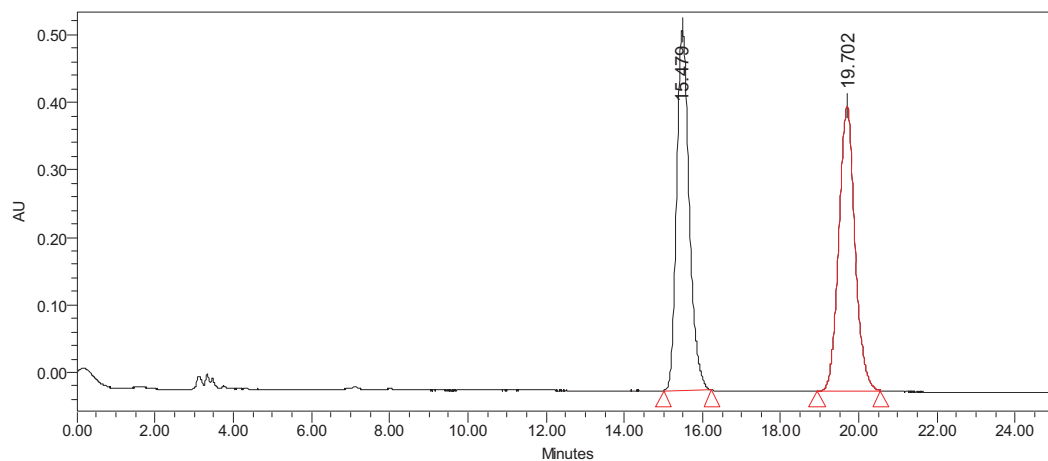
References

- [1] T. Okino, Y. Hoashi, Y. Takemoto, *J. Am. Chem. Soc.*, 2003, **125**, 12672–12673.
- [2] N. Yamagiwa, H. Qin, S. Matsunaga, M. Shibasaki, *J. Am. Chem. Soc.*, 2005, **127**, 13419–13427.
- [3] C. Cassani, L. Bernardi, F. Fini, A. Ricci, *Angew. Chem. Int. Ed.*, 2009, **48**, 5694–5697.

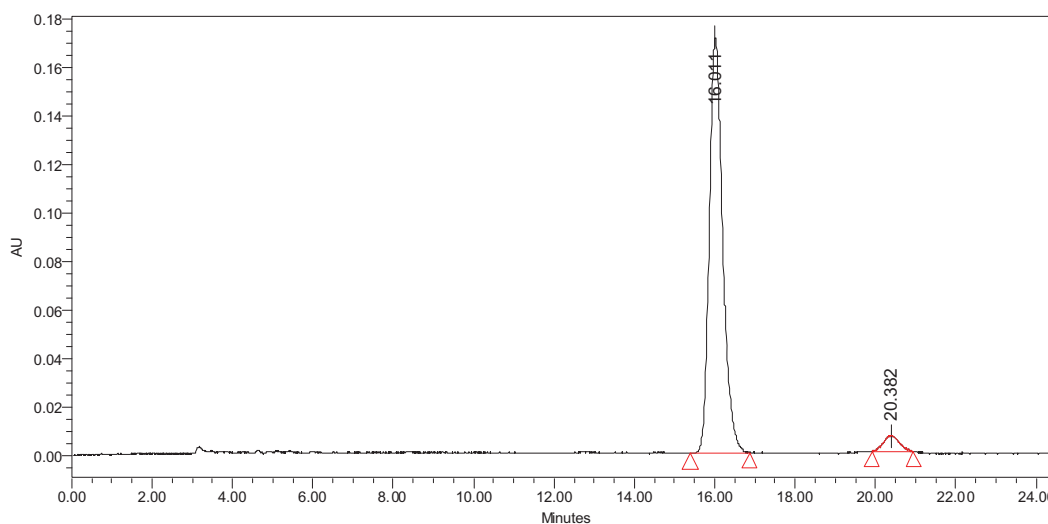
Copies of HPLC results



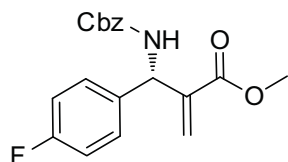
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 85/15, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 15.479 | 11942706 | 49.79 | 533201 |
| 2 | 19.702 | 12044967 | 50.21 | 421524 |

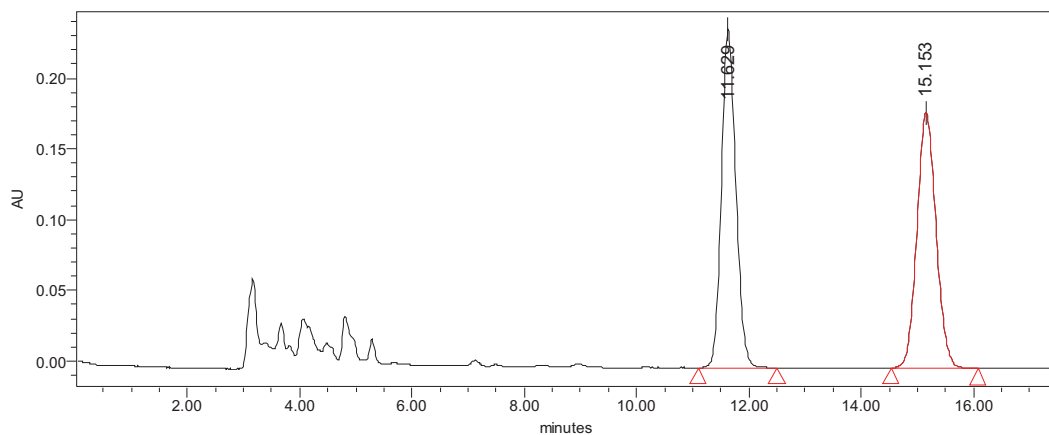


| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 16.011 | 3969118 | 95.87 | 171573 |
| 2 | 20.382 | 171006 | 4.13 | 6391 |

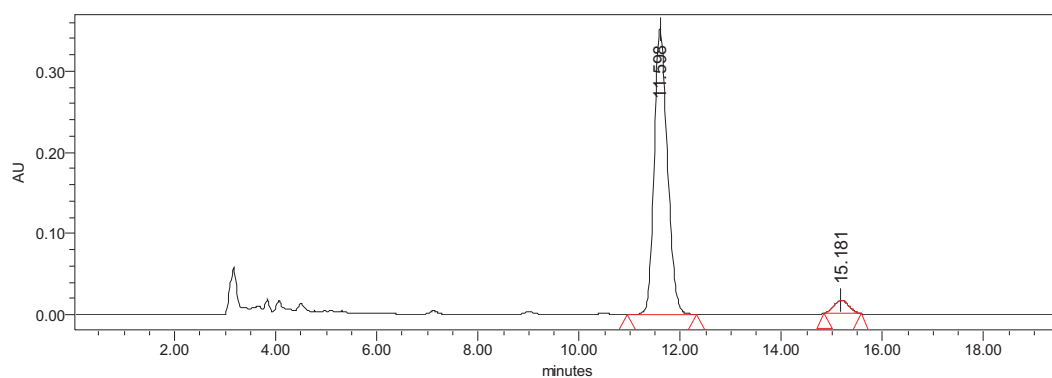


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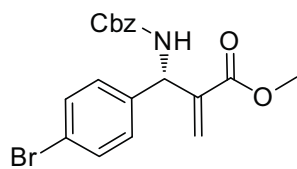
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 11.629 | 4285773 | 50.04 | 239695 |
| 2 | 15.153 | 4278429 | 49.96 | 180704 |

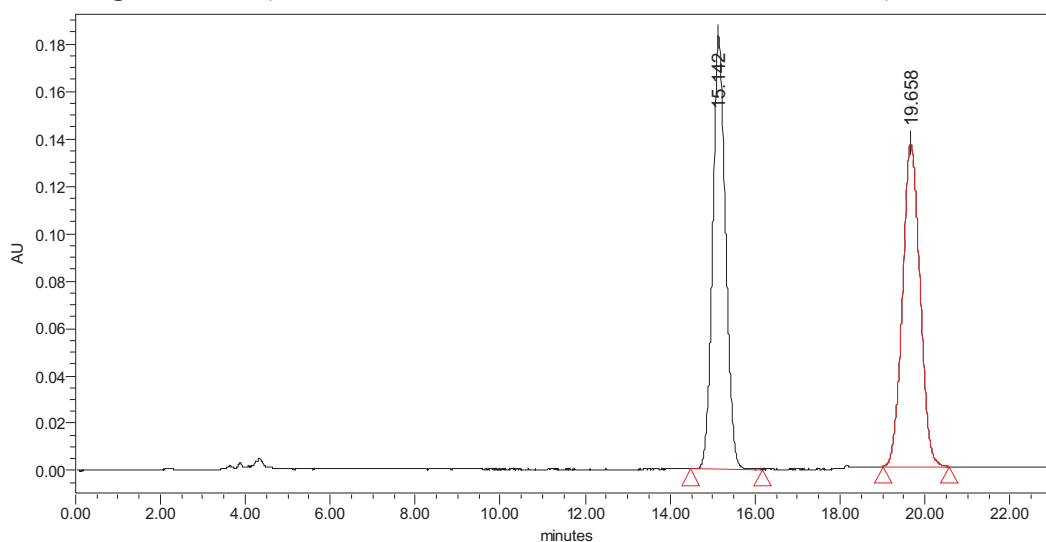


| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 11.598 | 6383457 | 94.99 | 351612 |
| 2 | 15.181 | 336737 | 5.01 | 15982 |

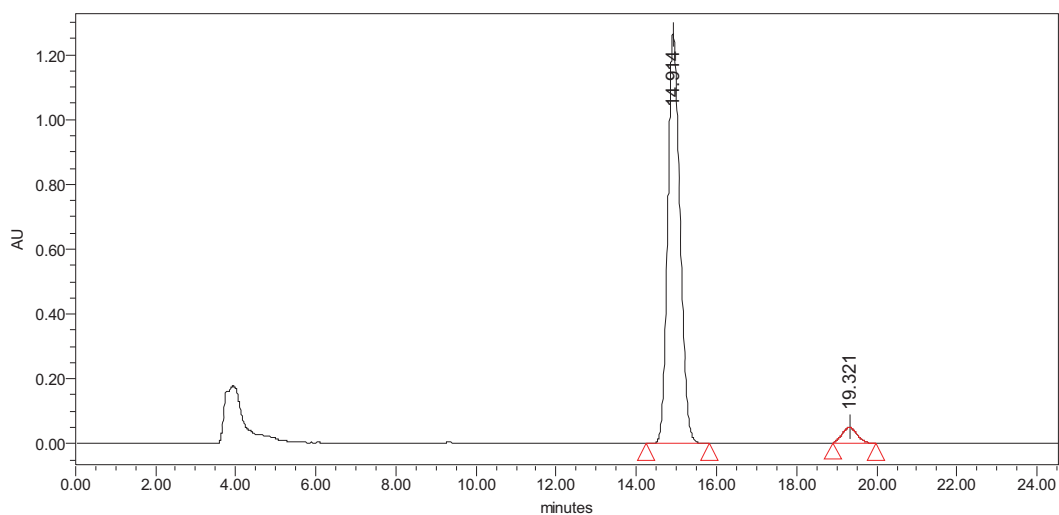


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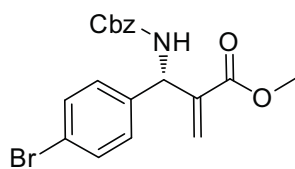
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 15.142 | 3895406 | 49.85 | 182734 |
| 2 | 19.658 | 3918491 | 50.15 | 136472 |

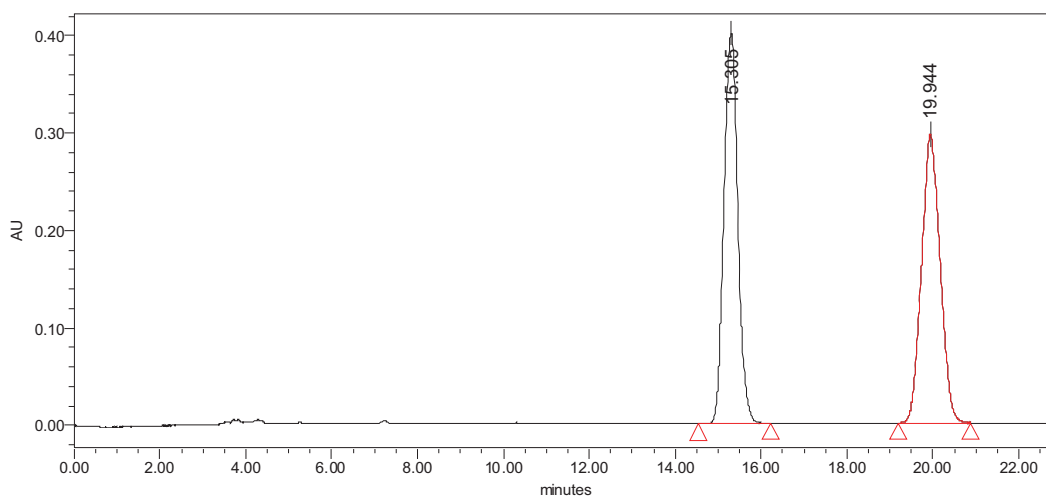


| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|---------|
| 1 | 14.914 | 26848287 | 95.50 | 1262336 |
| 2 | 19.321 | 1264908 | 4.50 | 48251 |

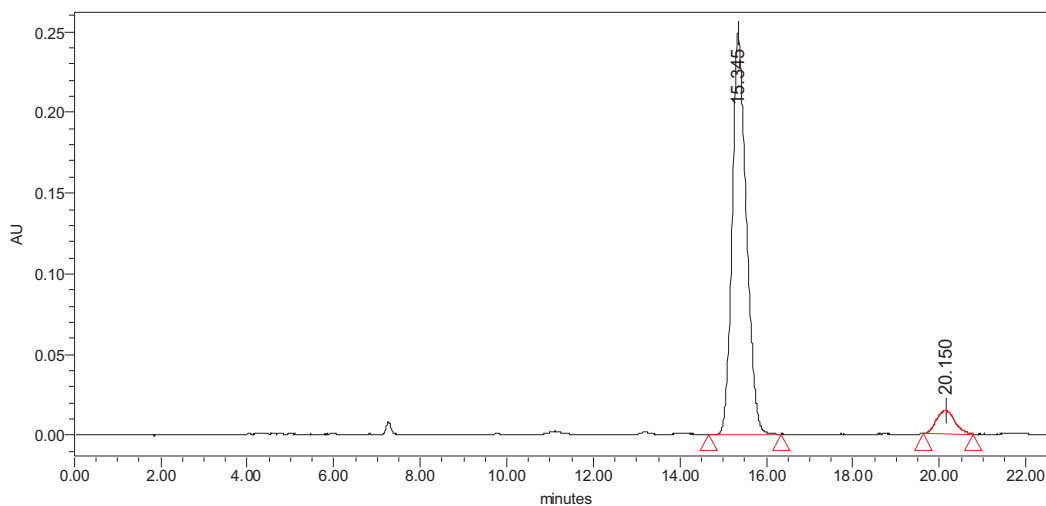


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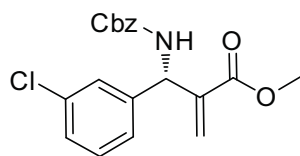
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 15.305 | 9041766 | 50.46 | 400427 |
| 2 | 19.944 | 8875362 | 49.54 | 296249 |

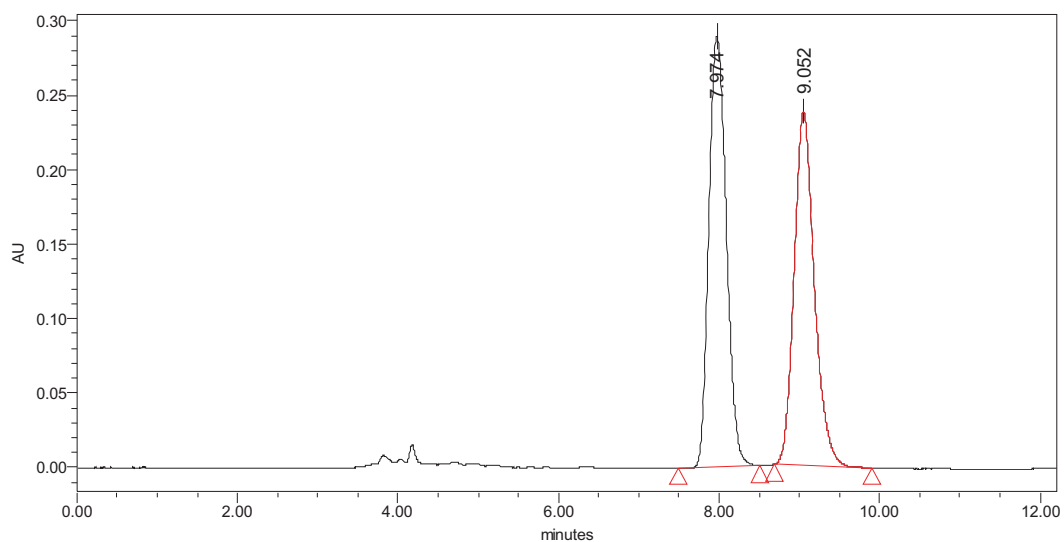


| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 15.345 | 5672922 | 93.04 | 248897 |
| 2 | 20.150 | 424479 | 6.96 | 14435 |

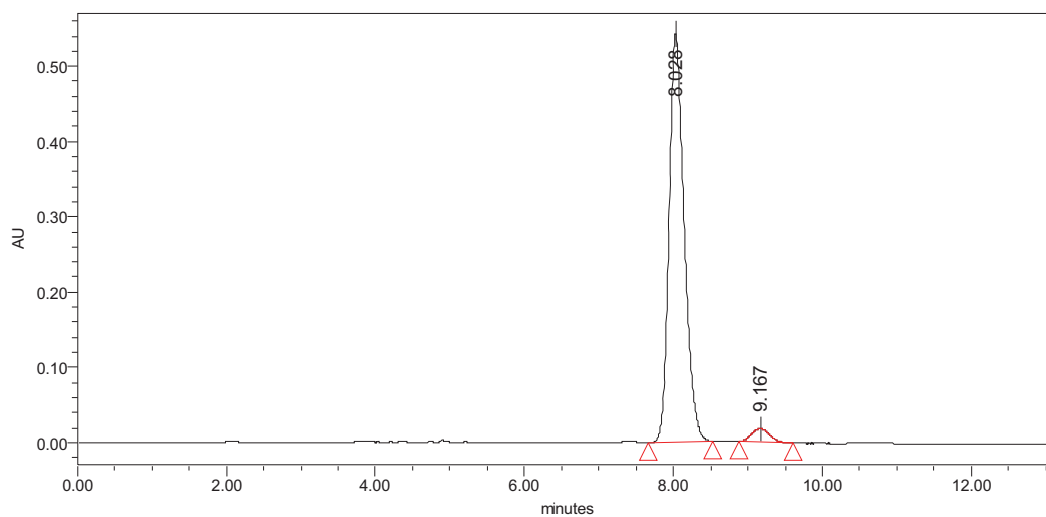


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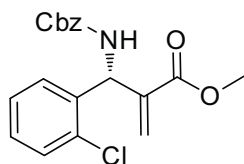
HPLC using an OD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 7.974 | 4395841 | 51.30 | 289348 |
| 2 | 9.052 | 4173660 | 48.70 | 237741 |

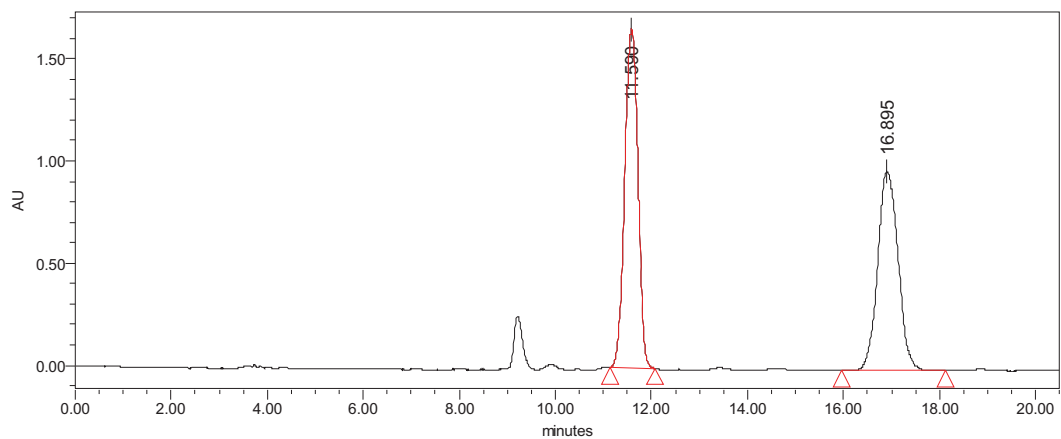


| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 8.028 | 7688916 | 96.04 | 542736 |
| 2 | 9.167 | 316819 | 3.96 | 18285 |

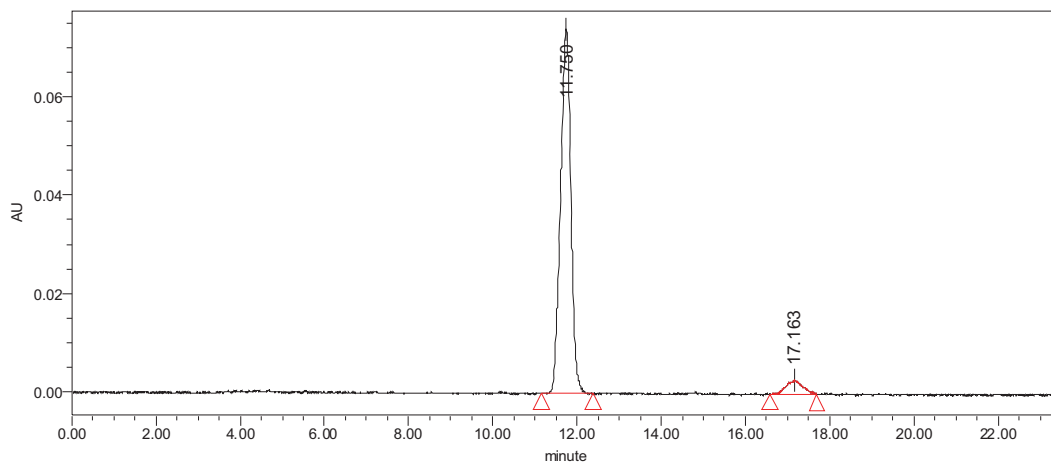


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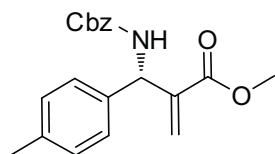
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|---------|
| 1 | 11.590 | 31800541 | 52.52 | 1656888 |
| 2 | 16.895 | 28748866 | 47.48 | 975259 |

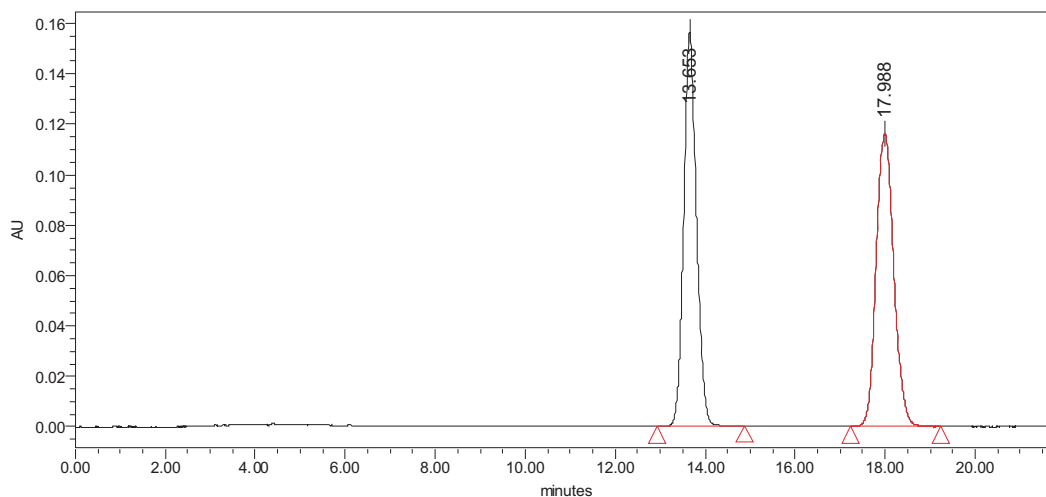


| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 11.750 | 7249977 | 95.22 | 11.749 |
| 2 | 17.163 | 364191 | 4.78 | 17.173 |

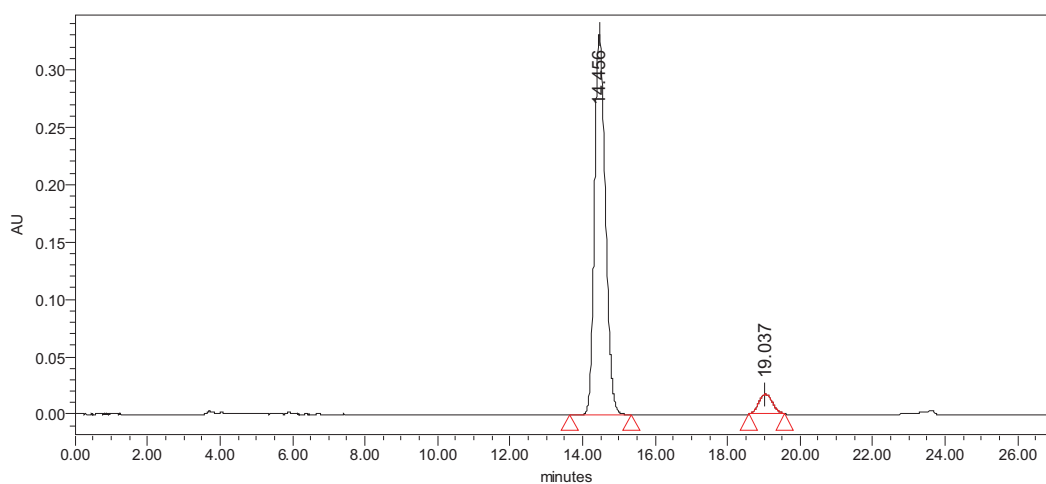


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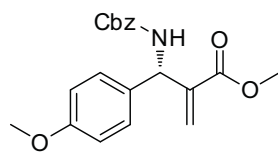
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 13.653 | 3090878 | 49.38 | 156513 |
| 2 | 17.988 | 3168804 | 50.62 | 116256 |

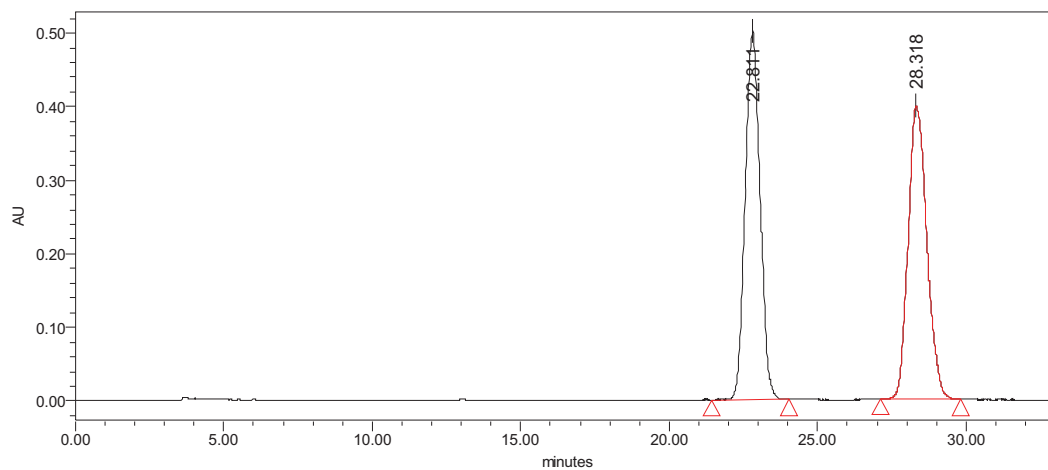


| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 14.456 | 7019815 | 93.89 | 331516 |
| 2 | 19.037 | 456470 | 6.11 | 17225 |

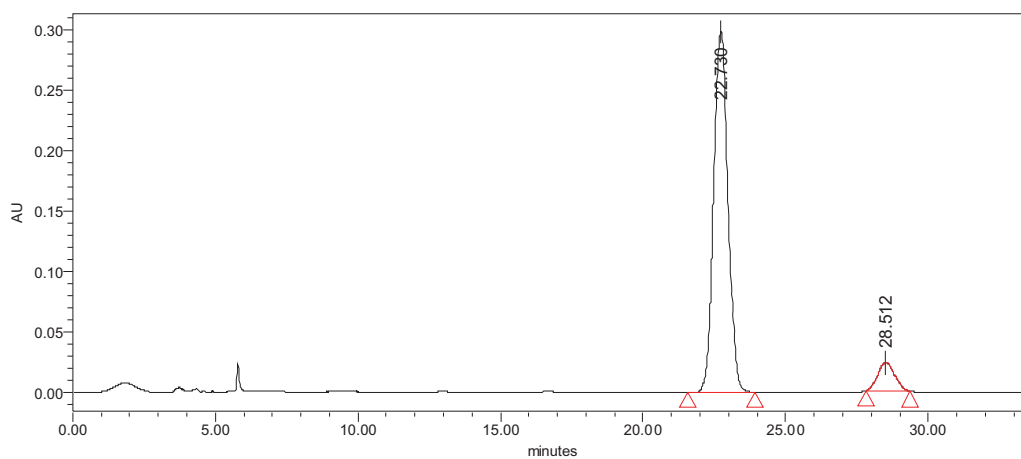


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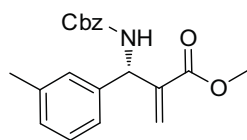
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 22.811 | 17547557 | 50.10 | 501873 |
| 2 | 28.318 | 17474980 | 49.90 | 398233 |

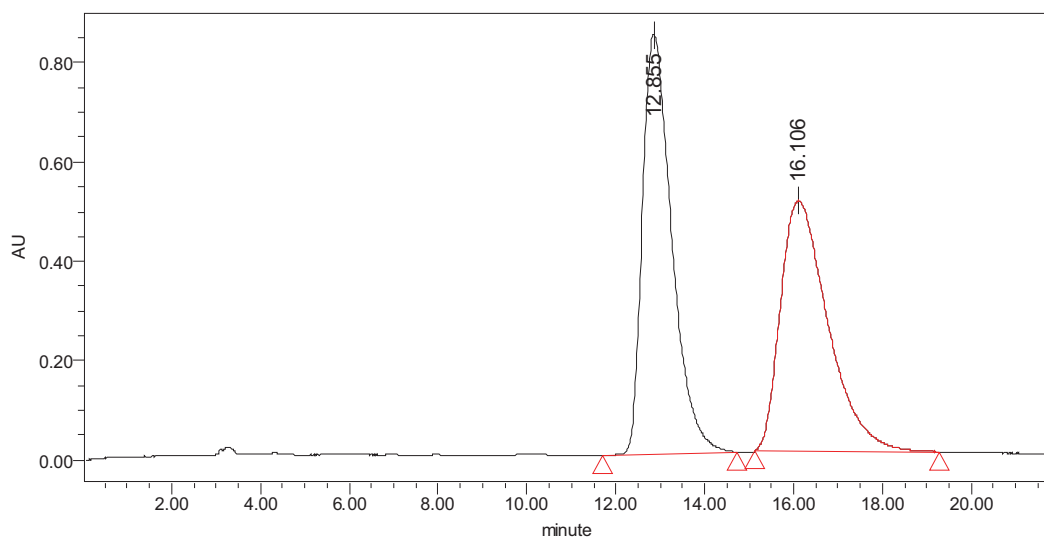


| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 22.730 | 10417780 | 91.41 | 297937 |
| 2 | 28.512 | 979352 | 8.59 | 23263 |

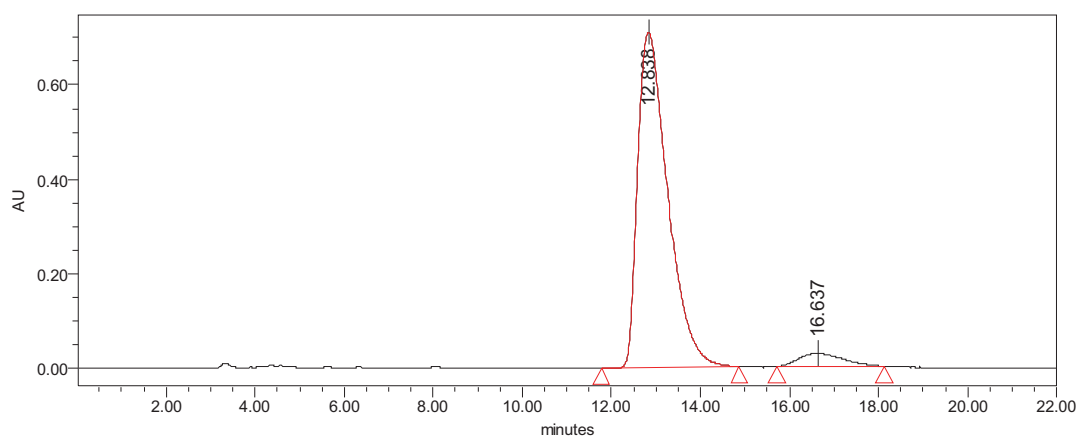


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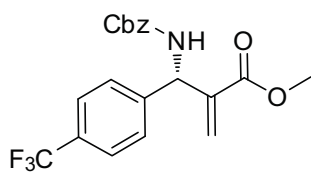
HPLC using an OJ-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 12.855 | 38697782 | 50.78 | 845119 |
| 2 | 16.106 | 37508851 | 49.22 | 504886 |

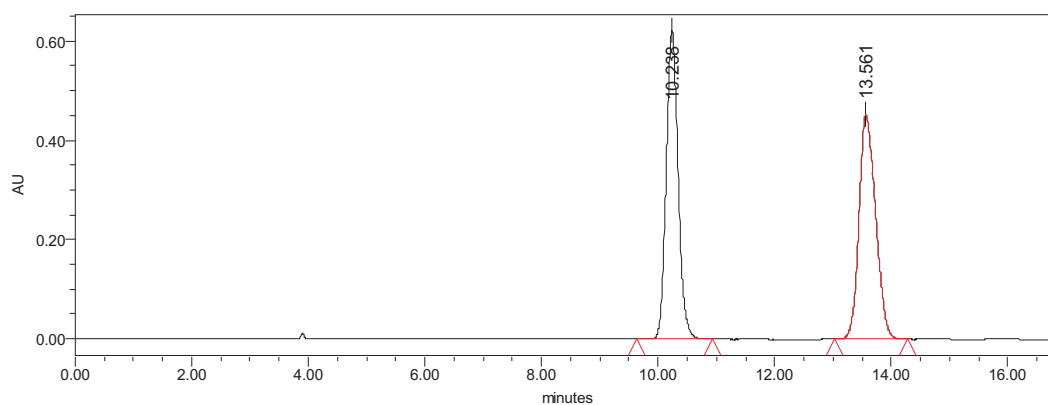


| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 12.838 | 33249911 | 94.57 | 710374 |
| 2 | 16.637 | 1908606 | 5.43 | 27714 |

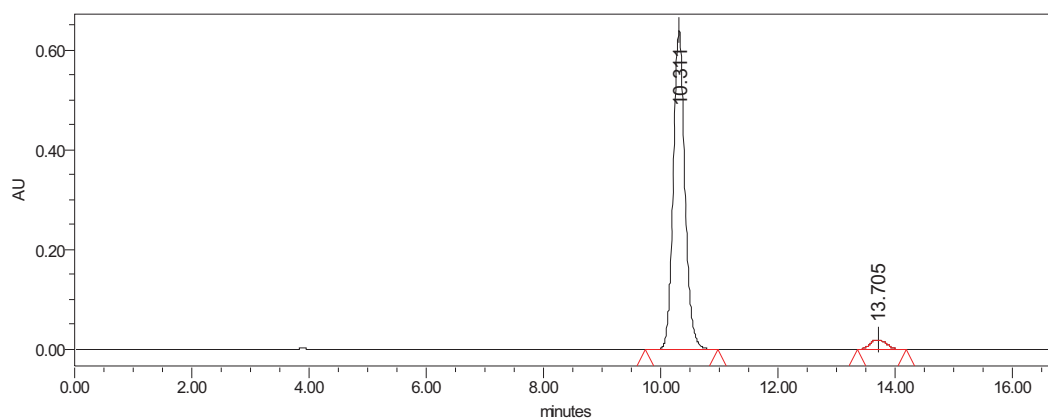


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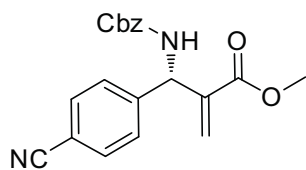
HPLC using an OD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 10.238 | 8827014 | 49.63 | 622102 |
| 2 | 13.561 | 8958924 | 50.37 | 453134 |

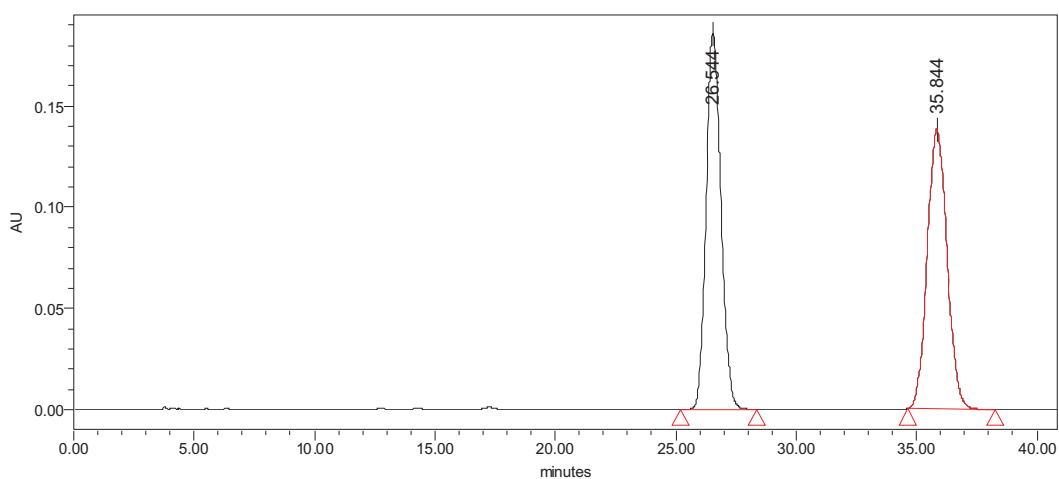


| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 10.311 | 8846796 | 95.89 | 639964 |
| 2 | 13.705 | 379119 | 4.11 | 19040 |

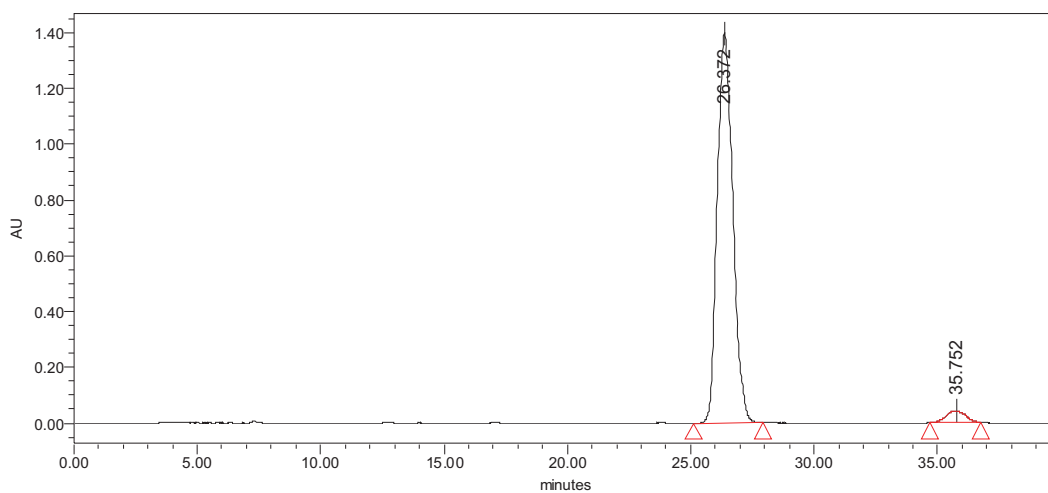


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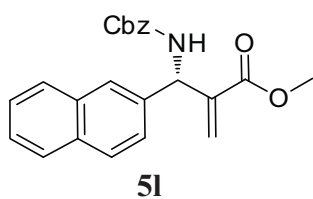
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



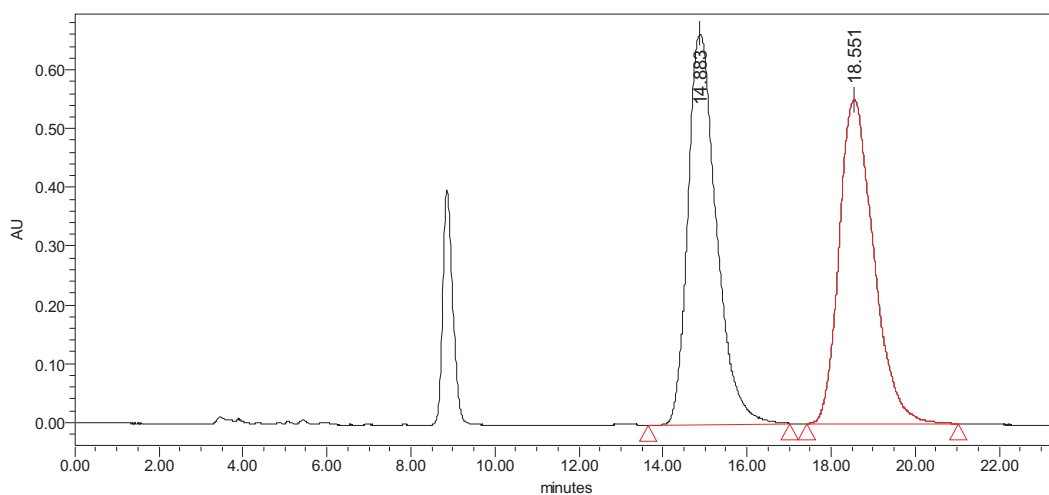
| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 26.544 | 7929876 | 50.15 | 185475 |
| 2 | 35.844 | 7883654 | 49.85 | 137948 |



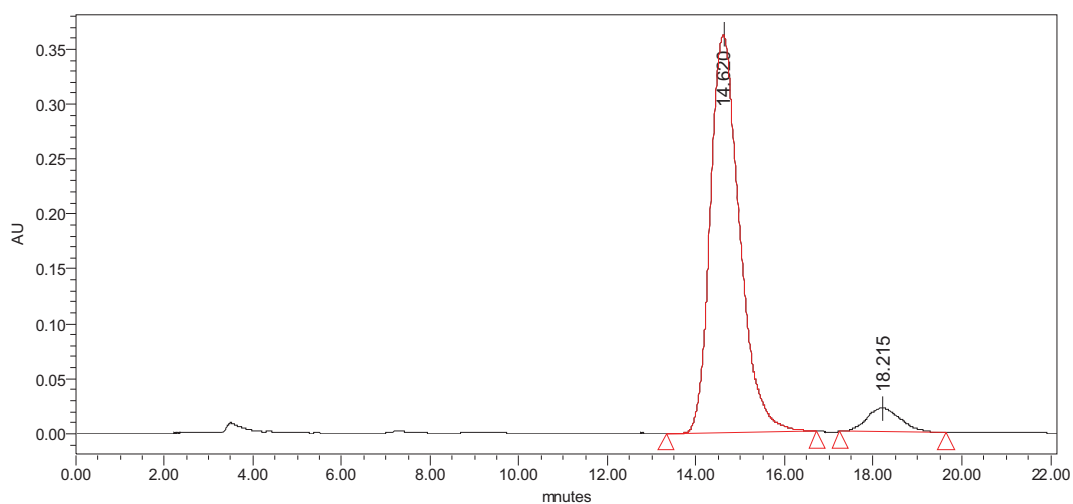
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|---------|
| 1 | 26.372 | 61682719 | 96.28 | 1398023 |
| 2 | 35.752 | 2385530 | 3.72 | 43433 |



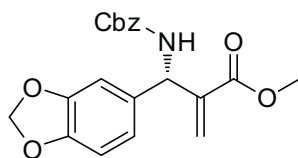
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 14.883 | 31424703 | 50.00 | 664890 |
| 2 | 18.551 | 31427098 | 50.00 | 551302 |

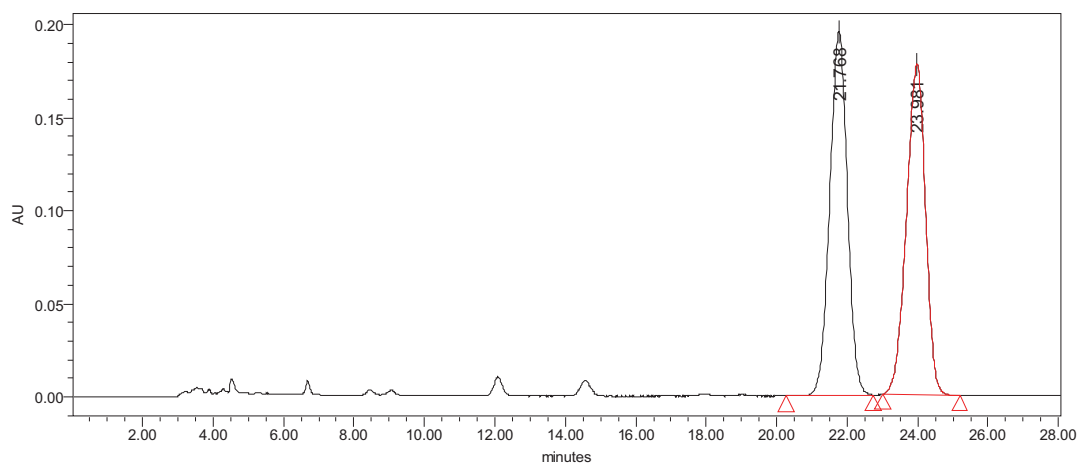


| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 14.620 | 16681524 | 93.41 | 362295 |
| 2 | 18.215 | 1177426 | 6.59 | 21674 |

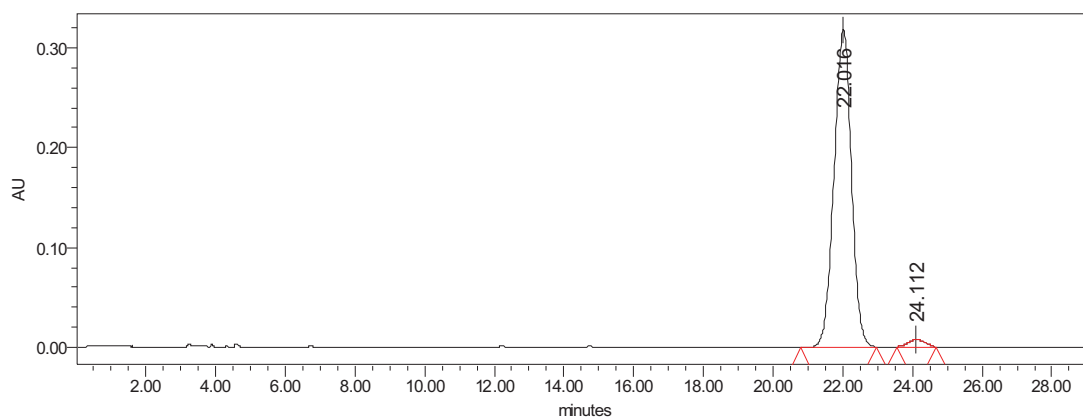


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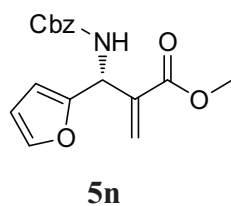
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



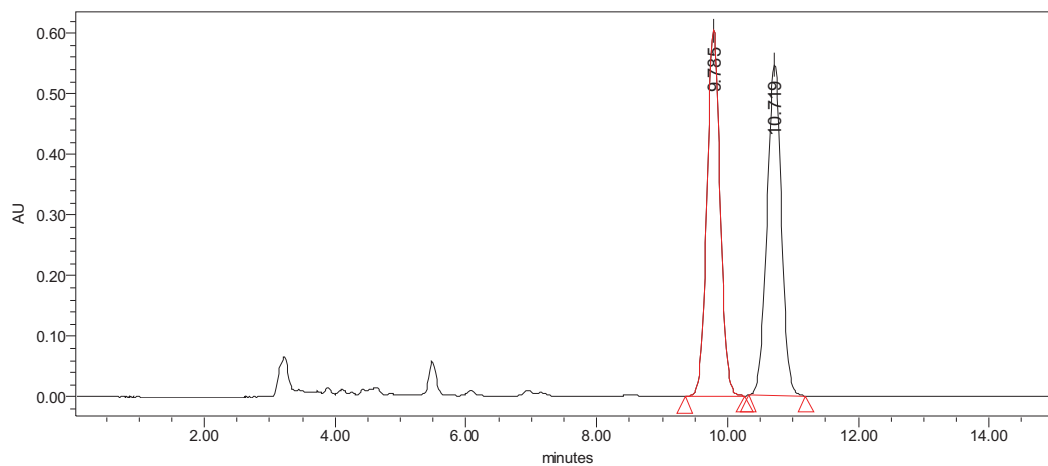
| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 21.768 | 6809774 | 50.42 | 195387 |
| 2 | 23.981 | 6696452 | 49.58 | 177599 |



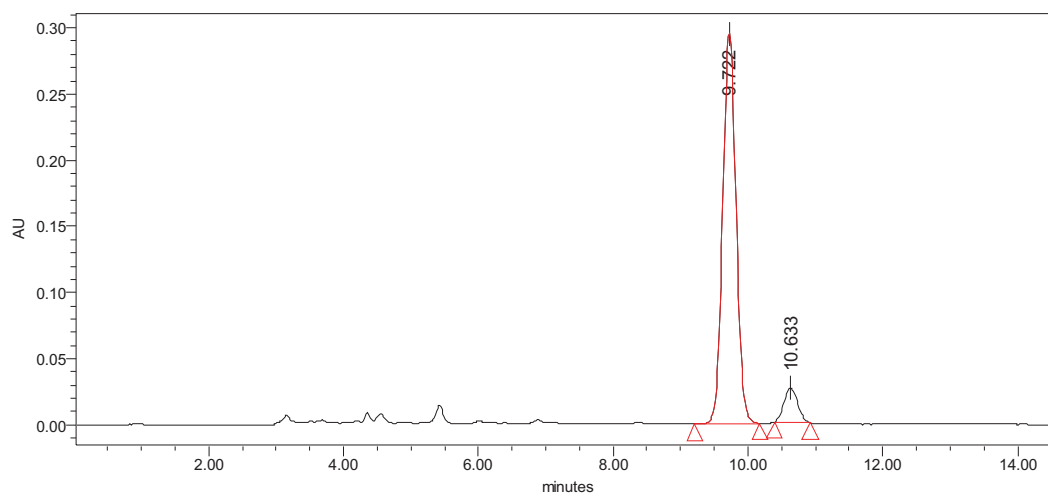
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 22.016 | 11106099 | 97.88 | 318175 |
| 2 | 24.112 | 240957 | 2.12 | 7206 |



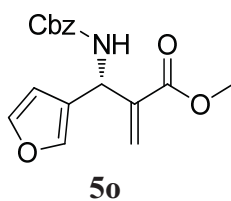
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



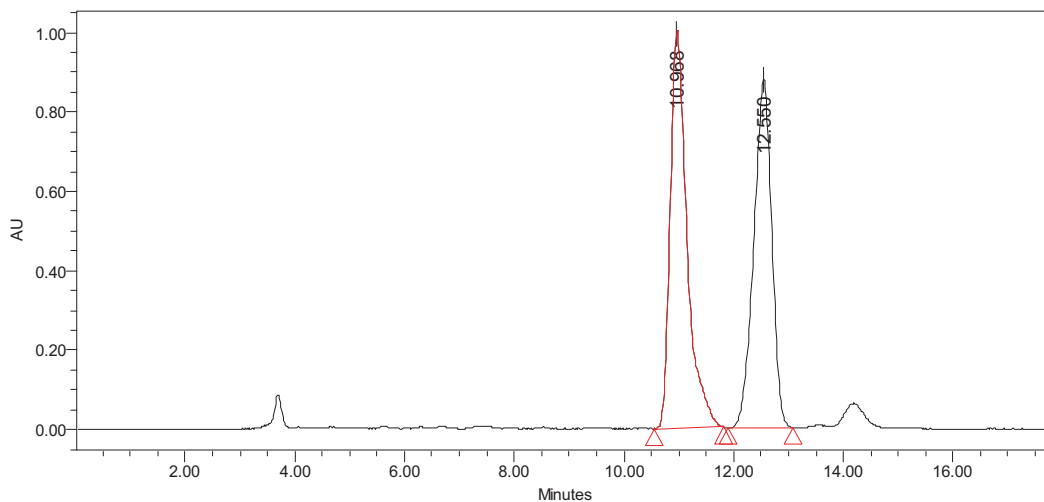
| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 9.785 | 8526490 | 50.34 | 604288 |
| 2 | 10.719 | 8412600 | 49.66 | 546545 |



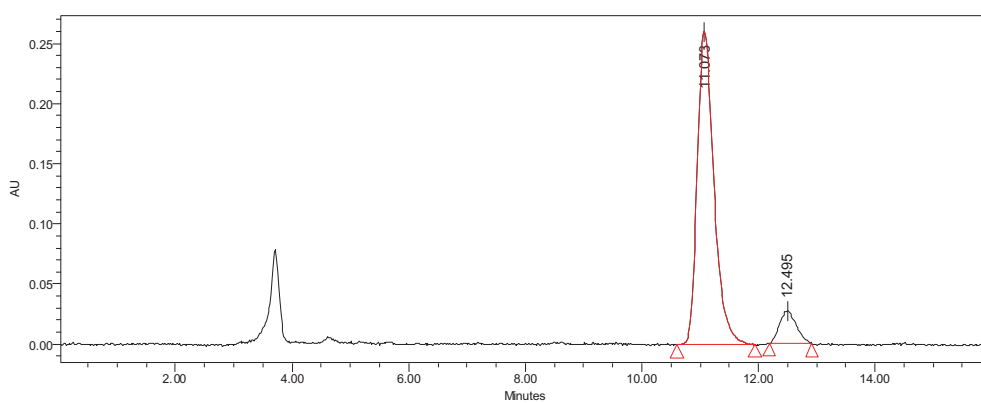
| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 9.722 | 4067597 | 91.76 | 295378 |
| 2 | 10.633 | 365365 | 8.24 | 25791 |



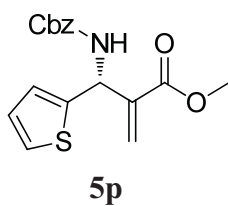
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



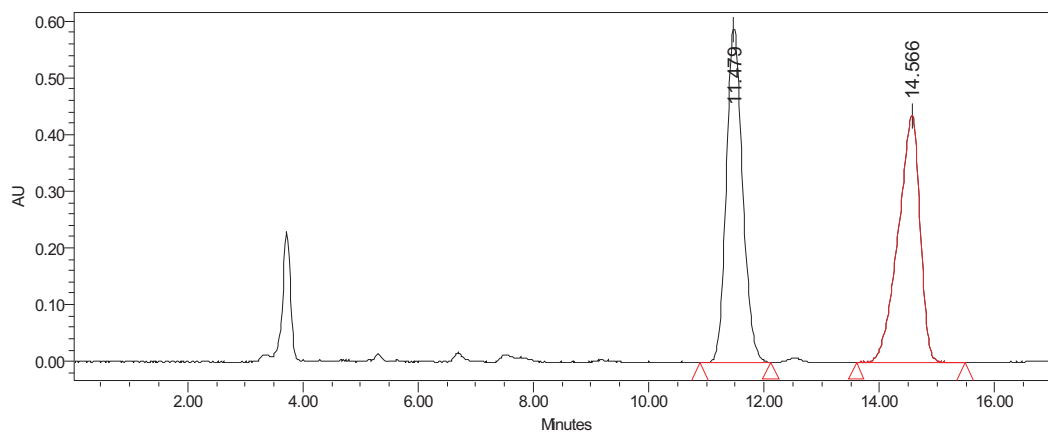
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 10.968 | 21242179 | 51.63 | 995315 |
| 2 | 12.550 | 19897864 | 48.37 | 877061 |



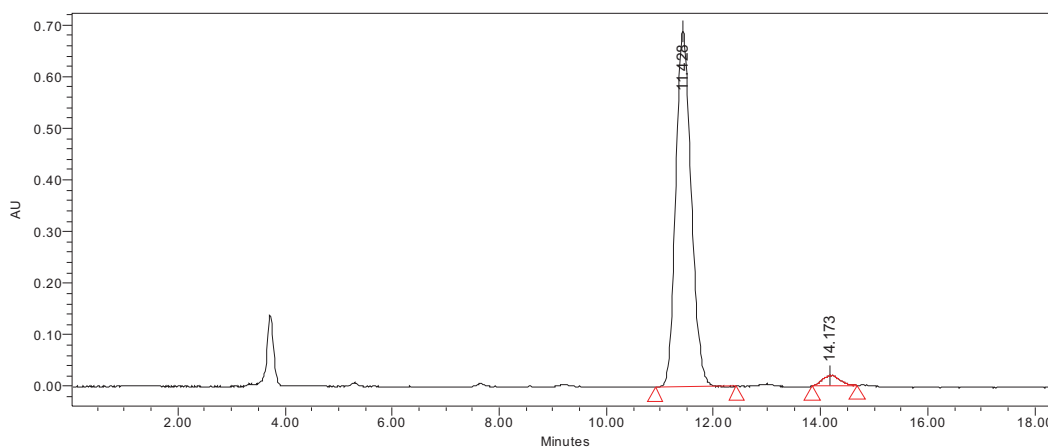
| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 11.073 | 5200100 | 90.55 | 260417 |
| 2 | 12.495 | 542865 | 9.45 | 26987 |



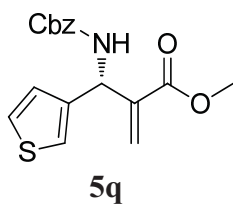
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



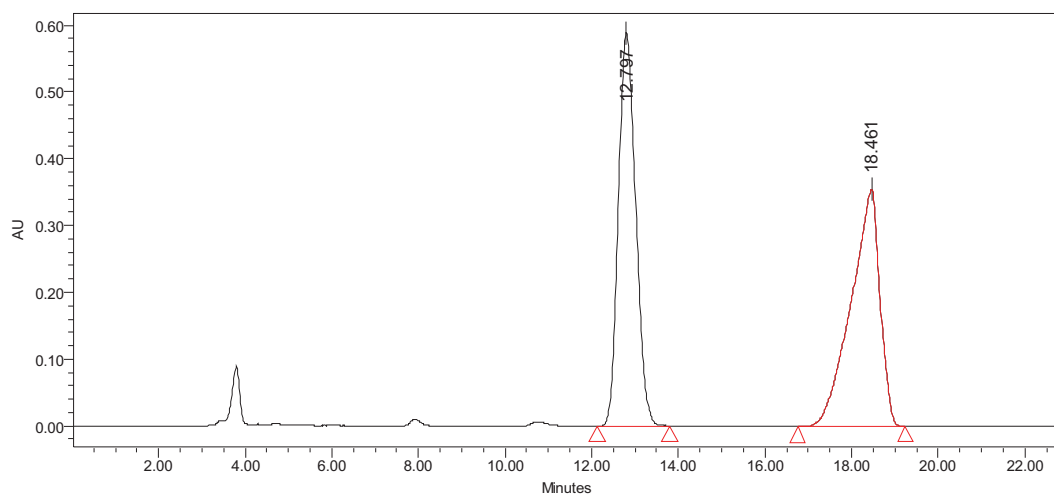
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 11.479 | 11630577 | 50.38 | 589183 |
| 2 | 14.566 | 11454482 | 49.62 | 435798 |



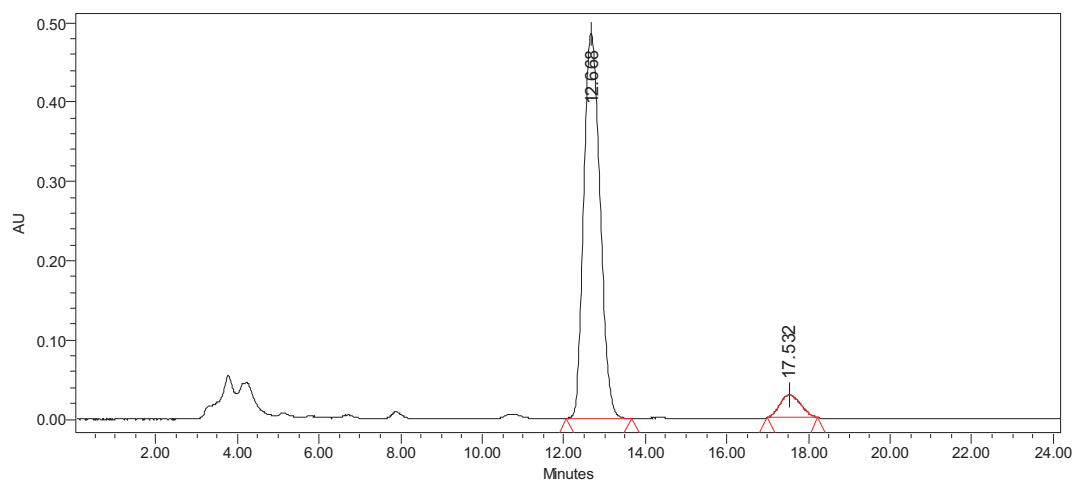
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 11.428 | 13820894 | 96.85 | 689960 |
| 2 | 14.173 | 450198 | 3.15 | 19726 |



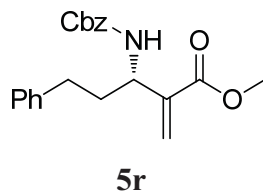
HPLC using an AD-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



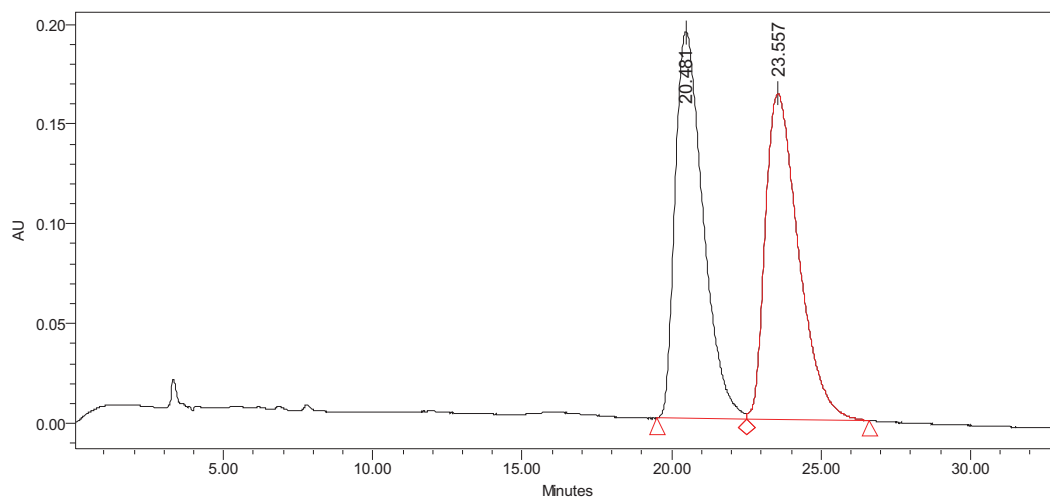
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 12.797 | 16458367 | 50.01 | 588887 |
| 2 | 18.461 | 16448977 | 49.99 | 355226 |



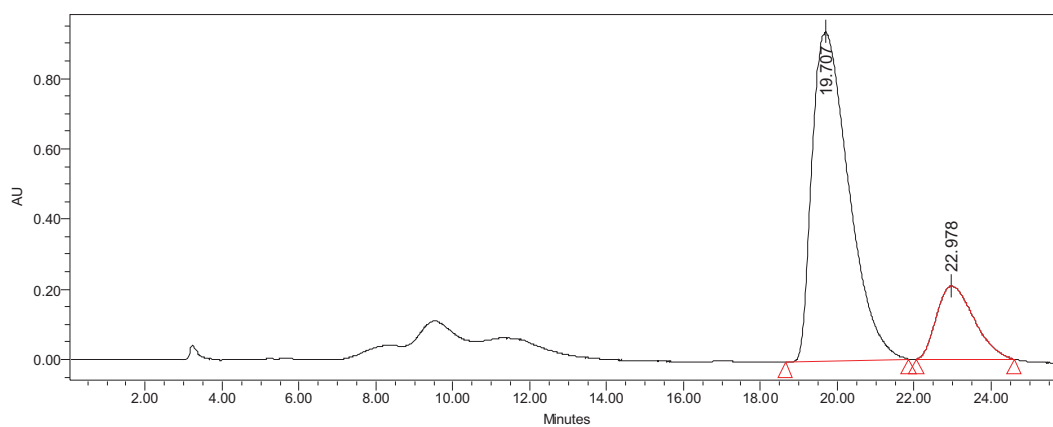
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 12.668 | 13365625 | 92.88 | 485954 |
| 2 | 17.532 | 1024105 | 7.12 | 28531 |



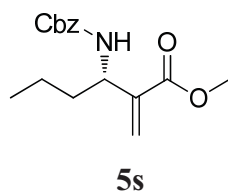
HPLC using an OJ-H (*n*-Hexane/*i*PrOH = 80/20, flow rate 1.0 mL/min)



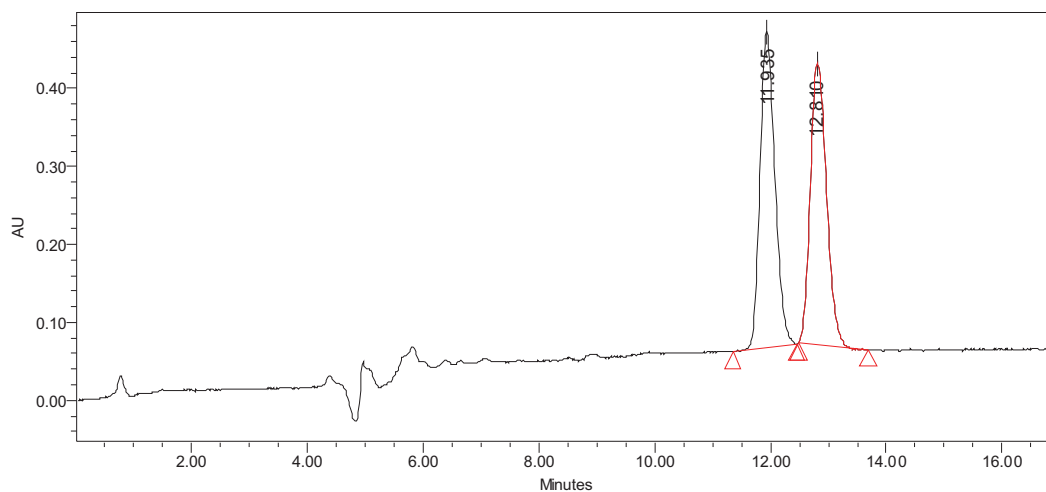
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 20.481 | 12645693 | 49.94 | 193531 |
| 2 | 23.557 | 12673913 | 50.06 | 163285 |



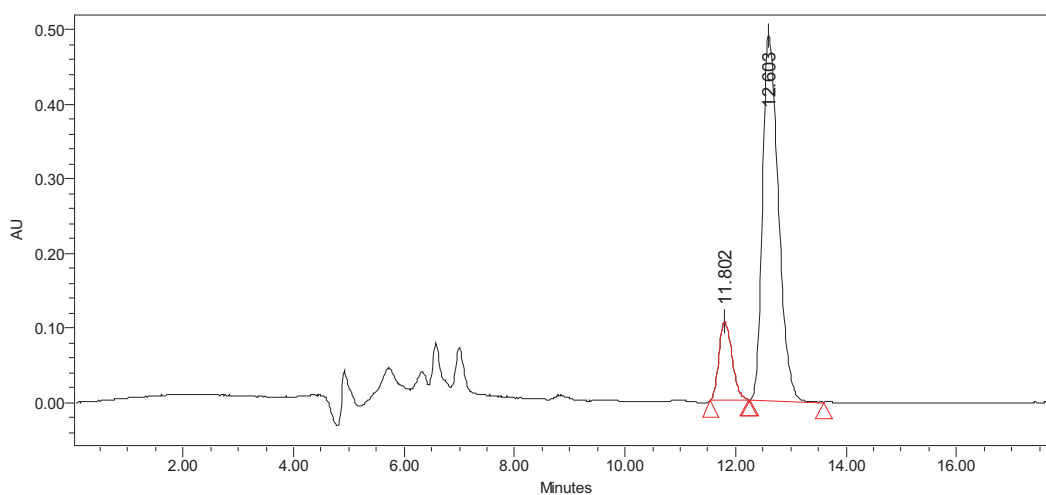
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 19.707 | 62532916 | 81.70 | 940014 |
| 2 | 22.978 | 14011251 | 18.30 | 208346 |



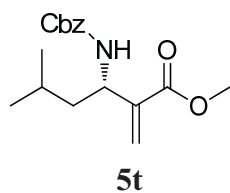
HPLC using an OD-H (*n*-Hexane/*i*PrOH = 95/5, flow rate 0.75 mL/min)



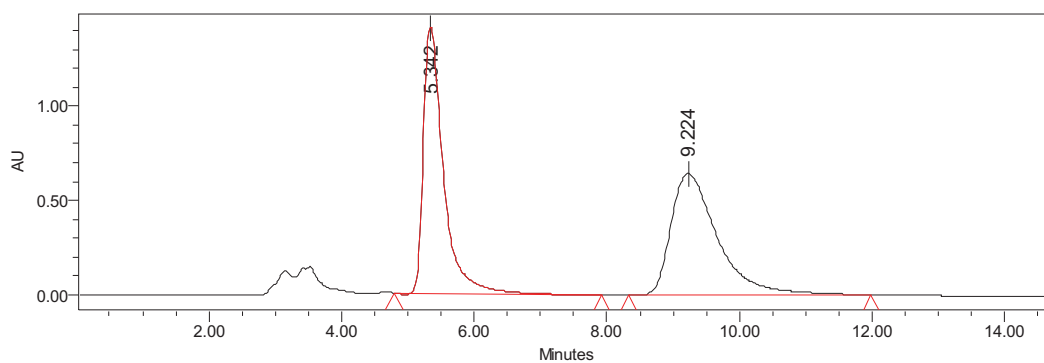
| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 11.935 | 7194102 | 50.54 | 405207 |
| 2 | 12.810 | 7039630 | 49.46 | 362363 |



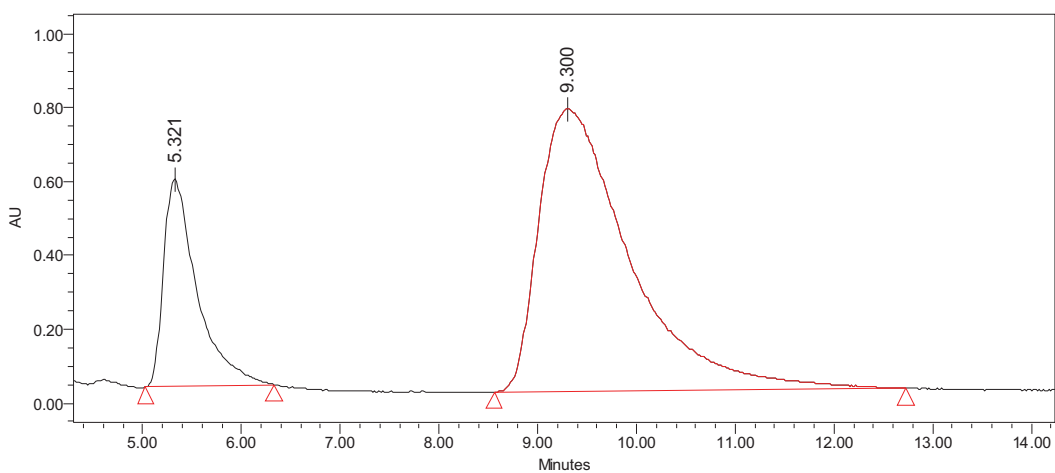
| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 11.802 | 1740720 | 15.05 | 105165 |
| 2 | 12.603 | 9822470 | 84.95 | 489487 |



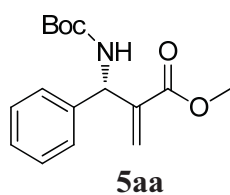
HPLC using an AS (*n*-Hexane/*i*PrOH = 90/10, flow rate 1.0 mL/min)



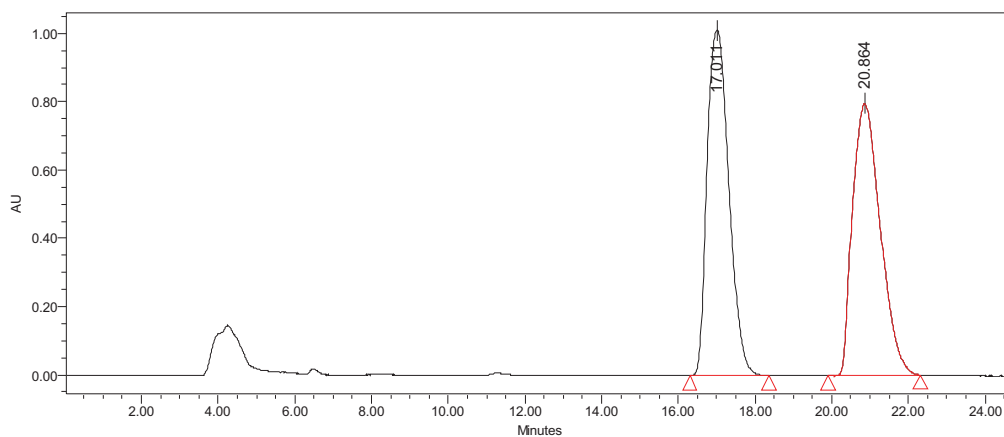
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|---------|
| 1 | 5.342 | 29958703 | 48.81 | 1413767 |
| 2 | 9.224 | 31414115 | 51.19 | 643457 |



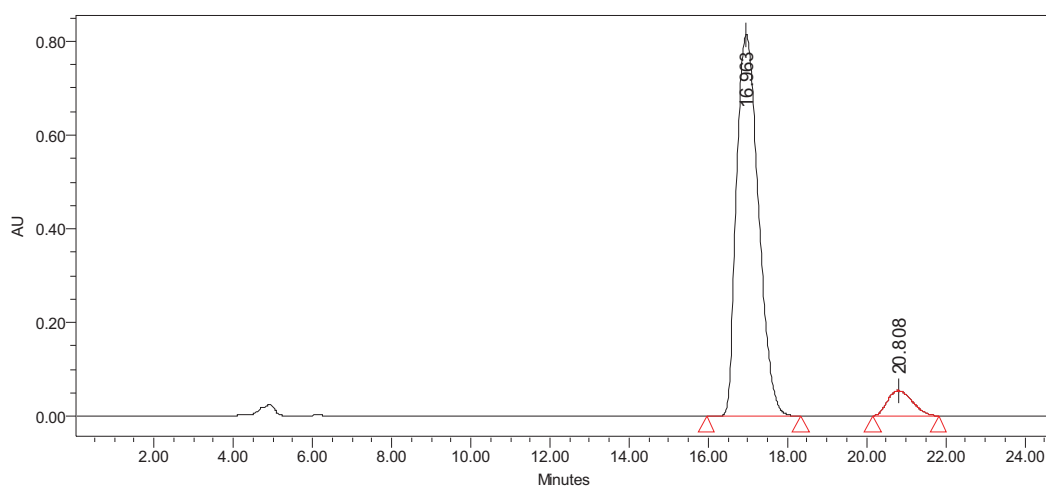
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 5.321 | 13313258 | 21.37 | 562599 |
| 2 | 9.300 | 48983471 | 78.63 | 763405 |



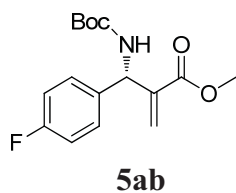
HPLC using an AD (*n*-Hexane/*i*PrOH = 95/5, flow rate 0.75 mL/min)



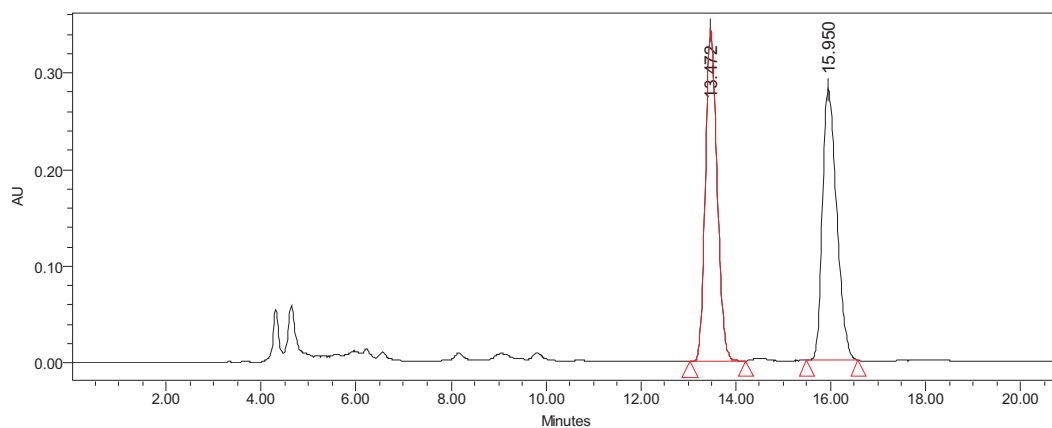
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|---------|
| 1 | 17.011 | 40050653 | 50.05 | 1011877 |
| 2 | 20.864 | 39969933 | 49.95 | 796547 |



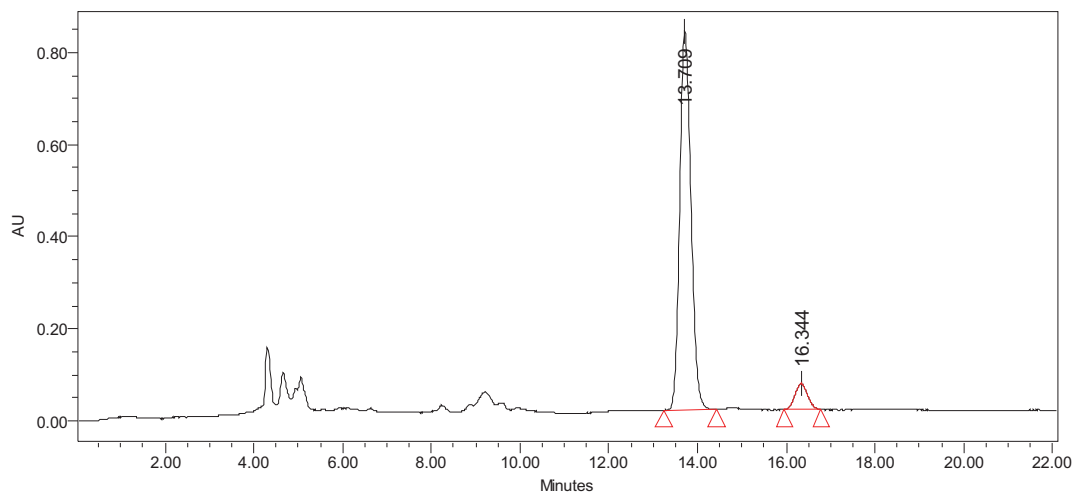
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 16.963 | 31431189 | 92.99 | 813506 |
| 2 | 20.808 | 2368506 | 7.01 | 53579 |



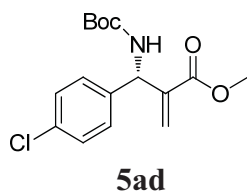
HPLC using an AD (*n*-Hexane/*i*PrOH = 95/5, flow rate 0.8 mL/min)



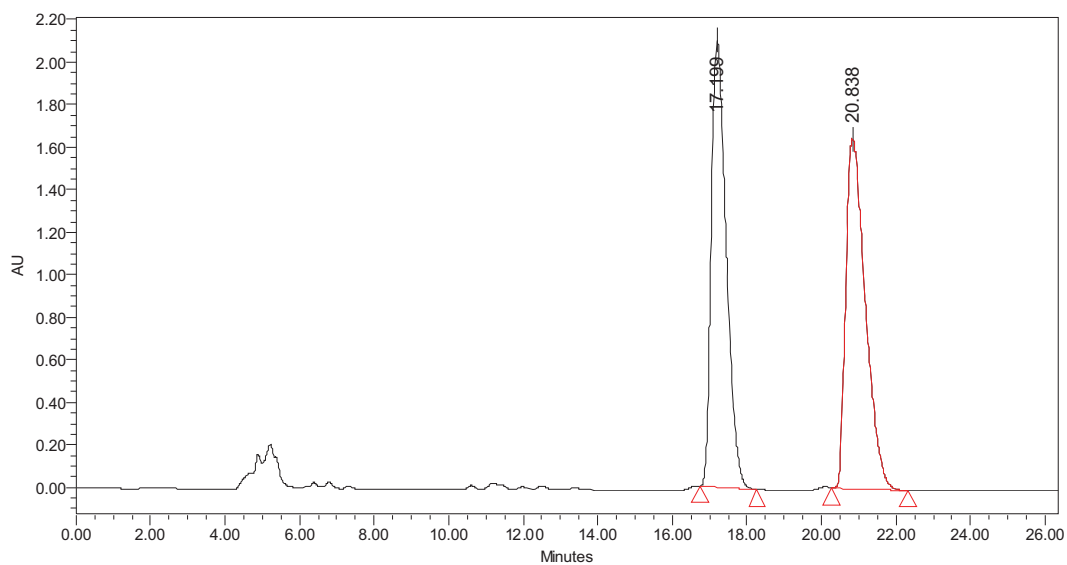
| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 13.472 | 5874253 | 50.15 | 343613 |
| 2 | 15.950 | 5838007 | 49.85 | 280491 |



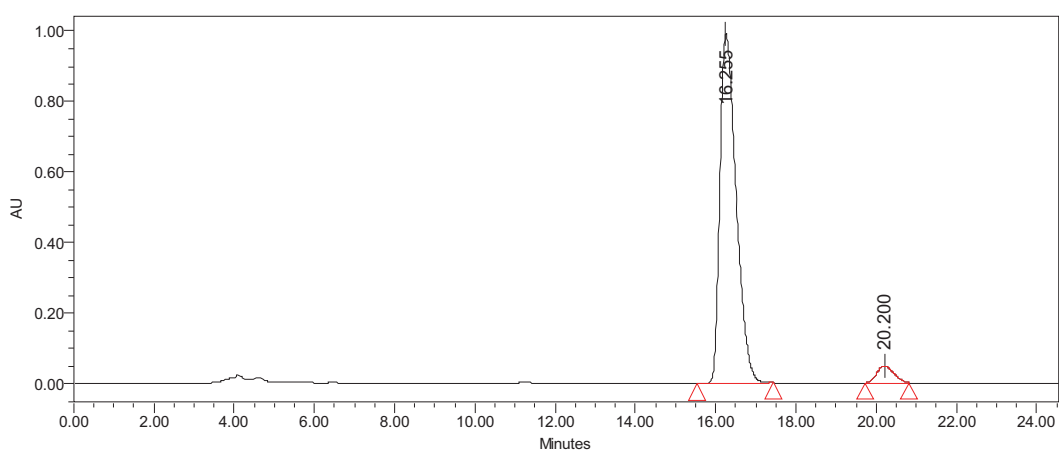
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 13.709 | 14595671 | 92.96 | 823303 |
| 2 | 16.344 | 1105863 | 7.04 | 56612 |



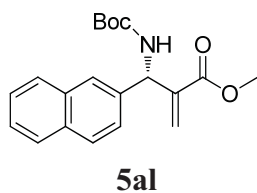
HPLC using an AD (*n*-Hexane/*i*PrOH = 95/5, flow rate 0.8 mL/min)



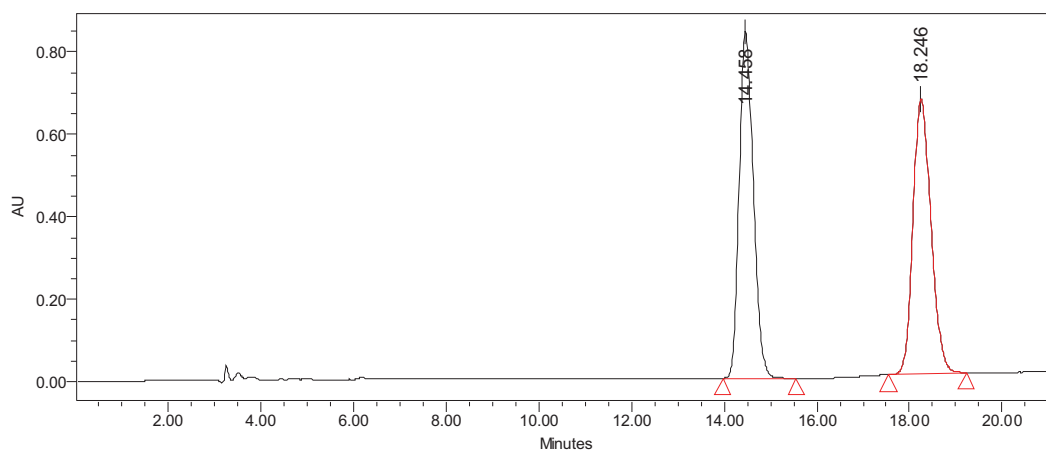
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|---------|
| 1 | 17.199 | 60155248 | 52.80 | 2102641 |
| 2 | 20.838 | 53779523 | 47.20 | 1650916 |



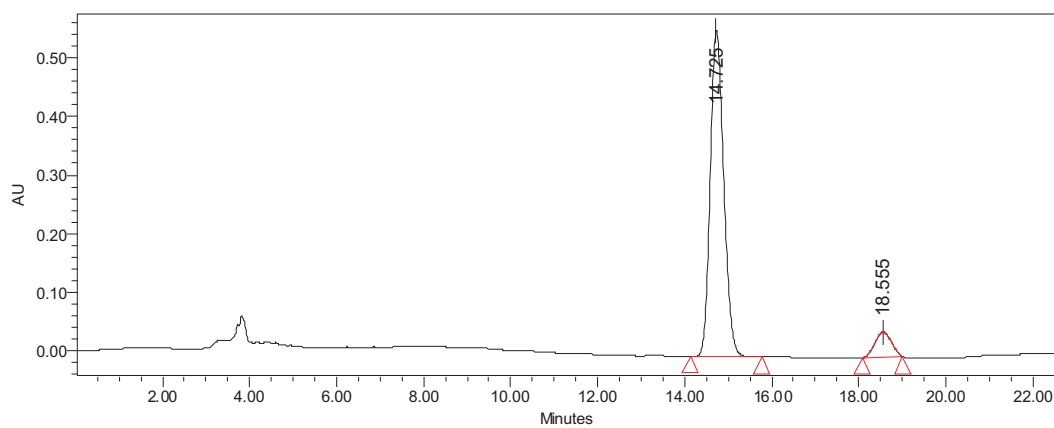
| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 16.255 | 25328933 | 94.41 | 991054 |
| 2 | 20.200 | 1498319 | 5.59 | 48366 |



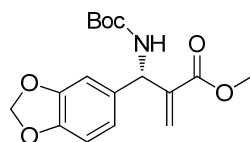
HPLC using an AD (*n*-Hexane/*i*PrOH = 95/5, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 14.458 | 17866060 | 49.95 | 841907 |
| 2 | 18.246 | 17901610 | 50.05 | 667220 |

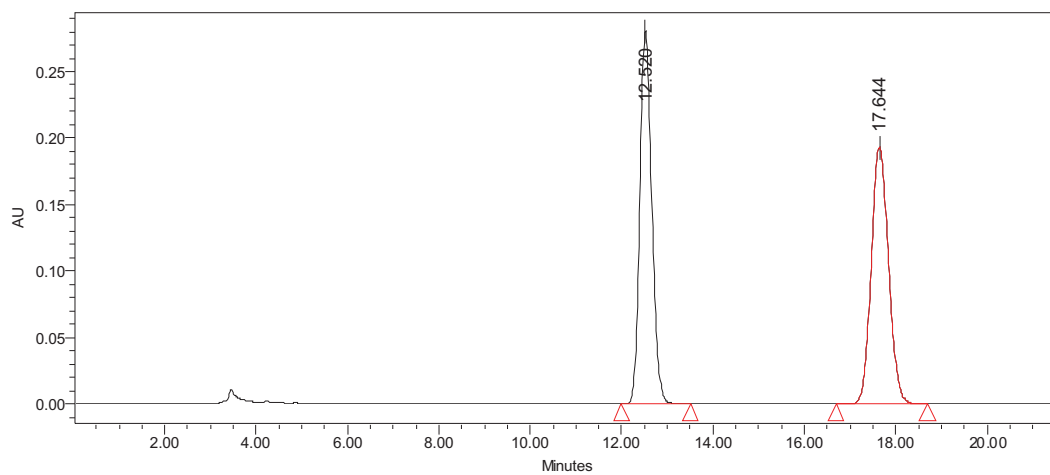


| Name | Retention Time | Area | % Area | Height |
|------|----------------|----------|--------|--------|
| 1 | 14.725 | 11910436 | 91.25 | 556903 |
| 2 | 18.555 | 1142800 | 8.75 | 42806 |

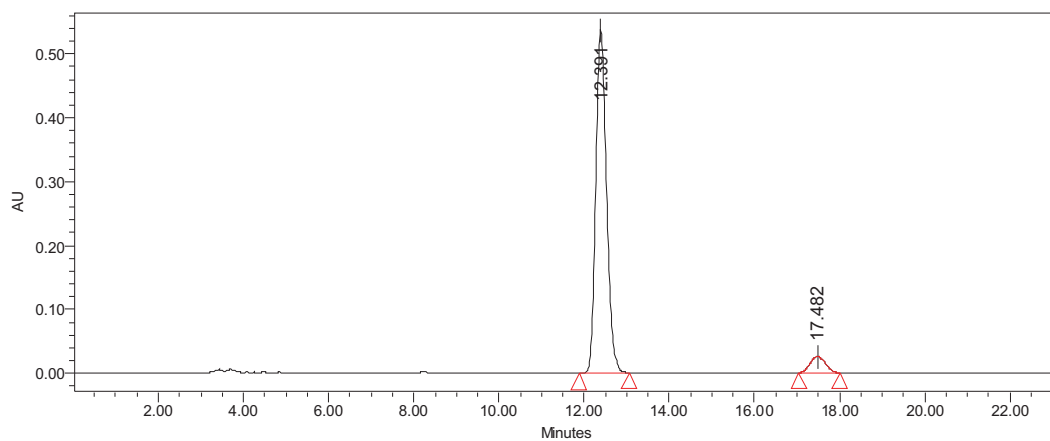


5am

HPLC using an AD (*n*-Hexane/*i*PrOH = 90/10, flow rate 1.0 mL/min)



| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 12.520 | 5079794 | 50.05 | 280641 |
| 2 | 17.644 | 5070638 | 49.95 | 193282 |



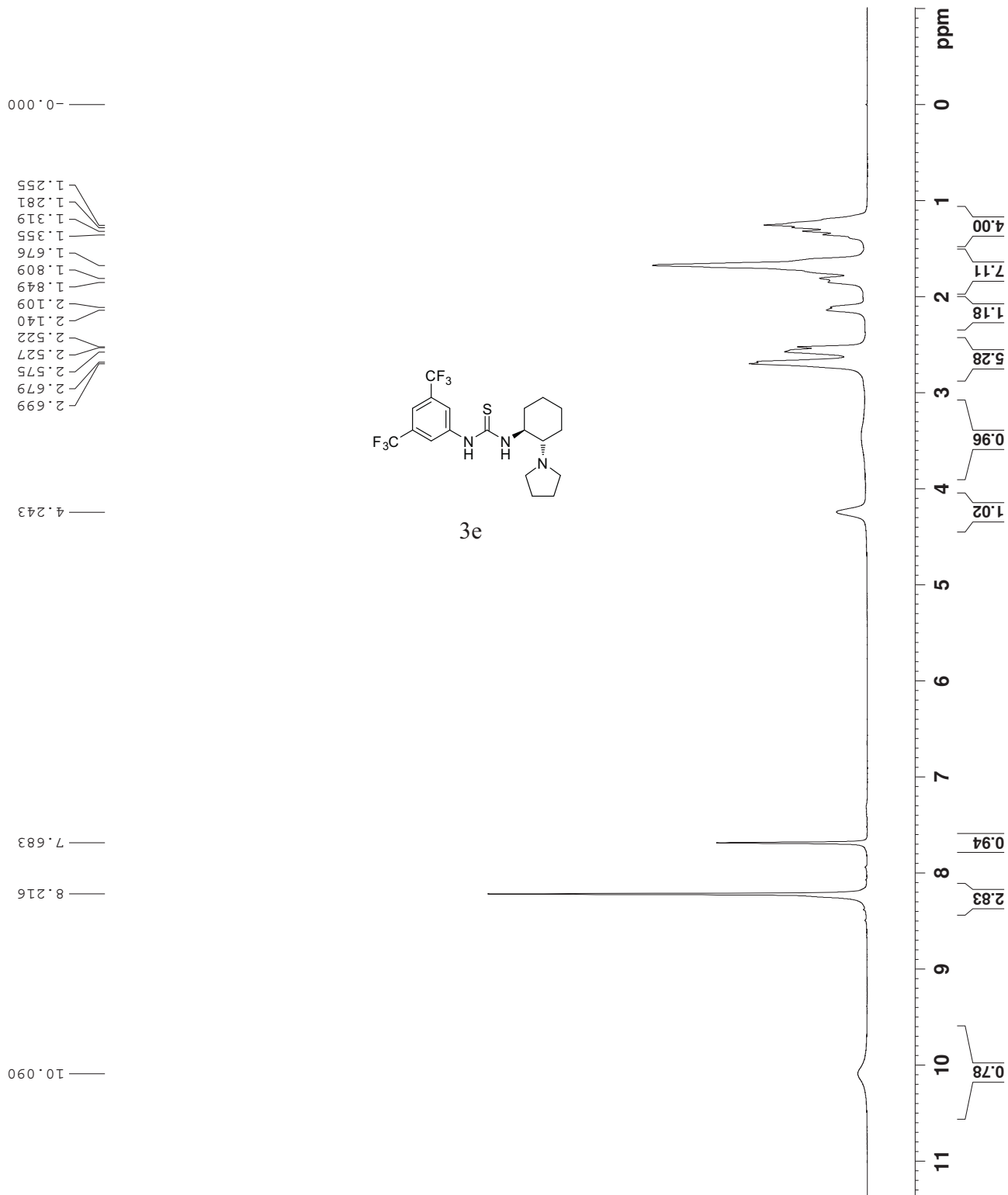
| Name | Retention Time | Area | % Area | Height |
|------|----------------|---------|--------|--------|
| 1 | 12.391 | 9562876 | 93.63 | 536781 |
| 2 | 17.482 | 650734 | 6.37 | 26001 |

Copies of NMR spectra

```

NAME          101224
EXPNO         7
PROCNO        1
Date_         20101224
Time          22.21
INSTRUM       spect
PROBHD        5 mm PABBO BB
PULPROG       zgpg30
TD            65536
SOLVENT       DMSO
NS            8
DS            2
SWH           6188.119 Hz
AQ            0.094423 Hz
RG            45.2
WDW           80.800 usec
DE            6.50 usec
TE            289.1 K
D1            1.00000000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          1H
P1            11.80 usec
PL1           0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1299896 MHz
WDW          EM
SSB           0
LB            0
GB            0
PC            1.00
    
```



```

NAME      101224
EXPNO     8
PROCNO    1
Date_     20101224
Time      23.59
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   DMSO
NS         1024
DS         4
SWH        18028.846 Hz
FIDRES     0.275098 Hz
AQ         1.8175818 sec
RG         203
DW         27.733 usec
DE         6.50 usec
TE         290.2 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1
  
```

```

===== CHANNEL f1 =====
NUC1       13C
P1         9.70 usec
PL1        0.00 dB
PL1W       29.38907051 W
SFO1       75.4752953 MHz
  
```

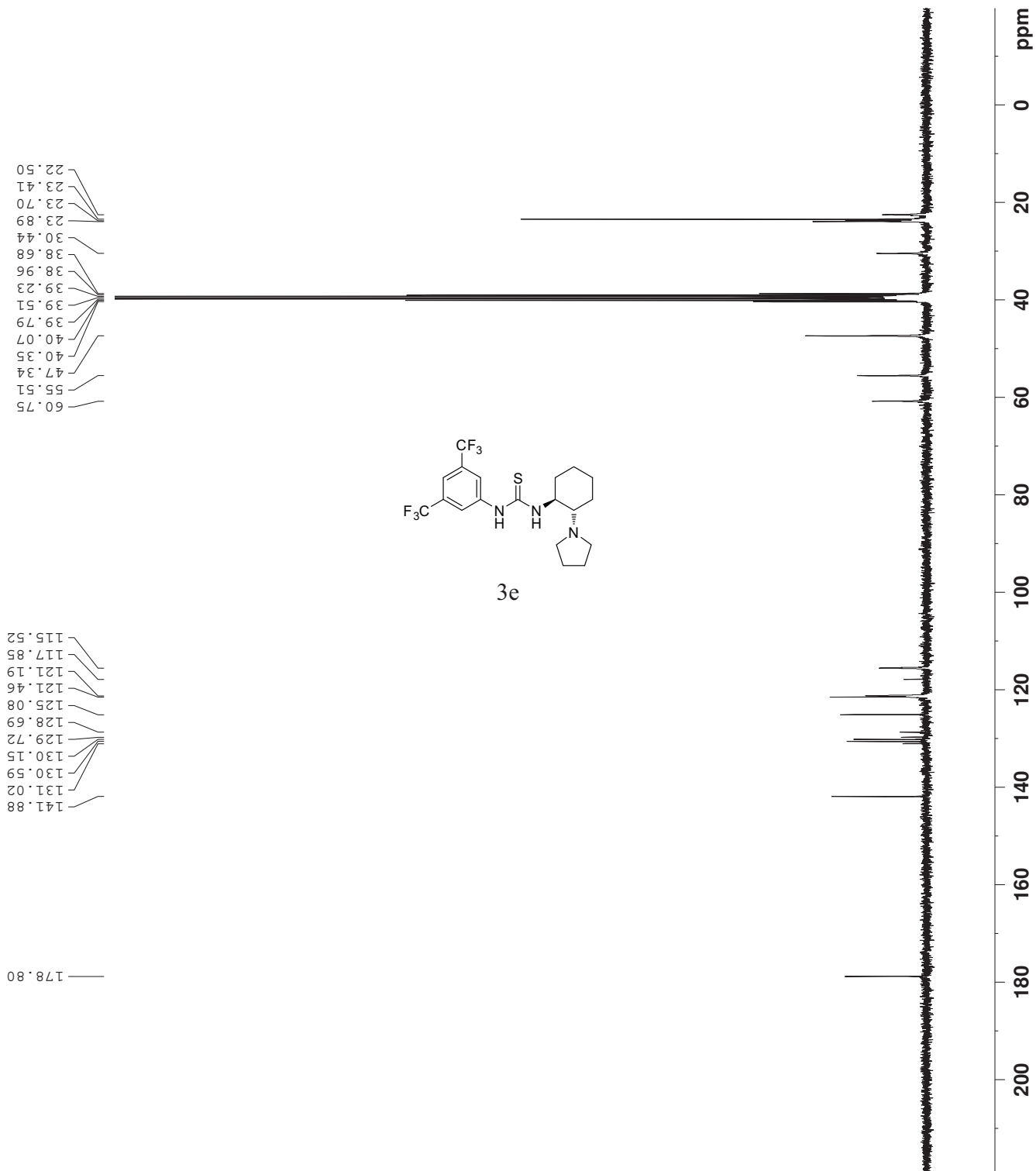
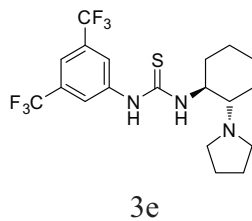
```

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2      80.00 usec
PL2         1.00 dB
PL12        17.00 dB
PL13         17.00 dB
PL14         17.00 dB
PL15         17.00 dB
PL16         17.00 dB
PL17         17.00 dB
PL18         17.00 dB
PL19         17.00 dB
PL20         17.00 dB
PL21         17.00 dB
PL22         17.00 dB
PL23         17.00 dB
PL24         17.00 dB
PL25         17.00 dB
PL26         17.00 dB
PL27         17.00 dB
PL28         17.00 dB
PL29         17.00 dB
PL30         17.00 dB
PL31         17.00 dB
PL32         17.00 dB
PL33         17.00 dB
PL34         17.00 dB
PL35         17.00 dB
PL36         17.00 dB
PL37         17.00 dB
PL38         17.00 dB
PL39         17.00 dB
PL40         17.00 dB
PL41         17.00 dB
PL42         17.00 dB
PL43         17.00 dB
PL44         17.00 dB
PL45         17.00 dB
PL46         17.00 dB
PL47         17.00 dB
PL48         17.00 dB
PL49         17.00 dB
PL50         17.00 dB
PL51         17.00 dB
PL52         17.00 dB
PL53         17.00 dB
PL54         17.00 dB
PL55         17.00 dB
PL56         17.00 dB
PL57         17.00 dB
PL58         17.00 dB
PL59         17.00 dB
PL60         17.00 dB
PL61         17.00 dB
PL62         17.00 dB
PL63         17.00 dB
PL64         17.00 dB
PL65         17.00 dB
PL66         17.00 dB
PL67         17.00 dB
PL68         17.00 dB
PL69         17.00 dB
PL70         17.00 dB
PL71         17.00 dB
PL72         17.00 dB
PL73         17.00 dB
PL74         17.00 dB
PL75         17.00 dB
PL76         17.00 dB
PL77         17.00 dB
PL78         17.00 dB
PL79         17.00 dB
PL80         17.00 dB
PL81         17.00 dB
PL82         17.00 dB
PL83         17.00 dB
PL84         17.00 dB
PL85         17.00 dB
PL86         17.00 dB
PL87         17.00 dB
PL88         17.00 dB
PL89         17.00 dB
PL90         17.00 dB
PL91         17.00 dB
PL92         17.00 dB
PL93         17.00 dB
PL94         17.00 dB
PL95         17.00 dB
PL96         17.00 dB
PL97         17.00 dB
PL98         17.00 dB
PL99         17.00 dB
PL100        17.00 dB
  
```

2.2.50
2.3.41
2.3.70
2.3.89
2.3.89
3.0.44
3.8.68
3.8.96
3.8.96
3.9.23
3.9.51
3.9.79
3.9.79
4.0.07
4.0.35
4.7.34
5.5.51
6.0.75

115.52
117.85
121.19
121.46
125.08
128.69
129.72
130.15
130.59
131.02
131.88
141.88

178.80



```
NAME 100913
EXPNO 10
PROCNO 1
Date_ 20100911
Time 20.03
INSTRUM spect
PROBHD 5 mm PABBO-1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 144
DW 80.800 usec
DE 6.50 usec
TE 292.5 K
D1 1.00000000 sec
TD0 1
=====
CHANNEL f1 =====
NUC1 1H
P1 11.80 usec
PL1 0.00 dB
PL1W 11.55467796 W
SFO1 300.1318534 MHz
SI 32768
SF 300.1300040 MHz
WDW EM
SSB 0
LB 0
GB 0
PC 1.00
```

0.000

3.663

5.132

5.765

5.928

6.378

7.254

7.260

7.267

7.274

7.276

7.289

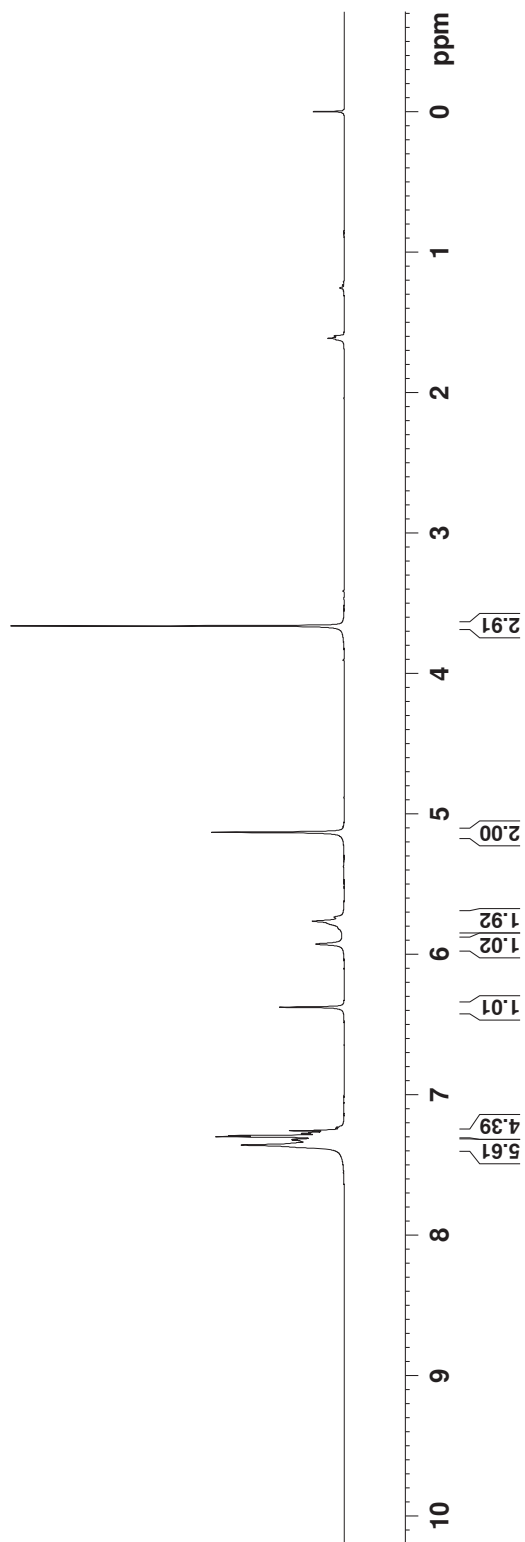
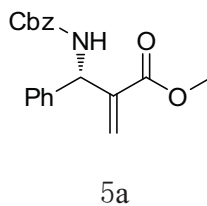
7.297

7.315

7.320

7.325

7.356



```

NAME 100913
EXPNO 6
PROCNO 1
Date_ 20100913
Time_ 15.45
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 384
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 292.3 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

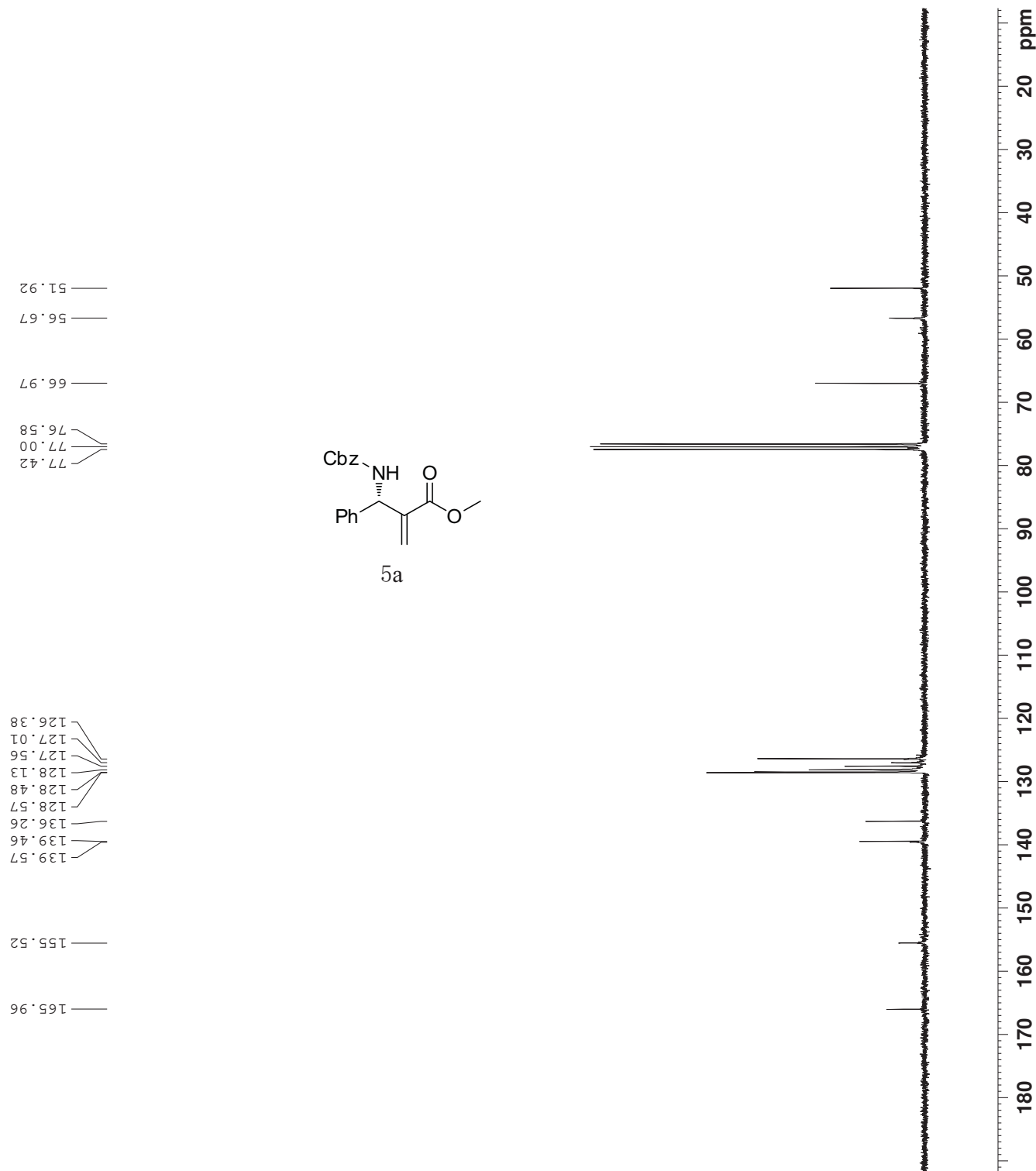
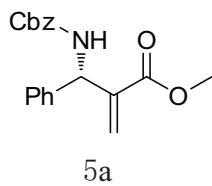
===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL2W 9.17820644 W
PL12W 0.23054613 W
PL13W 0.23054613 W
SFO2 300.13208 MHz
SI 2
SF 75.4677596 MHz
RG 80
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
    
```

51.92
 56.67
 66.97
 76.58
 77.00
 77.42

126.38
 127.01
 127.56
 128.13
 128.48
 128.57
 136.26
 139.46
 139.57

155.52
 165.96




```

NAME 101007
EXPNO 3
PROCNO 1
Date_ 20101007
Time 11.39
INSTRUM spect
PROBHD 5 mm PABBO QNP
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 50.8
WDW 80.800 usec
DE 6.50 usec
TE 300.0 K
D1 1.00000000 sec
TDO 1

=====
CHANNEL f1 =====
NUC1 1H
P1 11.80 usec
PL1 0.00 dB
PL1W 11.55467796 W
SFO1 300.1318534 MHz
SI 32768
SF 300.1300276 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
    
```

0.000

3.590

5.048

5.631

5.661

5.739

5.767

5.844

6.294

6.885

6.914

6.943

7.148

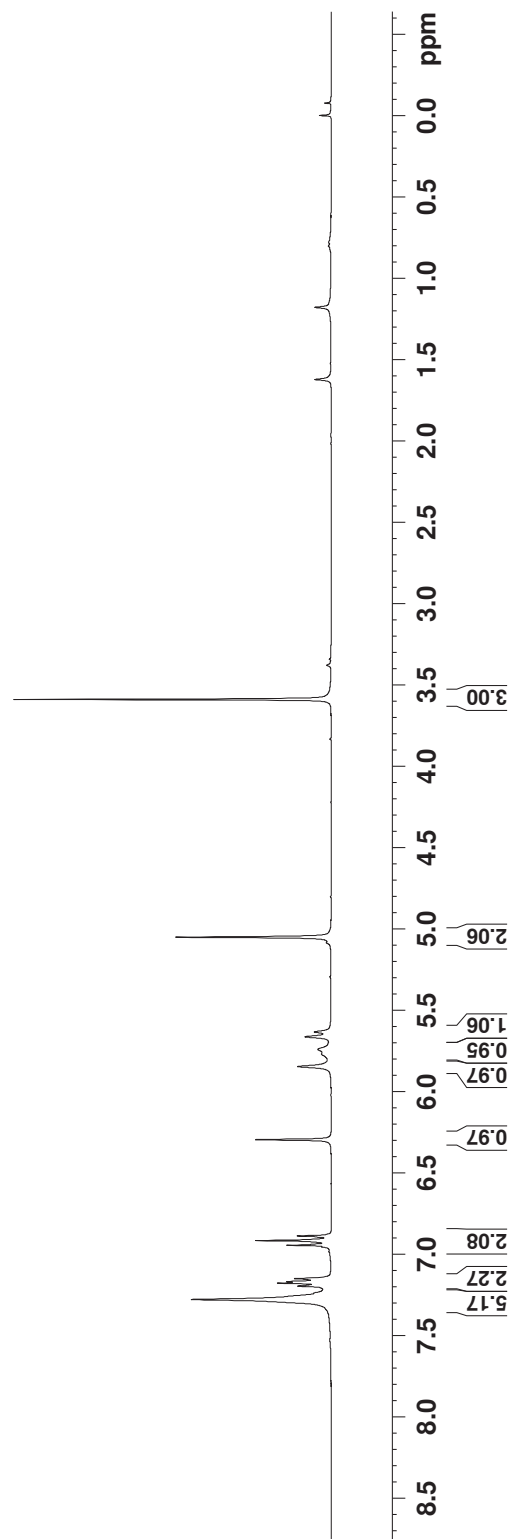
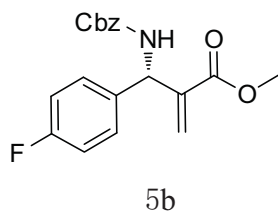
7.166

7.175

7.194

7.237

7.276



```

NAME          1011007
EXPNO         4
PROCNO        1
Date_         20101007
Time_        11.47
INSTRUM       spect
PROBHD        5 mm FAPBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            249
DS            4
SWH           18028.846 Hz
FIDRES       0.275098 Hz
AQ           1.8175818 sec
RG           203
DW           27.733 usec
DE           6.50 usec
TE           300.0 K
D1           2.0000000 sec
D11          0.0300000 sec
TD0          1

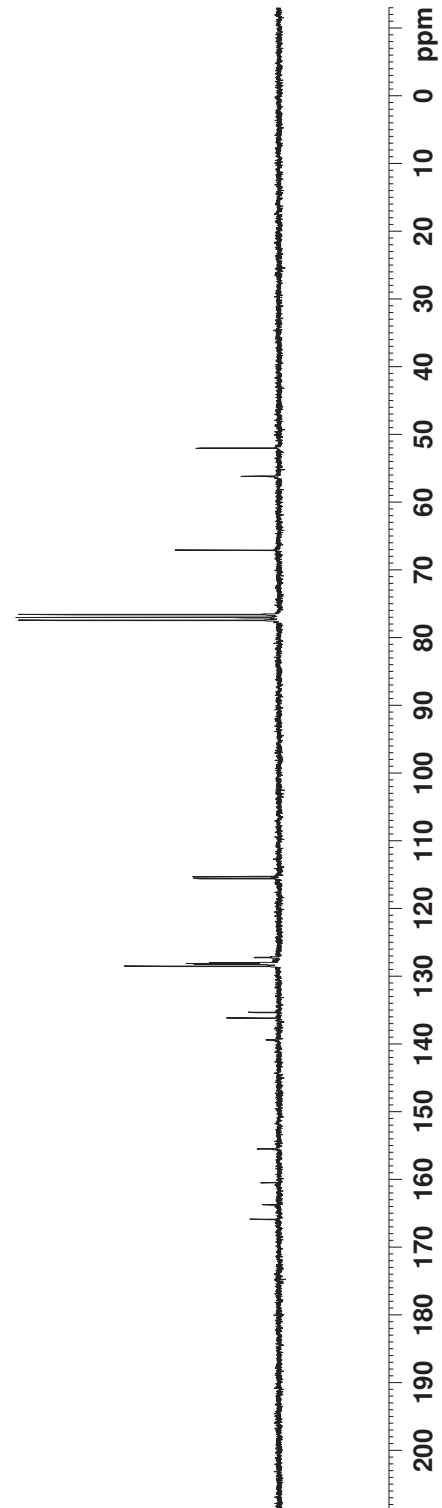
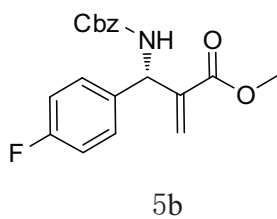
===== CHANNEL f1 =====
NUC1          13C
P1           9.70 usec
PL1          0.00 dB
PL1W         29.38907051 W
SFO1         75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2      waltz16
NUC2          1H
PCPD2       80.00 usec
PL2          1.00 dB
PL12         17.00 dB
PL13         17.00 dB
PL14         17.00 dB
PL15         17.00 dB
PL16         17.00 dB
PL17         17.00 dB
PL18         17.00 dB
PL19         17.00 dB
PL20         17.00 dB
PL21         17.00 dB
PL22         17.00 dB
PL23         17.00 dB
PL24         17.00 dB
PL25         17.00 dB
PL26         17.00 dB
PL27         17.00 dB
PL28         17.00 dB
PL29         17.00 dB
PL30         17.00 dB
PL31         17.00 dB
PL32         17.00 dB
PL33         17.00 dB
PL34         17.00 dB
PL35         17.00 dB
PL36         17.00 dB
PL37         17.00 dB
PL38         17.00 dB
PL39         17.00 dB
PL40         17.00 dB
PL41         17.00 dB
PL42         17.00 dB
PL43         17.00 dB
PL44         17.00 dB
PL45         17.00 dB
PL46         17.00 dB
PL47         17.00 dB
PL48         17.00 dB
PL49         17.00 dB
PL50         17.00 dB
PL51         17.00 dB
PL52         17.00 dB
PL53         17.00 dB
PL54         17.00 dB
PL55         17.00 dB
PL56         17.00 dB
PL57         17.00 dB
PL58         17.00 dB
PL59         17.00 dB
PL60         17.00 dB
PL61         17.00 dB
PL62         17.00 dB
PL63         17.00 dB
PL64         17.00 dB
PL65         17.00 dB
PL66         17.00 dB
PL67         17.00 dB
PL68         17.00 dB
PL69         17.00 dB
PL70         17.00 dB
PL71         17.00 dB
PL72         17.00 dB
PL73         17.00 dB
PL74         17.00 dB
PL75         17.00 dB
PL76         17.00 dB
PL77         17.00 dB
PL78         17.00 dB
PL79         17.00 dB
PL80         17.00 dB
PL81         17.00 dB
PL82         17.00 dB
PL83         17.00 dB
PL84         17.00 dB
PL85         17.00 dB
PL86         17.00 dB
PL87         17.00 dB
PL88         17.00 dB
PL89         17.00 dB
PL90         17.00 dB
PL91         17.00 dB
PL92         17.00 dB
PL93         17.00 dB
PL94         17.00 dB
PL95         17.00 dB
PL96         17.00 dB
PL97         17.00 dB
PL98         17.00 dB
PL99         17.00 dB
PL100        17.00 dB

```

52.00 —
 56.16 —
 67.06 —
 76.58 —
 77.00 —
 77.42 —

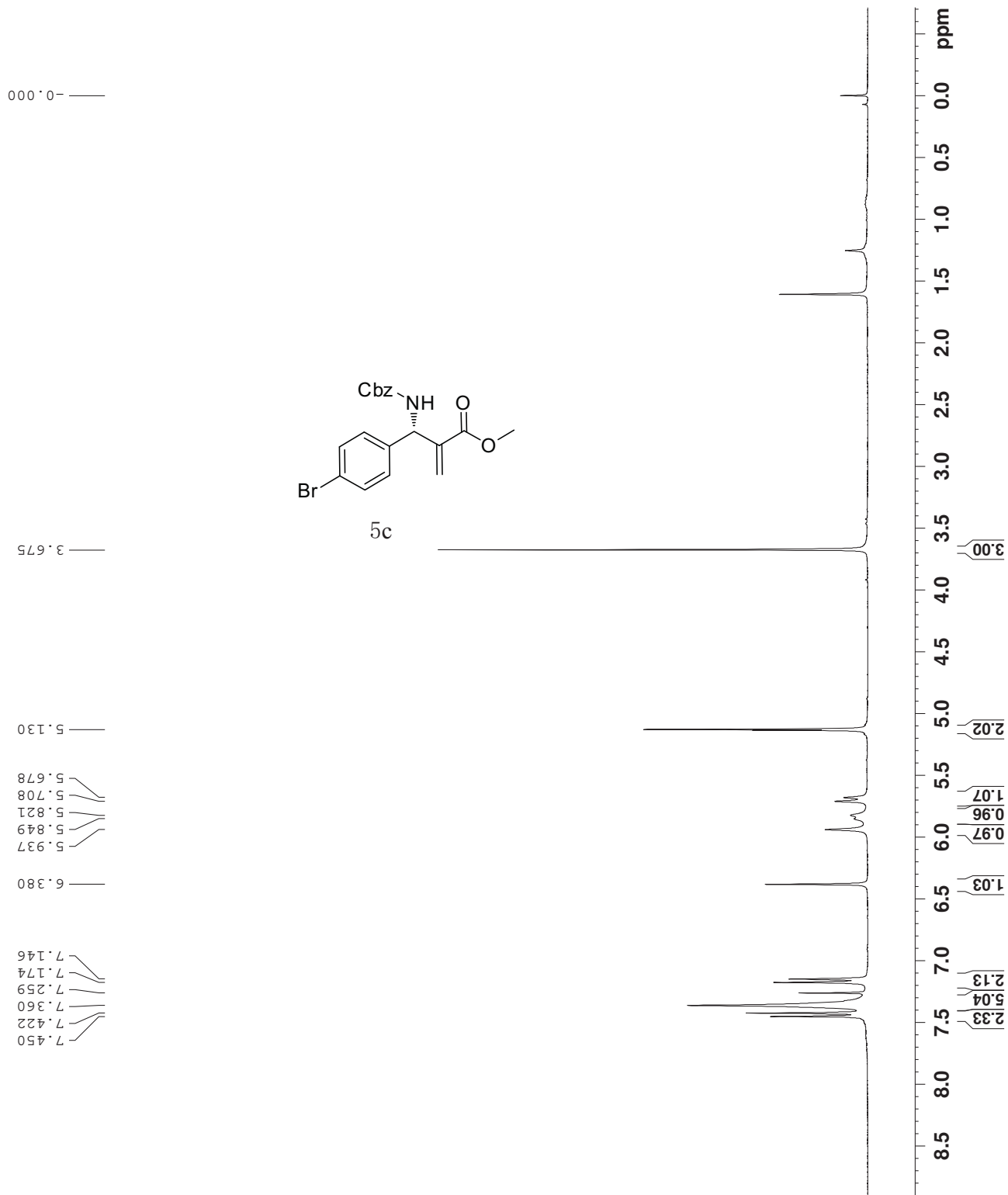
115.28 —
 115.57 —
 127.22 —
 128.01 —
 128.12 —
 128.19 —
 128.51 —
 135.29 —
 135.33 —
 136.16 —
 139.39 —
 155.49 —
 160.48 —
 163.74 —
 165.88 —



```

NAME 101007
EXPNO 1
PROCNO 1
Date_ 20101007
Time 12.50
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
DS 8
NS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 161
DW 80.800 usec
DE 6.50 usec
TE 300.0 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.80 usec
PL1 0.00 dB
PL1W 11.55467796 W
SFO1 300.1318534 MHz
SI 32768
SF 300.1300026 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
    
```



```

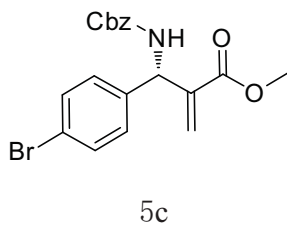
NAME          1011007
EXPNO         8
PROCNO        1
Date_         20101007
Time_        12.56
INSTRUM       spect
PROBHD        5 mm FAPBBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            627
DS            4
SWH           18028.846 Hz
FIDRES       0.275098 Hz
AQ           1.8175818 sec
RG           203
DW           27.733 usec
DE           6.50 usec
TE           300.0 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0          1

===== CHANNEL f1 =====
NUC1         13C
P1           9.70 usec
PL1          0.00 dB
PL1W         29.38907051 W
SFO1         75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2      waltz16
NUC2         1H
PCPD2        80.00 usec
PL2          1.00 dB
PL12         17.00 dB
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52.10
56.41
67.16
76.59
77.02
77.44

121.58
127.72
128.09
128.27
128.57
131.70
136.16
138.71
139.11
155.56
165.84



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NAME 101007
EXPNO 5
PROCNO 1
Date_ 20101007
Time 12.05
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 6188.119 Hz
AQ 0.094423 Hz
RG 5.2953587 sec
RG 128
DE 80.800 usec
TE 6.50 usec
TD0 300.0 K
D1 1.00000000 sec
D1 1
===== CHANNEL f1 =====
NUC1 1H
P1 11.80 usec
PL1 0.00 dB
PL1W 11.55467796 W
SFO1 300.1318534 MHz
SI 32768
SF 300.1300033 MHz
WDW EM
SSB 0
LB 0
GB 0
PC 1.00
    
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0.000

3.672

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5.696

5.726

5.826

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5.934

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7.228

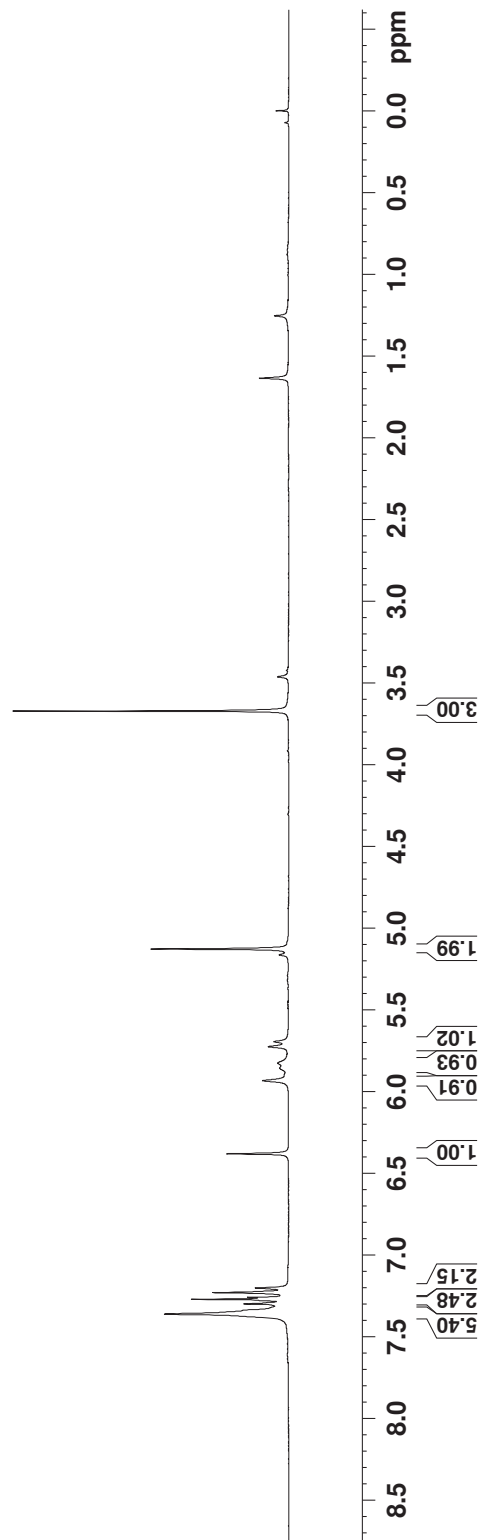
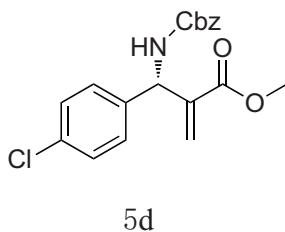
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7.268

7.275

7.297

7.359



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NAME          1011007
EXPNO         6
PROCNO        1
Date_         20101007
Time_         12.16
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            500
DS            4
SWH           18028.846 Hz
FIDRES        0.275098 Hz
AQ            1.8175818 sec
RG            203
DW            27.733 usec
DE            6.50 usec
TE            300.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1

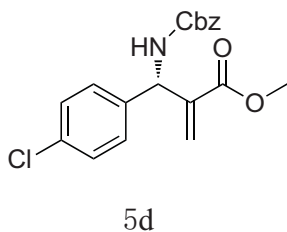
===== CHANNEL f1 =====
NUC1          13C
P1            9.70 usec
PL1           0.00 dB
PL1W          29.38907051 W
SFO1          75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           1.00 dB
PL12          17.00 dB
PL13          17.00 dB
PL14          17.00 dB
PL15          17.00 dB
PL16          17.00 dB
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PL315         17.00 dB
PL316         17.00 dB
PL317         17.00 dB
PL318         17.00 dB
PL319         17.00 dB
PL320         17.00 dB
PL321         17.00 dB
PL322         17.00 dB
PL323         17.00 dB
PL324         17.00 dB
PL325         17.00 dB
PL326         17.00 dB
PL327         17.00 dB
PL328         17.00 dB
PL329         17.00 dB
PL330         17.00 dB
PL331         17.00 dB
PL332         17.00 dB
PL333         17.00 dB
PL334         17.00 dB
PL335         17.00 dB
PL336         17.00 dB
PL337         17.00 dB
PL338         17.00 dB
PL339         17.00 dB
PL340         17.00 dB
PL341         17.00 dB
PL342         17.00 dB
PL343         17.00 dB
PL344         17.00 dB
PL345         17.00 dB
PL346         17.00 dB
PL347         17.00 dB
PL348         17.00 dB
PL349         17.00 dB
PL350         17.00 dB
PL351         17.00 dB
PL352         17.00 dB
PL353         17.00 dB
PL354         17.00 dB
PL355         17.00 dB
PL356         17.00 dB
PL357         17.00 dB
PL358         17.00 dB
PL359         17.00 dB
PL360         17.00 dB
PL361         17.00 dB
PL362         17.00 dB
PL363         17.00 dB
PL364         17.00 dB
PL365         17.00 dB
PL366         17.00 dB
PL367         17.00 dB
PL368         17.00 dB
PL369         17.00 dB
PL370         17.00 dB
PL371         17.00 dB
PL372         17.00 dB
PL373         17.00 dB
PL374         17.00 dB
PL375         17.00 dB
PL376         17.00 dB
PL377         17.00 dB
PL378         17.00 dB
PL379         17.00 dB
PL380         17.00 dB
PL381         17.00 dB
PL382         17.00 dB
PL383         17.00 dB
PL384         17.00 dB
PL385         17.00 dB
PL386         17.00 dB
PL387         17.00 dB
PL388         17.00 dB
PL389         17.00 dB
PL390         17.00 dB
PL391         17.00 dB
PL392         17.00 dB
PL393         17.00 dB
PL394         17.00 dB
PL395         17.00 dB
PL396         17.00 dB
PL397         17.00 dB
PL398         17.00 dB
PL399         17.00 dB
PL400         17.00 dB
PL401         17.00 dB
PL402         17.00 dB
PL403         17.00 dB
PL404         17.00 dB
PL405         17.00 dB
PL406         17.00 dB
PL407         17.00 dB
PL408         17.00 dB
PL409         17.00 dB
PL410         17.00 dB
PL411         17.00 dB
PL412         17.00 dB
PL413         17.00 dB
PL414         17.00 dB
PL415         17.00 dB
PL416         17.00 dB
PL417         17.00 dB
PL418         17.00 dB
PL419         17.00 dB
PL420         17.00 dB
PL421         17.00 dB
PL422         17.00 dB
PL423         17.00 dB
PL424         17.00 dB
PL425         17.00 dB
PL426         17.00 dB
PL427         17.00 dB
PL428         17.00 dB
PL429         17.00 dB
PL430         17.00 dB
PL431         17.00 dB
PL432         17.00 dB
PL433         17.00 dB
PL434         17.00 dB
PL435         17.00 dB
PL436         17.00 dB
PL437         17.00 dB
PL438         17.00 dB
PL439         17.00 dB
PL440         17.00 dB
PL441         17.00 dB
PL442         17.00 dB
PL443         17.00 dB
PL444         17.00 dB
PL445         17.00 dB
PL446         17.00 dB
PL447         17.00 dB
PL448         17.00 dB
PL449         17.00 dB
PL450         17.00 dB
PL451         17.00 dB
PL452         17.00 dB
PL453         17.00 dB
PL454         17.00 dB
PL455         17.00 dB
PL456         17.00 dB
PL457         17.00 dB
PL458         17.00 dB
PL459         17.00 dB
PL460         17.00 dB
PL461         17.00 dB
PL462         17.00 dB
PL463         17.00 dB
PL464         17.00 dB
PL465         17.00 dB
PL466         17.00 dB
PL467         17.00 dB
PL468         17.00 dB
PL469         17.00 dB
PL470         17.00 dB
PL471         17.00 dB
PL472         17.00 dB
PL473         17.00 dB
PL474         17.00 dB
PL475         17.00 dB
PL476         17.00 dB
PL477         17.00 dB
PL478         17.00 dB
PL479         17.00 dB
PL480         17.00 dB
PL481         17.00 dB
PL482         17.00 dB
PL483         17.00 dB
PL484         17.00 dB
PL485         17.00 dB
PL486         17.00 dB
PL487         17.00 dB
PL488         17.00 dB
PL489         17.00 dB
PL490         17.00 dB
PL491         17.00 dB
PL492         17.00 dB
PL493         17.00 dB
PL494         17.00 dB
PL495         17.00 dB
PL496         17.00 dB
PL497         17.00 dB
PL498         17.00 dB
PL499         17.00 dB
PL500         17.00 dB
    
```

77.42
77.00
76.58
67.12
56.31
52.06

139.13
138.14
136.14
133.41
128.73
128.54
128.24
127.72
127.63

165.82
155.54

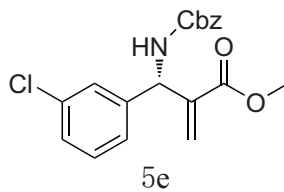


```

NAME          101008
EXPNO         3
PROCNO        1
Date_         20101008
Time          21.43
INSTRUM      spect
PROBHD       5 mm PABBO-DEL
PULPROG      zgpg30
TD           65536
SOLVENT      CDCl3
DS           8
NS           2
SWH          6188.119 Hz
FIDRES       0.094423 Hz
AQ           5.2953587 sec
RG           57
DW           80.800 usec
DE           6.50 usec
TE           290.6 K
D1           1.00000000 sec
TD0          1

===== CHANNEL f1 =====
NUC1         1H
P1           11.80 usec
PL1          0.00 dB
PL1W        11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300273 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```

0.000



3.601

5.057

5.628

5.659

5.794

5.824

5.865

6.318

7.080

7.093

7.102

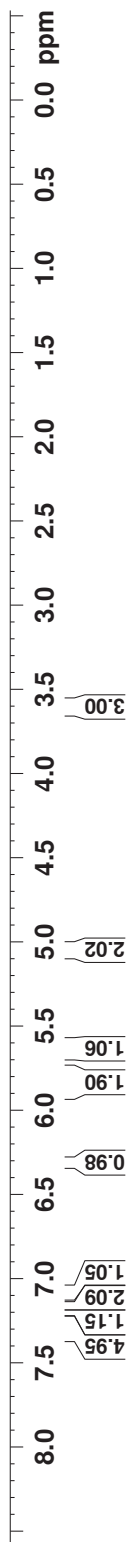
7.154

7.165

7.173

7.197

7.284



```

NAME      101008
EXPNO     10
PROCNO    1
Date_     20101008
Time      21.51
INSTRUM   spect
PROBHD    5 mm FAPBBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         203
DS         4
SWH        18028.846 Hz
FIDRES     0.275098 Hz
AQ          1.8175818 sec
RG          203
DW          27.733 usec
DE          6.50 usec
TE          291.4 K
D1          2.0000000 sec
D11         0.0300000 sec
TD0         1
    
```

```

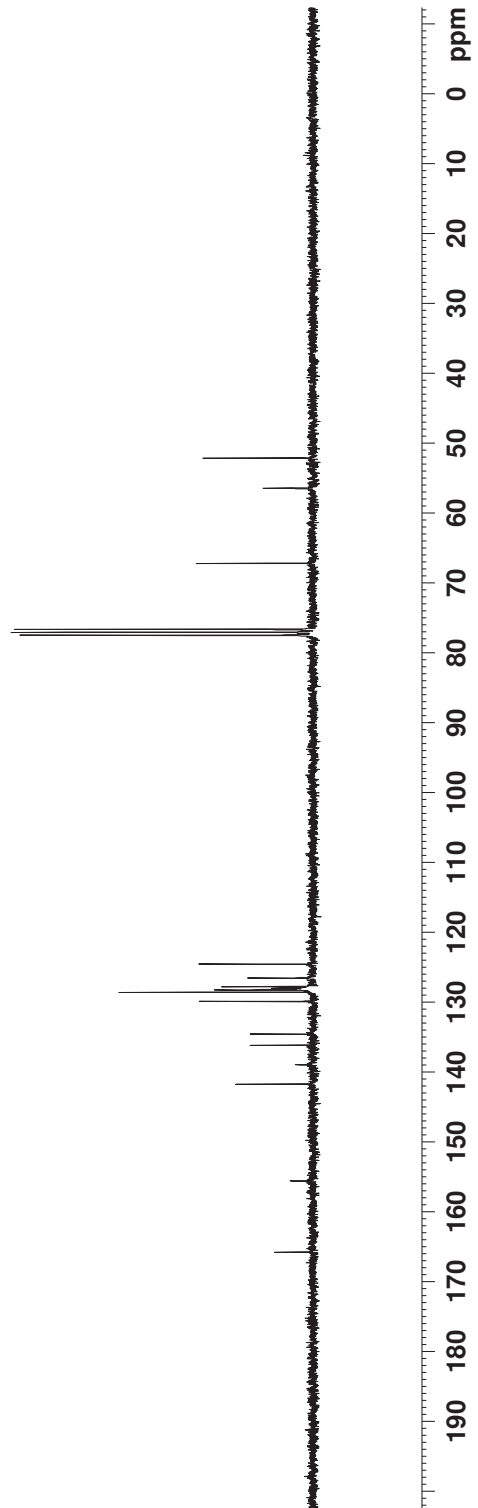
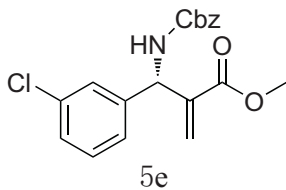
===== CHANNEL f1 =====
NUC1      13C
P1         9.70 usec
PL1        0.00 dB
PL1W       29.38907051 W
SFO1       75.4752953 MHz
    
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2       1H
PCPD2     80.00 usec
PL2        1.00 dB
PL12       17.00 dB
PL13       17.00 dB
PL14       17.00 dB
PL15       17.00 dB
PL16       17.00 dB
PL17       17.00 dB
PL18       17.00 dB
PL19       17.00 dB
PL20       17.00 dB
PL21       17.00 dB
PL22       17.00 dB
PL23       17.00 dB
PL24       17.00 dB
PL25       17.00 dB
PL26       17.00 dB
PL27       17.00 dB
PL28       17.00 dB
PL29       17.00 dB
PL30       17.00 dB
PL31       17.00 dB
PL32       17.00 dB
PL33       17.00 dB
PL34       17.00 dB
PL35       17.00 dB
PL36       17.00 dB
PL37       17.00 dB
PL38       17.00 dB
PL39       17.00 dB
PL40       17.00 dB
PL41       17.00 dB
PL42       17.00 dB
PL43       17.00 dB
PL44       17.00 dB
PL45       17.00 dB
PL46       17.00 dB
PL47       17.00 dB
PL48       17.00 dB
PL49       17.00 dB
PL50       17.00 dB
PL51       17.00 dB
PL52       17.00 dB
PL53       17.00 dB
PL54       17.00 dB
PL55       17.00 dB
PL56       17.00 dB
PL57       17.00 dB
PL58       17.00 dB
PL59       17.00 dB
PL60       17.00 dB
PL61       17.00 dB
PL62       17.00 dB
PL63       17.00 dB
PL64       17.00 dB
PL65       17.00 dB
PL66       17.00 dB
PL67       17.00 dB
PL68       17.00 dB
PL69       17.00 dB
PL70       17.00 dB
PL71       17.00 dB
PL72       17.00 dB
PL73       17.00 dB
PL74       17.00 dB
PL75       17.00 dB
PL76       17.00 dB
PL77       17.00 dB
PL78       17.00 dB
PL79       17.00 dB
PL80       17.00 dB
PL81       17.00 dB
PL82       17.00 dB
PL83       17.00 dB
PL84       17.00 dB
PL85       17.00 dB
PL86       17.00 dB
PL87       17.00 dB
PL88       17.00 dB
PL89       17.00 dB
PL90       17.00 dB
PL91       17.00 dB
PL92       17.00 dB
PL93       17.00 dB
PL94       17.00 dB
PL95       17.00 dB
PL96       17.00 dB
PL97       17.00 dB
PL98       17.00 dB
PL99       17.00 dB
PL100      17.00 dB
    
```

52.12
 56.43
 67.18
 76.62
 77.05
 77.47

124.55
 126.53
 127.78
 128.00
 128.26
 128.57
 129.87
 134.56
 136.17
 138.94
 141.74
 155.58
 165.79




```

NAME                101021
EXPNO                1
PROCNO               1
Date_                20101021
Time                 9.36
INSTRUM              spect
PROBHD               5 mm PABBO BB
PULPROG              zgpg30
TD                   65536
SOLVENT              CDCl3
NS                   8
DS                   2
SWH                  6188.119 Hz
FIDRES              0.094423 Hz
AQ                   5.2953587 sec
RG                   36
DE                   80.800 usec
TE                   290.2 K
D1                   1.00000000 sec
TD0                  1

===== CHANNEL f1 =====
NUC1                 1H
P1                   11.80 usec
PL1                  0.00 dB
PL1W                 11.55467796 W
SFO1                 300.1318534 MHz
SI                   32768
SF                   300.1300057 MHz
WDW                  EM
SSB                   0
LB                   0.30 Hz
GB                   0
PC                   1.00
    
```

0.000

3.674

5.109

5.679

5.707

5.739

5.865

6.136

6.165

6.398

7.200

7.206

7.215

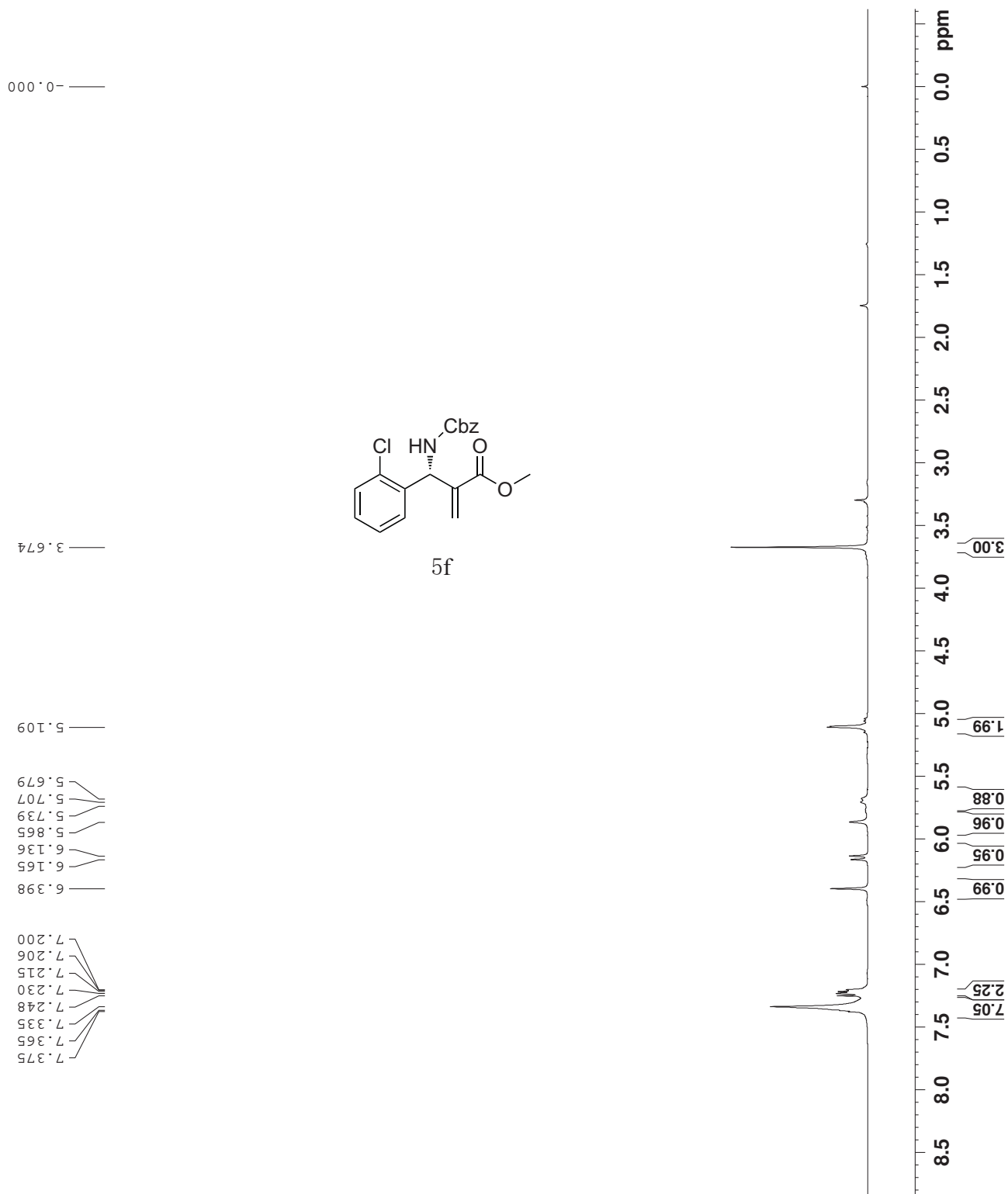
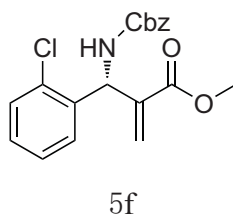
7.230

7.248

7.335

7.365

7.375



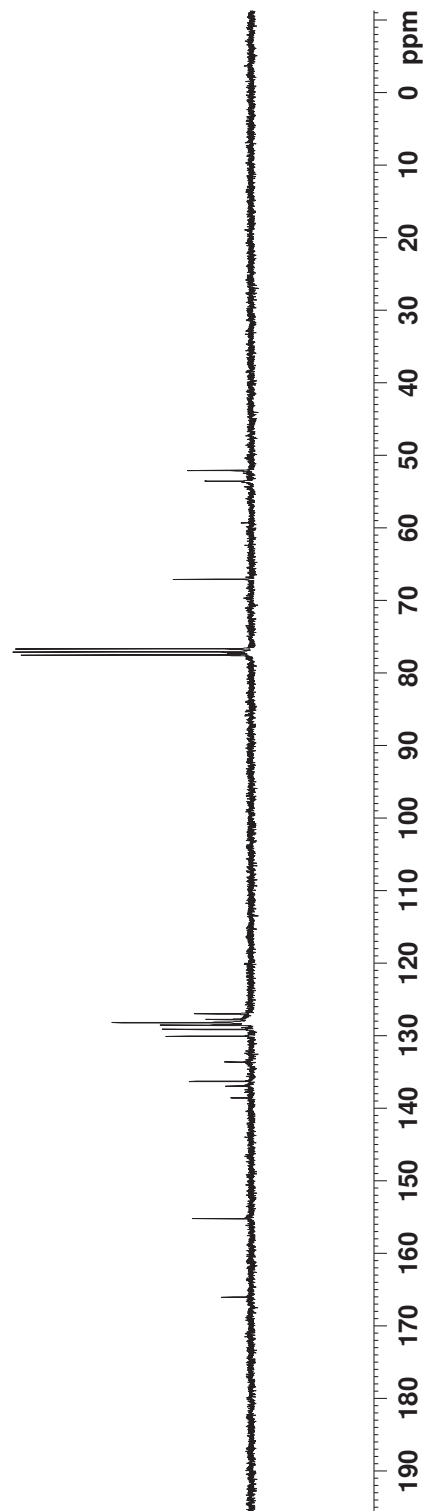
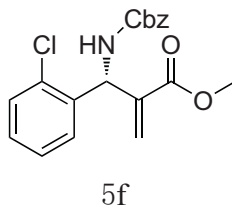
```

NAME 101021
EXPNO 2
PROCNO 1
Date_ 20101021
Time_ 9.43
INSTRUM spect
PROBHD 5 mm F4BBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 180
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 291.1 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL14 17.00 dB
PL2W 9.17820644 W
PL12W 0.23054613 W
PL13W 0.23054613 W
SFO2 300.132008 MHz
SI 2
SF 75.4677496 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
    
```

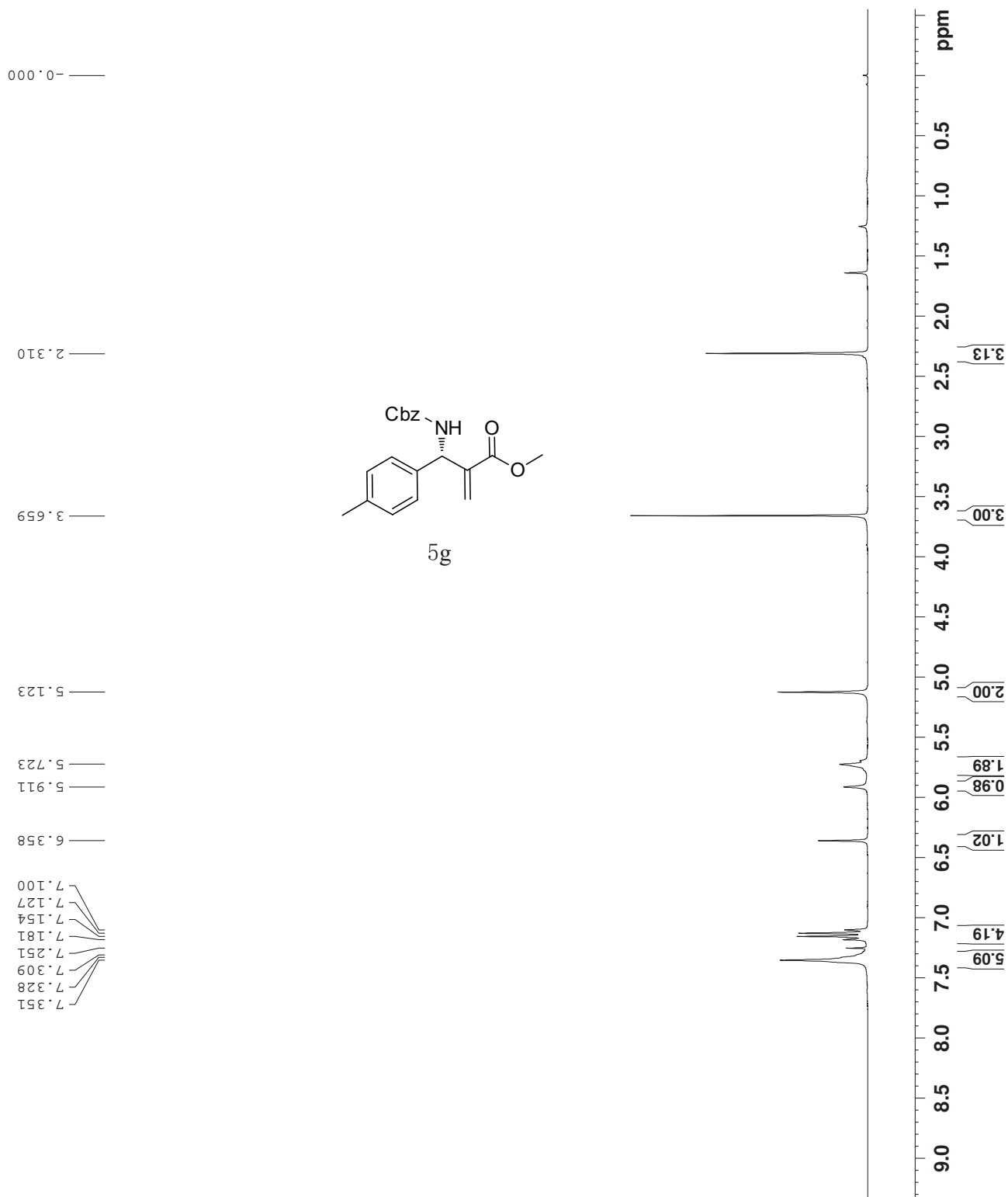
126.96
 127.74
 128.19
 128.53
 129.12
 130.07
 130.61
 133.61
 136.28
 136.94
 138.56
 155.21
 165.98
 52.07
 53.53
 67.07
 76.66
 77.08
 77.51



```

NAME          101007
EXPNO         9
PROCNO        1
Date_         20101007
Time          13.41
INSTRUM       spect
PROBHD        5 mm PABBO QNP
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            2
SWH           6188.119 Hz
AQ            0.094423 Hz
RG            5.2953587 sec
DE            80.800 usec
TE            300.0 K
D1            1.00000000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          1H
P1            11.80 usec
PL1           0.00 dB
PL1W          11.55467796 W
SFO1          300.1318534 MHz
SI            32768
SF            300.1300050 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
    
```



```

NAME      1011007
EXPNO     10
PROCNO    1
Date_     20101007
Time      13.46
INSTRUM   spect
PROBHD    5 mm FAPBBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         702
DS         4
SWH        18028.846 Hz
FIDRES     0.275098 Hz
AQ         1.8175818 sec
RG         203
DW         27.733 usec
DE         6.50 usec
TE         300.0 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1
    
```

```

===== CHANNEL f1 =====
NUC1      13C
P1        9.70 usec
PL1       0.00 dB
PL1W      29.38907051 W
SFO1      75.4752953 MHz
    
```

```

===== CHANNEL f2 =====
CPDPRG2   waltz16
NUC2      1H
PCPD2     80.00 usec
PL2       1.00 dB
PL12      17.00 dB
PL13      17.00 dB
PL14      17.00 dB
PL2W      9.17820644 W
PL12W     0.23054613 W
PL13W     0.23054613 W
SFO2      300.132000 MHz
SI         2
SF         75.4677588 MHz
WDW        EM
SSB         0
LB         1.00 Hz
GB         0
PC         1.40
    
```



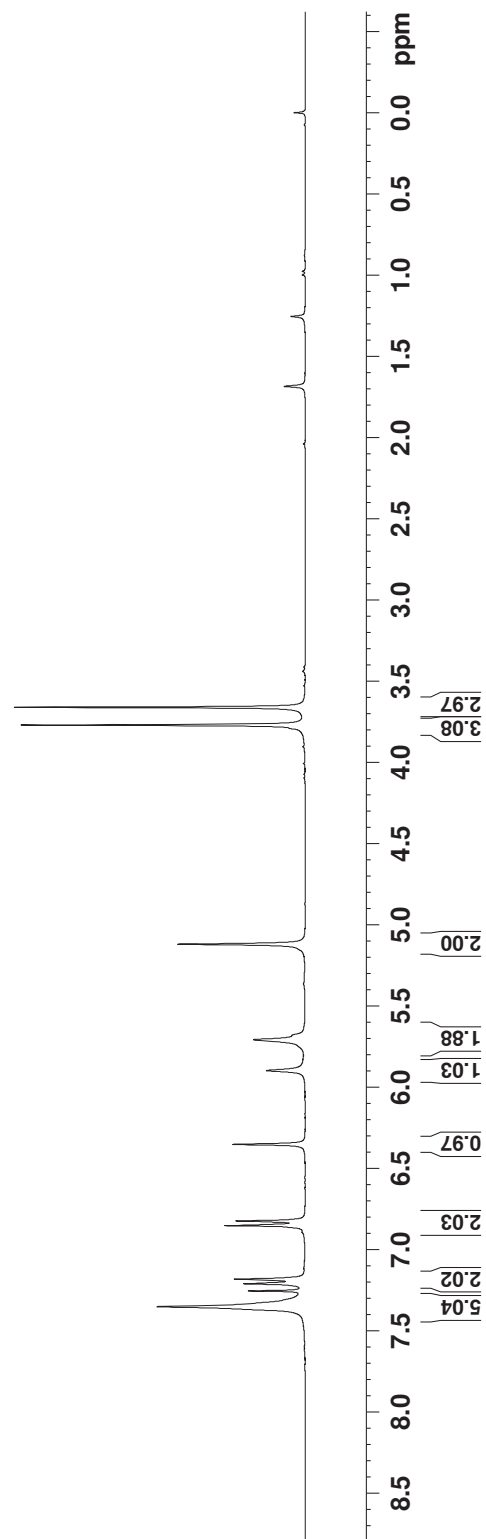
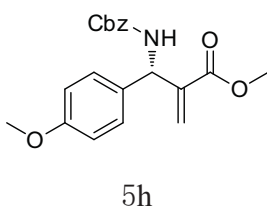
```

NAME 101018
EXPNO 1
PROCNO 1
Date_ 20101011
Time 9.45
INSTRUM spect
PROBHD 5 mm PABBO
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 50.8
DW 80.800 usec
DE 6.50 usec
TE 290.2 K
D1 1.00000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.80 usec
PL1 0.00 dB
PL1W 11.55467796 W
SFO1 300.1318534 MHz
SI 32768
SF 300.1300045 MHz
WDW EM
SSB 0
LB 0
GB 0
PC 1.00
    
```

0.000

7.349
7.208
7.180
6.850
6.821
6.350
5.998
5.709
5.120
3.771
3.662

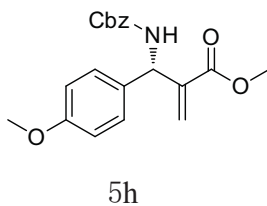


```

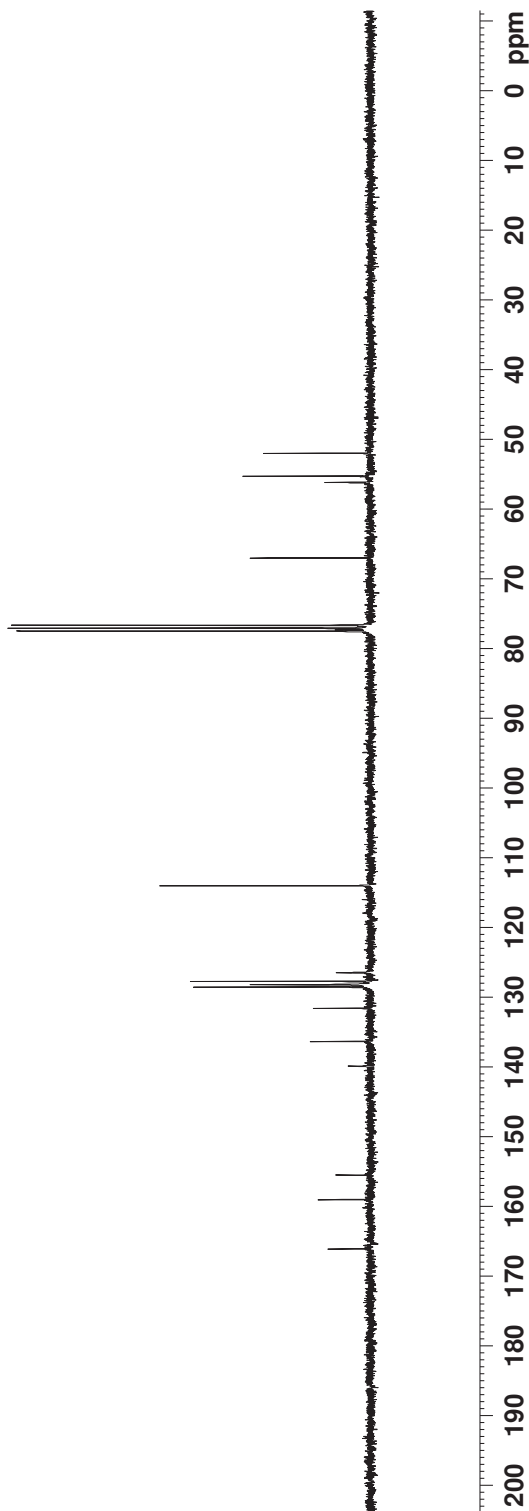
NAME          101018
EXPNO         2
PROCNO        1
Date_         20101018
Time_         9.54
INSTRUM       spect
PROBHD        5 mm FAPBBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            293
DS            4
SWH           18028.846 Hz
FIDRES       0.275098 Hz
AQ           1.8175818 sec
RG           203
DW           27.733 usec
DE           6.50 usec
TE           291.1 K
D1           2.0000000 sec
D11          0.0300000 sec
TD0          1

===== CHANNEL f1 =====
NUC1          13C
P1           9.70 usec
PL1          0.00 dB
PL1W         29.38907051 W
SFO1         75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2      waltz16
NUC2          1H
PCPD2       80.00 usec
PL2          1.00 dB
PL12         17.00 dB
PL13         17.00 dB
PL2W         9.17820644 W
PL12W        0.23054613 W
PL13W        0.23054613 W
SFO2         300.13208 MHz
SI           2
SF           75.4677496 MHz
WDW          EM
SSB          0
LB           1.00 Hz
GB           0
PC           1.40
    
```



166.10
 159.02
 155.49
 139.86
 136.34
 131.59
 128.53
 128.19
 127.72
 126.47
 114.00
 77.47
 77.05
 76.63
 66.98
 56.15
 55.25
 51.97

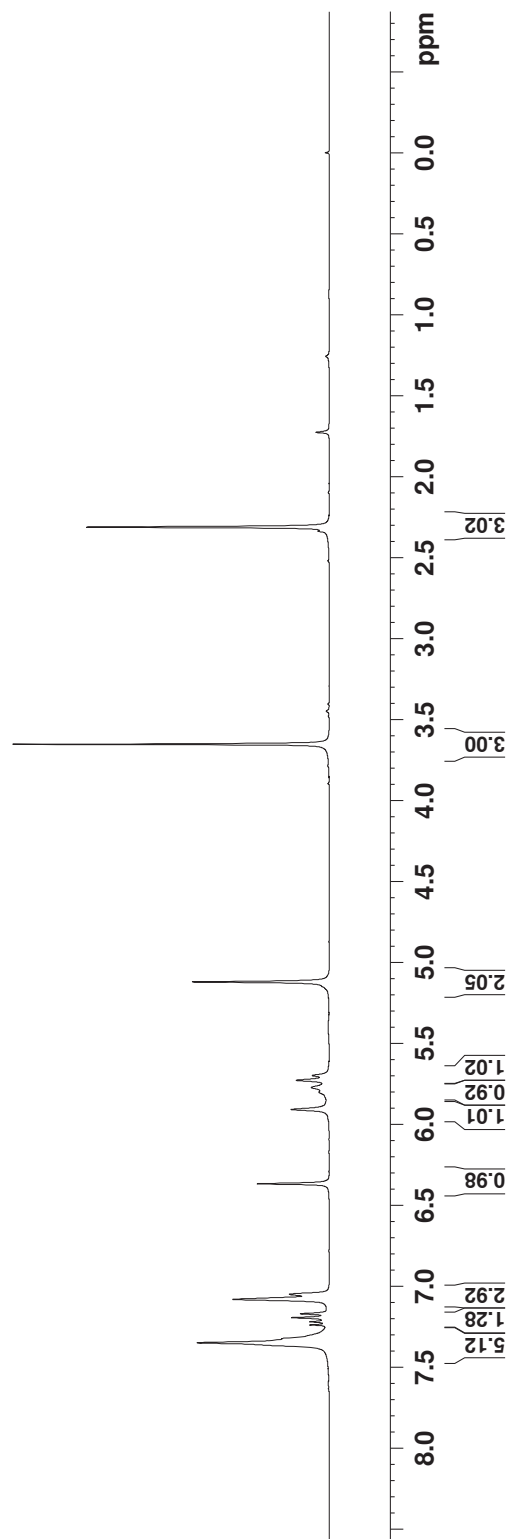
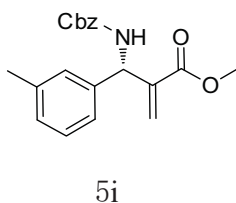


```

NAME          101023
EXPNO         6
PROCNO        1
Date_         20101023
Time_         20.47
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            2
SWH           6188.119 Hz
FIDRES       0.094423 Hz
AQ           5.2953587 sec
RG            36
DW           80.800 usec
DE           6.50 usec
TE           290.4 K
D1           1.00000000 sec
TD0          1

===== CHANNEL f1 =====
NUCL          1H
P1           11.80 usec
PL1          0.00 dB
PL1W         11.55467796 W
SFOL         300.1318534 MHz
SI           32768
SF           300.1300093 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```

7.346
7.320
7.236
7.217
7.191
7.167
7.079
7.048
6.364
5.909
5.802
5.773
5.728
5.699
5.121
3.653
2.311
-0.000

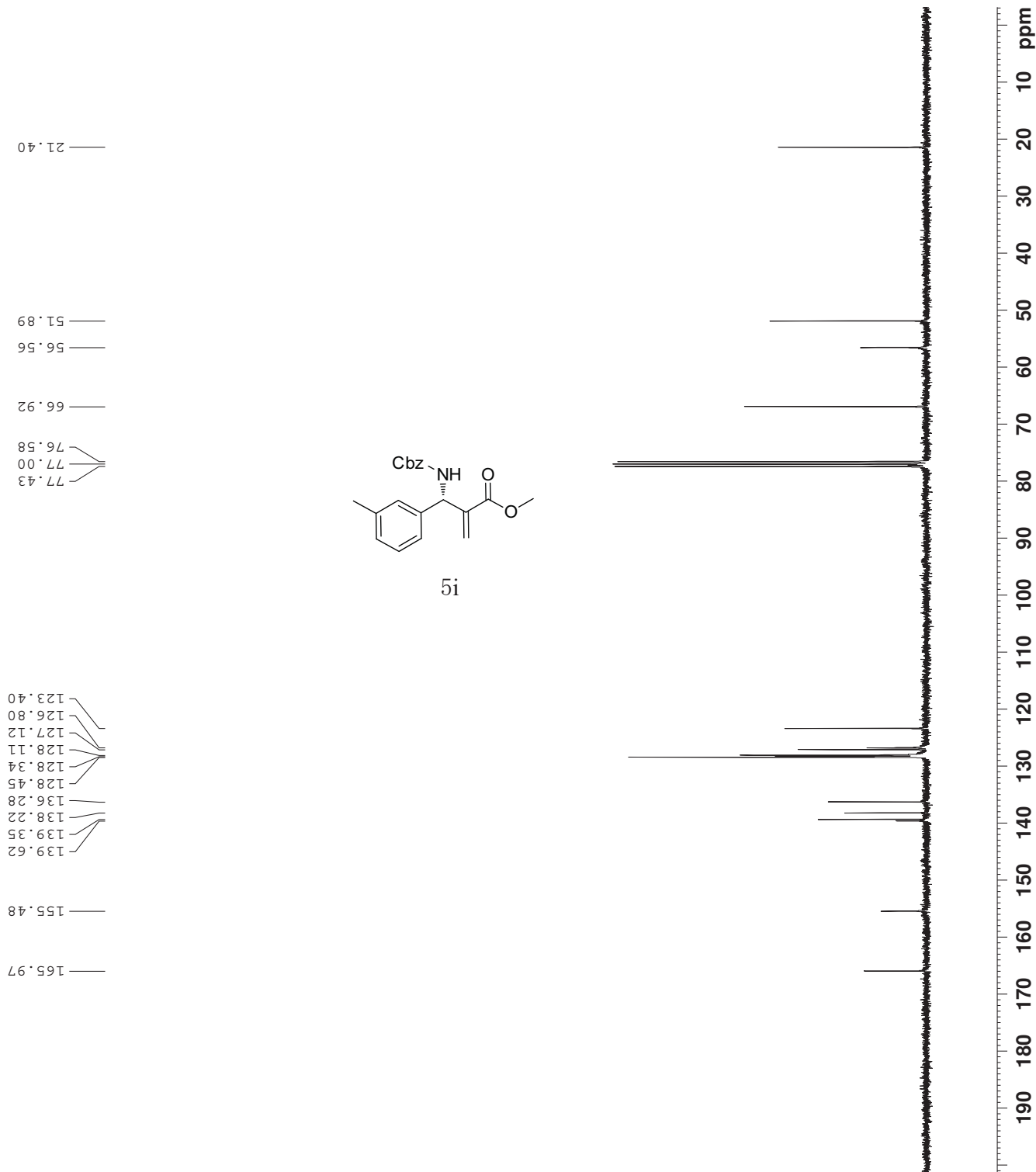
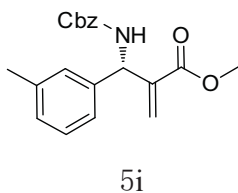


```

NAME 101023
EXPNO 7
PROCNO 1
Date_ 20101023
Time_ 20.53
INSTRUM spect
PROBHD 5 mm FAPBBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 321
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 291.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL2W 17.00 dB
PL3 17.00 dB
PL3W 9.17820644 W
PL4W 0.23054613 W
SFO2 300.132068 MHz
SI 2
SF 75.4677588 MHz
RG 80
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
    
```




```

NAME          101021
EXPNO         3
PROCNO        1
Date_         20101021
Time          9.54
INSTRUM       spect
PROBHD        5 mm PABBO BB
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            2
SWH           6188.119 Hz
AQ            0.094423 Hz
RG            45.2
DE            80.800 usec
TE            290.5 K
D1            1.00000000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          1H
P1            11.80 usec
PL1           0.00 dB
PL1W          11.55467796 W
SFO1          300.1318534 MHz
SI            32768
SF            300.1300059 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
    
```

— 0.000

— 3.671

— 5.134

— 5.776

— 5.807

— 5.968

— 6.406

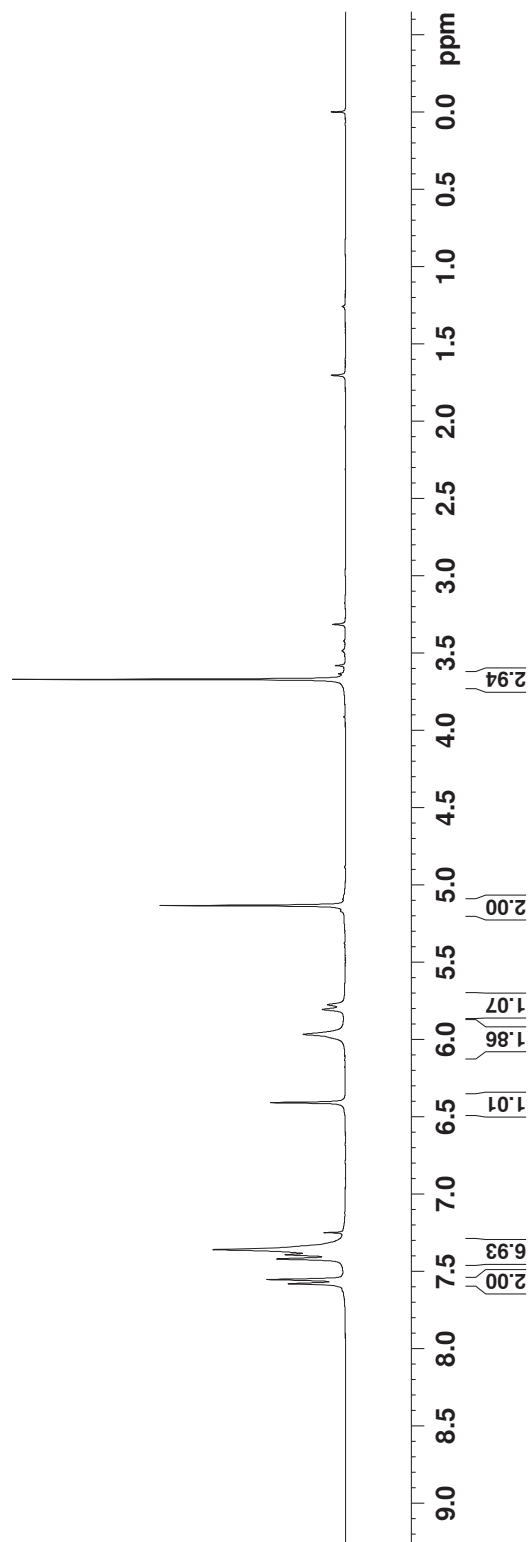
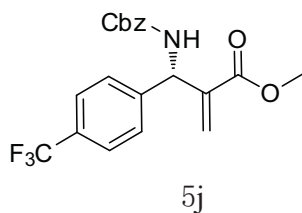
— 7.357

— 7.390

— 7.418

— 7.551

— 7.578



```

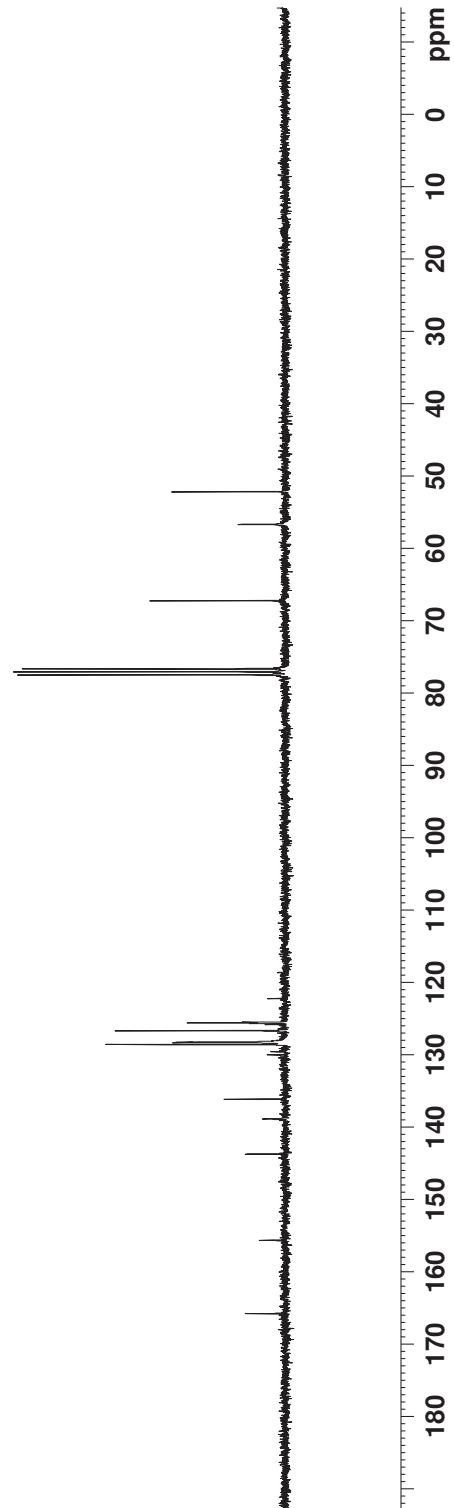
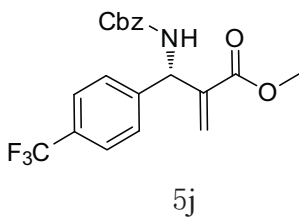
NAME 101021
EXPNO 4
PROCNO 1
Date_ 20101021
Time_ 10.02
INSTRUM spect
PROBHD 5 mm FAPBBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 143
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 291.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL2W 9.17820644 W
PL12W 0.23054613 W
PL13W 0.23054613 W
SFO2 300.132000 MHz
SI 2
SF 75.4677496 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
    
```

52.15
 56.66
 67.23
 76.63
 77.05
 77.48

122.23
 125.50
 125.55
 125.60
 125.83
 126.67
 128.24
 128.30
 128.58
 128.58
 129.57
 130.00
 136.12
 138.87
 143.72
 155.66
 165.77



```

NAME          101016
EXPNO         2
PROCNO        1
Date_         20101011
Time         17.16
INSTRUM       spect
PROBHD        5 mm PABBO BB
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            2
SWH           6188.119 Hz
AQ            0.094423 Hz
RG            5.2953587 sec
RG            128
DE            80.800 usec
TE            290.7 K
D1            1.00000000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          1H
P1            11.80 usec
PL1           0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300021 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```

0.000

3.684

5.140

5.757

5.788

5.961

5.997

6.425

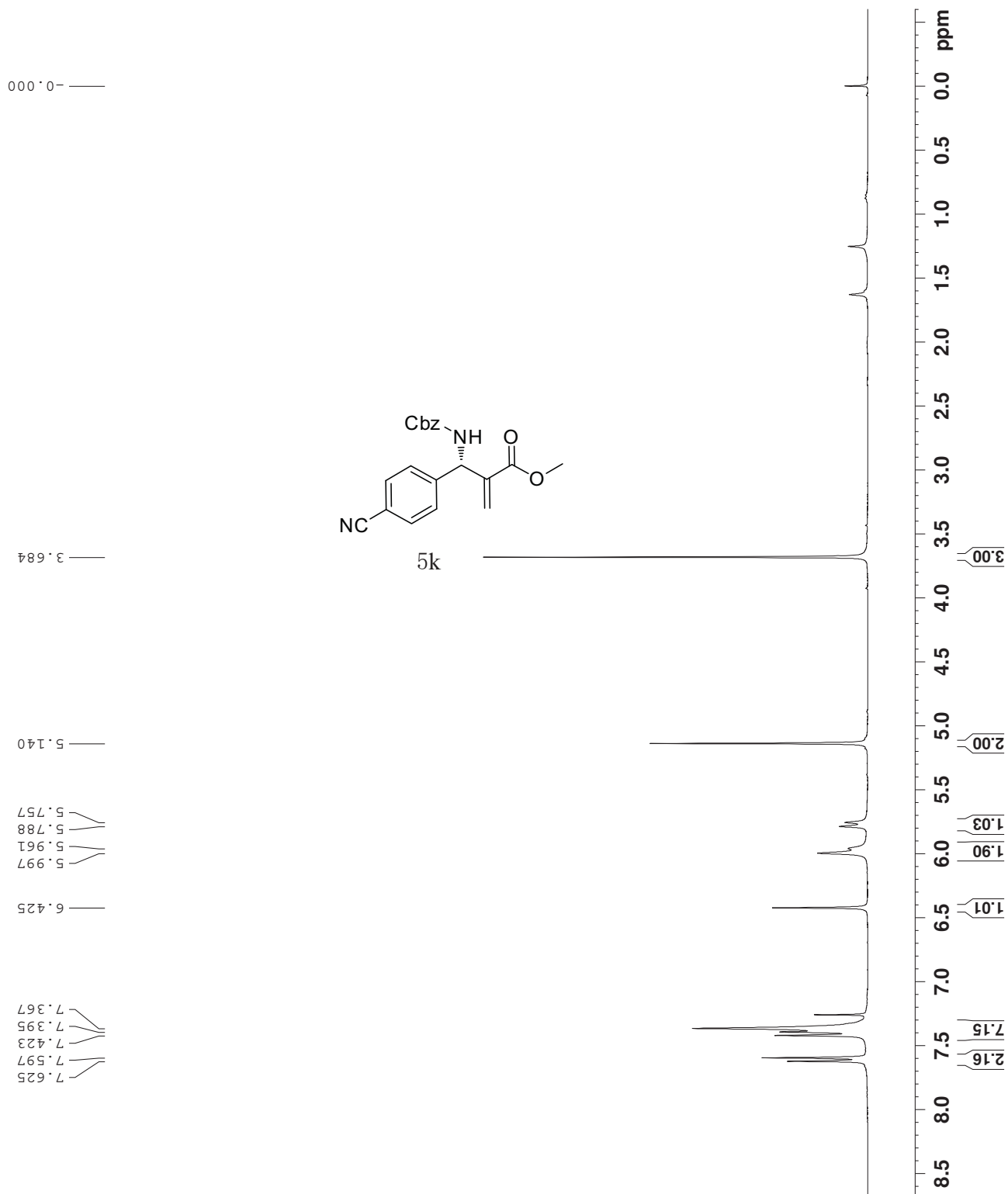
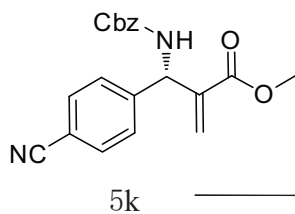
7.367

7.395

7.423

7.597

7.625



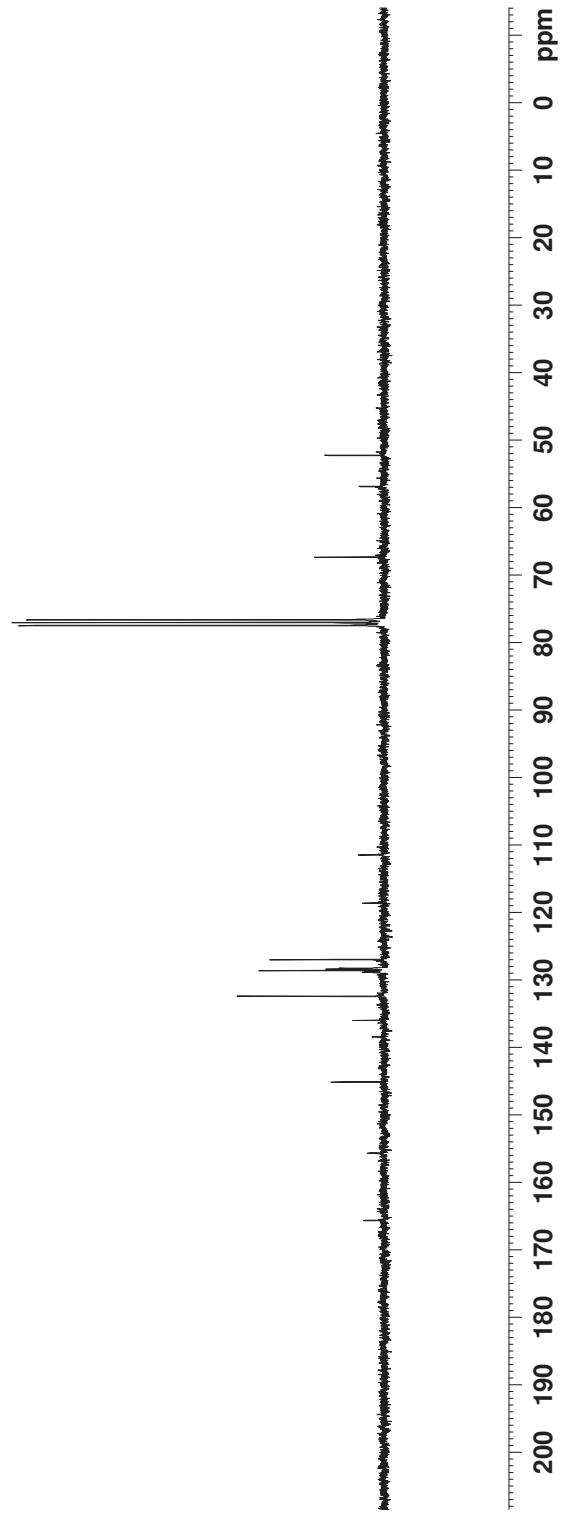
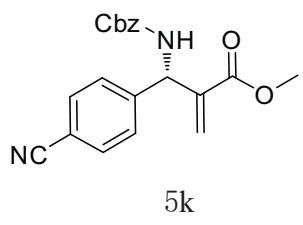
```

NAME 101016
EXPNO 3
PROCNO 1
Date_ 20101016
Time_ 16.37
INSTRUM spect
PROBHD 5 mm FAPBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 323
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 291.4 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

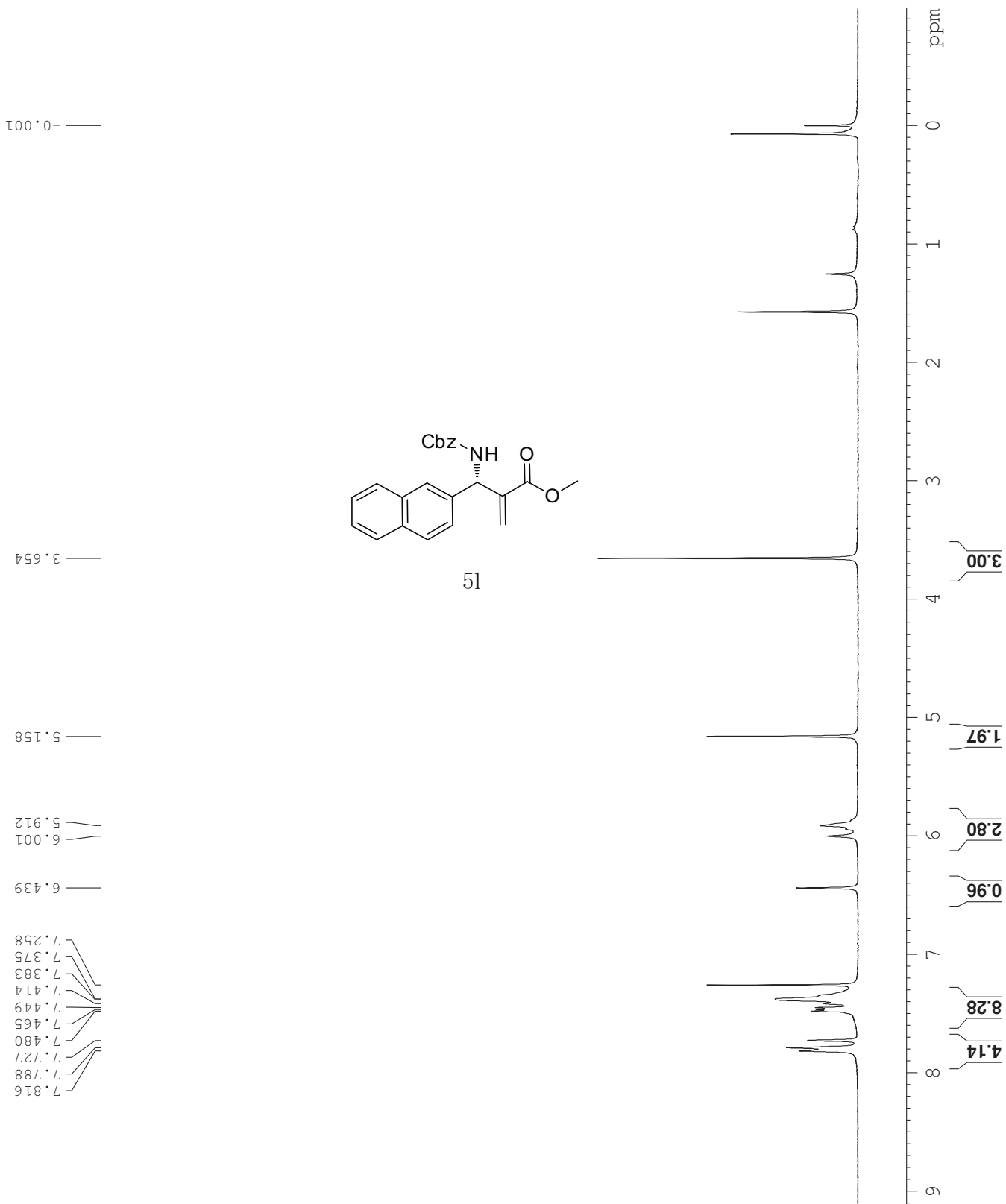
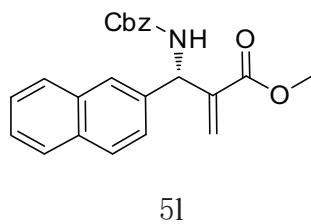
===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL2W 17.00 dB
PL13 17.00 dB
PL14 17.00 dB
PL15 17.00 dB
PL2W 9.17820644 W
PL12W 0.23084613 W
PL13W 0.23084613 W
SFO2 300.135208 MHz
SI 2
SF 75.4677496 MHz
RG 64
KWDW EM
LSB 1.00 Hz
GB 0
PC 1.40
    
```

52.24
 56.84
 67.33
 76.61
 77.03
 77.45
 111.46
 118.59
 126.98
 128.26
 128.36
 128.60
 128.84
 132.40
 136.00
 138.44
 145.11
 155.66
 165.64



```
NAME 101010
EXPNO 3
PROCNO 1
Date_ 20101010
Time 17.35
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zg30
TD 65536
SOLVENT CDC13
NS 8
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.2953587 sec
RG 203
DE 80.800 usec
TE 6.50 usec
D1 290.0 K
D11 1.0000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.80 usec
PL1 0.00 dB
PL1W 11.55467796 W
SF01 300.1318534 MHz
SI 32768
SF 300.1300028 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
```



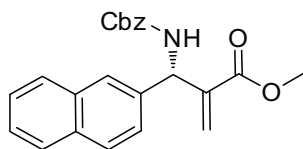
```

NAME          101011
EXPNO         2
PROCNO        1
Date_         20101011
Time_        10.25
INSTRUM       spect
PROBHD        5 mm FAPBBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            797
DS            4
SWH           18028.846 Hz
FIDRES        0.275098 Hz
AQ            1.8175818 sec
RG            203
DW            27.733 usec
DE            6.50 usec
TE            290.4 K
D1            2.0000000 sec
D11           0.0300000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          13C
P1            9.70 usec
PL1           0.00 dB
PL1W          29.38907051 W
SFO1          75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           1.00 dB
PL2W          17.00 dB
PL3           17.00 dB
PL3W          17.00 dB
PL4           9.17820644 W
PL4W          0.23084613 W
PL5           0.23084613 W
PL5W          300.132968 MHz
SI           2
SF            75.4677496 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
    
```

166.04
 155.62
 139.57
 136.93
 136.28
 133.23
 132.78
 128.56
 128.48
 128.24
 128.03
 127.61
 127.31
 126.27
 126.09
 125.11
 124.68
 77.45
 77.02
 76.60
 67.11
 56.82
 52.03



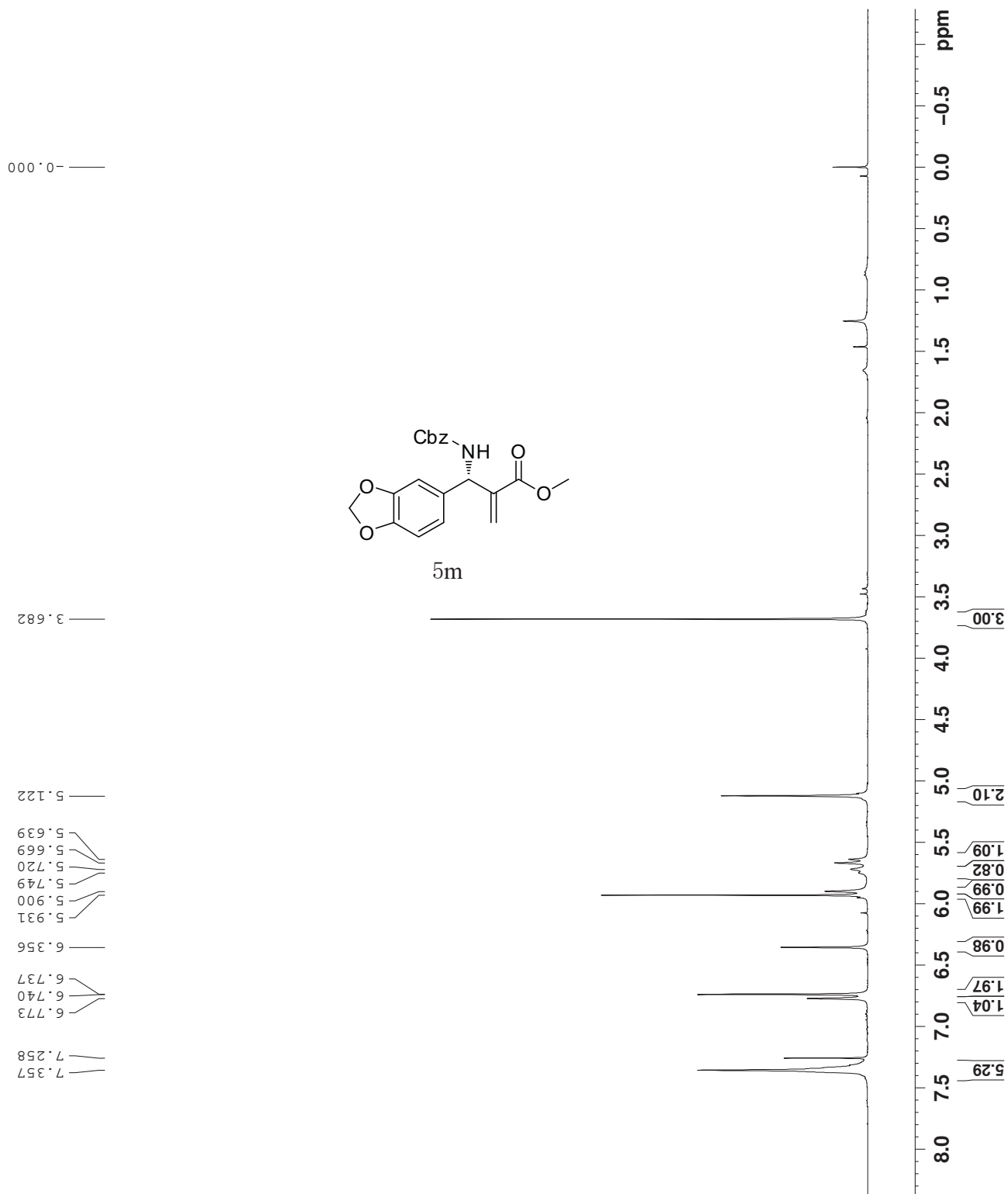
51

190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 ppm

```

NAME      110103
EXPNO    10
PROCNO   1
Date_    20110103
Time     17.41
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       2
DS       2
SWH      6188.119 Hz
AQ       0.094423 Hz
RG       5.2953567 sec
WDW      80.800 usec
DE       6.50 usec
TE       287.0 K
D1       1.00000000 sec
TD0      1

=====
CHANNEL f1
=====
NUC1     1H
P1       11.80 usec
PL1      0.00 dB
PL1W     11.55467796 W
SFO1     300.1318534 MHz
SI       32768
SF       300.1300028 MHz
WDW      EM
SSB      0
LB       0.30 Hz
GB       0
PC       1.00
    
```



```

NAME      110103
EXPNO     12
PROCNO    1
Date_     20110103
Time      17.49
INSTRUM   spect
PROBHD    5 mm FAPBBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         251
DS         4
SWH        18028.846 Hz
FIDRES     0.275098 Hz
AQ         1.8175818 sec
RG         203
DW         27.733 usec
DE         6.50 usec
TE         287.3 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1
    
```

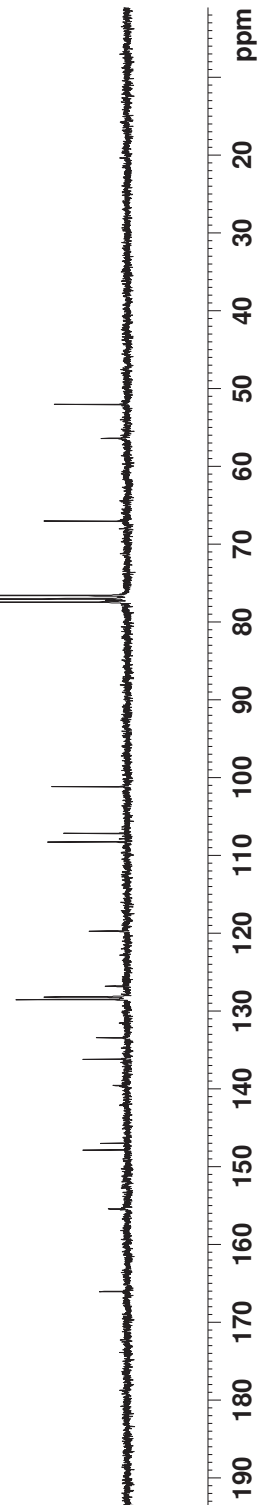
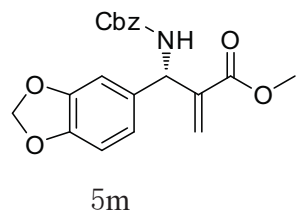
```

===== CHANNEL f1 =====
NUC1       13C
P1         9.70 usec
PL1        0.00 dB
PL1W       29.38907051 W
SFO1       75.4752953 MHz
    
```

```

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      80.00 usec
PL2        1.00 dB
PL12       17.00 dB
PL13       17.00 dB
PL14       17.00 dB
PL15       17.00 dB
PL16       17.00 dB
PL17       17.00 dB
PL18       17.00 dB
PL19       17.00 dB
PL20       17.00 dB
PL21       17.00 dB
PL22       17.00 dB
PL23       17.00 dB
PL24       17.00 dB
PL25       17.00 dB
PL26       17.00 dB
PL27       17.00 dB
PL28       17.00 dB
PL29       17.00 dB
PL30       17.00 dB
PL31       17.00 dB
PL32       17.00 dB
PL33       17.00 dB
PL34       17.00 dB
PL35       17.00 dB
PL36       17.00 dB
PL37       17.00 dB
PL38       17.00 dB
PL39       17.00 dB
PL40       17.00 dB
PL41       17.00 dB
PL42       17.00 dB
PL43       17.00 dB
PL44       17.00 dB
PL45       17.00 dB
PL46       17.00 dB
PL47       17.00 dB
PL48       17.00 dB
PL49       17.00 dB
PL50       17.00 dB
PL51       17.00 dB
PL52       17.00 dB
PL53       17.00 dB
PL54       17.00 dB
PL55       17.00 dB
PL56       17.00 dB
PL57       17.00 dB
PL58       17.00 dB
PL59       17.00 dB
PL60       17.00 dB
PL61       17.00 dB
PL62       17.00 dB
PL63       17.00 dB
PL64       17.00 dB
PL65       17.00 dB
PL66       17.00 dB
PL67       17.00 dB
PL68       17.00 dB
PL69       17.00 dB
PL70       17.00 dB
PL71       17.00 dB
PL72       17.00 dB
PL73       17.00 dB
PL74       17.00 dB
PL75       17.00 dB
PL76       17.00 dB
PL77       17.00 dB
PL78       17.00 dB
PL79       17.00 dB
PL80       17.00 dB
PL81       17.00 dB
PL82       17.00 dB
PL83       17.00 dB
PL84       17.00 dB
PL85       17.00 dB
PL86       17.00 dB
PL87       17.00 dB
PL88       17.00 dB
PL89       17.00 dB
PL90       17.00 dB
PL91       17.00 dB
PL92       17.00 dB
PL93       17.00 dB
PL94       17.00 dB
PL95       17.00 dB
PL96       17.00 dB
PL97       17.00 dB
PL98       17.00 dB
PL99       17.00 dB
PL100      17.00 dB
    
```

165.98
 155.44
 147.86
 147.00
 139.55
 136.20
 133.42
 128.51
 128.18
 126.80
 119.72
 108.26
 107.14
 101.13
 77.42
 77.00
 76.58
 67.00
 56.39
 52.01




```

NAME          101027
EXPNO         5
PROCNO        1
Date_         20101027
Time          18.18
INSTRUM       spect
PROBHD        5 mm PABBO BB
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
DS            8
NS            2
SWH           6188.119 Hz
FIDRES       0.094423 Hz
AQ           5.2953587 sec
RG           128
DW           80.800 usec
DE           6.50 usec
TE           300.0 K
D1           1.00000000 sec
TD0          1

===== CHANNEL f1 =====
NUC1          1H
P1           11.80 usec
PL1          0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300026 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```

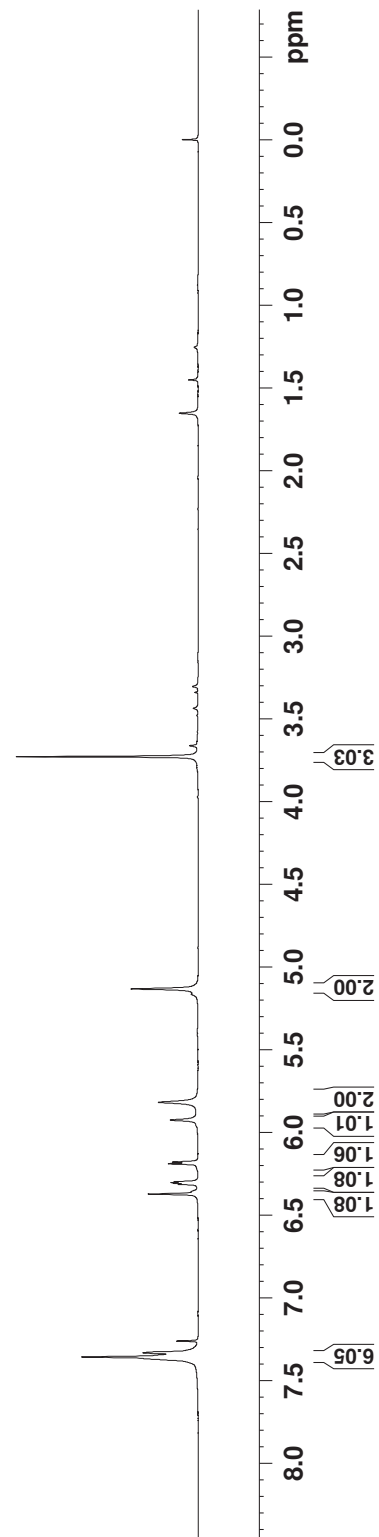
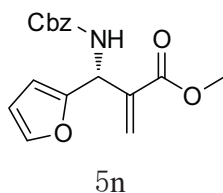
0.000

3.729

5.130

5.815
 5.923
 6.176
 6.187
 6.295
 6.301
 6.306
 6.312
 6.370

7.330
 7.355



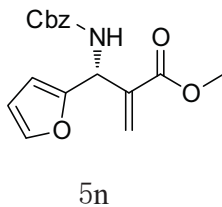
```

NAME 101027
EXPNO 6
PROCNO 1
Date_ 20101027
Time 18.27
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 823
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 300.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL14 17.00 dB
PL15 17.00 dB
PL16 9.17820644 W
PL17 0.23084813 W
PL18 0.23084813 W
SFO2 300.1312606 MHz
SI 2
SF 75.4677593 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
    
```

165.80
 155.39
 152.18
 142.20
 137.66
 136.16
 128.51
 128.18
 127.67
 110.49
 106.77
 77.42
 77.00
 76.58
 67.09
 52.06
 51.25



180 170 160 150 140 130 120 110 100 90 80 70 60 50 20 ppm

```

NAME          110516
EXPNO         1
PROCNO        1
Date_         20110516
Time          11.05
INSTRUM       spect
PROBHD        5 mm PABBO BB
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS           2
SFO1          6188.119 Hz
SFO2          0.094423 Hz
FIDRES       5.2953587 sec
RG           57
DE           80.800 usec
TE           289.5 K
D1           1.00000000 sec
TD0          1

===== CHANNEL f1 =====
NUC1          1H
P1           11.80 usec
PL1          0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300046 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```

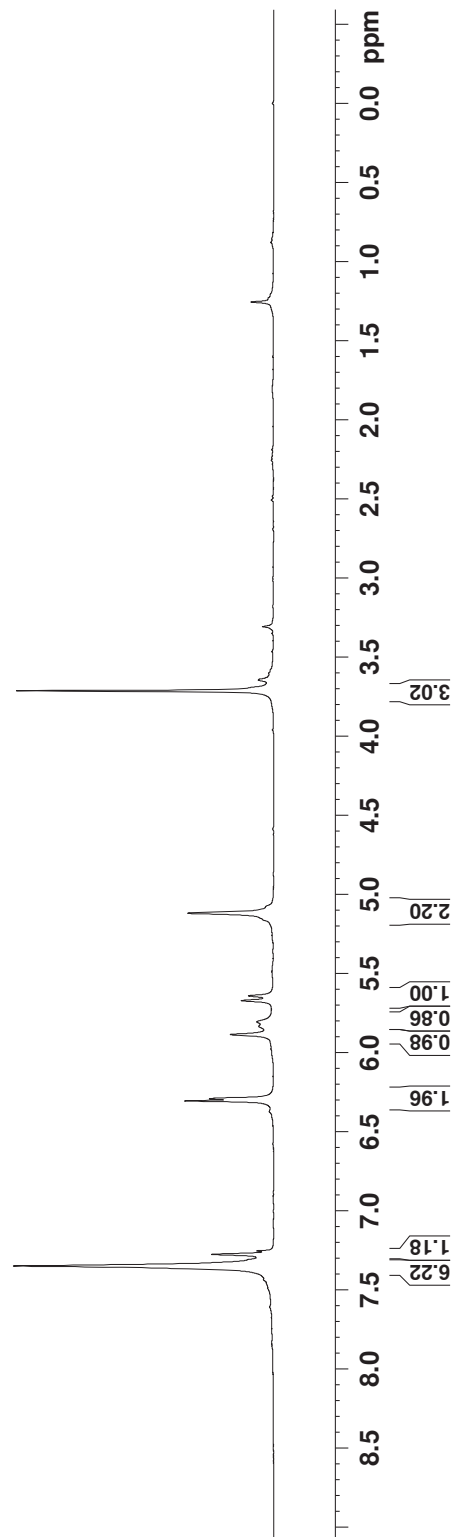
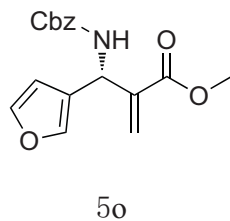
— -0.000

3.646
3.714

5.117

5.639
5.670
5.803
5.832
5.884
6.290
6.303

7.252
7.274
7.347
7.434
7.455



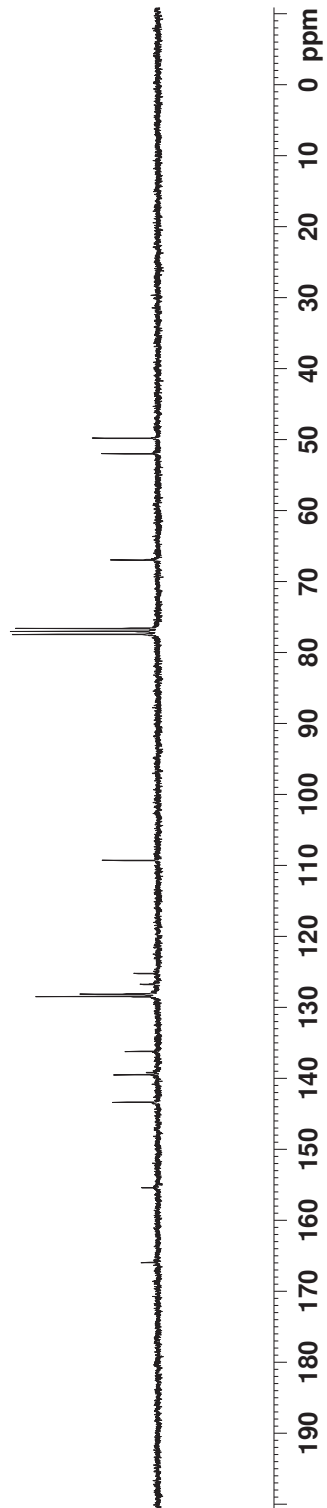
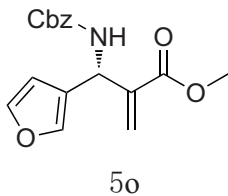
```

NAME          110516
EXPNO         2
PROCNO        1
Date_         20110516
Time_         11.09
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            170
DS            4
SWH           18028.846 Hz
FIDRES       0.275098 Hz
AQ           1.8175818 sec
RG           203
DW           27.733 usec
DE           6.50 usec
TE           290.9 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0          1

===== CHANNEL f1 =====
NUC1          13C
P1           9.70 usec
PL1          0.00 dB
PL1W         29.38907051 W
SFO1         75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2      waltz16
NUC2          1H
PCPD2        80.00 usec
PL2          1.00 dB
PL12         17.00 dB
PL13         17.00 dB
PL14         17.00 dB
PL15         17.00 dB
PL16         9.17820644 W
PL17         0.23084613 W
PL18         0.23084613 W
SFO2         300.1312605 MHz
SI           2
SF           75.4677592 MHz
RGW          RM
SSB          0
LB           1.00 Hz
GB           0
PC           1.40
    
```

49.78
 51.97
 66.93
 76.58
 77.00
 77.42
 109.28
 125.21
 126.74
 128.13
 128.46
 136.19
 139.18
 139.49
 143.36
 155.40
 165.96



```

NAME          110515
EXPNO         1
PROCNO        20110515
Date_         23.51
Time          23.51
INSTRUM       spect
PROBHD        5 mm PABBO BB
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            2
DS            8
SFO1          6188.119 Hz
SFO2          0.094423 Hz
FIDRES       5.2953587 sec
AQ            71.8
RG            80.800 usec
DE            6.50 usec
TE            289.1 K
D1            1.00000000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          1H
P1            11.80 usec
PL1           0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300045 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```

0.000

3.716

5.136

5.928

5.957

5.979

6.364

6.873

6.883

6.911

6.923

6.928

6.940

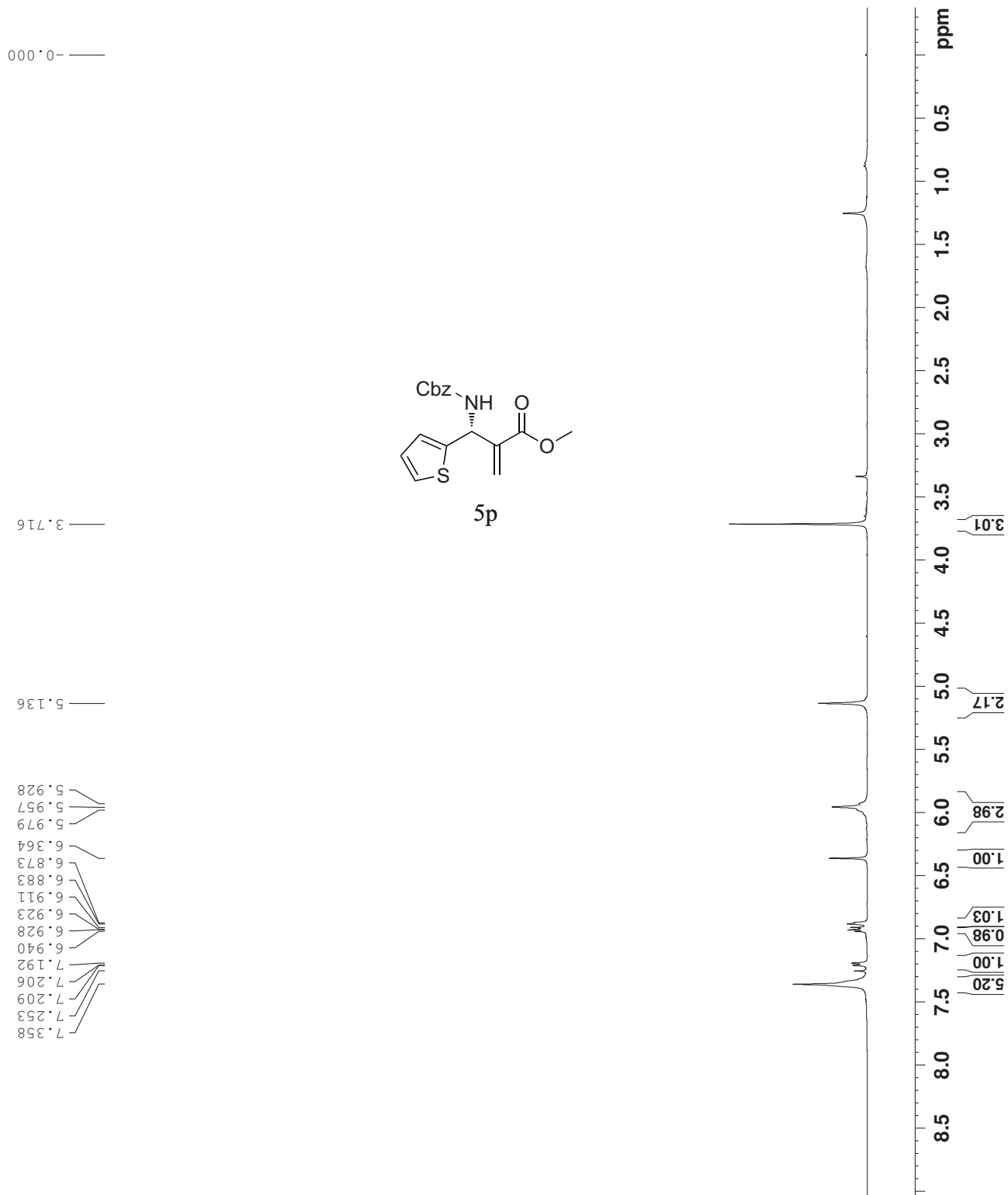
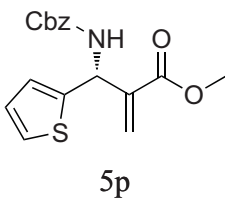
7.192

7.206

7.209

7.253

7.358



```

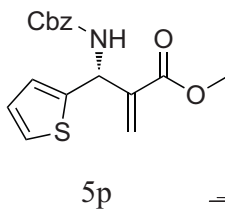
NAME 110515
EXPNO 2
PROCNO 1
Date_ 20110515
Time 23.57
INSTRUM spect
PROBHD 5 mm FAPBBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 167
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 289.9 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SF01 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL2W 17.00 dB
PL3 17.00 dB
PL3W 17.00 dB
PL4 9.17820644 W
PL4W 0.23084813 W
PL5 300.1312605 MHz
SI 2
SF 75.4677526 MHz
EM
RGDW 0
SSB 1.00 Hz
LB 0
GB 0
PC 1.40
    
```

52.09
 53.25
 67.08
 76.58
 77.00
 77.42

124.64
 124.96
 127.04
 127.35
 128.18
 128.51
 136.15
 139.11
 143.85
 155.33
 165.80



```

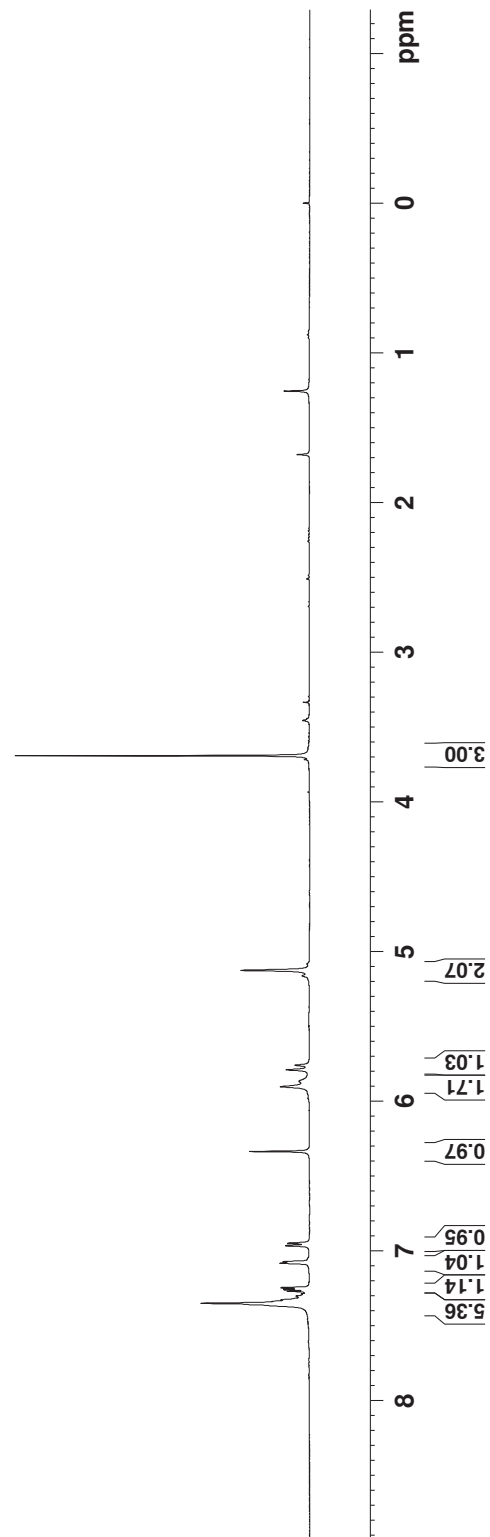
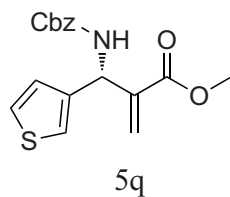
NAME      110510
EXPNO     3
PROCNO    1
Date_     20110510
Time      21.21
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         8
DS         2
SWH        6188.119 Hz
FIDRES     0.094423 Hz
AQ         5.2953587 sec
RG         71.8
DW         80.800 usec
DE         6.50 usec
TE         291.4 K
D1         1.00000000 sec
TD0        1

=====
CHANNEL f1 =====
NUC1       1H
P1         11.80 usec
PL1        0.00 dB
PL1W       11.55467796 W
SFO1       300.1318534 MHz
SI         32768
SF         300.1300056 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
    
```

— 0.000

— 3.692

5.083
 5.127
 5.162
 5.761
 5.791
 5.867
 5.904
 5.937
 6.337
 6.948
 6.951
 6.965
 6.968
 7.073
 7.079
 7.083
 7.245
 7.248
 7.255
 7.261
 7.271
 7.303
 7.309
 7.328
 7.338
 7.351

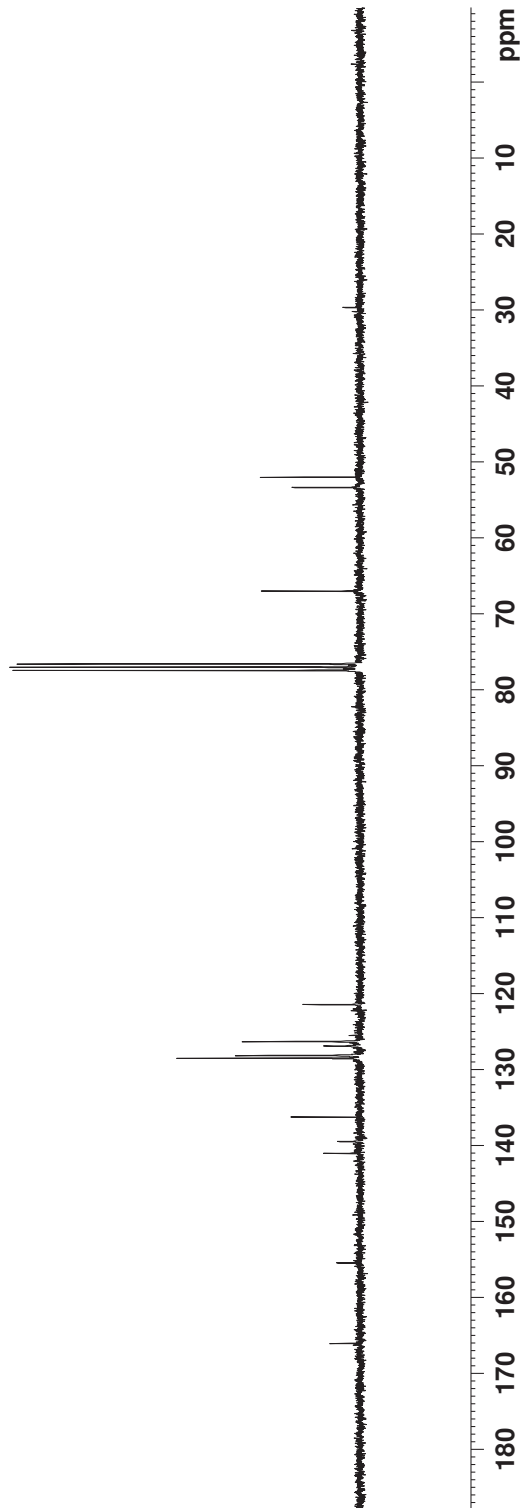
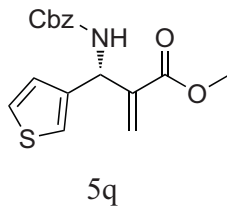


```

NAME      110510
EXPNO     4
PROCNO    1
Date_     20110510
Time      21.27
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         230
DS         4
SWH        18028.846 Hz
FIDRES     0.275098 Hz
AQ         1.8175818 sec
RG         203
DW         27.733 usec
DE         6.50 usec
TE         292.0 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       13C
P1         9.70 usec
PL1        0.00 dB
PL1W       29.38907051 W
SFO1       75.4752953 MHz

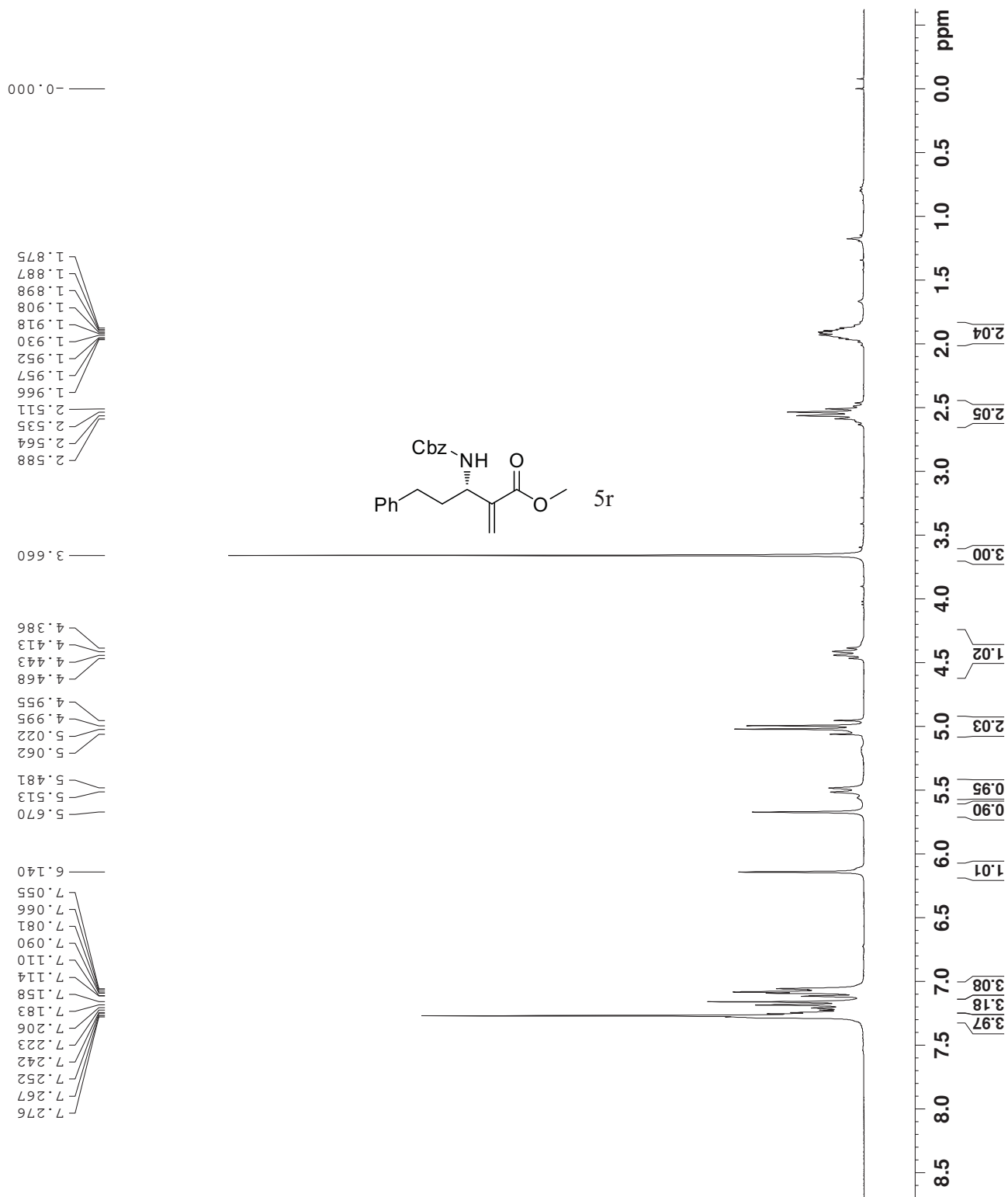
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      80.00 usec
PL2         1.00 dB
PL12        17.00 dB
PL13        17.00 dB
PL14        17.00 dB
PL15        17.00 dB
PL16        17.00 dB
PL17        17.00 dB
PL18        17.00 dB
PL19        17.00 dB
PL20        17.00 dB
PL21        17.00 dB
PL22        17.00 dB
PL23        17.00 dB
PL24        17.00 dB
PL25        17.00 dB
PL26        17.00 dB
PL27        17.00 dB
PL28        17.00 dB
PL29        17.00 dB
PL30        17.00 dB
PL31        17.00 dB
PL32        17.00 dB
PL33        17.00 dB
PL34        17.00 dB
PL35        17.00 dB
PL36        17.00 dB
PL37        17.00 dB
PL38        17.00 dB
PL39        17.00 dB
PL40        17.00 dB
PL41        17.00 dB
PL42        17.00 dB
PL43        17.00 dB
PL44        17.00 dB
PL45        17.00 dB
PL46        17.00 dB
PL47        17.00 dB
PL48        17.00 dB
PL49        17.00 dB
PL50        17.00 dB
PL51        17.00 dB
PL52        17.00 dB
PL53        17.00 dB
PL54        17.00 dB
PL55        17.00 dB
PL56        17.00 dB
PL57        17.00 dB
PL58        17.00 dB
PL59        17.00 dB
PL60        17.00 dB
PL61        17.00 dB
PL62        17.00 dB
PL63        17.00 dB
PL64        17.00 dB
PL65        17.00 dB
PL66        17.00 dB
PL67        17.00 dB
PL68        17.00 dB
PL69        17.00 dB
PL70        17.00 dB
PL71        17.00 dB
PL72        17.00 dB
PL73        17.00 dB
PL74        17.00 dB
PL75        17.00 dB
PL76        17.00 dB
PL77        17.00 dB
PL78        17.00 dB
PL79        17.00 dB
PL80        17.00 dB
PL81        17.00 dB
PL82        17.00 dB
PL83        17.00 dB
PL84        17.00 dB
PL85        17.00 dB
PL86        17.00 dB
PL87        17.00 dB
PL88        17.00 dB
PL89        17.00 dB
PL90        17.00 dB
PL91        17.00 dB
PL92        17.00 dB
PL93        17.00 dB
PL94        17.00 dB
PL95        17.00 dB
PL96        17.00 dB
PL97        17.00 dB
PL98        17.00 dB
PL99        17.00 dB
PL100       17.00 dB
    
```




```

NAME          101231
EXPNO         2
PROCNO        1
Date_         20101231
Time          11.58
INSTRUM       spect
PROBHD        5 mm PABBO BB
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
DS            8
NS            2
SWH           6188.119 Hz
AQ            0.094423 Hz
RG            36
DE            80.800 usec
TE            287.3 K
D1            1.00000000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          1H
P1            11.80 usec
PL1           0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300329 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```

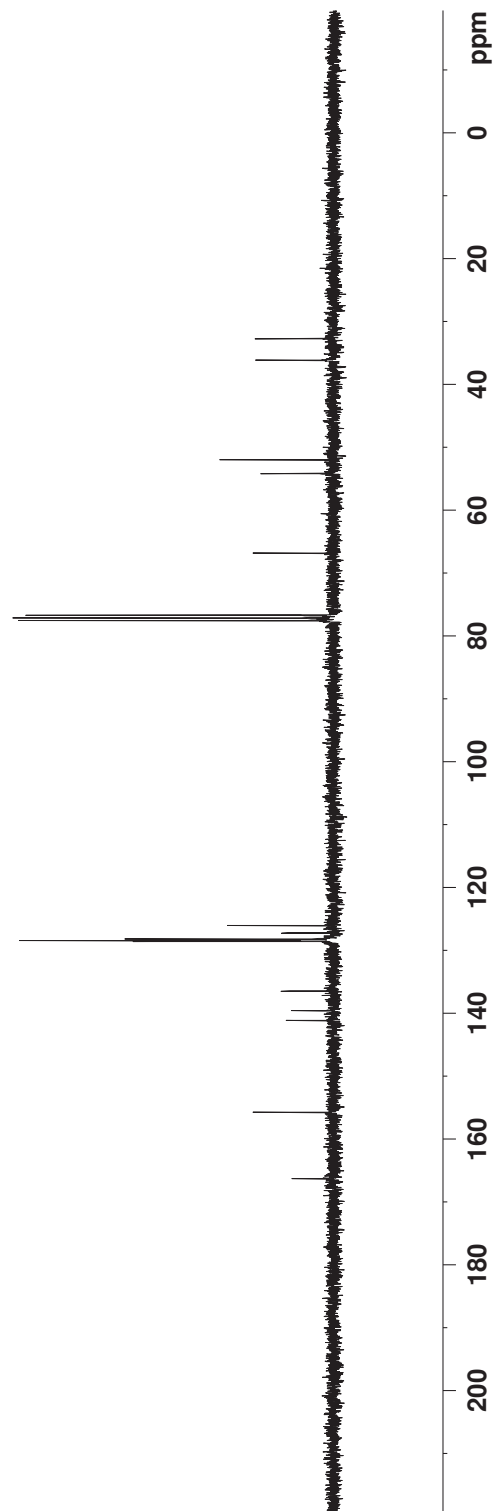
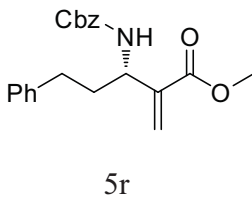


```
NAME 101231
EXPNO 3
PROCNO 1
Date_ 20101231
Time_ 12.02
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 56
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 287.7 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL2W 17.00 dB
PL13 17.00 dB
PL2W 9.17820644 W
PL12W 0.23054613 W
PL13W 0.23054613 W
SFO2 300.132208 MHz
SI 2
SF 75.4677496 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
```

126.02
127.22
128.18
128.39
128.44
128.55
136.46
139.57
141.12
155.74
166.29
77.53
77.10
76.68
66.78
54.17
51.95
36.10
32.72



```

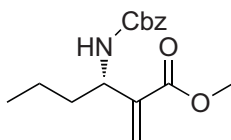
NAME      110522
EXPNO    3
PROCNO   1
Date_    20110522
Time     20.32
INSTRUM  spect
PROBHD   5 mm PABBO HD
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        8
DS        2
SWH       6188.119 Hz
FIDRES   0.094423 Hz
AQ        5.2953587 sec
RG        40.3
DW        80.800 usec
DE        6.50 usec
TE        290.4 K
D1        1.00000000 sec
TD0       1

===== CHANNEL f1 =====
NUC1      1H
P1        11.80 usec
PL1       0.00 dB
PL1W      11.55467796 W
SFO1      300.1318534 MHz
SI        32768
SF        300.1300026 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
    
```

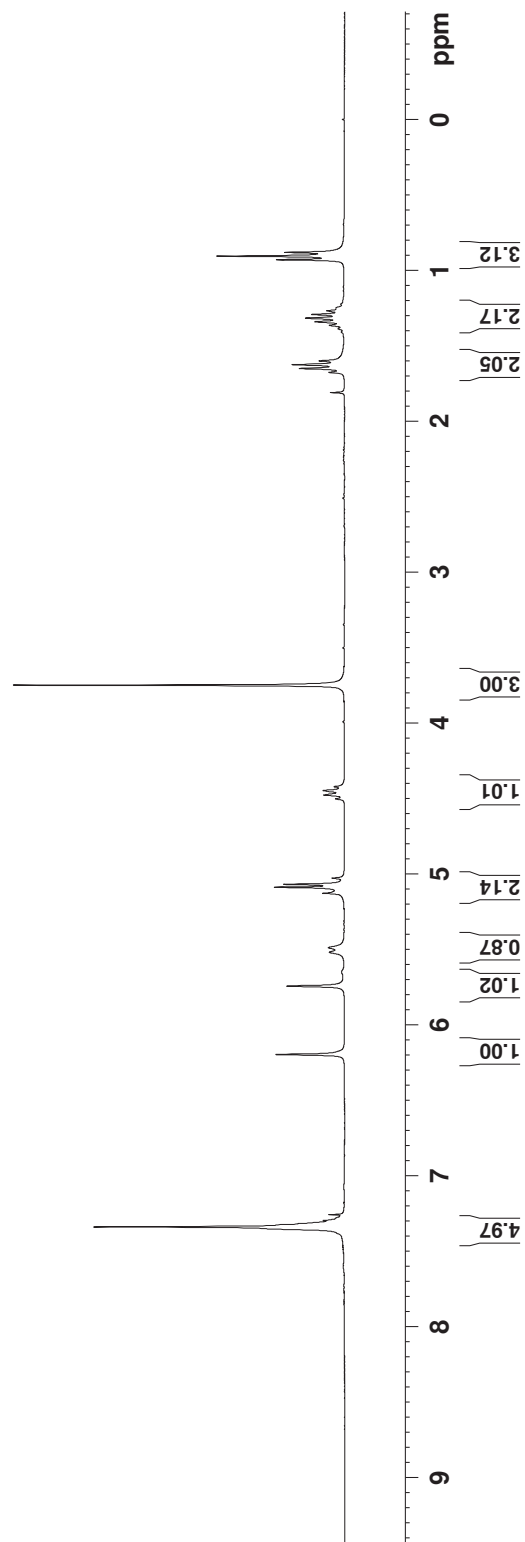
1.651
1.625
1.600
1.341
1.316
1.292
0.930
0.905
0.881

3.749
4.422
4.447
4.478
5.028
5.069
5.089
5.129
5.489
5.519
5.744
6.197

7.258
7.297
7.319
7.327
7.340



5s

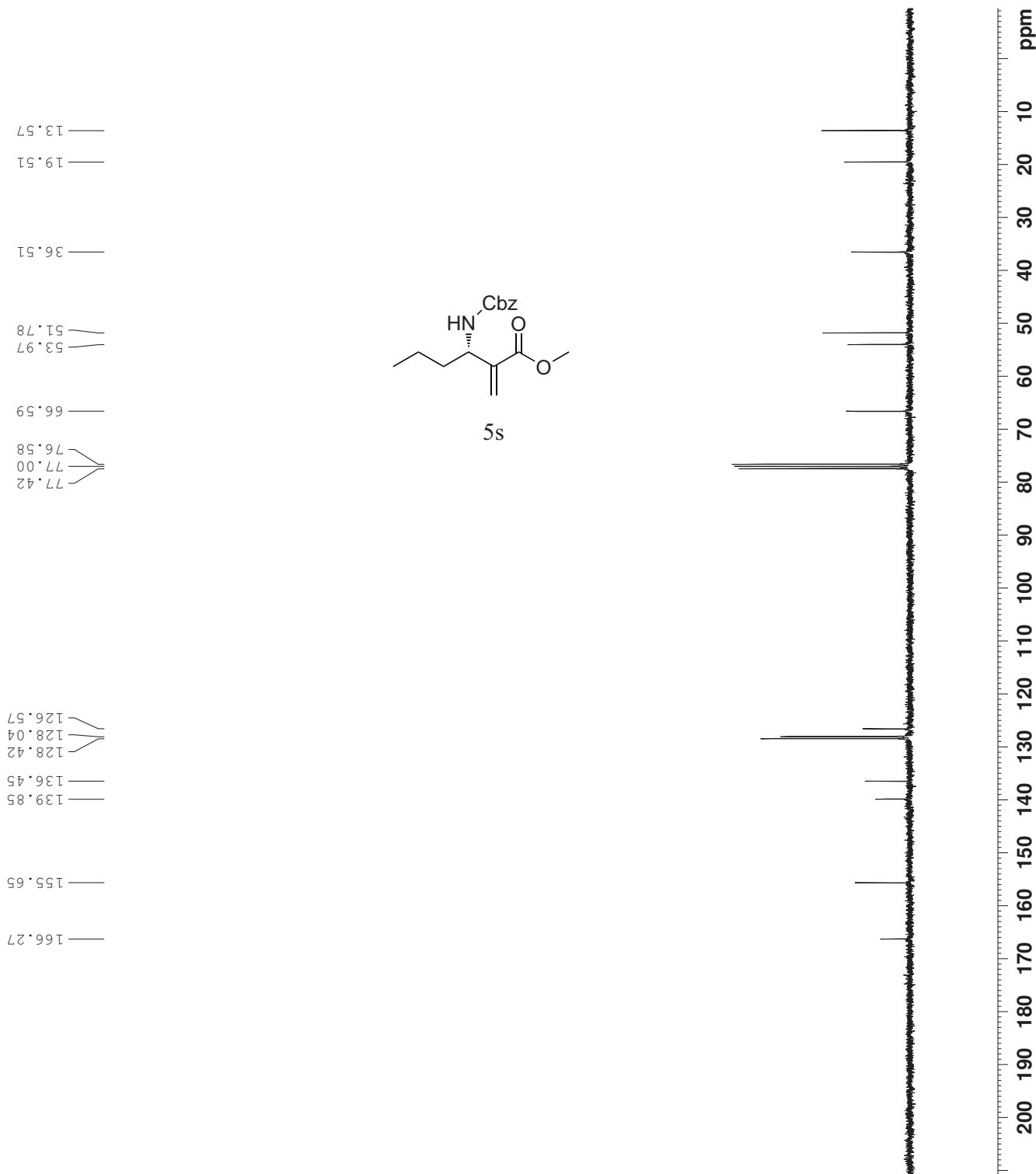
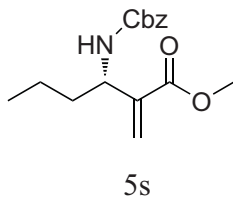


```

NAME 110522
EXPNO 4
PROCNO 1
Date_ 20110522
Time 20.39
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 112
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 291.2 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL23 17.00 dB
PL2W 9.17820644 W
PL12W 0.23084813 W
SFO2 300.1312605 MHz
SI 2
SF 75.4677594 MHz
RGW BM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
    
```



```

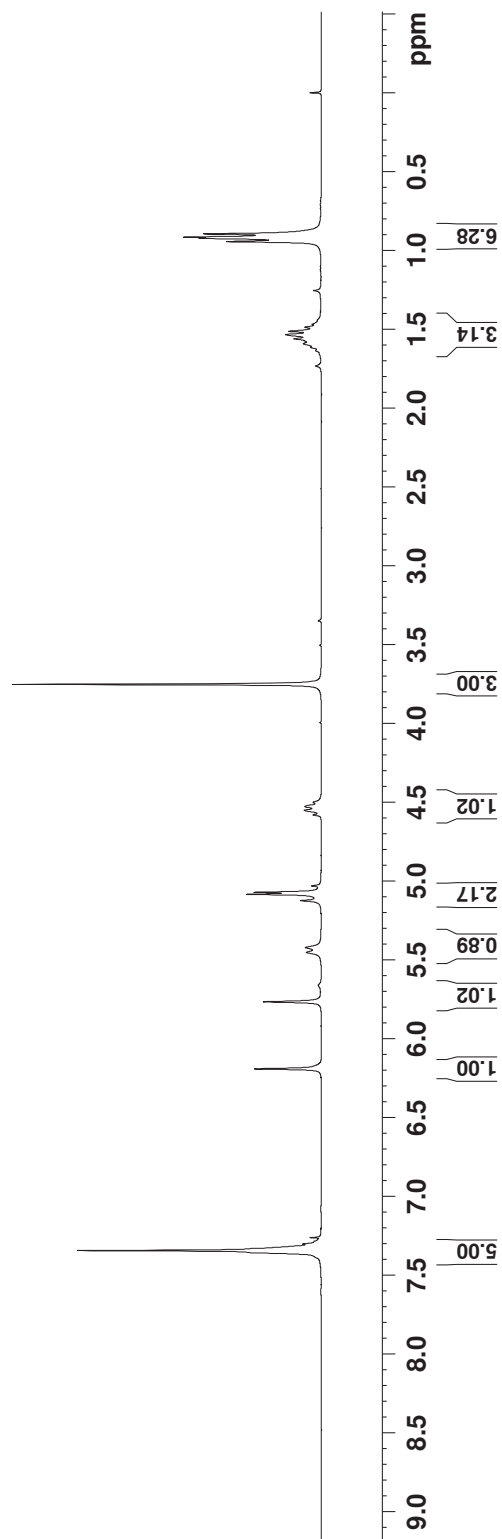
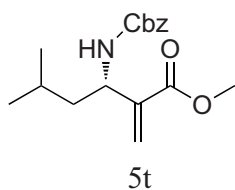
NAME      110601
EXPNO     1
PROCNO    1
Date_     20110601
Time      10.19
INSTRUM   spect
PROBHD    5 mm PABBO BB
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         8
DS         2
SWH        6188.119 Hz
FIDRES    0.109423 Hz
AQ         5.2953587 sec
RG         40.3
DW         80.800 usec
DE         6.50 usec
TE         290.1 K
D1         1.00000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       1H
P1         11.80 usec
PL1        0.00 dB
PL1W       11.55467796 W
SFO1       300.1318534 MHz
SI         32768
SF         300.1300023 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
    
```

1.636
1.615
1.591
1.561
1.534
1.513
1.487
1.468
0.944
0.923
0.916
0.895

5.764
5.450
5.419
5.126
5.085
5.072
5.031
4.581
4.552
4.528
4.501

6.189
7.342
7.301
7.260



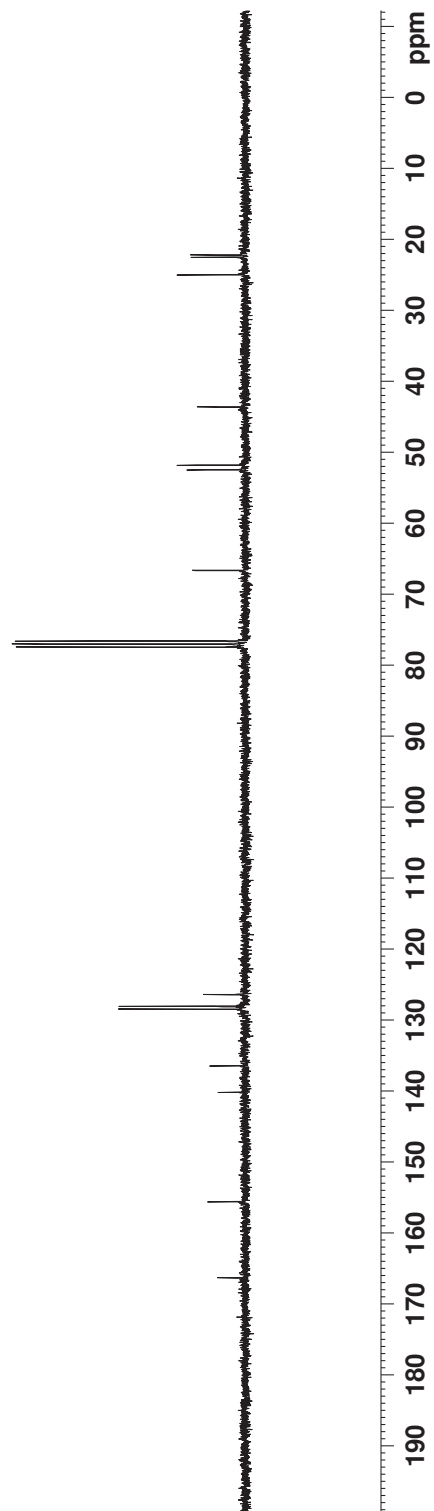
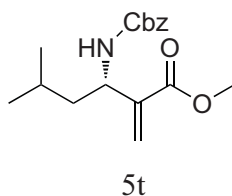
```

NAME                110601
EXPNO                2
PROCNO              1
Date_               20110601
Time                10.22
INSTRUM             spect
PROBHD              5 mm PABBO BB-
PULPROG             zgpg30
TD                  65536
SOLVENT             CDCl3
NS                   70
DS                   4
SWH                 18028.846 Hz
FIDRES              0.275098 Hz
AQ                  1.8175818 sec
RG                  203
DW                   27.733 usec
DE                   6.50 usec
TE                   290.5 K
D1                   2.00000000 sec
D11                  0.03000000 sec
TD0                  1

===== CHANNEL f1 =====
NUC1                 13C
P1                   9.70 usec
PL1                  0.00 dB
PL1W                 29.38907051 W
SFO1                 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2             waltz16
NUC2                 1H
PCPD2               80.00 usec
PL2                  1.00 dB
PL2W                 17.00 dB
PL3                  17.00 dB
PL3W                 17.00 dB
PL4                  9.17820644 W
PL4W                 0.23084613 W
PL5                  0.23084613 W
SFO2                 300.1312606 MHz
SI                   12
SF                   75.4677596 MHz
RGW                  EM
SSB                  0
LB                   1.00 Hz
GB                   0
PC                   1.40
    
```

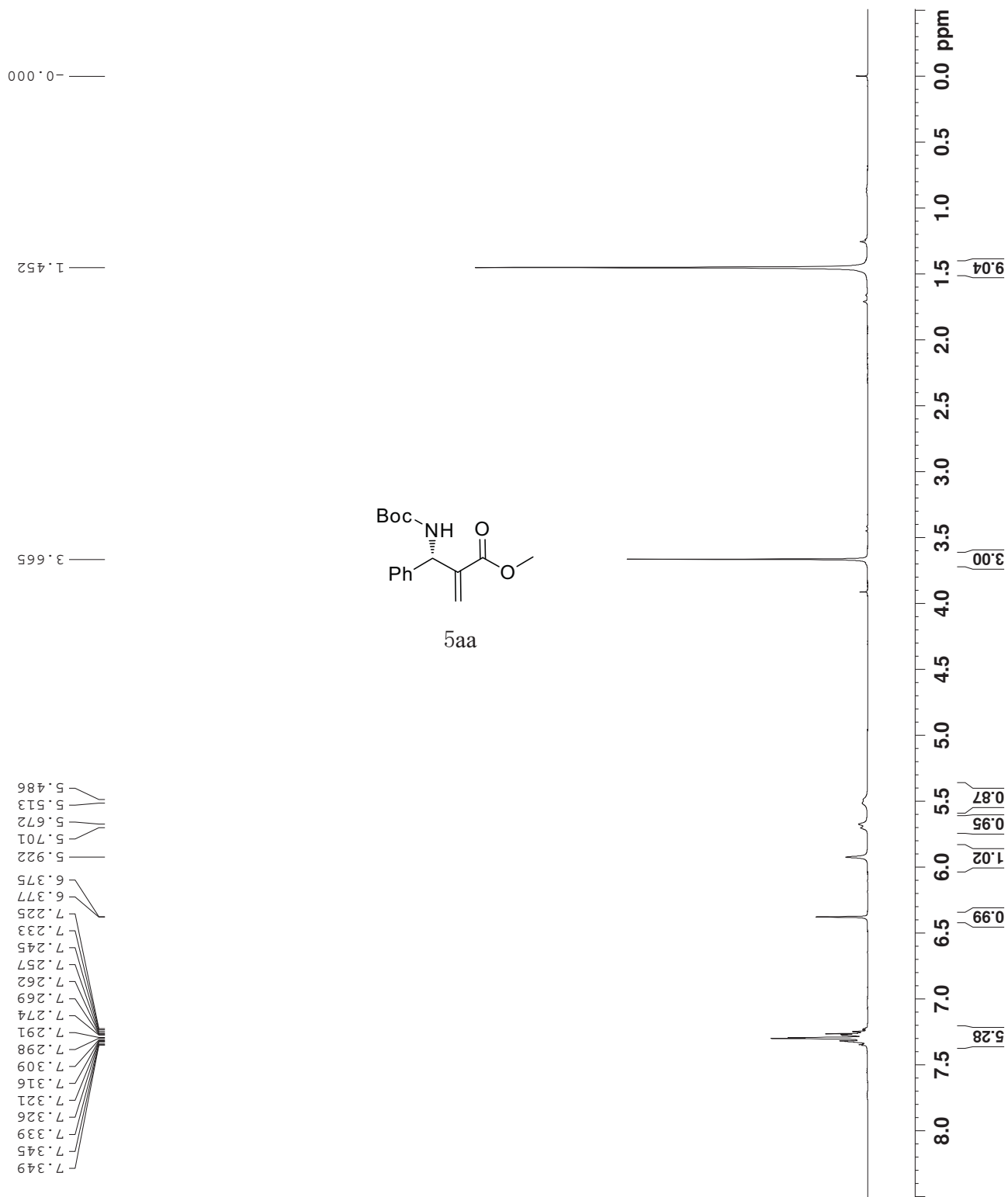
22.17
 22.50
 24.98
 43.59
 51.79
 52.45
 66.62
 76.58
 77.00
 77.42
 126.39
 128.06
 128.45
 136.45
 140.19
 155.60
 166.31



```

NAME 101227
EXPNO 3
PROCNO 1
Date_ 20101227
Time 17.56
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
DS 8
NS 2
SFO 6188.119 Hz
AQ 0.094423 Hz
RG 5.2953587 sec
DE 80.800 usec
TE 289.3 K
D1 1.00000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.80 usec
PL1 0.00 dB
PL1W 11.55467796 W
SFO1 300.1318534 MHz
SI 32768
SF 300.1300015 MHz
WDW EM
SSB 0
LB 0
GB 0
PC 1.00
    
```



```

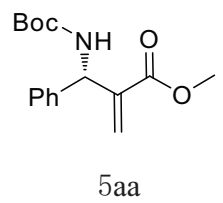
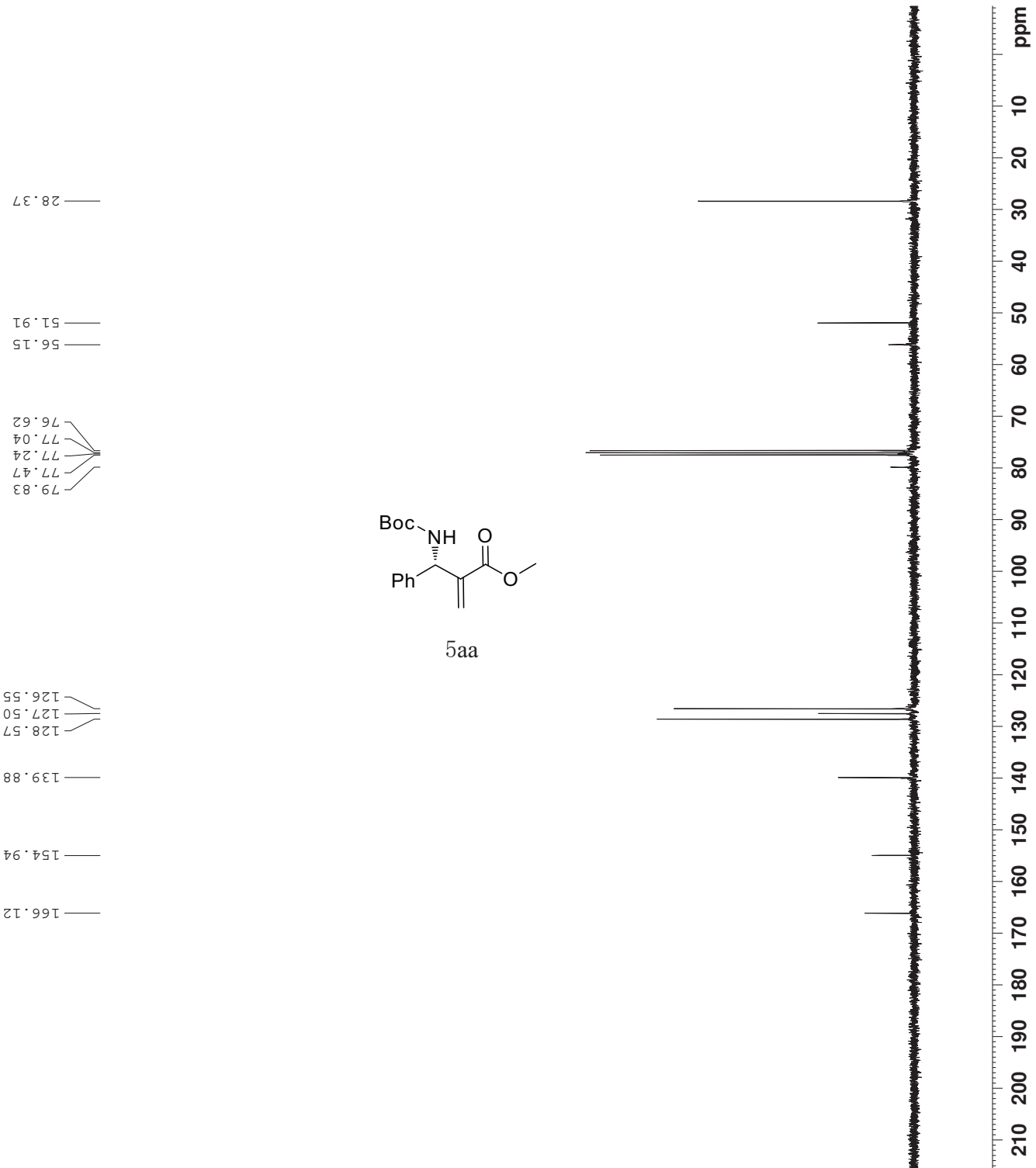
NAME      101227
EXPNO     4
PROCNO    1
Date_     20101227
Time      17.14
INSTRUM   spect
PROBHD    5 mm F4BBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         130
DS         4
SWH        18028.846 Hz
FIDRES     0.275098 Hz
AQ         1.8175818 sec
RG         203
DW         27.733 usec
DE         6.50 usec
TE         290.2 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1
    
```

```

===== CHANNEL f1 =====
NUC1       13C
P1         9.70 usec
PL1        0.00 dB
PL1W       29.38907051 W
SFO1       75.4752953 MHz
    
```

```

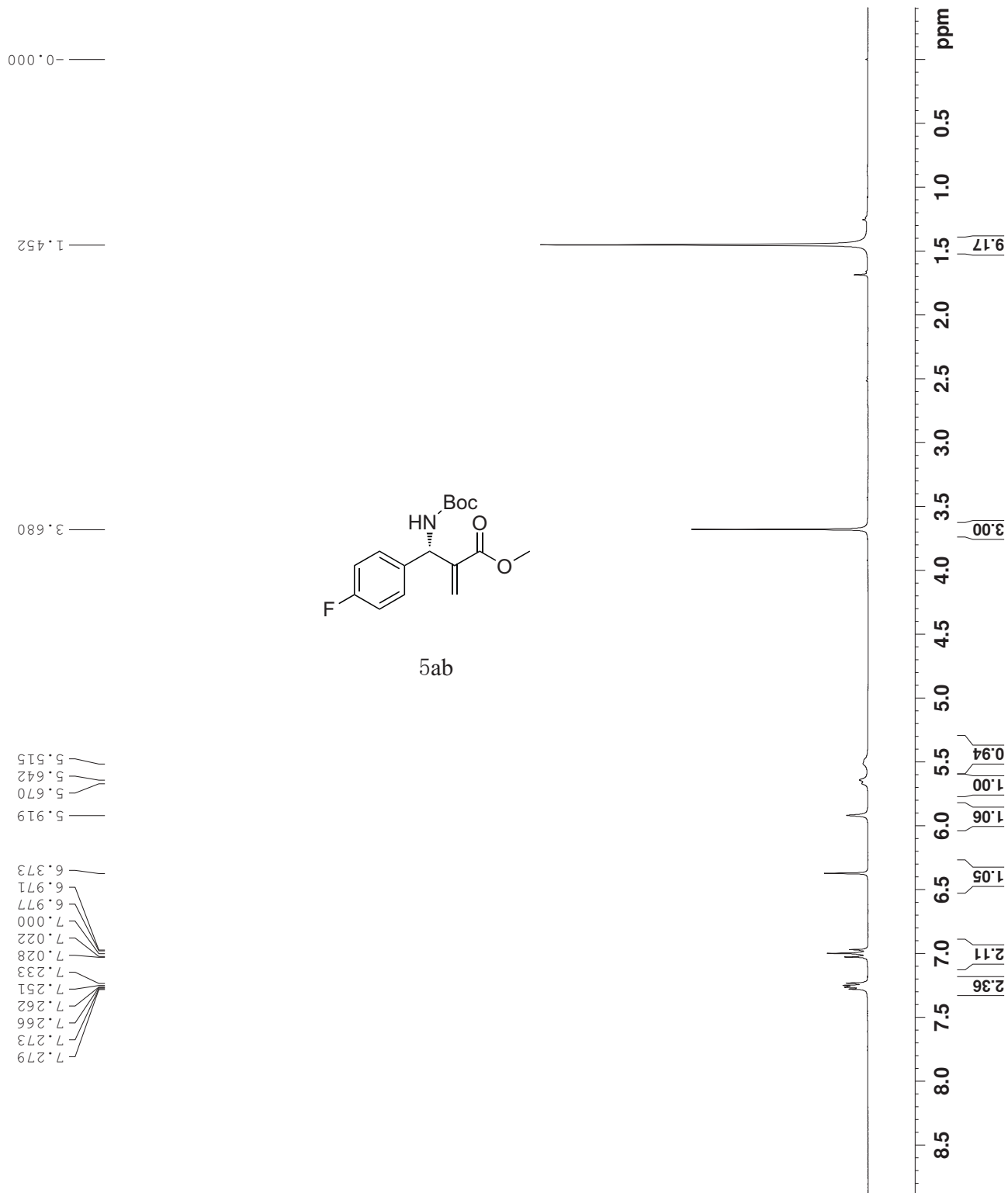
===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2      80.00 usec
PL2         1.00 dB
PL12        17.00 dB
PL13         17.00 dB
PL14         17.00 dB
PL15         17.00 dB
PL16         17.00 dB
PL17         17.00 dB
PL18         17.00 dB
PL19         17.00 dB
PL20         17.00 dB
PL21         17.00 dB
PL22         17.00 dB
PL23         17.00 dB
PL24         17.00 dB
PL25         17.00 dB
PL26         17.00 dB
PL27         17.00 dB
PL28         17.00 dB
PL29         17.00 dB
PL30         17.00 dB
PL31         17.00 dB
PL32         17.00 dB
PL33         17.00 dB
PL34         17.00 dB
PL35         17.00 dB
PL36         17.00 dB
PL37         17.00 dB
PL38         17.00 dB
PL39         17.00 dB
PL40         17.00 dB
PL41         17.00 dB
PL42         17.00 dB
PL43         17.00 dB
PL44         17.00 dB
PL45         17.00 dB
PL46         17.00 dB
PL47         17.00 dB
PL48         17.00 dB
PL49         17.00 dB
PL50         17.00 dB
PL51         17.00 dB
PL52         17.00 dB
PL53         17.00 dB
PL54         17.00 dB
PL55         17.00 dB
PL56         17.00 dB
PL57         17.00 dB
PL58         17.00 dB
PL59         17.00 dB
PL60         17.00 dB
PL61         17.00 dB
PL62         17.00 dB
PL63         17.00 dB
PL64         17.00 dB
PL65         17.00 dB
PL66         17.00 dB
PL67         17.00 dB
PL68         17.00 dB
PL69         17.00 dB
PL70         17.00 dB
PL71         17.00 dB
PL72         17.00 dB
PL73         17.00 dB
PL74         17.00 dB
PL75         17.00 dB
PL76         17.00 dB
PL77         17.00 dB
PL78         17.00 dB
PL79         17.00 dB
PL80         17.00 dB
PL81         17.00 dB
PL82         17.00 dB
PL83         17.00 dB
PL84         17.00 dB
PL85         17.00 dB
PL86         17.00 dB
PL87         17.00 dB
PL88         17.00 dB
PL89         17.00 dB
PL90         17.00 dB
PL91         17.00 dB
PL92         17.00 dB
PL93         17.00 dB
PL94         17.00 dB
PL95         17.00 dB
PL96         17.00 dB
PL97         17.00 dB
PL98         17.00 dB
PL99         17.00 dB
PL100        17.00 dB
    
```




```

NAME 110522
EXPNO 1
PROCNO 20110522
Date_ 20.11
Time 20.11
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 6188.119 Hz
AQ 0.094423 Hz
RG 71.8
WDW 80.800 usec
DE 6.50 usec
TE 289.6 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.80 usec
PL1 0.00 dB
PL1W 11.55467796 W
SFO1 300.1318534 MHz
SI 32768
SF 300.1300004 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
    
```



```

NAME 110522
EXPNO 5
PROCNO 1
Date_ 20110522
Time 21.14
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 438
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 291.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
    
```

```

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SF01 75.4752953 MHz

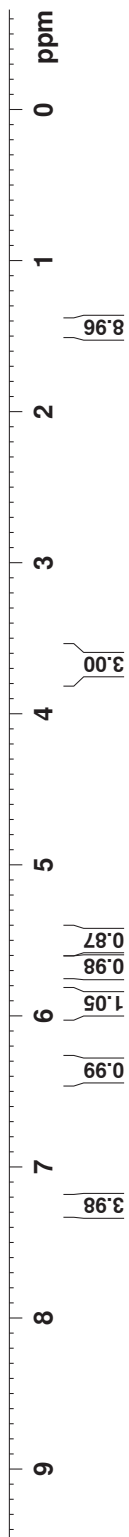
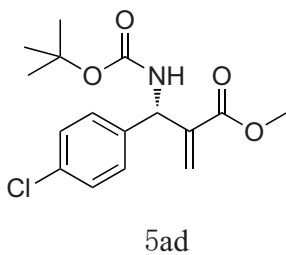
===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL2W 17.00 dB
PL3 17.00 dB
PL3W 17.00 dB
PL4 9.17820644 W
PL4W 0.23084613 W
SF02 300.1312605 MHz
SI 2
SF 75.4677507 MHz
EM 0
RFDW 1.00 Hz
SSB 0
LB 0
GB 0
PC 1.40
    
```



```

NAME      110515
EXPNO     4
PROCNO    20110515
Date_     0.18
Time      0.18
INSTRUM   spect
PROBHD    5 mm PABBO BB
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         8
DS         2
SFO1      6188.119 Hz
SFO2      0.109423 Hz
FIDRES    5.2953587 sec
AQ         57
RG         57
DE         80.800 usec
TE         6.50 usec
TD0        290.5 K
D1         1.00000000 sec
===== CHANNEL f1 =====
NUC1       1H
P1         11.80 usec
PL1        0.00 dB
PL1W       11.55467796 W
SFO1       300.1318534 MHz
SI         32768
SF         300.1300000 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
    
```

7.300
7.271
7.235
7.206
6.374
5.923
5.661
5.632
5.554
3.679
1.450
-0.000



```

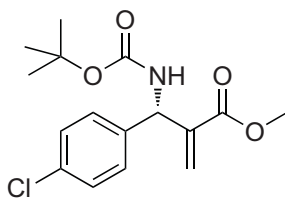
NAME                110515
EXPNO                5
PROCNO               1
Date_                20110516
Time                0.23
INSTRUM              spect
PROBHD               5 mm FAPBBO BB-
PULPROG              zgpg30
TD                   65536
SOLVENT              CDCl3
NS                   101
DS                   4
SWH                  18028.846 Hz
FIDRES               0.275098 Hz
AQ                   1.8175818 sec
RG                   203
DW                   27.733 usec
DE                   6.50 usec
TE                   291.1 K
D1                   2.0000000 sec
D11                  0.0300000 sec
TD0                  1
    
```

```

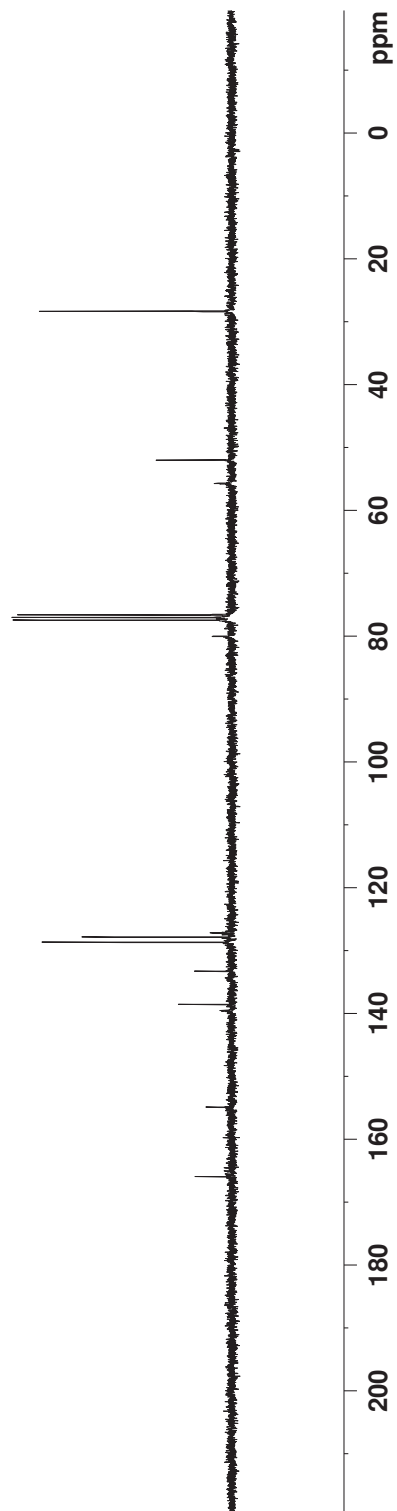
===== CHANNEL f1 =====
NUC1                 13C
P1                   9.70 usec
PL1                  0.00 dB
PL1W                 29.38907051 W
SF01                 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2              waltz16
NUC2                 1H
PCPD2                80.00 usec
PL2                  1.00 dB
PL12                 17.00 dB
PL13                 17.00 dB
PL14                 17.00 dB
PL15                 17.00 dB
PL16                 17.00 dB
PL17                 17.00 dB
PL18                 17.00 dB
PL19                 17.00 dB
PL20                 17.00 dB
PL21                 17.00 dB
PL22                 17.00 dB
PL23                 17.00 dB
PL24                 17.00 dB
PL25                 17.00 dB
PL26                 17.00 dB
PL27                 17.00 dB
PL28                 17.00 dB
PL29                 17.00 dB
PL30                 17.00 dB
PL31                 17.00 dB
PL32                 17.00 dB
PL33                 17.00 dB
PL34                 17.00 dB
PL35                 17.00 dB
PL36                 17.00 dB
PL37                 17.00 dB
PL38                 17.00 dB
PL39                 17.00 dB
PL40                 17.00 dB
PL41                 17.00 dB
PL42                 17.00 dB
PL43                 17.00 dB
PL44                 17.00 dB
PL45                 17.00 dB
PL46                 17.00 dB
PL47                 17.00 dB
PL48                 17.00 dB
PL49                 17.00 dB
PL50                 17.00 dB
PL51                 17.00 dB
PL52                 17.00 dB
PL53                 17.00 dB
PL54                 17.00 dB
PL55                 17.00 dB
PL56                 17.00 dB
PL57                 17.00 dB
PL58                 17.00 dB
PL59                 17.00 dB
PL60                 17.00 dB
PL61                 17.00 dB
PL62                 17.00 dB
PL63                 17.00 dB
PL64                 17.00 dB
PL65                 17.00 dB
PL66                 17.00 dB
PL67                 17.00 dB
PL68                 17.00 dB
PL69                 17.00 dB
PL70                 17.00 dB
PL71                 17.00 dB
PL72                 17.00 dB
PL73                 17.00 dB
PL74                 17.00 dB
PL75                 17.00 dB
PL76                 17.00 dB
PL77                 17.00 dB
PL78                 17.00 dB
PL79                 17.00 dB
PL80                 17.00 dB
PL81                 17.00 dB
PL82                 17.00 dB
PL83                 17.00 dB
PL84                 17.00 dB
PL85                 17.00 dB
PL86                 17.00 dB
PL87                 17.00 dB
PL88                 17.00 dB
PL89                 17.00 dB
PL90                 17.00 dB
PL91                 17.00 dB
PL92                 17.00 dB
PL93                 17.00 dB
PL94                 17.00 dB
PL95                 17.00 dB
PL96                 17.00 dB
PL97                 17.00 dB
PL98                 17.00 dB
PL99                 17.00 dB
PL100                17.00 dB
    
```

165.92
 154.87
 139.50
 138.54
 133.24
 128.65
 127.83
 127.14
 79.99
 77.43
 77.00
 76.58
 55.70
 51.97
 28.31



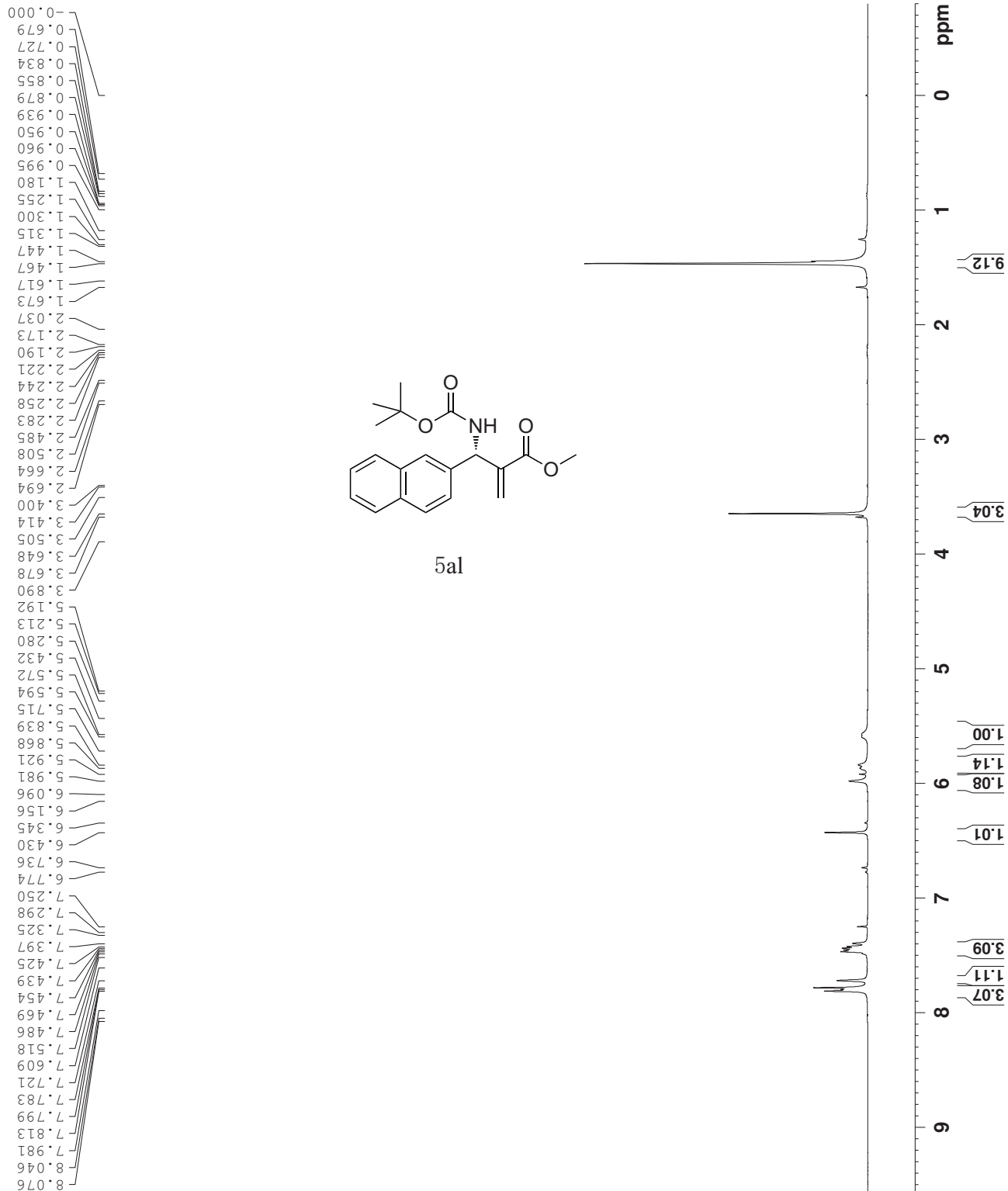
5ad



```

NAME          110515
EXPNO         8
PROCNO        1
Date_         20110515
Time          0.52
INSTRUM       spect
PROBHD        5 mm PABBO 1BB
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            2
DS            2
SFH           6188.119 Hz
FIDRES        0.104423 Hz
AQ            5.2953587 sec
RG            64
DE            80.800 usec
TE            291.6 K
D1            1.00000000 sec
TD0           1

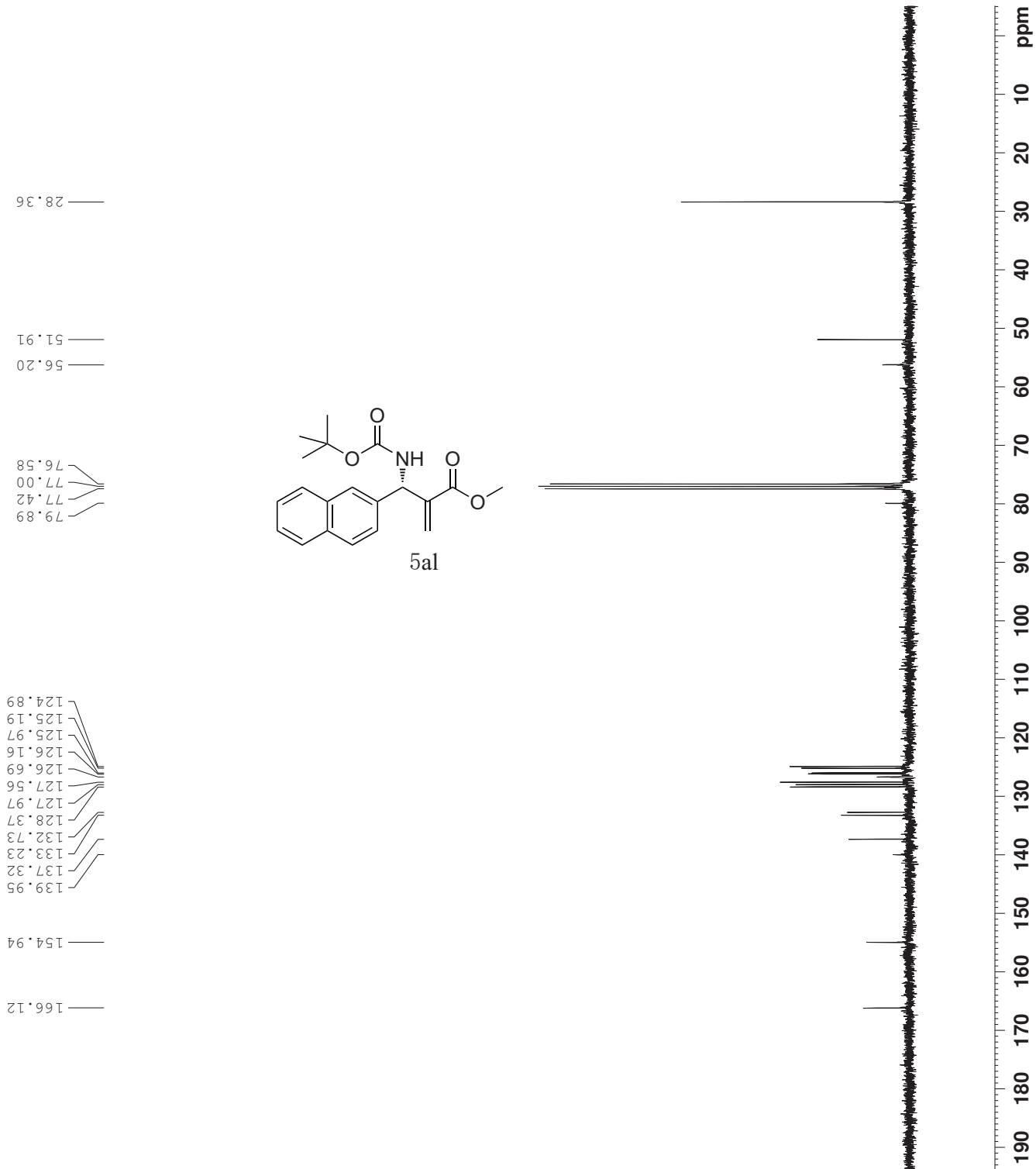
===== CHANNEL f1 =====
NUC1          1H
P1            11.80 usec
PL1           0.00 dB
PL1W          11.55467796 W
SFO1          300.1318534 MHz
SI            32768
SF            300.1300051 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
    
```



```
NAME 110515
EXPNO 9
PROCNO 1
Date_ 20110516
Time 1.00
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 264
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 292.9 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

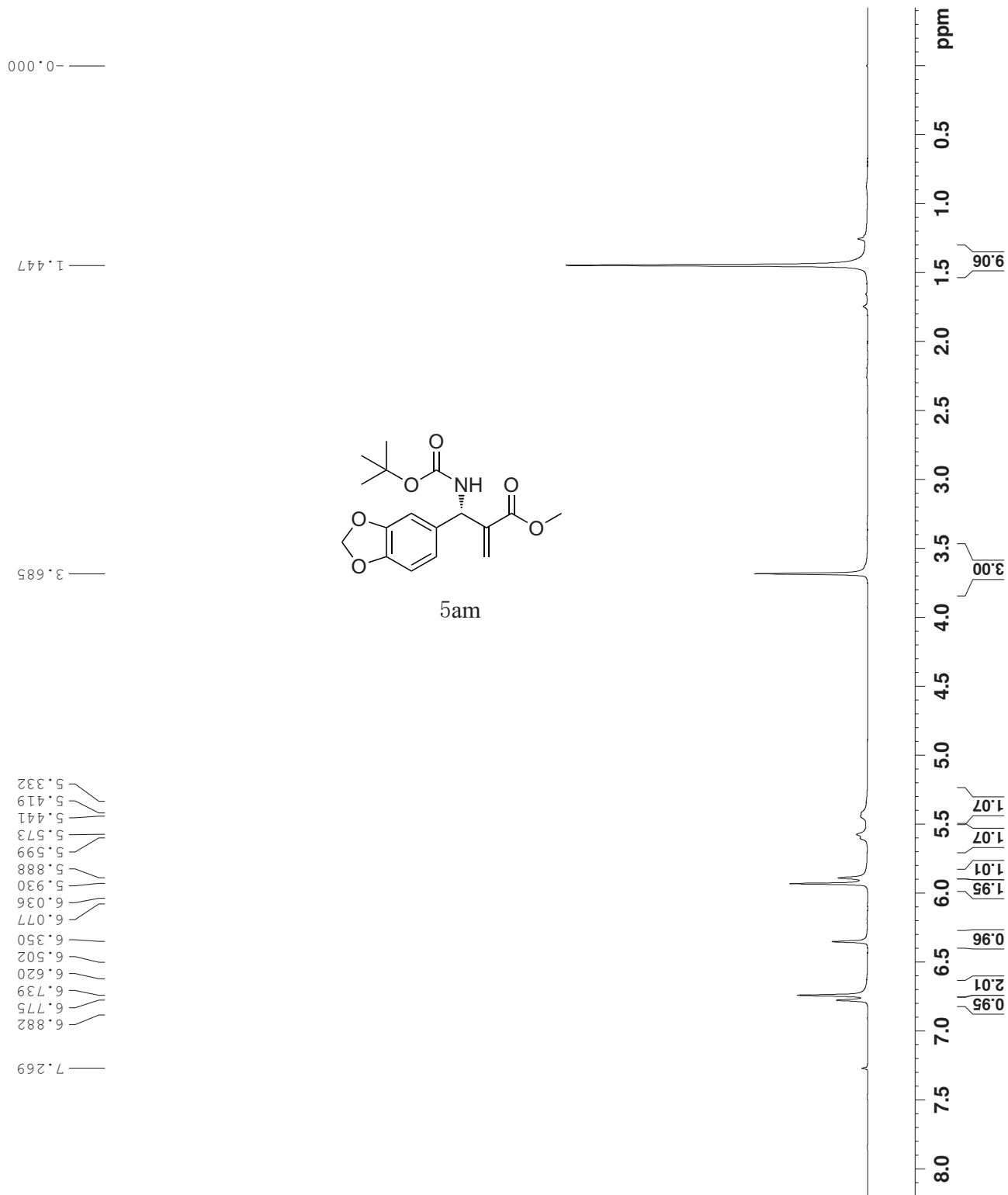
===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL14 17.00 dB
PL15 17.00 dB
PL16 17.00 dB
PL17 17.00 dB
PL18 9.17820644 W
PL19 0.23084813 W
PL20 300.1312606 MHz
SI 2
SF 75.4677597 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
```



```

NAME          110515
PROCNO        9
Date_         20110516
Time_         0.36
INSTRUM       spect
PROBHD        5 mm PABBO-1
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            2
SWH           6188.119 Hz
FIDRES       0.094423 Hz
AQ           5.2953587 sec
RG           57
DW           80.800 usec
DE           6.50 usec
TE           290.4 K
D1           1.00000000 sec
TD0          1

===== CHANNEL f1 =====
NUC1          1H
P1           11.80 usec
PL1          0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1299995 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```



```

NAME 110515
EXPNO 10
PROCNO 1
Date_ 20110516
Time 1.19
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 151
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 293.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SF01 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL14 17.00 dB
PL15 17.00 dB
PL16 17.00 dB
PL17 17.00 dB
PL18 17.00 dB
PL19 17.00 dB
PL20 17.00 dB
PL21 17.00 dB
PL22 17.00 dB
PL23 17.00 dB
PL24 17.00 dB
PL25 17.00 dB
PL26 17.00 dB
PL27 17.00 dB
PL28 17.00 dB
PL29 17.00 dB
PL30 17.00 dB
PL31 17.00 dB
PL32 17.00 dB
PL33 17.00 dB
PL34 17.00 dB
PL35 17.00 dB
PL36 17.00 dB
PL37 17.00 dB
PL38 17.00 dB
PL39 17.00 dB
PL40 17.00 dB
PL41 17.00 dB
PL42 17.00 dB
PL43 17.00 dB
PL44 17.00 dB
PL45 17.00 dB
PL46 17.00 dB
PL47 17.00 dB
PL48 17.00 dB
PL49 17.00 dB
PL50 17.00 dB
PL51 17.00 dB
PL52 17.00 dB
PL53 17.00 dB
PL54 17.00 dB
PL55 17.00 dB
PL56 17.00 dB
PL57 17.00 dB
PL58 17.00 dB
PL59 17.00 dB
PL60 17.00 dB
PL61 17.00 dB
PL62 17.00 dB
PL63 17.00 dB
PL64 17.00 dB
PL65 17.00 dB
PL66 17.00 dB
PL67 17.00 dB
PL68 17.00 dB
PL69 17.00 dB
PL70 17.00 dB
PL71 17.00 dB
PL72 17.00 dB
PL73 17.00 dB
PL74 17.00 dB
PL75 17.00 dB
PL76 17.00 dB
PL77 17.00 dB
PL78 17.00 dB
PL79 17.00 dB
PL80 17.00 dB
PL81 17.00 dB
PL82 17.00 dB
PL83 17.00 dB
PL84 17.00 dB
PL85 17.00 dB
PL86 17.00 dB
PL87 17.00 dB
PL88 17.00 dB
PL89 17.00 dB
PL90 17.00 dB
PL91 17.00 dB
PL92 17.00 dB
PL93 17.00 dB
PL94 17.00 dB
PL95 17.00 dB
PL96 17.00 dB
PL97 17.00 dB
PL98 17.00 dB
PL99 17.00 dB
PL100 17.00 dB

```




```

NAME      110305
EXPNO    10
PROCNO   1
Date_    20110305
Time     19.00
INSTRUM  spect
PROBHD   5 mm PABBO BB-
PULPROG  zg30
TD        65536
SOLVENT  CDCl3
NS        8
DS        2
SWH       6188.119 Hz
FIDRES   0.094423 Hz
AQ        5.2953587 sec
RG        36
DW        80.800 usec
DE        6.50 usec
TE        291.5 K
D1        1.00000000 sec
TDO       1

=====
CHANNEL f1
=====
NUC1      1H
P1        11.80 usec
PL1       0.00 dB
PL1W      11.55467796 W
SFO1      300.1318534 MHz
SI        32768
SF        300.1300161 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
    
```

— -0.000

— 3.455

— 5.133

— 5.791

— 5.821

— 5.961

— 5.990

— 6.974

— 7.213

— 7.269

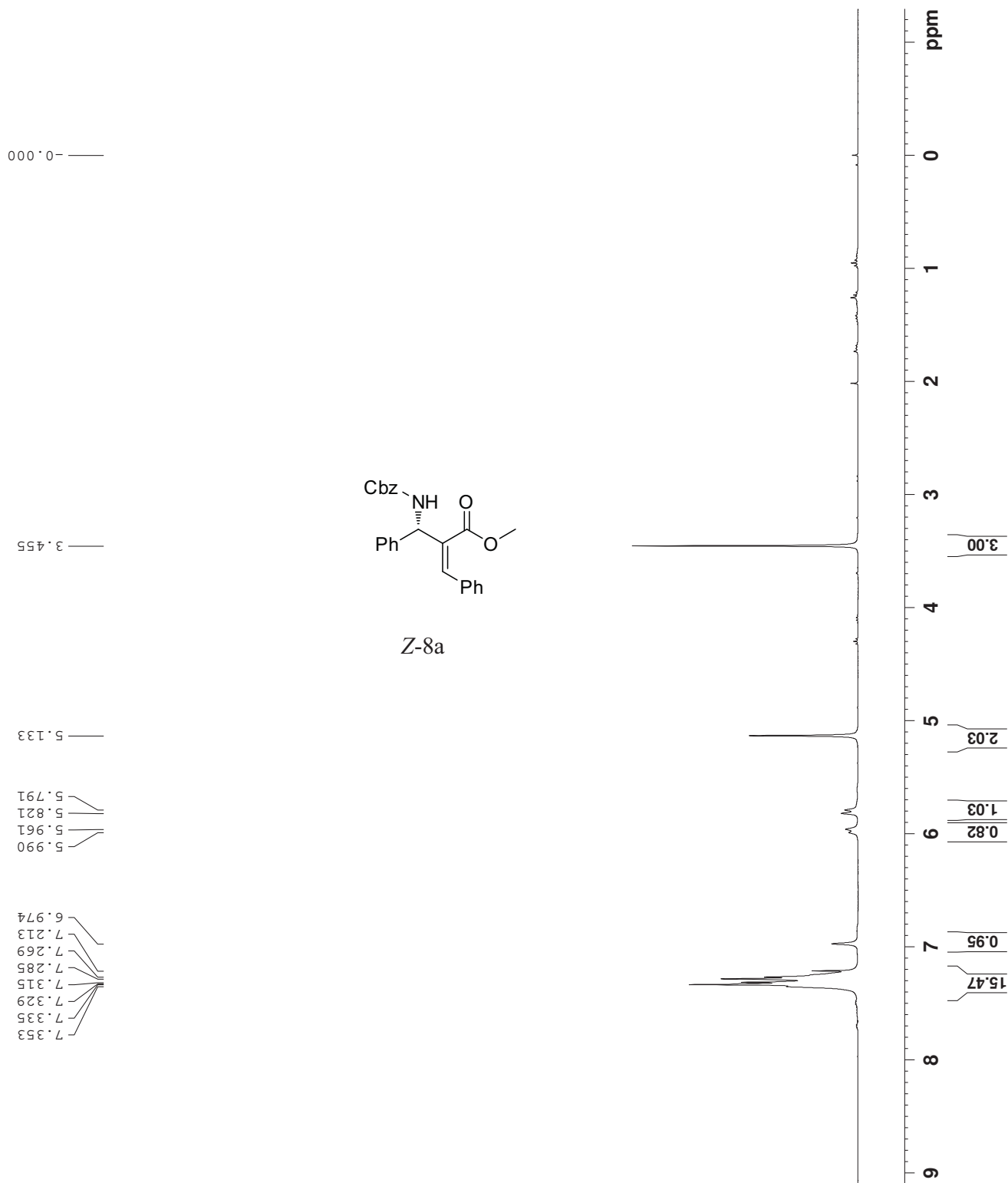
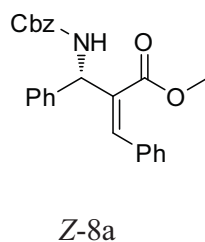
— 7.285

— 7.315

— 7.329

— 7.335

— 7.353



```

NAME 110305
EXPNO 11
PROCNO 1
Date_ 20110305
Time_ 19.06
INSTRUM spect
PROBHD 5 mm FAPBBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 108
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 292.3 K
D1 2.00000000 sec
D11 0.03000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

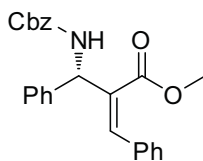
===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL2W 17.00 dB
SFO2 300.132000 MHz

===== CHANNEL f3 =====
CPDPRG2 waltz16
NUC3 13C
PCPD3 80.00 usec
PL3 1.00 dB
PL3W 17.00 dB
SFO3 300.132000 MHz

===== CHANNEL f4 =====
CPDPRG2 waltz16
NUC4 1H
PCPD4 80.00 usec
PL4 1.00 dB
PL4W 17.00 dB
SFO4 300.132000 MHz

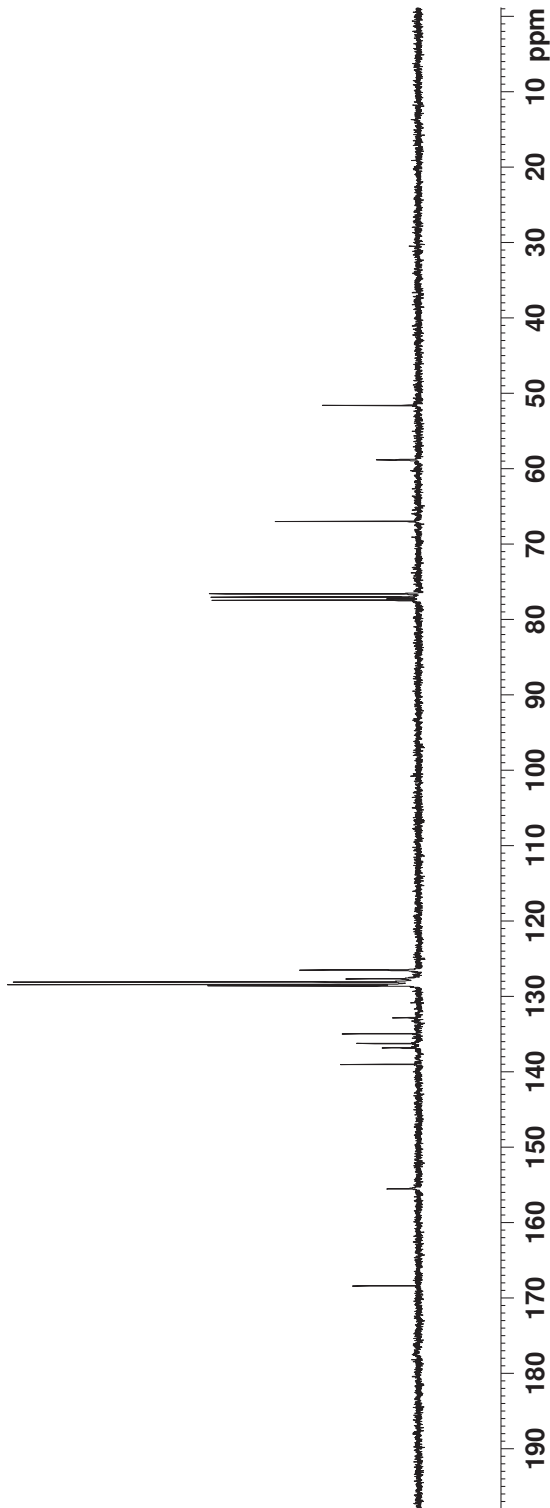
===== CHANNEL f5 =====
CPDPRG2 waltz16
NUC5 13C
PCPD5 80.00 usec
PL5 1.00 dB
PL5W 17.00 dB
SFO5 300.132000 MHz

===== CHANNEL f6 =====
CPDPRG2 waltz16
NUC6 1H
PCPD6 80.00 usec
PL6 1.00 dB
PL6W 17.00 dB
SFO6 300.132000 MHz
    
```



Z-8a

126.49
 127.66
 128.09
 128.43
 128.58
 132.84
 134.94
 136.24
 136.82
 139.01
 155.52
 168.32
 76.58
 77.00
 77.43
 66.97
 58.79
 51.57



```

NAME      110305
EXPNO    8
PROCNO   1
Date_    20110305
Time     18.26
INSTRUM spect
PROBHD   5 mm PABBO BB-
PULPROG zg30
TD       65536
SOLVENT  CDCl3
NS       8
DS       2
SWH      6188.119 Hz
FIDRES   0.094423 Hz
AQ       5.2953587 sec
RG       50.8
DW       80.800 usec
DE       6.50 usec
TE       291.5 K
D1       1.00000000 sec
TD0      1

===== CHANNEL f1 =====
NUC1      1H
P1       11.80 usec
PL       0.00 dB
PR1      11.55467796 W
PWL      300.1328434 MHz
SFO1     327.68
SF       300.1300116 MHz
WDW      EM
SSB      0
LB       0.30 Hz
GB       0
PC       1.00
    
```

— 0.000

— 3.659

— 5.144

5.763

5.794

5.876

5.906

6.825

6.878

6.893

6.931

7.228

7.264

7.293

7.304

7.311

7.322

7.348

7.355

7.370

7.477

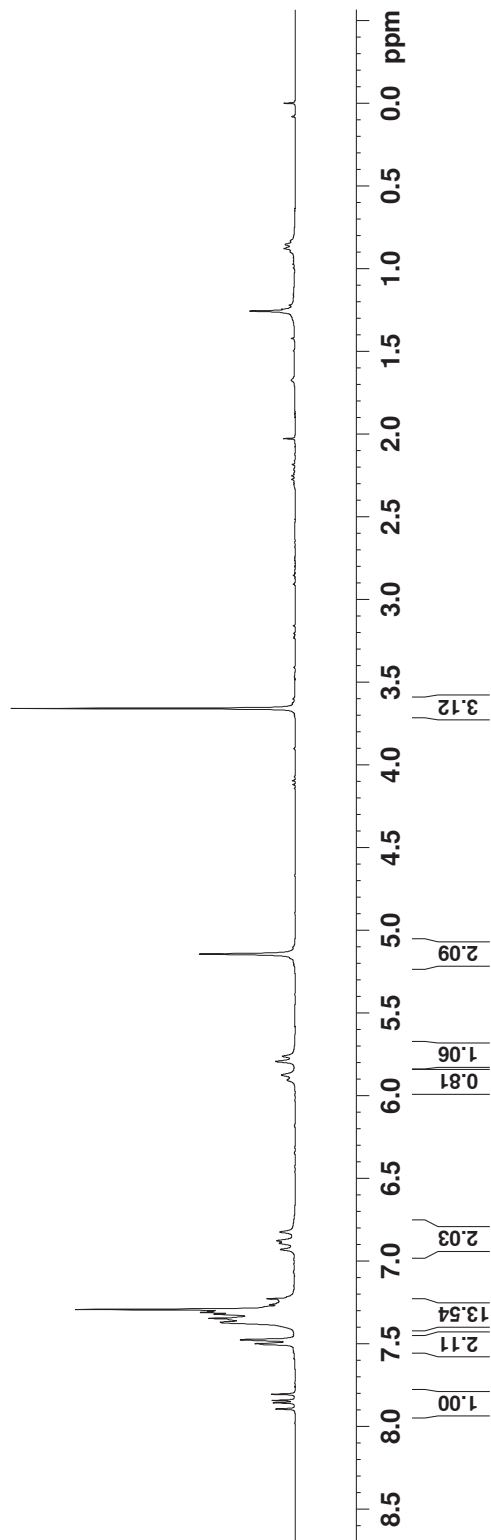
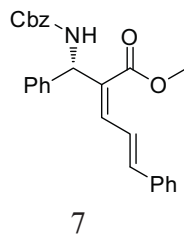
7.500

7.806

7.843

7.858

7.895



```

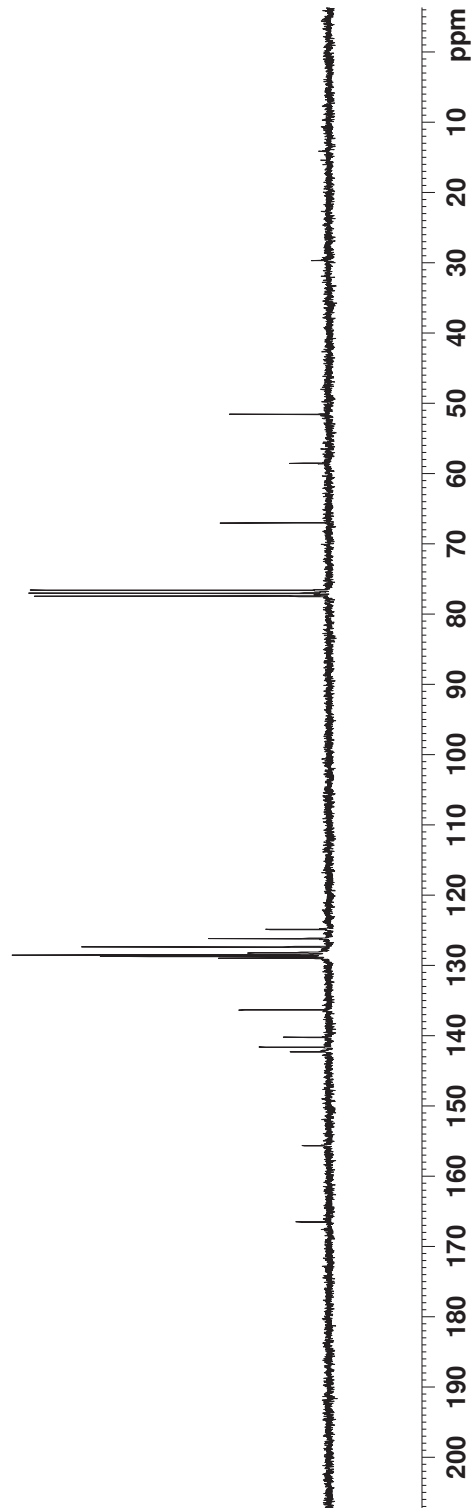
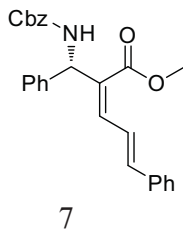
NAME 110305
EXPNO 9
PROCNO 1
Date_ 20110305
Time_ 18.32
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 143
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 291.9 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL2W 9.17820644 W
PL12W 0.23054613 W
PL13W 0.23054613 W
SFO2 300.132068 MHz
SI 2
SF 75.4677586 MHz
RG 50
WDW EM
SFB 1.00 Hz
LB 0
GB 0
PC 1.40
    
```

51.51 —
 58.51 —
 67.00 —
 76.58 —
 77.00 —
 77.42 —

124.86 —
 126.16 —
 127.36 —
 128.20 —
 128.50 —
 128.70 —
 128.96 —
 136.31 —
 140.21 —
 141.62 —
 142.29 —
 155.65 —
 166.50 —



```

NAME          110305
EXPNO         3
PROCNO        1
Date_         20110305
Time          17.09
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            2
DS            2
SFO1          6188.119 Hz
SFO2          61084.423 Hz
FIDRES        5.2953567 sec
AQ            57
RG            80.800 usec
DE            6.50 usec
TE            291.2 K
D1            1.00000000 sec
TD0           1

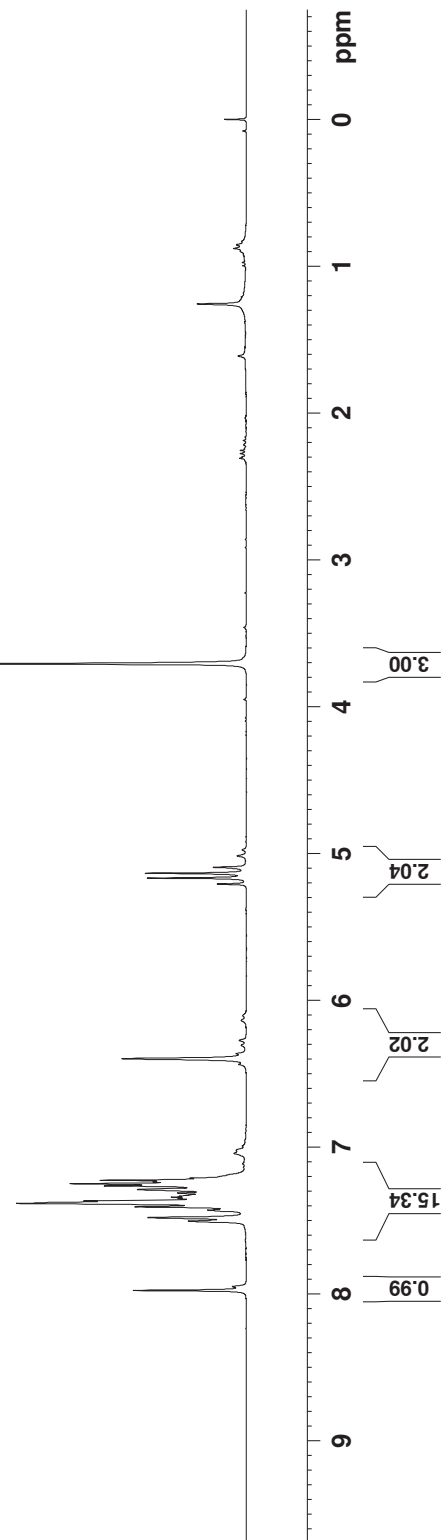
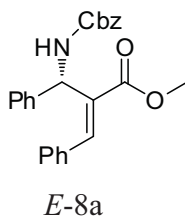
=====
CHANNEL f1 =====
NUC1          1H
P1            11.80 usec
PL1           0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300123 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```

0.000

3.708

5.208
5.168
5.135
5.094

7.977
7.504
7.481
7.408
7.384
7.367
7.350
7.342
7.334
7.314
7.289
7.265
7.250
7.238
7.226
7.212
6.398



```

NAME           110305
EXPNO          4
PROCNO         1
Date_          20110305
Time_         17.22
INSTRUM       spect
PROBHD        5 mm FAPBBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            227
DS            4
SWH           18028.846 Hz
FIDRES       0.275098 Hz
AQ           1.8175818 sec
RG           203
DW           27.733 usec
DE           6.50 usec
TE           292.0 K
D1           2.0000000 sec
D11          0.0300000 sec
TD0          1

===== CHANNEL f1 =====
NUC1          13C
P1           9.70 usec
PL1          0.00 dB
PL1W         29.38907051 W
SFO1         75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2        80.00 usec
PL2          1.00 dB
PL2W         17.00 dB
PL13         17.00 dB
PL14         17.00 dB
PL15         17.00 dB
PL2W         9.17820644 W
PL12W        0.23084613 W
PL13W        0.23095463 W
SFO2         300.133208 MHz
SI           2
SF           75.4677598 MHz
WDW          EM
SSB          0
LB           1.00 Hz
GB           0
PC           1.40
    
```

51.36
52.04

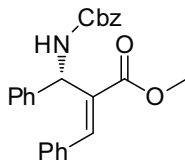
66.89

76.58
77.00
77.43

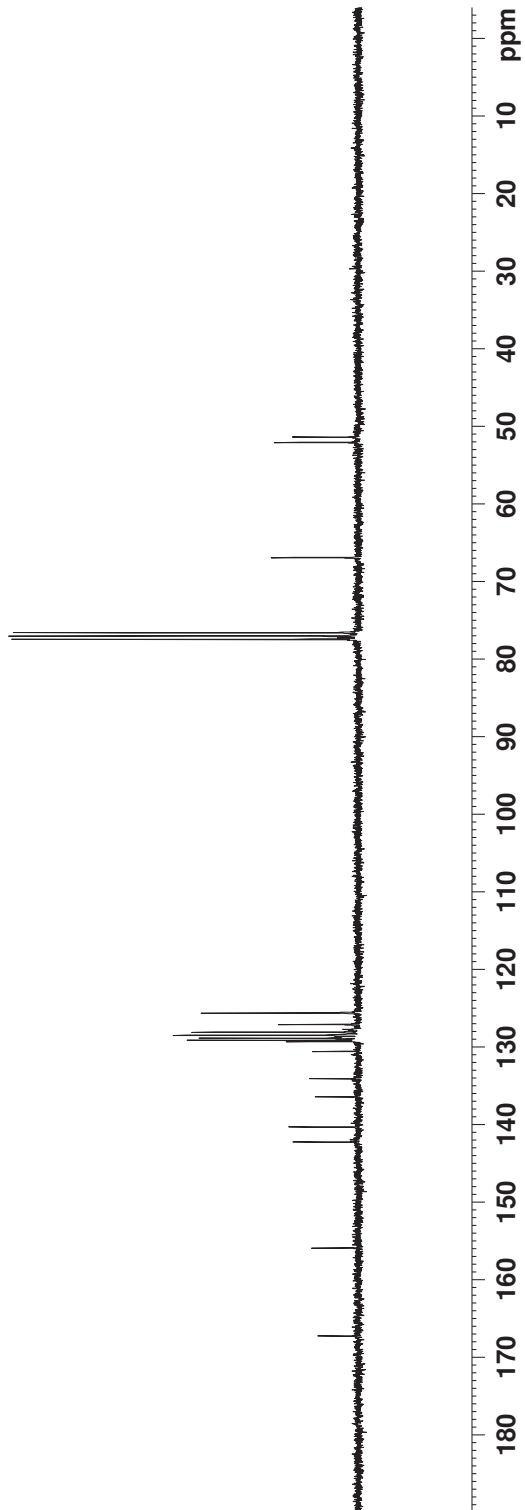
125.62
127.10
128.07
128.44
128.49
128.85
129.12
129.29
130.57
134.07
136.41
140.31
142.24

155.92

167.24



E-8a



```

NAME      11-0520
EXPNO     1
PROCNO    1
Date_     20110520
Time      16.29
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         8
DS         2
SWH        6188.119 Hz
FIDRES     0.094423 Hz
AQ         5.2953587 sec
RG         40.3
DW         80.800 usec
DE         6.50 usec
TE         289.5 K
D1         1.00000000 sec
TD0        1

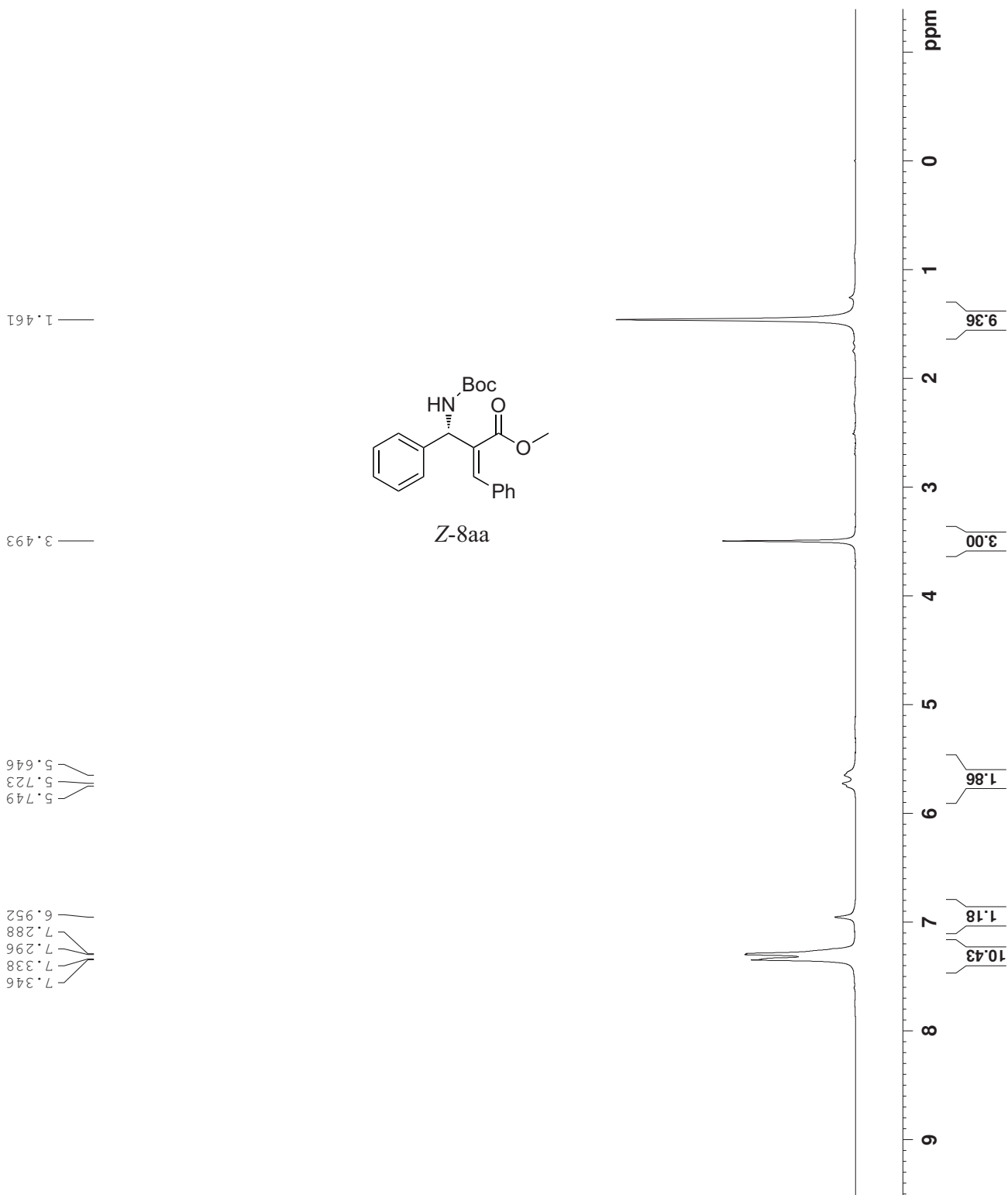
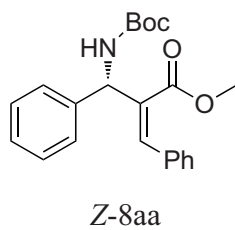
===== CHANNEL f1 =====
NUC1       1H
P1         11.80 usec
PL1        0.00 dB
PL1W       11.55467796 W
SFO1       300.1318534 MHz
SI         32768
SF         300.1300071 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
    
```

1.461

3.493

5.646
5.723
5.749

6.952
7.288
7.296
7.338
7.346

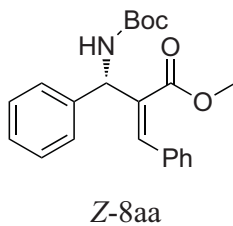


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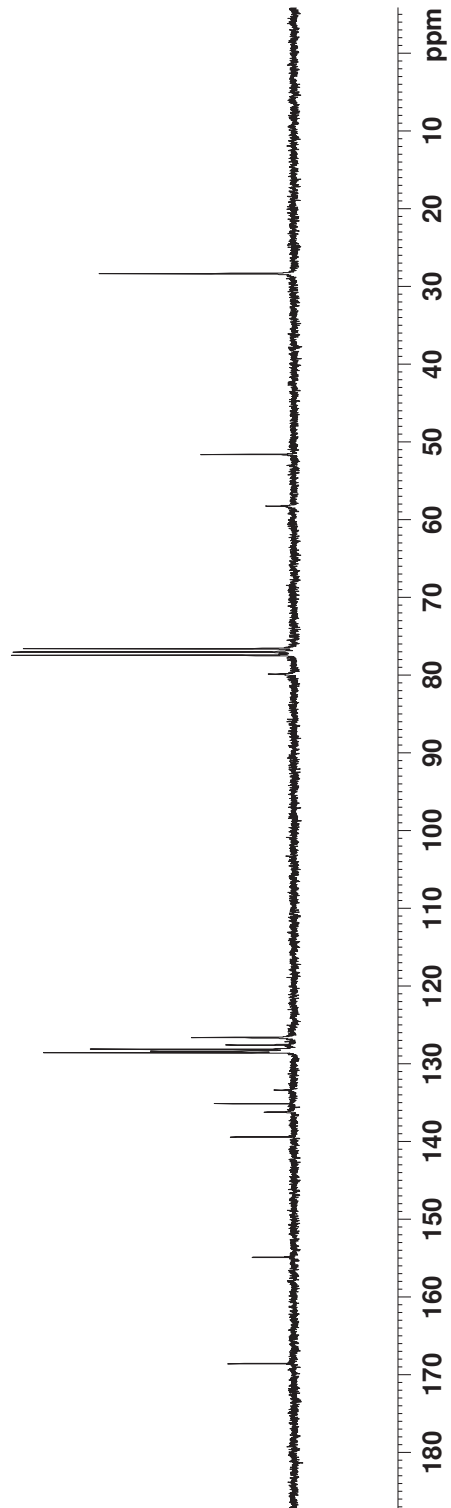
NAME 11-0520
EXPNO 3
PROCNO 1
Date_ 20110520
Time 16.39
INSTRUM spect
PROBHD 5 mm FAPBBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 151
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 290.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SF01 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL14 17.00 dB
PL15 17.00 dB
PL16 9.17820644 W
PL17 0.23084613 W
PL18 0.23084613 W
PL19 0.23084613 W
PL20 300.13128605 MHz
SI 2
SF 75.4677590 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
    
```



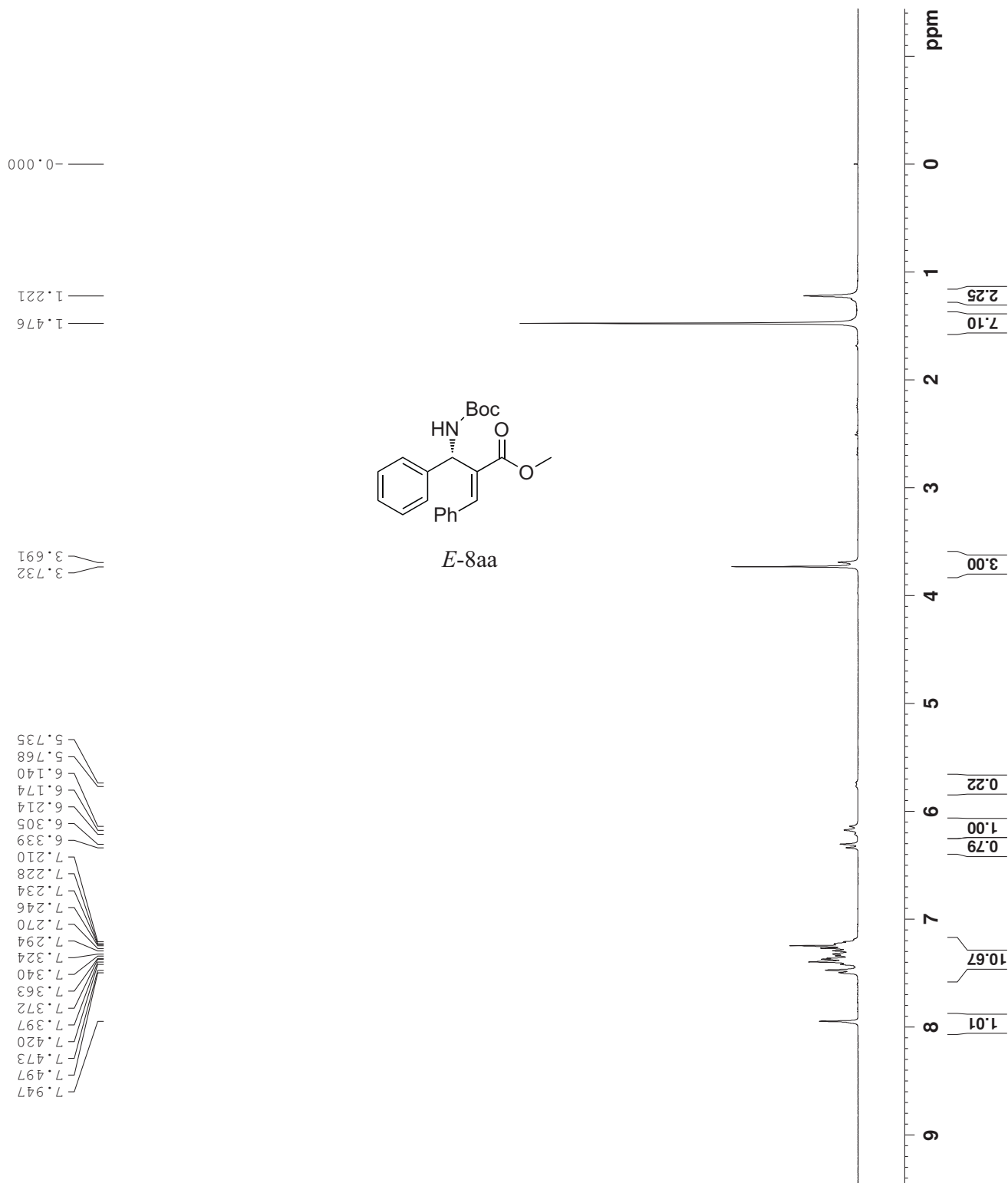
168.51 —
 154.89 —
 139.41 —
 136.21 —
 135.13 —
 133.39 —
 128.57 —
 128.42 —
 128.35 —
 128.12 —
 127.58 —
 126.62 —
 79.83 —
 77.42 —
 77.00 —
 76.58 —
 58.24 —
 51.58 —
 28.31 —




```

NAME          11-0520
EXPNO         5
PROCNO        1
Date_         20110520
Time_         16.58
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            4
DS            2
SWH           6188.119 Hz
FIDRES       0.094423 Hz
AQ           5.2953587 sec
RG           57
DE           80.800 usec
TE           289.7 K
D1           1.0000000 sec
TD0          1

===== CHANNEL f1 =====
NUC1          1H
P1           11.80 usec
PL1          0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300064 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```



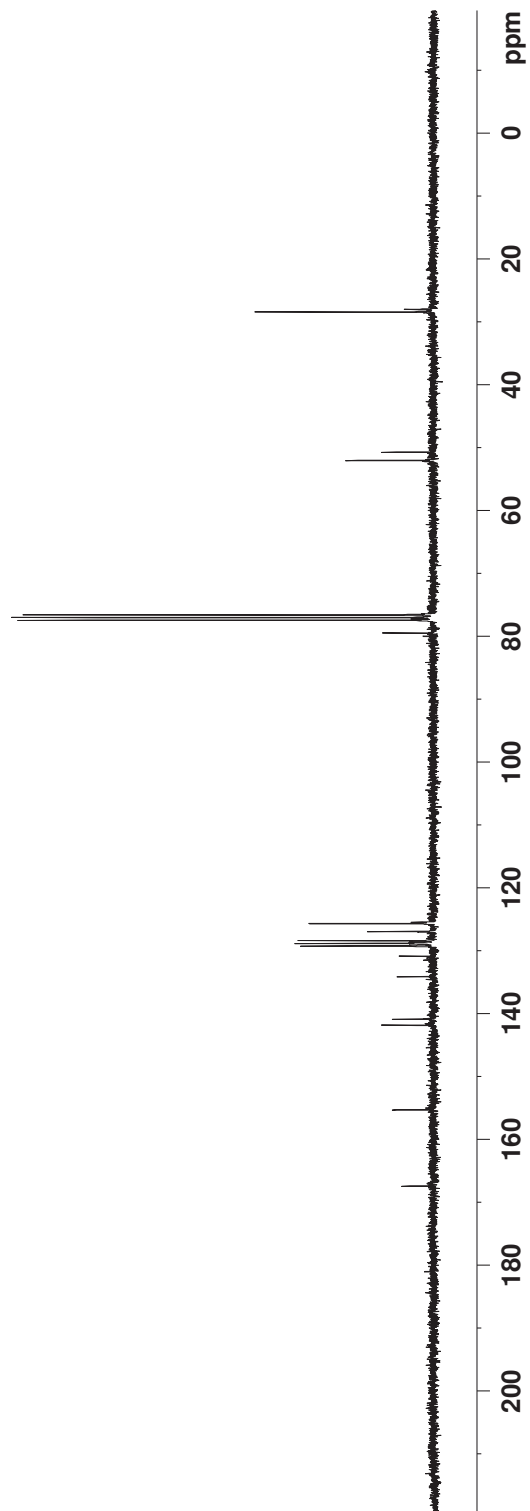
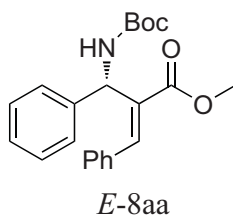
```

NAME          11-0520
EXPNO         6
PROCNO        1
Date_         20110520
Time         17.08
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            187
DS            4
SWH           18028.846 Hz
FIDRES       0.275098 Hz
AQ           1.8175818 sec
RG           203
DW           27.733 usec
DE           6.50 usec
TE           290.3 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0          1

===== CHANNEL f1 =====
NUC1          13C
P1           9.70 usec
PL1          0.00 dB
PL1W         29.38907051 W
SFO1          75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2        80.00 usec
PL2          1.00 dB
PL12         17.00 dB
PL13         17.00 dB
PL14         17.00 dB
PL15         17.00 dB
PL16         17.00 dB
PL17         17.00 dB
PL18         17.00 dB
PL19         17.00 dB
PL20         17.00 dB
PL21         17.00 dB
PL22         17.00 dB
PL23         17.00 dB
PL24         17.00 dB
PL25         17.00 dB
PL26         17.00 dB
PL27         17.00 dB
PL28         17.00 dB
PL29         17.00 dB
PL30         17.00 dB
PL31         17.00 dB
PL32         17.00 dB
PL33         17.00 dB
PL34         17.00 dB
PL35         17.00 dB
PL36         17.00 dB
PL37         17.00 dB
PL38         17.00 dB
PL39         17.00 dB
PL40         17.00 dB
PL41         17.00 dB
PL42         17.00 dB
PL43         17.00 dB
PL44         17.00 dB
PL45         17.00 dB
PL46         17.00 dB
PL47         17.00 dB
PL48         17.00 dB
PL49         17.00 dB
PL50         17.00 dB
PL51         17.00 dB
PL52         17.00 dB
PL53         17.00 dB
PL54         17.00 dB
PL55         17.00 dB
PL56         17.00 dB
PL57         17.00 dB
PL58         17.00 dB
PL59         17.00 dB
PL60         17.00 dB
PL61         17.00 dB
PL62         17.00 dB
PL63         17.00 dB
PL64         17.00 dB
PL65         17.00 dB
PL66         17.00 dB
PL67         17.00 dB
PL68         17.00 dB
PL69         17.00 dB
PL70         17.00 dB
PL71         17.00 dB
PL72         17.00 dB
PL73         17.00 dB
PL74         17.00 dB
PL75         17.00 dB
PL76         17.00 dB
PL77         17.00 dB
PL78         17.00 dB
PL79         17.00 dB
PL80         17.00 dB
PL81         17.00 dB
PL82         17.00 dB
PL83         17.00 dB
PL84         17.00 dB
PL85         17.00 dB
PL86         17.00 dB
PL87         17.00 dB
PL88         17.00 dB
PL89         17.00 dB
PL90         17.00 dB
PL91         17.00 dB
PL92         17.00 dB
PL93         17.00 dB
PL94         17.00 dB
PL95         17.00 dB
PL96         17.00 dB
PL97         17.00 dB
PL98         17.00 dB
PL99         17.00 dB
PL100        17.00 dB
    
```

27.97
28.40
50.70
52.01
76.58
77.00
77.42
79.45
125.46
125.67
126.94
128.38
128.83
128.83
129.26
130.85
134.13
140.90
141.82
155.29
167.43



```

NAME          110521
EXPNO         3
PROCNO        1
Date_         20110521
Time          16.58
INSTRUM       spect
PROBHD        5 mm PABBO-1
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            2
SWH           6188.119 Hz
FIDRES       0.094423 Hz
AQ           5.2953587 sec
RG           57
DW           80.800 usec
DE           6.50 usec
TE           289.4 K
D1           1.00000000 sec
TD0          1

===== CHANNEL f1 =====
NUC1          1H
P1           11.80 usec
PL1          0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300085 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```

— 0.000

— 3.479

— 5.142

5.752

5.782

5.955

5.984

6.981

7.009

7.038

7.239

7.270

7.289

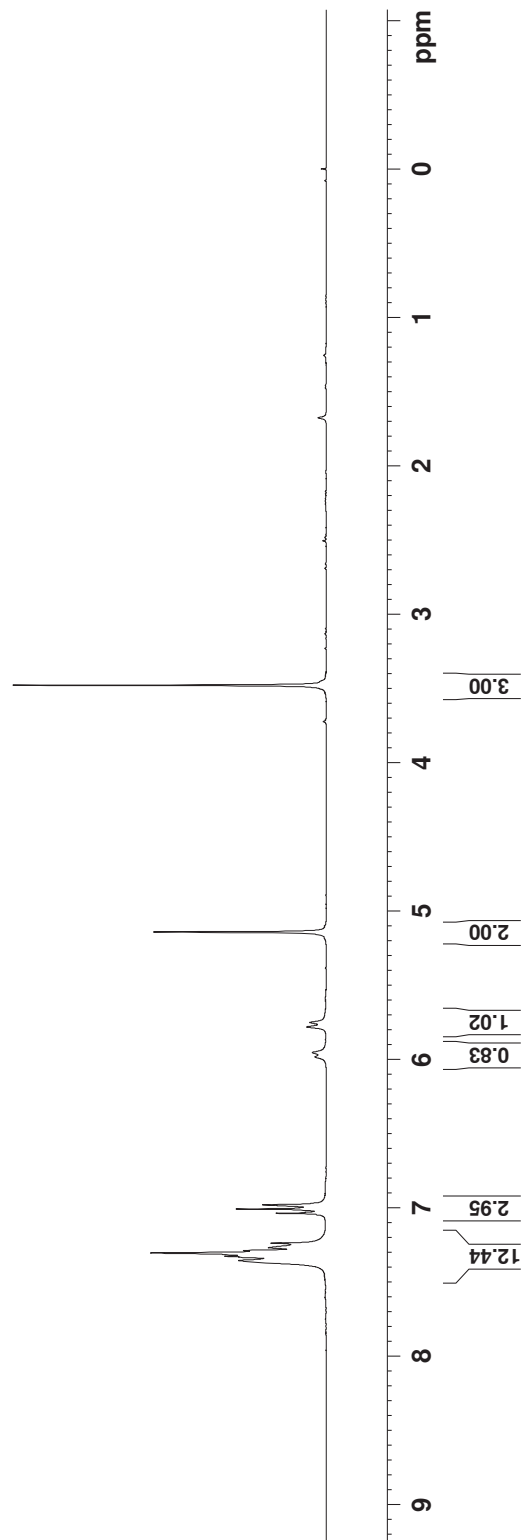
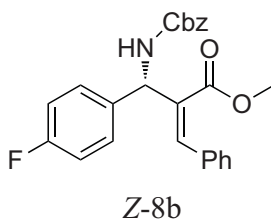
7.305

7.316

7.328

7.334

7.356

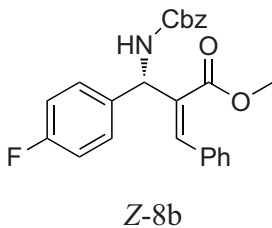


```

NAME 110521
EXPNO 4
PROCNO 1
Date_ 20110521
Time 17.07
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 207
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 290.0 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

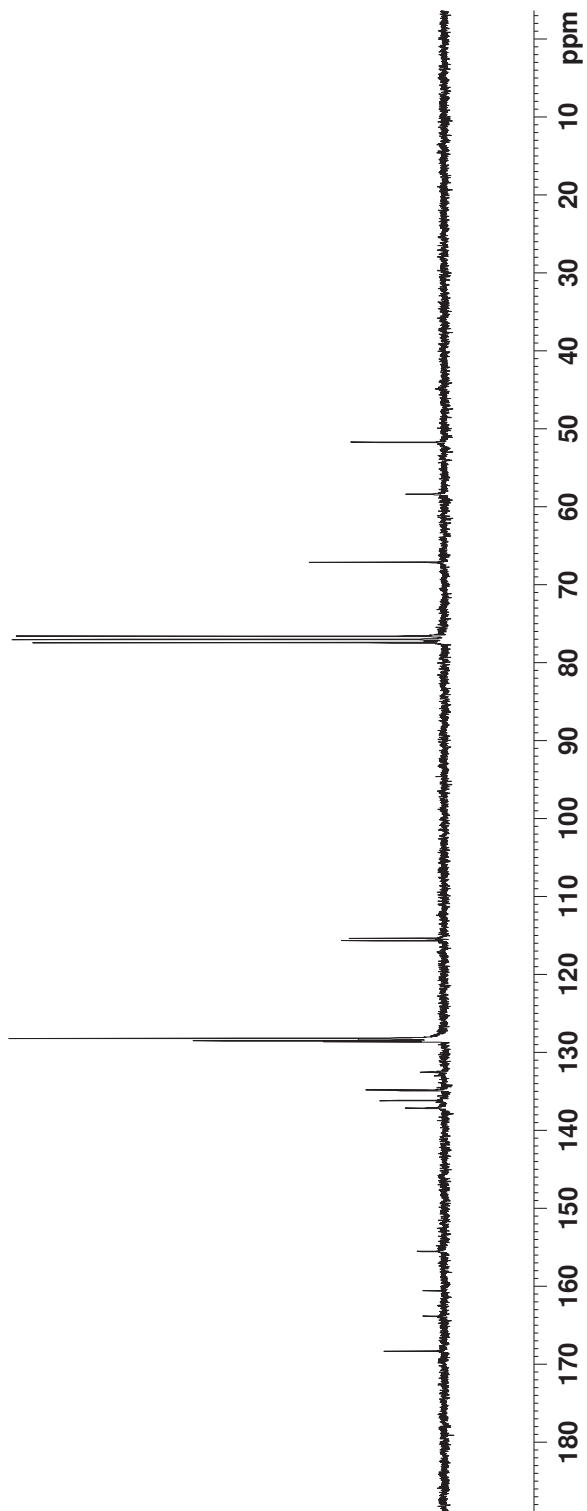
===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SF01 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL2W 17.00 dB
PL3 17.00 dB
PL3W 17.00 dB
PL4 9.17820644 W
PL4W 0.23084613 W
PL5 300.1312605 MHz
SI 2
SF 75.4677594 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
    
```



77.42
77.00
76.58
67.11
58.36
51.70

168.33
163.83
160.56
155.51
137.13
136.16
134.90
134.86
134.79
132.53
128.62
128.48
128.18
115.65
115.36



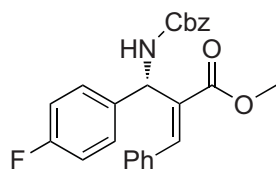
```

NAME 110522
EXPNO 10
PROCNO 1
Date_ 20110522
Time 21.36
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
DS 8
NS 2
SFO 6188.119 Hz
AQ 0.094423 Hz
RG 50.8
DE 80.800 usec
TE 290.8 K
D1 1.00000000 sec
TD0 1

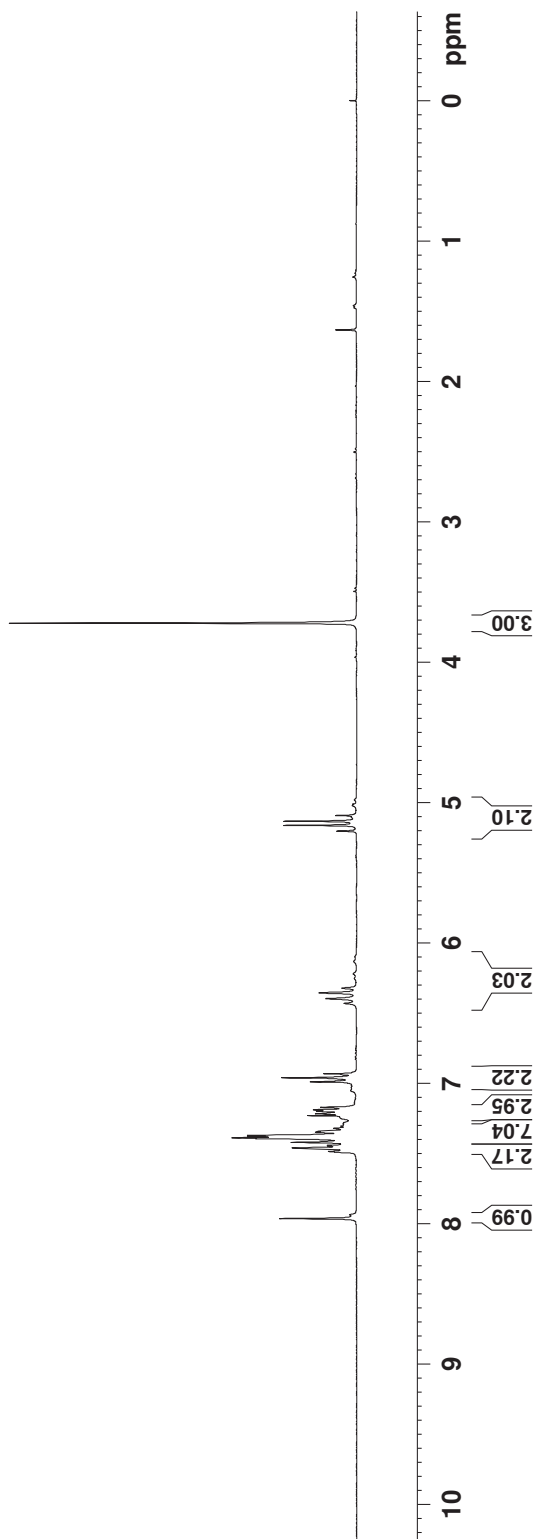
===== CHANNEL f1 =====
NUC1 1H
P1 11.80 usec
PL1 0.00 dB
PL1W 11.55467796 W
SFO1 300.1318534 MHz
SI 32768
SF 300.1300107 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
    
```

0.000

3.722
 5.093
 5.133
 5.163
 5.204
 5.223
 6.323
 6.356
 6.398
 6.431
 6.932
 6.939
 6.961
 6.984
 6.990
 7.172
 7.189
 7.200
 7.218
 7.232
 7.243
 7.282
 7.290
 7.296
 7.302
 7.318
 7.322
 7.341
 7.346
 7.368
 7.376
 7.386
 7.390
 7.418
 7.431
 7.439
 7.445
 7.457
 7.482
 7.487
 7.961



E-8b



```

NAME 110522
EXPNO 11
PROCNO 1
Date_ 20110522
Time 21.44
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 126
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 291.2 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL1W 9.17820644 W
PL2W 0.23054613 W
PL3W 0.23054613 W
SFO2 300.1312005 MHz
SI 32768
SF 75.4677548 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
    
```

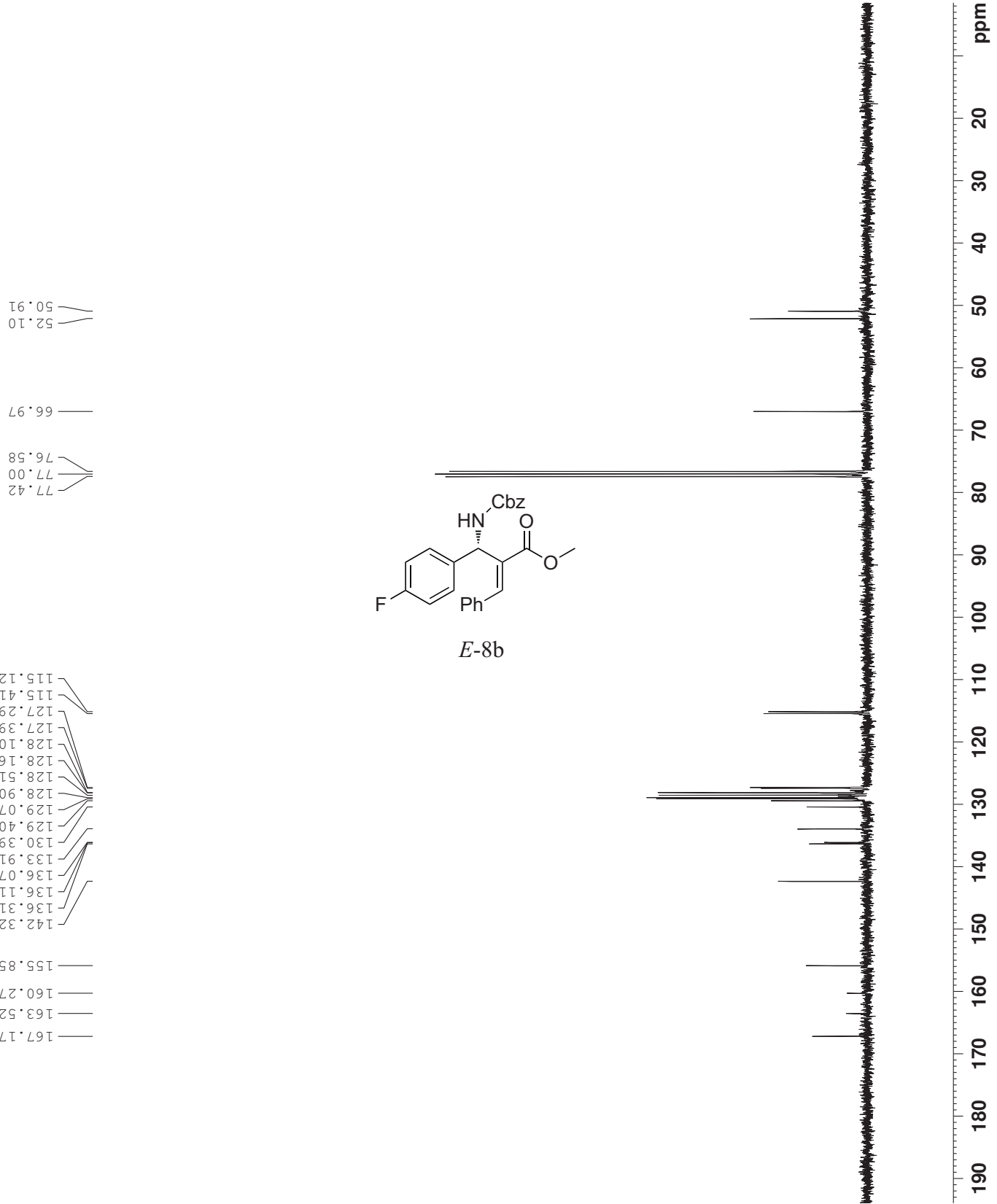
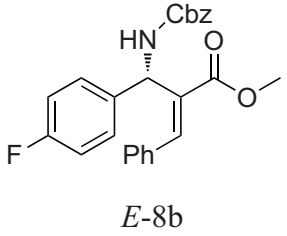
52.10
50.91

66.97

76.58
77.00
77.42

115.12
115.41
127.29
127.39
128.10
128.16
128.51
128.90
129.07
129.40
130.39
130.39
133.91
136.07
136.11
136.31
142.32

155.85
160.27
163.52
167.17



```

NAME 110526
EXPNO 2
PROCNO 1
Date_ 20110526
Time 15.59
INSTRUM spect
PROBHD 5 mm PABBO BB
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 6188.119 Hz
AQ 0.094423 Hz
RG 40.3
DE 80.800 usec
TE 289.8 K
D1 1.00000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 1H
P1 11.80 usec
PL1 0.00 dB
PL1W 11.55467796 W
SFO1 300.1318534 MHz
SI 32768
SF 300.1300130 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
    
```

0.000

3.470

5.131

5.723

5.753

6.020

6.050

6.989

7.195

7.224

7.258

7.286

7.295

7.299

7.318

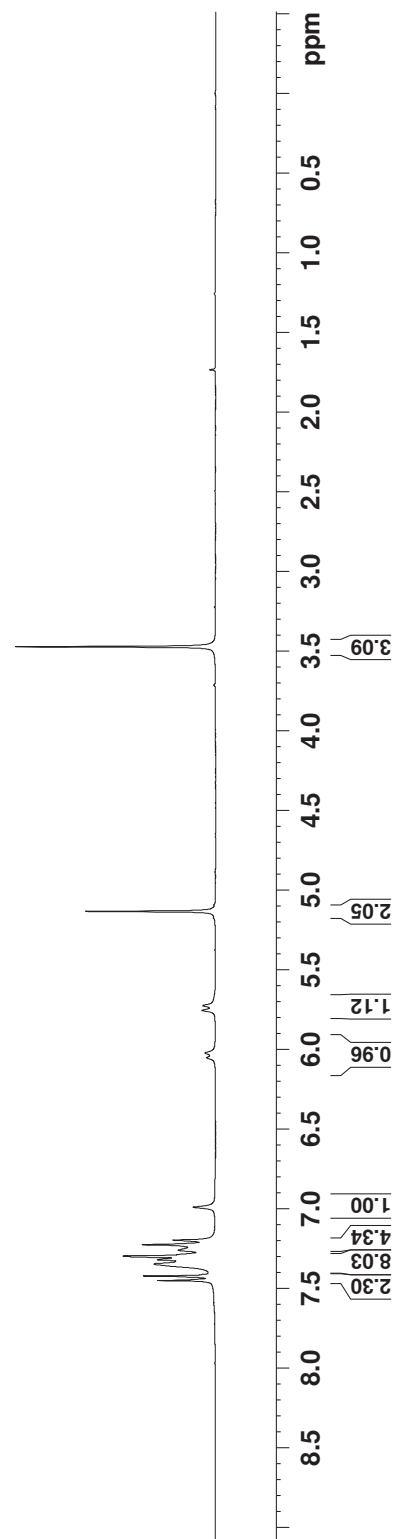
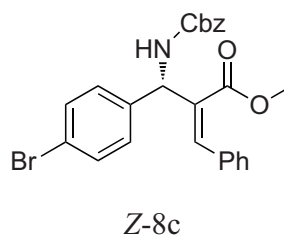
7.329

7.346

7.399

7.420

7.449



```

NAME          110526
EXPNO         3
PROCNO        1
Date_         20110526
Time         16.02
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            145
DS            4
SWH           18028.846 Hz
FIDRES        0.275098 Hz
AQ            1.8175818 sec
RG            203
DW            27.733 usec
DE            6.50 usec
TE            289.9 K
D1            2.00000000 sec
D11           0.03000000 sec
TD0           1
    
```

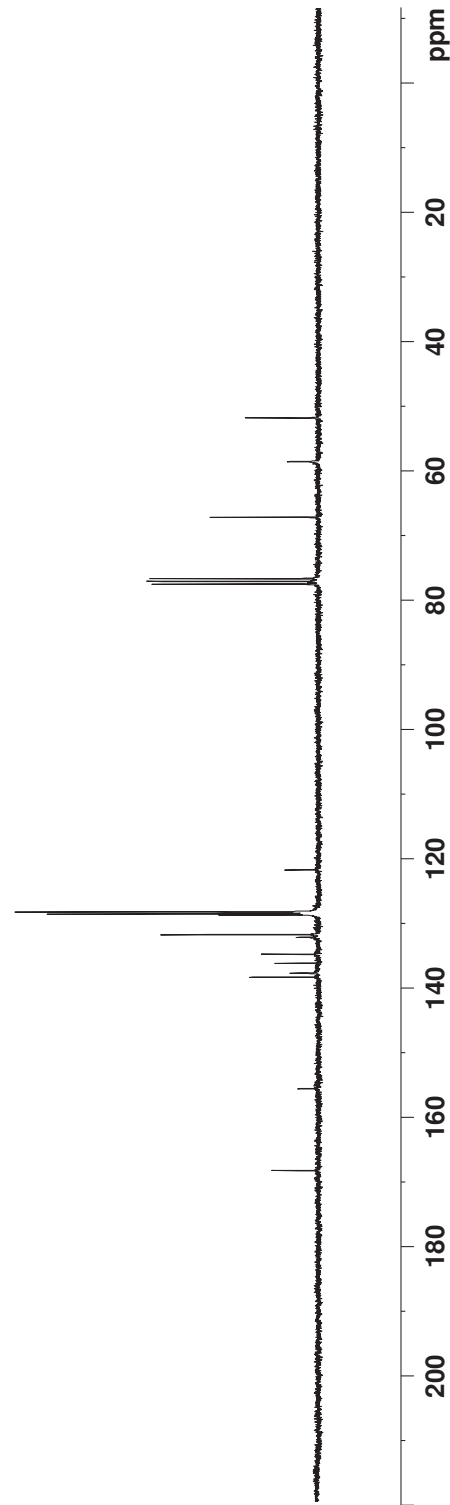
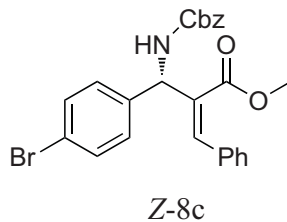
```

===== CHANNEL f1 =====
NUC1          13C
P1            9.70 usec
PL1           0.00 dB
PL1W          29.38907051 W
SFO1          75.4752953 MHz
    
```

```

===== CHANNEL f2 =====
CPDPRG2       waltz16
NUC2          1H
PCPD2         80.00 usec
PL2           1.00 dB
PL12          17.00 dB
PL13          17.00 dB
PL14          17.00 dB
PL15          17.00 dB
PL16          17.00 dB
PL17          17.00 dB
PL18          17.00 dB
PL19          17.00 dB
PL20          17.00 dB
PL21          17.00 dB
PL22          17.00 dB
PL23          17.00 dB
PL24          17.00 dB
PL25          17.00 dB
PL26          17.00 dB
PL27          17.00 dB
PL28          17.00 dB
PL29          17.00 dB
PL30          17.00 dB
PL31          17.00 dB
PL32          17.00 dB
PL33          17.00 dB
PL34          17.00 dB
PL35          17.00 dB
PL36          17.00 dB
PL37          17.00 dB
PL38          17.00 dB
PL39          17.00 dB
PL40          17.00 dB
PL41          17.00 dB
PL42          17.00 dB
PL43          17.00 dB
PL44          17.00 dB
PL45          17.00 dB
PL46          17.00 dB
PL47          17.00 dB
PL48          17.00 dB
PL49          17.00 dB
PL50          17.00 dB
PL51          17.00 dB
PL52          17.00 dB
PL53          17.00 dB
PL54          17.00 dB
PL55          17.00 dB
PL56          17.00 dB
PL57          17.00 dB
PL58          17.00 dB
PL59          17.00 dB
PL60          17.00 dB
PL61          17.00 dB
PL62          17.00 dB
PL63          17.00 dB
PL64          17.00 dB
PL65          17.00 dB
PL66          17.00 dB
PL67          17.00 dB
PL68          17.00 dB
PL69          17.00 dB
PL70          17.00 dB
PL71          17.00 dB
PL72          17.00 dB
PL73          17.00 dB
PL74          17.00 dB
PL75          17.00 dB
PL76          17.00 dB
PL77          17.00 dB
PL78          17.00 dB
PL79          17.00 dB
PL80          17.00 dB
PL81          17.00 dB
PL82          17.00 dB
PL83          17.00 dB
PL84          17.00 dB
PL85          17.00 dB
PL86          17.00 dB
PL87          17.00 dB
PL88          17.00 dB
PL89          17.00 dB
PL90          17.00 dB
PL91          17.00 dB
PL92          17.00 dB
PL93          17.00 dB
PL94          17.00 dB
PL95          17.00 dB
PL96          17.00 dB
PL97          17.00 dB
PL98          17.00 dB
PL99          17.00 dB
PL100         17.00 dB
    
```

168.17
 155.51
 138.24
 137.63
 136.09
 134.70
 132.07
 131.67
 128.64
 128.47
 128.15
 121.65
 77.42
 77.00
 76.58
 67.09
 58.48
 51.69



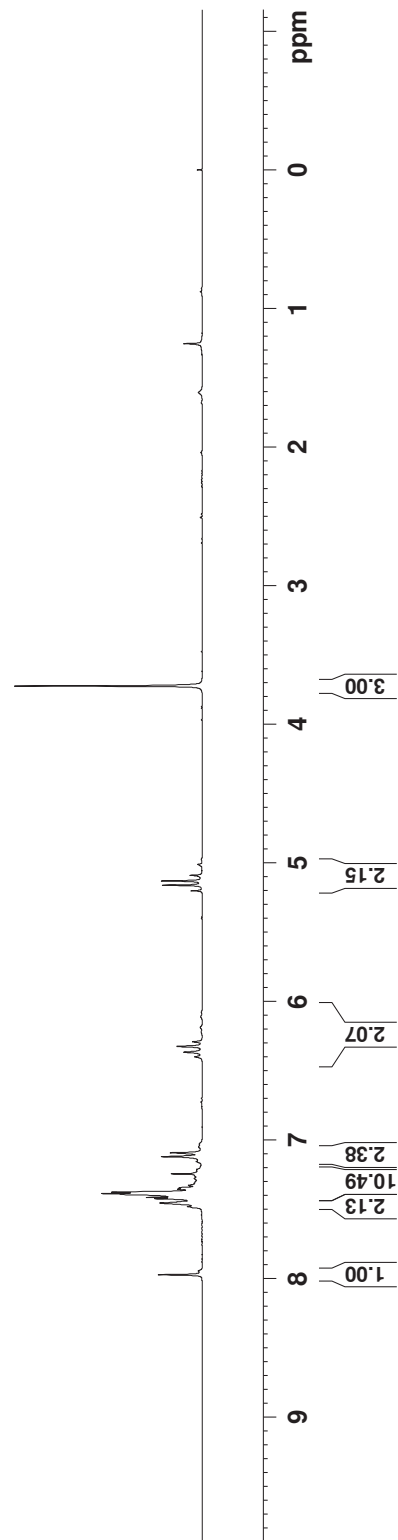
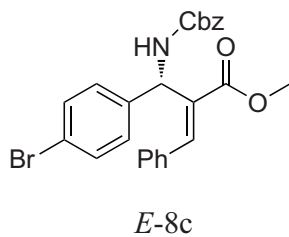

```

NAME          110522
EXPNO         12
PROCNO        1
Date_         20110521
Time          21.53
INSTRUM       spect
PROBHD        5 mm PABBO BB
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            2
SWH           6188.119 Hz
AQ            0.094423 Hz
RG            71.8
DE            80.800 usec
TE            6.50 usec
TD0           290.3 K
D1            1.00000000 sec
===== CHANNEL f1 =====
NUC1          1H
P1            11.80 usec
PL1           0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300075 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
    
```

— 0.000

— 3.725

7.970
7.478
7.452
7.422
7.413
7.404
7.385
7.374
7.353
7.344
7.325
7.309
7.302
7.276
7.256
7.242
7.118
7.090
6.401
6.368
6.326
6.293
5.203
5.162
5.132
5.091



```

NAME        110522
EXPNO      13
PROCNO     1
Date_      20110522
Time       21.57
INSTRUM    spect
PROBHD     5 mm PABBO BB-
PULPROG    zgpg30
TD         65536
SOLVENT    CDCl3
NS         90
DS         4
SWH        18028.846 Hz
FIDRES     0.275098 Hz
AQ         1.8175818 sec
RG         203
DW         27.733 usec
DE         6.50 usec
TE         290.9 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

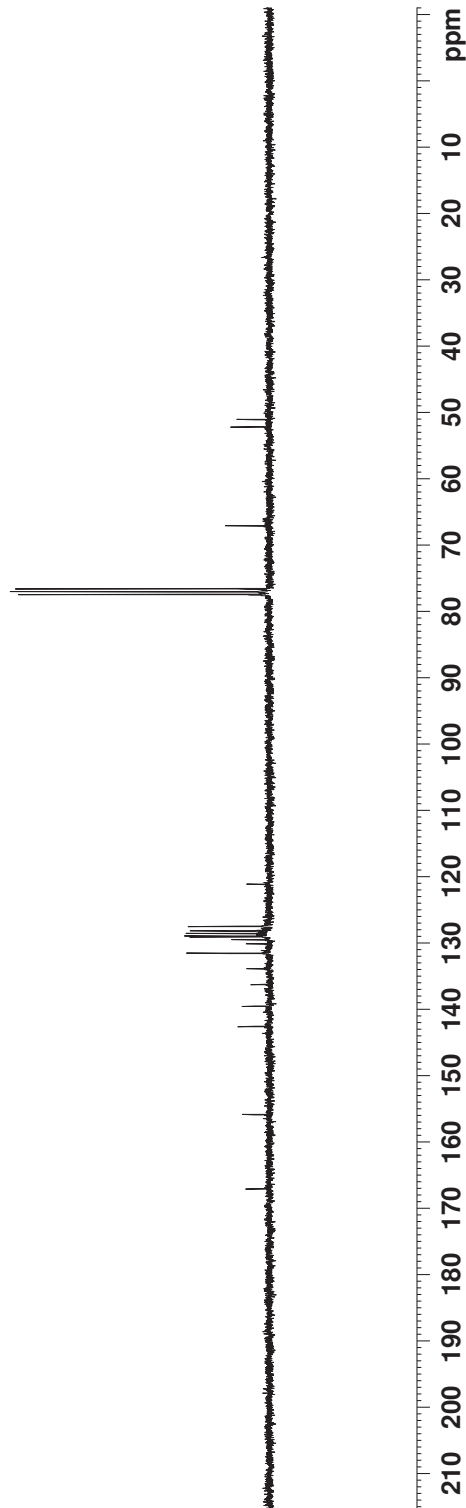
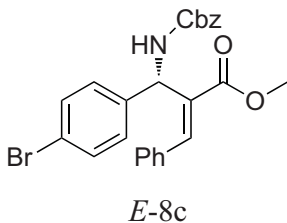
===== CHANNEL f1 =====
NUC1        13C
P1          9.70 usec
PL1         0.00 dB
PL1W        29.38907051 W
SFO1        75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2        1H
PCPD2      80.00 usec
PL2         1.00 dB
PL12        17.00 dB
PL13        17.00 dB
PL14        17.00 dB
PL15        17.00 dB
PL16        17.00 dB
PL17        17.00 dB
PL18        17.00 dB
PL19        17.00 dB
PL20        17.00 dB
PL21        17.00 dB
PL22        17.00 dB
PL23        17.00 dB
PL24        17.00 dB
PL25        17.00 dB
PL26        17.00 dB
PL27        17.00 dB
PL28        17.00 dB
PL29        17.00 dB
PL30        17.00 dB
PL31        17.00 dB
PL32        17.00 dB
PL33        17.00 dB
PL34        17.00 dB
PL35        17.00 dB
PL36        17.00 dB
PL37        17.00 dB
PL38        17.00 dB
PL39        17.00 dB
PL40        17.00 dB
PL41        17.00 dB
PL42        17.00 dB
PL43        17.00 dB
PL44        17.00 dB
PL45        17.00 dB
PL46        17.00 dB
PL47        17.00 dB
PL48        17.00 dB
PL49        17.00 dB
PL50        17.00 dB
PL51        17.00 dB
PL52        17.00 dB
PL53        17.00 dB
PL54        17.00 dB
PL55        17.00 dB
PL56        17.00 dB
PL57        17.00 dB
PL58        17.00 dB
PL59        17.00 dB
PL60        17.00 dB
PL61        17.00 dB
PL62        17.00 dB
PL63        17.00 dB
PL64        17.00 dB
PL65        17.00 dB
PL66        17.00 dB
PL67        17.00 dB
PL68        17.00 dB
PL69        17.00 dB
PL70        17.00 dB
PL71        17.00 dB
PL72        17.00 dB
PL73        17.00 dB
PL74        17.00 dB
PL75        17.00 dB
PL76        17.00 dB
PL77        17.00 dB
PL78        17.00 dB
PL79        17.00 dB
PL80        17.00 dB
PL81        17.00 dB
PL82        17.00 dB
PL83        17.00 dB
PL84        17.00 dB
PL85        17.00 dB
PL86        17.00 dB
PL87        17.00 dB
PL88        17.00 dB
PL89        17.00 dB
PL90        17.00 dB
PL91        17.00 dB
PL92        17.00 dB
PL93        17.00 dB
PL94        17.00 dB
PL95        17.00 dB
PL96        17.00 dB
PL97        17.00 dB
PL98        17.00 dB
PL99        17.00 dB
PL100       17.00 dB
PL101       17.00 dB
PL102       17.00 dB
PL103       17.00 dB
PL104       17.00 dB
PL105       17.00 dB
PL106       17.00 dB
PL107       17.00 dB
PL108       17.00 dB
PL109       17.00 dB
PL110       17.00 dB
PL111       17.00 dB
PL112       17.00 dB
PL113       17.00 dB
PL114       17.00 dB
PL115       17.00 dB
PL116       17.00 dB
PL117       17.00 dB
PL118       17.00 dB
PL119       17.00 dB
PL120       17.00 dB
PL121       17.00 dB
PL122       17.00 dB
PL123       17.00 dB
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PL500       17.00 dB
    
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51.02
 52.17
 67.04
 76.58
 77.00
 77.42

121.12
 127.48
 128.13
 128.20
 128.53
 128.94
 129.06
 129.48
 130.11
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 133.85
 136.26
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 155.86

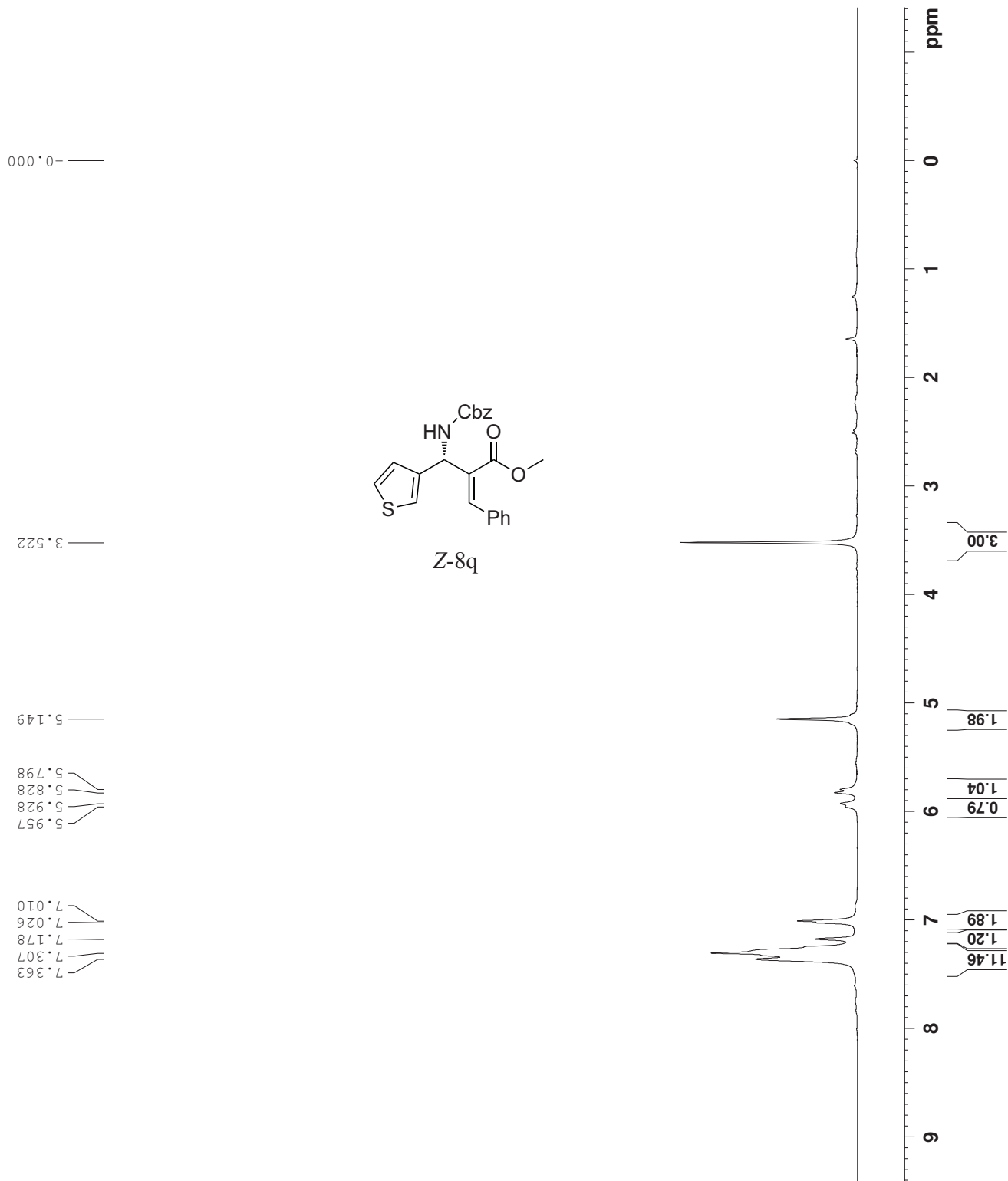
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NAME          110521
EXPNO         1
PROCNO        1
Date_         20110521
Time          16.30
INSTRUM       spect
PROBHD        5 mm PABBO BB-
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            2
SWH           6188.113 Hz
FIDRES       0.1094463 Hz
AQ           5.2395567 sec
RG           80.00
DM           80.00 usec
DE           289.3 K
TE           300.2 K
D1           1.00000000 sec
TD0          1

===== CHANNEL f1 =====
NUC1          1H
P1           11.80 usec
PL1          0.00 dB
PL1W         11.5546796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300066 MHz
MDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
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```
NAME 110521
EXPNO 2
PROCNO 1
Date_ 20110521
Time 16.37
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 308
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 290.1 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

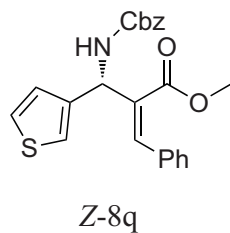
===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL14 17.00 dB
PL15 17.00 dB
PL16 9.17820644 W
PL17 0.23084813 W
PL18 0.23084813 W
SFO2 300.1312606 MHz
SI 2
SF 75.4677592 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
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51.71
55.66
67.05
76.58
77.00
77.42

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140.62

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168.41

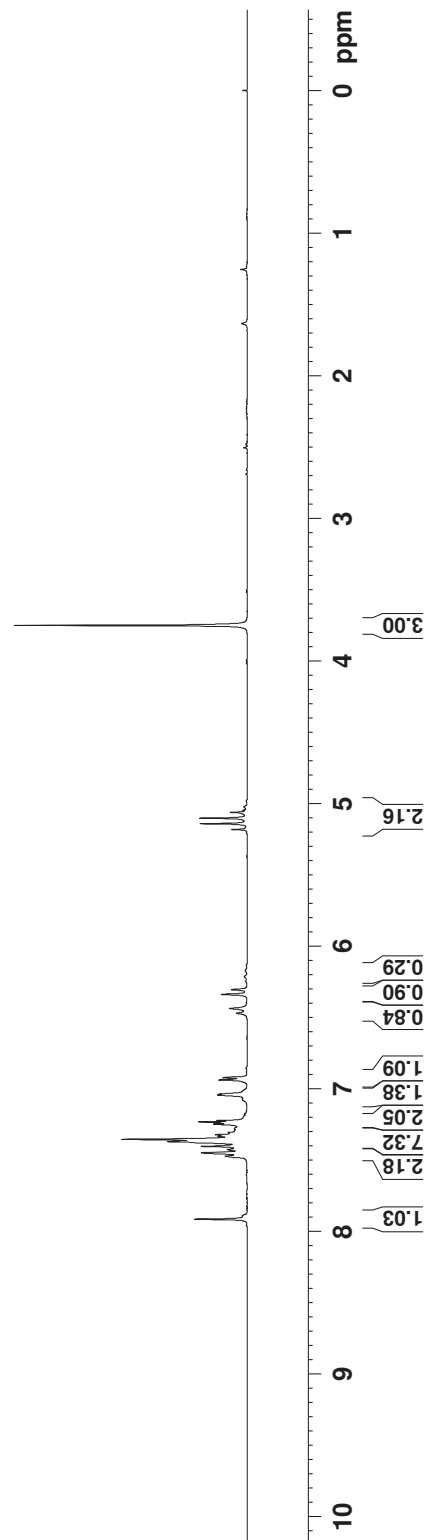
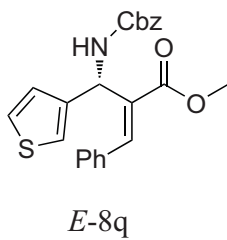


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NAME      110522
EXPNO    16
PROCNO   1
Date_    20110521
Time     22.15
INSTRUM  spect
PROBHD   5 mm PABBO BB
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        8
DS        2
SWH       6188.119 Hz
FIDRES   0.094423 Hz
AQ        5.2953587 sec
RG        57
DE        80.800 usec
TE        6.50 usec
TD0       290.0 K
DI        1.00000000 sec
===== CHANNEL f1 =====
NUC1      1H
P1        11.80 usec
PL1       0.00 dB
PL1W      11.55467796 W
SFO1      300.1318534 MHz
SI        32768
SF        300.1300105 MHz
WDW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00
    
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3.752
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 7.432
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 7.916

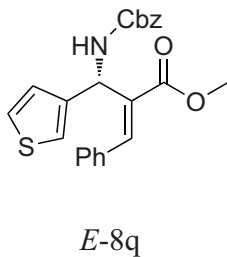


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NAME      110522
EXPNO     17
PROCNO    1
Date_     20110522
Time      22.21
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         84
DS         4
SWH        18028.846 Hz
FIDRES     0.275098 Hz
AQ         1.8175818 sec
RG         203
DW         27.733 usec
DE         6.50 usec
TE         290.6 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

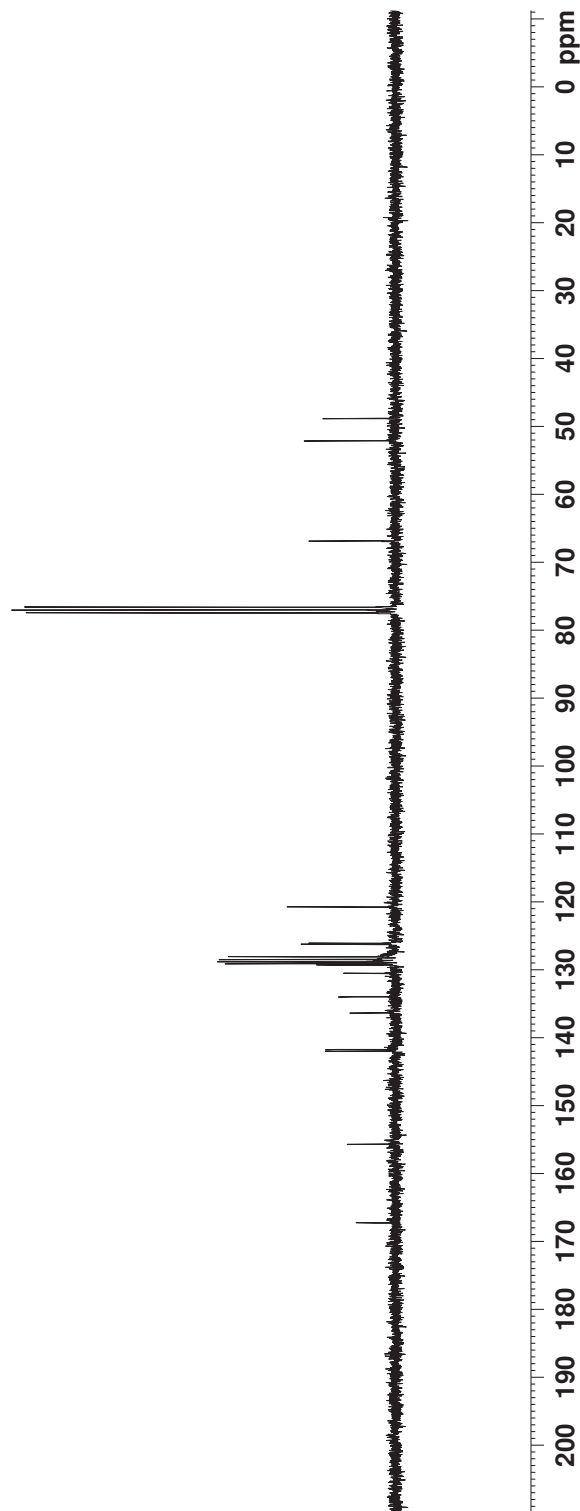
===== CHANNEL f1 =====
NUC1       13C
P1         9.70 usec
PL1        0.00 dB
PL1W       29.38907051 W
SFO1       75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      80.00 usec
PL2         1.00 dB
PL12        17.00 dB
PL13         17.00 dB
PL14         17.00 dB
PL15         17.00 dB
PL16         17.00 dB
PL17         17.00 dB
PL18         17.00 dB
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PL308        17.00 dB
PL309        17.00 dB
PL310        17.00 dB
PL311        17.00 dB
PL312        17.00 dB
PL313        17.00 dB
PL314        17.00 dB
PL315        17.00 dB
PL316        17.00 dB
PL317        17.00 dB
PL318        17.00 dB
PL319        17.00 dB
PL320        17.00 dB
PL321        17.00 dB
PL322        17.00 dB
PL323        17.00 dB
PL324        17.00 dB
PL325        17.00 dB
PL326        17.00 dB
PL327        17.00 dB
PL328        17.00 dB
PL329        17.00 dB
PL330        17.00 dB
PL331        17.00 dB
PL332        17.00 dB
PL333        17.00 dB
PL334        17.00 dB
PL335        17.00 dB
PL336        17.00 dB
PL337        17.00 dB
PL338        17.00 dB
PL339        17.00 dB
PL340        17.00 dB
PL341        17.00 dB
PL342        17.00 dB
PL343        17.00 dB
PL344        17.00 dB
PL345        17.00 dB
PL346        17.00 dB
PL347        17.00 dB
PL348        17.00 dB
PL349        17.00 dB
PL350        17.00 dB
PL351        17.00 dB
PL352        17.00 dB
PL353        17.00 dB
PL354        17.00 dB
PL355        17.00 dB
PL356        17.00 dB
PL357        17.00 dB
PL358        17.00 dB
PL359        17.00 dB
PL360        17.00 dB
PL361        17.00 dB
PL362        17.00 dB
PL363        17.00 dB
PL364        17.00 dB
PL365        17.00 dB
PL366        17.00 dB
PL367        17.00 dB
PL368        17.00 dB
PL369        17.00 dB
PL370        17.00 dB
PL371        17.00 dB
PL372        17.00 dB
PL373        17.00 dB
PL374        17.00 dB
PL375        17.00 dB
PL376        17.00 dB
PL377        17.00 dB
PL378        17.00 dB
PL379        17.00 dB
PL380        17.00 dB
PL381        17.00 dB
PL382        17.00 dB
PL383        17.00 dB
PL384        17.00 dB
PL385        17.00 dB
PL386        17.00 dB
PL387        17.00 dB
PL388        17.00 dB
PL389        17.00 dB
PL390        17.00 dB
PL391        17.00 dB
PL392        17.00 dB
PL393        17.00 dB
PL394        17.00 dB
PL395        17.00 dB
PL396        17.00 dB
PL397        17.00 dB
PL398        17.00 dB
PL399        17.00 dB
PL400        17.00 dB
PL401        17.00 dB
PL402        17.00 dB
PL403        17.00 dB
PL404        17.00 dB
PL405        17.00 dB
PL406        17.00 dB
PL407        17.00 dB
PL408        17.00 dB
PL409        17.00 dB
PL410        17.00 dB
PL411        17.00 dB
PL412        17.00 dB
PL413        17.00 dB
PL414        17.00 dB
PL415        17.00 dB
PL416        17.00 dB
PL417        17.00 dB
PL418        17.00 dB
PL419        17.00 dB
PL420        17.00 dB
PL421        17.00 dB
PL422        17.00 dB
PL423        17.00 dB
PL424        17.00 dB
PL425        17.00 dB
PL426        17.00 dB
PL427        17.00 dB
PL428        17.00 dB
PL429        17.00 dB
PL430        17.00 dB
PL431        17.00 dB
PL432        17.00 dB
PL433        17.00 dB
PL434        17.00 dB
PL435        17.00 dB
PL436        17.00 dB
PL437        17.00 dB
PL438        17.00 dB
PL439        17.00 dB
PL440        17.00 dB
PL441        17.00 dB
PL442        17.00 dB
PL443        17.00 dB
PL444        17.00 dB
PL445        17.00 dB
PL446        17.00 dB
PL447        17.00 dB
PL448        17.00 dB
PL449        17.00 dB
PL450        17.00 dB
PL451        17.00 dB
PL452        17.00 dB
PL453        17.00 dB
PL454        17.00 dB
PL455        17.00 dB
PL456        17.00 dB
PL457        17.00 dB
PL458        17.00 dB
PL459        17.00 dB
PL460        17.00 dB
PL461        17.00 dB
PL462        17.00 dB
PL463        17.00 dB
PL464        17.00 dB
PL465        17.00 dB
PL466        17.00 dB
PL467        17.00 dB
PL468        17.00 dB
PL469        17.00 dB
PL470        17.00 dB
PL471        17.00 dB
PL472        17.00 dB
PL473        17.00 dB
PL474        17.00 dB
PL475        17.00 dB
PL476        17.00 dB
PL477        17.00 dB
PL478        17.00 dB
PL479        17.00 dB
PL480        17.00 dB
PL481        17.00 dB
PL482        17.00 dB
PL483        17.00 dB
PL484        17.00 dB
PL485        17.00 dB
PL486        17.00 dB
PL487        17.00 dB
PL488        17.00 dB
PL489        17.00 dB
PL490        17.00 dB
PL491        17.00 dB
PL492        17.00 dB
PL493        17.00 dB
PL494        17.00 dB
PL495        17.00 dB
PL496        17.00 dB
PL497        17.00 dB
PL498        17.00 dB
PL499        17.00 dB
PL500        17.00 dB
    
```



77.42
77.00
76.58
66.85
52.09
48.82

167.25
155.68
142.02
141.75
136.35
133.96
130.48
129.29
129.08
128.82
128.48
128.10
128.05
126.21
126.06
120.73



```

NAME 110521
EXPNO 7
PROCNO 1
Date_ 20110521
Time 17.29
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 8
DS 2
SWH 6188.119 Hz
FIDRES 0.094423 Hz
AQ 5.295367 sec
RG 816
DW 80.00 usec
DE 289.4 K
TE 300.2 K
D1 1.0000000 sec
TDO 1

===== CHANNEL f1 =====
NUC1 1H
PI 11.80 usec
PL1 0.00 dB
PL1W 11.55467796 W
SF01 300.1318534 MHz
SI 32768
SF 300.1298190 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
    
```

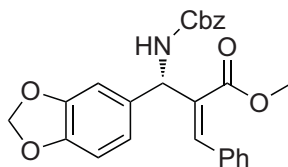
0.00

3.513

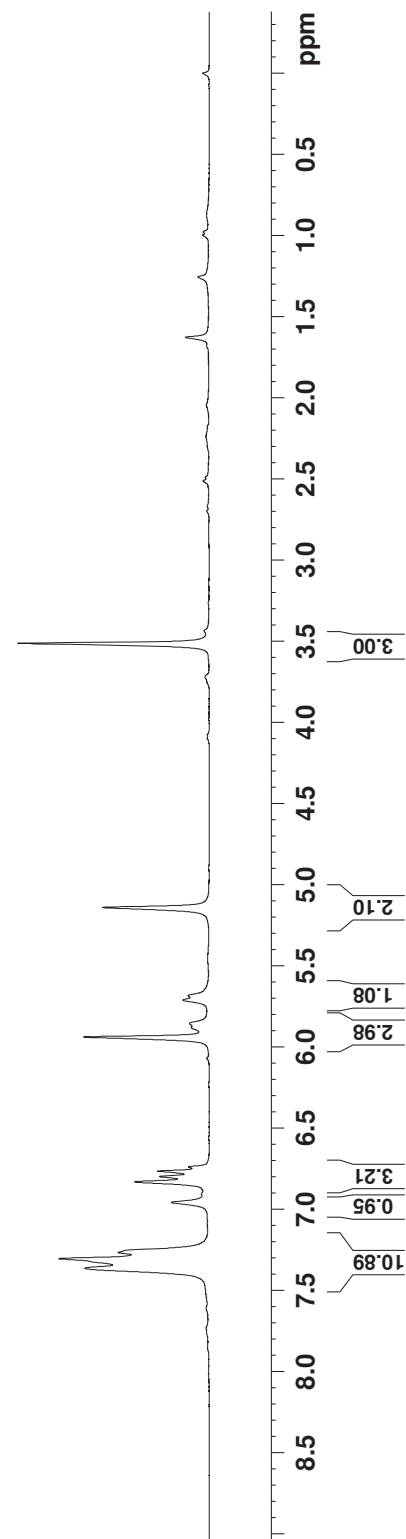
5.141

5.684
 5.711
 5.856
 5.880
 5.939

6.740
 6.766
 6.800
 6.832
 6.958
 7.267
 7.305
 7.365



Z-8m



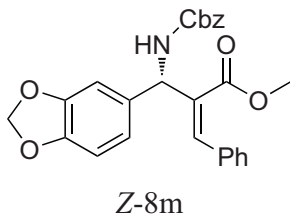
```

NAME 110521
EXPNO 8
PROCNO 1
Date_ 20110521
Time 17.37
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 403
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 290.4 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SF01 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL12 17.00 dB
PL13 17.00 dB
PL14 17.00 dB
PL15 17.00 dB
PL16 9.17820644 W
PL17 0.23084613 W
PL18 0.23084613 W
PL19 0.23084613 W
PL20 300.1312605 MHz
SI 2
SF 75.4677059 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
    
```

168.41
 155.46
 147.96
 147.13
 136.62
 136.23
 134.96
 133.03
 132.84
 128.51
 128.17
 119.89
 108.31
 107.22
 101.15
 77.42
 77.00
 76.58
 67.07
 58.62
 51.73




```

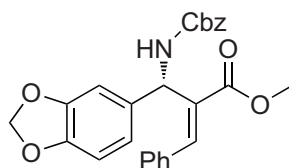
NAME          110522
EXPNO         14
PROCNO        1
Date_         20110522
Time_         22.05
INSTRUM       spect
PROBHD        5 mm PABBO BB
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            2
SWH           6188.119 Hz
AQ            0.109423 Hz
FIDRES       5.2953587 sec
RG            57
DE            80.800 usec
TE            6.50 usec
D1            290.1 K
D11           1.00000000 sec
TD0           1

===== CHANNEL f1 =====
NUC1          1H
P1            11.80 usec
PL1           0.00 dB
PL1W         11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300085 MHz
WDW          EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
    
```

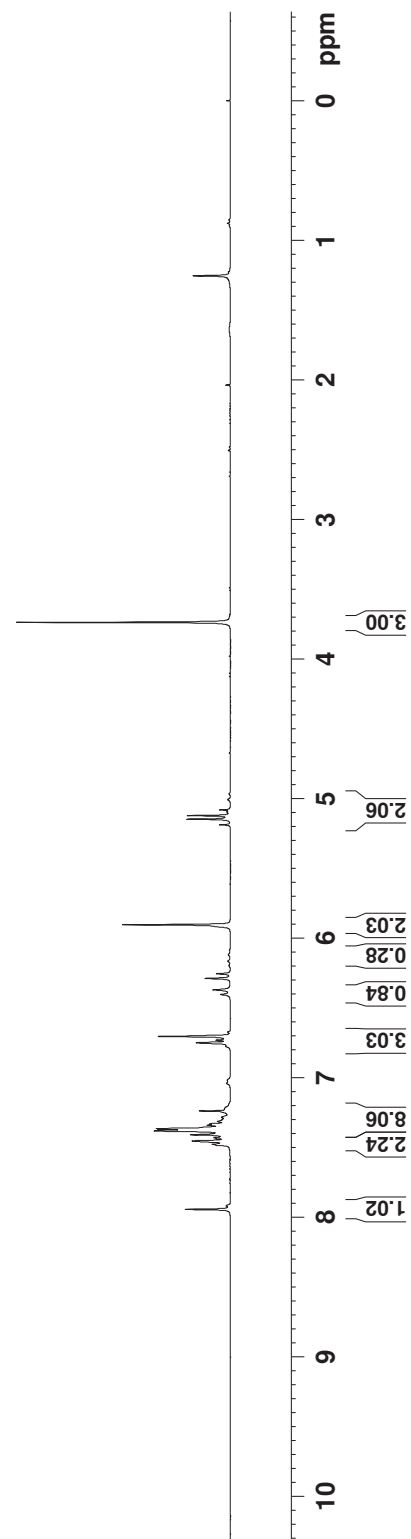
0.000

3.738

5.082
 5.123
 5.149
 5.189
 5.905
 6.256
 6.290
 6.372
 6.405
 6.705
 6.732
 6.752
 7.239
 7.313
 7.318
 7.332
 7.342
 7.366
 7.370
 7.382
 7.410
 7.424
 7.431
 7.437
 7.454
 7.478
 7.484
 7.941



E-8m

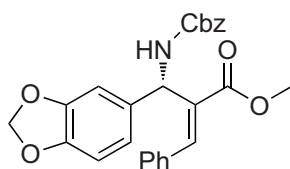


```

NAME      110522
EXPNO     15
PROCNO    1
Date_     20110522
Time      22.09
INSTRUM   spect
PROBHD    5 mm FAPBBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         58
DS         4
SWH        18028.846 Hz
FIDRES     0.275098 Hz
AQ         1.8175818 sec
RG         203
DW         27.733 usec
DE         6.50 usec
TE         290.7 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

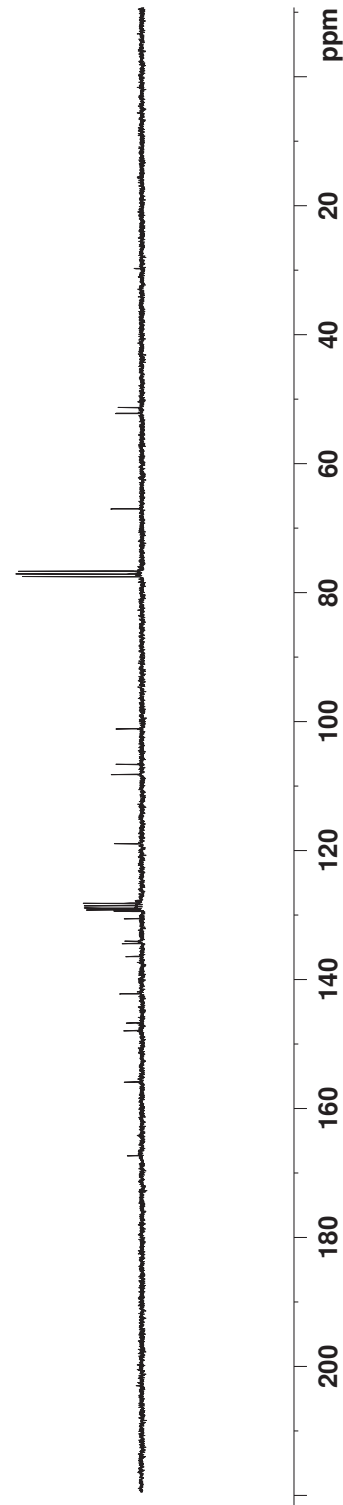
===== CHANNEL f1 =====
NUC1       13C
P1         9.70 usec
PL1        0.00 dB
PL1W       29.38907051 W
SF01       75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      80.00 usec
PL2        1.00 dB
PL2W       17.00 dB
PL3        17.00 dB
PL3W       17.00 dB
PL4        9.17820644 W
PL4W       0.23084613 W
PL5        300.1312606 MHz
SI         1
SF         75.4677594 MHz
RG         64
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
    
```



E-8m

167.26
 155.83
 147.86
 146.64
 142.13
 136.35
 134.34
 133.97
 130.50
 129.32
 129.11
 128.85
 128.49
 128.12
 128.07
 118.84
 108.12
 106.54
 101.03
 77.42
 77.00
 76.58
 66.91
 52.10
 51.17



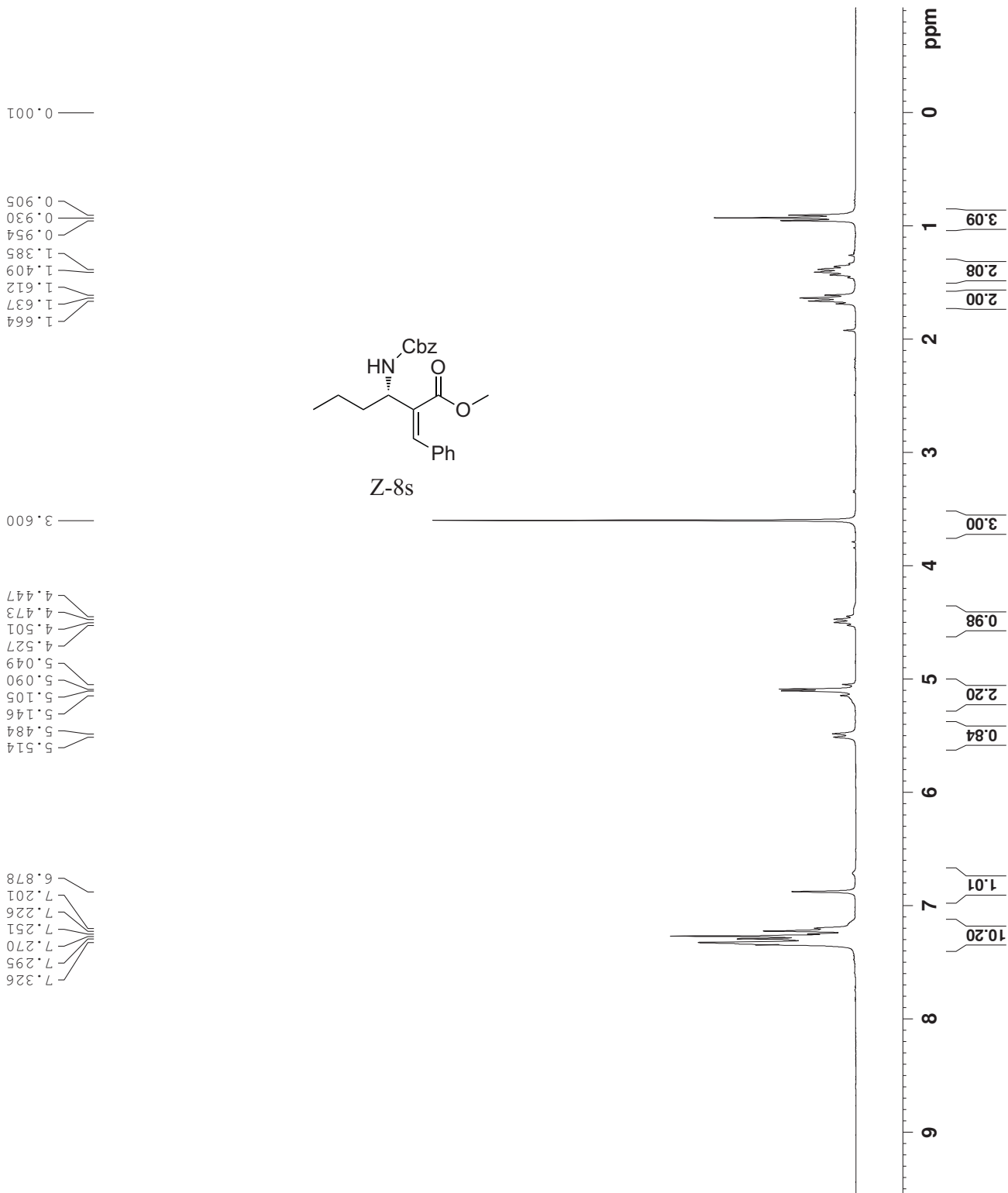
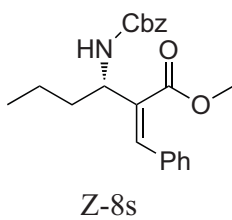
```

NAME      110528
EXPNO    3
PROCNO   1
Date_    20110528
Time     16.03
INSTRUM spect
PROBHD   5 mm F4BBO BB-
PULPROG zg30
TD        65536
SOLVENT  CDCl3
NS         8
DS         0
SWH       6188.119 Hz
FIDRES    0.094423 Hz
AQ         5.2953587 sec
RG         22.6
DW         80.800 usec
DE         6.50 usec
TE         300.0 K
D1         1.00000000 sec
TD0        1
===== CHANNEL f1 =====
NUC1      1H
P1         11.80 usec
PL1        0.00 dB
P2         11.55467296 usec
PL2        0.00 dB
SFO1      300.1318534 MHz
SF         307.68
SF         300.1300123 MHz
WDW        EM
SSB         0
LB         0.30 Hz
GB         0
PC         1.00
    
```

0.905
 0.930
 0.954
 0.954
 1.385
 1.409
 1.612
 1.637
 1.664

3.600
 4.447
 4.473
 4.501
 4.527
 5.049
 5.090
 5.105
 5.146
 5.484
 5.514

6.878
 7.201
 7.226
 7.251
 7.270
 7.295
 7.326



```

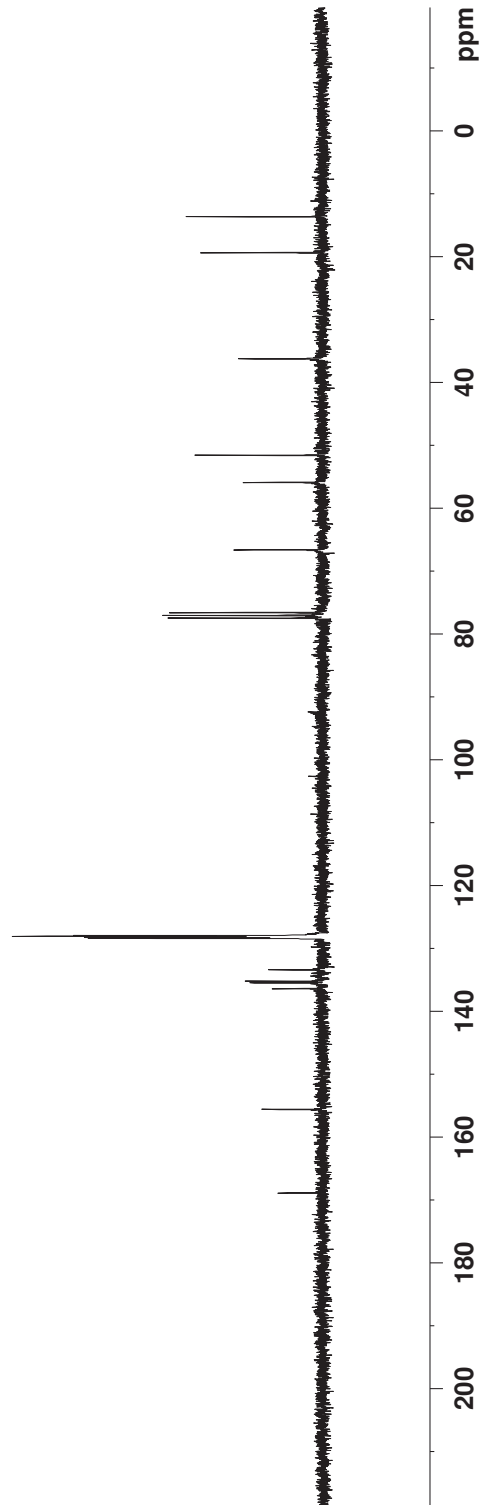
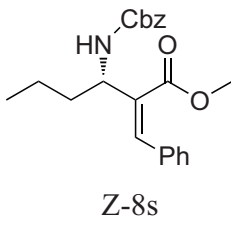
NAME 110528
EXPNO 4
PROCNO 1
Date_ 20110528
Time 15.57
INSTRUM spect
PROBHD 5 mm PABBO BB-
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 37
DS 4
SWH 18028.846 Hz
FIDRES 0.275098 Hz
AQ 1.8175818 sec
RG 203
DW 27.733 usec
DE 6.50 usec
TE 290.5 K
D1 2.00000000 sec
D11 0.03000000 sec
TD0 1
    
```

```

===== CHANNEL f1 =====
NUC1 13C
P1 9.70 usec
PL1 0.00 dB
PL1W 29.38907051 W
SFO1 75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 usec
PL2 1.00 dB
PL2W 17.00 dB
PL3 17.00 dB
PL3W 17.00 dB
PL4 9.17820644 W
PL4W 0.23084613 W
PL5 300.1312605 MHz
SI 2
SF 75.4677638 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40
    
```

13.60 —
 19.33 —
 36.20 —
 51.53 —
 55.87 —
 66.58 —
 76.58 —
 77.00 —
 77.43 —
 127.95 —
 128.03 —
 128.14 —
 128.22 —
 128.35 —
 128.38 —
 133.38 —
 135.17 —
 135.46 —
 136.39 —
 155.57 —
 168.88 —



```

NAME          110528
EXPNO         1
PROCNO        1
Date_         20110528
Time         16.16
INSTRUM       spect
PROBHD        5 mm PABBBB-1
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            0
SWH           6188.119 Hz
FIDRES       0.094423 Hz
AQ           5.2953587 sec
RG           36
DW           80.800 usec
DE           6.50 usec
TE           290.0 K
D1           1.00000000 sec
TD0          1

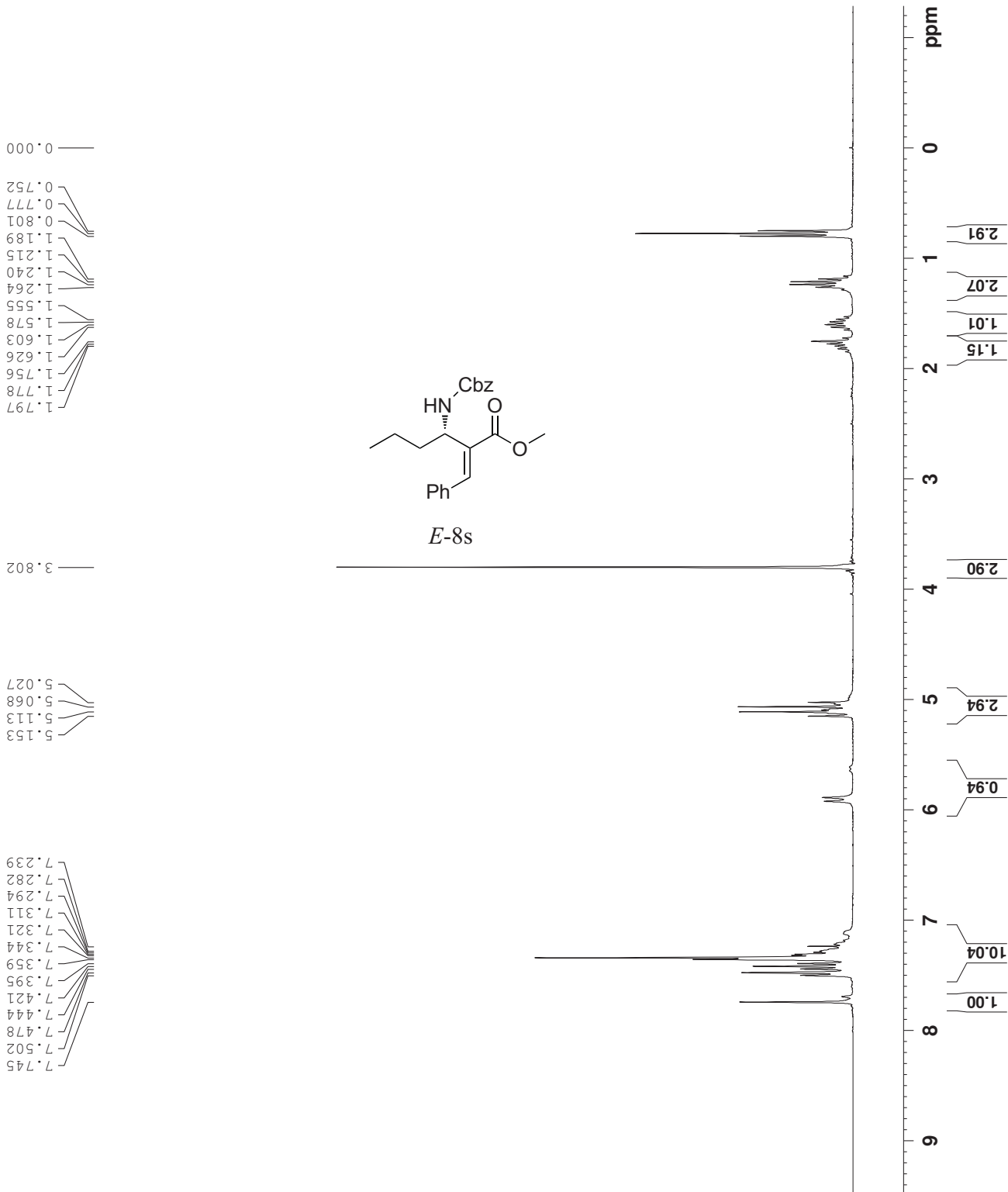
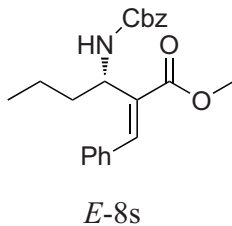
===== CHANNEL f1 =====
NUC1          1H
P1           11.80 usec
PL1          0.00 dB
PL1W        11.55467796 W
SFO1         300.1318534 MHz
SI           32768
SF           300.1300085 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
    
```

0.000
 0.752
 0.777
 0.801
 1.189
 1.215
 1.240
 1.264
 1.555
 1.578
 1.603
 1.626
 1.756
 1.778
 1.797

3.802

5.027
 5.068
 5.113
 5.153

7.239
 7.282
 7.294
 7.311
 7.321
 7.344
 7.359
 7.395
 7.421
 7.444
 7.478
 7.502
 7.745



```

NAME      110528
EXPNO     7
PROCNO    1
Date_     20110528
Time      16.24
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         101
DS         4
SWH       18028.846 Hz
FIDRES    0.275098 Hz
AQ         1.8175818 sec
RG         203
DW         27.733 usec
DE         6.50 usec
TE         290.8 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        1

===== CHANNEL f1 =====
NUC1       13C
P1         9.70 usec
PL1        0.00 dB
PL1W       29.38907051 W
SFO1       75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2    waltz16
NUC2       1H
PCPD2      80.00 usec
PL2         1.00 dB
PL12        17.00 dB
PL13         17.00 dB
PL14         17.00 dB
PL15         17.00 dB
PL16         17.00 dB
PL17         17.00 dB
PL18         17.00 dB
PL19         17.00 dB
PL20         17.00 dB
PL21         17.00 dB
PL22         17.00 dB
PL23         17.00 dB
PL24         17.00 dB
PL25         17.00 dB
PL26         17.00 dB
PL27         17.00 dB
PL28         17.00 dB
PL29         17.00 dB
PL30         17.00 dB
PL31         17.00 dB
PL32         17.00 dB
PL33         17.00 dB
PL34         17.00 dB
PL35         17.00 dB
PL36         17.00 dB
PL37         17.00 dB
PL38         17.00 dB
PL39         17.00 dB
PL40         17.00 dB
PL41         17.00 dB
PL42         17.00 dB
PL43         17.00 dB
PL44         17.00 dB
PL45         17.00 dB
PL46         17.00 dB
PL47         17.00 dB
PL48         17.00 dB
PL49         17.00 dB
PL50         17.00 dB
PL51         17.00 dB
PL52         17.00 dB
PL53         17.00 dB
PL54         17.00 dB
PL55         17.00 dB
PL56         17.00 dB
PL57         17.00 dB
PL58         17.00 dB
PL59         17.00 dB
PL60         17.00 dB
PL61         17.00 dB
PL62         17.00 dB
PL63         17.00 dB
PL64         17.00 dB
PL65         17.00 dB
PL66         17.00 dB
PL67         17.00 dB
PL68         17.00 dB
PL69         17.00 dB
PL70         17.00 dB
PL71         17.00 dB
PL72         17.00 dB
PL73         17.00 dB
PL74         17.00 dB
PL75         17.00 dB
PL76         17.00 dB
PL77         17.00 dB
PL78         17.00 dB
PL79         17.00 dB
PL80         17.00 dB
PL81         17.00 dB
PL82         17.00 dB
PL83         17.00 dB
PL84         17.00 dB
PL85         17.00 dB
PL86         17.00 dB
PL87         17.00 dB
PL88         17.00 dB
PL89         17.00 dB
PL90         17.00 dB
PL91         17.00 dB
PL92         17.00 dB
PL93         17.00 dB
PL94         17.00 dB
PL95         17.00 dB
PL96         17.00 dB
PL97         17.00 dB
PL98         17.00 dB
PL99         17.00 dB
PL100        17.00 dB
    
```

13.56 —
 19.35 —
 37.22 —
 48.63 —
 51.87 —
 66.49 —
 76.58 —
 77.00 —
 77.42 —

127.76 —
 127.94 —
 128.41 —
 128.60 —
 128.73 —
 129.05 —
 131.83 —
 134.43 —
 136.55 —
 140.49 —
 141.01 —
 155.72 —
 167.48 —

