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Electronic Supplementary Information

Phase-transfer-catalysed Asymmetric Synthesis of 2,2-Disubstituted 1,4-Benzoxazin-3-ones

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General Information

Infrared (IR) spectra were recorded on a ThermoFischer Scientific NICOLET iS5 spectrometer. ^{1}H NMR spectra were measured on JEOL JNM-FX400 (400 MHz) and JNM-ECA500 (500 MHz) spectrometers. Data were reported as follows: chemical shifts in ppm from tetramethylsilane as an internal standard or from the residual solvent in in $CDCl_3$ or acetone-d_6, integration, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, quin = quintet, m = multiplet, br = broad, app = apparent), coupling constants (Hz), and assignment. ^{13}C NMR spectra were measured on JEOL JNM-FX400 (100 MHz) and JNM-ECA500 (125 MHz) spectrometers with complete proton decoupling. Chemical shifts were reported in ppm from the residual solvent as an internal standard. High performance liquid chromatography (HPLC) was performed on Shimadzu 10A instruments at 210 nm using 4.6 mm x 25 cm Daicel chiral columns. High-resolution mass spectra (HRMS) were performed on Thermo Scientific Exactive Plus Orbitrap LC-MS. Optical rotations were measured on a JASCO DIP-1000 digital polarimeter. For thin layer chromatography (TLC) analysis throughout this work, Merck precoated TLC plates (silica gel 60 GF_{254}, 0.25 mm) were used. The products were purified by flash column chromatography silica gel 60 (Merck, 230-400 mesh) or preparative thin layer chromatography silica gel (PLC 60 F_{254}. 0.5 mm).

In experiments requiring dry solvent, CH_2Cl_2, toluene and THF were purchased from Kanto Chemical Co. Inc. as “Dehydrated” and further purified by passing through neutral alumina under nitrogen atmosphere. Commercially obtained reagents were used as received.

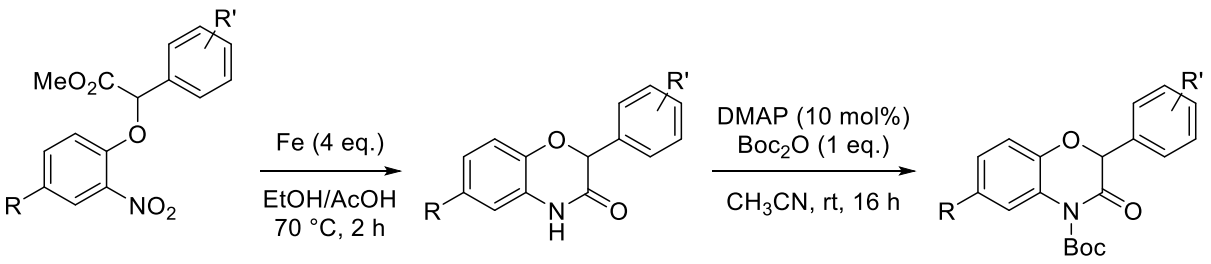
References

[a] M. Hori, T. Kataoka, H. Shimizu, N. Ueda, *Tetrahedron Lett.*, **1981**, *22*, 1701.

[b] J. Perron, B. Joseph, J.-Y. Mérour, *Eur. J. Org. Chem*., **2004**, 4606.

Substrate Synthesis

General Procedure 1 (GP1: benzoxazinone synthesis)

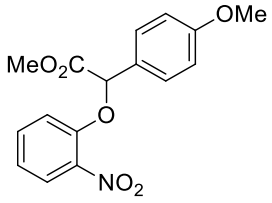


A mixture of ester (1.00 eq.) and Fe (4.00 eq.) in EtOH/AcOH (1:1, 0.4 M each) was stirred for 2 h at 70 °C under argon atmosphere. Afterwards, the reaction was allowed to cool down to room temperature, was diluted with EtOAc and aq. $NaHCO_3$-sol. was added. The phases were separated, the aqueous phase was extracted with EtOAc and the combined organic phases were washed with brine. After drying over Na_2SO_4 the solvent was removed *in vacuo* and the resulting solid was used without further purification in next step.

The crude benzoxazinone and DMAP (10 mol%) were dissolved in MeCN and the resulting solution was cooled down to 0 °C. Boc_2O (0.80 - 1.20 eq.) was added and the reaction was stirred for 16 h at room temperature. Aq. NH_4Cl-sol. was added, the phases were separated and the aqueous phase was extracted with EtOAc. The combined organic phases were washed with brine, dried over Na_2SO_4 and the solvent was removed *in vacuo*. The resulting crude product was purified by column chromatography on silica gel.

Substrate Synthesis

Methyl 2-(4-methoxyphenyl)-2-(2-nitrophenoxy)acetate (**7b**)

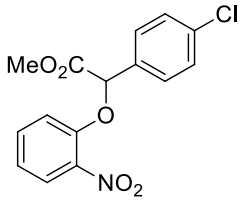


To a mixture of 2-nitrophenol (189 mg, 1.36 mmol) and K_2CO_3 (563 mg, 4.08 mmol) in acetone (13 mL) was added methyl 2-bromo-2-(4-methoxyphenyl)acetate (389 mg, 1.50 mmol) at room temperature and the resulting mixture was stirred for additional 16 h at 50 °C. After cooling back to room temperature aq. sat. NH_4Cl was added and extracted with EtOAc. The organic phase was washed with brine, dried over Na_2SO_4 and the solvent was removed *in vacuo*. The crude product was purified by column chromatography on silica gel

(hex:EtOAc = 3:1→1:1) to yield the title compound **7b** (352 mg, 1.11 µmol, 82%) as pale yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.88 (dd, *J* = 8.1, 1.7, 1 H), 7.55 – 7.50 (m, 2 H), 7.47 (ddd, *J* = 8.4, 7.5, 1.7, 1 H), 7.11 – 7.05 (m, 1 H), 6.98 (dd, *J* = 8.4, 0.8, 1 H), 6.95 – 6.90 (m, 2 H), 5.71 (s, 1 H), 3.81 (s, 3 H), 3.72 (s, 3 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 169.7, 160.7, 150.8, 141.0, 134.1, 128.7, 126.4, 126.1, 121.9, 116.2, 114.5, 79.7, 55.4, 52.9 ppm. IR (neat): 2955, 1751, 1605, 1512, 1350, 1244, 1030, 743 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{16}H_{15}NNaO_6$: *m/z* 340.0792 ([M + Na]$^+$), found: *m/z* 340.0798 ([M + Na]$^+$).

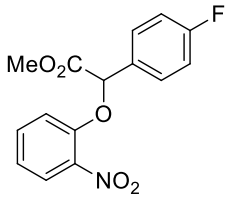
Methyl 2-(4-chlorophenyl)-2-(2-nitrophenoxy)acetate (**7c**)



To a mixture of 2-nitrophenol (303 mg, 2.20 mmol) and K_2CO_3 (911 mg, 6.60 mmol) in acetone (15 mL) was added methyl 2-bromo-2-(4-chlorophenyl)acetate (631 mg, 2.40 mmol) at room temperature and the resulting mixture was stirred for additional 16 h at 50 °C. After cooling back to room temperature aq. sat. NH_4Cl was added and extracted with EtOAc. The organic phase was washed with brine, dried over Na_2SO_4 and the solvent was removed *in vacuo*. The crude product was purified by column chromatography on silica gel (hex:EtOAc = 4:1→3:1) to yield the title compound **7c** (535 mg, 1.66 mmol, 76%) as pale yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.93 – 7.87 (m, 1 H), 7.60 – 7.55 (m, 2 H), 7.54 – 7.46 (m, 1 H), 7.43 – 7.36 (m, 2 H), 7.15 – 7.08 (m, 1 H), 6.98 (d, *J* = 8.4, 1 H), 5.74 (s, 1 H), 3.73 (s, 3 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 169.1, 150.6, 140.9, 135.6, 134.2, 132.9, 129.3, 128.6, 126.3, 122.3, 116.0, 79.3, 53.1 ppm. IR (neat): 2955, 1754, 1605, 1524, 1350, 1212, 1172, 772 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{15}H_{12}NNaO_5$: *m/z* 344.0296 ([M + Na]$^+$), found: *m/z* 344.0302 ([M + Na]$^+$).

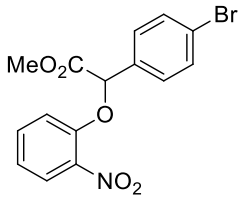
Methyl 2-(4-fluorophenyl)-2-(2-nitrophenoxy)acetate (**7d**)



To a mixture of 2-nitrophenol (189 mg, 1.36 mmol) and K_2CO_3 (563 mg, 4.08 mmol) in acetone (13 mL) was added methyl 2-bromo-2-(4-fluorophenyl)acetate (371 mg, 1.50 mmol) at room temperature and the resulting mixture was stirred for additional 16 h at 50 °C. After cooling back to room temperature aq. sat. NH_4Cl was added and extracted with EtOAc. The organic phase was washed with brine, dried over Na_2SO_4 and the solvent was removed *in vacuo*. The crude product was purified by column chromatography on silica gel (hex:EtOAc = 4:1→2:1) to yield the title compound **7d** (297 mg, 974 µmol, 72%) as pale yellow oil.

^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.89 (dd, *J* = 8.1, 1.7, 1 H), 7.64 – 7.57 (m, 2 H), 7.49 (ddd, *J* = 8.4, 7.5, 1.7, 1 H), 7.13 – 7.06 (m, 3 H), 6.98 (dd, *J* = 8.4, 0.8, 1 H), 5.74 (s, 1 H), 3.72 (s, 3 H) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 169.2 (d, *J* = 1.5), 163.3 (d, *J* = 248.6), 150.5, 140.8, 134.2, 130.1 (d, *J* = 3.4), 129.0 (d, *J* = 8.5), 126.2, 122.1, 116.0 (d, *J* = 21.9), 115.8, 79.2, 53.0 ppm. ^{19}F NMR (466 MHz, $CDCl_3$) δ = -111.79 (tt, *J* = 8.5, 5.2) ppm. IR (neat): 2957, 1755, 1606, 1526, 1509, 1226, 841 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{15}H_{12}FNNaO_5$: *m/z* 328.0592 ([M + Na]$^+$), found: *m/z* 328.0601 ([M + Na]$^+$).

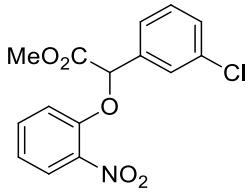
Methyl 2-(4-bromophenyl)-2-(2-nitrophenoxy)acetate (**7e**)



To a mixture of 2-nitrophenol (189 mg, 1.36 mmol) and K_2CO_3 (563 mg, 4.08 mmol) in acetone (13 mL) was added methyl 2-bromo-2-(4-bromophenyl)acetate (462 mg, 1.50 mmol) at room temperature and the resulting mixture was stirred for additional 16 h at 50 °C. After cooling back to room temperature aq. sat. NH_4Cl was added and extracted with EtOAc. The organic phase was washed with brine, dried over Na_2SO_4 and the solvent was removed *in vacuo*. The crude product was purified by column chromatography on silica gel (hex:EtOAc = 4:1→2:1) to yield the title compound **7e** (378 mg, 1.03 µmol, 76%) as yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.90 (dd, *J* = 8.1, 1.7, 1 H), 7.57 – 7.47 (m, 5 H), 7.15 – 7.07 (m, 1 H), 6.98 (dd, *J* = 8.4, 1.0, 1 H), 5.72 (s, 1 H), 3.72 (s, 3 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 169.1, 150.5, 140.9, 134.2, 133.4, 132.3, 128.8, 126.3, 123.8, 122.3, 116.0, 79.3, 53.1 ppm. IR (neat): 2954, 1753, 1523, 1348, 1071, 1011, 770 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{15}H_{12}BrNNaO_5$: *m/z* 387.9791 ([M + Na]$^+$), found: *m/z* 387.9798 ([M + Na]$^+$).

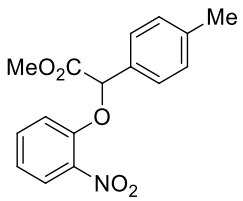
Methyl 2-(3-chlorophenyl)-2-(2-nitrophenoxy)acetate (**7f**)



To a mixture of 2-nitrophenol (303 mg, 2.20 mmol) and K_2CO_3 (911 mg, 6.60 mmol) in acetone (15 mL) was added methyl 2-bromo-2-(3-chlorophenyl)acetate (631 mg, 2.40 mmol) at room temperature and the resulting mixture was stirred for additional 16 h at 50 °C. After cooling back to room temperature aq. sat. NH_4Cl was added and extracted with EtOAc. The organic phase was washed with brine, dried over Na_2SO_4 and the solvent was removed *in vacuo*. The crude product was purified by column chromatography on silica gel (hex:EtOAc = 4:1→2:1) to yield the title compound **7f** (563 mg, 1.75 mmol, 80%) as pale yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.91 (d, *J* = 8.1, 1 H), 7.62 (s, 1 H), 7.58 – 7.47 (m, 2 H), 7.40 – 7.34 (m, 2 H), 7.12 (t, *J* = 7.8, 1 H), 6.98 (d, *J* = 8.4, 1 H), 5.73 (s, 1 H), 3.74 (s, 3 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 169.0, 150.5, 140.9, 136.2, 135.0, 134.3, 130.4, 129.7, 127.3, 126.3, 125.3, 122.3, 116.0, 79.3, 53.2 ppm. IR (neat): 2955, 1754, 1605, 1586, 1523, 1350, 1168, 773 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{15}H_{12}NNaO_5$: *m/z* 344.0296 ([M + Na]$^+$), found: *m/z* 344.0304 ([M + Na]$^+$).

Methyl 2-(2-nitrophenoxy)-2-(*p*-tolyl)acetate (**7g**)

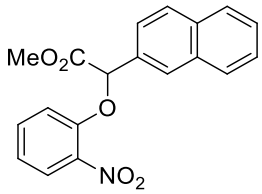


To a solution of 2-nitrophenol (757 mg, 5.45 mmol), methyl 2-hydroxy-2-(*p*-tolyl)acetate (891 mg, 4.95 mmol) and PPh_3 (1.56 g, 5.94 mmol) in CH_2Cl_2 (25 mL) was added DIAD (1.19 g,

5.94 mmol) *via* syringe pump at 0 °C and stirred for additional 16 h at room temperature. The reaction was quenched with aq. sat. NH_4Cl and the phases were separated. The aqueous phase was extracted with CH_2Cl_2, the combined organic phases were dried over Na_2SO_4 and the solvent was removed *in vacuo.* The crude product was purified by column chromatography on silica gel (hex:EtOAc = 6:1→4:1) to yield the title compound **7g** (1.43 mg, 4.75 mmol, 96%) as pale yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.54 – 7.49 (m, 2 H), 7.42 – 7.35 (m, 3 H), 7.24 (t, *J* = 8.1, 1 H), 6.90 (d, *J* = 7.7, 1 H), 6.77 (d, *J* = 8.2, 1 H), 5.69 (s, 1 H), 3.72 (s, 3 H), 2.33 (s, 3 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 169.5, 148.8, 143.0, 134.4, 131.8, 130.7, 129.5, 129.1, 127.1, 124.2, 112.1, 79.6, 52.9, 17.2 ppm. IR (neat): 2955, 1756, 1583, 1530, 1267, 1097, 774 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{16}H_{15}NNaO_5$: *m/z* 324.0842 ([M + Na]$^+$), found: *m/z* 324.0849 ([M + Na]$^+$).

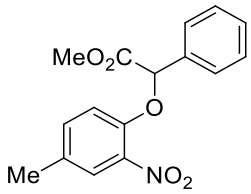
Methyl 2-(naphthalen-2-yl)-2-(2-nitrophenoxy)acetate (**7h**)



To a mixture of 2-nitrophenol (303 mg, 2.20 mmol) and K_2CO_3 (911 mg, 6.60 mmol) in acetone (15 mL) was added methyl 2-bromo-2-(naphthalen-2-yl)acetate (670 mg, 2.40 mmol) at room temperature and the resulting mixture was stirred for additional 16 h at 50 °C. After cooling back to room temperature aq. sat. NH_4Cl was added and extracted with EtOAc. The organic phase was washed with brine, dried over Na_2SO_4 and the solvent was removed *in vacuo*. The crude product was purified by column chromatography on silica gel (hex:EtOAc = 4:1→3:1) to yield the title compound **7h** (587 mg, 1.74 mmol, 79%) as pale yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 8.09 (s, 1 H), 7.93 – 7.82 (m, 4 H), 7.72 (dd, *J* = 8.6, 1.8, 1 H), 7.55 – 7.43 (m, 3 H), 7.12 – 7.06 (m, 1 H), 7.03 (dd, *J*=8.4, 1.0, 1 H), 5.92 (s, 1 H), 3.73 (s, 3 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 169.4, 150.8, 141.1, 134.2, 133.9, 133.3, 131.7, 129.1, 128.5, 128.0, 127.0, 127.0, 126.8, 126.2, 124.2, 122.1, 116.3, 80.3, 53.0 ppm. IR (neat): 2955, 1754, 1605, 1525, 1350, 1279, 1172, 1055, 744 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{19}H_{15}NNaO_5$: *m/z* 360.0842 ([M + Na]$^+$), found: *m/z* 360.0848 ([M + Na]$^+$).

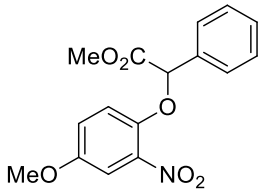
Methyl 2-(4-methyl-2-nitrophenoxy)-2-phenylacetate (**7j**)



To a solution of 4-methyl-2-nitrophenol (151 mg, 1.00 mmol), methyl 2-hydroxy-2-phenylacetate (183 mg, 1.10 mmol) and PPh_3 (315 mg, 1.20 mmol) in CH_2Cl_2 (10 mL) was added DIAD (242 mg, 1.2 mmol) *via* syringe pump at 0 °C and stirred for additional 16 h at room temperature. The reaction was quenched with aq. sat. NH_4Cl and the phases were separated. The aqueous phase was extracted with CH_2Cl_2, the combined organic phases were dried over Na_2SO_4 and the solvent was removed *in vacuo.* The crude product was purified by column chromatography on silica gel (hex:EtOAc = 6:1→4:1) to yield the title compound **7j** (275 mg, 914 µmol, 91%) as pale yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.70 (d, *J* = 2.1, 1 H), 7.65 – 7.58 (m, 2 H), 7.45 – 7.36 (m, 3 H), 7.30 – 7.24 (m, 1 H), 6.89 (d, *J* = 8.5, 1 H), 5.72 (s, 1 H), 3.71 (s, 3 H), 2.34 (s, 3 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 169.6, 148.6, 140.8, 134.7, 134.5, 132.2, 129.4, 129.0, 127.2, 126.2, 116.4, 80.3, 52.8, 20.3 ppm. IR (neat): 2955, 1755, 1530, 1354, 1282, 1213, 731 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{16}H_{15}NNaO_5$: *m/z* 324.0842 ([M + Na]$^+$), found: *m/z* 324.0850 ([M + Na]$^+$).

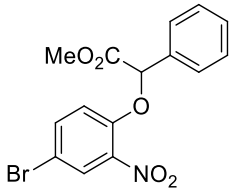
Methyl 2-(4-methoxy-2-nitrophenoxy)-2-phenylacetate (**7j**)



To a mixture of 4-fluoro-2-nitrophenol (33.8 mg, 200 µmol) and K_2CO_3 (82.9 mg, 600 µmol) in acetone (2 mL) was added methyl 2-bromo-2-phenylacetate (50.4 mg, 220 µmol) at room temperature and the resulting mixture was stirred for additional 16 h at 50 °C. After cooling back to room temperature aq. sat. NH_4Cl was added and extracted with EtOAc. The organic phase was washed with brine, dried over Na_2SO_4 and the solvent was removed *in vacuo*. The crude product was purified by column chromatography on silica gel (hex:EtOAc = 2:1) to yield the title compound **7j** (57.8 mg, 182 µmol, 96%) as yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.59 (m, 2 H), 7.44 – 7.35 (m, 4 H), 7.02 (dd, *J* = 9.2, 3.1, 1 H), 6.95 (d, *J* = 9.1, 1 H), 5.66 (s, 1 H), 3.80 (s, 3 H), 3.71 (s, 3 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 169.7, 154.5, 144.7, 141.5, 134.7, 129.4, 129.0, 127.4, 120.6, 119.1, 110.4, 81.3, 56.1, 52.8 ppm. IR (neat): 2923, 1751, 1529, 1496, 1353, 1353, 1213, 1033, 792 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{16}H_{15}NNaO_6$: *m/z* 340.0792 ([M + Na]$^+$), found: *m/z* 340.0799 ([M + Na]$^+$).

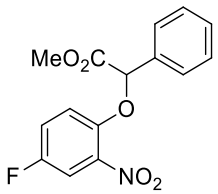
Methyl 2-(4-bromo-2-nitrophenoxy)-2-phenylacetate (**7k**)



To a solution of 4-bromo-2-nitrophenol (218 mg, 1.00 mmol), methyl 2-hydroxy-2-phenylacetate (183 mg, 1.10 mmol) and PPh_3 (315 mg, 1.20 mmol) in CH_2Cl_2 (10 mL) was added DIAD (242 mg, 1.2 mmol) *via* syringe pump at 0 °C and stirred for additional 16 h at room temperature. The reaction was quenched with aq. sat. NH_4Cl and the phases were separated. The aqueous phase was extracted with CH_2Cl_2, the combined organic phases were dried over Na_2SO_4 and the solvent was removed *in vacuo.* The crude product was purified by column chromatography on silica gel (hex:EtOAc = 6:1→4:1) to yield the title compound **7k** (344 mg, 942 µmol, 94%) as pale yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.90 (dd, *J* = 8.1, 1.7, 1 H), 7.58 – 7.47 (m, 5 H), 7.15 – 7.08 (m, 1 H), 6.98 (dd, *J* = 8.4, 1.0, 1 H), 5.72 (s, 1 H), 3.72 (s, 3 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 169.1, 149.9, 141.4, 136.9, 134.0, 129.7, 129.2, 128.9, 127.2, 117.9, 113.8, 80.3, 53.1 ppm. IR (neat): 2953, 1754, 1603, 1530, 1481, 1351, 1278, 1104, 735 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{15}H_{12}BrNNaO_6$: *m/z* 387.9791 ([M + Na]$^+$), found: *m/z* 387.9798 ([M + Na]$^+$).

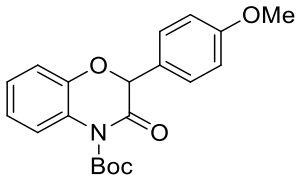
Methyl 2-(4-fluoro-2-nitrophenoxy)-2-phenylacetate (**7l**)



To a mixture of 4-fluoro-2-nitrophenol (157 mg, 1.00 mmol) and K_2CO_3 (415 mg, 3.00 mmol) in acetone (10 mL) was added methyl 2-bromo-2-phenylacetate (252 mg, 1.10 mmol) at room temperature and the resulting mixture was stirred for additional 16 h at 50 °C. After cooling back to room temperature aq. sat. NH_4Cl was added and extracted with EtOAc. The organic phase was washed with brine, dried over Na_2SO_4 and the solvent was removed *in vacuo*. The crude product was purified by column chromatography on silica gel (hex:EtOAc = 5:1) to yield the title compound **7l** (287 mg, 941 µmol, 94%) as yellow oil.

^{1}H NMR (495 MHz, $CDCl_3$) δ = 7.64 (dd, *J* = 7.7, 3.1, 1 H), 7.60 – 7.57 (m, 2 H), 7.44 – 7.38 (m, 3 H), 7.21 (ddd, *J* = 9.2, 7.2, 3.2, 1 H), 6.99 (dd, *J* = 9.2, 4.3, 1 H), 5.69 (s, 1 H), 3.72 (s, 3 H) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 169.2, 156.4 (d, *J* = 246.1), 147.1 (d, *J* = 3.1), 140.9 (d, *J* = 9.9), 134.1, 129.6, 129.0, 127.2, 121.0 (d, *J* = 23.0), 118.3 (d, *J* = 7.9), 113.4 (d, *J* = 27.5), 80.8, 53.0 ppm. ^{19}F NMR (466 MHz, $CDCl_3$) δ = -117.99 (td, *J* = 7.4, 4.3) ppm. IR (neat): 3078, 1751, 1531, 1495, 1356, 1270, 1200, 1047, 797 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{15}H_{12}FNNaO_5$: *m/z* 328.0592 ([M + Na]$^+$), found: *m/z* 328.0597 ([M + Na]$^+$).

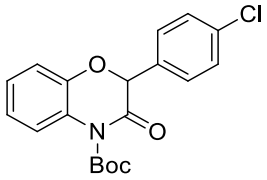
N-*t*-Butoxycarbonyl-2-(4-methoxyphenyl)-1,4-benzoxazin-3-one **4b**



Ester **7b** (296 mg, 932 µmol), Fe (208 mg, 3.73 mmol) in EtOH/AcOH (2.3 mL/2.3 mL) were reacted as described in the first part of **GP1**. The crude amide was reacted with Boc_2O (244 mg, 1.12 mmol) and DMAP (11.4 mg, 93.2 µmol) in MeCN (9 mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel (Pentane:EtOAc = 8:1→6:1) to obtain the title compound **4b** (207 mg, 582 µmol, 72%) as a white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.35 – 7.30 (m, 2 H), 7.10 – 7.06 (m, 1 H), 7.06 – 6.98 (m, 3 H), 6.89 – 6.84 (m, 2 H), 5.56 (s, 1 H), 3.78 (s, 3 H), 1.62 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 164.4, 160.3, 150.2, 144.2, 128.9, 126.4, 126.2, 125.4, 122.9, 118.3, 117.6, 114.3, 86.0, 78.9, 55.3, 27.8 ppm. IR (neat): 2980, 1752, 1707, 1514, 1247, 1146, 1033 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{20}H_{21}NNaO_5$: *m/z* 378.1312 ([M + Na]$^+$), found: *m/z* 378.1317 ([M + Na]$^+$).

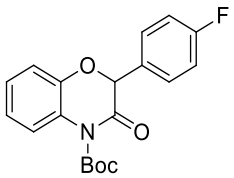
N-*t*-Butoxycarbonyl-2-(4-chlorophenyl)-1,4-benzoxazin-3-one **4c**



Ester **7c** (508 mg, 1.58 mmol), Fe (353 mg, 6.32 mmol) in EtOH/AcOH (4 mL/4 mL) were reacted as described in the first part of **GP1**. The crude amide was reacted with Boc_2O (284 mg, 1.30 mmol) and DMAP (19.3 mg, 158 µmol) in MeCN (15 mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel (Pentane:EtOAc = 8:1→6:1) to obtain the title compound **4c** (431 mg, 1.19 mmol, 76%) as a pale yellow solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.39 – 7.29 (m, 4 H), 7.11 – 6.98 (m, 4 H), 5.57 (s, 1 H), 1.61 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 163.8, 150.0, 144.0, 135.2, 132.7, 129.1, 128.8, 126.2, 125.6, 123.3, 118.2, 117.8, 86.3, 78.6, 27.8 ppm. IR (neat): 2982, 1750, 1706, 1497, 1247, 1145, 752 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{19}H_{18}ClNNaO_4$: *m/z* 382.0817 ([M + Na]$^+$), found: *m/z* 382.0819 ([M + Na]$^+$).

N-*t*-Butoxycarbonyl-2-(4-fluorophenyl)-1,4-benzoxazin-3-one **4d**

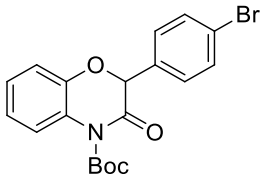


Ester **7d** (264 mg, 866 µmol), Fe (193 mg, 3.46 mmol) in EtOH/AcOH (2.2 mL/2.2 mL) were reacted as described in the first part of **GP1**. The crude amide was reacted with Boc_2O (227 mg, 1.04 mmol) and DMAP (10.6 mg, 86.6 µmol) in MeCN (9 mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel (Pentane:EtOAc = 10:1→8:1) to obtain the title compound **4d** (214 mg, 623 µmol, 72%) as a pale yellow solid.

^{1}H NMR (500 MHz, $CDCl_3$) δ = 7.42 – 7.37 (m, 2 H), 7.11 – 7.08 (m, 1 H), 7.08 – 6.99 (m, 5 H), 5.57 (s, 1 H), 1.63 (s, 9 H) ppm. ^{13}C NMR (125 MHz, $CDCl_3$) δ = 163.9, 163.1 (d, *J* = 248.1), 150.0, 144.0, 129.9 (d, *J* = 3.5), 129.3 (d, *J* = 8.6), 126.2, 125.5, 123.1, 118.2, 117.7, 115.8 (d, *J* = 21.9), 86.2, 78.5, 27.8 ppm. ^{19}F NMR (466 MHz, $CDCl_3$) δ = -112.20 – -112.27 (m) ppm. IR

(neat): 2982, 1750, 1708, 1510, 1248, 1146, 1042 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{19}H_{18}FNNaO_4$: *m/z* 366.1112 ($[M + Na]^+$), found: *m/z* 366.1120 ($[M + Na]^+$).

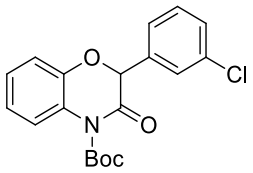
N-*t*-Butoxycarbonyl-2-(4-bromophenyl)-1,4-benzoxazin-3-one **4e**



Ester **7e** (1.05 mg, 2.87 mmol), Fe (640 mg, 11.5 mmol) in EtOH/AcOH (7 mL/7 mL) were reacted as described in the first part of **GP1**. The crude amide was reacted with Boc_2O (542 mg, 2.48 mmol) and DMAP (32.1 mg, 287 µmol) in MeCN (30 mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel (Pentane:EtOAc = 10:1→6:1) to obtain the title compound **4e** (951 mg, 2.35 mmol, 82%) as a yellow solid.

^1H NMR (400 MHz, $CDCl_3$) δ = 7.50 – 7.46 (m, 2 H), 7.30 (d, *J* = 8.5, 2 H), 7.10 – 7.00 (m, 4 H), 5.55 (s, 1 H), 1.62 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 163.6, 150.0, 143.9, 133.1, 132.0, 129.0, 126.1, 125.6, 123.4, 123.2, 118.2, 117.7, 86.2, 78.5, 27.8 ppm. IR (neat): 2981, 1747, 1705, 1497, 1369, 1244, 1142, 750 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{19}H_{18}BrNNaO_4$: *m/z* 426.0311 ($[M + Na]^+$), found: *m/z* 426.0313 ($[M + Na]^+$).

N-*t*-Butoxycarbonyl-2-(3-chlorophenyl)-1,4-benzoxazin-3-one **4f**

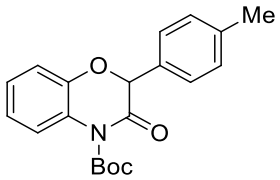


Ester **7f** (563 mg, 1.75 mmol), Fe (391 mg, 7.0 mmol) in EtOH/AcOH (4.5 mL/4.5 mL) were reacted as described in the first part of **GP1**. The crude amide was reacted with Boc_2O (343 mg, 1.58 mmol) and DMAP (21.4 mg, 175 µmol) in MeCN (20 mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel (Pentane:EtOAc = 8:1→6:1) to obtain the title compound **4f** (472 mg, 1.31 mmol, 75%) as a pale yellow solid.

^1H NMR (400 MHz, $CDCl_3$) δ = 7.43 (s, 1 H), 7.32 – 7.23 (m, 3 H), 7.11 – 6.98 (m, 4 H), 5.55 (s, 1 H), 1.61 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 163.5, 149.9, 143.8, 136.1, 134.7,

130.0, 129.2, 127.4, 126.1, 125.6, 125.4, 123.2, 118.1, 117.7, 86.2, 78.3, 27.7 ppm. IR (neat): 2981, 1750, 1705, 1498, 1243, 1142, 750 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{19}H_{18}ClNNaO_4$: *m/z* 382.0817 ($[M + Na]^+$), found: *m/z* 382.0823 ($[M + Na]^+$).

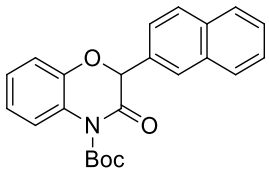
N-*t*-Butoxycarbonyl-2-(4-methylphenyl)-1,4-benzoxazin-3-one **4g**



Ester **7g** (1.369 g, 4.54 mmol), Fe (1.01 g, 18.2 mmol) in EtOH/AcOH (11 mL/11 mL) were reacted as described in the first part of **GP1**. The crude amide was reacted with Boc_2O (858 mg, 4.09 mmol) and DMAP (55.4 mg, 454 µmol) in MeCN (40 mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel (Pentane:EtOAc = 8:1→6:1) to obtain the title compound **4g** (1.10 g, 3.23 mmol, 71%) as a white solid.

^1H NMR (400 MHz, $CDCl_3$) δ = 7.28 (d, *J* = 8.1, 2 H), 7.13 (d, *J* = 8.0, 2 H), 7.10 – 6.94 (m, 4 H), 5.56 (s, 1 H), 2.28 (s, 3 H), 1.59 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 164.2, 150.2, 144.1, 139.0, 131.2, 129.5, 127.2, 126.3, 125.4, 122.9, 118.2, 117.5, 85.9, 79.1, 27.7, 21.1 ppm. IR (neat): 2981, 1749, 1704, 1498, 1243, 1142, 1040, 749 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{20}H_{21}NNaO_4$: *m/z* 362.1363 ($[M + Na]^+$), found: *m/z* 362.1368 ($[M + Na]^+$).

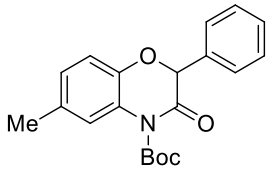
N-*t*-Butoxycarbonyl-2-(2-naphthalenyl)-1,4-benzoxazin-3-one **4h**



Ester **7h** (582 mg, 1.80 mmol), Fe (400 mg, 7.18 mmol) in EtOH/AcOH (4.5 mL/4.5 mL) were reacted as described in the first part of **GP1**. The crude amide was reacted with Boc_2O (353 mg, 1.62 mmol) and DMAP (22.0 mg, 180 µmol) in MeCN (20 mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel (Pentane:EtOAc = 10:1→8:1) to obtain the title compound **4h** (442 mg, 1.18 mmol, 65%) as a white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.88 – 7.78 (m, 4 H), 7.55 (d, *J* = 8.5, 1 H), 7.48 (dd, *J* = 5.8, 3.6, 2 H), 7.13 – 7.07 (m, 2 H), 7.07 – 6.96 (m, 2 H), 5.79 (s, 1 H), 1.64 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 164.2, 150.2, 144.2, 133.6, 133.1, 131.6, 128.8, 128.5, 127.9, 126.9, 126.8, 126.6, 126.4, 125.5, 124.6, 123.1, 118.3, 117.7, 86.2, 79.3, 27.8. IR (neat): 2981, 1749, 1704, 1498, 1244, 1142, 747 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{23}H_{21}NNaO_4$: *m/z* 398.1363 ([M + Na]$^+$), found: *m/z* 398.1368 ([M + Na]$^+$).

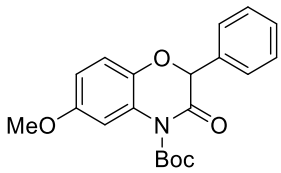
N-*t*-Butoxycarbonyl-6-methyl-2-phenyl-1,4-benzoxazin-3-one **4i**



Ester **7l** (690 mg, 2.30 mmol), Fe (513 mg, 9.20 mmol) in EtOH/AcOH (6 mL/6 mL) were reacted as described in the first part of **GP1**. The crude amide was reacted with Boc_2O (476 mg, 2.19 mmol) and DMAP (28.1 mg, 230 µmol) in MeCN (23 mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel (Pentane:EtOAc = 10:1→1:1) to obtain the title compound **4i** (645 mg, 1.90 µmol, 93%) as a white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.44 – 7.38 (m, 2 H), 7.37 – 7.31 (m, 3 H), 6.94 (d, *J*=8.1, 1 H), 6.89 – 6.81 (m, 2 H), 5.58 (s, 1 H), 2.28 (s, 3 H), 1.63 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 164.4, 150.3, 142.0, 134.4, 132.7, 129.1, 128.8, 127.4, 126.0, 126.0, 118.1, 117.9, 86.0, 79.2, 27.9, 21.1 ppm. IR (neat): 2981, 1752, 1706, 1509, 1248, 1146, 844 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{20}H_{21}NNaO_4$: *m/z* 362.1363 ([M + Na]$^+$), found: *m/z* 362.1369 ([M + Na]$^+$).

N-*t*-Butoxycarbonyl-6-methoxy-2-phenyl-1,4-benzoxazin-3-one **4j**

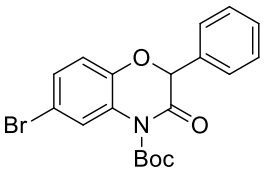


Ester **7j** (715 mg, 2.26 mmol), Fe (504 mg, 9.03 mmol) in EtOH/AcOH (6 mL/6 mL) were reacted as described in the first part of **GP1**. The crude amide was reacted with Boc_2O (468 mg, 2.15 mmol) and (27.6 mg, 226 µmol) in MeCN (13 mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel

(Pentane:EtOAc = 8:1→6:1) to obtain the title compound **4j** (586 mg, 1.64 mmol, 73%) as a white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.43 – 7.39 (m, 2 H), 7.37 – 7.31 (m, 3 H), 6.97 (d, *J* = 8.8, 1 H), 6.67 (d, *J* = 2.8, 1 H), 6.58 (dd, *J* = 8.8, 2.8, 1 H), 5.56 (s, 1 H), 3.74 (s, 3 H), 1.62 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 164.6, 155.4, 150.1, 138.1, 134.3, 129.1, 128.8, 127.4, 126.9, 118.6, 110.2, 104.0, 86.1, 79.3, 55.9, 27.8 ppm. IR (neat): 2982, 1754, 1708, 1615, 1508, 1250, 1145, 1044 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{20}H_{21}NNaO_5$: *m/z* 378.1312 ([M + Na]$^+$), found: *m/z* 378.1281 ([M + Na]$^+$).

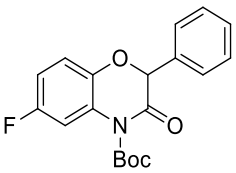
N-*t*-Butoxycarbonyl-6-bromo-2-phenyl-1,4-benzoxazin-3-one **4k**



Ester **7k** (509 mg, 1.39 mmol), Fe (310 mg, 5.56 mmol) in EtOH/AcOH (4 mL/4 mL) were reacted as described in the first part of **GP1**. The crude amide was reacted with Boc_2O (261 mg, 1.20 mmol) and DMAP (17.0 mg, 139 µmol) in MeCN (15 mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel (Pentane:EtOAc = 8:1→6:1) to obtain the title compound **4k** (438 mg, 1.08 mmol, 78%) as a white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.39 – 7.33 (m, 5 H), 7.27 (d, *J* = 2.2, 1 H), 7.15 (dd, *J* = 8.5, 2.2, 1 H), 6.94 (d, *J* = 8.6, 1 H), 5.62 (s, 1 H), 1.63 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 163.8, 149.7, 143.4, 133.7, 129.4, 129.0, 128.3, 127.5, 127.3, 120.9, 119.7, 115.1, 86.7, 79.2, 27.9 ppm. IR (neat): 2982, 1750, 1716, 1491, 1248, 1145, 1004, 699 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{19}H_{18}BrNNaO_4$: *m/z* 426.0311 ([M + Na]$^+$), found: *m/z* 426.0316 ([M + Na]$^+$).

N-*t*-Butoxycarbonyl-6-fluoro-2-phenyl-1,4-benzoxazin-3-one **4l**

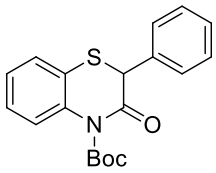


Ester **7l** (255 mg, 836 µmol), Fe (187 mg, 3.34 mmol) in EtOH/AcOH (2 mL/2 mL) were reacted as described in the first part of **GP1**. The crude amide was reacted with Boc_2O

(200 mg, 920 µmol) and DMAP (10.2 mg, 83.6 µmol) in MeCN (8 mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel (Pentane:EtOAc = 8:1→6:1) to obtain the title compound **4l** (146 mg, 425 µmol, 51%) as a white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.42 – 7.33 (m, 5 H), 7.00 (dd, *J* = 8.9, 5.1, 1 H), 6.91 (dd, *J* = 9.6, 2.8, 1 H), 6.80 – 6.71 (m, 1 H), 5.59 (s, 1 H), 1.63 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 164.16, 158.2 (d, *J* = 240.8), 149.9, 140.3 (d, *J* = 2.6), 133.9, 129.3, 128.9, 127.4, 127.1 (d, *J* = 10.8), 119.0 (d, *J* = 9.2), 111.8 (d, *J* = 23.5), 105.5 (d, *J* = 29.1), 86.6, 79.3, 27.8 ppm. ^{19}F NMR (466 MHz, $CDCl_3$) δ = -118.36 (ddd, *J* = 9.7, 8.0, 5.2) ppm. IR (neat): 2981, 1750, 1711, 1624, 1505, 1250, 1145, 844 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{19}H_{18}FNNaO_4$: *m/z* 366.1112 ($[M + Na]^+$), found: *m/z* 366.1119 ($[M + Na]^+$).

N-*t*-Butoxycarbonyl-2-phenyl-1,4-benzothiazin-3-one **4m**

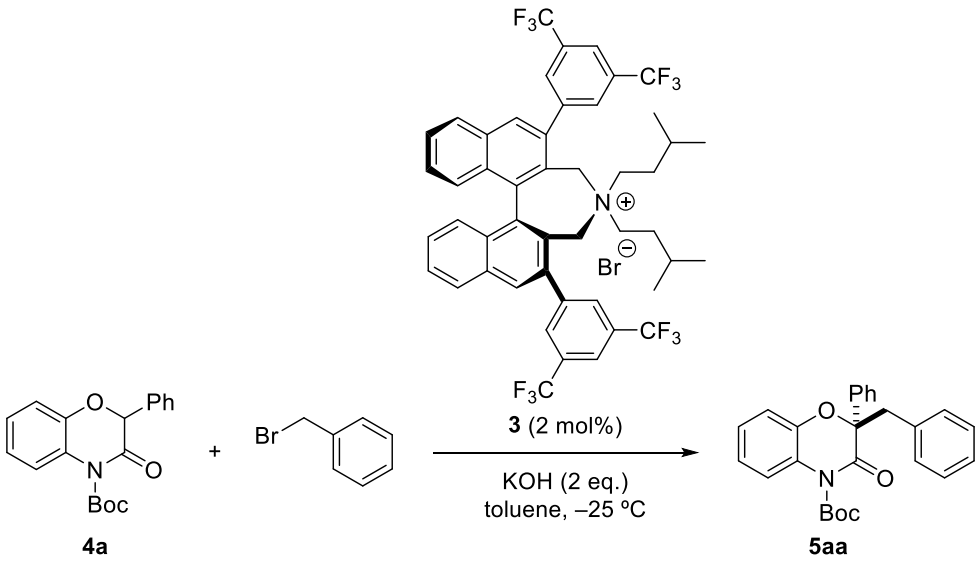


The corresponding benzothiazinone[a] (768 mg, 3.19 mmol) was reacted with Boc_2O (764 mg, 3.50 µmol) and DMAP (38.9 mg, 319 µmol) in MeCN (20mL) as described in the second part of **GP1**. The crude product was purified by column chromatography on silica gel (Pentane:EtOAc = 8:1→6:1) to obtain the title compound **4m** (649 mg, 1.90 µmol, 60%) as a white solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.39 – 7.33 (m, 3 H), 7.32 – 7.24 (m, 3 H), 7.21 – 7.16 (m, 1 H), 7.04 (td, *J* = 7.6, 1.1, 1 H), 6.95 (dd, *J* = 8.2, 0.8, 1 H), 4.63 (s, 1 H), 1.61 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 164.9, 152.1, 136.5, 133.6, 128.9, 128.9, 128.5, 128.4, 127.4, 124.9, 122.4, 118.9, 85.9, 47.5, 27.7 ppm. IR (neat): 2981, 1760, 1683, 1477, 1238, 1133, 843 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{19}H_{19}NNaO_5S$: *m/z* 364.0978 ($[M + Na]^+$), found: *m/z* 364.0983 ($[M + Na]^+$).

Phase-transfer catalysis

General Procedure 2 (GP2: Catalysis with KOH in toluene)



To a degassed test tube equipped with a magnetic stirring bar powdered KOH (11.2 mg, 200 µmol) was added rapidly. After addition of lactam (100 µmol) and catalyst **3** (1.9 mg, 2.0 mol%) the test tube was cooled to -25 °C and the components were dissolved in toluene (1 mL) to continue cooling at the same temperature for 1 h. The alkylation agent (250 µmol) was added in one portion and the reaction mixture was stirred vigorously for the stated period. The reaction mixture was diluted by ethyl acetate and passed through a short pad of silica gel. After evaporation of the solvent, the residue was purified by PLC on silica gel (hexane/acetone or hexane/EtOAc) to yield the title compound.

GP3: General Procedure 3 (Catalysis with K_3PO_4 in mesitylene)

To a degassed test tube equipped with a magnetic stirring bar K_3PO_4 (212 mg, 1.00 mmol) was added. After addition of lactam (32.5 mg, 100 µmol) and catalyst **3** (1.9 mg, 2.0 mol%) the test tube was cooled to -25 °C, mesitylene (1 mL) was added and the cooling was continued for additional 30 min. Benzyl bromide (68.4 mg, 400 µmol) was added in one portion and the reaction mixture was stirred vigorously for the stated period. The reaction mixture was diluted by ethyl acetate and passed through a short pad of silica gel. After evaporation of the solvent, the residue was purified by PLC on silica gel (hexane/EtOAc) to yield the title compound.

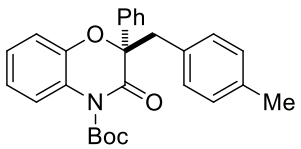
Product **5aa**

To a degassed test tube equipped with a magnetic stirring bar powdered KOH (11.2 mg, 200 µmol) was added rapidly. After addition of 1,4-benzoxazin-3-one **4a**[b] (32.5 mg, 100 µmol) and catalyst **PTC** (1.9 mg, 2.0 mol%) the test tube was cooled to -25 °C and the components were dissolved in toluene (1 mL) to continue cooling at the same temperature for 1 h. Benzyl bromide (42.8 mg, 250 µmol) was added in one portion and the reaction mixture was stirred vigorously for 72 h. The reaction mixture was diluted by ethyl acetate and passed through a short pad of silica gel. After evaporation of the solvent, the residue was purified by PLC on silica gel (hexane/acetone = 10:1.1) to give **5aa** as a colorless oil (32.6 mg, 78.5 µmol, 79% yield, 96% ee).

^{1}H NMR (400 MHz, $(CD_3)_2CO$) δ = 7.27 – 7.18 (m, 2 H), 7.18 – 7.10 (m, 5 H), 7.09 – 7.00 (m, 4 H), 6.90 (ddd, *J* = 8.1, 7.3, 1.6 Hz, 1 H), 6.78 (m, 1 H), 6.73 (dd, *J* = 8.1, 1.6 Hz, 1 H), 3.53 (d, *J* = 14.2 Hz, 1 H), 3.25 (d, *J* = 14.2 Hz, 1 H), 1.48 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 165.3, 150.4, 143.5, 137.5, 135.3, 131.6, 128.5, 128.4, 127.8, 126.8, 126.1, 126.0, 125.0, 122.6, 118.5, 116.8, 85.8, 84.7, 45.7, 27.8 ppm. IR (neat): 2981, 1759, 1699, 1499, 1370, 1350, 1250, 1146 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{26}H_{25}NO_7$: *m/z* 438.1676 ([M + Na]$^+$), found: *m/z* 438.1680 ([M + Na]$^+$). $[\alpha]_D^{25}$ = +130.5 (*c* = 1.0, $CHCl_3$).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 9.9 min (minor) and 11.7 min (major)).

2,2-disubstituted 1,4-benzoxazin-3-one **5ab**



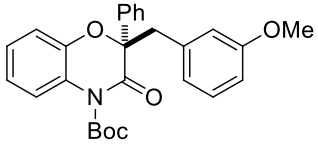
Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4a** (32.5 mg, 100 µmol) and 4-methylbenzyl bromide (46.3 mg, 250 µmol) over the course of 62 h. The residue was purified by PLC on silica gel (hexane/acetone = 10:1.1). Colorless oil (34.5 mg, 80 µmol, 80% yield, 97% ee).

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.34 – 7.27 (m, 2 H), 7.25 – 7.14 (m, 3 H), 7.12 – 7.03 (m, 3 H),

7.03 – 6.93 (m, 3 H), 6.88 – 6.83 (m, 2 H), 3.63 (d, *J* = 14.2 Hz, 1 H), 3.34 (d, *J* = 14.2 Hz, 1 H), 2.29 (s, 3 H), 1.61 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 165.4, 150.4, 143.6, 137.6, 136.3, 132.2, 131.4, 128.5, 128.3, 128.3, 126.1, 126.1, 125.0, 122.5, 118.5, 116.8, 85.7, 84.7, 45.4, 27.8, 21.1 ppm. IR (neat): 2981, 1759, 1700, 1499, 1370, 1348, 1280, 1251, 1146 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{27}H_{27}NO_7$: *m/z* 452.1832 ([M + Na]$^+$), found: *m/z* 452.1837 ([M + Na]$^+$). $[\alpha]_D^{23.0}$ = +148.5 (*c* = 1.0, $CHCl_3$).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 10.8 min (minor) and 14.8 min (major)).

Product **5ac**

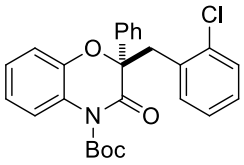


Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4a** (32.5 mg, 100 µmol) and 3-methoxylbenzyl bromide (50.3 mg, 250 µmol) over the course of 69 h. The residue was purified by PLC on silica gel (hexane/acetone = 10:1.1). Colorless oil (40.0 mg, 89.8 µmol, 90% yield, 95% ee).

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.32 – 7.26 (m, 2 H), 7.23 – 7.16 (m, 3 H), 7.14 – 7.03 (m, 2 H), 6.97 (m, 1 H), 6.89 – 6.82 (m, 2 H), 6.80 – 6.72 (m, 2 H), 6.69 (m, 1 H), 3.71 (s, 3 H), 3.64 (d, *J* = 14.1 Hz, 1 H), 3.38 (d, *J* = 14.1 Hz, 1 H), 1.62 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 165.0, 158.9, 150.1, 143.2, 137.1, 136.5, 128.3, 128.0, 125.8, 125.8, 124.7, 124.7, 123.8, 122.3, 118.2, 116.6, 116.5, 112.4, 85.5, 84.3, 54.9, 45.4, 27.5 ppm. IR (neat): 2981, 1760, 1699, 1600, 1585, 1499, 1449, 1370, 1351, 1250, 1146, 1056 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{27}H_{27}NO_5$: *m/z* 468.1781 ([M + Na]$^+$), found: *m/z* 468.1787 ([M + Na]$^+$). $[\alpha]_D^{22.0}$ = +139.0 (*c* = 1.0, $CHCl_3$).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 13.9 min (minor) and 16.2 min (major)).

Product **5ad**

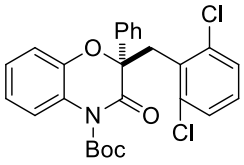


Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4a** (32.5 mg, 100 µmol) and 2-chlorobenzyl bromide (51.4 mg, 250 µmol) over the course of 76 h. The residue was purified by PLC on silica gel (hexane/acetone = 10:1.1). Colorless oil (31.5 mg, 70.0 µmol, 70% yield, 95% ee).

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.38 (m, 1 H), 7.30 – 7.22 (m, 3 H), 7.20 – 7.15 (m, 3 H), 7.15 – 7.09 (m, 2 H), 7.02 (m, 1 H), 6.94 (m, 1 H), 6.88 – 6.79 (m, 2 H), 3.82 (d, *J* = 14.5 Hz, 1 H), 3.75 (d, *J* = 14.5 Hz, 1 H), 1.63 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 165.2, 150.5, 143.4, 137.0, 136.5, 133.5, 132.9, 129.4, 128.5, 128.4, 128.3, 126.3, 126.2, 126.2, 125.1, 122.6, 118.6, 116.7, 85.9, 84.6, 41.4, 27.8 ppm. IR (neat): 2982, 1760, 1701, 1500, 1371, 1351, 1249, 1146 cm^{-1}; HRMS (ESI) exact mass calcd for $C_{26}H_{24}NO_4Cl$: *m/z* 472.1286 ([M + Na]$^+$), found: *m/z* 472.1293 ([M + Na]$^+$); $[\alpha]_D^{26.0}$ = +104.8 (*c* = 1.0, $CHCl_3$).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 9.2 min (minor) and 11.0 min (major)).

Product **5ae**

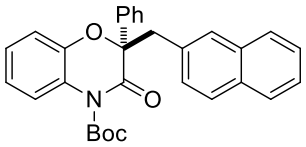


Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4a** (32.5 mg, 100 µmol) and 2,6-dichlorobenzyl bromide (60.0 mg, 250 µmol) over the course of 68 h. The residue was purified by PLC on silica gel (hexane/acetone = 10:1.1). Colorless oil (11.9 mg, 24.6 µmol, 25% yield, 96% ee).

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.24 – 7.18 (m, 2 H), 7.18 – 7.04 (m, 6 H), 6.99 – 6.87 (m, 2 H), 6.86 – 6.78 (m, 2 H), 4.08 (s, 2 H), 1.66 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 165.4, 150.6, 143.2, 138.4, 132.0, 128.6, 128.6, 128.2, 128.1, 128.0, 126.7, 126.2, 125.0, 122.6, 118.6, 116.7, 86.0, 84.0, 38.7, 27.8 ppm. IR (neat): 2982, 1760, 1700, 1500, 1436, 1370, 1350, 1250, 1146 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{26}H_{23}NO_4Cl_2$: *m/z* 506.0896 ([M + Na]$^+$), found: *m/z* 506.0879 ([M + Na]$^+$). $[\alpha]_D^{23.0}$ = +142.9 (*c* = 1.0, $CHCl_3$).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 9.9 min (minor) and 11.3 min (major)).

Product **5af**

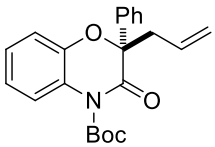


Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4a** (32.5 mg, 100 µmol) and 2-(bromomethyl)naphthalene (55.3 mg, 250 µmol) over the course of 72 h. The residue was purified by PLC on silica gel (hexane/dichloromethane = 1:1). Colorless oil (28.1 mg, 60.4 µmol, 60% yield, 95% ee).

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.81 – 7.69 (m, 2 H), 7.66 (d, *J* = 8.4 Hz, 1 H), 7.61 (s, 1 H), 7.44 – 7.37 (m, 2 H), 7.34 – 7.26 (m, 3 H), 7.22 – 7.14 (m, 3 H), 7.04 (m, 1 H), 6.94 (m, 1 H), 6.89 – 6.78 (m, 2 H), 3.83 (d, *J* = 14.1 Hz, 1 H), 3.56 (d, *J* = 14.2 Hz, 1 H), 1.58 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 165.0, 150.0, 143.2, 137.1, 133.0, 132.6, 132.3, 130.1, 129.6, 128.1, 128.1, 127.7, 127.3, 126.7, 125.8, 125.8, 125.8, 125.4, 125.3, 124.7, 122.3, 118.2, 116.5, 85.5, 84.5, 45.6, 27.4 ppm. IR (neat): 2981, 1760, 1699, 1518, 1500, 1462, 1370, 1349, 1249, 1146 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{30}H_{27}NO_4$: *m/z* 488.1832 ([M + Na]$^+$), found: *m/z* 488.1839 ([M + Na]$^+$). $[\alpha]_D^{25.0}$ = +227.3 (*c* = 1.0, $CHCl_3$).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 13.5 min (minor) and 17.0 min (major)).

Product **5ag**

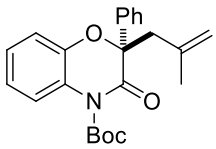


Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4a** (32.5 mg, 100 µmol) and allyl bromide (60.5 mg, 500 µmol) over the course of 52 h. The residue was purified by PLC on silica gel (hexane/acetone = 10:1.1). Colorless oil (30.0 mg, 82.1 µmol, 82% yield, 94% ee).

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.42 – 7.37 (m, 2 H), 7.29 – 7.18 (m, 3 H), 7.12 (m, 1 H), 7.03 – 6.97 (m, 1 H), 6.91 – 6.83 (m, 2 H), 5.91 (ddt, *J* = 17.2, 10.2, 7.0 Hz, 1 H), 5.18 – 5.07 (m, 2 H), 3.10 (dd, *J* = 14.6, 6.7 Hz, 1 H), 2.85 (dd, *J* = 14.6, 7.3 Hz, 1 H), 1.62 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 165.1, 150.5, 143.7, 137.8, 132.1, 128.6, 128.4, 126.3, 125.9, 125.1, 122.6, 119.4, 118.5, 116.8, 85.9, 84.2, 44.3, 27.8 ppm. IR (neat): 3447, 2981, 1761, 1699, 1499, 1370, 1350, 1250, 1146, 1056 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{22}H_{23}NO_4$: *m/z* 388.1519 ([M + Na]$^+$), found: *m/z* 388.1527 ([M + Na]$^+$). $[\alpha]_D^{26.0}$ = +66.7 (*c* = 1.0, $CHCl_3$).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 8.6 min (minor) and 9.7 min (major)).

Product **5ah**

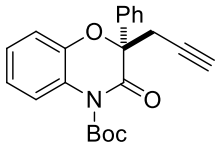


Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4a** (32.5 mg, 100 µmol) and 3-bromo-2-methylpropene (67.5 mg, 500 µmol) over the course of 54 h. The residue was purified by PLC on silica gel (hexane/acetone = 10:1.1). Colorless oil (23.6 mg, 62.2 µmol, 62% yield, 97% ee).

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.45 – 7.37 (m, 2 H), 7.29 – 7.16 (m, 4 H), 7.11 (d, *J* = 7.6 Hz, 1 H), 7.04 – 6.97 (m, 1 H), 6.93 – 6.84 (m, 2 H), 4.90 – 4.76 (m, 2 H), 3.13 (d, *J* = 14.7 Hz, 2 H), 2.82 (d, *J* = 14.7 Hz, 2 H), 1.75 (s, 3 H), 1.62 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 165.4, 150.5, 143.5, 140.2, 138.1, 128.5, 128.3, 126.2, 126.1, 125.1, 122.6, 118.5, 116.7, 116.1, 85.9, 84.8, 47.1, 27.8, 24.5 ppm. IR (neat): 2981, 1760, 1702, 1500, 1371, 1351, 1251, 1146 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{23}H_{25}NO_4$: *m/z* 402.1676 ([M + Na]$^+$), found: *m/z* 402.1685 ([M + Na]$^+$). $[\alpha]_D^{24.0}$ = +61.3 (*c* = 1.0, $CHCl_3$).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 7.9 min (minor) and 9.4 min (major)).

Product **5ai**

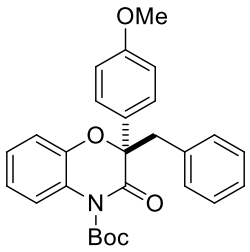


Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4a** (32.5 mg, 100 µmol) and propargyl bromide (59.5 mg, 500 µmol) over the course of 96 h. The residue was purified by PLC on silica gel (hexane/acetone = 10:1.1). Colorless oil (18.3 mg, 50.4 µmol, 50% yield, 88% ee).

^{1}H NMR (400 MHz, $(CD_3)_2CO$) δ = 7.37 – 7.29 (m, 2 H), 7.25 – 7.07 (m, 4 H), 6.95 (td, *J* = 7.7, 1.5 Hz, 1 H), 6.84 (td, *J* = 7.8, 1.4 Hz, 1 H), 6.76 (dd, *J* = 8.1, 1.5 Hz, 1 H), 3.09 (dd, *J* = 17.0, 2.6 Hz, 1 H), 2.89 (dd, *J* = 17.0, 2.7 Hz, 1 H), 2.32 (t, *J* = 2.6 Hz, 1 H), 1.50 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $(CD_3)_2CO$) δ = 164.5, 151.1, 144.0, 137.7, 129.9, 129.6, 127.2, 126.8, 126.2, 124.0, 119.5, 117.3, 86.9, 84.0, 79.7, 72.7, 31.1, 27.9 ppm. IR (neat): 3295, 2982, 1759, 1702, 1499, 1370, 1353, 1282, 1247, 1146 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{22}H_{21}NO_4$: *m/z* 386.1363 ([M + Na]$^+$), found: *m/z* 386.1374 ([M + Na]$^+$). $[\alpha]_D^{23.0}$ = +72.0 (*c* = 1.0, $CHCl_3$).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 12.0 min (minor) and 13.4 min (major)).

Product **5ba**



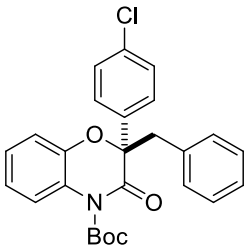
Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4b** (35.5 mg, 0.10 mmol) and benzyl bromide (42.8 mg, 0.25 mmol) over the course of 72 h. The residue was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (17.0 mg, 38.2 µmol, 38% yield, 98% ee).

^{1}H NMR (400 MHz, $(CD_3)_2CO$) δ = 7.15 – 7.05 (m, 7 H), 7.01 (dd, *J* = 8.2, 1.3, 1 H), 6.90 (ddd, *J* = 8.0, 7.3, 1.6, 1 H), 6.82 – 6.76 (m, 1 H), 6.74 (dd, *J* = 8.0, 1.5, 1 H), 6.70 – 6.66 (m, 2 H), 3.60 (s, 3 H), 3.50 (d, *J* = 14.2, 1 H), 3.23 (d, *J* = 14.1, 1 H), 1.48 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $(CD_3)_2CO$) δ = 165.6, 160.8, 151.1, 144.0, 136.5, 132.3, 130.4, 128.6, 128.2, 127.6, 127.1, 125.9, 123.6, 119.3, 116.8, 114.7, 86.5, 85.2, 55.6, 46.3, 27.8 ppm. IR (neat): 2980,

1760, 1699, 1500, 1250, 1146, 841 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{27}H_{27}NNaO_5$: *m/z* 468.1781 ([M + Na]$^+$), found: *m/z* 468.1735 ([M + Na]$^+$). $[\alpha]_D^{24.9}$ = 79.9 (*c* = 0.90, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 15.7 min (minor) and 21.8 min (major)).

Product **5ca**

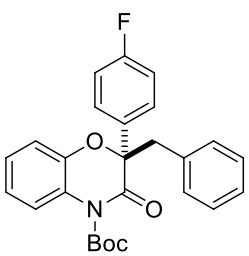


Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4c** (36.0 mg, 0.10 mmol) and benzyl bromide (42.8 mg, 0.25 mmol) over the course of 24 h. The residue was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (20.9 mg, 46.5 µmol, 47% yield, 94% ee).

^{1}H NMR (400 MHz, $(CD_3)_2CO$) δ = 7.36 – 7.29 (m, 4 H), 7.27 – 7.15 (m, 6 H), 7.09 – 7.02 (m, 1 H), 6.95 (td, *J* = 7.7, 1.4, 1 H), 6.89 (dd, *J* = 8.1, 1.6, 1 H), 3.65 (d, *J* = 14.2, 1 H), 3.40 (d, *J* = 14.2, 1 H), 1.61 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $(CD_3)_2CO$) δ = 165.1, 150.8, 143.6, 137.3, 135.9, 134.8, 132.2, 129.3, 128.6, 128.6, 127.7, 126.8, 126.0, 123.9, 119.3, 116.9, 86.7, 84.9, 45.8, 27.7 ppm. IR (neat): 2980, 1760, 1699, 1499, 1249, 1146, 750 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{26}H_{24}ClNNaO_4$: *m/z* 472.1286 ([M + Na]$^+$), found: *m/z* 472.1239 ([M + Na]$^+$). $[\alpha]_D^{25.1}$ = 75.3 (*c* = 1.29, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 100:1, flow rate = 0.5 mL/min, retention time; 16.0 min (minor) and 23.1 min (major)).

Product **5da**

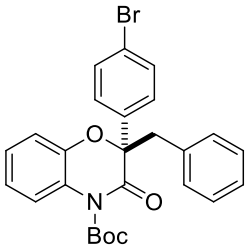


Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4d** (34.3 mg, 0.10 mmol) and benzyl bromide (42.8 mg, 0.25 mmol) over the course of 16 h. The residue was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (39.0 mg, 90.0 µmol, 90% yield, 95% ee).

^{1}H NMR (400 MHz, CD_3CN) δ = 7.24 (ddd, *J* = 6.8, 5.2, 2.2, 2 H), 7.17 – 7.12 (m, 5 H), 7.04 (dd, *J* = 8.1, 1.4, 1H), 6.99 – 6.83 (m, 4 H), 6.74 (dd, *J* = 8.2, 1.4, 1 H), 3.54 (d, *J* = 14.2, 1 H), 3.29 (d, *J* = 14.2, 1 H), 1.49 (s, 9 H) ppm. ^{13}C NMR (100 MHz, CD_3CN) δ = 165.4, 163.6 (d, *J*=246.1), 150.9, 143.6, 136.2, 134.5 (d, *J*=3.1), 132.3, 129.1 (d, *J*=8.4), 128.7, 127.9, 126.7, 126.3, 124.1, 119.4, 117.0, 116.2 (d, *J*=21.8), 87.4, 85.1, 45.8, 27.7 ppm. ^{19}F NMR (466 MHz, $(CD_3)_2CO$) δ = -109.72 (tt, *J*=8.9, 5.4) ppm. IR (neat): 2981, 1760, 1699, 1499, 1249, 1145, 842 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{26}H_{24}FNNaO_4$: *m/z* 456.1582 ([M + Na]$^+$), found: *m/z* 456.1536 ([M + Na]$^+$). $[\alpha]_D^{24.5}$ = 173.1 (*c* = 1.50, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 10.1 min (minor) and 11.7 min (major)).

Product **5ea**



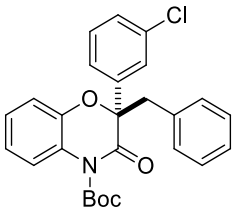
Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4e** (40.4 mg, 0.10 mmol) and benzyl bromide (42.8 mg, 0.25 mmol) over the course of 72 h at -35 °C. The residue was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (31.8 mg, 64.3 µmol, 64% yield, 96% ee).

^{1}H NMR (400 MHz, $(CD_3)_2CO$) δ = 7.36 – 7.29 (m, 2 H), 7.18 – 7.03 (m, 8 H), 6.93 (td, *J* = 7.7, 1.5, 1 H), 6.82 (td, *J* = 7.7, 1.4, 1 H), 6.76 (dd, *J* = 8.1, 1.5, 1 H), 3.52 (d, *J* = 14.2, 1 H), 3.26 (d, *J* = 14.2, 1 H), 1.48 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $(CD_3)_2CO$) δ = 165.1, 150.9, 143.7, 138.0, 136.0, 132.5, 132.3, 129.1, 128.7, 127.8, 126.9, 126.1, 124.0, 123.1, 119.4, 117.0, 86.8, 85.1, 45.9, 27.8 ppm. IR (neat): 2980, 1760, 1703, 1370, 1250, 1146, 750 cm^{-1}. HRMS (ESI) exact

mass calcd for $C_{26}H_{24}BrNNaO_4$: *m/z* 516.0781 ([M + Na]$^+$), found: *m/z* 516.0727 ([M + Na]$^+$). $[\alpha]_D^{25.3}$ = 152.5 (*c* = 1.00, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 100:1, flow rate = 0.5 mL/min, retention time; 16.8 min (minor) and 25.0 min (major)).

Product **5fa**

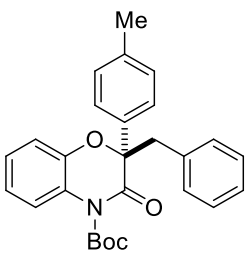


Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4f** (35.9 mg, 0.10 mmol) and benzyl bromide (42.8 mg, 0.25 mmol) over the course of 16 h. The residue was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (28.5 mg, 63.3 µmol, 63% yield, 86% ee).

^{1}H NMR (400 MHz, $(CD_3)_2CO$) δ = 7.22 – 7.03 (m, 10 H), 6.94 (ddd, *J* = 8.1, 7.3, 1.6, 1 H), 6.83 (td, *J* = 7.7, 1.4, 1H), 6.77 (dd, *J* = 8.1, 1.6, 1 H), 3.54 (d, *J* = 14.2, 1H), 3.28 (d, *J* = 14.2, 1 H), 1.49 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $(CD_3)_2CO$) δ = 165.0, 150.9, 143.6, 141.0, 136.0, 134.9, 132.3, 131.1, 129.6, 128.7, 127.9, 127.0, 126.8, 126.2, 125.5, 124.1, 119.4, 117.0, 86.9, 85.0, 45.9, 27.8 ppm. IR (neat): 2981, 1761, 1699, 1499, 1249, 1146, 751 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{26}H_{24}ClNNaO_4$: *m/z* 472.1286 ([M + Na]$^+$), found: *m/z* 472.1237 ([M + Na]$^+$). $[\alpha]_D^{23.3}$ = 182.9 (*c* = 1.40, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 100:1, flow rate = 0.5 mL/min, retention time; 13.5 min (minor) and 17.0 min (major)).

Product **5ga**

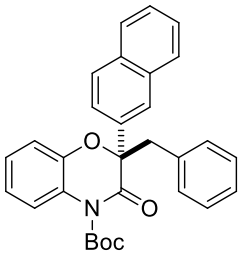


Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4g** (33.9 mg, 0.10 mmol) and benzyl bromide (42.8 mg, 0.25 mmol) over the course of 48 h. The residue was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (34.2 mg, 79.6 µmol, 80% yield, 91% ee).

^{1}H NMR (400 MHz, $(CD_3)_2CO$) δ = 7.17 – 7.04 (m, 7 H), 7.02 (dd, *J* = 8.1, 1.3, 1 H), 6.94 (dd, *J* = 8.5, 0.5, 2 H), 6.89 (ddd, *J* = 8.1, 7.3, 1.6, 1 H), 6.81 – 6.70 (m, 2 H), 3.51 (d, *J* = 14.2, 1 H), 3.22 (d, *J* = 14.2, 1 H), 2.09 (s, 3 H), 1.47 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $(CD_3)_2CO$) δ = 165.5, 151.1, 144.1, 139.2, 136.5, 135.7, 132.3, 130.0, 128.6, 127.6, 127.1, 126.8, 125.9, 123.6, 119.4, 116.8, 86.5, 85.4, 46.3, 27.8, 21.0 ppm. IR (neat): 2981, 1759, 1701, 1499, 1250, 1146, 752 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{27}H_{27}NNaO_4$: *m/z* 452.1832 ([M + Na]$^+$), found: *m/z* 452.1841 ([M + Na]$^+$). $[\alpha]_D^{23.6}$ = 187.9 (*c* = 1.24, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 10.1 min (minor) and 13.1 min (major)).

Product **5ha**



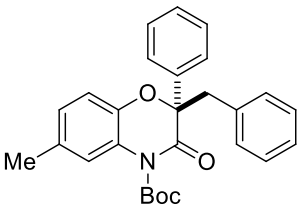
Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4h** (37.5 mg, 0.10 mmol) and benzyl bromide (42.8 mg, 0.25 mmol) over the course of 30 h. The residue was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (38.5 mg, 82.7 µmol, 83% yield, 96% ee).

^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.76 – 7.69 (m, 1 H), 7.66 (d, *J* = 8.7, 1 H), 7.45 – 7.35 (m, 3 H), 7.23 – 7.15 (m, 5 H), 7.11 (dd, *J* = 8.1, 0.7, 1 H), 6.98 – 6.91 (m, 1 H), 6.84 – 6.76 (m, 2 H), 3.75 (d, *J* = 14.2, 1 H), 3.49 (d, *J* = 14.2, 1 H), 1.62 (s, 8 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 165.4, 150.4, 143.6, 135.2, 135.1, 133.1, 133.0, 131.6, 128.5, 128.1, 127.8, 127.7, 126.9, 126.6, 126.4, 126.2, 125.7, 125.1, 123.7, 122.6, 118.5, 116.8, 85.8, 84.8, 45.6, 27.8 ppm. IR (neat): 2980, 1760, 1699, 1499, 1249, 1146, 747 cm^{-1}. HRMS (ESI) exact mass calcd for

$C_{30}H_{27}NNaO_4$: *m/z* 488.1832 ([M + Na]$^+$), found: *m/z* 488.1840 ([M + Na]$^+$). $[\alpha]_D^{25.3}$ = 258.7 (*c* = 1.00, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK IC-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 10.9 min (major) and 11.8 min (minor)).

Product **5ia**

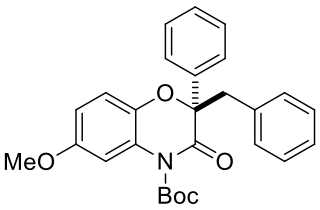


Prepared according to the general procedure **GP3** with 1,4-benzoxazin-3-one **4i** (33.9 mg, 0.10 mmol) and benzyl bromide (68.4 mg, 0.40 mmol) over the course of 72 h. The residue was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (23.1 mg, 53.8 µmol, 54% yield, 81% ee).

^{1}H NMR (400 MHz, CD_3CN) δ = 7.34 – 7.16 (m, 10 H), 7.01 (d, *J* = 8.2, 1 H), 6.88 – 6.79 (m, 1 H), 6.59 (s, 1 H), 3.63 (d, *J* = 14.3, 1 H), 3.36 (d, *J* = 14.2, 1 H), 2.16 (s, 3 H), 1.59 (s, 9 H) ppm. ^{13}C NMR (100 MHz, CD_3CN) δ = 165.8, 151.2, 141.7, 138.7, 136.7, 134.0, 132.4, 129.7, 129.6, 128.8, 127.9, 127.0, 126.8, 126.6, 119.3, 117.3, 87.4, 85.5, 46.0, 27.9, 20.9 ppm. IR (neat): 2980, 1759, 1700, 1509, 1250, 1145, 699 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{27}H_{27}NNaO_4$: *m/z* 452.1832 ([M + Na]$^+$), found: *m/z* 452.1787 ([M + Na]$^+$). $[\alpha]_D^{24.0}$ = 187.9 (*c* = 1.39, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 100:1, flow rate = 0.5 mL/min, retention time; 12.5 min (minor) and 21.3 min (major)).

Product **5ja**



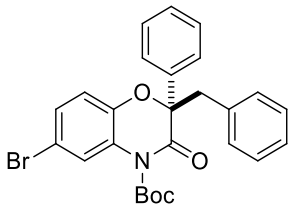
Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4j** (35.5 mg, 0.10 mmol) and benzyl bromide (42.8 mg, 0.25 mmol) over the course of 68 h. The residue

was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (37.7 mg, 84.6 µmol, 85% yield, 92% ee).

^{1}H NMR (500 MHz, $(CD_3)_2CO$) δ = 7.35 – 7.30 (m, 2 H), 7.28 – 7.15 (m, 8 H), 7.09 – 7.04 (m, 1 H), 6.58 (dd, *J* = 8.9, 2.8, 1 H), 6.37 (d, *J* = 2.7, 1 H), 3.63 (s, 3 H), 3.60 (d, *J* = 14.2, 1 H), 3.33 (d, *J* = 14.2, 1 H), 1.59 (s, 9 H) ppm. ^{13}C NMR (125 MHz, $(CD_3)_2CO$) δ = 165.6, 156.0, 150.9, 138.5, 137.6, 136.3, 132.2, 129.2, 129.2, 128.4, 127.5, 127.3, 126.7, 119.8, 110.5, 102.7, 86.6, 85.2, 55.9, 46.2, 27.7 ppm. IR (neat): 2981, 1761, 1703, 1508, 1251, 1146, 699 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{27}H_{27}NNaO_5$: *m/z* 468.1781 ([M + Na]$^+$), found: *m/z* 468.1735 ([M + Na]$^+$). $[\alpha]_D^{25.0}$ = 238.5 (*c* = 1.35, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 13.5 min (minor) and 20.1 min (major)).

Product **5ka**

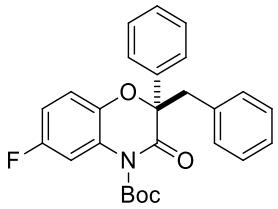


Prepared according to the general procedure **GP3** with 1,4-benzoxazin-3-one **4k** (20.2 mg, 0.05 mmol) and benzyl bromide (42.8 mg, 0.25 mmol) over the course of 48 h at 10 °C. The residue was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (22.9 mg, 46.3 µmol, 76% yield, 88% ee).

^{1}H NMR (400 MHz, $(CD_3)_2CO$) δ = 7.37 – 7.18 (m, 11 H), 7.16 (d, *J* = 8.6, 1 H), 7.07 (d, *J* = 2.1, 1 H), 3.66 (d, *J* = 14.2, 1 H), 3.39 (d, *J* = 14.2, 1 H), 1.62 (s, 9 H) ppm. ^{13}C NMR (100 MHz, $(CD_3)_2CO$) δ = 165.3, 150.6, 143.5, 138.0, 136.0, 132.2, 129.5, 129.4, 128.7, 128.5, 128.2, 127.7, 126.7, 121.2, 119.9, 115.0, 87.1, 85.7, 46.1, 27.7 ppm. IR (neat): 2980, 1756, 1709, 1491, 1252, 1145, 699 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{26}H_{24}BrNNaO_4$: *m/z* 516.0781 ([M + Na]$^+$), found: *m/z* 516.0790 ([M + Na]$^+$). $[\alpha]_D^{24.3}$ = 208.8 (*c* = 1.00, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 100:1, flow rate = 0.5 mL/min, retention time; 13.3 min (minor) and 17.2 min (major)).

Product **5la**

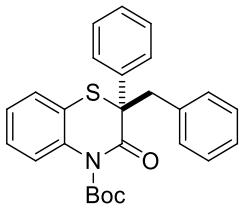


Prepared according to the general procedure **GP3** with 1,4-benzoxazin-3-one **4l** (34.3 mg, 0.10 mmol) and benzyl bromide (68.4 mg, 0.40 mmol) over the course of 144 h at 0 °C. The residue was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (27.3 mg, 63.0 µmol, 63% yield, 89% ee).

^{1}H NMR (500 MHz, $(CD_3)_2CO$) δ = 7.34 – 7.30 (m, 2 H), 7.30 – 7.16 (m, 9 H), 6.80 (ddd, *J* = 8.9, 8.2, 2.9, 1 H), 6.69 (dd, *J* = 9.7, 2.8, 1 H), 3.63 (d, *J* = 14.2, 1 H), 3.35 (d, *J* = 14.2, 1 H), 1.60 (s, 9 H) ppm. ^{13}C NMR (125 MHz, $(CD_3)_2CO$) δ = 164.5, 157.7 (d, *J* = 238.9), 149.8, 139.4 (d, *J* = 2.8), 137.2, 135.2, 131.3, 128.6, 128.5, 127.7, 126.8, 126.7 (d, *J* = 11.0), 125.8, 119.6 (d, *J* = 9.5), 111.2 (d, *J* = 23.5), 103.6 (d, *J* = 29.2), 86.1, 84.7, 45.4, 26.9 ppm. ^{19}F NMR (466 MHz, ACETONE-D6) δ = -120.23 (ddd, *J*=9.7, 8.3, 5.2) ppm. IR (neat): 2981, 1756, 1704, 1505, 1248, 1143, 842, 698 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{26}H_{24}FNNaO_4$: *m/z* 456.1582 ([M + Na]$^+$), found: *m/z* 456.1587 ([M + Na]$^+$). $[\alpha]_D^{25.2}$ = 155.6 (*c* = 1.32, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK IC3, hexane/2-propanol = 200:1, flow rate = 0.5 mL/min, retention time; 19.1 min (major) and 23.5 min (minor)).

Product **5ma**



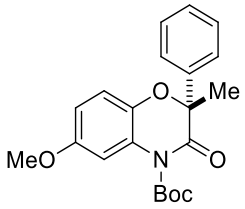
Prepared according to the general procedure **GP2** with 1,4-benzoxazin-3-one **4m** (17.1 mg, 0.05 mmol), PTC (2.35 mg, 5 mol%) and benzyl bromide (21.3 mg, 125 µmol) in mesitylene over the course of 48 h at -10 °C. The residue was purified by PLC on silica gel (hexane/EtOAc = 10:1). Colorless oil (18.7 mg, 43.3 µmol, 87% yield, 91% ee).

^{1}H NMR (400 MHz, CD_3CN) δ = 7.35 (dd, *J* = 7.7, 1.4, 1 H), 7.08 (ddd, *J* = 8.2, 7.5, 1.5, 1 H), 7.01 – 6.95 (m, 1 H), 6.92 – 6.86 (m, 2 H), 6.68 (dd, *J* = 8.3, 1.1, 1 H), 3.55 (d, *J* = 14.1, 1 H),

3.49 (d, *J* = 14.1, 1 H), 1.61 (s, 3 H) ppm. ^{13}C NMR (100 MHz, CD_3CN) δ = 167.9, 153.1, 137.4, 137.1, 136.4, 132.1, 130.0, 129.3, 129.2, 128.8, 128.6, 128.3, 128.2, 125.7, 121.8, 118.2, 87.0, 57.1, 44.8, 27.8 ppm. IR (neat): 2981, 1763, 1682, 1446, 1236, 1148, 699 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{26}H_{25}NNaO_3S$: *m/z* 454.1447 ([M + Na]$^+$), found: *m/z* 454.1453 ([M + Na]$^+$). $[\alpha]_D^{25.3}$ = 315.1 (*c* = 1.00, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 30:1, flow rate = 0.5 mL/min, retention time; 13.9 min (minor) and 17.0 min (major)).

Product **5jj**



To a degassed test tube equipped with a magnetic stirring bar powdered KOH (11.2 mg, 200 µmol) was added rapidly. After addition of 1,4-benzoxazin-3-one **4j** (17.8 mg, 50 µmol) and catalyst **PTC** (2.4 mg, 5.0 mol%) the test tube was cooled to -25 °C and the components were dissolved in mesitylene (1 mL) to continue cooling at the same temperature for 1 h. Dimethyl sulfate (190 mg, 1.50 mmol) was added in one portion and the reaction mixture was stirred vigorously for 72 h. The reaction mixture was diluted by ethyl acetate and passed through a short pad of silica gel. After evaporation of the solvent, the residue was purified by PLC on silica gel (hexane/EtOAc = 10:1) to give **5jj** as a colorless oil (9.1 mg, 24.4 µmol, 49% yield, 49% ee) along with 15% of the *O*-methylated side-product as inseparable mixture of region-isomers.

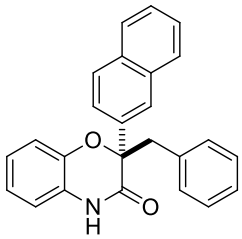
^{1}H NMR (400 MHz, $(CD_3)_2CO$) δ = 7.32 – 7.21 (m, 2 H), 7.22 – 7.15 (m, 2 H), 7.16 – 7.10 (m, 1 H), 6.95 (d, *J* = 8.8, 1 H), 6.47 (dd, *J* = 8.9, 2.8, 1 H), 6.26 (d, *J* = 2.8, 1 H), 3.54 (s, 3 H), 1.66 (s, 3 H), 1.51 (s, 9 H) ppm. ^{13}C NMR (125 MHz, $(CD_3)_2CO$) δ = 165.4, 155.2, 150.2, 139.4, 137.1, 128.6, 128.4, 125.2, 118.9, 109.7, 102.1, 85.7, 81.8, 55.0, 26.9, 26.5 ppm. IR (neat): 1771, 1615, 1251, 1146, 1039 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{21}H_{23}NNaO_5$: *m/z* 392.1468 ([M + Na]$^+$), found: *m/z* 392.1466 ([M + Na]$^+$). $[\alpha]_D^{14.6}$ = 95.6 (*c* = 0.90, MeCN).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-3, hexane/2-propanol = 100:1, flow rate = 0.5 mL/min, retention time; 20.1 min (minor)

and 31.4 min (minor)).

Deprotection

Product **6**



To a solution of 1,4-benzoxazin-3-one **5ha** (22.8 mg, 49.0 µmol) in CH_2Cl_2 (1.0 mL) was added trifluoro acetic acid (0.2 mL) at 0 °C and the resulting mixture was stirred at room temperature for addition 2 h. The reaction was neutralized with aq. sat. $NaHSO_4$, the phases were separated and the aqueous phase was extracted with CH_2Cl_2. The combined organic phases were dried over Na_2SO_4 and the solvent was removed *in vacuo*. The crude product was purified by PTLC (hex:EtOAc = 4:1) to yield the title compound **6** (17.7 mg, 48.4 µmol, 99%, 96% ee) as white solid.

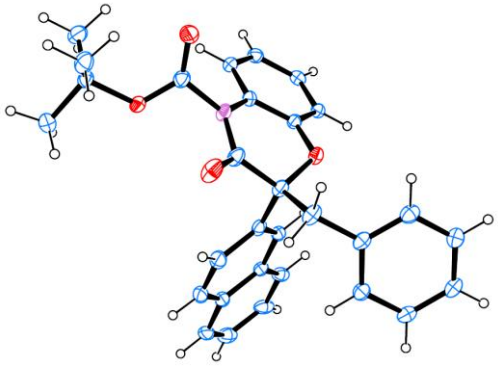
H NMR (400 MHz, $CDCl_3$) δ = 8.36 (s, 1 H), 7.88 (s, 1 H), 7.78 – 7.65 (m, 3 H), 7.60 (dd, *J* = 8.7, 1.6, 1 H), 7.47 – 7.37 (m, 2 H), 7.30 (dd, *J* = 6.3, 2.8, 2 H), 7.24 – 7.12 (m, 4 H), 6.94 (t, *J* = 7.3, 1 H), 6.82 (t, *J* = 7.6, 1 H), 6.63 (d, *J* = 7.7, 1 H), 3.79 (d, *J* = 14.2, 1 H), 3.46 (d, *J* = 14.2, 1 H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ = 167.0, 160.7, 143.3, 136.2, 135.7, 133.1, 131.5, 128.5, 128.3, 127.9, 127.7, 126.9, 126.6, 126.4, 125.3, 124.3, 123.7, 122.6, 121.3, 117.8, 115.4, 102.0, 85.1, 48.9, 45.7, 15.1 ppm. IR (neat): 2341, 1681, 1501, 1082, 798, 745 cm^{-1}. HRMS (ESI) exact mass calcd for $C_{25}H_{19}NO_2Na$: *m/z* 388.1308 ($[M + Na]^+$), found: *m/z* 388.1326 ($[M + Na]^+$). $[\alpha]_D^{18.6}$ = 84.3 (*c* = 1.45, $CDCl_3$).

The enantiomeric purity of the product was determined by HPLC analysis (Daicel CHIRALPAK AD-H, hexane/2-propanol = 10:1, flow rate = 1.0 mL/min, retention time; 26.2 min (minor) and 37.9 min (major)).

Determination of the Absolute Configuration of 5ha

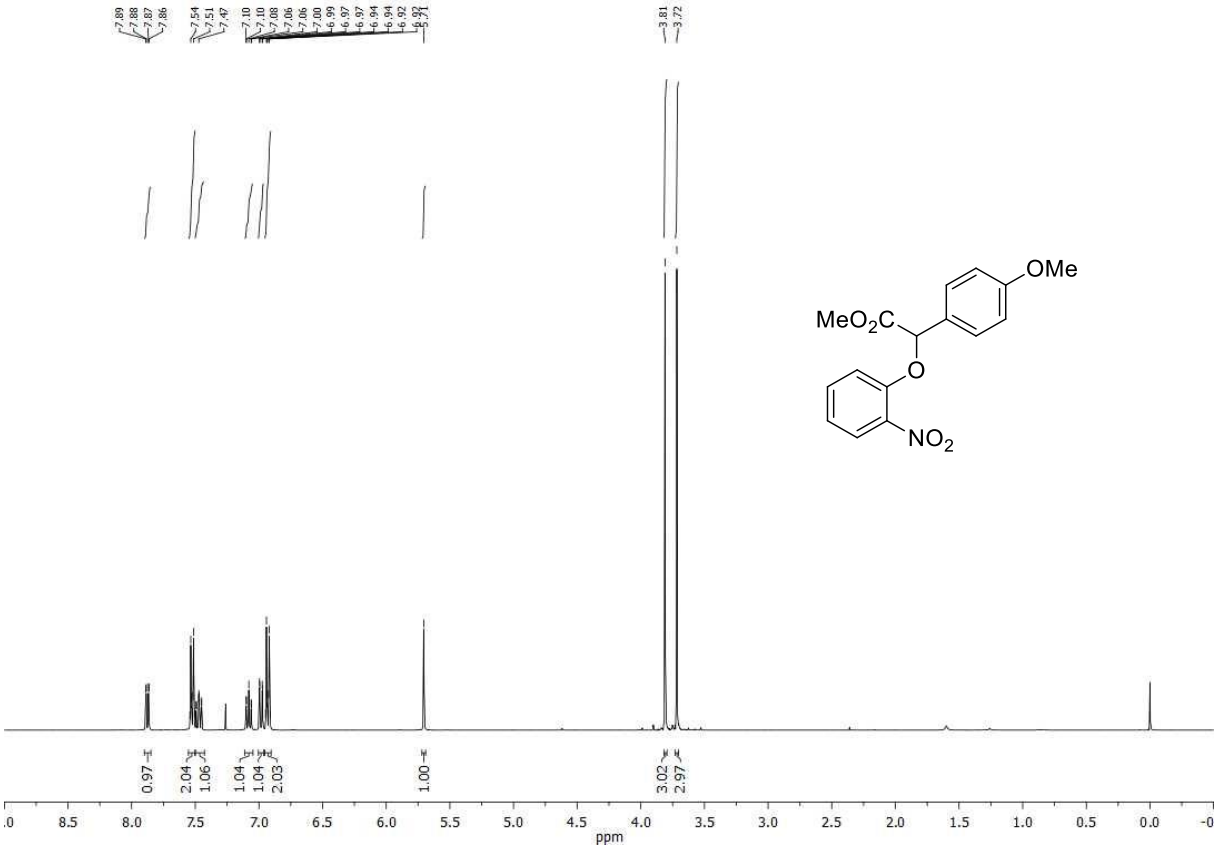
Crystals suitable for an x-ray analysis were obtained by layering a solution of the product in CH_2Cl_2 with hexane. The x-ray analysis revealed the absolute configuration of the product to be (*R*).

The crystal structure has been deposited at the Cambridge Crystallographic Data Centre (CCDC 1840492). The data can be obtained free of charge via the Internet at www.ccdc.cam.ac.uk/conts/retrieving.html.

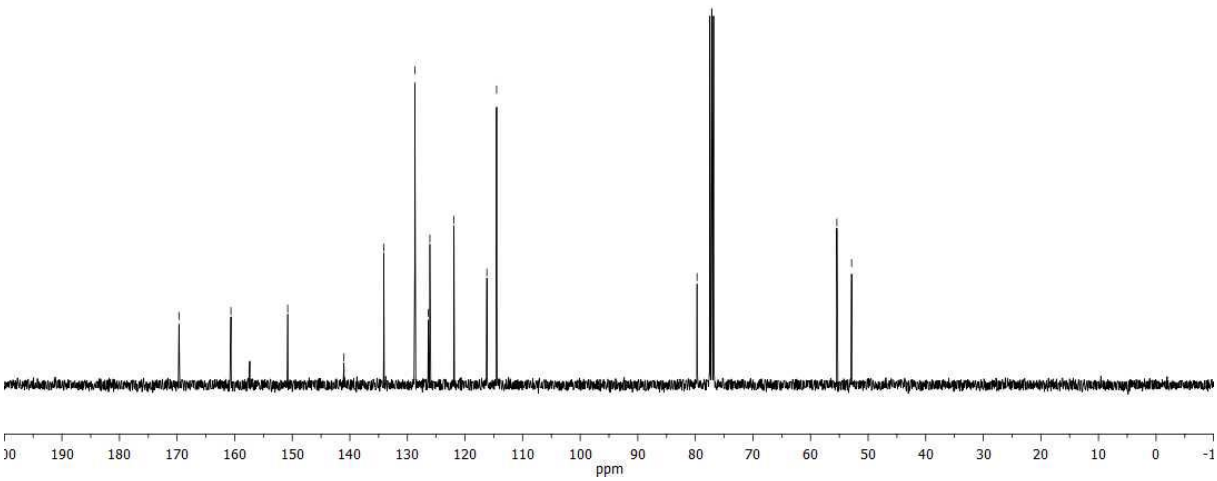


NMR Spectra

Methyl 2-(4-methoxyphenyl)-2-(2-nitrophenoxy)acetate (**7b**)

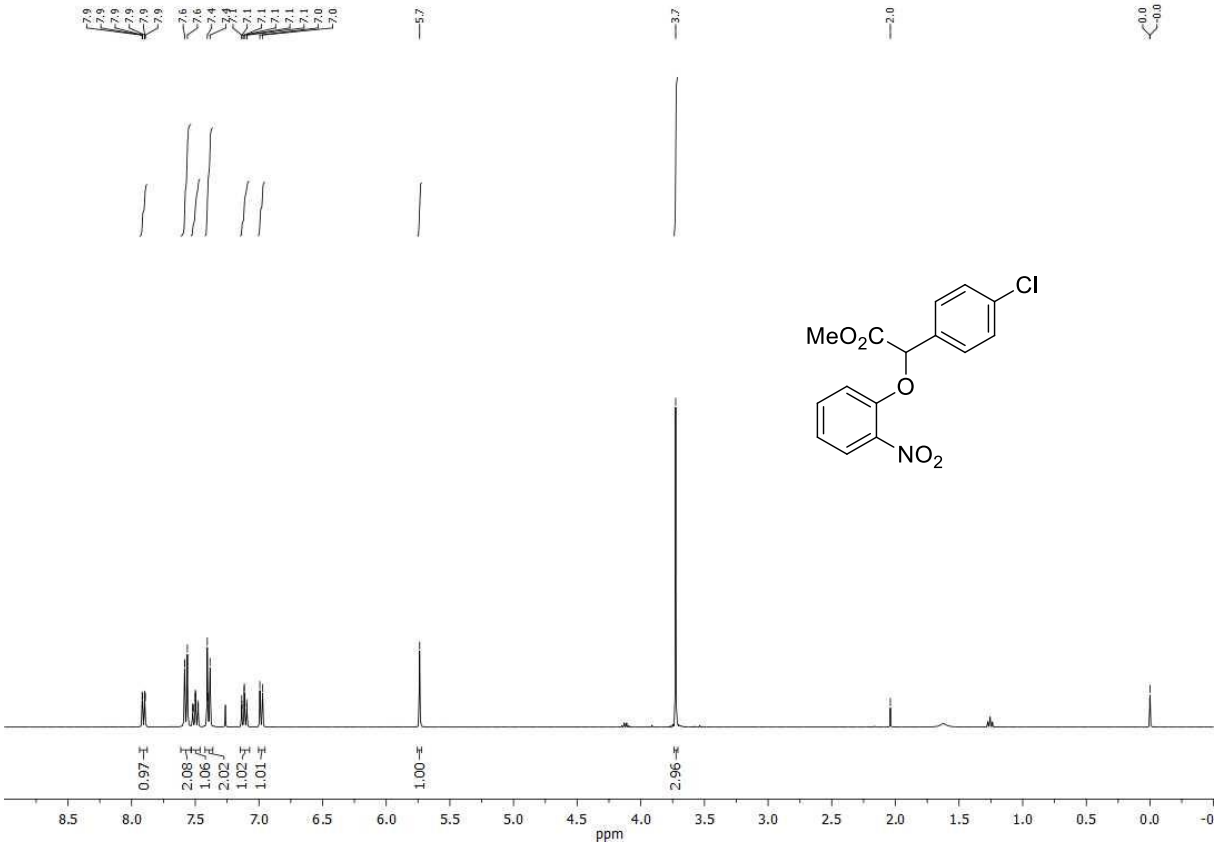


^{1}H NMR (400 MHz, $CDCl_3$)

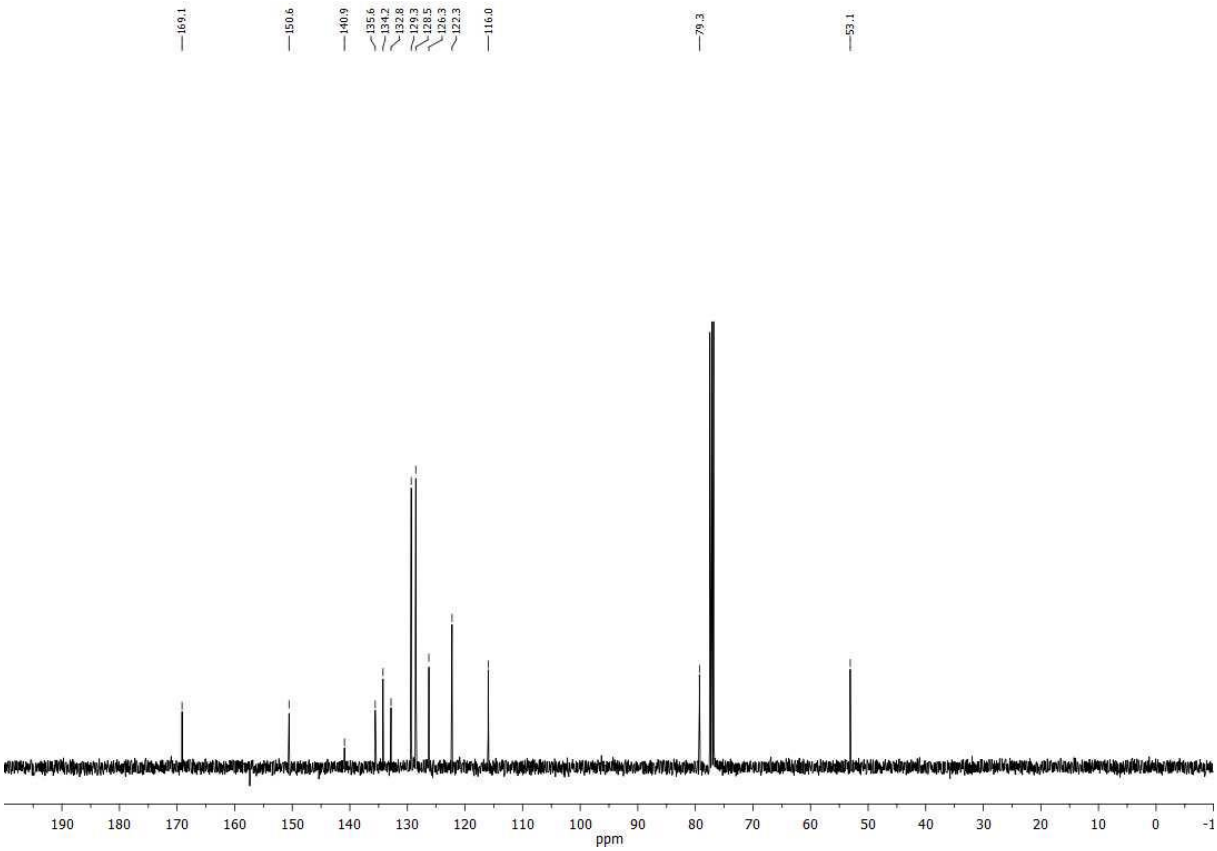


^{13}C NMR (100 MHz, $CDCl_3$)

Methyl 2-(4-chlorophenyl)-2-(2-nitrophenoxy)acetate (**7c**)

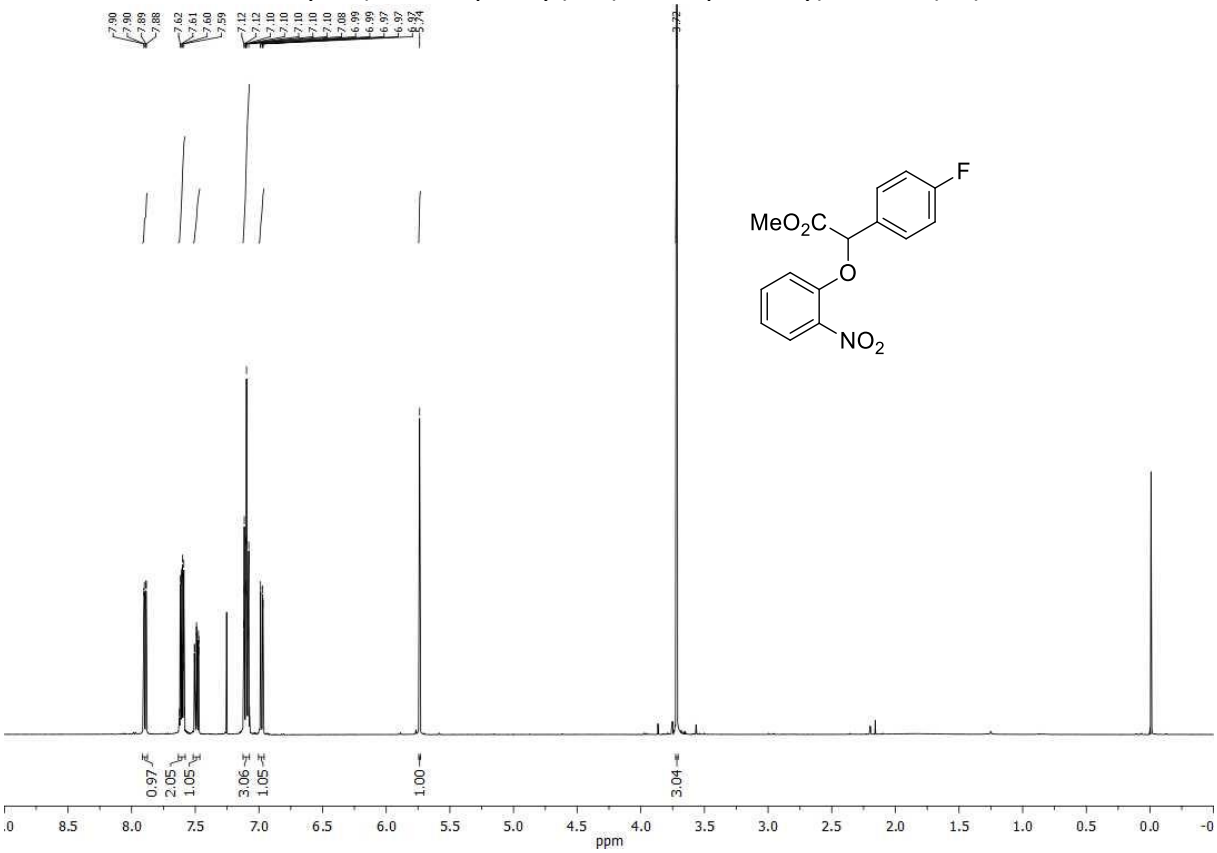


^{1}H NMR (400 MHz, $CDCl_3$)

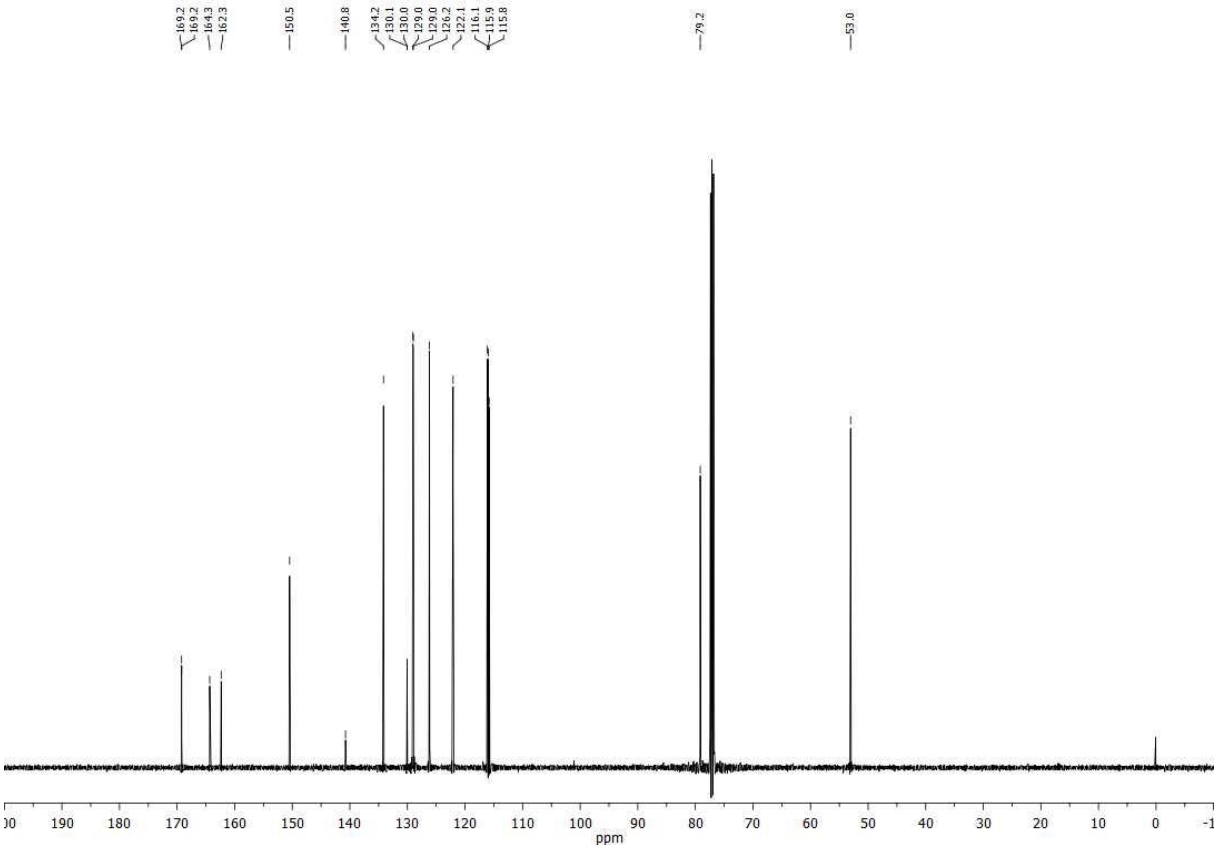


^{13}C NMR (100 MHz, $CDCl_3$)

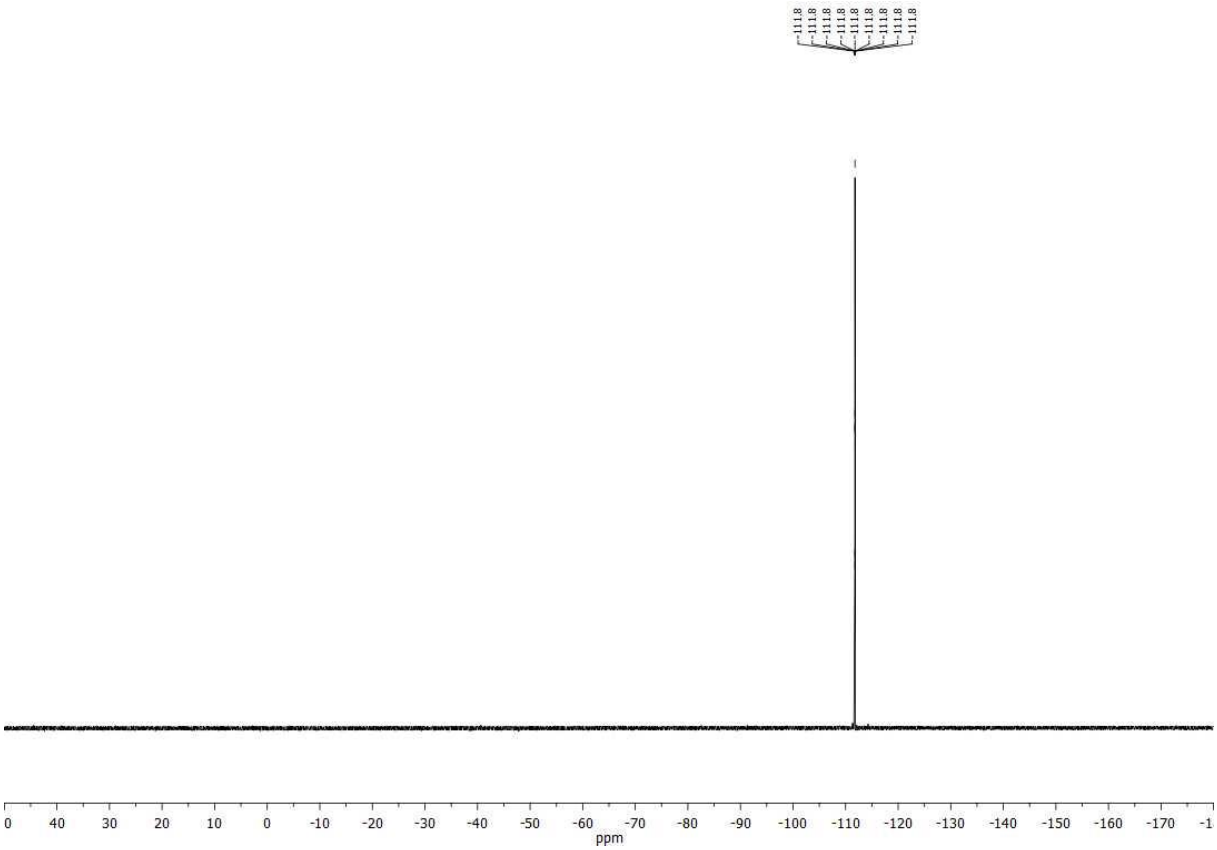
Methyl 2-(4-fluorophenyl)-2-(2-nitrophenoxy)acetate (**7d**)



^{1}H NMR (600 MHz, $CDCl_3$)

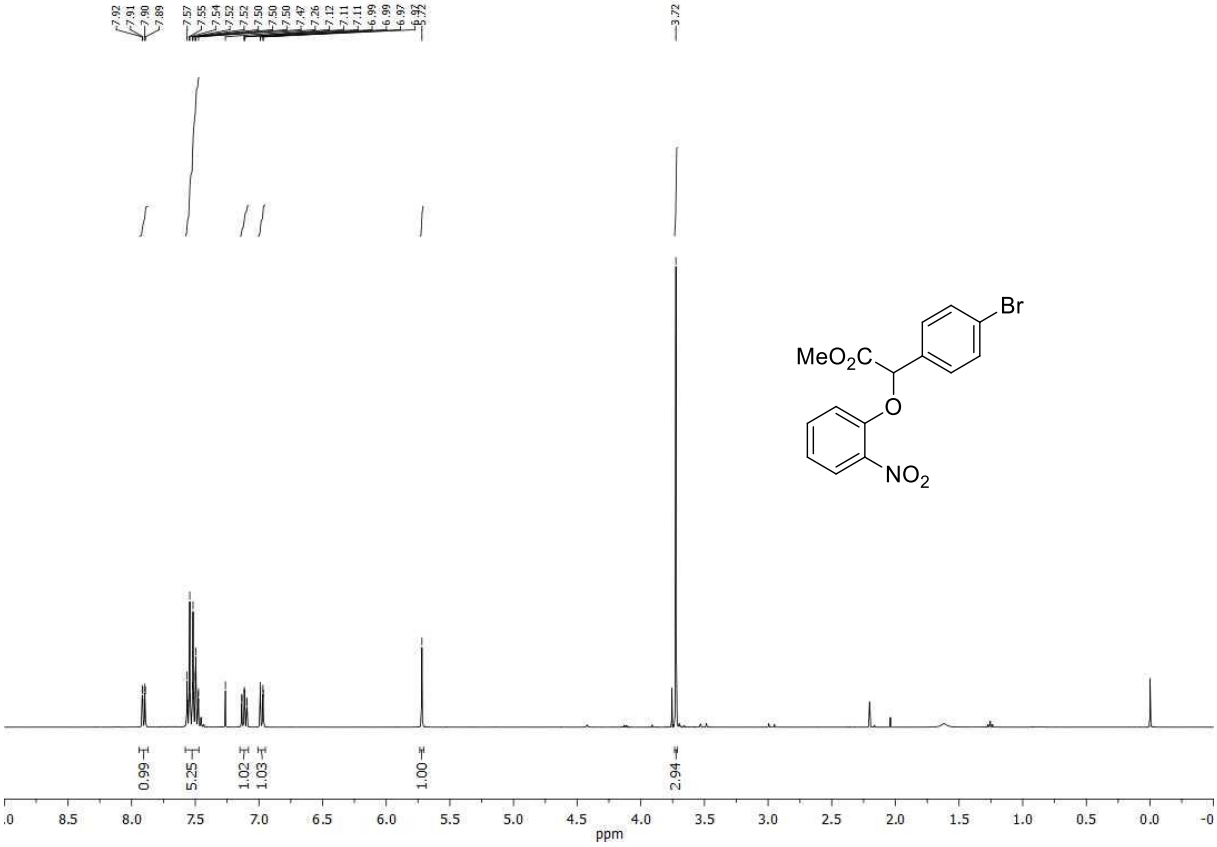


^{13}C NMR (125 MHz, $CDCl_3$)

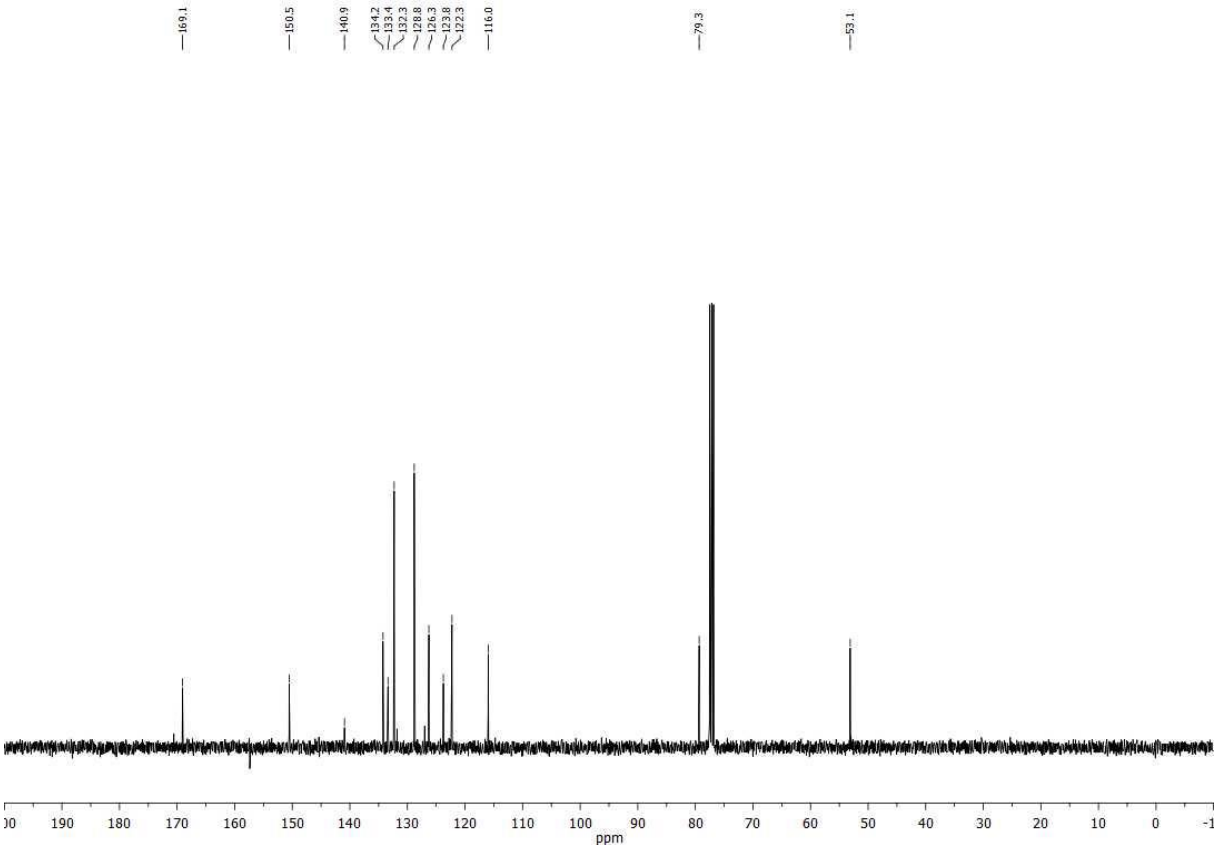


^{19}F NMR (466 MHz, $CDCl_3$)

Methyl 2-(4-bromophenyl)-2-(2-nitrophenoxy)acetate (**7e**)

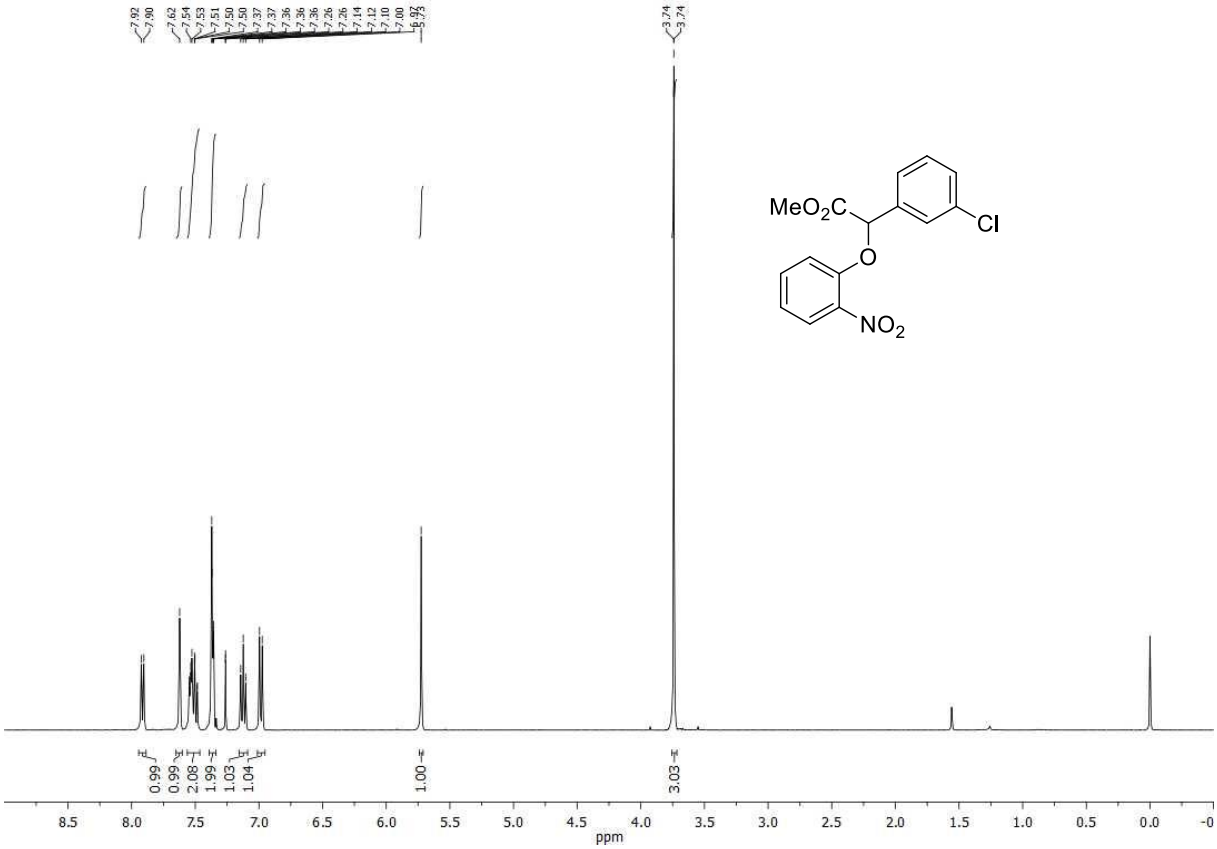


^{1}H NMR (400 MHz, $CDCl_3$)

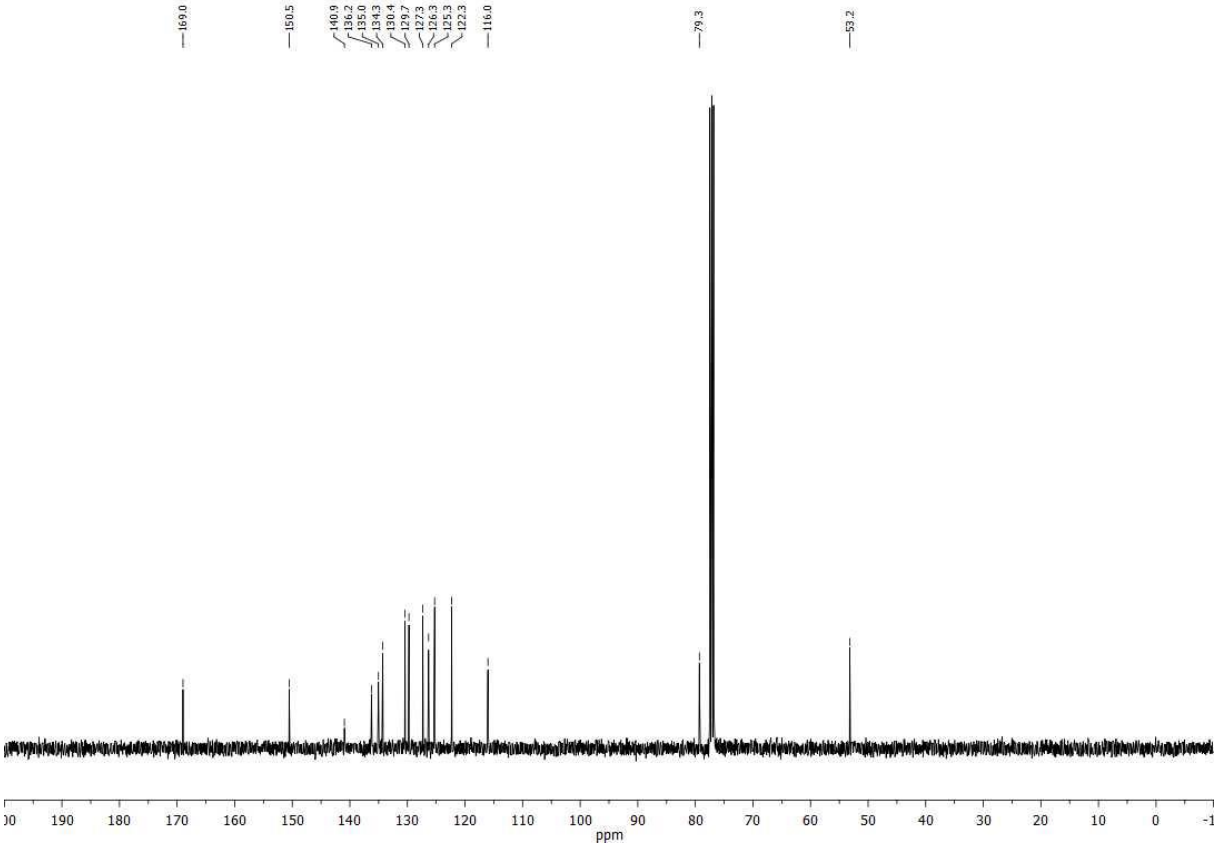


^{13}C NMR (100 MHz, $CDCl_3$)

Methyl 2-(3-chlorophenyl)-2-(2-nitrophenoxy)acetate (**7f**)

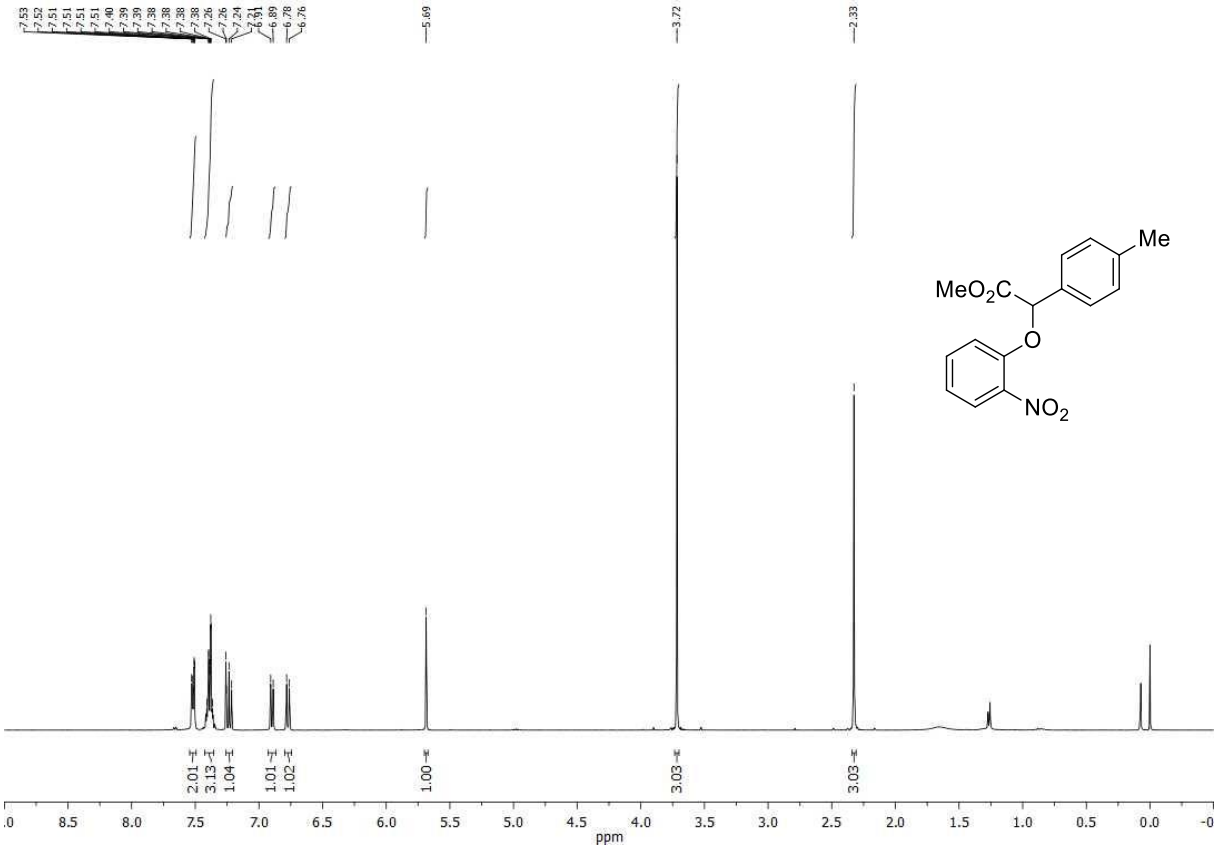


^{1}H NMR (400 MHz, $CDCl_3$)

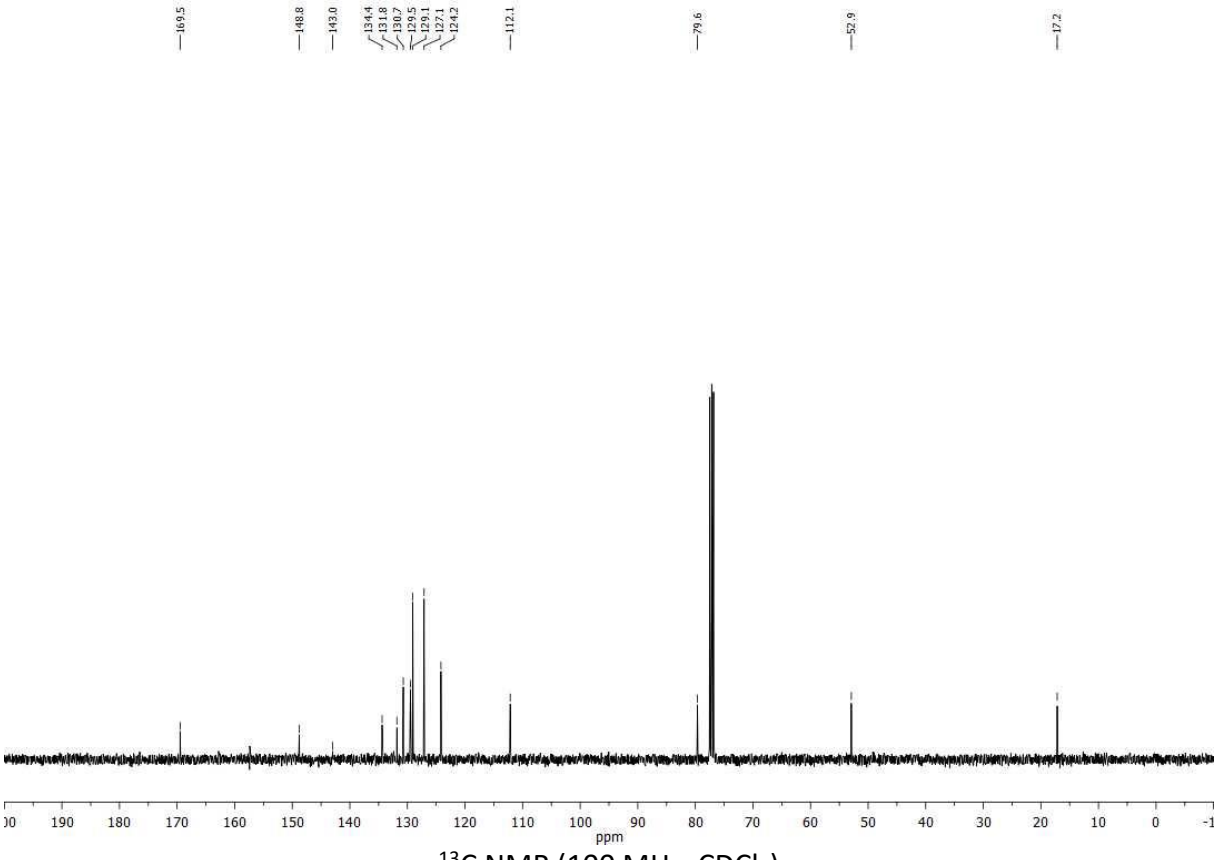


^{13}C NMR (100 MHz, $CDCl_3$)

Methyl 2-(2-nitrophenoxy)-2-(*p*-tolyl)acetate (**7g**)

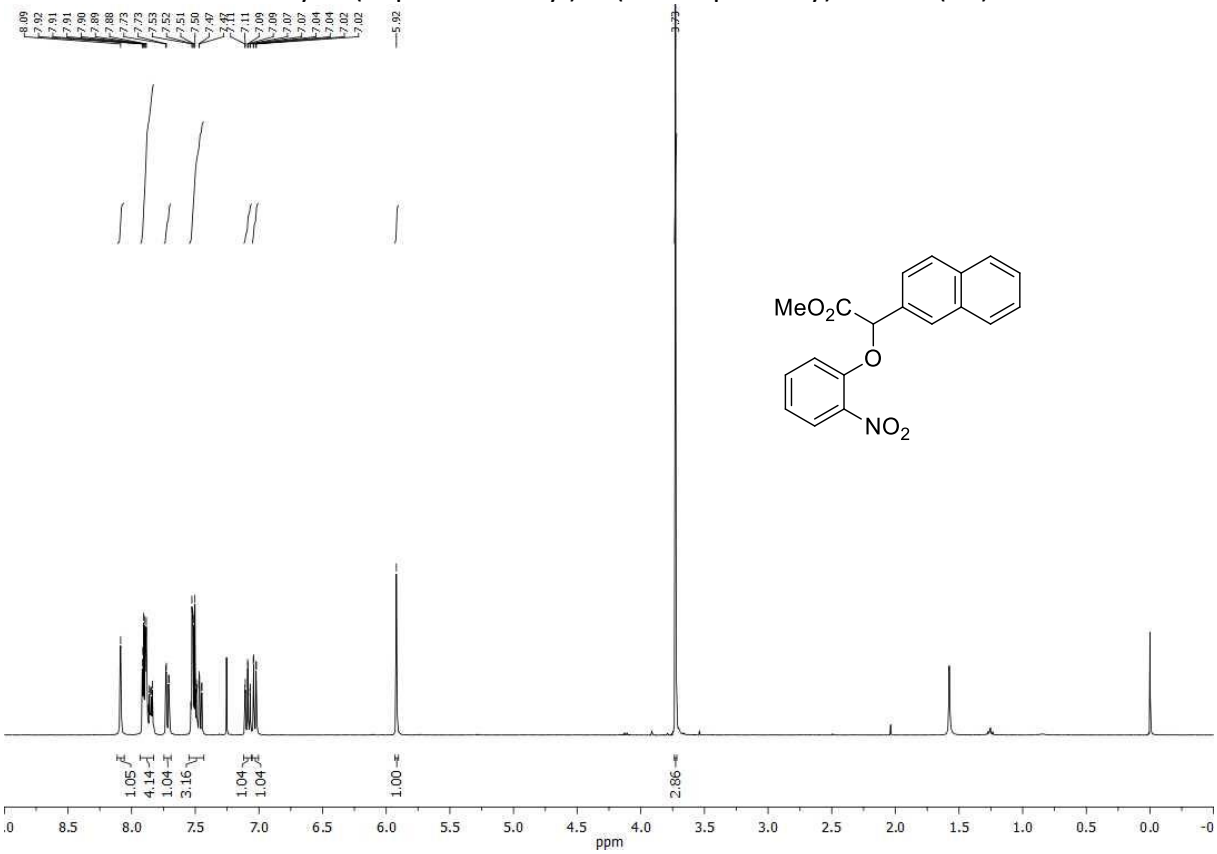


^{1}H NMR (400 MHz, $CDCl_3$)

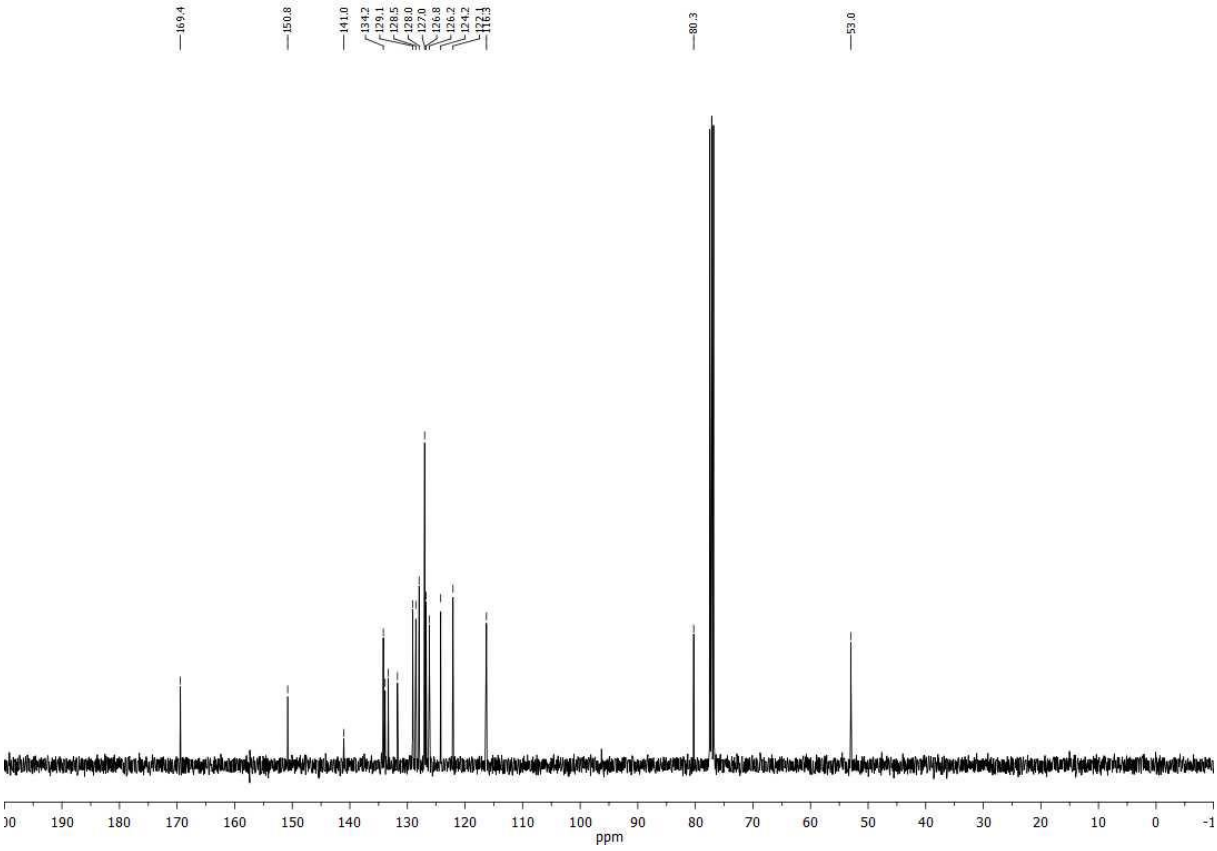


^{13}C NMR (100 MHz, $CDCl_3$)

Methyl 2-(naphthalen-2-yl)-2-(2-nitrophenoxy)acetate (**7h**)

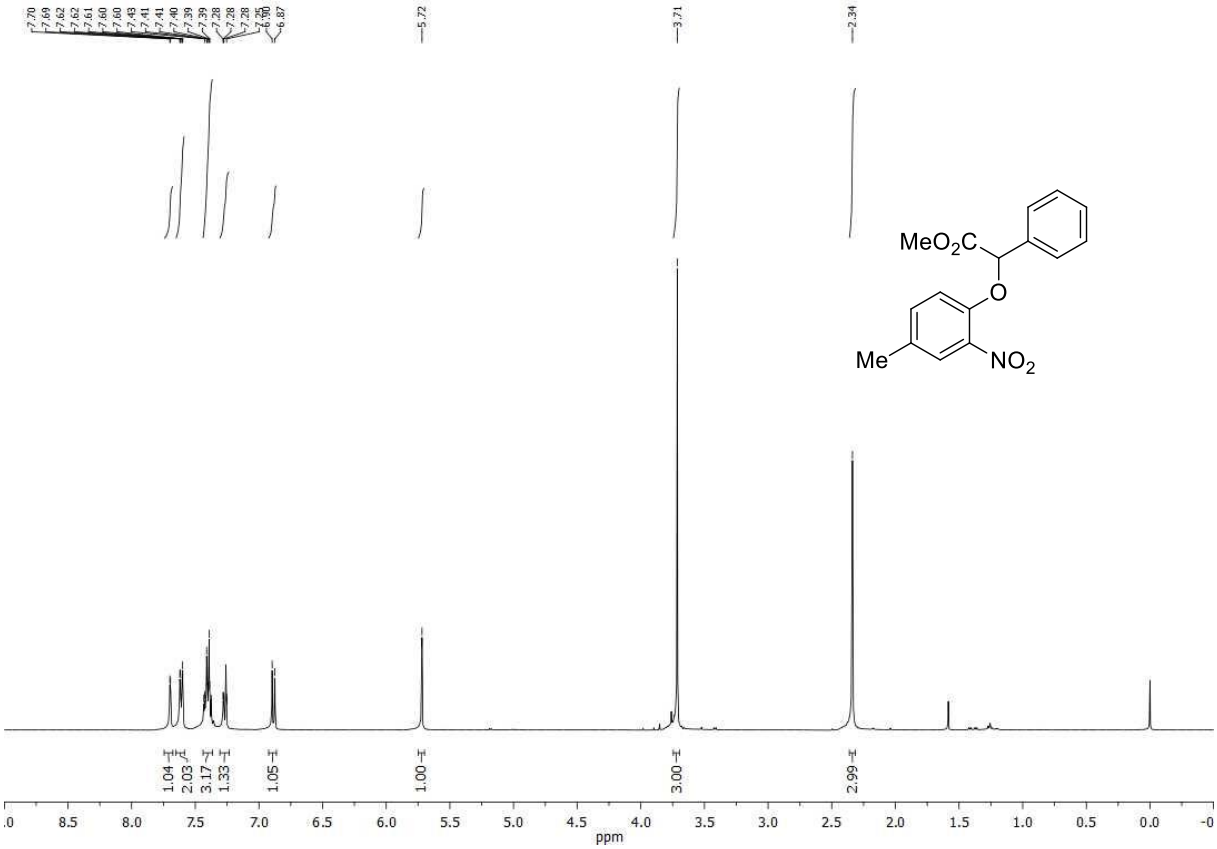


^{1}H NMR (400 MHz, $CDCl_3$)

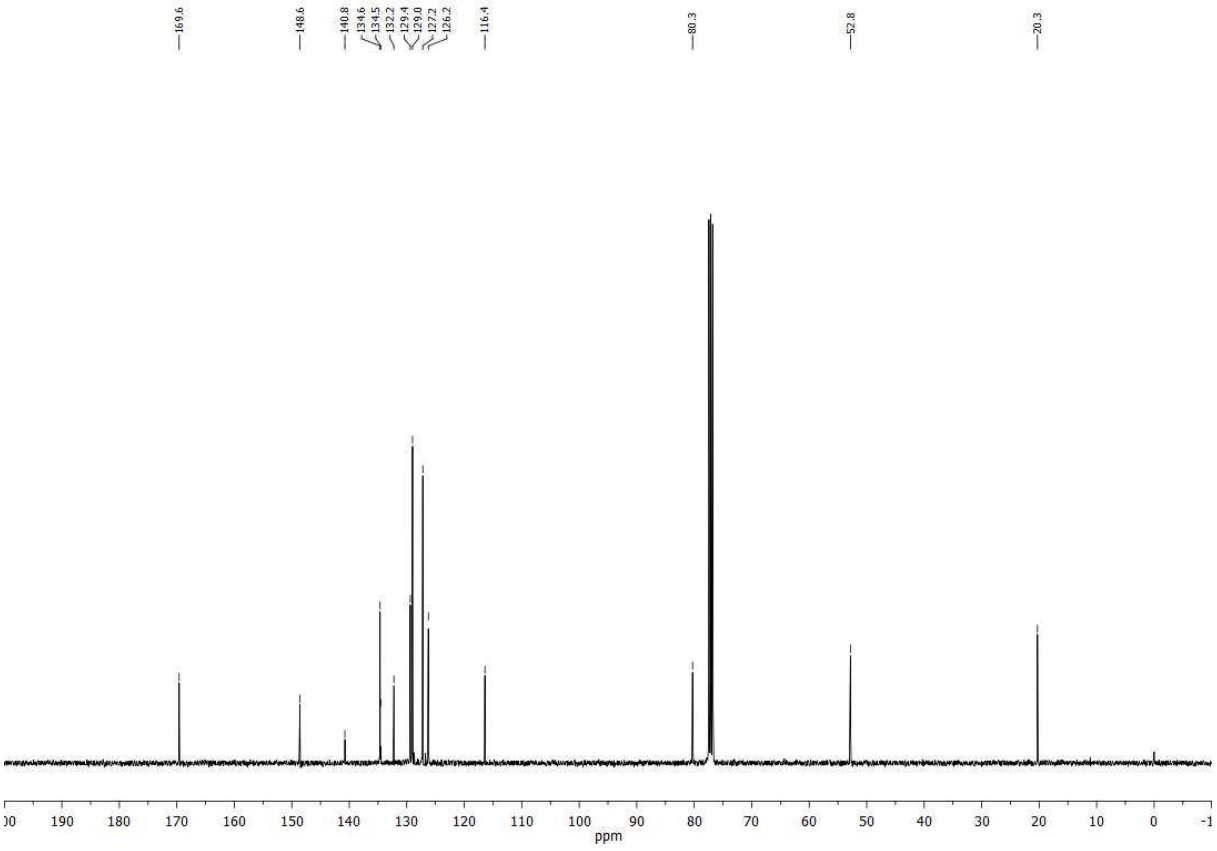


^{13}C NMR (100 MHz, $CDCl_3$)

Methyl 2-(4-methyl-2-nitrophenoxy)-2-phenylacetate (**7i**)

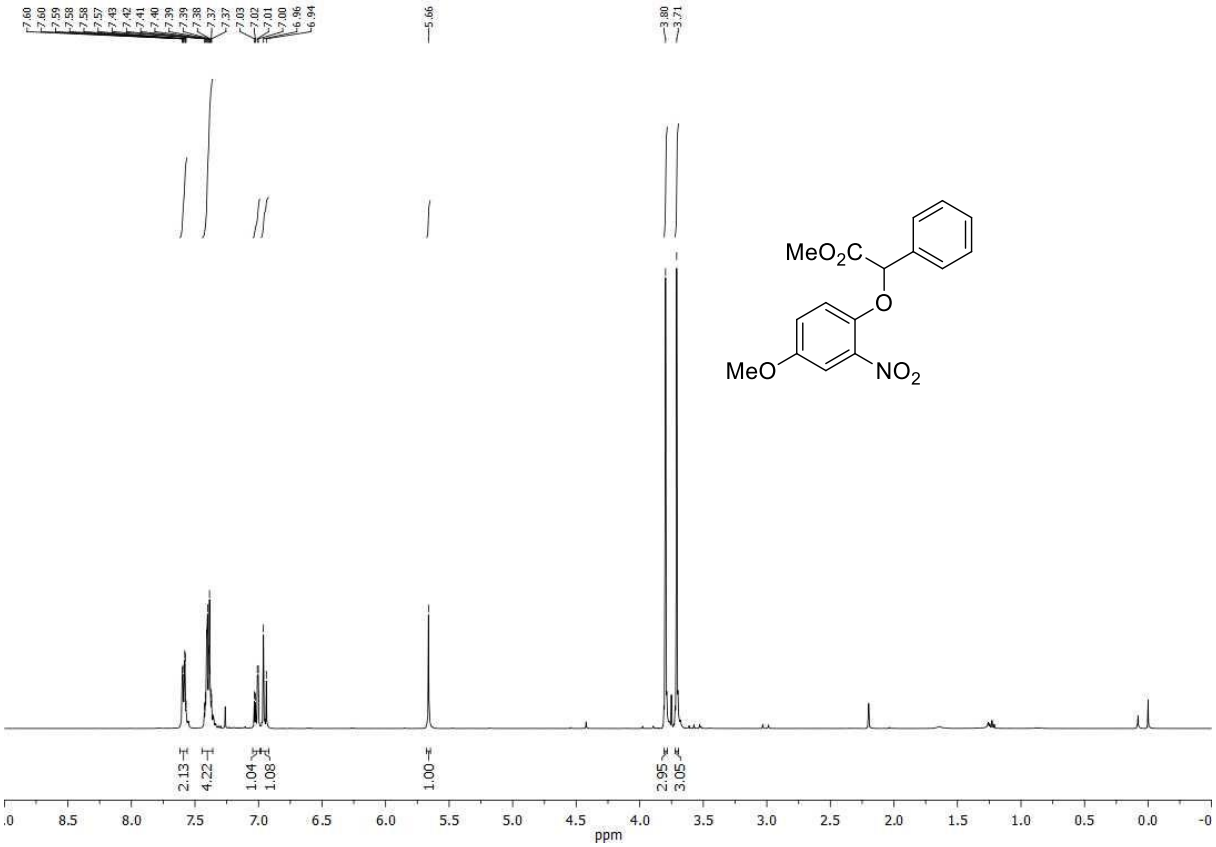


^{1}H NMR (400 MHz, $CDCl_3$)

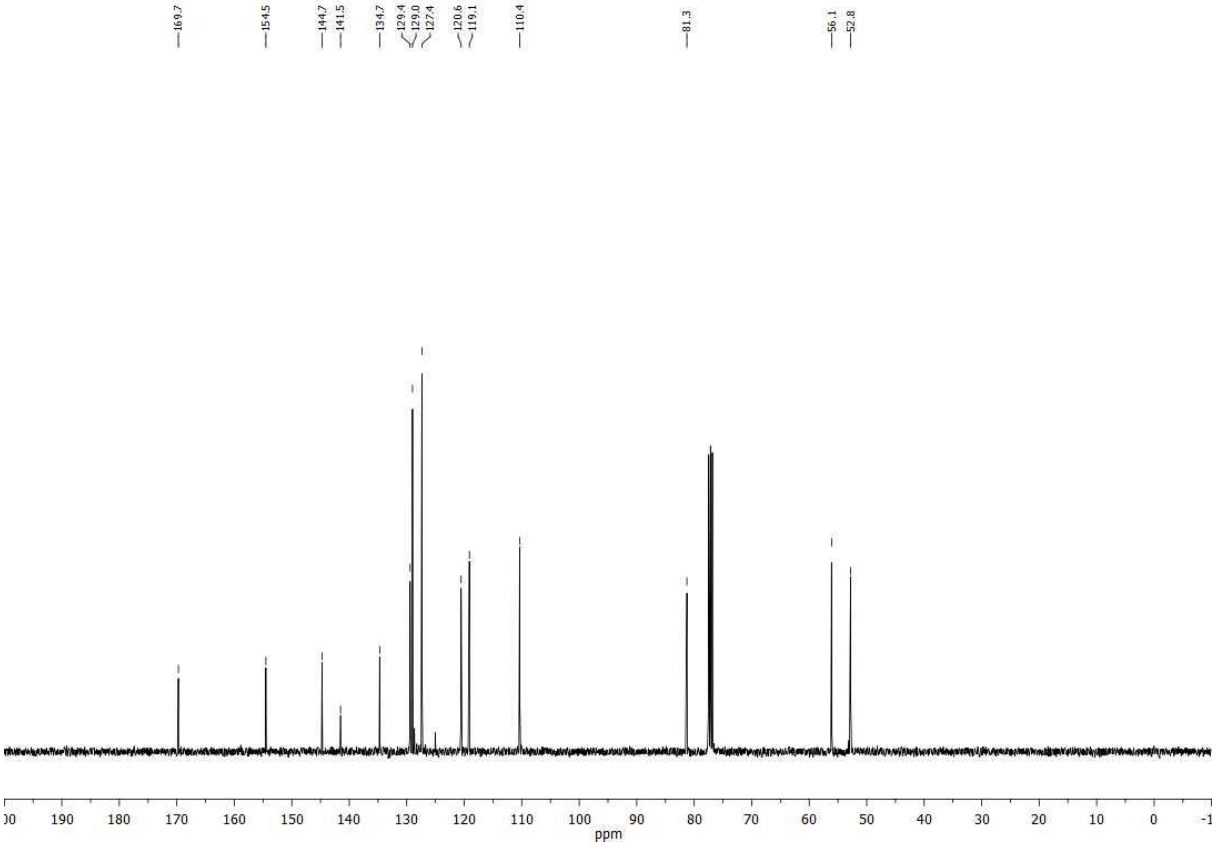


^{13}C NMR (100 MHz, $CDCl_3$)

Methyl 2-(4-methoxy-2-nitrophenoxy)-2-phenylacetate (**7j**)

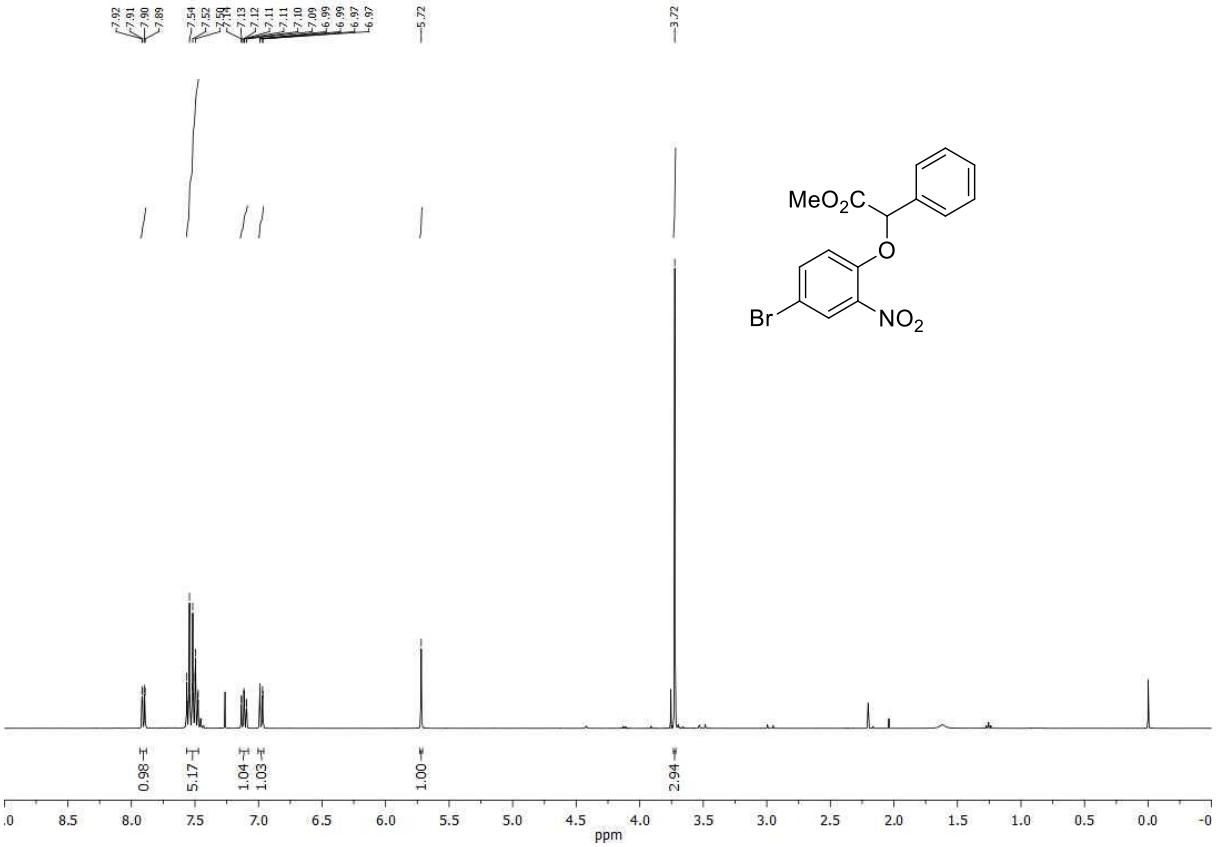


^{1}H NMR (400 MHz, $CDCl_3$)

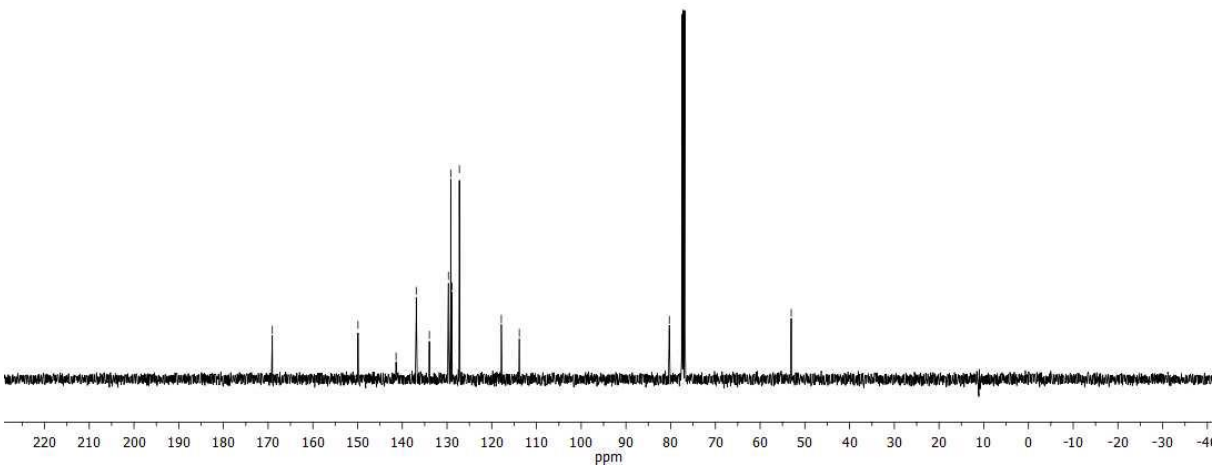


^{13}C NMR (100 MHz, $CDCl_3$)

Methyl 2-(4-bromo-2-nitrophenoxy)-2-phenylacetate (**7k**)

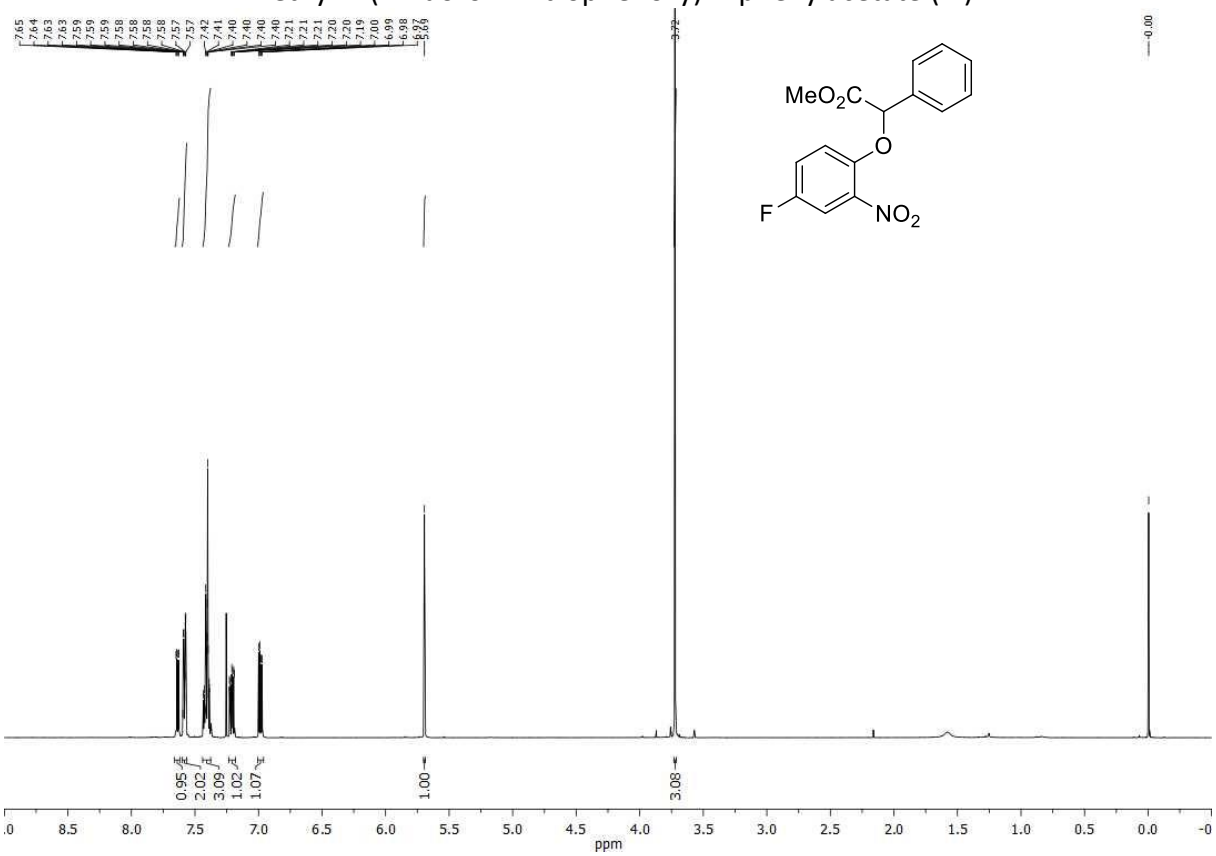


^{1}H NMR (400 MHz, $CDCl_3$)

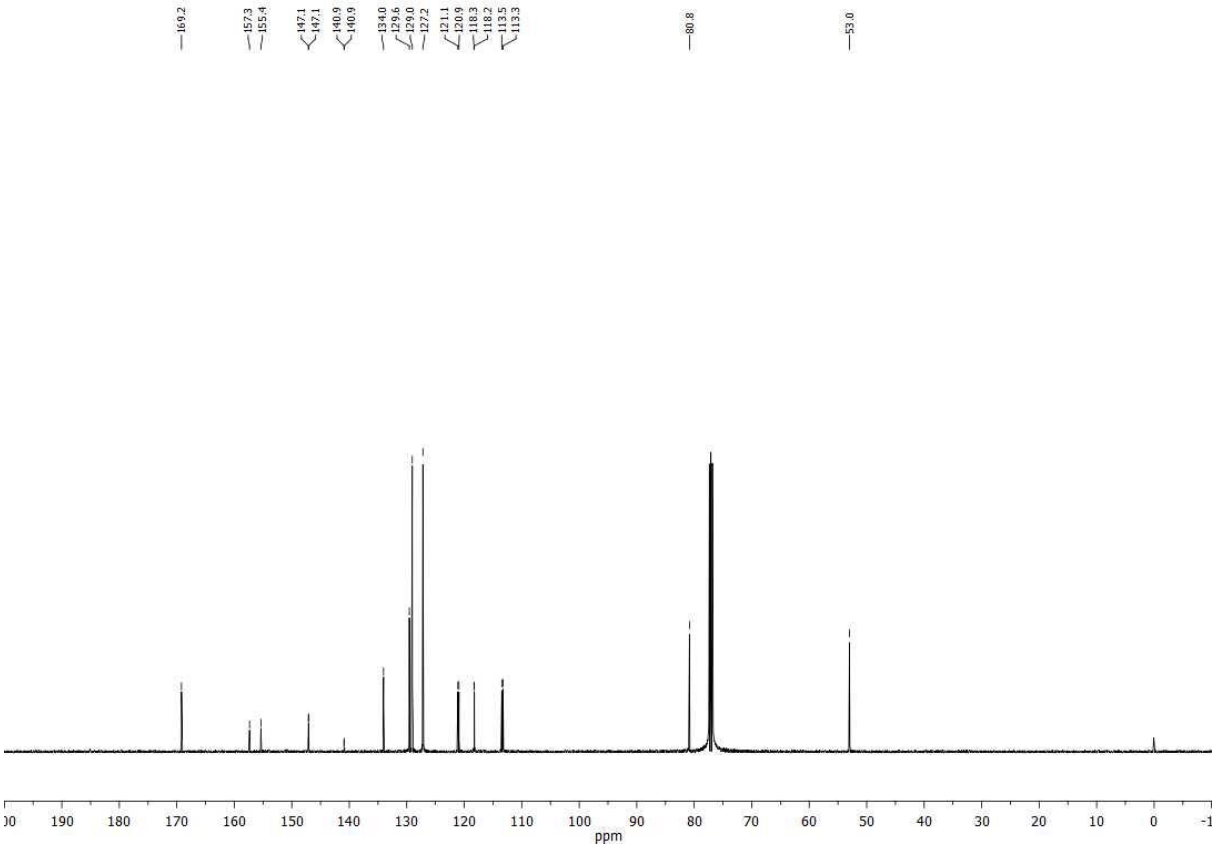


^{13}C NMR (100 MHz, $CDCl_3$)

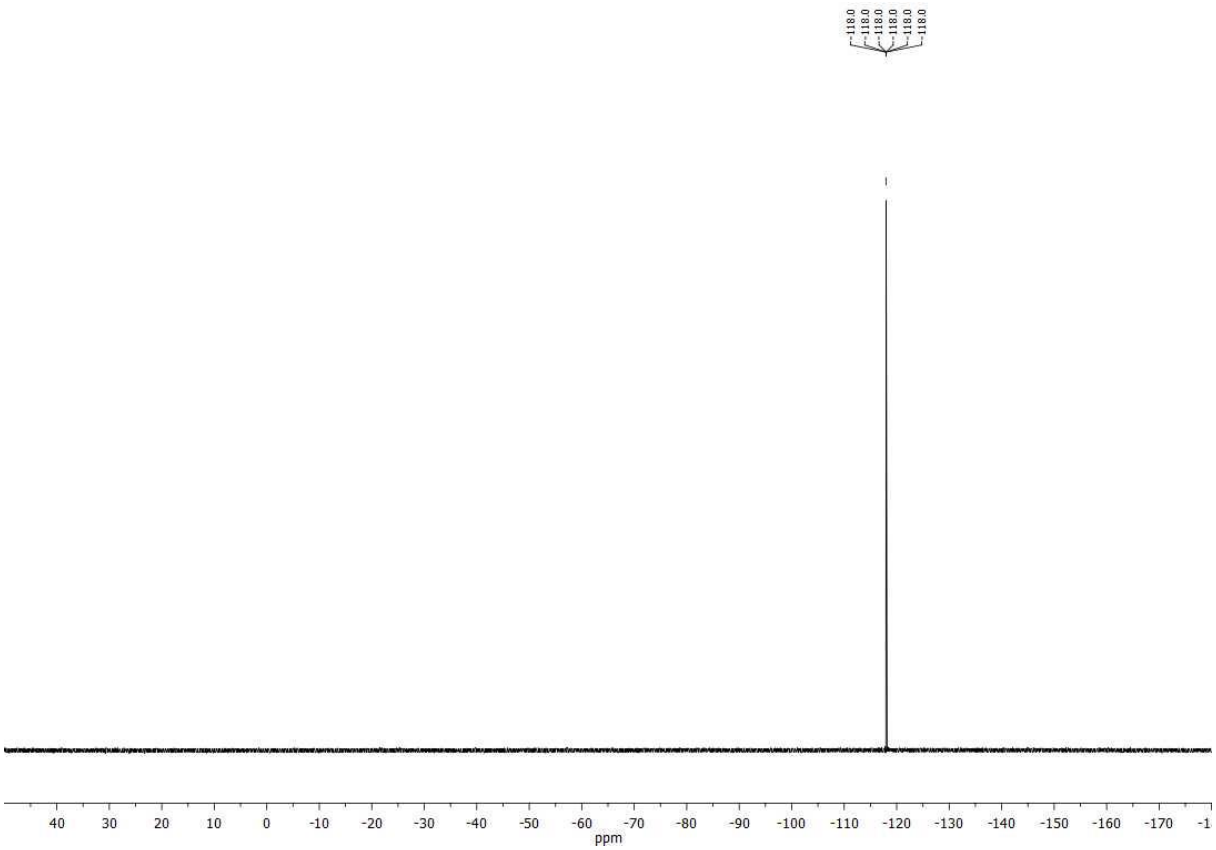
Methyl 2-(4-fluoro-2-nitrophenoxy)-2-phenylacetate (**7l**)



^{1}H NMR (600 MHz, $CDCl_3$)

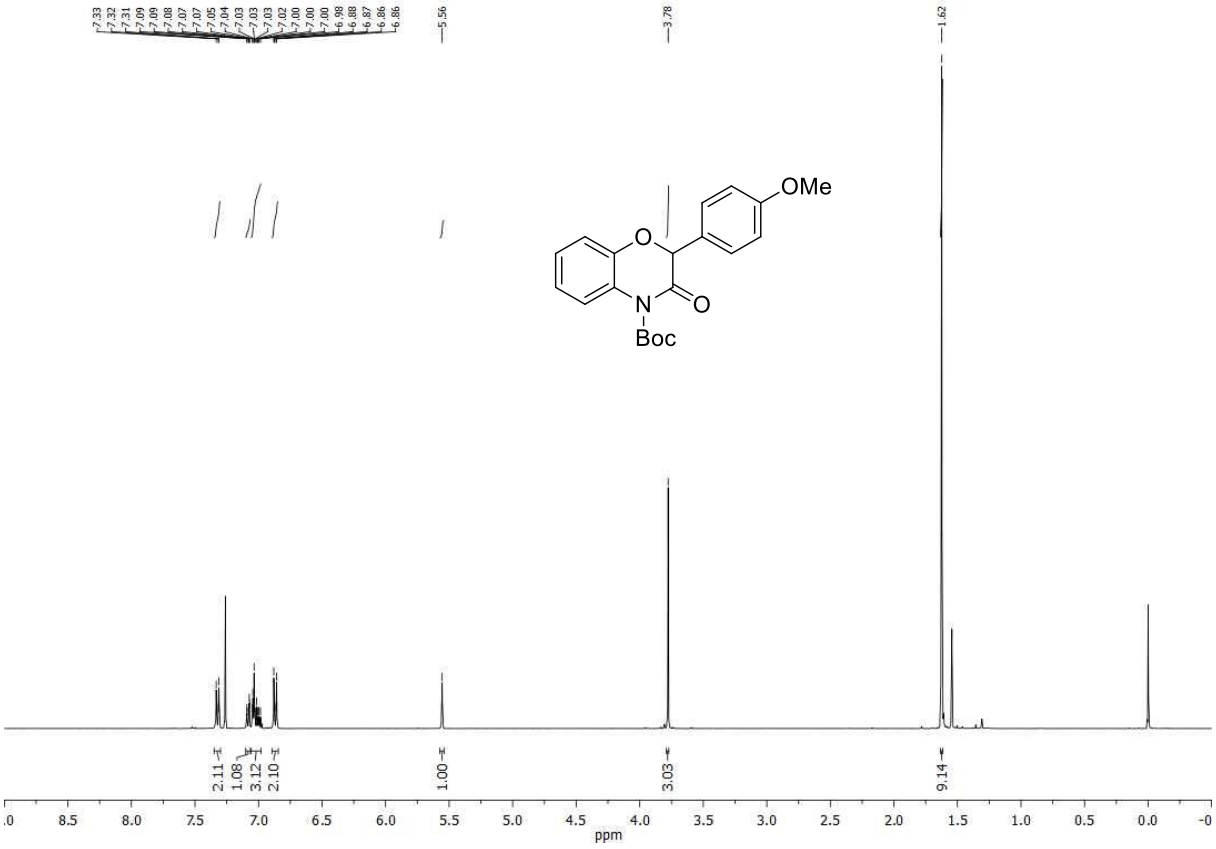


^{13}C NMR (125 MHz, $CDCl_3$)

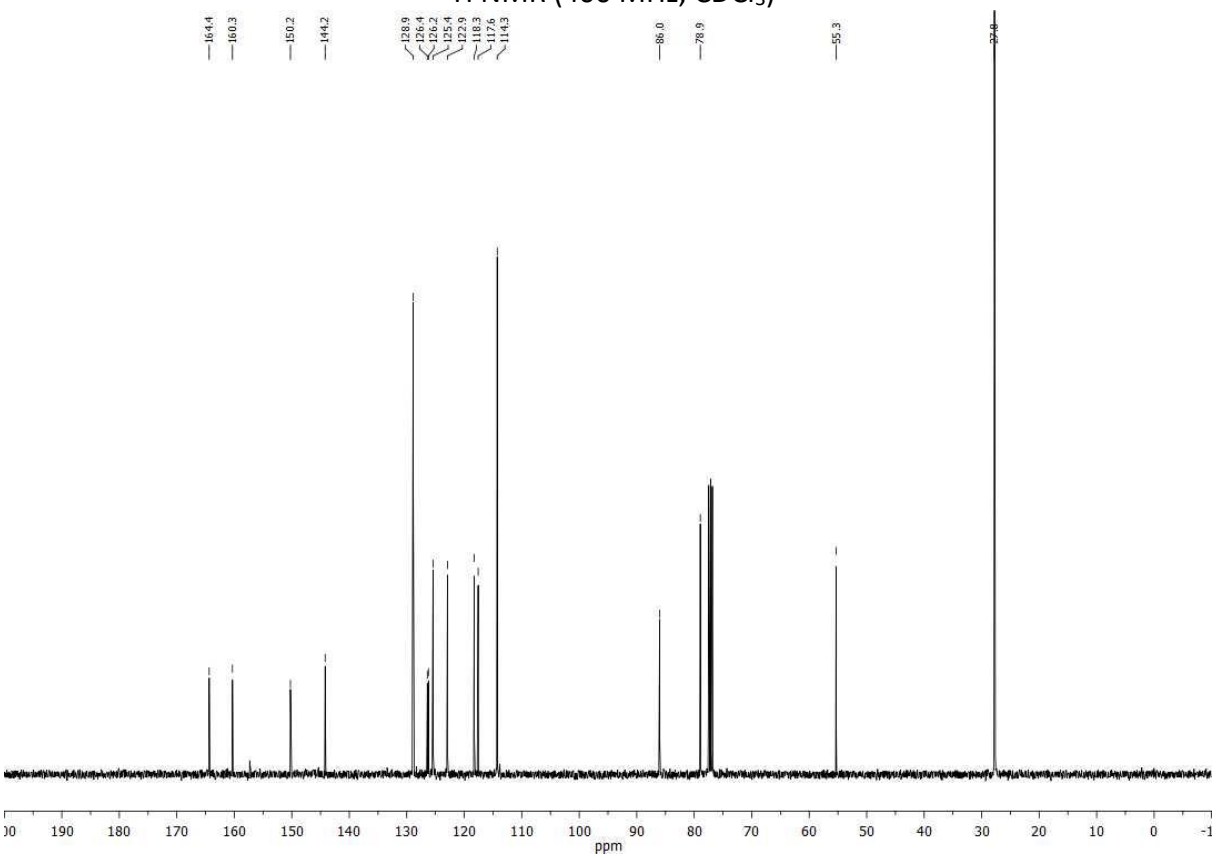


^{19}F NMR (466 MHz, $CDCl_3$)

1,4-benzoxazin-3-one **4b**

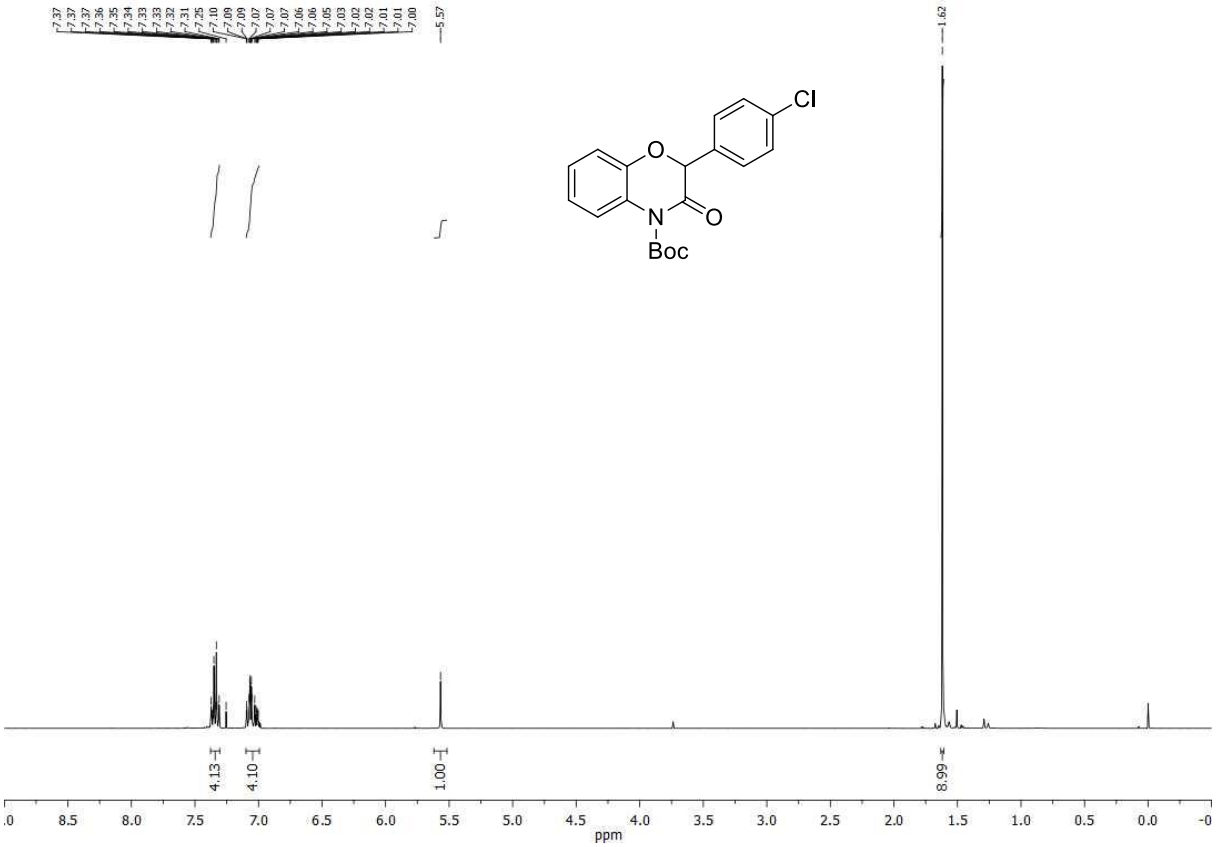


^{1}H NMR (400 MHz, $CDCl_3$)

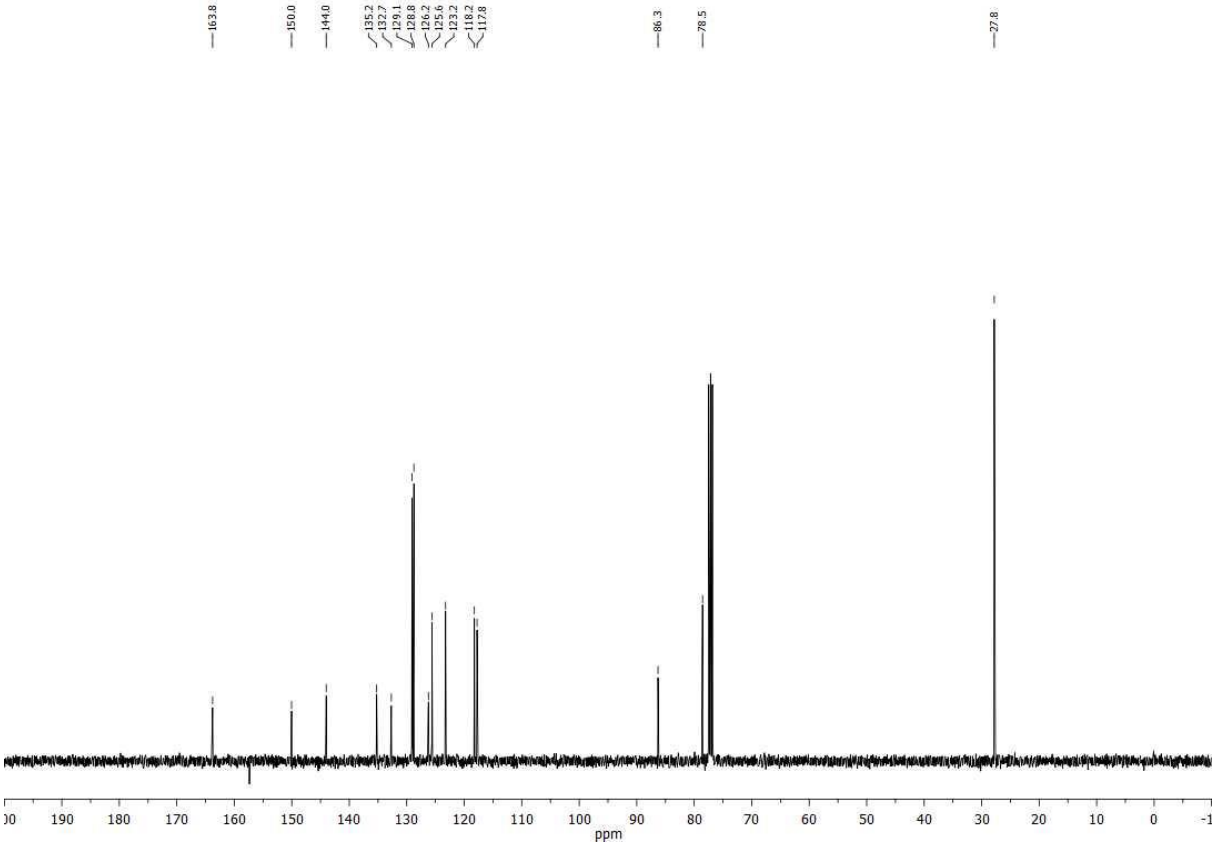


^{13}C NMR (100 MHz, $CDCl_3$)

1,4-benzoxazin-3-one **4c**

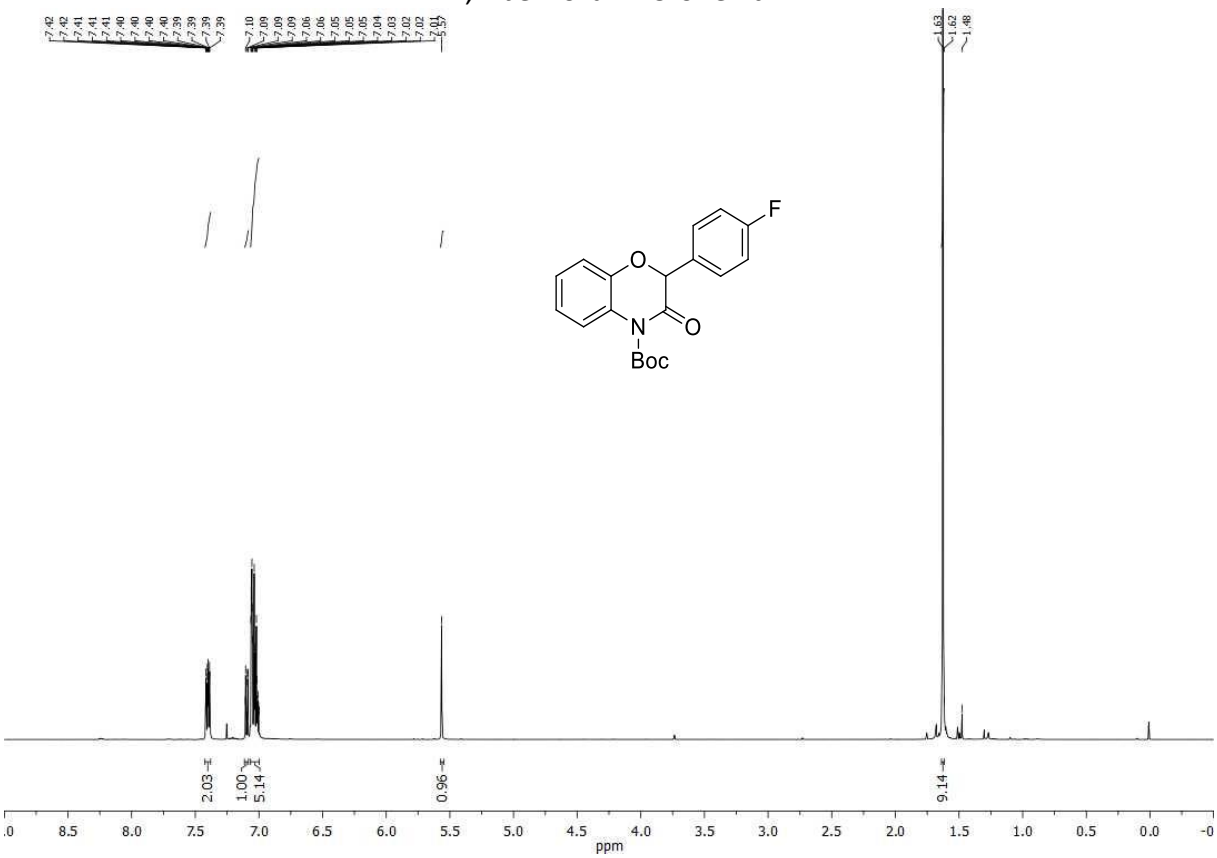


^{1}H NMR (400 MHz, $CDCl_3$)

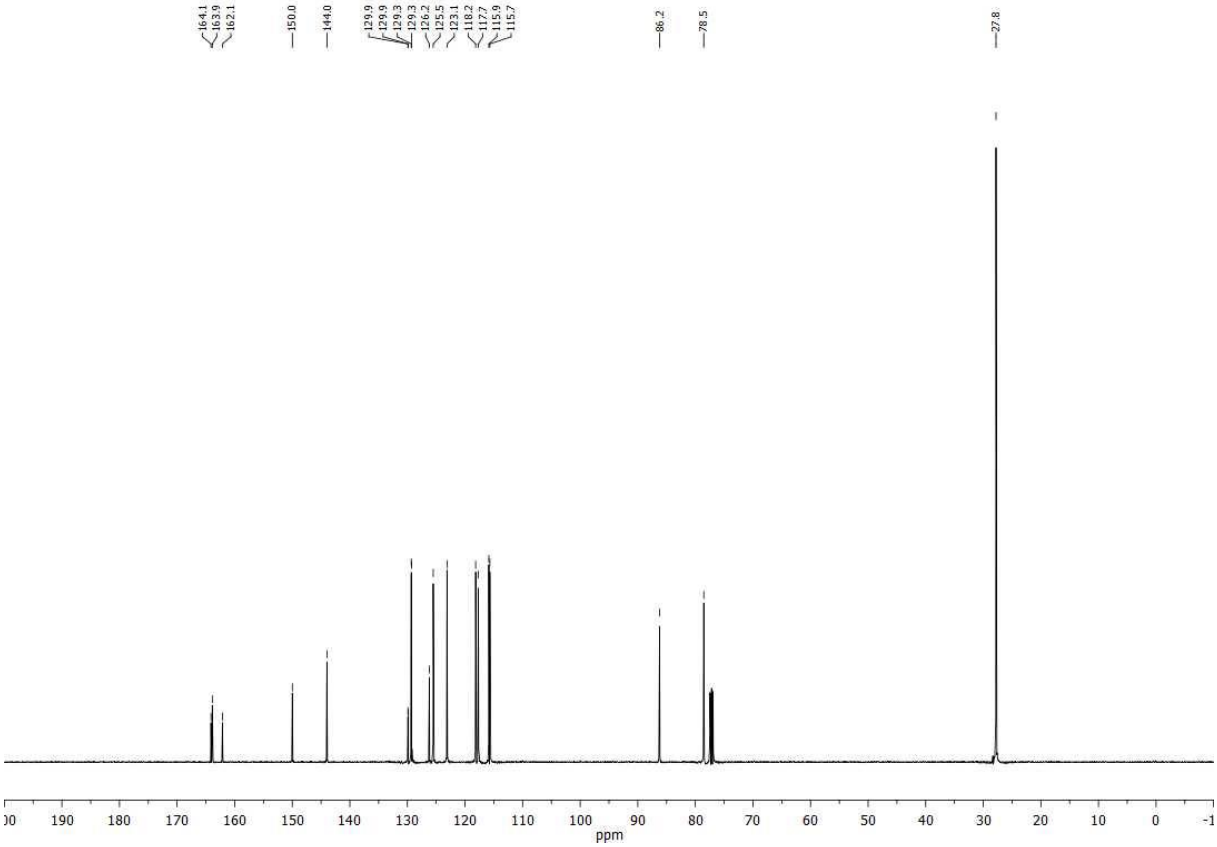


^{13}C NMR (100 MHz, $CDCl_3$)

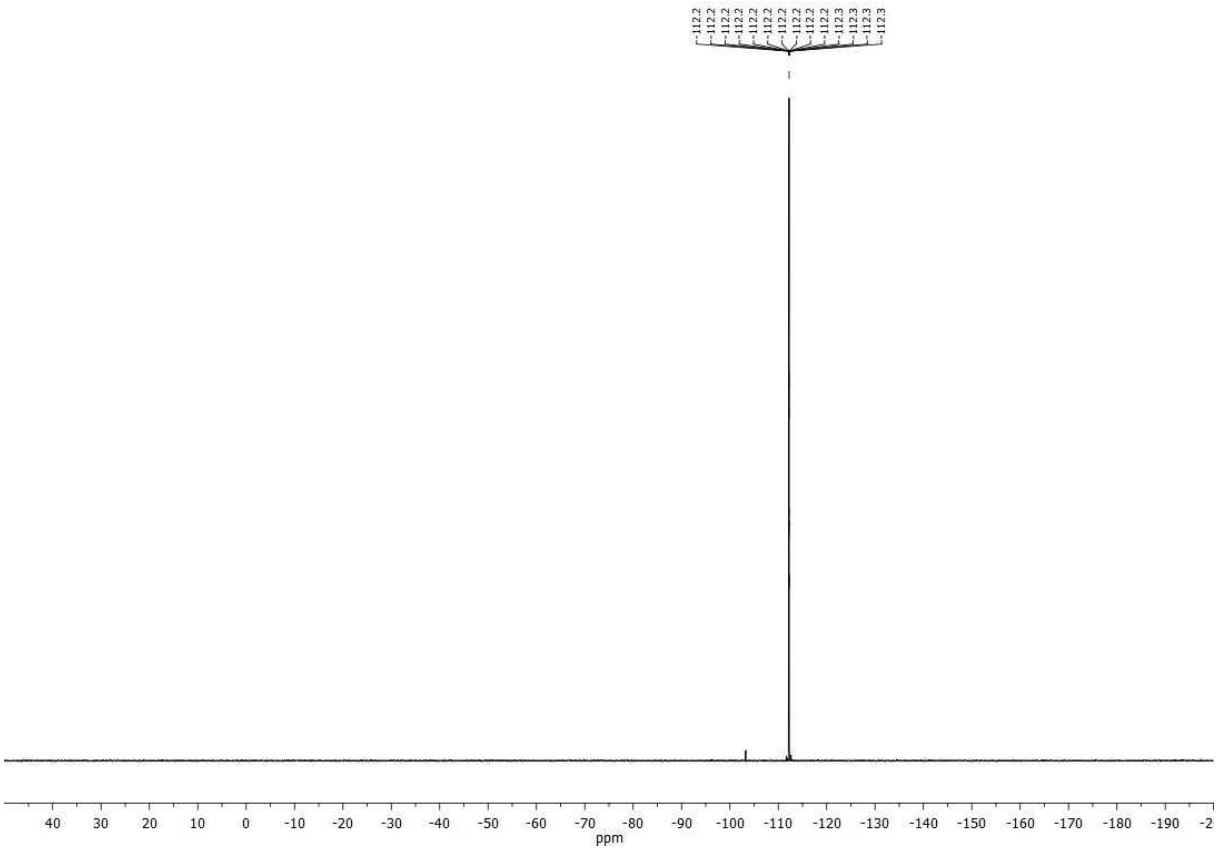
1,4-benzoxazin-3-one **4d**



^{1}H NMR (500 MHz, $CDCl_3$)

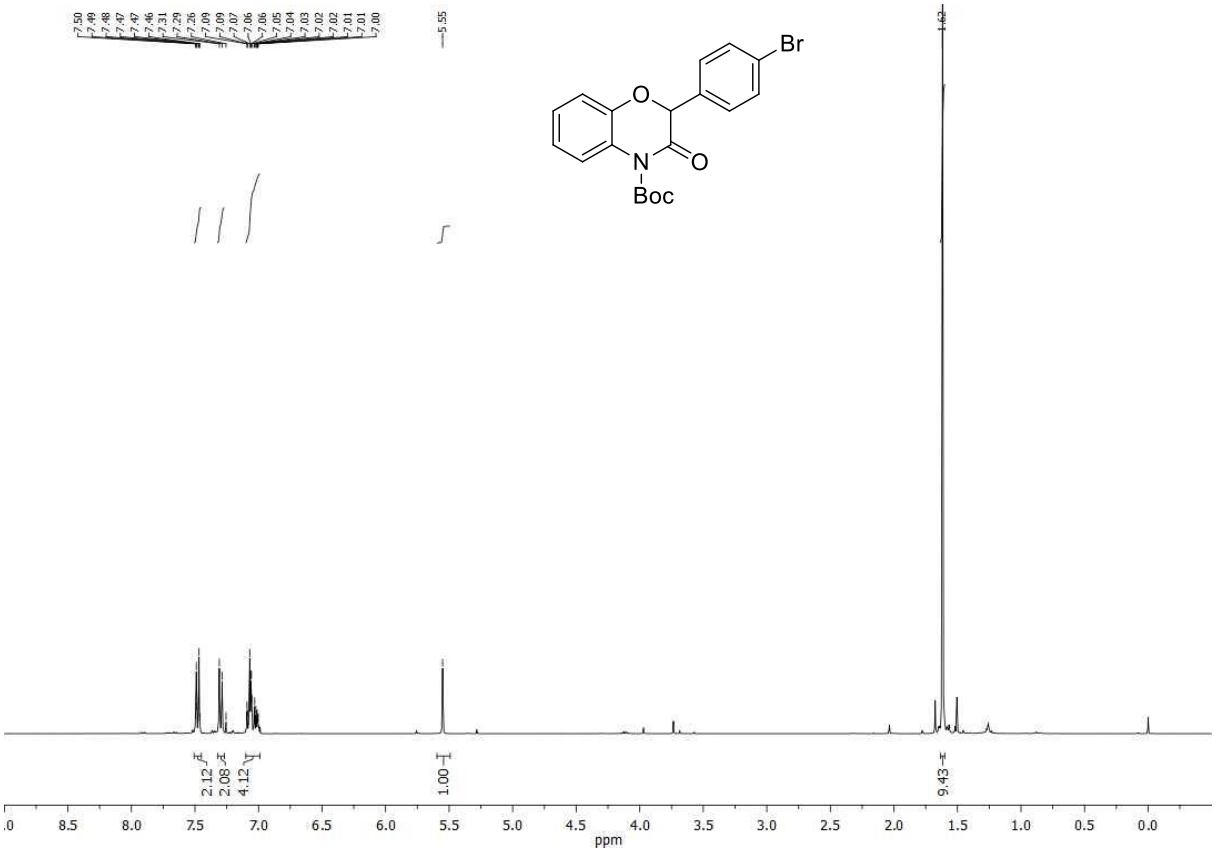


^{13}C NMR (125 MHz, $CDCl_3$)

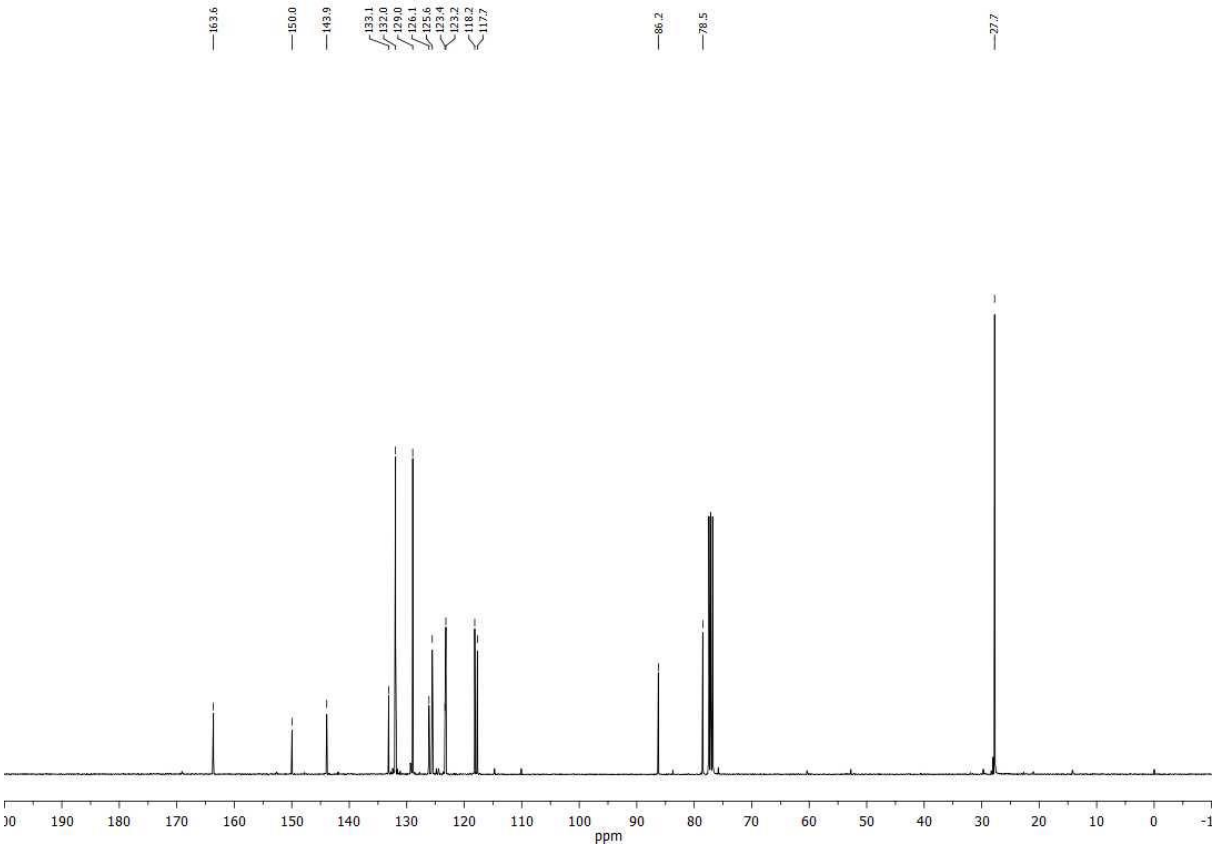


^{19}F NMR (466 MHz, $CDCl_3$)

1,4-benzoxazin-3-one **4e**

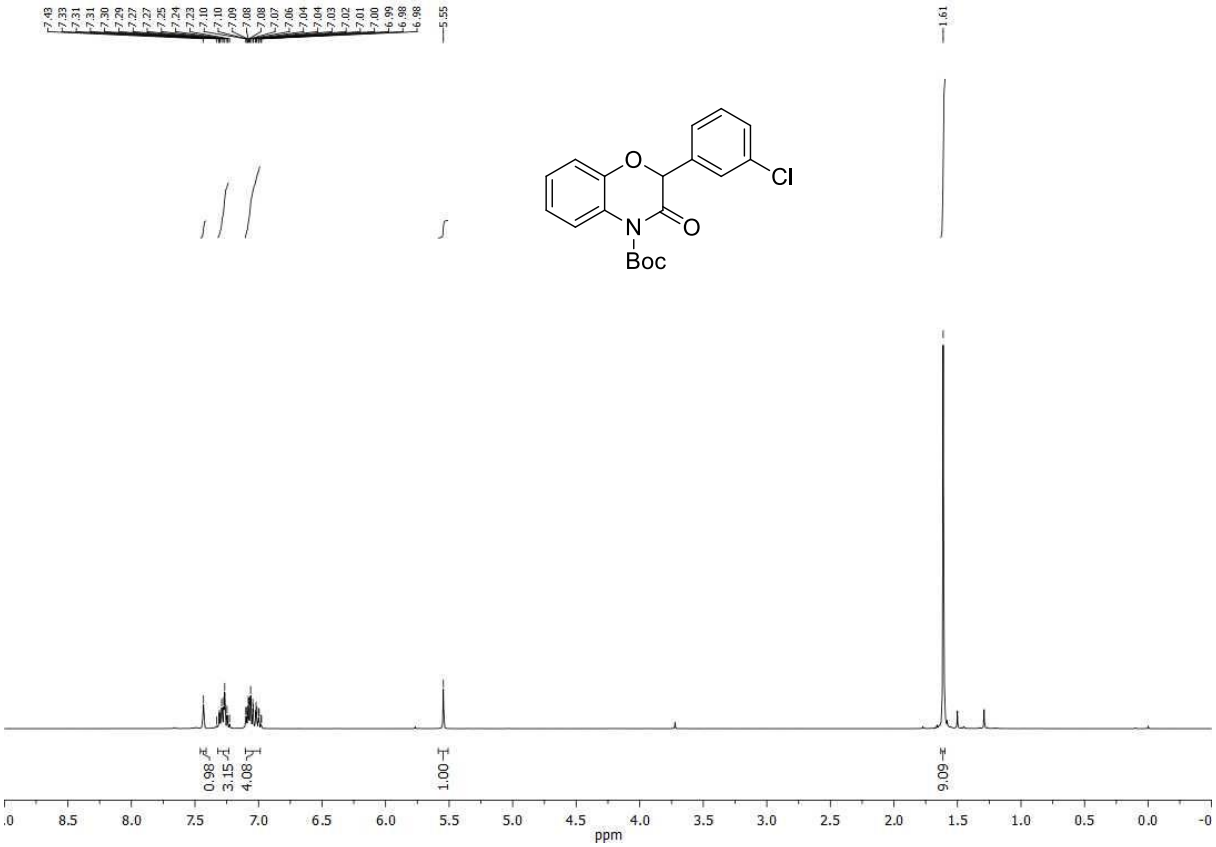


^{1}H NMR (400 MHz, $CDCl_3$)

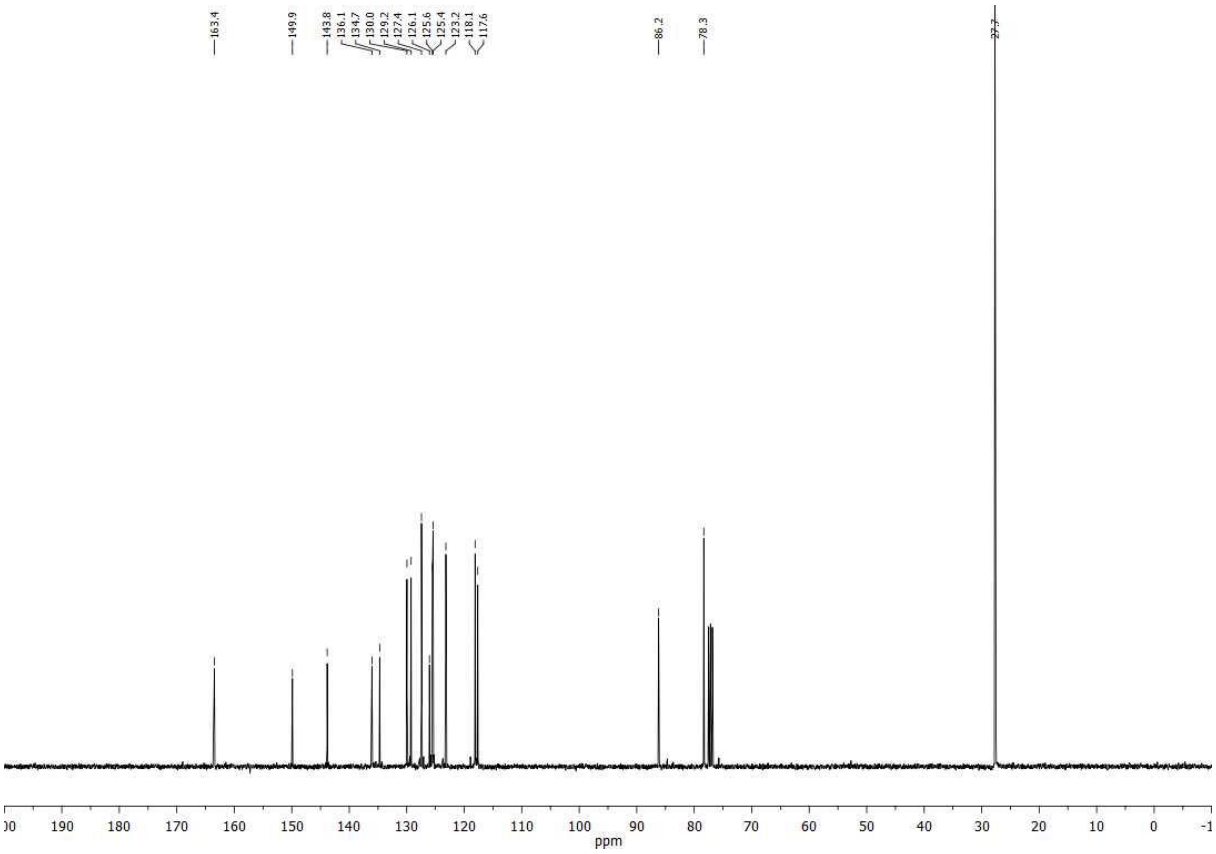


^{13}C NMR (100 MHz, $CDCl_3$)

1,4-benzoxazin-3-one **4f**

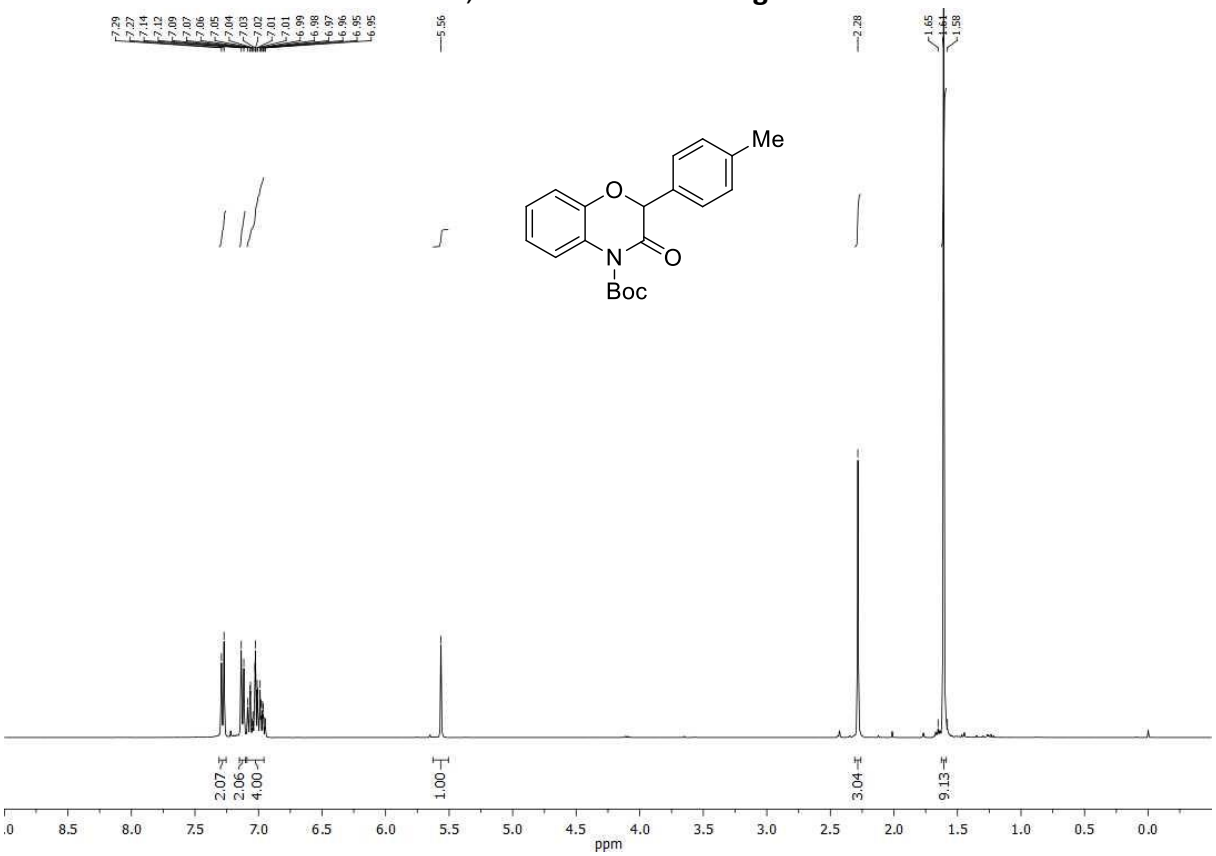


^{1}H NMR (400 MHz, $CDCl_3$)

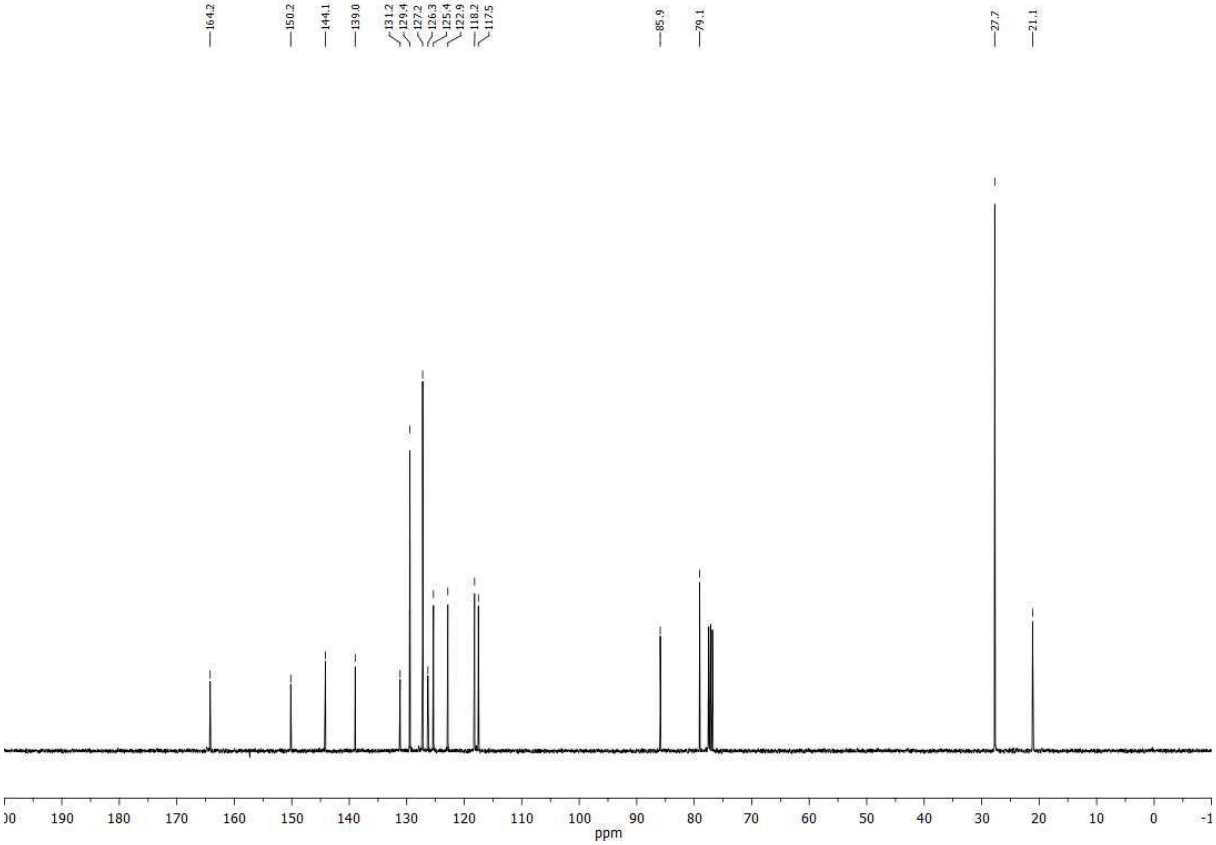


^{13}C NMR (100 MHz, $CDCl_3$)

1,4-benzoxazin-3-one **4g**

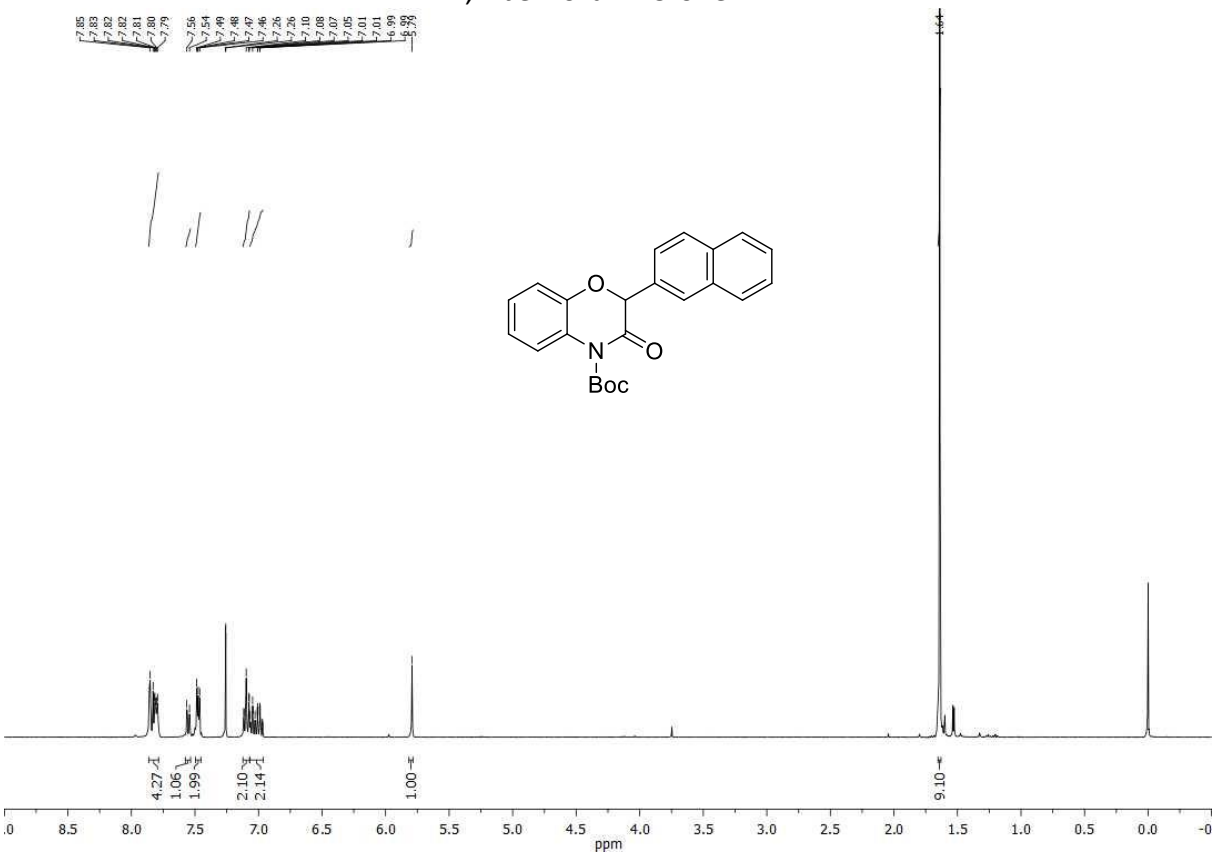


^{1}H NMR (400 MHz, $CDCl_3$)

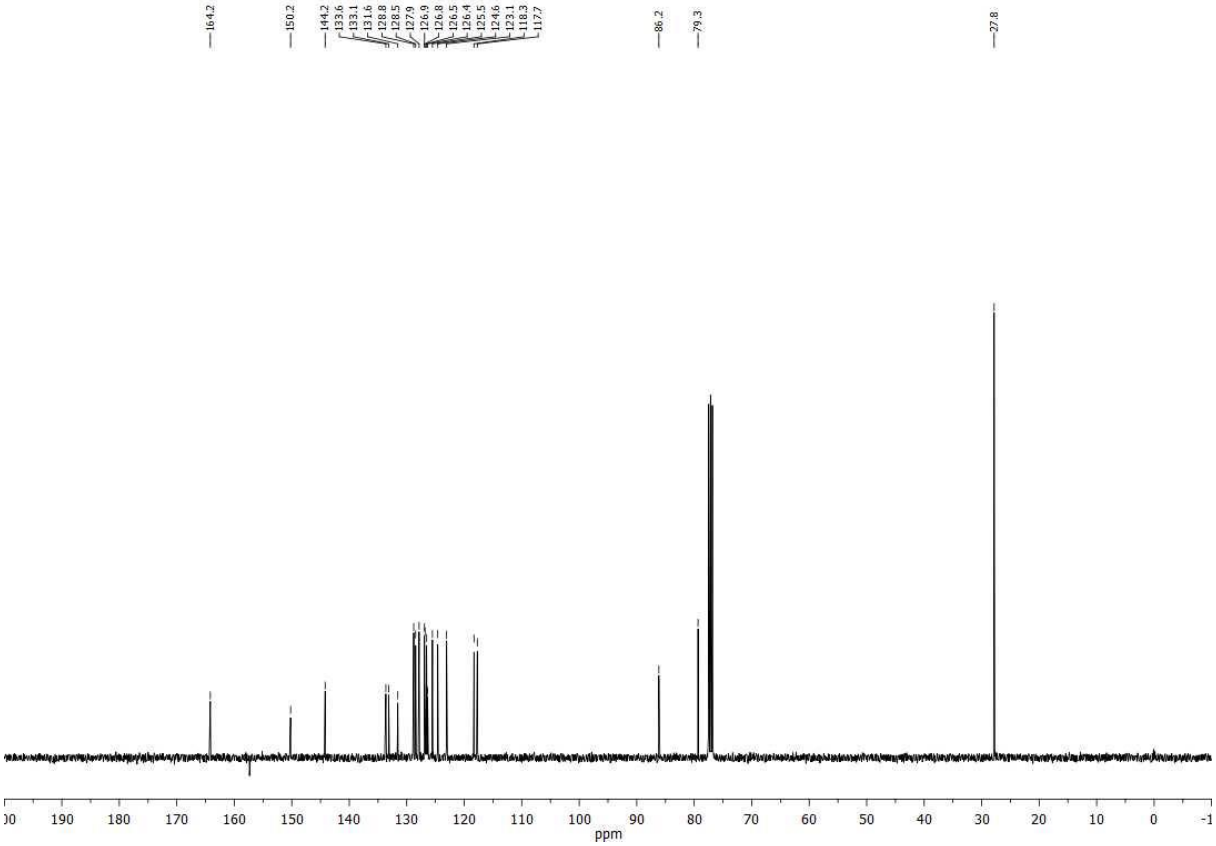


^{13}C NMR (100 MHz, $CDCl_3$)

1,4-benzoxazin-3-one **4h**

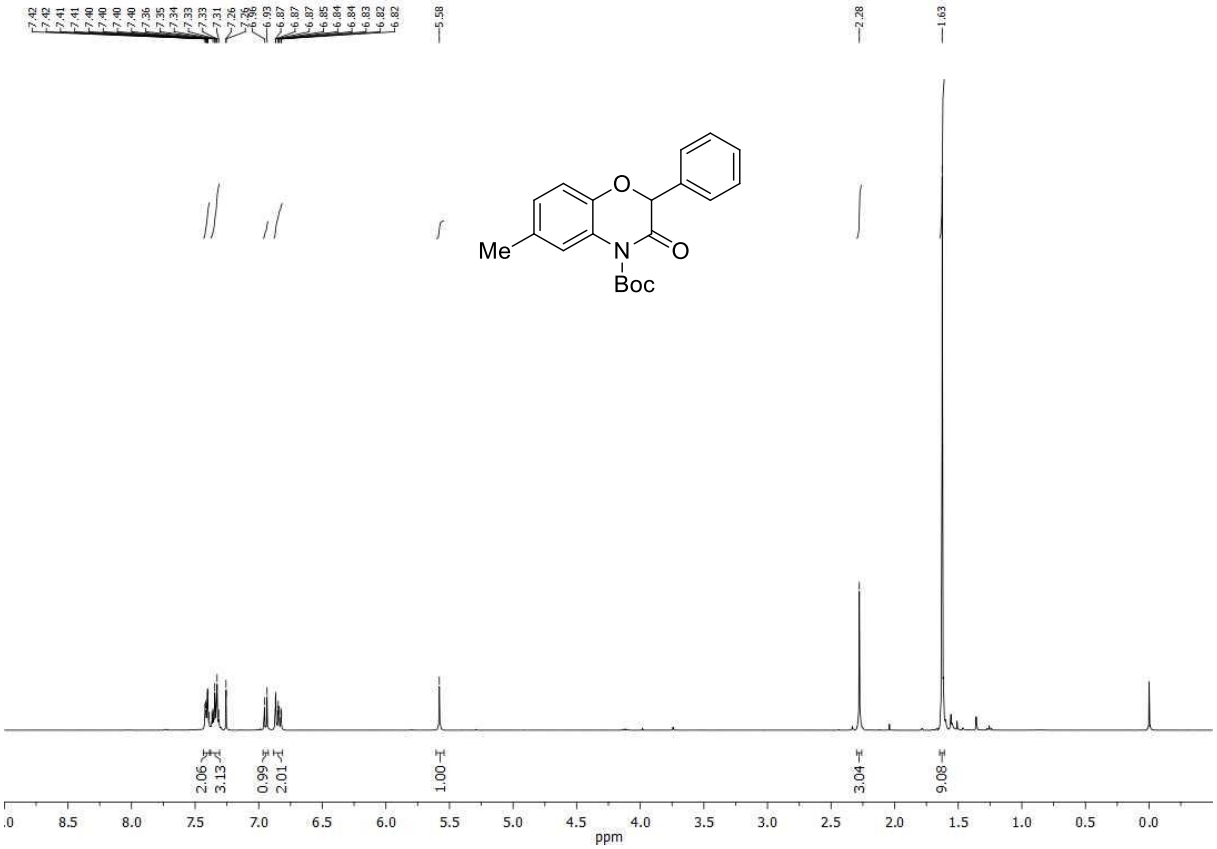


^{1}H NMR (400 MHz, $CDCl_3$)

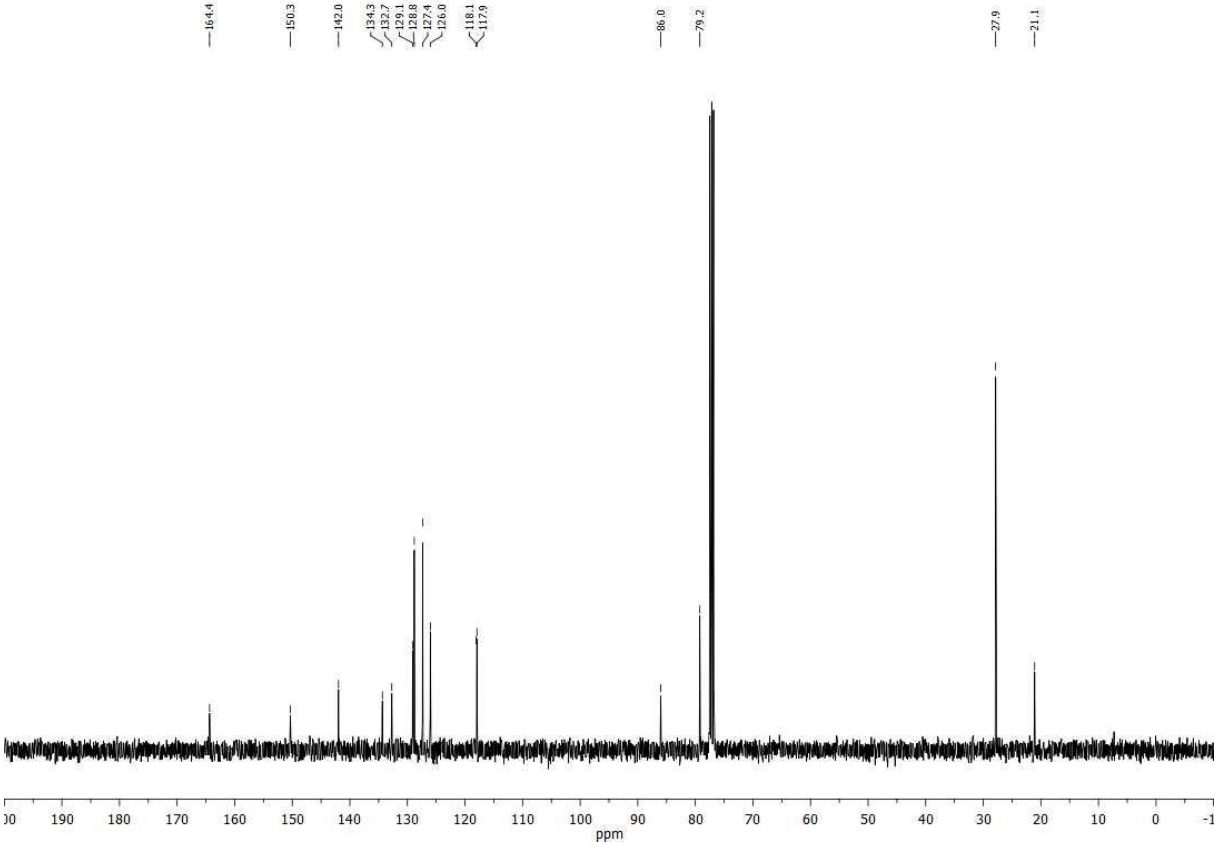


^{13}C NMR (100 MHz, $CDCl_3$)

1,4-benzoxazin-3-one **4i**

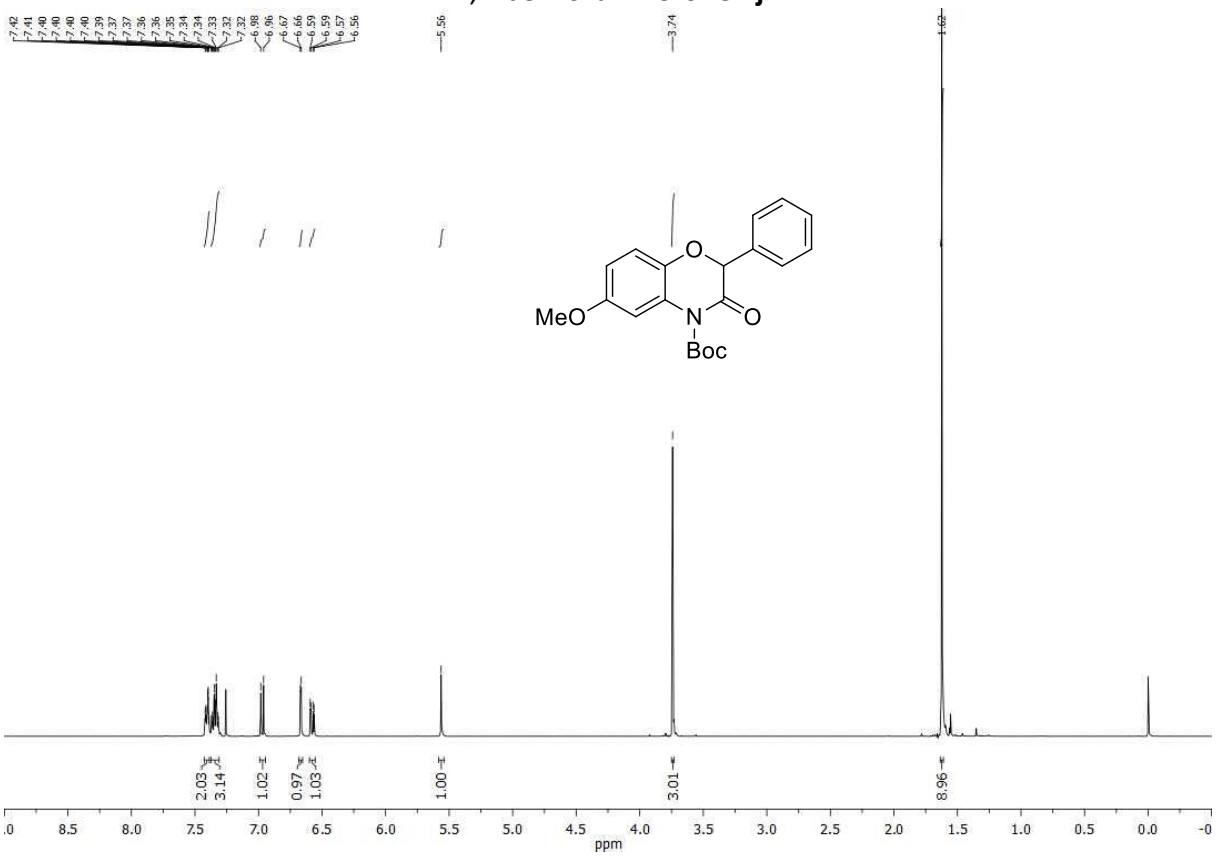


^{1}H NMR (400 MHz, $CDCl_3$)

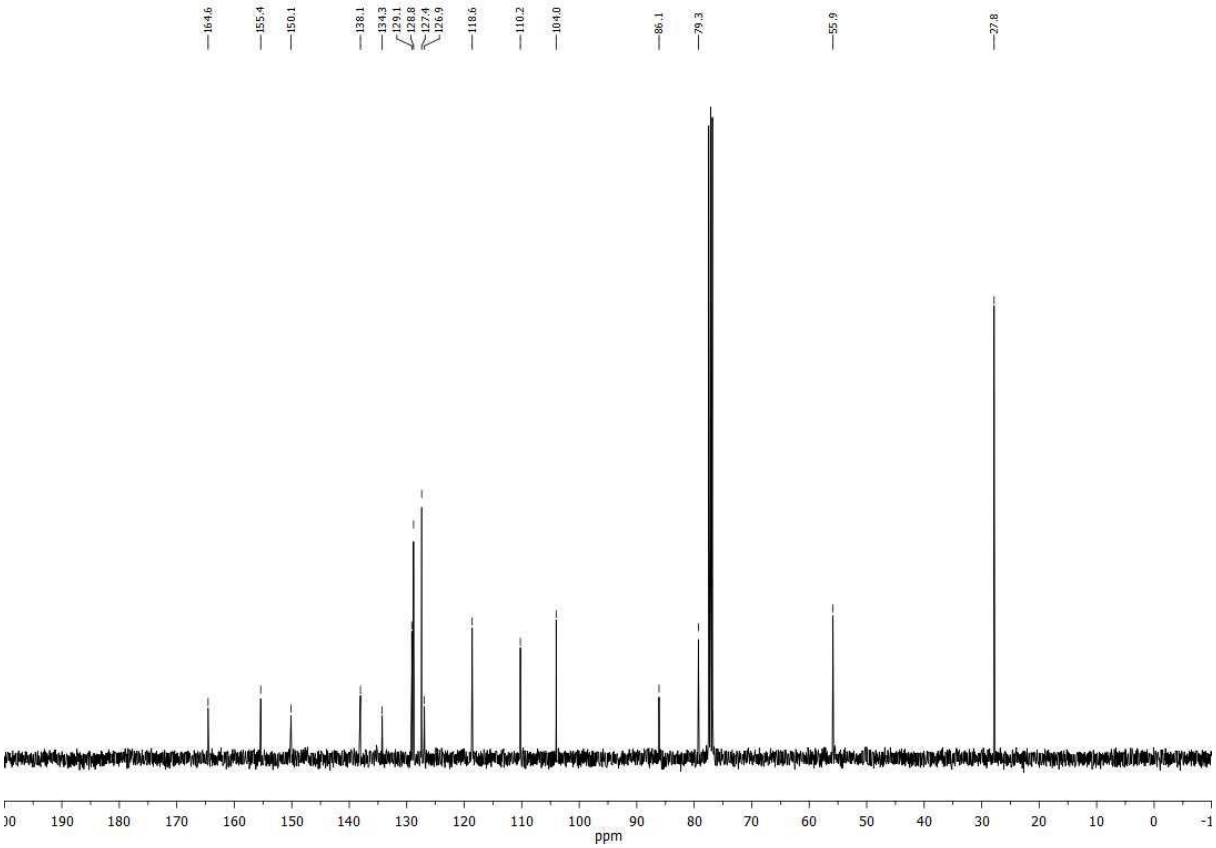


^{13}C NMR (100 MHz, $CDCl_3$)

1,4-benzoxazin-3-one **4j**

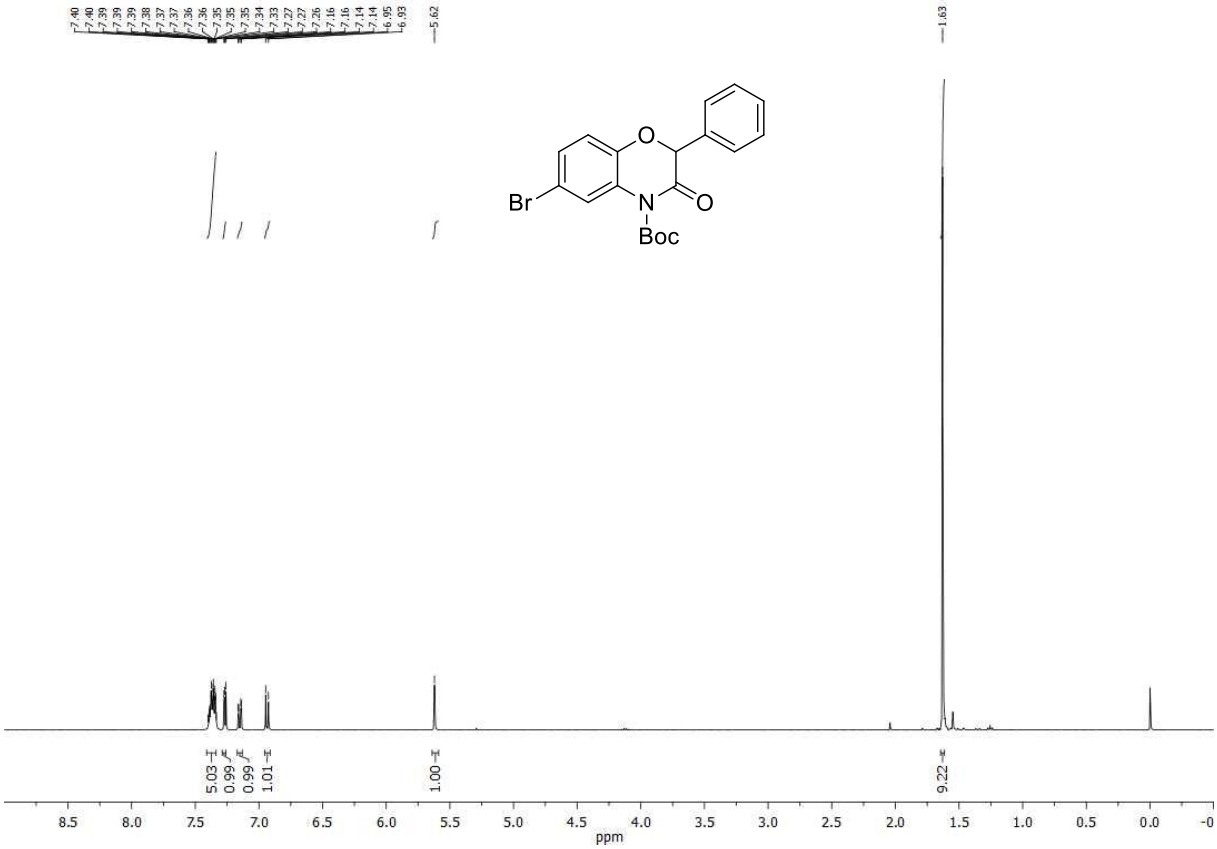


^{1}H NMR (400 MHz, $CDCl_3$)

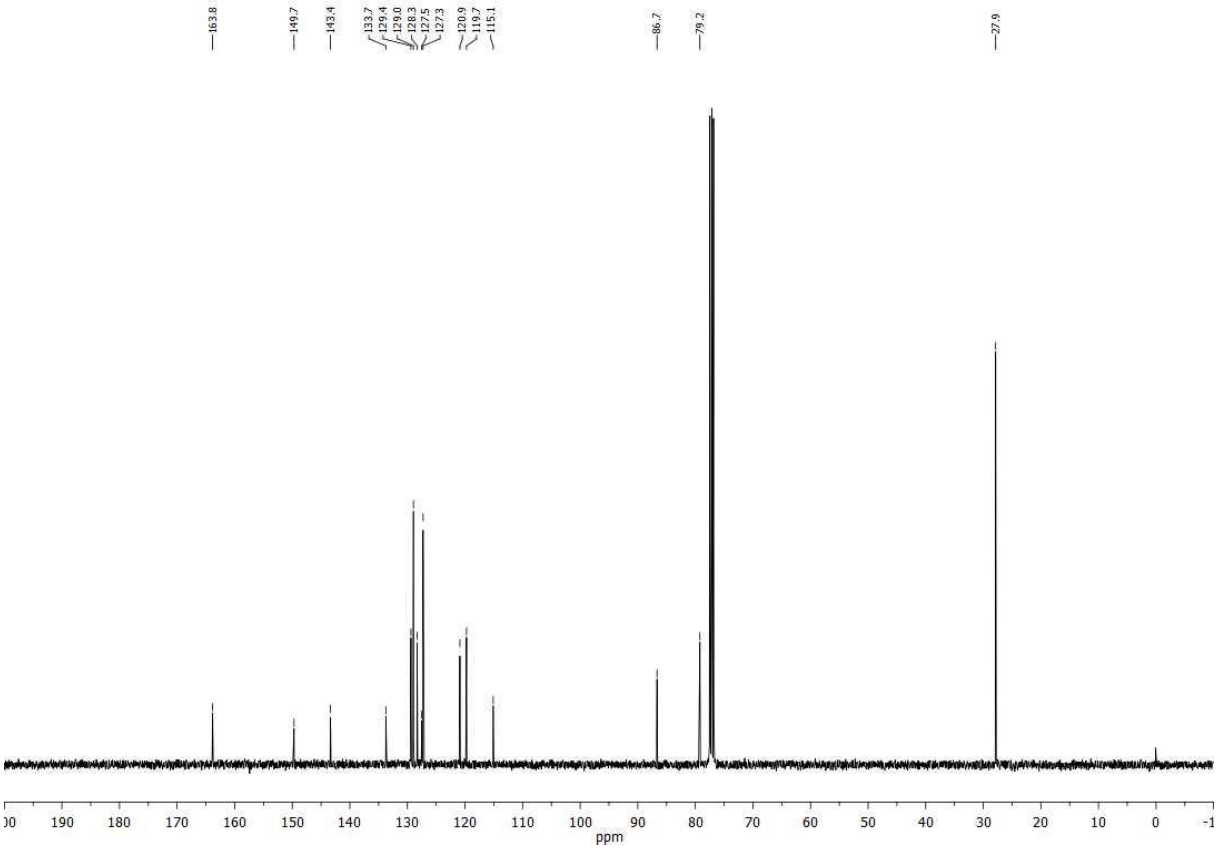


^{13}C NMR (100 MHz, $CDCl_3$)

1,4-benzoxazin-3-one **4k**

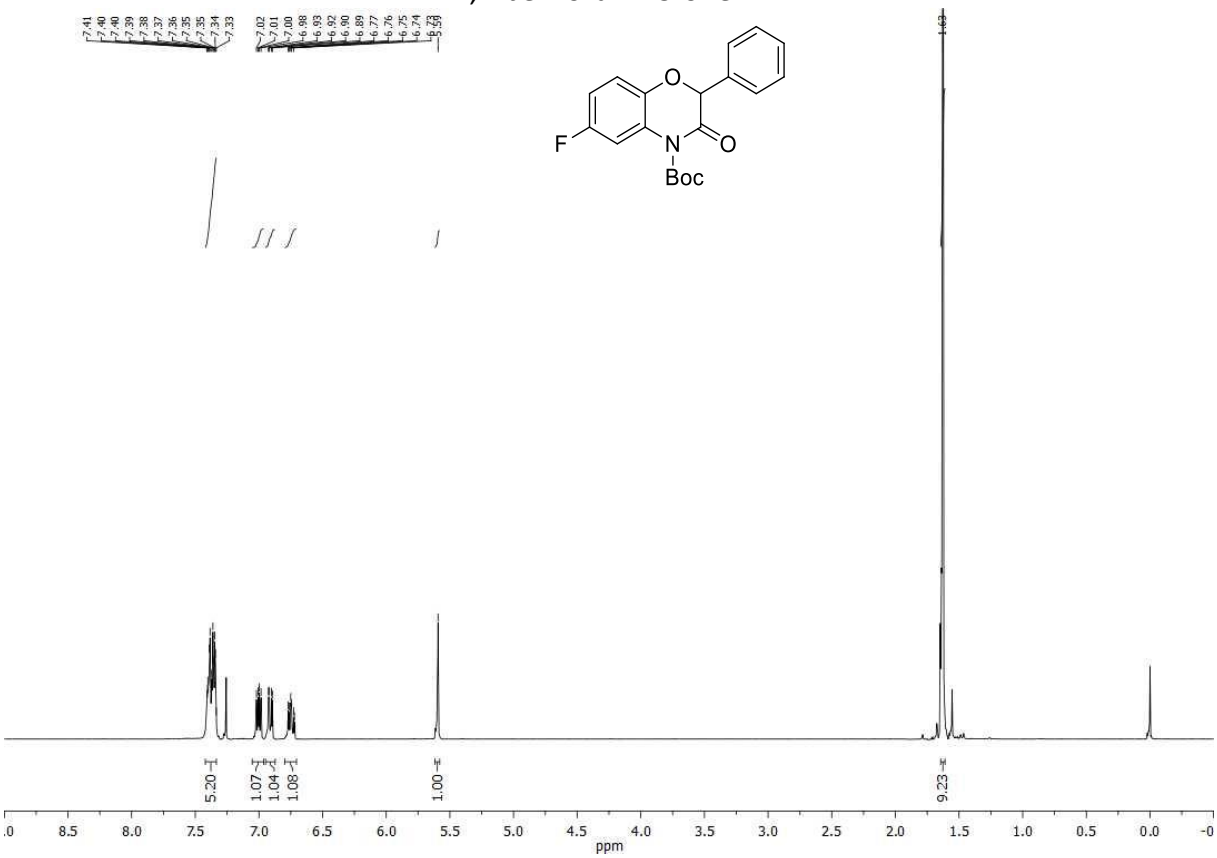


^{1}H NMR (400 MHz, $CDCl_3$)

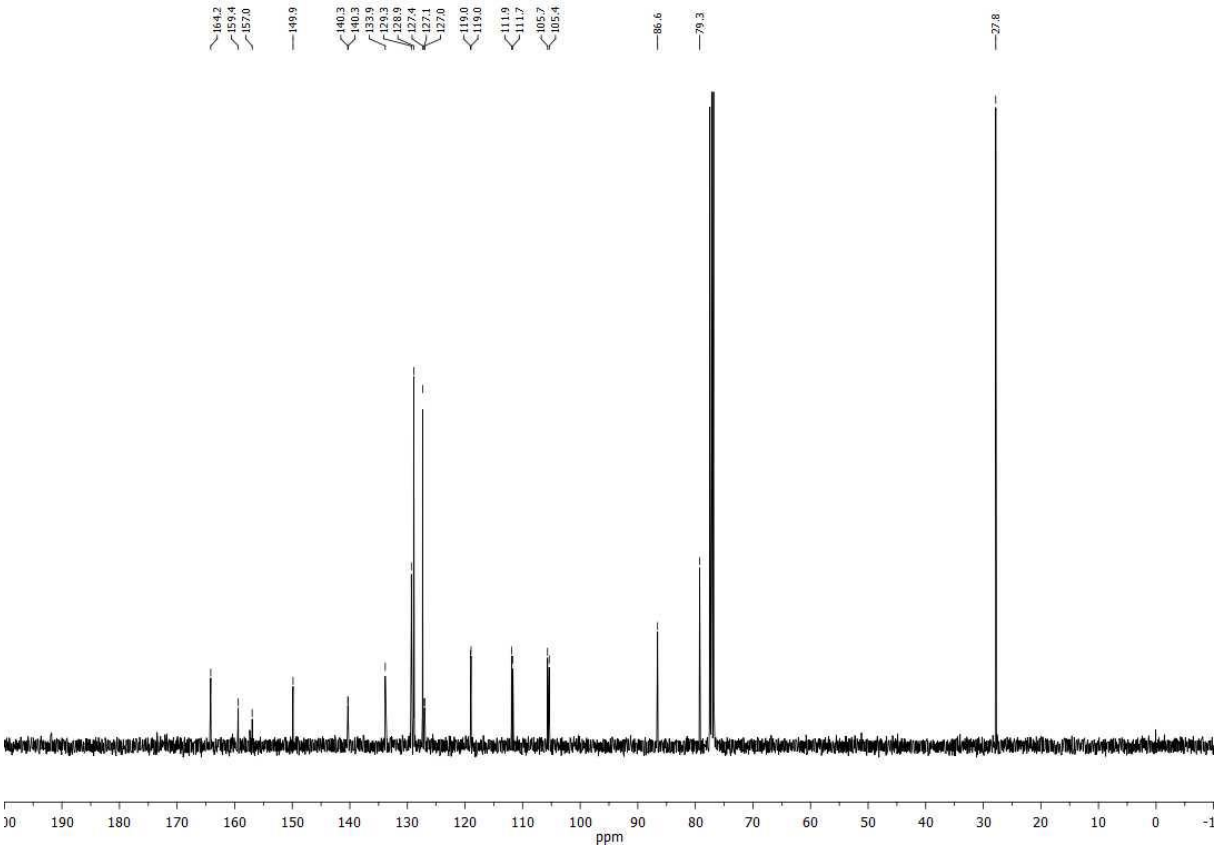


^{13}C NMR (100 MHz, $CDCl_3$)

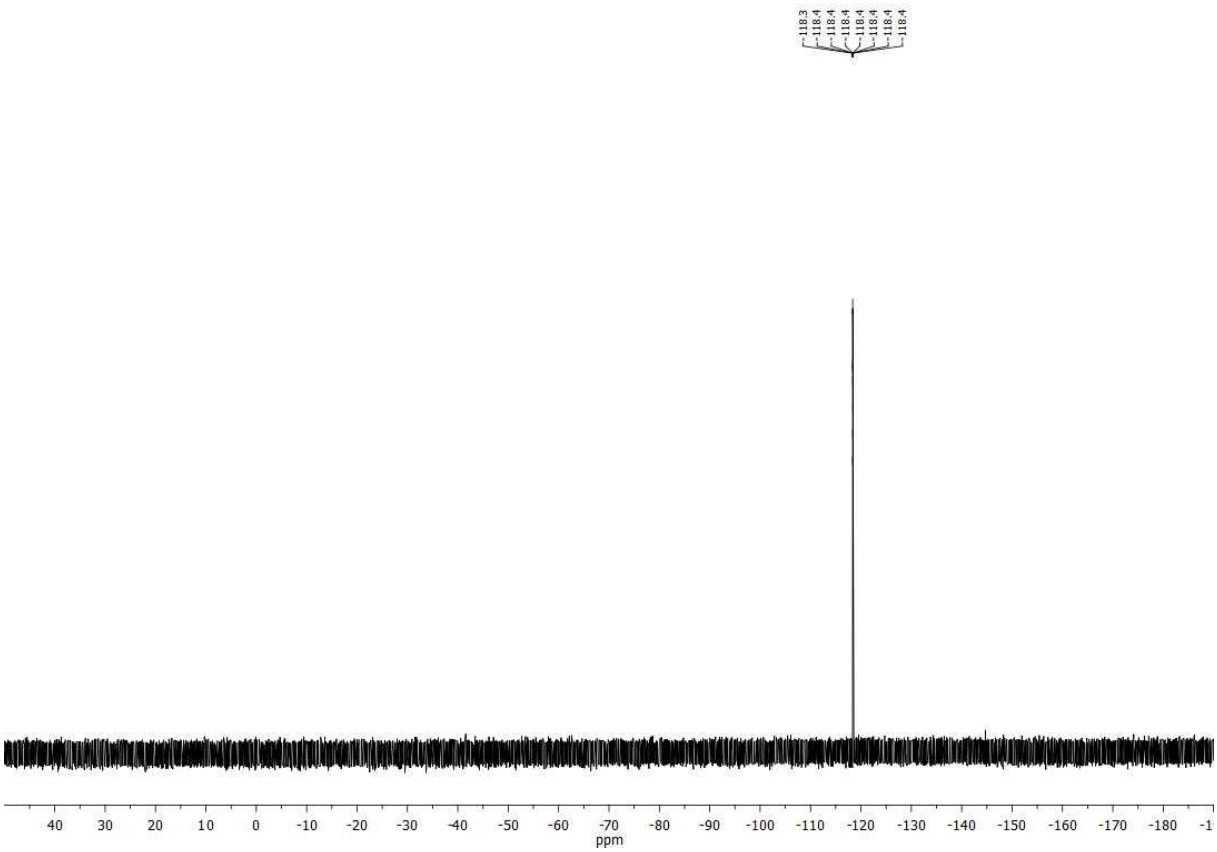
1,4-benzoxazin-3-one **4l**



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

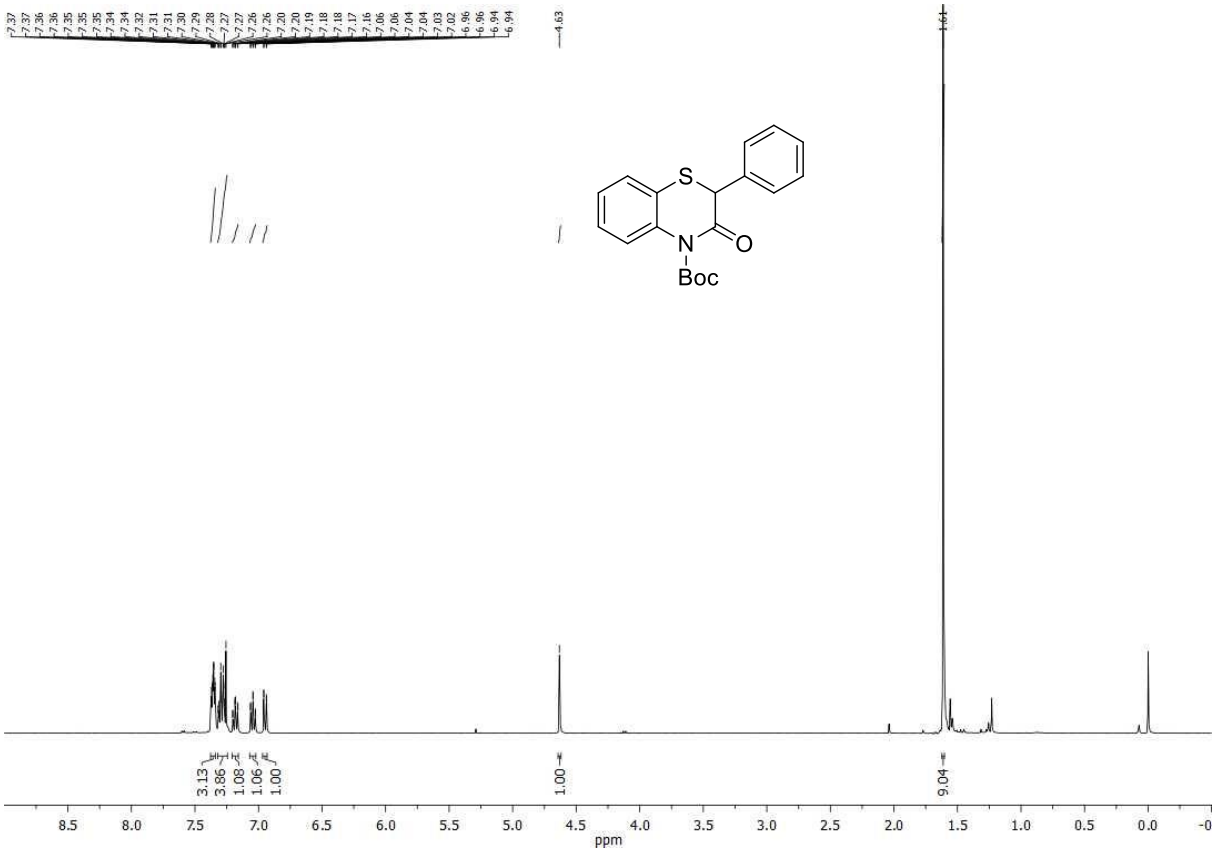


^{13}C NMR (100 MHz, $CDCl_3$)

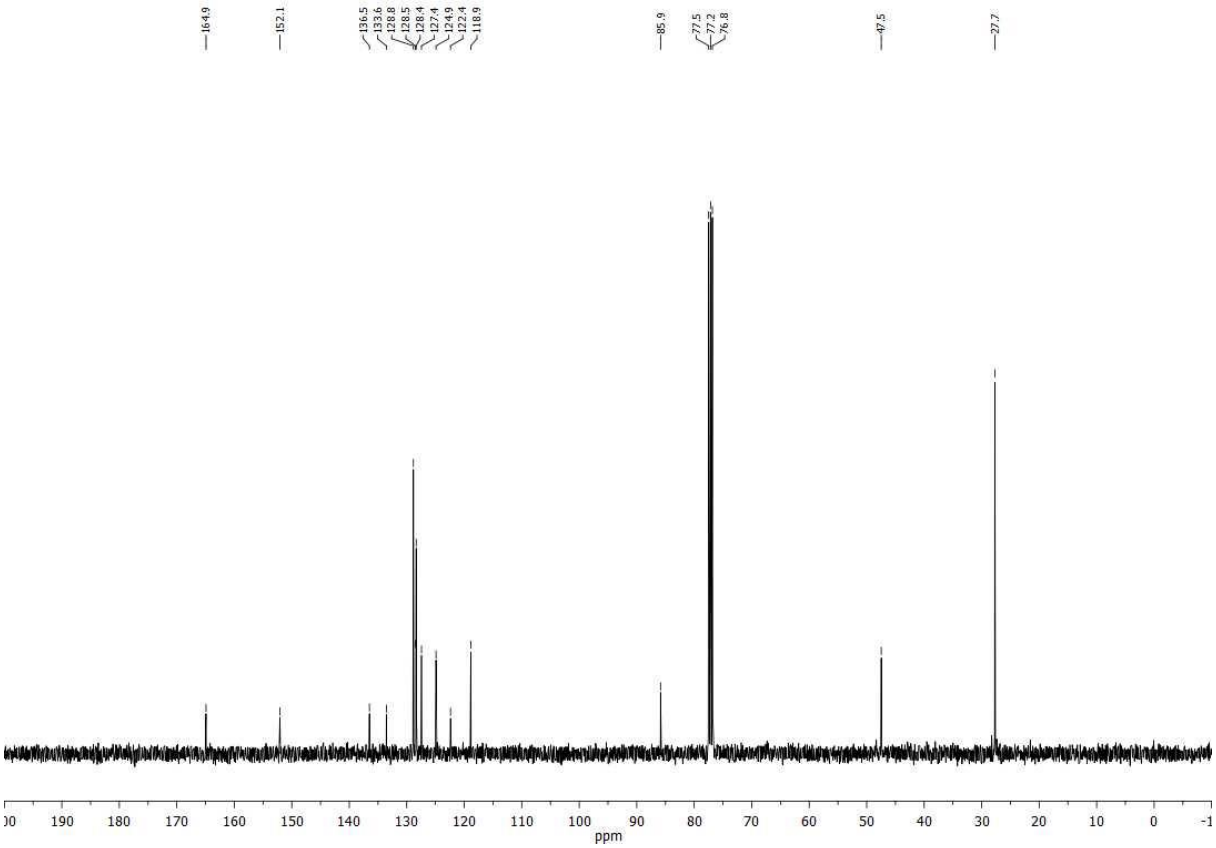


^{19}F NMR (466 MHz, $CDCl_3$)

1,4-benzoxazin-3-one **4m**

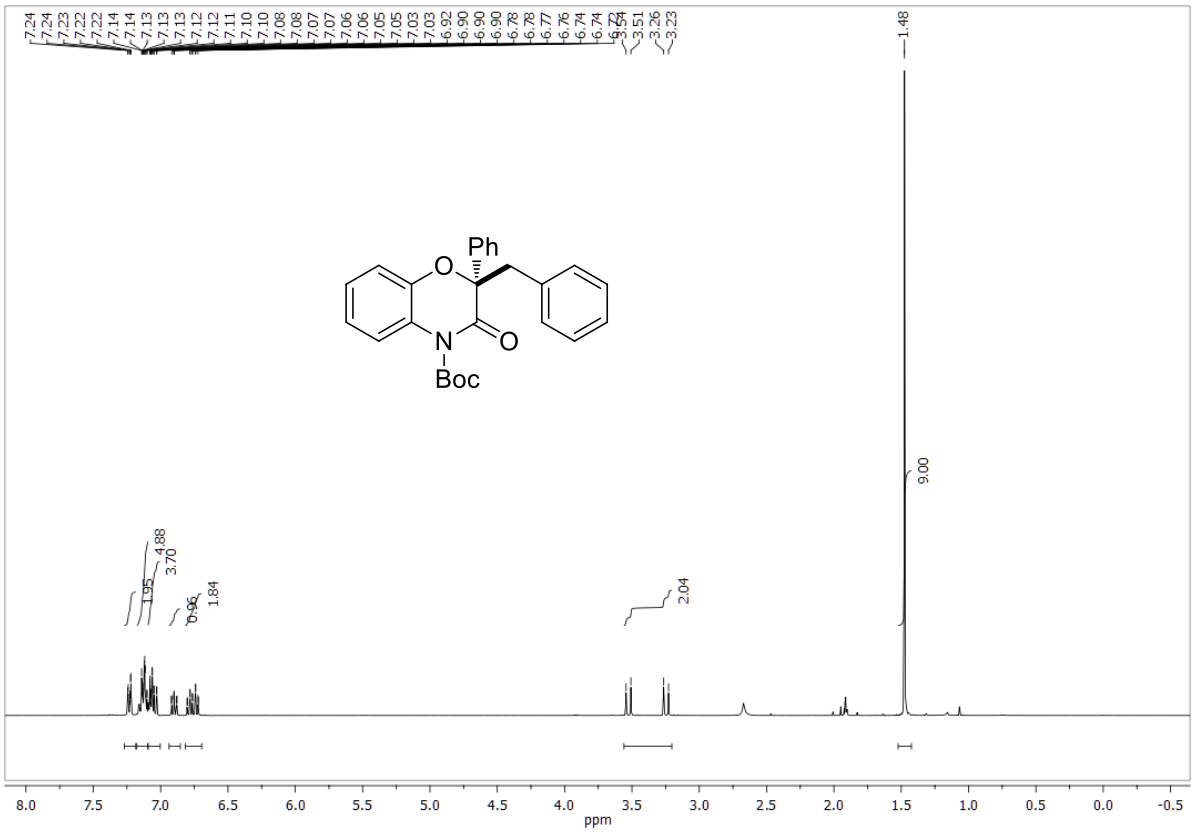


^{1}H NMR (400 MHz, $CDCl_3$)

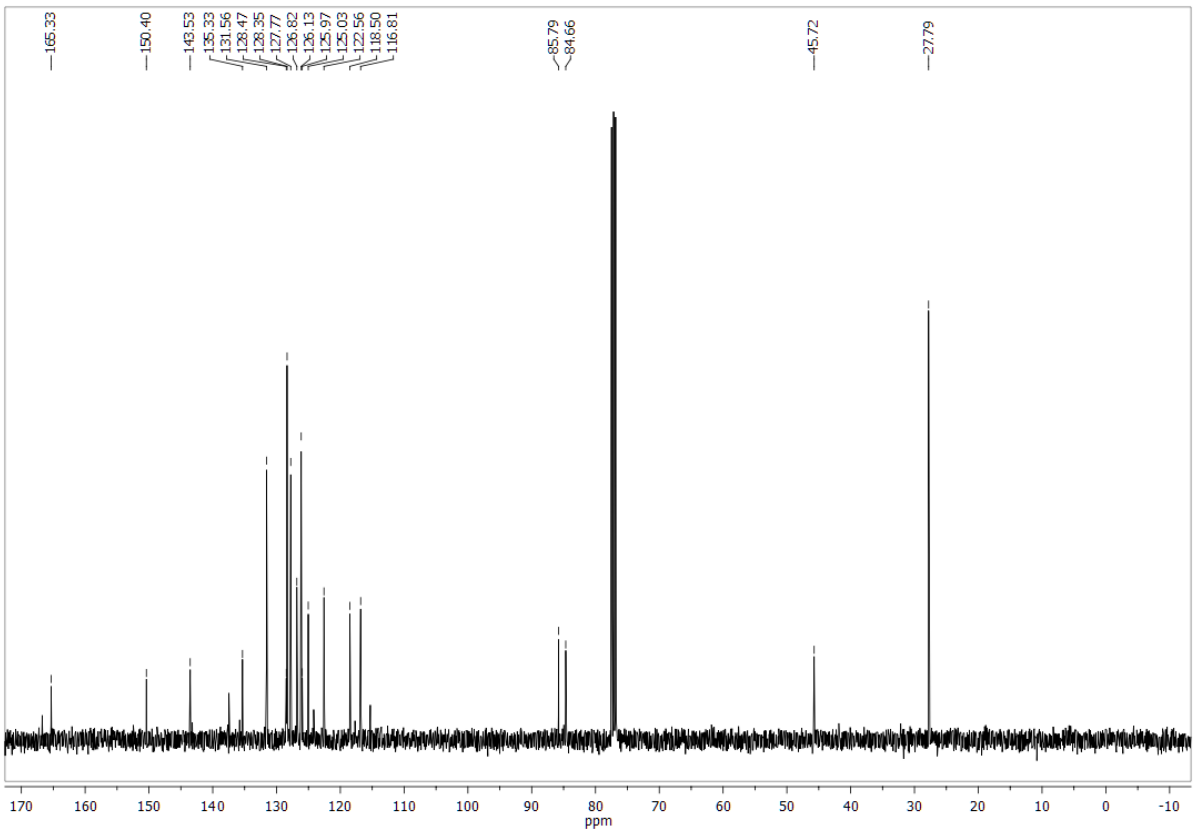


^{13}C NMR (100 MHz, $CDCl_3$)

Product **5aa**

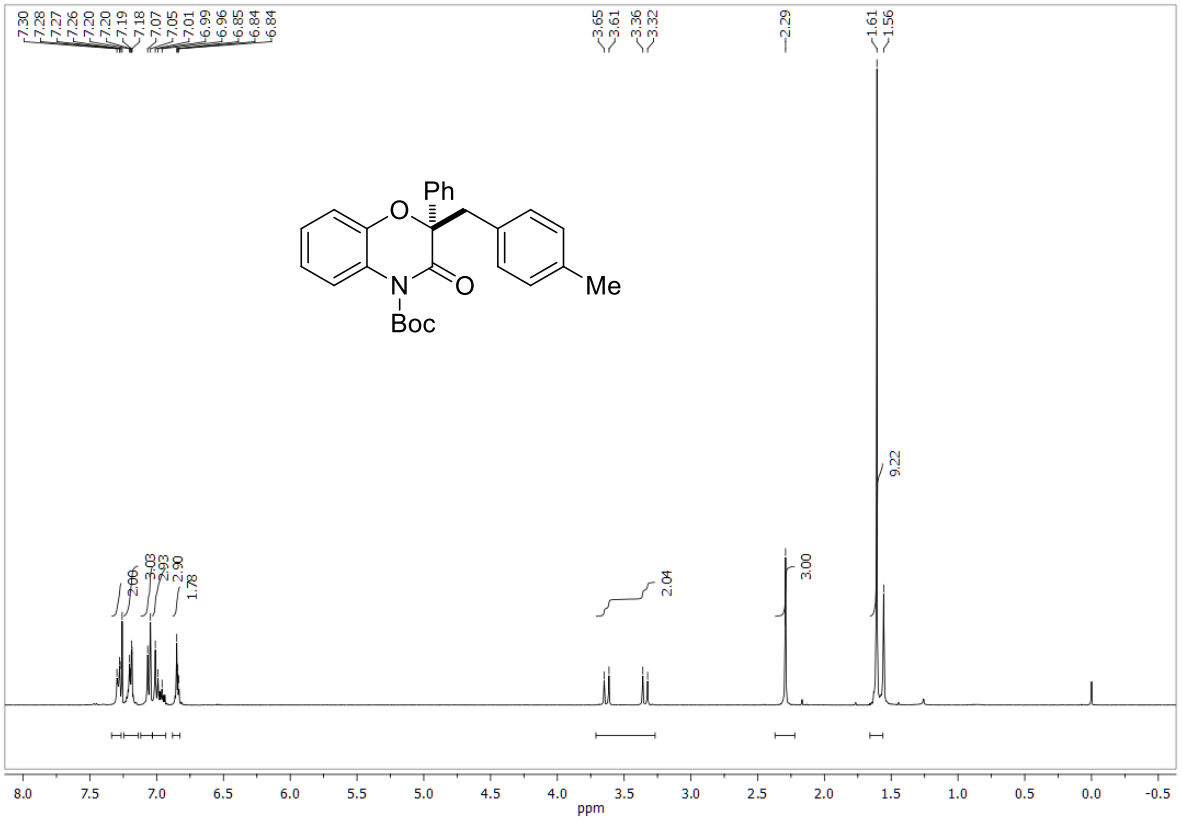


^{1}H NMR (400 MHz, $CDCl_3$)

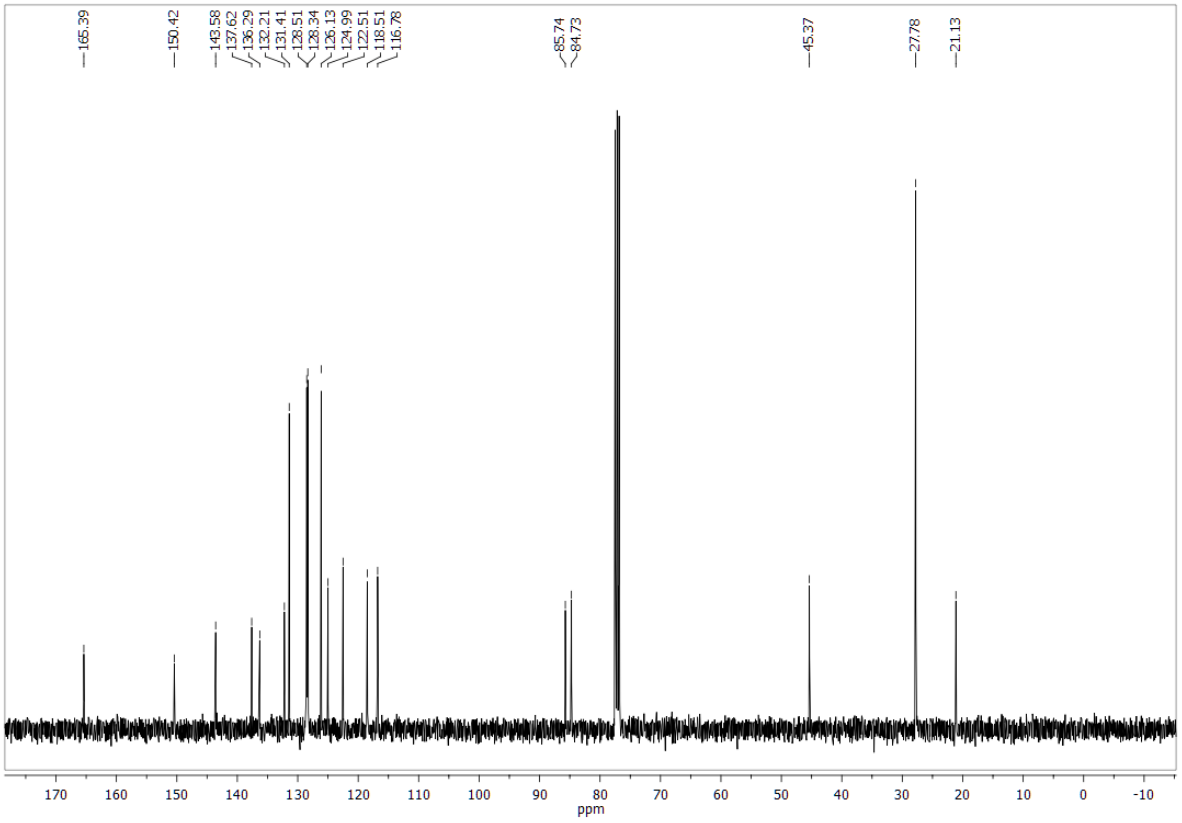


^{13}C NMR (100 MHz, $CDCl_3$)

Product **5ab**

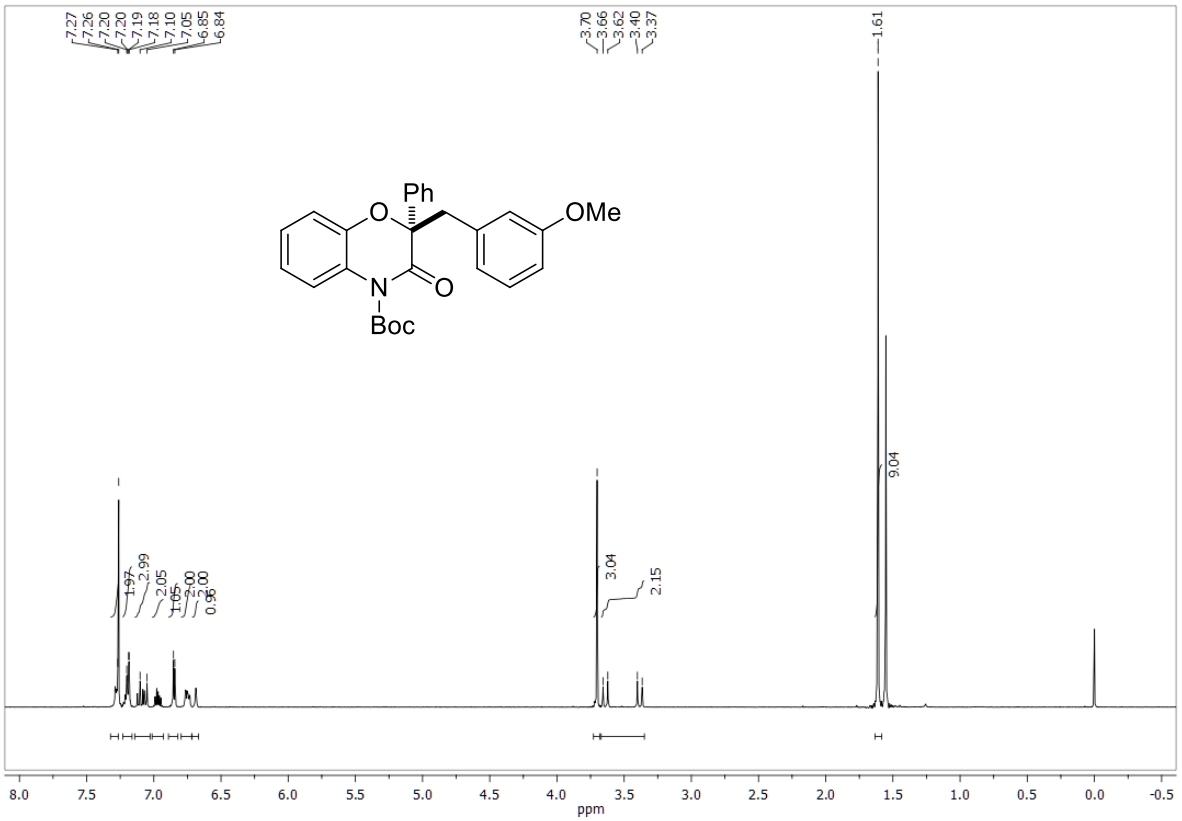


^{1}H NMR (400 MHz, $CDCl_3$)

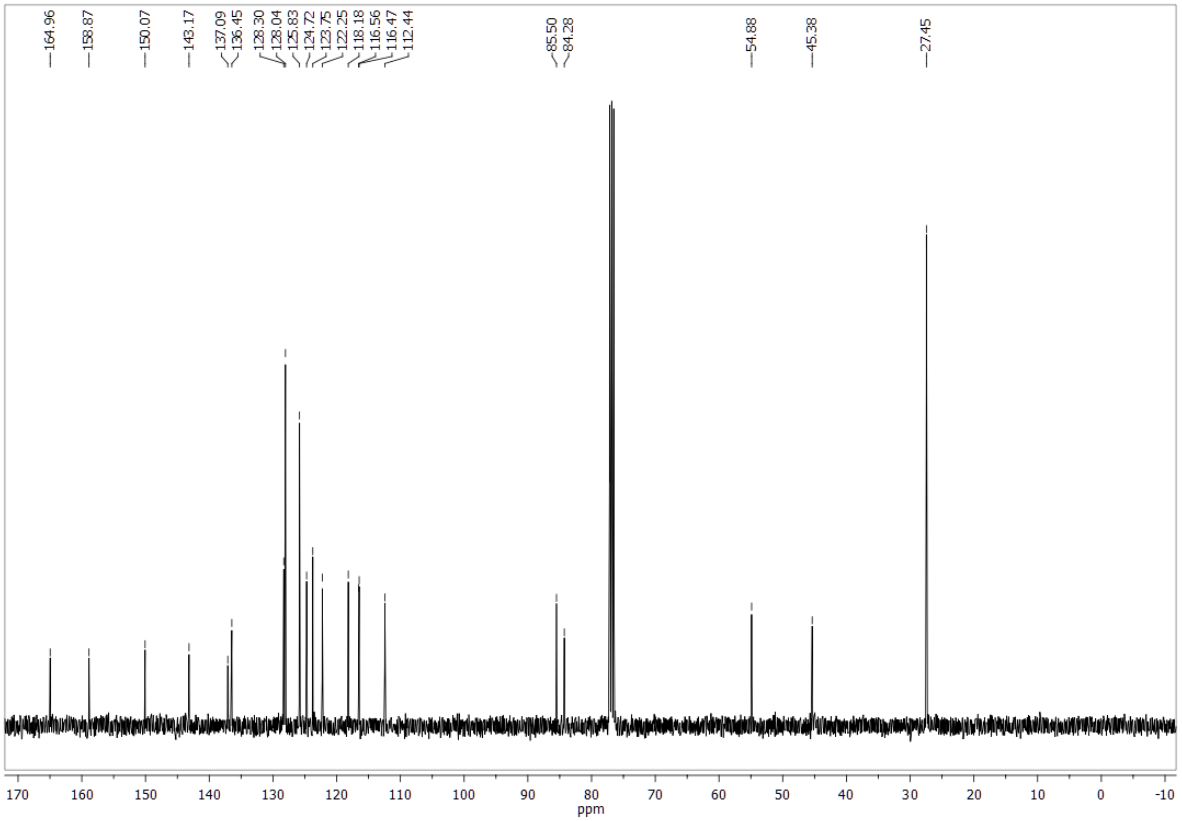


^{13}C NMR (100 MHz, $CDCl_3$)

Product **5ac**

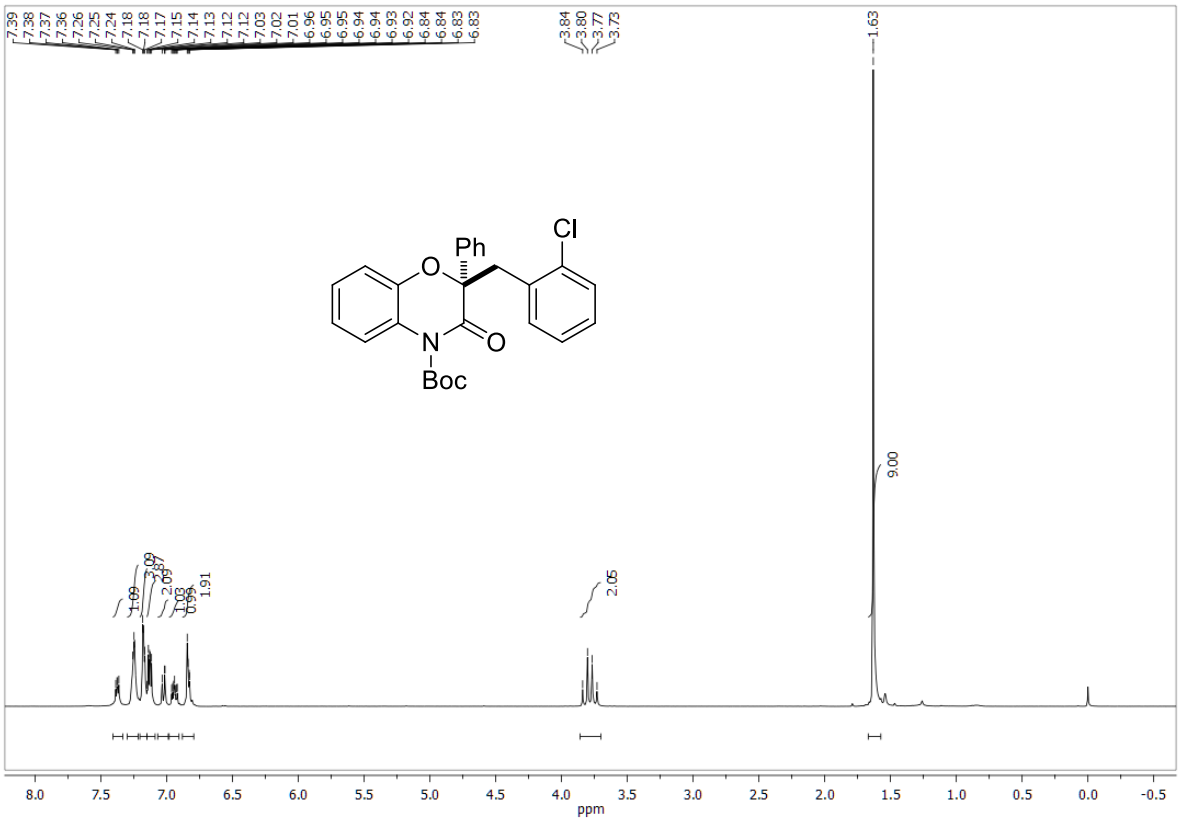


^{1}H NMR (400 MHz, $CDCl_3$)

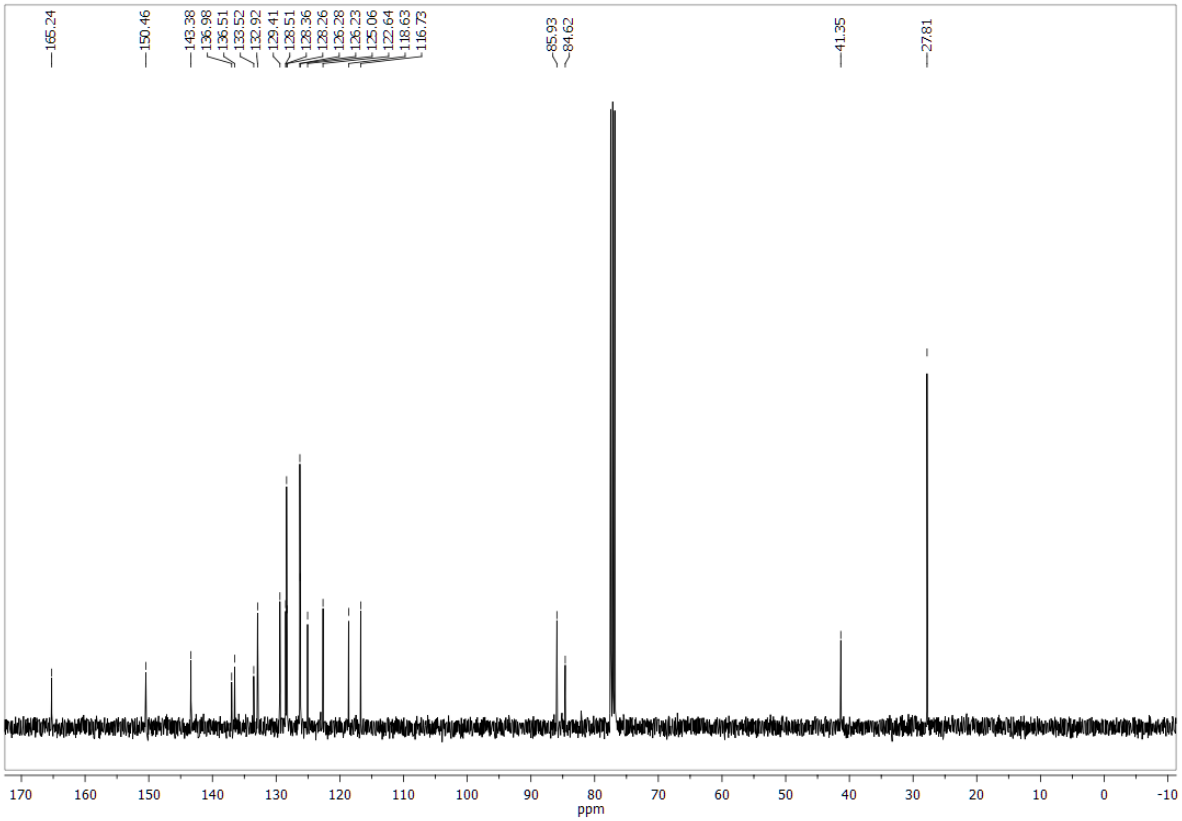


^{13}C NMR (100 MHz, $CDCl_3$)

Product **5ad**

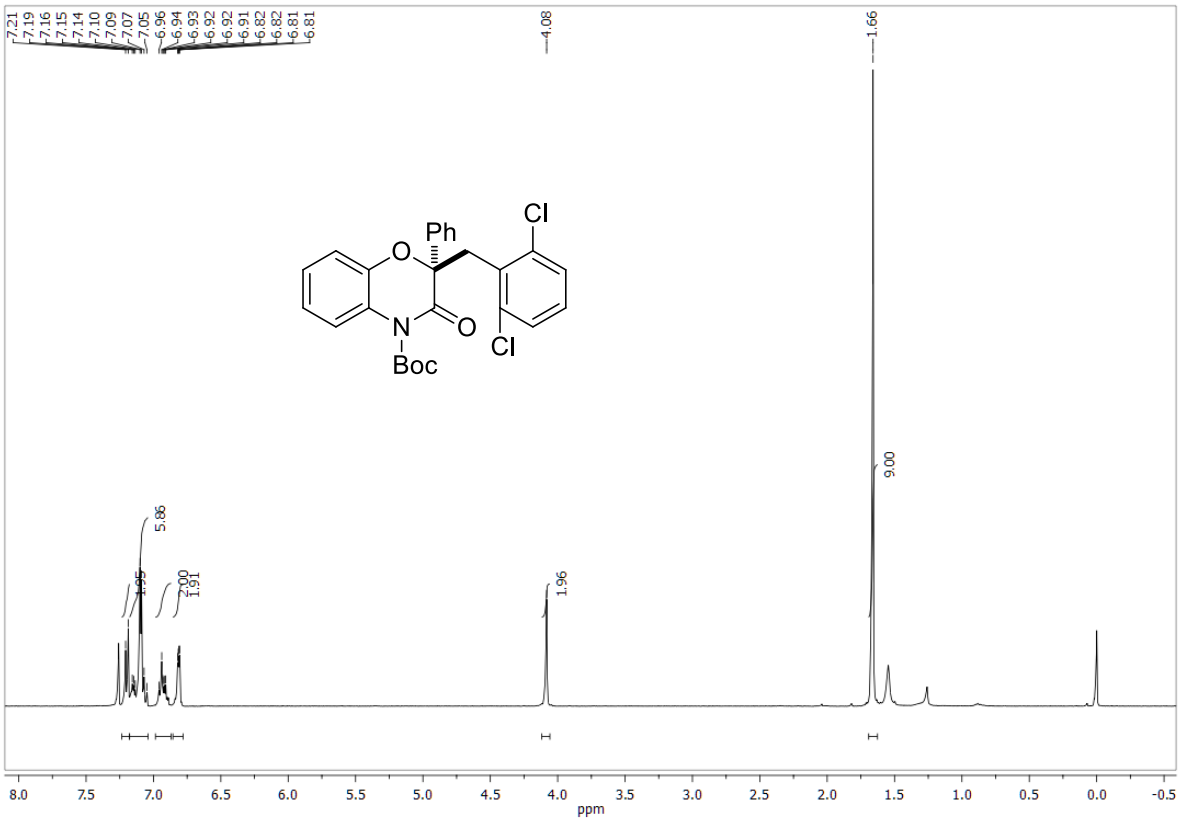


^{1}H NMR (400 MHz, $CDCl_3$)

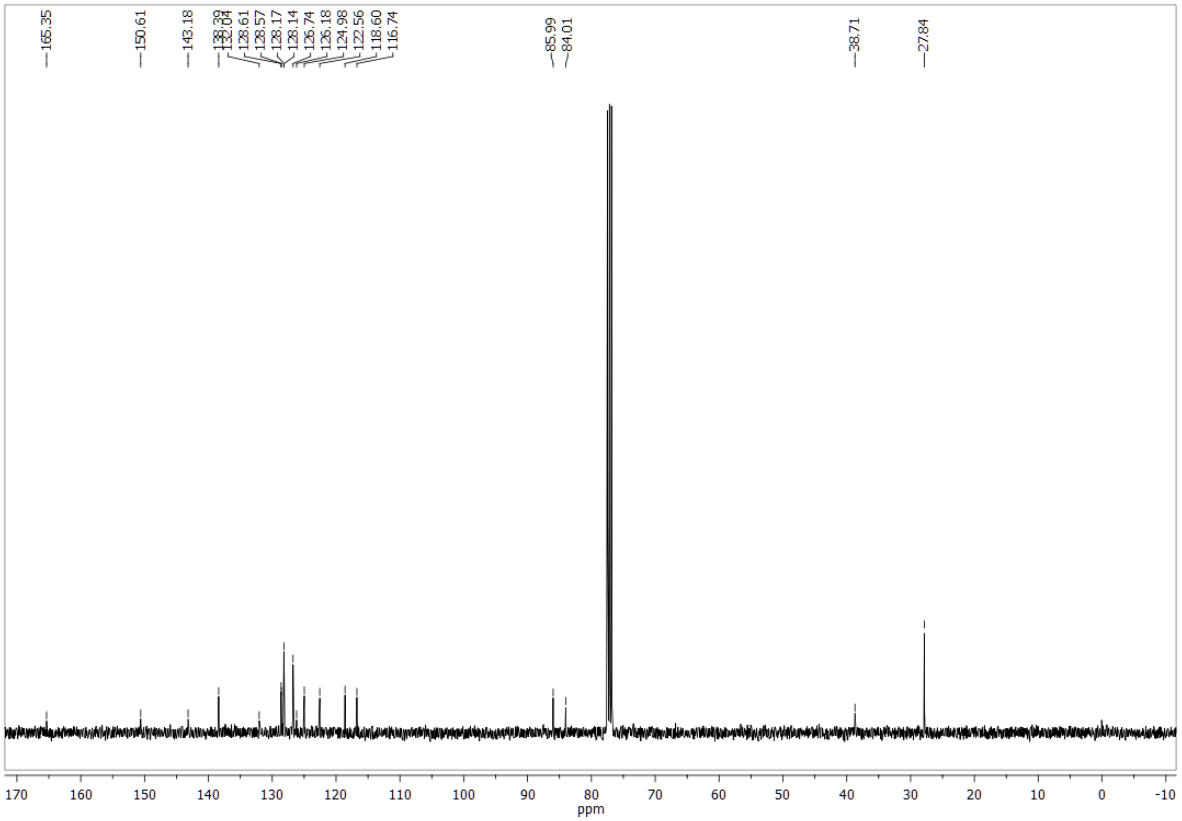


^{13}C NMR (100 MHz, $CDCl_3$)

Product **5ae**

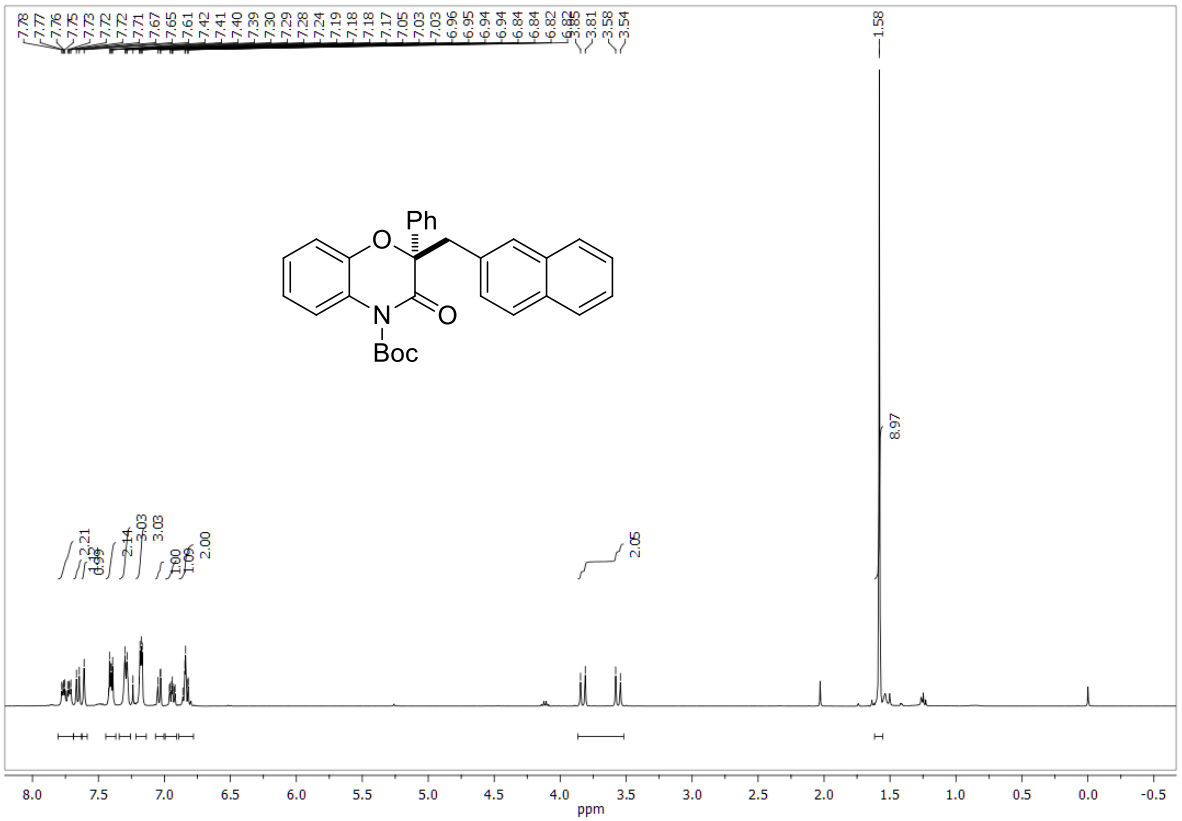


^{1}H NMR (400 MHz, $CDCl_3$)

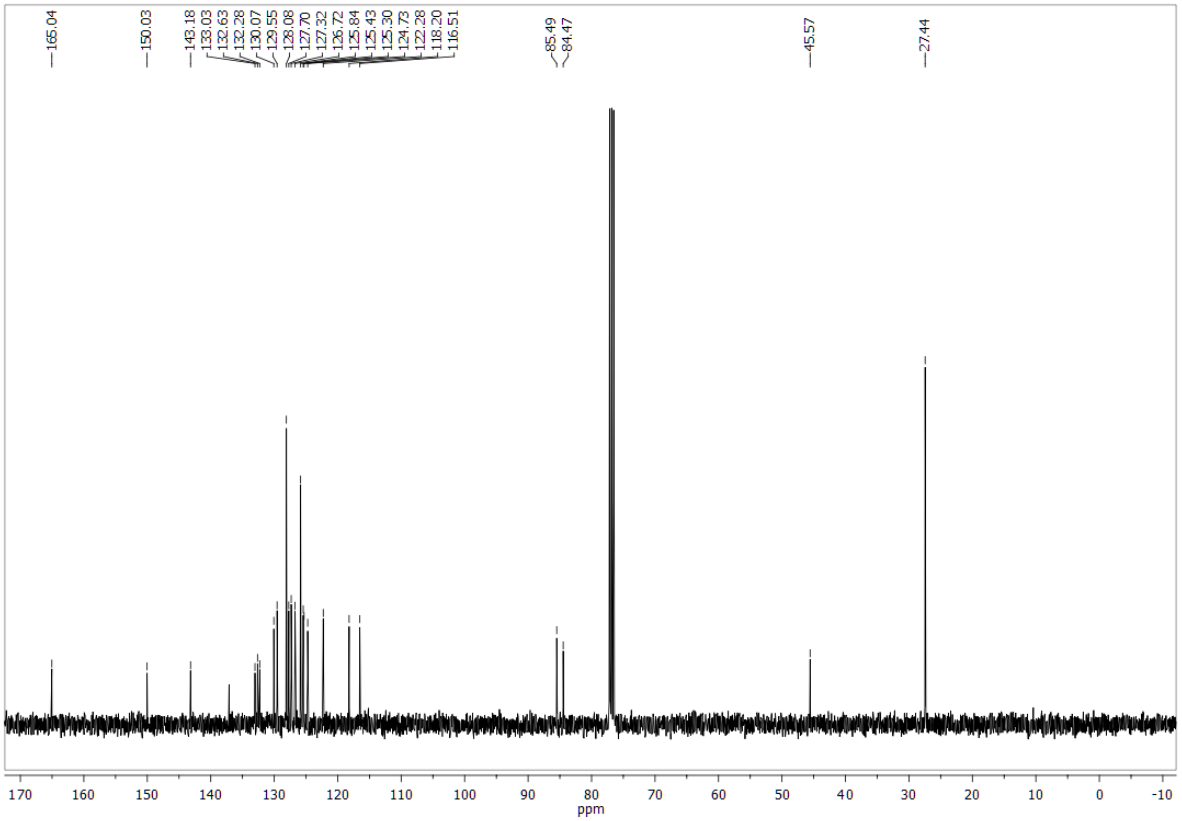


^{13}C NMR (100 MHz, $CDCl_3$)

Product **5af**

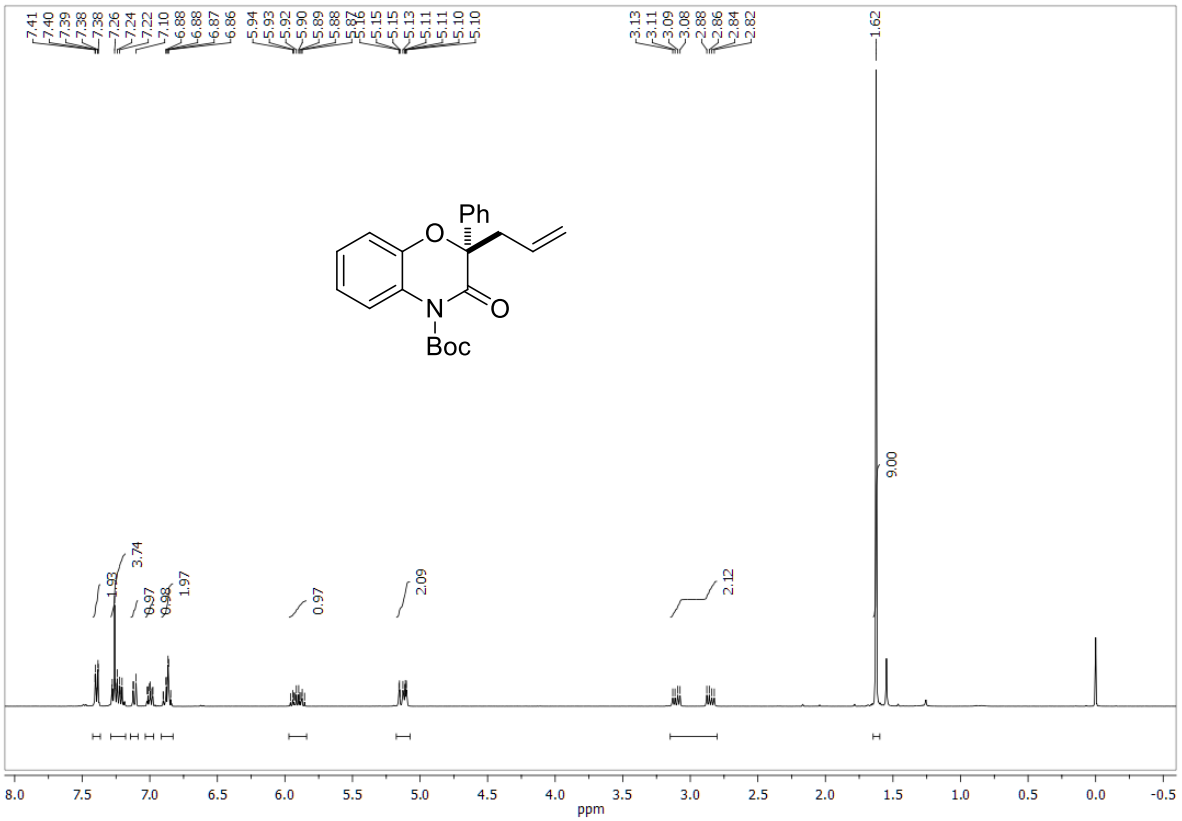


^{1}H NMR (400 MHz, $CDCl_3$)

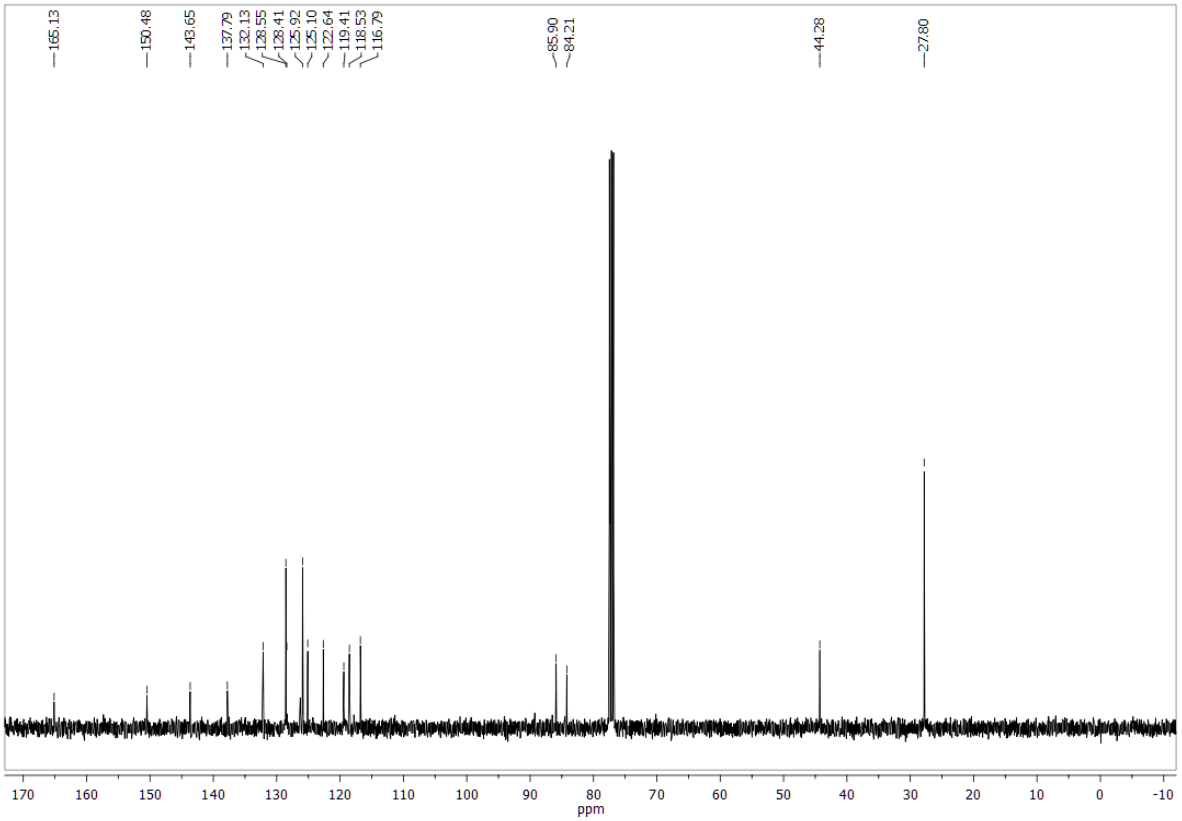


^{13}C NMR (100 MHz, $CDCl_3$)

Product **5ag**

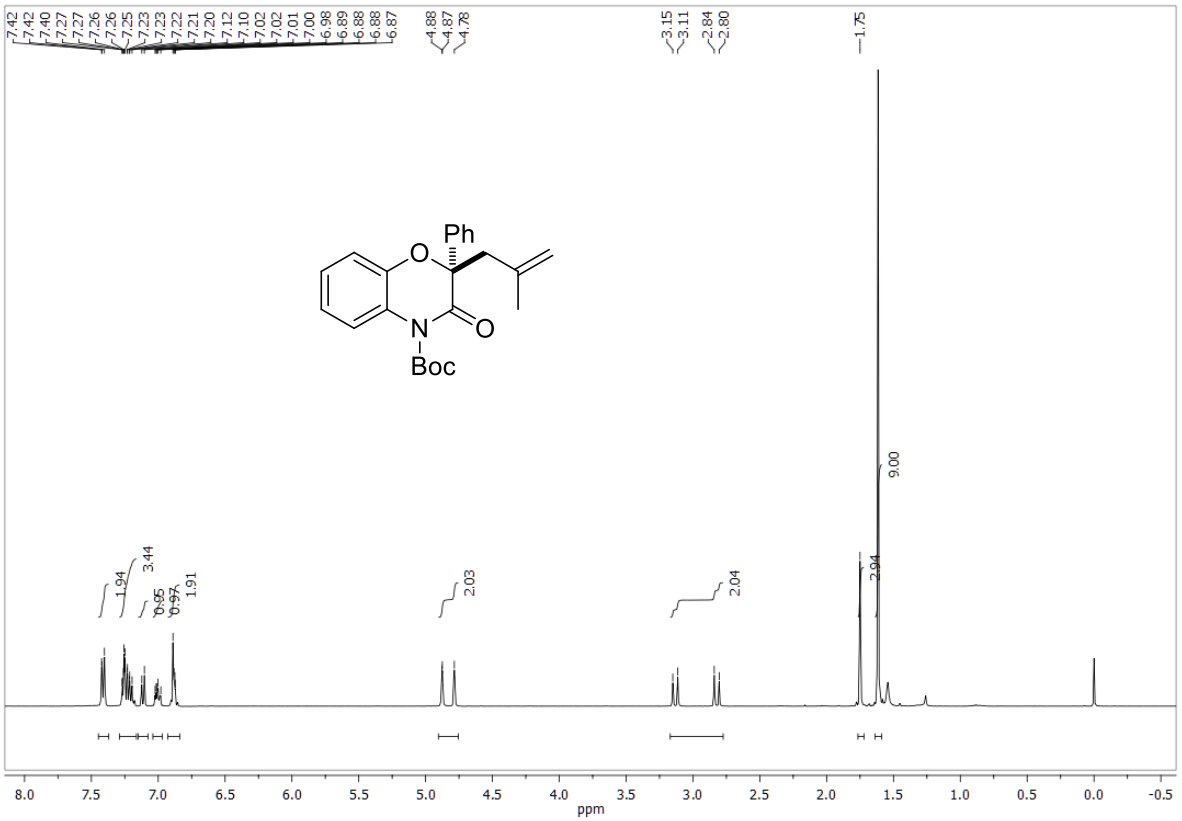


^{1}H NMR (400 MHz, $CDCl_3$)

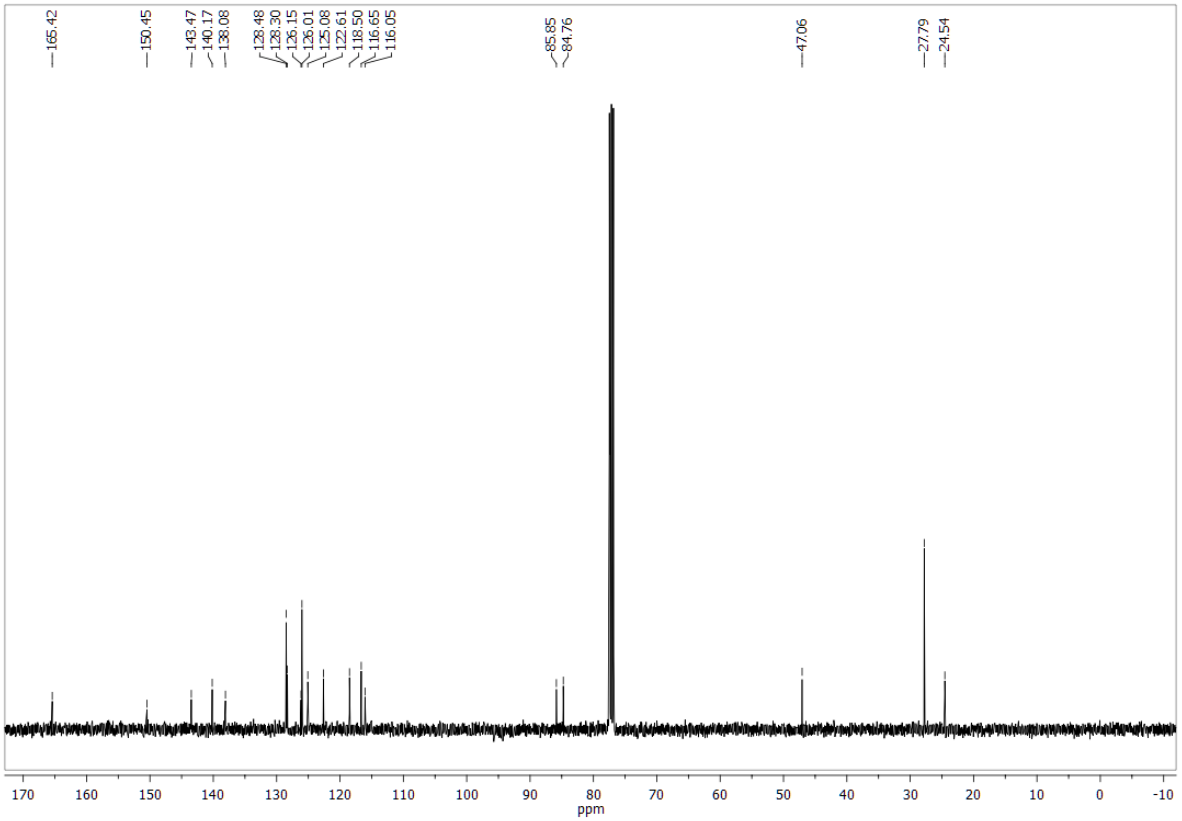


^{13}C NMR (100 MHz, $CDCl_3$)

Product **5ah**

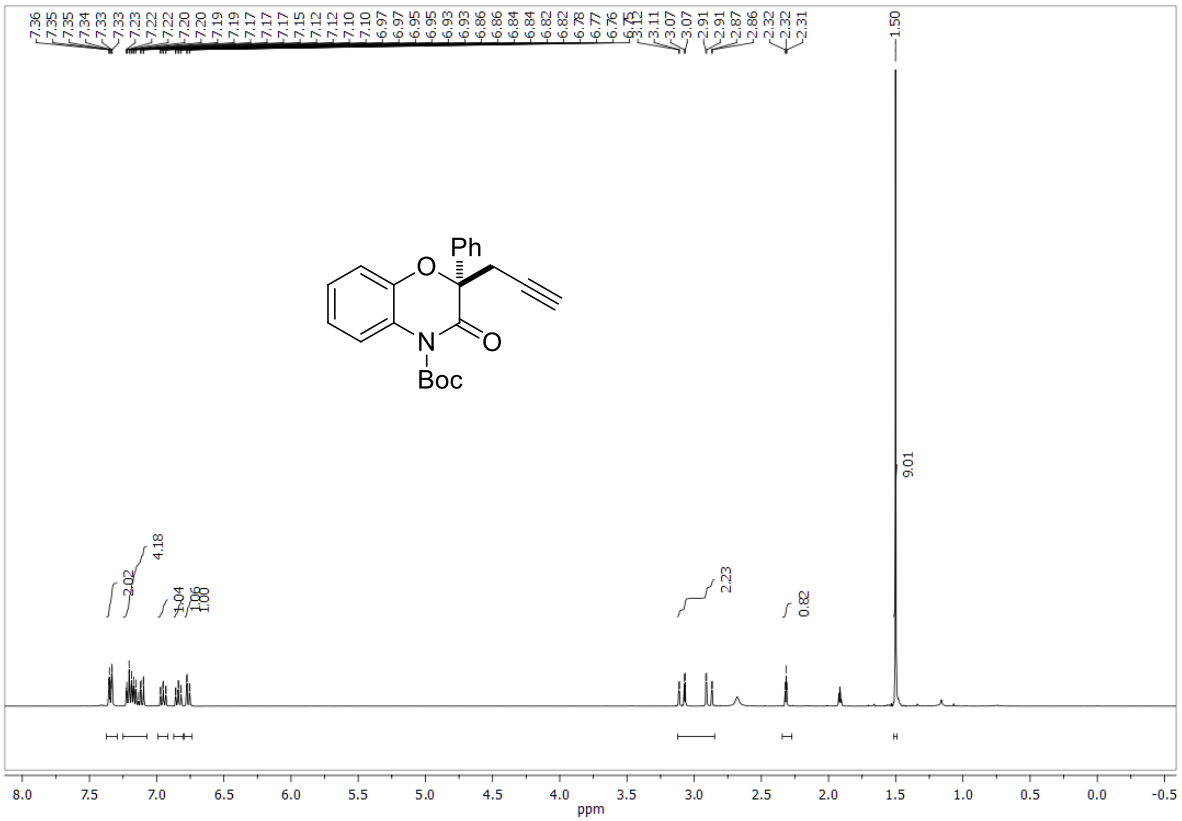


^{1}H NMR (400 MHz, $CDCl_3$)

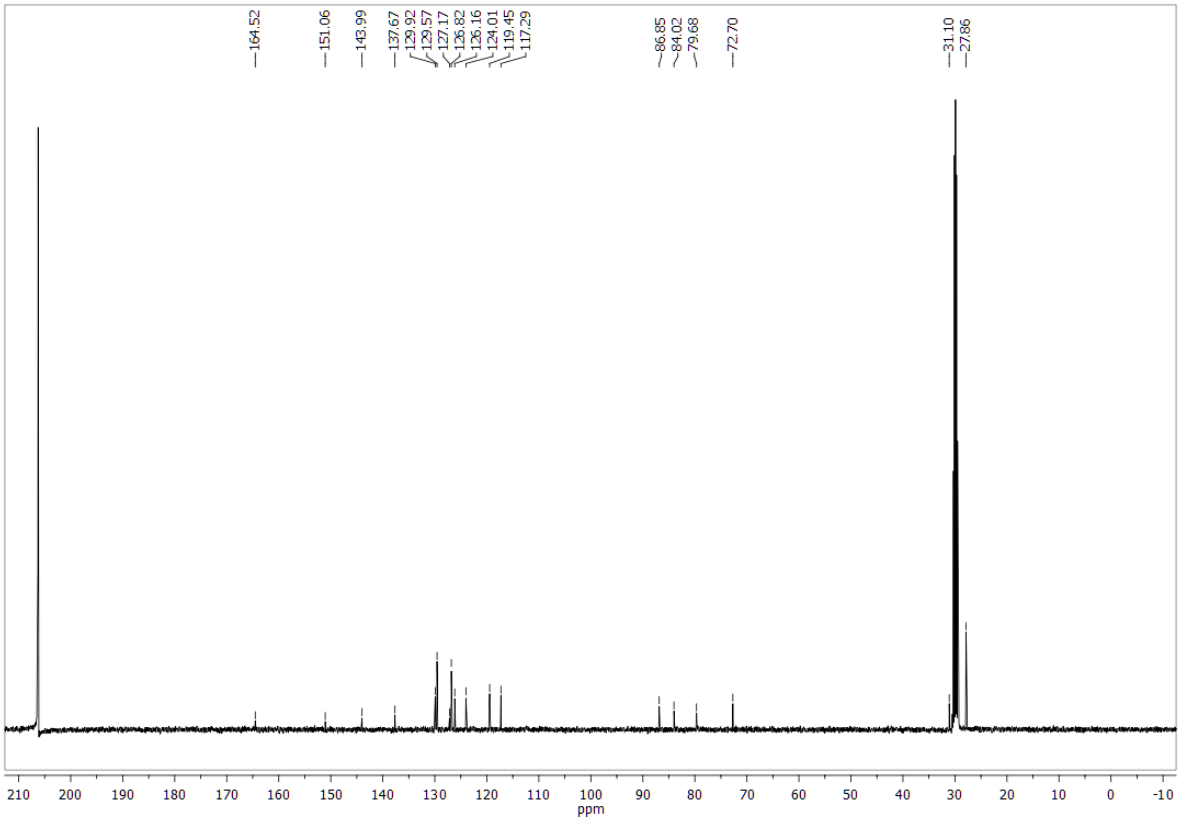


^{13}C NMR (100 MHz, $CDCl_3$)

Product **5ai**

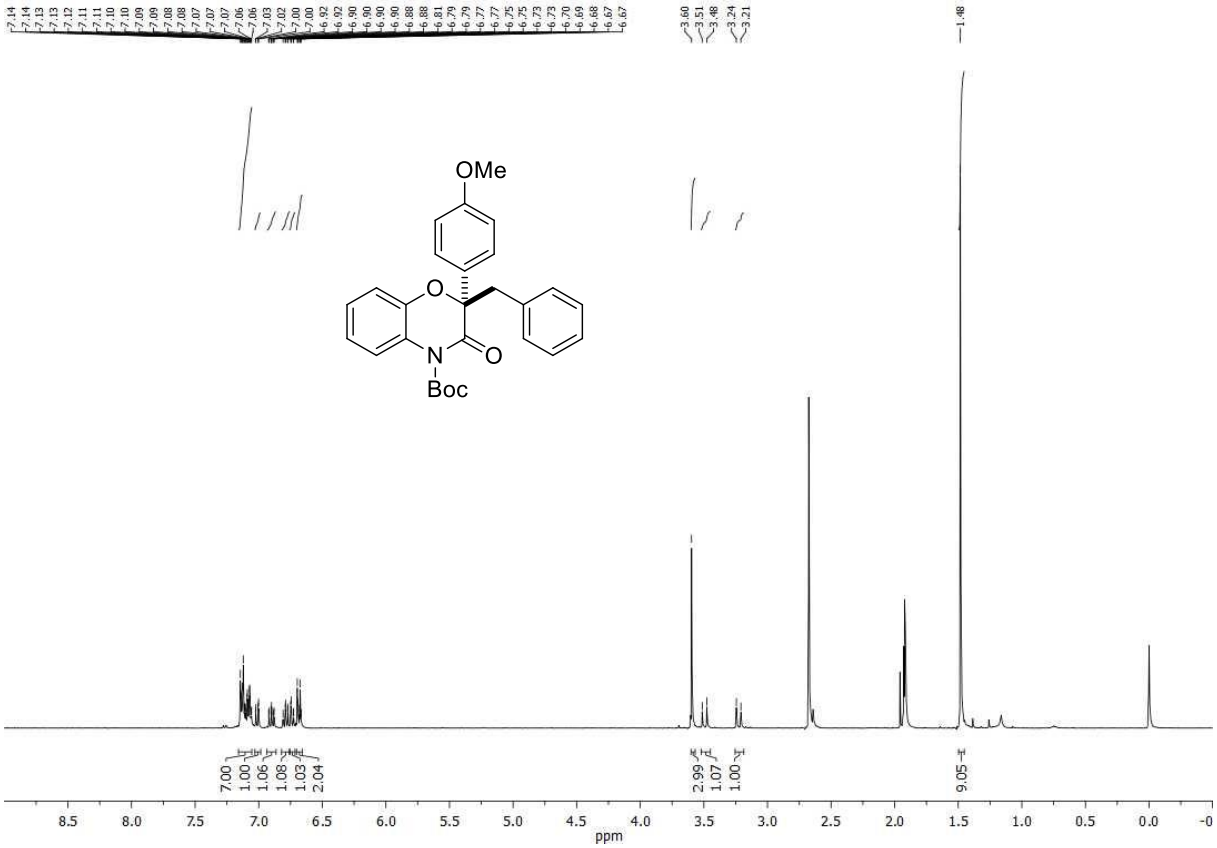


^{1}H NMR (400 MHz, $(CD_3)_2CO$)

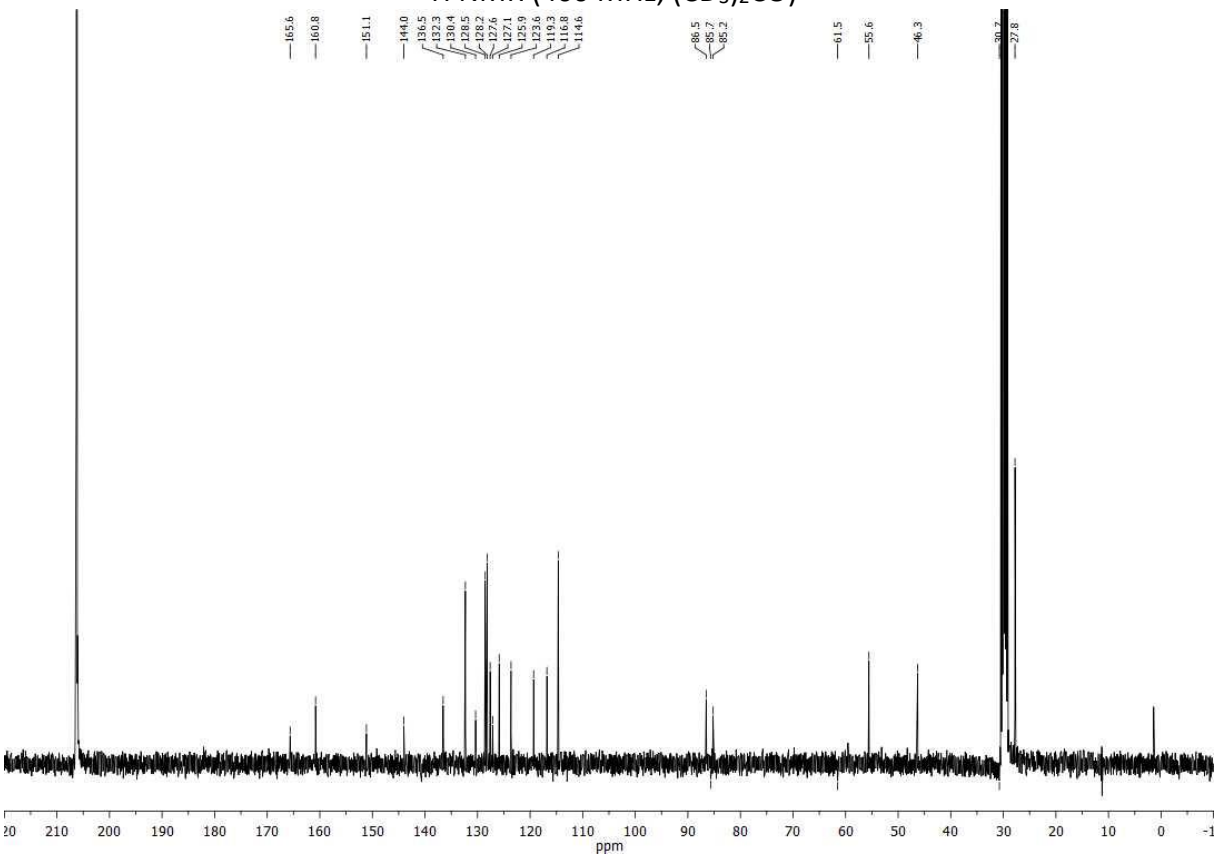


^{13}C NMR (100 MHz, $(CD_3)_2CO$)

Product **5ba**

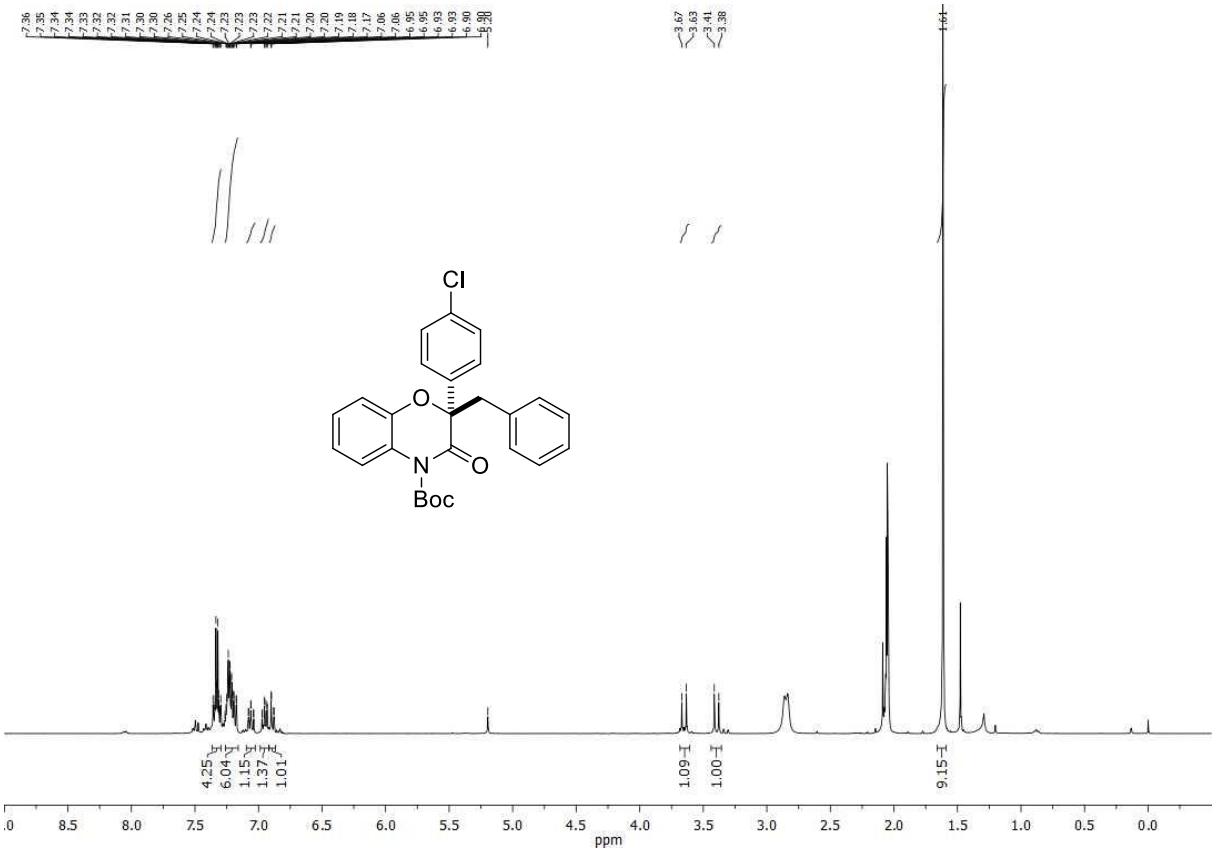


^{1}H NMR (400 MHz, $(CD_3)_2CO$)

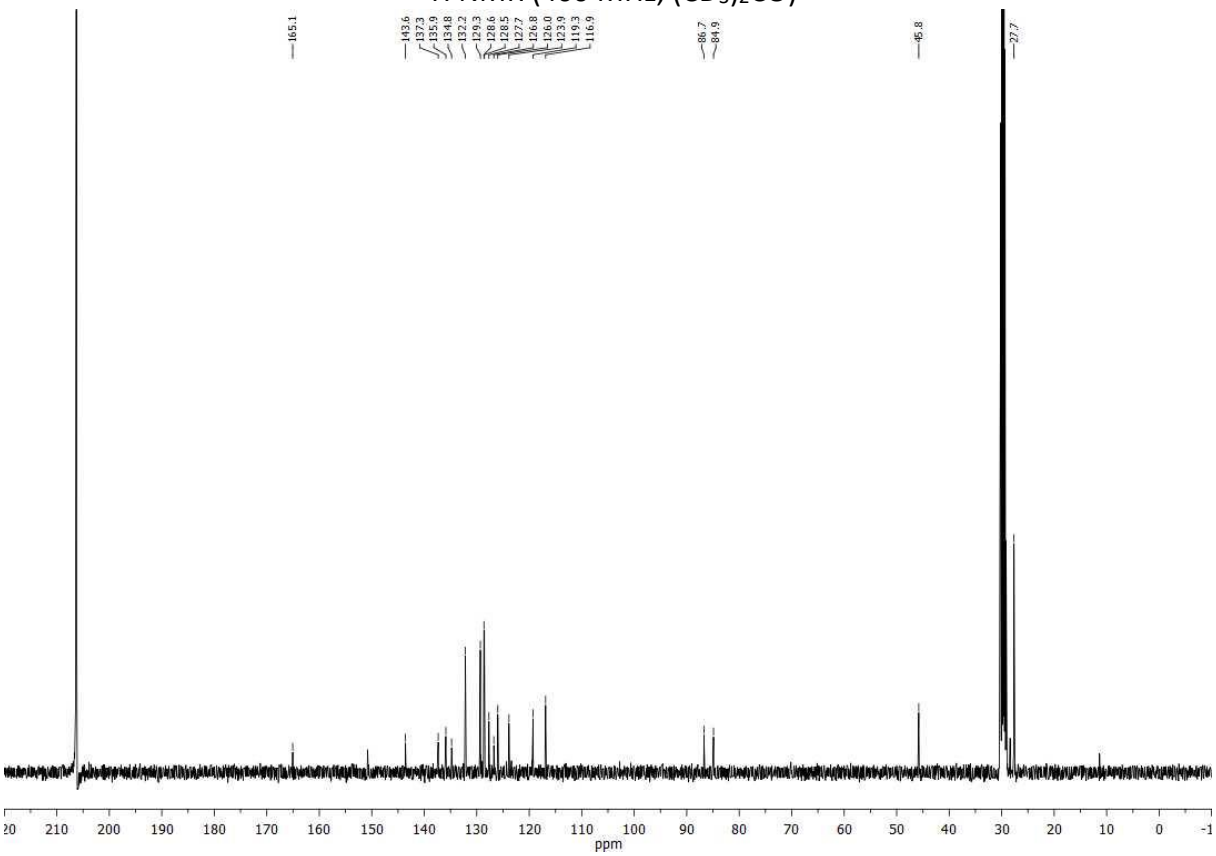


^{13}C NMR (100 MHz, $(CD_3)_2CO$)

Product **5ca**

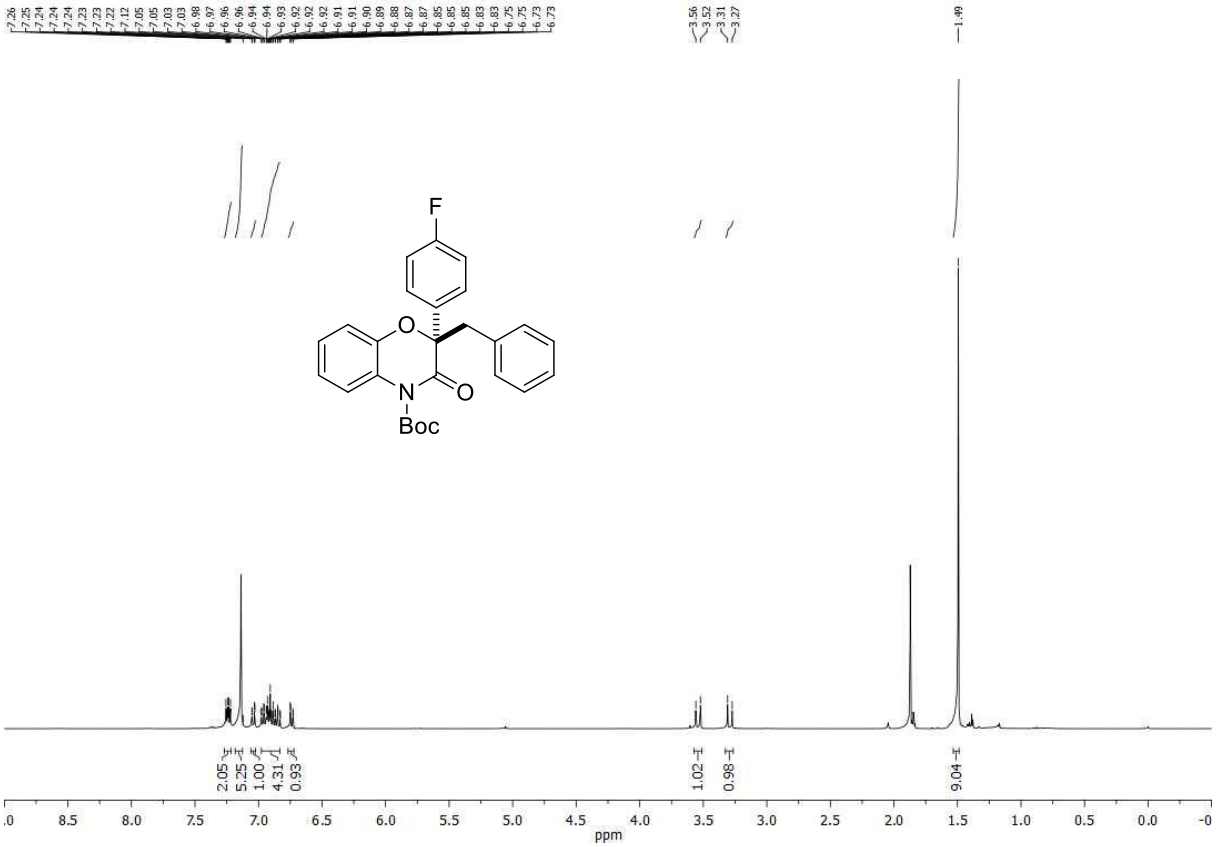


^{1}H NMR (400 MHz, $(CD_3)_2CO$)

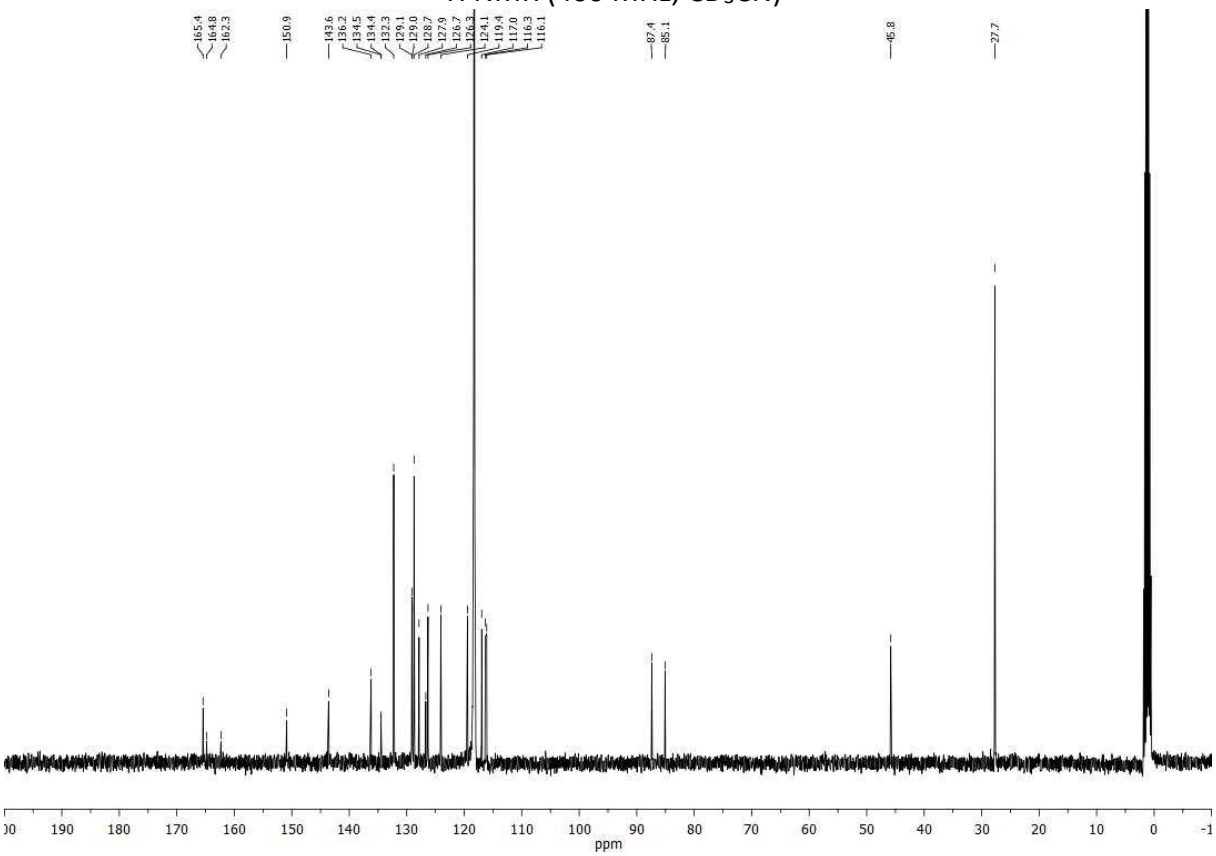


^{13}C NMR (100 MHz, $(CD_3)_2CO$)

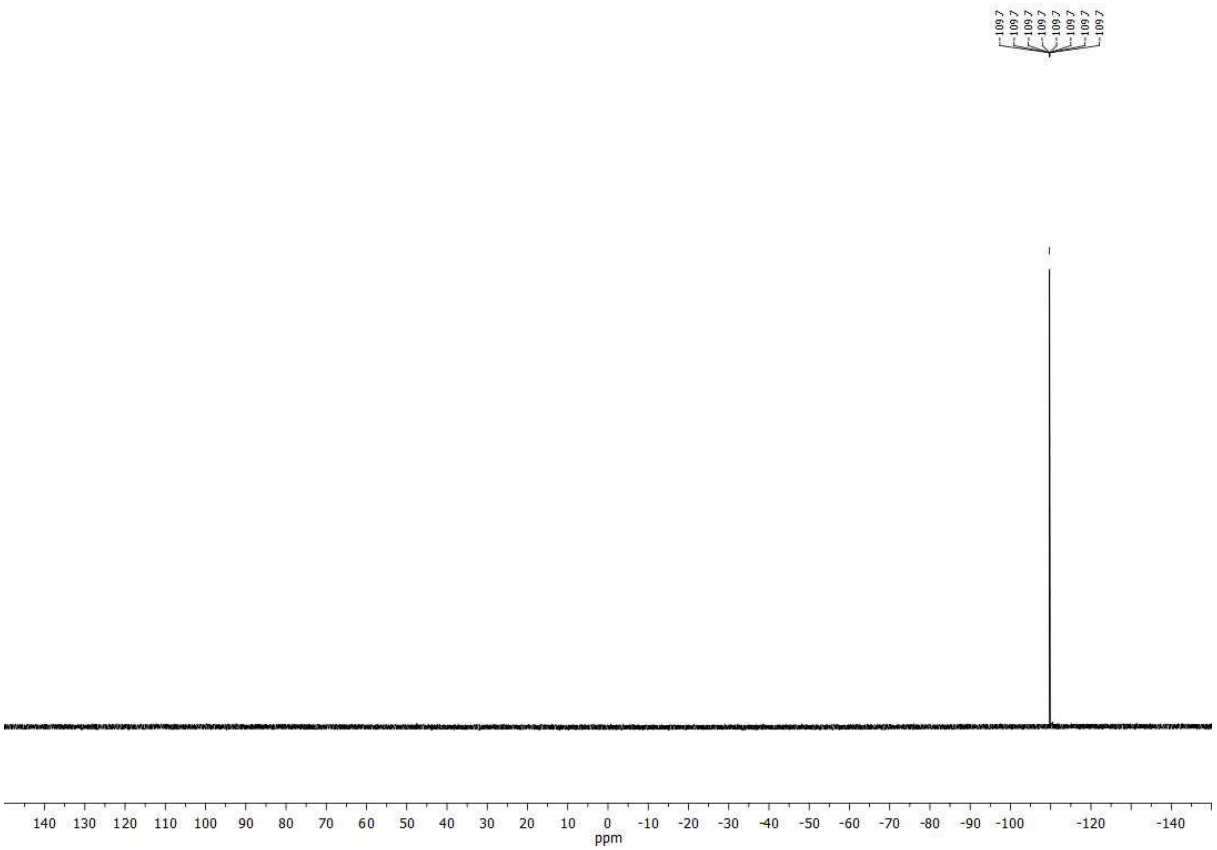
Product **5da**



^{1}H NMR (400 MHz, CD_3CN)

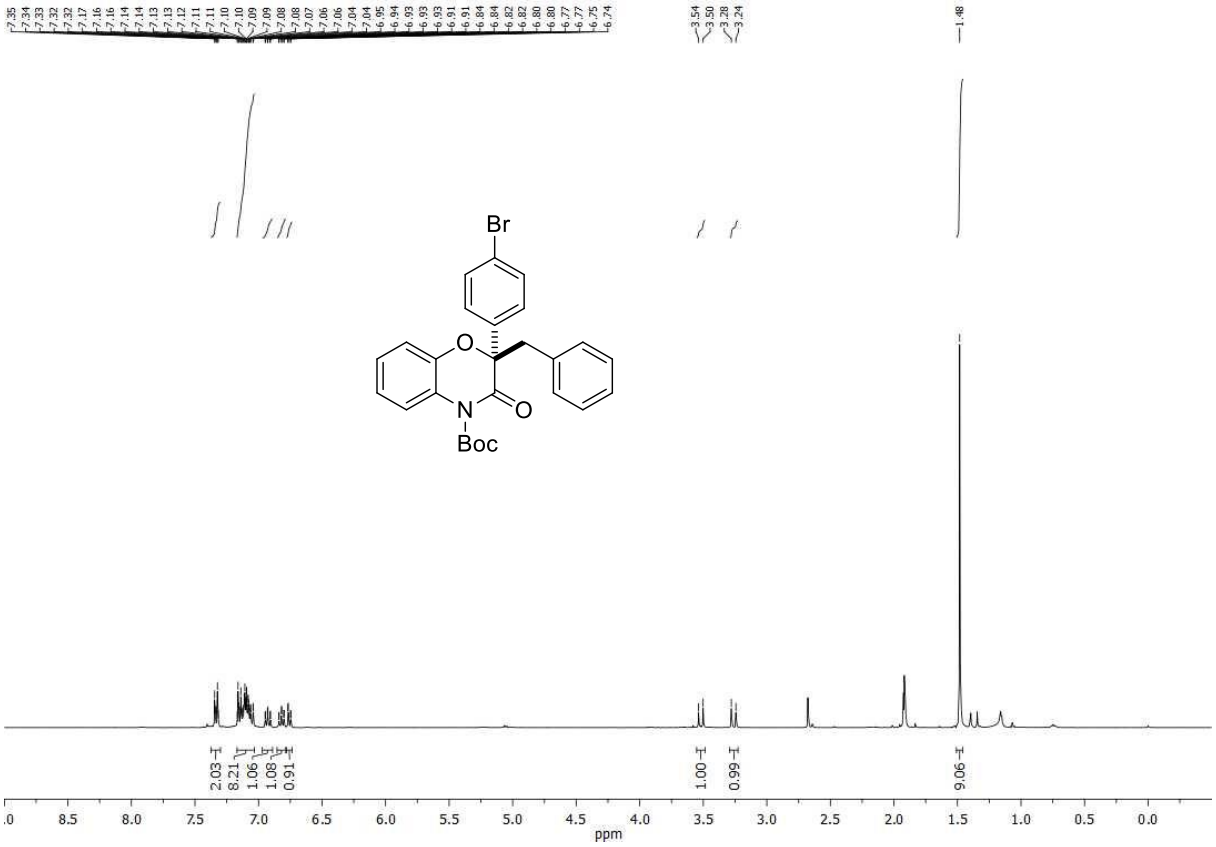


^{13}C NMR (100 MHz, CD_3CN)

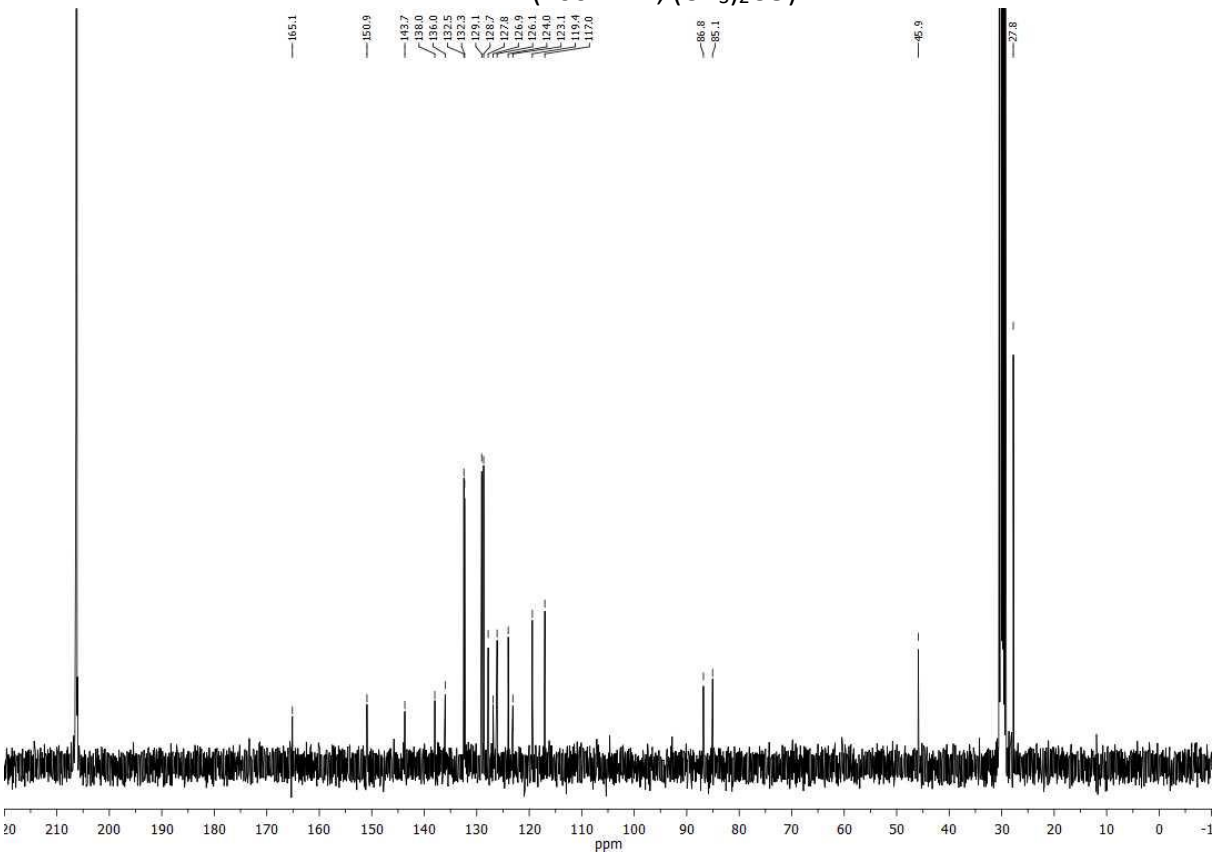


^{19}F NMR (466 MHz, $(CD_3)_2CO$)

Product **5ea**

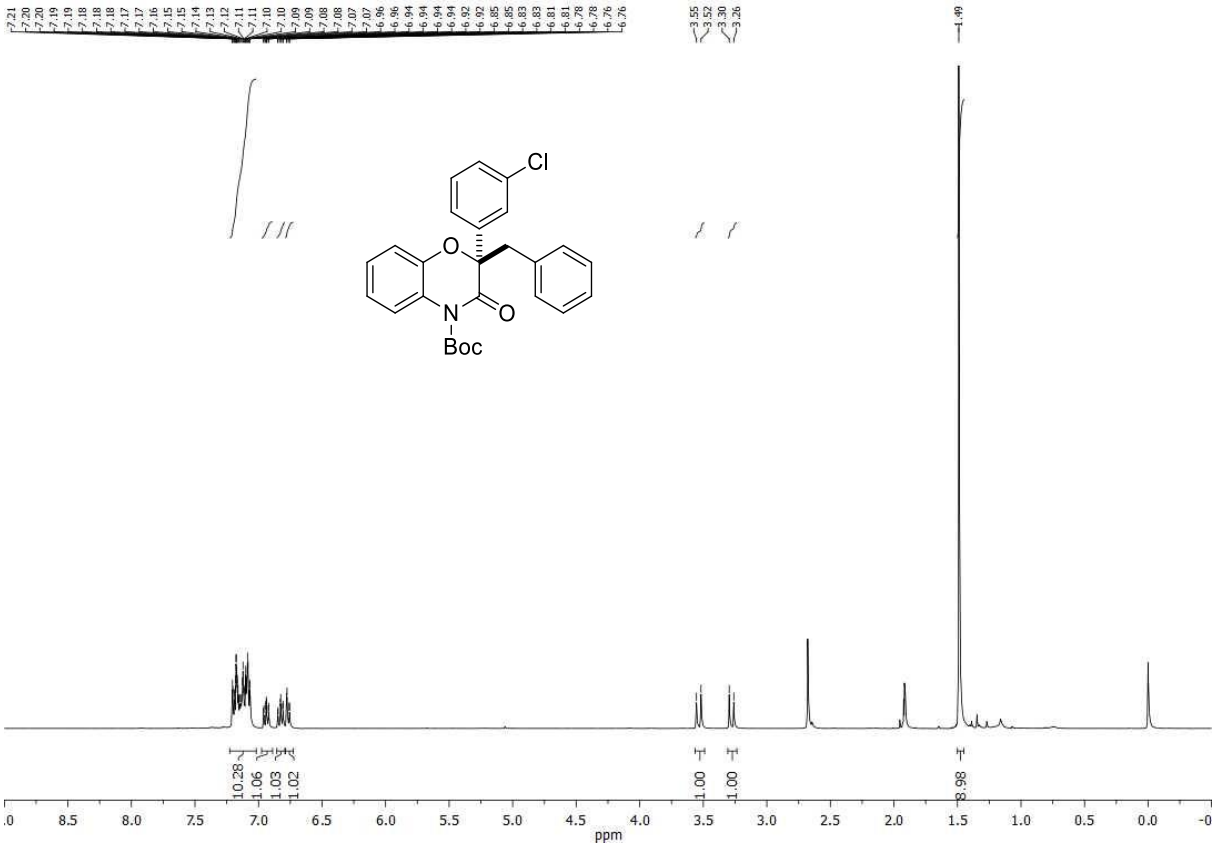


^{1}H NMR (400 MHz, $(CD_3)_2CO$)

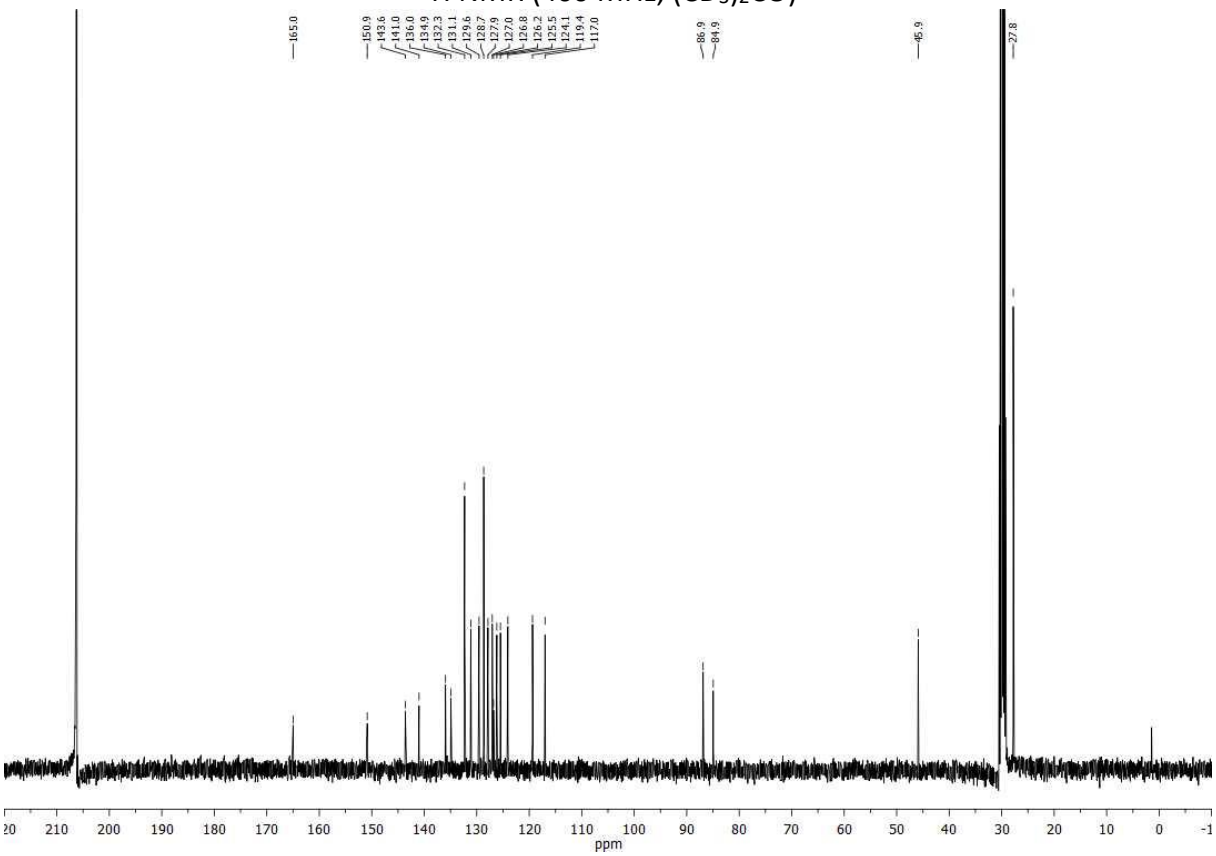


^{13}C NMR (100 MHz, $(CD_3)_2CO$)

Product **5fa**

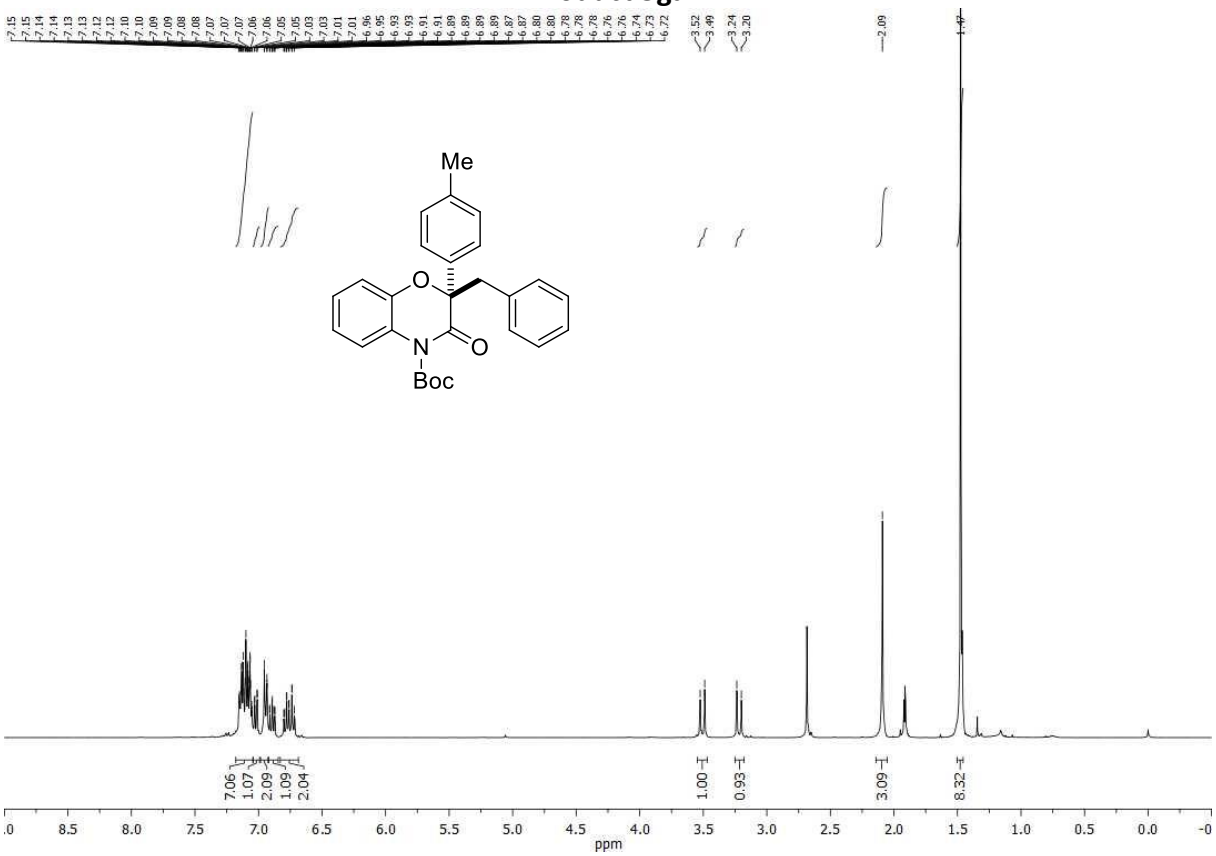


^{1}H NMR (400 MHz, $(CD_3)_2CO$)

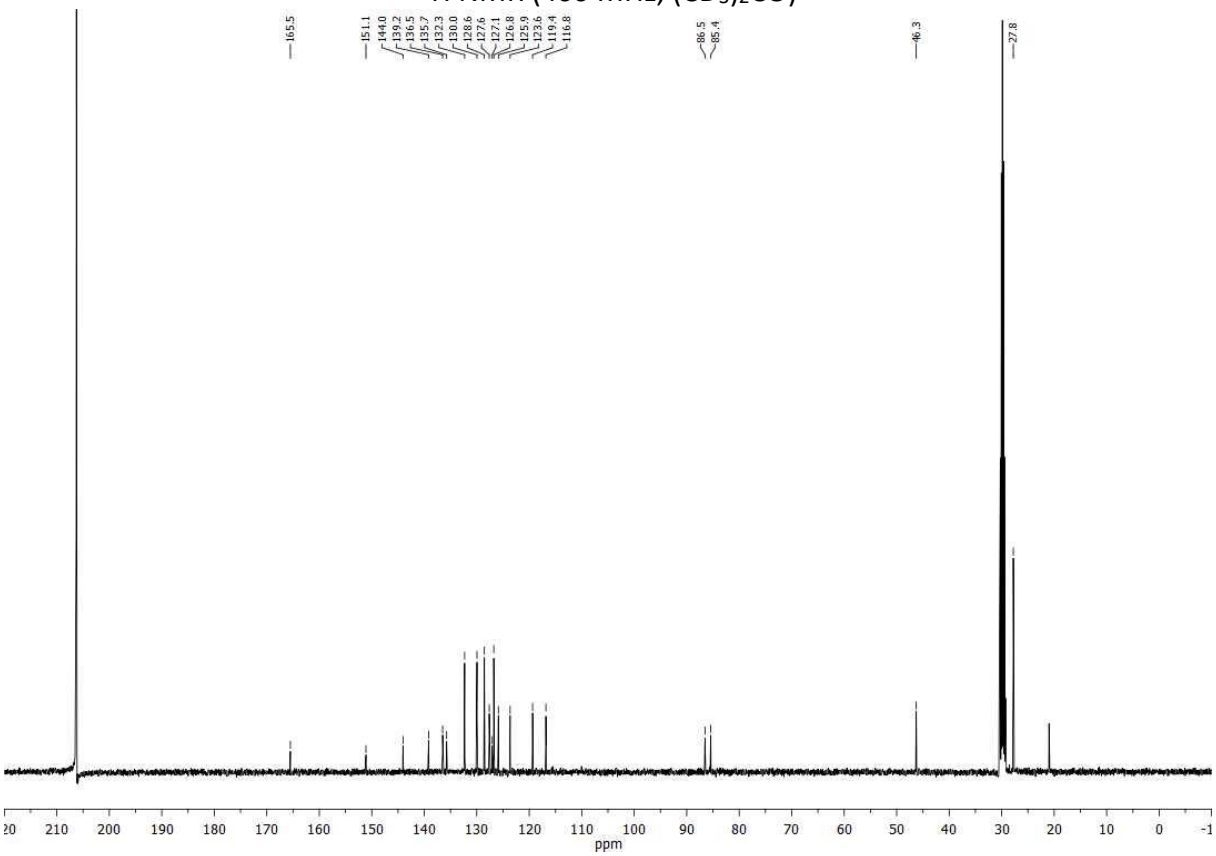


^{13}C NMR (100 MHz, $(CD_3)_2CO$)

Product **5ga**

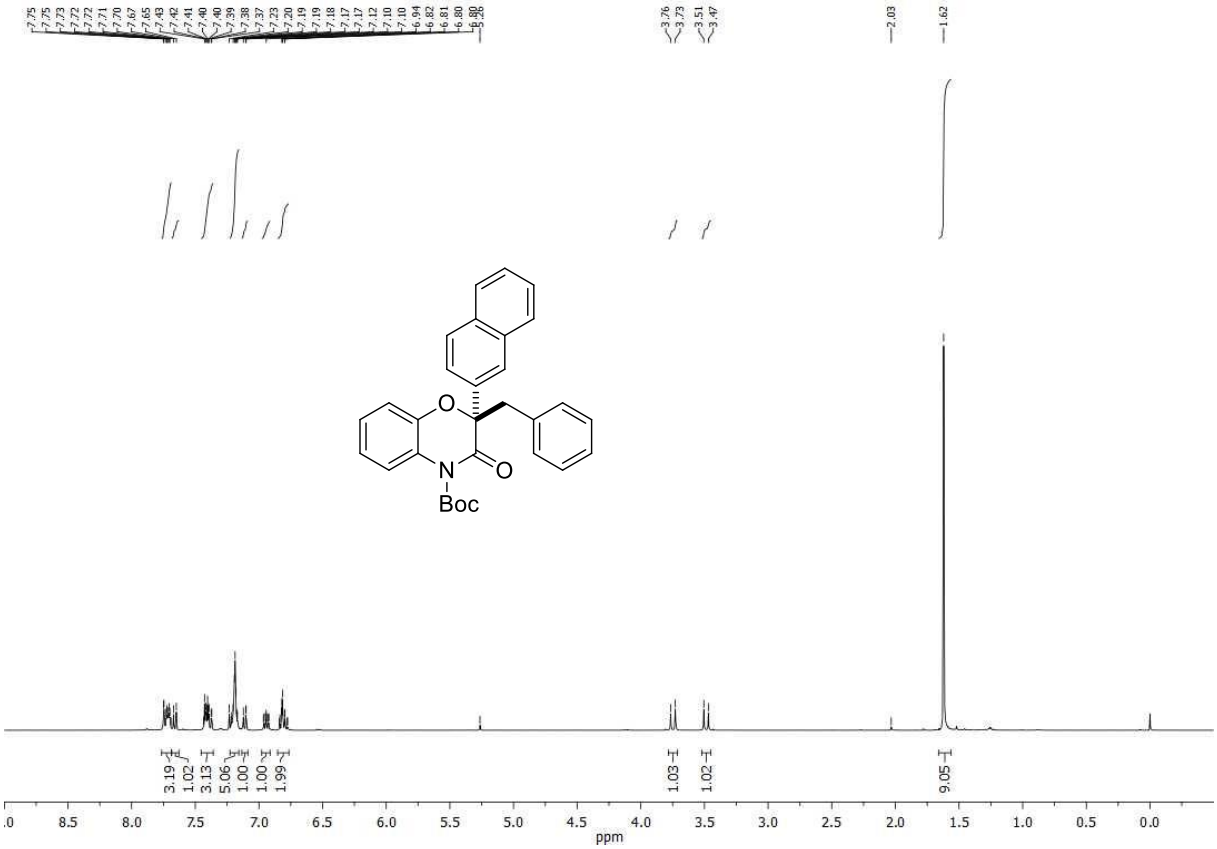


^{1}H NMR (400 MHz, $(CD_3)_2CO$)

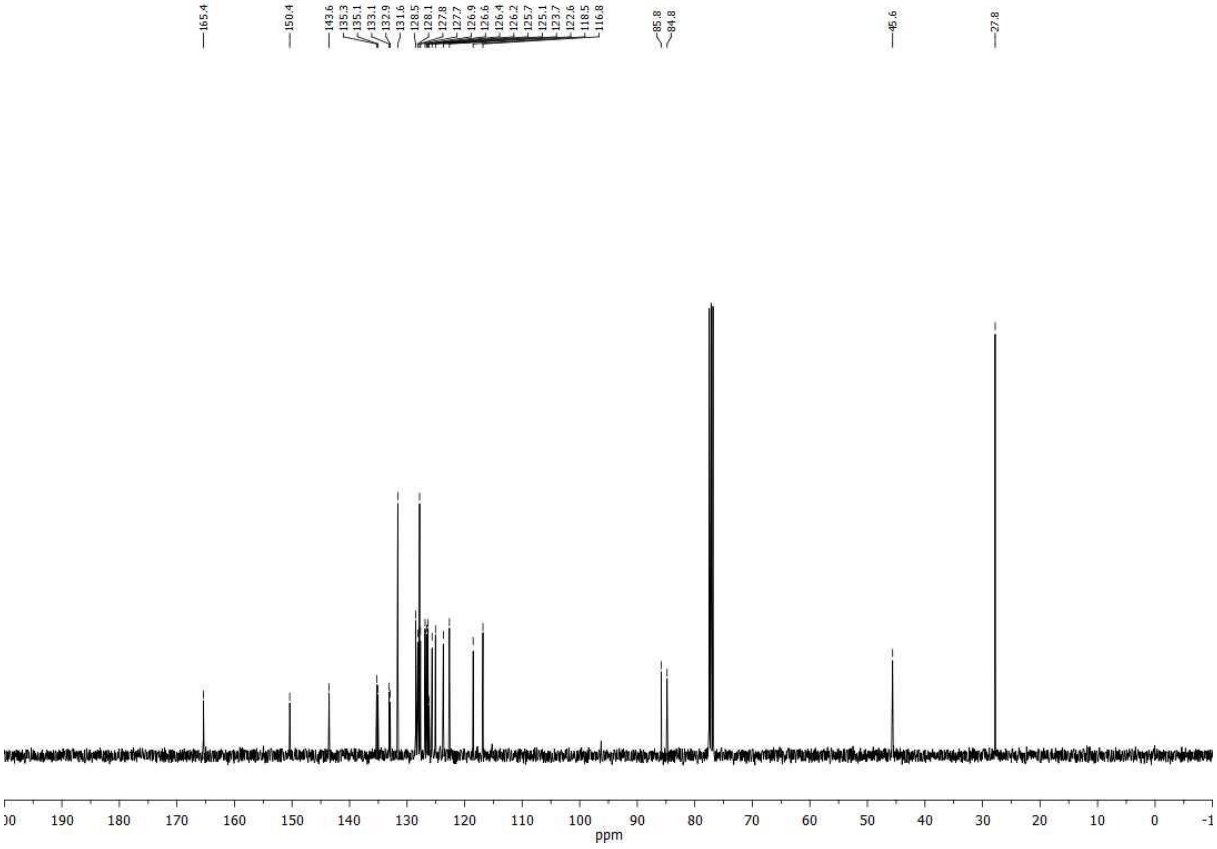


^{13}C NMR (100 MHz, $(CD_3)_2CO$)

Product **5ha**

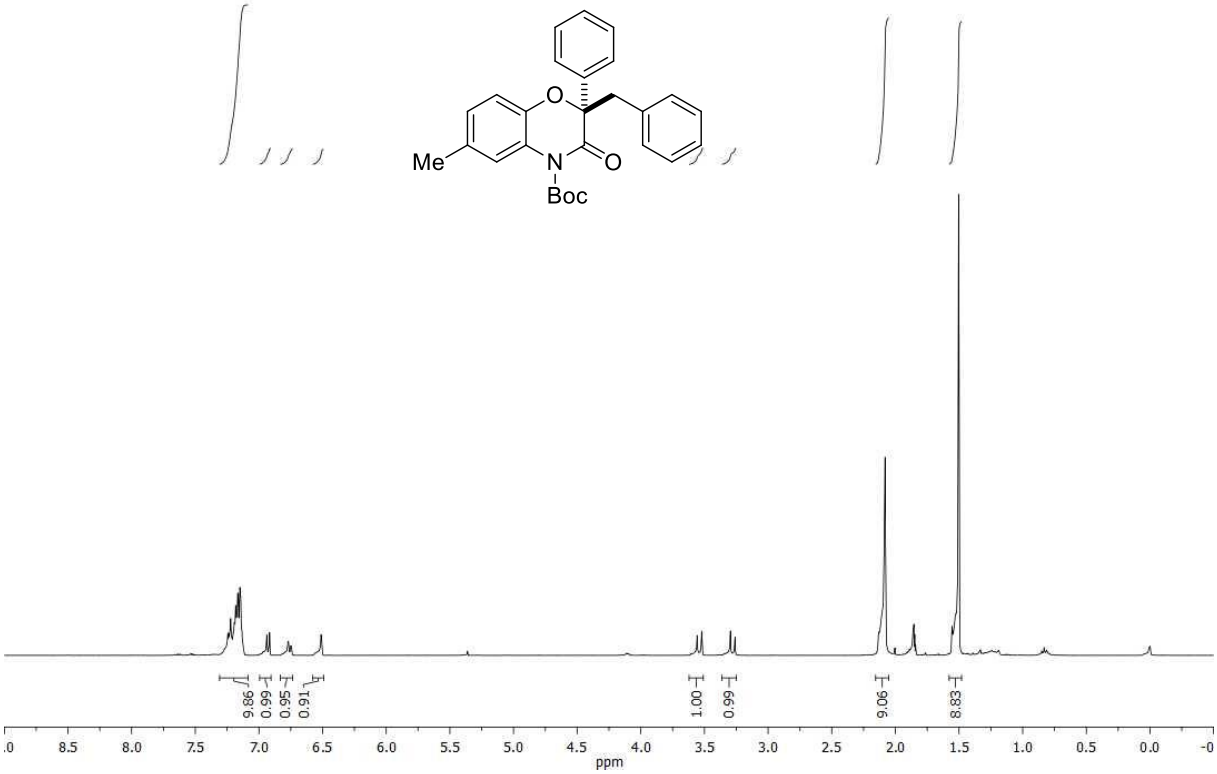


^{1}H NMR (400 MHz, $CDCl_3$)

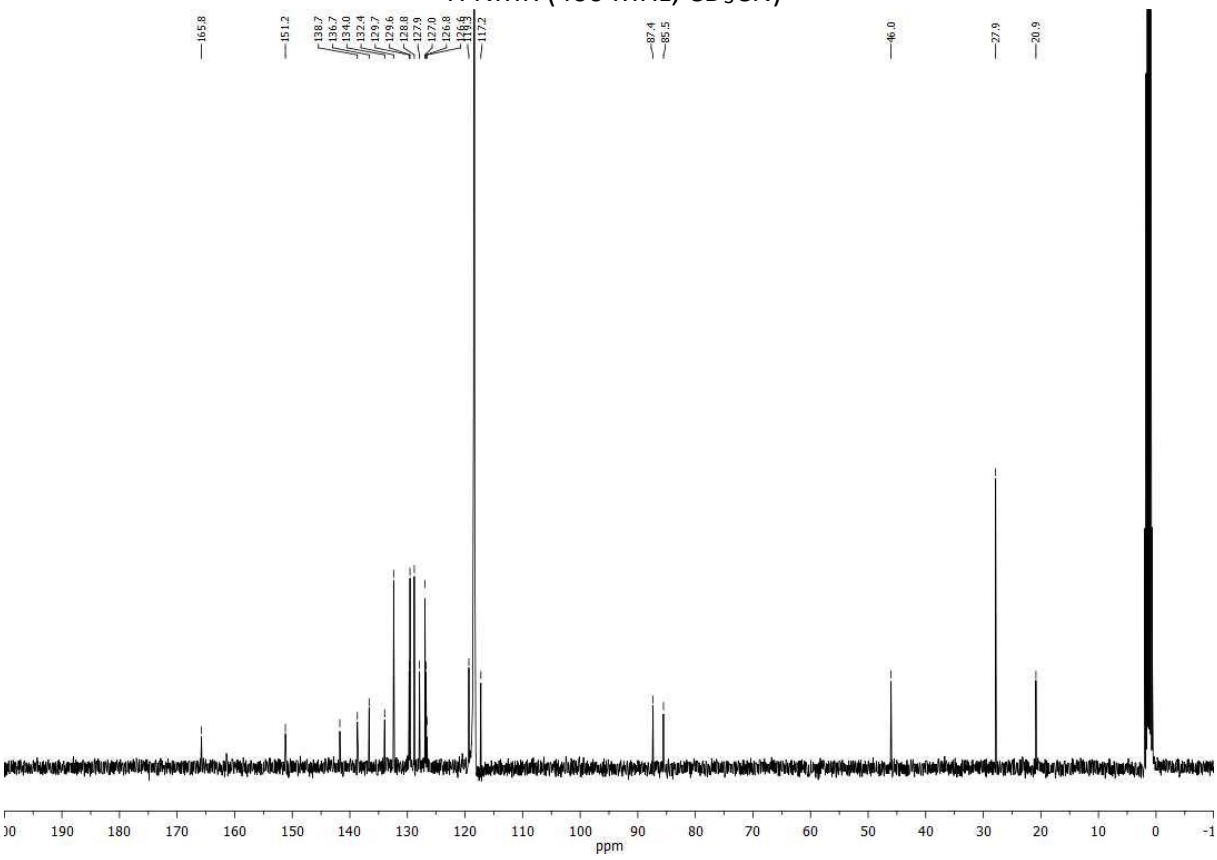


^{13}C NMR (100 MHz, $CDCl_3$)

Product **5ia**

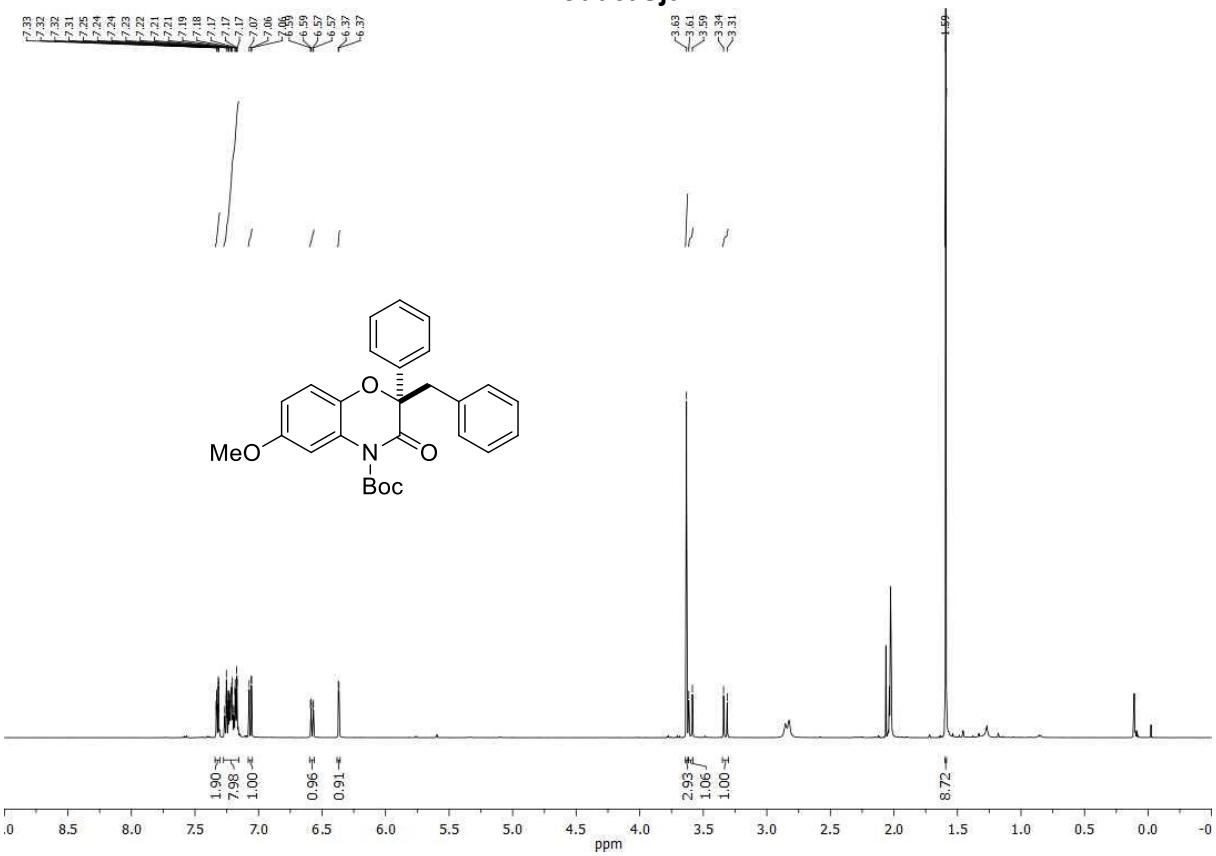


^{1}H NMR (400 MHz, CD_3CN)

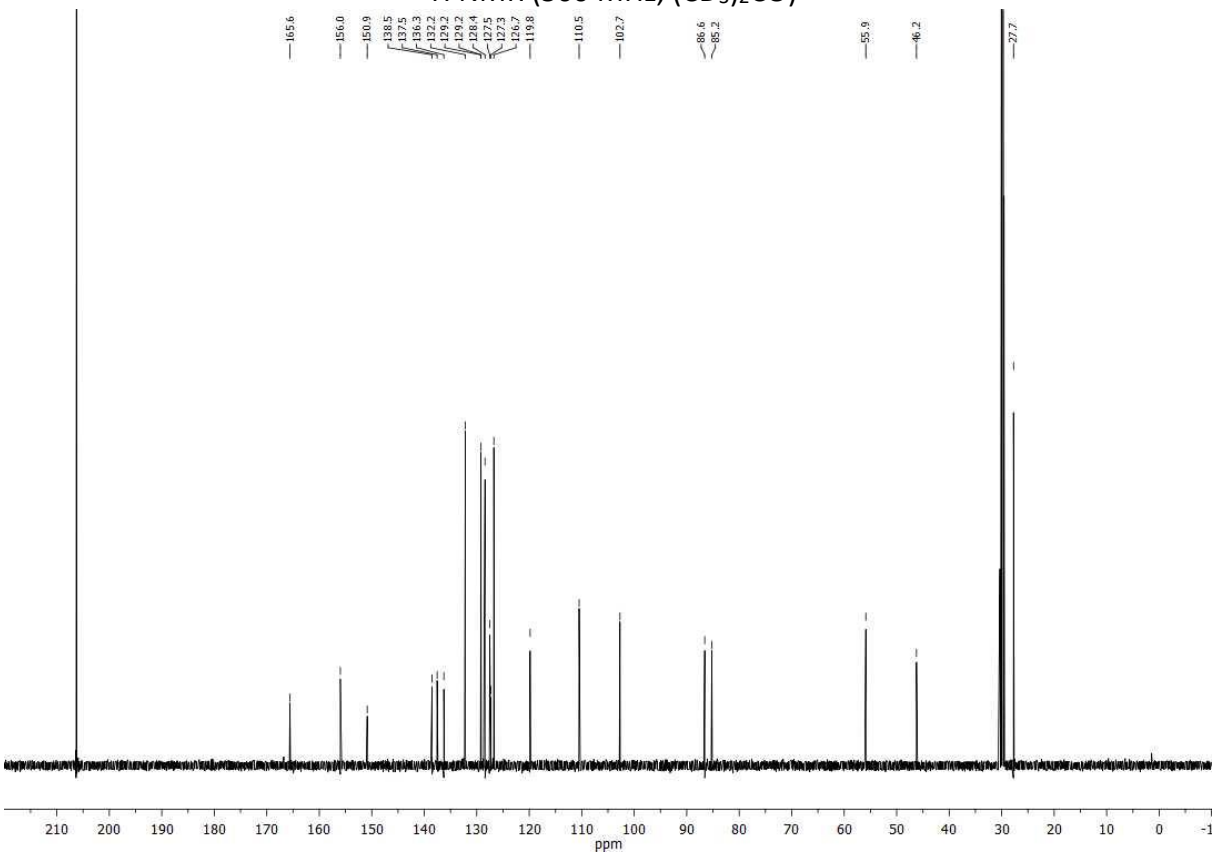


^{13}C NMR (100 MHz, CD_3CN)

Product **5ja**

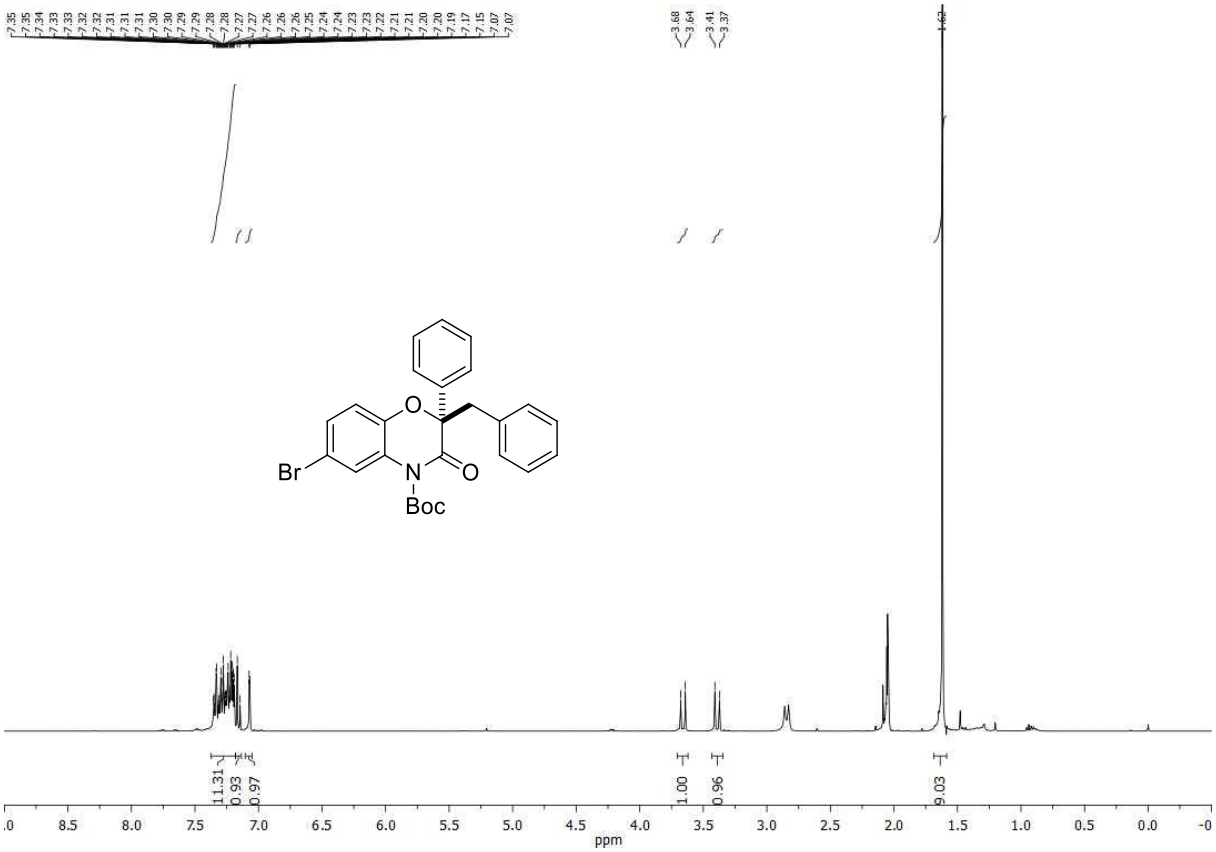


^{1}H NMR (500 MHz, $(CD_3)_2CO$)

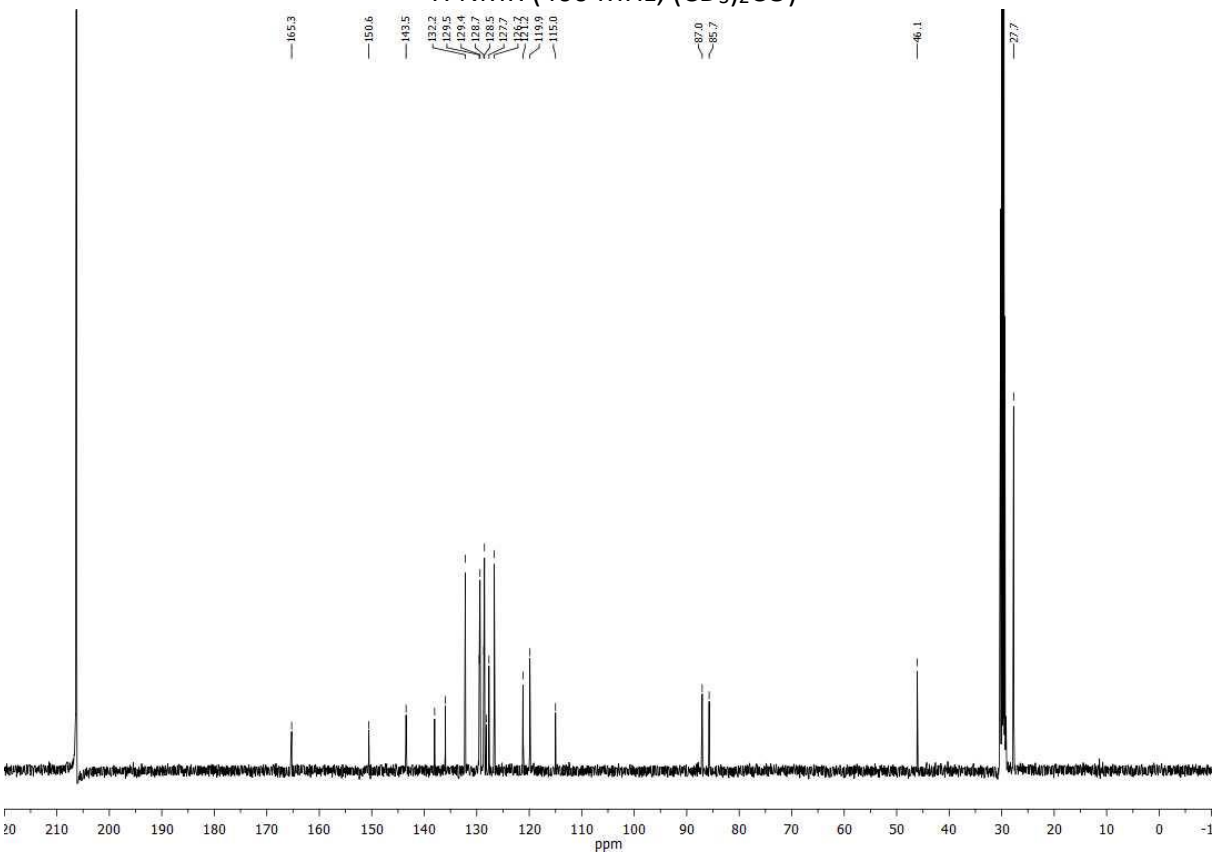


^{13}C NMR (125 MHz, $(CD_3)_2CO$)

Product **5ka**

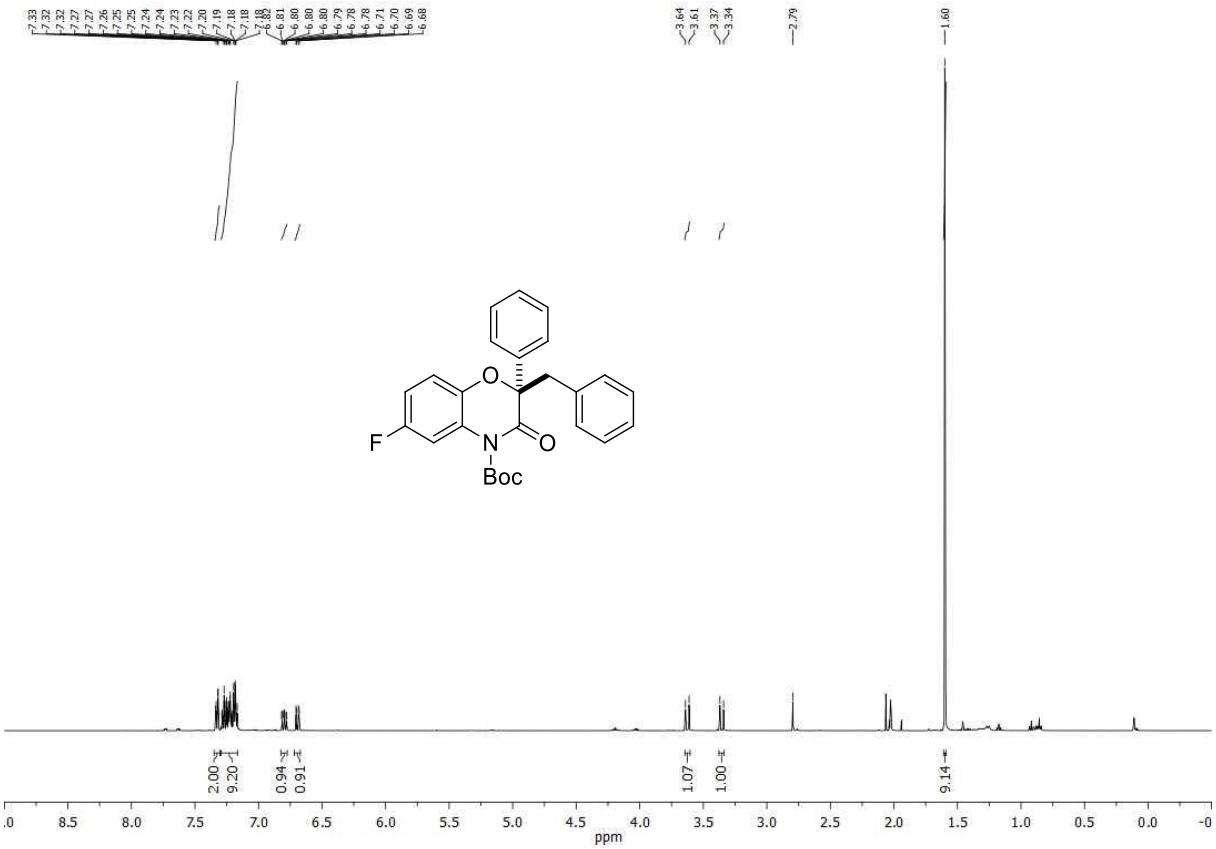


^{1}H NMR (400 MHz, $(CD_3)_2CO$)

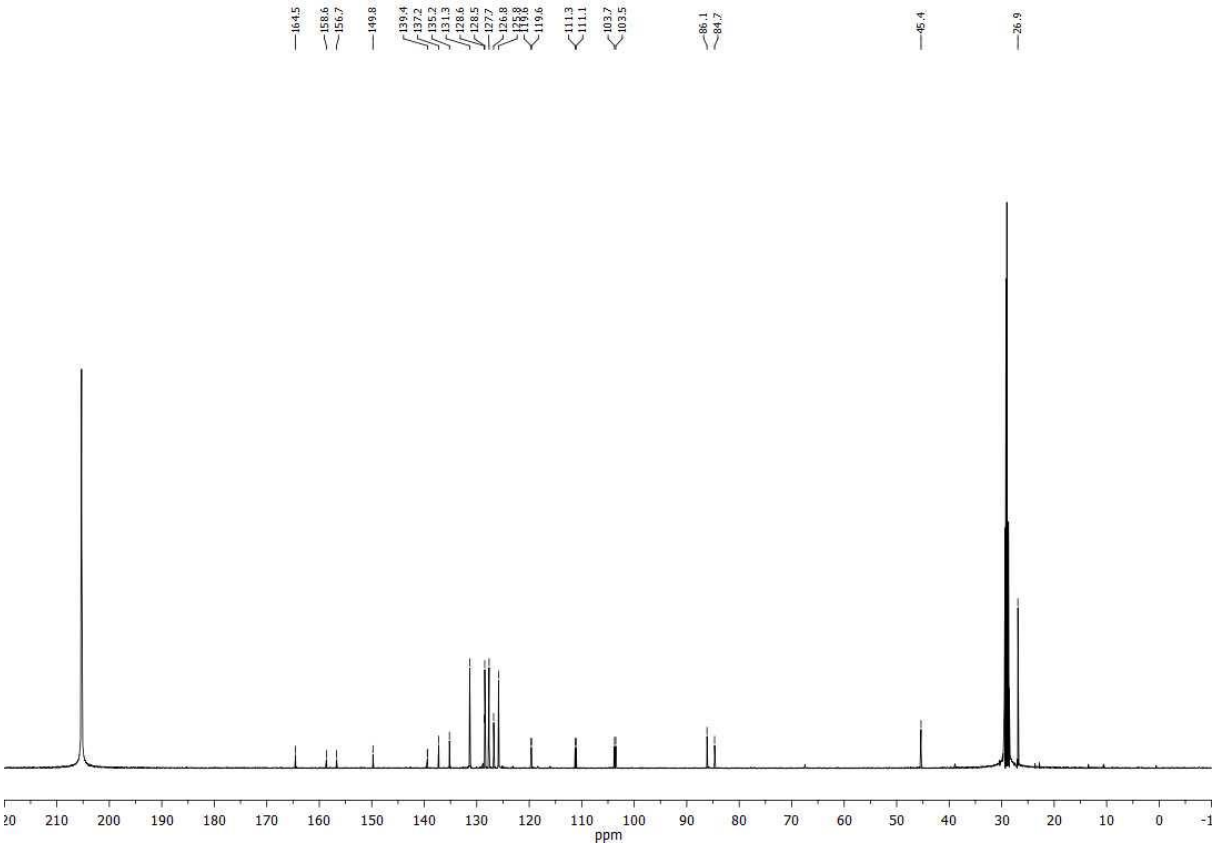


^{13}C NMR (400 MHz, $(CD_3)_2CO$)

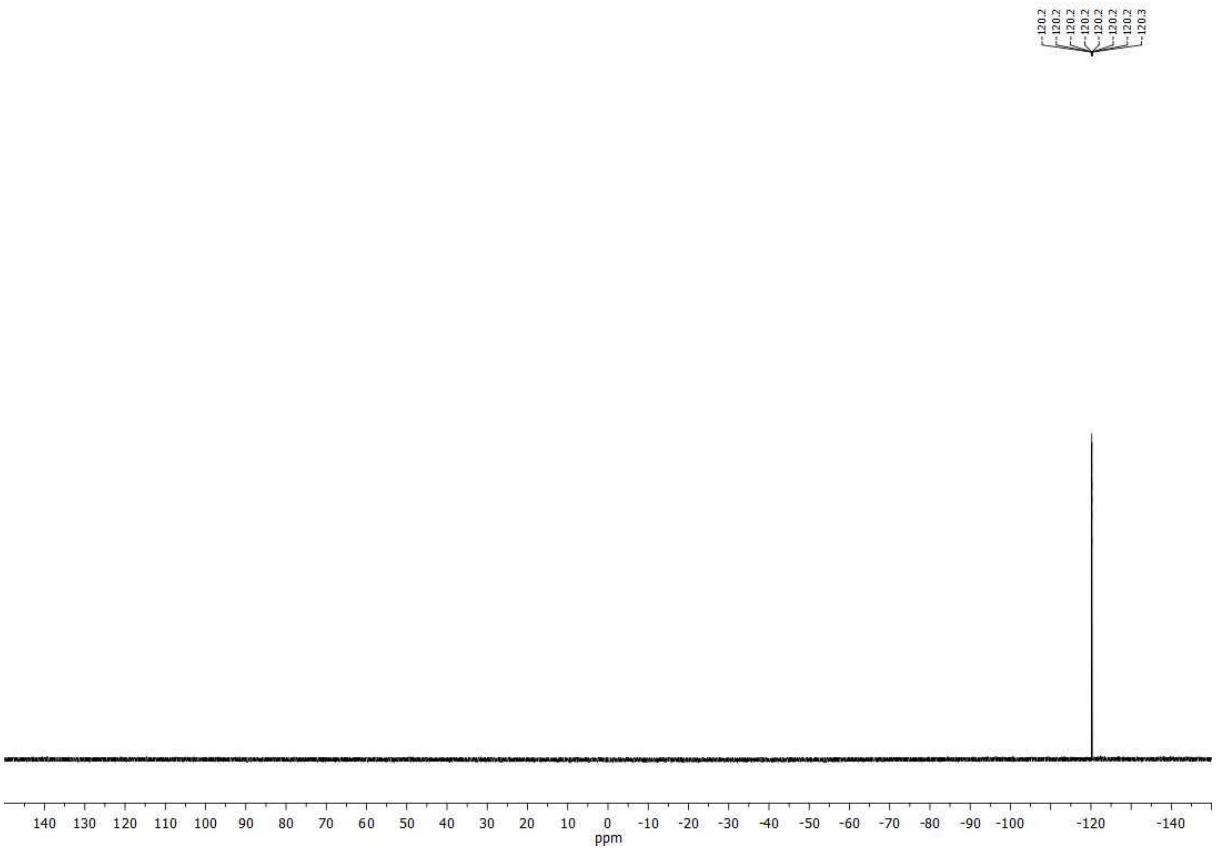
Product **5la**



^{1}H NMR (500 MHz, $(CD_3)_2CO$)

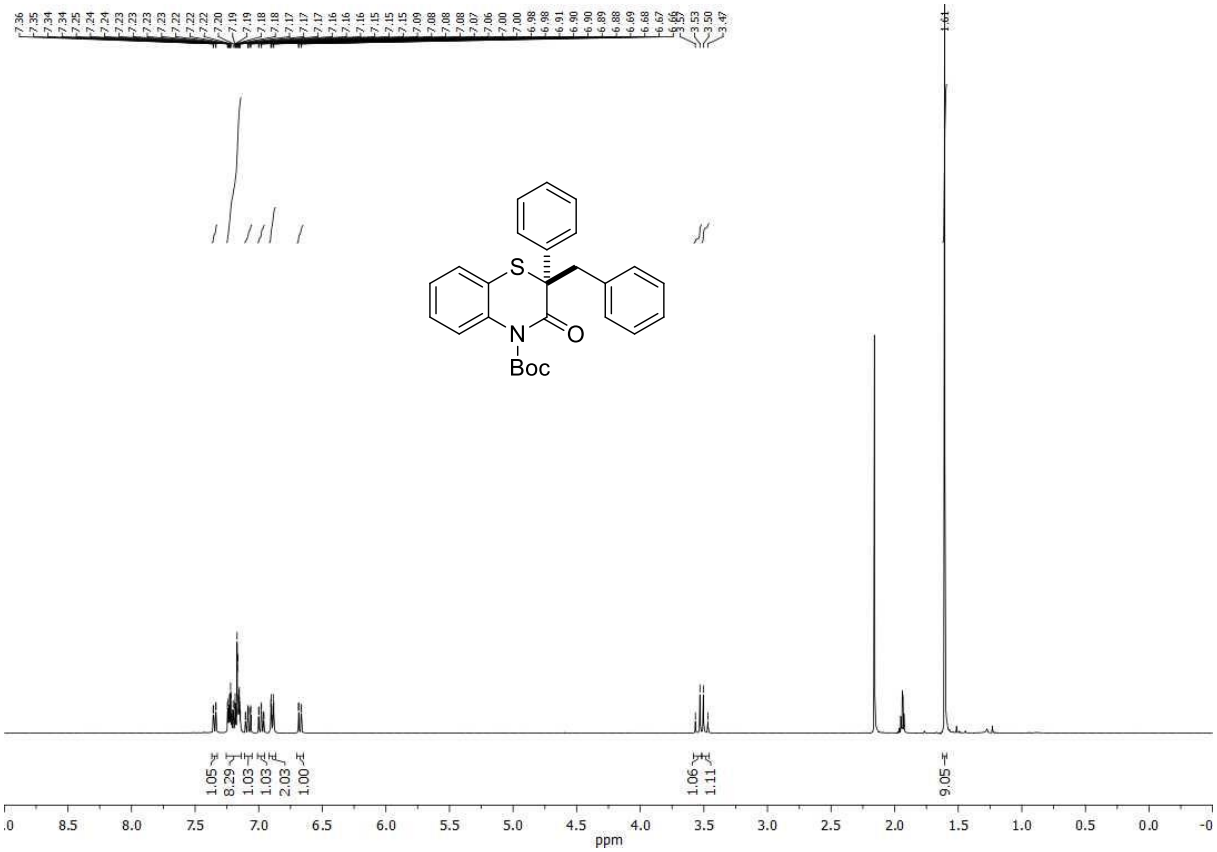


^{13}C NMR (125 MHz, $(CD_3)_2CO$)

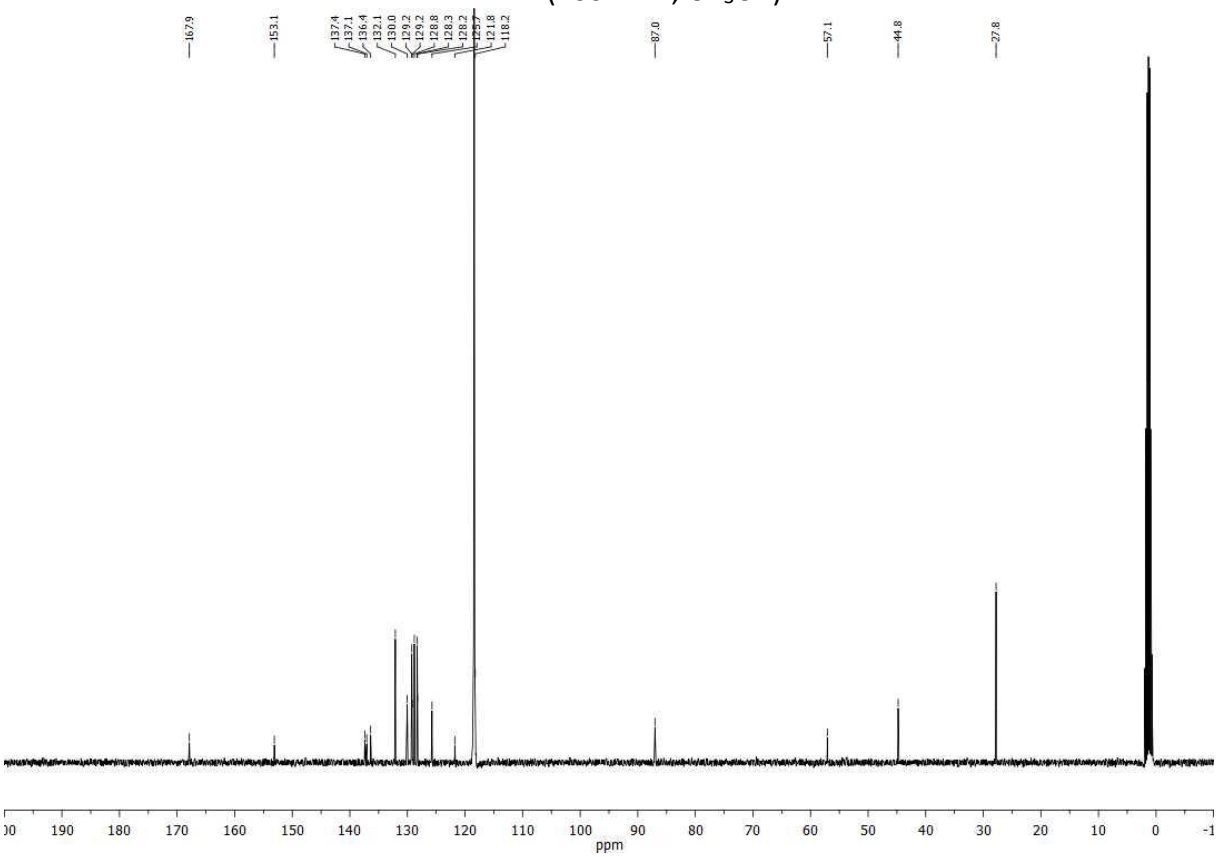


^{19}F NMR (466 MHz, $(CD_3)_2CO$)

Product **5ma**

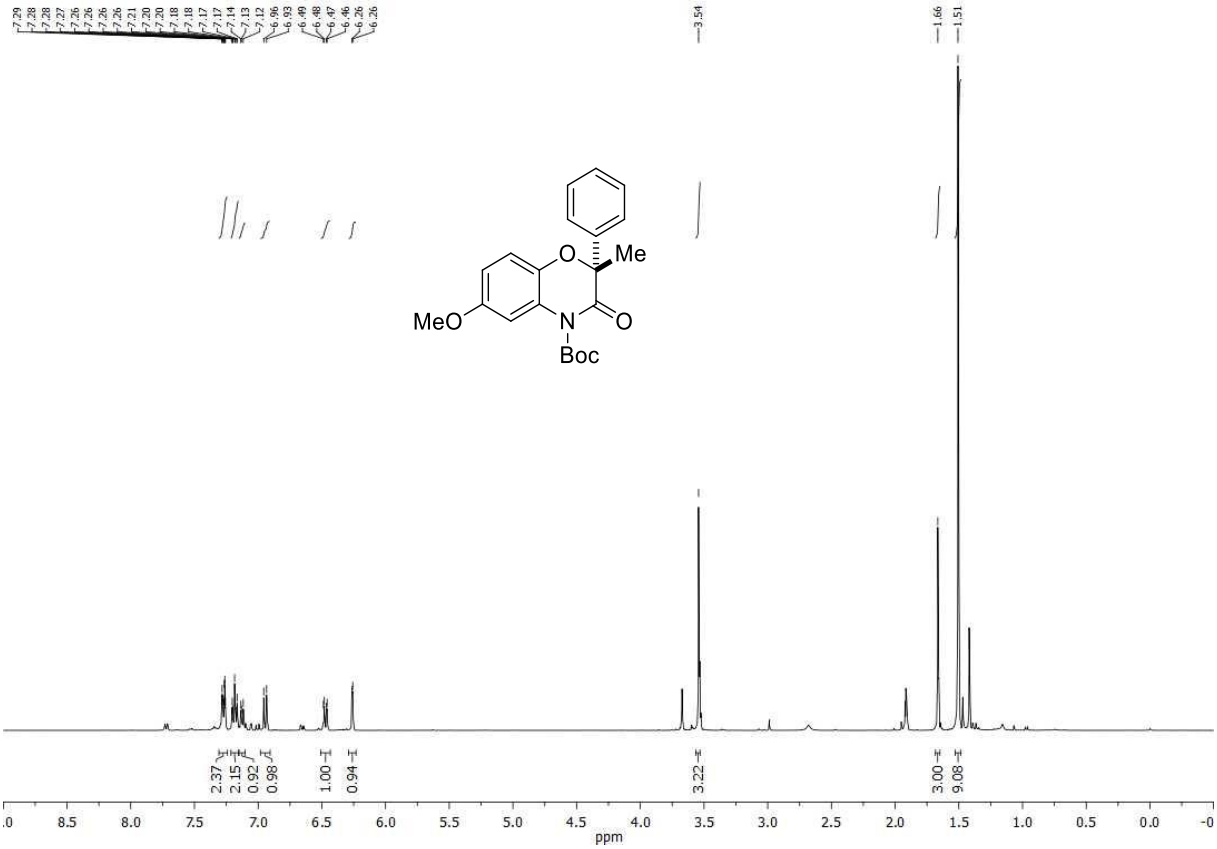


^{1}H NMR (400 MHz, CD_3CN)

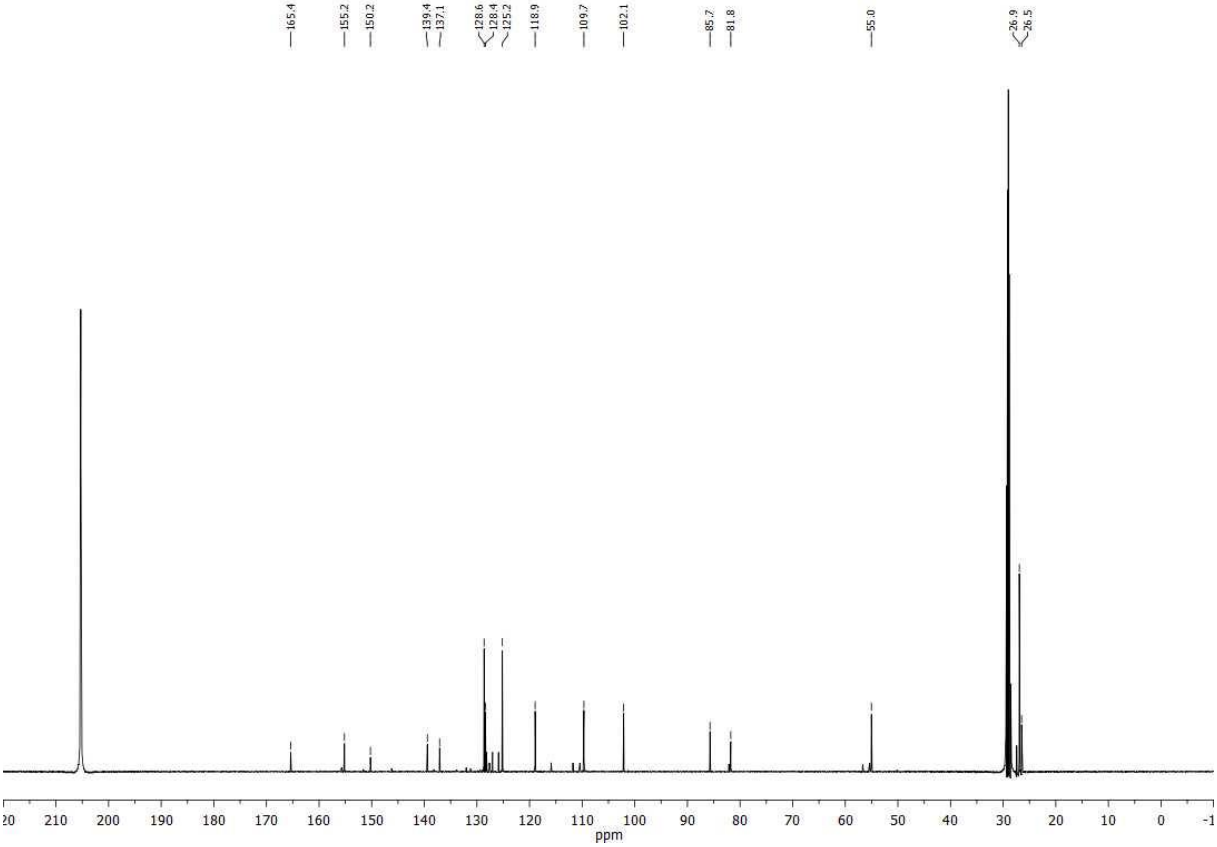


^{13}C NMR (100 MHz, CD_3CN)

Product **5jj**

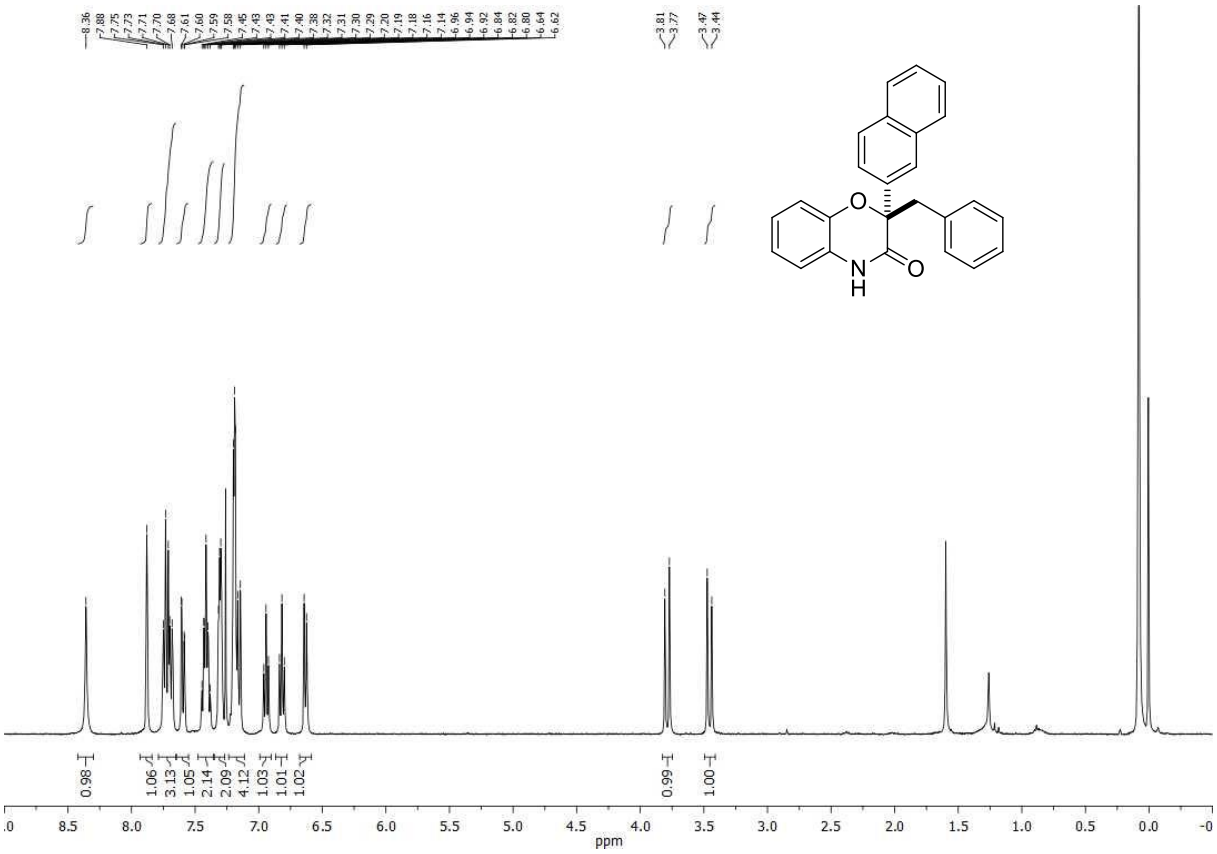


^{1}H NMR (400 MHz, $(CD_3)_2CO$)

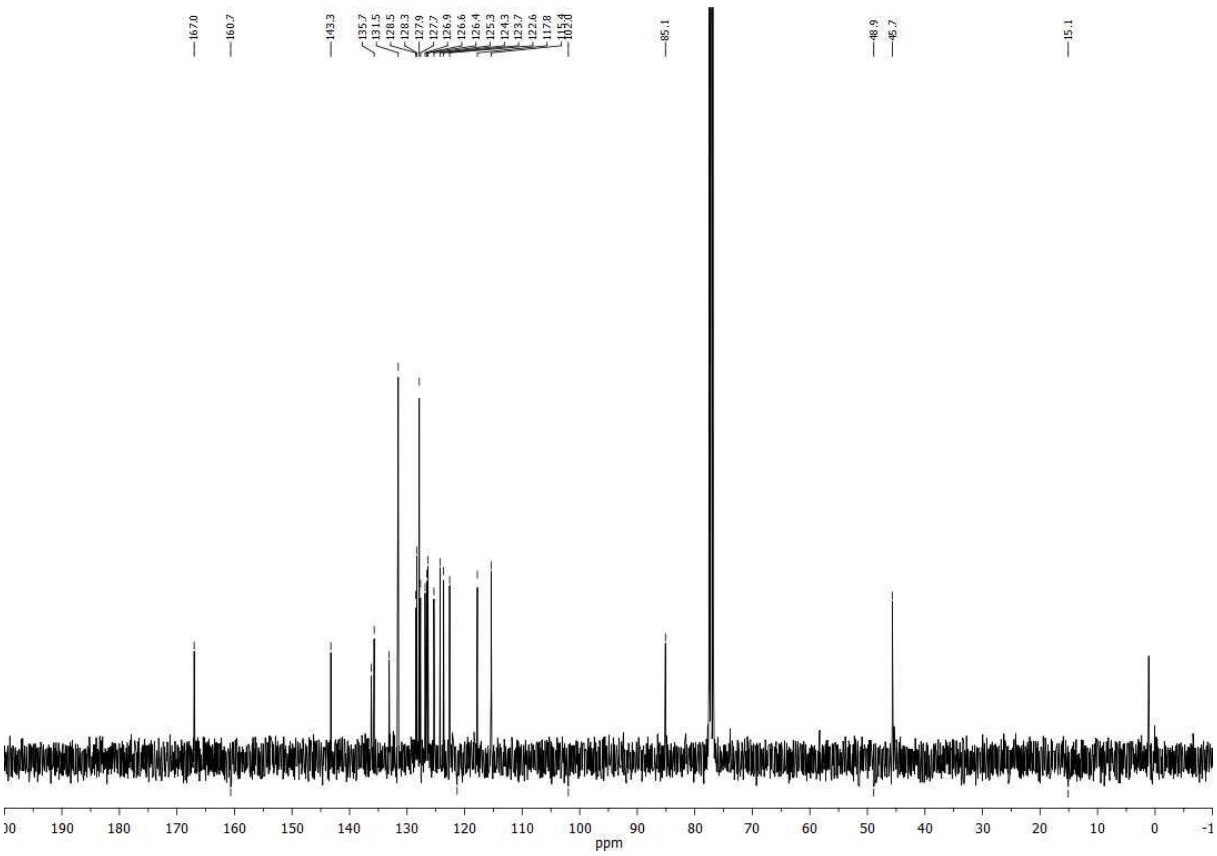


^{13}C NMR (125 MHz, $(CD_3)_2CO$)

Product **6ha**



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



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

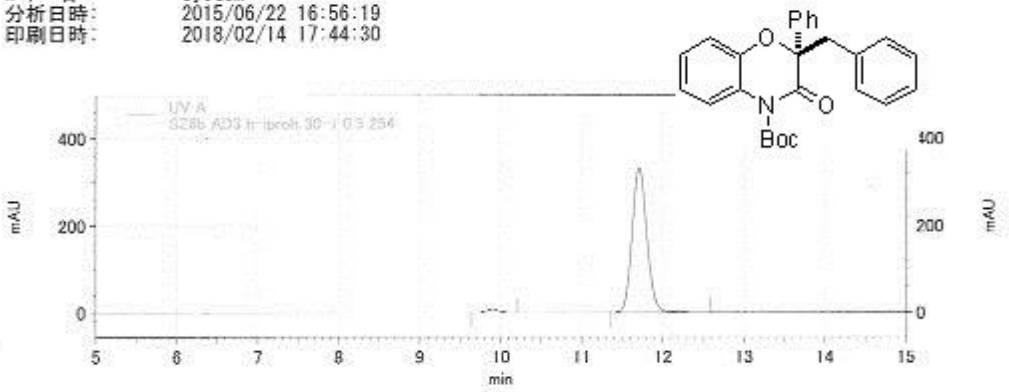
HPLC

Product **5aa**

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ6b AD3 h-iproh 30-1 0.5 254.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/06/22 16:56:19
印刷日時: 2018/02/14 17:44:30



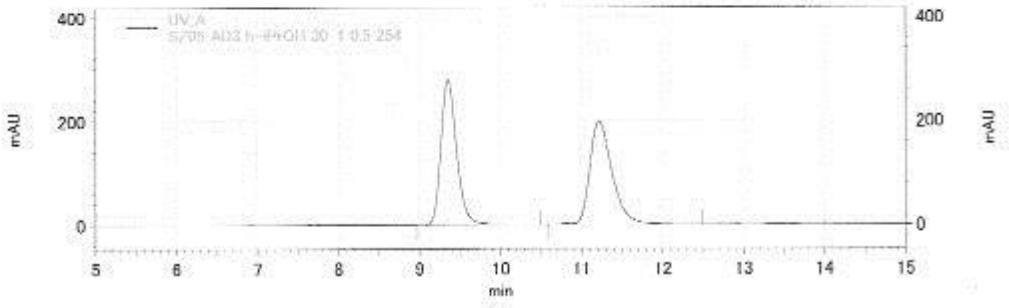
UV_A結果

No	RT	Area	Area%
1	9.90	80305	1.882
2	11.71	4186664	98.118
ﾄｰﾀﾙ		4266969	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ05 AD3 h-iPrOH 30-1 0.5 254.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/06/19 13:34:48
印刷日時: 2018/02/14 17:43:20



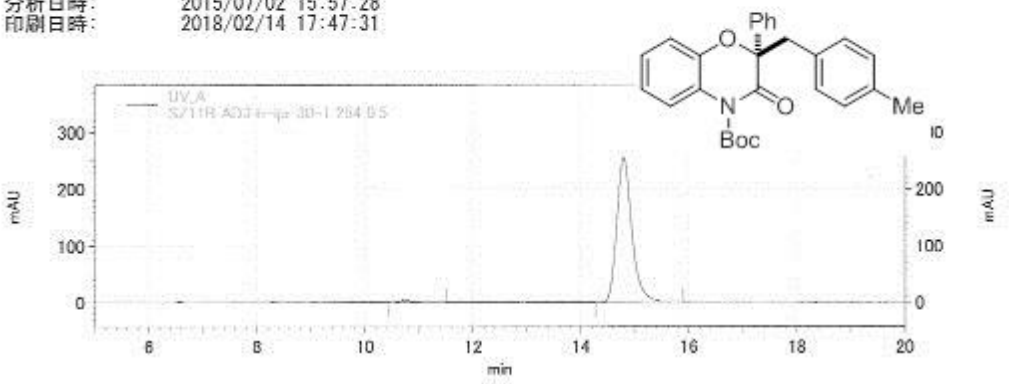
UV_A結果

No	RT	Area	Area%
1	9.35	3763104	49.999
2	11.22	3763190	50.001
ﾄｰﾀﾙ			

Product **5ab**

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ11B AD3 h-ipr 30-1 254 0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/02 15:57:28
印刷日時: 2018/02/14 17:47:31

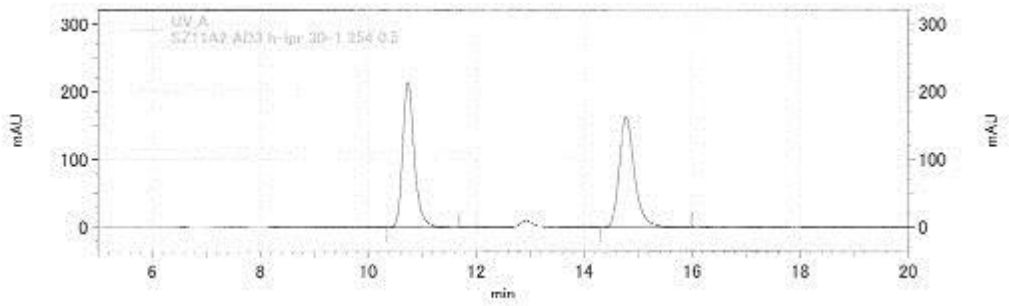


UV_A結果

No	RT	Area	Area%
1	10.75	72908	1.441
2	14.79	4984967	98.559
ﾄｰﾀﾙ		5057875	100.000

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ11A2 AD3 h-ipr 30-1 254 0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/02 16:32:55
印刷日時: 2018/02/14 17:47:45



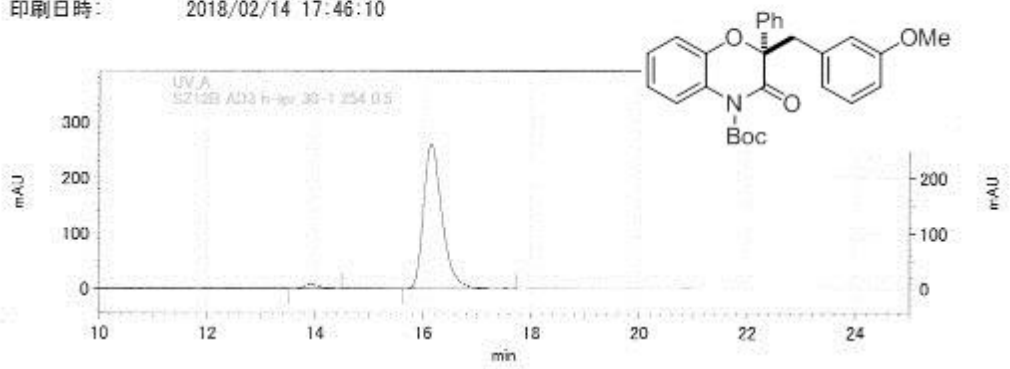
UV_A結果

No	RT	Area	Area%
1	10.74	3178142	50.157
2	14.78	3158281	49.843
ﾄｰﾀﾙ			

Product **5ac**

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ12B AD3 h-ipr 30-1 254 0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/03 15:19:55
印刷日時: 2018/02/14 17:46:10

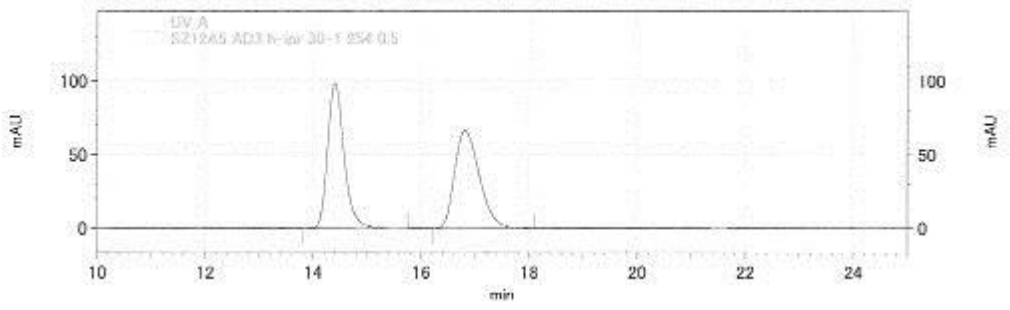


UV_A結果

No	RT	Area	Area%
1	13.92	145857	2.289
2	16.15	6224995	97.711
ﾄｰﾀﾙ		6370852	100.000

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ12A5 AD3 h-ipr 30-1 254 0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/02 11:36:38
印刷日時: 2018/02/14 17:46:41



UV_A結果

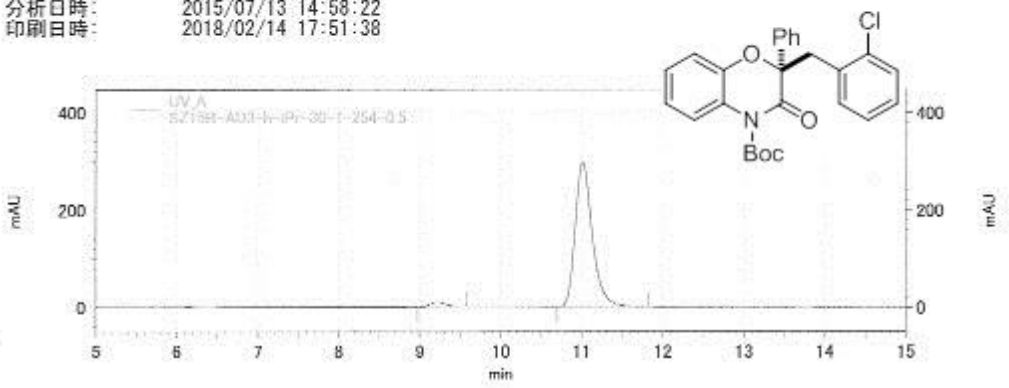
No	RT	Area	Area%
1	14.40	2071688	49.471
2	16.81	2115953	50.529
ﾄｰﾀﾙ			

Product **5ad**

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ15B-AD3-h-iPr-30-1-254-0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/13 14:58:22
印刷日時: 2018/02/14 17:51:38



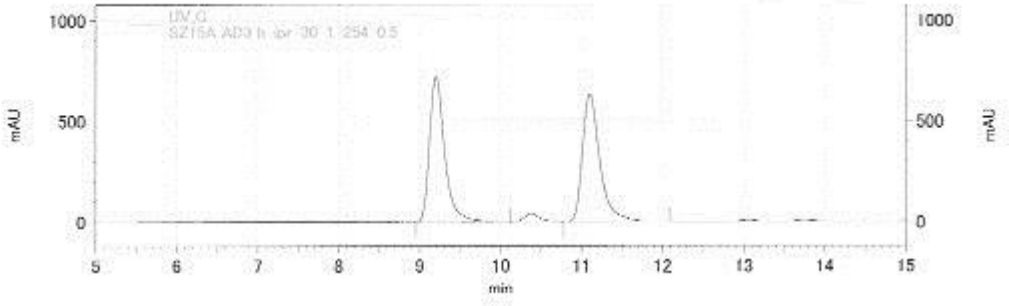
UV_A結果

No	RT	Area	Area%
1	9.21	119987	2.686
2	11.01	4347117	97.314
ﾄｰﾀﾙ		4467104	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ15A AD3 h-ipr-30-1-254-0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/10 15:42:48
印刷日時: 2018/02/14 17:52:25



UV_C結果

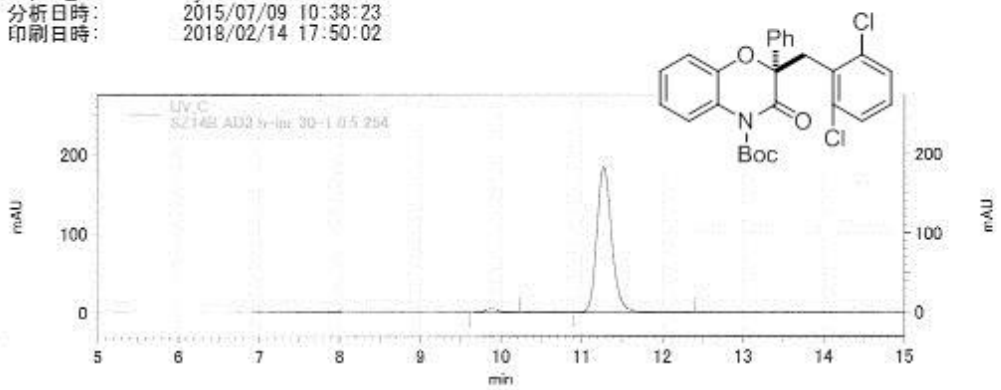
No	RT	Area	Area%
1	9.20	9278347	49.663
2	11.10	9404235	50.337
ﾄｰﾀﾙ			

Product **5ae**

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ14B AD3 h-ipr 30-1 0.5 254.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/09 10:38:23
印刷日時: 2018/02/14 17:50:02



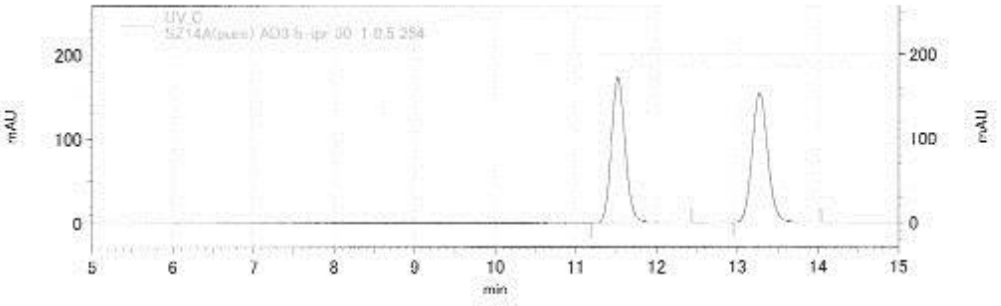
UV_C結果

No	RT	Area	Area%
1	9.88	52011	2.174
2	11.27	2340140	97.826
ﾄｰﾀﾙ		2392151	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ14A(pure) AD3 h-ipr 30-1 0.5 254.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/08 15:34:48
印刷日時: 2018/02/14 17:50:51



UV_C結果

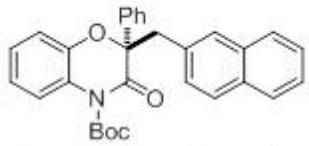
No	RT	Area	Area%
1	11.52	2056681	50.045
2	13.27	2052979	49.955
ﾄｰﾀﾙ			

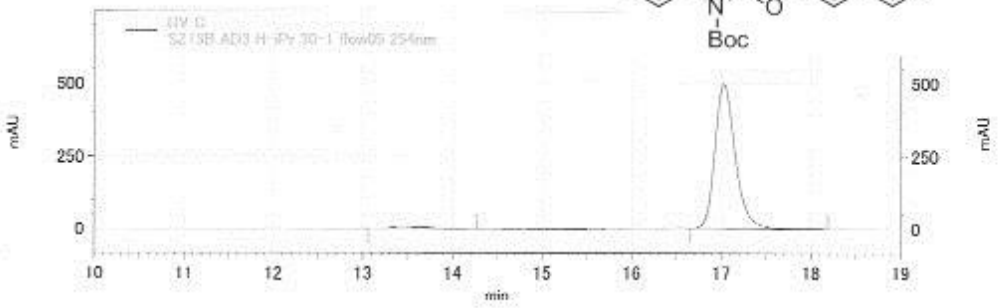
Product **5af**

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ13B AD3 H-iPr 30-1 flow05 254nm.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/21 17:49:45
印刷日時: 2018/02/14 17:48:55





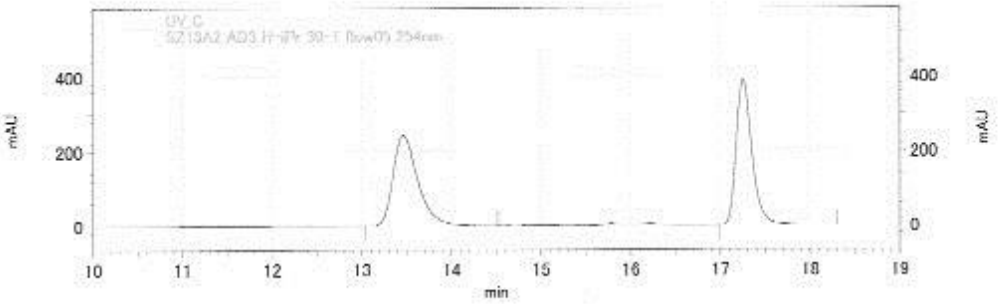
UV_C結果

No	RT	Area	Area%
1	13.45	211744	2.616
2	17.02	7881295	97.384
トータル		8093039	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ13A2 AD3 H-iPr 30-1 flow05 254nm.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/21 13:48:19
印刷日時: 2018/02/14 17:49:10



UV_C結果

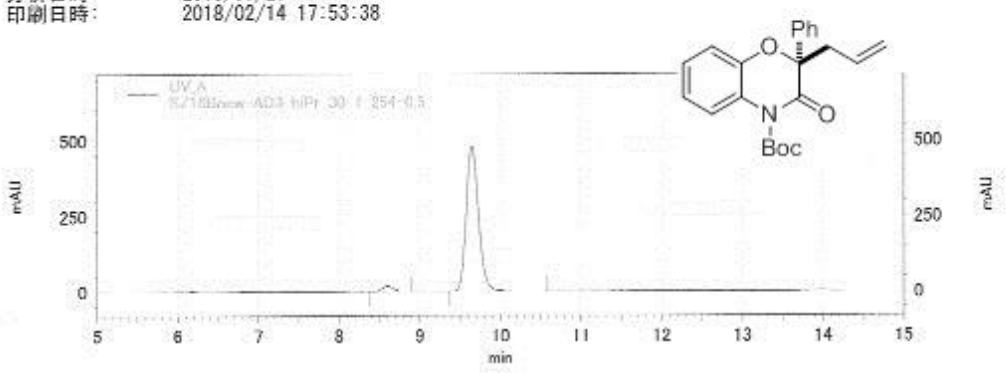
No	RT	Area	Area%
1	13.46	4667304	49.536
2	17.25	4754785	50.464

Product **5ag**

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ16Bnew-AD3-hiPr-30-1-254-0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/25 16:42:05
印刷日時: 2018/02/14 17:53:38



UV_A結果

No	RT	Area	Area%
1	8.60	169902	3.227
2	9.65	5094908	96.773
トータル		5264810	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ16A-AD3-h-iPr-30-1-254-0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
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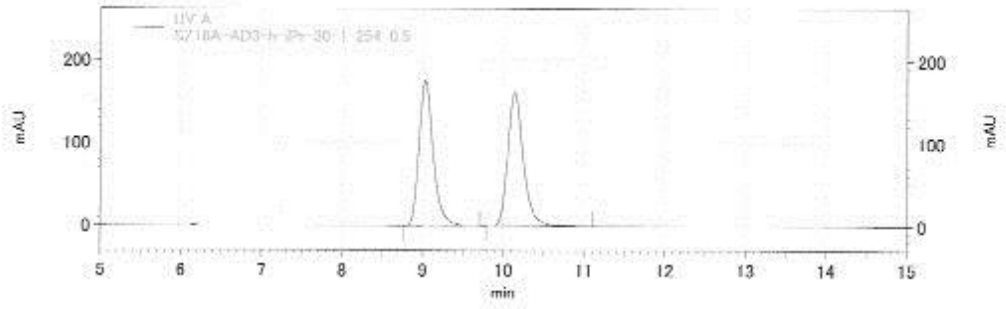
分析日時: 2015/07/13 12:46:53
印刷日時: 2018/02/14 17:53:14



UV_A結果

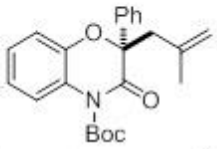
No	RT	Area	Area%
1	9.03	2154164	49.964
2	10.14	2157247	50.036
トータル			

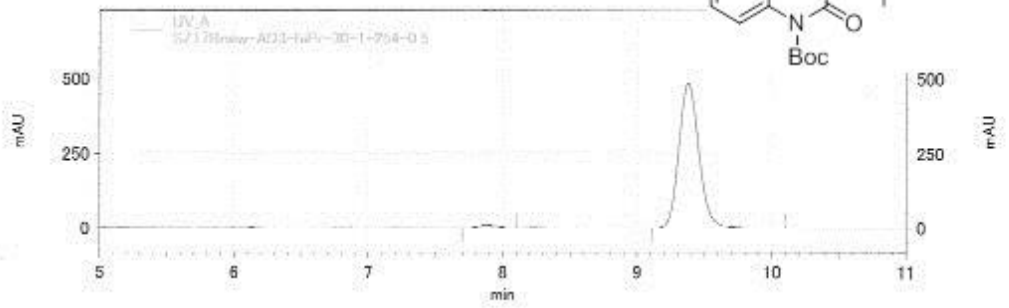
Product **5ah**

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ17Bnew-AD3-hiPr-30-I-254-0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/27 11:09:09
印刷日時: 2018/02/14 17:54:20





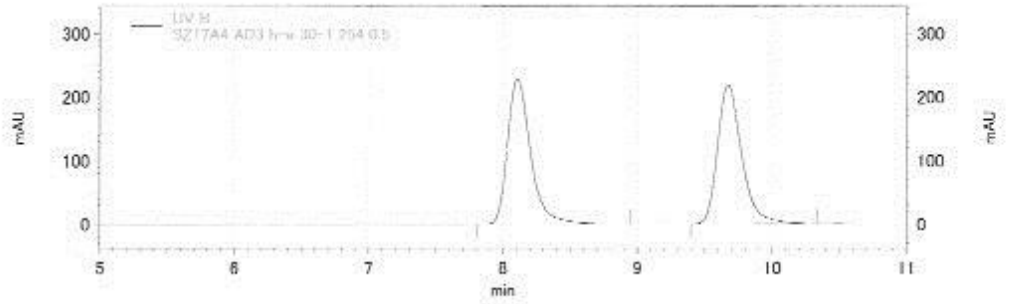
UV_A結果

No	RT	Area	Area%
1	7.89	84825	1.665
2	9.38	5008492	98.335
ﾄｰﾀﾙ		5093317	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ17A4 AD3 h-e 30-I 254 0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/18 15:02:43
印刷日時: 2018/02/14 17:54:47



UV_B結果

No	RT	Area	Area%
1	8.11	2707209	50.060
2	9.67	2700771	49.940
ﾄｰﾀﾙ			

Product **5ai**

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ20B AD3 h-ipr 30-1 254 0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/29 12:17:03
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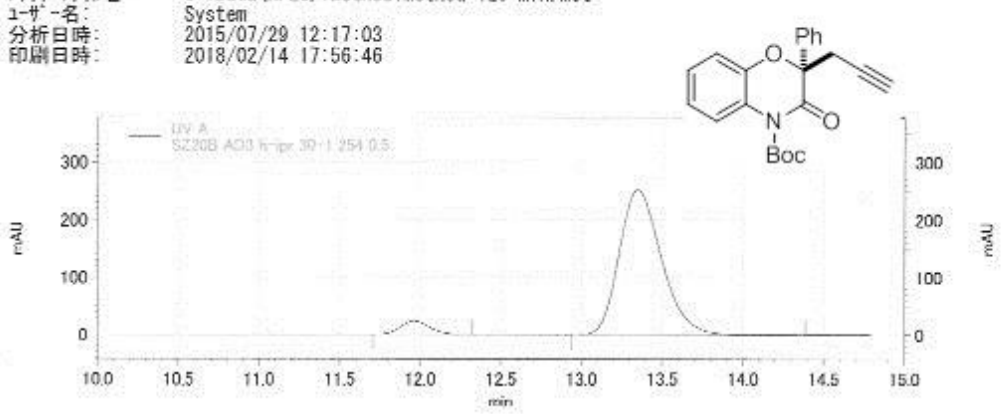


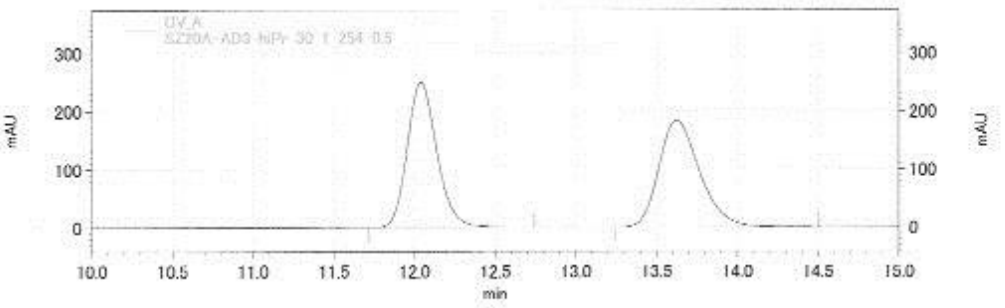
UV_A結果

No	RT	Area	Area%
1	11.96	298322	6.108
2	13.35	4585603	93.892
ﾄｰﾀﾙ		4883925	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ20A-AD3-hiPr-30-1-254-0.5.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/24 16:27:20
印刷日時: 2018/02/14 17:56:33



UV_A結果

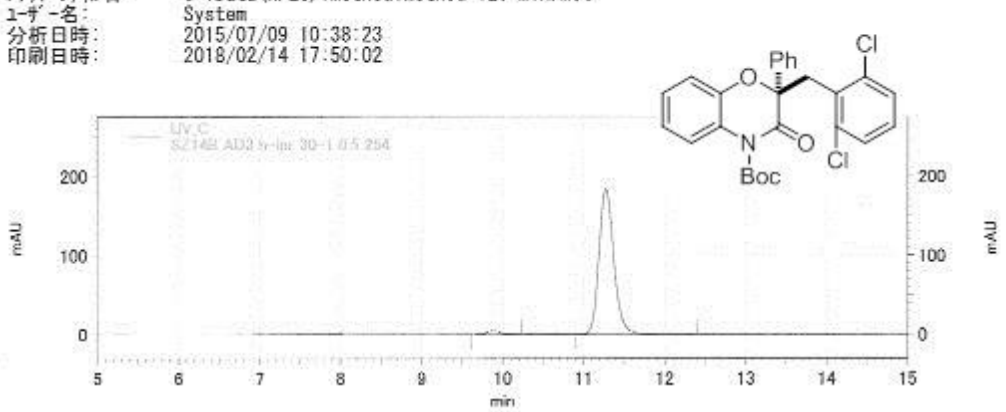
No	RT	Area	Area%
1	12.04	3175524	49.742
2	13.62	3208513	50.258
ﾄｰﾀﾙ			

Product **5ba**

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ14B AD3 h-ipr 30-1 0.5 254.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/09 10:38:23
印刷日時: 2018/02/14 17:50:02



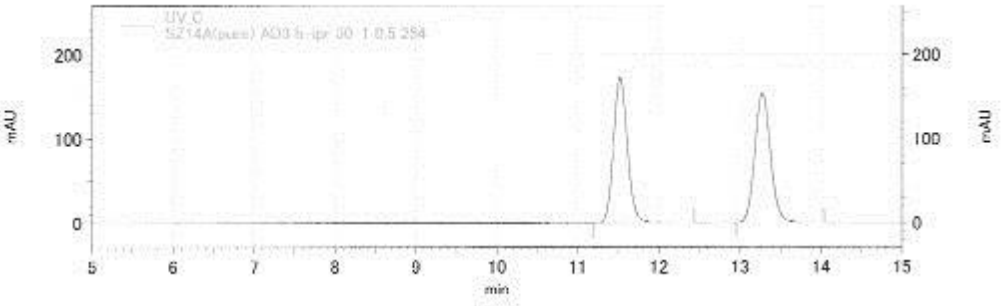
UV_C結果

No	RT	Area	Area%
1	9.88	52011	2.174
2	11.27	2340140	97.826
ﾄｰﾀﾙ		2392151	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥卒業 alumni¥Saman¥SZ14A(pure) AD3 h-ipr 30-1 0.5 254.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/07/08 15:34:48
印刷日時: 2018/02/14 17:50:51



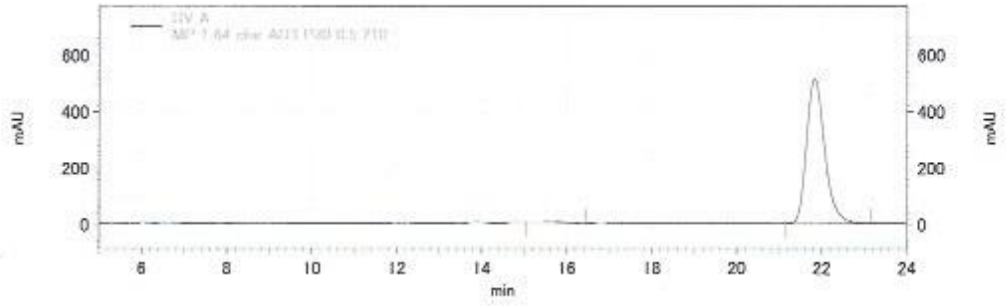
UV_C結果

No	RT	Area	Area%
1	11.52	2056681	50.045
2	13.27	2052979	49.955
ﾄｰﾀﾙ			

Product **5ba**

面積%レポート

データファイル名 : C:¥Data(HPLC)¥Martin¥MP_I_64_chir AD3 P30 0.5 210.dat
メソッドファイル名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ユーザー名: System
分析日時: 2015/12/03 21:15:59
印刷日時: 2017/12/01 17:28:44

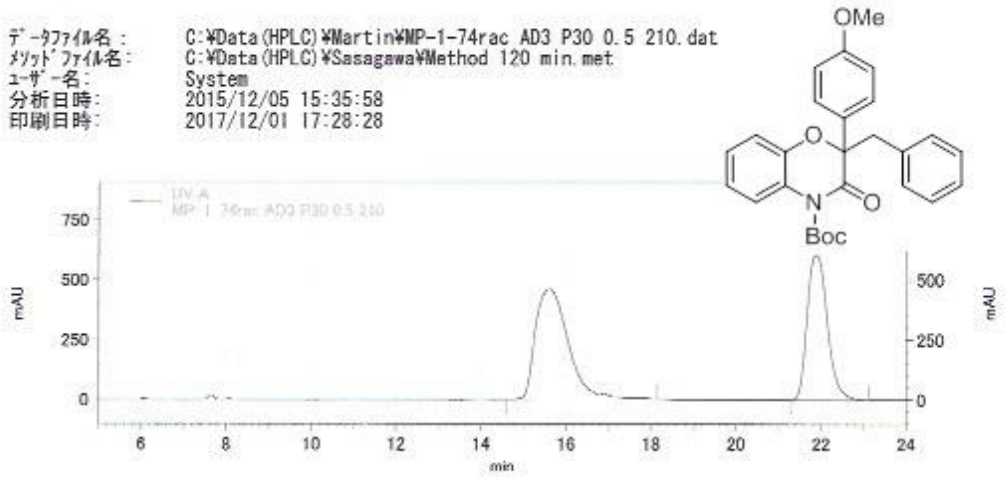


UV_A結果

No	RT	Area	Area%
1	15.74	168359	1.096
2	21.83	15186259	98.904
トータル		15354618	100.000

面積%レポート

データファイル名 : C:¥Data(HPLC)¥Martin¥MP-1-74rac AD3 P30 0.5 210.dat
メソッドファイル名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ユーザー名: System
分析日時: 2015/12/05 15:35:58
印刷日時: 2017/12/01 17:28:28



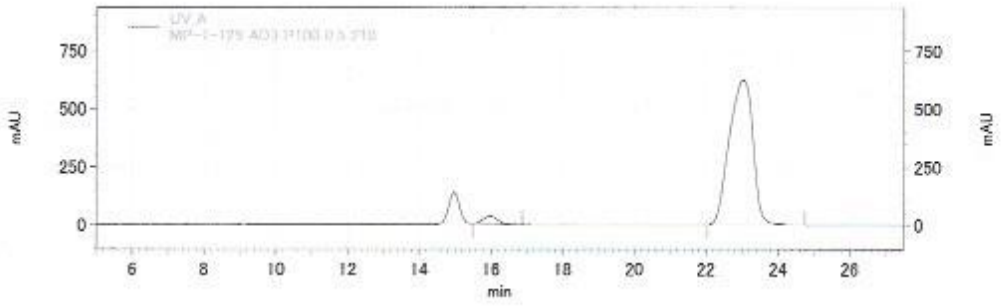
UV_A結果

No	RT	Area	Area%
1	15.60	24707955	55.503
2	21.88	19808443	44.497

Product **5ca**

面積%レポート

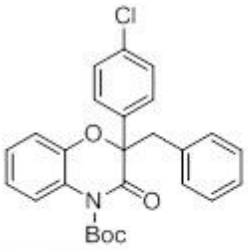
ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP-1-129 AD3 P100 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2016/01/19 14:21:38
印刷日時: 2017/11/29 15:30:25



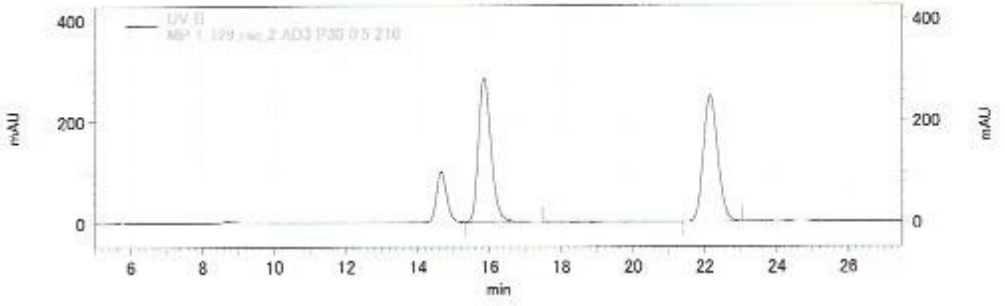
UV_A結果

No	RT	Area	Area%
1	15.98	961215	3.262
2	23.05	28510310	96.738
ﾄｰﾀﾙ		29471525	100.000

面積%レポート



ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP_1_129_rac_2 AD3 P30 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2017/11/29 15:05:45
印刷日時: 2017/11/29 15:34:33



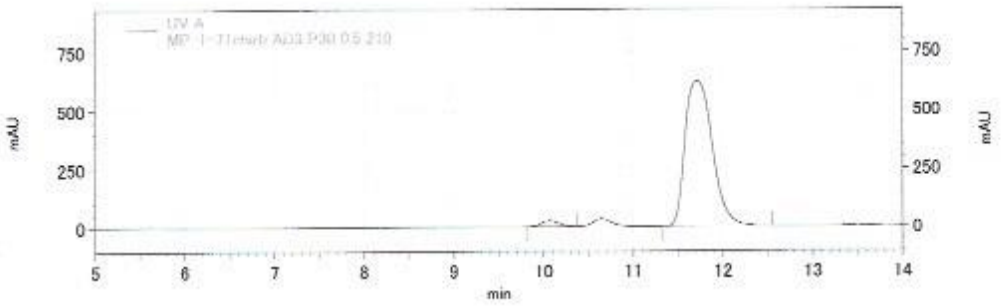
UV_B結果

No	RT	Area	Area%
1	15.85	6879169	49.944
2	22.15	6894649	50.056
ﾄｰﾀﾙ			

Product **5da**

面積%レポート

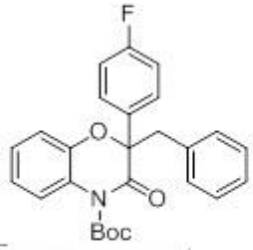
ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP-1-71chirb AD3 P30 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/12/05 14:59:34
印刷日時: 2017/12/01 9:25:08



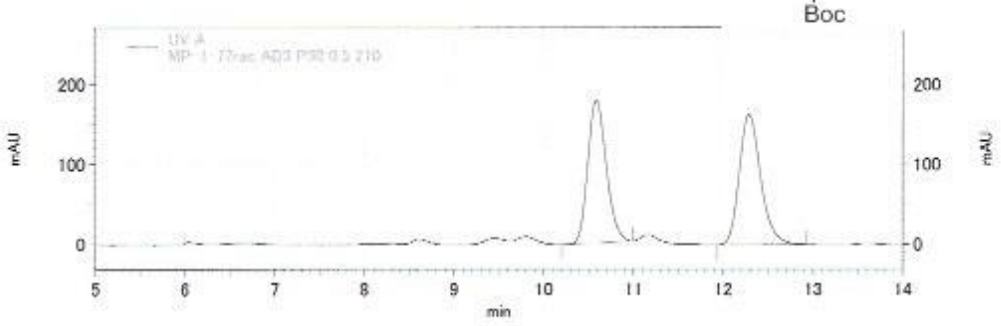
UV_A結果

No	RT	Area	Area%
1	10.07	335458	2.496
2	11.71	13103660	97.504
ﾄｰﾀﾙ		13439118	100.000

面積%レポート



ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP-1-77rac AD3 P30 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/12/05 15:18:19
印刷日時: 2017/12/01 9:25:30



UV_A結果

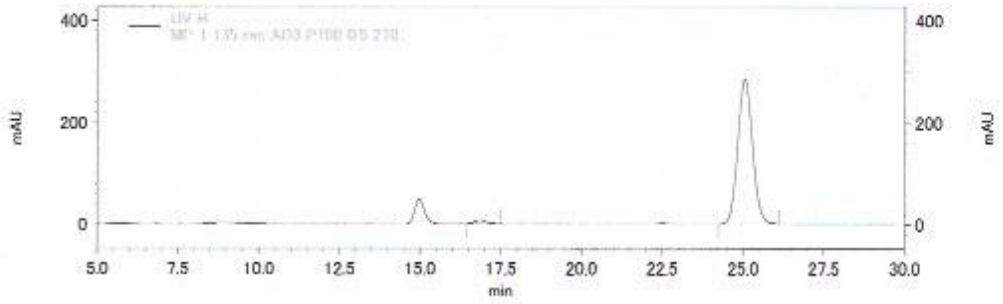
No	RT	Area	Area%
1	10.58	2561378	48.799
2	12.28	2687427	51.201
ﾄｰﾀﾙ			

Product **5ea**

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP_1_135_rac AD3 P100 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2017/11/29 15:35:44
印刷日時: 2017/11/29 16:05:32



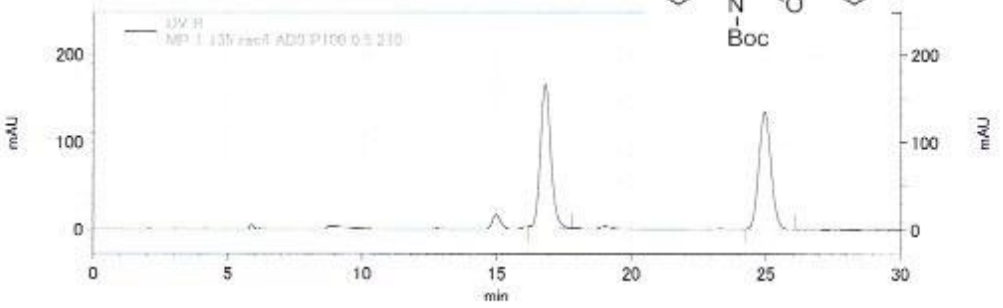
UV_B結果

No	RT	Area	Area%
1	16.85	165107	1.811
2	25.05	8950360	98.189
ﾄｰﾀﾙ		9115467	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥Project1¥MP_1_135_rac4 /
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2017/11/29 17:12:45
印刷日時: 2017/11/29 17:43:38



UV_B結果

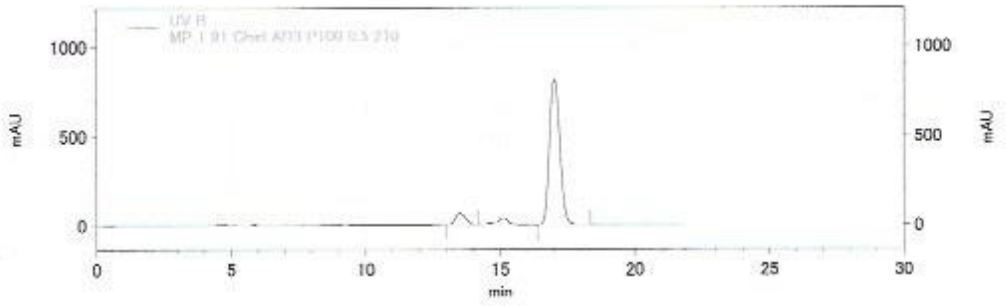
No	RT	Area	Area%
1	16.80	4345176	51.021
2	24.95	4171327	48.979
ﾄｰﾀﾙ			

Product **5fa**

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥Project1¥MP_1_91_Chirl AD3 P100 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2017/11/30 11:00:37
印刷日時: 2017/11/30 11:22:28



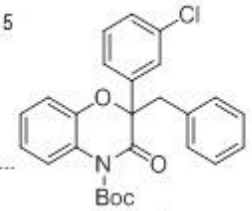
UV_B結果

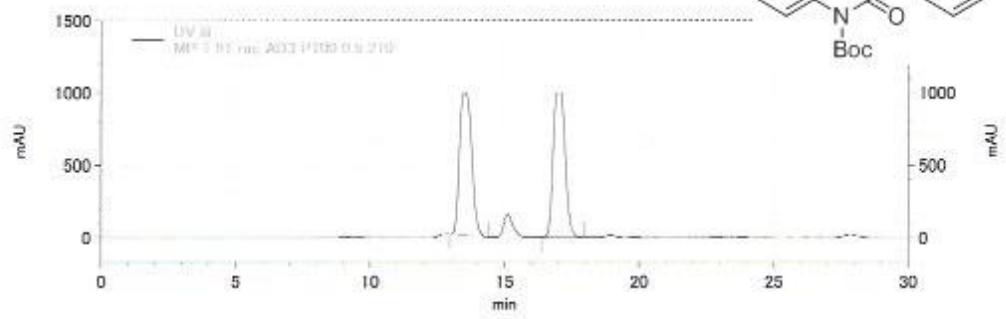
No	RT	Area	Area%
1	13.50	1698999	7.211
2	17.01	21861761	92.789
ﾄｰﾀﾙ		23560760	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥Project1¥MP_1_91_rac AD3 P100 0.5
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2017/11/30 10:24:39
印刷日時: 2017/11/30 10:59:46





UV_B結果

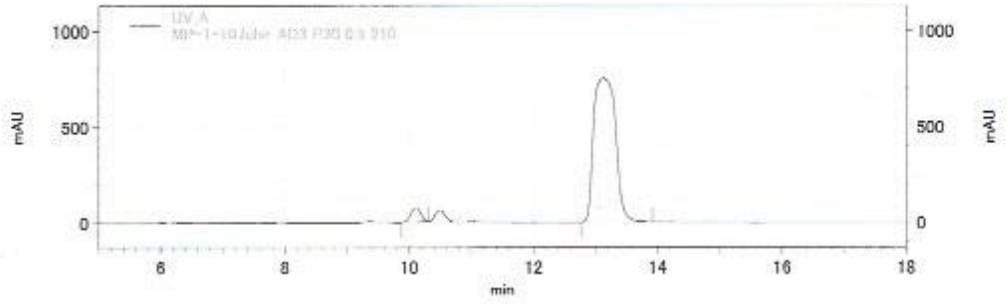
No	RT	Area	Area%
1	13.55	30833709	50.072
2	17.04	30744733	49.928
ﾄｰﾀﾙ			

Product **5ga**

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP-1-107chir AD3 P30 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/12/24 11:46:49
印刷日時: 2017/12/01 9:31:48



UV_A結果

No	RT	Area	Area%
1	10.11	836545	4.343
2	13.13	18425581	95.657
トータル		19262126	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP-1-108racB AD3 P30 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
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分析日時: 2016/01/07 16:32:35
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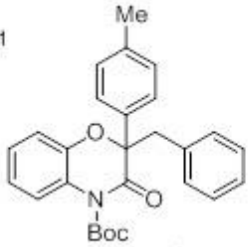
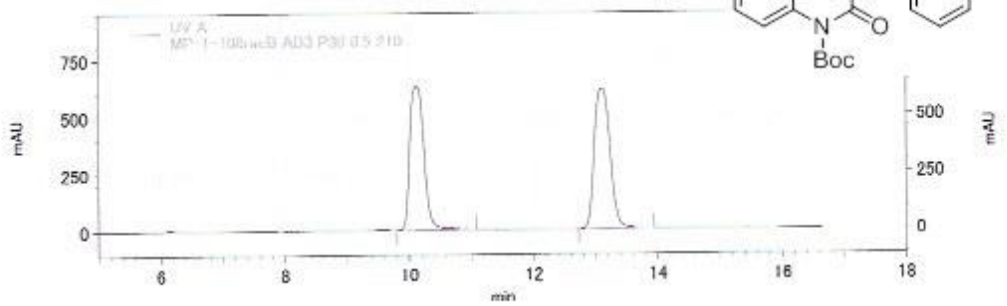




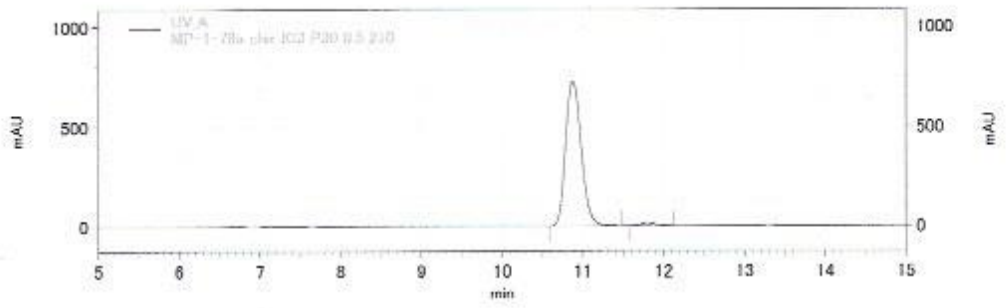
UV_A結果

No	RT	Area	Area%
1	10.12	9961356	47.771
2	13.11	10891118	52.229
トータル			

Product **5ha**

面積%レポート

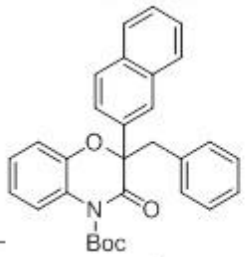
ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP-1-78a chir IC3 P30 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/12/10 14:05:08
印刷日時: 2017/12/01 9:10:26



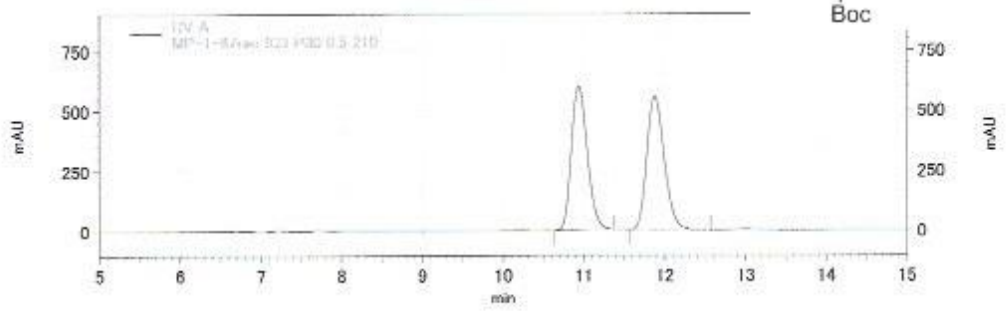
UV_A結果

No	RT	Area	Area%
1	10.88	9740345	98.159
2	11.80	182693	1.841
ﾄｰﾀﾙ		9923038	100.000

面積%レポート



ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP-1-87rac IC3 P30 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/12/11 16:10:48
印刷日時: 2017/12/01 9:11:04



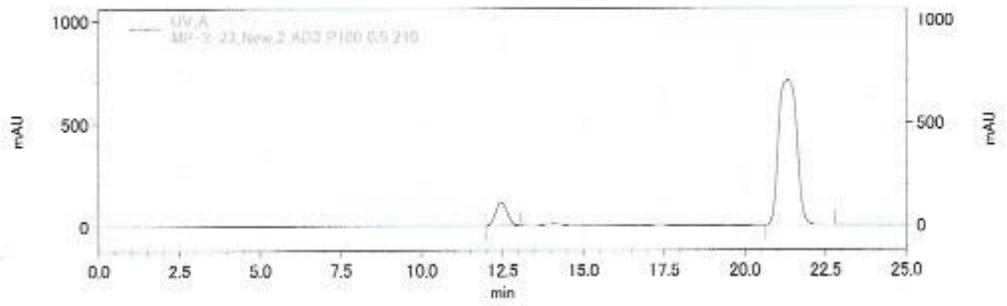
UV_A結果

No	RT	Area	Area%
1	10.94	8189392	49.520
2	11.88	8348070	50.480

Product **5ia**

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP-2-23_New_2 AD3 P100 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2016/04/23 12:37:43
印刷日時: 2017/12/01 9:06:01



UV_A結果

No	RT	Area	Area%
1	12.45	2900428	9.496
2	21.31	27644153	90.504
ﾄｰﾀﾙ		30544581	100.000

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥Project1¥MP_2_23_rac
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
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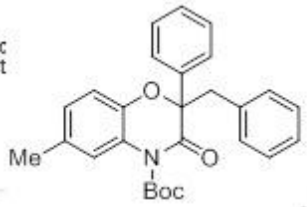
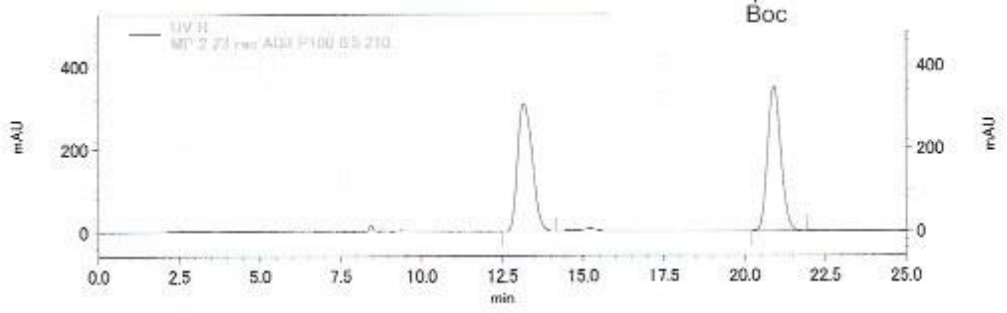
印刷日時: 2017/12/01 9:06:18





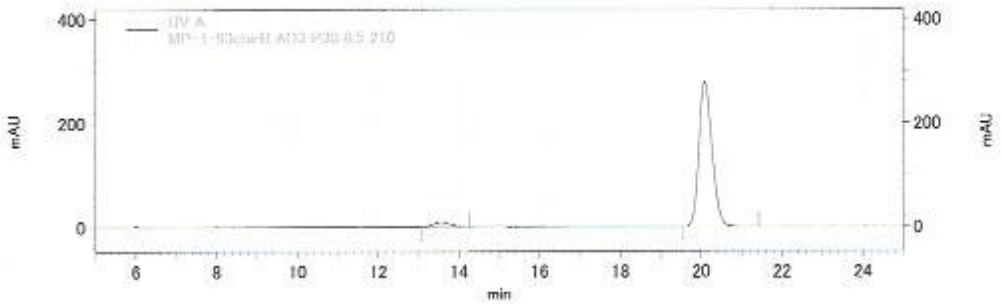
UV_B結果

No	RT	Area	Area%
1	13.17	9784192	49.616
2	20.91	9935581	50.384

Product **5jj**

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP-1-93chirB AD3 P30 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/12/17 10:57:24
印刷日時: 2017/12/01 9:20:52

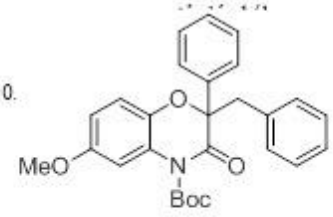


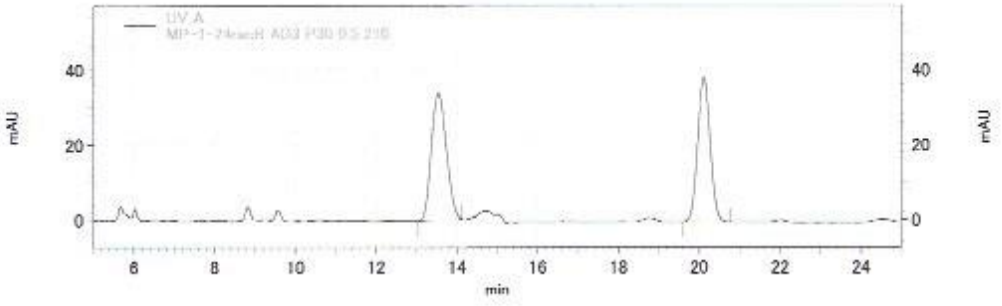
UV_A結果

No	RT	Area	Area%
1	13.57	262705	4.000
2	20.09	6304757	96.000
ﾄｰﾀﾙ		6567462	100.000

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP-1-24racB AD3 P30 0.5 210.
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2015/12/17 11:26:30
印刷日時: 2017/12/01 9:21:24





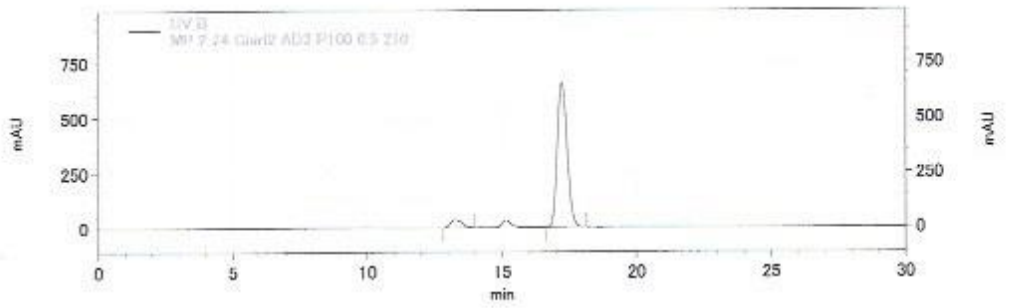
UV_A結果

No	RT	Area	Area%
1	13.54	880084	51.243
2	20.11	837374	48.757

Product **5ka**

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥Project1¥MP_2_24_Chir12 AD3 P100 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2017/11/30 13:48:24
印刷日時: 2017/11/30 14:29:45



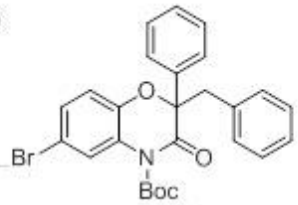
UV_B結果

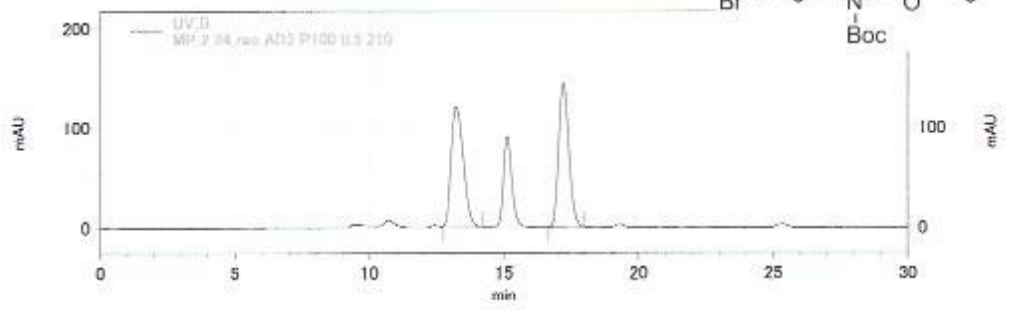
No	RT	Area	Area%
1	13.28	1047617	5.865
2	17.23	16813405	94.135
ﾄｰﾀﾙ		17861022	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥Project1¥MP_2_24_rac AD3 P100
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2017/11/30 11:58:22
印刷日時: 2017/12/01 9:04:19





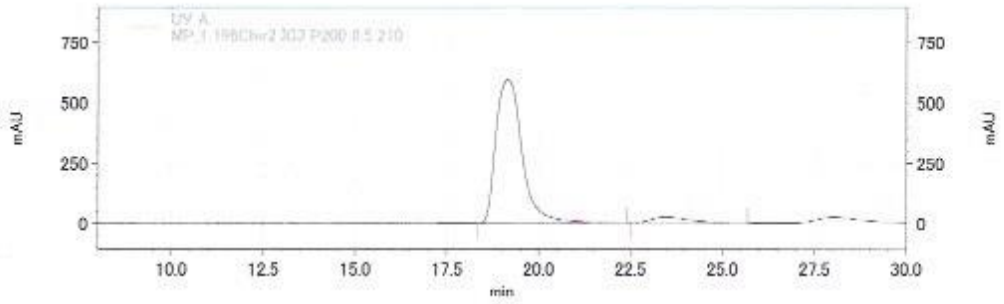
UV_B結果

No	RT	Area	Area%
1	13.23	3756035	49.657
2	17.21	3807958	50.343

Product **5la**

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥Project1¥MP_1_196Chir2 IC3 P200 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2017/12/04 17:24:41
印刷日時: 2017/12/04 18:10:19

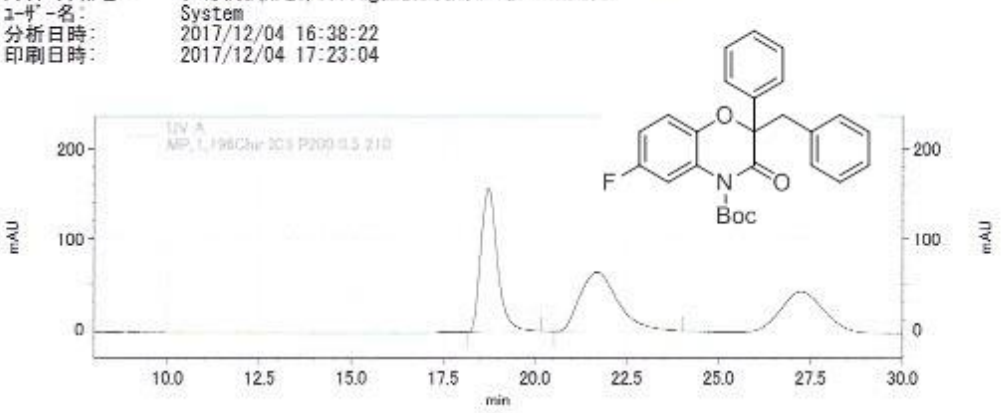


UV_A結果

No	RT	Area	Area%
1	19.14	29492362	94.606
2	23.45	1681537	5.394
ﾄｰﾀﾙ		31173899	100.000

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥Project1¥MP_1_196Chir IC3 P200 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2017/12/04 16:38:22
印刷日時: 2017/12/04 17:23:04



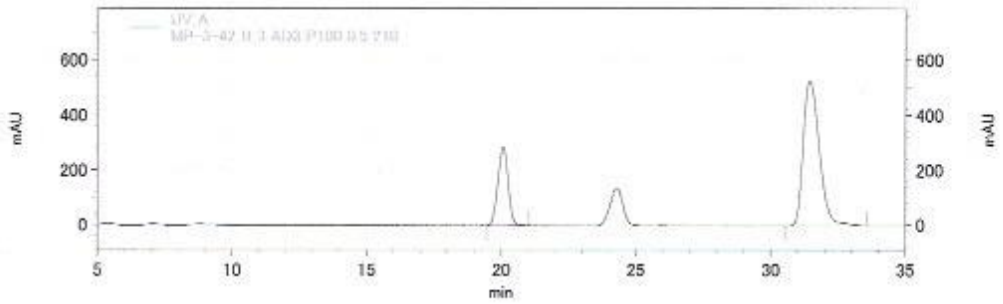
UV_A結果

No	RT	Area	Area%
1	18.73	4951779	51.025
2	21.64	4752921	48.975

Product **5ja**

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥MP-3-42_B_3 AD3 P100 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名 : C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名 : System
分析日時 : 2016/09/29 18:18:46
印刷日時 : 2017/12/01 14:35:42

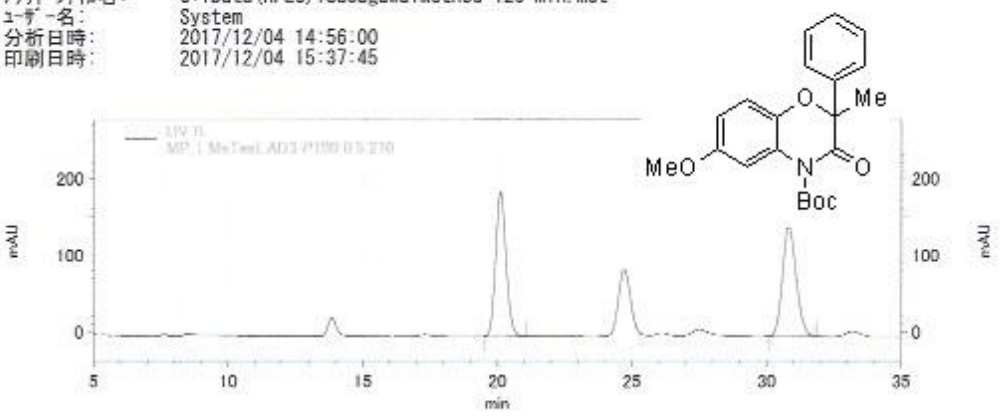


UV_A結果

No	RT	Area	Area%
1	20.07	7547115	25.462
2	31.44	22093465	74.538
ﾄｰﾀﾙ		29640580	100.000

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥Project1¥MP_1_MeTest AD3 P100 0.5 210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名 : C:¥Data(HPLC)¥Sasagawa¥Method 120 min.met
ﾕｰｻﾞｰ名 : System
分析日時 : 2017/12/04 14:56:00
印刷日時 : 2017/12/04 15:37:45



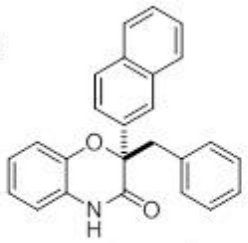
UV_B結果

No	RT	Area	Area%
1	20.12	5066280	49.866
2	30.82	5093556	50.134

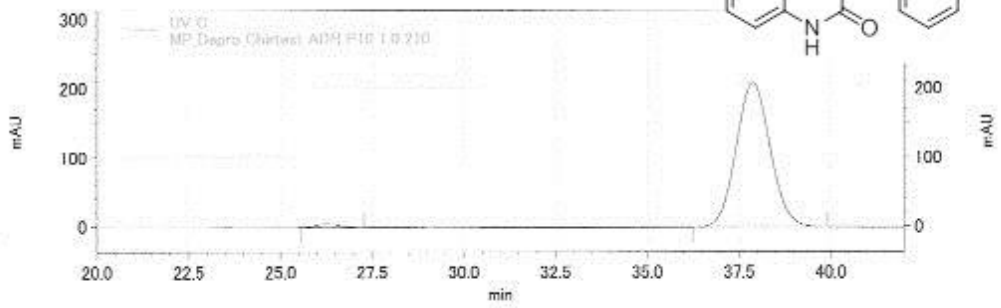
Product **6ha**

ﾍﾟｰｼﾞ 1/1

面積%レポート



ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥Project1¥MP_Depro_Chirtest ADH
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2018/02/13 16:42:25
印刷日時: 2018/02/14 9:06:32



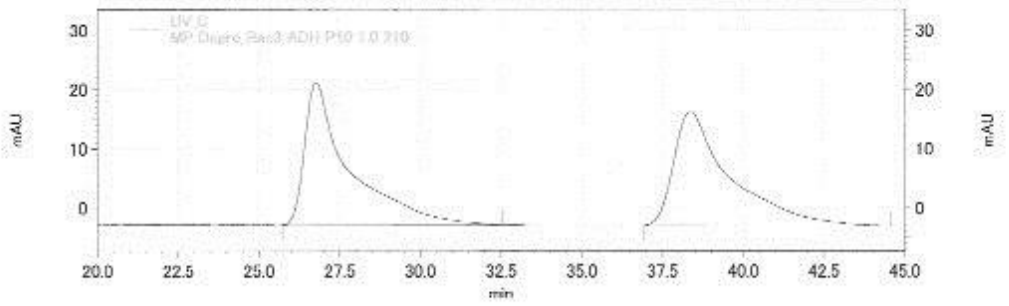
UV_C結果

No	RT	Area	Area%
1	26.24	238459	1.734
2	37.88	13513666	98.266
ﾄｰﾀﾙ		13752125	100.000

ﾍﾟｰｼﾞ 1/1

面積%レポート

ﾃﾞｰﾀﾌｧｲﾙ名 : C:¥Data(HPLC)¥Martin¥Project1¥MP_Depro_Rac3_ADH_P10_1.0_210.dat
ﾒｿｯﾄﾞﾌｧｲﾙ名: C:¥Data(HPLC)¥Method¥Method 120 min.met
ﾕｰｻﾞｰ名: System
分析日時: 2018/02/13 17:25:23
印刷日時: 2018/02/14 9:05:58



UV_C結果

No	RT	Area	Area%
1	26.75	2329719	49.972
2	38.35	2332360	50.028