Supporting Information

Hydroxy-Directed Enantioselective Hydroxyalkylation in the Carbocyclic Ring of Indoles

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General Experimental Methods

Starting materials synthesis, catalysts synthesis, racemic and enantioselective reactions were performed in overnight oven-dried (120 ºC) round bottom flasks. THF, dioxane and Et_2O were freshly distilled from Na/benzophenone ketyl under nitrogen. iPr_2O and EtOAc were dried and stored over 4 Å molecular sieves. CH_2Cl_2 and toluene were distilled from CaH_2 under nitrogen. Reactions were monitored by analytical TLC using Merck Silica Gel 60 F-254 thin layer plates. Flash column chromatography was performed on Merck silica gel 60, 0.040-0.063 mm, and visualized using both a UV lamp (254 nm) and then a CAM solution (an aqueous solution of ceric ammonium molybdate). Melting points were measured in capillary tubes, although products decomposed upon heating. NMR spectra were run at 300 MHz for ^1H and at 75 for ^{13}C, respectively, using residual nondeuterated solvent as internal standard ($CHCl_3$: δ 7.26 for ^1H and 77.0 ppm for ^{13}C; MeOD-d^4 δ 3.31 for ^1H and 49.0 ppm for ^{13}C) and at 282 MHz for ^{19}F NMR using $CFCl_3$ as internal standard. Chemical shifts are given in ppm. The carbon type was determined by DEPT experiments. High resolution mass spectra (ESI) were recorded on a Q-TOF spectrometer equipped with an electrospray source with a capillary voltage of 3.3 kV(ESI). Specific optical rotations were measured using sodium light (D line 589 nm) at 20°C in a 10 cm cell. Concentrations are given in g/100mL. Chiral HPLC analyses were performed in a chromatograph equipped with a UV diode-array detector using chiral stationary columns from Daicel.

Catalysts **I** is commercially available.

Catalyts **II** and **IV** were prepared from quinine following the methodology reported by Deng.[1] Catalyt **III** was prepared from quinine following the methodology reported by Deng.[2] Catalyt **V** was prepared from quinine following the methodology reported by Soós.[3] Catalyt **VI** was prepared from quinine following the methodology reported by Du.[4]

7-Hydroxyindole **1d** (purchased from Fluorochem) was purified by column chromatography prior to be used (hexanes:EtOAc).

Synthesis and characterization of compounds 3, 5 and 7

General procedure for the enantioselective Friedel-Crafts of hydroxydinoles **1** and isatins **2, 4** or **6**

To a test tube containing hydroxyindole **1** (0.1 mmol), isatin **2, 4** or **6** (0.1 mmol) and catalyst **VI** (3.5 mg, 0.005 mmol, 5% mol), Et_2O (1.5 mL) was added and the resulting mixture was stirred at room temperature until completion (TLC). Then, the reaction mixture was directly poured into a column for chromatography, using hexanes:EtOAc as eluent to afford product **3**, **5** or **7**, respectively

General procedure for the racemic Friedel-Crafts reaction with ketones

A test tube was charged with hydroxyindole **1** (0.1 mmol), isatin **2, 4** or **6** (0.1 mmol) and a 1:1 mixure of catalyst **VI** and its pseudoenatiomer synthesized from quinidine (3.5 mg in total, 0.005 mmol, 5% mol). Then, Et_2O (1.5 mL) was added and the mixture was stirred at room temperature. Monitoring of the reaction and purification of the products were carried out as described above.

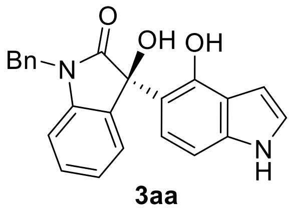
This procedure does not afford purely racemic compounds in some cases, but ^{1}H NMR spectra demonstrated compounds are identical to those obtained with the enantioselective methodology. Other racemic or non-chiral catalyst afforded complex mixtures due to lack of regioselectivity.

Procedure for the enantioselective Friedel-Crafts of hydroxydinoles **1a** and isatins **2a** at 1 mmol scale

To a 50 ml round bottom flask containing hydroxyindole **1a** (133.2 mg, 1 mmol) and isatin **2a** (237.3, 1 mmol) and catalyst **VI** (35,2 mg, 0.05 mmol, 5% mol), Et_2O (15 mL) was added and the resulting mixture was stirred at room temperature for 7 hours (TLC). Then, the reaction mixture was directly poured into a column for chromatography, using hexanes:EtOAc (8:2 to 6:4) as eluent to afford product **3aa** (348 mg, 94% yield, 88% ee), as a white solid.

Analytitcal data for the products obtained by F-C reaction

(+)-(*R*)-1-Benzyl-3-hydroxy-3-(4-hydroxy-1*H*-indol-5-yl)-5-methylindolin-2-one (3aa)

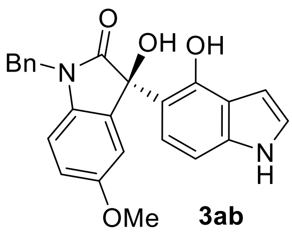


3aa

Enantiomeric excess (90%) was determined by chiral HPLC (Chiralpak AD-H), hexanes-^{i}PrOH 70:30, 1.0 mL/min, major enantiomer t_r = 21.8 min, minor enantiomer t_r = 19.8 min.

White solid (33.7 mg, 91% yield), mp decomp. ; **$[\alpha]_D^{20}$** + 47.8 (*c* 1.11, MeOH) (90% *ee*). **^{1}H NMR (300 MHz, MeOD)** δ 7.49 – 7.13 (m, 8H), 7.09 (d, *J* = 3.2 Hz, 1H), 7.00 (dd, *J* = 8.0, 4.4 Hz, 2H), 6.88 (d, *J* = 8.6 Hz, 1H), 6.80 (d, *J* = 7.7 Hz, 1H), 6.53 (d, *J* = 3.2 Hz, 1H), 5.02 (d, *J* = 15.9 Hz, 1H), 4.92 (d, *J* = 15.9 Hz, 1H) ppm. **^{13}C NMR (75.5 MHz, MeOD)** δ 180.7 (C), 149.7 (C), 144.2 (C), 139.5 (C), 137.5 (C), 134.2 (C), 130.2 (CH), 129.7 (CH), 128.5 (CH), 128.4 (CH), 125.7 (CH), 124.4 (CH), 124.15 (CH), 121.5 (CH), 120.2 (C), 114.6 (C), 110.6 (CH), 104.0 (CH), 99.65 (CH), 79.55 (C), 44.7 (CH_2) ppm. **HRMS (ESI)** *m/z*: 369.1236 $[M - H]^-$, $C_{23}H_{17}N_2O_3$ requires 369.1239.

(+)-(*R*)-1-Benzyl-3-hydroxy-3-(4-hydroxy-1*H*-indol-5-yl)-5-methoxyindolin-2-one (3ab)

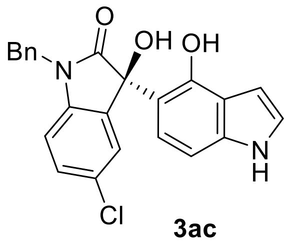


3ab

Enantiomeric excess (86%) was determined by chiral HPLC (Chiralpak AD-H), hexanes-^{i}PrOH 80:20, 1.5 mL/min, major enantiomer t_r = 54.3 min, minor enantiomer t_r = 63.4 min.

Brown solid (31.5 mg, 79% yield), mp decomp.; **$[\alpha]_D^{20}$** +1.72 (*c* 1.305, MeOH) (86% *ee*). **^{1}H NMR (300 MHz, MeOD)** δ 7.40 (d, *J* = 7.2 Hz, 2H), 7.37 – 7.12 (m, 3H), 7.09 (d, *J* = 3.2 Hz, 1H), 6.97 (d, *J* = 8.5 Hz, 1H), 6.88 (dd, *J* = 8.5, 0.8 Hz, 1H), 6.84 (d, *J* = 2.4 Hz, 1H), 6.79 – 6.52 (m, 3H), 4.98 (d, *J* = 15.9 Hz, 1H), 4.87 (d, *J* = 14.7 Hz, 1H, *overlapped with H_2O signal*), 3.64 (s, 3H) ppm. **^{13}C NMR (75.5 MHz, MeOD)** δ 180.5 (C), 158.0 (C), 149.8 (C), 139.5 (C), 137.46 (C), 137.43 (C) 135.4 (C), 129.7 (CH) 128.5 (CH), 128.4 (CH), 124.4 (CH), 121.5 (CH), 120.3 (C), 114.8 (CH), 112.7 (CH), 111.2 (CH), 104.0 (CH), 99.7 (CH), 80.0 (C), 56.1, (CH3), 44.8 (CH_2) ppm. **HRMS (ESI)** *m/z*: 399.1343 $[M - H]^-$, $C_{24}H_{19}N_2O_4$ requires 399.1345.

(+)-(*R*)-1-Benzyl-5-chloro-3-hydroxy-3-(4-hydroxy-1*H*-indol-5-yl)indolin-2-one (3ac)

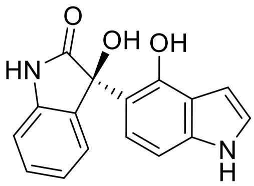


3ac

Enantiomeric excess (87%) was determined by chiral HPLC (Chiralpak AD-H), hexanes-^{i}PrOH 70:30, 1.0 mL/min, major enantiomer t_r = 15.9 min, minor enantiomer t_r = 22.4 min.

Brown solid (40.5 mg, 97% yield), mp decomp.; **$[\alpha]_D^{20}$** +33.1 (*c* 0.95, MeOH) (87% *ee*). **^{1}H NMR (300 MHz, MeOD)** δ 7.50 – 7.41 (m, 2H), 7.40 – 7.13 (m, 5H), 7.12 – 7.07 (m, 2H), 6.96 (dd, *J* = 8.5, 0.8 Hz, 1H), 6.75 (d, *J* = 8.3 Hz, 1H), 6.56 – 6.50 (m, 1H), 5.03 (d, *J* = 16.0 Hz, 1H), 4.93 (d, *J* = 15.9 Hz, 1H) ppm. **^{13}C NMR (75.5 MHz, MeOD)** δ 180.4 (C), 148.9 (C), 143.1 (C), 139.7(C), 137.2 (C), 136.4 (C), 129.8 (CH), 129.75 (CH), 129.3 (C), 128.6 (CH), 128.4 (CH), 125.7 (CH), 124.5 (CH), 121.2 (CH), 120.2 (C), 114.75 (C), 111.7 (CH), 104.1 (CH), 99.5 (CH), 78.7 (C), 44.8 (CH_2) ppm. **HRMS (ESI)** *m/z*: 403.0842 $[M - H]^-$, $C_{23}H_{16}ClN_2O_3$ requires 493.0849.

(+)-(*R*)-3-Hydroxy-3-(4-hydroxy-1*H*-indol-5-yl)indolin-2-one (5aa)

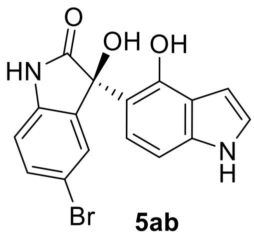


5aa

Enantiomeric excess (85%) was determined by chiral HPLC (Chiralpak AD-H), hexanes-^{i}PrOH 80:20, 1.5 mL/min, major enantiomer t_r = 17.0 min, minor enantiomer t_r = 22.1 min.

Brown solid (20.7 mg, 70% yield), mp decomp.; **$[\alpha]_D^{20}$** +16.5 (*c* 0.685, MeOH) (85% *ee*). **^{1}H NMR (300 MHz, MeOD)** 7.29 – 7.17 (m, 2H), 7.08 (d, *J* = 3.2 Hz, 1H), 7.01 (td, *J* = 7.5, 1.0 Hz, 1H), 6.93 (dd, *J* = 7.6, 0.7 Hz, 1H), 6.85 – 6.77 (m, 2H), 6.52 (d, *J* = 3.2 Hz, 1H) ppm. **^{13}C NMR (75.5 MHz, MeOD)** δ 182.65 (C), 150.4 (C), 143.2 (C), 139.4(C), 134.7 (C), 130.4 (CH), 126.2 (CH), 124.4 (CH), 123.7 (CH), 121.6 (CH), 120.4 (C), 114.1 (C), 111.1 (CH), 103.9 (CH), 99.7 (CH), 80.5 (C) ppm. **HRMS (ESI)** *m/z*: 279.0776 $[M - H]^-$, $C_{16}H_{11}N_2O_3$ requires 279.0770.

(+)-(*R*)-5-Bromo-3-hydroxy-3-(4-hydroxy-1*H*-indol-5-yl)indolin-2-one (5ab)

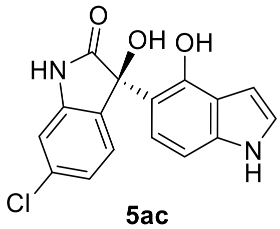


5ab

Enantiomeric excess (84%) was determined by chiral HPLC (Chiralpak AD-H), hexanes-^{i}PrOH 80:20, 1.0 mL/min, major enantiomer t_r = 29.6 min, minor enantiomer t_r = 21.7 min.

Brown solid (25.8 mg, 69% yield), mp decomp.; **$[\alpha]_D^{20}$** +2.3 (*c* 1.025, MeOH) (84% *ee*). **^{1}H NMR (300 MHz, MeOD)** δ 7.37 (dd, *J* = 8.2, 2.0 Hz, 1H), 7.25 (d, *J* = 1.8 Hz, 1H), 7.09 (d, *J* = 3.2 Hz, 1H), 7.02 (d, *J* = 8.5 Hz, 1H), 6.90 (d, *J* = 8.5 Hz, 1H), 6.85 (d, *J* = 8.3 Hz, 1H), 6.52 (d, *J* = 3.2 Hz, 1H) ppm. **^{13}C NMR (75.5 MHz, MeOD)** δ 182.1 (C), 149.5 (C), 142.55 (C), 139.6 (C), 137.2 (C), 133.0 (CH), 128.9 (CH), 124.5 (CH), 121.3 (CH), 120.2 (C), 115.8 (C), 114.3 (C), 112.7 (CH), 104.1 (CH), 99.6 (CH), 79.6 (C) ppm. **HRMS (ESI)** *m/z*: 356.9885/358.9865 $[M - H]^-$, $C_{16}H_{10}BrN_2O_3$ requires 356.9875/358.9854.

(+)-(*R*)-6-Chloro-3-hydroxy-3-(4-hydroxy-1*H*-indol-5-yl)indolin-2-one (5ac)

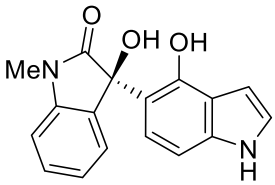


5ac

Enantiomeric excess (78%) was determined by chiral HPLC (Chiralcel OD-H), hexanes-^{i}PrOH 80:20, 1.0 mL/min, major enantiomer t_r = 28.3 min, minor enantiomer t_r = 20.5 min.

Brown solid (16.4 mg, 50% yield), mp decomp.; **$[\alpha]_D^{20}$** +3.7 (*c* 0.218, MeOH) (78% *ee*). **^{1}H NMR (300 MHz, MeOD)** δ 7.14 – 7.05 (m, 2H), 7.03 – 6.92 (m, 3H), 6.88 (dd, *J* = 8.6, 0.8 Hz, 1H), 6.50 (dd, *J* = 3.2, 0.8 Hz, 1H) ppm. **^{13}C NMR (75.5 MHz, MeOD)** δ 182.5 (C), 149.6 (C), 144.8 (C), 139.5 (C), 135.7 (C), 133.6 (C), 127.1 (CH), 124.4 (CH), 123.3 (CH), 121.3 (CH), 120.2 (C), 114.4 (C), 111.3 (CH), 104.0 (CH), 99.6 (CH), 79.3 (C). ppm. **HRMS (ESI)** *m/z*: 313.0377 $[M - H]^-$, $C_{16}H_{10}ClN_2O_3$ requires 313.0380.

(+)-(*R*)-3-Hydroxy-3-(4-hydroxy-1*H*-indol-5-yl)-1-methylindolin-2-one (7aa)

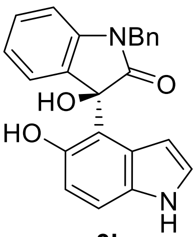


7aa

Enantiomeric excess (80%) was determined by chiral HPLC (Chiralpak AD-H), hexanes-^{i}PrOH 80:20, 1.5 mL/min, major enantiomer t_r = 17.5 min, minor enantiomer t_r = 21.3 min.

Brown solid (23.8 mg, 77% yield), mp decomp.; **$[\alpha]_D^{20}$** +35.9 (*c* 1.09, MeOH) (80% *ee*). **^{1}H NMR (300 MHz, MeOD)** δ 7.32 (ddd, *J* = 7.7, 1.3, 0.6 Hz, 1H), 7.26 – 7.15 (m, 1H), 7.10 – 6.97 (m, 3H), 6.94 (d, *J* = 8.6 Hz, 1H), 6.85 (dd, *J* = 8.6, 0.8 Hz, 1H), 6.50 (dd, *J* = 3.2, 0.8 Hz, 1H), 3.24 (s, 3H) ppm. **^{13}C NMR (75.5 MHz, MeOD)** δ 180.7 (C), 149.7 (C), 145.1 (C), 139.4 (C), 134.1 (C), 130.45 (CH), 125.6 (CH), 124.4 (CH), 124.1 (CH), 121.4 (CH), 120.2 (C), 114.6 (C), 109.6 (CH), 103.9 (CH), 99.6 (CH), 79.6 (C), 26.6 (CH3) ppm. **HRMS (ESI)** *m/z*: 293.0932 $[M - H]^-$, $C_{17}H_{13}N_2O_3$ requires 293.0926.

(+)-(*R*)-1-Benzyl-3-hydroxy-3-(5-hydroxy-1*H*-indol-4-yl)indolin-2-one (3ba)

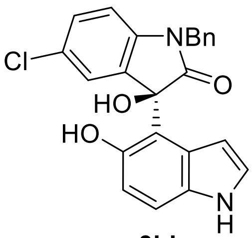


3ba

Enantiomeric excess (96%) was determined by chiral HPLC (Chiralpak AD-H), hexanes-^{i}PrOH 70:30, 1.0 mL/min, major enantiomer t_r = 25.3 min, minor enantiomer t_r = 36.2 min.

Brown oil (19.3 mg, 52% yield), **$[\alpha]_D^{20}$** +118.6 (*c* 0.835, MeOH) (96% *ee*). **^{1}H NMR (300 MHz, $CDCl_3$)** δ 7.52 – 7.42 (m, 2H), 7.39 – 7.12 (m, 6H), 7.09 – 6.78 (m, 3H), 6.67 (d, *J* = 8.5 Hz, 1H), 5.03 (d, *J* = 15.8 Hz, 1H), 4.95 (d, *J* = 15.5 Hz, 1H) ppm. **^{13}C NMR (75.5 MHz, $CDCl_3$)** δ 179.9 (C), 144.3 (C), 137.4 (C), 133.8 (C), 133.1 (C), 130.5 (CH), 129.7 (CH), 128.7 (CH), 128.6 (CH), 125.7 (CH), 125.9 (CH), 124.2 (CH), 113.5 (C), 112.85 (CH), 110.7 (CH), 102.2 (C), 44.8 (CH_2) ppm. **HRMS (ESI)** *m/z*: 369.1268 $[M - H]^-$, $C_{23}H_{17}N_2O_3$ requires 369.1239.

(−)-(*R*)-1-Benzyl-5-chloro-3-hydroxy-3-(5-hydroxy-1*H*-indol-4-yl)indolin-2-one (3bb)

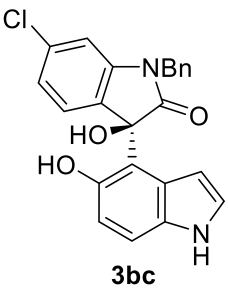


3bb

Enantiomeric excess (94%) was determined by chiral HPLC (Chiralpak AD-H), hexanes-^{i}PrOH 70:30, 1.0 mL/min, major enantiomer t_r = 15.2 min, minor enantiomer t_r = 29.4 min.

Brown oil (35.6 mg, 88% yield), $[\alpha]_D^{20}$ −117.5 (*c* 0.86, MeOH) (94% *ee*). **^{1}H NMR (300 MHz, $CDCl_3$)** δ 8.79 (s, 1H), 8.21 (s, 1H), 7.38 (d, *J* = 1.9 Hz, 1H), 7.34 – 7.20 (m, 5H), 7.16 (dd, *J* = 8.3, 2.1 Hz, 1H), 7.07 (d, *J* = 8.7 Hz, 1H), 6.91 (s, 1H), 6.75 (d, *J* = 7.7 Hz, 1H), 6.67 (d, *J* = 8.3 Hz, 1H), 5.84 (s, 1H), 4.94 (d, *J* = 15.7 Hz, 1H), 4.86 (d, *J* = 15.8 Hz, 1H) ppm. **^{13}C NMR (75.5 MHz, $CDCl_3$)** δ 177.9 (C), 141.0 (C), 134.6 (C), 132.6 (C), 131.5 (C), 129.85 (CH), 129.0 (C), 128.8 (CH), 127.8 (CH), 127.4 (CH), 126.1 (CH), 124.9 (CH), 114.3 (C), 112.6 (CH), 110.8 (CH), 101.2 (C), 79.4 (C), 44.25 (CH2) ppm. **HRMS (ESI)** *m/z*: 403.0853 $[M - H]^-$, $C_{23}H_{16}ClN_2O_3$ requires 403.0849.

(−)-(*R*)-1-Benzyl-6-chloro-3-hydroxy-3-(5-hydroxy-1*H*-indol-4-yl)indolin-2-one (3bc)

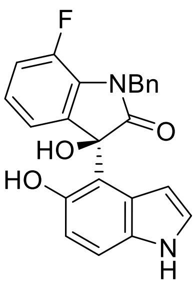


3bc

Enantiomeric excess (89%) was determined by chiral HPLC (Chiralpak IC), hexanes-^{i}PrOH 80:20, 1.0 mL/min, major enantiomer t_r = 20.6 min, minor enantiomer t_r = 73.7 min.

Yellow oil (23.5 mg, 58% yield), $[\alpha]_D^{20}$ −160.3 (*c* 0.44, MeOH) (89% *ee*). **^{1}H NMR (300 MHz, $CDCl_3$)** δ 7.47 (d, *J* = 7.3 Hz, 2H), 7.42 – 7.24 (m, 3H), 7.24 – 7.01 (m, 3H), 6.92 (d, *J* = 7.8 Hz, 1H), 6.81 (s, 1H), 5.05 (d, *J* = 15.9 Hz, 1H), 4.93 (d, *J* = 15.8 Hz, 1H) ppm. **^{13}C NMR (75.5 MHz, $CDCl_3$)** δ 180.1 (C), 145.8 (C), 137.0 (C), 135.9 (C), 133.3 (C), 132.5 (C), 129.8 (CH), 128.7 (CH), 128.6 (CH), 126.8 (CH), 125.8 (CH), 123.7 (CH), 113.1 (CH), 112.8 (CH), 111.0 (CH), 102.3 (CH), 44.9 (CH_2) ppm. **HRMS (ESI)** *m/z*: 403.0861 $[M - H]^-$, $C_{23}H_{16}ClN_2O_3$ requires 403.0849.

(+)-(*R*)-1-Benzyl-7-fluoro-3-hydroxy-3-(5-hydroxy-1*H*-indol-4-yl)indolin-2-one (3bd)

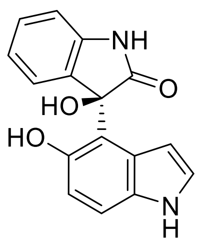


3bd

Enantiomeric excess (85%) was determined by chiral HPLC (Chiralpak IC), hexanes-^{i}PrOH 80:20, 1.5 mL/min, major enantiomer t_r = 14.3 min, minor enantiomer t_r = 56.8 min.

Grey oil (31.8 mg, 82% yield), $[\alpha]_D^{20}$ +437.5 (*c* 0.25, MeOH) (85% *ee*). **^{1}H NMR (300 MHz, MeOD)** δ 7.40 (d, *J* = 7.3 Hz, 2H), 7.31 – 7.12 (m, 4H), 7.11 – 6.75 (m, 4H), 6.64 (d, *J* = 8.5 Hz, 1H), 5.13 – 5.00 (m, 2H) ppm. **^{13}C NMR (75.5 MHz, MeOD)** δ 179.85 (C), 148.7 (d, *J* = 243.5 Hz, CF), 138.4 (C), 136.77 (d, *J* = 2.0 Hz, C), 133.2 (C), 130.61 (d, *J* = 8.5 Hz, C), 129.5 (CH), 128.3 (CH), 125.9 (CH), 125.0 (CH), 121.85 (CH), 118.22 (d, *J* = 21 Hz, CH), 112.9 (CH), 102.5 (C), 80.1 (C), 46.4 (d, *J* = 4.5 Hz, CH_2). **^{19}F NMR (282 MHz, MeOD**) δ -136.8 ppm; **HRMS (ESI)** *m/z*: 387.1147 $[M - H]^-$, $C_{23}H_{16}FN_2O_3$ requires 387.1145.

(−)-(*R*)-3-Hydroxy-3-(5-hydroxy-1*H*-indol-4-yl)indolin-2-one (5ba)

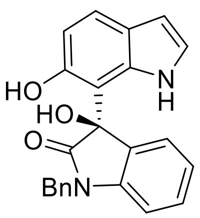


5ba

Enantiomeric excess (90%) was determined by chiral HPLC (Chiralpak AD-H), hexanes-^{i}PrOH 80:20, 1.5 mL/min, major enantiomer t_r = 20.5 min, minor enantiomer t_r = 32.8 min.

Brown oil (21.9 mg, 78% yield), **$[\alpha]_D^{20}$** −174.6 (*c* 0.13, MeOH) (90% *ee*). **^{1}H NMR (300 MHz, MeOD)** δ 8.90-8.40 (m, 7H), 8.24 (d, *J* = 8.7 Hz, 1H), ppm. **^{13}C NMR (75.5 MHz, MeOD)** δ 143.2 (C), 139.6 (C),134.5 (C), 132.9 (CH), 130.7 (CH), 126.2 (CH), 125.7 (CH), 123.8 (CH), 113.8 (CH), 112.9 (CH), 111.2 (CH), 101.5 (C) ppm. **HRMS (ESI)** *m/z*: 279.0788 $[M - H]^-$, $C_{16}H_{11}N_2O_3$ requires 279.0770.

(−)-(*R*)-1-Benzyl-3-hydroxy-3-(6-hydroxy-1*H*-indol-7-yl)indolin-2-one (3ca)

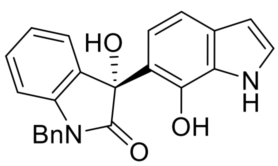


3ca

Enantiomeric excess (91%) was determined by chiral HPLC (Chiralpak IC), hexanes-^{i}PrOH 80:20, 1.0 mL/min, major enantiomer t_r = 14.3 min, minor enantiomer t_r = 16.6 min.

Brown oil (12.9 mg, 35% yield), **$[\alpha]_D^{20}$** −175.4 (*c* 0.35, MeOH) (91% *ee*). **^{1}H NMR (300 MHz, $CDCl_3$)** δ 7.51 (d, *J* = 7.3 Hz, 1H), 7.40 – 7.23 (m, 5H), 7.18 – 7.07 (m, 3H), 6.89 (td, *J* = 7.5, 0.9 Hz, 1H), 6.72 (d, *J* = 7.6 Hz, 1H), 6.51 (d, *J* = 8.4 Hz, 1H), 6.37 (d, *J* = 3.2 Hz, 1H), 5.10 (d, *J* = 16.0 Hz, 1H), 4.88 (d, *J* = 18.5 Hz, 1H, *overlapped with the H_2O signal*) ppm. **^{13}C NMR (75.5 MHz, $CDCl_3$)** δ 180.5 (C), 150.1 (C), 144.45 (C), 137.65 (C), 137.4 (C), 134.2 (C), 130.1 (CH), 129.7(CH), 128.5 (CH), 128.4 (CH), 124.9 (CH), 124.7 (C), 124.0 (CH), 123.9 (CH), 121.1 (CH), 110.51 (CH), 110.47 (CH), 110.1 (C), 101.7 (CH), 79.4 (C)., 45.0 (CH2) ppm. **HRMS (ESI)** *m/z*: 369.1251 $[M - H]^-$, $C_{23}H_{17}N_2O_3$ requires 369.1239.

(−)-(*R*)-1-Benzyl-3-hydroxy-3-(7-hydroxy-1*H*-indol-6-yl)indolin-2-one (3da)

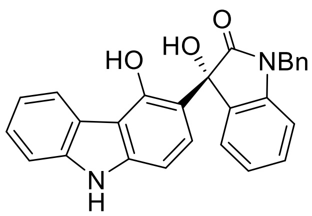


3da

Enantiomeric excess (86%) was determined by chiral HPLC (Chiralpak IC), hexanes-^{i}PrOH 80:20, 1.5 mL/min, major enantiomer t_r = 18.9 min, minor enantiomer t_r = 23.5 min.

Black oil (22.6 mg, 61% yield), **$[\alpha]_D^{20}$** −1.3 (*c* 0.23, MeOH) (86% *ee*). **^{1}H NMR (300 MHz, $CDCl_3$)** δ 8.64 (s, 1H), 7.53 (dd, *J* = 7.3, 1.4 Hz, 1H), 7.36 – 7.12 (m, 7H), 7.03 (dd, *J* = 8.3, 0.6 Hz, 1H), 6.77 (d, *J* = 7.4 Hz, 1H), 6.48 (d, *J* = 8.3 Hz, 1H), 6.47-6.45 (m, 1H), 4.93 (d, *J* = 15.7 Hz, 1H), 4.80 (d, *J* = 15.7 Hz, 1H) ppm. **^{13}C NMR (75.5 MHz, $CDCl_3$)** δ 179.9 (C), 143.3 (C), 142.35 (C), 134.8 (C), 130.6 (C), 130.2 (CH), 129.6 (C), 128.9 (CH), 128.3 (C), 127.8 (CH), 127.1 (CH), 126.5 (CH), 125.45 (CH), 123.8 (CH), 119.2 (CH), 115.85 (C), 112.6 (CH), 110.2 (CH), 102.7 (CH), 80.3 (C), 44.1 (CH_2) ppm. **HRMS (ESI)** *m/z*: 369.1268 $[M - H]^-$, $C_{23}H_{17}N_2O_3$ requires 369.1239.

(+)-(*R*)-1-Benzyl-3-hydroxy-3-(4-hydroxy-9*H*-carbazol-3-yl)indolin-2-one (3ea)

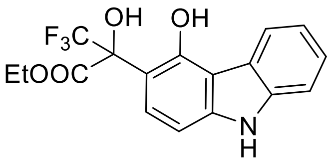


3ea

Enantiomeric excess (74%) was determined by chiral HPLC (Chiralpak IC), hexanes-^{i}PrOH 80:20, 1.0 mL/min, major enantiomer t_r = 28.2 min, minor enantiomer t_r = 73.05 min.

Brown oil, (23.1 mg, 55% yield), **$[\alpha]_D^{20}$** +144.9 (*c* 0.275, MeOH) (74% *ee*). **^{1}H NMR (300 MHz, $CDCl_3$)** δ 8.37 – 8.28 (m, 1H), 7.46 – 7.19 (m, 9H), 7.13 (dtd, *J* = 16.1, 7.3, 1.1 Hz, 2H), 6.85 (d, *J* = 7.9 Hz, 1H), 6.77 (d, *J* = 8.5 Hz, 1H), 6.62 (d, *J* = 8.5 Hz, 1H), 4.95 (d, *J* = 15.7 Hz, 1H), 4.88 (d, *J* = 15.5 Hz, 1H) ppm. **^{13}C NMR (75.5 MHz, $CDCl_3$)** δ 180.2 (C), 155.25 (C), 143.75 (C), 143.3 (C), 141.2 (C), 137.1 (C), 133.55 (C), 130.8 (CH), 129.8 (CH), 128.7 (CH), 128.4 (CH), 126.4 (CH), 125.8 (CH), 125.7 (CH), 124.6 (CH), 124.01 (CH), 123.96 (C), 119.9 (CH), 114.4 (C), 114.1 (C), 111.1 (CH), 111.05 (CH), 102.9 (CH), 81.4 (C), 44.5 (CH_2) ppm. **HRMS (ESI)** *m/z*: 419.1394 $[M - H]^-$, $C_{27}H_{19}N_2O_3$ requires 419.1396.

(+)-Ethyl 3,3,3-trifluoro-2-hydroxy-2-(4-hydroxy-9*H*-carbazol-3-yl)propanoate (9e)



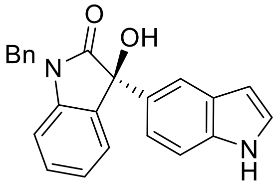
9e

Enantiomeric excess (98%) was determined by chiral HPLC (Chiralpak AD-H), hexanes-^{i}PrOH 90:10, 1.5 mL/min, major enantiomer t_r = 26.05 min, minor enantiomer t_r = 21.3 min.

White oil, (24.7 mg, 70% yield), **$[\alpha]_D^{20}$** +167.2 (*c* 1.2, $CHCl_3$) (98% *ee*). **^{1}H NMR (300 MHz, $CDCl_3$)** δ 9.48 (s, 1H), 8.38 (dd, *J* = 7.7, 0.7 Hz, 1H), 8.06 (s, 1H), 7.52 (dd, *J* = 8.7, 1.1 Hz, 1H), 7.46 – 7.35 (m, 2H), 7.33 – 7.21 (m, 1H), 6.93 (d, *J* = 8.7 Hz, 1H), 5.21 (s, 1H), 4.61 – 4.47 (m, 2H), 1.45 (t, *J* = 7.1 Hz, 3H). ppm. **^{13}C NMR (75.5 MHz, $CDCl_3$)** δ 168.6 (C), 154.6 (C), 141.6 (C), 138.9 (C), 125.3 (CH), 125.22 (q, *J* = 1.8 Hz, CH), 123.4 (CH), 123.1 (q, *J* = 286.0 Hz, CF_3), 122.9 (C), 120.2 (CH), 113.3 (C), 110.0 (CH), 104.1 (C), 102.3 (CH), 80.7 (q, *J* = 31.1 Hz, C), 65.05 (CH_2), 13.9 (CH_3). **^{19}F NMR** (282 MHz, $CHCl_3$) δ -77.5 ppm; **HRMS (ESI)** *m/z*: 352.0787 $[M - H]^-$, $C_{17}H_{13}F_3NO_4$ requires 352.0797.

Procedure and characterization data for compound 10aa

(+)-(*S*)-1-Benzyl-3-hydroxy-3-(1*H*-indol-5-yl)indolin-2-one



10aa

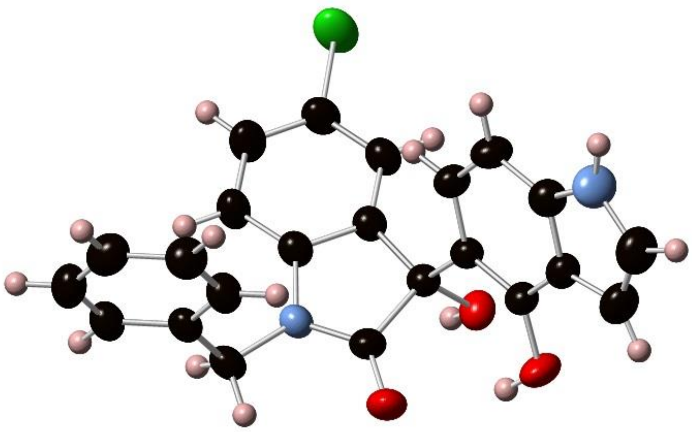
Compound **3aa** (37 mg, 0.1 mmol) and 4-dimethylaminopyridine (36.7 mg, 0.3 mmol, 3 eq) were placed in a 10 mL round bottomed flask. Then, the flask was purged with N_2 and CH_2Cl_2 (2 mL) was added. After 5 minutes, *N*-phenyl-bis(trifluoromethanesulfonimide (71.4 mg, 0.2 mmol, 2 eq) was added and the mixture was stirred at room temperature. The reaction was monitored by thin layer chromatography eluting with CH_2Cl_2. When the starting material was consumed, H_2O was added (5 mL) and the mixture was extracted with EtOAc (3 x 20 mL). The combined organic layers were washed with brine (30 mL) and dried under anhydrous Na_2SO_4.

The organic solvents were removed in vacuo and the residue was transfered to a 25 mL round bottomed flask, which was purged with N_2. Then, MeOH (3 mL) was added, followed by 10% Pd/C (6 mg, 10 wt %) and Et_2NH (13 µL, mmol, 1.2 eq). Then, the reaction vessel was repeatedly purged with H_2 using a balloon and a needle as a vent. Finally, the reaction was stirred at room temperature under H_2 (1 atm, balloon). The reaction was monitored by thin layer chromatography eluting with CH_2Cl_2. When the reaction was completed, the suspension was passed through a pad of Celite® and the organic solvents were removed under vacuum. The residue was purified by column chromatography eluting with CH_2Cl_2 affording product **10aa** as an oil (27.5 mg, 78% yield).

Enantiomeric excess (85%) was determined by chiral HPLC (Chiralpak AD-H), hexanes-^{i}PrOH 70:30, 1.5 mL/min, major enantiomer t_r = 15.8 min, minor enantiomer t_r = 11.5 min.

White oil, **$[\alpha]_D^{20}$** +42.9 (*c* 0.215, MeOH) (85% *ee*); **^{1}H NMR (300 MHz, $CDCl_3$)** δ 8.21 (s, 1H), 7.75 – 7.68 (m, 1H), 739 – 7.24 (m, 8H), 7.23 – 7.17 (m, 2H), 7.04 (td, *J* = 76, 1.0 Hz, 1H), 6.79 (d, *J* = 7.7 Hz, 1H), 6.52 (ddd, *J* = 3.1, 2.0, 0.9 Hz, 1H), 5.06 (d, *J* = 15.7 Hz, 1H), 4.87 (d, *J* = 15.7 Hz, 1H), 3.28 (s, 1H).; **^{13}C NMR (75.5 MHz, $CDCl_3$)** δ 178.1 (C), 142.6 (C), 135.64 (C), 135.58 (C), 132.1 (C), 131.6 (C), 129.5 (CH), 128.8 (CH), 127.8 (C), 127.7 (CH), 127.3 (CH), 125.1 (CH), 124.9 (CH), 123.4 (CH), 119.6 (CH), 117.8 (CH), 111.4 (CH), 109.6 (CH), 103.1 (CH), 78.3 (C), 44.0 (CH_2) ppm; **HRMS (ESI)** *m/z*: 353.1284 $[M - H]^-$, $C_{23}H_{17}N_2O_2$ requires 353.1290.

X-ray Crystallography data of compound 3ac:



X-ray data for compound **3ac**: crystallized from DCM:Hexanes; $C_{23}H_{17}ClN_2O_3$; Mr=404.84; orthorhombic; space group=$P2_12_12_1$; a=8.8120(2), b=11.4950(4); c=19.1110(5) Å; V=1935.83(10) $Å^3$; Z=4; ρ_{calcd}=1.389 Mg m^{-3}; μ=0.225 mm^{-1}; F(000)=840. A colorless crystal of 0.04x0.06x0.08 mm^3 was used; 4428 [R(int)=0.0682] independent reflections were collected on a Enraf Nonius CCD diffractomer by using graphite monochromator and Mo Kα (λ = 0.71073 Å). The structures were solved by using direct methods with SHELXS-2014 and refined by using full matrix least squares on F^2 with SHELXL-2014. Non-hydrogen atoms were refined anisotropically, and hydrogen atoms were placed in calculated positions refined by using idealized geometries (riding model) and assigned fixed isotropic displacement parameters. Final R(ωR) values were R=0.0430 and ωR=0.0976. CCDC-1530502 contains the supplementary crystallographic data for this paper. These data can be obtained free of charge from The Cambridge Crystallographic Data Centre via www.ccdc.cam.ac.uk/data_request/cif.

References

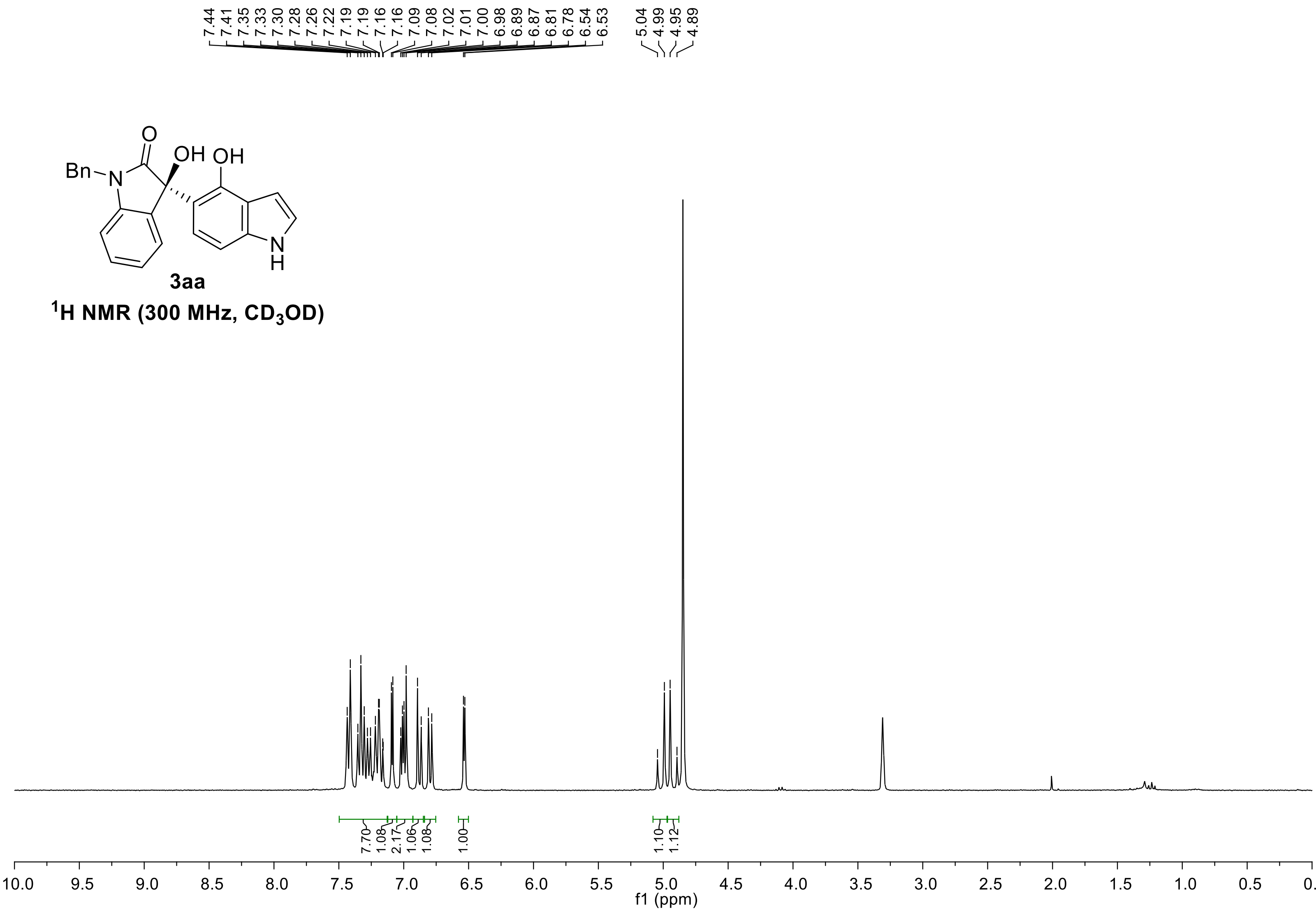
[1] Li, H.; Wang, Y.; Tang, L.; Deng, L. *J. Am. Chem. Soc.* **2004**, 126, 9906–9907.

[2] Li, H.; Wang, B.; Deng, L. *J. Am. Chem. Soc.* **2006**, 128, 732-733.

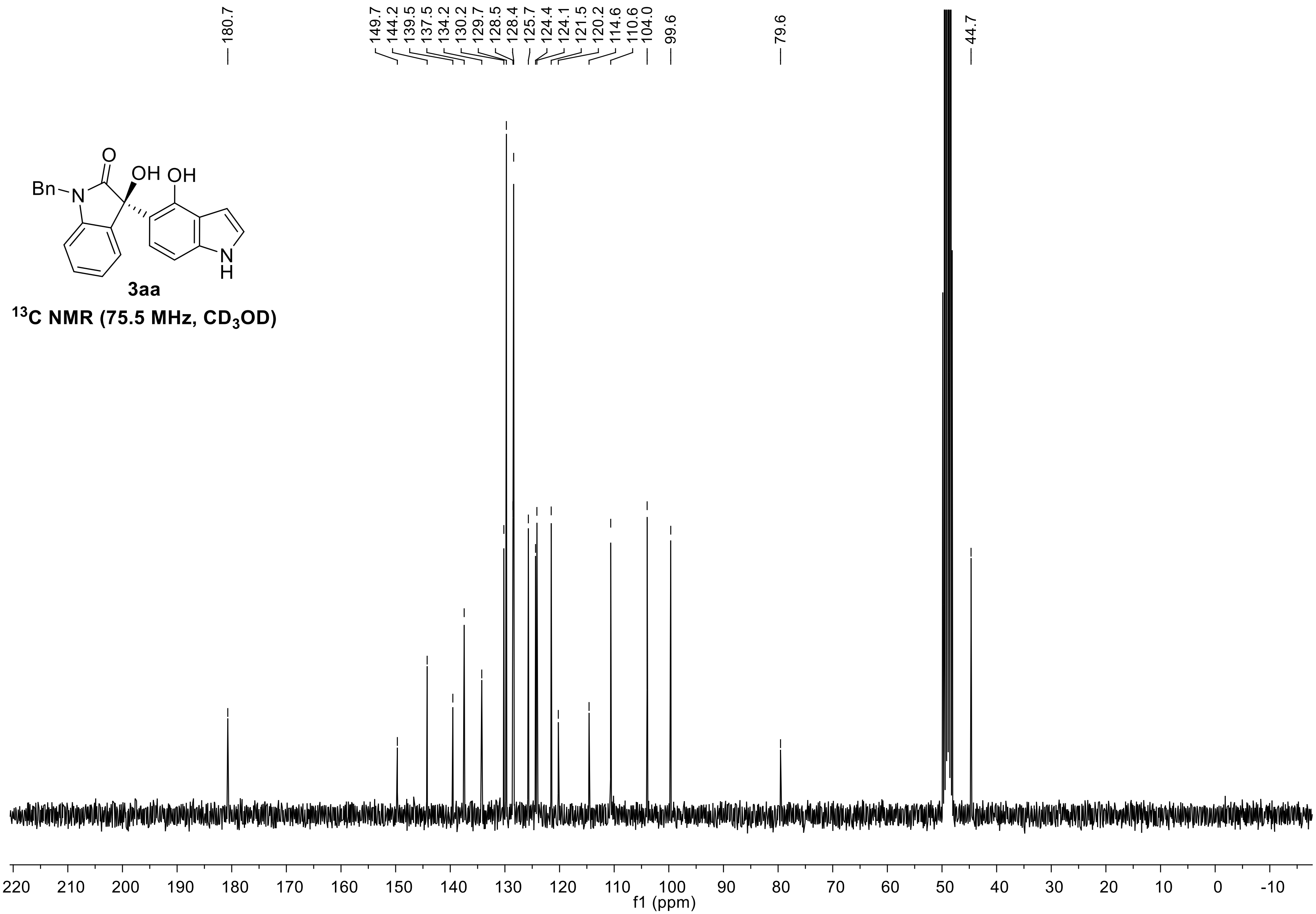
[3] Vakulya, B.; Varga, S.; Csámpai, A.; Soós, T. *Org. Lett.* **2005**, 7, 1967–1969.

[4] Yang, W.; Du, D.-M. *Org. Lett.* **2010**, 12**,** 5450–5453.

NMR spectra

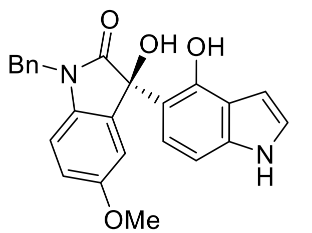


7.44
7.41
7.35
7.33
7.30
7.28
7.26
7.22
7.19
7.19
7.16
7.16
7.09
7.08
7.02
7.01
7.00
6.98
6.89
6.87
6.81
6.78
6.54
6.53
5.04
4.99
4.95
4.89
O
OH
OH
Bn
N
N
H
3aa
^{1}H NMR (300 MHz, CD_3OD)
7.70
1.08
2.17
1.06
1.08
1.00
1.10
1.12
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)



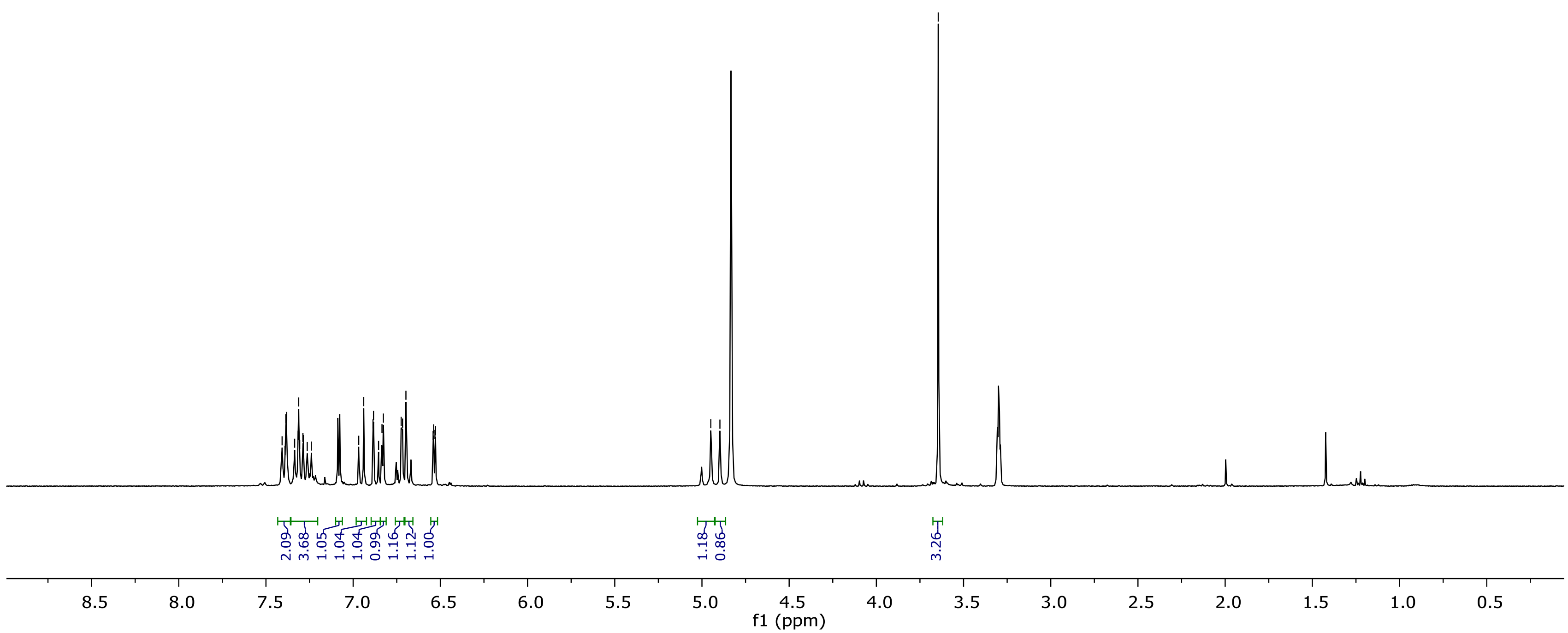
3aa

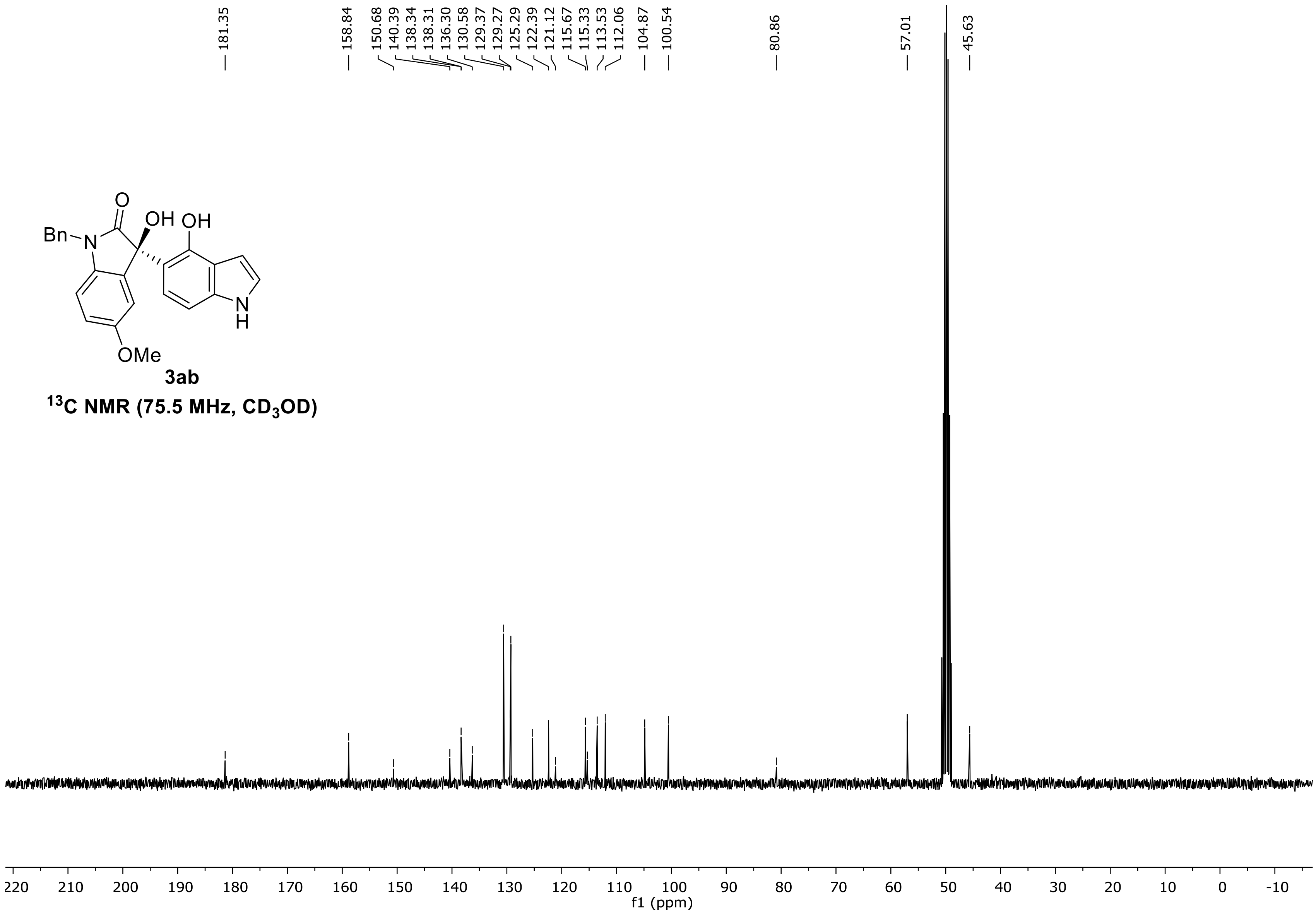
^{13}C NMR (75.5 MHz, CD_3OD)



3ab

^{1}H NMR (300 MHz, CD_3OD)

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140.39
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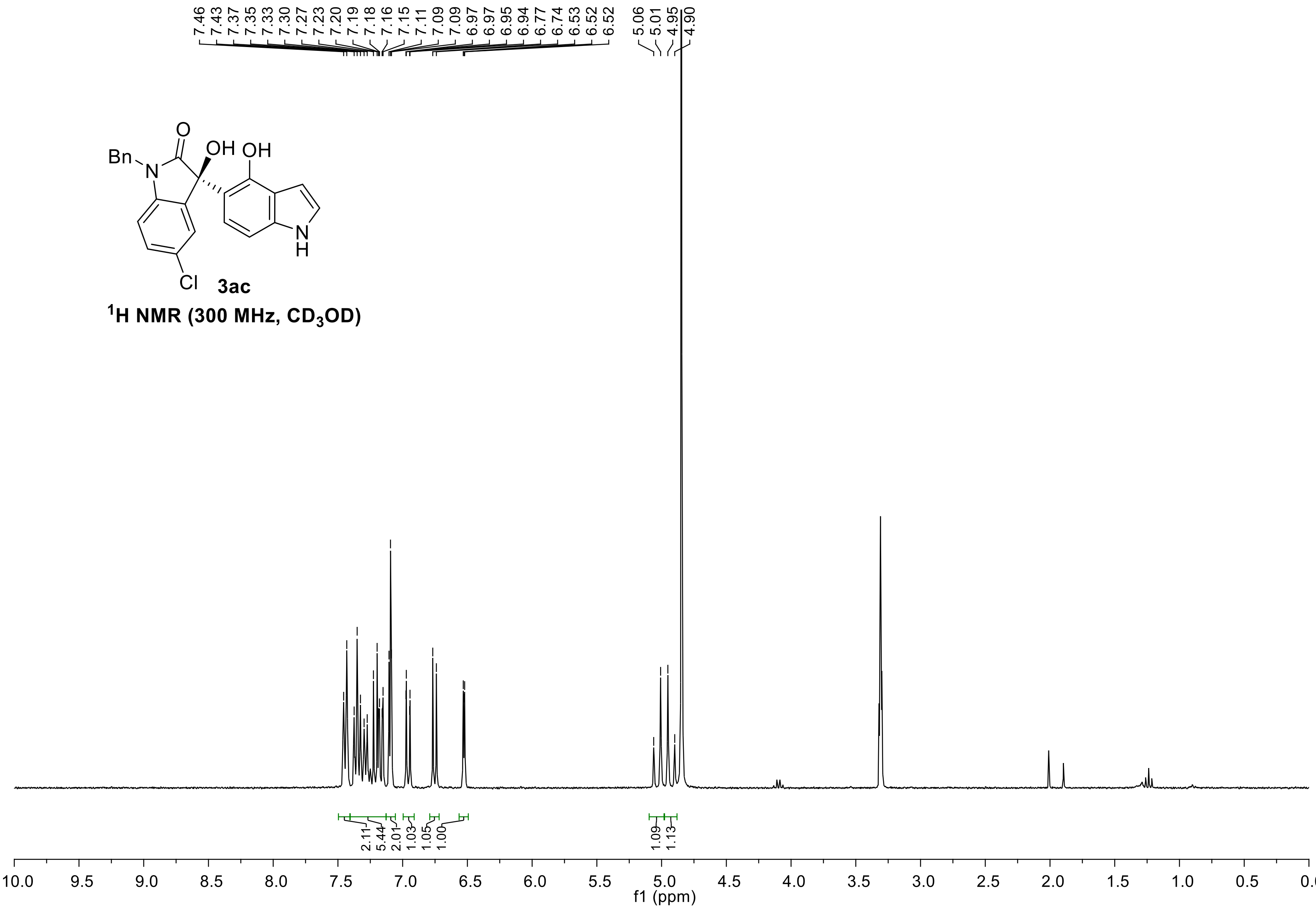
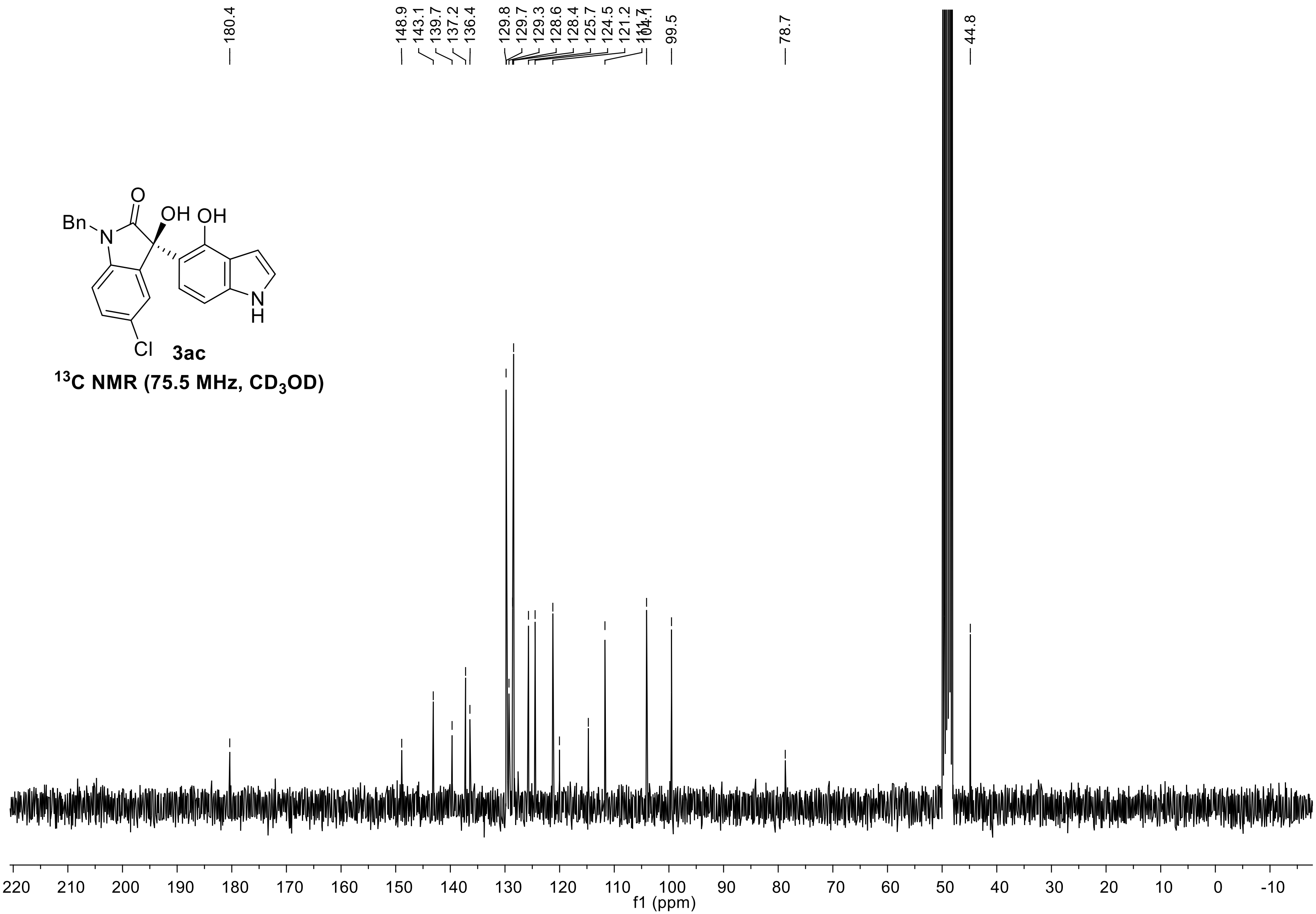
138.31
136.30
130.58
129.37
129.27
125.29
122.39
121.12
115.67
115.33
113.53
112.06
104.87
100.54
80.86
57.01
45.63
Bn
N
O
OH
OH
N
H
OMe
3ab
^{13}C NMR (75.5 MHz, CD_3OD)
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



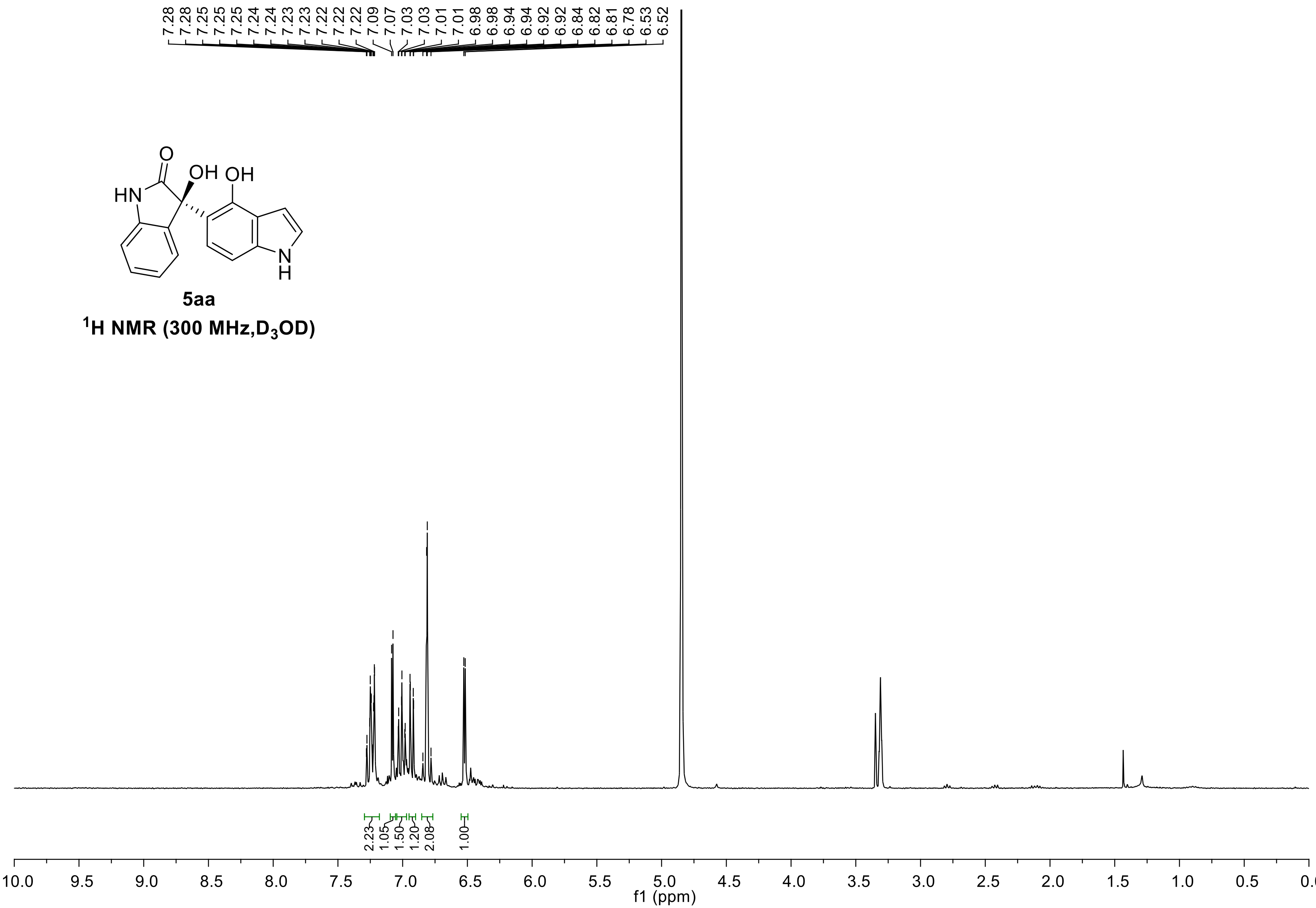
3ac

^{1}H NMR (300 MHz, CD_3OD)



3ac

^{13}C NMR (75.5 MHz, CD_3OD)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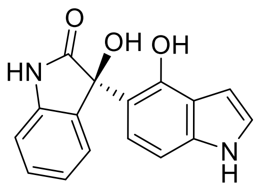
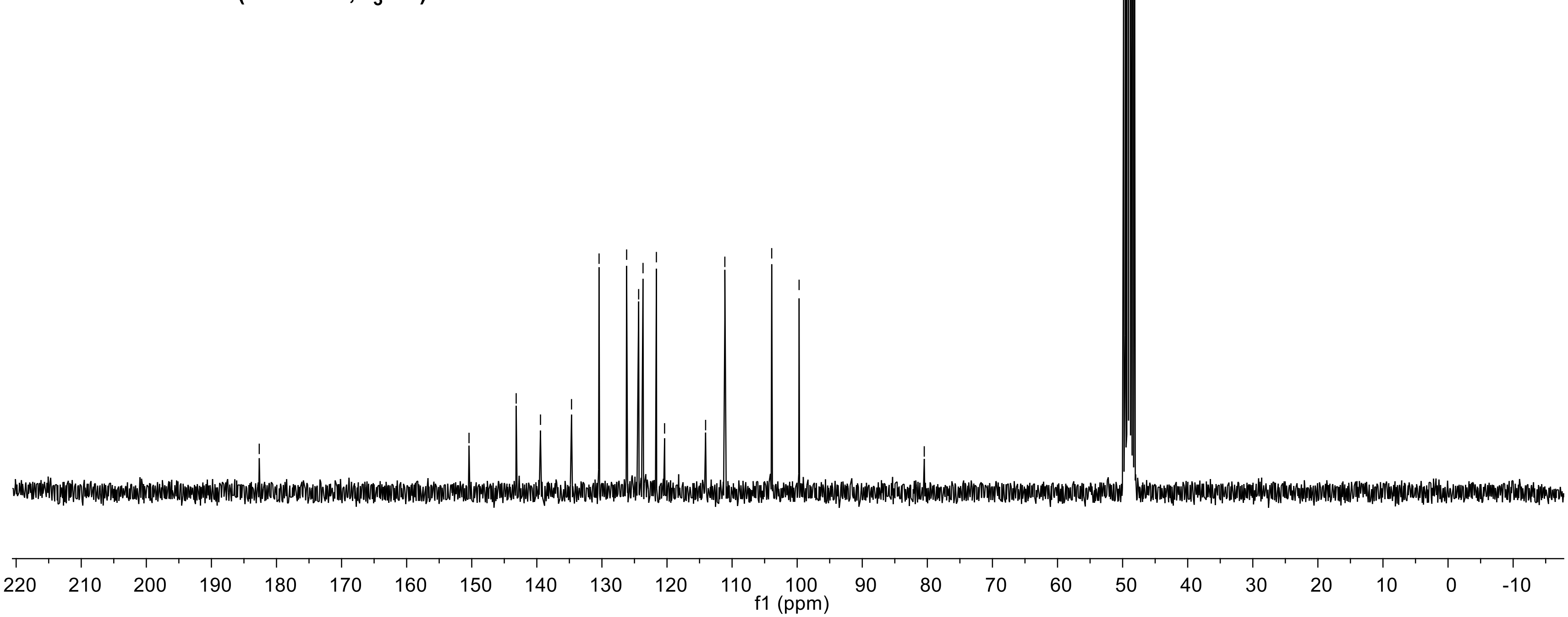
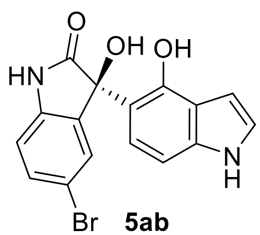
O
OH
OH
HN
N
H
5aa
^{1}H NMR (300 MHz,D$_3$OD)
2.23 1.05 1.50 1.20 2.08 1.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)



5aa

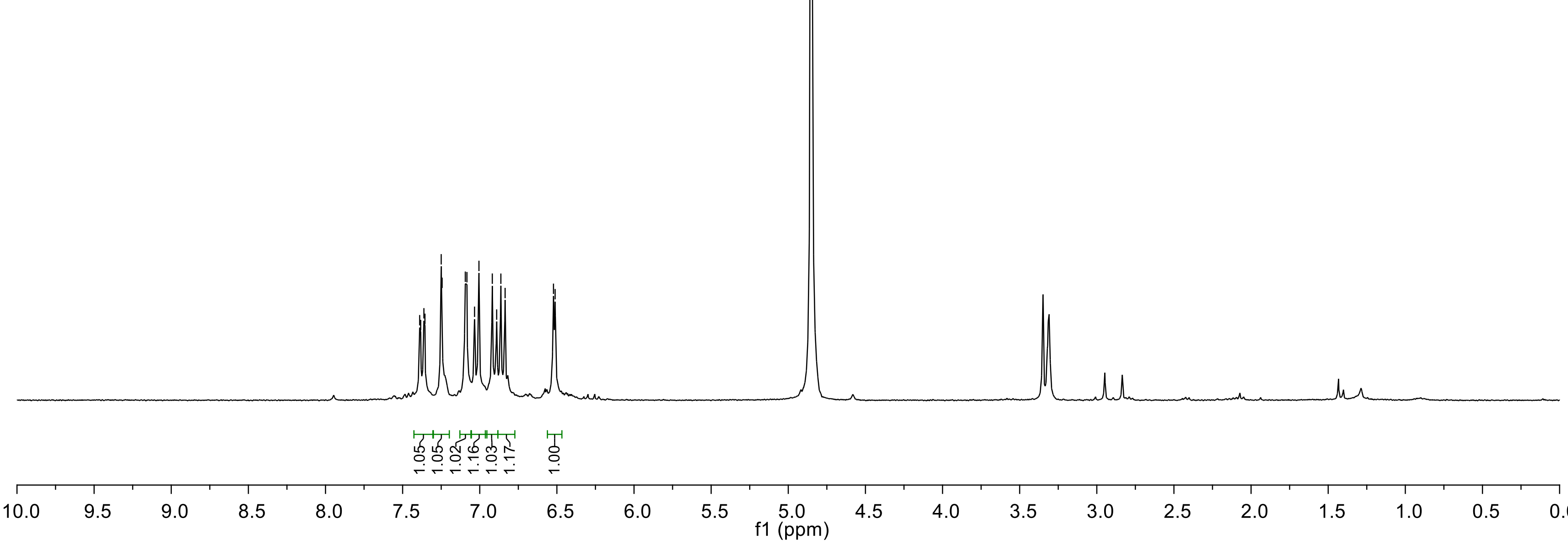
^{13}C NMR (75.5 MHz,D$_3$OD)

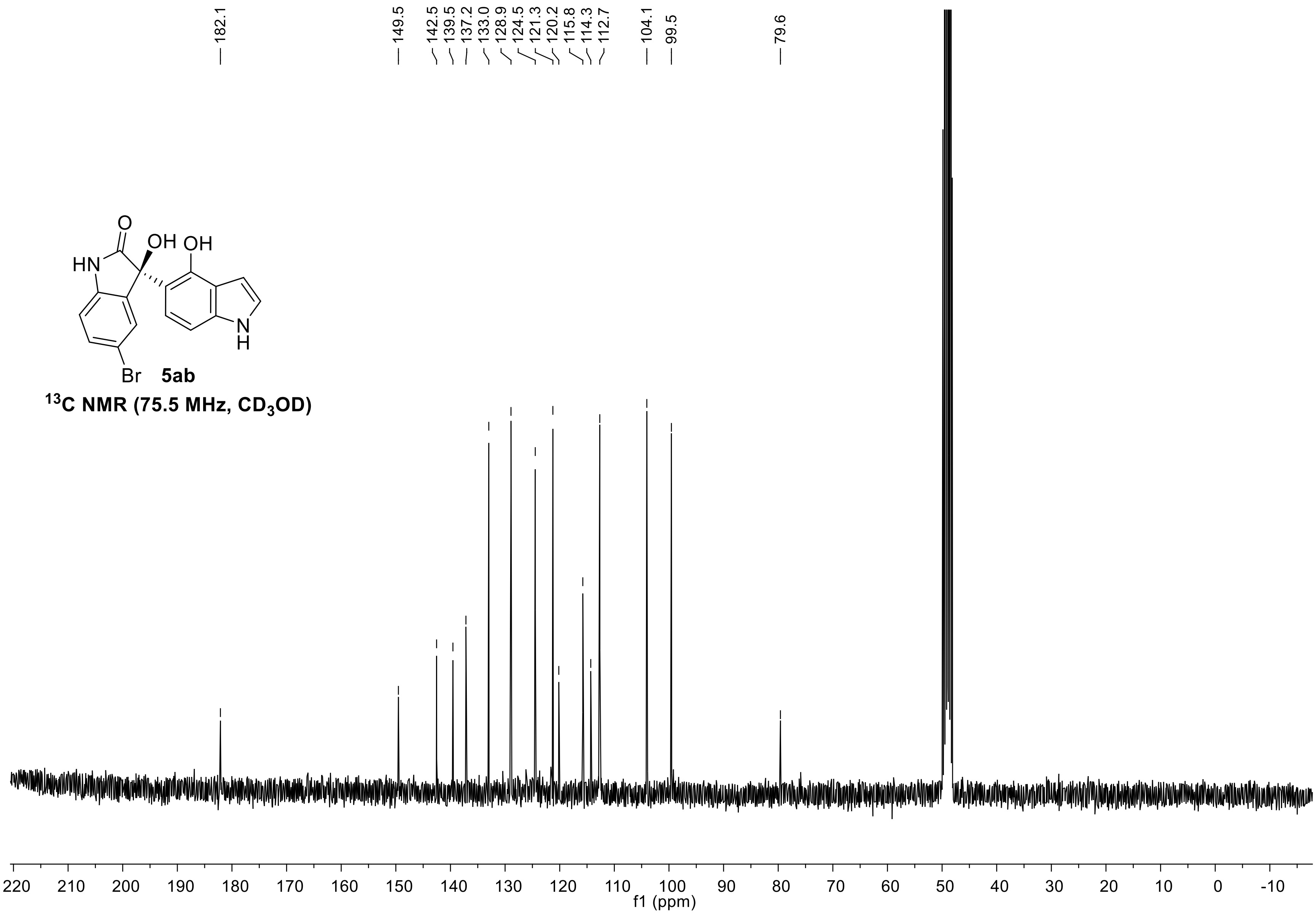




Br **5ab**

^{1}H NMR (300 MHz, CD_3OD)





182.1
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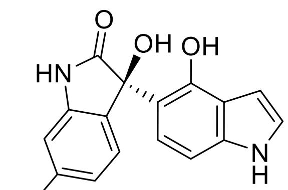
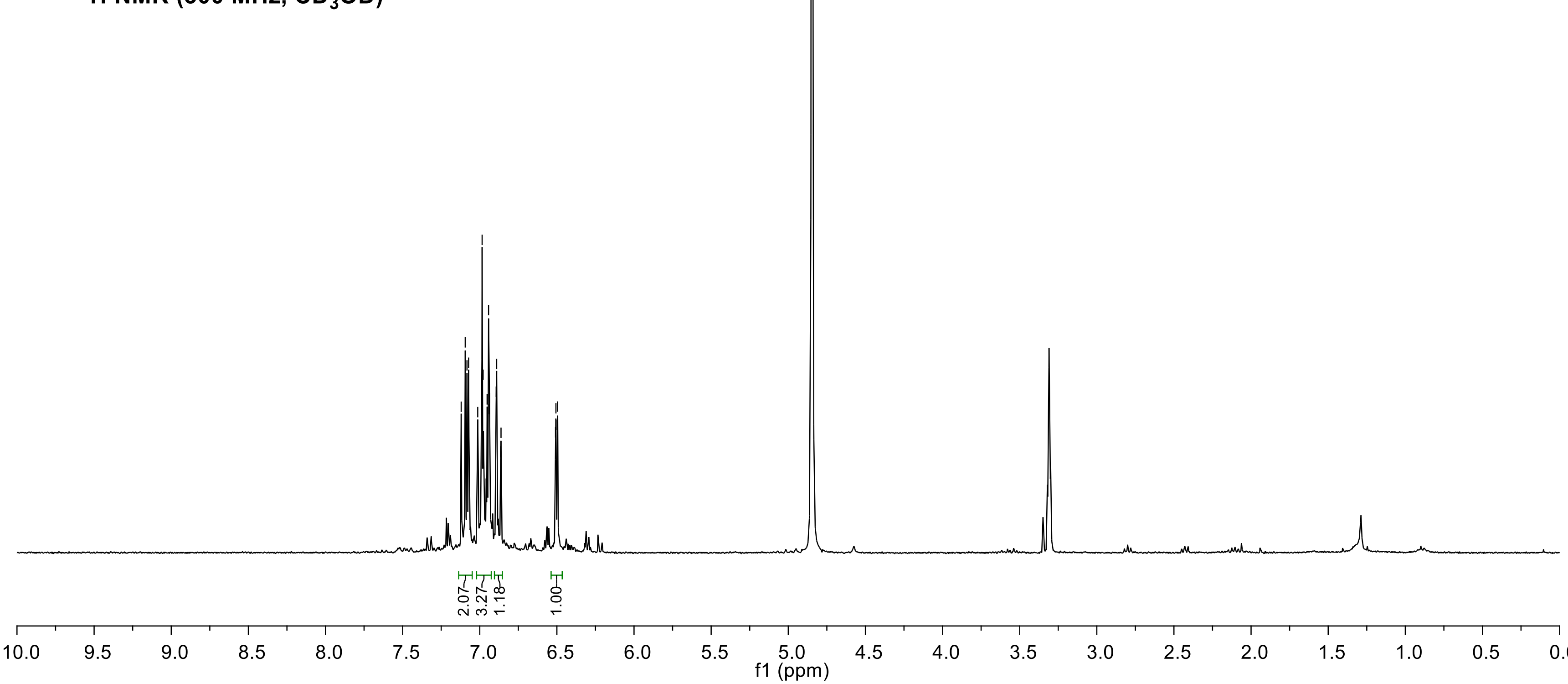
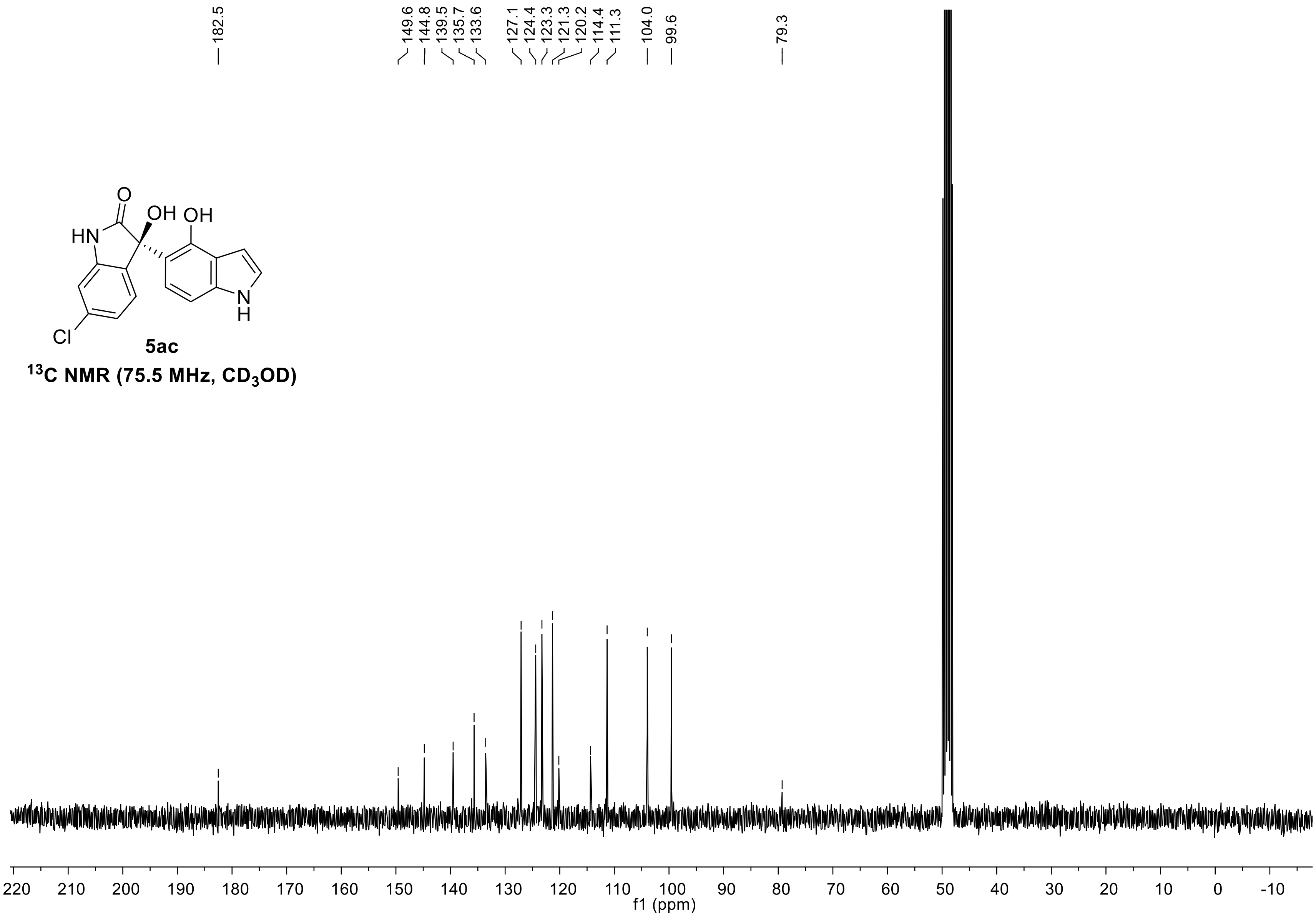
142.5
139.5
137.2
133.0
128.9
124.5
121.3
120.2
115.8
114.3
112.7
104.1
99.5
79.6
O
OH
OH
HN
N
H
Br
5ab
^{13}C NMR (75.5 MHz, CD_3OD)
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



5ac

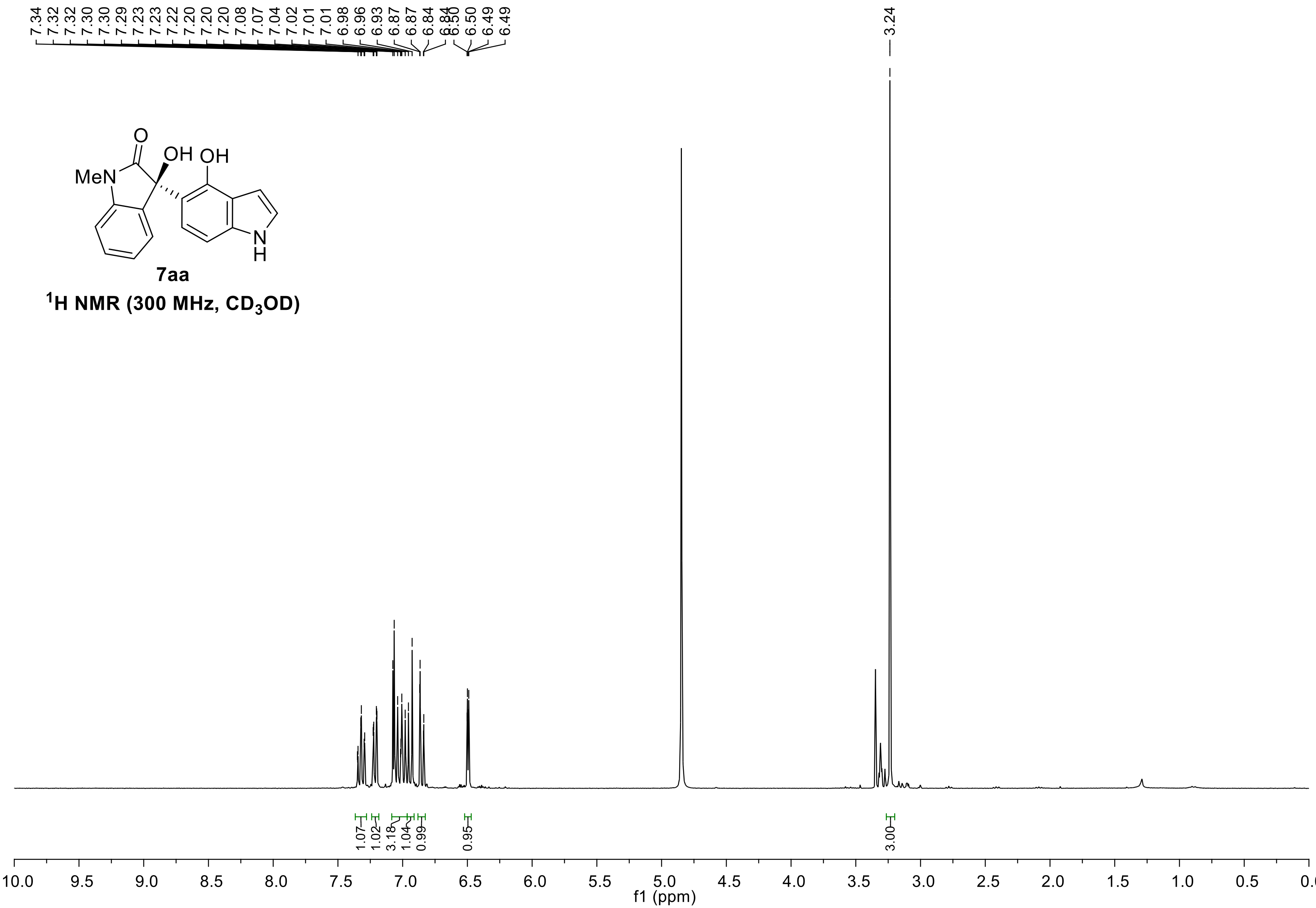
^{1}H NMR (300 MHz, CD_3OD)





5ac

^{13}C NMR (75.5 MHz, CD_3OD)


7.34
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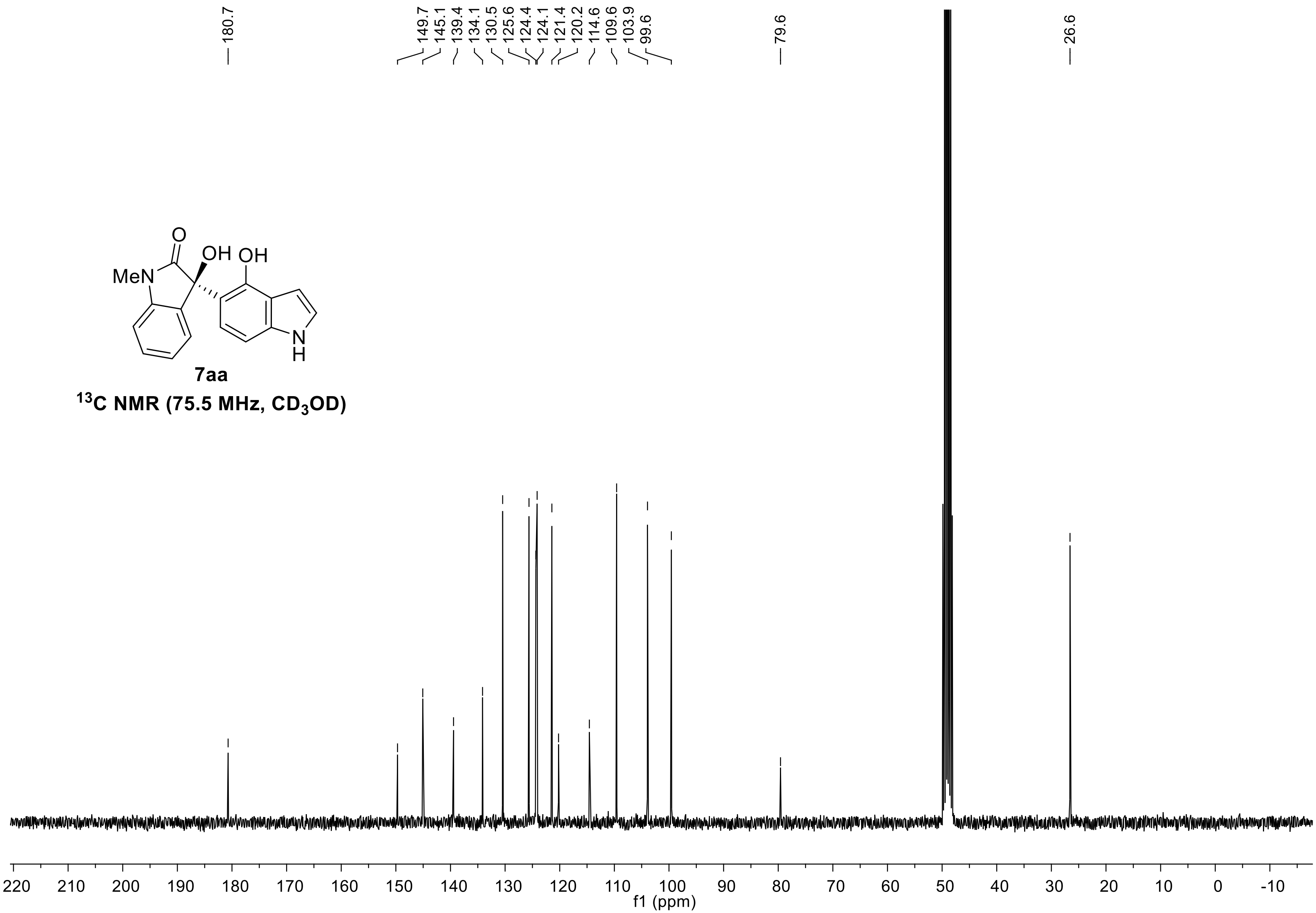
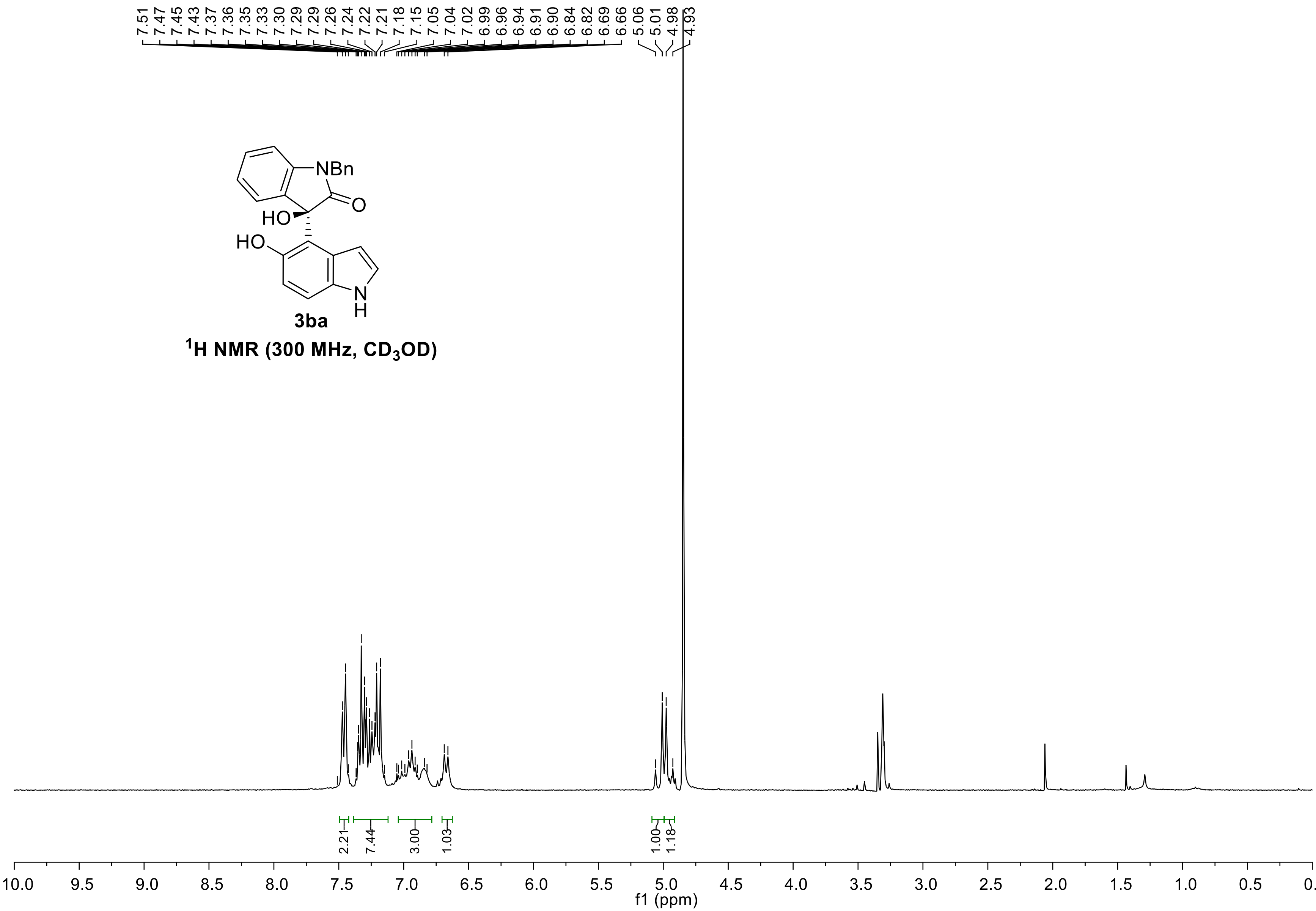
7.23
7.22
7.20
7.20
7.20
7.08
7.07
7.04
7.02
7.01
7.01
6.98
6.96
6.93
6.87
6.87
6.84
6.84
6.50
6.50
6.49
6.49
3.24
O
OH
OH
MeN
N
H
7aa
1H NMR (300 MHz, CD3OD)
1.07
1.02
3.18
1.04
0.99
0.95
3.00
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

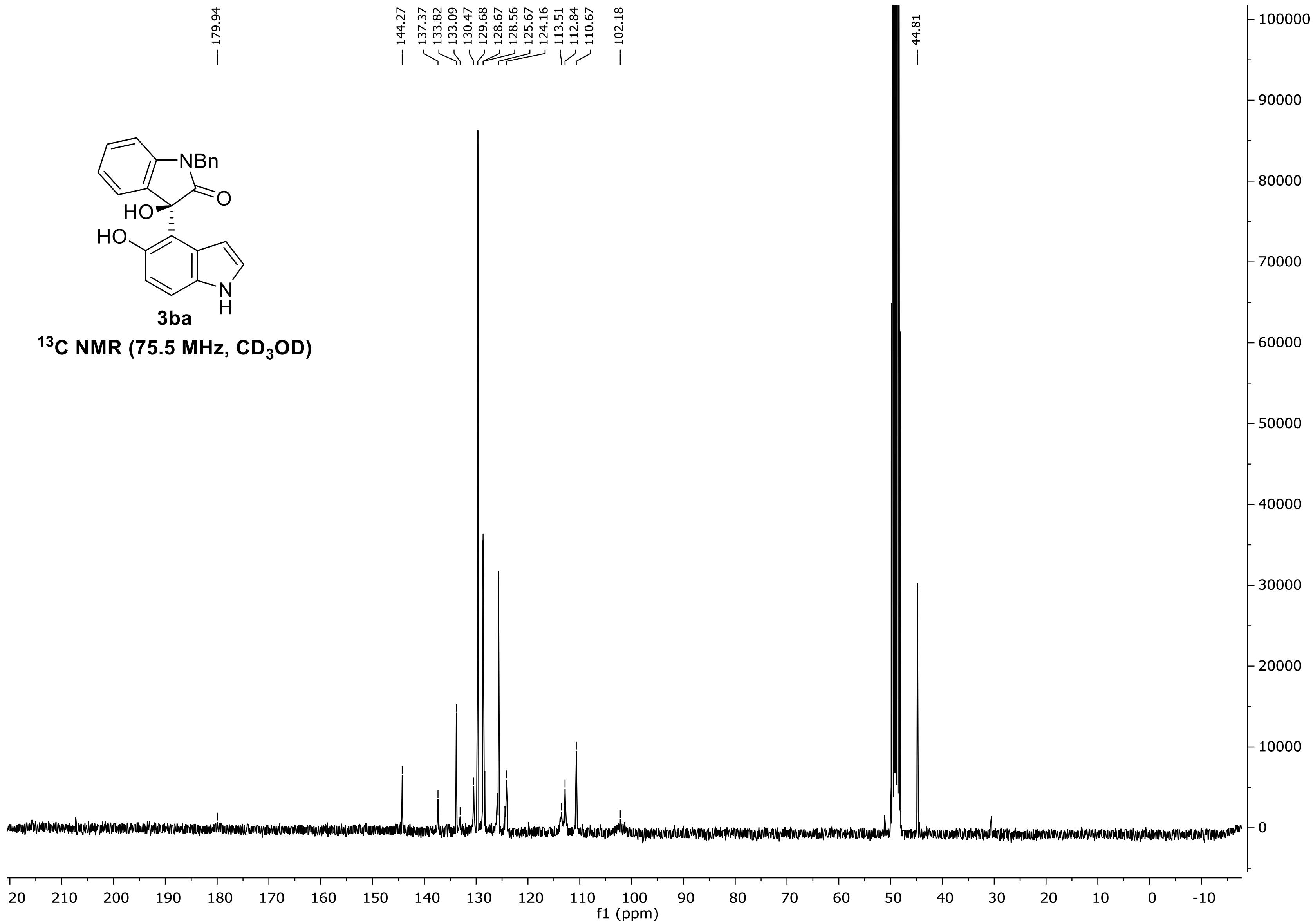


7aa

^{13}C NMR (75.5 MHz, CD_3OD)

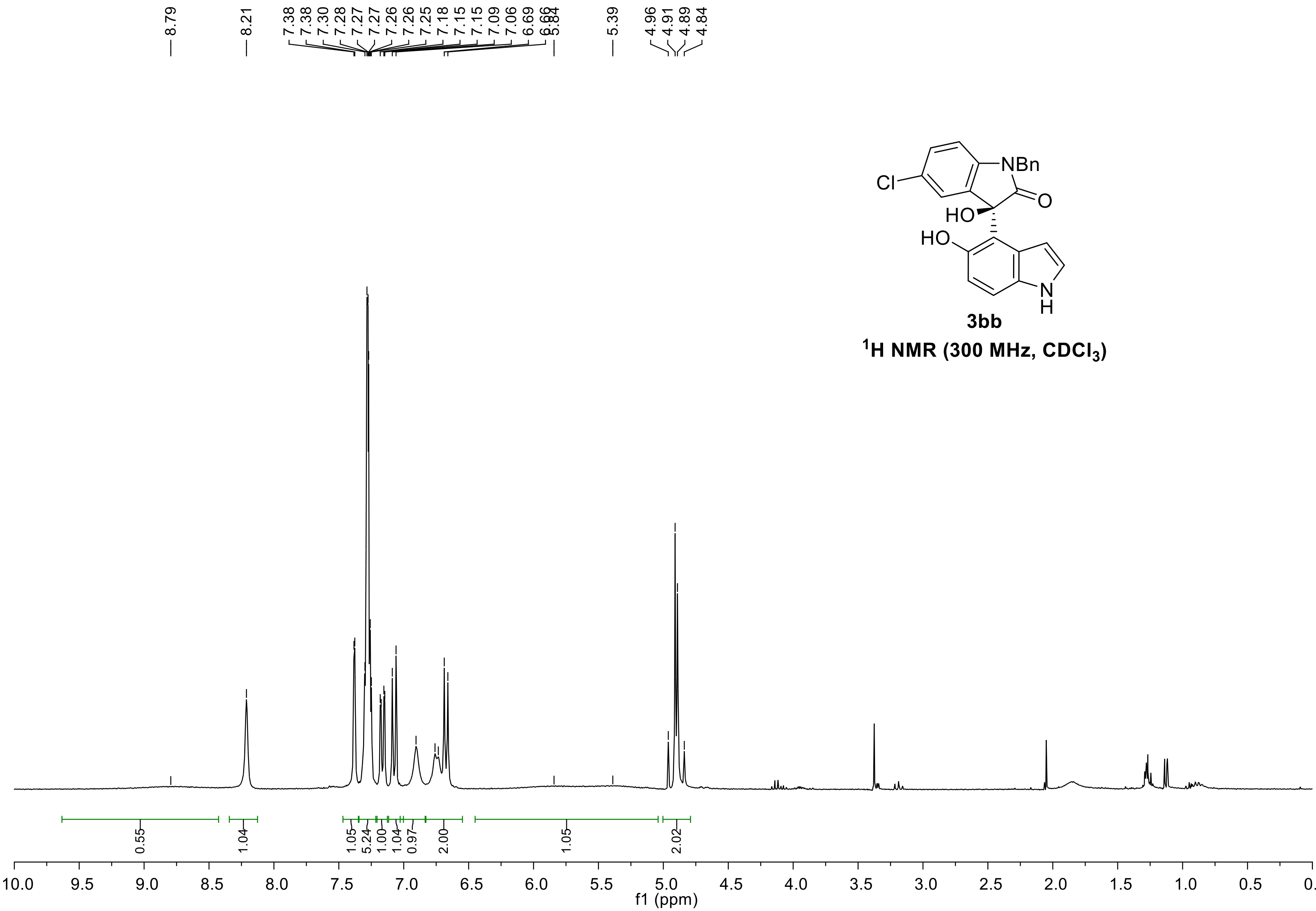


7.51 7.47 7.45 7.43 7.37 7.36 7.35 7.33 7.30 7.29 7.29 7.26 7.24 7.22 7.21 7.18 7.15 7.05 7.04 7.02 6.99 6.96 6.94 6.91 6.90 6.84 6.82 6.69 6.66 5.06 5.01 4.98 4.93
NBn
O
HO
HO
N
H
3ba
^{1}H NMR (300 MHz, CD_3OD)
2.21 7.44 3.00 1.03 1.00 1.18
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)



3ba

^{13}C NMR (75.5 MHz, CD_3OD)

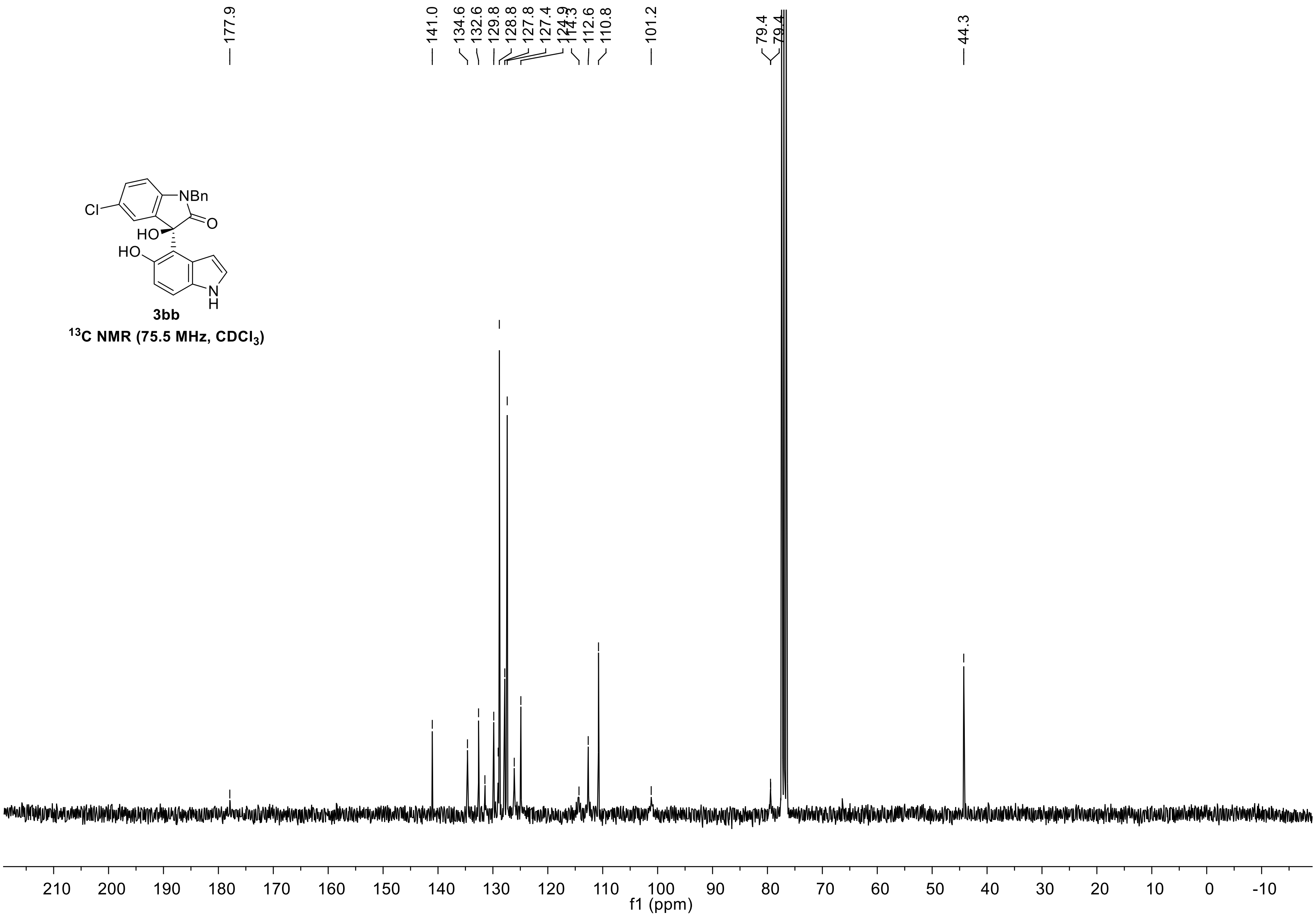


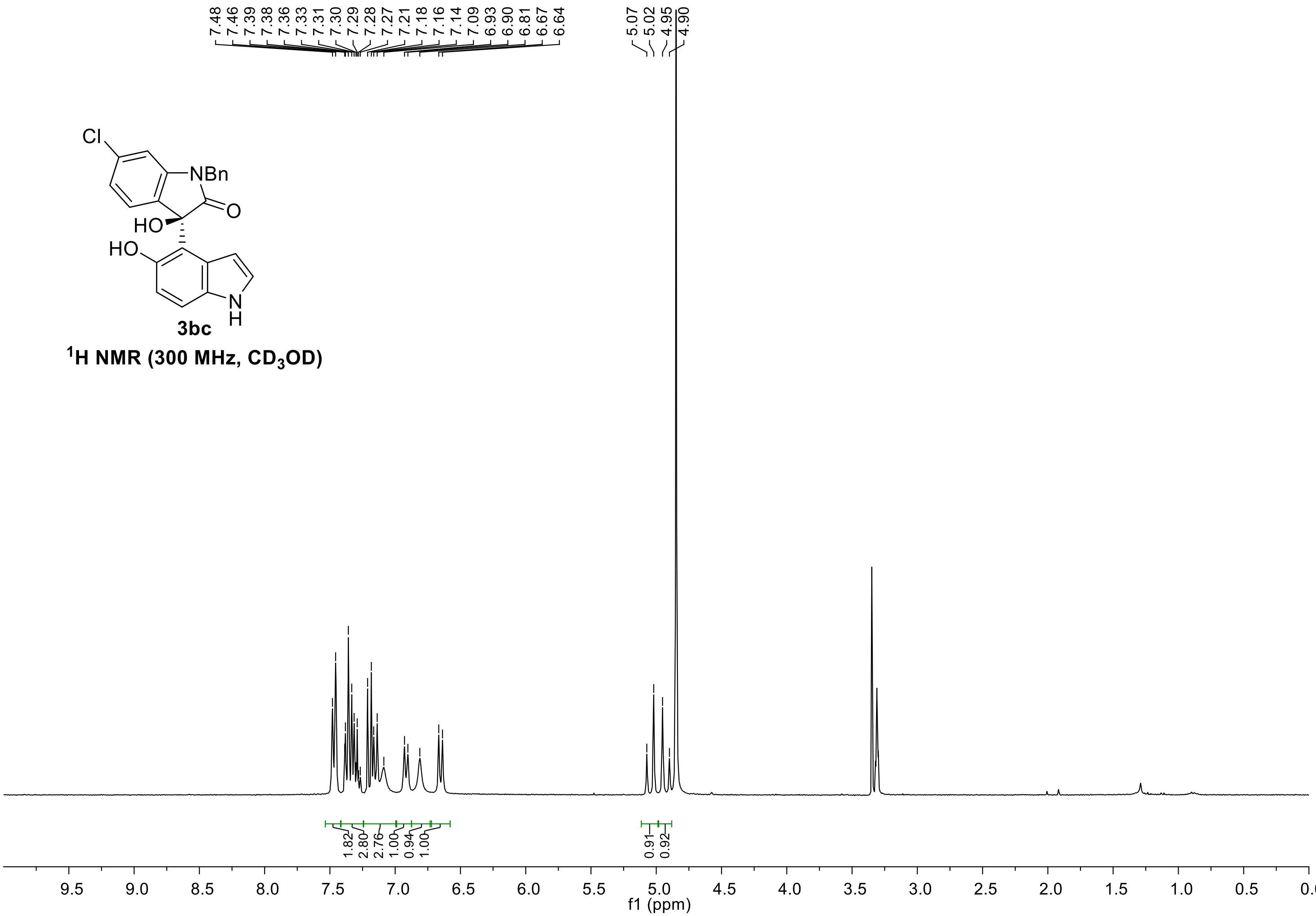
3bb

^{1}H NMR (300 MHz, $CDCl_3$)

3bb

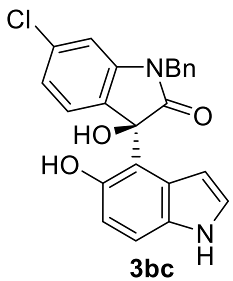
^{13}C NMR (75.5 MHz, $CDCl_3$)





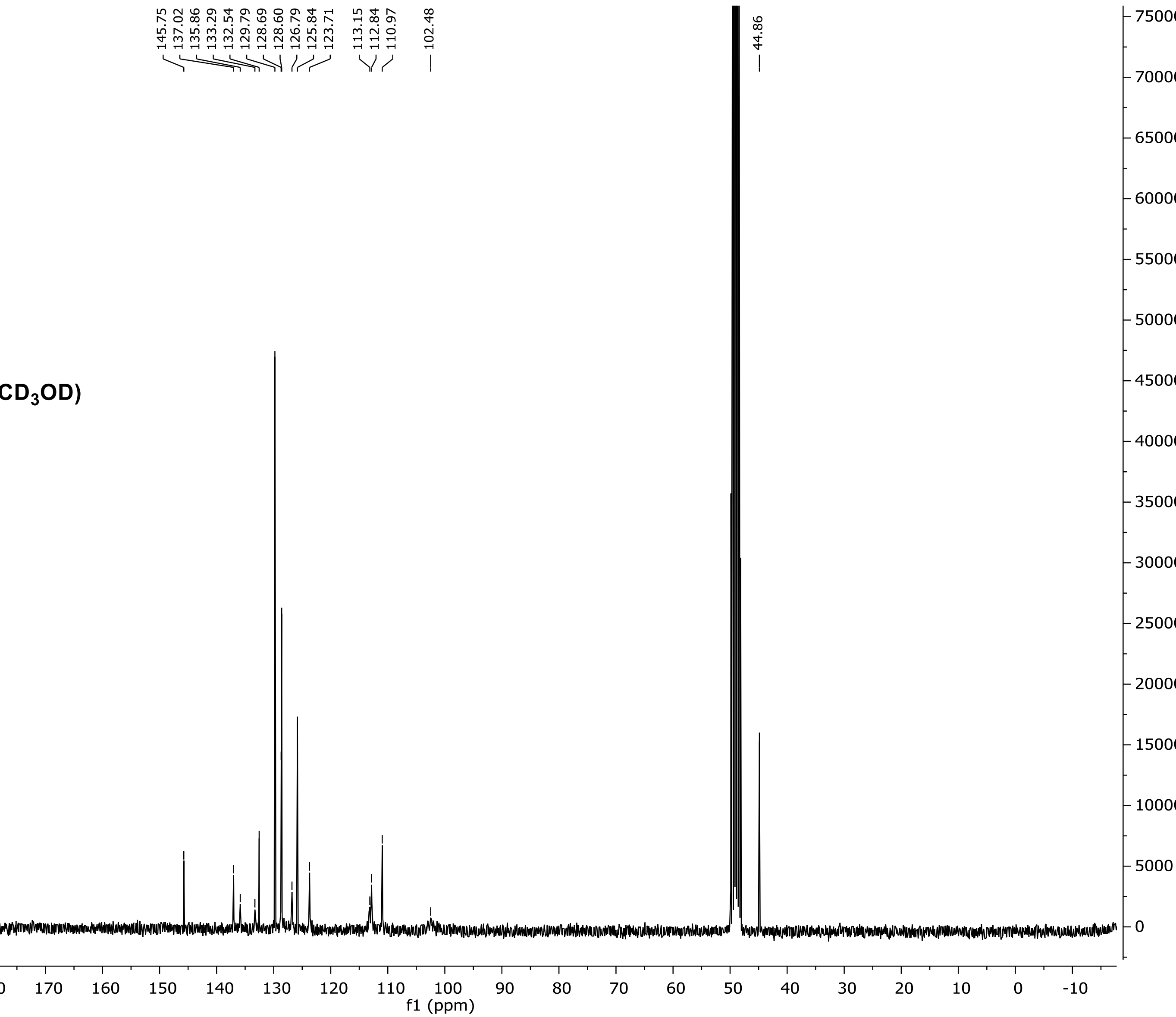
3bc

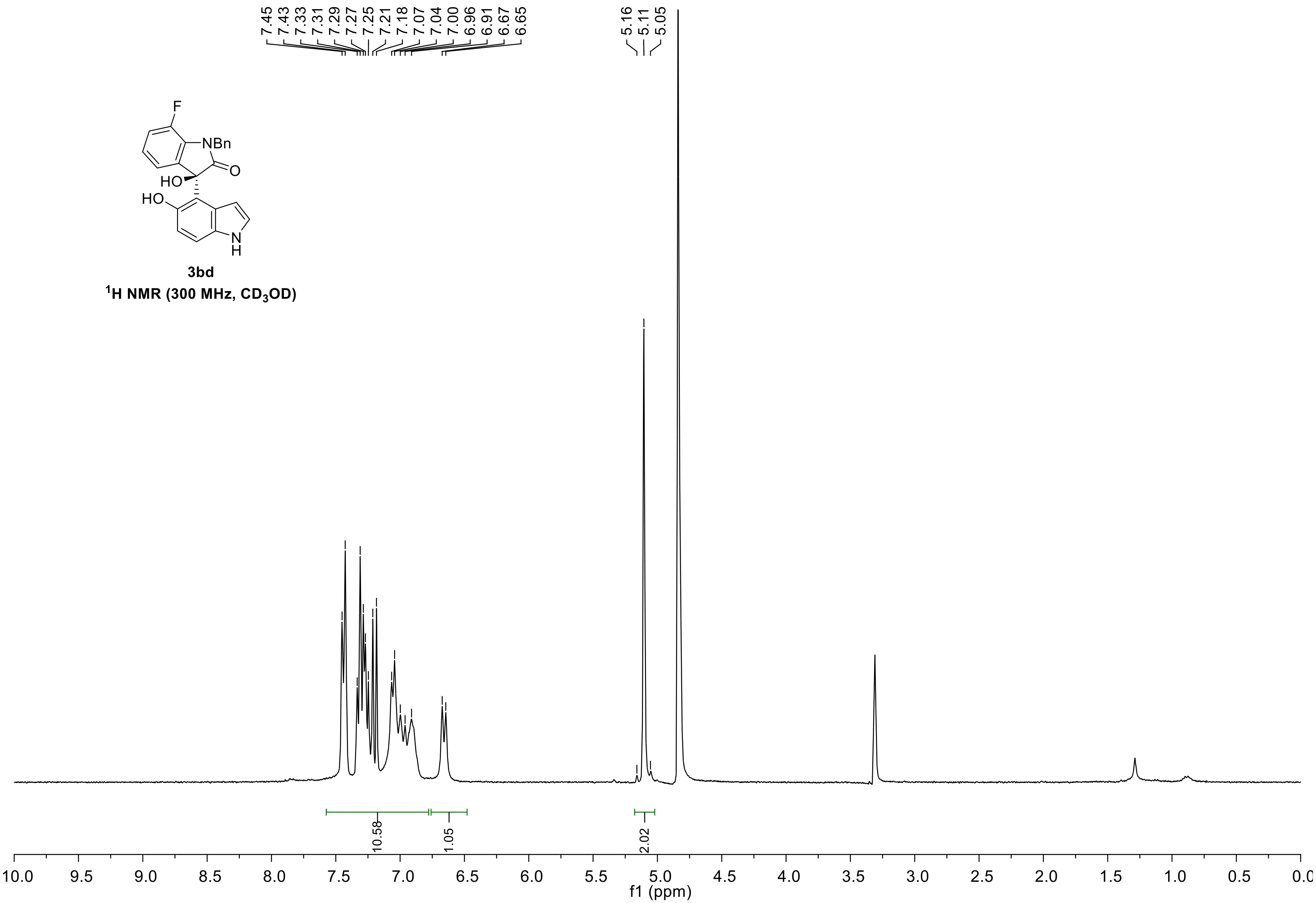
^{1}H NMR (300 MHz, CD_3OD)



3bc

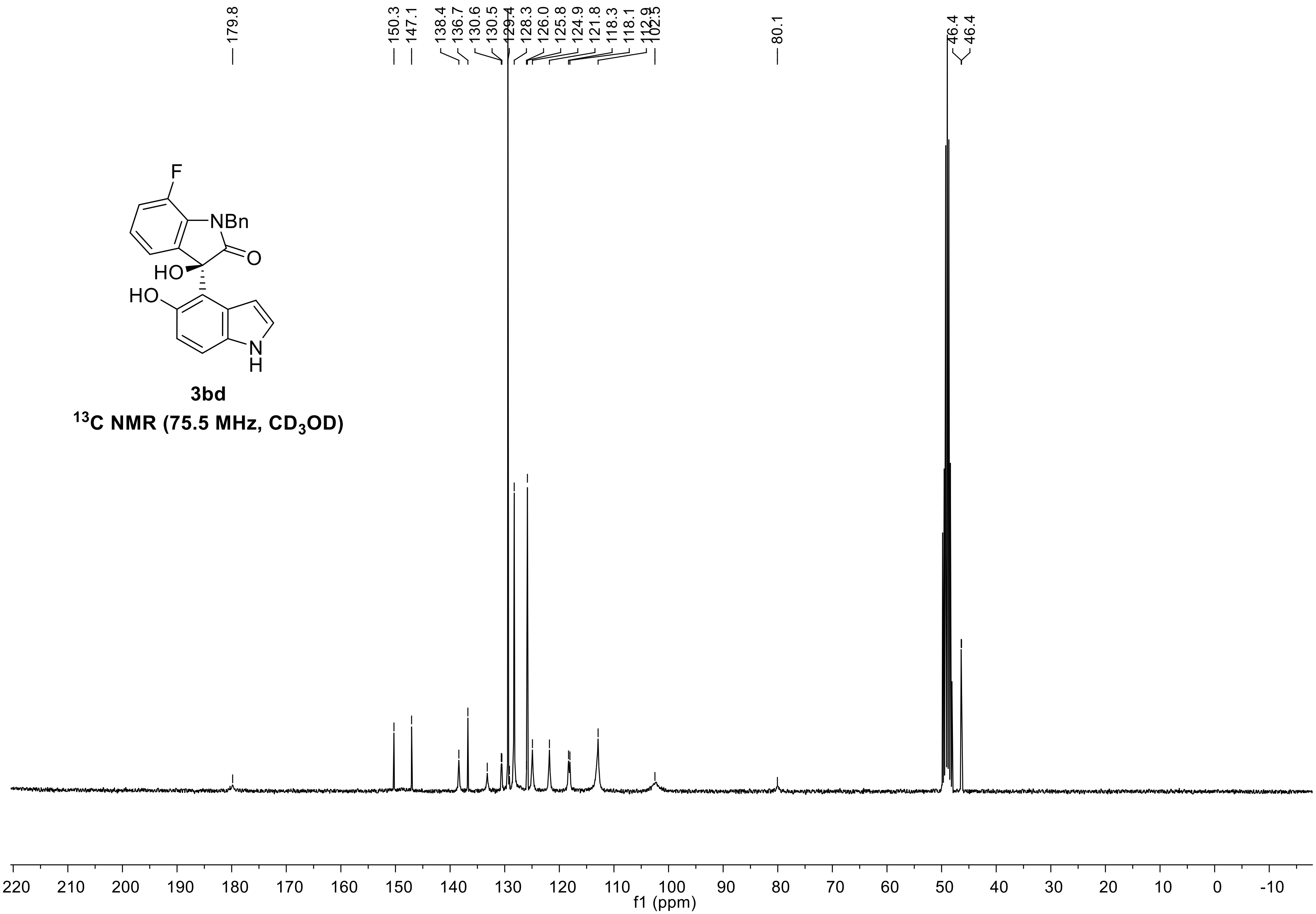
^{13}C NMR (75.5 MHz, CD_3OD)





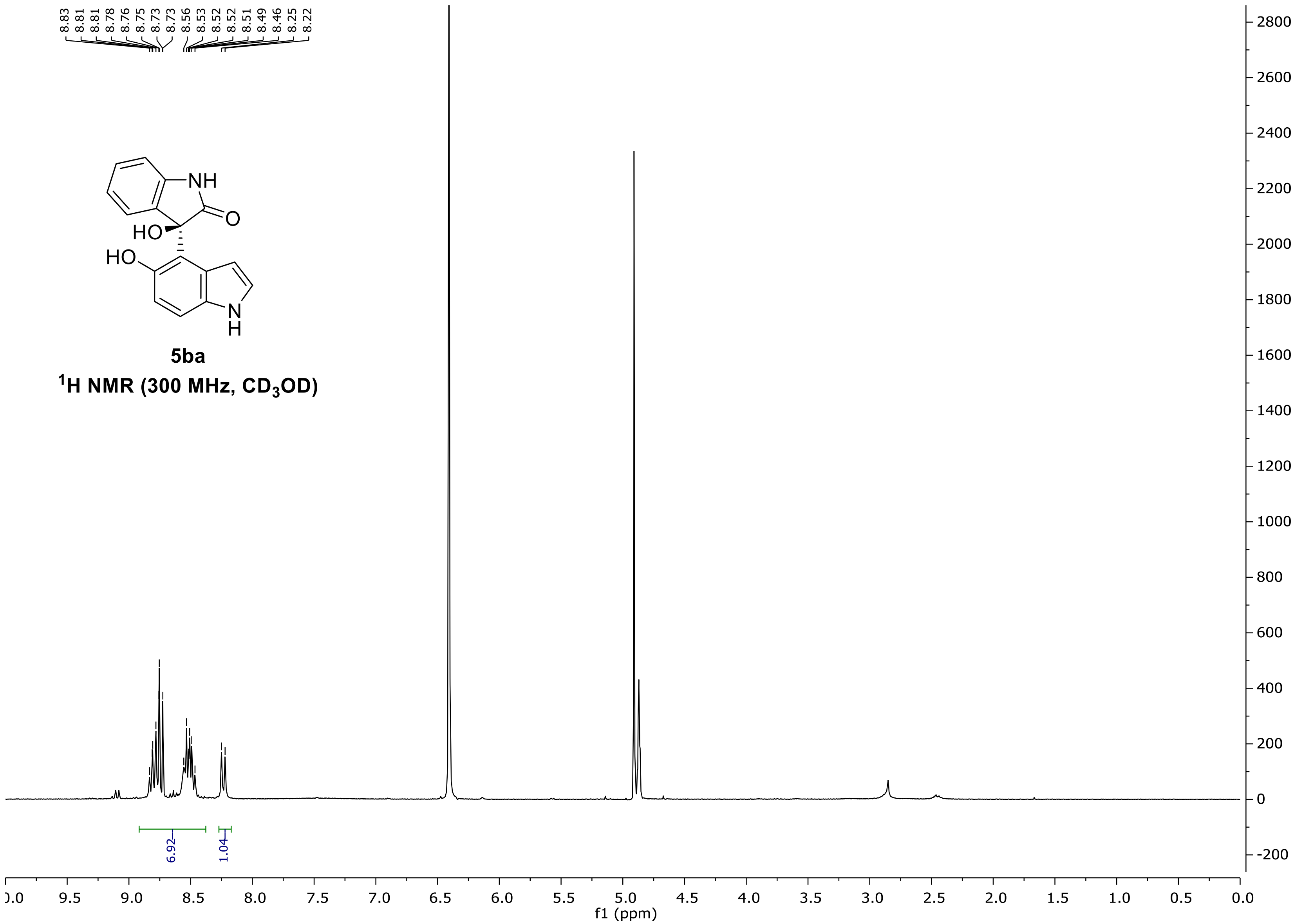
3bd

^{1}H NMR (300 MHz, CD_3OD)



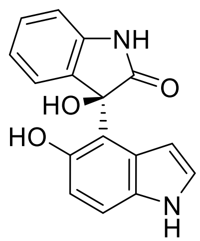
3bd

^{13}C NMR (75.5 MHz, CD_3OD)



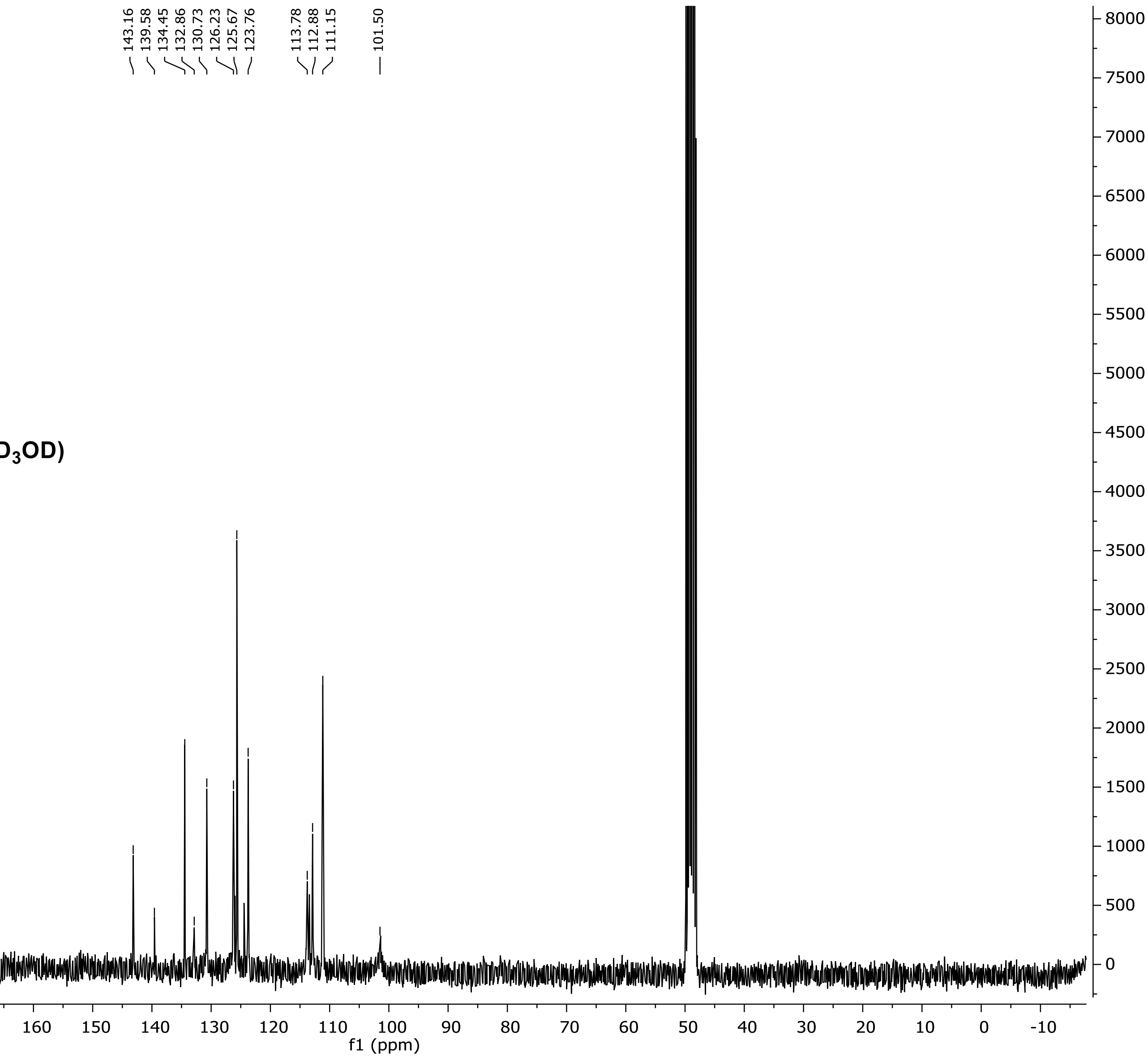
5ba

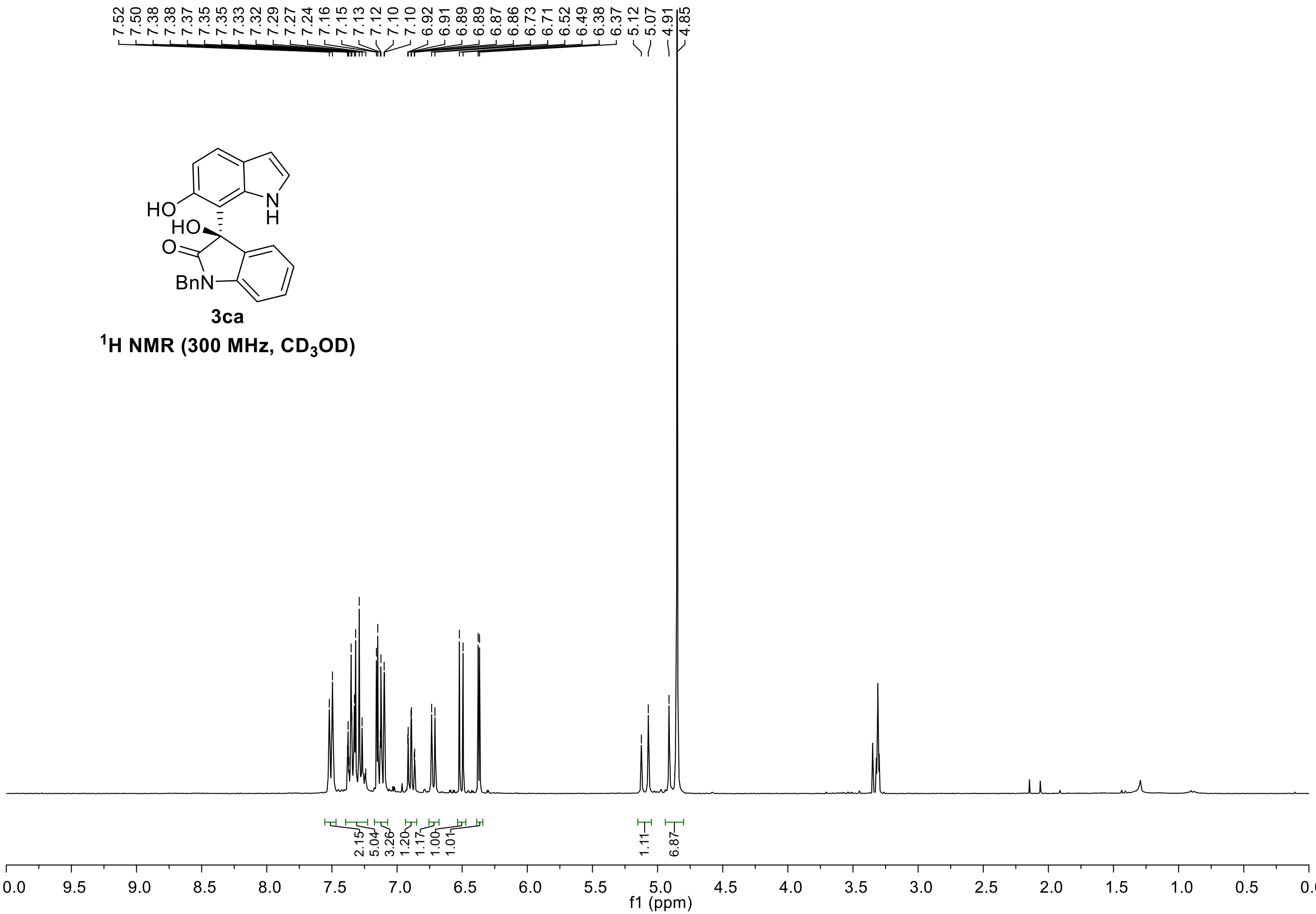
^{1}H NMR (300 MHz, CD_3OD)



5ba

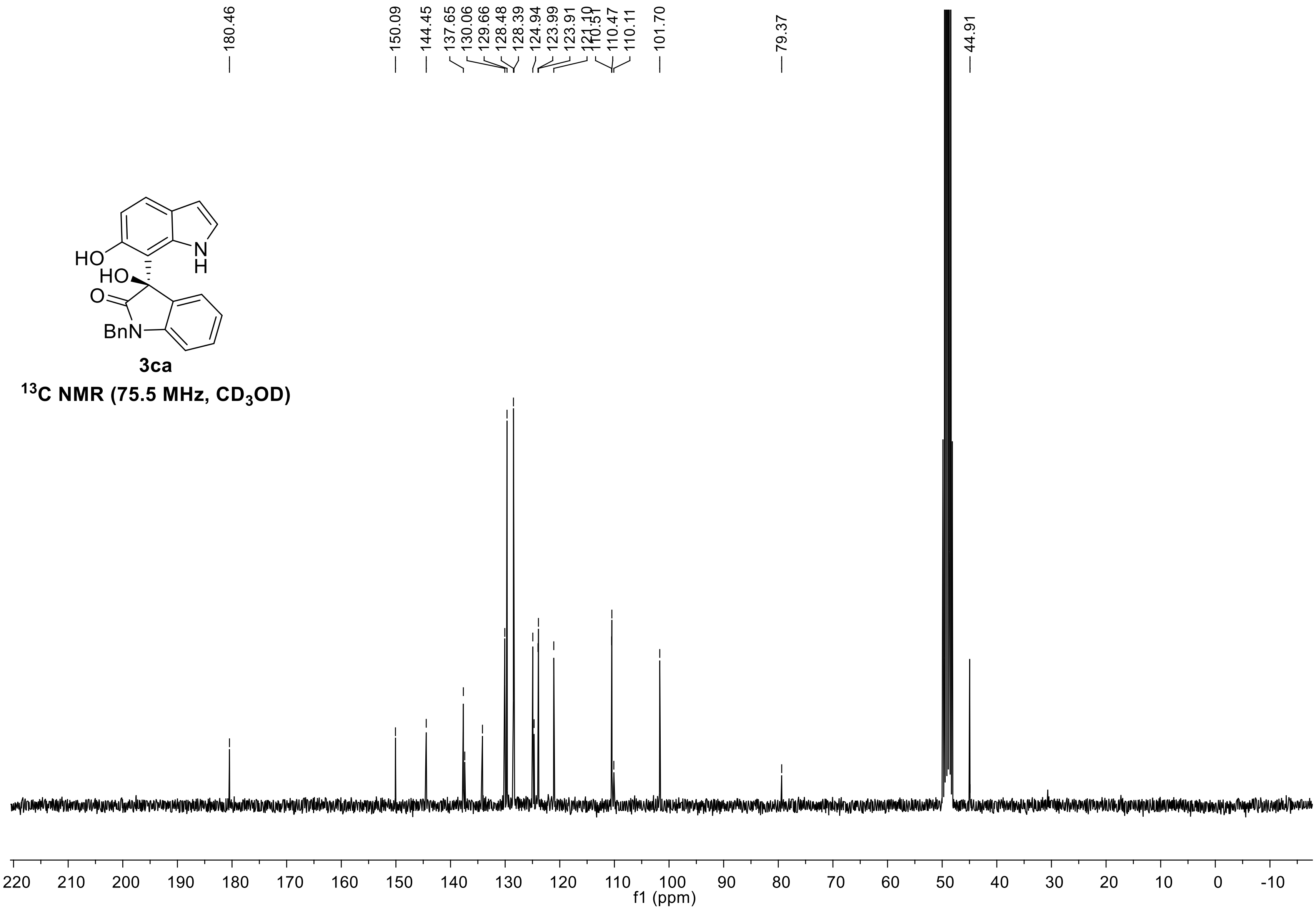
[1]H NMR (300 MHz, CD_3OD)





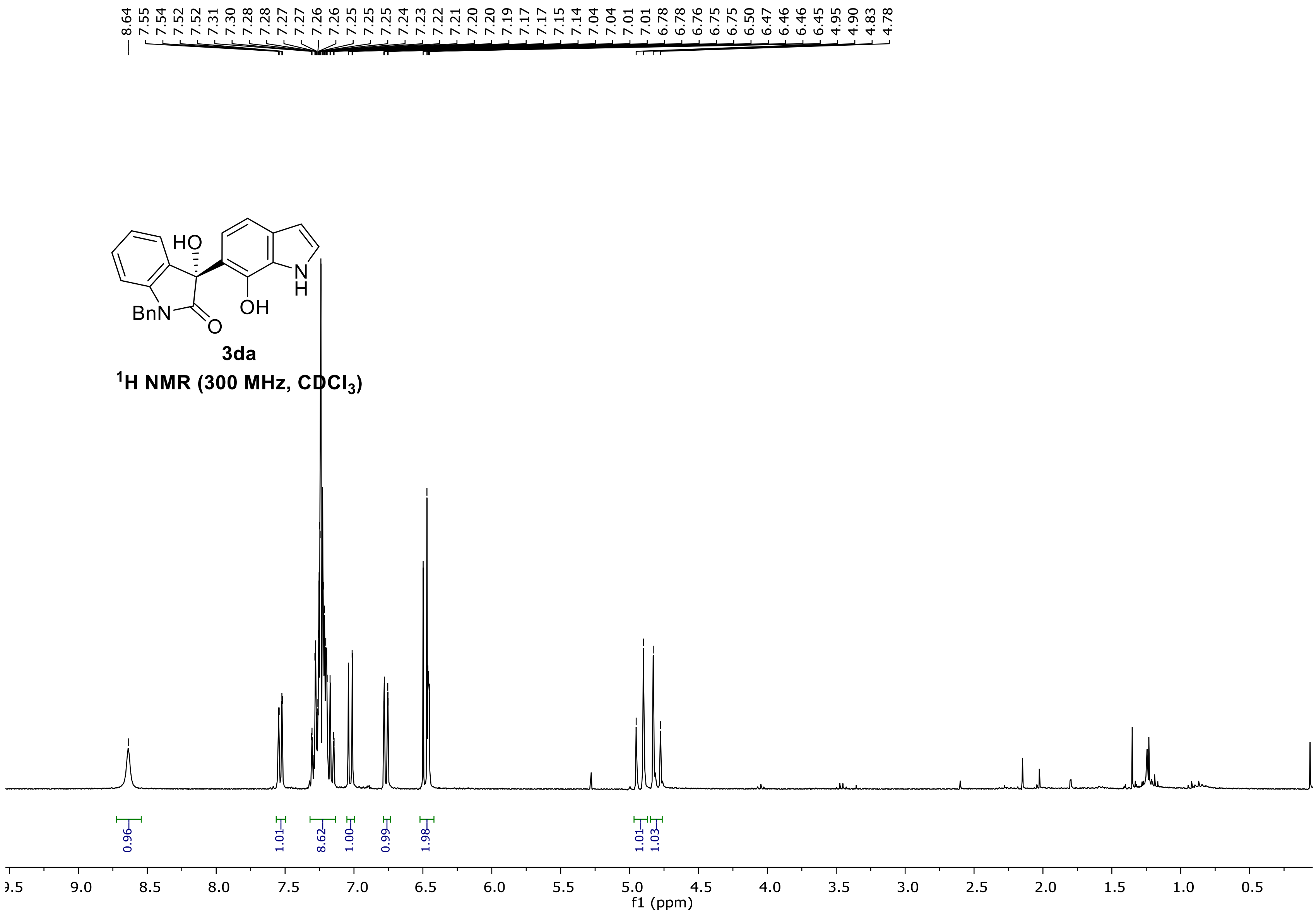
3ca

[1]H NMR (300 MHz, CD_3OD)

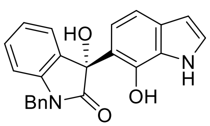


3ca

^{13}C NMR (75.5 MHz, CD_3OD)

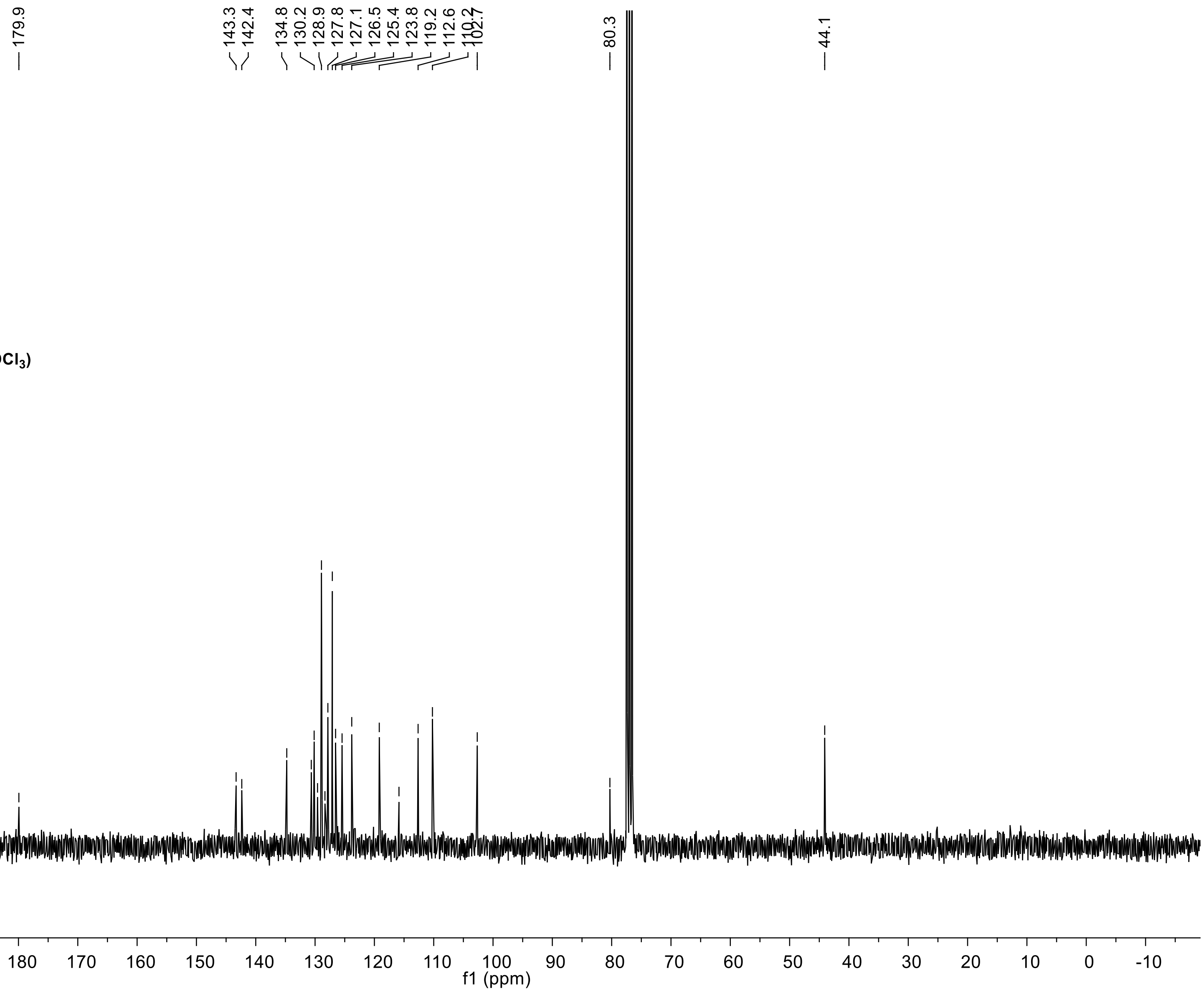


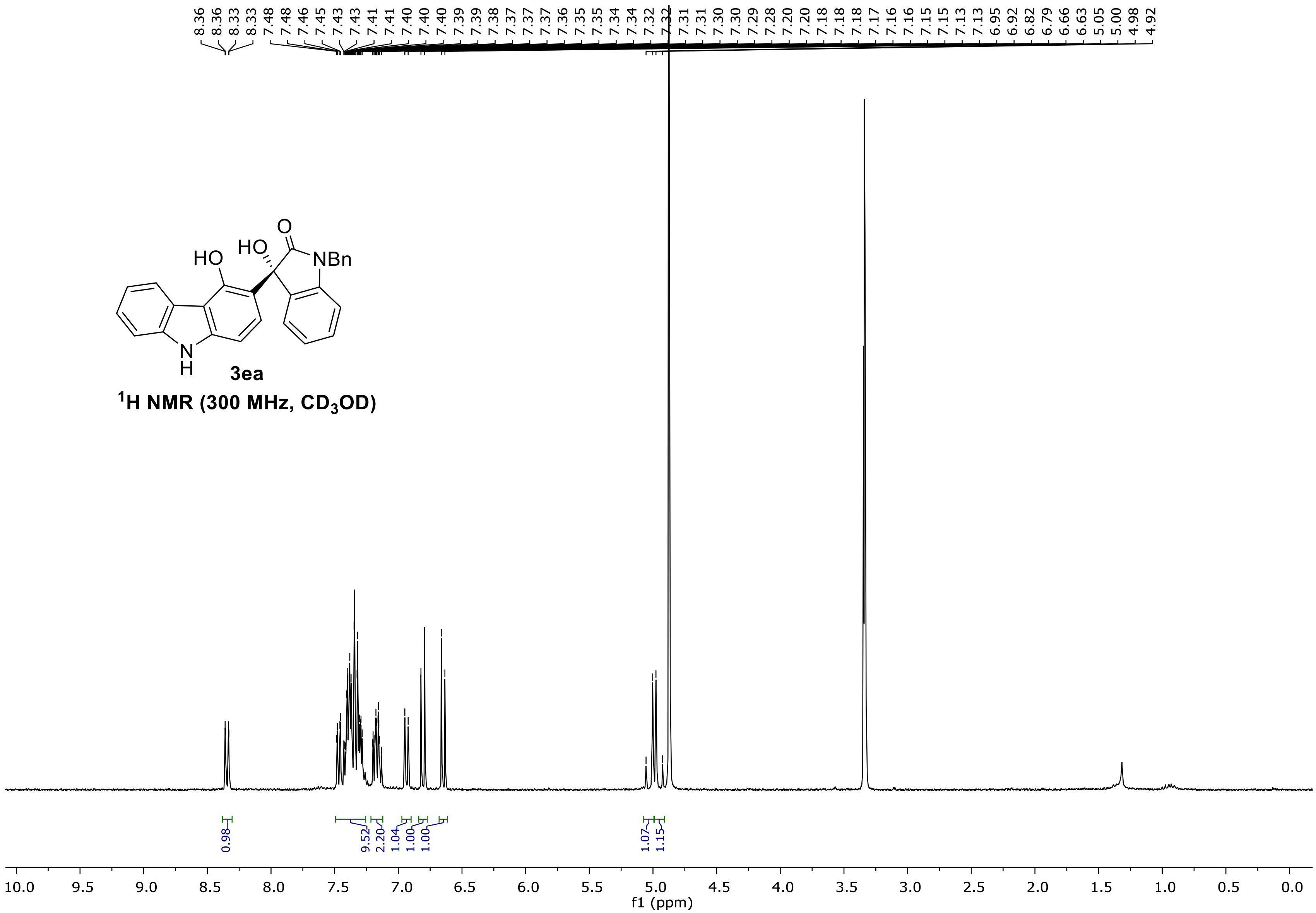
8.64
7.55
7.54
7.52
7.52
7.31
7.30
7.28
7.28
7.27
7.27
7.26
7.26
7.25
7.25
7.25
7.24
7.23
7.22
7.21
7.20
7.20
7.19
7.17
7.15
7.14
7.04
7.04
7.01
7.01
6.78
6.78
6.76
6.75
6.75
6.50
6.47
6.46
6.46
6.45
4.95
4.90
4.83
4.78
HO
N
H
OH
BnN
O
3da
1H NMR (300 MHz, CDCl3)
0.96
1.01
8.62
1.00
0.99
1.98
1.01
1.03
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)



3da

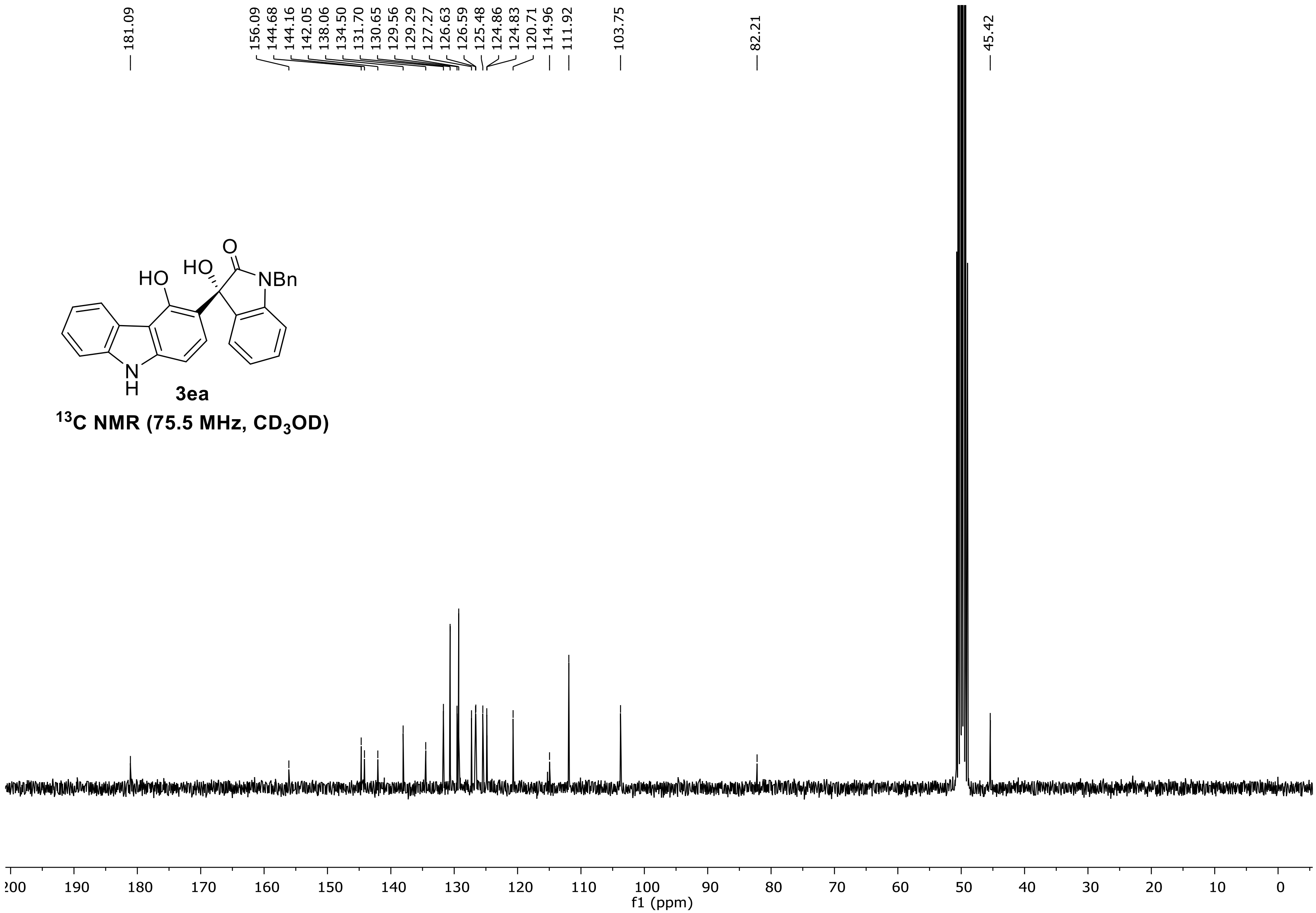
^{13}C NMR (75.5 MHz, CDCl$_3$)





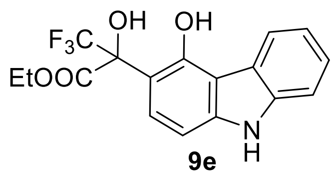
3ea

^{1}H NMR (300 MHz, CD$_3$OD)



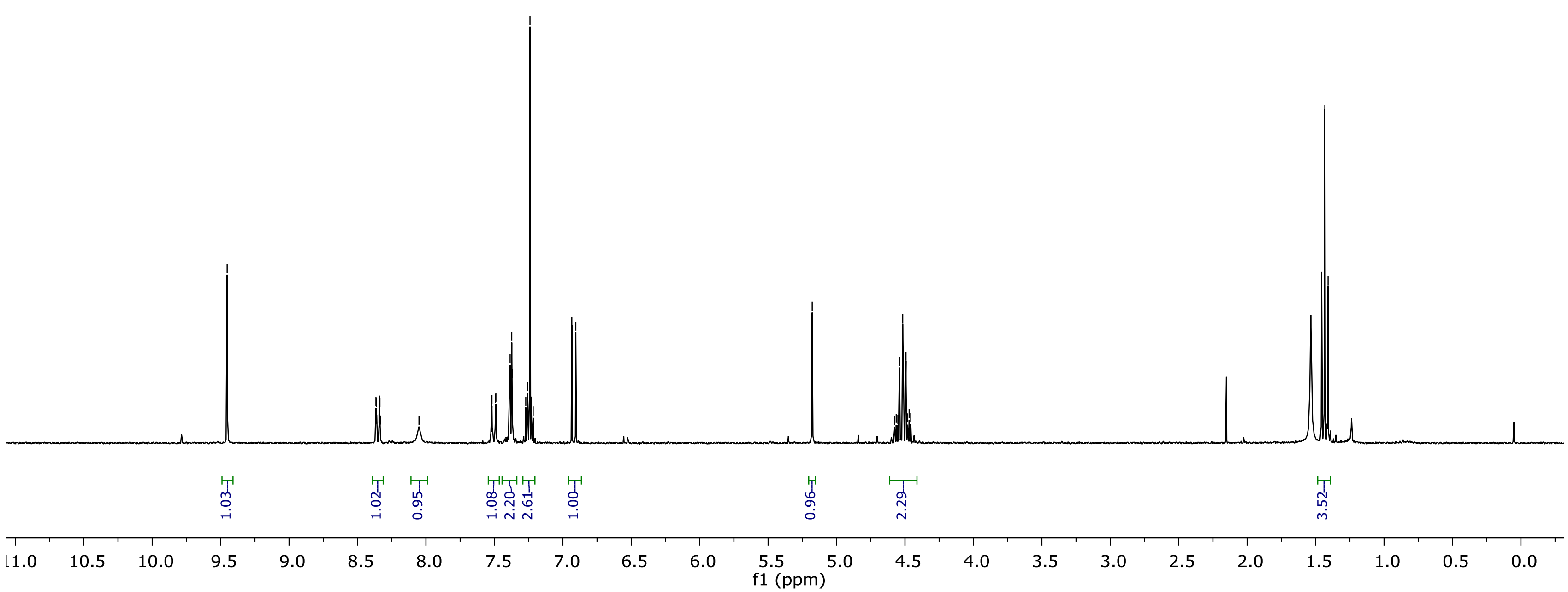
3ea

^{13}C NMR (75.5 MHz, CD_3OD)



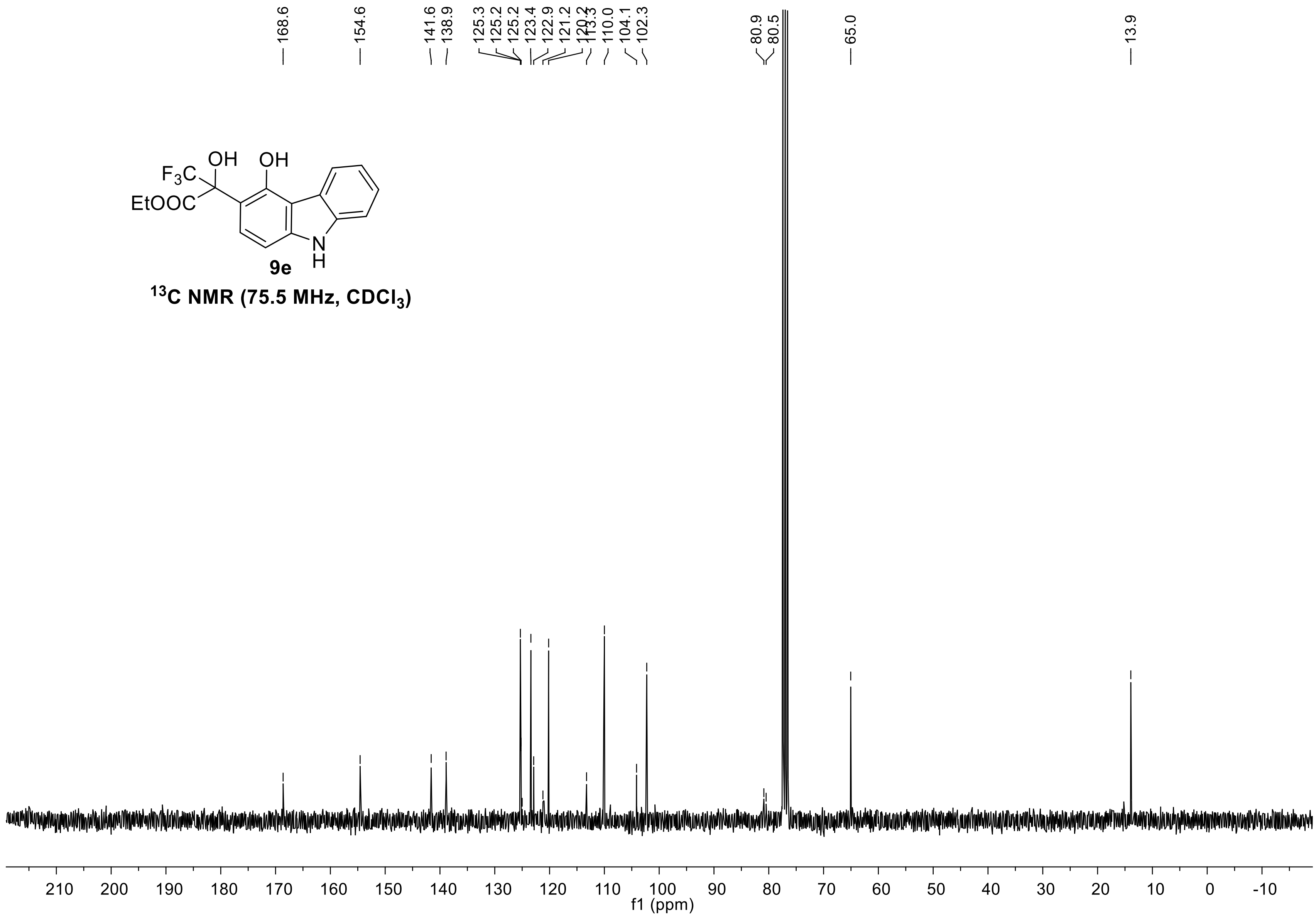
9e

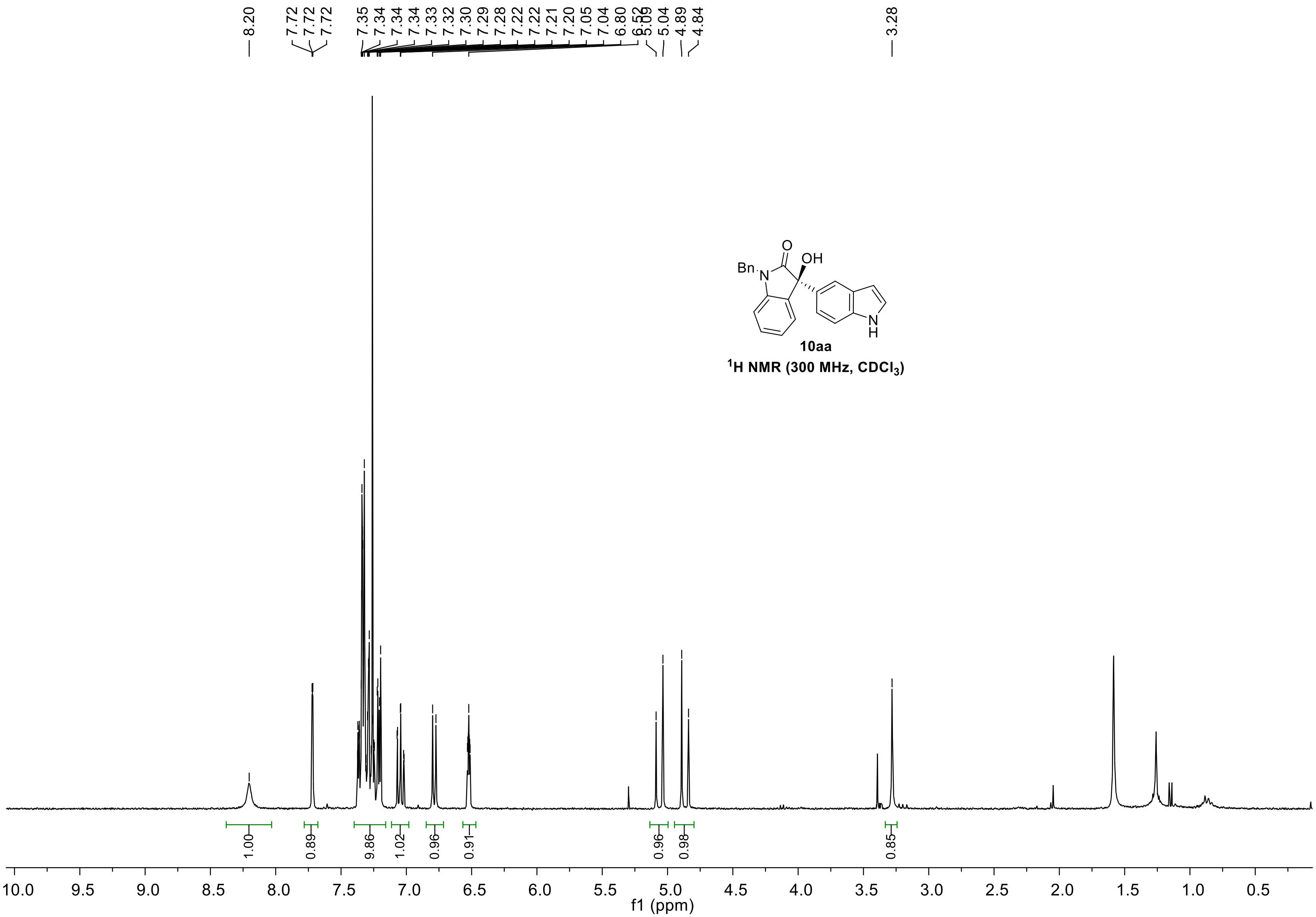
[1]H NMR (300 MHz, CDCl$_3$)



9e

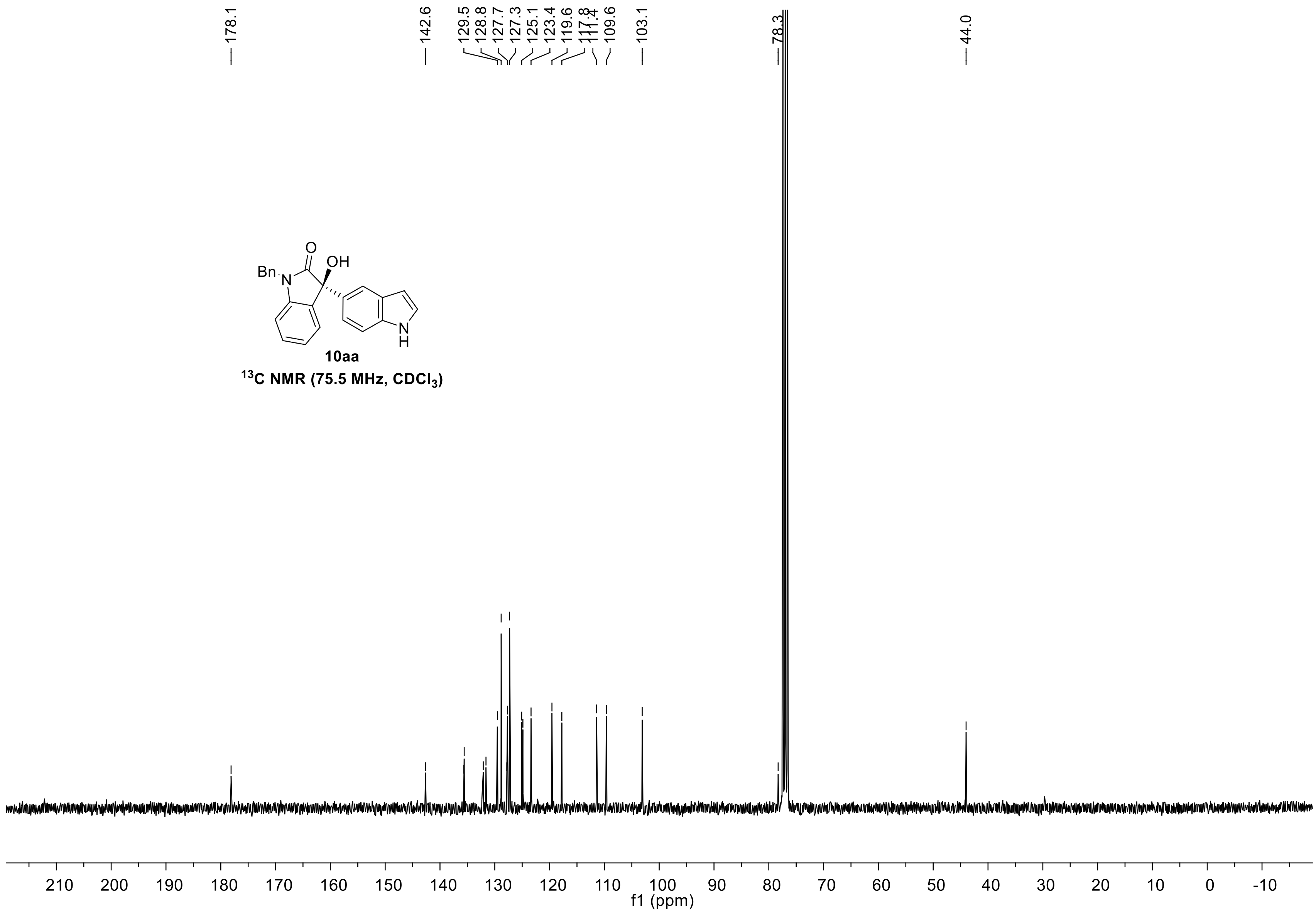
^{13}C NMR (75.5 MHz, $CDCl_3$)



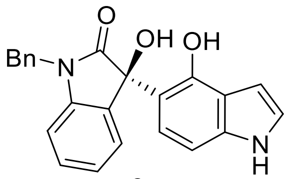


10aa

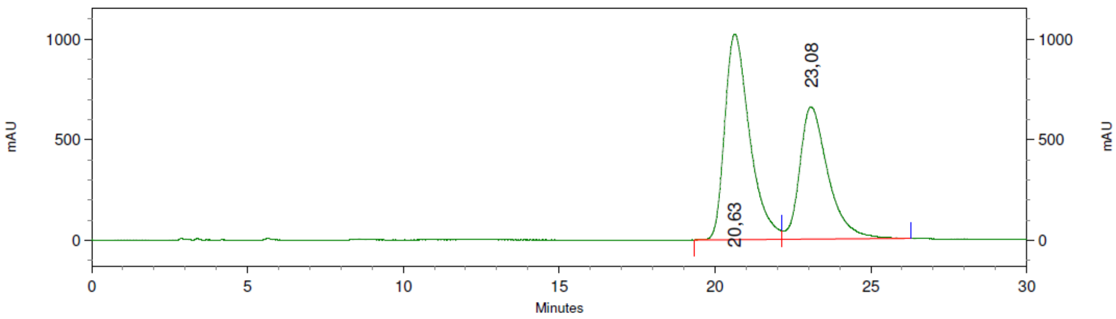
^{1}H NMR (300 MHz, CDCl$_3$)


178.1
142.6
129.5
128.8
127.7
127.3
125.1
123.4
119.6
117.8
111.4
109.6
103.1
78.3
44.0
O
OH
Bn
N
N
H
10aa
^{13}C NMR (75.5 MHz, $CDCl_3$)
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

HPLC Traces

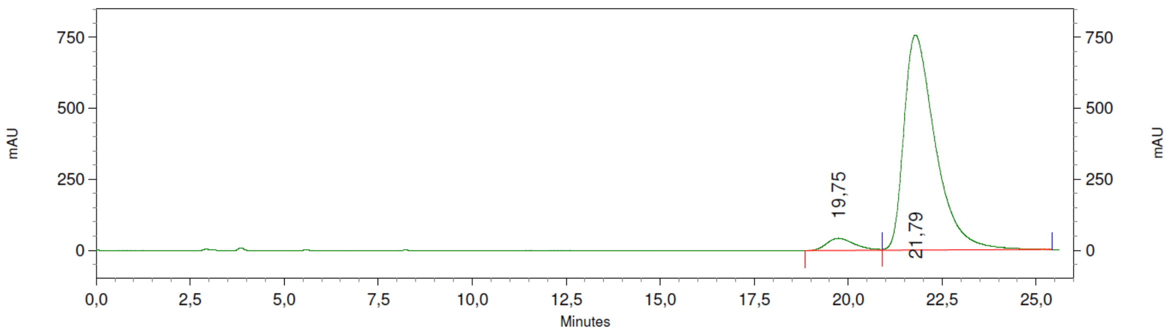


3aa



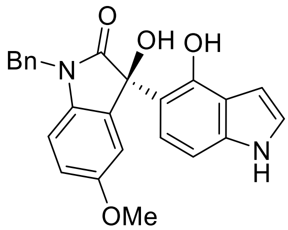
1: 220 nm, 4 nm Results

Retention Time	Area	Area Percent
20,63	227699006	57,658
23,08	167214952	42,342

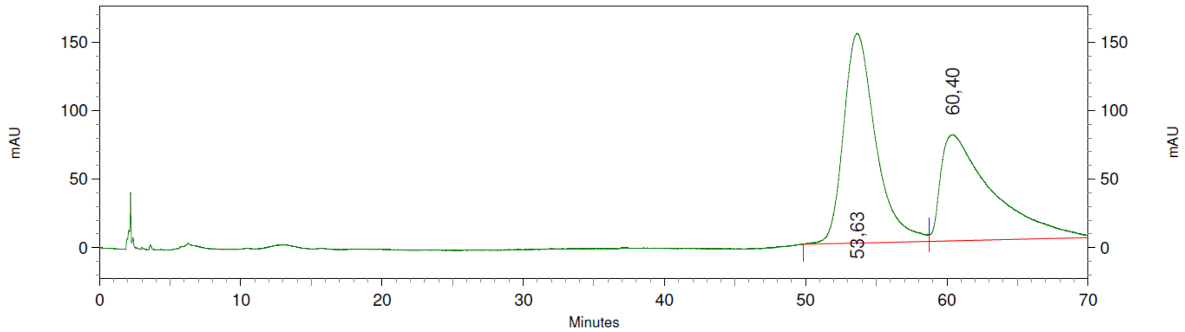


2: 230 nm, 4 nm Results

Retention Time	Area	Area Percent
19,75	9141580	4,922
21,79	176589262	95,078

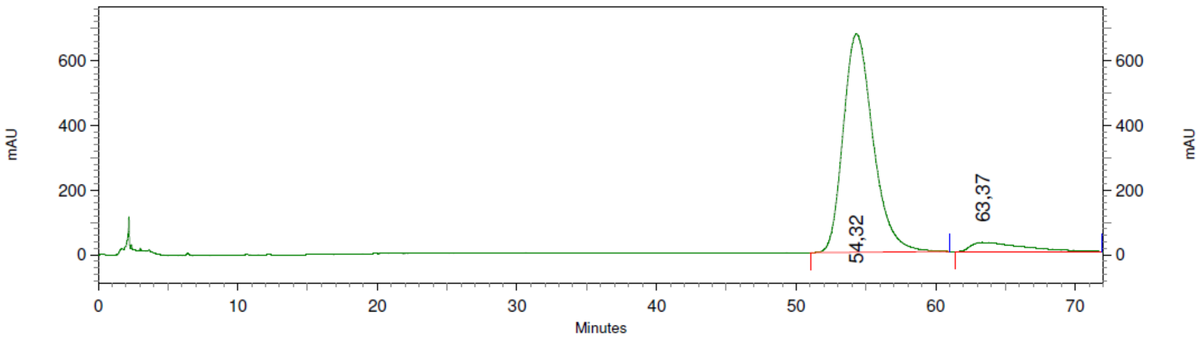


3ab



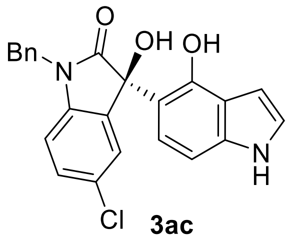
1: 220 nm, 4 nm Results

Retention Time	Area	Area Percent
53,63	96859637	55,126
60,40	78846819	44,874

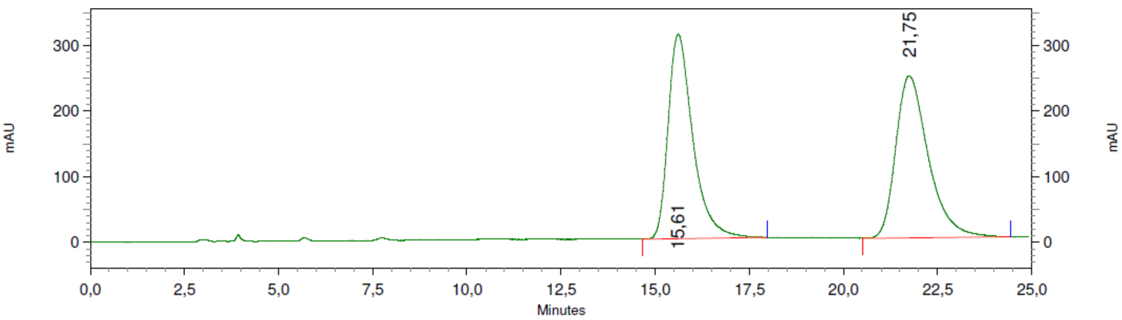


1: 220 nm, 4 nm Results

Retention Time	Area	Area Percent
54,32	402843402	93,062
63,37	30034908	6,938

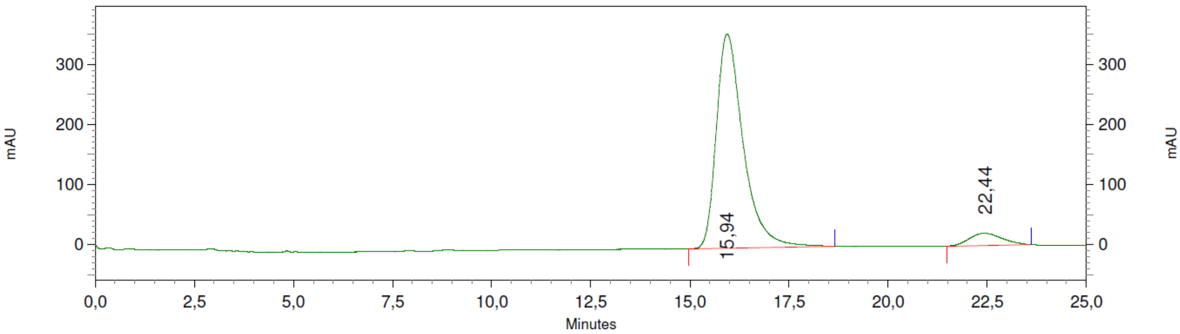


3ac



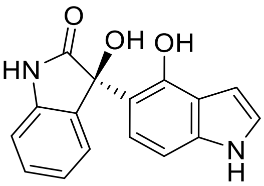
2: 230 nm, 4 nm Results

Retention Time	Area	Area Percent
15,61	56862160	48,952
21,75	59296009	51,048

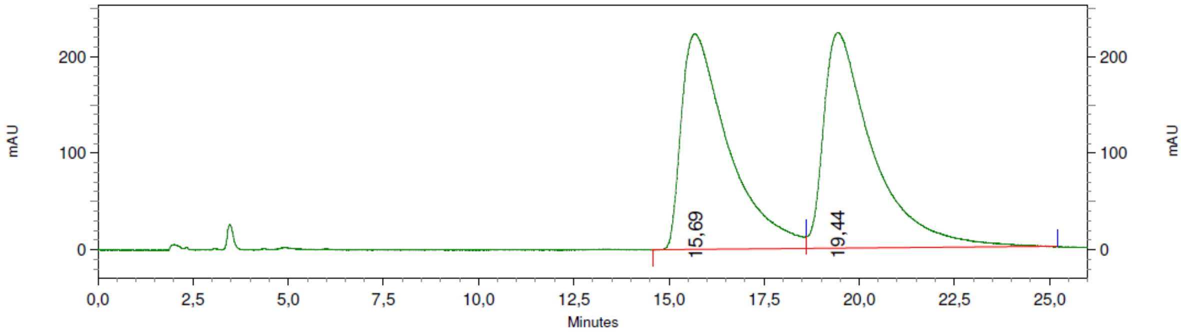


2: 230 nm, 4 nm Results

Retention Time	Area	Area Percent
15,94	67151771	93,483
22,44	4680987	6,517

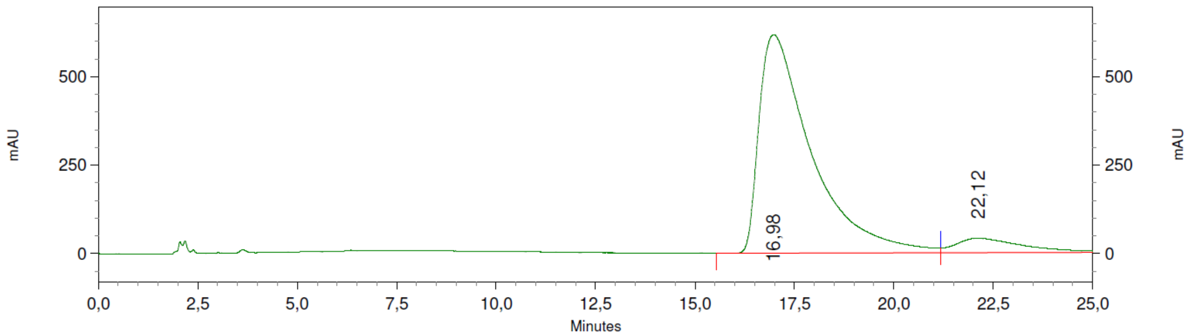


5aa



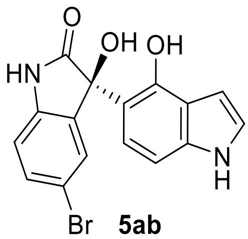
3: 230 nm, 4 nm Results

Retention Time	Area	Area Percent
15,69	77310583	48,905
19,44	80773626	51,095

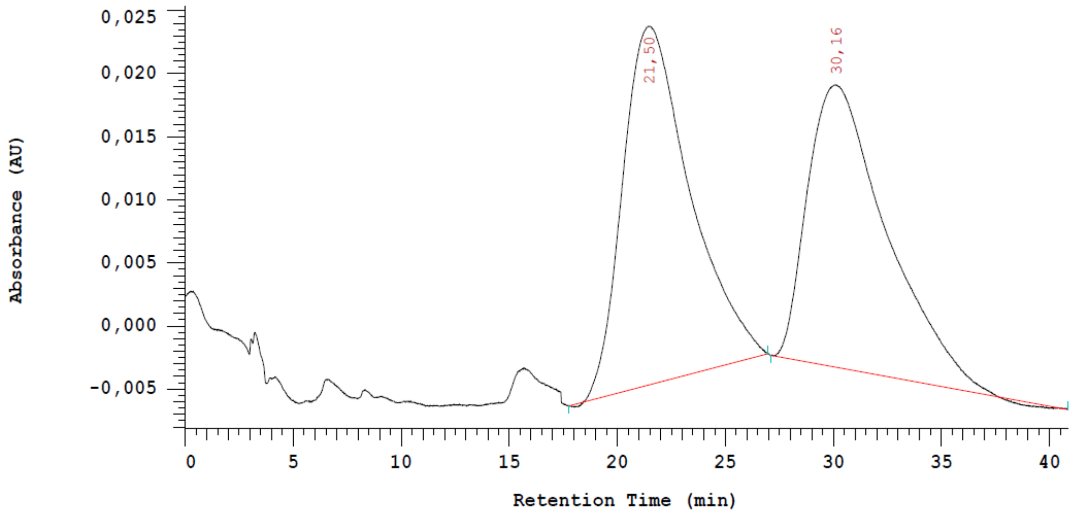


1: 220 nm, 4 nm Results

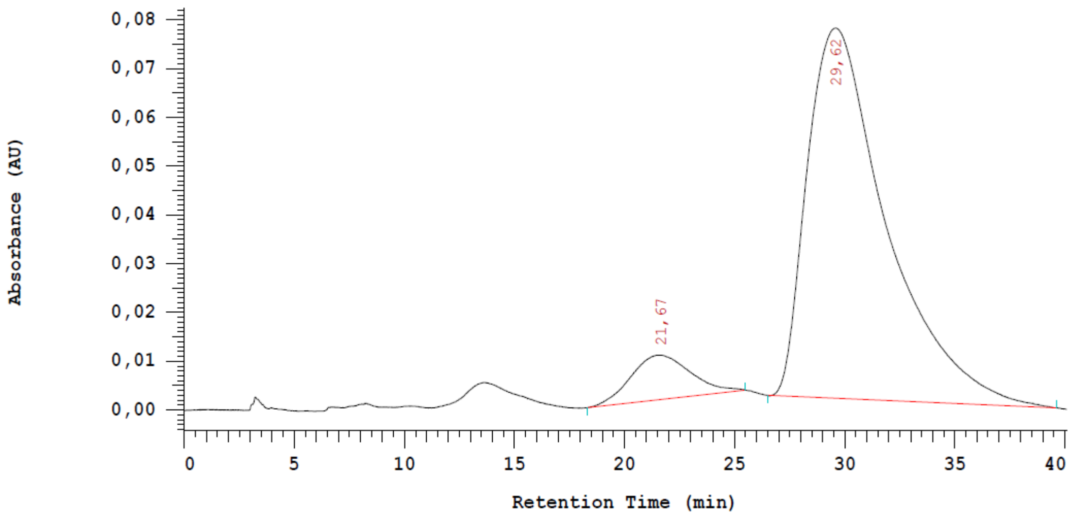
Retention Time	Area	Area Percent
16,98	225871773	92,272
22,12	18917287	7,728



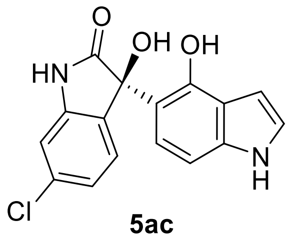
5ab



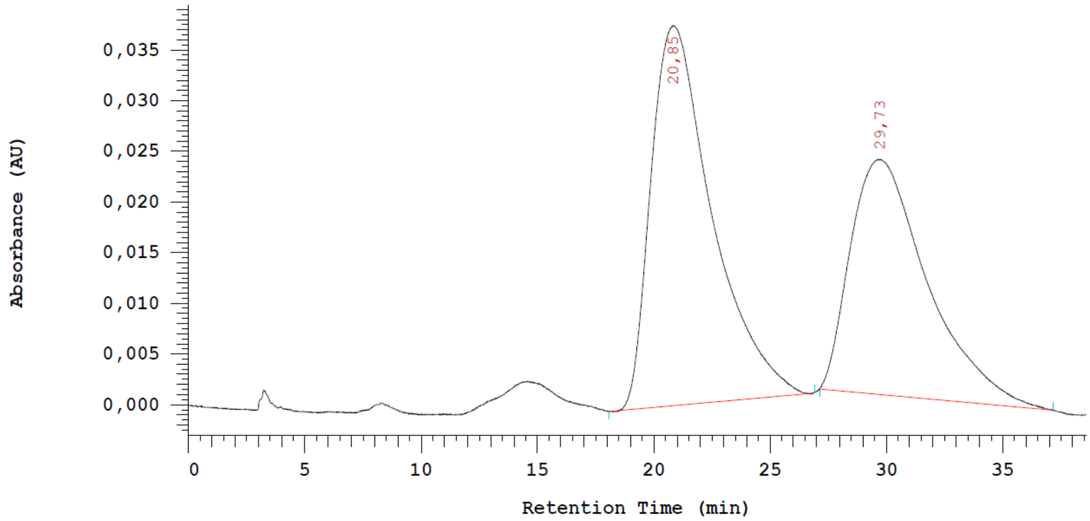
No.	RT	Area	Area %	Name
1	21,50	3077180	51,949	
2	30,16	2846300	48,051	enanti (-)
		5923480	100,000	



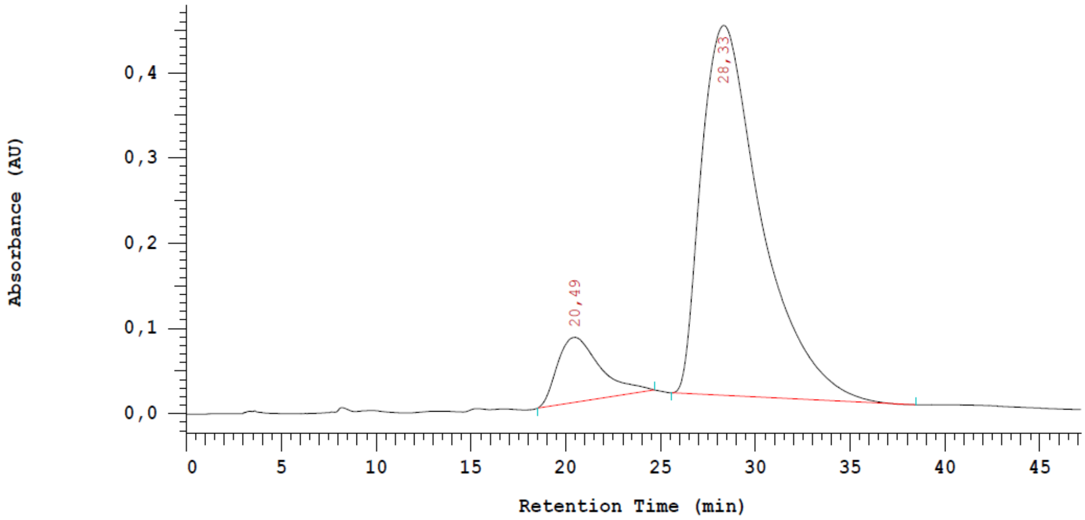
No.	RT	Area	Area %	Name
1	21,67	852240	8,248	enant. (+)
2	29,62	9481040	91,752	enanti (-)
		10333280	100,000	



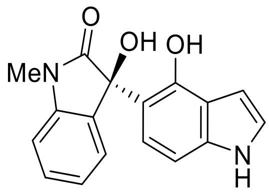
5ac



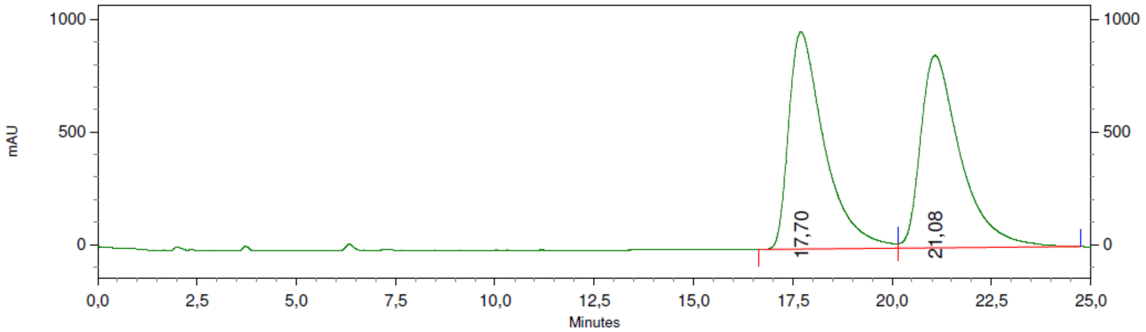
No.	RT	Area	Area %	Name
1	20,85	3411090	56,209	
2	29,73	2657500	43,791	enanti (-)
		6068590	100,000	



No.	RT	Area	Area %	Name
1	20,49	5930484	11,075	
2	28,33	47616908	88,925	enanti (-)
		53547392	100,000	

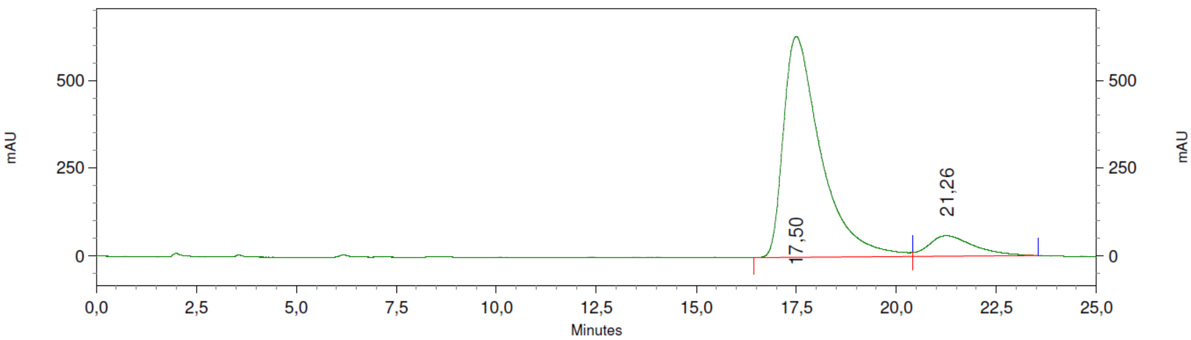


7aa



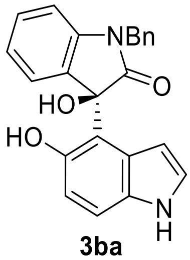
1: 225 nm, 4 nm Results

Retention Time	Area	Area Percent
17,70	241281942	50,218
21,08	239184826	49,782

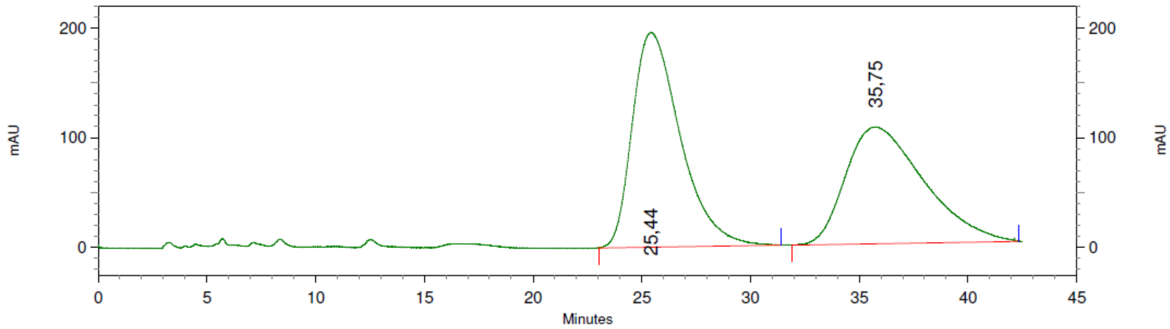


1: 225 nm, 4 nm Results

Retention Time	Area	Area Percent
17,50	164056528	90,024
21,26	18180641	9,976

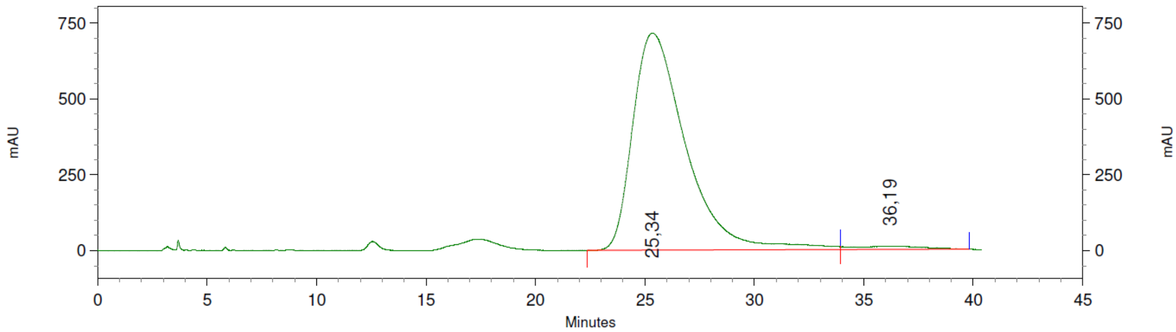


3ba



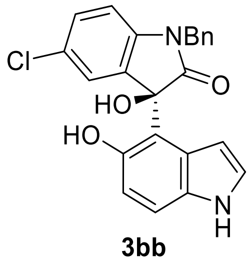
2: 270 nm, 4 nm Results

Retention Time	Area	Area Percent
25,44	119985007	52,977
35,75	106498239	47,023

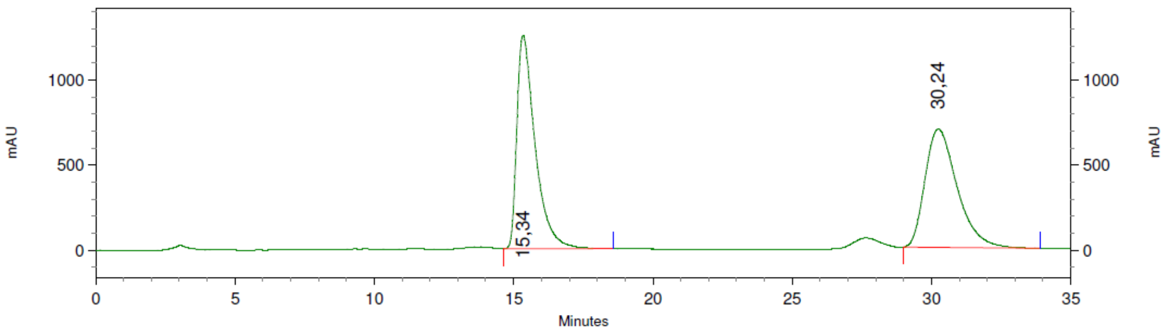


1: 223 nm, 4 nm Results

Retention Time	Area	Area Percent
25,34	482278648	98,079
36,19	9443663	1,921

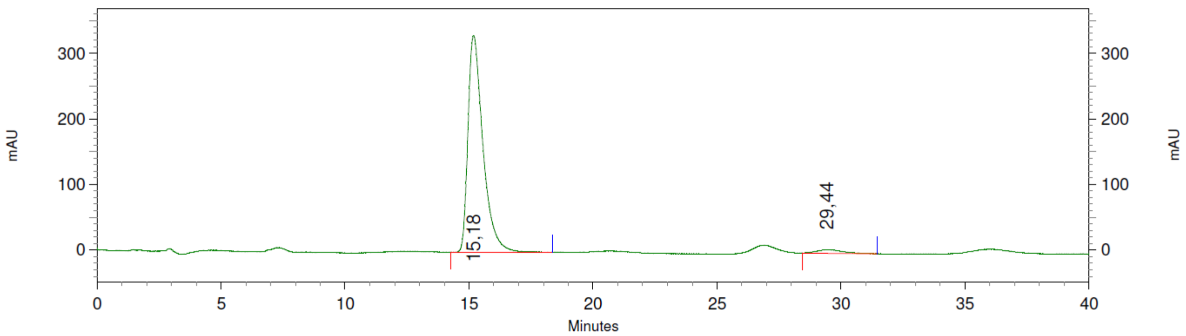


3bb



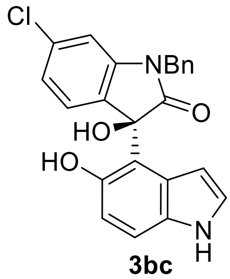
2: 260 nm, 4 nm Results

Retention Time	Area	Area Percent
15,34	228025355	50,513
30,24	223394056	49,487

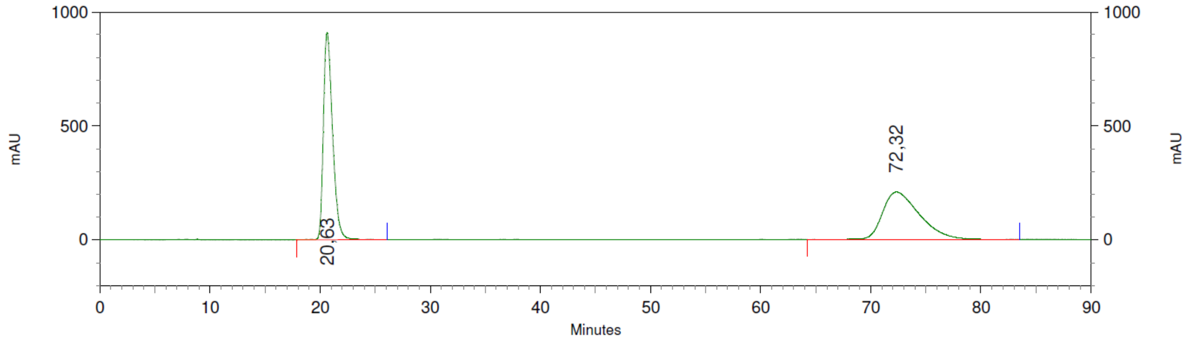


2: 300 nm, 4 nm Results

Retention Time	Area	Area Percent
15,18	55695344	96,952
29,44	1750829	3,048

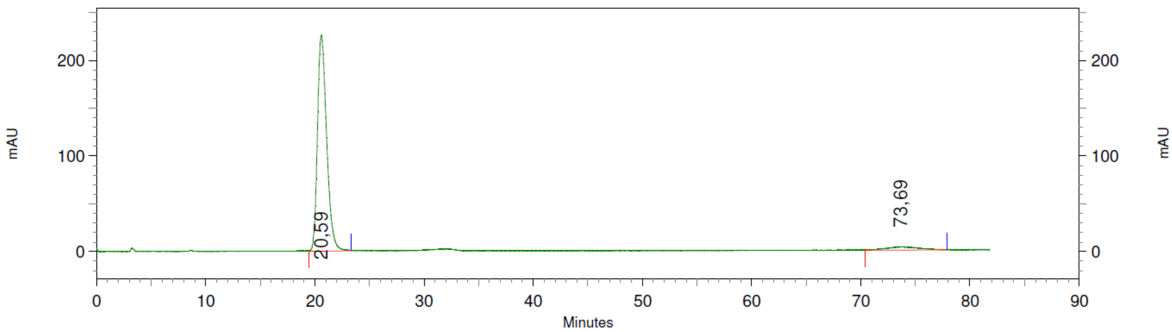


3bc



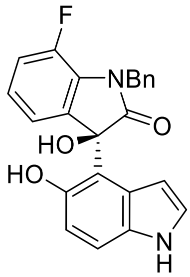
8: 270 nm, 4 nm Results

Retention Time	Area	Area Percent
20,63	209964422	51,902
72,32	194579399	48,098

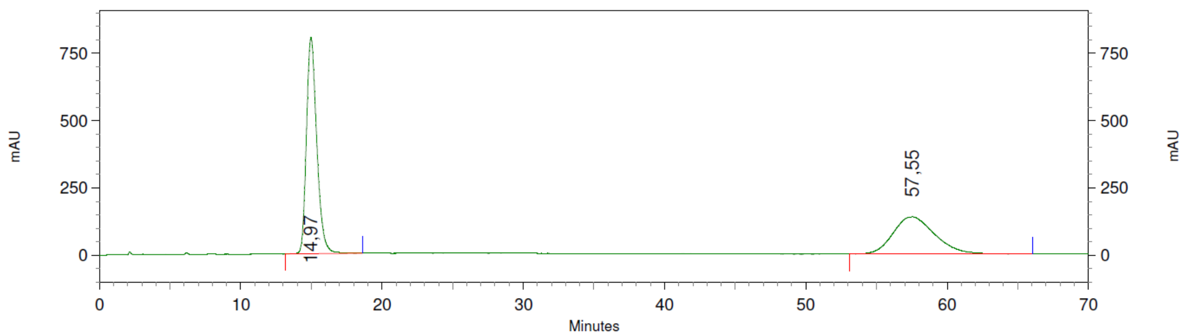


3: 245 nm, 4 nm Results

Retention Time	Area	Area Percent
20,59	52767156	94,293
73,69	3193659	5,707

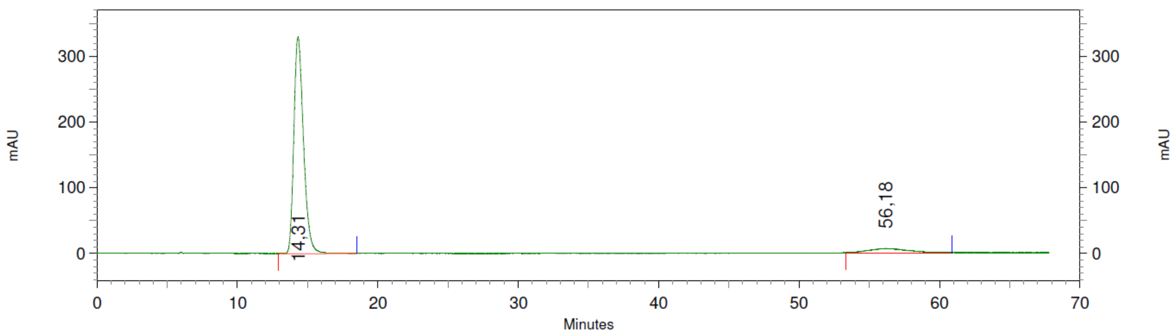


3bd



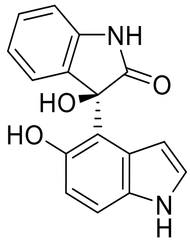
3: 220 nm, 4 nm Results

Retention Time	Area	Area Percent
14,97	163244151	58,785
57,55	114454800	41,215

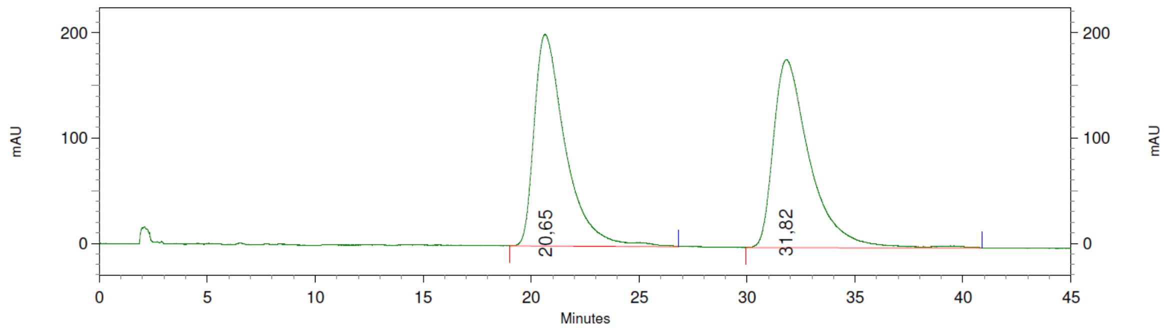


3: 260 nm, 4 nm Results

Retention Time	Area	Area Percent
14,31	63258620	92,373
56,18	5223110	7,627

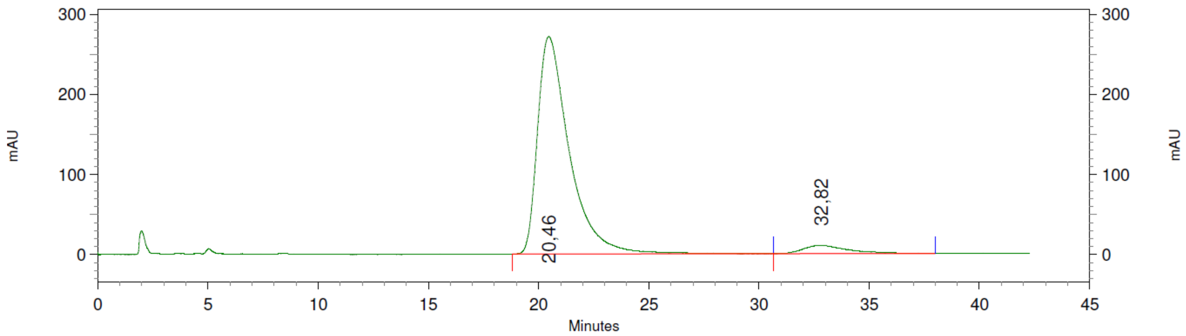


5ba



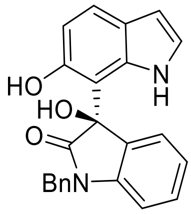
3: 220 nm, 4 nm Results

Retention Time	Area	Area Percent
20,65	80962708	49,227
31,82	83505435	50,773

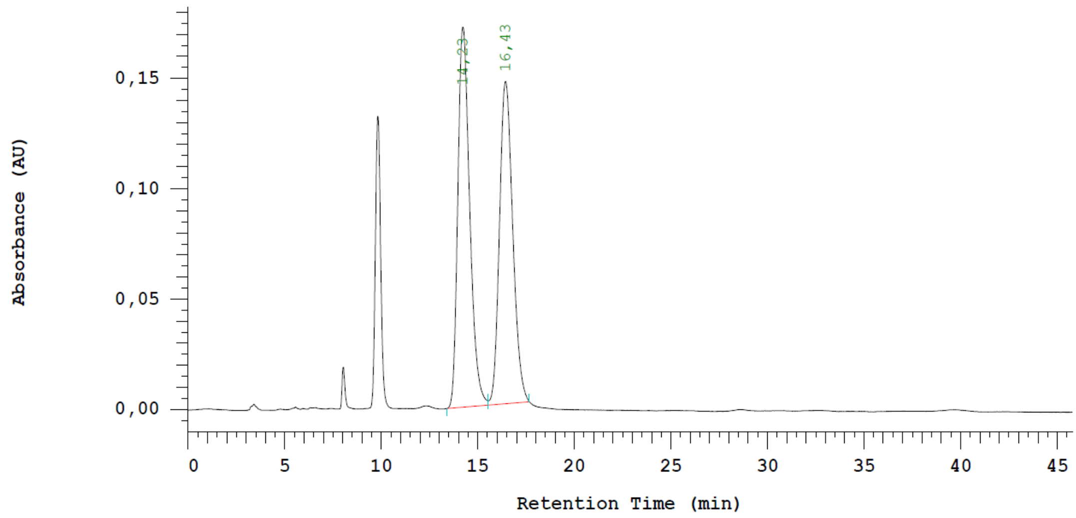


3: 220 nm, 4 nm Results

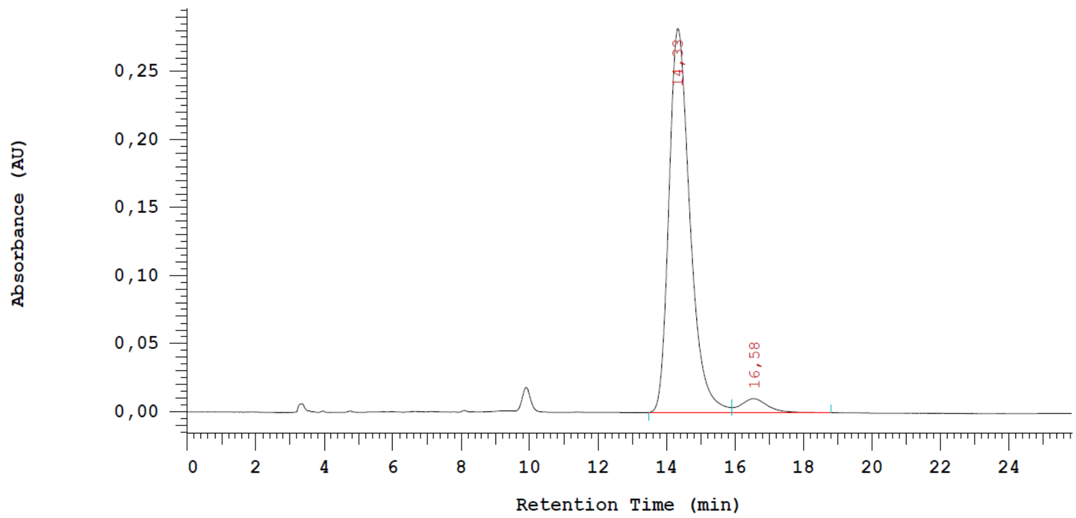
Retention Time	Area	Area Percent
20,46	108843015	94,819
32,82	5947696	5,181



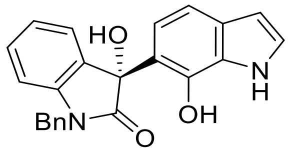
3ca



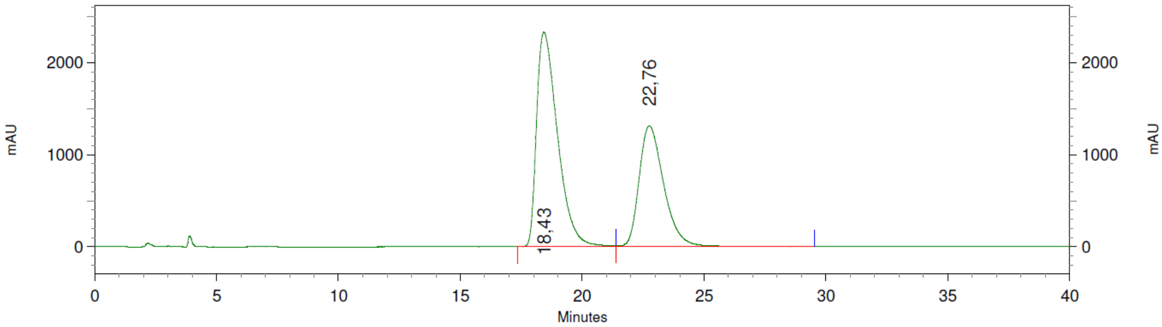
No.	RT	Area	Area %	Name
1	14,23	3626290	51,282	
2	16,43	3444974	48,718	
		7071264	100,000	



No.	RT	Area	Area %	Name
1	14,33	6036124	95,573	
2	16,58	279600	4,427	
		6315724	100,000	

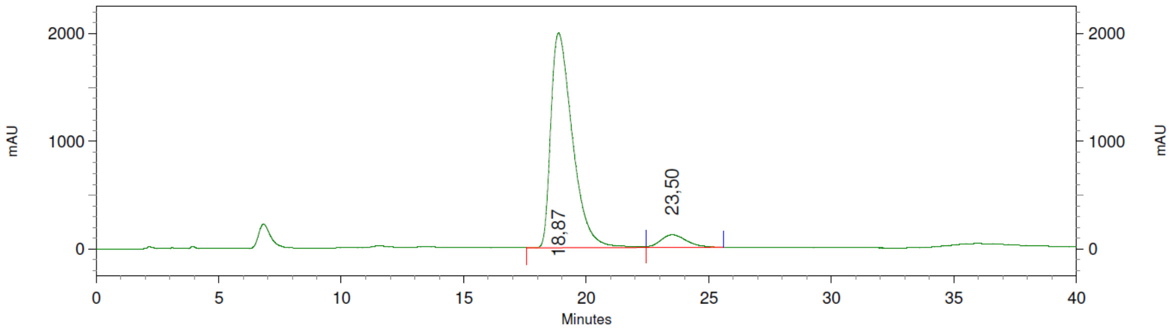


3da



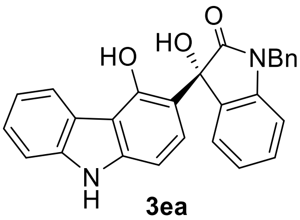
3: 220 nm, 4 nm Results

Retention Time	Area	Area Percent
18,43	559783180	59,993
22,76	373304808	40,007

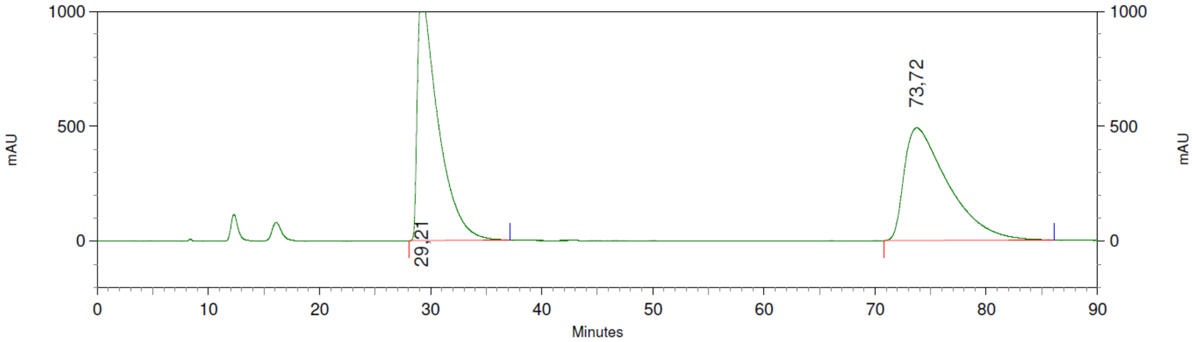


3: 220 nm, 4 nm Results

Retention Time	Area	Area Percent
18,87	491481038	93,214
23,50	35781599	6,786

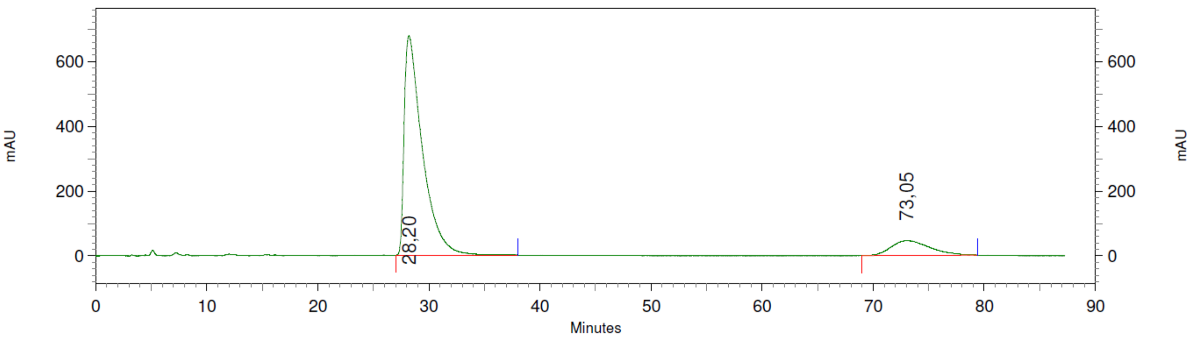


3ea



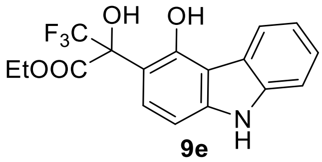
5: 250 nm, 4 nm Results

Retention Time	Area	Area Percent
29,21	554837590	50,686
73,72	539821656	49,314

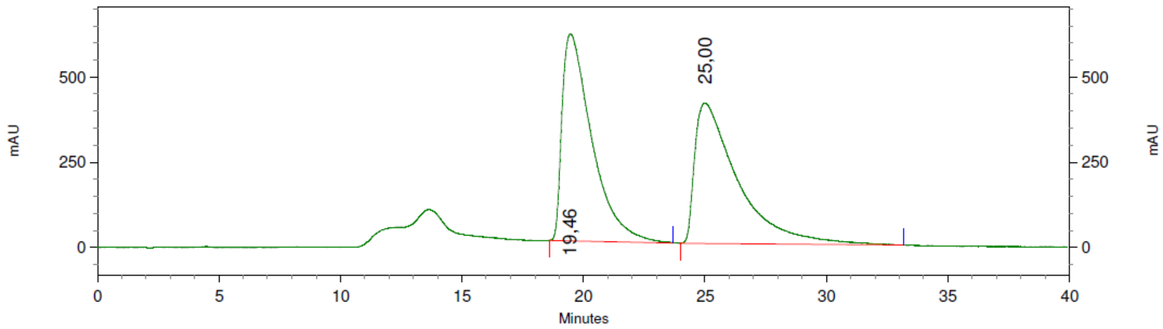


3: 245 nm, 4 nm Results

Retention Time	Area	Area Percent
28,20	309404277	87,234
73,05	45279042	12,766



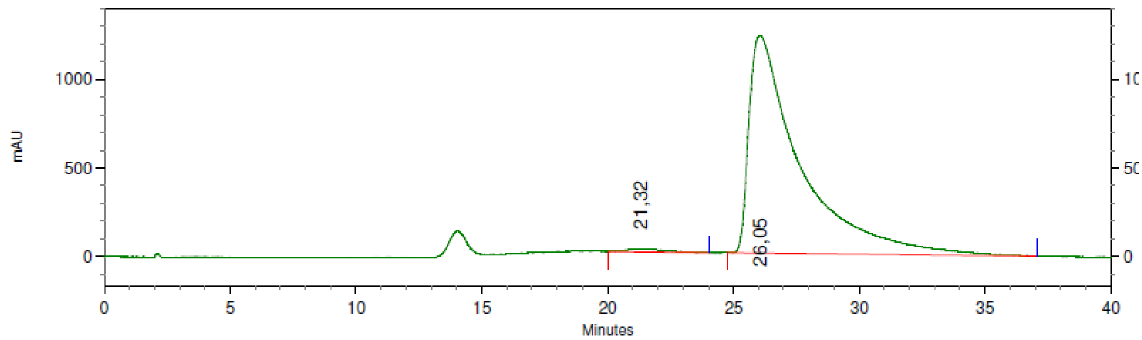
9e



1: 330 nm, 4 nm Results

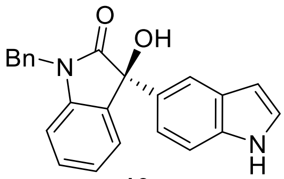
Retention Time	Area	Area Percent
19,46	206835722	50,484
25,00	202867305	49,516

C:\EZChrom Elite\Enterprise\Projects\GonzaloMarc\Trifluoropyruvate\MM12-BASH 9010 1.5.dat

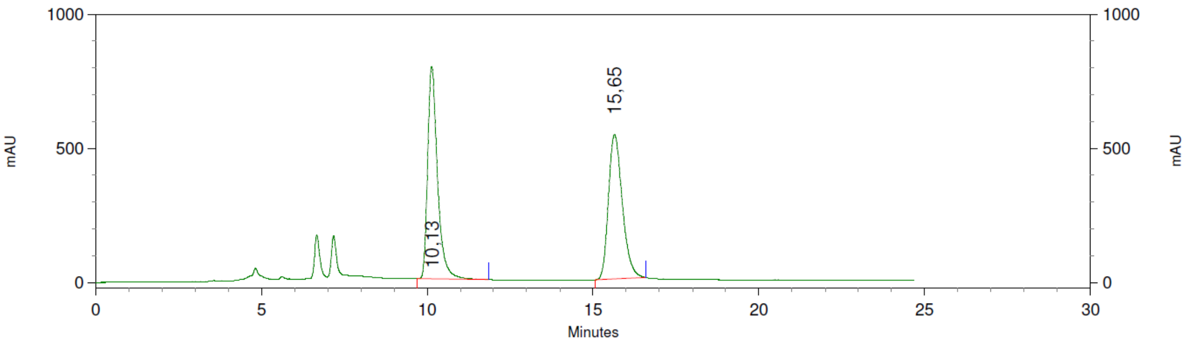


1: 243 nm, 4 nm Results

Retention Time	Area	Area Percent
21,32	6531067	0,933
26,05	693261741	99,067

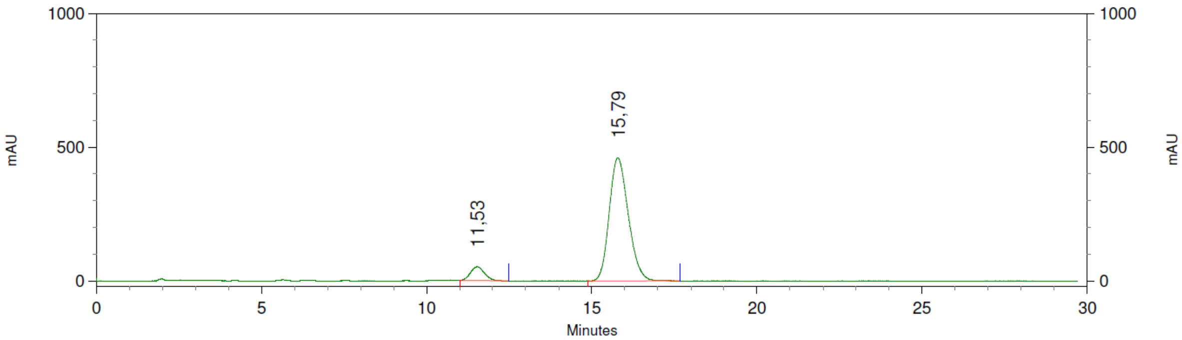


10aa



4: 235 nm, 4 nm Results

Retention Time	Area	Area Percent
10,13	65526770	51,141
15,65	62602654	48,859



4: 235 nm, 4 nm Results

Retention Time	Area	Area Percent
11,53	6153328	7,685
15,79	73916901	92,315