ELECTRONIC SUPPLEMENTARY INFORMATION

BIOCATALYZED SYNTHESIS OF HETEROBIARYL SULFOXIDES: A COMPARATIVE STUDY BETWEEN BAEYER-VILLIGER MONOOXYGENASES AND UNSPECIFIC PEROXYGENASES

Pablo Vázquez-Domínguez,[a,b] Julia Carrión-González,[a] Desirée García-Requena,[a] Marco W. Fraaije,[c] Nikola Loncar,[d] Rosario Fernández,[a] Katrin Scheibner,[e] Ana Gutiérrez,[f] Alejandro González-Benjumea,*[f] Abel Ros,*[b] Gonzalo de Gonzalo*[a]

[a] Department of Organic Chemistry, University of Seville, Seville, Spain

[b] Instituto de Investigaciones Químicas (CSIC-US) and Centro de Innovación en Química Avanzada (ORFEO−CINQA), Seville, Spain

[c] Groningen Biomolecular Sciences and Biotechnology Institute, University of Groningen, Groningen, The Netherlands

[d] GECCO Biotech B.V, Groningen, The Netherlands

[e] Institute of Biotechnology Institution, Brandenburg University of Technology Cattbus-Senftenberg, Germany.

[f] Instituto de Recursos Naturales y Agrobiología de Sevilla (IRNAS), CSIC, Seville, Spain

* Corresponding authors,

E-mail addresses: a.g.benjumea@irnas.csic.es (Dr. A. González-Benjumea); a.ros@iiq.csic.es (Dr, A. Ros); gdegonzalo@us.es (Prof. G. de Gonzalo)

TABLE OF CONTENTS

1. Materials and methods……S3
2. General procedure for the synthesis of sulfides **1a-i**……S4
3. General procedure for the synthesis of sulfides **1j-n**……S7
4. General procedure for the synthesis of racemic sulfoxides (±)-**2a-n**……S8
5. General procedure for the BVMO-catalyzed sulfoxidation of heterobiaryl sulfides **1a-n**……S12
6. General procedure for the BVMO-catalyzed synthesis of optically active sulfoxides (+)- or (-)-**2a-n** at multimilligram scale……S16
7. Optimization and general procedure for the UPO-catalyzed sulfoxidation of heterobiaryl sulfides **1a-n**……S18
8. 8. General procedure for the UPO-catalyzed synthesis of sulfoxides **2e** and **2j** at multimiligram scale……S19
9. Chromatographic analysis by GC/MS……S19
10. References……S20
11. NMR and HPLC spectra of the novel compounds……S22

1. Materials and methods

Nuclear magnetic resonance (NMR) spectra were recorded using instruments operating at different frequencies depending on the nucleus: 500 MHz for ^{1}H NMR, 126 MHz for ^{13}C NMR, and 471 MHz for ^{19}F NMR. The solvent signal was used as an internal reference, showing chemical shifts of 7.26 ppm for ^{1}H and 77.0 ppm for ^{13}C, with $CDCl_3$ as the solvent. Column chromatography was carried out using silica gel (Merck Kieselgel 60), while thin-layer chromatography (TLC) was performed on aluminum plates (1.5 × 5.0 cm) coated with a 0.25 mm layer of silica gel (Merck, Silica Gel 60 F254). Compounds were visualized either under UV light or by dipping the plates in a potassium permanganate, followed by heating. Reactions were routinely monitored using TLC and/or NMR analysis. Final compounds were characterized by ^{1}H NMR, ^{13}C NMR, and high-resolution mass spectrometry (HRMS). Optical rotation measurements were conducted with a JASCO P-2000 polarimeter. High-performance liquid chromatography (HPLC) analyses were performed using a Thermo-Fisher UltiMate system equipped with a Thermo UltiMate detector. GC/MS analyses were performed with an Agilent 8890 GC System equipped with a 5977B GC/MSD Detector. Unless otherwise noted, all reagents and solvents used were of analytical grade and employed without further purification.

Purified phosphite dehydrogenase (PTDH) from *Pseudomonas stuzteri* fused Baeyer-Villiger monooxygenases 2-oxo-Δ3-4,5,5-trimethylcyclopentenylacetyl-CoA 1,2-monooxygenase (OTEMO) from *Pseudomonas putida* ATCC 17453, cyclohexanone monooxygenase from *Thermocrispum municipale* (*Tm*CHMO), phenyalacetone monooxygenase from *Thermobifida fusca* (PAMO), polycyclic ketone monooxygenase (PockeMO) from *Thermothelomyces thermophila* and cyclopentadecanone monooxygenase (CPDMO) from *Pseudomonas sp*. HI-70 were supplied by GECCO Biotech (Groningen, the Netherlands). *Mro*UPO from pure cultures of *Maramius rotula* DSM 25031 was supplied by JenaBios (Jena, Germany).

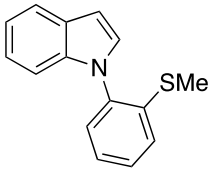
*Mro*UPO and *Cgl*UPO are wild enzymes isolated at JenaBios (Jena, Germany) from pure cultures of *M. rotula* DSM 25031 and *C. globosum* DSM 62110 from the German Collection of Microorganisms and Cell Cultures (Braunschweig, Germany). *rHin*UPO and *rCci*UPO are recombinant enzymes obtained at

Novozymes A/S (Bagsvaerd, Denmark) by heterologous expression of the cloned genes in the *A. oryzae* industrial host, using proprietary technology.[1]

2. General procedure for the synthesis of sulfides 1a-i.

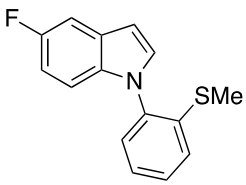
A dried Schlenk tube was charged with the corresponding indole (1.5 mmol), CuI (10 mol%, 19 mg) and K_3PO_4 (2 mmol, 425 mg). After cycles of vacuum-N_2, anhydrous toluene (1 mL), *trans*-cyclohexyl-1,2-diamine (30 mol%, 37 μL) and the corresponding tioether (1.0 mmol) were added. The reaction was stirred 3 days at 110 °C, then it was cooled to rt, diluted with DCM (50 mL) and washed with NH_3(aq.). The organic phase was dried over anhydrous $MgSO_4$, filtered, concentrated to dryness, and the crude was purified by column chromatography on silica gel.

1-(2-(Methylthio)phenyl)-1H-indole (1a).



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1a** (179 mg, 75%) as a white amorphous solid. Spectroscopic properties of this compound are in accord with those described.[2]. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.71-7.68 (m, 1H), 7.45 (td, *J* = 7.3 and 1.5 Hz, 1H), 7.38 (dd, *J* = 8.0 and 1.5 Hz, 1H), 7.34 (dd, *J* = 8.0 and 1.6 Hz, 1H), 7.29 (dd, *J* = 7.0 and 1.5 Hz, 1H), 7.24 (d, *J* = 3.2 Hz, 1H), 7.21-7.14 (m, 2H), 7.11-7.09 (m, 1H), 6.70 (dd, *J* = 3.2, 0.9 Hz, 1H), 2.29 (s, 3H).

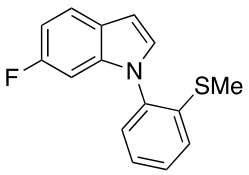
5-Fluoro-1-(2-(methylthio)phenyl)-1H-indole (1b)



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1b** (205 mg, 80%) as a colorless viscous oil. Spectroscopic properties of this compound are in accord with those described.[1] ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48-7.43 (m, 1H), 7.39-7.37 (m, 1H), 7.34-7.30 (m, 2H), 7.29-7.26 (m, 2H), 7.00 (dd, *J* = 8.9 and 4.5 Hz, 1H), 6.92 (td, *J* = 9.1, and 2.4 Hz, 1H), 6.66 (d, *J* = 3.1 Hz, 1H), 2.31 (s, 3H) ppm.

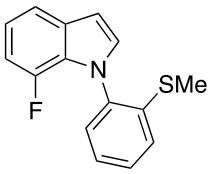
6-Fluoro-1-(2-(methylthio)phenyl)-1H-indole (1c)

Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1c** (217 mg, 84%) as a colorless



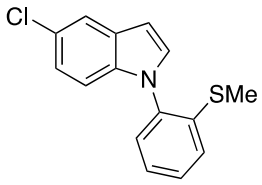
viscous oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.60 (dd, *J* = 8.6 and 5.3 Hz, 1H), 7.48-7.44 (m, 1H), 7.38 (d, *J* = 7.1 Hz, 1H), 7.34-7.27 (m, 2H), 7.22 (d, *J* = 3.2 Hz, 1H), 6.93 (td, *J* = 9.1 and 2.3 Hz, 1H), 6.78 (dd, *J* = 9.8 and 2.1 Hz, 1H), 6.68 (d, *J* = 3.2 Hz, 1H) 2.32 (s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 160.1 (d, *J* = 236 Hz), 138.0, 136.8 (d, *J* = 12 Hz), 136.2, 129.2 (d, *J* = 3 Hz), 129.0, 126.2, 125.4, 124.7, 121.5 (d, *J* = 10 Hz), 108.9 (d, *J* = 24 Hz), 102.9, 97.0 (d, *J* = 26 Hz), 15.0 ppm. ^{19}F NMR (377 MHz, $CDCl_3$) δ −120.5 ppm. HRMS (ESI) calcd. for $C_{15}H_{13}NFS$ (M + H+) 258.0753. Found 258.0752.

7-Fluoro-1-(2-(methylthio)phenyl)-1H-indole (1d)



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1d** (143 mg, 56%) as a white amorphous solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.47-7.42 (m, 2H), 7.33-7.33 (m, 2H), 7.27-7.24 (m, 1H), 7.16 (d, *J* = 3.2 Hz, 1H), 7.08-7.03 (m, 1H), 6.87 (d, *J* = 12.1 and 7.8 Hz, 1H), 6.7 (t, *J* = 2.8 Hz, 1H), 2.34 (s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 149.9 (d, *J* = 245 Hz), 138.0 (d, *J* = 23 Hz), 132.4 (d, *J* = 5 Hz), 130.2, 128.9, 128.3, 125.6, 124.9, 124.7 (d, *J* = 9 Hz), 121.4 (d, *J* = 7 Hz), 116.7 (d, *J* = 3 Hz), 107.8 (d, *J* = 17 Hz), 103.5, 15.0 ppm. ^{19}F NMR (377 MHz, $CDCl_3$) δ −133.1 ppm. HRMS (ESI) calcd. for $C_{15}H_{13}FNS$ (M + H+) 258.0753. Found 258.0750.

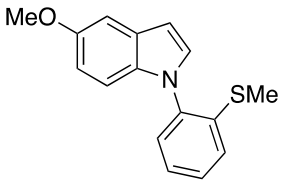
5-Chloro-1-(2-(methylthio)phenyl)-1H-indole (1e)



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1e** (208 mg, 76%) as a colorless viscous oil. Spectroscopic properties of this compound are in accord with those described.[2] ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.66 (d, *J* = 1.9 Hz, 1H), 7.46-7.44 (m, 1H), 7.38 (d, *J* = 7.6 Hz, 1H), 7.33-7.29 (m, 2H), 7.26-7.25 (m, 1H), 7.13 (dd, *J* = 8.7 and 1.9 Hz, 1H), 7.00 (d, *J* = 8.7 Hz, 1H), 6.64 (d, *J* = 3.1 Hz, 1H), 2.30 (s, 3H) ppm.

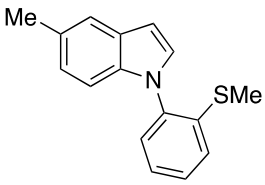
5-Methoxy-1-(2-(methylthio)phenyl)-1H-indole (1b) (1f).

Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 30:1) afforded **1f** (204 mg, 76%) as a white amorphous solid. Spectroscopic properties of this compound are in accord with



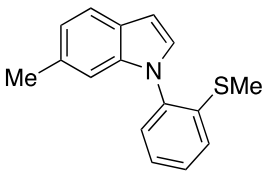
those described.[2] ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45-7.41 (m, 1H), 7.38-7.36 (m, 1H), 7.34-7.32 (m, 1H), 7.29-7.27 (m, 1H), 7.22 (d, *J* = 3.2 Hz, 1H), 7.15 (d, *J* = 2.4 Hz, 1H), 7.00 (d, *J* = 8.9 Hz, 1H), 6.84 (dd, *J* = 8.8 and 2.4 Hz, 1H), 6.62 (d, *J* = 2.8 Hz, 1H), 3.87 (s, 3H), 2.30 (s, 3H).

5-Methyl-1-(2-(methylthio)phenyl)-1H-indole (1g)



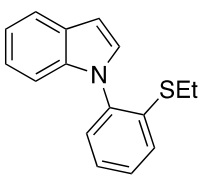
Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1h** (205 mg, 81%) as a white amorphous solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.49 (br s, 1H), 7.46-7.41 (m, 1H), 7.38 (dd, *J* = 7.8 and 1.0 Hz, 1H), 7.34 (dd, *J* = 7.7 and 1.8 Hz, 1H), 7.30-7.28 (m, 1H), 7.21 (d, *J* = 3.2 Hz, 1H), 7.03-6.99 (m, 2H), 6.63 (dd, *J* = 3.2 and 0.6 Hz, 1H), 2.47 (s, 3H), 2.29 (s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 137.9, 136.9, 135.1, 129.4, 128.7, 128.6, 128.4, 126.2, 125.3, 123.7, 120.6, 110.2, 102.4, 21.4, 15.1 ppm. HRMS (ESI) calcd. for $C_{16}H_{16}NS$ ($M + H^+$) 254.1003. Found 254.1001.

6-Methyl-1-(2-(methylthio)phenyl)-1H-indole (1h)



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1i** (172 mg, 68%) as a light yellow oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.59 (d, *J* = 8.0 Hz, 1H), 7.46 (td, *J* = 7.9 and 1.6 Hz, 1H), 7.39 (dd, *J* = 8.1 and 1.1 Hz, 1H), 7.35 (dd, *J* = 7.7 and 1.4 Hz, 1H), 7.30 (td, *J* = 7.1 and 1.4 Hz, 1H), 7.18 (d, *J* = 3.2, Hz, 1H), 7.01 (d, *J* = 8.0, Hz, 1H), 6.91 (s, 1H), 6.66 (dd, *J* = 3.1 and 0.9 Hz, 1H), 2.43 (s, 3H), 2.31 (s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 138.1, 137.2, 136.9, 132.0, 128.7, 128.6, 128.2, 126.2, 126.2, 125.4, 122.0, 120.5, 110.4, 102.7, 21.9, 15.1 ppm. HRMS (ESI) calcd. for $C_{16}H_{16}NS$ ($M + H^+$) 254.1003. Found 254.1006.

1-(2-(Ethylthio)phenyl)-1H-indole (1i).



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 70:1) afforded **1j** (197 mg, 78%) as a colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.72-7.69 (m, 1H), 7.48 (dd, *J* = 7.9 and 1.5 Hz, 1H), 7.42

(td, *J* = 7.1 and 1.7 Hz, 1H), 7.36 (dd, *J* = 7.8 and 1.7 Hz, 1H), 7.31 (dd, *J* = 7.2 and 1.5 Hz, 1H), 7.26 (d, *J* = 3.2 Hz, 1H), 7.22-7.15 (m, 2H), 7.14-7.11 (m, 1H), 6.71 (dd, *J* = 3.2, 0.9 Hz, 1H), 2.73 (q, *J* = 7.3 Hz, 2H), 1.19 (t, *J* = 7.3 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 137.6, 136.8, 136.2, 128.8, 128.6, 128.5, 128.4, 128.3, 125.9, 122.0, 120.8, 120.1, 110.5, 102.7, 26.4, 13.8 ppm. HRMS (ESI) calcd. for $C_{16}H_{16}NS$ (M + H^+) 254.1003. Found 254.1001.

3. General procedure for the synthesis of sulfides 1j-n:

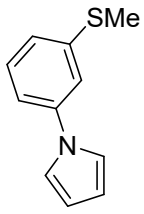
A Pall-Knorr reaction was performed between 2,5-dimethoxytetrahydrofuran and (alkylthio)anilines. Whereas 2-(methylthio)aniline, 3-(methylthio)aniline and 4-(methylthioaniline) were commercially available, 2-(ethylthio)aniline,[3] and 2-(isopropylthio)aniline[4] were obtained according to the literature. Thus:

A solution of 2,5-dimethoxytetrahydrofuran (7.27 g, 0.055 mol) and the corresponding 2-,3- or 4-{alkylthio)aniline (0.05 mol) in glacial acetic acid (15 mL) was stirred at 100ºC for 30 min, then poured into crushed ice. The organic solution was washed with a 5% solution of sodium hydrogenocarbonate (2 x 15 mL) and water (2 x 15 mL, dried onto anhydrous sodium sulfate and evaporated under reduced pressure to yield the crude products. The desired sulfides were obtained after purification by column chromatography employing .

1-(2-(Methylthio)phenyl)-1H-pyrrole (1j).

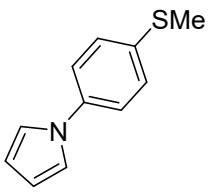
Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1L** (7.08 g, 75%) as a white solid. The NMR data matched with the described in the literature.[5]

1-(3-(Methylthio)phenyl)-1H-pyrrole (1k).



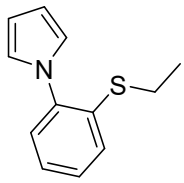
Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1m** (6.70 g, 71%) as a white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.33 (t, *J* = 10.6 Hz, 1H), 7.28 (t, *J* = 2.7 Hz, 1H), 7.15 (m, 2H), 7.08 (t, *J* = 2.9 Hz, 2H), 6.36 (t, *J* = 2.9 Hz, 2H), 2.53 (s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.3, 140.4, 129.8, 123.5, 119.4, 118.5, 117.3, 110.6, 15.7 ppm. HRMS (ESI) calcd. for $C_{11}H_{12}NS$ (M + H^+) 190.0690. Found 190.0688.

1-(4-(Methylthio)phenyl)-1H-pyrrole (1l)



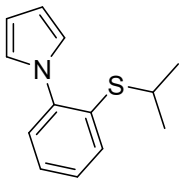
Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1n** (7.74 g, 82%) as a white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.33 (s, 4H), 7.07 (t, *J* = 2.9 Hz, 2H), 6.36 (t, *J* = 2.9 Hz, 2H), 2.52 (br s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 138.4, 135.5, 128.2, 121.1, 119.3, 110.5, 16.5 ppm. HRMS (ESI) calcd. for $C_{11}H_{12}NS$ ($M + H^+$) 190.0690. Found 190.0693.

1-(2-(Ethylthio)phenyl)-1H-pyrrole (1m).



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1o** (7.00 g, 69%) as a white solid. The NMR data matched with the described in the literature.[6]

1-(2-(Isopropyllthio)phenyl)-1H-pyrrole (1n).

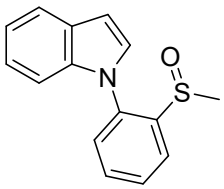


Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **1p** (7.59 g, 70%) as a white solid. The NMR data matched with the described in the literature.[7]

4. General procedure for the synthesis of racemic sulfoxides (±)-2a-n.

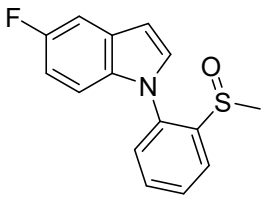
To a solution of the corresponding sulfide **1a-n** (1.0 mmol) in a mixture of methanol (2.0 mL)/DCM (1.0 mL), an aqueous solution of hydrogen peroxide (35% wt) is slowly added at room temperature. After 24 hours, water (5.0 mL) is added and the mixture is extracted with DCM (3 x 5.0 mL). The organic layers are dried onto $MgSO_4$ and the solvent evaporated under reduced pressure.

(±)-1-(2-(Methylsulfinyl)phenyl)-1H-indole (2a)



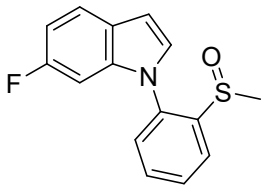
Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2a** (221.8 mg, 87%) as a white amorphous solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 (dd, *J* = 7.8 and 1.6 Hz, 1H), 7.74-7.64 (m, 3H), 7.46 (d, *J* = 7.7 Hz, 1H), 7.26-7.16 (m, 4H), 6.73 (d, *J* = 3.2, 1H), 2.16 (br s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.6, 136.5, 135.2, 131.8, 129.4, 128.7, 128.3, 128.0, 125.3, 123.1, 121.3, 121.0, 110.2 (br s), 104.5, 41.9. HRMS (ESI) calcd. for $C_{15}H_{14}NOS$ ($M + H^+$) 256.0796. Found 256.0799.

(±)-5-Fluoro-1-(2-(methylsulfinyl)phenyl)-1H-indole (2b)



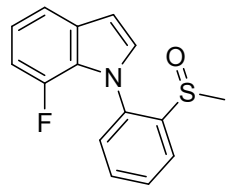
Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2b** (218.4 mg, 80%) as a white amorphous solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 (d, *J* = 7.7 Hz, 1H), 7.73 (t, *J* = 7.7 Hz, 1H), 7.66 (d, *J* = 7.6 Hz, 1H), 7.44 (d, *J* = 7.7 Hz, 1H), 7.33 (dd, *J* = 9.3 and 2.5 Hz, 1H), 7.24 (br s, 1H), 7.08 (dd, *J* = 8.9 and 4.5 Hz, 1H), 6.95 (td, *J* = 9.0 and 2.4 Hz, 1H), 6.68 (d, *J* = 3.2 Hz, 1H), 2.16 (br s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 158.5 (d, *J* = 235 Hz), 143.6, 135.0, 133.1, 131.9, 129.6 (2xC), 129.1 (d, *J* = 10 Hz), 128.2, 125.4, 111.5 (d, *J* = 26 Hz), 111.0 (br s), 106.1 (d, *J* = 24 Hz), 104.4, 41.9 ppm. ^{19}F NMR (377 MHz, $CDCl_3$) δ –123.2 ppm. HRMS (ESI) calcd. for $C_{15}H_{13}FNOS$ ($M + H^+$) 274.0702. Found 274.0700.

(±)-6-Fluoro-1-(2-(methylsulfinyl)phenyl)-1H-indole (2c)



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2c** (204.7 mg, 75%) as a white amorphous solid. δ 8.18 (dd, *J* = 7.8 and 1.6 Hz, 1H), 7.73 (td, *J* = 7.7 and 1.4 Hz, 1H), 7.67 (td, *J* = 7.6 and 1.4 Hz, 1H), 7.60 (dd, *J* = 8.6 and 5.2 Hz, 1H), 7.44 (br d, *J* = 7.7 Hz, 1H), 7.20 (br s, 1H), 6.96 (td, *J* = 8.6 and 2.3 Hz, 1H), 6.84(dd, *J* = 9.6 and 2.3 Hz, 1H), 6.70 (d, *J* = 3.3 Hz, 1H), 2.18 (br s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 160.5 (d, *J* = 239 Hz), 136.7, 136.6, 134.8, 131.9, 129.7, 128.5 (d, *J* = 4 Hz), 128.1, 125.5, 125.0, 122.1 (d, *J* = 10 Hz), 109.9 (d, *J* = 25 Hz), 104.5, 96.6 (br s), 41.9 (br s) ppm. ^{19}F NMR (377 MHz, $CDCl_3$) δ –118.8 ppm. HRMS (ESI) calcd. for $C_{15}H_{13}FNOS$ ($M + H^+$) 274.0702. Found 274.0698.

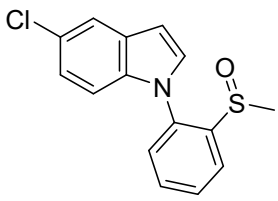
(±)-7-Fluoro-1-(2-(methylsulfinyl)phenyl)-1H-indole (2d)



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2d** (240.2 mg, 88%) as a white solid. ^{1}H NMR (400 MHz, $CDCl_3$) for a 1.9/1.1 mixture of rotamers: δ 8.14-8.10 (m, 1H), 7.71 (td, *J* = 10.1 and 1.7 Hz, 1H), 7.60 (td, *J* = 10.1 and 2.1 Hz, 1H), 7.47-7.40 (m, 2H), 7.19 (d, *J* = 4.4 Hz, 0.6H), 7.13-7.06 (m, 1.4H), 6.90 (dt, *J* = 16.6 and 10.0 Hz, 1H), 6.76-6.72 (m, 1H), 2.33(s, 1.9H), 2.25 (s, 1.1H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 149.6 (d, *J* = 240 Hz), 144.5, 143.2, 136.3, 132.9, 131.3, 130.3, 129.7, 129.5, 129.4, 128.8, 128.8, 127.9, 124.4, 124.4, 121.3 (d, *J* = 8 Hz), , 121.2 (d, *J* = 8

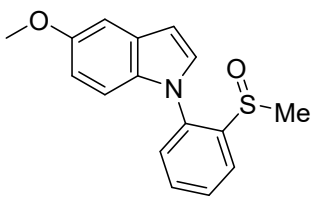
Hz), 117.3 (d, *J* = 5 Hz), 117.0 (d, *J* = 5 Hz), 108.8 (d, *J* = 23 Hz), 108.7 (d, *J* = 23 Hz 105.4, 105.0, 42.1, 42.0 ppm. ^{19}F NMR (377 MHz, $CDCl_3$) δ –131.2, –131.7 ppm. HRMS (ESI) calcd. for $C_{15}H_{13}FNOS$ ($M + H^+$) 274.0702. Found 274.0699.

(±)-5-Chloro-1-(2-(methylsulfinyl)phenyl)-1H-indole (2e).



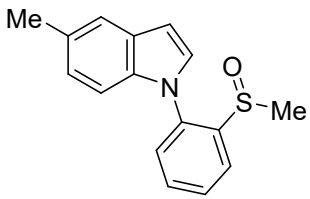
Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2e** (216.7 mg, 75%) as a white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 (dd, *J* = 10.3 and 2.3 Hz, 1H), 7.73 (td, *J* = 10.2 and 1.9 Hz, 1H), 7.69-7.64 (m, 2H), 7.43 (d, *J* = 1.9 Hz, 1H), 7.23 (d, *J* = 4.3 Hz, 1H), 7.17 (dd, *J* = 11.6 and 2.7 Hz, 1H), 7.07 (d, *J* = 11.6 Hz, 1H), 6.67 (dd, *J* = 4.4 and 1.2 Hz, 1H), 2.17 (br s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.6, 135.0, 134.7, 131.9, 129.7, 129.7, 129.4, 128.2, 126.8, 125.4, 123.4, 120.7, 111.2 (br s), 104.1, 42.0 ppm. HRMS (ESI) calcd. for $C_{15}H_{13}ClNOS$ ($M + H^+$) 290.0406. Found 290.0410.

(±)-5-Methoxy-1-(2-(methylsulfinyl)phenyl)-1H-indole (2f).



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2f** (188.2 mg, 65%) as a white solid.^{1}H NMR (400 MHz, $CDCl_3$) δ 8.15 (dd, *J* = 10.1, 2.4 Hz, 1H), 7.69 (td, *J* = 10.0 and 2.2 Hz, 1H), 7.63 (td, *J* = 10.1 and 2.6 Hz, 1H), 7.44 (dd, *J* = 2.0 Hz, 1H), 7.17 (d, *J* = 4.3 Hz, 1H), 7.13 (d, *J* = 3.2 Hz, 1H), 7.07 (d, *J* = 11.9 Hz, 1H), 6.86 (dd, *J* = 11.9 and 3.2 Hz, 1H), 6.64 (dd, *J* = 4.3 and 1.2 Hz, 1H), 3.87 (s, 3H), 2.15 (br s, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.0, 143.4, 135.3, 131.7, 131.7, 129.3, 129.2, 128.5, 128.2, 125.3, 113.2, 111.0, 104.2, 102.8, 55.8, 41.8 ppm. HRMS (ESI) calcd. for $C_{16}H_{16}NO_2S$ ($M + H^+$) 286.0902. Found 286.0899.

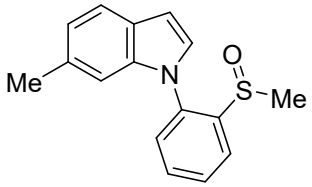
(±)-5-Methyl-1-(2-(methylsulfinyl)phenyl)-1H-indole (2g).



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2g** (222.3 mg, 78%) as a white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.16 (d, *J* = 7.7 Hz, 1H), 7.70 (t, *J* = 7.6 Hz, 1H), 7.64 (t, *J* = 7.6 Hz, 1H), 7.47 (s, 1H), 7.44 (d, *J* = 7.6 Hz, 1H), 7.16 (br s, 1H), 7.07 (d, *J* = 8.6 Hz, 1H), 7.04 (d, *J* = 8.5 Hz, 1H), 6.65

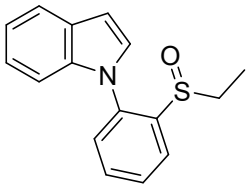
(d, *J* = 3.2 Hz, 1H), 2.46 (s, 3H), 2.15 (br s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.5, 135.4, 134.9, 131.7, 130.4, 129.2, 129.0, 128.2, 128.0, 125.3, 124.6, 120.9, 109.9 (br s), 104.1, 41.8, 21.4 ppm. HRMS (ESI) calcd. for $C_{16}H_{16}NOS$ ($M + H^+$) 270.0953. Found 270.0955.

(±)-6-Methyl-1-(2-(methylsulfinyl)phenyl)-1H-indole (2h).



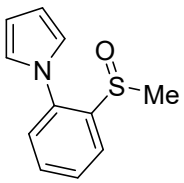
Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2h** (196.4 mg, 73%) as a white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.59 (d, *J* = 8.0 Hz, 1H), 7.46 (td, *J* = 7.9 and 1.6 Hz, 1H), 7.39 (dd, *J* = 8.1 and 1.1 Hz, 1H), 7.35 (dd, *J* = 7.7 and 1.4 Hz, 1H), 7.30 (td, *J* = 7.1 and 1.4 Hz, 1H), 7.18 (d, *J* = 3.2, Hz, 1H), 7.01 (d, *J* = 8.0, Hz, 1H), 6.91 (s, 1H), 6.66 (dd, *J* = 3.1 and 0.9 Hz, 1H), 2.43 (s, 3H), 2.31 (s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 138.1, 137.2, 136.9, 132.0, 128.7, 128.6, 128.2, 126.2, 126.2, 125.4, 122.0, 120.5, 110.4, 102.7, 21.9, 15.1 ppm. HRMS (ESI) calcd. for $C_{16}H_{16}NOS$ ($M + H^+$) 270.0953. Found 270.0952.

(±)-1-(2-(Ethylsulfinyl)phenyl)-1H-indole (2i).



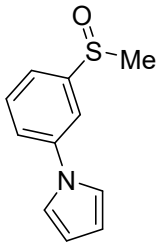
Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2i** (212.5 mg, 79%) as a white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.10 (d, *J* = 7.6 Hz, 1H), 7.72-7.66 (m, 2H), 7.64 (t, *J* = 7.6 Hz, 1H), 7.45 (d, *J* = 6.0 Hz, 1H), 7.22-7.16 (m, 4H), 6.72 (d, *J* = 3.2 Hz, 1H), 2.36 (br s, 1H), 1.92 (br s, 1H), 0.90 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.6 (br s), 136.5, 135.4, 131.7, 128.9, 128.7, 128.2, 128.0, 126.6, 123.0, 121.2, 121.0, 110.2 (br s), 104.4, 46.9 (br s), 5.1 ppm. HRMS (ESI) calcd. for $C_{16}H_{16}NOS$ ($M + H^+$) 270.0953. Found 270.0947.

(±)-1-(2-(Methylsulfinyl)phenyl)-1H-pyrrole (2j)



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2j** (178.3 mg, 87%) as a white solid. The NMR data matched with the described in the literature.[2,3]

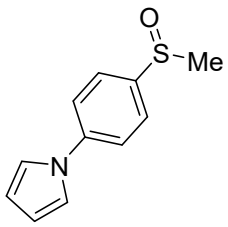
(±)-1-(3-(Methylsulfinyl)phenyl)-1H-pyrrole (2k)



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded

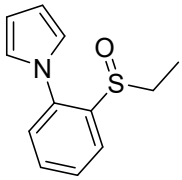
2k (161.9 mg, 79%) as a white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73 (t, *J* = 2.3 Hz, 1H), 7.57 (t, *J* = 9.9 Hz, 1H), 7.51 (m, 1H), 7.42 (dt, *J* = 9.9 and 2.0 Hz, 1H), 7.15 (t, *J* = 3.0 Hz, 2H), 6.38 (t, *J* = 3.0 Hz, 2H), 2.77 (s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 147.8, 141.7, 130.6, 122.4, 120.1, 119.2, 114.9, 111.3, 44.1 ppm. HRMS (ESI) calcd. for $C_{11}H_{12}NOS$ ($M + H^+$) 206.0640. Found 206.0644.

(±)-1-(4-(Methylsulfinyl)phenyl)-1H-pyrrole (2l)



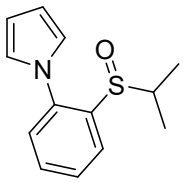
Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2l** (168.1 mg, 82%) as a white solid. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.71 (d, *J* = 11.6 Hz, 2H), 7.54 (d, *J* = 11.6 Hz, 2H), 7.13 (t, *J* = 3.0 Hz, 2H), 6.38 (t, *J* = 3.0 Hz, 2H), 2.75 (s, 3H) ppm. ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.9, 142.2, 125.2, 120.8, 119.2, 111.5, 44.1 ppm. ppm. HRMS (ESI) calcd. for $C_{16}H_{16}ONS$ ($M + H^+$) 206.0640. Found 206.0635.

(±)-1-(2-(Ethylsulfinyl)phenyl)-1H-pyrrole (2m)



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2m** (170.8 mg, 78%) as a white solid. The NMR data matched with the described in the literature.[2,3]

(±)-1-(2-(Methylsulfinyl)phenyl)-1H-pyrrole (2n)



Following the general procedure, purification by column chromatography on silica gel (Cyclohexane/EtOAc 50:1) afforded **2n** (170.1 mg, 73%) as a white solid. The NMR data matched with the described in the literature.[4]

5. General procedure for the BVMO-catalyzed sulfoxidation of heterobiaryl sulfides 1a-o.

Unless otherwise stated, prochiral sulfides **1a-n** (5 mM) were dissolved in 1.0 mL Tris/HCl 50 mM (pH 9.0) containing DMSO (10 μL), the corresponding cosolvent MeOH or 1,4-dioxane (0.1 mL) when indicated, NADPH (0.2 mM), sodium phosphite (10 mM) and the corresponding BVMO (1.0 μM). Reactions were stirred at the selected temperatures for the times established. Once finished, the reactions were extracted with EtOAc (2 x 0.6 mL), dried onto Na_2SO_4 and the samples were directly analyzed by GC/MS and HPLC to determine the level of

conversion as well as the enantiomeric excesses of the chiral sulfoxides (+)-**2a-j,** (+)-**2m,n** or (-)-**2k,l**.

Table S1. Enzymatic sulfoxidations of 1-(2-(methylthio)phenyl)-1H-indole (**1a**) catalyzed by BVMOs in buffer Tris/HCl 50 mM pH 9.0 at 30ºC for the synthesis of (+)-**2a**.

Entry	BVMO	Time (h)	Conv (%)[a]	*ee* (%)[b]
1	AncBVMO	48	≤3	n.d.
2	*Tm*CHMO	48	8	n.d.
3	PockeMO	48	8	n.d.
4	CPDMO	48	≤3	n.d.
5	PAMO	48	≤3	n.d.
6	OTEMO	48	≤3	n.d.

[a] Determined by GC/MS. [b] Determined by HPLC. n.d. not determined.

Table S2. Enzymatic sulfoxidations of indole-based sulfides (**1b-i**) catalyzed by BVMOs. Reactions were carried out for 48 hours at 45ºC using buffer Tris/HCl 50 mM pH 9.0.

Entry	Sulfide	BVMO	Cosolvent	Conv (%)	*ee* (%)	*Config.*
1	**1b**	*Tm*CHMO	None	12	55	(+)
2	**1b**	*Tm*CHMO	10% MeOH	16	51	(+)
3	**1b**	*Tm*CHMO	10% dioxane	≤3	n.d.	(+)
4	**1b**	PockeMO	None	27	17	(+)
5	**1c**	*Tm*CHMO	None	16	53	(+)
6	**1c**	*Tm*CHMO	10% MeOH	18	47	(+)
7	**1c**	*Tm*CHMO	10% dioxane	5	13	(+)
8	**1c**	PockeMO	None	34	32	(+)
9	**1d**	*Tm*CHMO	None	57	79	(+)
10	**1d**	*Tm*CHMO	10% MeOH	51	94	(+)
11	**1d**	*Tm*CHMO	10% dioxane	18	28	(+)
12	**1d**	PockeMO	None	23	10	(+)
13	**1e**	PockeMO	None	27	66	(+)
14	**1e**	PockeMO	10% MeOH	8	9	(+)
15	**1e**	PockeMO	10% dioxane	19	5	(+)
16	**1e**	*Tm*CHMO	None	44	25	(+)

17	**1f**	PockeMO	None	37	77	(+)
18	**1f**	PockeMO	10% MeOH	39	16	(+)
19	**1f**	PockeMO	10% dioxane	37	5	(+)
20	**1f**	*Tm*CHMO	None	13	17	(+)
21	**1g**	PockeMO	None	18	39	(+)
22	**1g**	*Tm*CHMO	None	14	18	(+)
23	**1h**	PockeMO	None	18	6	(+)
24	**1h**	*Tm*CHMO	None	10	13	(+)
25	**1i**	PockeMO	None	15	20	(+)
26	**1i**	*Tm*CHMO	None	19	9	(+)

[a] Determined by GC/MS. [b] Determined by HPLC. n.d. Not determined.

Table S3. Enzymatic sulfoxidations of pyrrole-based sulfides (**1j-n**) catalyzed by BVMOs for the synthesis of sulfoxides **2j-n**. Reactions were carried out in Tris/HCl 50 mM pH 9.0 buffer for 48 hours.

Entry	Sulfide	BVMO	Cosolvent	T (ºC)	Conv (%)[a]	*ee* (%)[b]	*Config.*
1	**1j**	PockeMO	None	30	22	47	(+)
2	**1j**	OTEMO	None	30	12	43	(+)
3	**1j**	PAMO	None	30	10	31	n.d.
4	**1j**	AncBVMO	None	30	≤3	n.d.	n.d.
5	**1j**	CPDMO	None	30	5	≤3	n.d.
6	**1j**	PockeMO	None	45	5	42	(+)
7	**1j**	OTEMO	None	45	32	40	(+)
8	**1j**	PAMO	None	45	25	30	(+)
9	**1j**	PockeMO	10% Dioxane	30	17	45	(+)
10	**1j**	PockeMO	10% MeOH	30	10	47	(+)
11	**1k**	TmCHMO	None	30	7	≤3	n.d.
12	**1k**	PAMO	None	30	10	7	(-)
13	**1k**	CPDMO	None	30	≤3	n.d.	n.d.
14	**1k**	PockeMO	None	45	38	68	(-)
15	**1k**	PAMO	None	45	12	6	(-)
16	**1k**	PockeMO	10% Dioxane	30	25	79	(-)

17	**1k**	PockeMO	10%MeOH	30	26	82	(-)
18	**1l**	TmCHMO	None	30	≤3	n.d.	n.d.
19	**1l**	PAMO	None	30	≤3	n.d.	n.d.
20	**1l**	CPDMO	None	30	≤3	n.d.	n.d.
21	**1l**	PockeMO	None	45	7	52	(-)
22	**1l**	PockeMO	10%Dioxane	30	22	66	(-)
23	**1l**	PockeMO	10% MeOH	30	29	70	(-)
24	**1m**	PockeMO	None	30	12	40	(+)
25	**1m**	OTEMO	None	30	10	31	(+)
26	**1m**	PAMO	None	30	≤3	n.d.	n.d.
27	**1n**	PockeMO	None	30	10	42	(+)
28	**1n**	OTEMO	None	30	≤3	n.d.	n.d.
29	**1n**	PAMO	None	30	≤3	n.d.	n.d.

[a] Determined by GC/MS. [b] Determined by HPLC. n.d. not determined

Table S4. Effect of pH in the sulfoxidation of **1i** catalyzed by TmCHMO and in the OTEMO-catalyzed oxidation of **1k**. Reactions were carried out in only Tris/HCl buffer 50 mM at 30ºC during 48 hours.

Entry	Sulfide	BVMO	pH	Conv (%)	*ee* (%)	*Config.*
1	**1j**	*Tm*CHMO	7.0	21	88	(+)
2	**1j**	*Tm*CHMO	8.0	34	87	(+)
3	**1j**	*Tm*CHMO	9.0	40	88	n.d.
4	**1j**	*Tm*CHMO	9.5	40	86.	n.d.
5	**1k**	OTEMO	7.0	10	79	n.d.
6	**1k**	OTEMO	8.0	12	78	(+)
7	**1k**	OTEMO	9.0	16	79	(+)
8	**1k**	OTEMO	9.5	18	78	(+)

[a] Determined by GC/MS. [b] Determined by HPLC.

6. General procedure for the BVMO-catalyzed synthesis of optically active sulfoxides (+)- or (-)-2a-n at multimilligram scale.

Unless otherwise stated, prochiral sulfides **1a-n** (10 mM) were dissolved in 8.0 mL of solution containing Tris/HCl 50 mM (pH 9.0), DMSO (10 μL), the corresponding cosolvent (0.8 mL) when indicated, NADPH (0.2 mM), sodium phosphite (10 mM) and the corresponding BVMO (1.0 μM). Reactions were stirred at 45ºC for **1a-i** and 30ºC for **1j-n** for 96 hours. Once finished, the reactions were extracted with EtOAc (2 x 0.6 mL), dried onto Na_2SO_4 and the samples were purified by column chromatography and analyzed by HPLC to determine the enantiomeric excesses of the chiral sulfoxides (+)-**2a-j**, (+)-**2m,n** and (–)-**2k,l**.

(+)-**2a**: Sulfoxidation was carried out in presence *Tm*CHMO of using Tris/HCl 50 mM pH 9.0 containing 10% v/v MeOH as reaction medium. Yield 23% (4.7 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 15.3 min (minor) and 16.5 min (major). $[\alpha]_D^{25}$ = +15.1 (0.2, $CHCl_3$, 70% *ee*).

(+)-**2b**: Sulfoxidation was carried out in presence of *Tm*CHMO using Tris/HCl 50 mM pH 9.0 as reaction medium. Yield 20% (4.3 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 17.1 min (minor) and 18.8 min (major). $[\alpha]_D^{25}$ = +11.5 (0.15, $CHCl_3$, 55% *ee*).

(+)-**2c**: Sulfoxidation was carried out in presence of *Tm*CHMO using Tris/HCl 50 mM pH 9.0 as reaction medium. Yield 15% (3.3 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 14.4 min (minor) and 17.2 min (major). $[\alpha]_D^{25}$ = +11.2 (0.12, $CHCl_3$, 55% *ee*).

(+)-**2d**: Sulfoxidation was carried out in presence of *Tm*CHMO using Tris/HCl 50 mM pH 9.0 containing 10% v/v MeOH as reaction medium. Yield 50% (10.9 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 15.2 min (minor) and 16.7 min (major). $[\alpha]_D^{25}$ = +12.7 (0.40, $CHCl_3$, 94% *ee*).

(+)-**2e**: Sulfoxidation was carried out in presence PockeMO of using Tris/HCl 50 mM pH 9.0 as reaction medium. Yield 22% (5.1 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 18.8 min (minor) and 21.3 min (major). $[\alpha]_D^{25}$ = +8.9 (0.20, $CHCl_3$, 66% *ee*).

(+)-**2f**: Sulfoxidation was carried out in presence of PockeMO using Tris/HCl 50 mM pH 9.0as reaction medium. Yield 41% (9.3 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 23.7 min (minor) and 26.9 min (major). $[\alpha]_D^{25}$ = +20.2 (0.18, $CHCl_3$, 75% *ee*).

(+)-**2g**: Sulfoxidation was carried out in presence of PockeMO using Tris/HCl 50 mM pH 9.0 as reaction medium. Yield 20% (4.3 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 14.3 min (minor) and 15.6 min (major). $[\alpha]_D^{25}$ = +15.3 (0.12, $CHCl_3$, 39% *ee*).

(+)-**2h**: Sulfoxidation was carried out in presence of *Tm*CHMO using Tris/HCl 50 mM as reaction medium. Yield 13% (2.8 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 11.8 min (minor) and 12.8 min (major). $[\alpha]_D^{25}$ = +2.9 (0.10, $CHCl_3$, 13% *ee*).

(+)-**2i**: Sulfoxidation was carried out in presence of using Tris/HCl 50 mM as reaction medium. Yield 15% (3.2 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 11.5 min (minor) and 14.0 min (major). $[\alpha]_D^{25}$ = +3.9 (0.18, $CHCl_3$, 21% *ee*).

(+)-**2j**: : Sulfoxidation was carried out in presence of *Tm*CHMO using Tris/HCl 50 mM as reaction medium with 10% v/v 1,4-dioxane. Yield 57% (10.1 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 12.1 min (minor) and 14.8 min $[\alpha]_D^{25}$ = +13.1 (0.58, $CHCl_3$, 90% *ee*).

(–)-**2k**: Sulfoxidation was carried out in presence of OTEMO using Tris/HCl 50 mM as reaction medium containing 10% v/v MeOH. Yield 80% (14.1 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 11.1 min (minor) and 13.5 min $[\alpha]_D^{25}$ = -10.7 (0.75, $CHCl_3$, 87% *ee*).

(–)-**2l**: Sulfoxidation was carried out in presence of OTEMO using Tris/HCl 50 mM as reaction medium. Yield 22% (3.9 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 10.5 min (minor) and 11.4 min $[\alpha]_D^{25}$ = -10.1 (0.25, $CHCl_3$, 72% *ee*).

(+)-**2m**: Sulfoxidation was carried out in presence of *Tm*CHMO using Tris/HCl 50 mM as reaction medium for 96 hours. Yield 26% (4.9 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 16.5 min (minor) and 17.6 min. $\alpha]_D^{25}$ = +8.9 (0.20, $CHCl_3$, 65% *ee*).

(+)-**2n**: Sulfoxidation was carried out in presence of *Tm*CHMO using Tris/HCl 50 mM/ 10% v/v 1,4-dioxane as reaction medium for 96 hours. Yield 19% (3.8 mg). HPLC (IA column, 95:5 *n*-Hex/*i*-PrOH, 30 °C, 1 mL/min): t_R 10.8 min (minor) and 13.6 min (major). $[\alpha]_D^{25}$ = (0.15, $CHCl_3$, 49% *ee*).

7. Optimization and general procedure for the UPO-catalyzed sulfoxidation of heterobiaryl sulfides.

The reaction conditions for heterobiaryl derivatives were optimized with the sulfide **1a**. In this sense, **1a** (0.5 mM) were dissolved in sodium phosphate buffer 50 mM (pH 5.0) containing the corresponding cosolvent MeCN or acetone (0.1-0.3 mL), and *Mro*UPO (0.25-0.5 μM). The reactions were stirred at 30 ˚C and an aqueous ^{t}BuOOH solution (1-2 mM) was added with a syringe pump for 4 hours. The mixture was stirred for additional 20 hours. Once finished, the reactions were extracted with MTBE (3 x 0.5 mL), dried onto Na_2SO_4 and the samples were directly analyzed by GC/MS and HPLC to determine the level of conversion as well as the enantiomeric excess.

Table S5. Optimization of the UPO-catalyzed reaction with the sulfide **1a**.

Entry	*Mro*UPO (μM)	Cosolvent	^{t}BuOOH (mM)	**2a** (%)[a]	Conv (%)[a]	*ee* (%)	*Config.*
1	0.25	10% Acetone	1	98	35	n.d.	n.d.
2	0.5	10% Acetone	1	94	52	n.d.	n.d.
3	0.25	10% MeCN	1	97	34	n.d.	n.d.
4	0.5	10% MeCN	1	94	52	n.d.	n.d.
5	0.25	10% Acetone	2	98	53	n.d.	n.d.
6	0.5	10% Acetone	2	98	55	n.d.	n.d.
7	0.25	10% MeCN	2	99	32	n.d.	n.d.
8	0.5	10% MeCN	2	96	63	n.d.	n.d.
9	0.25	20% Acetone	1	99	51	n.d.	n.d.
10	0.5	20% Acetone	1	96	84	n.d.	n.d.
11	0.25	20% MeCN	1	99	55	n.d.	n.d.
12	0.5	20% MeCN	1	92	61	n.d.	n.d.
13	0.25	20% Acetone	2	95	54	n.d.	n.d.
14	0.5	20% Acetone	2	98	83	64	(+)
15	0.25	20% MeCN	2	98	62	n.d.	n.d.
16	0.5	20% MeCN	2	93	72	62	(+)
17	0.25	30% Acetone	1	94	63	n.d.	n.d.
18	0.5	30% Acetone	1	98	99	62	(+)
19	0.25	30% MeCN	1	98	78	48	(+)

20	0.5	30% MeCN	1	97	99	59	(+)
21	0.25	30% Acetone	2	99	62	n.d.	n.d.
22	0.5	30% Acetone	2	97	99	60	(+)
23	0.25	30% MeCN	2	99	71	n.d.	n.d.
24	0.5	30% MeCN	2	98	99	62	(+)

[a] Determined by GC/MS. [b] Determined by HPLC. n.d. not determined

The rest of prochiral sulfides **1b-n** (0.5 mM) were dissolved in sodium phosphate buffer 50 mM (pH 5.5) containing 30% MeCN (0.3 mL) and *Mro*UPO (0.5 μM). Reactions were stirred at 30 ˚C and aqueous ^{t}BuOOH solution (2 mM for **1b-i** and 0.5 mM for **1j-n**) was added with a syringe pump for 4 h. Reactions were stirred for a further 20 h with indole-derivatives and 1 h with pyrrole-derivatives. Once finished, the reactions were extracted with MTBE (3 x 0.5 mL), dried onto Na_2SO_4 and the samples were directly analyzed by GC/MS and HPLC to determine the level of conversion and product distribution as well as the enantiomeric excesses of the chiral sulfoxides.

8. General procedure for the UPO-catalyzed synthesis of sulfoxides 2-e and 2-j at multimiligram scale

Prochiral sulfides **1e** and **1j** (60 mM) were disolved in sodium phosphate buffer (50 mM, pH 5.5) containing 60% MeCN (0.6 mL) and *Mro*UPO (60 μM). Reactions were stirred at 30 °C and aqueous tBuOOH solution (120 mM for **1e** and 60 mM for **1j**) was added with a syringe pump for 4 hours. Reactions were stirred for 20 hours and extracted with MTBE (3 x 1.0 mL), dried onto Na2SO4 and analyzed by GC/MS and HPLC to determine the degree of conversion and the enantiomeric excess of the corresponding sulfoxides(+)-**2e** and (+)-**2j**, respectively.

9. Chromatographic analysis by GC/MS

For the determination of the conversion values in the biocatalyzed sulfoxidations, a HP-5 cross-linked methyl siloxane column (30 m x 0.32 mm x 0.25 μm, 1.0 bar N_2) column was employed. The injector temperature was 225 °C and the FID temperature was 250 °C. The following temperature programs were used: A)100ºC (5 min), 10ºC/min, 220ºC (15 min) for compounds **1a-i**, and B) 50ºC (5

min), 10ºC/min, 220ºC (10 min) for compounds **1j-n**. To monitor levels of conversion, substrates and products were quantified by use of calibration curves.

Table S5. GC retention times for the determination of conversion.

Sulfide	Sulfoxide	Method	t_R sulfide (min)	t_R sulfoxide (min)
1a	**2a**	A	18.4	20.6
1b	**2b**	A	18.5	20.7
1c	**2c**	A	18.3	20.4
1d	**2d**	A	17.9	20.3
1e	**2e**	A	20.9	24.2
1f	**2f**	A	21.1	24.7
1g	**2g**	A	19.0	21.4
1h	**2h**	A	18.7	20.8
1i	**2i**	A	22.7	27.4
1j	**2j**	B	19.2	21.8
1k	**2k**	B	19.3	22.1
1l	**2l**	B	18.8	21.9
1m	**2m**	B	19.7	22.7
1n	**2n**	B	20.1	22.8

UPO-catalyzed reactions were analyzed by GC/MS with a Shimadzu GC-MS QP2020 Ultra equipment using a DB-5HT (30 m x 0.25 mm x 0.1 μm) capillary column. Helium was used as carrier gas at a flow of 0.95 ml·min^{-1}. The injection was performed at 300 ˚C, the oven was heated from 120 ˚C (5 or 3 min for indole or pyrrole sulfides) to 240 ˚C (10 min) at a rate of 10 ˚C·min^{-1} for indole sulfides and 15 ˚C·min^{-1} for pyrrole sulfides. The ion source and the transfer line were set at 280 ˚C. Compounds were identified by mass fragmentography, and the quantification was carried out from total-ion peak areas

To show the chemoselectivity of the BVMO-biocatalyzed oxidations, the chromatograms obtained in the sulfoxidation of compounds **1a**, **1c**, **1f, 1j** and **1k** are shown in Figure S1.

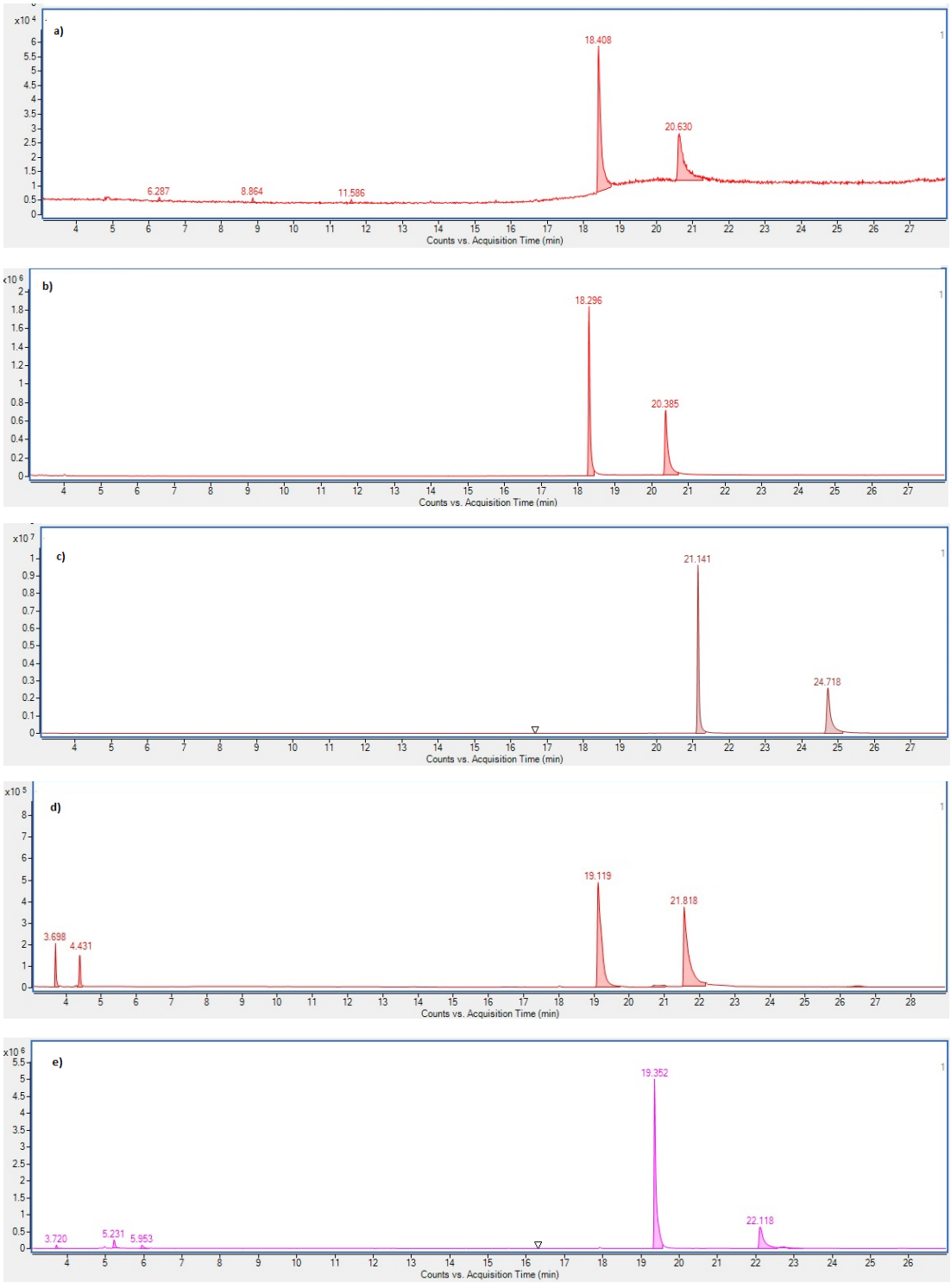


Figure S1. GC/MS chromatograms of the biooxidations of starting sulfides **1a** (a), **1c** (b), **1f** (c), **1j** (d) and **1k** (e).

Control experiments (without *Mro*UPO) with substrate **1a** were performed in presence of H_2O_2 or *t*BuOOH using acetone or MeCN as cosolvents. Results are shown in Figure S2 indicating the presence of sulfoxide **2a** in absence of the biocatalyst:

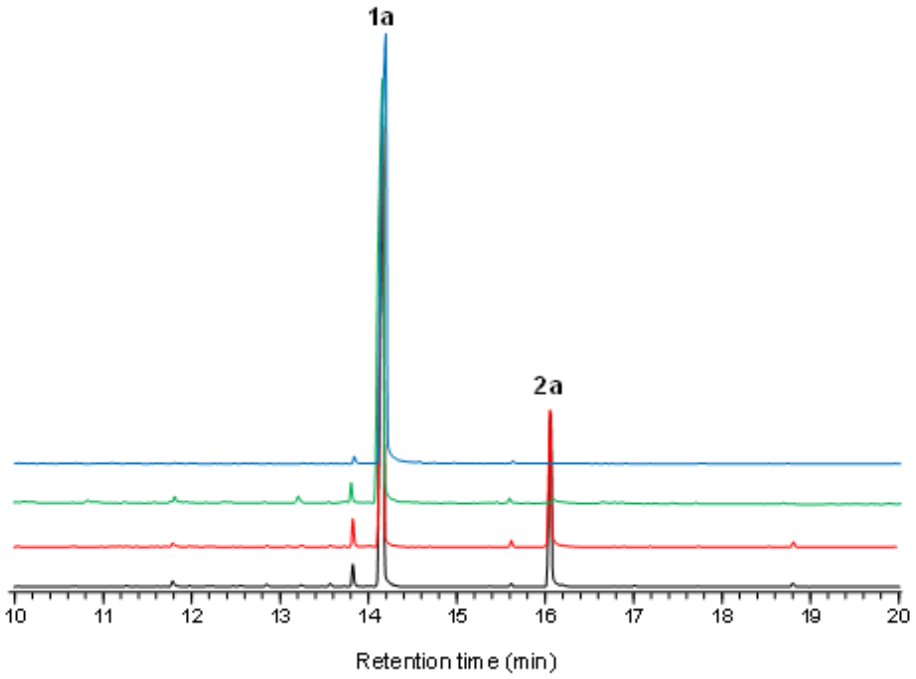


Figure S2. Blank reactions in absence of UPO. Black: Acetone/H_2O_2; Red: MeCN/H_2O_2; Green: Acetone/^{t}BuOOH; Blue: MeCN/^{t}BuOOH

Figure S3 showed the chromatograms obtained in the *Mro*UPO-catalyzed sulfoxidations of compounds **1m** and **1n** , in which no sulfoxide formation is observed, whereas different hydroxylated products appear. In the GC/MS method described for the UPO-catalyzed oxidations, corresponding sulfoxides **2m** and **2n** present the retention times of X min and Y min, respectively.

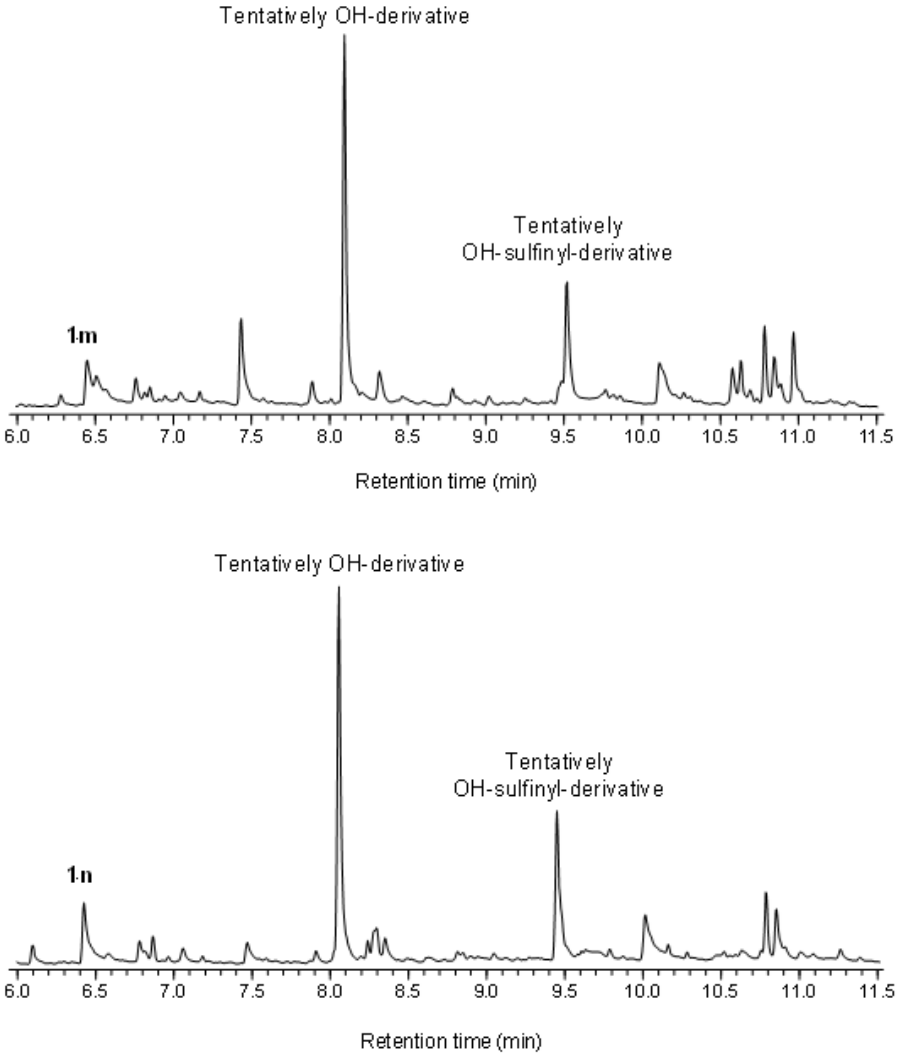


Figure S3. Chromatograms for the sulfoxidation of compounds **1m** and **1n** catalyzed by *Mro*UPO.

10. References

[1] S. Landvick, L. H.S., Ostergaard and L. Kalum, Polypeptides Having Peroxygenase Activity, 2016, U.S. Patent number US9506044B2; (b) M. J. Pecyna, K. M. Schnorr, R. Ullrich, K. Scheibner, M. G., Kluge and M. Hofrichter, Fungal Peroxygenases and Methods of Application, 2008, Patent number WO2008119780

[2] Y. Li, Y.-C. Liou, X. Chen, L. Ackerman, Thioether-enabled palladium-catalyzed atroposelective C–H olefination for N–C and C–C axial chirality*, Chem. Sci.* **2022**, 13, 4088-4094.

[2] H. Shimizu, K. Matsuo, T. Kataoka, M. Hori, Syntheses and Properties of Novel Cyclic Sulfilimines, 2-Azathiabenzene Derivatives. *Chem. Pharm. Bull*. **1984**, *32*, 4360-4371.

[3] M. A. Barysevich, M. V. Laktsevich-Iskryk, A. V. Krech, V. N. Zhabinskii, V. A, Khripach, A. L. Hurski, Palladium-Catalyzed 2-(Neopentylsulfinyl)aniline Directed C–H Acetoxylation and Alkenylation of Arylacetamides, *Eur. J. Org. Chem.* **2020**, 937-943.

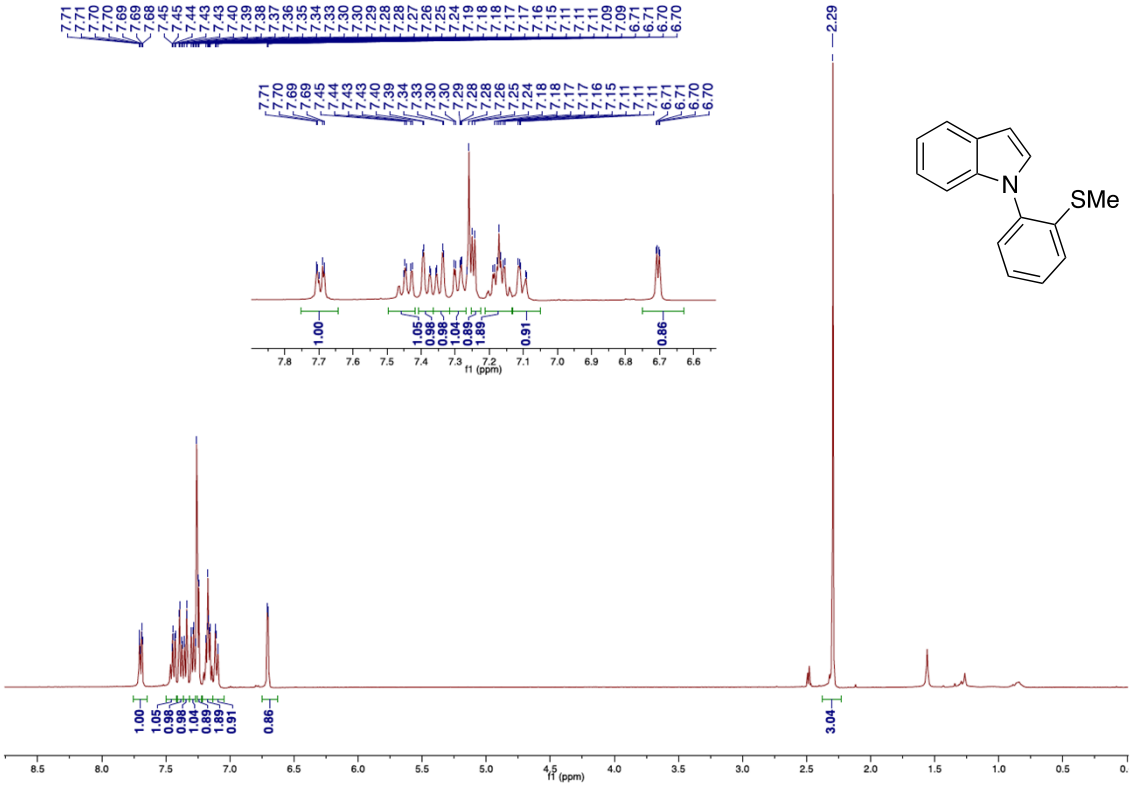
[4] D. K. Bates, R. T. Winters, B. A. Sell, "Intramolecular Capture of Pummerer Rearrangement Intermediates. I. Synthesis of Pyrrolo[Z,l-c][1,4]benzothiazines" *J. Heterocycl. Chem.,* **1986,** *23*, 695-699.

[5] D. K. Bates, R. T. Winters, J. A. Picard, "Interrupted Pummerer Rearrangement: Capture of Tricoordinate Sulfur Species Generated under Pummerer Rearrangement Conditions" *J. Org. Chem.* **1992**, *57*, 3094-3097.

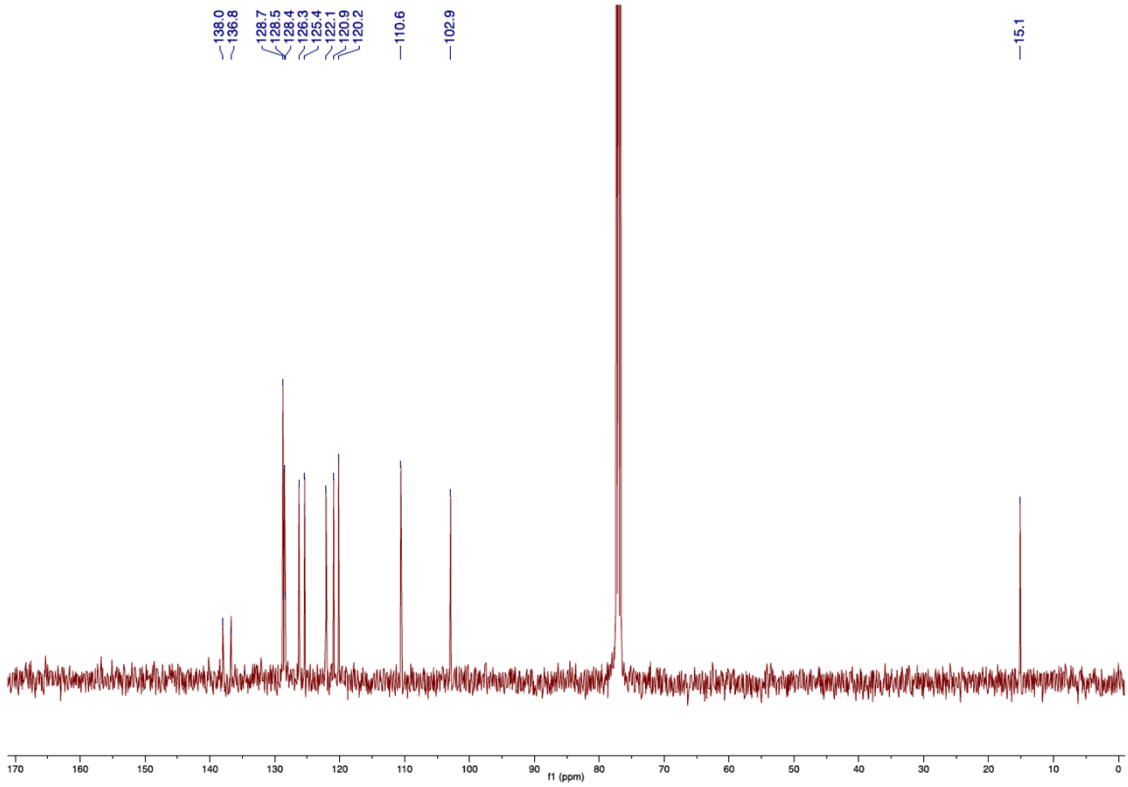
[6] K. Kobayashi, A. Hyota, H. Kondo, A. Imaoka, "Synthesis of 4-Aryl-4-methyl- and 4,4-Dimethyl-4H-pyrrolo[2,1-c][1,4]benzothiazines by an Easy Five-Step Sequence Starting from 2-Sulfanylbenzenamines" *Synthesis*, **2012**, 44, 3019-3026.

11. NMR and HPLC spectra of the novel compounds

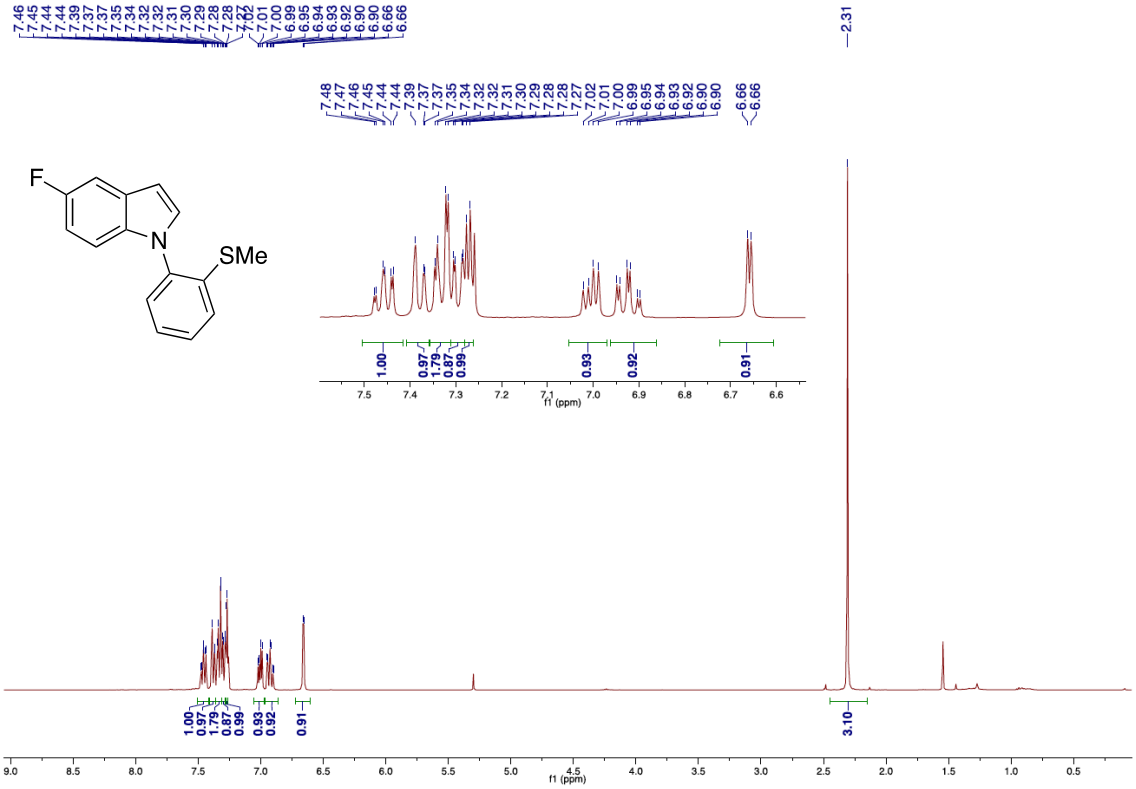
^{1}H-RMN (400 MHz, $CDCl_3$) for 1a:



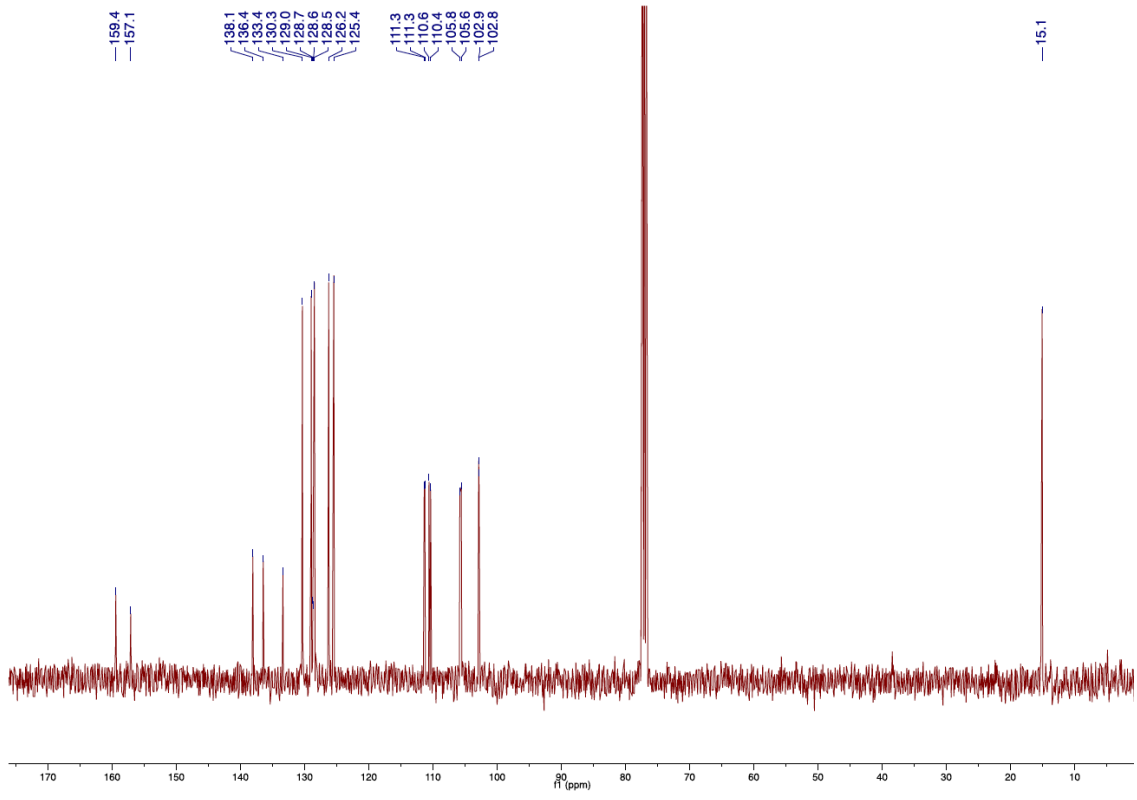
^{13}C-RMN (100 MHz, $CDCl_3$) for 1a:



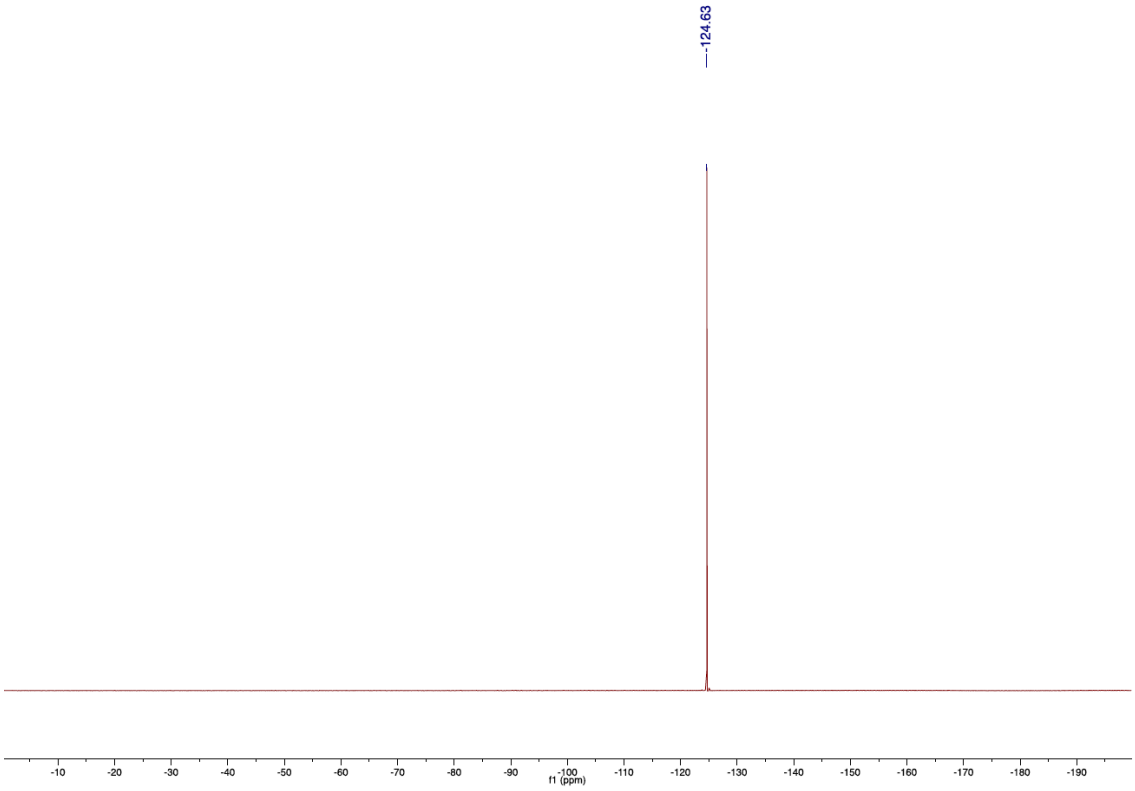
^{1}H-RMN (400 MHz, $CDCl_3$) for 1b:



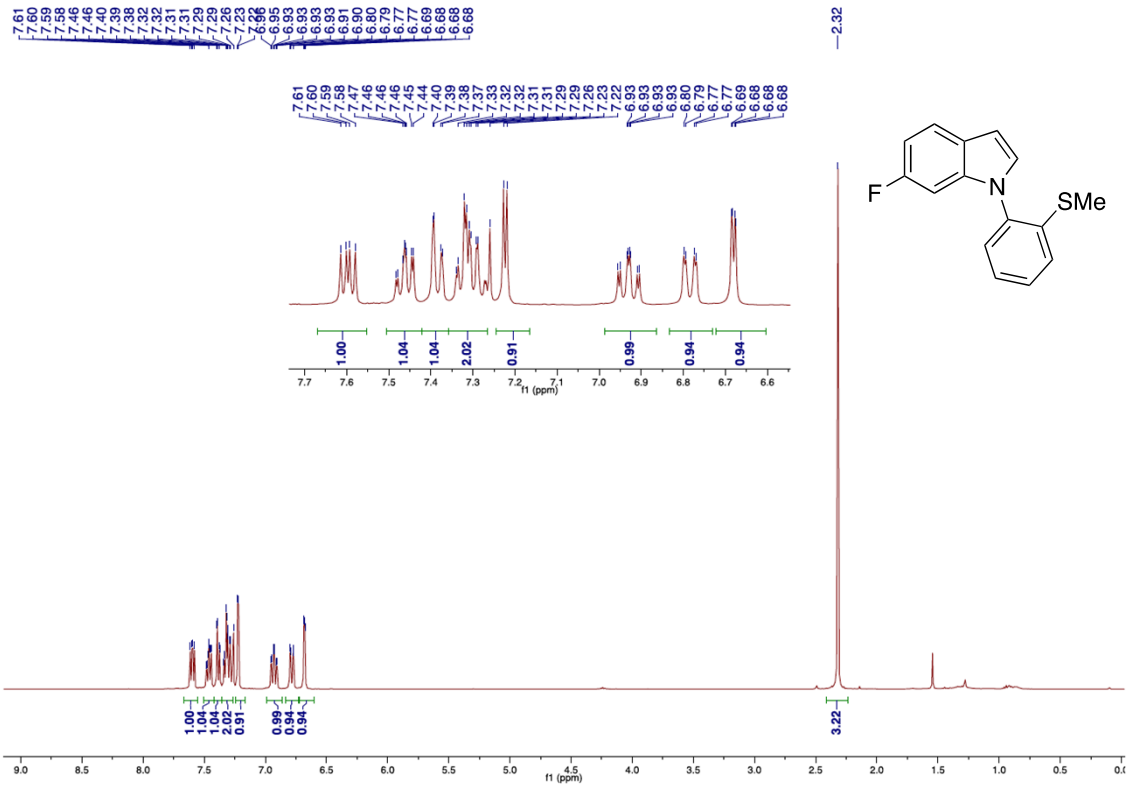
^{13}C-RMN (100 MHz, $CDCl_3$) for 1b:



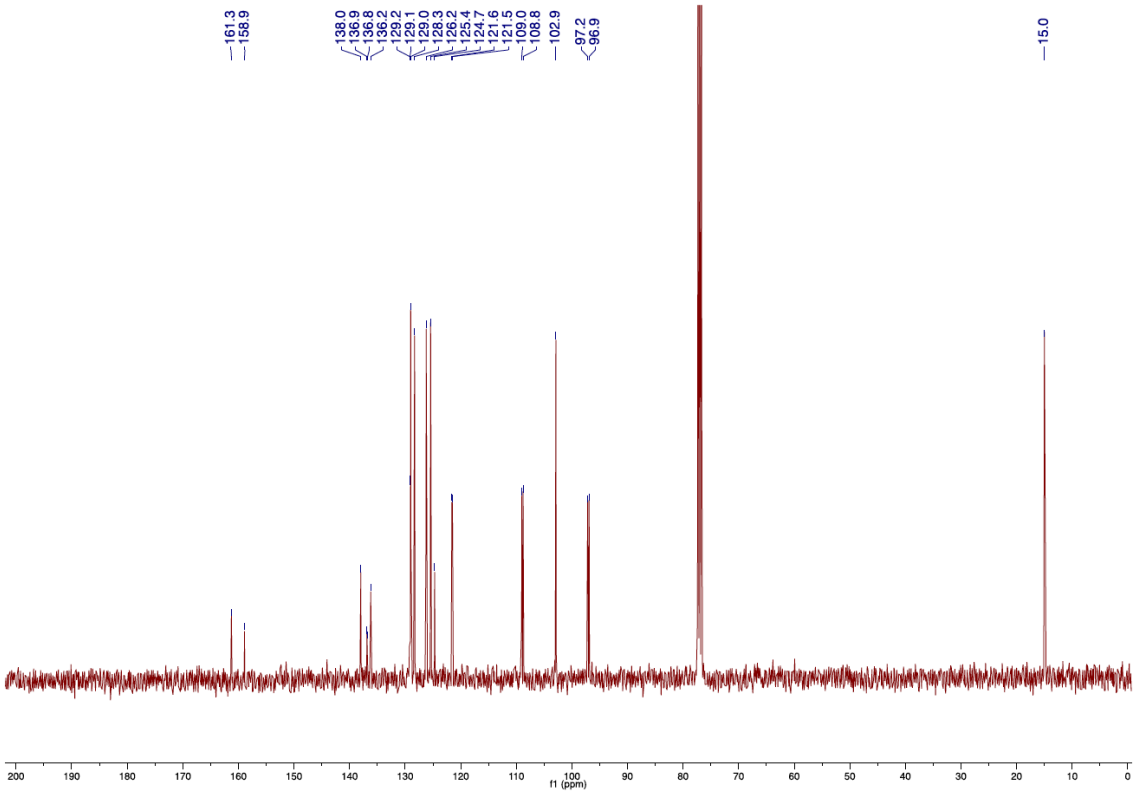
^{19}F-RMN (377 MHz, $CDCl_3$) for 1b:



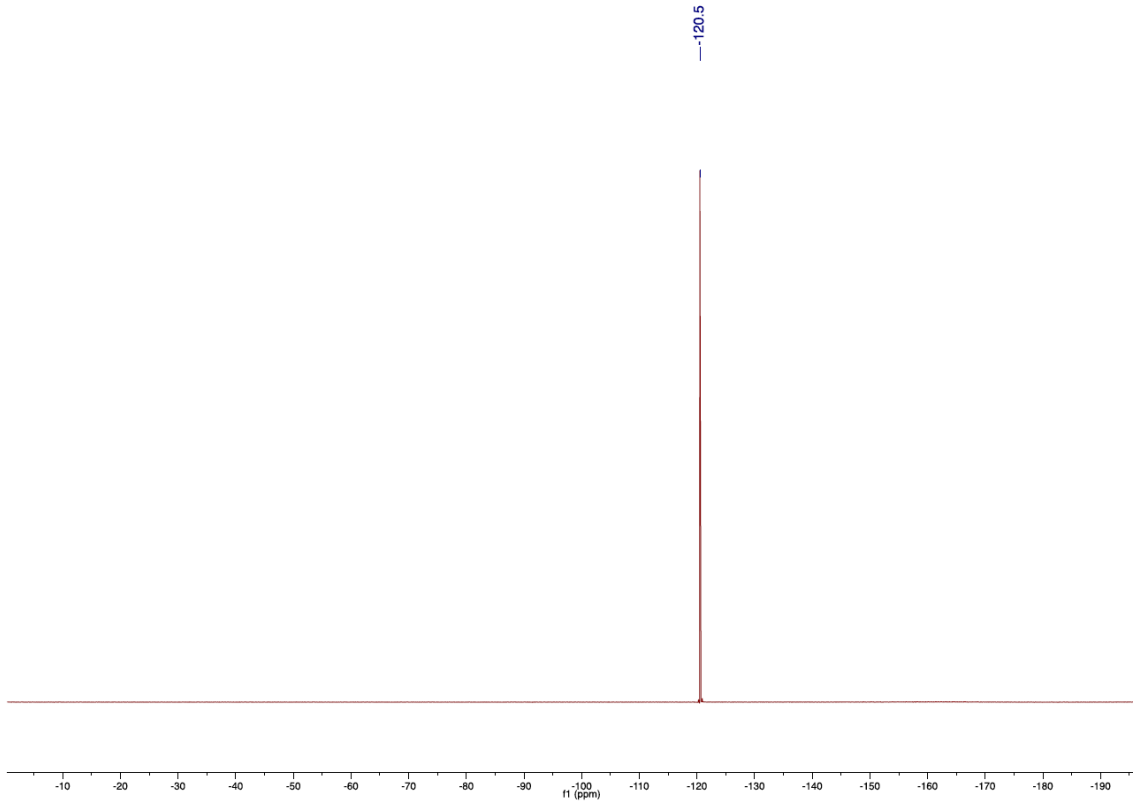
^{1}H-RMN (400 MHz, $CDCl_3$) for 1c:



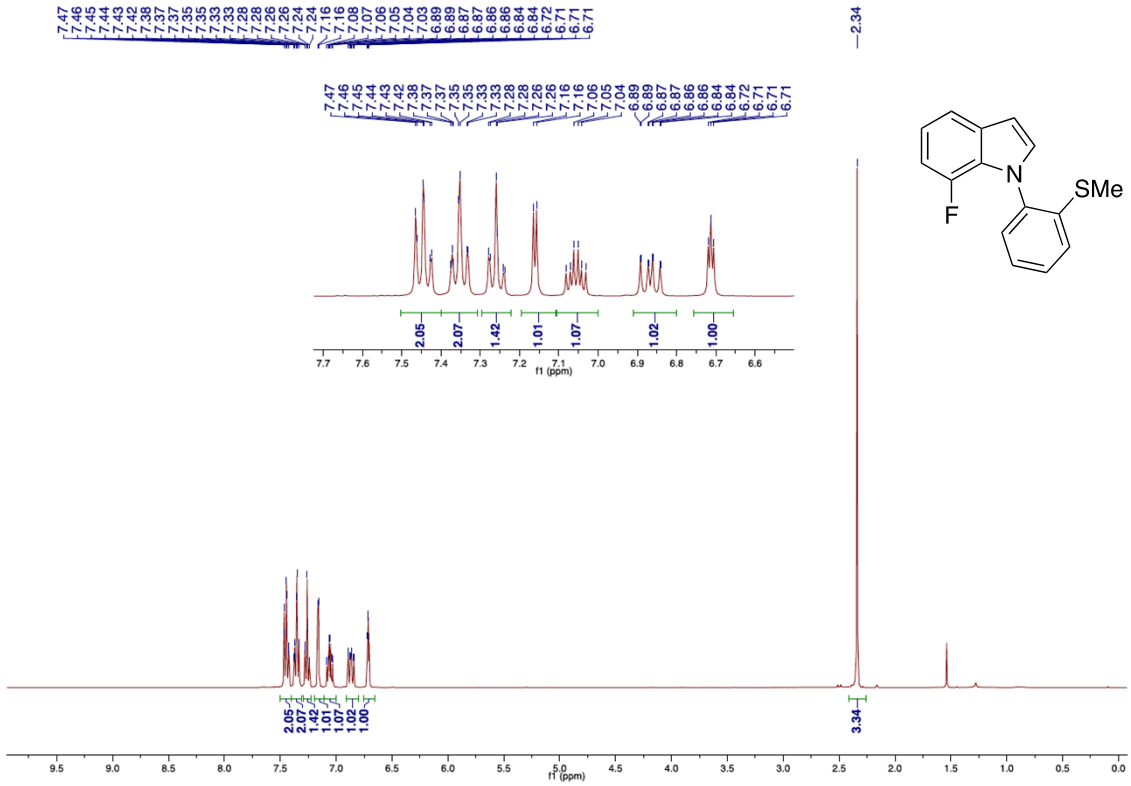
^{13}C-RMN (100 MHz, $CDCl_3$) for 1c:



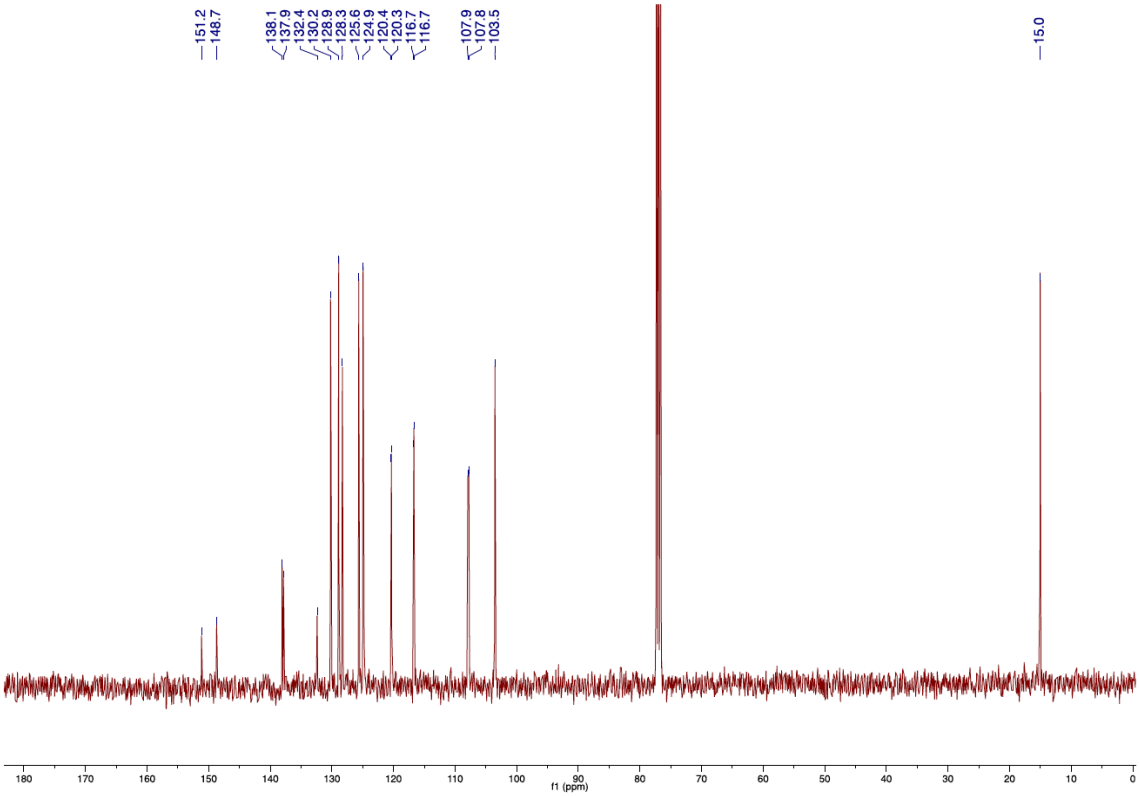
^{19}F-RMN (377 MHz, $CDCl_3$) for 1c:



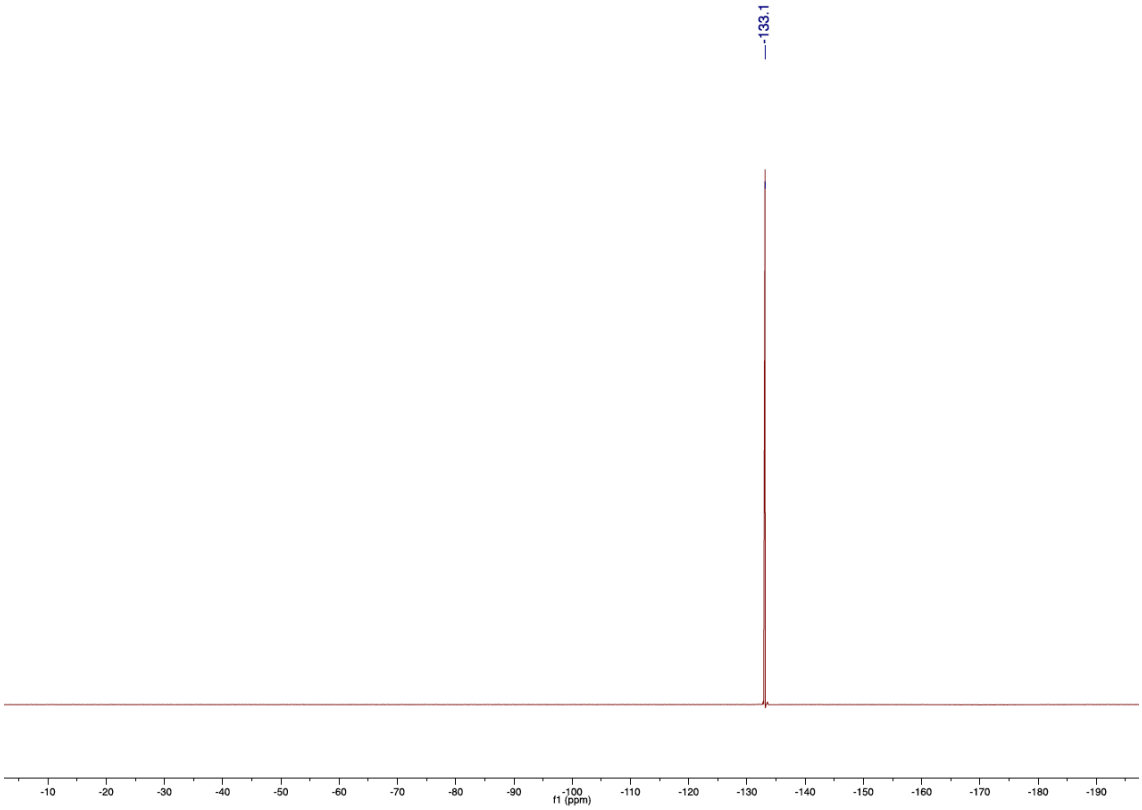
^{1}H-RMN (400 MHz, $CDCl_3$) for 1d:



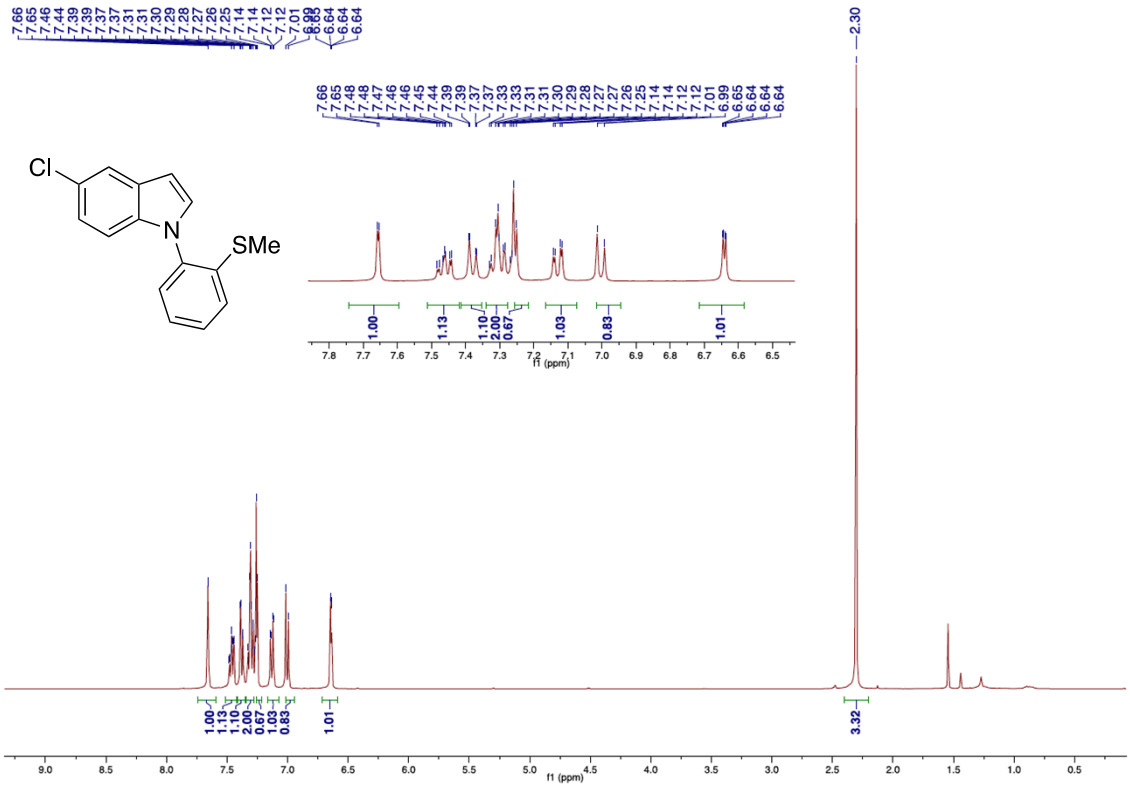
^{13}C-RMN (100 MHz, $CDCl_3$) for 1d:



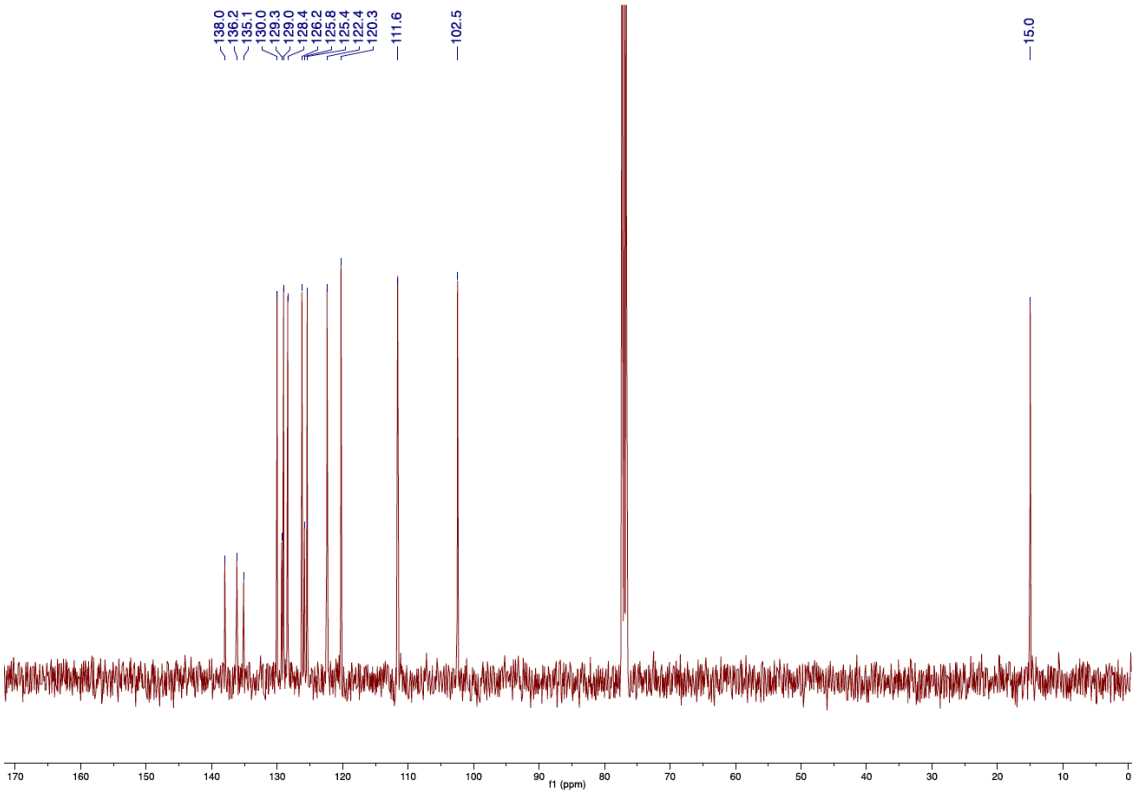
^{19}F-RMN (377 MHz, $CDCl_3$) for 1d:



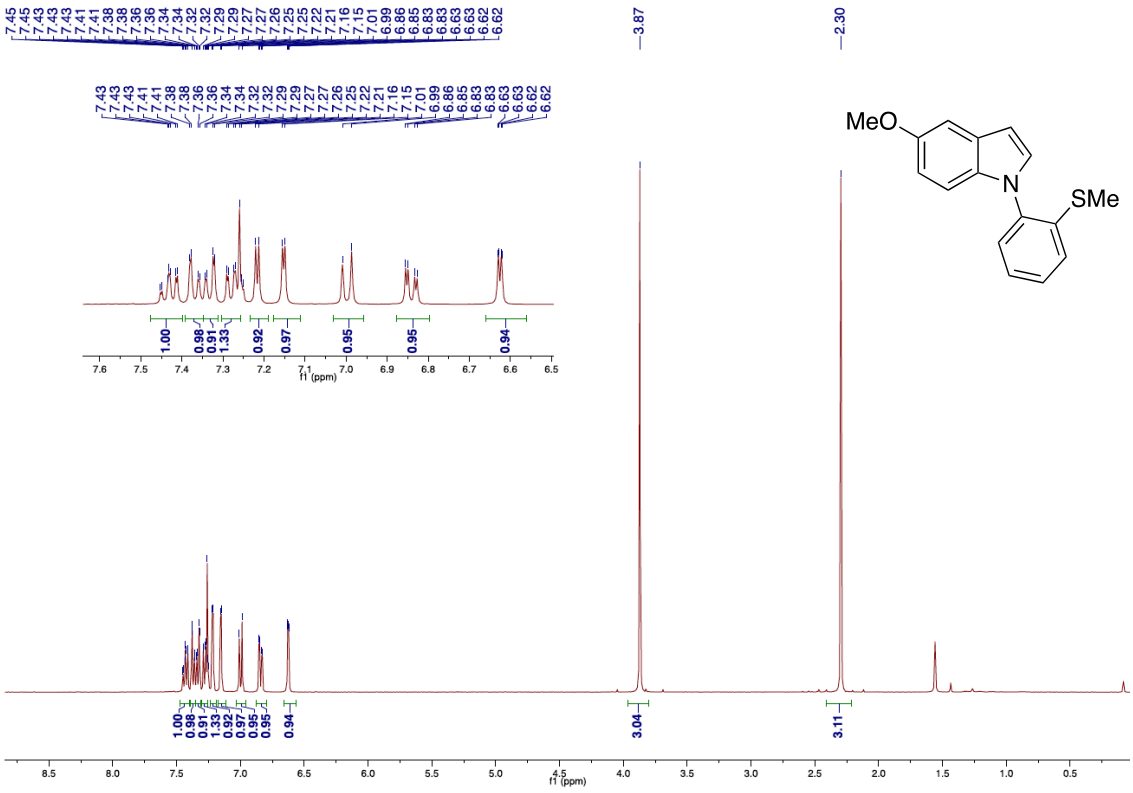
^{1}H-RMN (400 MHz, $CDCl_3$) for 1e:



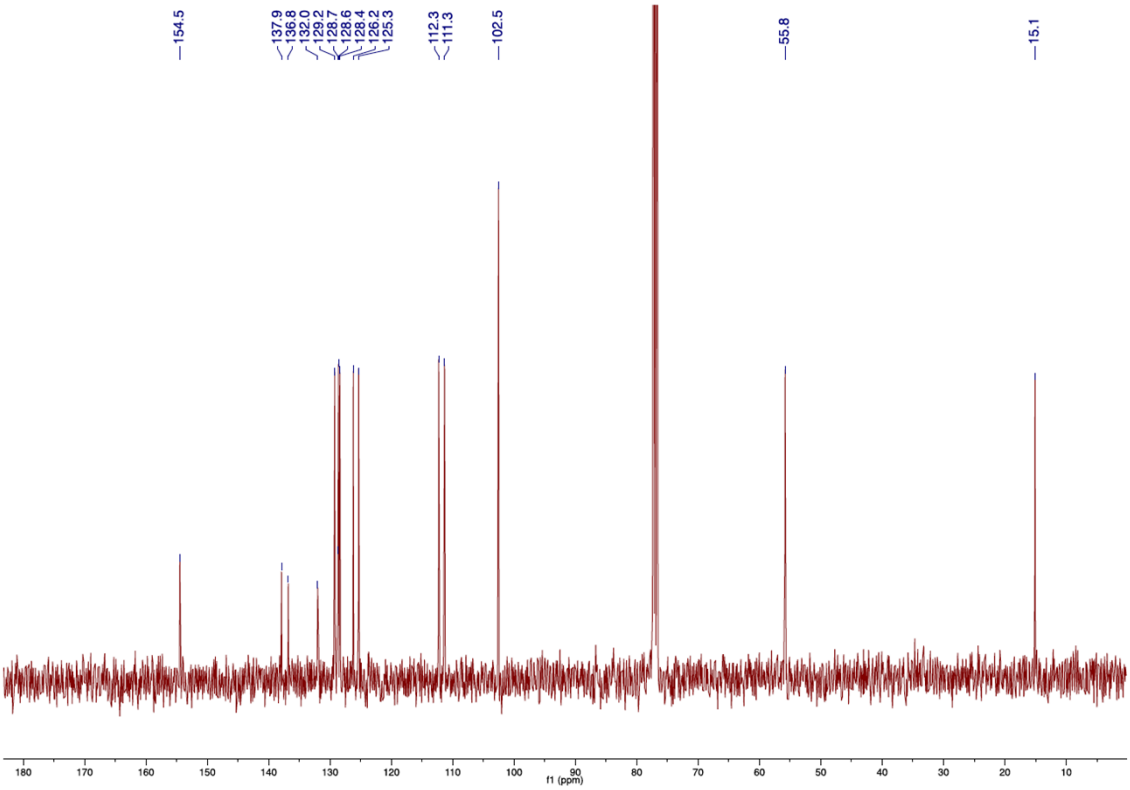
^{13}C-RMN (100 MHz, $CDCl_3$) for 1e:



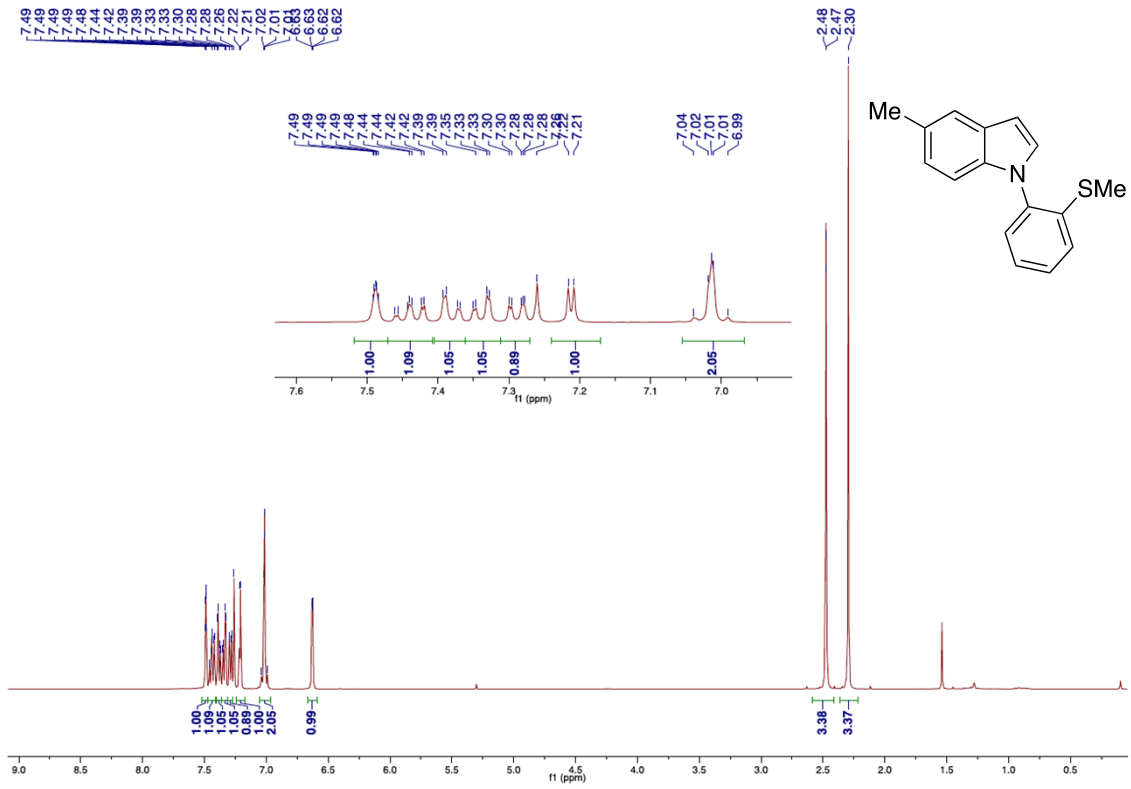
^{1}H-RMN (400 MHz, $CDCl_3$) for 1f:



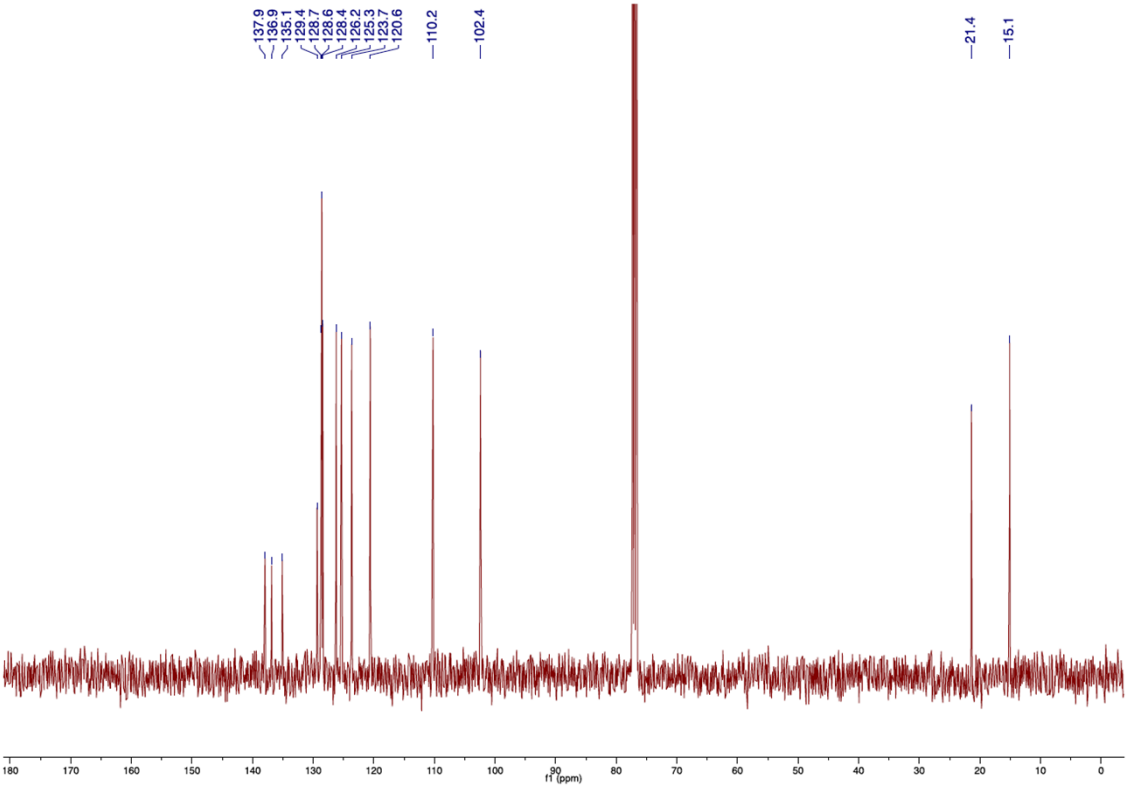
^{13}C-RMN (100 MHz, $CDCl_3$) for 1f:



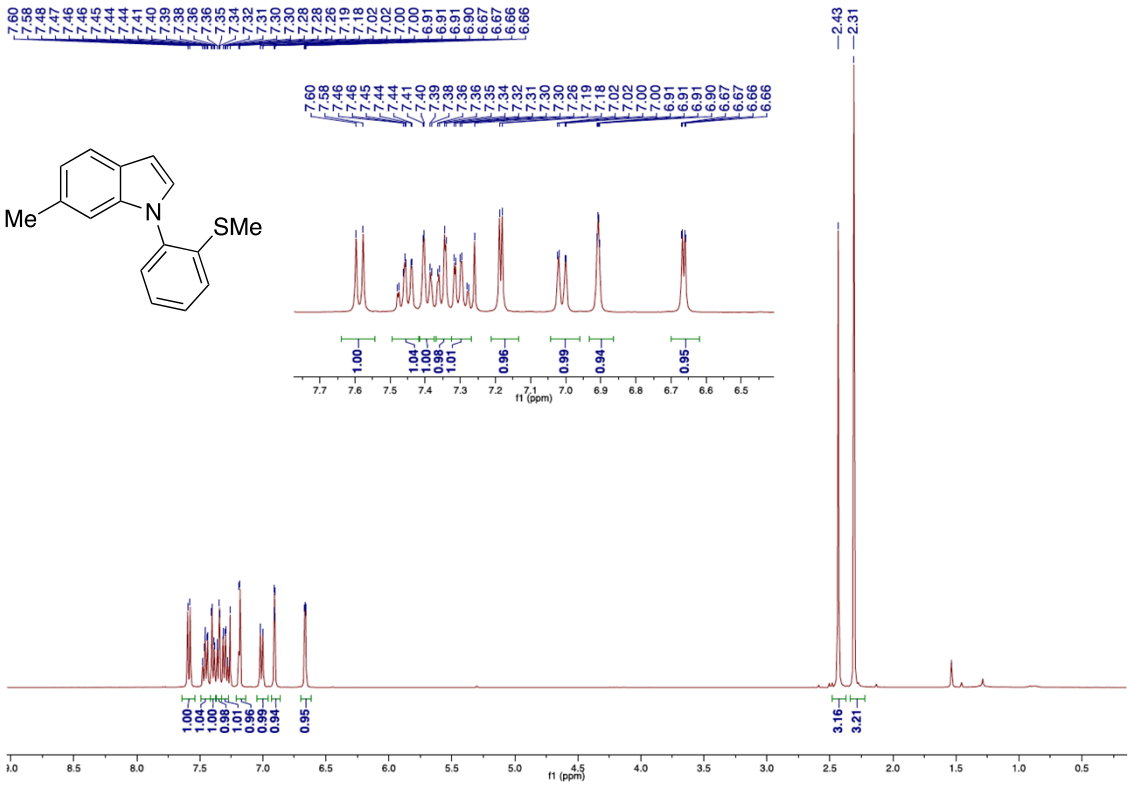
^{1}H-RMN (400 MHz, $CDCl_3$) for 1g:



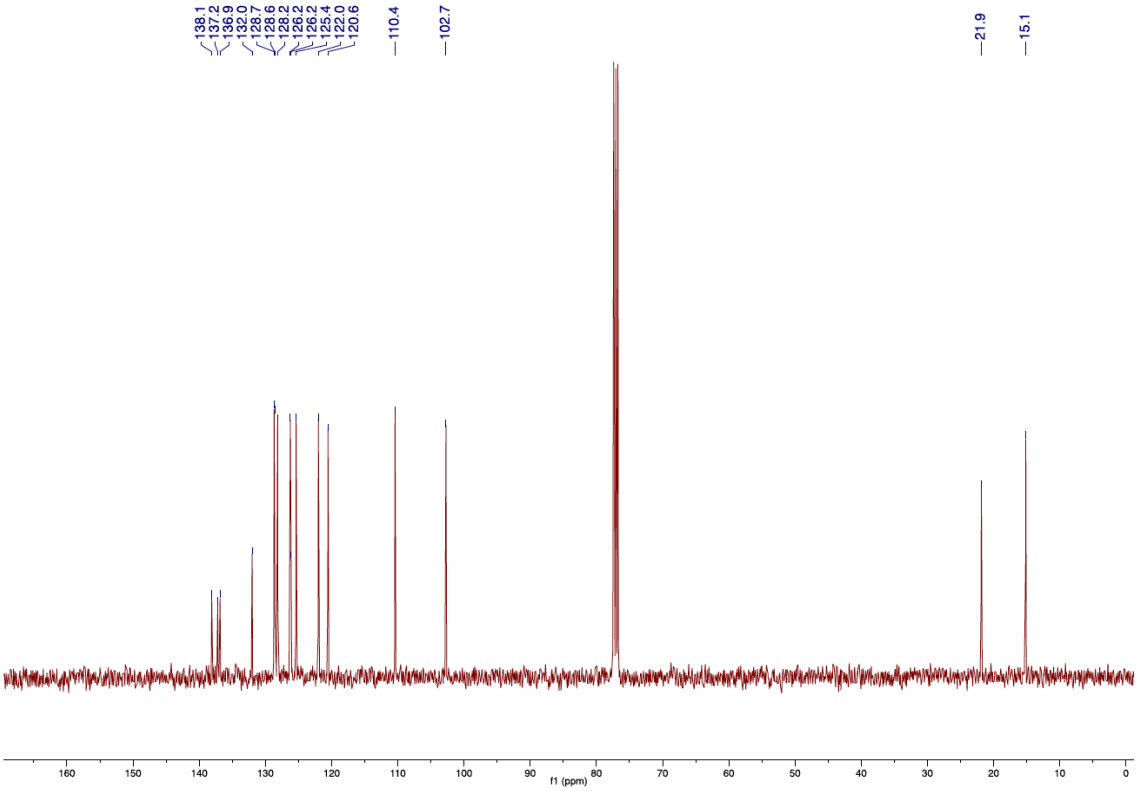
^{13}C-RMN (100 MHz, $CDCl_3$) for 1g:



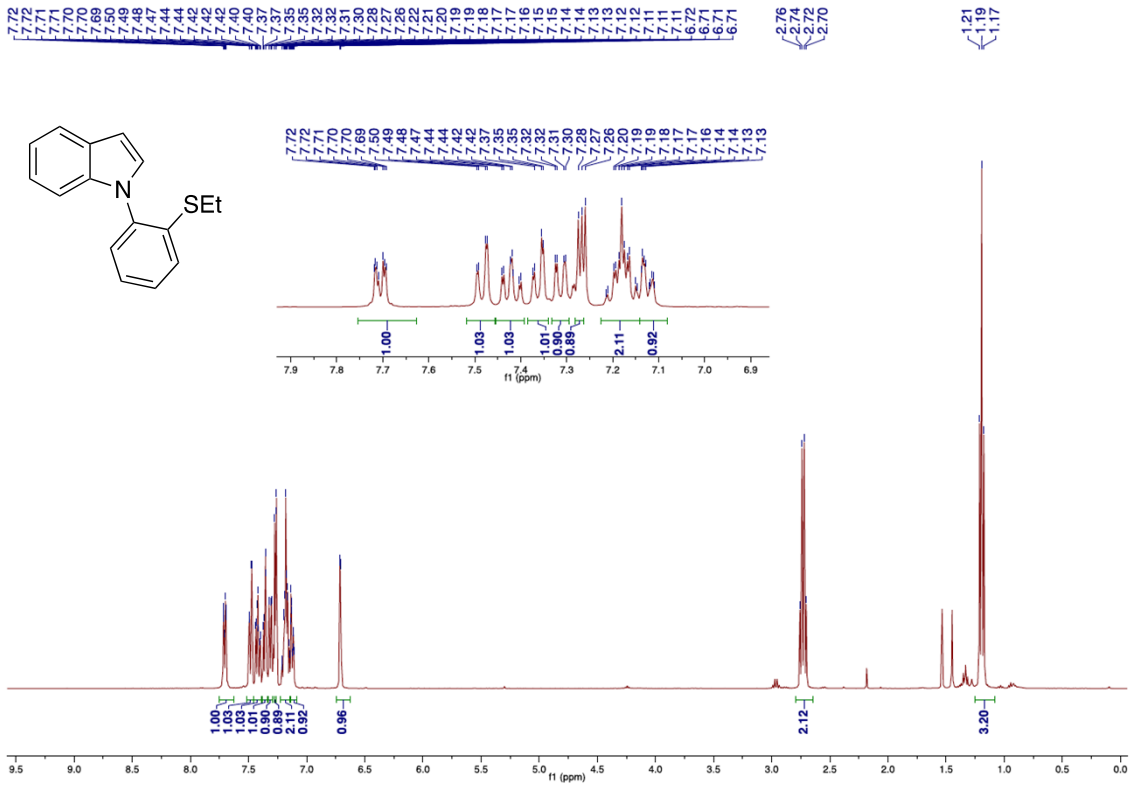
^{1}H-RMN (400 MHz, $CDCl_3$) for 1h:



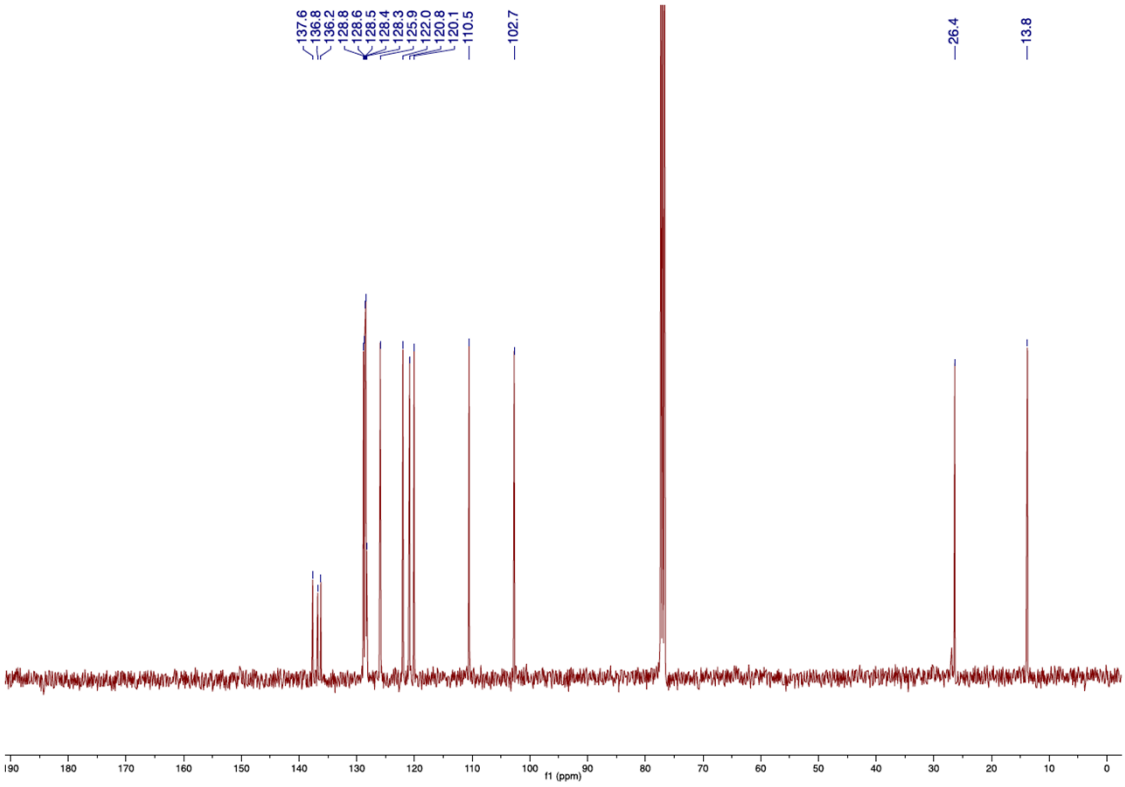
^{13}C-RMN (100 MHz, $CDCl_3$) for 1h:



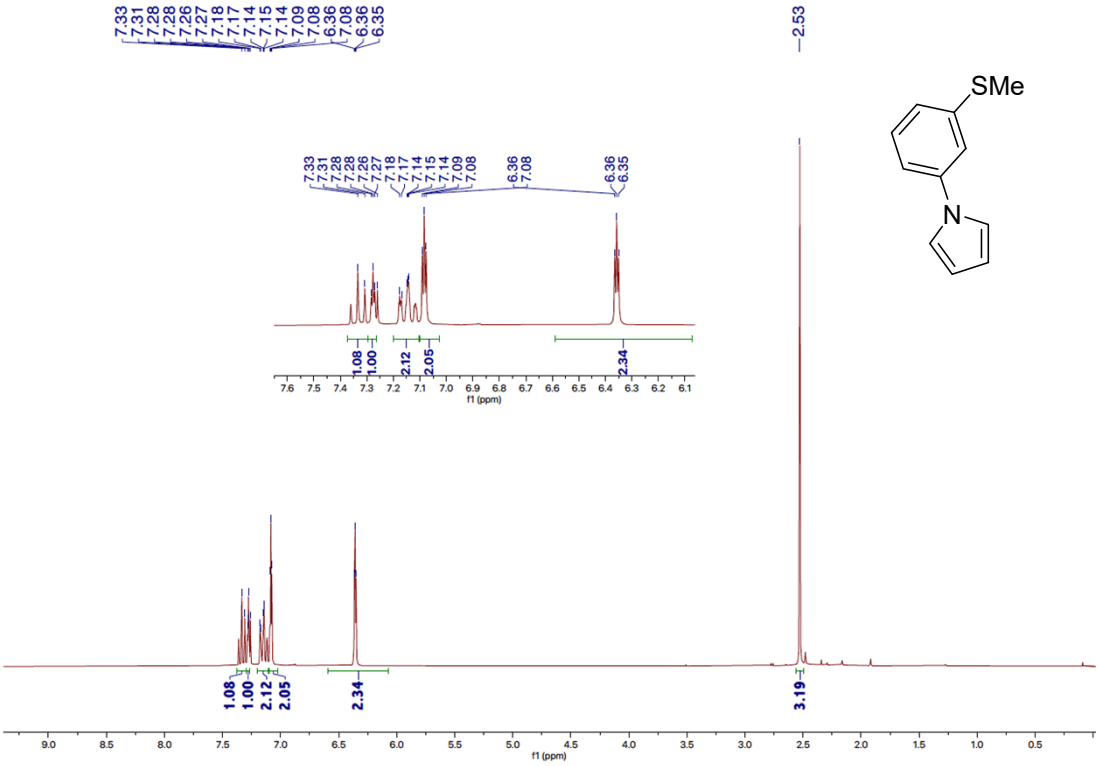
^{1}H-RMN (400 MHz, $CDCl_3$) for 1i:



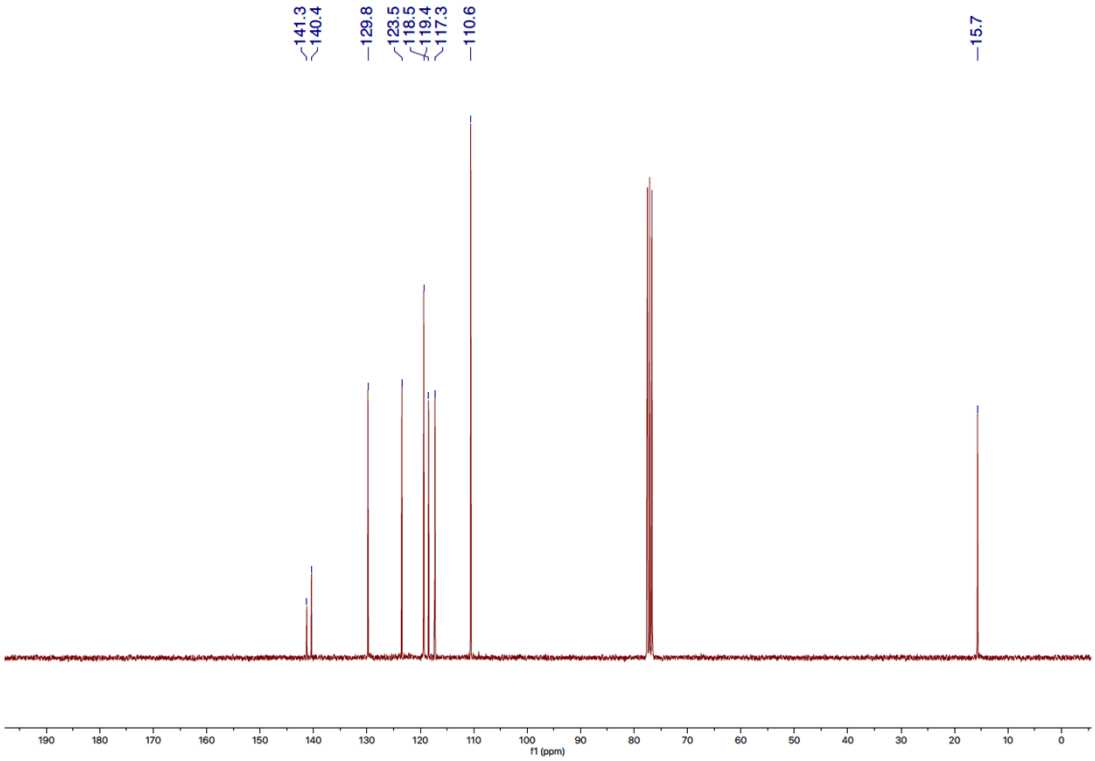
^{13}C-RMN (100 MHz, $CDCl_3$) for 1i:



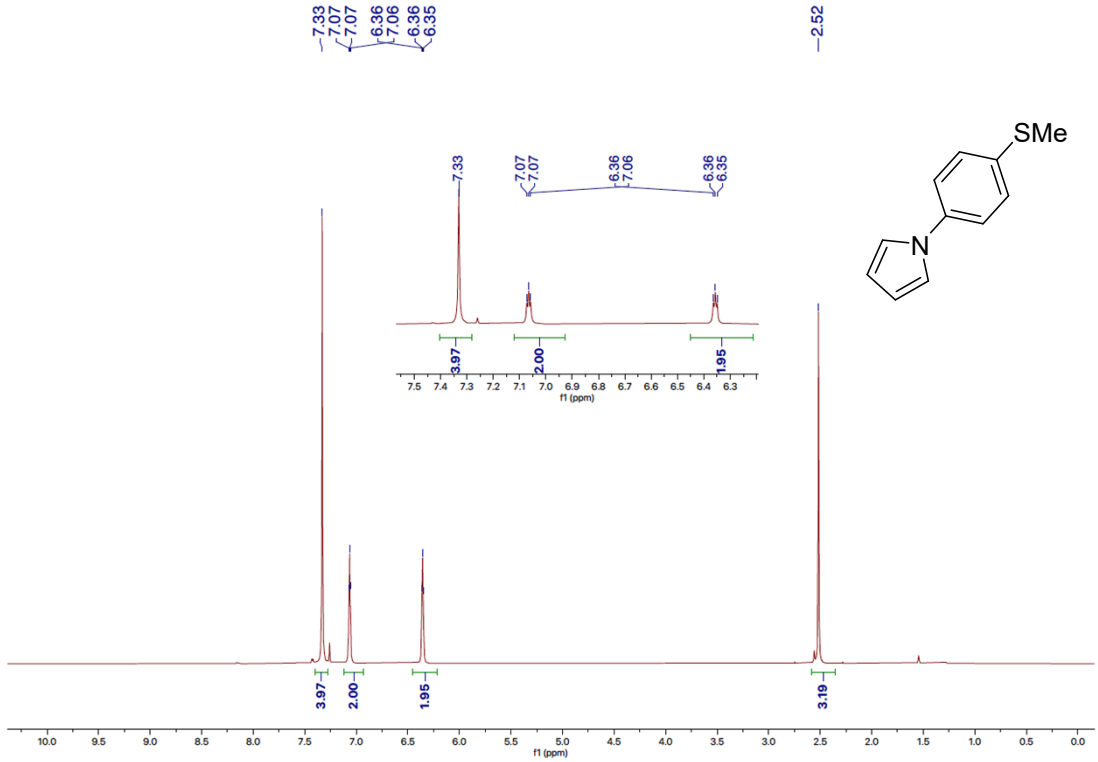
^{1}H-RMN (400 MHz, $CDCl_3$) for 1k:



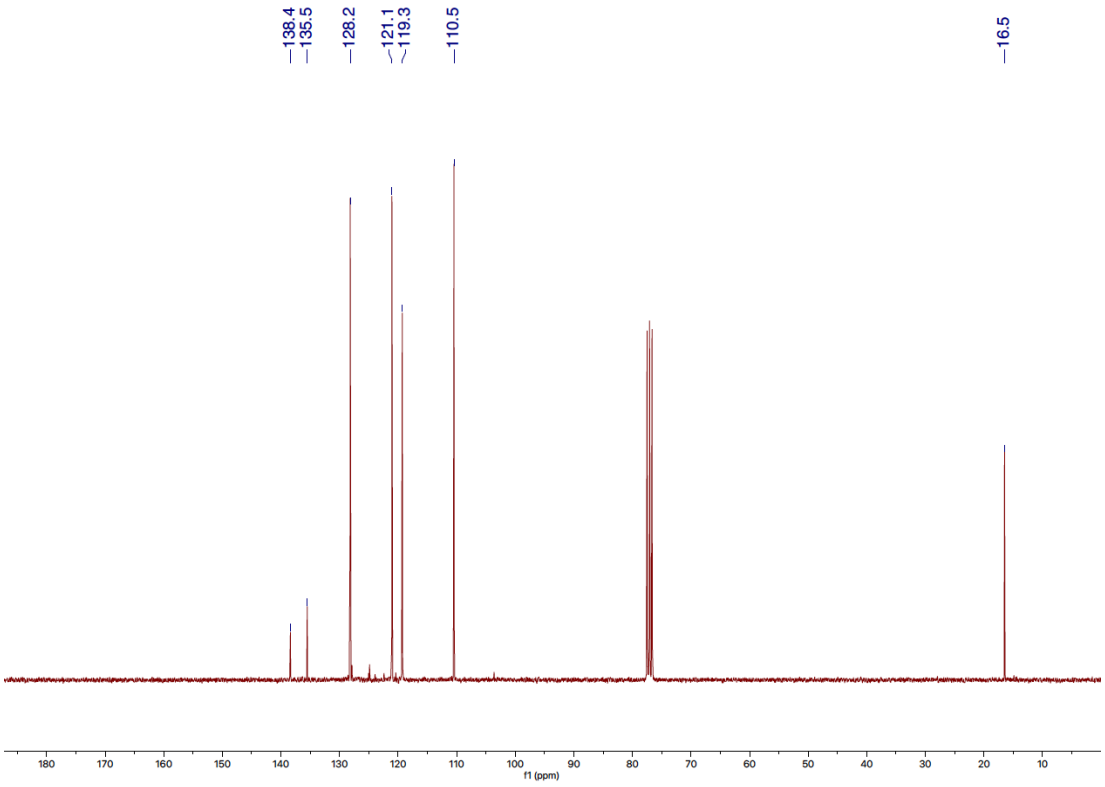
^{13}C-RMN (100 MHz, $CDCl_3$) for 1k:



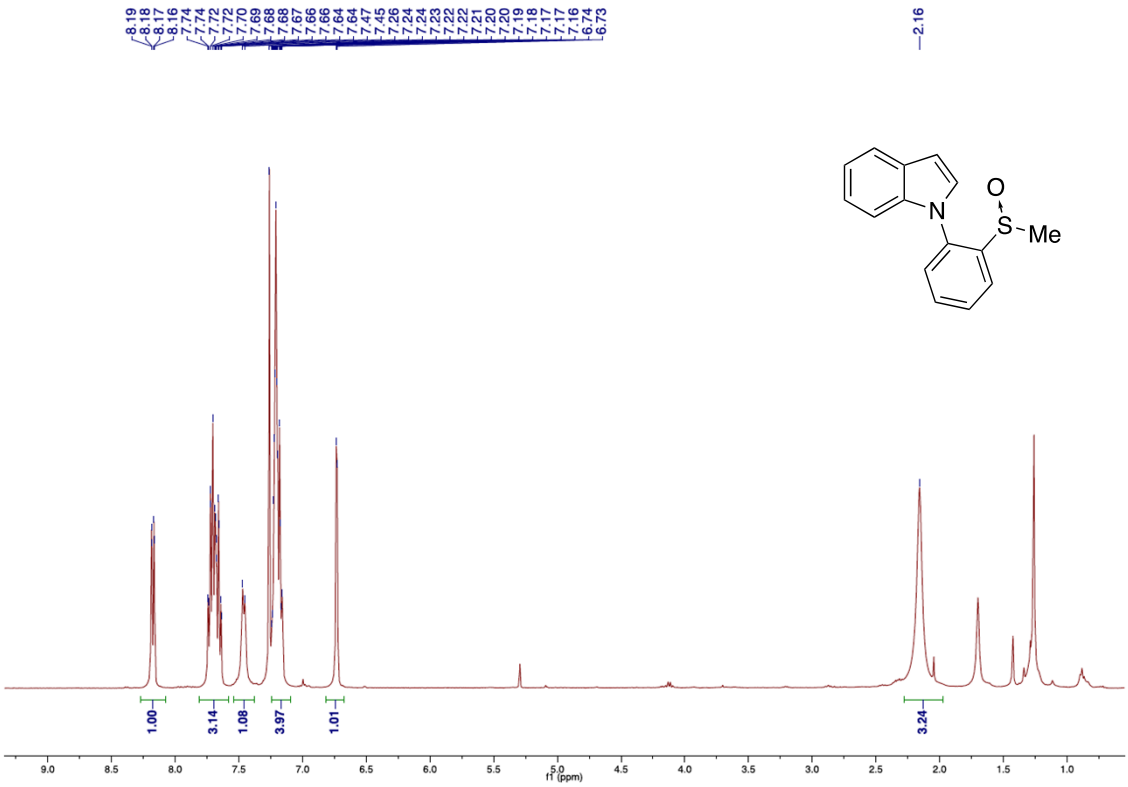
^{1}H-RMN (400 MHz, $CDCl_3$) for 1l:



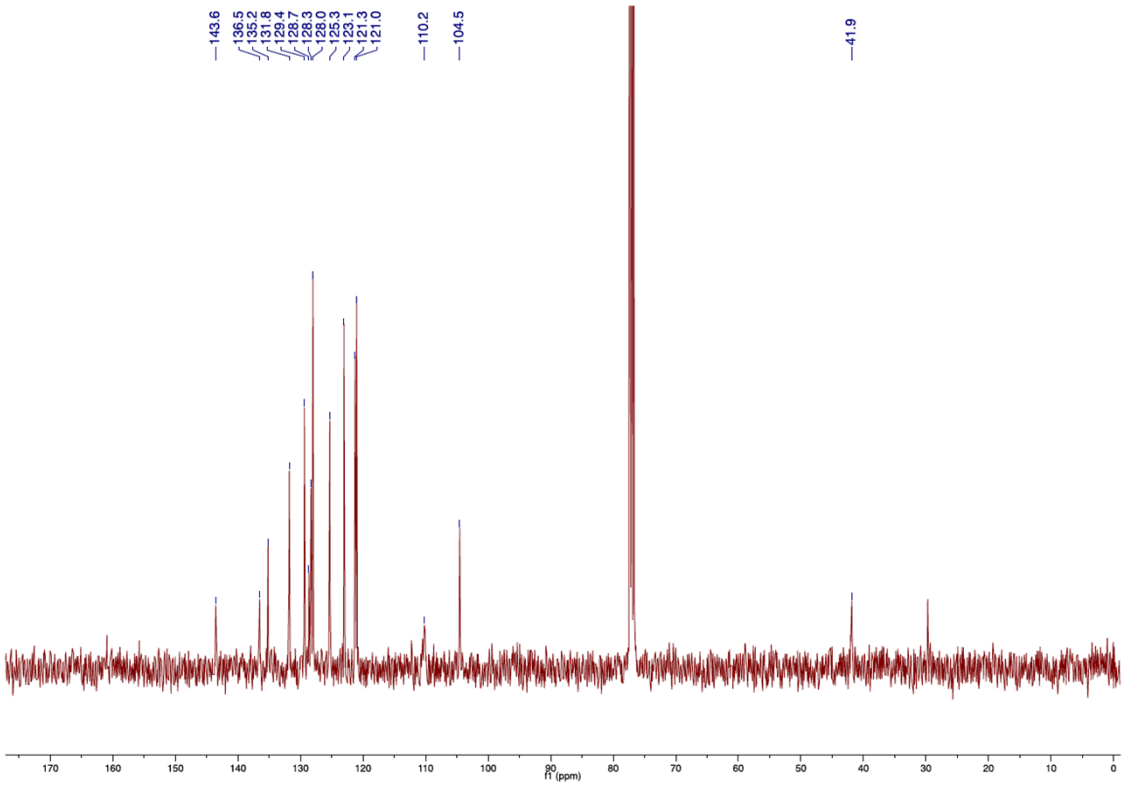
^{13}C-RMN (100 MHz, $CDCl_3$) for 1l:



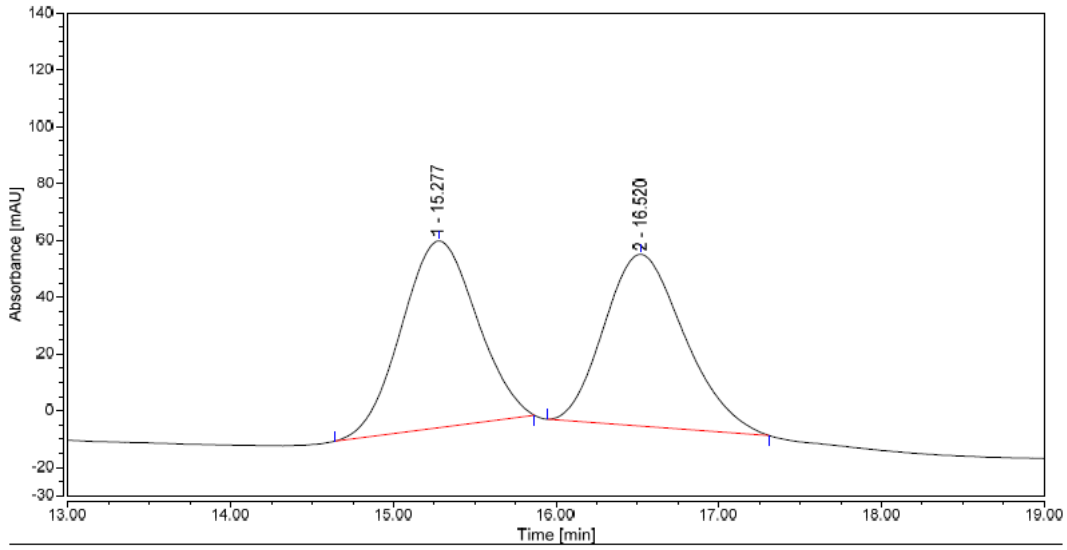
^{1}H-RMN (400 MHz, $CDCl_3$) for 2a:



^{13}C-RMN (100 MHz, $CDCl_3$) for 2a:



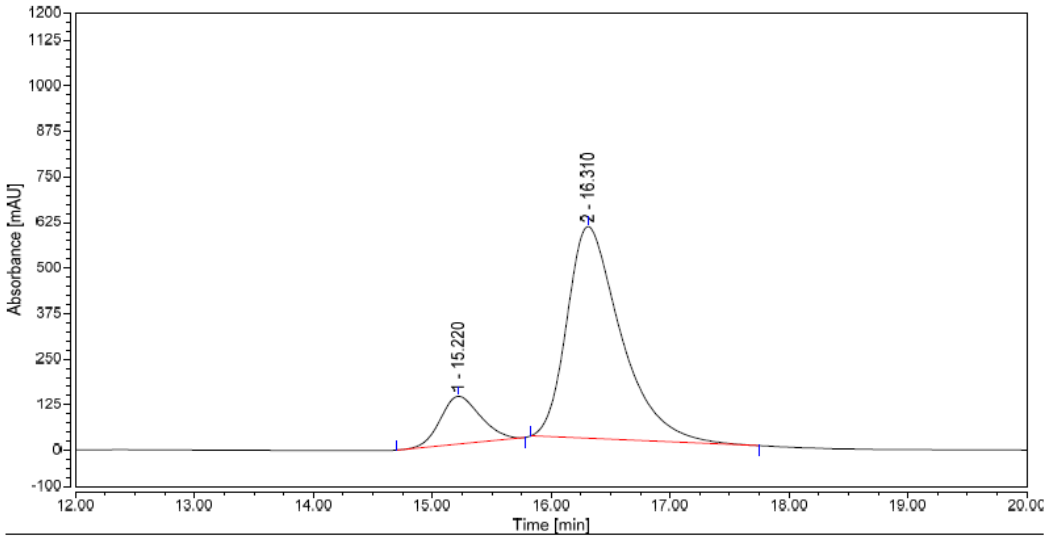
Racemic sample of **2a**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	15.277	35.236	50.44
2	16.520	34.626	49.56

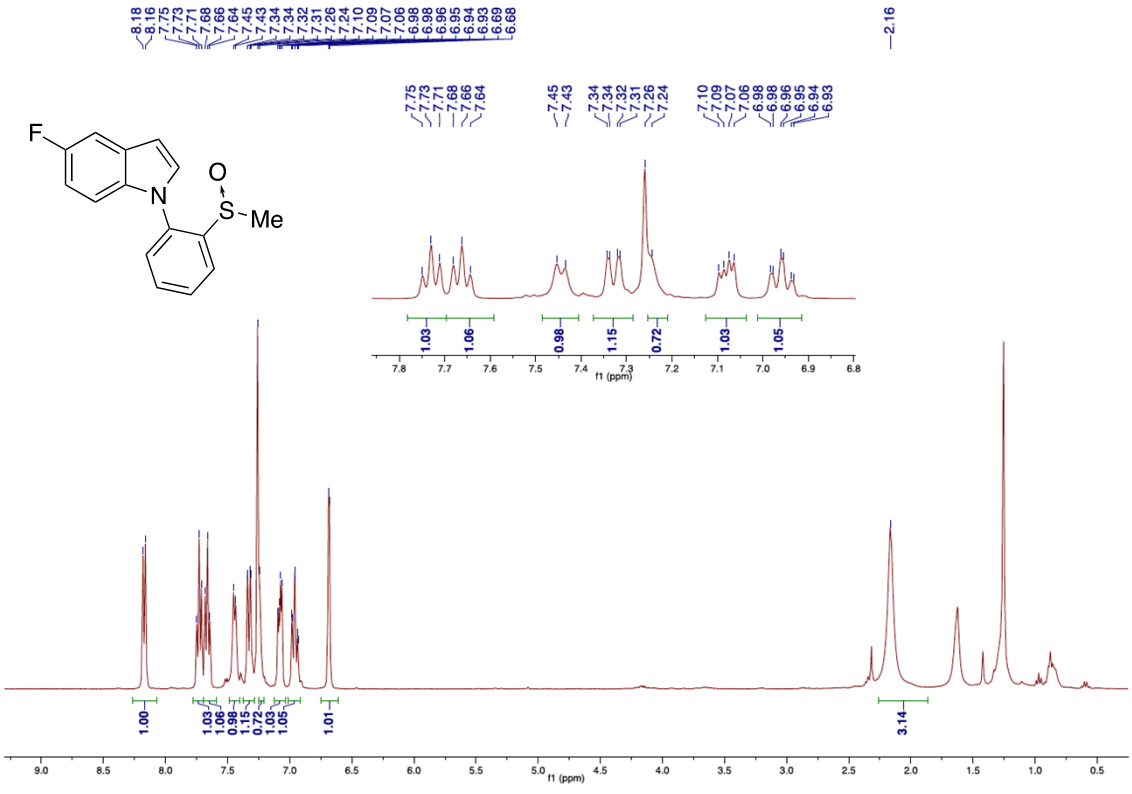
Enantioenriched sample of **2a**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



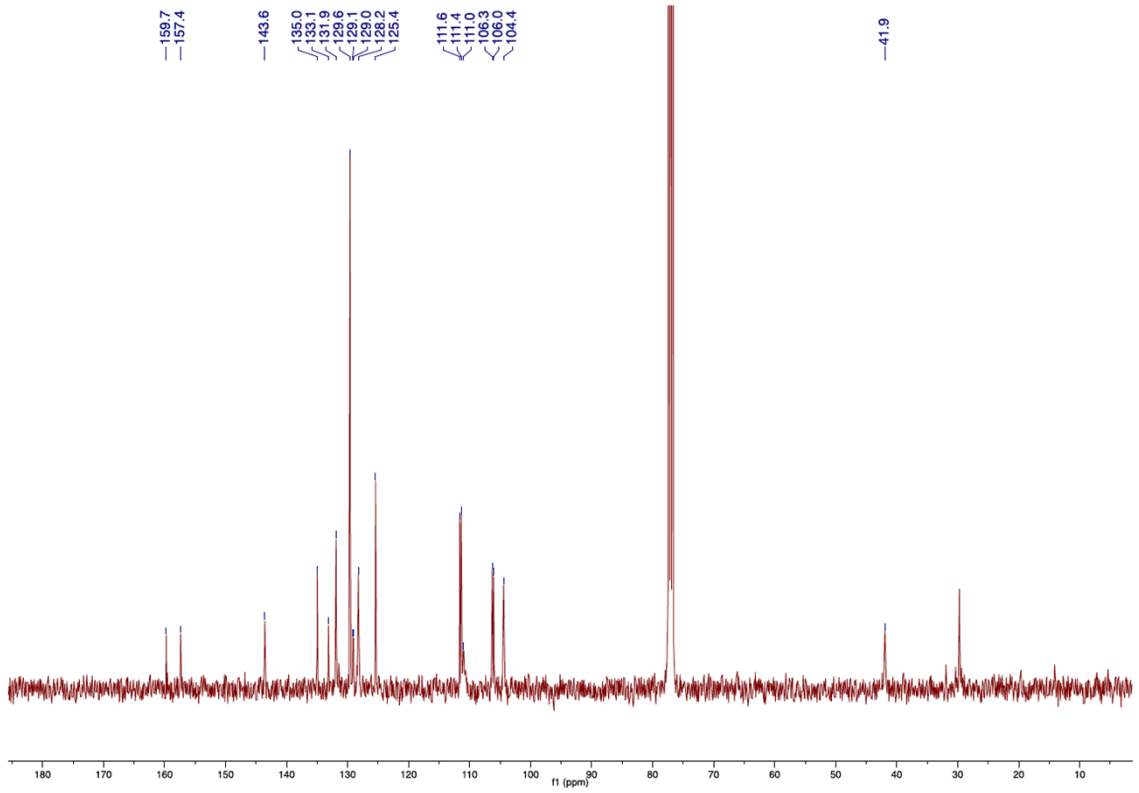
Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	15.220	50.804	14.25
2	16.310	305.615	85.75

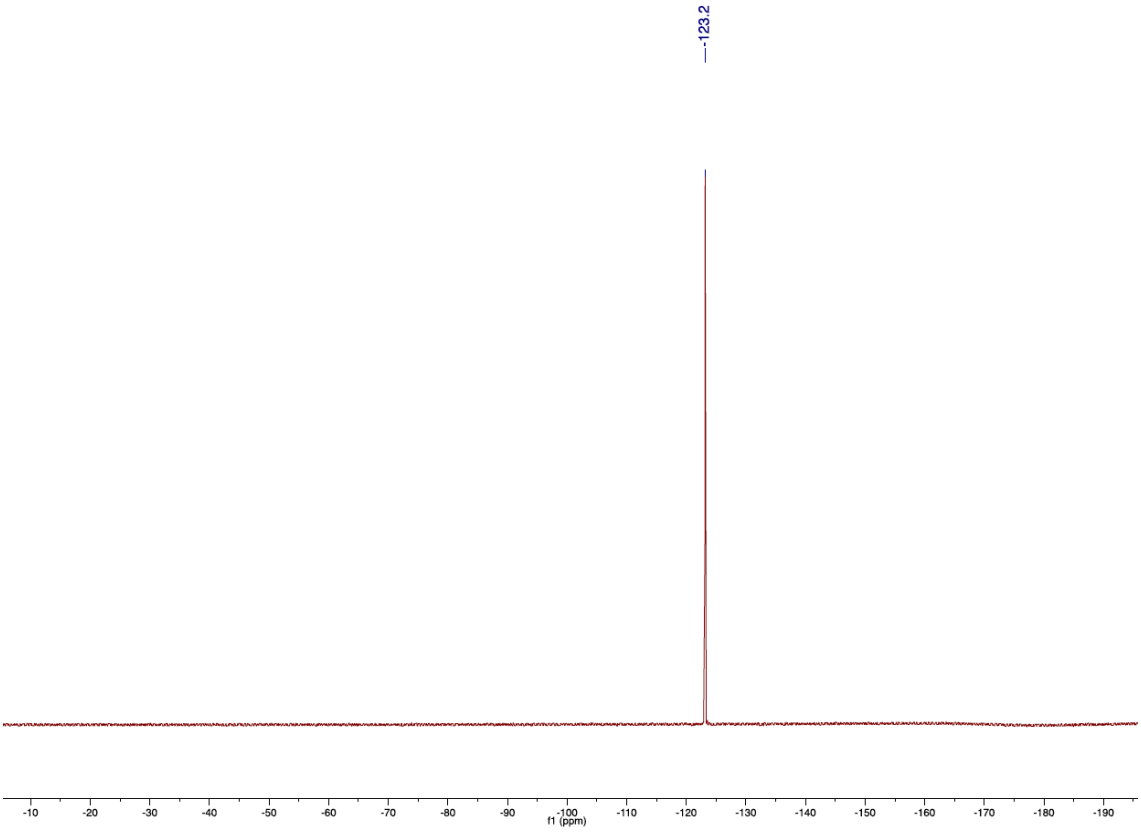
^{1}H-RMN (400 MHz, $CDCl_3$) for 2b:



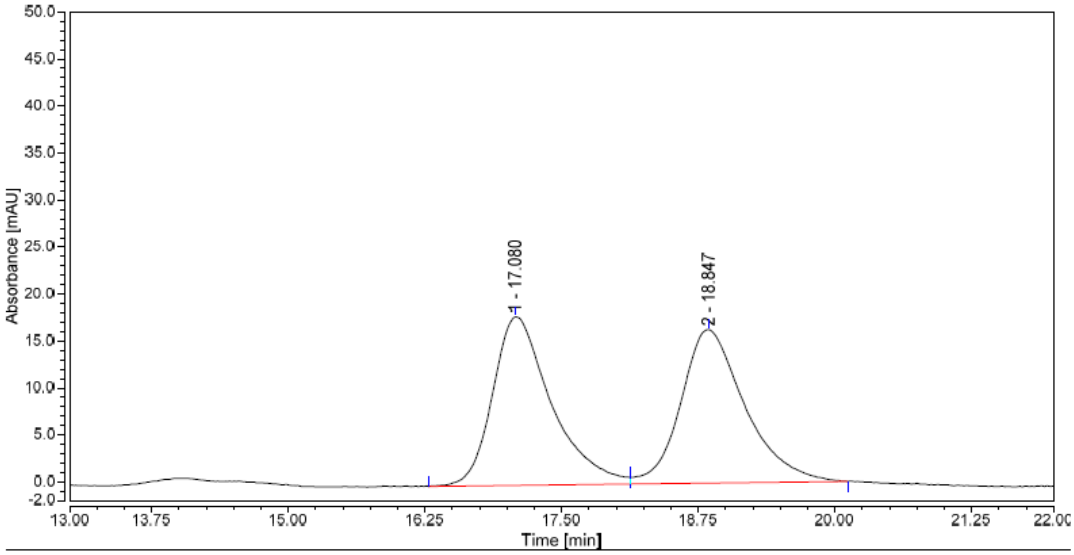
^{13}C-RMN (100 MHz, $CDCl_3$) for 2b:



^{19}F-RMN (377 MHz, $CDCl_3$) for 2b:



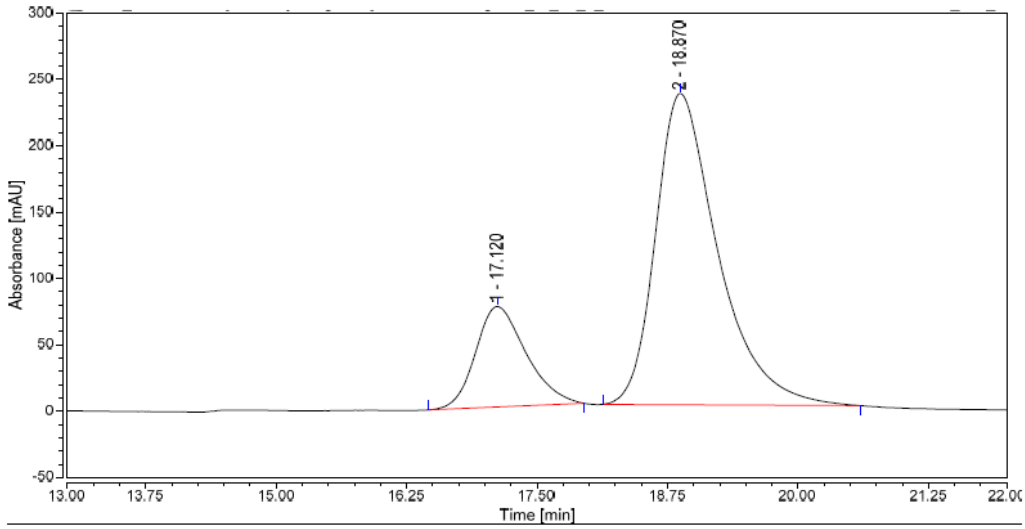
Racemic sample of **2b**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	17.080	11.151	50.15
2	18.847	11.083	49.85

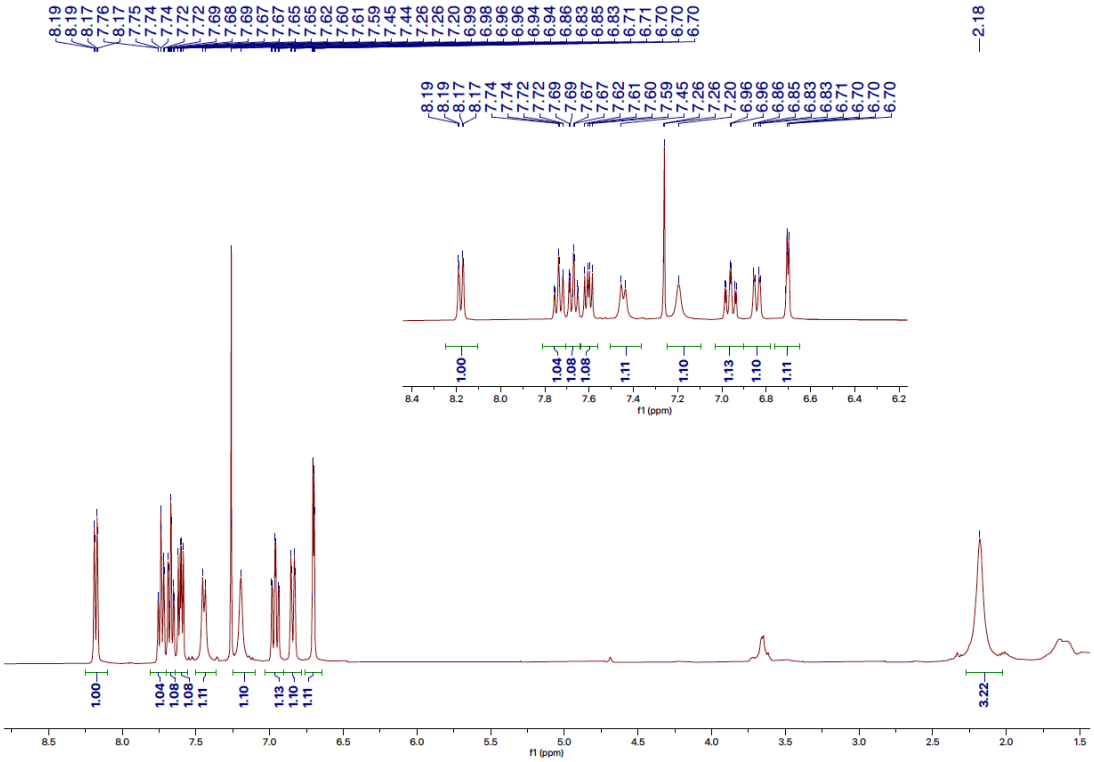
Enantioenriched sample of **2b**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



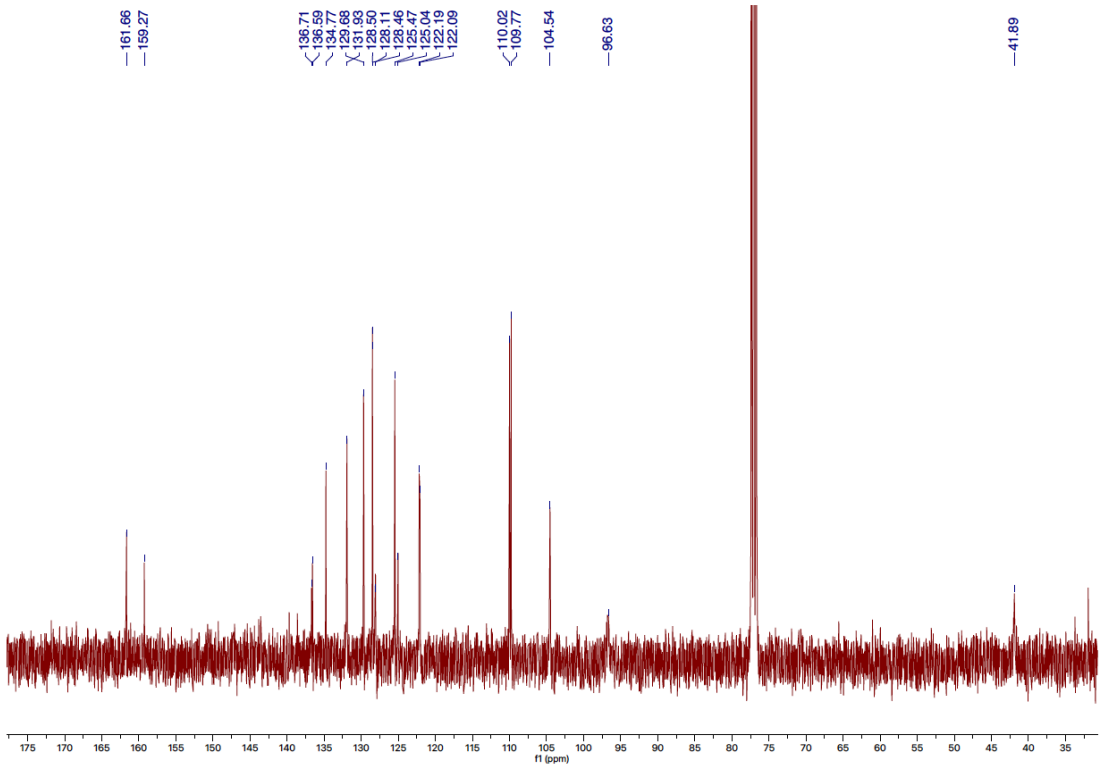
Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	17.120	42.295	20.66
2	18.870	162.401	79.34

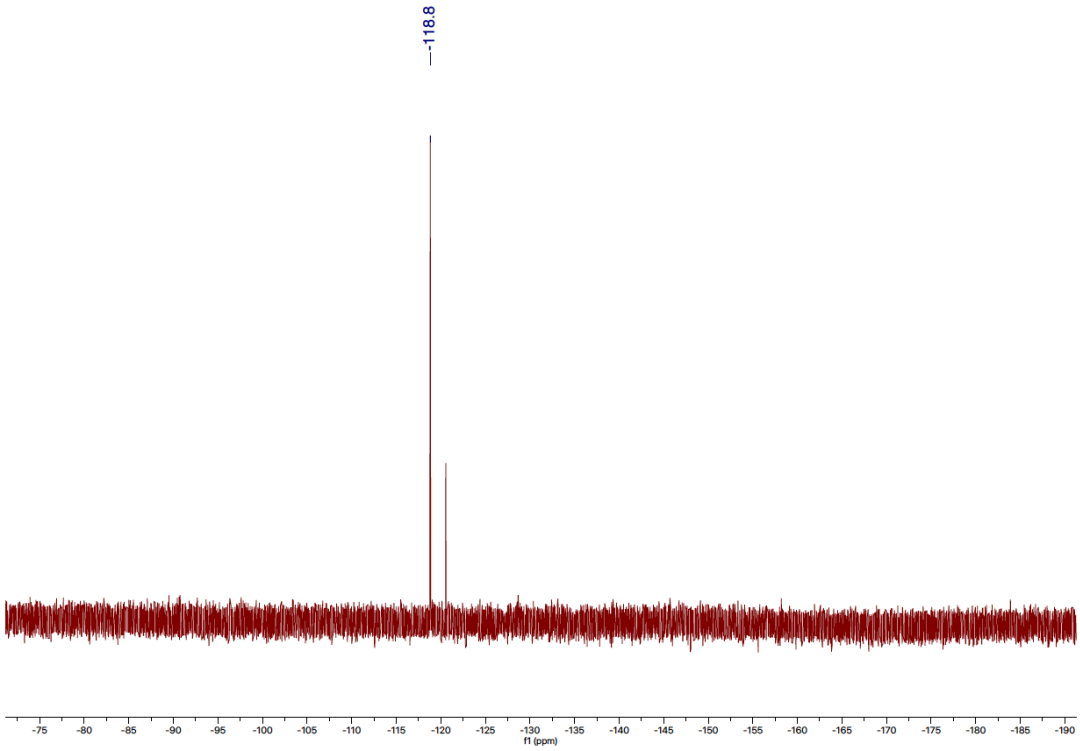
^{1}H-RMN (400 MHz, $CDCl_3$) for 2c:



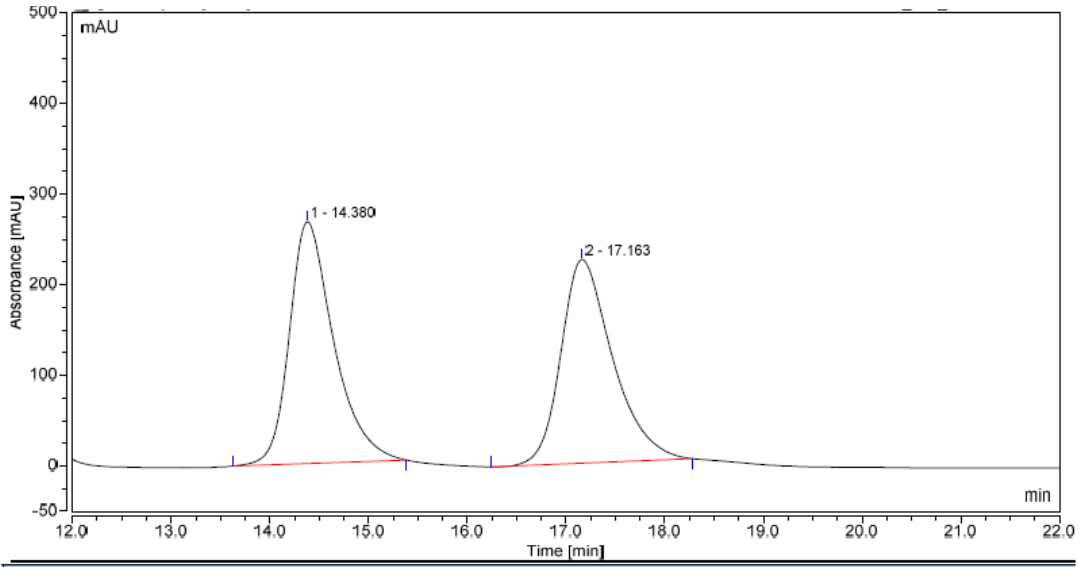
^{13}C-RMN (100 MHz, $CDCl_3$) for 2c:



^{19}F-RMN (377 MHz, $CDCl_3$) for 2c:



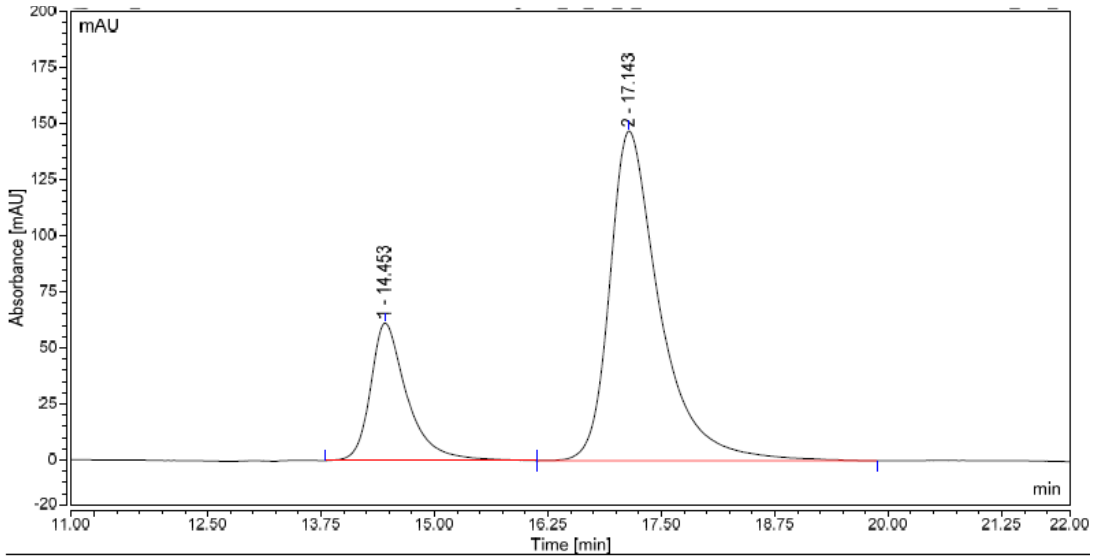
Racemic sample of **2c**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	14.380	138.829	50.43
2	17.163	136.454	49.57

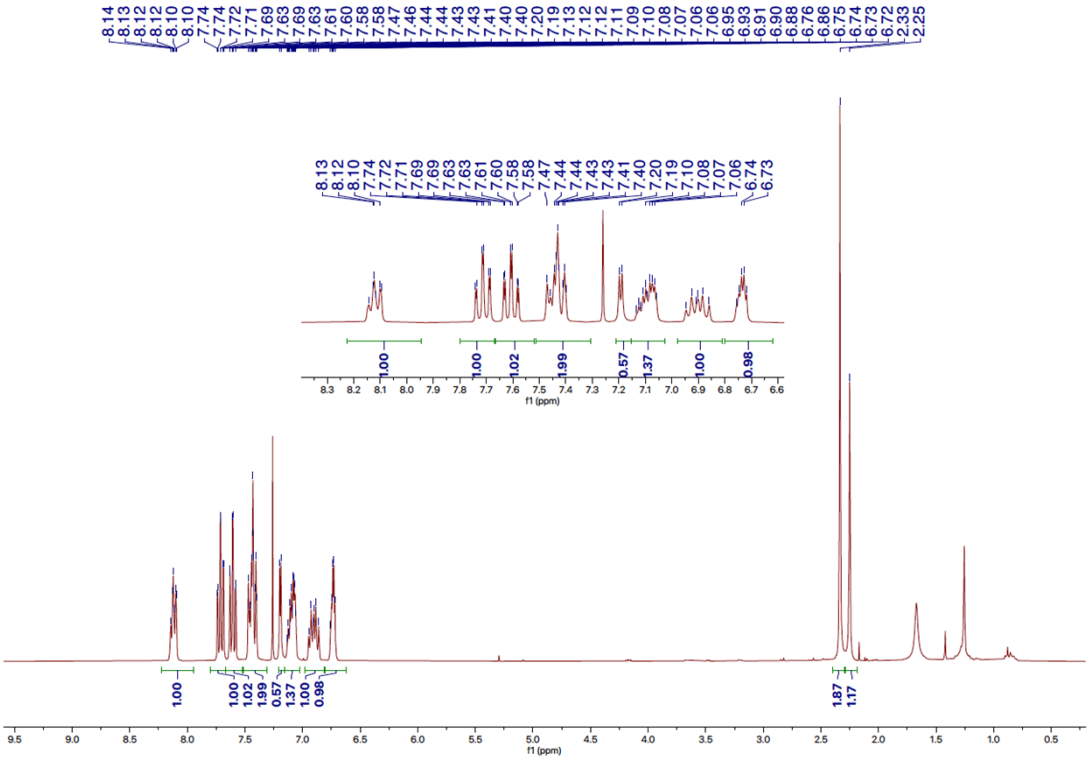
Enantioenriched sample of **2c**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



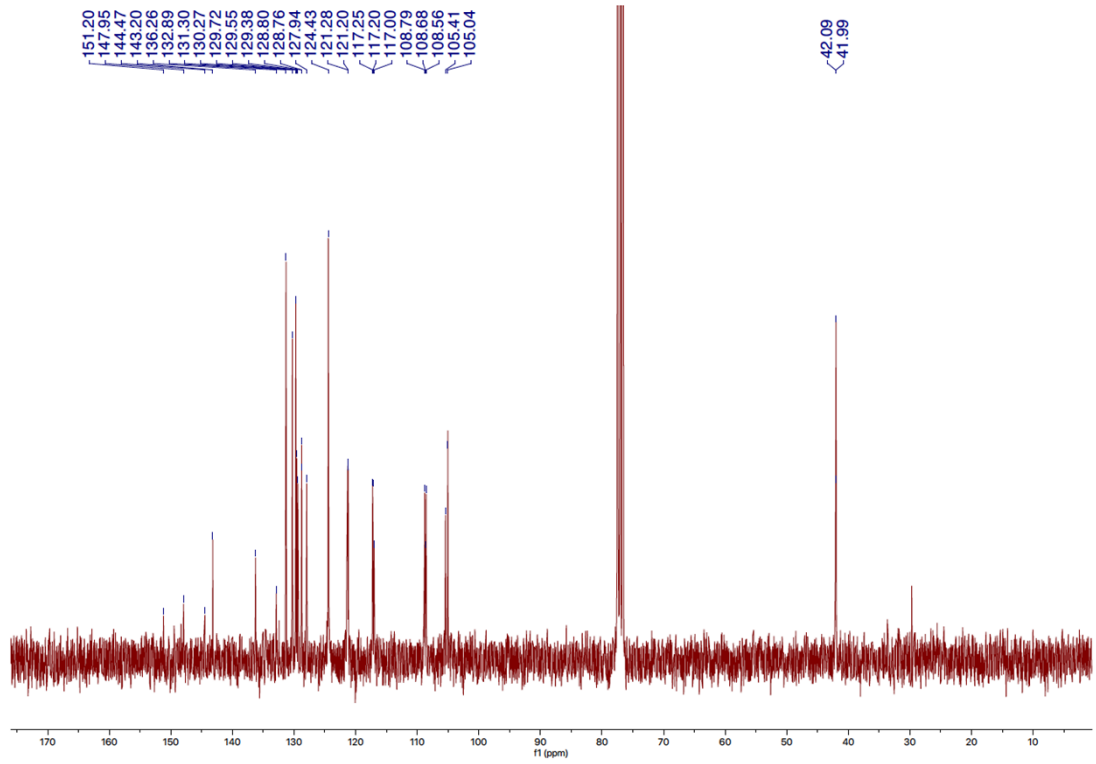
Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	14.453	28.725	23.37
2	17.143	94.177	76.63

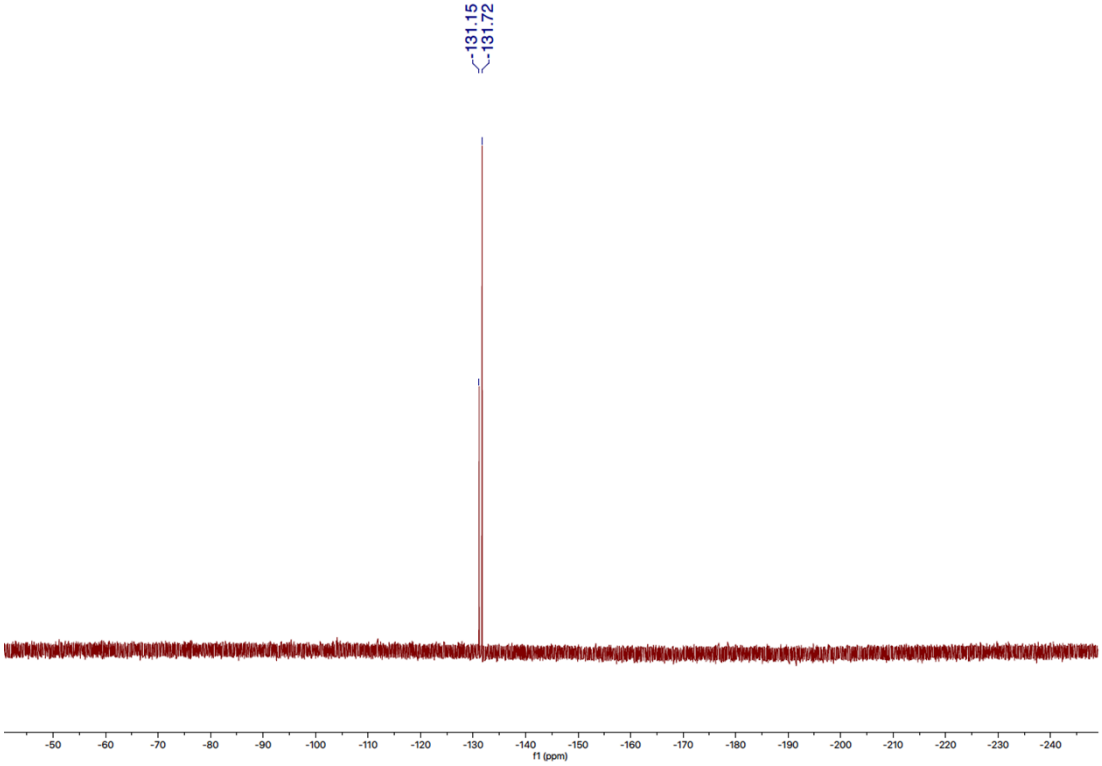
^{1}H-RMN (400 MHz, $CDCl_3$) for 2d:



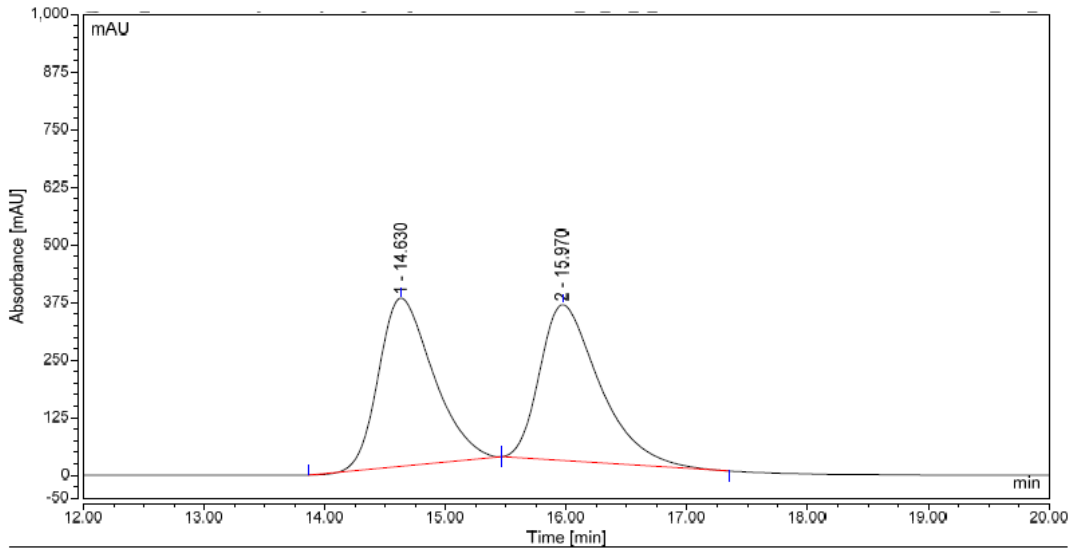
^{13}C-RMN (100 MHz, $CDCl_3$) for 2d:



^{19}F-RMN (377 MHz, $CDCl_3$) for 2d:



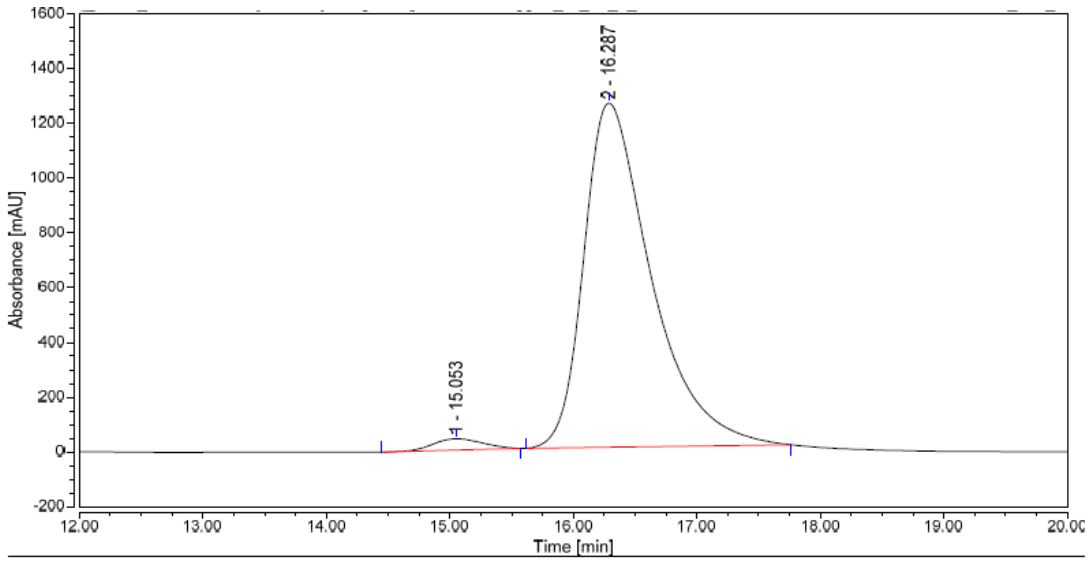
Racemic sample of **2d**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	14.630	190.587	49.51
2	15.970	194.360	50.49

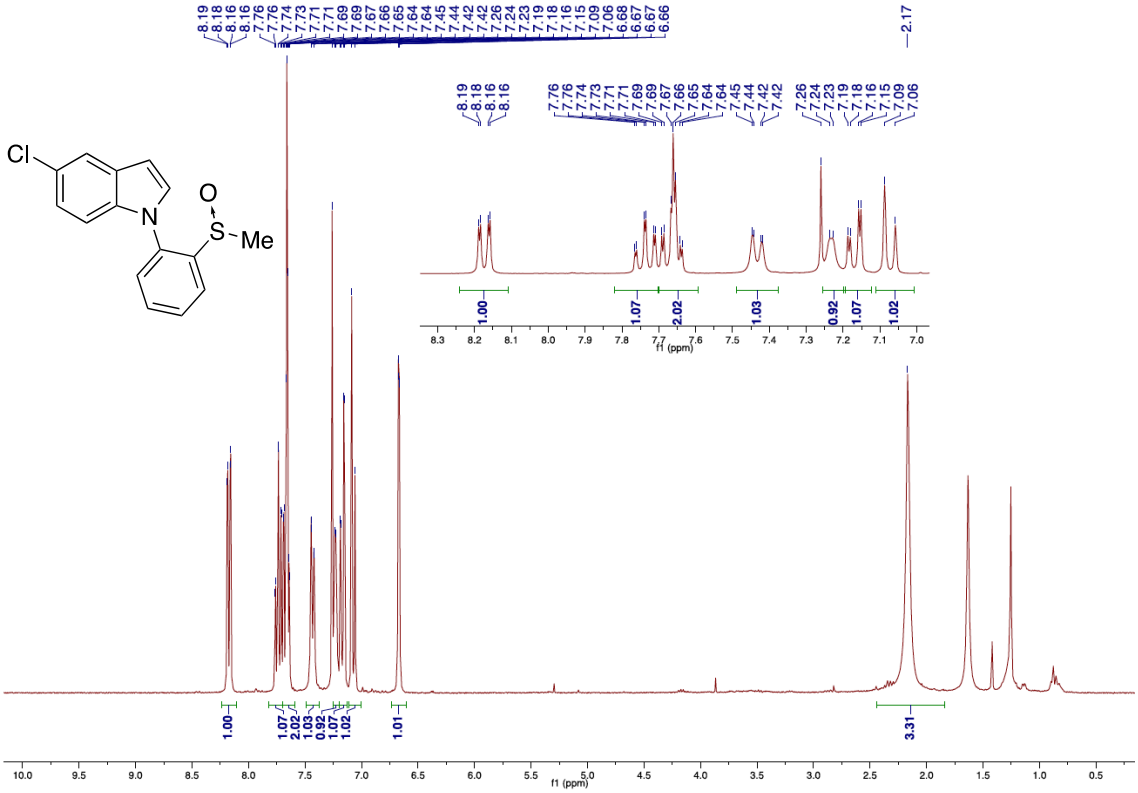
Enantioenriched sample of **2d**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



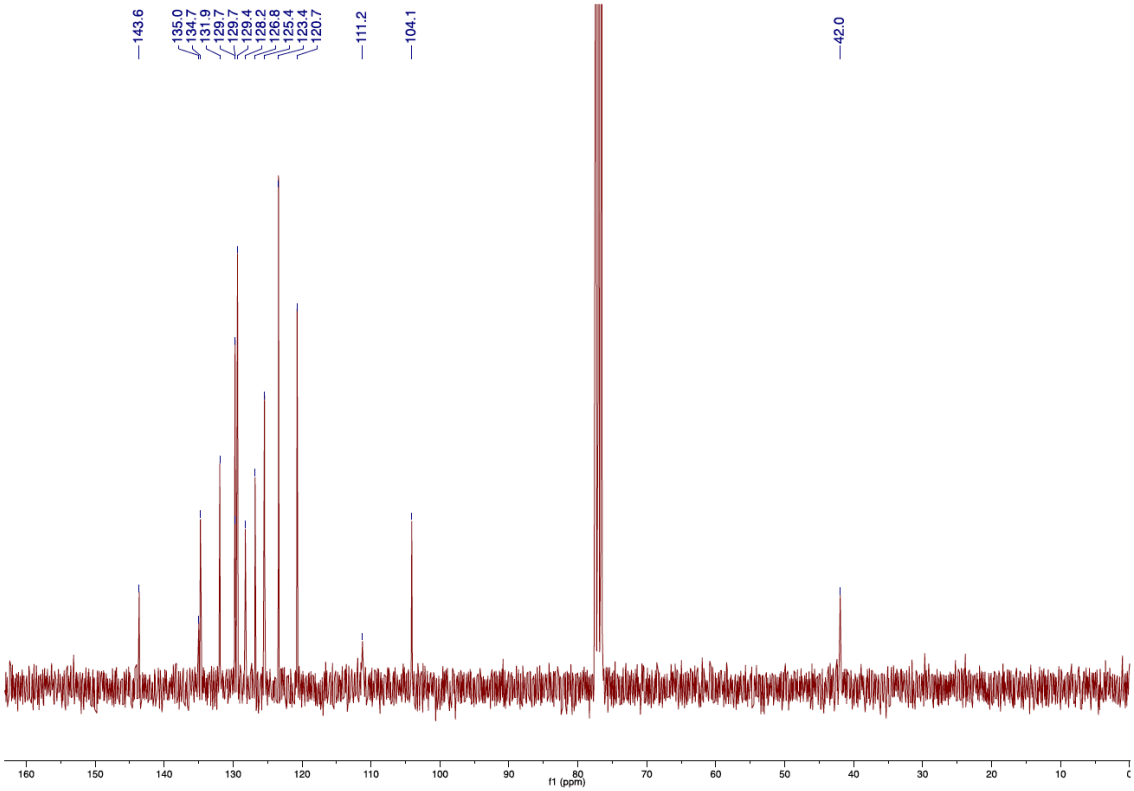
Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	15.053	18.939	2.33
2	16.287	794.294	97.67

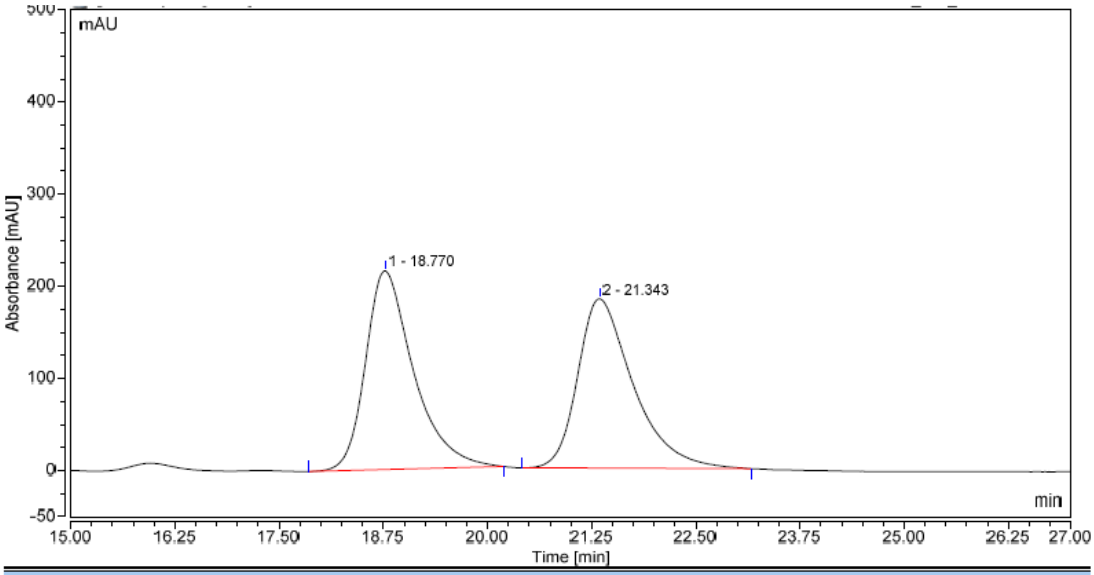
^{1}H-RMN (400 MHz, $CDCl_3$) for 2e:



^{13}C-RMN (100 MHz, $CDCl_3$) for 2e:



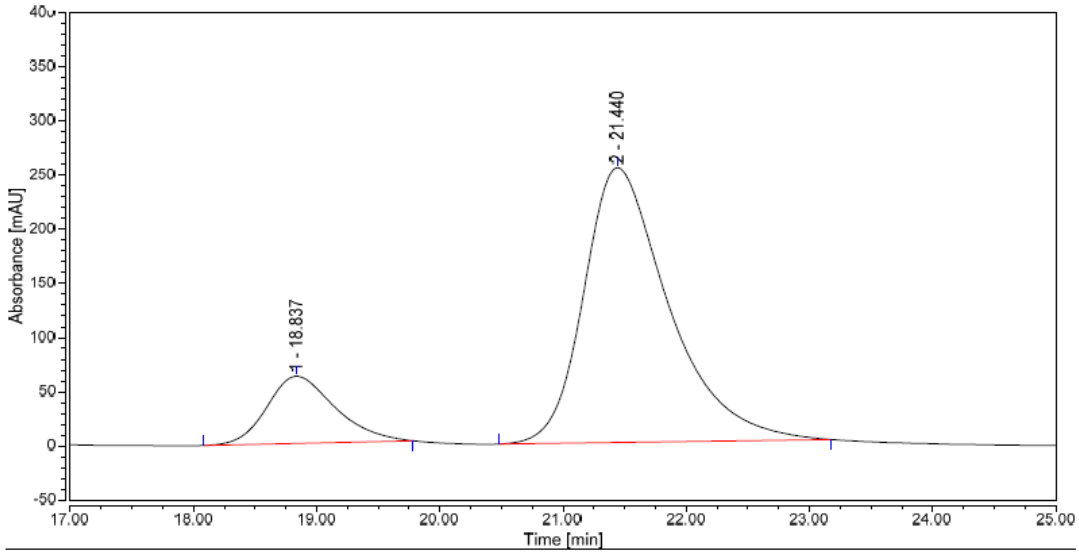
Racemic sample of **2e**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	18.770	144.055	50.45
2	21.343	141.493	49.55

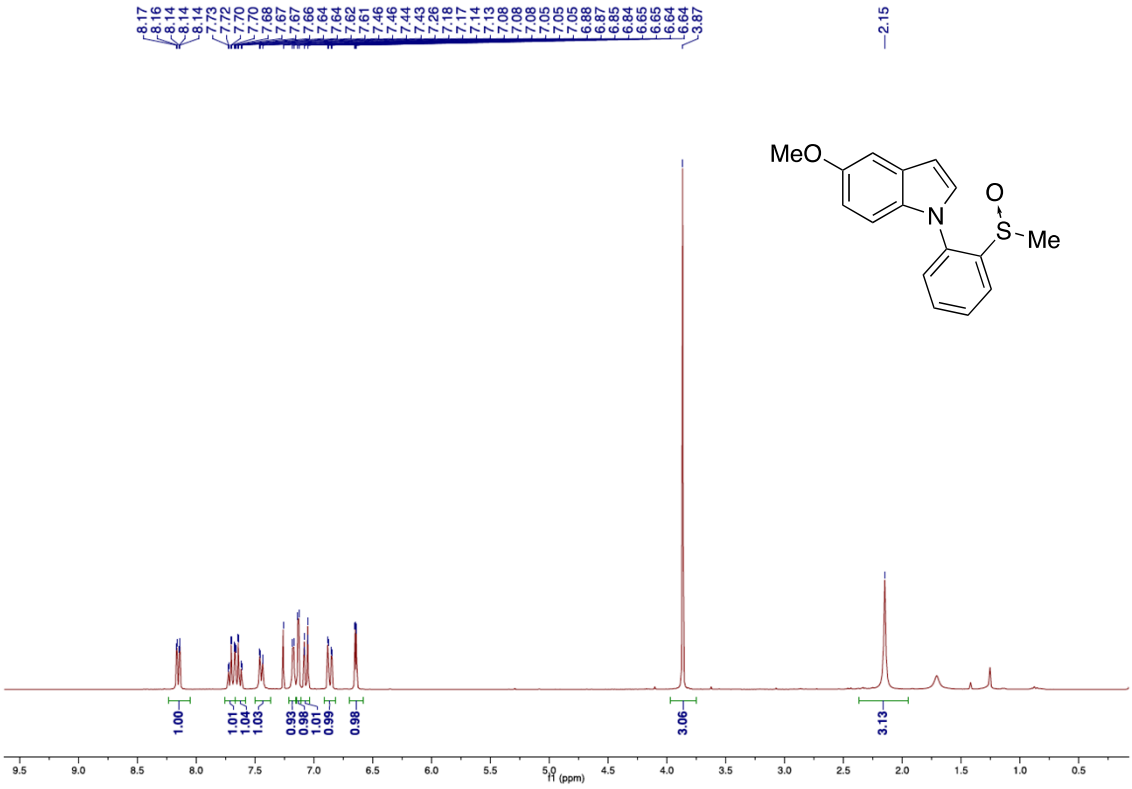
Enantioenriched sample of **2e**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



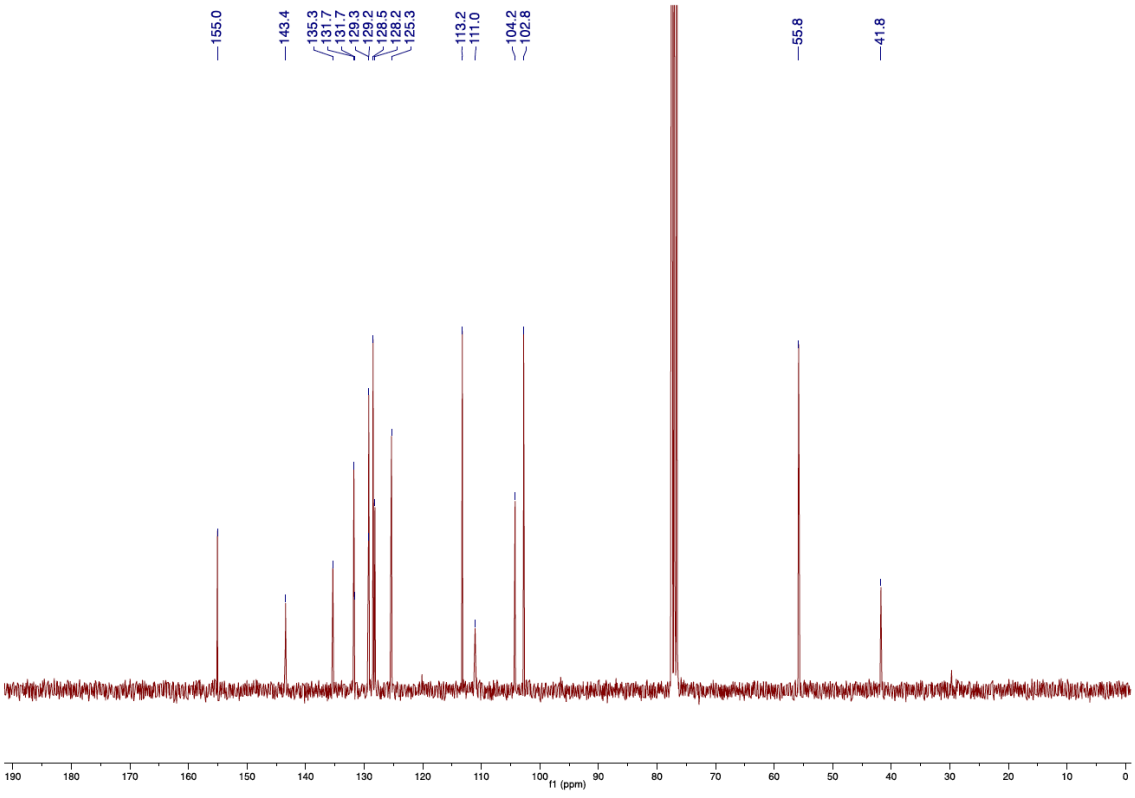
Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	18.837	39.632	16.35
2	21.440	202.739	83.65

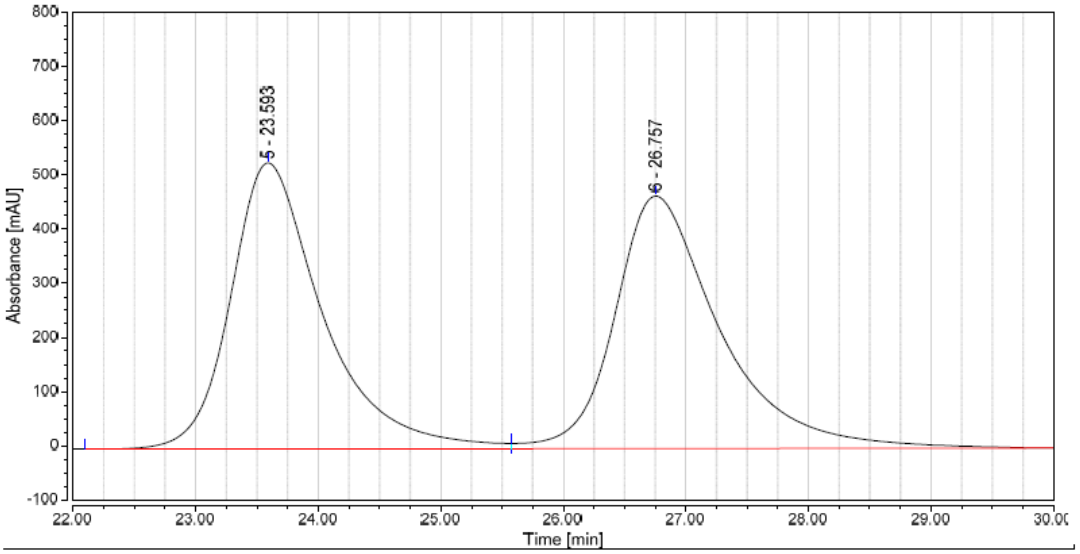
^{1}H-RMN (400 MHz, $CDCl_3$) for 2f:



^{13}C-RMN (100 MHz, $CDCl_3$) for 2f:



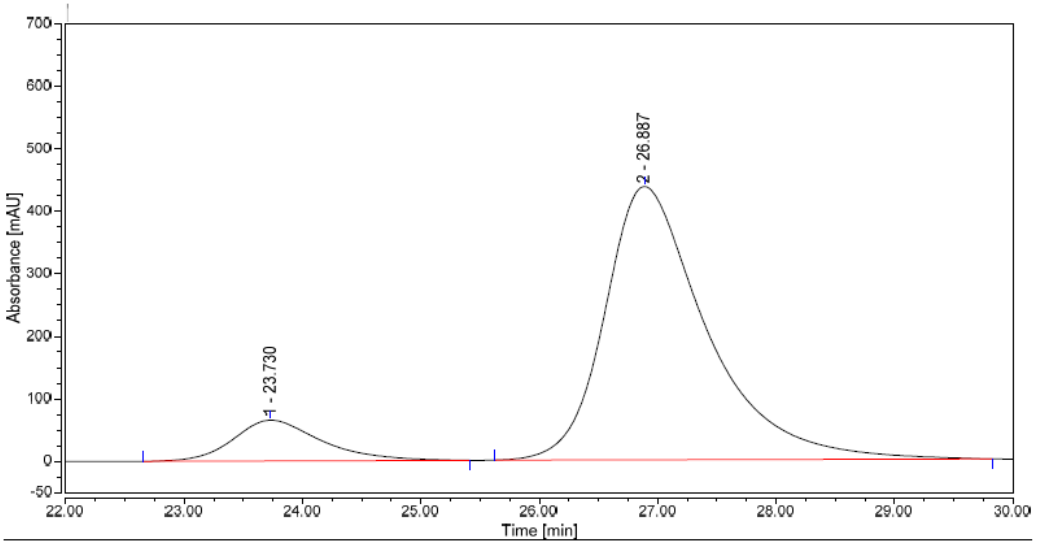
Racemic sample of **2f**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	23.593	460.007	48.74
2	26.757	464.809	49.25

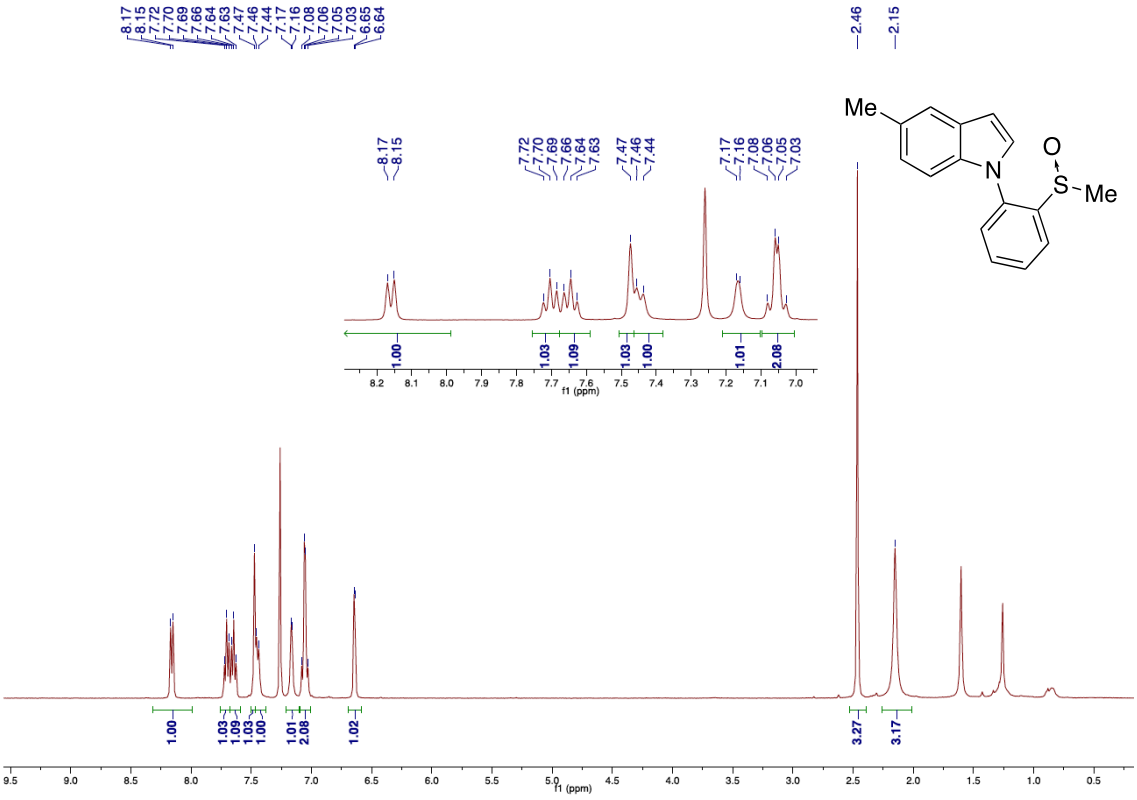
Enantioenriched sample of **2f**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



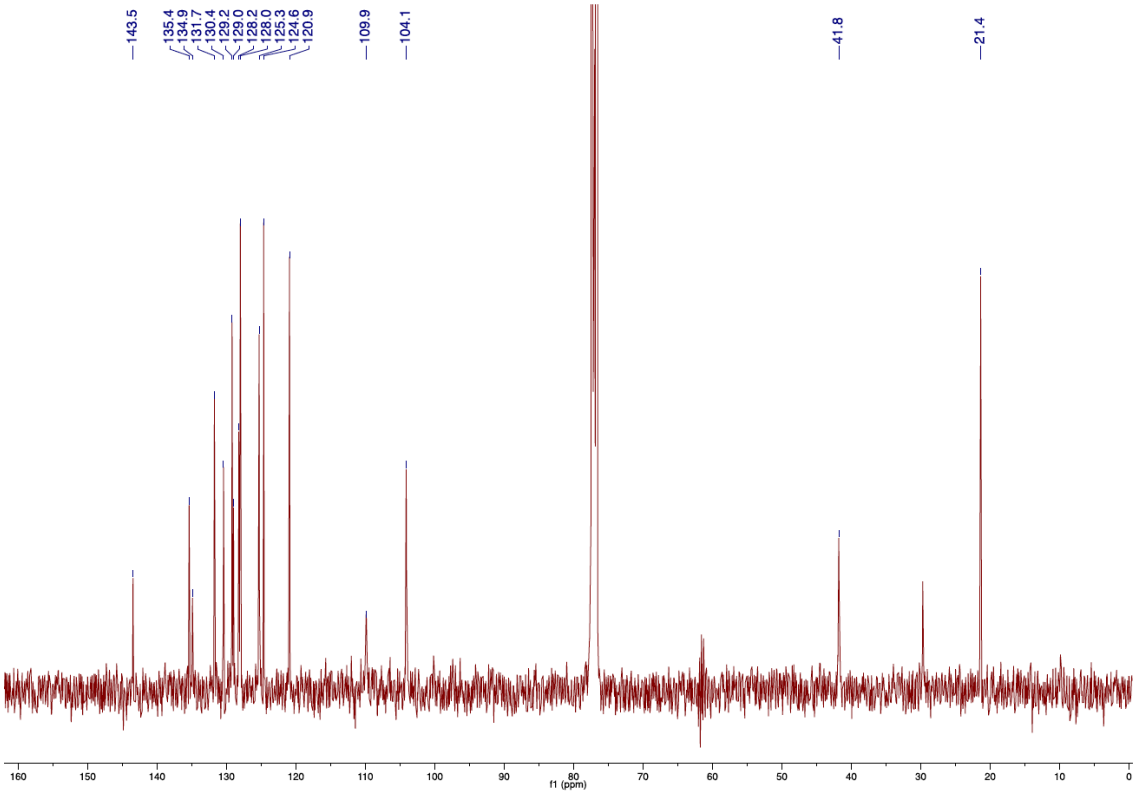
Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	23.730	55.992	11.37
2	26.887	436.601	88.63

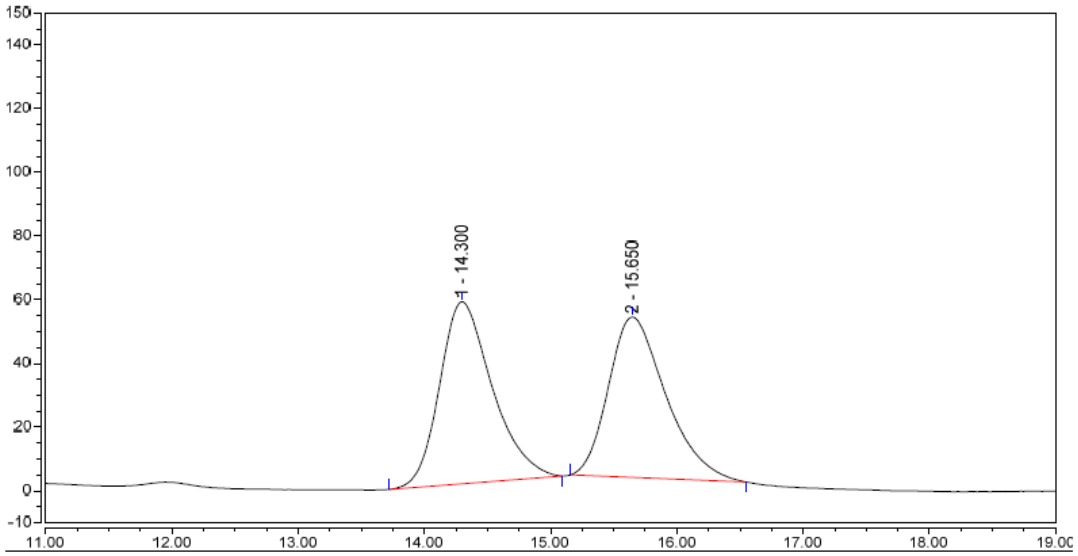
^{1}H-RMN (400 MHz, $CDCl_3$) for 2g:



^{13}C-RMN (100 MHz, $CDCl_3$) for 2g:



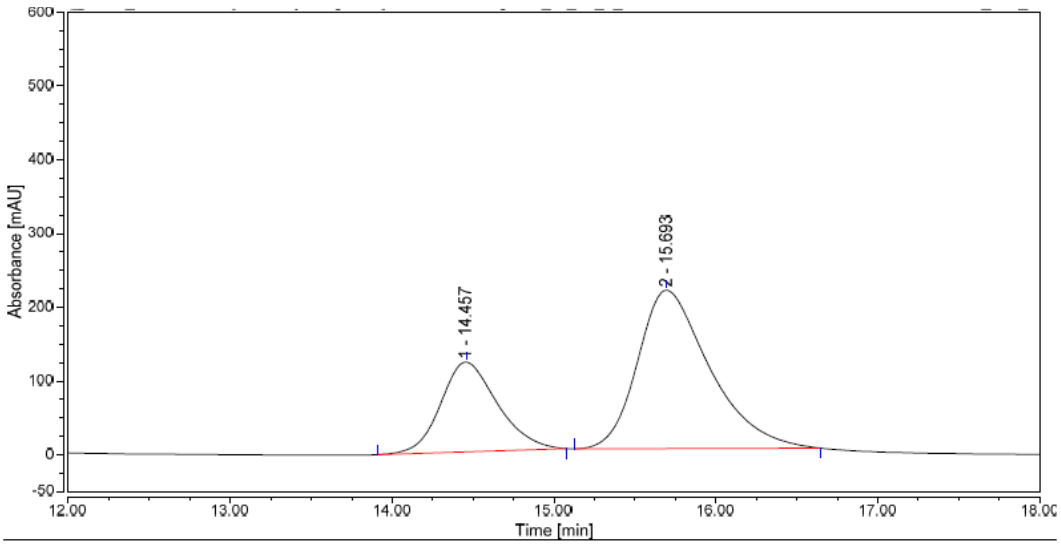
Racemic sample of **2g**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	14.300	27.564	50.96
2	15.650	26.525	49.04

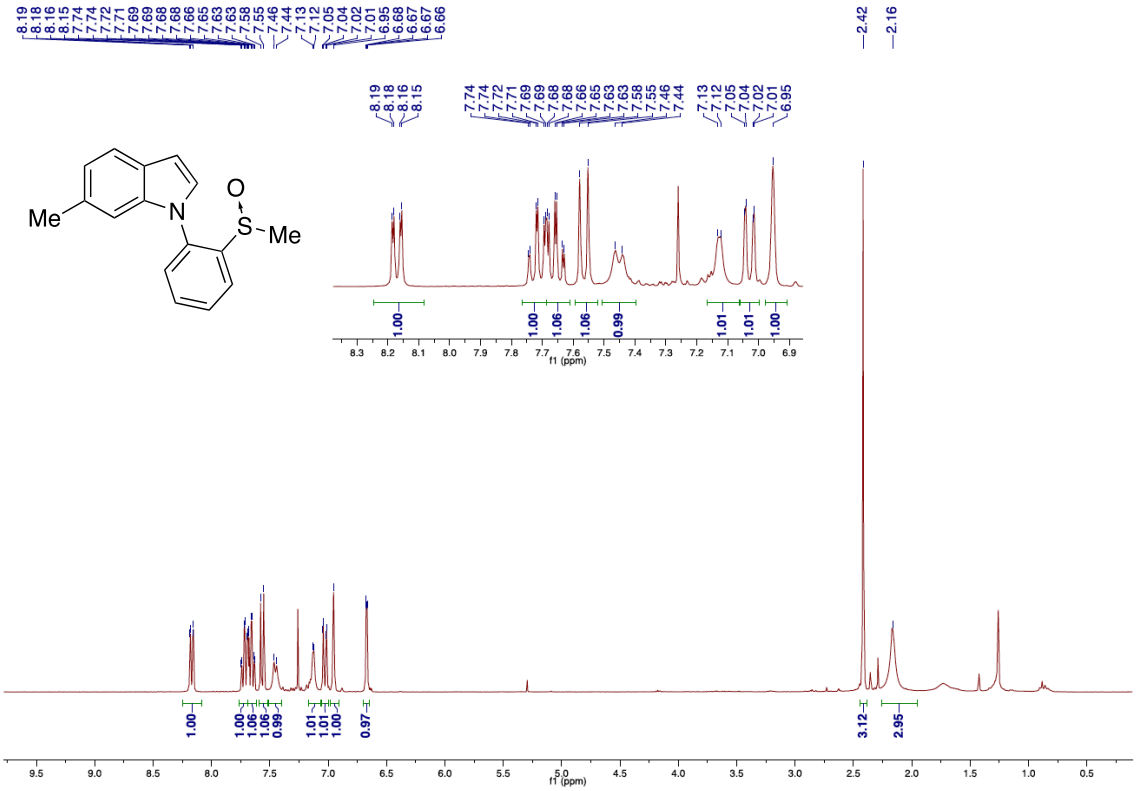
Enantioenriched sample of **2g**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



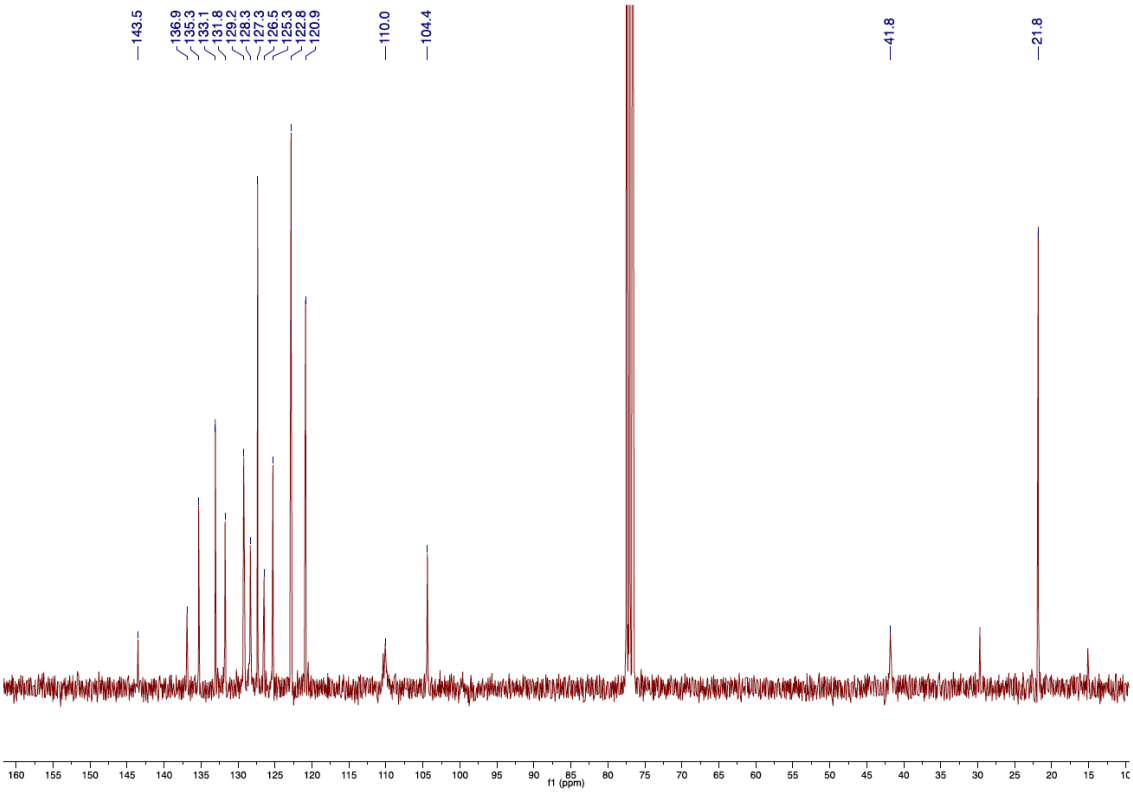
Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	14.457	49.368	30.82
2	15.693	110.799	69.18

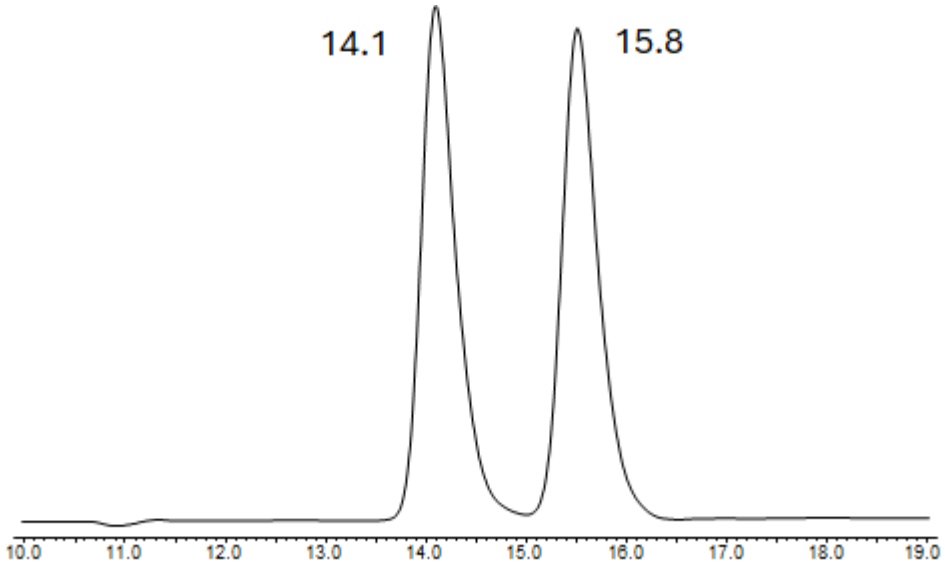
^{1}H-RMN (400 MHz, $CDCl_3$) for 2h:



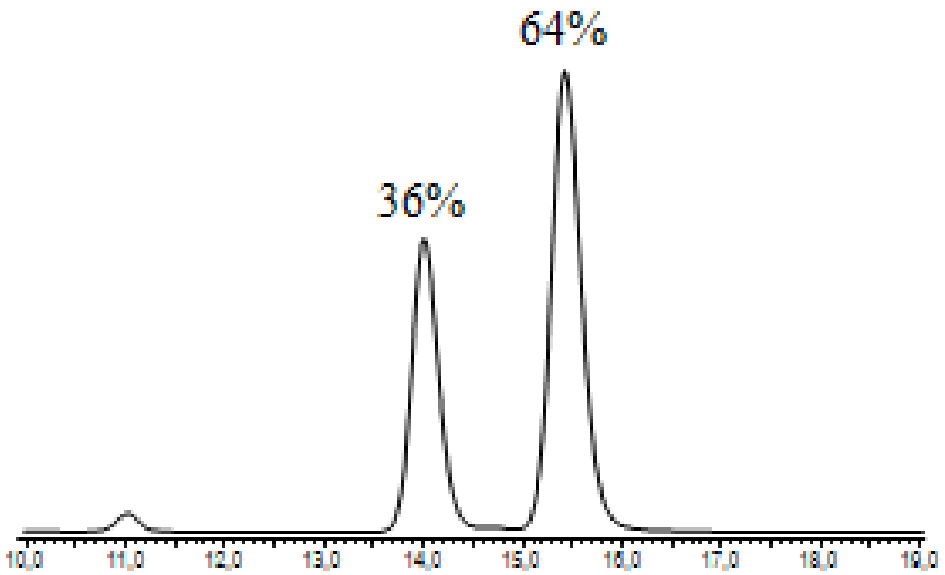
^{13}C-RMN (100 MHz, $CDCl_3$) for 2h:



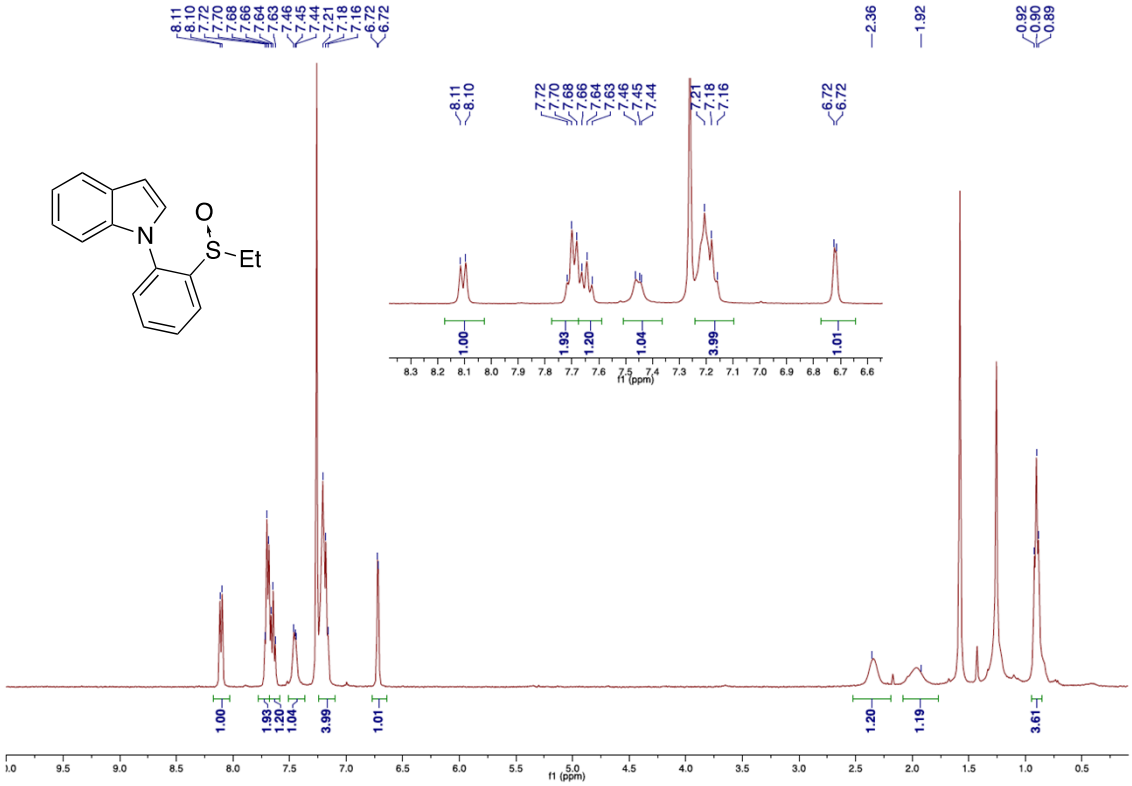
Racemic sample of **2h**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



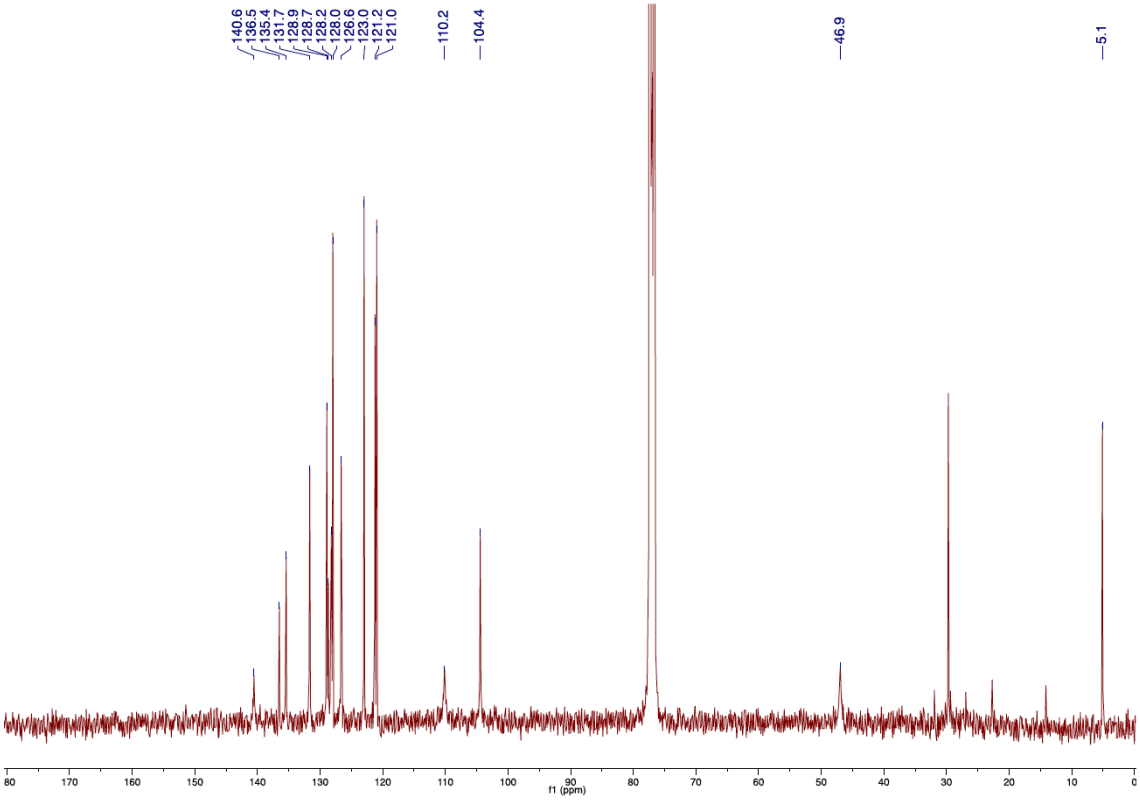
Enantioenriched sample of **2h**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min.



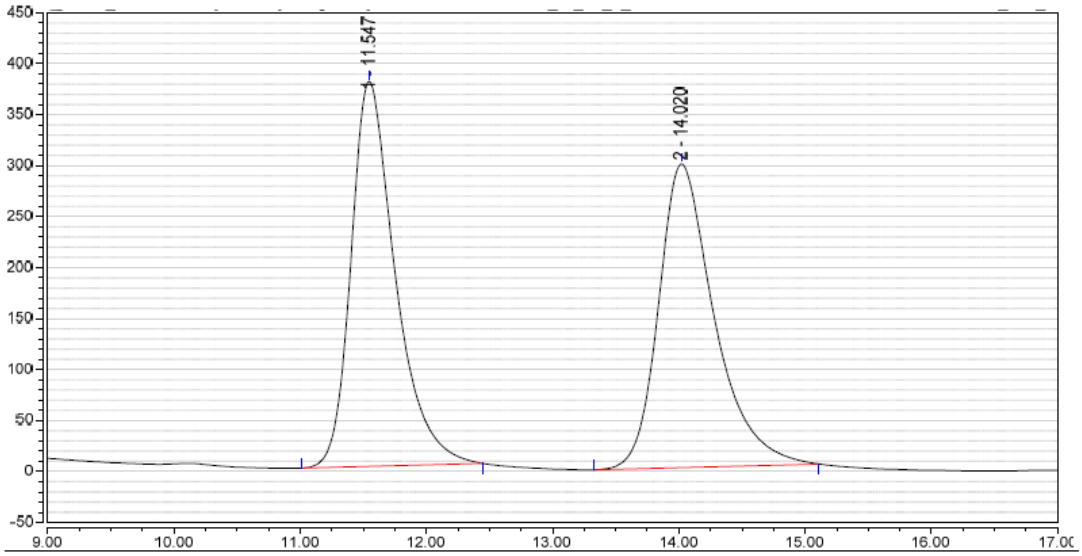
^{1}H-RMN (400 MHz, $CDCl_3$) for 2i:



^{13}C-RMN (100 MHz, $CDCl_3$) for 2i:



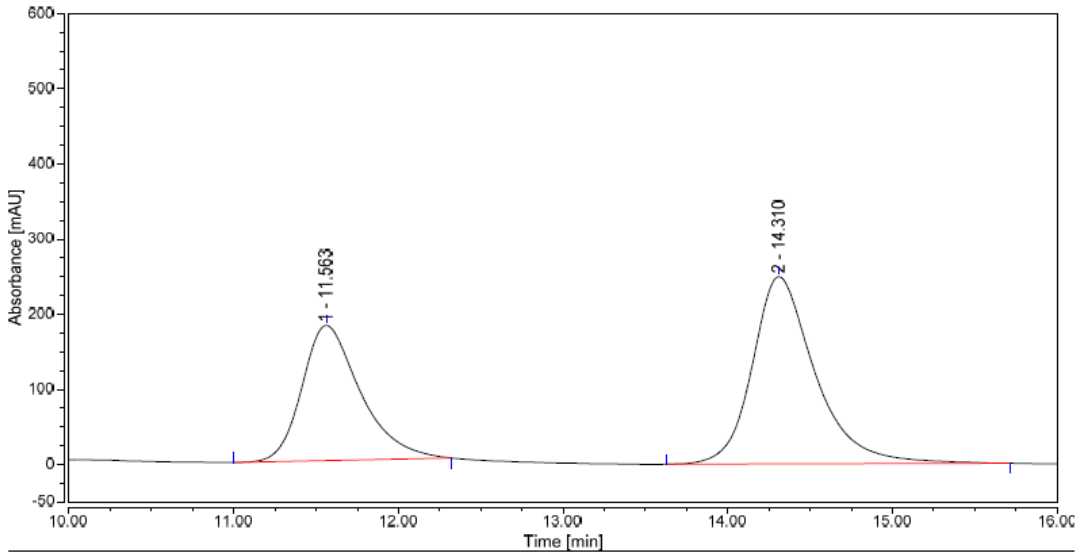
Racemic sample of **2i**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	11.547	153.242	50.23
2	14.020	151.823	49.77

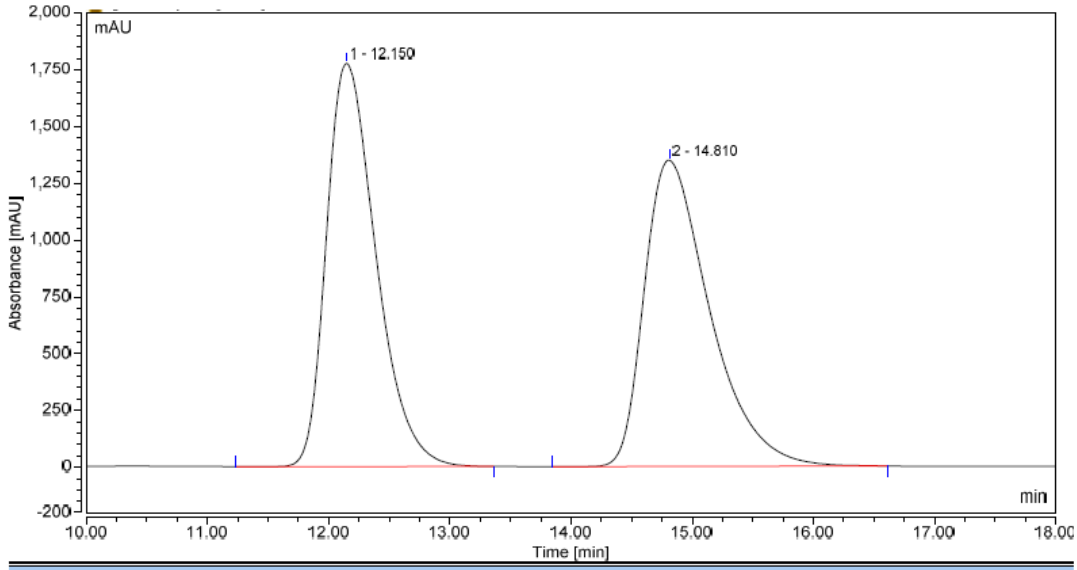
Enantioenriched sample of **2i**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	11.563	73.990	40.09
2	14.310	110.574	59.91

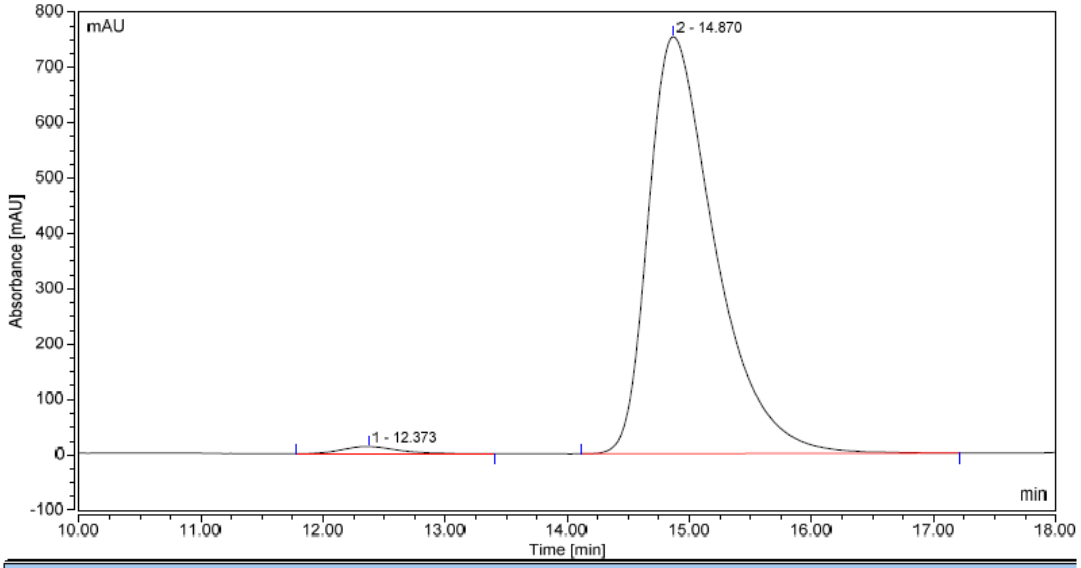
Racemic sample of **2j**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	12.150	841.745	49.89
2	14.810	845.503	50.11

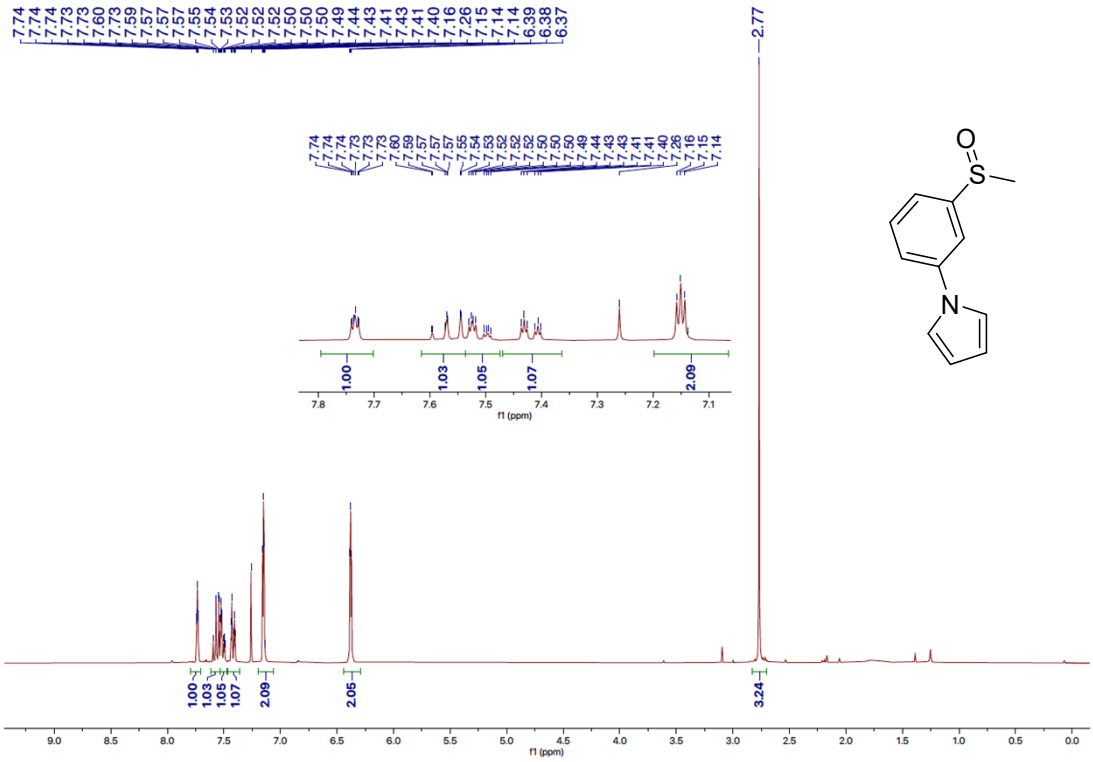
Enantioenriched sample of **2j**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min



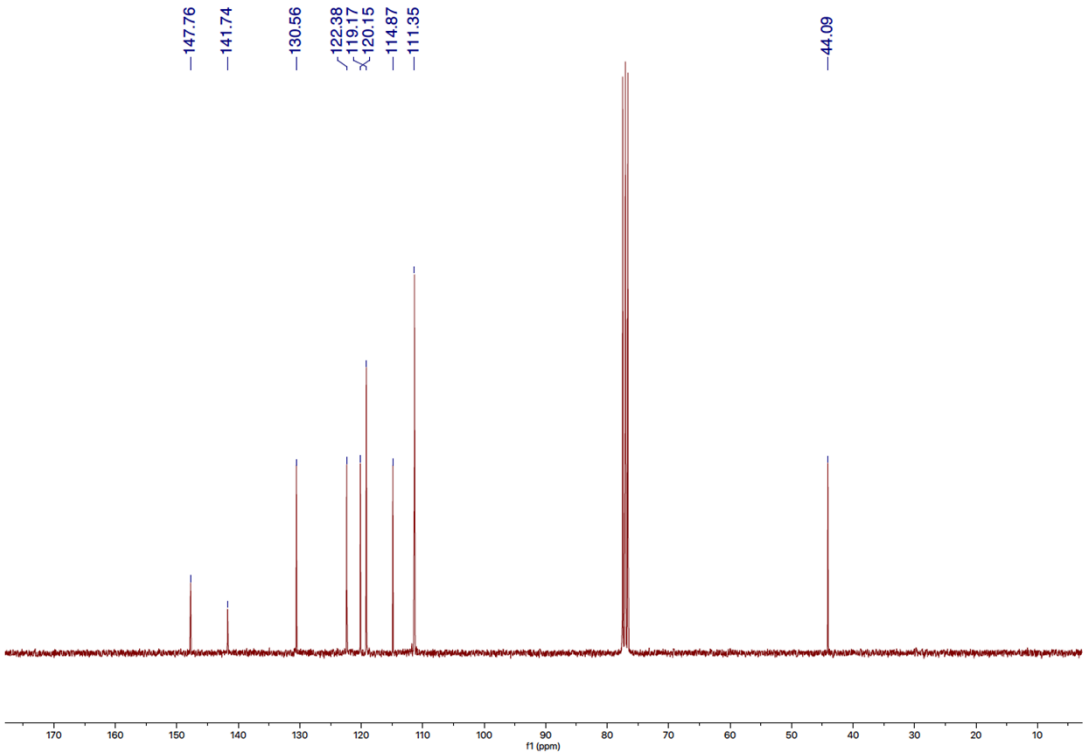
Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	12.373	7.129	1.47
2	14.870	477.389	98.53

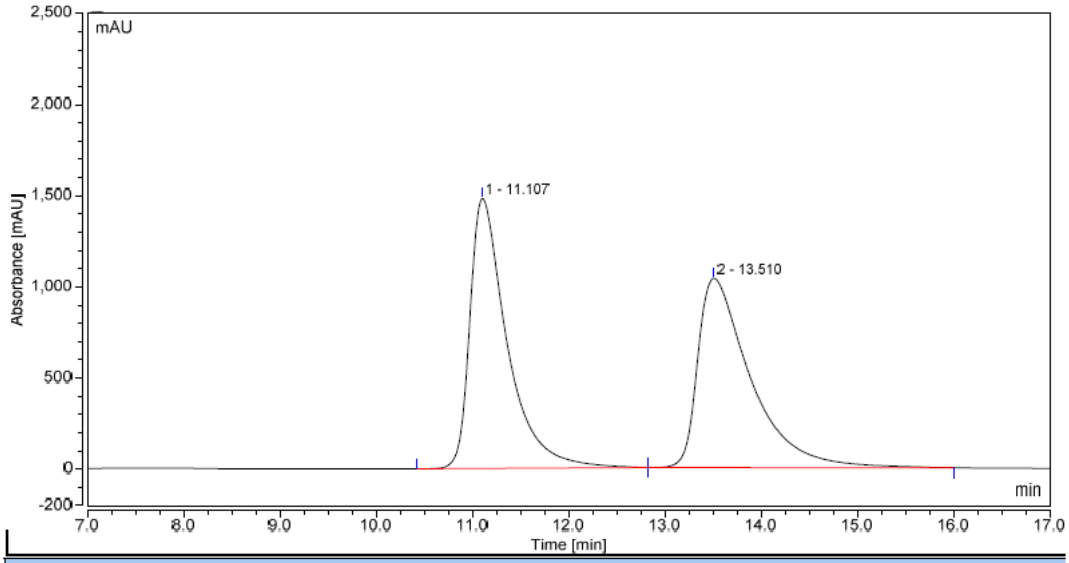
^{1}H-RMN (400 MHz, $CDCl_3$) for 2k:



^{13}C-RMN (100 MHz, $CDCl_3$) for 2k:



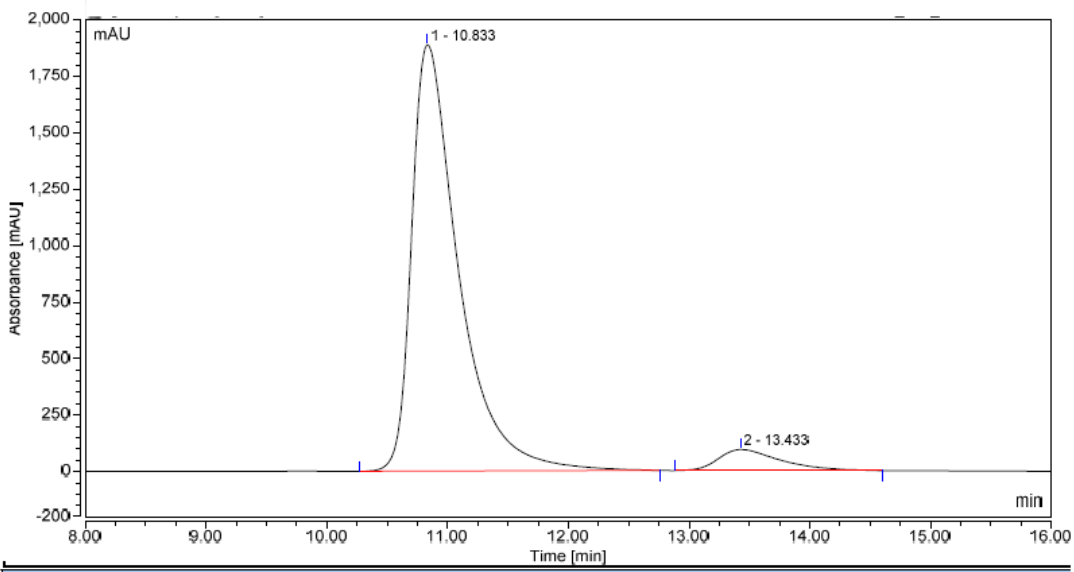
Racemic sample of **2k**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	11.107	662.198	50.08
2	13.510	660.091	49.92

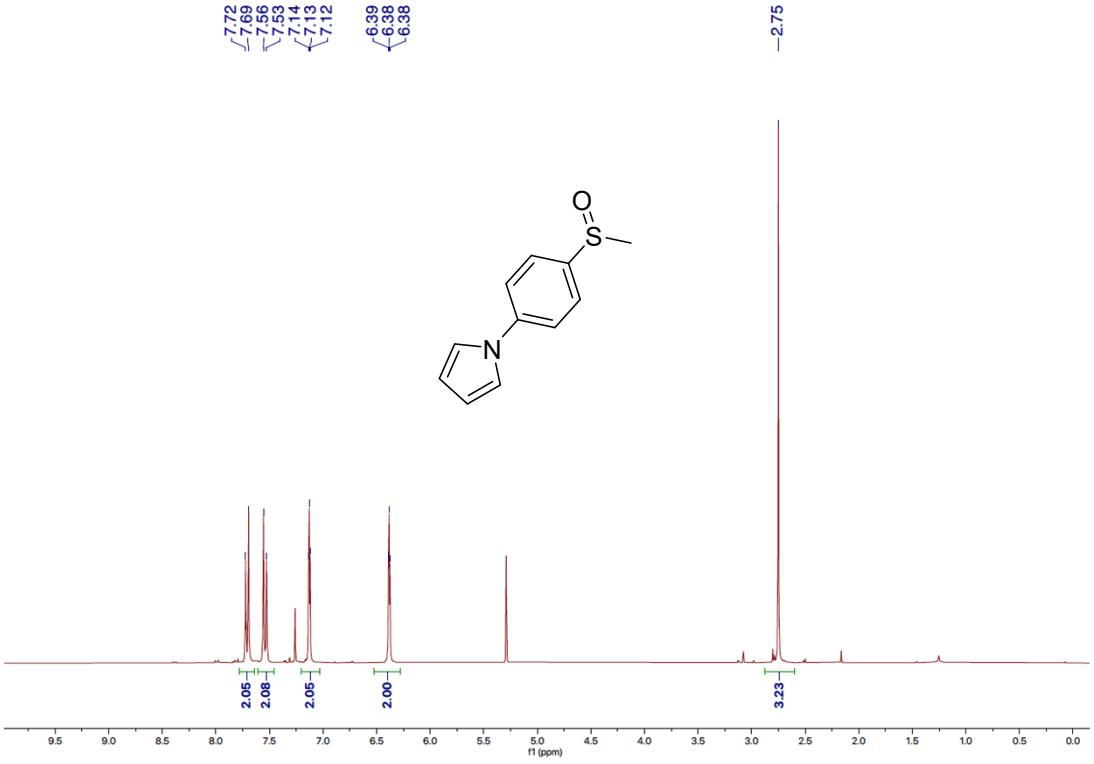
Enantioenriched sample of **2k**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min



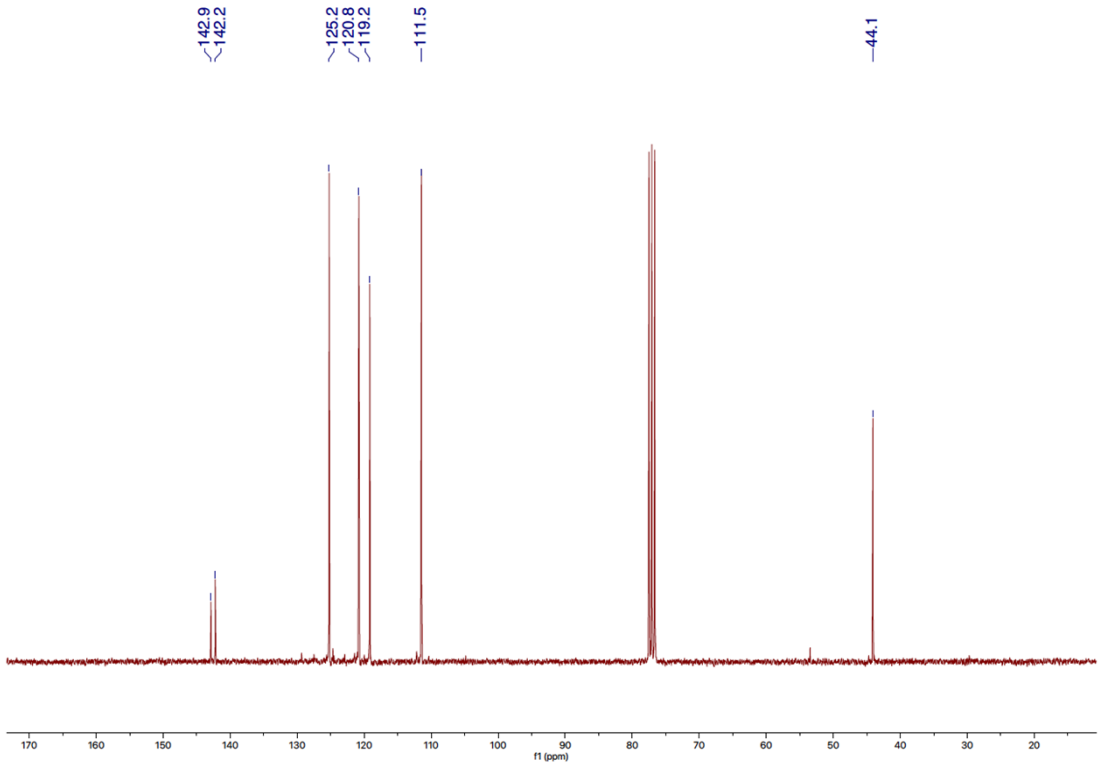
Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	10.833	851.324	93.99
2	13.433	54.409	6.01

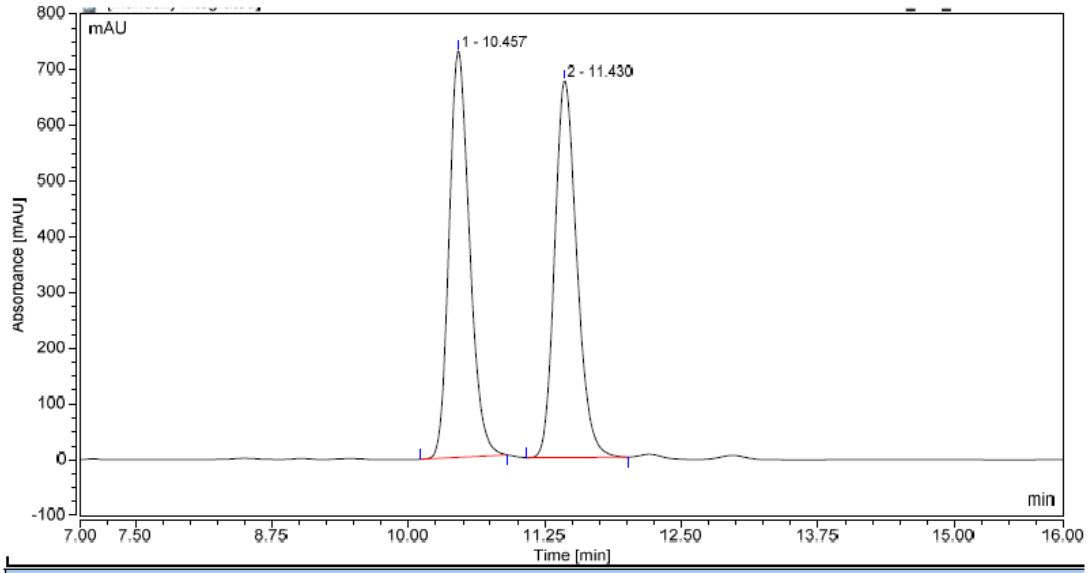
^{1}H-RMN (400 MHz, $CDCl_3$) for 2l:



^{13}C-RMN (100 MHz, $CDCl_3$) for 2l:



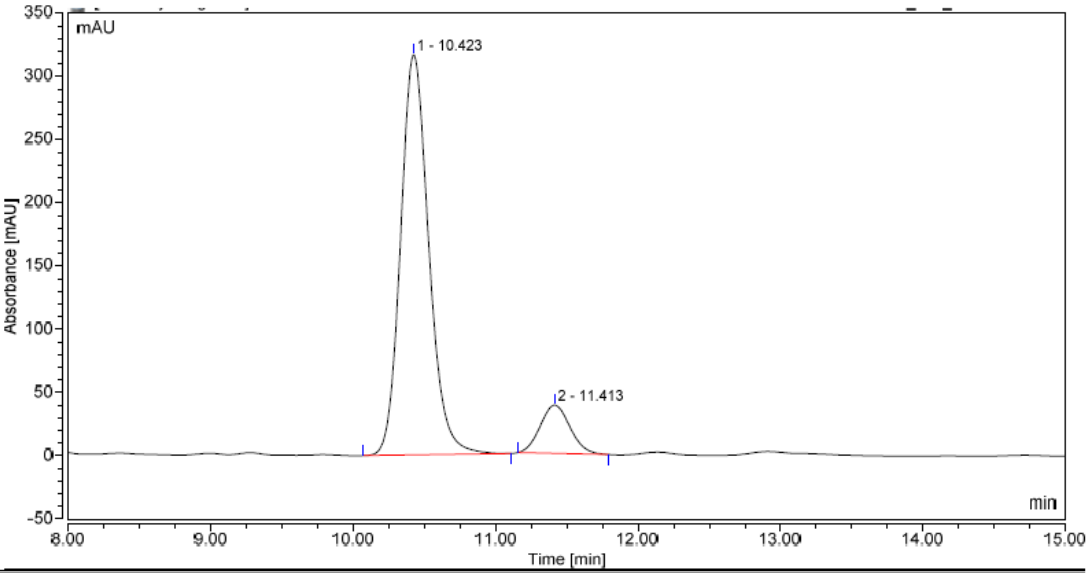
Racemic sample of **2l**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	10.457	158.112	49.85
2	11.430	159.082	50.15

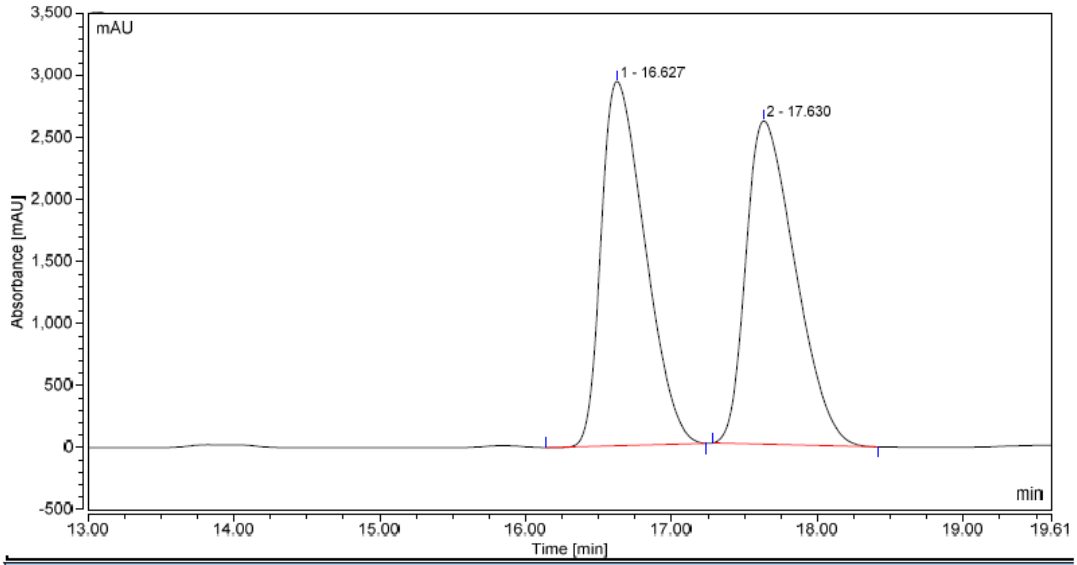
Enantioenriched sample of **2l**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	10.423	72.421	88.66
2	11.413	9.266	11.34

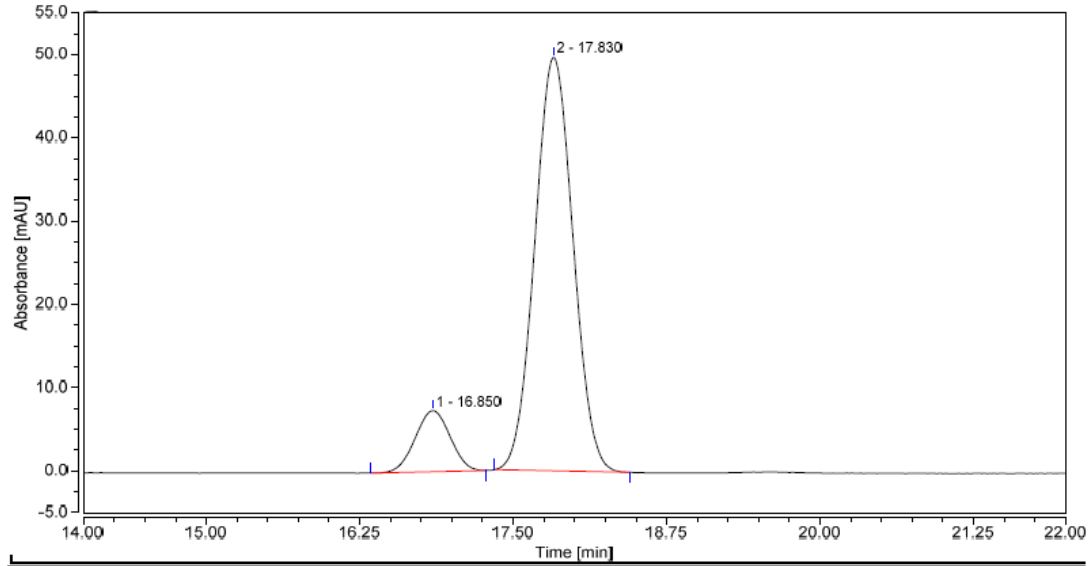
Racemic sample of **2m**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	16.627	1018.393	49.89
2	17.630	1022.940	50.11

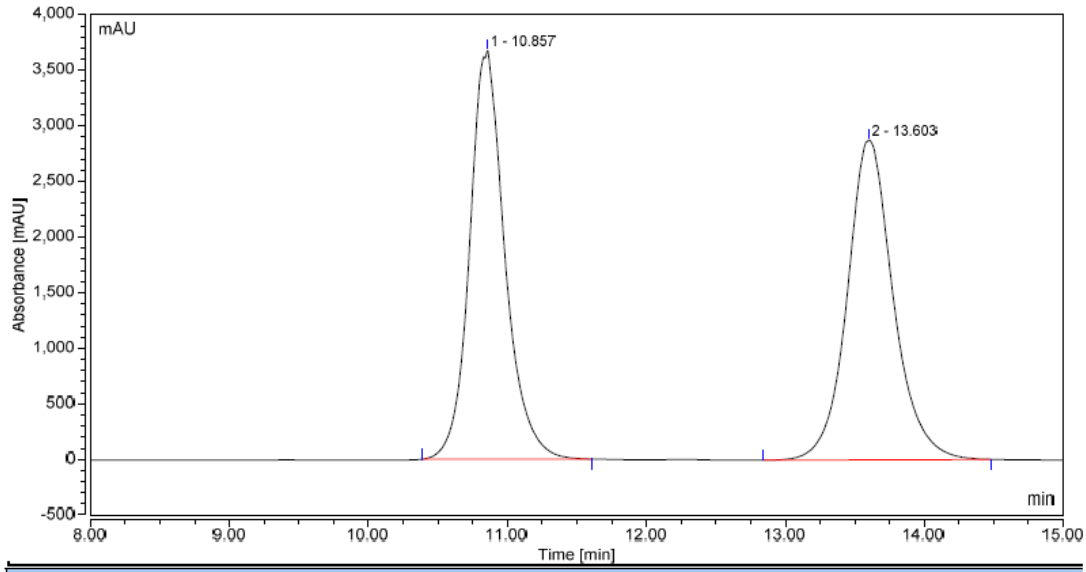
Enantioenriched sample of **2m**: IA column, *n*-Hex/*i*-PrOH 95:5, T = 30 °C, F = 1 mL/min



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	16.850	2.418	11.88
2	17.830	17.937	88.12

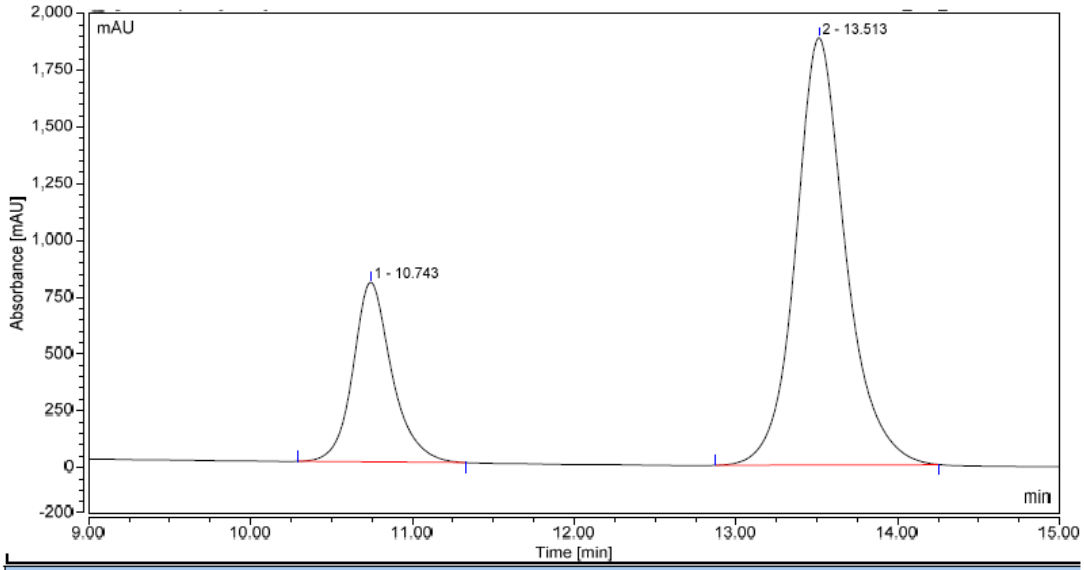
Racemic sample of **2n**: IA column, *n*-Hex/*i*-PrOH 93:7, T = 30 °C, F = 1 mL/min



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	10.857	1081.576	49.45
2	13.603	1105.688	50.55

Enantioenriched sample of **2n**: IA column, *n*-Hex/*i*-PrOH 93:7, T = 30 °C, F = 1.0 mL/min



Integration Results

No.	Retention Time min	Area mAU*min	Relative Area %
1	10.743	220.528	24.62
2	13.513	675.354	75.38