Supplementary Information (SI) for Green Chemistry.

Supporting Information

Development of Heterogeneous P-N-N Tridentate Ligand for Iridium-Catalyzed Asymmetric Hydrogenation of Ketones in Batch and Flow

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1. General

Commercial reagents were used without further purification. Melting points were recorded with a micro melting point apparatus and uncorrected. The morphology of samples was observed through a field emission scanning electron microscope (FE-SEM, HITACHI Regulus 8100) at an acceleration voltage of 10 kV. The related elemental distribution was analyzed with energy-dispersive X-ray spectroscopy (EDS, Oxford Utim Max 65). Transmission electron microscope (TEM) images were performed using a Tecnai G2 F30 S-Twin and Energy spectrum model: Xplore 80. Nitrogen sorption isotherms at the temperature of liquid nitrogen were performed on a micropolitics system, and the samples were degassed for 10 h at 393 K before the measurements. The specific surface areas were calculated from the adsorption data using Brunauer-Emmett-Teller (BET) methods. The total pore volume at P/Po = 0.995. The pore size distribution curves were obtained from the desorption branches using the nonlocal density functional theory (NLDFT) method. The ^{1}H NMR spectra were recorded at 600 MHz or 400 MHz. The ^{13}C NMR spectra were recorded at 150 MHz or 100 MHz. The coupling constants J were given in Hz. HRMS spectra were recorded on an Agilent 1200HPLC-6210TOFMS using ESI as ion source. The conversion of starting materials was monitored by thin layer chromatography (TLC) using silica gel plates (silica gel 60 F254 0.25 mm), and components were visualized by observation under UV light (254 and 365 nm). Optical rotations were determined using an AUTOPOL V polarimeter. HPLC analyses were performed on Agilent 1100 and Waters e2695 equipped with IA-H, IC-H, ID-H, OD-H, OJ-H and AD-H.

2. Preparation of Polymer-supported Catalysts

2.1. Synthetic route for the preparation of Ligand precursor D

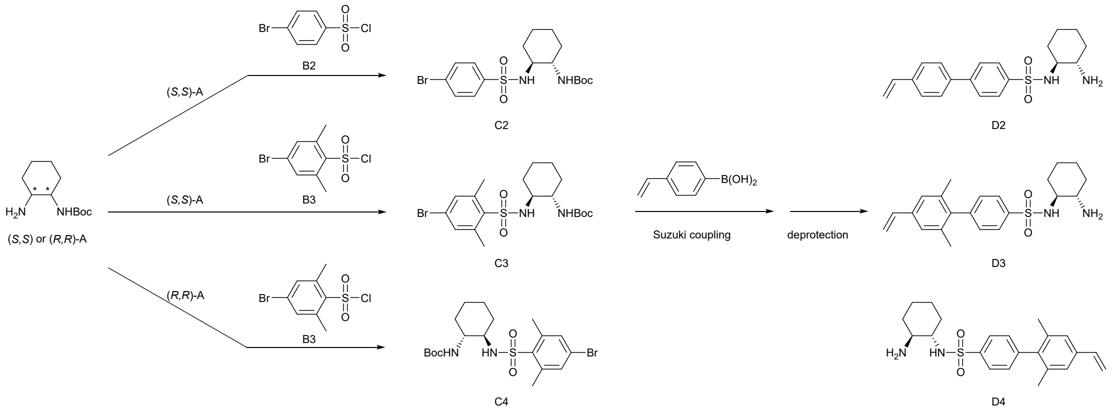
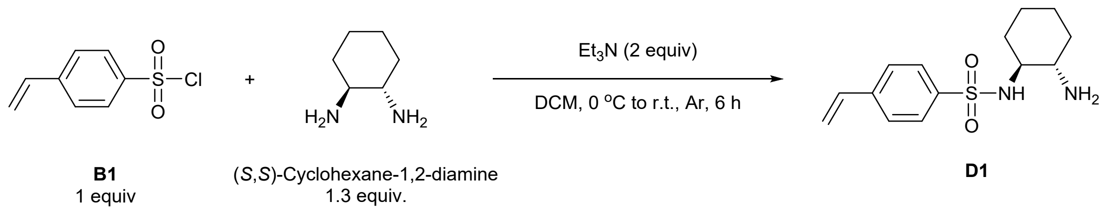


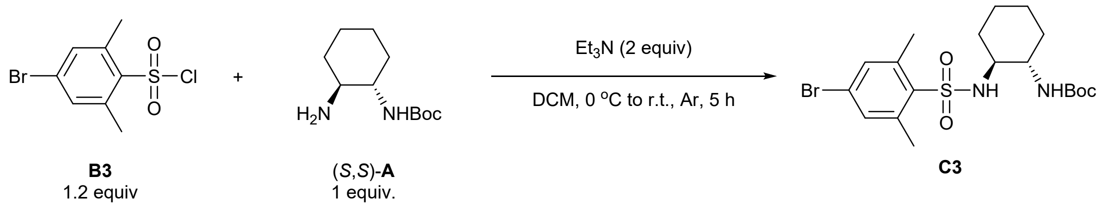
Figure S1 Synthetic route for the preparation of ligand precursor

2.2. General procedure for the preparation of D1



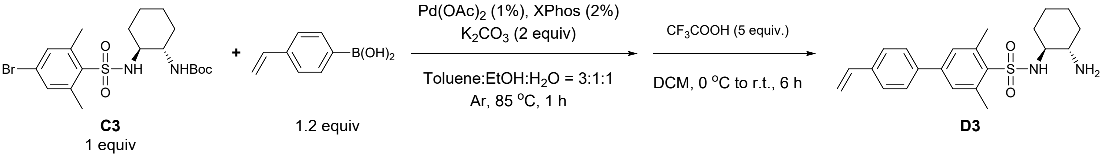
To a solution of (*S*, *S*)- Cyclohexane-1,2-diamine (1.7 g, 15 mmol) and Et_3N (2.8 mL, 20 mmol) in DCM (15 mL) was added **B1** (2.0 g, 10 mmol) in DCM (10 mL) dropwise at 0 °C. The mixture was then allowed to warm to room temperature and stirred for 6 h. After reaction, the mixture was washed with H_2O and brine, then the organic layer was dried over Na_2SO_4 and concentrated to get the crude product, which can be purified via a short column over silica gel to give the product **D1** as white solid (1.74 g, 62% yield).

2.3. General procedure for the preparation of C2-C4



To a solution of (*S*, *S*)-**A** (2.14 g, 10 mmol) and Et_3N (2.8 mL, 20 mmol) in DCM (10 mL) was added **B3** (3.4 g, 12 mmol, 0.8 M in DCM) dropwise at 0 °C. The mixture was then allowed to warm to room temperature and stirred for 5 h. After reaction, the mixture was washed with H_2O and brine, then the organic layer was dried over Na_2SO_4 and concentrated. The obtained solid was suspended in PE, stirred, and then filtered to give the product **C3** as white solid (4.28 g, 93% yield). **C2** and **C4** were synthesized from different acyl chlorides and enantiomeric diamines with similar yield respectively.

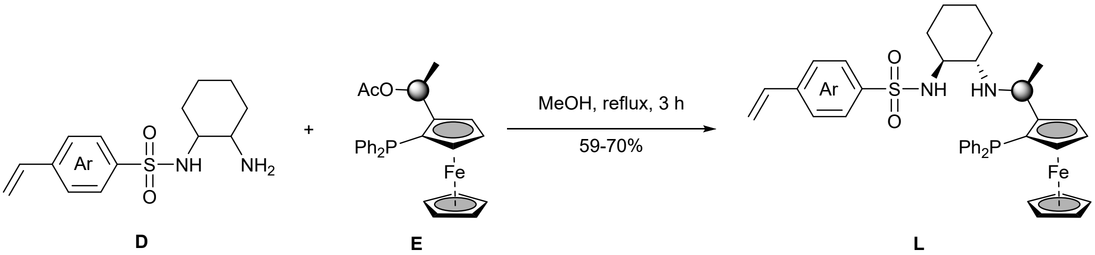
2.4. General procedure for the preparation of D2-D4



C3 (6.5 mmol), 4-Vinylphenylboronic acid (7.8 mmol), $Pd(OAc)_2$ (0.065 mmol), XPhos (0.13 mmol), K_2CO_3 (13 mmol), Toluene (65 mL), EtOH (13 mL), H_2O (13 mL) was added to a 250 mL round flask. The mixture was stirred at 85 °C for 1 h under an argon atmosphere. Upon completion, organic solvent was removed and H_2O (20 mL) was added. The resulting mixture was extracted with DCM for three times, and the combined organic extracts were washed with brine, dried over Na_2SO_4 and the solvent removed in vacuo to give the crude product.

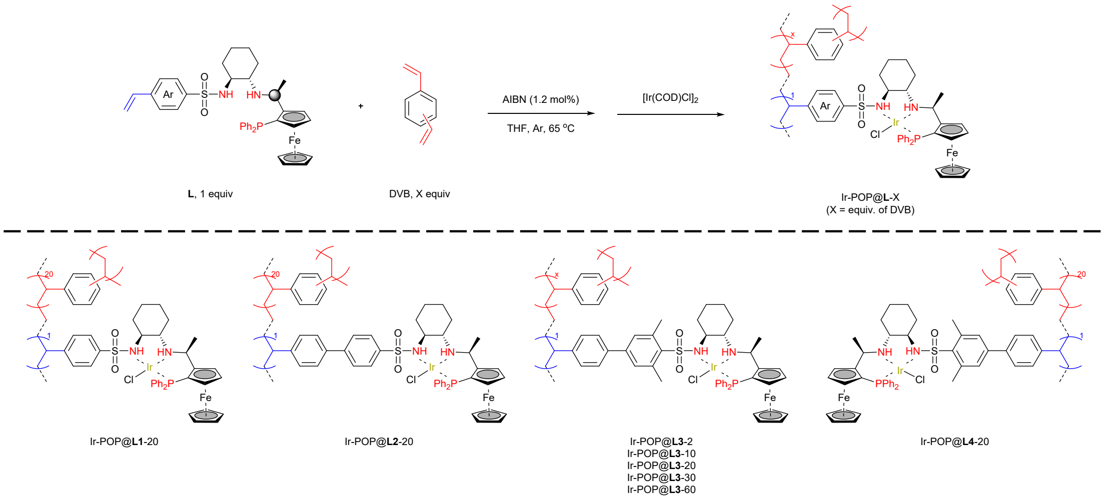
The crude product obtained above was redispersed in DCM (8 mL), and trifluoroacetic acid (2.5 mL) was added slowly at 0 °C. Then the reaction mixture was allowed to warm to room temperature. When completion of the reaction, the pH was adjusted to pH = 12-14 using NaOH (2 M in H_2O). The reaction mixture was extracted with DCM for three times. The organic extracts were washed with brine, dried over Na_2SO_4 and concentrated to give a green solid crude product, which can be purified by flash column chromatography over silica gel to give the **D3** as white solid (1.45 g, 58% yield). **D2** and **D4** was prepared from **C2** and **C4** respectively with similar yield.

2.5. General procedure for the preparation of vinyl *f*-diaphos L[1]



A solution of (R_C,S_{FC})- or (S_C,R_{FC})-**E** (5.5 mmol), (*R,R*) or (*S,S*)-1,2-diamine **D** (5 mmol) in dry MeOH (10 mL) was stirred at reflux for 3 hours. The reaction mixture was cooled to room temperature, and then the solvent was removed under vacuum. The crude product was purified by column chromatography on silica gel to yield **L1**−**L4** as orange solid in 59%-70% yield.

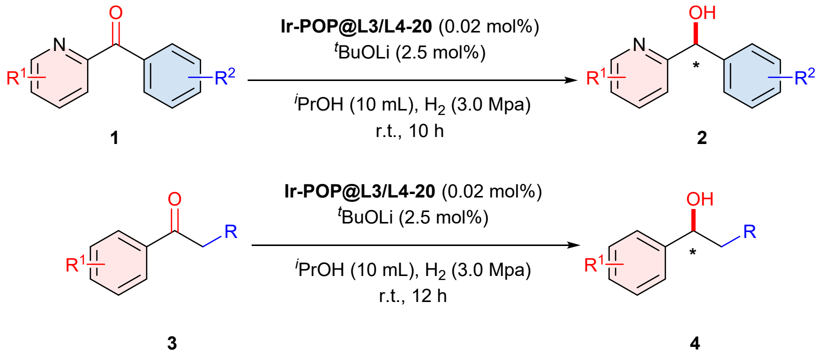
2.6. General procedure for the synthesis of Ir-POP@L-X[2]



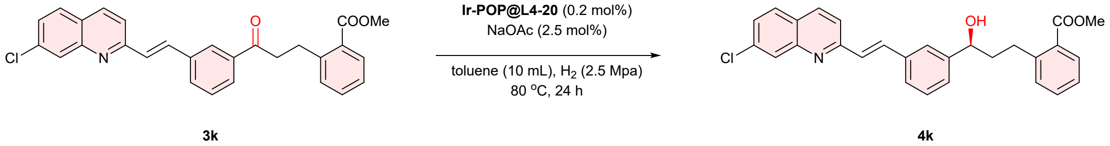
In a glove box, AIBN (26 mg, 0.16 mmol), DVB (780 mg, 6 mmol), *f*-diaphos ligand **L3** (237.3 mg, 0.3 mmol) in THF (21 mL) was added to a sealed tube. Then the sealed tube was taken out from the glove box, and heated at 65 °C for 24 h. When the system became gel-like, the reaction was stopped, and the mixture was allowed to cool to room temperature. Then, EtOH (50 mL) was added, and the mixture was stirred to disperse the polymer. The mixture was then filtered and washed with DCM, THF and EA three times respectively, yielding POP@**L3**-20 as yellow solid powder (730.1 mg, 72% yield). Other polymer ligands were prepared through same method using different ligand or equivalent of DVB.

Under argon atmosphere, POP@**L3**-20 (570 mg), $[Ir(COD)Cl]_2$ (42.2 mg, 0.063 mmol) and ^{i}PrOH (10 mL) was added to a oven-dried vial (50 mL), then the vial was sealed and taken out from the glove box and stirred at 40 °C for 1.5 h. The resulting mixture was filtered and rinsed with excess DCM, ^{i}PrOH until filtrate become colorless. Then the residue was dried at 40 °C under reduced pressure to afford **Ir-POP@L3-20** as a orange powder (563.3 mg, 92% (w/w)).

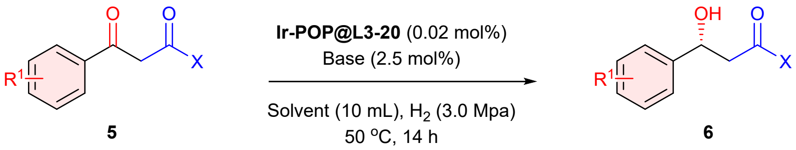
3. General procedure for asymmetric hydrogenation



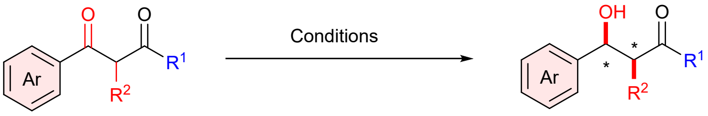
General procedure for the asymmetric hydrogenation of 2-pyridyl aryl ketones and aryl alkyl ketones: Under argon atmosphere, **Ir-POP@L3-20** or **Ir-POP@L4-20** (2.1 or 2.0 mg), substrates **1** (2 mmol), ^{t}BuOLi (4 mg, 0.05 mmol), anhydrous ^{i}PrOH (10 mL) were added to an oven-dried hydrogenation vessel (50 mL). After the vessel was securely placed into the autoclave, the assembled system was carefully removed from the glove box. Subsequently, the autoclave was purged seven times with hydrogen, then pressurized to 30 atm of H_2 and stirred at room temperature for 10 h. Upon completion, the heterogeneous catalyst was separated via filtration. The aqueous solution was combined and the solvent was removed under reduced pressure. The residue was purified by silica gel flash chromatography to afford the desired product. The *ee* value was determined by chiral HPLC analysis.



Procedure for the asymmetric hydrogenation of **3k**: Under argon atmosphere, **Ir-POP@L4-20** (20.1 mg), **3k** (2 mmol, 912 mg), NaOAc (4.1 mg, 0.05 mmol), anhydrous toluene (10 mL) were added to an oven-dried hydrogenation vessel (50 mL). After the vessel was securely placed into the autoclave, the assembled system was carefully removed from the glove box. Subsequently, the autoclave was purged seven times with hydrogen, then pressurized to 25 atm of H_2 and stirred at 80 °C for 24 h. Upon completion, the heterogeneous catalyst was separated via filtration. The aqueous solution was combined and the solvent was removed under reduced pressure. The residue was purified by silica gel flash chromatography to afford the desired product. The *ee* value was determined by chiral HPLC analysis.



General procedure for the asymmetric hydrogenation of *β*-aryl-*β*-ketoaimdes/esters: Under argon atmosphere, **Ir-POP@L3-20** (2.1 mg), substrates **5** (2 mmol), NaOH (2 mg, 0.05 mmol, for **5a**), ^{t}BuOLi (4 mg, 0.05 mmol, for **5b**), NaOAc (4.1 mg, 0.05 mmol, for **5c, 5d, 5e**), dried EA (10 mL, for **5a**, **5c, 5d, 5e**), ^{i}PrOH (10 mL, for **5b**) were added to an oven-dried hydrogenation vessel (50 mL). After the vessel was securely placed into the autoclave, the assembled system was carefully removed from the glove box. Subsequently, the autoclave was purged seven times with hydrogen, then pressurized to 30 atm of H_2 and stirred at 50 °C for 14 h. Upon completion, the heterogeneous catalyst was separated via filtration. The aqueous solution was combined and the solvent was removed under reduced pressure. The residue was purified by silica gel flash chromatography to afford the desired product. The *ee* value was determined by chiral HPLC analysis.



Procedure for the asymmetric hydrogenation of *α*-F-*β*-ketone Esters **5f**: Under argon atmosphere, **Ir-POP@L3-20** (2.1 mg), substrates **5f** (2 mmol), NaOH (4 mg, 0.1 mmol), dried EA (10 mL) were added to an oven-dried hydrogenation vessel (50 mL). After the vessel was securely placed into the autoclave, the assembled system was carefully removed from the glove box. Subsequently, the autoclave was purged seven times with hydrogen, then pressurized to 5 atm of H_2 and stirred at room temperature for 12 h. Upon completion, the heterogeneous catalyst was separated via filtration. The aqueous solution was combined and the solvent was removed under reduced pressure. The residue was purified by silica gel flash chromatography to afford the desired product. The *ee* and *dr* value was determined by chiral HPLC analysis.

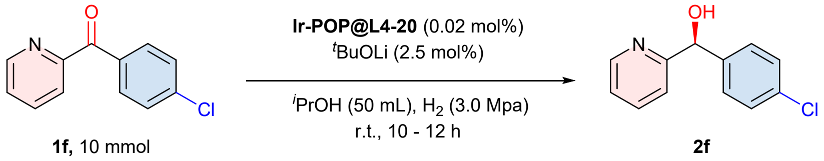
Procedure for the asymmetric hydrogenation of *β*’-keto-*β*-amino esters **5g-5i**: Under argon atmosphere, **Ir-POP@L4-20** (2.1 mg), substrates **5g-5i** (2 mmol), NaOAc (4.1 mg, 0.05 mmol), dried toluene (10 mL) were added to an oven-dried hydrogenation vessel (50 mL). After the vessel was securely placed into the autoclave, the assembled system was carefully removed from the glove box. Subsequently, the autoclave was purged seven times with hydrogen, then pressurized to 35 atm of H_2 and stirred at 60

°C for 24 h. Upon completion, the heterogeneous catalyst was separated via filtration. The aqueous solution was combined and the solvent was removed under reduced pressure. The residue was purified by silica gel flash chromatography to afford the desired product. The *ee* and *dr* value was determined by chiral HPLC analysis.

4. Batch recycling and continuous flow with Ir-POP@L4-20

4.1. General procedure for batch recycling experiment

Under an argon atmosphere, **Ir-POP@L4-20** (10 mg, 0.002 mmol of Ir), substrate **1f** (10 mmol), ^{t}BuOLi (20 mg, 0.25 mmol), and anhydrous isopropanol (50 mL) was added into a 250 mL hydrogenation autoclave. The autoclave was then carefully removed from the glove box and purged seven times with hydrogen. The system was subsequently pressurized to 30 atm of H_2 and maintained at 25-30 °C with continuous stirring for 10 hours. Notably, the reaction time for each cycle was progressively extended by 30 minutes starting from Run 3. Upon completion, the heterogeneous catalyst was filtered in glove box. The aqueous solution was poured and combined, and the filter residue was washed with anhydrous ^{i}PrOH. After washing, heterogeneous catalyst was transferred to hydrogenation vessel for next recycle. The solvent in supernatant was removed under reduced pressure, the *ee* value and conversion was determined by HPLC analysis. The resulting residue was combined and purified via a short column of silica gel to afford product as white solid (15.1 g, 98% yield).



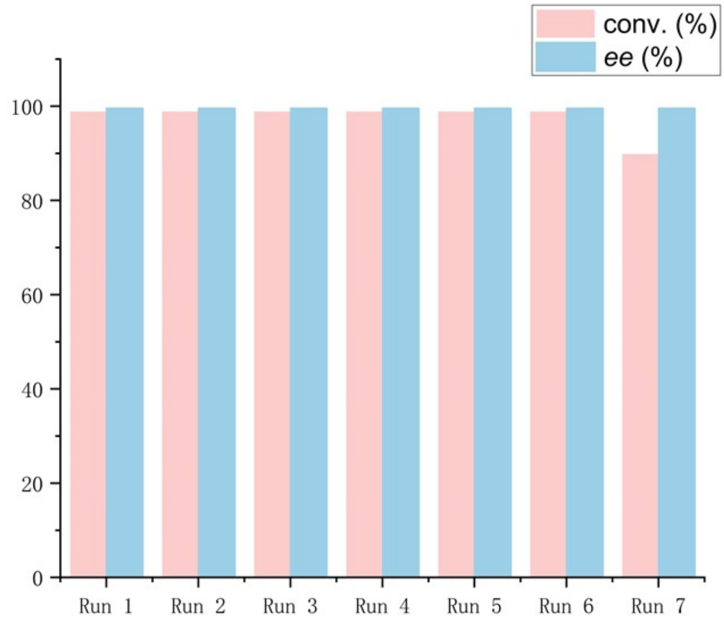


Figure S2 Batch recycle of catalyst **Ir-POP@L4-20**

4.2. General procedure for continuous flow[3]

4.2.1. Pretreatment of catalyts

Ir-POP@L4-20 (75 mg, 0.015 mmol of Ir), ^{t}BuOLi (8 mg, 0.1 mmol), anhydrous ^{i}PrOH (2.5 mL) were added to an oven-dried flask (10 mL) and stirred for 0.5 h in 25 °C to 30 °C. The resulting solid was filtered and grinded to fine powder get the pretreated catalyst. All aforementioned operations were performed inside the glove box.

4.2.2. Set up of a fixed bed reactor

Inside a glovebox, fill the pretreated catalyst prepared above, ^{t}BuOLi (300 mg), and silica sand (40-60 mesh) as solid dilutant into the SUS column (Φ10×200 mm). The column's inlet is fitted with a gas-liquid mixer, with one-way valves attached to both the gas and liquid inlets. The column's outlet is sealed with a screw stopper. Then the assembled system was taken out from glove box carefully.

4.2.3. Preparation of substrate solution

Substrate **2f** (7.9 g, 36 mmol) and ^{i}PrOH (180 mL) were added to a 2-neck round bottom flask (500 mL), and changed seven times with Ar. The system was then sonicated for ten minutes, followed by another replacement with Ar for five times. The solution was kept under Ar balloon.

4.2.4. Installation of the equipment

A Hydrogen cylinder and a mass flow controller were equipped at the one-way valves for gas inlet. A plunger pump and a safety valve were introduced at the 3-way switcher for liquid inlet. H_2 was introduced at the rate of 50 mL/min into the continuous flow system, while the screw stopper at the outlet of the fixed bed reactor was removed. ^{i}PrOH was flowed at the rate of 1 mL/min into the system. Then, a pressure monitor and a back pressure regulator were introduced at the outlet of the column, and the back pressure was adjusted to 2.0 MPa.

4.2.5. Continuous asymmetric hydrogenation of 2f

When pressure in system achieved 2.0 MPa, ^{i}PrOH was replaced with substrate solution prepared above and the rate of solution introduced to the system was reduced to 0.3 mL/min to start the reaction. The resulting solution from the end of reactor was collected into a conical flask every 2 h at the start of reaction. After several hours of operation, the intervals were extended to every 8 h. Conversion and *ee* was determined by HPLC analysis. After determination of conversion and *ee*, the solvent was removed under reduced pressure and the residue was combined. The flow reaction was continued for 130 h. After reaction, 102.7 g of crude product was obtained, 100 mg of which was taken to determine the Ir leaching by ICP-MS. The residue was dispersed in DCM and washed by brine for three times, dried over Na_2SO_4 and concentrated, then purified by recrystallization in ^{n}heptane to give the **2f** as white solid (99.52 g, 97.1% yield).

Table S1. Continuous asymmetric hydrogenation of **2f**

time (h)	conv. (%)	*ee*(%)
0-2	82	99.1
2-4	91	99.6
4-6	96	99.6
6-8	98	99.5
8-10	99	99.5
10-12	99	99.6
12-20	98	99.4
20-28	99	99.6
28-36	99	99.6
36-44	98	99.6
44-52	96	99.6
52-60	99	99.5
60-68	99	99.3
68-76	98	99.6
76-84	99	99.6
84-92	99	99.6
92-100	98	99.6
100-108	99	99.6
108-116	97	99.6
116-124	99	99.6
124-130	94	99.6

5. Characterization

5.1. Ir loading of Ir-POP@L-X

Table S2. ICP-OES of Iridium of **Ir-POP@L-X** (fresh prepared or after reaction)

	Ir (mmol/g)	Ir
Ir-POP@L1-20	$1.82*10^{-1}$	3.51%
Ir-POP@L2-20	$2.11*10^{-1}$	4.05%
Ir-POP@L3-20	$1.94*10^{-1}$	3.72%
Ir-POP@L4-20	$1.99*10^{-1}$	3.82%
Ir-POP@L3-2	$5.22*10^{-1}$	10.21%
Ir-POP@L3-10	$3.74*10^{-1}$	7.19%
Ir-POP@L3-30	$1.70*10^{-1}$	3.27%
Ir-POP@L3-60	$0.90*10^{-1}$	1.72%
Ir-POP@L4-20 (after flow)	$1.99*10^{-1}$	3.83%
Ir-POP@L4-20 (after batch recycle)	$1.97*10^{-1}$	3.79%

5.2. The swelling ratio (SR) of Ir-POP@L-X[4]

The swelling ratio (SR) of the samples was determined gravimetrically by immersing a pre-weighed (Wd) dried sample in 10 mL of MeCN for 2 h. The samples were centrifuged (16000 r/min) to remove the solvent and weighed (Ws). The SR of the samples is calculated as follows: SR = (Ws-Wd)/Wd*100%[5]

Table S3. The swelling ratio (SR) of Ir-POP@L-X

	Wd (mg)	Ws (mg)	SR (%)
Ir-POP@L3-20	100	544	444
Ir-POP@L4-20	100	567	467
Ir-POP@L3-10	100	425	325
Ir-POP@L3-30	100	599	499
Ir-POP@L3-60	100	624	524

5.3. X-ray photoelectron spectroscopy (XPS) of POP@L4-20

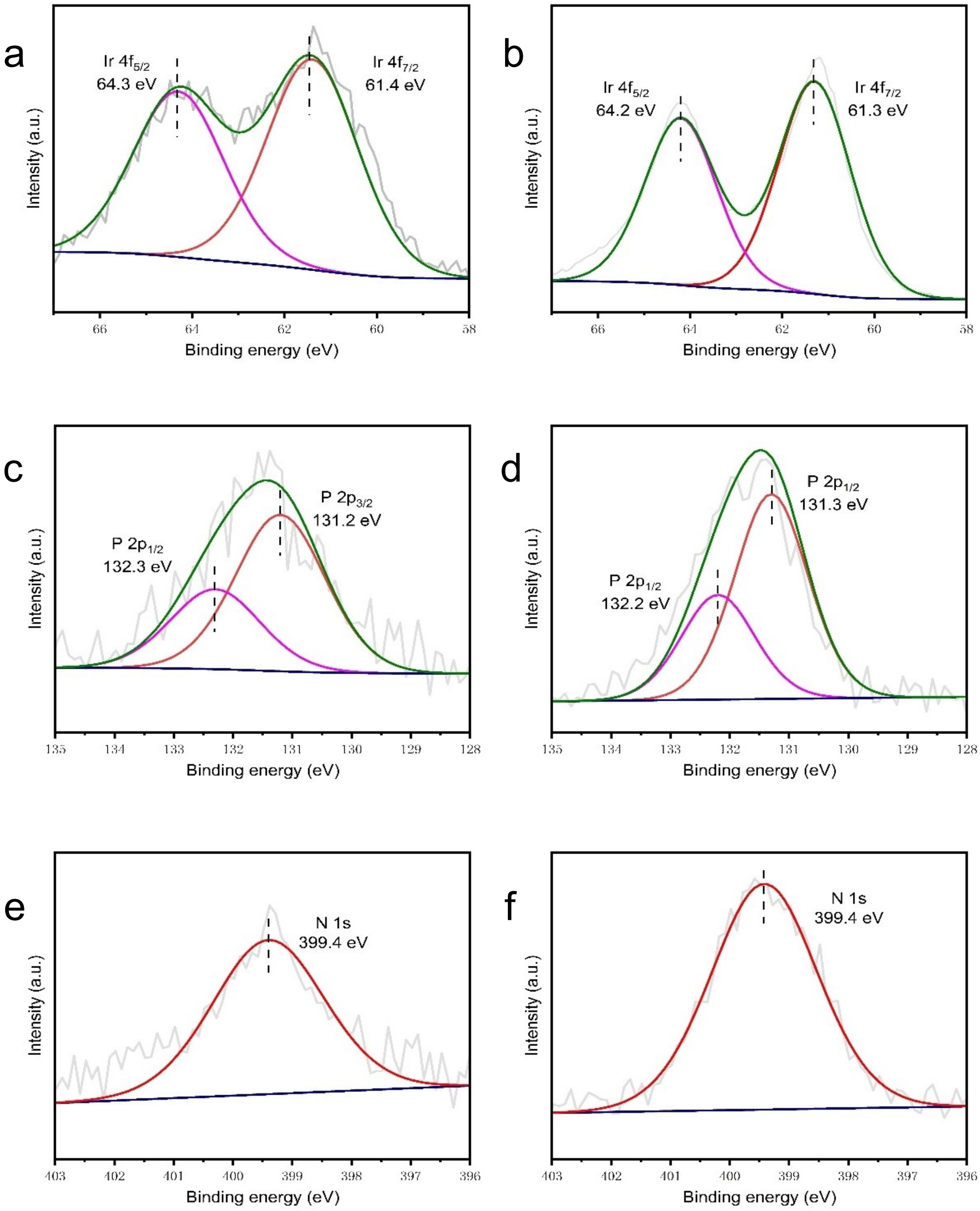


Figure S3. X-ray photoelectron spectroscopy (XPS) of **Ir-POP@L4-20** and **Ir-L4**. (a) Ir 4f spectra of **Ir-POP@L4-20**. (b) Ir 4f spectra of **Ir-L4**. (c) P 2p spectra of **Ir-POP@L4-20**. (d) P 2p spectra of **Ir-L4**. (e) N 1s spectra of **Ir-POP@L4-20** (f) N 1s spectra of **Ir-L4**.

5.4. The thermogravimetric (TG) spectra of Ir-POP@L4-20

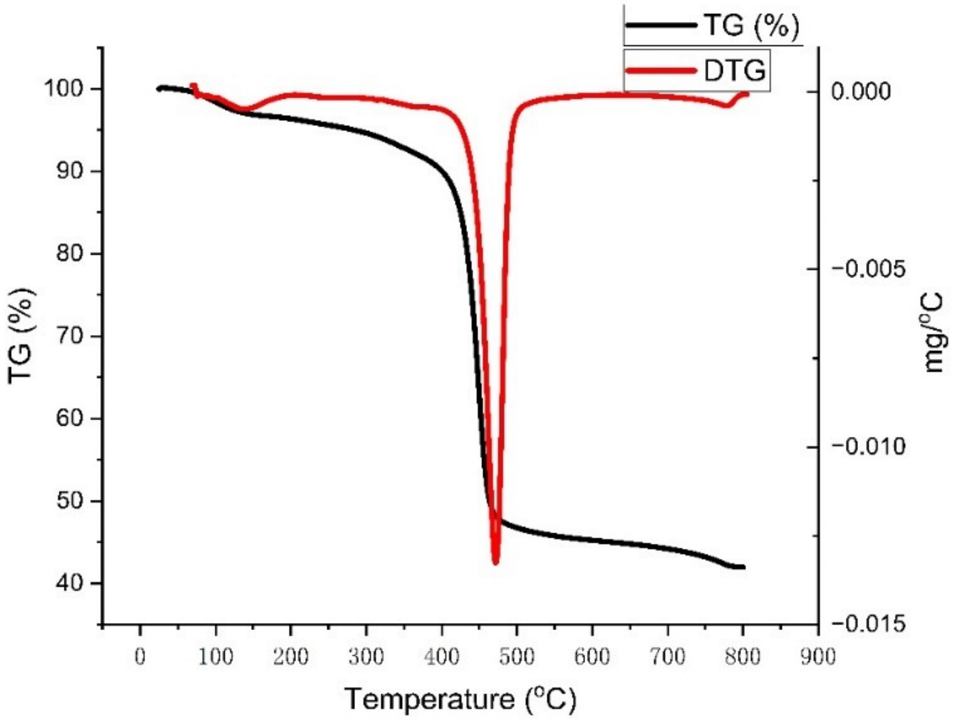


Figure S4. TGA of Ir-POP@L4-20.

5.5. SEM and TEM of catalysts fresh prepared or after reaction

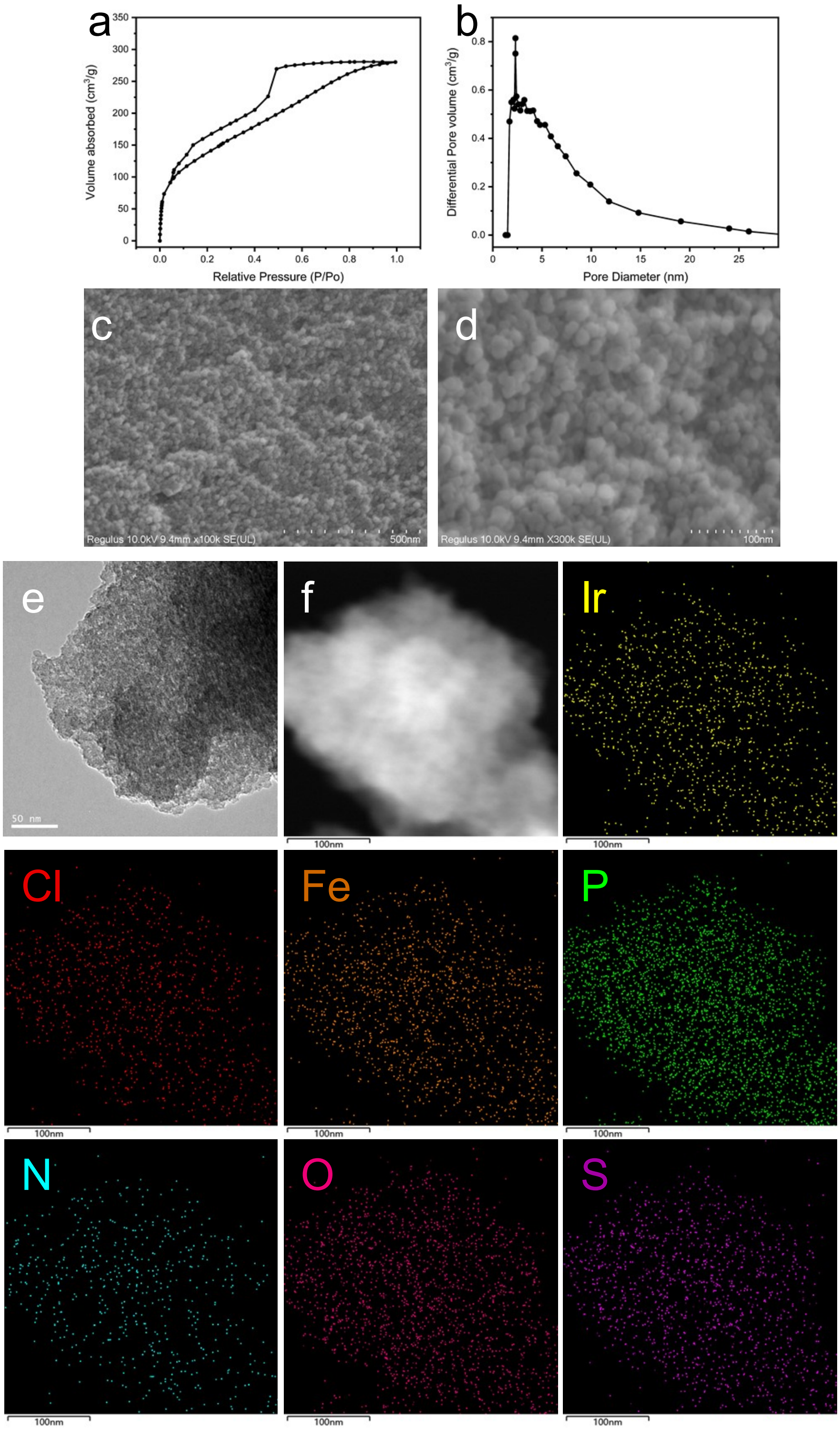


Figure S5. Characterization of **fresh prepared Ir-POP@L4-20.** a) N_2 sorption isotherm. b) Pore size distribution (based on NLDFT calculations). c) SEM image of **Ir-POP@L4-20** (scale bar: 500 nm). d) SEM image of **Ir-POP@L4-20** (scale bar: 100 nm). e) TEM image of **Ir-POP@L4-20** (scale bar: 10 nm). f) HAADF-STEM image and EDS mapping of composition elements Ir, Cl, Fe, P, N, O, S respectively (**Ir-POP@L4-20**, scale bar: 100 nm)

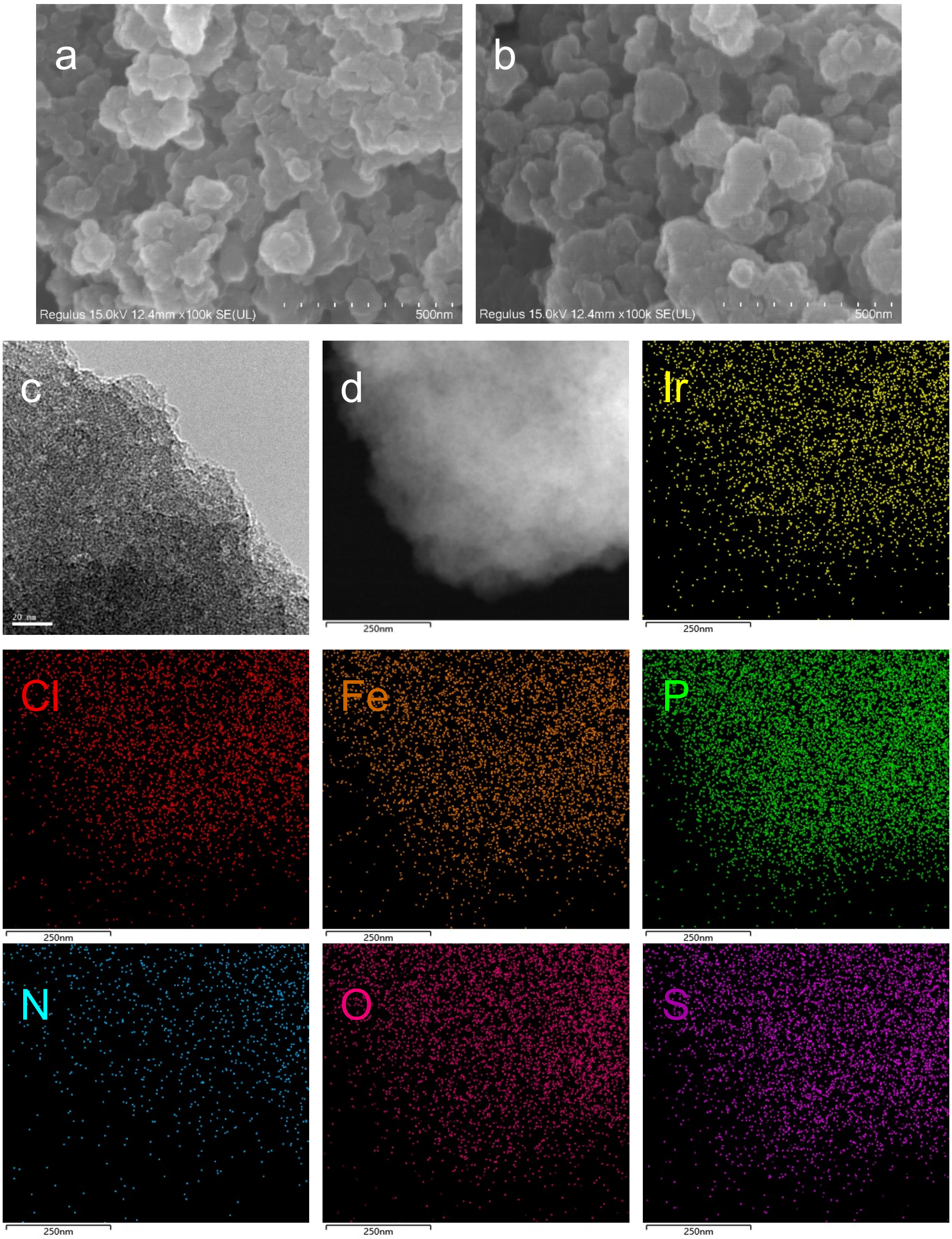


Figure S6. Characterization of **Ir-POP@L4-20 after flow.** a) SEM image (scale bar: 500nm). b) SEM image (scale bar: 500nm). c) TEM image (scale bar: 20 nm). b) HAADF-STEM image and EDS mapping of composition elements Ir, Cl, Fe, P, N, O, S respectively (scale bar: 250 nm)

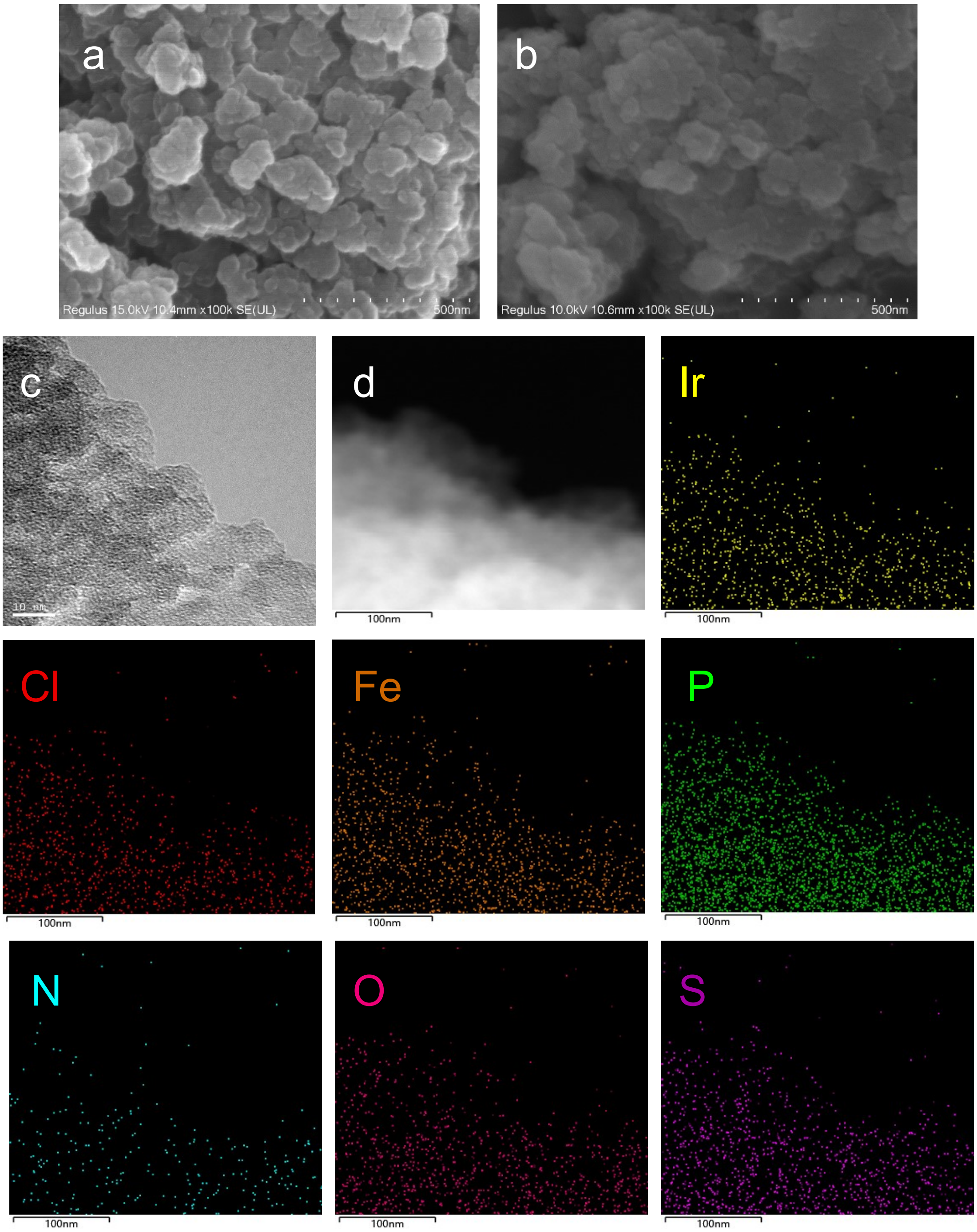
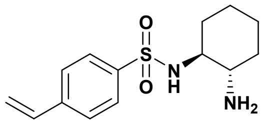


Figure S7. Characterization of **Ir-POP@L4-20 after batch recycling.** a) SEM image (scale bar: 500nm). b) SEM image (scale bar: 500nm). c) TEM image (scale bar: 10 nm). b) HAADF-STEM image and EDS mapping of composition elements Ir, Cl, Fe, P, N, O, S respectively (scale bar: 100 nm)

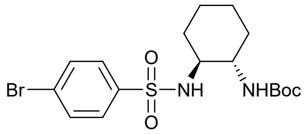
6. Data of compounds

N-((1*S*,2*S*)-2-aminocyclohexyl)-4-vinylbenzenesulfonamide (D1)



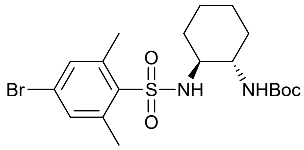
White solid, 1.74 g, 62% yield, m.p. 105-107 °C (Lit.[6] 105-107 °C); $[\alpha]_D^{20}$ = +18.4 (c = 0.5, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (d, *J* = 8.0 Hz, 2H), 7.48 (d, *J* = 8.0 Hz, 2H), 6.70 (dd, *J* = 18.0, 11.6 Hz, 1H), 5.84 (d, *J* = 17.6 Hz, 1H), 5.38 (d, *J* = 10.8 Hz, 1H), 2.92 (br s, 2H), 2.64 (m, 1H), 2.39-2.33 (m, 1H), 1.86 (d, *J* = 11.6 Hz, 1H), 1.68 (s, 1H), 1.68-1.53 (m, 2H), 1.17-0.97 (m, 4H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.5, 139.9, 135.4, 127.3, 126.7, 117.2, 60.6, 54.8, 35.2, 32.5, 25.0, 24.8. HRMS (ESI) calcd for $C_{14}H_{21}N_2O_2S$ $[M + H]^+$: 281.1318, found: 280.1322.

tert-butyl-((1*S*,2*S*)-2-((4-bromophenyl)sulfonamido)cyclohexyl)carbamate (C2)



White solid, 4.08 g, 94% yield, m.p. 120-121 °C; $[\alpha]_D^{20}$ = -20.3 (c = 0.5, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.70 (d, *J* = 8.4 Hz, 2H), 7.59 (d, *J* = 8.8 Hz, 2H), 5.98 (q, *J* = 6.4 Hz, 1H), 4.52 (t, *J* = 8.4 Hz, 1H), 3.34-3.25 (m, 1H), 2.91-2.83 (m, 1H), 1.97-1.86 (m, 2H), 1.63 (t, *J* = 15.2 Hz, 2H), 1.40 (s, 9H), 1.29-1.20 (m, 2H), 1.16-1.05 (m, 2H). ^{13}C NMR (100 MHz, $CDCl_3$) δ157.0, 140.8, 132.2, 128.5, 127.1, 80.1, 59.5, 53.6, 33.8, 32.8, 28.4, 24.7, 24.5. HRMS (ESI) calcd for $C_{17}H_{26}BrN_2O_4S$ $[M + H]^+$: 433.0791, found: 433.0789.

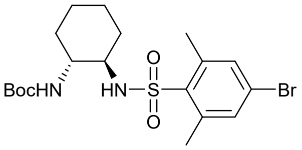
tert-butyl-((1*S*,2*S*)-2-((4-bromo-2,6-dimethylphenyl)sulfonamido)cyclohexyl) carbamate (C3)



White solid, 4.40 g, 95% yield, m.p. 122-123 °C; $[\alpha]_D^{20}$ = -22.7 (c = 0.5, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28 (s, 2H), 5.61 (d, *J* = 6.4 Hz, 1H), 4.51 (d, *J* = 8.4

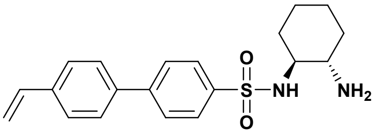
Hz, 1H), 3.32 (d, *J* = 10.8 Hz, 1H), 2.94 (t, *J* = 5.2 Hz, 1H), 2.64 (s, 6H), 2.02-1.97 (m, 1H), 1.78-1.76 (m, 1H), 1.70-1.65 (m, 1H), 1.62-1.57 (m, 1H), 1.44 (s, 9H), 1.25-1.20 (m, 1H), 1.18-1.11 (m, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ157.1, 140.9, 137.9, 133.8, 125.9, 80.3, 59.1, 53.6, 33.6, 33.0, 28.5, 24.8, 24.6, 23.1. HRMS (ESI) calcd for $C_{19}H_{30}BrN_2O_4S$ $[M + H]^+$: 461.1104, found: 461.1107.

tert-butyl-((1*R*,2*R*)-2-((4-bromo-2,6-dimethylphenyl)sulfonamido)cyclohexyl) carbamate (C4)



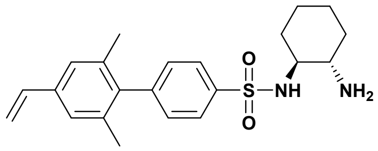
White solid, 4.34 g, 94% yield, m.p. 122-123 °C; $[\alpha]_D^{20}$ = +20.8 (c = 0.5, $CHCl_3$). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29 (s, 2H), 5.61 (d, *J* = 6.4 Hz, 1H), 4.51 (d, *J* = 8.4 Hz, 1H), 3.33 (d, *J* = 10.4 Hz, 1H), 2.95 (t, *J* = 4.8 Hz, 1H), 2.64 (s, 6H), 2.02-1.97 (m, 1H), 1.78-1.76 (d, *J* = 11.2 Hz, 1H), 1.70-1.66 (m, 1H), 1.62-1.58 (m, 1H), 1.44 (s, 9H), 1.25-1.20 (m, 1H), 1.18-1.11 (m, 3H). ^{13}C NMR (100 MHz, $CDCl_3$) δ157.2, 140.9, 138.0, 133.9, 126.0, 80.4, 59.1, 53.7, 33.7, 33.1, 28.6, 24.9, 24.7, 23.2. HRMS (ESI) calcd for $C_{19}H_{30}BrN_2O_4S$ $[M + H]^+$: 461.1104, found: 461.1102.

N-((1*S*,2*S*)-2-aminocyclohexyl)-4'-vinyl-[1,1'-biphenyl]-4-sulfonamide (D2)



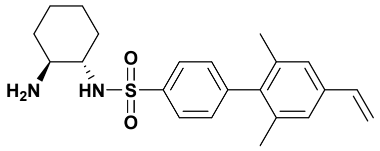
White solid, 1.18 g, 51% yield, m.p. 140-141 °C; $[\alpha]_D^{20}$ = +12.7 (c = 0.5, $CHCl_3$) ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.96 (d, *J* = 8.4 Hz, 2H), 7.70 (d, *J* = 8.4 Hz, 2H), 7.57 (d, *J* = 8.0 Hz, 2H), 7.49 (d, *J* = 8.0 Hz, 2H), 6.74 (dd, *J* = 17.6, 10.8 Hz, 1H), 5.81 (d, *J* = 17.6 Hz, 1H), 5.30 (d, *J* = 10.8 Hz, 1H), 3.12 (br s, 3H), 2.76-2.71 (m, 1H), 2.45 (td, *J* = 10.4, 4.0 Hz, 1H), 1.94 (d, *J* = 11.2 Hz, 1H), 1.78 (d, *J* = 10.0 Hz, 1H), 1.64-1.57 (m, 2H), 1.22-1.08 (m, 4H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.8, 139.7, 138.5, 137.8, 136.2, 127.6, 127.4, 126.9, 144.8, 60.5, 54.8, 35.3, 32.7, 25.0, 24.8. HRMS (ESI) calcd for $C_{20}H_{25}N_2O_2S$ $[M + H]^+$: 357.1631, found: 357.1630.

N-((1*S*,2*S*)-2-aminocyclohexyl)-2',6'-dimethyl-4'-vinyl-[1,1'-biphenyl]-4-sulfonamide (D3)



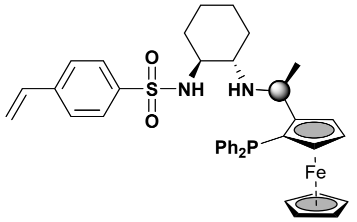
White solid, 1.45 g, 58% yield, m.p. 147-148 °C; $[\alpha]_D^{20} = +24.9$ (c = 0.5, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.57 (d, *J* = 8.4 Hz, 2H), 7.48(d, *J* = 8.4 Hz, 2H), 7.36 (s, 2H), 6.75 (dd, *J* = 17.6, 10.8 Hz, 1H), 5.81 (d, *J* = 17.6 Hz, 1H), 5.30 (d, *J* = 11.2 Hz, 1H), 2.77 (s, 6H), 2.69 (td, *J* = 10.0, 4.0 Hz, 1H), 2.46 (td, *J* = 10.4, 4.0 Hz, 1H), 1.92 (t, *J* = 10.8 Hz, 2H), 1.63 (t, *J* = 10.8 Hz, 2H), 1.28-1.05 (m, 4H). ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.5, 139.5, 138.4, 137.7, 136.6, 136.3, 129.6, 127.4, 126.8, 114.6, 60.1, 54.8, 35.8, 32.6, 25.0, 24.9, 23.5. HRMS (ESI) calcd for $C_{22}H_{29}N_2O_2S$ $[M + H]^+$: 385.1944, found: 384.1941.

N-((1*R*,2*R*)-2-aminocyclohexyl)-2',6'-dimethyl-4'-vinyl-[1,1'-biphenyl]-4-sulfonamide (D4)



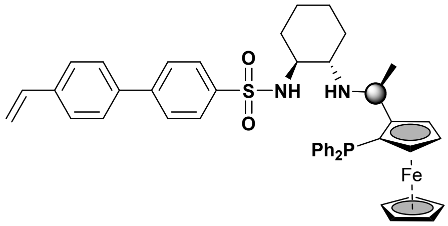
White solid, 1.40 g, 56% yield, m.p. 147-148 °C; $[\alpha]_D^{20} = -29.0$ (c = 0.5, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.57 (d, *J* = 8.4 Hz, 2H), 7.48 (d, *J* = 8.4 Hz, 2H), 7.36 (s, 2H), 6.74 (dd, *J* = 17.6, 10.8 Hz, 1H), 5.80 (d, *J* = 17.6 Hz, 1H), 5.30 (d, *J* = 10.8 Hz, 1H), 2.77 (s, 6H), 2.64 (td, *J* = 10.0, 4.0 Hz. 1H), 2.40 (td, *J* = 10.8, 4.0 Hz, 1H), 1.94-1.90 (m, 2H), 1.65-1.59 (m, 2H), 1.23-1.05 (m, 4H). ^{13}C NMR (100 MHz, $CDCl_3$) δ143.4, 139.5, 138.4, 137.6, 136.5, 136.2, 129.6, 127.3, 126.8, 114.6, 60.2, 54.8, 35.9, 32.6, 25.0, 24.9, 23.5. HRMS (ESI) calcd for $C_{22}H_{29}N_2O_2S$ $[M + H]^+$: 385.1944, found: 384.1946.

vinyl-*f*-diaphos L1



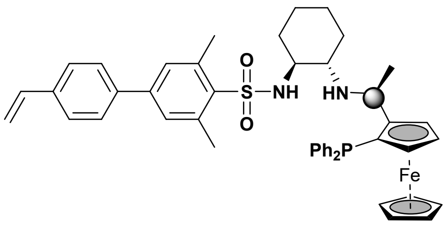
Orange solid, 2.03 g, 59% yield, m.p. 164-165 °C; $[\alpha]_D^{20} = +141.5$ (c = 0.5, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.76 (d, *J* = 8.0 Hz, 2H), 7.49-7.44 (m, 4H), 7.36-7.35 (m, 3H), 7.15-7.11 (m, 1H), 7.02 (t, *J* = 8.0 Hz, 4H), 6.76 (dd, *J* = 17.6, 10.8 Hz, 1H), 5.90 (br s, 1H), 5.88 (d, *J* = 17.6 Hz, 1H), 5.42 (d, *J* = 10.8 Hz, 1H), 4.50 (s, 1H), 4.35 (t, *J* = 2.8 Hz, 1H), 4.06 (s, 5H), 4.00-3.98 (m, 1H), 3.68-3.67 (m, 1H), 2.14-2.06 (m, 2H), 1.90 (d, *J* = 12.4 Hz, 1H), 1.78 (td, *J* = 10.8, 4 Hz, 1H), 1.45 (t, *J* = 14.8 Hz, 2H), 1.34 (d, *J* = 6.4 Hz, 3H), 1.13-0.94 (m, 2H), 0.85-0.78 (m, 1H), -0.33 to -0.43 (m, 1H). ^{13}C NMR (100 MHz, CDCl3) δ 141.4, 139.8 (d, *J* = 10.7 Hz), 138.8, 136.6 (d, 9.4 Hz), 135.5, 135.0 (d, *J* = 20.8 Hz), 132.8 (d, *J* = 19.3 Hz), 129.2, 128.4, 128.3 (d, *J* = 6.7 Hz), 128.2 (d, *J* = 7.6 Hz), 126.4, 117.2, 98.2 (d, *J* = 22.4 Hz), 74.3 (d, *J* = 6.3 Hz), 71.2 (d, *J* = 4.1 Hz), 69.7, 69.4 (d, *J* = 3.8 Hz), 69.2, 57.8, 56.9, 46.2 (d, *J* = 9.3 Hz), 32.3, 29.8, 24.8, 24.0, 20.0. ^{31}P NMR (162 MHz, $CDCl_3$) δ −24.79 (s). HRMS (ESI) calcd for $C_{38}H_{42}FeN_2O_2PS$ $[M + H]^+$: 677.2049, found: 677.2044.

vinyl-*f*-diaphos L2



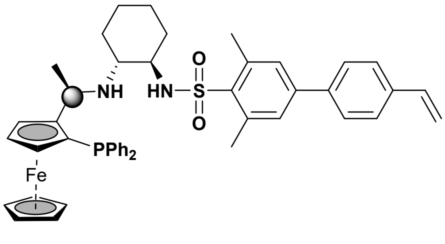
Orange solid, 2.44 g, 64% yield, m.p. 158-159 °C. $[\alpha]_D^{20} = +98.5$ (c = 0.5, $CHCl_3$). ^1H NMR (400 MHz, $CDCl_3$) δ 7.88 (d, *J* = 8 Hz, 2H), 7.66 (d, *J* = 8.4 Hz, 2H), 7.60 (d, *J* = 8.0 Hz, 2H), 7.51 (d, *J* = 8.0 Hz, 2H), 7.43 (t, *J* = 8.0 Hz, 2H), 7.36 (t, *J* = 7.6 Hz, 3H), 7.10 (t, *J* = 6.4 Hz, 1H), 7.03-6.95 (m, 4H), 6.78 (dd, *J* = 17.6, 10.8 Hz, 1H), 5.93 (br s, 1H), 5.84 (d, *J* = 17.6 Hz, 1H), 5.34 (d, *J* = 11.2 Hz, 1H), 4.53 (s, 1H), 4.36 (t, *J* = 3.2 Hz, 1H), 4.08 (s, 5H), 3.99-3.97 (m, 1H), 3.67 (s, 1H), 2.21-2.09 (m, 2H), 1.90-1.88 (m, 2H), 1.51-1.42 (m, 2H), 1.36 (d, *J* = 6.4 Hz, 3H), 1.19-1.12 (m, 1H), 1.02-0.98 (s, 1H), 0.91-0.80 (m, 2H), -0.43 to -0.54 (m, 1H). ^{13}C NMR (100 MHz, CDCl3) δ 144.4, 139.8 (d, *J* = 11 Hz), 138.5 (d, *J* = 14.6 Hz), 137.7, 136.4 (d, *J* = 9.3 Hz), 136.1, 135.0, 134.8, 132.9, 132.7, 129.2, 128.4 (d, *J* = 4.1 Hz), 128.2 (d, *J* = 5.4 Hz), 128.2, 127.4, 127.1, 126.9, 114.8, 98.2 (d, *J* = 22.3 Hz), 74.3 (d, *J* = 6.1 Hz), 71.2 (d, *J* = 4 Hz), 69.8, 69.4 (d, *J* = 3.9 Hz), 69.2, 57.8, 56.7, 46.0 (d, *J* = 9.2 Hz), 32.5, 29.6, 24.7, 24.0, 19.9. ^{31}P NMR (162 MHz, CDCl$_3$) δ −24.38 (s). HRMS (ESI) calcd for $C_{44}H_{46}FeN_2O_2PS$ [M + H]$^+$: 753.2362, found: 753.2361.

vinyl-*f*-diaphos L3



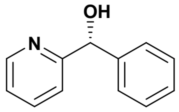
Orange solid, 2.77 g, 70% yield, m.p. 160-161 °C. [*α*]$_D^{20}$ = +143.0 (c = 0.5, CHCl$_3$) ^{1}H NMR (600 MHz, CDCl$_3$) δ 7.60 (d, *J* = 7.8 Hz, 2H), 7.51 (d, *J* = 7.8 Hz, 2H), 7.47 (t, *J* = 7.8 Hz, 2H), 7.38-7.33 (m, 5H), 7.11 (t, *J* = 7.2 Hz, 1H), 7.00 (p, *J* = 7.2 Hz, 4H), 6.78 (dd, *J* = 17.4, 10.8 Hz, 1H), 6.01 (s, 1H), 5.84 (d, *J* = 18.0 Hz, 1H), 5.33 (d, *J* = 10.8 Hz, 1H), 4.52 (s, 1H), 4.34 (s, 1H), 4.08 (s, 5H), 4.07-4.05 (m, 1H), 3.68 (s, 1H), 2.75 (s, 6H), 2.25 (d, *J* = 6.6 Hz, 1H), 2.12 (t, *J* = 10.8 Hz, 1H), 1.92 (d, *J* = 13.2 Hz, 1H), 1.81 (t, *J* = 11.4 Hz, 1H), 1.50 (d, *J* = 13.8 Hz, 1H), 1.43 (d, *J* = 6.0 Hz, 4H), 1.13 (q, *J* = 12.0 Hz, 1H), 1.02 (q, *J* = 13.2 Hz, 1H), 0.82 (q, *J* = 7.2 Hz, 1H), -0.46 (q, *J* = 12.6 Hz, 1H). ^{13}C NMR (150 MHz, CDCl3) δ 143.0, 140.0 (d, *J* = 11.1 Hz), 139.6, 137.9 (d, *J* = 140.6 Hz), 136.3 (d, *J* = 9.0 Hz), 136.1, 135.8, 135.0 (d, *J* = 21.0 Hz), 132.5 (d, *J* = 19.2 Hz), 129.3, 129.1, 128.2 (d, *J* = 6.3), 128.1, 128.0, 127.2, 126.7, 114.5, 97.8 (d, *J* = 23.1 Hz), 74.0 (d , *J* = 6.0 Hz), 71.2 (d, *J* = 4.2 Hz), 69.7, 69.2 (d, *J* = 3.8 Hz), 69.1, 57.8, 56.8, 46.0 (d, *J* = 10.0 Hz), 32.3, 29.6, 24.8, 23.9, 23.5, 19.7. ^{31}P NMR (162 MHz, CDCl$_3$) δ −24.71 (s). HRMS (ESI) calcd for $C_{46}H_{50}FeN_2O_2PS$ [M + H]$^+$: 781.2675, found: 781.2672.

vinyl-*f*-diaphos L4



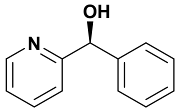
Orange solid, 2.69 g, 68% yield, m.p. 160-161 °C. $[\alpha]_D^{20}$ = -143.6 (c = 0.5, $CHCl_3$). ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.60 (*J* = 7.8 Hz, 2H), 7.50 (d, *J* = 8.4 Hz, 2H), 7.47 (td, *J* = 7.8, 1.8 Hz, 2H), 7.37-7.32 (m, 5H), 7.12-7.09 (m, 1H), 7.03-6.98 (m, 4H), 6.78 (dd, *J* = 17.4, 10.8 Hz, 1H), 6.00 (s, 1H), 5.84 (d, *J* = 17.4 Hz, 1H), 5.32 (d, *J* = 10.8 Hz, 1H), 4.53 (s, 1H), 4.34 (s, 1H), 4.08 (s, 1H), 4.07-4.05 (m, 1H), 3.69 (s, 1H), 2.75 (s, 6H), 2.26 (d, *J* = 12.6 Hz, 1H), 2.12 (t, *J* = 10.8 Hz, 1H), 1.92 (dd, *J* = 15.0, 4.2 Hz, 1H), 1.84-1.80 (m, 1H), 1.52 (d, *J* = 13.8 Hz, 1H), 1.44 (d, *J* = 6.0 Hz, 4H), 1.17-1.10 (m, 1H), 1.05-0.97 (m, 1H), 0.86-0.78 (m, 1H), -0.44 (q, *J* = 12.6 Hz, 1H). ^{13}C NMR (150 MHz, CDCl3) δ 143.0, 140.0 (d, *J* = 11.0 Hz), 139.6, 138.4, 137.5, 136.4 (d, *J* = 9.2 Hz), 136.2, 135.8, 134.9 (d, *J* = 21.0 Hz), 132.5 (d, *J* = 19.2 Hz), 129.3, 129.1, 128.2 (d, *J* = 6.6 Hz), 128.1, 128.0, 127.2, 126.7, 114.5, 97.8 (d, *J* = 23.0 Hz), 74.0 (d, *J* = 6.2 Hz), 71.2 (d, *J* = 4.0 Hz), 69.7, 69.2 (d, *J* = 3.8 Hz), 69.1, 57.8, 56.8, 46.0 (d, *J* = 9.8 Hz), 32.3, 29.6, 24.8, 24.0, 23.5, 19.7. ^{31}P NMR (162 MHz, $CDCl_3$) δ −24.73 (s). HRMS (ESI) calcd for $C_{46}H_{50}FeN_2O_2PS$ $[M + H]^+$: 781.2675, found: 781.2674.

(*R*)-phenyl(pyridin-2-yl)methanol [(*R*)-2a]



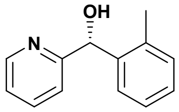
White solid, 99% yield, 368.2 mg, >99% *ee*. $[\alpha]_D^{20}$ = -1.6 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = -1.2 (c = 0.5, EtOH), >99% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 0.8 mL/min; UV detection at 210 nm; t_R (*R*) = 14.13 min (major), t_R (*S*) = 17.97 min (minor). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.60 (t, *J* = 7.6 Hz, 1H), 7.42 (d, *J* = 6.8 Hz, 2H), 7.35 (t, *J* = 7.6 Hz, 2H), 7.31-7.27 (m, 1H), 7.21 (d, *J* = 8.0 Hz, 1H), 7.19-7.15 (m, 1H), 5.78 (s, 1H), 5.51 (br s, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 161.2, 147.9, 143.3, 136.9, 128.5, 127.8, 127.0, 122.4, 121.3, 75.1. HRMS (ESI) calcd for $C_{12}H_{12}NO$ $[M+H]^+$: 186.0913, found: 186.0911.

(*S*)-phenyl(pyridin-2-yl)methanol [(*S*)-2a]



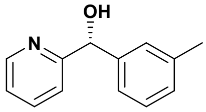
White solid, 99% yield, 366.6 mg, >99% *ee*. $[\alpha]_D^{20}$ = +2.1 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = +2.0 (c = 0.5, EtOH), >99% *ee* (*S*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 0.8 mL/min; UV detection at 210 nm; t_R (*R*) = 14.10 min (minor), t_R (*R*) = 18.50 min (major). Spectral data were in agreement with those of the enantiomer reported above.

(*R*)-pyridin-2-yl(o-tolyl)methanol [(*R*)-2b]



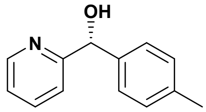
White solid, 99% yield, 393.6 mg, >99% *ee*. $[\alpha]_D^{20}$ = +54.1 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = +56.4 (c = 0.5, EtOH), >99% *ee* (*R*)].. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R (*S*) = 13.19 min (minor), t_R (*R*) = 17.30 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 8.54 (d, *J* = 4.0 Hz, 1H), 7.59 (td, *J* = 7.2, 1.6 Hz, 1H), 7.28 (d, *J* = 6.8 Hz, 1H), 7.21-7.15 (m, 4H), 7.05 (d, 7.6 Hz, 1H), 5.98 (s, 1H), 5.36 (br s, 1H), 2.33 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 161.6, 148.3, 141.2, 137.4, 136.7, 131.3, 128.5, 128.3, 126.6, 122.8, 121.7, 73.4, 20.0. HRMS (ESI) calcd for $C_{13}H_{14}NO$ $[M+H]^+$: 200.1070, found: 200.1074.

(*R*)-pyridin-2-yl(m-tolyl)methanol [(*R*)-2c]



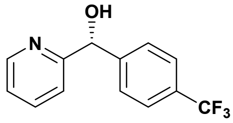
White solid, 98% yield, 396.1 mg, >99% *ee*. $[\alpha]_D^{20}$ = +4.2 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = +3.3 (c = 0.5, EtOH), >99% *ee* (*R*)].. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R (*S*) = 14.85 min (minor), t_R (*R*) = 21.41 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 8.58 (d, *J* = 5.2 Hz, 1H) 7.64 (td, *J* = 8.0, 2.0 Hz, 1H), 7.29-7.19 (m, 5H), 7.12 (d, *J* = 7.2 Hz, 1H), 5.76 (s, 1H), 5.40 (br s, 1H), 2.36 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 161.2, 147.9, 143.2, 138.3, 136.9, 128.6, 128.5, 127.7, 124.2, 124.4, 121.4, 75.1, 21.5. HRMS (ESI) calcd for $C_{13}H_{14}NO$ $[M+H]^+$: 200.1070, found: 200.1077.

(*R*)-pyridin-2-yl(p-tolyl)methanol [(*R*)-2d]



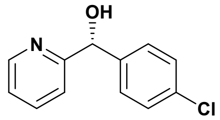
White solid, 98% yield, 388.9 mg, >99% *ee*. $[\alpha]_D^{20}$ = +6.7 (c = 0.5, EtOH), [lit.[7] $[i]^{20}_D$ = +5.9 (c = 0.5, EtOH), >99% *ee* (*R*)].. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R (*S*) = 15.77 min (minor), t_R (*R*) = 18.68 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 8.56 (d, *J* = 5.2 Hz, 1H), 7.60 (td, *J* = 7.6, 1.6 Hz, 1H), 7.26 (d, *J* = 8 Hz, 2H), 7.20-7.13 (m, 4H), 5.72 (s, 1H), 5.22 (br s, 1H), 2.33 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 161.2, 147.9, 140.4, 137.6, 136.9, 129.4, 127.1, 122.5, 121.4, 74.9, 21.3. HRMS (ESI) calcd for $C_{13}H_{14}NO$ $[M+H]^+$: 200.1070, found: 200.1071.

(*R*)-pyridin-2-yl(4-(trifluoromethyl)phenyl)methanol [(*R*)-2e]



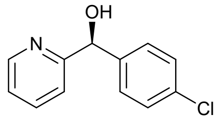
Colorless oil, 97% yield, 491.4 mg, 99% *ee*. $[\alpha]_D^{20}$ = -7.8 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = -6.3 (c = 0.5, EtOH), 96% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R (*S*) = 12.07 min (minor), t_R (*R*) = 15.62 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 8.55 (d, *J* = 4.4 Hz, 1H), 7.64 (td, *J* = 7.6, 1.6 Hz, 1H), 7.58 (d, *J* = 8 Hz, 2H), 7.51 (d, *J* = 8 Hz, 2H), 7.22-7.19 (m, 1H), 7.16 (d, *J* = 8 Hz, 1H), 5.81 (s, 1H), 5.46 (br s, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 160.2, 148.2, 147.3, 137.2, 130.0 (q, *J* = 32.4 Hz), 127.4, 125.6 (q, *J* = 3.8 Hz), 124.2 (q, *J* = 270 Hz), 122.9, 121.4, 74.6. HRMS (ESI) calcd for $C_{13}H_{11}F_3NO$ $[M+H]^+$: 254.0787, found: 254.0789.

(*R*)-(4-chlorophenyl)(pyridin-2-yl)methanol [(*R*)-2f]



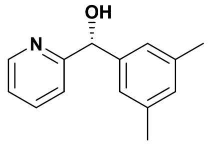
White solid, 98% yield, 433.5.1 mg, >99% *ee*. $[\alpha]_D^{20}$ = -1.2 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = -0.8 (c = 0.5, EtOH), >99% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R (*S*) = 11.31 min (minor), t_R (*R*) = 14.94 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 8.53 (d, *J* = 4.8 Hz, 1H), 7.62 (td, *J* = 7.6, 1.6 Hz, 1H), 7.32-7.27 (m, 4H), 7.18 (d, *J* = 7.6, 5.2 Hz, 1H), 7.14 (d, *J* = 8.0 Hz, 1H), 5.72 (s, 1H), 5.40 (br s, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 160.6, 148.1, 141.8, 137.1, 133.7, 128.8, 128.5, 122.7, 121.3, 74.5. HRMS (ESI) calcd for $C_{12}H_{11}ClNO$ $[M+H]^+$: 220.0524, found: 220.0526.

(*S*)-(4-chlorophenyl)(pyridin-2-yl)methanol [(*S*)-2f]



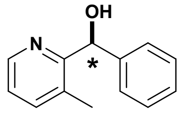
White solid, 99% yield, 435.4 mg, 99.6% *ee*. $[\alpha]_D^{20}$ = +7.5 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = +7.7 (c = 0.5, EtOH), >99% *ee* (*S*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 0.8 mL/min; UV detection at 210 nm; t_R (*S*) = 11.20 min (major), t_R (*R*) = 14.98 min (minor). Spectral data were in agreement with those of the enantiomer reported above.

(*R*)-(3,5-dimethylphenyl)(pyridin-2-yl)methanol [(*R*)-2g]



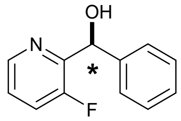
White solid, 97% yield, 413.6 mg, >99% *ee*. $[\alpha]_D^{20}$ = +3.2 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = +3.6 (c = 0.5, EtOH), >99% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t$_R$ (*S*) = 10.63 min (minor), t$_R$ (*R*) = 16.58 min (major). **^{1}H-NMR** (400 MHz, CDCl$_3$) δ 8.55 (d, *J* = 4.8 Hz, 1H), 7.61 (td, *J* = 7.6, 1.6 Hz, 1H), 7.18 (t, *J* = 8.0 Hz, 2H), 7.00 (s, 2H), 6.92 (s, 1H), 5.69 (s, 1H), 5.31 (br s, 1H), 2.30 (s, 6H). **^{13}C NMR** (100 MHz, CDCl$_3$) δ 161.2, 147.8, 143.2, 138.2, 136.9, 129.6, 124.9, 122.4, 121.4, 75.1, 21.4. HRMS (ESI) calcd for $C_{14}H_{16}NO$ [M+H]$^+$: 214.1226, found: 214.1222.

(+)-(3-methylpyridin-2-yl)(phenyl)methanol [(+)-2h]



colorless oil, 94% yield, 374.5 mg, >99% *ee*. $[\alpha]_D^{20}$ = +0.8 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = +0.5 (c = 0.5, EtOH), >99% *ee*]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 214 nm; t$_R$ = 15.04 min (minor), t$_R$ = 18.13 min (major). **^{1}H-NMR** (400 MHz, CDCl$_3$) δ 8.48 (d, *J* = 4.4 Hz, 1H), 7.44 (dt, *J* = 7.6, 0.8 Hz, 1H), 7.33-7.23 (m, 5H), 7.18 (dd, *J* = 8, 5.2 Hz, 1H), 5.76 (s, 1H), 2.09 (s, 3H). **^{13}C NMR** (100 MHz, CDCl$_3$) δ 157.9, 145.0, 142.4, 138.6, 130.5, 128.5, 127.8, 127.7, 122.7, 72.6, 17.9. HRMS (ESI) calcd for $C_{16}H_{14}NO$ [M+H]$^+$: 200.1070, found: 200.1073.

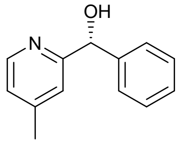
(+)-(3-fluoropyridin-2-yl)(phenyl)methanol[(+)-2i]



White solid, 95% yield, 386.7 mg, >99% *ee*. $[\alpha]_D^{20}$ = +4.1 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = +4.4 (c = 0.5, EtOH), >99% *ee*]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 214 nm; t$_R$ = 17.05 min (minor), t$_R$ = 20.25 min (major). **^{1}H-NMR** (400 MHz, CDCl$_3$) δ 8.42 (d, *J* = 4.4 Hz, 1H), 7.44 (d, *J* = 8.4 Hz, 2H), 7.37-7.33 (m, 3H), 7.31-7.23 (m, 2H), 6.05 (s, 1H), 5.38 (br s, 1H). **^{13}C NMR** (100 MHz, CDCl$_3$) δ 156.2 (d, *J* = 256.0

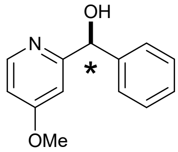
Hz), 149.1 (d, J = 16.3 Hz), 144.0 (d, J = 5.1 Hz), 142.2, 128.2, 127.9, 126.8 (d, J = 1.6 Hz), 124.1 (d, J = 3.6 Hz), 123.6 (d, J = 18.1 Hz), 70.2 (d, J = 2.6 Hz). HRMS (ESI) calcd for $C_{12}H_{11}FNO$ $[M+H]^+$: 204.0819, found: 204.0814.

(*R*)-(3-fluoropyridin-2-yl)(phenyl)methanol[(*R*)-2j]



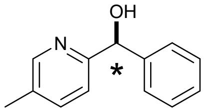
White solid, 99% yield, 393.3 mg, >99% *ee*. $[\alpha]_D^{20}$ = +44.1 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = +42.0 (c = 0.5, EtOH), >99% *ee*]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R (*S*)= 17.16 min (minor), t_R (*R*)= 26.06 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 8.42 (d, J = 4.8 Hz, 1H), 7.41 (dd, J = 8.8, 2.0 Hz, 2H), 7.38-7.34 (m, 2H), 7.32-7.28 (m, 1H), 7.02 (d, J = 4.8 Hz, 1H), 7.00 (s, 1H), 5.74 (s, 1H), 5.46 (br s, 1H), 2.30 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ160.9, 148.2, 147.6, 143.5, 128.6, 127.8, 127.1, 123.6, 122.1, 75.0, 75.0, 21.2. HRMS (ESI) calcd for $C_{13}H_{14}NO$ $[M+H]^+$: 200.1070, found: 200.1065.

(+)-(4-methoxypyridin-2-yl)(phenyl)methanol [(+)-2k]



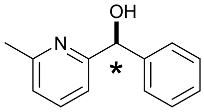
White solid, 99% yield, 426.6 mg, 99.3% *ee*. $[\alpha]_D^{20}$ = +5.2 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = +5.8 (c = 0.5, EtOH), >99% *ee*]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R = 20.66 min (minor), t_R = 37.00 min (major). **^{1}H-NMR** (600 MHz, $CDCl_3$) δ 8.35 (d, J = 5.4 Hz, 1H), 7.41 (d, J = 7.2 Hz, 2H), 7.35 (t, J = 7.8 Hz, 2H), 7.28 (t, J = 7.2 Hz, 1H), 6.72-6.71 (m, 2H), 5.72 (s, 1H), 5.44 (br s, 1H), 3.77 (s, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ 166.4, 163.2, 149.2, 143.3, 128.6, 127.8, 127.0, 109.1, 106.8, 75.2, 55.2. HRMS (ESI) calcd for $C_{13}H_{14}NO$ $[M+H]^+$: 216.1019, found: 216.1011.

(+)-(5-methylpyridin-2-yl)(phenyl)methanol [(+)-2i]



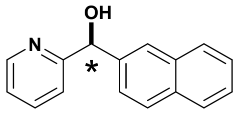
White solid, 99% yield, 395.0 mg, >99% *ee*. $[\alpha]_D^{20}$ = +19.6 (c = 0.5, EtOH). The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R = 15.94 min (minor), t_R = 19.61 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 8.37 (s, 1H), 7.44-7.40 (m, 3H), 7.37-7.33 (m, 2H), 7.28 (tt, *J* = 6.8, 1.6 Hz, 1H), 7.09 (d, *J* = 8.0 Hz, 1H), 5.76 (s, 1H), 5.46 (br s, 1H), 2.32 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.4, 148.1, 143.5, 137.6, 131.9, 128.5, 127.7, 127.0, 120.8, 74.9, 18.1. HRMS (ESI) calcd for $C_{13}H_{14}NO$ $[M+H]^+$: 200.1070, found: 200.1066.

(-)-(5-methylpyridin-2-yl)(phenyl)methanol [(-)-2m]



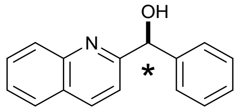
White solid, 99% yield, 395.7 mg, 99% *ee*. $[\alpha]_D^{20}$ = -20.4 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = -25.2 (c = 0.5, EtOH), >99% *ee*]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R = 9.23 min (minor), t_R = 10.57 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.51 (t, *J* = 7.6 Hz, 1H), 7.41-7.34 (m, 4H), 7.31-7.28 (m, 1H), 7.06 (d, *J* = 7.6 Hz, 1H), 6.92 (d, *J* = 8.0 Hz, 1H), 5.72 (s, 2H), 2.61 (s, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 159.9, 156.8, 143.5, 137.2, 128.6, 127.8, 127.2, 121.9, 118.4, 74.7, 24.3. HRMS (ESI) calcd for $C_{13}H_{14}NO$ $[M+H]^+$: 200.1070, found: 200.1068.

(+)-naphthalen-2-yl(pyridin-2-yl)methanol [(+)-2h]



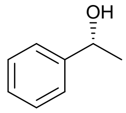
White solid, 99% yield, 463.7 mg, >99% *ee*. $[\alpha]_D^{20}$ = +1.6 (c = 0.5, EtOH), [lit.[7] $[\alpha]^{20}_D$ = +1.3 (c = 0.5, EtOH), >99% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R (*S*) = 24.61 min (minor), t_R (*R*) = 32.73 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 8.58 (dd, *J* = 5.2, 2.0 Hz, 1H), 7.90 (s, 1H), 7.86-7.79 (m, 3H), 7.58 (td, *J* = 7.6, 2.0 Hz, 1H), 7.51-7.43 (m, 3H), 7.19-7.17 (m, 2H), 5.93 (s, 1H), 5.53 (br s, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 160.9, 147.9, 140.6, 137.0, 133.4, 133.2, 128.6, 128.1, 127.8, 126.3, 126.2, 126.1, 124.9, 122.6, 121.6, 75.3. HRMS (ESI) calcd for $C_{16}H_{14}NO$ $[M+H]^+$: 236.1070, found: 236.1069.

(+)-phenyl(quinolin-2-yl)methanol [(+)-2o]



White solid, 94% yield, 442.8 mg, 95.4% *ee*. $[\alpha]_D^{20}$ = +5.2 (c = 0.5, EtOH). The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R (*S*) = 22.55 min (minor), t_R (*R*) = 24.09 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 8.16 (d, *J* = 8.4 Hz, 1H), 8.04 (d, *J* = 8.4 Hz, 1H), 7.79 (d, *J* = 7.6 Hz, 1H), 7.78-7.74 (m, 1H), 7.57-7.53 (m, 1H), 7.44-7.42 (m, 2H), 7.37-7.33 (m, 2H), 7.29 (tt, *J* = 6.8, 3.2 Hz, 1H), 7.19 (d, *J* = 8.4 Hz, 1H), 6.11 (br s, 1H), 5.89 (s, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 160.6, 146.1, 142.9, 137.1, 130.0, 128.9, 128.7, 128.1, 127.7, 127.6, 127.6, 126.7, 119.4, 75.3. HRMS (ESI) calcd for $C_{16}H_{14}NO$ $[M+H]^+$: 236.1070, found: 236.1072.

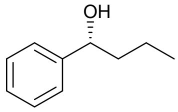
(*R*)-1-phenylethan-1-ol [(*R*)-4a]



Colorless oil, 99% yield, 242.2 mg, 97.8% *ee*. $[\alpha]_D^{20}$ = +74.5 (c = 0.5, $CHCl_3$), [lit.[1]

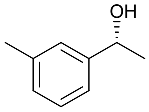
$[\alpha]^{20}_{D}$ = +65.3 (c = 0.5, $CHCl_3$), 95.4% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak OJ-H column, hexane: isopropanol = 95:5; flow rate = 0.5 mL/min; UV detection at 214 nm; t_R (*S*) = 21.46 min (minor), t_R (*R*) = 24.91 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.41-7.36 (m, 4H), 7.32-7.28 (m, 1H), 4.90 (q, *J* = 6.4 Hz, 1H), 2.15 (br s, 1H), 1.52 (d, *J* = 6.4 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 145.9, 128.6, 127.6, 125.5, 70.5, 25.2. HRMS (ESI) calcd for $C_8H_{11}O$ $[M+H]^+$: 123.0804, found: 123.0801.

(*R*)-1-phenylbutan-1-ol [(*R*)-4b]



White solid, 99% yield, 297.8 mg, 97.3% *ee*. $[\alpha]_D^{20}$ = +24.1 (c = 0.5, $CHCl_3$), [lit.[1] $[\alpha]^{20}_{D}$ = -33.2 (c = 0.5, $CHCl_3$), 98.5% *ee* (*S*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 97:3; flow rate = 0.8 mL/min; UV detection at 214 nm; t_R (*R*) = 16.54 min (major), t_R (*S*) = 18.69 min (minor). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.40-7.33 (m, 4H), 7.32-7.28 (m, 1H), 4.68 (t, *J* = 6.4 Hz, 1H), 2.20 (br s, 1H), 1.86-1.77 (m, 1H), 1.74-1.65 (m, 1H), 1.49-1.41 (m, 1H), 1.35-1.30 (m, 1H), 0.96 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 145.0, 128.5, 127.5, 126.0, 74.5, 41.3, 19.1, 14.1. HRMS (ESI) calcd for $C_{10}H_{15}O$ $[M+H]^+$: 151.1117, found: 151.1115.

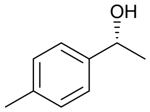
(*R*)-1-(*m*-tolyl)ethan-1-ol [(*R*)-4c]



Colorless oil, 99% yield, 270.4 mg, 98.2% *ee*. $[\alpha]_D^{20}$ = +49.1 (c = 0.5, $CHCl_3$), [lit.[1] $[\alpha]^{20}_{D}$ = -36.0 (c = 0.5, $CHCl_3$), 98.8% *ee* (*S*)]. The *ee* was determined by HPLC on Chiralpak OJ-H column, hexane: isopropanol = 95:5; flow rate = 0.8 mL/min; UV detection at 214 nm; t_R (*S*) = 16.24 min (minor), t_R (*R*) = 17.45 min (major). **^{1}H-NMR**

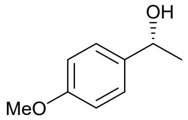
(400 MHz, $CDCl_3$) δ 7.28, (t, *J* = 7.6 Hz, 1H), 7.20 (t, *J* = 7.6 Hz, 2H), 7.13 (d, *J* = 7.6 Hz, 1H), 4.86 (q, *J* = 6.4 Hz, 1H), 2.44 (d, *J* = 3.2 Hz, 1H), 2.41 (s, 3H), 1.51 (d, *J* = 6.4 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 145.9, 138.1, 128.4, 128.2, 126.2, 122.5, 70.4, 25.1, 21.5. HRMS (ESI) calcd for $C_9H_{13}O$ $[M+H]^+$: 137.0961 found: 137.0966.

(*R*)-1-(*p*-tolyl)ethan-1-ol [(*R*)-4d]



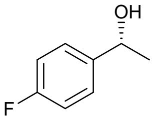
Colorless oil, 99% yield, 271.2 mg, 98.1% *ee*. $[\alpha]_D^{20}$ = +33.5 (c = 0.5, $CHCl_3$), [lit.[1] $[\alpha]^{20}_D$ = -27.6 (c = 0.5, $CHCl_3$), 97.9% *ee* (*S*)]. The *ee* was determined by HPLC on Chiralpak OJ-H column, hexane: isopropanol = 95:5; flow rate = 0.8 mL/min; UV detection at 214 nm; t_R (*S*) = 18.95 min (minor), t_R (*R*) = 22.32 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.29 (d, *J* = 8.0 Hz, 2H), 7.19 (d, *J* = 7.6 Hz, 2H), 4.89 (q, *J* = 6.4 Hz, 1H), 2.37 (s, 3H), 1.91 (br s, 1H), 1.51 (d, *J* = 6.4 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 143.0, 137.3, 129.3, 125.5, 70.4, 25.2, 21.2. HRMS (ESI) calcd for $C_9H_{13}O$ $[M+H]^+$: 137.0961 found: 137.0965.

(*R*)-1-(4-methoxyphenyl)ethan-1-ol [(*R*)-4e]



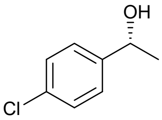
Colorless oil, 99% yield, 301.4 mg, 97.6% *ee*. $[\alpha]_D^{20}$ = +46.4 (c = 0.5, $CHCl_3$), [lit.[1] $[\alpha]^{20}_D$ = -51.6 (c = 0.5, $CHCl_3$), 97.7% *ee* (*S*)]. The *ee* was determined by HPLC on Chiralpak OJ-H column, hexane: isopropanol = 98:2; flow rate = 0.8 mL/min; UV detection at 214 nm; t_R (*R*) = 29.89 min (major), t_R (*S*) = 32.86 min (minor). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.28 (d, *J* = 8.0 Hz, 2H), 6.87 (d, *J* = 8.4 Hz, 2H), 4.82 (q, *J* = 6.4 Hz, 1H), 3.79 (s, 3H), 2.24 (br s, 1H), 1.46 (d, *J* = 6.4 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 159.0, 138.1, 126.8, 113.9, 70.0, 55.4, 25.1. HRMS (ESI) calcd for $C_9H_{13}O_2$ $[M+H]^+$: 153.0910 found: 153.0911.

(*R*)-1-(4-fluorophenyl)ethan-1-ol [(*R*)-4f]



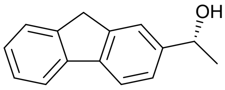
Colorless oil, 99% yield, 277.4 mg, 98.1% *ee*. $[\alpha]_D^{20}$ = +38.7 (c = 0.5, $CHCl_3$), [lit.[1] $[\alpha]^{20}_D$ = -29.6 (c = 0.5, $CHCl_3$), 95.8% *ee* (*S*)]. The *ee* was determined by HPLC on Chiralpak OJ-H column, hexane: isopropanol = 98:2; flow rate = 0.8 mL/min; UV detection at 214 nm; t_R (*S*) = 35.22 min (minor), t_R (*R*) = 38.06 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.30 (dd, *J* = 8.4, 5.2 Hz, 2H), 7.02 (t, *J* = 8.8 Hz, 2H), 4.82 (q, *J* = 6.4 Hz, 1H), 2.85-2.78 (m, 1H), 1.44 (d, *J* = 6.4 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 162.1 (d, *J* = 243.4 Hz), 141.6 (d, *J* = 3.1 Hz), 127.2 (d, *J* = 7.8 Hz), 115.2 (d, *J* = 21.2 Hz), 69.7, 25.2. HRMS (ESI) calcd for $C_8H_{10}OF$ $[M+H]^+$: 141.0710 found: 141.0708.

(*R*)-1-(4-chlorophenyl)ethan-1-ol [(*R*)-4g]



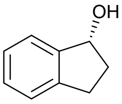
Colorless oil, 99% yield, 310.0 mg, 96.7% *ee*. $[\alpha]_D^{20}$ = +5.0 (c = 0.5, $CHCl_3$), [lit.[1]$[\alpha]^{20}_D$ = -5.2 (c = 0.5, $CHCl_3$), 97.0% *ee* (*S*)]. The *ee* was determined by HPLC on Chiralpak OJ-H column, hexane: isopropanol = 98:2; flow rate = 0.8 mL/min; UV detection at 214 nm; t_R (*S*) = 34.56 min (minor), t_R (*R*) = 38.91 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.33-7.28 (m, 4H), 4.86 (q, *J* = 6.4 Hz, 1H), 2.33 (br s, 1H), 1.46 (d, *J* = 6.8 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 144.3, 133.0, 128.6, 126.8, 69.7, 25.3. HRMS (ESI) calcd for $C_8H_{10}ClO$ $[M+H]^+$: 157.0415 found: 157.0411.

(*R*)-1-(9*H*-fluoren-2-yl)ethan-1-ol [(*R*)-4h]



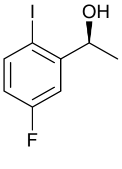
White solid, 99% yield, 416.4 mg, 97.5% *ee*. $[\alpha]_D^{20}$ = +19.7 (c = 0.5, $CHCl_3$), [lit.[1] $[\alpha]^{20}_D$ = -33.2 (c = 0.5, $CHCl_3$), 99.4% *ee* (*S*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 95:5; flow rate = 0.8 mL/min; UV detection at 214 nm; t_R (*S*) = 18.21 min (minor), t_R (*R*) = 21.06 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.78 (d, *J* = 7.6 Hz, 1H), 7.74 (d, *J* = 7.6 Hz, 1H), 7.55 (d, *J* = 8.4 Hz, 2H), 7.41-7.36 (m, 2H), 7.32 (td, *J* = 7.6, 1.2 Hz, 1H), 4.96 (q, *J* = 6.4 Hz, 1H), 3.88 (s, 2H), 2.12 (br s, 1H), 1.56 (d, *J* = 6.4 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ144.6, 143.7, 143.5, 141.5, 141.2, 126.8, 126.7, 125.1, 124.3, 122.2, 119.9, 119.9, 70.7, 37.0, 25.4. HRMS (ESI) calcd for $C_{15}H_{15}O$ $[M+H]^+$: 211.1117 found: 211.1114.

(*R*)-2,3-dihydro-1*H*-inden-1-ol [(*R*)-4i]



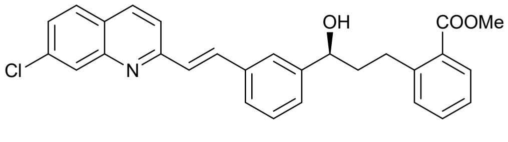
White solid, 99% yield, 268.8 mg, 95.0% *ee*. $[\alpha]_D^{20}$ = -14.2 (c = 0.5, $CHCl_3$), [lit.[8] $[\alpha]^{20}_D$ = -33.0 (c = 0.85, $CHCl_3$), >99% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak OJ-H column, hexane: isopropanol = 95:5; flow rate = 0.8 mL/min; UV detection at 214 nm; t_R (*S*) = 19.31 min (minor), t_R (*R*) = 22.44 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.45-7.43 (m, 1H), 7.28-7.24 (m, 3H), 5.28-5.25 (t, *J* = 6.0 Hz, 1H), 3.12-3.04 (m, 1H), 2.88-2.81 (m, 1H), 2.55-2.47 (m, 1H), 2.02-1.92 (m, 2H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 145.1, 143.4, 128.4, 126.8, 125.0, 124.3, 76.5, 36.0, 29.9. HRMS (ESI) calcd for $C_9H_{11}O$ $[M+H]^+$: 135.0804 found: 135.0802.

(*S*)-1-(5-fluoro-2-iodophenyl)ethan-1-ol [(*S*)-4j]



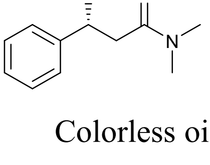
White solid, 98% yield, 521.4 mg, 95.0% *ee*. $[\alpha]_D^{20}$ = +33.9 (c = 0.5, $CHCl_3$). The *ee* was determined by HPLC on Chiralpak IA-H column, hexane: isopropanol = 95:5; flow rate = 0.8 mL/min; UV detection at 214 nm; t_R (*R*) = 25.93 min (minor), t_R (*S*) = 28.090 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.73-7.69 (m, 1H), 7.31-7.27 (m, 1H), 6.75-6.70 (m, 1H), 4.98 (p, *J* = 5.6 Hz, 1H), 2.57-2.33 (m, 1H), 1.43-1.40 (m, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 163.6 (d, *J* = 246.3 Hz), 150.1 (d, *J* = 6.5 Hz), 140.4 (d, *J* = 7.6 Hz), 116.6 (d, *J* = 21.9 Hz), 113.9 (d, *J* = 23.3 Hz), 89.4 (d, *J* = 5 Hz), 75.5, 23.8. HRMS (ESI) calcd for C_8H_9FIO $[M+H]^+$: 266.9677 found: 266.9679.

Methyl-(*S,E*)-2-(3-(3-(2-(7-chloroquinolin-2-yl)vinyl)phenyl)-3-hydroxypropyl)benzoate [(*S*)-4k]



Pale yellow solid, 93% yield, 851.8 mg, 95.0% *ee*. $[\alpha]_D^{20}$ = -7.1 (c = 0.5, $CHCl_3$). The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 75:25; flow rate = 0.5 mL/min; UV detection at 210 nm; t_R (*R*) = 14.85 min (minor), t_R (*S*) = 15.99 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 8.10 (d, *J* = 5.6 Hz, 2H), 7.90 (d, *J* = 7.6 Hz, 1H), 7.72-7.62 (m, 4H), 7.52 (dd, *J* = 6.8, 1.6 Hz, 1H), 7.47-7.41 (m, 3H), 7.36 (t, *J* = 8.0 Hz, 2H), 7.27 (t, *J* = 7.2 Hz, 2H), 4.75 (t, *J* = 6.8 Hz, 1H), 3.89 (s, 3H), 3.13 (q, *J* = 8.0 Hz, 2H), 2.11 (m, 2H), 1.92 (br s, 1H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.4, 163.0, 148.3, 145.0, 144.0, 141.4, 136.1, 153.3, 132.3, 131.2, 130.9, 129.3, 128.8, 128.5, 127.9, 127.5, 126.9, 126.1, 126.1125.2, 123.7, 121.9, 73.4, 52.2, 41.3, 40.8, 35.8, 30.5. HRMS (ESI) calcd for $C_{28}H_{25}ClNO_3$ $[M+H]^+$: 458.1415 found: 458.1418. b

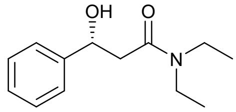
(*R*)-3-hydroxy-*N*,*N*-dimethyl-3-phenylpropanamide [(*R*)-4l]



Colorless oil, 99% yield, 378.8 mg, 99% *ee*. $[\alpha]_D^{20}$ = +65.1 (c = 0.5, $CHCl_3$), [lit.[9]

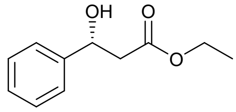
[α]$^{20}{}_{D}$ = +96.2 (c = 0.76, $CHCl_3$), 99% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R (*R*) = 17.66 min (major), t_R (*S*) = 19.21 min (minor). **^{1}H-NMR** (600 MHz, $CDCl_3$) δ 7.40 (d, *J* = 7.8 Hz, 2H), 7.36 (t, *J* = 7.8 Hz, 2H), 7.28 (t, *J* = 7.2 Hz, 1H), 5.14 (dd, *J* = 9.6, 3.0 Hz, 1H), 4.82 (br s, 1H), 2.98 (s, 3H), 2.93 (s, 3H), 2.71-2.60 (m, 2H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ 172.3, 143.2, 128.5, 127.5, 125.8, 70.4, 41.9, 37.1, 35.3. HRMS (ESI) calcd for $C_{11}H_{16}NO_2$ $[M+H]^+$: 194.1176 found: 194.1177.

(*R*)-*N*,*N*-diethyl-3-hydroxy-3-phenylpropanamide [(*R*)-4m]



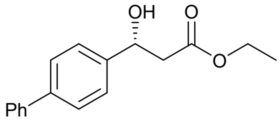
Colorless oil, 99% yield, 438.2 mg, >99% *ee*. [α]$_D{}^{20}$ = +78.1 (c = 0.5, $CHCl_3$), [lit.[9] [α]$^{20}{}_{D}$ = +98.5 (c = 0.64, $CHCl_3$), 98% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 92:8; flow rate = 1 mL/min; UV detection at 210 nm; t_R (*R*) = 14.51 min (major), t_R (*S*) = 16.36 min (minor). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.39 (d, *J* = 8.0 Hz, 2H), 7.34 (td, *J* = 7.2, 1.6 Hz, 2H), 7.26 (td, *J* = 7.2, 1.6 Hz, 1H), 5.12 (dt, *J* = 5.6, 2.8 Hz, 1H), 5.08 (d, *J* = 2.4 Hz, 1H), 3.46-3.31 (m, 2H), 3.26-3.15 (m, 2H), 2.70-2.56 (m, 2H), 1.14-1.08 (m, 6H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 171.4, 143.2, 128.4, 127.4, 125.7, 70.5, 41.9, 41.5, 40.2, 14.0, 12.9. HRMS (ESI) calcd for $C_{13}H_{20}NO_2$ $[M+H]^+$: 222.1489 found: 222.1485.

(*R*)-*N*,*N*-diethyl-3-hydroxy-3-phenylpropanamide [(*R*)-4n]



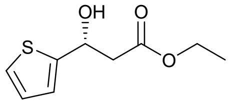
Colorless oil, 99% yield, 381.0 mg, 98.6% *ee*. [α]$_D{}^{20}$ = +16.7 (c = 0.5, $CHCl_3$), [lit.[9] [α]$^{20}{}_{D}$ = +48.4 (c = 1.88, $CHCl_3$), 99% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak OD-H column, hexane: isopropanol = 94:6; flow rate = 1 mL/min; UV detection at 214 nm; t_R (*S*) = 12.68 min (minor), t_R (*R*) = 18.60 min (major). **^{1}H-NMR** (600 MHz, $CDCl_3$) δ 7.38 (q, *J* = 6.6 Hz, 3H), 7.32-7.28 (m, 1H), 5.16 (d, *J* = 9.0 Hz, 1H), 4.20 (q, *J* = 7.2 Hz, 2H), 3.33 (br s, 1H), 2.80-2.71 (m, 2H), 1.28 (t, *J* = 6.6 Hz, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ 172.5, 142.7, 128.7, 127.9, 125.8, 61.0, 43.5, 14.3. HRMS (ESI) calcd for $C_{11}H_{15}O_3$ $[M+H]^+$: 195.1016 found: 195.1011.

Ethyl-(*R*)-3-([1,1'-biphenyl]-4-yl)-3-hydroxypropanoate [(*R*)-4o]



White solid, 99% yield, 535.7 mg, 98.0% *ee*. $[\alpha]_D^{20}$ = +16.1 (c = 0.5, $CHCl_3$), [lit.[9] $[\alpha]^{20}_D$ = +32.9 (c = 0.95, $CHCl_3$), >99% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 94:6; flow rate = 1 mL/min; UV detection at 254 nm; t_R (*S*) = 20.47 min (minor), t_R (*R*) = 23.16 min (major). **^{1}H-NMR** (600 MHz, $CDCl_3$) δ 7.60 (d, *J* = 7.8 Hz, 4H), 7.47-7.40 (m, 4H), 7.36 (t, *J* = 7.2 Hz, 1H), 5.21-5.18 (m, 1H), 4.20 (q, *J* = 6.6 Hz, 2H), 3.48 (d, *J* = 3.6 Hz, 1H), 2.84-2.74 (m, 2H), 1.29 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR** (150 MHz, $CDCl_3$) δ 172.4, 141.7, 140.8, 140.7, 128.8, 127.4, 127.3, 127.1, 126.2, 70.2, 60.9, 43.4, 14.2. HRMS (ESI) calcd for $C_{17}H_{19}O_3$ $[M+H]^+$: 271.1329 found: 271.1327.

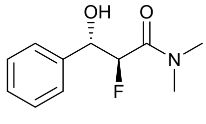
Ethyl-(*R*)-3-hydroxy-3-(thiophen-2-yl)propanoate [(*R*)-4p]



Green liquid, 98% yield, 408.2 mg, 98.4% *ee*. $[\alpha]_D^{20}$ = +11.9 (c = 0.5, $CHCl_3$), [lit.[9] $[\alpha]^{20}_D$ = +25.4 (c = 0.95, $CHCl_3$), >99% *ee* (*R*)]. The *ee* was determined by HPLC on Chiralpak OD-H column, hexane: isopropanol = 94:6; flow rate = 1 mL/min; UV detection at 214 nm; t_R (*S*) = 17.30 min (minor), t_R (*R*) = 30.80 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.24 (dd, *J* = 8.0, 4.4 Hz, 1H), 6.98-6.95 (m, 2H), 5.36 (dd, *J* = 8.0, 3.6 Hz, 1H), 4.18 (q, *J* = 6.8 Hz, 2H), 3.54 (br s, 1H), 2.91-2.80 (m, 2H), 1.26 (t, *J*

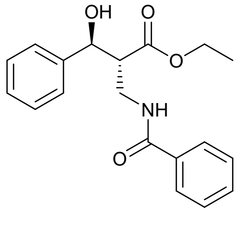
= 7.2 Hz, 3H). **^{13}C NMR** (100 MHz, CDCl$_3$) δ 172.1. 146.4, 126.8, 125.0, 123.7, 66.6, 61.1, 43.3, 14.2. HRMS (ESI) calcd for $C_9H_{12}O_3S$ [M+H]$^+$: 201.0580 found: 201.0581.

(2*S*, 3*S*)-2-fluoro-3-hydroxy-N,N-dimethyl-3-phenylpropanamide [(2*S*, 3*S*)-6a]



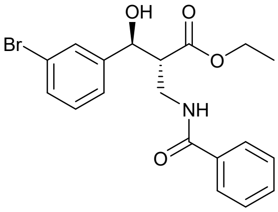
White solid, 94% yield, 397.1 mg, >99% *ee*, 94:6 *dr*. $[\alpha]_D^{20}$ = +351.5 (c = 0.1, CH_2Cl_2), [lit.[10] $[\alpha]^{20}_D$ = +372.0 (c = 0.1, CH_2Cl_2), >99% *ee*, 97:3 *dr* (2*S*, 3*S*)]. The *ee* and *dr* was determined by HPLC on Chiralpak ID-H column, hexane: isopropanol = 90:10; flow rate = 1 mL/min; UV detection at 214 nm; t_{R1} = 26.84 min (major), t_{R2} = 31.17 min (minor), t_{R3} = 34.89 min (minor), t_{R3} = 36.97 min (minor). **^{1}H-NMR** (600 MHz, CDCl$_3$) δ 7.44 (d, *J* = 7.8 Hz, 2H), 7.37 (t, *J* = 7.8 Hz, 2H), 7.32 (t, *J* = 7.2 Hz, 1H), 5.13-5.10 (m, 1H), 4.97 (dd, *J* = 46.8, 7.8 Hz, 1H), 4.24 (d, *J* = 4.2 Hz), 2.98 (d, *J* = 1.2 Hz, 3H), 2.94 (d, *J* = 2.4 Hz, 3H). **^{13}C NMR** (150 MHz, CDCl$_3$) δ 168.0 (d, *J* = 19.6 Hz), 139.0 (d, *J* = 1.6 Hz), 128.5, 128.4, 127.0 (d, *J* = 0.9 Hz), 88.5 (d, *J* = 185.1 Hz), 72.8 (d, *J* = 24.3 Hz), 36.9 (d, *J* = 5.8 Hz), 35.9. HRMS (ESI) calcd for $C_{11}H_{15}FNO_2$ [M+H]$^+$: 212.1081 found: 212.1083.

(2*R*,3*S*)-ethyl-2-(benzamidomethyl)-3-hydroxy-3-phenylpropanoate[(2*R*, 3*S*)-6b]



White solid, 94% yield, 614.9 mg, 99% *ee*, 99:1 *dr*. $[\alpha]_D^{20}$ = - 82.1 (c = 0.5, CHCl$_3$), [lit.[11] $[\alpha]^{20}_D$ = -80.8 (c = 0.5, CHCl$_3$), 99% *ee*, 99:1 *dr* (2*R*, 3*S*)]. The *ee* and d*r* was determined by HPLC on Chiralpak ID-H column, hexane: isopropanol = 90:10; flow rate = 1 mL/min; UV detection at 214 nm; t_{R1} = 26.84 min (major), t_{R2} = 31.17 min (minor), t_{R3} = 34.89 min (minor), t_{R3} = 36.97 min (minor). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.68 (d, *J* = 7.2 Hz, 2H), 7.46 (td, *J* = 7.2, 2.0 Hz, 1H), 7.37-7.23 (m, 7H), 7.11-7.06 (m, 1H), 5.01 (t, *J* = 6.4 Hz, 1H), 4.25-4.18 (m, 1H), 4.06 (qd, *J* = 7.6, 2.4 Hz, 2H), 3.60 (t, *J* = 6.4 Hz, 2H), 3.20 (q, *J* = 6.4 Hz, 1H), 1.10 (td, *J* = 6.8, 2.0 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ173.1, 167.8, 141.2, 133.9, 131.5, 128.5, 128.4, 127.9, 126.9, 126.1, 73.2, 61.0, 52.1, 38.9, 14.0. HRMS (ESI) calcd for $C_{19}H_{22}NO_4$ $[M+H]^+$: 328.1543 found: 328.1544.

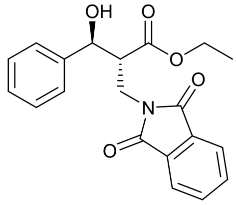
Ethyl-(2*R*,3*S*)-2-(benzamidomethyl)-3-(3-bromophenyl)-3-hydroxypropanoate[(2*R*, 3*S*)-6c]



White solid, 85% yield, 307.7 mg, 96.5% *ee*, 98:2 *dr*. $[\alpha]_D^{20}$ = -25.8 (c = 0.5, $CHCl_3$), [lit.[11] $[\alpha]^{20}_D$ = -15.3 (c = 0.3, $CHCl_3$), 99% *ee*, 99:1 *dr* (2*R*, 3*S*)]. The *ee* was determined by HPLC on Chiralpak IA-H column, hexane: isopropanol = 90:10; flow rate = 0.8 mL/min; UV detection at 214 nm; t_{R1} = 24.42 min (minor), t_{R2} = 25.63 min (minor), t_{R3} = 37.90 min (minor), t_{R3} = 44.06 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.69 (d, *J* = 7.6 Hz, 2H), 7.49-7.44 (m , 2H), 7.36 (t, *J* = 7.2 Hz, 3H), 7.21 (d, *J* = 7.6 Hz, 1H), 7.14 (t, *J* = 8.0 Hz, 1H), 7.06-7.01 (m, 1H), 4.98 (t, *J* = 5.2 Hz, 1H), 4.34-4.29 (m, 1H), 4.12-3.99 (m, 2H), 3.74-3.56 (m, 2H), 3.16 (q, *J* = 6.4 Hz, 1H), 1.10 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.8, 168.1, 143.8, 139.9, 131.8, 130.9, 130.0, 129.2, 128.6, 127.0, 124.8, 122.6, 72.3, 61.2, 52.0, 38.9, 14.0. HRMS (ESI) calcd for $C_{19}H_{21}BrNO_4$ $[M+H]^+$: 406.0648 found: 406.0645.

Ethyl-(2R,3S)-2-((1,3-dioxoisoindolin-2-yl)methyl)-3-hydroxy-3-

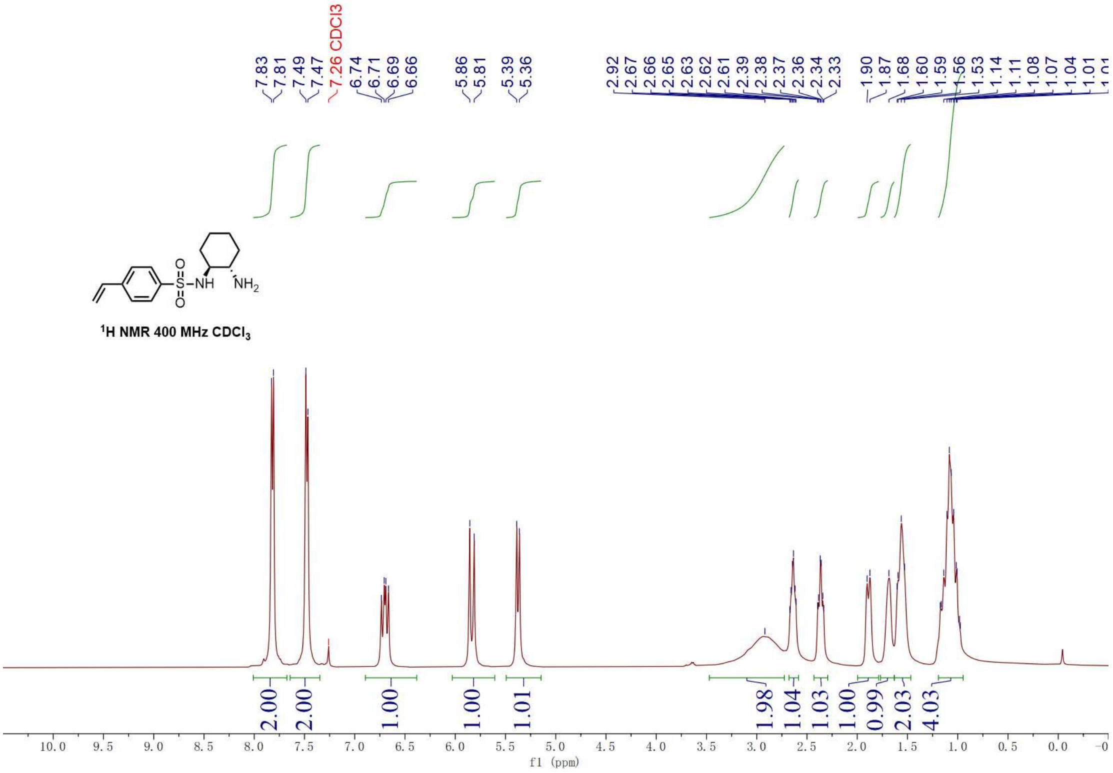
phenylpropanoate [(2*R*, 3*S*)-6d]



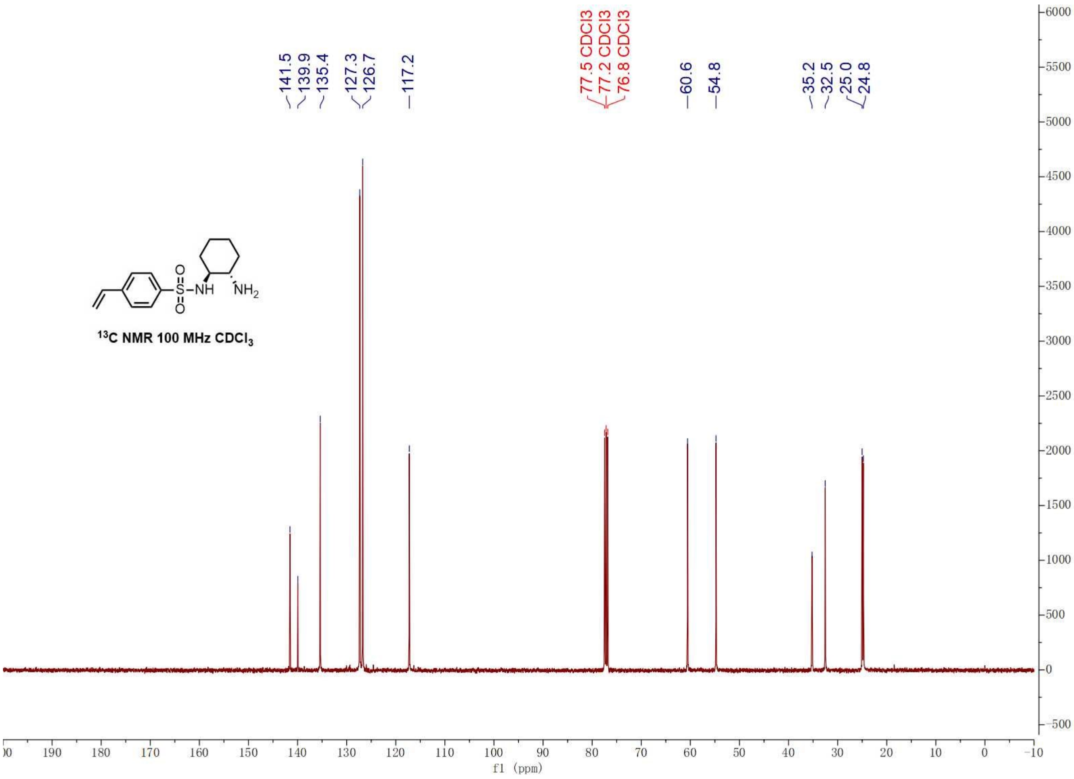
White solid, 87% yield, 614.9 mg, >99% *ee*, 99:1 *dr*. $[\alpha]_D^{20}$ = -23.9 (c = 0.5, $CHCl_3$), [lit.[11] $[\alpha]^{20}_D$ = -28.0 (c = 0.7, $CHCl_3$), 99% *ee*, 98:2 *dr* (2*R*, 3*S*)]. The *ee* was determined by HPLC on Chiralpak IA-H column, hexane: isopropanol = 85:15; flow rate = 0.5 mL/min; UV detection at 214 nm; t_{R1} = 28.10 min (minor), t_{R2} = 34.45 min (minor), t_{R3} = 48.68 min (minor), t_{R3} = 53.81 min (major). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 7.79-7.76 (m, 2H), 7.69-7.66 (m, 2H), 7.35 (d, *J* = 8.0 Hz, 2H), 7.29 (td, *J* = 7.2, 1.6 Hz, 2H), 7.20 (td, *J* = 7.2, 1.6 Hz, 1H), 4.92 (t, *J* = 6.4 Hz, 1H), 4.06-3.97 (m, 3H), 3.75-3.69 (m, 1H), 3.51-3.47 (m,1H), 3.37-3.31 (m, 1H), 0.98 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR** (100 MHz, $CDCl_3$) δ 172.5, 168.0, 140.9, 134.1, 131.8, 128.6, 128.1, 126.3, 123.3, 73.3, 61.3, 50.8, 37.6, 13.8. HRMS (ESI) calcd for $C_{10}H_{20}NO_5$ $[M+H]^+$: 354.1336 found: 354.1333.

7. NMR data characterizations of chiral products

D1

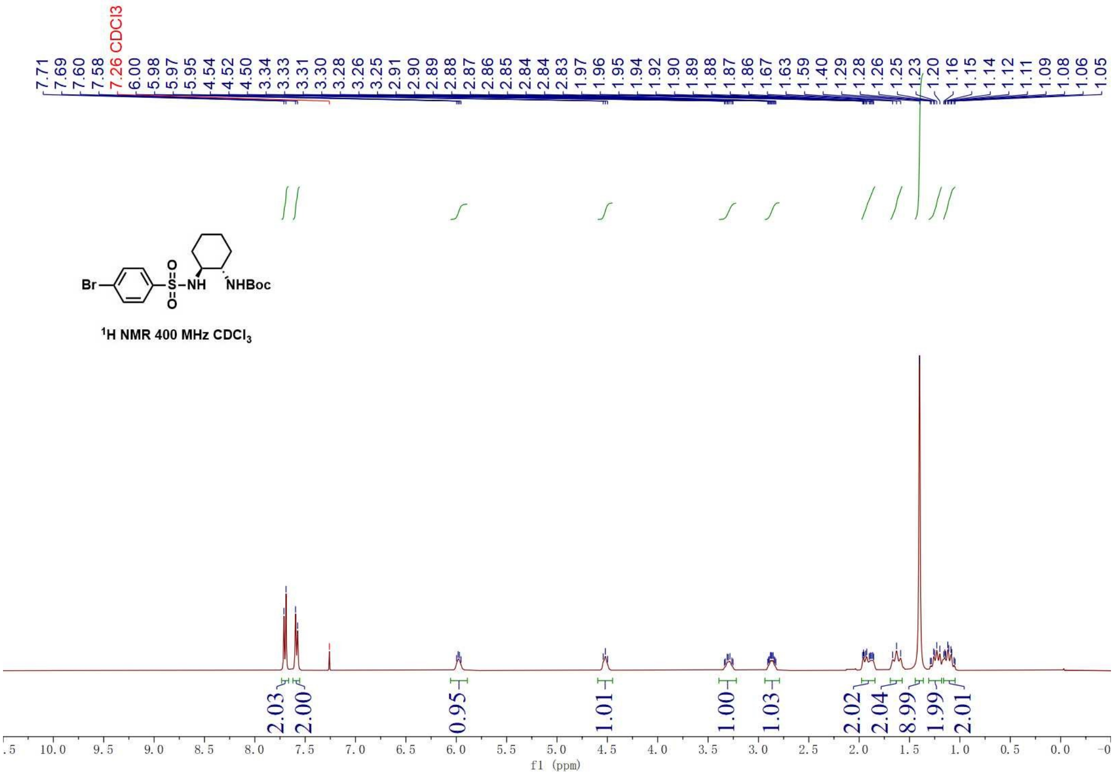


^{1}H NMR (400 MHz) in CDCl$_3$

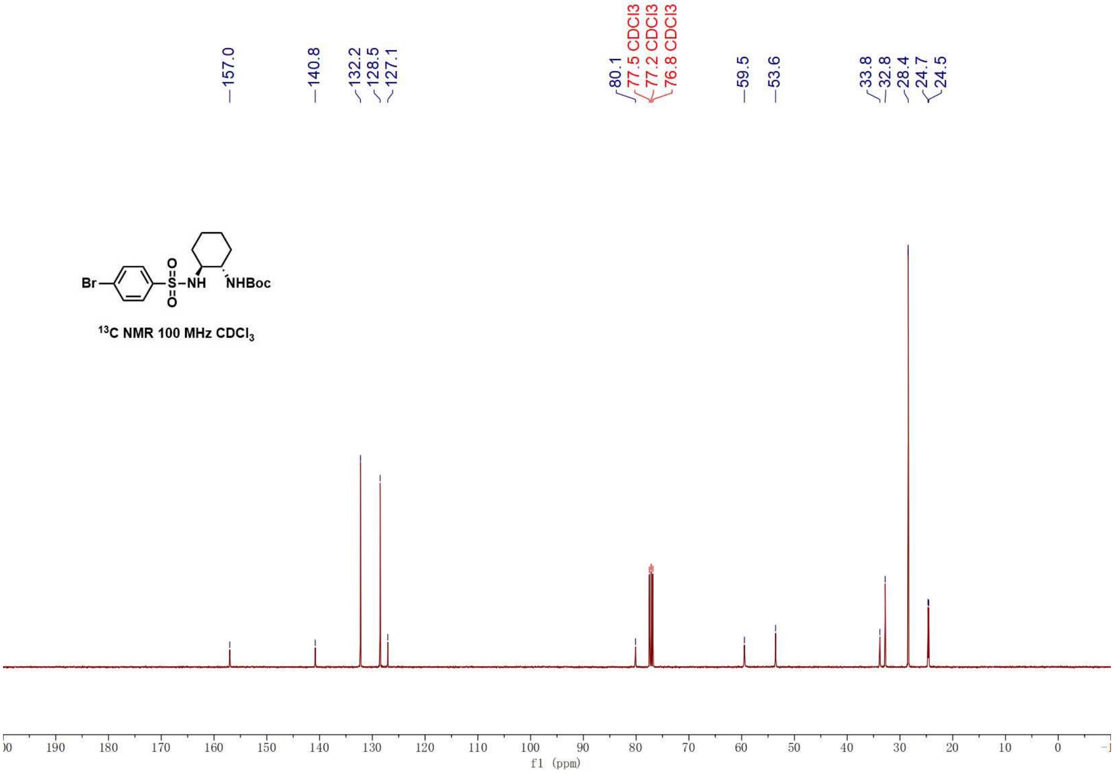


^{13}C NMR (100 MHz) in CDCl$_3$

C2

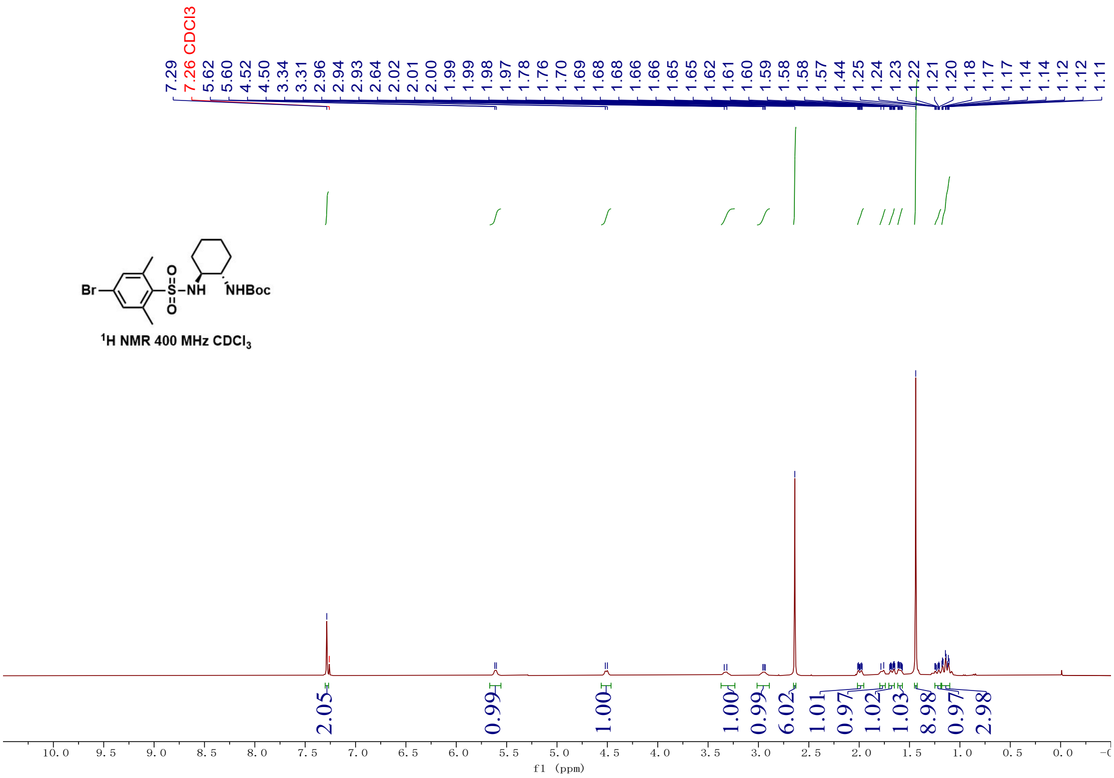


^{1}H NMR (400 MHz) in CDCl$_3$

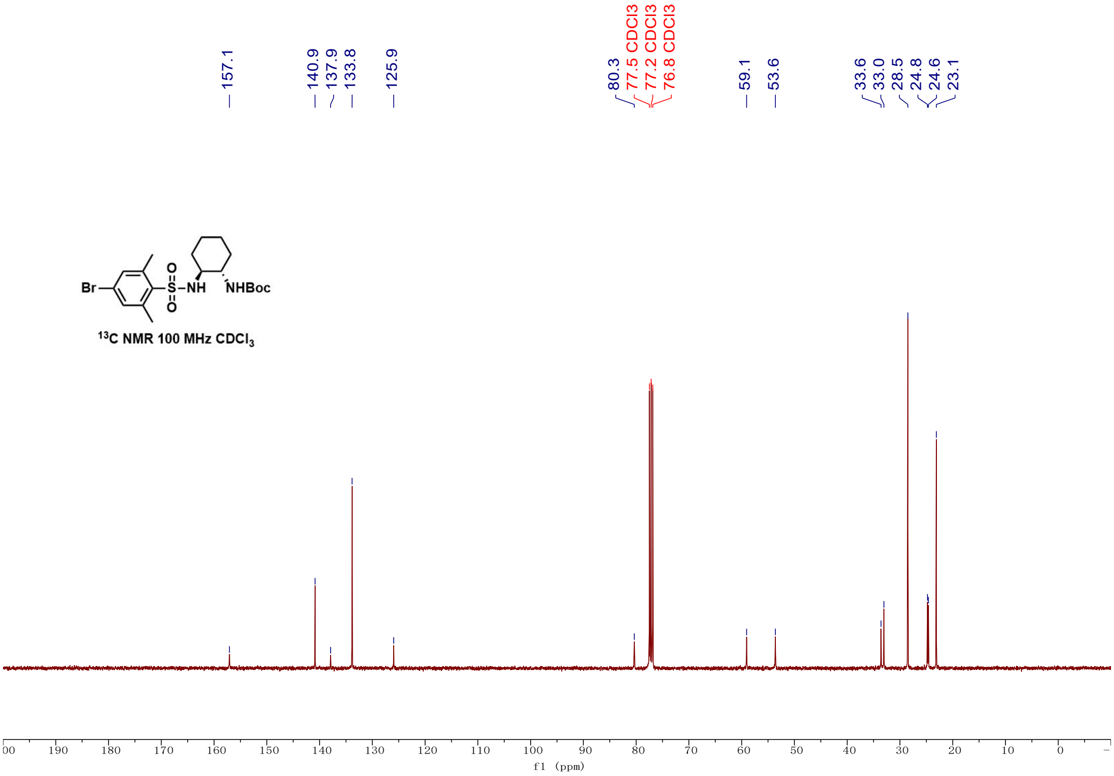


^{13}C NMR (100 MHz) in CDCl$_3$

C3

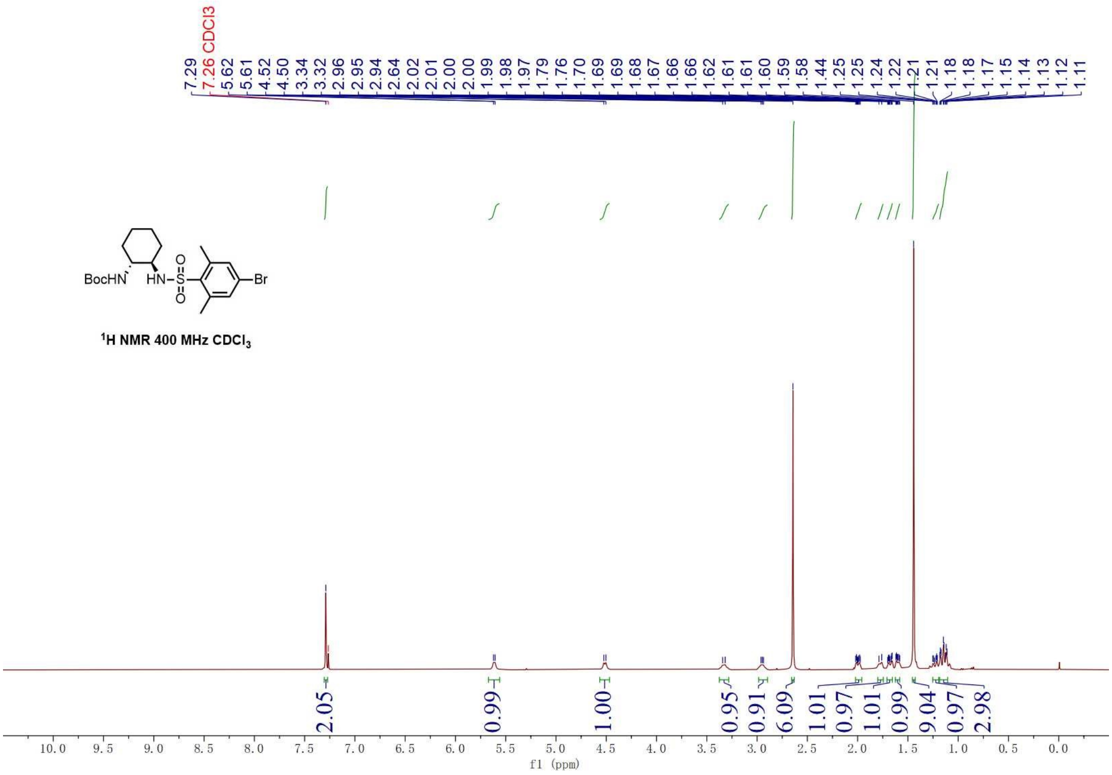


^{1}H NMR (400 MHz) in CDCl$_3$

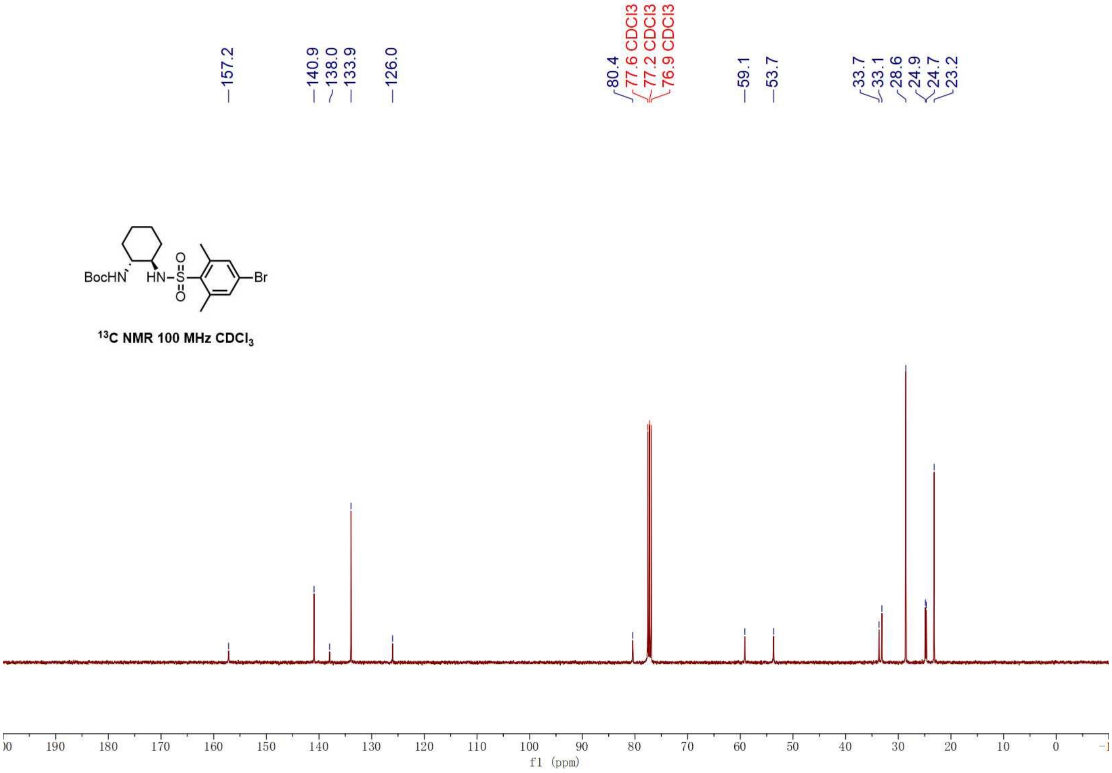


^{13}C NMR (100 MHz) in CDCl$_3$

C4

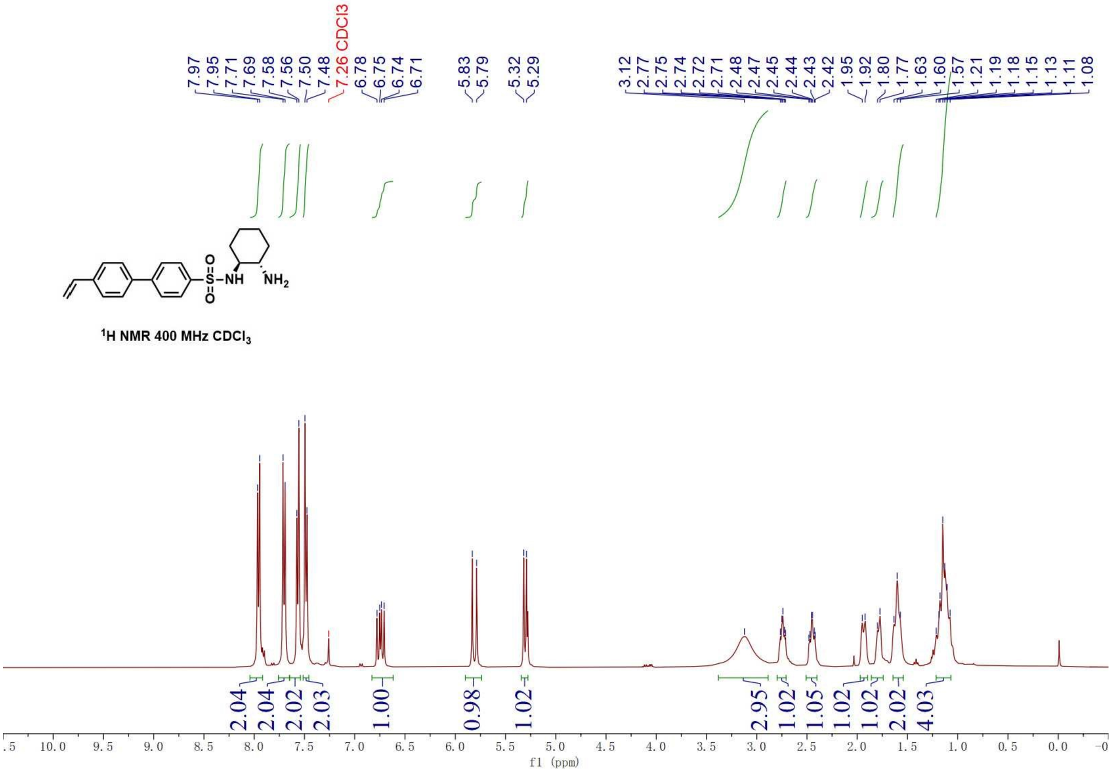


^{1}H NMR (400 MHz) in $CDCl_3$

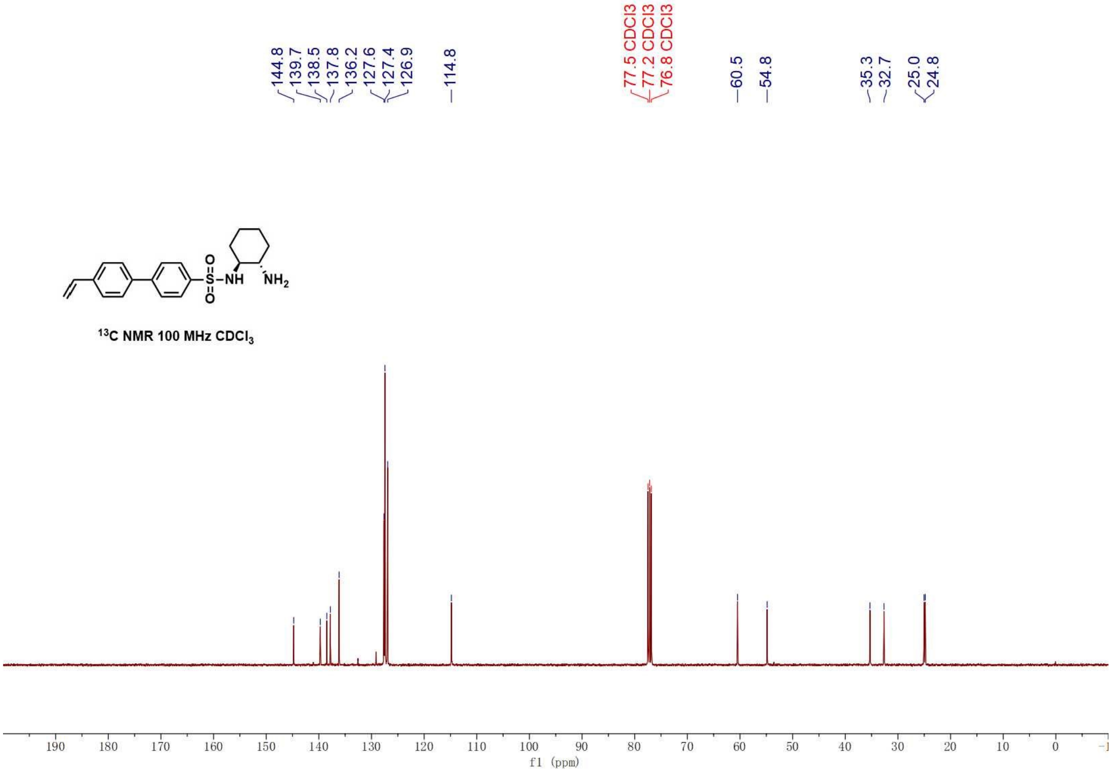


^{13}C NMR (100 MHz) in $CDCl_3$

D2

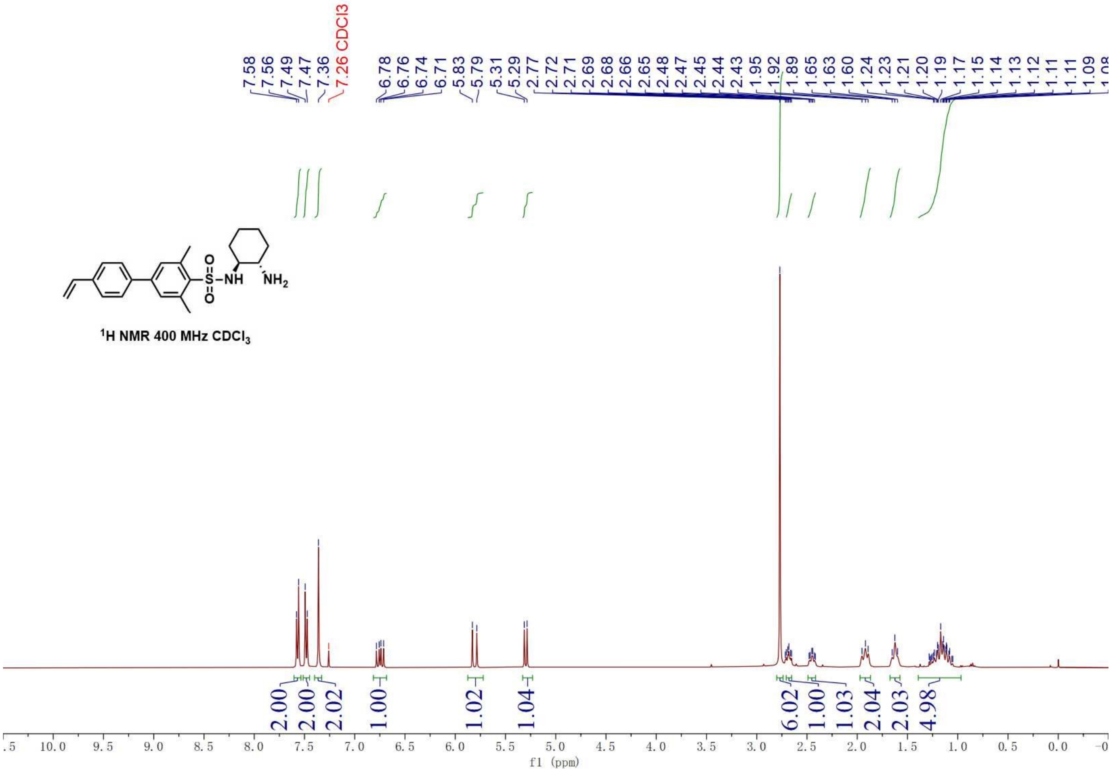


^{1}H NMR (400 MHz) in CDCl$_3$

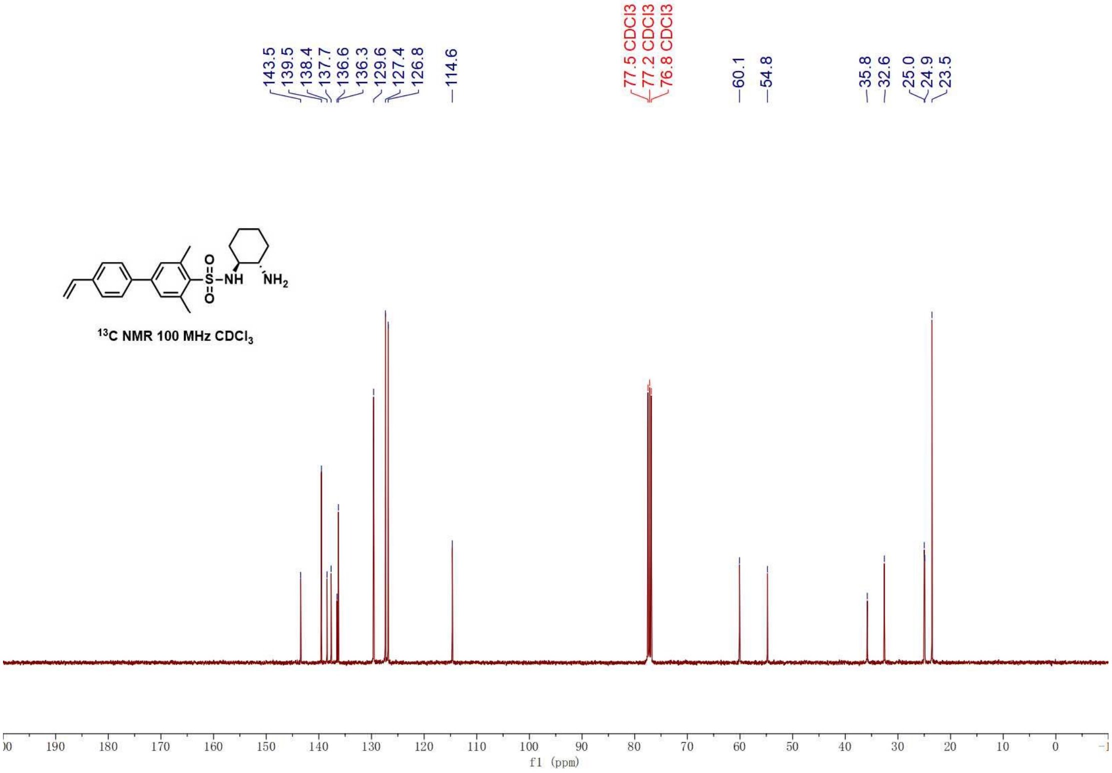


^{13}C NMR (100 MHz) in CDCl$_3$

D3

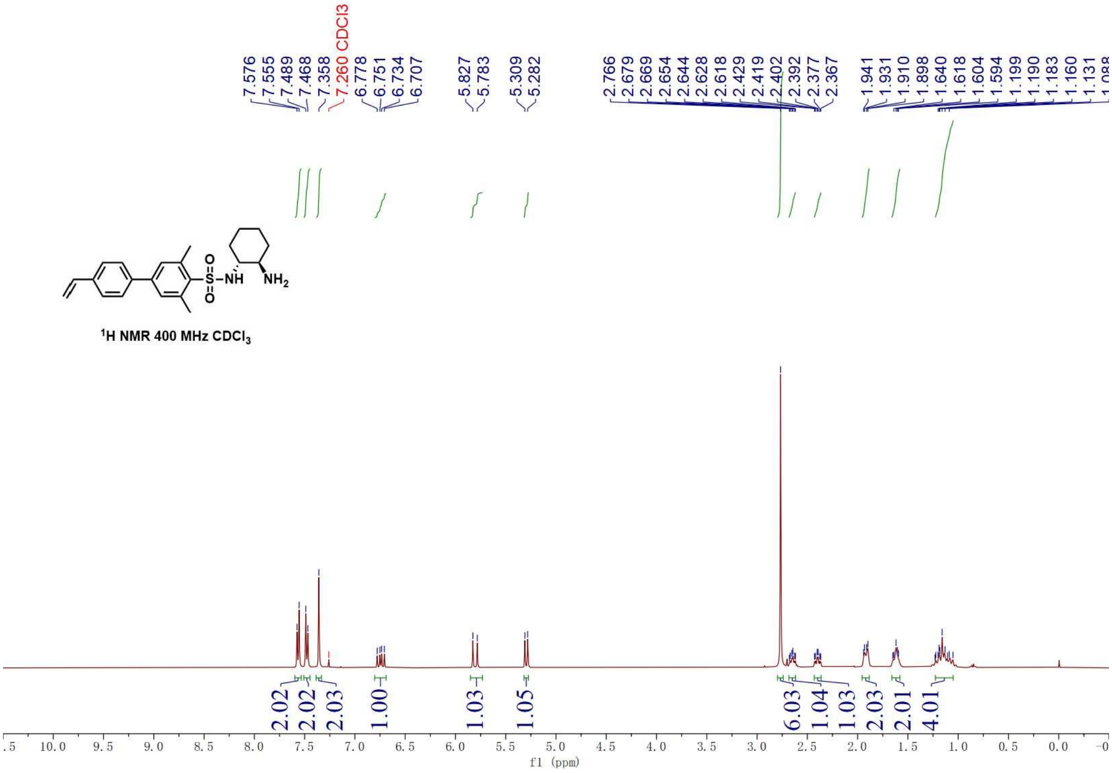


^{1}H NMR (400 MHz) in CDCl$_3$

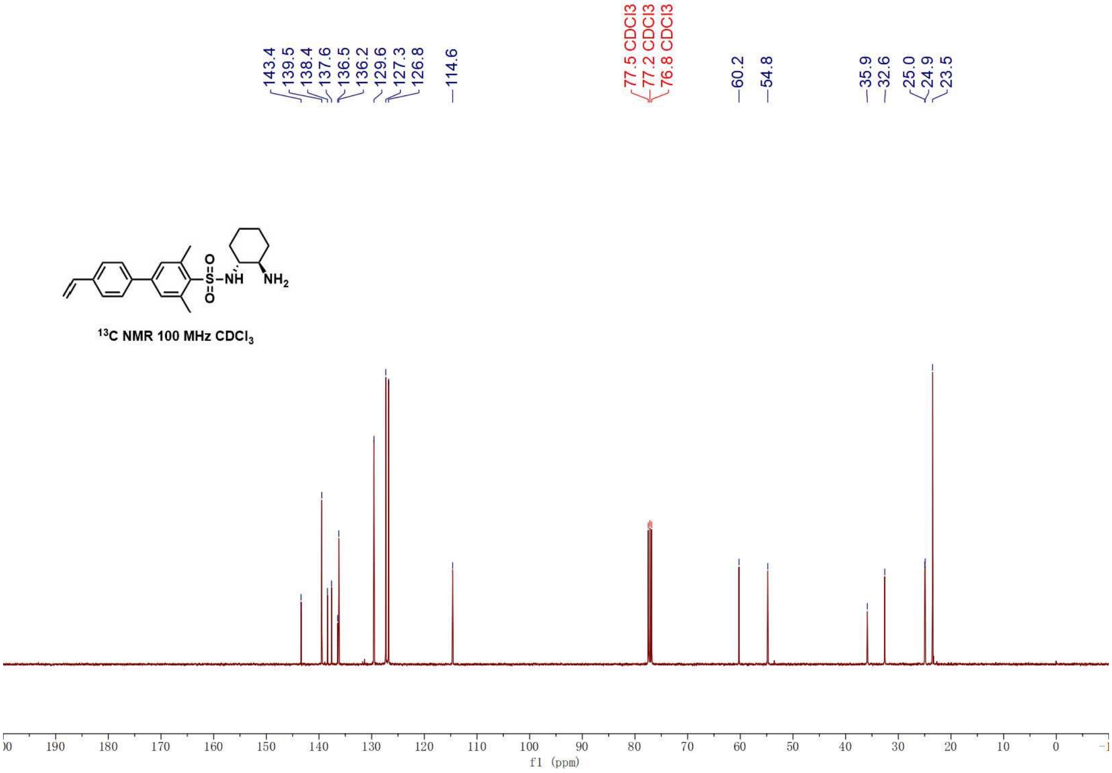


^{13}C NMR (100 MHz) in CDCl$_3$

D4

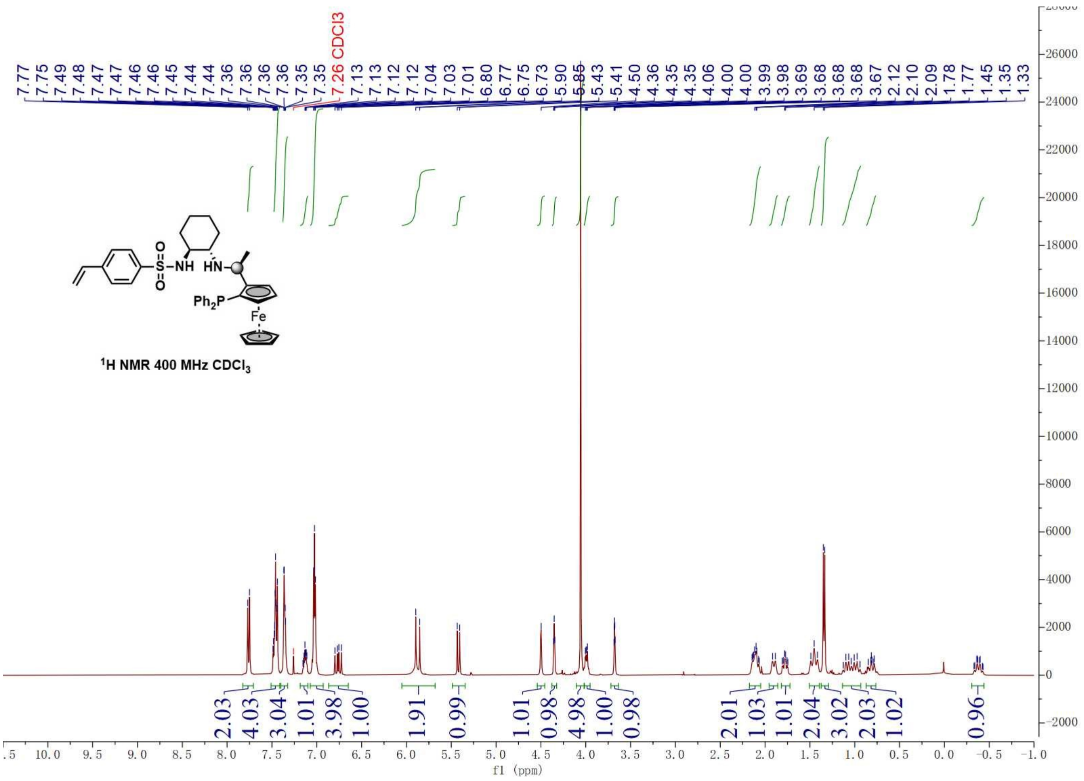


^{1}H NMR (400 MHz) in CDCl$_3$

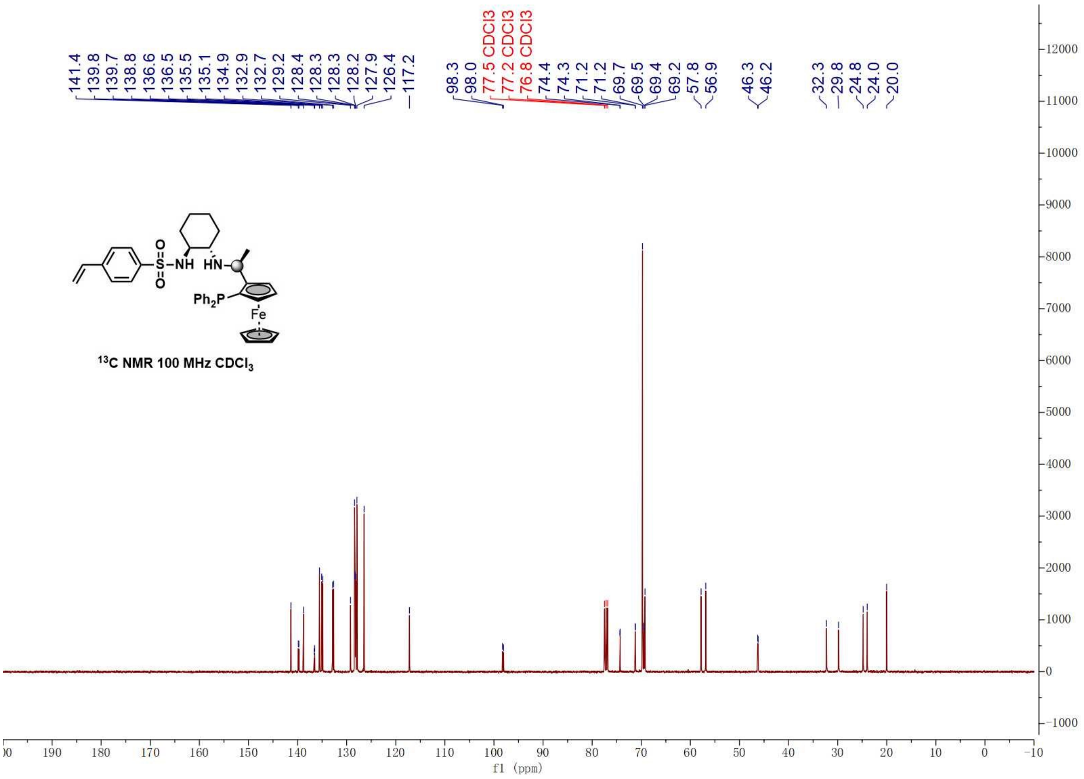


^{13}C NMR (100 MHz) in CDCl

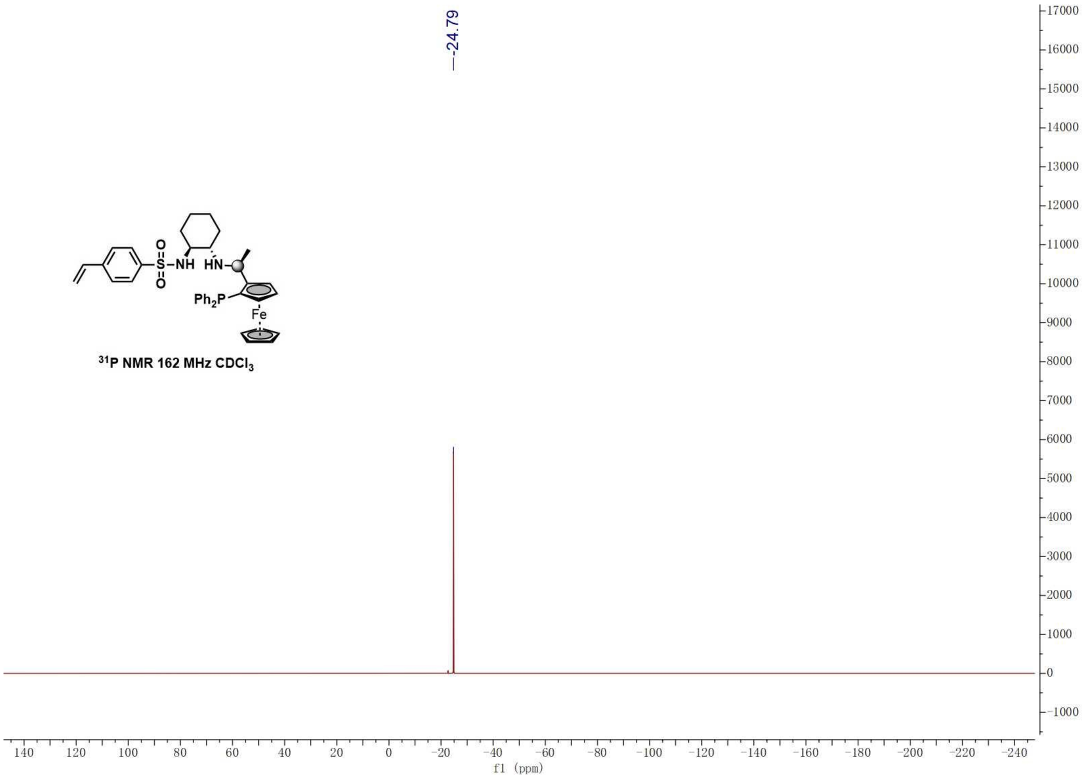
vinyl-*f*-diaphos L1



^{1}H NMR (400 MHz) in CDCl$_3$

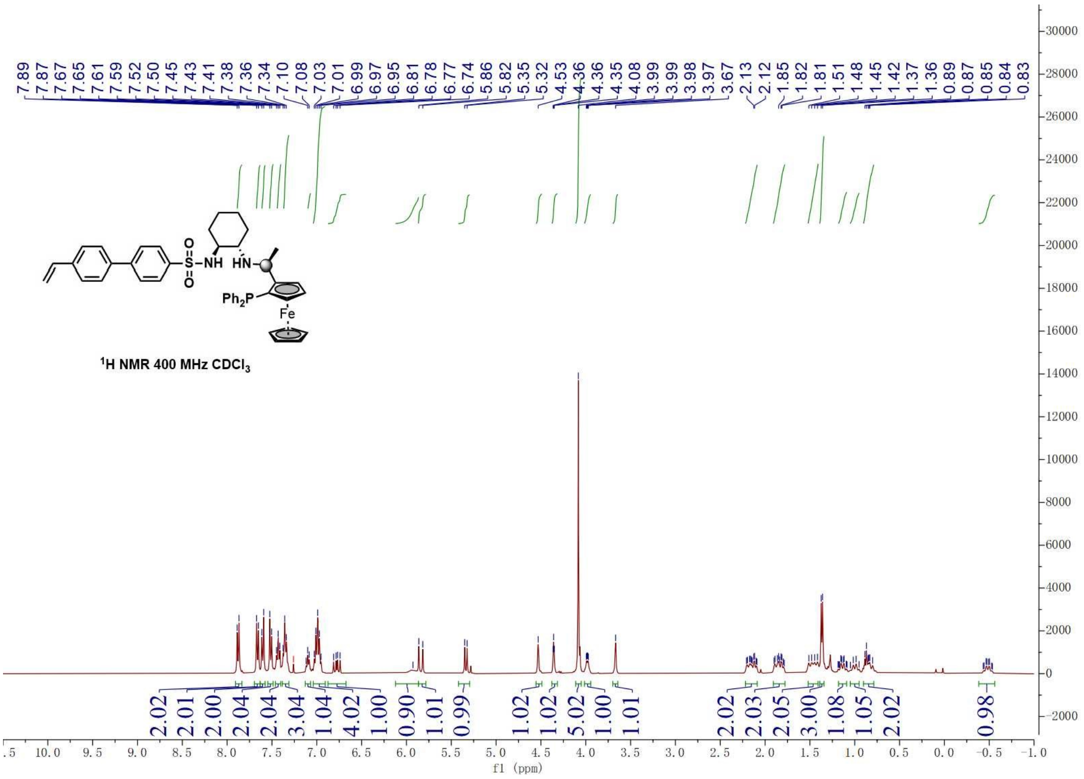


^{13}C NMR (100 MHz) in CDCl$_3$

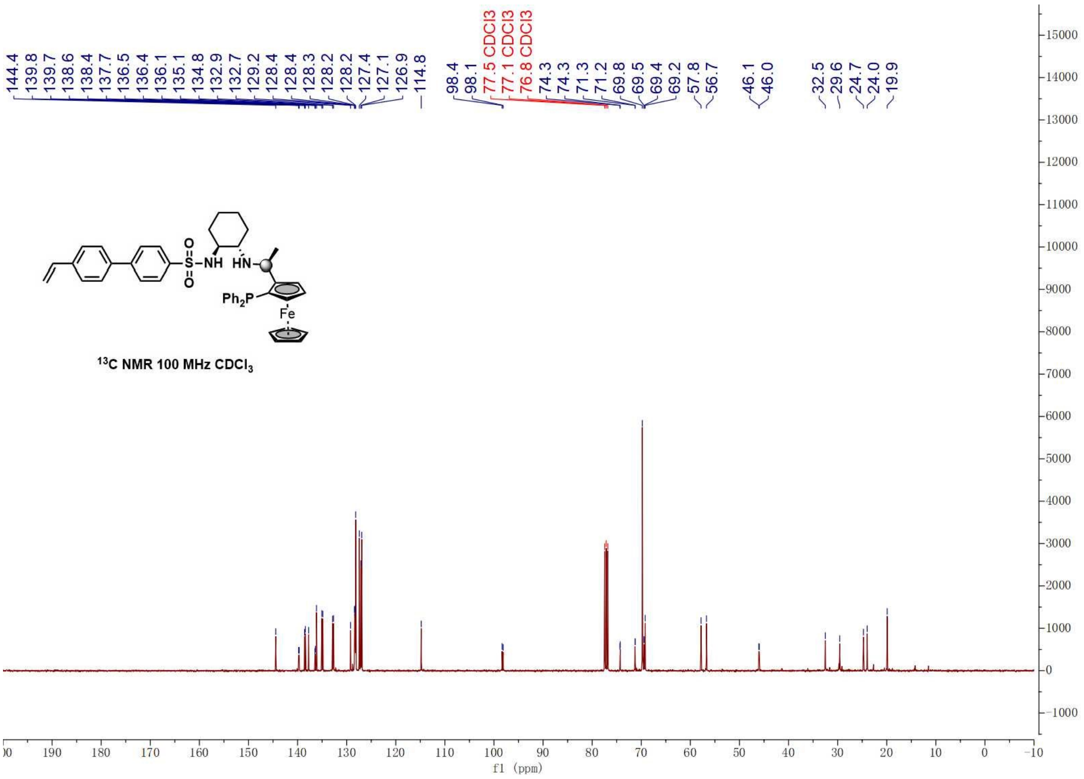


^{31}P NMR (162 MHz) in CDCl$_3$

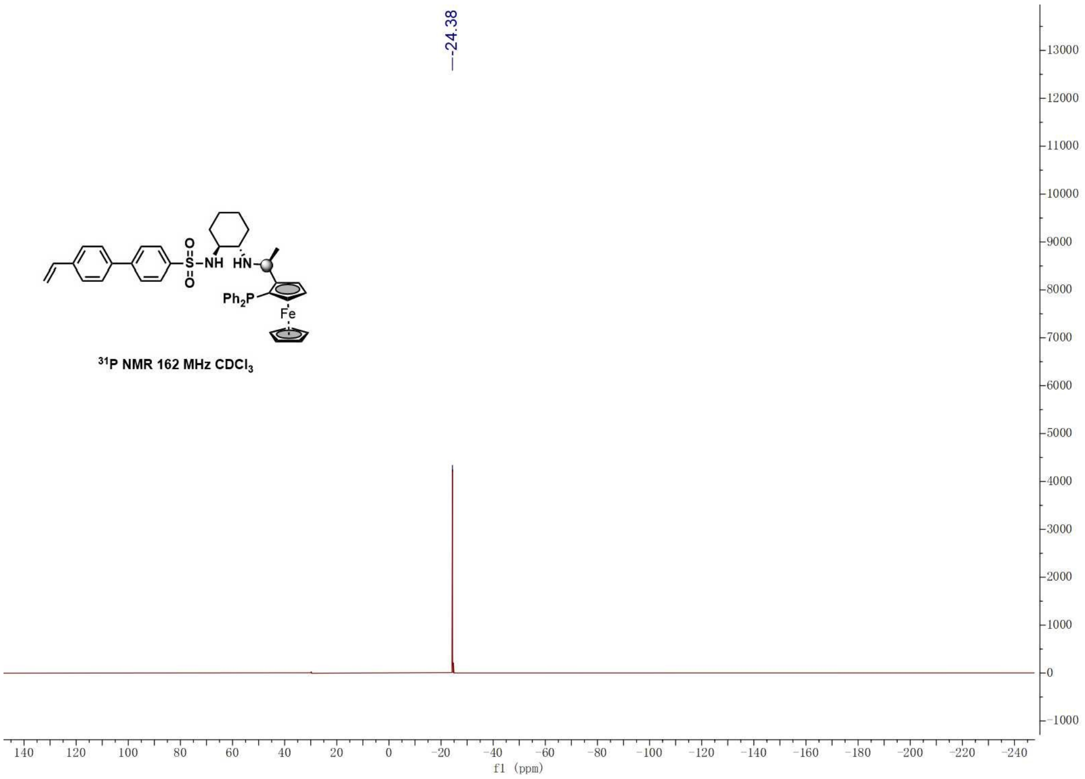
vinyl-*f*-diaphos L2



^{1}H NMR (400 MHz) in CDCl$_3$

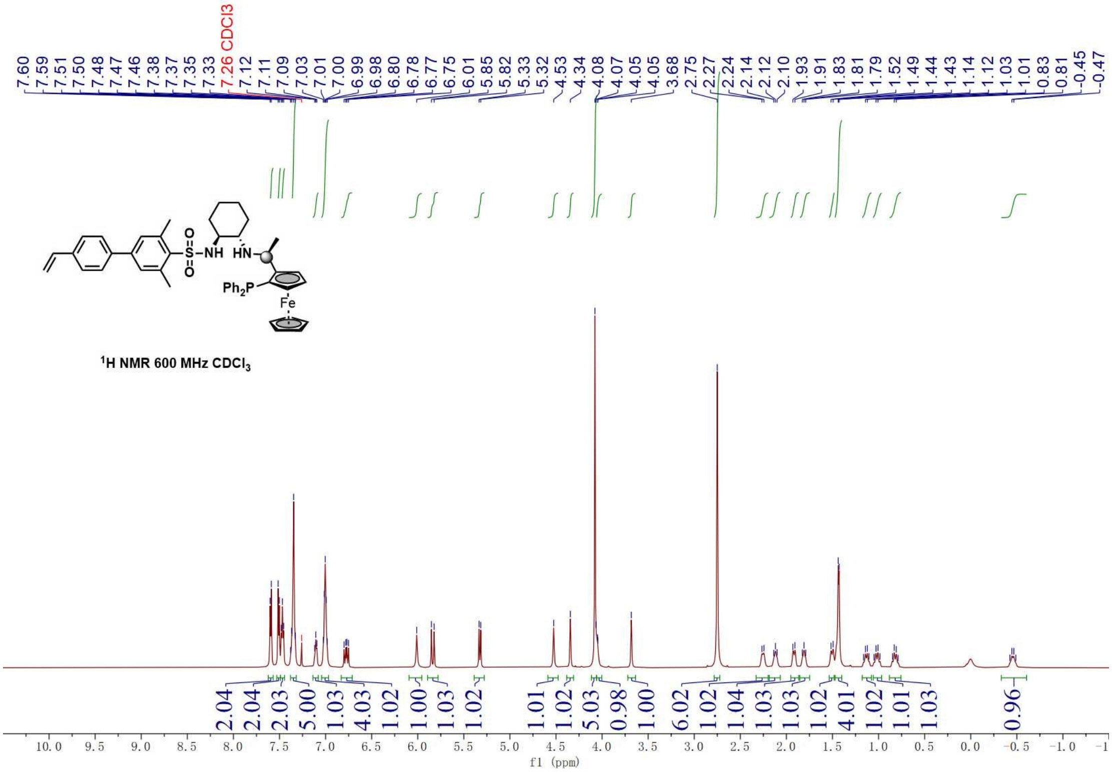


^{13}C NMR (100 MHz) in CDCl$_3$

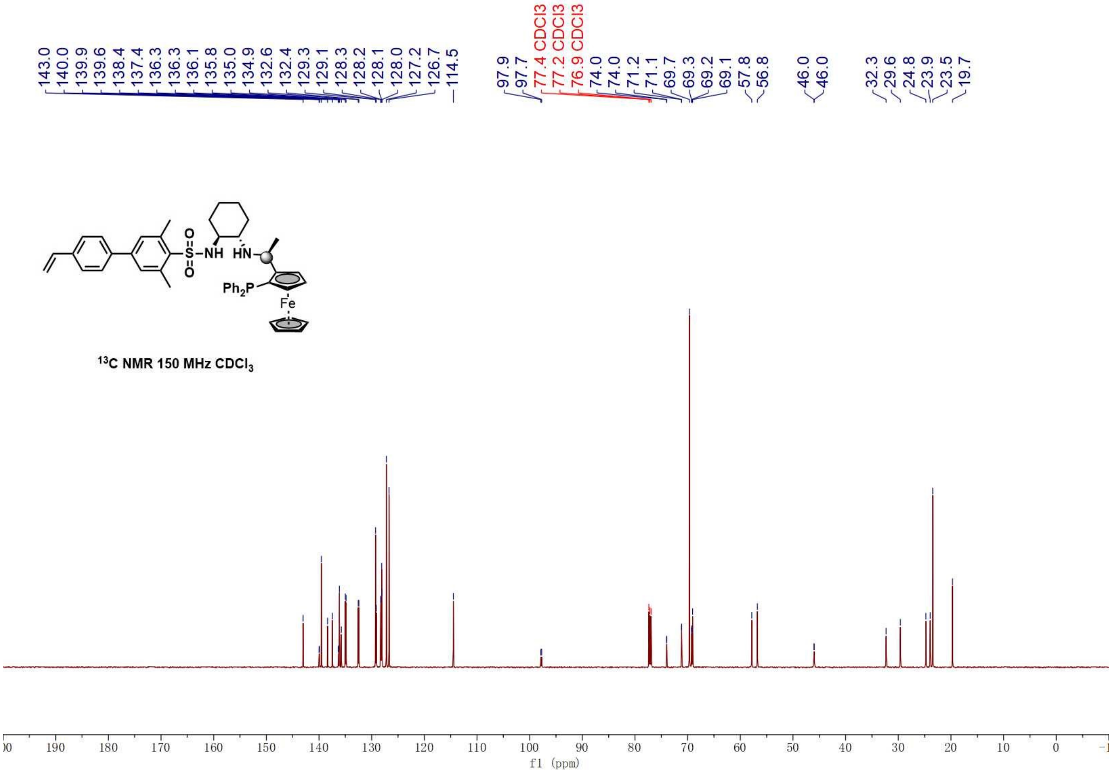


^{31}P NMR (162 MHz) in CDCl$_3$

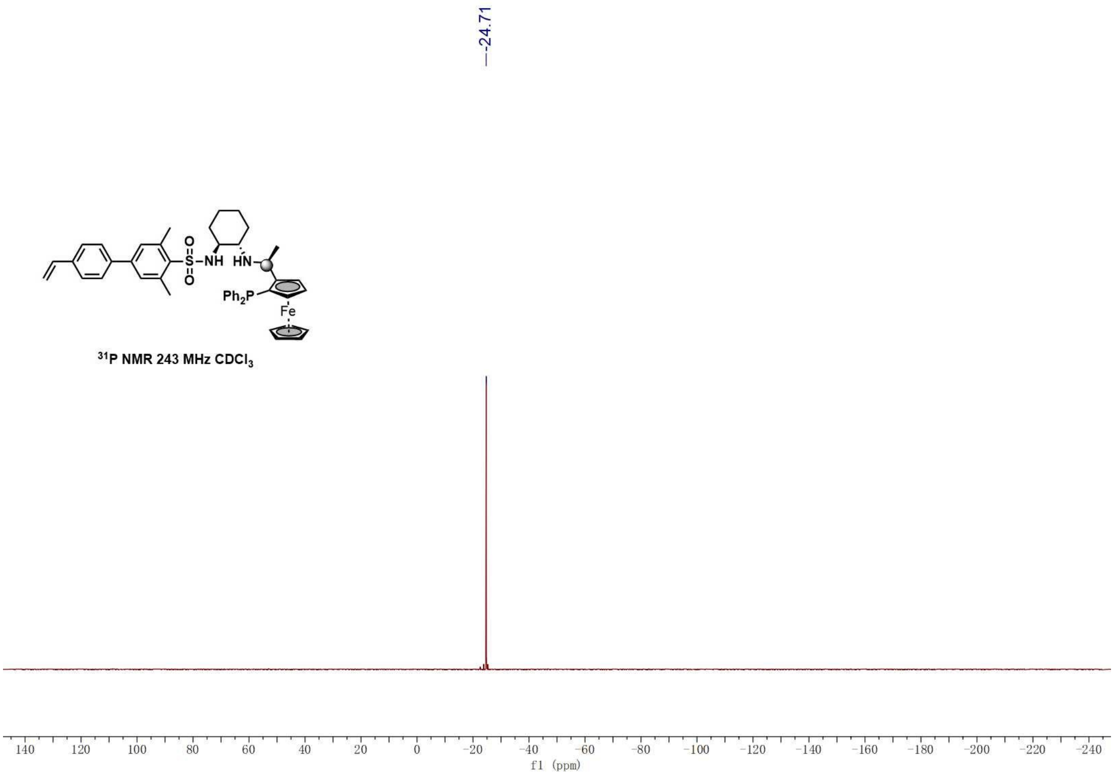
vinyl-*f*-diaphos L3



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

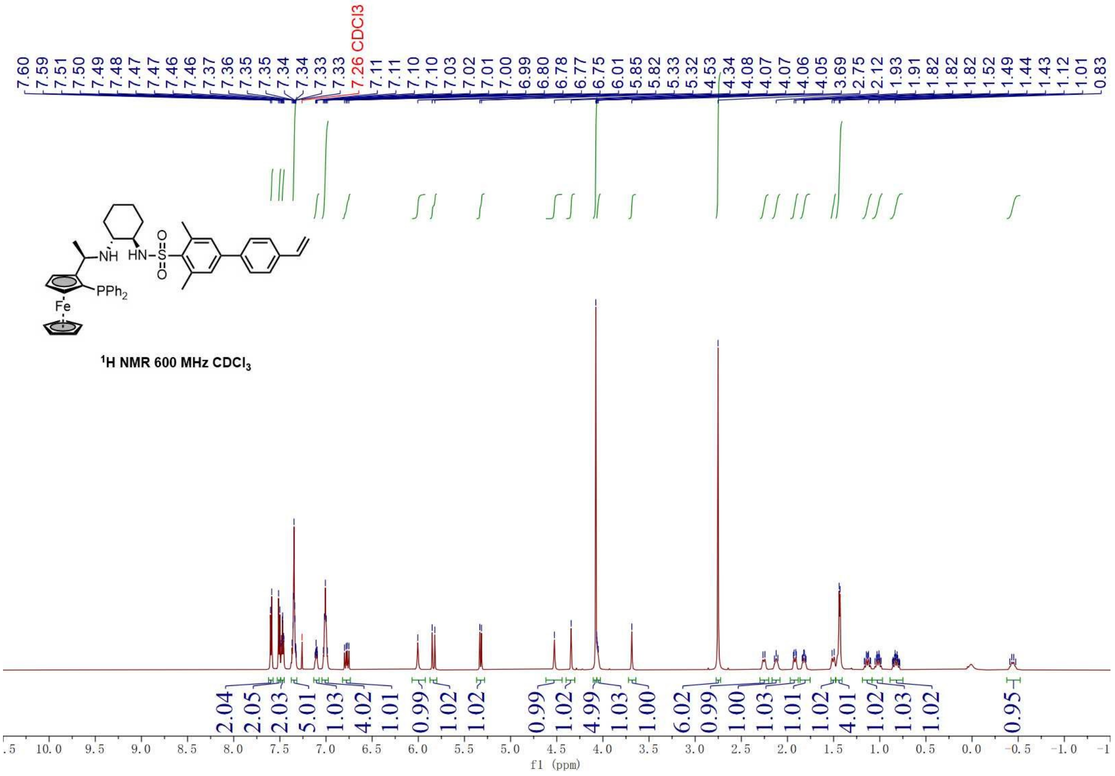


^{13}C NMR (150 MHz) in $CDCl_3$

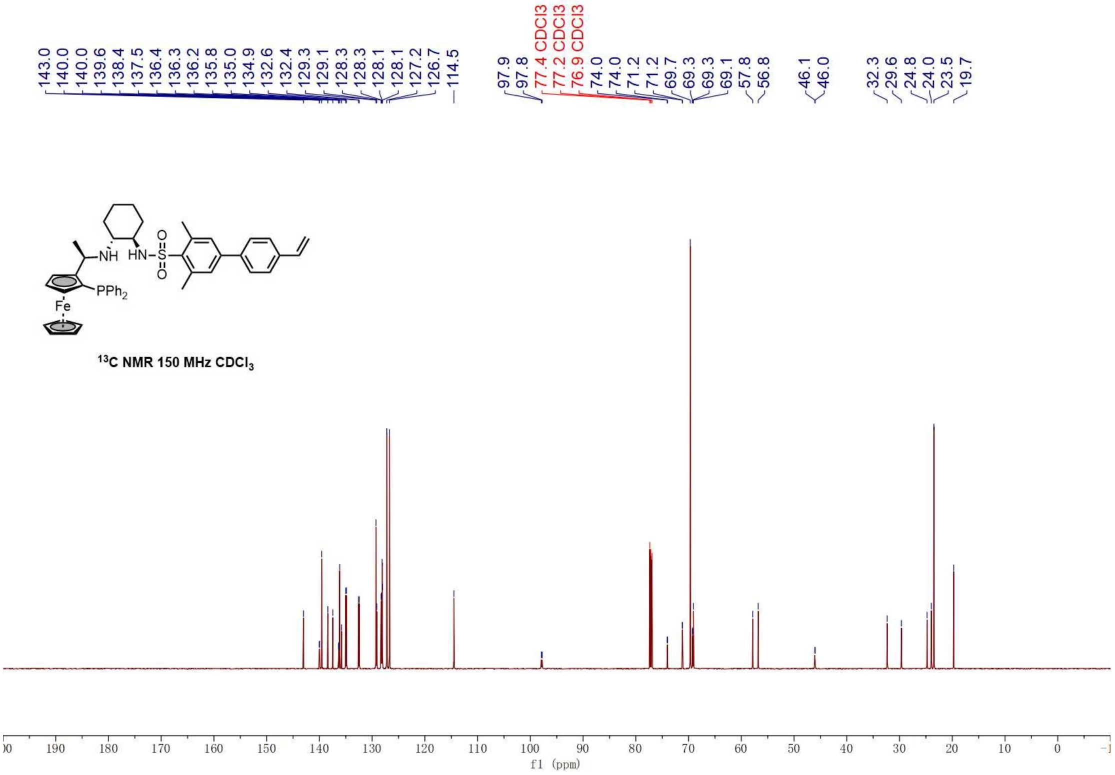


^{31}P NMR (243 MHz) in CDCl$_3$

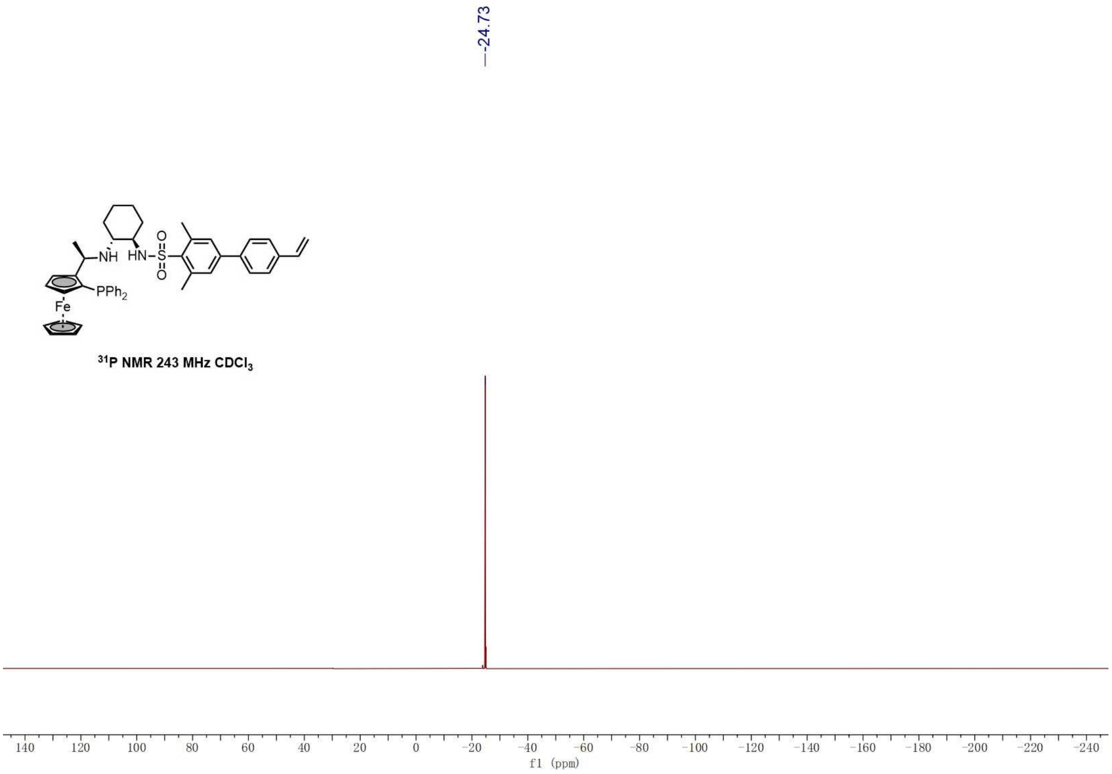
vinyl-*f*-diaphos L4



^{1}H NMR (600 MHz) in CDCl$_3$

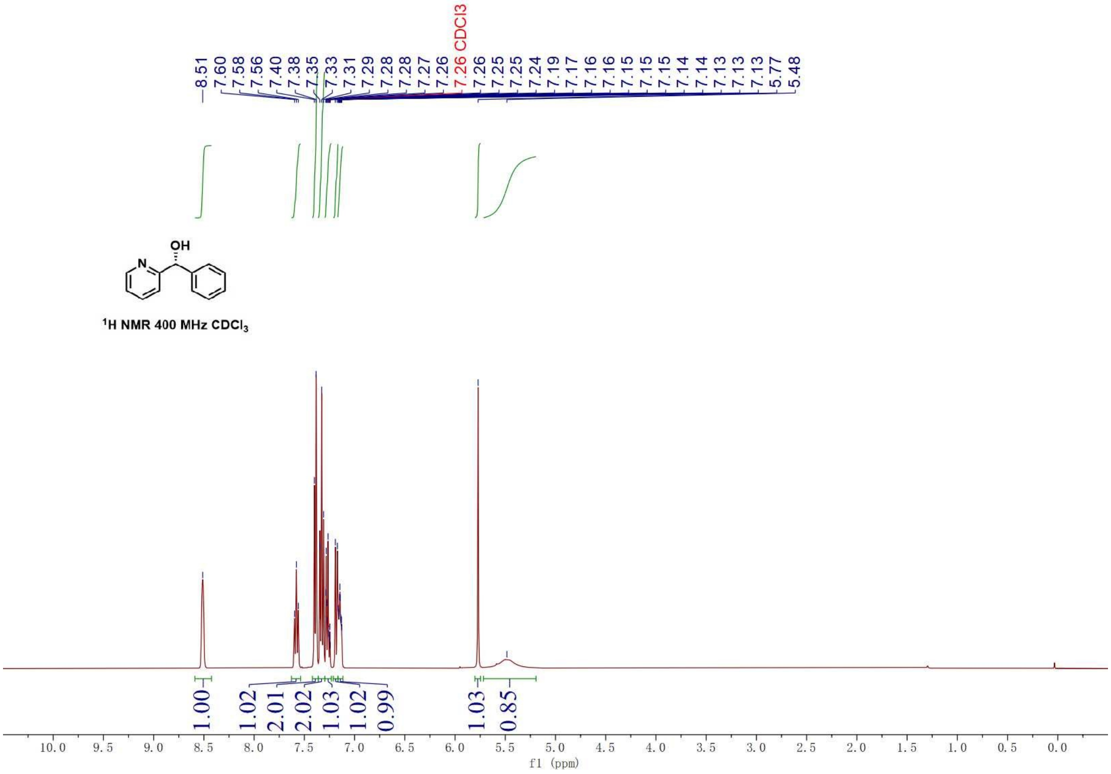


^{13}C NMR (100 MHz) in CDCl$_3$

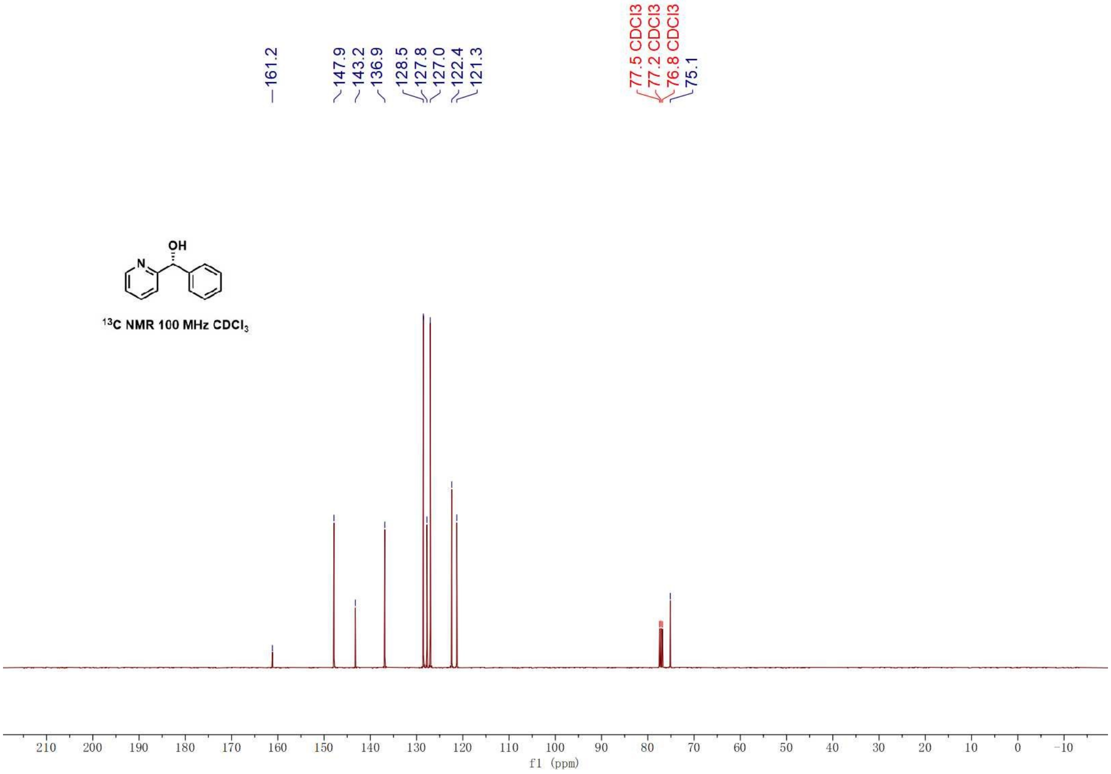


^{31}P NMR (243 MHz) in $CDCl_3$

[(*R*)-2a]

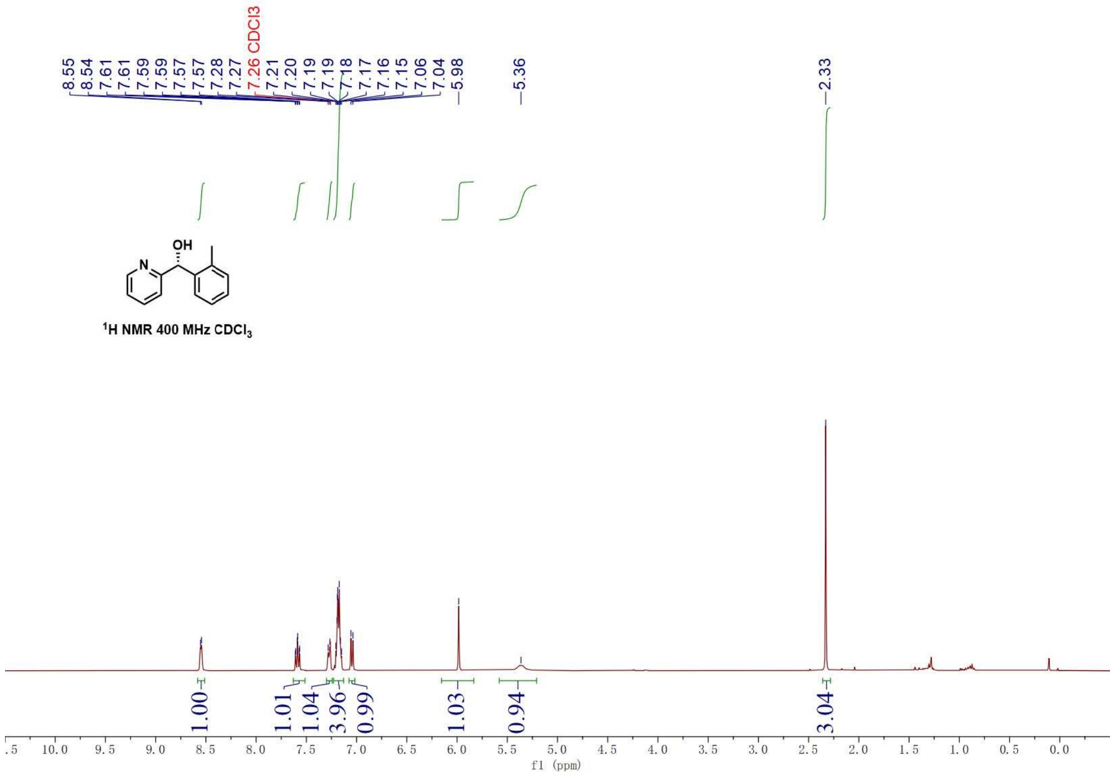


^{1}H NMR (400 MHz) in CDCl$_3$

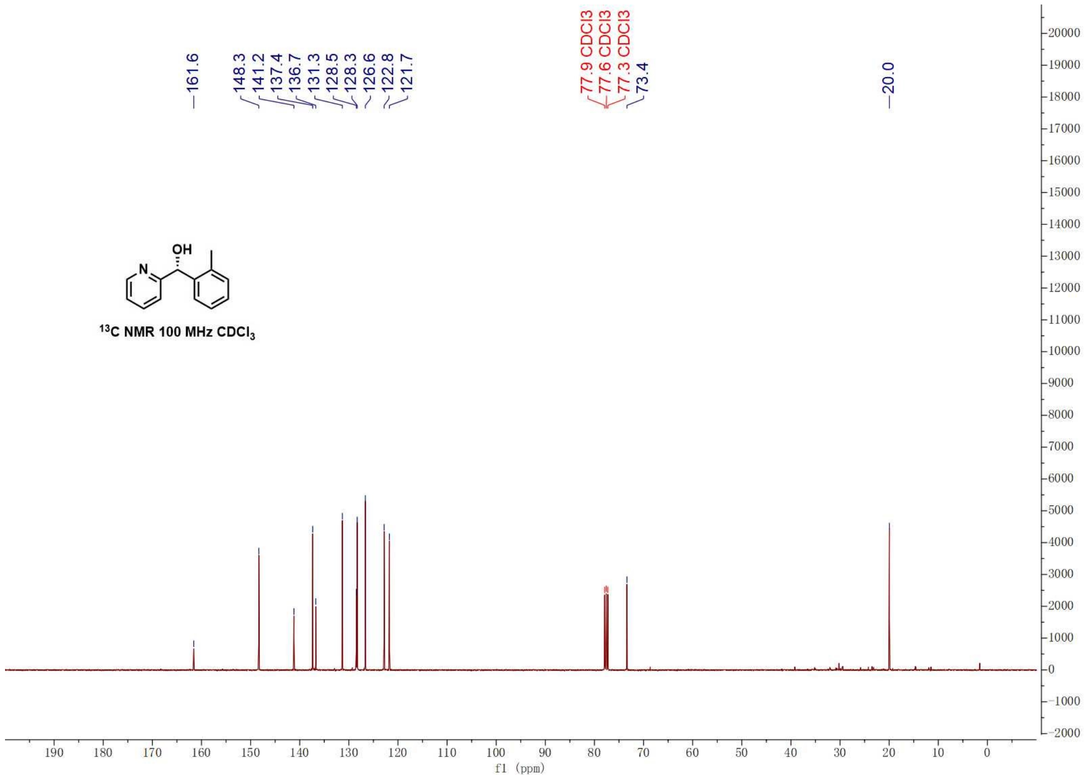


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-2b]

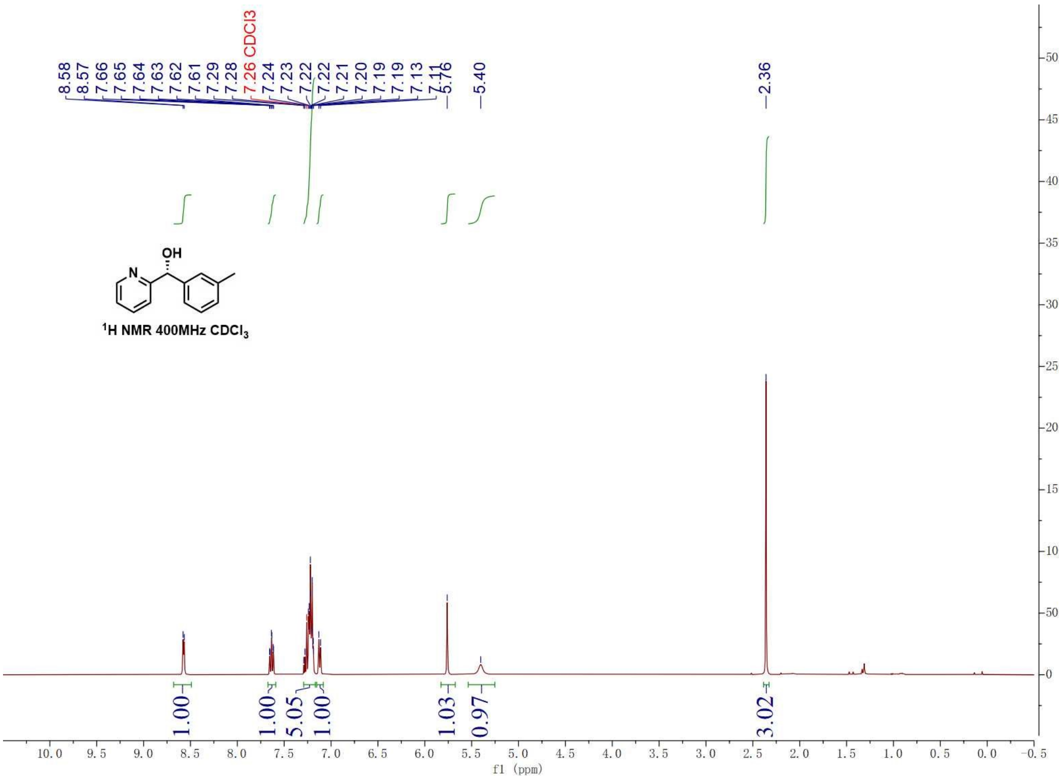


^{1}H NMR (400 MHz) in CDCl$_3$

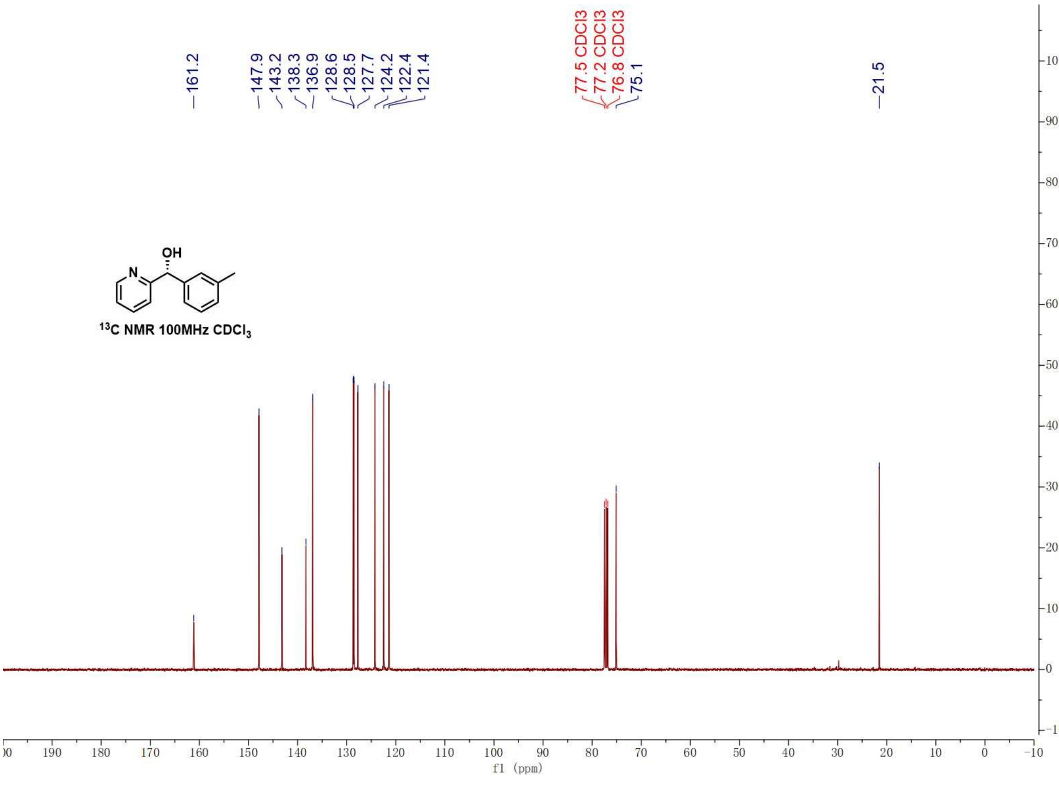


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-2c]

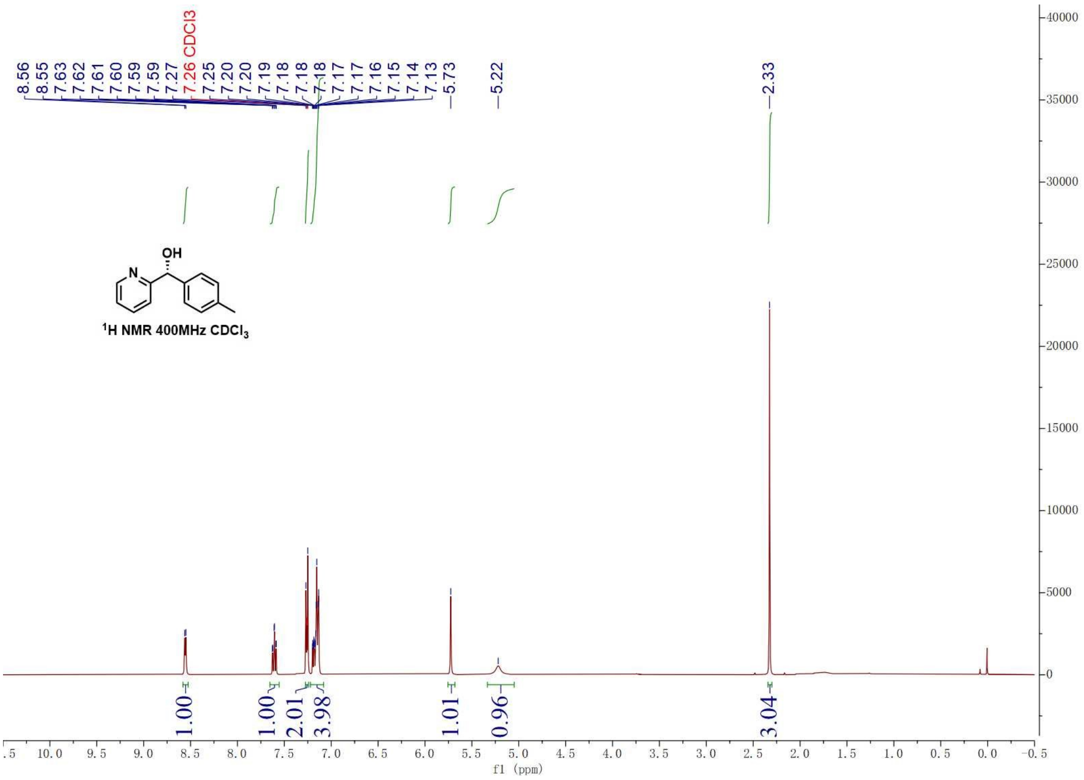


^{1}H NMR (400 MHz) in $CDCl_3$

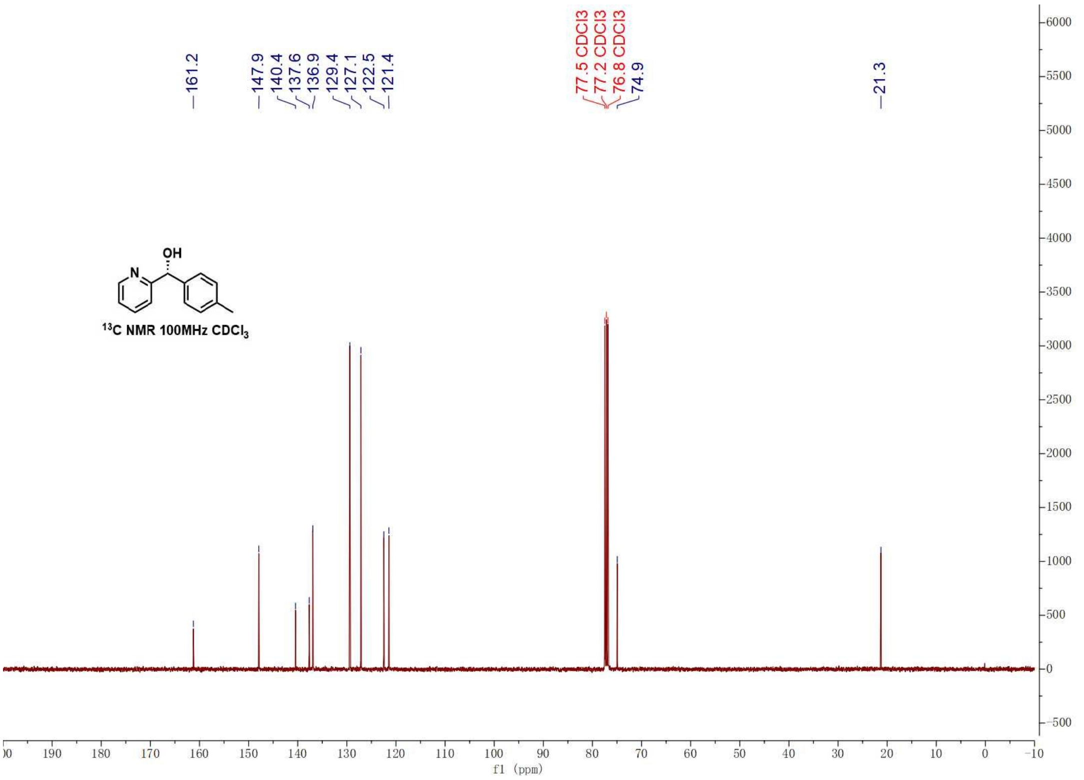


^{13}C NMR (100 MHz) in $CDCl_3$

[(*R*)-2d]

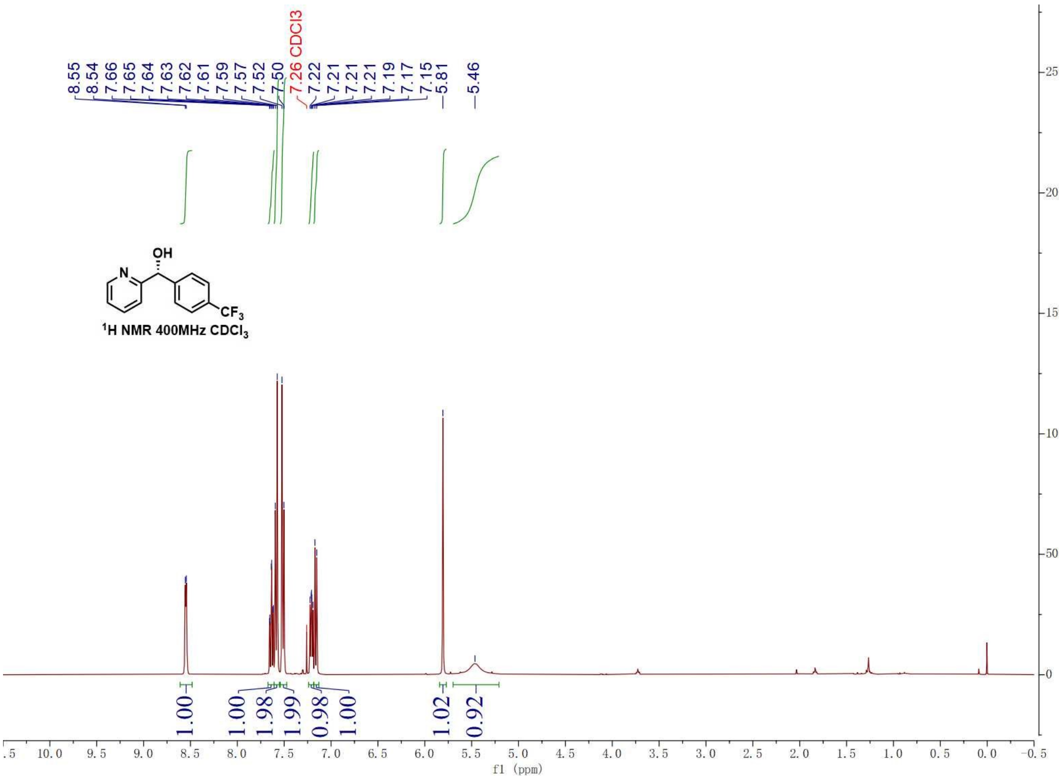


^{1}H NMR (400 MHz) in CDCl$_3$

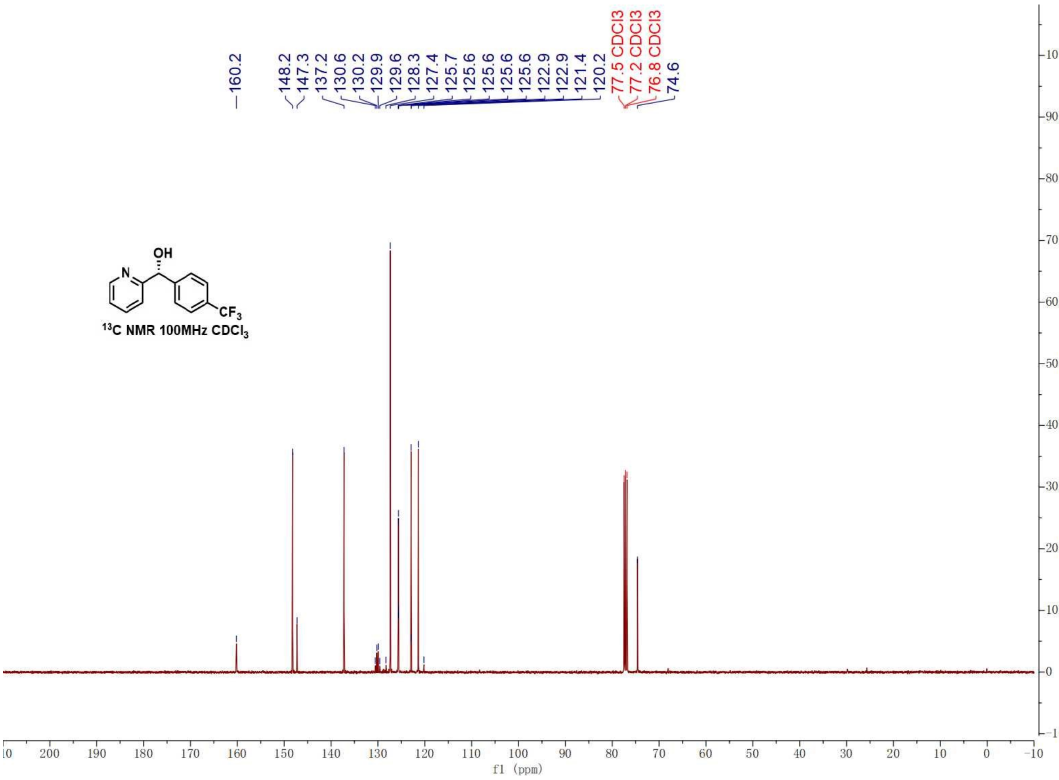


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-2e]

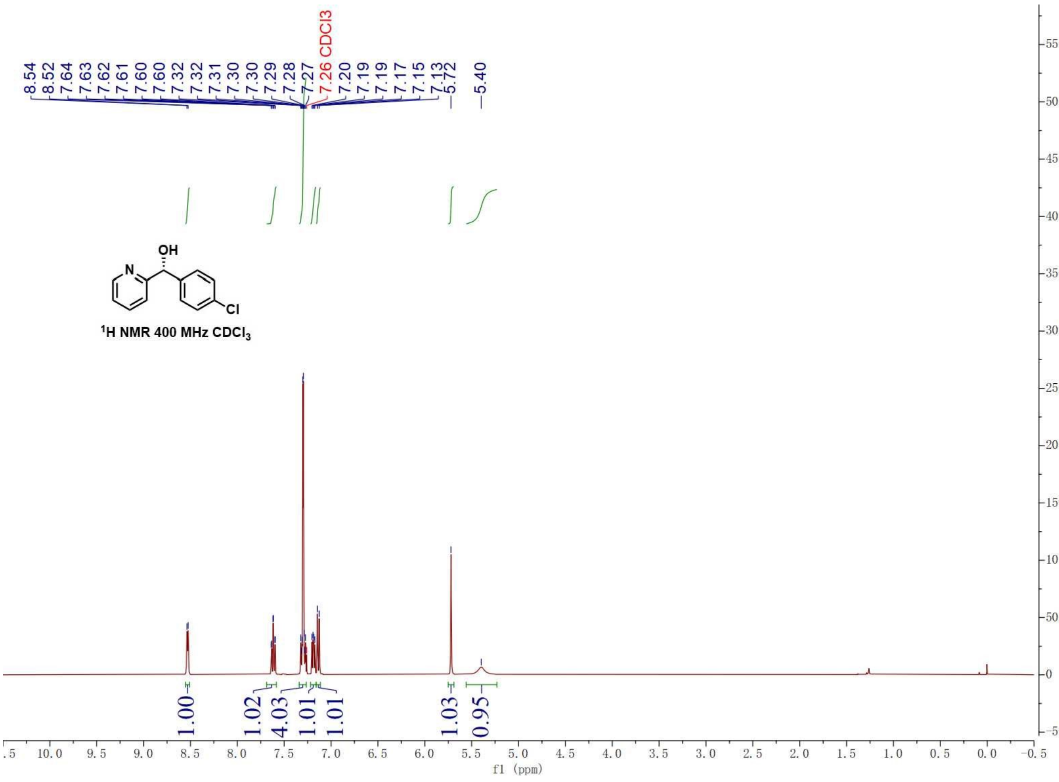


^{1}H NMR (400 MHz) in CDCl$_3$

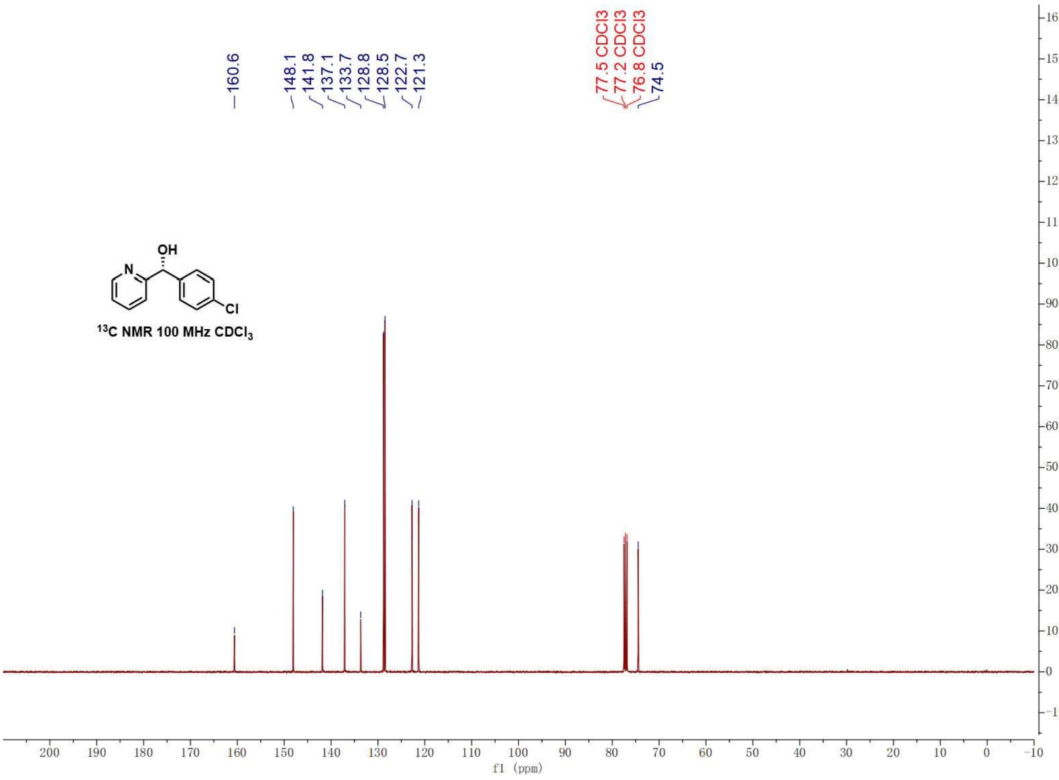


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-2f]

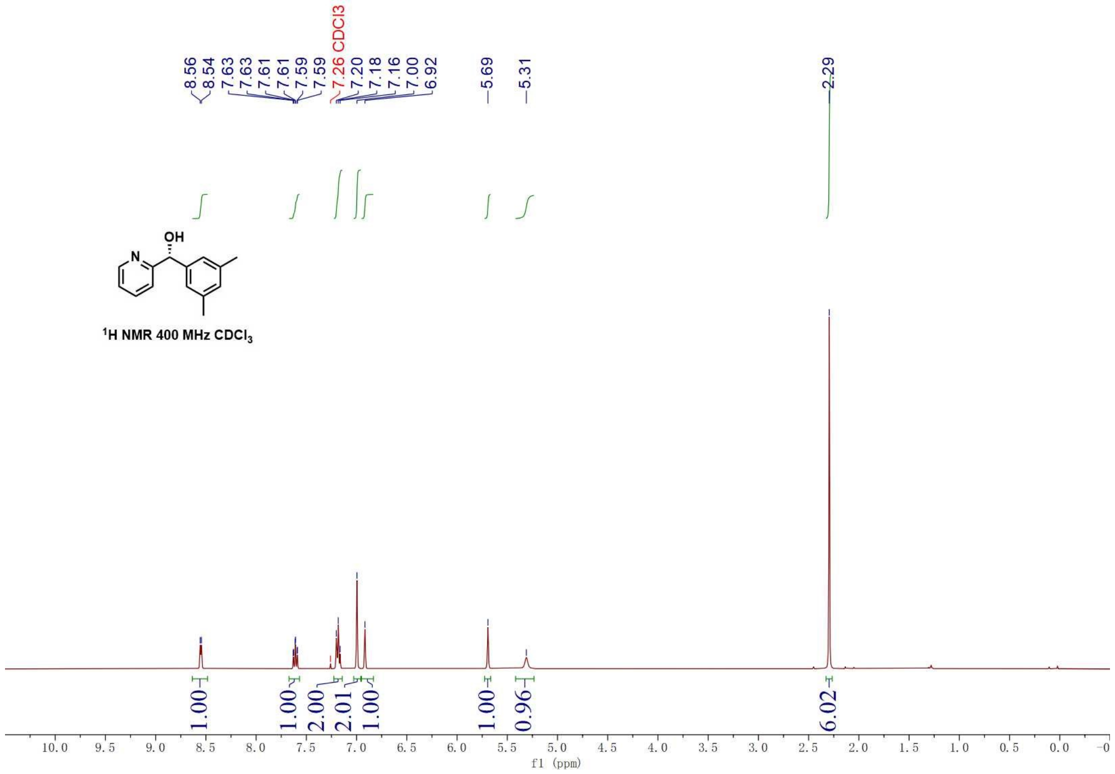


^{1}H NMR (400 MHz) in CDCl$_3$

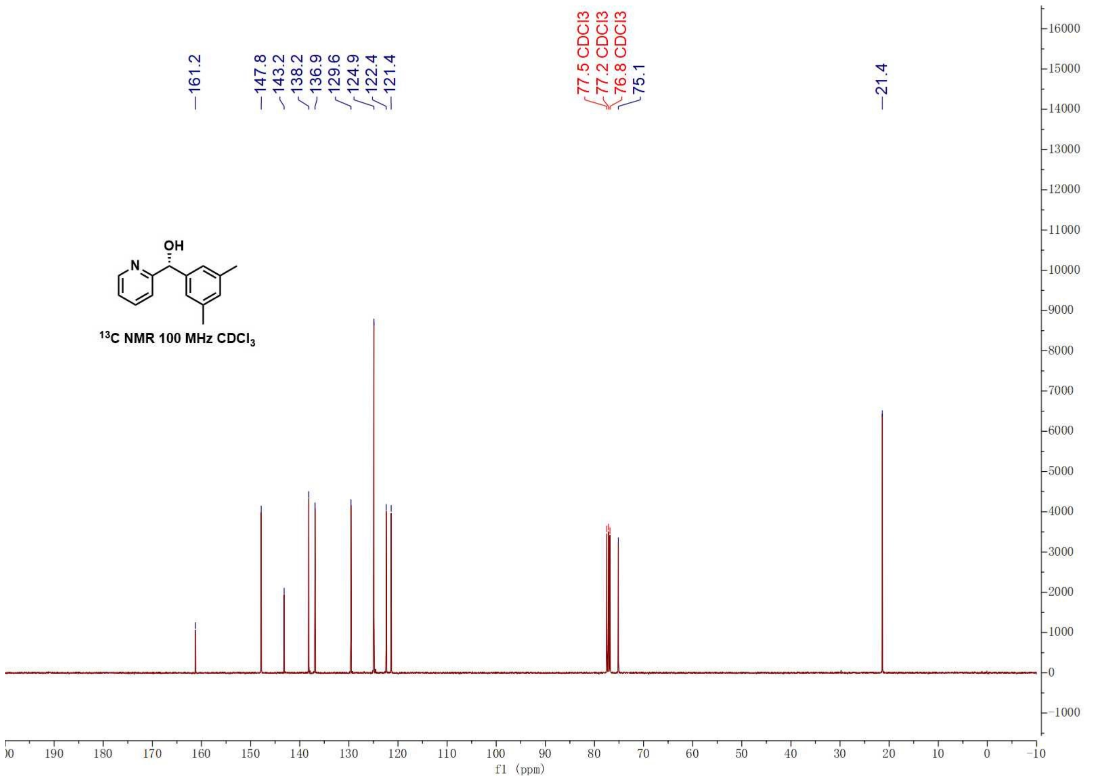


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-2g]

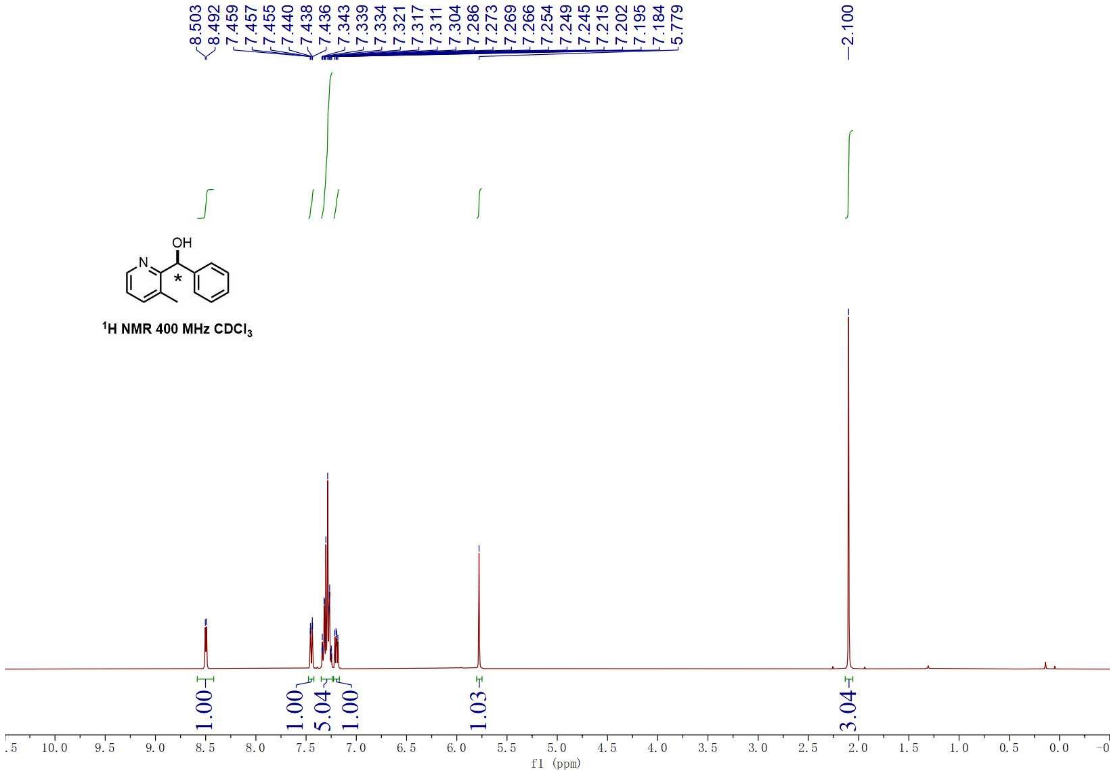


^{1}H NMR (400 MHz) in CDCl$_3$

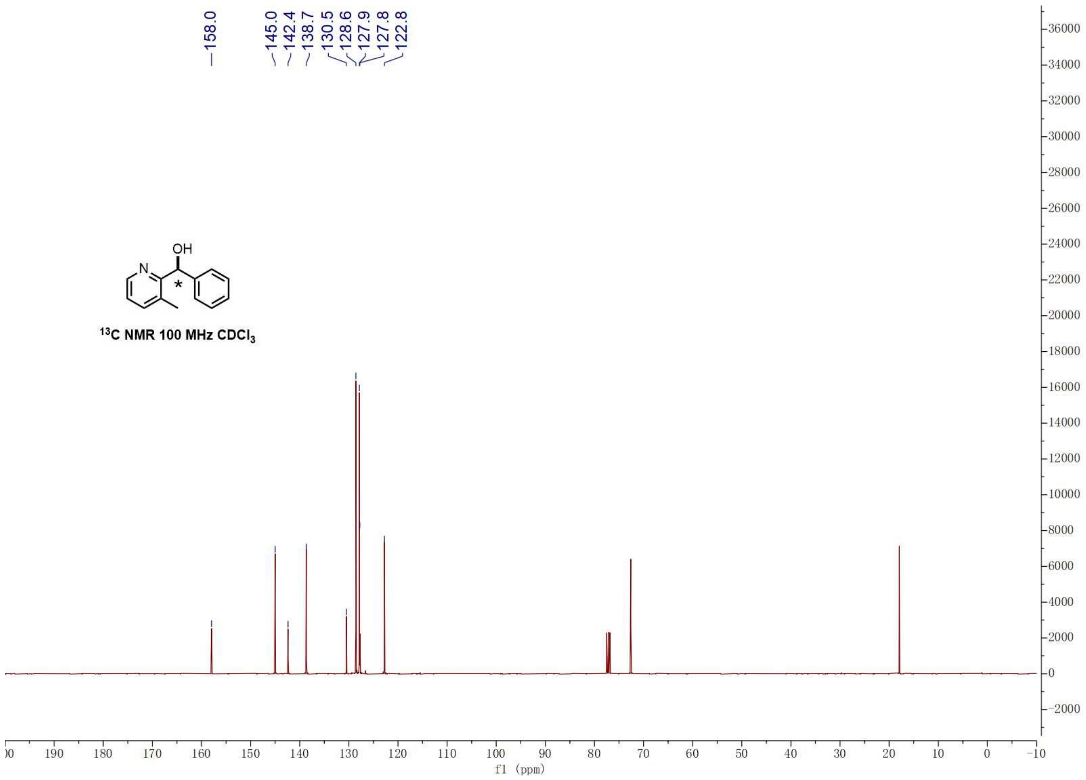


^{13}C NMR (100 MHz) in CDCl$_3$

[(+)-2h]

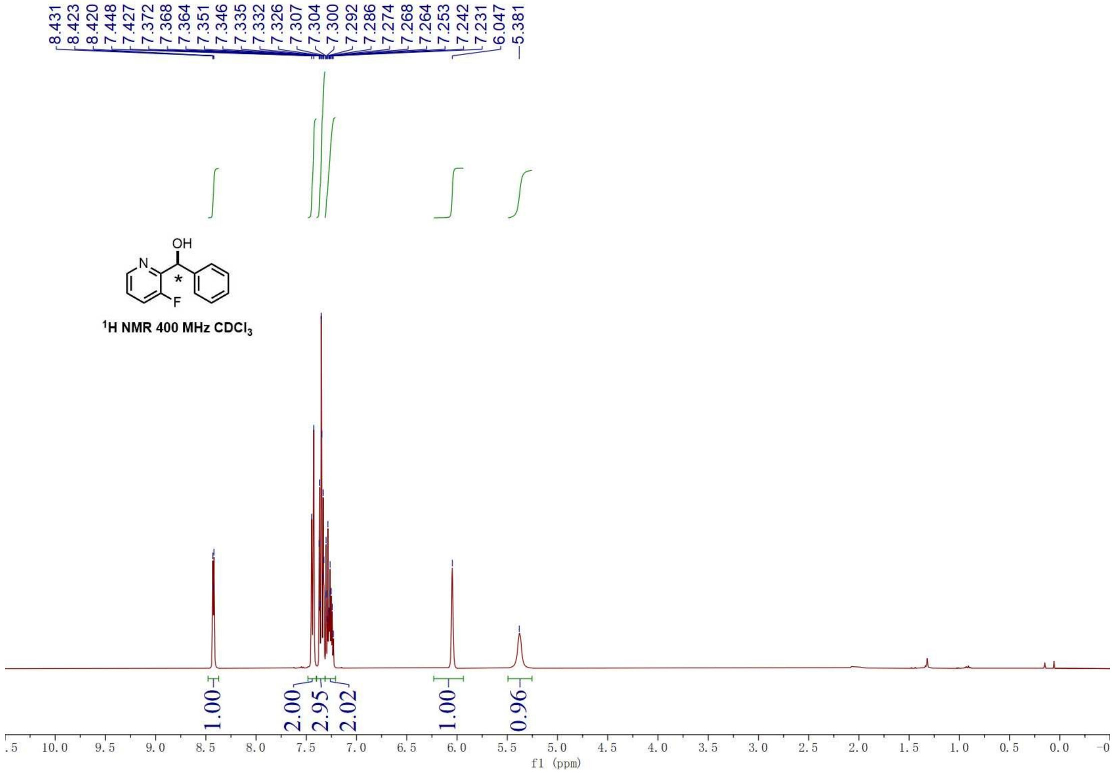


^{1}H NMR (400 MHz) in CDCl$_3$

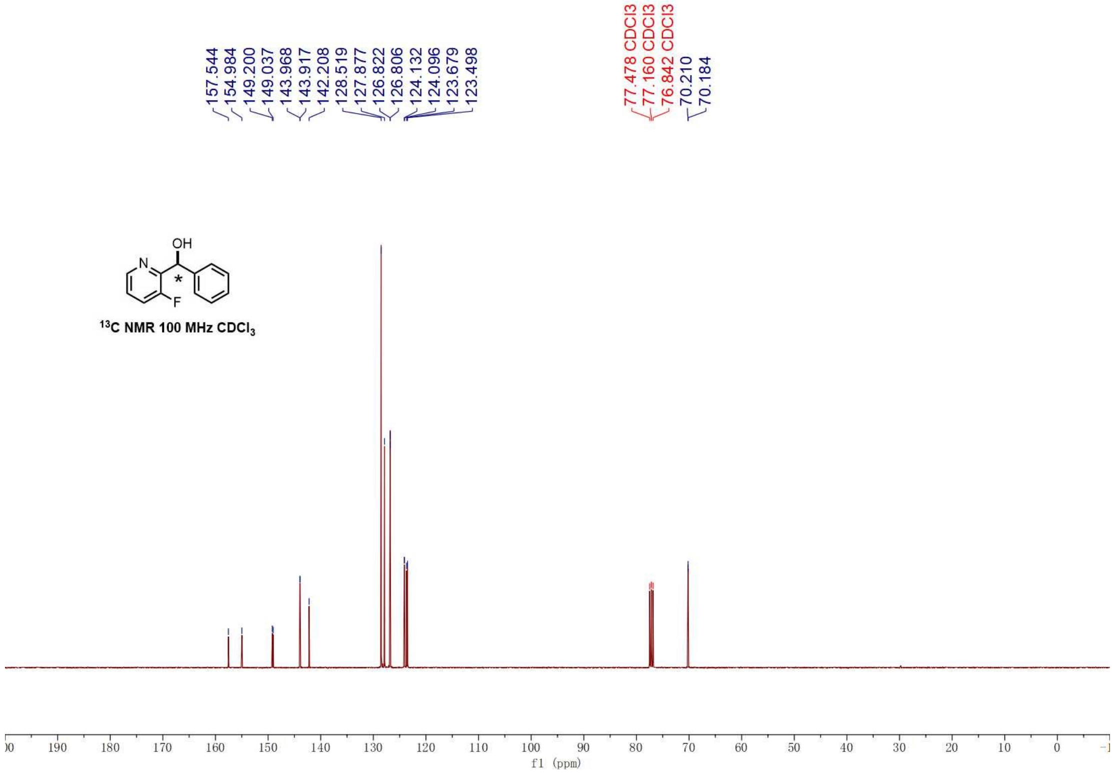


^{13}C NMR (100 MHz) in CDCl$_3$

[(+)-2i]

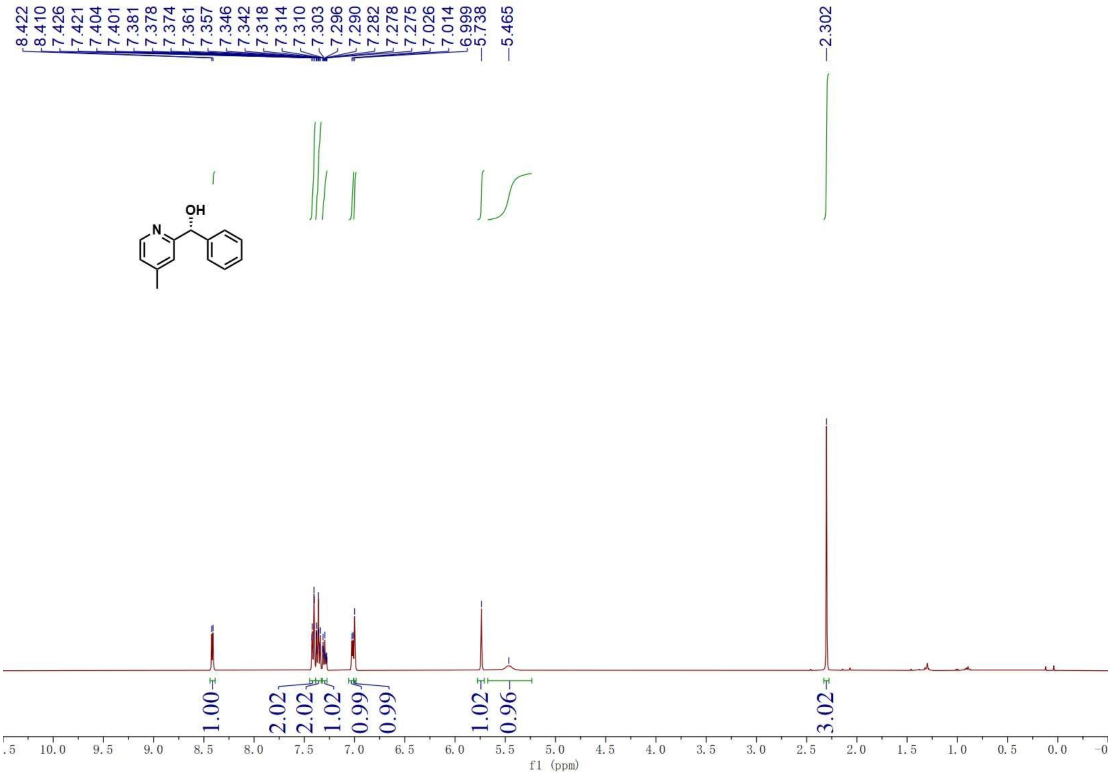


^{1}H NMR (400 MHz) in $CDCl_3$

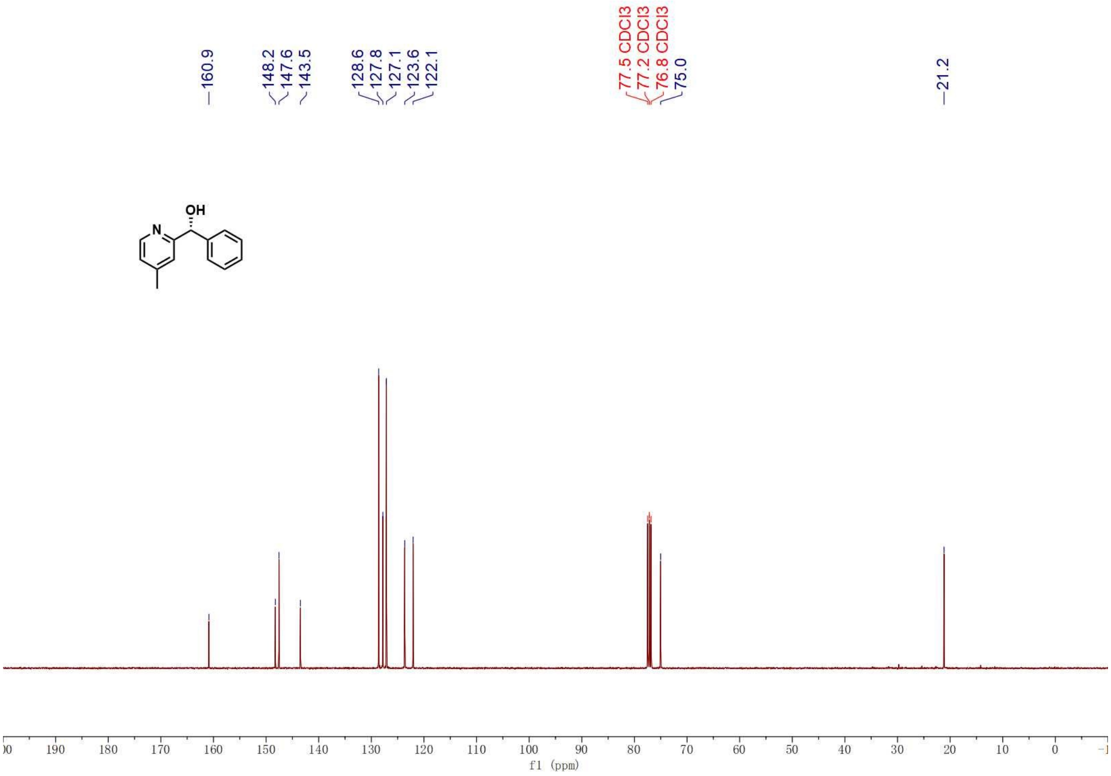


^{13}C NMR (100 MHz) in $CDCl_3$

[(*R*)-2j]

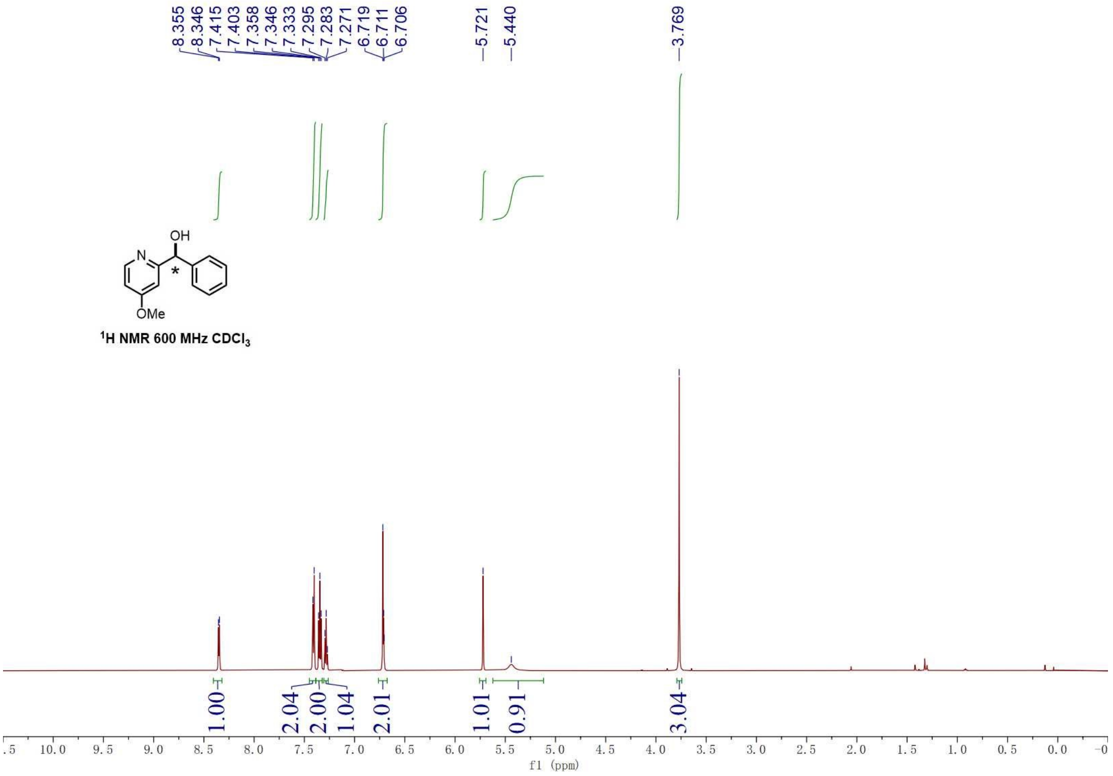


^{1}H NMR (400 MHz) in CDCl$_3$

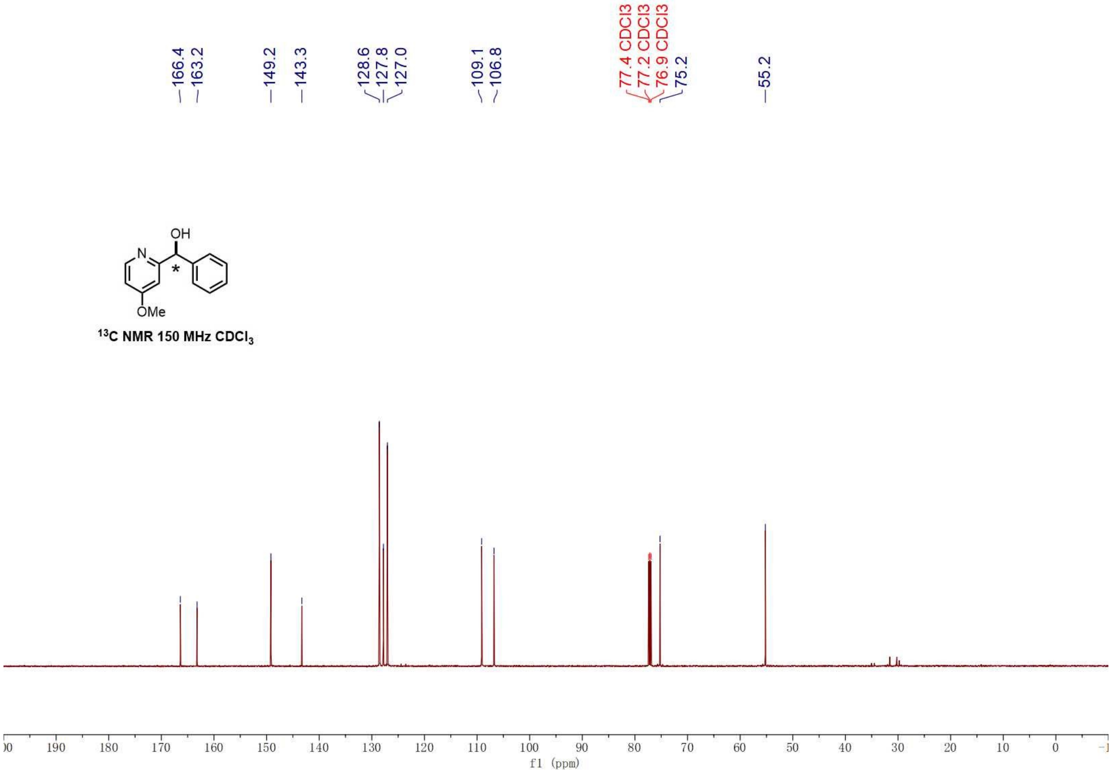


^{13}C NMR (100 MHz) in CDCl$_3$

[(+)-2k]

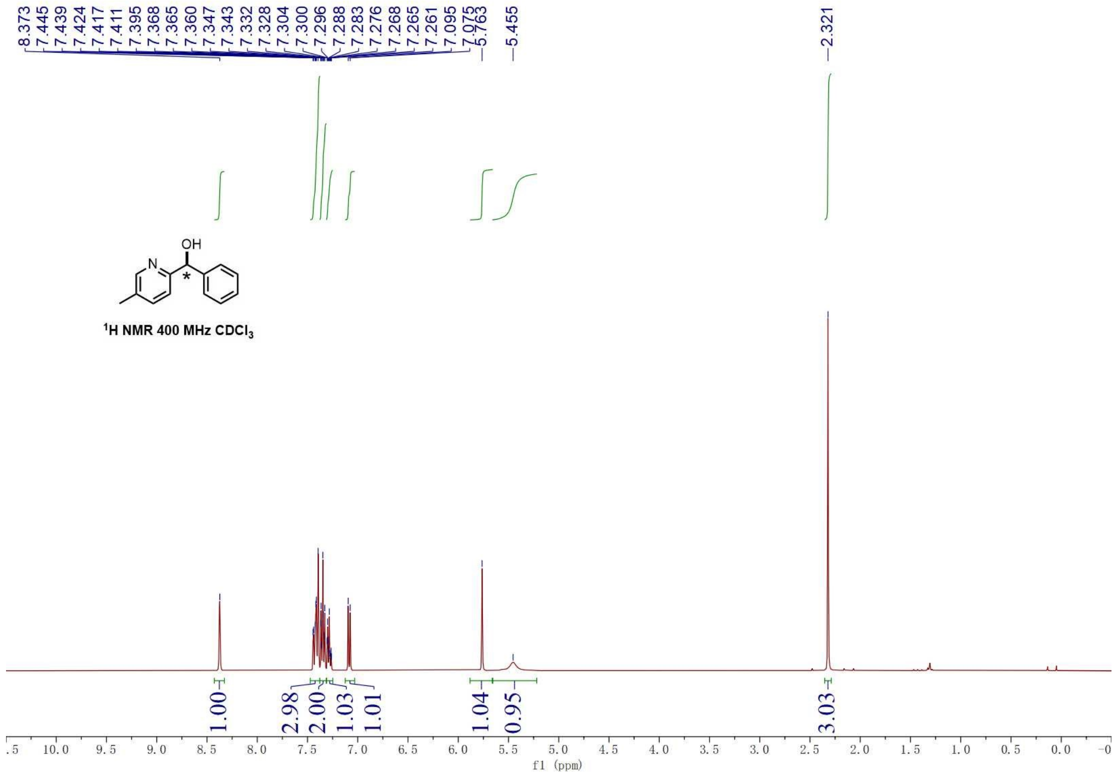


^{1}H NMR (600 MHz) in CDCl$_3$

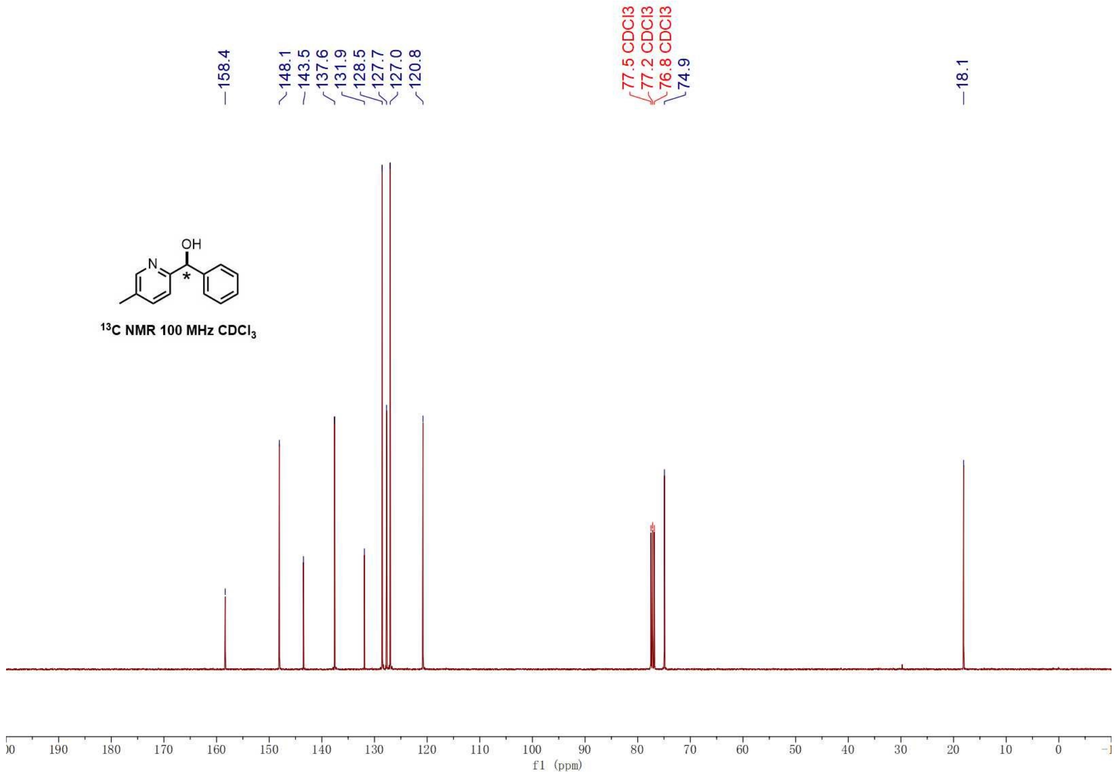


^{13}C NMR (150 MHz) in CDCl$_3$

[(+)-2i]

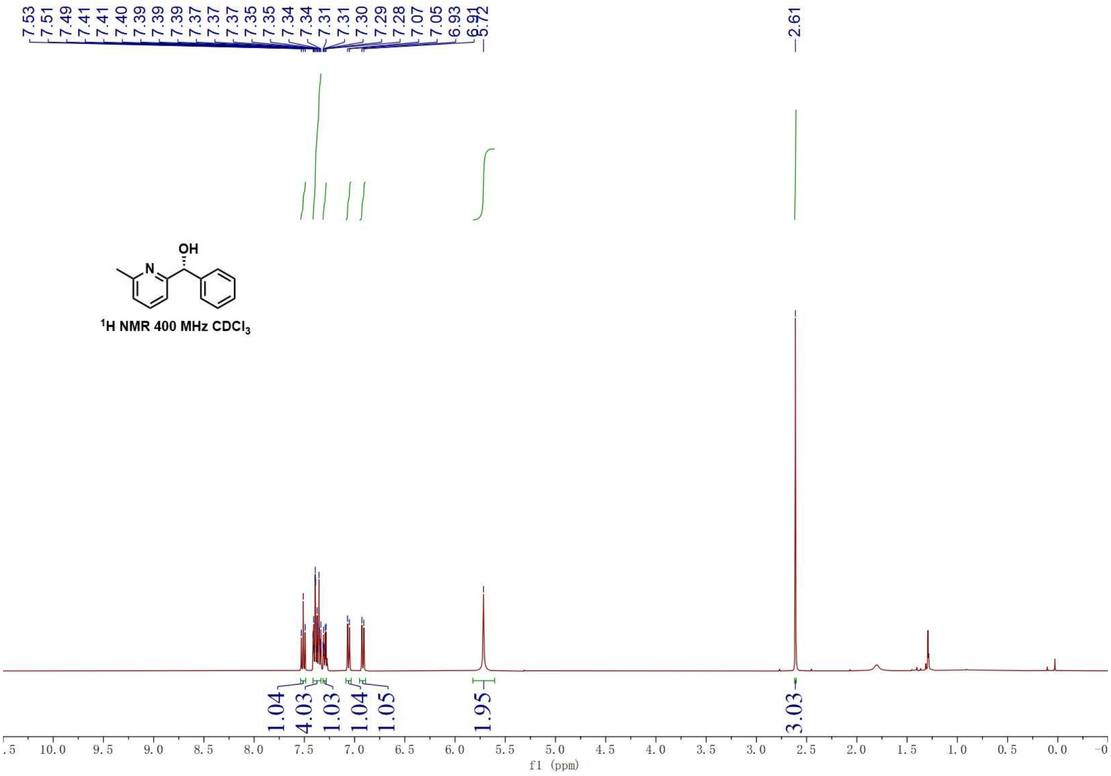


^{1}H NMR (400 MHz) in CDCl$_3$

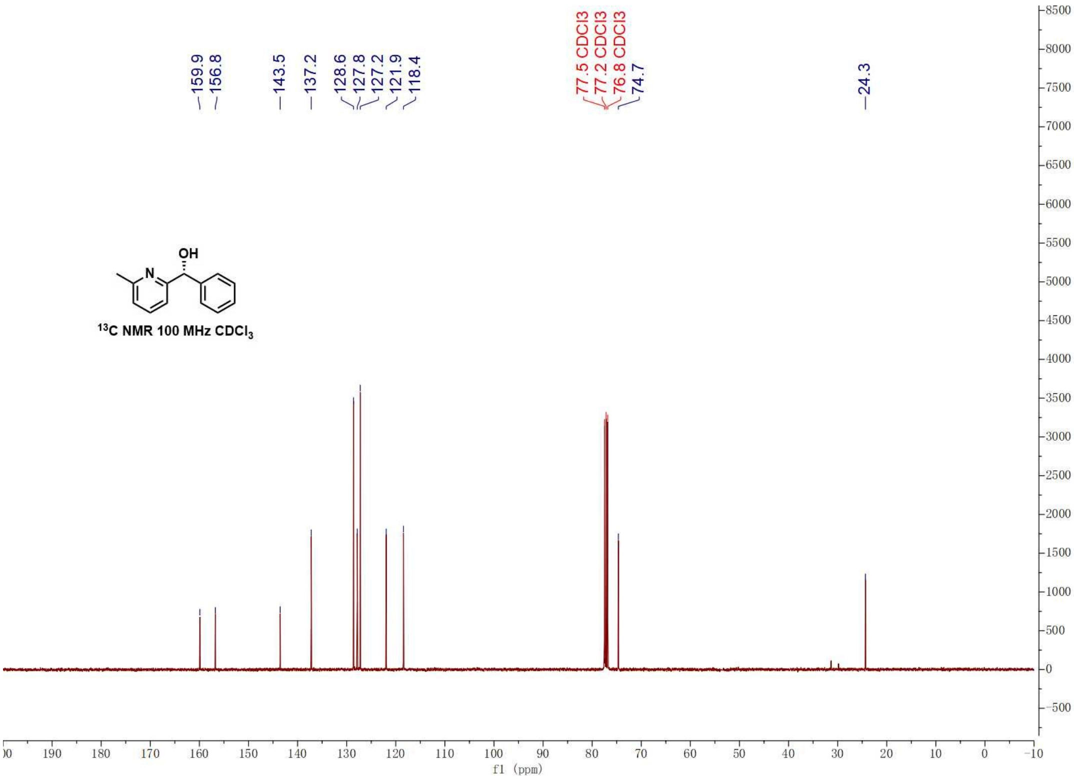


^{13}C NMR (100 MHz) in CDCl$_3$

[(-)-2m]

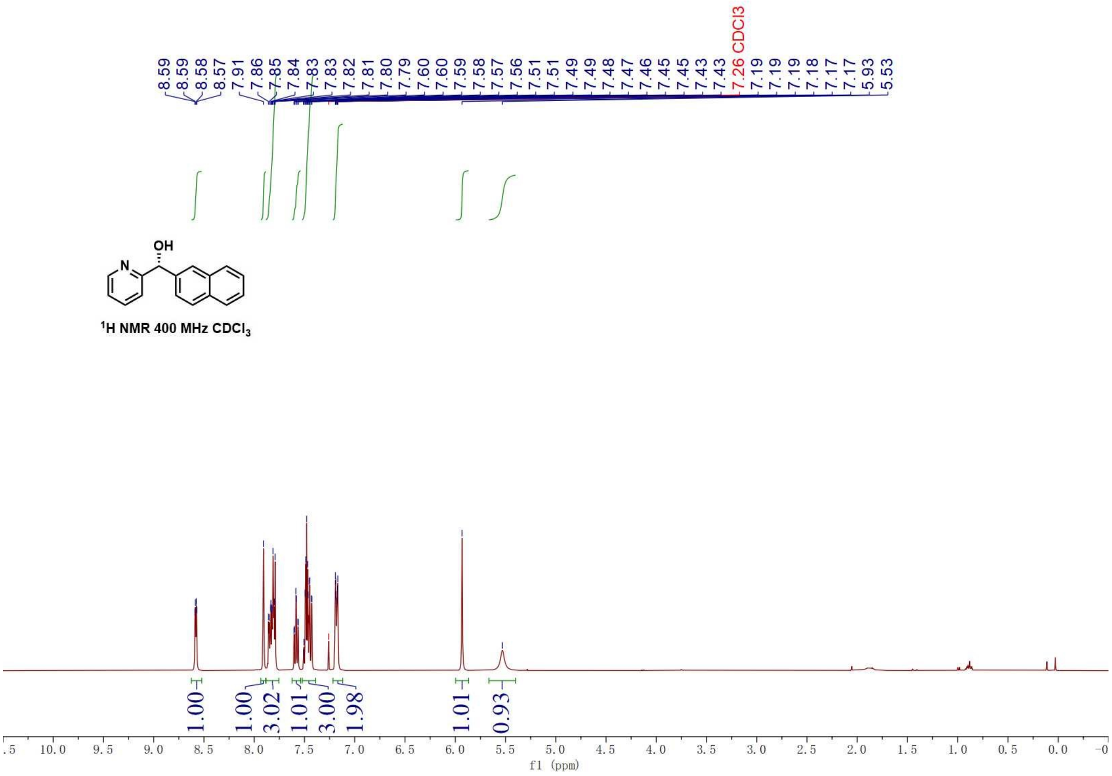


^{1}H NMR (400 MHz) in CDCl$_3$

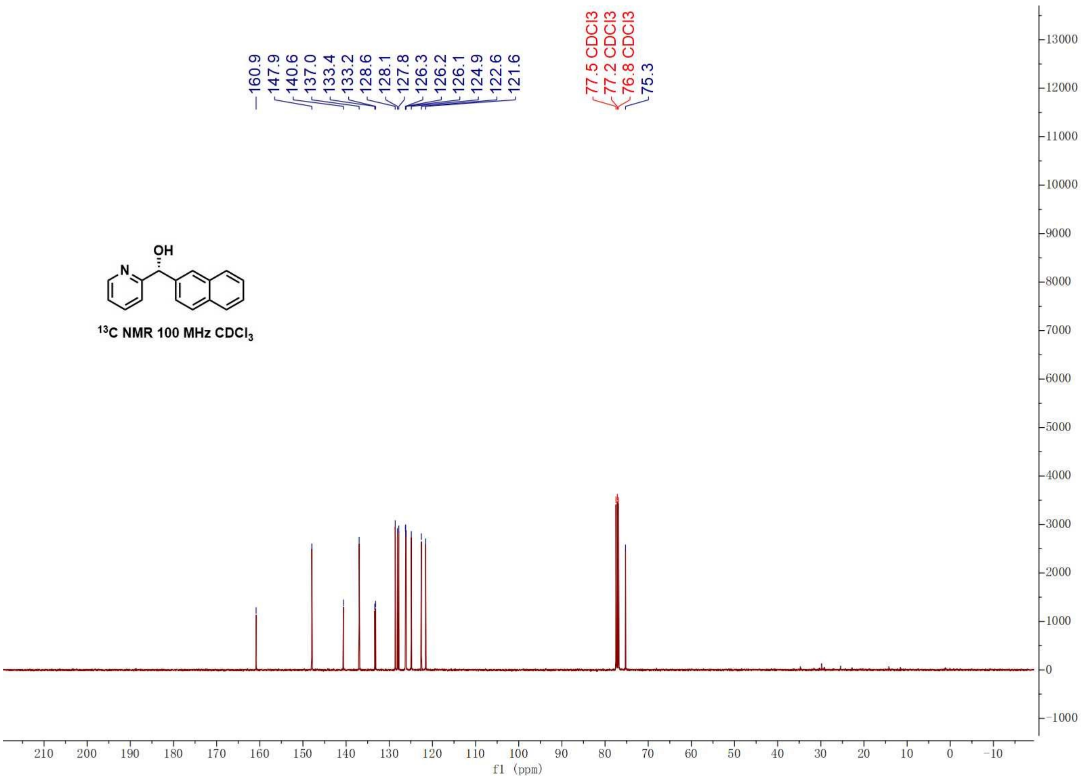


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-2n]

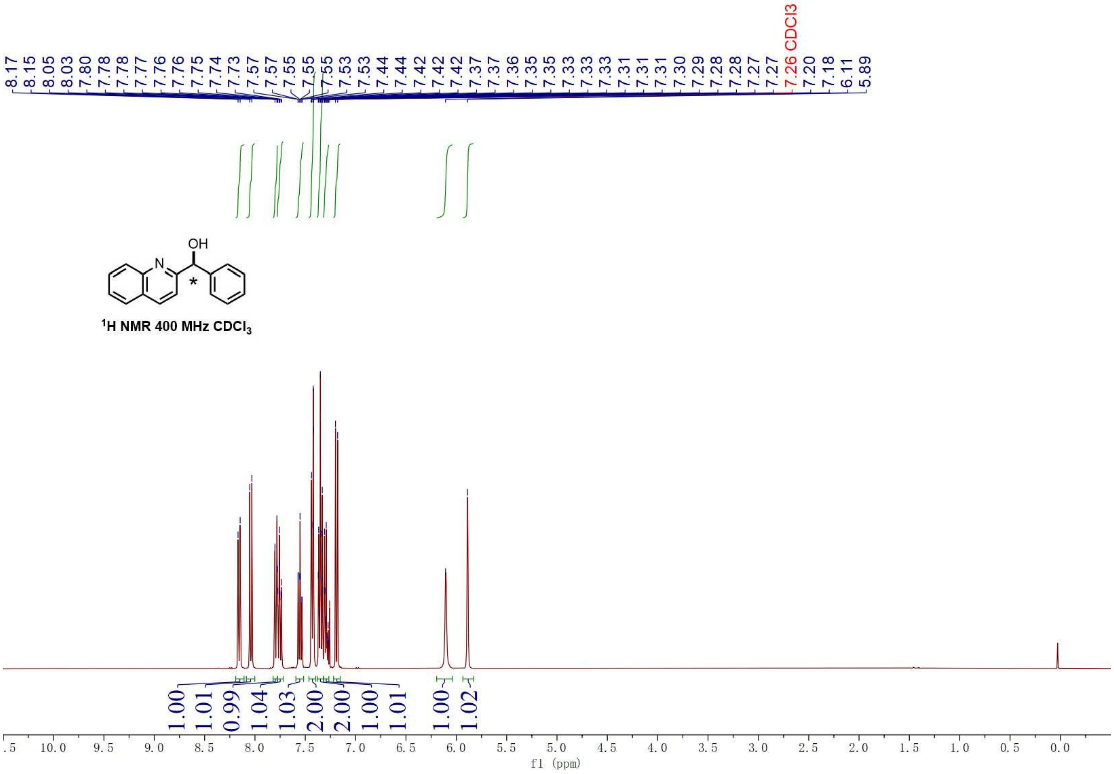


^{1}H NMR (400 MHz) in CDCl$_3$

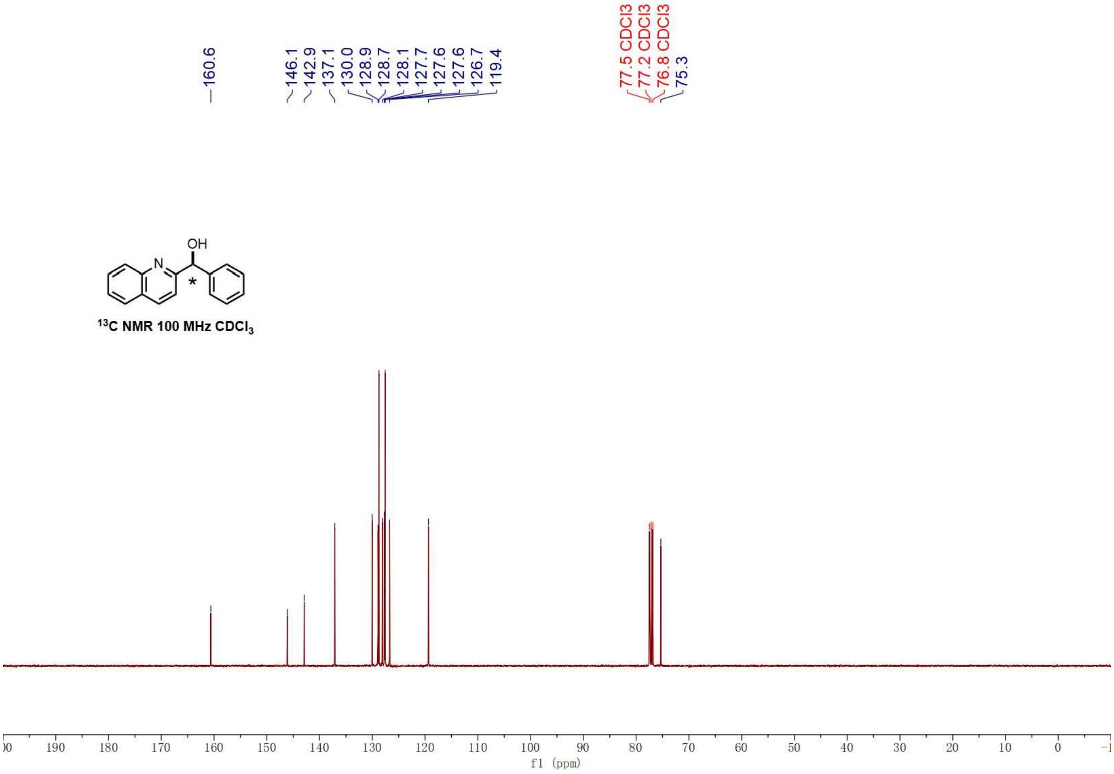


^{13}C NMR (100 MHz) in CDCl$_3$

[(+)-2o]

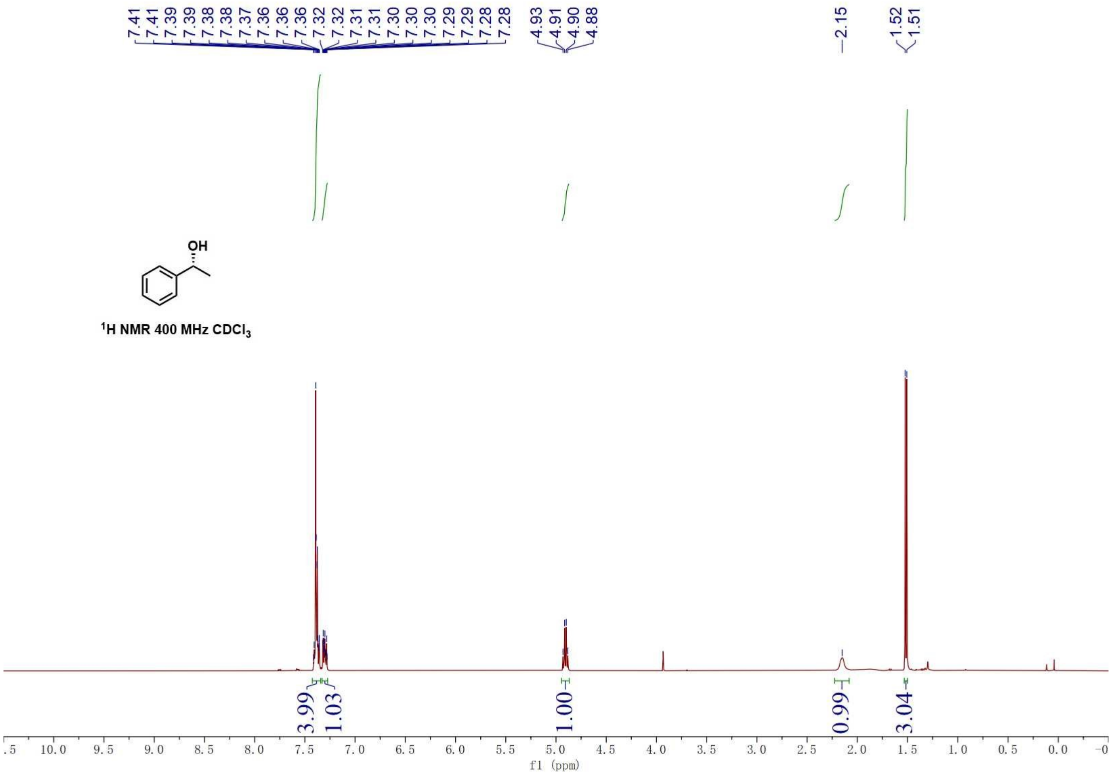


^{1}H NMR (400 MHz) in CDCl$_3$

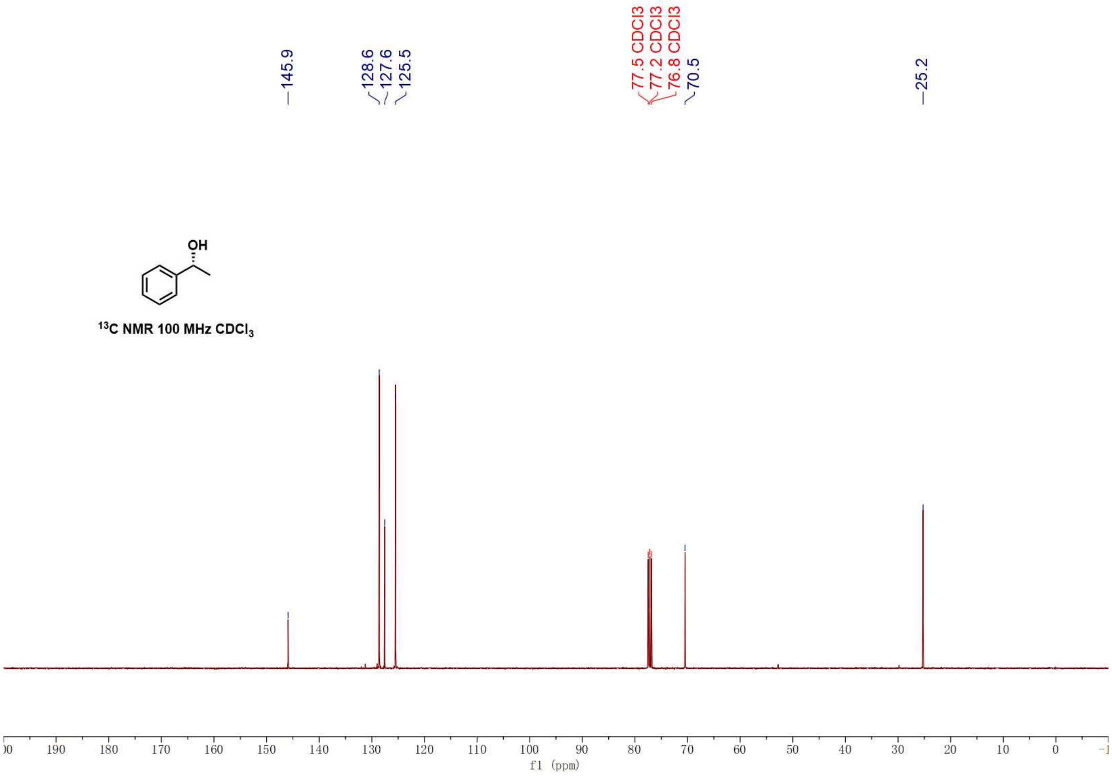


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4a]

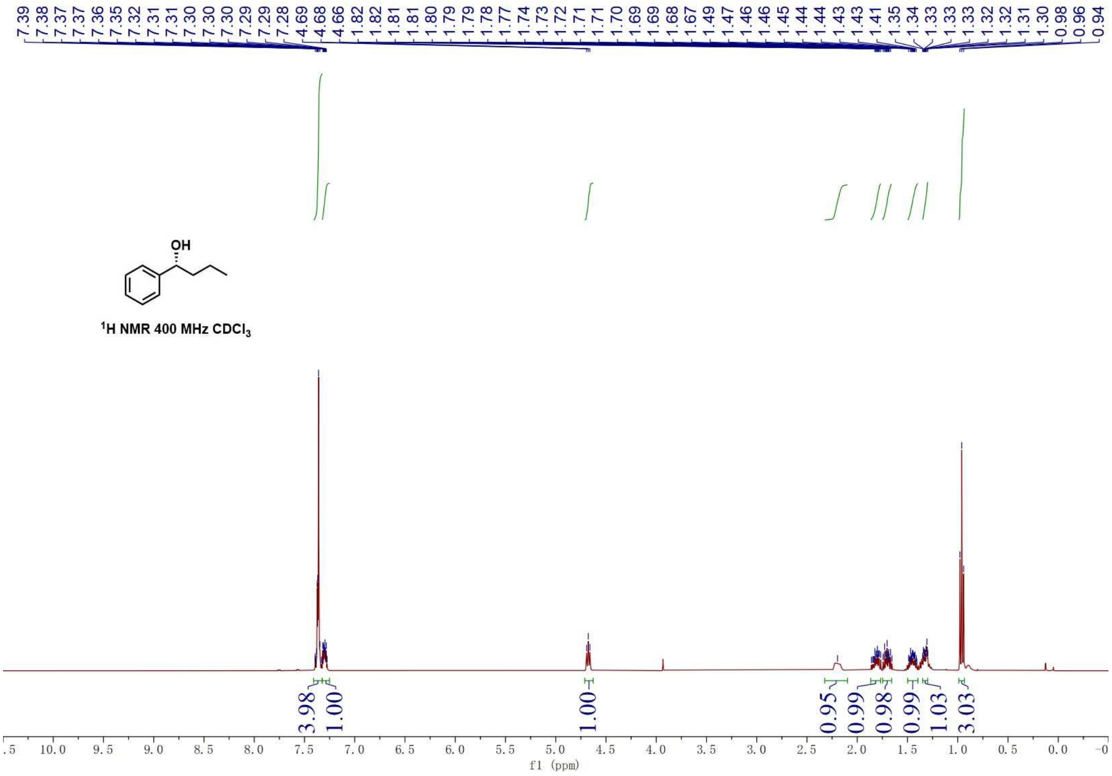


^{1}H NMR (400 MHz) in CDCl$_3$

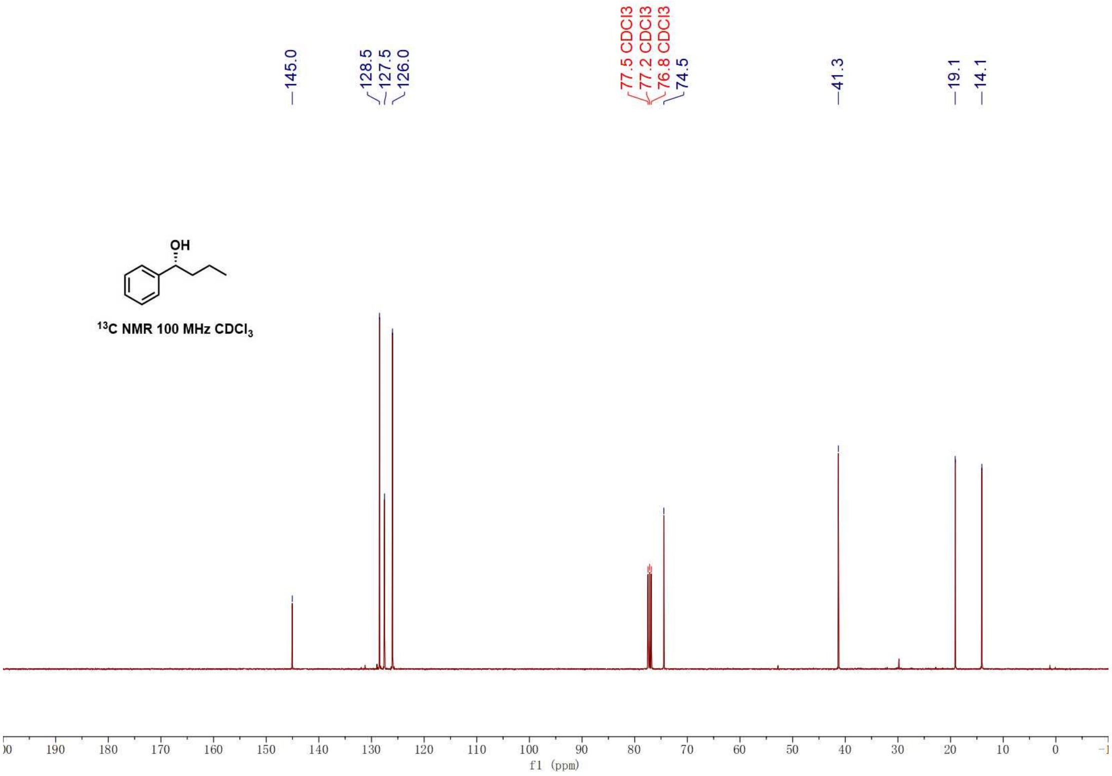


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4b]

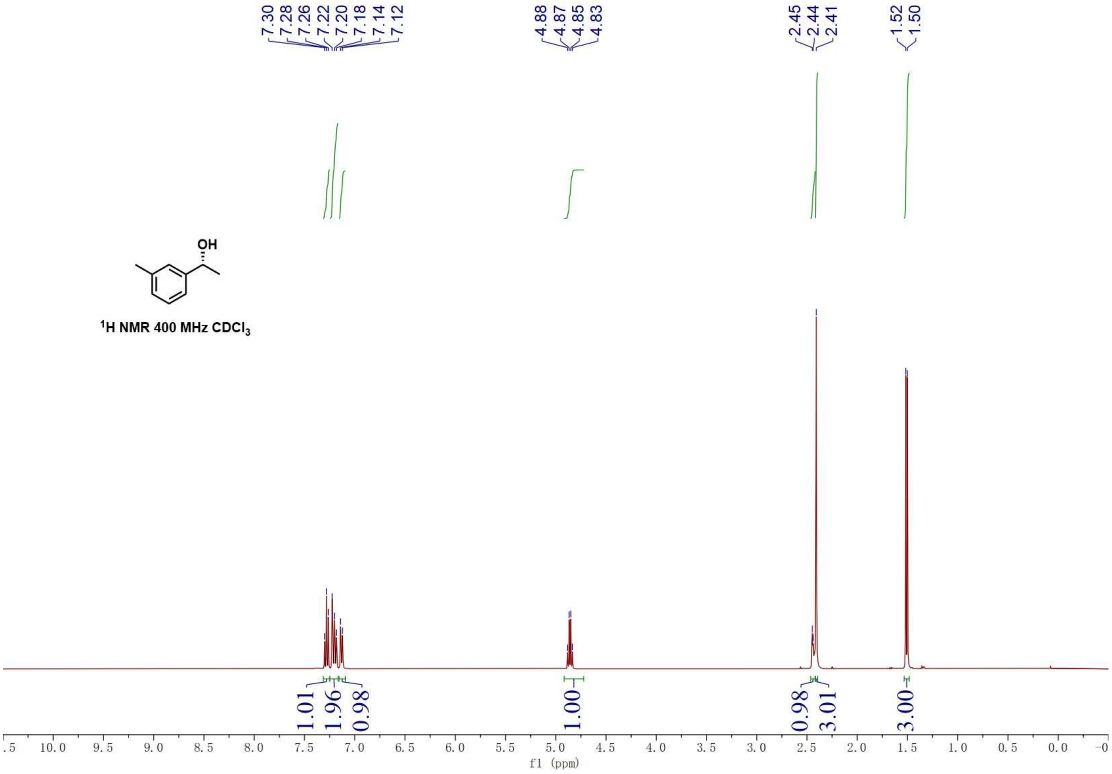


^{1}H NMR (400 MHz) in CDCl$_3$

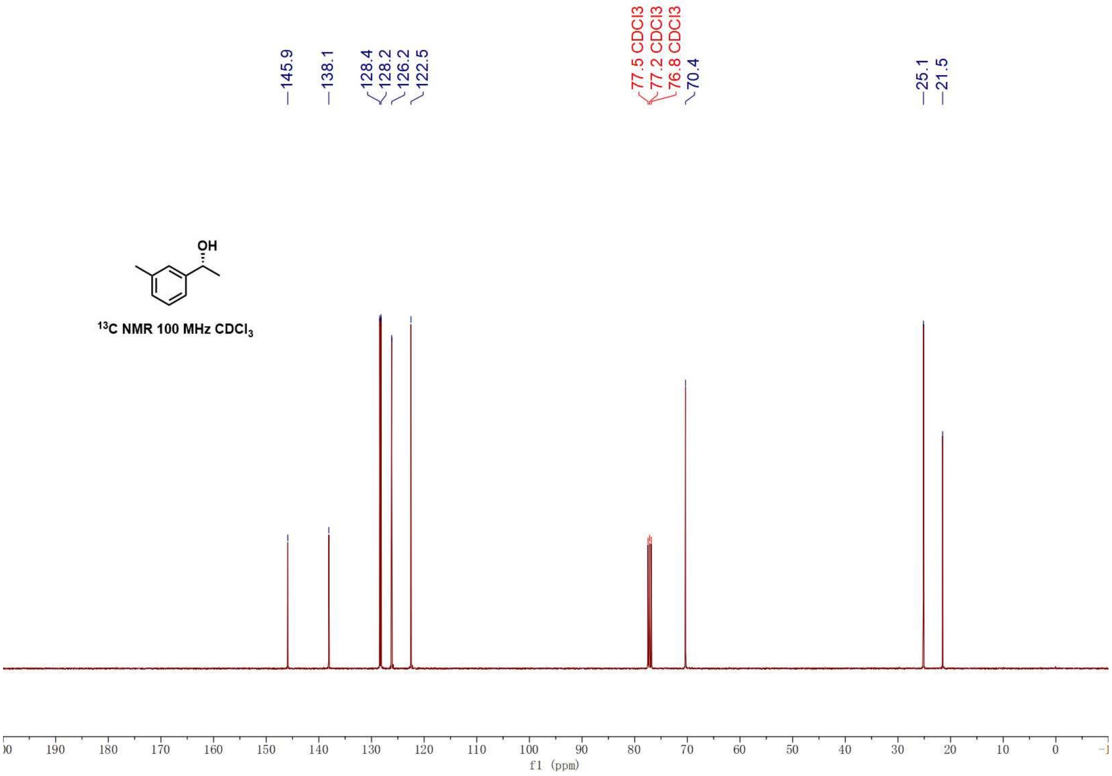


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4c]

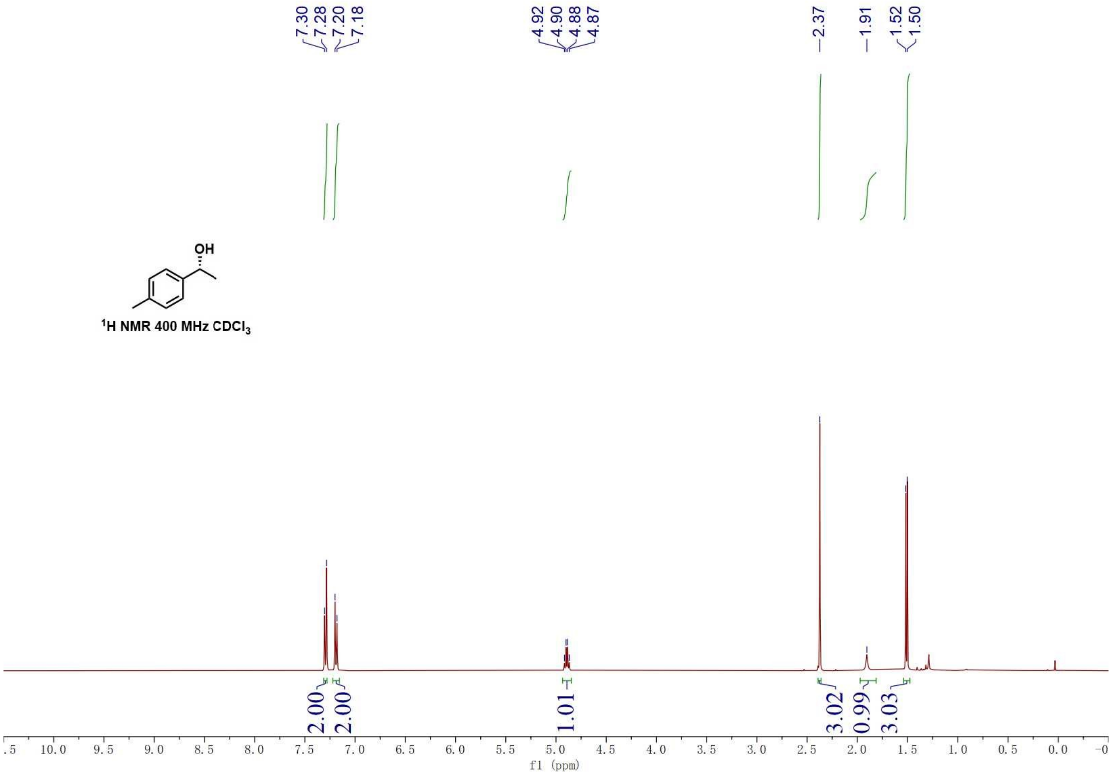


^{1}H NMR (400 MHz) in CDCl$_3$

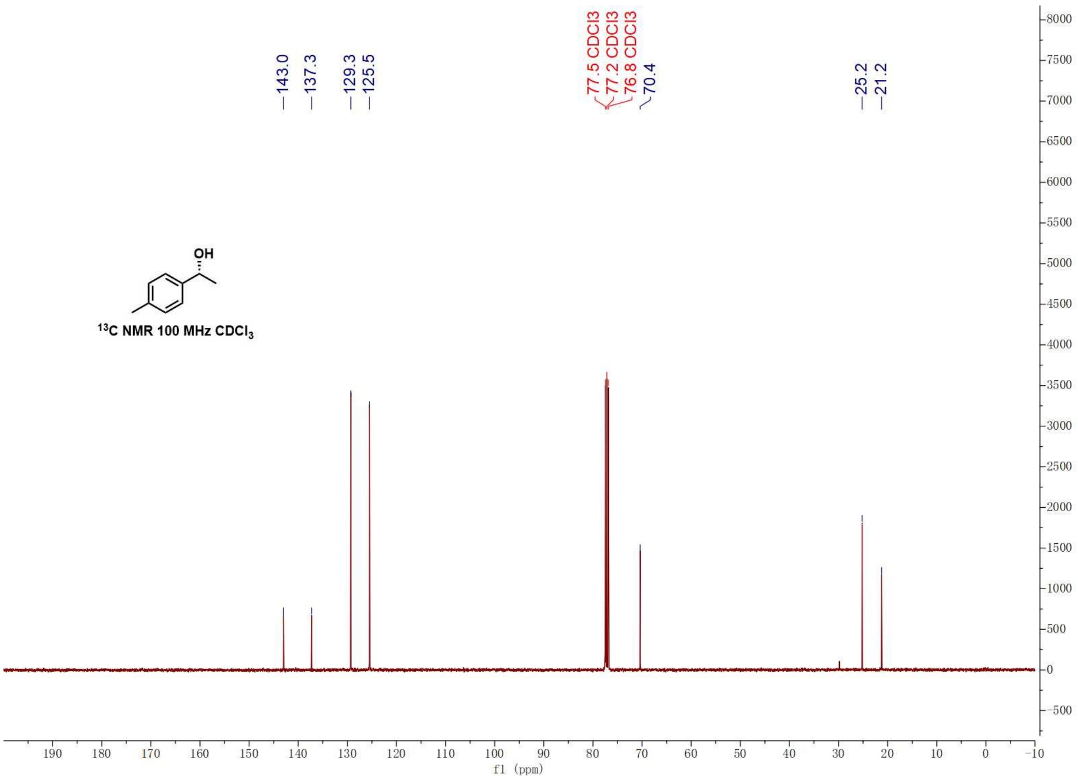


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4d]

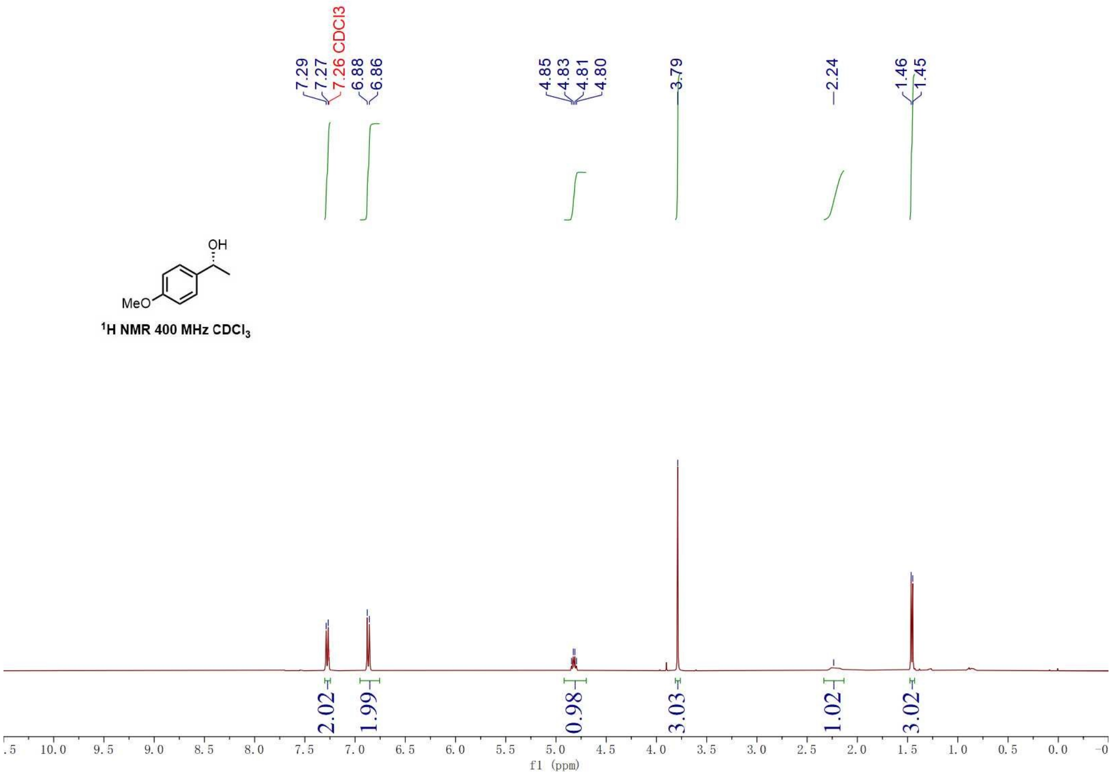


^{1}H NMR (400 MHz) in CDCl$_3$

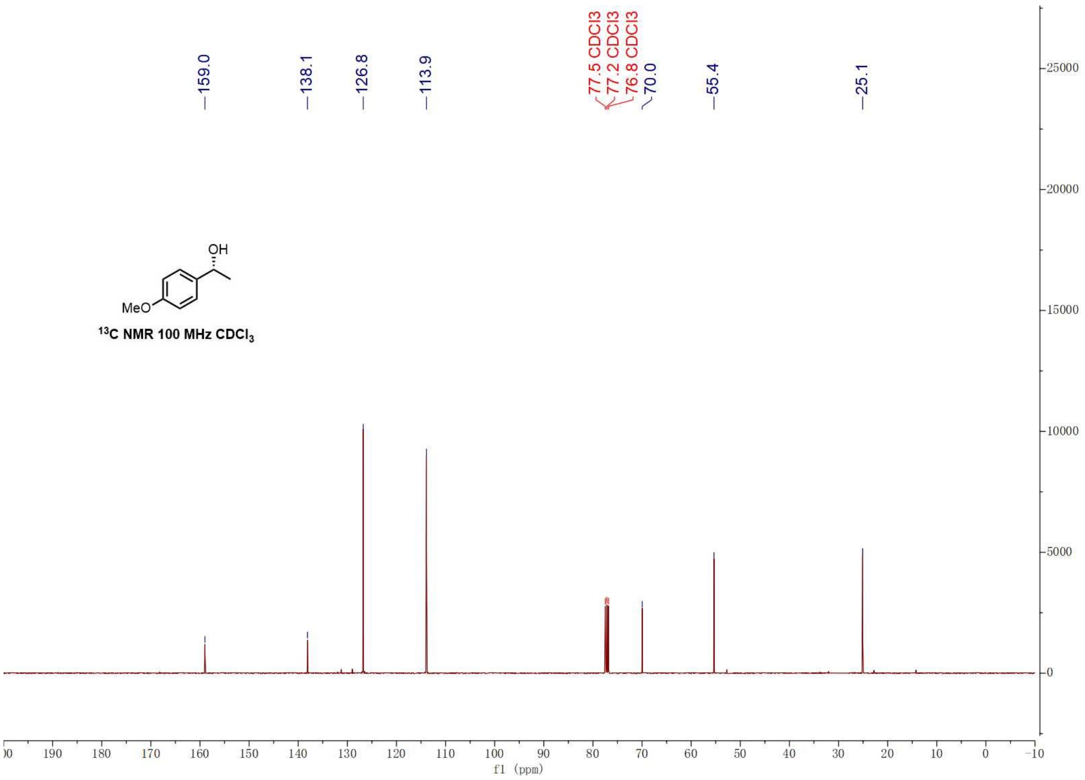


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4e]

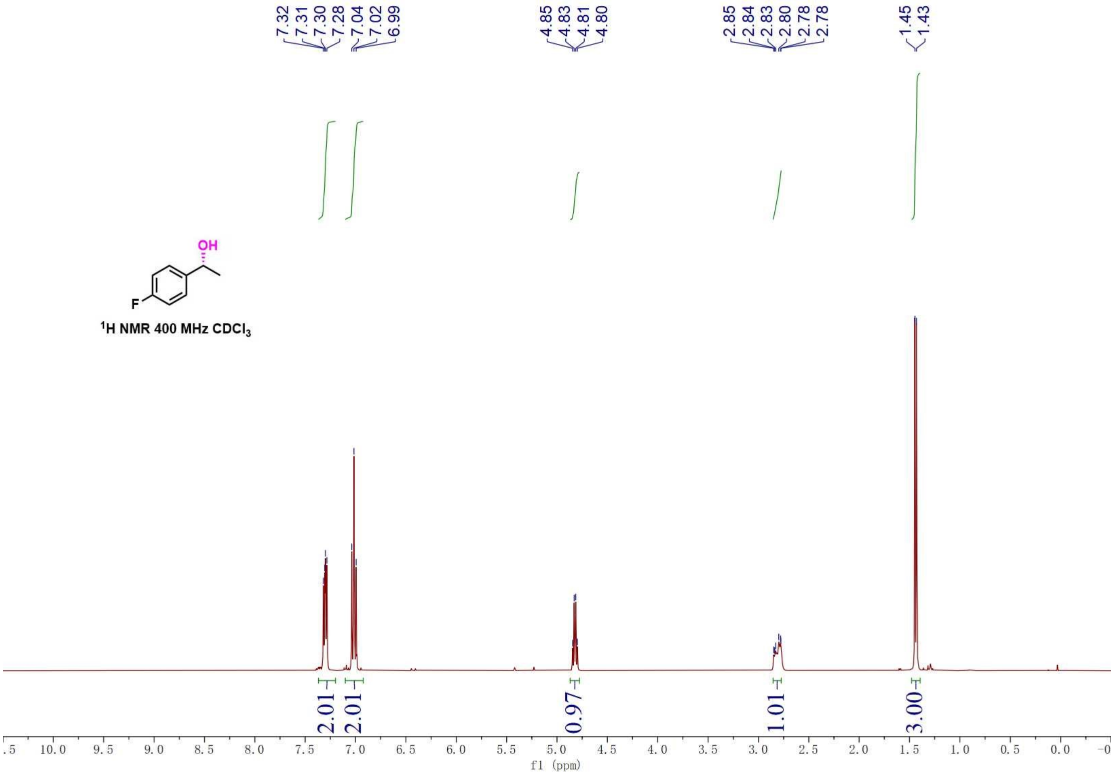


^{1}H NMR (400 MHz) in CDCl$_3$

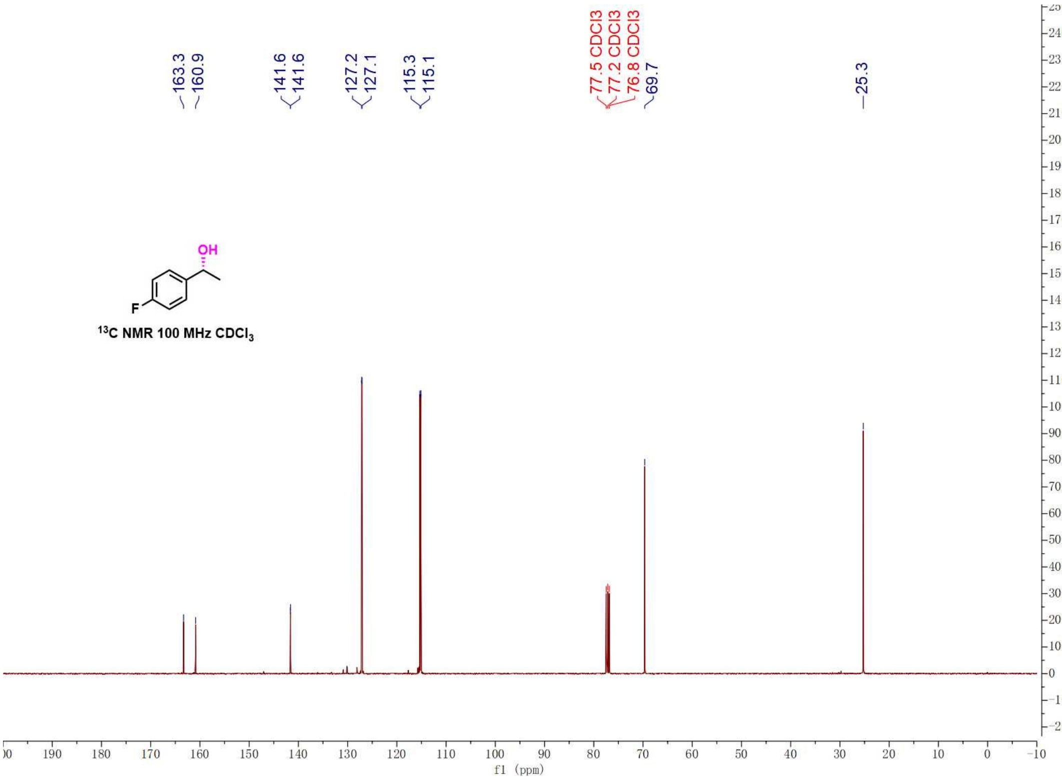


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4f]

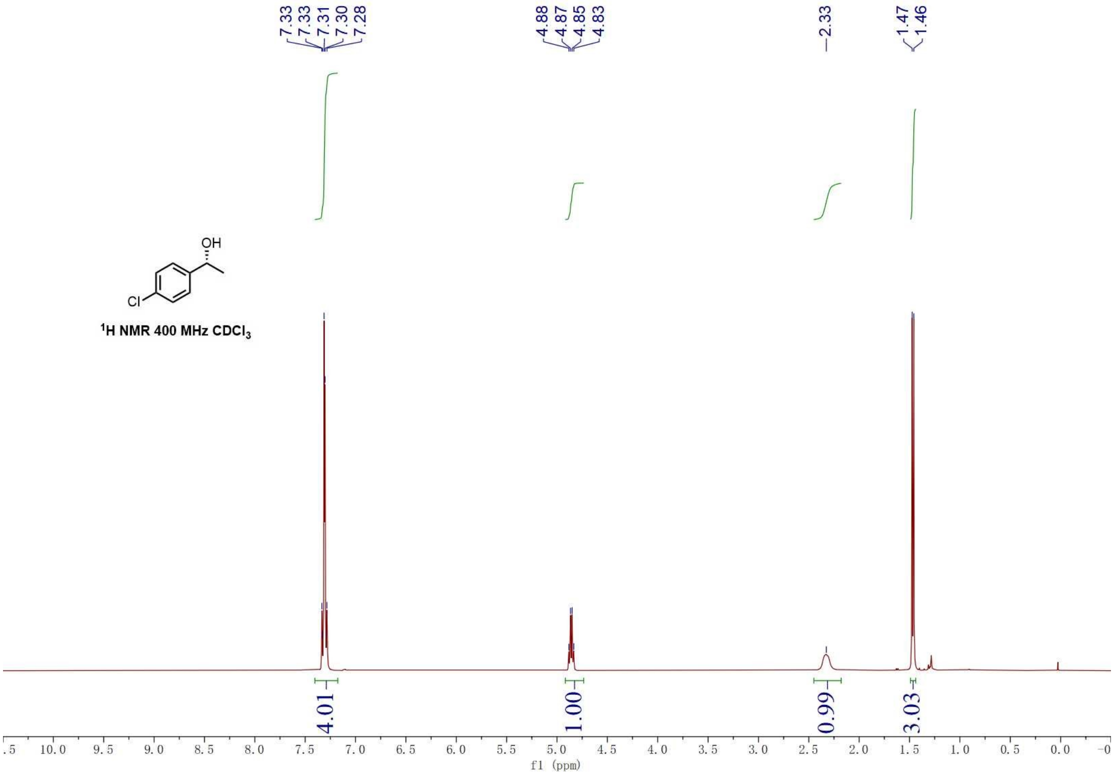


^{1}H NMR (400 MHz) in CDCl$_3$

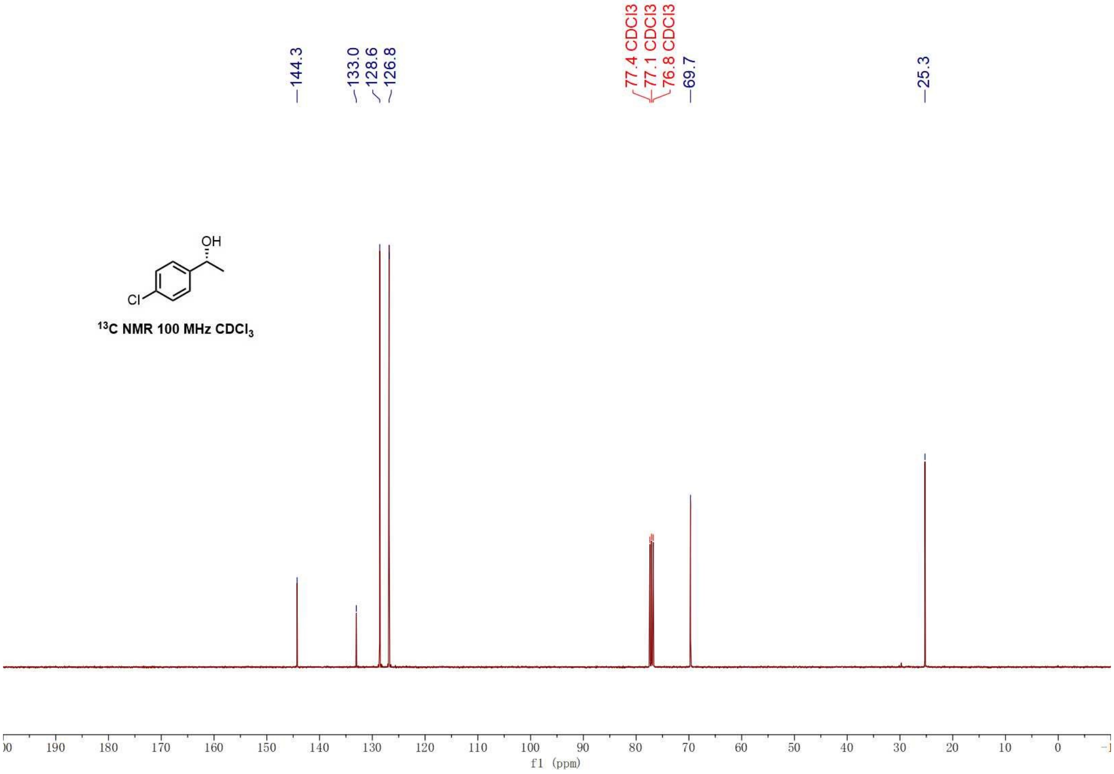


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4g]

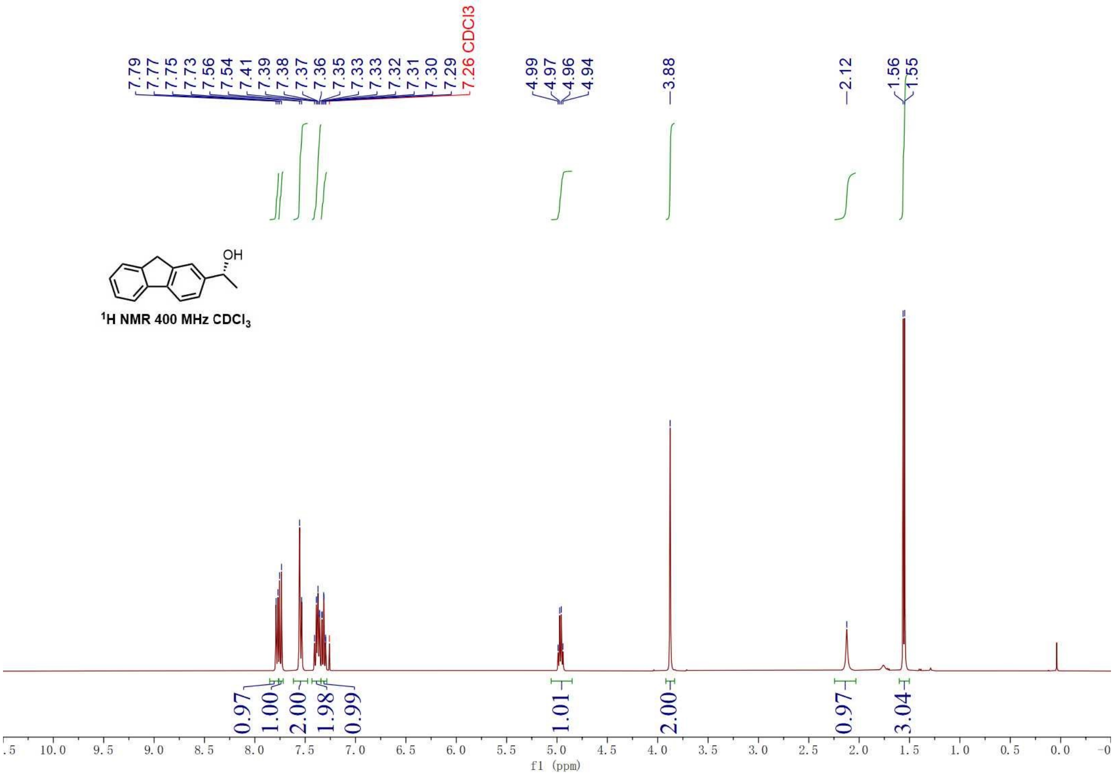


^{1}H NMR (400 MHz) in CDCl$_3$

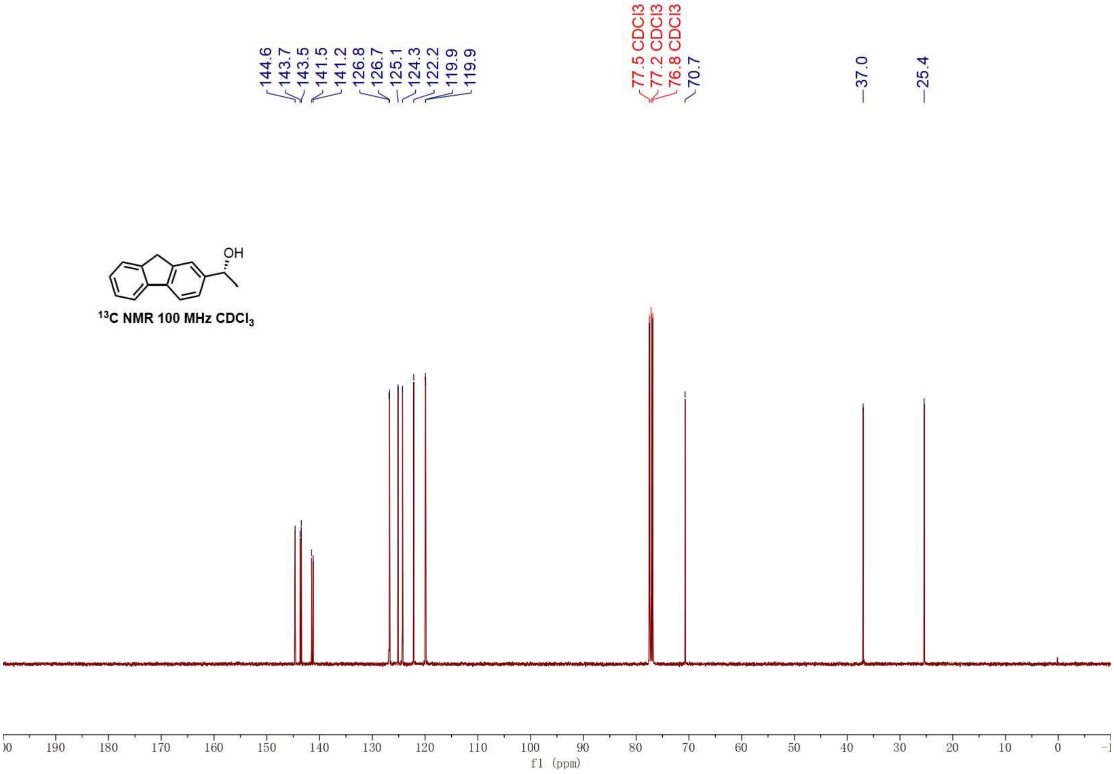


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4h]

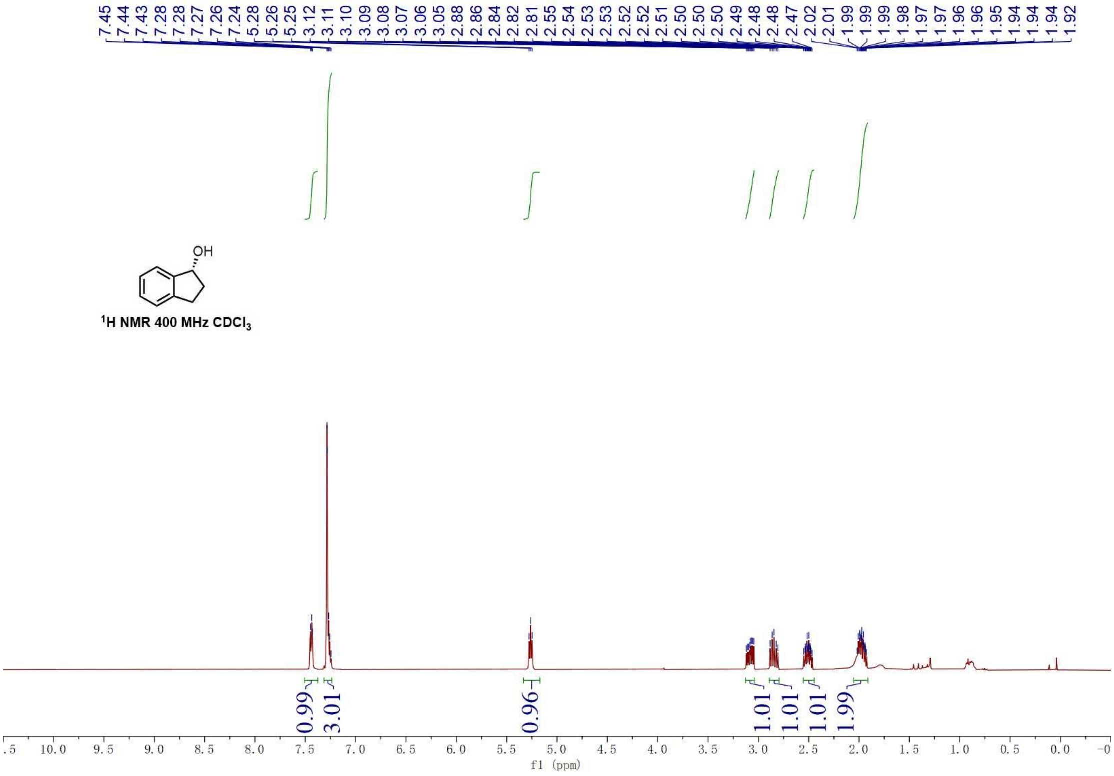


^{1}H NMR (400 MHz) in CDCl$_3$

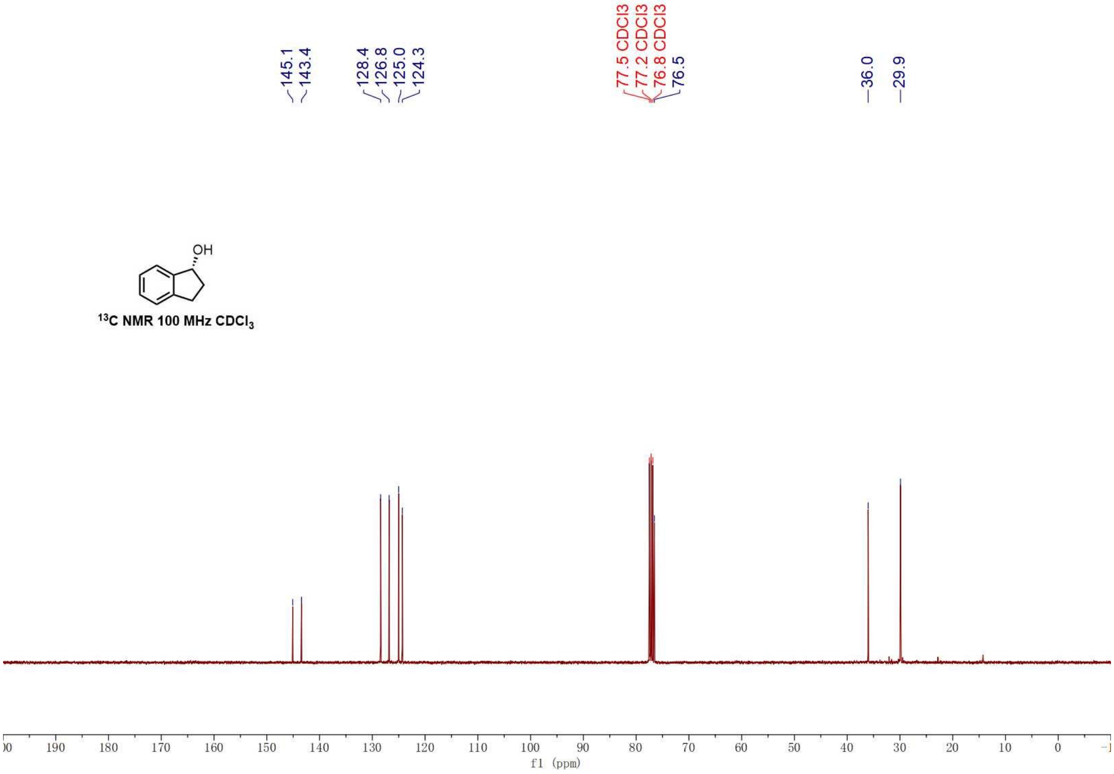


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4i]

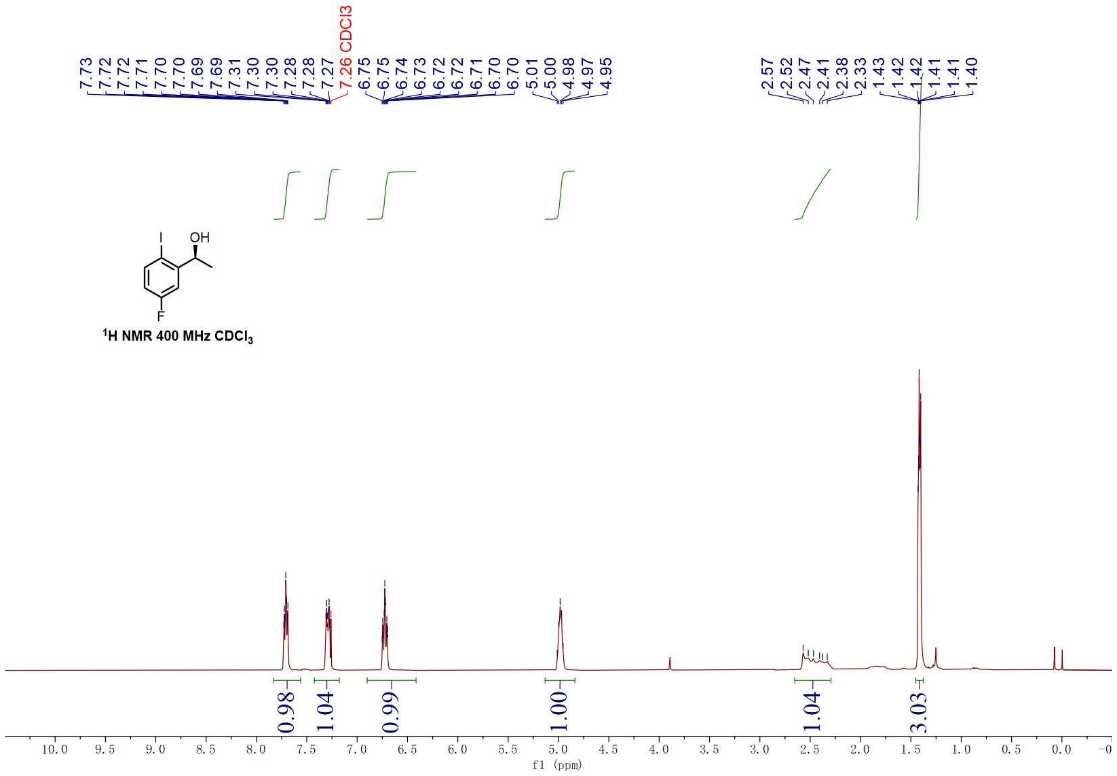


^{1}H NMR (400 MHz) in CDCl$_3$

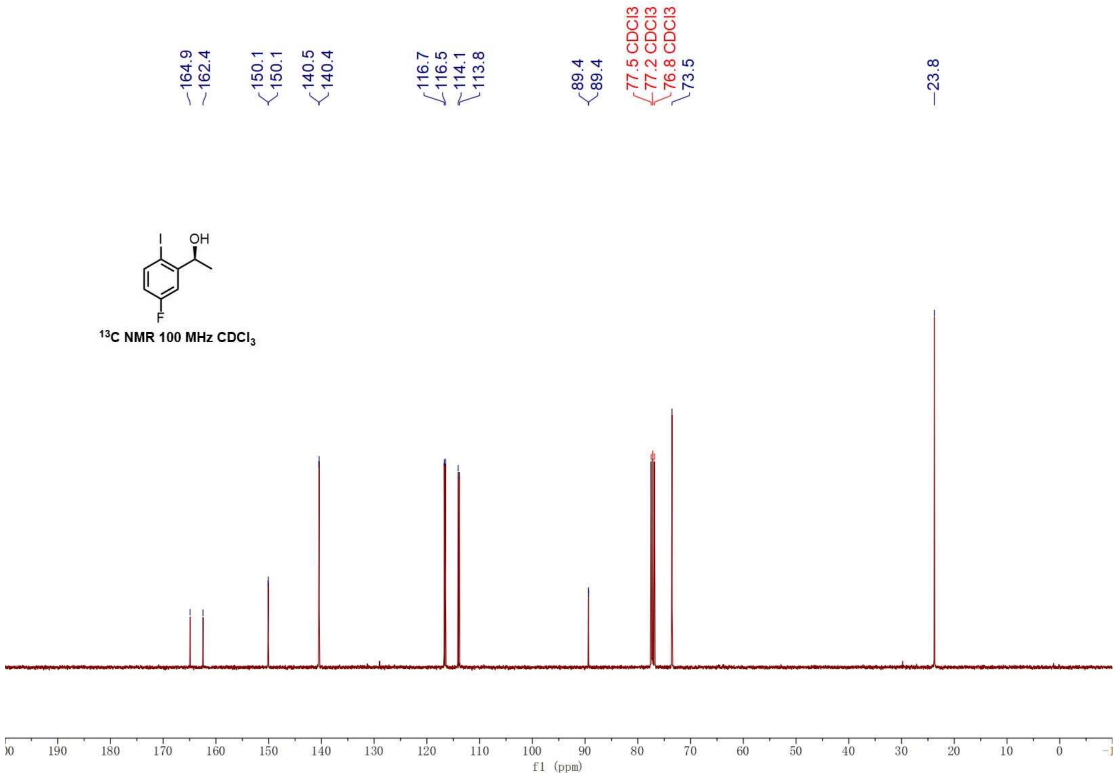


^{13}C NMR (100 MHz) in CDCl$_3$

[(*S*)-4j]

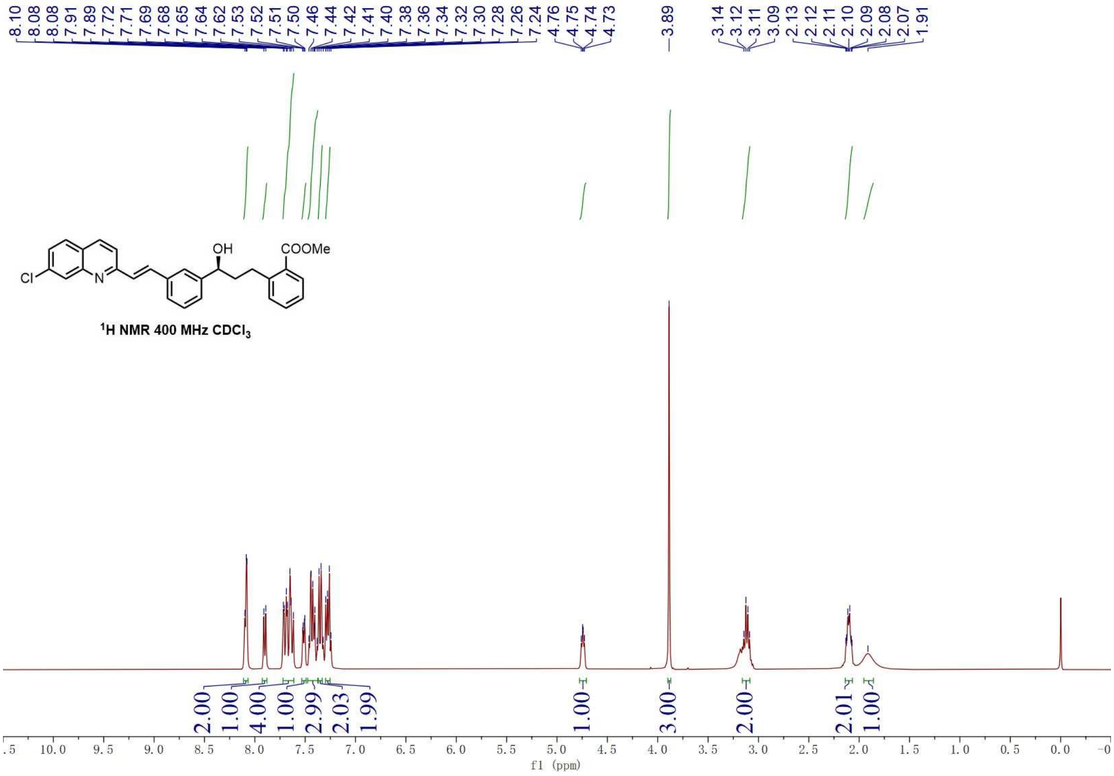


^{1}H NMR (400 MHz) in CDCl$_3$

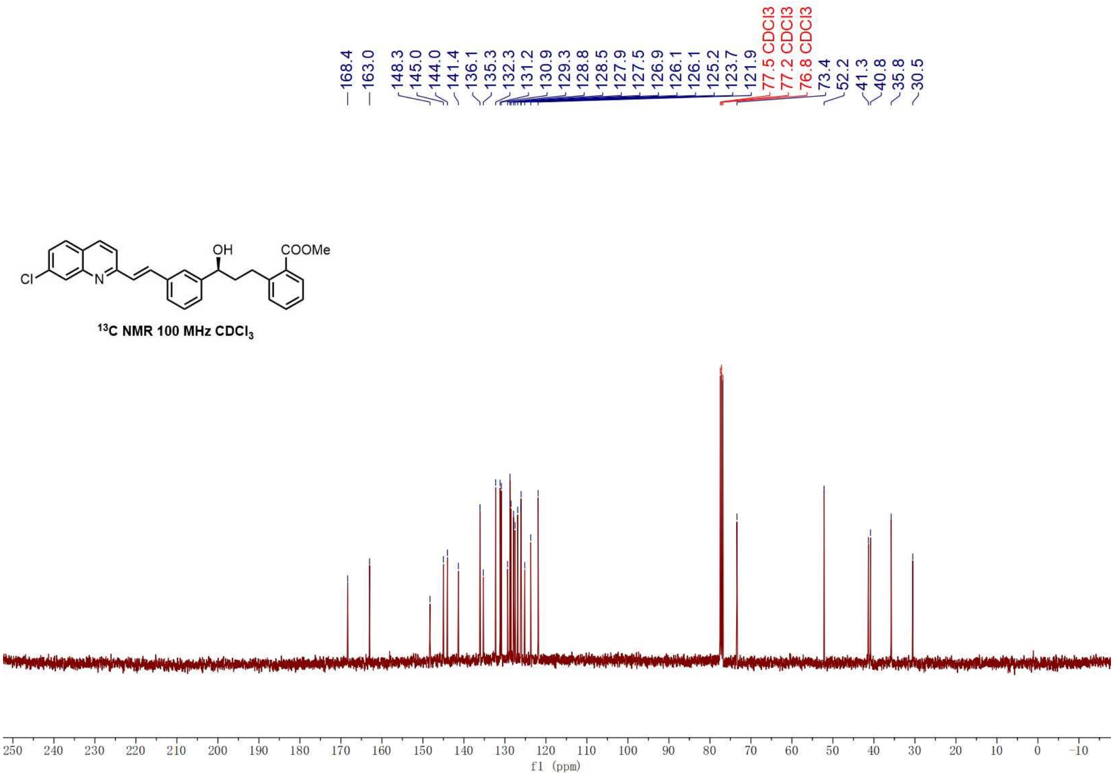


^{13}C NMR (100 MHz) in CDCl$_3$

[(*S*)-4k]

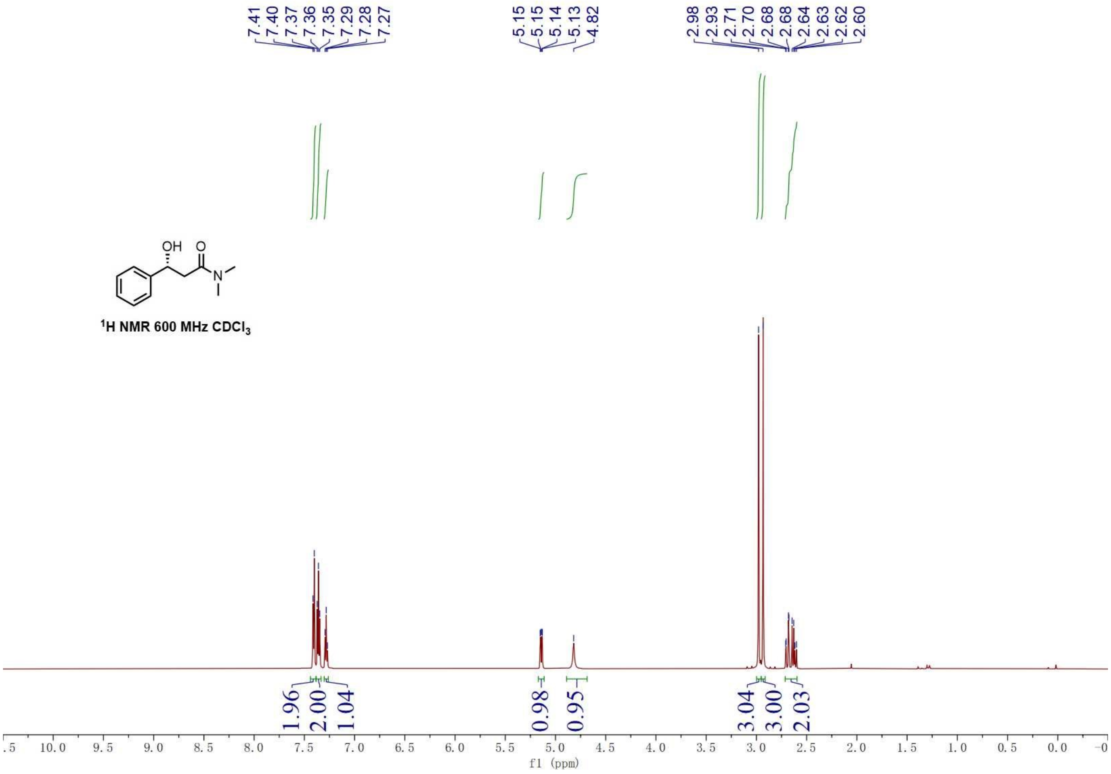


^{1}H NMR (400 MHz) in CDCl$_3$

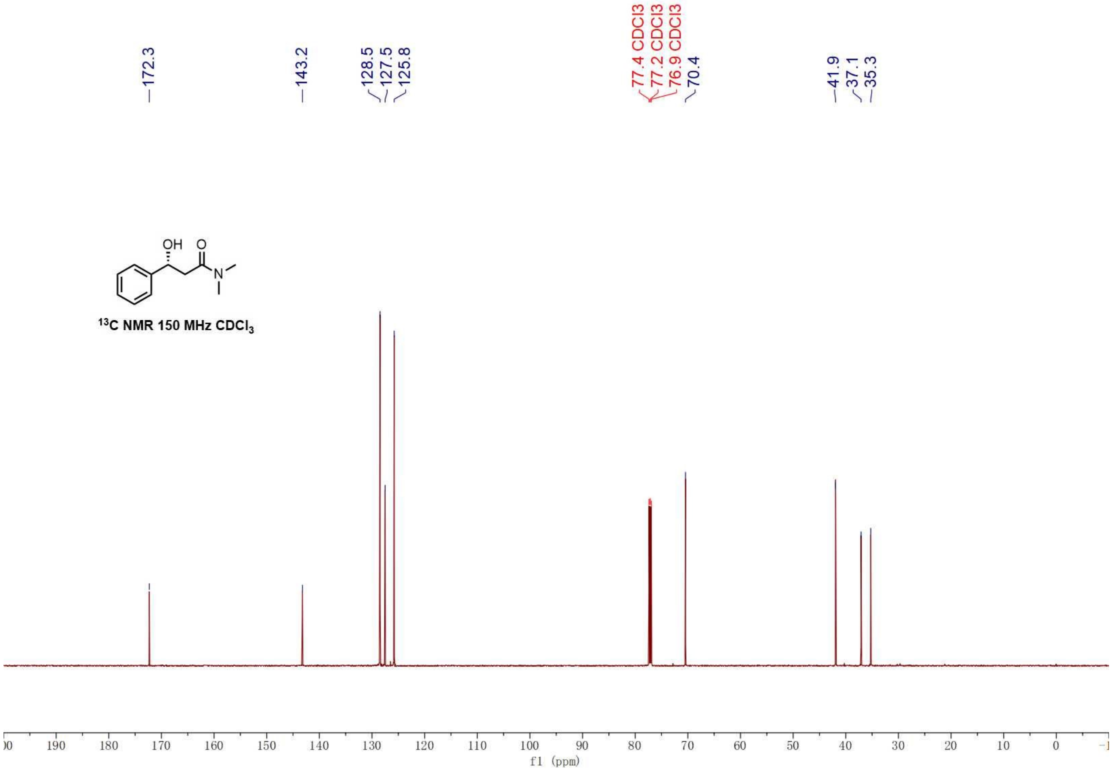


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4l]

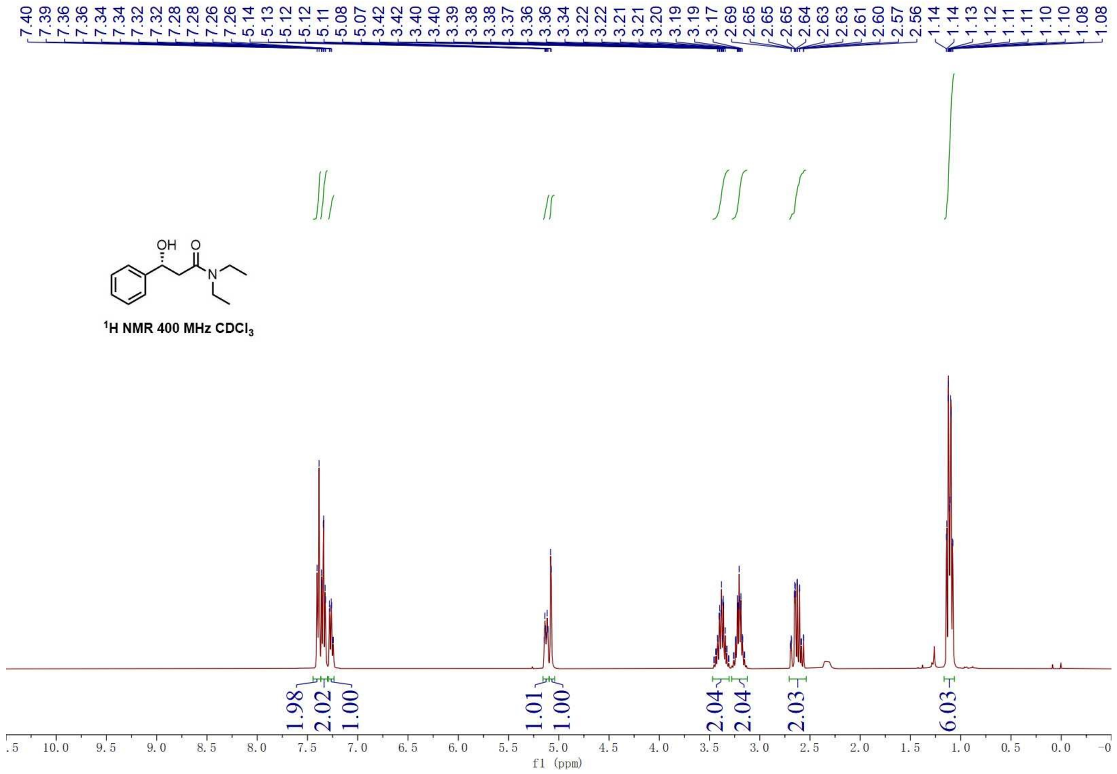


^{1}H NMR (600 MHz) in CDCl$_3$

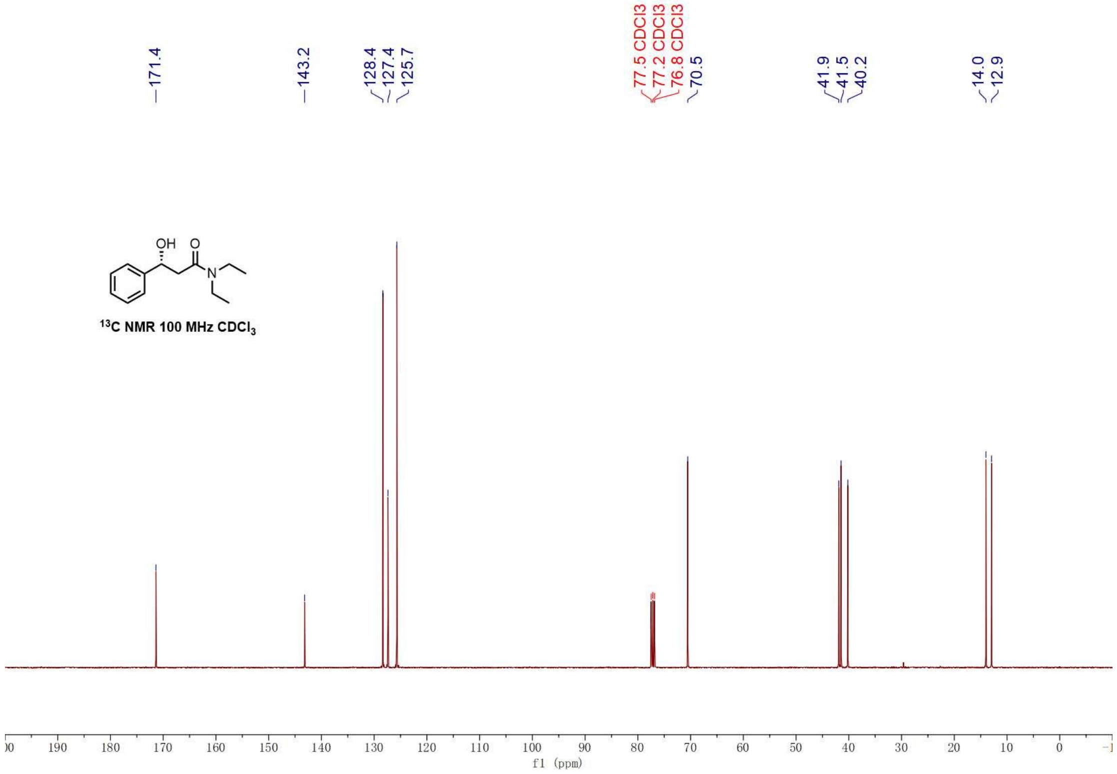


^{13}C NMR (150 MHz) in CDCl$_3$

[(*R*)-4m]

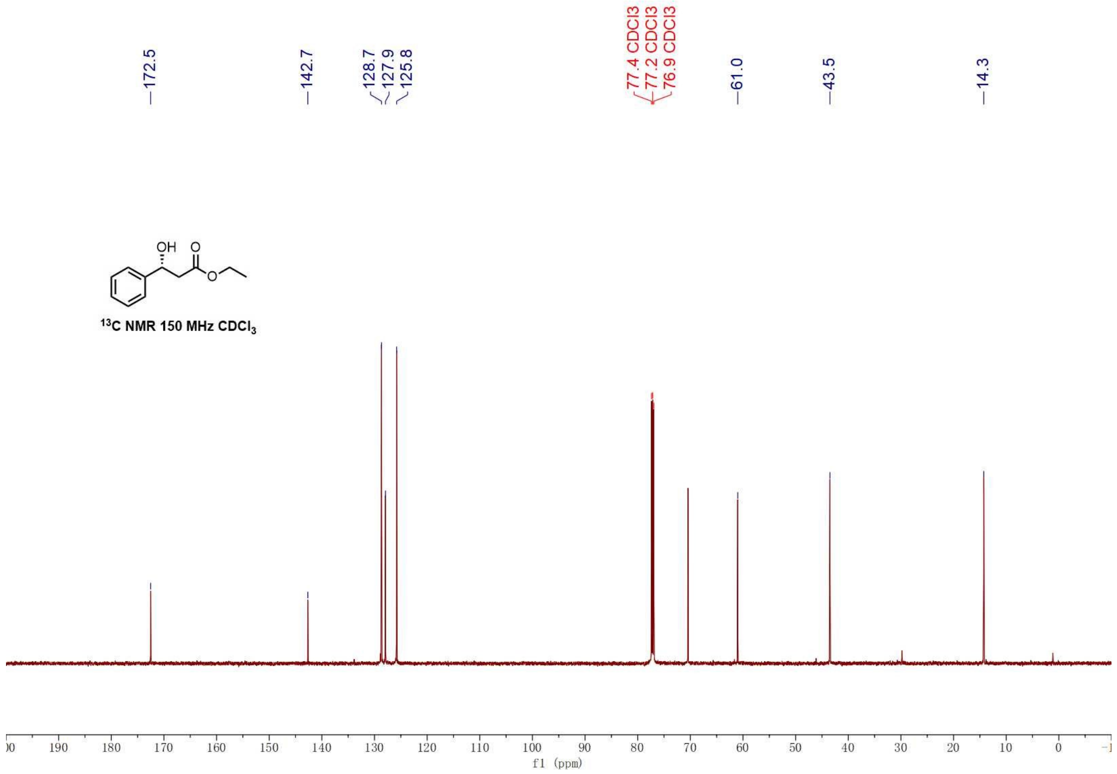


^{1}H NMR (400 MHz) in CDCl$_3$

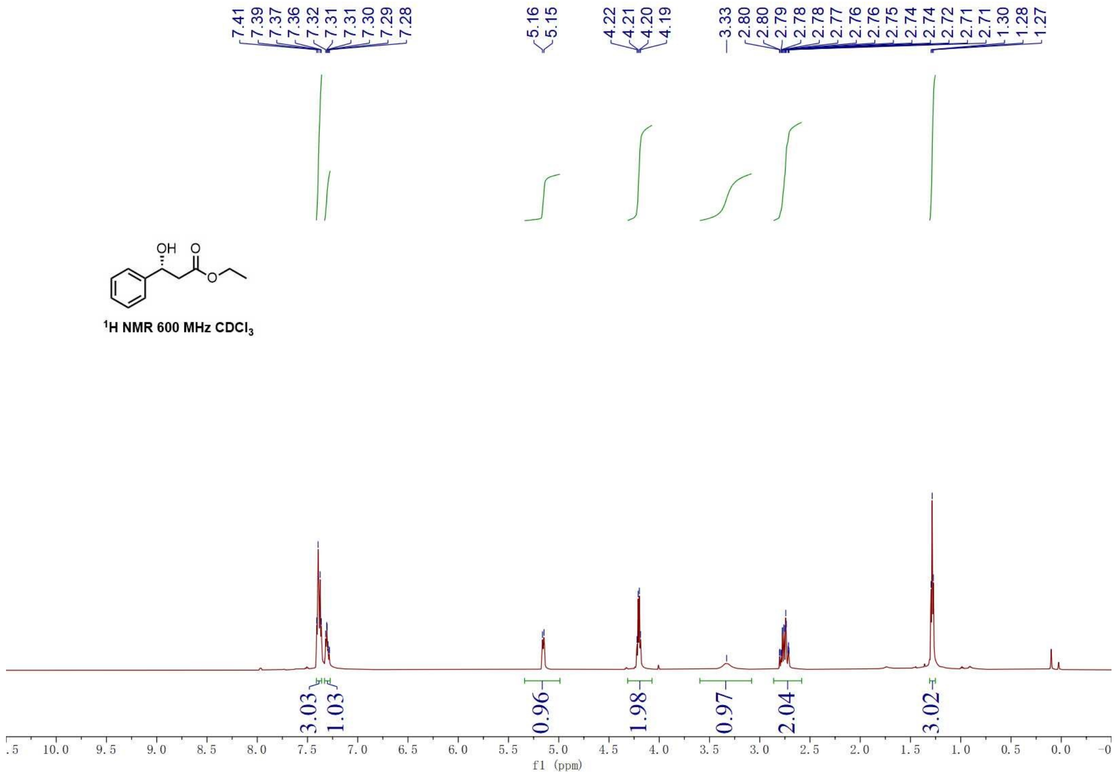


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4n]

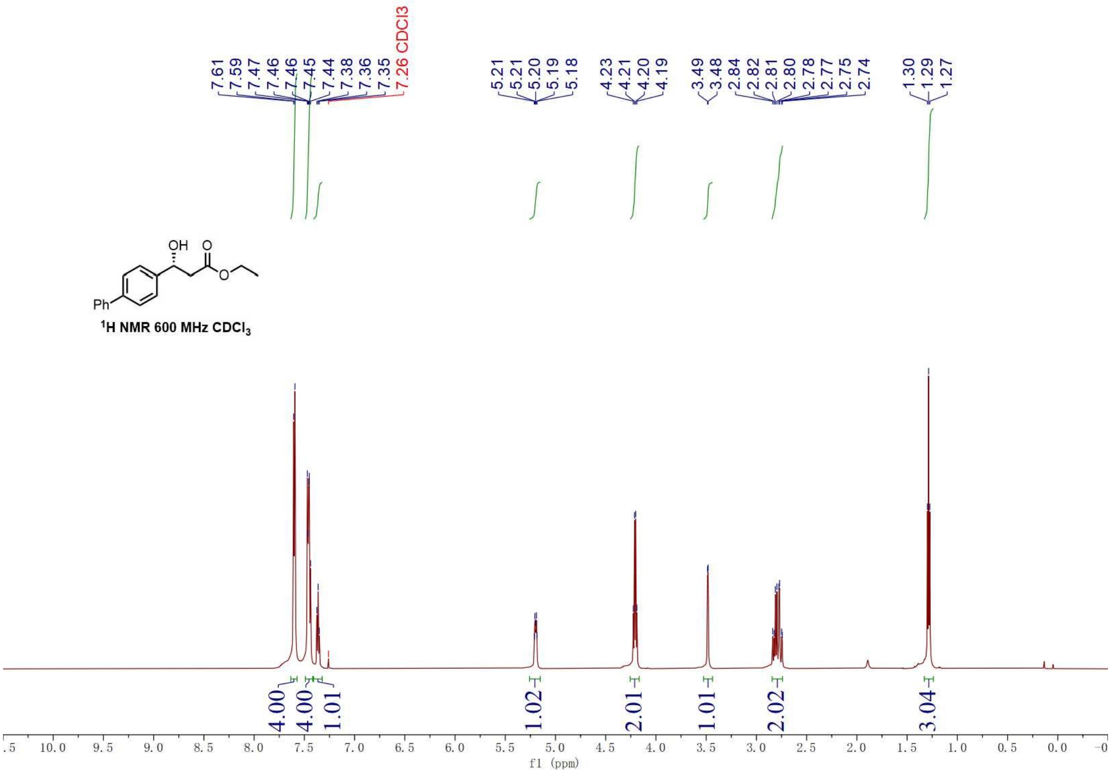


^{1}H NMR (400 MHz) in CDCl$_3$

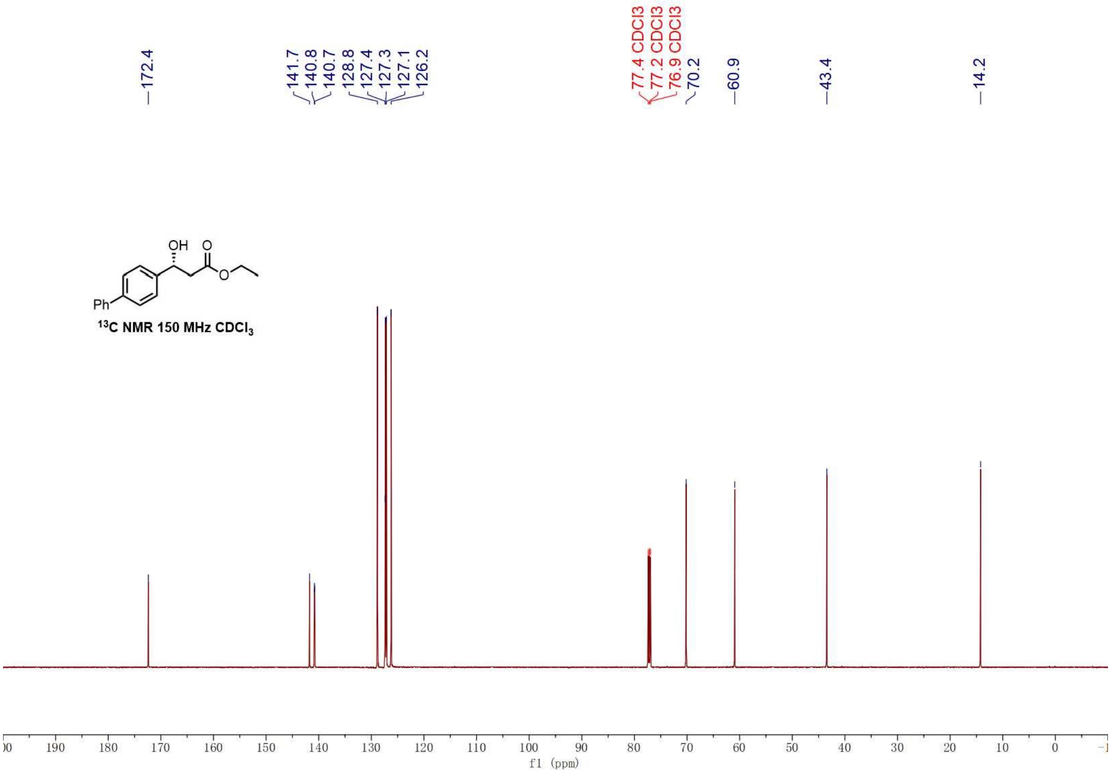


^{13}C NMR (100 MHz) in CDCl$_3$

[(*R*)-4o]

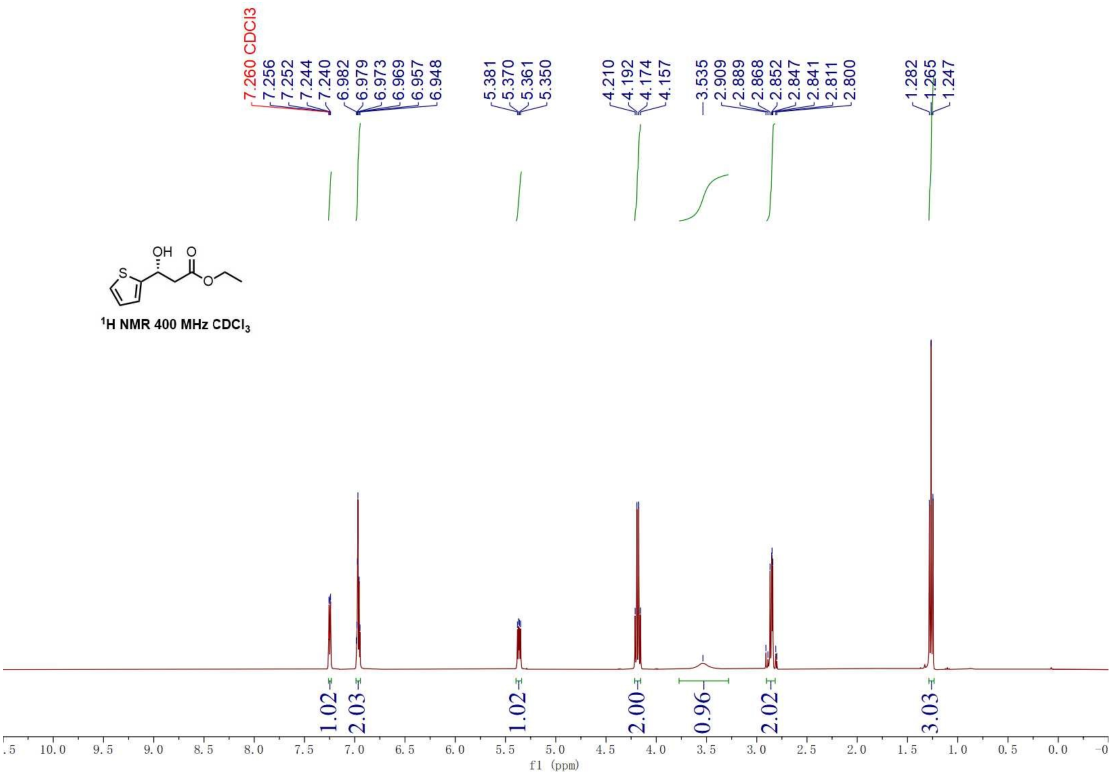


^{1}H NMR (600 MHz) in CDCl$_3$

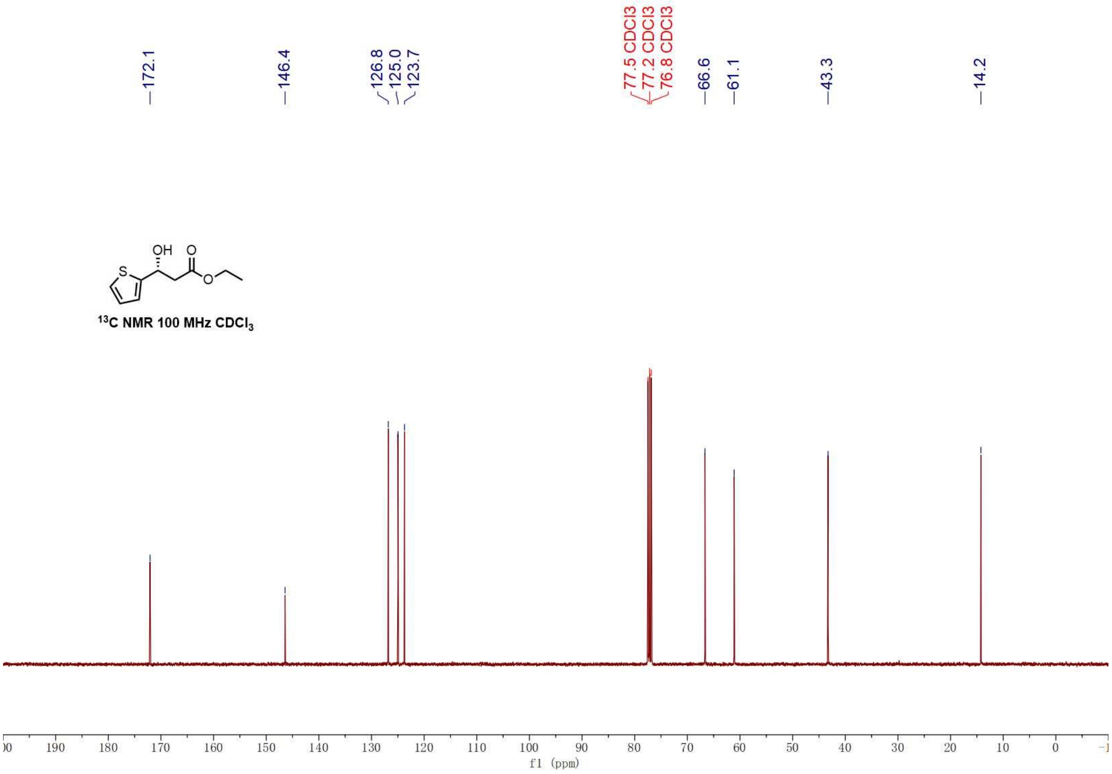


^{13}C NMR (150 MHz) in CDCl$_3$

[(*R*)-4p]

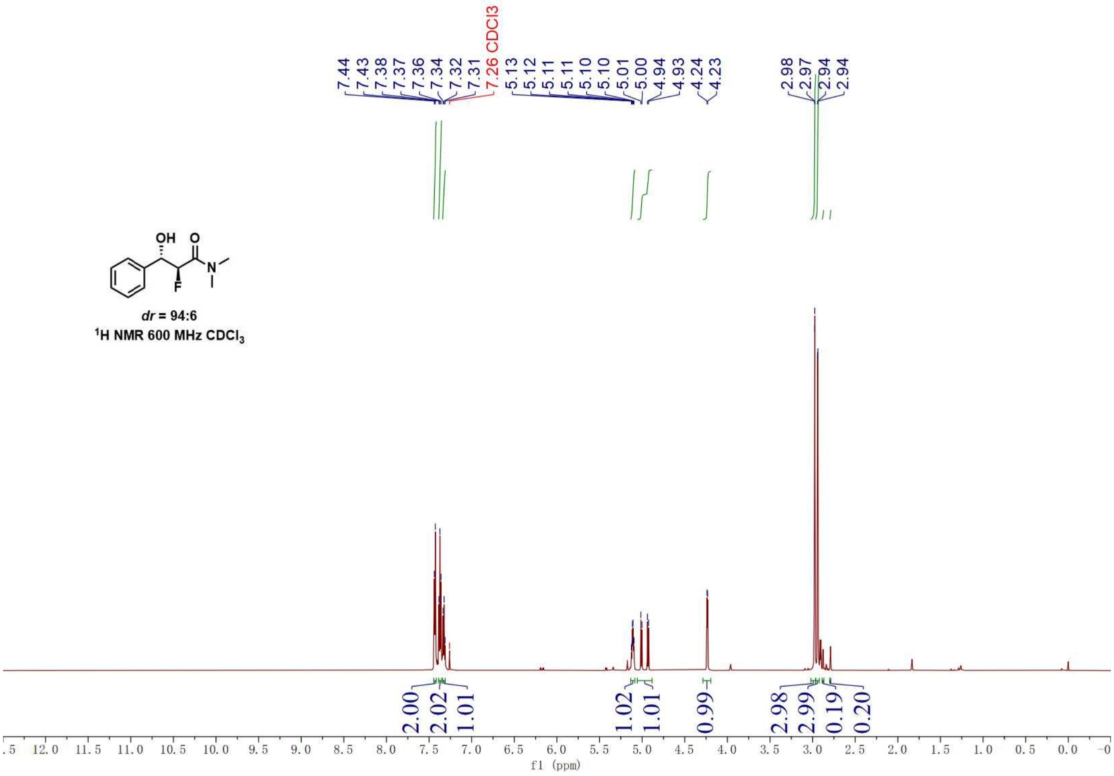


^{1}H NMR (400 MHz) in CDCl$_3$

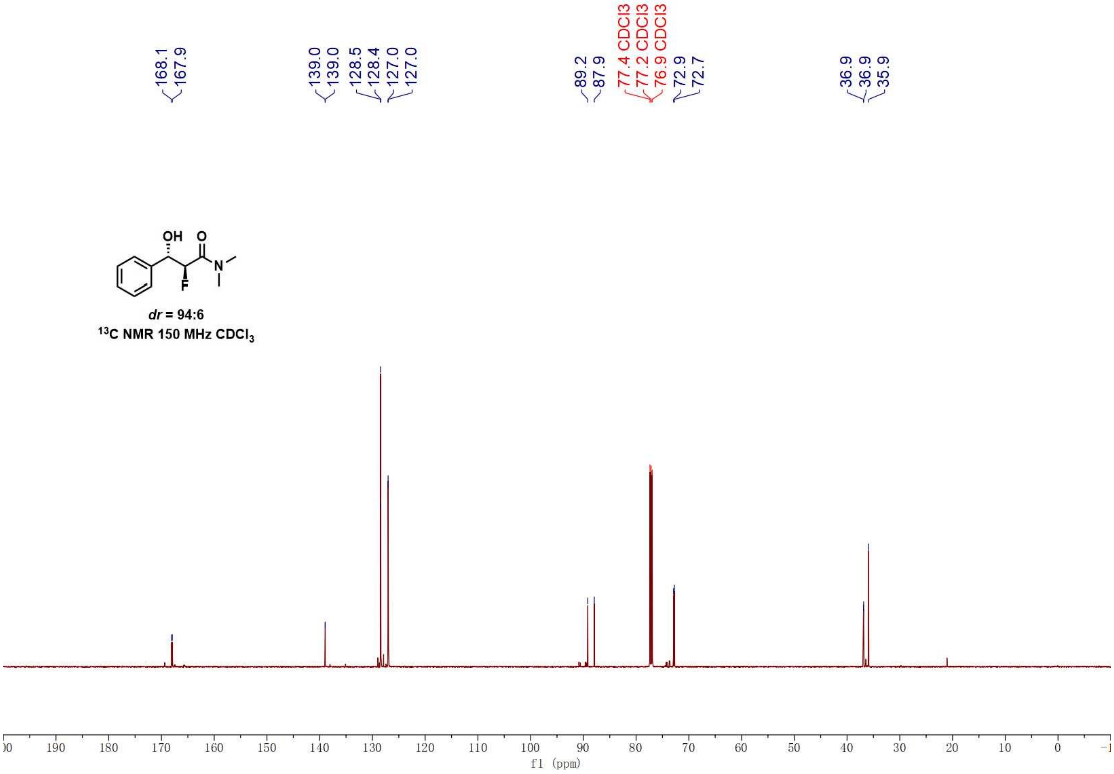


^{13}C NMR (100 MHz) in CDCl$_3$

[(2*S*, 3*S*)-6a]

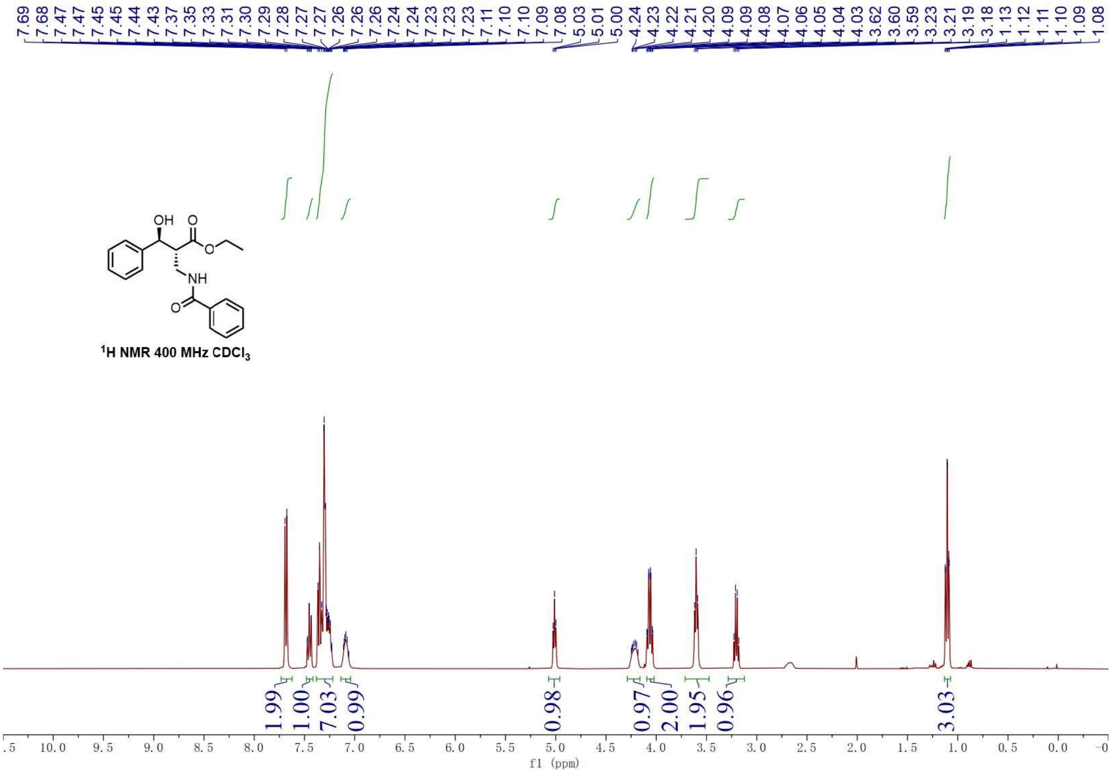


^{1}H NMR (600 MHz) in CDCl$_3$

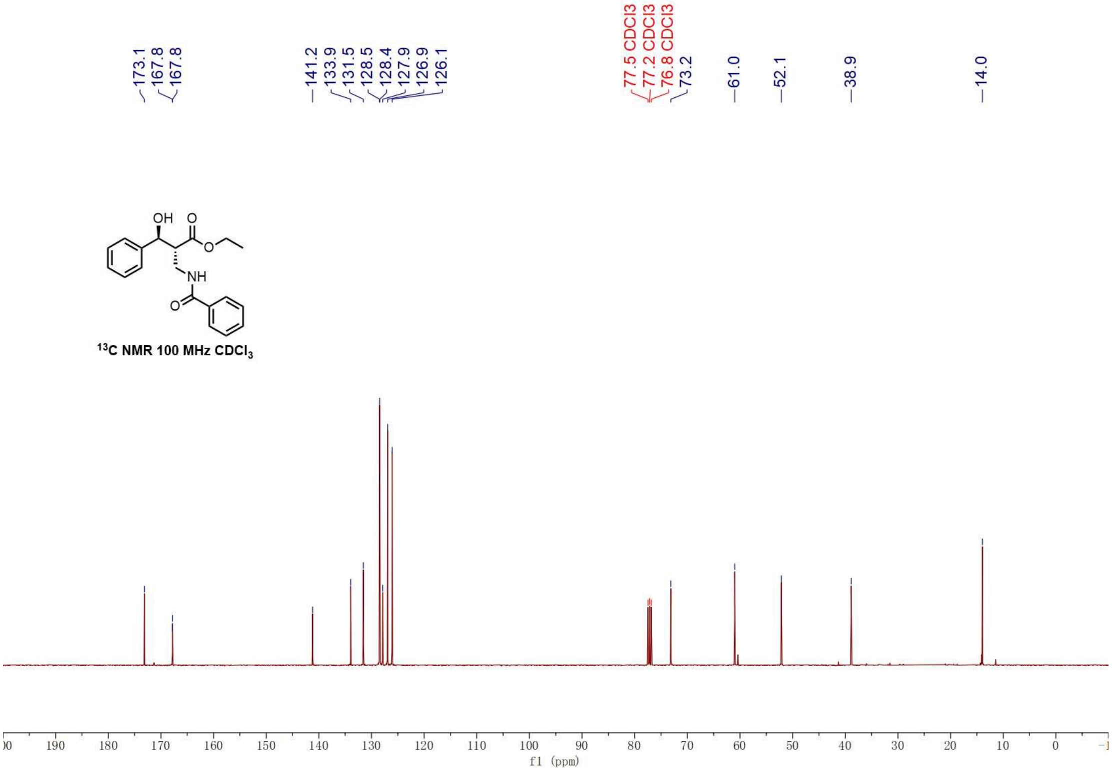


^{13}C NMR (150 MHz) in CDCl$_3$

[(2*R*, 3*S*)-6b]

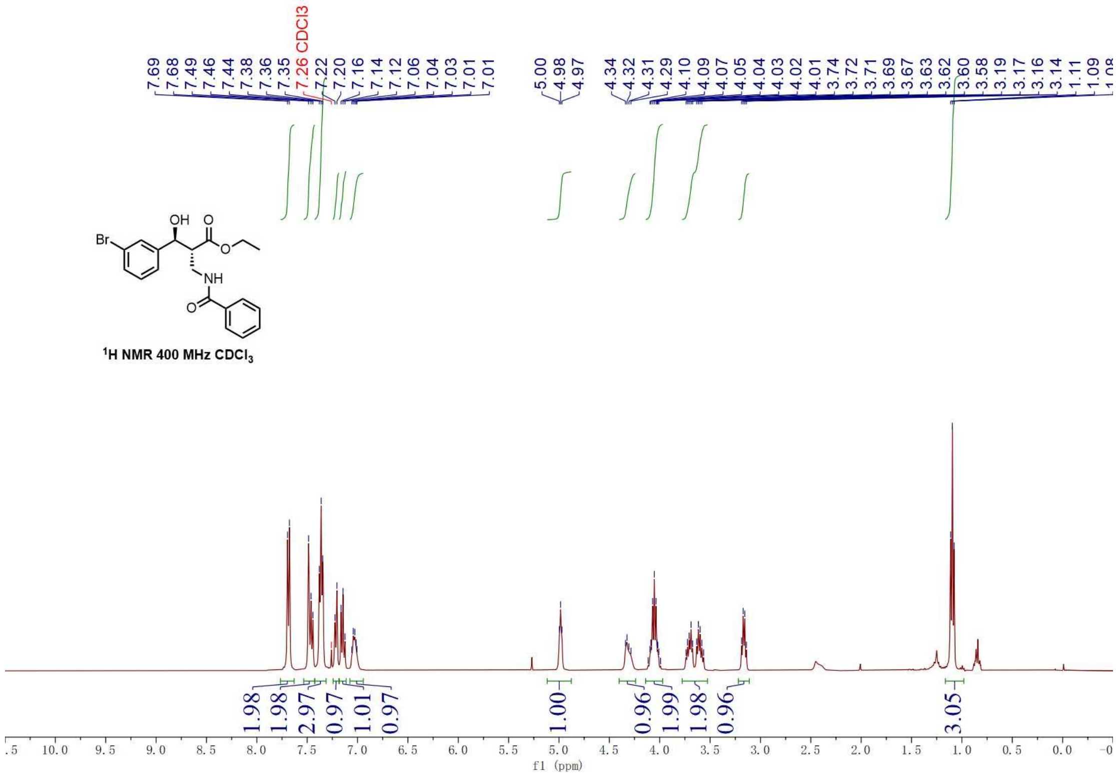


^{1}H NMR (400 MHz) in CDCl$_3$

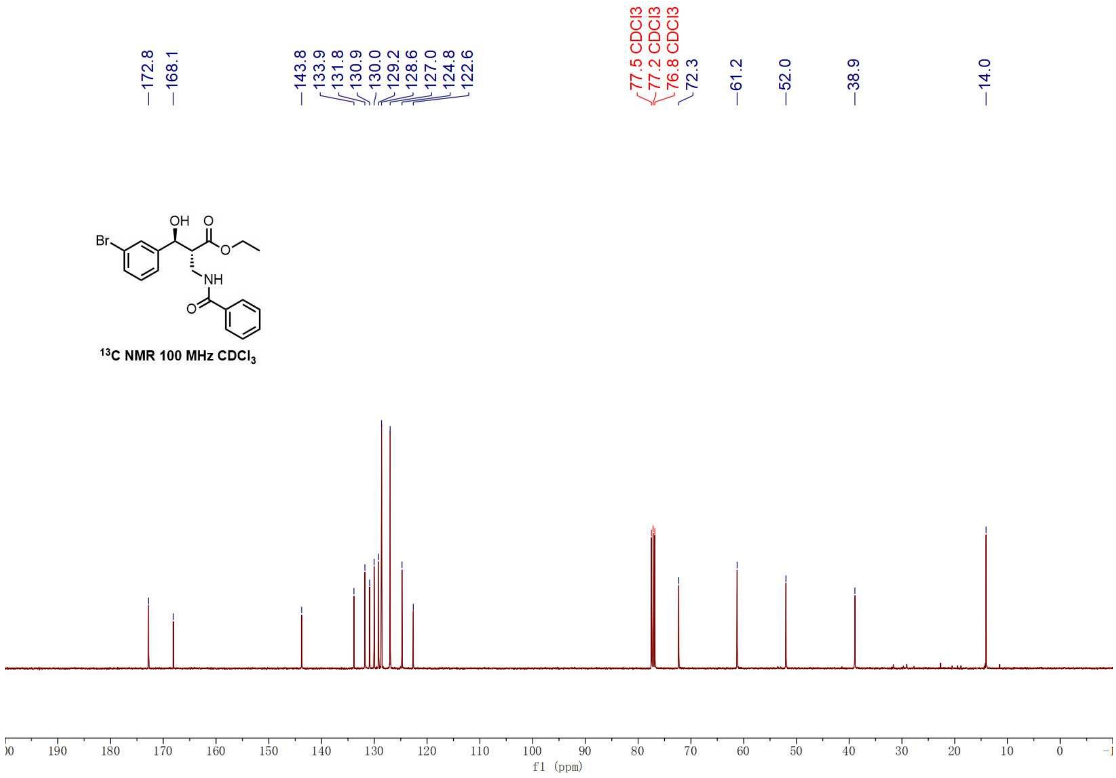


^{13}C NMR (100 MHz) in CDCl$_3$

[(2*R*, 3*S*)-6c]

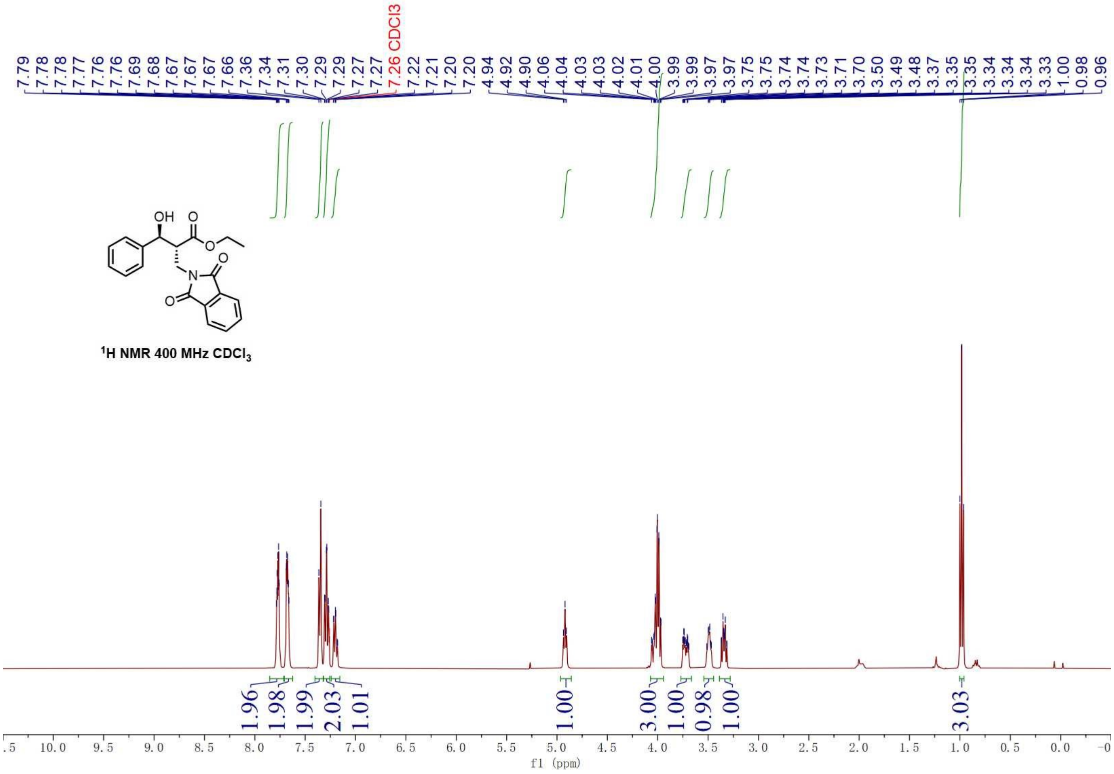


^{1}H NMR (400 MHz) in CDCl$_3$

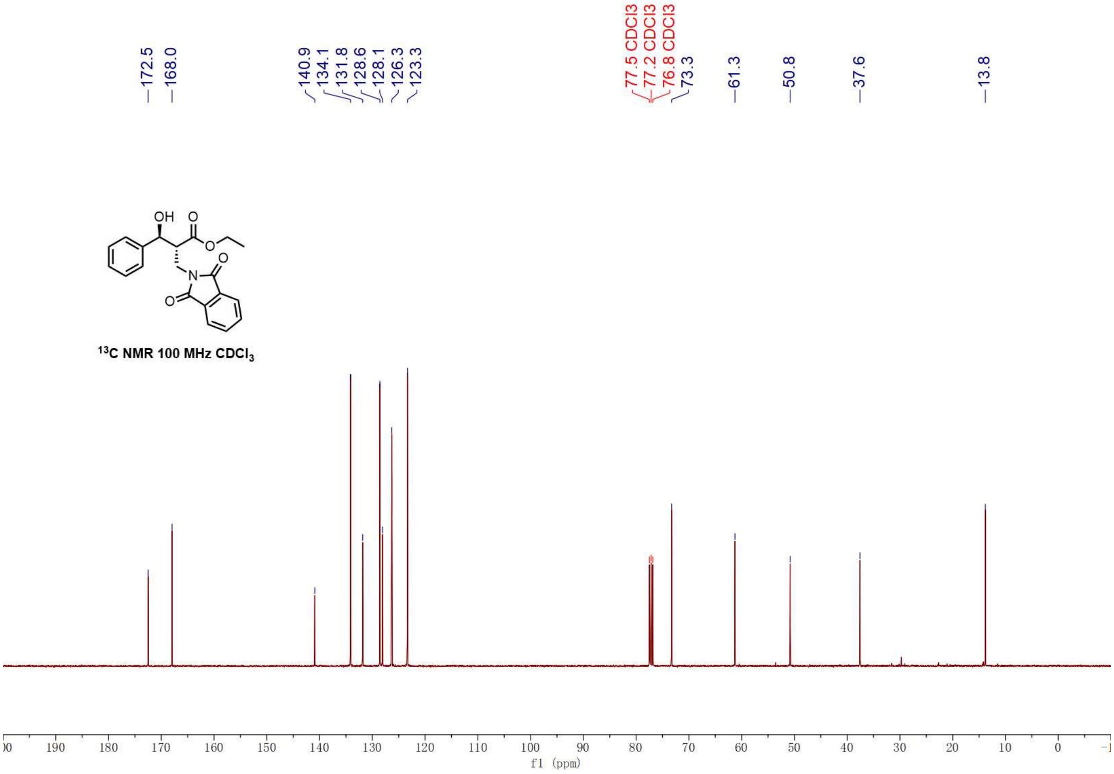


^{13}C NMR (100 MHz) in CDCl$_3$

[(2*R*, 3*S*)-6d]



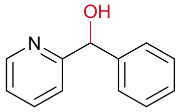
^{1}H NMR (400 MHz) in CDCl$_3$

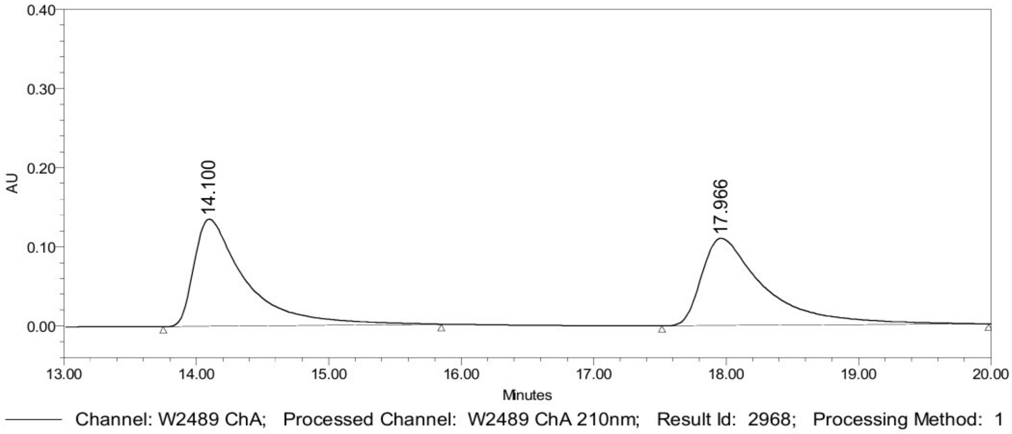


^{13}C NMR (100 MHz) in CDCl$_3$

8. HPLC analyses for chiral products

Rac-Phenyl(pyridin-2-yl)methanol

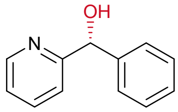


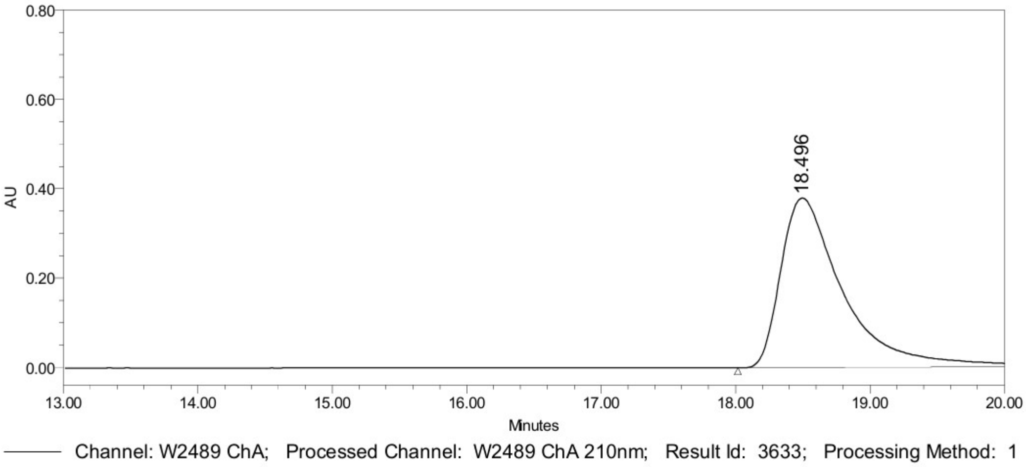


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	14.100	3672575	50.09	135538
2	W2489 ChA 210nm	17.966	3659720	49.91	110138

(*R*)-Phenyl(pyridin-2-yl)methanol [(*R*)-2a]

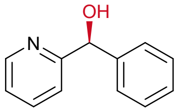


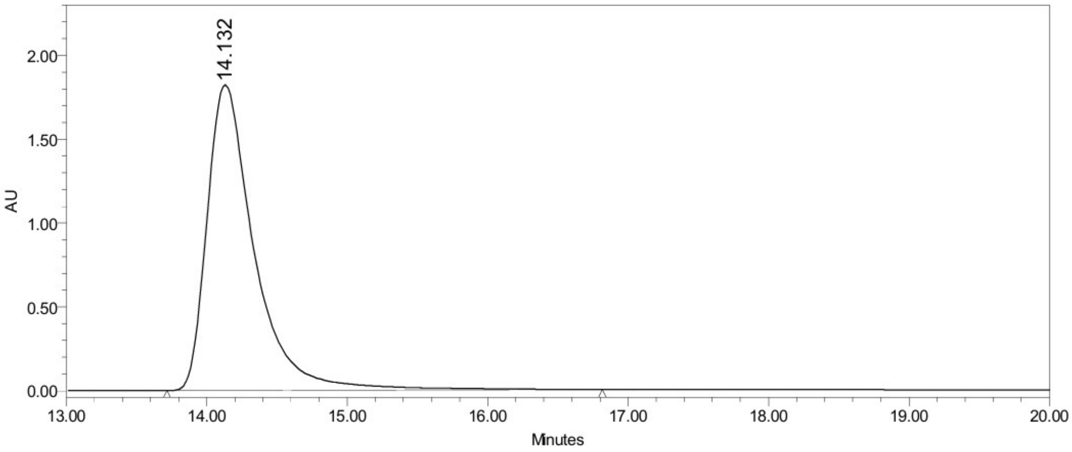


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	18.496	12359509	100.00	380009

(*S*)-Phenyl(pyridin-2-yl)methanol [(*S*)-2a]



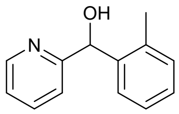


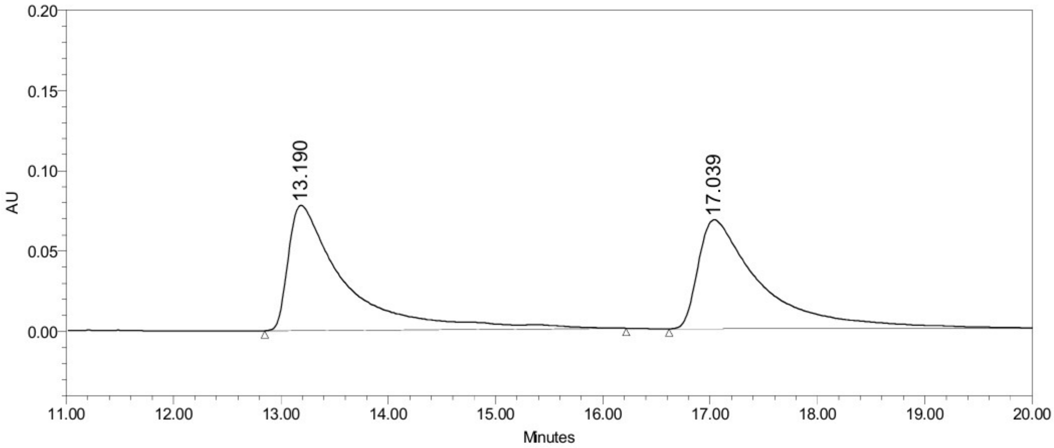
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 2971; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	14.132	42638877	100.00	1822453

Rac-Pyridin-2-yl(o-tolyl)methanol



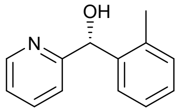


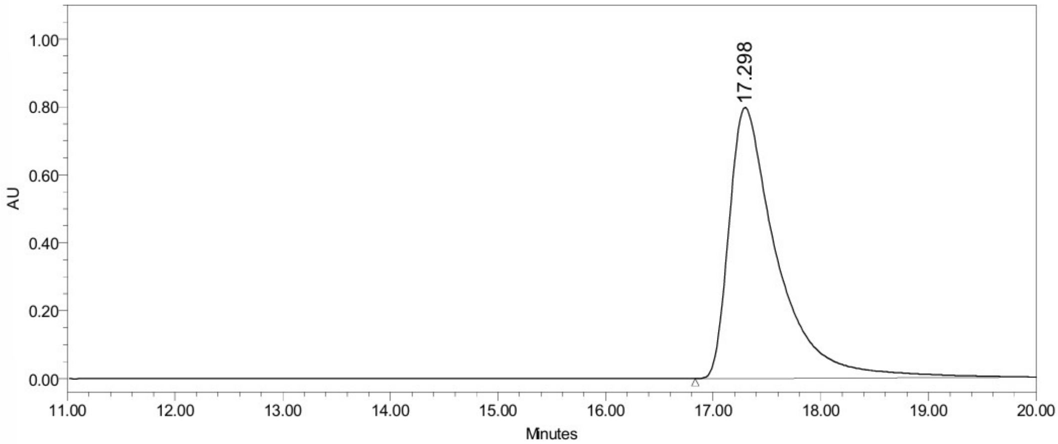
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 2772; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	13.190	2865072	50.68	77888
2	W2489 ChA 210nm	17.039	2788377	49.32	67867

(*R*)-Pyridin-2-yl(o-tolyl)methanol [(*R*)-2b]



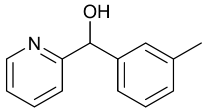


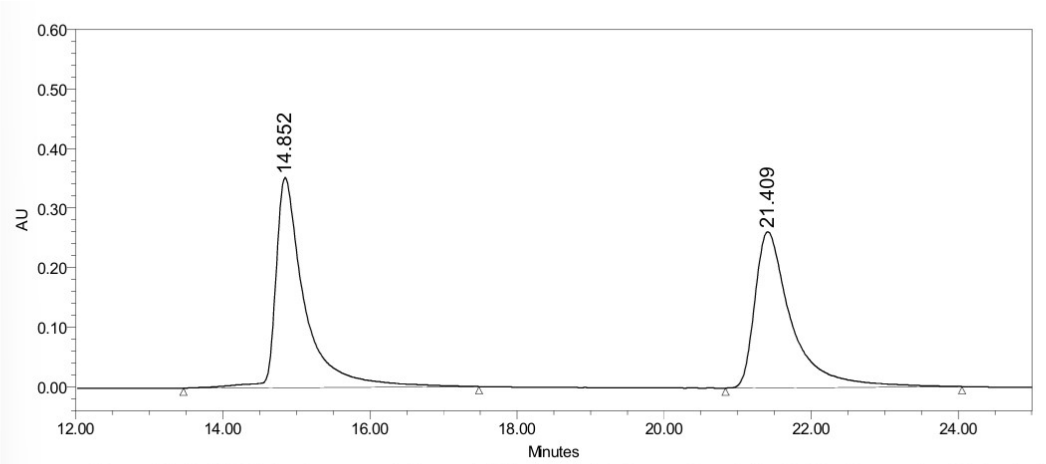
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 2775; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	17.298	24842419	100.00	797958

Rac-Pyridin-2-yl(m-tolyl)methanol



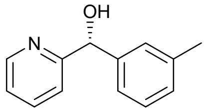


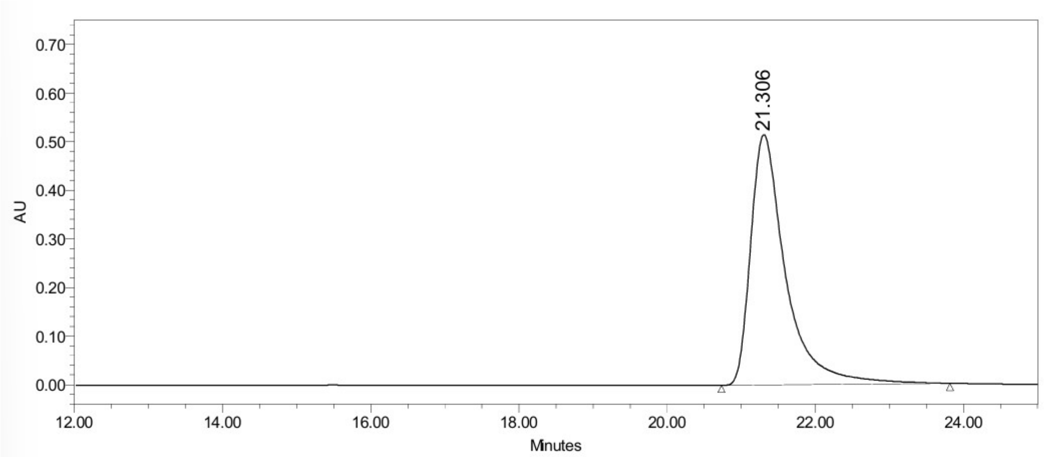
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 2795; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	14.852	9566523	51.45	352317
2	W2489 ChA 210nm	21.409	9026785	48.55	261876

(*R*)-Pyridin-2-yl(m-tolyl)methanol [(*R*)-2c]



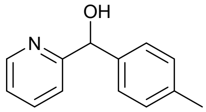


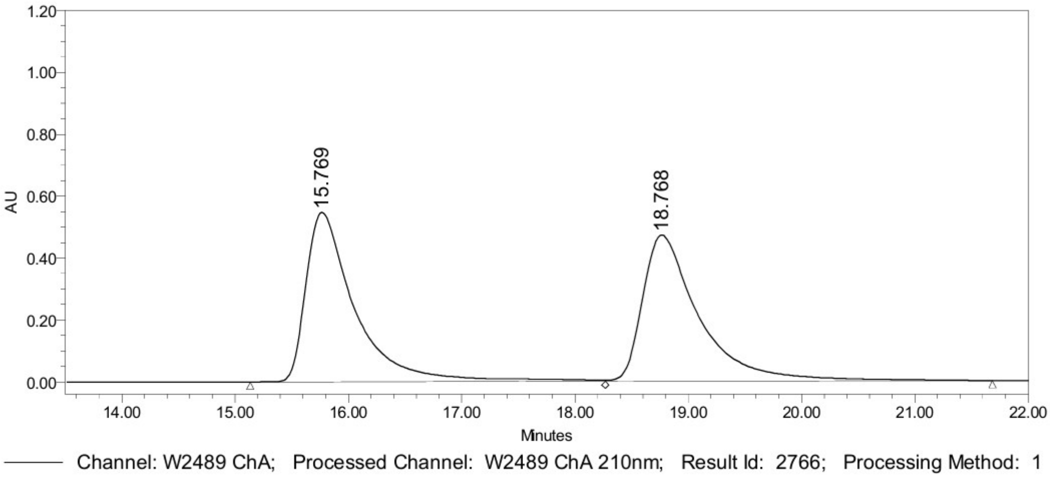
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 2798; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	21.306	16888439	100.00	515025

Rac-Pyridin-2-yl(p-tolyl)methanol

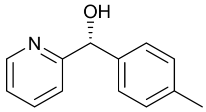


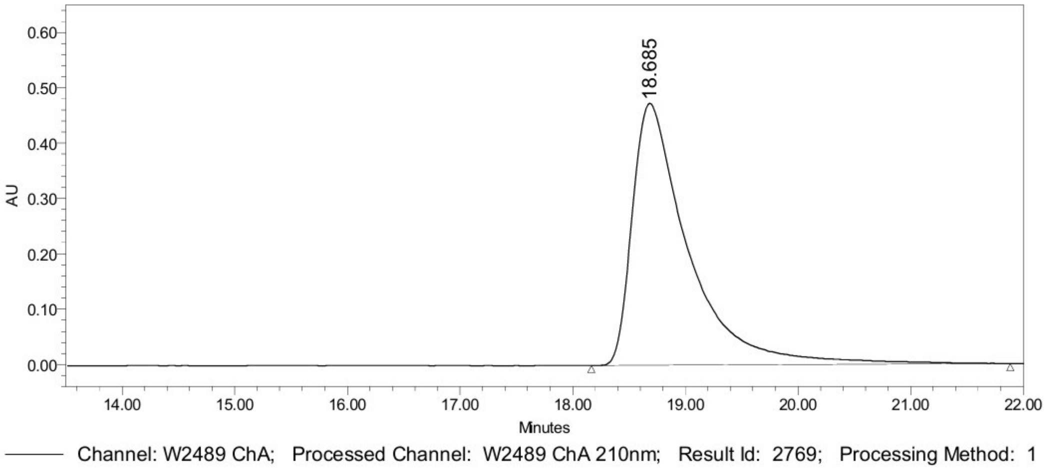


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	15.769	16516514	50.21	547505
2	W2489 ChA 210nm	18.768	16376006	49.79	472264

(*R*)-Pyridin-2-yl(p-tolyl)methanol [(*R*)-2d]

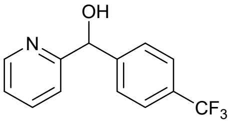


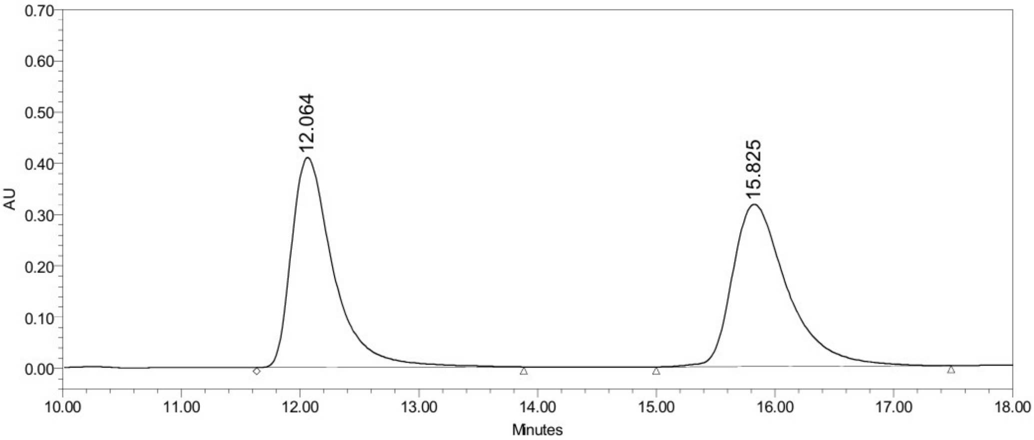


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	18.685	16415363	100.00	473510

Rac-Pyridin-2-yl(4-(trifluoromethyl)phenyl)methanol



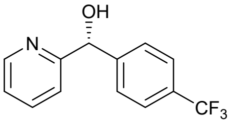


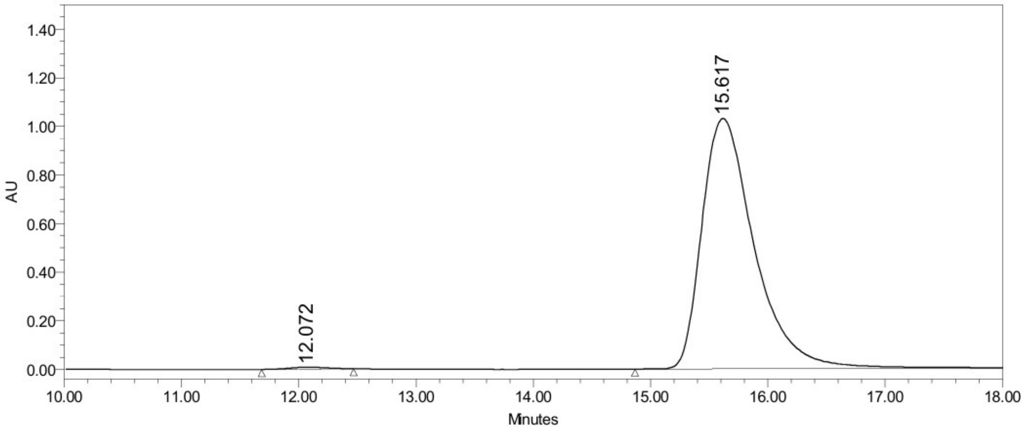
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 2726; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	12.064	10053248	49.74	409433
2	W2489 ChA 210nm	15.825	10160302	50.26	316704

(*R*)-Pyridin-2-yl(4-(trifluoromethyl)phenyl)methanol [(*R*)-2e]



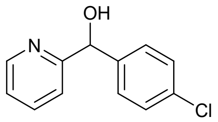


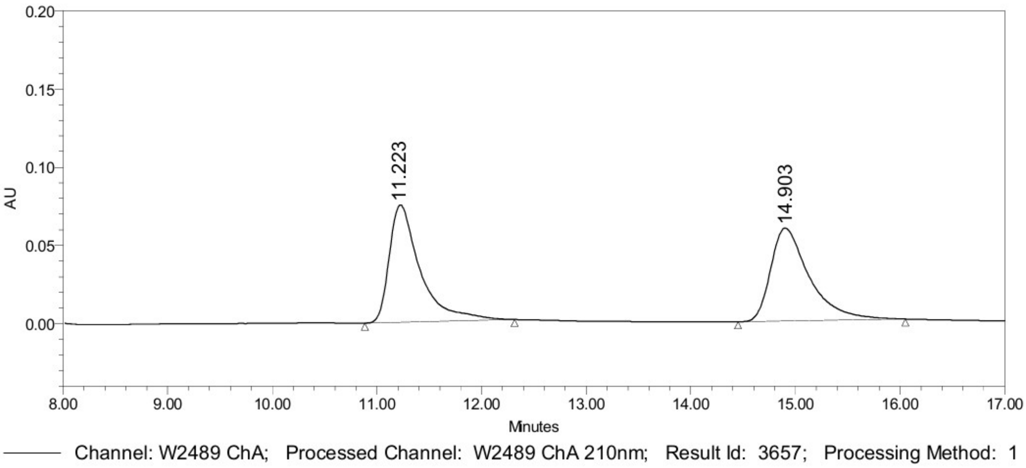
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 2729; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	12.072	161171	0.50	7354
2	W2489 ChA 210nm	15.617	32370962	99.50	1031505

Rac-(4-Chlorophenyl)(pyridin-2-yl)methanol

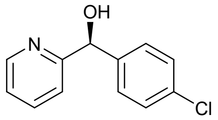


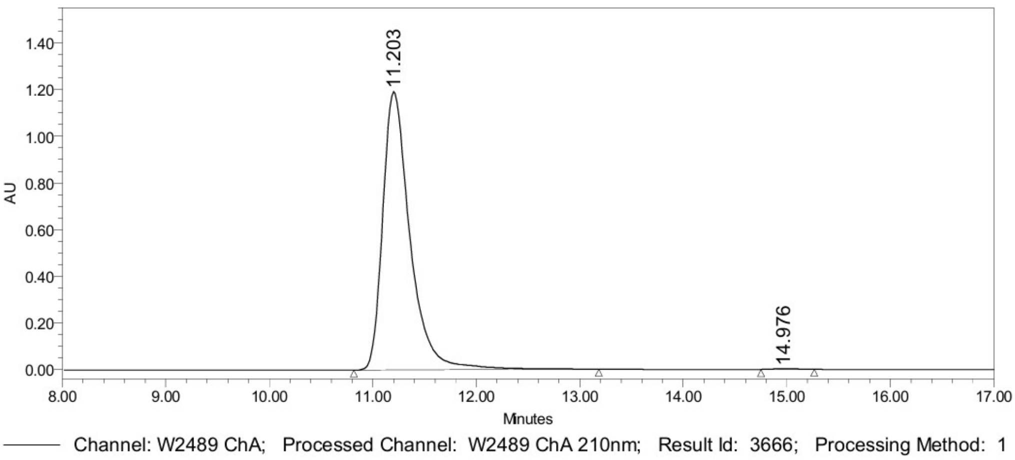


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	11.223	1541033	50.13	75129
2	W2489 ChA 210nm	14.903	1532743	49.87	59533

(*S*)-(4-Chlorophenyl)(pyridin-2-yl)methanol [(*S*)-2f]

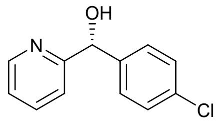


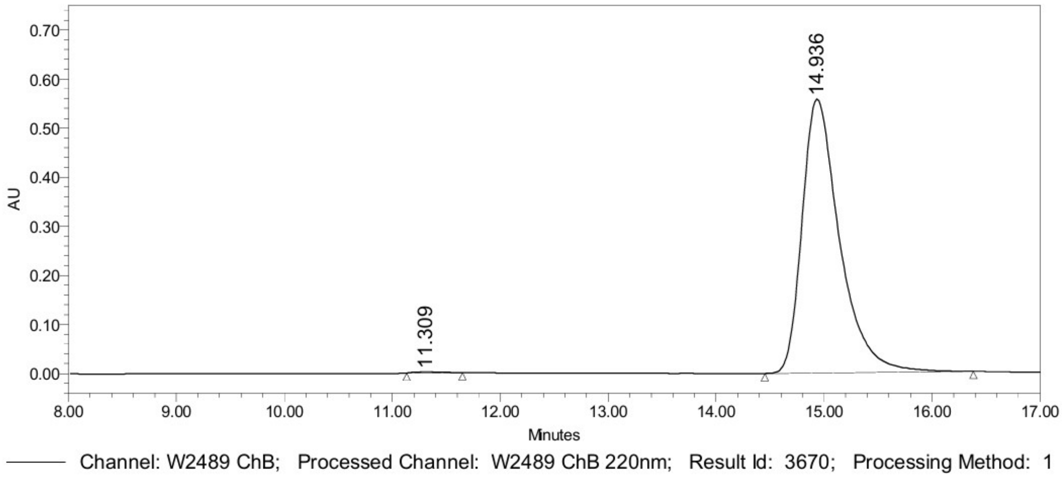


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	11.203	21877367	99.80	1192344
2	W2489 ChA 210nm	14.976	42751	0.20	2419

(*R*)-(4-Chlorophenyl)(pyridin-2-yl)methanol [(*R*)-2f]

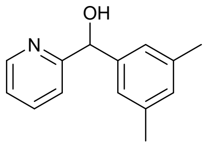


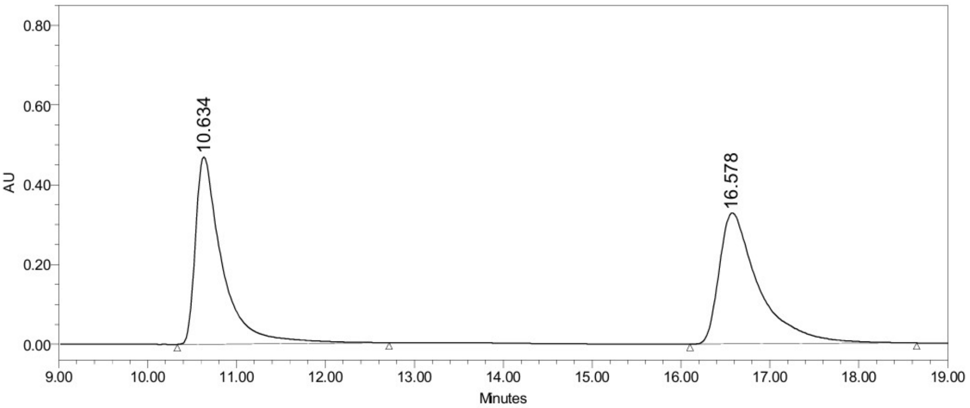


Processed Channel Descr.: W2489 ChB 220nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChB 220nm	11.309	37499	0.28	2248
2	W2489 ChB 220nm	14.936	13444021	99.72	557946

Rac-(3,5-Dimethylphenyl)(pyridin-2-yl)methanol



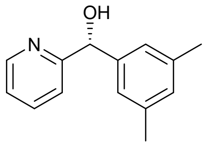


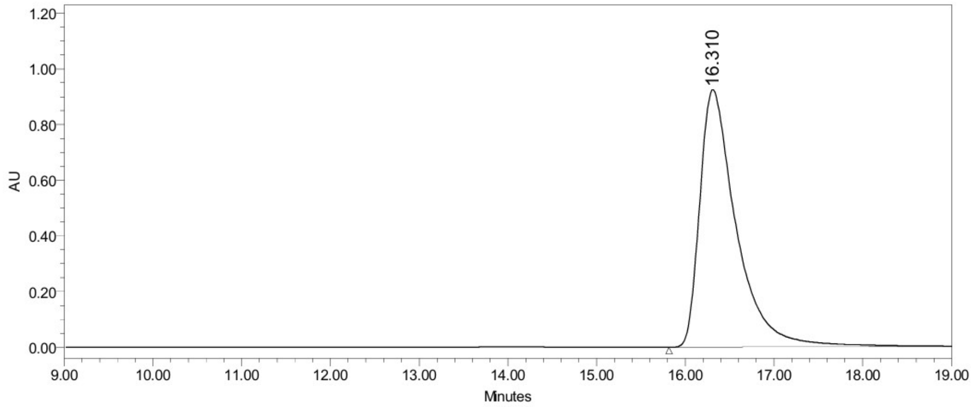
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2738; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	10.634	9815203	49.04	469960
2	W2489 ChA 214nm	16.578	10198631	50.96	328630

(*R*)-(3,5-Dimethylphenyl)(pyridin-2-yl)methanol [(*R*)-2g]



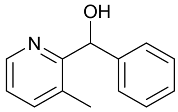


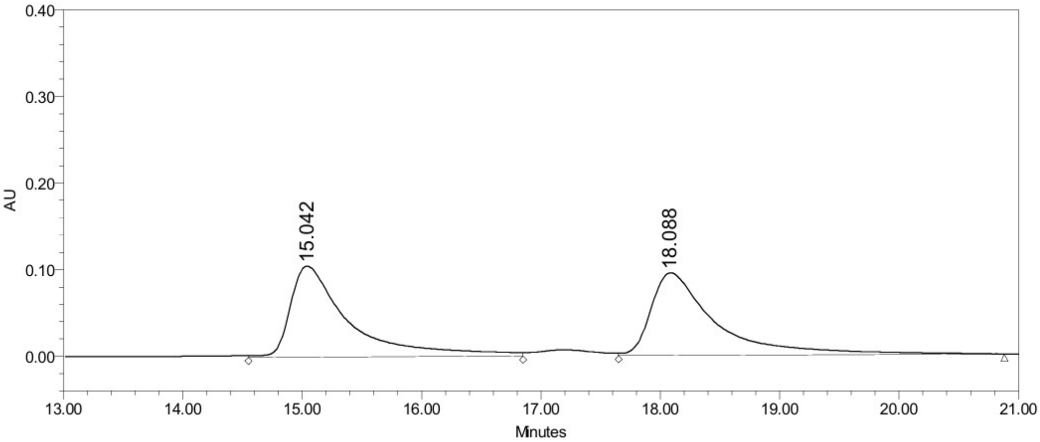
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2741; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	16.310	26523391	100.00	924998

Rac-(3-Methylpyridin-2-yl)(phenyl)methanol



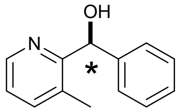


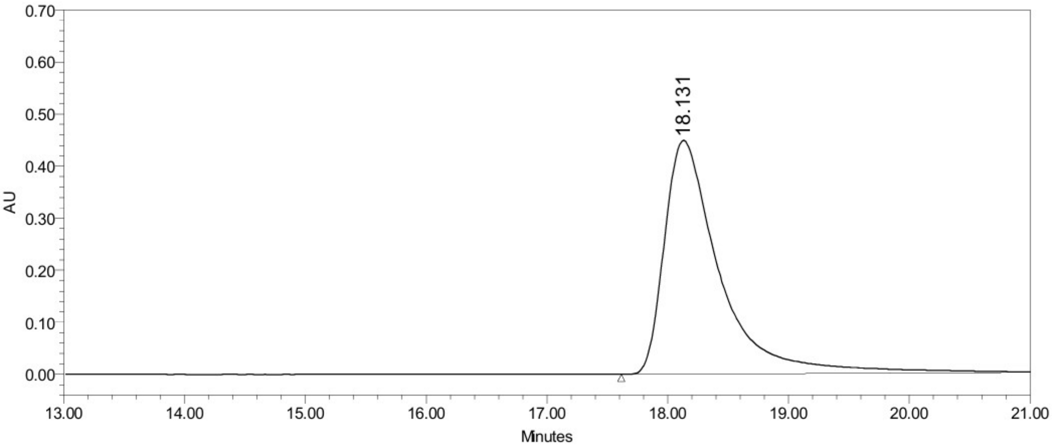
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2927; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	15.042	3585620	49.91	105170
2	W2489 ChA 214nm	18.088	3598612	50.09	95367

(+)-(3-Methylpyridin-2-yl)(phenyl)methanol [(+)-2h]



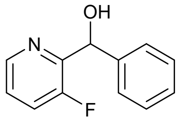


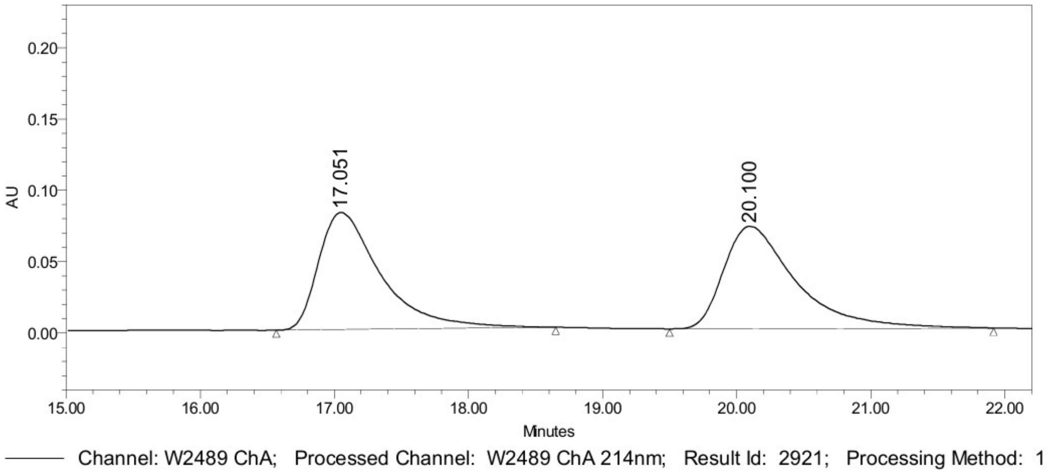
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2930; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	18.131	14375466	100.00	449421

Rac-(3-Fluoropyridin-2-yl)(phenyl)methanol

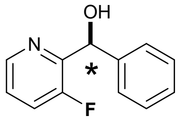


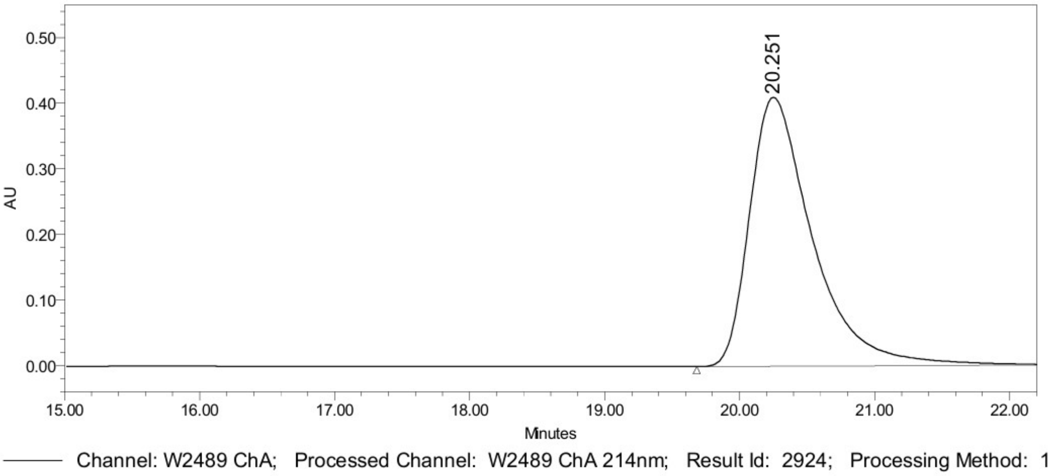


Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	17.051	2658082	49.72	82142
2	W2489 ChA 214nm	20.100	2688208	50.28	71832

(*R*)-(3-Fluoropyridin-2-yl)(phenyl)methanol [(+)-2i]

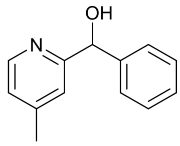


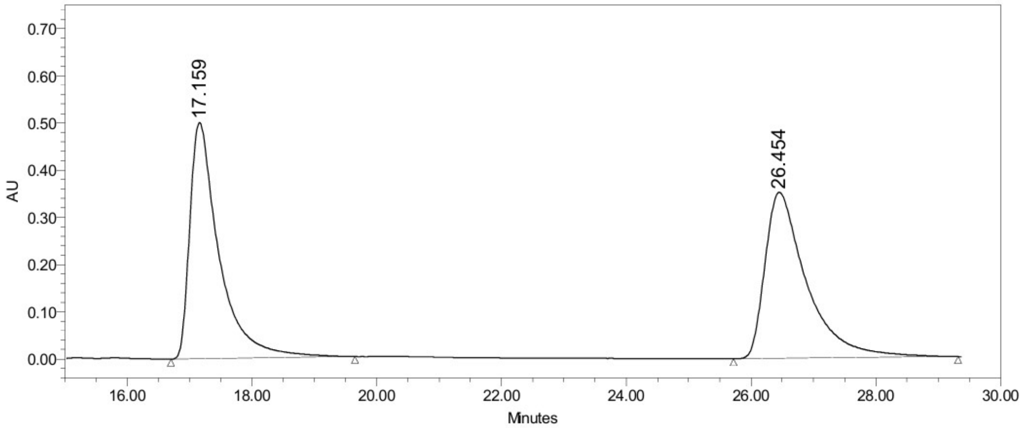


Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	20.251	13310093	100.00	409863

Rac-(4-Methylpyridin-2-yl)(phenyl)methanol



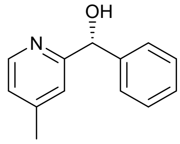


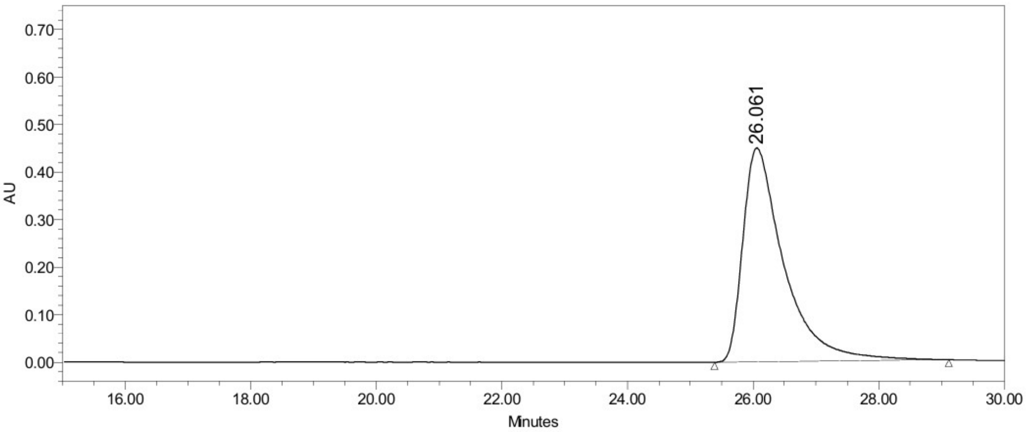
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 2778; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	17.159	16297027	49.98	500721
2	W2489 ChA 210nm	26.454	16312779	50.02	351494

(*R*)-(4-Methylpyridin-2-yl)(phenyl)methanol [(*R*)-2j]



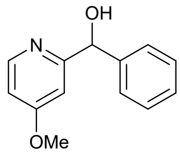


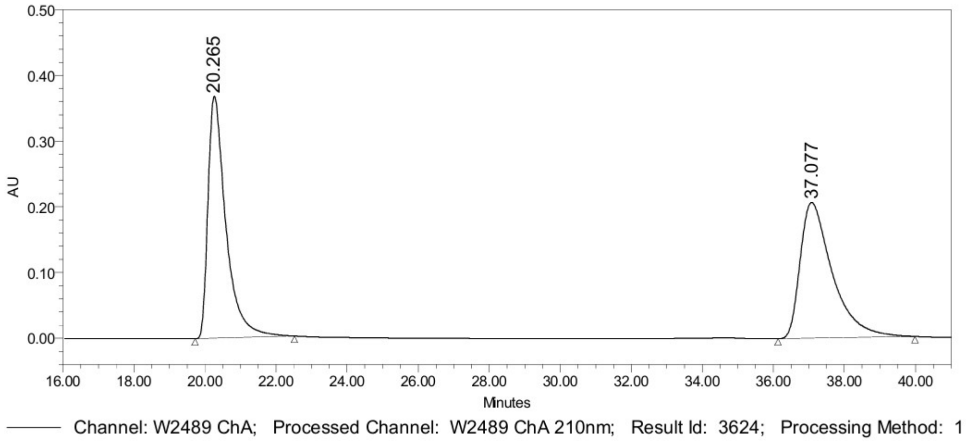
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 2781; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	26.061	20401042	100.00	449604

***Rac*-(4-Methoxypyridin-2-yl)(phenyl)methanol**

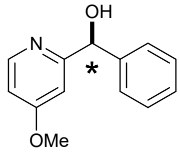


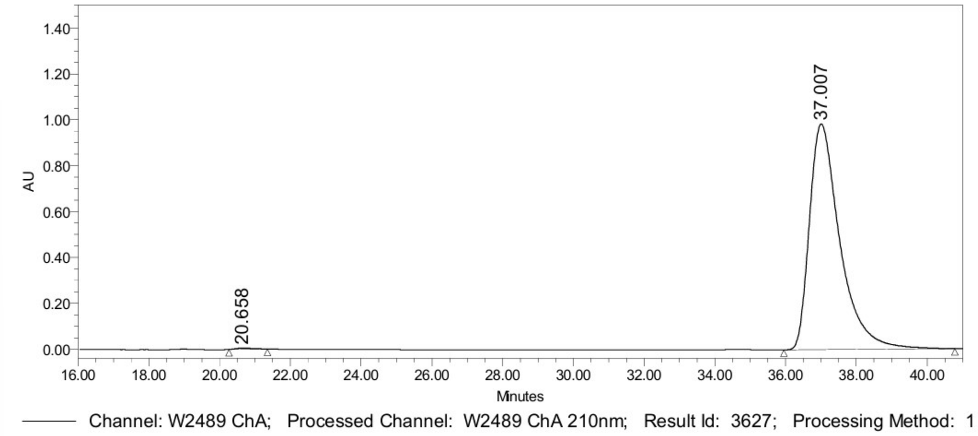


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	20.265	12896109	49.84	368296
2	W2489 ChA 210nm	37.077	12980363	50.16	206663

(+)-(4-Methoxypyridin-2-yl)(phenyl)methanol [(*R*)-2k]

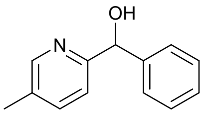


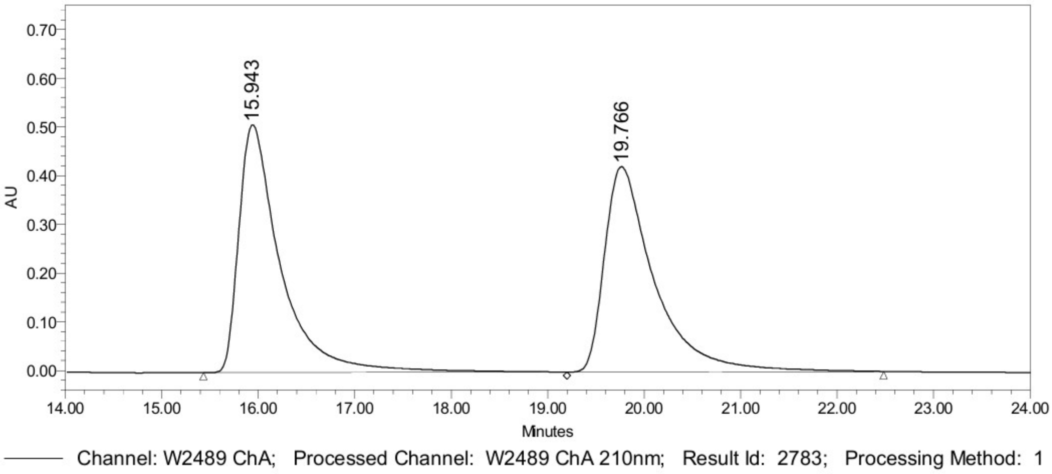


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	20.658	192263	0.33	5570
2	W2489 ChA 210nm	37.007	58676860	99.67	982910

Rac-(5-Methylpyridin-2-yl)(phenyl)methanol

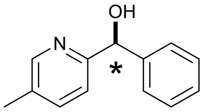


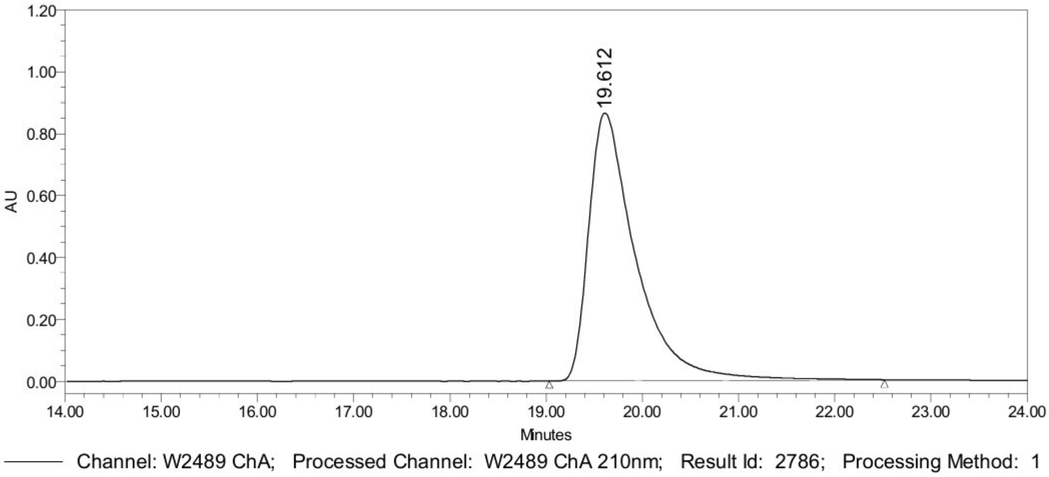


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	15.943	15317478	50.42	508336
2	W2489 ChA 210nm	19.766	15064688	49.58	421222

(+)-(5-Methylpyridin-2-yl)(phenyl)methanol [(+)-2l]

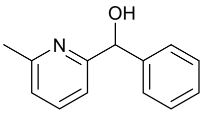


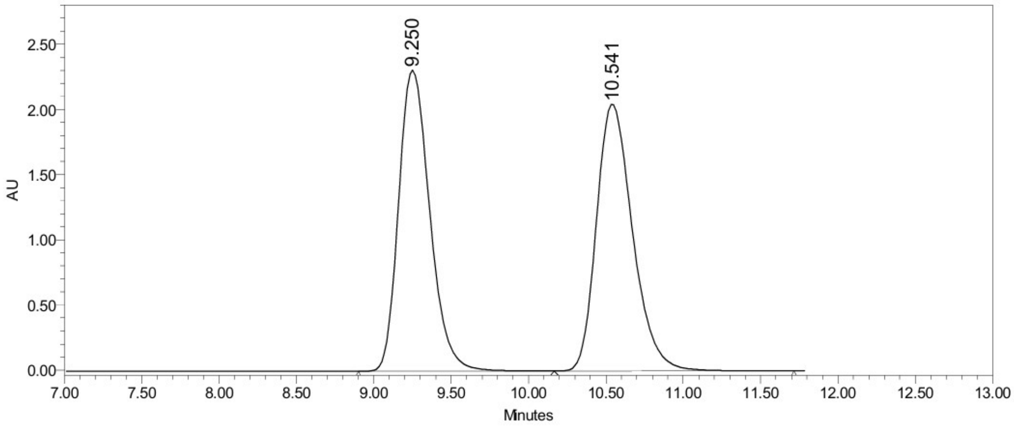


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	19.612	29422015	100.00	866272

Rac-(6-Methylpyridin-2-yl)(phenyl)methanol



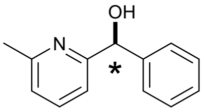


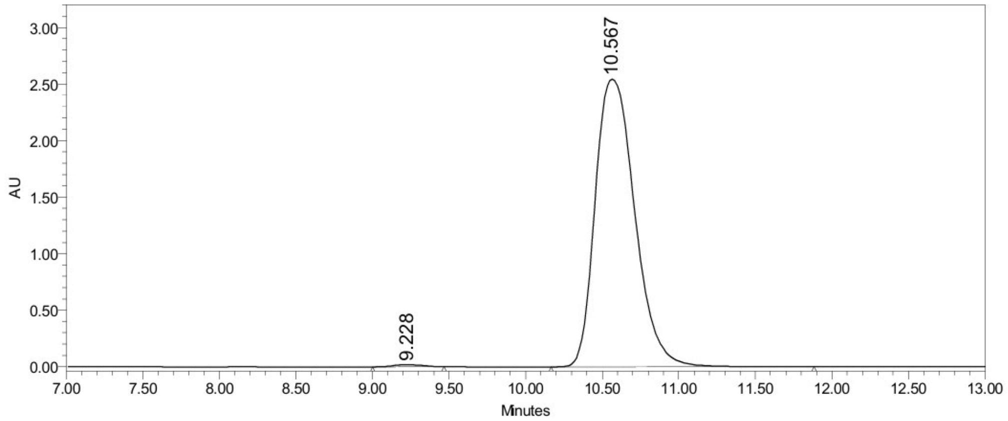
——— Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 3612; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	9.250	32318205	49.33	2308746
2	W2489 ChA 210nm	10.541	33200859	50.67	2050703

(-)-(6-Methylpyridin-2-yl)(phenyl)methanol [(-)-2m]



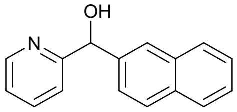


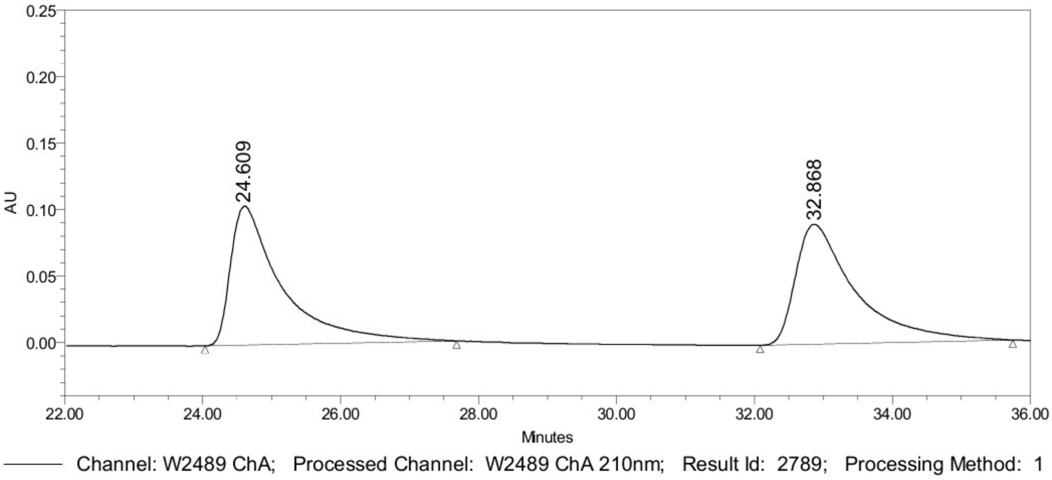
——— Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 3615; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	9.228	243999	0.53	19709
2	W2489 ChA 210nm	10.567	45623984	99.47	2545707

Rac-Naphthalen-2-yl(pyridin-2-yl)methanol

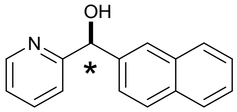


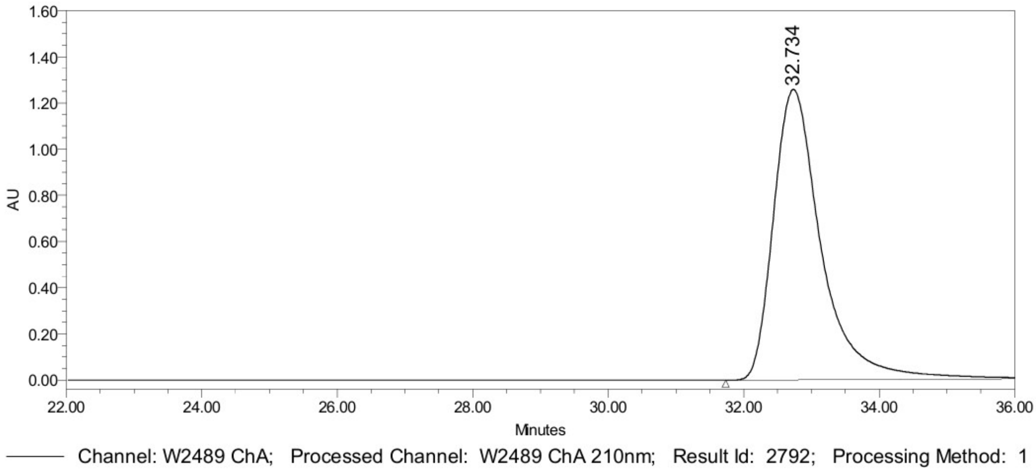


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	24.609	5436757	49.96	104438
2	W2489 ChA 210nm	32.868	5444377	50.04	90115

(+)-Naphthalen-2-yl(pyridin-2-yl)methanol [(+)-2n]

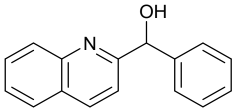


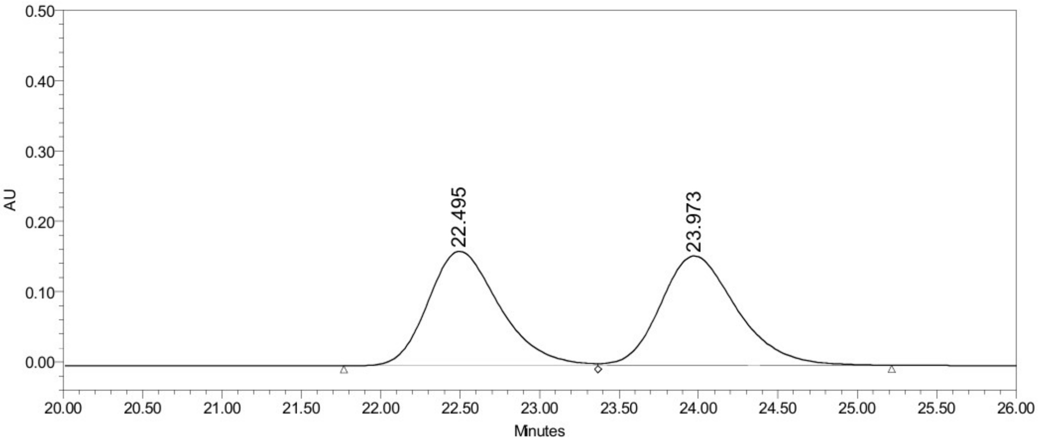


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	32.734	62029175	100.00	1257955

Rac-Phenyl(quinolin-2-yl)methanol



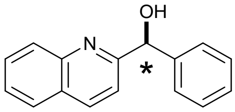


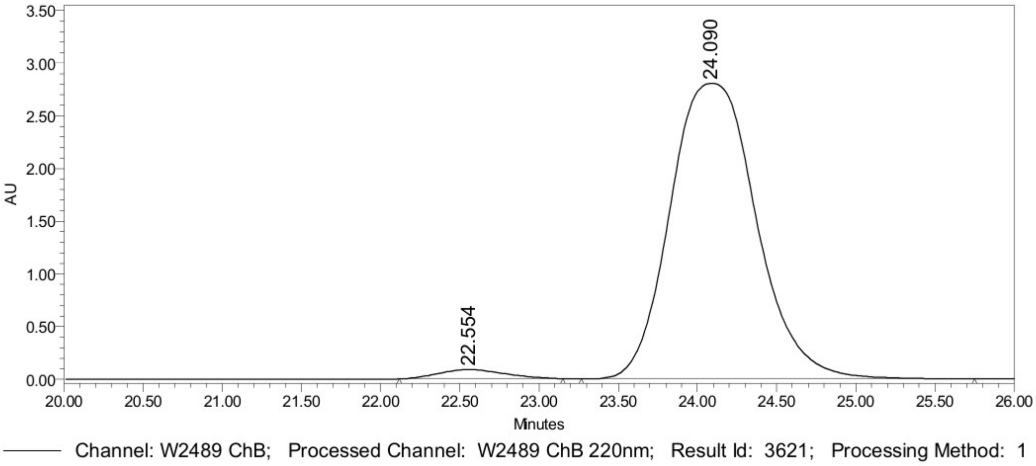
——— Channel: W2489 ChB; Processed Channel: W2489 ChB 220nm; Result Id: 3618; Processing Method: 1

Processed Channel Descr.: W2489 ChB 220nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChB 220nm	22.495	5100310	49.46	162706
2	W2489 ChB 220nm	23.973	5212552	50.54	155776

(+)-phenyl(quinolin-2-yl)methanol [(+)-2o]



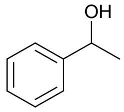


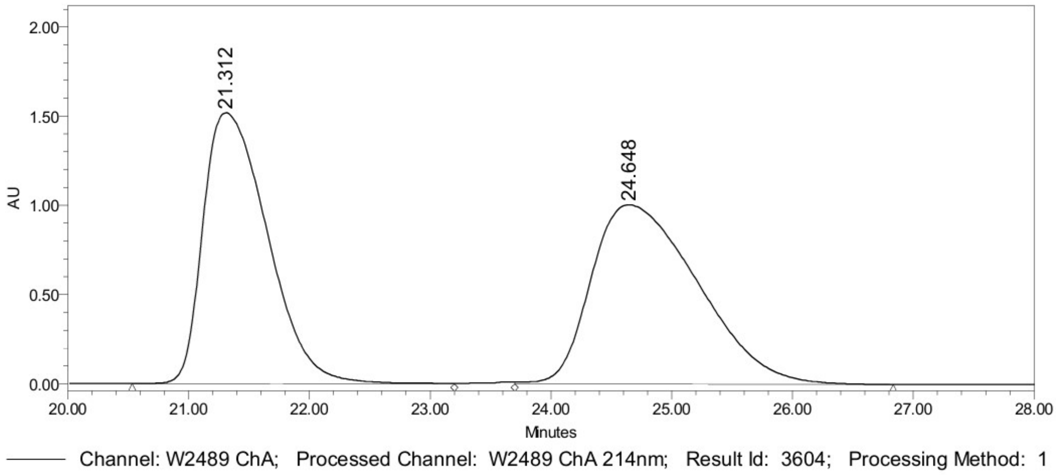
——— Channel: W2489 ChB; Processed Channel: W2489 ChB 220nm; Result Id: 3621; Processing Method: 1

Processed Channel Descr.: W2489 ChB 220nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChB 220nm	22.554	2510227	2.31	87150
2	W2489 ChB 220nm	24.090	105988542	97.69	2806557

Rac-1-phenylethan-1-ol

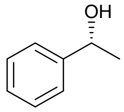


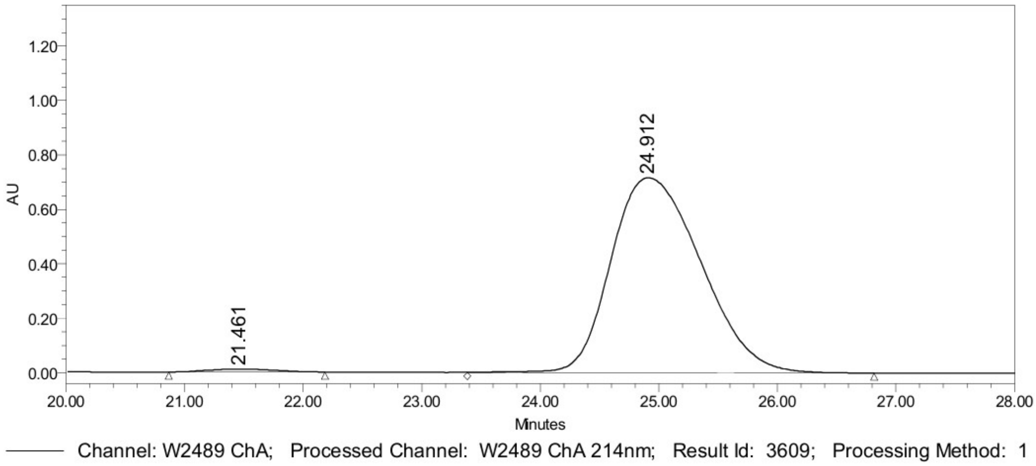


Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	21.312	56316129	47.78	1518474
2	W2489 ChA 214nm	24.648	61557994	52.22	1004873

(*R*)-1-phenylethan-1-ol [(*R*)-4a]

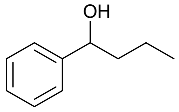


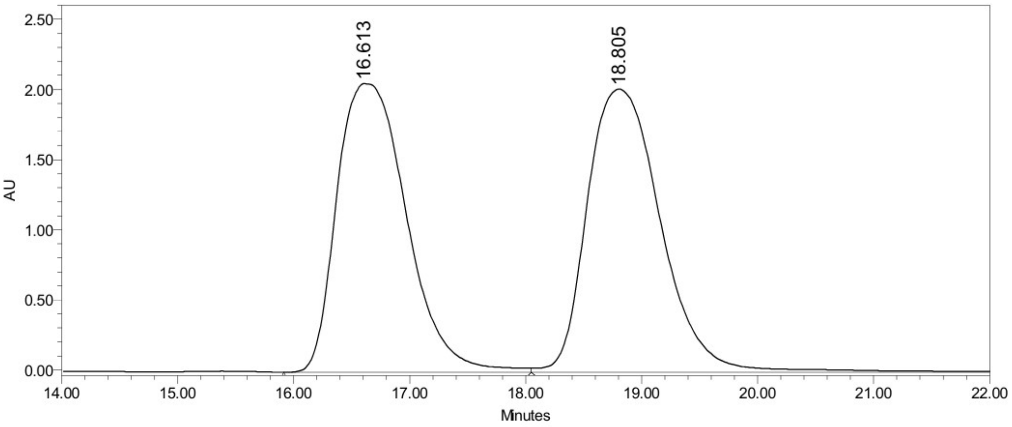


Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	21.461	422590	1.11	10463
2	W2489 ChA 214nm	24.912	37746652	98.89	716364

Rac-1-phenylbutan-1-ol



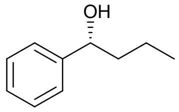


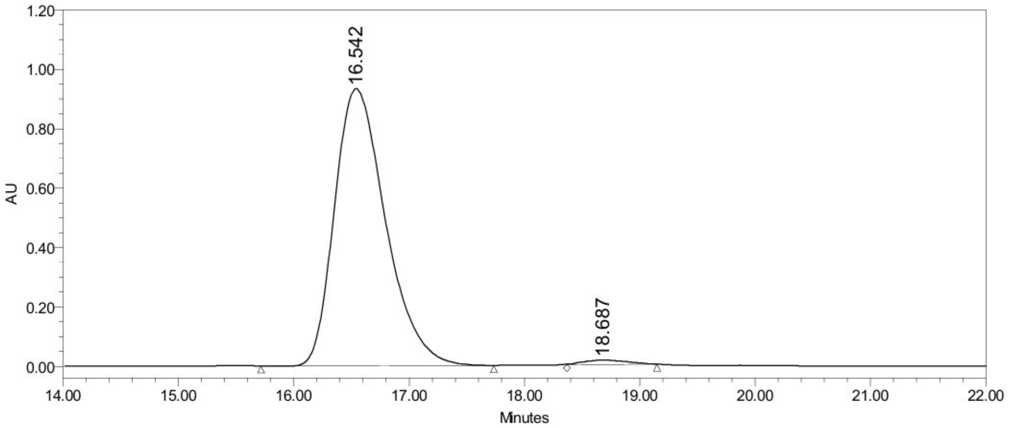
——— Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 1914; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	16.613	85753252	48.90	2059412
2	W2489 ChA 210nm	18.805	89613223	51.10	2017788

(*R*)-1-phenylbutan-1-ol [(*R*)-4b]



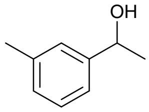


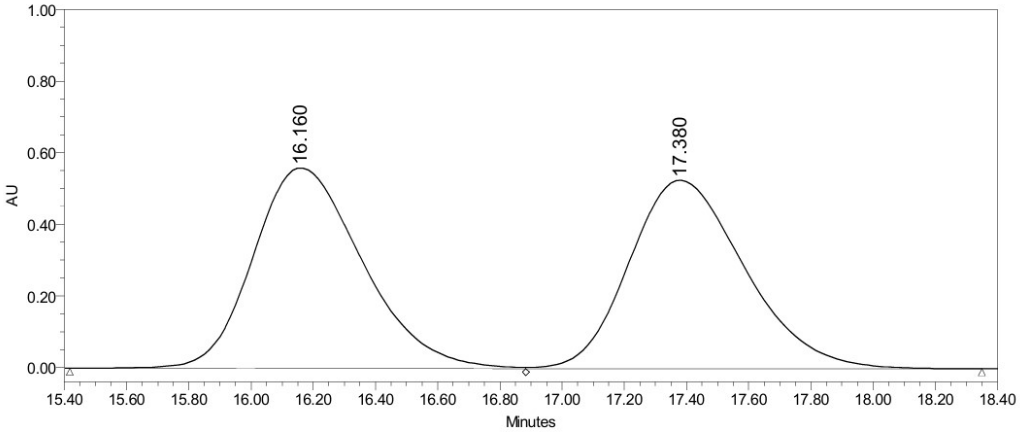
——— Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 1917; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	16.542	28651166	98.65	932950
2	W2489 ChA 210nm	18.687	392870	1.35	14582

Rac-1-(m-tolyl)ethan-1-ol



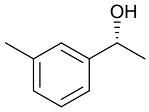


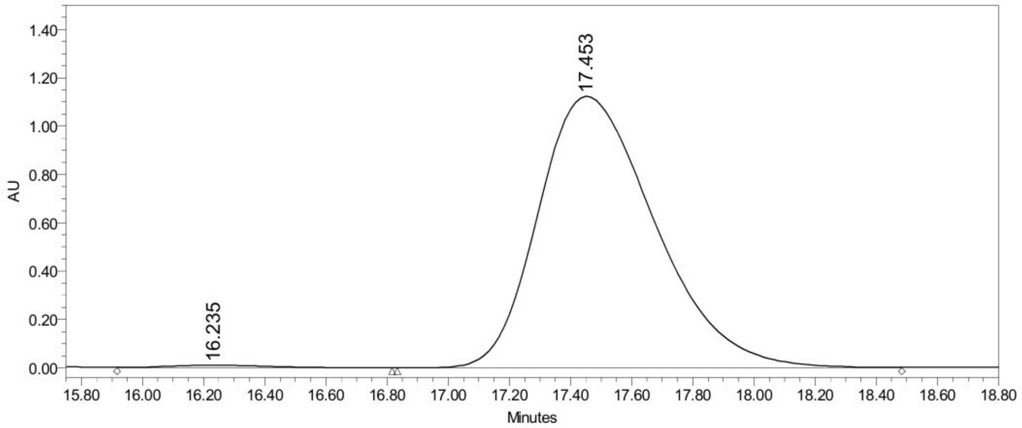
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 1891; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	16.160	13699031	50.24	560671
2	W2489 ChA 214nm	17.380	13569055	49.76	526479

(*R*)-1-(m-tolyl)ethan-1-ol [(*R*)-4c]



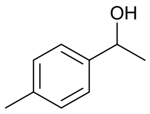


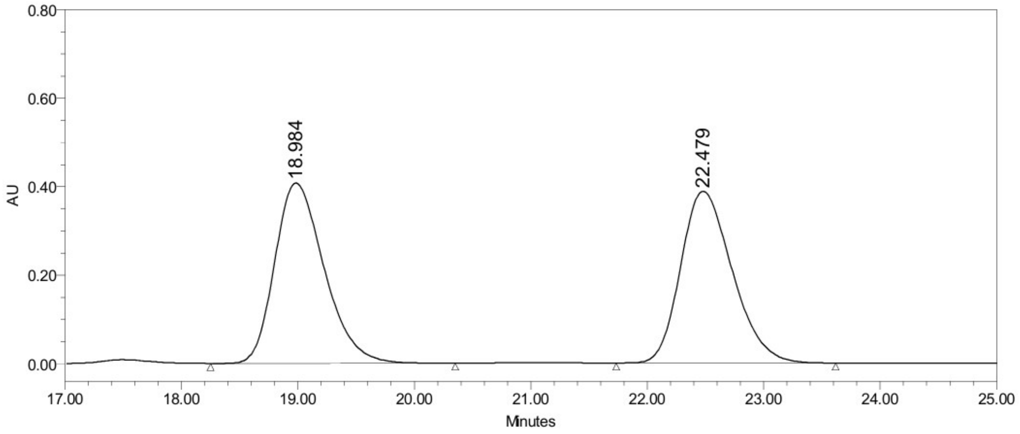
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 1887; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	16.235	264949	0.88	10665
2	W2489 ChA 214nm	17.453	29844742	99.12	1123551

Rac-1-(p-tolyl)ethan-1-ol

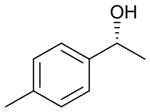


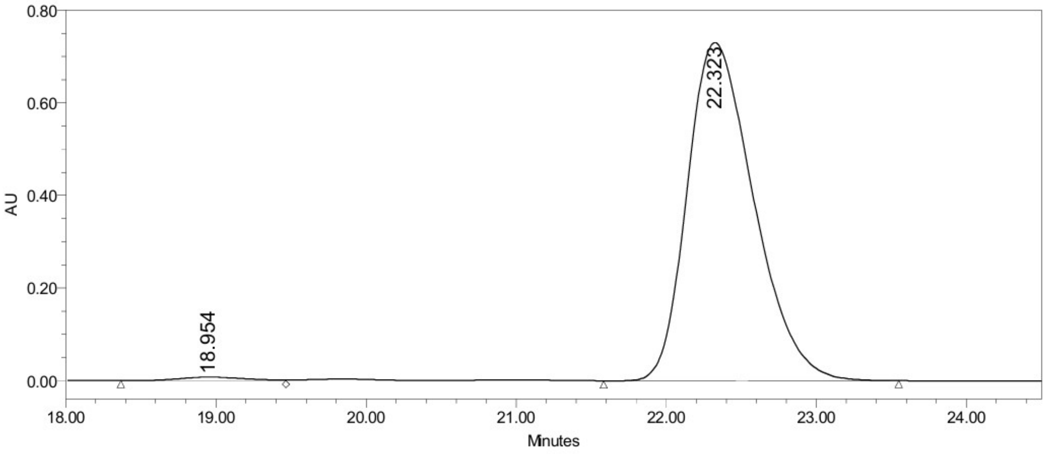


Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	18.984	12017702	50.07	407622
2	W2489 ChA 214nm	22.479	11982996	49.93	388249

(*R*)-1-(p-tolyl)ethan-1-ol [(*R*)-4d]

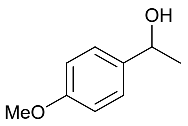


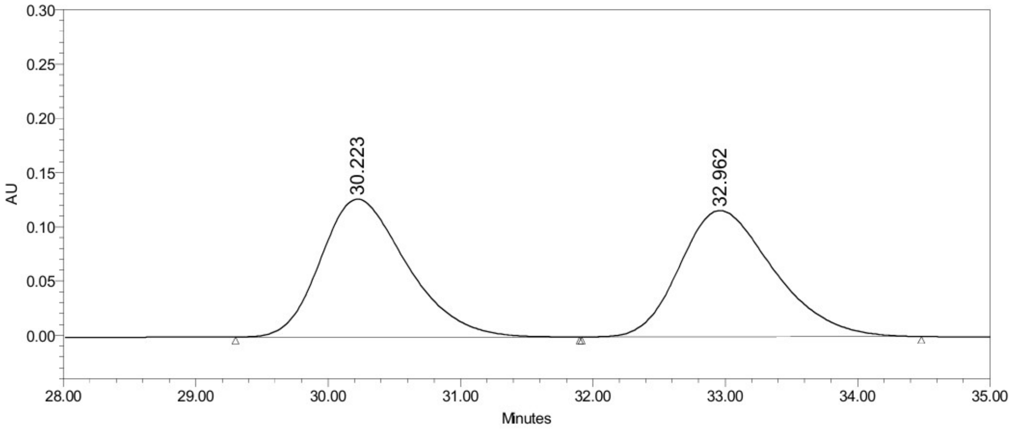


Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	18.954	216951	0.95	7524
2	W2489 ChA 214nm	22.323	22504540	99.05	730912

Rac-1-(4-methoxyphenyl)ethan-1-ol



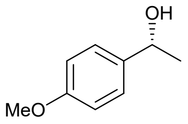


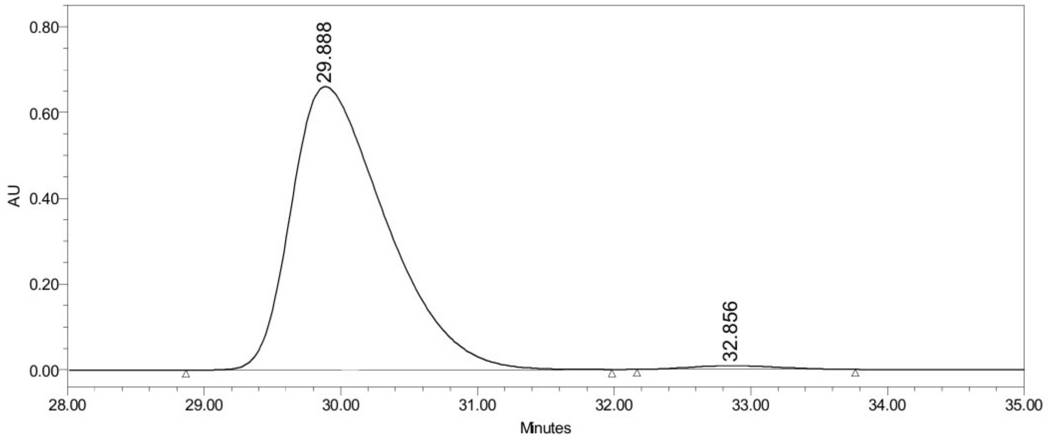
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 3210; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	30.223	5771769	50.08	127155
2	W2489 ChA 214nm	32.962	5753162	49.92	116323

(*R*)-1-(4-methoxyphenyl)ethan-1-ol [(*R*)-4e]



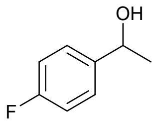


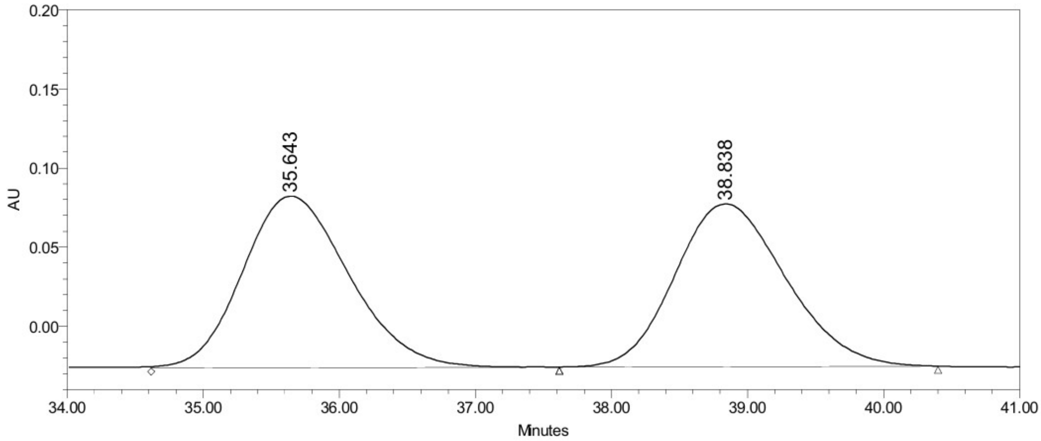
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 3207; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	29.888	31708050	98.80	660315
2	W2489 ChA 214nm	32.856	385285	1.20	8535

Rac-1-(4-fluorophenyl)ethan-1-ol



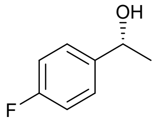


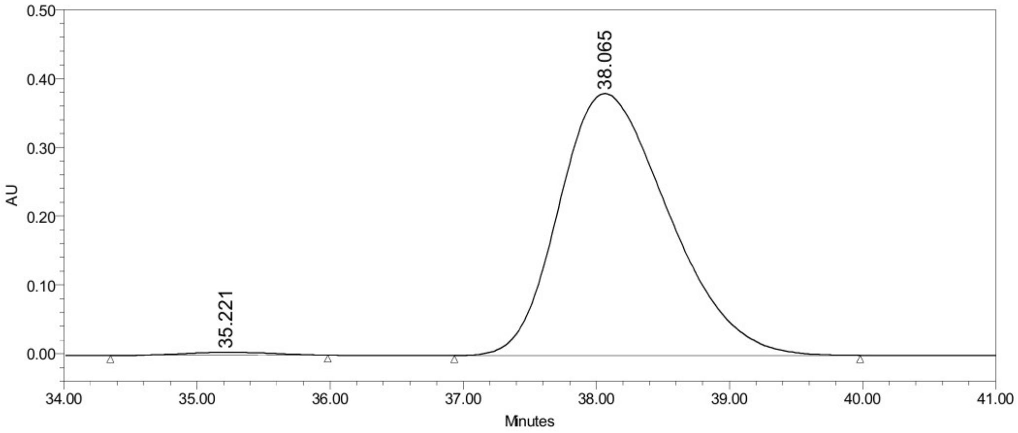
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 1900; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	35.643	5896139	50.33	108331
2	W2489 ChA 210nm	38.838	5817747	49.67	102761

(*R*)-1-(4-fluorophenyl)ethan-1-ol [(*R*)-4f]



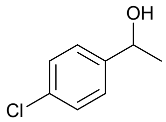


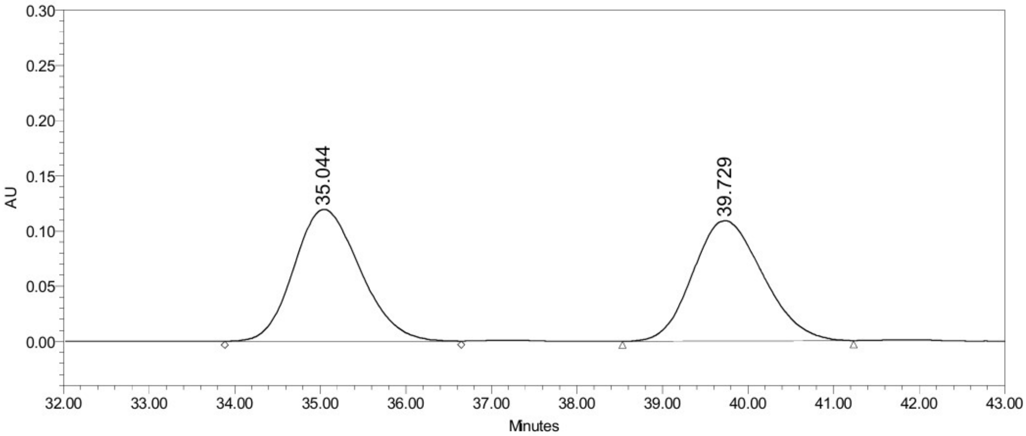
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 1905; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	35.221	215456	0.98	4592
2	W2489 ChA 210nm	38.065	21760222	99.02	380578

Rac-1-(4-chlorophenyl)ethan-1-ol



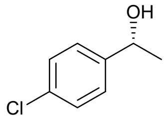


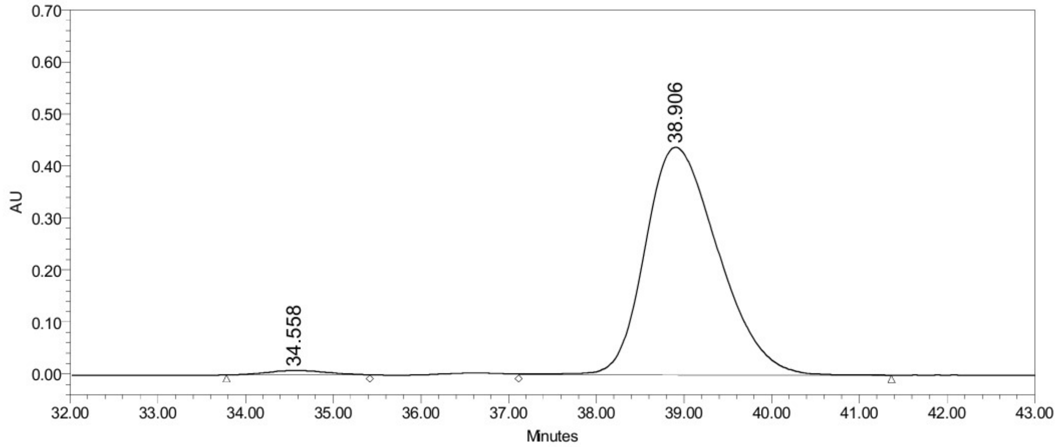
——— Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 1908; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	35.044	6408195	50.79	119456
2	W2489 ChA 210nm	39.729	6208661	49.21	108934

(*R*)-1-(4-chlorophenyl)ethan-1-ol [(*R*)-4g]



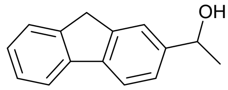


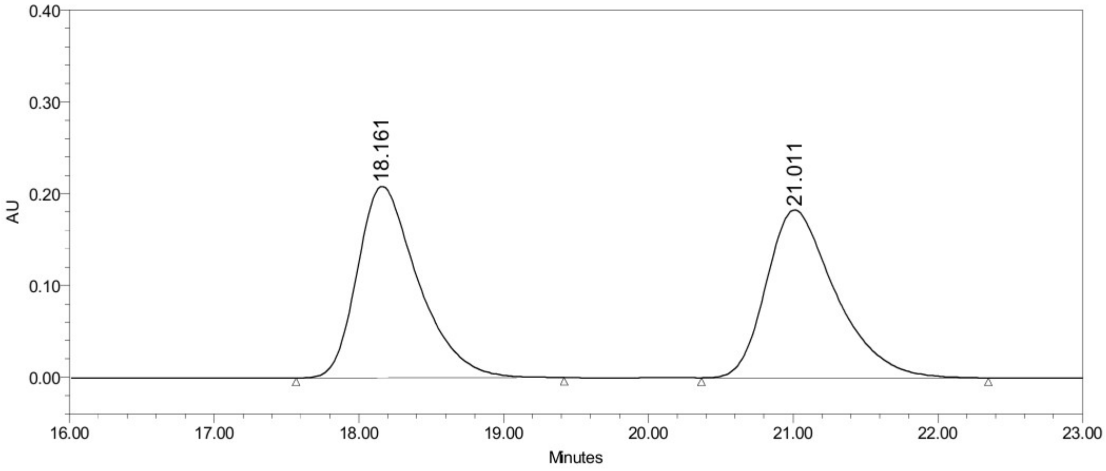
——— Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 1911; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	34.558	420387	1.63	8795
2	W2489 ChA 210nm	38.906	25411498	98.37	438298

Rac-1-(9H-fluoren-2-yl)ethan-1-ol



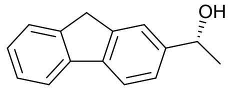


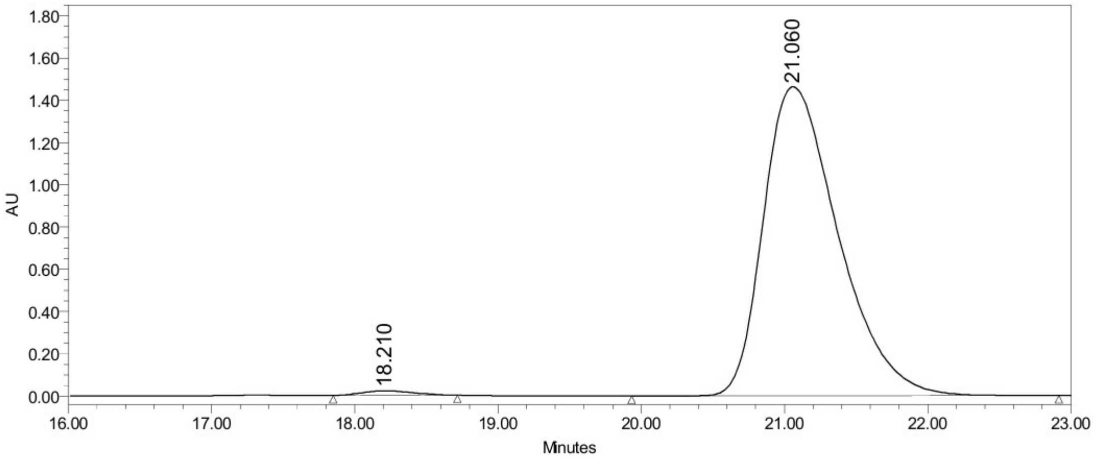
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2744; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	18.161	6074551	49.99	208569
2	W2489 ChA 214nm	21.011	6077583	50.01	182655

(*R*)-1-(9H-fluoren-2-yl)ethan-1-ol [(*R*)-4h]



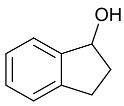


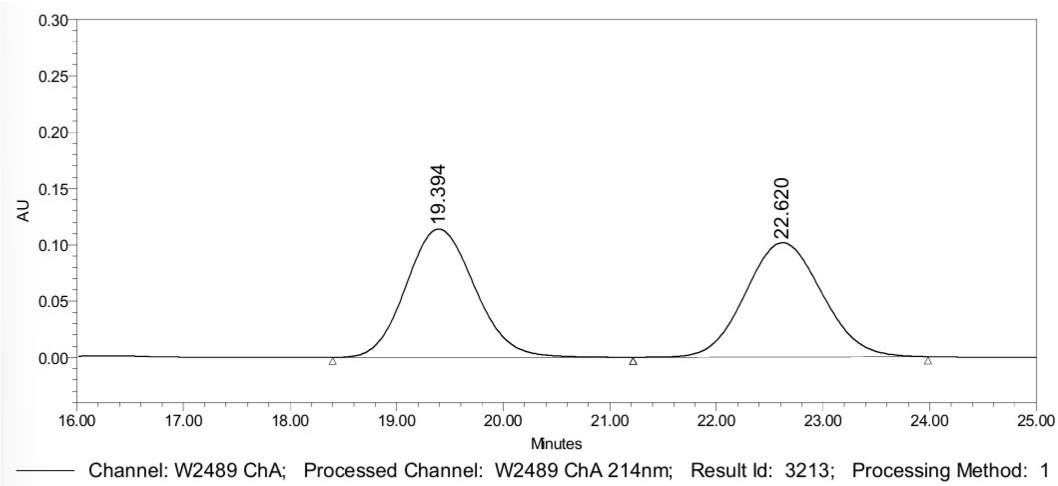
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2747; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	18.210	543719	1.01	21682
2	W2489 ChA 214nm	21.060	53146673	98.99	1462866

Rac-2,3-dihydro-1H-inden-1-ol

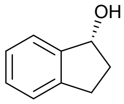


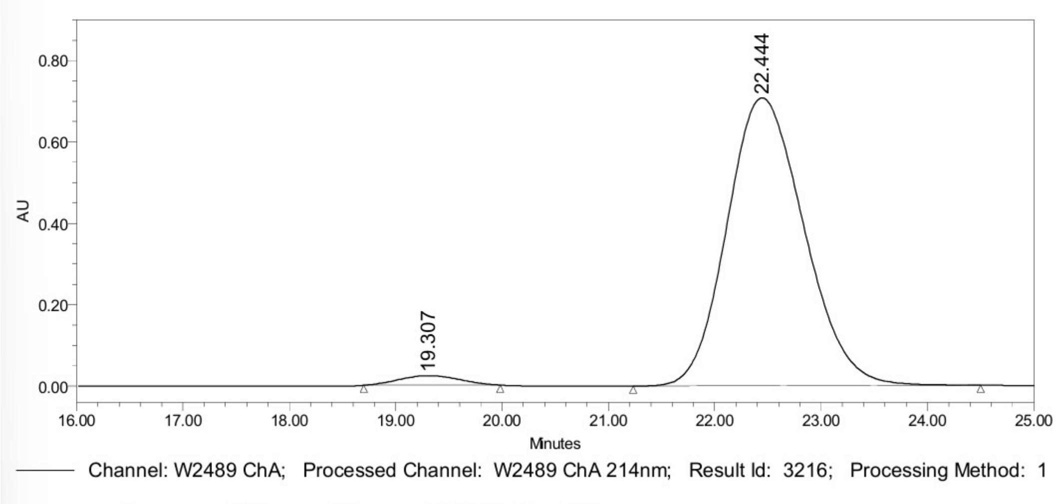


Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	19.394	5092390	50.11	113871
2	W2489 ChA 214nm	22.620	5070486	49.89	101366

(*R*)-2,3-dihydro-1H-inden-1-ol [(*R*)-4i]

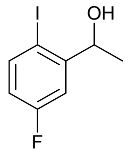


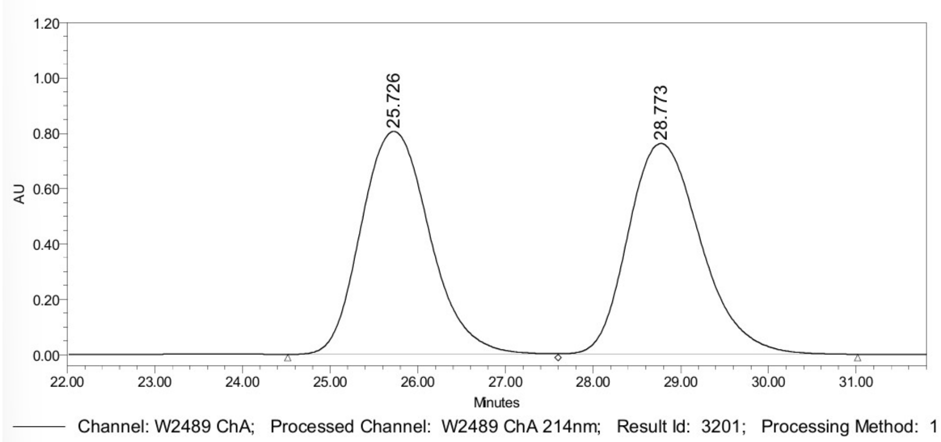


Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	19.307	918462	2.51	23251
2	W2489 ChA 214nm	22.444	35626632	97.49	707199

Rac-1-(5-fluoro-2-iodophenyl)ethan-1-ol

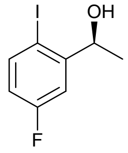


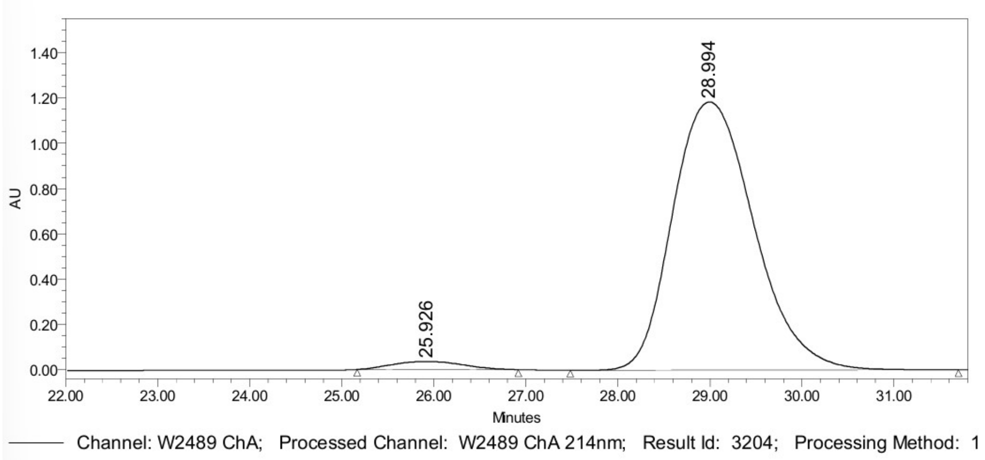


Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	25.726	43897778	49.93	805925
2	W2489 ChA 214nm	28.773	44016143	50.07	762593

(*S*)-1-(5-fluoro-2-iodophenyl)ethan-1-ol [(*S*)-4j]



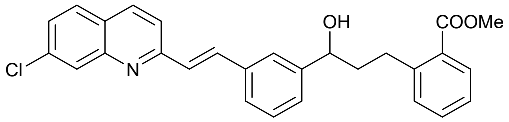


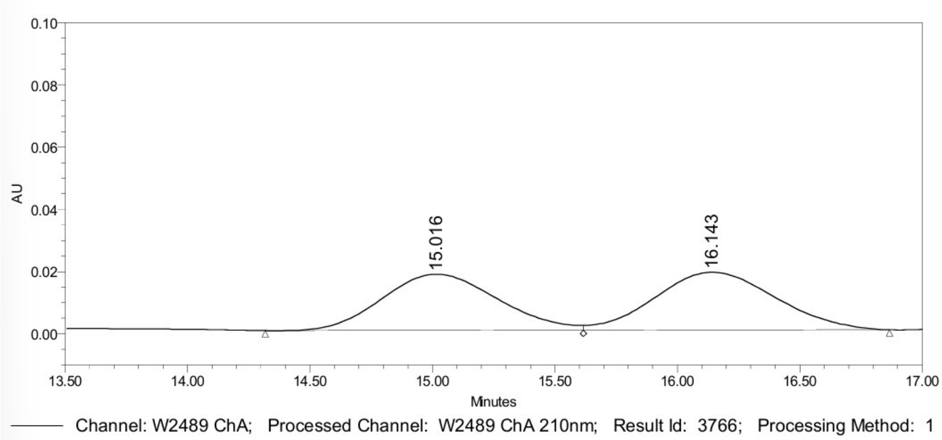
Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	25.926	1897876	2.54	35649
2	W2489 ChA 214nm	28.994	72713521	97.46	1183662

Methyl (*E*)-2-(3-(3-(2-(7-chloroquinolin-2-yl)vinyl)phenyl)-3-

hydroxypropyl)benzoate

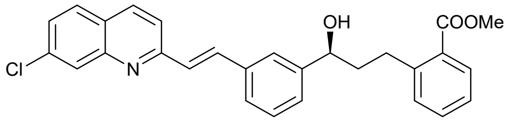


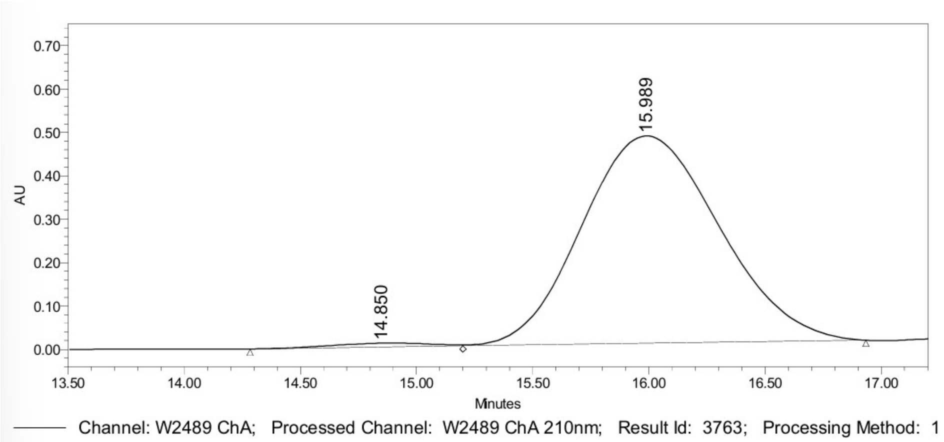


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	15.016	594433	48.24	18079
2	W2489 ChA 210nm	16.143	637879	51.76	18627

methyl (***S***, ***E***)-2-(3-(3-(2-(7-chloroquinolin-2-yl)vinyl)phenyl)-3-hydroxypropyl)benzoate [(***S***)-4k]

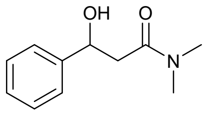


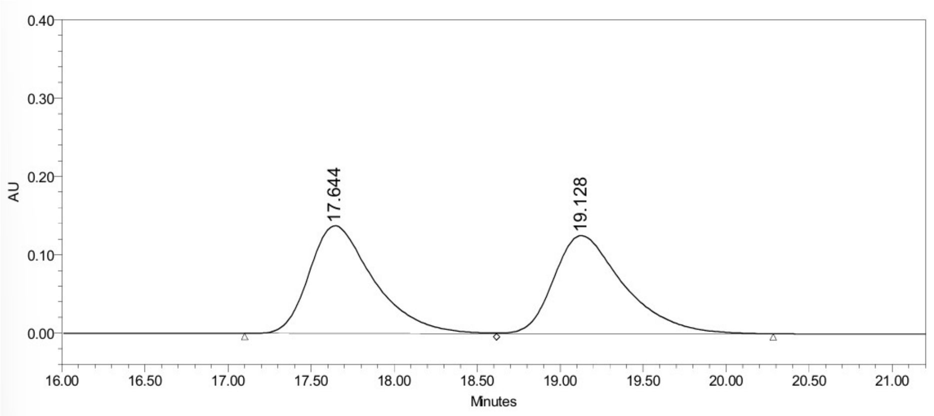


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	14.850	262342	1.32	8840
2	W2489 ChA 210nm	15.989	19630959	98.68	477688

Rac-3-hydroxy-N,N-dimethyl-3-phenylpropanamide



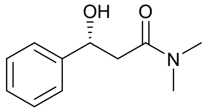


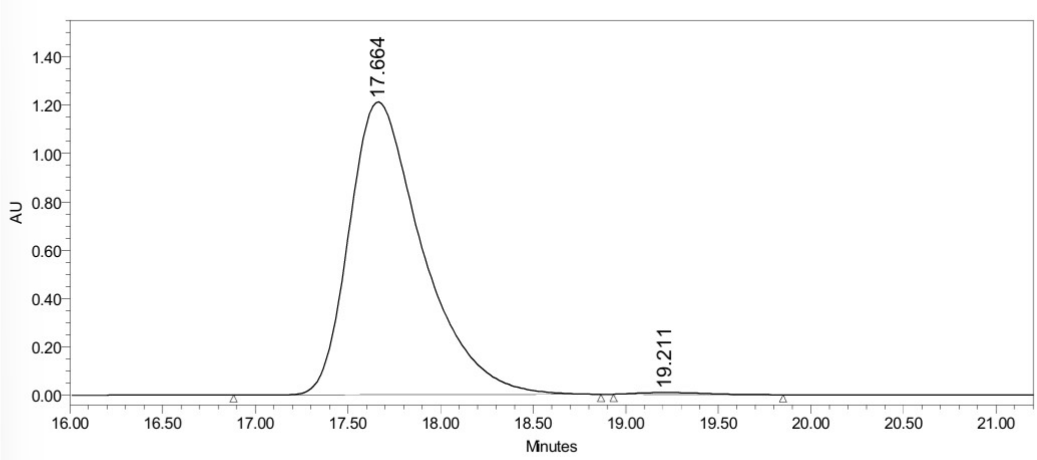
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 2942; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	17.644	3718246	50.35	137572
2	W2489 ChA 210nm	19.128	3666546	49.65	125212

(*R*)-3-Hydroxy-N,N-dimethyl-3-phenylpropanamide [(*R*)-4l]



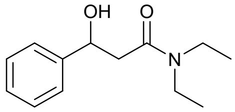


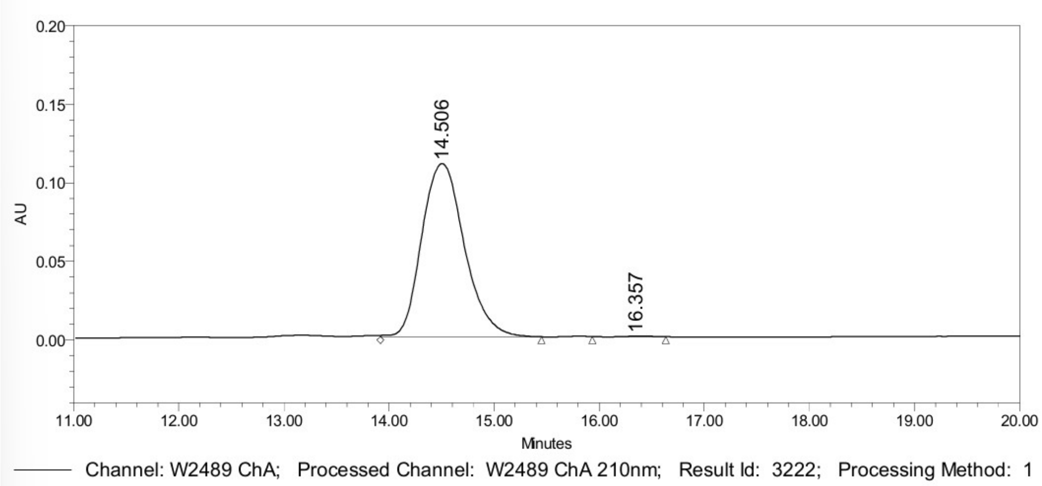
Channel: W2489 ChA; Processed Channel: W2489 ChA 210nm; Result Id: 2945; Processing Method: 1

Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	17.664	33189577	99.44	1210367
2	W2489 ChA 210nm	19.211	187145	0.56	7778

Rac-N,N-diethyl-3-hydroxy-3-phenylpropanamide

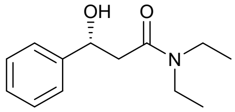


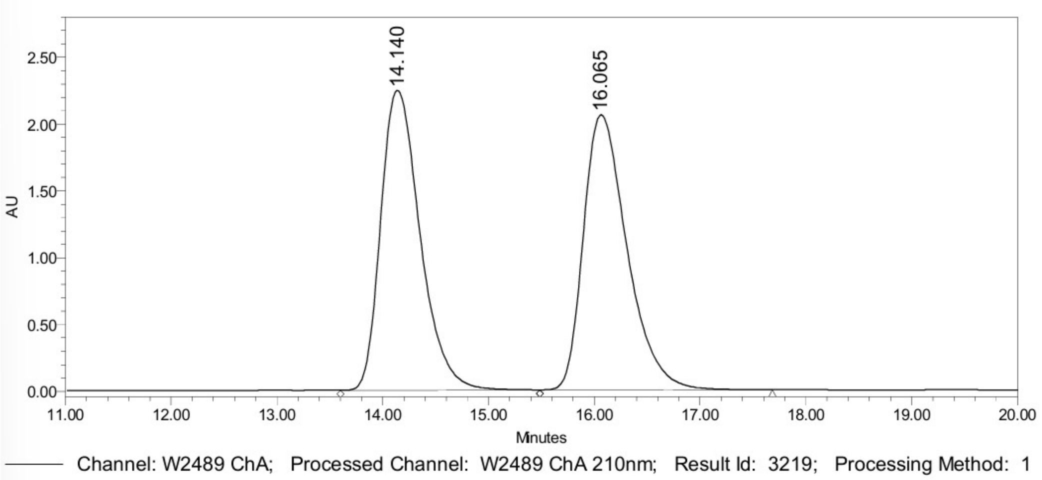


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	14.506	3088424	99.78	110020
2	W2489 ChA 210nm	16.357	6824	0.22	323

(*R*)-N,N-diethyl-3-hydroxy-3-phenylpropanamide [(*R*)-4m]

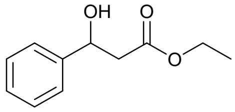


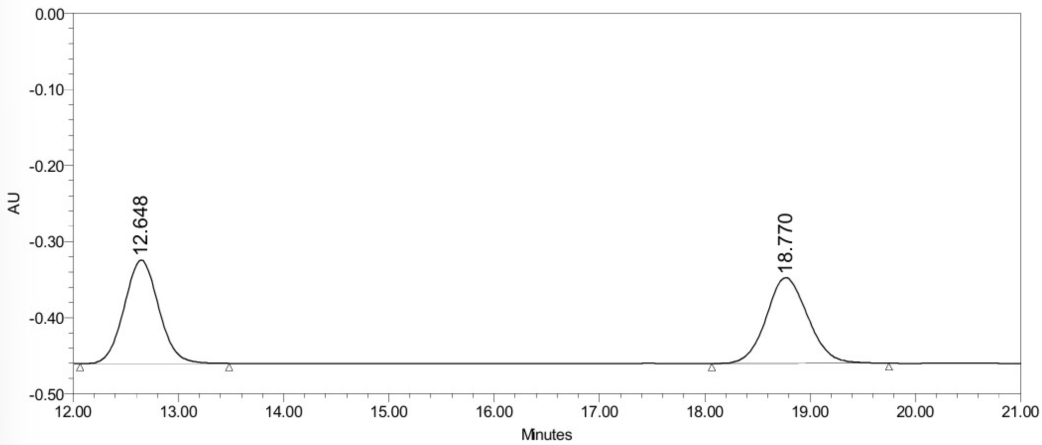


Processed Channel Descr.: W2489 ChA 210nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 210nm	14.140	58025903	49.59	2244311
2	W2489 ChA 210nm	16.065	58974270	50.41	2058965

Rac-Ethyl-3-hydroxy-3-phenylpropanoate



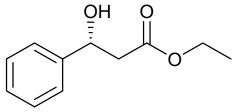


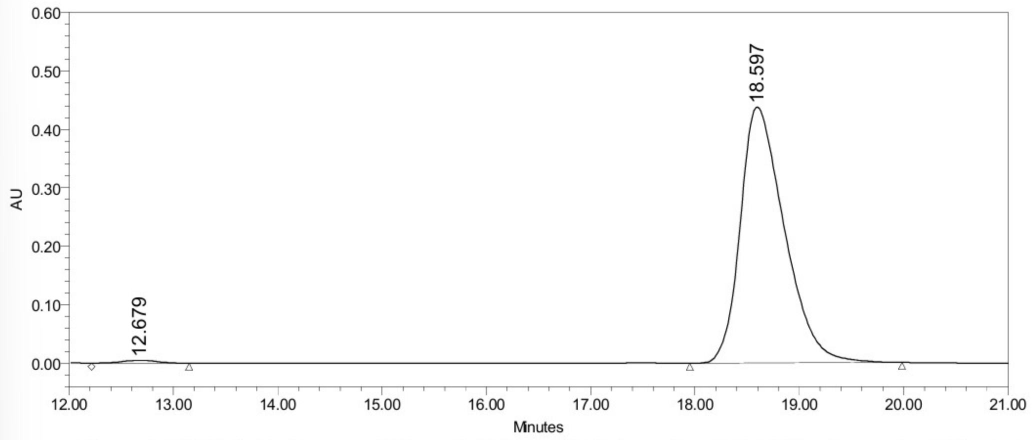
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2957; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	12.648	3099116	50.01	136129
2	W2489 ChA 214nm	18.770	3097364	49.99	112729

Ethyl-(*R*)-3-hydroxy-3-phenylpropanoate [(*R*)-4n]



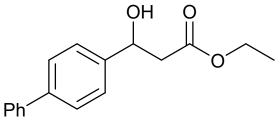


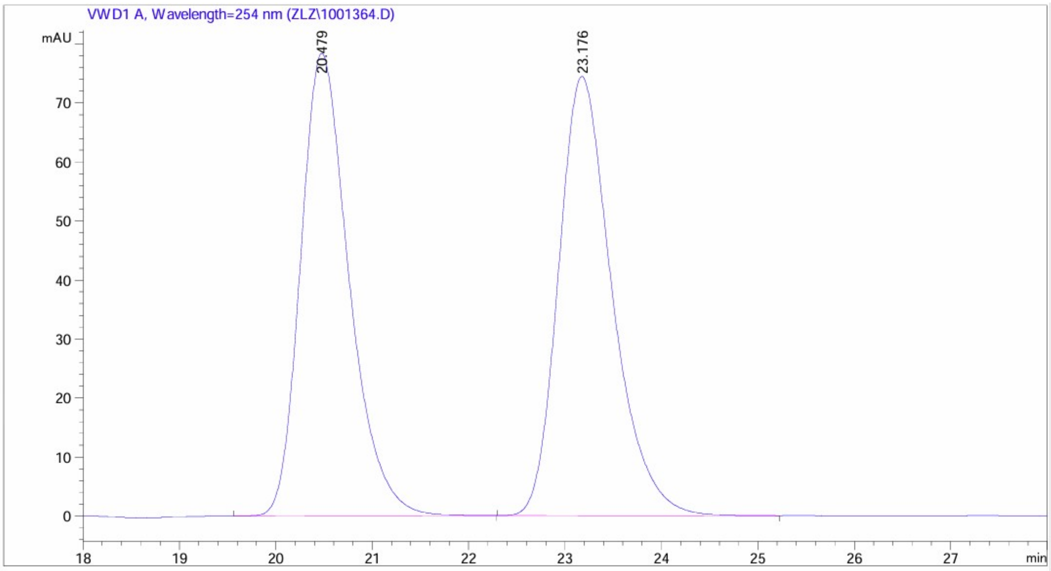
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2954; Processing Method: 1

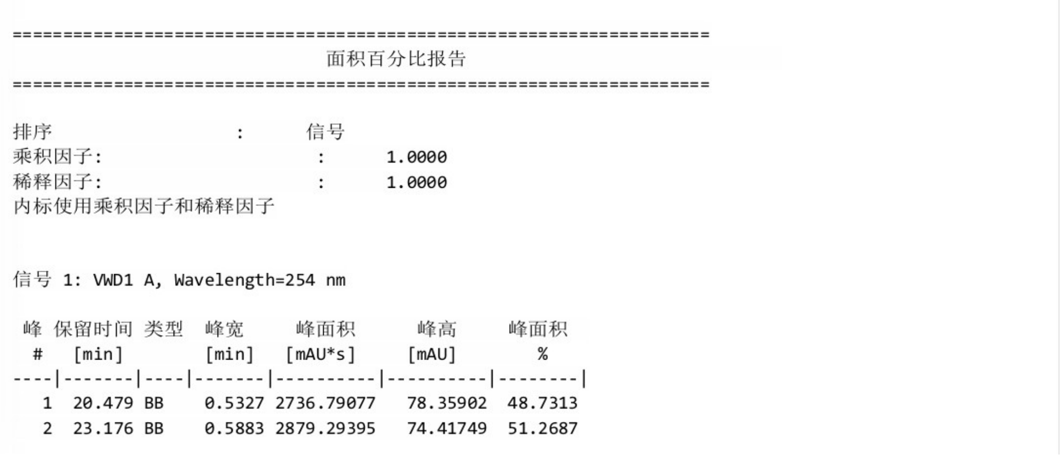
Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	12.679	113957	0.88	5006
2	W2489 ChA 214nm	18.597	12867243	99.12	437823

Rac-Ethyl-3-([1,1'-biphenyl]-4-yl)-3-hydroxypropanoate







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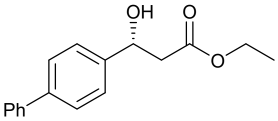
=====================================================================
                              面积百分比报告
=====================================================================

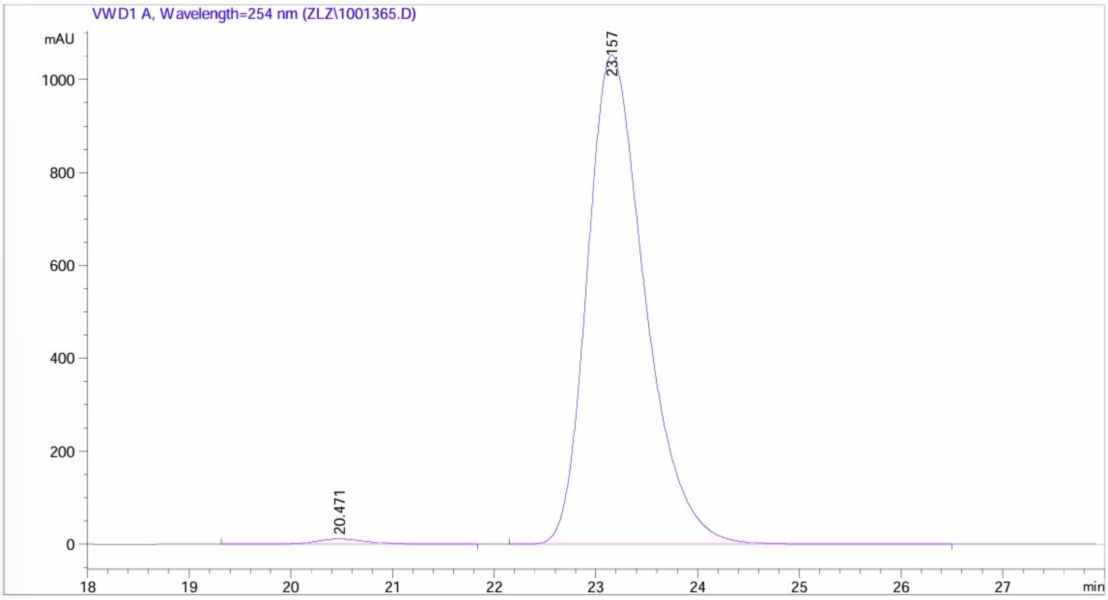
排序                   :      信号
乘积因子:                      :      1.0000
稀释因子:                      :      1.0000
内标使用乘积因子和稀释因子

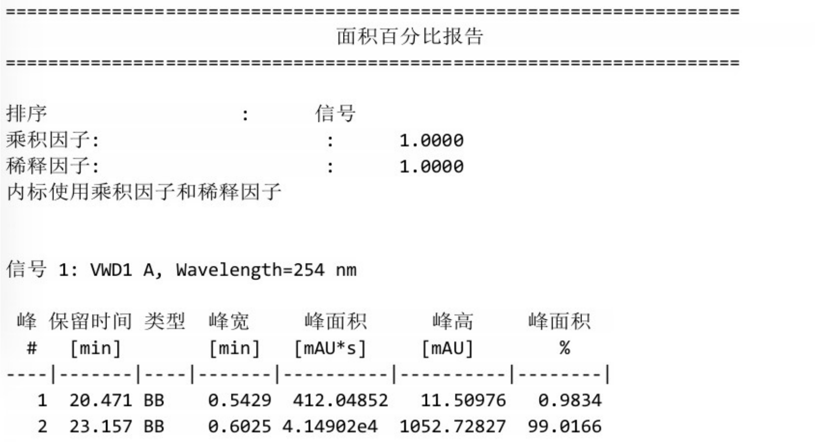

信号 1: VWD1 A, Wavelength=254 nm

 峰  保留时间 类型  峰宽      峰面积       峰高      峰面积
  #   [min]        [min]    [mAU*s]      [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1  20.479 BB    0.5327 2736.79077   78.35902  48.7313
   2  23.176 BB    0.5883 2879.29395   74.41749  51.2687
```

Ethyl-(*R*)-3-([1,1'-biphenyl]-4-yl)-3-hydroxypropanoate [(*R*)-4o]







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=====================================================================
                        面积百分比报告
=====================================================================

排序                    :       信号
乘积因子:                       :      1.0000
稀释因子:                       :      1.0000
内标使用乘积因子和稀释因子


信号 1: VWD1 A, Wavelength=254 nm

 峰  保留时间 类型  峰宽     峰面积      峰高       峰面积
  #   [min]        [min]   [mAU*s]     [mAU]        %
----|-------|----|-------|----------|----------|--------|
   1  20.471 BB    0.5429  412.04852   11.50976   0.9834
   2  23.157 BB    0.6025 4.14902e4  1052.72827  99.0166
```
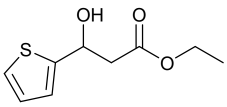
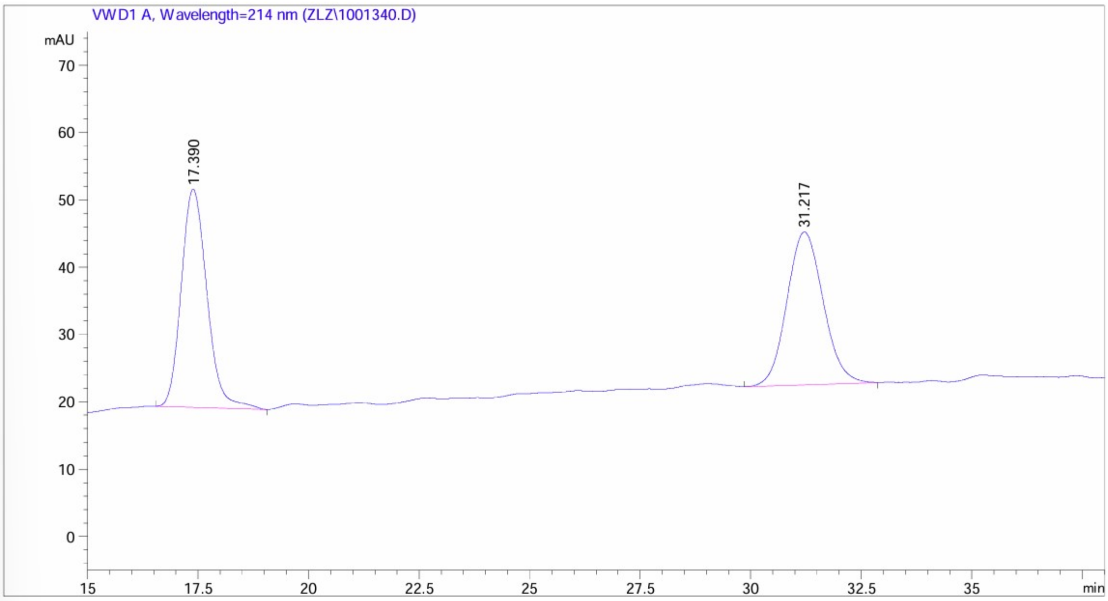
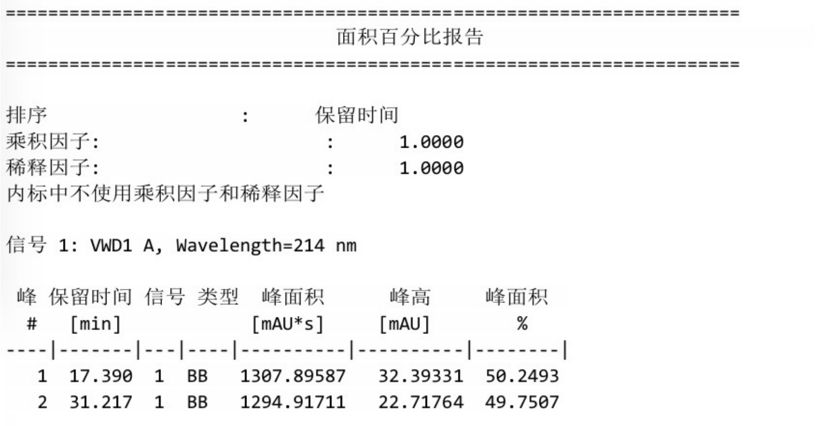

Rac-Ethyl-3-hydroxy-3-(thiophen-2-yl)propanoate







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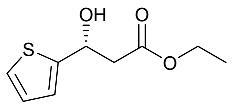
=====================================================================
                        面积百分比报告
=====================================================================

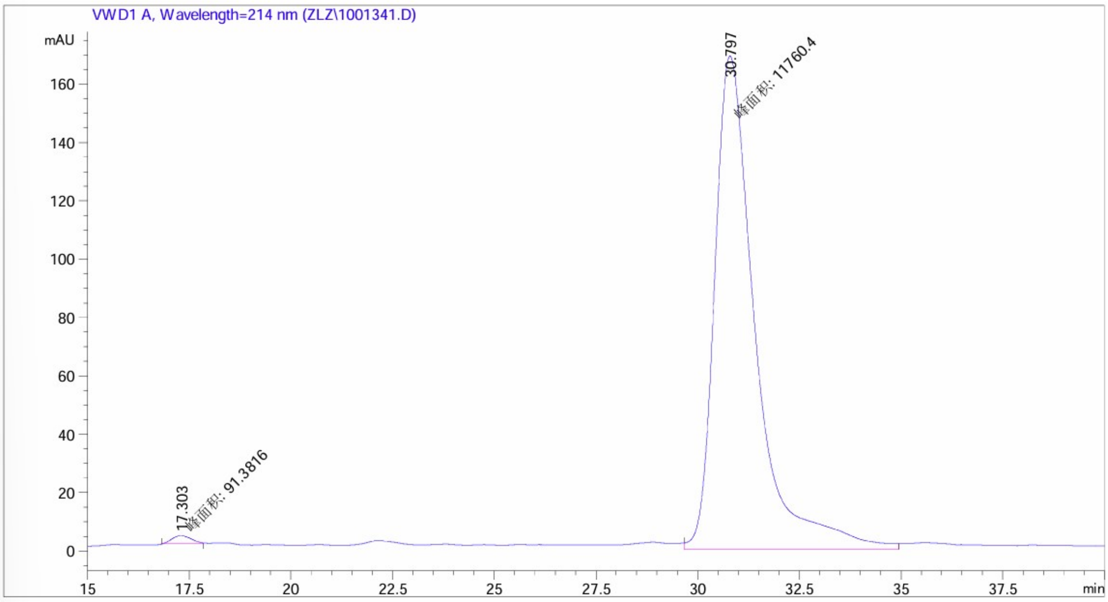
排序                    :     保留时间
乘积因子:                       :      1.0000
稀释因子:                       :      1.0000
内标中不使用乘积因子和稀释因子

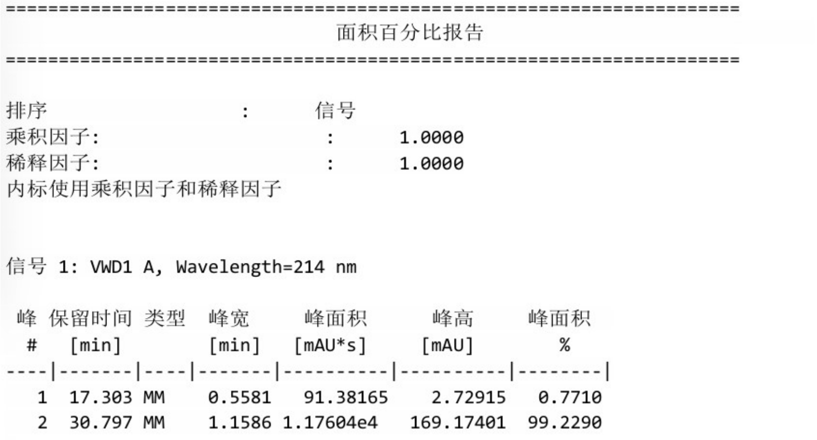
信号 1: VWD1 A, Wavelength=214 nm

 峰 保留时间 信号 类型  峰面积      峰高      峰面积
  #   [min]            [mAU*s]     [mAU]       %
----|-------|---|----|----------|----------|--------|
   1  17.390  1  BB   1307.89587   32.39331  50.2493
   2  31.217  1  BB   1294.91711   22.71764  49.7507
```

Ethyl-(*R*)-3-hydroxy-3-(thiophen-2-yl)propanoate [(*R*)-4p]







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==================================================================
                         面积百分比报告
==================================================================

排序                   :      信号
乘积因子:                      :      1.0000
稀释因子:                      :      1.0000
内标使用乘积因子和稀释因子


信号 1: VWD1 A, Wavelength=214 nm

 峰 保留时间 类型  峰宽     峰面积      峰高      峰面积
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1  17.303 MM    0.5581   91.38165    2.72915   0.7710
   2  30.797 MM    1.1586 1.17604e4  169.17401  99.2290
```
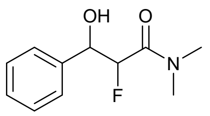
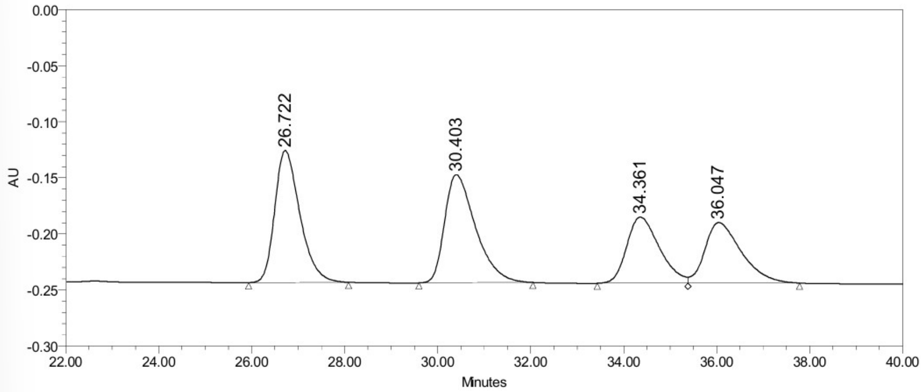

Rac-2-Fluoro-3-hydroxy-N,N-dimethyl-3-phenylpropanamide



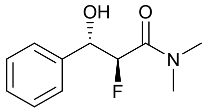


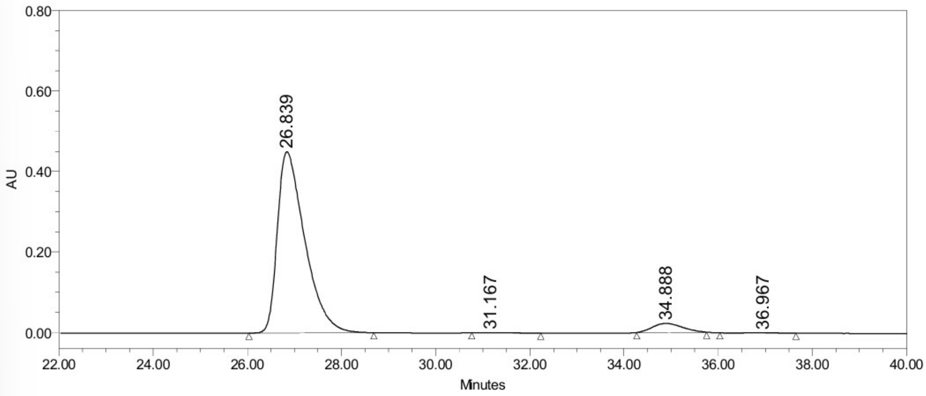
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2981; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	26.722	4426068	30.08	117749
2	W2489 ChA 214nm	30.403	4457611	30.29	96408
3	W2489 ChA 214nm	34.361	2887670	19.62	59037
4	W2489 ChA 214nm	36.047	2943738	20.00	54098

(2*S*,3*S*)-2-Fluoro-3-hydroxy-N,N-dimethyl-3-phenylpropanamide [(2S,3S)-6a]



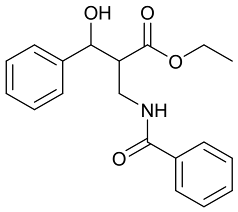


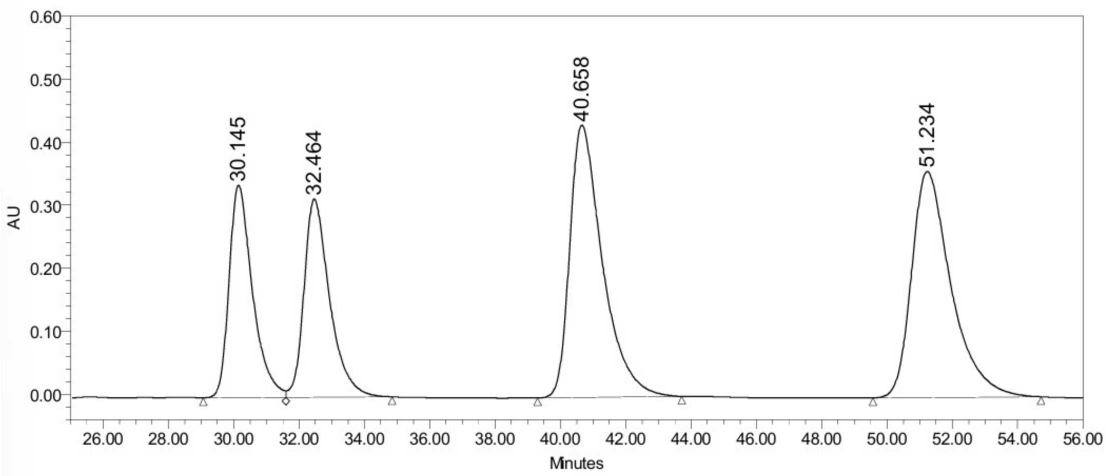
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2987; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	26.839	18209556	94.55	450272
2	W2489 ChA 214nm	31.167	36595	0.19	1005
3	W2489 ChA 214nm	34.888	976702	5.07	22348
4	W2489 ChA 214nm	36.967	36478	0.19	844

Rac-Ethyl 2-(benzamidomethyl)-3-hydroxy-3-phenylpropanoate



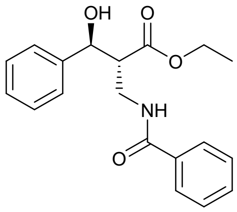


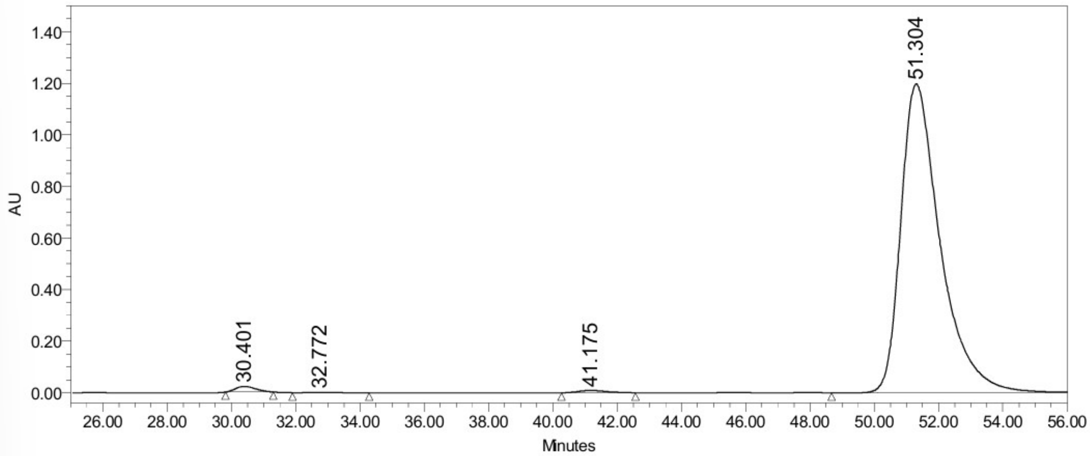
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2627; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	30.145	16795002	17.84	336101
2	W2489 ChA 214nm	32.464	17165226	18.23	314062
3	W2489 ChA 214nm	40.658	30063366	31.93	431536
4	W2489 ChA 214nm	51.234	30126098	32.00	358256

(2*R*,3*S*)-Ethyl-2-(benzamidomethyl)-3-hydroxy-3-phenylpropanoate [(2*R*,3*S*)-6b]



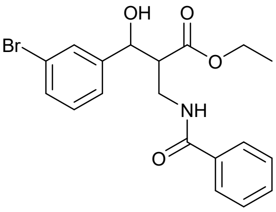


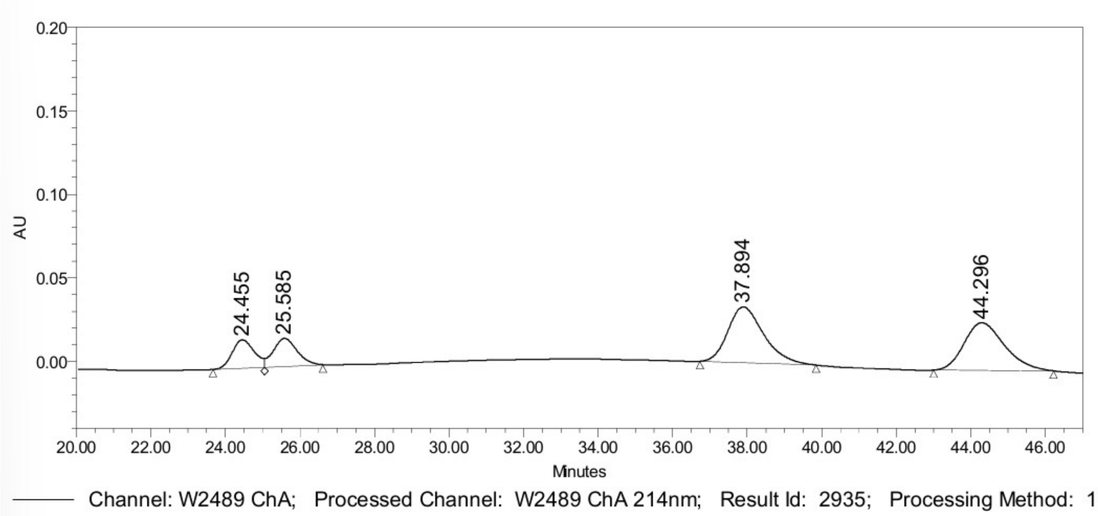
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2624; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	30.401	949769	0.92	21894
2	W2489 ChA 214nm	32.772	90526	0.09	1720
3	W2489 ChA 214nm	41.175	564528	0.55	8948
4	W2489 ChA 214nm	51.304	101723584	98.45	1197248

Ethyl-2-(benzamidomethyl)-3-(3-bromophenyl)-3-hydroxypropanoate



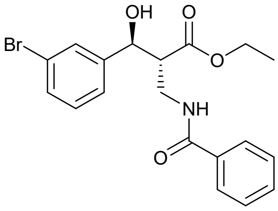


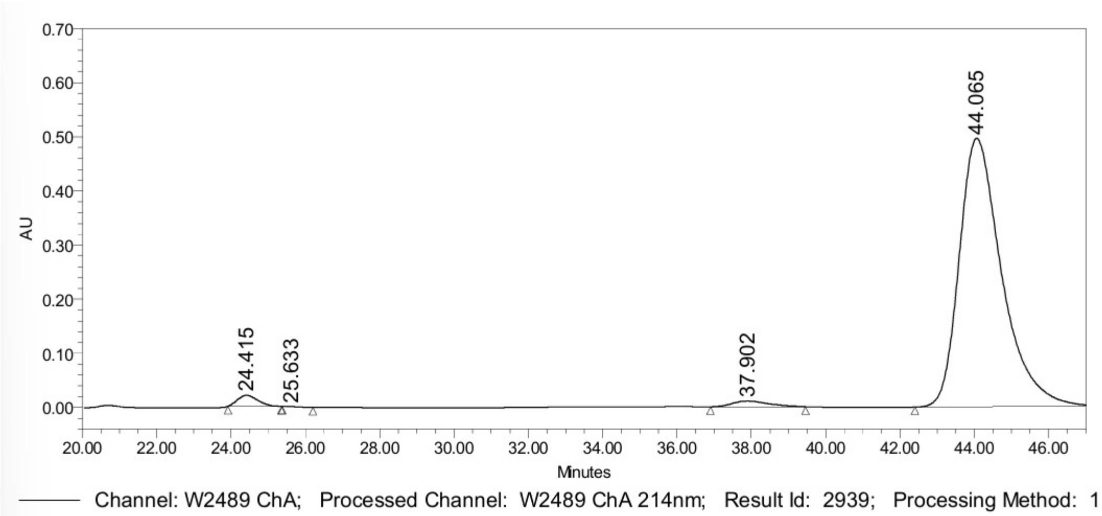
Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	24.455	699398	11.99	16991
2	W2489 ChA 214nm	25.585	747028	12.81	16780
3	W2489 ChA 214nm	37.894	2235914	38.33	33344
4	W2489 ChA 214nm	44.296	2150383	36.87	28537

(2*R*, 3*S*)-Ethyl-2-(benzamidomethyl)-3-(3-bromophenyl)-3-hydroxypropanoate

[(2*R*,3*S*)-6c]



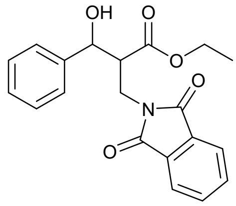


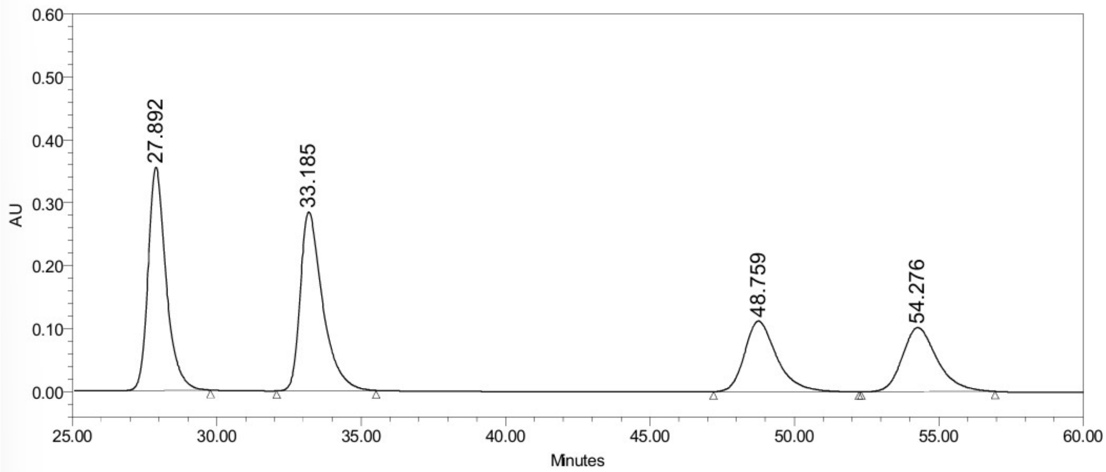
Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2939; Processing Method: 1

Processed Channel Descr.: W2489 ChA 214nm

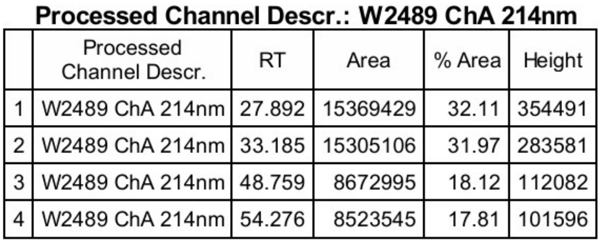
	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	24.415	759666	1.86	20264
2	W2489 ChA 214nm	25.633	6965	0.02	317
3	W2489 ChA 214nm	37.902	710793	1.74	10466
4	W2489 ChA 214nm	44.065	39387595	96.38	495893

Rac-Ethyl-2-((1,3-dioxoisoindolin-2-yl)methyl)-3-hydroxy-3-phenylpropanoate





Channel: W2489 ChA; Processed Channel: W2489 ChA 214nm; Result Id: 2634; Processing Method: 1

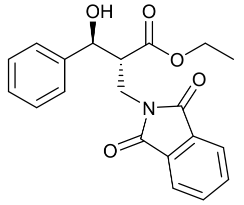


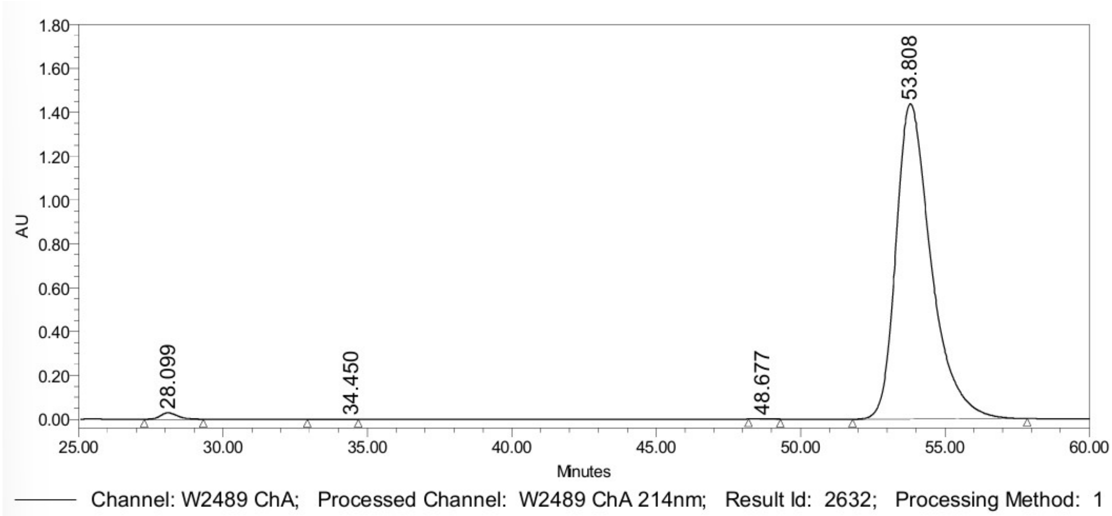
Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	27.892	15369429	32.11	354491
2	W2489 ChA 214nm	33.185	15305106	31.97	283581
3	W2489 ChA 214nm	48.759	8672995	18.12	112082
4	W2489 ChA 214nm	54.276	8523545	17.81	101596

(2*R*,3*S*)-Ethyl-2-((1,3-dioxoisoindolin-2-yl)methyl)-3-hydroxy-3-

phenylpropanoate [(2*R*,3*S*)-6d]





Processed Channel Descr.: W2489 ChA 214nm

	Processed Channel Descr.	RT	Area	% Area	Height
1	W2489 ChA 214nm	28.099	1224201	0.99	29292
2	W2489 ChA 214nm	34.450	13982	0.01	352
3	W2489 ChA 214nm	48.677	66461	0.05	1653
4	W2489 ChA 214nm	53.808	122050726	98.94	1437092

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