Electronic Supplementary Material (ESI) for RSC Advances.

Ruthenium-catalyzed asymmetric hydrogenation of aromatic and heteroaromatic ketones using cinchona alkaloids derived NNP ligand

Ling Zhang†, Qian Chen†, Linlin Li, Jian Jiang, Hao Sun, Li Li, Ting Liu, Lin Zhang* and Chun Li*

State Key Laboratory of Functions and Applications of Medicinal Plants & School of Pharmaceutical Sciences Guizhou Medical University, Guiyang, 550004, People's Republic of China. E-mail: scuchunli@163.com, gmulinzhang@163.com

Table of Contents

1. General experimental details

Unless otherwise mentioned, all experiments were carried out under an atmosphere of argon or using standard Schlenk techniques. Solvents were dried with standard procedures and degassed with N_2. NMR spectra were recorded on a Bruker DPX 400 or 600 spectrometer. Chemical shifts are reported in ppm and coupling constants are given in Hz. High-resolution mass spectra (HRMS) were obtained on a Bruker MicroQTOF Ⅱ instrument were recorded using electrospray ionization (ESI) techniques.

Reagents: Unless otherwise stated, commercial reagents including Benzylidene-bis(tricyclohexylphosphine)dichlororuthenium were used without further purification.

2. Mechanistic Studies

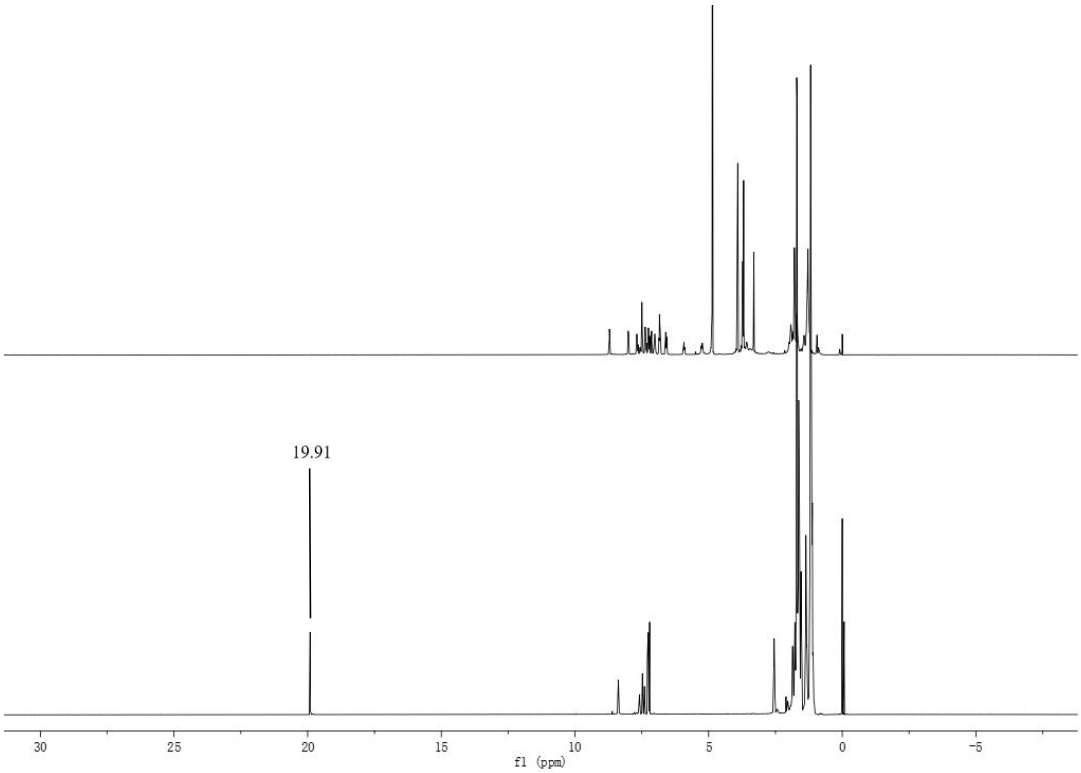


Figure S1. (a) ^{1}H NMR of the mixture of catalyst precursor and **L5** (CD_3OD, 600 MHz); (b) ^{1}H NMR of the catalyst precursor (CD_3OD, 600 MHz).

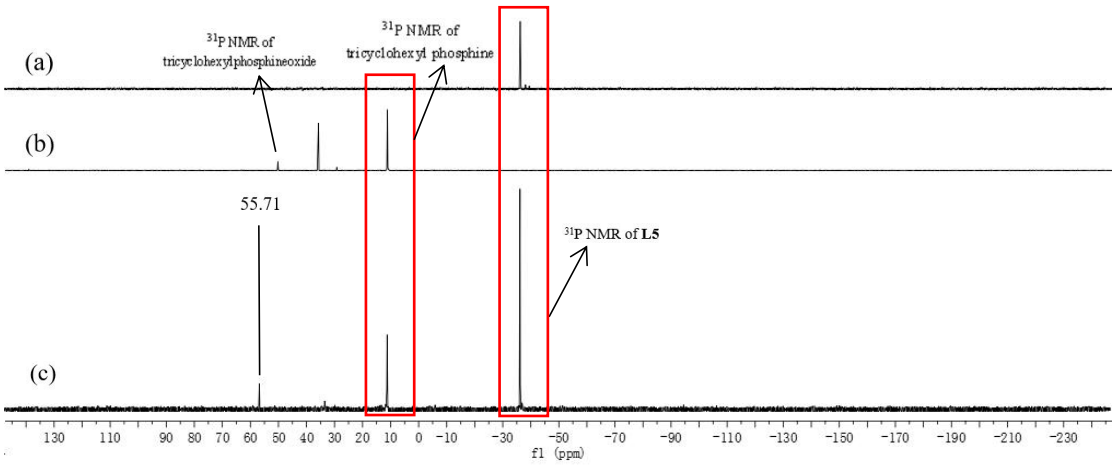


Figure S2. (a) ^{31}P NMR of **L5** (CD_3OD, 600 MHz); (b) ^{31}P{H} NMR of the catalyst precursor (CD_3OD, 600 MHz). (c) ^{31}P{H} NMR of the mixture of catalyst precursor and **L5**.

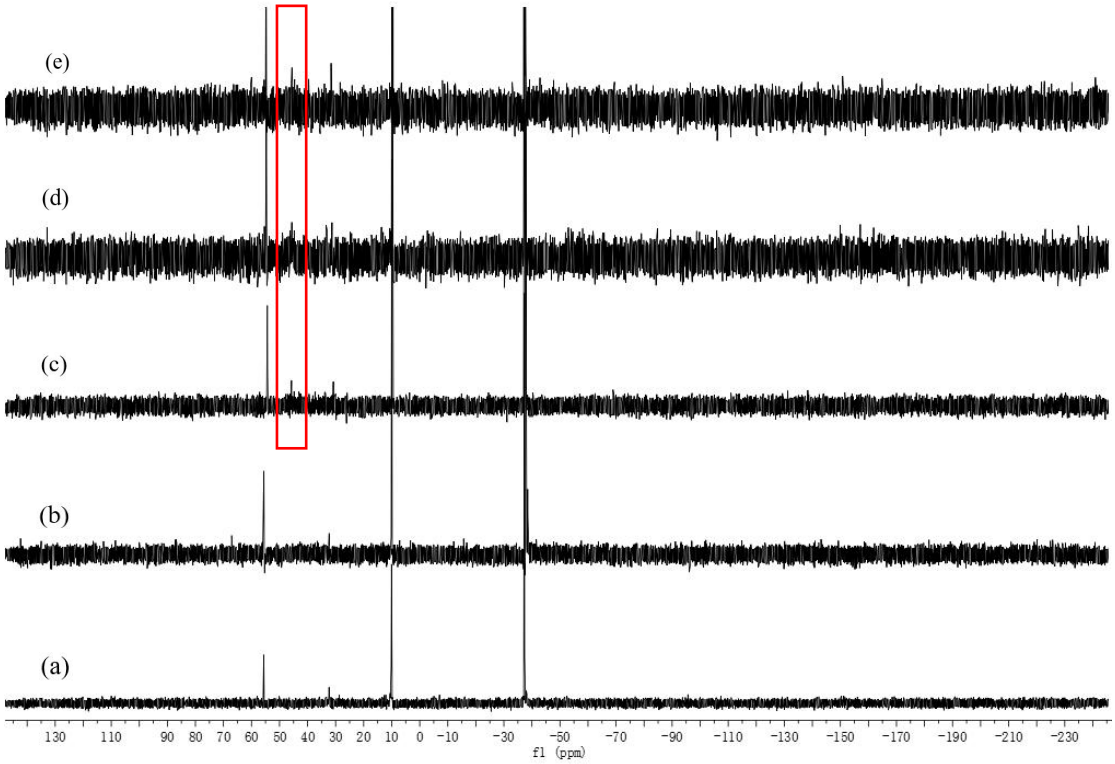


Figure S3. ^{31}P{H} NMR spectra taken at 30 min to 2 h after introducing H_2 to the solution. (a) ^{31}P{H} NMR of the mixture of catalyst precursor and **L5** in CD_3OD; (b) ^{31}P{H} NMR of the reaction solution in CD_3OD. (Conditions: catalyst precursor (9.0 mg, 0.011 mmol), **L5** (14.5 mg, 0.022 mmol), $Ba(OH)_2$ (15.6 mg, 0.091 mmol), H_2 (6.0 MPa), CD_3OD (0.6 mL), 30 ℃, 1 h.); (c) ^{31}P{H} NMR of hydrogenation of acetophenone catalyzed by catalyst precursor and **L5** in CD_3OD. (Conditions: acetophenone (660 mg, 5.5 mmol), catalyst precursor (9.0 mg, 0.011 mmol), **L5** (14.5 mg, 0.022 mmol), $Ba(OH)_2$ (15.6 mg, 0.091 mmol), H_2 (6.0 MPa), CD_3OD (0.6 mL), 30 ℃, 30 min.); (d) ^{31}P{H} NMR of hydrogenation of acetophenone catalyzed by catalyst

precursor and **L5** in CD_3OD. (Conditions: acetophenone (660 mg, 5.5 mmol), catalyst precursor (9.0 mg, 0.011 mmol), **L5** (14.5 mg, 0.022 mmol), $Ba(OH)_2$ (15.6 mg, 0.091 mmol), H_2 (6.0 MPa), CD_3OD (0.6 mL), 30 ℃, 1 h.); (e) $^{31}P\{H\}$ NMR of hydrogenation of acetophenone catalyzed by catalyst precursor and **L5** in CD_3OD. (Conditions: acetophenone (660 mg, 2.2 mmol), catalyst precursor (9.0 mg, 0.011 mmol), **L5** (14.5 mg, 0.022 mmol), $Ba(OH)_2$ (15.6 mg, 0.091 mmol), H_2 (6.0 MPa), CD_3OD (0.6 mL), 30 ℃, 2 h.).

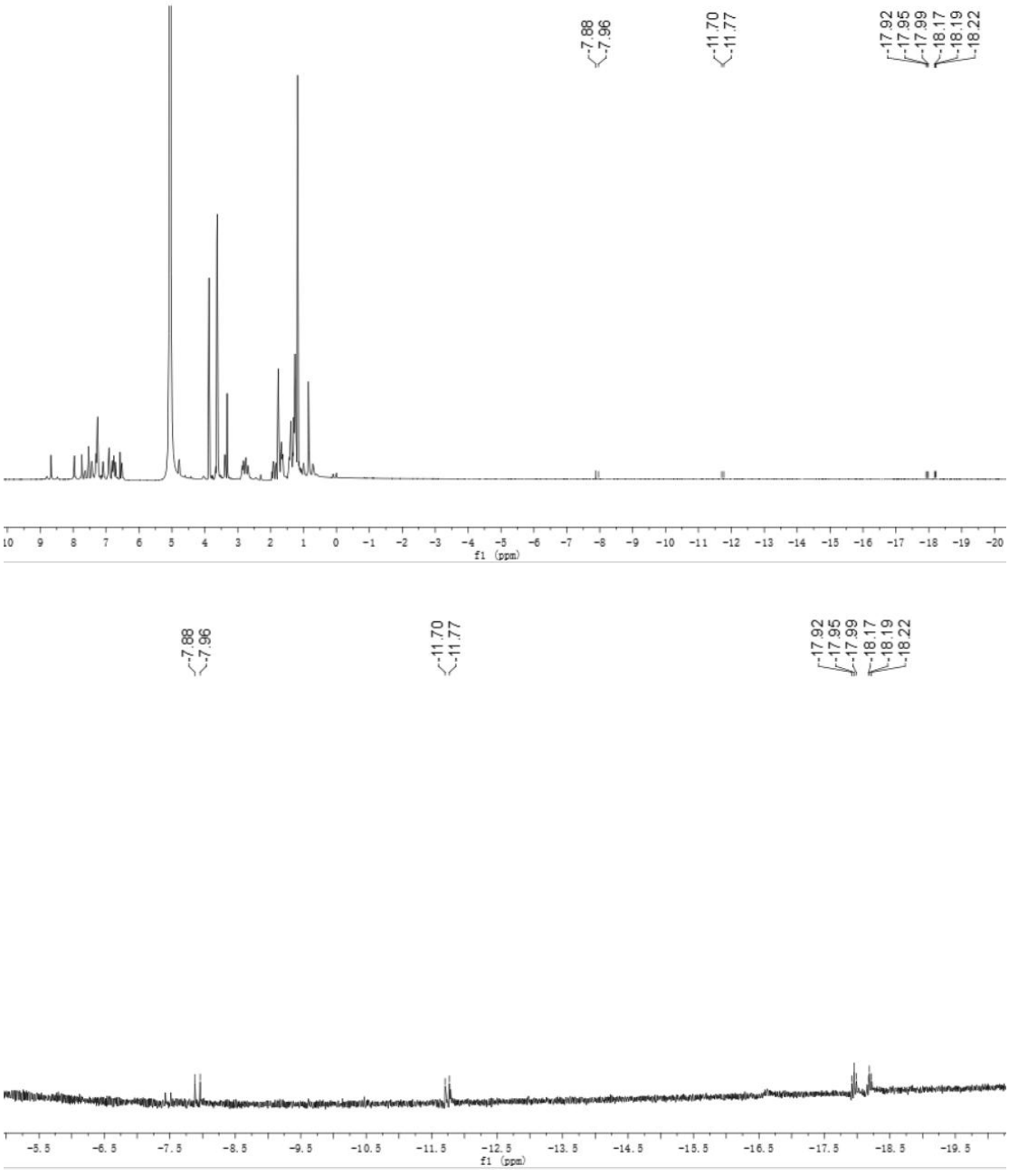
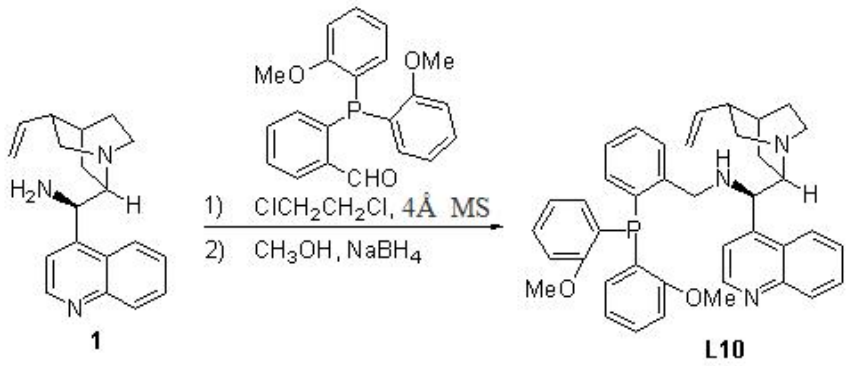


Figure S4. ^1H NMR of the reaction solution in CD_3OD. (Conditions: catalyst precursor (18.0 mg, 0.022 mmol), **L5** (29.0 mg, 0.044 mmol), $Ba(OH)_2$ (15.6 mg, 0.15 mmol), H_2 (6.0 MPa), CD_3OD (0.5 mL), 30 ℃, 1 h.).

3. Synthesis of L10



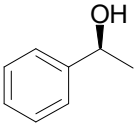
Under argon, to a solution of **1** (1.0 mmol) in 1,2-dichloro-ethane (10 mL) was added 2-diarylphosphanyl-benzaldehyde (1.5 mmol) and 4Å MS (3.3 g) at room temperature. After stirring for 24 h, the mixture was filtered and the filtrate was concentrated under reduced pressure to afford the solid residue. Subsequently, the solid residue was dissolved in anhydrous and oxygen free MeOH (5 ml), and $NaBH_4$ (3.0 mmol) was added at 0 ℃. The mixture was stirred at room temperature for 4h. The reaction was quenched with water (10 mL) and the aqueous layer was extracted with CH_2Cl_2 (20 mL x 3). The combined organic layers were dried over anhydrous sodium sulfate and filtered. The solvent was concentrated and the crude product was further purified by column chromatography on silica gel (CH_2Cl_2/MeOH/ammonia water=20/1/0.1) to give the corresponding ligand **L10 (**white solid, 0.25 g, 37% yield**)**. ^{1}H NMR (600MHz, $CDCl_3$): *δ* = 8.89 (s, 1H), 8.22 (d, *J* = 3.0 Hz, 1H), 8.13 (d, *J* = 6.0 Hz, 1H), 7.83 (s, 1H), 7.69 - 7.72 (m, 1H),7.53 - 7.55 (m, 1H), 7.29 - 7.34 (m, 2H), 7.19 - 7.24 (m, 2H), 7.07 - 7.09 (m, 1H), 6.85 - 6.87 (m, 1H), 6.80 - 6.83 (m, 1H), 6.72 - 6.75 (m, 1H), 6.66 (s, 1H), 6.59 (s, 1H), 5.82 - 5.88 (s, 1H), 5.03 - 5.10 (s, 2H), 4.68 (d, *J* = 3.0 Hz, 1H), 3.98 - 4.07 (m, 1H), 3.70 (s, 3H), 3.64 (s, 3H), 3.37 (d, *J* = 6.0 Hz, 3H), 2.87 (s, 1H), 2.71 (s, 2H), 2.16 (s, 1H), 1.50 (s, 1H), 1.42 (d, *J* = 3.0 Hz, 2H), 1.26 - 1.30 (m, 2H), 1.12 - 1.15 (m, 1H), 0.84 - 0.89 (m, 1H), 0.70 (s, 1H). ^{13}C{H} NMR (150MHz, $CDCl_3$): δ = 161.12, 150.61, 149.05, 148.19, 140.88, 134.98, 133.90, 133.68, 130.29, 129.91, 128.99, 128.77, 127.00, 126.12, 125.00, 123.00, 120.97, 120.83, 119.82, 114.31, 110.07, 62.46, 57.28, 55.59, 50.31, 49.14, 47.19, 43.44, 39.75, 29.70, 27.66, 26.67, 24.50. ^{31}P{H} NMR (303MHz, $CDCl_3$): δ = -38.31. HRMS (ESI) calcd. for $C_{40}H_{42}N_3O_2P$ $[M+H]^+$: 628.3087, found: 628.3101.

4. General procedure for asymmetric hydrogenation

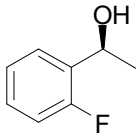
All reagents were of analytical grade and used as-received without further purification. The purity of hydrogen was over 99.99%. Required amount of Ruthenium precursor (1.41 mg, 0.00171 mmol), acetophenone (412 mg, 3.43 mmol), **L5** (2.25 mg, 0.00343 mmol), $Ba(OH)_2$ (51.6 mg, 0.3 mmol) and MeOH (2 mL) were added to a 25 mL stainless autoclave and purged by three cycles of pressurization/venting with H_2. The required H_2 pressure (6.0 MPa) was then installed and the autoclave was wormed to the indicated temperature. The autoclave was cooled down after the indicated reaction time and the pressure was slowly released. The product was purified by silica gel chromatography using petroleum ether/ethylacetate (10/1) as eluent. The enantioselectivity values were analyzed by GC-9790 with a Beta-DEX^{TM}120 capillary column (df = 0.25μm, 0.25 mm i.d.×30 m) and LC-16 with

Chirasil OD-H column (25 cm × 4.6 mm), Chirasil IA column (25 cm × 4.6 mm) and Chirasil IB column (25 cm × 4.6 mm). The ee values of chiral alcohols were calculated from the equations enantioselectivity values (ee, %) = | R - S| / |R + S|. Optical rotation was measured on the Rudolph Autopol Ⅰ with $[\alpha]_D^{25}$ values reported in degrees at 25 ℃; concentration (c) is in g/100ml.

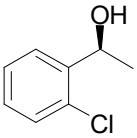
5. Characterization data of compounds



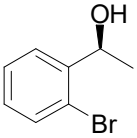
(*S*)-1-Phenyl-ethanol (P1): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 99 % yield, 415 mg, 98.8% ee, S isomer; $[a]_D^{25}$ = - 56.4 (c = 1.00 in $CHCl_3$) (lit.1 $[a]_D^{20}$ = - 59.7 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 7.29-7.35(m, 4H), 7.19-7.23(m, 1H), 5.17(d, *J* = 2.0 Hz, 1H), 4.68-4.74(m, 1H), 1.32 (d, *J* = 4.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 147.81, 128.44, 126.97, 125.74, 68.55, 26.43.



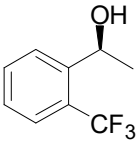
(*S*)-1-(2-Fluoro-phenyl)-ethanol (**P2**): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 93% yield, 447 mg, 99.2% ee, S isomer; $[a]_D^{25}$ = - 44.7 (c = 1.00 in $CHCl_3$) (lit.2 $[a]_D^{25}$ = - 43.9 (c = 1.0, $CHCl_3$); ^{1}H NMR (400 MHz, DMSO-d_6); δ 7.50-7.54(m, 1H), 7.08-7.28(m, 3H), 5.32(d, *J* = 2.0 Hz, 1H), 4.96-5.01 (m, 1H), 1.33(d, *J* = 4.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 160.51, 158.10, 134.35, 128.76, 127.42, 124.79, 115.40, 115.59, 62.47, 25.18.



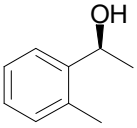
(S)-1-(2-Chlorophenyl)-ethan-1-ol (P3): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 99% yield, 530 mg, 99.7% ee, S isomer; $[a]_D^{25}$ = - 51.1 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 56.6 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 7.60-7.63(m, 1H), 7.34-7.37(m, 2H), 7.23-7.27(m, 1H), 5.40(d, *J* = 2.0 Hz, 1H), 4.99-5.05(m, 1H), 1.31(d, *J* = 2.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 144.97, 130.69, 129.32, 128.67, 127.78, 127.34, 65.43, 24.77.



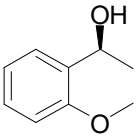
(S)-1-(2-Bromophenyl)-ethan-1-ol (P4): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 99% yield, 679 mg, 99.6% ee, S isomer; $[a]_D^{25}$ = -47.3 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 48.3 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 7.59-7.62(m, 1H), 7.52-7.54(m, 1H), 7.38-7.41(m, 1H), 7.15-7.19(m, 1H), 5.43(d , *J* = 2.0 Hz, 1H), 4.93-4.98(m, 1H), 1.30(d , *J* = 2.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 146.50, 132.55, 129.08, 128.36, 127.61, 121.11, 67.79, 24.86.



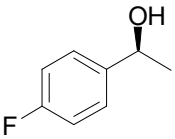
(S)-1-(2-Trifluoromethyl-phenyl)-ethanol (P5): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 49 % yield, 32 mg, 99.7% ee, S isomer; $[a]_D^{25}$ = -48.5 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 46.0 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83(d, *J* = 4.0 Hz, 1H), 7.57-7.62(m, 2H), 7.35-7.38(m, 1H), 5.31-5.36(m, 1H), 2.02(s, 1H), 1.49(d, *J* = 4.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, $CDCl_3$) δ 144.01, 131.37, 126.33, 126.03, 124.37, 124.32, 124.26, 124.16, 122.00, 64.68, 64.66, 24.41.



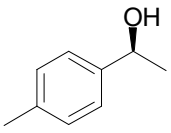
(S)-1-o-Tolyl-ethanol (P6): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 77% yield, 36 mg, 99.9% ee, S isomer; $[a]_D^{25}$ = -59.9 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = -62.6 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51 (d, *J* = 4.0 Hz, 1H), 7.23(d, *J* = 4.0 Hz, 1H), 7.12-7.19(m, 2H), 5.10-5.14(m, 1H), 2.34(s, 3H), 1.85(s, 1H), 1.47(d, *J* = 2.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, $CDCl_3$) δ 142.79, 133.20, 129.35, 126.15, 125.35, 123.43, 65.80, 22.90, 17.88.



(S)-1-(2-Methoxy-phenyl)-ethanol (P7): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 48% yield, 25 mg, 99.9% ee, S isomer; $[a]_D^{25}$ = -24.5 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 26.5 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 7.43(d, *J* = 4.0 Hz, 1H), 7.17-7.21(m, 1H), 6.91-6.95(m, 2H), 4.98-5.01 (m, 2H), 3.77(s, 3H), 1.25(d, *J* = 4.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 155.71, 135.86, 127.87, 125.80, 120.70, 110.78, 62.84, 55.67, 25.13.

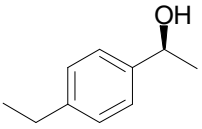


(S)-1-1-(4-Fluoro-phenyl)-ethanol (P8): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 99% yield, 48 mg, 99.4% ee, S isomer; $[a]_D^{25}$ = -37.1 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$= - 42.4 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.36-7.38(m, 2H), 7.11-7.14(m, 2H), 5.20(d, *J* = 3.0 Hz, 1H), 4.70-4.74(m, 1H), 1.31(d, *J* = 6.0 Hz, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 162.23, 160.63, 143.99, 127.64, 127.59, 115.14, 115.00, 67.91, 26.43.

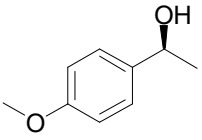


(S)-1-1-p-Tolyl-ethanol (P9): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 20:1), 99% yield, 46 mg, 98.6% ee, S

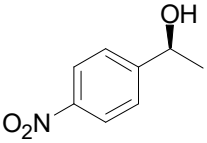
isomer; $[a]_D^{25}$ = -46.3 (c = 1.00 in $CHCl_3$), (lit.3 $[a]_D^{20}$ = - 45.9 (c = 1.11, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.23(d, *J* = 3.0 Hz, 2H), 7.12(d, *J* = 3.0 Hz, 2H), 5.07(d, *J* = 3.0 Hz, 1H), 4.66-4.70(m, 1H), 2.28(s, 3H), 1.31(d, *J* = 3.0 Hz, 3H) . ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 144.87, 135.86, 128.97, 125.69, 68.37, 26.46, 21.13.



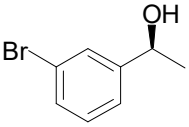
(S)-1-(4-ethylphenyl)ethan-1-ol (P10): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 84 % yield, 22 mg, 99.6% ee, S isomer; $[a]_D^{25}$ = -39.9 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 44.9 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.25(d, *J* = 3.0 Hz, 2H), 7.14(d, *J* = 6.0 Hz, 2H), 5.07(d, *J* = 3.0 Hz, 1H), 4.66-4.70(m, 1H), 2.56-2.59(m, 2H), 1.31(d, *J* = 3.0 Hz, 3H), 1.15-1.18(m, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 145.13, 142.36, 127.78, 125.76, 68.40, 28.32, 26.41, 16.24.



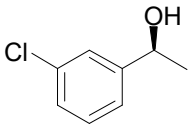
(S)-1-(4-Methoxy-phenyl)-ethanol (P11): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 92% yield, 48 mg, 99.6% ee, S isomer; $[a]_D^{25}$ = -39.0 (c = 1.00 in $CHCl_3$), (lit.1 $[a]_D^{20}$ = - 41.7 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 7.25(d, *J* = 6.0 Hz, 2H), 6.86(d, *J* = 4.0 Hz, 2H), 5.06(d, *J* = 2.0 Hz ,1H), 4.65-4.67(m, 1H), 3.72(s, 3H), 1.29(d, *J* = 4.0 Hz, 3H) . ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 158.42, 139.84, 126.90, 113.80, 68.11, 55.46, 26.41.



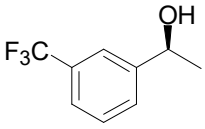
(S)-1-(4-nitrophenyl)ethan-1-ol (P12): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 99% yield, 14 mg, 88.5% ee, S isomer; $[a]_D^{25}$ = -32.3 (c = 1.00 in $CHCl_3$), (lit.4 $[a]_D^{25}$ = -22.2 (c = 0.8, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 8.20 (d, J = 3.0 Hz, 2H), 7.63 (d, J = 6 Hz, 2H), 5.52 (d, J = 3.0 Hz, 1H), 4.85 - 4.89 (m, 1H), 1.36 (d, J = 3.0 Hz, 3H). ^{13}C{H} (100 MHz, DMSO-d6) δ 155.78, 146.71, 126.93, 123.76, 67.89, 26.11.



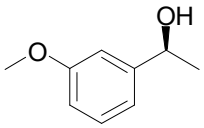
(S)-1-(3-bromophenyl)ethan-1-ol (P13)： Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 99% yield, 68 mg, 97.2% ee, S isomer; $[a]_D^{25}$ = -27.4 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 30.2 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.53(s, 1H), 7.41(d, *J* = 3.0 Hz, 1H), 7.34(d, *J* = 3.0 Hz, 1H), 7.27-7.29(m, 1H), 5.31(d, *J* = 3.0 Hz, 1H), 4.70-4.74(m, 1H), 1.32(d, *J* = 3.0 Hz, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 150.77, 130.72, 129.76, 128.52, 124.87, 121.95, 67.90, 26.26.



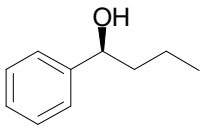
(S)-1-(3-chlorophenyl)ethan-1-ol (P14): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 97% yield, 52 mg, 97.3% ee, S isomer; $[a]_D^{25}$ = -35.2 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 37.2 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.40(s, 1H), 7.33-7.35 (m, 1H), 7.26-7.30(m, 2H), 5.30(d, *J* = 1.5 Hz, 1H), 4.71-4.75(m, 1H), 1.32(d, *J* = 6.0 Hz, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 150.52, 133.27, 130.37, 126.85, 125.63, 124.47, 67.95, 26.24.



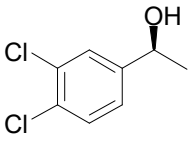
(S)-1-(3-(trifluoromethyl)phenyl)ethan-1-ol (P15): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 99% yield, 65 mg, 98.4% ee, S isomer; $[a]_D^{25}$ = -29.7 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 33.1 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.69(s, 1H), 7.65(d, *J* = 3.0 Hz, 1H), 7.54-7.59(m, 2H), 5.39(d, *J* = 3.0 Hz, 1H), 4.81-4.85(m, 1H), 1.35(d, *J* = 3.0 Hz, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 149.31, 129.98, 129.52, 125.77, 123.97, 123.70, 122.15, 67.91, 26.26.



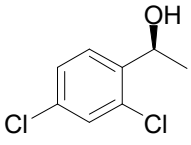
(S)-1-(3-methoxyphenyl)ethan-1-ol (P16): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 99% yield, 52 mg, 99.6% ee, S isomer; $[a]_D^{25}$ = -35.1 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 39.8 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.21-7.23(m, 1H), 6.91 (d, *J* = 6.0 Hz, 2H), 7.68(d, *J* = 6.0 Hz, 1H), 5.15(d, *J* = 3.0 Hz, 1H), 4.68-4.71(m, 1H), 3.75(s, 3H), 1.32(d, *J* = 3.0 Hz, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 159.62, 149.65, 129.47, 117.99, 112.33, 111.30, 68.48, 55.35, 26.42.



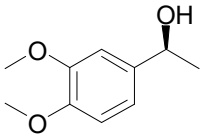
(S)-1-Phenyl-butan-1-ol (P17): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate =20:1), 99% yield, 51 mg, 97.6% ee, S isomer; $[a]_D^{25}$ = - 32.7 (c = 1.00 in $CHCl_3$) (lit.2 $[a]_D^{25}$ = - 39.8 (c = 1.0, $CHCl_3$)); ^{1}NMR (400 MHz, DMSO-d_6) δ 7.31(d, *J* = 2.0 Hz, 4H), 7.18-7.24(m, 1H), 5.12(d, *J* = 2.0 Hz, 1H), 4.48-4.53(m, 1H), 1.47-1.52(m, 2H), 1.20-1.37(m, 2H), 0.84-0.87(m, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 146.90, 128.37, 127.00, 126.23, 72.50, 42.03, 19.00, 14.36.



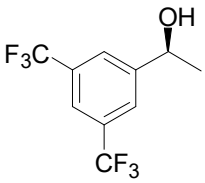
(S)-1-(3,4-dichlorophenyl)ethan-1-ol (P18): Light yellow oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 99% yield, 65 mg, 94.7% ee, S isomer; $[a]_D^{25}$ = -35.4 (c = 1.00 in $CHCl_3$), (lit.5 $[a]_D^{25}$ = -38.19 (c = 1.04, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.55-7.57 (m, 2H), 7.33 (d, *J* = 6.0 Hz, 1H), 5.39 (d, *J* = 3.0 Hz, 1H), 4.75-4.71 (m, 1H), 1.32 (d, *J* = 3.0 Hz, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 149.12, 131.15, 130.70, 129.30, 127.81, 126.19, 67.40, 26.07.



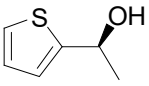
(S)-1-(2,4-dichlorophenyl)ethan-1-ol (P19): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate =20:1), 99% yield, 65 mg, 97.4% ee, S isomer; $[a]_D^{25}$ = -46.7 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 55.7 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.62(d, *J* = 6.0 Hz, 1H), 7.52(d, *J* = 3.0 Hz, 1H), 7.43-7.45(m, 1H), 5.47(d, *J* = 3.0 Hz, 1H), 4.97-5.01(m, 1H), 1.30(d, *J* = 3.0 Hz, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 144.17, 132.20, 131.55, 128.84, 128.70, 127.98, 65.15, 24.56.



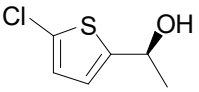
(S)-1-(3,4-dimethoxyphenyl)ethan-1-ol (P20): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate =2:1), 87% yield, 54 mg, 97.6% ee, S isomer; $[a]_D^{25}$ = -41.2 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 44.3 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 6.95(s, 1H), 6.83-6.88(m, 2H), 5.05(d, *J* = 3.0 Hz, 1H), 4.64-4.68(m, 1H), 3.74(d, *J* = 6.0 Hz, 3H), 1.31(d, *J* = 3.0 Hz, 1H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 148.97, 147.94, 140.53, 117.65, 111.98, 109.78, 68.34, 56.03, 26.45.



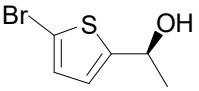
(S)-1-(3,5-Bis-trifluoromethyl-phenyl)-ethanol (P21): White solid, mp: 54-55℃, purified by silica gel chromatography (petroleum ether/ethylacetate =10:1), 99% yield, 88 mg, 98.2% ee, S isomer; $[a]_D^{25}$ = -22.1 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 20.4 (c =1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 8.04(s, 2H), 7.95(s, 2H), 5.62(d, *J* = 3.0 Hz, 1H), 4.93-4.97(m, 1H), 1.39(d, *J* = 3.0 Hz, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 130.59, 130.37, 130.16, 126.55, 124.84, 123.03, 120.70, 67.44, 26.04.



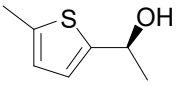
(S)-1-(Thiophen-2-yl)-ethan-1-ol (P22): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate =20:1), 99% yield, 43 mg, 99.6% ee, S isomer; $[a]_D^{25}$ = - 30.7 (c = 1.00 in $CHCl_3$), (lit.6 $[a]_D^{25}$ = - 29.6 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 7.35(d, *J* = 2.0 Hz, 1H), 6.91-6.95(m, 2H), 5.50(d, *J* = 2.0 Hz, 1H), 4.91-4.97(m, 1H), 1.41(d, *J* = 4.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 152.40, 126.94, 124.25, 122.75, 64.86, 26.40.



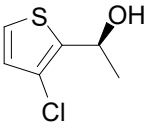
(S)-1-(5-Chlorothiophen-2-yl)-ethan-1-ol (P23): Light yellow oil, purified by silica gel chromatography (petroleum ether/ethylacetate =20:1), 99% yield, 55 mg, 97.0% ee, S isomer; $[a]_D^{25}$ = -66.8 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = -70.4 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 6.93(d, *J* = 2.0 Hz, 1H), 6.77(d, *J* = 2.0 Hz, 1H), 5.68 (d, *J* = 2.0 Hz, 1H), 4.83-4.89(m, 1H), 1.38(d, *J* = 4.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 152.01, 126.68, 126.30, 122.30, 65.02, 25.91.



(S)-1-(5-Bromothiophen-2-yl)-ethan-1-ol (P24): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate =10:1), 99% yield, 70 mg, 97.2% ee, S isomer; $[a]_D^{25}$ = -66.1 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = -64.8 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 7.03(d, *J* = 2.0 Hz, 1H), 6.75(d, *J* = 2.0 Hz, 1H), 5.67(d, *J* = 4.0 Hz, 1H), 4.85-4.90(m, 1H), 1.38(d, *J* = 4.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 154.70, 130.21, 123.37, 109.37, 65.06, 25.96.

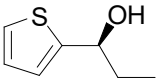


(S)-1-(5-Methyl-thiophen-2-yl)-ethan-1-ol (P25)： Light yellow oil, purified by silica gel chromatography (petroleum ether/ethylacetate =10:1), 81% yield, 39 mg, 99.4% ee, S isomer; $[a]_D^{25}$ = - 28.8 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = -31.9 (c = 1.0, $CHCl_3$)); ^{1}NMR (400 MHz, DMSO-d_6) δ 6.68(d, *J* = 2.0 Hz, 2H), 6.60(d, *J* = 2.0 Hz, 1H), 5.37(d, *J* = 2.0 Hz, 1H), 4.82-4.85(m, 1H), 2.38(s, 1H), 1.37(d, *J* = 4.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 149.83, 137.50, 124.91, 122.52, 64.89, 26.22, 15.46.

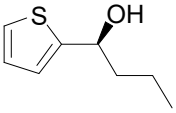


(S)-1-(3-Chlorothiophen-2-yl)-ethan-1-ol (P26): Light yellow oil, purified by silica gel chromatography (petroleum ether/ethylacetate =20:1), 99% yield, 55 mg, 99.7% ee, S isomer; $[a]_D^{25}$ = - 38.7 (c = 1.00 in CHCl3), (lit.2 $[a]_D^{25}$ = -42.9 (c = 1.0, CHCl3)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 7.51(d, *J* = 4.0 Hz, 1H), 6.97(d, *J* = 2.0 Hz, 1H), 5.76(d, *J* = 2.0 Hz, 1H),

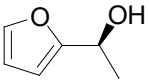
4.98-5.04(m, 1H), 1.37(d, *J* = 2.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 145.03, 127.69, 124.59, 118.56, 63.49, 25.30.



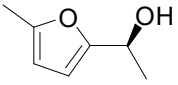
(S)-1-(Thiophen-2-yl)-propan-1-ol (P27): Light yellow oil, purified by silica gel chromatography (petroleum ether/ethylacetate =10:1), 90% yield, 44 mg, 99.0% ee, S isomer; $[a]_D^{25}$ = - 18.4 (c = 1.00 in $CHCl_3$), (lit.7 $[a]_D^{20}$ = - 22.1 (c = 0.9, $CHCl_3$)); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.24(d, *J* = 2.0 Hz, 1H), 6.94-6.96(m, 2H), 4.81-4.84(m, 1H), 2.13(s, 1H), 1.83-1.90(m, 2H), 0.94-0.97(m, 3H). ^{13}C{H} NMR (100 MHz, $CDCl_3$) δ 146.83, 124.76, 122.65, 121.96, 69.92, 30.41, 8.34.



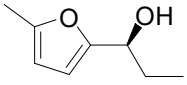
(S)-1-(Thiophen-2-yl)-butan-1-ol (P28): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate =10:1), 94% yield, 50 mg, 97.5% ee, S isomer; $[a]_D^{25}$ = -21.6 (c = 1.00 in $CHCl_3$), (lit.8 $[a]_D^{25}$ = - 21.1 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 7.36(d, *J* = 2.0 Hz, 1H), 6.91-6.95(m, 2H), 5.46(d, *J* = 2.0 Hz, 1H), 4.75(s, 1H), 1.62-1.69(m, 2H), 1.29-1.39(m, 2H), 0.86-0.89(m, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 151.51, 126.85, 124.28, 123.14, 68.55, 42.16, 18.96, 14.26.



(S)-1-(Furan-2-yl)-ethan-1-ol (P29): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate =20:1), 99% yield, 38 mg, 99.6% ee, S isomer; $[a]_D^{25}$ = - 40.4 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 43.3 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, $CDCl_3$); δ 7.37(d, *J* = 2.0 Hz, 1H), 6.33(d, *J* = 2.0 Hz, 1H), 6.22(d, *J* = 2.0 Hz, 1H), 4.85-4.90(m, 1H), 2.08(s, 1H), 1.54(d, *J* = 4.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, $CDCl_3$) δ 157.63, 141.91, 110.13, 105.11, 63.62, 21.27.

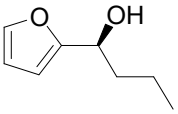


(S)-1-(5-methylfuran-2-yl)ethan-1-ol (P30): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate =20:1), 92% yield, 10 mg, 98.8% ee, S isomer; $[a]_D^{25}$ = -18.7 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 24.9 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 6.06(s, 1H), 5.95(s, 1H), 5.12(s, 1H), 4.60(s, 1H), 2.23(d, J = 2.0 Hz, 3H), 1.32-1.35(m, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 157.66, 150.41, 106.43, 105.66, 62.16, 22.43, 13.75.

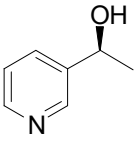


(S)-1-(5-methylfuran-2-yl)propan-1-ol (P31): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate =20:1), 99% yield, 12 mg, 98.8% ee, S isomer; $[a]_D^{25}$ = -42.5 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 43.8 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600

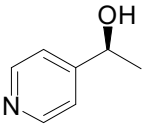
MHz, DMSO-d_6) δ 6.06(d, *J* = 1.5 Hz, 1H), 5.95(d, *J* = 1.5 Hz, 2H), 5.09(d, *J* = 3.0 Hz, 1H), 4.31-4.34(m, 1H), 2.22(s, 3H), 1.63-1.70(m, 2H), 0.82-0.85(m, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 156.76, 150.39, 160.40, 106.35, 67.82, 29.01, 13.75, 10.54.



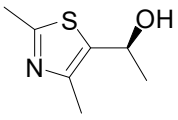
(S)-1-(furan-2-yl)butan-1-ol (P32): Light yellow oil, purified by silica gel chromatography (petroleum ether/ethylacetate =20:1), 98% yield, 12 mg, 99.9% ee, S isomer; $[a]_D^{25}$ = -19.3 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 24.0 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36(s, 1H), 6.32(d, *J* = 2.0 Hz, 1H), 6.22(d, *J* = 2.0 Hz, 1H), 4.65-4.69(m, 1H), 2.03(s, 1H). 1.80-1.85(m, 1H), 1.33-1.41(m, 2H), 0.92-0.96(m, 3H). ^{13}C{H} NMR (100 MHz, $CDCl_3$) δ 156.95, 141.84, 110.09, 105.74, 67.52, 37.63, 18.77, 13.84.



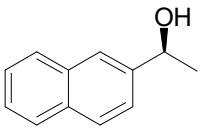
(S)-1-(Pyridin-3-yl)-ethan-1-ol (P33): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate =2:1), 99% yield, 42 mg, 97.6% ee, S isomer; $[a]_D^{25}$ = -44.1 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 49.2 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.49(d, *J* = 2.0 Hz, 1H), 8.40(d, *J* = 2.0 Hz, 1H), 7.75(d, *J* = 4.0 Hz, 1H), 7.26-7.28(m, 1H), 4.90-4.95(m, 1H), 3.90(s, 1H), 1.51(d, *J* = 2.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, $CDCl_3$) δ 147.75, 146.70, 141.48, 133.43, 123.37, 67.38, 24.95.



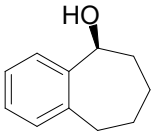
(S)-1-(Pyridin-4-yl)-ethan-1-ol (P34): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate =2:1), 99% yield, 42 mg, 97.2% ee, S isomer; $[a]_D^{25}$ = -40.8 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 44.3 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.46(d, *J* = 4.0 Hz, 2H), 7.32(d, *J* = 4.0 Hz, 2H), 4.87-4.92(m, 1H), 3.73(s, 1H), 1.49(d, *J* = 2.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, $CDCl_3$) δ155.16, 148.35, 119.96, 67.78, 24.34.



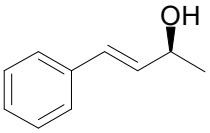
(S)-1-(2,4-dimethylthiazol-5-yl)ethan-1-ol (P35): White solid, mp: 88-89 ℃, purified by silica gel chromatography (petroleum ether/ethylacetate =1:1), 99% yield, 53 mg, 99.2% ee, S isomer; $[a]_D^{25}$ = -41.7 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 44.2 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 5.53(d, *J* = 1.5 Hz, 1H), 4.99-5.03(m, 1H), 2.59(s, 3H), 2.27(s, 3H), 1.38(d, *J* = 3.0 Hz, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 161.90, 145.40, 138.52, 62.40, 26.36, 19.17, 15.29.



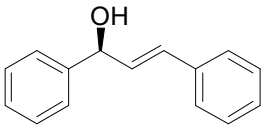
(S)-1-(naphthalen-2-yl)ethan-1-ol (P36): White solid, Mp: 71-72℃, purified by silica gel chromatography (petroleum ether/ethylacetate =10:1), 99% yield, 58 mg, 97.4% ee, S isomer; $[a]_D^{25}$ = -44.2 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 40.2 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.88-7.92(m, 4H), 7.50-7.57(m, 3H), 5.35(d, *J* = 3.0 Hz,1H), 4.94(s, 1H), 1.45-1.46(m, 3H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 145.43, 133.37, 132.62, 128.17, 128.00, 127.94, 126.41, 125.86, 124.86, 123.68, 68.66, 26.32.



(S)-6,7,8,9-tetrahydro-5H-benzo[7]annulen-5-ol (P37): White solid, mp: 66-68 ℃, purified by silica gel chromatography (petroleum ether/ethylacetate = 1:1), 60 % yield, 17 mg, 99.6% ee, S isomer; $[a]_D^{25}$ = -23.4 (c = 1.00 in $CHCl_3$), (lit.2 $[a]_D^{25}$ = - 27.0 (c = 1.0, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.44(d, *J* = 3.0 Hz, 1H), 7.13-7.16(m, 1H), 7.05-7.09(m, 2H), 5.17(s, 1H), 4.73(d, *J* = 6.0 Hz, 1H), 2.80-2.83(m, 1H), 2.65-2.69(m, 1H), 1.87-1.95(m, 2H), 1.70-1.75(m, 2H), 1.49-1.52(m, 1H), 1.25-1.27(m, 1H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 146.18, 140.58, 129.27, 126.58, 126.06, 125.01, 71.99, 37.74, 35.46, 28.29, 27.89.

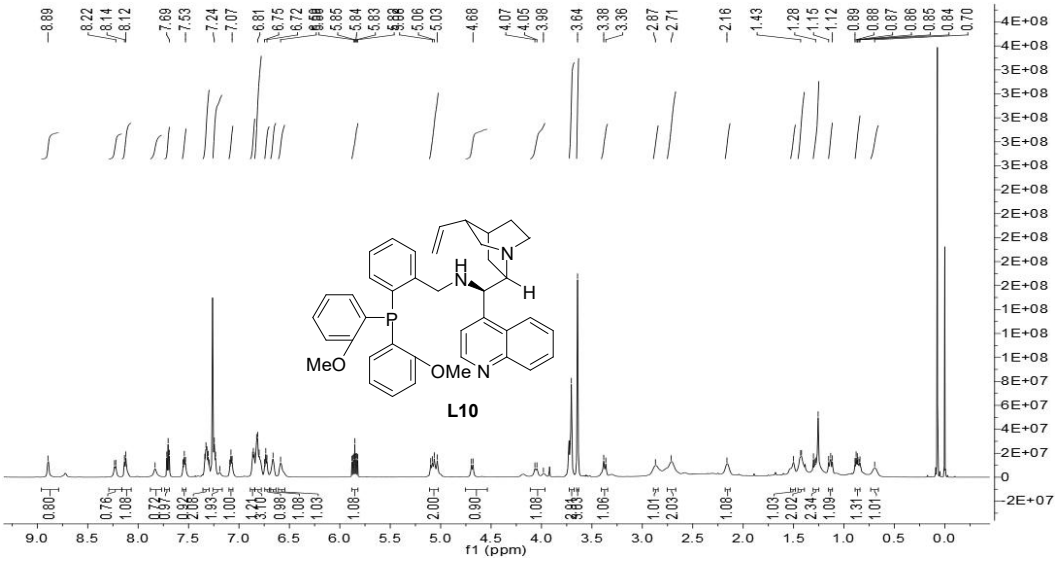


(S)-4-phenylbut-3-en-2-ol (P38): Light yellow oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 88.6% yield, 45 mg, 73.8% ee, S isomer; $[a]_D^{25}$ = -22.0 (c = 1.00 in $CHCl_3$), (lit.9 $[a]_D^{25}$ = -12.1 (c = 1.0, $CHCl_3$)); ^{1}H NMR (400 MHz, DMSO-d_6) δ 7.41 (d, *J* = 4.0 Hz, 2H), 7.30 - 7.34 (m, 2H), 7.20 - 7.24 (m, 1H), 6.51 (d, *J* = 8.0 Hz, 1H), 6.29 - 6.34 (m, 1H), 4.92 (d, *J* = 2.0 Hz, 1H), 4.29 - 4.33 (m, 1H), 1.22 (d, *J* = 4.0 Hz, 3H). ^{13}C{H} NMR (100 MHz, DMSO-d_6) δ 137.41, 136.02, 129.11, 127.69, 127.65, 126.66, 67.15, 24.34.

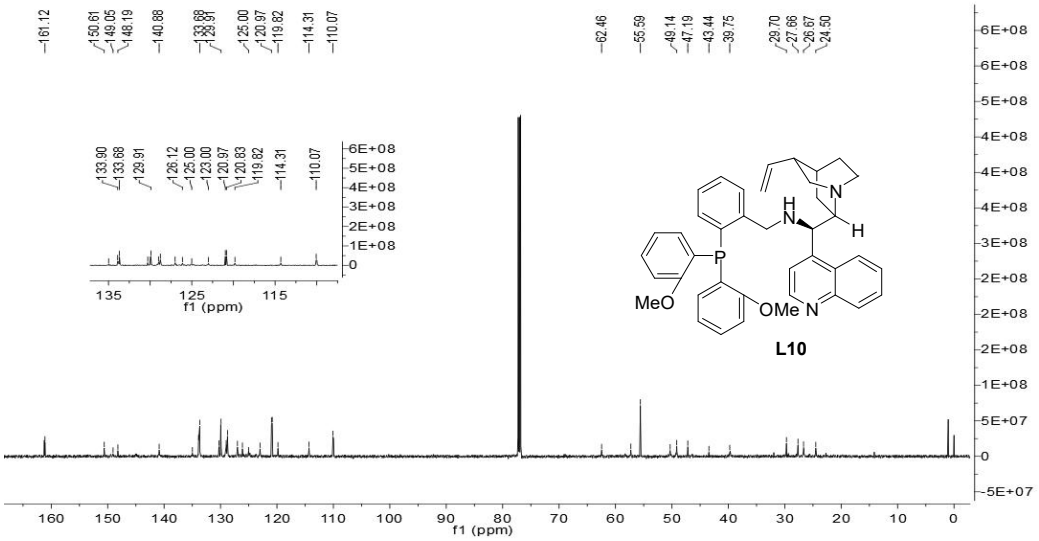


(S)-1,3-diphenylprop-2-en-1-ol (P39): Colorless oil, purified by silica gel chromatography (petroleum ether/ethylacetate = 10:1), 99% yield, 72 mg, 78.3% ee, S isomer; $[a]_D^{25}$ = -12.5 (c = 1.00 in $CHCl_3$), (lit.10 $[a]_D^{25}$ = -8.3 (c = 0.58, $CHCl_3$)); ^{1}H NMR (600 MHz, DMSO-d_6) δ 7.40 - 7.43 (m, 4H), 7.29 - 7.35 (m, 4H), 7.21 - 7.25 (m, 2H), 6.64 (d, *J* = 9.0 Hz, 1H), 6.38 - 6.41 (m, 1H), 5.63 (d, *J* = 3.0 Hz, 1H), 5.24 - 5.26 (m, 1H). ^{13}C{H} NMR (150 MHz, DMSO-d_6) δ 144.90, 137.11, 134.16, 129.07, 128.62, 128.58, 127.86, 127.34, 126.75, 126.67, 73.63.

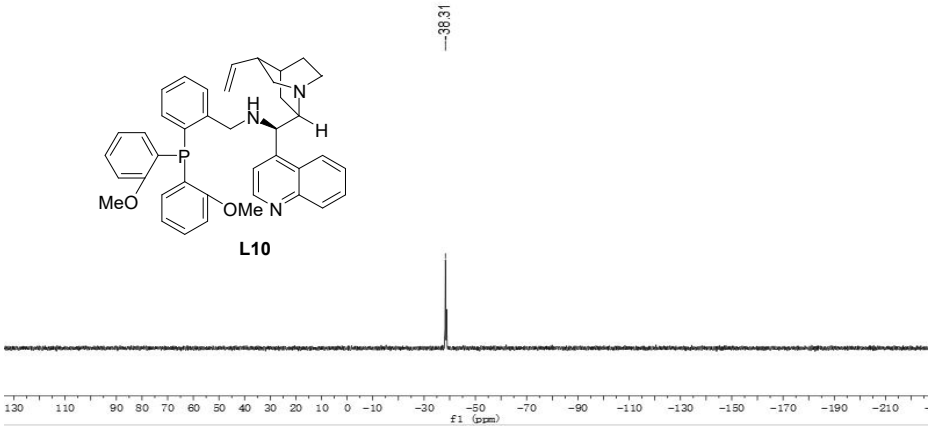
6. NMR spectra



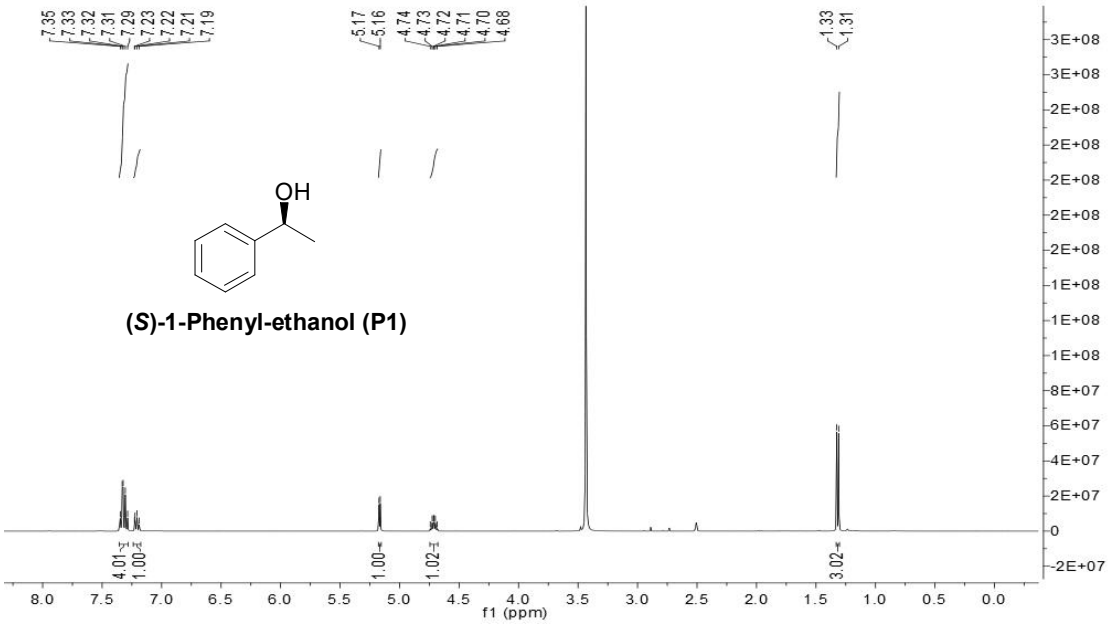
^{1}H NMR ($CDCl_3$, 600 MHz) of **L10**



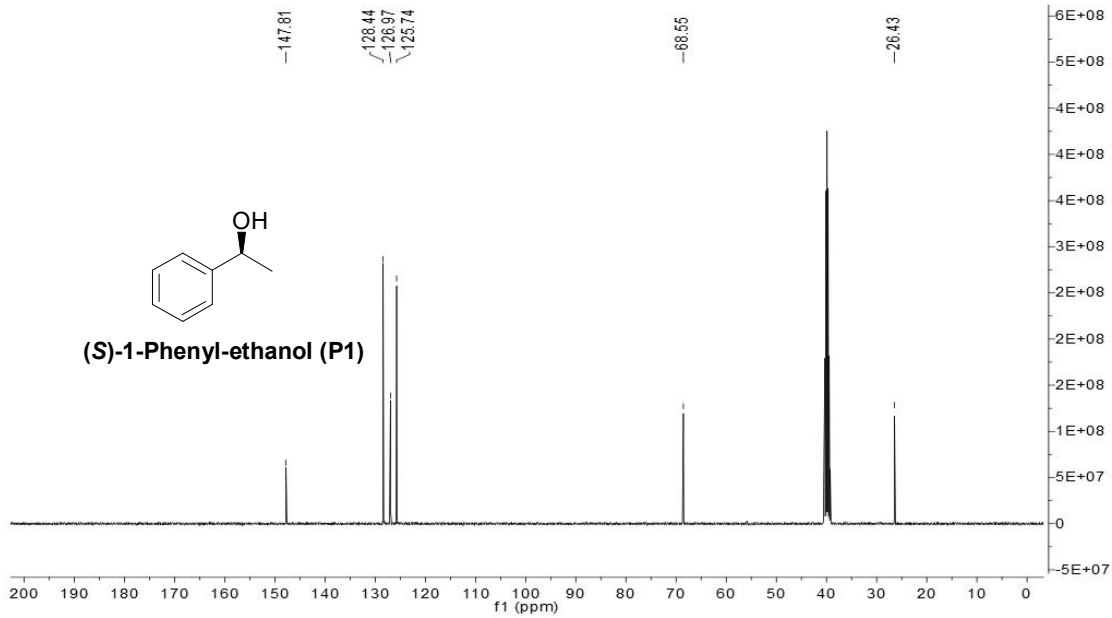
^{13}C{H} NMR ($CDCl_3$, 150 MHz) of **L10**



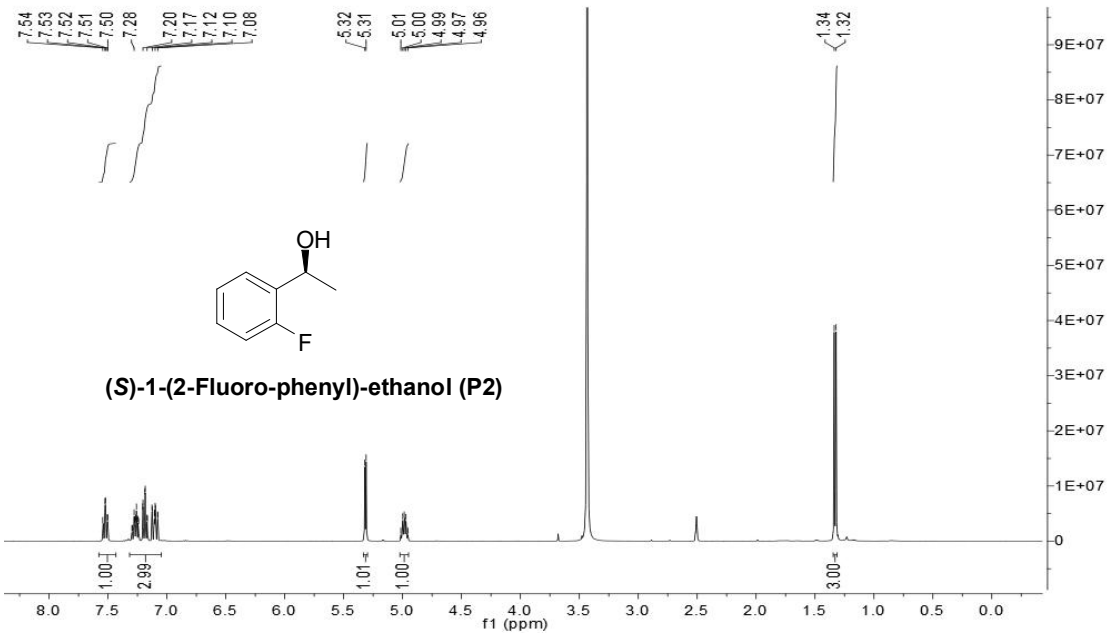
^{31}P{H} NMR ($CDCl_3$, 303 MHz) of **L10**



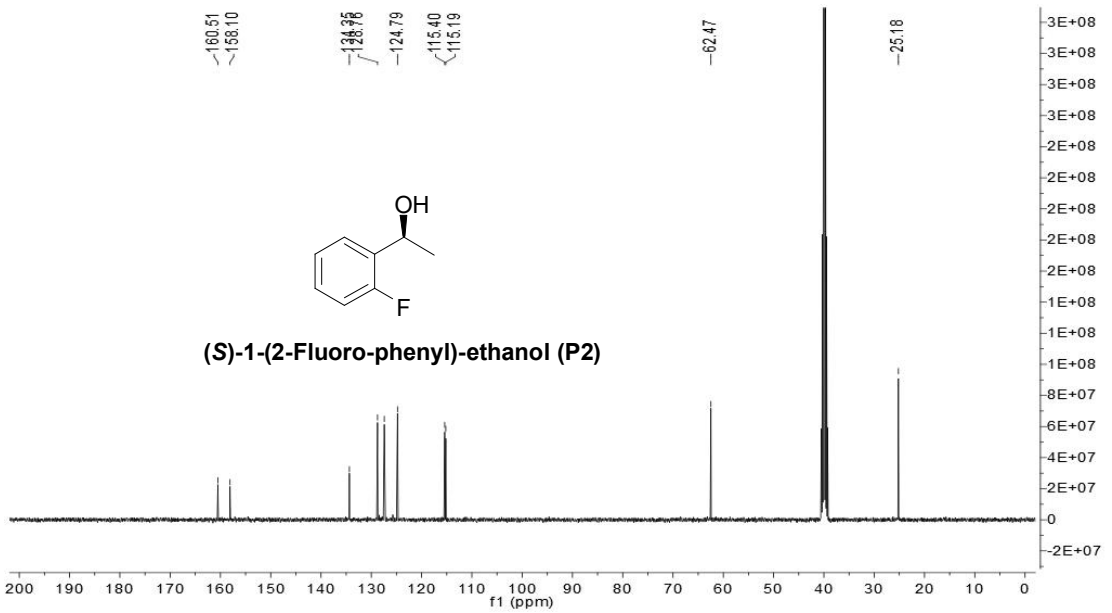
^{1}H NMR (DMSO-d_6, 400 MHz) of (*S*)-1-Phenyl-ethanol (**P1**)



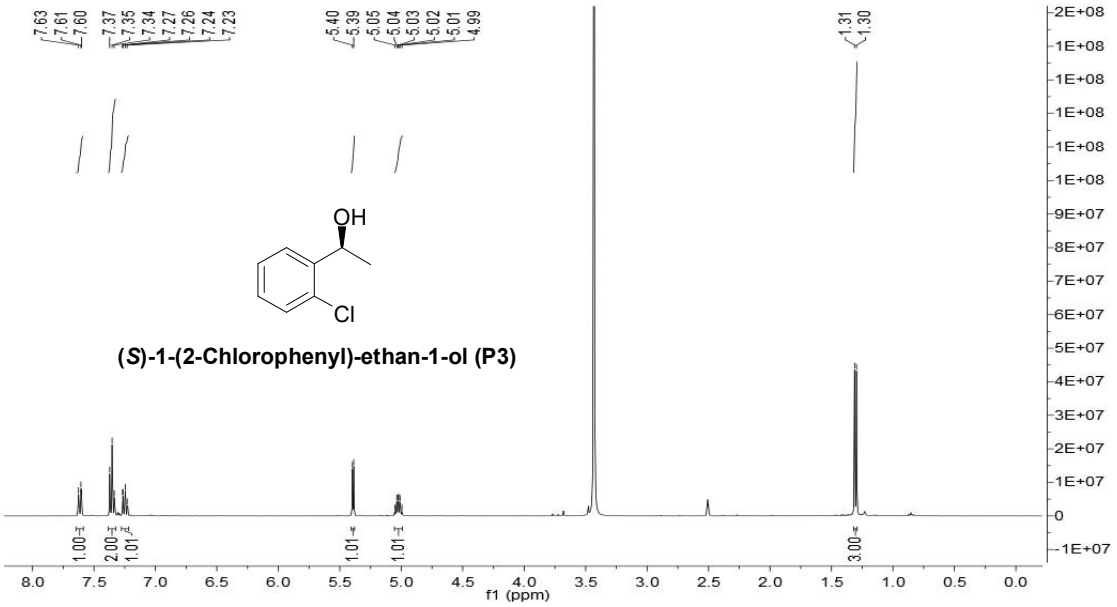
^{13}C{H} NMR (DMSO-d_6, 100 MHz) of (*S*)-1-Phenyl-ethanol (**P1**)



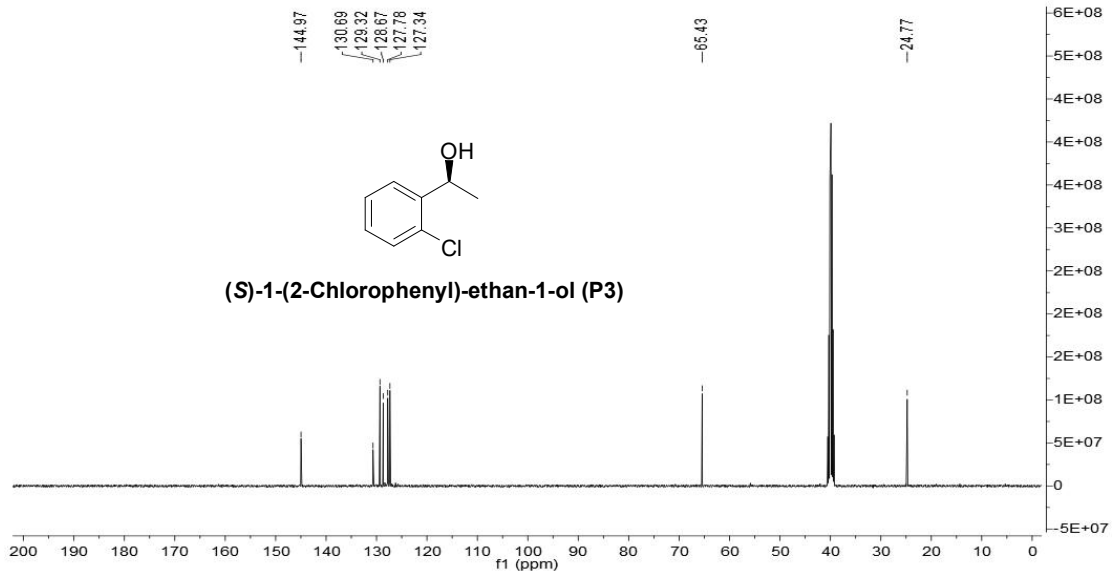
^{1}H NMR (DMSO-d_6, 400 MHz) of (S)-1-(2-Fluoro-phenyl)-ethanol (**P2**)



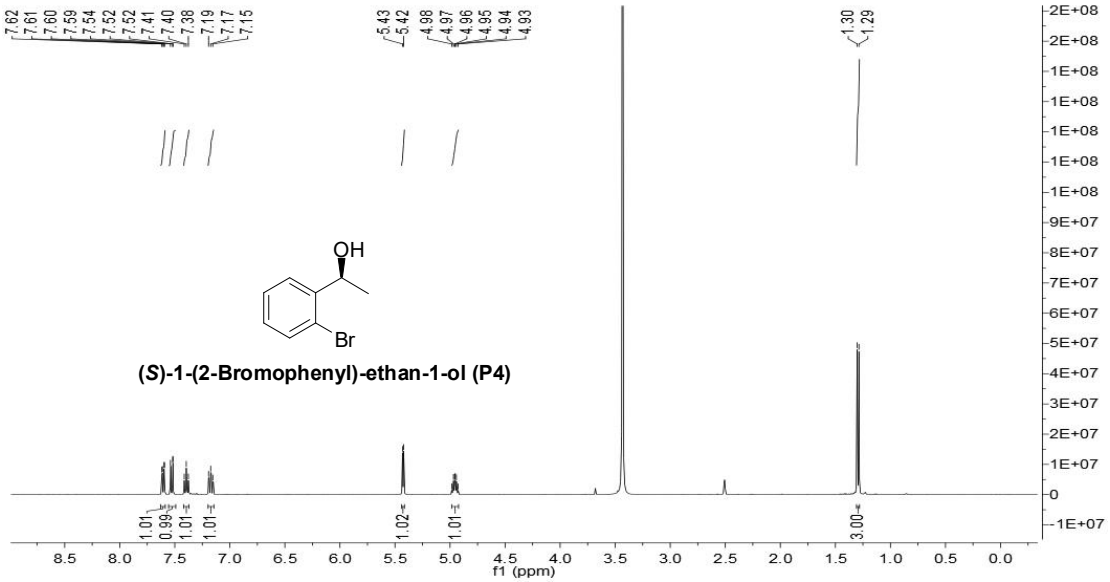
^{13}C{H} NMR (DMSO-d_6, 100 MHz) of (S)-1-(2-Fluoro-phenyl)-ethanol (**P2**)



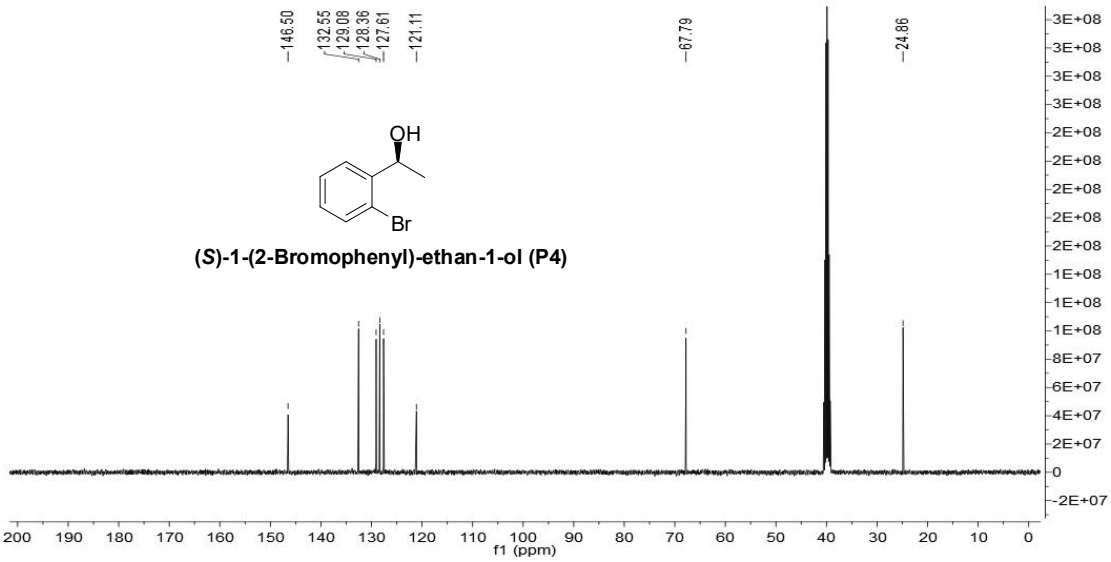
^{1}H NMR (DMSO-d_6, 400 MHz) of (S)-1-(2-Chlorophenyl)-ethan-1-ol **(P3)**



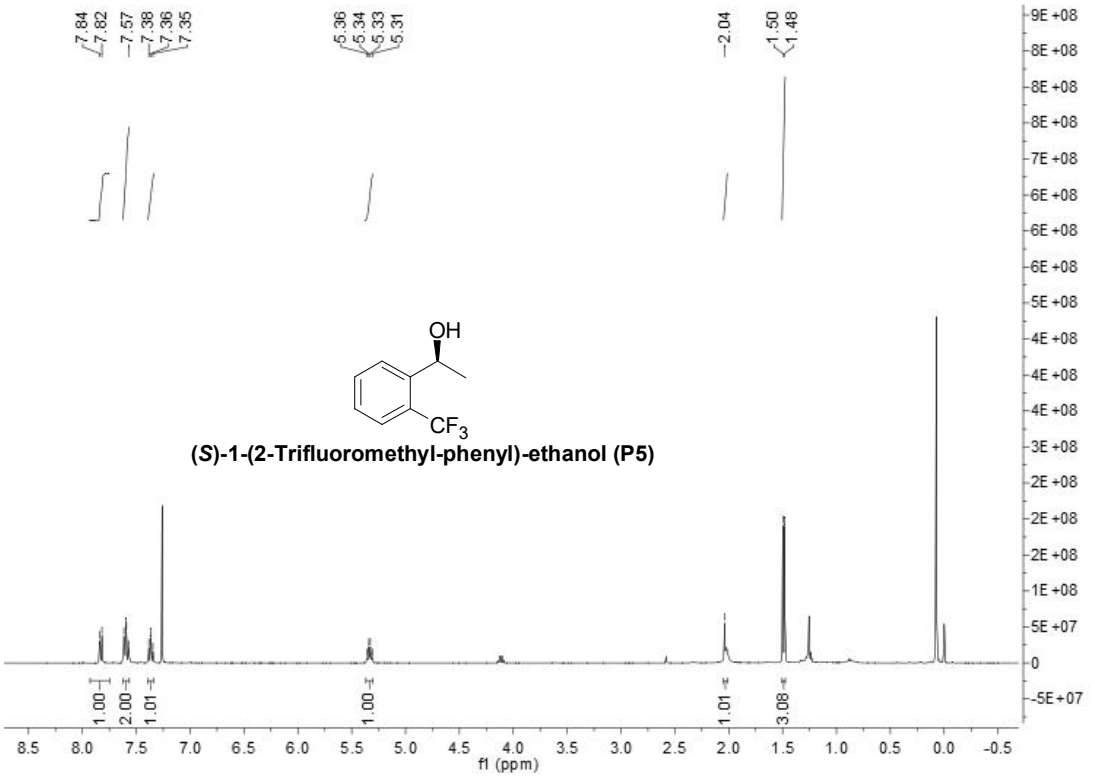
^{13}C{H} NMR (DMSO-d_6, 100 MHz) of (S)-1-(2-Chlorophenyl)-ethan-1-ol **(P3)**



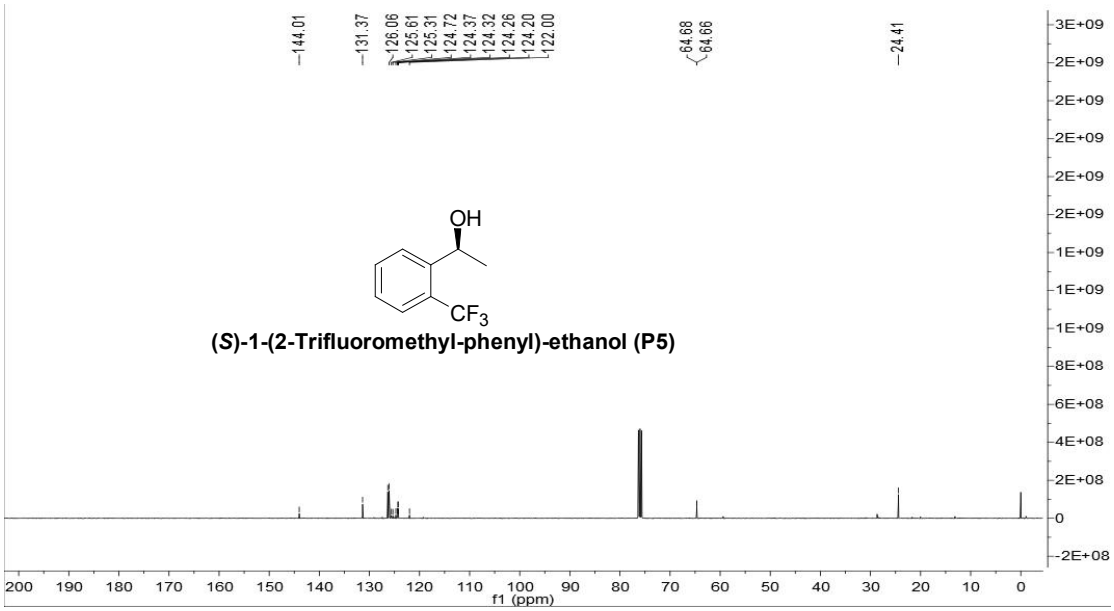
^{1}H NMR (DMSO-d_6, 400 MHz) of (*S*)-1-(2-Bromophenyl)-ethan-1-ol (**P4**)



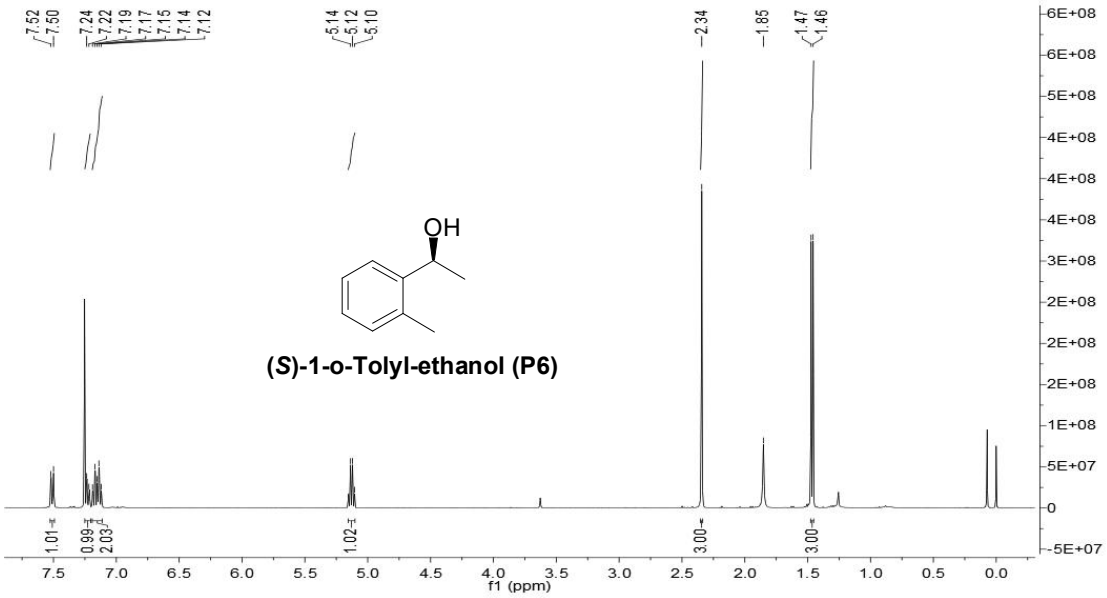
^{13}C{H} NMR (DMSO-d_6, 100 MHz) of (*S*)-1-(2-Bromophenyl)-ethan-1-ol (**P4**)



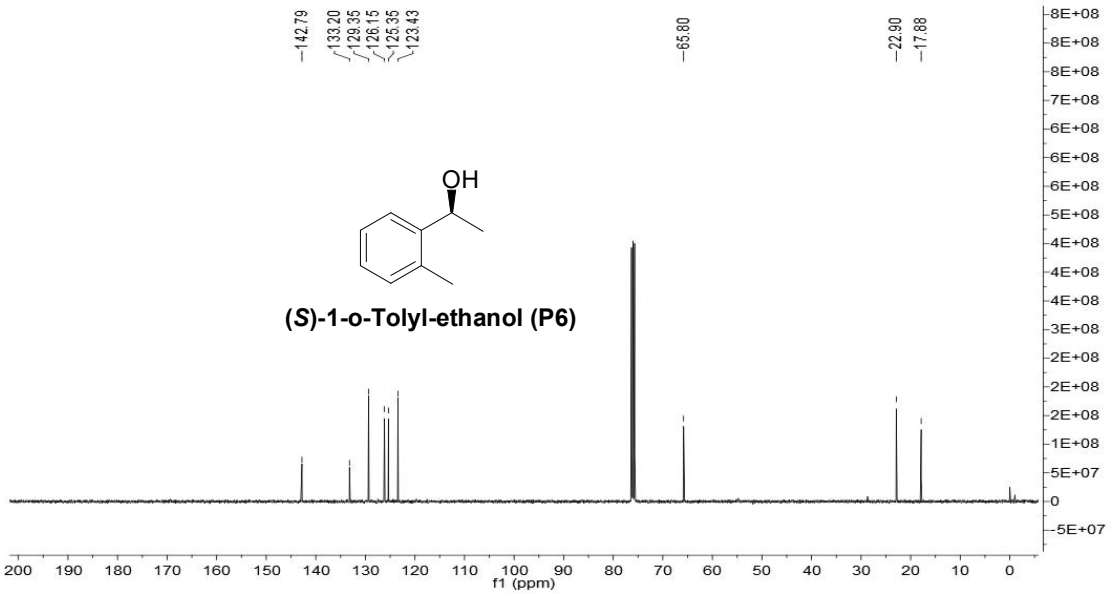
^{1}H NMR ($CDCl_3$, 400 MHz) of (S)-1-(2-Trifluoromethyl-phenyl)-ethanol **(P5)**



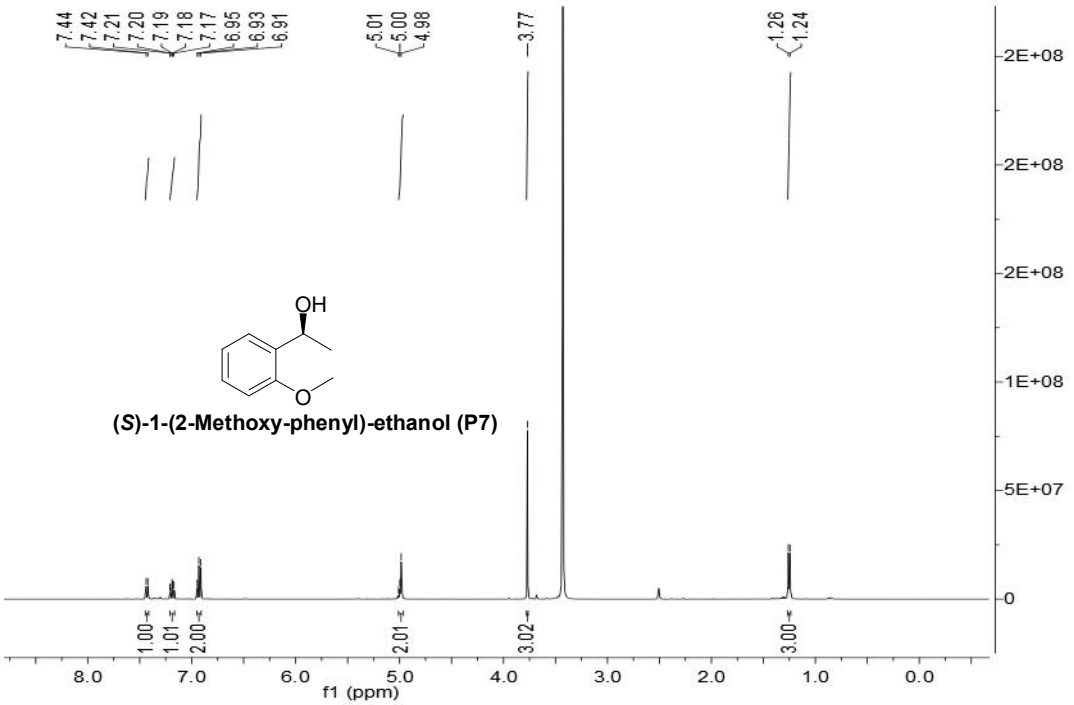
^{13}C{H} NMR ($CDCl_3$, 100 MHz) of (S)-1-(2-Trifluoromethyl-phenyl)-ethanol **(P5)**



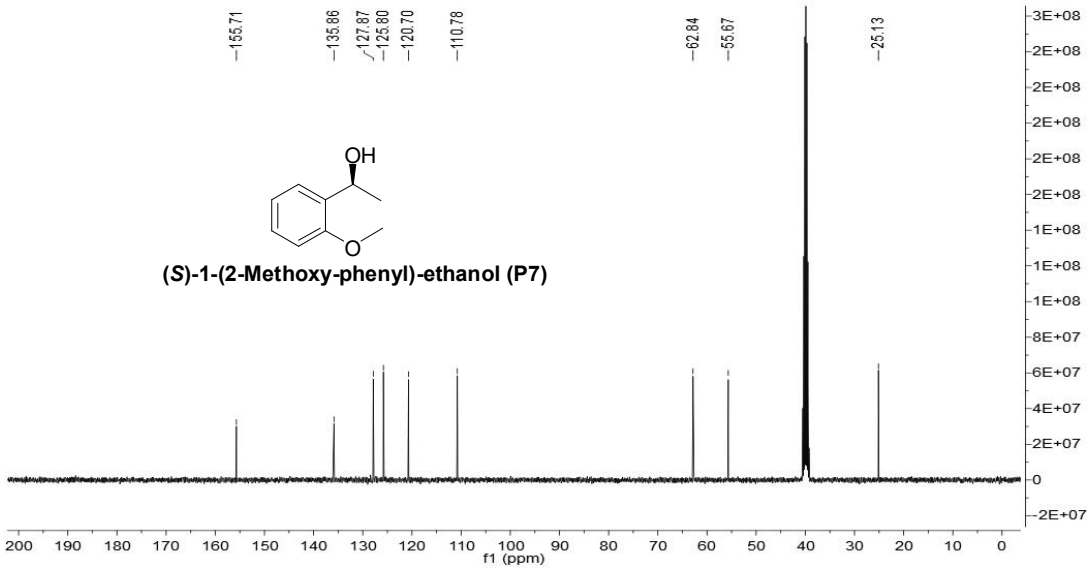
^{1}H NMR ($CDCl_3$, 400 MHz) of (S)-1-o-Tolyl-ethanol **(P6)**



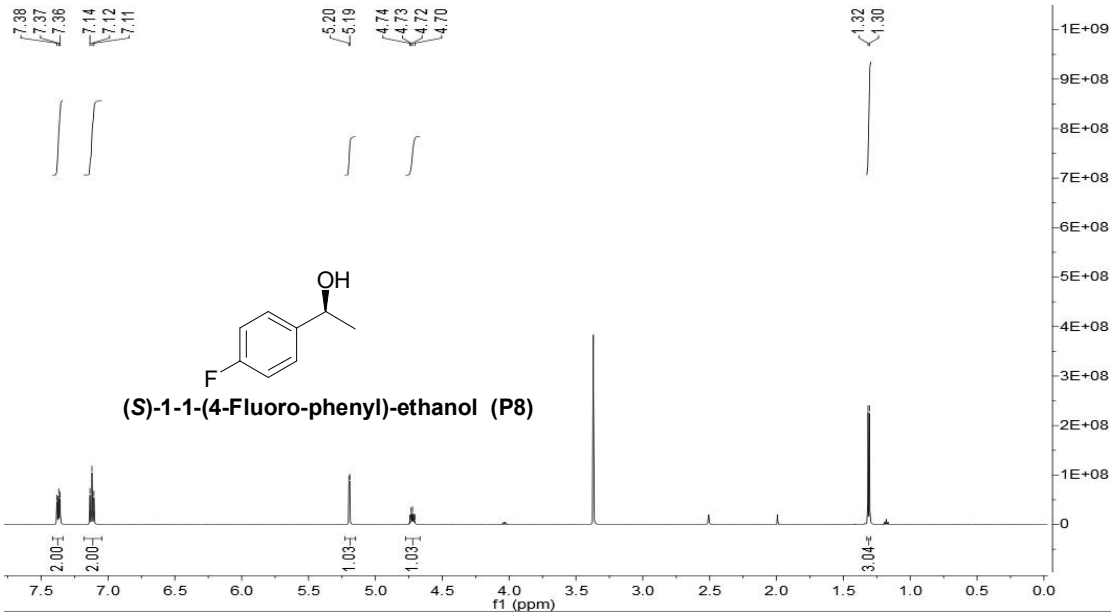
^{13}C{H} NMR ($CDCl_3$, 100 MHz) of (S)-1-o-Tolyl-ethanol **(P6)**



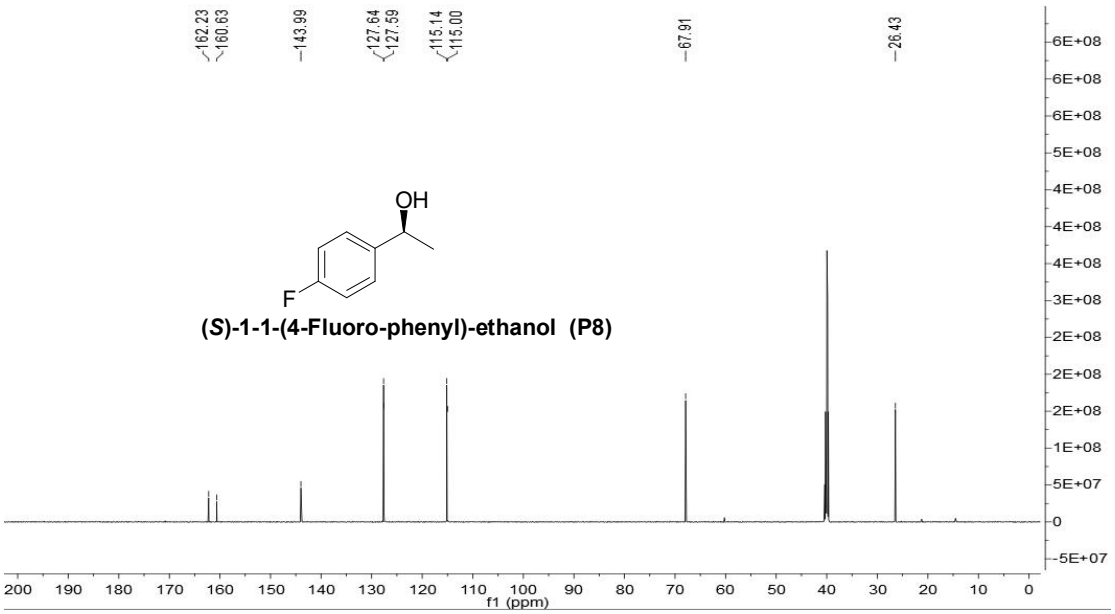
^{1}H NMR (DMSO-d_6, 400 MHz) of (S)-1-(2-Methoxy-phenyl)-ethanol (**P7**)



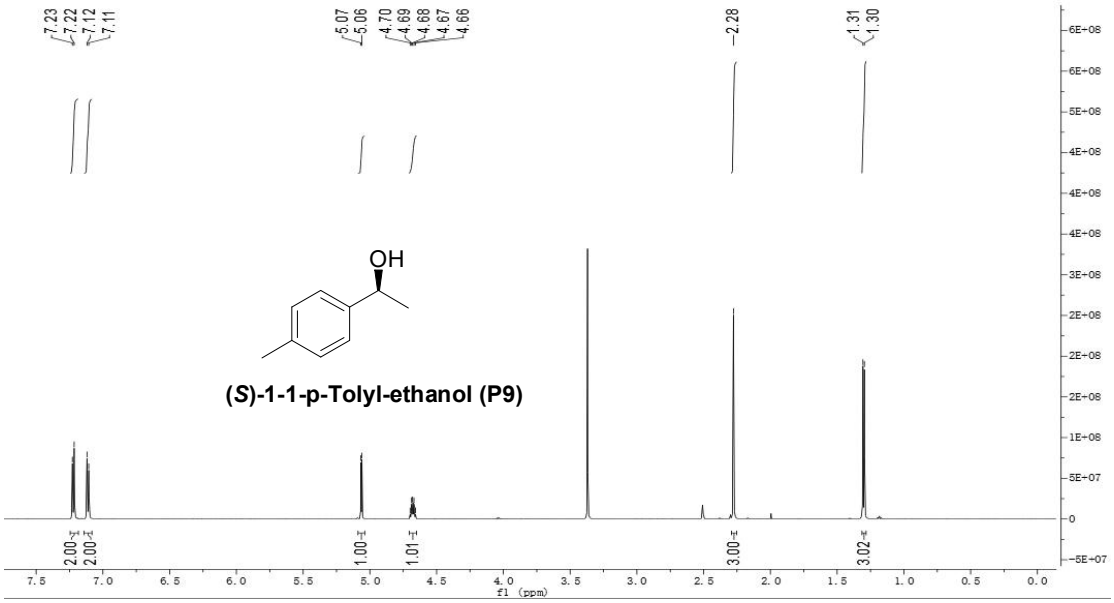
^{13}C{H} NMR (DMSO-d_6, 100 MHz) of (S)-1-(2-Methoxy-phenyl)-ethanol (**P7**)



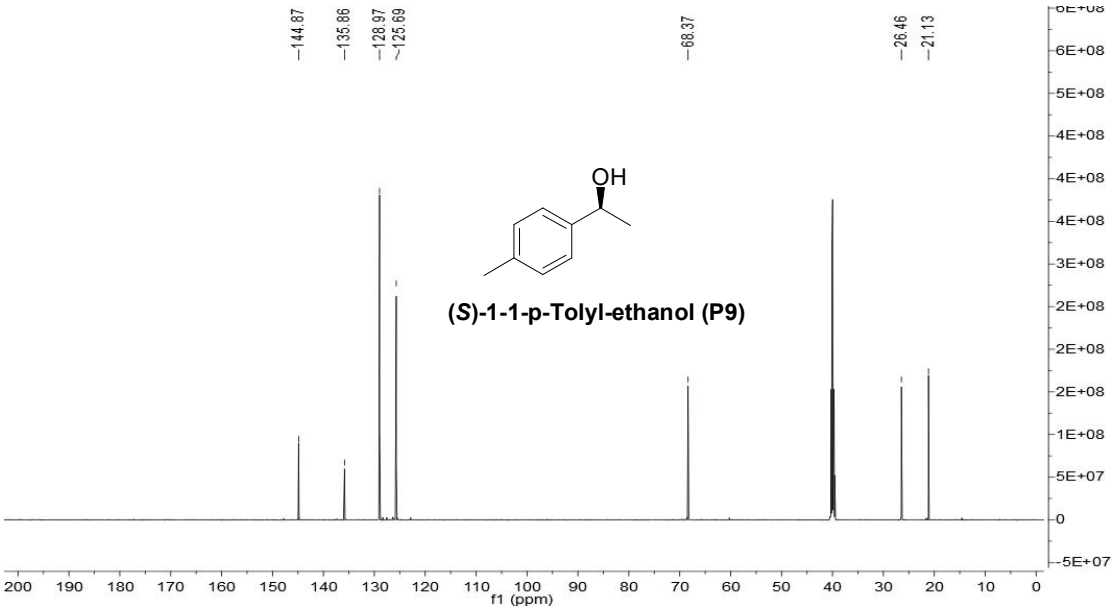
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(4-Fluoro-phenyl)-ethanol (**P8**)



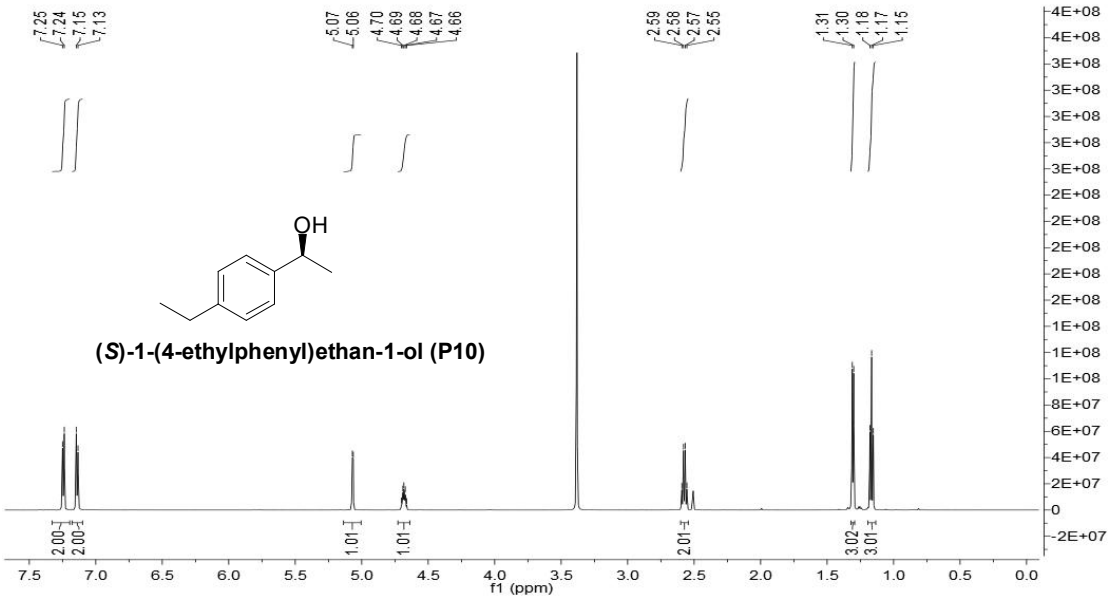
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(4-Fluoro-phenyl)-ethanol (**P8**)



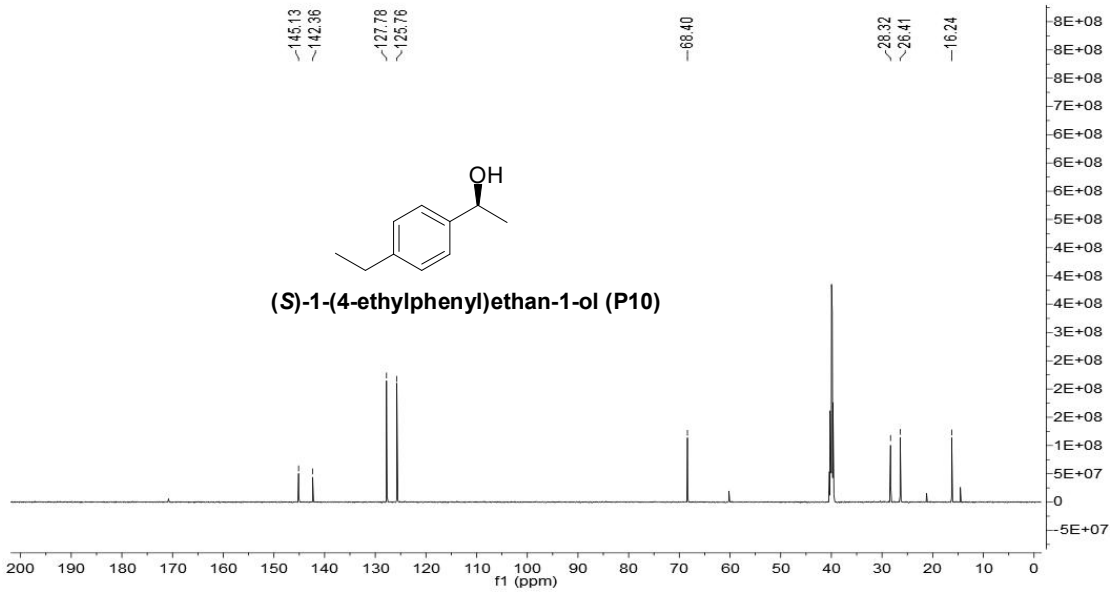
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-1-p-Tolyl-ethanol (**P9**)



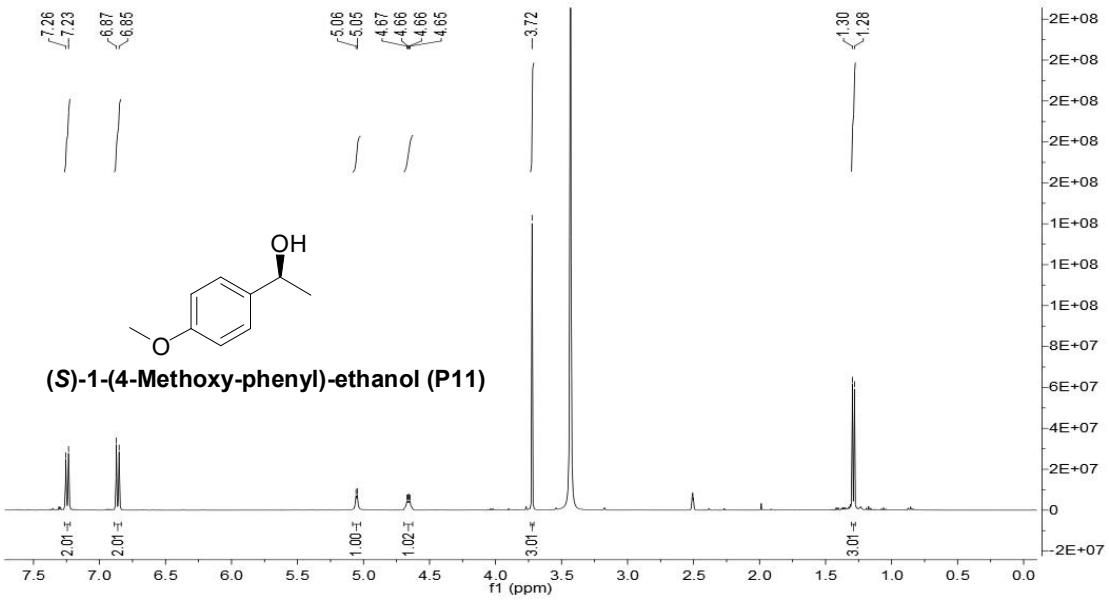
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-1-p-Tolyl-ethanol (**P9**)



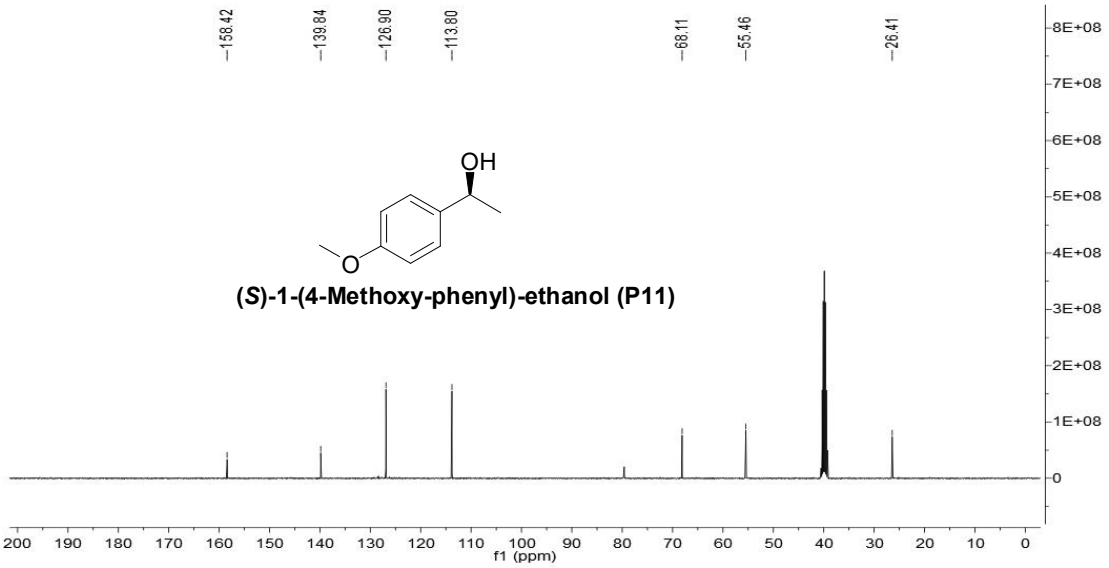
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(4-ethylphenyl)ethan-1-ol (**P10**)



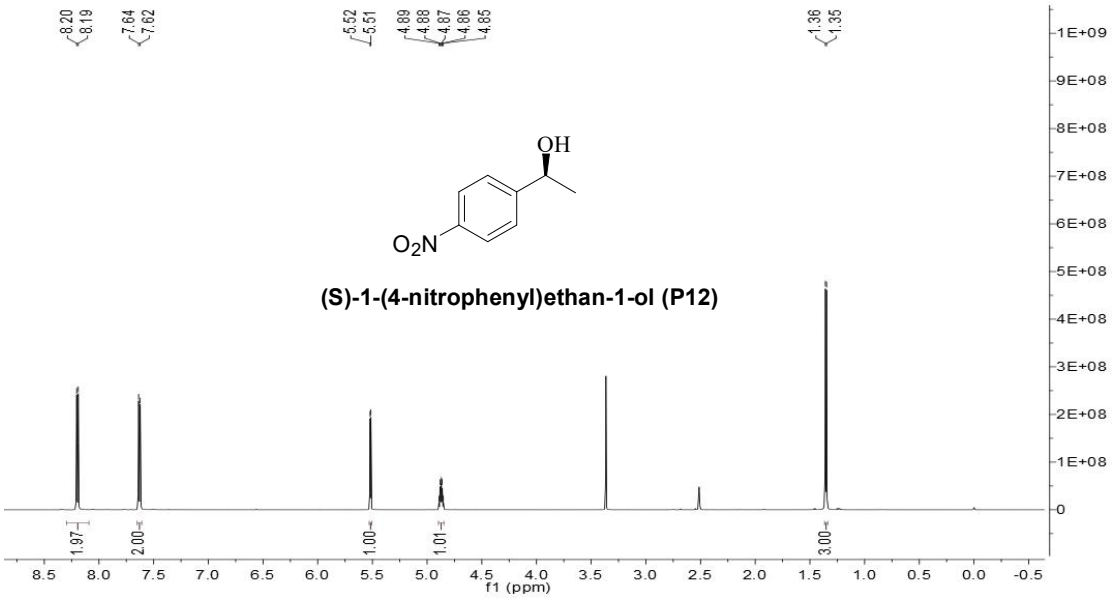
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(4-ethylphenyl)ethan-1-ol (**P10**)



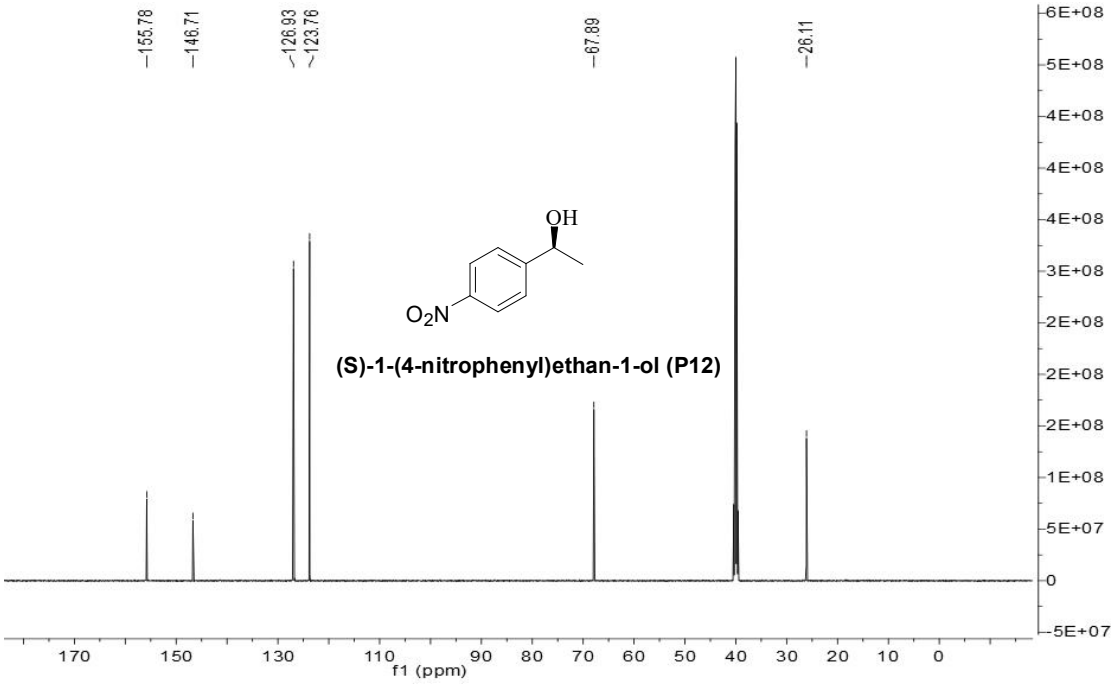
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(4-Methoxy-phenyl)-ethanol (**P11**)



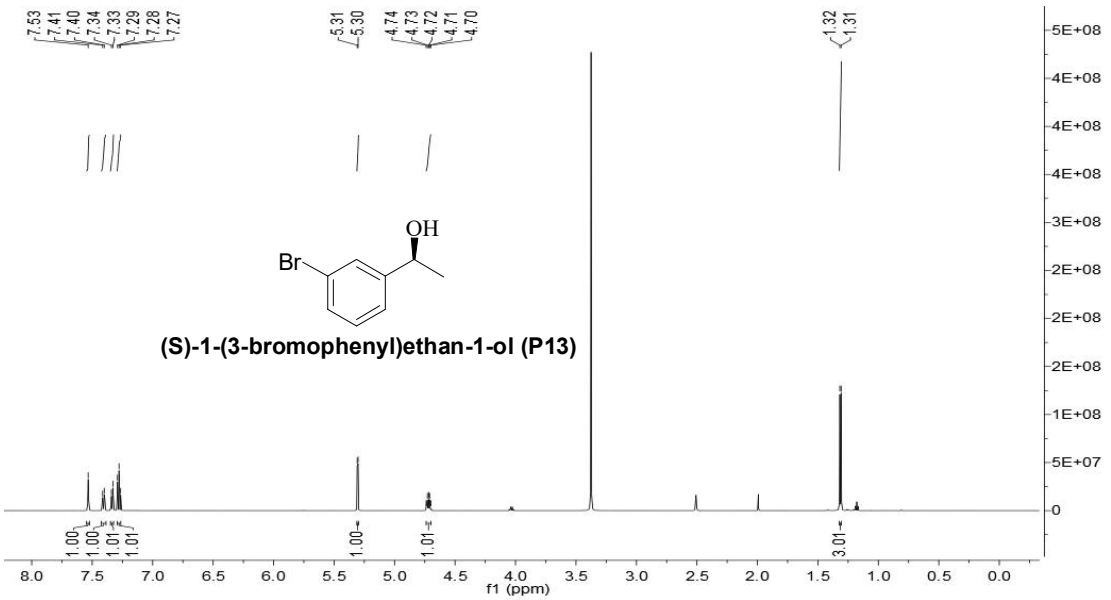
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(4-Methoxy-phenyl)-ethanol (**P11**)



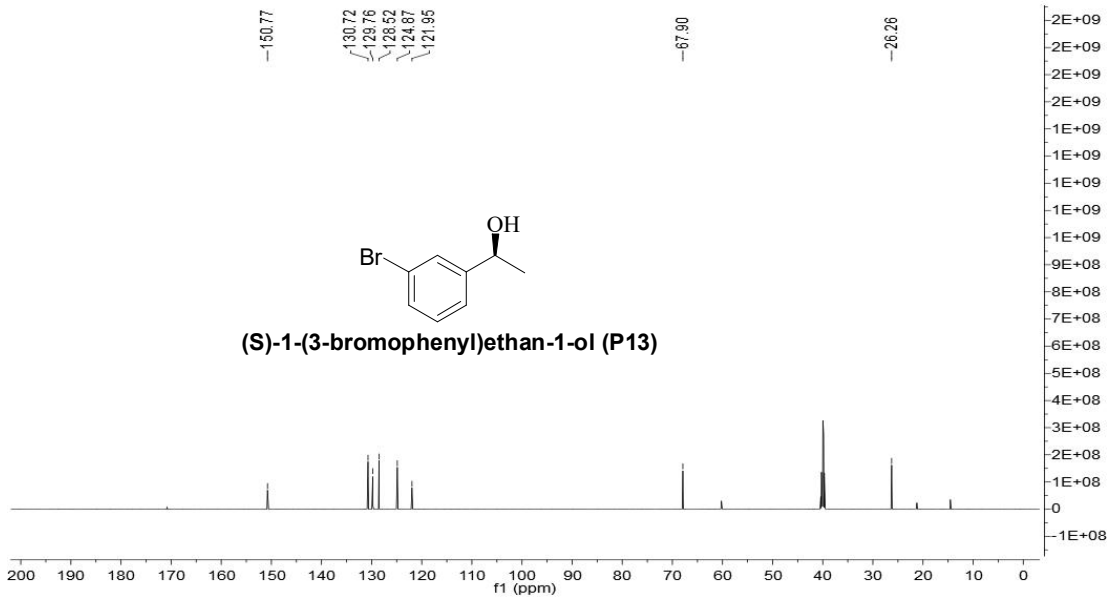
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(4-nitrophenyl)ethan-1-ol (**P12**)



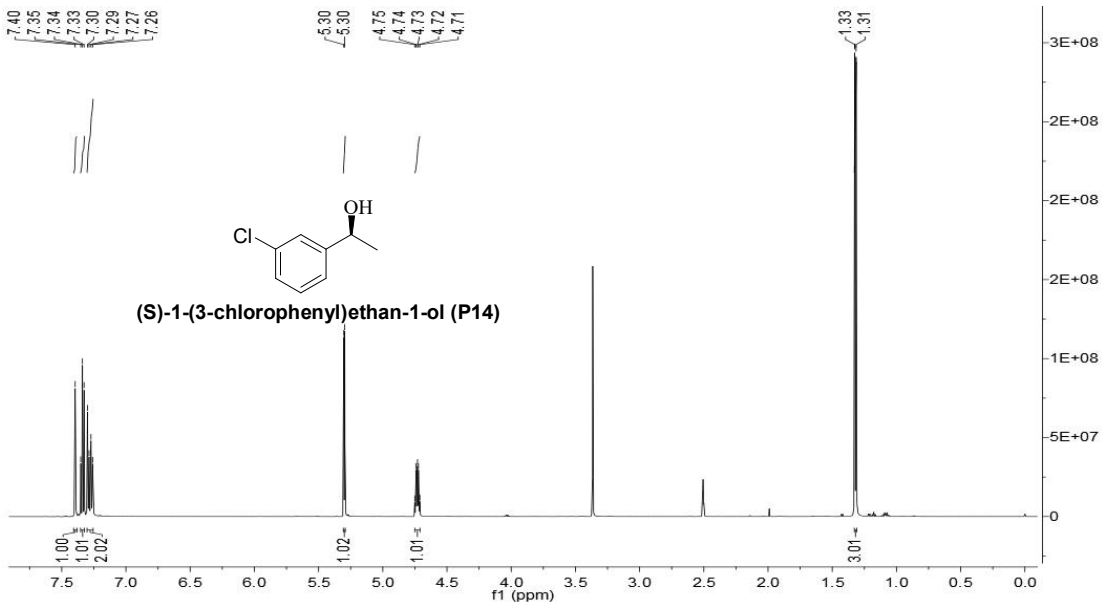
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(4-nitrophenyl)ethan-1-ol (**P12**)



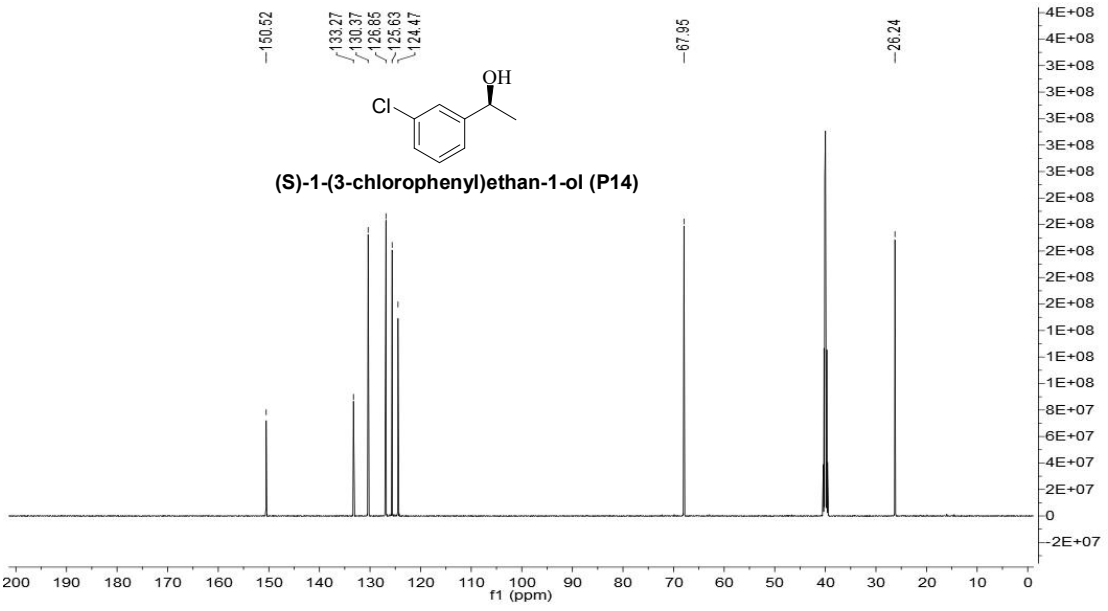
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(3-bromophenyl)ethan-1-ol (**P13**)



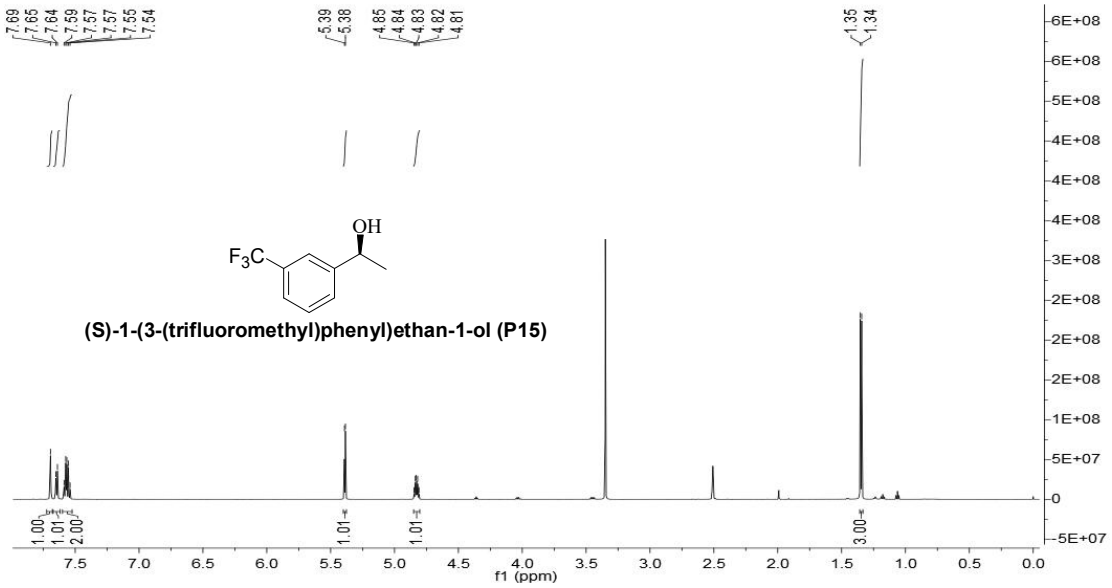
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(3-bromophenyl)ethan-1-ol (**P13**)



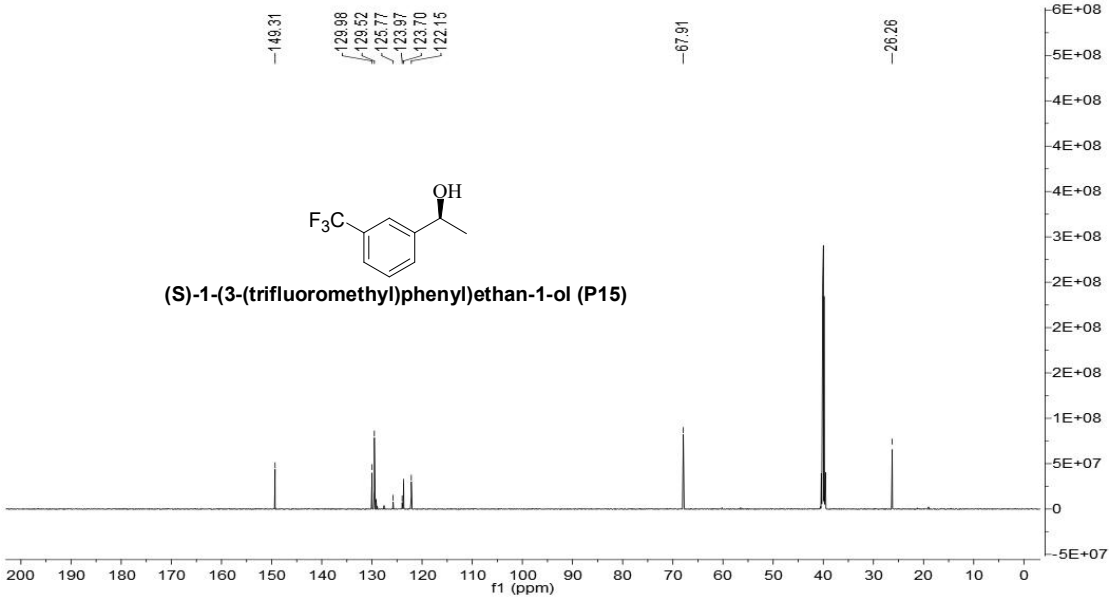
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(3-chlorophenyl)ethan-1-ol (**P14**)



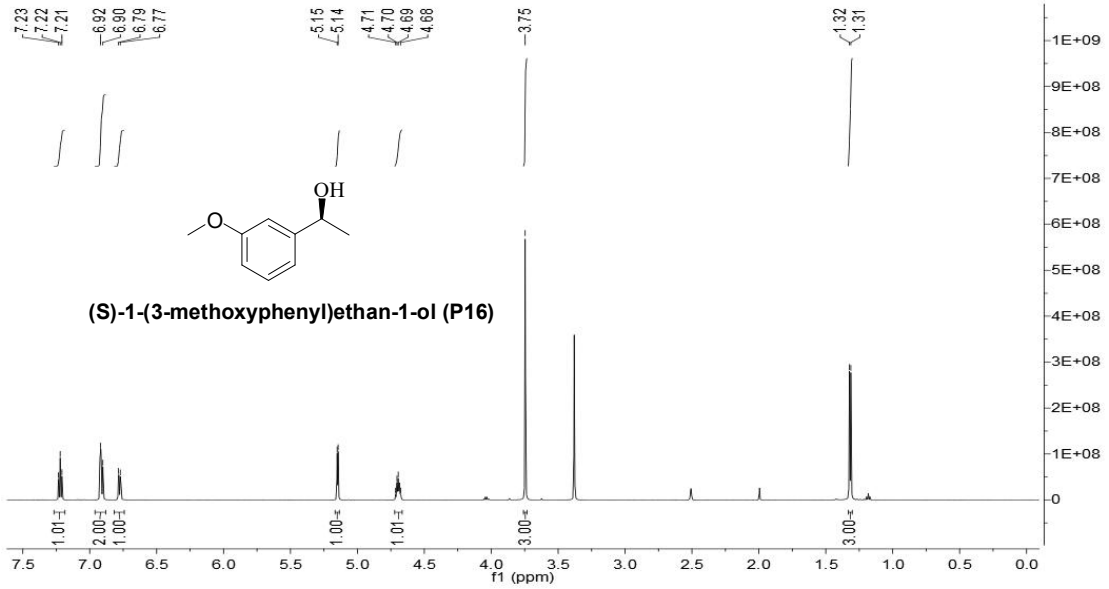
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(3-chlorophenyl)ethan-1-ol (**P14**)



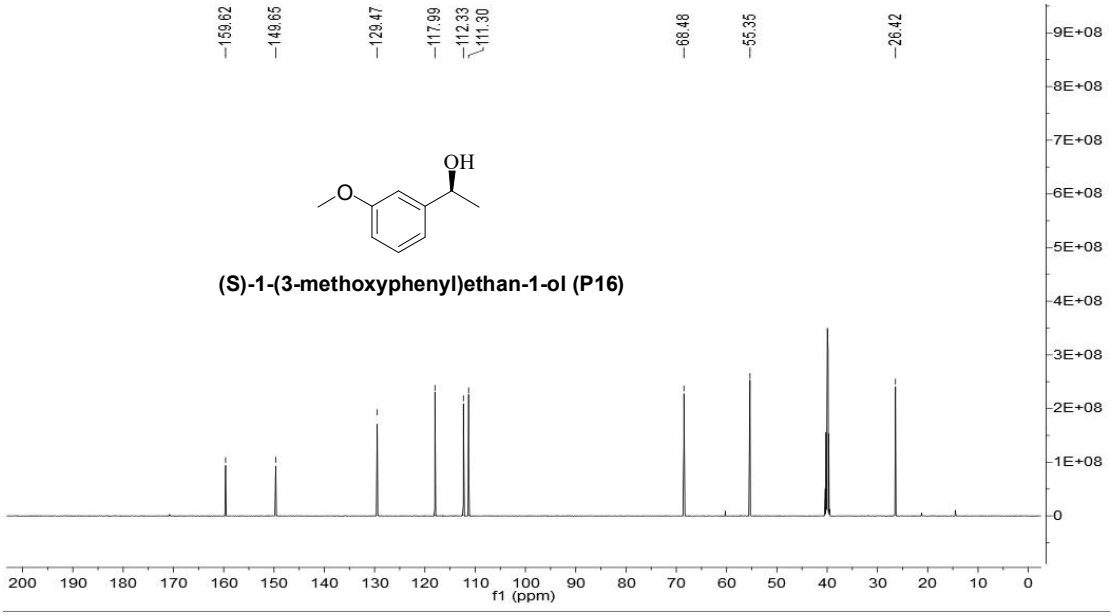
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(3-(trifluoromethyl)phenyl)ethan-1-ol (**P15**)



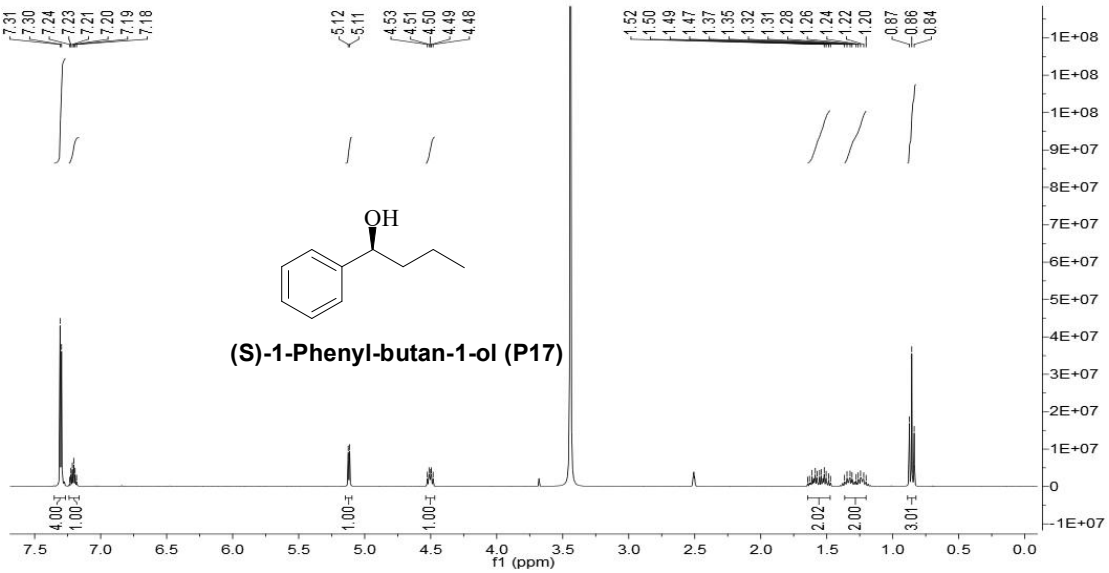
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(3-(trifluoromethyl)phenyl)ethan-1-ol (**P15**)



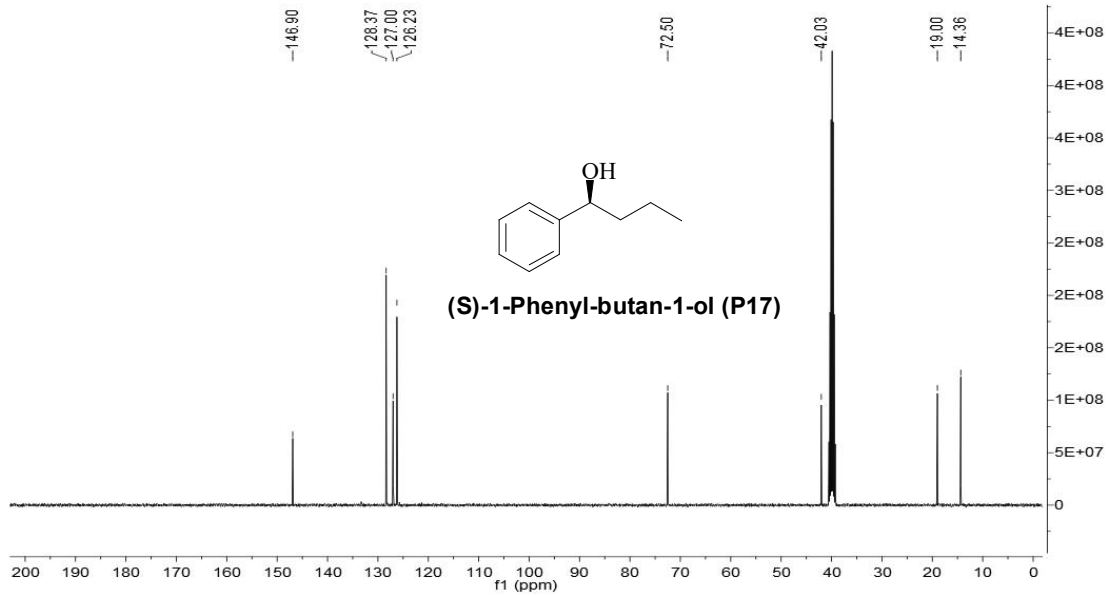
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(3-methoxyphenyl)ethan-1-ol (**P16**)



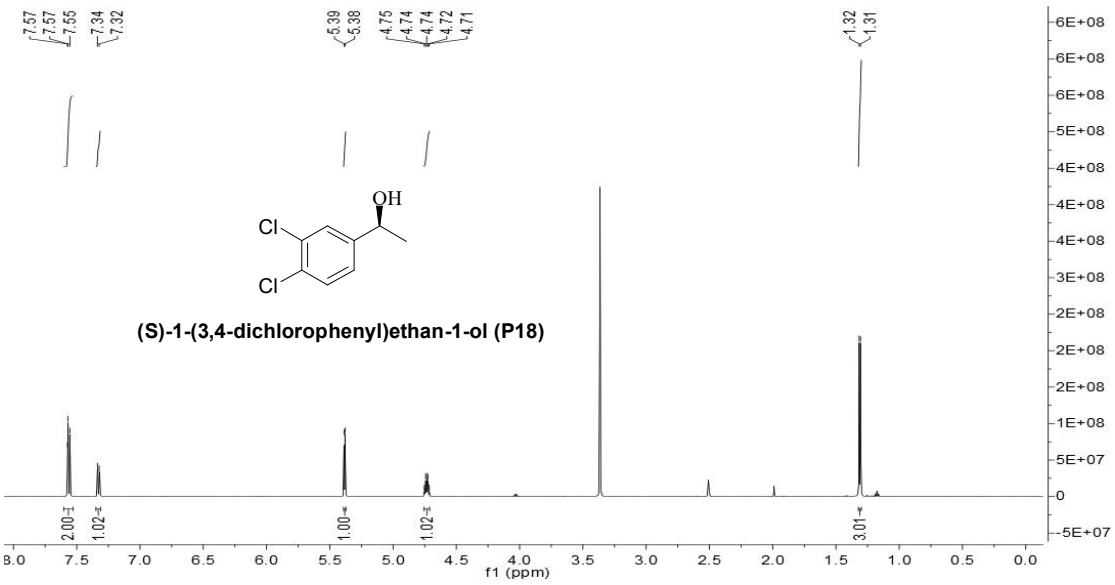
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(3-methoxyphenyl)ethan-1-ol (**P16**)



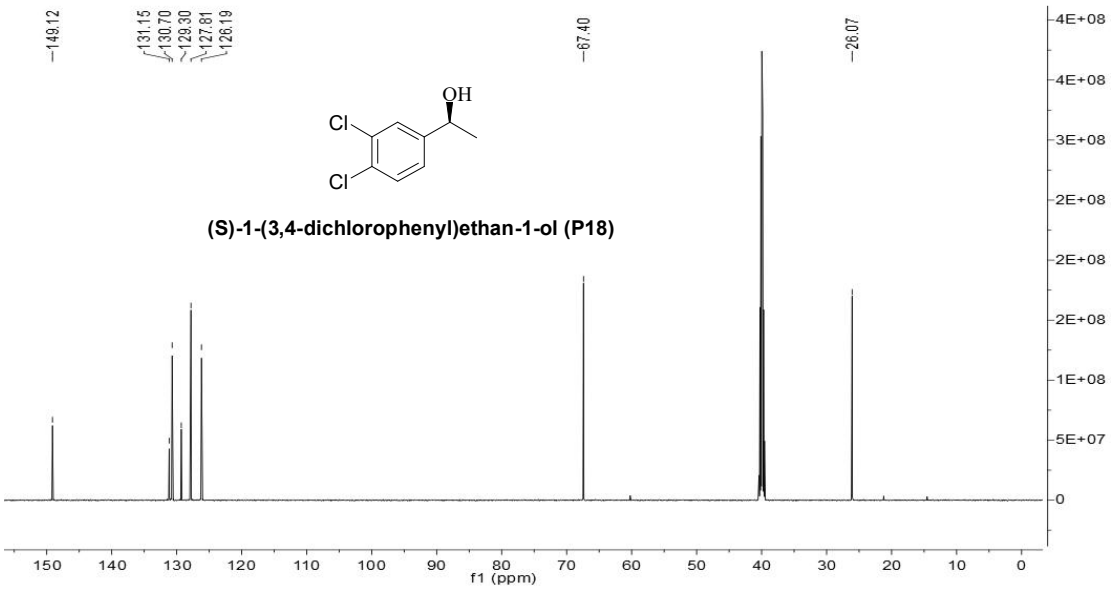
^{1}H NMR (400 MHz, DMSO-d_6) of (S)-1-Phenyl-butan-1-ol (**P17**)



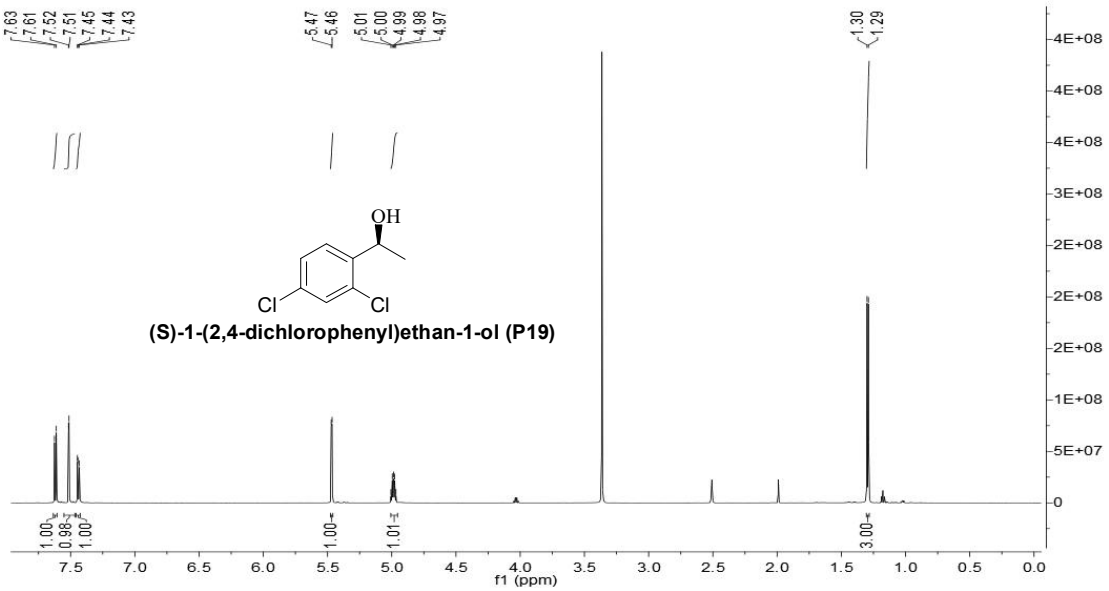
^{13}C{H} NMR (100 MHz, DMSO-d_6) of (S)-1-Phenyl-butan-1-ol (**P17**)



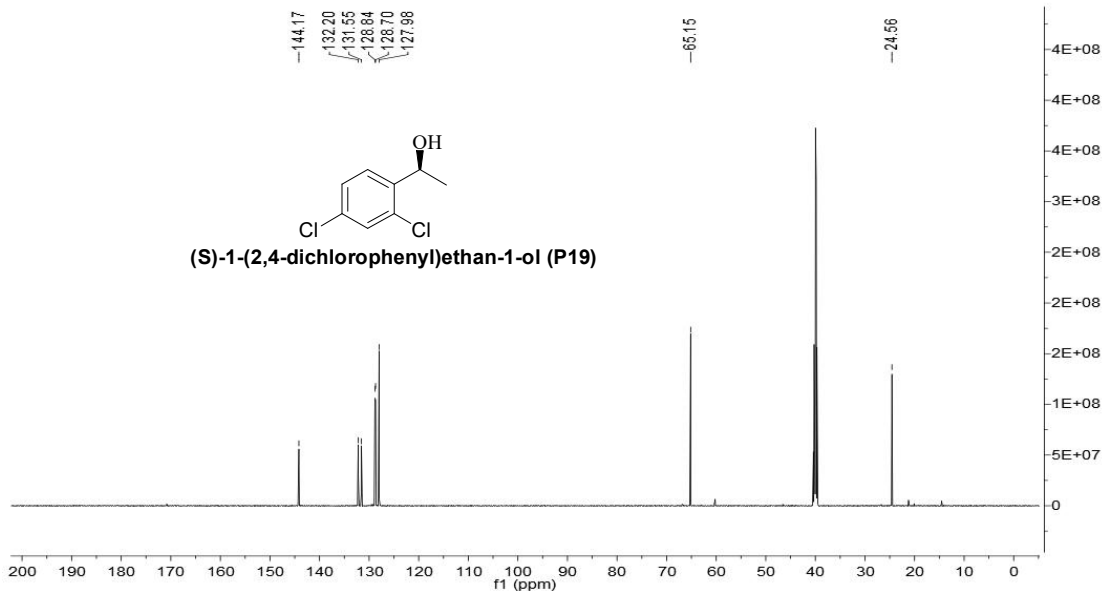
^{1}H NMR (600 MHz, DMSO-d_6) of (S)-1-(3,4-dichlorophenyl)ethan-1-ol (P18)



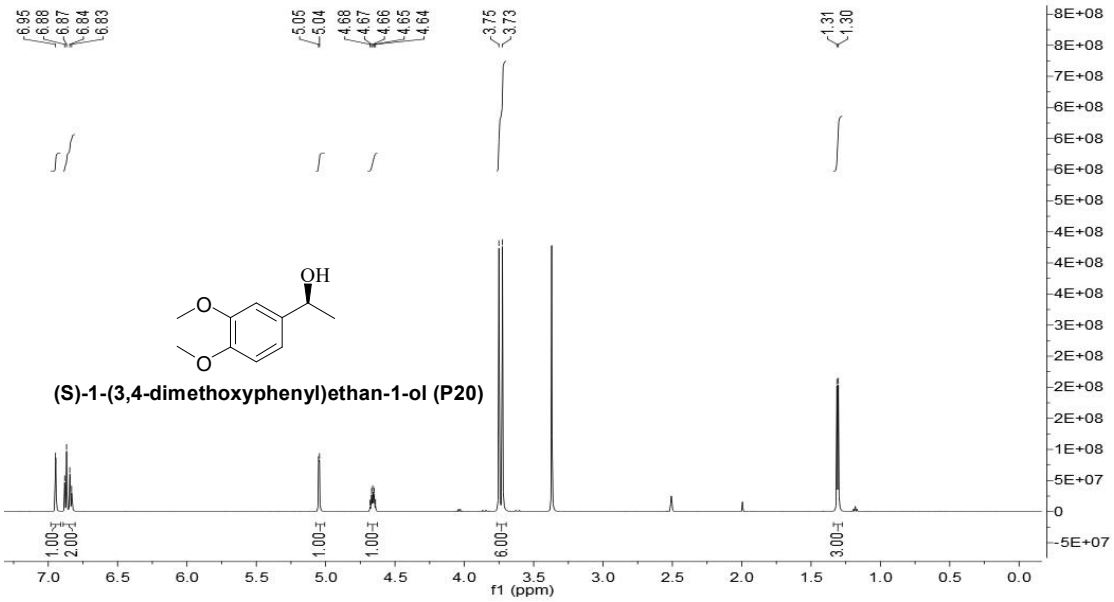
^{13}C{H} NMR (150 MHz, DMSO-d_6) of (S)-1-(3,4-dichlorophenyl)ethan-1-ol (**P18**)



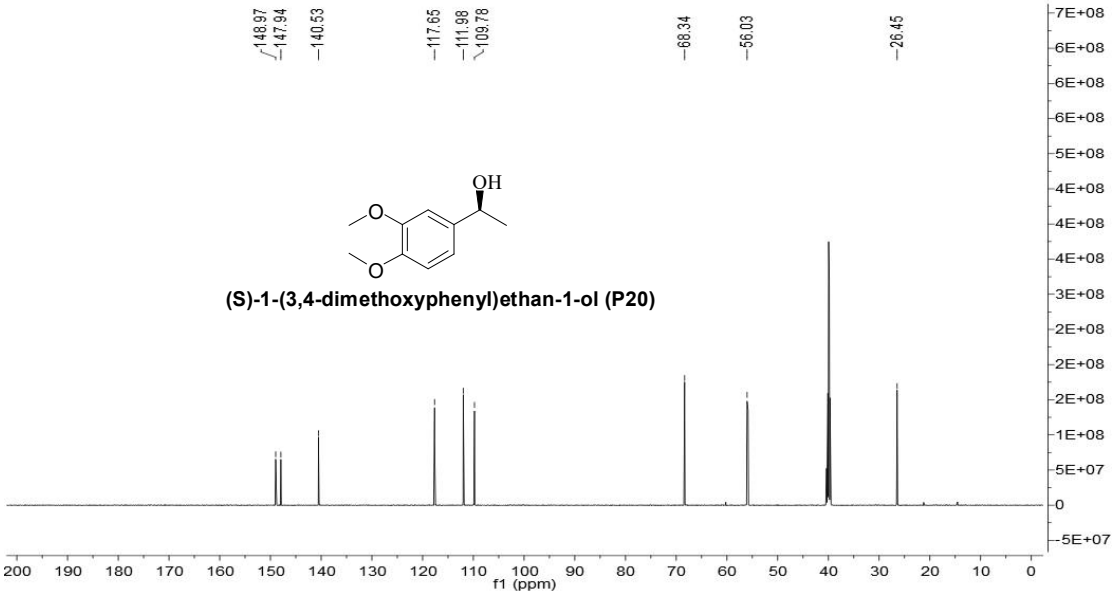
^{1}H NMR (DMSO-d_6, 600 MHz) of (*S*)-1-(2,4-dichlorophenyl)ethan-1-ol (**P19**)



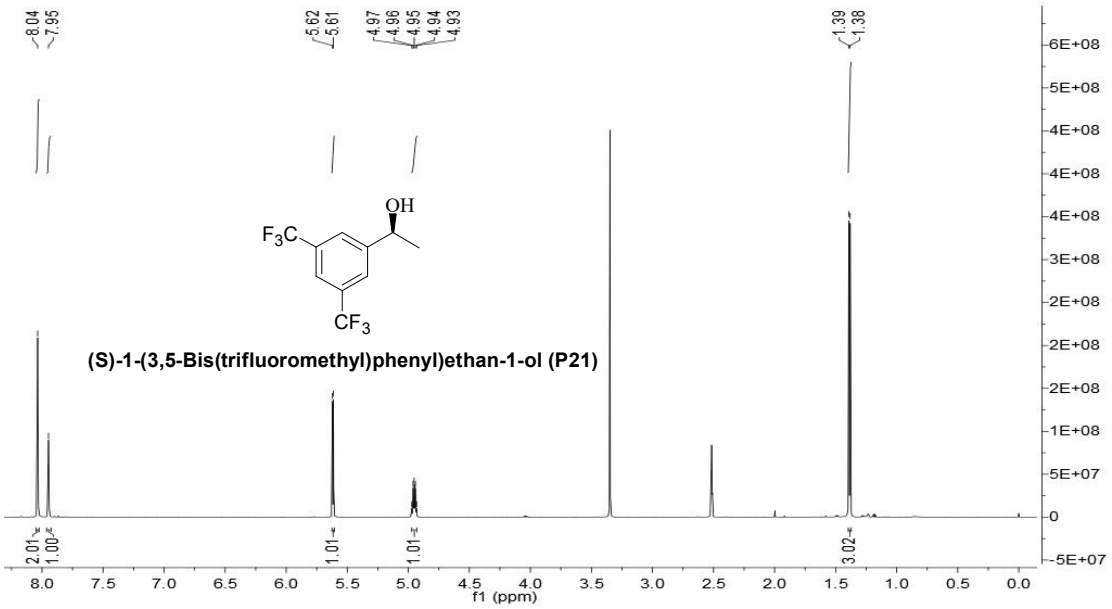
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(2,4-dichlorophenyl)ethan-1-ol (**P19**)



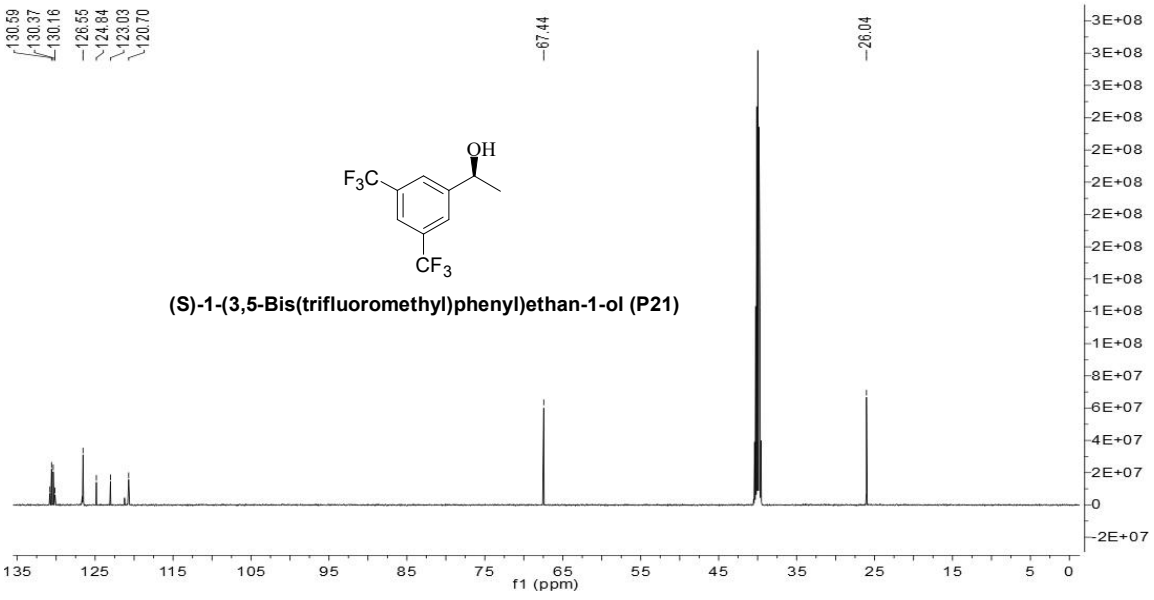
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(3,4-dimethoxyphenyl)ethan-1-ol (**P20**)



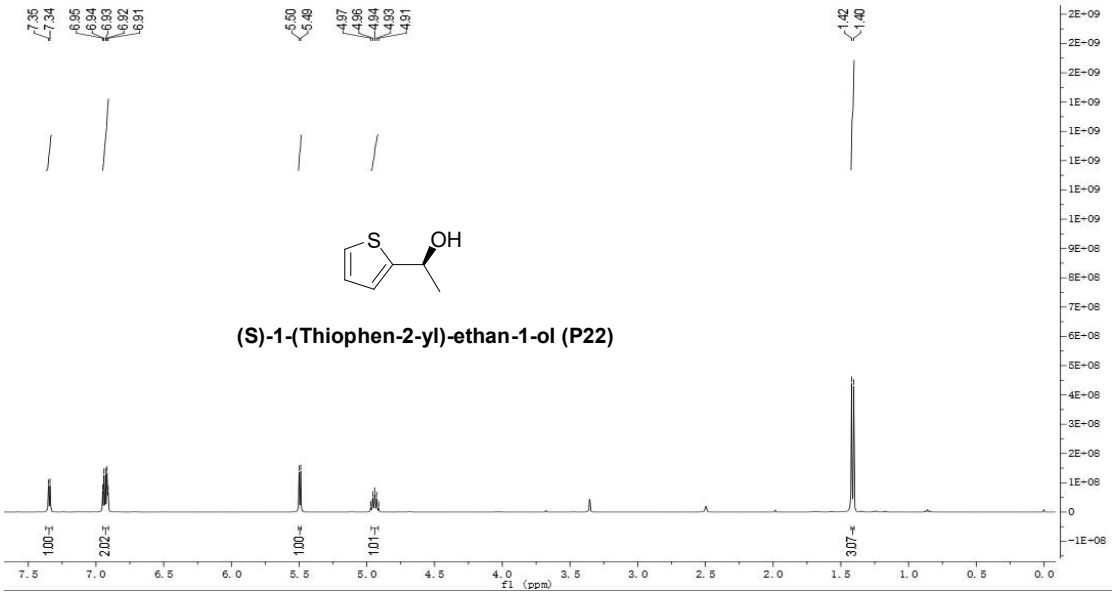
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(3,4-dimethoxyphenyl)ethan-1-ol (**P20**)



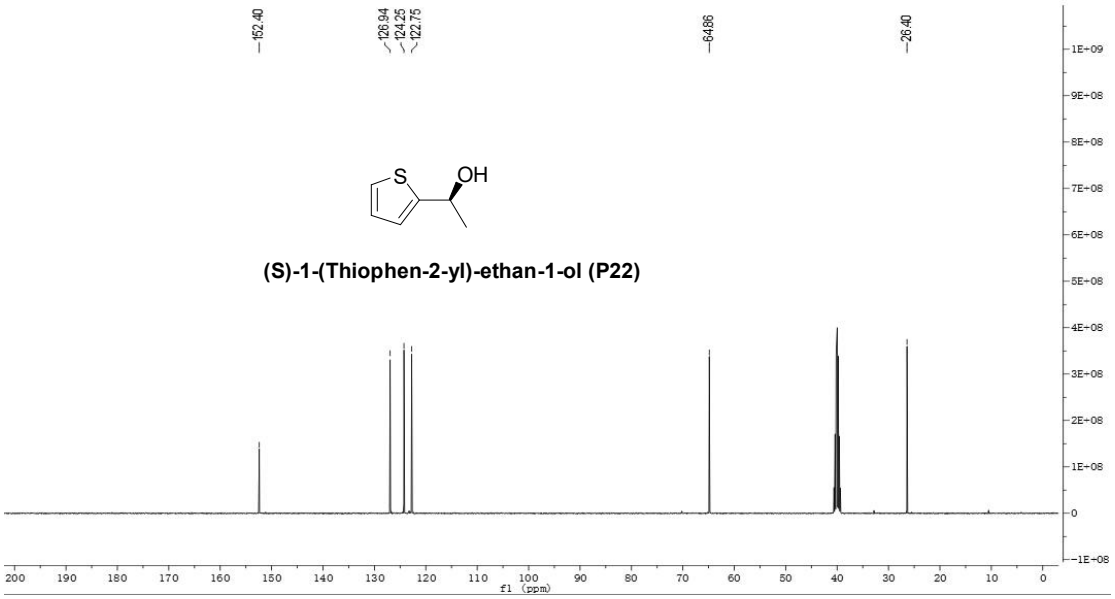
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(3,5-Bis(trifluoromethyl)phenyl)ethan-1-ol (**P21**)



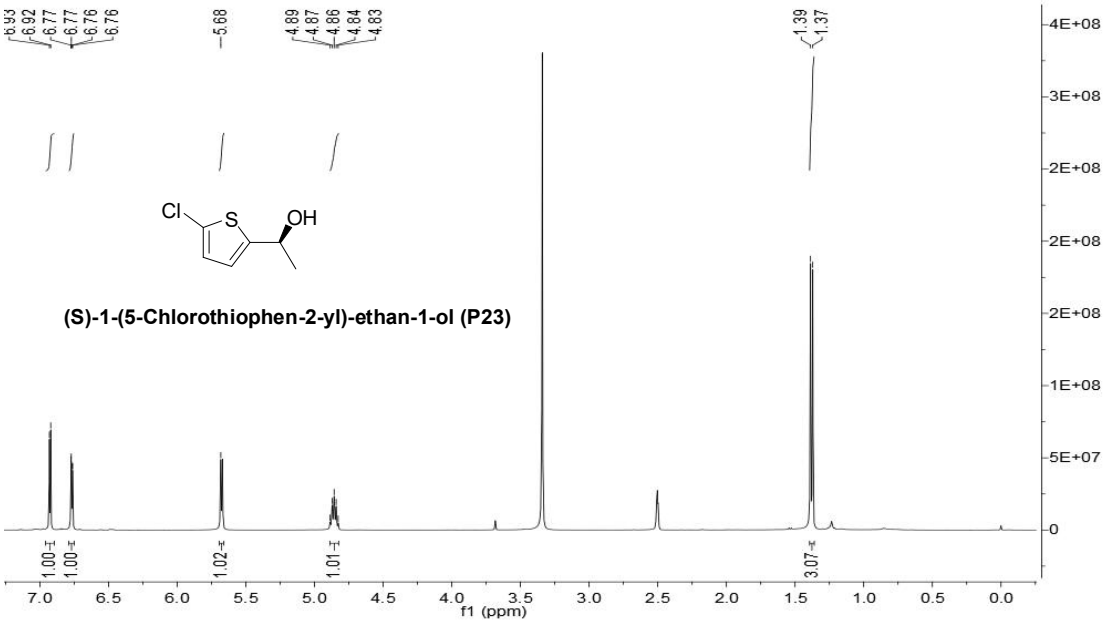
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(3,5-bis(trifluoromethyl)phenyl)ethan-1-ol (**P21**)



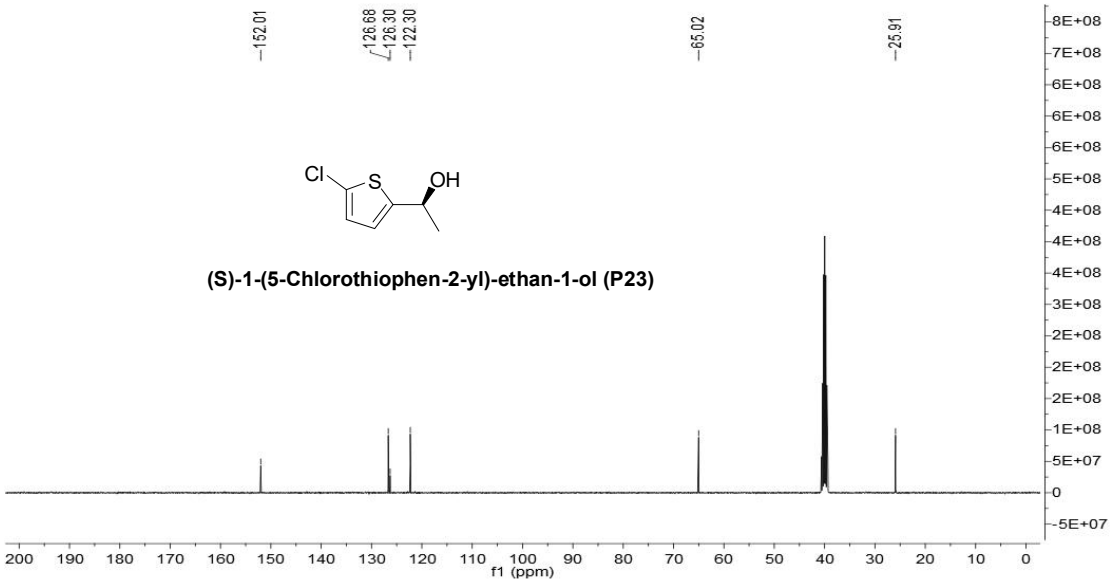
^{1}H NMR (DMSO-d_6, 400 MHz) of (S)-1-(Thiophen-2-yl)-ethan-1-ol (**P22**)



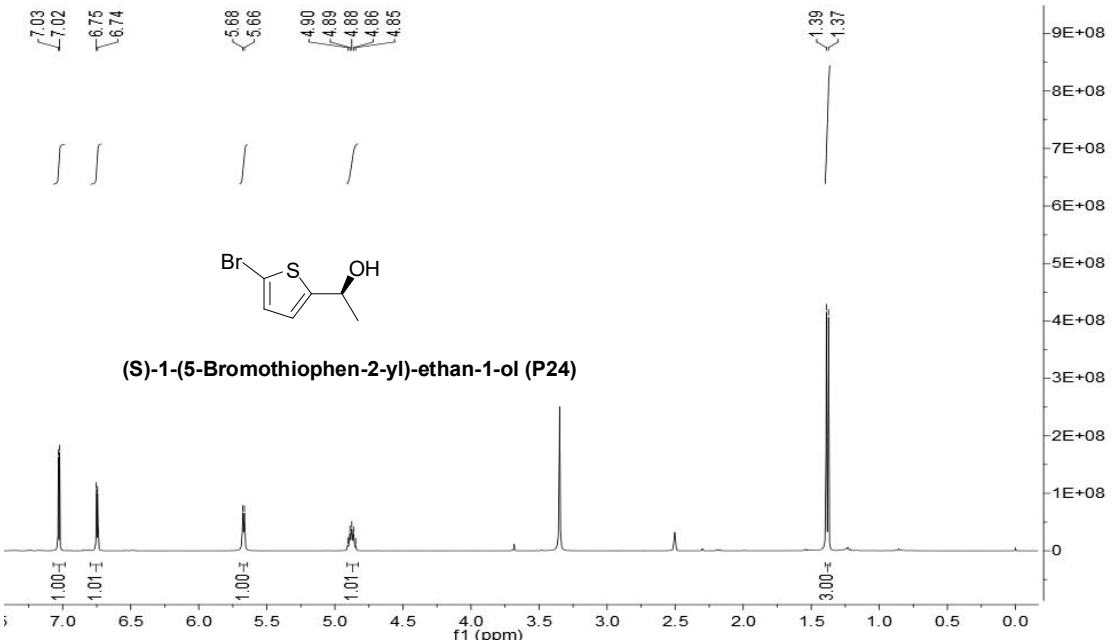
^{13}C{H} NMR (DMSO-d_6, 100 MHz) of (S)-1-(Thiophen-2-yl)-ethan-1-ol (**P22**)



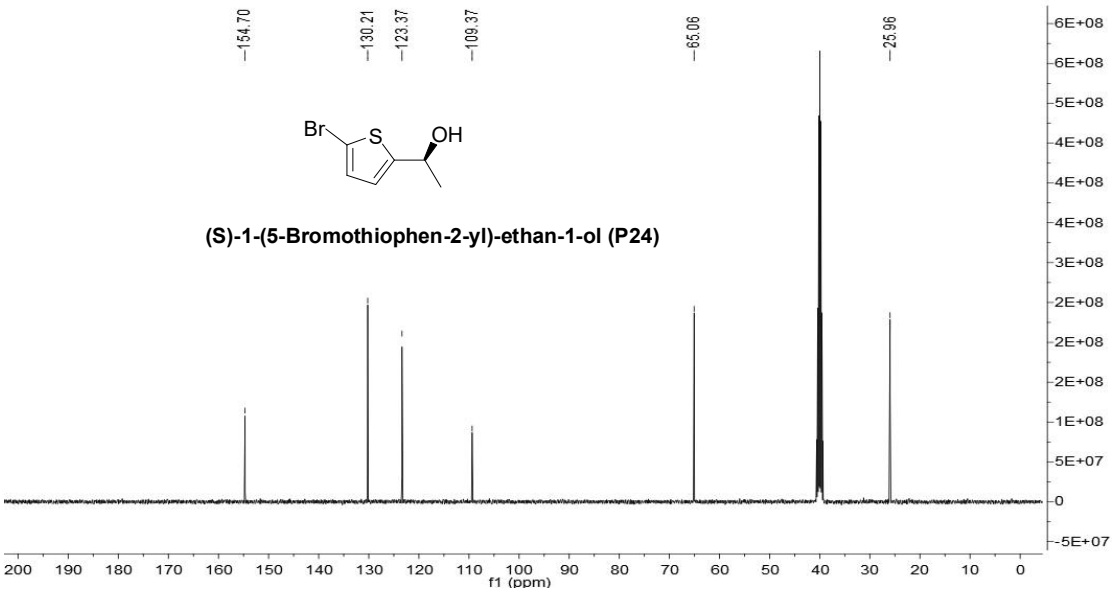
^{1}H NMR (DMSO-d_6, 400 MHz) of (S)-1-(5-Chlorothiophen-2-yl)-ethan-1-ol (**P23**)



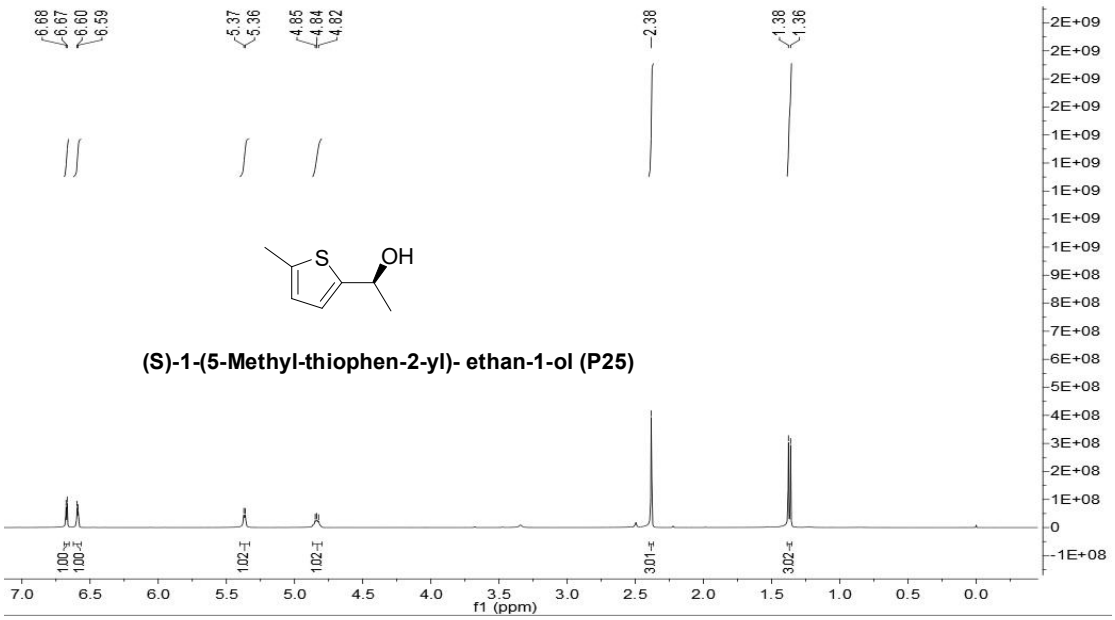
^{13}C{H} NMR (DMSO-d_6, 100 MHz) of (S)-1-(5-chlorothiophen-2-yl)-ethan-1-ol (**P23**)



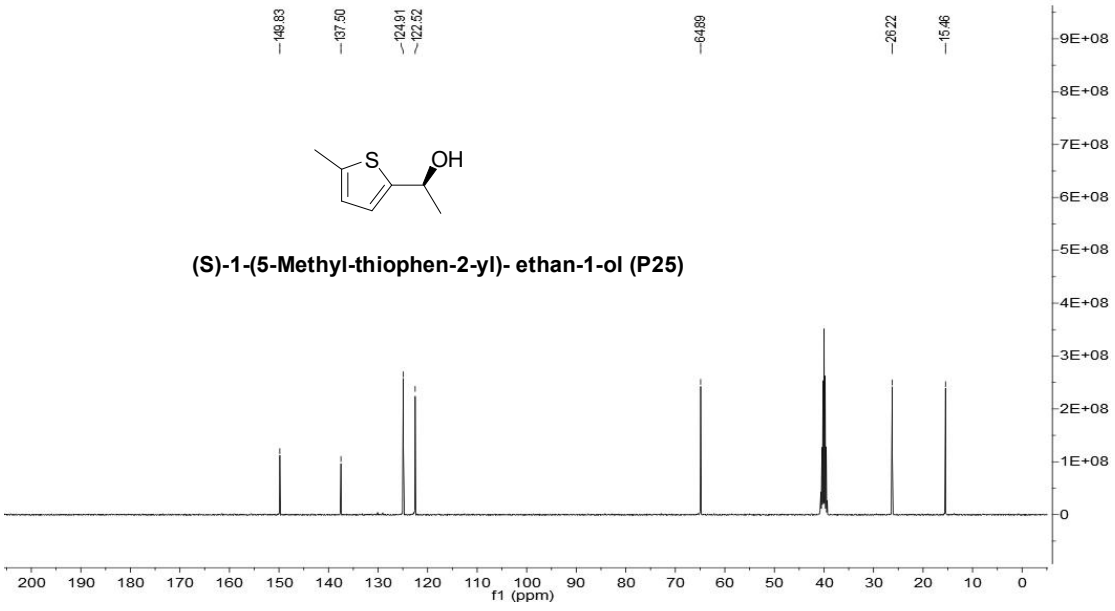
^{1}H NMR (DMSO-d_6, 400 MHz) of (S)-1-(5-Bromothiophen-2-yl)-ethan-1-ol (**P24**)



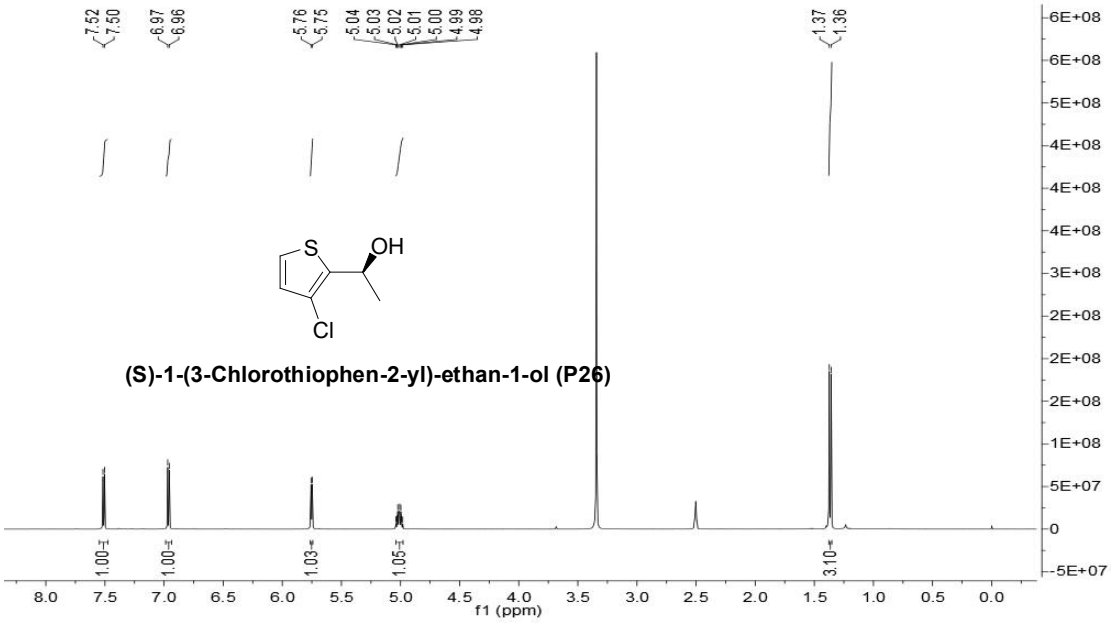
^{13}C{H} NMR (DMSO-d_6, 100 MHz) of (S)-1-(5-Bromothiophen-2-yl)-ethan-1-ol (**P24**)



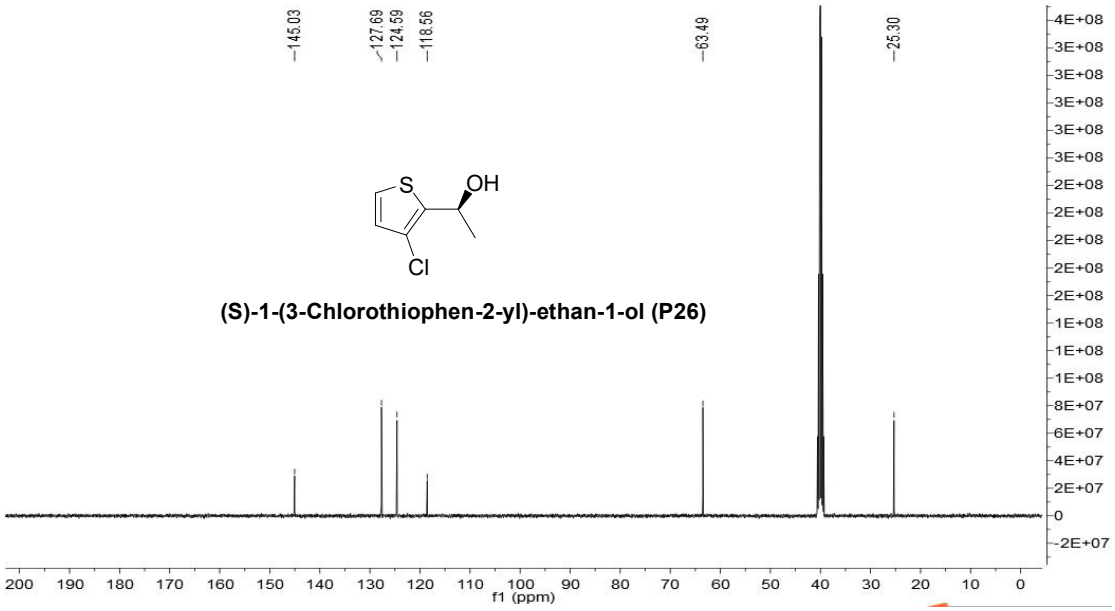
^{1}H NMR (400 MHz, DMSO-d_6) of (S)-1-(5-Methyl-thiophen-2-yl)- ethan-1-ol (**P25**)



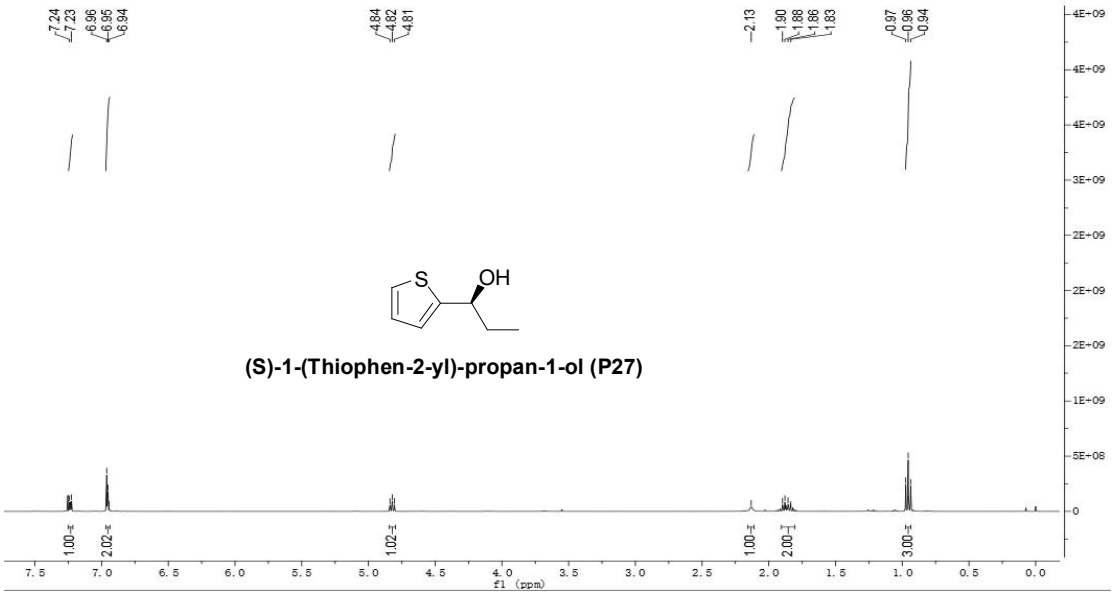
^{13}C{H} NMR (100 MHz, DMSO-d_6) of (S)-1-(5-Methyl-thiophen-2-yl)- ethan-1-ol (**P25**)



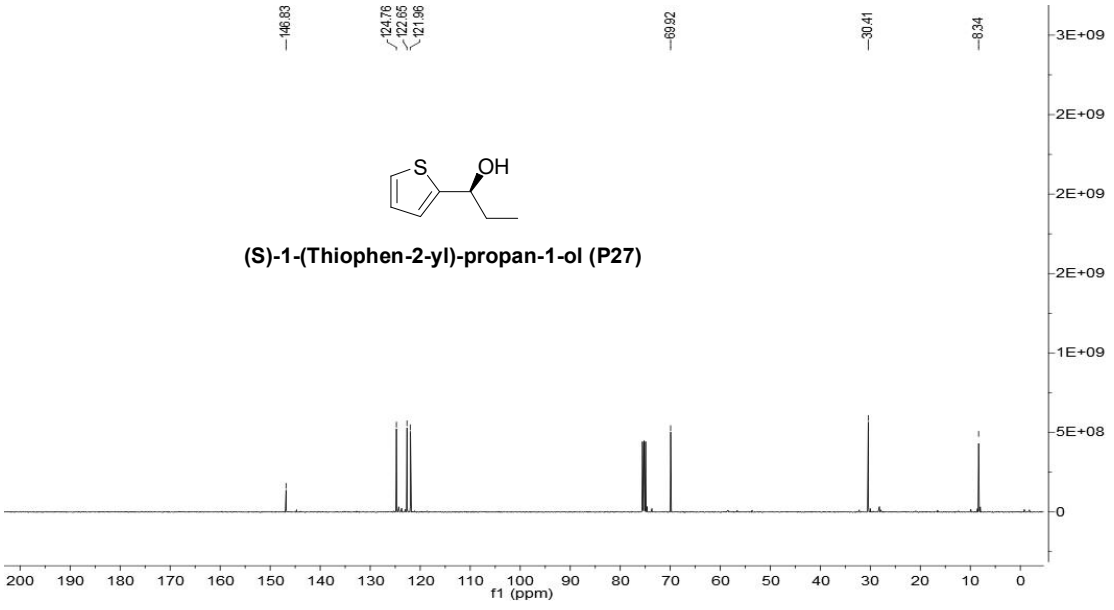
^{1}H NMR (DMSO-d_6, 400 MHz) of (S)-1-(3-Chlorothiophen-2-yl)-ethan-1-ol (**P26**)



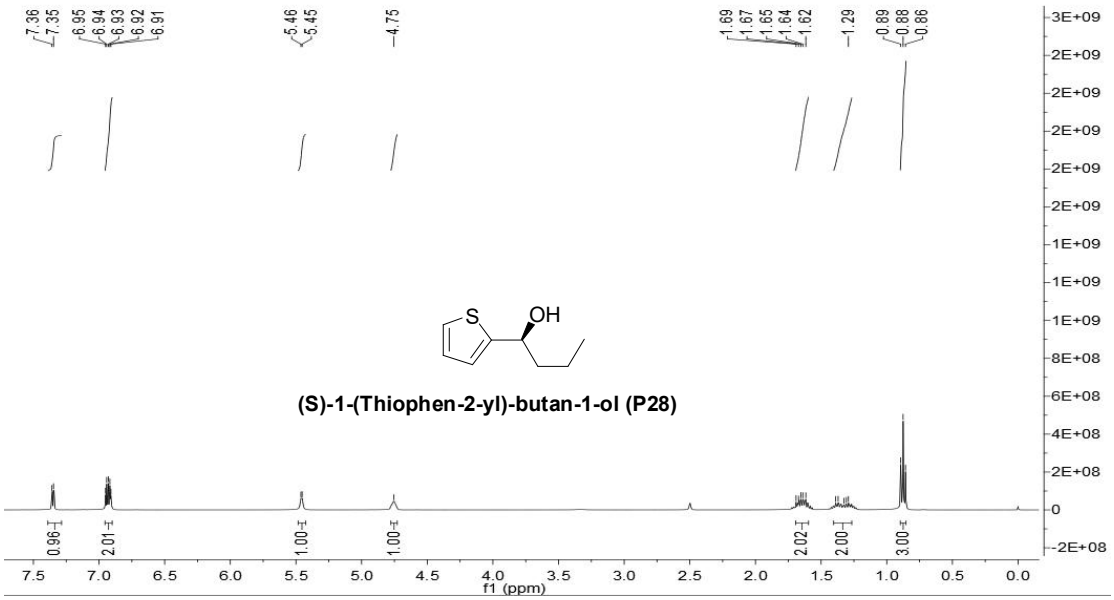
^{13}C{H} NMR (DMSO-d_6, 100 MHz) of (S)-1-(3-Chlorothiophen-2-yl)-ethan-1-ol (**P26**)



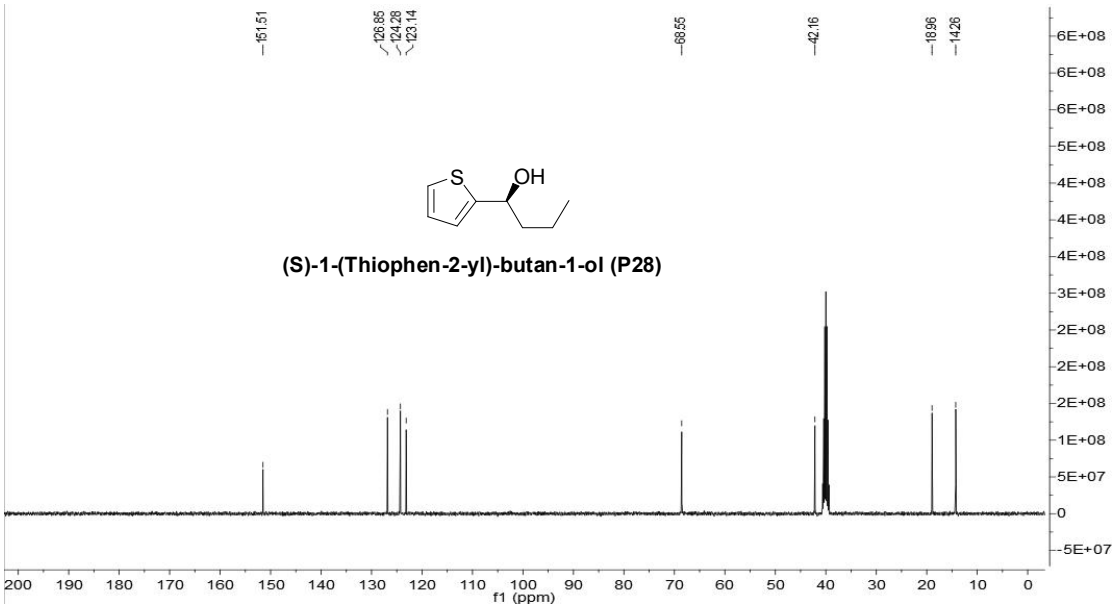
^{1}H NMR ($CDCl_3$, 400 MHz) of (S)-1-(Thiophen-2-yl)-propan-1-ol (**P27**)



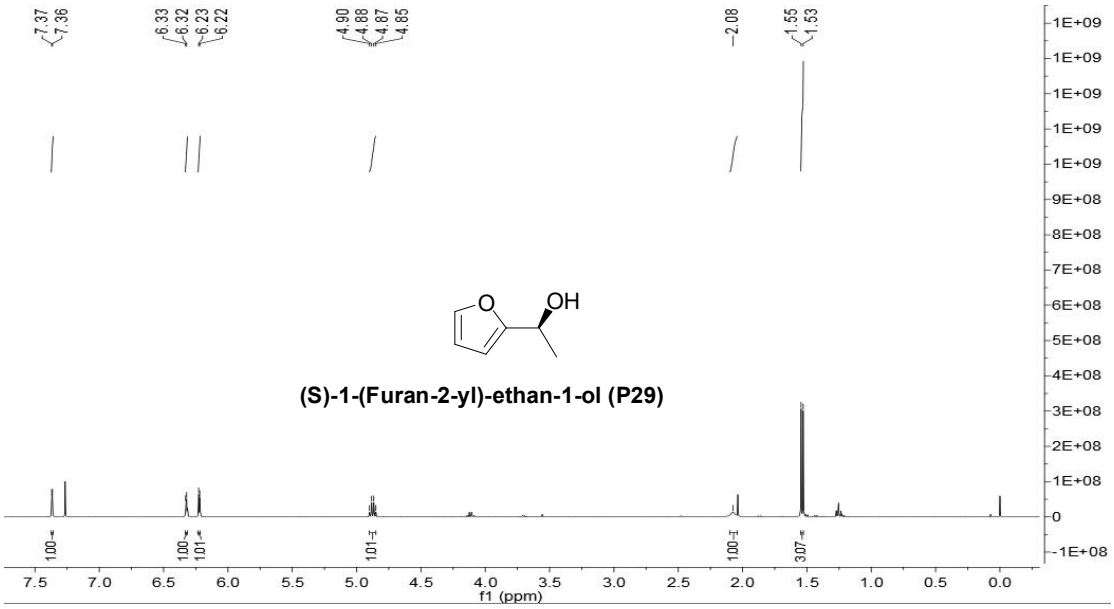
^{13}C{H} NMR ($CDCl_3$, 100 MHz) of (S)-1-(Thiophen-2-yl)-propan-1-ol (**P27**)



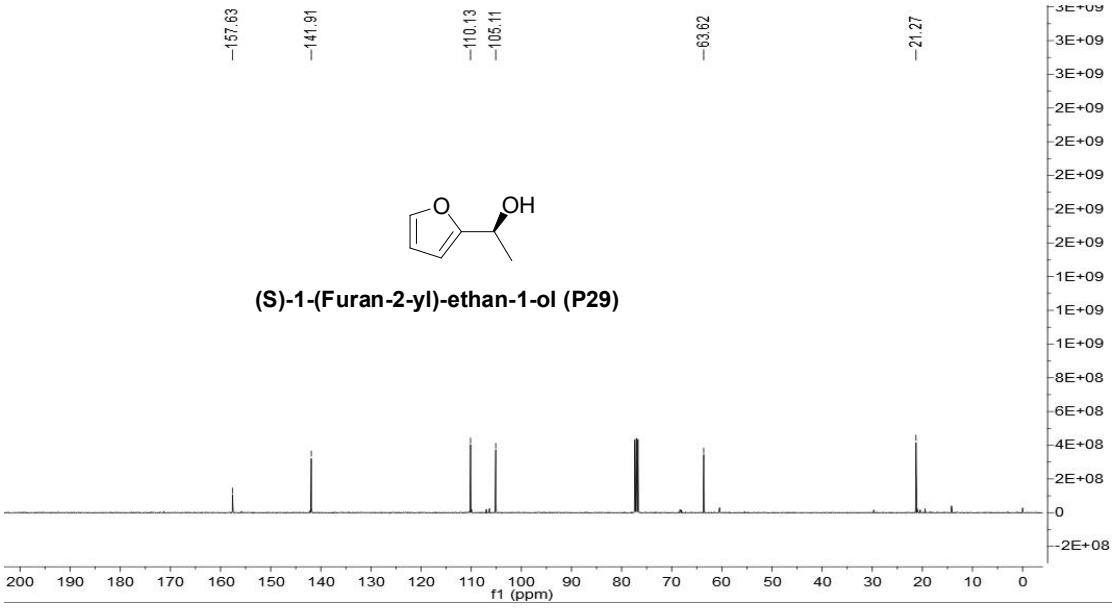
^{1}H NMR (DMSO-d_6, 400 MHz) of (S)-1-(Thiophen-2-yl)-butan-1-ol (**P28**)



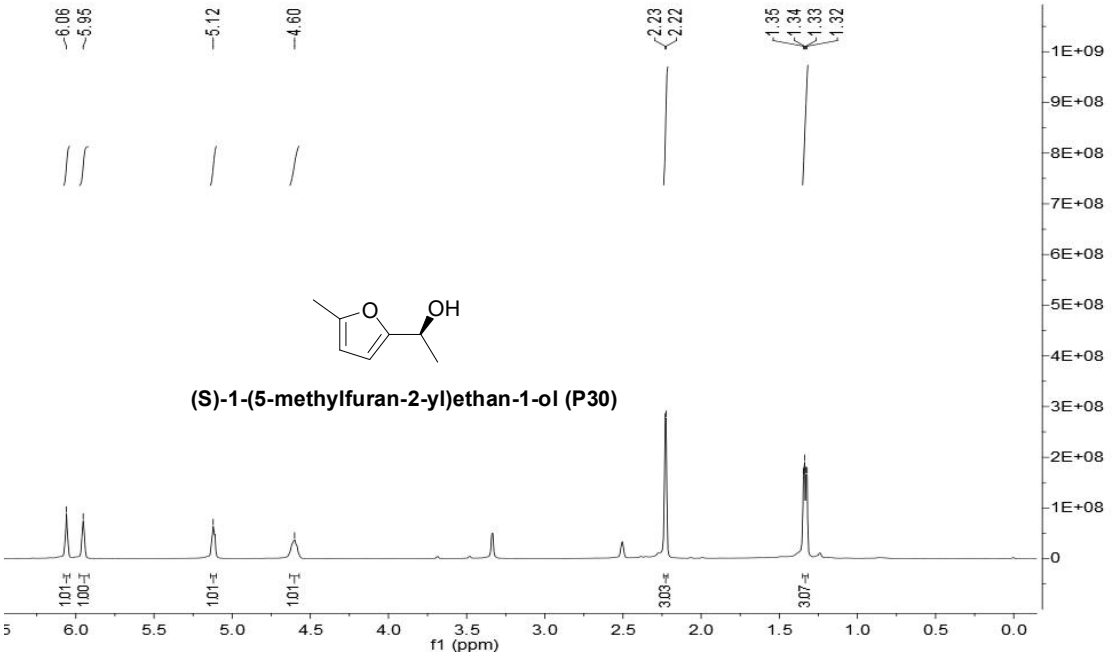
^{13}C{H} NMR (DMSO-d_6, 100 MHz) of (S)-1-(Thiophen-2-yl)-butan-1-ol (**P28**)



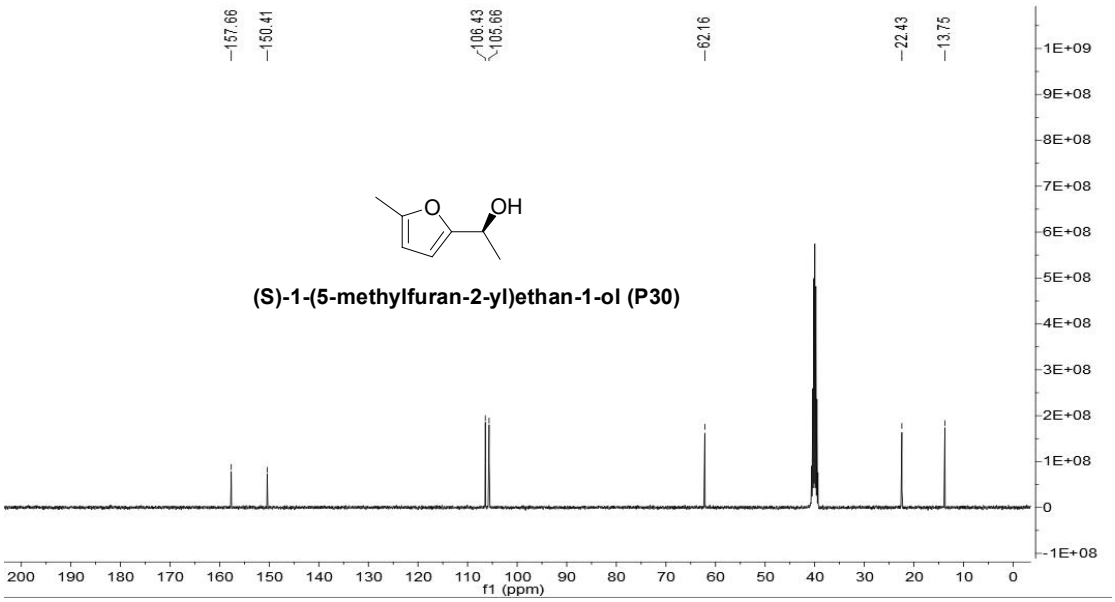
^{1}H NMR ($CDCl_3$, 400 MHz) of (S)-1-(Furan-2-yl)-ethan-1-ol (**P29**)



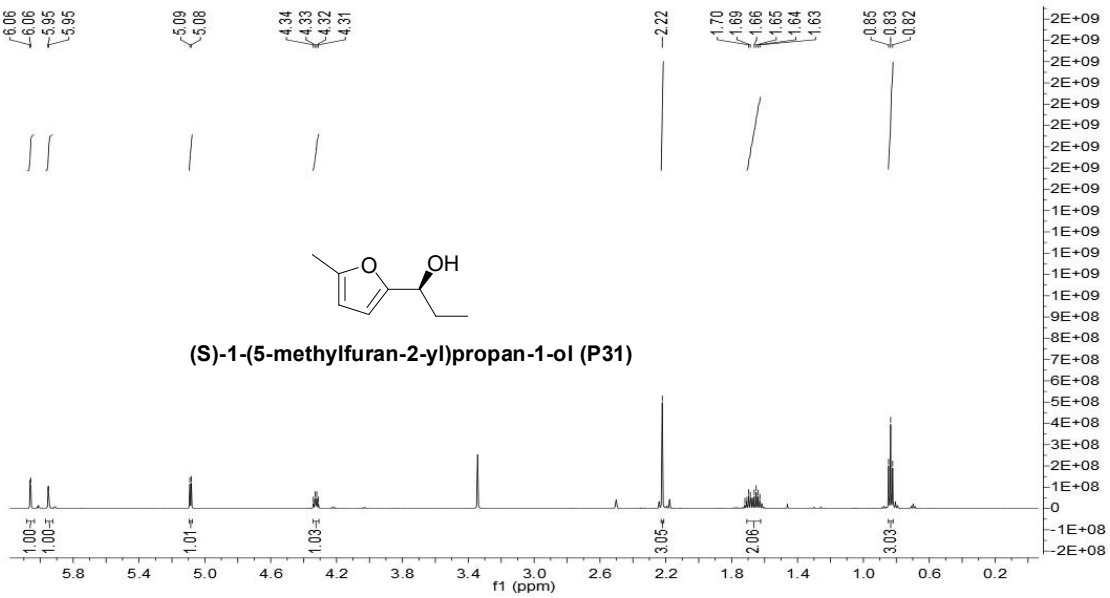
^{13}C{H} NMR ($CDCl_3$, 100 MHz) of (S)-1-(Furan-2-yl)-ethan-1-ol (**P29**)



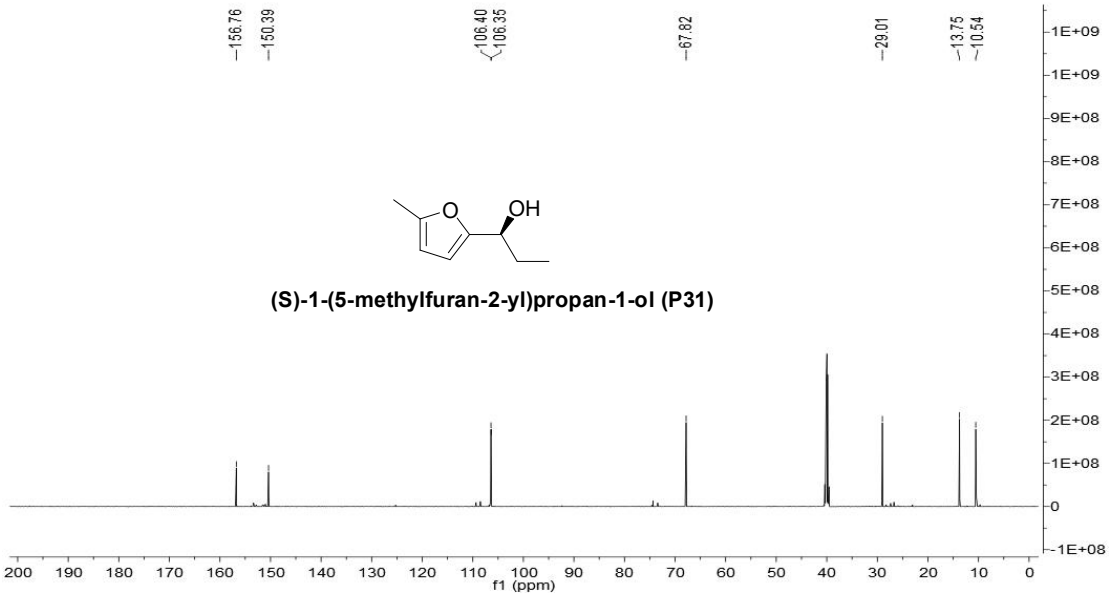
^{1}H NMR (DMSO-d_6, 400 MHz) of (S)-1-(5-methylfuran-2-yl)ethan-1-ol (**P30**)



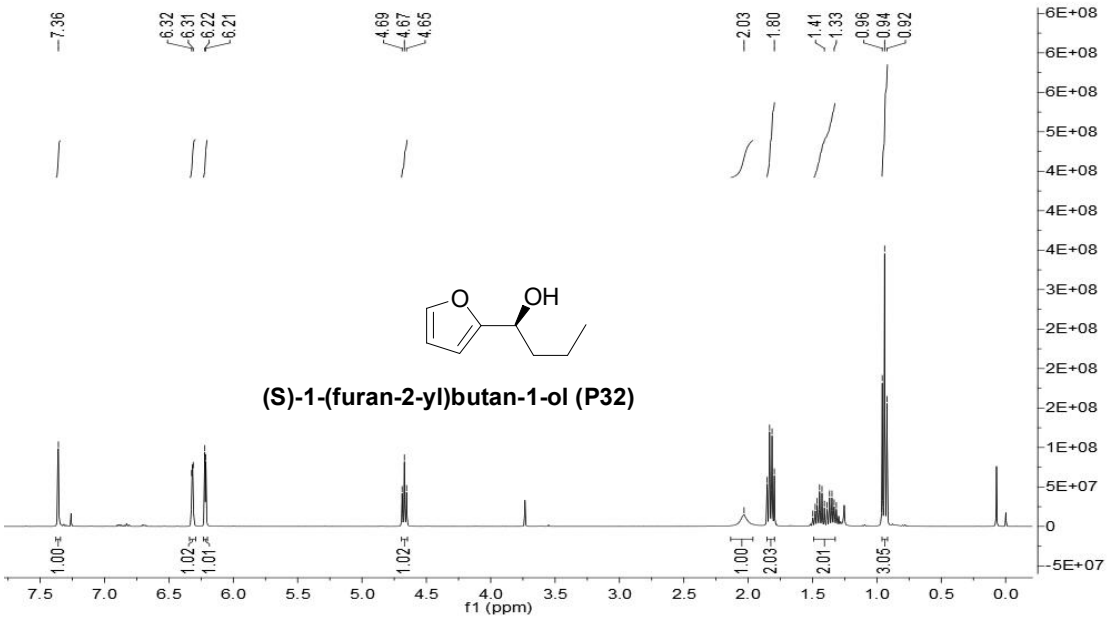
^{13}C{H} NMR (DMSO-d_6, 100 MHz) of (S)-1-(5-methylfuran-2-yl)ethan-1-ol (**P30**)



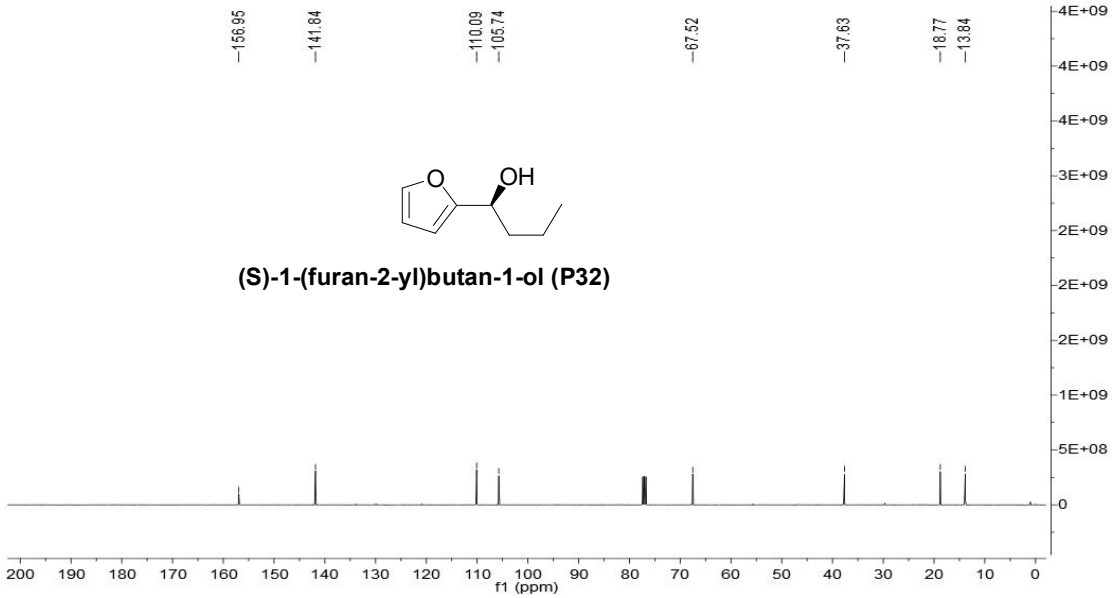
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(5-methylfuran-2-yl)propan-1-ol (**P31**)



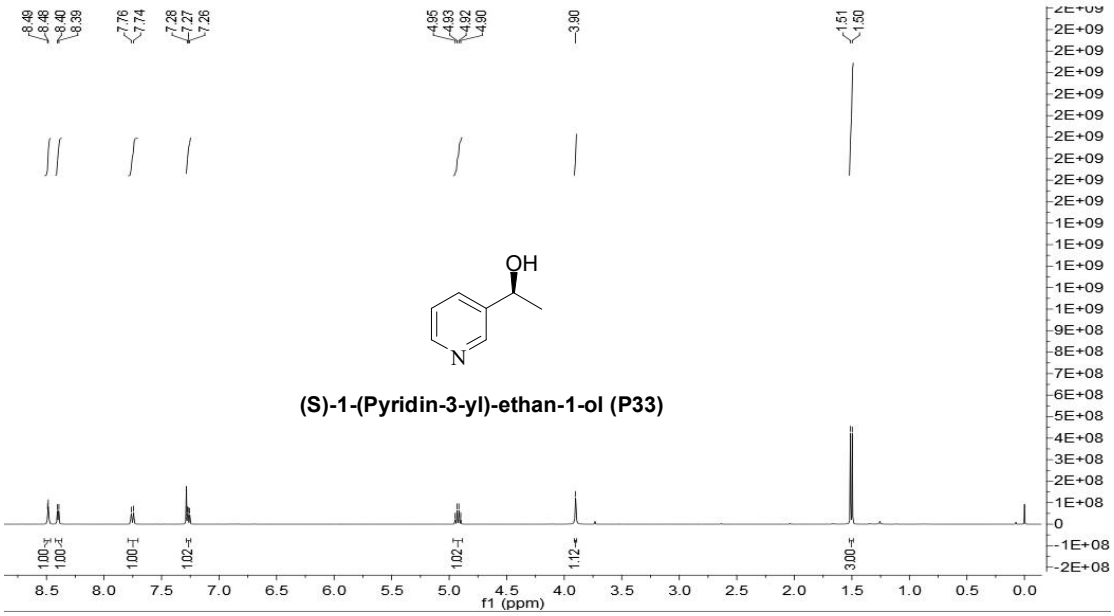
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(5-methylfuran-2-yl)propan-1-ol (**P31**)



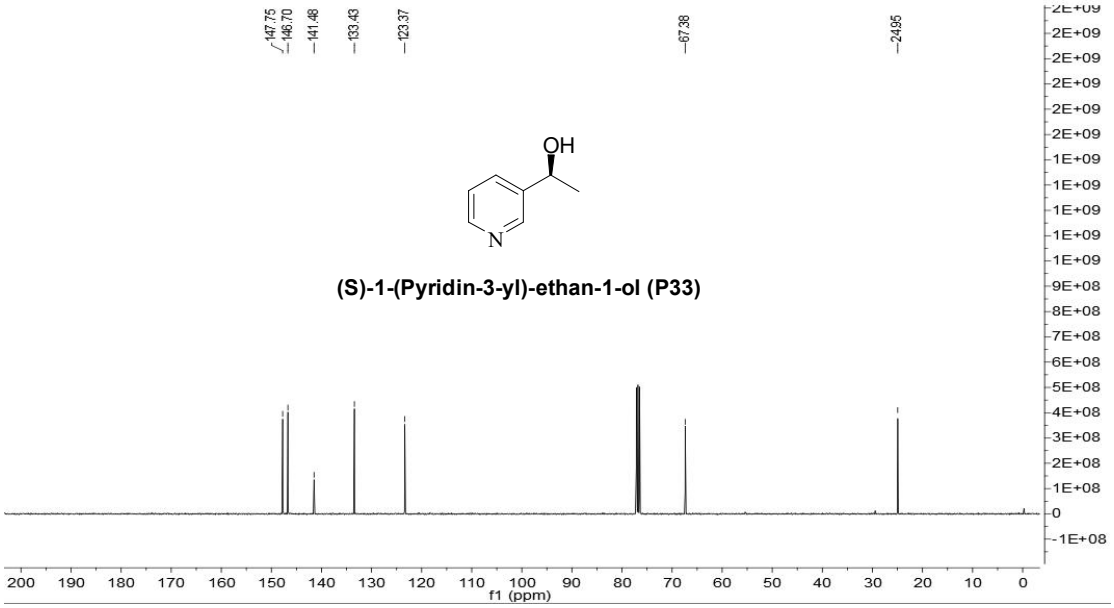
^{1}H NMR ($CDCl_3$, 400 MHz) of (S)-1-(furan-2-yl)butan-1-ol (**P32**)



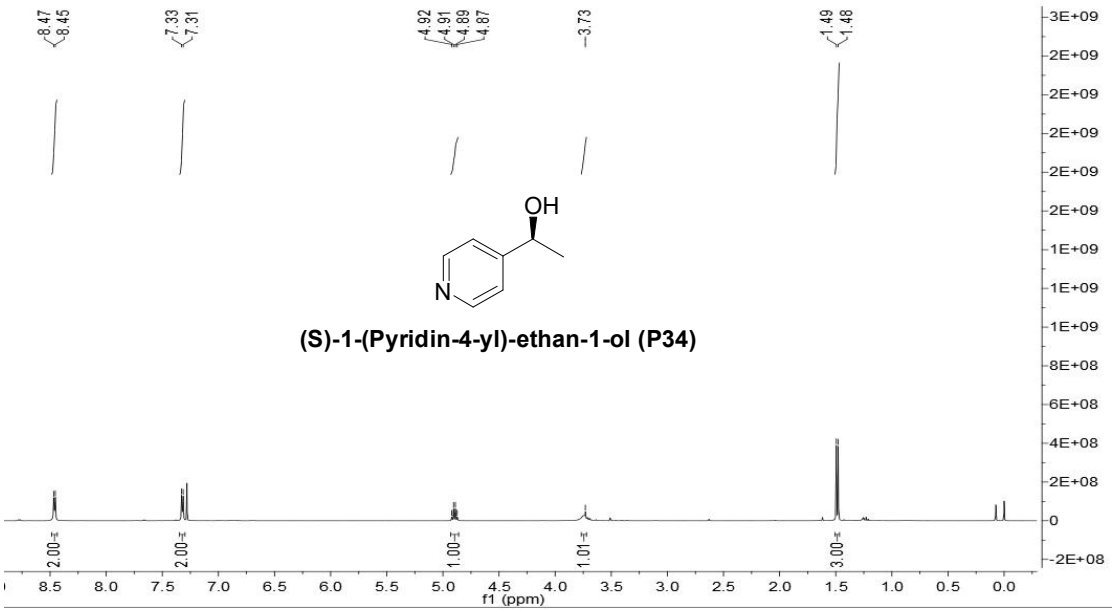
^{13}C{H} NMR ($CDCl_3$, 100 MHz) of (S)-1-(furan-2-yl)butan-1-ol (**P32**)



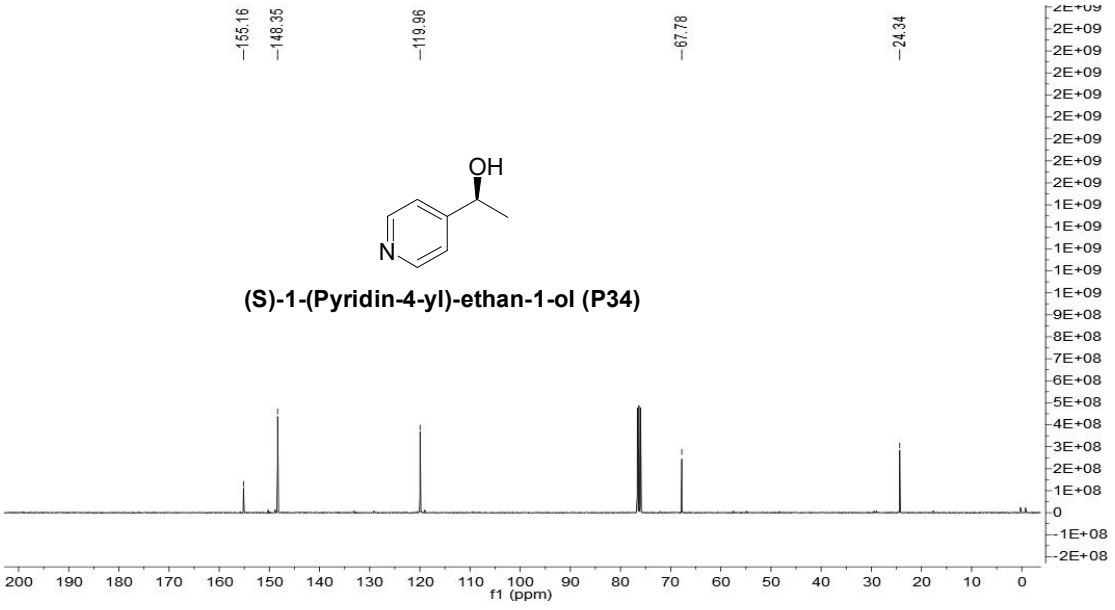
^{1}H NMR ($CDCl_3$, 400 MHz) of (S)-1-(Pyridin-3-yl)-ethan-1-ol (**P33**)



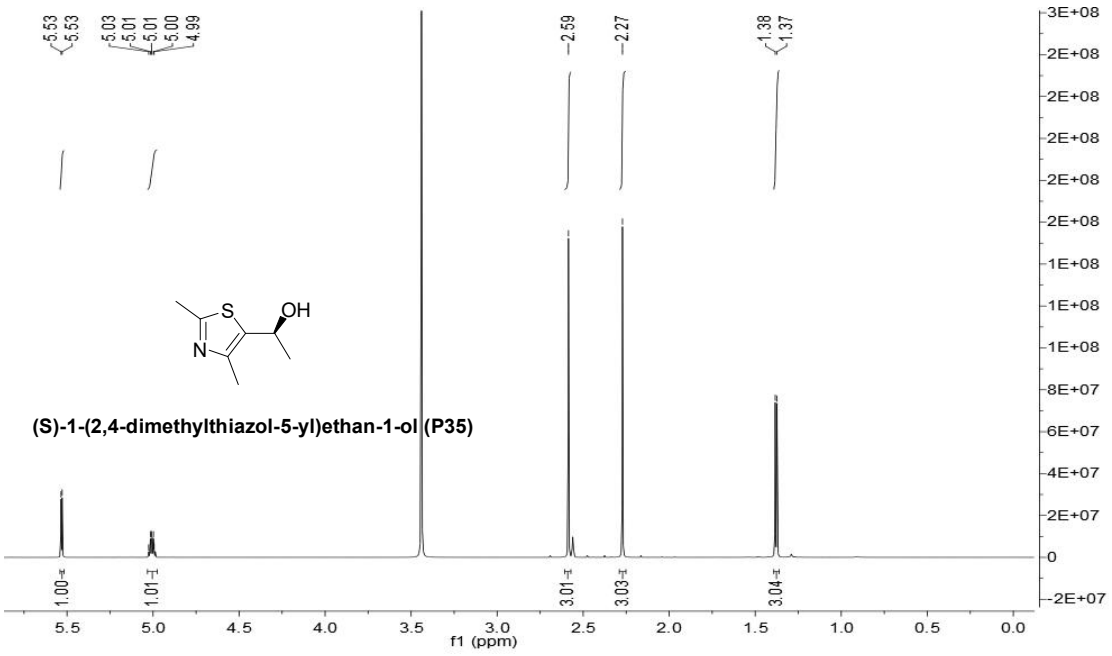
^{13}C{H} NMR ($CDCl_3$, 100 MHz) of (S)-1-(Pyridin-3-yl)-ethan-1-ol (**P33**)



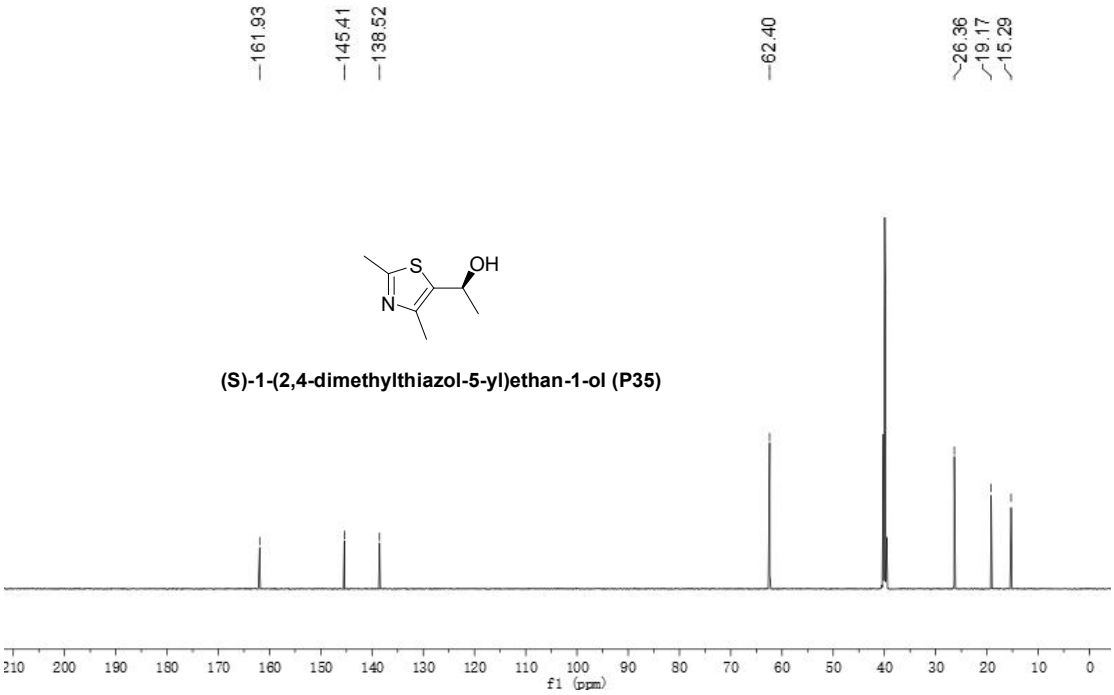
^{1}H NMR ($CDCl_3$, 400 MHz) of (S)-1-(Pyridin-4-yl)-ethan-1-ol (**P34**)



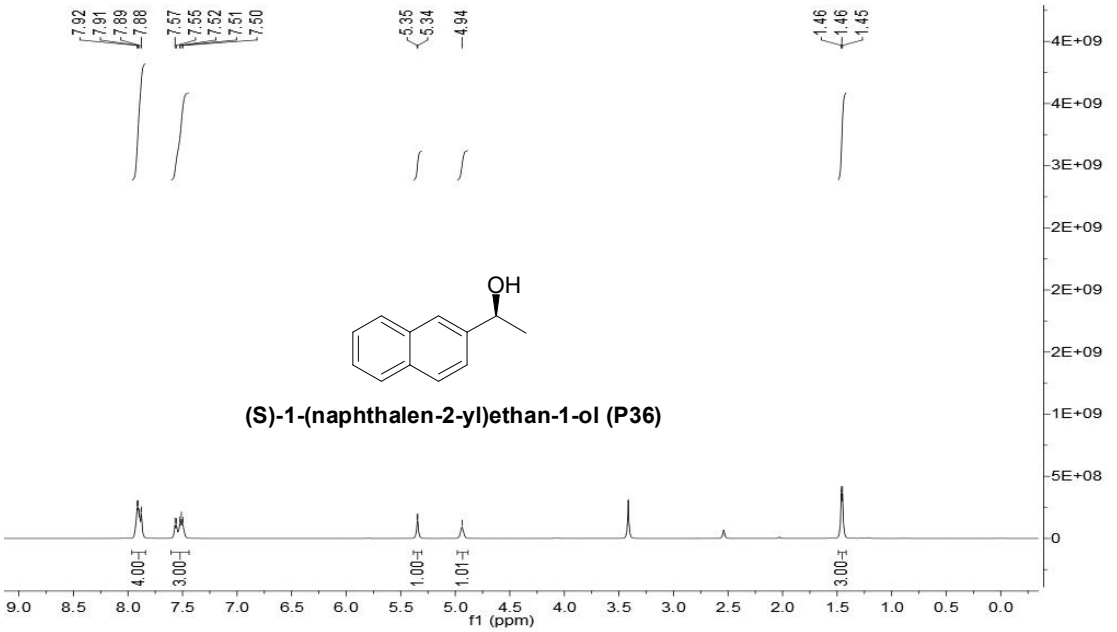
^{13}C{H} NMR ($CDCl_3$, 100 MHz) of (S)-1-(Pyridin-4-yl)-ethan-1-ol (**P34**)



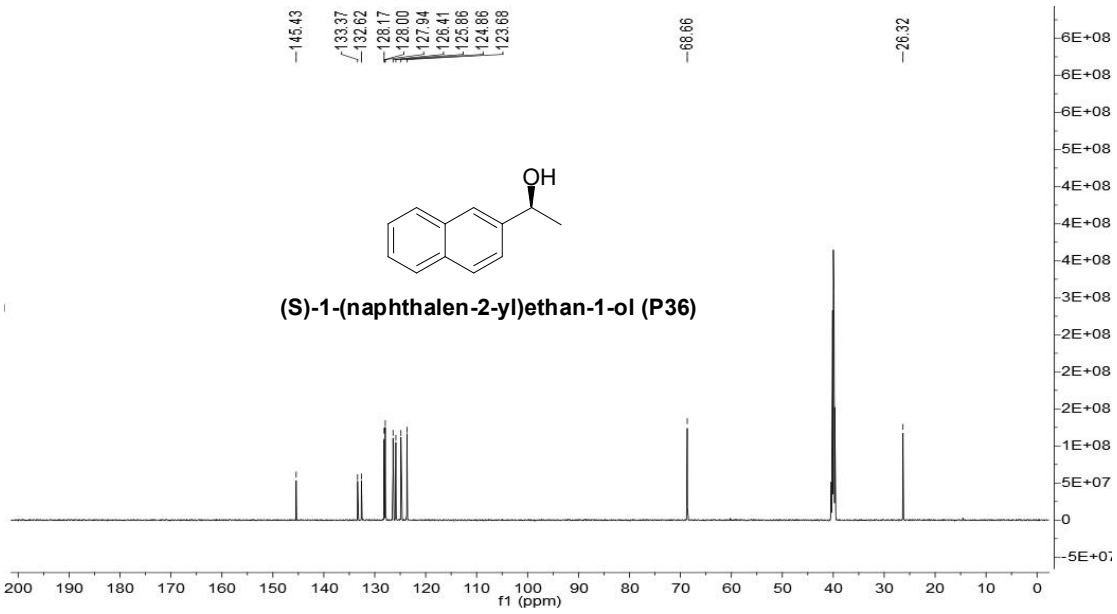
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(2,4-dimethylthiazol-5-yl)ethan-1-ol (**P35**)



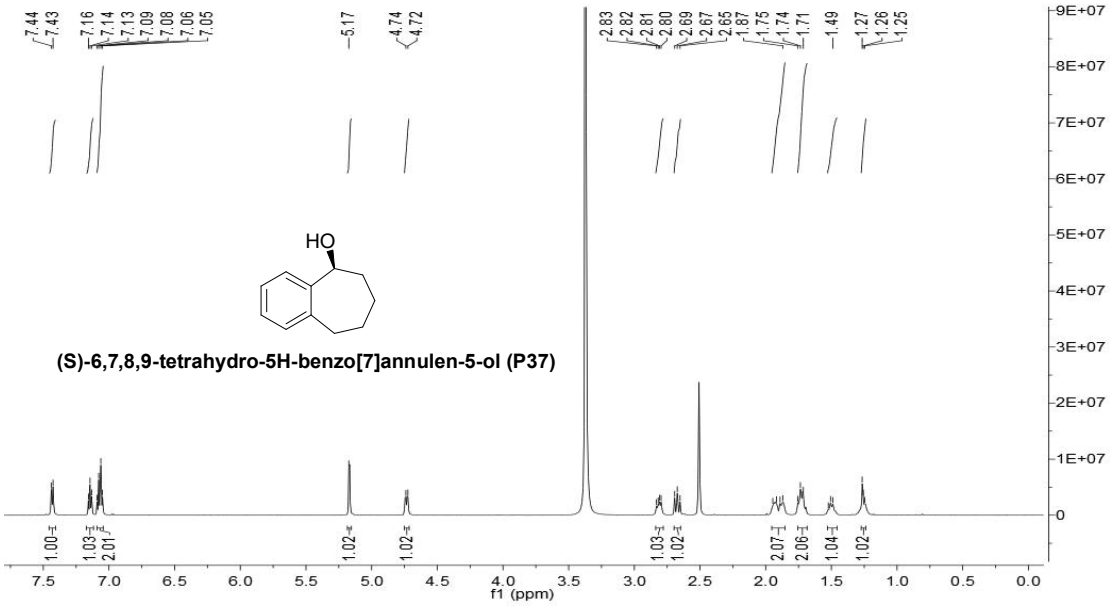
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(2,4-dimethylthiazol-5-yl)ethan-1-ol (**P35**)



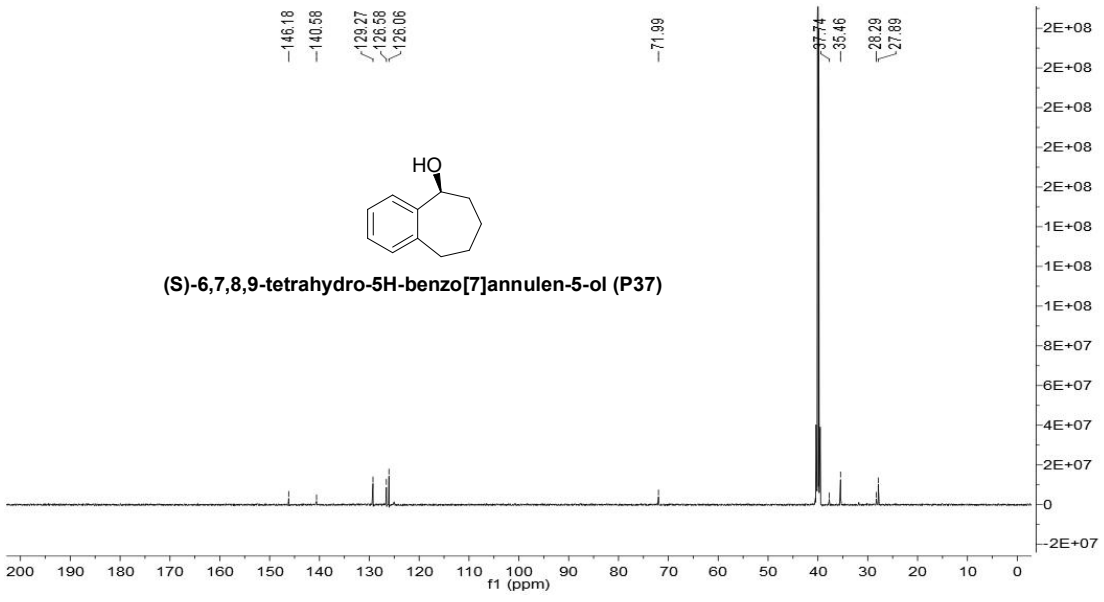
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1-(naphthalen-2-yl)ethan-1-ol (**P36**)



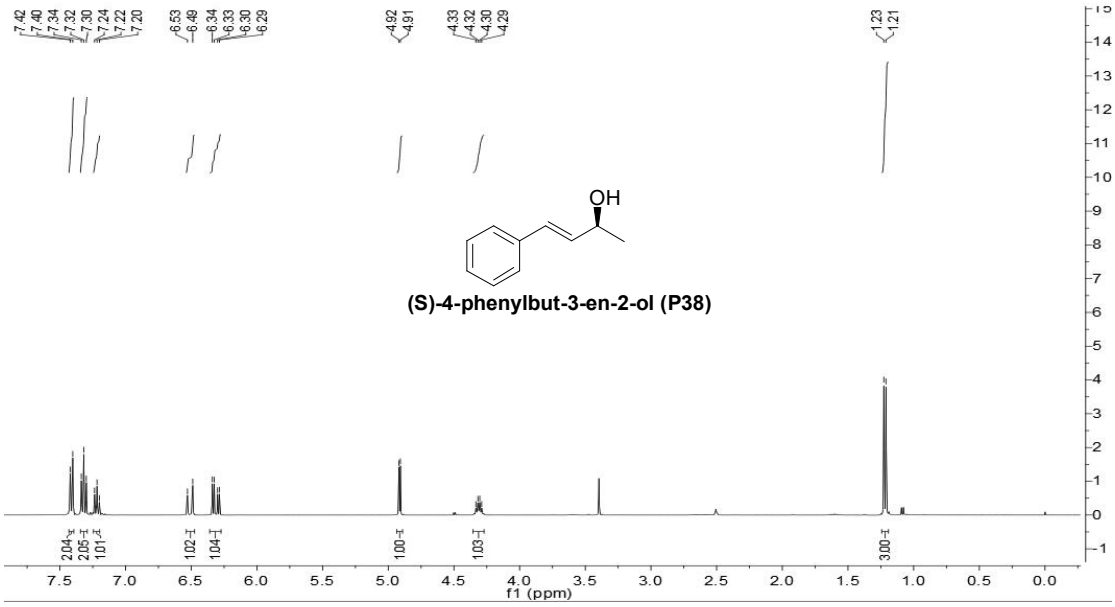
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1-(naphthalen-2-yl)ethan-1-ol (**P36**)



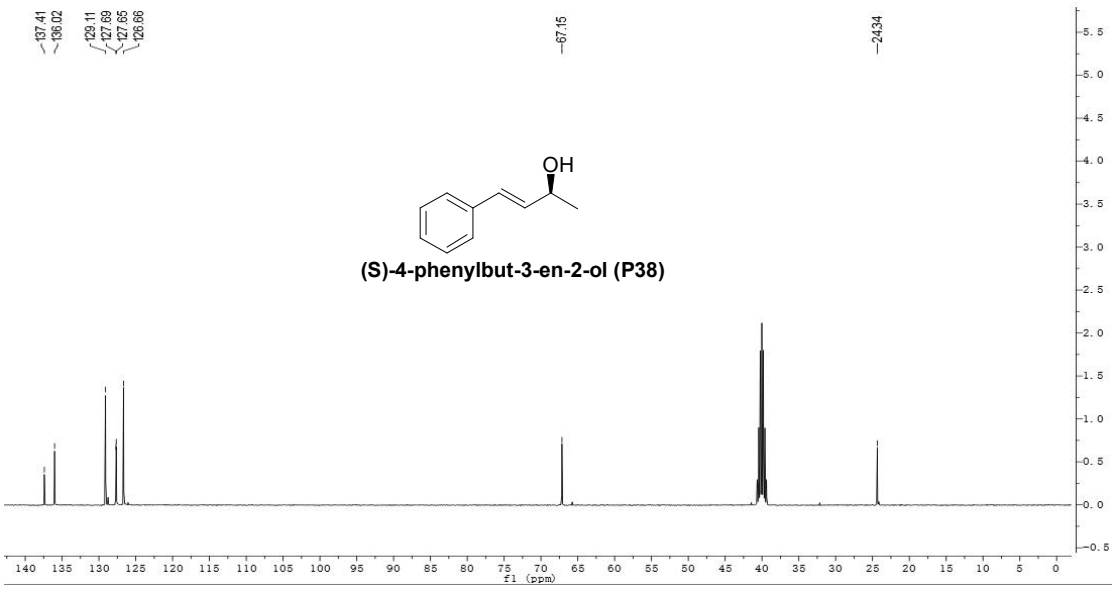
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-6,7,8,9-tetrahydro-5H-benzo[7]annulen-5-ol (**P37**)



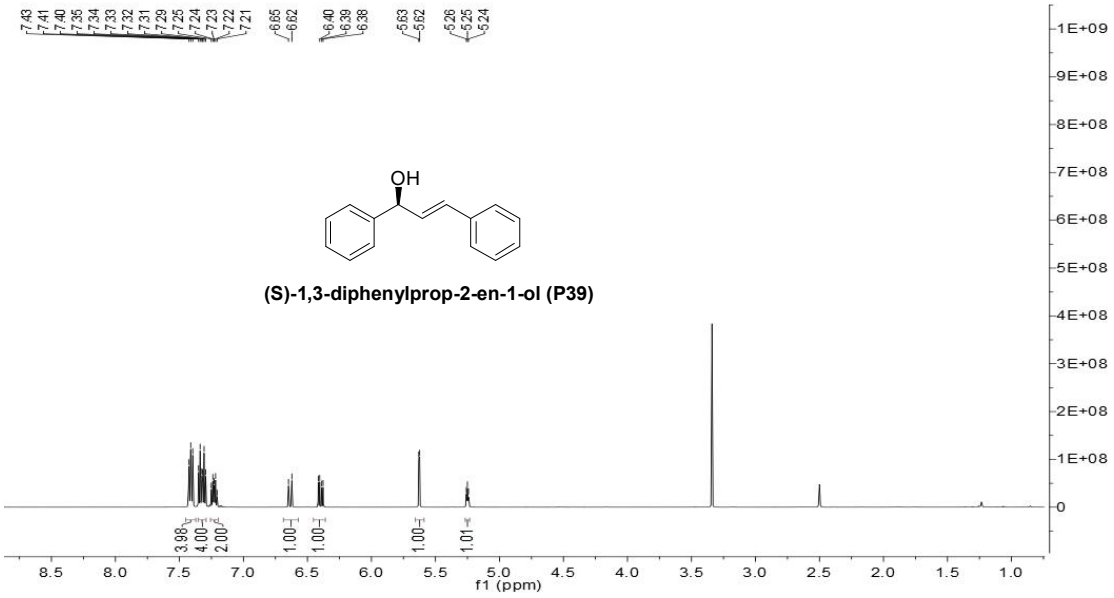
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-6,7,8,9-tetrahydro-5H-benzo[7]annulen-5-ol (**P37**)



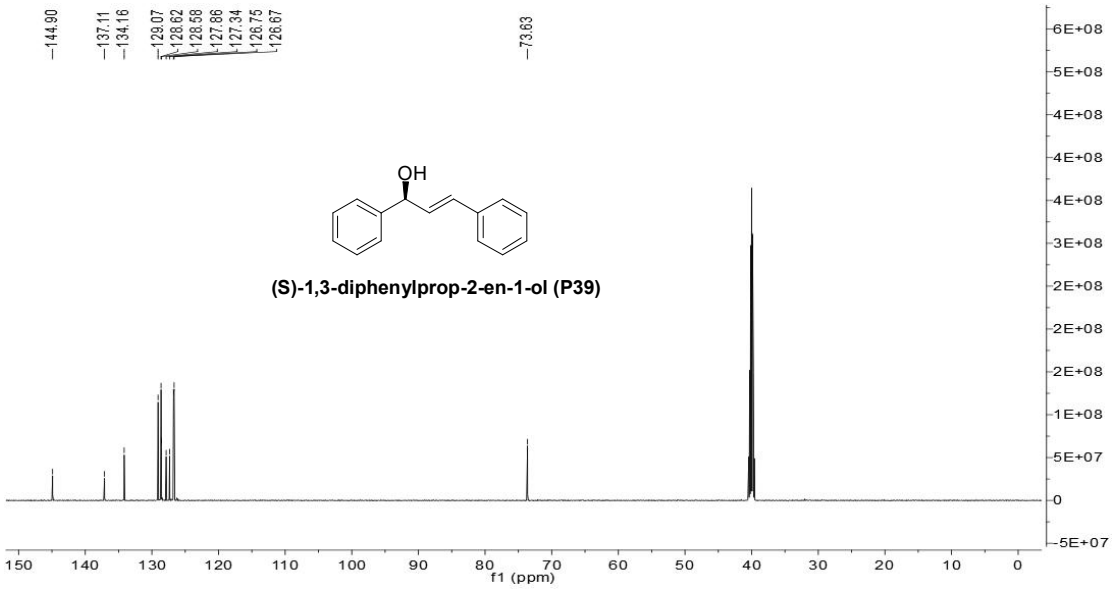
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-4-phenylbut-3-en-2-ol (**P38**)



^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-4-phenylbut-3-en-2-ol (**P38**)



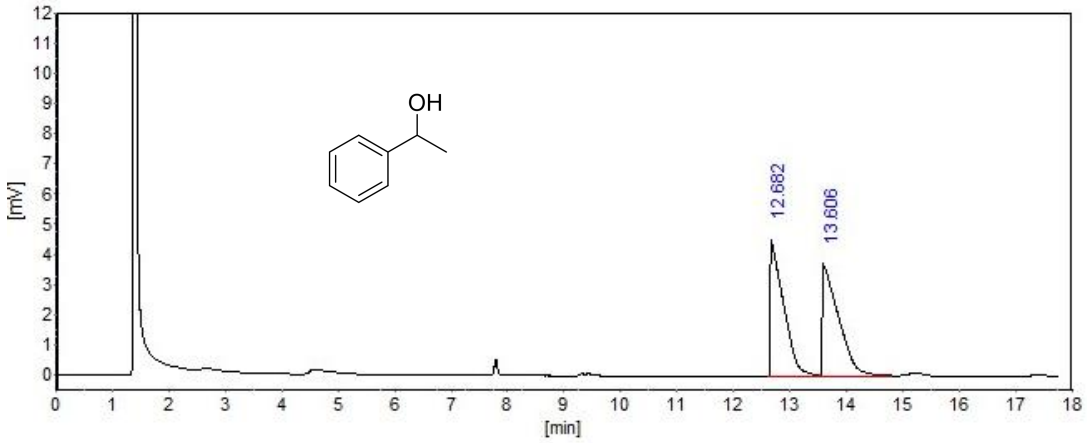
^{1}H NMR (DMSO-d_6, 600 MHz) of (S)-1,3-diphenylprop-2-en-1-ol (**P39**)



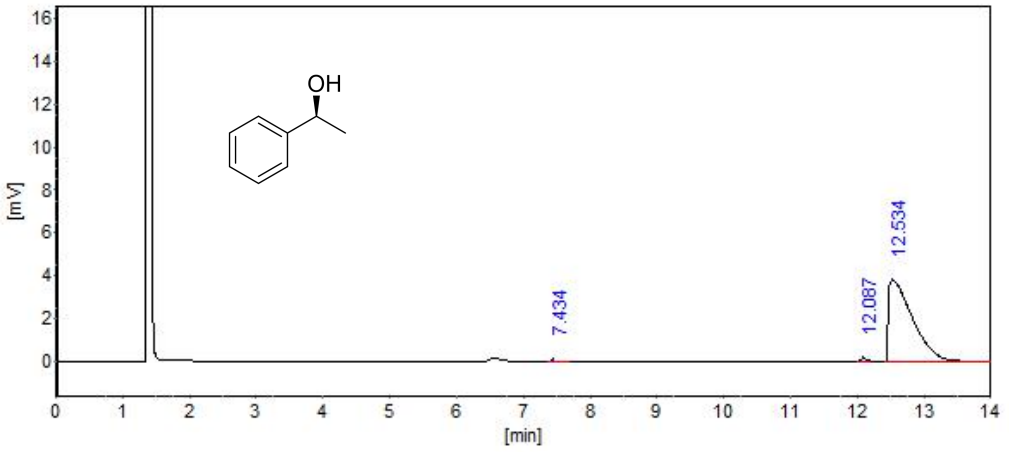
^{13}C{H} NMR (DMSO-d_6, 150 MHz) of (S)-1,3-diphenylprop-2-en-1-ol (**P39**)

7. HPLC and GC chromatograms of alcohol products

(±)-1-Phenylethanol : The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; injector temperature: 250 ℃; detector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.08 MPa.

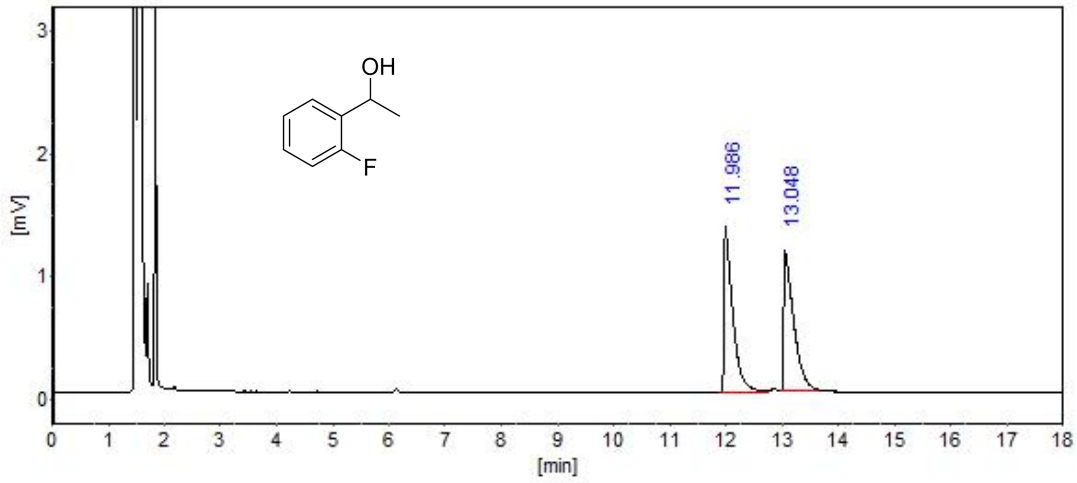


(*S*)-1-Phenylethanol (P1): 98.8% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.08 MPa.

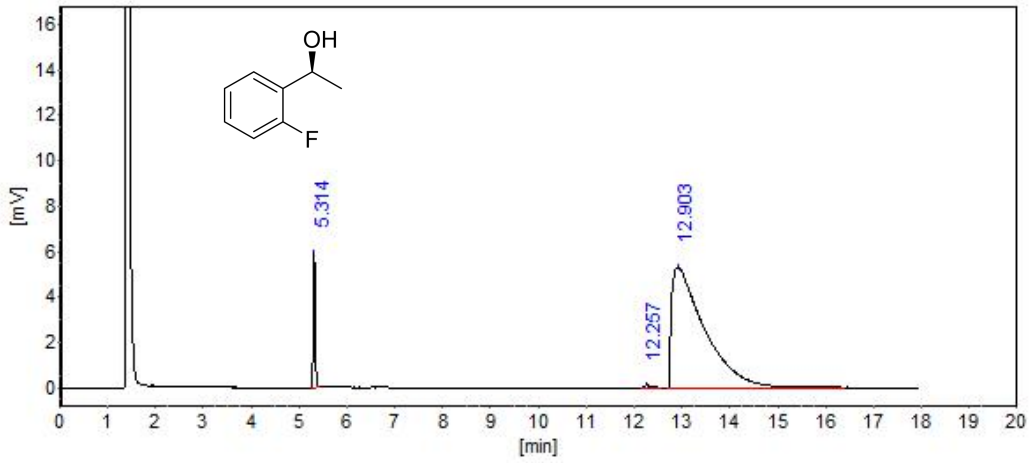


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	12.087	564	0.581
3	12.534	96467	99.419

(±)-1-(2-Fluoro-phenyl)-ethanol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2 ; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.08 MPa.

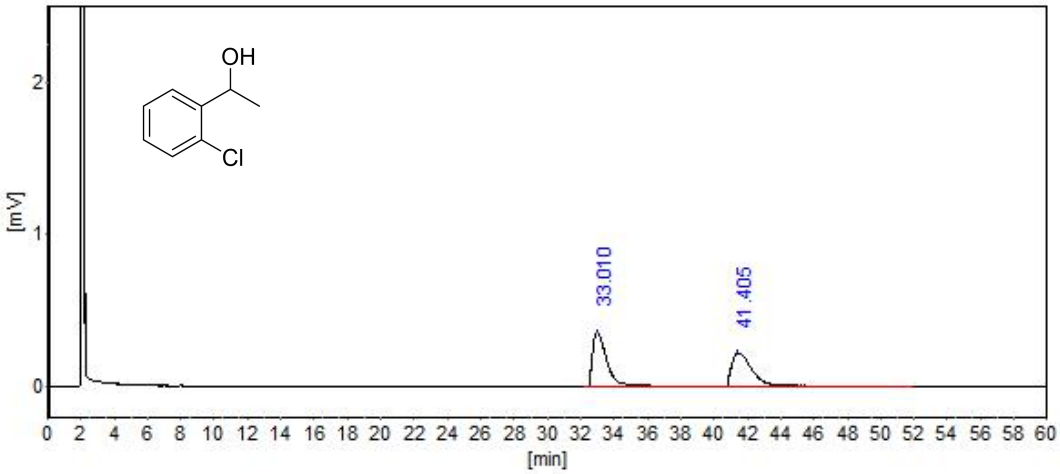


(*S*)-1-(2-Fluoro-phenyl)-ethanol (P2): 99.2% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.08 MPa.

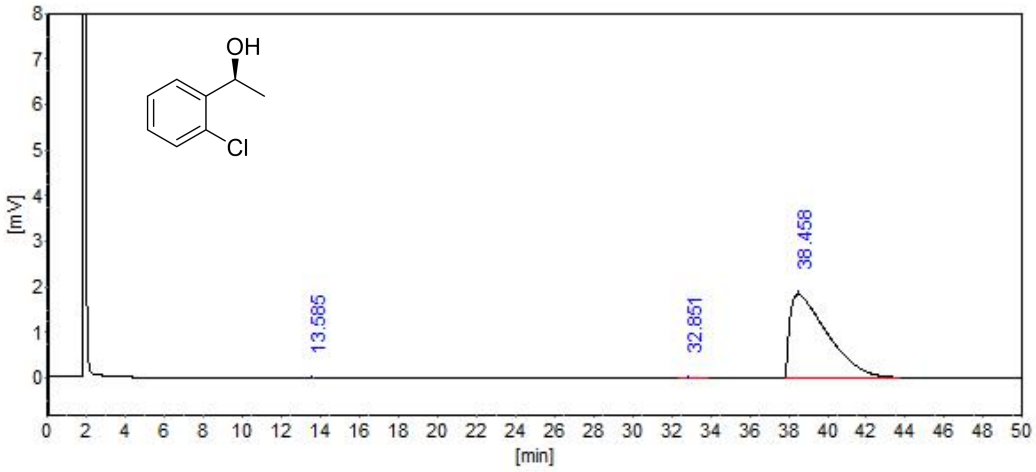


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	12.257	1002	0.395
3	12.903	252296	99.605

(±)-1-(2-Chlorophenyl)-ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

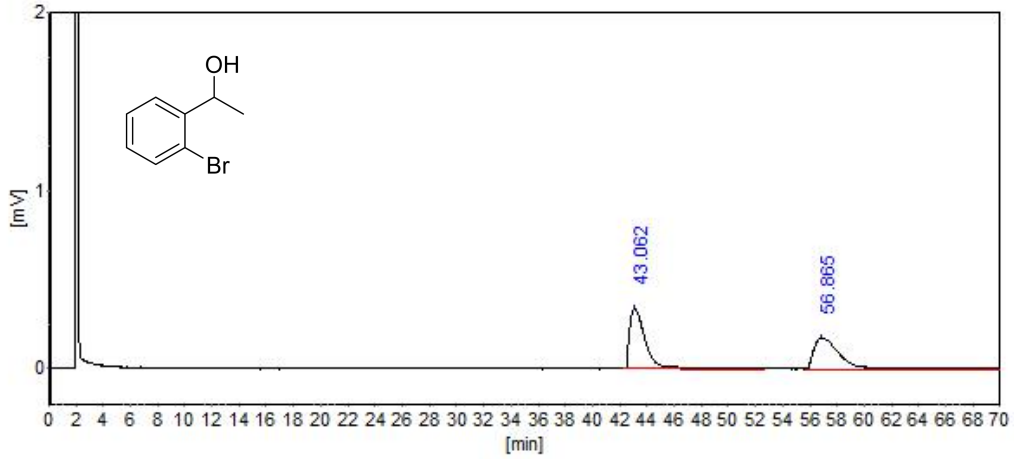


(*S*)-1-(2-Chlorophenyl)-ethan-1-ol (P3): 99.7% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

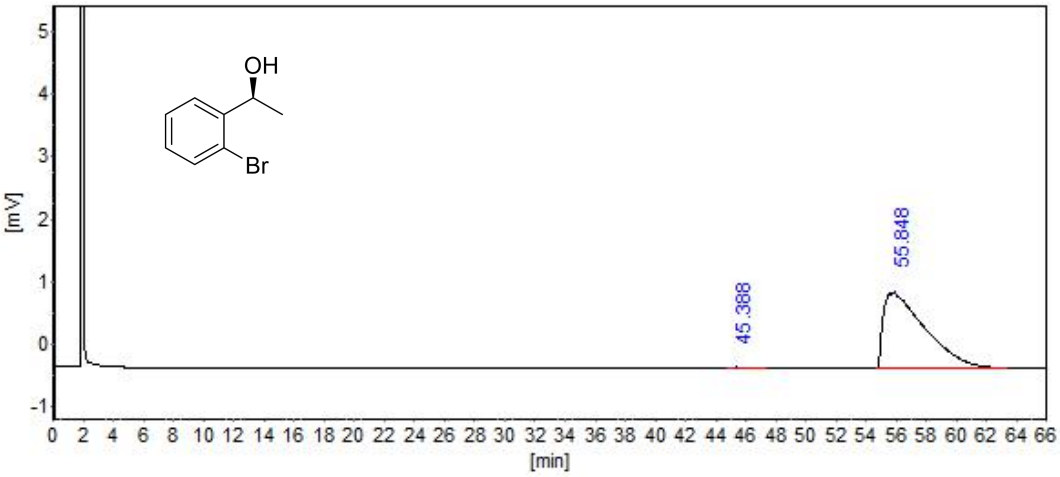


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	32.851	360	0.145
3	38.458	247284	99.855

(±)-1-(2-Bromophenyl)-ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.06 MPa.

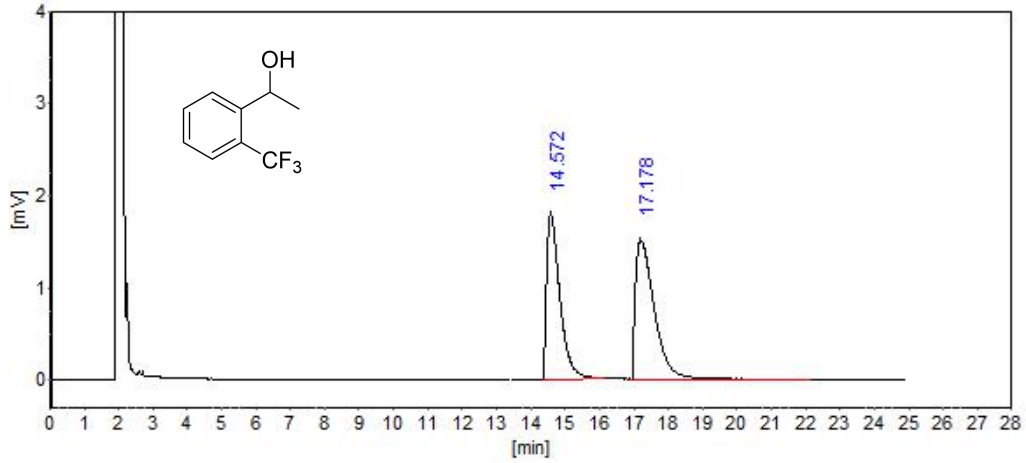


(*S*)-1-(2-Bromophenyl)-ethan-1-ol (P4): 99.6% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.06 MPa.

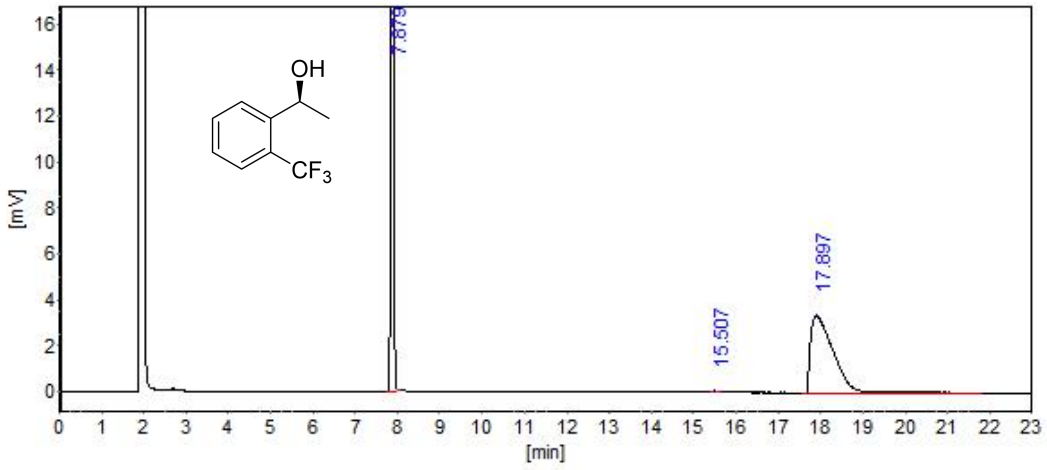


Peak	Retention time [min]	Area [uv*s]	Area [%]
1	45.388	476	0.202
2	55.848	235676	99.798

(±)-1-(2-Trifluoromethyl-phenyl)-ethanol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

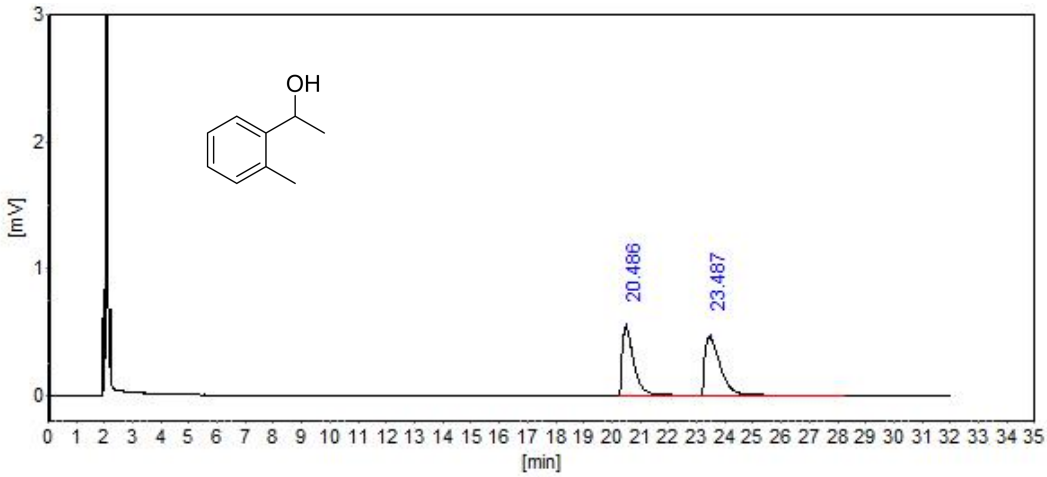


(*S*)-1-(2-Trifluoromethyl-phenyl)-ethanol (P5): 99.7% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

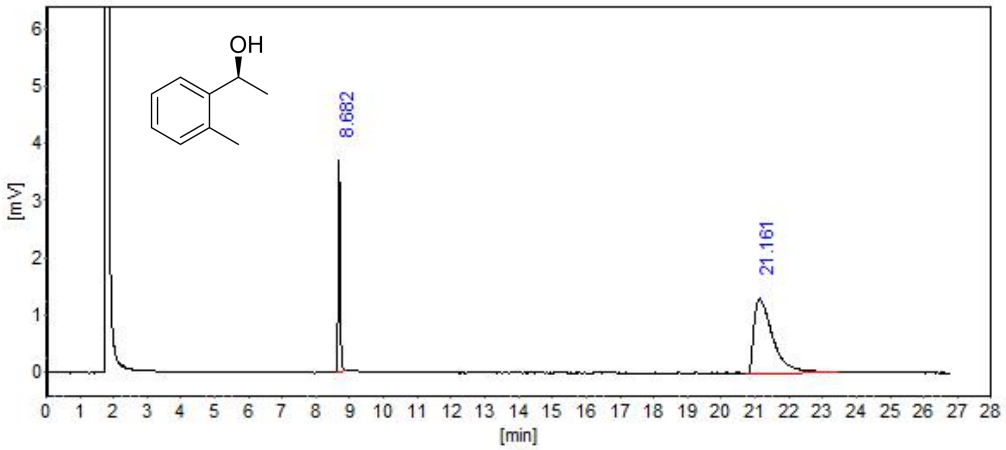


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	15.507	184	0.148
3	17.897	124193	99.852

(±)-1-o-Tolyl-ethanol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

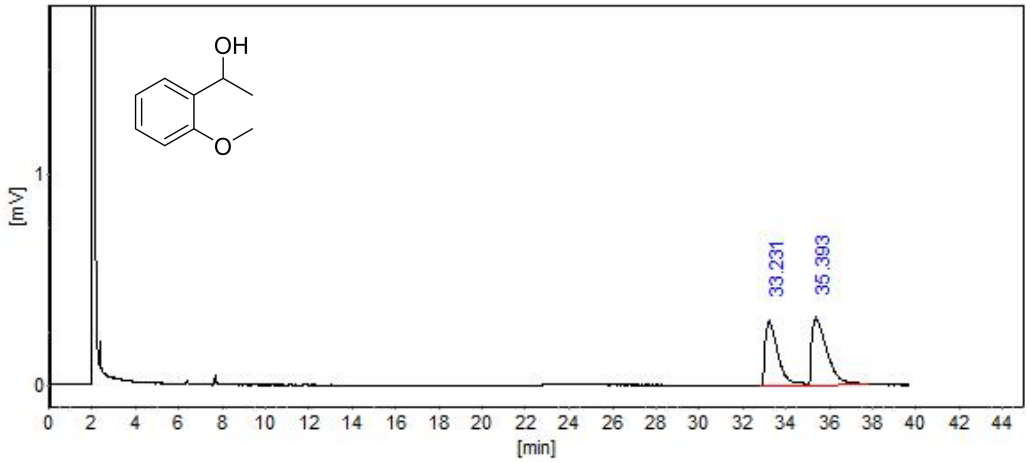


(*S*)-1-o-Tolyl-ethanol (P6): 99.9% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

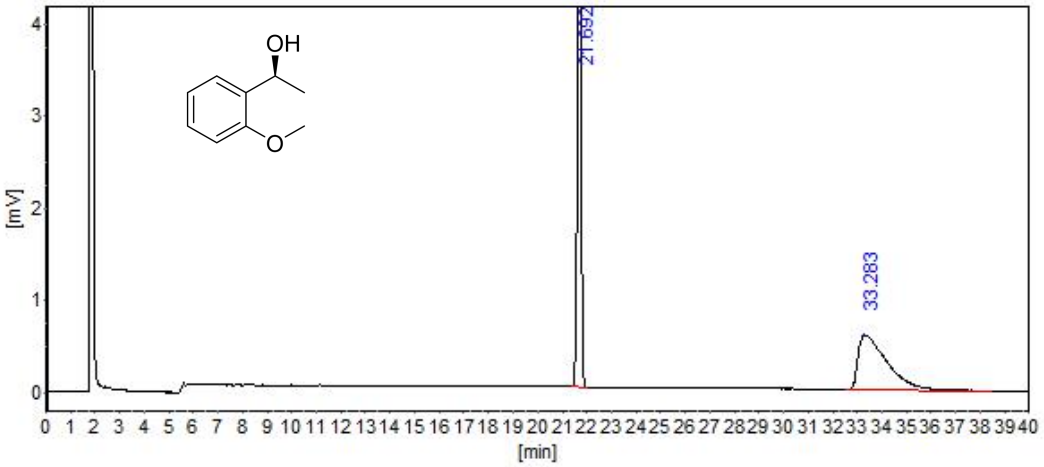


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	21.129	50069	100

(±)-1-(2-Methoxy-phenyl)-ethanol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

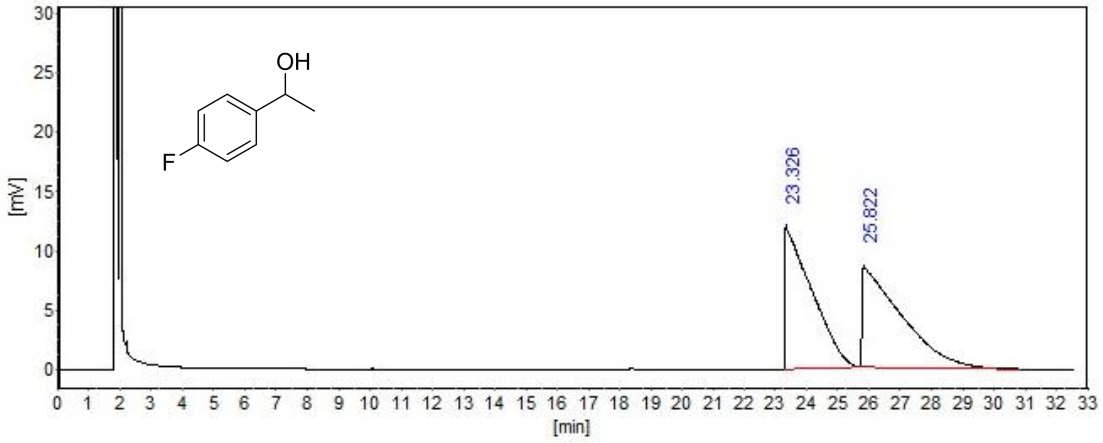


(*S*)-1-(2-Methoxy-phenyl)-ethanol (P7): 99.9% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

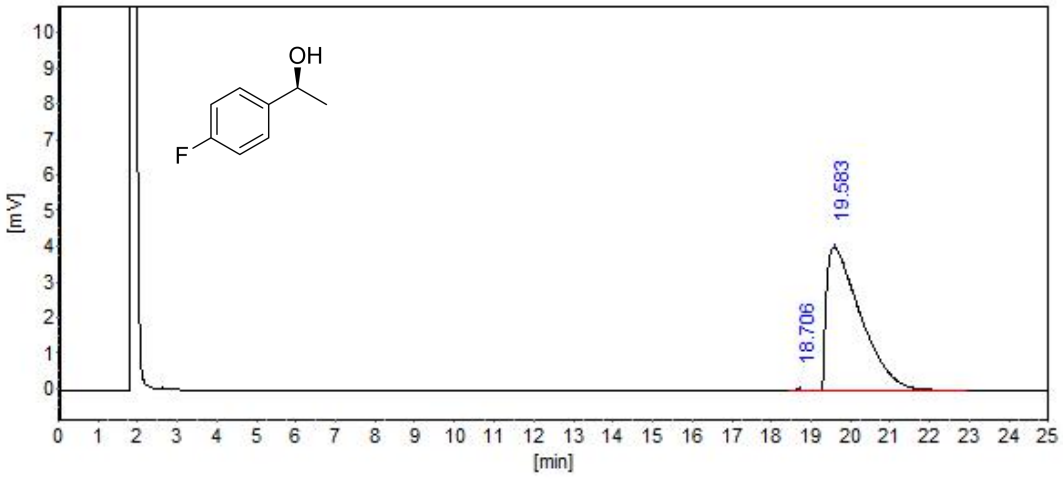


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	33.283	48772	100

(±)-1-(4-Fluoro-phenyl)-ethanol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

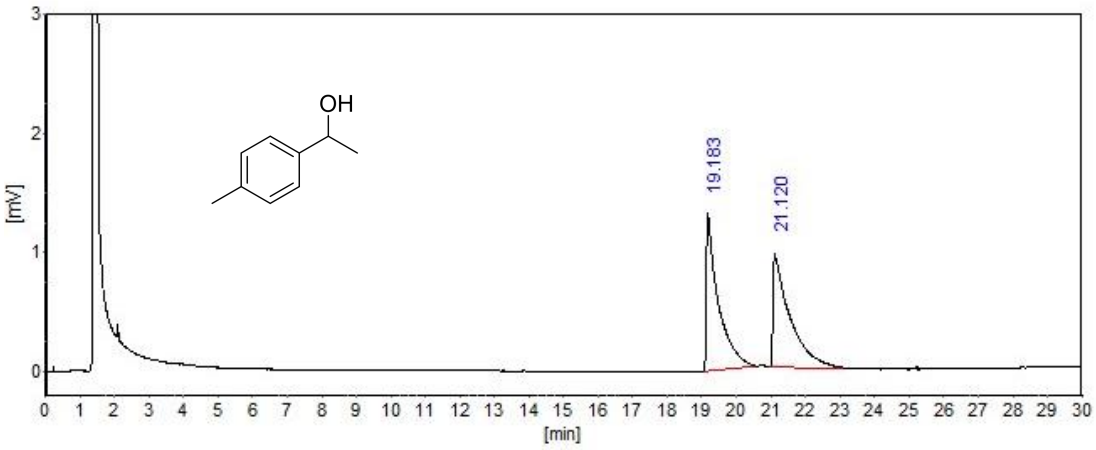


(*S*)-1-(4-Fluoro-phenyl)-ethanol (P8): 99.4% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

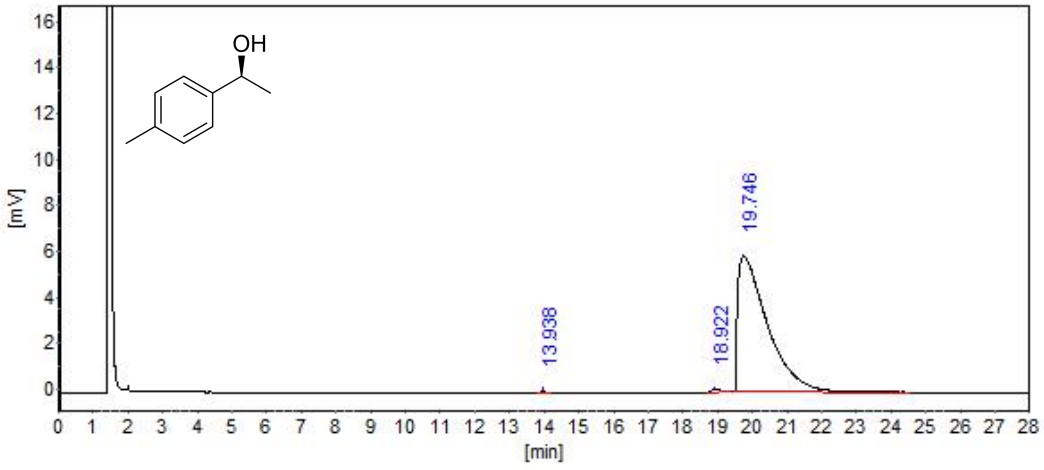


Peak	Retention time [min]	Area [uv*s]	Area [%]
1	18.706	787	0.324
2	19.583	242363	99.676

(±)-1-p-Tolyl-ethanol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.08 MPa.

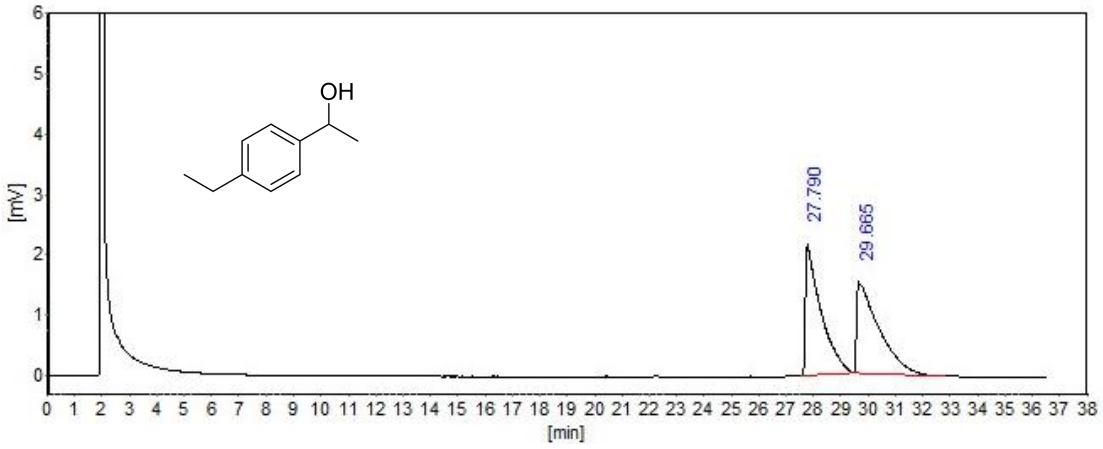


(*S*)-1-p-Tolyl-ethanol (P9): 98.6% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.08 MPa.

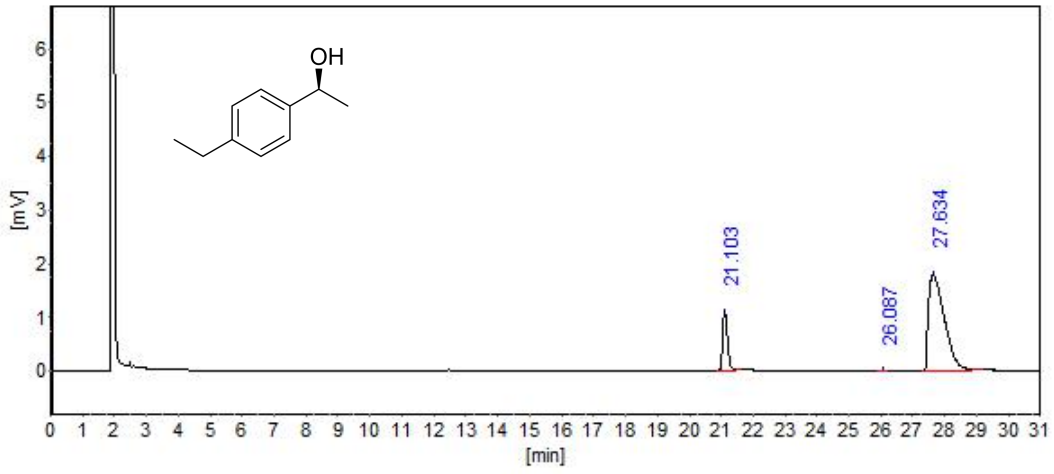


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	18.922	2375	0.673
3	19.746	350560	99.327

(±)-1-(4-ethylphenyl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

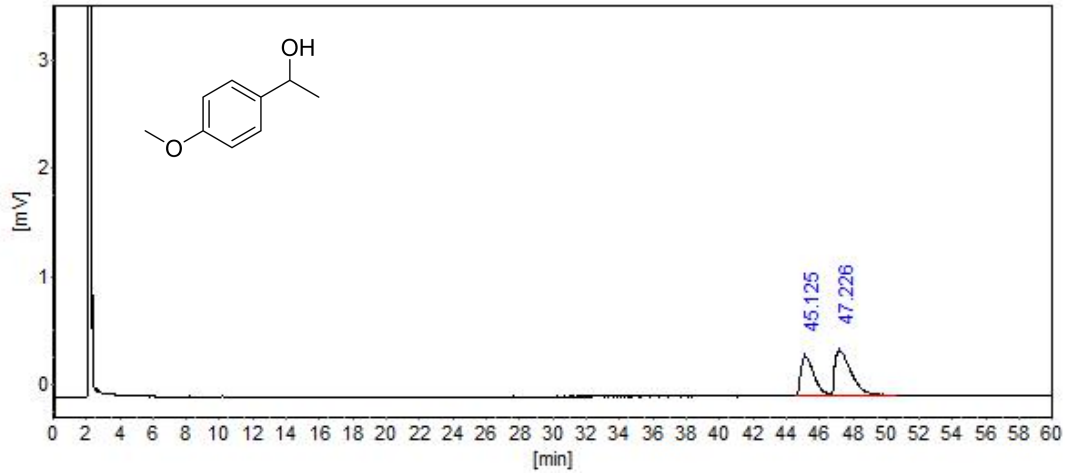


(*S*)-1-(4-ethylphenyl)ethan-1-ol (P10): 99.6% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

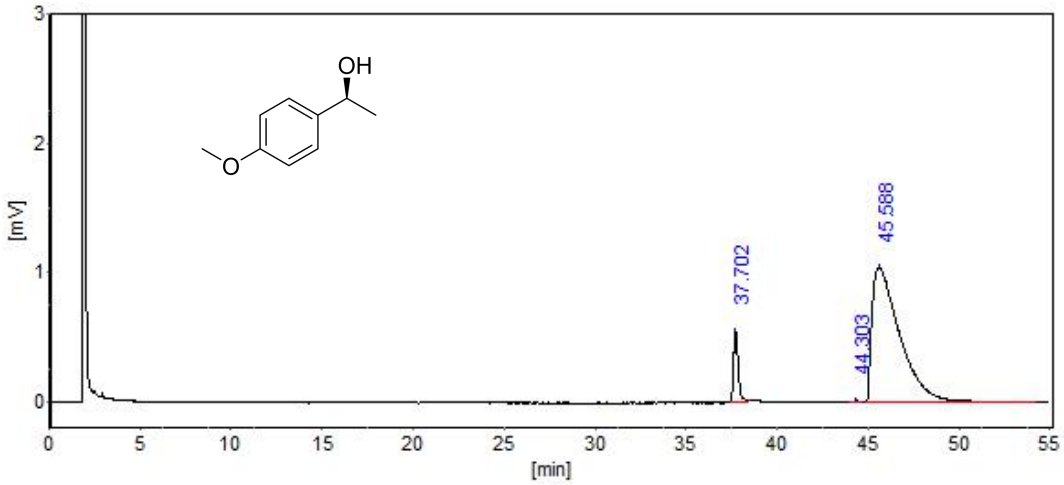


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	26.087	132	0.211
3	27.634	62339	99.789

(±)-1-(4-Methoxy-phenyl)-ethanol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

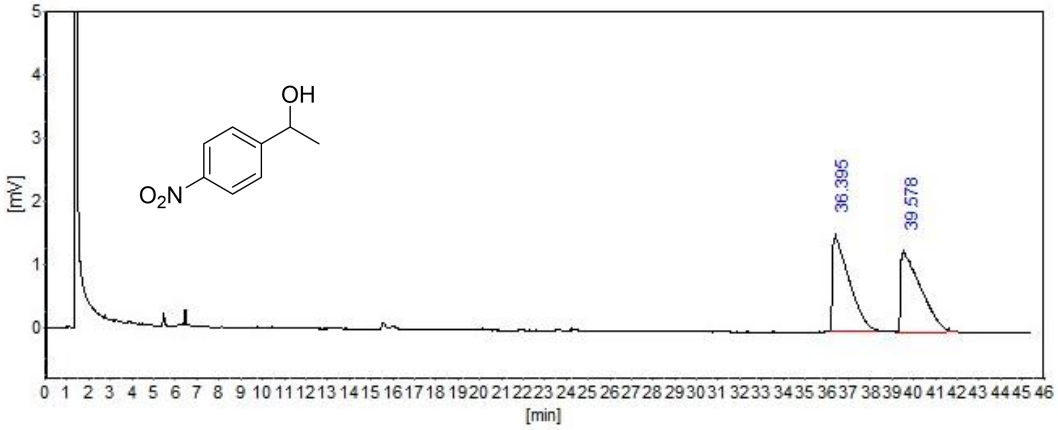


(*S*)-1-(4-Methoxy-phenyl)-ethanol (P11): 99.6% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

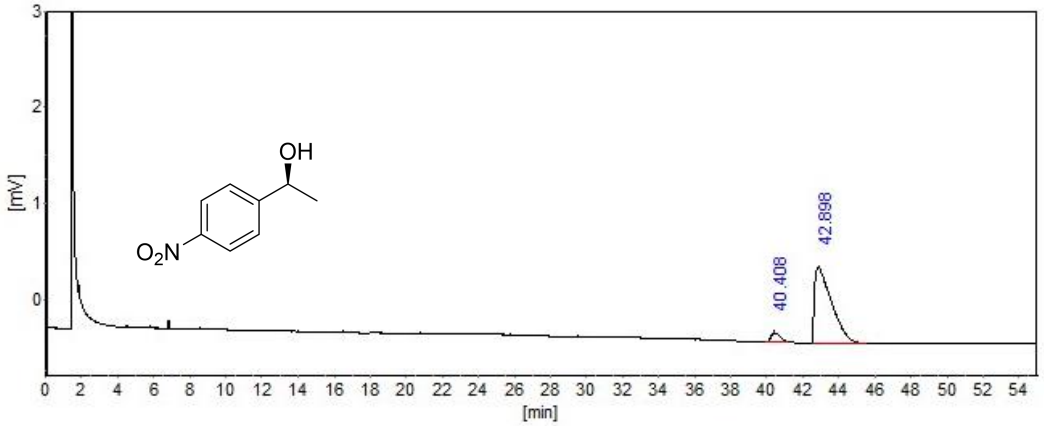


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	44.303	274	0.246
3	45.588	110993	99.754

(±)-1-(4-nitrophenyl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 160 ℃; inlet pressure = 0.08 MPa.

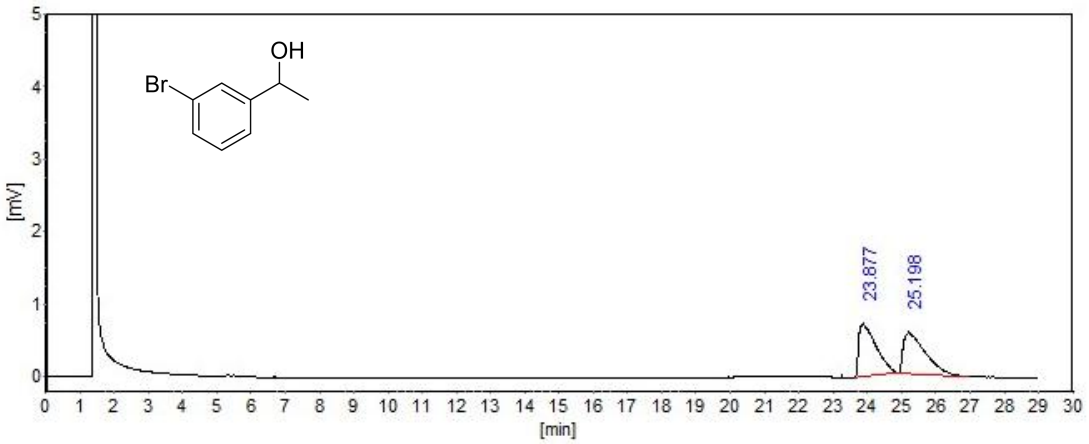


(S)-1-(4-nitrophenyl)ethan-1-ol: 88.5 % ee (*S*). The conversion and enantiomeric excess were determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 160℃; inlet pressure = 0.08 MPa.

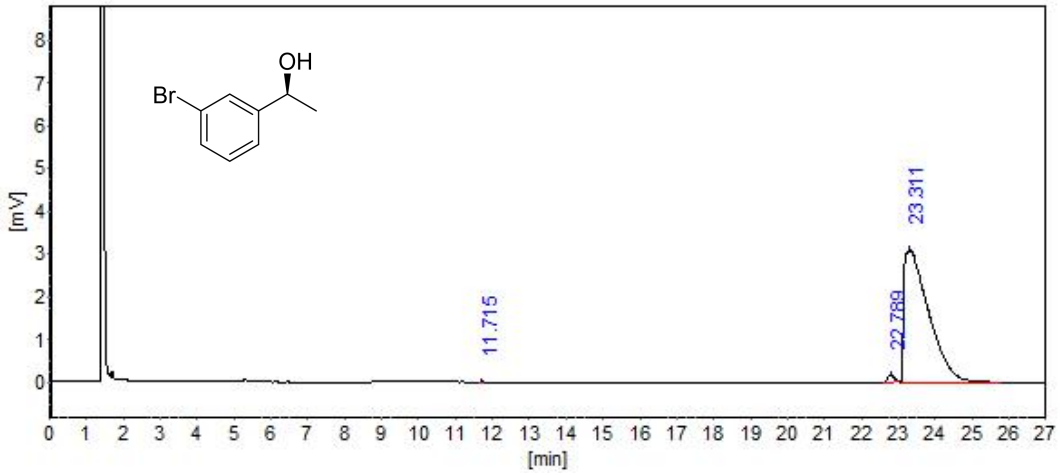


Peak	Retention time [min]	Area[uv*s]	%Area
1	40.408	3198	5.774
2	42.898	52186	94.226

(±)-1-(3-bromophenyl)ethan-1-ol： The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 140 ℃; inlet pressure = 0.08 MPa.

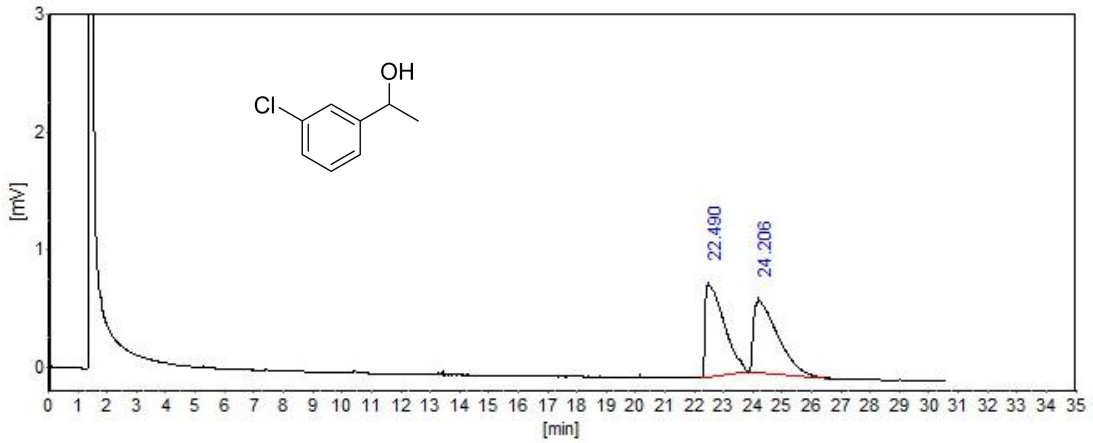


(*S*)-1-(3-bromophenyl)ethan-1-ol (P12): 97.2 % ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 140 ℃; inlet pressure = 0.08 MPa.

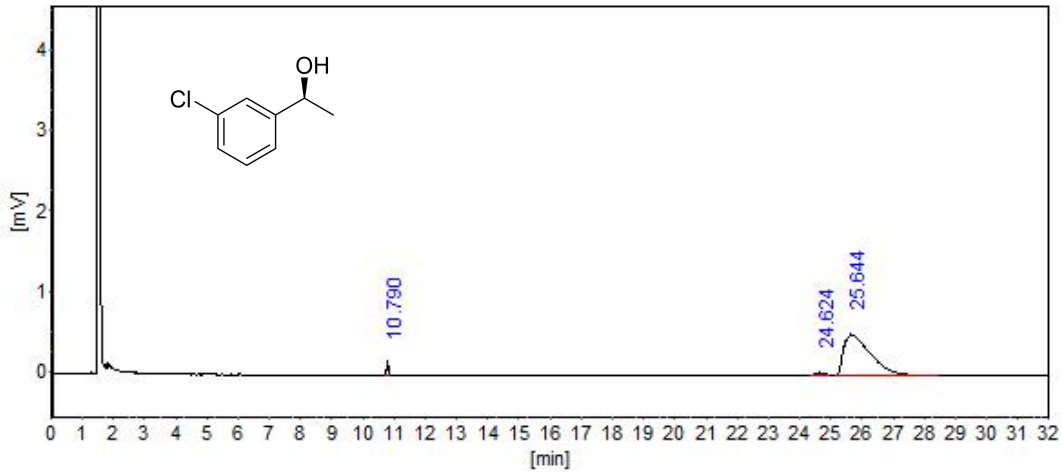


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	22.789	2035	1.395
3	23.311	143807	98.605

(±)-1-(3-chlorophenyl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130℃; inlet pressure = 0.08 MPa.

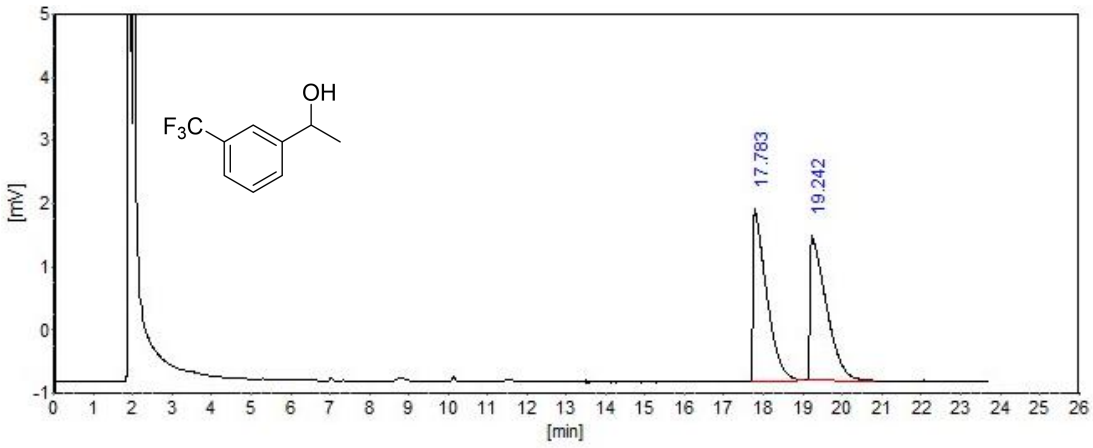


(*S*)-1-(3-chlorophenyl)ethan-1-ol (P13): 97.3 % ee (S). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130℃; inlet pressure = 0.08 MPa.

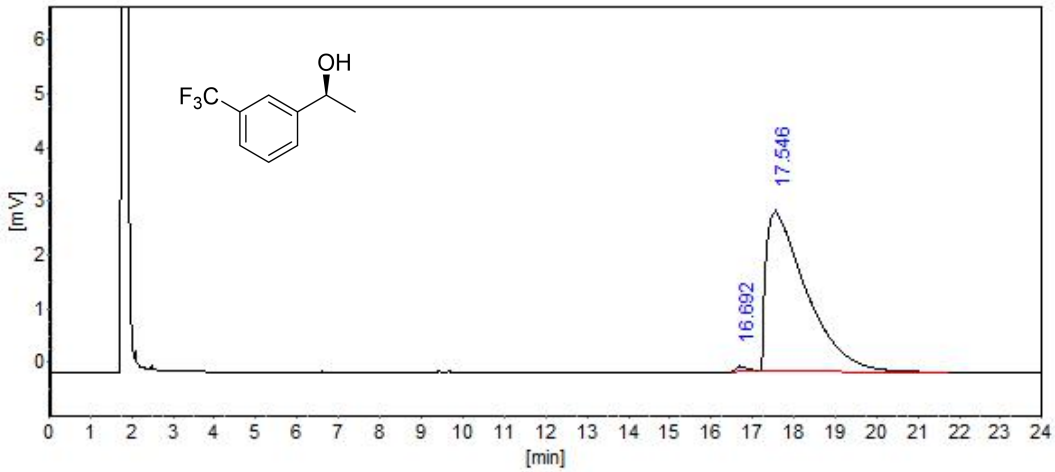


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	24.624	407	1.331
3	25.644	30193	98.669

(±)-1-(3-(trifluoromethyl)phenyl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

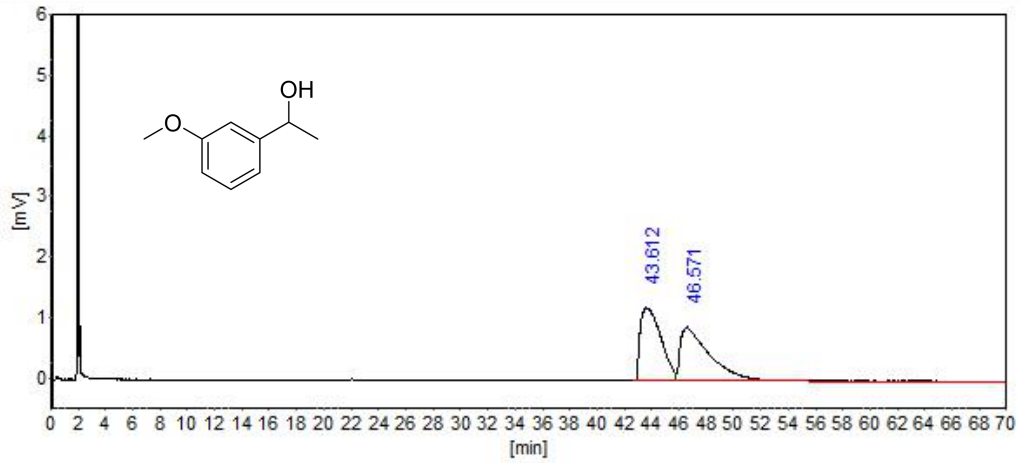


(*S*)-1-(3-(trifluoromethyl)phenyl)ethan-1-ol (P14): 98.4% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

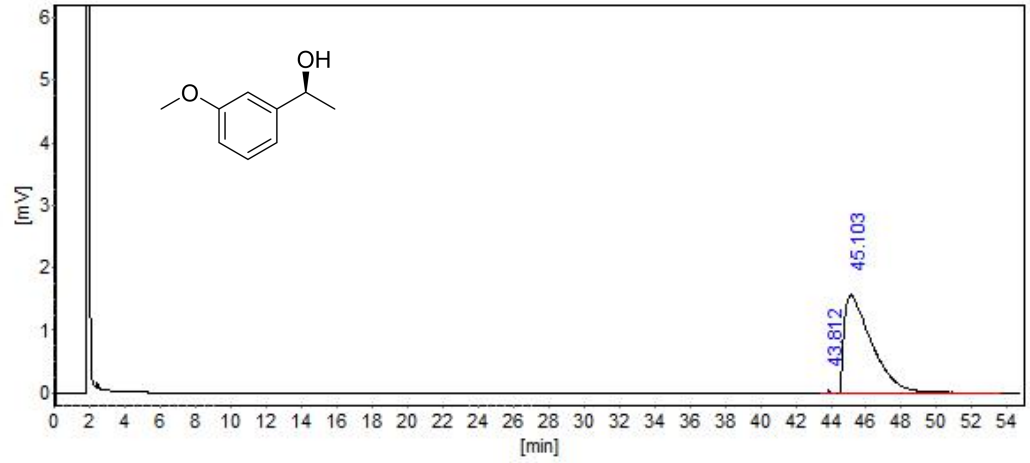


Peak	Retention time [min]	Area [uv*s]	Area [%]
1	16.692	1633	0.804
2	17.546	201466	99.196

(±)-1-(3-methoxyphenyl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

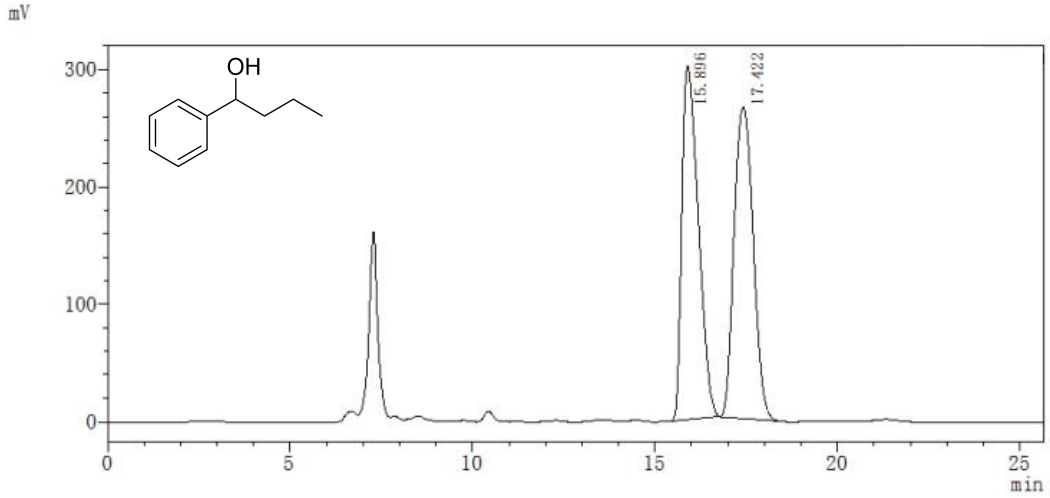


(*S*)-1-(3-methoxyphenyl)ethan-1-ol (P15): 99.6% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

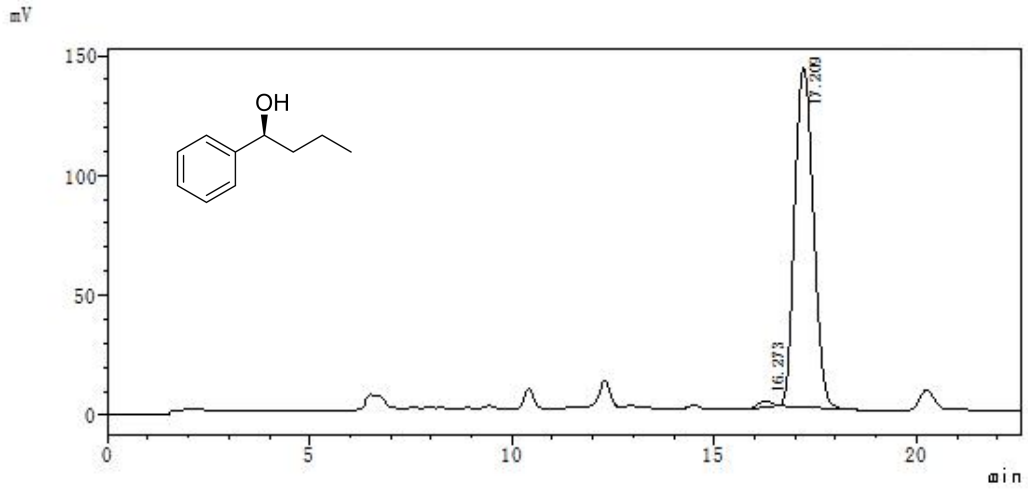


Peak	Retention time [min]	Area [uv*s]	Area [%]
1	43.812	277	0.162
2	45.103	170442	99.837

(±)-1-Phenyl-butan-1-ol: The racemate was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 95:5; flow rate = 0.5 mL/min; UV detection at 254 nm.

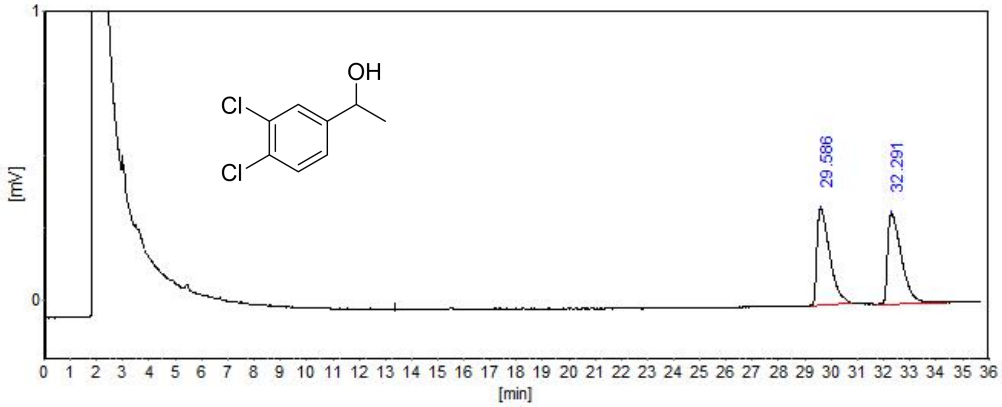


(*S*)-1-Phenyl-butan-1-ol (P16): 97.6% ee (*S*). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 95:5; flow rate = 0.5 mL/min; UV detection at 254 nm.

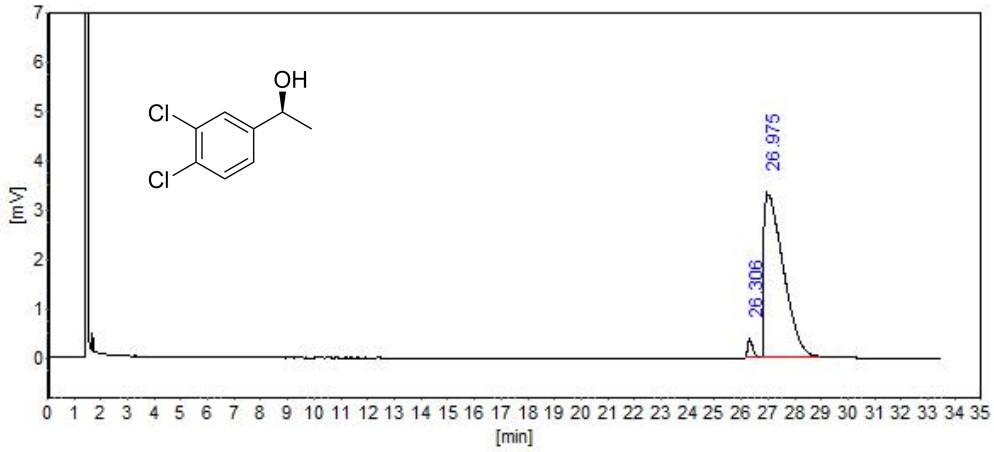


Peak	Retention time [min]	Peak Area [mAU*s]	Peak Area [%]
1	16.273	55793	1.210
2	17.209	4555539	98.790

(±)-1-(3,4-dichlorophenyl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 150 ℃; inlet pressure = 0.08 MPa.

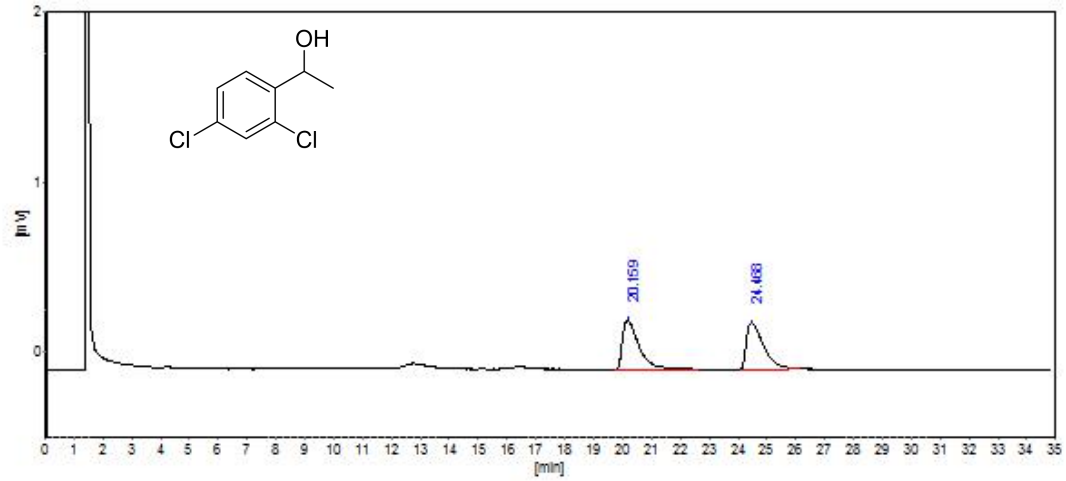


(*S*)-1-(3,4-dichlorophenyl)ethan-1-ol: 94.7 % ee (*S*). The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 150 ℃; inlet pressure = 0.08 MPa.

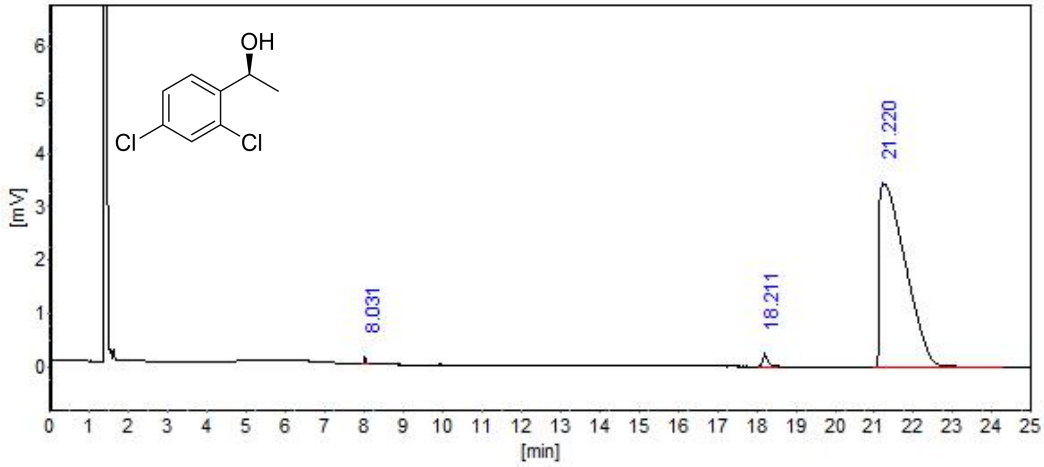


Peak	Retention time [min]	Area[uv*s]	%Area
1	26.306	4539	2.646
2	26.975	166980	97.354

(±)-1-(2,4-dichlorophenyl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 150 ℃; inlet pressure = 0.08 MPa.

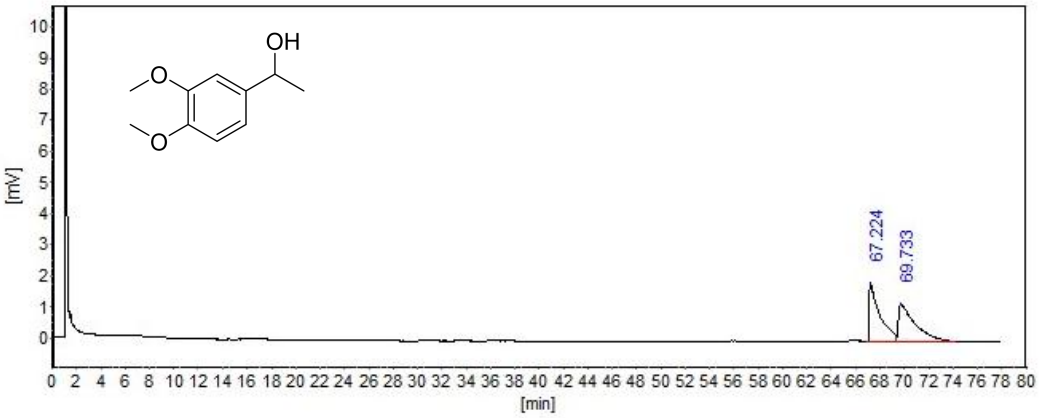


(*S*)-1-(2,4-dichlorophenyl)ethan-1-ol (P17): 97.4 % ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 150 ℃; inlet pressure = 0.08 MPa.

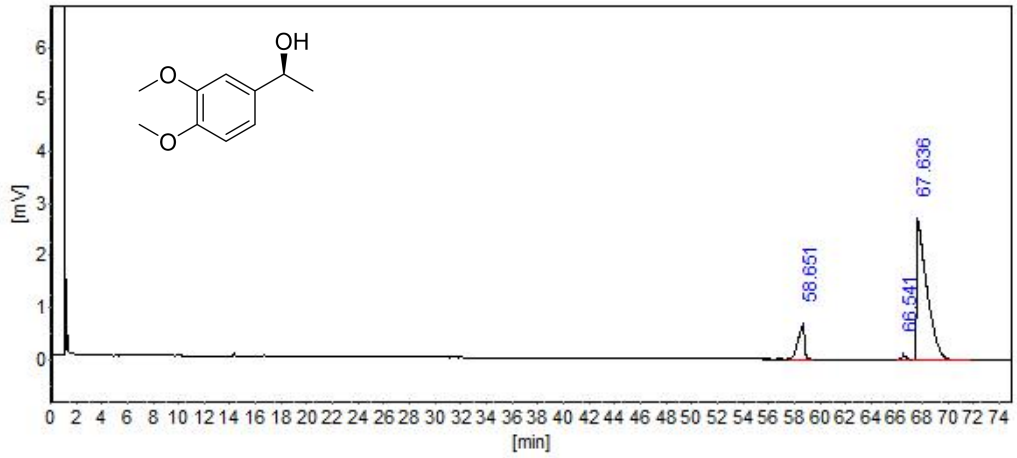


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	18.211	2133	1.322
3	21.220	159208	98.678

(±)-1-(3,4-dimethoxyphenyl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.1 MPa.

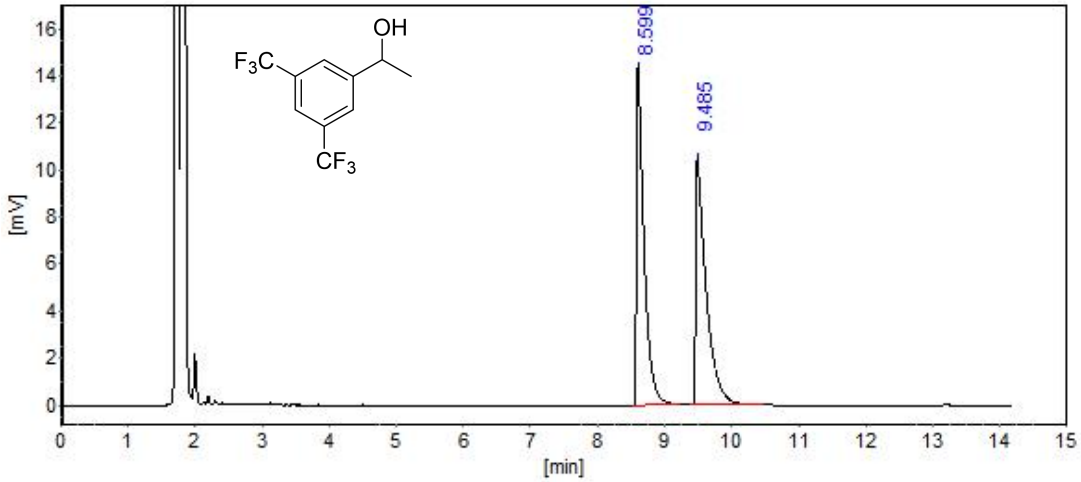


(*S*)-1-(3,4-dimethoxyphenyl)ethan-1-ol (P18): 97.6 % ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.1 MPa.

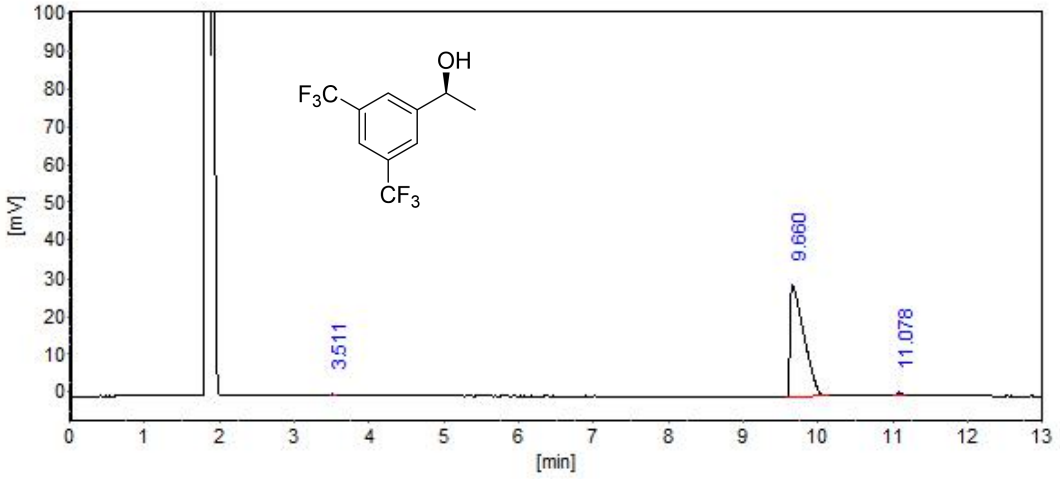


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	66.541	1815	1.193
3	67.636	150301	98.807

(±)-1-(3,5-bis(trifluoromethyl)phenyl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

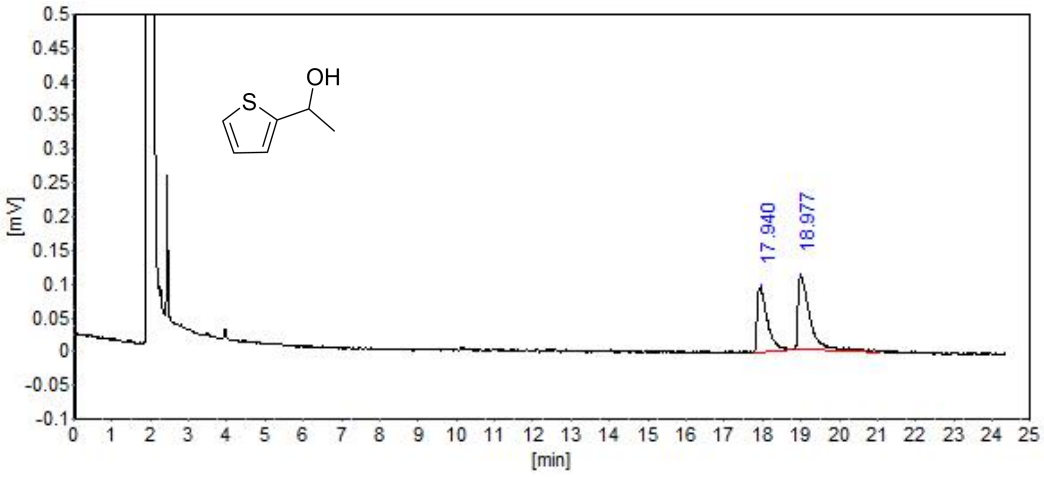


(*S*)-1-(3,5-bis(trifluoromethyl)phenyl)ethan-1-ol (P19): 98.2 % ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

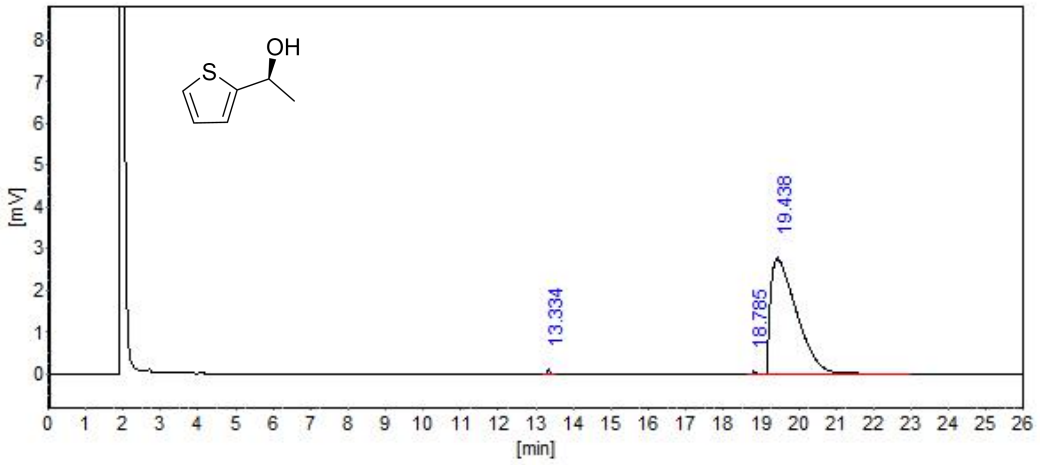


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	9.660	372647	99.072
3	11.078	3490	0.928

(±)-1-(Thiophen-2-yl)-ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

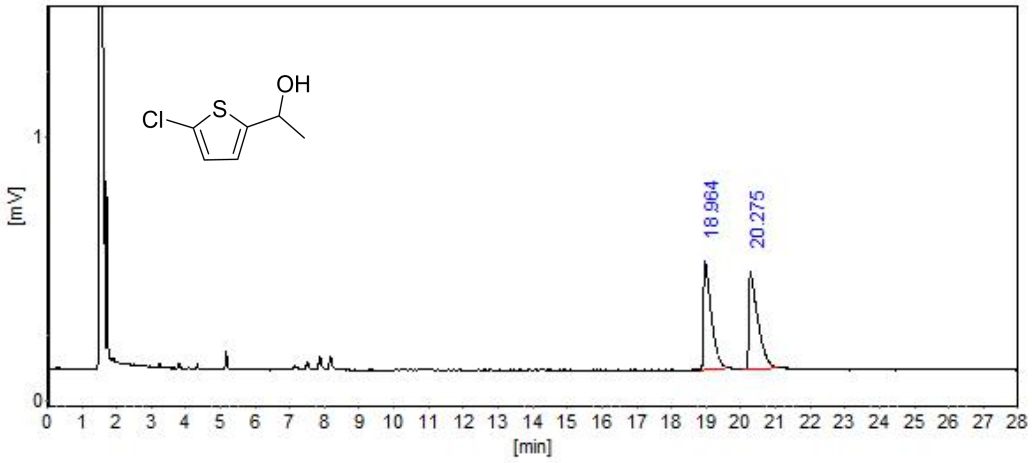


(*S*)-1-(Thiophen-2-yl)-ethan-1-ol (P20): 99.6% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

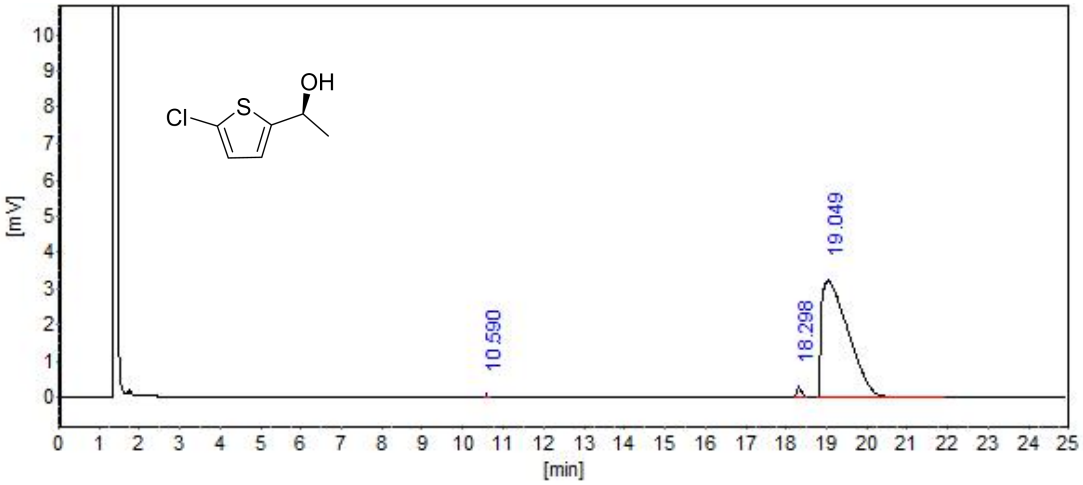


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	18.785	324	0.240
3	19.438	134112	99.760

(±)-1-(5-Chlorothiophen-2-yl)-ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25µm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.08 MPa.

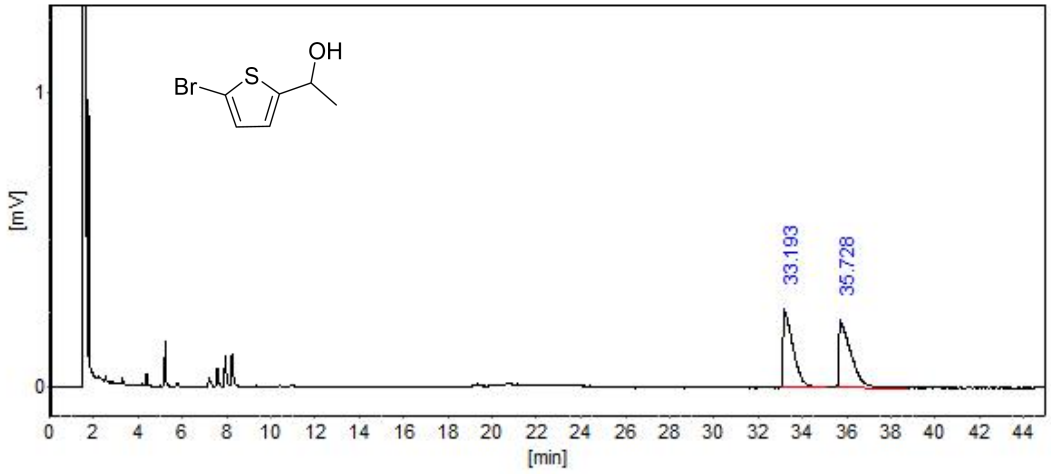


(*S*)-1-(5-Chlorothiophen-2-yl)-ethan-1-ol (P21): 97.0% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25µm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.08 MPa.

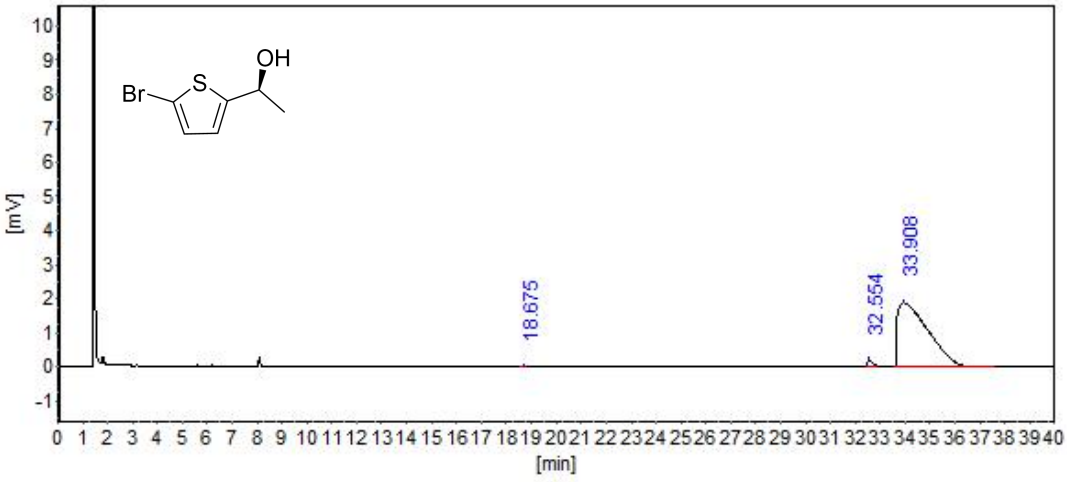


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	18.298	2213	1.471
3	19.049	148198	98.529

(±)-1-(5-Bromothiophen-2-yl)-ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.08 MPa.

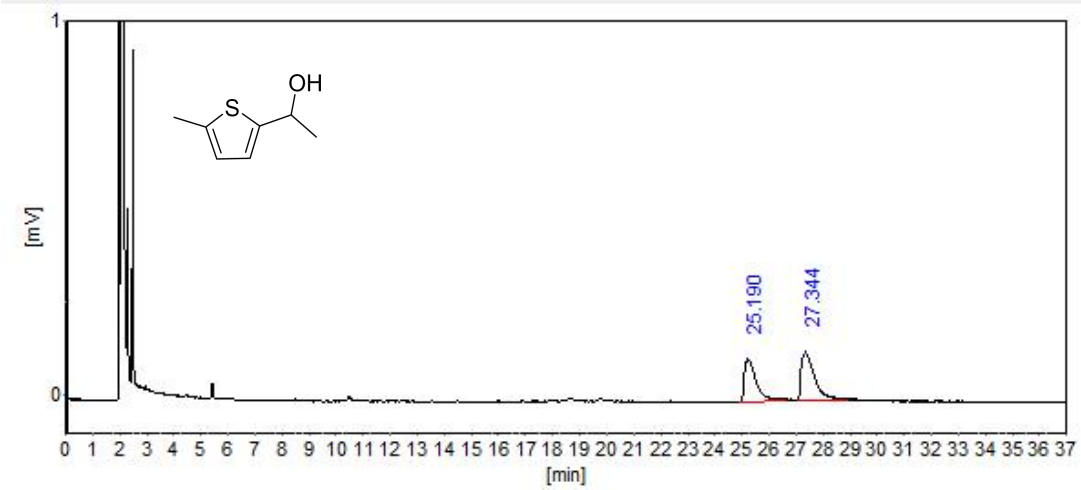


(*S*)-1-(5-Bromothiophen-2-yl)-ethan-1-ol (P22): 97.2% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.08 MPa.

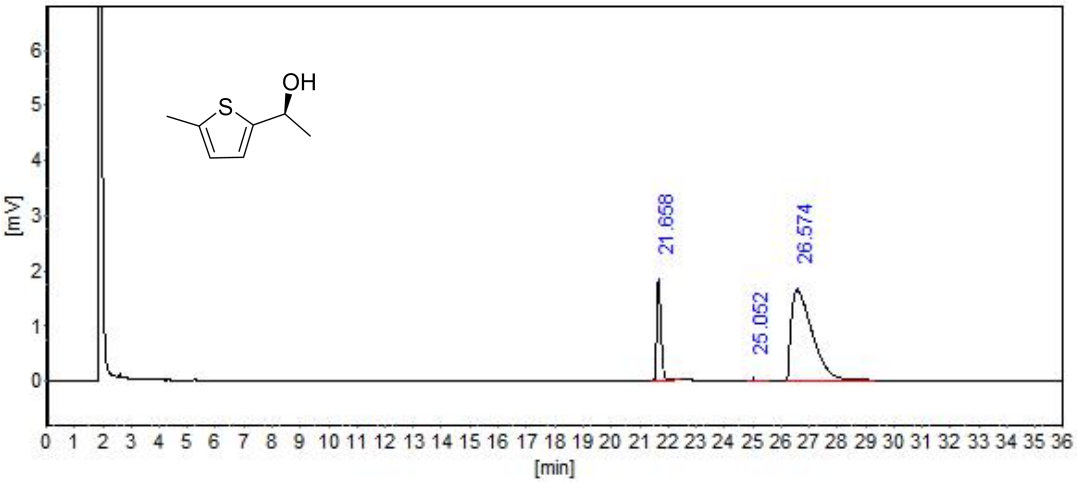


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	32.554	2313	1.385
3	33.908	160681	98.615

(±)-1-(5-Methyl-thiophen-2-yl)-ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

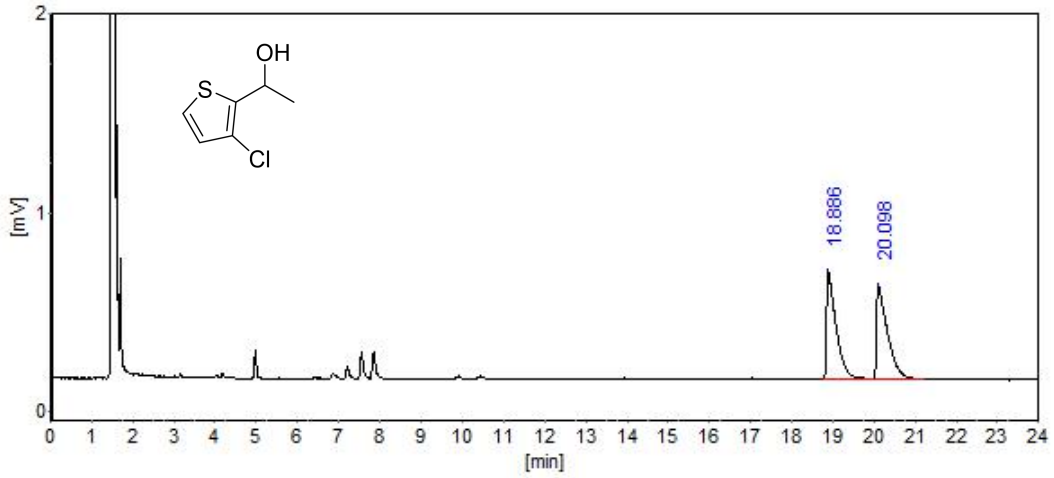


(*S*)-1-(5-Methyl-thiophen-2-yl)-ethan-1-ol (P23): 99.4% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

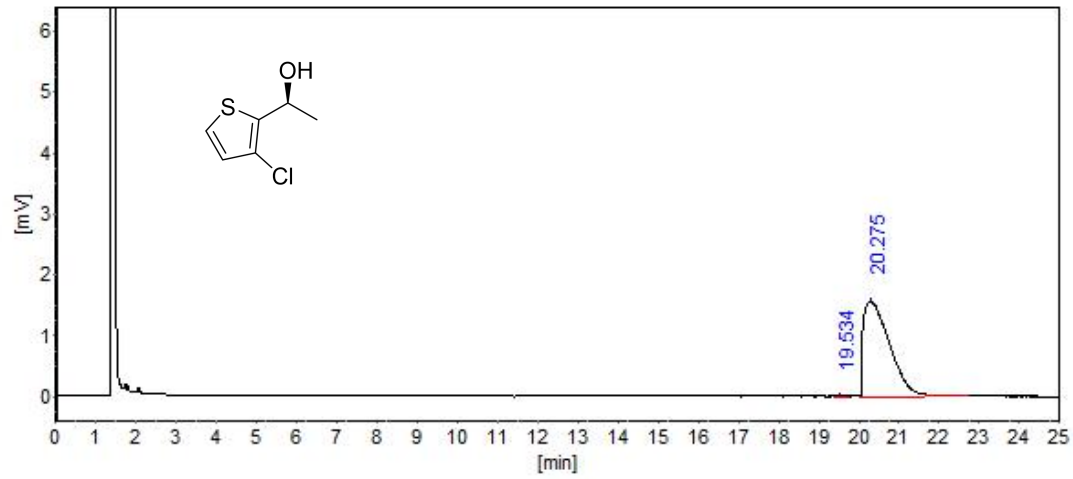


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	25.052	289	0.336
3	26.574	85575	99.664

(±)-1-(3-Chlorothiophen-2-yl)-ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25µm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.08 MPa.

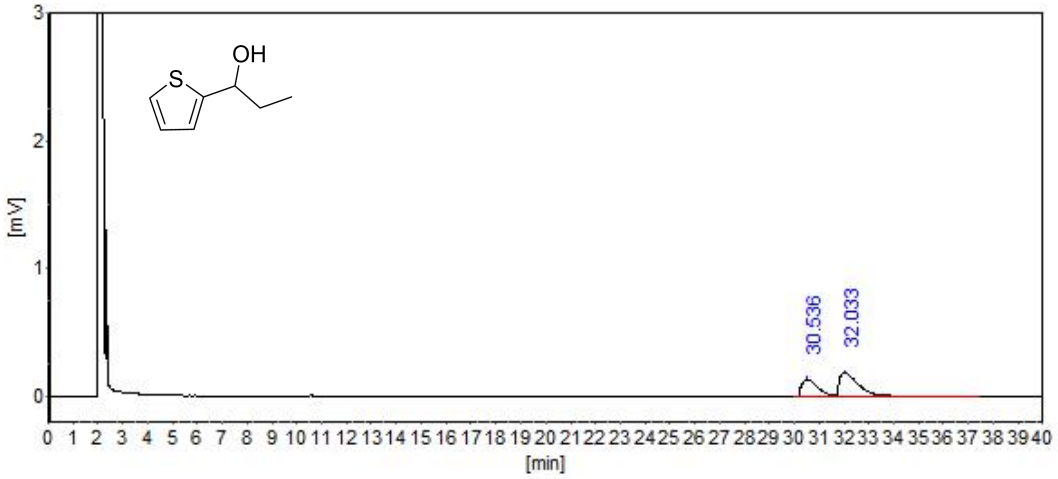


(*S*)-1-(3-Chlorothiophen-2-yl)-ethan-1-ol (P24): 99.7% ee (*S*). The enantiomeric excess were determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25µm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.08 MPa.

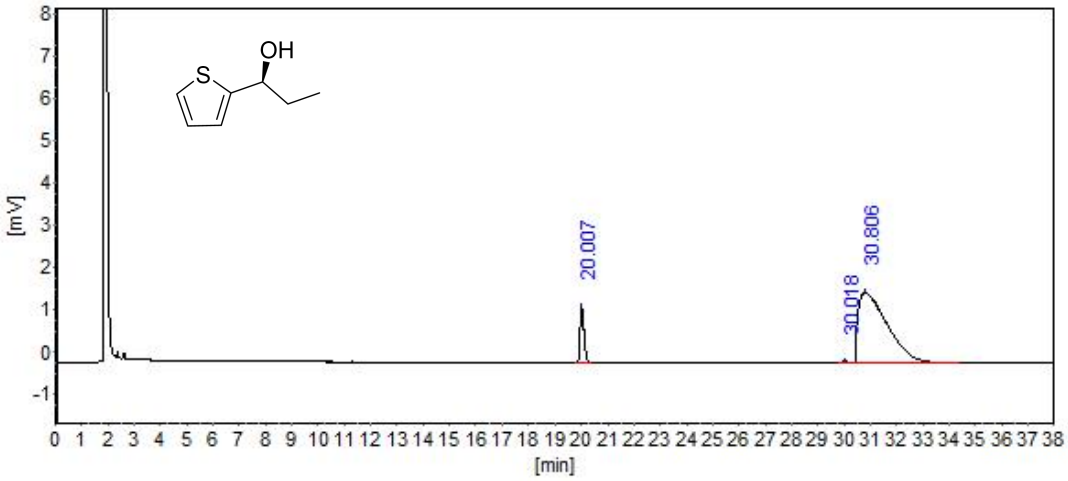


Peak	Retention time [min]	Area [uv*s]	Area [%]
1	19.534	93	0.132
2	20.275	70389	99.868

(±)-1-(Thiophen-2-yl)-propan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

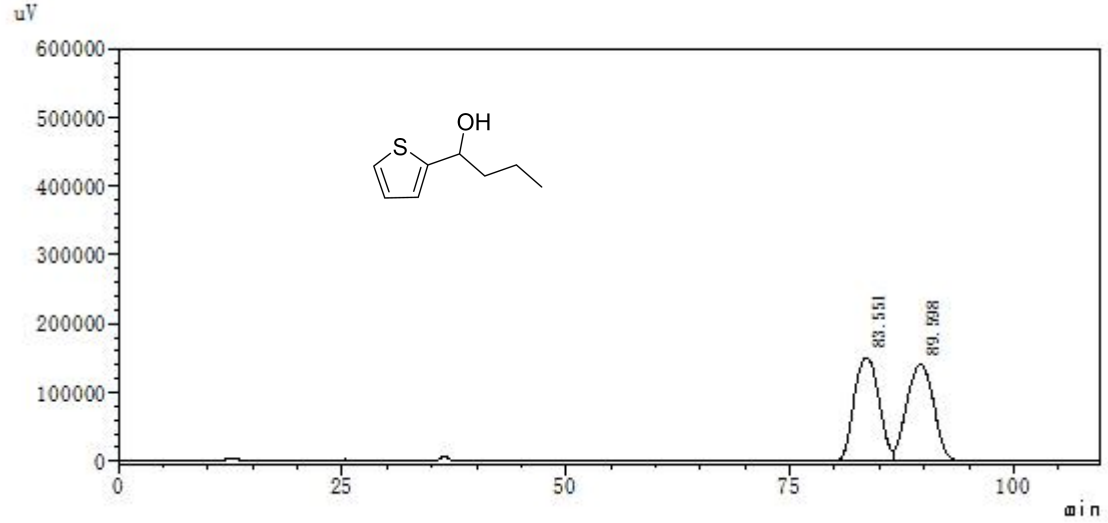


(*s*)-1-(Thiophen-2-yl)-propan-1-ol (P25): 99.0% ee (*S*). The enantiomeric excess were determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 115 ℃; inlet pressure = 0.06 MPa.

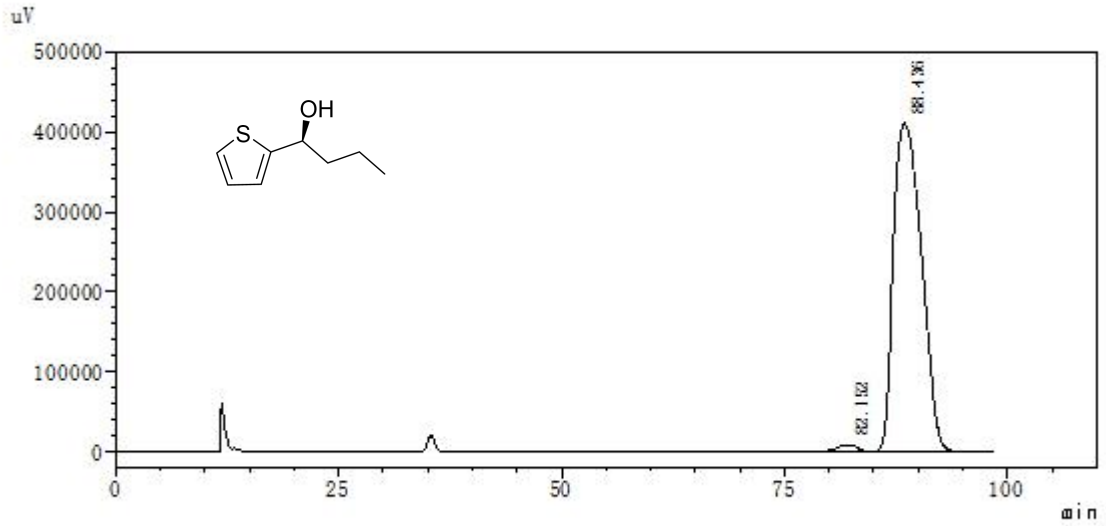


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	30.018	686	0.527
3	30.806	129506	99.473

(±)-1-(Thiophen-2-yl)-butan-1-ol: The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 99:1; flow rate = 0.3 mL/min; UV detection at 254 nm.

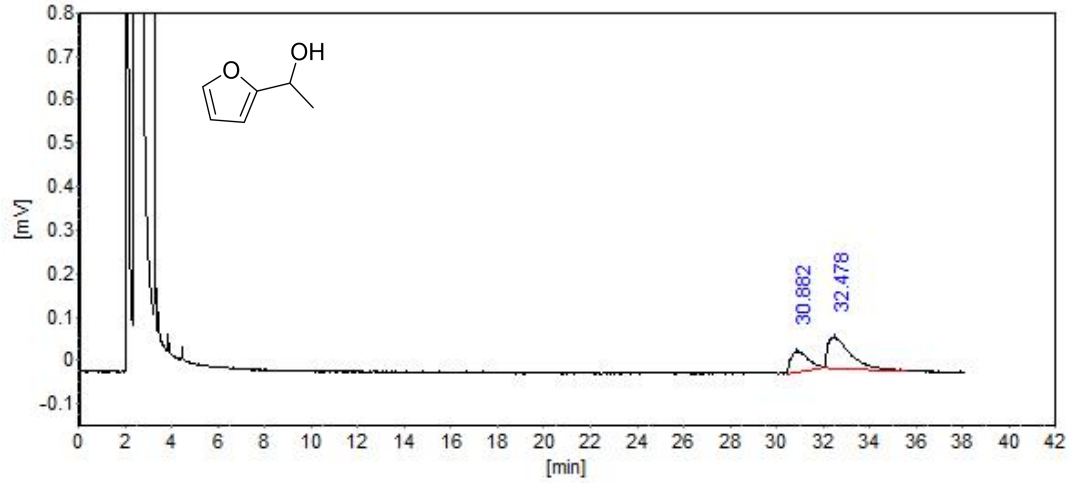


(*S*)-1-(Thiophen-2-yl)-butan-1-ol (P26): 97.5% ee (*S*). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 99:1; flow rate = 0.3 mL/min; UV detection at 254 nm.

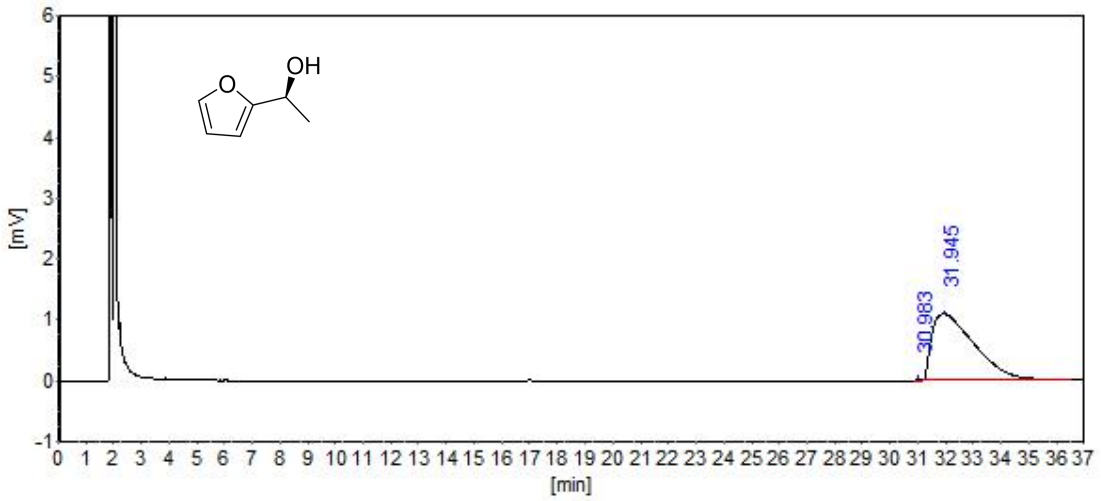


Peak	Retention time [min]	Peak Area [mAU*s]	Peak Area [%]
1	82.152	1373378	1.251
2	88.436	89894360	98.749

(±)-1-(Furan-2-yl)-ethan-1-ol： The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 75 ℃; inlet pressure = 0.06 MPa.

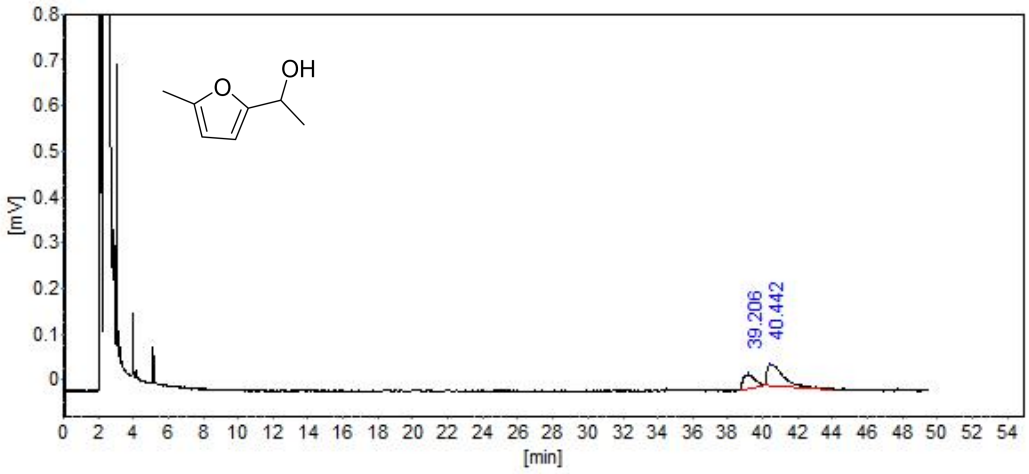


(*S*)-1-(Furan-2-yl)-ethan-1-ol (P27): 99.6% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 75 ℃; inlet pressure = 0.06 MPa.

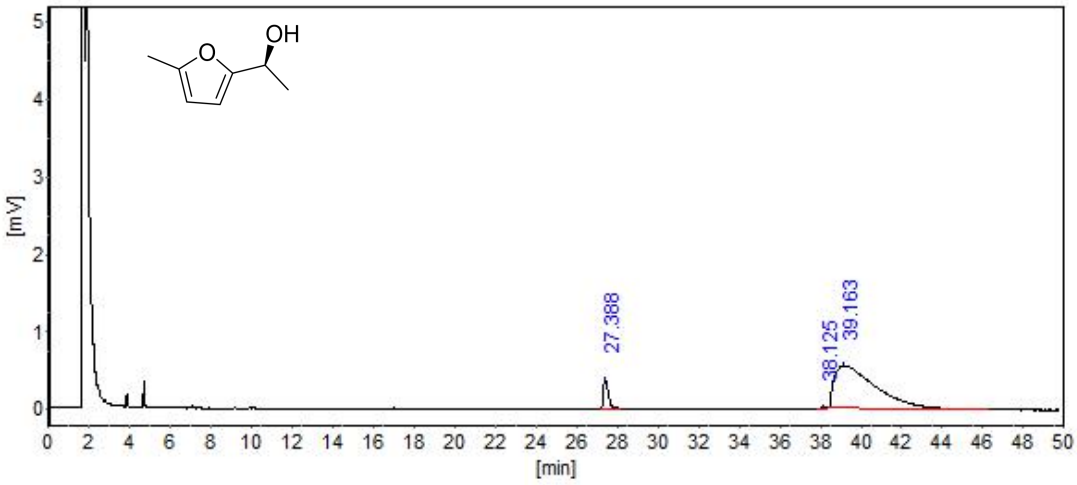


Peak	Retention time [min]	Area [uv*s]	Area [%]
1	30.983	263	0.225
2	31.945	116723	99.775

(±)-1-(5-methylfuran-2-yl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 80 ℃; inlet pressure = 0.06 MPa.

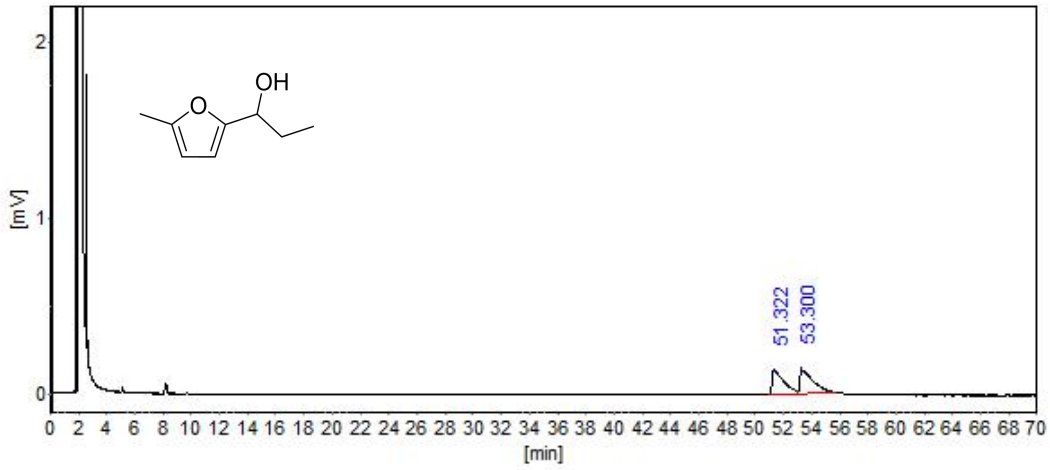


(*S*)-1-(5-methylfuran-2-yl)ethan-1-ol (P28): 98.8% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 80 ℃; inlet pressure = 0.06 MPa.

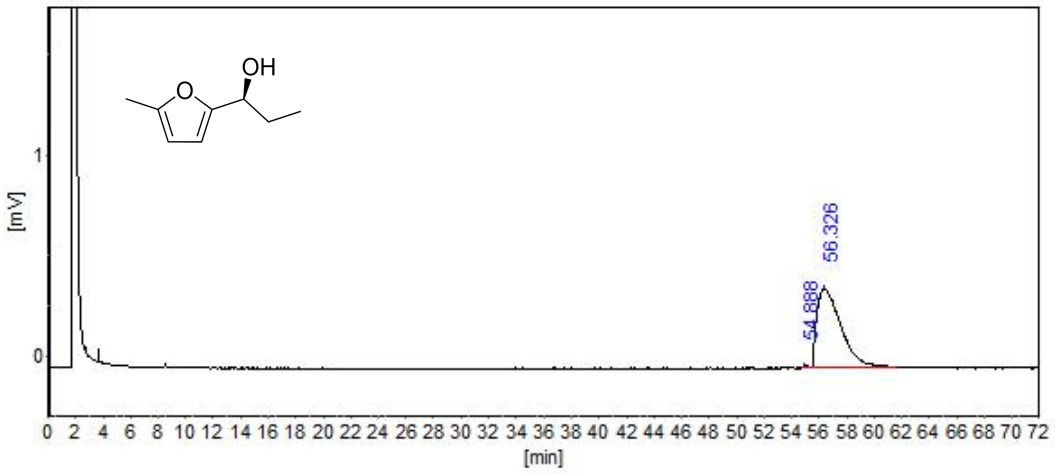


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	38.125	447	0.575
3	39.163	77330	99.425

(±)-1-(5-methylfuran-2-yl)propan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25µm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 85 ℃; inlet pressure = 0.06 MPa.

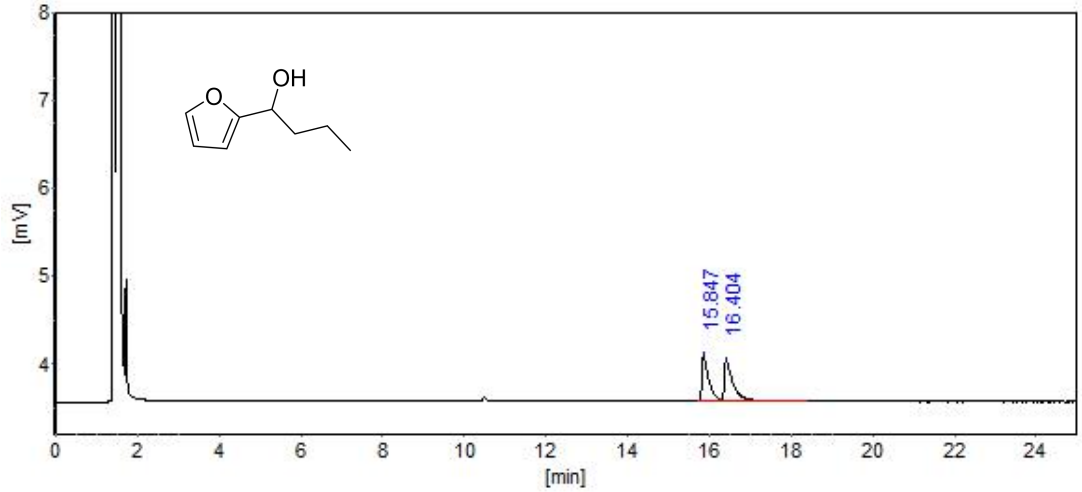


(±)-1-(5-methylfuran-2-yl)propan-1-ol (P29): 98.8 % ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25µm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 85 ℃; inlet pressure = 0.06 MPa.

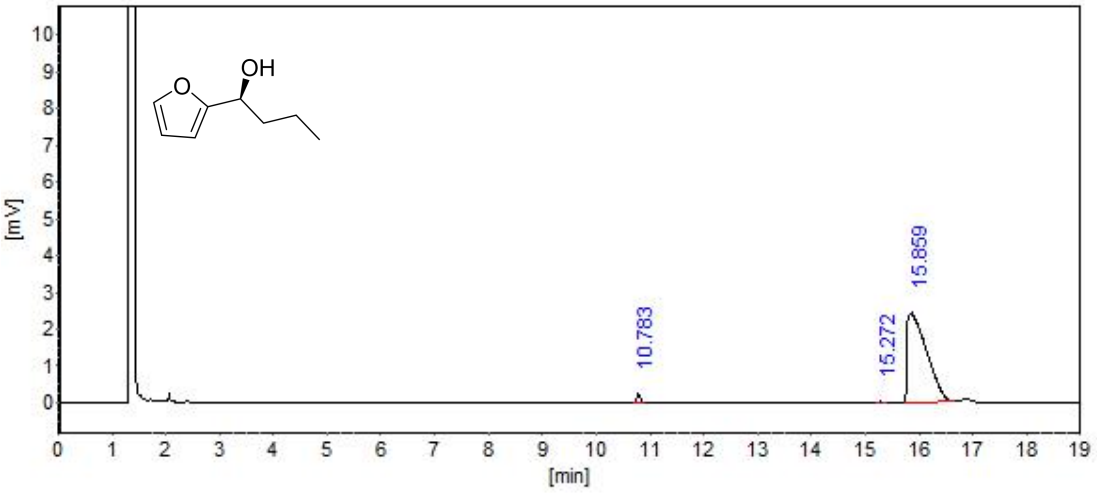


Peak	Retention time [min]	Area [uv*s]	Area [%]
1	54.888	263	0.554
2	56.326	47231	99.445

(±)-1-(furan-2-yl)butan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 105 ℃; inlet pressure = 0.08 MPa.

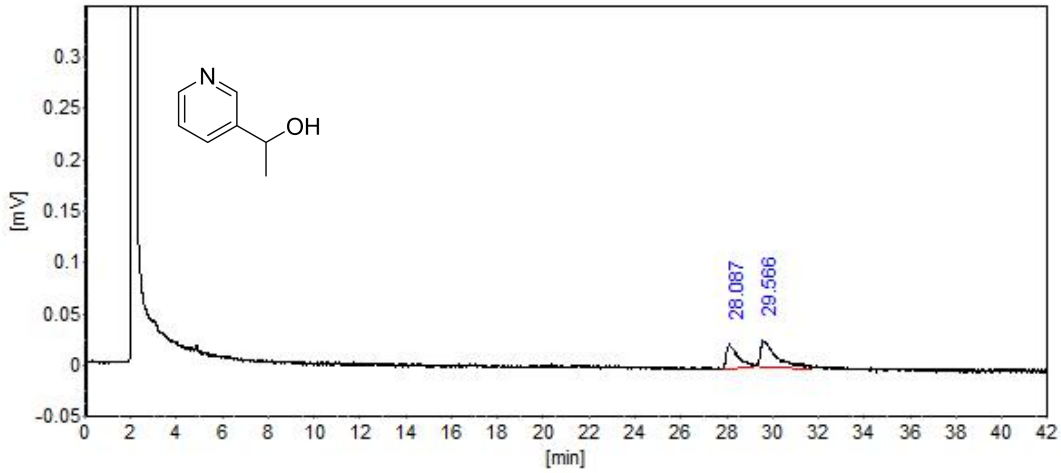


(*S*)-1-(furan-2-yl)butan-1-ol (P30): 99.9% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 105 ℃; inlet pressure = 0.08 MPa.

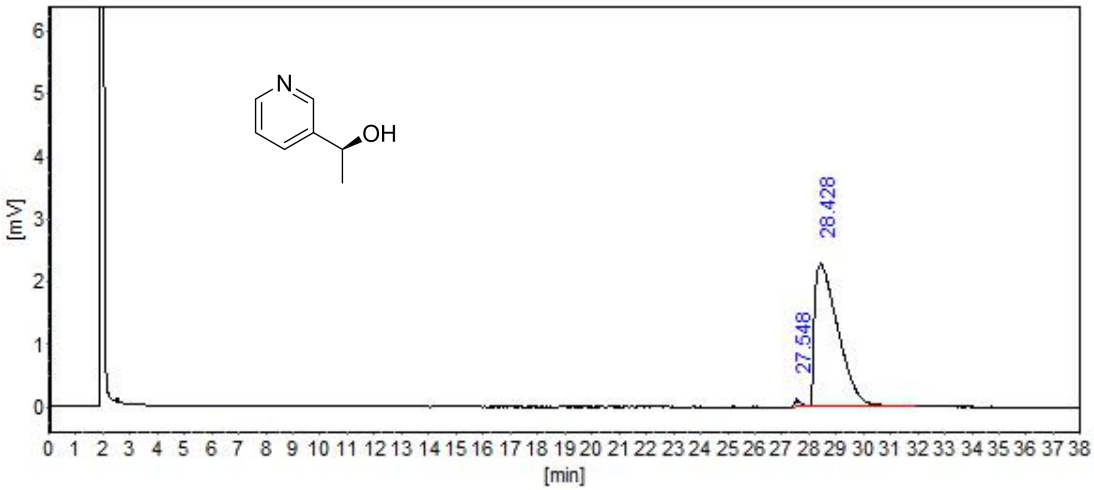


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	15.272	37	0.061
3	15.859	61254	99.939

(±)-1-(Pyridin-3-yl)-ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.



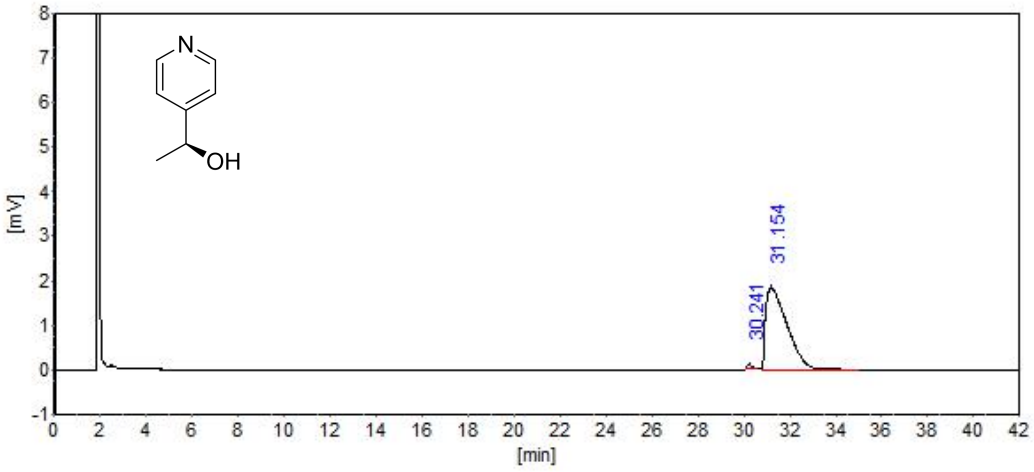
(*S*)-1-(Pyridin-3-yl)-ethan-1-ol (P31): 97.6% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.



Peak	Retention time [min]	Area [uv*s]	Area [%]
1	27.548	1662	1.206
2	28.428	136143	98.794

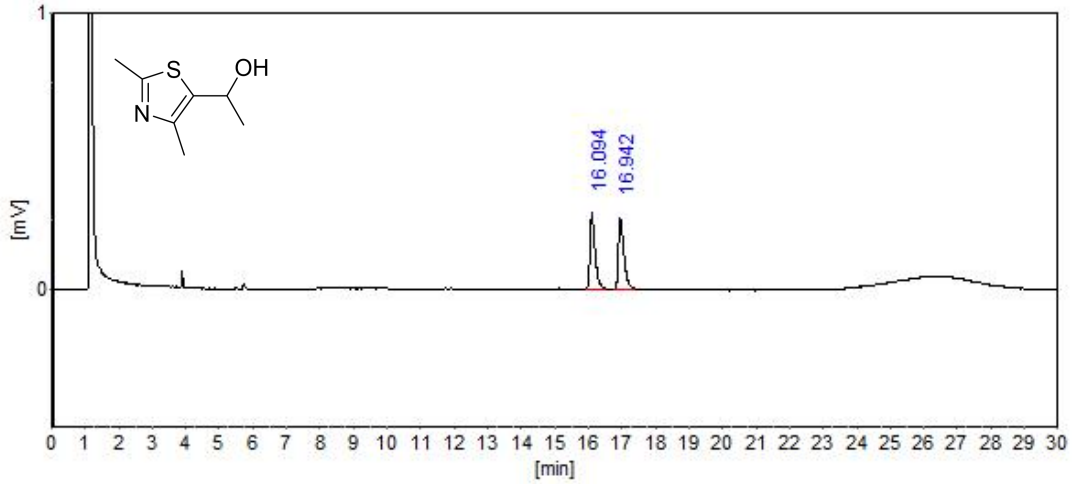
(±)-1-(Pyridin-4-yl)-ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

(*S*)-1-(Pyridin-4-yl)-ethan-1-ol (P32): 97.2% ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 125 ℃; inlet pressure = 0.06 MPa.

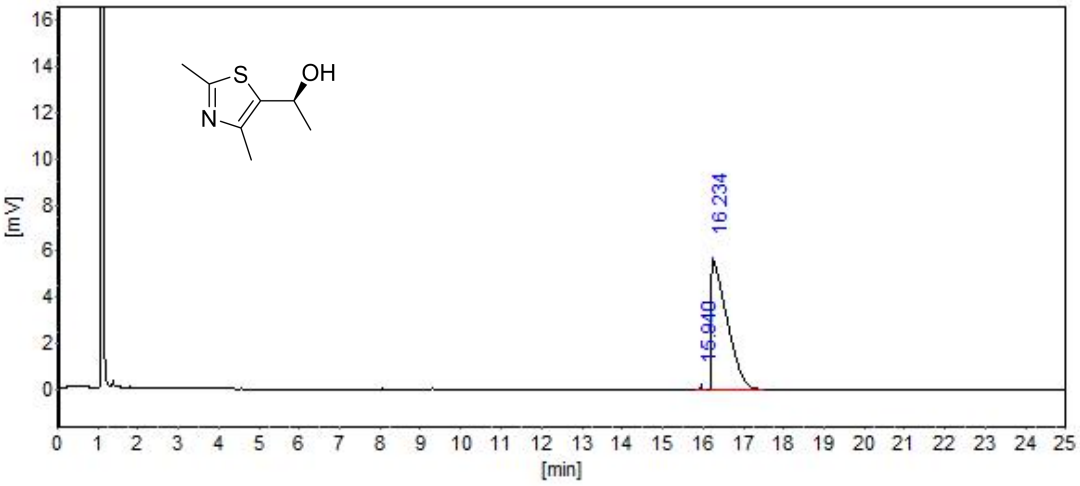


Peak	Retention time [min]	Area [uv*s]	Area [%]
1	30.241	1723	1.420
2	31.154	119636	98.580

(±)-1-(2,4-dimethylthiazol-5-yl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25µm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.1 MPa.

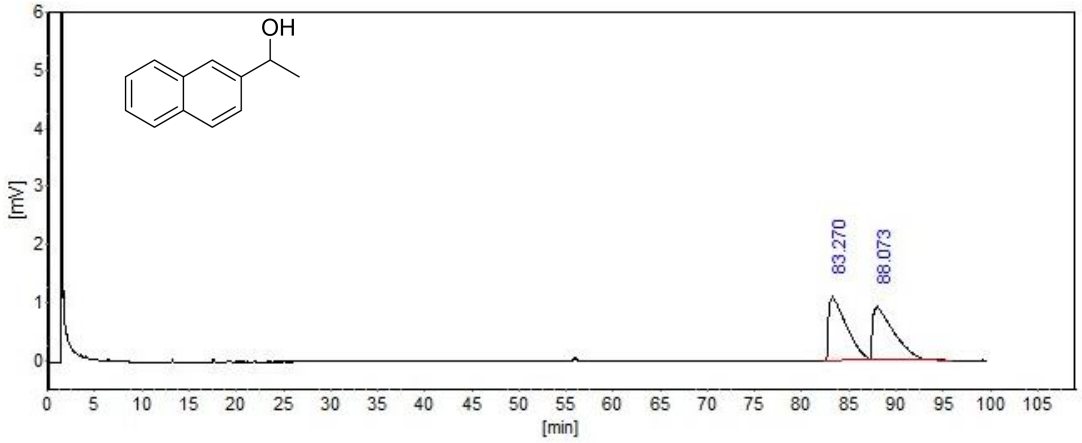


(S)-1-(2,4-dimethylthiazol-5-yl)ethan-1-ol (P33): 99.2 % ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25µm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 130 ℃; inlet pressure = 0.1 MPa.

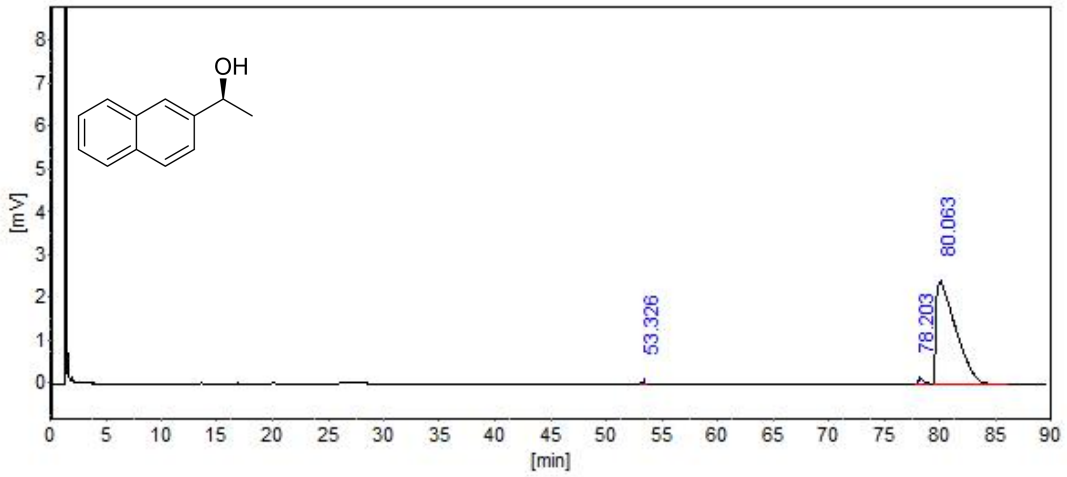


Peak	Retention time [min]	Area [uv*s]	Area [%]
1	15.940	630	0.418
2	16.234	150185	99.582

(±)-1-(naphthalen-2-yl)ethan-1-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 140 ℃; inlet pressure = 0.08 MPa.

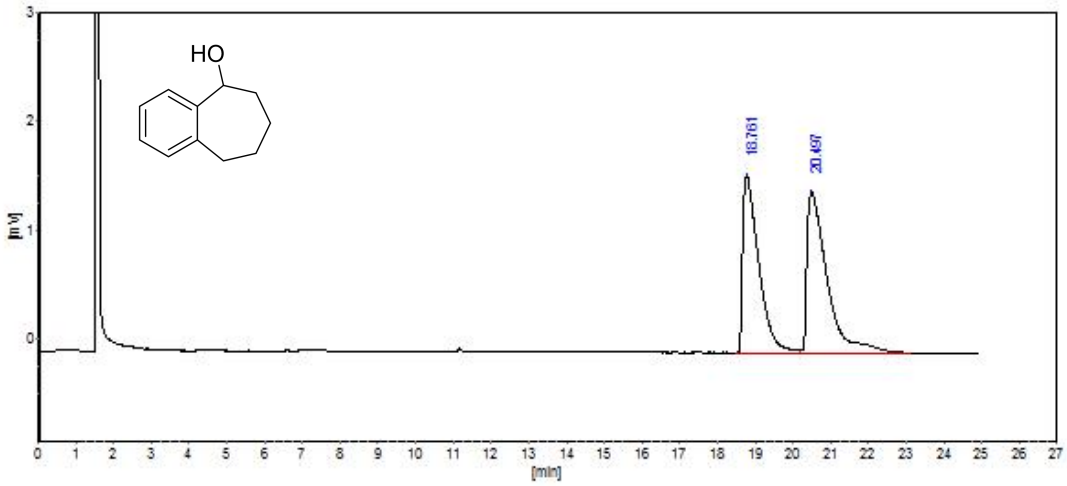


(*S*)-1-(naphthalen-2-yl)ethan-1-ol (P34): 97.4 % ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 140 ℃; inlet pressure = 0.08 MPa.

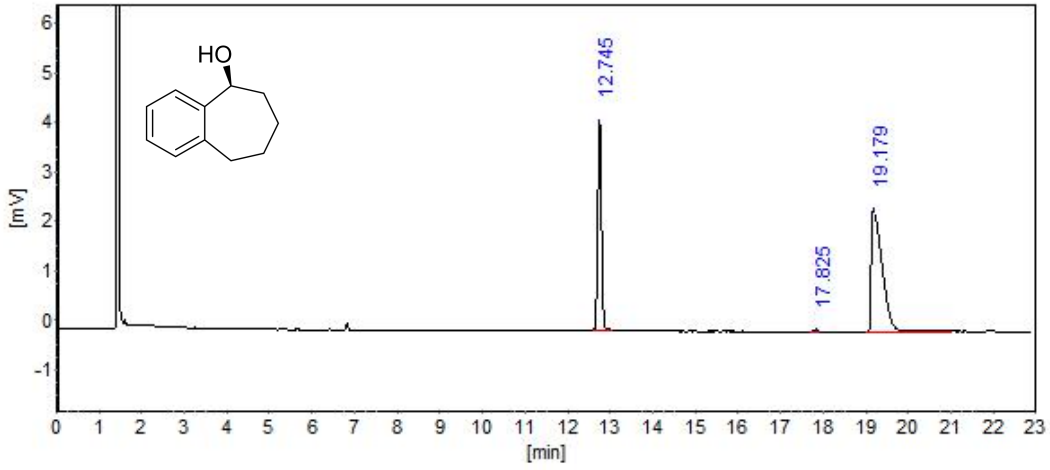


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	78.203	3899	1.318
3	80.063	291912	98.682

(±)-6,7,8,9-tetrahydro-5H-benzo[7]annulen-5-ol: The racemate was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 160 ℃; inlet pressure = 0.08 MPa.

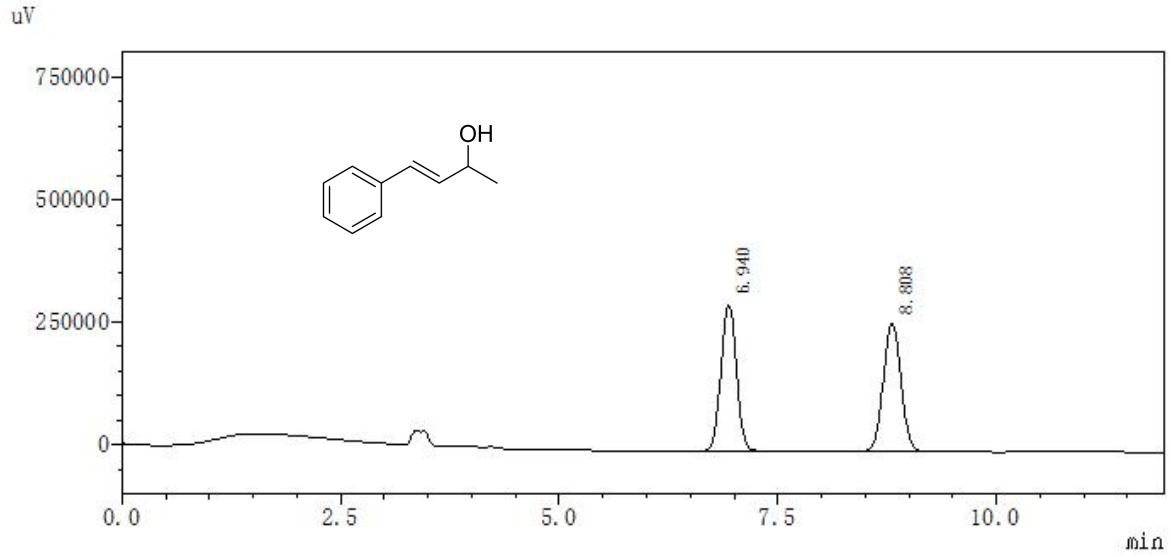


(*S*)-6,7,8,9-tetrahydro-5H-benzo[7]annulen-5-ol (P35): 99.6 % ee (*S*). The enantiomeric excess was determined by GC equipped with a chiral β-DEX^{TM}120 (df = 0.25μm, 0.25 mm i.d.×30 m, fused silica capillary column); carrier gas: H_2; detector temperature: 250 ℃; injector temperature: 250 ℃; column temperature: 160 ℃; inlet pressure = 0.08 MPa.

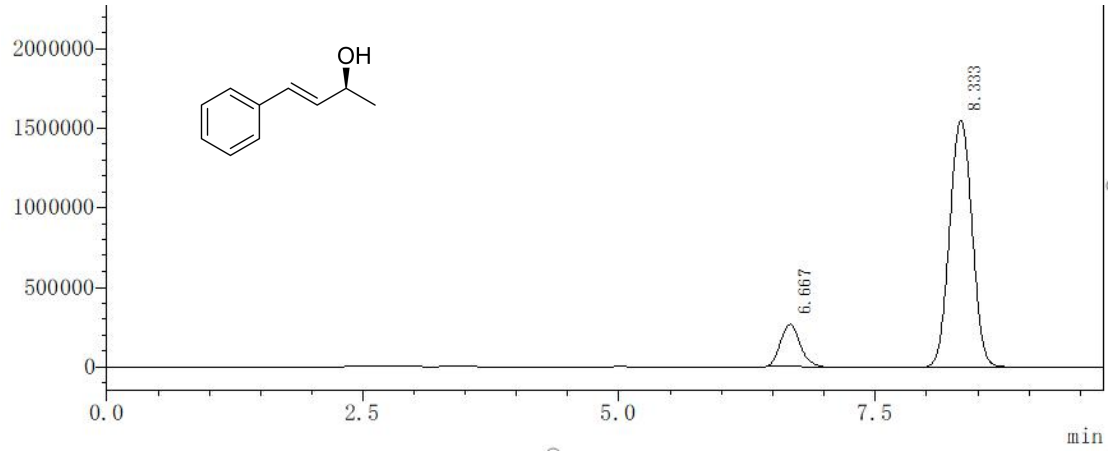


Peak	Retention time [min]	Area [uv*s]	Area [%]
2	17.825	72	0.162
3	19.179	44172	99.838

(±)-4-phenylbut-3-en-2-ol: The racemate was determined by HPLC on Chiralcel IB column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 254 nm.

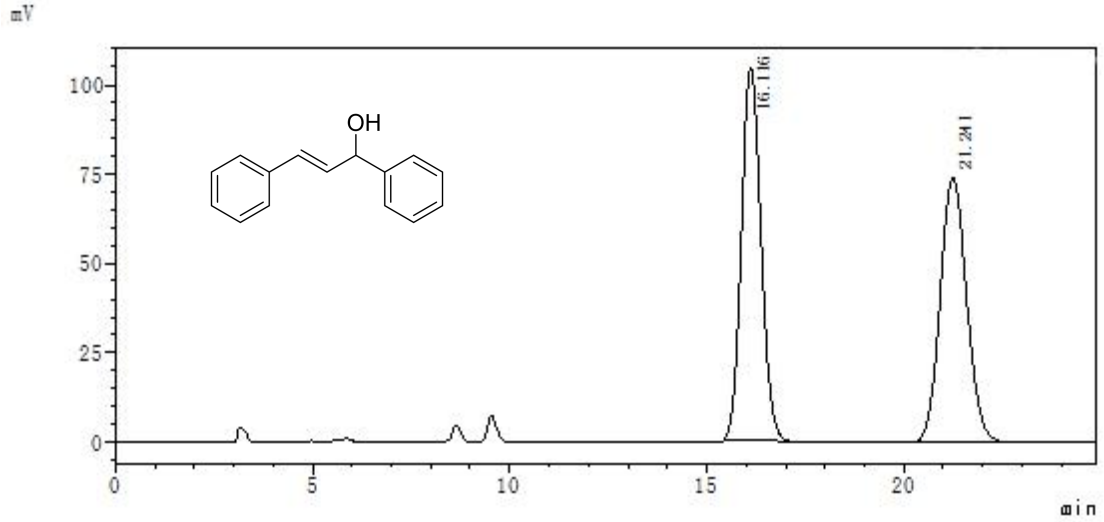


(S)-4-phenylbut-3-en-2-ol: 73.8% ee (*S*). The racemate was determined by HPLC on Chiralcel IB column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 254 nm.

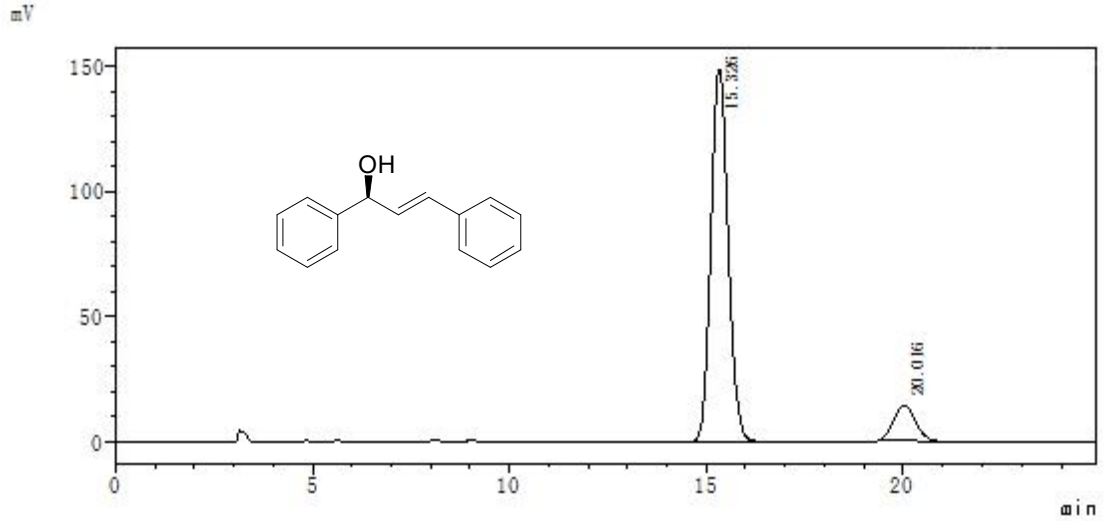


Peak	Retention time [min]	Peak Area (mAU*s)	Peak Area (%)
1	6.667	3575493	13.079
2	8.333	23762166	86.921

(±)-1,3-diphenylprop-2-en-1-ol: The racemate was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 254 nm.



(S)-1,3-diphenylprop-2-en-1-ol: 78.3% ee (*S*). The racemate was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 254 nm.



Peak	Retention Time [min]	Peak Area (mAU*s)	Peak Area (%)
1	15.326	4513582	89.165
2	20.016	548454	10.835

References

[1] Z. Liang, T. Yang, G. Gu, L. Dang, X. Zhang, Chinese Journal of Chemistry, 2018, 36, 851-856.

[2] L. Zhang, L. Zhang, Q. Chen, L. Li, J. Jiang, H. Sun, C. Zhao, Y. Yang, C. Li, Org. Lett. 2022, 24, 415-419.

[3] J. B. Xie, J. H. Xie, X. L. Liu, Q. Q. Zhang, Q. L. Zhou. Chem. Asian J. 2011, 6, 899 - 908.

[4] S. Liu, H. Liu, H. Zhou, Q. Liu, J. Lv, Org. Lett. 2018, 20, 1110-1113.

[5] K. T.sriwong, A. A. Koesoema, T. Matsuda, RSC Adv., 2020,10, 30953-30960.

[6] Y. Li, Y. Zhou, Q. Shi, K. Ding, R. Noyori, C. A. Sandoval, Advanced Synthesis and Catalysis, 2011, 353, 495 - 500.

[7] A. Kišic, M. Stephan, B. Mohar, Advanced Synthesis and Catalysis 2015, 357, 2540-2546.

[8] C. Li, X. Lu, M. Wang, L. Zhang, J. Jiang, S. Yan, Y. Yang, Y. Zhao, L. Zhang, Tetrahedron Letters 2020, 61, 152356.

[9] Z. Huang, Y. Wang, X. Leng, Z. Huang, J. Am. Chem. Soc. 2021, 143, 4824-4836.

[10] Y. Sun, C. Lu, B. Zhao, M. Xue, J. Org. Chem. 2020, 85, 10504-10513.